Birse Community Trust

SCOTTISH WOOD ANTS IN BIRSE PARISH

(December 2016)

INTRODUCTION

Wood ants are an important natural component of native pinewood ecosystems in Scotland, and significant relic populations of wood ants exist in Birse parish on Deeside, Aberdeenshire.

Both Scotland's native species of wood ant, the Northern or Hairy Wood Ant (*Formica lugubris*) and the Scottish Wood Ant (*Formica aquilonia*), occur in the parish and they are the most easterly surviving colonies of each species in Scotland.

This is BCT's third report on the wood ants in Birse parish, following reports in 2014[1] and 2015[2]. The first part of this report updates the information in the earlier reports on the number and distribution of wood ant nests recorded in the parish.

The second part of the report discusses the results of a research project by Dr Jenni Stockan and Marjan Lintermans from the James Hutton Institute, into the very unusual vegetation covered Scottish Wood Ant nests described in BCT's 2015 wood ant report.

BCT is grateful to Jenni Stockan for all her assistance with BCT's project on wood ants and for the information from her research on the vegetation covered nests. BCT is also grateful to everyone else who has helped with BCT's work on wood ants.[3]

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[1] BCT 'Wood Ant Colonies in Birse Parish' (2014)
[2] BCT 'Wood Ants in Birse Parish' (2015)
[3] including Robin Callander, Irvine Ross, Rod Begbie, Rita Callander and Neil Mackenzie.

1. Distribution of Wood Ant Nests

Parish Scale

1 The first map at the end of this report shows the distribution of the 172 recorded wood ant nests in Birse parish, while the attached schedules record the details of each nest in terms of location, species and size.

2 The distinctive pattern in Map 1, with the distribution of nests stretching 6 miles across the parish, reflects the historic boundary of the Bishops of Aberdeen's medieval hunting forest in the south west half of the parish, as explained in BCT's 2014 report.

3 The increase in the number of recorded nests from 151 in 2015 to 172 in 2016, was due to the additional nests found in and around the Glen Ferrick and Upper Finlets area, with over 100 nests now recorded there.

4 These additional nests expanded the distribution of the nests recorded in that area, with the discovery of five nests down the Burn of Garbet to the north of Rhachatan and also a single nest near Craig of Woodend to the south-east.

Forest of Birse

5 The second map shows the distribution of the nests in the Forest of Birse area in more detail and distinguishes between the two species *F.aquilonia* (Scottish Wood Ant) and *F.lugubris* (Northern Wood Ant).

6 The population of *F.aquilonia* in Rhachatan is surrounded by *F.lugubris* populations to the north, east and south, while there are also the separate *F.lugubris* populations further up the glen at the Finlets Burn and East and West Bogturk.[4]

7 In 2016, there was a systematic approach to identifying the species of each nest in the Rhachatan area. As a result, the number of nests identified as *F.aquilonia* increased from 19 in 2015 to 42, and the boundaries between the two species in the area became more clearly defined.

Glen Ferrick and Upper Finlets

8 The third map in this report shows the distribution of nests in the Glen Ferrick and Upper Finlets area in more detail, with the species of the nests where this has been identified. A number of nests south of Rhachatan have yet to be identified and it is possible that the line of nests 101-109 might be *F.aquilonia*.

9 The species are clearly separated into different areas, yet there do not appear to be significant differences in the respective habitats, in terms of tree density or other factors. This would seem to indicate that *F.aquilonia* is the dominant species, despite some suggestions in research literature that the species might be co-dominant.

10 The impression from looking at the *F.aquilonia* nests is that the population has been expanding its area, as discussed in the next section. There is no apparent evidence on site that the *F.aquilonia* have been displacing the *F.lugubris* from parts of the area. However, it is possible that this has happened over time if both species survived historically within a smaller core area at Rhachatan.

[4] The historical explanation of the distribution of nests in the Forest of Birse is discussed in BCT's 2015 report.

2. Vegetation Covered F.aquilonia Nests

Background

1 Both species of wood ant, *F.lugubris* and *F.aquilonia*, build characteristic domed shaped bare mounds of pine needles and other material. The mounds can be up to 2 metres in diameter and a metre or more in height.

