



Well, who taught a spider? A young spider knows how to spin a web without any instructions from anybody.

Dr Dorian to Mrs Arable in *Charlotte's Web*

Produced by Sue Lewis, Education Officer, Science Communication

nature culture discover



Introduction

Web2Spider is a scientific tool kit for teachers and students to monitor spider diversity in their local environment by observing web types.

This toolkit consists of:

- three dichotomous keys
- two identification tables explaining the characteristics of 19 orb webs and 13 non-orb webs and the spiders that commonly make them
- tally sheet
- glossary

Web2Spider is suitable for students from year 3 to 10.

Aims

Web2Spider aims to:

- increase understanding of and interest in spider diversity in your surroundings.
- provide a resource to collect data and monitor spider diversity and behaviour.

Spider diversity

Invertebrates make up over 85% of animal species, and many ecologists consider invertebrate diversity to be an important indicator of ecosystem health.

Measuring spider web diversity with the BugWise Web2Spider guide

Dr Helen Smith, Australian Museum

Australia, with its unique spider fauna, offers an outstanding example of exceptionally high biodiversity. Eighty-one of the 108 currently recognised spider families live in Australia and about 3300 Australian species have been described so far. However, more than 6000 Australian species still await description.

Spiders as Bioindicators of Terrestrial Biodiversity

Dr Barbara Baehr, Queensland Museum

Acknowledgements

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W2S wishes to acknowledge Prof Barbara York Main for her web photographs (W11, W12, W19) used in the identification table.

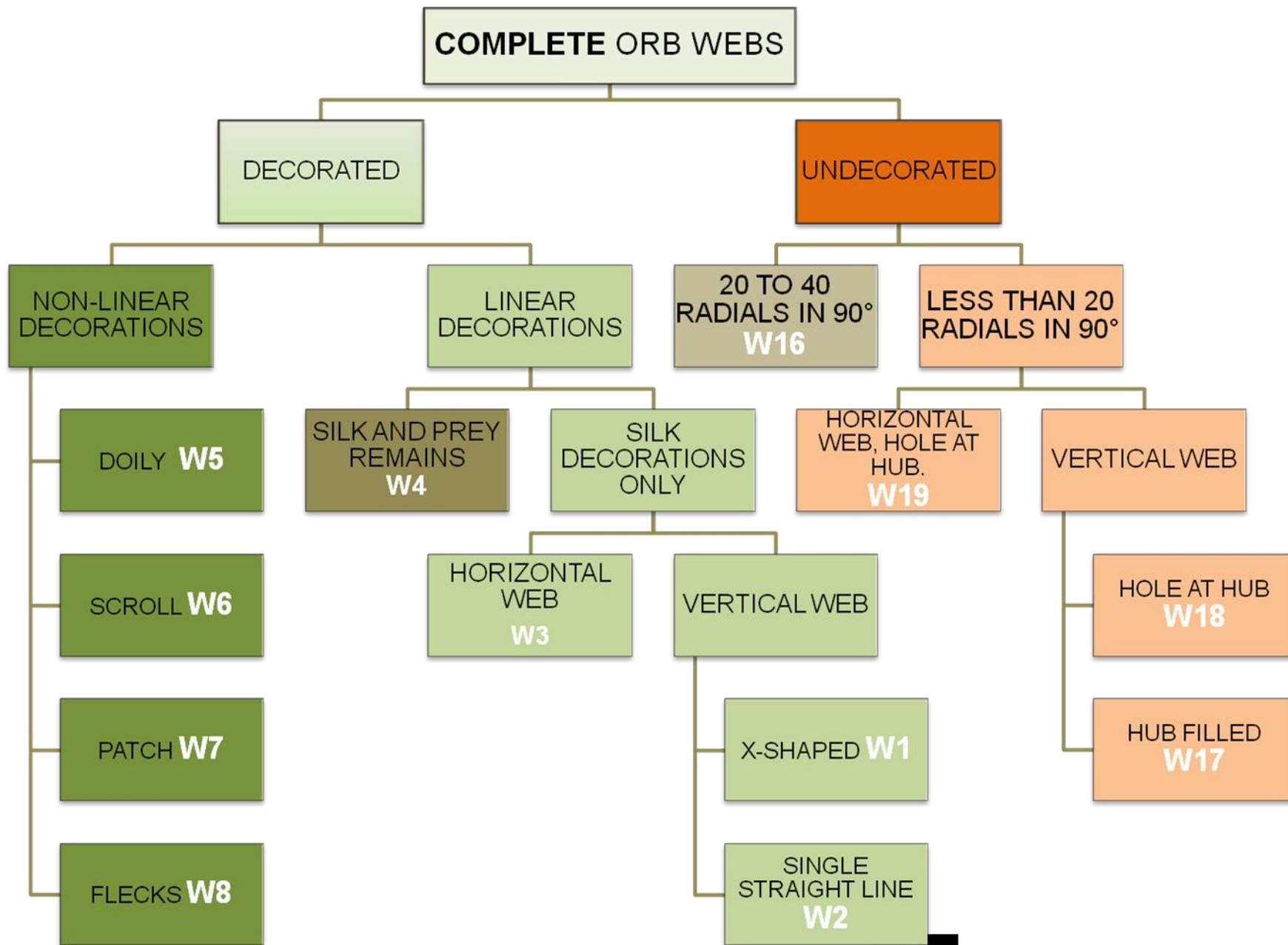
Further information can be found at www.australianmuseum.net.au/bugwise

