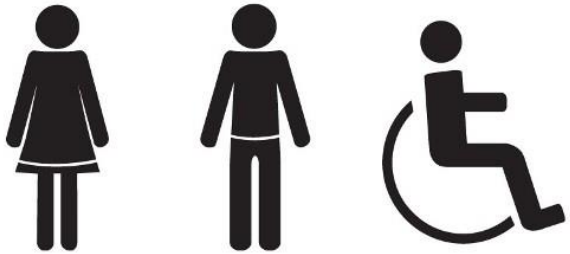
Bumblebee survey walks

LOTTERY FUNDED

Housekeeping

- Emergency Exits

- Fire assembly point
- Toilets



Today's Session

1. Presentation
   - The importance of moorlands
   - Conservation works
   - Why bumblebees?
   - Bumblebee ecology & ID

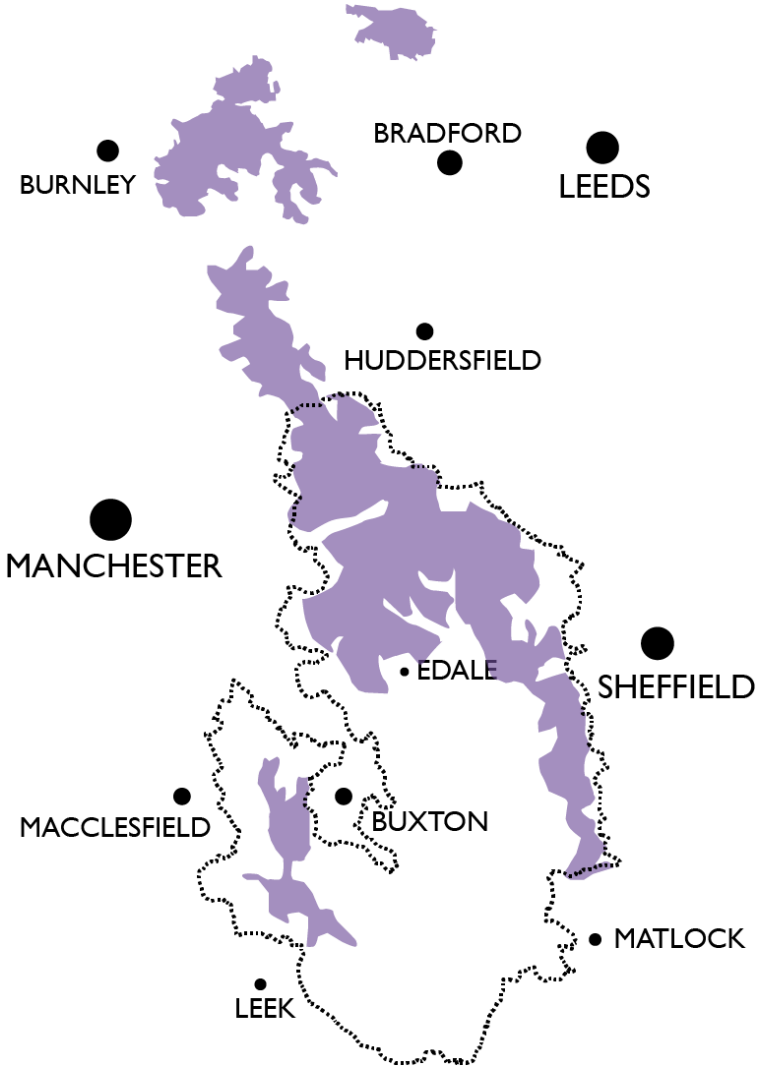
     SHORT BREAK
   - ID Quiz
   - Upland habitats
   - How to conduct a survey
   - Submitting your records
   - How data will be used

2. Practical session to practice survey methods and field ID

3. Feedback

The importance of moorlands

- The Peak District moorlands are hugely important, being the most southerly point in the range of some species.
- Climate change may affect these population ranges and it will be noticed here first.
- Designated as both a Special Protection Area (SPA) for breeding birds and as a Special Area of Conservation (SAC) for internationally important habitats.



Conservation works

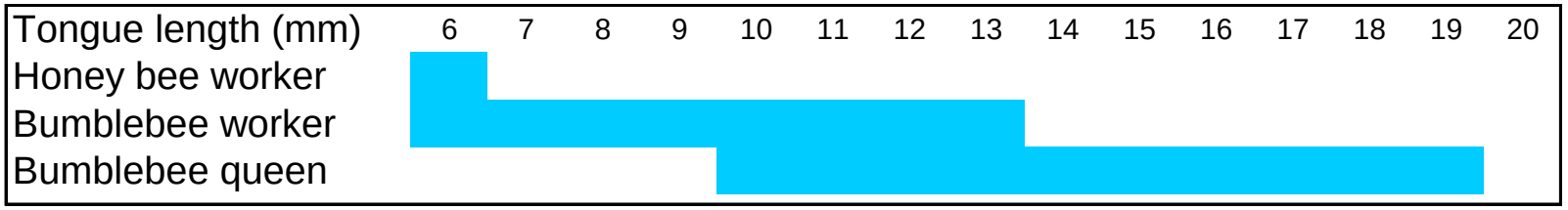
Black Hill - 2015

Why bumblebees?

- Many species are declining rapidly in Britain and other parts of their distribution.
- Two species have gone extinct in the UK and many more are threatened.
- Loss of flowers for forage, loss of suitable nest sites, use of pesticides.
- A changing climate may also affect their habitats and food sources.
- Potential loss of biodiversity and pollinator services – wild plants and crops.
- Important to track population trends – early warning system.

Why bumblebees?

Bumblebee Conservation Trust



Schematic representation range of plants visited by honey bees and bumblebees (showing area of overlap).

Bumblebee facts

- Order Hymenoptera, the same as other bees, wasps, sawflies and ants.
- All bumblebees are of the genus '**Bombus**', ie. *Bombus monticola*

- 250 species worldwide, mostly in the Northern Hemisphere.
- 24 species in the UK, with only 8 of those found commonly across the country.
- They are naturally predated on by birds, wasps, spiders and badgers who like the honey and larvae.

- Only female bumblebees can sting and they do not lose their sting like honeybees.

Bumblebee facts

- Like honey bees, they feed on nectar and gather pollen to feed their young.
- Their soft fuzzy hair, called pile, is a familiar characteristic of the bumblebee and helps insulate them against the cold.
- Their buzzing sound is made by vibrating muscles in the thorax, they can be detached from the wings to warm up the body. Video
- They form social colonies, but with fewer members than honey bees. Some mature colonies may hold only 50 bumblebees, a honey bee hive can have up to 50,000-60,000 bees.
- Bumblebees can travel up to 2km from their nests to find flower patches. Video
- Unlike honeybees, they don’t communicate through dance!

