

Tiromoana Bush Avifauna and Vegetation Monitoring

Plot Locations and Methods

David Norton
 School of Forestry, University of Canterbury
 Private Bag 4800, Christchurch
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Background

Monitoring of avifauna and vegetation at Tiromoana Bush is based on a series of transects initially established in November 2005 and located through the main patches on remnant and regenerating forest. This report explains the location of these transects and their associated plots, and summarises the methods used in their measurement.

General location

The avifauna and vegetation monitoring points are located along 13 transects spread through the major areas of native woody vegetation within Tiromoana Bush (Fig .1). Each transect comprises three sample points, with all three used for bird monitoring and two for vegetation monitoring (Table 1). The bird monitoring points are marked by blue cattle ear tags nailed to a prominent tree at each site, while the vegetation monitoring sites comprise a 10 x 10 m plot with metal standards in each corner. A yellow cattle ear-tag is attached to one metal standard at each vegetation monitoring plot. Tracks into the sites from the forest edge have been marked using strips of white venetian blind permolat nailed to trees.

Table 1. Coding and coordinates (NZ Map Grid) for bird and vegetation monitoring plots.

Bird_code	Veg_code	Easting	Northing	Bird_code	Veg_code	Easting	Northing
1A	1A	2499256	5789830	8A	8A	2497529	5789820
1B	1B	2499254	5789880	8B	8B	2497480	5789822
1C		2499254	5789920	8C		2497434	5789850
2A	2A	2499261	5790119	9A		2496772	5789538
2B	2B	2499214	5790126	9B	9A	2496736	5789557
2C		2499161	5790154	9C	9B	2496708	5789539
3A		2498941	5789587	10A	10A	2497242	5789182
3B	3A	2498892	5789565	10B		2497211	5789138
3C	3B	2498845	5789556	10C	10B	2497183	5789105
4A	4A	2498545	5789098	11A	11A	2496862	5788874
4B		2498572	5789080	11B	11B	2496858	5788828
4C	4B	2498602	5789068	11C		2496883	5788778
5A	5A	2498555	5790112	12A		2496738	5789037
5B	5B	2498525	5790154	12B	12A	2496746	5789079
5C		2498463	5790178	12C	12B	2496750	5789123
6A	6A	2498028	5790209	13A	13A	2495385	5789339
6B	6B	2497986	5790222	13B	13B	2495343	5789372
6C		2497943	5790252	13C		2495303	5789372
7A	7A	2497618	5790108				
7B	7B	2497578	5790162				
7C		2497571	5790204				

