Quantock Hills
Heathland Breeding Bird Survey
2018

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Summary

The Quantock Hills AONB supports important populations of heathland breeding birds. These have been monitored on a six-year cycle since 2000. A survey of sixteen target species was carried out in 2018 covering all areas of heathland and associated habitats within forty-three one-kilometre squares. A summary of results is presented in table 1 below.

The data suggests that cuckoo and tree pipit populations have increased since 2012. These are both red-listed species. Other populations seem to have remained relatively stable including those of willow warbler, redstart, meadow pipit and linnet, the latter species also red-listed.

The data also suggests that skylark and yellowhammer have decreased significantly since 2012, with the estimated number of breeding pairs down by 31% and 42% respectively. This is against a background of year-on-year increases since 2000 for both species. Both species are red-listed and their apparent decline within the AONB is a cause for serious concern.

There is no sign of recovery of Dartford warbler and whinchat breeding populations. Both species remain at very low numbers in the northern half of the Quantock Common. The estimated breeding population of whitethroat and stonechat fell by 22% and 19% respectively, both species relying heavily on areas of mature scrub. Data suggests that garden warbler has also declined since 2012.

The scarcity of lesser redpoll records in 2018 is a mystery, with only one territory noted compared to 24 in 2012. It is unclear whether this represents a genuine decline in the AONB and needs further investigation.

Poor late-winter weather undoubtedly affected some resident heathland birds, including skylark, Dartford warbler, stonechat, meadow pipit, linnet and yellowhammer, and some migrant breeders, notably garden warbler and whitethroat were affected by poor spring weather on the continent. It seems unlikely that declines in species such as skylark and yellowhammer was solely due to poor weather.

The report concludes with recommendations for further work, including a review of management interventions for scrub-dependent species such as whitethroat, Dartford warbler, whinchat and stonechat and investigation into the current value of farmland within

and adjacent to the AONB for resident heathland birds such as skylark, linnet and yellowhammer.

Target species	BOCC4 status	Estimated number of breeding pairs						18-year change (%)	12-year change (%)	6-year change (%)
		1992	2000	2006	2012	2018	2018 total in 2000/2006/2012 survey squares			
Cuckoo	Red	20	10	23	21	33	25/33/33	150	43	57
Skylark	Red	250	78	58	136	94	87/94/94	12	62	-31
Willow warbler	Amber	n/s	n/s	168	138	158	-/158/156	n/a	-7	13
Grasshopper warbler	Red	n/s	n/s	2	0	0	-/0/0	n/a	-100	0
Garden warbler	Green	n/s	n/s	n/s	38	22	-/-/22	n/a	n/a	-42
Whitethroat	Green	n/s	41	71	83	65	39/65/65	-5	-8	-22
Dartford warbler	Amber	0	18	35	1	2	2/2/2	-89	-94	100
Redstart	Amber	n/s	8	36	44	40	30/40/40	275	11	-9
Whinchat	Red	62	22	22	4	4	4/4/4	-82	-82	0
Stonechat	Green	63	128	108	132	107	94/107/107	-27	-1	-19
Wheatear	Green	n/s	1	3	40	7	Non-breeder	-	-	-
Meadow pipit	Amber	426	210	187	202	182	158/182/182	-25	-3	-10
Tree pipit	Red	142	33	78	39	60	50/58/58	52	-26	49
Linnet	Red	151 birds	93	140	197	168	132/167/167	42	19	-15
Lesser redpoll	Red	n/s	n/s	n/s	24	1	-/-/1	n/a	n/a	-96
Yellowhammer	Red	74	86	126	177	103	86/103/103	0	-18	-42

Table 1: estimated breeding populations and trends of target species 1992-2018

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Cover photo: Dartford Warbler by Brian Gibbs.

Contents

1 Introduction

The Quantock Hills Area of Outstanding Natural Beauty (AONB) supports an extensive area of heathland of national importance for a range of rare and vulnerable wildlife. Much of this interest is focused on the Quantocks Site of Special Scientific Interest (SSSI), centred on Quantock Common. The most valuable areas of heathland are found where rotational management has encouraged a varied age structure in the heather and gorse and where the heathland forms part of a mosaic of well-managed habitats, including acidic grassland, wet flushes, broadleaved scrub and woodland edge. This interest extends beyond the boundary of the common land to include enclosed farmland, which plays an important supporting role in providing food for heathland breeding birds such as yellowhammer.

The AONB supports a range of threatened breeding birds, including red- and amber-listed species identified in Birds of Conservation Concern 4 (BOCC4) (Eaton et al 2015) such as cuckoo, skylark and tree pipit. The AONB partnership under the guidance of the Joint Advisory Committee (JAC) monitors populations of these species as part of their commitment to conserving priority habitats and wildlife within the area. The populations of heathland breeding birds have been monitored within the AONB since 1992, with surveys taking place every six years since 2000. The data gathered through these surveys provides information on changes in the number and distribution of target heathland species, which in turn helps to inform habitat management through the AONB Management Plan.

This report sets out the findings of the 2018 heathland breeding bird survey. It also includes a review of population and distribution trends for target species over the past eighteen years since Countryside Stewardship and other agri-environment schemes were introduced to the AONB. The report briefly considers the possible causes of changes in target species populations and sets out a series of recommendations for the JAC and its partners.

For the sake of brevity, where the term ‘breeding territories’ or ‘breeding pairs’ is used in the report, this refers to the *estimated number* based on the interpretation of records of individuals or pairs recorded during the survey.

2 Survey method

The 2018 survey was a repeat of surveys carried out in 1992 (Street 1992), 2000 (Booker 2001), 2006 (Booker 2007) and 2012 (Booker 2014). As previously, the aims were to estimate the current breeding population of each target species, to identify trends in their population and distribution and to help inform future management of the AONB. Fieldwork was carried out by staff and volunteers from the Quantocks AONB Service, Forestry England, Somerset Ornithological Society, the National Trust and the RSPB.

Forty-three one-kilometre squares were surveyed for sixteen target species following the method used in previous surveys (appendix 1). This allowed population trends over the past two decades to be assessed and significant changes in species' ranges to be identified.

The 2018 survey focused on the same target species as in 2012. With the publication of BoCC4 in 2015, whinchat has become red-listed and wheatear and whitethroat have moved from the amber to green list. Species names and order follows the ninth edition of the BOU Checklist of British Birds (BOU 2018).

Target species	**Latin name**	**BOCC4 status**
Cuckoo	*Cuculus canorus*	Red
Skylark	*Alauda arvensis*	Red
Tree pipit	*Anthus trivialis*	Red
Meadow pipit	*Anthus pratensis*	Amber
Redstart	*Phoenicurus phoenicurus*	Amber
Wheatear	*Oenanthe oenanthe*	Green
Whinchat	*Saxicola rubetra*	Red
Stonechat	*Saxicola rubicola*	Green
Garden warbler	*Sylvia borin*	Green
Whitethroat	*Sylvia communis*	Green
Dartford warbler	*Sylvia undata*	Amber
Grasshopper warbler	*Locustella naevia*	Red
Willow warbler	*Phylloscopus trochilus*	Amber
Linnet	*Linaria cannabina*	Red
Lesser redpoll	*Acanthis cabaret*	Red
Yellowhammer	*Emberiza citrinella*	Red

Table 2 – target breeding bird species and their UK conservation status 2018

The 2018 survey area included all heathland and acid grassland habitat within the AONB and associated scrub and woodland edge. The survey included three additional squares to the 2012 survey, two more than in 2006 and 13 more than in 2000. To allow data comparison between years, additional 2018 squares were excluded from the analysis of change of species population and distribution.

Surveyors carried out two visits to each one-kilometre square, the first between 1st April and 15th May and the second between 16th May and 30th June. Observers followed a route which gave good coverage of all areas of suitable habitat, noting target species and other points of interest on the recording form. The survey instructions and a blank copy of the recording form are included in appendix 1. Survey forms were collated and analysed by RSPB SWRO and are stored at RSPB SWRO.

3 Results

3.1 Cold weather impacts 2018

The Quantocks saw low temperatures and heavy snowfall in late February and early March 2018. National reporting rates for species such as meadow pipit, wheatear, grasshopper warbler and whinchat appear to have been lower in 2018 than average (https://app.bto.org/birdtrack/main/data-home.jsp).

It is difficult to know what level of impact the poor weather had on resident birds. It will certainly have adversely affected insectivorous species like Dartford warbler and stonechat, including birds already on territory. Hard weather can also affect seed-eating species like skylark, yellowhammer and meadow pipit, the level of impact depending in part on the availability of food locally, especially during the January to March 'hungry gap' when a lot of winter seed sources have been depleted.

Many AONB resident birds move to lower ground in winter where there is a better chance of finding food. Farmland around Lilstock and Knighton for example regularly support good numbers of yellowhammer and skylark on winter stubbles and game cover crops. Coastal saltmarsh on the Somerset coast can also support good numbers of wintering skylark. It is likely that these areas will have supported many of the AONB's breeding birds, however there is no information on how well these birds fared in late winter 2018, and some degree of impact on the Quantock's breeding populations must be assumed.

It is unlikely that returning summer migrants would have been adversely affected by the Feb/March weather, most of which arrived after the thaw. Willow warbler and redstart arrived in Somerset within a couple days of their normal return dates (Brian Gibbs pers comm), although other species arrived on average a week later than normal in Somerset, probably due to conditions further south which held many birds back. The delay may have affected survey counts of breeding migrants such as garden warbler and whitethroat, although the extent of any impacts are difficult to assess.

3.2 Summary data

Table 1 provides a summary of the estimated number of breeding territories of each target species in the AONB in 2018. It also includes an estimate of population change for each species since 2000.

Fig 1 shows the number of target species recorded in each survey square in 2018, providing a useful indication of the diversity of species across the AONB. As might be expected, the most diverse survey squares recorded in 2018 were those supporting the largest areas of open heathland, including much of the northern half of Quantock Common, Great Hill and squares around Aisholt Common and Lydeard Hill. Fig 2 maps the combined total of individuals of each target species in each survey square in 2018, providing an indication of the abundance of heathland birds within each survey square. This shows a broadly similar pattern, although there was reduced abundance in some of the northern squares notably in the nine squares around Weacombe Hill-Longstone Hill-Dowsborough-Black Ball Hill-Thorncombe Hill-Hurley Beacon.

The 2018 distribution and population change maps for each target species are included in appendix 3. The remaining figures in appendix 3 show changes in the number of breeding territories for each target species for the three survey periods 2000-2018, 2006-2018 and 2012-2008. The most useful of these is probably the 2000-2018 maps because of the extended time period between surveys and the benchmark provided by the introduction of agri-environment agreements, starting on the northern part of Quantock Common in 2002.

Most between-year counts in a survey square are relatively small (generally plus or minus 1-2 pairs) and the significance of differences at this scale is difficult to determine given the margin of error that can occur in the detection of birds. Where significant change between survey years is thought to have been likely, it is based on a combination of change in the total counts within the AONB between survey periods supported by evidence of consistent patterns of change across parts of the site.

3.3 Species accounts

Cuckoo

UK status	BoCC4 Red list (Eaton et al 2015). BTO Atlas: major declines since 1960s across England (Balmer et al 2013). BBS trend: -41% in UK, -70% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW England: -82% 1995-2017, much higher than UK as a whole (Harris et al 2018). Highest breeding densities mainly in uplands, including the Quantocks. Variable trends in these areas, not all data is recent: • Exmoor: increased >50% 2008-2014 (Sim et al 2016). • Dartmoor Training Area: -8.3% 2006-18 (Stanbury et al 2018). • East Dartmoor: 'declined significantly' 1979-2016 (Booker & Rylands 2016). • Bodmin Moor: +2% 1984-2008, +170% 1999-2008 (Chown 2008).
Somerset status	Locally a fairly common migrant breeder (SOS 2017). Strongholds on Exmoor and Quantocks and still widely found on the Somerset Levels, especially Avalon Marshes (Ballance et al 2014).

Fig 3 shows the distribution of breeding territories based on recorded males in 2018. Calling male cuckoos were recorded on open heathland, woodland edge and scrub across the AONB. They remained largely absent from clearings in wooded and forested areas although these habitats were not targeted during the survey.

Cuckoos are often highly mobile on their breeding grounds and territories can be difficult to map accurately. The 2018 results suggest that the Quantocks breeding population is higher than in each of the 2000, 2006 and 2012 survey years (table 1). This reflects the trend on Exmoor where cuckoo abundance increased by over 50% between 2008 and 2014 (Sim et al 2016). With the additional survey squares covered in 2018, the current population based on the number of calling males is c. 33 pairs.

Fig 4 illustrates changes in the number of territories for the period 2000-2018. It suggests that much of the increase since 2000 occurred in the northern part of the AONB, especially in the West Hill area and south to Hurley Beacon and Robin Upright's Hill. Fig 5 shows the change in the number of territories recorded between 2006-2018 and suggests that small changes have occurred across the AONB, both positive and negative. Fig 6 covering the 2012-2018 period suggests a similar pattern, with many areas returning similar counts in both survey years. These change maps support the conclusion that cuckoo numbers remain stable or have increased across the AONB, with the northern common providing most of any increase since 2000.

Skylark

UK status	BoCC4 Red list (Eaton et al 2015). BTO Atlas: – 58% decline in UK breeding population 1970-2010 (Balmer et al 2013). BBS trend: -18% in UK, -24% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW England: -36% 1995-2016 (Harris et al 2018). Upland areas including the Quantocks are important areas for breeding skylark. Variable trends in these areas, not all data is recent: • Exmoor: declines (Geary 2002, Stanbury 2008) with recovery >50% 2008-14 (Sims et al 2016). • Dartmoor Training Area: -14.5% 2006-18 (Stanbury et al 2018). • East Dartmoor: trend unknown 1979-2016 (Booker & Rylands 2016). • Apparently stable on Bodmin Moor: +4% 1984-2008, -12% 1999-2008 (Chown 2008).
Somerset status	Common local resident though marked contraction in range and numbers over the last 30 years (SOS 2017). Most frequent on the Levels and in the western uplands, especially the Quantocks and Exmoor, although even here there are signs of declines (Ballance et al 2014).

Skylarks can be difficult to detect during poor weather or windy conditions, when males often remain on the ground. It is therefore critical for this species that survey conditions are good in order to get an accurate count of singing males. The 2018 results suggest a Quantock population of c. 94 pairs. This is considerably lower than the maximum count of c. 136 pairs in 2012 and represents a decline of c. 42%. This is still significantly higher than the 2000 and 2006 counts, when the population was estimated at 78 and 58 pairs respectively.

Fig 7 shows the distribution of breeding territories in 2018. Although skylarks were widespread on open land throughout the AONB, the highest densities occurred in the northern half of the site, especially on common land north of Hurley Beacon. This pattern of distribution is similar to that recorded in 2012. A number of open heathland squares returned nil counts, especially in the area around Hodder's Combe, Great Bear, Triscombe and Aisholt Common.

Fig 8 illustrates changes in the number of territories for the period 2000-2018. This suggests that there has been a modest increase in skylarks across the site over that period. This is similar for the period 2006-2018 (fig 9), with a general increase across the northern part of the common. The 2006-2012 change map (Booker 2014) suggested that there had been declines in the southern part of the AONB and the 2012-18 change map (fig 10) suggests that most of any further decline has occurred in the northern half of the AONB, with a large drop in recorded birds across many survey squares in the core of the SSSI.

Willow warbler

UK status	BoCC4 Amber list (Eaton et al 2015). BTO Atlas: 25% decline in English breeding population 1995-2010 (Balmer et al 2013). BBS trend: -13% in UK, -44% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW England: -62% 1995-2017 (Harris et al 2018). Devon and Somerset: -67% over 25 years (Charman 2009). Bodmin Moor: +52% 1984-2008 (Chown 2008).
Somerset status	Common migrant breeder. Has decreased or disappeared in many lowland areas (SOS 2017) but still good numbers on Exmoor, the Quantocks and the Mendips (Ballance et al 2014).

Willow warblers returned to the Quantock combes from early April onwards, where they are birds of woodland edge, rides and areas of heathland with scrub. The 2018 results suggest that the breeding population has been fairly stable since 2006. Following a slight drop in 2012, numbers in 2018 were similar to 2006 with an estimated 158 pairs (table 1).

Fig 11 shows the territory distribution of birds in 2018. It shows that willow warblers were fairly evenly distributed throughout the AONB, with the highest densities associated with woodland edge and scrub around Robin Upright's Hill and Great Bear, although the species was recorded in many squares away from woodland including most areas with open heath. As in 2012, good numbers were recorded around Broomfield Hill in the far south of the area.

The 2006-18 change map (fig 12) shows big declines in the number of territories in the southern half of the AONB, with a modest increase in numbers in the northern half, though overall these changes balance out. Similar changes were noted in the 2012 survey (Booker 2014) and areas such as Aisholt Common, Lydeard Hill, Wills Neck and survey squares across to Triscombe do not appear to have recovered since 2012. The 2012-18 change map (fig 13) suggests a mixed picture with small local increases or decreases throughout the AONB which may easily be due to differences in levels of detection of birds between years, with the highest increase again around the Robin Upright's Hill area.

Grasshopper warbler

Grasshopper warblers have never been common on the Quantocks, where suitable areas of damp scrub combined with dense low ground cover are uncommon. Only two birds were recorded in 2006 and none in 2012 and 2018.

Garden warbler

UK status	BoCC4 Green list (Eaton et al 2015). BBS trend: -25% in UK, -31% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW England: -31% 1995-2017 (Harris et al 2018).
Somerset status	Locally a fairly common migrant breeder (SOS 2017). Commonest in the west of the county including the Quantocks and Brendon Hills with other hotspots including the Avalon Marshes and Blackdown Hills (Ballance et al 2014).

Fig 14 shows the distribution of garden warbler records for 2018. As might be expected, most birds were recorded in squares with lots of woodland edge or clearings rather than open moorland. Undoubtedly the focus on open ground species means that garden warblers are not well represented by this type of survey. It was included for the first time in 2012 because it is often noted within these areas and although currently on the BOCC4 green list, current trends suggest the UK breeding population is vulnerable.

The 2018 total of 22 territories represents a 42% decline from the 38 territories recorded in 2012 although records suggest that 2018 was a poor year for garden warbler across Somerset generally and many birds arrived later than normal. Fig 15 shows changes in the number of territories for the period 2012-18 with squares in the northern-western part of the AONB showing a general reduction between 2012 and 2018, especially in areas around West Quantoxhead south to Bicknoller. This may be explained at least in part by the poor season across the county in 2018 although small but consistent increases were noted in and around Holford Combe, Dowsborough, the Robin Upright's Hill/Great Bear area and Aisholt Common.

Whitethroat

UK status	BoCC4 Green list (Eaton et al 2015). BTO Atlas: +15% 1970-2010, 7% range expansion since 1988-91 (Balmer et al 2013). BBS trend: +18% in UK, +15% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW England: +5% 1995-2017 (Harris et al 2018).
Somerset status	Common migrant breeder (SOS 2017). Commonest in lowland areas from the south-eastern end of the Poldens to Steart and north to the southern slopes of Mendip. In the western hills and Mendip they are uncommon or absent in farmland (Ballance et al 2014).

Whitethroats were late to arrive in Somerset in 2018 and observers noted reduced numbers in the county, including the Quantocks, reflected in the count total of 65 territories (table 1), down by 18% from 2012 when 83 territories were recorded. This is against a background of year-on-year increases since 2000 which has included increased numbers in the northern

part of the AONB and in the Aisholt Common and Lydeard Hill area in the south. It is difficult to know whether the apparent decline over the past six years represents a genuine reduction in the number of territories or is the result of poor migration in 2018.

Fig 16 shows the territory distribution of whitethroats in 2018. Widely distributed in low densities in the northern part of the AONB, numbers were noticeable higher along the western side of the AONB from Thorncombe Hill through Great Hill, Wills Neck, Lydeard Hill and Cothelstone Hill. Fig 17 shows the changes in abundance and distribution for the period 2000-18, suggesting that there has been a long-term decline around the northern common, especially around Black Hill and on heathland above Hodder's and Holford Combes. Fig 17 suggest there have been modest increases in territories in the southern part of the AONB centred around Lydeard Hill. Modest declines have continued since 2006 in most squares north of Crowcombe (figs 18 & 19), balanced to some extent by a general increase in the southern part of the AONB.

Dartford warbler

UK status	BoCC4 Amber list (Eaton et al 2015). BTO Atlas: 70% increase in UK breeding population 1994-2006 (Balmer et al 2013). No national BBS data available.
SW status	No SW BBS data available.
Somerset status	Resident breeder, locally fairly common in some years but badly affected by hard winters. From c. 1989 to 2009 fairly common and increasing resident breeder; disappeared from most sites by 2009/10. Exmoor population – following a succession of warm winters the breeding population reached well over 30 pairs (SOS 2017) with Exmoor the most important site in Somerset. The population was badly affected by the winter of 2017/18, with only 1-2 pairs recorded in 2018 (SOS 2018).

Dartford warblers are insectivorous and undergo big population declines following harsh winters, even on lowland sites. The hard winter of 2010/11 saw a major decline on the Quantocks and there is no sign of recovery since peak numbers in 2006 when the core area for the population occurred in the northern part of the common. Any remaining birds will have been hit very badly by adverse weather in Feb-March 2018. Two probable territories were found in the Longstone Hill area (fig 20), one more than in 2012 but a long way from the peak count of 35 territories recorded in 2006 (fig 22). There were sightings of Dartford warblers after the 2018 survey period with a single bird on Longstone Hill in summer 2018 and a pair seen on Longstone/Pardlestone Hill in November 2018.

Redstart

UK status	BoCC4 Amber list (Eaton et al 2015). BTO Atlas: increasing in core areas, decreasing in range margins since 1988-91 Breeding Atlas (Balmer et al 2013). BBS trend: +15% in UK, +3% in England 1995-2017 (Harris et al 2018).
SW status	No SW BBS data available. Mainly confined to upland fringes including Dartmoor, Exmoor, Bodmin Moor and the Quantocks: • Exmoor population: declined by over 50% between early 1990s and 2008 (Sim et al 2016), increased by over 50% between 2008 and 2014 (Sim et al 2016). • Bodmin Moor: +47% 1984-2008, +7% 1999-2008 (Chown 2008).
Somerset status	Locally common migrant breeder (SOS 2017). Now largely confined to uplands particularly Exmoor and the Quantocks with smaller populations on Mendip and the Blackdowns (Ballance et al 2014).

Fig 24 shows the territory distribution of redstarts in 2018. Redstarts were recorded in low densities across the central and western side of the AONB, confined mainly to the fringes of the wooded combes. The species has shown a steady population increase since 2000, with an estimated 2018 population of 40 pairs, slightly down on the 2012 estimate of 44 pairs but this could be down to birds being missed in some of these areas. Overall the breeding population seems to be stable.

Fig 25 shows that increases in the AONB population since 2000 have occurred throughout the western and central parts of the AONB and that these apparently small increases in a large number of survey squares account for the significant increase in the AONB population overall over the past 18 years. Changes since 2006 have been relatively minor (figs 26 & 27), with small losses balanced by similar increases in other areas.

Whinchat

UK status	BoCC4 Red list (Eaton et al 2015). BTO Atlas: 47% range contraction in UK since 1970 and 57% population decline (Balmer et al 2013). BBS trend: -56% in UK, -48% in England 1995-2017 (Harris et al 2018).
SW status	No BBS SW England data (Harris et al 2018). Largely extinct in the lowlands apart from Salisbury Plain. Mainly confined to upland fringes including Dartmoor, Exmoor, Bodmin Moor and the Quantocks with declines at most monitored sites: • Salisbury Plain SSSI: -47.5% 2000-15 (Thompson Ecology 2015). • Exmoor: population decline 1992/3-2002 (Geary 2002) but stable 2008-14 (Sim et al 2016). • Dartmoor Training Area: -67.2% 2006-18 with 70.8% range contraction (Stanbury et al 2018). • East Dartmoor: 'possible decline' 1979-2016 (Booker & Rylands 2016). • Bodmin Moor: -88% 1984-2008, -78% 1999-2008 (Chown 2008).

Somerset status	Locally a fairly common migrant breeder, now almost entirely confined to Exmoor (SOS 2017). 62 territories recorded in 1992 on the Quantocks (Street 1992), now down to a small handful (Ballance et al 2014).

An estimated total of four pairs were recorded in 2018, the same number as in 2012, although this interpretation of data may still be over-optimistic. Fig 28 shows the distribution of whinchat records for 2018. These refer to a fledgling seen on the eastern side of Thorncombe Burrow on 17 May, a singing male on 19 June on the north side of Longstone Hill and a pair west of a singing male on the same day. A single bird seen on the western slope of Woodlands Hill on 5 May could have been passing through.

The 2018 figures are still significantly lower than the 22 pairs recorded in 2000 and 2006 and much lower than the total of 62 pairs seen in 1992. It seems there is no sign of recovery of the breeding population.

It is worth summarising the decline of this important red-listed species on the Quantocks. Since 1992 the core population has been focused on the northern common (58 pairs out of the AONB total of 62 pairs), adjacent to and north of Hurley Beacon. By 2000 this population had declined to 21 pairs (a 64% decline) with one pair remaining on Lydeard Hill. The population remained at c. 22 pairs in 2006 but by 2012 this had fallen to only four pairs on Longstone Hill, Black Hill, Thorncombe Hill and Weacombe Hill. Figs 29-31 show the change maps for whinchat since 2000 when the most recent population decline seems to have started.

Stonechat

UK status	BoCC4 Green list (Eaton et al 2015). BTO Atlas: most 1988-91 losses reversed with substantial eastwards expansion (Balmer et al 2013). BBS trend: +87% in UK, +86% in England 1995-2016 (Harris et al 2018).
SW status	No BBS SW England data (Harris et al 2018). Highest densities in uplands including Dartmoor, Exmoor, Bodmin Moor and the Quantocks: • Exmoor: increased by over 50% between early 1990s and 2008 and 27% increase 2008-14 (Sim et al 2016). • Dartmoor Training Area: -42.2% 2006-18 with 31.9% range contraction (Stanbury et al 2018). • East Dartmoor: 'strong increase' 1979-2016 (Booker & Rylands 2016). • Bodmin Moor: -21% 1999-2008 (Chown 2008).
Somerset status	Locally common resident or migrant breeder (SOS 2017). 90% of the Somerset breeding population occurs on the Quantocks and Exmoor, the remainder found on the Mendips and along the coast (Ballance et al 2014).

107 territories were recorded in 2018, down by 25% on 2012 but similar to 2006 (table 1). The 2012 estimate of 132 breeding pairs was the highest count since 1992 despite two previous hard winters (2009/10 and 2010/11). Fig 32 shows the distribution of territories in 2018. These were widely spread across open habitats within the AONB, especially on the northern part of the common, extending along the western slopes to Lydeard Hill. Compared to 2000, numbers were down by almost a third across the AONB with the biggest decline on the northern common.

In 2018 many stonechats began returning to the Quantocks when severe conditions set in. It seems likely that the number of pairs within the AONB would have been lower than in recent years as a result. It is therefore difficult to say what the background trend would have been for the AONB if the harsh weather had not arrived.

Fig 33 shows where changes in the number of breeding territories have occurred since 2000, reflecting an overall decline of c. 19% in the Quantock population. Some significant declines have occurred on the northern part of the Quantock Common, centred on Black Ball Hill and including Quantock Moor and the heathland above Hodder's and Holford Combes. There appear to have been declines across the southern heathland from Triscombe across to Aisholt Common, and Bagborough Hill to Lydeard Hill. There seem to have been some increases over this period as well in the far northern parts of the common, including the northern end of Black Hill, the western end of Longstone Hill, Weacombe Hill and squares to the north. A number of squares were not surveyed in 2000, which explains the lack of change data for parts of the western common around Crowcombe. Fig 35 shows that there have been declines since population recovery in 2012. These have been mainly in the Quantock Moor and Black Ball Hill area and survey squares to the north.

Wheatear

Seven wheatears were recorded during the survey (fig 36), all referring to probably passage birds. Breeding has never been proven on the Quantocks although there is a suspicion that they may have bred around the top of Smith's Combe in rabbit burrows (Brian Gibbs pers comm).

Meadow pipit

UK status	IUCN red list 'least concern' (www.iucnredlist.org). BoCC4 Amber list (Eaton et al 2015). BTO Atlas: 46% decline between 1970 and 2010 (Balmer et al 2013). BBS trend: -11% in UK, -17% in England 1995-2017 (Harris et al 2018).

SW status	BBS SW trend: -29% 1995-2017 (Harris et al 2018). Mainly an upland breeding species including: • Exmoor: slight decline (Stanbury 2008) but increased 79% 2008-14 (Sim et al 2016). • Dartmoor Training Area: -37.3% 2006-18 with 10.4% range contraction (Stanbury et al 2018). • East Dartmoor: population change unknown 1979-2016 (Booker & Rylands 2016). • Bodmin Moor: –21% 1999-2008 (Chown 2008).
Somerset status	A locally common resident and migrant breeder (SOS 2017). Regular breeding on Exmoor and the Brendons, the Quantocks, Bridgwater Bay coast, Somerset Levels, and the Mendip Hills (Ballance et al 2014).

As in 2012, the Quantocks breeding population appears to be stable, having fluctuated between 210 pairs in 2000 and 182 pairs in 2018, although these figures are significantly lower than the estimated 426 territories occupied in the 1992 survey. Meadows pipit remains the most abundant species on the Quantock Common, with numbers almost double that of skylark. Meadow pipit numbers across Somerset seems to have been generally lower following the Feb-March snow and this in part may explain the slightly lower counts in 2018.

Fig 37 shows the estimated distribution of meadow pipit territories in 2018. The species appears to be most common in the central and northern part of the AONB, showing a similar distribution to 2012. As in 2012, meadow pipit was not recorded on Aisholt Common.

Fig 38 shows the long-term change in distribution since 2000, indicating that the area around Quantock Moor east to Dowsborough, Woodlands Hill, and south from Hurley Beacon east to Robin Upright's Hill, have lost a number of meadow pipit territories, while the area north of Black Ball Hill has gained territories. Similarly, the southern part of the AONB has experienced a net loss of territories especially around Lydeard Hill. Fig 40 showing changes since 2012 suggests that further losses have occurred around Black Hill and several squares further north, with large increases on the south side of Thorncombe Hill and on Great Hill.

Tree pipit

UK status	BoCC4 Red list (Eaton et al 2015). BTO Atlas shows reductions in range and abundance across much of Britain (Balmer et al 2013). BBS trend: +3% in UK, -53% in England 1995-2017 (Harris et al 2018).
SW status	No BBS SW trend (Harris et al 2018). Mixed fortunes in SW uplands over the past four decades with many areas registering ongoing declines: • Exmoor: slight decline (Stanbury 2008), -2% 2008-14 (Sim et al 2016). • Dartmoor Training Area: population declined from five to one pair (80%) 2006-18 with 80% range contraction (Stanbury et al 2018).

	• East Dartmoor: apparent increase from 31-34 pairs to 102 pairs 1979-2016 (Booker & Rylands 2016). • Bodmin Moor: -50% 1999-2008 (Chown 2008).
Somerset status	An uncommon migrant breeder which has apparently decreased (SOS 2017). Now largely confined to Exmoor, Quantocks and the Brendons with a small number on the Mendip Hills (Ballance et al 2014).

60 tree pipit territories were recorded in 2018. This is significantly higher than the 39 recorded in 2012 suggesting recovery towards the 78 territories recorded in 2006 (table 1), although the population remains at about two thirds of this total. This is still a long way short of the estimated 142 territories recorded in 1992.

Fig 41 shows the distribution of tree pipits in 2018 and confirms that this is a locally common species within the AONB, associated with scrub close to the woodland edge. In 2018 most breeding pairs were found in three separate areas: a northern group around Stowborrow Hill, West Hill and the open heathland above Smith's Combe; a north-central group centred on Robin Upright's Hill; and a southern group centred on Wills Neck and Lydeard Hill. There were a few outlying pairs around Merridge Hill and Broomfield Hill. Robin Upright's Hill and Wills Neck appeared to support the largest number of territories.

