6   REQUIREMENTS FOR CONSERVATION

6.1   Introduction

A very few examples of the artificial habitats considered in this report have statutory protection as SSSI or LNRs. A few, not all the same ones, have good invertebrate records. None have good enough invertebrate records, as seen in the Introduction, to be able to define invertebrate "communities" by more than species lists and, occasionally, relative abundances of some species in a very few years.

The importance of such habitats for biodiversity conservation is however substantial, as demonstrated above. Few Broad Habitat types could boast as many as 12-15% of the list of nationally scarce and rare species, and no other for which no Key Habitat has been defined.

The situation is therefore one in which we have the minimal knowledge needed to know how important the problem is and, so far, only the skeleton of a conservation strategy which will address it. Clearly we need to know more about the invertebrates, more about the sites concerned and have a better strategy for conservation. It is not easy to judge how to do this and to set the priorities in the right order.

In the following I leave aside the purely synanthropic species which are either controversial for conservation (such as specific parasites) or common species present as curiosities well outside their global range (such as camel crickets and the range of tropical pyralid moths which breed in aquatic nurseries).

6.2   Invertebrate surveys

We know too little about the invertebrate faunas of artificial sites, in particular and in general. There are two consequences of this. First, important sites may disappear unknown because they have not been surveyed or have been inadequately surveyed. Second, particular species with specific requirements may go extinct because we know

little about their ecology until too late even if we set aside their sites (the Large Blue syndrome - Thomas 1995).

The second problem is likely to be the more serious, simply because for these species site safeguard is not enough. It is however being addressed in part through Biodiversity Action and Species Recovery plans.

The problem of under-recorded sites is more difficult to solve directly, simply because entomologists are thin on the ground compared to habitats which need surveying and because of the amount of work which is necessary to simply list a significant proportion of even the easiest taxonomic groups to record at a site.

In the face of the sheer size of the problem, in which artificial habitats are so widespread and, partly because of Government guidance for redevelopment of "brownfield sites" (PPG3 - 1992), under threat of disappearance, a more rapid appraisal and inventory of sites is needed.

This is difficult, because it needs good field entomologists who are themselves scarce. The rate of species recording is further constrained by the phenology of insects, with species only accessible to sampling at certain times of year, and the natural year-to-year fluctuations in the populations of many species, which means that they may only be detectable readily in some years.

Species recording, let alone studies of species' ecology and community ecology, will still need to be targeted at a few highly important situations. The key problem is to find a means of targeting effort whereby the many with commoner skills can help the few entomologists select sites for detailed examination. Clearly it would also help to train more good entomologists, but that is a longer-term solution outside the scope of this report.

6.3 Habitat survey

While our knowledge of individual species' ecology usually remains poor, knowledge of the overall requirements of species of conservation importance is relatively good. As described above, the important species of artificial habitats are truly biased towards certain taxonomic groups, certain semi-natural habitat origins, and a southern geographical restriction.

Existing standard methods of habitat survey (e.g. Phase 1 Habitat Survey - NCC 1990 - or the Countryside Survey 1990 - Barr et al 1993) are wholly inadequate for an assessment of artificial habitats. Being vegetation-biased, the methods ignore or over-simplify the structural components which are known to be important to invertebrates. Even methods more specifically targeted at artificial habitats (Shimwell 1983) have been focused on vegetation.

This problem is not confined to artificial habitats but is particularly acute there because of the dominance of many artificial habitats by structural features rather than by recognisable vegetation types.

A standard method for the habitat assessment of artificial sites for invertebrates is sorely needed, as the only feasible way for covering sufficient ground to focus surveys of the invertebrates themselves and conservation by site safeguard or other means. The most important aspects of this are essentially the invertebrate habitat features highlighted as important by Kirby (1992). Any recording system needs to convey enough information to the specialist entomologist to make a judgement as to whether a site or area is a high priority for investigation, without being unduly complex.

Some of the key components which need attention are as follows.

-       An estimate of age and/or succession rate. The best sites appear to be those which support a patchy but species-rich vegetation which is maintained in an open state for long periods because of nutrient, toxicity and/or disturbance

limits on succession, without the grazing or cutting management which keeps a site open but removes plant architecture components needed by invertebrates.

