

ECOLOGY AND CONSERVATION OF THE LESSER SILVER WATER BEETLE *HYDROCHARA CARABOIDES* ON THE SOMERSET LEVELS

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Abstract

The following account provides a brief summary of work carried out on the Lesser Silver Water Beetle between 2000 and 2003. This work was funded by English Nature as part of their Species Recovery Programme (SRP). The aims of this study were to survey the distribution of the species on the Somerset Levels, to elucidate its ecology and to suggest management prescriptions that will maintain and enhance the breeding population.

BRITISH DISTRIBUTION

The Lesser Silver Water Beetle is currently known from only two areas in Britain. The first of these is on the Cheshire Plain, where it occurs in field ponds in both Cheshire, and across the Welsh border into Denbighshire. However, the largest British population is on the Somerset Levels, where it is restricted to the 'peat-moors' of the Brue valley. During the current study, most records of this species have come from Shapwick Heath National Nature Reserve (NNR), and this site supports the largest colonies of *Hydrochara* in Somerset. Other breeding sites for the species have been discovered at Westhay Moor NNR, Ham Wall NNR and Westhay Heath, and adults were also recorded at Catcott Heath, Tadham Moor and Catcott Grounds. Historically the Lesser Silver Water Beetle had a wider distribution that also included the East Anglian fens, the marshes around London and Askham Bog in Yorkshire. It had disappeared from all of these other areas by the

early 20th century, and until its discovery in Cheshire in 1990, it was for many years thought to be confined in Britain to the Somerset Levels.

STATUS

Because of its extreme rarity, and the decline in its British range, the Lesser Silver Water Beetle is protected under Schedule 5 of the Wildlife and Countryside Act, which prohibits collecting of all stages of the species. It is listed in the British Red Data Book (RDB) as Red Data Book 1 (Endangered) and is a priority species in the UK Biodiversity Action Plan (BAP). The BAP includes a set of objectives and actions for the beetle that aim to maintain and enhance its British populations. English Nature is charged with delivering the objectives laid out in the BAP and the work carried out in this project, aims to meet these objectives.

PHENOLOGY (Figs 1–6)

The adult Lesser Silver Water Beetle is quite large, between 14 and 18mm (about three quarters of an inch) in length. It is a uniform black-brown in colour, though it usually has a slight greenish tinge. The 'feelers' on the head (antennae and palps) are reddish brown in colour, with the antennae having a black club at their tip. The underside of the beetle is densely coated in thick, felty hairs. These repel water, and are used to provide the beetle with an air supply when it is submerged. They give the underside a silvery

appearance when the beetle is underwater, and it is this which gives the species its somewhat cumbersome vernacular name.

The best time of year to find the adult beetles is in spring, from March through to May, This being the usual breeding season. In late May and early June the female lays her eggs. These are encased in a silken cocoon that is wrapped in a dead leaf and floats on the surface of the water. The cocoon, though well camouflaged, is very distinctive on account of the silken 'mast' that protrudes from one end of it. The larvae hatch in early-to-mid June. They are equipped with huge jaws and a series of feathery filaments on the abdomen that make them instantly recognisable. They are voracious predators that feed on a variety of invertebrate prey. In their younger stages, they are pale grey-coloured, and swim actively, or rest amongst aquatic vegetation. At this stage, they have been observed feeding on aquatic crustacea, such as copepods and cladocerans. The mature larvae are much darker, and become encrusted with sediment, they are much more sedentary, dwelling amongst the detritus layer, and ambushing water-louse *Asellus* spp. At this stage, the filaments along the side of the abdomen, which also become encrusted with sediment, provide excellent camouflage for the larvae, breaking up its outline against the background of dead leaves. The larvae grow very rapidly, and in July, after moulting three times, they leave the water and pupate in a cell in the peat. After another two weeks, the adult hatches and returns to the water to over-winter.

HABITAT REQUIREMENTS

In the Somerset Levels, the Lesser Silver Water Beetle favours still, shallow water-bodies with a well-developed organic bottom layer. This thick detritus provides an ideal habitat for the water louse that constitute the main larval prey. A number of the breeding sites discovered during this study dried out completely over the summer, but the very rapid larval development allows *Hydrochara* to complete the aquatic stage of its development before this happens.

