

# A Conservation Strategy for the **Shrill carder bee, *Bombus sylvarum*** in England and Wales 2020-2030

Sam Page, Sinead Lynch, Vicky Wilkins  
and Bex Cartwright



Led by



## Acknowledgements

This document was developed as part of the Back from the Brink partnership programme, made possible thanks to funding from the National Lottery Heritage Fund.



The species conservation planning process and stakeholder workshops were facilitated by the IUCN's Species Survival Commission (SSC) Conservation Planning Specialist Group (CPSG). Special thanks to facilitators Jamie Copesey and Vicky Wilkins.



We are grateful to all of the individuals, partners, stakeholders and volunteers who have participated in the conservation planning process to date (attending workshops, commenting on drafts) and to the experts who fed into the species knowledge review, everyone's contribution has been valuable.

Special acknowledgement to the organisations and individuals involved in the Strategy Steering Group, who have contributed considerable time and energy to producing and reviewing this document, and to Vicky Wilkins for her expert input.

The Shrill carder bee Strategy Steering Group members (at the time of writing) are as follows:



## Citation

Page, S., Lynch S., Wilkins, V. and Cartwright, B (2020) A Conservation Strategy for the Shrill carder bee *Bombus sylvarum* in England and Wales, 2020–2030. Bumblebee Conservation Trust, Stirling, Scotland UK

For further details contact: [enquiries@bumblebeeconservation.org](mailto:enquiries@bumblebeeconservation.org)

Cover photo: Claire Fidler.

# Contents

<i>Foreword by</i> <b>Baroness Jones of Moulsecoomb</b>	<b>4</b>
<i>Rhagair gan y</i> <b>Farwnes Jones o Moulsecoomb</b>	<b>4</b>
<b>Executive summary</b>	<b>5</b>
Our vision	5
Our goals	5
<b>Crynodeb gweithredol</b>	<b>6</b>
Ein gweledigaeth	6
Ein nodau	6
<b>Introduction</b>	<b>7</b>
Species status	7
Distribution and abundance	7
Species ecology	8
Threats and their drivers	8
Research and knowledge gaps	9
Conservation work to date	10
<b>Conservation strategy 2020–2030</b>	<b>11</b>
Vision and goals	12
Objectives and actions	13
Governance and monitoring progress	21
Partners and stakeholders	21
<b>Next steps</b>	<b>22</b>
Fundraising Plan	22
Communications Plan	22
Monitoring and Evaluation Plan	22
National Project	22
Local Implementation Plans	23
<b>References and further reading</b>	<b>24</b>



## Foreword by **Baroness Jones of Moulsecomb**

Having a tattoo makes me a rarity in the House of Lords. Few of my fellow peers sport one and I can guarantee that none of them have a Shrilc carder bee on their shoulder. Back in 2010 I was persuaded to have the tattoo as part of an artistic project to highlight a hundred species in the UK that were on the edge of extinction. Since then, I'm glad to see that the Shrilc carder bee has increasingly benefited from the wonderful work of conservation professionals and numerous volunteers, but there is still cause for concern.

The Shrilc carder bee in the UK is facing a unique set of challenges. Loss and fragmentation of habitat is the key threat and Shrilc carder bee populations are isolated. This makes them vulnerable to inbreeding and loss of genetic diversity, further increasing the risk of local extinctions.

The Shrilc carder bee, along with many other endangered species that we wish to conserve, are facing another major problem - climate change. This will inevitably impact on both individual species and the habitats that they rely upon to survive. Many species may be able to adapt and/or migrate. However, for species like the Shrilc carder bee that survive in just five geographically isolated areas, this

is difficult. The rate of climate change is speeding up every year and the shift in weather patterns, including the frequency of extreme weather events, is already having a noticeable impact. Time is not on the side of many threatened species. Migration to new suitable habitats is a possibility, but the isolation of the existing areas is leaving the bees cut off.

Another problem is uncertainty surrounding our approach to conservation, particularly Post Brexit. EU rules are in danger of being abandoned and new systems of enforcement are not yet in place. In England, both the Environment Bill and the Agriculture Bill will have major impacts on the way we seek to conserve habitats and species. This could be for the good, or for bad, but the impacts will be felt by those seeking to preserve endangered species and precious habitats.

This is why it is vitally important that we have strategies in place that will ensure a future for species like the Shrilc carder bee. I hope that we can turn these strategies into practical action on the ground and guarantee a future for the creatures that we share our environment with.

## *Rhagair gan y* **Farwnes Jones o Moulsecomb**

Mae bod â thatŵ yn fy ngwneud i'n eithaf unigryw yn Nhŷ'r Arglwyddi. Ychydig iawn o fy nghyd arglwyddi sydd ag un ac fe allaf i warantu nad oes gan yr un ohonyn nhw Gardwenynen feinlais ar eu hysgwydd. Yn ôl yn 2010 fe gefais i fy narbwylllo i gael tatŵ fel rhan o brosiect artistig i dynnu sylw at y cant o rywogaethau yn y DU oedd ar fin diflannu am byth. Ers hynny, rydw i'n falch o weld bod y Gardwenynen feinlais wedi elwa mwy a mwy o waith rhyfeddol y gweithwyr cadwraeth proffesiynol a'r gwirfoddolwyr niferus, ond mae lle i bryderu o hyd.

Mae'r Gardwenynen feinlais yn y DU yn wynebu cyfres unigryw o heriau. Colli a darnio ei chynefin yw'r prif fygythiad ac mae poblogaethau'r Gardwenynen feinlais yn ynysig. Mae hyn yn eu gwneud yn fwy agored i niwed o fewnfridio a cholli amrywiaeth enetig, gan gynyddu'r risg o ddiflannu yn lleol ymhellach.

Mae'r Gardwenynen feinlais, ynghyd â llawer o rywogaethau eraill sydd mewn perygl yr ydyn ni eisiau eu gwarchod, yn wynebu problem fawr arall - newid hinsawdd. Yn anochel, bydd hyn yn cael effaith ar rywogaethau unigol a'r cynefinoedd maen nhw'n dibynnu arnynt i oroesi. Efallai y bydd llawer o rywogaethau'n gallu addasu a/neu fudo. Fodd bynnag, ar gyfer rhywogaethau fel y Gardwenynen

feinlais sy'n goroesi mewn dim ond pum ardal ynysig yn ddaearyddol, mae hyn yn anodd. Mae cyfradd y newid yn yr hinsawdd yn cyflymu bob blwyddyn ac mae'r newid ym mhatrymau'r tywydd, gan gynnwys amledd tywydd eithafol, yn cael effaith amlwg eisoes. Nid yw amser ar ochr llawer o rywogaethau sydd dan fygythiad. Mae mudo i gynefinoedd newydd addas yn bosiblwydd, ond mae'r ynysu ar yr ardaloedd presennol yn gadael gwenyn wedi'u gwahanu.

Problem arall yw'r ansicrwydd am ein gwaith cadwraeth, yn enwedig ar ôl Brexit. Mae perygl y bydd rheolau'r UE yn cael eu dileu ac nid oes systemau gorfodi newydd yn eu lle eto. Yn Lloegr, bydd Bil yr Amgylchedd a'r Bil Amaethyddiaeth yn cael effaith fawr ar y ffordd rydyn ni'n ceisio gwarchod cynefinoedd a rhywogaethau. Gallai hyn fod er da, neu er drwg, ond bydd y rhai sy'n ceisio gwarchod rhywogaethau mewn perygl a chynefinoedd gwerthfawr yn teimlo'r effaith.

