

ECOSA

ECOLOGICAL SURVEY & ASSESSMENT

Report on findings of the 2002-2003 field survey
for Rosser's Sac Spider *Clubiona rosserae*

For the *Clubiona rosserae* Partnership

Draft Report

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Report on findings of the 2002-2003 field survey
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1.0 INTRODUCTION

1.1 Background

Simon Colenutt of Ecological Survey & Assessment (ECOSA) was contracted to carry out a review of the known range, status and ecology of the species in Europe, and a detailed field survey for the species at its known and potential sites. The contract was carried out under the auspices of the *Clubiona rosserae* Partnership, a collaborative partnership between Buglife – The Invertebrate Conservation Trust, English Nature, the British Arachnological Society and Anglian Water. The Objective and aims of the partnership are as follows.

Objective

To ensure that Rosser's sac-spider (*Clubiona rosserae*) is secure from extinction in East Anglia and UK.

Aims

1. To deliver key sections of the national Species Action Plan.
2. To develop the knowledge of the species ecological requirements necessary to manage the species habitat correctly.
3. To disseminate ecological and distribution information to audiences relevant to the conservation of the species.
4. To inform the development of the future conservation of the species, including required actions, a monitoring programme and a priority assessment.

This report details the findings of the field surveys for the species that were carried out between October 2002 and June 2003. In total some 43 days or half days were spent in the field searching for the species, and trapping using a range of techniques, has been employed but to date the species has not been found.

2.0 METHODOLOGY

This section details the range of techniques that have been employed in searching for *Clubiona rosserae* to date. During the survey only adults were collected for identification, the majority of immature were confirmed as such in the field using a 20x handlens, logged and released. The adults were then preserved in alcohol and identified using a microscope and specialist keys.

2.1 Visual searching

On average 4 days were spent in the field per month from October 2002 to June 2003 searching for the species. Much of this effort has been concentrated at Chippenham Fen. At Chippenham Fen the fenland and marsh grassland compartments were the main focus of the survey work with compartments 1,2,4,5,6,8,10,11 and 13 surveyed in detail. Fieldwork at Chippenham was carried out in a standardised manner but that at other sites was more casual and was based entirely on visual methods.

During these visits a range of techniques were employed. Most frequently used was to inspect curled leaves of vegetation for the distinctive silken cells of Clubionids, these were then opened over a net and the spider collected. Similarly, heads of reeds and rushes, and hollow reed stems were opened over a net and any Clubionids present collected. This method was time standardised so that 30 minutes was spent collecting in each compartment and cells were collected as they were encountered.

The next most frequently used technique was sweep netting, this was carried out in a standardised manner. Transects across each fen or wet grassland compartment at Chippenham Fen were walked at a steady pace sweeping the net from side to side through the top 30-40cm of vegetation for 30 minutes per compartment. On average two half days a month was spent sweep netting and on each occasion all transects were sampled, in total this took approximately 4 hours of more or less continuous sampling. This form of sampling was very weather dependent since it could only be carried out when the vegetation was dry but attempts were made to sample as close to the second and fourth week of each month from November to June as possible. The net was inspected after every 20 sweeps and any Clubionids present in the net collected. **Map 1** shows the location of all transects walked.

Grubbing was employed in each of the fen and grassland habitats at Chippenham. This was carried out in a standardised manner with 15 minutes spent in each compartment. Two half days per month were spent grubbing. The method used was to part areas of vegetation and to collect any spider

disturbed. One minute was then spent observing the ground for any spiders disturbed into hiding during the parting of the vegetation to reveal themselves. Finally, moss and other debris on the ground was lifted and parted. Attempts were made to sample as close to the second and fourth week of each month from November to June as possible. The same fenland compartments as for sweep netting were sampled during grubbing but in addition compartments 7 and 10 were sampled.

