



Myotismart Ltd

**GALLOWAY FOREST PINE MARTEN PROJECT
2017-2019**

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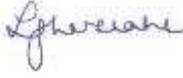
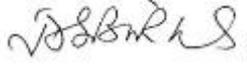
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SUMMARY

- This report describes fieldwork on pine martens in Galloway Forest Park during May 2018. It also provides some preliminary results from genotyping work on pine marten samples collected in the Fleet Basin during September and October 2017.
- The May 2018 fieldwork involved two main components: licensed checks of 97 den boxes for evidence of use – including breeding - by pine martens; and repeat transects to assess the abundance of field voles *Microtus agrestis* and pine marten scats at widely dispersed locations within Galloway Forest Park.
- Current or recent box occupancy rates during May 2018 were unusually high, with evidence of breeding at a record nine boxes (eight 'VWT' style and one Galloway Lite); and an exceptional 78% of Galloway Lite boxes showed signs of recent use, with 46% showing evidence of heavy use by pine martens.
- An additional component was the involvement of selected visitors in the fieldwork; this confirms the value of Galloway Forest Park as a demonstration site for pine marten research, monitoring and conservation in a commercial forest.

1 INTRODUCTION

1.1 Background

This third interim report on the Galloway Forest Pine Marten Project 2017-2019 describes fieldwork undertaken in Galloway Forest Park during May 2018. The project is a collaborative partnership between Forestry Enterprise Scotland (FES), Swift Ecology and Myotismart. The primary aim of the fieldwork was to identify and record evidence of pine marten occupancy at the 97 den boxes installed in the forest.

In order to share knowledge about our work on pine martens in Galloway Forest, at a time when there is unprecedented interest in the species, we were able to involve several other people in our fieldwork. This opportunity to educate and inform others emphasises the value of Galloway Forest as a place to demonstrate what can be achieved for pine marten conservation in a modern, highly productive, multi-purpose forest. Regrettably, two anticipated visitors from France – Claire Poirson and Hugo Fourdin – were unable to join us due to illness.

In addition, this report provides some preliminary findings following genotyping of samples collected during the pine marten population estimate exercise undertaken in the Fleet Basin during autumn 2017.

1.2 Purpose of this Report

This interim report provides a record of work done, information gathered and samples collected during May 2018. Full analysis and evaluation of results will be presented in the final report at the end of the project.

1.3 Personnel

Fieldwork during May 2018 was led by Johnny Birks (JB) of Swift Ecology and John Martin (JM) of Myotismart with considerable assistance from Shirley Martin (also of Myotismart). JM and JB have collaborated with FCS/FES over studies of pine martens in Galloway Forest since 2003, initially with The Vincent Wildlife Trust (VWT). JB and JM both hold a licence from Scottish Natural Heritage to disturb and live-trap pine martens. Gareth Ventress of FES and Lizzie Croose of the VWT provided valuable assistance.

1.4 Acknowledgements

For their assistance with fieldwork we thank Gareth Ventress, Shirley Martin, Lizzie Croose and Trina Barratt. We are very grateful to Gareth Ventress for ongoing support and local information.

2 RESULTS

2.1 Introduction

A day-by-day summary of our activities over the period 12th to 26th May 2018 is presented in Appendix 1, with a record of all visitors who accompanied us on each day. Excluding the core team of John and Shirley Martin, Johnny Birks and Gareth Ventress, we involved 20 individuals in a total of 33 visitor days in our fieldwork (note that this includes one day dedicated to a field meeting involving nine members of the Scotland section of the Chartered Institute of Ecology and Environmental Management).

The fieldwork was dominated by checks of the 42 'VWT' den boxes spread over four zones in Galloway Forest; by checks of the 50 Galloway Lite den boxes in the Fleet Basin; and by the completion of annual transects to record the abundance of field voles (four transects) and pine marten and fox scats (eight transects); checks were also made of the five original prototype Galloway Lite boxes at Blackcraig.

The weather during our fieldwork period was unusually dry.

2.2 VWT Den Box Checks

2.2.1 Levels of box occupancy

The results presented in Table 1 indicate that this was our most successful May session to date, with eight out of 42 boxes (19%) either containing marten kits or with fresh evidence of breeding this year but no kits, presumably because the family had recently moved on. Also, for the first time, breeding in boxes was recorded from all four of the den box zones.

Table 1. A summary of the level of VWT box occupancy in May 2018 (note that A & P = Arrechleoch and Penninghame)

Forest zone	Glentrool	Fleet Basin	A & P	Carrick	Total
No. boxes	12	10	10	10	42
No. used	7	5	6	8	26
Breeding	3	1	2	2	8

Beyond the evidence of breeding, the proportion of VWT den boxes showing any signs of recent occupancy by martens (including breeding) was at an unprecedented 62% in May 2018, with variations across the zones from 50% in the Fleet Basin to 80% in Carrick. A likely explanation for this higher level of use of the VWT den boxes is the relatively severe and prolonged winter weather in the months preceding our visit, meaning that martens made greater use of the elevated shelter offered by den boxes than they would during mild winters.