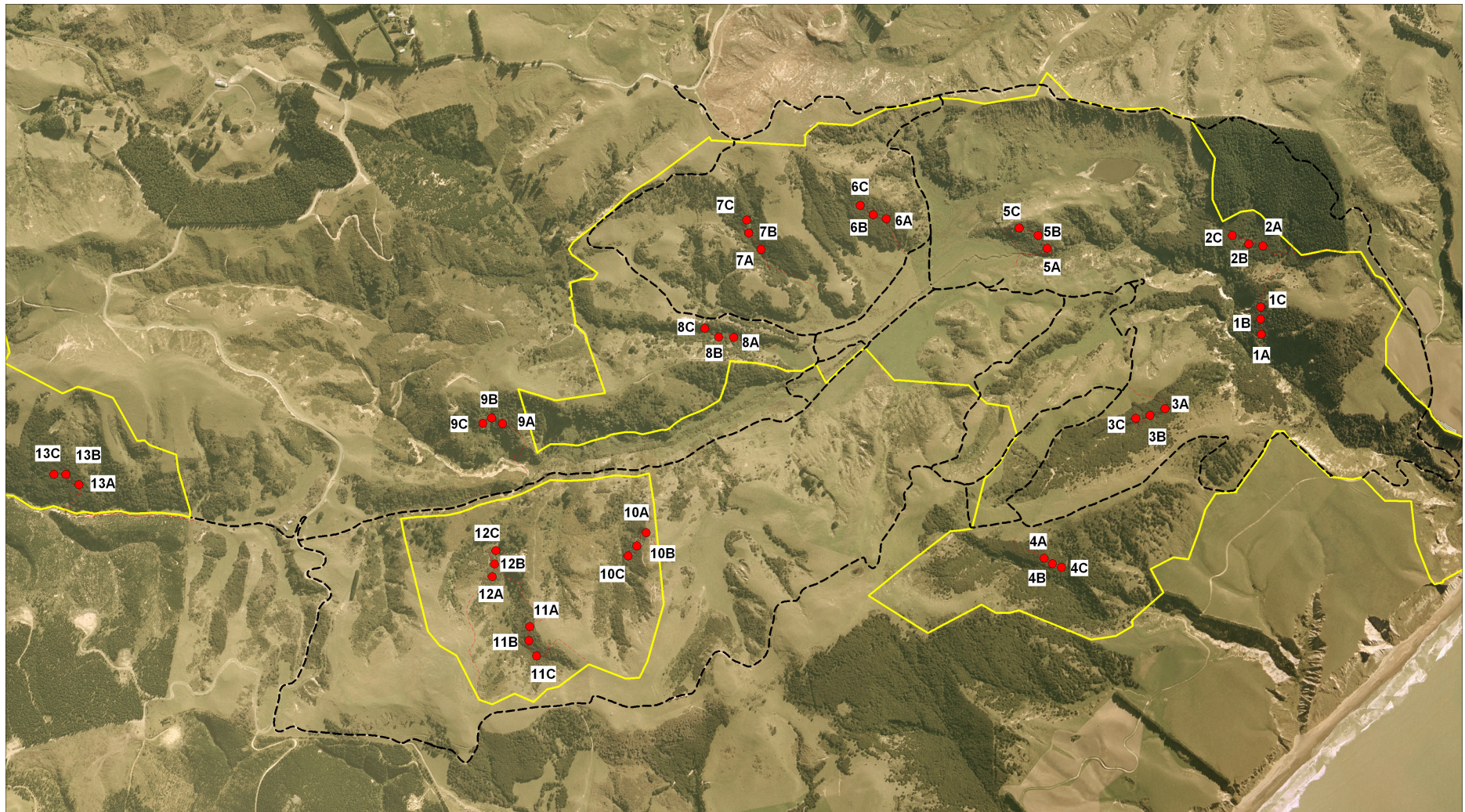


Figure 1. Location of the bird and vegetation monitoring lines.

Bird counts

The following notes on sampling methodology come from the 2010 Tiromoana Bush bird monitoring report (Buckingham & Holster 2010). Bird monitoring is based on modified five-minute bird counts (Dawson & Bull 1975) for measuring the relative abundance of forest birds; the main modification is the use of a simplified distance sampling technique where bird registrations are stratified into distance bands. Counts are carried out between 0800 hrs and 1530 hrs NZDT during appropriate weather conditions. During each five-minute bird count all individuals of all species are counted within a radius of 200m from the observer (note that species such as welcome swallow, scaup or spur-winged plover that are not associated with forest or scrub habitat are excluded from counts). Birds are recorded as first heard or first seen to provide a simple measure of conspicuousness (Gibb 1996). Lateral distances (0-5m; >5-20m; >20-50m; and >50-200m) of each bird from the observer (count station) is estimated. Given the very low number of registrations within the 0-5m delimiter these registrations have been combined with the >5-20m data for analysis, thus providing three lateral distance estimates for each count (“near”, “moderately close” and “far”). A rangefinder and tape measure are used when the lateral distance to a particular bird is uncertain.

Audio samples have also been taken once at each count station during fine, calm mornings when birds tend to be most vocal. In 2005 and 2006, a portable Minidisc™ recorder (Sony MZ-R909) and Vizivox “Hammerhead”™ stereo omnidirectional microphone was set up to record bird calls within an approximate 100m radius during the five-minute count. In 2007 the MZ-R909 recorder was upgraded to Sony Hi-MD MZ-M100 for higher-quality professional recordings, and this was also used during subsequent monitoring surveys. External noise (e.g. wind, aeroplanes, land vehicles and machinery) affects the sound quality of the recordings. Using a Sony MZ-RH1 Hi-MD recorder and SONICSTAGE software, recordings from either standard minidiscs or Hi-minidiscs are uploaded to a computer and burned on to CD.

Bird counts are undertaken in October each year. All transects, except Transect 5, are counted three times, while Transect 5 is counted up to six times, providing a total of 120-126 counts (108 forest counts and 12-18 scrub counts). The higher numbers of counts on Transect 5 (scrub habitat) was designed to increase sampling data, as this habitat is unique in Tiromoana Bush.

Bird monitoring has been undertaken using this methodology by the same observer (Rhys Buckingham) over the 5-year period 2005-2009 (Buckingham 2006 a&b, 2008, 2009, Buckingham & Holster 2010). It is proposed the bird counts be undertaken again for a minimum of three years starting in 2016.

Vegetation measurements

Within each 10x10 m vegetation monitoring plot the diameter of all trees >2cm diameter is measured at 1.2-1.3 m above ground level (breast height; dbh). All trees have been tagged and the diameter tape is wrapped around the tree with the bottom edge of the tape sitting immediately on top of the tag nail keeping the tape perpendicular to the orientation of the tree. Only those trees that are rooted in the plot are measured, and the diameters of branches of multi-stemmed trees are tagged and measured separately.

Two 1.5 x 1.5 m seedling plots are located on a diagonal line across the plot (Figure 2), with plot centres at ca. 4.8 and 9.6 m from start of diagonal line. All four corners of each seedling plot are marked with a wooden stake. All seedlings >20 cm have been tagged and their height is measured. Both tree diameters and seedling height were first measured in 2007 and have been remeasured at various times since, with the most recent seedling height measurements completed in 2010 and the most recent tree diameter measurements completed in 2015.

