

# DRAGONFLY MONITORING SCHEME 2009 PILOT

Version 2.0 (2 May 2010)



## **Dragonfly Monitoring Scheme Coordinator:**

Steve Prentice, BDS Dragonflies in Focus Project Officer

**Text:** Dave Smallshire, Tim Beynon and the BDS Dragonfly Conservation Group

**Reference:** This publication should be referred to as "Smallshire, D. & Beynon, T. (2010) *Dragonfly Monitoring Scheme Manual*. British Dragonfly Society.

## **Acknowledgements:**

The BDS acknowledges the help and encouragement of De Vlinderstichting (Dutch Butterfly Conservation) in the production of this manual, which was based largely on Ketelaar, R. & C. Plate (2001) Manual Dutch Dragonfly Monitoring Scheme. Report VS2001.028, Dutch Butterfly Conservation, Wageningen.

**Illustrations:** De Vlinderstichting and Dave Smallshire

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## 1. Introduction

**For some years, the British Dragonfly Society and the Dragonfly Recording Network have focussed attention on changes in dragonfly distribution and on identifying key sites for our rarest species. While distribution mapping can show graphically how species have spread in recent years, it is a blunt instrument for monitoring dragonfly populations. It is hoped that the British Dragonfly Monitoring Scheme will yield counts from a large number of sites to provide national population indices. It will also allow Britain to contribute to a Europe-wide dragonfly monitoring initiative.**

How are dragonflies doing? Will the numbers of river-dwelling species like Demoiselles *Calopteryx* increase with improving water quality required under the EU Water Framework Directive? Will White-faced Darter *Leucorrhinia dubia* decline and other species increase as a result of climate change?

**To answer these kinds of questions the British Dragonfly Society is piloting the Dragonfly Monitoring Scheme in 2009.**

This pilot will allow us to evaluate the likely uptake by dragonfly recorders and to gauge the statistical power of the data gathered. It will also collate any existing transect counts obtained using broadly similar methods.

The main aim of this monitoring is to keep a record of changes in numbers – it can be regarded as a thermometer from which you can read how well or how badly dragonflies in a country or a particular area are faring. After we have found out the cause of these changes we can begin appropriate conservation measures for dragonflies.

As well as determining *national* trends, the data can also be used for a *particular area*. Is Small Red Damselfly *Ceriagrion tenellum* faring better in Wales compared with the south-east of England? Is the sudden increase in Scarce Chaser *Libellula fulva* in south-west England due to warmer springs or has improved water quality in rivers played an important role? At the level of an individual site, the methods described here can be used to monitor the effects of wetland management.



Monitoring Schemes need to have a long time span and robust dataset. The longer a project is running, the more reliable the data are. For individual sites the same applies: the longer a transect is active, the more insight one gets into the changes and developments at a particular site. Some dragonfly recorders have been diligently counting along fixed transects for a number of years, so building up valuable datasets. In combination, retrospective data may provide a potentially powerful tool to assess past changes; part of this initiative is to capture these datasets.

**This manual shows you how to take part in the British Dragonfly Monitoring Scheme pilot. This is done by counting adults systematically, allowing us to detect negative trends at an early stage and try to reverse them. Information can be gathered by both volunteers and professionals, such as nature reserve wardens. Everyone with a reasonable knowledge of dragonflies can participate and help to make the Dragonfly Monitoring Scheme a success.**

To take part in the DMS Pilot, or to offer existing transect data for analysis, please register your interest with the Coordinator:

Steve Prentice  
Dragonflies in Focus Project Officer  
British Dragonfly Society  
c/o Natural England  
Parkside Court  
Hall Park Way  
Telford TF3 4LR  
Tel.: 0300 060 0647  
Email: [stephen.prentice@naturalengland.org.uk](mailto:stephen.prentice@naturalengland.org.uk)

### **Changes to 2010 methodology**

As a result of experience and feedback from the 2009 season, the following changes have been incorporated into the methodology:

1. Use of fixed point counts where visibility is severely limited.
2. Flexibility to count all species in all sections.



## 2. The British Dragonfly Monitoring Scheme

### Who can take part?

Anybody with a reasonable knowledge of dragonflies can help in this project. It is important to be able to recognise your local dragonfly species.

### Different possibilities

Dragonflies are counted at predefined transects along the waterside. The transects can be visited and counted every week, two weeks, or monthly during the flight season, depending on how much time you can spare. All transects can add to the dataset, including those where not many species are found.