Bumblebee facts

Two types of bumblebee:

- ***Social or 'True' bumblebees***
  - Queens build own nest.
  - Raise own workers.
  - Females have pollen baskets.

- ***Cuckoo bumblebees***
  - Enter nest of social bumblebees.
  - Kill social queen and use her workers to raise offspring (males / new queens).
  - Often have darker wings.
  - No pollen baskets.

Social bumblebee life-cycle

Queen hibernates
(winter)

Queen forages and
builds nest
(spring)

Queen lays egg that
develop into **workers**
(early summer)

Queen continues to lay
eggs and **workers** forage and
maintain nest
(summer)

Some eggs develop into
new queens and **males**
(late summer)

Mated **queens** forage to build
reserves for hibernation. **Males**, **workers**
and **old queen** die
(late summer)

Bumblebee ID

Distinguishing between species:

- Habitat, distribution, time of year (atlas / field guide)
- Colouring / banding on head, thorax and abdomen
- Size
  - Colouring and size vary within species & between queens, workers and males.
- Also some variability between individuals of same caste.
- Pollen baskets / pollen loads

Our target species

These species have been chosen for two reasons:

1. Possible responses to climate change
2. Easy to identify

- Bilberry bumblebee (*Bombus monticola*)

- Tree bumblebee (*Bombus hypnorum*)

- Red-tailed bumblebee (*Bombus lapidarius*)

Bilberry Bumblebee (Bombus monticola)

Why we're interested…

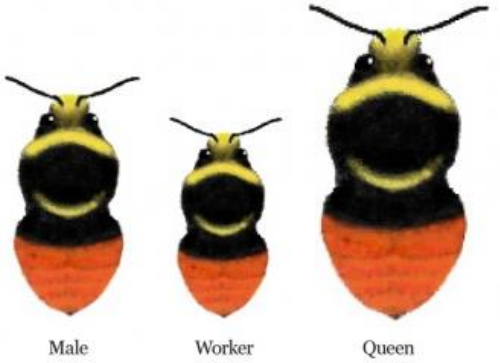
- A cold-loving species of uplands, expected to decline in the Peak District in response to climate change.

- Key features to look out for:
  - Fairly small
  - Over half of the base of the abdomen is red
  - Two lemon yellow bands on thorax

- Could be confused with:
  - the early bumblebee (*Bombus pratorum*)
  - males of the red-tailed bumblebee (*Bombus lapidarius*)

  but neither have as much red on their abdomen.

Bilberry Bumblebee (Bombus monticola)



Red tail and much of abdomen, unlike other red-tailed species where only the tip is red

Bilberry Bumblebee (Bombus monticola)

*Note the **lemon** yellow banding*

Favourite flowers

Heathers

Bird's foot trefoil

Bilberry

Clovers

And…

Tree Bumblebee (Bombus hypnorum)

Why we're interested…

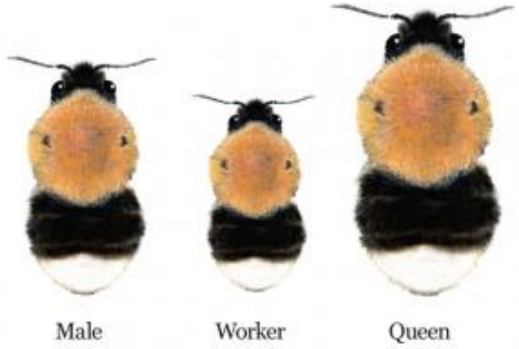
- First seen in the UK in 2001 and rapidly expanding northwards. Climate change likely to be a contributing factor. Expected to increase in the UK.

- Key features to look out for:
  - Another fairly small species
  - Black head, thorax brown-ginger, white end to abdomen
  - One of the first bees to emerge in Spring

- Could be confused with:
  - common carder bee (*Bombus pascuorum*)

  but this does not have a white tail.

Tree Bumblebee (Bombus hypnorum)



Brown-ginger fluffy thorax

White tail

Tree Bumblebee (Bombus hypnorum)

Thorax can be variable between individuals (sometimes appears darker when black hairs present)

White tail is always present

Favourite flowers

Observations suggest the tree bumblebee will visit a wide variety of flowers.

Daisies & other "wide-open" flowers

Blackberry bushes (shown here with a tree bumblebee feeding!)

And…

Red-tailed Bumblebee (Bombus lapidarius)

Why we're interested…

- Fairly widespread in the UK and expanding in Scotland. Less common in the uplands but this may change in response to climate change.

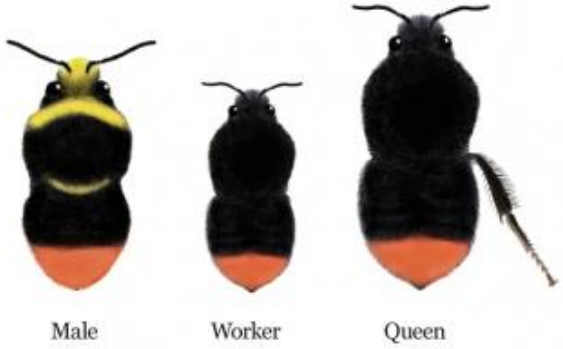
- Key features to look out for:
  - Queens (20-22 mm long) and workers (11-16 mm long) all black with orange-red tail
  - Males (14-16 mm long) have yellow facial hairs and yellow bands on the thorax.

- Males could be confused with:
  - early bumblebee (*Bombus pratorum*)
  - bilberry bumblebee (*Bombus monticola*).