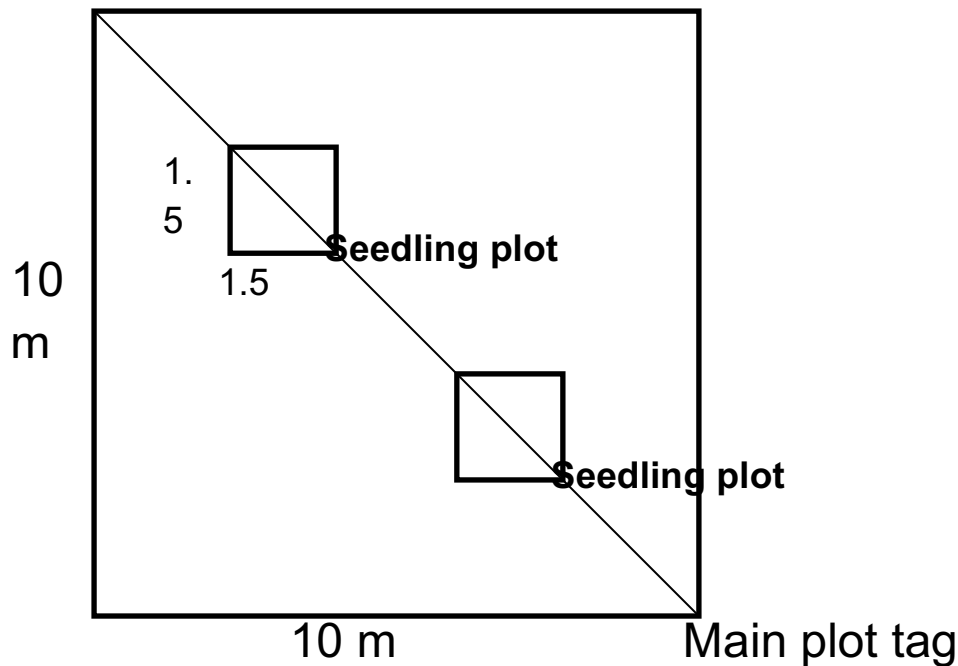


Figure 2. Vegetation monitoring plot showing location of seedling plots.

Where possible photos have been taken from each corner of the permanent plot looking diagonally across the plot with the opposite stake marking the far boundary of the photo. All photographs have been taken using a Nikon D50 digital camera, with a variable focal length lens. Photographs have been taken in autumn-winter each year, and where possible they are taken under overcast sky conditions to avoid bright sun flecks in the image. Photographs are taken with the camera positioned directly over the metal standard (but not resting on it). In taking photographs it is important that a copy of the original (2006) photos is used as a guide to ensure that each photo covers the same view (a variable focal length lens is important for this). Failure to do this can reduce the comparability of photographs between years. Use features such as trees as guides to ensure that photos cover the same scene each year (but be aware that trees can fall over).

Detailed location information

Place names referred to in the following notes are those used in the Tiromoana Bush Walkway pamphlet (Fig. 3).

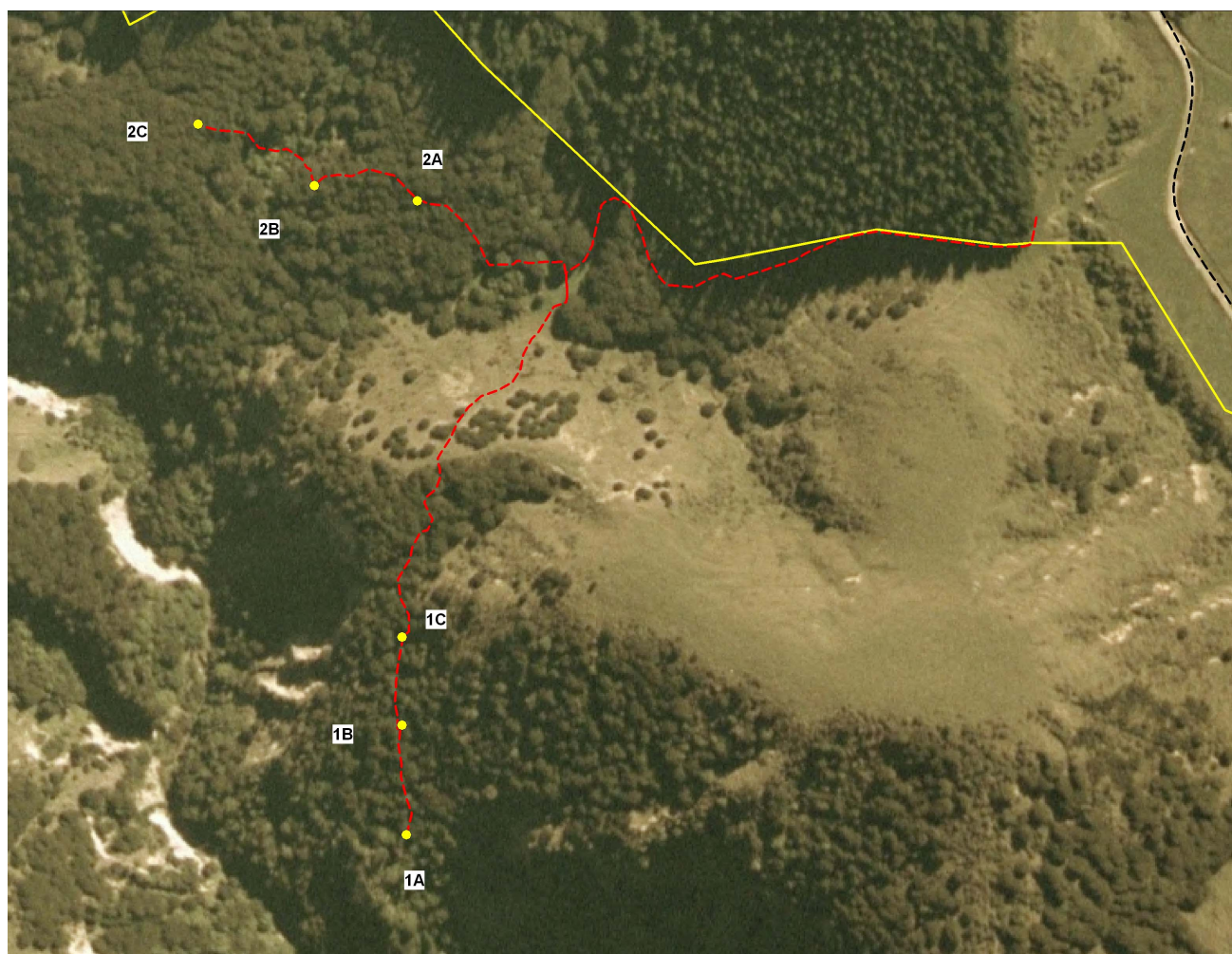


Figure 2. Tiromoana Bush Walkway names.