2 However, as BCT's 2015 report on wood ants described, thriving *F.aquilonia* nests were discovered at Rhachatan that are completely covered with vegetation (as illustrated below) and significantly larger than the usual bare nests.

3 The 2015 report described the apparent progression amongst the Rhachatan nests from partially vegetation covered to completely covered nests, and suggested that the completely covered nests appeared to represent the apex of natural *F.aquilonia* nest development in long established colonies in a suitable, relatively stable habitat.

4 In 2016, Dr. Jenni Stockan and Marjan Lintermans carried out a short research project to investigate the *F.aquilonia* nests at Rhachatan, as no equivalent vegetation covered nests have been recorded elsewhere in Scotland. The project involved taking a wide range of measurements, including the size of the nests, their percentage vegetation cover and internal nest temperatures.

5 As a result of their project, the researchers concluded that the vegetation covered *F.aquilonia* nests at Rhachatan "are healthy and thriving" and do indeed appear to represent "a climax state for *F.aquilonia* nests in stable and undisturbed habitat".[5]

Research Results

6 Measurements from the project confirmed that the vegetation covered nests are significantly taller and have significantly greater volume than the uncovered nests.

[5] Jenni Stockan & Marjan Lintermans 'Undercover but thriving: a unique population of vegetated wood ant (F.aquilonia) nests in Scotland' (in prep.)

The covered nests also have over 50% greater volume than *F.aquilonia* nests that have been measured elsewhere in Scotland.[6]

7 The measurements showed a clear correlation between the percentage vegetation cover on nests and the height and volume of nests. This confirmed the progression apparent on site, with both nest size and vegetation cover increasing from the bare nest mounds to the larger, fully covered nests. As the nests get larger, the vegetation free window maintained by the ants on the south side of the nest reduces in size until it is allowed to grow over completely.

8 The correlation between size and vegetation cover reflects a progression of younger nests to older nests, as nest size is generally correlated with age, so that the larger, covered nests can be considered the oldest nests. Map 4 in this report also shows the nests with highest percentage vegetation cover are concentrated in a core area with the less covered, younger nests around it, reflecting an apparent expansion in the *F.aquilonia* population.

9 During the research, there was no apparent difference between the covered and uncovered nests in the onset of ant activity in the spring or subsequent levels of ant activity. The internal temperatures of the nests were also similar during the limited period of the project, reflecting that the larger covered nests are able to rely more on their own internally generated heat than solar radiation.

10 It is a significant feature of the covered nests that the dominant vegetation on them is blaeberry (*Vaccinium myrtillis*). While the blaeberry shoots appear to provide an internal structure that supports the taller height of the covered nests, blaeberry's deciduous nature means that more solar radiation will reach the surface of the nest during the early part of the year.

11 The fact that the completely covered nests are healthy and thriving indicates that *F.aquilonia* is more shade tolerant than previously recognised. The capacity to generate more of the nest's heat internally and rely less on solar radiation, will also potentially insulate them more against the weather and fluctuations in external temperatures.

12 Another apparent benefit of the covered nests includes a lack of the winter damage by other animals that occurs to most uncovered nests, so that the ants in the covered nests do not need to repair the nests in spring and can spend more time foraging. Similarly, the ants in the covered nests do not need to spend time controlling the vegetation on the surface of the nest to keep it open.

Distinctive Population

13 The discovery of the population of *F.aquilonia* at Rhachatan is of significant conservation interest because of the distinctive vegetation covered nests and the new perspective they provide on the capacity of the species to thrive with less solar radiation than previously recognised.

14 *F.aquilonia* is a widespread species, which is distributed across northern Eurasia at latitudes of greater than around 50 degrees. While no nests equivalent to the covered nests at Rhachatan have been recorded elsewhere in Scotland to date, there are

[6] Stockan and Lintermans (in prep.)

also no records so far of equivalent covered nests elsewhere. There are, however, suggestions that some may occur in northern Scandinavia and it is anticipated they will also occur at other locations in the species extensive range.[7]

15 A key factor in the development of the covered nests at Rhachatan appears to be a relatively long history as an undisturbed habitat. However, other habitat related factors will also be significant, including the site's exposure and microclimate, the nature of the substrate, the extent and character of the tree cover, the type of ground vegetation, and the abundance and quality of the food supply available to the ants.