Dyma pam mae'n hanfodol bwysig bod gennym ni strategaethau yn eu lle a fydd yn sicrhau dyfodol i rywogaethau fel y Gardwenynen feinlais. Rydw i'n gobeithio y gallwn ni droi'r strategaethau hyn yn weithredu ymarferol ar y tir a gwarantu dyfodol ar gyfer y creaduriaid rydyn ni'n rhannu ein hamgylchedd gyda nhw.

# Executive summary

The **Shrill carder bee** (*Bombus sylvarum*) is one of the rarest and most threatened bumblebee species in England and Wales. Once widespread, it now only exists in five isolated population areas. In England, these are in the Thames Estuary and Somerset; in Wales these are in the Gwent Levels, Kenfig–Port Talbot, and south Pembrokeshire. In at least two of these population areas, numbers are worryingly low and appear to be declining.

There is an **urgent need for a coordinated and strategic approach** to ensure that this iconic bee, named for its charismatic high-pitched buzz, not only survives – but once again thrives.

This ten-year conservation strategy for England and Wales has been compiled through a **collaborative process with a range of partners and stakeholders** at national and local level. Through this process we developed a **Vision** for the Shrill carder bee in England and Wales. From there, we identified six **Goals** which would help us to achieve the vision. Underneath the goals sit **Objectives**, and then individual **Actions** which are assigned a lead organisation to take them forward.

A Shrill carder bee Strategy Steering Group, consisting of representatives from the Bumblebee Conservation Trust, Buglife, RSPB, BWARS, Natural England and Natural Resources Wales, has been set up to coordinate and oversee the strategy. The next stage in the process will be the development of Local Implementation Plans, to be taken forward by a local lead organisation. In order to maintain momentum and deliver the strategy we will develop a Monitoring and Evaluation Plan to monitor progress and evaluate impact, a fundraising plan to ensure that there are resources to implement the strategy, and a communications plan to increase engagement with the strategy.

## Our vision

*It is 2050. The Shrill carder bee is thriving, with sustainable populations that are spreading and connecting across a network of flower-rich landscapes. This recovery is founded on a robust understanding of its needs, and coordinated action at national, local and community level. As a flagship species, the Shrill carder bee is valued as an important part of our natural heritage.*

## Our goals

- Goal 1:** No net loss of occupied area for Shrill carder bee populations, preventing local extinctions.
- Goal 2:** Habitat resources for Shrill carder bee are increased in size, quality, resilience and connectivity to achieve viable populations.
- Goal 3:** Shrill carder bee populations are increasing in occupied area, abundance and viability, reducing national extinction risk.
- Goal 4:** Shrill carder bee knowledge and understanding is increased, and all data and information is openly accessible, facilitating evidence-based conservation.
- Goal 5:** Key audiences have an appreciation and sense of responsibility for the Shrill carder bee, facilitating action and protection for the species.
- Goal 6:** Good governance for the Shrill carder bee strategy will be achieved at all levels, maintaining momentum and quality in implementation.

# Crynodeb gweithredol

Mae'r **gardwenynen feinlais** (*Bombus sylvarum*) yn un o'r rhywogaethau prinnaf ac sy'n wynebu'r bygythiad mwyaf fel cacynen yng Nghymru a Lloegr. Arferai fod â dosbarthiad eang ond bellach dim ond mewn pum ardal boblogaeth ynysig mae'n bodoli. Yn Lloegr, yr ardaloedd hyn yw Aber Afon Tafwys a Gwlad yr Haf; yng Nghymru, Gwastadeddau Gwent, Cynffig–Port Talbot, a de Sir Benfro yw'r rhain. Mewn o leiaf ddwy o'r ardaloedd poblogaeth hyn, mae'r niferoedd yn bryderus o isel ac yn ymddangos fel pe baent yn dirywio.

Mae **angen brys am ddull strategol ac wedi'i gydlynu** o weithio i sicrhau bod y wenynen eiconig hon, sydd wedi cael ei henw oherwydd ei suo main carismataidd, nid yn unig yn goroesi – ond yn ffynnu unwaith eto. Mae'r strategaeth ddeng mlynedd yma ar gyfer Cymru a Lloegr wedi cael ei llunio drwy **broses gydweithredol ar gyfer partneriaid a rhanddeiliaid** amrywiol ar lefel genedlaethol a lleol. Drwy gyfrwng y broses hon rydyn ni wedi datblygu **Gweledigaeth** ar gyfer y Gardwenynen feinlais yng Nghymru a Lloegr. Dewiswyd chwe **Nod** gennym i'n helpu i gyflawni'r weledigaeth. O dan y nodau mae **Amcanion**, ac wedyn **Camau Gweithredu** unigol sy'n cael eu neilltuo i sefydliad arweiniol er mwyn bwrw ymlaen â hwy.

Mae Grŵp Llywio Strategaeth y Gardwenynen feinlais, sy'n cynnwys cynrychiolwyr o'r Ymddiriedolaeth Cadwraeth Cacwn, Buglife, yr RSPB, BWARS, Natural England a Chyfoeth Naturiol Cymru, wedi cael ei sefydlu er mwyn cydlynu a goruchwyllo'r strategaeth. Cam nesaf y broses fydd datblygu Cynlluniau Gweithredu Lleol, i'w rhoi ar waith gan y sefydliad arweiniol lleol. Er mwyn cynnal momentwm a rhoi'r strategaeth ar waith, bydd Cynllun Monitro a Gwerthuso'n cael ei ddatblygu er mwyn monitro cynnydd a gwerthuso effaith, a chynllun codi arian i sicrhau bod adnoddau ar gael i weithredu'r strategaeth, a hefyd cynllun cyfathrebu i gynyddu'r ymgysylltu â'r strategaeth.

## Ein gweledigaeth

*Mae'n 2050. Mae'r Gardwenynen feinlais yn ffynnu, gyda phoblogaethau cynaliadwy sy'n lledaenu ac yn cysylltu ar draws rhwydwaith o dirweddau sydd â chyfoeth o flodau. Sylfaen yr adferiad yma yw deall ei hanghenion a gweithredu wedi'i gydlynu ar lefel genedlaethol, lleol a chymunedol. Fel rhywogaeth nodedig, mae'r Gardwenynen feinlais yn cael ei gwerthfawrogi fel rhan bwysig o'n treftadaeth naturiol.*

## Ein nodau

- Nod 1:** Dim colled net o'r ardaloedd maent yn byw ynddynt i boblogaethau'r Gardwenynen feinlais, gan atal diflannu yn lleol.
- Nod 2:** Cynyddu adnoddau cynefin y Gardwenynen feinlais o ran maint, ansawdd, cadernid a chysylltedd er mwyn sicrhau poblogaethau hyfyw.
- Nod 3:** Poblogaethau'r Gardwenynen feinlais yn cynyddu yn yr ardaloedd lle maent yn byw, gyda digonedd a hyfywedd, gan leihau'r risg o ddiflannu yn genedlaethol.
- Nod 4:** Cynyddu'r wybodaeth am y Gardwenynen feinlais a'r ddealltwriaeth ohoni, a'r holl ddata a'r wybodaeth ar gael yn hwylus, gan hwyluso cadwraeth seiliedig ar dystiolaeth.
- Nod 5:** Cynulleidfaoedd allweddol yn gwerthfawrogi ac yn teimlo cyfrifoldeb am y Gardwenynen feinlais, gan hwyluso gweithredu dros y rhywogaeth a'i gwarchod.
- Nod 6:** Llywodraethu da ar gyfer strategaeth y Gardwenynen feinlais yn cael ei gyflawni ar bob lefel, gan gynnal momentwm ac ansawdd wrth weithredu.