Monitoring transect 1: Transects 1 and 2 are both accessed from the 4x4 track on the eastern side of Tiromoana Bush where it drops down through the forestry block. From 'Forestry Junction' access follows an obvious marked (warratahs) track for *ca.* 200 m until it reaches a tongue of grass that runs down from the plantation forest. From here to access transect 1 head south for *ca.* 150 m, initially down gentle grass slopes and then steeply up onto the ridge. Once you reach the ridge crest a white permolat marker indicates the start of the track which is then followed across the slope for *ca.* 80 m to the first monitoring site (1C). The route can be difficult to follow as there is a gully to cross and the track drops down around this, but the route is marked the whole way. From the first site it is *ca.* 50 m to site 1B and another 50 m to site 1A. Return the same way you entered this site.

Veg plot no.	1A	1B
Bird site no.	1A	1B
Vegetation	Kanuka-mixed broadleaved forest with kohuhu, <i>Helichrysum aggregatum</i> , <i>Coprosma propinqua</i>	Open kanuka over <i>Coprosma propinqua</i> and lots of grass
No. of photos	1	2

NB: Photos points were difficult to establish because of the thick understorey.

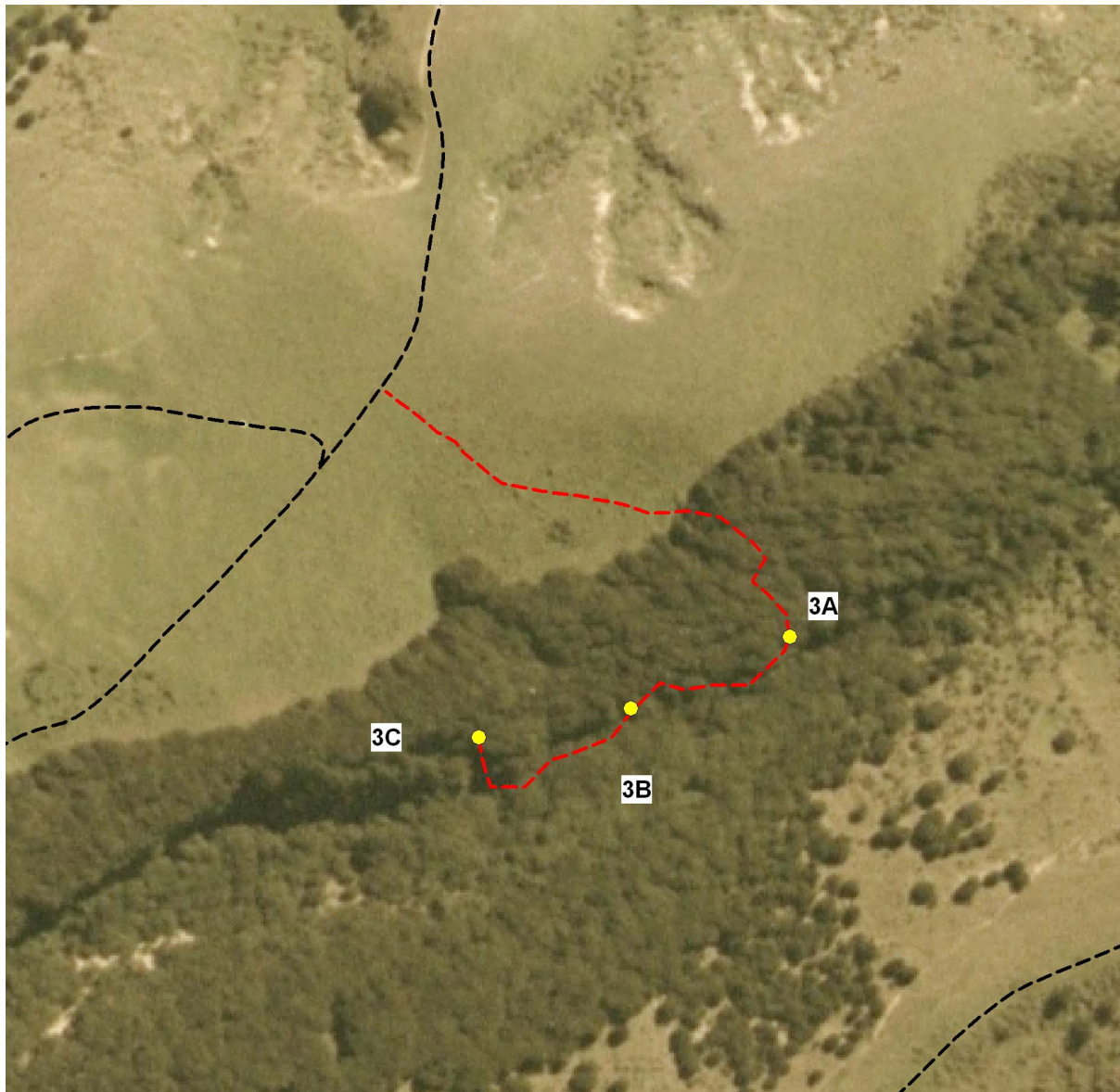


Monitoring transect 2: Follow the access route to Transects 1 until the tongue of grass that runs down from the plantation forest is reached. From here head south for *ca.* 40 m down the grassy tongue, then drop down (west) into a small gully and pick up the permatat markers and follow an old cattle track west for *ca.* 100 m to the first monitoring site. The track runs through dense mahoe regeneration in places. Continue along old cattle tracks for *ca.* 50 m to the site 2B and a further *ca.* 50 m to the site 2C – return the same way.