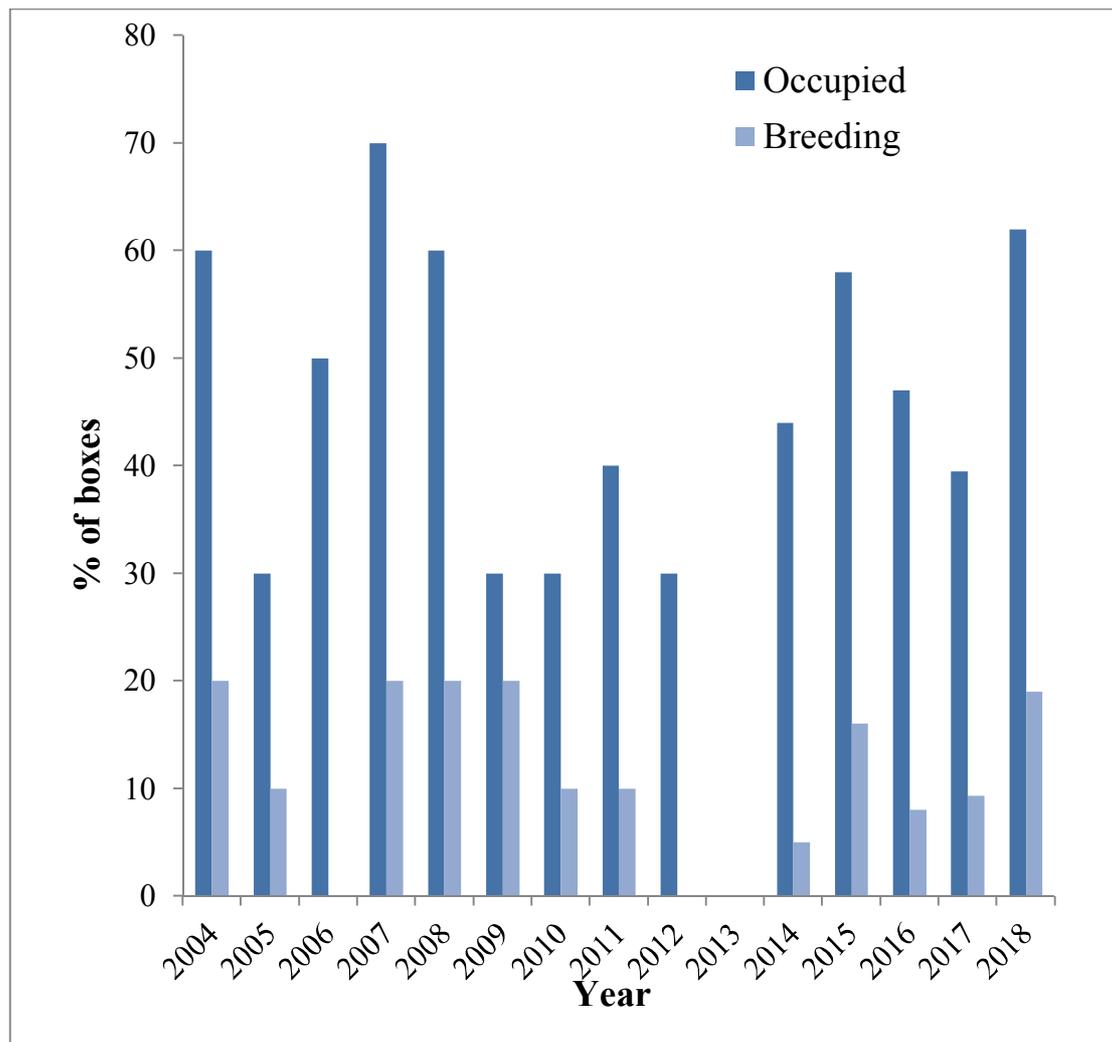


Figure 1. Annual changes in the proportion of the VWT style den boxes occupied and used for breeding by pine martens in Galloway Forest (note that prior to 2013 only 10 boxes were present).

2.2.2 Number of kits processed

Despite the record number of marten litters recorded in boxes, we managed to process only three litters of live kits and a fourth comprising a single dead kit. The remaining four cases involved three boxes in which the mother was present so kits could not be handled (and on our return visits to two of these boxes the litters had been moved); and in the fourth case the litter had been recently moved before our visit. In terms of litter sizes, we processed live litters of 2, 2, and 1 kits; and observations at three boxes where mothers remained present (so kits were partly obscured so difficult to count) we estimated litters of 2, 1 or 2 and undetermined.