# Introduction

The Shrill carder bee (*Bombus sylvarum*) is one of the **most threatened bumblebee species in England and Wales**. Once widespread, it now only exists in five isolated population areas. In at least two of these, numbers are worryingly low and appear to be declining. This, together with a range of other threats, means the species is vulnerable and at risk of further local extinctions – following its apparent loss from Salisbury Plain (a sixth population, last recorded in 2008) – and national declines.

There is an urgent need for a coordinated and strategic approach to ensure that this iconic bee, named for its charismatic high-pitched buzz, not only survives – but once again thrives. This ten-year strategy, compiled through a collaborative process with a range of partners and stakeholders, aims to do this.

## Species status

The Shrill carder bee (*Bombus sylvarum*) is listed as a **priority species of conservation concern** under Section 41 in England (NERC Act 2006) and Section 7 in Wales (Environment [Wales] Act 2016). It was a UK Biodiversity Action Plan species and listed as Notable b (Nationally Scarce Nb) by Falk (1991). An updated status review for aculeate species in Great Britain (including Shrill carder bee) is currently underway but the results were not available at the time of writing.

The Shrill carder bee is also a qualifying feature for a number of Sites of Special Scientific Interest.

As part of the conservation planning process, a comprehensive species knowledge review was produced by the Bumblebee Conservation Trust and Buglife ([www.bumblebeeconservation.org/wp-content/uploads/2017/07/Shrill-carder-bee-species-knowledge-review-10.19.pdf](http://www.bumblebeeconservation.org/wp-content/uploads/2017/07/Shrill-carder-bee-species-knowledge-review-10.19.pdf)). The following sections provide a brief overview from that document. Species threat analysis sessions in June and October 2019 involving a range of stakeholders also inform section 1.4 (Threats and their drivers).

## Distribution and abundance

The Shrill carder bee (*Bombus sylvarum*) has a wide distribution across Europe and has been found to be associated with warmer and drier areas of the

continent (Williams et al, 2007). It is on the northern edge of its range in the UK. Historic records indicate that the Shrill carder bee was widespread across southern England and Welsh lowland and coastal regions, with more localised records in central and northern England. The second half of the 20th century saw a major decline in range for the species.

Populations of Shrill carder bee are now **limited to five key areas across the UK**. In England, these are the Thames Estuary and Somerset; in Wales these are the Gwent Levels, Kenfig–Port Talbot, and south Pembrokeshire. The Thames Estuary and Gwent Levels populations appear to be the largest and most abundant. The Somerset population exists at a very low population density and the Kenfig population is small and restricted. Less is known about the Pembrokeshire population but it does not appear to be thriving in a manner equivalent to the Thames Estuary or Gwent populations. It is possible a sixth population on Salisbury Plain may remain in very low numbers; however, this population is likely to have been lost (at the time of writing [Feb 2020] the last recorded sighting was in 2008).

There is reasonable distribution data for Shrill carder bee (although the relatively frequent discovery of new sites and rediscovery of the species at previous locations suggests that the species may be easily overlooked in a landscape).

In terms of abundance monitoring, Shrill carder bee has been recorded on several BeeWalk transects (the Bumblebee Conservation Trust's national bumblebee recording scheme which measures abundance) but there are significant gaps in coverage, with very few or no active transects in some population areas, and there is currently insufficient BeeWalk data to reliably assess and monitor population abundance.



**Figure 1. Shrill carder bee (*Bombus sylvarum*) distribution records, 2010-19**

Data from the Trust, BWARS – including iRecord, BRERC, KMBRC, CCW/NRW, Kent Field Club, NT, SERC, SEWBRc & WWBIC.

## Species ecology

The Shrill carder bee is a **late-emerging** bumblebee in the UK, with new colonies being established by a single queen usually in late May (although in some years there are sightings in April). Workers are seen from June to October, and males and daughter queens appear from late August. New queens enter hibernation from late September.

The species is **long-tongued** and appears to use a wide range of forage species overall but time of year and local conditions dictate the forage available. In addition, differences in forage choice are displayed between different populations. Plant species within the families Fabaceae (Pea family), Lamiaceae (Mint family), Orobanchaceae (Broomrape family) and Asteraceae (Daisy family) all appear to be important.

The Shrill carder bee is associated with open, often tall grassland sites with a varied sward structure and a high density of diverse forage sources. Recent records are from a variety of **flower-rich habitats and habitat mosaics**, including but not exclusive to: traditionally managed hay meadows and pastures, chalk downland, sand dunes, brownfield sites, field ditches, coastal floodplain grazing marsh, saltmarsh and sea walls - which can be an important habitat particularly in the Thames gateway.

Good quality Shrill carder bee habitat should provide abundant forage and suitable nesting in close proximity. **Management recommendations** tend

to focus on ensuring plentiful flower-rich habitat, with continuity of suitable forage through the Shrill carder bee flight season (April-October) in addition to providing undisturbed nesting habitat.

There is currently little data on or knowledge of Shrill carder bee nesting and hibernation sites. Nests appear to be associated with rough long grass with a litter layer, and have been found on the surface or just below ground. There is some evidence that there is a preference for a sunny exposure and a south/south-east facing slope.

There is no evidence of problems with pests or pathogens specific to Shrill carder bee, but little research has been done in this area. There are a range of parasites, parasitoids and pathogens which affect bumblebees in general. These parasites and diseases are likely to affect the Shrill carder bee, although their lower population densities may reduce the impact of these compared with more common bumblebee species.

## Threats and their drivers

**Loss of habitat** is a key threat for the Shrill carder bee, particularly the loss and fragmentation of flower-rich habitat mosaics that provide all the life cycle requirements (foraging, nesting, hibernation) needed to sustain resilient Shrill carder bee populations.



Drivers for this habitat loss include **inappropriate management** (such as badly timed or frequent cutting, over-grazing, use of fertiliser) or a **lack of management resulting in degradation or loss of habitats** (e.g. through grass dominance, scrub encroachment, invasive species). **Development pressures** (such as housing, industry, transport infrastructure) are a major threat and driver for loss of habitat for Shril carder bee populations in heavily populated and/or industrial areas such as the Thames Estuary (e.g. Port of Tilbury expansion) and parts of south Wales (e.g. M4 relief road, Gwent Levels Solar Farm).

Shril carder bee populations in the UK are isolated from one another and found in fragmented habitats. As a result, they are **vulnerable to inbreeding and loss of genetic diversity**, reducing resilience and increasing the risk of local extinctions. Ellis et al (2006) found evidence of inbreeding and a genetic bottleneck in the Castlemartin (Pembrokeshire) population. However, further updated research is needed to determine the severity of this threat on current populations.