- Substrate particle size, i.e. clay, silt, sand, stones, solid or cracked rock, walls or concrete.

- Substrate material and if possible a direct estimate of pH. Besides being important in determining vegetation, it is likely to affect some species directly.

- Aspect of habitat component, slopes exposed to the south having especially a hotter microclimate earlier in the year.

- Shelter factors, small pits or glades in scrub having an extra bonus for early warmth.

- Any clear limiting toxicity or pollution of substrate.

A first approximation at achieving this is suggested in Table 1. The principle is to take advantage of the existing Phase 1 Habitat Survey which is well known and established, but to formalise the associated target note system which is already attached to it. A target note in Phase 1 is map-based and can refer to a point or an area as appropriate. It is also potentially amenable to computerised versions of Phase 1 Habitat Survey using, for instance, geographical information systems (Kent Wildlife Habitat Survey 1995).

Table 1 is therefore intended to be the first draft of a formal target note which can be filled in rapidly by anyone with sufficient biological skills to carry out a Phase 1 Habitat survey. It is intended to be useful either as a hard record or to be readily digitised. It is hoped that the form used will be improved as time goes by in the light of practical experience, but it is presented to stimulate its testing in the field and further development.

Table 1:   Suggested target note record for habitat features important to invertebrates

Invertebrate habitat target note record								Reference:
Site			**Recorder:**				**Date:**	
Phase 1 Habitat type					**Qualifier (e.g. roof)**			
Live vegetation	Cover%	**Height**	Min	Mode	Max	Alien flo scrub	Native flo scrub	Field layer flo / seed
Dead vegetation		Leaf litter	Bales/thatch	Herb stem	Twig	Branch	Trunk	Veteran
Animal structures/products			Burrow	Nest	Dung	Midden	Slurry/sludge	Carrion
Management species	Cattle	Horse/pony	Sheep	Goat	Rabbit	Human	Other	Unknown
Management pattern / intensity		Occasional bite	26-74% taken	>75% taken	Occasional stems	Even cut	None	Unknown
Disturbance /shelter types		Hoofprint	Scrapes	<30cm	<1m	<5m	>5m	Glade
Substrate size		Clay	Silt	Sand	Gravel	Stones	Cracked solid	Solid
Substrate type	Concrete	Brick	Stone	Soil	Ash	Clinker/slag	Metal	Other:
Wetness		Water	Saturated	Damp	Dry	Dessicated	Seasonal	Unknown
Slope		Flat	<10°	>10°	>30°	>45°	>60°	Cliff/wall
Slope faces (aspect)	NW	W	SW	S	SE	E	NE	N
pH	**Value:** **OR**		Very calcareous		Calcareous	Neutral	Acid	Very acid
Additional factors			Linked note(s)					

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Features considered important are:

- A unique record identifier.

- Maximal use of a "tick-box" system for recording which is both rapid and forces the observer to make objective decisions which can be used by others to judge the resulting quality or otherwise of the habitat provided.

- A row giving linkage to standard information about the site. In practice recorders may wish to use only a single site reference and this is all that would be needed in a computer stored version.

- A row which allows linkage to either the whole or part of a Phase 1 Habitat classification area.

- A series of rows giving the opportunity to record information about structural components. Not all rows will be relevant in all situations: they need only be ticked where appropriate.

- An opportunity to link the target note to another (which may itself be linked to further notes), essential for identifying groups of structural units which may be needed to meet the needs of many invertebrate species.

- An opportunity to make comments which the observer does not feel able to fit into the remaining system.

This note system works within and across the "vegetation" at Phase 1 Habitat level, i.e. ephemeral, tall ruderal, the different grassland types or scrub. More could be added, but any standard system must be a compromise between ease of recording and giving the full information needed for an experienced entomologist to judge the likely quality of components or their combinations. A few worked examples and details of

the system are given in Appendix 1 to this report, in the hope of stimulating the testing and development of the system.