Most of the breeding areas in which the Lesser Silver Water Beetle has been found are at least partially shaded by trees, usually willows or birches. This provides the female with a plentiful supply of dead leaves to use during construction of the egg cocoon, and it may also help to prevent an excessive abundance of duckweeds. The egg cocoon is almost invariably positioned in a patch of open water with

no duckweed, which presumably affords it better protection from predators. Floating duckweeds *Lemna* spp. (including the alien *L. minuta*) are known to have increased on the Somerset Levels during the last fifty years, with this being a probable consequence of increased eutrophication of the water by agricultural run-off. This in turn may have reduced the range of suitable breeding habitat for the species, especially in permanently wet, less shaded ditches, where the water surface is usually covered with a dense mat of duckweed. Certainly at its Cheshire sites, and elsewhere in Europe it occurs in permanent, unshaded water-bodies, and the use of such areas in Somerset may indicate that the species has been forced into sub-optimal habitats by the spread of duckweeds.

Seasonal water bodies also tend to lack vertebrate predators such as fish that might otherwise predate egg cocoons, larvae and adults. Both natural swamp, and artificial ditch habitats are used by the Lesser Silver Water Beetle. The largest breeding colony discovered during the current survey was in an area of seasonally flooded swamp woodland on Shapwick Heath NNR. Good breeding populations have also been found in shallow, partially shaded ditches with thick bottom sediment.

Because of the ephemeral nature of the breeding habitat used by the Lesser Silver Water Beetle, breeding areas move around from one year to another. The adult flies readily, and this enables it to disperse easily to new areas of suitable breeding habitat. Because of this, adults are found in a much wider range of habitats than are the egg cocoons and larvae. They show a strong preference for mats of Floating Sweet-grass *Glyceria fluitans*, in which the adults are very often found, and upon which they probably feed.

MANAGEMENT

Fortunately, the main breeding colonies of *Hydrochara* are on land owned and managed by conservation organisations (Shapwick Heath NNR by English Nature, Westhay Moor NNR by the Somerset Wildlife Trust and Ham Wall NNR by the Royal Society for the Protection of Birds). Bearing in mind the habitat requirements set out above, the following management recommendations are suggested.

- Ensure that the ditch clearing rotation allows for the development of late-successional ditches with

shallow water and thick bottom sediments.

- Maintain at least partial tree cover along late-successional ditches within breeding areas.
 - Manage water levels to ensure that there is suitable shallow water (less than 1m) within breeding areas from March through to July.
 - Maintain areas of seasonally flooded swamp woodland within the Somerset peat moors. Create new areas of habitat by raising water levels in wet woodland between March and July.
- Avoid clearance of ditches within breeding areas between May and August inclusive, when egg cocoons and larvae are in the water, or when pupae are present in ditch banks.
 - Investigate techniques for controlling the growth of duckweed within areas that would otherwise provide suitable breeding habitat for *Hydrochara*. Monitor the results of any experimental *Lemna* control in allowing colonisation by breeding Lesser Silver Water Beetle.



Fig. 1 Adult; © J.M. Walters



Fig. 4 Larva feeding; © J.M. Walters

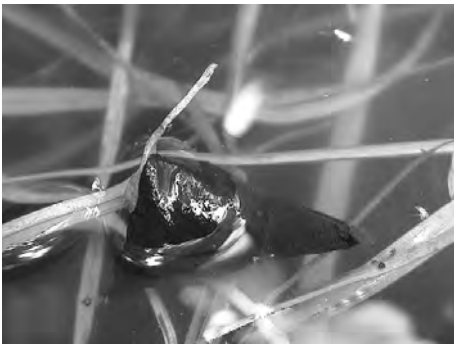


Fig. 2 Egg; © J.M. Walters

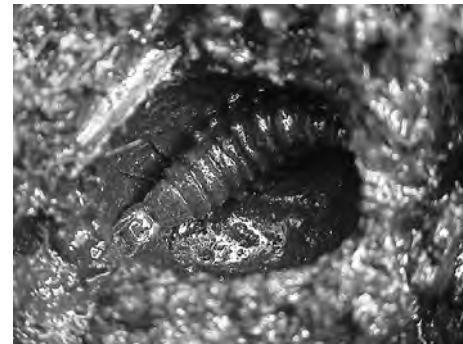


Fig. 5 Pre-pupa; © J.M. Walters



Fig. 3 Larva; © J.M. Walters



Fig. 6 Pupa; © J.M. Walters