Female

Male

Red-tailed Bumblebee (Bombus lapidarius)

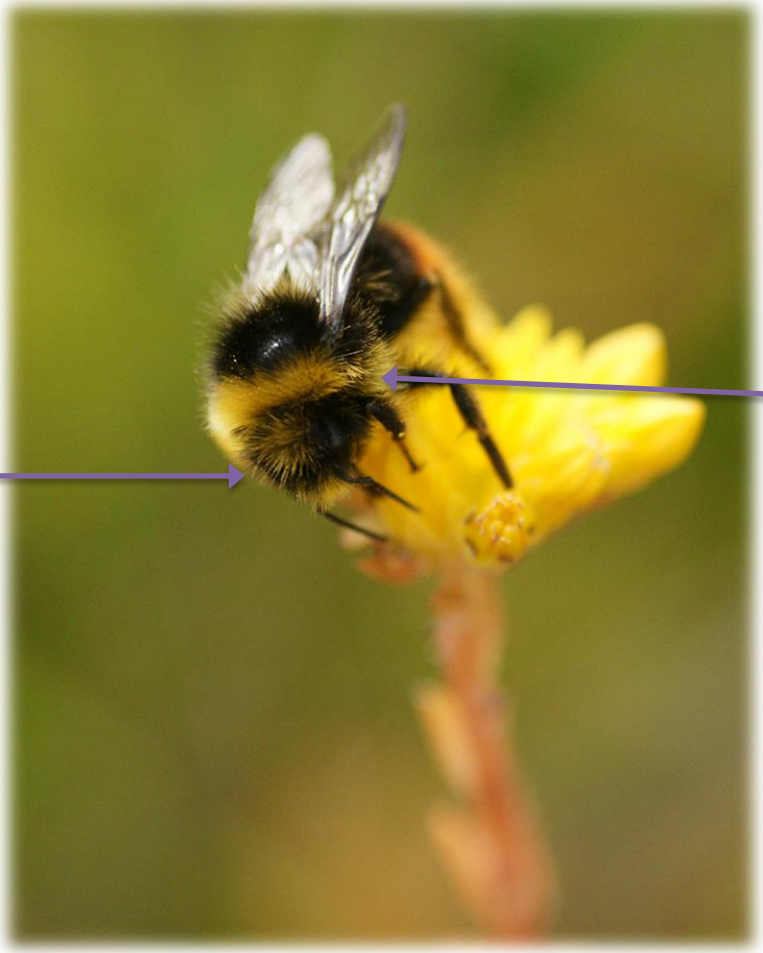


Females: Queens & workers

- *black body*
- *only tip of tail red*

Red-tailed Bumblebee (Bombus lapidarius)

Males:
Yellow banding and facial hairs which are absent from the female



The yellow colouring is a deeper yellow than the lemon yellow of the bilberry bumblebee

Favourite flowers

Bird's-foot trefoil
(and other vetches)

Knapweed

Scabious

Particularly likes yellow flowers, such as gorse

And…

Other bumblebees you may see

Bumblebee Conservation Trust

White-tailed bumblebee

Buff-tailed bumblebee

Early bumblebee

Garden bumblebee

Face

Heath bumblebee

Face

Common carder bee

Potential confusion species

Common carder bee (Bombus pascuorum)

May occasionally be confused with the Tree bumblebee.

What makes it different?

- It is brown/ginger and hairy all over
- The only other colour on this bee is black on sides of abdomen
- It can begin to look scruffy and worn by the end of the season

Brown/ginger over all of body

Some black hairs on sides of abdomen

The Tree bumblebee has an obvious white tip (with 3 distinct colours – ginger, black, white).

Tree bumblebee

Potential confusion species

Early bumblebee (Bombus pratorum)

Could be confused with the Bilberry bumblebee or the male Red-tailed bumblebee.

What makes it different?

- It is one of the smallest bumblebees
- Only the final segment on the abdomen is red/orange
- The yellow banding on the worker is often missing

The Bilberry bumblebee has orange/red on much of the abdomen, not just the tip

The male red-tailed bumblebee has a bigger red tail tip and its yellow band is on the thorax, not the abdomen.

Early bumblebee

Bilberry bumblebee

Male Red-tailed bumblebee

Bumblebee mimics

- Hoverflies and bee-flies mimic bumblebees.
- They hover and have a light, darting flight; bumblebees fly more slowly and make a distinctive buzzing sound.
- Flies have one pair of wings, bumblebees have two.

