New Forest Nightjar Survey Report

Higher Level Stewardship Agreement
The Verderers of the New Forest
AG00300016

December 2013

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RPS
Willow Mere House
Compass Point Business Park
Stocks Bridge Way
St Ives
Cambridgeshire PE27 5JL

Tel: +44(0)1480 466335
Fax: +44(0)1480 466911
Email: rpscm@rpsgroup.com

QUALITY MANAGEMENT

Prepared by:	**Neal Gates, Alan Bull**
Principal Surveyors:	**Alan Bull, Andrew Seth, Neal Gates, Darryl Spittle**
Reviewed by	**Darryl Spittle**
Authorised by:	**Max Wade**
Date:	**18/12/13**
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Client	**New Forest National Park Authority**

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EXECUTIVE SUMMARY

- RPS was commissioned by the New Forest National Park Authority on behalf of it partners within the New Forest Higher Level Stewardship (HLS) Scheme to undertake a survey of breeding Nightjar on land covered by the New Forest HLS Scheme and New Forest Crown Lands outside the scheme managed by the Forestry Commission.
- The area within the defined survey area containing habitat with the potential to support Nightjar were identified using GIS data layers of vegetation classification from various sources. Once these areas had been identified a fieldwork programme was designed, following the criteria and methods set in out in previous national surveys.
- Once the programme of fieldwork had been completed data were analysed to determine the number of individual territories present.
- The analysis provided a breeding population of 544 Nightjar (based on territorial males) within the area surveyed in the New Forest in 2013.
- Comparisons with previous surveys (when accounting for variances in survey technique and completeness) would indicate that the breeding population of Nightjar within the New Forest has remained relatively stable since the previous surveys in 2004/5.
- The dataset compiled provides:
  - a robust baseline of the current breeding population of Nightjar in the New Forest;
  - the appropriate detail to inform future surveys of Nightjar within the New Forest; and
  - a basis upon which to further assess factors influencing the breeding population and distribution of Nightjar within the New Forest.

1 INTRODUCTION

Background to the study and the HLS

1.1 The Higher Level Stewardship Scheme (HLS) awarded to the New Forest in February 2010 is unique. Normally this scheme is granted by Defra through Natural England to a single landowner. In the case of the New Forest, whilst the Crown Lands are managed by the Forestry Commission (FC), the Verderers have statutory rights conferred under the New Forest Acts to administer the grazing and commoning rights. The scheme entitled the Verderers Grazing Scheme (VGS) was awarded in 10 February 2010 by Natural England to a single signatory, The Verderers of the New Forest.

1.2 The Verderers are legally and financially accountable for the delivery of the scheme, but on the proviso that a formal Partnership was established with the Forestry Commission and National Park Authority to deliver the scheme. This was set up through a Memorandum of Agreement (MoA) signed on the 22nd February 2010.

1.3 The delivery of the agreement is overseen by a Board drawn from the chief executives of the Partners as well as representatives from key stakeholders.

1.4 As part of the HLS agreement there is a requirement to undertake surveys for bird species for which the New Forest SPA is designated. The HLS Board identified the requirement for delivery of a comprehensive survey of Nightjar *Caprimulgus europaeus* in 2013 in accordance with the methodology used in the national surveys of this species.

1.5 RPS was commissioned by the New Forest National Park Authority (NFNPA) on behalf of its partners within the New Forest HLS scheme to undertake a survey of breeding Nightjar on land covered by the HLS scheme. In addition survey was also required to cover suitable habitat outside the HLS area but forming part of the Crown Lands managed by the Forestry Commission. Costs of work associated with these areas were paid for by the Forestry Commission. Where additional habitat was surveyed this was achieved without additional cost to the HLS scheme.

1.6 Natural England assisted the delivery of this contract by making available previous survey data for Nightjar which were obtained during national census work carried out by Natural England's predecessor body in partnership with the British Trust for Ornithology.

