

FORMAK Vegetation Plot - *Whakawhaaitana Maheuheu* Field instructions

Preparation

Field team of two

- One person measures, the other records the measurements called out by this person.
- Can be done with one but this is much more difficult and time consuming – not recommended.

Planning Checklist

Have you:

- Determined how many vegetation plots you will establish and where they will be located?
- Ensured that the recorder and measurer have sufficient knowledge to identify most of the plants you are likely to encounter, and have access to books and specialists to help them identify the remainder.
- See FORMAK Vegetation Plot Planning Instructions for more information.

Equipment Checklist

- | | |
|--|---|
| <input type="checkbox"/> FORMAK Vegetation Plot Field Instruction | <input type="checkbox"/> Nails (60mm galvanised flat head). |
| <input type="checkbox"/> FORMAK Visual Guide | <input type="checkbox"/> Camera and film or digital camera (with sufficient memory and batteries) |
| <input type="checkbox"/> FORMAK Header Guide | <input type="checkbox"/> 20m measuring tape |
| <input type="checkbox"/> FORMAK Vegetation Plot Form | <input type="checkbox"/> Diameter tape |
| <input type="checkbox"/> Binoculars | <input type="checkbox"/> Compass |
| <input type="checkbox"/> GPS (optional – but use it if you have one) | <input type="checkbox"/> Location markers |
| <input type="checkbox"/> NZMS 260 series map of the area. | <input type="checkbox"/> Plot peg markers (5 per plot) |
| <input type="checkbox"/> Aerial Photograph – if available | <input type="checkbox"/> Plot pegs (5 per plot) |
| <input type="checkbox"/> Clipboard | <input type="checkbox"/> Permanent marker pen |
| <input type="checkbox"/> Canopy scope | <input type="checkbox"/> Blank sheets of A4 paper |
| <input type="checkbox"/> Measuring pole | <input type="checkbox"/> Plant identification references |
| <input type="checkbox"/> Pencils | <input type="checkbox"/> Plant specimen identification folder |
| <input type="checkbox"/> Rubber | |
| <input type="checkbox"/> Hammer | |

This Field Instruction

- Includes the following:
 - On Site
 - Mark Out the Plot
 - Photograph the Plot
 - Canopy & Ground Cover Measurement
 - Understorey Sub Plot Measurement
 - Tree Diameter, Sapling & Epicormic Shoot Measurement
 - Final Check
 - APPENDIX

On Site

Locate the start

1 Locate the start of your plot in the field.

Avoid damage to plot area

2 Put down any field gear, packs etc at least 2-3m away from the plot start in, away from where the plot will be run out. This will avoid your trampling you plot area as you access equipment.

Plot Header

3 Care must be taken to avoid trampling on and damaging seedlings through the steps in measuring the vegetation plot.

4 The recorder completes filling in the header information (see FORMAK Header Guide) while the measurer is laying out the plot.

Recorder

5 Records measurements called out by the measurer

Measurer

6 The measurer usually undertakes the remainder of the steps below, while the recorder writes on the Field Form the results they call out.

Mark out the Plot

What

The plot is a 20m long strip. A 20m tape measure is laid out down the centre and pegged at 5m intervals.

Why

The plot is set up as a strip to make it relatively easy to lay out and measure.

Permanent pegs ensure that the plot can be laid out in the same location when it is re-measured – so changes on the same site can be compared over time.

Mark the Start

7 Nail a location marker on the nearest “secure” tree to the plot start. This should be a tree that is healthy and will remain for many years. Nails should be left protruding 20mm to allow for tree growth. Mark the plot number, and also the distance and magnetic bearing to the 0m plot peg, on the marker with a waterproof marker pen.

Peg the Start

8 Take 5 plot pegs and 5 plot tags to carry when you run out the plot.

9 Peg the start of the plot and attach the start of the tape measure to the plot peg, holding it in place with the peg tag.

10 Write the plot no and / 0 on the tag to indicate it is the 0m plot peg. Eg. “1/0” (plot 1, 0m).

Run out Tape measure

11 Run the tape measure out to its full 20m length on the plot orientation bearing. Keep the cord straight and as close to the ground as possible (e.g. under branches not over them).



12 Peg the plot at the 20m mark. Wrap the tape around the 20m plot peg to secure it so that the tape is firm, but able to follow the ground profile (i.e not stretched across a gully well above the ground)

13 Write the plot no and / 20 on the tag to indicate it is the 20m plot peg.

**Peg every
5m**

14 Peg the tape measure at 15, 10, and 5m as you walk back along the tape to the start peg. Mark each plot tag Plot no ... / 15, Plot no... / 10, Plot no ... / 5 as you go



Photograph the Plot

What

The plot is photographed in a standard way, from the start (0m) peg looking to the finish (20m) peg

Why

The photograph is repeated every time the plot is measured. Major changes in the understorey etc can be seen in repeat images. It can be a striking way of showing changes.