Fig 42 shows the change in the number of breeding territories since 2000, highlighting the increase in territories to 2018. This includes notable increases in the Robin Upright's Hill area and in the Wills Neck, Aisholt Common and Lydeard Hill area, where some of the increase is probably associated with new areas of clearfell. Increases since 2012 (fig 44) are reflected in higher counts in the same general areas.

Linnet

UK status	BoCC4 Red list (Eaton et al 2015). Very widespread in UK but declining everywhere except Ireland (Balmer et al 2013). BBS trend: -17% in UK, -18% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW trend: -12% 1995-2017 (Harris et al 2018): Exmoor: increase by >50% early 1990s–2008, 21% increase 2008-14 (Sim et al 2016). Dartmoor Training Area: population declined from 42 to 14 pairs (66.7%) 2006-18 with 75% range contraction (Stanbury et al 2018). East Dartmoor: increased 1979-2016 (Booker & Rylands 2016). Increasing on Bodmin Moor (Booker 2014).
Somerset status	Fairly common resident and migrant breeder in upland, inland lowland and coastal areas (SOS 2017). Generally agreed that numbers have declined since the 1970s, though remains widespread (Ballance et al 2014).

On their breeding grounds, linnets are active over large areas so it can be difficult to identify territories with a high degree of confidence. An estimated 168 pairs were located in 2018, a total count about mid-way between the 2006 total of 140 pairs and the 2012 total of 197 pairs. The 2018 data suggests that there has been a decline of about 15% since 2012 although there is likely to be a high margin of error in these figures.

Fig 45 shows the distribution of territories in 2018. Linnet is a widespread breeding species throughout the AONB with good numbers especially in the north and central areas, including the western heathland areas around Great Hill and Wills Neck.

Fig 46 illustrates the change in territories between 2000 and 2018, suggesting that increases in counts are largely due to higher numbers in the northern half of the AONB. Localised declines were recorded around Black Hill and Dowsborough and further south around Lydeard Hill. Fig 48 suggests that recent declines in counts between 2012 and 2018 is largely due to a fall in numbers in the northern half of the AONB with some observed increases around Wills Neck and the open heath south-east of Great Wood.

Lesser redpoll

UK status	BoCC4 Red list (Eaton et al 2015). BTO Atlas shows reductions in breeding abundance across much of range (Balmer et al 2013). BBS trend: +34% in UK, -13% in England 1995-2017 (Harris et al 2018).
SW status	No BBS SW trend (Harris et al 2018). Exmoor: +24% 2008-14 (Sim et al 2016). Increasing on north Dartmoor (Stanbury 2006). East Dartmoor: unknown change 1979-2016 (Booker & Rylands 2016). Increasing on Bodmin Moor (Booker 2014).
Somerset status	Uncommon resident breeder mostly on upland area including Exmoor, the Brendons and the Quantocks (SOS 2017). The bulk of the Somerset breeding population is on Exmoor, with an apparently stable population on the Quantocks (Ballance et al 2014).

Lesser redpoll is not strongly associated with open heathland on the Quantocks but breeding territories do occur. 2012 was the first time this species had been surveyed, with 25 territories recorded. In 2018 only a single territory was recorded, on Robin Upright's Hill (fig 49). This is surprising considering the numbers previously recorded and it is difficult to know if this represents a genuine decline within the AONB. There seems to be good breeding habitat throughout large parts of the site, especially in areas such as Hare Knaps.

Yellowhammer

UK status	BoCC4 Red list (Eaton et al 2015). BTO Atlas shows reductions in breeding abundance across much of range. BBS trend: -21% in UK, -30% in England 1995-2017 (Harris et al 2018).
SW status	BBS SW trend: -23% 1995-2017 (Harris et al 2018). Exmoor: +15% 2008-14 (Sim et al 2016). Increasing on north Dartmoor (Stanbury 2006). Dartmoor Training Area: population declined from 25 to 6 pairs (76%) 2006-18 with 72.2% range contraction (Stanbury et al 2018). East Dartmoor: increase 1979-2016 (Booker & Rylands 2016). Increasing on Bodmin Moor (Booker 2014).
Somerset status	Locally common resident breeder, generally decreasing (SOS 2017). Most common in upland areas especially Exmoor, the Brendons and the Quantocks with smaller number on the Blackdowns (Ballance et al 2014).

The 2018 survey recorded a marked decline in the number of yellowhammer territories from 177 in 2012 to 103 in 2018. This may in part have been due to the adverse weather conditions in late February and early March, but species such as yellowhammer probably fare better in these conditions than insectivores such as stonechat and Dartford warbler. This decline follows three successive increases in the Quantock population since 2000 and represents a 42% decline since 2012.

Fig 50 shows the 2018 distribution of yellowhammer territories, confirming that it remains a widespread species in open habitat across the AONB, especially in the northern common but also around Lydeard Hill and further south down to Cothelstone Hill and Broomfield Hill. There was a noticeable absence of birds in the Dowsborough/Woodlands Hill area.

Fig 51 illustrates changes in the number of territories for the period 2000-18, during which the overall number of territories increased, largely due to increases in the far north of the AONB and around Lydeard Hill.

Fig 53 is perhaps most important change map for yellowhammer, covering what appears to have been a period of major decline in breeding territories between 2012 and 2018. The map suggests that this has been widespread and not confined to one geographical area, although the biggest declines seem to have taken place in the northern part of the Quantock Common where the most territories were recorded. In addition, previously important areas in the south around Lydeard Hill, Cothelstone Hill and Broomfield Hill all seem to have experienced declines. A small number of squares showed modest increases in numbers although these may not be significant.

4 Discussion

4.1 Summary of changes 2012-18

With the publication of BoCC4, whinchat has been red-listed alongside cuckoo, skylark, grasshopper warbler, tree pipit, linnet, lesser redpoll and yellowhammer. The Quantock Hills have become even more important for these increasingly vulnerable and declining species.

The survey showed that of the seven red-listed species:

- Cuckoo seem to be stable or increasing.
- Skylark numbers have declined by a third.
- Whinchat numbers remain at an all-time low with no signs of recovery.
- Tree pipit numbers increased by almost 50% in the equivalent 2000 survey squares and the total count approached the recent maximum (78 pairs in 2006).
- Linnet numbers remain fairly high but were down by about 15% on 2012. Given the margin of error in detection between survey years, it is likely that the breeding population remains relatively stable.
- Lesser redpoll is a mystery with only one recorded territory in 2018.
- Yellowhammer have declined by 42% since 2012 and in 2018 were at their lowest number since 2000.

The decline of skylark and yellowhammer was in contrast to the trend up to 2012 which suggested that these two species were both increasing in the AONB. Both species rely in winter on farmland at lower altitude. Yellowhammer in particular is also thought to rely on surrounding farmland during the breeding season for invertebrate food, with many breeding territories close to or within range of the network of enclosed fields and hedgerows surrounding common land.

Of the five amber-listed species:

- Willow warbler numbers appear to be stable.
- Dartford warbler remains at 1-2 pairs with no signs of recovery.
- Redstart numbers appear to be relatively stable.
- Meadow pipit numbers appear to have declined slightly with10% fewer territories than in 2012. Given the margin of error in detection between survey years, it is likely that the breeding population remains relatively stable.

Of the four green-listed species:

- Garden warbler seemed to have declined significantly, although any real decline is likely to have been masked by a poor breeding season in Somerset as a whole.
- Whitethroat declined by about 22% following previous increases, but again, any real decline is likely to have been masked by a poor breeding season in Somerset as a whole.
- Stonechat numbers declined by 19% as part of a long-term decline since 2000. There is undoubtedly a poor-weather effect involved for this species, although it is difficult to be sure how much this has affected the breeding population.

4.2 Interpreting changes in target species

Although there is broad understanding of the habitat needs of upland birds, there is still more to learn about how they are affected their environment (Pearce-Higgins et al 2009). Heathland, acid grassland, wet flushes, scrub and woodland edge provide a mix of open habitats for a range of birds in the Quantocks AONB. So does enclosed farmland close to the Quantocks Common, and it is likely that species such as yellowhammer feed in these areas during the breeding season, while in winter resident birds feed on stubbles and game crops at lower altitudes. The section below identifies some of the key findings from the 2018 survey.

Cuckoo numbers remain healthy on the Quantocks. This is likely in part to the continued abundance of meadow pipits, their main host species, and points also to the ready availability of larger moth caterpillars which are important for both adults and young. Cuckoos remain widely dispersed across heathland and grassland habitats throughout the AONB which suggests that there remain plenty of suitable vantage points for calling birds. Research into cuckoo breeding ecology on Dartmoor by Exeter University, the BTO and the RSPB should provide further guidance to how open habitats within upland areas can be managed for them.

Skylark remains one of the commonest open habitat species within the AONB, although the sharp drop in numbers between 2012 and 2018 is a cause for concern which is unlikely to be due entirely to poor winter/early spring weather. It is the typical species of open heathland and grassland with the male song flight one of the most evocative sounds of open moorland in early spring and summer especially on level land.

It is difficult to be certain about the causes of the decline in numbers since 2012. Reduced structural diversity of plateau grassland within the AONB is a possible factor: skylark like a varied sward structure to include a mix of short (0-15 cm) and medium height vegetation (up to 30 cm), favouring non-Molinia grassland (Sim et al 2016). They also tend to decrease in areas which have been re-wetted although this is unlikely to be a problem for them in the Quantocks. Reduced sward diversity can occur through overgrazing or too much swaling and bracken control which encourage bare ground and short swards It also occurs where there is widespread undergrazing. Feedback from experienced field workers suggests that widespread changes to sward structure across the AONB are unlikely to have happened since 2012. More detailed investigation is recommended to see if there might be a correlation between skylark numbers and type/intensity of management intervention, especially in areas which seem to have suffered the greatest reductions in breeding territories.

Other factors may have played a role in the reduction of skylark numbers between 2012 and 2018, including longer-term changes in winter food availability on farmland at lower altitudes which could have impacted survival of breeding birds. The additional effects of hard winters and short-term influences such as the weather conditions in spring 2018 may also have played a part.

Whitethroat is an important species of open scrub within the AONB and favours open hillsides particularly along the western edge of the site. Numbers within the northern part of the AONB may have dropped slightly since 2012, perhaps due to the poor spring weather along migration routes in 2018. However, as with Dartford warbler and whinchat (below), it may be worth looking more closely at whether scrub management in some areas may have contributed to a reduction in the number of breeding territories.

Dartford warbler is a resident species on the Quantocks and is dependent on stands of up to 2 ha of mature gorse with heather species which support a high biomass of spiders and other invertebrate food all year round and provide effective cover in cold weather. Dartford warbler is classified as ‘near threatened’ on the IUCN’s red list (www.iucnredlist.org). With predicted changes in the climate, it is likely that conditions on important heathlands such as the Quantock Common will become increasingly favourable for this species, despite its current vulnerability to harsh winters. It is worth looking more closely at how this habitat within the AONB is currently managed, especially in the remaining core breeding area around Longstone Hill on the northern part of the Common.

Whinchat is associated with longer vegetation with song perches usually on bracken, heather or small hawthorn trees or other scrub. In recent years they have occurred in areas with heavy bracken growth sometimes interspersed with gorse on the Quantocks. Unlike Exmoor the Quantocks has very few areas of cotton grass mire which is where whinchats are often found.

The decline in whinchat on the Quantocks is in contrast to Exmoor, and it seems likely that overgrazing, extensive bracken control and swaling impacted breeding habitat up to 2012 (Booker 2014). The top of Halsway Combe and Hill traditionally supported two or three pairs of whinchat but this area is now mostly well-grazed rough grassland and the habitat is now unsuitable for them to breed (Brian Gibbs pers comm). It would be helpful to review changes in management intervention in core breeding areas up to 2018, and to consider how the recovery of suitable areas of habitat for whinchat might be achieved.

Stonechat is strongly associated with stands of mature gorse and other low scrub interspersed with heathland and rough grassland. There is little information on what happens to the Quantocks population in winter, although it is likely that some birds move to lower ground especially along the coast and others may migrate in the autumn onto the continent. Stonechat is another species which is hit hard by poor winter conditions. There is some concern that the long-term decline in this species on the Quantocks and the further decline since 2012 might be linked to loss of suitable areas of scrub on the open heath, notwithstanding the effects of hard winters. As with other scrub-dependent species, it would be useful to review how gorse and other scrub is managed in the AONB, and to consider how the recovery of suitable areas of habitat for stonechat might be achieved.

Meadow pipit is one of the most important heathland bird species within the AONB although it is still relatively abundant in open habitats. It is classified as globally of ‘least concern’ on the IUCN’s red list (www.iucnredlist.org). Overall, the AONB population seems to have remained relatively stable since 2012, which is encouraging, although it is very difficult to get accurate counts of breeding birds. There is some evidence that meadow pipits decline following hard winters and it is possible that the Quantocks population was hit to some extent by the late winter snow, which may explain the slightly lower counts in 2018. They are sensitive to overgrazing, utilising a patchwork of grassland, mires, lowland and upland heathland and blanket bog, especially where there is good heterogeneity in vegetation height and structure. This is a key species within the AONB and an important indicator of the wider health of heathland and grassland habitats. It is important therefore that meadow pipit numbers continued to be monitored as part of the six-year survey cycle for heathland birds.

Tree pipit requires scattered trees on the heathland squares where it occurs, very often on sloping ground. The breeding population seems to have increased significantly since 2012, which is welcome. However, some surprise was expressed by experienced AONB fieldworkers at the upward trend in numbers. Given the importance of the Quantocks population therefore it would be worth continuing sample counts between official surveys to check whether the population is genuinely being maintained or increasing. It may also be worth looking more closely at the distribution of breeding territories in relation to areas of suitable habitat on the ground, especially the availability of tall scrub.

Lesser redpoll can utilise areas of mature gorse and broadleaved scrub although they are largely confined to areas of broadleaved and conifer plantation. Like tree pipit, it would be worth continuing sample counts annually to understand more clearly what might be happening to the Quantocks population, especially in open habitats. This could be particularly important given how few lesser redpolls were recorded during 2018.

Yellowhammer decline in the Quantocks since 2012 is a cause for great concern. In many of the northern common survey squares a lot of territories were in combes and the moorland fringe on the lower slopes of the hills where they nest in gorse and other dense scrub. Here birds include adjoining farmland as part of their feeding range (Brian Gibbs pers comm). If this is a common feature in other parts of the AONB then the availability of invertebrate-rich grassland and scrub off the Quantock Common is a critical feature which needs to be maintained. In addition, the maintenance of suitable areas of gorse and other scrub is essential to provide safe nesting sites, as well as areas of open, invertebrate-rich grassland on the common itself and it is worth reviewing management interventions in squares which have experienced the greatest reductions in the number of yellowhammer territories.

Another factor affecting breeding numbers might be the availability of winter foraging areas, as with other species. Yellowhammers move away from the Quantocks in winter but it is not clear how far they go. There is good evidence of yellowhammers overwintering on winter stubbles and game cover crops around Lilstock and Knighton. These flocks presumably include breeding birds from the Quantocks. Studies elsewhere suggest that breeding distribution of yellowhammer is linked to nearby wintering habitats (Whittingham et al 2005), and there is evidence that some birds move less than 10 km from their breeding territories (eg Paradis et al. 1998). The availability of suitable winter feeding areas for local yellowhammers is therefore also something which the AONB partners could investigate further, and if necessary work with other partners to secure more feeding opportunities within range of the AONB.

5 Recommendations

The extensive area of heathland mosaic within the AONB, combined with woodland edge and scrub habitat, remains of great importance for heathland birds, many of which have been lost from much of the wider countryside in Somerset and elsewhere in the UK.

Maintaining and where possible increasing the populations of these species is closely linked to land management within the AONB, primarily through livestock grazing, swaling and scrub and bracken management. The challenge within the AONB is to continue to maintain and in some cases enhance and recover these habitats as part of the wider management responsibilities of the AONB Partnership.

Recommendation 1: review major management interventions and habitat change on the Quantock Common and other areas of open habitat within the AONB since 2000 to assess their likely impacts on target bird populations, especially skylark, whitethroat, stonechat, linnet and yellowhammer. Where necessary review the AONB Management Plan to ensure improved targeting of grassland and especially heathland and scrub management and restoration for these species.

Recommendation 2: for Dartford warbler and whinchat, similarly review management interventions and habitat change around the Longstone Hill area since 2000. Develop and implement a specific management plan for these two species on the northern half of the Quantock Common, to be included in future revisions of the AONB Management Plan. Consideration should be given to integrating rotational gorse, heather and bracken management for these two species with wider management objectives and related interventions including swaling. Given the perilous state of the Dartford warbler population in Somerset currently, it is vital that remaining areas of suitable gorse are conserved for this species. Similarly for whinchat it is vital that any bracken management programme takes full account of the needs of this species.

Recommendation 3: review the suitability of enclosed farmland within the AONB and within a 5 km buffer for breeding and wintering birds, especially skylark, meadow pipit, linnet and yellowhammer. Seek to work with landowners to ensure sufficient areas of insect-rich summer pasture, weedy winter stubbles and winter wild bird cover within these areas. This would help support the AONB breeding populations of these important species.

Recommendation 4: continued regular monitoring is vital in identifying long-term trends in the number and distribution of target heathland birds so that the impact of management intervention and climate change can be assessed. Continue a six-yearly monitoring cycle of target species within the AONB. For skylark, whitethroat, Dartford warbler, whinchat, stonechat, tree pipit, lesser redpoll and yellowhammer annual monitoring of sample squares is also recommended. Outputs from these surveys should be shared widely with land owners and managers and local communities.

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Appendix 1: Survey instructions & recording forms

QUANTOCK HILLS AONB HEATHLAND BREEDING BIRD SURVEY 2018
FIELD RECORDING FORM

KM SQUARE						

VISIT 1 SURVEYOR		VISIT 1 DATE	
VISIT 2 SURVEYOR		VISIT 2 DATE	

MAP OF KM SQUARE. Please use black ink for Visit 1 records and blue ink for Visit 2 records.

cut up tetrad from OS 1:25,000 map (if printed in time)
or OS 1:50,000 to be glued here

SPECIES TO RECORD

Cuckoo (CK), Skylark (S.), Willow warbler (WW), Grasshopper warbler (GH), Garden warbler (MG), Whitethroat (WH), Dartford Warbler (DW), Redstart (RT), Whinchat (WC), Stonechat (SC), Wheatear (W.), Meadow pipit (MP), Tree pipit (TP), Linnet (LI), Lesser Redpoll (LR), Yellowhammer (Y.)

QUANTOCK HILLS AONB HEATHLAND BREEDING BIRD SURVEY 2018

SUMMARY RECORDING FORM

KM SQUARE						

SPECIES	EVIDENCE OF BREEDING			
	Po	**Pr**	**Co**	**Total**
Cuckoo				
Skylark				
Willow warbler				
Grasshopper warbler				
Garden warbler				
Whitethroat				
Dartford warbler				
Redstart				
Whinchat				
Stonechat				
Wheatear				
Meadow pipit				
Tree pipit				
Linnet				
Lesser redpoll				
Yellowhammer				

ADDITIONAL RECORDS/NOTES/OWNERSHIP DETAILS IF KNOWN ETC

QUANTOCK HILLS AONB HEATHLAND BREEDING BIRD SURVEY 2018

SURVEY METHOD

The basic unit of fieldwork is the 1 km square on the OS national grid.

Within the square, only areas of open moorland are to be surveyed, using the published methodology for recording stonechats and Dartford warblers:

- Devise a route that takes you within 50m of every part of the moorland within the square and mark this route on the map.
- The survey consists of two visits, following the same route each time.
- The first visit should take place between the beginning of April and mid May; the second between mid May and the end of June. Surveys should be undertaken in the early morning on calm, dry days.

FIELD RECORDING FORM

Please use the field map. Record all your observations of the selected species onto this map, noting breeding behaviour, using the atlas codes below. Use black ink for the first visit and blue ink for the second visit.

SUMMARY RECORDING FORM

Please complete the separate summary recording form as soon as possible after each visit specifying for each species, whether breeding is possible, probable or confirmed.

ATLAS CODES (summary of observations)		Evidence of breeding
✓	Present in breeding season in possible nesting habitat	Possible breeding (Po)
P	Pair observed in suitable nesting habitat	Probable breeding (Pr)
S	Singing male	Pr
T	Territorial behaviour	Pr
D	Courtship and display.	Pr
N	Adult visiting probable nest site	Pr
BB	Carrying nesting material	Pr
A	Agitated behaviour/anxiety call/distraction display	Confirmed breeding (Co)
FL	Recently fledged young	Co
FY	Adult carrying food	Co