16 While the population of *F.aquilonia* at Rhachatan with less than 50 nests is relatively small compared to many other locations in Scotland, the density of nests at over 5 per hectare is higher than the densities recorded elsewhere in Scotland, which appear to be generally less than two per hectare.[8]

17 The relatively high density of nests and the fact that the volume of the covered nests is over 50% greater than other measured *F.aquilonia* nests in Scotland,[9] indicate an unusually high density of *F.aquilonia* ants in the Rhachatan area. This suggests a particularly favourable habitat for the ants, including the food supply available. However, at this stage, it is not clear why Rhachatan should be so favourable.

18 A botanical survey of the ground vegetation of the site confirmed, for example, that it is dominated by ling heather (*Calluna vulgaris*) and relatively species poor.[10] The extent of blaeberry present is likely to be very significant given its dominance on the covered nests. There is also no bracken in the core area. The extent and character of the tree cover of Scots pine on the site, while appearing similar to other local sites, will be crucial to the ants in terms of the ground level solar radiation and food supply.

19 The tree cover is a key site variable that could change and affect the Rhachatan population of *F.aquilonia*. A limited inspection of the trees on the site suggests that measurements would show the tree cover has been gradually increasing over the last 50-100 years or more. There is limited deadwood on the site and a pattern of scattered, old open-grown pines with groups of younger pine that have regenerated beside them, as well as a limited number of individual younger pine that have become established in other open areas.

20 The current rate of increase in tree cover in the Rhachatan area is slow and would appear to present no immediate threat to the *F.aquilonia*. The dense ground vegetation on much of the site and local deer numbers limit the natural regeneration. There are, however, signs of increasing numbers of pine seedlings on some parts of the site that have been swiped in the past as part of capercaillie conservation.

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[7] Stockan (pers. comm.)
[8] Stockan and Lintermans (in prep.)
[9] Stockan and Lintermans (in prep.)
[10] R.Begbie 'Botanical Survey - Rhachatan, Forest of Birse' (2015)

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Wood Ant Nests in Birse Parish