Approach to the contract

1.7 This document provides a detailed account of the methods used to determine the extent of habitat considered suitable for supporting breeding Nightjar within the New Forest and reports on and evaluates the findings of the surveys. Accordingly, this document provides the following:

- A detailed account of the methods employed to determine the areas which are suitable to support breeding Nightjar;
- The survey method used based on the national survey methodology;
- A breeding population (based on territorial males) of Nightjar within the target area;

- An analysis of the survey information including the status of the population compared to previous local and national studies; and
- A preliminary analysis of the potential factors which may be affecting the distribution of Nightjar within the study area.

Designations and Conservation Importance of the New Forest

1.8 The New Forest is one of the largest tracts of semi-natural vegetation in the country and consequently hosts three international wildlife site designations. The New Forest is classified as a Special Protection Area for its breeding and overwintering bird species of European importance, in accordance with the European Birds Directive (Directive 2009/147/EC on the conservation of wild birds [codified version]). It is also designated as Special Area of Conservation for its habitats and non-avian species of European importance, in accordance with the European Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). The European Directive requirements, ensuring the protecting of European wildlife sites, are transposed into UK law by the Conservation of Habitats and Species Regulations 2010.

1.9 A further international designation is its listing as a Ramsar site, under the Ramsar Convention. This recognises the importance of the site as a wetland, supporting wetland flora and fauna of international importance.

1.10 The New Forest Site of Special Scientific Interest (SSSI) is the national wildlife designation underpinning the European site designations and recognises the wider national scientific and biodiversity value of the New Forest.

The New Forest SPA

1.11 The New Forest is recognised as an internationally important site for its breeding and over wintering bird species. The New Forest qualifies and has been classified as an SPA under Article 4.1 of the Birds Directive by supporting internationally important populations of the following species during the breeding season:

- Dartford Warbler *Sylvia undata*
- Nightjar *Caprimulgus europaeus*
- Woodlark *Lullula arborea*
- Honey Buzzard *Pernis apivorus*

1.12 The site qualifies and is classified under Article 4.1 of the Birds Directive by supporting over wintering populations of Hen Harrier *Circus cyaneus.*

1.13 The New Forest is classified under Article 4.2 of the Birds Directive for supporting significant breeding populations of both Hobby *Falco subbuteo* and Wood Warbler *Phylloscopus sibilatrix*.

Nightjar populations nationally and in the New Forest

1.14 National surveys of the UK breeding population of Nightjar were undertaken in 1981, 1992 and 2004. The sampling methodology and data recording has varied slightly between years. Fearnley *et al.* (2012) provide a summary of New Forest populations in the context of national populations recorded during national surveys.

1.15 Following historic declines nationally in the 20th century, the numbers of breeding Nightjar have steadily increased since the 1981 national survey. The most recent national survey, undertaken in 2004, showed an overall increase in the population size and range for the whole of the UK, and a total population estimate of 4,606 territorial males.

1.16 The New Forest was surveyed as part of the national survey in 2004, although sampling coverage was incomplete. Additional Nightjar surveys within the New Forest were commissioned by English Nature (now Natural England) in 2005 to supplement the previous year's national survey.

1.17 The 2004 national Nightjar survey recorded 552 observations in the New Forest and in 2005 an additional 161 records were recorded in areas not surveyed during 2004. In total 713 Nightjar records were noted during the national survey, of which, 51 territory centres were outside of the SPA and clustered around Poor Common, Vernon Dene and Burton Common and the accuracy of 33 records was low as they were only mapped to 1km grid square level (Fearnley *et al.* 2012)

Nightjar ecology

1.18 In the UK Nightjar principally breed on lowland heathland and within young conifer plantations where suitable habitat is generated as consequence of the rotational clear-felling of trees. Studies have shown that this should ideally support 10-20% bare ground patches of >2m^2 for nesting (Langston *et al.* 2007). The woodland-heathland interface and adjacent areas which can support rich densities of invertebrate prey are important for foraging. In the UK larger Lepidoptera form an important part of the species' diet (Snow and Perrins, 1998).

1.19 The main threats to the species are considered to be:

- A reduction in the area of lowland heathland due to habitat loss;
- Changes in forestry practice that do not recognise the importance of clear-felled and replanted forests; and
- Disturbance by walkers and dogs, particularly when birds are incubating (Langston *et al.* 2007).

