

New Forest Dartford Warbler (Sylvia undata) survey

Higher Level Stewardship Agreement The Verderers of the New Forest AG00300016

2 November 2023





Department for Environment Food & Rural Affairs



NATURAL ENGLAND

This project has been funded under the Rural Development Programme for England

Copyright

This report has been prepared for and funded by The Verderers of the New Forest Higher Level Stewardship Agreement AG00300016. The HLS partners shall have the sole right to publish the report and results of the survey, with an appropriate acknowledgement of the work or material contributed by the Contractor.

This report should be cited as: Hampshire Ornithological Society 2023, New Forest Dartford Warbler (*Sylvia undata*) survey. Higher Level Stewardship Agreement The Verderers of the New Forest AG00300016.

SUMMARY

Hampshire Ornithological Society (HOS) was commissioned by Forestry England on behalf of the New Forest Higher Level Stewardship (HLS) Scheme partners to survey breeding Dartford Warblers in the New Forest. The area surveyed was primarily the New Forest Special Protection Area (SPA), including land managed by Forestry England, National Trust, Hampshire County Council and Wellow Parish Council. Some small inland heathland areas elsewhere within the New Forest National Park were also surveyed.

213 one kilometre squares were surveyed over the period April-June 2023 using the national methodology. These included all squares known to have suitable breeding habitat and/or where Dartford Warblers had been recorded in the preceding six years.

Analysis of data indicated a total of 544 Dartford Warbler breeding territories within the New Forest SPA and a further 27 territories outside of the SPA. This is the highest ever recorded in the New Forest SPA; twice as many as in 2014 when 268 territories were found and four times as many as in the last survey in 2018, when only 135 were found following unusually cold weather during February and March 2018.

Analysis of breeding density in different locations and years suggests that The New Forest could hold even more Dartford Warblers in the future if additional suitable habitat develops and if winters continue to be relatively mild.

1 INTRODUCTION

1.1 The New Forest and its designations

The New Forest is one of the largest tracts of semi-natural vegetation in the country and holds three international wildlife site designations.

It is classified as a Special Protection Area under Article 4.1 of the European Birds Directive, recognising that it is an internationally important site for breeding and over-wintering bird species. This includes an internationally important population of Dartford Warbler (*Sylvia undata*).

The New Forest is also designated as Special Area of Conservation (SAC) for its habitats and non-avian species of European importance, in accordance with the European Habitats Directive.

The New Forest is also listed as a Ramsar site, for its importance as a wetland, with flora and fauna of international importance.

The New Forest Site of Special Scientific Interest (SSSI) is the national wildlife designation recognising the national scientific and biodiversity value of the site.

1.2 The Higher Level Stewardship Scheme

The Higher Level Stewardship (HLS) Scheme is awarded to The Verderers of the New Forest by the Department for Environment, Food and Rural Affairs (Defra) through Natural England.

The HLS Scheme is delivered in partnership with Forestry England and the New Forest National Park Authority. This includes commissioning surveys of bird species for which the New Forest SPA is designated. The Dartford Warbler is surveyed at about five year intervals and the last survey was done in 2018.

On behalf of the HLS partners, Forestry England commissioned HOS to survey breeding Dartford Warblers on land covered by the HLS Scheme, New Forest Crown Lands outside the scheme managed by the Forestry Commission and New Forest heathland areas managed by National Trust, Hampshire County Council and Wellow Parish Council. The primary survey area was the New Forest SPA, so that comparisons with previous years could be made.

1.3 Dartford Warblers in the UK and New Forest

In Britain, Dartford Warblers prefer to breed in lowland heathland with thick heather (*Calluna vulgaris* and *Erica spp.*) and scattered gorse (*Ulex spp.*). They occur widely in France and Spain where temperatures are usually higher. Although some disperse locally in late summer and autumn, Dartford Warblers are unusual among British warblers, in that they don't migrate south to spend the winter in warmer countries with longer winter days.

Situated in the south of England with a relatively mild climate and extensive heathland, The New Forest is recognised as a stronghold for the Dartford Warbler. In recent years the species has extended its range northwards from its former southern coastal distribution and is now present as far north as North Wales, Staffordshire and Norfolk.

Dartford Warblers eat insects and spiders and these are hardest to find in cold winters when day length is short and nights are long. When winters are mild, survival is usually good and the population grows; when winters are cold and especially if there is prolonged snow cover, mortality is high and their density and range contract (Bibby, 1978; Bradbury *et al.*, 2011). Habitat quality is also thought to be important: dense gorse and heather provide better feeding and roosting conditions than more exposed areas (Murison et al., 2007).

National surveys of the UK breeding population of Dartford Warbler were undertaken in 1974, 1984, 1994 and 2006, with some variation in sampling methods and data recording over that period.