Climate change, and in particular **extreme weather events** such as flooding and drought, is also a threat. For the Somerset population, risk of flooding and the threat of severe floods is likely to increase in the coming decades. Flooding can cause habitat loss or degradation (and reduced availability of forage) but can also affect the survival of nests or overwintering queens. Small, isolated populations with low abundance (such as that in Somerset) are particularly at risk. It is likely that flooding on Somerset Levels has already been a driver for Shril carder bee population declines in the Somerset population.

A variety of **interrelated threats** are likely to be acting on Shril carder bee populations alongside habitat loss and extreme weather events, including: an inability for bees to disperse and track with climatic shifts; phenological shifts caused by climate change impacting foraging; pesticides; pathogens; and possible competition and disease risk from commercial bee populations.

A disconnect between people and nature, alongside a lack of understanding and/or appreciation for the Shril carder bee and its habitats, were also identified as threats during the process.

## Research and knowledge gaps

Much of the current knowledge on Shril carder bee builds on extensive work carried out by the Bumblebee Working Group and Hymettus in the 1990s and early 2000s. Since then, there have been a few key studies such as genetic research by Ellis et al (2006), a PhD thesis by Stuart Connop (2007), and a series of Countryside Council for Wales and Natural Resources Wales survey reports carried out across the Welsh populations between 2000 and 2013.

There are a number of **knowledge gaps** which need to be addressed to better inform effective conservation of this species. These include:

- Existing and potential future changes in the climate envelope for the species across north west Europe
- Genetic structuring of the species at a UK and European (for context) level, and determining level of inbreeding pressure
- Ecological requirements e.g. Foraging behaviour (temporal, differentiation of nectar and pollen sources, preferences between castes, forage distance); Queen dispersal times and distances; Nesting and hibernation requirements
- Use of habitat at a landscape scale, particularly in relation to habitat fragmentation and location of nesting sites and forage resources.
- Impact of pesticides and pathogens on Shril Carder bee populations and disease risk and competition from commercial bumblebee and honeybee populations

Robust **population monitoring** is also required, involving a more targeted approach across all population areas (including Salisbury Plain). In addition to BeeWalk (national bumblebee recording scheme), different approaches may be needed – particularly for lower density populations – such as: more intensive surveying, longer or more frequent transects, and timed counts. There is also a lack of data regarding queen and/or reproductive nest abundance.

## Conservation work to date

A range of short-term conservation projects have been delivered across England and Wales in recent years – only one has focused solely on the Shrill carder bee (Back from the Brink Shrill carder bee project, [naturebftb.co.uk/the-projects/shrill-carder-bee](http://naturebftb.co.uk/the-projects/shrill-carder-bee)), others have had a more general pollinator/invertebrate or habitat focus, and some have had Shrill carder bee as one of several target priority bumblebee species e.g. Making a Buzz for the Coast ([bumblebeeconservation.org/making-a-buzz-for-the-coast](http://bumblebeeconservation.org/making-a-buzz-for-the-coast)) and Pollinating the Levels ([livinglevels.org.uk/project-descriptions/2018/2/19/pollinating-the-levels](http://livinglevels.org.uk/project-descriptions/2018/2/19/pollinating-the-levels)). Sensitive management of sea walls by the Environment Agency aims to boost populations and facilitate the spread of Shrill carder bee in Essex and Kent' In addition, habitat management and habitat restoration/creation activities for Shrill carder bee have taken place via eNGOs and government bodies on nature reserves (e.g. RSPB, Wildlife Trusts, National Trust, local authorities, NRW), and to some extent through agri-environment schemes. However, a more targeted, long-term and coordinated approach is needed across all five Shrill carder bee

population areas to conserve the species and ensure its survival.

With its high-pitched buzz and distinctive colouring/banding, as well as its priority conservation status, the Shrill carder bee is an appropriate species for community engagement. There are good opportunities to use it as **flagship species** to champion pollinator and threatened bumblebee conservation, as well as the habitats it is associated with; engaging landowners and professionals as well as the wider public with its conservation. Several projects have been taking concerted action to raise public awareness (e.g. Making a Buzz for the Coast, Bee Wild West Wales, Back from the Brink) with positive results.

There is also scope for key sites to become **Shrill carder bee champion sites** (an initiative being explored under the Back from the Brink project) in order to promote and celebrate the positive work being done on these sites for Shrill carder bee, and increase public awareness of their importance for the species.



Meadow at Lytes Cary Manor.



Beginners ID Course, Somerset.

Photo credit: Daisy Headley.

Photo credit: Daisy Headley.



# Conservation strategy 2020–2030

This strategy has been developed as part of the ‘Back from the Brink’ Shrill carder bee project through a **collaborative process** of species conservation planning, led by the Bumblebee Conservation Trust, with Buglife, and facilitated by the IUCN SSC Conservation Planning Specialist Group.

A range of partners and stakeholders have been involved (see partner endorsement on page 25, also see Copsey, et al. (2019) for more details of the Shrill carder bee conservation planning workshop) and a Strategy Steering Group (SCB SSG) has been set up to coordinate and oversee the strategy, consisting of representatives from the Trust, Buglife, RSPB, Natural England, Natural Resources Wales, and BWARS.

This document is a top-level **national strategy**, aimed at ensuring a coordinated and strategic approach for conservation of the Shrill carder bee across its current UK population range (England and Wales), covering a ten year period from 2020 to 2030. This strategy will be accompanied by detailed **Local Implementation Plans** (to be developed) in each of the five population areas where Shrill carder bee persists.

A two-day Shrill carder bee conservation planning workshop was held in October 2019, attended by

40 participants with representation from a variety of organisations including government (national and local), non-governmental, and academic institutions. The results of the workshop were compiled into a report (Copsey et al, 2019) and, together with an initial Threat Analysis workshop in June 2019, have formed the basis of this strategy. Detailed information from the workshops relevant to the next steps, including the Local Implementation Plans, has been captured in a separate document to inform development of these going forward.

Prior to the workshop and to inform the conservation planning process, a **species knowledge review** was produced by the Bumblebee Conservation Trust and Buglife, in consultation with other experts. This document will be reviewed and updated every three years (Action 6.1.5, page 20).



Mosaic of forage and nesting habitat, Canvey Wick.



Shrill carder bee (*Bombus sylvarum*), Dungeness.

## Vision and goals

### Our vision

*It is 2050. The Shrill carder bee is thriving, with sustainable populations that are spreading and connecting across a network of flower-rich landscapes. This recovery is founded on a robust understanding of its needs, and coordinated action at national, local and community level. As a flagship species, the Shrill carder bee is valued as an important part of our natural heritage.*

### Our goals

These goals outline the broad operational themes for conservation activity for Shrill carder bee over the next ten years. For each goal, a number of objectives have been formulated and specific actions identified in relation to these. See Action Tables in the following section.

- Goal 1:** No net loss of occupied area for Shrill carder bee populations, preventing local extinctions.
- Goal 2:** Habitat resources for Shrill carder bee are increased in size, quality, resilience and connectivity to achieve viable populations.
- Goal 3:** Shrill carder bee populations are increasing in occupied area, abundance and viability, reducing national extinction risk.
- Goal 4:** Shrill carder bee knowledge and understanding is increased, and all data and information is openly accessible, facilitating evidence-based conservation.
- Goal 5:** Key audiences have an appreciation and sense of responsibility for the Shrill carder bee, facilitating action and protection for the species.
- Goal 6:** Good governance for the Shrill carder bee strategy will be achieved at all levels, maintaining momentum and quality in implementation.