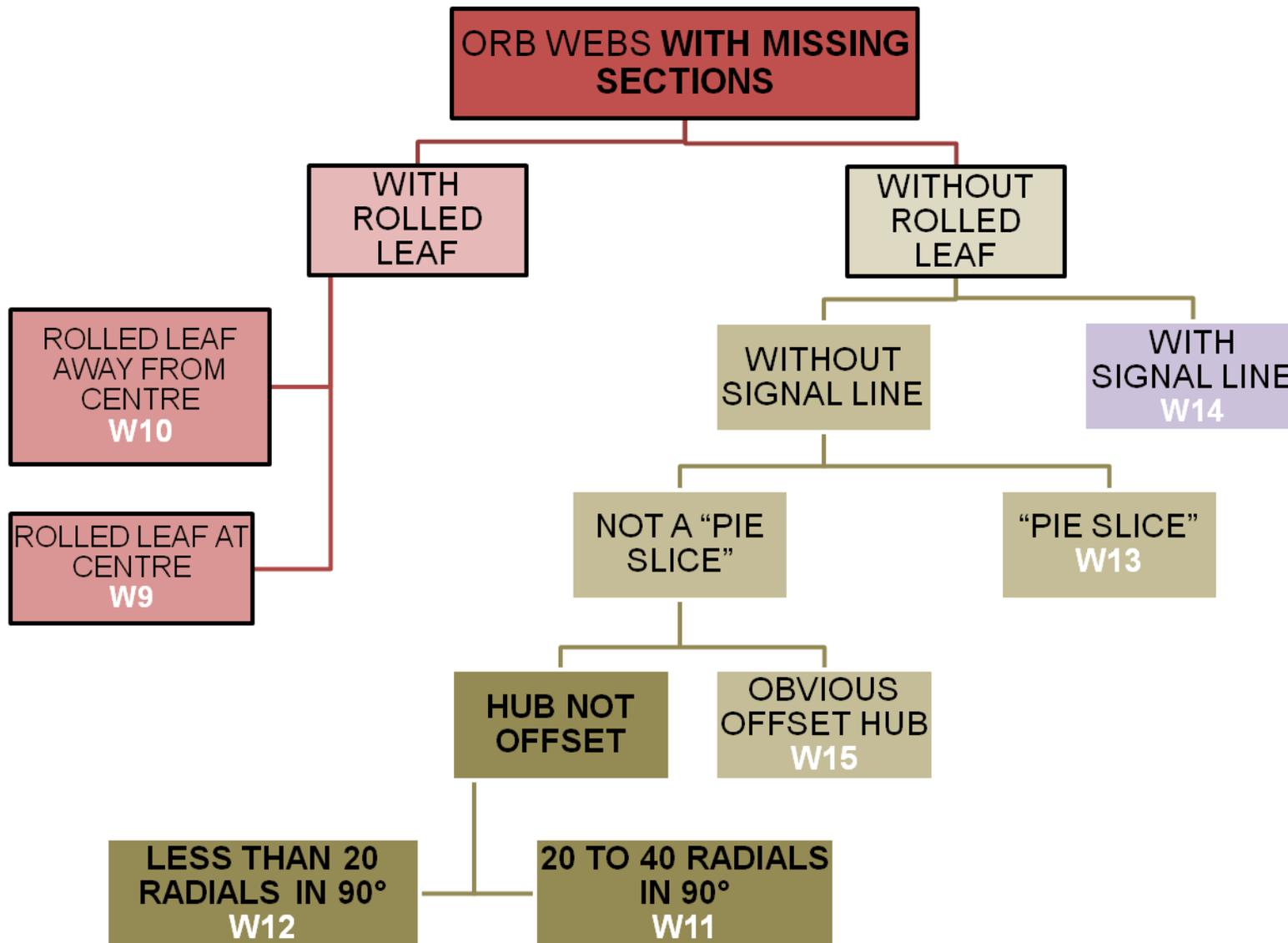


How to use the Web2Spider toolkit

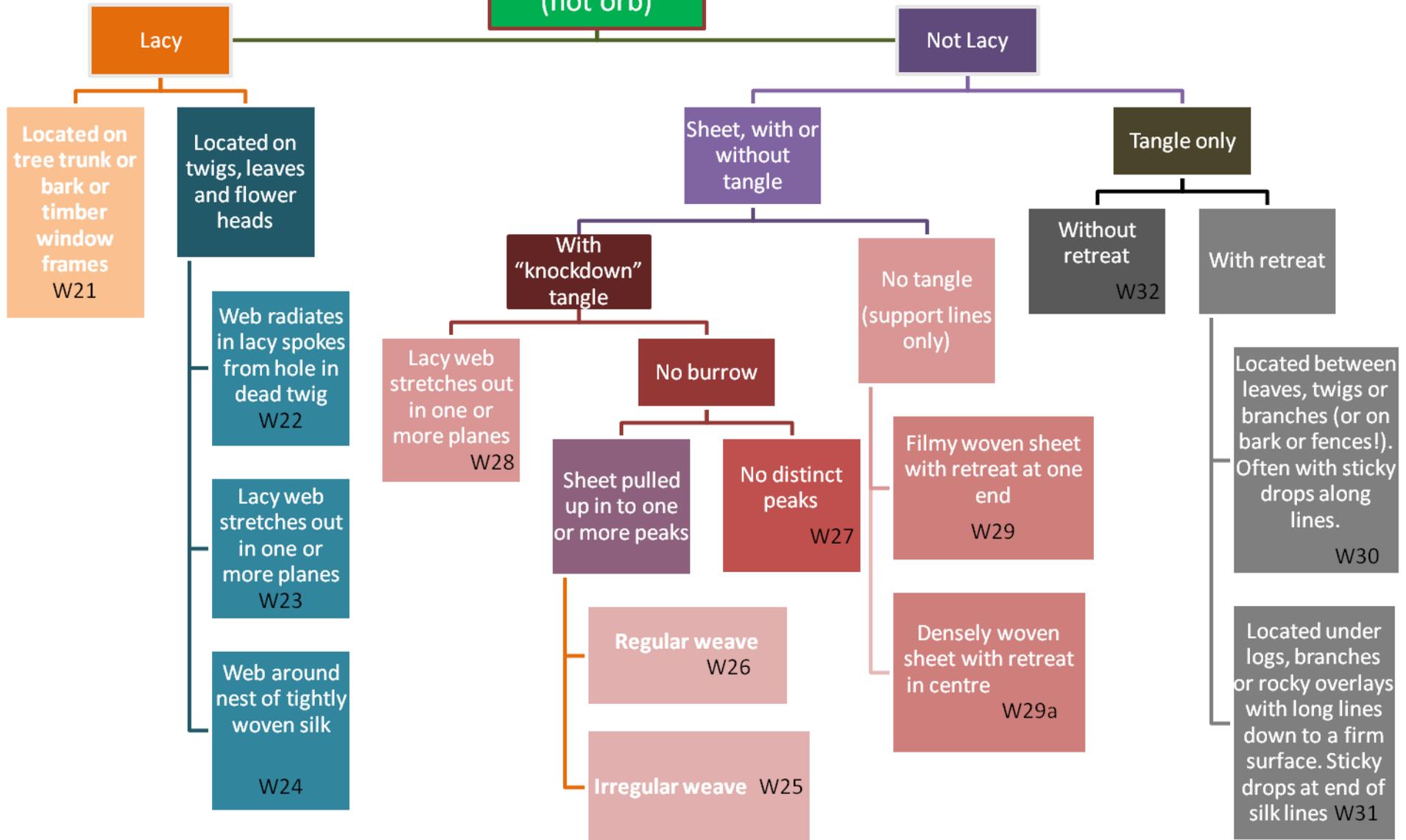
1. **Locate** web
2. **Spray** web with a fine spray from approx. 30 cm using supplied spray bottle
3. **Identify** whether the web is a
 - a. Complete orb web, or
 - b. Orb web with missing sections, or
 - c. Other web (not an orb web)
4. **Choose** the appropriate dichotomous **key** to identify web type e.g. W8
5. **Choose** appropriate identification **table** to identify spider
6. **Record** web type using the Tally Sheet







Other webs (not orb)



COMPLETE ORB WEBS

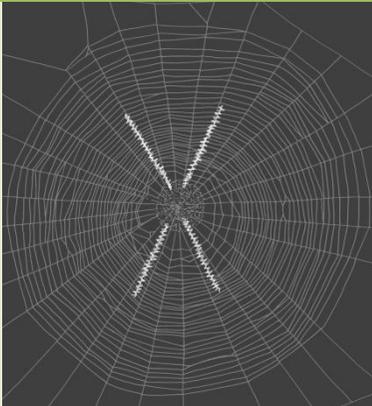
**WEB TYPE
& SIZE
(diameter)**

DESCRIPTORS

Examples of SPIDERS from SYDNEY REGION

W1

5-30cms.



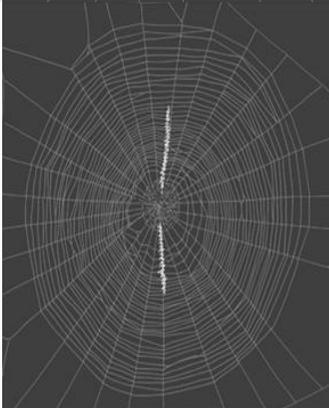
- **Vertical** web with an **X**, or **part of an X**.
- The spider is at the hub, **head down**.