2.2.3 Box condition

We recorded the condition of all the VWT style den boxes that we checked. The following boxes showed signs of deterioration and will need repair, re-hanging or replacement in the next year or two:

FB01 poor condition, FB04 needs re-hanging, FB08 started to delaminate, GT01 poor condition, GT04 delaminating, GT06 poor condition/delaminating, GT07

delaminating, GT08 box on ground, relocated with new one, GT09 front delaminating, CF08 corner of box chewed externally.

2.3 Galloway Lite Den Box Checks

The 50 *Galloway Lite* den boxes installed in the Fleet Basin in 2014 were each checked once over several days during mid-May 2018 for evidence of recent use by pine martens. Of the 50 boxes checked 39 (78%) showed evidence of use by a pine marten since the previous full check in September 2017; 16 of these showed signs of ‘Slight’ use and 23 showed signs of ‘Heavy’ use. This represents an unusually high level of box occupancy (previous checks from September 2015 onwards have typically revealed 40-50% of boxes with evidence of recent use – see Figure 2); as with the VWT style boxes, this was perhaps a consequence of the preceding severe and prolonged winter affecting Galloway Forest, with an associated greater need for pine martens to find sheltered resting sites. Evidence of the use of a GL box as a natal den came in the form of video footage recorded by Gareth Ventress at GL7 of an adult female marten apparently removing a very young kit on 16/4/2018.

Table 2. Levels of use by pine martens of the 50 Galloway Lite den boxes in May 2018

Level of use	None	Slight	Heavy
No. boxes	11	16	23

Since their installation in September 2014, 47 of the boxes have shown evidence of use by martens, representing a cumulative occupancy rate of 94% over four years (see Figure 2). Figure 2 indicates that on each full check after May 2015, evidence of use by pine martens has been recorded at 38-76% of boxes.

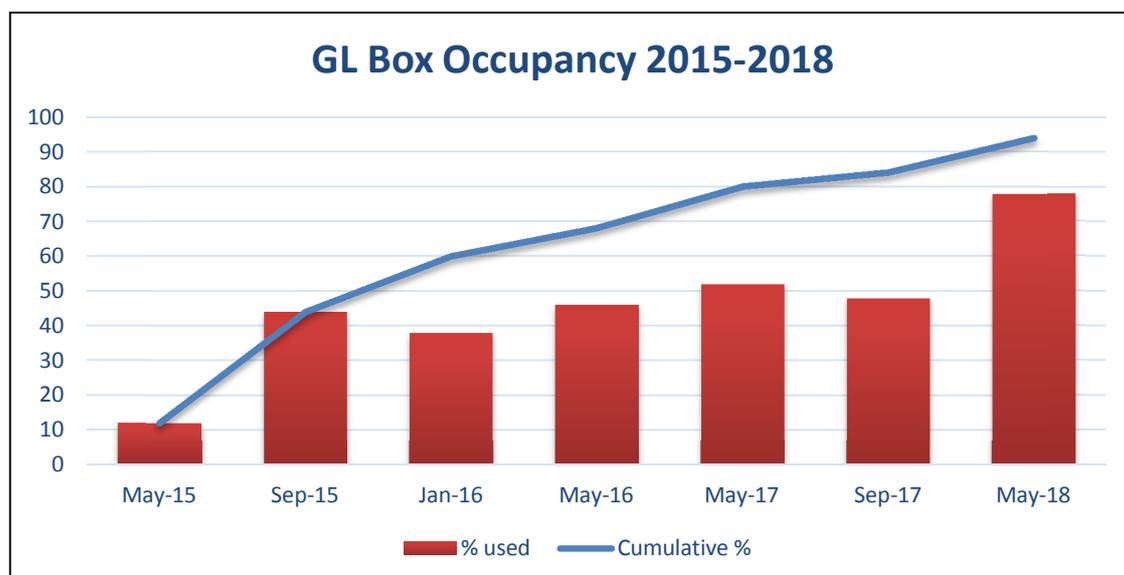


Figure 2. Patterns of occupancy by pine martens of the 50 Galloway Lite den boxes as revealed by checks under SNH licence during 2015 to 2018.

2.4 Annual Vole Transects

The four vole transects were successfully completed, some with the involvement of volunteers. Figures 3 and 4 below show that field vole abundance in all four of the den box zones in Galloway Forest had apparently declined in 2018, following a peak in vole abundance in 2017.

