

Early Successional Freshwater Habitats

Introduction

Ponds can support a larger proportion of freshwater biodiversity than lakes or rivers and are especially important for uncommon freshwater species (Céréghino et al., 2007). A range of different ponds at a site supports the largest diversity of wildlife. Different parts of a pond can be at different stages of succession and attract different species.

Temporary pools such as this one at Dogsthorpe Star Pit nature reserve are home to a wide variety of invertebrates, including an array of specialised species, many of which are rare. Photo: Josh Hellon

One area that is often overlooked is the presence of early successional freshwater habitats. This includes ponds that dry up seasonally, new ponds, ditches and scrapes. Temporary pools are often not valued enough, they can be seen as an inconvenience or may be deepened to hold water for longer, to the detriment of the specialist fauna dependant on them (Kirby, 1993). The invertebrates that live in temporary pools are often not able to cope with the competition and predation from other animals in permanent water. They have specialist adaptations to allow them to cope with periodic drying out of the temporary pools, this means that many species are not found in other habitats.



Habitat Creation and Maintenance

Water depths of 20 cm to 50 cm have been shown to support higher numbers and diversity of aquatic invertebrates than deeper waterbodies (Kirby, 1993). These waterbodies can gradually dry out if not disturbed and new ponds may have to be created to replace them. This is energy-intensive, often requiring heavy machinery, but is essential to maintain these habitats and the species they support.

Maintaining early successional features of existing pools is also resource-intensive. Scrub management must occur around the pools to ensure excessive vegetation does not drop in and to prevent excessive over-siltation. Early successional reedbed can be important for reedbed and wetland specialist invertebrates. However, reedbeds must be maintained so the reed does not become too dense and spread into open water, a habitat which many aquatic invertebrates and other species groups require. Smaller temporary water bodies are also important. Trampling from grazing animals and wheel ruts create temporary pools, vital for a wide variety of species. Water beetles can be effective colonisers of temporary pools due to their strong flight muscles.



This pond at Flitwick Moor nature reserve was excavated in 2011, recreating the historic peat diggings that would once have been common in the area and allowed early successional habitats and their associated species to develop. Surveys of this new pond have shown that it has attracted a wide range of aquatic invertebrates including several uncommon water beetle species associated with acidic waters. Photo © Gwen Hitchcock

Cruel to be Kind

Conservation work may sometimes look destructive. We sometimes have to play the part of large mammals, which have been lost from Britain, to fell trees and manage scrub. Historically, areas of grassland and bare earth would have been created by large mammals such as aurochs, bison and elks. Many species are reliant on these habitats rather than dense woodland; modern-day practical conservation involves taking the place of these animals to maintain habitats. This is both resource and energy-intensive.

Similarly, beavers used to maintain wetland habitats in a way that benefited a large number of species. Now conservation work tries to replicate the work that beavers would have performed. In many cases, we are also replicating old farming and forestry techniques to conserve the biodiverse habitats that are associated with traditionally managed areas such as hay meadows and coppice woodlands.

Although this work may look destructive at first, it is essential if we are to maintain a wide variety of habitats for wildlife to thrive. Bare earth is colonised by lichens and mosses, which support flowering plants and eventually scrub and trees. Resetting the balance of these different habitats is essential. Without management, our reserves would quickly become relatively uniform woodland, which is only beneficial to a select group of species.

 **Read our article from *Local Wildlife***
wildlifebcn.org/cruel-to-be-kind

Volunteer work parties are an essential component of our reserve work, over 1000 volunteers support us with our work and we could not do what we do without them. Photo © Toni Castello



Monitoring our Freshwaters – Water Beetles and Bugs

Water beetles (*Coleoptera*) and bugs (*Hemiptera*) are great indicators of freshwater quality and are also fascinating and important in their own right. There are approximately 283 water beetle species in the UK. Of these 283 species, five are Regionally Extinct, 34 are Threatened, 37 are Near-Threatened and 84 are Nationally Scarce (Foster, 2010). There are 69 water bug species found in the UK. Water beetles vary dramatically in size and shape from tiny 1.5mm beetles up to 40mm great diving beetles. Similarly, water bugs vary from tiny 2mm bugs to those around 50mm in length. The ecology of water beetles is diverse, with some species feeding on algae and detritus and others feeding on other invertebrates and fish. The majority of water bugs are predators of other invertebrates and prefer shallow areas around vegetation or close to pond edges.

One reason why these groups are such good indicators is that there are a large number of habitat-specialist species. Some prefer well-vegetated ponds and others require very early successional ponds. There are also several species of flowing water. Some

What makes water beetles and bugs good indicator species:

- Diverse enough to give fine discrimination between good, mediocre and poor sites
- Several species found in almost all habitats
- A manageable number of species, 283 water beetles and 69 water bugs in Britain
- Identification less difficult than most invertebrates
- Their ecology is well understood and documented – we know their response to habitat and water quality

species are only found in the cleanest freshwaters so can tell us a lot about water quality that impacts a wide variety of species.