Bee-flies
Bombylius major

© Anton

Hoverflies
Volucella bombylans

© Jeffdelonge

Solitary bees
Anthophora plumipes

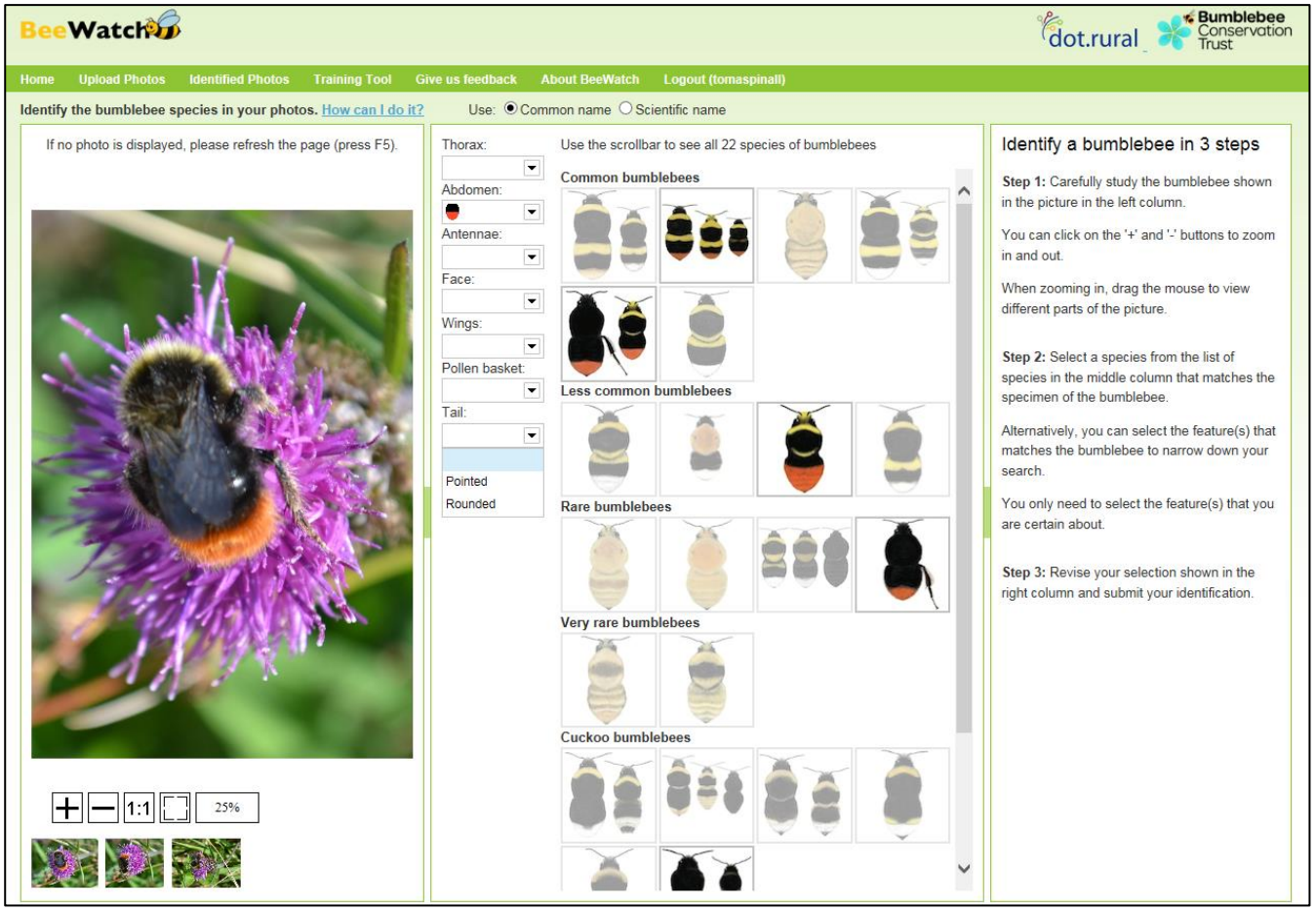
© Aiwok

Mining bees
Andrena fulva

- Solitary bees of the genus *Anthophora* are smaller and are very fast fliers.
- Some mining bees can be confused with bumblebees but they have thinner, longer abdomens and are nipped in at waist.

BeeWatch

- Very useful ID tool from BBCT & the University of Aberdeen
- Upload photos for others to ID
- Help ID other people's pictures
- Training tool to practice your ID



Useful resources & further information

Field Guides

- FSC laminate guide - field-studies-council.org/publications/pubs/guide-to-bees-of-britain.aspx (*does not include all bumblebee species*)
- What's that Bumblebee? ID guide. Bumblebee Conservation Trust, 2012. 8 page fold out laminate guide - bumblebeeconservation.org/support-us/merchandise/P8
- Field Guide to the bumblebees of Great Britain and Ireland. Revised Edition. Edwards, M. & Jenner, M. 2009. UK: Ocelli. pp. 108 - Includes information on distribution, habitat, time of year.

Websites

- Community Science - www.moorsforthefuture.org.uk/community-science
- Bumblebee Conservation Trust - www.bumblebeeconservation.org
- Bees, Wasps and Ants Recording Society (BWARS) - www.bwars.com
- BeeWatch - homepages.abdn.ac.uk/wpn003/beewatch/index.php?r=user/auth
- iSpot - www.ispot.org.uk
- The Natural History Museum website - http://www.nhm.ac.uk/nature-online/life/insects-spiders/identification-guides-and-keys/bumblebees/index.html

Quiz Time!

Red-tailed bumblebee *(Bombus lapidarius)*

Quiz Time!

Common carder bee *(Bombus pascuorum)*

Quiz Time!

Hoverfly

Quiz Time!

Early bumblebee *(Bombus pratorum)*

Quiz Time!

Tawny mining bee *(Andrena fulva)*

Quiz Time!

White-tailed bumblebee *(Bombus lucorum)*

Quiz Time!

Forest cuckoo bumblebee*(Bombus sylvestris)*

Quiz Time!

Honey bee *(Apis mellifera)*

Quiz Time!

Buff-tailed bumblebee *(Bombus terrestris)*

Quiz Time!

Tree bumblebee *(Bombus hypnorum)*

Quiz Time!

Heath bumblebee *(Bombus jonellus)*

Quiz Time!

Hoverfly *(Volucella bombylans)*

Quiz Time!

Bilberry bumblebee *(Bombus monticola)*

Tea break!

- Resume in 10-15 mins

Habitats

Acid bogs

- Wet, peat forming sites created by the build-up of *Sphagnum* mosses that retain water and decay slowly.
- Blanket bogs atop the hills in the Peak District.
- Mix of vegetation, but most commonly seen with cotton grasses and other mosses like *Polytrichum spp.*
- Shrubs also found but do not dominate as on dry-heaths.

Common cotton grass

Polytrichum

Sphagnum moss (S. papillosum)

Habitats

Heaths / Moorlands

- Dominated by heathers and dwarf shrubs like bilberry and crowberry and larger bushes such as gorse.
- Typically found on poor, acid, often sandy, well drained soils, hence known as “dry heath”.
- Waterlogged moors become peat generating bogs, some can be rich in *Sphagnum* mosses.

Typical heathland

Heather

A tasty crop of bilberries

Habitats

Acid Grasslands

- Dominated by grasses and herbs.
- Found on a range of lime-deficient soils derived from acid rocks such as sandstones and gritstones.
- Usually species-poor, but some patches are home to rarer plants such as the greater butterfly orchid.
- Often dominated by Purple moor grass (*Molinia caerulea*), Mat grass (*Nardus stricta*) and Wavy hair grass (*Deschampsia flexuosa*) in the Peak.

Purple moor grass and rushes

Wavy hair grass

Greater butterfly orchid

Habitats

Bracken hillsides

- Bracken is a species of fern common in the hills of the Peak District.
- It is a very successful plant (it is poisonous) that dominates, creating a distinctive habitat lacking in many other species.
- Its thick cover provides nesting sites for birds and invertebrates alike.

A bracken covered hillside

Bracken dying off in autumn

A stand of bracken

Transect monitoring

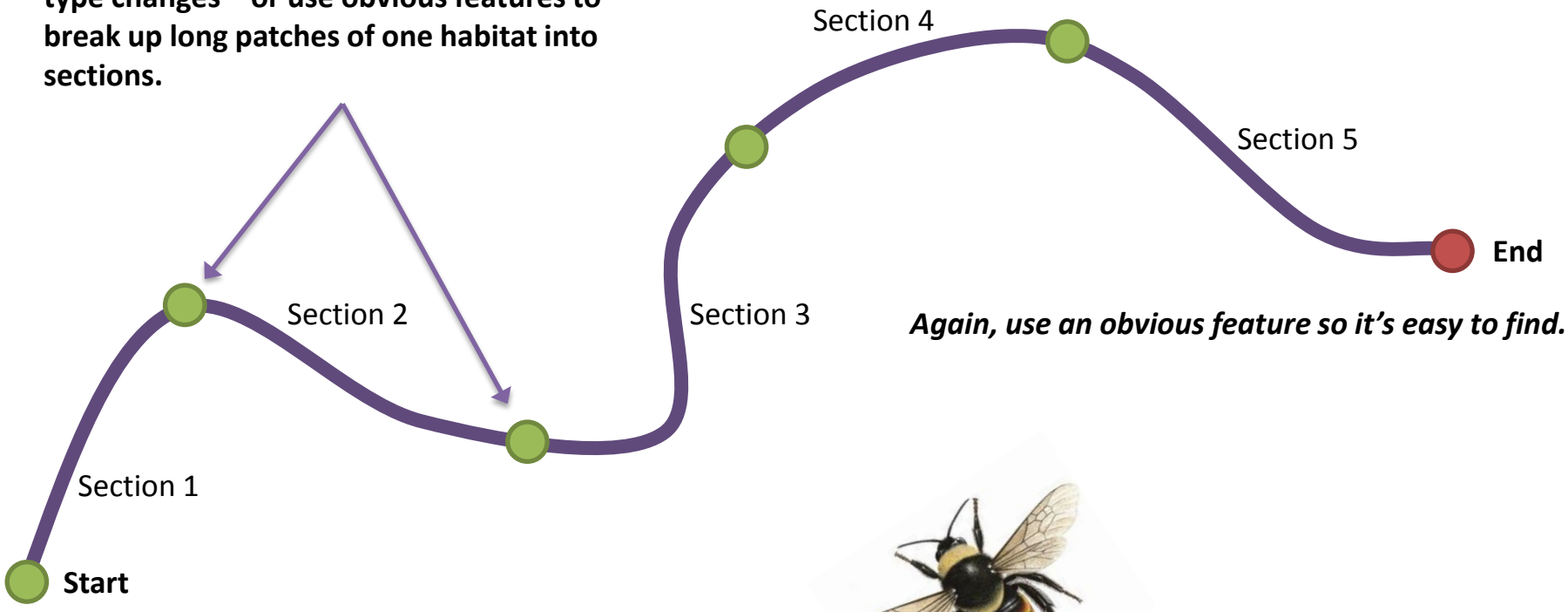
- Based on the Bumblebee Conservation Trust's 'BeeWalk' methodology.
- A network of fixed route transects 1-2 km long.