For sites with Red Data species, it is particularly important to know how numbers are changing. Many such species are highly localised and restricted to nature reserves and other high quality habitats. To survey these sites, transects can cover just the important species, but weekly counting is strongly recommended for the main flight period only.

- Anybody with a reasonable knowledge on dragonflies can join the monitoring scheme.
- Transects can be counted every week, two weeks, or monthly from May to September, or just during the relevant flight period for rare species.



*Figure 1: Many rare species are found in beautiful locations.*



### 3. Fieldwork

**Dragonflies are counted along fixed transects using a standardised method. Monitoring transects are typically at least 100 metres long and are only counted in fine weather.**

#### **Establishing a monitoring transect**

When choosing a transect location, find a waterside route that:

- Is relatively uniform in character and easily accessible;
- Can be counted each year in the same way, using easily recognisable points in the landscape; and
- Is sunny both in spring and summer.

The route should follow the water's edge as far as possible. The basic transect is around 100m long and split into two halves: 1A and 1B (see figure 2). All dragonflies are counted in each section. If it is not possible to count along a full 100m, the transect can be shorter (but at least 25m, in which case it has only one section). Circuits of two or more ponds may be combined to form a transect, but care should be taken to avoid double-counting dragonflies.

A length of 100m is in most cases long enough to count a reasonable numbers of Damselflies (Zygoptera) and darters (*Sympetrum*). For other Dragonflies (Anisoptera), you may need to walk more than 100m to get a useful count. At larger water bodies, extra sections of 100m can be added to the transect, up to a maximum of 500m (see figure 3). Along these extra sections, only Anisoptera (except for darters *Sympetrum*) and demoiselles (*Calopteryx*) are counted, unless you feel confident that you can record all species effectively and repeatably.

Estimate the transect lengths using paces (a tall person has paces of about 1m). If possible mark the distances between transect sections permanently and map the presence of distinctive features to help walk the same sections in the future. The precise length and route of a transect are less important than the need to **count over the same route on all visits.**

- Choose a sunny transect route with fairly uniform habitat.
- The route should follow the water's edge as far as possible.
- The transect is typically 100m long (two 50m sections).
- Count all damselflies and dragonflies along this transect.
- The transect can be shorter, but at least 25m long.
- The transect can be lengthened with sections of 100m, up to a maximum of 500m, in which all species (if you are able) or only Anisoptera and *Calopteryx* species are counted.
- Single-species transects for damselflies (except demoiselles) should not extend to additional 100m sections.
- Count along the same route on every visit.