Scale 1 : 55,000 7/11/2016

Single wood ant nest

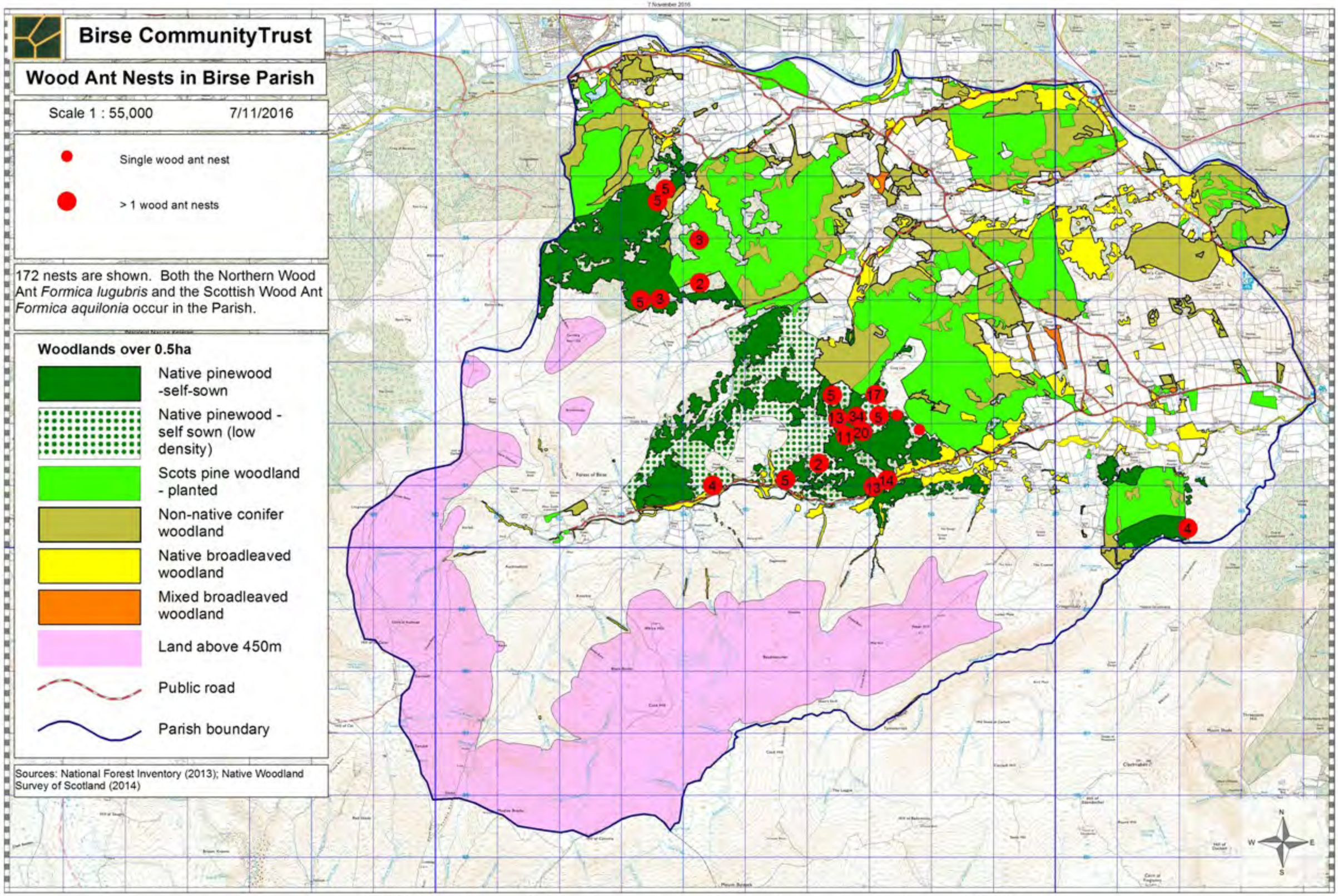
> 1 wood ant nests

172 nests are shown. Both the Northern Wood Ant *Formica lugubris* and the Scottish Wood Ant *Formica aquilonia* occur in the Parish.

Woodlands over 0.5ha

- Native pinewood -self-sown
- Native pinewood - self sown (low density)
- Scots pine woodland - planted
- Non-native conifer woodland
- Native broadleaved woodland
- Mixed broadleaved woodland
- Land above 450m
- Public road
- Parish boundary

Sources: National Forest Inventory (2013); Native Woodland Survey of Scotland (2014)