Appendix 2: Species diversity & abundance maps

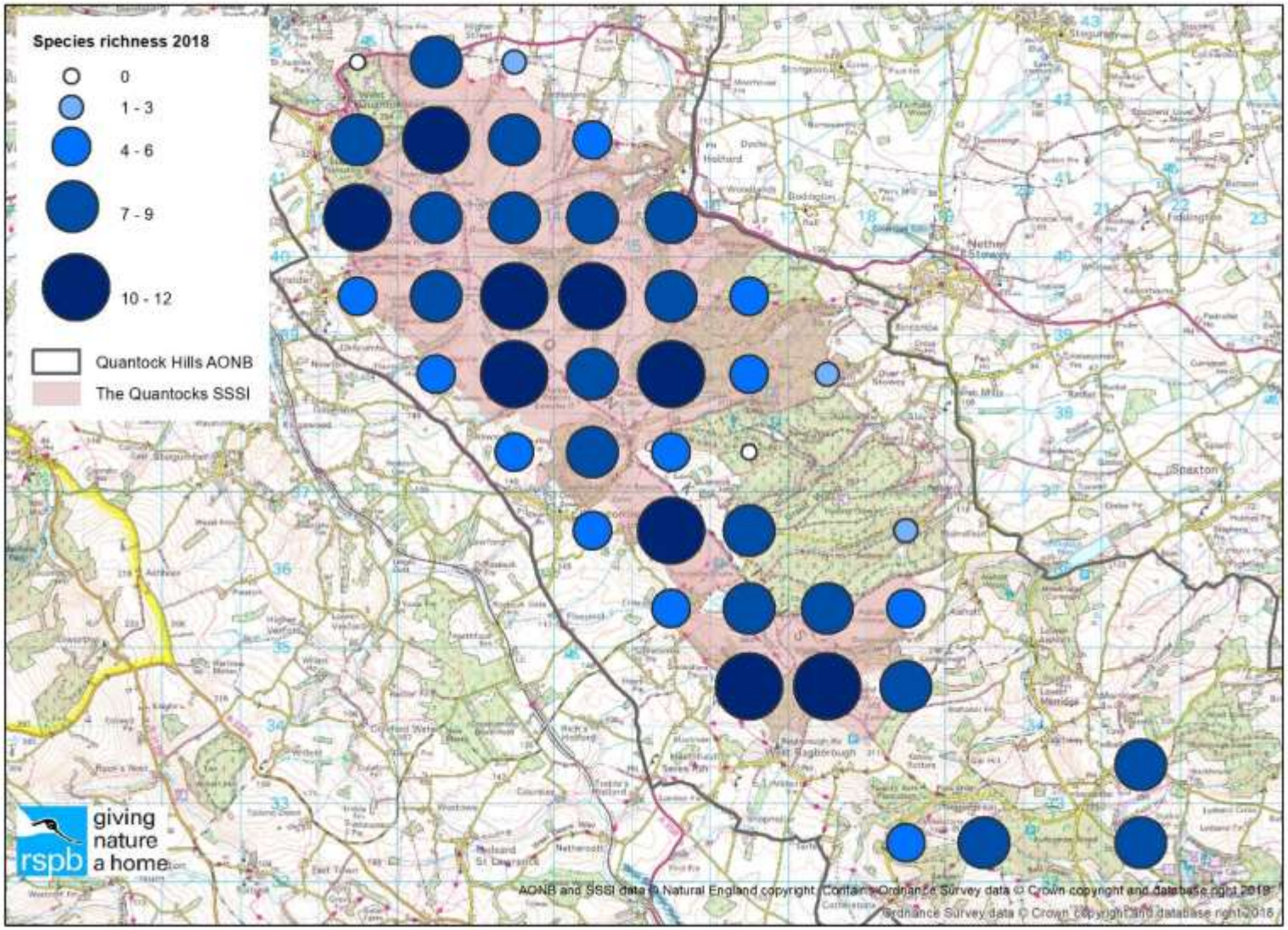

Fig 1 – number of target species recorded per survey square

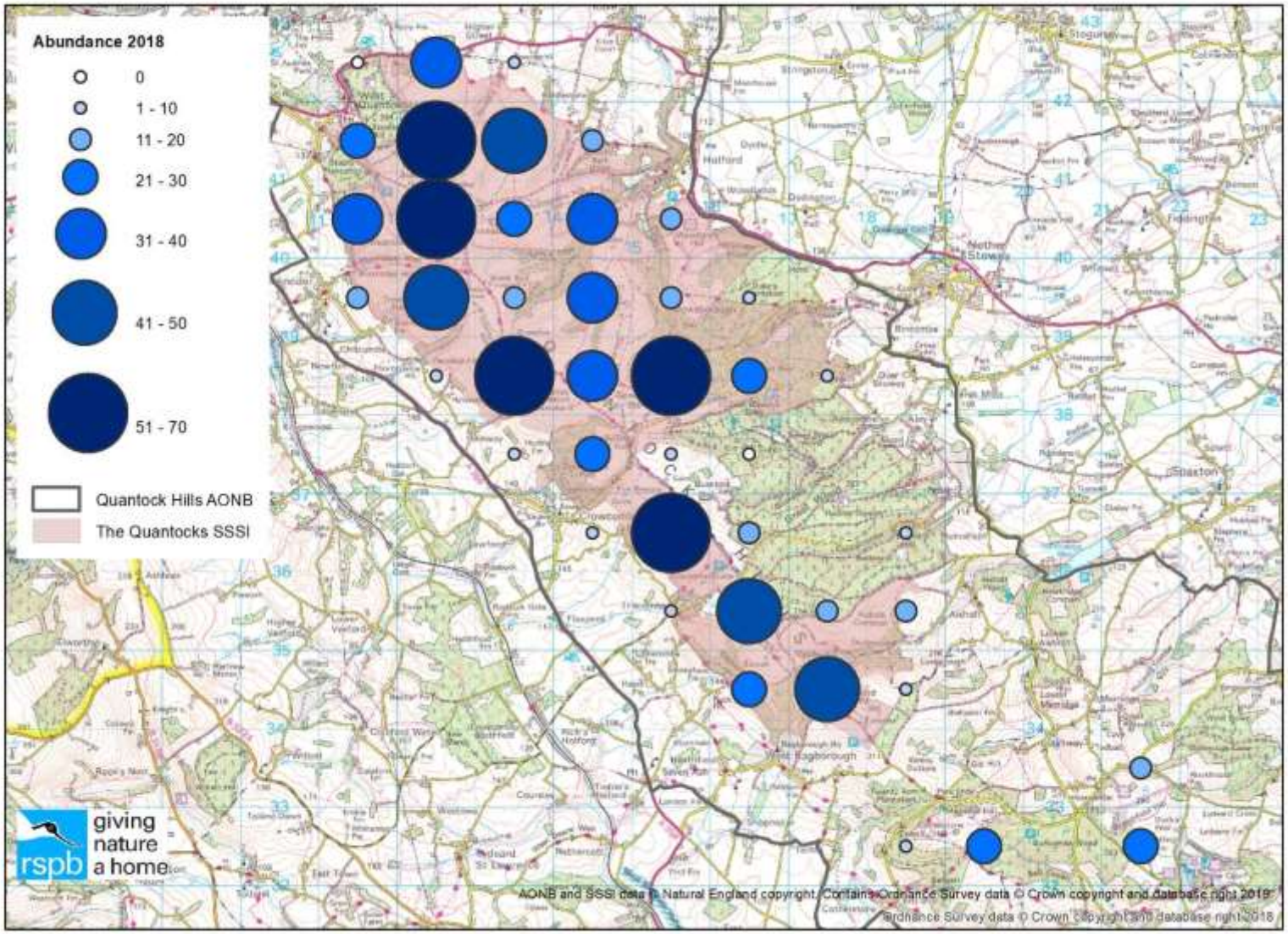

Fig 2 – combined target species counts by survey square

Appendix 3: Species distribution & population change maps

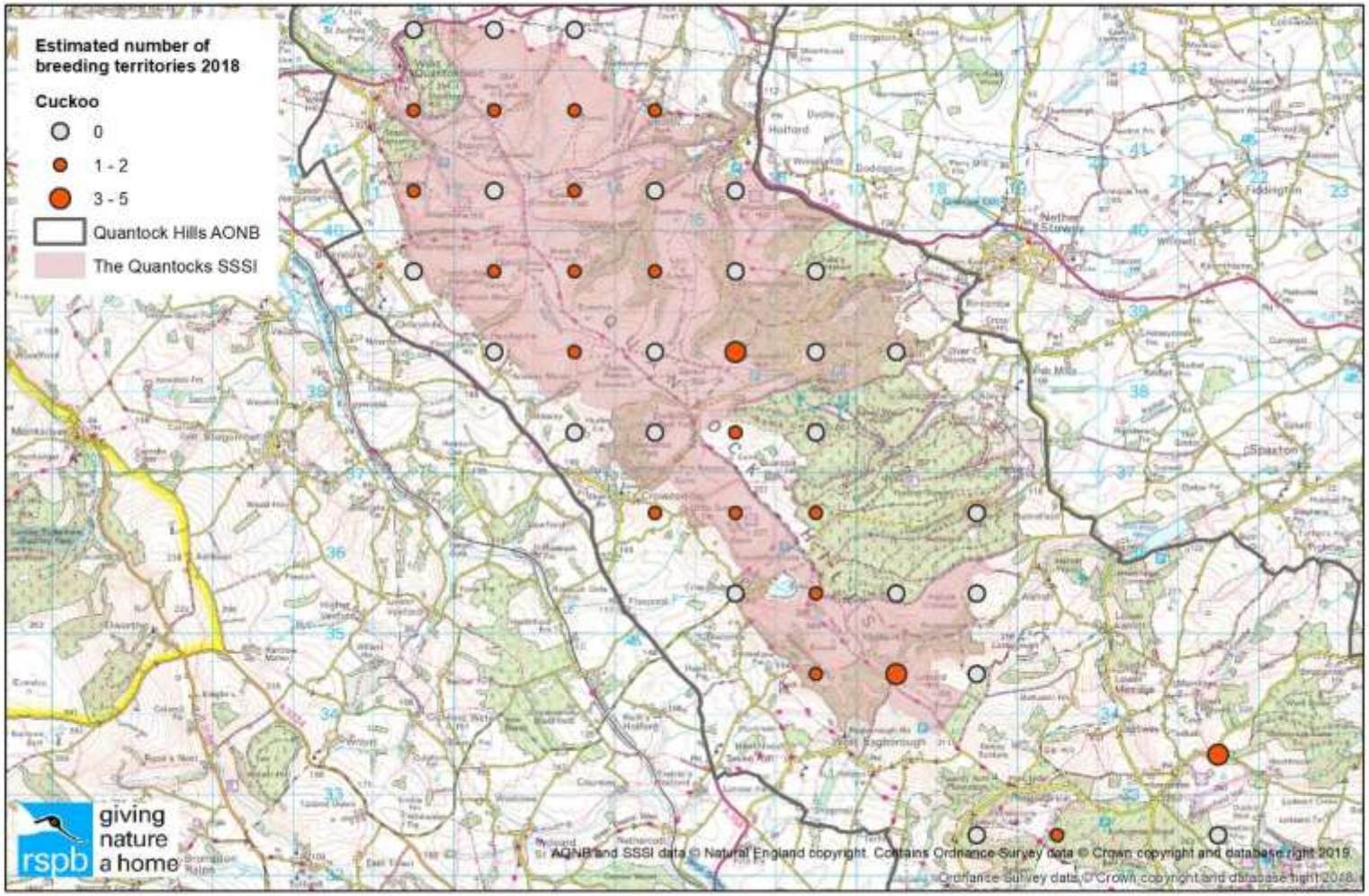

Fig 3 –cuckoo breeding territories distribution 2018

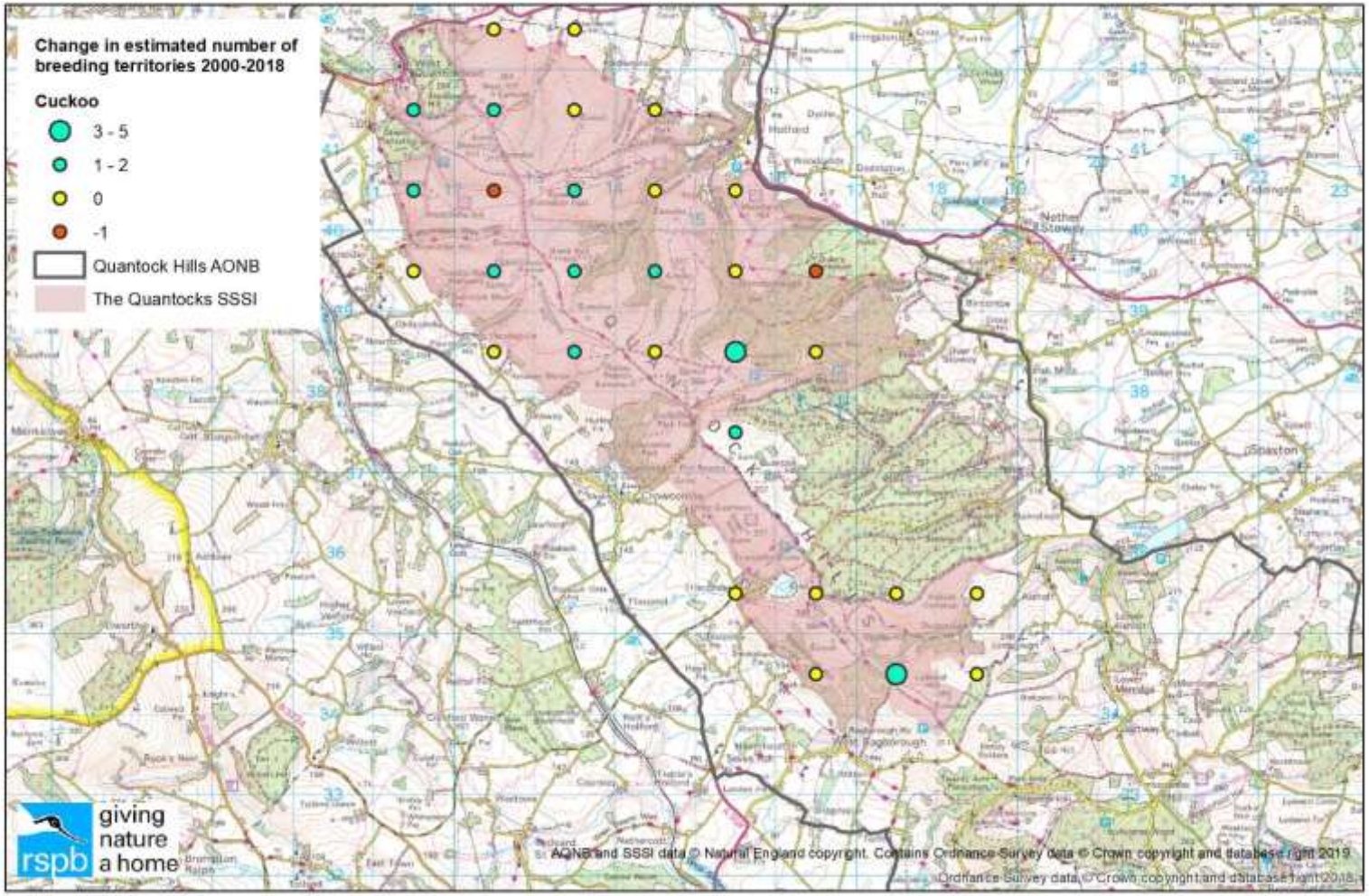

Fig 4 – cuckoo breeding territories change 2000-2018

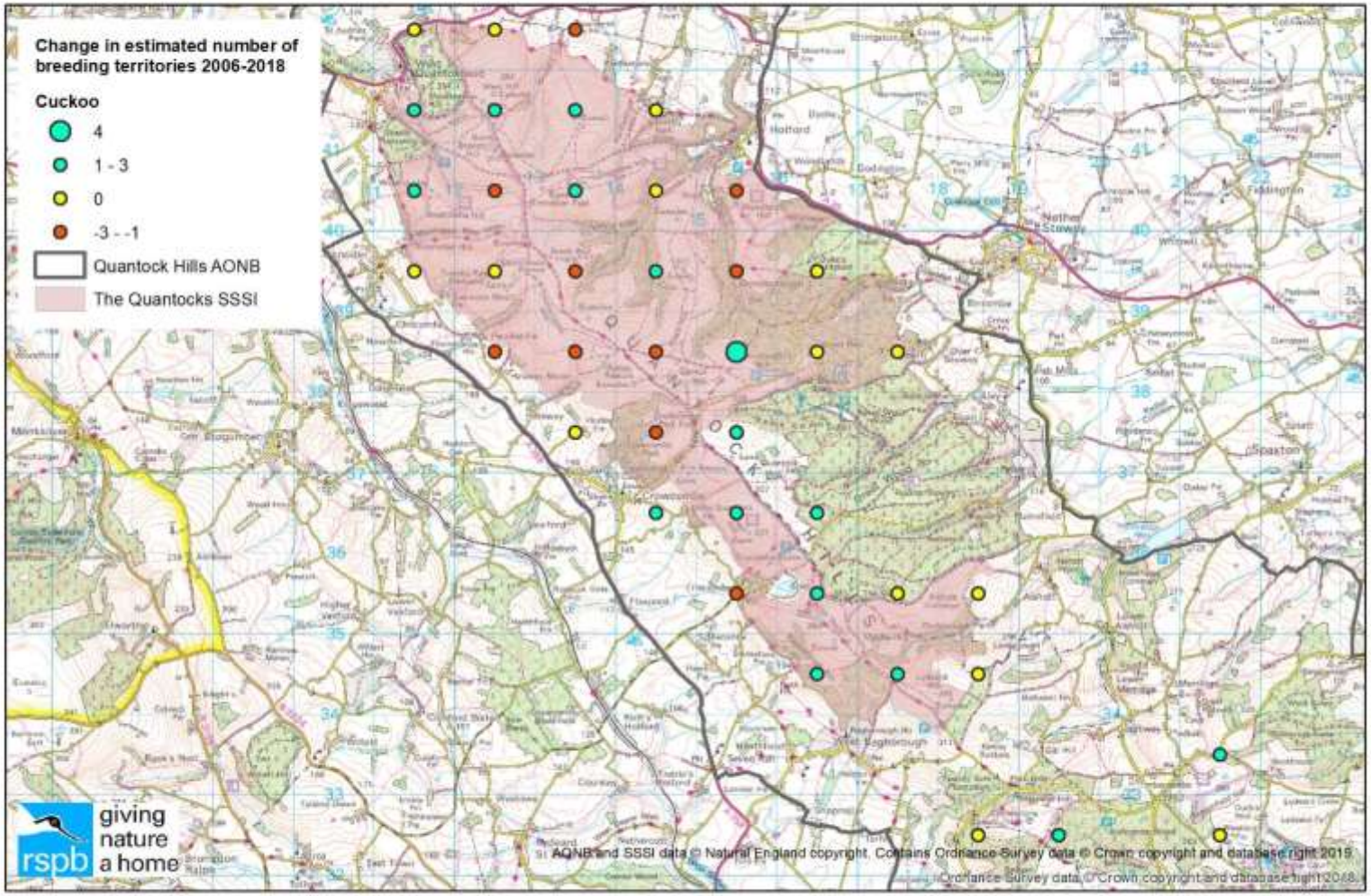

Fig 5 – cuckoo breeding territories change 2006-2018

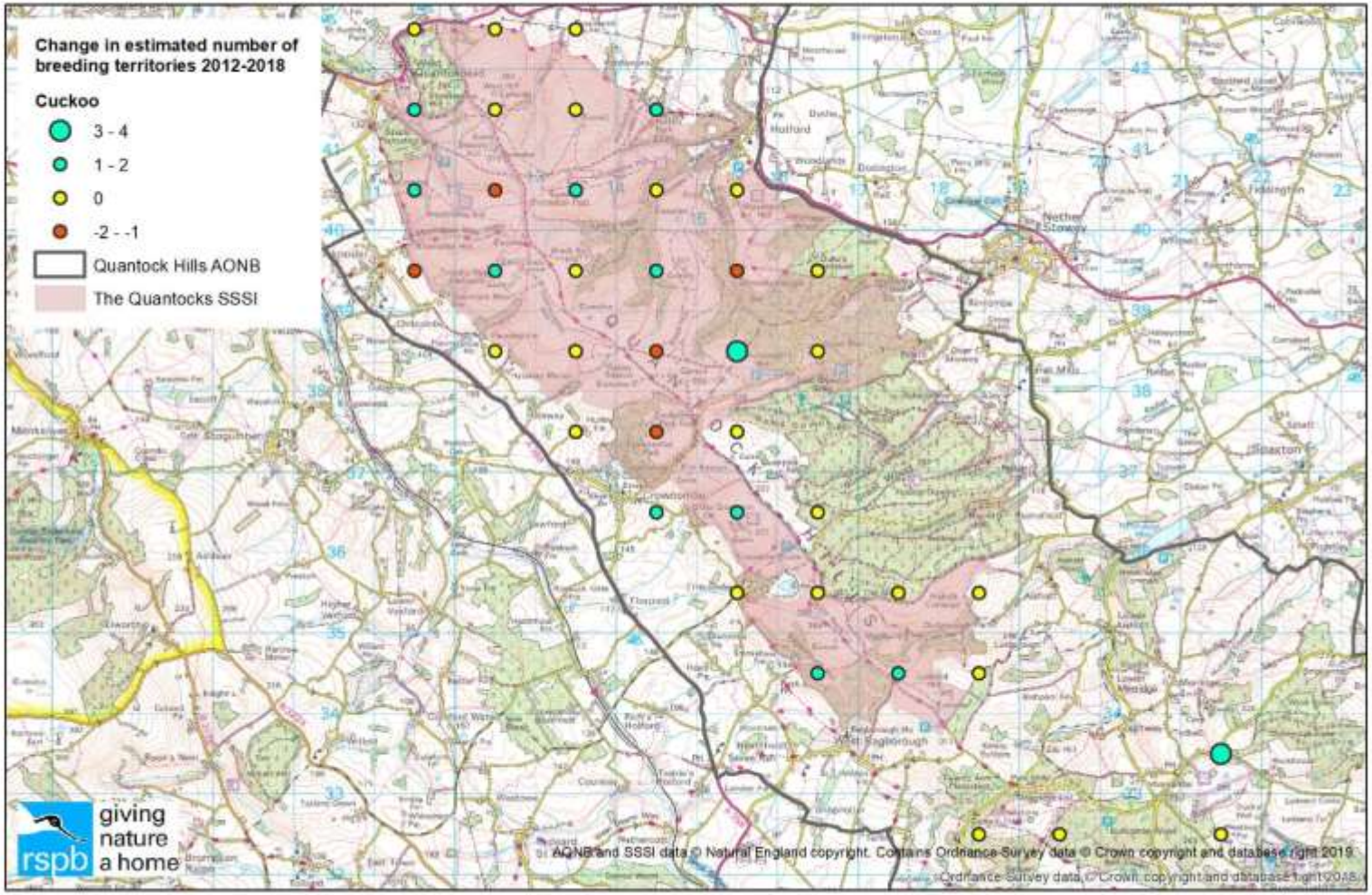

Fig 6 – cuckoo breeding territories change 2012-2018

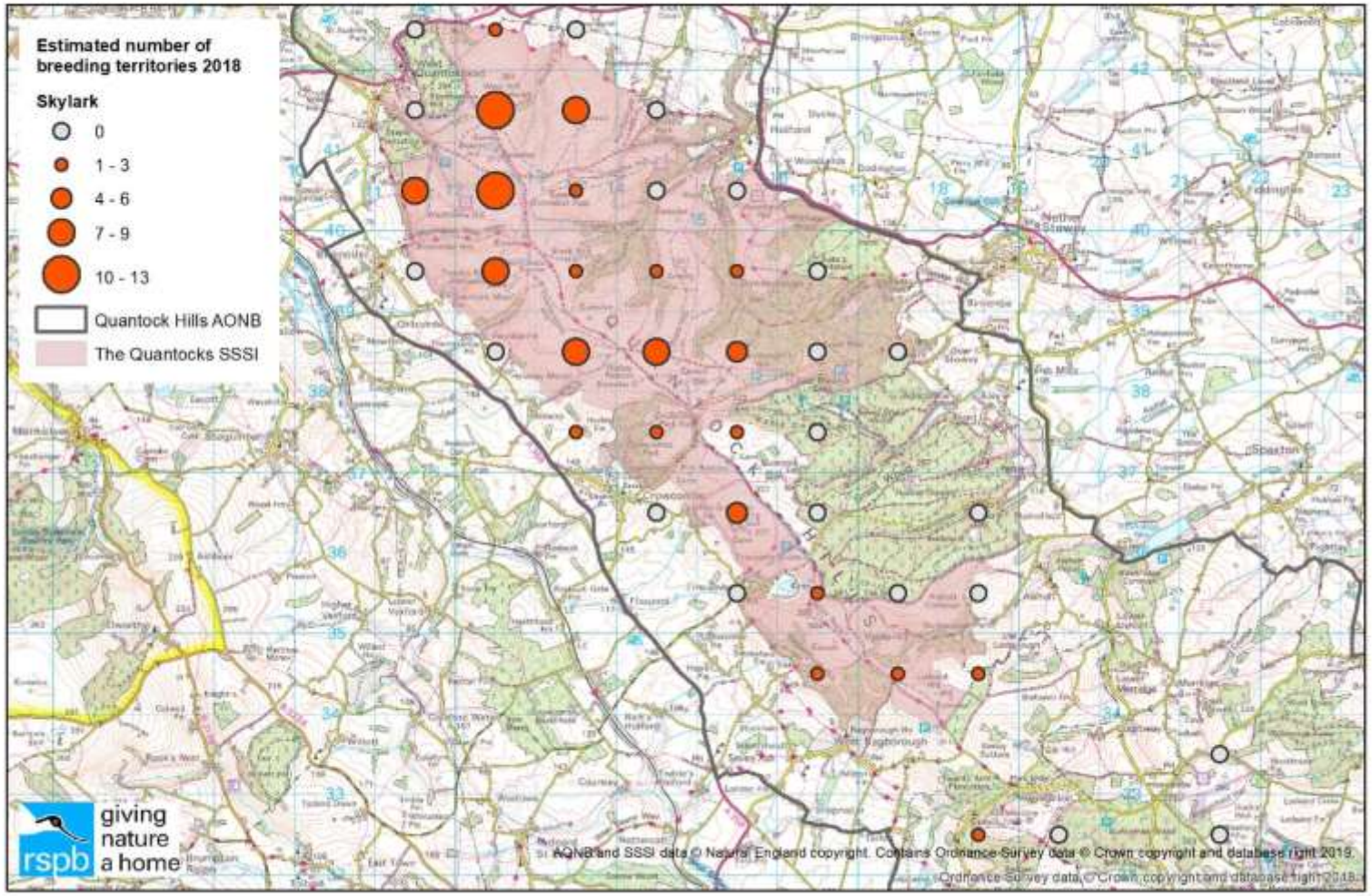

Fig 7 –skylark breeding territories distribution 2018

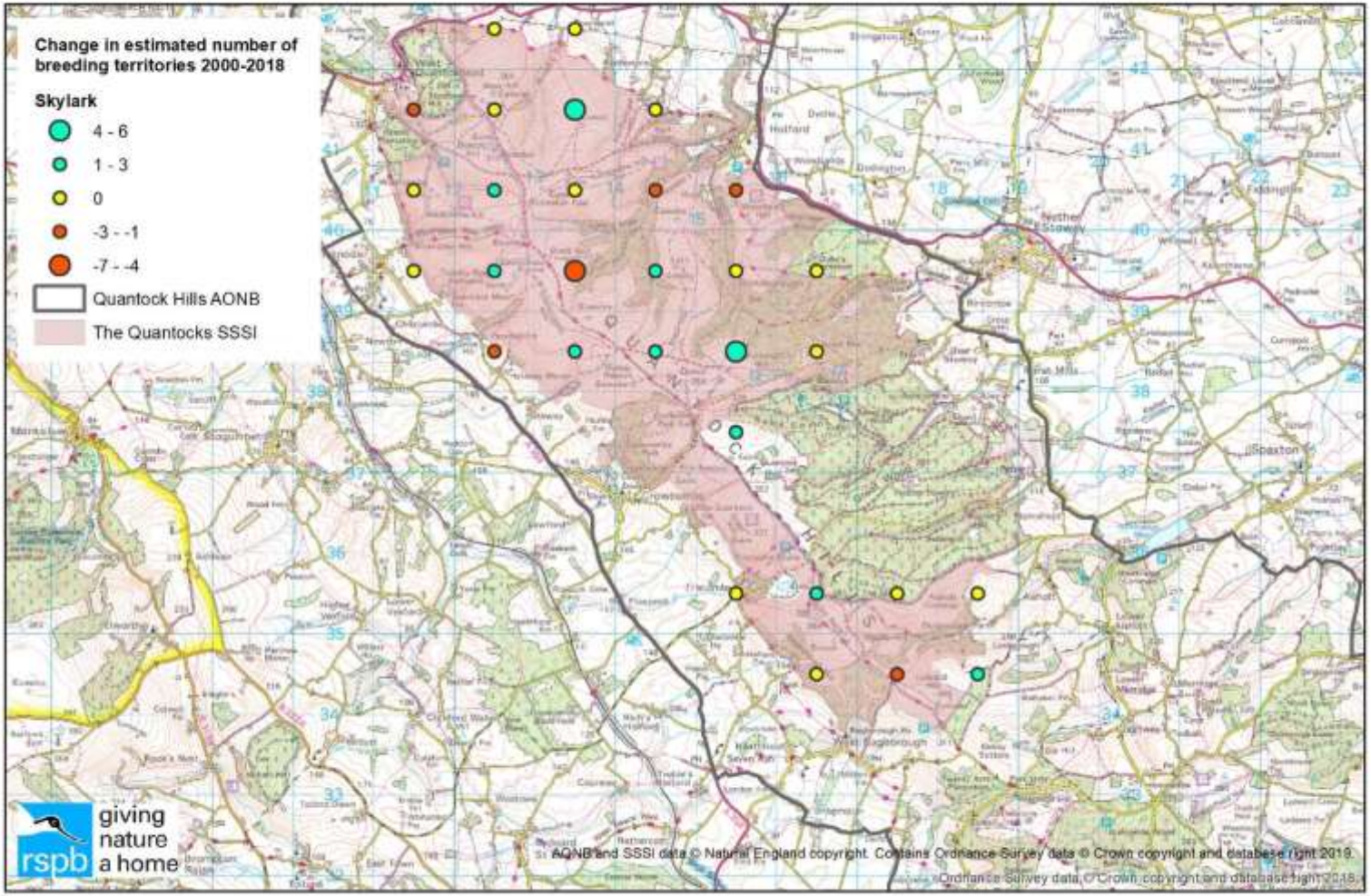

Fig 8 – skylark breeding territories change 2000-2018

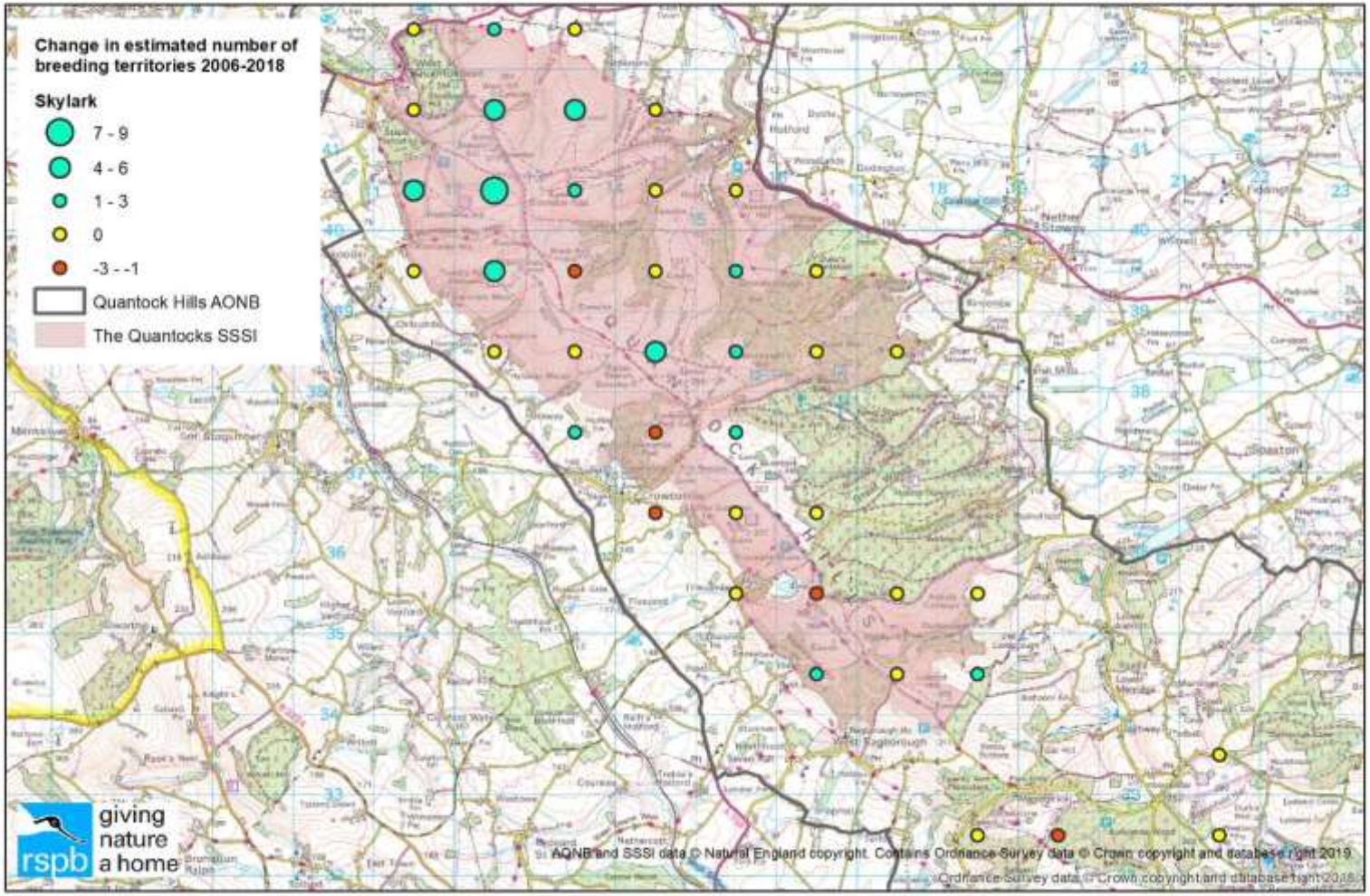