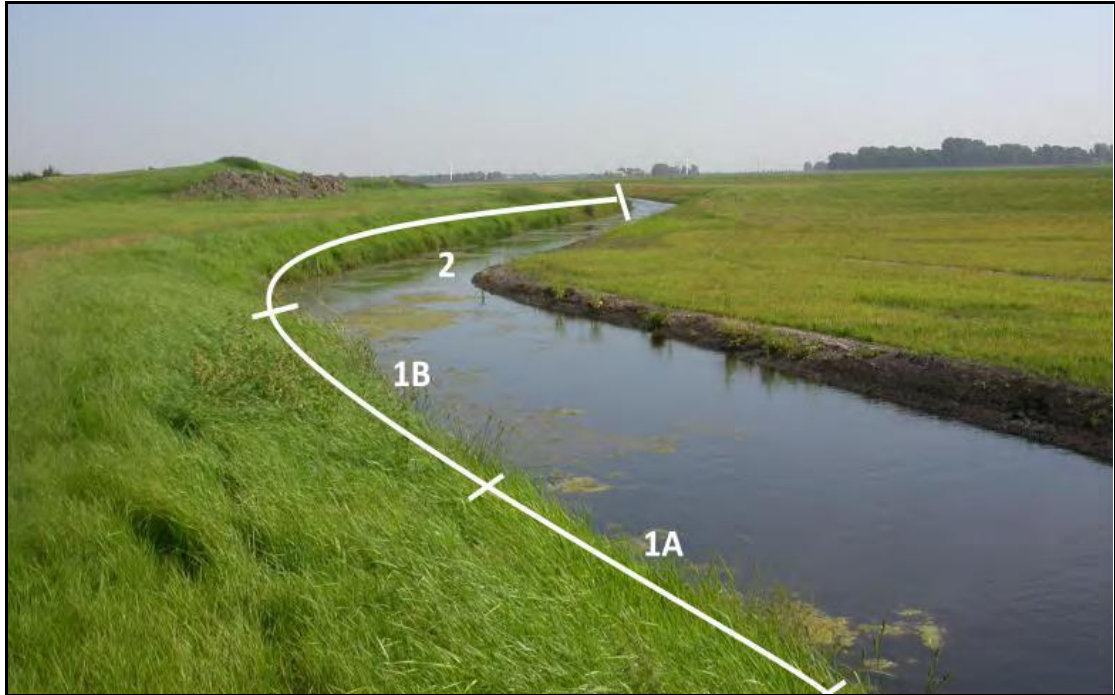


Figure 2: Example of an all-species transect with a length of 200m.



Figure 3: Example of a single-species transect with a length of 400m for Banded Demoiselle *Calopteryx splendens*.

You are strongly encouraged to take photographs of the transect. These can be used to relocate it in future years and to show any changes in habitat that may occur.



## All-species and Single-species Transect counts

It is important that dragonflies are counted along the same transect route each year using the same standardised method. A standard method is important for being able to compare results from year to year. For this pilot year you can choose how frequently you make visits, but counts should meet the following conditions:

- **Either:**
  1. Make 5 **monthly** visits between May and September; or
  2. Make 10 **fortnightly** visits between May 1<sup>st</sup> and September 17<sup>th</sup>; or
  3. Make **weekly** counts for selected **rare species** during the normal flight period for that or those species.
- You decide when to count, based on weather conditions and your free time.
- Try to spread out the counts evenly over the counting period. Weekly counts should be at least three days apart, fortnightly counts at least a week apart and monthly counts at least two weeks apart.
- If a count cannot be made in any of the required periods, make two counts in the following period. When you know in advance that you will not be able to do a count, it is acceptable to count twice in the previous period or to ask someone else to do your count for you. Try to avoid missing a count completely.

Counts should only be carried out when most dragonflies are active, using the following guidelines:

- Counts should be carried out between 10:00 and 16:00 BST. On hot days (above 22°C), counts between 09:30 and 16:30 are permissible.
- Count during sunny weather, with cloud cover less than 60%.
- Do not count if the wind is stronger than force 4 on the Beaufort scale (i.e. >18 mph, when small trees in leaf begin to sway).
- The temperature should be at least 17°C in the shade. On sunny, calm days, counts may be made at a slightly lower temperature, but never lower than 15°C.
- Do not count during rain, or when the temperature exceeds 30°C.

### When can I count?

| time                       | 10:00-16:00 BST |           |         | 09:30-16:30 | 09:30-16:30 |
|----------------------------|-----------------|-----------|---------|-------------|-------------|
| Temperature                | < 15°C          | 15°- 17°C | 17-22°C | Over 22°C   | Over 30°C   |
| Cloud cover over 60%:      | No              | No        | Yes     | Yes         | No          |
| Cloud cover below 60%:     | No              | Yes       | Yes     | Yes         | No          |
| Wind greater than force 4: | No              | No        | No      | No          | No          |
| Rain:                      | No              | No        | No      | No          | No          |



## Counting dragonflies

- Walk slowly. Occasional stops to scan with binoculars may be helpful. Sometimes it may be difficult to identify and count all dragonflies during a single transect walk. If so, count the first 100m twice, first to count the damselflies (*Zygoptera*) and darters (*Sympetrum* species), then again to count the other Anisoptera.
- In the first 100m section, count all the individuals seen within a strip **2m inland** and **5m out from** the water's edge, or less if the water body is narrower than 5m (Figure 4). The zone over the water includes the emergent plant zone.
- If it is not possible to record within these zones for some or all of the transect, they may be varied to ensure that reasonable numbers are counted. If access to the water's edge is limited, do **fixed point counts** from suitable vantage points at least 10m apart; each count should last at least 1minute, typically 2-3 minutes and not more than 5 minutes. In all cases it is **essential** that the route and position of fixed point counts are recorded so that **all** subsequent counts are made in the same way.
- **In additional 100m sections**, continue to count in the same strip, but only record demoiselles (*Calopteryx* species) and Anisoptera. It should be possible to walk these sections at a slightly quicker pace.