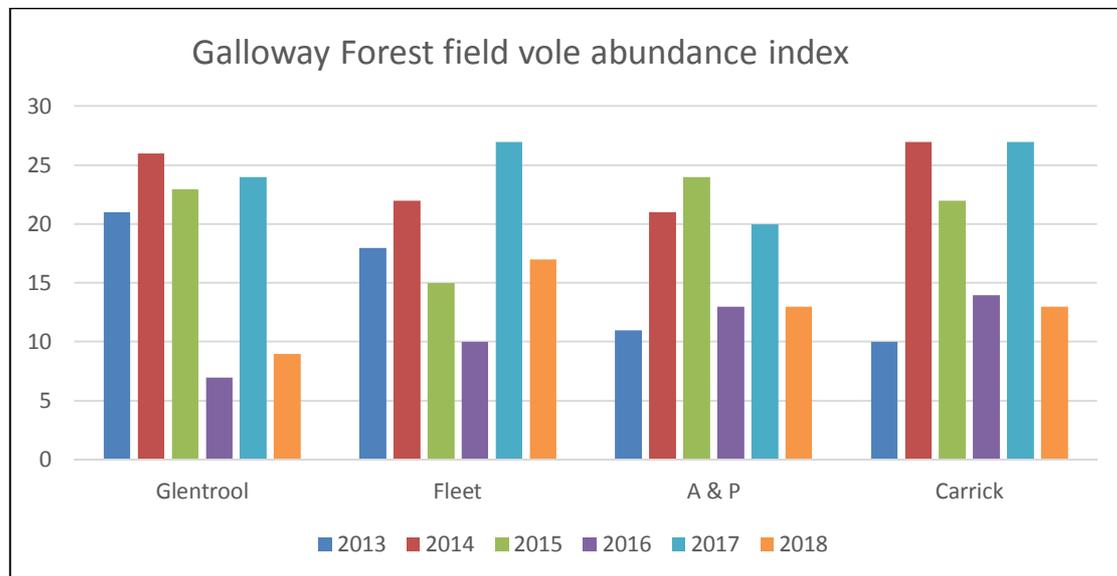


Figure 3. Annual field vole indices for the four Galloway Forest den box zones from 2013 to 2018.

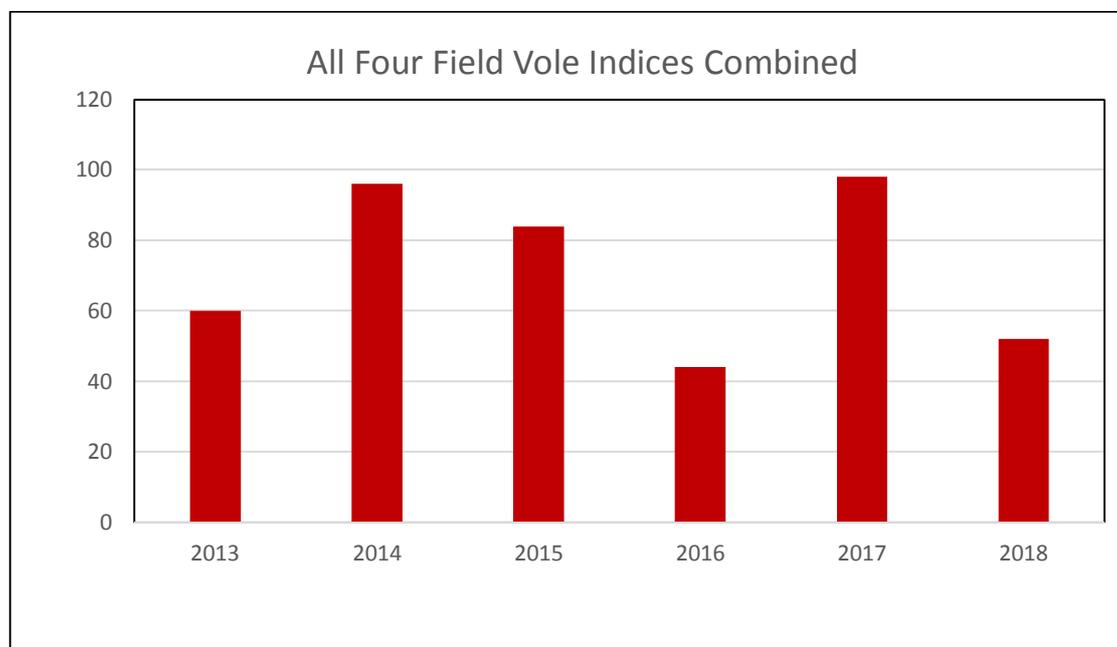


Figure 4. Annual changes in the Galloway Forest field vole abundance index from 2013 to 2018, showing combined data for all four den box zones.

2.5 Annual Scat Transects

The eight annual scat transects (two in each of the four den box zones) were completed successfully, some with the involvement of volunteers (see Figure 5).

Both pine marten and fox scats were counted as usual. Mean marten scat abundance was relatively high at 2.5 scats per kilometre searched in 2018, although this was explained partly by a high count of 10 scats on one transect in Arrecleoch. It is worth noting that the two years with peak marten scat abundance – 2015 and 2018 – follow the vole abundance peaks in 2014 and 2017.

