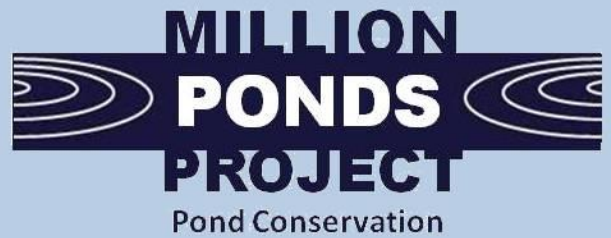


# Creating ponds for the Oxbow Diving Beetle *Hydroporus rufifrons*



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

## 1. The Oxbow Diving Beetle

The Oxbow Diving Beetle *Hydroporus rufifrons* is a relatively small (4-5mm) diving beetle, which is actually quite large in comparison with the other members of the *Hydroporus* family (2-4mm). It may be recognised by its broad pale shoulders, but this character is quite variable (Figure 1) so reliable identification is dependent on microscopic examination and needs to be verified by an expert.

The Oxbow Diving Beetle has declined by 92% in the last 21 years. It appears to have become extinct in the east of England from County Durham to Norfolk and has been lost from many sites to the west. It is now known from just a handful of locations (14 sites) in England, Wales and Scotland (Figure 2).



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**Figure 1.** The Oxbow Diving Beetle and showing the variable colour forms (right).

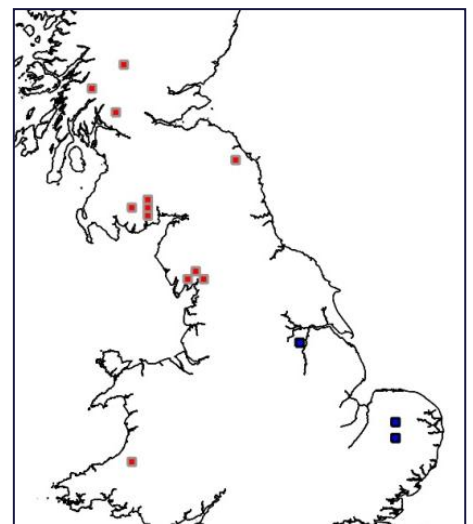
## 2. Key habitat requirements

This beetle is found in shallow temporary pools in unimproved pasture, many of which have formed from cut-off meanders, giving it the name of Oxbow Diving Beetle. It has also been recorded from isolated fell ponds in the Lake District and is occasionally found in larger dam-ponds in its stronghold around Windermere. All waterbodies for the Oxbow Diving Beetle have:

- Clean water free from the excessive nutrient inputs associated with agricultural intensification.
- Fluctuating water levels over broad shallow margins.
- Marginal sedges and rushes and abundant submerged vegetation including fine leaved grasses and mosses.
- High levels of organic matter in the pond which are associated with relic oxbow pond systems.
- Low levels of grazing which maintain a diverse sward and reduce the cover of woody scrub.

### Key messages

- This is a relic temporary pond species. New ponds may need to develop over many decades to provide the right habitat for Oxbow Diving Beetle.
- Create ponds within unimproved floodplain grasslands on circumneutral substrates.
- Design ponds to mimic natural floodplain waterbodies such as oxbow lakes. Include broad shallow margins to support emergent sedges and rushes.
- Fluctuating water levels reduce the number of competitive plants and animals.
- Manage sites using low intensity grazing to maintain an open diverse sward and reduce the amount of woody scrub.



**Figure 2.** Current distribution for the Oxbow Diving Beetle in the UK. Reintroduction sites shown in blue.

### 3. Reversing the decline

#### *Distribution and status*

The Oxbow Diving Beetle is currently recorded from Ceredigion, North Lincolnshire, Mid-west Yorkshire, Cumbria (reintroduction), Westmorland, North Northumberland, Kirkcudbrightshire, Dumfries, Stirling, Mid Perthshire and Argyll.

This is a fraction of its former distribution with historical records from Surrey, South Essex, Berkshire, East and West Suffolk, West Norfolk, Cambridgeshire, Caerfyrddyn, South Lancashire, North-east and Mid-west Yorkshire, Durham, South Northumberland, Cumberland, Renfrew, Dumbarton, West Perthshire and Eastern Ross. As a result of this marked decline it is listed as Endangered in the IUCN red list (JNCC 2010).

#### *Why it has declined*

The reasons for the decline of Oxbow Diving Beetle are due to a range of different factors caused by the way people manipulate and manage floodplains.

