

ASSESSMENT OF ECOLOGICAL VALUES IN TYNEHOLME, WOODSLEA, OLD SHED, HOMESTEAD, AND FOX FORESTS, SOUTHEASTERN SOUTH ISLAND



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1. INTRODUCTION

IFS Growth Ltd manages areas of exotic plantation forest in several parts of New Zealand, including southeastern South Island and wishes to achieve the National Standard for Certification of Plantation Forest Management in New Zealand, which is managed by the Forest Stewardship Council (FSC). Among other matters, certification requires the assessment of ecological values within the forestry management units managed by IFS Growth Ltd, with a view to developing management plans for areas that are identified to have high ecological values.

IFS Growth Ltd have identified and mapped the non-stocked areas within the estate, and non-stocked areas in several forests in the lower North Island have been the subject of a desktop review of ecological values (Wildland Consultants 2015 and 2017). A desktop assessment of five forests within the IFS Growth southern estate is now required to determine the ecological values present or likely to be present within unstocked areas, and to help prioritise any areas where field work is necessary to confirm values.

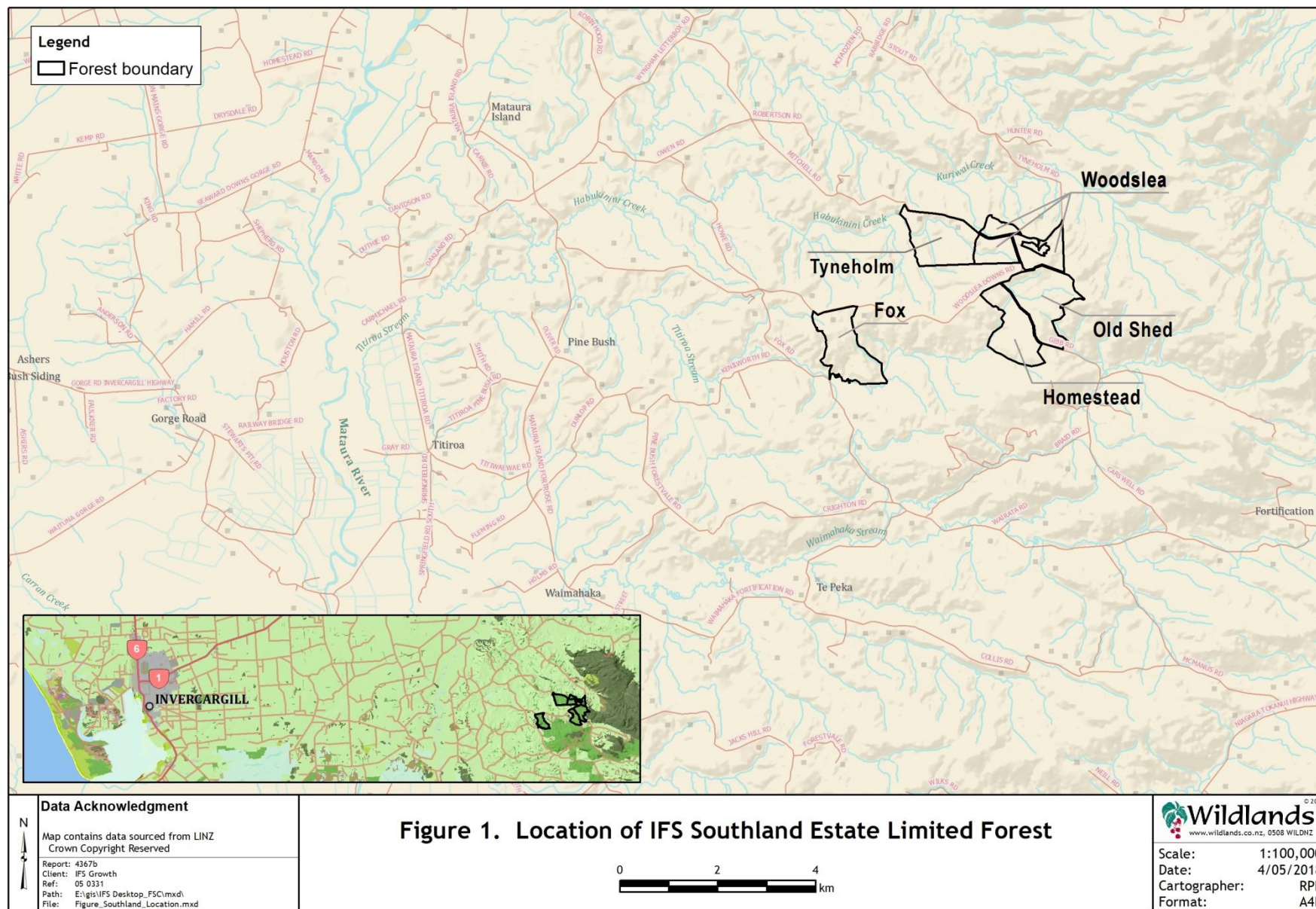
2. SCOPE

Five exotic production forests are to be assessed, all of which occur in the Southland District. Four of these forests (Tyneholme, Woodslea, Old Shed and Homestead) are clustered together, forming a contiguous area, while the fifth forest (Fox) occurs nearby (approximately 2.1 kilometres from Homestead Forest). The forests are located approximately 42 kilometres east of Invercargill and approximately 40 kilometres south of Gore (Figure 1). The size of each forest is as follows:

- Tyneholme Forest (132 hectares)
- Woodslea Forest (136 hectares)
- Old Shed Forest (139 hectares)
- Homestead Forest (109 hectares)
- Fox Forest (127 hectares)

The desktop assessment followed methods used in 2015 (Wildland Consultants 2015) and involved a review of information to identify or confirm:

- The ecological context of each site.
- Broad vegetation types and fauna habitats present within existing or proposed natural areas.
- Distribution and movement patterns of known rare, threatened, or endangered species.



3. METHODS

Non-plantation areas within the Southland Estate Ltd have already been mapped by IFS Growth. Due to the numerous very small natural areas present in some forests, the desktop assessment of the indigenous vegetation and habitats was restricted to areas >0.5 hectares, which is generally considered to be a minimum size to be self-sustaining.

Relevant literature, reports, and data sets were reviewed to determine the ecological values within or likely to be present within each of the sites:

- New Zealand Plant Conservation Network (NZPCN 2018; accessed on-line April 2018) indigenous plant records database.
- New Zealand Freshwater Fish Database (NZFFD; NIWA 2018; accessed on-line April 2018) for records of freshwater fish (indigenous and introduced) and freshwater invertebrates within contributing and receiving waterways.
- Department of Conservation Bioweb Herpetofauna Database (accessed April 2018) for records of lizards.
- Department of Conservation Bat Database (accessed April 2018) for records of indigenous bats.
- The eBird database maintained by Cornell University, which has bird records for sites within New Zealand.
- The Atlas of bird distribution in New Zealand 1999-2004 (Robertson *et al.* 2007), which contains records for birds in 10 × 10 kilometre grid squares throughout the country.
- An invertebrate database for New Zealand (Patrick 2018), which has point records for various species.
- The most recent species threat classification lists for birds (Robertson *et al.* 2017), bats (O'Donnell *et al.* 2017), vascular plants (de Lange *et al.* 2013), freshwater fish (Goodman *et al.* 2014), reptiles (Hitchmough *et al.* 2016), and aquatic invertebrates (Grainger *et al.* 2014) based on the revised species threat classification system (Townsend *et al.* 2008).
- Threatened Environment Classification (TEC; as per Cieraad *et al.* 2015), based on analysis of land environments derived from soil and climate data (Land Environments of New Zealand; Leathwick *et al.* 2003), land cover (Land Cover Database 4.1; LCDB4; Landcare Research 2012), and protected areas. TEC is designed as a regional-national scale tool for assessing the threat status of land environments based on the loss of original natural vegetation cover, and the extent to which remaining original vegetation is protected. At smaller geographic scales such as for individual properties or natural areas, TEC analyses are potentially informative, but should only be applied with caution, and should not be used as the sole or primary factor when assessing the degree of threat or vulnerability for a particular site.

- National guidelines on priorities for protecting rare and threatened indigenous biodiversity on private land (MfE and DOC 2007). The four priorities are:
 1. To protect indigenous vegetation associated with land environments (defined by LENZ at Level IV) that have 20% or less remaining in indigenous cover. That is 'Acutely Threatened' or 'Chronically Threatened' land environments.
 2. To protect indigenous vegetation associated with sand dunes and wetlands; ecosystem types that have become uncommon due to human activity.
 3. To protect indigenous vegetation associated with 'historically rare' terrestrial ecosystem types not already covered by Priorities 1 and 2. Historically rare ecosystem types are listed in Williams *et al.* (2007).
 4. To protect habitats of acutely and chronically threatened indigenous species. Due to changes in the threat classification framework since this priority was first written, this now includes species classified as 'Acutely Threatened' or 'Chronically Threatened' under the previous threat classification framework (Molloy *et al.* 2002) and 'Threatened' and 'At Risk-Declining' under the more recent framework (Townsend *et al.* 2008).