6.4 Spatial relations

Sites do not exist in isolation, either historically or at any one time (see e.g. Figure 1). The precise importance of habitat "corridors" has been notoriously difficult to establish (Dawson 1994). However, the effects of isolation on invertebrates in urban ruderal sites have been investigated rigorously (Denys & Schmidt 1998) and in their example is now known to be substantially that which received wisdom has suggested for some time. Sites which are isolated from others by extreme and/or polluted built-up areas become impoverished in species, although overall abundance may increase as certain species are favoured by foodplant stress or the absence of natural enemies. In extreme isolation however, even these species decline.

This reinforces the impression that connections between isolated habitat sites are important for invertebrates and should be first recorded in any survey of sites and second, maintained or created to promote invertebrate diversity.

6.5 Safeguarding and conservation

As stated above, some artificial sites with an important invertebrate fauna are already protected as SSSI or as nature reserves. The overall importance of these sites for scarce and rare invertebrates described in this report suggests that there is no justification in avoiding site designation simply because of artificial status. Like other habitats, the best and most representative sites merit statutory protection.

Unlike semi-natural habitats however, artificial habitats are continually being generated and destroyed in the normal course of urban renewal and redevelopment and as fashions and the needs of industry change. It is highly likely that many of the species of artificial habitats depend on this repeated renewal.

This creates a conundrum. If sites otherwise regarded as derelict always receive protection for nature conservation, they will not be made available for redevelopment. In practical circumstances, this means that developers and landowners will spend money keeping these sites "tidy" and sterile to avoid them developing significant interest and attracting designations. We need mechanisms which, while safeguarding the best sites, encourage people to allow transient interest to develop where sites are temporarily not required for development.

The experience at Center Parcs has also shown forcefully that significant invertebrate interest, not merely that which can be expected in any network of suburban gardens, can coexist in close proximity to development. The methods of doing this are simple. There are some active management requirements, but the main benefit has been achieved simply by allowing natural colonisation instead of intrusive "gardening" and avoiding the use of fertilisers and pesticides.

This simple rule is at the same time vital and exceedingly difficult to achieve amongst current public and official attitudes. It is noteworthy that no intensively managed urban park is amongst the best invertebrate sites. Such places under their usual management can at best provide islands of relatively high diversity against the very poor comparison of modern urban areas. Likewise, the attitude of local authority planners and developers alike to the treatment of building surrounds often remains a desire for a manicured appearance, often using alien species, which is of limited use for the invertebrate fauna which under more natural conditions is well capable of surviving in these situations.

Changing such attitudes needs education on the one hand and, on the other, and seeking ways in which a result attractive to land use planners can be achieved by more natural means which allows a diverse fauna to survive.

7 ACKNOWLEDGEMENTS

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Appendix 1: Structural target note system and examples

The boxes are:

Always required

Reference: A unique reference for the note.

Required if the note will not be always attached to a wider record

Site: Either a name or other identifiable reference could be used.
Recorder: Name of recorder.
Date: Date of record.

Required as described

The intention is to provide presence / absence data only where possible for simplicity and speed: there is nothing to prevent a recorder placing quantitative (e.g. percent cover) data in presence/absence boxes if desired.

<u>Phase 1 habitat type</u>

Habitat code:	As Phase 1 Habitat Survey. **Always**
Qualifier:	Indicates if only part is intended, such as the roof of a building or the gravelled, not tarmac, areas of a car park.

<u>Live Vegetation row</u>

Vegetation cover:	Approximate percentage, or 0. **Always**
Vegetation height:	If vegetation exists, minimum (optional), mode (**always**) and maximum (optional) height in cm.
Alien flo scrub	Flowering species of shrub alien to Britain (can be useful nectar sources for many species). **Ticked if present**
Native flo scrub	The same for native species. **Ticked if present**
Field layer flo/seed	The same for herbaceous flowering species. **Ticked if present**

<u>Dead vegetation row</u> (all **Ticked if present** - include timbers in buildings at the right size)

Leaf litter	Persistent litter layer in vegetation sward
Bales/thatch	Stored bales or thatch as on a roof
Dead stem	Upstanding dead stems of herbaceous perennials or robust grasses such as reed.
Dead twig	Small woody material up to 2.5 to 10cm diameter
Dead branch	Medium sized woody material between 2.5 and 30cm diameter
Dead trunk	Large woody material over 30cm
Veteran	Pollard or other ancient tree with holes / dead heartwood / rot / sap flow or other indicators of suitability for demanding saproxylic fauna.