We started surveying water beetles and bugs on our reserves in 2012. Surveyors used a standard method (Palmer, Drake and Stewart, 2010) to collect a sample of invertebrates using a long-handled pond net. The samples were sorted on the bankside with specimens taken for identification to species-level.

“ These surveys have not only given us information about the distribution and rarity of species in our area through the generation of biological records, but it has also told us a lot about the condition of freshwaters on our sites and their relative importance. ”

Josh Hellon, Monitoring and Research Manager,
Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire

Nature reserves with a CCI of 20 or above (Hellon, 2016)

Reserve	CCI	SQS	Number of Species of Conservation Interest
Lattersey	33.19	3.67	13
Dogsthorpe Star Pit	29.31	2.85	8
Wilson's Pits	27.72	2.86	7
Irthlingborough Lakes and Meadows	25.05	2.38	12
Pitsford Reservoir	24.75	2.83	16
Stanground Wash	24.49	1.90	4
Godmanchester	24.09	2.78	2
Summer Leys	23.39	2.60	9

Species of conservation interest were categorised as being species with a CCI of 7 or above.

Shown in the table are the nature reserves surveyed that have a CCI of 20 or above, these are considered the top sites for aquatic invertebrates. We also analysed the waterbodies on the sites individually to determine which are the most important for aquatic invertebrates. The majority of these waterbodies that hold particularly special assemblages are early successional habitats. They all have at least one rare species present with a CCI of 8 and an overall CCI > 30 so are considered priority waterbodies for conservation.

Summary

Different species thrive in ponds at different stages of succession. Habitat maintenance is essential to ensure that we have a mosaic of freshwater habitats. These diverse habitats can support diverse invertebrate populations including rare and declining species. Monitoring is essential to ensure that our management of these unique habitats is as effective as possible.

Acknowledgements

Our thanks go to everyone that helps out with aquatic invertebrate monitoring on our reserves and also to Graham Warnes for providing information for this case study.

References

Cérégino, R., Biggs, J., Oertli, B. and Declerck, S. (2007). *The Ecology of European ponds: Defining the Characteristics of a Neglected Freshwater Habitat*. Hydrobiologia, 597(1), pp.1–6.

Chadd, R. and Extence, C. (2004). *The Conservation of Freshwater Macroinvertebrate Populations: a Community-based Classification Scheme*. Aquatic Conservation: Marine and Freshwater Ecosystems, 14(6), pp.597–624.

Foster, G.N. (2010). *A Review of the Scarce and Threatened Beetles of Great Britain: Water Beetles of Great Britain*. Peterborough, UK: Natural England.

Foster, G.N., Foster, A.P., Eyre, M.D. and Bilton, D.T. (1989). Classification of Water Beetle Assemblages in Arable Fenland and Ranking of Sites in Relation to Conservation Value. *Freshwater Biology*, 22(3), pp.343–354.

Hellon, J. (2016). *Aquatic Beetle and Bug Surveys on Our Reserves*. The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire.

Kirby, P. (1993). *Habitat Management for Invertebrates: a Practical Handbook*. Sandy, UK: Royal Society For The Protection Of Birds.

Palmer, M., Drake, M. and Stewart, N. (2010). *A Manual for the Survey and Evaluation of the Aquatic Plant and Invertebrate Assemblages of Grazing Marsh Ditch Systems*. Peterborough, UK: Buglife.

Water Beetles at Dogsthorpe Star Pit

Dogsthorpe Star Pit near Peterborough is home to a wide variety of ponds, four of which are the top ten waterbodies for rare species on our reserves. The site is a Site of Special Scientific Interest primarily due to the rare invertebrate species found in the shallow ponds on site. Over 64 different water beetle species have been recorded on the site including several fenland relic species and scarce coastal species.

Large areas of open water are not as beneficial to many invertebrates as smaller ponds with more microhabitats. So some of the ponds at Dogsthorpe have been separated from the main lake and reprofiled so that they have shallower sides, which makes them more suitable for a wide range of invertebrates. The water levels of the lake are carefully maintained by pumping the water out of the site. The idea of the management on-site is to create ponds with varying depths, some of which dry up in the summer. These ponds are created on an ongoing basis, every three years. Some of the deeper ponds are good for stoneworts as well.

Creating the new ponds or re-exposing the clay creates the early successional habitat that many invertebrates prefer. Exposing the clay can create brackish pools, home to a wide variety of scarce species. Some spur ditches are allowed to dry out during the summer months. This creates pockets of water of varying salinity and areas of bare mud. Some ponds have also been dug in the gravel-rich areas of the site which provide habitats for a different suite of species. To stop reeds encroaching, constant work is needed to manage the vegetation in these areas.