Fig 9 – skylark breeding territories change 2006-2018

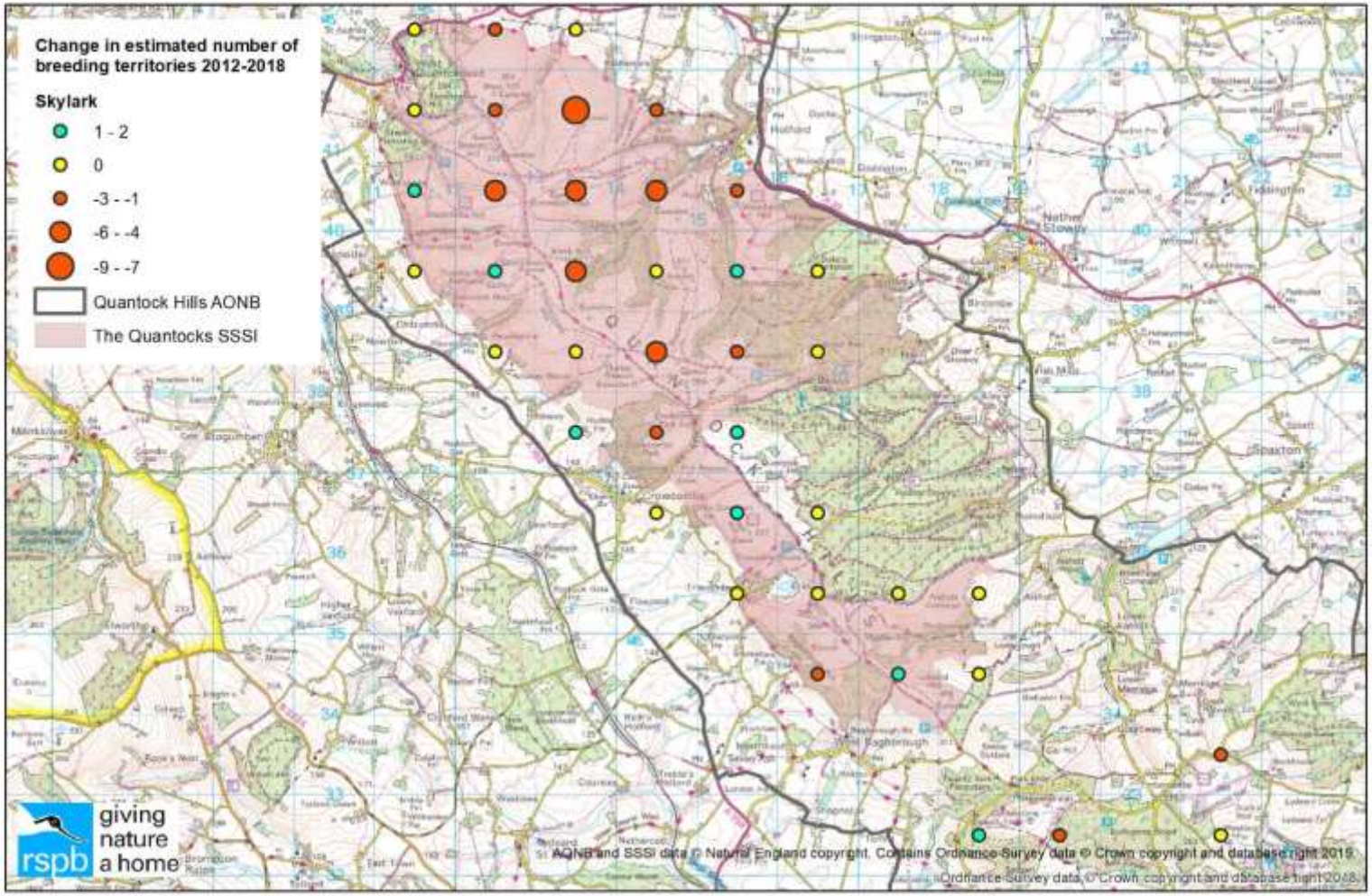

Fig 10 – skylark breeding territories change 2012-2018

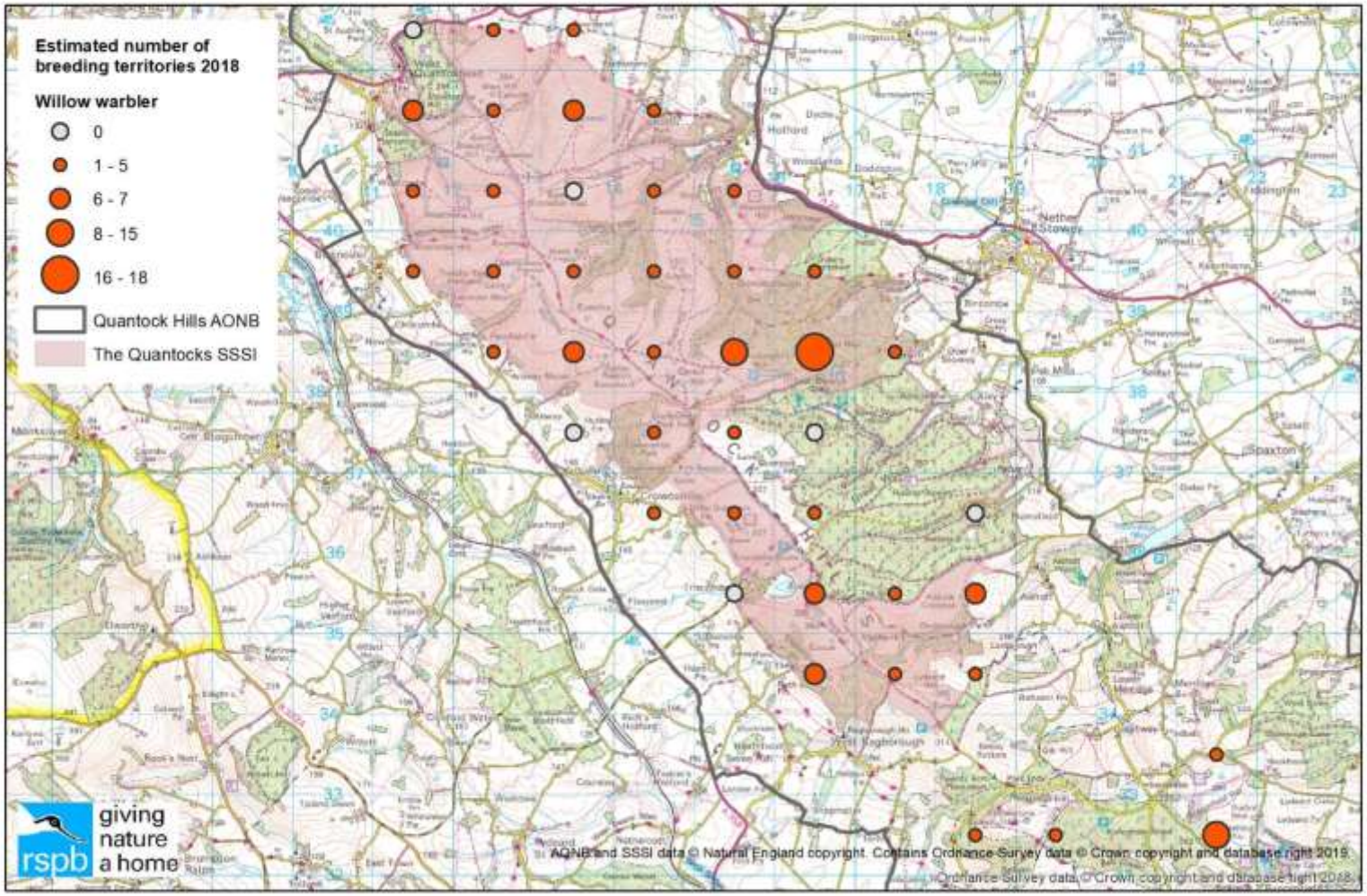

Fig 11 – willow warbler breeding territories distribution 2018

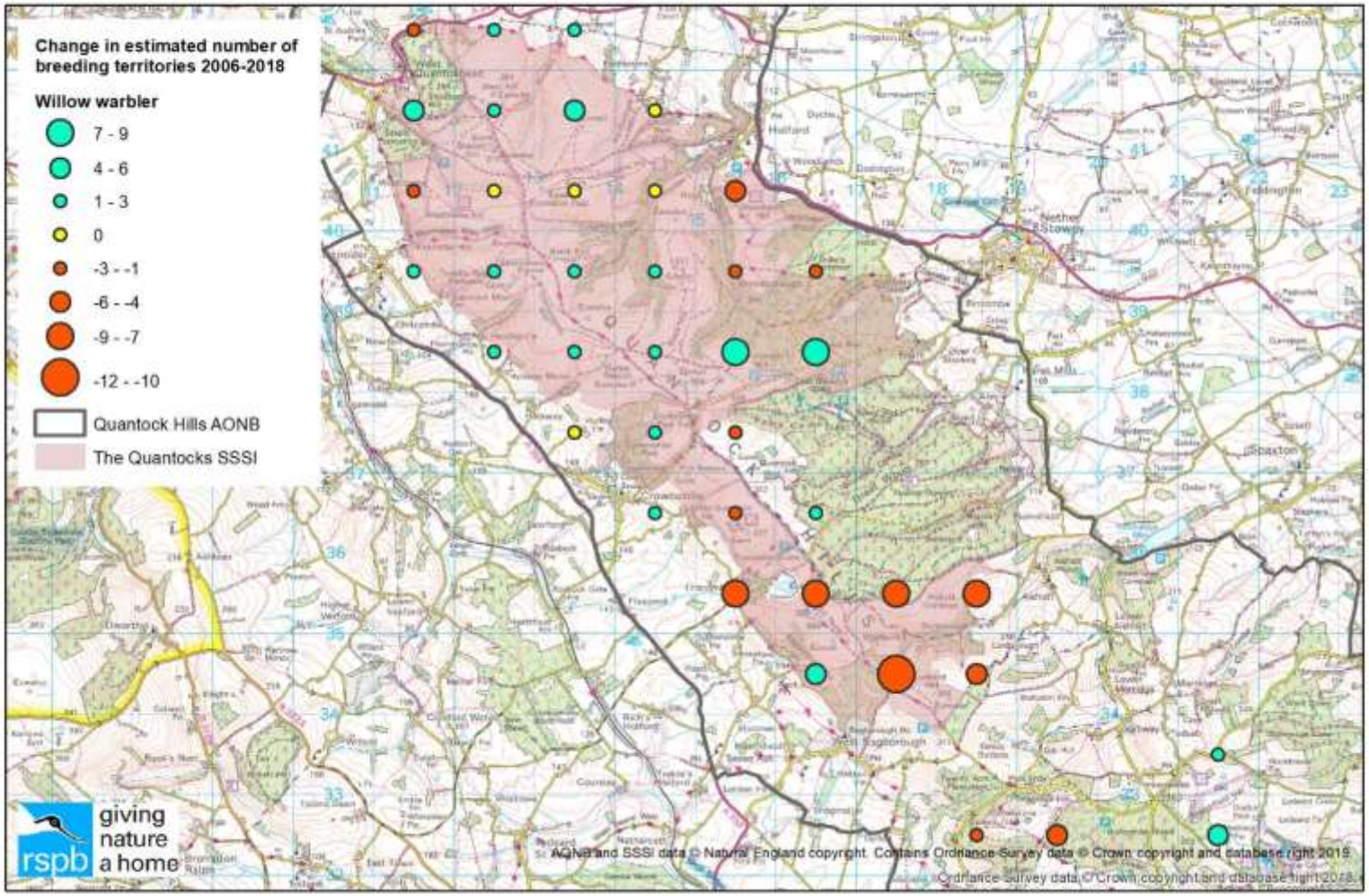

Fig 12 – willow warbler breeding territories change 2006-18

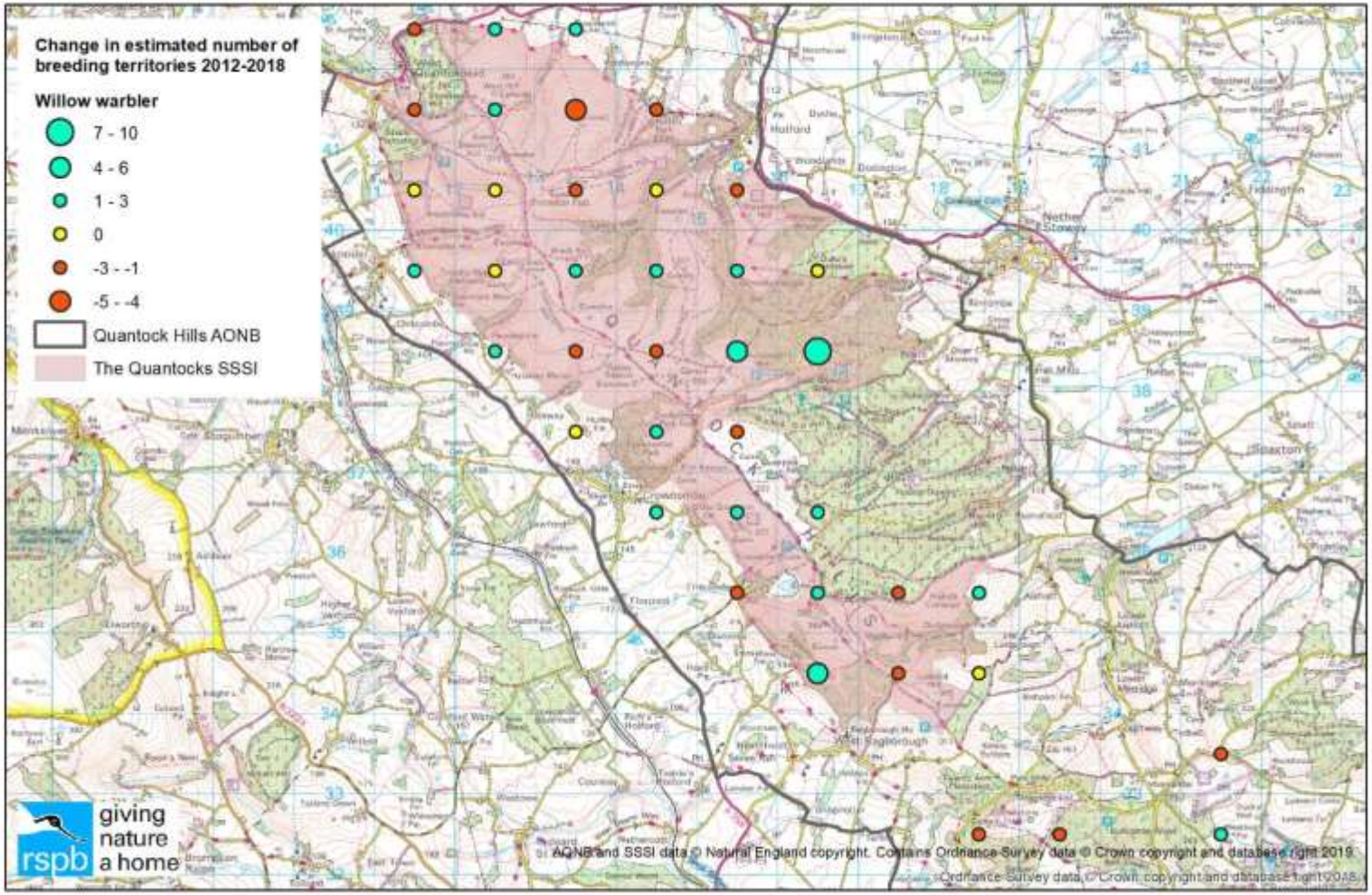

Fig 13 – willow warbler breeding territories change 2012-18

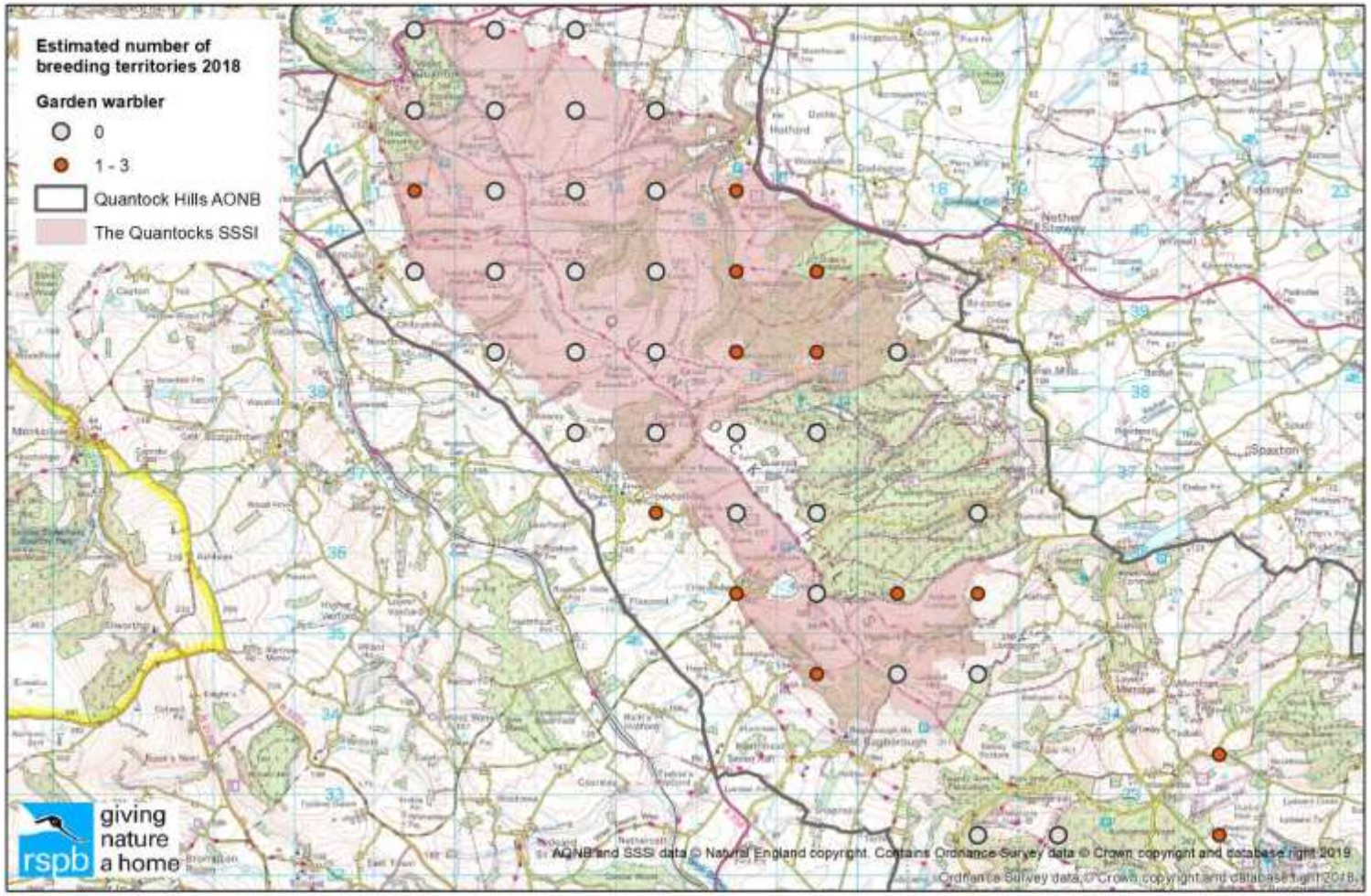

Fig 14 – garden warbler breeding territories distribution 2018

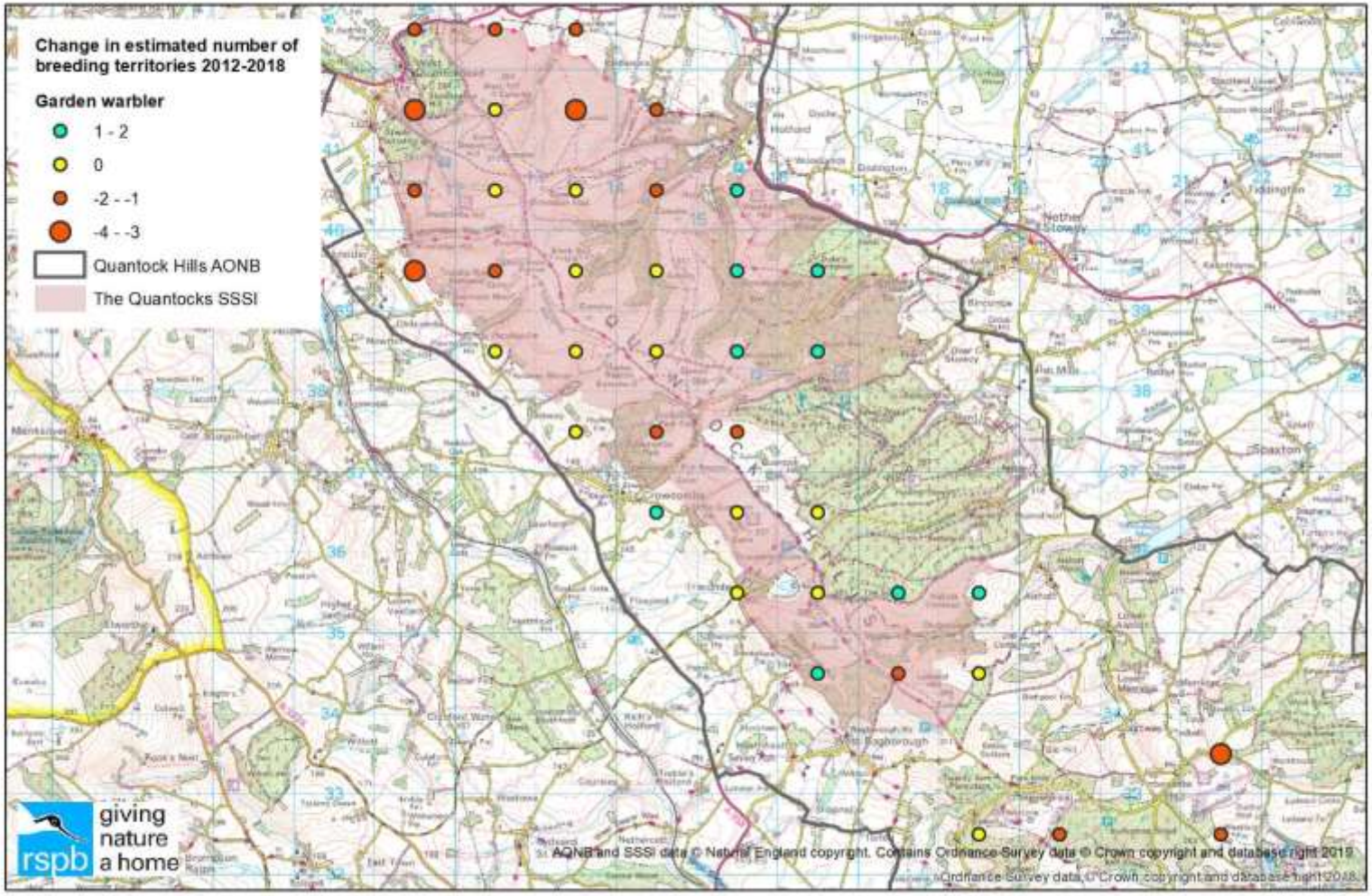

Fig 15 –garden warbler breeding territories change 2012-2018

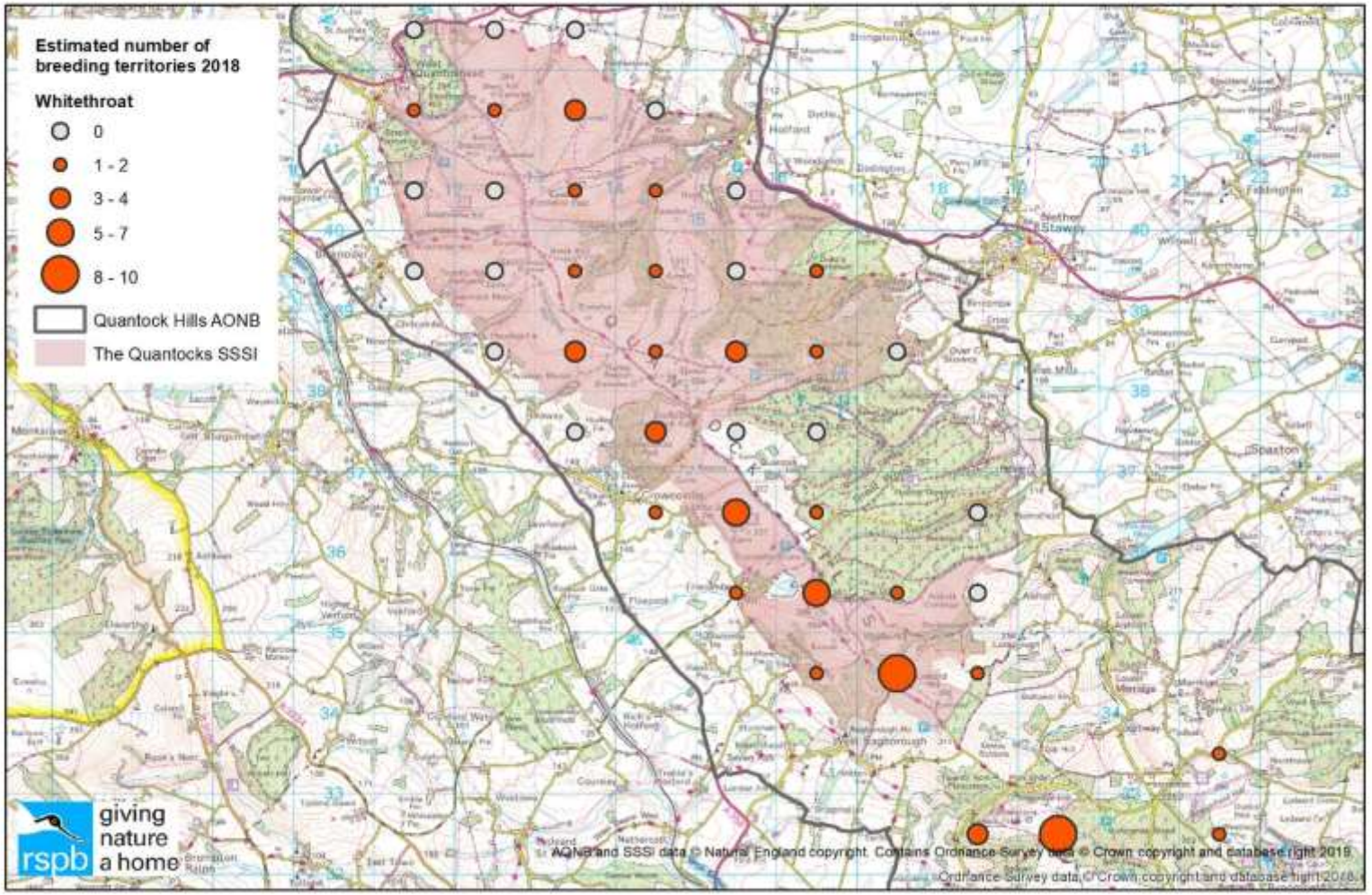

Fig 16 - whitethroat breeding territories distribution 2018

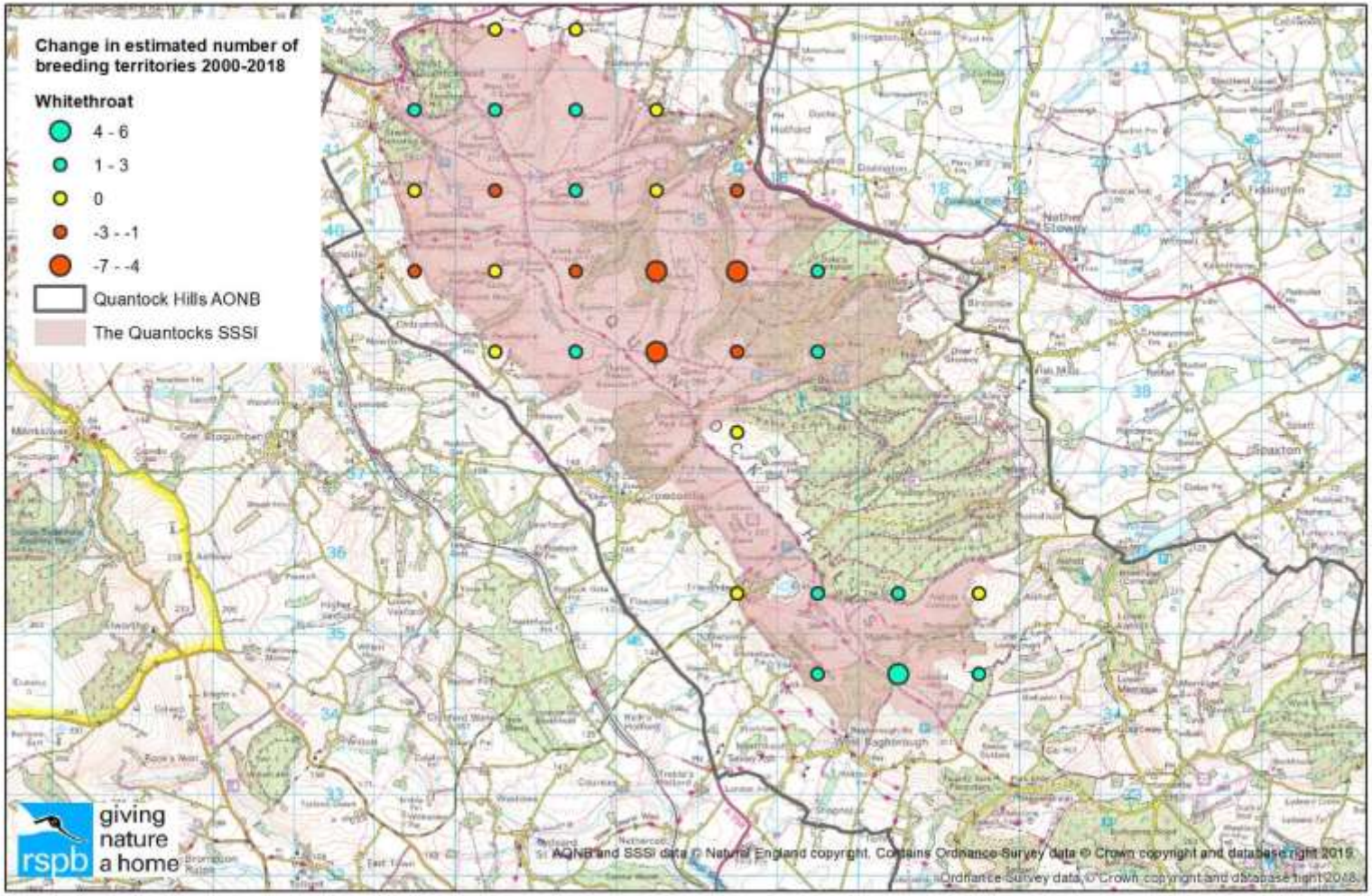

Fig 17 – whitethroat breeding territories change 2000-2018