Finally, on each visit varying amounts of cut reed and sedge were sifted for spiders. This involved placing a handful of material into a sieve with a mesh size of 1cm and shaking the contents vigorously over a white sheet. Any Clubionids were then collected using a pooter. Attempts were made to sample as close to the second and fourth week of each month from November to June as possible. **Map 1** shows the approximate location of piles of cut vegetation sampled.

2.2 Trapping

Trapping methods have been employed throughout the current survey period, the location of traps are shown in **Map 2**. Refuge traps consisting of 90x20 cm sheets of polythene bubble wrap (with a bubble diameter of 1cm) folded in 3 to give a 30x20cm sheet in 3 layers and sandwiched between black 1000 gauge geotextile weed-suppressing material have been operated throughout. A total of 5 rows of 5 traps were located at Chippenham fen. Each trap was located approximately 10m from the last. These were replaced every month by lifting them and placing each in a snap shut polythene bag, a new trap was then put in the same position.

Roofing-felt has been found to be effective in attracting ground dwelling species, and especially Clubiona, this is probably due to the fact that the felt warms faster than the surrounding environment allowing the spiders to gain body heat rapidly. Felts are frequently used by these species to construct their egg-sacs beneath, again, probably due to the high temperatures found beneath. A total of 40 sheets of 100x50cm sheets of low grade mineralised roofing felt were placed on piles of cut sedge and amongst fenland vegetation across the site. These were inspected either early or late in the day or when weather conditions were overcast and cool. Any Clubionids found were collected with a pooter and egg sacs were collected and opened over a net.

Water traps were placed on site on 3 May 2003, they were not used on site prior to this date due to the high water levels on the fen. The traps consist of white trays measuring 25x34x5cm, with approximately 2cm of anti-freeze, 1cm of water and a few drops of mild detergent. These were emptied on a monthly basis when a small aquarium net was used to collect the sample which was then immediately placed in alcohol. These were then sorted at a later date.

2.3 **Methods used at other sites**

In addition casual collecting work was carried out from November 2002 to June 2003 at Hopton Fen, Wicken Fen, Botany Bay, Market Weston Fen, West Stow Country Park, and along the River Snail. All sites are detailed in the ECOSA report entitled 'Clubiona rosserae initial survey of potential sites'. A total of four days spent at Tuddenham Fen and Cavenham Heath between March and June 2003 the site was sampled in an unstandardised manner by grubbing, sweeping and searching for cells in suitable areas of the site, **Map 3**.

3.0 RESULTS

3.1 General

In total 1150 *C. stagnatilis* were sampled during the fieldwork but no *C. rosserae* were recorded. **Table 1** shows the numbers recorded on a monthly basis from all compartments combined at Chippenham. Figures for October are incomplete since the sampling programme did not fully instigate until mid-month. **Figure 1** shows a plot of the total number of *C. stagnatilis* recorded.

Table 1 *Clubiona stagnatilis* samples from Chippenham Fen. A plot of these figures is shown in figure 1.

	October	November	December	January	February	March	April	May	June	Total
Adult male	21	14	10	11	12	17	21	35	15	156
Adult female	10	9	9	10	11	15	28	35	51	178
Immature	121	125	110	112	96	83	52	56	61	816
Total	152	148	129	133	119	115	101	126	127	1150

Table 2 shows the number of *C. stagnatilis* recorded from each compartment with all months combined. Numbers are reasonably evenly dispersed.

Table 2 Number of *C. stagnatilis* recorded from all compartments, all techniques combined.

Compartment	2	4	8	11	13
Number of <i>C. stagnatilis</i>	124	197	289	276	264

3.2 Cell searches

This proved to be the most efficient way of collecting Clubionids. **Table 1** shows the results of the cell searches. Note that only *C. stagnatilis* were sampled from cells since all other clubionid species could be identified in the field and were released.

Table 3 Percentage of total number *Clubiona stagnatilis* taken from silk cells.