- Few rivers in the UK are able to function naturally leading to the loss of floodplain habitats such as oxbow lakes and river fens.
- Wet grasslands are often drained and improved with the addition of fertilisers which reduce the number and quality of floodplain ponds.
- At other sites cessation of grazing has resulted in the development of shaded ponds which are not suitable for Oxbow Diving Beetle.
- Some sites have been lost through land flooding schemes to create reservoirs for hydroelectric power and public water supplies.

#### *Why will creating new ponds help?*

Conservation work is currently focussed on protecting the Oxbow Diving Beetle at remaining sites and reintroducing it to suitable habitat within its former range. Translocations from Cumbria to Lincolnshire and the Brecks appear to have been successful, and are continuing to be monitored.

Creation of new ponds within the floodplain can help to reverse the net loss of good quality pond habitats and can be used to simulate cut-off river meanders and backwaters where the river is no longer able to follow its natural course. **It is important to consider pond creation as part of any programme of realigning waterways.**

The mature ponds which the Oxbow Diving Beetle inhabits may take many decades to become suitable, and if we want to increase the chances of this beetle spreading out from current sites we should begin to plan for the future - creating new pond habitat within the landscape to replace existing ponds as they are lost to natural processes (Figure 3).

**Figure 3. Development of ponds in oxbow systems**



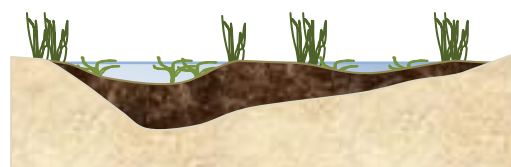
A naturally functioning river meanders across the floodplain. Small temporary pools form in natural hollows adjacent to the main river.



The narrow neck of the meander is eroded to a point where the river breaks through. Deposition seals off the old meander and creates an oxbow lake.



The young oxbow pond in a clean water catchment develops abundant emergent and submerged plant growth.



Eventually the pond fills with sediments (after many decades if the pond is managed by grazing) - creating a complex of small, shallow temporary ponds. These relic habitats may remain in the landscape for hundreds of years.



## 4. Pond designs for the Oxbow Diving Beetle

The Oxbow Diving Beetle is found in relict temporary ponds in the floodplain of naturally functioning river systems. These mature ponds cannot be created instantaneously but need to develop over decades to establish the correct vegetation structure and levels of organic matter. Pond creation to achieve a complex of ponds of different ages within the pond landscape will benefit the widest range of species, including species such as Oxbow Diving Beetle which occupy ponds in the latter stages of the pond's life.

### Pond location

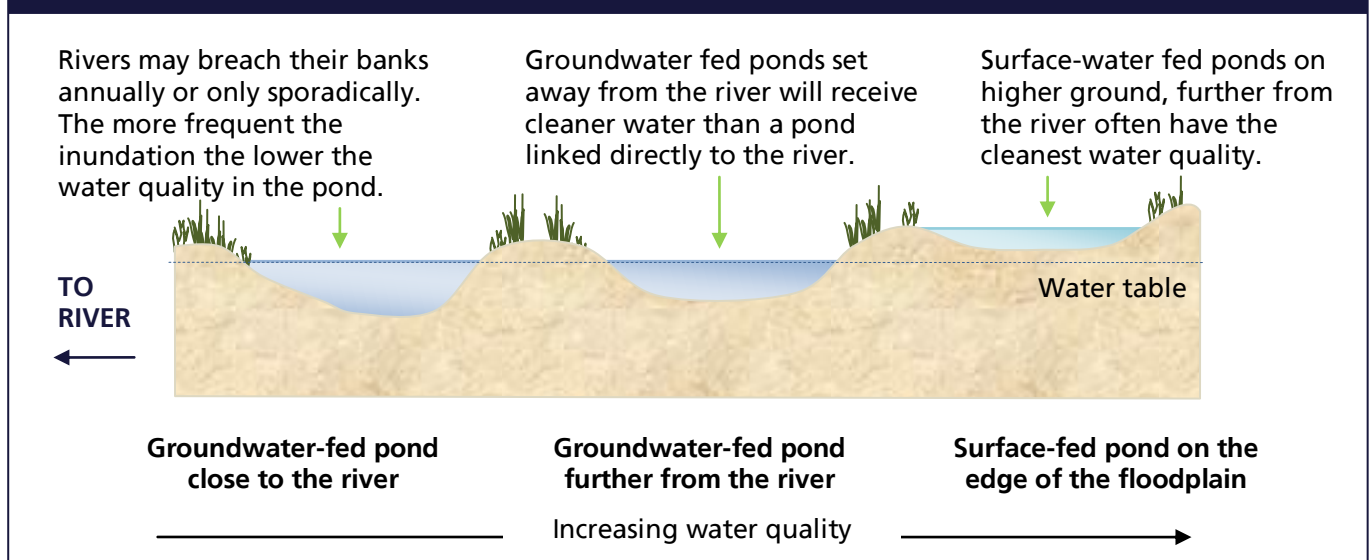
- The exact dispersal mechanism for Oxbow Diving Beetle is unknown. Flight tests have proved negative but as individuals are discovered in isolated ponds it would seem that at least some individuals in the population can fly. So locating new ponds in a river catchment that already supports a population is more likely to lead to successful colonisation.
- Ponds which contain Oxbow Diving Beetle also support another relic temporary pond species, the Mud Snail *Omphiscola glabra*. Therefore it may also be appropriate to create ponds within the range of the Mud Snail (see the [Bap Species Map](#) for more information) as this may provide suitable habitat for both species in the future.