**Label
Photo**

15 Assemble the plot pole and write the:

- Location name
- Plot number
- Date

in large print (large enough to easily read from 5m) on a blank sheet of A4 paper using the marker pen. Clip this to the front of the clipboard.

16 Get the measurer to stand at the 5m plot peg with the measuring pole and clipboard showing plot details. Make sure you can clearly see the writing on the clipboard.

**Photo of
Plot**

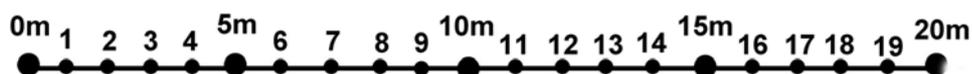
17 Stand over the 0m plot peg and face toward the 20m plot peg. With the camera in portrait view (i.e the image is taller than it is wide) take a photo so that the 20m plot peg is in the centre of the image. If you cannot see the 20m peg, judge its position as best you can.



Canopy & Ground Cover Measurement

What

Assessments of the canopy and ground cover are made at every 1m point along the 20m tape. The canopy scope is used to assess the canopy. Canopy heights are estimated every 5m. Possum browse on canopy species is assessed Note: All species – both native and introduced are recorded.



Why

The amount of canopy cover, and the species present can be a useful indicator of major long term changes in the forest. The level of canopy cover is also very important to determining how much light reaches the forest floor, and therefore what seedlings we would expect to see. The number of species and heights in the canopy may indicate its diversity for birds. Assessing the forest floor can provide indications of the stability of the site and damage from e.g. stock. It also identifies conditions for germination and growth of young seedlings.

Canopy scope on pole

- 18 Clamp the canopy scope onto the plot pole at a height you can easily sight through it when standing.
- 19 Place the pole upright directly beside the 0m plot peg.



Ground every 1m

- 20 Identify the ground cover where the bottom of the pole touches the ground. Where vegetation touches the pole below the 45cm mark, this is recorded as the ground cover. Cover classes are shown on FORMAK Vegetation Plot Form.



- 21 If vegetation or fern is recorded as the cover, also record the species.
- 22 Call out results to the recorder as you go.

Canopy every 1m

- 23 Holding the pole steady look into the viewer and AT FIRST GLANCE identify if the crosshair is on any part of over head vegetation or is on open sky.
- 24 In the same "first glance" classify the cover into one of the canopy cover classes shown in the FORMAK Visual Guide.



Trees above every 1m

- 25 Looking within the circular area shown in the canopy scope viewer list the species of individual tree seen – going from lowest to highest. You will

often need to identify the general area you are looking at from the canopy scope, then remove your eye from the viewer – and look up at the trees directly to identify them.



Height at each 5m

- 26 Estimate the height in metres of the lowest vegetation and the highest vegetation within the circular area shown in the viewer (see Height Estimation Guidelines). This done at each of the 5 plot pegs

Continue to end

- 27 Work your way along the tape measure, doing ground cover and canopy assessments every metre, until you get to the end of the plot.

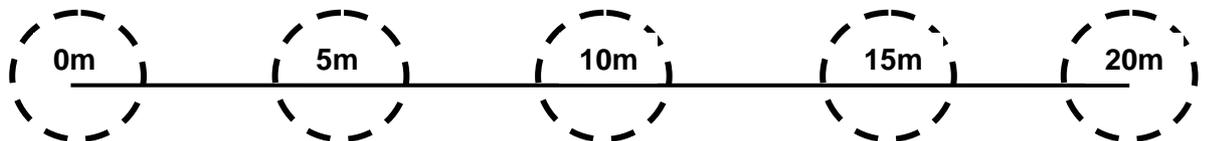
Browse on canopy

- 28 For all the species that were identified as present in the canopy, scan the canopy in the area above the plot with binoculars and identify if any possum browsed leaves are present. (see FORMAK Visual Guide for pictures of leaves browsed by possum). Record what level of browse is present from the classes shown on the plot form.

Understorey Sub Plot Measurement

What

Circular plots of 1m radius are assessed around each of the 5 plot pegs. Seedlings and saplings in each plot are counted by species and the level of browse assessed. All species – both native and introduced are recorded.



Why

The understorey gives an indication of what level of impacts are occurring from browsing ground animals (e.g. deer, goats, stock). It gives an idea of what species are coming through to replace the forest canopy. It can help show what level of diversity is present that may be important for bird species.