Forest management unit boundaries and potential natural area boundaries were mapped on high resolution aerial imagery in ArcGIS for Desktop Basic 10.1.

Ecological significance criteria from previous Wildland Consultants FSC assessments (Wildland Consultants 2015 and 2017) (see Appendix 1) were adapted to suit the southeastern South Island context and were used to assess the significance of each site.

Priorities were identified for field assessment of sites.

4. ECOLOGICAL CONTEXT

4.1 Tahakopa Ecological District

Tahakopa Ecological District (c.239,047 ha) is located to the south of Waipahi Ecological District. The climate is moist, cool, and cloudy. Rainfall is from 800-1400 mm p.a. (McEwen 1987).

Tahakopa Ecological District is a coastal district of parallel low hills and valleys formed by folded Jurassic marine and estuarine sediments (sandstones and mudstones) of the Southland syncline. Most of Tahakopa Ecological District is below 600 m a.s.l. (McEwen 1987). There are a range of soils from a variable cover of loess over tuffaceous greywacke and related slope deposits. At lower altitudes, soils are moderately leached with firm to friable silty or clayey subsoils. At higher altitudes under cooler, moister conditions, soils have a pale-coloured subsurface horizon and iron/humus pans. On higher crests of the ranges there are poorly drained soils with peaty top-soils. Small areas of alluvial soils are present in valleys (McEwen 1987).

4.2 Historic vegetation types

Tahakopa Ecological District would have originally contained extensive low-altitude podocarp/kāmahi forests. These have now been largely cleared for agriculture, with high producing exotic grassland today comprising c.55% landcover within the Ecological District (Landcover Database v2). Remaining indigenous forests (c.33% cover) are mostly located at higher elevations within the ED.

4.3 Protected areas

Department of Conservation-Administered Sites

The five forest blocks are close (approximately 600 metres at closest point) to the western boundary of the Catlins Conservation Park. Old Shed Forest is connected to Catlins Conservation Park via a large area (approximately 1.3 × 1.6 kilometres long) of privately owned indigenous forest (possibly silver beech (*Lophozonia menziesii*) forest). Catlins Conservation Park comprises 50,693 hectares and is the largest remaining area of indigenous forest on the east coast of the South Island. This conservation park contains nationally important examples of podocarp (rimu, *Dacrydium cupressinum*; tōtara, *Podocarpus totara* var. *totara*; matai, *Prumnopitys taxifolia*) silver beech and southern rātā (*Metrosideros umbellata*) forests.

QEII Open Space Covenants

There are two QEII Open Space Covenants within a 5 kilometre radius of the forests. Queen Elizabeth II Open Space Covenant 5-13-184 comprises three parcels with the closest located approximately 300 metres west of the Tyneholm Block, and the others 1.1 kilometres and 1.4 kilometres west of the Tyneholm Block. The area closest to the Tyneholm Block appears to be a wetland when viewed on aerial photographs; the other two parcels comprise lowland forest and riparian wetland. Covenant 5-13-157 comprises a series of eight small areas, mostly associated with riparian areas. The closest, and smallest of the areas is approximately five kilometres to the south of the Homestead Block.

4.4 Protected natural areas programme

A Protected Natural Areas Programme (PNAP) survey has not been undertaken for Tahakopa Ecological District. Therefore, no recommended areas for protection (RAP's) have been identified in the ecological district.

A search of Environment Southland's Significant Natural Areas (SNA's) (Environment Southland 2017) found that there were no SNA's close to the five forestry blocks. The closest SNA was Edendale Scenic Reserve, which is 20 kilometres northwest of the five forestry blocks.

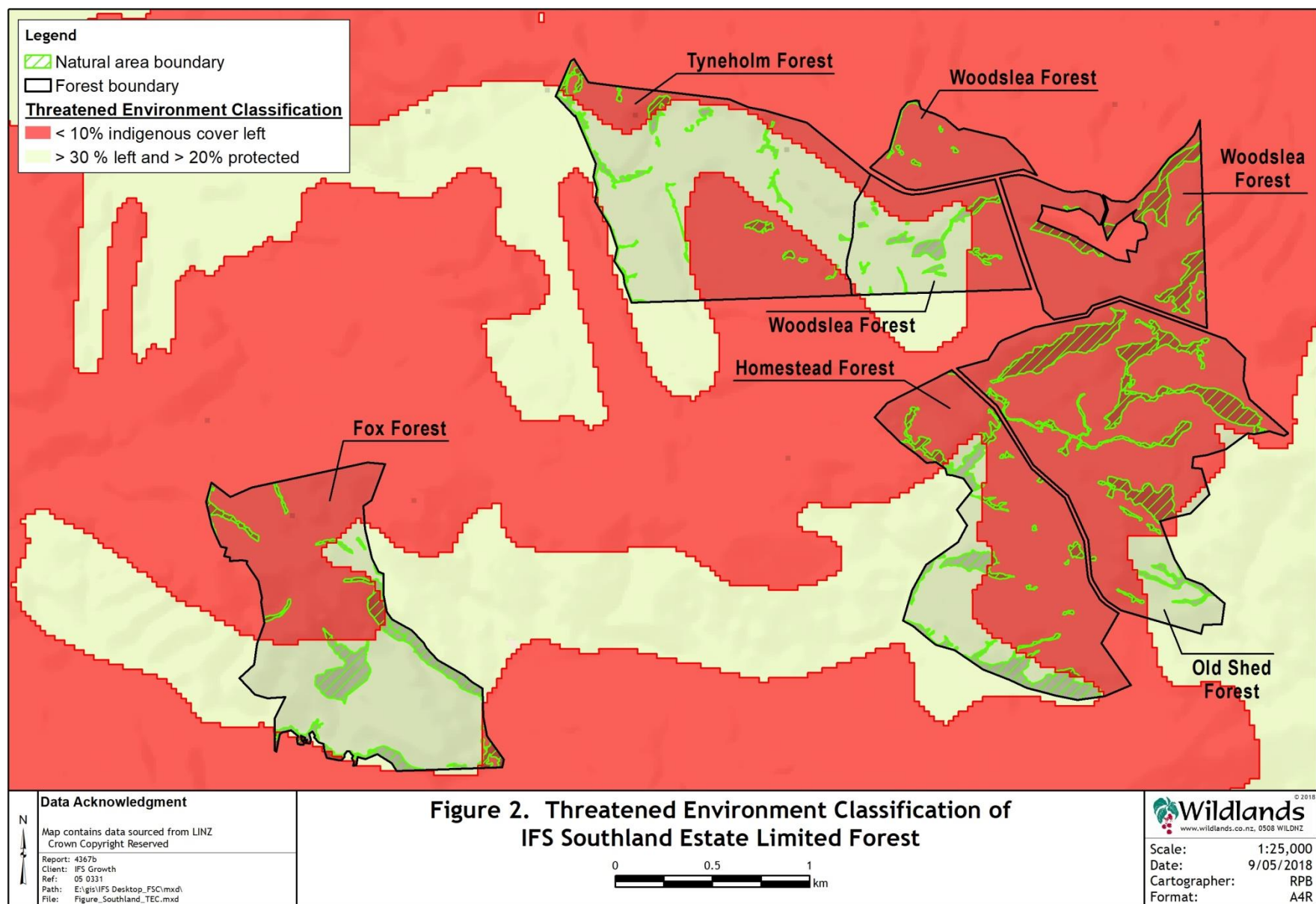
4.5 Threatened environments

All of the forests have parts of their natural areas located on 'Acutely Threatened' land environments (with <10% indigenous cover remaining; Table 1, Figure 2). If indigenous vegetation is located on 'Acutely Threatened' land environments and has

sufficient ecological values then it could meet Priority 1 in the national guidelines on priorities for protecting rare and threatened indigenous biodiversity on private land (MfE and DOC 2007).

Table 1: Area (hectares) of each threatened land environment classification in unstocked areas in Tyneholme, Woodslea, Old Shed, Homestead, and Fox Forests.