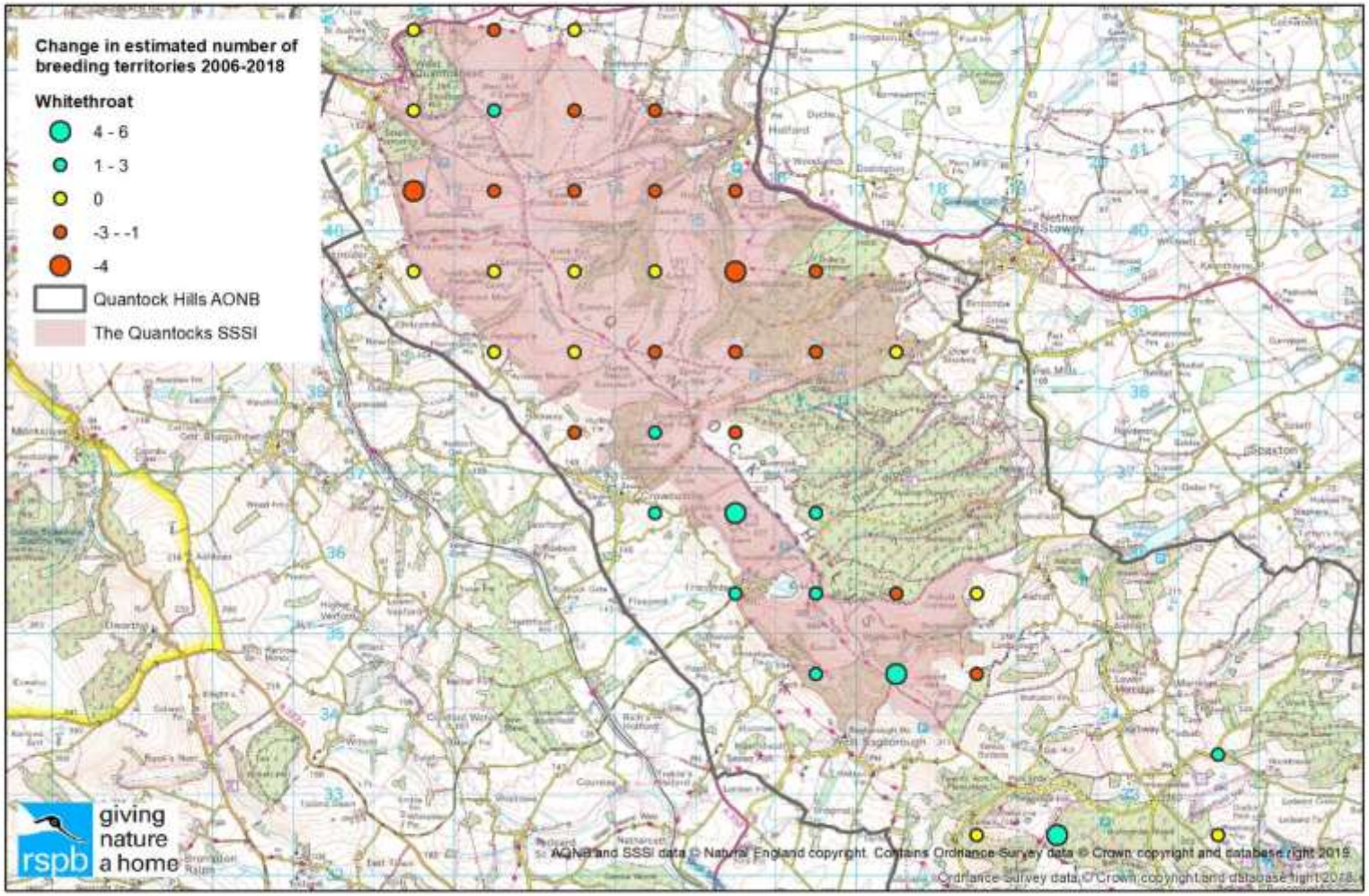

Fig 18 - whitethroat breeding territories change 2006-2018

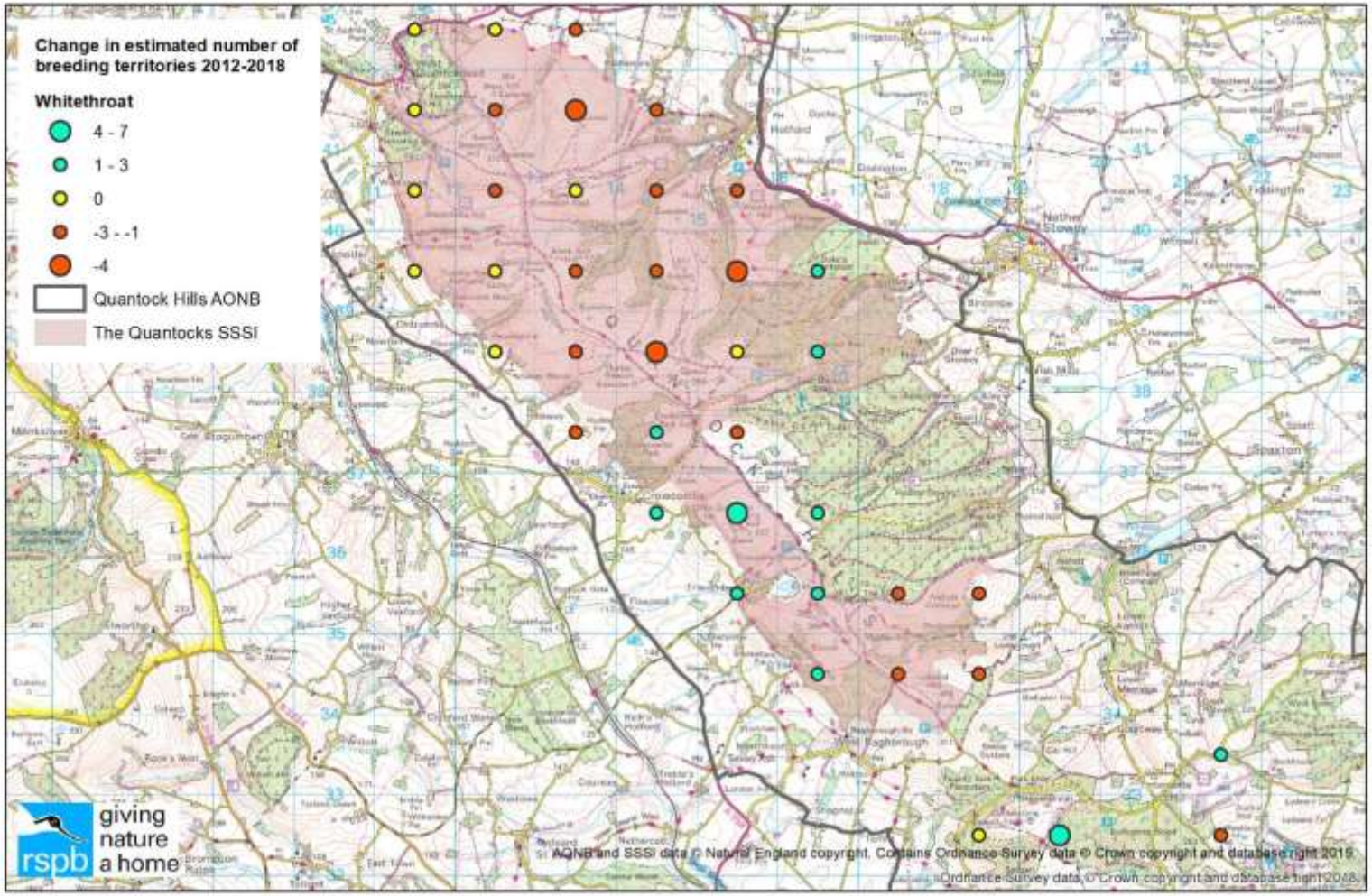

Fig 19 - whitethroat breeding territories change 2012-2018

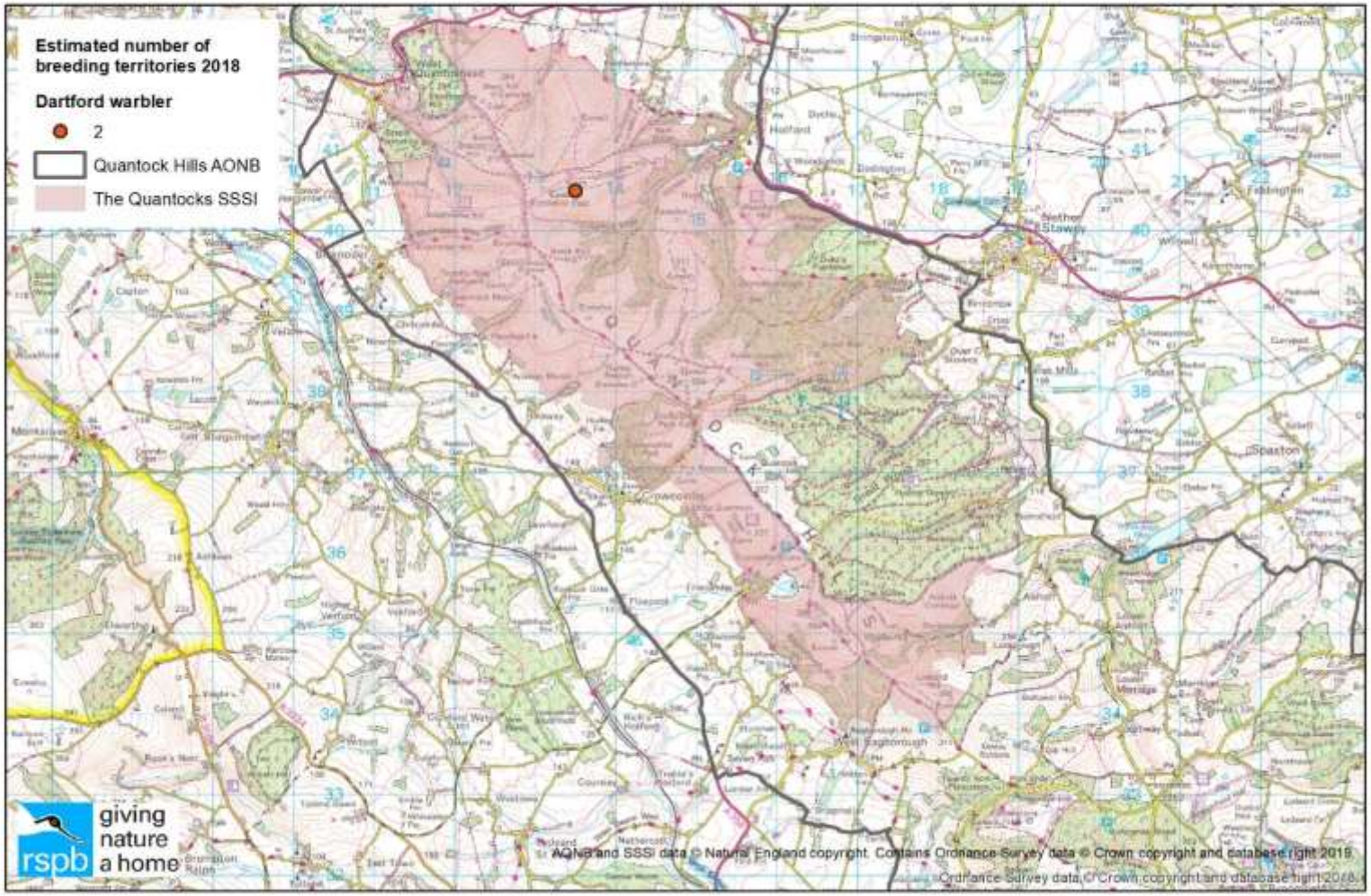

Fig 20 – Dartford warbler breeding territories distribution 2018

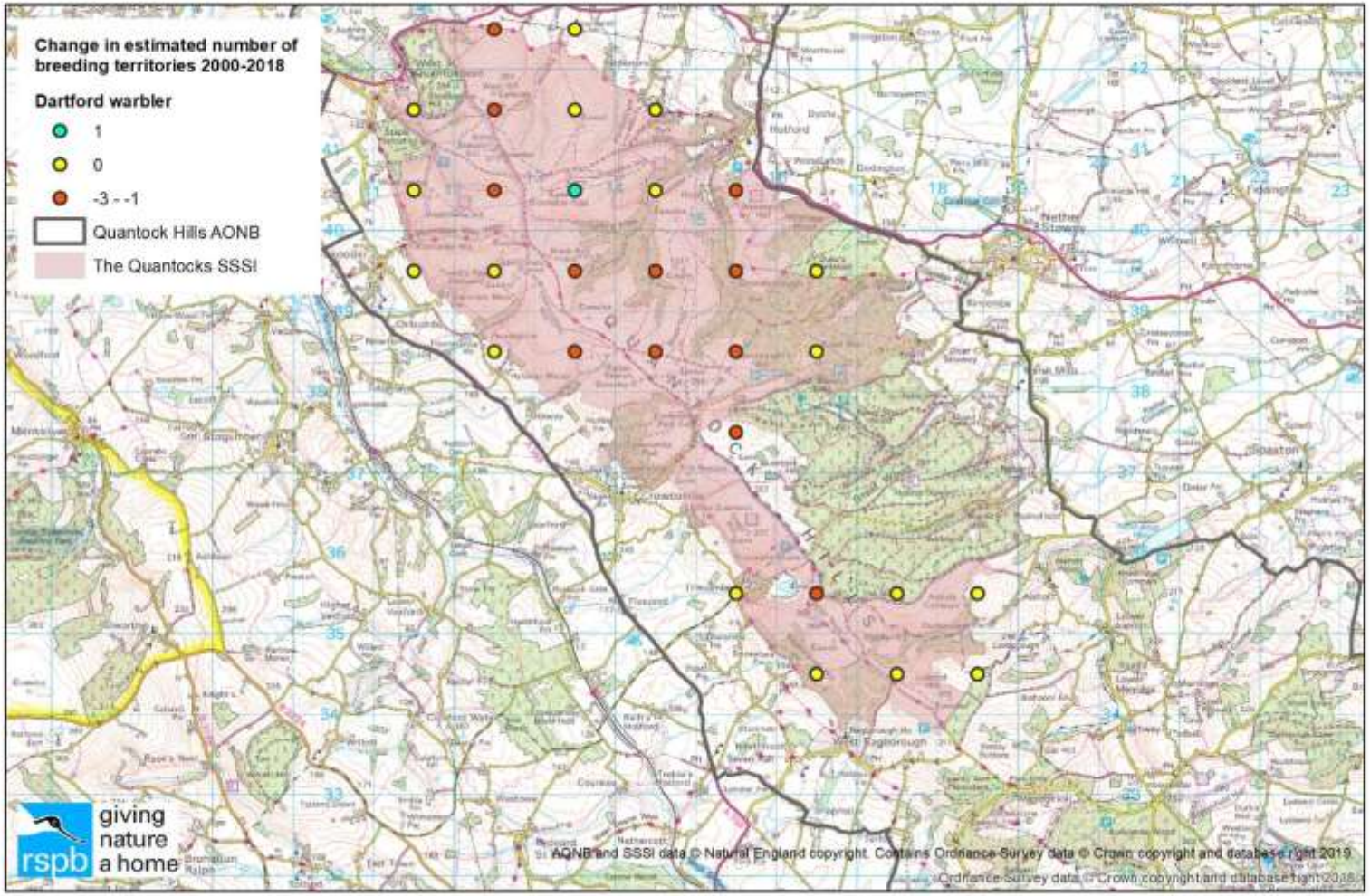

Fig 21 – Dartford warbler breeding territories change 2000-2018

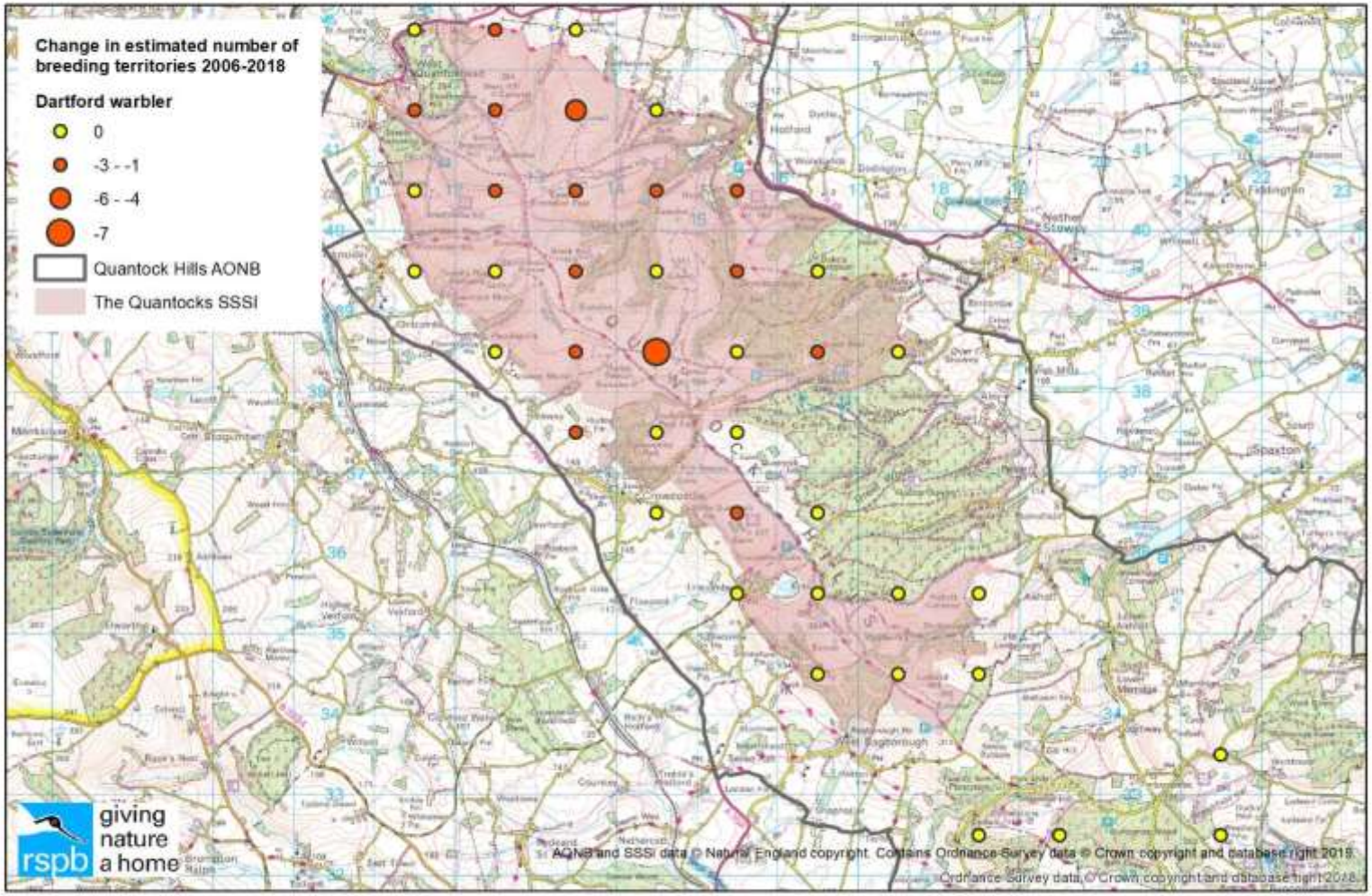

Fig 22 – Dartford warbler breeding territories change 2006-2018

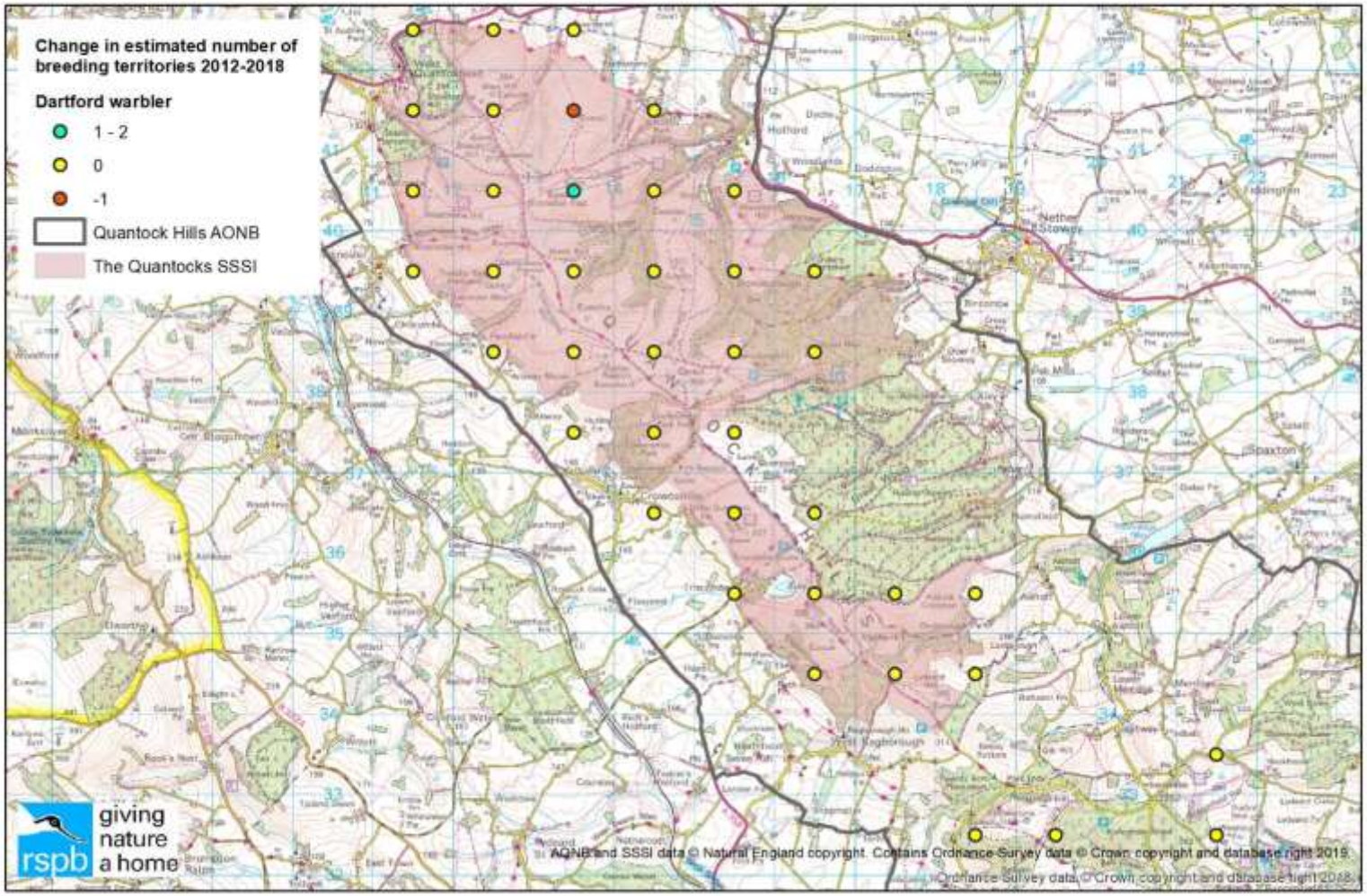

Fig 23– Dartford warbler breeding territories change 2012-2018

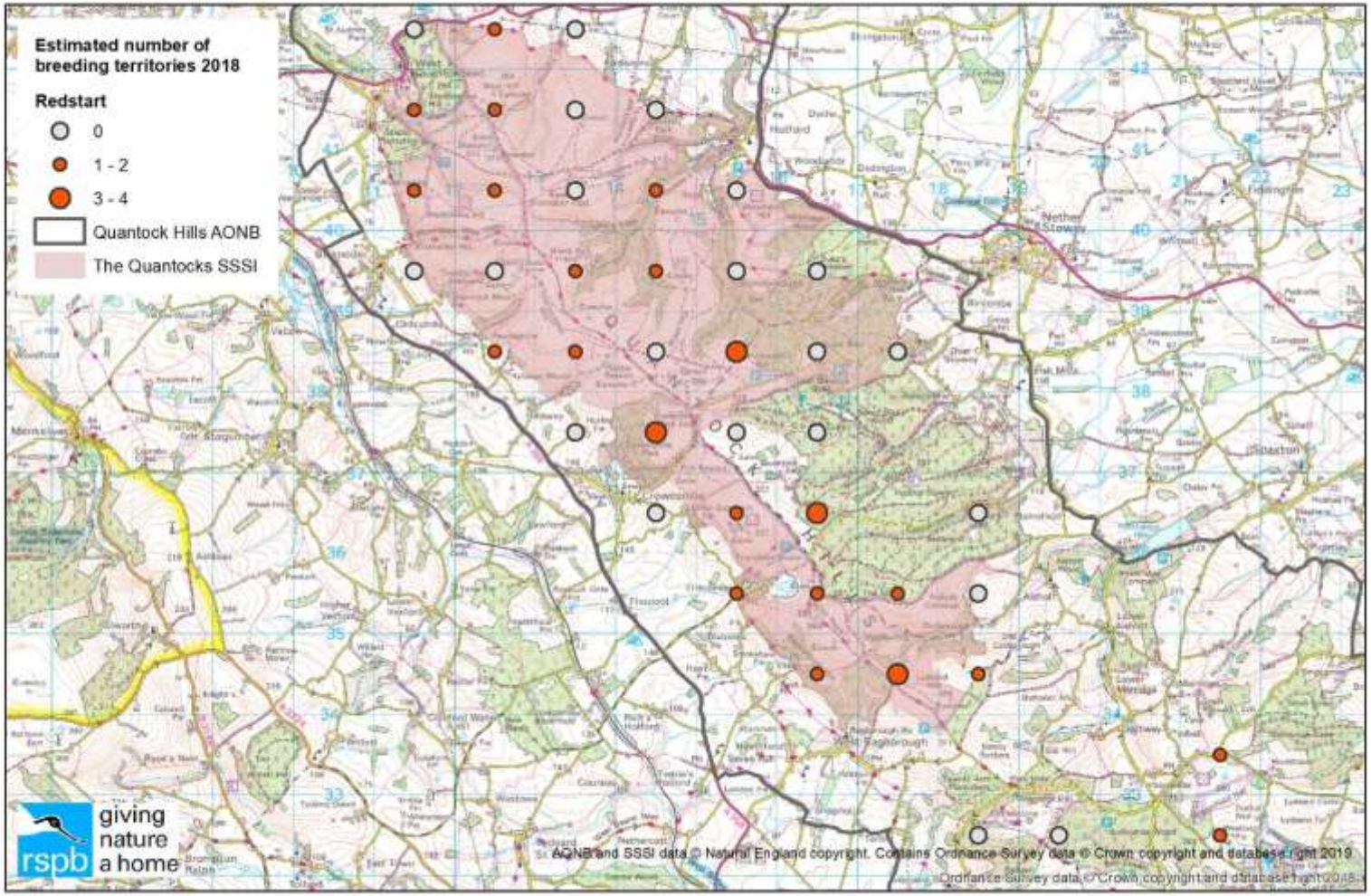

Fig 24 – redstart breeding territories distribution 2018

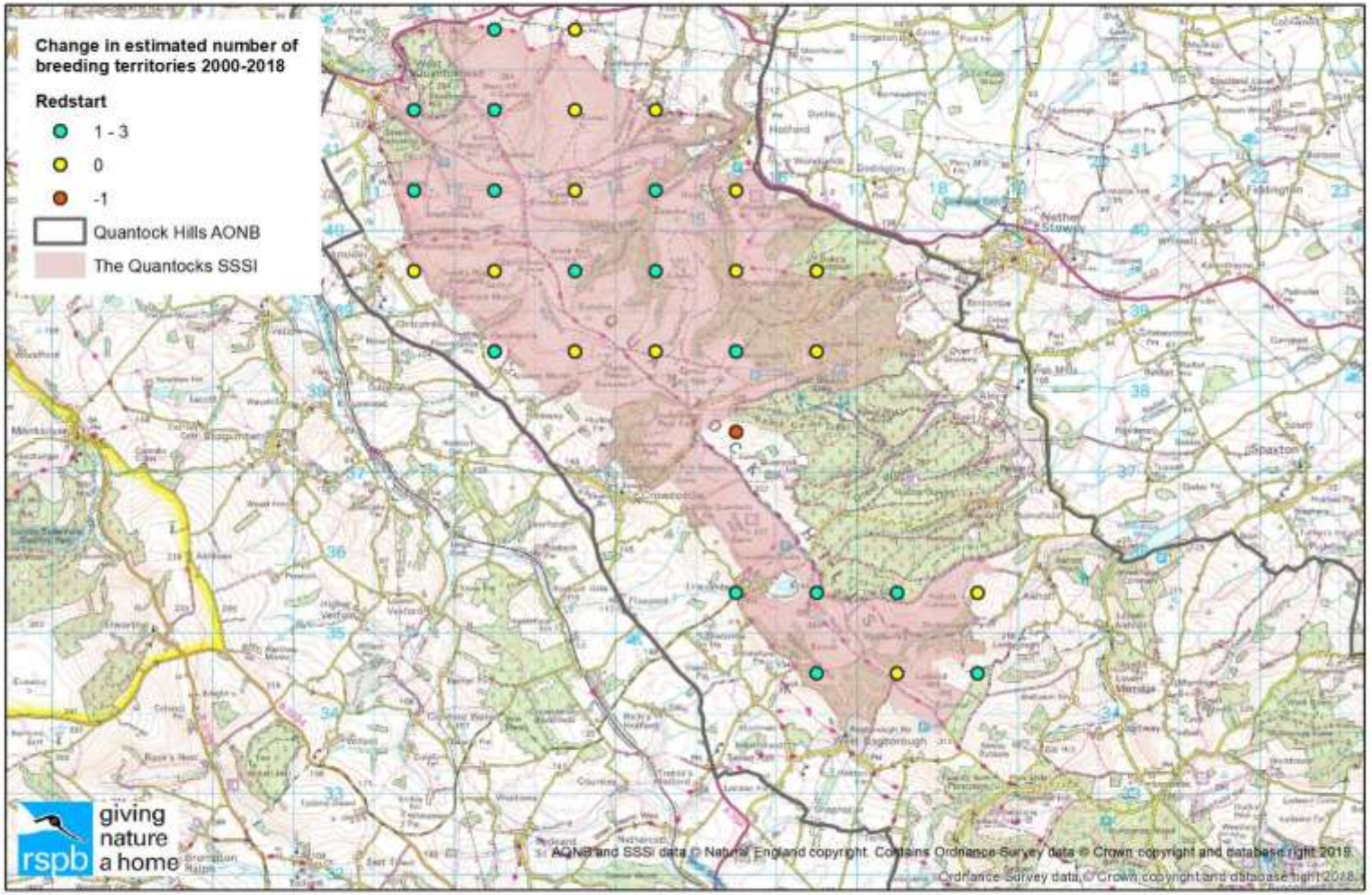

Fig 25 – redstart breeding territories change 2000-2018

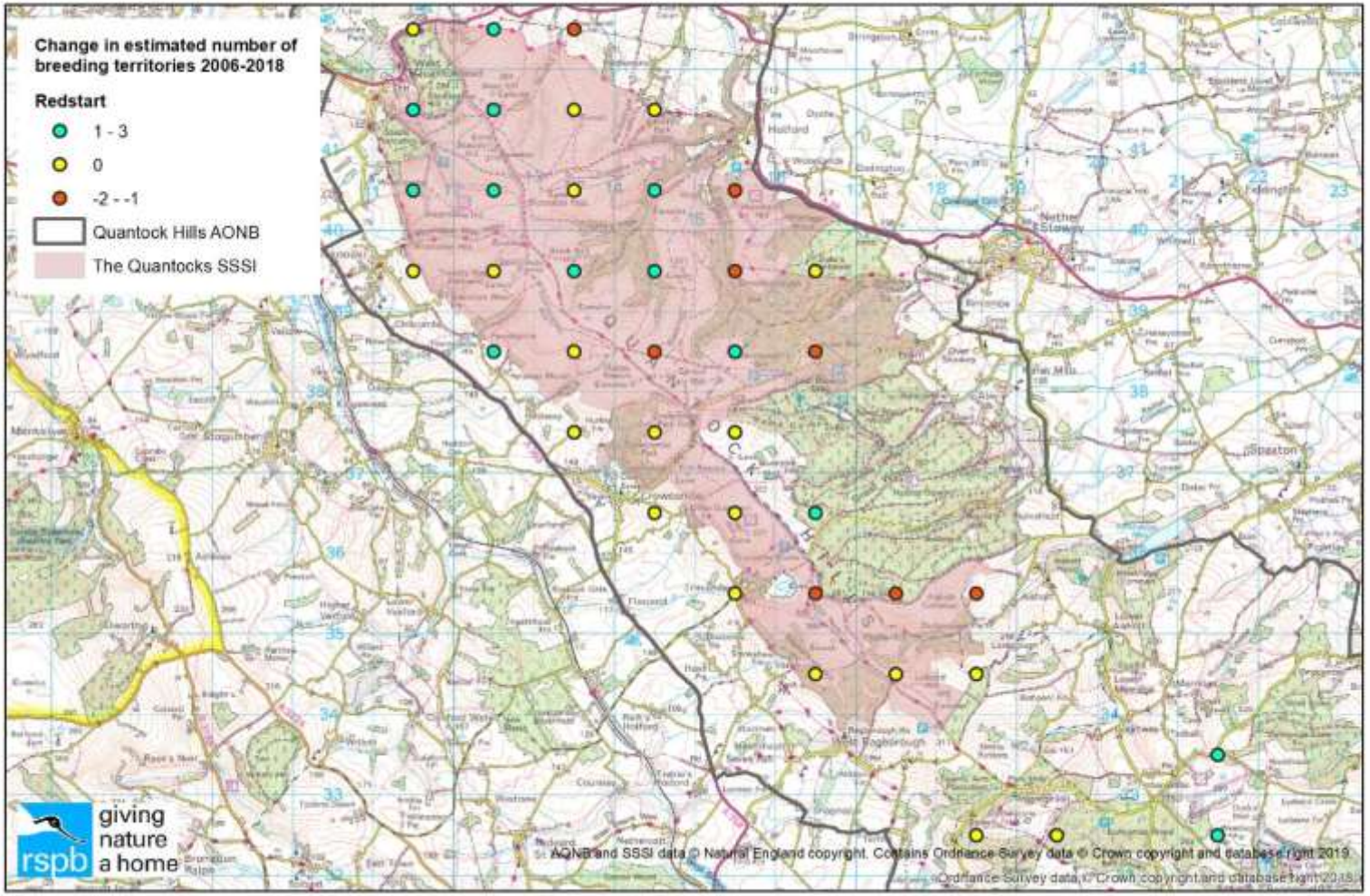

Fig 26 – redstart breeding territories change 2006-2018