Use pole folded

- 29 Remove the canopy scope from the pole and separate and fold the pole in the middle, so it is 1m long

Circle from peg

- 30 Use the pole against each plot peg to see which small seedlings, large seedlings and saplings (see appendix for definitions) are within a 1m radius of each plot peg.

- 31 The two ends of the folded 2m pole is held against the plot peg with the short end against the peg and the black end beside it.



32 Start with the pole lined up with the tape measure and “sweep” around in a full circle counting seedlings and saplings as you go.



Check heights

33 Check the height of seedlings using the marks on the pole (see FORMAK - The Kit, in Overview Section). Where saplings need to be checked, the pole may need to be temporarily snapped back into its full length.

Count stems

34 Tally the number of stems of each species in each size class (small seedling, large seedling, sapling) for each plot. Species that can't be counted (e.g. sprawling ferns or vines) have their %cover within the subplot estimated.



Browse on seedlings

35 Estimate the browse class over the combined small and large seedling classes for each species present in either of these classes. (see FORMAK Visual Guide for pictures of browse)

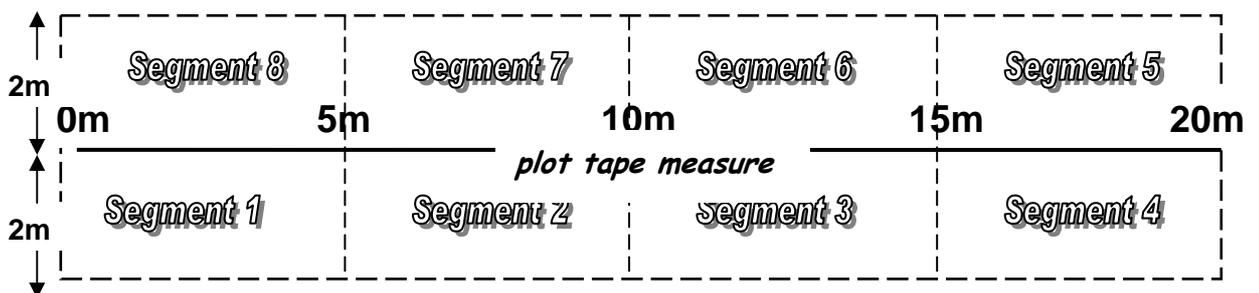
Move to next peg

36 Move to the next 5m plot peg and repeat the understorey counts. Continue until all 5 understorey sub plots are measured.

Tree Diameter, Saplings & Epicormic Shoots

What

Trees and saplings are measured within 2m either side of the central tape measure i.e. a rectangular plot of 20m x 4m (80m²). Tree diameters are measured and saplings are counted. Epicormic shoots from any tree stems in the plot are also counted. Note that if more than a total of 100 saplings was recorded across the sum of the 5 understorey sub plots already completed, saplings are not counted in the full plot. All species – both native and introduced are recorded.



Why

Identifying the species and size (diameter) of trees in the plot can give us information on longer term changes in the forest. These measures also provide some indication of the current status of the site. It can give an indication of the level of “occupancy” of the site – if there are a lot of large trees it may be close to the maximum level the site will support. It also gives an indication of the mixture of sizes present – is it dominated by larger, older trees only – or are there a range of sizes from small to large.

Counts of saplings and epicormic shoots provide information on the condition of the understorey in a similar way to the understorey subplots. Counts over the whole plot area are generally required so enough saplings are counted. It is important to include epicormic shoots as they are any important means of regeneration for some species such as kamahi and broadleaf.

2m either side

- 37 From the 0m peg facing toward the 20m peg, trees, saplings and epicormics within 2m of the plot tape measure are assessed. Use pole at its full length to check if stems are in.



Assess segments

- 38 Each 5m x 2m segment is numbered consecutively moving down the right hand side of the central tape measure, and back along the left hand side (see diagram above). This gives a total of 8 segments. Each segment has a plot peg at each of its two corners that are on the measuring tape.



Some key points

- 39 Note the following key points:
- If the total count of saplings from the 5 circular understorey sub plots (already completed) was 100 or more – don't count saplings over this full plot area.
 - Tree stems must have more than half their base within the plot (see appendix).
 - 2m is measured at right angles to tape measure cord and parallel with ground surface.
 - End of plot is at right angles with the tape measure.