	October	November	December	January	February	March	April	May	June
Adult male	80	85	96	94	91	47	71	72	69
Adult female	50	94	95	91	92	46	60	64	74
Immature	80	96	91	94	89	18	40	31	40

3.3 Grubbing

This was not an especially rewarding method of collecting Clubionids because as the temperature increased through the season (the time when numbers of adults was greatest) Clubionids became increasingly difficult to hand capture because of their speed, and it was found that many of the spiders captured on the ground were sub-adult, the adults tending to be higher in the vegetation. **Table 3** shows the proportion of *C. stagnatilis* collected using this method.

Table 4 Percentage of total number of *Clubiona stagnatilis* taken by grubbing.

	October	November	December	January	February	March	April	May	June
Adult male	6	4	0	0	0	9	6	7	9
Adult female	4	0	0	1	0	11	9	10	6
Immature	11	3	1	0	2	17	19	16	10

3.4 Bubbletraps

These produce reasonable numbers of Clubionids but a large proportion were sub-adult. Numbers captured using this technique were low during the winter months but increased through to March and October. Numbers again tailed off during November.

Table 5 Percentage of total number of *Clubiona stagnatilis* taken in bubbletraps.

	October	November	December	January	February	March	April	May	June
Adult male	2	6	0	0	0	19	10	8	6
Adult female	13	0	0	0	1	15	10	11	10
Immature	21	13	1	0	2	23	13	24	22

3.5 Roofing felt

Numbers captured using this technique were low during the winter months but increased through to March and October. Numbers again tailed off during November. The method faces similar problems as that of grubbing in that as temperatures increase then Clubionids become increasingly difficult to capture from beneath the felt as a result numbers in April to June were lower than expected.

Table 6 Percentage of total number of *Clubiona stagnatilis* taken under roofing felt.

	October	November	December	January	February	March	April	May	June
Adult male	4	4	0	0	1	11	7	4	5
Adult female	13	0	1	1	0	13	6	4	4
Immature	17	10	2	1	1	23	11	11	15

3.6 Sweep netting

This technique effectively samples the same animals as does web searching but appears to be not as effective at sampling as that technique presumably because most Clubionids remain sealed in the silk purse on disturbance. Those captured using this method are probably those that are active or not fully sealed into the cell.

Table 7 Percentage of total number of *Clubiona stagnatilis* taken by sweep netting.

	October	November	December	January	February	March	April	May	June
Adult male	8	5	4	6	8	14	6	6	10
Adult female	20	6	4	7	7	15	15	10	6
Immature	11	3	5	3	6	21	17	16	12