- Transects are split into sections based on habitat type and landmarks.
- Numbers of each target species plus any others seen in each section are recorded.
- The same route is walked several times per year (preferably monthly) and over many years.
- Standardised methodology and repeated visits to the same sites will provide high-quality long-term data to reliably detect changes in abundance.

Transects

There should be between 4 and 10 sections on a transect

Section breaks should be where the habitat type changes – or use obvious features to break up long patches of one habitat into sections.



Again, use an obvious feature so it's easy to find.

Use an obvious feature so it's easy to find.

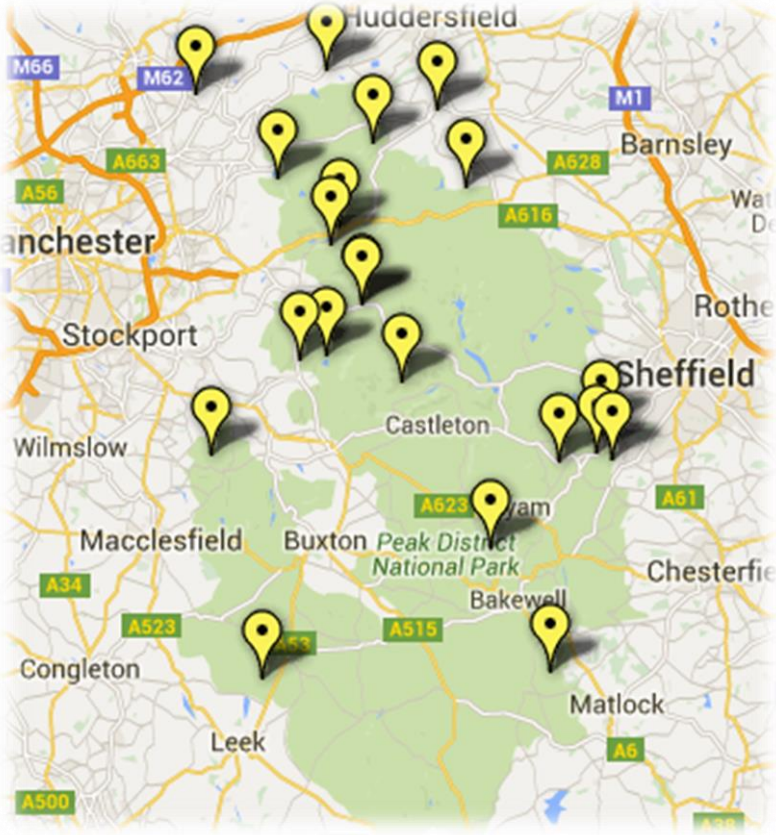
Transect monitoring

Where to survey

- Transects within the Peak District and South Pennines (some locations have two transects).

- Maps, transect guides and survey forms are available to download from the Community Science Project website or on request.

- If you've surveyed them all or want to establish a **new transect of your own**, come and speak to us.



Establishing your own transect

- You could pick a location where you know you enjoy walking, this should be on or very near to moorland.
- Make sure it is **convenient** and **accessible**.
- Length should be between **1-2 km** (about 60 minutes to walk).
- Split it into sections based on habitat type (we can help with this) or by obvious features if the habitat type is the same throughout the whole transect.
- Always let us know if you are setting up a transect.
- We'll add it to iRecord so that it can be recorded by surveyors

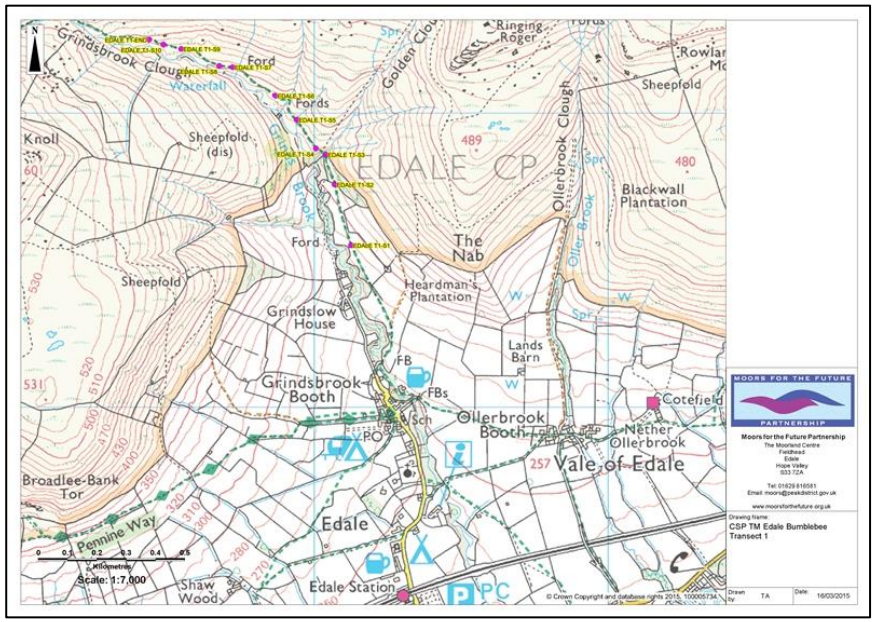
Transect monitoring

When to survey

- Ideally, transects should be walked once per month from March to October (preferably at a similar time of day each month).
- More often is better, but…..
- Need to survey when it is warm and/or sunny, with little wind and no rain!
- Transects should ideally be walked between 11am and 5pm.
- Use our Facebook page to discuss with others what transects have not been surveyed recently and any ID queries.