Category	Criteria		Tyneholme	Woodslea	Old Shed	Homestead	Fox	Total (ha)
	Indigenous Cover (%)	Protected (%)						
1. Acutely Threatened	<10%	-	2.22	10.22	21.77	3.73	4.11	42.05
2. Chronically Threatened	10-20%	-						
3. At Risk	20-30%	-						
4. Critically Underprotected	>30%	<10%						
5. Underprotected	>30%	10-20%						
6. Less Reduced and Better Protected	>30%	>20%	4.35	2.82	1.58	10.40	11.59	30.74
No Category								
Total			6.57	13.04	23.35	14.13	15.7	72.79



5. BIODIVERSITY VALUES WITHIN THE FIVE PLANTATION FORESTS

5.1 Overview

The following section summarises the records for threatened indigenous flora and fauna that exist close to Tyneholme, Woodslea, Old Shed, Homestead, and Fox Forests. Due to the close proximity of the five forest blocks, it can be assumed that these biodiversity records have relevance for each of the forest blocks.

5.2 Flora

Based on a search of the NZPCN indigenous plant records database (NZPCN 2018), two threatened indigenous plant species have been recorded within 10 kilometres of the five forest blocks. Both records occur in Catlins Conservation Park. One of the species is a fern (southern strap-fern, *Notogrammitis rigida*; At Risk-Naturally Uncommon), while the other species, *Coprosma pedicellata* (At Risk-Declining), is a divaricate shrub or small tree.

Notogrammitis rigida is a terrestrial fern and is usually found in coastal areas confined to mossy rock faces, shaded cliff faces and recesses just above the high tide mark. However, it is occasionally found as a low epiphyte in coastal shrubland, thus this species is unlikely to be present in the study area.

Coprosma pedicellata is a species of wetlands (and possibly the reason for nearby QEII Covenants). It can be found in kahikatea (*Dacrycarpus dacrydioides*) dominated lowland alluvial forest, or areas that were formerly kahikatea forest wetlands. This species is often restricted to the margins of small oxbow lakes and ponds, or former stream/river channels. It is very tolerant of waterlogging and plants may be found growing within water. If appropriate wetland habitat is present, then this species could be present.

5.3 Avifauna

In total, 41 species of birds were recorded in eBird and Robertson *et al.* (2007) (Table 2). The eBird records were located within approximately 5.6 kilometres of Tyneholme Forest, while the records reported by Robertson *et al.* (2007) occur within an approximate six kilometre radius from the forest blocks. Twenty five of the species that were recorded near the forests were indigenous and 16 were naturalised. Two species (Canada goose; *Branta canadensis* and Australian coot; *Fulica atra*) were only recorded as eBird records, while 16 species were recorded only by Robertson *et al.* (2007). In total, 23 species were recorded by both sources. Of these species, four are threatened following Robertson *et al.* (2017). It is possible that black shag (*Phalacrocorax carbo*; At Risk-Naturally Uncommon) may occur in natural areas within the forest blocks as this species occurs in a wide range of habitats from sea level to the subalpine zone (Powlesland 2013). The remaining three species have a low probability of occurring in the study area:

1. Black-billed gull (*Larus bulleri*; Threatened-Nationally Critical).
2. Australian coot (At Risk-Naturally Uncommon).
3. South Island pied oystercatcher (*Haematopus finschi*; At Risk-Declining).

Table 2: Indigenous and naturalised bird records in Tyneholme, Woodslea, Old Shed, Homestead, and Fox Forests.

• eBird records within five kilometres of the forests

† Robertson *et al.* (2007) records within six kilometres of the forests

Scientific Name	Common Name	Indigenous or Naturalised	Conservation Status	Record Source
<i>Alauda arvensis</i>	Skylark	Naturalised		• †
<i>Anas gracilis</i>	Grey teal	Indigenous	Not threatened	†
<i>Anas platyrhynchos</i>	Mallard	Naturalised		• †
<i>Anas rhynchos</i>	Australasian shoveler	Indigenous	Not threatened	• †
<i>Anthornis melanura</i>	Bellbird	Indigenous	Not threatened	• †
<i>Aythya novaeseelandiae</i>	New Zealand scaup	Indigenous	Not threatened	• †
<i>Branta canadensis</i>	Canada goose	Naturalised		†
<i>Callipepla californica</i>	California quail	Naturalised		•
<i>Carduelis carduelis</i>	Goldfinch	Naturalised		• †
<i>Carduelis chloris</i>	Greenfinch	Naturalised		†
<i>Carduelis flammea</i>	Redpoll	Naturalised		†
<i>Circus approximans</i>	Australasian harrier	Indigenous	Not threatened	• †
<i>Columba livia</i>	Rock pigeon	Naturalised		†
<i>Cygnus atratus</i>	Black swan	Indigenous	Not threatened	†
<i>Egretta novaehollandiae</i>	White-faced heron	Indigenous	Not threatened	†
<i>Emberiza citrinella</i>	Yellowhammer	Naturalised		• †
<i>Fringilla coelebs</i>	Chaffinch	Naturalised		• †
<i>Fulica atra</i>	Australian coot	Indigenous	At Risk-Naturally Uncommon	•
<i>Gerygone igata</i>	Grey warbler	Indigenous	Not threatened	• †
<i>Gymnorhina tibicen</i>	Australian magpie	Naturalised		• †
<i>Haematopus finschi</i>	South island pied oystercatcher	Indigenous	At Risk-Declining	†
<i>Hemiphaga novaeseelandiae</i>	Kererū	Indigenous	Not threatened	• †
<i>Himantopus himantopus leucocephalus</i>	Pied stilt	Indigenous	Not threatened	†
<i>Hirundo neoxena neoxena</i>	Welcome swallow	Indigenous	Not threatened	• †
<i>Larus bulleri</i>	Black-billed gull	Indigenous	Threatened-Nationally Critical	†
<i>Larus dominicanus</i>	Black-backed gull	Indigenous	Not threatened	†
<i>Mohoua novaeseelandiae</i>	Brown creeper	Indigenous	Not threatened	†
<i>Ninox novaeseelandiae</i>	Morepork	Indigenous	Not threatened	†
<i>Passer domesticus</i>	House sparrow	Naturalised		• †
<i>Petroica macrocephala macrocephala</i>	South Island tomtit	Indigenous	Not threatened	• †
<i>Phalacrocorax carbo</i>	Black shag	Indigenous	At Risk-Naturally Uncommon	†
<i>Porphyrio melanotus</i>	Pukeko	Indigenous	Not threatened	†
<i>Prosthemadera novaeseelandiae</i>	Tūtī	Indigenous	Not threatened	• †
<i>Prunella modularis</i>	Dunnock	Naturalised		• †
<i>Rhipidura fuliginosa placabilis</i>	South Island fantail	Indigenous	Not threatened	• †
<i>Sturnus vulgaris</i>	European starling	Naturalised		• †
<i>Tadorna variegata</i>	Paradise shelduck	Indigenous	Not threatened	• †
<i>Turdus merula</i>	Eurasian blackbird	Naturalised		• †
<i>Turdus philomelos</i>	Song thrush	Naturalised		• †
<i>Vanellus miles</i>	Masked lapwing	Indigenous	Not threatened	• †
<i>Zosterops lateralis</i>	Silvereye	Indigenous	Not threatened	†

5.4 Bats

The Department of Conservation bat database contains records for long-tailed bats (*Chalinolobus tuberculatus*; Threatened-Nationally Critical) within approximately 17 kilometres of the five plantation forests. These records are from the nearby Catlins Conservation Park. Long-tailed bats are known to utilise plantation forests, including pine plantations, and the five forestry blocks are within the known home-range distance for long tailed bats (Borkin 2009 and 2010). Thus bats could occur within all of the five forestry blocks.

5.5 Lizards

The Bioweb Herpetofauna database contains no records for indigenous or naturalised reptiles within a 10 kilometre radius of the five plantation forests. However, this does not mean that there are no lizards within the forests, merely that nobody has looked for or reported any yet.

5.6 Freshwater fauna

Based on a search of the New Zealand Freshwater Fish Database (NIWA 2018), there are no records for indigenous or naturalised freshwater fauna in streams or rivers that occur within or near the five plantation forests. The streams and rivers that were searched included the Mataura River, Kuriwai Creek, Habukinini Creek and Titiroa Stream. However, this does not mean that there are no indigenous fish within the forests, merely that nobody has looked for or reported any yet. It is also possible that downstream fish passage barriers prevent fish for accessing the stream habitat within the forests.

5.7 Invertebrates

There are no indigenous invertebrate records within a ten kilometre radius of the five plantation forests (Brian Patrick, Wildland Consultants, personal communication; Patrick 2018). However, this does not mean that there are no indigenous invertebrates within the forests, merely that nobody has looked for or reported any yet.

