

The Great North Pine Marten Pursuit



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Executive Summary

- Ten pine marten scat surveys were conducted in the north of England.
- 72 individual volunteer surveyors took part in the surveys, two-thirds of whom were 'new recruits' having not previously taken part in a scat survey.
- Given the known difficulty of identifying scats morphologically, surveyors were instructed to collect all scats that they could not confidently dismiss as not having been produced by a pine marten.
- All collected scats were subjected to DNA-analytical techniques for species-level identification.
- In excess of 213 KM of forested tracks and trails were surveyed, and each of 47 survey teams covered an average of 5.49 KM.
- No pine marten scats were detected.
- In contrast to the previous recent scat survey of pine martens in England and Wales (Messenger *et al.*, 2010), these surveys produced a greater proportion of samples for which the species depositing it was not determined genetically. This was due to our adoption of a more selective and cost-effective approach to sequencing, and this did not affect the likelihood of detecting a pine marten scat.
- 142 fox scats were collected overall, with surveyors collecting fox scats that they determined to be possible pine marten scats every 2.0 KM surveyed.
- Due to the probable low density of pine martens in the areas surveyed, and the fact that scat collecting is not always successful even in areas where pine martens are known to be present, these data should not be taken to indicate an absence of pine martens in these areas.
- However, if pine martens are indeed present in the areas surveyed, it is likely that they are living at low densities and/or are depositing their scats away from tracks and trails.
- In addition to scat surveys, 8 pine marten den boxes were installed in two forests/woodlands. These were located in the Eden Valley (3) and Kidland Forest (5).

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Access to land and permission to survey was provided by The Forestry Commission, National Trust, M-Sport, The Ministry of Defence and Tilhill.

Many thanks to all of the volunteers who took part, especially those travelling long distances and/or participating in multiple surveys. This survey simply could not have been conducted without your efforts, enthusiasm and dedication. You are the 'Big Society'! Volunteer surveyors were (alphabetically): Duncan Angus, Tony Barrett, Trina Barrett, Amy-Jane Beer, Julian Berkeley, Charlotte Bickler, Brian Birkett, Maxine Birkett, Laura Black, Andrey Boytsov, Derek Capes, Paul Clark, Dick Collin, Karen Collin, Robert Cussen, Lyndsay Cuthbert, Rob Davies, Mick Douch, Sarah Edwards, James Foggin, Conah Gerrard, Tony Gerrard, David Hardy, Grant Harknett, David Humphreys, Janice Gwilliam, Louise Hemsley, Ruth Jackson, Sarah Jupp, Mary Lee, Steve Lowe, Iain Macmillan, Jill Maghee, David Major, Emmie Major, Rhia McBain, Viv McDonald, Ian McMurdo, Phillipa McMurdo, Deborah Monk, Andrew Mottram, Dougie Nisbet, Kevin O'Hara, Carlie Peggie, Laura Popley, Tony Purcell, Lynda Robertson, Les Robertson, Paul Rowntree, Elizabeth Sanderson, Bob Shaw, Pat Shaw, Arran Smith, Christine Smith, David Smith, June Stanworth, Brian Stockley, Joanne Swaffield, Martin Swaffield, Jackie Unsworth, Anne Wadsworth, Geoff Wadsworth, Naomi Waite, Brian Walker, Lizzie Warren, Chris Watson, Jos Wilson, Laura Winter, Hugh Webster, John Woods and Jane Young. Thanks to Tom Dearnley for permissions and field assistance with den boxes in Kidland; Jon Beardsley for help monitoring den boxes in Grizedale and surrounds; Matt Easton for access and permissions to put up den boxes in the Eden Valley and Jez Kalkowski for access and assistance in Catterick Garrison.

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Introduction

The pine marten (*Martes martes*) is the rarest native carnivore in England and Wales and, unlike in Scotland and Ireland, populations show little evidence of natural recovery following a historical human-induced decline in the late 19th Century.

Although the pine marten appears to be extinct in large parts of its former range in England and Wales, third-party sightings collected over a considerable time period suggest the long-term persistence of populations in core areas, particularly North Yorkshire, Cumbria, Northumberland, Snowdonia and Carmarthenshire. These records include occasions where two or more individuals were seen together, which may be interpreted as indicating successful or attempted breeding in this solitary species (Birks and Messenger 2010).

While not necessarily contradicting these sightings data, current genetic data casts doubt on the notion that relict populations have persisted without direct human-intervention to the present day, and suggest that current populations consist at least partially of individuals translocated from elsewhere (Jordan *et al.*, In Prep.). Genetic haplotypes¹ not previously detected in England and Wales have been found in locations across England and Wales in recent years (>1990) including some from northern England providing evidence of introgression with the American marten, *Martes americana* (Kyle *et al.*, 2003), whereas the original or relict haplotype has not been detected since 1924 in England and 1950 in Wales respectively (Jordan *et al.*, In prep.).

While the failure of populations to recover naturally south of the Scottish border highlights the need for urgent conservation action in England and Wales, determining the correct course of such action depends on detailed information on the genetic composition of current pine marten populations. For example, if current populations contain relict genetic types, the option of reintroduction - and the potential dilution of these unique genetic types of possible added conservation value - should be questioned. In contrast, if populations consist entirely or primarily of non-relict individuals with origins elsewhere, reintroduction of pine martens from elsewhere may be considered as an appropriate conservation tool for restoring pine marten populations to England and Wales.

With the value of current genetic data in mind, a series of surveys was initiated in order to collect pine marten DNA from extant populations of England. In order to increase our chances of detection success, the 'Great North Pine Marten Pursuit' (GNPMP) focussed on northern England, where sightings records have been most abundant and persistent over time, and where previous evidence in the form of DNA has been obtained (see Birks and Messenger 2010).

The GNPMP had two main aims:

- 1) Determine, unequivocally, the presence of pine martens in specific areas, and so allow a focussing of future conservation resources in those areas;

¹ A haplotype is a group of alleles of different genes on a single chromosome that tend to be inherited as a unit and are relatively conserved. The species *Martes martes* contains individuals of many different haplotypes, and because particular pine marten haplotypes are often associated with specific geographic areas, determining an individual pine marten's haplotype can provide some clues as to its origin.

- 2) Determine the genetic haplotype of any pine martens detected in order to better inform the future conservation strategy for the species.

In addition to these main objectives, the following secondary aims were identified:

- a) Increase volunteer involvement in The Vincent Wildlife Trust's (VWT) activities;
- b) Increase the number of suitable pine marten den sites in sightings hotspots through the provision of den boxes;
- c) Create publicity for pine martens and the VWT's work in England.

1. Methods

All methods and much of the text in this section were based on those of a previous series of surveys (see Messenger *et al.*, 2010 for further details).

2.1. Selection of sites

Ten sites were selected and surveyed in the north of England in August 2010.

Because of the difficulty of detecting pine martens by scat surveys (e.g. see Messenger *et al.*, 2010), from the outset we focussed on those sites that we considered most likely to produce positive results. General 'hot-spot' areas were identified on the basis of having produced high-scoring pine marten sightings since 1995 (using Birks and Messenger, 2010) and/or unequivocal evidence of pine martens in the form of scats or carcasses. From these general areas, we selected specific survey sites that had either generated abundant and persistent high-scoring reports, or persistent but perhaps a lower frequency of reports in sites that we deemed to be isolated and/or to have low visitor numbers. In addition, the criteria for survey site selection included access arrangements, the availability of local volunteers, and the location in relation to other sites on the schedule. The former criterion meant that the final list contained few private woodlands following unsuccessful attempts to gain access permissions, while the latter constraint allowed all sites to be feasibly incorporated into a single series of surveys.

Table 1: The locations of survey sites

| Site | Sub-sites | NGR (approx.) |
|----------------------------|--------------------|---------------|
| Grizedale | | SD3394 |
| Ennerdale | - Ennerdale valley | NY1314 |
| | - Lowther Park | NY0511 |
| Whinlatter & Thirlmere | - Whinlatter | NY2124 |
| | - Dodd Wood | NY2427 |
| | - Thirlmere | NY3019 |
| Greystoke | | NY3933 |
| Kidland | | NT9111 |
| Harwood | | NY9994 |
| Slaley | | NY9655 |
| Hamsterley | | NZ0830 |
| Silton, Boltby & Wass Moor | - Silton Forest | SE4694 |
| | - Boltby Forest | SE4888 |
| | - Wass Moor | SE5580 |
| Dalby & Broxa | | SE9292 |

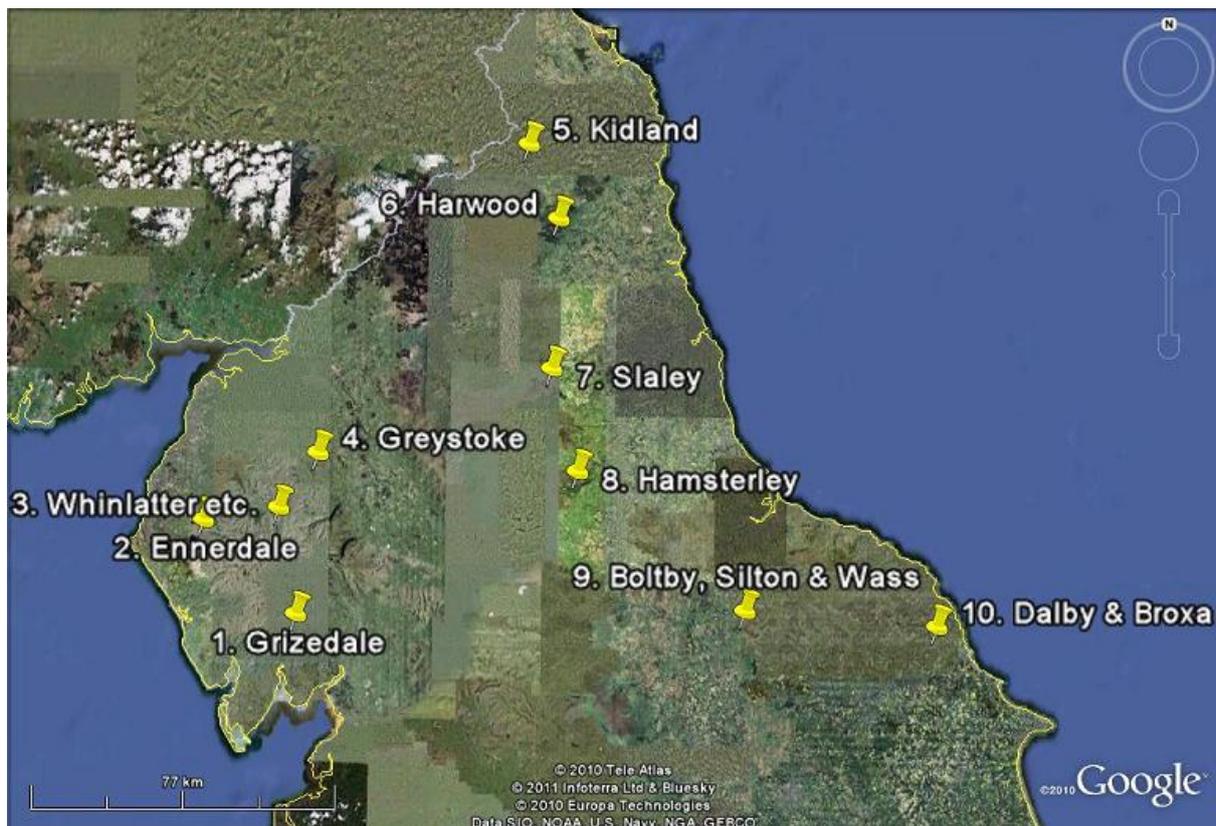


Figure 1: The distribution of survey sites across Northern England (map from Google Earth (c) 2010)

1.2. Selection of sectors

Each of the ten survey sites were partitioned into sectors, with each sector being an area in which a single survey team would operate. These were created based on 1:25,000 scale OS maps. Areas of woodland were selected, and each sector was designed to have at least 5km of walkable tracks and paths, with as many circular routes as possible. Consideration was also given to ease of access and the avoidance of any pre-identified hazards. Although the intention was to avoid extensive areas of clear-fell, primarily from expert local knowledge, this was not always successful.

During onsite briefings (see below), surveyors were divided into teams and each team was allocated a particular sector. Surveyors were usually given an opportunity to select sectors for themselves, with local surveyors sometimes expressing a desire to survey a particular area. The remaining sectors were divided between the remaining teams.

1.3. Volunteer surveyors

Volunteer surveyors were recruited via the VWT's pine marten website (www.pinemarten.info) and existing volunteer network, and through local radio and newspaper articles which we stimulated by a VWT press release prior to the Pursuit (Appendix 5). It was intended that volunteer surveyors would be recruited from a wide area and represent a mixture of experienced surveyors and new recruits that were either previously unaware of our work or had been aware but had not yet contributed practically.

Volunteer surveyors assembled at a prearranged location and were given a short introduction on the purpose of the survey, briefed on the methodology, and then issued with all necessary equipment, including basic survival aids, recording forms and scat collecting kits. Health and safety issues, site safety matters and the emergency plan were explained and mobile 'phone numbers were exchanged and recorded by each team.

1.4. Field work

Each team was provided with a sector map and another showing where that sector was in relation to other sectors and important features (roads and telephone boxes, where present). Survey teams were encouraged to select the routes they would take prior to setting off, choosing circular routes wherever possible. Teams were instructed to walk slowly along each route, searching for scats as they went, and paying particular attention to track intersections, stream crossings, boulders, dry stone walls etc. which it was suggested might represent preferred scatting points. Surveyors were requested to mark the route(s) that they had taken on the sector map provided.

Surveyors were shown dried pine marten and stoat scats at the briefing in an attempt to aid scat-identification, but a number of photographs (see Appendix 1) were also shown to illustrate that the identification of marten scats by morphology alone is not reliable (see Davison *et al.*, 2002 for further information). Surveyors were instructed to collect any scats found within their sector that could not be dismissed as having definitely been produced by a non-target species (that is any animal other than a pine marten).

Prior to collection, each scat was photographed *in situ* alongside a uniquely-numbered zip-lock collecting bag. This ensured that each photograph included a unique identifying number and a scale for reference. All scat handling was undertaken using new disposable wooden spatulas for each sample, and great care was taken to avoid cross-

contamination. The finer details of the collecting technique appear in Messenger *et al.*, 2010.

1.5. DNA analysis

All DNA analyses were conducted at the Waterford Institute of Technology, Ireland.

DNA extracts were made and initially screened for fox and pine marten DNA using a real time PCR assay (O'Reilly *et al.*, 2007). In order to maximise the chances of success, several small samples were taken from various parts of the scat and pooled in the extract. Care was taken to avoid cross contamination from other samples processed in the lab; precautions included swabbing the bench area with dilute bleach, and using disposable forceps for sampling. Samples from other sources were never processed in the same batch. Scats were stored frozen.

Samples not shown to be fox or pine marten but which were shown to contain significant levels of DNA were further analysed by DNA sequencing. The sequencing targeted two regions. Firstly a region of approximately 400 base-pairs of the mitochondrial D-loop was amplified and sequenced using primers that would amplify a limited range of mammals (e.g. mustelids, fox, dog, cat). In contrast to the methods described in Messenger *et al.*, 2010, samples that failed with this assay were not tested further on the basis of a simple cost-benefit analysis. It is important to note that this selective approach should not have resulted in any pine marten scats not being detected (i.e. no false-negatives), and it was decided that saving money and therefore being able to test a greater volume of scats was of greater value than determining non-target species down to species level. However, in order to test this assumption, the results of this survey will also be compared to those of the 2008/9 VWT/WIT Pine Marten Survey of England and Wales (Messenger *et al.*, 2010). To do so, species identified in the 2008/9 survey that the GNPMP methodology was unable to identify (namely sheep, vole, hedgehog, human, amphibian, bird and mixed/miscellaneous) were clumped and included in a "others/not determined" category, and the proportion of scats that fell into this category was compared to the proportion of scats that were 'not determined' in the GNPMP. Assuming that field collection techniques were similar across the two series of survey, if the genetic methods were comparable then the proportion of scats that were not determined on each survey should be broadly similar (allowing for some variation caused by survey sites, environmental variables affecting DNA-preservation etc).

1.6. Statistical analyses

Statistical tests were carried out in 'R' (R Development Core Team 2008) and were all non-parametric, as normality tests showed data were not normally distributed. Unless otherwise stated, averages given refer to arithmetic mean values +/- standard deviation.

2. Results

3.1. Overall summary

Although 243 scats were collected over the course of 10 scat surveys, pine marten DNA was not detected in any of these samples. The vast majority of scats (91.0 %; 142 of 156 samples) for which the species responsible was determined were produced by foxes. Other samples were also collected from stoats (5 samples), a badger, a dog and a roe deer. Example photographs of the scats collected are presented in Appendix 4.

More than 213 kilometres (KM) of tracks, trails and rides were surveyed at 10 different sites with each site having an average of 21.29 +/- 8.53 KM (mean +/- SD) surveyed. Each team surveyed a mean distance of 5.49 +/- 1.95 KM overall (range 2.52-11.0 KM, n = 38 sectors). This figure does not include a total of 9 sectors for which no route was recorded on the map by the surveyors. Therefore, the total survey effort is likely to have included an additional distance of somewhere in the region of 39.1 to 72.8 KM (calculated from the lowest [4.34KM] and highest [8.09KM] distances surveyed, multiplied by the number of sectors [9] for which no distance was recorded). Distances on duplicate sections of sectors (those that had been walked previously by that team or another) were excluded from this estimation of survey effort.

Table 2: Survey effort

| Site | No. survey teams (No. with route recorded) | Total distance surveyed (KM) | Mean distance surveyed/team (KM) |
|----------------------------|--|------------------------------|----------------------------------|
| Grizedale | 2 (2) | 9.79 | 4.89 |
| Ennerdale | 5 (4) | 24.07 | 6.02 |
| Whinlatter & Thirlmere | 5 (4) | 23.65 | 5.91 |
| Greystoke | 1 (1) | 4.42 | 4.42 |
| Kidland | 7 (5) | 23.62 | 4.72 |
| Harwood | 4 (3) | 19.30 | 6.43 |
| Slaley | 5 (5) | 21.70 | 4.34 |
| Hamsterley | 5 (4) | 23.28 | 5.82 |
| Silton, Boltby & Wass Moor | 7 (7) | 30.72 | 4.39 |
| Dalby & Broxa | 7 (4) | 32.38 | 8.09 |
| Total | 47 (38) | 212.92 | 5.60 |

Scats collected on sectors for which distance was not recorded were not used in calculating the 'rate' at which scats were found. On average, survey teams travelled 5.6 KM of tracks and trails in each survey, collecting a potential scat every 1.14 KM. Fox scats were collected every 2 KM on average. The distance a team travelled before a scat was collected varied between and within survey sites, but as detailed habitat data were not collected it is not possible to determine whether this accounted for any of this variation.

Additionally, it is important to note that surveyors varied in their experience of scat searching and expertise in identifying scats, and because surveyors were instructed to collect all scats that they could not confidently deduce were not produced by a pine marten, then differential collection of scats between teams would almost certainly have occurred. Experienced individuals would most likely have been more selective than relatively inexperienced surveyors.

Site by site statistics, sectors and scat distribution maps are given in Appendix 2.

Table 3: All scats collected relative to survey effort

| Site | No. scats (No. scats from known survey distances) | Distance surveyed (KM) | Scats/KM |
|----------------------------|--|-------------------------------|-----------------|
| Grizedale | 10 (10) | 9.79 | 1.02 |
| Ennerdale | 11 (8) | 24.07 | 0.33 |
| Whinlatter & Thirlmere | 22 (13) | 23.65 | 0.55 |
| Greystoke | 1 (1) | 4.42 | 0.23 |
| Kidland | 63 (41) | 23.62 | 1.74 |
| Harwood | 22 (18) | 19.30 | 0.93 |
| Slaley | 19 (19) | 21.70 | 0.88 |
| Hamsterley | 25 (18) | 23.28 | 0.77 |
| Silton, Boltby & Wass Moor | 43 (43) | 30.72 | 1.40 |
| Dalby & Broxa | 28 (17) | 32.38 | 0.53 |
| Total | 243 (187) | 212.92 | 0.88 |

Table 4: Fox scats collected relative to survey effort

| Site | No. scats (No. scats from known survey distances) | Distance surveyed (KM) | Scats/KM |
|----------------------------|--|-------------------------------|-----------------|
| Grizedale | 2 (2) | 9.79 | 0.20 |
| Ennerdale | 8 (7) | 24.07 | 0.29 |
| Whinlatter & Thirlmere | 16 (9) | 23.65 | 0.38 |
| Greystoke | 0 (0) | 4.42 | 0.00 |
| Kidland | 48 (35) | 23.62 | 1.48 |
| Harwood | 21 (17) | 19.30 | 0.88 |
| Slaley | 1 (1) | 21.70 | 0.05 |
| Hamsterley | 4 (4) | 23.28 | 0.17 |
| Silton, Boltby & Wass Moor | 22 (22) | 30.72 | 0.72 |
| Dalby & Broxa | 20 (10) | 32.38 | 0.31 |
| Total | 142 (107) | 212.92 | 0.50 |

2.2. Surveyor involvement

The whole series of scat surveys involved 104 surveyor days involving 72 individual surveyors. Overall, two-thirds of surveyors (48 of 72) had not participated in pine marten surveys previously, with a mean of 47.5 +/- 29 % of surveyors on each survey being new to the task (range 0 to 83.3 %; Table 6).