The New Forest National Park boundaries

1.20 Figure 1.1 shows the New Forest HLS Scheme and Crown Lands Study Area.

2 METHODS

Identification of the area to be surveyed and design of the survey programme

2.1 This section of the report provides a detailed account of the process which was undertaken to establish the extent of the habitats required to be surveyed as part of the contract.

2.2 The areas of the National Park containing habitat with the potential to support Nightjar were identified using GIS data layers obtained from the New Forest National Park Authority, Forestry Commission and Natural England. This included the following sources:

- Map layers supplied by the HLS partners showing the boundaries of the HLS and Crown Land areas;
- Map layers from the Lowland Heathland Inventory showing lowland heathland habitat (and other habitats) within the National Park (obtained from Natural England);
- Map layers from the Inventory of Trees and Woodlands Woodland showing the woodland types within the National Park (obtained from the Forestry Commission); and
- Map layers from the Forest Design Plans database showing sub-compartment management and age and species composition, well as working areas within the current year (obtained from the Forestry Commission).

2.3 The habitats/land use types identified in the map layers listed above and considered suitable for Nightjar followed those identified in previous national surveys for the species (Morris *et al.* 1994, Conway *et al.* 2007) and were classified as falling into the following broad habitat types:

- Lowland heathland;
- Coniferous woodland less than 21 years old; and
- Coniferous plantations consisting of unplanted blocks, bare ground and clear-fell areas.

2.4 The design of the fieldwork programme was based on the criteria and methods set out in the national surveys (Morris *et al.* 1994, Conway *et al.* 2007). The following criteria were followed when designing the survey programme:

- A minimum of two visits between the last week of May and mid-July, with at least three weeks between visits and at least one visit in June;
- One visit being at dusk and one at dawn; and
- Each visit should look to cover no more than 80 ha with the observer walking within 200m of all potentially suitable habitat.

2.5 Once the extent of the area to be surveyed had been identified from the available GIS data and the above methodological criteria had been considered, a process of identifying suitable survey units centred upon a suitable route was undertaken. This involved defining approximately 80 ha survey units within the identified suitable habitat ensuring as near to complete coverage of all

suitable habitat as possible. Through each survey unit a route for the observer to easily follow was determined which allowed all suitable habitat to be approached within approximately 200m. Survey units were determined to allow observers to follow a route which could walked in conjunction with another observer covering an adjacent survey unit. This was important as it enabled observers to maintain contact and ensure that birds were not double counted. The routes were established using aerial photographs, ordnance survey maps and ground truthing.

2.6 Once the survey units and routes had been finalised they were recorded in GIS format. This then enabled a survey programme to be drawn up to ensure that the surveyor resource was allocated in the most efficient manner and to ensure full coverage of the identified survey units in the allotted time frames.

2.7 The extent of the area identified as being potentially suitable to support breeding Nightjar and surveyed during 2013 is shown in Figure 2.1.

Delivery of the survey programme

2.8 The survey for Nightjar will be carried out in accordance with the national survey methodology (Conway *et al.* 2007).

2.9 An initial daytime visit to each approximately 80ha survey unit was carried out to assess the survey route and identify any on-site issues. This ensured that issues regarding the survey route or access to the route were determined before the survey commenced. Any adjustments to survey routes were mapped to ensure that the route could be following on the subsequent visit.

2.10 Two visits to each of the 80 ha survey units were undertaken; one at dusk and the other at dawn, with visits being undertaken between the hours of 21.00-23.00 and 02.00-04.30, respectively.

2.11 The visits were undertaken between the last week of May and mid July, with at least three weeks between visits to a survey unit and with each survey unit receiving at least one visit in June. The visits were carried out between the following dates:

- Visit one; 23rd May 2013 – 14th June 2013
- Visit two; 24th June 2013 – 11th July 2013

2.12 Surveys were only carried out in calm (less than Beaufort force 4), mild and dry conditions, to ensure that there was the greatest possibility of encountering birds when conditions were optimal for both territorial activity and feeding. Cold and windy conditions or periods of prolonged rainfall are likely to suppress invertebrate prey abundance and, therefore, Nightjar feeding activity; and reduce the amount of Nightjar territorial and breeding behaviour.