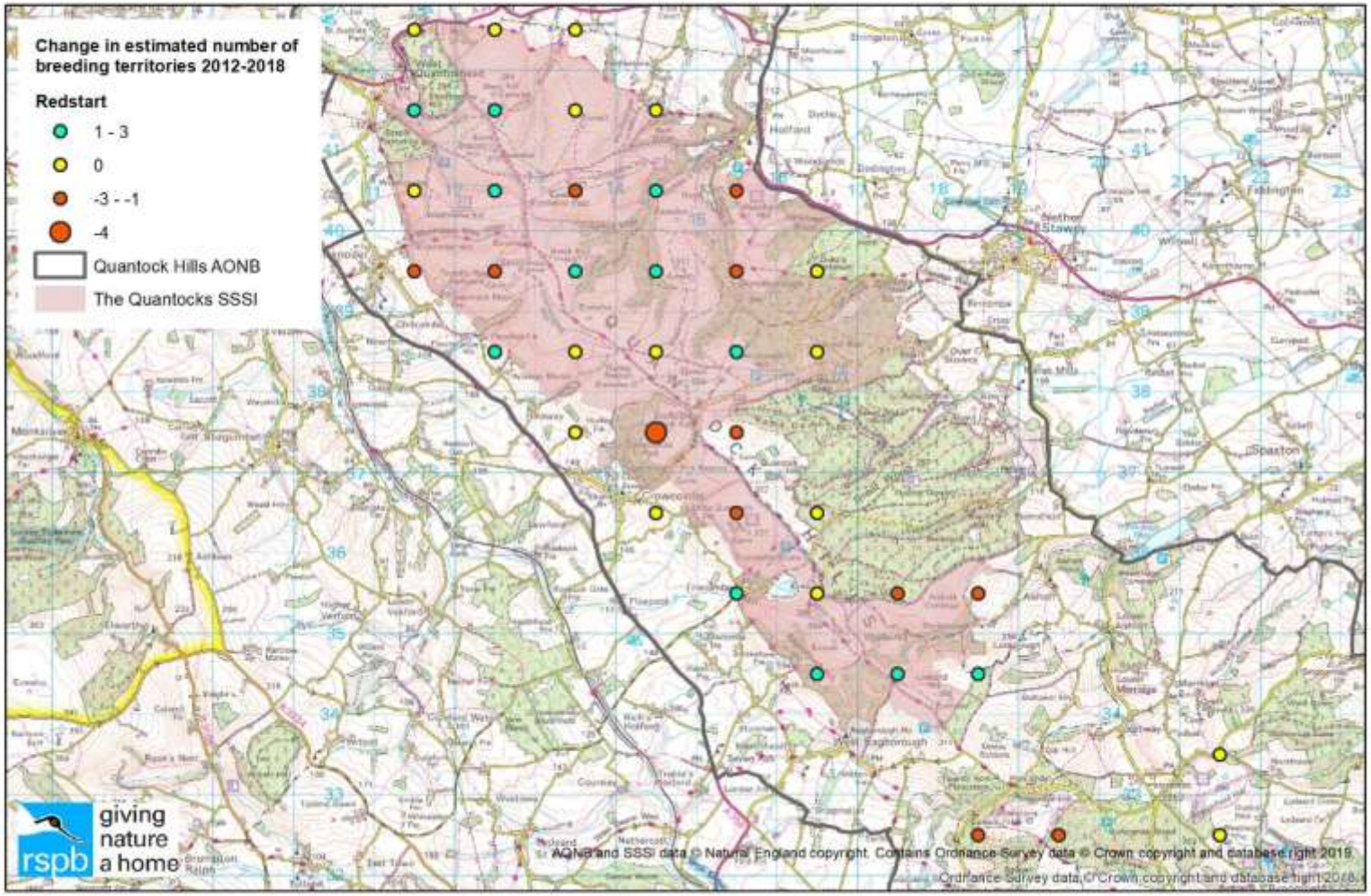

Fig 27 – redstart breeding territories change 2012-2018

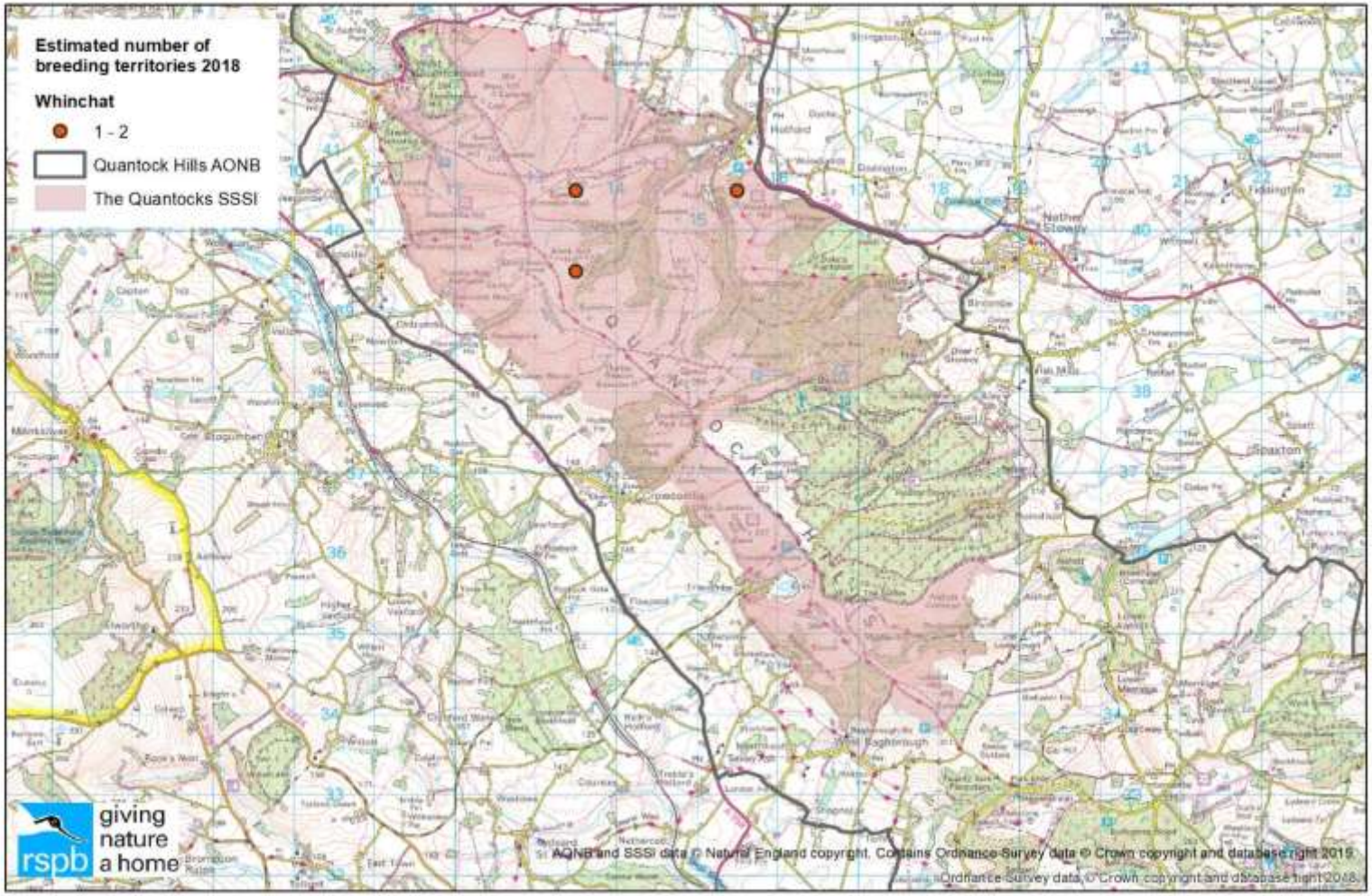

Fig 28 – whinchat breeding territories distribution 2018

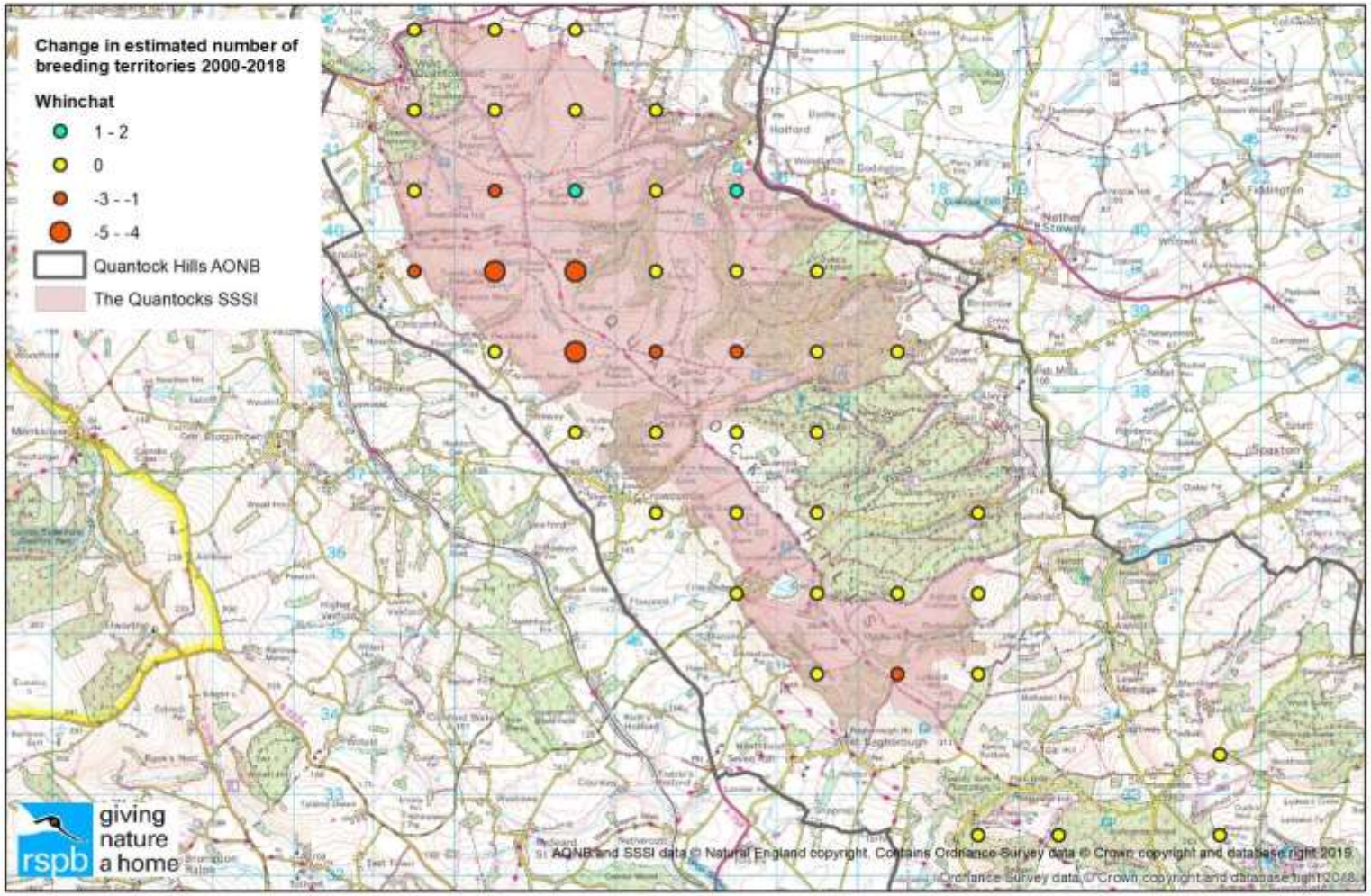

Fig 29 – whinchat breeding territories change 2000-2018

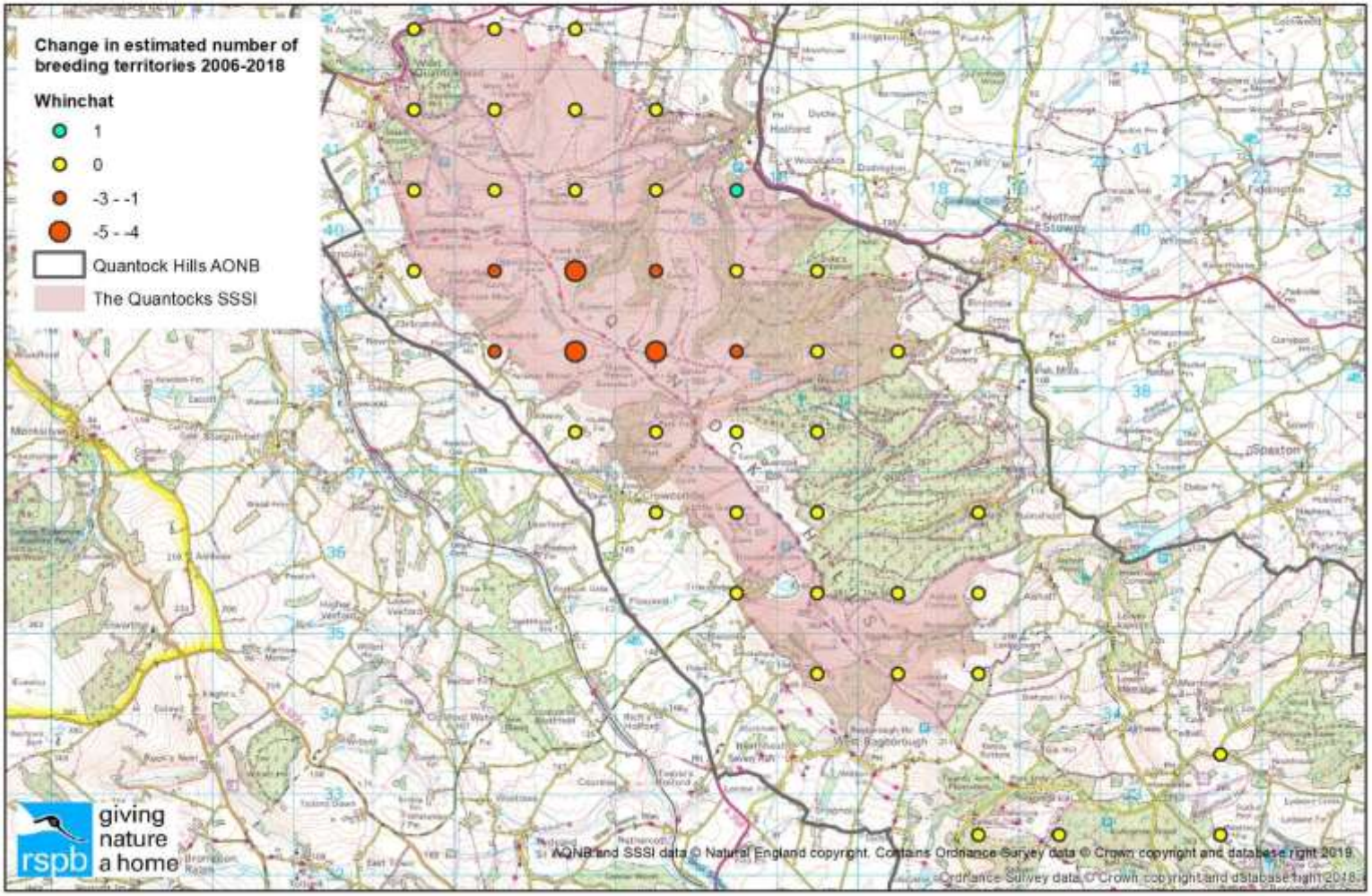

Fig 30 – whinchat breeding territories change 2006-2018

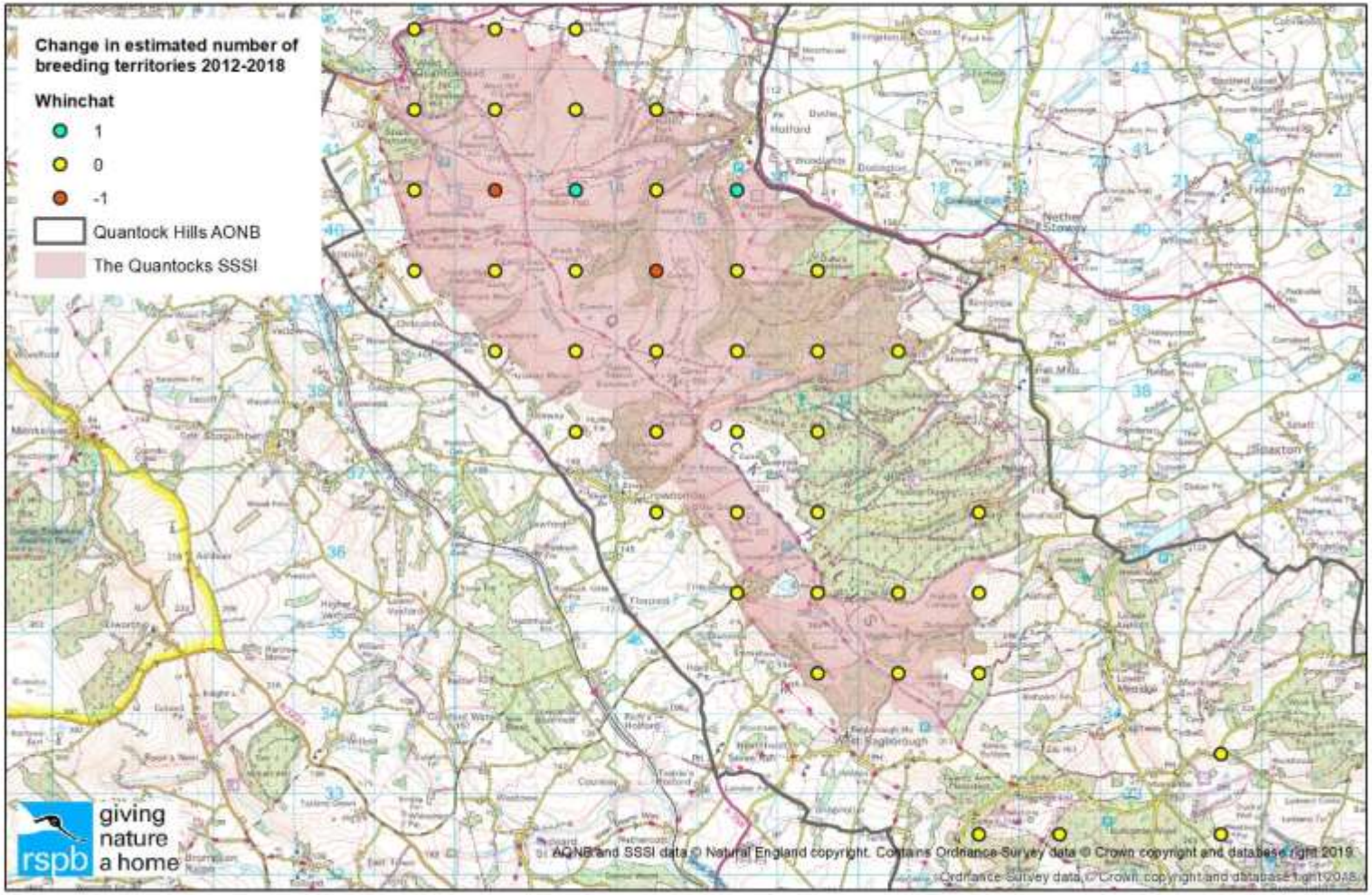

Fig 31 – whinchat breeding territories change 2012-2018

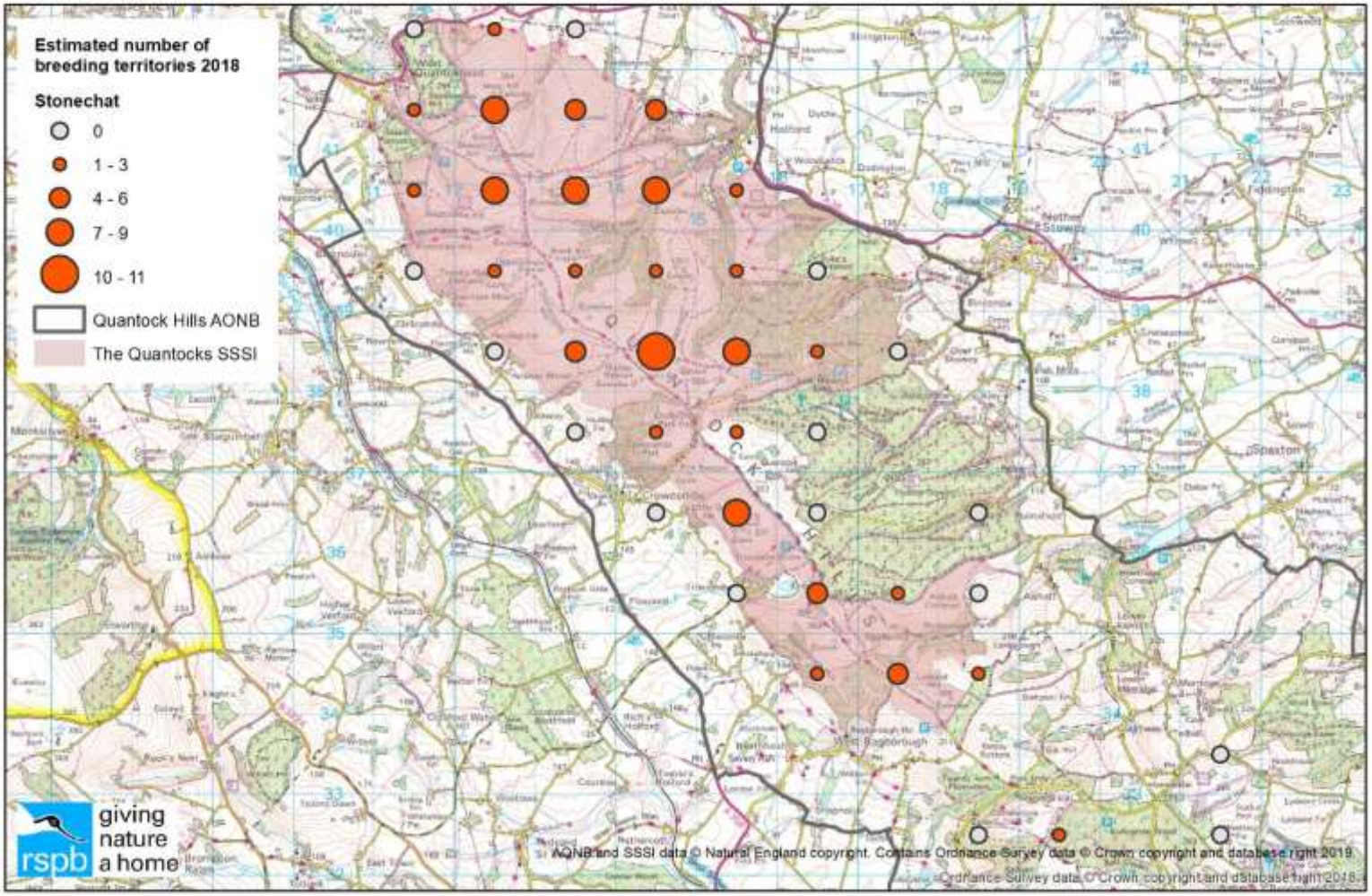

Fig 32 – stonechat breeding territories distribution 2018

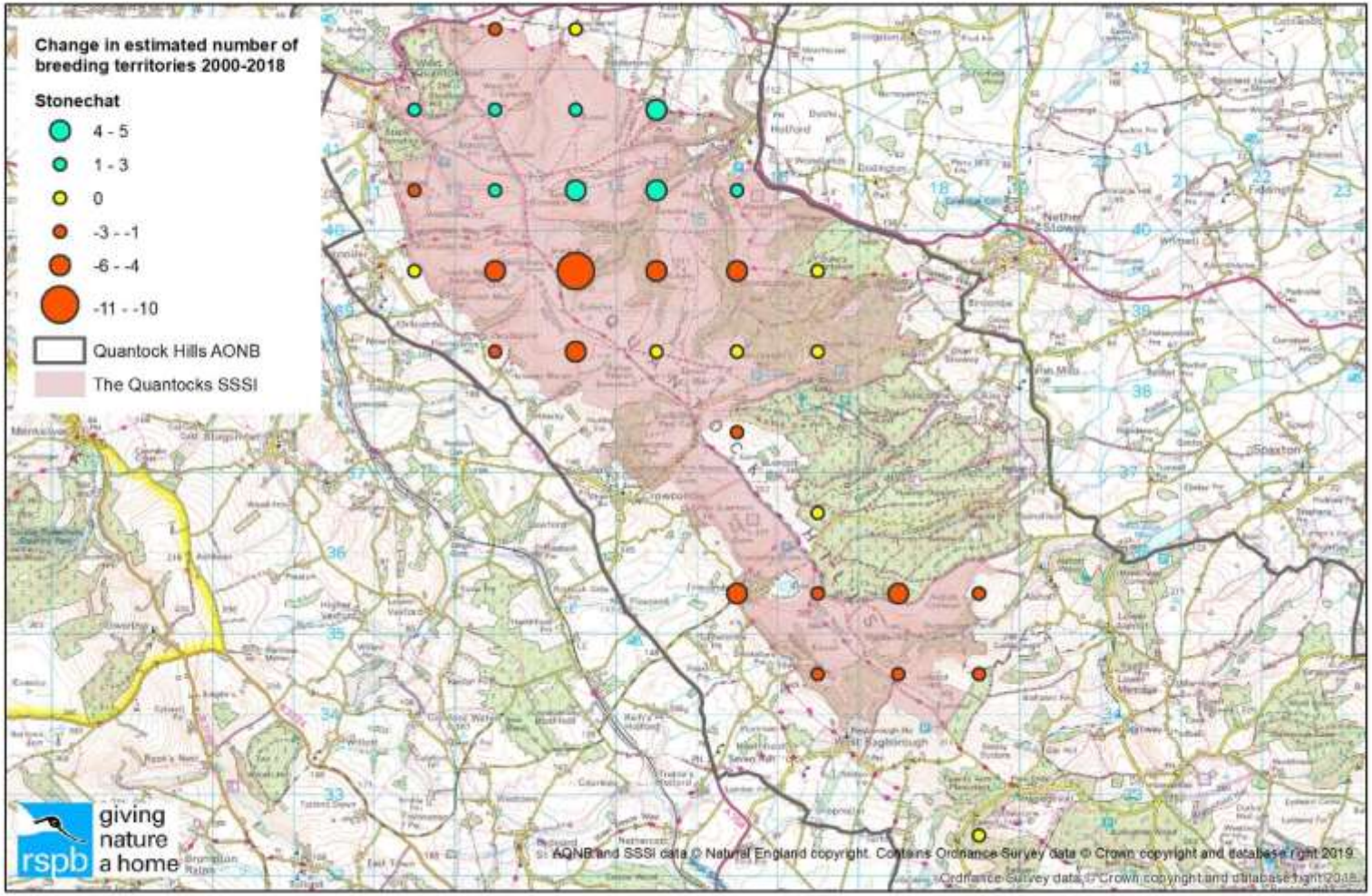

Fig 33 – stonechat breeding territories change 2000-2018

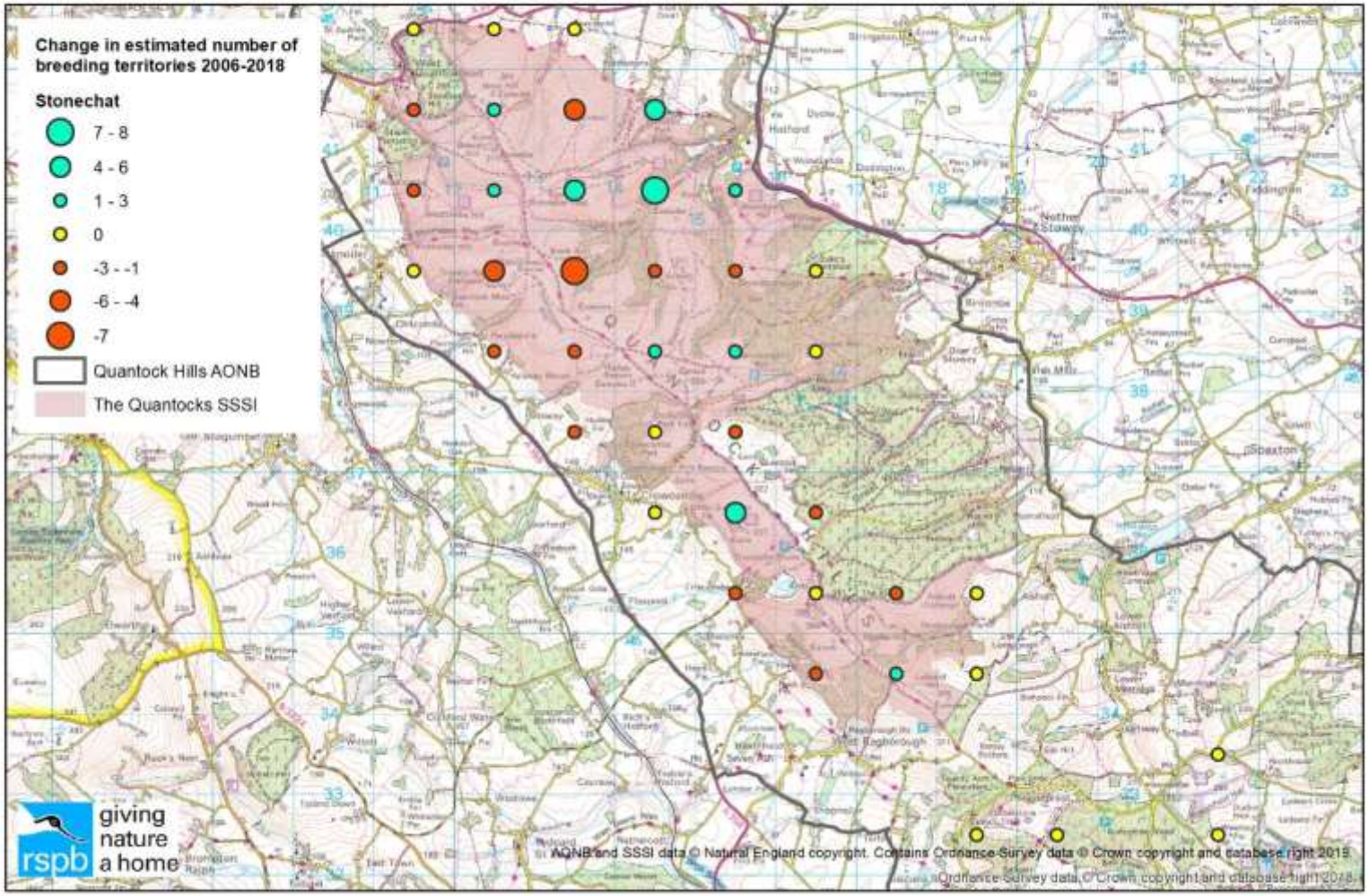

Fig 34 – stonechat breeding territories change 2006-2018

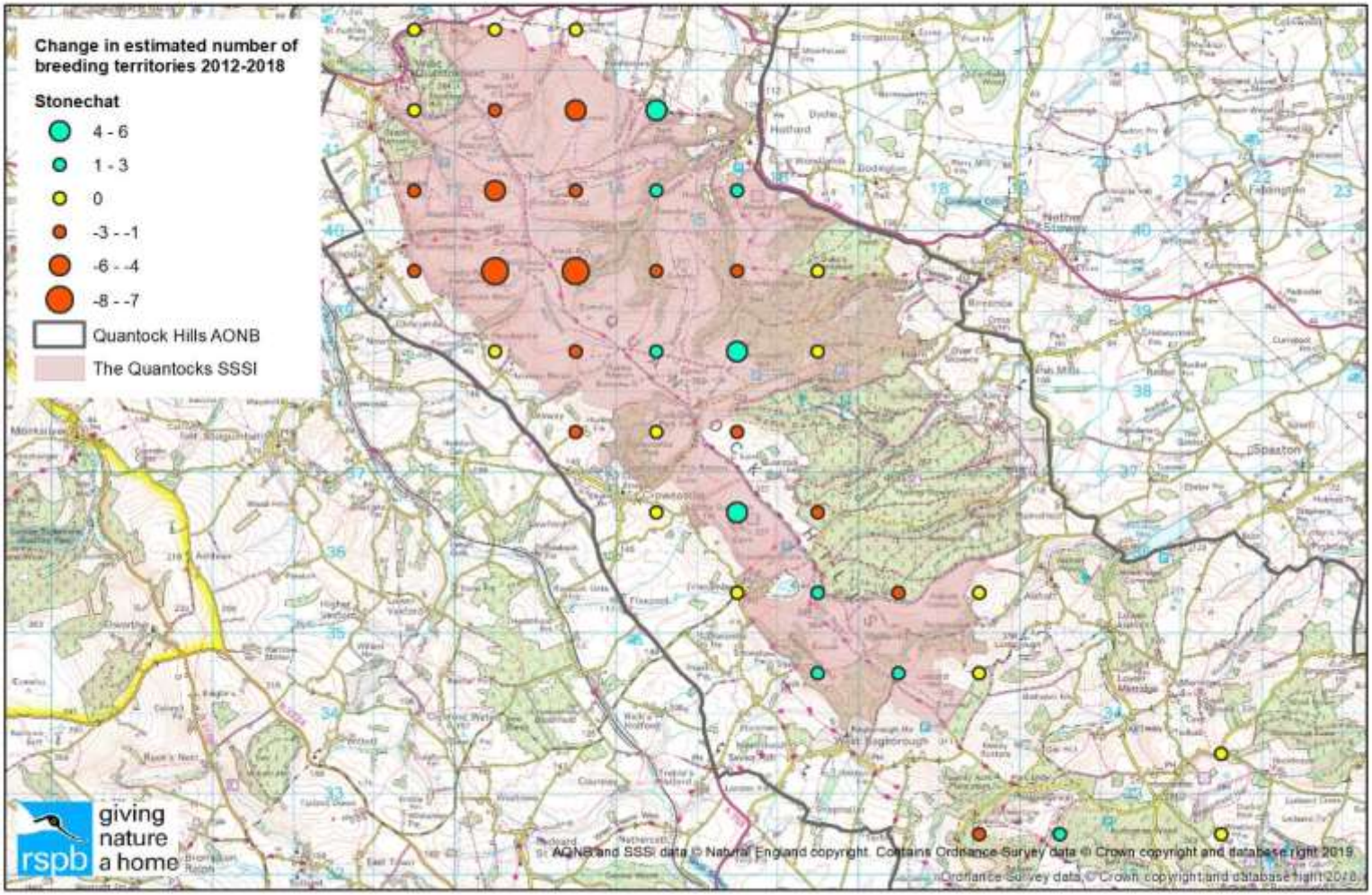

Fig 35 – stonechat breeding territories change 2012-2018