Table 6: Surveyor involvement and experience

| Site | Total surveyors | Experienced surveyors | Previously inexperienced surveyors | Propn of all surveyors that were previously inexperienced |
|----------------------------|-----------------|-----------------------|------------------------------------|---|
| Grizedale | 6 | 4 | 2 | 0.333 |
| Ennerdale | 9 | 4 | 5 | 0.556 |
| Whinlatter & Thirlmere | 12 | 9 | 3 | 0.250 |
| Greystoke | 1 | 1 | 0 | 0.000 |
| Kidland | 17 | 15 | 12 | 0.444 |
| Harwood | 9 | 8 | 1 | 0.111 |
| Slaley | 11 | 5 | 6 | 0.545 |
| Hamsterley | 11 | 5 | 6 | 0.545 |
| Silton, Boltby & Wass Moor | 13 | 3 | 10 | 0.769 |
| Dalby & Broxa | 15 | 12 | 3 | 0.200 |

2.3. Comparison with 2008/9 VWT/WIT Survey

The proportion of scats for which the species responsible was 'not determined' was relatively high in this study (35.8 % of 243 samples), especially compared with previous surveys (e.g. 20.5 % of 726 samples in Messenger et al., 2010). This is most likely due to our adoption of a more selective approach to sequencing following initial genetic screening (see above), so that birds in particular will not have been detected/identified. However, when we statistically take into account the differing approaches of the two surveys, the results are strikingly similar. Overall, the proportion of scats collected that were not determined in the GNPMP did not differ significantly from the number of not determined and other non-target species identified in the 2008/9 surveys (Binomial test of proportions: $\chi^2 = 0.536$, d.f. = 1, $p = 0.464$; Table 6, Figure 2). Note that in order to make these results comparable, species identified in the 2008/9 survey that the GNPMP methodology was unable to identify (namely sheep, vole, hedgehog, human, amphibian, bird and mixed/miscellaneous) were included in this others/ not determined category. This result, and the similar results obtained in both surveys for dog (Binomial test of proportions: $\chi^2 = 1.007$, d.f. = 1, $p = 0.316$; Table 6), fox ($\chi^2 = 0.565$, d.f. = 1, $p = 0.452$) and all mustelids ($\chi^2 = 2.082$, d.f. = 1, $p = 0.149$), is encouraging as it indicates that the

more selective genetic analyses conducted in the GNPMP methodology were unlikely to have resulted in missed mustelids/target species. Indeed, the GNPMP detected a significantly greater proportion of stoats overall (Binomial test of proportions: $\chi^2 = 5.769$, d.f. = 1, $p = 0.016$; Table 6).

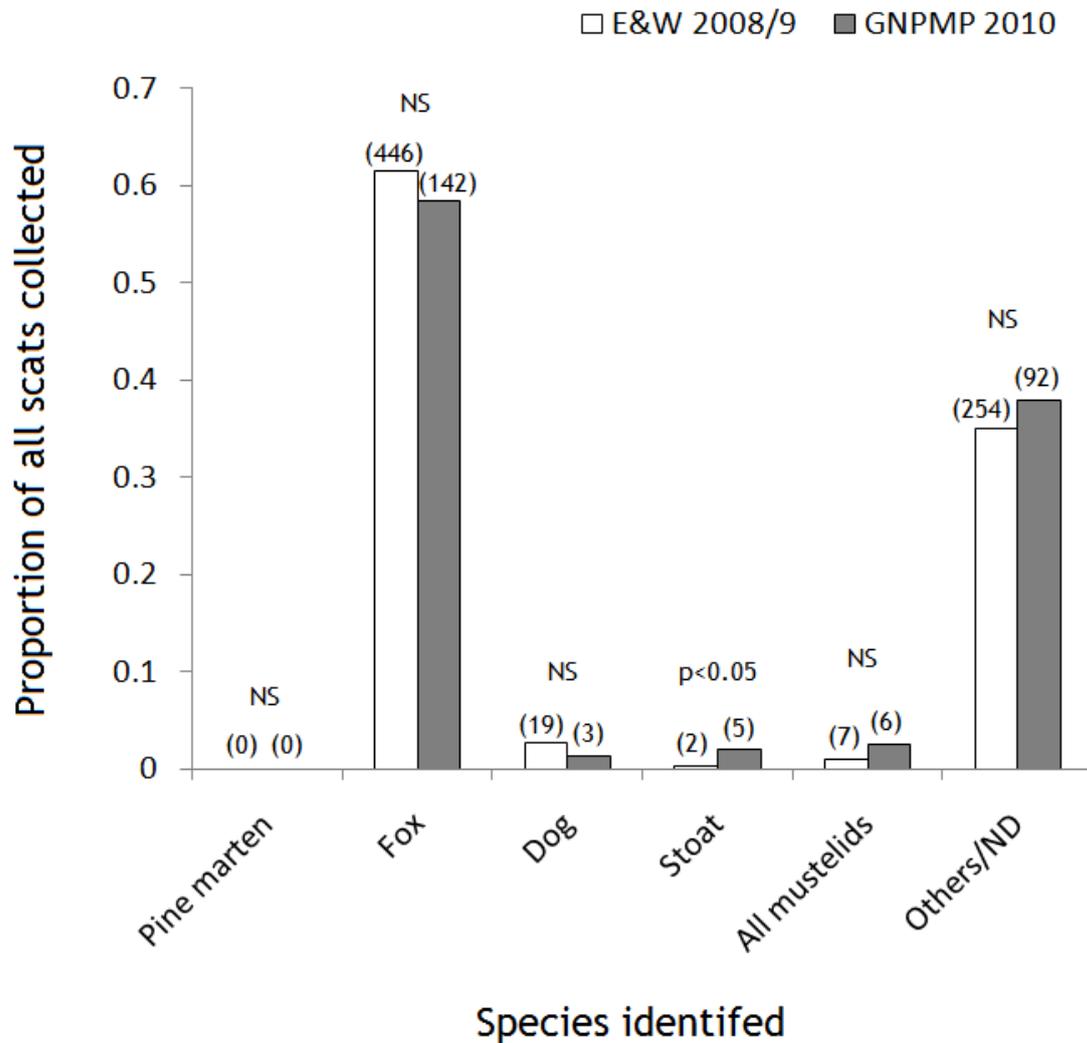


Figure 2: Comparison of the proportion of scats collected on the GNPMP (filled bars) with the VWT/WIT scat survey of England and Wales in 2009 (open bars). Proportions are relative to the number of scats collected on that particular series of surveys, and the number of scats collected (in brackets) are noted at the top of each bar. Paired comparisons were made between the same sample types across the two surveys using a Binomial test of proportions, and the significance values are also shown (where NS means no significant difference).

Five sites (Hamsterley, Kidland, Ennerdale, Thirlmere and Grizedale) that were surveyed during the GNPMP had previously been surveyed in the 2008/9 survey². This offered an opportunity to compare the results of the two surveys in more detail (see Table 6).

During the GNPMP, surveyors collected a significantly greater proportion of fox scats in Hamsterley and Kidland than during the 2008/9 surveys at the same sites (Binomial test of proportions: Hamsterley, $\chi^2 = 4.955$, d.f. = 1, $p = 0.026$; Kidland, $\chi^2 = 4.720$, d.f. = 1, $p = 0.030$), and a significantly lower proportion on the GNPMP in Grizedale ($\chi^2 = 24.487$, d.f. = 1, $p < 0.001$). The proportion of all scats collected that were identified as fox scats in Ennerdale and Thirlmere were similar over the two surveys (Binomial test of proportions: Ennerdale, $\chi^2 = 0.287$, d.f. = 1, $p = 0.592$; Thirlmere, $\chi^2 = 0.640$, d.f. = 1, $p = 0.424$).

² Note that although both the GNPMP and the 2008/9 series of surveys also included areas of North York Moors, the actual areas surveyed in the two surveys differed substantially and so a direct comparison has not been made here.

Table 6: Comparisons of the 2008/9 and 2010 (GNPMP) scat surveys

| Survey site | Species detected | No. scats collected | | Propn. scats collected | | Binomial test of proportions | | | |
|-------------|----------------------|---------------------|------------|------------------------|-------|------------------------------|------|-------|---------|
| | | 2008/9 | 2010 | 2008/9 | 2010 | χ^2 | d.f. | p | Sig. |
| ALL | <i>Pine marten</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Fox</i> | 446 | 142 | 0.614 | 0.584 | 0.565 | 1 | 0.452 | NS |
| | <i>Dog</i> | 19 | 3 | 0.026 | 0.012 | 1.007 | 1 | 0.316 | NS |
| | <i>Stoat</i> | 2 | 5 | 0.003 | 0.021 | 5.769 | 1 | 0.016 | p<0.05 |
| | <i>All mustelids</i> | 7 | 6 | 0.010 | 0.025 | 2.082 | 1 | 0.149 | NS |
| | <i>Others/ND</i> | 254 | 92 | 0.350 | 0.379 | 0.536 | 1 | 0.464 | NS |
| | Total | 726 | 243 | | | | | | |
| Hamsterley | <i>Pine marten</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Fox</i> | 0 | 0 | 0.000 | 0.160 | 4.955 | 1 | 0.026 | p<0.05 |
| | <i>All mustelids</i> | 1 | 0 | 0.022 | 0.000 | 0.000 | 1 | 1.000 | NS |
| | <i>Others/ND</i> | 44 | 19 | 0.978 | 0.760 | 6.222 | 1 | 0.013 | p<0.05 |
| | Total | 45 | 25 | | | | | | |
| Kidland | <i>Pine marten</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Fox</i> | 19 | 48 | 0.528 | 0.762 | 4.720 | 1 | 0.030 | p<0.05 |
| | <i>All mustelids</i> | 1 | 4 | 0.028 | 0.063 | 0.092 | 1 | 0.762 | NS |
| | <i>Others/ND</i> | 15 | 11 | 0.417 | 0.175 | 5.738 | 1 | 0.017 | p<0.05 |
| | Total | 36 | 63 | | | | | | |
| Ennerdale | <i>Pine marten</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Fox</i> | 50 | 8 | 0.847 | 0.727 | 0.287 | 1 | 0.592 | NS |
| | <i>All mustelids</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Others/ND</i> | 9 | 3 | 0.153 | 0.273 | 0.287 | 1 | 0.592 | NS |
| | Total | 59 | 11 | | | | | | |
| Grizedale | <i>Pine marten</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Fox</i> | 29 | 2 | 1.000 | 0.200 | 24.487 | 1 | 0.000 | p<0.001 |
| | <i>All mustelids</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Others/ND</i> | 0 | 8 | 0.000 | 0.800 | 24.487 | 1 | 0.000 | p<0.001 |
| | Total | 29 | 10 | | | | | | |
| Thirlmere | <i>Pine marten</i> | | | | | | | | |
| | <i>Fox</i> | 5 | 5 | 0.500 | 0.833 | 0.640 | 1 | 0.424 | NS |
| | <i>All mustelids</i> | 0 | 0 | 0.000 | 0.000 | | | | |
| | <i>Others/ND</i> | 5 | 1 | 0.500 | 0.167 | 0.640 | 1 | 0.424 | NS |
| | Total | 10 | 6 | | | | | | |

3. Discussion

This series of surveys was set up to collect pine marten DNA from the North of England in order to: (a) prove the presence of pine martens; and (b) inform the future conservation strategy for the species in England and Wales. Unfortunately, following 10 scat surveys in different regions, we found no DNA-evidence of the presence of pine martens in any of these areas, despite previous recent evidence in the form of evaluated sightings by members of the public and/or unequivocal DNA evidence in the form of scats or carcasses. During the course of the surveys we engaged the services of 72 surveyors, 48 of whom were new to this work. Many of these ‘new recruits’ were attracted to the project *via* our website or articles published in local newspapers as the GNPMP passed through the region. Although we have not quantified this specifically, public knowledge of the ‘plight’ of the pine marten in England and Wales has most likely increased as a result of these surveys.

4.1. Pine marten evidence

There are two possible explanations for the absence of pine marten evidence in this survey. Either pine martens are no longer present in the areas surveyed, or alternatively the methods used were inappropriate to detect them in these regions or under these circumstances.

With reference to the possibility that pine martens are not present in the areas surveyed, it is important to point out, once more, that ‘absence of evidence is not evidence of absence’. Outside of this survey, two main sources of evidence point to the continued utilisation of the surveyed sites by pine martens. First, a long history of sightings records from these areas suggests the continued occupation of pine martens in these areas- albeit probably at low densities. Grizedale Forest and surrounds in Cumbria (Westmorland Vice County) for example, has produced a large number of high-quality sightings of pine martens over recent years, with Cumbria as a whole producing 66 high quality reports between 1996 and 2007 (Birks and Messenger, 2010). Additionally, some of the survey areas have produced recent pine marten DNA evidence. Such data collected on an *ad hoc* basis confirms that they were present in these areas recently, and one survey site (Kidland) produced irrefutable evidence (a scat confirmed as pine marten by DNA analysis) of their presence as recently as three-months prior to this survey being conducted there. On the basis of this evidence, and other similar evidence derived from or close to the other sites surveyed, it seems unlikely that pine martens are now absent from these areas entirely, but it is almost certain that any populations that are present are not living at high densities.

An alternative explanation for the lack of evidence that we were able to produce in these surveys, and one that almost certainly relates to the suspected low density of martens in these areas, is that the detection method used is inappropriate for the specific conditions that martens are living in in these areas. The efficacy of scat surveys along tracks and rides is probably questionable, especially given the possibility that pine martens may not be territorial at low density and may avoid regular use of tracks to avoid contact with foxes, with which they compete in some areas at least (Lindström *et al.*, 1995). Indeed, the results of this survey, and the recent two-year WIT/VWT pine marten scat survey (Messenger *et al.*, 2010), illustrate the difficulties of using such a technique, and consequently the difficulties of determining their presence by this method. Are pine martens not detected because they are not there or is the technique producing false negatives? As described above, sightings records and the occasional unequivocal record

strongly suggest the latter, but techniques need to be tested and verified, and this can only be done on low density but known populations of martens. Even in Scotland, in areas where sightings records confirm or at least support their presence, scat surveys have previously failed to produce positive results (Velandar, 1983). At best we can suggest that pine martens, if present, are surviving at low population densities, but these data should not be interpreted as evidence of absence or extinction, we have too much evidence of the persistence of pine martens in these areas (e.g. Birks and Messenger 2010, Jordan *et al.*, In Prep) for a short scale survey such as this to undermine.

With doubts firmly cast on the usefulness of traditional scat surveys to detect martens at low population densities, further work is now ongoing to determine more successful techniques for surveying under such conditions. At present, trials are underway to test the efficacy of pine marten scat detection dogs and (separately) commercial marten lure. Only when techniques that are known to work consistently at low density populations fail will we be able to conclude that pine martens are absent from particular areas.

3.2. Surveyor involvement

Overall we were extremely pleased by the healthy turn-out of volunteers on the surveys, and this allowed us to survey a relatively large area of forest during the GNPMP. Early morning starts, and wandering around forests in the rain for hours, scouring the ground and inspecting and collecting ‘promising’ scats will clearly not be everyone’s idea of a great day out, and consequently we were extremely buoyed by the number of people that were keen to be involved. It was particularly rewarding to see the high percentage of volunteers that were joining in for the first time, and also then the return of these ‘new recruits’ to subsequent surveys along the route demonstrated that they thought the task valuable or enjoyable at least. Many surveyors local to sites commented that they had not previously known of the possible presence of pine martens in their local area, some had had sightings themselves which we then recorded, and some surveyors travelled from afar to get involved. None of this work would be possible without their hard work and enthusiasm, and we are extremely grateful for that.

3.3. Comparison with 2008/9 VWT/WIT survey

In contrast to the previous recent scat survey of pine martens in England and Wales (Messenger *et al.*, 2010), the GNPMP produced a greater proportion of samples for which the species depositing it was not determined genetically. However, as described in the *results* sector of this report, this is most likely due to our adoption of a more selective approach to sequencing following initial genetic screening, and this did not affect the likelihood of us detecting a pine marten scat, should one have been collected. Interestingly, and somewhat reassuringly, when we account statistically for the differing approaches of the two surveys, the results of both are strikingly similar. Overall, the proportion of scats collected that were ‘not determined’ in the GNPMP did not differ significantly from the number of not determined and other non-target species identified in the 2008/9 surveys, which suggests that the more selective genetic analyses conducted in the GNPMP methodology were unlikely to have resulted in missed mustelids or target species. Indeed, this is further supported by the fact that a greater number of stoat scats were collected during the GNPMP than the 2008/9 survey.

Within the GNPMP, some survey sites had a higher proportion of ‘not determined’ scats than others. Slaley forest was particularly pronounced in this regard with 78.9 % not determined, and Hamsterley is next up with 64.2 %. Both of these results may be explained by the popularity and density of pheasant rearing on and in the vicinity of both

estates but, in addition to this, the Slaley survey in particular was conducted at the height of a series of particularly wet days, which may have contributed in some scats being washed out and not containing sufficient genetic material for analysis.

4. Conclusions and future work

Despite surveying a large area (over 213 KM of forest tracks and trails), this series of surveys produced no concrete DNA evidence of the presence of pine martens in the North of England. This contrasts markedly with third-party sightings data and DNA evidence collected previously on an *ad hoc* basis, and calls into question the efficacy of short-term scat surveys in detecting pine martens at low density. Investigating alternative methods of detection under such conditions is an important priority, and has been highlighted as such in the conservation strategy that is being developed for the species in England and Wales.

The pine marten conservation strategy is currently being developed by a group of stakeholders, overseen/coordinated by the VWT. It outlines and develops our aim to restore self-sustaining populations of pine martens to England and Wales, and will provide a route-map for pine marten conservation work and research into the future. Under this strategy, the main focus of pine marten work will now shift from intensive detection towards determining the factors limiting pine marten population recovery in England and Wales. However, the value of genetic data on determining the direction of the strategy means that the development of alternative effective detection techniques will be necessary, and that DNA evidence should still be collected when possible. In addition, monitoring of populations will be required throughout all stages of the strategy, and so the reporting of potential sightings to the VWT is strongly encouraged.

5. References

Birks, J. & Messenger, J. (2010) *Evidence of pine martens in England and Wales 1996-2007. Analysis of reported sightings and foundations for the future.* Report published by The Vincent Wildlife Trust.

Davison, A., Birks, J. D. S., Brookes, R. C., Braithwaite, A. C. and Messenger J. E. (2002) On the origin of faeces: morphological versus molecular methods for surveying rare carnivores from their scats. *Journal of Zoology* 257: 141-143.

Jordan, N. R., Messenger, J., Turner, P., Birks, J. D. S., Croose, E. & O'Reilly, C. (In preparation). *Molecular comparison of historical and contemporary pine marten (*Martes martes*) populations in the British Isles: evidence of differing origins and fates.*

Kyle, C.J., Davison, A. and Strobeck, C. (2003) Genetic structure of European pine martens (*Martes martes*), and evidence for introgression with *M americana* in England. *Conservation genetics* 4: 179-188.

Lindström, E. R., Brainerd, S. M., Helldin, J-O. & Overskaug, K. (1995) Pine marten-red fox interactions: a case of intraguild predation? *Annales Zoologici Fennici* 32: 123-130.

Messenger, J., Croose, E., Turner, P. & O'Reilly, C. (2010) *The Vincent Wildlife Trust and Waterford Institute of Technology Pine Marten Scat DNA Survey of England and Wales 2008-2009*. Report published by The Vincent Wildlife Trust.

