

Standard Operating Procedure 14

Measuring Small Tree Plot

Overview

This SOP describes the tasks required to establish, mark out and measure a Small Tree Plot.

Glossary of definitions

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.

Field Form: A data collection form for recording measurements and other information. This form may be in one of three formats: Hardcopy paper form; MS Excel form, or MS Access Database.

Point of Germination: Point at which tree seedling takes root and becomes established. For lignotubers or coppicing stumps, the point at which the stem has originated on the original stump.

Sample Point Location: Point established in the field using differential GPS, on or very close to the Sample Point.

Sample Point Location Stake: Stake on or offset from the Sample Point Location – which marks the site of the Sample Point Location.

Small tree: For measurement purposes, a tree with an actual size less than 10 cm dbh but greater than 1.3 m in height. This distinction is only for the purposes of differentiating which observers will measure a particular individual plant. It does not correspond with any Plant Growth Form (which is concerned with the potential size of a species).

Small Tree Plot (STP): 0.005 ha circular plot within which detailed small tree data and information is collected. The Centre of the STP is exactly coincident with the *Sample Point Location* and the Sample Point Location Stake *if* the Stake is NOT off-set from the Sample Point Location.

Small Tree Plot Form: Field Form used for recording STP measurement data and information.

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 14.2 for list of all tree species.

Equipment list

Tape measure or a height pole extended horizontally to 3.99 m

Tape measure (50m)

Field form

Diameter tape

Calculator

Compass (1)

Clinometer

Field First Aid Kit

Field notebook

Personal Protection Equipment (PPE)

Procedure

Mark out Small Tree Plot (STP): The Sample Point Location (which is also the Stake location if the Stake is not off-set from the Sample Point Location), marks the centre of the Small Tree Plot (STP). SOP 11: Establishing and Marking Sample Point Location, describes the procedure for establishing and marking out the Sample Point Location. Standing at the permanent stake, measure out the perimeter of the Small Tree Plot (STP) using a tape measure or a height pole extended horizontally to 3.99 m. This distance does not need to be adjusted for the slope of ground provided that the observers measure horizontally and not along the ground.

Delineate the perimeter of the STP using a suitable number of temporary markers, or by "lassoing" (with a tape measure) all the stems to be included in the count. Where few small trees are rooted within 3.99 m of the sample point location, this marking-out step may not be necessary (a simple horizontal sweep with the height pole set at 3.99 m will intercept any stems within the STP).

Checking Borderline Trees: Check trees on or close to the STP boundary ('borderline trees') by running a measuring tape at the required slope adjusted radial distance from the Sample Point Location to the tree stem Point Of Germination. A tree leaning outside of the STP border with its Point Of Germination inside the STP boundary should be considered inside the STP. Conversely, a tree leaning into the plot, but with its Point Of Germination outside of the STP border should *not* be considered inside the STP. Refer to Figure 14.1, Appendix 14.1 for examples of borderline trees.

Identify and count each tree: Identify using standard botanical features, such as buds, fruit, bark type and juvenile leaves (for eucalypts) and count each living or dead small tree of < 10 cm DBH AND ≥ 1.3 m height rooted within (or with the majority of their trunk cross-section within) the radius of the Small Tree Plot. Use a diameter tape or callipers to measure diameter at breast height (refer to Figure 14.2, Appendix 14.1 for the procedure).

Use Table 14.2 Appendix 14.2 for the definitive list of tree species. Do not include species that are not on

the tree list these are accounted for in the Vegetation Quadrat sampling (see SOP 15: Measuring Vegetation Quadrats).

If a small tree is multi-stemmed, with the separation below breast height, the individual stems should be counted. Coppice stems should be also treated as multiple stems.

Include small dead trees that are "hung up" on other trees, hence cannot fall to the ground. However, do not include fallen small trees: these will be included as medium litter in Vegetation Quadrat assessments (see SOP 15: Measuring Vegetation Quadrats).

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 such as juvenile leaves, mature leaves, bark type etc. Create a temporary descriptive and 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 Small Tree Plot Form for any tree of similar appearance.