Animal structures / products row (all **Ticked if present**)

Burrow
Nest
Dung   Dung scattered by animals
Midden   Piled dung or dung / straw mixtures. The context (e.g. indoor/outdoor
                will be clear from other rows.
Slurry/sludge   Extensive areas as in older sewage treatment or in slurry lagoons.
Carrion   Dead animal material.

Management species row (all **Ticked if present**, if none then do not tick a box)
These indicate the species responsible for the grazing / cutting / dung / carrion etc.

Cattle
Horse / pony
Sheep
Goat
Rabbit
Human
Other   State species
Not known

Management pattern / intensity row (**Always, tick one only**)

Occasional bite   Most of the vegetation not grazed, but occasional patches or bites. Very
                  light grazing (maximum 25% of the area).
26-74% taken
>75% taken
Occasional stems Mainly an even mow or graze but occasional stems remain.
Even cut   Grazed or mown (species row shows which) to an even height.
None   No evidence of grazing or cutting, although small mammals (i.e. mice
                  and voles) may be present, or not applicable to this note.
Not known   At the time of visit it was not possible to judge management pattern or
                  intensity.

Clearly some sites may have complicated seasonal or other grazing regimes. This is considered too complex to record here and will often refer to sites managed specifically for nature conservation. If it is desired to record this information, it should be placed in the "Additional factors".

Disturbance / shelter types (all **Ticked if present**)

Hoofprints	Ground variation produced by animal hoofprints.
Scrapes	The slightly larger scale disturbance produced by for instance, rabbits or foraging badgers (animal burrows are treated separately above.
<30cm	Other pit or bank less than 30cm deep or tall.
<1m	Larger pits or banks less than 1m.
5m	As above less than 5m deep.
>5m	As above more than 5m deep.
Glade	Shelter formed by opening in scrub or woodland vegetation.

Substrate size row (all **Ticked if present**)

Clay, silt, sand, gravel and stones follow standard definitions. Solid means uncracked face of concrete or stone. Cracked solid means with significant cracks or a built wall / tiled roof with separate stones or bricks.

Substrate type row (all **Ticked if present**)

Concrete, brick, stone, ash, clinker or slag and metal are allowed for. Other/info can be used to indicate another type or, for instance, indicate that ash is pfa (pulverised fuel ash).

Substrate wetness row (One **Always, with optional qualifier**)

Wetness from water to dessicated. Seasonal box should be ticked if the observer judges that the state observed is likely to fluctuate. The Not recorded box should be ticked if the observer considers that conditions are so unusual for the site at the time of recording that wetness cannot be judged.

Substrate slope row (**Tick as needed to show range if present**)

A range of values is allowed, with separate boxes for completely flat areas and completely vertical ones (cliff / wall).

Substrate aspect row (**Tick as needed to show range if present**)

A compass range is shown. No box should be ticked for a completely flat site.

pH row (Always, one box)

A subjective range is allowed for, and the option to say "not known" or put in an actual pH value.

Linked notes   The unique reference to any other note(s) which the observer wishes to link to this record.

Additional factors   Opportunity for recorder to note any additional information considered necessary, such as the suspected presence of toxic material.

Examples

The example sets shown are both places familiar to the author which are good, or potential sites for important invertebrates. The car park at Elveden Forest Center Parcs village supports several Red Data Book and nationally scarce aculeate Hymenoptera. The complex of habitats around the White Hart inn at Wytham in Oxfordshire includes the dovecote which provided the only known record for the rove beetle *Aleocharis villosus* as well as walls and roofs supporting specialised moss-feeding *Bryotropha* species (Lep: Gelechiidae) and with potential for other scarce invertebrates.