2.13 The locations of all churring male Nightjar were recorded, with special attention given to simultaneously churring males. All other observations of calling birds (both males and females) or birds seen flying were also recorded.

2.14 All data were recorded in the field directly onto an ArcGIS base map using ESRI software on hand-held PDA devices. Data were then transferred to a central database and all data went through an internal verification process.

Data analysis

Determination of territories

2.15 On completion of the surveys individual territories were determined by replicating the analysis used in Conway *et al.* (2007) and use of generic territory mapping techniques given in Bibby *et al.* (2000). This involved analysing the data recorded from the two survey visits and applying the following process to bird registrations to determine the individual number of territories:

- Data were firstly filtered by visit number (1 or 2) and then, where observers were able to identify different individuals such as those recorded as simultaneously churring males, these were marked as such. Registrations of churring males which were not specifically recorded as representing different individuals in the field where considered to be such if the registrations were over 350m apart or separated by known topographical or structural features (barriers such as a hill ridge or forest block).
- The consolidated maps for both visits were then combined and clusters of registrations (i.e. two churring males from the sequential visits) indicating the presence of distinct groupings of registrations were identified as being indicative of discrete territories.
- A territory centre point was then allocated to each of these discrete territories based on the distribution of the registrations considered to represent this territory.

Limitations

2.16 The weather conditions in early spring 2013 saw prolonged spells of unsettled weather, particularly in April and the beginning of May, with well above average rainfall and below average temperatures (www.metoffice.gov.uk). Low pressure systems dominated for much of the early spring up to late May and as a result many migrant species, including Nightjar appear to have been delayed in their arrival in 2013.

2.17 From the beginning of June a more settled pattern of high pressure systems established themselves across the UK and northern Europe ensuring predominantly fine, settled weather for the majority of the survey period. This weather was also conducive to the arrival of Nightjar on their breeding grounds in southern England and it is not considered that the unsettled weather in mid/late May significantly affected the recording of Nightjar during the survey.

3 RESULTS

Survey coverage and delivery

3.1 Observers managed to survey the entirety of the suitable habitat, as identified in paragraphs 2.1-2.3 and shown in Figure 2.1. This included a couple of additional heathland areas outside of the agreed HLS and Crown Land boundaries, which were included as they formed continuous tracts of heathland with areas included in the survey and for completeness were incorporated. This did not affect the survey programme. Surveys were undertaken twice within the required timeframes and in appropriate weather conditions ensuring confidence in the completeness and accuracy of the results presented here.

Breeding population in 2013

3.2 The breeding population of Nightjar recorded from the entire New Forest area surveyed in 2013 was 544.

3.3 The survey recorded 441 territories on land within the HLS Scheme area and 49 territories within forestry Inclosures which lie outside the HLS Scheme area. Nearly all the Scheme area lies within the Crown Lands which are under the management of the FC. Some of the Inclosures (forestry plantations) are excluded from the HLS Scheme because they are not open to grazing. A further 54 territories were recorded on land outside of these boundaries but within the New Forestry National Park. These territories were as follows:

- Hale Purlieu – 2 territories;
- Brune's Purlieu – 1 territory;
- Hyde Common – 2 territories;
- Gorley Common – 1 territory;
- Dorridge Hill – 3 territories;
- Brogenslade Bottom – 1 territory;
- Great Bottom – 4 territories;
- Chibden Bottom – 4 territories;
- Ibsley Common – 9 territories.
- Rockford Common – 9 territories;
- Kingston Great Common – 3 territories;
- Bisterne Common – 6 territories;
- Plaitford Common – 2 territories;

- Penn Common – 1 territory;
- Half Moon Common – 6 territories;
- Holbury Purlieu – 1 territory.

3.4 The location of all territories recorded during the survey of breeding Nightjar in 2013 is provided in Figure 3.1. The location details for each territory are provided in Appendix A.

