

Photo-point monitoring

Although not quantitative, photo-points provide a relatively simple and objective tool for tracking change in vegetation through time. Photo-points are widely used by organisations such as the QEII National Trust to document changes in vegetation cover in covenants. Photo-points can be used to follow changes in both overall vegetation cover (landscape photo-points; Figure 1) and vegetation composition (close-up photo-points; Figure 2). The latter can be used to track changes in shrub or tussock density, or under forest to show changes in understory vegetation. The strength of photo-points is that they are quick and easy to repeat and can be established and managed by farmers. Furthermore, and depending on how they are set up, it is possible to extract some quantitative information from them, at least for dominant species (e.g., by counting the number of tussocks or shrubs present at different times).



Figure 1. Landscape photo-point showing change in vegetation cover on a retired sheep and beef farm over 13-years (2005 left, 2018 right). Note the increase in shrub cover on the hillside in the top right and restoration plantings below this, and the changes to the two ponds and especially expansion of raupo on the left-hand pond. Mahoe is also now dominant in the vegetation on the spur in the foreground where it was less important in 2005. The flats in the middle distance were cut for biallage not long before the 2018 photo was taken. (Photos: David Norton)



Figure 2. Close-up photo-point sequence showing little change in fescue tussock grassland over 13 years. Note tape lines (estimated in 2018) for reference. (Photos: David Norton)

There are several key steps to obtaining a successful sequence of photos that can allow interpretation of vegetation. Having a camera with the ability to zoom is helpful to make sure that the area captured in the image is the same each year.

Tip: to ensure good quality for images for photo-monitoring following the guidelines below:

<p>Permanently marking photo points</p>	<p>This ensures photos are always taken from the same place – best done using a metal standard driven well into the ground as fences, buildings and trees can be moved, and also modify grazing animal behaviour and hence vegetation. With modern GPS, a coordinate can be used to locate yourself within 1-2m of the photo point location which can be sufficiently close for landscape photo-points but not for close-up photo points where permanent stakes are required.</p>
<p>Locate photo-points in vegetation that is typical of the area</p>	<p>Close-up photo-points are best located away from structures (fences, buildings etc.) within areas of vegetation that are representative of the more general conditions in the paddock or block of interest.</p>
<p>Take original photos when repeating photos</p>	<p>Essential to ensure that the same view is photographed each time (e.g., angle, inclusion of key features etc) – memory is not very reliable!</p>
<p>Use a camera with an eyepiece</p>	<p>It is much easier to ensure that the correct view is captured when a photo is taken looking through an eyepiece (compared to using a screen on the back of a camera or phone).</p>
<p>Take photos at the same time of year</p>	<p>Photos are best taken in early summer (November- December) after the spring growth flush but before vegetation mid-summer die-back starts. This reduces seasonality differences between years.</p>
<p>Develop a series of photos over several years</p>	<p>A single unusual season can result in misleading results so building up a sequence of images avoids this</p>



Figure 3: bush edges also provide a good location – this is where changes would be expected.

The approach to taking landscape and close-up photo-points are slightly different. Landscape photo-points are best for illustrating changes in major landcover types like shrubland or forest and should include whole hillsides or similar large areas in the image. Accurate repeat photos and subsequent comparisons are best done when the image includes some distinctive features like ridges or rock bluffs. Close-up photo-points provide more detailed information on dominant species and their cover abundance at a particular site. For these, permanent reference points such as metal standards allow precise locations for accurate comparisons between years. In some situations, landscape photo-points can be located at the same place as close-up photo-points.

Drones also provide an excellent way to obtain aerial images of remnants and other biodiversity areas that are hard to photograph from the ground (Figure 4). Try to ensure that the images have the same perspective when repeated in the future.



Figure 4. Drone image of Hawke's Bay forest remnant (courtesy Adam Forbes).

Where metal standards are used to mark photo-points, these need to be driven well into the ground to avoid being knocked over by cattle. Use of short standards driven in until only about 10 cm protrudes (and with protective caps fitted) can be an alternative, but this is only practicable where there is no chance of them being hit by a vehicle or bike. The number of photo-points established will vary depending on the size of the property and the amount of native biodiversity present. For landscape photo-points, several photos can also be taken from the same place (a panorama). Depending on the size and nature of a property, the number of landscape photo-points is likely to range between 10 and 20 per property. The number of close-up photo-points will be more specific to the particular property and will depend on the vegetation present and management issues that might apply. If the farm has some tussock grassland, then close-up photo-points are very good for tracking changes in tussock density. It is also recommended that a few close-up photo-points are established in bush remnants or regenerating forest such as kānuka to track change in them through time (Figure 5).



Figure 5. Close-up photo-point showing rapid re-growth of mahoe under a kānuka canopy over three years with grazing animal retirement. Note background trees for reference. (Photos: David Norton)

Once established, photo-points should initially be rephotographed annually for four or five years to establish a good baseline, and then at least every second year to develop a long-term sequence. Where possible, photo-points should be established close to access routes as this will substantially reduce the amount of time required to photograph them. The position of all photo-points should be recorded using a GPS as well as marking them on the ground. Depending on the size of the property and the type of access available, photo-points should be able to be photographed in one day.

Although not providing detailed information on the species present, photo-points are an ideal tool for assessing the broad effects of your management on native vegetation cover and hence on native biodiversity. As such, they are very useful for informing the annual review of the biodiversity management plan and for showing others the changes that have resulted from your management.