Nationally, numbers fell to an historic low after the severe winters of the early 1960s, but recovered over subsequent years, aided by milder winters, with a total population estimated at 3,142 territories during the 2006 survey.

The New Forest SPA was surveyed as part of the 2006 national survey, recording 453 territories (420 when corrected for accuracy and within the SPA) (Fearnley *et al.*, 2012). In 2014, a reduction to 268¹ territories was found (Gates, 2014), but evidence from limited survey work in 2017 suggested that numbers were back at around the 2006 level. Cold weather with lying snow for two periods in February/March 2018 are thought to have severely affected the population, both within the New Forest SPA where only 135² territories were found (HOS, 2019) and elsewhere in the species range.

Supplementary advice on conserving and restoring site features for the New Forest SPA (Natural England, 2019) includes the following target: 'Restore the size of the breeding Dartford Warbler population to a level which is above 538 pairs whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent'. The supporting and explanatory notes explain that this objective is 'subject to natural population variations in response to climatic factors'.

¹ The total population within the New Forest SPA in 2014 will have been greater than 268 pairs because the survey did not include West Wellow Common, nor National Trust land around Hale, Plaitford Common and Bramshaw.

² The 2018 survey also found three territories in National Trust land at Foxbury and five on Burton Common, which are outside the New Forest SPA.

2 METHODS

2.1 The area surveyed

The 2023 survey was organised for HOS by Rob Clements and Nigel Matthews.

The boundary of the area within the New Forest to be surveyed for breeding Dartford Warblers was primarily the New Forest SPA, which is covered by the New Forest HLS Scheme. Most of the SPA is New Forest Crown Lands managed by Forestry England, with smaller areas managed by Hampshire County Council (HCC), National Trust and Wellow Parish Council. As was done in 2018, small inland heathland areas outside of the New Forest SPA were also surveyed: around Badminston Common near Fawley, Burton and Poors Commons near Bransgore, Newlands Plantation near Rockford Common, Foxbury managed by National Trust near West Wellow and Gorley and Hyde Commons managed by HCC³.

Heathland areas within the boundary were identified using the 2014 and 2018 Dartford Warbler surveys, the HOS species database, a study of relevant OS maps and through fieldwork. All 1km squares surveyed in 2014 and 2018 and all with April-June records in 2017-22 were considered. OS maps showed additional heathland, including small areas adjacent to woodland, and clearings within plantations. Including some squares with small amounts of potentially suitable habitat that were checked by the survey organisers, a total of 213 1km squares was checked, and where appropriate surveyed during the fieldwork season.

2.2 Survey methodology

HOS members were invited to survey 1km squares through a dedicated website. The same website provided survey instructions and enabled each volunteer to download a recording form for each of their squares (each with a map of their 1km square at 1:25,000). 85 volunteers responded and subsequently surveyed one or more squares each. During the survey period, two other people reported a total of five Dartford Warblers territories (via Going Birding or BirdTrack) in locations where surveyors did not find them.

Most volunteers knew the New Forest well and were experienced in doing bird surveys. Training (on two separate mornings) was offered to all volunteers and 25 less experienced volunteers took advantage of this.

The survey methodology was based on the national survey methodology (Wotton et al 2009). Volunteers were instructed to survey areas of potentially suitable habitat at least twice; preferably three or four times if Dartford Warblers were located (with a minimum of 10 days between all visits). The first two visits were done between April 1st and May 15th, and third and fourth visits between May 16th and June 30th. Where possible, visits were carried out between dawn and mid-morning, in calm, dry weather.

Wet and windy weather during the early weeks of the survey period meant that ideal weather conditions were relatively few but the large number of surveyors meant that best use of these was possible. Additional visits were made if initial visits had to be done during less favourable conditions and also where several pairs were found to be nesting closely together.

³ Other parts of Hampshire (including coastal areas within the New Forest) were surveyed for Dartford Warbler by additional HOS volunteer surveyors. A Hampshire-wide survey report will be published by HOS in the 2023 Hampshire Bird Report.

Routes followed within the allocated squares were chosen individually by each volunteer to ensure all suitable habitat was surveyed.

The start date of April 1st fitted well with recent experience that Dartford Warbler breeding activity has started by this time. The end date of June 30th avoided the possibility of recording dispersing Dartford Warblers in squares where they had not bred.

2.3 Determination of territories

The locations of all Dartford Warblers were recorded on the maps provided. Annotations showed singing males (especially those singing simultaneously with neighbouring birds), calling birds, birds carrying food and birds in flight.

The definition of a territory followed that used in the national survey (Wotton *et al.*, 2009, Bibby *et al.*, 2000) as follows:

- Singing male (simultaneously singing males were regarded as separate territories as were further singing males recorded at least 200m apart)
- Pair exhibiting breeding behaviour (nest, mating, displaying etc)
- Individuals present on more than one occasion and/or two individuals present.

