



Myotismart Ltd

FLEET BASIN PINE MARTEN PROJECT

Interim Report No. 2

**A report to:
Forestry Commission Scotland
and Peoples' Trust for Endangered Species**


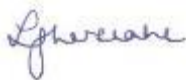

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The information which we have prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional *bona fide* opinions.

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SUMMARY

- This report describes genetic analyses of samples gathered during autumn 2014 and fieldwork on pine martens in the Fleet Basin area of Galloway Forest Park during May 2015.
- 52 hair samples and 114 scats were analysed by the Waterford Institute of Technology to determine species, gender and individual genotype. 89% of samples were confirmed as pine marten; genotype success rates differed between hair samples (43%) and scats (23%).
- On the basis of genotypes identified, a minimum of 15 pine martens was recorded as present in the Fleet Basin during autumn 2014, although up to one third of these are likely to have been dependent juveniles still occupying their natal ranges.
- The 50 *Galloway Lite* pine marten den boxes installed in the Fleet Basin during September 2014 were checked in May 2015 for evidence of use by pine martens. Seven boxes showed evidence of use or occupancy by pine martens, though none was used for breeding.
- Additional work within the Fleet Basin included checking wooden den boxes for use by pine martens (two of which contained litters of marten kits) and collection of marten scat piles from box lids for future use in dietary studies of breeding female martens.

1 INTRODUCTION

1.1 *Background*

This is the second interim report on the Fleet Basin Pine Marten Project; it describes results following genetic analysis of samples collected during the first phase of fieldwork undertaken during September and October 2014; and it describes fieldwork undertaken in May 2015 comprising the first check of 50 pine marten den boxes installed in September 2014.

The aim of the project is to establish a non-invasive monitoring programme for pine martens in The Fleet Basin Red Squirrel Stronghold (part of Galloway Forest Park in south-west Scotland) in order to inform red squirrel conservation efforts.

The main objectives of the project are as follows:

- To establish a baseline inventory of pine martens present in The Fleet Basin in 2014;
- To identify broad patterns of pine marten distribution within The Fleet Basin in 2014;
- To establish a long-term monitoring programme focusing on pine marten distribution and abundance in The Fleet Basin;
- To facilitate further research through provision of information and material of relevance to red squirrel conservation in The Fleet Basin (e.g. marten breeding success and faecal samples for dietary analysis).

This is a collaborative project, involving contributions from Forestry Commission Scotland (FCS), the Molecular Ecology Group at Waterford Institute of Technology (WIT) and two ecological consultancies involved in pine marten surveys and monitoring: Myotismart and Swift Ecology. The project is supported by funding from FCS and the Peoples' Trust for Endangered Species (PTES).

1.2 *Purpose of this Report*

This is one of a series of interim reports produced to inform our funders, partners and collaborators about progress with the project. In order to keep these interim reports brief and readable we avoid detailed descriptions of methodology and full analysis and evaluation of results; these will be presented in the final report at the end of the project.

1.3 *Personnel*

Genetic analysis of pine marten samples was undertaken at Waterford Institute of Technology by Catherine O'Reilly and Peter Turner. Analysis of the genotyping results was undertaken by Lizzie Croose of The Vincent Wildlife Trust as part of her MSc degree. Fieldwork during May 2015 was led by Johnny Birks (JB) of Swift Ecology and John Martin (JM) of Myotismart with considerable assistance from others, including Shirley Martin and Faith Billington. During the fieldwork in May 2015 we were joined on occasions by Peter Turner, Peter Lurz, Pete Garson and

Steven Parker. Martin Webber of FCS and his colleagues provided valuable support and information on harvesting patterns.

2 METHODS

2.1 Genetic Analysis and Population Estimates

The methods used are described in full in Lizzie Croose's MSc thesis entitled *A non-invasive study of pine marten (Martes martes) population abundance and density in the Galloway Forest, Scotland*, appended to this report.

