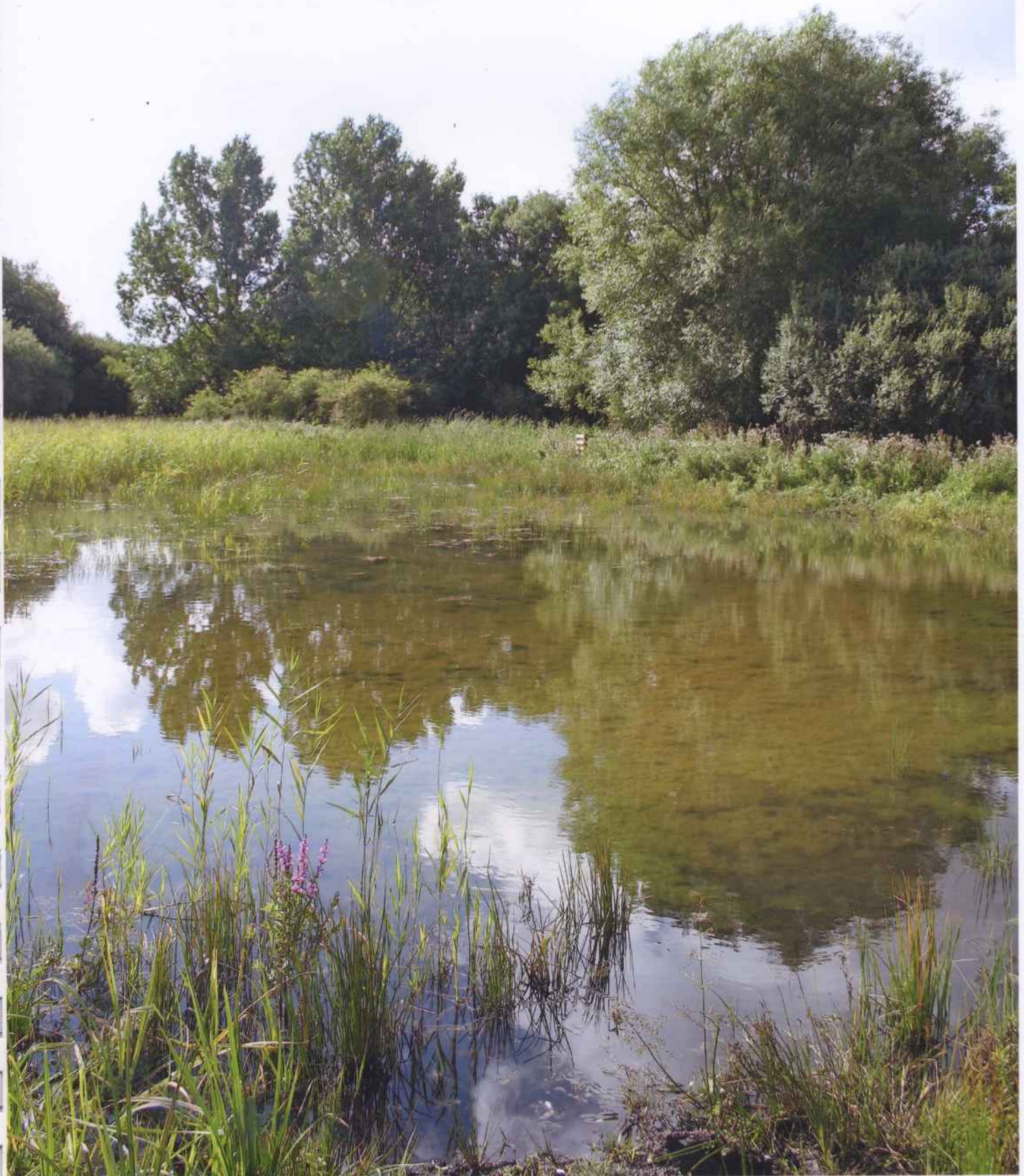


A SURVEY OF THE AQUATIC COLEOPTERA AND  
HEMIPTERA-HETEROPTERA OF PARKERS PIECE,  
BLEYSWYCKS BANK, BETTY'S FEN, BLO NORTON FEN  
AND HINDERCLAY FEN

Geoff Nobes. September 2010



## Introduction

Twelve sites were surveyed in fens bordering the Little Ouse, for their aquatic coleoptera and hemiptera-heteroptera in September 2010 for the Lower Ouse Headwaters Project Group.

### The sites were:

- 1-Parkers piece
  - 2-Betty's Fen
  - 3- Betty's Fen
  - 4- Bleyswycks Bank
  - 5-Blo Norton Fen
  - 6- Blo Norton Fen
  - 7- Blo Norton Fen
  - 8- Blo Norton Fen
  - 9- Hinderclay Fen
  - 10- Hinderclay Fen
  - 11- Hinderclay Fen
  - 12- Hinderclay Fen
- 
- Sixty-seven species of water beetles were recorded including 5 Red Data Book species and 12 Nationally Notable species.
  - Seventeen species of aquatic bugs were recorded, all fairly common species apart from the Nationally Scarce bug *Microvelia pygamaea*.

Water traps were set at a few of the sites and a list of the aculeate hymenoptera captured in these is provided.

## METHODS

Twelve sites were surveyed in September 2010 for aquatic beetles and bugs (Map 1).