Data and information recording

Complete the Identification section at the top of the Small 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 tree section of the Small Tree Plot Form:

Record each live species and dead species name within the STP in the <species name> field.

Unidentifiable species should be given a descriptive name and recorded in the Field Form as <Tree Species>. Check the <temporary name> box to mark this record as an unidentified species that is temporarily named. Follow the procedures outlined in SOP 20A: Plant Specimen Collection and Identification Procedures to record further information about this species on the Plant Specimen Collection Form.

Record the frequency of living and dead trees in the <living> and <dead> fields. Add the number of living and dead trees for each species and record in the <total> field.

If there are no small trees within the Small Tree Plot, write words to that effect on the form, so that an audit of the data will not confuse an absence of data for a failure to assess the parameter.

Record any comments: Record any additional information relating to the plot in the <Comments> field.

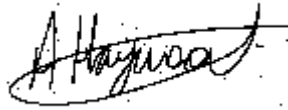
Complete the Field Form Check section at the bottom of the form: The Contractor Field Crew Leader initials the <Team Leader Initials> field, enters the date <Date checked> and writes down any comments about data verification in the <comments> field.

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 form is shown in Figure 14.3 Appendix 14.3.

Version (current)	Version (previous)	Author	Date	Summary of changes
1.0		KT22	19/05/10	
		Nb29	22/06/2010	Minor changes made to body of SOP. Form redone to reflect changes made to all forms.
		NB29	16/08/2010	Example form inserted
1.1	1.0	mw0a	04/07/2011	Amendments made post field season 1

Endorsed



Date 18/02/2011

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Division/Branch: Forests and Parks Division / Management and Operations Branch

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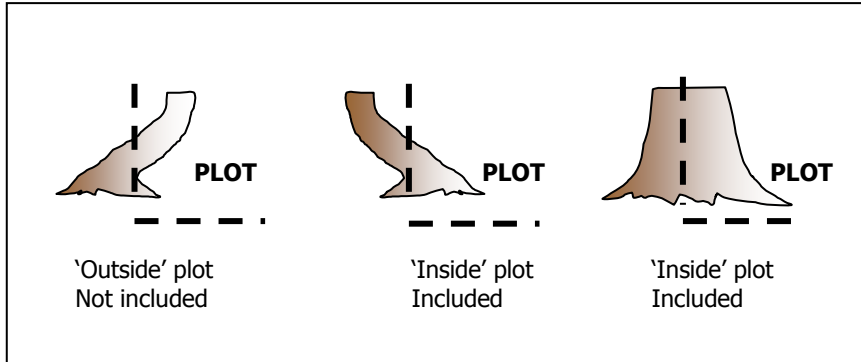