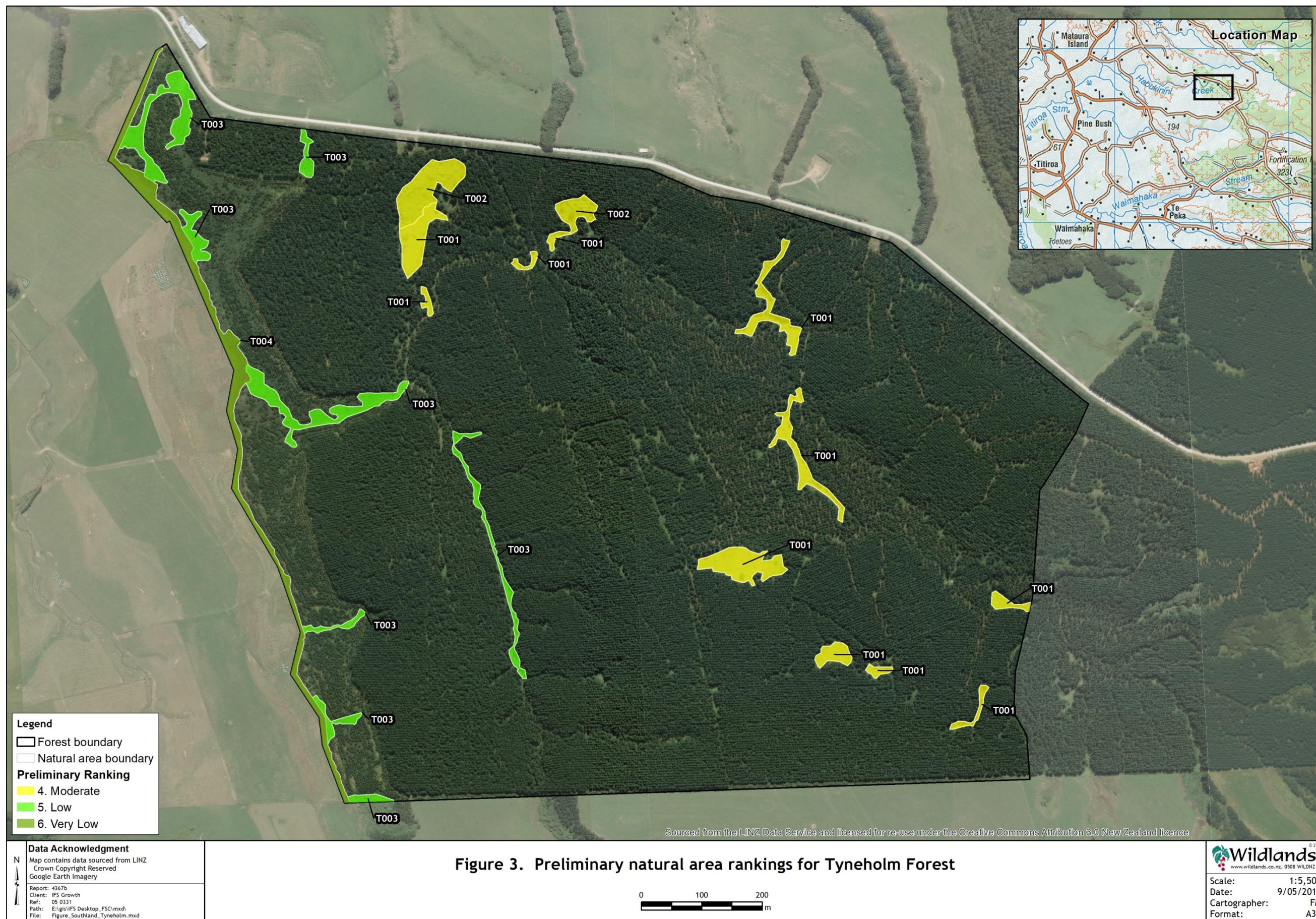
6. TYNEHOLME FOREST

6.1 Site description

Tyneholme Forest is a 132 hectare plantation of radiata pine (*Pinus radiata*) that is situated at approximately 180 metres above sea level (a.s.l) and located immediately south of Mitchell Road. The forest is bordered by pasture in its northern, western and southern boundaries. The forest is immediately bordered by Woodslea Forest to the east. A tributary of Habukinini Creek passes through the forest.

6.2 Vegetation and habitats

Four vegetation types were identified in unstocked areas in Tyneholme Forest. These are described below and are illustrated in Figure 3.



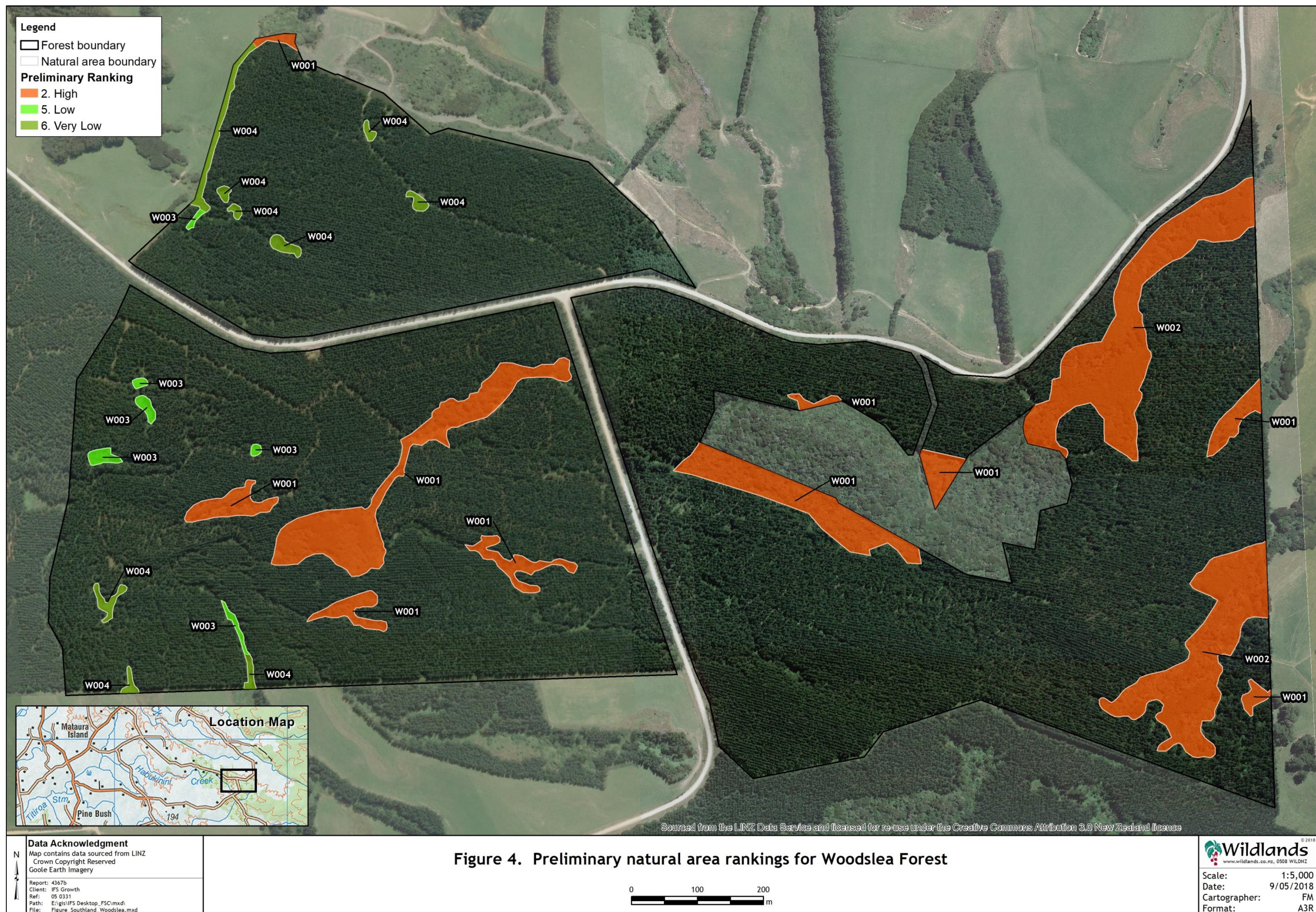


Figure 4. Preliminary natural area rankings for Woodslea Forest

6.2.1 Degraded wetlands (T001)

Based on examinations of aerial images, areas of wetland appear to occur within Tynholme Forest. Based on these images, these wetlands appear to be quite degraded and may contain a high proportion of naturalised species. However, sedges (probably the indigenous *purei*; *Carex secta*) are clearly visible in aerial images within the majority of the natural areas, indicating that some indigenous vegetation still persists. These wetlands should be surveyed, both to assess their overall ecological state, as well as for the presence of *Coprosma pedicellata*.