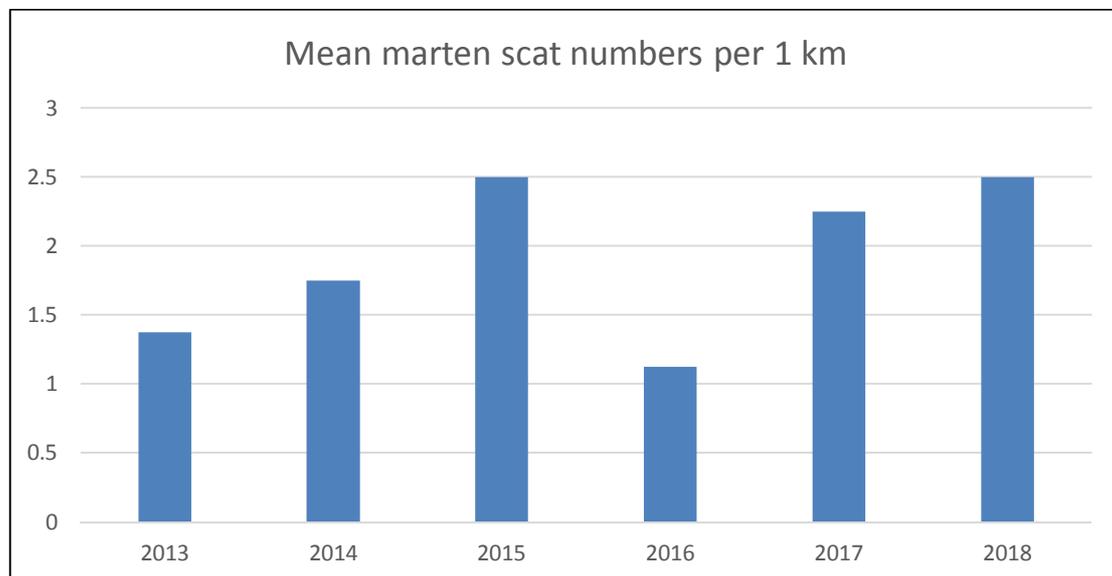


Figure 5. Annual changes in the abundance of pine marten scats recorded on eight transects in Galloway Forest 2013-2018, showing all transect data combined.

2.6 Fleet Basin Genotyping Results

Although the geneticists at Waterford have not yet finished working on the samples collected in autumn 2017, the preliminary results (with figures kindly supplied by Lizzie Croose) are so interesting that we are keen to present them here. Figures 6 and 7 illustrate, respectively, the geographical distribution of all detections for the 30 individual pine martens identified and the frequency of detections by the three methods used.

It is notable and surprising – given the great extent of harvesting activity likely to have reduced habitat quality for pine martens in the Fleet Basin over the past three years – that genotyping has apparently revealed 30 individuals as present in autumn 2017, compared with 15 individuals recorded as present in 2014. Only about half of this apparent doubling of marten numbers is explained by the addition of live-trapping as a sampling method in 2017: if genotypes recorded only by live-trapping are excluded, the number of individuals recorded in 2017 is 22 – still a substantial increase from the 2014 total. Both 2014 and 2017 were peak field vole years according to our abundance index, so that offers no ready explanation for the difference. Therefore, we cannot rule out the possibility that the provision of 50 *Galloway Lite* den boxes throughout the Fleet Basin in 2014 contributed to an apparent increase in pine marten numbers at a time when we might have expected numbers to fall due to reductions in habitat quality.