A Shrill carder bee queen foraging on Knapweed.



Habitat management for bumblebees workshop, Coalhouse Fort.



## Objectives and actions

In the following tables, objectives and actions have been grouped under each goal. Lead and supporting organisations have been identified, as have broad timelines and resources.

There are no performance indicators nor milestones present in these tables, instead indicators and milestones will be outlined in the Strategy’s ‘Monitoring and Evaluation Plan’ that will be developed in the first year of the strategy’s implementation – see section 3 ‘Next Steps’. The action tables will be fully reviewed and updated every three years (in addition to six-monthly progress updates carried out by the Strategy Steering Group), so some action timelines have been structured around this.

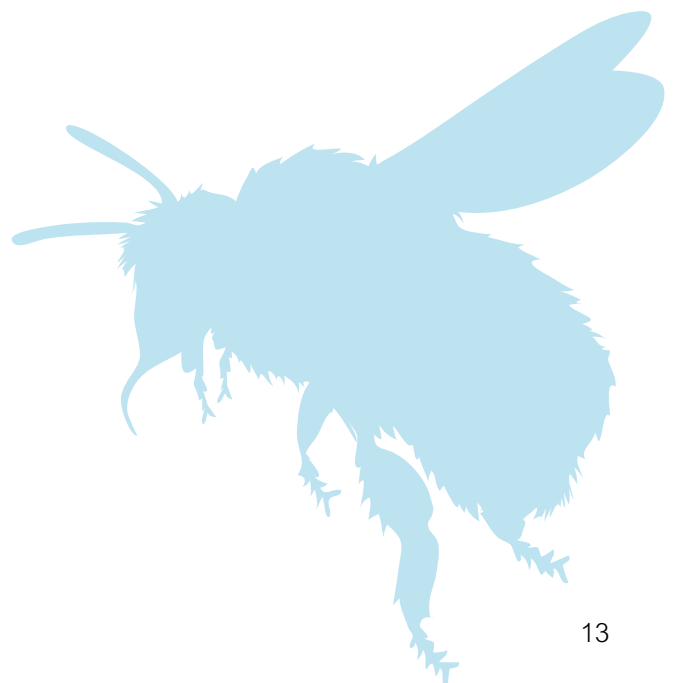
Organisations identified as the ‘lead partner’ for an action are intended to act as a coordinator for that action, with support from partners on delivering the action. It is not anticipated that the ‘lead partner’ carries out all of the work for that action; for example, although the Bumblebee Conservation Trust are currently highlighted as the lead partner on many actions, significant support for other partners and stakeholders will be necessary for delivery of these actions.

As a national (England and Wales) focused strategy, many of these actions will be implemented at a national level but some do need specific local action to be successful and when necessary this has been highlighted in the tables. More detailed local actions will be outlined in the ‘Local Implementation Plans’, for more information see section 3 ‘Next Steps’.



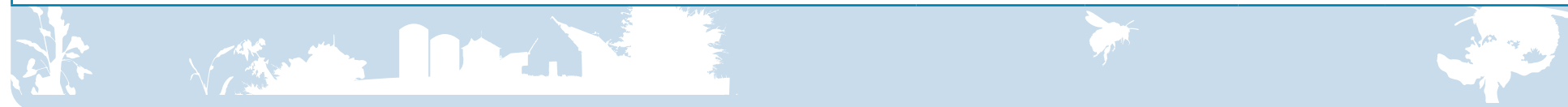
Photo credit: Daisy Headley.

A Shrilc carder bee foraging on Red bartsia.



**Goal 1: No net loss of occupied area for Shrill carder bee populations, preventing local extinctions.**

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
1.1 Maintain Shrill carder bee habitat through reduced development pressure and increase habitat provision through planning commitments					
<b>Policy</b>	<b>1.1.1</b> Embed Shrill carder bee in local planning and biodiversity policies in local authority areas supporting Shrill carder bee populations.	<b>Buglife (lead)</b> RSPB	Local	2020–2030	Staff time
<b>Awareness</b>	<b>1.1.2</b> Produce advisory materials to support the development of appropriate mitigation and land management strategies and disseminate to local authorities and local NGO partners.	<b>Buglife</b> RSPB	National / Country level	2020	Staff time
<b>Policy / Habitat management</b>	<b>1.1.3</b> Collate and respond to major planning applications affecting Shrill carder bee populations and press for best practice mitigation where appropriate.	<b>Buglife (lead)</b> RSPB	National / Country level	2020–2030	Staff time
1.2 Maintain Shrill carder bee populations on designated sites by ensuring site protection and appropriate management					
<b>Policy</b>	<b>1.2.1</b> Shrill carder bee is a qualifying feature on designated sites which are considered to be important in supporting Shrill carder bee populations.	<b>NE/NRW</b>	Country level	2020–2023	Staff time
<b>Habitat management</b>	<b>1.2.2</b> Appropriate habitat management interventions are integrated into the management of designated sites which feature Shrill carder bee as qualifying feature to ensure the species is not lost from existing sites.	<b>NE/NRW</b>	Country level	2020–2023	Staff time



**Goal 2:** Habitat resources for Shrill carder bee are increased in size, quality, resilience and connectivity to achieve viable populations.

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
Objective 2.1 Improved land management to increase size and quality of Shrill carder bee habitat, as well as managing threats					
<b>Habitat management</b>	<b>2.1.1</b> Design a standardised <b>Shrill carder bee advice framework</b> of land management recommendations and standards that can be tailored to geographical location; and develop an associated online information sharing platform (links to Action 4.2.1).	<b>BBCT (lead)</b> Buglife, RSPB Local partners	National	2021–2023	Staff time, online platform
	<b>2.1.2</b> Integration of threat mitigation into land management recommendations and standards (action 2.1.1), e.g. in relation to climate change, extreme weather events, pesticides, imported bees (competition and disease/pathogen flow).	<b>BBCT (lead)</b> Buglife, RSPB	National	2021–2030	Staff time
	<b>2.1.3</b> Produce a summary of Agri-environment (AES) options for Shrill carder bee (e.g. location, size, establishment methods, ongoing maintenance) and disseminate to advisers in Welsh Government/Natural Resources Wales and Natural England, and local advisory networks. Ensure these options are updated when new AES schemes commence.	<b>RSPB (lead)</b> NE, NRW, BBCT, Buglife	Country level	2020–2030	Staff time
	<b>2.1.4</b> Deliver bespoke land management advice in Shrill carder bee population areas, via local projects, and establish small grant schemes for land managers in each Shrill carder bee population area. (Linked to Action 2.2.3)	<b>BBCT (lead)</b> Local partners	Local	2022–2030	Funded project(s)
	<b>2.1.5</b> Create, pilot and implement a standardised site evaluation and habitat monitoring protocol for Shrill carder bee, incorporating forage and nesting habitat; Link to Action 3.1.1 to set up a feedback loop to ensure habitat data and population data is analysed together and can inform future evidence-based habitat delivery.	<b>BBCT (lead)</b> Buglife, RSPB, BWARS	National	2021–2022	Funded project (development)
Objective 2.2 Increased connectivity of Shrill carder bee habitat on a national, regional and local scale					
<b>Habitat management</b>	<b>2.2.1</b> Identify focus areas for habitat connectivity work nationally using Shrill carder bee distribution records, habitat mapping and threat mapping (e.g. Somerset flooding) in each of the Shrill carder bee population area (linked to Actions 2.2.3 and 6.1.3)	<b>BBCT</b> <b>BWARS</b> NE/NRW Academics	National / Local	2021	Funded project (development)
	<b>2.2.2</b> Target and deliver Shrill carder bee habitat at landscape scale by working with relevant farmer cluster groups and encouraging uptake of relevant AES options	<b>NE/NRW (lead)</b> BBCT, Buglife, RSPB, Local partners	Local	2021–2030	Funded project(s)
	<b>2.2.3</b> Develop and deliver landscape scale projects, when necessary, in each Shrill carder bee population area (linked to Local Implementation Plans, Action 6.1.3)	<b>BBCT (lead)</b> RSPB, Buglife, Local partners	Local	2020–2030	Species Recovery Manager (new post) Funded project(s)
	<b>2.2.4</b> Engage with other landscape and biodiversity projects that overlap with Shrill carder bee range (or potential range) to integrate beneficial habitat management and opportunities for connectivity	<b>BBCT (lead)</b> RSPB, Buglife, Local partners	Local	2020–2030	Species Recovery Manager (new post) Funded project(s)