6.2.2 Indigenous broadleaved scrub (T002)

Two small areas of indigenous broadleaved scrub occur in the northwestern section of Tynholme Forest. These areas may contain tree and shrub species such as kāpuka (*Griselinia littoralis*), kāmahi (*Weinmannia racemosa*), kōtukutuku (*Fuchsia excorticata*) and mānuka (*Leptospermum scoparium*). In the western-most patch of broadleaved scrub, willow (likely grey willow; *Salix cinerea*) appear to occur in the scrub that borders T001 (Figure 3).

6.2.3 Gorse-broom shrubland (T003)

Areas of scrub, containing gorse (*Ulex europaeus*) and/or broom (*Cytisus scoparius*), are located along the western and northwestern boundaries of the forest. These areas of scrub may also contain blackberry (*Rubus fruticosus* agg.) and other exotic woody shrubs. Early succession indigenous woody species such as karamū (*Coprosma robusta*), kōhūhū (*Pittosporum tenuifolium*) and makomako (*Aristotelia serrata*) may also be scattered through the scrub, but do not appear to be a dominant part of the vegetation.

6.2.4 Exotic grassland (T004)

The western margin of Tynholme Forest borders pastures that are utilised for livestock grazing. This strip of pasture is dominated by naturalised grass and broadleaved herb species that are likely to include cocksfoot (*Dactylis glomerata*), Kentucky bluegrass (*Poa pratensis*), red fescue (*Festuca rubra* subsp. *rubra*), rye grass (*Lolium perenne*) and white clover (*Trifolium repens*). Indigenous plant species are unlikely to be dominant within this habitat.

7. WOODSLEA FOREST

7.1 Site description

Woodslea Forest is a 136 hectare plantation of radiata pine that has compartments on either side of Mitchell Road and Woodslea Downs Road. The forest is situated at approximately 230 metres a.s.l and is bordered by pasture on its northern, eastern and part of its southern border. Tynholme forest is located immediately west of the forest, while Old Shed is located immediately south of the forest for part of its boundary. A tributary of Habukinini Creek flows through the forest.

7.2 Vegetation and habitats

Four vegetation types were identified in natural areas in Woodslea Forest. These are described below and are illustrated in Figure 4.

7.2.1 Southern rātā-kāmahi forest (W001)

A number of small areas appear to be dominated by southern rātā and kāmahī in Woodslea Forest. The canopy appears to contain occasional silver beech. The understorey of this forest may contain broadleaved species such as hūpiro (*Coprosma foetidissima*), kāpuka, kōtukutuku, mountain horopito (*Pseudowintera colorata*), putaputawhētā (*Carpodetus serratus*) and the treefern kātote (*Cyathea smithii*).

7.2.1 Silver beech forest (W002)

Two areas of forest appear to be dominated by silver beech. These areas of forest may contain southern rātā and kāmahī, as well as the subcanopy species outlined in the rātā and kāmahī forest description above.

7.2.1 Broom-blackberry scrub (W003)

Small areas of scrub in the west of Woodslea Forest appear to contain broom or blackberry. These areas may also contain indigenous tree ferns (most likely whekī-ponga; *Dicksonia fibrosa* or whekī; *D. squarrosa*), as well as indigenous woody plant species such as karamu, kōtukutuku and tarata (*Pittosporum eugenioides*).

7.2.2 Exotic grassland (W004)

Small areas of rank naturalised grasses and broadleaved herbaceous species appear to occur in the western section of Woodslea Forest. All of these areas are small and three occur immediately adjacent to roads, so are likely to be highly disturbed and of low habitat value. It is likely that these areas comprise species such as, cooksfoot, creeping buttercup (*Ranunculus repens*), foxglove (*Digitalis purpurea*), selfheal (*Prunella vulgaris*) and Yorkshire fog.

8. OLD SHED FOREST

8.1 Site description

Old Shed Forest (approximately 240 metres a.s.l) is a 139 hectare plantation of radiata pine that is partially bordered by Woodslea Downs Road to its north and Gibb Road to its west. The forest is located immediately south of Woodslea Forest and immediately adjacent to Homestead Forest. A section of the northern and eastern boundaries occur next to pasture, while a large section of the southeastern boundary is bordered by indigenous forest. Tributaries of the Titiroa Stream pass through Old Shed Forest.

8.2 Vegetation and habitats

Five vegetation types were identified in natural areas in Old Shed Forest. These are described below and are illustrated in Figure 5.

8.2.1 Silver beech-southern rātā-kāmahi forest (OS001)

Numerous small to medium sized areas of forest that likely comprise a canopy of silver beech, southern rātā and kāmahi occur throughout Old Shed Forest. These areas may also contain a subcanopy of species such as haumangōroa (*Raukaua simplex*), hūpiro, kāpuka, kōtukutuku, orihou (*Pseudopanax colensoi*), mountain horopito and putaputawhētā.

8.2.1 Broadleaved scrub (OS002)

An area of broadleaved scrub occurs in the southern section of Old Shed Forest that appears to primarily contain indigenous shrub and tree species that may primarily comprise southern rātā and kāmahi. Along the eastern fringe of this scrub occurs a small stand of mature silver beech. However, this scrub also appears to comprise small areas of naturalised tree and shrub species such as blackberry, broom and willow.

8.2.1 Exotic-indigenous scrub on pond margin (OS003)

A small pond (35 metres long) is located in the northern half of Old Shed Forest. The pond is primarily bordered by radiata pine plantation but does have some scrub on its western and eastern margins. This scrub is likely a mix of naturalised and indigenous species. Sedges (probably pūrei; *Carex secta*) occur both on the pond margins and in the water. These margins should be checked for the presence of *Coprosma pedicellata*.

8.2.2 Blackberry-broom shrubland (OS004)

Areas of broom and blackberry scrub are scattered throughout Old Shed Forest. These areas may also contain gorse and, in wetter areas, grey willow. Small areas of rank naturalised grasses occur within some of the areas of scrub. It is likely also that these areas of scrub comprise indigenous woody shrub and tree species such as kōtukutuku and kōhūhū.

8.2.3 Exotic grassland (OS005)

Rank naturalised pasture grows along the margins of tracks and in shallow gullies that may have once been wetland habitat. Although it appears that these areas are dominated by naturalised grass species such as tall fescue and Yorkshire fog, they may also still contain indigenous plant species that are commonly associated with wetland habitats in the ecological district.

9. HOMESTEAD FOREST

9.1 Site description

Homestead forest (190 metres a.s.l) is a 109 hectare plantation of radiata pine that is bordered by Woodslea Downs Road to its north and Gibb road its east. The forest is located immediately west of Old Shed Forest. The north, west and part of the eastern boundary of the forest are bordered by pasture for livestock grazing and scrub. The south and southwest border of the forest adjoins further areas of radiata pine plantation. Tributaries of the Titiroa Stream pass through the forest.

9.2 Vegetation and habitats

Four vegetation types were identified in natural areas in Homestead Forest. These are described below and are illustrated in Figure 6.

9.2.1 Silver beech-southern rātā-kāmahi forest (H001)

There are three areas of indigenous forest that appear to contain a canopy of silver beech, southern rātā and kāmahi. The understorey species within this forest are likely to be similar to those within the same forest type in Old Shed Forest.