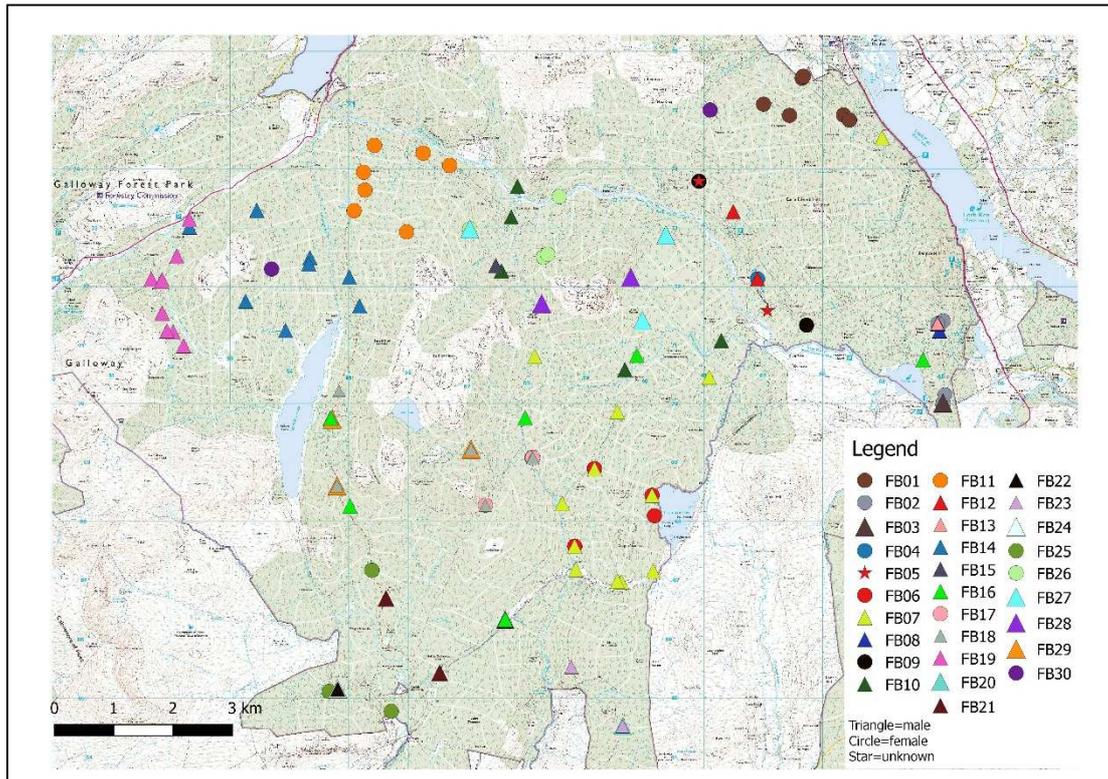


Figure 6. Preliminary genotyping results from the Fleet Basin during sampling by scat collection, hair tubes and live-trapping in autumn 2017.

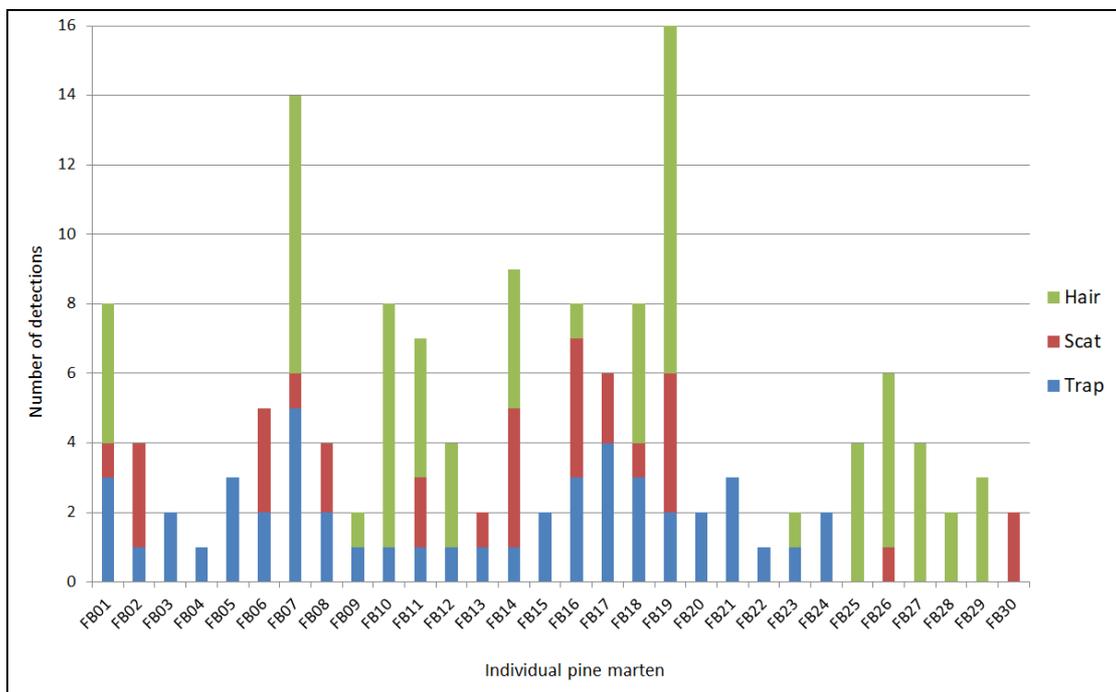


Figure 7. Preliminary genotyping results from the Fleet Basin during sampling in autumn 2017, showing frequency and types of detection for the 30 individuals identified.

4 CONCLUSIONS AND FUTURE WORK

4.1 Conclusions

- May 2018 was a record year in terms of numbers of litters born in den boxes and levels of box occupancy generally: the former is further confirmation of the value of artificial den boxes as a habitat enhancement tool for pine martens in modern forests; the latter is likely a response by martens to the unusually severe and prolonged winter, meaning that elevated, sheltered resting sites were more important than usual;
- Only three litters of live kits could be processed for various reasons beyond our control; we should consider how much it actually matters that we don't manage to count kits and take hair samples and, if it does matter, we may need to develop a new strategy for handling kits where the adult female is present;
- The video evidence of a female marten occupying a GL box in a manner consistent with its use as a natal den, followed by her removal of a single kit after a few days, added weight to our suspicions that there is something about the Mark 1 design that does not meet the needs of breeding female martens; Mark 2 is expected to be an improvement because of its greater depth and distance between the base and entrance hole;
- The involvement of several visitors in our May fieldwork has both costs and benefits. Whilst we remain committed to using our Galloway project as a means to pass on knowledge, experience and skills to people who are likely to contribute to pine marten conservation in the future, we need to set some limits to ensure that neither we nor the martens are adversely affected!
- The preliminary genotyping results from the Fleet Basin project in autumn 2017 are very thought-provoking, with the real possibility that the provision of 50 GL boxes in 2014 contributed to a significant increase in the number of martens. With hindsight, had we designed this part of the project so that there was a 'control' area, we could be more confident of the impact of the den boxes.