Figure 14.1: Examples of Small Tree Plot borderline trees

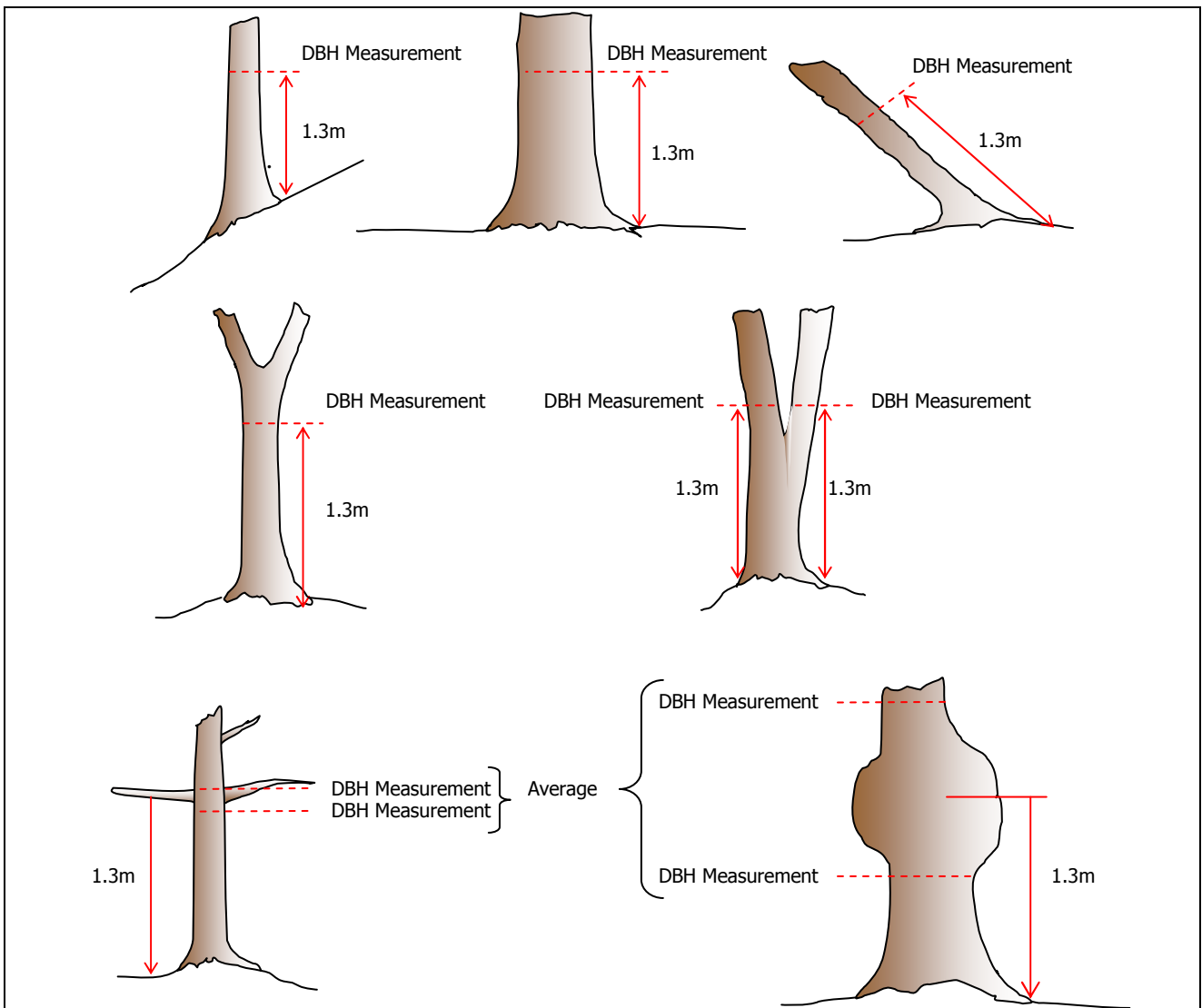


Figure 14.2: Examples of DBH measurements

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Appendix 14.2

Table 14.1: Reference table for tree species names, common names and Flora Information System number
* This list comprises all species with an FIS 'LIFELOOK' code of LT, MT or T.