Veg plot no.	2A	2B
Bird site no.	2A	2B
Vegetation	Kanuka forest with putaputaweta	Kanuka forest with <i>Helichrysum aggregatum</i>
No. of photos	3	3

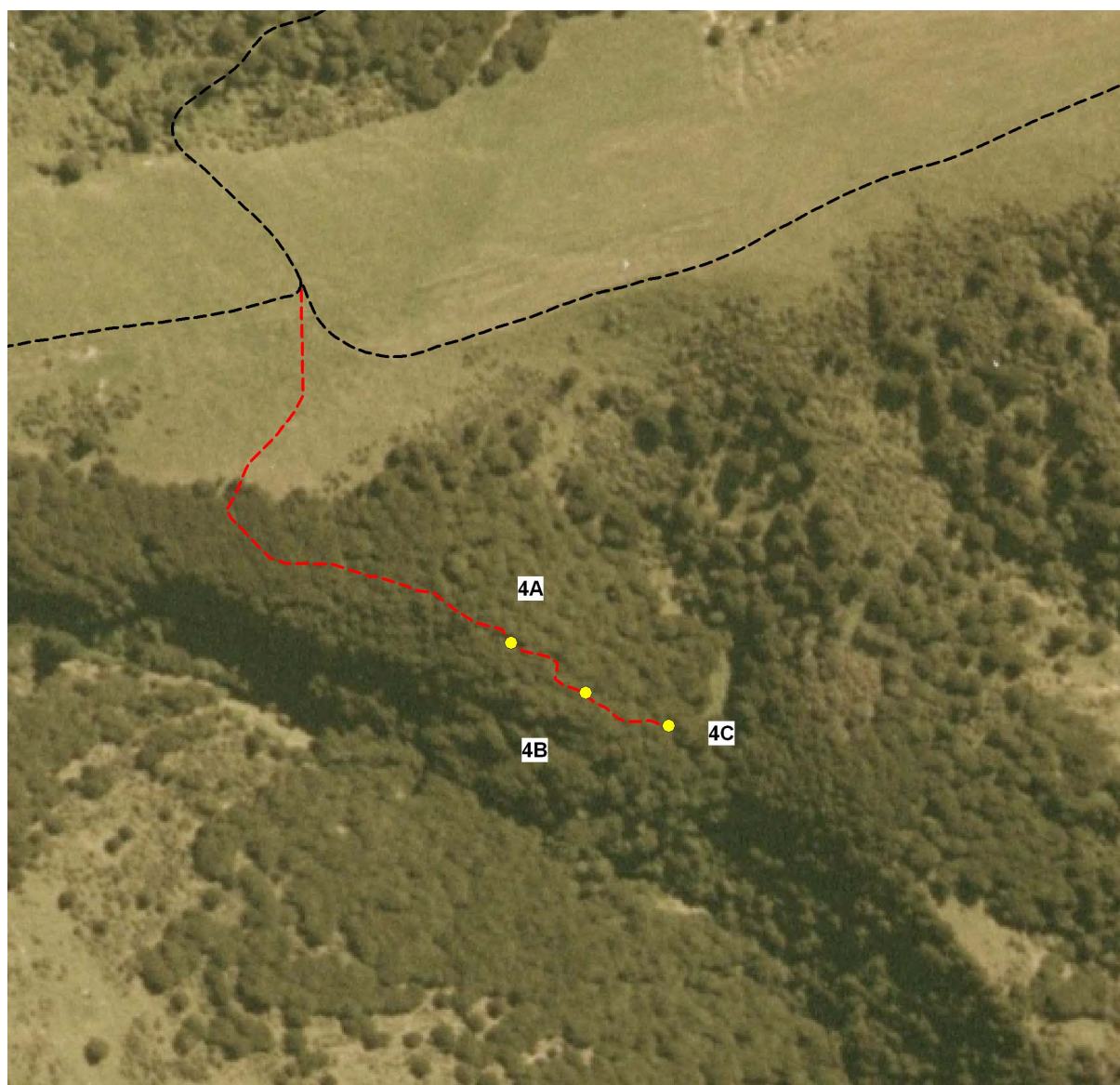
Monitoring transect 3: Access is from the main Tiromoana Bush walking track between the ‘Viewing Platform’ and ‘Kanuka North’. Access starts *ca.* 500 m from the ‘Viewing Platform’ along the 4x4 track and *ca.* 130 m before ‘Kanuka North’ junction. Head east-southeast from the 4x4 track for *ca.* 100 m to a permatat marker on the bush edge. Drop steeply down to site 3A (*ca.* 60 m), then follow an old stock track up valley, before crossing the stream to site 3B (on the true right, *ca.* 60 m), and then on up the valley again for *ca.* 60

m, before crossing back over the stream to site 3C (true left). Return the same way, or you can head straight up the slope and back to the track.



Veg plot no.	3A	3B
Bird site no.	3B	3C
Vegetation	Kanuka forest with sparse <i>Coprosma rhamnoides</i>	Kanuka - mahoe forest with <i>Coprosma rotundifolia</i>
No. of photos	3	3

Monitoring transect 4: Access is from the main Tiromoana Bush walking track at ‘Ella Peak Junction’. Head south-southwest from the junction for *ca.* 70 m to a permolat marker on the bush edge. From here follow markers and old cattle tracks in a southeasterly direction to the three monitoring sites, the 4A after *ca.* 130 m, 4B a further *ca.* 30 m on and 4C a further *ca.* 40 m. return the same way.