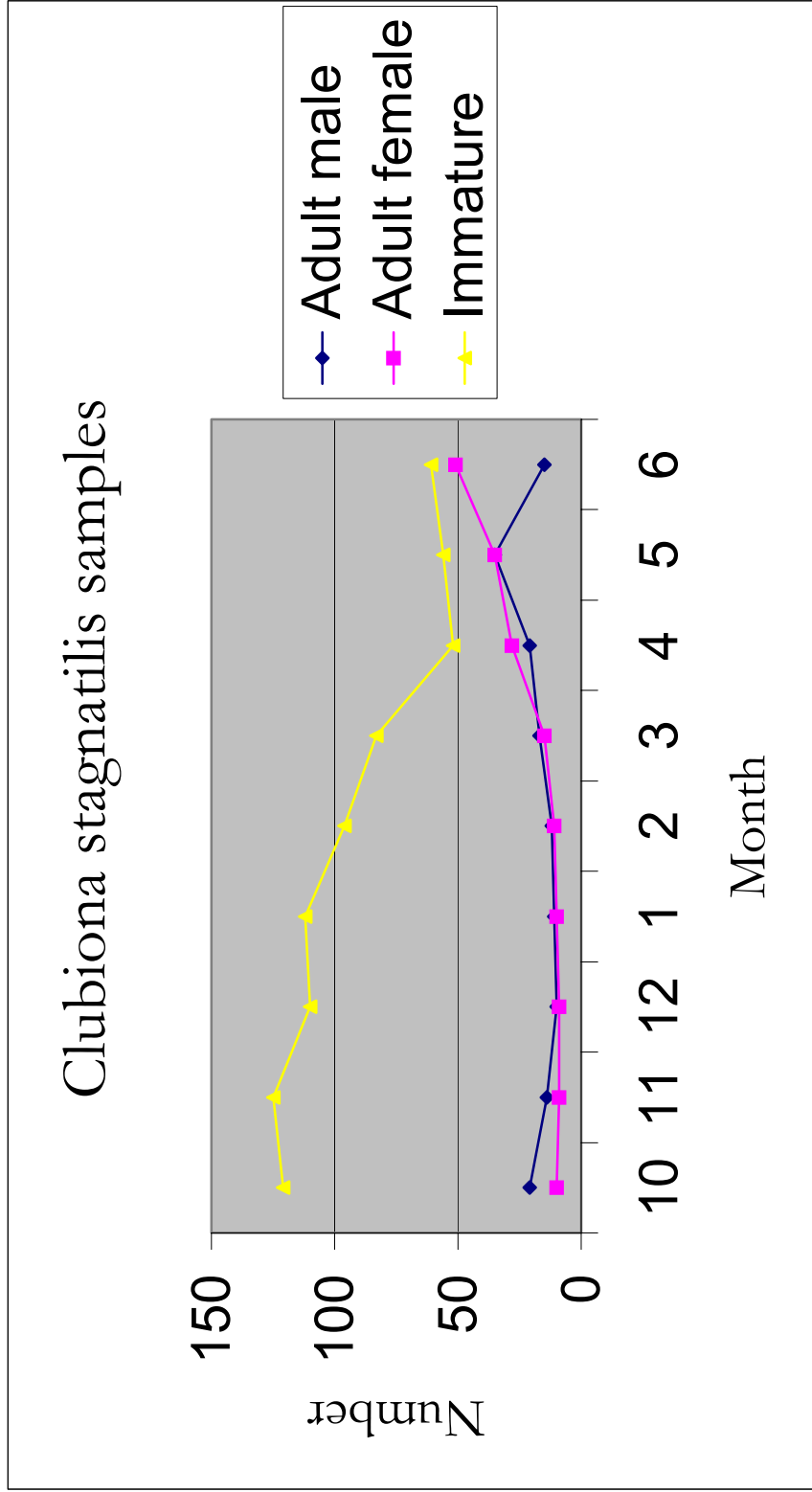
3.7 Watertraps

These produced low numbers of Clubionids with very few *C. stagnatilis* present. In addition many were turned over and emptied of their contents possibly by deer or badger. The traps were not placed on the site until May and as a result only data for May and June are currently available.

Table 5 Percentage of total number of *Clubiona stagnatilis* taken in bubbletraps.

	October	November	December	January	February	March	April	May	June
Adult male	0	0	0	0	0	0	0	3	2
Adult female	0	0	0	0	0	0	0	1	1
Immature	0	0	0	0	0	0	0	2	2

Figure 1 Plot of Clubiona stagnatilis samples in table 1.



4.0 Discussion

4.1 *Clubiona stagnatilis*

Large numbers of *C. stagnatilis* have been recorded during the sampling programme, Table 1, other species were not sampled in such large numbers mainly because they are distinguishable in the field from *C. rosserae/stagnatilis* and there is no need to sample. When viewed as a proportion of the total catch of *C. stagnatilis* some interesting results emerge from the sample methods and this is especially notable within the results of the search of silk cells due to the large numbers obtained.

These figures reveal an interesting pattern in the lifecycle of *C. stagnatilis* (see figure 1) with large numbers of immatures present during the winter, with numbers falling during February to March reaching a low in April, and with numbers beginning to climb again during May and June. Adult numbers remain low during the winter but with the onset of warmer weather in March their numbers climb as immatures reach maturity. Throughout this period numbers of males and females are similar but in May, presumably after mating activity the number of males declines whilst female numbers climb. This could be for two reasons, either males die after mating or they descend to the ground where they are more difficult to locate. Whereas the increase in numbers of females is probably due to the fact that they inhabit silken cells high in the vegetation and become more readily located. Such life-cycle patterns would repay more detailed survey.

