SPECIES DOSSIER

Creating ponds for the One-grooved Diving Beetle *Bidessus unistriatus*

MILLION PONDS PROJECT

Freshwater Habitats Trust

A 50-YEAR PROJECT TO CREATE A NETWORK OF CLEAN WATER PONDS FOR FRESHWATER WILDLIFE

1. A small beetle in need of a helping hand

The One-grooved Diving beetle is an extremely rare species in the UK. It is one of our smallest water beetles, just 2mm in length, but is easily recognised on close inspection by the single furrow running from the back of the head onto each wing case (Figure 1).

There are currently only three known sites for the One-grooved Diving Beetle in the UK, one in the New Forest in Hampshire and two in Norfolk (Figure 2). Despite extensive searches in these areas it has only been found in a limited number of ponds. It is likely that the One-grooved Diving Beetle has always been a rare species, as it has only ever been recorded from 18 ten km squares. However, its decline to just a few sites is a cause for concern and requires conservation action.

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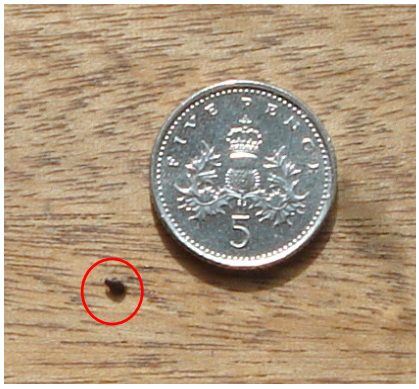

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Figure 1. The One-grooved Diving Beetle *Bidessus unistriatus*.

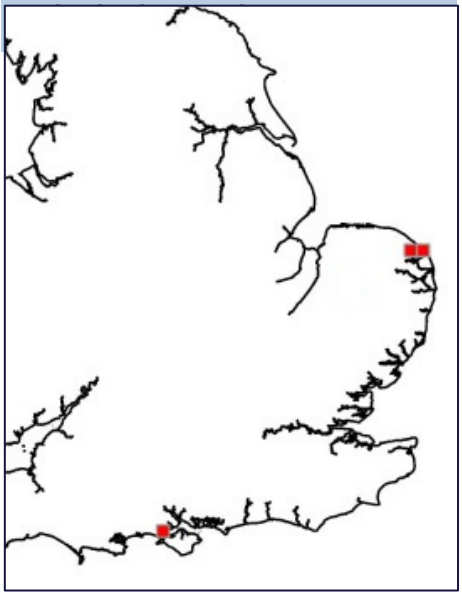
2. Key habitat requirements

The exact requirements of this species are still unknown, but its current distribution suggests that it is able to utilise sites which have been created as a result of mineral extraction (peat or clay). Therefore it may be possible to create new ponds for the One-grooved Diving Beetle to strengthen the UK population and prevent further declines.

- **Pond size -** Surface area appears to be unimportant but it appears to be restricted to ponds with soft substrates and broad shallow margins <20cm deep, which are poached.
- **Water chemistry -** Ponds for One-grooved Diving Beetle have varying pH - peat (low pH), mud or marl (high pH). In the UK, this species seems to favour clean-water habitats - stoneworts may be good indicators of suitable conditions.
- **Surrounding habitat -** Traditionally managed landscapes such as the New Forest and the Norfolk Fens. These habitats have a long history of year-round grazing which maintains an open, poached sward.

Key messages

- **Create ponds within the current or historical distribution of One-grooved Diving Beetle.**
- **Locate ponds in low intensity catchment to limit nutrient inputs into the pond.**
- **Design ponds with shallow basins and broad margins (<20cm for 2-3m).**
- **Ponds should have fluctuating water levels and may be semi-permanent or temporary.**
- **Manage sites by grazing to keep the turf short and poached. Further management of scrub and tall emergent vegetation may be required if they encroach onto the site and threaten to**



Data supplied by The Aquatic Coleoptera Conservation Trust

Figure 2. Current distribution of the One-grooved Diving Beetle in the UK.

3. Creating ponds for One-grooved Diving Beetle

Locating ponds

The post-glacial distribution of One-grooved Diving Beetle in the UK is restricted to south and east-England, including Dorset, South Hampshire, East Sussex, Cambridgeshire, East Norfolk, Middlesex and East Suffolk. Pond creation for One-grooved Diving Beetle should be located adjacent to existing populations or within the historical distribution of this species.

In Europe, flight activity (which is assumed to be the main mode of dispersal) is associated with warm temperatures (16^{o}C), so this may be one species which benefits from increasing summer temperatures, provided it has appropriate habitat to move in to.

Care should be taken not to damage habitats with existing biodiversity value. However there are many opportunities for pond creation in heathland and fen sites as part of restoration management, including scrub clearance work. For more information on opportunities for pond creation in these habitats visit the Supplementary Habitat Factsheets in the *Pond Creation Toolkit*.