SCIENTIFIC NAME	COMMON NAME	FIS No.
<i>Acacia binervia</i>	Coast Myall	3635
<i>Acacia caeruleascens</i>	Limestone Blue Wattle	3633
<i>Acacia cognata</i>	Narrow-leaf Bower-wattle	0021
<i>Acacia dallachiana</i>	Catkin Wattle	0023
<i>Acacia dealbata</i>	Silver Wattle	0025
<i>Acacia deanei</i>	Deane's Wattle	0026
<i>Acacia decurrens</i>	Early Black-wattle	0028
<i>Acacia difformis</i>	Drooping Wattle	0029
<i>Acacia dodonaeifolia</i>	Sticky Hop Wattle	4269
<i>Acacia doratoxylon</i>	Currawang	0030
<i>Acacia elata</i>	Cedar Wattle	0031
<i>Acacia falciformis</i>	Large-leaf Hickory-wattle	0033
<i>Acacia floribunda</i>	White Sallow-wattle	0036
<i>Acacia frigescens</i>	Frosted Wattle	0037
<i>Acacia howittii</i>	Sticky Wattle	0044
<i>Acacia implexa</i>	Lightwood	0045
<i>Acacia irrorata</i>	Green Wattle	3631
<i>Acacia kettlewelliae</i>	Buffalo Wattle	0046
<i>Acacia leprosa</i>	Cinnamon Wattle	0049
<i>Acacia loderi</i>	Nealie	0052
<i>Acacia longifolia</i>	Coast/Sallow Wattle	5128
<i>Acacia maidenii</i>	Maiden's Wattle	0055
<i>Acacia mearnsii</i>	Black Wattle	0056
<i>Acacia melanoxylon</i>	Blackwood	0057
<i>Acacia melvillei</i>	Myall	0058
<i>Acacia mucronata</i>	Narrow-leaf Wattle	0062
<i>Acacia nano-dealbata</i>	Dwarf Silver Wattle	0064
<i>Acacia obliquinervia</i>	Mountain Hickory Wattle	0067
<i>Acacia obtusifolia</i>	Blunt-leaf Wattle	0068
<i>Acacia omalophylla</i>	Yarran Wattle	0069
<i>Acacia oswaldii</i>	Umbrella Wattle	0070
<i>Acacia pendula</i>	Weeping Myall	0073
<i>Acacia penninervis</i>	Hickory Wattle	0074
<i>Acacia phlebophylla</i>	Buffalo Sallow-wattle	0076
<i>Acacia podalyriifolia</i>	Queensland Silver Wattle	5210
<i>Acacia pravissima</i>	Ovens Wattle	0077
<i>Acacia prominens</i>	Gosford Wattle	3649
<i>Acacia pycnantha</i>	Golden Wattle	0078
<i>Acacia retinodes</i>	Wirilda	0079
<i>Acacia salicina</i>	Willow Wattle	0083
<i>Acacia saligna</i>	Golden Wreath Wattle	0084
<i>Acacia schinoides</i>	Frosty Wattle	5133
<i>Acacia silvestris</i>	Red Wattle	0087
<i>Acacia stenophylla</i>	Eumong	0090

SCIENTIFIC NAME	COMMON NAME	FIS No.
<i>Acacia subporosa</i>	Bower Wattle	0093
<i>Acacia terminalis</i>	Sunshine Wattle	0095
<i>Acacia verniciflua</i>	Varnish Wattle	0099
<i>Acer</i> - ALL SPECIES	MAPLE	
<i>Acmena smithii</i>	Lilly Pilly	0115
<i>Acronychia oblongifolia</i>	Yellow-wood	0116
<i>Agonis</i> - ALL SPECIES	MYRTLE	
<i>Ailanthus altissima</i>	Tree Of Heaven	0163
<i>Akebia quinata</i>	Five-leaf Akebia	5799
<i>Alectryon</i> - ALL SPECIES	ALECTRYON	
<i>Allocasuarina littoralis</i>	Black Sheoak	0677
<i>Allocasuarina luehmannii</i>	Buloke	0678
<i>Allocasuarina torulosa</i>	Forest Oak	5383
<i>Allocasuarina verticillata</i>	Drooping Sheoak	0685
<i>Angophora</i> - ALL SPECIES	APPLE	
<i>Arbutus unedo</i>	Irish Strawberry Tree	0253
<i>Atherosperma moschatum</i>	Southern Sassafras	0311
<i>Banksia integrifolia</i>	Coast Banksia	0362
<i>Banksia saxicola</i>	Rock Banksia	0365
<i>Banksia serrata</i>	Saw Banksia	0366
<i>Bedfordia arborescens</i>	Blanket-leaf	0382
<i>Betula aff. pubescens</i>	Birch	5819
<i>Brachychiton populneus</i>	Kurrajong	0447
<i>Bursaria spinosa</i>	Sweet Bursaria	0515
<i>Callistachys lanceolata</i>	Greenbush	3908
<i>Callistemon pallidus</i>	Lemon Bottlebrush	0564
<i>Callistemon salignus</i>	Willow Bottlebrush	5398
<i>Callitris endlicheri</i>	Black Cypress-pine	0577
<i>Callitris glaucophylla</i>	White Cypress-pine	0576
<i>Callitris gracilis</i>	Slender Cypress-pine	0578
<i>Callitris oblonga</i>	Dwarf Cypress-pine	5365
<i>Callitris rhomboidea</i>	Oyster Bay Pine	0579
<i>Callitris spp. (naturalised)</i>	Cypress-pine	9281
<i>Casuarina</i> - ALL SPECIES	SHEOAK	
<i>Codonocarpus cotinifolius</i>	Bell-fruit Tree	0792
<i>Commersonia sp. aff. fraseri</i>	Blackfellow's Hemp	0802
<i>Coprosma repens</i>	Mirror Bush	0823
<i>Coprosma robusta</i>	Karamu	0824
<i>Cornus capitata</i>	Himalayan Strawberry-tree	4253
<i>Correa lawrenceana</i>	Mountain Correa	0831
<i>Corymbia</i> - ALL SPECIES	GUM - BLOODWOOD	
<i>Crataegus monogyna</i>	Hawthorn	0867
<i>Cupressus</i> - ALL SPECIES	CYPRESS	
<i>Daviesia laxiflora</i>	Tall Bitter-pea	4405
<i>Dodonaea viscosa 'Purpurea'</i>	Purple Hop-bush	5413
<i>Elaeocarpus holopetalus</i>	Black Oliveberry	1136
<i>Elaeocarpus reticulatus</i>	Blue Oliveberry	1137
<i>Eremophila bignoniiflora</i>	Bignonia Emu-bush	1198
<i>Eremophila longifolia</i>	Berrigan	1203
<i>Eriobotrya japonica</i>	Loquat	5295
<i>Eucalyptus</i> - ALL SPECIES	EUCALYPT	
<i>Eucryphia moorei</i>	Eastern Leatherwood	1327