**Goal 3:** Shrill carder bee populations are increasing in occupied area, abundance and viability, reducing national extinction risk.

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
Objective 3.1 Comprehensive Shrill carder bee monitoring programme is established to understand population dynamics and recovery					
<b>Monitoring</b>	<b>3.1.1</b> Develop a national <b>Shrill carder bee population monitoring strategy</b> , which is integrated into Local Implementation Plans (Action 6.1.3), and links to existing pollinator monitoring schemes (e.g. BeeWalk, UK Pollinator Monitoring Scheme) and local pollinator action plans. (Linked to Actions 1.1.6 and 2.1.2 ; also Action 5.2.2)	<b>BBCT (lead)</b> BWARS Buglife	National	2021–2022	Funded project (development)
	<b>3.1.2</b> Design a survey protocol(s) for assessing Shrill carder bee population viability e.g. queen counts (Linked to Action 3.1.1)	<b>BBCT (lead)</b> BWARS Academics	National	2021–2023	Funded project (development)
	<b>3.1.3</b> Design protocol for assessing identified Shrill carder bee nest sites in order to gather data and gain better understanding of species nesting requirements (Linked to Actions 2.1.6 and 3.1.1)	<b>BBCT (lead)</b> BWARS	National	2020–2021	Staff time
	<b>3.1.4</b> Recruit Shrill carder bee monitoring ‘champions’ in each local population area to ensure long term-monitoring, embed in population monitoring strategy (Action 3.1.1)	<b>BBCT (lead)</b> BWARS Buglife Local partners	Local	2021–2023	Funded project(s)





**Goal 4:** Shrill carder bee knowledge and understanding is increased, and all data and information is openly accessible, facilitating evidence-based conservation.

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
4.1 Improved understanding of the key aspects of Shrill carder bee ecology and habitat requirements, including geographical differences					
<b>Research and knowledge</b>	<b>4.1.1</b> Undertake a study to assess climate envelope for Shrill carder bee in NW Europe and define ideal/potential future range in England and Wales, facilitating future action and targeting conservation.	<b>BBCT</b> to identify academic lead Universities	National	2021	Funded research project
	<b>4.1.2</b> Develop a list of key Shrill carder bee ecology research areas and identify emerging technologies/techniques which may help tackle knowledge gaps; Establish University champions and BWARS members who support and action this list of Shrill carder bee research studies.	<b>BBCT (lead)</b> BWARS Academics	National	2020–2023	Staff time
	<b>4.1.3</b> Review, update and disseminate Species Knowledge Review every five years (first version 2019), embedding new research and learning.	<b>BBCT</b> in consultation with experts	National	2024 and 2029	Staff time
4.2 Increased access and use of data and information by conservationists, researchers and land managers					
<b>Research and knowledge</b>	<b>4.2.1</b> Create a portal of all Shrill carder bee information (e.g. collation of data, land management advice/templates, strategy progress) engaging all partners and stakeholders (links to Action 2.1.1)	<b>BBCT (lead)</b>	National	2021 portal established	Staff time, Online portal
4.3 Improved understanding of Shrill carder bee genetics and climate change being used to inform targeting of conservation strategies					
<b>Research and knowledge</b>	<b>4.3.1</b> Develop, fund and complete a genetic study to understand the genetic health of each of the populations in the UK (and also NW Europe for context – including Irish populations) in order to inform conservation management and strategies.	BBCT to identify academic lead Universities	National	2022 study underway	Funded research project

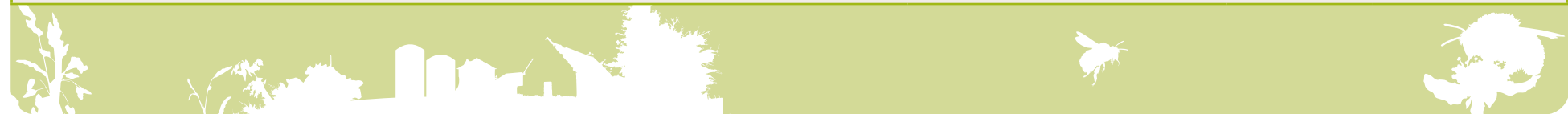


**Goal 5: Key audiences have an appreciation and sense of responsibility for the Shrill carder bee, facilitating action and protection for the species.**

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
5.1 Land managers in species range have an improved understanding of Shrill carder bee and are taking action					
<b>Awareness</b>	<b>5.1.1</b> Engage a wide range of land managers in Shrill carder bee population areas to raise awareness about Shrill carder bee and Agri-Environment opportunities, in order to influence land management choices. Embed delivery into Local Implementation Plans (Action 6.1.3) and landscape projects (Action 2.2.3) and evaluate effectiveness of land manager engagement strategies at local level. Target audiences include: farmers, local authorities, e-NGOs, local industry, utility companies, engineers/developers, Network Rail, Highways England, Welsh Government, Trunk Road Agencies, Ministry of Defence.	<b>RSPB (lead)</b> BBCT, Buglife Local partners	National / Local	2021–2030	Funded project(s)
	<b>5.1.2</b> Target and deliver bespoke land manager training delivered to upskill and achieve integration of habitat management for Shrill carder bee into site management plans	<b>BBCT (lead)</b> Buglife, RSPB Local partners		2022	Funded project(s)
	<b>5.1.3</b> Use the B-Lines tool to capture land management action for Shrill carder bee, engaging with partners and stakeholders to ensure habitat action is periodically updated on the existing B-Lines webmap.	<b>Buglife (lead)</b> Local partners	National	2020–2030	Staff time
	<b>5.1.4</b> Key sites and landowners acting as ‘Shrill carder bee custodians’, with habitat management and monitoring for SCB prioritised and embedded within site management plans; Shrill carder bee is championed as flagship species and members of the public/site users are aware of and engaged in Shrill carder bee conservation and monitoring (links to objectives 2.1, 3.1 and 5.1)	<b>BBCT (lead)</b> RSPB Local partners e.g. National Trust Wildlife Trusts MOD	National	2020–2030	Staff time
5.2 Local communities in species range have increased awareness of Shrill carder bee and are engaging in its conservation and monitoring					
<b>Awareness</b>	<b>5.2.1</b> Develop and implement a national <b>public engagement strategy</b> for Shrill carder bee, which is integrated into Local Implementation Plans (Action 6.1.3) and landscape projects (Action 2.2.3), included shared resources, volunteering opportunities and promotion of conservation action such as gardening.	<b>Strategy Steering Group (lead)</b>	National / Local	2021 strategy developed	Species Recovery Manager (new post)
	<b>5.2.2</b> Recruit volunteers in SCB population areas, involving relevant biological recording groups, field clubs and members of the public to engage with the species as well as gather data e.g. targeted surveys and Shrill carder bee blitz days (link to 3.1.1)	<b>BBCT (lead)</b> Buglife, BWARS Local partners	Local	2022–2030	Funded project(s)