In most cases, where three or four visits were made, the consolidated map clearly showed a pattern of discrete territories.

A centre point (six-figure grid reference) for each territory was chosen, based on the distribution of registrations. Since numbers were so high this year, in several squares where 10+ pairs/territories were located, there were concentrations of breeding pairs with centres of territory around 100m apart, much closer than recorded in 2018.

Territories near the edge of the squares were checked against territories near the edge of adjacent squares to ensure there was no duplication.

3 RESULTS

3.1 Breeding population of Dartford Warblers in the New Forest SPA in 2023

Within the New Forest SPA, 544 Dartford Warbler territories were found in 142 1km squares, many more than in the last survey, in 2018, when 135 territories were found in 74 squares.

Outside of the New Forest SPA, territories were found at Foxbury (7 territories), Burton Common (4), Poors Common (1), Newlands Plantation (1), Badminston Common (11) and Hyde Common (3) bringing the total inland New Forest population to 571 pairs.

Figures 1 and 2 show the distribution of individual territories located across the New Forest during the 2023 survey.



Figure 1. Distribution of Dartford Warbler territories found in 2023 – western half of survey area. Green areas: New Forest SPA; brown areas: lowland heathland; pale blue lines: National Trust land; orange lines: Wellow Parish Council land; dark blue lines: HCC land. See footnote on page 9 for copyright information.



Figure 2. Distribution of Dartford Warbler territories found in 2023 – eastern half of survey area⁴. Green areas: New Forest SPA; brown areas: lowland heathland; pale blue lines: National Trust land; orange lines: Wellow Parish Council land; dark blue lines: HCC land. See footnote on page 9 for copyright information.

⁴ Note that coastal parts of the New Forest are not covered in this report.

3.2 Breeding density and distribution

The table and bar chart below⁵ show that in 2023 many squares had much higher breeding densities than in 2014 and 2018.

Territories/1km ²	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
No. of 1km squares 2014	42	28	11	16	6	2	0	1	1	0	0	0	0	1					
No. of 1km squares 2018	41	19	6	5	4	1													
No. of 1km squares 2023	34	28	24	24	17	10	2	4	2	0	1	1	1	1	0	0	1	1	1



Figure 3 shows the distribution and density of territories across the New Forest during the 2023 survey (excluding the coast).

Figures 4 and 5 compare the distribution with in 2023 with 2014 and 2018. In comparison with both 2014 and 2018 Dartford Warblers were found in many more squares in 2023; they were 'missing' from just a few squares.

The number of territories found in each 1km square in 2014, 2018 and 2023 is shown in Appendix A.

Six-figure grid references for each territory found in 2023 are provided in Appendix B.

 $^{^{\}rm 5}$ Data used here include territories found outside the New Forest SPA in all three years.



Figure 3. Number of Dartford Warbler territories found in each 1km square surveyed in 2023, with stronger colours indicating higher densities. Copyright information for all maps⁶.

National Trust boundaries within the New Forest National Park: https://heritagerecords.nationaltrust.org.uk/map

Hampshire County Council boundaries within the New Forest National Park: Courtesy of Pete Durnell

⁶ New Forest National Park Boundary adapted to add intertidal zone from

National_Parks_December_2021_Boundaries_GB_BFC_7384908220231449714.gpkg from the Office for National Statistics under the terms of the Open Government Licence and UK Government Licensing Framework.

New Forest SPA Boundary published by Natural England from the DEFRA data services platform under the terms of the Open Government Licence.

Lowland heath boundaries from the Priority Habitats Inventory (England) published by Natural England from the DEFRA data services platform under the terms of the Open Government Licence.

Place names from the OS Open Names [™] under the terms and conditions contained within Open Government Licence. Contains OS data © Crown Copyright (and Crown database rights) 2023 - <u>https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/</u>

Map background - OpenStreetMap under the Open Database Licence: https://www.openstreetmap.org/copyright



Figure 4. Changes in the breeding distribution of Dartford Warblers between 2014 and 2023

- Green square: Present in 2023 but not in 2014
- Grey square: Present in both 2014 and 2023
- Red square: Present in 2014 but not in 2023

See footnote on page 9 for copyright information.



Figure 5. Changes in the breeding distribution of Dartford Warblers between 2018 and 2023

- Green square: Present in 2023 but not in 2018
- Grey square: Present in both 2018 and 2023
- Red square: Present in 2018 but not in 2023

See footnote on page 9 for copyright information.

4 EVALUATION AND DISCUSSION

4.1 Fluctuations in breeding populations

The table below gives the Dartford Warbler population estimates for the New Forest SPA in each of the surveys completed since 1994 (Gibbons and Wotton, 1996, Fearnley *et al.*, 2012, Gates, 2014, HOS, 2019).