Pond creation following mineral extraction may also provide opportunities for the One-grooved Diving Beetle. Many of its current and historical sites are within man made habitats including marl pits and brick pits, and natural fluctuating meres.

There may be a case for introducing One-grooved Diving Beetle to new, suitable sites because this species is so rare. But care should be taken not to have a negative impact on existing populations by removing individual for captive breeding – this has proved unsuccessful so far.

Water source

New ponds for One-grooved Diving Beetle should be **fed by groundwater or surface water** draining from low-intensity, unpolluted catchments, e.g. heathlands, fens and woodlands. Although the One-grooved Diving Beetle is able to withstand some pollution, new ponds should ideally have clean water. The presence of stoneworts in sites where it occurs is a good indicator of high water quality and may provide a marker for sites with potential for further pond creation.

One-grooved Diving Beetle ponds in the New Forest show fluctuations in pH linked to the substrate and water source. The ponds are fed by water draining from the adjacent heathland which can lower pH to 6.3 following heavy rain, but the marl substrate can increase pH to as much as 8.3 in the dry summer months. Other sites for One-grooved Diving Beetle on peat have a pH around 7.0, therefore it would appear that **circumneutral ponds** are the preferred habitat.

Ponds for One-grooved Diving Beetle appear to have **naturally high conductivity** due to the underlying marl substrate or from an influx of saline water into coastal ponds in the Norfolk Broads.

Pond Complexes

Where it occurs, the habitat for the One-grooved Diving Beetle includes a complex of ponds, rather than a single waterbody. The current and only pond site for One-grooved Diving Beetle in the New Forest is part of a complex of 33 ponds. Both Hickling Broad and Catfield Fen in Norfolk are comprised of many hundreds of pools, and the One-Grooved Diving Beetle has appeared and disappeared from over 30 ponds in and around these fen sites.

Maximum numbers of adults are recorded in the spring when they must congregate to breed. There is then a period of dispersal when numbers of adults within the pond decline and then a peak in the autumn when the beetles congregate once more, presumably for hibernation. Creation of a complex of ponds may therefore be essential to provide habitat for the beetles during the summer months outside of the breeding pond. Pond complexes also increase the potential number of breeding ponds.

As we do not have enough information on the ecological requirements of the One-grooved Diving Beetle, a complex of ponds of different sizes and shapes will also provide a range of habitat types available, increasing the likelihood that suitable conditions will be created. It will also strengthen the population if individuals can move around the site as conditions change.

Pond designs

It is difficult to be prescriptive about the exact designs of ponds suitable for One-grooved Diving Beetle because it occurs in such a limited number of sites which may not be its optimum habitat. However, we know that certain pond characteristics are important for many scarce and threatened pond species and it is likely that they are also important for this beetle. These include:

- **Shallow depth.** Less than 0.1-0.2m deep for at least 2m.This may be the whole pond or the pond margin with a slope less than 1:20 (3^{o}). During pond creation try not to be too tidy, as the micro-topography (bumps and lumps) within the pond will create ideal habitat. This will further be enhanced by grazing animals poaching the margin to create a broad zone of micro-pools (Figure 3).