Veg plot no.	4A	4B
Bird site no.	4A	4C
Vegetation	Kanuka forest	Kanuka forest with <i>Coprosma rhamnoides</i>
No. of photos	4	2

Monitoring transect 5: Access to these monitoring points is difficult and it is easy to lose the track markers! State at the Kate Pond weir and cross Kate Stream heading slightly downstream to a permolat marker on a kanuka above you. Then go around this tree (downstream) and follow a cut line up through rapidly regenerating forest to a large kanuka between 5A and 5B. Site 5A is *ca.* 20 m southeast from here while 5B is *ca.* 40 m northwest. Site 5C is *ca.* 70 m further across the hill slope again, but is not well marked - be careful not to lose the route! Both vegetation monitoring sites are hard to get good photos because of the thick low shrubland.

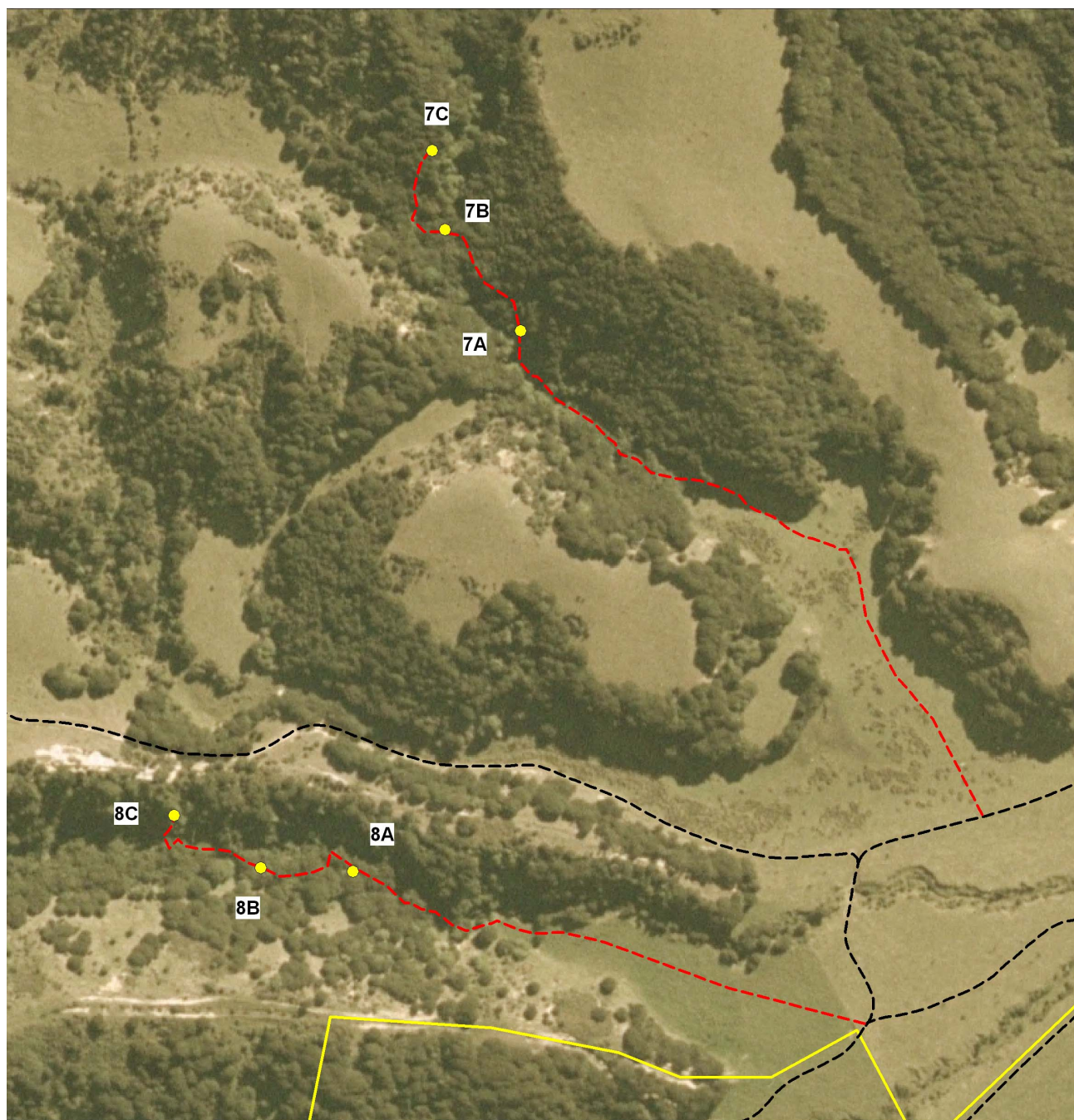


Veg plot no.	5A	5B
Bird site no.	5A	5B
Vegetation	Mahoe shrubland with <i>Coprosma propinqua</i> and <i>C. rotundifolia</i>	Mahoe shrubland with <i>Coprosma propinqua</i> , <i>C. rotundifolia</i> and matagouri
No. of photos	2	4

Monitoring transect 6: Access is from the main walking track ca. 160 m north of ‘Kate Bridge’ (culvert). Follow the 4x4 track southeast for ca. 100 m, and then ca. 40 m north to a permolat marker at bush edge. Follow the markers up through the kanuka forest for ca. 110 m to the first monitoring plot, and then head northwest around the slope for ca. 50 m to site 6B and a further ca. 50 m to site 6C. Return the same way.