O'Reilly, C., Staham, M., Mullins, J., Turner, P.D. & O'Mahony, D. (2007) Efficient species identification of pine marten (*Martes martes*) and red fox (*Vulpes vulpes*) scats using a 5' nuclease real-time PCR assay. *Conservation Genetics* 9: 735-738.

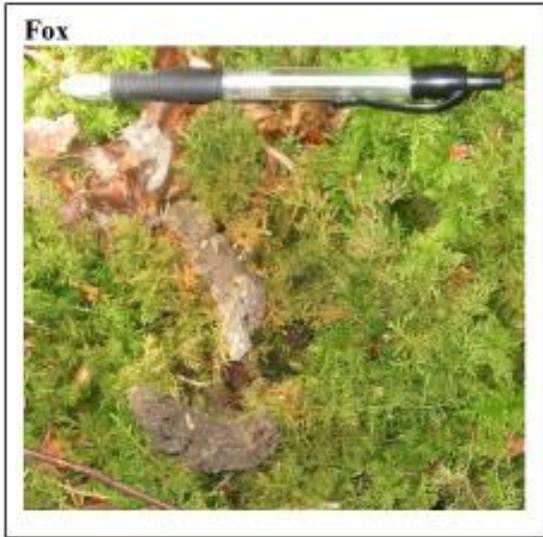
R Development Core Team. 2008. *R: A Language and Environment for Statistical Computing*. Vienna: R Foundation for Statistical Computing. <http://www.R-project.org>.

Velander, K. A. (1983) *Pine Marten Survey of Scotland, England and Wales 1982 - 1983*. London: The Vincent Wildlife Trust.

Appendices

Appendix 1: Which scat is it?

Which scat is it?



Photographs by Peter Turner (WIT)

Appendix 2: Site by site statistics, sectors and scat distribution maps

Key to the maps in this section:



Survey sector boundary



Survey sector number



Scat for which species responsible was determined (F= Red fox, D=Domestic Dog, S=Stoat, B=Badger, R=Roe deer).



Scat for which the species responsible was not determined.

(Note that on all maps in this section, scats for which the labels are obscured are all of the same species as those obscuring them).

1. Grizedale

Basic data:

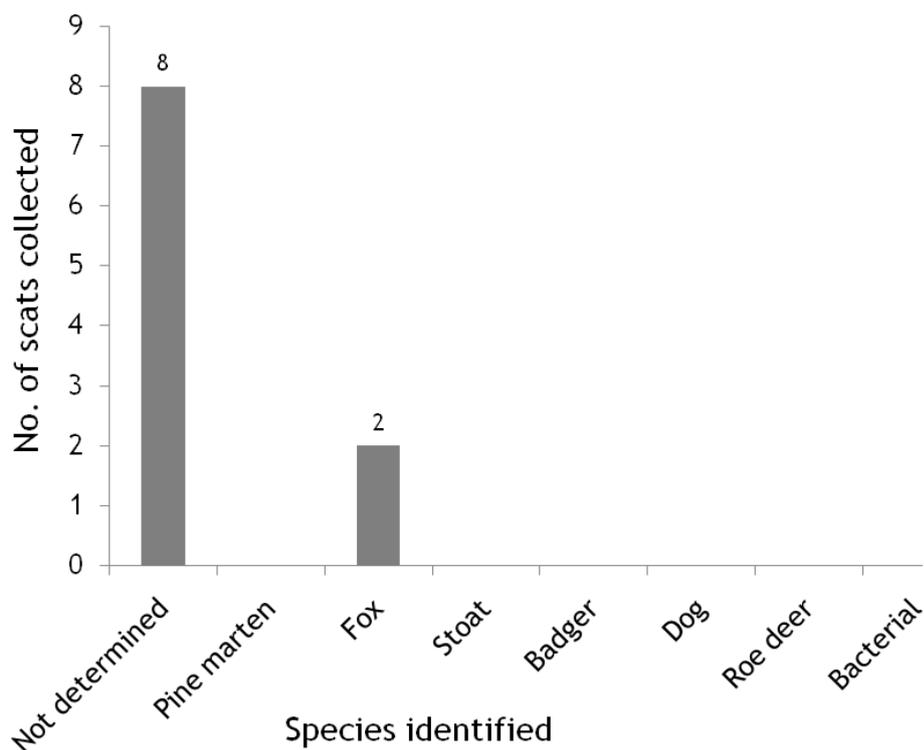
Date: 11th August 2010
Vice County: Westmorland (69)
Site NGR (approx.): SD3394

No. surveyors: 5
No. sectors surveyed: 2
Total distance surveyed (KM): 9.79
Total scats collected: 10

Survey team:

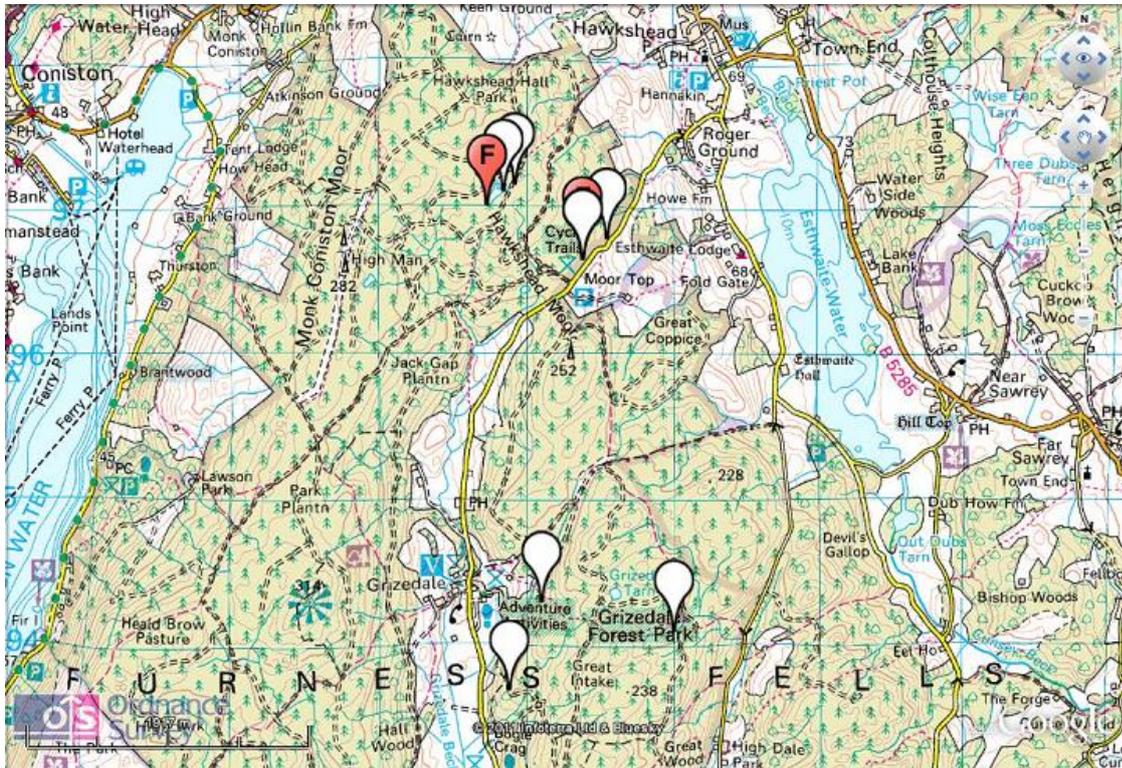
Ian McMurdo, Phillipa McMurdo, Louise Hemsley, Andrew Mottram, Natalie Buttriss (VWT), Neil Jordan (VWT; den box survey), Jon Beardsley (den box survey)

Frequency of scats collected:

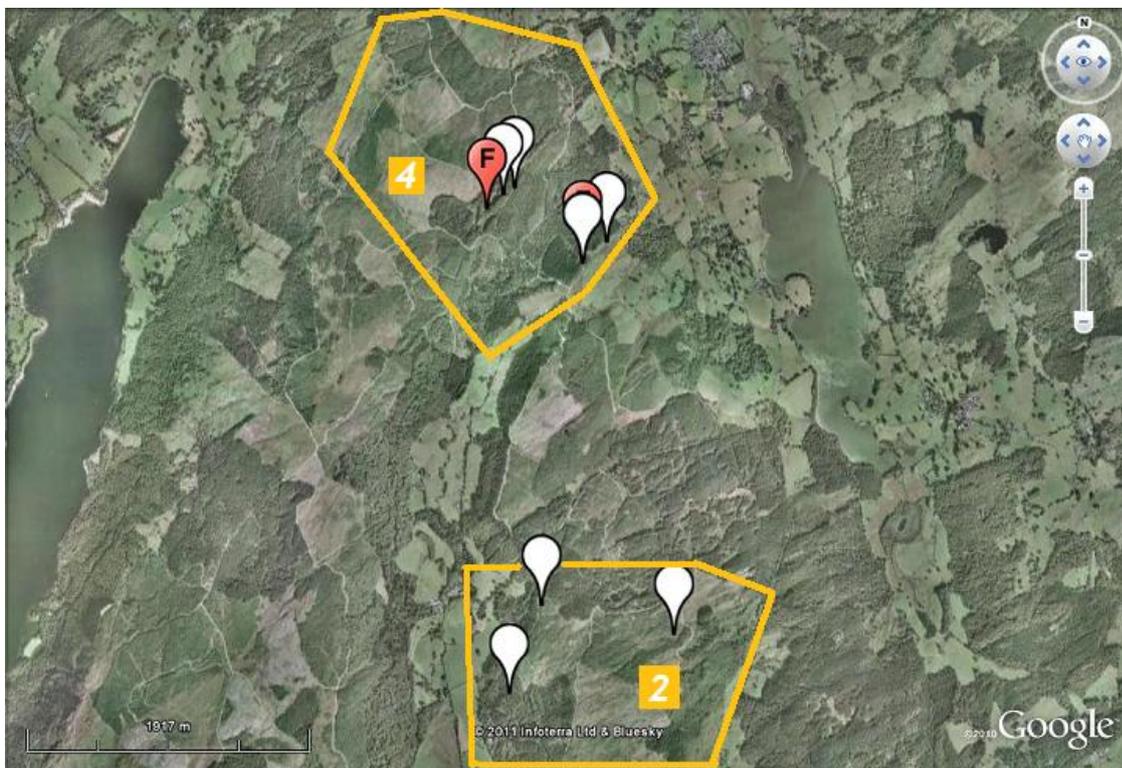


Survey maps:

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



2. Ennerdale

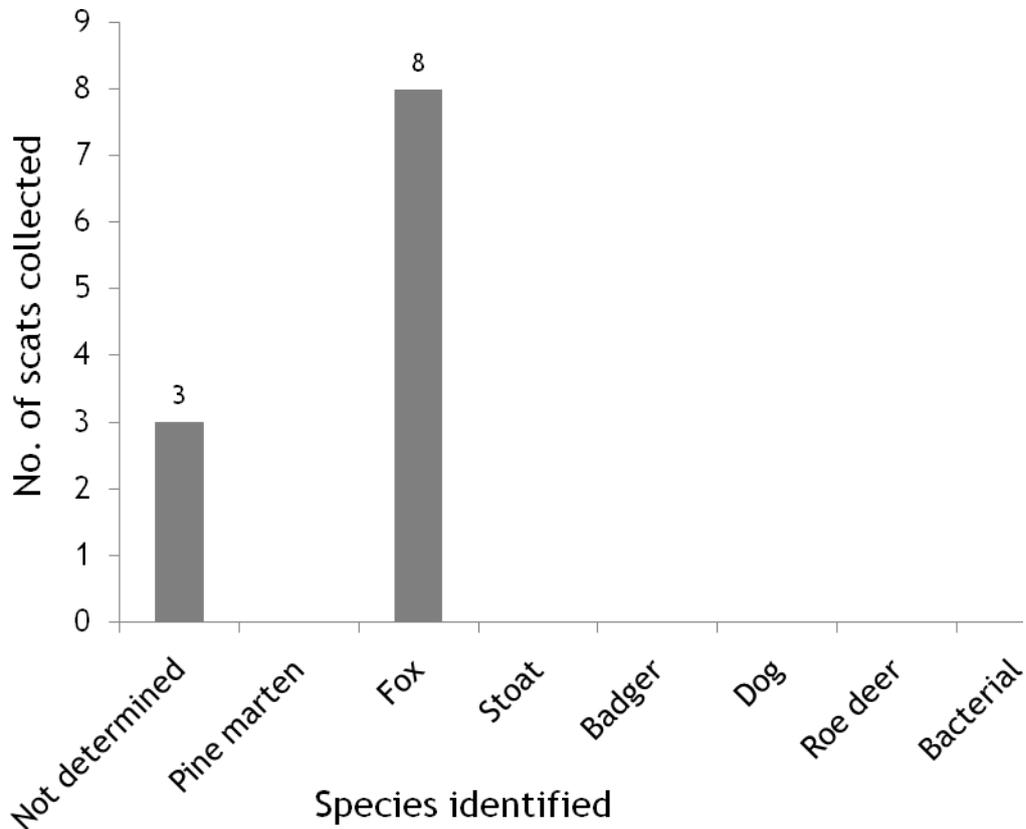
Basic data:

| | |
|--------------------------------------|-----------------|
| <i>Date:</i> | 14 August 2010 |
| <i>Vice County:</i> | Cumberland (70) |
| <i>Site NGR (approx.):</i> | NY1314, NY0511 |
| <i>No. surveyors:</i> | 9 |
| <i>No. sectors surveyed:</i> | 5 |
| <i>Total distance surveyed (KM):</i> | 24.07 |
| <i>Total scats collected:</i> | 11 |

Survey team:

Julian Berkeley, Viv McDonald, Lynda Robertson, Les Robertson, Lizzie Warren, Grant Harknett, Chris Watson, Henry Schofield (VWT), Lizzie Croose (VWT), Neil Jordan (VWT)

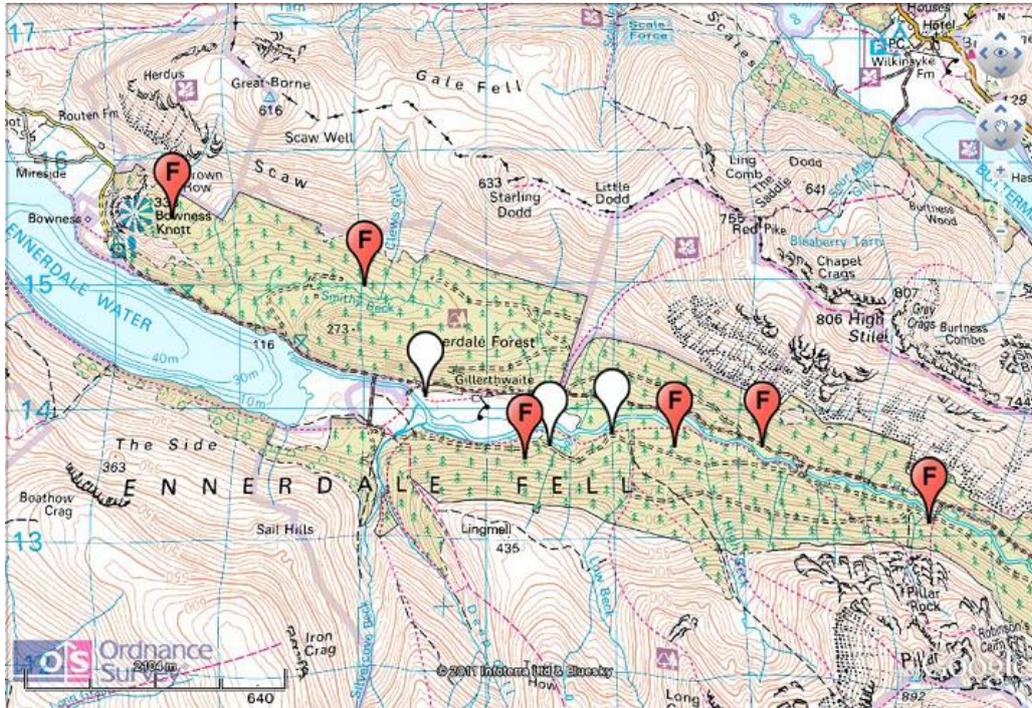
Frequency of scats collected:



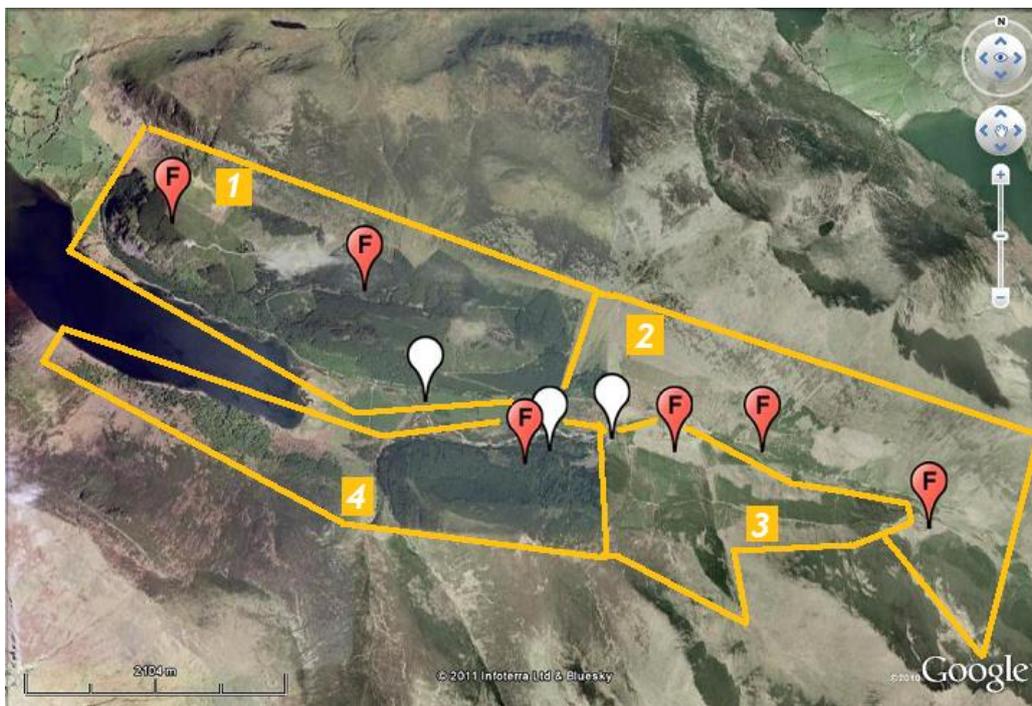
Survey maps:

Ennerdale (main)

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



Lowther Park

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



3. Whinlatter and Thirlmere

Basic data:

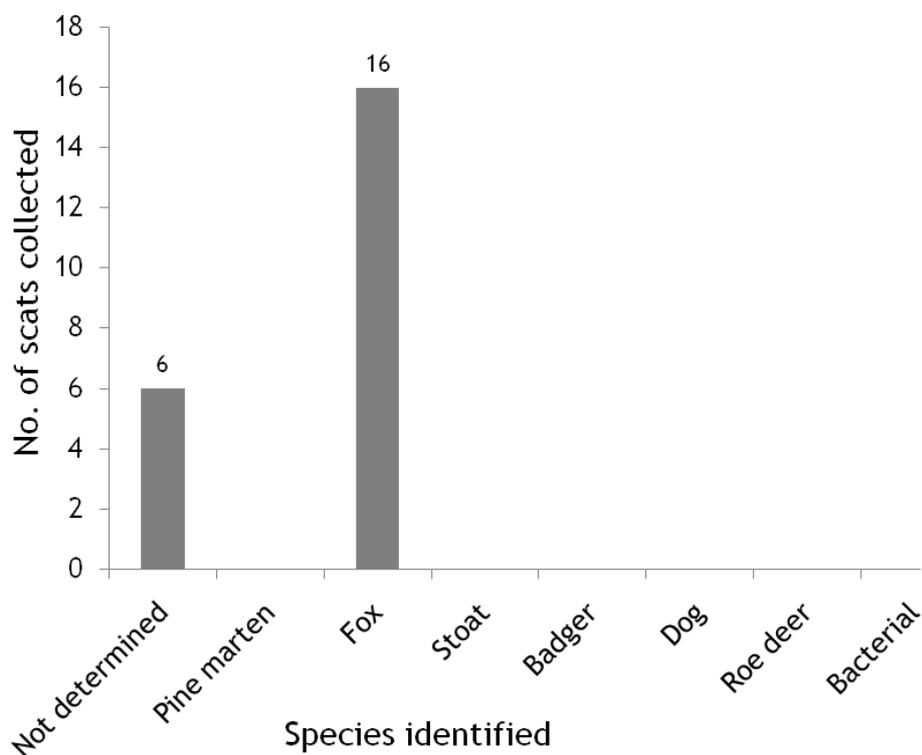
Date: 15 August 2010
Vice County: Cumberland (70)
Site NGR (approx.): NY2124, NY2427, NY3019