SCIENTIFIC NAME	COMMON NAME	FIS No.
<i>Euonymus europaeus</i>	Common Spindle Tree	5943
<i>Eupomatia laurina</i>	Bolwarra	1344
<i>Exocarpos cupressiformis</i>	Cherry Ballart	1350
<i>Ficus</i> - ALL SPECIES	FIG	
<i>Fraxinus</i> - ALL SPECIES	ASH	
<i>Geijera parviflora</i>	Wilga	1419
<i>Geissorhiza aspera</i>	Wine Cups	5620
<i>Grevillea barklyana</i>	Gully Grevillea	1529
<i>Grevillea robusta</i>	Silky Oak	7157
<i>Hakea laurina</i>	Pincushion Hakea	5747
<i>Hakea leucoptera</i>	Silver Needlewood	1564
<i>Hedycarya angustifolia</i>	Austral Mulberry	1600
<i>Ilex aquifolium</i>	English Holly	1759
<i>Lagunaria patersonia</i>	Pyramid Tree	5751
<i>Laurus nobilis</i>	Bay Laurel	7480
<i>Leptospermum grandifolium</i>	Mountain Tea-tree	1955
<i>Leptospermum laevigatum</i>	Coast Tea-tree	1957
<i>Leptospermum lanigerum</i>	Woolly Tea-tree	1958
<i>Leptospermum trinervium</i>	Paperbark Tea-tree	1950
<i>Ligustrum lucidum</i>	Large-leaf Privet	2002
<i>Lomatia fraseri</i>	Tree Lomatia	2050
<i>Malus pumila</i>	Apple	2118
<i>Melaleuca lanceolata</i>	Moonah	2150
<i>Melaleuca linariifolia</i>	Flax-leaf Paperbark	7526
<i>Melaleuca styphelioides</i>	Prickly Paperbark	7288
<i>Melia azedarach</i>	White Cedar	5455
<i>Metrosideros excelsa</i>	New Zealand Christmas Tree	7533
<i>Monotoca glauca</i>	Currant-wood	3859
<i>Myoporum insulare</i>	Common Boobialla	2239
<i>Myoporum laetum</i>	Ngaio	5779
<i>Myoporum montanum</i>	Waterbush	2240
<i>Myoporum platycarpum</i>	Sugarwood	2242
<i>Nematolepis squamea subsp. squamea</i>	Satinwood	4814
<i>Notelaea ligustrina</i>	Privet Mock-olive	2280
<i>Notelaea venosa</i>	Large Mock-olive	2282
<i>Nothofagus cunninghamii</i>	Myrtle Beech	2283
<i>Olea</i> - ALL SPECIES	OLIVE	
<i>Olearia argophylla</i>	Musk Daisy-bush	2299
<i>Paraserianthes lophantha</i>	Cape Wattle	0169
<i>Paulownia tomentosa</i>	Paulownia	5456
<i>Persoonia arborea</i>	Tree Geebung	2459
<i>Persoonia silvatica</i>	Forest Geebung	2469
<i>Phebalium squamulosum subsp. squamulosum</i>	Forest Phebalium	4817
<i>Philotheca trachyphylla</i>	Rock Wax-flower	1227
<i>Photinia glabra</i>	Red-leaf Photinia	5862
<i>Photinia serratifolia</i>	Chinese Hawthorn	5863
<i>Picea</i> - ALL SPECIES	SPRUCE	
<i>Pinus</i> - ALL SPECIES	PINE	
<i>Pittosporum bicolor</i>	Banyalla	2540
<i>Pittosporum crassifolium</i>	Karo	3953
<i>Pittosporum tenuifolium</i>	Kohuhu	5796
<i>Pittosporum undulatum</i>	Sweet Pittosporum	2543