- Spiders rest with **front and rear legs paired up** forming an "X".
- When web is in **shade**, the full **X** is less likely to be present.

St Andrew's Cross spider
Argiope keyserlingi



W2

5-30cms.



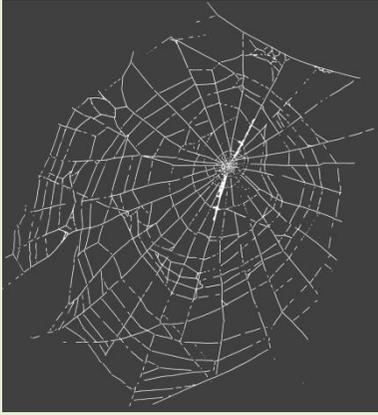
- **Vertical** web with **line up and down**.
- The spider is at the web hub by day, **head down**.
- The decoration may only be very fine.

Araneus spp.
(eburnus, bradleyi)
Argiope protensa



W3

10-30cms

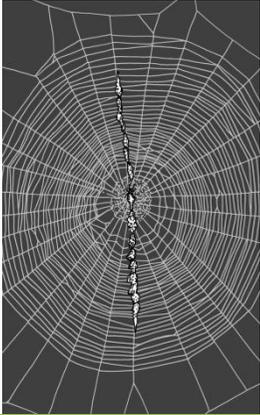


- Extra decorations such as silk spots or flecks can be found anywhere on web. *Zosis* spp.
- Silk may seem **floppy, soft** and often **messy**.
- Webs are made from combed rather than sticky silk, and sometimes have partially destroyed web still attached.
- Spiders are usually active in the web by day, **head down** at hub.
- May have an **offset hub**.
- There is a **barrier web present**.