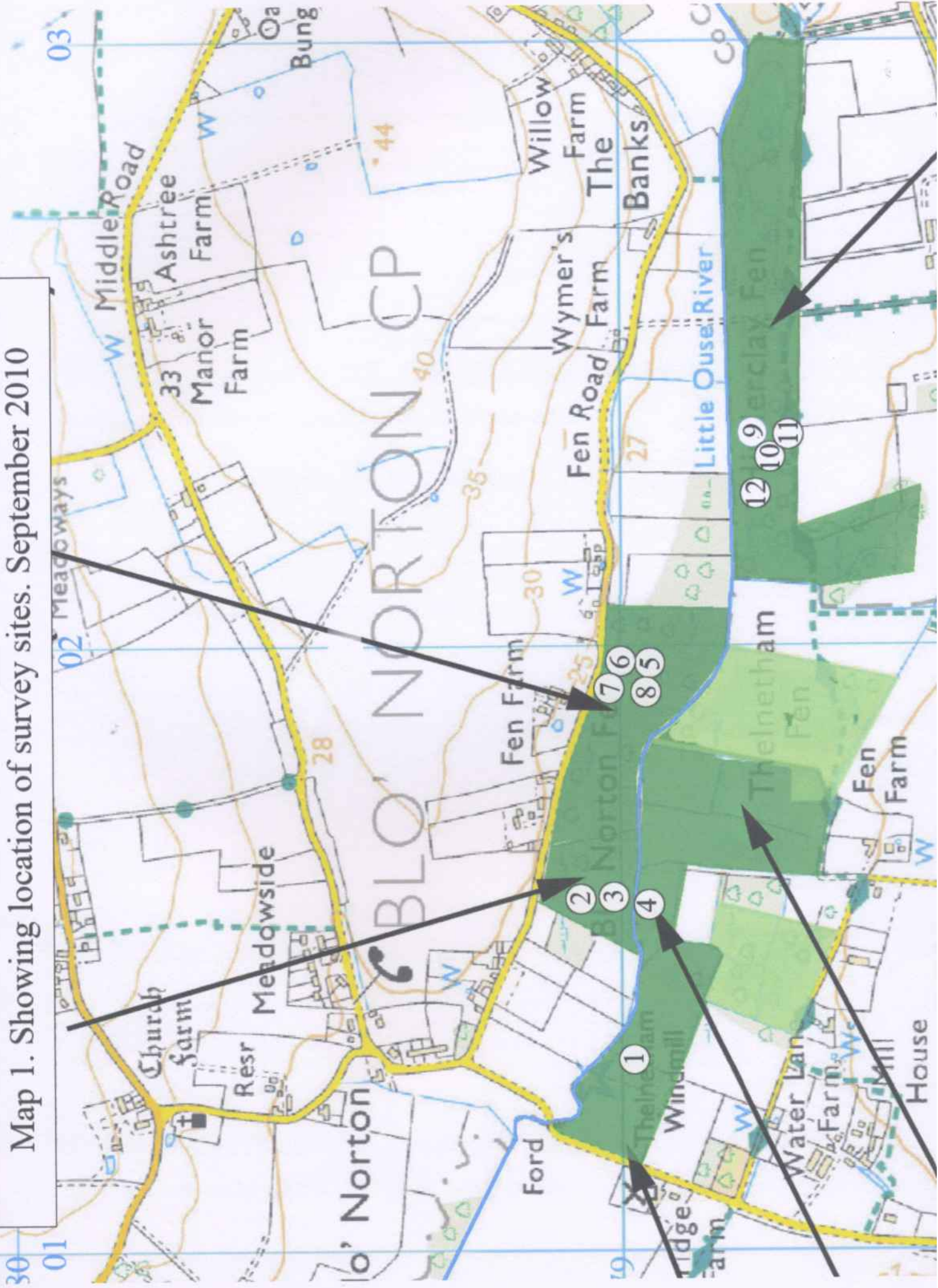
Sites were surveyed using a D-framed net with 1mm mesh bag. Netted material was examined on a large white plastic tray. No set time was allowed at each site, netting continuing until no more species could be found. The method used on the mossy pools and shallow edges of the dykes was to tread-down the debris in the water by foot and then skim the surface with a flour-sieve to catch the invertebrates. This method is preferable to netting in very shallow water as very little weed or debris is caught and very small beetles can be seen more easily. Most material was identified in the field and released but voucher specimens were taken of species of interest and those requiring microscopic examination to determine the species. An estimate was made of the numbers of each species found. A list was made for each station sampled and the number of species recorded from each.

Conductivity and pH readings were taken from each of the sites surveyed. Dominant plants were recorded from each site and habitat photographs taken of the stations sampled.

Site Quality Scores are produced for most of the sites surveyed, for their water beetle fauna, using criteria contained in Foster & Eyre (1992).

The survey was carried out in good weather conditions and there were no limiting factors.

Map 1. Showing location of survey sites. September 2010



## Results

Sixty-seven species of aquatic coleoptera were identified from the following families:

Family	No of species	RDB 1	RDB 2	RDB 3	N/a	N/b
GYRINIDAE	1					
HALIPLIDAE	4					
NOTERIDAE	1					
DYTISCIDAE	36		1	1		8
HYDROCHIDAE	2			2		
HELOPHORIDAE	2					
HYDROPHILIDAE	16			1		3
HYDRAENIDAE	4					1
ELMIDAE	1					
<b>Totals</b>	<b>67</b>		<b>1</b>	<b>4</b>		<b>12</b>

**One species classified as Nationally Vulnerable (Red Data Book 2)**

*Agabus striolatus*

**Four species classified as Nationally Rare (Red Data Book 3)**

*Laccornis oblongus*

*Hydrochus crenatus*

*Hydrochus elongatus*

*Enochrus nigrinus*

**Twelve species classified as Nationally Scarce List B (Notable N/b).**

*Hydroglyphus geminus*

*Graptodytes granularis*

*Hydroporus neglectus*

*Ilybius chalconatus*

*Ilybius guttiger*

*Rhantus grapi*

*Rhantus suturalis*

*Hydaticus seminiger*

*Berosus signaticollis*

*Cercyon sternalis*

*Helochares lividus*

*Hydraena testacea*

**Seventeen species of aquatic bugs were identified from the following families:**

Family	No of species	RDB 1	RDB 2	RDB 3	N/a	N/b
NEPIDAE	2					
CORIXIDAE	6					
NAUCORIDAE	1					
NOTONECTIDAE	3					
PLEIDAE	1					
HEBRIDAE	1					
VELIIDAE	1					1
GERRIDAE	2					
<b>Totals</b>	<b>17</b>					<b>1</b>

**One species classified as Nationally Scarce List B (Notable N/b).**

*Microvelia pygmaea*

## Notes on the sites surveyed

### Site No 1. Parker's Piece. TM01309-78981.

Surveyed: 2<sup>nd</sup> September 2010. Ph: 8.0. Cond: 586 (µS/cm)

This is a shallow reed-lined scrape excavated in early summer 2009.