4 EVALUATION AND DISCUSSION

Trends in the breeding population

4.1 For the purpose of this evaluation the breeding population includes all the territories derived from the 2013 survey, irrespective of land landownership/management boundaries, as this is considered to most accurately reflect the extent of the area covered in previous surveys.

4.2 Fearnley *et al.* (2012) considered the breeding population within the current survey area at the time of the last national survey in 2004 and incorporating the additional surveys commissioned in 2005, to be 629. This may represent an overestimate as the survey was based on surveying 1 km grid squares containing suitable habitat. As a result there may have been some duplication of records in neighbouring squares between years.

4.3 It is considered that the breeding population of 544 territorial males recorded in 2013 is at a comparable level to that recorded in 2004/5 and that the population of Nightjar within the New Forest National Park has remained relatively stable in that period.

4.4 The UK breeding population of Nightjar based on the last national survey for the species in 2004 is considered to consist of 4,606 territorial males. The breeding population recorded in the New Forest National Park in 2013, therefore, represents 12% of the UK breeding population.

Densities of territorial Nightjar within the New Forest

4.5 Fearnley *et al.* (2012) considered the density of breeding Nightjar occurring within the New Forest SPA to be relatively low when compared with other heathland SPAs in southern England. Based on the 2013 survey data the density of breeding Nightjar per hectare for the whole of the New Forest area covered within the survey boundary (irrespective of habitat suitability) is 0.02 (based on a survey area of 25,345 ha). When compared with densities based on the 2004 national survey from the Dorset Heaths SPA (0.06) and the Thames Basin Heaths SPA (0.03) the density occurring in the New Forest remains relatively low. It should be noted that this calculation is based on total SPA area and that large tracts of habitat within the New Forest SPA (as well as the Dorset Heaths and Thames Basin Heaths SPAs) are not suitable for breeding Nightjar.

4.6 This apparent lower density of Nightjar has previously been highlighted (Sharp *et al.* 2008), although it remains unclear as to the mechanisms causing this. The New Forest National Park is subject to various pressures and it is likely that a combination of these is responsible for these low densities, when compared with other southern heathlands. The New Forest is unique in terms of its size and the extent of management practices which occur; the Forest also has a continuous history of grazing, which has greatly influenced the structure and distribution of certain habitats.

Territory distribution and habitat relationship

4.7 Nightjar territories within the New Forest National Park are aggregated around the main areas of heathland, predominantly in the western half of the Forest. Their distribution correlates well

with that of areas of dry heathland (see Table 4.1). Other habitats are less often used, with other heathland types and young conifer plantations/clearfell the next most important habitats ulitised within the New Forest. Table 4.1 shows the number of territories recorded per habitat type and the density of territories occurring within these habitats.

Table 4.1. The number and density of Nightjar per habitat type in the New Forest in 2013, compared with the previous survey (2004/5) and those on the Dorset Heaths and Thames Basin Heaths (Sharp *et al.* 2008)

Habitat	Number of Nightjar territories				Nightjar density (per ha)			
	New Forest 2013[1]	New Forest 2004/5	Dorset Heaths	Thames Basin Heaths	New Forest 2013[2]	New Forest 2004/5	Dorset Heaths	Thames Basin Heaths
Dry Heathland	245	251	181	151	0.04	0.04	0.08	0.07
Young Conifer Plantation/clearfell	72	94	191	105	0.06	0.02	0.05	0.02
Wet Heath	109	97	76	15	0.03	0.03	0.05	0.09
Deciduous woodland/scrub	9	135	10	1	0.00	0.01	0.02	0.06
Grassland	55	119	6	1	0.02	0.01	0.01	0.01
Total	490	696	464	273				

Notes on Table 4.1:

1. The 2013 territories presented are only those recorded from within the HLS/Crown Lands survey area and do not include the additional 54 recorded outside this area, for which the detailed habitat data were not available.

2. The habitat area used to calculate density for the 2013 data is based on the habitat present within the survey area; this does not necessarily represent the equivalent area of habitat identified in 2004/5 – this has been based on the entirety of National Park boundary.