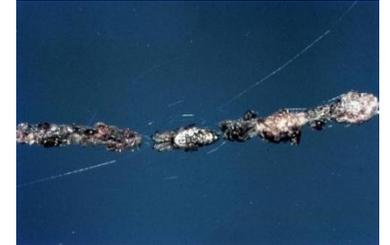


W4

15-40cms.

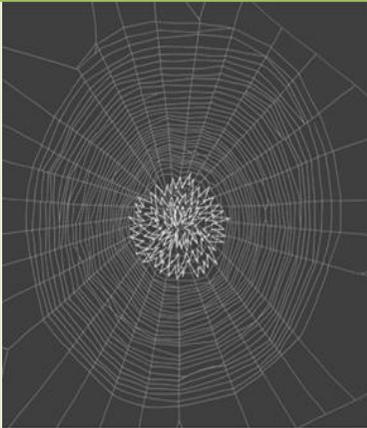


- Decoration is a line of debris and egg sacs **joined with silk**. *Cyclosa* spp.
- Decoration is woven to the web surface.
- Spider is camouflaged at web **hub**.



W5

5-30cms.



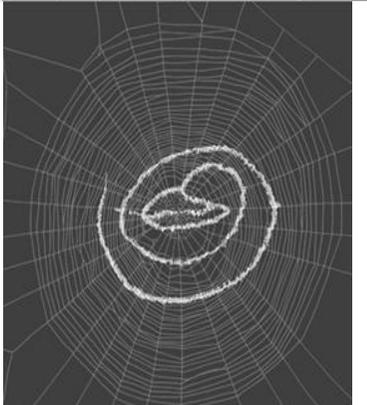
- Decoration of silk only, in compact **doily**.
- Young St Andrews Cross switch from making a doily to an X at a leg span of about 1cm.

Young St Andrews cross spider



W6

5-30cms



- Decoration of silk only, in meandering "S" or **scroll**.
- Spider is **camouflaged** at the **hub**.
- Some species attach egg sacs to twigs nearby.

Cyclosa spp



W7

15-40cms.



- **Messy** patch of **silk and debris**.
- Decorated patch maybe the start of a much larger area or line of debris.

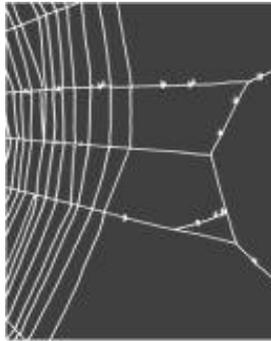
Cyclosa spp



(maybe a variant of W4 or W6; more research needed)

W8

15-40cms



- Silk **flecks**, often on support lines; may also have silk patches on web.
- **Strong webs** in open situations.
- Spider is black, white and yellow, although proportion of colours varies.
- Spiders often form colonies and occupy webs by day.

6-spined spider, spiny spider, jewel spider, Christmas spider.
Austracantha minax



MISSING SECTOR & OFFSET ORB WEBS

WEB TYPE
& SIZE
(diameter)

W9

15-30cms.



DESCRIPTORS

- Leaf opens at web **centre**.
- Leaf suspended in a tangle of lines - **barrier web**.
- Web **hub** emerges from open end of leaf.
- Spider hides in leaf during day, often **head down** with legs protruding from entrance of **retreat** (leaf).

Leaf-curling spider
Phonognatha graeffei

Examples of SPIDERS from
SYDNEY REGION



W10

15-30cms.

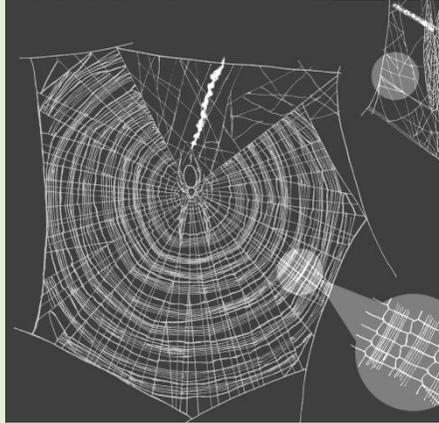


- Leaf **away** from centre and attached to web's top support line
- Web **hub** is quite separate from leaf.
- **No tangle above web.**
- Spider hides in leaf (**retreat**) during day, **head upwards** and darkly-pigmented posterior of **abdomen used as plug.**

Leaf-curling spider
Araneus dimidiatus

W11

15-50cms.



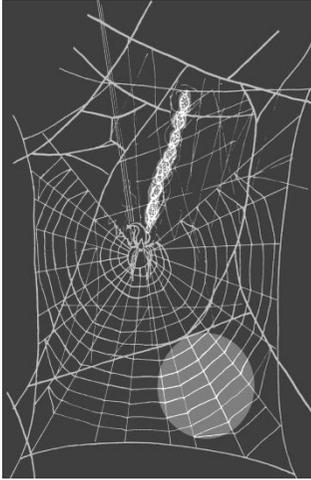
- Many radial lines, **20 to 40** in 90°.
- Debris may be present on separate line.
- Web silk **often golden yellow.**
- Spider is at hub by day, **head down.**
- Small males may be present in the same web.
- Tangle of lines create **a barrier web.**
- Tiny kleptoparasites may also be present.