	1994	2006	2014	2018	2023
New Forest SPA population (territories)	535	420	268	135	544

The marked fluctuations are consistent with variations in winter weather conditions, with low population levels after hard winters and rising populations after mild winters. Although changes in habitat condition may have helped, the data suggest that the series of relatively mild winters with minimal snow cover since 2018 has enabled the New Forest Dartford Warbler population to reach its highest ever recorded level.

The 2023 population is higher than the target of 538 pairs for the New Forest SPA (Natural England, 2019).

In north-east and east Hampshire annual surveys on the Thames Basin Heaths and Wealden Heaths SPAs have shown Dartford Warbler numbers to be strongly dependent on winter conditions. The cold winters in 2008-09 and 2009-10 caused a major collapse. Numbers recovered in subsequent years until the 'Beasts from the East' in early 2018 resulted in another fall. The following run of mild winters has allowed the populations to reach record levels in recent years, peaking in 2022 (J Eyre & J Clark, pers. comm.).

During the last national survey, in 2006, the UK breeding population of Dartford Warbler was estimated at 3,142 territories. Of this total, the New Forest population of 420 territories represented around 13% and the estimated Hampshire population of around 800 pairs was about 25%.

The six SPAs designated for Dartford Warbler (including the New Forest) held a similar population in the 1990s and 2006 (1,681 and 1,654 pairs respectively). In the 1990s, these SPAs held virtually all the UK population. However, subsequent range expansion meant that by 2006 they held only 52% of the national total, an example of the changing conservation significance of protected areas with a species that is expanding its range, perhaps as a result of climate change.

4.2 Breeding densities and habitat management

In the past, the density of breeding Dartford Warbler in the New Forest compared with other heathland SPAs in southern England has been considered to be relatively low and Gates, 2014, tabulated and compared densities in various locations, habitats and years.

In 2006, the density recorded on dry heathland (their preferred habitat) in the New Forest was 0.03 pairs per hectare. This was much lower than the Dorset Heaths and Thames Basin Heaths SPAs, which had 0.11 and 0.10 pairs/hectare respectively.

During this survey, some New Forest 1km squares held up to 19 territories (0.19 pairs/hectare), a density which is compatible with the national survey methodology that most pairs are likely to nest 200+m apart, and greater than densities found in the Dorset and Thames Heaths. These squares had large amounts of good Dartford Warbler habitat (thick heather growth and scattered clumps of gorse).

Across several adjacent squares, the New Forest habitat is typically more varied, with areas of unsuitable (or less suitable) mires, short or non-existent heather, over-mature gorse, bracken or scrub. This ever-changing mosaic of habitats suits a wide range of plant and animal species and is achieved through grazing and occasional direct habitat management (controlled burning, heather cutting etc.). It follows that the average Dartford Warbler population density across the whole New Forest is much lower than in the small proportion of squares that temporarily and coincidentally have ideal Dartford Warbler habitat.

Volunteers were not asked to grade the habitat in their allocated survey squares, so direct comparisons with previous surveys is not possible. However, examination of OS maps and online aerial views enabled a rough estimate to be made of the proportion of each 1km square surveyed that was open heathland and mire (i.e. after wooded areas, roads, farmland and residential areas had been removed). Across all 1km squares *which had at least one Dartford Warbler territory* there was an average of 0.09 pairs/hectare, much more comparable with the other SPAs, especially as some of these squares had wet mires which are mostly unsuitable.

Data from the RSPB Heathland Survey in Dorset, covering 31 sites mainly in east Dorset, showed a decline from 450 territories in 2017 to 369 in 2018, followed by a rise to 563 in 2022 (Chris Dyer pers comm.). These fluctuations are much smaller than had occurred in the New Forest, probably because the Dorset heathland is often managed to maximise the quantity of gorse and heather whereas New Forest habitats are more influenced by grazing and the desire to maintain and improve a wider range of rare and wildlife rich environments.

Although the New Forest may not provide wide, contiguous areas of ideal Dartford Warbler habitat and will therefore be vulnerable to spells of cold weather, its large size and mix of habitats means it is capable of sustaining a significant Dartford Warbler population. In the event of widespread cold weather and persistent snow cover, the New Forest population is likely to remain a valuable reservoir from which the national population would recover.

Although the number of ponies grazing the New Forest is fairly stable at around 5,500, the number of cattle registered to be depastured (usually for only part of the year) has reduced in recent years, from over 8,300 in 2019 and 2020 to just over 4,000 in 2022 (The Verderers of the New Forest). Resultant reduced grazing may, over time, allow heather and gorse to grow more densely and thereby increase the amount of good Dartford Warbler habitat.