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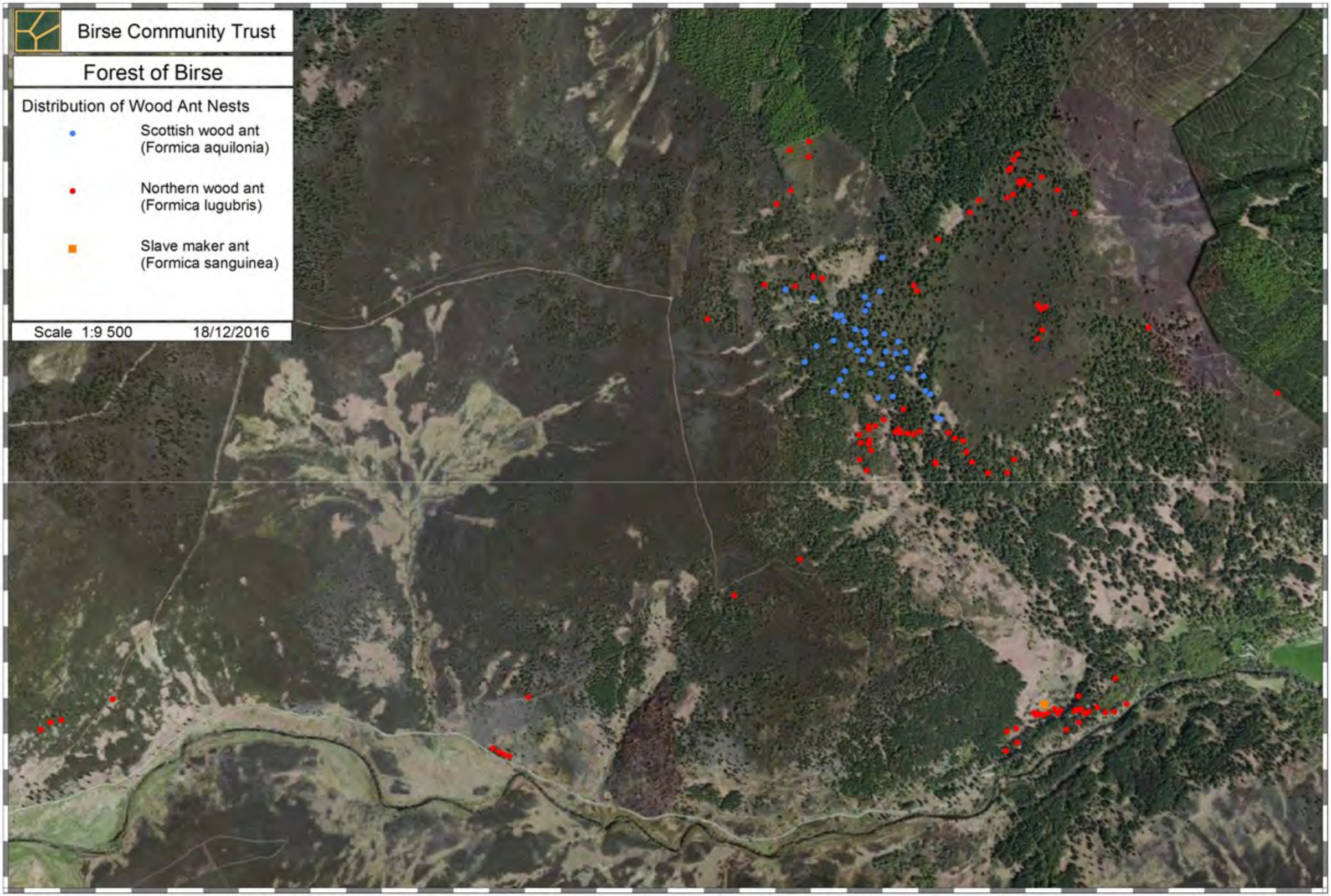
Forest of Birse

Distribution of Wood Ant Nests

- Scottish wood ant (Formica aquilonia)
- Northern wood ant (Formica lugubris)
- Slave maker ant (Formica sanguinea)