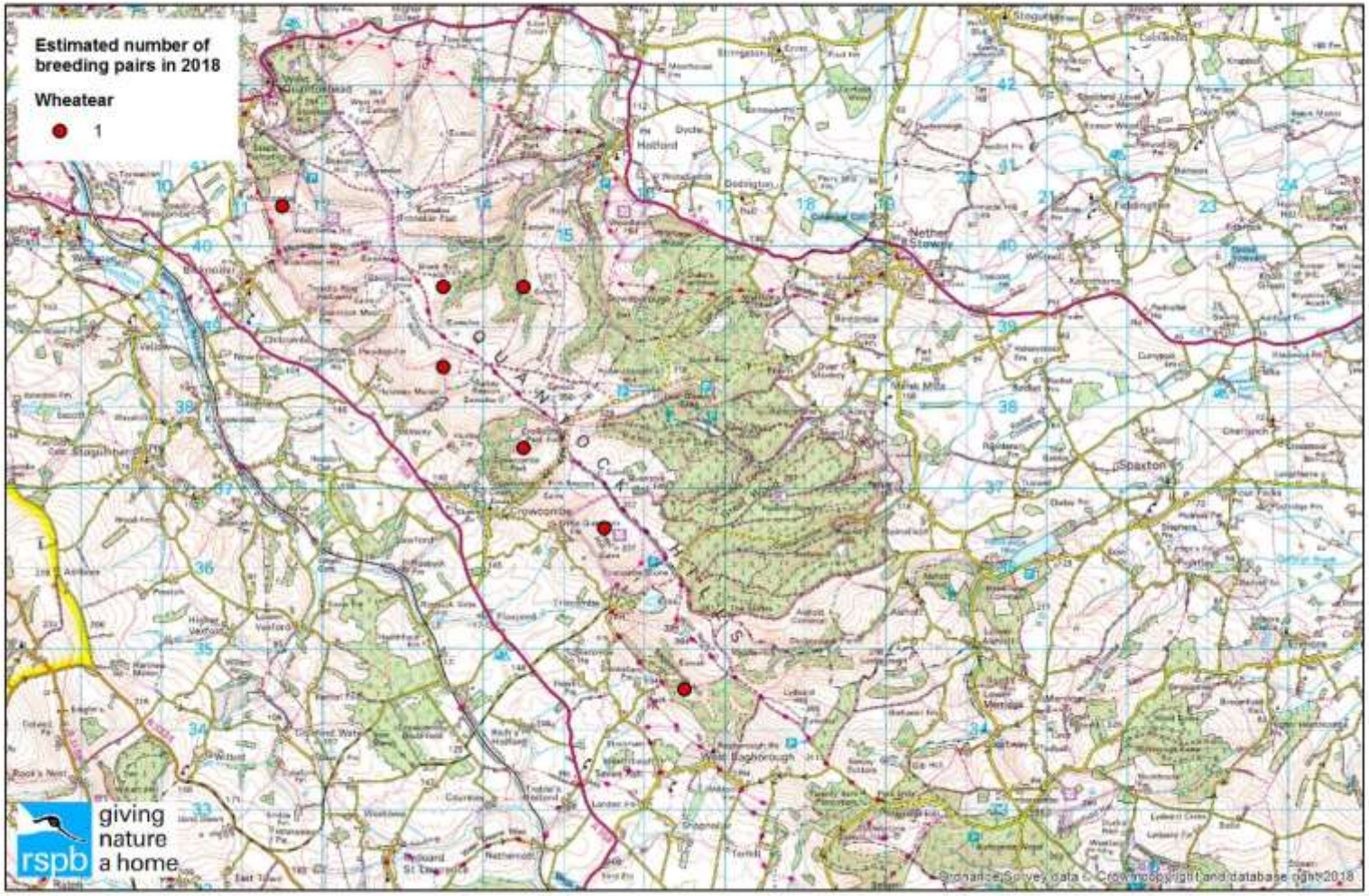

Fig 36 – wheatear breeding territories distribution 2018

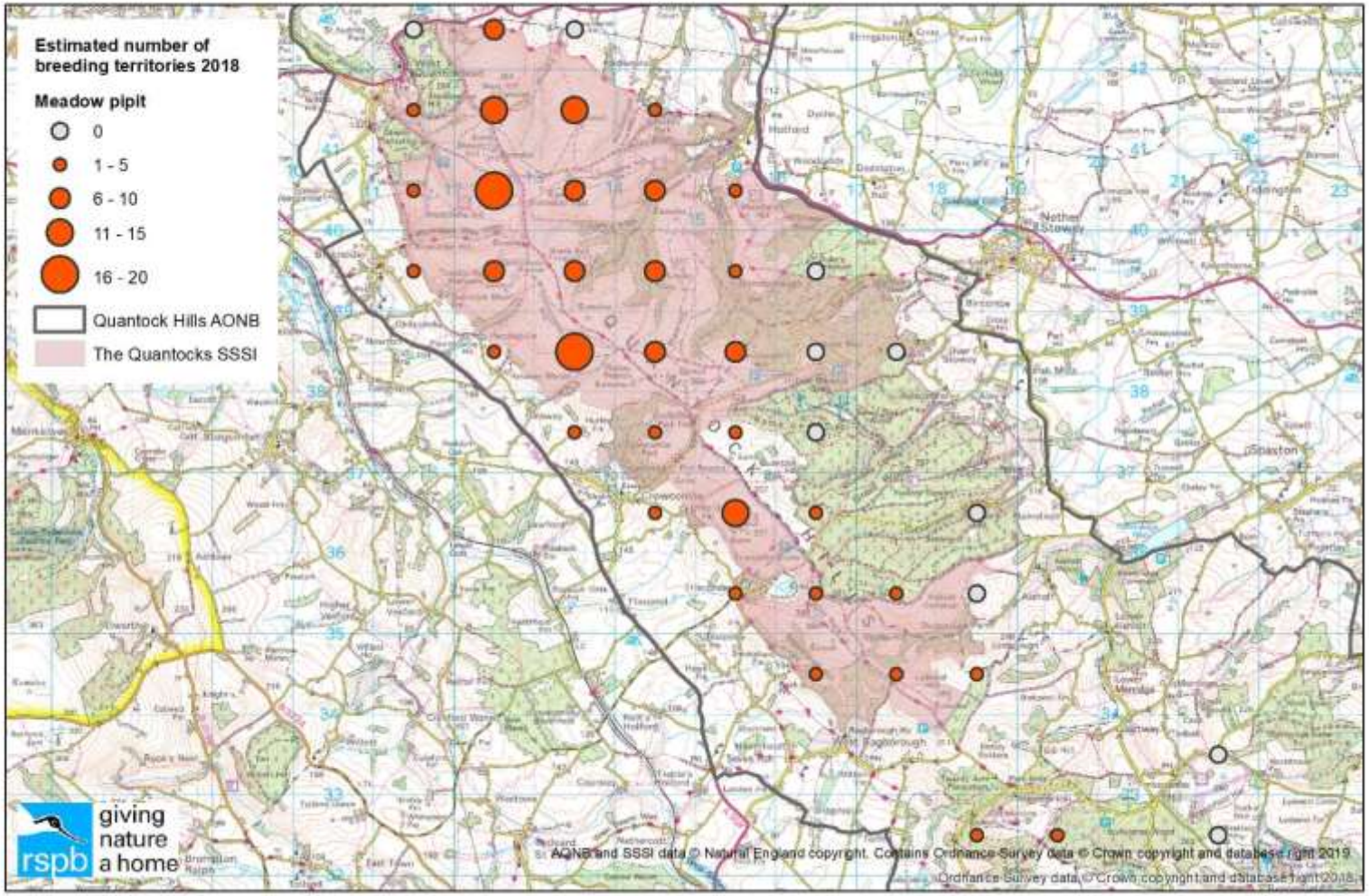

Fig 37 – meadow pipit breeding territories distribution 2018

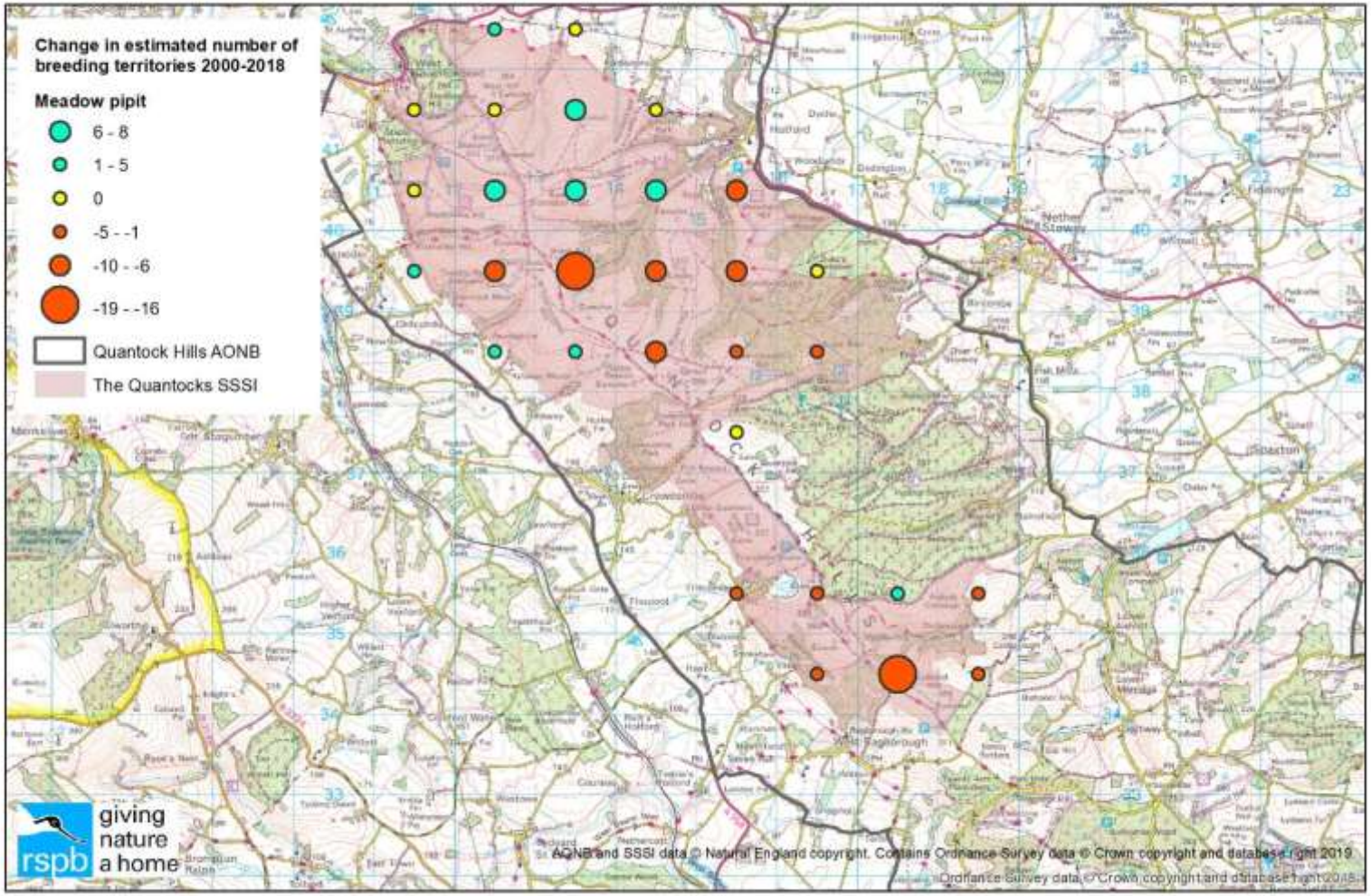

Fig 38 – meadow pipit breeding territories change 2000-2018

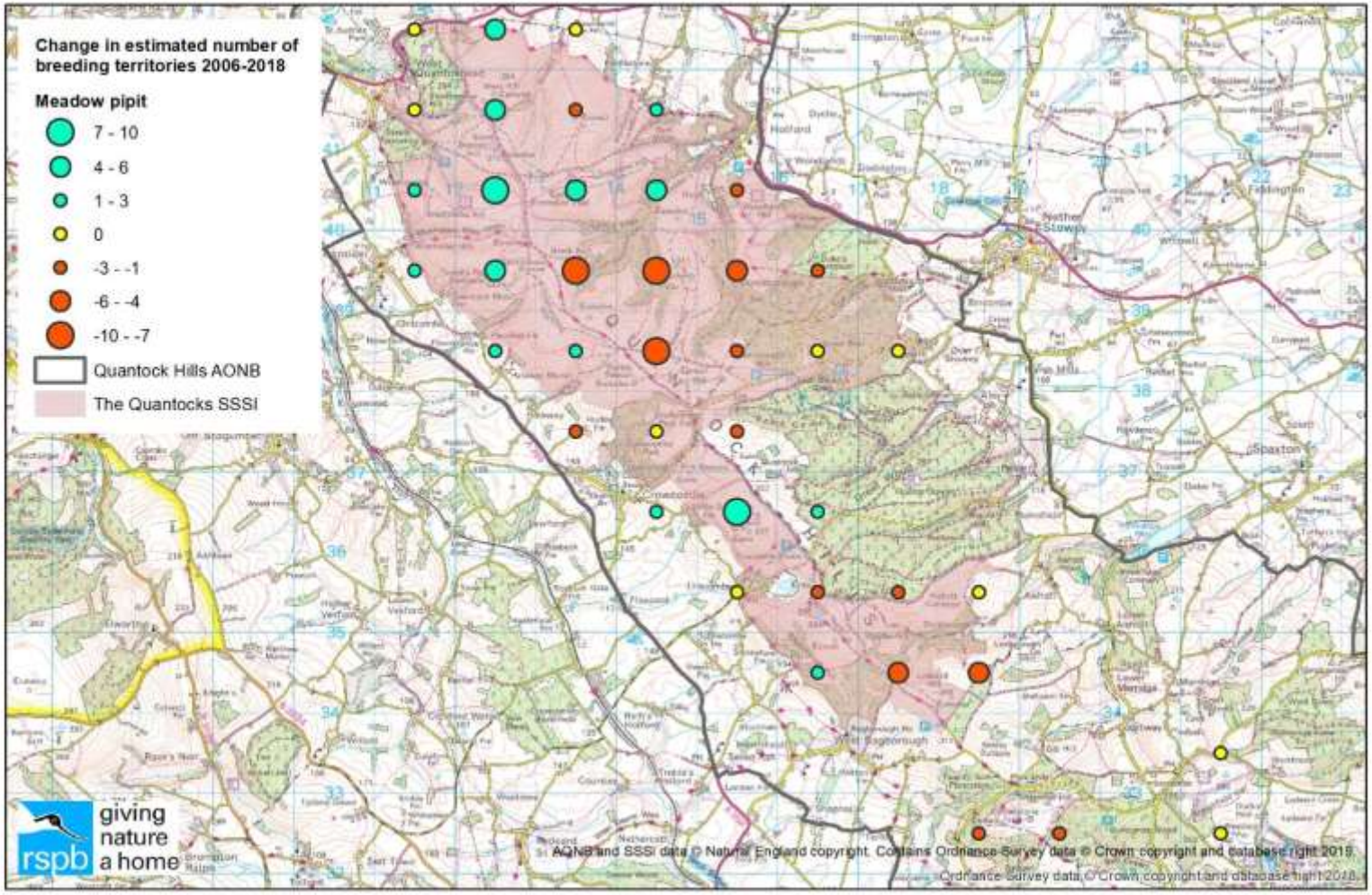

Fig 39 – meadow pipit breeding territories change 2006-2018

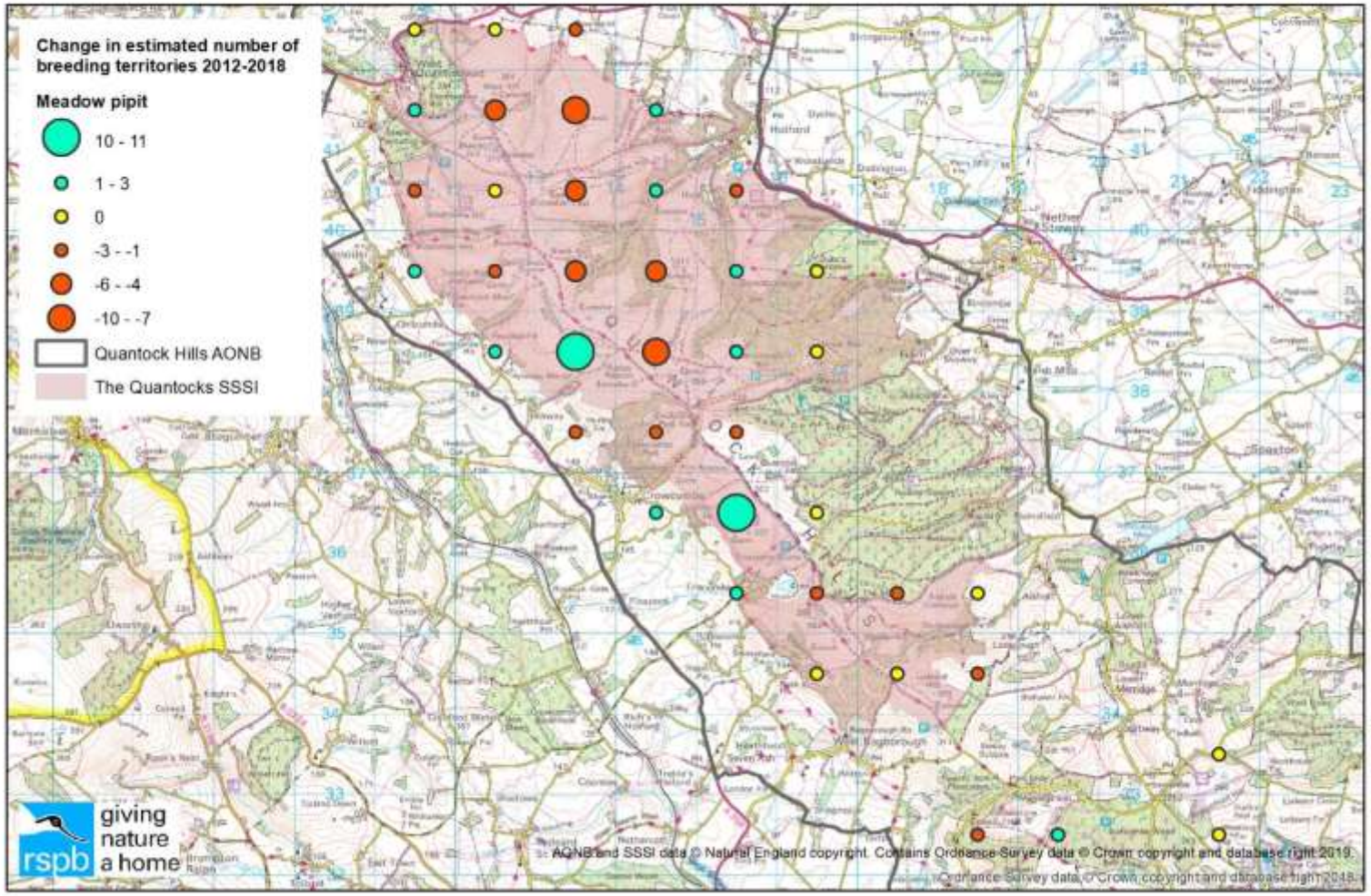

Fig 40 – meadow pipit breeding territories change 2012-2018

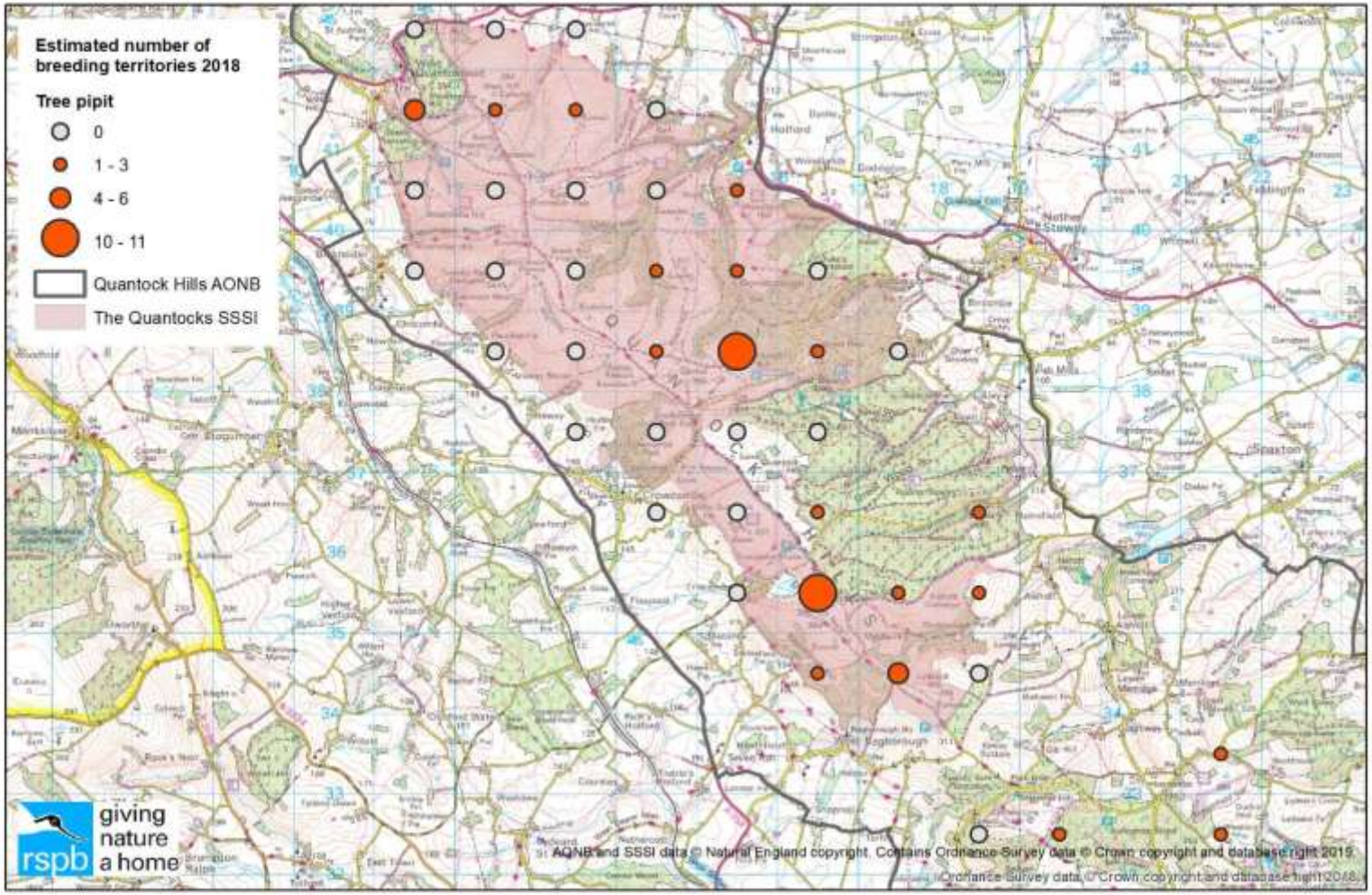

Fig 41 – tree pipit breeding territories distribution 2018

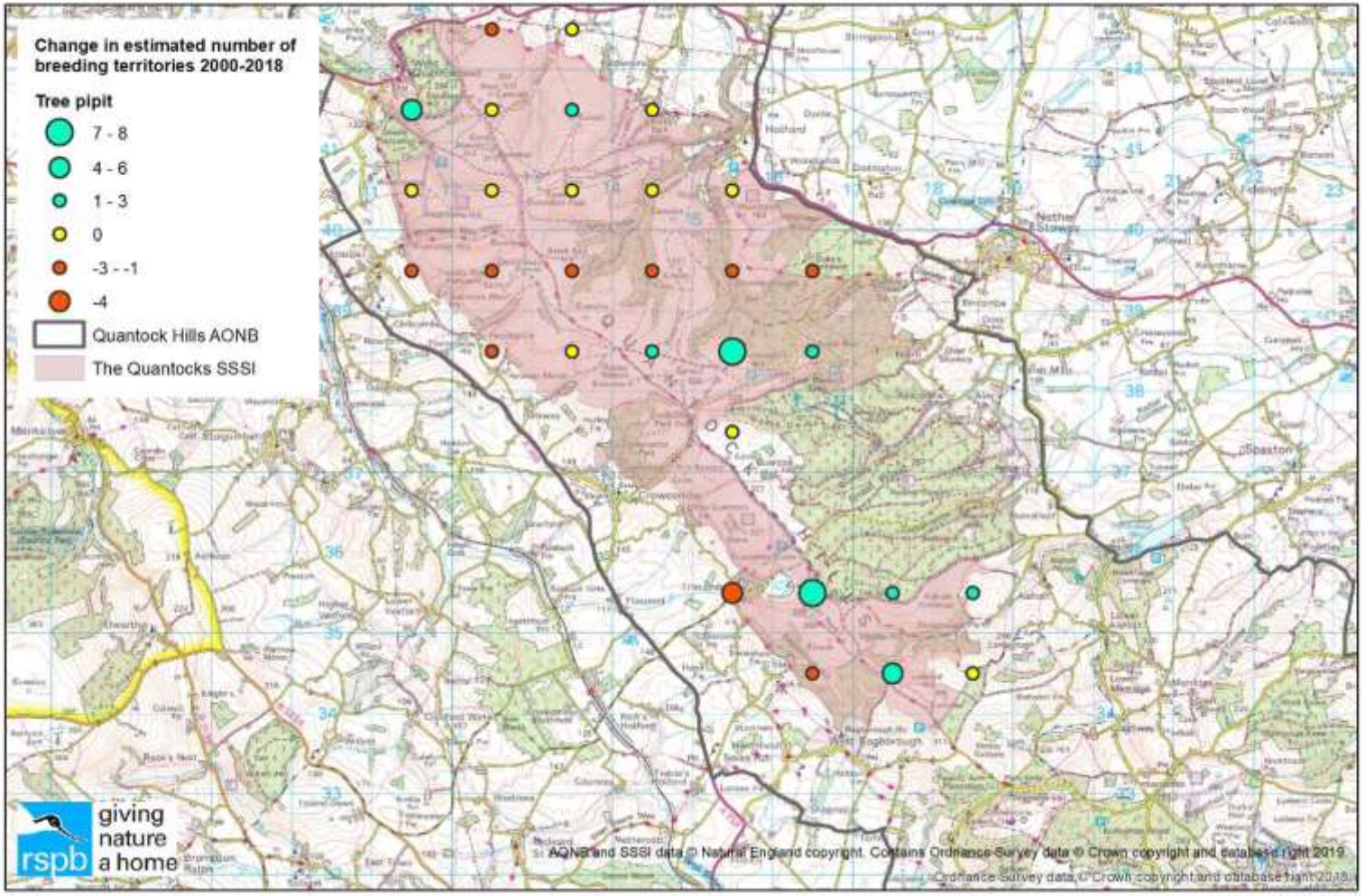

Fig 42 – tree pipit breeding territories change 2000-2018

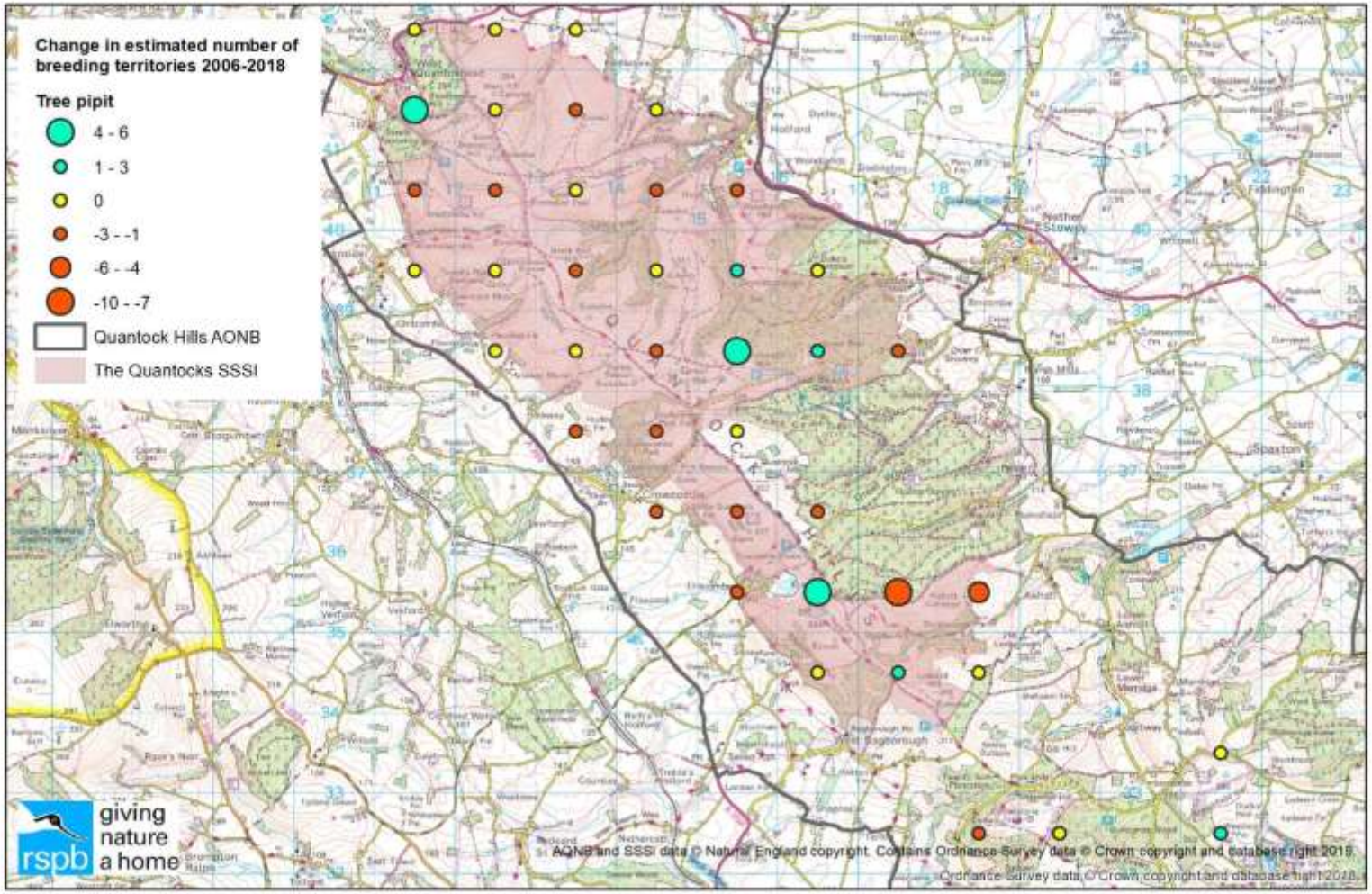

Fig 43 – tree pipit breeding territories change 2006-2018

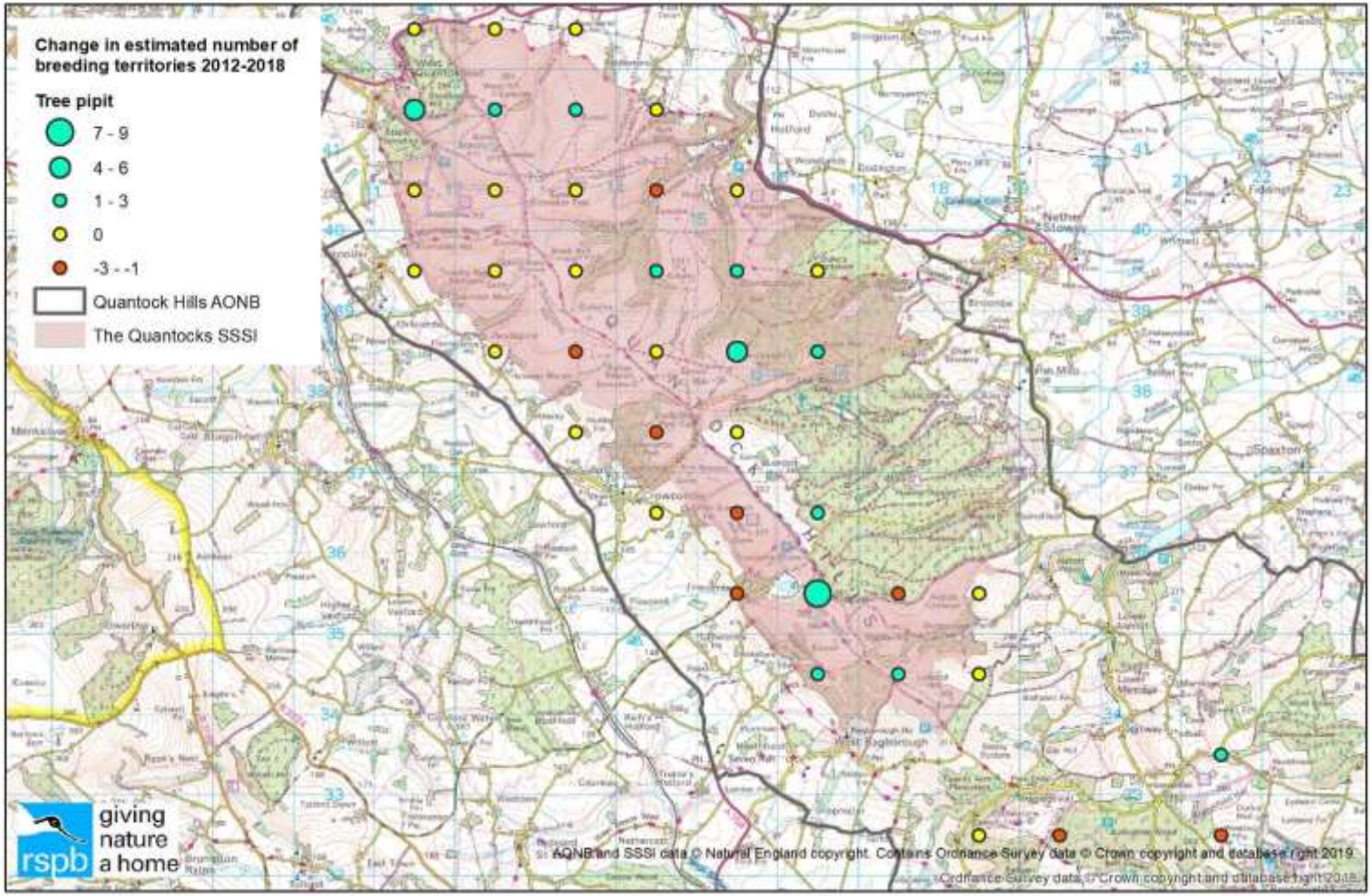

Fig 44 – tree pipit breeding territories change 2012-2018