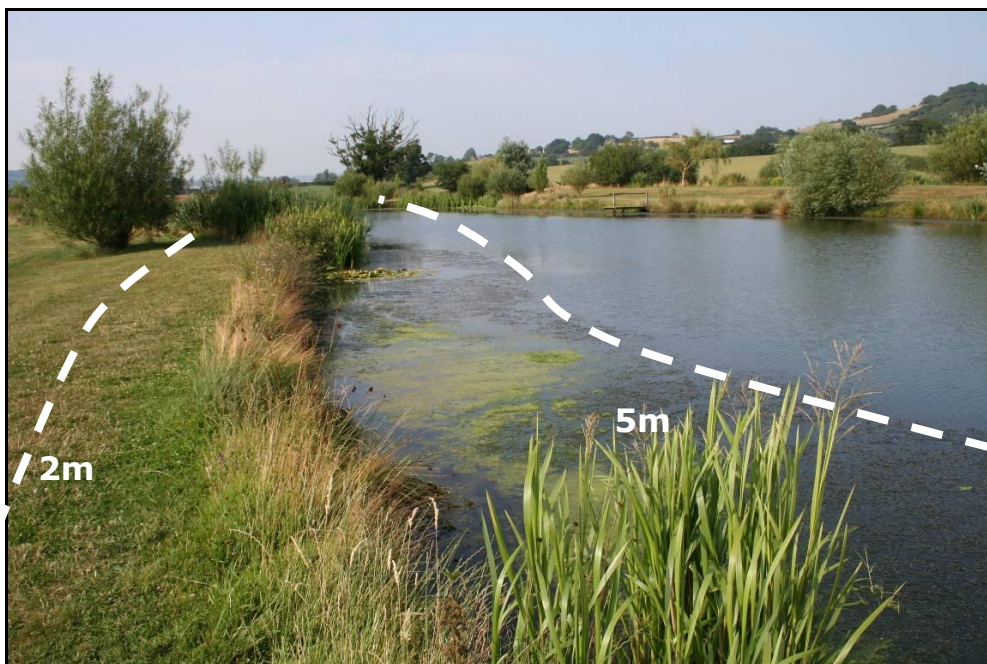


Figure 4: the counting zones either side of the bankside.





- Count all individual adults. A pair in tandem or mating counts as two individuals.
- Newly-emerged individuals should **not** be counted, but **immatures that have clearly been flying for some time should be**. (Emergence can be quantified as a separate exercise to monitor trends in productivity at specific locations.)
- Try to identify the species on sight; close-focus binoculars will help. This causes less disturbance and saves time. If necessary, return later and catch some individuals to confirm identity.
- Some females, teneral and species groups, notably blue damselflies, are difficult to identify. If you are unsure, count all individuals then return, catch and identify a number at random (ideally 10-15) and then extrapolate. For example, if you counted 100 blue damselflies and caught 10 of which two were Common Blue and the rest Azure, you record 20 Common Blue Damselflies and 80 Azure Damselflies.
- Counting can be difficult when dragonflies are very numerous. The following tips might be helpful:
  1. When large numbers of damselflies are present, an exact count is not necessary. Try to make a sensible estimate.
  2. When many individuals of, for example, Four-spotted Chaser (*Libellula quadrimaculata*) are patrolling, it can be difficult to keep track of the numbers. Divide the section into smaller parts and count the individuals present in each.

It is useful to record numbers in a note book (use ### etc.) or into a voice recorder. You can also use these to note changes in the habitat (like management, water level and pollution). This information can be transferred to recording forms later, but double check to avoid transcription errors.

### Counting dragonflies

- Walk slowly, first counting damselflies and darters, then count the remaining species during a second walk.
- Do not count newly-emerged individuals.
- Count during favourable dragonfly weather.
- Count in a strip ideally from 2m inland to 5m out from the bankside, or from fixed points where visibility is severely limited.
- In additional 100m sections, count only demoiselles and Anisoptera in this strip (or all species if this is possible).
- Single-species transects for damselflies (except demoiselles) should not extend to additional 100m sections.



## 4. The Recording Forms

**Record your results carefully and send them to the coordinator promptly at the end of the recording season (no later than 31 October).**

Please record the transect details on form F1. Different forms are used for all-species transects (F2) and single-species transects (F3). PLEASE NOTE THAT 2010 FORMS HAVE BEEN MODIFIED TO REFLECT THE CHANGES DESCRIBED ON PAGE 3. You can also use these forms to send in past counts gathered using similar, if not identical, methods; please complete the forms as fully as possible.