### Water source

The floodplain is not always a good source of unpolluted water (see [Pond Creation Toolkit: Factsheet 2](#) and [Supplementary habitat factsheet: Floodplain ponds](#) for more information). Even outside of urban areas, most streams and rivers in the UK have high levels of nutrient pollution because of agricultural runoff in their catchments. Ponds fed by river water will become eutrophic and the pond will also quickly fill with nutrient-rich sediments. The Oxbow Diving Beetle needs ponds fed by clean water. To achieve this:

- Don't connect ponds directly to ditches or streams they should be located within the river floodplain but isolated from the river network.
- Locate ponds on the outer edge of the floodplain boundary (identify the area using the Environment Agency flood maps [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)). The more frequent the flooding the lower the quality of the pond, whereas ponds on the outer-edge of the floodplain are more likely to maintain their water quality for longer.
- If the surrounding landuse is low intensity, such as unimproved grasslands or woodlands, ponds can be groundwater-fed as this is a good source of unpolluted water.
- If the landuse surrounding the pond site is intensive, groundwater fed ponds can still be high in nutrients. So in these sites, locate ponds where they are more likely to fill from clean surface water only, i.e. on impermeable substrates like clay (Figure 4).

**Figure 4. Locating ponds and finding a clean water source**



## Pond design

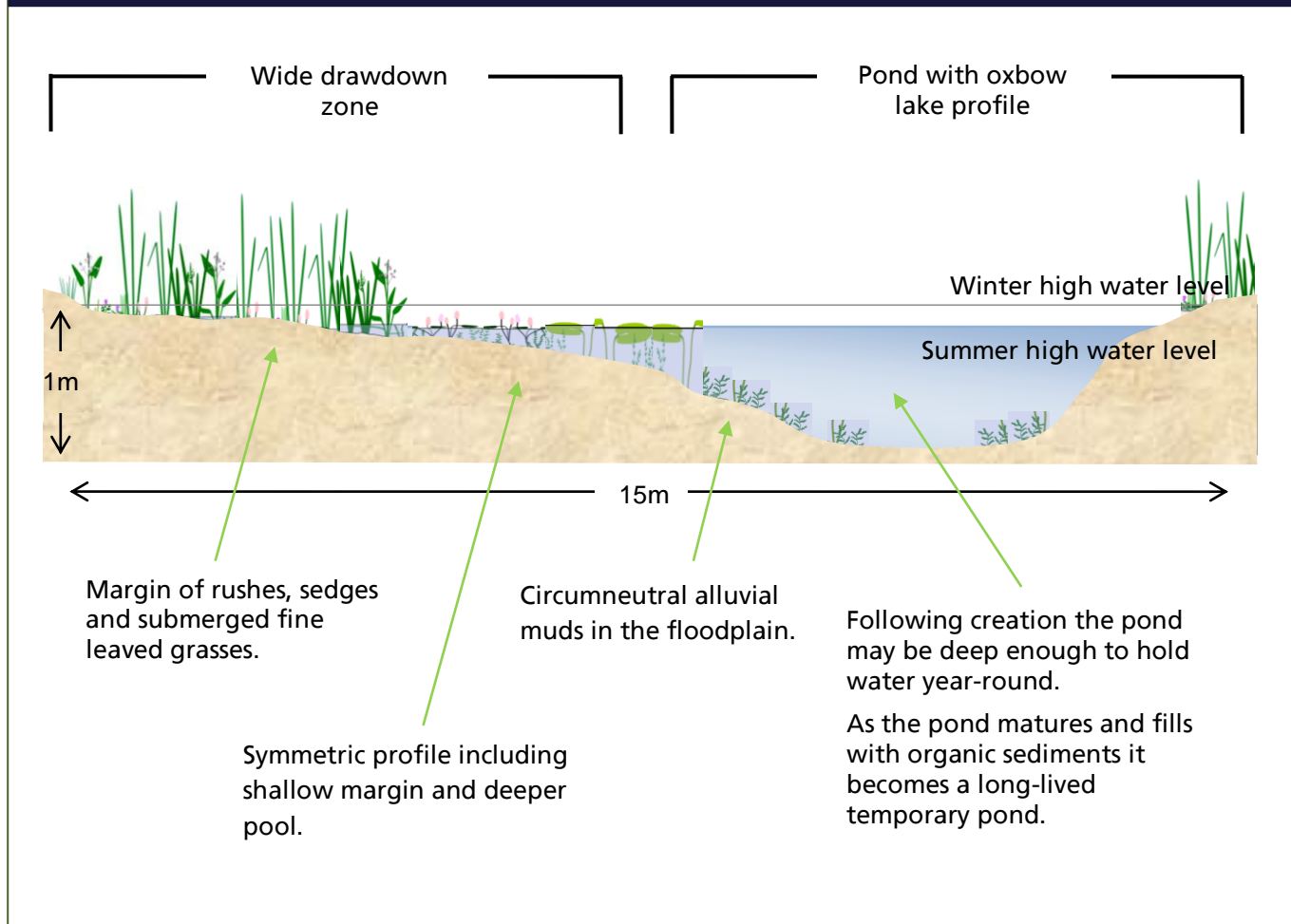
- **Create a complex of small ponds.** A group of small ponds between 10-50m<sup>2</sup> will provide more edge habitat than a single large pond. The Oxbow Diving Beetle is found in the margins of pools rather than areas of open water.

A pond complex of different sizes and shapes, including linear ponds which resemble cut-off meanders, will result in a range of environmental conditions to benefit a greater number of floodplain species.

- **Design ponds with broad, shallow margins.** Less than 0.1-0.2m deep for at least 2m, with a bank angle less than 1:20 (3°). These margins will support a margin of emergent and submerged aquatic plants. Shallow margins and fluctuating water levels will produce a broad drawdown zone which will be covered by water in winter and slowly exposed over the summer months.