No. surveyors: 12
No. sectors surveyed: 5
Total distance surveyed (KM): 23.65
Total scats collected: 22

Survey team:

Tony Gerrard, Conah Gerrard, Julian Berkeley, Viv McDonald, Ian McMurdo, Phillipa McMurdo, Trina Barrett, Tony Barrett, Tony Purcell, Henry Schofield (VWT), Lizzie Croose (VWT), Neil Jordan (VWT)

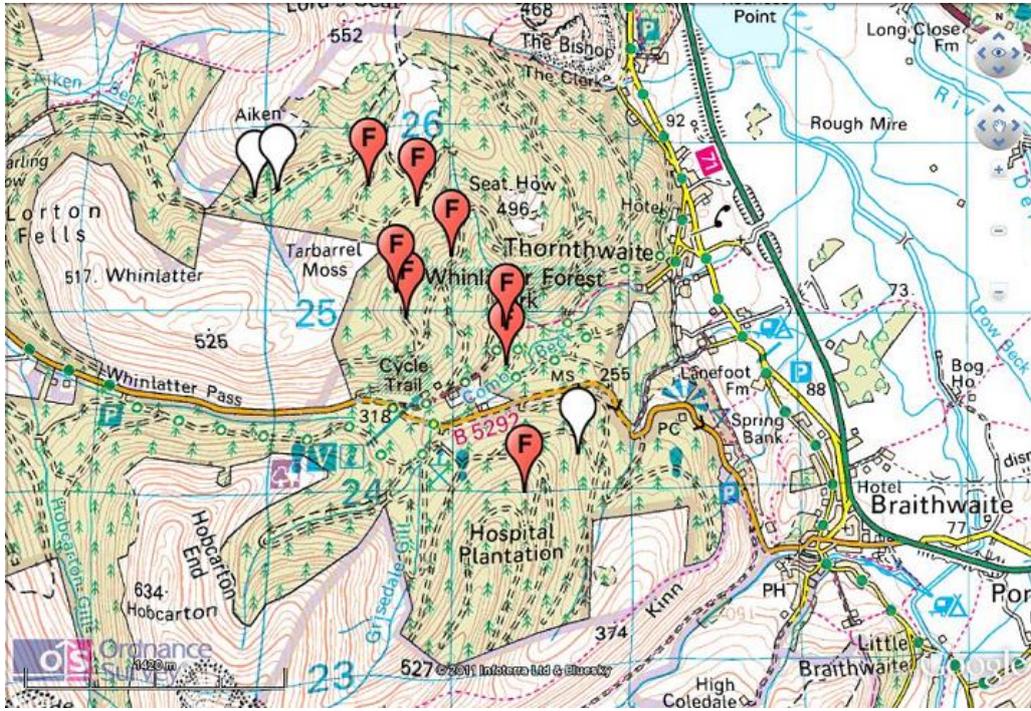
Frequency of scats collected:



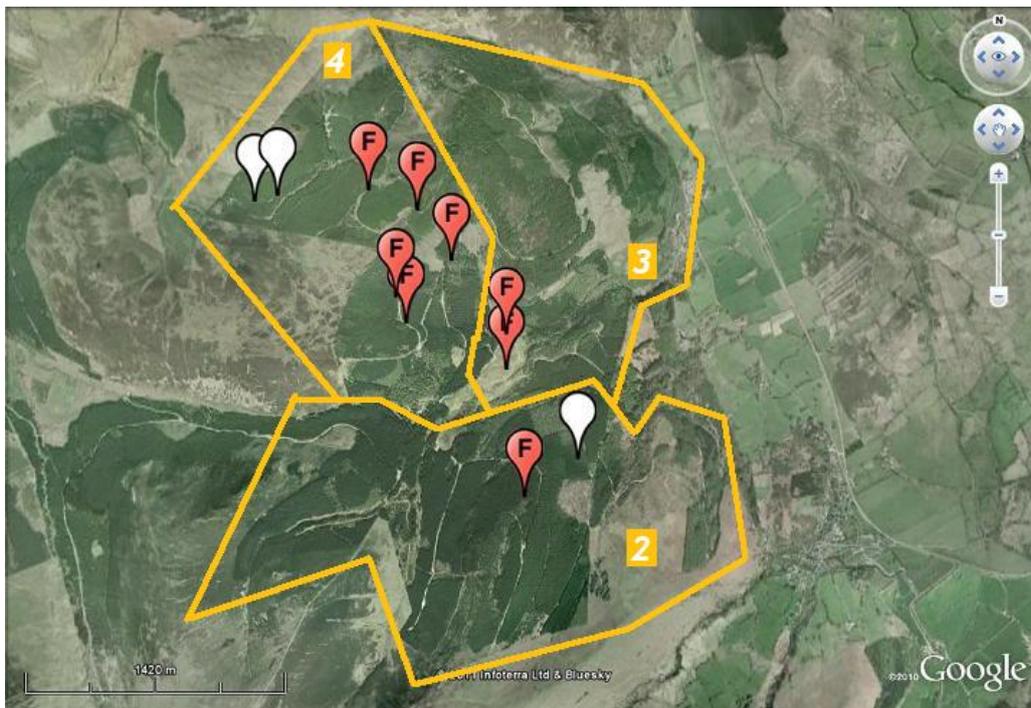
Survey maps:

Whinlatter and Thirlmere (main)

Map of approximate survey area (with collected scats shown)

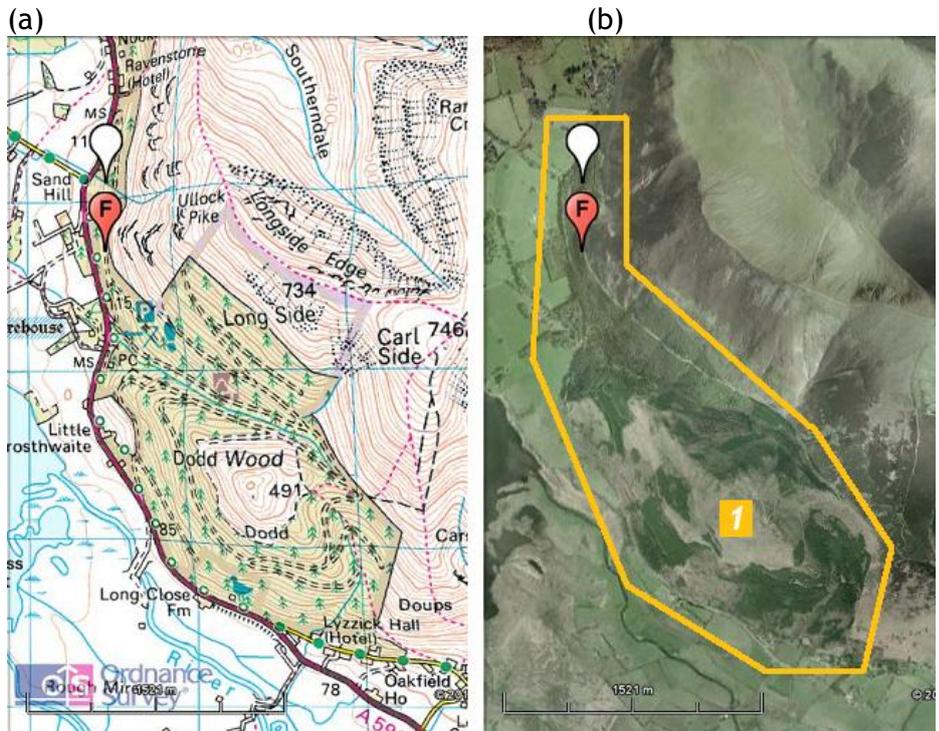


Map of numbered survey sectors (with collected scats shown)



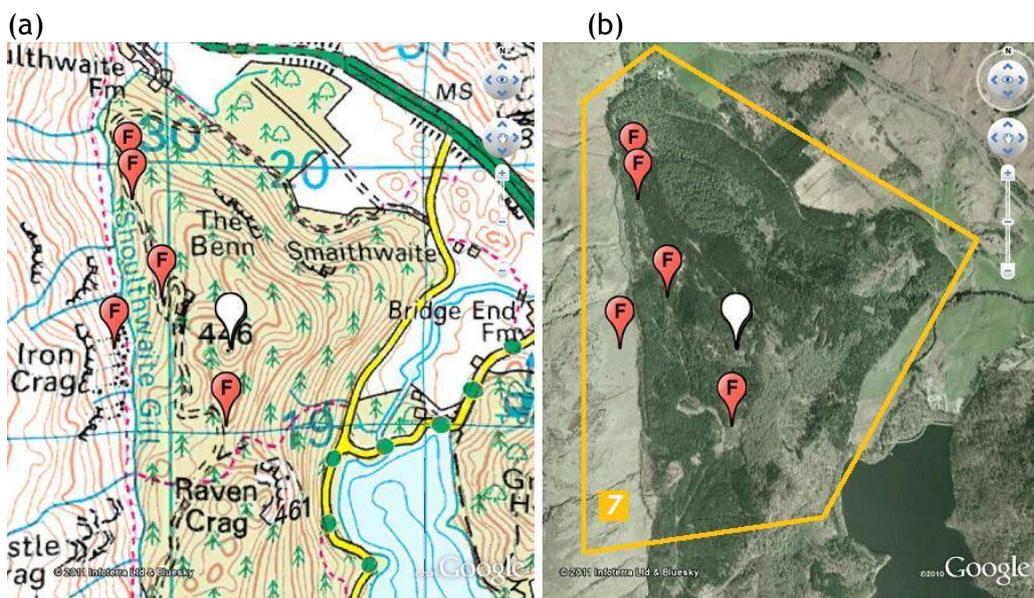
Whinlatter and Thirlmere (Dodd)

Maps of approximate survey area (a) numbered survey sectors (b), with collected scats shown



Whinlatter and Thirlmere (Thirlmere)

Maps of approximate survey area (a) numbered survey sectors (b), with collected scats shown



4. Greystoke

Basic data:

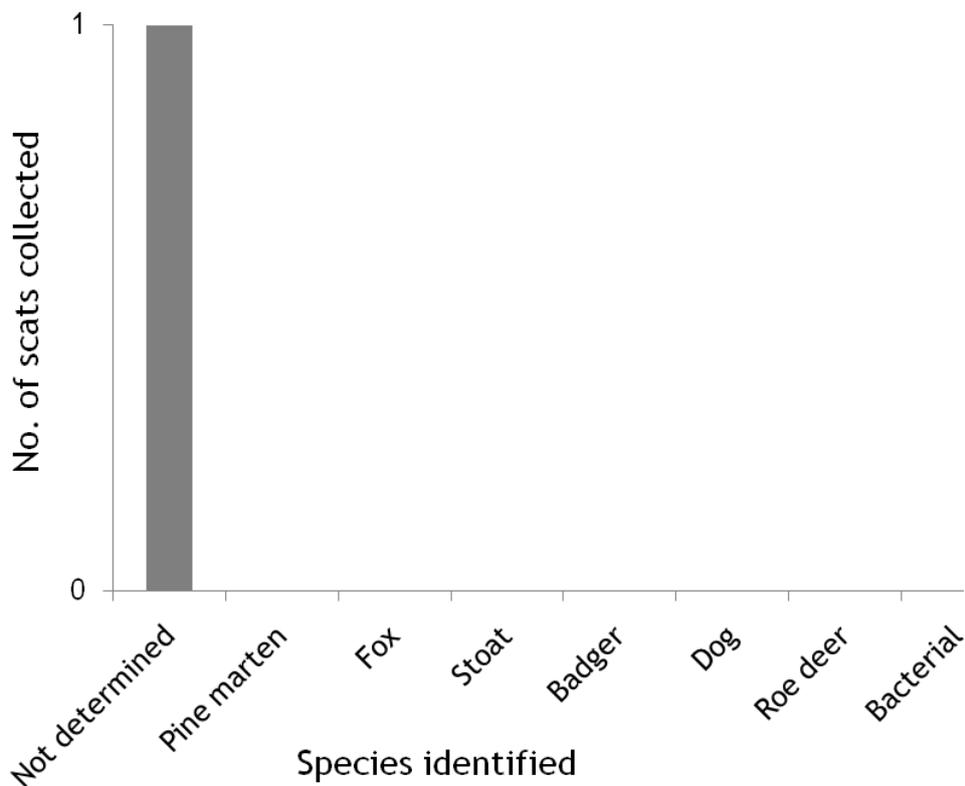
Date: 16 August 2010
Vice County: Cumberland (70)
Site NGR (approx.): NY3933

No. surveyors: 1
No. sectors surveyed: 1
Total distance surveyed (KM): 4.42
Total scats collected: 1

Survey team:

Lizzie Croose (VWT), Neil Jordan (VWT; den box erection Eden Valley), John Messenger (VWT; den box erection Eden Valley)

Frequency of scats collected:

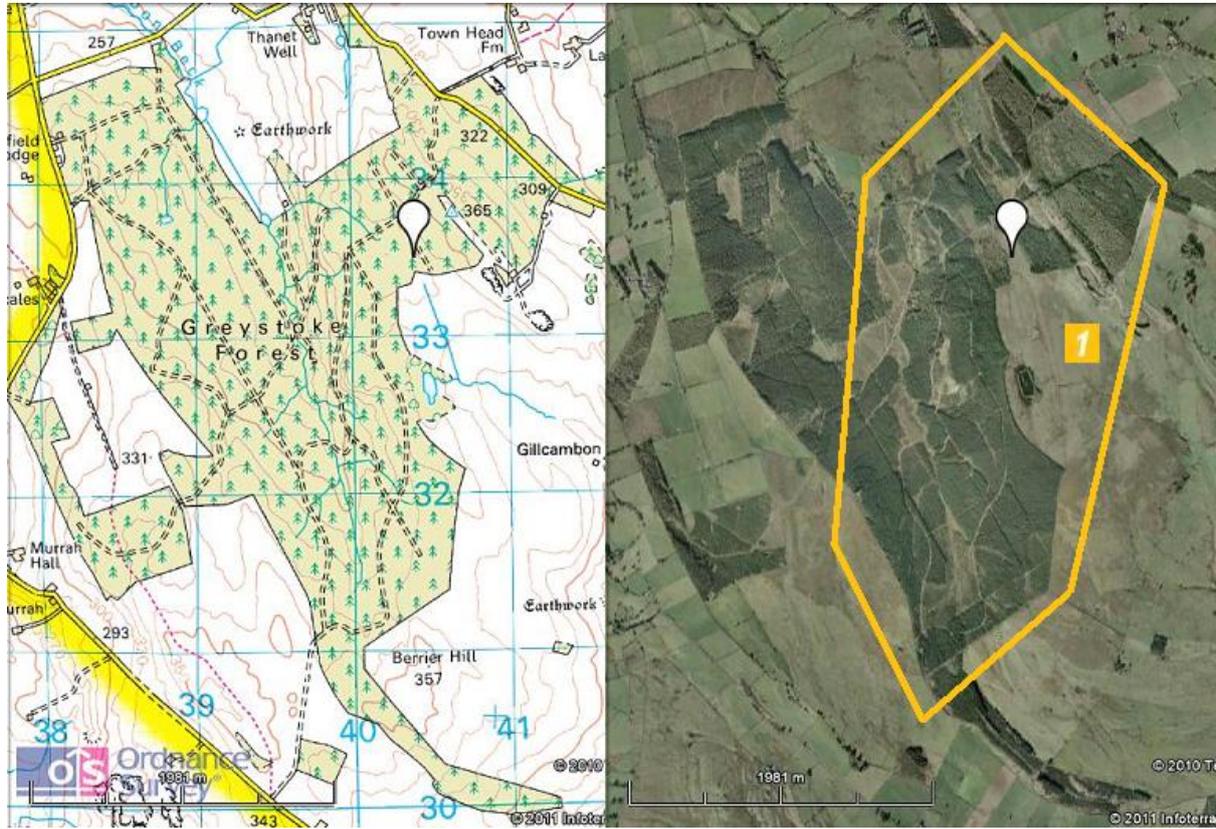


Survey maps:

Maps of approximate survey area (a) numbered survey sectors (b), with collected scats shown

(a)

(b)



5. Kidland

Basic data:

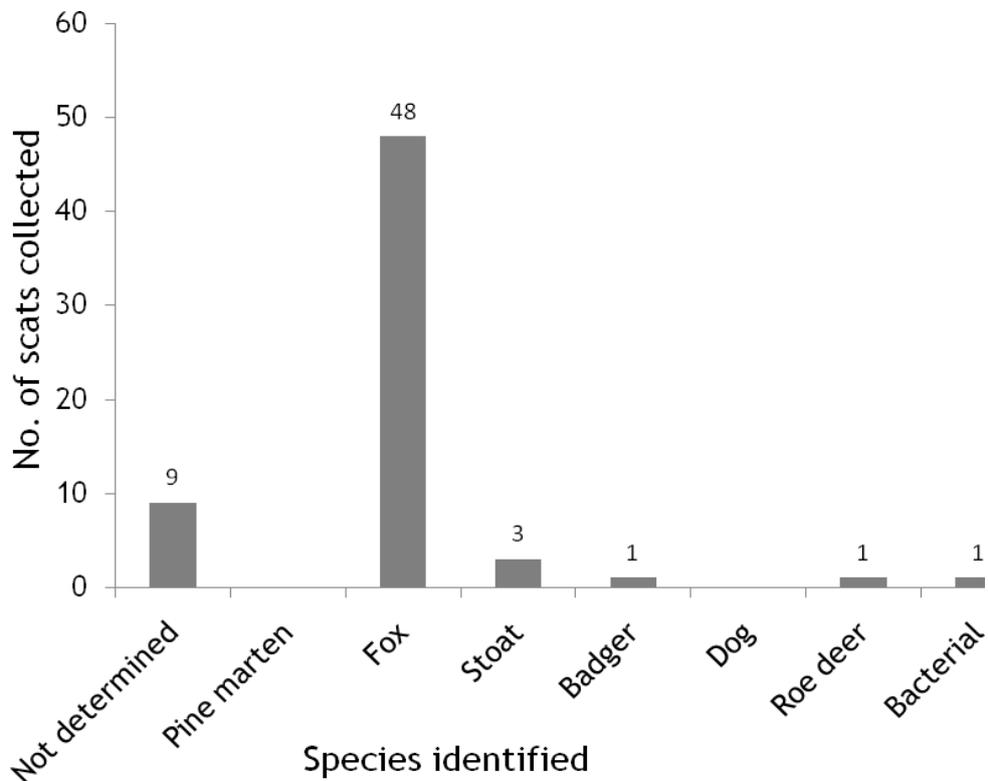
Date: 18 August 2010
Vice County: North Northumberland (68)
Site NGR (approx.): NT9111

No. surveyors: 17
No. sectors surveyed: 7
Total distance surveyed (KM): 23.62
Total scats collected: 63

Survey team:

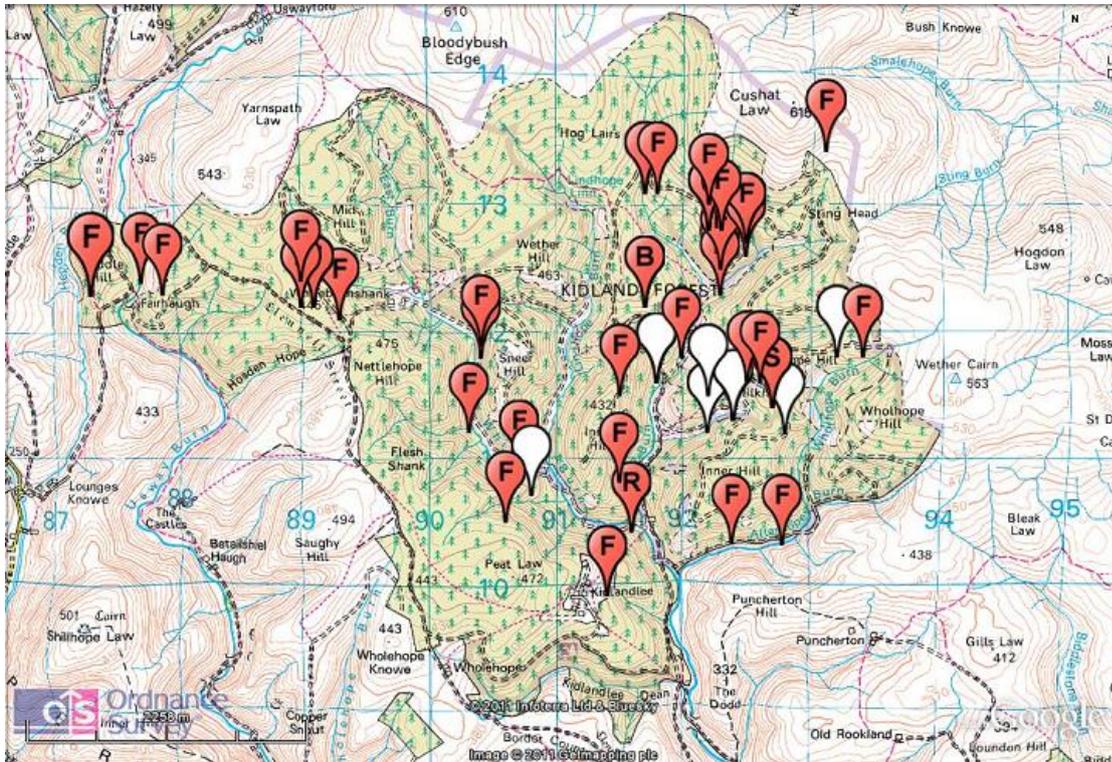
Dougie Nisbet, Kevin O'Hara, Laura Black, Robert Cussen, David Hardy, David Smith, Steve Lowe, James Foggin, Duncan Angus, June Stanworth, Paul Clark, Martin Swaffield, Joanne Swaffield, John Woods, David Humphreys, Lizzie Croose (VWT), Neil Jordan (VWT)

Frequency of scats collected:

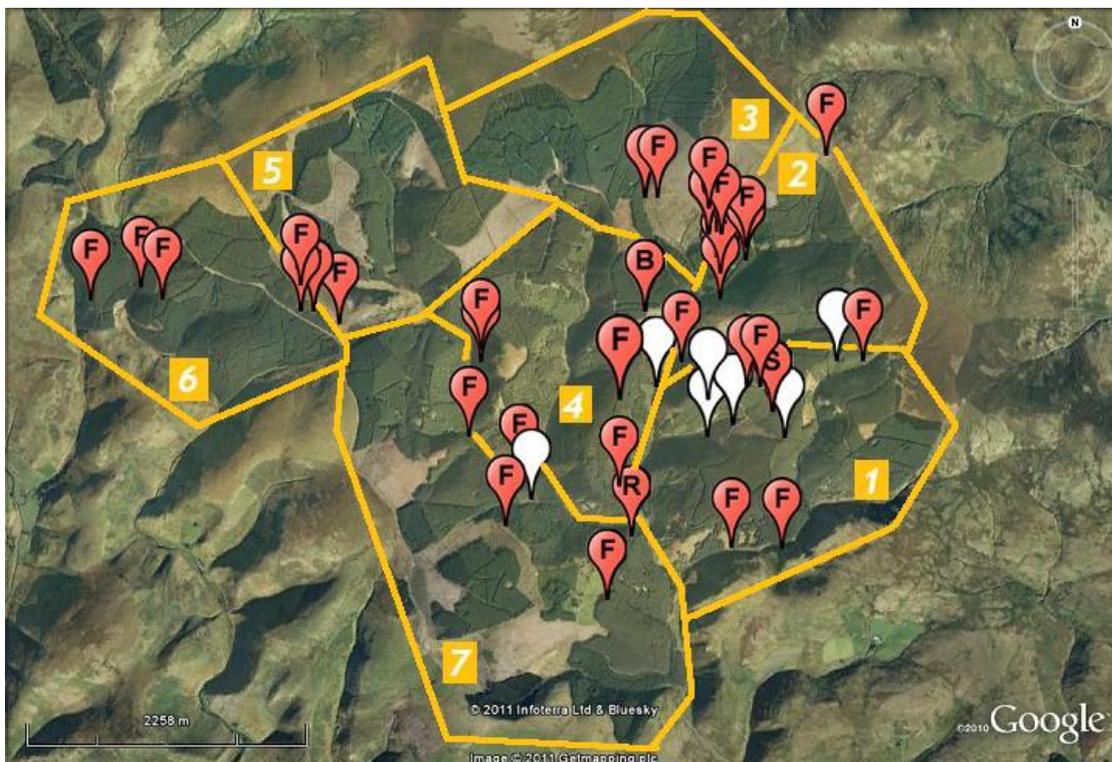


Survey maps:

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



6. Harwood

Basic data:

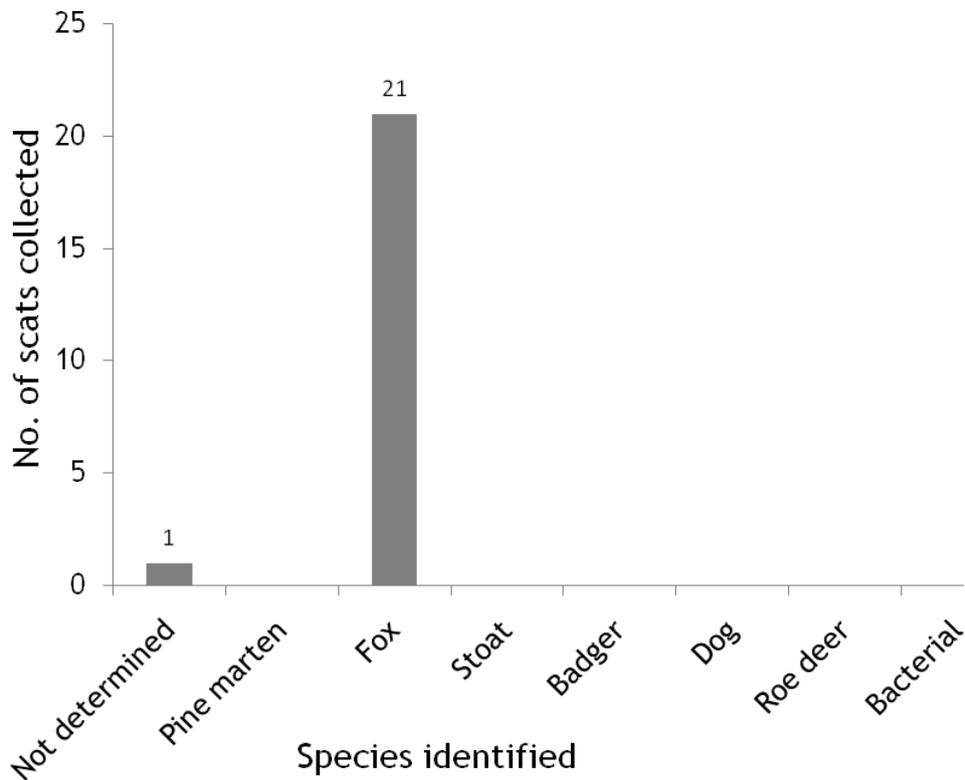
Date: 19 August 2010
Vice County: South Northumberland (67)
Site NGR (approx.): NY9994

No. surveyors: 9
No. sectors surveyed: 3
Total distance surveyed (KM): 19.3
Total scats collected: 22

Survey team:

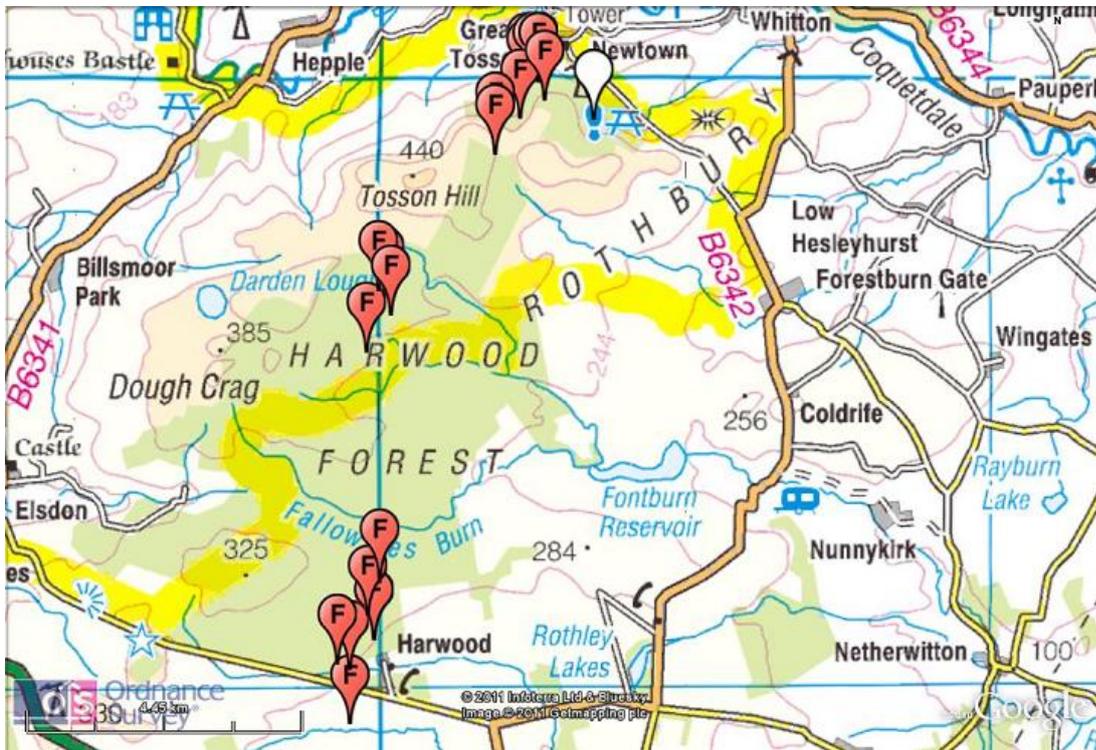
Kevin O'Hara, Naomi Waite, Sarah Jupp, David Hardy, John Woods, James Foggin, Duncan Angus, Lizzie Croose (VWT), Neil Jordan (VWT)

Frequency of scats collected:

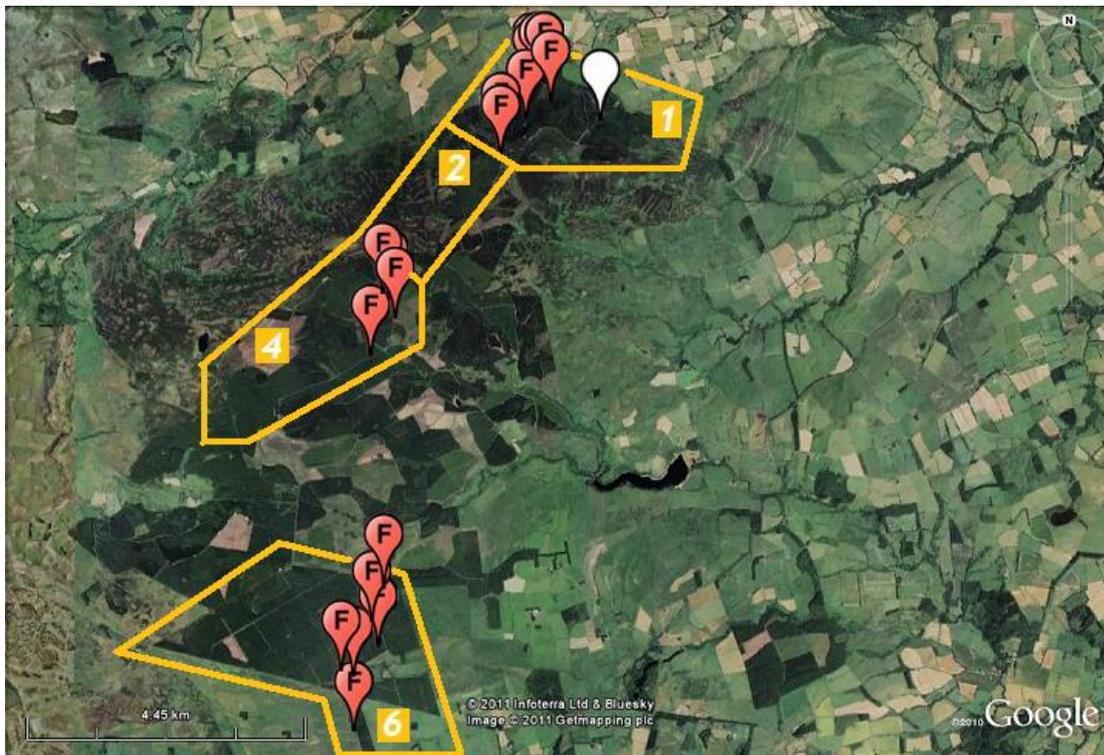


Survey maps:

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



7. Slaley

Basic data:

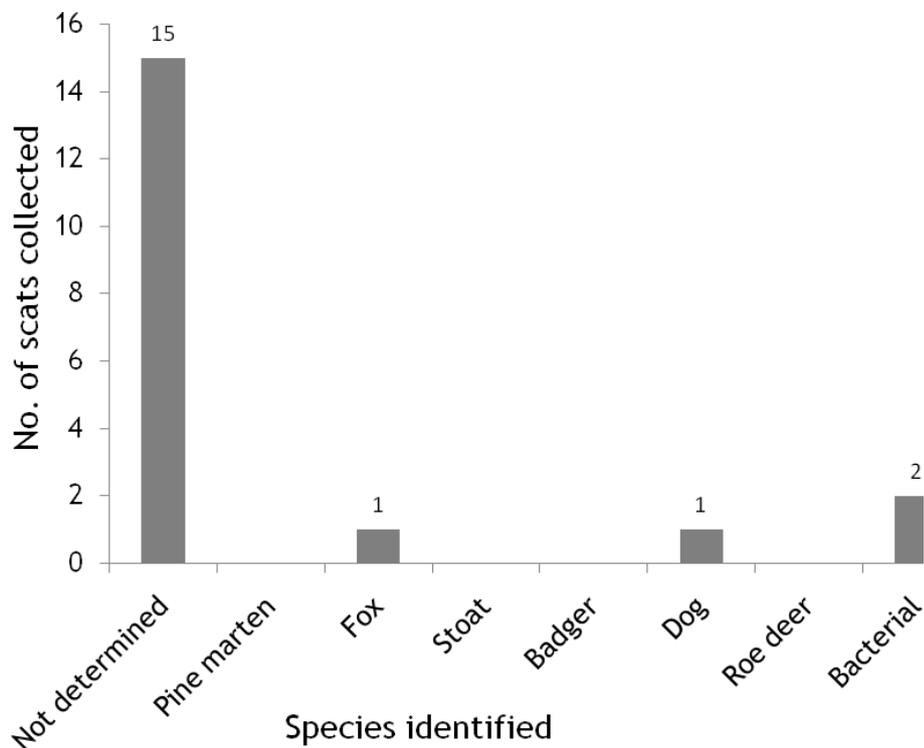
Date: 20 August 2010
Vice County: South Northumberland (67)
Site NGR (approx.): NY9655

No. surveyors: 11
No. sectors surveyed: 5
Total distance surveyed (KM): 21.7
Total scats collected: 19

Survey team:

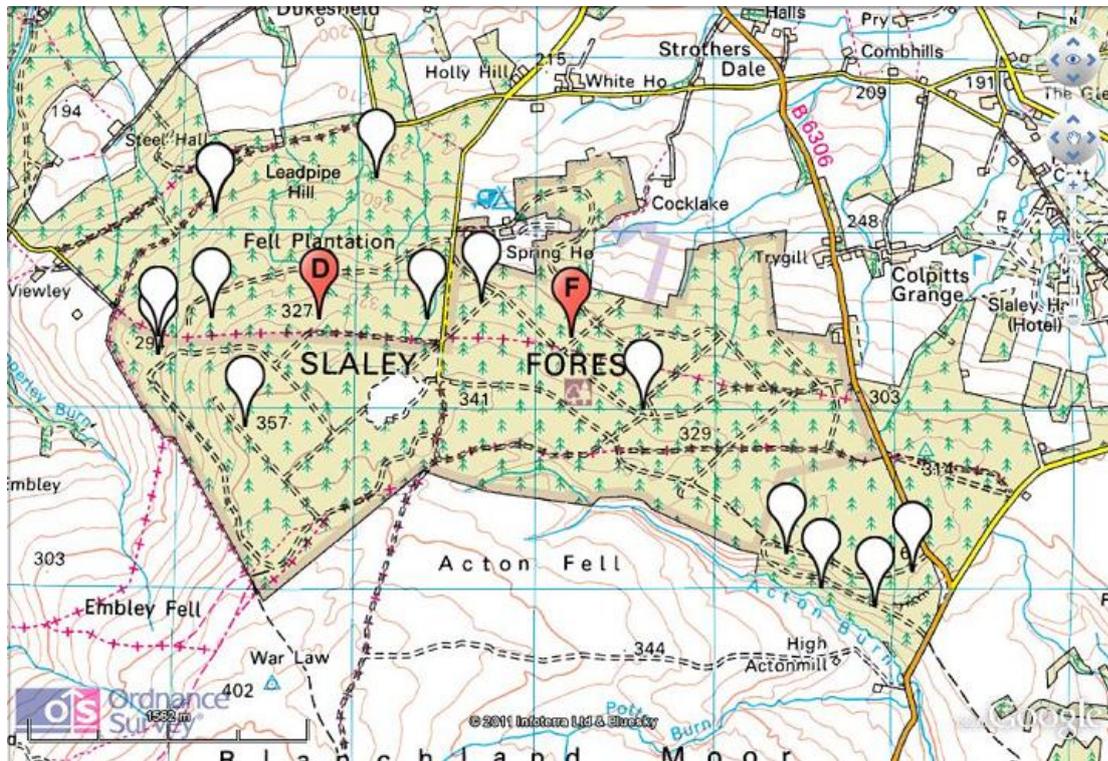
Sarah Edwards, Anne Wadsworth, Geoff Wadsworth, Bob Shaw, David Hardy, Rhia McBain, Lyndsay Cuthbert, Pat Shaw, Mary Lee, Jane Young, John Woods

Frequency of scats collected:

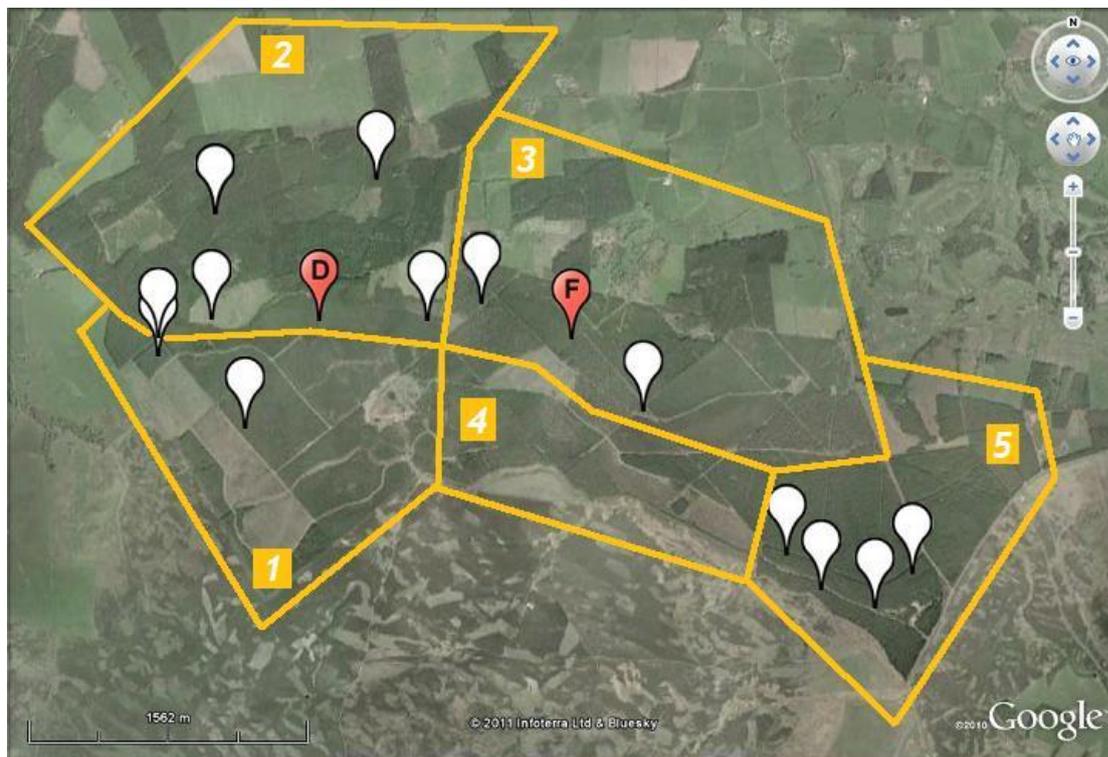


Survey maps:

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



8. Hamsterley

Basic data:

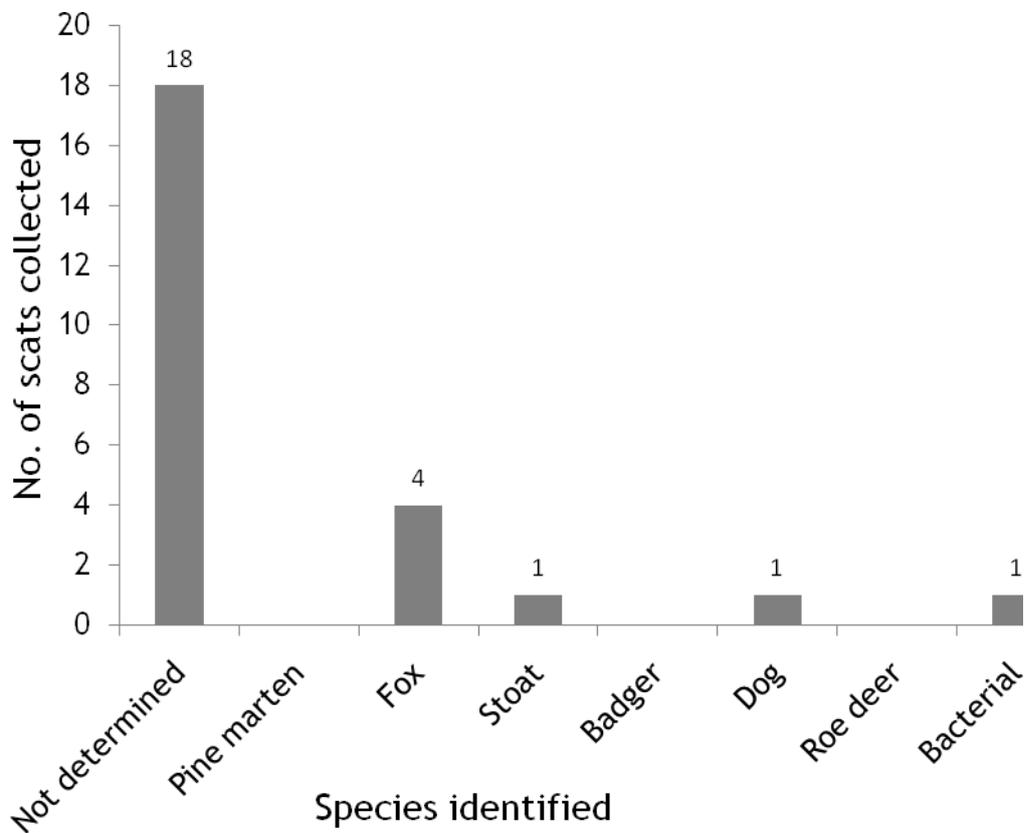
Date: 21 August 2010
Vice County: County Durham (66)
Site NGR (approx.): NZ0830

No. surveyors: 11
No. sectors surveyed: 5
Total distance surveyed (KM): 32.38
Total scats collected: 28

Survey team:

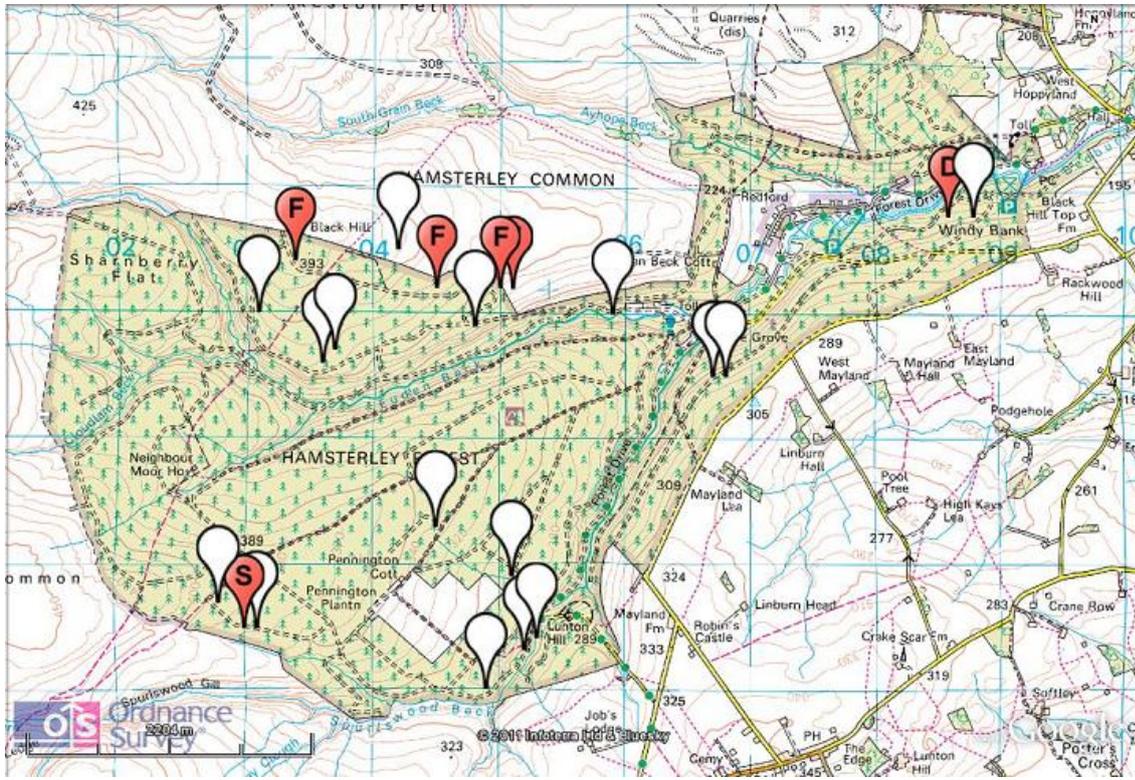
Viv McDonald, Andrey Boytsov, Ruth Jackson, Deborah Monk , David Hardy, Jane Young, Carlie Peggie, Paul Rowntree, Iain Macmillan, Hilary Macmillan (VWT), Neil Jordan (VWT)

Frequency of scats collected:

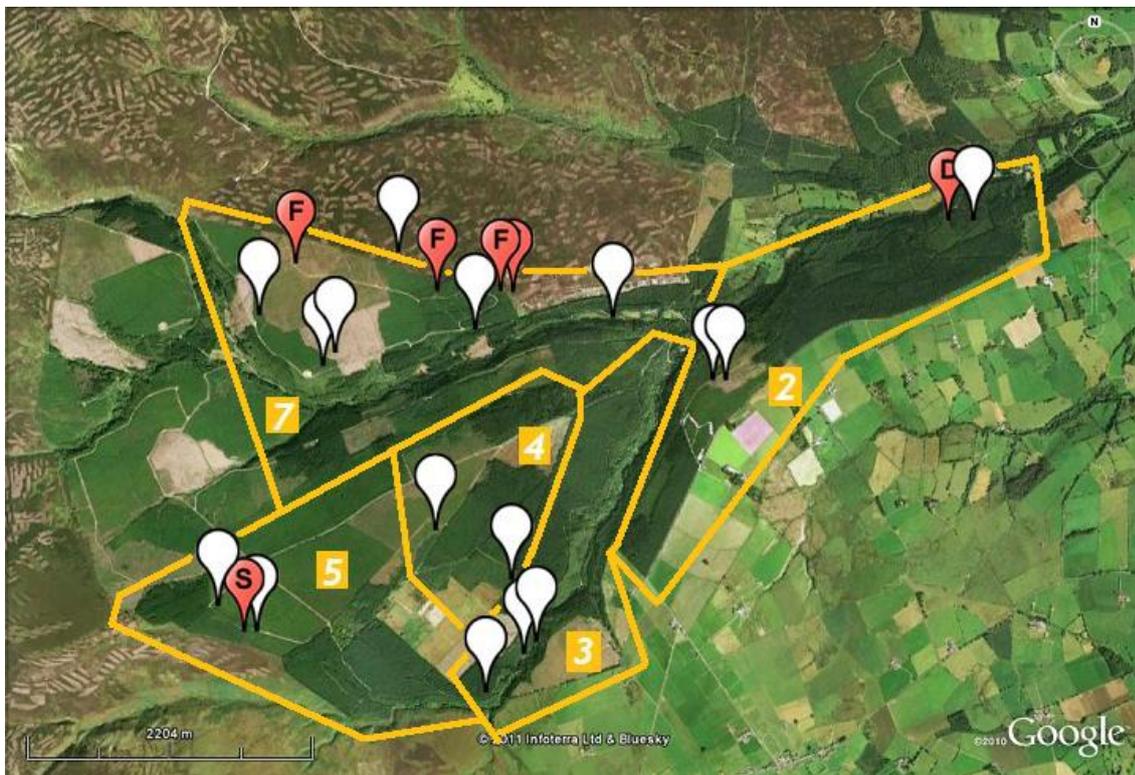


Survey maps:

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



9. Boltby, Silton and Wass Moor

Basic data:

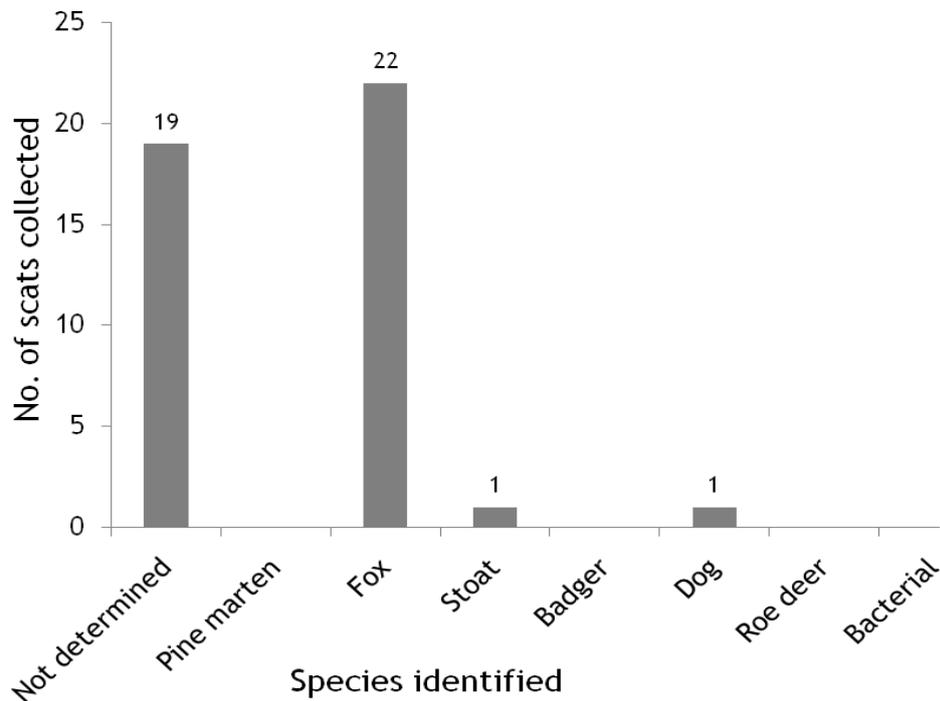
Date: 24 August 2010
Vice County: North-east Yorkshire (62)
Site NGR (approx.): SE4694, SE4888, SE5580

No. surveyors: 13
No. sectors surveyed: 8
Total distance surveyed (KM): 30.72
Total scats collected: 43

Survey team:

Janice Gwilliam, Elizabeth Sanderson, Jill Maghee, Jos Wilson, Dick Collin, Karen Collin, Brian Birkett, Maxine Birkett, David Major, Emmie Major, Rob Davies, Christine Smith, Neil Jordan (VWT)

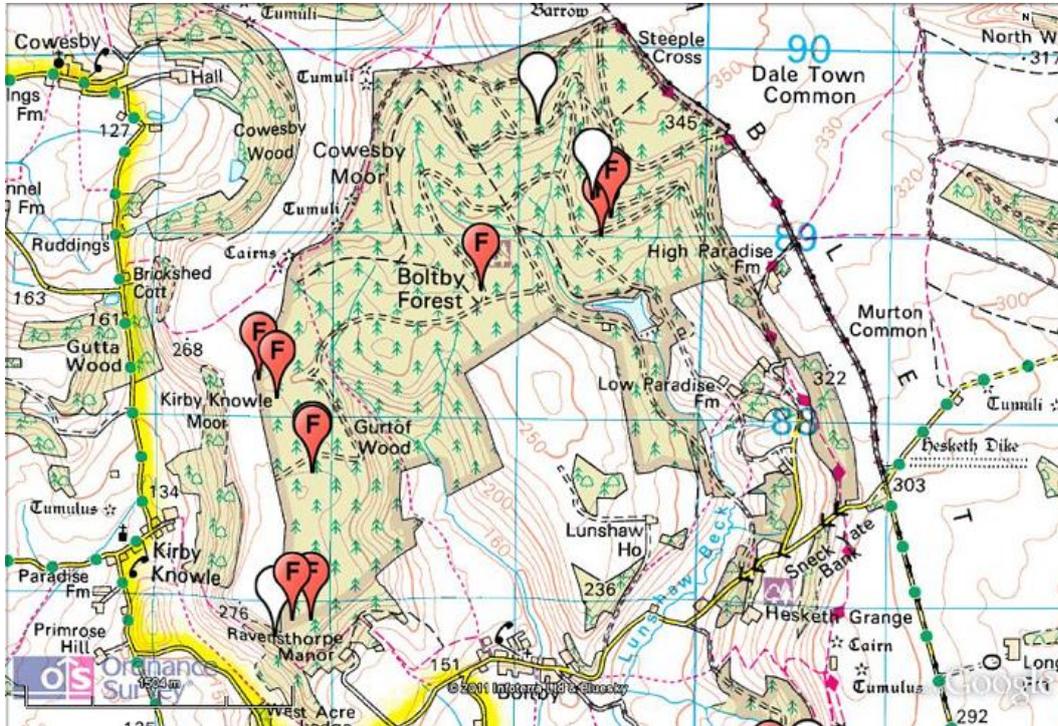
Frequency of scats collected:



Survey maps:

Boltby (Main)

Map of approximate survey area (with scats shown)



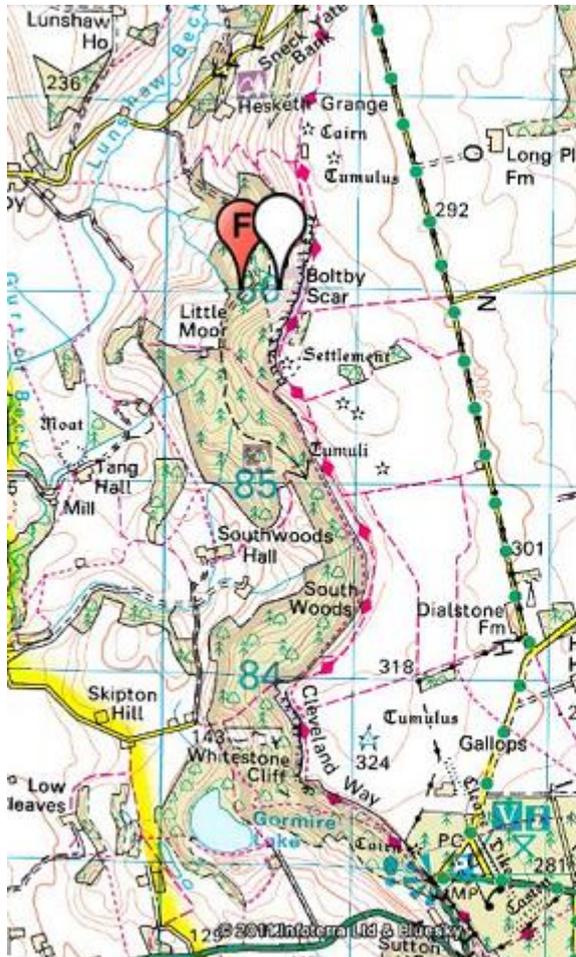
Map of numbered survey sectors (with collected scats shown)



Boltby (South)

Maps of approximate survey area (a) numbered survey sectors (b), with collected scats shown

(a)

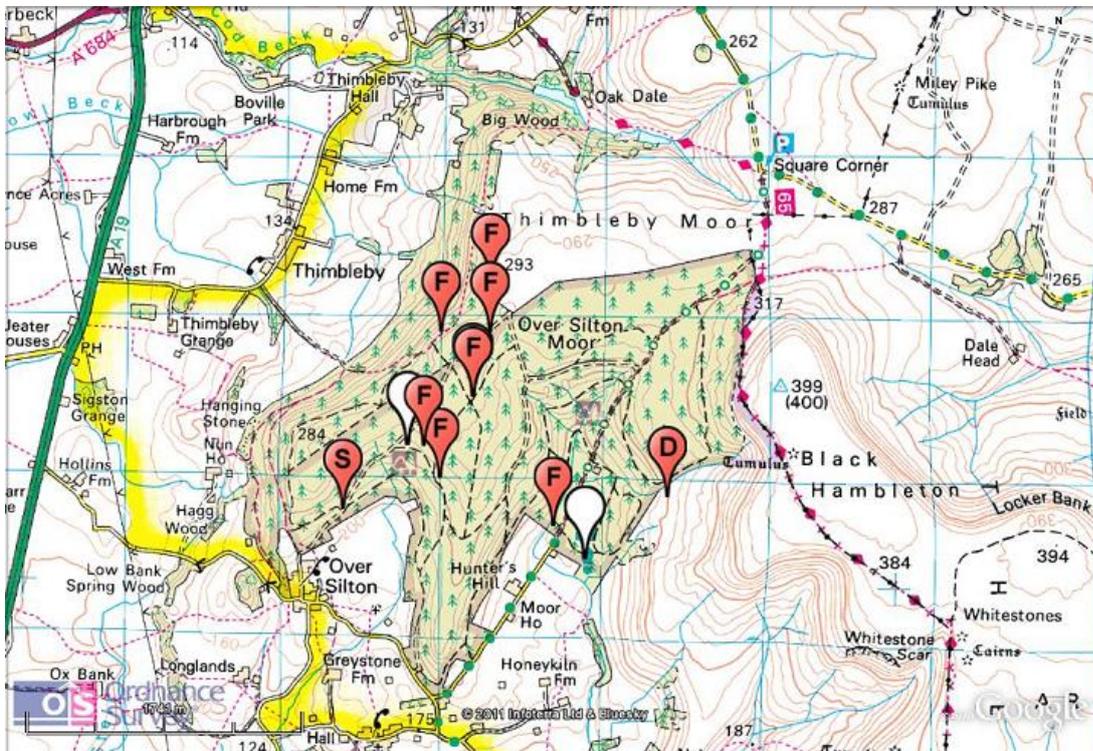


(b)