Vegetation around the edge consists of hard and soft rush tussocks, amphibious bistort, jointed rush, brookweed, purple loostrife and hemp agrimony. *Charophytes* carpets the water.

Thirty-seven species of water beetles were recorded here including the RDB3 *Enochrus nigritus*. The Nationally Notable water beetles *Berosus signaticollis* and *Graptodytes granularis* were abundant in the shallows. One specimen of the water stick-insect *Ranatra linearis* was found amongst reed stems in shallow water. Eleven species of water bugs were recorded. Three-spined sticklebacks were noted.

This new pond already contains a good range of species and should get even better in time. Marginal vegetation and grassy, mossy edges favoured by many water beetle species is largely absent at the moment. It would be of benefit if the sheep could be excluded from grazing at least some of the perimeter of the pond on one side.

### Site No2. Betty's Fen. TM01591-79065.

Surveyed: 3<sup>rd</sup> September 2010. Ph: 7.8. Cond: 465 (µS/cm)

This is a very shallow reed-lined turf pond excavated some years ago. This pond is surrounded by a large dense reedbed with few other plants apart from water mint, gypsywort, brookweed, purple loostrife and bittersweet. Fen pondweed *Potamogeton coloratus* is abundant.

This site was previously surveyed by the author on 9<sup>th</sup> June 2007 when 22 species of water beetles were recorded. Twenty-eight species of water beetles were recorded in this survey including the RDB book species *H. crenatus* and *H. elongatus*. Both these species

were abundant in the flooded reed litter at the edges of the pond during the 2010 survey but were not recorded in 2007. Four Nationally Notable species of water beetles were also recorded: *Berosus signaticollis*, *Cercyon sternalis*, *Helochaeres lividus* and *Ilybius chalconatus*.

This pond also would benefit from having some grassy, mossy edges. This could possibly be achieved by cutting the reed on the path side down to the waters edge and keeping it mown throughout the summer. This would also allow some smaller plants to colonise the edges and create a diversity of habitat around the pond. Some reedmace *Thypha* was noted colonising the fen on either side of the path through the site. It is suggested that this plant is removed as soon as possible as it can be very invasive once it gets a hold. This can be achieved very easily by wiping the stems with a strong solution of Roundup in May, with a gloved hand.

### Site No 3. Betty's Fen. TM01531-79066.

Surveyed: 3<sup>rd</sup> September 2010. Ph: 7.0. Cond: 561(µS/cm)

This is the site where the author found the very rare diving beetle *Agabus striolatus* in June 2007. The pools are now heavily choked with reed and *Glyceria* and were very

hard to work, and no specimens of *Agabus striolatus* were found. The Nationally Notable diving beetle *Ilybius guttiger* was recorded amongst a few other common species.

**Site No 4. Blevswycks Bank. TM01569-78947.**

**Surveyed: 3<sup>rd</sup> September 2010. Ph: 7.0. Cond: 1187 (µS/cm)**

This is a small pool left after recent dehydration of the site in the recent drought. The pool is very well vegetated with amphibious bistort, soft rush, jointed rush and flooded grass. Sixteen species of water beetle were recorded. Three Nationally Notable species were common here: *Rhantus suturalis*, *Berosus signaticollis* and *Helochares lividus*. The conductivity of the water was found to be very high here, possibly caused by pollution from sheep droppings, run off from nearby fields or other effluent. This did not seem to be affecting the aquatic fauna as water beetles and bugs were abundant.

**Site No 5. Blo Norton Fen. TM01983-78957.**

**Surveyed: 4<sup>th</sup> September 2010. Ph: 7.3. Cond: 463 (µS/cm)**

A fairly recently excavated small pool in a rich reed and *Cladium* mown fen. This is a small deep pool 8mts long by 2mts wide containing abundant *Chara hispida* and emergent vegetation in very clear, clean water. Plants include water mint, angelica, marsh thistle, hemp agrimony and cut *Cladium* and reed, with mossy margins. Twenty- four species of water beetles were recorded here including the Nationally Notable large diving beetles *Hydaticus seminiger* and *Rhantus grapi*. The whirligig beetle *Gyrinus substriatus* and the pond skater *Gerris lacustris* were present on the surface of the water. The ten-spined stickleback was noted here as was a small newt larva, possibly great-crested. Very few odonata larvae were noted. Aquatic molluscs were also almost absent. This is a super little pool containing an impressive number of species and a diverse fauna.

**Site No 6. Blo Norton Fen. TM01998-78980.**

**Surveyed: 4<sup>th</sup> September 2010. Ph: 7.5. Cond: 542 (µS/cm)**

This is a small pool very closed to the last but longer established containing abundant *Potamogeton colaratus*. Emergent and marginal plants included: Reed, water mint, marsh valerian, meadowsweet, lesser water parsnip and cut *Cladium* tussocks. There are some nice mossy areas around the tussocks. This is another nice pool with 31 species of water beetles recorded including the RDB species *Laccornis oblongus* and *Enochrus nigrinus*. Four Nationally Notable diving beetles were also recorded, these were: *Hydaticus seminiger*, *Hydroporus neglectus*, *Ilybius chalconatus* and *Rhantus grapi*. Also of note were several specimens of the uncommon backswimmer *Notonecta maculata*. The mossy edges to this pool are its most important areas for water beetles as this is where most of them breed. The two RDB book species and *Hydroporus neglectus* are particularly associated with such areas.