2.2 Checking of Galloway Lite Den Boxes

Each *Galloway Lite* den box was checked by means of a Ridgid-SeeSnake endoscope and a pole-mounted camera. These were used in addition to an external visual inspection to detect the following evidence of activity by martens at each box:

- Marten scats on the box lid or beneath the box
- Rearrangement of the wood shavings inside the box (e.g. flattening) to indicate an animal had rested therein
- Marten hairs present within the box or around the box entrance
- Scratch marks on the tree trunk and side branches indicating a marten climbing in and out of the box.



Use of an endoscope to check the interior (left) and lid (right) of a *Galloway Lite* den box.

In addition, during box checks wood shavings were added to all boxes without them; and in all boxes the shavings were deliberately disturbed so that any future flattening by martens would be detectable.

2.3 Sampling at Natal Den Boxes

In addition to checks of the *Galloway Lite* boxes, all pre-existing wooden den boxes (ten were acquired by FCS and installed in the Fleet Basin in 2013) were checked for use by breeding females and for the presence of pine marten kits. This work is undertaken under a licence from Scottish Natural Heritage. Hair samples were removed for genetic analysis from any kits handled, and sticky patches were installed in den entrances to collect hairs from adult females for the same purpose; these patches were recovered a few days later.

Where natal den boxes had large quantities of marten scats on the lids, these were collected, bagged and stored deep-frozen in order to facilitate future studies of pine marten diet in the forest.

2.4 Constraints

As in autumn 2014, the extent of timber harvesting activity under way in spring 2015 in the Fleet Basin had some bearing upon the work, but significant impacts were avoided or minimised thanks to good communications between FCS and contractors. Only two boxes had to be relocated due to harvesting activity or windthrow (tree blown over); and two further boxes were left more or less isolated in a clearfell area (so less likely to be used by martens in future) following harvesting activity. These isolated boxes were left *in situ* as cover will develop around them over the next few years.

3 RESULTS

3.1 *Genetic Analysis and Population Estimates*

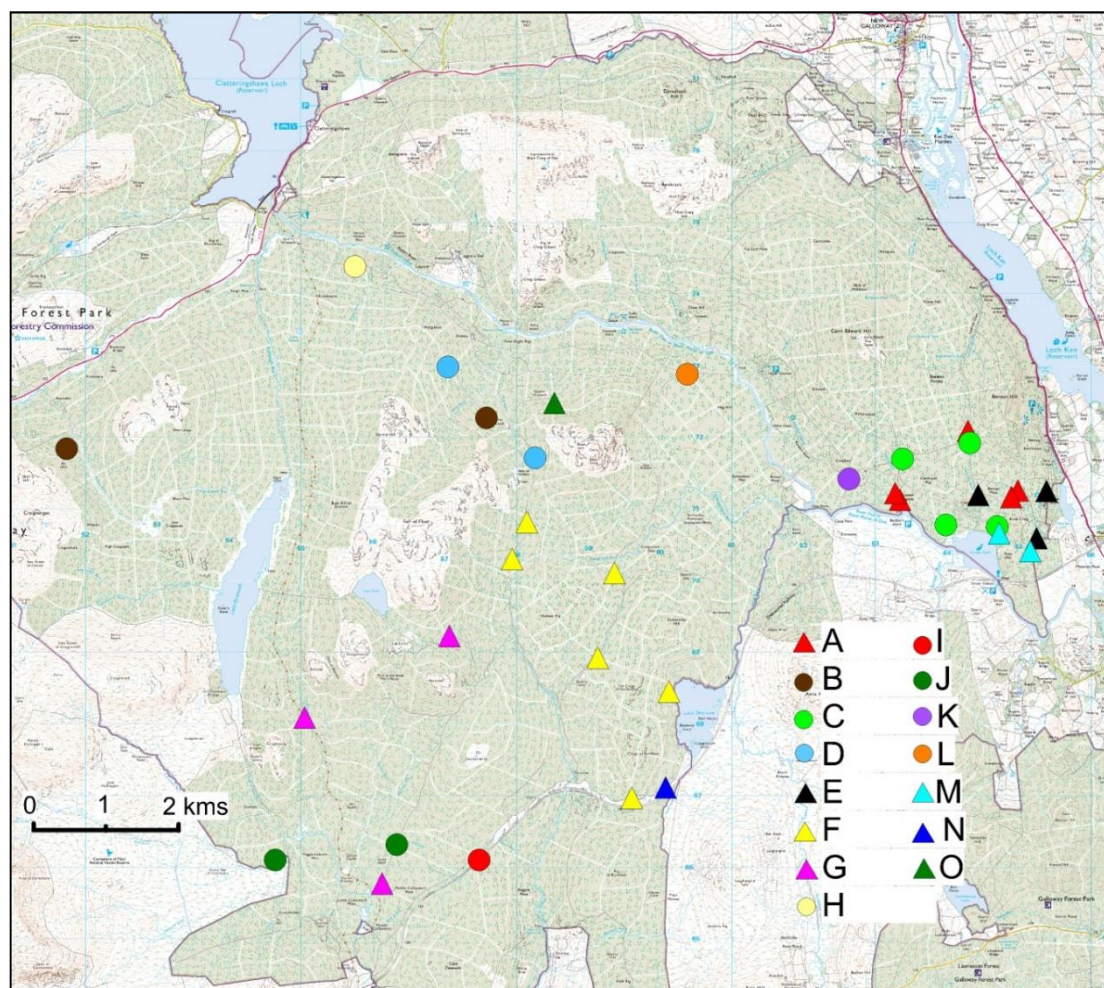
Full results of this element of the study are presented in the MSc thesis prepared by Lizzie Croose and submitted to the University of Edinburgh in June 2015, which is appended to this report. An oral paper on this work was presented by Lizzie at The Mammal Society's Spring Conference in Lancaster on 28th March 2015; a short paper will be offered for publication in a peer-reviewed scientific journal; and another oral version has been offered for presentation at the 32nd European Mustelid Colloquium in Lyon in October 2015. A summary of the main findings is presented below.