4.8 The Nightjar density per hectare is compared to that occurring on both the Dorset Heaths and Thames Basin Heaths (Table 4.1). For all habitat types the density recorded in the New Forest is lower than that of the respective habitat within the other two southern lowland heathlands. The density per habitat type recorded in the 2013 survey is comparable with that reported based on the 2004 national survey data. Little change in densities has occurred during the period and the populations across the Forest have remained stable.

4.9 Each territory centre was buffered by 100 m, in line with other studies (Clarke, Sharp and Liley, 2010), to account for the fact that whilst the territory centre may fall outside of the dry heath, that habitat may still form an important component of the territory area. Table 4.2 shows the number of territory centres occurring within 100 m of dry heathland both within the 2013 survey and previous national surveys. The majority of Nightjar records (78%) were located on, or within 100m of, dry heath. This is a higher figure to that recorded during the 2004 and 2005 surveys of the New Forest (66% and 63%, respectively); however, this may reflect differences in habitat data rather than actual increase in the use of dry heath. Notwithstanding this, it is clear that dry heath accounts for the largest proportion of Nightjar territories within the New Forest.

Table 4.2. The number of Nightjar territory centres from the 2013 survey on, or within 100m of, dry heathland in the New Forest compared with those from previous surveys (Fearnley *et al.* 2012)

Year	Total records	Number of territory centres on dry heath	Territory centres on and within 100m of dry heath
2004	501	157	329
2005	128	45	80
2013	490	243	384

Management of New Forest National Park

4.10 The nature of the New Forest is unique and subsequently so are the management processes. The heathland habitat is managed by the Forestry Commission through burning, cutting, mowing, bale and flail. The area of heathland managed annually across the New Forest is not consistent, with Fearnley *et al.* (2012) giving a median figure of 123.9 ha per year (data from 1991-2006). Burning is the dominant management technique with more than seven times as much heath burned than cut in the review period (Fearnley *et al.* 2012).

4.11 Since 2004 the Forestry Commission continued to create areas of open habitat through its Forest Design Plans which has led to a greater increase in areas of woodland edge habitat and open habitat itself.

4.12 In investigating whether the management of dry heathland could have an impact on the distribution of Nightjar territories, Fearnley *et al.* (2012) concluded that there was little evidence to suggest that habitat management had influenced the distribution of Nightjar territories. Further work is suggested using both the 2004/5 and 2013 datasets to investigate the impacts of management techniques at a finer scale and especially the resultant mosaics of habitat that arise.

5 CONCLUSIONS

5.1 A full survey of breeding Nightjar was successfully undertaken in 2013 on land within the New Forest HLS Scheme and Crown Lands. All habitat potentially suitable for breeding Nightjar was identified and visited twice during the periods defined in the national survey methods (Conway *et al.* 2007).

5.2 The analysis of the survey data identified a total of 544 Nightjar territories within the area surveyed.

5.3 Comparisons with previous surveys (when accounting for variances in survey technique and completeness) would indicate that the breeding population of Nightjar within the New Forest has remained relatively stable in the period since the previous surveys in 2004/5.

5.4 The dataset compiled provides:

- a robust baseline of the current breeding population of Nightjar in the New Forest;
- the appropriate detail to inform future surveys of Nightjar within the New Forest; and
- a basis upon which to further assess factors influencing the breeding population and distribution of Nightjar within the New Forest.

5.5 The survey of breeding Nightjar in 2013 fulfils the commitment of the HLS Board, under the agreement for the HLS scheme, for providing accurate and current population information on Nightjar; one of the species for which the New Forest SPA is designated.

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FIGURES

Figure 1.1. The New Forest HLS Scheme and Crownland Study Area.

Figure 2.1. The extent of the area identified as being potentially suitable to support breeding Nightjar and surveyed in 2013.

Figure 3.1. The location of all Nightjar territories recorded in 2013.

APPENDICES

Appendix A. Location data for all Nightjar territories recorded in 2013.