### Transect Details (form F1)

**Site Name:** give each transect a unique name

**Grid Reference:** for the start point (at least 6-figure).

**Transect Length:** this is the total surveyed (maximum 500m).

**Zone Widths:** these will normally be 5m over the water (including emergent vegetation) and 2m over "dry" land.

**Land & Water Use:** indicate any factors that may influence the dragonfly population, e.g. use as a coarse or game fishery; high density of wildfowl.

**Site Management:** describe any land or water management that may influence the dragonfly population (e.g. grazing, mowing, weed cutting).

**Site Status:** indicate if the site has any statutory (e.g. SSSI) or informal (e.g. Wildlife Trust Reserve) status.

**Ownership:** where known, give details, especially if access is restricted.

**Section lengths:** these will normally be about 50m (1A & 1B) or 100m.

**Habitat:** where possible, use the terms and codes given in the habitat lists that follow for both the land and water areas surveyed.

**Site Map:** this is an important record and should show precisely the transect route, with sites of fixed point counts if relevant, and each section, with any deviations from the standard count zone widths.

### All-species Transects (form F2)

Use one form for each visit. Enter the total adult dragonflies counted (excluding any newly-emerged) in each section, entering a zero if there were none in a section counted. Please complete the form *even if you record no dragonflies*.

The form has space to enter the average temperature and wind speed (Beaufort Scale: 0 = smoke rises vertically; 1 = slight smoke drift; 2 = wind felt on face; 3 = leaves in slight motion) during the visit, and % cloud cover during each section. Use the Notes box to describe the habitat state, any changes since the previous visit and any other factors that may have influenced the count, such as:

- Percentage cover of floating pondweeds, water-lilies, duckweed and algae, sphagnum, tall emergents.
- Pondweed, sediment or ditch clearance
- Spread of invasive emergent plants (e.g. Reed)
- Grazing or cutting of bankside vegetation
- Water level and clarity
- Flow rate
- Length or percentage of margin shaded by trees

### Single-species Transects (form F3)

This form can be used to record all the counts for one year of a single target species. Record the average temperature and cloud cover during a count and describe any changes in habitat conditions evident at each visit. Use the Notes box to describe any significant factors (e.g. if the survey method was modified in any way for the species in question) or results obtained during the year.



## Habitat types

Please use the following terms in combination to describe, as far as you are able, the aquatic and terrestrial vegetation along each transect, together with any variations that occur between sections. Levels 1 and 2 describe the aquatic environment, whereas Level 3 is used to describe the emergent plant zones and the terrestrial habitat alongside the transect. If the habitat terms do not describe an aspect of your transect, please enter the words that best describe it.

Use a "/" between each level and separate multiple entries under levels 2 and 3 with semi-colons, e.g. LP/Ust;Oxb/Sw;Fp;Scr. Where known, please include the dominant plant species under Level 3.

| Code      | Level 1                | Code       | Level 2                  | Code       | Level 3                   |
|-----------|------------------------|------------|--------------------------|------------|---------------------------|
| <b>LL</b> | Large Lake (>5ha)      | <b>Eu</b>  | Eutrophic                | <b>Sw</b>  | Swamp                     |
| <b>SL</b> | Small Lake (2-5ha)     | <b>Me</b>  | Mesotrophic              | <b>Ma</b>  | Marsh                     |
| <b>LP</b> | Large Pond (0.1-2ha)   | <b>OI</b>  | Oligotrophic             | <b>Thf</b> | Tall herb fen             |
| <b>SP</b> | Small Pond(s) (<0.1ha) | <b>Dy</b>  | Dystrophic               | <b>Gr</b>  | Grassland                 |
| <b>RI</b> | River (>3m wide)       | <b>Ust</b> | Uncertain trophic status | <b>Bb</b>  | Blanket bog               |
| <b>S</b>  | Stream (30cm-3m)       | <b>Mw</b>  | Mineral working          | <b>Urb</b> | Upland raised bog         |
| <b>RU</b> | Runnel (<30cm)         | <b>Pw</b>  | Peat working             | <b>Lrb</b> | Lowland raised bog        |
| <b>CA</b> | Canal                  | <b>Res</b> | Reservoir                | <b>Vm</b>  | Valley mire               |
| <b>DR</b> | Drain/Ditch/Dyke       | <b>Bal</b> | Balancing                | <b>Bm</b>  | Basin mire                |
| <b>FS</b> | Flush/Spring           | <b>Sed</b> | Sedimentation            | <b>Fp</b>  | Flood plain               |
|           |                        |            |                          | <b>Gm</b>  | Grazing marsh             |
|           |                        | <b>Fp</b>  | Fishpond                 | <b>Uh</b>  | Upland heath              |
|           |                        | <b>Oa</b>  | Other artificial water   | <b>Lh</b>  | Lowland heath             |
|           |                        | <b>Oxb</b> | Oxbow                    | <b>T</b>   | Tillage                   |
|           |                        | <b>Bp</b>  | Borrow pit               | <b>Blw</b> | Broad-leaved woodland     |
|           |                        | <b>Ds</b>  | Dune slack               | <b>Cw</b>  | Coniferous woodland       |
|           |                        | <b>Sl</b>  | Saline lagoon            | <b>Mw</b>  | Mixed woodland            |
|           |                        | <b>Tmp</b> | Temporary                | <b>Sc</b>  | Scrub                     |
|           |                        | <b>Smf</b> | Slow-medium flow         | <b>Bg</b>  | Bare ground               |
|           |                        | <b>Ff</b>  | Fast-flowing             | <b>Gr</b>  | Grazed                    |
|           |                        | <b>Ac</b>  | Acidic - pH<6            | <b>Cu</b>  | Cut                       |
|           |                        | <b>Ne</b>  | Neutral - pH 6-8         | <b>Bu</b>  | Burnt                     |
|           |                        | <b>Ca</b>  | Calcareous - pH>8        | <b>Ur</b>  | Urban (developed)         |
|           |                        | <b>Br</b>  | Brackish                 | <b>Pos</b> | Urban (public open space) |