9.2.1 Small pond area (H002)

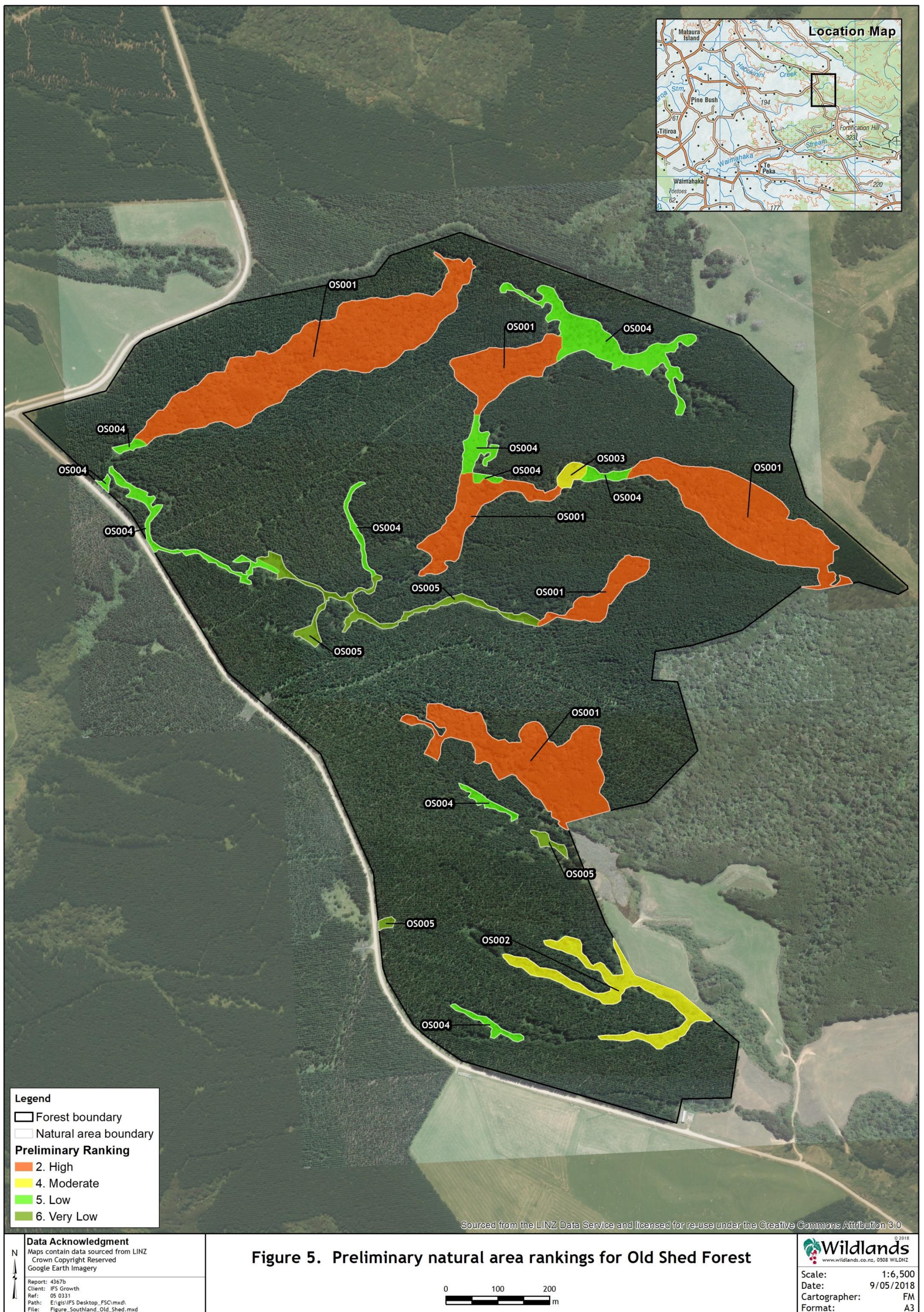
A small pond (approximately 18 metres wide) occurs along the western margin of Homestead Forest. Indigenous scrub and forest occurs along the northern side of the pond, while either broom or gorse occurs along the eastern side. The south and western sides of the pond are bordered by what appears to be rank naturalised grasses and indigenous sedges. These margins should be checked for the presence of *Coprosma pedicellata*.

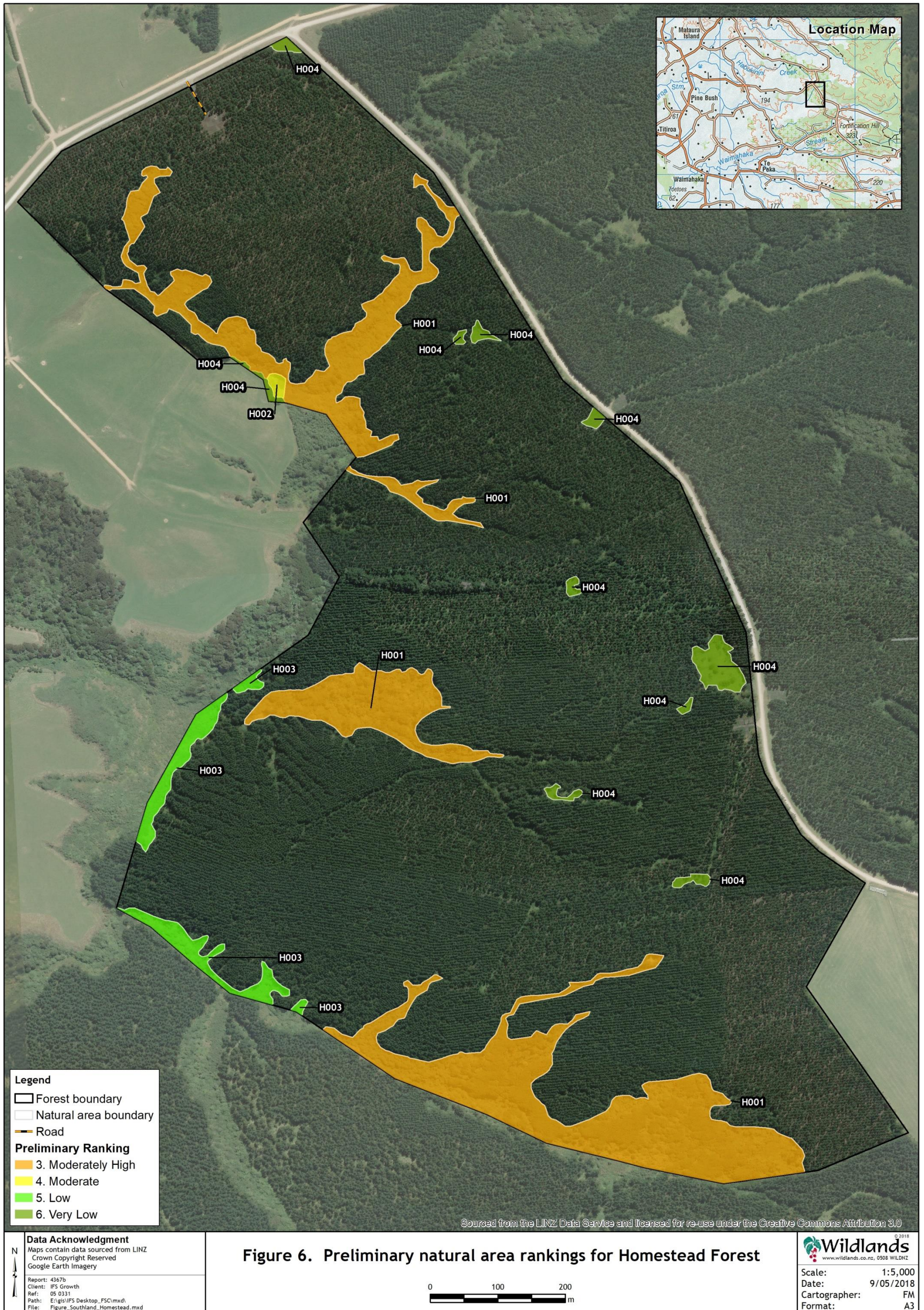
9.2.1 Willow treeland/broom-blackberry shrubland (H003)

Areas of scrub that likely contain grey willow, blackberry, and either broom or gorse occur along the margins of the forest in the southwest corner of Homestead Forest. These areas of exotic scrub may also contain small patches of harakeke and pūrei in low lying depressions.

9.2.2 Exotic grassland (H004)

Small areas of exotic grasses are scattered throughout Homestead Forest. These areas likely contain grass species such as cocksfoot, red fescue, tall fescue and Yorkshire fog, but also broadleaved herbs such as selfheal and broad-leaved dock (*Rumex obtusifolius*). Exotic woody species like blackberry, broom and Himalayan honeysuckle (*Leycesteria formosa*) may occur around the fringes of these areas.





10. FOX FOREST

10.1 Site description

Fox forest (approximately 130 metres a.s.l) is a 127 hectare plantation of radiata pine that is bordered by Woodslea Downs Road to its north. The forest is primarily surrounded by pasture for livestock grazing and scrub, although the plantation is connected to an adjacent radiata pine plantation on its southern border.

10.2 Vegetation and habitats

Five vegetation types were identified in natural areas in Fox Forest. These are described below and are illustrated in Figure 7.

10.2.1 Silver beech-southern rātā-kāmahi forest (F001)

Three areas of southern rātā-kāmahi forest that also likely contains silver beech appear to occur at Fox Forest. These areas of forest likely contain a subcanopy of species such as haumangōroa, hūpiro, kāpuka, kōtukutuku, orihoi (*Pseudopanax colensoi*), mountain horopito, and putaputawhētā.

10.2.1 Tall fescue wetland (F002)

An area in the east of the forest may contain a degraded wetland. This area appears to be dominated by naturalised grasses (most likely tall fescue). However, this area may simply represent a forest clearing where radiata pine failed to establish. A field inspection is required to determine the ecological values and appropriate management.