**Site No 7. Blo Norton Fen. TM01967-78998.**

**Surveyed: 4<sup>th</sup> September 2010. Ph: 6.9. Cond: 576. ( $\mu$ S/cm)**

This is a large area of flooded Alder carr towards the northern boundary of the site. This area contains many small deep, shaded pools amongst reed and large *Cladium* tussocks. The site looked very similar to where *Agabus striolatus* is found at Catfield Fen in the Broads so it was thoroughly searched for this species. Two specimens of this RDB2 diving beetle species were found along with the Nationally Notable diving beetle *Ilybius guttiger* in these pools amongst leaves and mud.

**Site No 8. Blo Norton Fen. TM01976-78955.**

**Surveyed: 9<sup>th</sup> September 2010. Ph: 7.3. Cond: 688 ( $\mu$ S/cm)**

This is a large area of tall reedbed and *Cladium* adjacent to site No 5 containing some small pools of very shallow water. This area was searched because it also looked promising for *Agabus striolatus*. One specimen of this species was found here also at the edge of the reedbed.

**Site No 9. Hinderclay Fen. TM02357-78758.**

**Surveyed: September 2010. Ph: 6.9. Cond: 613 ( $\mu$ S/cm)**

This is a small pond at the edge of sallow carr choked with reeds and duckweed. This is pool at the edge of a thick reedbed and is partly shaded by sallows and a large birch tree. The water is stagnant with an accumulation of muddy silt and decomposing leaves. Only six very common species of water beetles were recorded here.

**Site No 10. Hinderclay Fen. TM02334-78754.**

**Surveyed: 9<sup>th</sup> September 2010. Ph: 6.0. Cond: 893 ( $\mu$ S/cm)**

This is a very dense reedbed with some *Cladium*, *Iris*, *Juncus* and *Typha* tussocks. The water is very shallow at the edges of the site but there is a pool about a metre deep in the middle of the reedbed. There is a deep layer of muddy silt and reed and *Juncus* litter. The conductivity of the water was at this site. There were only 11 species of water beetles here, but the Nationally Notable diving beetle *Hydaticus seminiger* was recorded.

**Site No 11. Hinderclay Fen. TM02319-78795.**

**Surveyed: 12<sup>th</sup> September 2010. Ph: 7.0. Cond: 1017 ( $\mu$ S/cm)**

This is a recently dug small turf pond in rich fen at the edge of a path. The pond is lined with reed on three sides. Other plants include lesser spearwort, water mint and gypsywort. There is a covering of algae in places. Sixteen species of water beetles were recorded here including the Nationally Notable *Hydroporus granularis* and *Helochares lividus*. Of note was the remarkable high conductivity of the water here. This again, could be the affect of some sort of pollution from outside influences. Algae was noted on this pool and the *Chara* beds were a lot smaller than in the next site. Mayfly, dragonfly and alder fly larvae were noted as were ten-spined sticklebacks.

**Site No 12. Hinderclay Fen. TM02250-78784.**



Surveyed: 12<sup>th</sup> September 2010. Ph: 7.5. Cond: 442 (µS/cm)

This is another recently dug small turf pond containing abundant *Chara*. The pond is surrounded on three sides by dense reedbed. Other Plants include; water mint, marsh bedstraw, gypswort, purple loostrife, skullcap, blunt-flowered rush and *Cladium*. This is a superb pond, containing over twice as many water beetles as the last, 33 species. The conductivity of the water here was at normal levels and no algae were present. One specimen of the Nationally Rare *Hydrochus elongatus* was recorded. Four Nationally Scarce species were recorded: *Graptodyes granularis*, *Ilybius guttiger*, *Rhantus frontalis* and *Helochares lividus*. The Nationally Rare minute water cricket *Microvelia pygmaea* was recorded here and also the water scorpion *Nepa cineria*. Dragonfly and mayfly larvae and ten-spined sticklebacks were also frequent. It would be a good idea to keep this pond free of reeds on the open site by treating the stems with Roundup in the spring as suggested for another site earlier in the report. It is also suggested that more of these pond is excavated in line with this one in the same area.

### Note on the rare species of water beetles recorded during the survey

***Laccornis oblongus* RDB 3** This is a small brownish-black, flightless water beetle found in old, undisturbed wetlands, and is very local and scarce and has been recorded from East Anglia, Somerset, Hereford, Westmorland, Durham, Dumfriesshire and the Border moorlands. *Laccornis oblongus* is considered a relict species and an indicator of undisturbed fen (Foster 1983). This is a characteristic species of the pingo sites at Thompson Common and East Walton Common. It is also frequent in many rich Broadland sites such as at Catfield Fen. This species is proving more common than once thought and I now have 77 records for this species in the county from 36 sites. Two specimens of *L. oblongus* were found during the survey in site 6 on Blo Norton Fen. The habitat was amongst flooded moss in a shallow pool. This species is confined to shallow, mossy fen areas of temporary base-rich fen areas. Cuppen & Dettner (1987) and others have noted the occurrence of adults in the early spring and in the autumn. Larvae have been found in April and May, with eggs laid in captivity hatching very quickly. It is likely that the pupa of teneral adults rest in their pupal chambers until sites flood again after a period of drying out in the summer. Unpublished flight tests have proved negative. This species appears to be capable of surviving in small, isolated sites. Management measures on reserve should include recognition of the need to maintain shallow mossy swamps in partial shade.

#### ***Agabus striolatus*. RDB2**

J. L Brown took this beetle on Horning Marsh in 1839 and it was last reported there by Clark (1855). Balfour-Browne had suggested that *striolatus* had become extinct in Britain Balfour-Browne (1950). In September 1977, two specimens were found at Catfield fen by G. N. Foster the first British records since 1855. (Foster 1977). These were found in shaded pits under gale in Sweet Gale Wood on the Butterfly Conservation side of Catfield Fen. It has subsequently been found at several other sites in Broadland and also in a few sites in west Norfolk by the author (Nobes 2001). *Agabus striolatus* was only known from Norfolk until 2006 when it was found at Inkle Moor in south-west Yorkshire. It still remains one of the rarest of British water beetles.