What to take with you

- Map & guide of the transect
- Transect survey form
- Binoculars for close up views to help with ID
- Camera to take photos for verification
- GPS unit (if you have one)
- Health & Safety guidelines



Health & Safety

Please ensure that you are aware of the risks involved in moorland surveying and use your common sense.

Don’t forget to:

- Wear appropriate footwear for rough ground.
- Check the weather forecast before you go out.
- Wear appropriate clothing, and take additional layers.
- Take a hat and/or sunscreen – it is easy to get burnt on the hill.
- Let someone know where you are going, and carry a mobile phone.
- Please take care of the moors – do not smoke, and take your litter home.

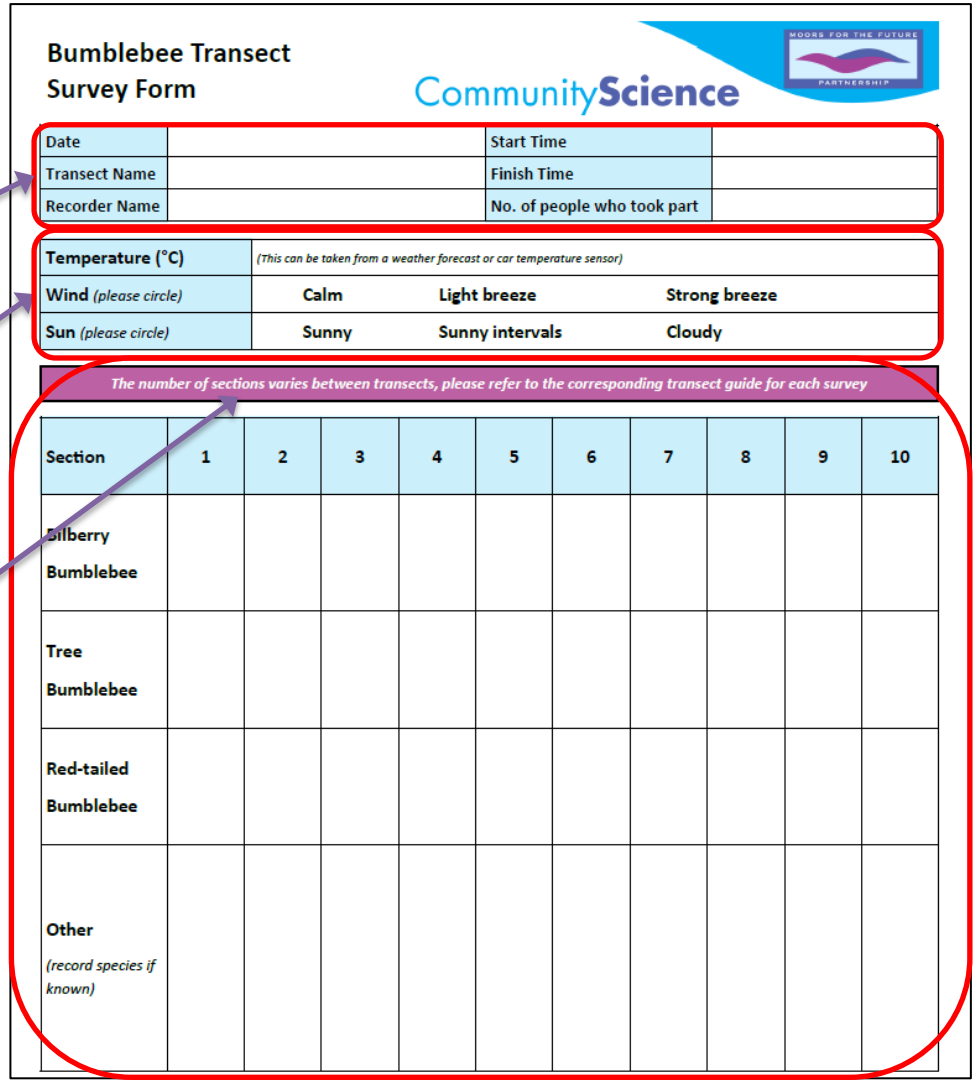
Transect monitoring

Conducting the survey

Fill in the details at the top of the survey form first. This information will help when analysing the data.

Leave the wind and sun sections until the end.

Remember to check how many sections your transect has so you can fill in the form accurately



Bumblebee Transect Survey Form

CommunityScience

Date		Start Time	
Transect Name		Finish Time	
Recorder Name		No. of people who took part	

Temperature (°C)	*(This can be taken from a weather forecast or car temperature sensor)*		
Wind *(please circle)*	Calm	Light breeze	Strong breeze
Sun *(please circle)*	Sunny	Sunny intervals	Cloudy

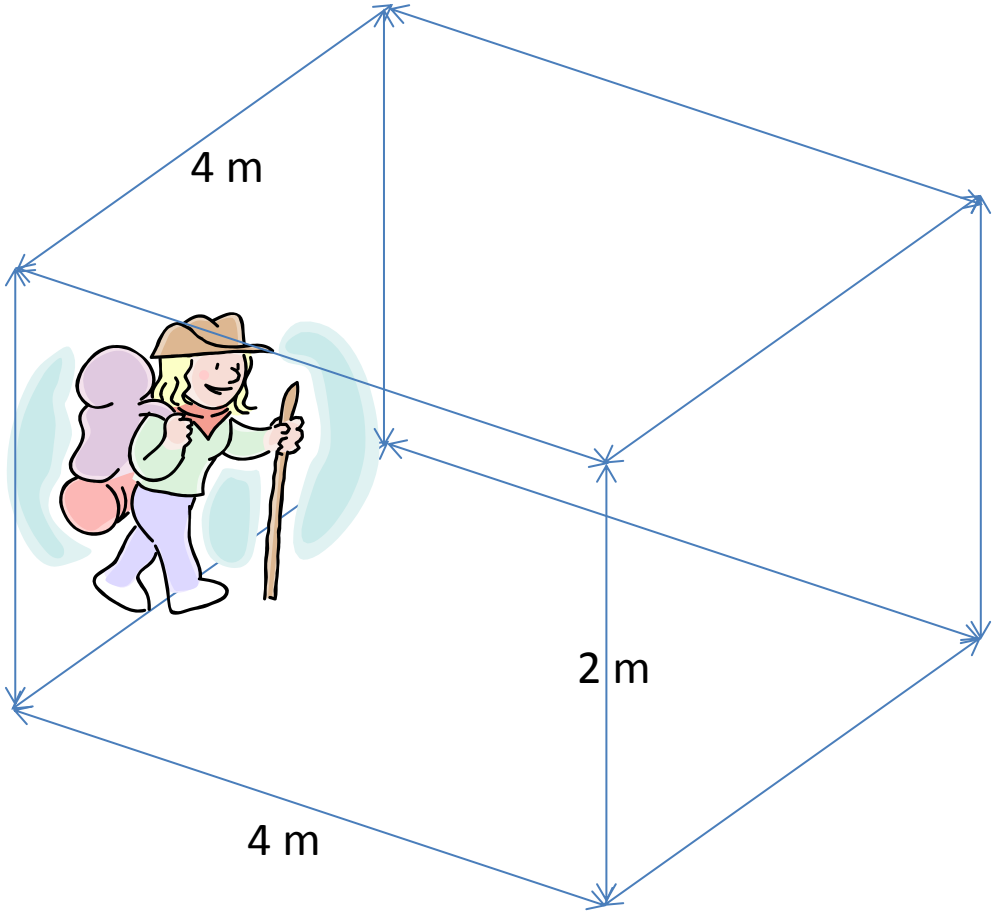
The number of sections varies between transects, please refer to the corresponding transect guide for each survey