Further heathland is being created as selected plantations are felled as part of the New Forest Design Plan. Initially, these areas tend to have very little heather or gorse, but over time these species will become established and thereby extend the area which is suitable for nesting Dartford Warblers.

Even during the 2023 survey, some volunteers noted that Dartford Warblers were not found in all apparently suitable habitat so, even without additional areas of habitat, numbers could increase still further if mild winters continue into the future.

5 CONCLUSIONS

A full survey of breeding Dartford Warblers undertaken in 2023 across the New Forest SPA identified a healthy total of 544 Dartford Warbler territories (and a further 27 territories within the New Forest but outside the SPA). This was more than had been found in any previous survey.

The total of 544 territories is twice as many as in 2014 when 268 territories were found and four times as many as in the last survey in 2018, when only 135 were found following unusually cold weather during February and March 2018.

Compared with both 2014 and 2018, Dartford Warblers were present in many more 1km squares and they were breeding at much higher densities. The major factor in this increase is very likely to have been the series of mild winters since 2018.

The survey resulted in a dataset that documents the distribution and breeding densities of Dartford Warbler in the New Forest in a 'good year'. If mild winters continue, it is likely that their numbers will increase further.

Changes in grazing and heathland creation through clear-felling of plantations could enable habitats preferred by Dartford Warblers to expand, thereby enabling a further increase in the population.

The New Forest Dartford Warbler population is significant within Hampshire and within the UK. Even though the habitats are not managed specifically for the Dartford Warbler, The New Forest is likely to provide a reservoir from which the species would recover if a series of hard winters were to occur.

The survey fulfils the commitment of the HLS board, under the agreement for the HLS scheme, to provide accurate and current population information for Dartford Warbler, one of the species for which the New Forest SPA is designated.

7 REFERENCES

Bibby, C.J. (1978) Conservation of the Dartford Warbler on English lowland heath: A review. Biological Conservation 13, 299-307

Bibby, C.J, Burgess N.D, & Hill D.A. (2000) Bird Census Techniques. Academic Press, London

Bradbury, R.B., Pearce-Higgins, J.W., Wotton, S.R., Conway, G. and Grice, P.V. (2011) The influence of climate and topography in patterns of territory establishment in a range-expanding bird. Ibis 153, 336-344

Fearnley, Hoskin R, Liley D, Whire J, & Lake S. (2012) Urban development and the New Forest SPA. Footprint Ecology/New Forest National Park Authority

Gibbons, D. W. and Wotton, S. (1996) The Dartford Warbler in the United Kingdom in 1994. British Birds 89, 203-212

Hampshire Ornithological Society, 2019. New Forest Dartford Warbler Survey Report 2018. Higher Level Stewardship Agreement The Verderers of the New Forest AG00300016

Murison, G., Bullock, J.M., Underhill-Day, J., Langston, R., Brown, A.F. and Sutherland, W.J. (2007) Habitat type determines the effects of disturbance on the breeding productivity of the Dartford Warbler Sylvia undata. Ibis 149, 16-26

Natural England, 2019. European Site Conservation Objectives: Supplementary advice on conserving and restoring site features New Forest Special Protection Area

Wotton, S. Conway, G. Eaton M. Henderson I & Grice P. (2009) The status of the Dartford Warbler in the UK and the Channel islands in 2006. British Birds 102: 230-246

Gates, N. (2014). New Forest Dartford warbler 2014 Survey Report. Higher Level Stewardship Agreement The Verderers of the New Forest AG00300016

6 ACKNOWLEDGEMENTS

Thanks are due to Keith Betton and Ron Taylor for assistance with the planning of the 2023 survey and writing this report. Robert Klaschka kindly produced the maps. The following 87 observers contributed records to the survey (including two who sent records via BirdTrack or Going Birding).

K Anderson S Aradas G Baker P Bailey K Betton G Bird M Black A Blair S Boswell C Bown S Broadway D Brookes C Chapleo R Chapman R Clements S Clemons N&R Coates S Colenutt J Craddock M Creighton M Dalgarno J Dedman

G Digby J Ecob M Edgeller R Farnworth J Faulkner J Fenner P Ford S Fox O Frampton P Gibbs D Gilman C Gouldstone T Griffin R Groves M Halligan A Hallows M Harrison T Hines A Holding C Hunnisett J Hunt G James

C Johnson K Kearns N Kendall C Kidger R Lemon N Matthews G Mintram D Moore J Moseley R Mould-Ryan D Munday C Newman S Nickols M O'Driscoll N Owen P Pearson D Perks J Pett C Pond A Prugel-Bennett G Pullin C Purchase

J Puzio S Randall A Rhodes T Richmond C Roseveare D Russell K Saver H Schneider P Sheaf D Shrive A Snook T Stone R Taylor G Thornton R Webb J West **B** Weston K Weyman C Willard N Windibank A Young