4.2 Future Work

- In August 2018, JM, SM and JB will attend the International Martes Symposium in Wisconsin, where JM and JB will give presentations on our work in Galloway Forest;
- In mid-September 2018 JM and JB will revisit Galloway to install 50 Mark 2 GL boxes close to the existing Mark 1 boxes; on the same visit they may also deliver another Mammal Society training course on pine marten den boxes.

APPENDIX 1 May 2018 Work Log

JB = Johnny Birks, JM = John Martin, SM = Shirley Martin, GV = Gareth Ventress.

Date & visitors	Activity
12/5/18	JM and SM plus Zella drove to Viewfield Farmhouse, New Galloway; JB and Lizzie Croose plus Dooley did likewise; then all drove to Mason's Arms in Gatehouse of Fleet to meet with Trina Barrett and Gareth Ventress for a meal; lovely sunny evening
13/5/18 L. Croose T. Barratt GV	Dry sunny day. All met in Glen Trool and checked six of the VWT boxes, some of which were in poor condition (GT08 had fallen off its tree in Camer Wood so was removed). No sign of martens in GT09 and GT07; we walked to locate a new site for the replacement for GT08; then checked GT10 (Bargrennan) - no fresh signs; then GT11 (old Brigton) and definite sounds of marten moving inside so box left with trail camera installed. GT01 (Butterburn) had possible signs so not checked; GT02 (Tarfessock) had big pile of new scats so not checked and trail camera installed. Then did Suie (GT) vole transect – signs right down so population has crashed; and scat transect – no marten scats and 30 fox scats.
14/5/18 L. Croose T. Barratt P. Garson	Cool, dry and cloudy start, followed by sun. JM, SM and LC entered Fleet Basin via SE entrance to check boxes therein; JB met TB and Pete Garson at Dromore VC to check boxes in SW of FB. All met up at Cullendoch (Whippet Cottage) where we chatted to owner Ben and identified his otter skull. Most GL boxes showed signs of occupancy; and the Big Water of Fleet box (FB09) had a mother and 2 well-grown kits in; then to Loch Grannoch for lunch. In total we checked 18 boxes; and all but one of the GLs had signs of use, some with big piles of oldish scats, indicating heavy use during winter/early spring. Then I drove PG back to Dromore while JM & SM and LC went back to New Galloway to meet Kevin O'Hara.
15/5/18 L. Croose T. Barratt K. O'Hara S. Johnstone GV	Cool and cloudy to start with, then sunny intervals and light showers pm. Met Stephanie Johnstone at Clatt VC and all drove on to Penninghame. Checked all five den boxes: single kit (eyes closed but well grown so about 4-5 weeks old) in AP09; signs of marten use at AP07 and AP10. Then to Fleet Basin NW corner to check GL07b (heavy use) and GL09, GL10 and GL11 (all used). Then did FB vole transect and scat transect at Reservoir entrance. Jane S-S and Steve Carter arrived 1800h.
16/5/18 L. Croose	Sunny and cool to start with, warming up to 18° later.