Section	1	2	3	4	5	6	7	8	9	10
Bilberry Bumblebee										
Tree Bumblebee										
Red-tailed Bumblebee										
Other *(record species if known)*										

Transect monitoring

Conducting the survey

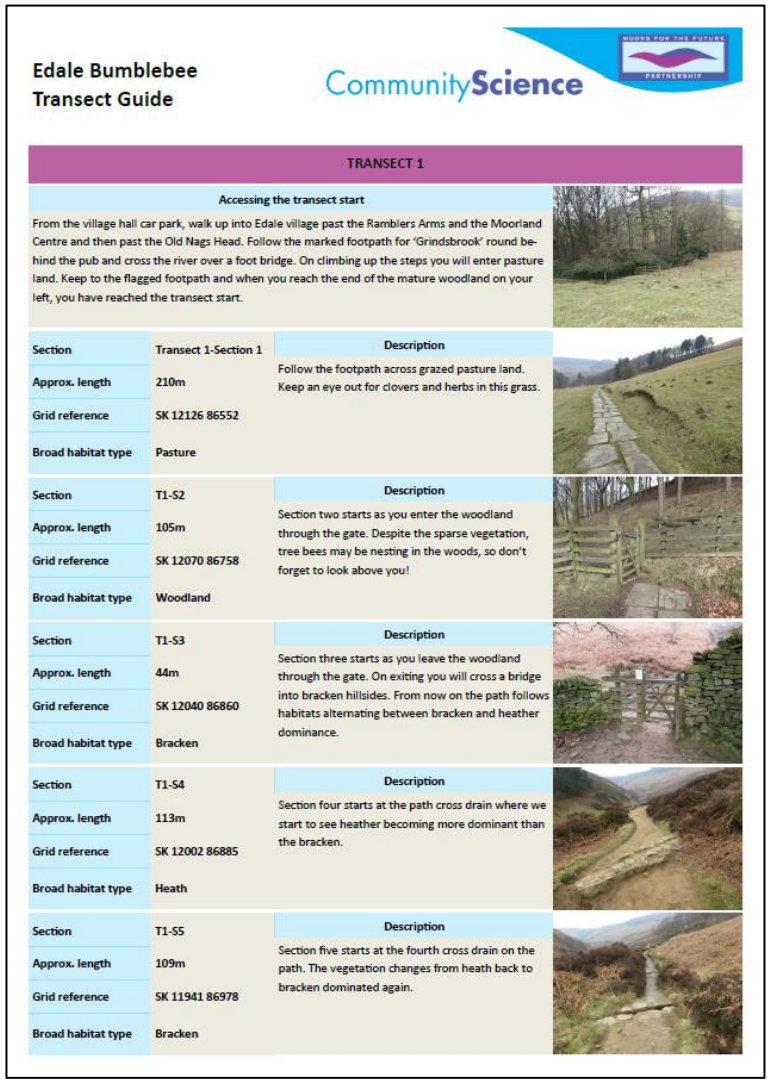
- Walk the transect at a ***slow and steady pace***. Maximum of 2 “spotters”.
- Record all the bumblebees ***2m to each side***, ***4m in front*** and ***2m above the ground***.
- On wide paths (>2 m) walk to one side and always keep to the same side.
- ***Do not linger*** where you think you will see bumblebees (it’s cheating!).
- Note the number of individuals of each target species (& others) seen ***in each section***.
- Do not attempt to be too accurate if unsure of species.



Transect monitoring

Conducting the survey

- Use the transect guides to determine section transitions. These guides include:
  - Grid references
  - Section lengths
  - Habitat types
  - Section descriptions
  - Photos
- Also use the transect map as a guide.
- If surveying your own transect you may not need a guide.



Edale Bumblebee Transect Guide

CommunityScience

TRANSECT 1

Accessing the transect start

From the village hall car park, walk up into Edale village past the Ramblers Arms and the Moorland Centre and then past the Old Nags Head. Follow the marked footpath for 'Grindsbrook' round behind the pub and cross the river over a foot bridge. On climbing up the steps you will enter pasture land. Keep to the flagged footpath and when you reach the end of the mature woodland on your left, you have reached the transect start.

Section	Transect 1-Section 1
Approx. length	210m
Grid reference	SK 12126 86552
Broad habitat type	Pasture

Description

Follow the footpath across grazed pasture land. Keep an eye out for clovers and herbs in this grass.

Section	T1-S2
Approx. length	105m
Grid reference	SK 12070 86758
Broad habitat type	Woodland

Description

Section two starts as you enter the woodland through the gate. Despite the sparse vegetation, tree bees may be nesting in the woods, so don't forget to look above you!

Section	T1-S3
Approx. length	44m
Grid reference	SK 12040 86860
Broad habitat type	Bracken

Description

Section three starts as you leave the woodland through the gate. On exiting you will cross a bridge into bracken hillsides. From now on the path follows habitats alternating between bracken and heather dominance.

Section	T1-S4
Approx. length	113m
Grid reference	SK 12002 86885
Broad habitat type	Heath

Description

Section four starts at the path cross drain where we start to see heather becoming more dominant than the bracken.