Scale 1:9 500 18/12/2016



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Wood Ants in Birse Parish

Upper Glen Ferrick and Upper Finlets

Distribution of Wood Ant Nests

- Wood ant species unidentified
- Formica lugubris
- Formica aquilonia

Scale 1:2 500 18/12/2016

Cairn

Corybeg

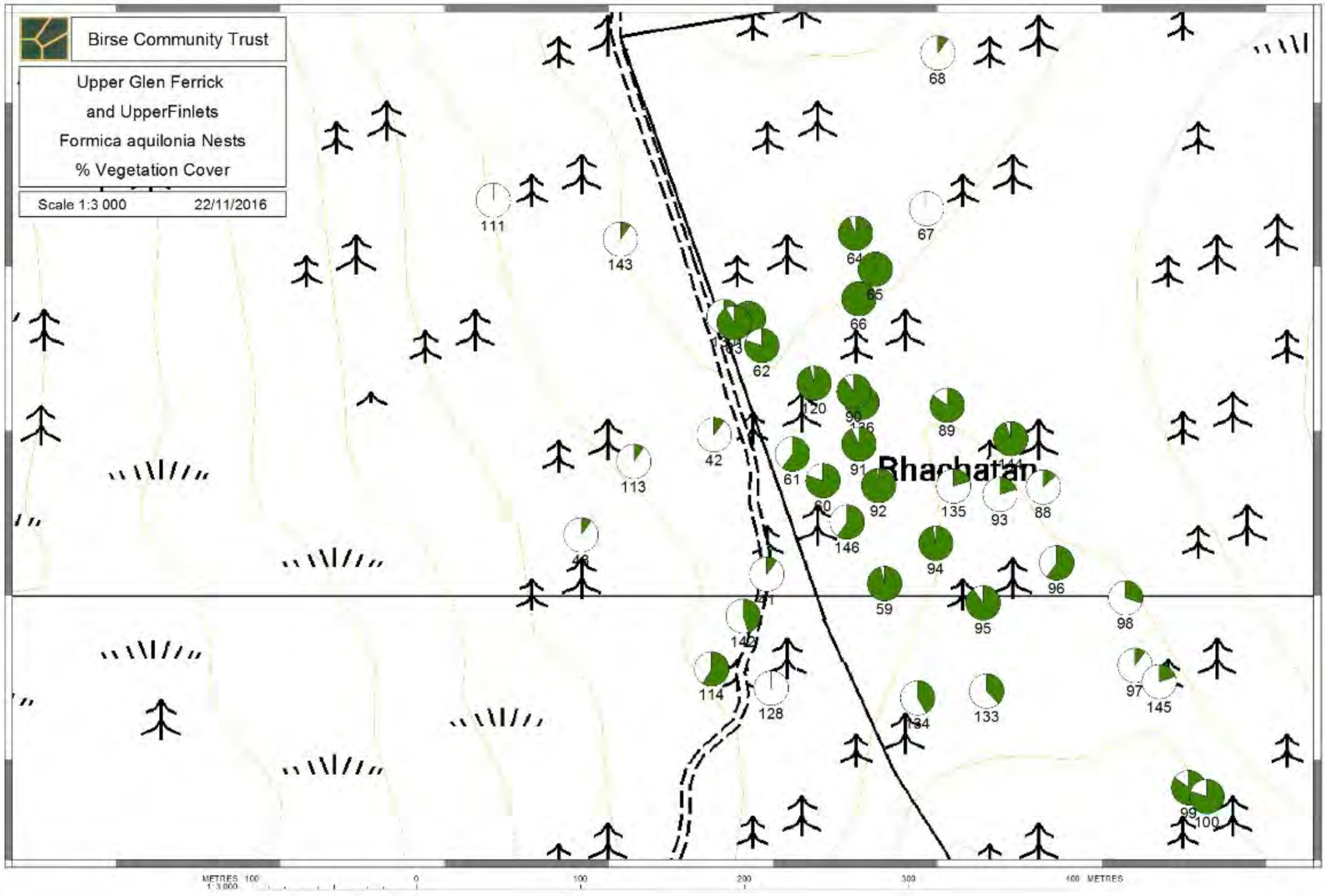
Rhachatan

Wood

Birse Community Trust

Upper Glen Ferrick
and UpperFinlets
Formica aquilonia Nests
% Vegetation Cover

Scale 1:3 000 22/11/2016



Forest of Birse Wood Ant nest Locations **09/12/2016**

				OS Map Reference	
ID		**Size**	**Species**	**X**	**Y**
Finlets Burn East					
1		Large		357215	791012
2		Medium		357250	791033
3		Large		357238	791065
4		Large		357241	791066
5		Large		357256	791069
6		Medium		357302	791075
7		Medium		357325	791060
8		Small		357349	791062
9		Small		357383	791084
10		Medium		357351	791156
11		Large		357249	791106
12		Large		357266	791057
13a		Medium		357249	791067
13		Large		357278	791062
Finlets Burn West					
14		Medium		357198	791066
15		Medium		357190	791057
16		Medium		357182	791070
17		Large		357151	791053
18		Large		357140	791057
19		Medium		357127	791058
20		Medium		357124	791059
21		Medium		357163	791059
22			Slave Maker Ant	357153	791083
23		Small		357126	791053
24		Large		357077	790976
25		Small		357046	790953
26		Medium		357075	791015
27		Small		357048	791007
Finlets Track					
28		Medium	F. lugubris	355710	791103
29		Large	F. lugubris	356470	791488
29a		Large	F. lugubris	356284	791388
Upper Finlets 1					
30		Large		356637	791767
31		Large		356657	791737
32		Medium		356669	791792
33		Medium		356662	791811
34		Small		356662	791814
35		Medium		356664	791821
36		Medium		356640	791815
37		Medium		356636	791837