T. Barratt K. O'Hara Jane S-S S. Carter GV	All met at Glencaird depot in Glentrool; checked Glencaird box at new location (GT03); in all checked 7 Glentrool boxes: 3 were occupied – 4 kits handled under supervision at 2 (by Gareth Ventress at Tarfessock, and Lizzie Croose at Brighton); and one where mother with kit(s) present (Stroan House box, checked by Kevin O'Hara). Then installed new box up the Pulniskie Burn as a replacement for GT08 that fell down in Camer Wood. Did GT scat survey. Kevin O'Hara departed for home at end of day.
17/5/18 L. Croose T. Barratt Jane S-S S. Carter GV	Sunny and mild all day (up to 17°). SM unwell so stayed at home with Zella. Remainder entered Fleet Basin via Raiders Road north end and checked 18 boxes of both designs. No martens/kits present in any boxes, but majority showed signs of winter use. Late in the day JM became unwell. Gareth V. joined us for the evening.
18/5/18	Office/data entry day. JM still unwell. Sunny day LC and SC left for home early; later JB drove J S-S to Dumfries station. JB delivered a talk on the Galloway pine marten work to a community group in Gatehouse of Fleet. 72 people attended and there were good discussions in the question session afterwards.
19/5/18	Day off. Sunny and dry. Pete Turner and Catherine O'Reilly arrived at Ken Bridge Hotel and we joined them for an evening meal.
20/5/18 C. O'Reilly P. Turner J. Mouat 9 CIEEM members GV	Sunny and dry with cool wind. JB took PT and CO'R for a tour of the Fleet Basin with Jenni Mouat to review genotyping results from autumn 2017, check some GL boxes and do scat transect. JM, SM and GV entertained local CIEEM group in the Fleet Basin. All met at Clatteringshaws at end of event to introduce CO'R and PT and have general discussion. 4 GL boxes were checked and 1 scat transect done in FB.
21/5/18 GV	Started sunny then some low cloud and cooler later. JM and SM went to Carrick and checked 5 boxes – all with signs of occupancy by martens; one box (Changue Road) had clearly had a litter of kits in until very recently but the mother had moved them elsewhere (as had happened at the same box a few years ago). JB and GV had an informal meeting with Andrew Jarrott at the FC offices in Minnigaff; then went to Arrechleoch to check all 5 boxes and complete the scat transect there. Three boxes had signs of use by martens and one contained a dead kit aged approx. 4-5 weeks. This means that this year we already have evidence of martens breeding at seven of the boxes – a record for us! JB and GV checked the Suie west box (GT12 Corrafeckloch), which had been well used.
22/5/18	Sunny all day.

<p>J. Mouat P. Lurz S. Johnstone GV</p>	<p>All spent the day completing box checks in the Fleet Basin, including revisit to Big Water of Fleet VWT box (FB09) that had mother and kits in last week. Marten family had moved, and JM's trail camera revealed that the mother had moved two well-grown kits from the box, one on 16th May around mid-day and the other on 17th May around 1300h (so 2 and 3 days after our check last week).</p> <p>We then checked 15 GL boxes in the central part of the Fleet Basin, allowing all visitors to get some practice at box-checking under supervision. No martens present, but a high level of over-winter use apparent (perhaps in response to the severe winter weather in Galloway?).</p> <p>Between box-checks we had many productive discussions about future research, monitoring and conservation work on martens and red squirrels, focusing especially on Stephanie Johnstone's ideas for a wider project on pine marten recovery in Southern Scotland; and on Jenni Mouat's interest in doing an MSc dissertation on pine martens (fox-marten interactions, or marten feeding ecology in Galloway Forest?).</p>
<p>23/5/18 GV</p>	<p>Cool and cloudy start, turning into a hot and sunny day up to 22°C. We checked the final two GL boxes close to Clatteringshaws, then met GV at his office. Productive discussions about future work, such as installing more GL Mark 2 boxes in the Fleet Basin. We also viewed videos from GV's camera trap on GL07, which provided evidence of an adult female using the box as a natal den, but then removing a single kit from the box after just 3 days and not returning. NB this is our first confirmation of the use of a GL box as a natal den. And we note that this female occupies an area where no female was recorded during our genotyping work last autumn.</p> <p>We revisited the Stroan House VWT box and found that the kits had been moved.</p> <p>The old Bargrennan box, however, had even more scats on the lid than when first visited, suggesting that the family had not been moved since Lizzie processed the kits last week (JB's camera trap was pointless because he had not put an SD card in).</p> <p>Use of the GL boxes by martens has increased to 76% - doubtless reflecting the relatively severe winter and perhaps the apparent increase in marten abundance in the Fleet Basin indicated by last autumn's genotyping work. This brings to 8 the number of litters born in boxes this year.</p> <p>JB and GV completed the Penninghame scat and vole transects.</p>
<p>24/5/18 GV</p>	<p>Sunny and warm all day, up to 24°C.</p> <p>All drove north to Carrick Forest in two vehicles, calling in to visit Andrew Jarrott at the FES Straiton office for a discussion about current and future work.</p>

	<p>Then completed the Carrick vole transect (the fourth and final transect all confirming a downward trend following last year's peak) and two scat transects. We checked the remaining five VWT boxes in Carrick and found a breeding female in one (and heard at least one kit); she would not move from the box so no count or handling of the kits, which must have been quite small – and/or few – to remain concealed beneath her. This brings to nine the number of boxes in which breeding has occurred this year – a record for us – and for the first time we have confirmed breeding in boxes in all four of the forest zones in the same year.</p>
25/5/18	<p>Another warm and sunny day. JM and SM went to check the five Kirroughtree prototype boxes while JB entered data and completed various other office tasks; JM and SM did likewise in the afternoon. Then we met up with GV in the evening for a thorough debriefing in the Clachan Inn.</p>
26/5/18	<p>JM and SM drove home to Cumbria; JB and Dooley drove to Edinburgh to support family in the Edinburgh Marathon Festival.</p>