Section	T1-S5
Approx. length	109m
Grid reference	SK 11941 86978
Broad habitat type	Bracken

Description

Section five starts at the fourth cross drain on the path. The vegetation changes from heath back to bracken dominated again.

Transect monitoring

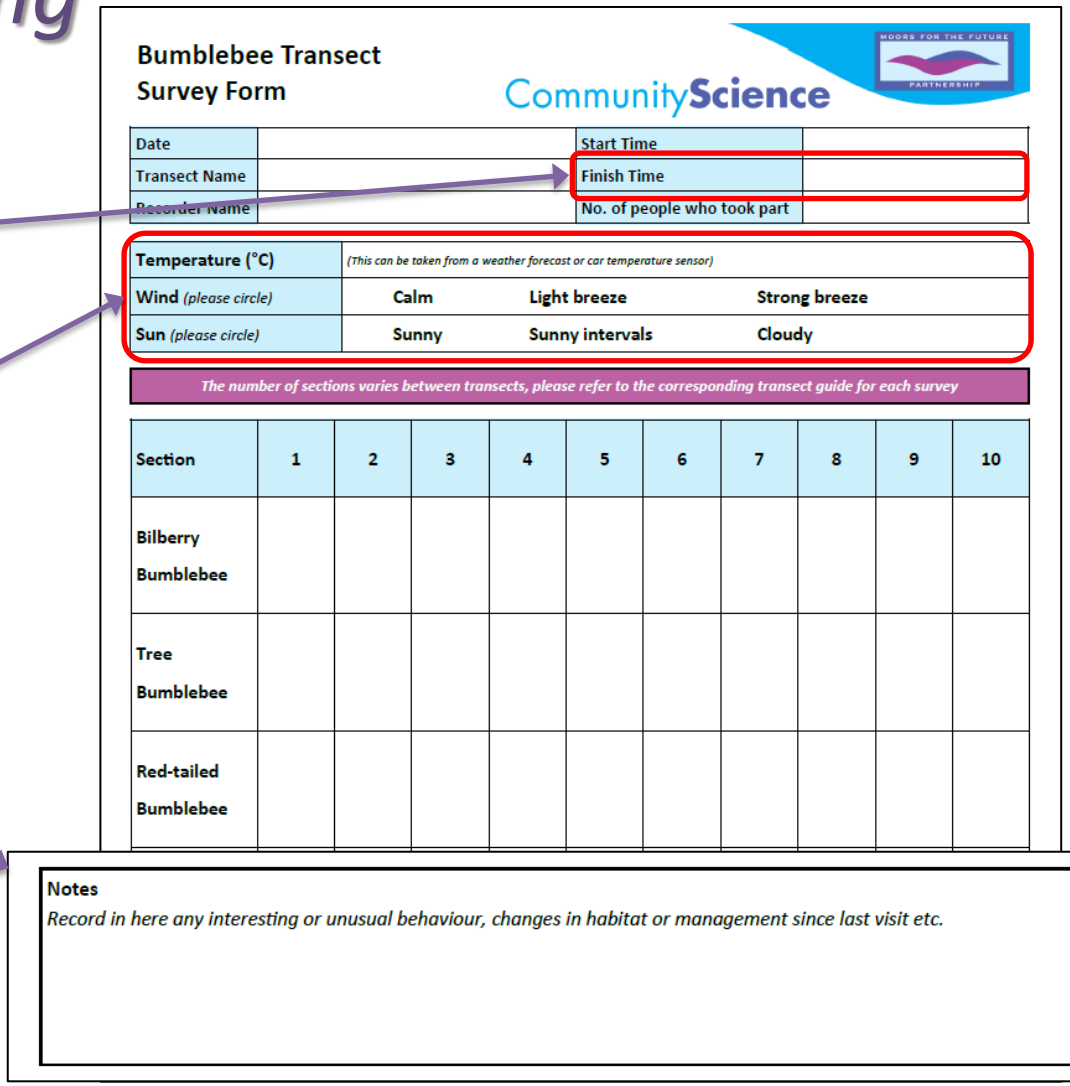
At the end of the survey

Enter your finish time at the top of the form.

Enter the predominant weather conditions during the survey.

In the notes section include:

- *Changes in habitat from previous survey or transect map/guide*
- *Changes in weather during the survey*
- *Any other interesting observations or behaviour.*



Bumblebee Transect Survey Form

CommunityScience

Date		Start Time	
Transect Name		Finish Time	
Recorder Name		No. of people who took part	

Temperature (°C)	*(This can be taken from a weather forecast or car temperature sensor)*		
Wind *(please circle)*	Calm	Light breeze	Strong breeze
Sun *(please circle)*	Sunny	Sunny intervals	Cloudy

The number of sections varies between transects, please refer to the corresponding transect guide for each survey

Section	1	2	3	4	5	6	7	8	9	10
Bilberry Bumblebee										
Tree Bumblebee										
Red-tailed Bumblebee										

Notes

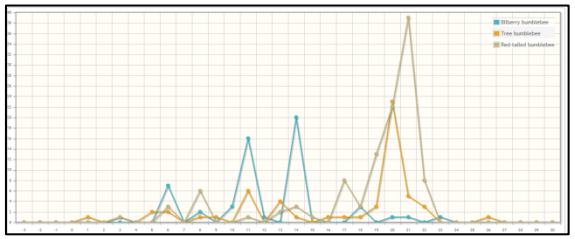
Record in here any interesting or unusual behaviour, changes in habitat or management since last visit etc.

Submitting your records

- All data will be put on to the biological recording website iRecord (www.brc.ac.uk/irecord).
- Records are passed on to the Biological Records Centre, and are verified by volunteers (who are experts in their field).
- We encourage all our recorders to use this facility by setting up their own account which is quick and easy.
- Link to iRecord can be found on our website.
- Tutorial videos for using iRecord can be viewed on our Youtube channel.
- Alternatively, you can post the recording form to Moors for the Future – fill in details on reverse.

What will your data tell us?

- Are populations increasing or decreasing in abundance?
- Are species doing better on some sites than others? If so, why?
  - Habitat?
  - Elevation?
- Is annual abundance related to climatic conditions?
- How are species doing in the Peak District compared with the rest of the UK?
- Has the timing of events changed?
- Does the timing of events differ between sites?
- Is the timing of events related to climatic conditions?



Other surveys

Supporting you

www.moorsforthefuture.org.uk/community-science

We are here to help you and our website offers all the support you should need including:

- **A downloadable PDF of this presentation**
- Further information and guidelines
- Updates on which transects need surveying
- Survey forms, transect guides and maps for download
- Help on submitting your records online
- How to establish new transects

You can also contact us via:

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