Diameter of trees

- 40 Moving through the segments in order
- If tagging of tree stems is being undertaken, nail tag to tree at breast height (1.35m) – leaving 2 cm of nail protruding to allow for tree growth.
 - Measure the diameter of any tree stems present (see appendix for definition of a tree stem and diameter measurement)

Count saplings & epicormics

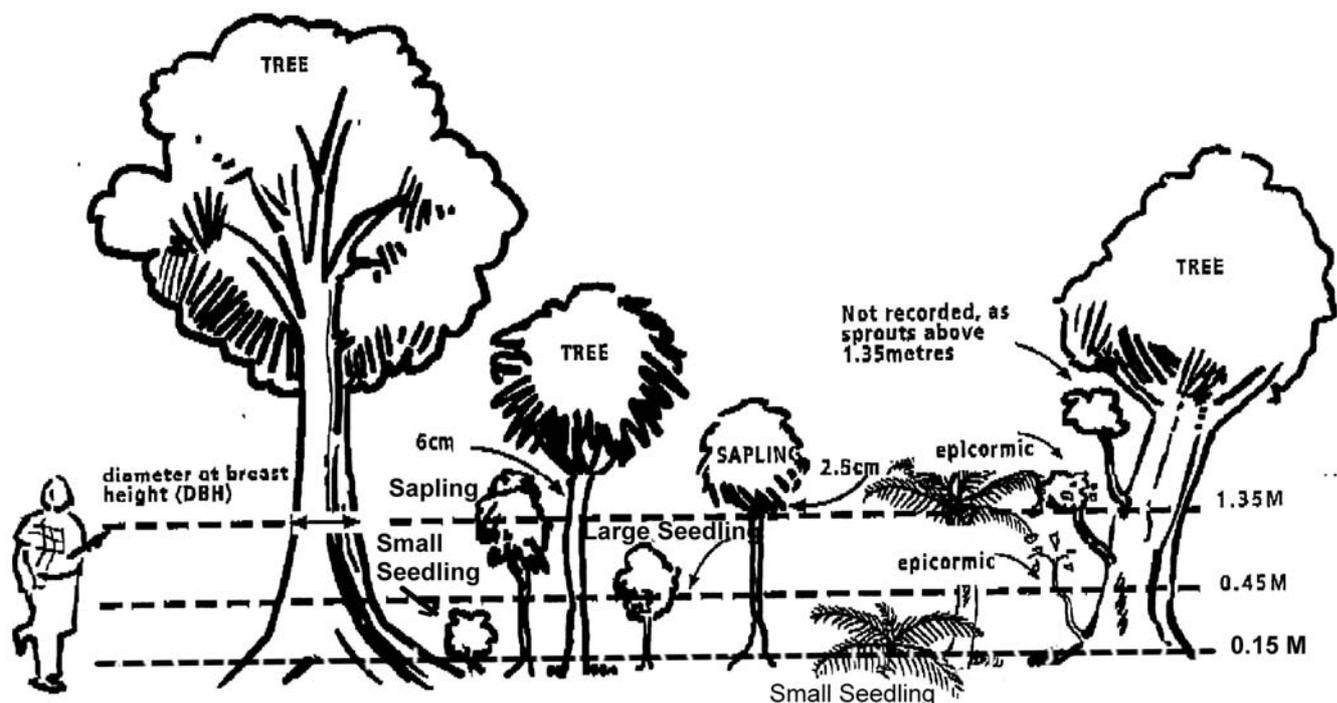
- Count the saplings of each species.
- Count the epicormic shoots associated with any tree stem (see appendix for definition).
- Call out to recorder every time you change segments e.g. "moving into segment 3"

Final Check

- 41 Check back through the plot form and field instruction to make sure all steps have been completed.
- 42 Remove the tape measure from the pegs, replacing the plot tags as you do, so they remain permanently in place. Roll up the measuring tape ready for the next plot.

APPENDIX

Size Classes



Class	Definition
Small seedlings	<ul style="list-style-type: none"> • 15cm – 45cm • Understorey subplots only • Count all woody species within 1.0m of the plot peg that are 15cm - 45cm in height. Fern species such as Hen & Chicken fern (<i>Asplenium bulbiferum</i>) that form distinct individual tufts are also counted. • % Cover within the 1m radius understorey plot is estimated for non distinct herbs, grasses, rhizomatous species and sprawling species that cannot be counted • Note: this class may include mature plants of some small stature species.
Large seedlings	<ul style="list-style-type: none"> • 46cm – 135cm • Understorey subplots only • Count all woody species between 46cm and 135cm in height that are within 1.0m of the plot peg. Fern species such as Hen & Chicken fern (<i>Asplenium bulbiferum</i>) that form distinct individual tufts are also counted. • % Cover within the 1m radius understorey plot is estimated for non distinct herbs, grasses, rhizomatous species and sprawling species that cannot be counted. • Note: this class may include mature plants of some small stature species.
Saplings	<ul style="list-style-type: none"> • Greater than 135cm in height but less than 3cm Diameter at breast height (DBH) • Understorey subplots and whole plot. If the total count of all sapling species across all understorey subplots is greater than 100, don't count saplings over the whole plot. • Count all woody species greater than 135cm in height but less than 3cm Diameter at breast height (DBH) that are within 1.0m of the plot peg. Fern species such as Hen & Chicken fern (<i>Asplenium bulbiferum</i>) that form distinct individual tufts are also counted. • % Cover within the 1m radius understorey plot is estimated for non distinct herbs, grasses, rhizomatous species and sprawling species that cannot be