Veg plot no.	6A	6B
Bird site no.	6A	6B
Vegetation	Kanuka forest, spare understorey	Kanuka forest, spare understorey
No. of photos	4	4

Monitoring transect 7: This site is accessed from the internal 4x4 road on the northern side of Kate Stream. Follow the track that heads north up to the black-beech restoration site for ca. 150 m (to where it starts to climb up the slope). Then head northwest up the grassy valley floor for ca. 150 m to a permolat marker on a kowhai tree at the bush edge. Follow the permolat markers up the valley through kowhai woodland and grassy clearings for ca. 100 m to the first monitoring site which is located on the true left-hand side of the valley. Head up the valley follow old cattle tracks for ca. 60m before crossing the creek to the next site (7B) located in a flat basin ca. 10 m up from the creek. Climb steeply up the face for ca. 40 m above this site to reach site 7C. Return the same way.



Veg plot no.	7A	7B
Bird site no.	7A	7B
Vegetation	Kanuka forest, spare understorey	Kanuka-mahoe- <i>Coprosma rotundifolia</i> forest, with dense mahoe regeneration
No. of photos	3	3

Monitoring transect 8: This site is also accessed from the internal 4x4 track to the north of Kate Stream starting *ca.* 120 m northeast from the water pump used to supply water back up

to the landfill. From this track head east-northeast for *ca.* 200 m to a permolat marker on a kanuka tree. The follow markers up the valley on the true right-hand side across a slip and then up through kanuka forest to the first monitoring site. The second site (8B) is a further *ca.* 50 m up on the same side – note that at one point you have to climb up to the left before continuing on up the valley. The final site (8C) is another *ca.* 50 m up, and then cross the stream to the true left-hand side and scramble up about 10 m to reach it. Return the same way.

Veg plot no.	8A	8B
Bird site no.	8A	8B
Vegetation	Kanuka forest, with good mahoe regeneration	Kanuka-kaikamoko forest
No. of photos	3	3

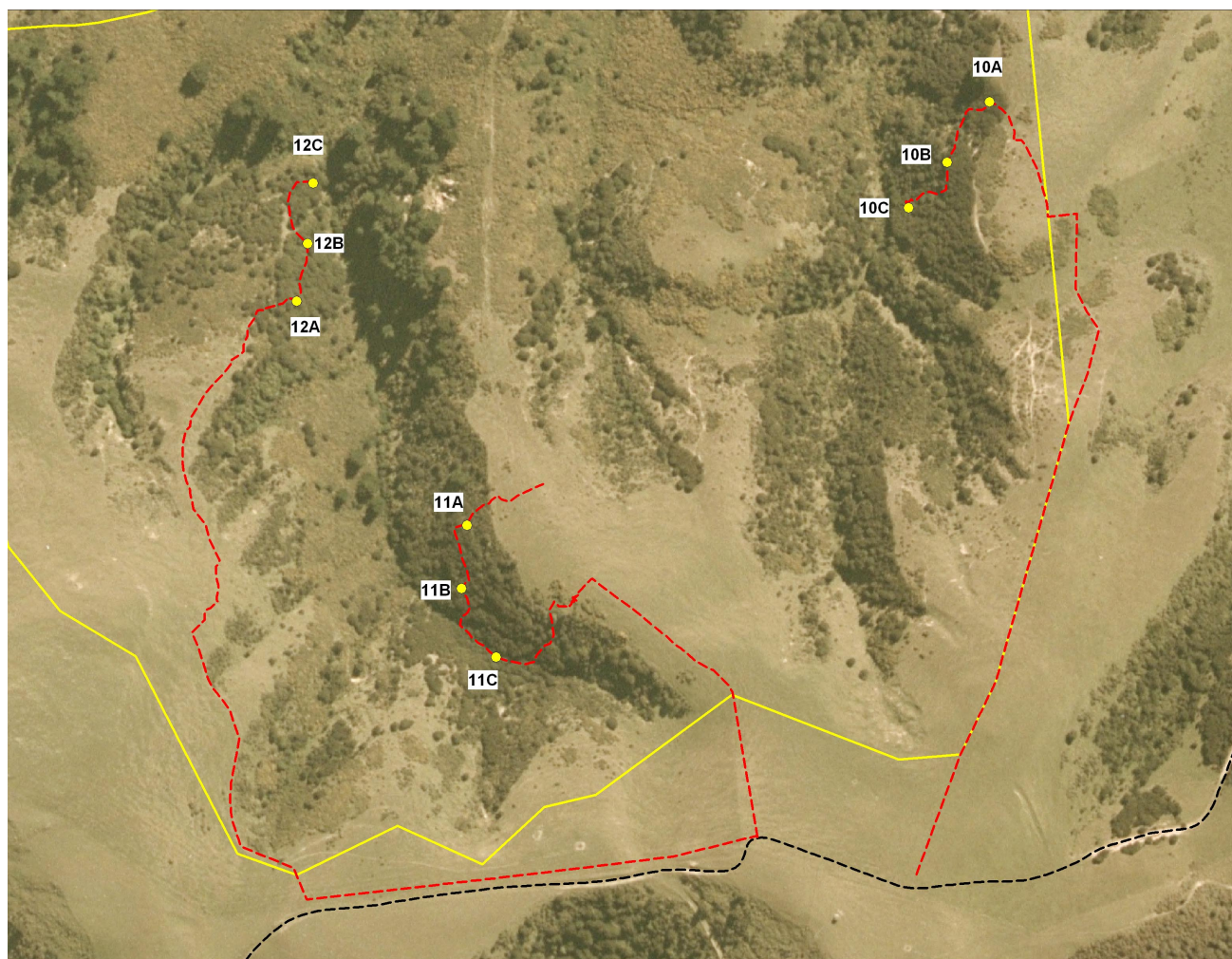
Monitoring transect 9: This site lies outside the Tiromoana Bush boundary, but is still part of the monitoring network. Access is from the Kate Valley Stream service road – drop down to the stream. Cross the stream and climb steeply for *ca.* 70 m up a steep slope covered in regenerating broom to a small grove of kanuka at the top of the slope (white cross on tree – visible from service road), then *ca.* 60 m across a grassy basin to an old ?bulldozer track entering bush (white permolat marker here). Follow roughly around the contour this track and the old stock tracks *ca.* 55 m west to the first monitoring sites, then *ca.* 45 m to site 9B and *ca.* 35 m to site 9C. Return the same way.