A higher proportion of *C. stagnatilis* recorded from October to February were recorded from silk cells than at any other time of the year. This reflects the winter 'hibernation' and period of inactivity in the species, come March levels of activity increases and more are recorded away from their cells. In March there is a fall in the proportion recorded from silk cells as the spiders become active and more are found in the essentially ground sampling bubble traps, felts and through grubbing. This almost certainly reflects a period when the spiders are actively hunting following a period when no or little food was consumed and are wandering in the habitat searching for mates. During April the proportion occupying silk cells increases again and this number remains relatively constant until June when the sampling under this contracted ceased (although traps remained on site and sampling continued and this is to be analysed in the next report). At this time the number of immatures within the population are relatively low and numbers of adults are beginning to climb. It is thought that at this time, following feeding, adults are maturing within their cells ready for breeding activity and egg production and that feeding activity is largely confined to nighttime excursions, no nighttime observations have been carried out to date.

The silken cells were almost invariably folded into common reed or reed canary-grass with only a small proportion recorded from other plant species. These were usually located between 20cm and approximately 30cm from the top of the vegetation. Spiders were usually recorded singly but on 6 occasions two adult spiders were recorded from the cells. These were invariably a male and a female and probably indicate that mating had or was about to take place, all such observations were made in May and June. Egg sacs and spiderlings were recorded from 21st May with numbers increasing through to June although counts were made. Frequently Linyphids and weevils were recorded sharing the folded leaf in the winter months although not in the same cell, these were not specifically identified.

4.2 Other fenland spiders recorded

During the course of the work casual observations have been carried out on other species of fenland spiders. These were not recorded systematically and no intensive collecting of spiders in general has been carried out since much of the focus of the years work was in locating *C. rosserae* but the results below present a summary of the information on other species recorded to date.

Agracina striata Nb

1 record of an adult female from the north to south ditch running through the central area of compartment 11 at Chippenham on 5 June. The individual was recorded from decomposing, damp, cut sedge probably cut and stacked in the summer of 2002.

Hypomma fulvum Na

Recorded in good numbers from all fenland compartments at Chippenham. Usually by sweeping vegetation, also by grubbing. Recorded from 15 April to 30 June. Also recorded at Tuddenham, Wicken, Hopton Fen, and Market Weston Fen.

Marpissa radiata Na

The species was recorded throughout the recording season with small numbers in the winter months building through the summer. The species was recorded in all fen compartments sampled. During the winter the species was recorded most frequently from silk cells spun approximately 40cm above the ground in dead reed canary-grass or in common reed leaves. The species was usually recorded singly in these cells but on two occasions a male and female were found cohabiting. During the summer there was a trend towards the spiders moving higher and spinning their cells in the heads of common reed when they were easy to locate and were evidently abundant at Chippenham. Also recorded in small numbers from Tuddenham, Wicken, Hopton Fen, Market Weston Fen and Fowlmere.

Neon valentulus RDB2

Two records of males from Chippenham Fen in compartment 8 on 12 May and 6 June. Both were recorded during sweeping the central areas of the compartment where there are areas of species rich swards but also some smaller areas dominated by saw sedge. It is probable that they were taken from the top 15cm of an approximately 60cm sward.

Sitticus caricis Nb

2 adult males were recorded at Chippenham Fen in compartment 8 on 29 April and 13 May. These were both recorded whilst grubbing at ground level in the taller areas of fen.

Theridiosoma gemmosum Nb

Four records, two each from Chippenham Fen in compartments 8 and 11, on 12 May, 21 May, 18 and 19 June all adult males. Each was recorded by grubbing, usually amongst damp reed and moss.