Golden orb spider
Nephila spp.



W12

20-40cms.



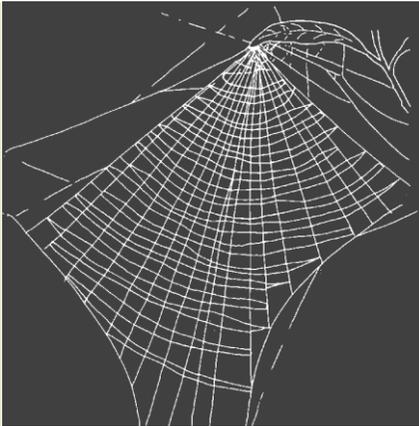
- Web is **sloping**.
- Radial lines **less numerous**, less than **20-40** in a 90° section.
- Fluffy egg sacs may be present in a line through missing sector into web centre.
- Large young females are sometimes brightly coloured with yellow and red, but at maturity, become fawn coloured which matches the debris and egg sacs which they later add to the web.
- By day, spider **camouflaged** in centre, **head down slope**.
- **Barrier web** often present.

Scorpion-tailed spider
Arachnura higginsi



W13

5-30cms.



- Web may be a "pie slice" and **vertical**.
- **Retreat** is a living leaf, a small curled leaf, other debris or just a cone of silk.
- The web is slowly changed into the adult shape.(W9)

Young leaf-curling spider
Phonognatha graeffei



W14

5-30cms.



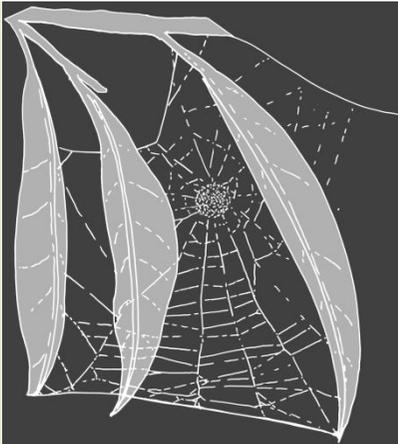
- A fine **signal line** to tangled retreat in plant.
- Signal line is often hard to spot – this kind of web is often given away by the tangle around the retreat.
- Sometimes catching spirals pass through the “missing sector” close to the edge of the web.
- Spider is alerted to prey by **vibrations** along the signal line which leads to the retreat.

Signal-line spider



W15

5-10cms.



- **Offset orb**, web more or less **horizontal**.
- **Hub obviously** offset, often hidden under a leaf or attached to a twig.
- A **tangle of lines** is often present near the hub.
- Webs are made from **combed silk** rather than sticky silk.
- Spiders are usually near the web **hub by day**, but may look like a piece of debris.
- Resting pose is characteristic with **front legs folded under**.

Philoponella spp.



W16

5-15cms.



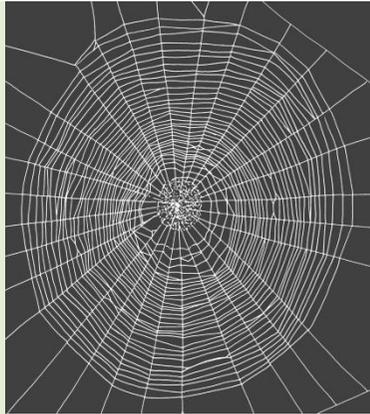
- **Many radial lines**, 20-40 in a 90° section.
- Web may be distinctly oval.
- The catching surface of the orb can be difficult to find in a tangle of **barrier** lines.
- The web form is slowly changed to the adult shape. (W11)
- Spiders may be very common in spring and summer.

Young (juvenile) golden orb spider
Nephila spp.



W17

5-30cms.



- Web **hub filled in**; radial lines **less than 20** in 90° section.
- Web **slightly sloping** or **vertical**.
- **Juveniles** of many orb weavers make this web.
- Signal-line weavers occasionally make an **entire web** when the retreat is away from the surface of the web, so that the signal line does not interfere with the catching spirals.
- Many decorated orb weaving spiders make a plain orb, especially in **shady** locations.

Araneus spp; (see W10, W2.) *Argiope* spp; (see W1, W5)
Cyclosa spp; (see W4, W6, W7); signal-line spider (see W14);
Eriophora spp (see W18)



W18

20-90cms.



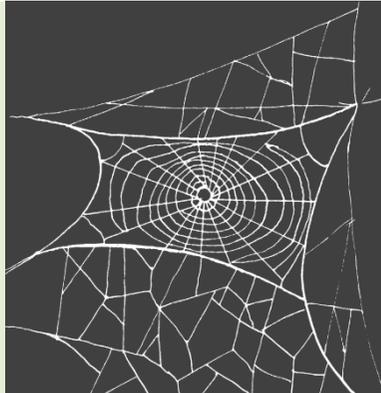
- **Vertical or slightly sloping** web, usually less than 30°. Less than 20 radials in 90°.
- **Hole at hub.** Adult *Eriophora* (garden orb spiders) make **huge wheel-like webs**.
- Spiders usually hide away from web by day and remake the web in the evening.
- *Eriophora heroine* make smaller webs lower down in understorey or shrubby vegetation.

Garden orb spiders
Eriophora spp.



W19

5-30cms.