This species lives in shaded pools in fen carr in the Norfolk Broads. It can also occur in more open areas, such as at Whitwell Common where it occurs in dense reedbeds, which provide the shade needed. But these areas are always adjacent to scrub or woodland which are used for overwintering purposes or during periods of drought. This species is capable of running out of water, and crawls rather than swims when submerged. Flight tests have failed and six specimens dissected were found to have vestigial flight muscles and poorly sclerotised subalar discs (Foster 1982). It is a spring breeder with larvae being found in early summer and adults being active during the winter.

This species could be considered at threat from salinification associated with sea level changes following climatic change (Cuppen & Cuppen (1983) and from pollution associated with intensive use of the neighbouring open water bodies by pleasure craft. At Blo Norton Fen this species could be put at risk by any drop in the water table or the removal of too much shade in the form of scrub from its habitat.

***Hydrochus crenatus*. RDB3** This species follows a similar pattern of distribution to *H. brevis* except that it is very rare in Broadland. *H. crenatus* occurs mainly in mossy edges of fluctuating ponds and in rich fens. The life cycle of this species is unknown

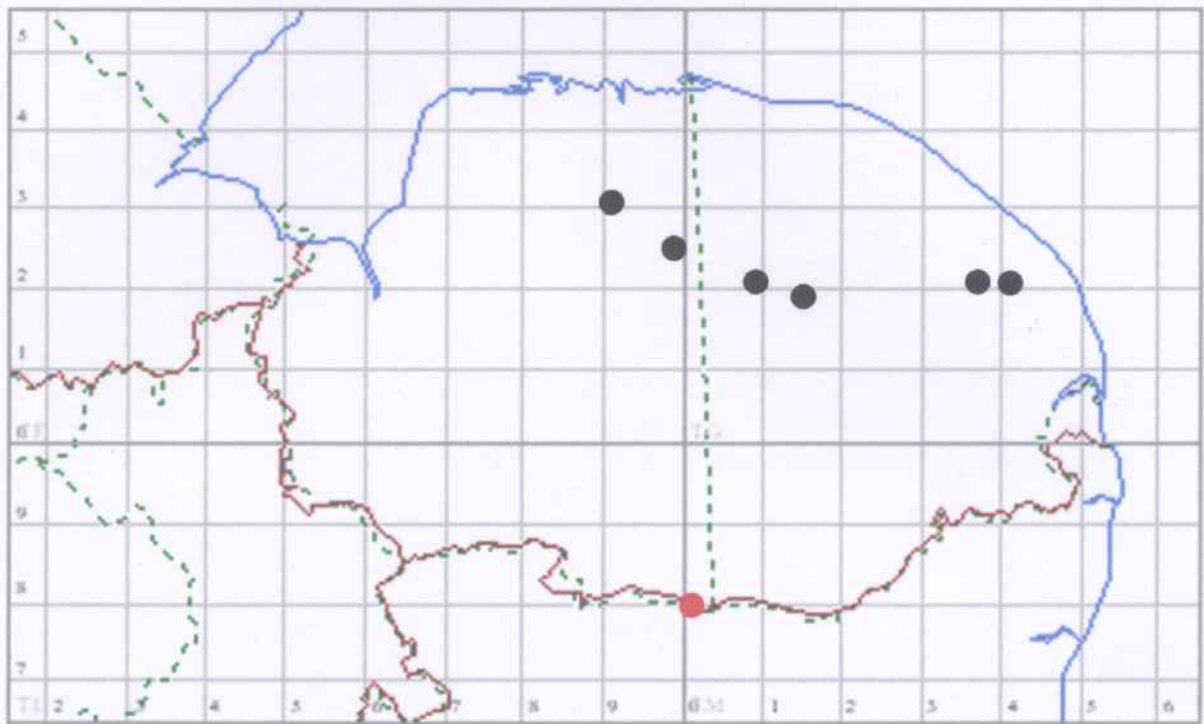
but adults are commonest in the spring and autumn. This species was abundant in mud and reed debris at the shallow edges of the large pond on Betty's Fen. *H. crenatus* has strong centres in Huntingdonshire and Breckland eg Thompson and Foulden Commons. Loss of fenland habitat have reduced the distribution of this species but excessive abstraction of groundwater in Breckland poses the greatest threat, as this will alter the hydrology of the fluctuating meres.

Restriction on water abstraction in Breckland is desirable to protect the wetlands there, which, however, do not receive direct statutory protection in some cases.

***Hydrochus elongatus*. RDB3** There are recent records for Norfolk, Somerset, Sussex, Kent and Huntingdonshire. This species occurs in shallow, well vegetated, still water, often in reedbeds and other areas with rich emergent vegetation over clay in low-lying areas. Habits and life-history are the same as for the other two *Hydrochus* species already described. There are records for 12 hectads in Britain since 1990. This species has contracted its range owing to loss of sites in Scotland, northeast England and London. Loss of fenland habitats, particularly reed beds, will be detrimental to this species. Restoration of old clay ponds should take into account the need to retain reedbeds. This species can colonize man-made ponds once they are well established. This species along with the last were abundant amongst mud and reed debris in the shallows of the reed-lined pond on Betty's Fen. Interestingly, this and the next species have not been found on Blo Norton Fen. Both species however, occur at Redgrave and Lopham Fens. One specimen of *H. elongatus* was also found in a newly dug turf pond (Site No13) on Hinderclay Fen on 11<sup>th</sup> September 2010.

***Enochrus nigrinus* RDB3** In Britain this species is confined to southern and eastern England. It occurs in Norfolk in the Breckland pingos as well as a few Broadland sites, *E. nigrinus* is found in mesotrophic and base rich fens in lowlands. The life history details of *Enochrus* species appear to vary from one species to another and the life history of individual British species has not been described. Adults feed on algae and decaying plants whereas the larvae are predaceous. *E. nigrinus* has been recorded from 14 hectads since 1990. It would appear that this species has been lost from the Surrey heaths. It is fairly common in Norfolk in rich fen sites. The major risk appears to be exposed by excessive abstraction of water in the Breckland adversely affecting the hydrology. Loss of heathland habitats will also have contributed to the decline. Maintenance of undisturbed, shallow exposed pools is necessary for this species. *E. nigrinus* was common in the mud and reed litter at the edge of Parkers Piece. It was also found in a small pool on Blo Norton Fen (6).