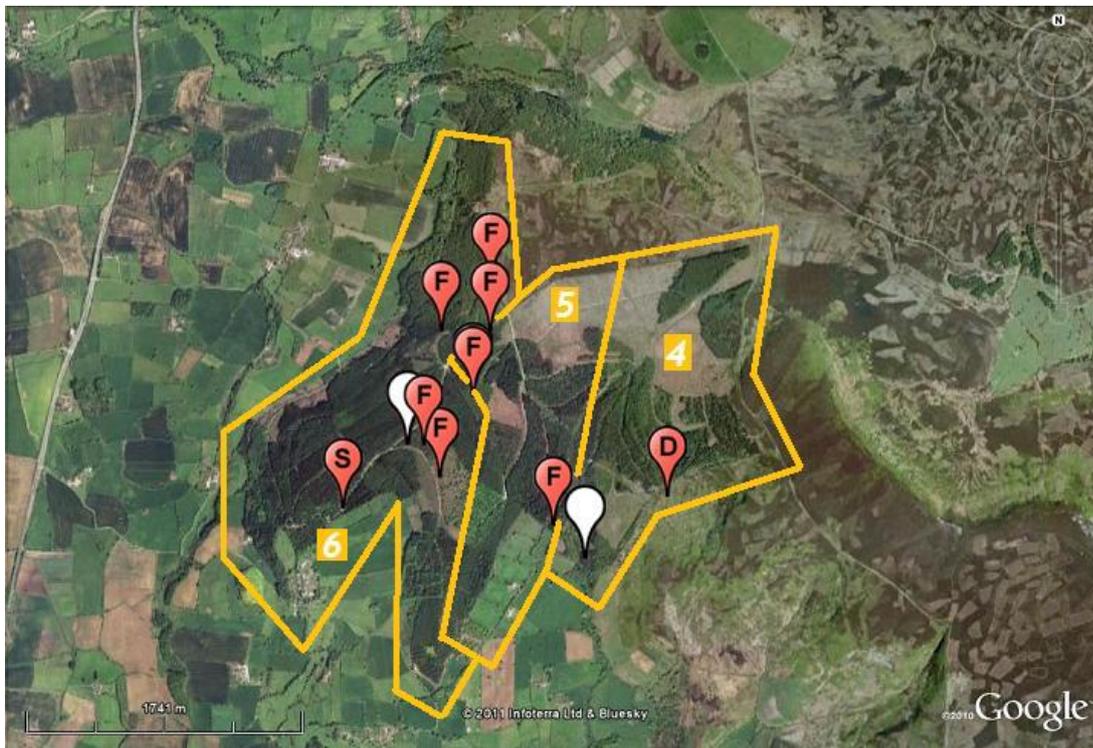


Silton

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



10. Dalby and Broxa

Basic data:

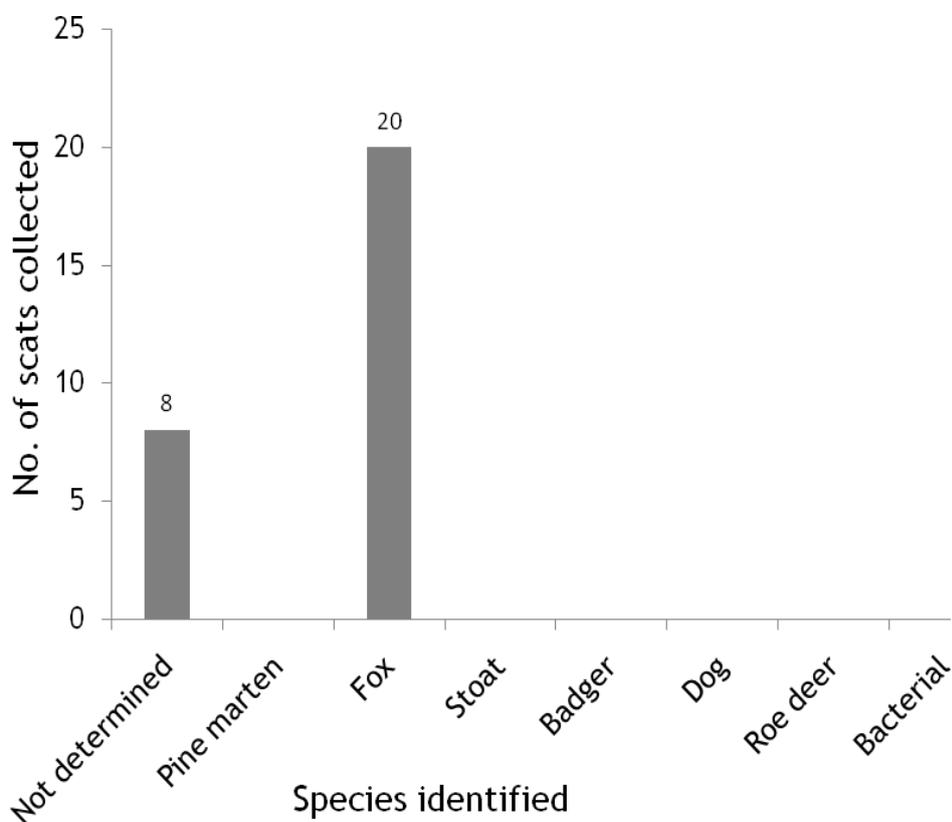
Date: 25 August 2010
Vice County: North-east Yorkshire (62)
Site NGR (approx.): SE9292

No. surveyors: 15
No. sectors surveyed: 7
Total distance surveyed (KM): 32.38
Total scats collected: 28

Survey team:

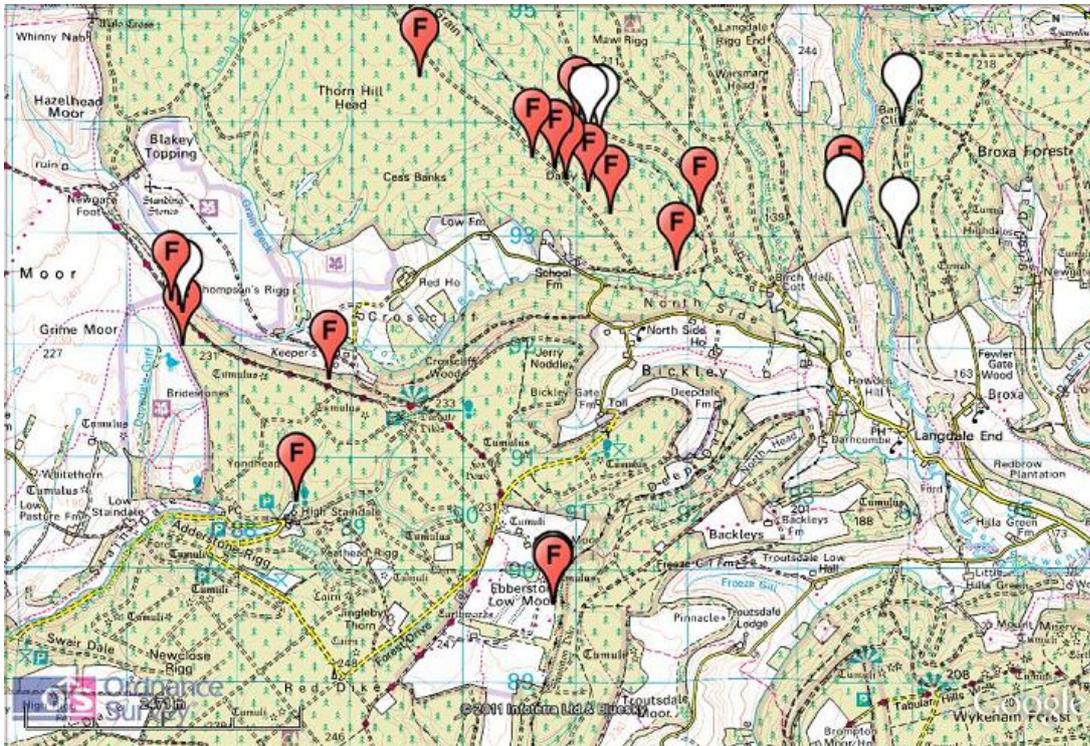
Laura Popley, Jackie Unsworth, Laura Winter, Charlotte Bickler, Brian Stockley, Brian Birklett, Maxine Birklett, Amy-Jane Beer, Rob Davies, Derek Capes, Mick Douch, Brian Walker, Arran Smith, Hugh Webster, Neil Jordan (VWT)

Frequency of scats collected:

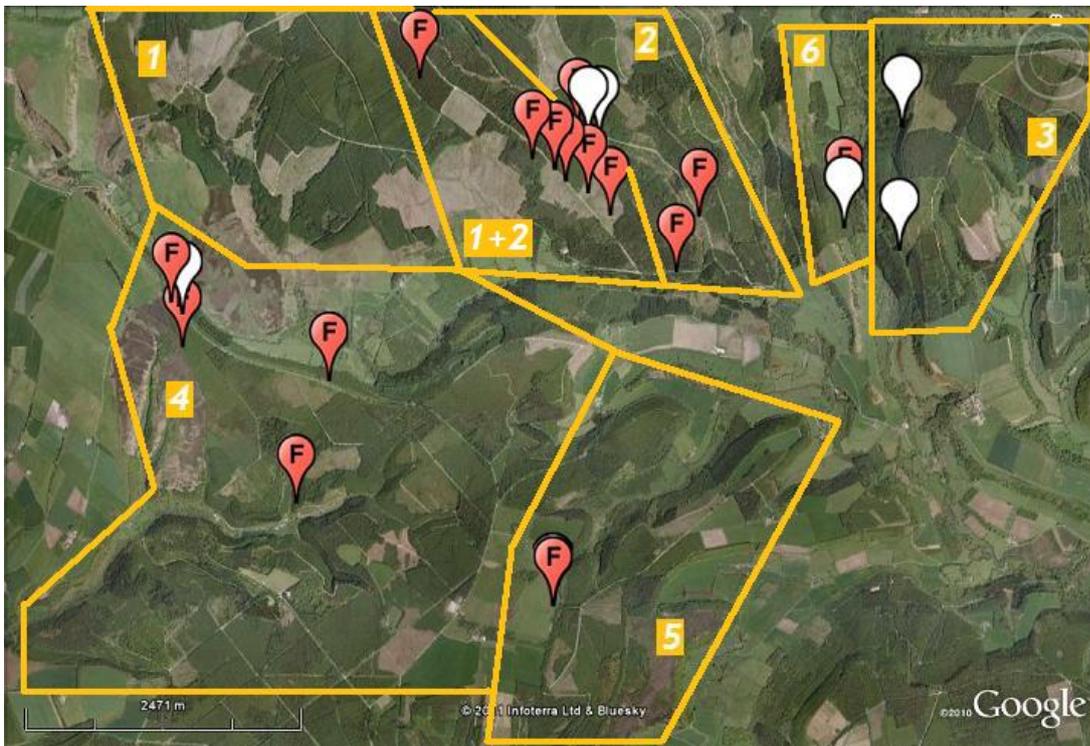


Survey maps:

Map of approximate survey area (with collected scats shown)



Map of numbered survey sectors (with collected scats shown)



Appendix 3: Great North Pine Marten Pursuit Diary

(The following pages were taken from the online blog on www.pinemarten.info which was updated 'on the road').

Day 1 – Grizedale scat and den box survey

Wednesday, August 11th, 2010

The pursuit began at the same time as the rains. Having collected a volunteer from the bus stop in Hawkshead, we arrived at a soggy ‘Bogle Crag’ car park and gave a briefing worthy of the name. We had an ITV film crew on hand to record the day’s events for posterity, as one of our volunteers is part of a ‘fly on the wall’ programme focusing on the Lake District (you can apparently see it in January, if you so wish).

With their usual enthusiasm the volunteers trudged off through the forest to their damp sectors. Meanwhile I met with the Forestry Commission’s beat ranger and set off to check the den boxes which they and the VWT put up in partnership a few years ago. Bashing through the brush, each with half of a collapsible ladder as a weapon, Jon and I made our way to the boxes and ascended for a look inside. Apart from the dense vegetation that must be negotiated, bush-wacker style, now is a good time to check the boxes, as any kits will have left the den boxes already, and the temperatures are high enough not to cause difficulties if we were to temporarily evict a marten that might be using it as an over-day nap spot. Although none of the boxes we checked had the typical external signs of prolonged marten use (there were no deep piles of scats on the lids), in opening up the boxes we did get a few surprises.

Lifting the lid on first box, we were surprised to find it full of vegetation, a big ball of nest material basically. Martens don’t bring any bedding into dens, and so it seemed that a non-target species was squatting in our marten forest penthouse. On removing the material from this box and one of the others later on, Jon’s hand met with the mummified remains of a couple of grey squirrels, providing evidence of the culprit and perhaps highlighting the severity of the previous winter. Having cleared the boxes out, and hopefully made them ship-shape for future marten tenancy, we made our way back to the car park to meet the rest of the volunteers, but not before checking our final box. At the base of this box, we were surprised to find a few feathers that had apparently been chewed-out (rather than plucked) from the preyed upon bird, which is typical of a carnivore kill rather than death by raptor. An interesting bit of anecdotal evidence at best, but on return from the Great North Pine Marten Pursuit, we’ll be setting up some camera traps and hair-tubes in the vicinity of this one. Maybe....just maybe.

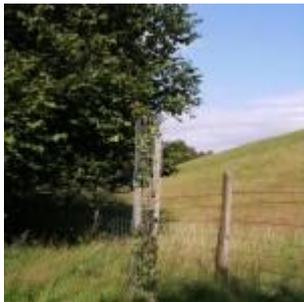
Back at Bogle crag, soggy volunteers returned from all angles with a good haul of equally soggy scats, so thank you to all who came out on our first survey. Natalie is posting the scats off to Waterford lab tomorrow so we’ll keep you updated on the results. I’m scribbling this from our woodland camp on day one. Tomorrow, we’ll break camp and begin to make our way over to Ennerdale via Langdale. One scat survey down and ten to go...

Days 2 & 3- Dispersing from Grizedale to Ennerdale

Thursday & Friday August 12th & 13th, 2010

Today I became an adolescent marten and tried to disperse between tow pine marten hot spots (areas producing a high number of sightings). Starting from the sunny camp in Grizedale I made my way, somewhat marten-like, across the landscape in an attempt to understand the difficulties martens might face in this environment.

Computer power issues on the road prevent me from waxing-lyrical at this stage about woodland fragmentation, the use of alternative 3-D habitats and den sites, and the open patches of the route where I was forced to run the risk of predation, but I'll include a few pictures of the journey here and recount the tale at a later stage. It goes without saying that I made it across safely, but I'm not sure I would have if I was actually a marten...



Future connectivity



Possible den site



Craggy woodlands

Craggy woodlands may be ideal habitat, but getting between them could be a challenge. Foxes abound and the lack of connectivity makes the crossing quite a dangerous activity. Hedgerow planting will help and is underway in places, and some of the older ones contain possibly suitable cavities already. The abandoned quarry looked like fantastic habitat, especially since it backed onto some ancient woodland.

Day 4- Ennerdale scat survey

Saturday, August 14th, 2010

Following a frantic morning of Keswick based dongle-induced computer tedium, our frustration immediately dissolved as we steered our Lakeland Land rover down into the magnificent Ennerdale valley. Soon we were as calm as the water to our

right, as we relaxed on the shore with a quick picnic, before making our way down the sunny valley to the YHA hostel for our first and last night of luxury. Real beds awaited, and replaced the need to slip and slide around in a muddy field driving metal pegs through canvas holes in order to make shelter. But, as you'll see from the pie chart of precipitation, the weather was stunning and it was great to show Lizzie and Henry wild Ennerdale at its best.

As if that weren't enough, the sightings board inside the hostel offered more good news. Amid the sea of red squirrel and woodpecker records an island of hope jutted out in black marker pen...



A recent sightings record from Ennerdale

What great timing, and only 100m up the valley too, and so after a hearty meal of bangers and mash a la Schofield and Jordan, we set off for the site dragging camera traps and playback equipment up the slope. As we've tried previously, we hooked-up a small mp3 player to a set of speakers and blasted the calls of a 'rutting marten' in one location and the soft-toy-type-squeaks of kits in a natal den in another, training a camera on each and spraying the surrounding vegetation with bait, we skulked off at dusk and tucked into a bottle of wine.



Setting up camera trap

A healthy while after dawn I returned to the sites to find that, while the rutting marten had aroused no interest, the kits seemed to have done the trick and drawn something in. The camera had triggered and the bait had been taken, and so I collected the equipment together and we headed back down the valley to meet today's team of volunteers, my heart racing slightly.



Pre-survey briefing

As the keenly assembled masses gathered around the truck and got their things together for the day, the sun broke over the steep fell sides and bathed the valley. Sadly, the flash of the camera had failed to similarly light the scene last night and we were left with a rather dull representation of the area- the kit-seeking, bait-gobbling nocturnal visitor not apparent in the gloom. Perhaps on return the picture can be enhanced, but it just goes to illustrate the rollercoaster of emotion that pine marten fieldwork entails!

The balance sheet today was resoundingly positive though, as Ennerdale is simply a stunning valley and the volunteers that came out to survey it were a great bunch too. Some local volunteers from the Wild Ennerdale partnership were headed up by the valleys pine marten expert and general enthusiast, Julian Berkeley, who provided Lizzie was a great guided tour of the area in search of scats, and we even had a couple of enthusiasts come all the way from Baldock in

Hertfordshire, which is an absolutely phenomenal effort! As always, to everyone who came along we are really very grateful for your efforts, and we look forward to seeing everyone at the rest of our Great North Pine Marten Pursuit. Onwards and Eastwards to Whinlatter and Thirlmere...

Day 5- Whinlatter & Thirlmere scat survey

Sunday, August 15th, 2010

We awoke on Sunday morning to glorious sunshine radiating through our tent - it seemed that the (unusually!) good weather was set to continue for at least another day! The lakes and mountains of the Lake District looked especially stunning in the August sunshine as we made our way to the meeting point for the survey. What better way to spend a sunny Sunday than looking for pine marten scats?!

At the briefing we were joined by a photographer from the Workington Times and Star, who then joined Lizzie and Julian on the survey to see what it's all about. He photographed us posing jollily with scat collecting bags and clipboards in hand, so keep your eyes peeled for a feature in the paper soon!

The fantastic weather made for perfect surveying conditions and as we climbed to the top of Whinlatter forest park and had a bite to eat overlooking Lake Bassenthwaite and the surrounding peaks, it was easy to see why martens may chose to frequent this area. Not only do the steeply-sided forests provide excellent denning and foraging opportunities for the critters, but the views are unbeatable! As one might expect with a popular tourist area such as the Lake District, the availability of scats on tracks was reduced by the number of cyclists and walkers frequently using them. Perhaps we should think about scraping bike tyres for scats?! All in all, the surveyors returned after the survey with a good crop of scats. We treated ourselves to an ice cream from a nearby van conveniently parked at our designated meeting place. After bidding our goodbyes, we packed up the car and headed east to the Eden Valley. We took a detour along our route to search for a possible marten road kill that had been reported to us by a passerby at Whinlatter, but after scanning the roads intensely, nothing was found. We arrived at our next campsite near Kirkoswald in time to have a BBQ and raise a toast to another successful survey, whilst sitting by the camp fire and watching the stars. Let's hope we have as much success tomorrow...



Whinlatter Forest

Day 6- Greystoke and Eden Valley scat survey and den boxes

Monday, August 16th, 2010

Planning a scatology-fest in an isolated area of North West Cumbria perhaps wasn't a great idea, but that's one of the tasks we set ourselves as we make our way from west to east searching for signs of those elusive beasts. On this occasion however, our hoped-for devotees were even more elusive than our quarry, but we pressed ahead on a rarely aptly-named Sunday in August, and did what we could.



Potential foraging areas in Greystoke Forest

Lizzie headed off to Greystoke, a key area for pine marten sightings, to continue our tour of head-down trail-scanning hikes, while myself and John Messenger (the VWT's real pine marten expert) went further east to the stunning Eden Valley, where we hauled up three den boxes (kindly provided by the Cumbria Community Foundation) into what we deemed suitable locations for pine marten occupancy. These really were rooms with a view, and we hope that they assist in the recolonisation/recovery of martens in this region.

The den boxes themselves are designed (by John) with thermoregulation in mind, and in comparison to the roomy but chilly owl boxes that martens have used in the past, they are very well insulated. The marten boxes have twinned external chimneys, accessed from the bottom of the box, which allow the occupant(s) to slink up and then drop down into a central small chamber, which is much snuggler as a result. The internal dimensions of this chamber are based on those of cavities of the black woodpecker, which pine martens routinely commandeer for breeding and sheltering within across central Europe, where both species- and the ancient woodland within which they thrive- are common. In contrast to other areas, den boxes are necessary here, as the woodland we have is much younger and generally lacks an abundance of old growth features with suitable cavities. Den boxes are therefore a crucial part of our practical conservation armoury, and in collaboration with local and National landowners (such as the Forestry Commission in this case), we are trying to increase the number and connectedness of the boxes we have out there with a national den box scheme. These three boxes represent about a 2% improvement in this artificial pine marten real estate in England and Wales- and so if you're keen to contribute too then please let us know - it can make a big difference.

Earlier this year we received news that we'd be hoping for; a marten had moved into a John Messenger designed den box in England. This was a first for England and Wales, and had occurred in one of Kevin O'Hara's Northumberland boxes, which is where we headed to next...

Day 7- Kidland den boxes

Tuesday, August 17th, 2010

Northumberland has yet more sheltered housing for pine martens- another five units in all- after another great day of hauling and hoisting...

The boxes were unloaded from our swanky 4x4, and dropped at sites deemed suitable by folks in the know. John, Lizzie and I were fortunate enough to be joined by Forestry Commission Ecologist Tom Dearnley, who provided expert advice and local knowledge including details of the future harvesting scheme for the forest; vital information to have when siting the boxes.