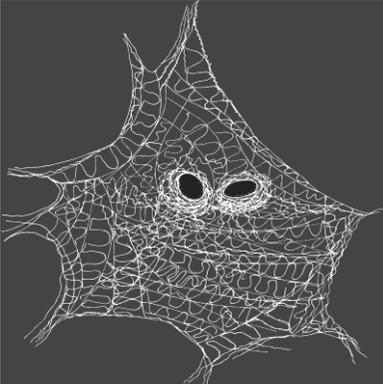
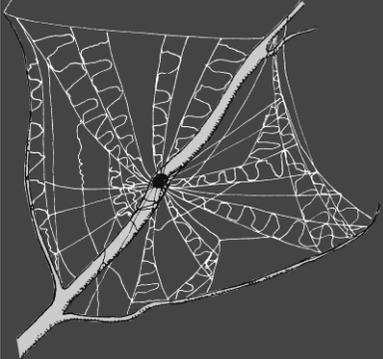


- **Horizontal or strongly sloping** web, slope usually more than 30°.
- *Tetragnatha* have elongated jaws, body and legs. If they are in the web by day they have **head up slope**, otherwise they often hide with their **legs extended along a twig**.
- The abdomen of *Leucauge* is silver, with black and yellow; these spiders are always in their web during the day, **head down slope**.
- **Barrier web** may be present.

Tetragnatha spp;
(long-jawed spiders)
Leucauge sp

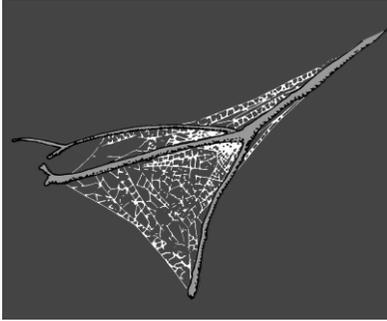


OTHER WEBS: LACE, SHEET & TANGLE

| WEB TYPE & SIZE | | DESCRIPTORS | Examples of SPIDERS from SYDNEY REGION |
|-----------------------------|--|---|---|
| W21 10-30cms. |  | <ul style="list-style-type: none"> • Lacy web found on tree trunks or bark. • "Funnel-like" entrance leads to a retreat. • Old silk is matted and coarse, and lace degenerates in to an irregular pattern. | Black house or Window spider <i>Badumna longinqua</i> and <i>B. insignis</i>  |
| W22 5-15cms. |  | <ul style="list-style-type: none"> • Web radiates from hole in dead twig. • Found among twigs, leaves and flower heads. • Lacy radial spokes. | Common name: N/A Desidae: <i>Paramatachia</i> spp.  |

W23

5-20cms.



- Found among twigs, leaves and flower heads.
- Lacy surfaces stretch out in one or more planes.
- Silk retreat may be visible

Black house spider
Desidae:
Badumna spp.



W24

15-40cms.



- Found among twigs, leaves and flower heads.
- Surrounds a large or small nest made from leaves or debris woven tightly with silk.

Common name:
N/A
Desidae:
Phryganoporus candidus.



W25

5-15cms.



- Sheet pulled up in one or more peaks.
- Leaf or detritus retreat suspended in lines above sheet.
- Irregularly woven sheet, very light and filmy.

Comb-footed platform spider
Achaearanea mundula



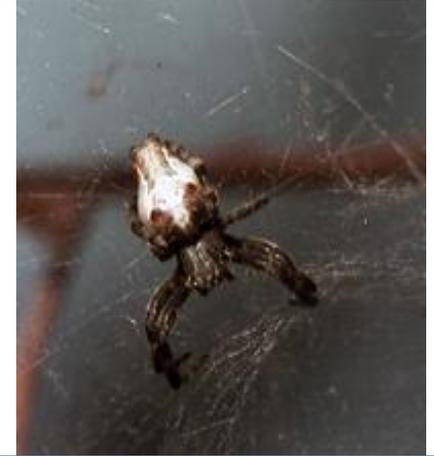
W26

5-25cms



- Sheet pulled up in one or more peaks
- Leaf/detritus retreat suspended in lines above sheet.
- Regular radial weave (may be finely meshed, look closely!)
- Several spiders may make webs close together with many connecting lines.

Tent web spider
Cyrtophora sp.



W27

5-15cms.



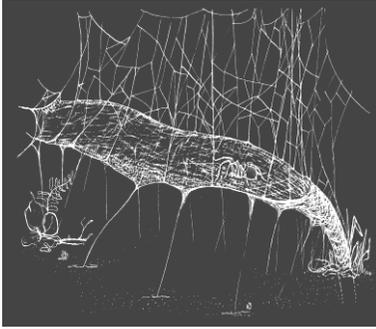
- No distinct peaks in sheet (may be small peaks where knockdown lines attach).
- No retreat
- Small sheets or hammocks in low vegetation.
- Knockdown tangle above or below sheet.

Money spiders
Linyphiidae



W28

10-
100cms



- Platform web with fine knockdown tangle above sheet.
- Sheet slopes down into a retreat burrow.
- Retreat is usually a burrow in the ground, but maybe into a wood crevice or grass tussock.

Platform spider
Corasoides australis



W29

10-40cms.



- Filmy sloping sheet slope down from retreat.
- Retreat opens to underside of sheet and spider runs upside down on sheet.
- Retreat burrow often in rotting wood or under bark, sometimes in an earthen embankment.
- Web roughly triangular or trapezoid.

Sombrero/Cave
spider
Stiphidiidae spp.
Cupboard spider
Theridiidae:
Steatoda spp.