Invertebrate habitat target note record Reference: *EG1*

Site *White Hart inn, Wytham, Oxford*	Recorder: *CG*		Date: *1/1/1998*

Phase 1 Habitat type *J3.6 Buildings*		Qualifier (e.g. roof) *Roof*

Live vegetation		Cover% *15*	**Height**	Min *0.5*	Mode *2*	Max *10*	Alien flo scrub	Native flo scrub	Field layer flo / seed
Dead vegetation			Leaf litter	Bales/thatch	Herb stem	Twig	Branch	Trunk	Veteran
Animal structures/products				Burrow	Nest	Dung	Midden	Slurry/sludge	Carrion
Management species		Cattle	Horse/pony	Sheep	Goat	Rabbit	Human	Other	Unknown
Management pattern / intensity			Occasional bite	26-74% taken	>75% taken	Occasional stems	Even cut	None	Unknown
Disturbance /shelter types			Hoofprint	Scrapes	<30cm	<1m	<5m	>5m	Glade
Substrate size			Clay	Silt	Sand	Gravel	Stones	Cracked solid	Solid
Substrate type	Concrete	Brick	Stone	Soil	Ash	Clinker/slag	Metal	Other:	
Wetness			Water	Saturated	Damp	Dry	Dessicated	Seasonal	Unknown
Slope			Flat	<10°	>10°	>30°	>45°	>60°	Cliff/wall
Slope faces (aspect)		NW	W	SW	S	SE	E	NE	N
pH		Value:	OR	Very calcareous		Calcareous	Neutral	Acid	Very acid

Additional factors *Bryophytes, Sedum*	Linked note(s) *EG2, EG3*

Invertebrate habitat target note record　　　　　　　　　　　　Reference: *E92*

Site *White Hart inn, Wytham, Oxford*	Recorder: *CG*	Date: *1/1/98*

Phase 1 Habitat type *T3.6 Buildings*	Qualifier (e.g. roof) *Dovecote*

Live vegetation		Cover% *O*	**Height**	Min ·	Mode	Max	Alien flo scrub	Native flo scrub	Field layer flo / seed
Dead vegetation			Leaf litter	Bales/thatch	Herb stem	Twig	Branch	Trunk	Veteran
Animal structures/products				Burrow	Nest	Dung	Midden	Slurry/sludge	Carrion
Management species		Cattle	Horse/pony	Sheep	Goat	Rabbit	Human	Other	Unknown
Management pattern / intensity			Occasional bite	26-74% taken	>75% taken	Occasional stems	Even cut	None	Unknown
Disturbance /shelter types			Hoofprint	Scrapes	<30cm	<1m	<5m	>5m	Glade
Substrate size			Clay	Silt	Sand	Gravel	Stones	Cracked solid	Solid
Substrate type	Concrete	Brick	Stone	Soil	Ash	Clinker/slag	Metal	Other:	
Wetness			Water	Saturated	Damp	Dry	Dessicated	Seasonal	Unknown
Slope			Flat	<10°	>10°	>30°	>45°	>60°	Cliff/wall
Slope faces (aspect)		NW	W	SW	S	SE	E	NE	N
pH		Value:　　　　OR	Very calcareous			Calcareous	Neutral	Acid	Very acid

Additional factors *No doves for >20 years*	Linked note(s) *E91, E93*

Invertebrate habitat target note record								Reference: EG3

Site White Hart Inn, Wytham, Oxford		Recorder: CG				Date: 1/1/98		
Phase 1 Habitat type J2.5 Wall					Qualifier (e.g. roof) Garden walls			