10.2.1 Willow treeland (F003)

A riparian margin in the east of Fox Forest appears to have been colonized by either crack (*Salix ×fragilis*) or grey willow. The subcanopy may have been invaded by blackberry. It is likely that indigenous plants like harakeke, pūrei and toetoe persist within this treeland.

10.2.2 Gorse-broom-blackberry shrubland (F004)

Areas of exotic shrubland, that primarily appear to contain either gorse or broom and blackberry, are scattered throughout Fox Forest. These areas may also contain mature radiata pine trees, naturalised willows (*Salix* spp.), as well as indigenous shrub and tree species such as mānuka, kōhūhū and kōtukutuku.

10.2.3 Exotic grassland (F005)

Small areas of rank pasture grasses occur around the edges of the plantation. These areas likely contain cocksfoot, sweet vernal (*Anthoxanthum odoratum*) and Yorkshire fog. In wet areas these grasslands may contain tall fescue, and occasional indigenous plant species like harakeke or toetoe (*Austroderia richardii*).

11. PRELIMINARY NATURAL AREA RANKINGS

Preliminary rankings for natural areas in Tyneholme, Woodslea, Old Shed, Homestead and Fox Forests are provided in Table 3 and 4. Note the following matters in relation to these rankings:

- ‘Sites’ are continuous areas of indigenous vegetation larger than 0.5 hectares. Three smaller areas of wetland and small ponds were included as these are habitats that have undergone wide scale loss both in the Ecological District and nationally. In addition, a small area of scrub at Woodslea Forest was included as this may contain a component of indigenous shrub species.
- There is uncertainty regarding the vegetation types and fauna present for many of the natural areas, as this was entirely a desktop assessment.

In total, 22 potential natural areas were assessed (Tables 3 and 4). The majority (17 of 23 units) are considered to be of moderate or lower ecological value due to their small sizes, primarily comprising naturalised plant species, or relatively early succession vegetation types. Nevertheless, many of these natural areas provide habitat for indigenous plants, and potentially also for indigenous birds and bats, and are important for buffering other natural areas, or streams that flow through the natural areas.

Based on the criteria set out in Tables 3 and 4, the rankings indicate that four natural areas, two in Woodslea Forest and one each in Old Shed and Fox Forests are of potentially High status, and one natural area in Homestead forest was of Moderately High value:

- W002 covers 5.71 hectares and contains moderately sized areas of southern rātā-kāmahi forest that are dispersed throughout Woodslea Forest.
- W004 is a 6.41 hectare silver beech forest in the east of Woodslea Forest.
- OS001 is a series of silver beech-southern rātā-kāmahi forests that cover a 17.26 hectare area in Old Shed Forest.
- F005 is a series of examples of silver beech-southern rātā-kāmahi forests that cover c.8.33 hectares in Fox Forest.
- H001 (Moderately High) is a series of silver beech-southern rātā-kāmahi forests that cover c.12 hectares in Homestead Forest.

These natural areas contain vegetation types that were once common within Tahakopa Ecological District, but now, due to forest clearance, are rare outside of areas of publicly owned conservation land. More broadly, these forest types are rare in the eastern South Island and silver beech is near its southern limit in the general area that the plantations occur. These natural areas likely also support a diverse range of indigenous plant species and provide important habitat for indigenous fauna.

All remaining natural areas are of either Moderate (seven natural areas), Low (five natural areas), or Very Low (five natural areas) ecological value (Table 3 and 4).

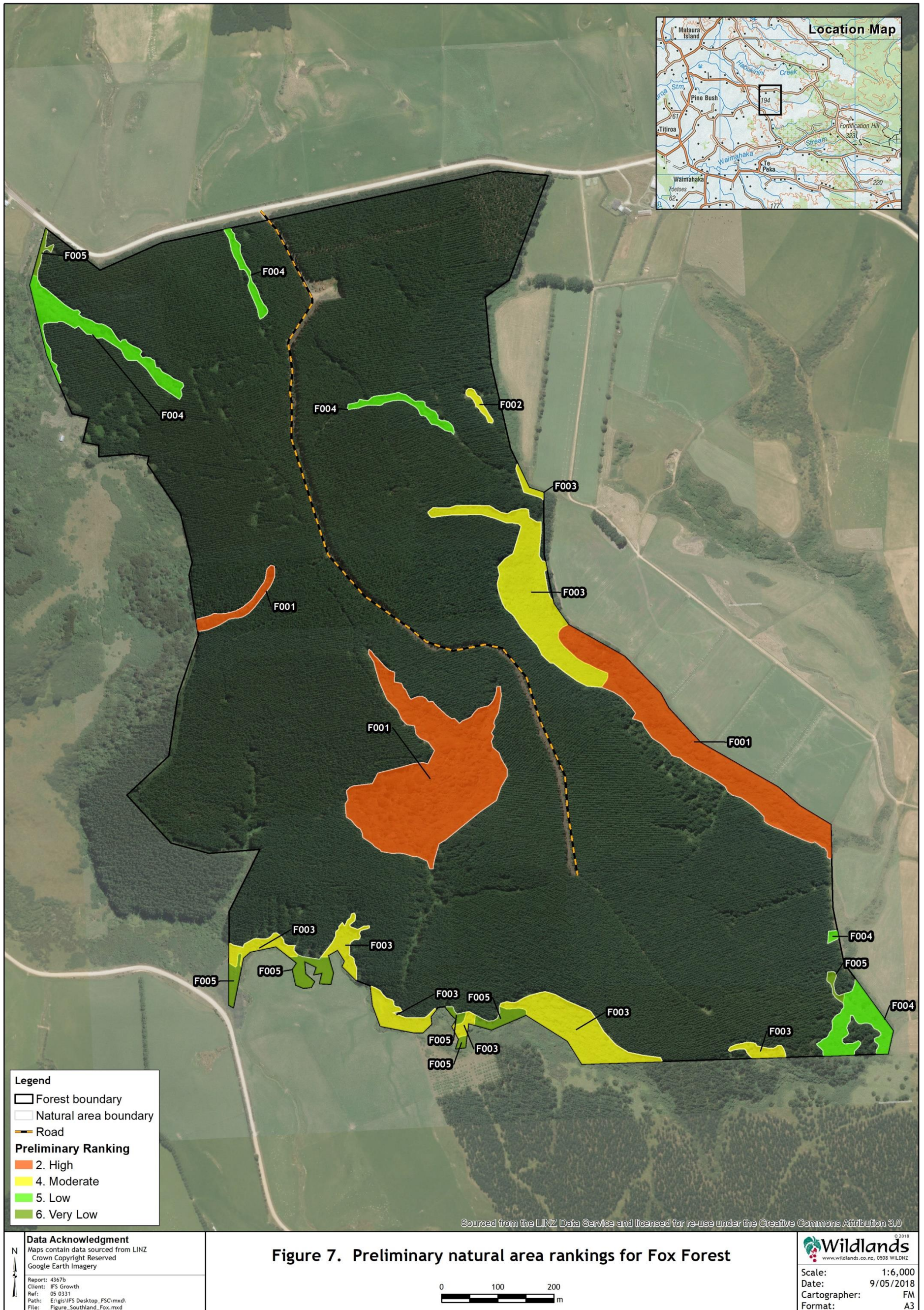


Table 3: Summary of ecological rankings and the number of management units per overall rank for Tyneholme, Woodslea, Old Shed, Homestead and Fox Forests.

Overall Ecological Rank	Forest Block (Number of Natural Areas)					Total
	Tyneholme	Woodslea	Old Shed	Homestead	Fox	
1. Potential HCVF						0
2. High		2	1		1	4
3. Moderately High				1		1
4. Moderate	2		2	1	2	7
5. Low	1	1	1	1	1	5
6. Very Low	1	1	1	1	1	5
Total	4	4	5	4	5	22

Table 4: Preliminary natural area rankings for Tyneholme, Woodslea, Old Shed, Homestead, and Fox Forests.