W29a

5-15cms.



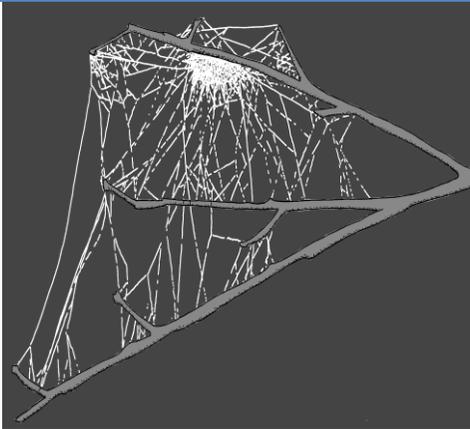
- Densely woven sheet with broad funnel to substrate.
- Found on rock faces or underside of logs.
- Retreat in centre of sheet.
- Funnel often closed by sheet.

Crinoline or
Sombrero Spider
*Stiphidion
facetum*



W30

5-10cms.



- Tangle webs with silk retreat; retreat may be tight silk or untidy mess, usually densely woven.
- Web between leaves, twigs or branches.
- Long lines of Theridiid web often have evenly spaced sticky droplets.
- Spider is usually in or near retreat, upside down.

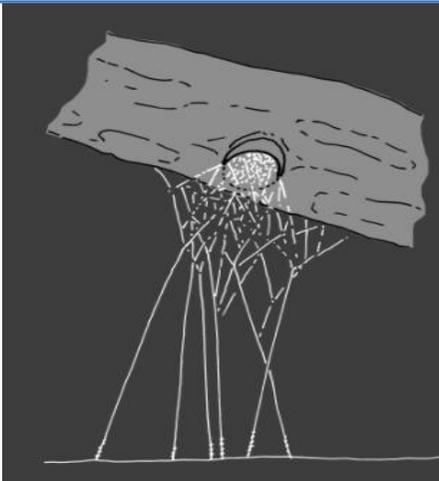
Comb-footed spiders

Achaearanea spp. *Theridion* spp.



W31

15-100cms.



- Tangle webs with long lines which always go down to firm surface (e.g. ground/log).
- Retreat in dense tangle, thimble shaped, usually under shelter.
- Sticky droplets near end of long lines only. The long lines are the catching points – crawling animals get stuck to the sticky droplets, the elasticity of the long lines takes prey upwards when it breaks.
- The retreat may be of thickly tangled silk and often contains egg sacs, as well as spider, which hangs upside down.

Redback spider

Latrodectus hasselti

or

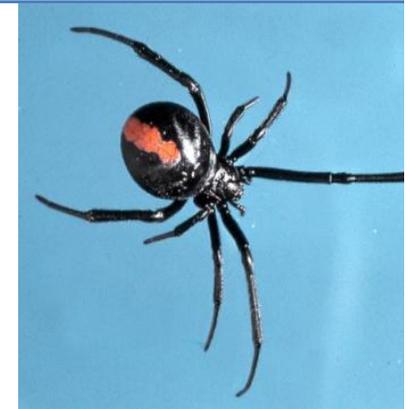
Comb-footed spider

Achaearanea spp.

or

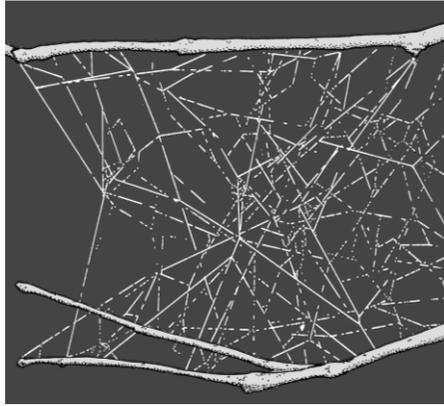
Cupboard spider

Steatoda spp.



W32

5-10cms.



- Tangle web without a silk retreat.
- Spindle or asterisk-shaped egg sac may be suspended in the tangle.
- Sticky droplets on lines present or absent.
- Theridiids will usually be present in a catching web

Cobweb or Neon spider
Theridion sp.



GLOSSARY

A barrier web, also known as a labyrinth, is a haphazard series of silk lines in front of and/or behind an orb web. These are thought to help deter and detect predators. The lines may also help to disorient flying prey, making them more likely to fly into the orb, which is the catching part of the web.

Catching surface: the area of an orb web that is covered by spirals or switchbacks of sticky, stretchy silk. In missing sector webs, the missing sector is defined by not having this catching surface, although a tangle of lines may fill the gap.

Debris refers to the remains of the spider's meals and sometimes small scraps of leaves and bark that are incorporated into webs and retreats. Some spiders join these bits in a line and hang it from the web, whereas others attach it to the surface of the web using conspicuous white silk. Retreats may also be made from, or incorporate, debris.

Decorations are silk patterns, or sometimes the silk-wrapped remains of the spider's meals (debris), which are woven onto the surface of the orb web. If examined closely the silk patterns often zigzag.

Fan: indicating the shape of a hand fan. Extending out from a central point.

Hammock: what we have termed here a hammock web is a sheet web that is suspended like a trampoline or circus safety net. The main supports and stabilising lines are around the edge and below the sheet and the centre is lower than the edges. There is often a tangle below the sheet where the spider waits for prey.

Horizontal: see orientation

The **hub** is the central area of an orb web. This is typically an irregularly woven area where the radial support lines meet and are joined together. Some spiders eat away part of this area when they have finished making the sticky spiral.