Territories within the HLS survey area

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
418161	116397
418494	116074
418879	115885
418617	115808
420233	117060
420071	116864
419964	116951
419865	116824
419812	116901
419642	116755
421209	117724
420529	117571
419294	116960
419261	116695
418992	116436
419636	116310
419716	116602
420121	116668
420170	116376
420310	116416
421857	116781
421724	116389
421189	116277
420784	116479
420290	115802
420758	116101
421020	115752
420605	115662
419352	115988
419640	115742
419582	115496
419391	115604
419447	115403
419624	115215
419137	115138
419000	115353
419492	114723
419257	114773
418839	114257
418688	114226
418674	114022

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
417968	114578
418188	114543
417748	113694
418259	113564
418436	113339
417865	113226
418042	113392
418148	113223
417944	113040
418079	112940
418341	112789
418801	112969
419169	112744
418368	112411
418844	112157
419198	112212
418208	111409
418288	111736
418655	111422
419419	111693
419217	111373
418341	110718
418331	108465
419921	111760
419697	112438
420375	112319
420523	112259
421294	112325
422263	113938
422371	113720
422329	113578
422517	113523
422041	113639
421999	113074
422200	113062
422693	113258
422517	116596
422801	116414
422851	115985
423472	116077
422960	115495
423291	115366
423631	115105
424055	115181
424008	115505
424584	116064
424981	116140
424845	113357

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
424939	112984
424284	112607
424039	112283
423372	112603
423708	111563
423499	110773
423315	111686
422740	112144
422840	111300
422625	110837
422287	111138
422418	111644
419889	109963
420234	110638
420524	110475
420873	110519
421738	109674
422021	109497
421145	110897
420675	110851
421305	110279
421883	110557
421589	110679
421388	111022
421339	110774
421220	115243
421017	115190
421103	114611
420863	114261
420639	114712
420021	115281
420314	115114
420229	113908
420057	114146
419781	113684
419689	113938
419497	113825
419681	113408
419410	113104
419433	113349
419202	114116
419112	113794
419175	113568
419004	113424
418696	113459
418853	113544
418820	113726
418590	113680

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
421250	109245
421088	108988
421567	108567
421003	107951
420834	108335
420286	107932
419998	107861
420046	107536
420226	107419
419409	106820
419193	107103
419022	107106
418482	106279
427180	109088
427673	108454
425482	111295
425398	110316
425165	109977
425154	109437
424482	109697
424329	109564
423983	109947
425647	109226
423665	108800
423173	108466
423073	107778
422564	107993
422548	108598
422200	108694
421810	107408
421711	107522
421279	107340
421514	107086
421836	107067
422366	106129
421707	106256
421580	106709
421563	106513
421426	106633
421142	106690
421292	106195
421328	106425
421058	106336
420512	106420
420572	105851
420694	106291
420821	106098
420926	105936

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
421150	105821
420080	106721
420112	106334
421535	104868
421418	104517
421295	104927
420900	104724
421312	105111
419756	106131
419577	105509
419939	105393
419327	105831
419175	105714
419475	105158
419298	105278
419163	105158
418811	105334
418689	105061
419048	104883
419362	104657
419445	104474
418946	104487
419670	103660
419351	104053
419267	103540
418788	104164
418562	104216
418682	103917
418914	103291
419297	103062
419297	103062
418568	103477
418774	102371
418729	102074
419033	100799
419044	100548
419295	100619
419663	100418
420010	100243
419718	102619
419783	102827
419594	102114
419467	102022
419470	101816
419964	101985
419718	101635
419964	101595
420378	101732

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
418931	101380
419329	101564
419602	101257
419298	101357
420080	101256
420514	101336
420334	100595
420307	100838
421196	101180
421125	100833
420687	100742
420776	100484
421232	99781
421837	101021
421528	101287
422271	101279
422136	101319
421456	101666
420866	101896
421202	102033
421549	102121
421575	102319
421869	102057
421895	101822
422467	101938
422435	101663
422282	102118
422755	101470
423189	101309
422970	102199
423332	102087
423613	101947
423647	101677
423467	101733
423755	102286
423467	102400
423943	102804
424271	103045
424269	103347
425988	105929
426289	106037
424565	101796
424568	101925
424929	101601
425292	101562
424806	101892
425028	101820
425233	102081