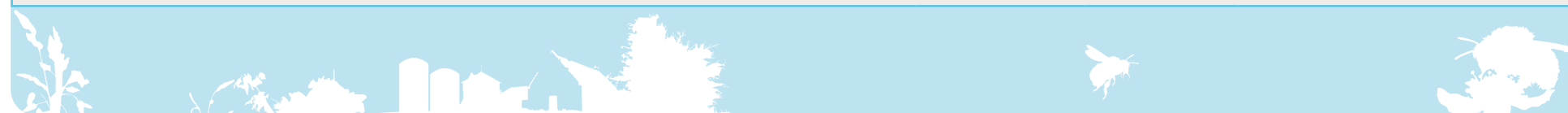
Goal 5. (continued)

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
5.3 Key decision makers have information and skills to alter Shrilc carder bee relevant policy					
Policy	<b>5.3.1</b> Identify and embed opportunities for Shrilc carder bee conservation in national policy, such as the relevant Area Statements in Wales and the Govt. 25 year Environment Plan and associated initiatives/targets in England (e.g. ‘nature recovery networks’ or similar, habitat targets, species recovery programmes, ‘environmental gains’ in relation to planning)	<b>Buglife (lead)</b> NE, NRW BBCT, RSPB, BWARS	Country level	2020–2023 Ongoing	Staff time
	<b>5.3.2</b> Embed Shrilc carder bee as a priority species in new Agri-environment schemes at local and national level, and provide information on appropriate options and target areas which can be embedded in the scheme	<b>NE/NRW (lead)</b> BBCT, Buglife, RSPB	Country level / Local	2020–2023 Ongoing	Staff time
	<b>5.3.3</b> At a local level, provide decision makers with succinct evidence base and suggested policy changes to reduce (or mitigate against) threats to Shrilc carder bee such as: planning and development, pesticides, imported bees and honey bee management.	<b>BBCT (lead)</b> Buglife, RSPB Local partners	Local	2020–2023 Ongoing	Staff time



**Goal 6.** Good governance for the Shrill carder bee strategy will be achieved at all levels, maintaining momentum and quality in implementation.

Action type	Actions	Responsible Organisations	National/ Local action	Timeline (start-finish)	Resources
6.1 The tools, group and systems are in place to allow implementation and modification of the strategy at national, regional and local levels					
<b>Governance</b>	6.1.1 The Shrill carder bee Strategy Steering Group (SSG) meets on a minimum six-monthly basis to oversee implementation and strategically deliver the strategy. The SSG will steer development of a fundraising plan for implementation of the strategy and regularly review progress.	<b>BBCT (secretariat)</b> Buglife, RSPB, NE, NRW, BWARS	National	2020–2030 2020 fundraising plan	Staff / volunteer time
<b>Governance</b>	6.1.2 Develop and implement a cross-organisational ‘National Shrill Carder Bee project’ to drive forward implementation of the strategy at national and local levels. Develop a communications plan and include a three yearly gathering of partners and stakeholders (from all Shrill carder bee population areas) to facilitate knowledge sharing, collaboration and strategy reviews.	<b>SCB Strategy Steering Group (lead)</b> Local partners	National / Local	2020–2022 2020 comms plan	Funded project / Species Recovery Manager (new post)
<b>Governance</b>	6.1.3 Develop Local Implementation Plans (LIPs) for each of the Shrill carder bee population areas (Pembrokeshire, Kenfig, Gwent Levels, Somerset, Thames Estuary), to drive local action and maintain momentum at local level, with full engagement of local partners. Each LIP to be led by a local lead organisation.	<b>BBCT national lead</b> Local partner leads to be identified	Local	2021–2022	Species Recovery Manager (new post)
<b>Governance</b>	6.1.4 Establish a Shrill carder bee strategy Monitoring and Evaluation Plan, with key performance indicators (KPIs) and milestones identified and measured, that integrates national/local targets and results, and is linked to three-year review cycle (Action 6.1.5).	<b>SCB Strategy Steering Group (lead)</b>	National	2020–2022	Species Recovery Manager (new post)
<b>Governance</b>	6.1.5 This strategy and action tables are reviewed and updated on a three year cycle by the Strategy Steering Group and engaging wider stakeholders.	<b>SCB Strategy Steering Group (lead)</b> Local partners & stakeholders	National	2023, 2026, 2029	Staff / volunteer time





## Governance and monitoring progress

A national Shril carder bee **Strategy Steering Group** (SSG) has been set up to coordinate and oversee implementation of this ten-year strategy. The SSG consists of (at the time of writing) Bumblebee Conservation Trust (secretariat), Buglife, RSPB, BWARS, Natural England and Natural Resources Wales and will meet on a minimum six-monthly basis.

The SSG will coordinate regular action updates as well as three-yearly strategy progress reviews, engaging wider stakeholders and updating the action tables as appropriate (Action 6.1.5). A **Monitoring and Evaluation Plan** (Action 6.1.4) will be developed in the first year of the plan (2020) to monitor progress and evaluate impact, with measurable Key Performance Indicators and milestones set against key objectives and/or actions.

In each Shril carder bee population area, a local lead organisation will be identified to lead on the development and delivery of the **Local Implementation Plans** (Action 6.1.3) and the setting up of 'Local steering groups' to facilitate this process will be explored.

## Partners and stakeholders

The Shril carder bee **Strategy Steering Group** members (at the time of writing) are Bumblebee Conservation Trust, Buglife, RSPB, Natural Resources Wales, Natural England and Bees, Wasps & Ants Recording Society.



## Next steps

The Strategy Steering Group (SSG) will ensure momentum is maintained to enable this strategy is delivered. Priority actions for the first phase of the plan include:

### Fundraising Plan

The SSG partners will enlist support from their fundraising teams to develop a comprehensive fundraising plan for implementation of the strategy (Action 6.1.1). This will outline key priorities and actions requiring funding, potential funding streams and timelines. It is envisaged that multiple funding sources, both national and local, will be required, as well as existing staff or volunteer time as in kind contributions from within organisations.