Grid square	Territories 2014	Territories 2018	Territories 2023
SU1608			1
SU1609	2	2	1
SU1612			1
SU1707			1
SU1708	3	1	2
SU1709	2		
SU1710	3	1	1
SU1711	2	1	1
SU1712			2
SU1713	1		
SU1801	6	2	3
SU1802	1	2	
SU1803	5	2	2
SU1804	2		13
SU1805			5
SU1806	2		3
SU1808	3		2
SU1810	1	1	
SU1811	1	1	5
SU1812	1		
SU1813	2	1	5
SU1814	1	2	
SU1815	1	1	2
SU1816		3	
SZ1995		5	4
SU1900	1	1	2
SU1901	2	2	5
SU1902	4	1	4
SU1903	2	2	5
SU1904	2		5
SU1905	2	2	5
SU1906	2	1	6
SU1907	1		3
SU1911	2	1	5
SU1912	2	1	
SU1913	4	3	6
SU1914			2
SU1915	4	1	14
SU1916	3		6
SU1918			2
SZ2098			1
SU2000	3	2	3
SU2001	2	2	6

Appendix A. Number of territories found in each 1km square in 2014, 2018 and 2023

Grid square	Territories 2014	Territories 2018	Territories 2023
SU2002			1
SU2004			1
SU2005	1		1
SU2006		1	1
SU2007	4		4
SU2008	1		6
SU2010	4	1	1
SU2011	1		4
SU2012	4		2
SU2014	5	1	4
SU2015	2		5
SU2016	3		4
SU2017	3	1	4
SU2019		1	
SZ2198			1
SU2101	4	5	19
SU2102	2	2	3
SU2105			2
SU2106	8	2	3
SU2107	4		4
SU2108	1		6
SU2109	1	1	8
SU2110	1	1	1
SU2113			2
SU2115			3
SU2116	2	1	4
SU2117	2	1	1
SZ2298			1
SU2201	5	1	8
SU2202		2	6
SU2206			1
SU2207	4		
SU2208			3
SU2209			1
SU2210	1		5
SU2211			2
SU2212			1
SU2213	1		3
SU2215			1
SU2216	1		3
SU2301	9		3
SU2302	4	5	9
SU2303	2		2
SU2308	1		2
SU2309	1		4

Grid square	Territories 2014	Territories 2018	Territories 2023
SU2310	2	2	4
SU2311	1		1
SU2315			1
SU2401		2	2
SU2402	1		1
SU2403	3	1	
SU2409	1		
SU2410	1	1	3
SZ2599			1
SU2500		1	7
SU2501	4		2
SU2502	2	3	3
SU2503	2		
SU2510			3
SU2511			4
SU2600			4
SU2601		3	17
SU2602	1	2	4
SZ2799	2		2
SU2700		4	6
SU2701	1		2
SU2702			4
SU2703		1	
SU2706			2
SU2707			1
SU2717			1
SZ2899	1	1	4
SU2800		1	2
SU2801			4
SU2803			2
SU2817			2
SZ2998		2	3
SZ2999		4	5
SU2900		1	
SU2917			2
SU3017		3	5
SU3107	1		1
SU3207	2		2
SU3208			1
SZ3399	2		4
SU3300	1		2
SU3307	1		
SZ3498		2	5
SZ3499	5	1	7
SU3400	4	5	12

Grid square	Territories 2014	Territories 2018	Territories 2023
SU3401		1	8
SU3405	1	3	
SU3406		1	2
SU3407	1		3
SU3408	1		
SZ3598			1
SZ3599			11
SU3500	4		18
SU3501	1		5
SU3504	1	2	3
SU3505	4	4	5
SU3506	2		3
SU3507			3
SZ3698		1	3
SZ3699	1	1	6
SU3600			8
SU3601	1	1	6
SU3602	1		2
SU3605	5	4	4
SU3606	14	4	9
SU3607			1
SU3705	5	6	5
SU3706	1	1	3
SU3805	1		
SU3806	3	1	3
SU3904			5
SU3905	3	1	
SU3906	4	1	4
SU4003	3		3
SU4004	6		2
SU4005			1
SU4102	1		1
SU4103	2	1	1
SU4104	4		4
SU4202	1		
SU4204			1
SU4301	2		4
SU4501			4
SU4502			4
SU4601			3
Total	268	143	571

Appendix B. Locations of all Dartford Warbler territories found within the survey area in 2023. Those in red font were outside the New Forest SPA.