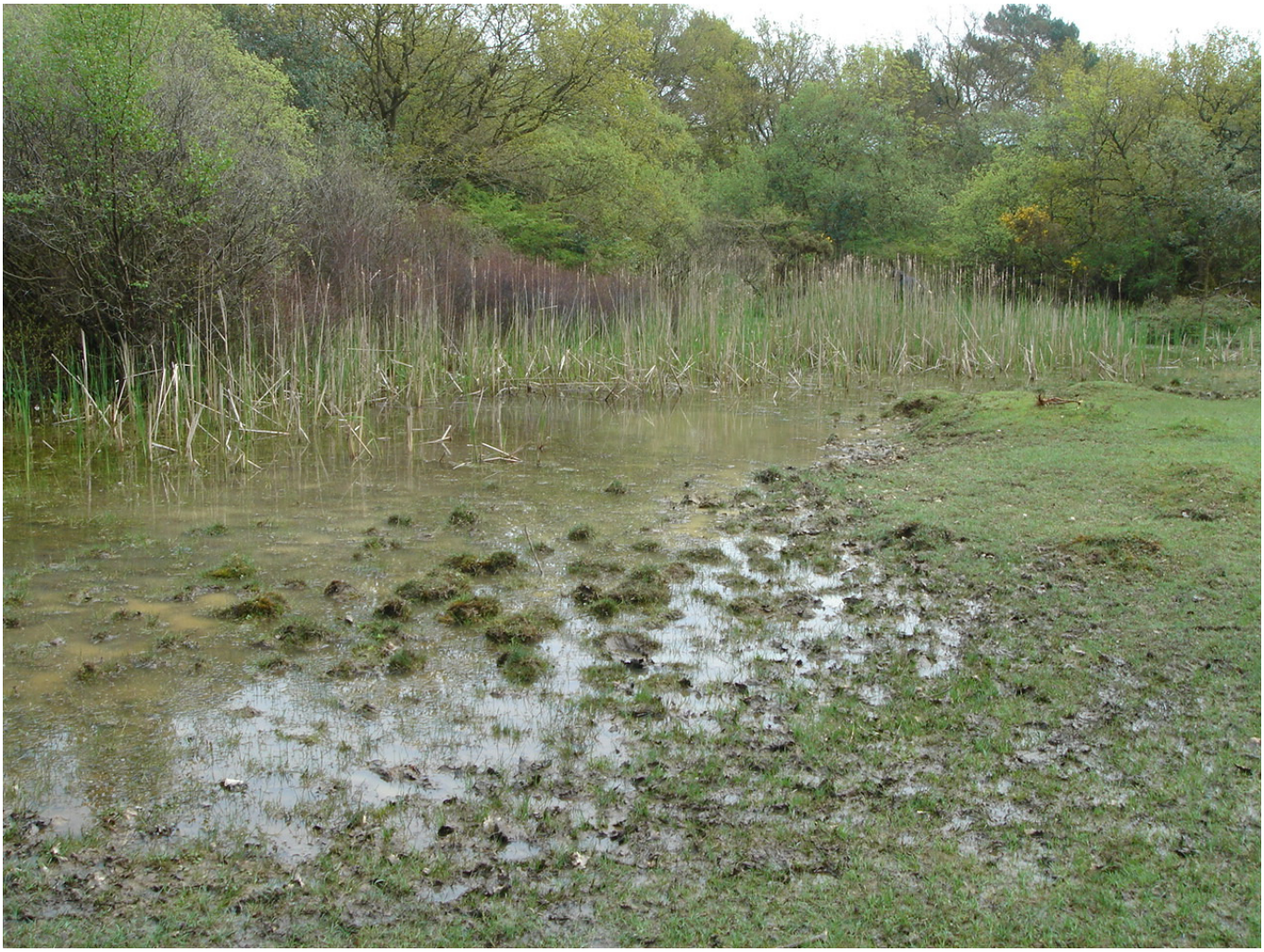


Figure 3. Habitat for the One-grooved Diving Beetle demonstrating the apparent preference for broad, shallow, poached pond margins, adjacent to a grazed short turf.

- **A wide drawdown zone** (the area which is covered by high water levels in winter but then slowly exposed over the summer) and complete drying of some ponds may be important in reducing the number of predators and the cover of dominant plants and invertebrates.
- **Small ponds** may be better than large bodies of water because they are more easily poached, and can be grazed across their entire surface area which reduces the cover of dominant emergent plants such as Bulrush *Typha latifolia*.
- **Convoluted margins** to increase the area of edge habitat. One-grooved Diving Beetle is often found on the very outer edge of the pond amongst sparse fine-leaved vegetation.

5. Management for the One-grooved Diving Beetle

Grazing. Ponds should need very little management once they have been created, provided they are maintained by low intensity grazing using cattle, ponies or deer. The biggest threat to the One-grooved Diving Beetle appears to be changes in grazing which lead to over or under grazing of the site. It is difficult to be prescriptive about stocking densities but provided trampling pressure does not remove all vegetation from the pond it is probably sufficient (Figure 4). Soft sediments which are easily poached need only low density of livestock to maintain bare mineral substrates.

Scrub removal. Whilst One-grooved Diving Beetle is apparently tolerant of some shade it appears to have been lost from sites which become covered by scrub. This may be linked to lowering of water temperatures or loss of submerged vegetation. Periodic scrub removal may be necessary to keep sites open.

Figure 4. Poached margins and fluctuating water levels halt pond succession and produce a mixture of open bare substrates and early colonising plant species such as stoneworts. Grazing can maintain ponds in this state over hundreds of years.

6. Further reading

Foster, G.N. and Carr, R. (2008). The status of *Bidessus unistriatus* (Goeze) in England, with records of *B. grossepunctatus* Vorbringer, 1907, a species present in England in the Bronze Age (Dytiscidae). *The Coleopterist* 17(3):191-203.

For further information about the Million Ponds Project and to consult other factsheets in the Pond Creation Toolkit, please visit *www.freshwaterhabitats.org.uk* or email enquiries to *info@freshwaterhabitats.org.uk*

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This factsheet was prepared with the advice and expertise of Prof. Garth Foster, The Aquatic Coleoptera Conservation Trust.