The fundraising plan will be reviewed regularly by the SSG, and alternatives sought if funding is not secured. Implementation of the strategy at local level may be facilitated by projects such as the Rethink Nature partnership project being developed in Wales (equivalent to Back from the Brink in England). Another potential funding source could be Natural England's Species Recovery Programme (SRP). This is a limited funding pot and is not guaranteed, but the Shrill carder bee would be a priority species for funding from this source and match funding from other sources could increase the chance of receiving SRP funding (England only).

### Communications Plan

A communications plan will be developed which will outline communication structures and channels within the wider partnership and how the strategy will be disseminated (Action 6.1.2). This plan will identify how partners and stakeholders will be meaningfully engaged and feed into the strategy, its implementation and reviews, at national and local levels. Facilitating cross-connections will be important (e.g. between different Shrill carder bee population areas, and themed work streams),

including the establishment of an online Shrill carder bee information portal (Action 4.2.1). A three-yearly gathering of partners and stakeholders is proposed to facilitate knowledge sharing, collaboration and strategy reviews but this will be subject to funding.

### Monitoring and Evaluation Plan

As detailed above (Action 6.1.4), a Monitoring and Evaluation Plan will be developed in the first year of the strategy, with measurable Key Performance Indicators and milestones set against objectives and/or actions. The SSG will use this plan to monitor progress and evaluate impact of the strategy, The Monitoring and Evaluation Plan will include six-monthly action updates from partners (coordinated by the SSG) and three-yearly review points, which will coincide with the collation and analysis of Shrill carder bee data (linked to Shrill carder bee population monitoring strategy, Action 3.1.1).

### National Project

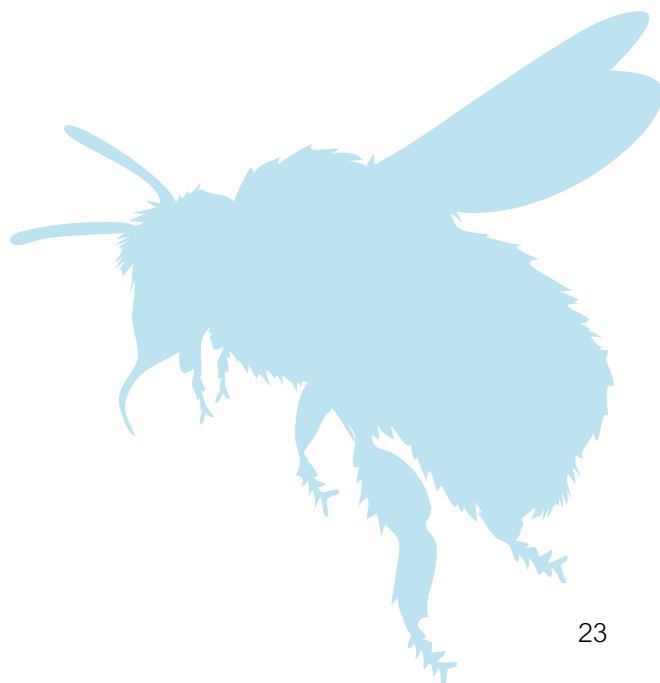
It is proposed that a 'Species Recovery Manager' is needed to lead on a national Shrill carder bee strategy project and to coordinate development of the Local Implementation Plans. Key actions in the first phase of the national project include:

- Shrill carder bee population monitoring strategy (Action 3.1.1)
- Public engagement strategy (Action 5.2.1)
- Shrill carder bee land management advice framework (Action 2.1.1)

- Habitat opportunity and threats mapping (to inform focus areas for local level landscape projects) (Action 2.2.1)
- Development of Local Implementation Plans and landscape scale projects for their delivery (Actions 6.1.3 and 2.2.3).

## Local Implementation Plans

This overarching conservation strategy is intended to guide implementation for local partners, and a top priority action for the strategy will be the development of 'Local Implementation Plans' in Shrill carder bee population areas (Action 6.1.3). The SSG will enable and support local partners to develop these plans, but their content needs to be driven by local needs and ideas, rather than being defined by the SSG. Numerous important local actions and initiatives already exist and/or were identified during the strategy workshop, and these have been collated into a document to aid local implementation plan development.



## References and further reading

Connop, S. (2007) Habitat and habitat management requirements of the shrill carder bee (*Bombus sylvarum*) and the brown-banded carder bee (*Bombus humilis*) in South Essex. PhD thesis submitted to the University of East London

Copsey, J., Page, S. and Wilkins, V. (2019) Shrill carder bee conservation planning workshop report, October 22nd-23rd, 2019. Developing a 10-year strategic action plan for *Bombus sylvarum* in England and Wales. Available from the Bumblebee Conservation Trust on request.

Ellis, J.S., Knight, M.E., Darvill, B. & Goulson, D. (2006) Extremely low effective population sizes, genetic structuring and reduced genetic diversity in a threatened bumblebee species, *Bombus sylvarum* (Hymenoptera: Apidae). *Molecular Ecology*, 15, 4375-4386

Falk, S (1991) A review of the scarce, rare and threatened bees, wasps and ants of Great Britain. *Research and Survey in Nature Conservation*, No. 35. Nature Conservancy Council

Page, S., Comont, R., Lynch, S. and Wilkins, V. (2019) Species Knowledge Review: Shrill carder bee *Bombus sylvarum* in England and Wales. Bumblebee Conservation Trust.  
[www.bumblebeeconservation.org/wp-content/uploads/2017/07/Shrill-carder-bee-species-knowledge-review-10.19.pdf](http://www.bumblebeeconservation.org/wp-content/uploads/2017/07/Shrill-carder-bee-species-knowledge-review-10.19.pdf)

Williams, P.H., Araújo, M.B. and Rasmont, P. (2007) Can vulnerability among British bumblebee (*Bombus*) species be explained by niche position and breadth? *Biological Conservation*, 138, 493-505

## Acronyms

AES	Agri-Environment Scheme(s)
BBCT	Bumblebee Conservation Trust
BWARS	Bees, Wasps and Ants Recording Society
eNGO	Environmental Non-Governmental Organisation
NE	Natural England
NRW	Natural Resources Wales
RSPB	Royal Society for the Protection of Birds
SCB	Shrill carder bee
SCB SSG	Shrill carder bee Strategy Steering Group

The strategy is endorsed by the following organisations:



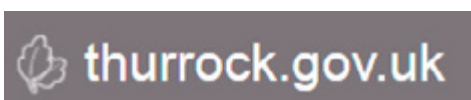
HABITAT  
— AID —



Defence  
Infrastructure  
Organisation



Parc Cenedlaethol  
Arfordir Penfro  
Pembrokeshire Coast  
National Park



University of  
East London

Pioneering Futures Since 1898



Partneriaeth **Bioamrywiaeth** Cymru  
Wales **Biodiversity** Partnership



[www.bumblebeeconservation.org](http://www.bumblebeeconservation.org)

Follow us on



Chairman: Professor Peter Hollingsworth

Chief Executive Officer: Gill Perkins

June 2020. BBCT146. Copyright 2020 ©. All rights reserved.

The Bumblebee Conservation Trust is a registered charity (England & Wales 1115634 / Scotland SC042830). Company registration number 05618710 (England & Wales)

Registered Office: Bumblebee Conservation Trust, Lakeside Centre, Lakeside Country Park, Wide Lane, Eastleigh, Hampshire SO50 5PE.