Map 2. Showing distribution of *Agabus striolatus* in Norfolk



● Blo Norton Fen

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## Conclusions

This survey of some of the LOHP sites bordering the Little Ouse in Norfolk and Suffolk has shown the area to have a diverse and important water beetle fauna. Management work carried out by members of the LOHP group has resulted in the restoration of many of these old fens providing good habitat for water beetles. Blo Norton Fen is particularly important because of the discovery of a population of the very rare water beetle *Agabus striolatus* in its most southerly station in Britain, and a long way from other sites in the Broads.

## Acknowledgements

Helen Smith of the LOHP is thanked for commissioning the survey and showing me around the sites and providing useful information.  
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Appendix 1.

**HABITAT QUALITY ASSESSMENT USING WATER BEETLES**

**Species Quality Scores (SQS) for water beetles.**

Foster and Eyre (1992) outline the methods currently used for the classification and ranking of water beetle communities. Species lists are classified into assemblage types and then used to rank sites by applying a point scoring system. The number of points awarded to each species of water beetle are listed by Foster and Eyre (1987, unpublished).

Sites are ranked using the following hierarchy of factors:

- The number of **Red Data Book (RDB)** species.
- The **Species Quality Score (SQS)** for the site. This is defined as the mean score per species, scores for each species having been awarded according to their rarity. Scores range from 1 for the commonest species to 32 for the rarest.

In the event of a tie on SQS:

- The number of **Nationally Scarce** species present.

In the event of a tie on N/b:

- The total **Number of Species** present (NOS).

The **Aggregate of Points** for the species present in a site (WET), i.e., the sum of the scores awarded to each species, gives a good measure of habitat quality. A score of more than 100 generally indicates a top site.

The **Aggregate of Points (WET)** may be calculated as follows:

$$\text{WET} = \text{SQS} \times \text{NOS}$$

The **Species Quality Score (SQS)** for a site may be calculated as follows:-

$$\text{SQS} = \frac{\text{WET}}{\text{NOS}}$$

A SQS of 2.0 or higher indicates a good site as do high species numbers and the presence of **Red Data Book** or **Nationally Scarce** species.

The system may be of limited use for sites where very few species are recorded since the results can easily be distorted by the chance presence of one or more rare species.

The Site Quality Score for the Sites surveyed in this survey are given in Appendix 2.





			PARKERS PIECE	BETTY'S FEN	BETTY'S FEN	BLEYSMYCKS BANK	BLO MORTON FEN	BLO MORTON FEN	BLO MORTON FEN	BLO MORTON FEN	HINDERCLAY FEN	HINDERCLAY FEN	HINDERCLAY FEN	HINDERCLAY FEN
Taxon	Count	Status	1	2	3	4	5	6	7	8	9	10	11	12
<i>Hydroporus striola</i>	2					2								5
<i>Hygrotus impressopunctatus</i>	2		3									5	1	3
<i>Hygrotus inaequalis</i>	1		4									1		
<i>Hyphydrus ovatus</i>	1		4	2									1	1
<i>Ilybius ater</i>	2			1		2		2						
<i>Ilybius chalconatus</i>	4	Nb		1				3						
<i>Ilybius fuliginosus</i>	1		5			2	1							
<i>Ilybius guttiger</i>	4	Nb			2				4					1
<i>Ilybius quadriguttatus</i>	4			2	1			1	4				2	1
<i>Laccobius bipunctatus</i>	1		5	1		1	1	1						2
<i>Laccobius colon</i>	2		1											
<i>Laccobius minutus</i>	2		4			3								
<i>Laccobius striatulus</i>	2							1						
<i>Laccophilus minutus</i>	1		4	1										1
<i>Laccornis oblongus</i>	8	RDB3						2						
<i>Limnebius truncatellus</i>	1							2						
<i>Liopteris haemorrhoidalis</i>	2		3	1	1		1	C	1			1		1
<i>Noterus clavicornis</i>	2		C	5										
<i>Ochthebius minimus</i>	1		C	A		2	3	2	*		2	2	3	2
<i>Oulimnius tuberculatus</i>	2													1
<i>Porhydrus lineatus</i>	2													1
<i>Rhantus grapi</i>	8	Nb					1	1						2
<i>Rhantus suturalis</i>	2	Nb				2								
<i>Suphrodytes dorsalis</i>	2						C							
<b>Total No Species: 37</b>														
			21	23		18	18	32		1	6	11	16	33
			2.1	2.3		1.8	1.8	3.2				2.1	2	2.2