- **Fluctuating water levels** also help to prevent wetlands plants such as bulrush *Typha latifolia* from dominating the pond and will help to produce a mixed sward of rushes, sedges and herbs which the Oxbow Diving Beetle uses for shelter.
- **Create shallow ponds.** Ponds don't need to be deep, about 1m in depth will be sufficient to allow the pond to remain in the landscape long enough to develop the correct vegetation structure and sediment depth for Oxbow Diving Beetle.

Deeper ponds should still include a broad shallow margin. To achieve this where space is limited, create asymmetric ponds which mimic the profile of oxbow ponds (Figure 5).

Figure 5. Profile of floodplain ponds to mimic oxbow lake systems





## Management and awareness

- Manage sites with low intensity grazing. This will slow down pond succession and maintain open patches in the emergent vegetation of temporary ponds in the floodplain.
- Period scrub management may be required to prevent woody vegetation from casting excessive shade over the pond.
- Long term monitoring of sites created for Oxbow Diving Beetle would be valuable to increase our understanding of the development of floodplain ponds. The beetle itself is fairly elusive therefore survey to establish presence should be conducted in the autumn and again in spring to coincide with periods of peak activity.
- Work is needed to increase awareness of the importance of relic temporary ponds. These habitats are often overlooked or over managed to return ponds to an earlier stage in their succession. Ponds should be allowed to develop naturally, creating new ponds to replace those which are lost naturally to succession. This will ensure that there are more mature ponds in the landscape which are suitable for species like the Oxbow Diving Beetle.

## 5. Further reading

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**For further information about the Million Ponds Project and to consult other factsheets in the Pond Creation Toolkit, please visit [www.pondconservation.org.uk/millionponds](http://www.pondconservation.org.uk/millionponds) or email enquiries to [info@pondconservation.org.uk](mailto:info@pondconservation.org.uk)**

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