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
424628	102269
425444	102365
425272	102772
426589	102071
426304	102412
427416	102455
427693	102243
427115	102293
426986	102438
426076	103437
426923	102928
425706	102229
426013	102361
426701	101481
427290	101600
426476	101749
426043	101805
428282	102078
428011	101334
427928	100487
426976	100666
426698	100857
425934	101063
426182	100818
426596	101092
425670	100461
425379	100222
425894	100239
426070	100358
425630	99974
425848	99746
425342	99664
425848	98933
426037	98536
426417	98794
426850	100212
427429	99514
428143	99428
427740	100070
428622	100096
428867	98713
428974	99149
429688	99153
429537	99975
429926	99963
429918	99173
429684	99431
429141	100086

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
428665	99469
427518	103593
427717	104261
428719	104132
431367	108036
431621	108281
432309	108053
432951	107778
433225	108370
432084	107543
435005	108600
435167	108325
435409	108626
435670	108805
436470	108163
434165	107330
434036	107098
433689	106715
433977	106301
434641	107088
434443	106450
434592	106748
434354	105722
434668	105650
435528	107303
435200	107333
435634	106920
435971	106764
436136	106639
436216	106897
437386	106691
436828	106850
436391	107045
436950	106344
436834	106106
436358	105994
436411	105547
436358	105220
436083	105193
435657	104955
435928	104866
435455	105848
437549	105830
437192	105822
437464	105409
437080	105361
438231	105933
438357	106836

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
438459	106393
438750	106532
439726	106988
438833	106194
439124	106310
440729	104768
440216	104890
440223	104662
440458	104738
440183	104417
439740	104675
440699	104275
440411	104275
440378	103845
440405	103452
440444	103118
441195	103329
441516	103356
442286	102757
441757	102708
441456	102972
441466	102512
441298	102476
442009	103802
441642	104401
441417	104427
441079	104580
441668	104917
442052	104824
441800	104626
443814	101426
436249	102496
436694	102002
436293	102002
436147	101593
436619	99966
436139	100335
437028	100117
436786	100958
436119	100755
435579	100791
435365	100347
435519	101279
435063	100819
435115	100105
434511	100462
434063	100879
433956	100521

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
434321	101113
434881	101236
433745	99712
433630	99470
433948	99128
435464	99259
435055	99303
434503	98600
434702	99097
434087	98894
433613	100605
434565	97958
436589	98235
436378	99168
425504	110889
425019	110947

Territories within the Forestry Commission Crown Lands

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
420423	108682
425585	108578
425974	108432
425699	108745
422893	106148
422672	105560
419041	101812
421910	99807
422022	100614
424775	106537
423922	101219
423999	100918
424448	100412
423803	100673
423602	100223
426093	99657
424720	99617
427074	99861
426932	99846
426260	104586
426074	105534
432302	106213
434215	108990
434542	109215
434562	109443

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
434678	109394
434512	108590
439081	105831
435423	103875
435173	103930
435109	103824
435344	103765
434637	103060
434489	103206
435833	102774
435446	102742
435149	102639
435499	102323
435094	102088
434923	102080
434834	101934
434931	102368
434739	102404
434616	102078
434580	102207
434290	102319
436242	102612
434320	103517
432827	103668

Territories outside of the HLS/FC Crown Land survey boundary

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
419272	118001
419682	118188
418467	115579
417772	112900
417635	112675
416671	111422
417884	111799
417726	111521
417484	111478
418013	110741
418351	110556
418109	110261
417888	110400
417676	110493
417524	111167
417253	110800
417170	110542
416965	110314
417266	110387

Ordnance Survey Easting (m)	Ordnance Survey Northing (m)
417362	110083
417074	109914
416793	109491
417147	109606
417167	109345
417904	109160
417722	108803
417884	108373
417633	108039
417534	107797
417147	109028
416608	109014
416806	108591
417081	108535
416962	108393
417183	108237
427742	117753
427361	118196
427930	116767
429409	116228
429280	116711
429548	116972
429746	117425
429941	117703
429673	117194
418474	103095
418567	102847
418618	102514
418390	101741
418274	101040
418181	101431
418515	101119
418819	100894
417746	101100
441913	104206