Veg plot no.	9A	9B
Bird site no.	9B	9C
Vegetation	Mixed broadleaved forest with putaputaweta, mahoe, tree fuchsia, kanuka, <i>Coprosma rotundifolia</i>	Kanuka-mahoe forest with <i>Coprosma rhamnoides</i>
No. of photos	3	2



Monitoring transect 10: This site is accessed from the Ella Peak ridge track. Go through the first gate on the ridge-crest fence-line (this is the access point for transect 11) and continue east for *ca.* 120 m to the next gate. Then follow down the fence line on the east side for *ca.* 520 m until the first fence running to the east is met (it is necessary to detour to the east of the fence near the bottom to avoid dense gorse). It is possible to drive part of the way down (April 2010), but this area has all been established in plantation forest (macrocarpa and cypress) and access may not be possible in the future. Once the fence junction is reached, cross the south-north fence and angle north north-east for *ca.* 70 m across and down to the bush edge (white cross on tree) with first site *ca.* 20 m below bush edge. Then travel southeast across and down the slope for *ca.* 60 m to site 10B, and then a further *ca.* 45 m to site 10C.

Veg plot no.	10A	10B
Bird site no.	10A	10C
Vegetation	Kanuka forest	Kanuka forest
No. of photos	4	3



Monitoring transect 11: This site is accessed from the Ella Peak ridge 4x4 track. Leave vehicle on the north side of the ridge-crest fence-line once you come through the gate and then walk downhill (north) through the plantation (*ca.* 110 m) and cross the fence into Tiromoana Bush at the point where the fence does a sharp bend. Walk down the spur (beside the old fenceline) to the second cabbage tree (two permolat markers on trunk) and then enter the bush through an area of small-leaved shrubland *ca.* 10 m below the cabbage tree (metal standard with white permolat marker at entrance to shrubland). Rapidly regenerating gorse is present in the grassland between the cabbage tree and the fenceline. From the forest edge the route drops steeply for *ca.* 40 m to the creek, cross this and turn right and down to the first monitoring site (11C) in *ca.* 20 m on the true left. Continue down valley (*ca.* 35 m), then cross to the true right and ascend *ca.* 30 m to site 11B. Then follow the contour for about *ca.* 50 m to site 11A. Access out is directly up the slope above site 11A to the old fenceline.

Veg plot no.	10A	10B
Bird site no.	10A	10C
Vegetation	Kanuka forest	Kanuka forest
No. of photos	4	3

Monitoring transect 12: This site is accessed from the Ella Peak ridge 4x4 track. Leave vehicle on the north side of the ridge-crest fence-line once you come through the gate and then walk west following the 4x4 track within the plantation forest for *ca.* 330 m until in an obvious hollow. Then head north for *ca.* 20 m to reach the Tiromoana Bush boundary fence. Cross the fence and follow the old bulldozed line around the hill slope (still heading roughly north-northeast for *ca.* 220 m. Then head down to obvious spur for *ca.* 250 m to pick up a white permolat marker on the bush edge. The last part of the route is quite scrubby with gorse starting to become dominant. Once in the bush it is a short drop (*ca.* 30 m) down to the first site, then on around through the forest for *ca.* 40 m to site 12B, and another *ca.* 60 m to site 12C. Return the same way.

Veg plot no.	12A	12B
Bird site no.	12B	12C
Vegetation	Open kanuka with <i>Coprosma rhamnoides</i> and gorse	Kanuka forest
No. of photos	4	3

Monitoring transect 13: Access is a 4x4 track that leaves the large shed storage area at the junction of the Kate Valley service road. Follow the 4x4 track west until it reaches a gate at the entrance to the plantation forest, leaving the vehicle there. Follow the 4x4 track west for *ca.* 420 m, until adjacent to an obvious clearing on the opposite (Tiromoana Bush) side of the creek. Cross the creek and climb to north-eastern corner of large grassy clearing where the access route starts from a kanuka with a permolat marker (*ca.* 30 m from creek). The route then follows up the spur to the first site which is reached after *ca.* 80 m. Site 13B is a further *ca.* 50 m west around the slope, and site 13C another *ca.* 40 m beyond this again. Return the same way.

Veg plot no.	13A	13B
Bird site no.	13A	13B
Vegetation	Kanuka forest	Kanuka forest with <i>Coprosma rhamnoides</i>
No. of photos	3	3



David Norton
10 May 2010