Securing a den box in place

Along with the management plan for the various forest blocks, the choice of the exact locations for boxes are also driven by considerations of food abundance, the likelihood that any martens will actually find them, and accessibility for future survey and maintenance. Many of the boxes were therefore situated along linear features such as streams or the intersections of animal trails, and harvesting tracks. The area itself is fantastic, with well-connected mature forestry providing shelter and commuting routes to vast areas of recent regeneration, the fringes of which should provide a healthy supply of voles and the like to satisfy even the largest of litters. There were many good sites to choose from, and room for many more boxes.



A ready-made pine marten den

Adding these to the Northumberland Wildlife Trust's existing den box scheme can only improve the chances of martens successful breeding here, and with the recent success on one of the boxes in this very area, we are hopeful that some of them will be used in the near future. With NWT offering up another twenty or so boxes for the region, this is turning into the place to be if you're a marten, and so it's proven to be.

Day 8- Kidland scat survey

Wednesday, August 18th, 2010

We arrived in the morning at our remote meeting point (which conveniently happened to be next to the camp site where we were staying) and were pleasantly surprised by the turn-out of surveyors. A total of 17 people had made the long trip over to the wilds of the Cheviot Hills, which is mightily impressive in an area where human settlements are as few and far between as mobile phone signal. Huge thanks go to one surveyor in particular, John Watson, who cycled 27 miles all the way from Morpeth to join us on the survey... now that's what we call impressive dedication! Perhaps it was the recent discovery of a pine marten scat on a den box in Kidland and the tantalising hope that the marten(s) using that box are still in the vicinity that had spurred on surveyors' enthusiasm.

After a briefing we navigated our way into the forest and the teams split up and headed off to their sectors. Accessing Kidland Forest is not for the faint-hearted and our Land Rover which was kindly loaned to us by Lakeland Land Rover, was invaluable on this leg on the trip, as we drove up steep forest tracks and navigated many fords. Our sector took us onto a forest track that had the largest

number of fox scats we had ever encountered on one track. At points, the scats were occurring at regular 5 metre intervals. Perhaps this area marked the boundary between 2 or more fox territories and the animals were feeling the need to scent mark their patch. Among the many fox scats, we found a few scats that didn't appear to be obviously from a fox and indeed seemed to fit the size and morphology of a marten and these were readily collected.



A panoramic view of Kidland forest

We returned to our meeting point to see how everyone else had got on. Overall, we got a very good batch of scats - 63 in total - and many look very promising indeed. Back at the meeting point it became evident that one team was missing. It transpired that Steve Lowe, Northumberland Wildlife Trust's Head of Conservation, had managed to get lost whilst trying to navigate the tracks and trails of Kidland Forest. Kevin O'Hara jumped to the rescue and set off into the forest to look for Steve and his co-surveyor. 40 minutes later, they all returned unscathed with perhaps just their dignity having taken a battering! Thanks to the chaps from Northumberland Wildlife Trust for coming out on the survey and providing invaluable knowledge of the forest and drumming up some extra volunteers. Indeed, thanks to everyone who took part in the survey and made it possible for us to survey the entire forest - that really is what we call a 'blitz' approach!

After a quick break over a cup of tea to review the day's survey, we headed back into Kidland Forest armed with an MP3 player, a set of speakers, a camera and a tasty concoction of bait. In case it isn't obvious what we were planning, we were attempting to catch a marten 'red-handed' on camera, taking a snack of jam, peanut butter and sardines. We headed to the den box set up by Kevin O'Hara, where scats from a female pine marten were found in April. An inspection of the box from the ground showed that there were no more scats on the lid of the box, a tell-tale sign that the box is in use by a marten, and no further evidence to suggest that the box may still be in use. It appeared that no-one was home. Perhaps the marten had heard about our brand new den boxes that had been erected a couple of kilometres away and fancied moving house?



Setting up a camera trap

Undeterred, we set up 2 cameras near the den box, in case the marten(s) returned home. With one camera trained on the box, we set up the other one in front of some bait and next to the MP3 player, which was playing calls of pine marten kits, which were recorded in Scotland. It is hoped that a female marten may hear these calls and come to investigate them, thus getting her picture taken by our camera. Equipment set up, we left the forest and returned to camp, with our fingers crossed for what the cameras might capture...

Day 9- Harwood scat survey

Thursday, August 19th, 2010

Bright and early this morning, we de-camped and headed into Kidland for the final time to review the cameras that we had set up last night. Unfortunately, the bait set out hadn't been taken and the camera on the den box hadn't been triggered. The martens were clearly camera-shy or elsewhere...

It was with a hint of sadness that we left Kidland and headed to Harwood Forest for the next survey. Although we spent 2 days and 3 nights at Kidland, it didn't feel like we did the forest justice, as the area is so vast that it feels like there was much more we could have done, if we had the time and resources. Having said that, we were really fortunate to have had phenomenal support from the Northumberland Wildlife Trust, and we did certainly cover as much ground as we could be expected to. Kidland is certainly a fantastic place for wildlife, and sightings during our stay included many roe deer, kestrels, buzzards, a peregrine falcon, a red squirrel and a brown hare. Rather less excitingly, masses of sheep seemed to take a thrill from dodging in front of our Land Rover as we passed by. Only time will tell if we will have detected a marten during our trip, as we wait for the DNA results from Waterford, and we'll be publishing them here as soon as we hear them.

A few miles down the road we arrived at Harwood and were pleased to discover that all but one of the day's surveyors had been present at yesterday's survey at Kidland and were returning for more scatological searching. This intrepid band of volunteers included our cycling scat collector whom, it transpired, was somewhat of an expert pine marten scat collector, having done daily surveys in Scotland a few years ago; a very valuable addition to the team. We were again joined by a number of volunteers from the Northumberland Wildlife Trust (Kevin O'Hara's volunteer army), and so were again well set to cover a good amount of promising ground.

If you've been wading through the other posts, then you'll be familiar with the survey format by now and so I won't recount that here. There are only so many scatological references one can stomach after all, but we were lucky enough to have a fantastic view of a stoat hunting rabbits in the heart of the forest. Seeing a rather sleek and low-slung dark form gliding through the dappled shade (it was another glorious day!) and into a log pile, we crept forward for a closer look. A rabbit darted left, then another, and then a much smaller sleeker animal dashed from the wood pile away from us and up and over a small rocky pile, which was the remains of a partially collapsed dry stone wall. This particular individual was a rather dull brown, almost grey colour, but the black tip to the rather thin tail was immediately obvious and, along with the overall shape and size of this low-slung Mustelid, marked it out as a stoat. It was gone in a flash, along with its intended meal, and we felt a little guilty about that as we continued along our trail hunting for signs of its larger and more elusive cousin. The end of another great survey!

Day 10- Slaley scat survey

Friday, August 20th, 2010

The previous night we had seen the first rain for a few days, which left us to retreat into our tent to shelter. It was with great relief that we awoke this morning to sunshine. Unfortunately our relief was short-lived and by the time we met with the surveyors in Slaley Forest the rain had started again. Despite the wet conditions, our surveyors headed off into the forest undeterred, with eyes peeled for scats. The morning was showery and by the time we reconvened after the survey the rain had become heavy. It seemed that the weather couldn't dampen the enthusiasm of our fantastic group of surveyors and we ended the day with a good crop of scats, despite the soggy ground conditions.

After bidding goodbye to the surveyors, we hastily bundled the scat kits and resulting paperwork in the car and drove south through the rain into County Durham to our next campsite ready for the survey tomorrow.

Day 11- Hamsterley scat survey

Saturday, August 21st, 2010

“Oh you’re doing a pine marten scat survey. So you’re picking up bird droppings then?”...

This common misconception, repeated again today at our campsite, may well be an accurate description of our activities in Hamsterley forest this time around. Positioned as it is on the moorland fringe, Hamsterley is rather a haven for pheasants, and we were almost blown away by the abundance of suspected pheasant ‘scats’ encountered on our particular transect. The stark vacuum of predator evidence, in our particular sector at least, was also evident.

Some of our groups did report encounters with a few obvious fox scats, and also collected a number of ‘scats of interest’- scats that they could not definitely say were not deposited by a marten, which is encouraging, but we didn’t see a single one on our 4 or 5km search, which can probably be summed up as rather a pheasant fest. A number of the young birds burst out of the brush as we struggled around this predator vacuum, their immature plumage showing signs of being replaced by the beginnings of their typical adult clothes. Beautiful birds indeed, but at what cost? How compatible are pine martens (and other native predators) with these non-native but economically valuable birds? There are difficult issues and conflicting interests to balance.



Pheasant feeder in Hamsterley Forest

So far on our trip across the north we’ve seen many different areas, and it’s been extremely interesting and enlightening to see them in such quick succession. Superficially these forests can look very similar, but there are subtle and substantial factors that differ between them. How and where do martens fit in this ecological and political landscape?



Pre-walk team-talk

Again we were joined by a large number of surveyors, kindly giving up their day to join in our search (Andrey Boytsov came all the way up from London-bearing scats from the New Forest- and deserves special mention here, while Deborah Monk of Hamsterley itself to provide much-needed local knowledge!). Although multiple surveys on the bounce are clearly not affecting the enthusiasm of the volunteers (David Hardy has now done four surveys in a row, so particular thanks to him!), I however may be starting to show the signs of prolonged time spent in a tent and living out of a Land rover. In the briefing this morning, I expressed my gratitude to the many volunteers who'd turned out on such a wet Sunday, which would have been fine had it not been a sunny Saturday! Regardless of the day and the weather we really are very pleased to have had such great support, and I can't thank everyone enough for their time and enthusiasm. As always we await the DNA results with interest, and I'm going to have a day of R&R...



Saturday night at the survey!

Day 13- Catterick Garrison den box survey

Monday, August 23rd, 2010

After a quick meeting with the Rural Estate Advisor, Jez Kalkowski, and a brief map-reading exercise in the illustrious setting of a local McDonalds car park, I set off solo into the driving rain in search of pine marten den boxes. Situated as they were on the periphery- and occasionally within - live firing ranges, I trod carefully and restricted myself to checking the areas deemed safe by my guide. Nonetheless the signage was less than inviting, and you can imagine the, albeit bullet-strewn, haven that this area represents for a rare and elusive species.



Into the danger zone

With no means of ascending to the great heights at which these boxes were suspended (I had as yet not received the requisite formal ladder training, and current Health and Safety legislation was apparently incompatible with my boyish desire to shin up to such lofty heights), I was restricted to a cursory visual check of the roof of the boxes and their base for signs of use. By 'signs of use' I do of course mean scats, as pine martens are known to build scat pyramids on the roof of their residence and this is a sure sign of their occupancy.



Scats on a den box: a 'poo pyramid' in Dumfries and Galloway

Unfortunately none of the boxes that I was able to check had any evidence of occupation, and therefore none of that valuable DNA, although I did spend a good half an hour chasing a false lead. This dark cluster in the back corner of one box turned out to be a clump of old decaying leaves, but I didn't confirm this until I'd exhausted my arms with comical lassoing attempts and complicated rope tricks from my terrestrial (disad-)vantage point. On to the next one...

Day 14- Silton & Boltby Forest scat survey

Tuesday, August 24th, 2010

With the departure of the rest of the VWT team following the Hamsterley survey, I had packed up the large tent for the last time and reverted to a smaller 'exploding' type that was less hassle and easier to put up. Getting it down though was more of an issue, and in the end, after multiple failed attempts and fabric explosions, I stuffed it into the Land Rover and raced off for Silton.

On time, and almost on site, I was thrown another curve-ball however as I approached the Sneck Yate rendezvous location; the road was closed and I had to take what turned out to be a thirty-mile detour and arrived unprofessionally late with my tail between my legs. It was only five-minutes or so, but I was highly embarrassed, particularly as the car park was full of enthusiastic and friendly surveyors.



Boltby Forest

We got going quickly, and I fired off the volunteers in all directions, covering three main areas of woodland in the area; Boltby, Silton and Wass Moor. I remained close to the meeting point, choosing a section that took in Sutton bank, and provided a stunning view of the area. The woodland here is interesting and relatively well connected, with steep woodlands on the edges of old river and stream valleys joining what might elsewhere be isolated blocks of woodland. You can see why this vice county might house a number of surviving martens, as the recent VWT pine marten report suggests it does.

Mystery of the day for me was the discovery of several patches of rotting apples lying on the forest floor. I am certain that these were discarded deliberately, as they were not in the shadows of any fruit trees, but for what purpose they had been scattered I am still not sure.



Mysterious windfall

Again the weather held reasonably well, and we were rewarded with a good haul of scats, but only time will tell if they were deposited by our elusive quarry.

Day 15- Balby & Broxa scat and den box survey

Wednesday, August 25th, 2010

The day started with a bang- or burn really. Overnight someone decided that it would be a good idea to vandalise the Land Rover. Fortunately they restricted themselves to burning a small hole in the rear (plastic) window of the canopy, probably with a cigarette lighter. That was disappointing, and rather frustrating not to be able to discover the 'thinking' behind it, if in fact there was any at all.

Early doors, we made our way east to Dalby and I was joined by an old friend who is now teaching biology at Ampleforth College. Hugh is hoping to inspire the school to take on building of pine marten den boxes for the local area as part of their design and Technology course work in the coming year, and so he was keen to come along and discuss the project and a potential collaboration with the Forestry Commission. After a long drive through Dalby Forest and a short briefing, Hugh and I accompanied the local forest ranger, Mick Douch, to check on the existing boxes and discuss this project further.

As Mick ascended the ladder, checked the box tops for scats and the insides for evidence of use, we discussed siting options for the thirty-or-so boxes expected to be produced.

As we turned for home, and following a wonderful sighting of crossbills in the canopy, eagle-eyed marten enthusiast Mick spotted a scat on the road from the car that was too good to resist. If it had been produced in winter it would still be steaming, and the twisted coiled shape got my heart racing. Of all of the scats, from all of the surveys, this was the one I pin my hopes on, but we will let the lab decide. Nonetheless, it was good to finish on a high as I set off first across the moors, then the Dales finally reaching the Lakes, a little weary and rather weighed down with scats. Tomorrow, I'll have to work out how to put that tent away.

Appendix 4: 'Scatalogue'

Example photographs showing example scats collected during the GNPMP. Volunteers were encouraged to collect all scats that they could not dismiss as having certainly not been produced by a pine marten, and species were subsequently identified by DNA analysis.



Species not determined



Red fox



Stoat



Domestic dog



European badger

Appendix 5: GNPMP News briefing/Press release

5 July 2010

News briefing

Advanced notice of:

The Great North Pine Marten Pursuit!

A coast-to-coast 15-day endeavour across northern England in search of England's rarest mammal

Journalists are invited to join us on any of the 'legs' of the 'Great North Pine Marten Pursuit' - an ambitious 'coast to coast' series of research and survey initiatives involving as many as 200 volunteers over a 15-day period in August. It forms part of our ongoing search for the rare and elusive pine marten.

This pursuit is all the more important following the discovery **in the last week** (see earlier press release) of a pine marten in Northumberland - the first unequivocal evidence from Northumberland for 16 years.

We are aiming to visit multiple hot-spot sites (areas of reported pine marten sightings) across the north of England (see below for route details). At each site you will be able to record research in action. We will be setting up remote camera stations to try and capture pine marten footage; we will be using scent and sound lures; groups will be searching for pine marten droppings and we will be erecting and surveying den boxes in woodland sites, all with the help of teams of volunteers. The event will be launched on Wednesday 11th August in Grizedale Forest.

The pursuit, involving a mix of hiking and 4x4 travel, will start in South Cumbria on 11th August, pass up through sites in West Cumbria, North Cumbria and Northumberland, then down through Durham and across the North York Moors, finishing on 25th August.

Analysis of data collected by the VWT over a 10-year period, suggests that pine martens are still present in broadly the same parts of England and Wales from which they were recorded in earlier decades, including Lakeland, Northumbria and the North York Moors in England. What we now need is more evidence of their whereabouts and more DNA samples to analyse the origins of those animals still surviving amongst the hills and dales of northern England. This is crucial for the long-term conservation plans for the pine marten.

If you would like to join Dr Neil Jordan, our Pine Marten Project Manager, at any point along the route, please contact Hilary Macmillan, VWT Communications Manager, on 01531 636441 or email: hilarymacmillan@vwt.org.uk.

ENDS

Notes for Editors

The pine marten (*Martes martes*) had become extinct throughout much of Britain by the early part of the 20th century. Small populations survived in Wales and the Marches and in areas of northern England, but relatively strong populations were still to be found only in some parts of the Scottish Highlands where persecution pressures were less.

Recent studies show that the pine marten in Scotland appears to be making a good recovery. South of the Scottish border the situation appears to be different and the recovery taking place in Scotland has not yet occurred in those parts of England and Wales where pine martens survived.

The surveys and studies that have so far been conducted pose a number of important questions, including what is the status and distribution of the pine

marten in England and Wales and why has its recovery not yet occurred outside Scotland?

The VWT is engaged in long-term studies to address these and other questions.

Pine marten facts

A native mammal of Britain and Ireland, the pine marten (*Martes martes*) is a medium-sized mustelid (or member of the weasel family) and is related to the mink, polecat, otter, badger, stoat and weasel. Adult pine martens are similar in size to a small/medium-sized domestic cat, with males about a third larger than the females.

The pine marten has a slim body and a long tail that is thick and bushy in its winter coat. Rich brown fur contrasts with a creamy-yellow 'bib' on the throat and chest, and with the pale fur within the prominent, rounded ears (the bib varies in size and in some individuals is almost absent).

The pine marten probably arrived in Britain and Ireland soon after the end of the last glaciation, about 9,500 years ago. An animal of woodland, it would have been most numerous when Britain and Ireland had greater tree cover. It has been suggested that 6,500 years ago, pine martens were the second most common carnivore in Britain!

Pine martens are solitary for most of the year, and each adult occupies a home range that varies from 20 to 3000+ hectares depending on the quality of the habitat.

The Vincent Wildlife Trust is a national charity based in Ledbury, Herefordshire, which undertakes specialist wildlife research and conservation focusing chiefly on bats, polecat, pine marten and dormice. The charity was founded in 1975 by Vincent Weir and currently manages nearly 50 reserves in England, Wales and Ireland.

The VWT has always had strong links with the Mustelid family, of which the pine marten is a member, and as a result of its long-term approach to conservation, the Trust has built up a level of expertise that is unique in the UK.

The Vincent Wildlife Trust's 'Prospects for Pine Martens' project forms a key part of the Trust's commitment to researching and conserving the remnant pine marten population in England and Wales. The VWT's pine marten project is based in South Cumbria, a pine marten hot spot, but covers the whole of England and Wales.

A new report on the pine marten has just been published by The Vincent Wildlife Trust and is available on request.

Tel: 01531 636441 Email: enquiries@vwt.org.uk Web: www.vwt.org.uk and www.pinemarten.info.

Provisional dates and locations (*still subject to landowner approval)

| Date | County | Site(s) | Activity |
|---|-----------------|--|--|
| Wednesday 11 th August* | Cumbria | Grizedale | Scat survey and den box check |
| Thursday 12 th August* & Friday 13 th August* | Cumbria | Grizedale to Ennerdale hike | Highlighting habitat connectivity issues, crags as alternative 3D habitats, and the use of den boxes to improve habitat quality. |
| Saturday 14 th August | Cumbria | Ennerdale | Scat survey |
| Sunday 15 th August* | Cumbria | <i>Thirlmere, Whinlatter & Skiddaw</i> | Scat survey and den box check |
| Monday 16 th August* | Cumbria | Greystoke Forest & The Eden Valley | Scat survey |
| Tuesday 17 th August | Northumberland | Kidland Forest | Erect den boxes |
| Wednesday 18 th August | Northumberland | Kidland Forest | Scat survey |
| Thursday 19 th August | Northumberland | Harwood Forest | Scat survey |
| Friday 20 th August* | Northumberland | Slaley Forest & Derwent | Scat survey |
| Saturday 21 st August* | Durham | Hamsterley Forest | Scat survey |
| Sunday 22 nd August | North Yorkshire | Catterick | Scat survey |
| Monday 23 rd August | North Yorkshire | Catterick | Den box survey |
| Tuesday 24 th August | North Yorkshire | Silton & Boltby Forests & Ingleby Greenhow | Scat survey |
| Wednesday 25 th August | North Yorkshire | Dalby Forest & Broxa | Scat survey |

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