Live vegetation		Cover% 5	Height	Min 1	Mode 5	Max 30	Alien flo scrub	Native flo scrub	Field layer flo / seed
Dead vegetation			Leaf litter	Bales/thatch	Herb stem	Twig	Branch	Trunk	Veteran
Animal structures/products				Burrow	Nest	Dung	Midden	Slurry/sludge	Carrion
Management species		Cattle	Horse/pony	Sheep	Goat	Rabbit	Human	Other	Unknown
Management pattern / intensity			Occasional bite	26-74% taken	>75% taken	Occasional stems	Even cut	None	Unknown
Disturbance /shelter types			Hoofprint	Scrapes	<30cm	<1m	<5m	>5m	Glade
Substrate size			Clay	Silt	Sand	Gravel	Stones	Cracked solid	Solid
Substrate type	Concrete	Brick	Stone	Soil	Ash	Clinker/slag	Metal	Other:	
Wetness			Water	Saturated	Damp	Dry	Dessicated	Seasonal	Unknown
Slope			Flat	<10°	>10°	>30°	>45°	>60°	Cliff/wall
Slope faces (aspect)		NW	W	SW	S	SE	E	NE	N
pH		Value: OR	Very calcareous			Calcareous	Neutral	Acid	Very acid

Additional factors	Linked note(s) EG1, EG2

Invertebrate habitat target note record								Reference: *EG 4*

Site *Center Parcs, Elveden, Suffolk* **Recorder:** *CG* **Date:** *1/1/98*

Phase 1 Habitat type *J1/3 Ephemeral /short perennial* **Qualifier (e.g. roof)** *In car park*

Live vegetation			Cover% 5	**Height**	Min ¹ 1	Mode S	Max 20	Alien flo scrub	Native flo scrub	Field layer flo / seed
Dead vegetation				Leaf litter	Bales/thatch	Herb stem	Twig	Branch	Trunk	Veteran
Animal structures/products					Burrow	Nest	Dung	Midden	Slurry/sludge	Carrion
Management species			Cattle	Horse/pony	Sheep	Goat	Rabbit	Human	Other	Unknown
Management pattern / intensity				Occasional bite	26-74% taken	>75% taken	Occasional stems	Even cut	None	Unknown
Disturbance /shelter types				Hoofprint	Scrapes	<30cm	<1m	<5m	>5m	Glade
Substrate size				Clay	Silt	Sand	Gravel	Stones	Cracked solid	Solid
Substrate type		Concrete	Brick	Stone	Soil	Ash	Clinker/slag	Metal	Other:	
Wetness				Water	Saturated	Damp	Dry	Dessicated	Seasonal	Unknown
Slope				Flat	<10°	>10°	>30°	>45°	>60°	Cliff/wall
Slope faces (aspect)			NW	W	SW	S	SE	E	NE	N
pH			Value: OR	Very calcareous		Calcareous	Neutral	Acid	Very acid	

Additional factors *Variably compacted by traffic* **Linked note(s)** *EG5*

Invertebrate habitat target note record　　　　　　　　　　　Reference: *EG5*

Site *Center Parcs, Elveden, Suffolk*		Recorder: *CG*			Date: *1/1/98*			
Phase 1 Habitat type *B3/2　SI Calc. grassland*					Qualifier (e.g. roof) *With scattered scrub*			

Live vegetation		Cover% *80*	**Height**	Min • *20*	Mode *60*	Max *120*	Alien flo scrub	Native flo scrub	Field layer flo / seed
Dead vegetation			Leaf litter	Bales/thatch	Herb stem	Twig	Branch	Trunk	Veteran
Animal structures/products				Burrow	Nest	Dung	Midden	Slurry/sludge	Carrion
Management species		Cattle	Horse/pony	Sheep	Goat	Rabbit	Human	Other	Unknown
Management pattern / intensity			Occasional bite	26-74% taken	>75% taken	Occasional stems	Even cut	None	Unknown
Disturbance /shelter types			Hoofprint	Scrapes	<30cm	<1m	<5m	>5m	Glade
Substrate size			Clay	Silt	Sand	Gravel	Stones	Cracked solid	Solid
Substrate type	Concrete	Brick	Stone	Soil	Ash	Clinker/slag	Metal	Other:	
Wetness			Water	Saturated	Damp	Dry	Dessicated	Seasonal	Unknown
Slope			Flat	<10°	>10°	>30°	>45°	>60°	Cliff/wall
Slope faces (aspect)		NW	W	SW	S	SE	E	NE	N
pH		Value: OR		Very calcareous		Calcareous	Neutral	Acid	Very acid

Additional factors *Developing on car park divider banks*	Linked note(s) *EG4*