**Key:**

C= Common 6-10 specimens  
A= Abundant 11+ specimens

**Appendix 3. Taxonomic list of Aquatic coleoptera recorded in survey & showing National status categories.**

<b>Species</b>	<b>Status using present IUCN categories (and criteria).</b>	<b>Status in Bell (1986) and Shirt (1997), Hyman &amp; Parsons (1992, 2004) if different.</b>
<b>GYRINIDAE</b>		
<i>Gyrinus substriatus</i>	LRlc	
<b>HALIPLIDAE</b>		
<i>Haliphus flavicollis</i>	LRlc	
<i>Haliphus lineatocollis</i>	LRlc	
<i>Haliphus obliquus</i>	LRlc	
<i>Haliphus ruficollis</i>	LRlc	
<b>NOTERIDAE</b>		
<i>Noterus clavicornis</i>	LRlc	
<b>DYTISCIDAE</b>		
<i>Liopterus haemorrhoidalis</i>	LRlc	
<i>Laccornis oblongus</i>	LRnt	RDB3
<i>Hydroglyphus geminus</i>	LRnsB	Nb
<i>Hygrotus impressopunctatus</i>	LRlc	
<i>Hygrotus inaequalis</i>	LRlc	
<i>Hyphydrus ovatus</i>	LRlc	
<i>Hydroporus angustatus</i>	LRlc	
<i>Hydroporus erythrocephalus</i>	LRlc	
<i>Hydroporus incognitus</i>	LRlc	
<i>Hydroporus memnonius</i>	LRlc	
<i>Hydroporus neglectus</i>	LRnsB	Nb
<i>Hydroporus nigrita</i>	LRlc	
<i>Hydroporus palustris</i>	LRlc	
<i>Hydroporus planus</i>	LRlc	
<i>Hydroporus pubescens</i>	LRlc	
<i>Hydroporus striola</i>	LRlc	
<i>Porhydrus lineatus</i>	LRlc	
<i>Graptodytes granularis</i>	LRnsB	Nb
<i>Suphrodytes dorsalis</i>	LRlc	
<i>Agabus bipustulatus</i>	LRlc	
<i>Agabus nebulosus</i>	LRlc	
<i>Agabus striolatus</i>	VU(D2)	RDB2
<i>Agabus sturmi</i>	LRlc	
<i>Ilybius ater</i>	LRlc	
<i>Ilybius chalconatus</i>	LRnsB	Nb
<i>Ilybius fuliginosus</i>	LRlc	
<i>Ilybius guttiger</i>	LRnsB	Nb
<i>Ilybius quadriguttatus</i>	LRlc	
<i>Rhantus grapi</i>	LRnsB	Nb
<i>Rhantus suturalis</i>	LRnsB	Nb
<i>Colymbetes fuscus</i>	LRlc	
<i>Laccophilus minutus</i>	LRlc	
<i>Hydaticus seminiger</i>	LRnsB	Nb
<i>Acilius sulcatus</i>	LRlc	
<i>Dytiscus marginalis</i>	LRlc	
<i>Dytiscus semisulcatus</i>	LRlc	

<b>HYDRAENIDAE</b>		
<i>Hydraena riparia</i>	LRlc	
<i>Hydraena testacea</i>	LRnsB	Nb
<i>Limnebius truncatellus</i>	LRlc	
<i>Ochthebius minimus</i>	LRlc	
<b>HELOPHORIDAE</b>		
<i>Helophorus minutus</i>	LRlc	
<i>Helophorus obscurus</i>	LRlc	
<b>HYDOCHIDAE</b>		
<i>Hydrochus crenatus</i>	VU(B12ab)	RDB3
<i>Hydrochus elongatus</i>	LRnt	RDB3
<b>HYDROPHILIDAE</b>		
<i>Coelostoma orbiculare</i>	LRlc	
<i>Cercyon sternalis</i>	LRlc	Nb
<i>Hydrobius fuscipes</i>	LRlc	
<i>Anacaena globulus</i>	LRlc	
<i>Anacaena limbata</i>	LRlc	
<i>Anacaena lutescens</i>	LRlc	
<i>Laccobius bipunctatus</i>	LRlc	
<i>Laccobius colon</i>	LRlc	
<i>Laccobius minutus</i>	LRlc	
<i>Laccobius striatulus</i>	LRlc	
<i>Helochares lividus</i>	LRlc	Nb
<i>Enochrus coarctatus</i>	LRlc	
<i>Enochrus nigrinus</i>	VU (B12a)	RDB3
<i>Enochrus testaceus</i>	LRlc	
<i>Cymbiodyta marginellus</i>	LRlc	
<i>Berosus signaticollis</i>	LRnsB	Nb
<b>ELMIDAE</b>		
<i>Oulmnius tuberculatus</i>	LRlc	

**Appendix 4. List of water bugs recorded from each site**

			PARKERS PIECE	BETTY'S FEN	BETTY'S FEN	BLEYSWYCKS BANK	BLO NORTON FEN	BLO NORTON FEN	BLO NORTON FEN	BLO NORTON FEN	HINDERCLAY FEN	HINDERCLAY FEN	HINDERCLAY FEN	HINDERCLAY FEN
Taxon	SQS	Status: Site No:	1	2	3	4	5	6	7	8	9	10	11	12
<i>Callicorixa praeusta</i>		Common	C											
<i>Corixa punctata</i>		Very common	1	3		2		2						
<i>Gerris lacustris</i>		Very common	C				C							1
<i>Gerris odontogaster</i>		Very common	C									1		
<i>Hebrus rufipes</i>		Local						1						
<i>Hesperocorixa moesta</i>		Local	3											
<i>Hesperocorixa sahlbergi</i>		Very common		1			C	5		1	4	1	C	
<i>Ilyocoris cimicoides</i>		Widely scattered	3											
<i>Microvelia pygmaea</i>		Nb												1
<i>Nepa cinerea</i>		Common	2											2
<i>Notonecta glauca</i>		Very common		3		3	1	1		2	2	2		
<i>Notonecta maculata</i>		Widely scattered						2						
<i>Notonecta viridis</i>		Common	3	1		2	1							
<i>Plea minutissima</i>		Widely scattered	5	5		2								
<i>Ranatra linearis</i>		Widely scattered	1											
<i>Sigara dorsalis</i>		Very common	C											
<i>Sigara nigrolineata</i>		Very common				3		4						
<b>Total No species</b>	<b>11</b>													