Square							OS	map gr	id refer	ences	of territ	ories fo	ound			
SU1608	SU169089															
SU1609	SU166091															
SU1612	SU169124															
SU1707	SU175079															
SU1708	SU171083	SU171086														
SU1710	SU176107															
SU1711	SU179114															
SU1712	SU176127	SU177127														
SU1801	SU184014	SU189013	SU189018													
SU1803	SU189035	SU189038														
SU1804	SU186041	SU186042	SU187041	SU187042	SU187044	SU187045	SU188041	SU188043	SU188044	SU188045	SU189044	SU189045	SU189049			
SU1805	SU188051	SU189051	SU189052	SU189053	SU189058											
SU1806	SU186063	SU187064	SU188064													
SU1808	SU181082	SU184084														
SU1811	SU181112	SU182112	SU183113	SU186115	SU188119											
SU1813	SU181131	SU181135	SU183133	SU185135	SU189136											
SU1815	SU188154	SU189158														
SZ1995	SZ192954	SZ192957	SZ195956	SZ197954												
SU1900	SU196005	SU196008														
SU1901	SU191012	SU192013	SU192016	SU194011	SU198014											
SU1902	SU192021	SU196023	SU196026	SU199021												
SU1903	SU191037	SU196034	SU197036	SU198034	SU199032											
SU1904	SU190046	SU192049	SU195047	SU196048	SU197045											
SU1905	SU190052	SU191051	SU192053	SU195051	SU195057											
SU1906	SU193068	SU194061	SU195061	SU197061	SU197063	SU198062										

SU1907	SU191071	SU195071	SU198072																
SU1911	SU191111	SU191113	SU192116	SU196116	SU198117														
SU1913	SU191136	SU192131	SU192135	SU194133	SU194137	SU197135													
SU1914	SU196141	SU198142																	
SU1915	SU193154	SU194153	SU194156	SU195155	SU195157	SU196158	SU197151	SU197153	SU197154	SU197157	SU198151	SU198152	SU199151	SU199154					
SU1916	SU191157	SU192156	SU192158	SU199151	SU199154	SU199156													
SU1918	SU195183	SU197185																	
SZ2098	SZ202984																		
SU2000	SU202005	SU203007	SU209008																
SU2001	SU204017	SU207011	SU208011	SU209011	SU209012	SU209013													
SU2002	SU207021																		
SU2004	SU207047																		
SU2005	SU209052																		
SU2006	SU207068																		
SU2007	SU201077	SU201078	SU202072	SU202079															
SU2008	SU201081	SU204082	SU204083	SU205082	SU205084	SU206081													
SU2010	SU209108																		
SU2011	SU201116	SU201119	SU205118	SU207119															
SU2012	SU202121	SU205123																	
SU2014	SU201141	SU202142	SU205143	SU208147															
SU2015	SU201151	SU201157	SU201158	SU209153	SU209158														
SU2016	SU201165	SU201168	SU205163	SU208161															
SU2017	SU202173	SU204174	SU205175	SU208177															
SZ2198	SZ218985																		
SU2101	SU211011	SU211012	SU211013	SU211014	SU211018	SU211019	SU212013	SU213012	SU213013	SU213016	SU213019	SU214013	SU215010	SU215012	SU215013	SU215014	SU216012	SU219011	SU219014
SU2102	SU212021	SU216022	SU218022																
SU2105	SU211055	SU213059																	
SU2106	SU217065	SU218065	SU218069																
SU2107	SU217074	SU218071	SU219073	SU219074															

SU2108	SU212088	SU213085	SU213089	SU216088	SU219081	SU219089								
SU2109	SU214091	SU214095	SU216095	SU217096	SU217098	SU217099	SU218098	SU219099						
SU2110	SU218109													
SU2113	SU217139	SU218135												
SU2115	SU211151	SU211156	SU211158											
SU2116	SU211168	SU212161	SU214162	SU219165										
SU2117	SU211178													
SZ2298	SZ222985													
SU2201	SU221015	SU222019	SU223018	SU224018	SU225017	SU228012	SU228018	SU229019						
SU2202	SU222021	SU222023	SU223021	SU225021	SU227021	SU227023								
SU2206	SU223069													
SU2208	SU221083	SU221084	SU222083											
SU2209	SU222095													
SU2210	SU224101	SU225108	SU226107	SU226109	SU229105									
SU2211	SU222113	SU227114												
SU2212	SU221129													
SU2213	SU221135	SU222134	SU224139											
SU2215	SU229158													
SU2216	SU223168	SU224166	SU228163											
SU2301	SU230011	SU235016	SU238017											
SU2302	SU231022	SU231025	SU232022	SU232023	SU234022	SU234023	SU235027	SU236029	SU238029					
SU2303	SU238033	SU238034												
SU2308	SU234086	SU235088												
SU2309	SU235097	SU237097	SU238098	SU239095										
SU2310	SU234107	SU236101	SU236106	SU237107										
SU2311	SU236111													
SU2315	SU231157													
SU2401	SU246017	SU247019												
SU2402	SU245028													