38		Medium		356662	791852
39		Large	F. lugubris	356680	791862
40		Small		356662	791861
41		Large	F. aquilonia	356596	792015
42		Large	F. aquilonia	356564	792100
43		Medium	F. aquilonia	356483	792039
West Bogturk					
45		Medium		354548	791098
46		Large		354403	791039
47		Small		354372	791032
48		Small		354346	791012
Upper Glen Ferrick 1					
49		Large		356850	791755
50		Large		356848	791761
51		Large		356804	791846
52		Small		356786	791838
53		Medium		356770	791841
54		Medium		356752	791842
55		Large		356736	791844
56		Large		356747	791851
57		Large	F. lugubris	356759	791908
58		Large		356704	791879
59		Large	F. aquilonia	356668	792009
60		Medium	F. aquilonia	356631	792072
61		Large	F. aquilonia	356612	792088
62	Abandoned 2015	Large	F. aquilonia	356593	792155
63	Abandoned 2016 relocated to 130	Large	F. aquilonia	356576	792168
64		Large	F. aquilonia	356650	792223
65		Large	F. aquilonia	356662	792201
66		Large		356652	792183
67		Small	F. aquilonia	356693	792238
68		Medium	F. aquilonia	356700	792333
69		Medium	F. lugubris	356857	792384
70		Large	F. lugubris	356945	792459
71		Large		356945	792459
72		Small		356970	792493
73		Large		357052	792576
74		Small		357059	792583
75		Medium		357067	792607
76		Medium		357079	792622
77		Medium		357190	792521
78		Large		357238	792457
79		Medium		357146	792557
80		Large		357111	792536
81		Large		357095	792548
82		Medium		357086	792538

83		Large		357083	792546
84		Small		357067	792509
85		Medium		357050	792500
86		Large	F. lugubris	356788	792254
87		Medium	F. lugubris	356798	792238
88		Large	F. aquilonia	356764	792068
89		Large	F. aquilonia	356706	792118
90		Large	F. aquilonia	356649	792127
91		Large	F. aquilonia	356652	792094
92		Large	F. aquilonia	356664	792069
93		Large	F. aquilonia	356738	792064
94		Large	F. aquilonia	356699	792034
95		Large	F. aquilonia	356728	791998
96		Medium	F. aquilonia	356773	792022
97		Large	F. aquilonia	356820	791960
98		Large	F. aquilonia	356815	792001
99		Large	F. aquilonia	356853	791885
100		Large	F. aquilonia	356864	791880
101		Large		356885	791842
102		Large		356904	791827
103		Large		356927	791820
104		Large		356936	791789
105		Large		356951	791761
106		Medium		356996	791730
107		Medium		357050	791731
108		Large		357069	791768
Upper Finlets 2					
109		Medium	F. lugubris	356507	792279
110		Medium	F. lugubris	356456	792253
111		Medium	F. aquilonia	356430	792243
112		Medium	F. lugubris	356371	792257
113		Large	F. aquilonia	356515	792084
114		Medium	F. aquilonia	356563	791958
East Bogturk					
115		Large		355656	790937
116		Large		355641	790943
117		Small		355628	790950
118		Small		355611	790959
Upper Glen Ferrick 2					
119		Large	F. aquilonia	356625	792132
120		Large	F. aquilonia	356585	792171
121		Large		357134	792105
122		Large	F. lugubris	357148	792130
123		large	F. lugubris	357144	792188

124		Medium	F. lugubris	357144	792188
125		Medium	F. lugubris	357144	792188
126		Medium	F. lugubris	357444	792137
Additional Nests in 2016					
Upper Finlets					
127		Medium	F. lugubris	356211	792160
128		Small	F. aquilonia	356599	791946
Upper Glen Ferrick					
129	on east side of dyke	Medium	F. lugubris	356532	792273
130	relocated nest 63	Medium	F. aquilonia	356570	792172
133		Medium	F. aquilonia	356730	791944
134		Medium	F. aquilonia	356688	791940
135		Small	F. aquilonia	356710	792069
136	100% covered	Large	F. aquilonia	356654	792120
Burn of Garbet					
137		Large	F. lugubris	356496	792657
138		Medium	F. lugubris	356494	792614
139		Small	F. lugubris	356445	792520
140		Medium	F. lugubris	356441	792633
141		Small	F. lugubris	356405	792482
142	A1	Medium	F. aquilonia	356582	791990
143	A2	Large	F. aquilonia	356507	792219
144	A3	Large	F. aquilonia	356745	792098
145	A4	Medium	F. aquilonia	356835	791950
146	A5	Medium	F. aquilonia	356645	792047
147	Position to be confirmed	small	F. lugubris	357805	791952