### Definitions:

|            |  |
|------------|--|
| 1ha        | 10,000m <sup>2</sup> , equivalent to 100m x 100m or 200m x 50m   |
| Balancing  | Impoundment to take excess run-off during storm events   |
| Borrow pit | May be brackish  |
| Brackish   | Tastes salty; salt-tolerant vegetation   |
| Dune slack | May be brackish  |
| Dystrophic | Brownish acidic waters; high concentration of humic matter; few plants and fish; e.g bog pool                    |
| Eutrophic  | Rich in mineral and organic nutrients; abundant plant life, especially algae; low dissolved oxygen content       |
| Grassland  | Permanent grassland running up to the water's edge, typically <1.5m tall; specify whether acidic (pH<6), neutral |



|                 |  |
|-----------------|--|
|                 | (pH 6-7) or calcareous (pH 8 or above); include Bracken stands here  |
| Lowland heath   | Heathers and gorses, typically below 300m  |
| Marsh           | Grass-like vegetation, <1.5m above water by late summer (e.g. rushes <i>Juncus</i> species)                              |
| Mesotrophic     | Clear waters with beds of submerged aquatic plants and medium nutrient levels  |
| Mineral working | Working or abandoned sand, gravel or clay pit  |
| Oligotrophic    | Lacking in plant nutrients (phosphates, nitrates) and organic matter; few plants; high concentration of dissolved oxygen |
| Oxbow           | Cut-off river meander, sometimes seasonal  |
| Peat working    | Typically worked and flooded, includes the Broads  |
| Reservoir       | Impoundment for drinking water, canal feed or irrigation   |
| Saline lagoon   | May be hypersaline (unsuitable for Odonata); salt-tolerant vegetation  |
| Sedimentation   | Impoundment used to trap fine sediment   |
| Swamp           | Grass-like vegetation, >1.5m above water by late summer (e.g. Reed <i>Phragmites australis</i> )                         |
| Tall herb fen   | Meadowsweet and other tall herbs and grasses, >1.5m above waterlogged land by late summer                                |
| Temporary       | Waters (especially small ponds) are assumed to be permanent unless described in this way.                                |
| Tillage         | Cultivated arable & horticultural land   |
| Upland heath    | Heathers, typically above 300m   |

## A FINAL NOTE

Bear in mind that this is a pilot survey, designed in part to test the methodology and forms before final versions go live. Your comments and feedback will be extremely valuable, both during the monitoring season and at the end. If you have any queries during the monitoring season, send them to the coordinator, ideally by email.

**Please send any suggestions for improvement to the coordinator with your completed forms as soon as possible after the end of the counting season and in any case not later than 31 October 2010. This is to enable analysis to be undertaken in time to inform the final method for 2011 and beyond. It would be extremely helpful to have any similar transect counts from earlier years to include in the analysis – if you have any, please contact the Coordinator in the first instance.**

**Finally ... have a good season!**