4.3 **Clubiona rosserae**

No *Clubiona rosserae* were recorded during this, the 1st year of the survey. The level of survey work for *Clubiona rosserae* has been substantial whilst still not managing to locate the species. It is considered that there are two possible explanations for this; firstly, the species could be at such low density that larger samples of Clubionids are required in order to record it, or that the sampling methods used are not targeted in such a way that the species niche is sampled. It is considered that the samples taken to date are so large that if the methods used were sampling the niche occupied by the species then *C. rosserae* would be have been recorded, previous surveys have taken *C. rosserae* whilst sampling smaller numbers of Clubionids. As a result it is thought that either the species is extremely rare at the site or that the sampling programme is not targeting the species niche sufficiently. Alternatively it is possible that the species is prone to annual fluctuations in population level but there appears to be no current evidence that this is a feature of Clubionids.

Previous records at the Chippenham have come from water traps set at 1m above the ground (D.Procter *pers comm.*), from shaking piles of cut reed and sedge ¹, and from water and pitfall traps

¹ LOCKET, G.H. (1953) Description of a new species, pp. 419-420 In: Locket, G.H. & Millidge, A.F. (1953) *British spiders, Volume 2*. Ray Society

set at ground level². This may suggest that the species occupies the lowest part of the herbage and is perhaps mostly a ground dwelling species although in the Netherlands all 5 specimens have been taken from reed heads (Peter Van Helsingden *pers comm.*). The 2002/3 sampling programme has not sampled large numbers of Clubionids from the ground, pantraps have been set under the 2002/3 contract but were not in place until early May so most of the results from these are to be written up in June 2004. Pitfall traps have not been set due to high water levels and because of their unselective nature.

4.4 Survey Recommendations

The next phase of the sampling programme should include more focused survey of the ground level with pitfall traps, pantraps and G-vacs used with a greater degree of intensity. Since there are records from piles of cut reed and sedge it would be worth sifting these in a standardised manner or by placing pitfall traps in them, however, it is possible that records from cut sedge piles actually relate to adults moved there from open fen during cutting of the fen. If *C. rosserae* was recorded using these methods then it could be concluded that the species is predominately a ground dwelling species as opposed to *C. stagnatilis* that, although present on the ground, constructs its silken cells in the top of the herbage layer. This fact cannot be quantified from the data as no height data has been recorded for those cells located, but during grubbing any cells found were opened, very few were recorded at ground level. However, at present this is entirely speculation and it may be that *C. rosserae* is extremely rare at Chippenham Fen.

In addition, work at the newly discovered locality at Botany Bay, part of the RSPB's Lakenheath Fen complex would be worth carrying out. Although with only 1 specimen from the site it may be very scarce and difficult to locate there.

Despite having not recorded *C. rosserae* the research to date poses a large number of questions regarding the ecology of *C. stagnatilis*, for example;

- Is mating activity carried out primarily at night?
- Is mating carried out in the cell as observations of both sexes in a cell suggest, or is it carried out away from the cell perhaps on the ground?

² KIRBY, P. (1996) *Chippenham Fen NNR. Botanical, invertebrate and hydrological monitoring 1991-1995. Appendix 3 Invertebrate monitoring* (English Nature Research Report no. 194).

- Is the life-cycle pattern shown in figure 1 typical since Harvey et al³ indicate a bi-modal pattern of activity?
- What is the mean height for cell formation?
- How does cell density vary with sward management?
- Is there a decline in populations where the sward is cut or grazed more frequently?

The last two questions may have implications for populations of *C. rosserae*, since if it is found that too frequent a cutting regime or grazing regime reduces populations of *C. stagnatilis* then it could potentially push species with small populations, such as *C. rosserae*, into local extinction.

³ HARVEY, P.R., NELLIST, D.R. & TELFER, M.G., EDS. (2002) *Provisional atlas of British spiders (Arachnida: Araneae)*. Biological Records Centre.