Molecular genetic analyses of the samples collected from the Fleet Basin in autumn 2014 were used to determine species, gender and individual genotypes. 166 samples (52 hair samples and 114 scats) were collected, of which 89% were confirmed as pine marten via genetic analysis. Genotyping success rate was higher for hairs (43%) than scats (23%).

In total, 15 individual pine martens were detected; seven males and eight females. A population abundance estimate of 18 individuals (95% CI 15 to 25) was derived from the capture-recapture programme *Capwire*. Of the 15 individuals sampled, 14 (93%) were detected from scat sampling and 5 (33%) were detected from hair sampling. This difference probably reflects the reluctance of some animals to use hair tubes.

The number of times an individual pine marten was detected ranged from one to ten, with the majority of individuals detected fewer than four times.

The population density estimate for a post-breeding population was 0.13 pine martens per km² which is towards the lower limit of densities reported for pine martens elsewhere in Scotland.



The distribution and gender of individual genotyped pine martens in the Fleet Basin. Males are represented by triangles and females are represented by circles. Each individual marten is assigned a unique letter.

3.1.1 A population estimate for the whole of Galloway Forest

By extrapolating the pine marten population density estimates for the Fleet Basin to the wider area of the Galloway Forest, it is possible to derive a rough population estimate for pine martens in the entire forest managed by Forestry Commission Scotland (some 75,000 ha).

The pine marten population estimates derived for the Galloway Forest based on post-breeding population densities range from 98 to 113 individuals (see Table 1). The lower estimate of 98 individuals is a conservative estimate derived from the minimum population size density (the number of individuals genotyped, $n=15$) in the Fleet Basin, whereas the higher estimate of 113 individuals is based on the population size estimate for the Fleet Basin derived from *Capwire* ($n=18$). These figures represent a post-breeding population estimate and suggest that the Galloway Forest can likely support around 100 pine martens in late summer/autumn. The pre-breeding population estimate of 60 pine martens across the whole of the Galloway Forest is a rather conservative estimate for adults occupying stable home ranges throughout the year, based on the pre-breeding estimate for adults only in the Fleet Basin. These estimates should be used with caution, as pine marten population

abundance and density will inevitably vary both geographically and temporally in relation to habitat and patterns of harvesting within the Galloway Forest.