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

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Figure 14.3: Example Small Tree Plot Form

IDENTIFICATION			
<i>Sample Point ID</i>	PE2875N2430	SOP 14: Measuring a Small Tree Plot	
<i>Bioregion</i>	SEC	<i>SOP version</i>	1.0
<i>Date (DD/MM/YYYY)</i>	18 / 06 / 2010	<i>Contractor Company</i>	Company Name Ltd
<i>Field Crew Member #</i>	<i>Contractor Field Crew Member Surname</i>	<i>Contractor Field Crew Member First Name</i>	<i>Scribe</i>
1 (Team Leader)	Smith	Jo	<input type="checkbox"/>
2	Jones	Kim	<input checked="" type="checkbox"/>
3	Williams	Alex	<input type="checkbox"/>
4			<input type="checkbox"/>
5			<input type="checkbox"/>

SMALL TREE COUNT					
Number	Species Short Name (or specimen label name)	Temporary Name	Live Count	Dead Count	Total
1	<i>Acacia melanoxylon</i>	<input type="checkbox"/>	3	0	3
2	<i>Exocarpus cupressiformis</i>	<input type="checkbox"/>	0	2	2
3	<i>Eucalyptus globoidea</i>	<input type="checkbox"/>	2	2	4
4	<i>Eucalyptus sieberi</i>	<input type="checkbox"/>	1	4	5
5	<i>STP grey leaf Eucalyptus</i>	<input checked="" type="checkbox"/>	3	1	4
6		<input type="checkbox"/>			
7		<input type="checkbox"/>			
8		<input type="checkbox"/>			
9		<input type="checkbox"/>			
10		<input type="checkbox"/>			
11		<input type="checkbox"/>			
12		<input type="checkbox"/>			
13		<input type="checkbox"/>			
14		<input type="checkbox"/>			
15		<input type="checkbox"/>			
16		<input type="checkbox"/>			
17		<input type="checkbox"/>			
18		<input type="checkbox"/>			
19		<input type="checkbox"/>			
20		<input type="checkbox"/>			

COMMENTS

Grey leaf Eucalyptus specimen was collected for confirmation. I think it might be Eucalyptus consideniana (Yertchuk) as there are mature trees in the Large Tree plot. See Specimen Collection Sheet for description. Photo was taken too. JS

Field Form Check			
<i>Team Leader Initials</i>	JS	<i>Comments</i>	Form complete and accurate
<i>Date checked (DD/MM/YYYY)</i>	18 / 06 / 2010		
Data Entry Check			
<i>Date entered (DD/MM/YYYY)</i>	22/06/2010	<i>Contractor Surname</i>	Williams