**Key:**

C= Common 6-10 specimens

A=Abundant 11+ specimens

**Appendix 5. Taxonomic list of water bugs recorded**

<b>Taxon</b>	<b>Authority</b>	<b>Common name</b>	<b>National status taken from the Checklist of the Heteroptera of the British Isles by B.S. Nau 2003</b>
<b>NEPIDAE</b>			
<i>Nepa cinerea</i>	Linnaeus, 1758	Water scorpion	Common
<i>Ranatra linearis</i>	(Linnaeus, 1758)	Water stick insect	Widely scattered
<b>CORIXIDAE</b>			
<i>Callicorixa praeusta</i>	(Fieber, 1848)	Water boatman	Common
<i>Corixa punctata</i>	(Illiger, 1807)	Water boatman	Very common
<i>Hesperocorixa moesta</i>	(Fieber, 1848)	Water boatman	Local
<i>Hesperocorixa sahlbergi</i>	(Fieber, 1848)	Water boatman	Very common
<i>Sigara dorsalis</i>	(Leech, 1817)	Water boatman	Very common
<i>Sigara nigrolineata</i>	(Fieber, 1848)	Water boatman	Very common
<b>NAUCORIDAE</b>			
<i>Ilyocoris cimicoides</i>	(Linnaeus, 1758)	Saucer bug	Widely scattered
<b>NOTONECTIDAE</b>			
<i>Notonecta glauca</i>	(Linnaeus, 1758)	Backswimmer	Very common
<i>Notonecta maculata</i>	Fabricius, 1794	Backswimmer	Widely scattered
<i>Notonecta viridis</i>	Delcourt, 1909	Backswimmer	Common
<b>PLEIDAE</b>			
<i>Plea minutissima</i>	Leech, 1817	Minute backswimmer	Widely scattered
<b>HEBRIDAE</b>			
<i>Hebrus rufipes</i>	Thomson, 1871	<i>Sphagnum</i> bug	Local
<b>VELIIDAE</b>			
<i>Microvelia pygmaea</i>	(Dufour, 1833)	Minute water cricket	Notable Nb
<b>GERRIDAE</b>			
<i>Gerris lacustris</i>	(Linnaeus, 1758)	Pond skater	Very common
<i>Gerris odontogaster</i>	(Zetterstedt, 1828)	Pond skater	Very common

**Appendix 6. List of aculeate hymenoptera recorded from water traps**

**Parkers Piece. 2nd September 2010**

**Status**

**Aculeate hymenoptera**

*Arichnospila anceps*  
*Lasioglossum minutissimum*  
*Oxybelus uniglumis*  
*Priocnemis fennica*  
*Sphecodes hyalinatus*  
*Trypoxylon attenuatum*

**Blo Norton Fen**

**Aculeate hymenoptera**

*Halictus tumulorum*  
*Lasioglossum morio*  
*Priocnemis fennica*  
*Sphecodes niger*  
*Tiphia femorata*  
*Trypoxylon attenuatum*

RDB3

**Hinderclay Fen**

**Heather site 9 September 2010**

*Ammophila sabulosa*  
*Andrena fuscipes*  
*Arichnospila anceps*  
*Ectemnius continuus*  
*Episyron rufipes*  
*Lasioglossum calceatum*

**Heather site 12 September 2010**

*Anoplius nigerrimus*  
*Arichnospila anceps*  
*Ectemnius continuus*  
*Lasioglossum calceatum*  
*Lasioglossum malachrum*  
*Lasioglossum parvulum*  
*Mellinus arvensis*  
*Podalonia affinis*

RDB3

**Path through reeds fen 12th September 2010**

*Anoplius nigerrimus*  
*Bombus pascuorum*  
*Ectemnius continuus*  
*Lasioglossum punctatissimum*  
*Mellinus arvensis*  
*Trypoxylon attenuatum*

**Lichen area**

*Arichnospila anceps*  
*Crossocerus quadrimaculatus*  
*Mellinus arvensis*

**Appendix 7. Taxonomic list of aculeate hymenoptera recorded from water traps**

<b>Taxon</b>	<b>Status</b>	<b>Common name</b>
<b>TIPHIIDAE</b>		
<i>Trypoxylon attenuatum</i>		Slender wood-borer wasp
<b>POMPILIDAE</b>		
<i>Anoplius nigerrimus</i>		A spider- hunting wasp
<i>Arichnospila anceps</i>		A spider- hunting wasp
<i>Episyron rufipes</i>		A spider- hunting wasp
<i>Priocnemis fennica</i>		A spider- hunting wasp
<b>SPHECIDAE</b>		
<i>Ammophila sabulosa</i>		Red-banded sand wasp
<i>Podalonia affinis</i>	RDB3	Mud wasp
<b>CRABRONIDAE</b>		
<i>Crossocerus quadrimaculatus</i>		Four-spotted digger wasp
<i>Ectemnius continuus</i>		A hunting wasp
<i>Mellinus arvensis</i>		Field digger wasp
<i>Oxybelus uniglumis</i>		Common spiny digger wasp
<b>APIDAE</b>		
<i>Andrena fuscipes</i>		A mining bee
<i>Lasioglossum calceatum</i>		A mining bee
<i>Lasioglossum malachrum</i>		A mining bee
<i>Lasioglossum minutissimum</i>		A mining bee
<i>Lasioglossum parvulum</i>		A mining bee
<i>Lasioglossum punctatissimum</i>		A mining bee
<i>Sphecodes hyalinatus</i>		A cuckoo-bee
<i>Sphecodes monilicornis</i>		A cuckoo-bee
<i>Sphecodes niger</i>	RDB3	A cuckoo-bee
<i>Bombus pascuorum</i>		Common carder bumblebee

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Photographs of survey sites. September 2010



Site 1. Parkers Piece. 2nd Sept 2010



Site 2. Betty's Fen. 3rd Sept 2010



Site 3. Betty's Fen. 3rd Sept 2010



Site 4. Bleyswycks Bank. 3rd Sept 2010



Site 5. Blo Norton Fen. 4th Sept 2010



Site 6. Blo Norton Fen. 4th Sept 2010



# Photographs of sites surveyed. September 2010



Site 7. Blo Norton Fen. 4th Sept 2010



Site 8. Blo Norton Fen. 4th Sept 2010



Site 9. Hinderclay Fen. 9th Sept 2010



Site 10. Hinderclay Fen. 9th Sept 2010



Site 11. Hinderclay Fen. 12 Sept 2010



Site 12. Hinderclay Fen. 12 Sept 2010

# Photographs of the rare species recorded



*Laccornis oblongus*. RDB3



*Agabus striolatus*. RDB2



*Hydrochus crenatus*. RDB3



*Hydrochus elongatus*. RDB3



*Enochrus nigritus*. RDB3



*Ilybius chalconatus*. Nb