A **knockdown web** is a tangle of lines above or below a sheet web which disorients or intercepts flying insects so they land or fall onto the sheet. Like barrier webs, knockdown webs probably also serve a protective function by preventing predators such as wasps from easily flying in.

Lace webs do not contain sticky silk, instead they capture prey by snagging. Each line is composed of many tiny fibres which are combed to produce an entangling fuzzy thread, rather like a fluffed out strand of wool or cotton. The web is constructed in a characteristic pattern of ladder-like sections with zigzag steps. New regions show this clearly, but as the web ages, this structure decomposes, and sometimes new layers are laid over the old. Eventually the structure of old areas of the web appears as a jumble of different-sized squares, rectangles and circles.

A **nest** can be considered as a glorified retreat. Here we are specifically referring to the densely woven home of a particular kind of spider. These are often solitary, in which case the nest may be small, but sometimes they live communally, and the large nest may contain up to one hundred or more spiders.

Orientation: vertical, horizontal or sloping. These are all terms used to describe how an orb web is positioned. Using a bicycle wheel as a model, 'vertical' would refer to the normal orientation with the bicycle held upright ready for use. 'Horizontal' would apply if the bicycle were lying on its side, or 'sloping' if it were angled from being leant against a low wall or post.

Platform webs are a kind of sheet web. The sheet is gently to steeply sloping up and out from the spider's retreat, which is in a silk-lined burrow. The sheet is pulled taut into a smooth surface, which the spider runs on. This is the platform. Above the platform is a maze of knockdown lines.

Radials are the silk lines that radiate from the centre of an orb web to the outer frame or support lines like the spokes of a wheel. They are the framework on which the catching spiral is laid.

A **retreat** is a hideaway where the owner of the web may be lurking. This is typically a dead, curled leaf; a hole in a dead twig; or pieces of debris joined to form a tube, which is bound with silk. Sometimes the retreat is just a denser area of silk lines woven into a tunnel, which is usually against a twig or leaf. Often there is a protective tangle of lines around the retreat area, which can make it look like a separate web.

Sector: if you think of the radial lines that go from the centre of an orb web to the frame as being like the spokes of a wheel, then the area between each spoke is a sector (like a pie slice). 'Missing

sectors' might be filled in with a tangle, but there are rarely any catching spirals through them. The catching spirals either form a U-turn to either side or end abruptly.

A **sheet** is a closely woven mesh of non-sticky silk lines. Sheet webs can be simply guyed out to the adjacent substrate, e.g. vegetation etc., or associated with a tangle of vertical or haphazardly orientated lines. The sheet part can be seen as a distinct flat or curving surface among the supporting lines. Dew, or a fine spray of water droplets, shows a sheet up clearly.

A **signal line** allows the spider to hide away from an orb web in relative safety, whilst allowing it to monitor the web in case prey flies in. The signal line is usually attached in the hub area at one end and can be followed to the spider's retreat at the other. One leg of the spider can often be seen resting on the line.

Silk is composed of thin, strong protein fibres. Silks are produced by a number of invertebrates, including caterpillars such as the 'silkworm' and spiders. Whereas the caterpillars and other insects mostly use silk to make a nest or a cocoon, spiders have adapted silk for all kinds of purposes. These include the covering for egg sacs, for making secure retreats and, of course making webs. Spider silk is spun from the spinnerets, on the tip of the spider's abdomen. Several different kinds are made, including combed fluffy silk (cribellate silk) which is used in lace webs, strong non-sticky threads like those that support orb webs and the sticky silk that is coated with viscous droplets and makes up the catching spiral on many orb webs.

Sloping: see orientation.

Spirals form the catching surface of a typical orb web. Sometimes there is literally one continuous spiral from the outer edge of the web into the hub. In other webs there may be breaks, or the catching thread may reverse direction once or many times. In most orb webs the spirals are made of sticky silk that is coated in glue-like droplets. A few kinds of orb webs have catching silk of a different nature (cribellate silk). This cannot be as highly tensioned as sticky silk, and so these webs often appear untidy and 'floppy'.

A **tangle** is a more-or-less unstructured and haphazard collection of silk lines without other features like an orb or a sheet. As a guide, we have defined a simple tangle web as anything over five lines in roughly a 10 x 10 x 10 cm area. When tangles are a part of a different web type they usually have a special name; for example, a system of haphazard lines placed on either side of an orb or below it is usually called a 'labyrinth' or 'barrier web' and a similar tangle above a sheet web is often called a 'knockdown web'.

Vertical: see orientation.

Tally Sheet

Names: _____

Location: _____

Habitat description: *e.g. grasses, bushes, trees, tree canopy, large trees, dead trees*

| Web Type | 1 st survey Date: Time: Weather conditions: | 2 nd survey Date: Time: Weather conditions: | 3 rd survey Date: Time: Weather conditions: | 4 th survey Date: Time: Weather conditions: |
|----------|---|---|---|---|
| W1 | | | | |
| W2 | | | | |
| W3 | | | | |
| W4 | | | | |
| W5 | | | | |
| W6 | | | | |
| W7 | | | | |
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| W22 | | | | |
| W23 | | | | |
| W24 | | | | |
| W25 | | | | |
| W26 | | | | |
| W27 | | | | |
| W28 | | | | |
| W29 | | | | |
| W29a | | | | |
| W30 | | | | |
| W31 | | | | |
| W32 | | | | |