SU2410	SU242101	SU243104	SU245102															
SZ2599	SZ255999																	
SU2500	SU256006	SU257001	SU257002	SU257006	SU258001	SU258002	SU259004											
SU2501	SU252017	SU252019																
SU2502	SU251021	SU251026	SU258023															
SU2510	SU254108	SU257104	SU257105															
SU2511	SU251111	SU253111	SU253113	SU254119														
SU2600	SU260005	SU267007	SU268008	SU269008														
SU2601	SU260010	SU261012	SU261014	SU262011	SU263010	SU263012	SU263013	SU263017	SU263019	SU265011	SU265013	SU265014	SU265016	SU268013	SU268017	SU269014	SU269019	
SU2602	SU261023	SU261024	SU261029	SU263023														
SZ2799	SZ273996	SZ278999																
SU2700	SU271007	SU273007	SU275007	SU276008	SU279002	SU279004												
SU2701	SU272017	SU272019																
SU2702	SU270020	SU271023	SU275024	SU277021														
SU2706	SU273061	SU273063																
SU2707	SU275078																	
SU2717	SU273178																	
SZ2899	SZ281995	SZ281999	SZ286991	SZ289995														
SU2800	SU281006	SU284001																
SU2801	SU282013	SU282016	SU285011	SU285013														
SU2803	SU283039	SU287039																
SU2817	SU284174	SU285171																
SZ2998	SZ291989	SZ294989	SZ299988															
SZ2999	SZ292992	SZ292997	SZ294995	SZ294997	SZ299999													
SU2917	SU299176	SU299179																
SU3017	SU301171	SU301173	SU302174	SU304176	SU304178													
SU3107	SU315078																	
SU3207	SU320076	SU321079																
SU3208	SU323082																	

SZ3399	SZ337995	SZ339994	SZ339996	SZ339999															
SU3300	SU336005	SU336007																	
SZ3498	SZ343982	SZ346984	SZ348987	SZ348988	SZ348989														
SZ3499	SZ341997	SZ341999	SZ346993	SZ348994	SZ349994	SZ349997	SZ349999												
SU3400	SU341005	SU342003	SU342007	SU343006	SU343009	SU346001	SU346008	SU347004	SU347008	SU349003	SU349006	SU349009							
SU3401	SU341015	SU342011	SU342013	SU343011	SU344012	SU346014	SU347015	SU349014											
SU3406	SU342061	SU345069																	
SU3407	SU345076	SU346072	SU348073																
SZ3598	SZ358989																		
SZ3599	SZ351994	SZ351997	SZ351999	SZ352992	SZ352993	SZ352999	SZ353993	SZ354999	SZ356991	SZ358993	SZ359995								
SU3500	SU350003	SU351001	SU352001	SU352003	SU352009	SU353001	SU353005	SU353008	SU356001	SU356006	SU356008	SU357001	SU357005	SU358003	SU358004	SU358006	SU358009	SU359002	
SU3501	SU352017	SU355011	SU357014	SU357017	SU359015														
SU3504	SU353047	SU356049	SU359049																
SU3505	SU351058	SU352055	SU356057	SU357051	SU357054														
SU3506	SU351061	SU355068	SU355069																
SU3507	SU353072	SU357071	SU359071																
SZ3698	SZ362988	SZ365986	SZ367981																
SZ3699	SZ360993	SZ361995	SZ362997	SZ363991	SZ363994	SZ366993													
SU3600	SU360004	SU361003	SU362008	SU363002	SU364005	SU364006	SU366008	SU366009											
SU3601	SU362011	SU362013	SU362018	SU365015	SU367016	SU367018													
SU3602	SU361023	SU362022																	
SU3605	SU361053	SU361056	SU364053	SU364054															
SU3606	SU362065	SU363062	SU363069	SU364065	SU364065	SU365069	SU366063	SU368063	SU369065										
SU3607	SU361071																		
SU3705	SU373055	SU374055	SU374058	SU377059	SU379056														
SU3706	SU373063	SU374064	SU375062																
SU3806	SU381061	SU382063	SU385061																
SU3904	SU393049	SU395047	SU399045	SU399047	SU399049														
SU3906	SU393063	SU396069	SU398066	SU399063															

SU4003	SU403036	SU406037	SU406039									
SU4004	SU406043	SU407047										
SU4005	SU409052											
SU4102	SU419026											
SU4103	SU419032											
SU4104	SU411049	SU413048	SU414049	SU418048								
SU4204	SU421046											
SU4301	SU435016	SU435018	SU436018	SU437018								
SU4501	SU451017	SU454017	SU456019	SU459019								
SU4502	SU451023	SU452025	SU453025	SU454020								
SU4601	SU461018	SU462011	SU463015									