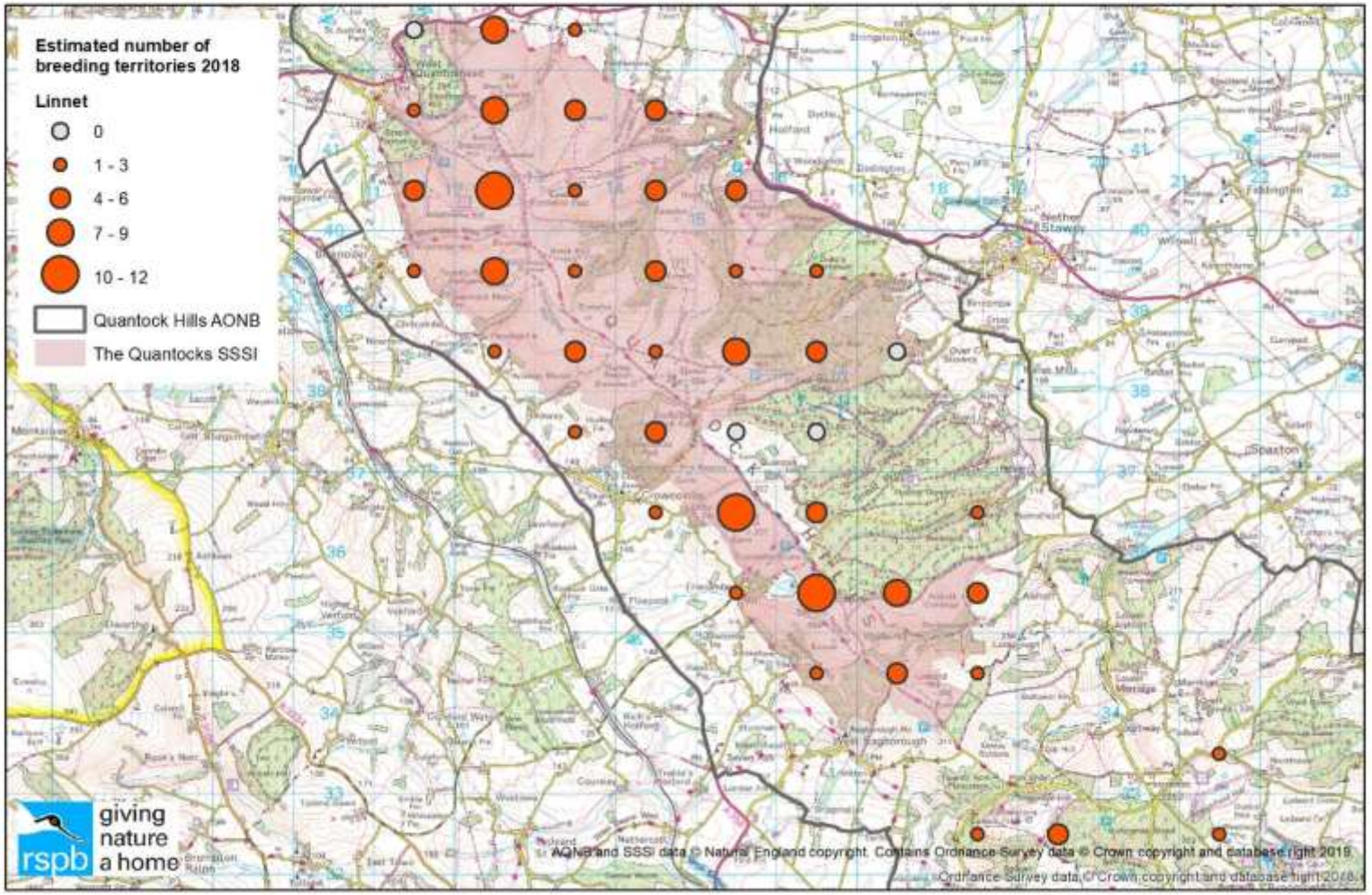

Fig 45 – linnet breeding territories distribution 2018

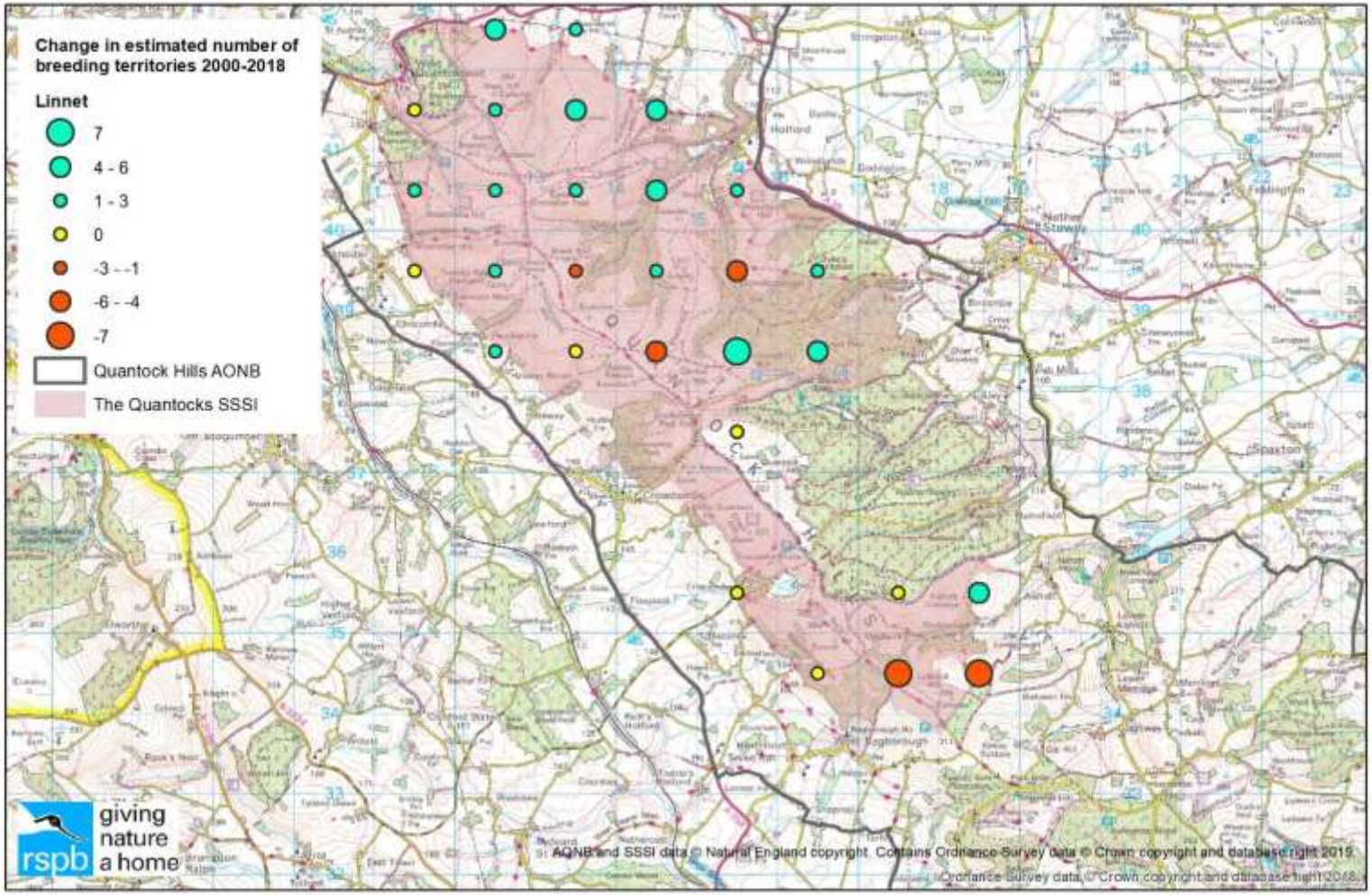

Fig 46 – linnet breeding territories change 2000-2018

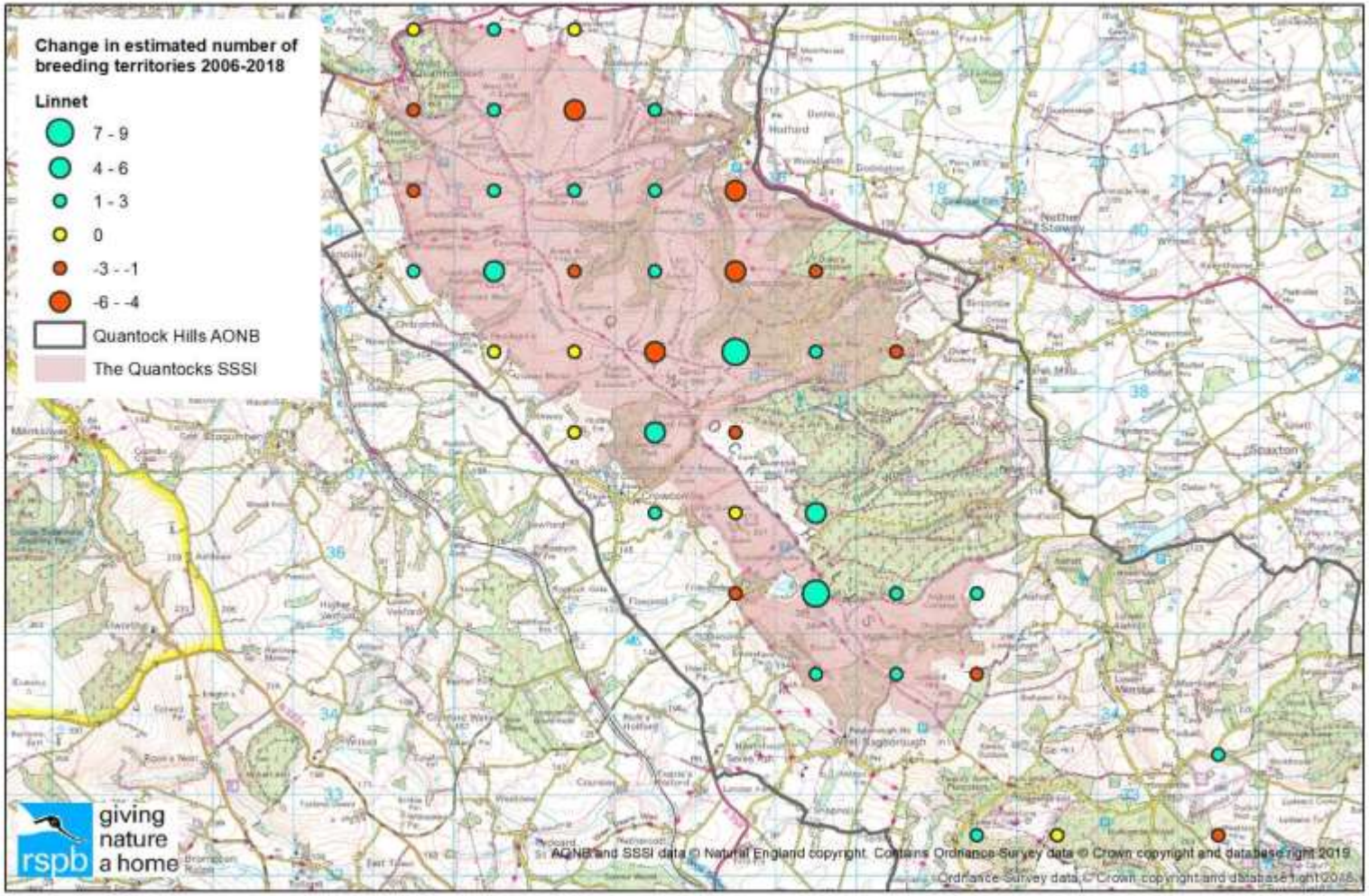

Fig 47 – linnet breeding territories change 2006-2018

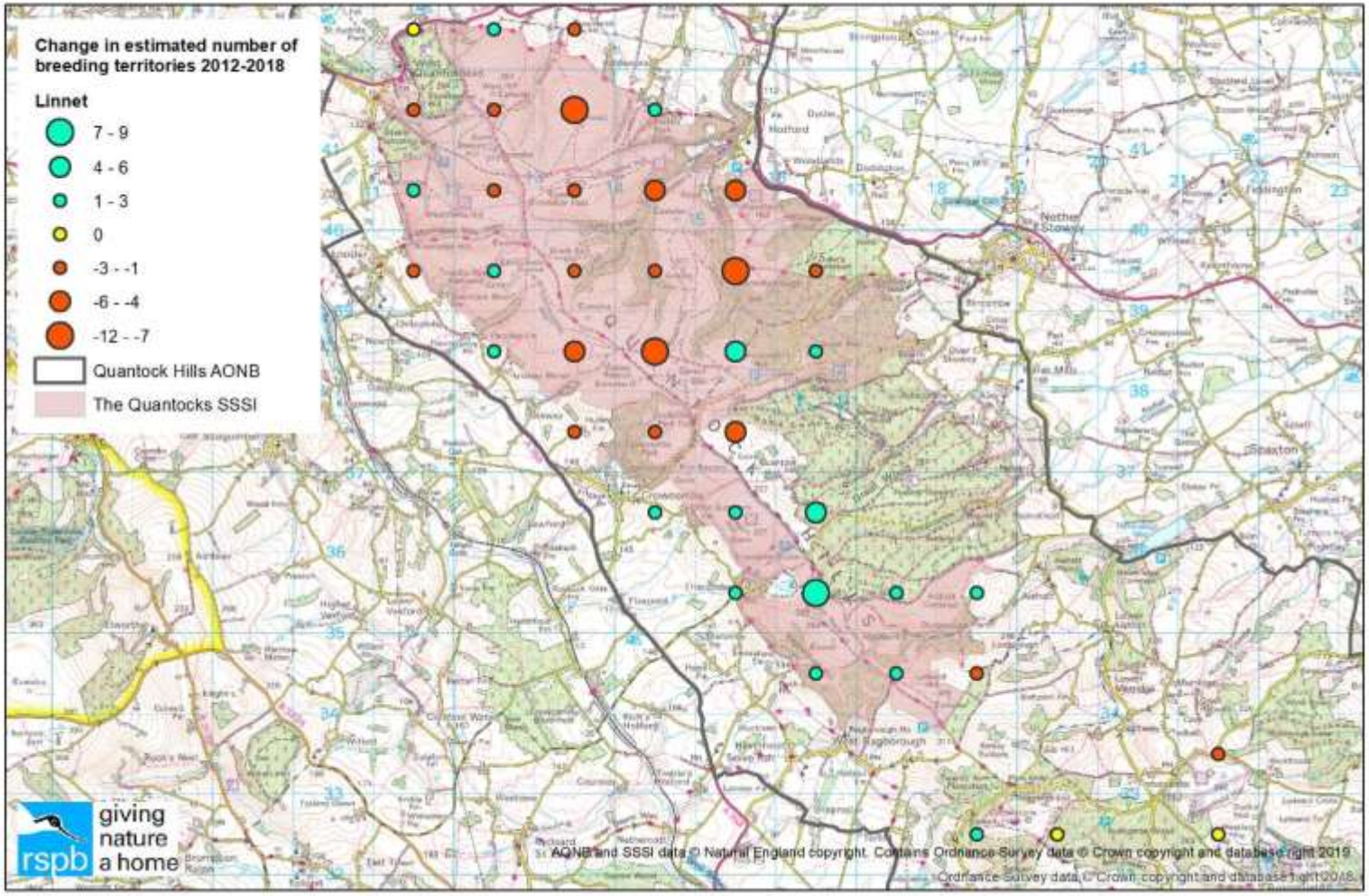

Fig 48 – linnet breeding territories change 2012-2018

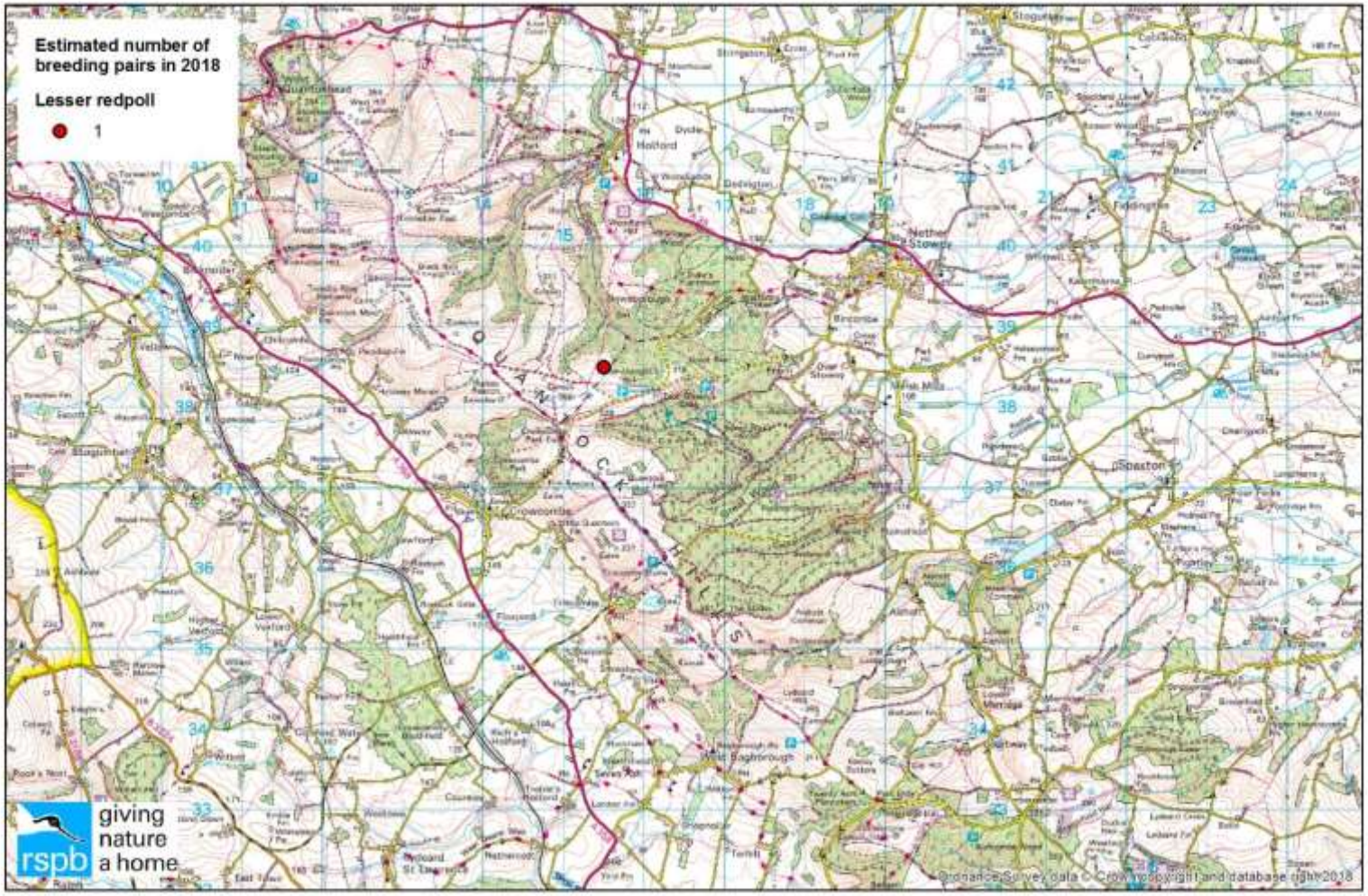

Fig 49 – lesser redpoll breeding territories distribution 2018

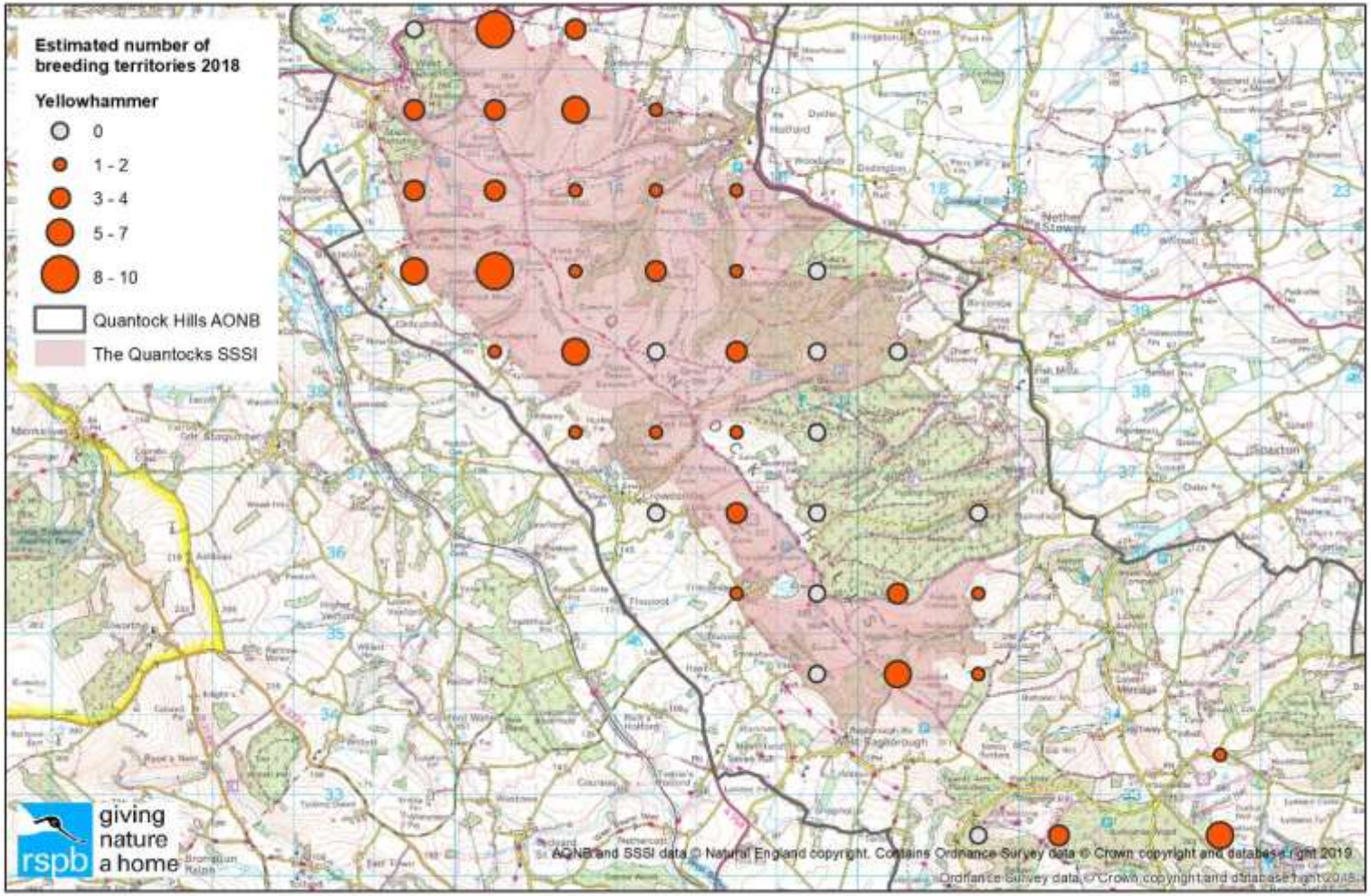

Fig 50 – yellowhammer breeding territories distribution 2018

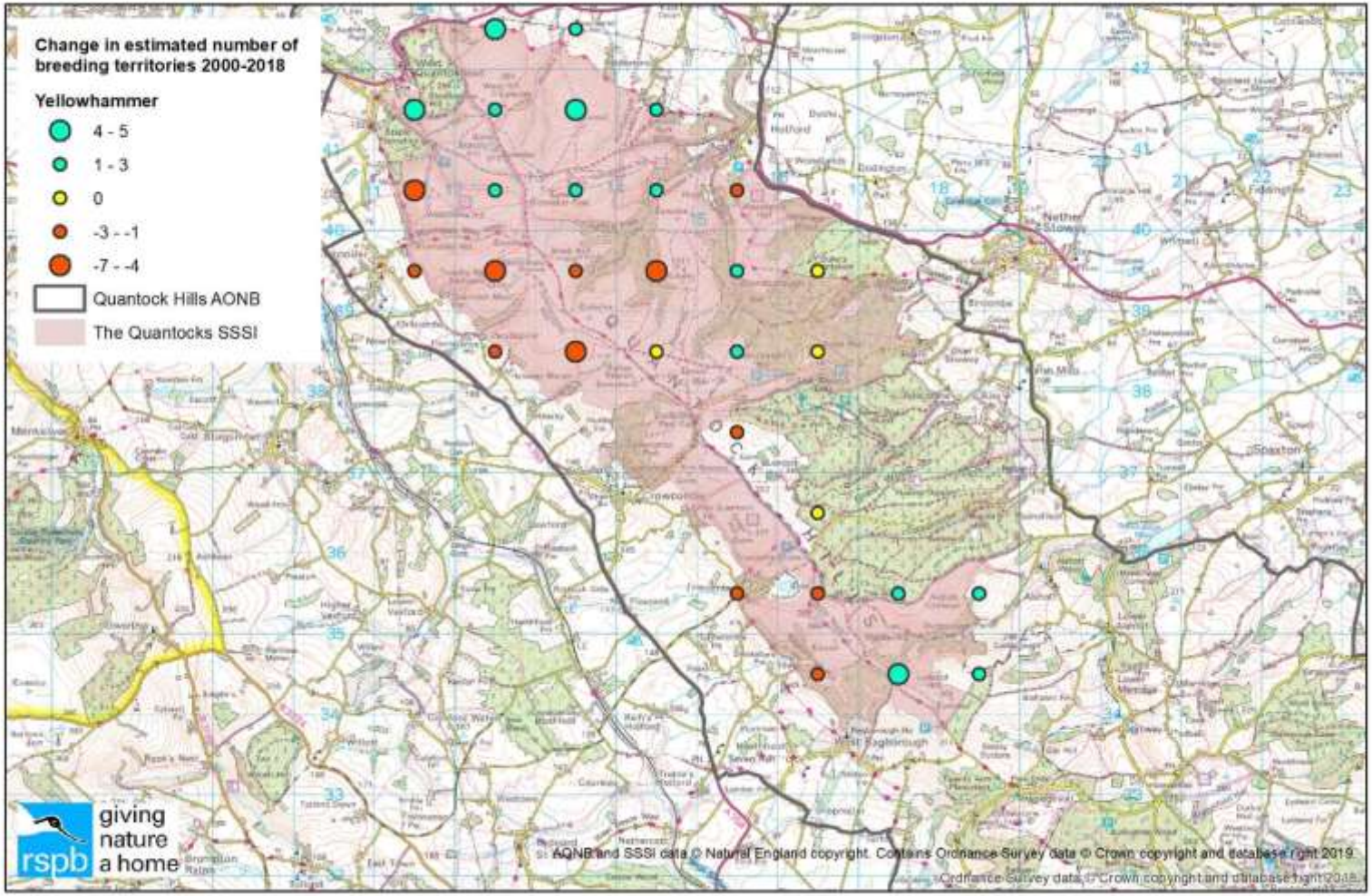

Fig 51 – yellowhammer breeding territories change 2000-2018

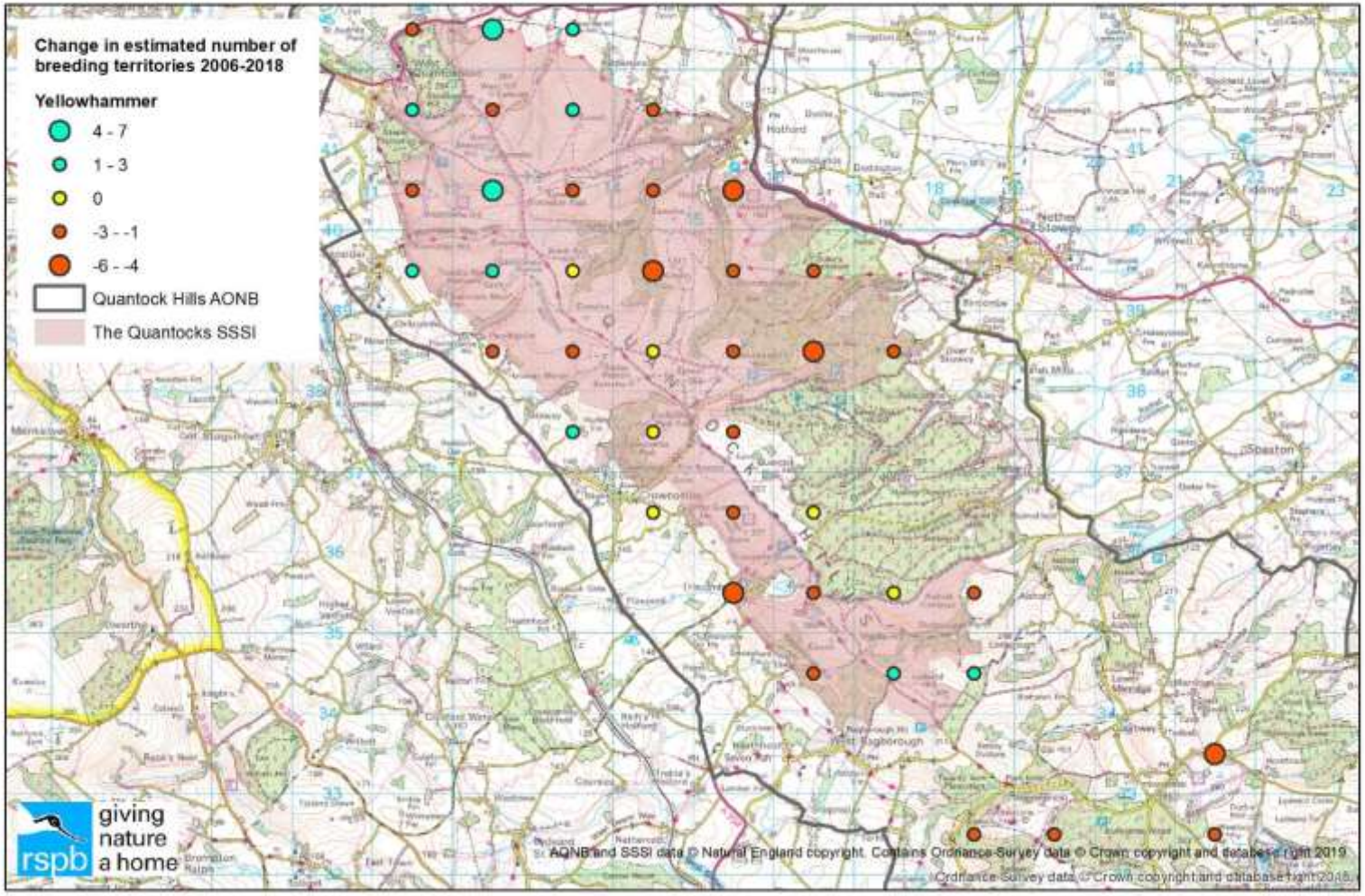

Fig 52 – yellowhammer breeding territories change 2006-2018

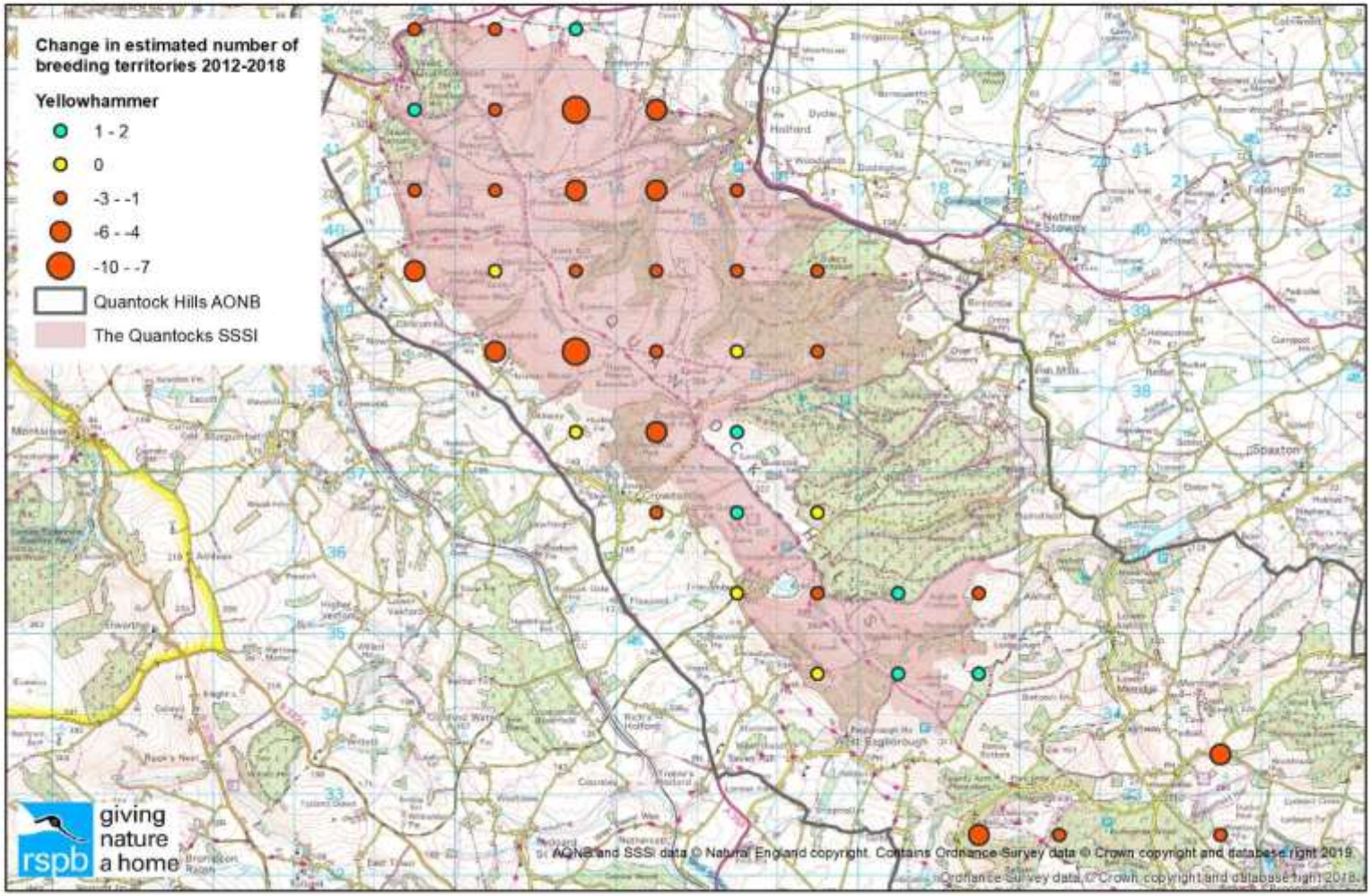

Fig 53 – yellowhammer breeding territories change 2012-2018