Forest	Site Name	Vegetation	Category	Area (ha)
Tyneholme	T001	Degraded wetlands	4	2.11
	T002	Indigenous broadleaved scrub	4	0.86
	T003	Gorse-broom shrubland	5	2.06
	T004	Exotic grassland	6	1.55
Woodslea	W001	Southern rātā-kāmahi forest	2	5.71
	W002	Silver beech forest	2	6.41
	W003	Broom-blackberry shrubland	5	0.28
	W004	Exotic grassland	6	0.64
Old Shed	OS001	Silver beech-southern rātā-kāmahi forest	2	17.26
	OS002	Broadleaved scrub	4	1.58
	OS003	Exotic-indigenous scrub on pond margin	4	0.18
	OS004	Blackberry-broom shrubland	5	3.29
	OS005	Exotic grassland	6	1.04
Homestead	H001	Silver beech-southern rātā-kāmahi forest	3	12
	H002	Small pond	4	0.07
	H003	Willow treeland/broom-blackberry shrubland	5	1.19
	H004	Exotic grassland	6	0.85
Fox	F001	Silver beech-southern rātā-kāmahi forest	2	8.33
	F002	Tall fescue wetland	4	0.08
	F003	Willow treeland	4	4.79
	F004	Gorse-broom scrub	5	2.16
	F005	Exotic grassland	6	0.76

12. FIELD SURVEYS

All five forests were assessed as a desktop exercise, but this technique is unable to provide information on the exact composition and condition of indigenous vegetation and fauna habitats within the IFS Growth Ltd estate. Therefore, it is important to undertake ground-based surveys to confirm vegetation types, and identify and evaluate fish, bat, and lizard habitats. There are recent records of long-tailed bats occurring in the Catlins Conservation Park in the DOC bat distribution database. Given that Old Shed Forest is contiguous with Catlins Conservation Park, and the other four plantation forests occur nearby, it is likely that all of the plantations contain

long-tailed bats. Pre-harvest surveys would be useful to determine if bats are indeed present at these sites. If bats are located at the plantations, harvesting operations should proceed following guidelines that aim to reduce impacts on resident bat populations (Wildland Consultants 2018). Surveys should also be undertaken of wetlands areas and riparian margins to determine if *Coprosma pedicellata* occurs within these habitats.

13. MANAGEMENT

Legal protection of areas of indigenous habitat would be valuable to help prevent future clearance and increase protection levels.

Field surveys of bats, fish, lizards and significant flora will likely identify other management activities that could benefit indigenous biodiversity values.

Several of the indigenous sites identified in this report, such as the areas of indigenous forest, would benefit from pest plant and animal control. It is likely that ungulates (for example, red deer; *Cervus elaphus* and pigs; *Sus scrofa*), possums (*Trichosurus vulpecula*), rats (*Rattus* spp.), and mustelid species (principally stoats; *Mustela erminea*) are present in these areas of indigenous forest. Controlling these pest animal species would improve habitat for indigenous flora and fauna by reducing browsing pressure and predation, and helping to prevent the spread of pest plants.

14. CONCLUSIONS

Tyneholme, Woodslea, Old Shed, Homestead, and Fox Forests contain approximately 73 hectares of natural areas. They appear to support a range of vegetation types, including beech forest, southern rātā-kāmahi forest, wetlands and broadleaved scrub. Some of the indigenous vegetation in the natural areas is located on ‘Acutely Threatened’ environments and larger areas of intact indigenous vegetation that occur in these areas warrant protection.

Legal protection of the indigenous vegetation and habitats within the natural areas would help safeguard their protection in the long term, especially for those areas ranked as having High or Moderately High Value (49.7 hectares). Long-tailed bats are likely to use habitat in some of the natural areas, and there is a high probability that threatened plant species occur within at least some of the natural areas in the five forest blocks. Therefore, field surveys are required to better document the ecological values and identify management required to enhance and maintain these natural areas.

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ECOLOGICAL RANKING CRITERIA

Table 5 below outlines preliminary ecological ranking criteria used to assess non-plantation vegetation and habitats in each forest. These ranking criteria follow prior ecological assessments of plantation forests (Wildland Consultants 2015 and 2017). In the first instance, all natural areas were assessed against these significance criteria and then assigned an overall ecological ranking according to Categories 1 to 6 in Table 6.

Table 5: Ecological significance criteria suggested for natural areas in forest management units.

Criteria	Ranking
Representativeness	
1. Indigenous vegetation or habitat that is representative, characteristic, or typical of the natural diversity of the relevant ecological district or ecological region. Note: Assessment of this criterion will require technical input from an ecologist.	H Indigenous vegetation that is similar in composition and structure to the original (1840) vegetation cover. M Secondary indigenous vegetation lacking the original canopy structure, but with some compositional and structural similarities (e.g. scattered emergent podocarps, regeneration of former canopy species). L Vegetation canopy exotic, or with a substantial exotic component, and lacks regeneration of the former canopy species.
2. Indigenous vegetation that is one of the largest examples of its type within the relevant ecological district or ecological region.	H Large intact examples of indigenous vegetation types in the relevant ecological district or region. M Moderately-sized examples of indigenous vegetation types in the relevant ecological district or region. L Small examples of indigenous vegetation types in the relevant ecological district or region.
Rarity	
3. Indigenous vegetation cover on land environments that have less than 20% of their original indigenous cover remaining.	H At least 5 ha of Indigenous vegetation on Acutely Threatened (<10% indigenous cover remaining) and Chronically Threatened (10-20% indigenous cover remaining) Level IV land environments. M At least 5 ha of indigenous vegetation on At Risk Level IV land environments that have 20-30% of their original cover remaining. L Indigenous vegetation on Level IV land environments that have at least 30% of their original extent remaining, or <5 ha of indigenous vegetation on At Risk, Chronically Threatened, or Acutely Threatened Level IV land environments.
4. Indigenous vegetation type or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the relevant ecological district, freshwater environment, or nationally. Note: Accurate information at the ecological district scale may not always be available.	H Indigenous vegetation or habitat of indigenous fauna that is reduced to less than 20% of its original extent. M Indigenous vegetation or habitat of indigenous fauna that is reduced to 20-30% of its original extent. L Indigenous vegetation or habitat of indigenous fauna that has at least 30% of its original extent remaining.
5. Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is Threatened, At Risk, or uncommon, nationally or within the relevant ecological district.	H A Nationally Threatened species ('Nationally Critical', 'Nationally Endangered', 'Nationally Vulnerable' from the national classification) is resident or commonly uses the site. M Nationally At Risk species (includes 'Declining', 'Naturally Uncommon', 'Relict', and 'Recovering' national categories) or uncommon species in the relevant ecological district is resident or commonly uses the site. L No nationally Threatened or At Risk or uncommon species present.

Criteria	Ranking
Distinctiveness	
6. The site contains indigenous vegetation or an indigenous species at its distribution limit within Wairarapa or nationally.	H A vegetation type or species is present at its national distribution limit.
	M A vegetation type or species is present at a regional distribution limit.
	L No vegetation types or species at national or regional distribution limits are present at the site.
7. Indigenous vegetation or an association of indigenous species that is distinctive, of restricted local occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combinations of factors.	H Vegetation occurring on originally rare ecosystems; associations of indigenous species that are distinctive within the relevant ecological district.
	M Associations of indigenous species that are locally distinctive.
	L No distinctive features present at the site.
Diversity and Pattern	
8. Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse natural features or ecological gradients.	H More than 75 indigenous plant species and/or five or more vegetation types, or 10 or more indigenous avifauna present.
	M Between 25-75 indigenous plant species and/or three or four vegetation types, or between 5-9 indigenous avifauna present.
	L Fewer than 25 indigenous plant species present within only one or two vegetation types, and fewer than five indigenous avifauna present.
Ecological context	
9. Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.	H A large site that provides important buffering of a protected natural area or wetland, occupies a headwater catchment of a permanent stream.
	M A smaller site that is part of a network of patches of indigenous vegetation within the flying distance of most forest birds; sites that provide moderate buffering of streams or wetlands.
	L Isolated from other areas of indigenous vegetation or habitat, lacks important buffering functions.
10. A wetland which plays an important hydrological, biological or ecological role in the natural functioning of a river or coastal system.	H Listed in WERI inventory or Regional Plan: Water for Otago.
	M Not listed in regional databases; greater than 0.5 ha in area, or smaller but dominated by indigenous plant species.
	L Not listed in regional databases; less than 0.5 ha and with a significant component of exotic plant species.
11. Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding, or resting) for indigenous fauna, either seasonally or permanently.	H The site provides an important habitat for indigenous fauna.
	M Sites of moderate habitat value for indigenous fauna.
	L Sites that have low importance as a resource for indigenous fauna.

Table 6: Ranking scheme for natural areas within forests.

Category	Criterion
1 Potential HCVF	Site values meet six or more high (H) rankings.
2 High	Site values meet 3-5 high (H) rankings.
3 Moderately High	Site values meet two high (H) rankings.
4 Moderate	Site values meet either one high (H) ranking or at least four moderate (M) rankings.
5 Low	Site values meet 1-3 moderate (M) rankings and no high (H) rankings
6 Very Low	No high (H) or moderate (M) rankings



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