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Class	Definition
	<p>counted.</p> <ul style="list-style-type: none"> • Note: this class may include mature plants of some small stature species.
Trees	<ul style="list-style-type: none"> • 3cm or greater in diameter at breast height (DBH) • Measure diameter in centimetres at breast height (1.35m above ground) of all tree stems of 3cm or more in diameter with more than half the base of their stem rooted in the plot.
Epicormic shoot	<ul style="list-style-type: none"> • Shoot from a tree stem that emerges between 15cm and 135cm above ground • 15cm or greater in length. • Less than 3cm in diameter at breast height. • Must be a shoot from a tree stem that has been identified within the plot. i.e epicormics must be able to be recorded against a specific tree diameter on the plot form. • Count number associated with each tree stem

Measuring height classes

The height of a seedling or sapling is measured as the vertical height above ground from its base. It is not measured along the length of the stem if the stem is growing horizontally. See image.



Multi stem plants

- If a seedling forks into multiple stems above or on the surface – Count it as one plant
- If it forks below surface – Count as multiple plants

Six Letter Codes for Recording Plant Names

A common approach to recording plant names that is often used in fieldwork is to record a six letter code based on the scientific name. This uses the first 3 letters of the genus and the first 3 letters of the species. For example red beech, *Nothofagus fusca*, becomes NOTFUS. Or mahoe, *Melicytus ramiflorus*, becomes MELRAM.

It is not essential that you know these codes, but it is useful to be aware of them and know how to “de code” them. The plant species list contained within the data entry system on www.formak.co.nz provides a full list of these codes and avoids you having to enter them directly if you are not familiar with them.

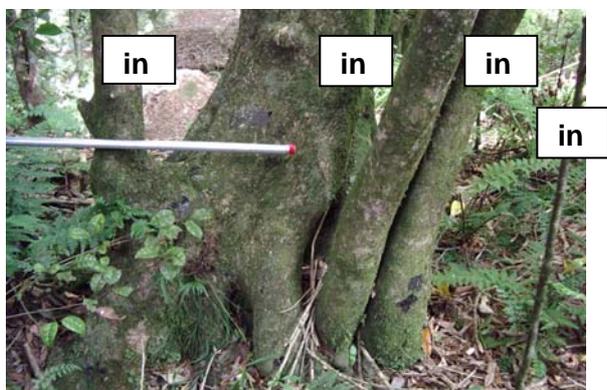
APPENDIX

When is a tree in the plot.

For a tree to be counted as in the vegetation plot, it must have more than half of its base rooted within the plot. Check whether a tree is in using the plot pole at right angles to the plot tape measure. The images below give examples



Note: when measuring the diameter of multi stemmed trees (see measuring tree diameters) if the base of the tree is more than half in the plot, then all of the multiple tree stems are measured, even if individual joined stems may actually be outside the plot (see image below)



Measuring diameter

Diameter is only measured on tree stems, i.e stems 3cm or more in diameter at breast height (1.35m) with half or more of their base rooted in the plot.

Diameter at Breast Height (DBH): Tree diameters are measured at breast height – 1.35m in height. Diameter is measured at right angles to the stem (see below). This is known as Diameter at Breast Height or DBH



Using a diameter tape: A diameter tape is supplied with FORMAK. Diameter tapes have a scale that allows diameter to be read directly when the tape is wrapped around the circumference of a stem. In the image below, diameter is measured as 143 mm.



APPENDIX

Leaning stems: Where stems are leaning or lying on the ground, measure DBH at 1.35m along the stem from the base.



Right angles: Always keep the tape at right angles to the stem.

Multi stemmed trees

- If the forking occurs at breast height, measure just below the fork.
- If the forking into multiple stems occurs below breast height – measure all the tree stems (greater than 3cm) individually at breast height (see below).



Swelling: Where there is an obvious major swelling at breast height, measure immediately below this.

Dead Trees: The diameter of dead trees is measured and their species is recorded as “dead”.