	Post-breeding population estimate*	Post-breeding population estimate **	Pre-breeding (adult only) population estimate
Fleet Basin population estimate	15	18	10
Fleet Basin population density (individuals per km ²)	0.13	0.15	0.08
Galloway Forest population estimate	98	113	60

Table 1. Population abundance estimates for pine martens in the Galloway Forest. *Based on minimum population size in Fleet Basin. **Based on Capwire population size estimate.

3.2 *Checking of Galloway Lite Den Boxes*

Seven of the 50 *Galloway Lite* den boxes were found to have probable evidence of occupancy or visits by pine martens during checks in May 2015, representing a usage rate of 14%. However, three boxes were not checked because two had been downed by harvesting (no. 22) and windthrow (no. 13), and one box (no. 48) was omitted accidentally from the checking programme. A further two boxes (nos. 42 and 45), though still standing on their original trees, are unlikely to be used in the near future by martens because of the extent of recent harvesting surrounding them (see photograph below). Thus, seven boxes used out of 47 candidates checked and likely to be used represents a usage rate of 15%. Some of the *Galloway Lite* boxes showed evidence of use by nesting birds.



Galloway Lite box no. 45 isolated on tree stump following harvesting.

3.3 *Sampling at Natal den Boxes*

Of nine wooden 'VWT' style den boxes available to pine martens (one had been lost during harvesting in 2013 or 2014) in the Fleet Basin, two (FB3 and FB9) contained marten kits during May 2015. All four kits (two in each box) were handled and hair samples removed for genotyping; and sticky hair patches applied to the box

entrances successfully gathered hairs (probably) from the two mother martens involved. Marten fur from inside another box (FB4) was also collected. These seven samples have been sent to Waterford for genotyping to compare with the genotyped samples from autumn 2014.



Two pine marten kits in box FB3 (left) and awaiting processing (right)



Weighing pine marten kit (left) and determining gender (right)

A large sample of scats (300+) from the lid of natal den box FB3 was collected and stored in the deep freeze at the FCS Clatteringshaws depot.

4 CONCLUSIONS

4.1 Summary

The molecular genetic results demonstrate that non-invasive sampling methods can be used to gather valuable information on low density populations of pine martens. However, in view of their differing detection and genotyping success rates, future studies aiming to determine pine marten population abundance and density should incorporate the collection of both hair and scat samples in order to detect as many individuals within the population as possible. Because of the presence in autumn of pre-dispersal juveniles within their natal ranges, population estimates at this time of year do not necessarily reflect the number of adult territories present.

The 15% usage rate of the *Galloway Lite* den boxes only eight months after they were installed, and during a period when the forest was heavily disturbed by harvesting, is most encouraging. It suggests that they provide a valuable resource for martens in commercial forests where elevated and sheltered den sites are scarce. The usage rate might have been higher if all the boxes had been supplied with wood shavings when they were installed in September 2014 (19 boxes had no shavings installed until the May 2015 visit).

4.2 Future Work

In September 2015, JM and JB will return to the Fleet Basin for a week to check the *Galloway Lite* boxes for further evidence of use by pine martens. Work will include fitting a purpose-built hair collection device to each box in order to gather more samples for genotyping, with hair samples to be recovered in May 2016; and scat collection along 21 predetermined transects (established in autumn 2014) as well as *ad hoc* collection of scats for genotyping.

In view of the growing local interest in pine martens we are collaborating with FCS and others to organise an evening event in September 2015 on the subject of pine martens and squirrels at the Clatteringshaws Visitor Centre.

5 RELEVANT LITERATURE

Croose, E., 2015. *A non-invasive study of pine marten (Martes martes) population abundance and density in the Galloway Forest, Scotland*. Unpublished MSc thesis, University of Edinburgh.

APPENDIX 1 Croose (2015) MSc Thesis

Appended as separate document.