WATER AND WILDLIFE ON THE LEVELS

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Abstract

The Somerset Levels and Moors have the largest expanses of lowland wet grassland in Britain, where the most relevant areas of conservation interest are wildfowl and wading birds, together with aquatic and wetland plants and invertebrates. The importance of both the quantity and quality of the water on the wetlands is highlighted. The naturally mesotrophic water supply results in prolific but diverse vegetation but only if it is protected from pollution by sewage or fertilizers. Land management has to try to satisfy the different requirements of conservation and the local graziers. The timing of ditch cleaning throws up a conflict of interest between the different requirements of aquatic plants and invertebrates. A system of management devised for birds on grazing marshes may be capable of satisfying both botanical and entomological interests.

INTRODUCTION

Britain's high rainfall and extensive low-lying areas provide the basis for rich wetlands. Although now sadly drained, there remains about 5000km^2 of land in the UK Ramsar sites of international importance for their wetland flora and fauna (including extensive estuarine land). Somerset is particularly well endowed with lowland wetlands compared with much of Britain. Lowland wet grassland alone occupies about 35,000ha of the county, and the Levels are the largest expanses of lowland wet grassland in the UK.

DEPENDANTS OF A WETLAND HABITAT

Wetlands cover a wide range of habitats where water is clearly the key feature above all else. Fens, bogs, river, ponds and carr woodland are more than just aquatic habitats. The dichotomy between aquatic and 'terrestrial' systems is an artificial convenience created by biologists, and does not match reality. When this division is disregarded, we find that a large fraction of our flora and fauna is dependent upon wetland habitats. There is obviously a gradient in the wetness required by plants and animals, so no precise figure can be given to the numbers of species reliant on wetlands. But as an example, take two large groups of Britain's beetles that are not thought of as aquatic species, the 350 species of ground beetles and1000 species of rove beetles. About half the ground beetles and about 40% of the rove beetles are entirely or mostly reliant on wetlands. Recent analysis of a similar number of flies produced the same result: about half are wetland species. If this large sample is indicative of the whole fauna, it is clear that the proportion of the fauna (and possibly flora) associated with wetlands is disproportionately large in comparison with the area of such habitats left in the country. This highlights the importance of water to our wildlife.

CONSERVATION SITES

The extraordinary richness of wetlands has been recognised in conservation since the establishment of first nature reserve, Wicken Fen, over a century

ago. As well as numerous SSSI and county trust sites, the importance of wetlands has been raised again in the recent BAP, which has plans for all major types of wetlands. Whilst a wide range of interest is taken into consideration in designating conservation sites, those of most relevance to Somerset's wetlands are wintering wildfowl, breeding waders, aquatic and wetland plants, and aquatic invertebrates.

OVERWINTERING BIRDS

Vast numbers of overwintering birds are now recorded on well managed moors such as RSPB's West Sedgemoor where peak winter counts of about 80,000 birds have been recorded recently (and how many invertebrates are needed to sustain this abundance?). Bewick's Swan, Teal and Lapwing over-winter here in internationally important numbers, while species on the 'amber' list of threatened birds, such as Widgeon, Shoveler and Pintail, are also present in large numbers. These birds rely on flooded expanses. When this water recedes in spring, leaving saturated ground, a different suite of birds uses the fields for nesting – Snipe, Curlew, Redshank and Lapwing, along with nationally rare Garganey and Black-tailed Godwit. Saturation appears to be essential simply through the mechanics of having to probe with long thin beaks for soil-dwelling invertebrates – a task that becomes increasingly difficult when the surface hardens and the terrestrial grasses form a closed dense mat as the ground dries out.

AQUATIC PLANTS

About 130 species of the 170 British aquatic plants can be found in ditch systems, and rich examples may have more than 15 species in a 20m section. Each species has its preferred range of water depths in which it flourishes. Most (but not all) submerged species such as the numerous *Potamogeton* species and Water Soldier prefer water deeper than 0.5m, and many (but not all) emergent species that fringe the ditches tolerate just a few centimetres; the wider the range of water depths, the more plants. In contrast, the range of tolerances of wetland plants of the meadows is measured in much smaller differences in wetness. Minor changes in soil wetness or the yearly flooding regime produce major changes in the plant communities, so that small changes in topography allow a wide range of species to thrive. Owing to drier swards tending to be more heavily managed (grazed harder, more fertilizer application) than damper swards, plant communities of wetter sites tend to be more interesting, since only tougher, common plants tend to thrive in the drier areas. Areas that are merely damp in the Levels are often dominated by species-poor Yorkshire-fog or Creeping Bent grass communities, whereas the species-rich flood meadow communities with abundant Meadow Foxtail or Crested Dog's-tail are typical of areas with winter inundation and permanently damp or wet soils. This is a generalisation that does not hold true for unimproved sites with a long history of sympathetic management and low inputs of nutrients, and such grassland can be diverse even though dry all year.

INVERTEBRATES

Wetland invertebrates on Somerset's wet grasslands, fens and ditches systems are extraordinarily rich. Surveys of such wetlands routinely record hundreds of species in a single year; attempts at complete inventories are perhaps somewhat pointless, if absorbing. More relevant are studies giving us an understanding of their water requirements, which is an aspect that is increasingly well understood for birds and plants but short on evidence for invertebrates.

WATER SUPPLY

Issues facing us in holding on to what we have are the amount and quality of the water on these sites. Fierce competition for water leaves wetlands short of supply, when, without abstraction for human consumption, agriculture and industry, they would probably be able to cope with recent droughts. But it is not just the amount of water that causes problems, it is when it arrives. One consequence of global warming is a less reliable timing of rainfall, so warm months get more rain than previously. This can lead to disastrous flooding of fens and marshes, as we have seen in the Somerset Moors in 1997. Breeding waders are displaced, invertebrates capable of surviving winter inundation are killed in a more susceptible phase of their life cycle, and warm water causes massive decay that kills plants, fish and invertebrates.

WATER QUALITY

Quality of water covers two aspects: its nutrient status and salinity. With the exception of the few remnants of raised bog at Shapwick Heath and Westhay Heath, Somerset has predominantly naturally mesotrophic water supplies, which lead to prolific but diverse vegetation. This richness diminishes when nutrient levels are raised artificially by enrichment from sewage and fertilisers. Insidious increases in nutrients lead to widespread loss of botanical interest, as detailed in the Norfolk grazing marshes where the proportion of aquatic plant communities of high value have dropped dramatically, as those dominated by algae and floating duckweed have risen. There are no comparable data for the impact of nutrients on invertebrates but limited evidence suggests that ditches dominated by algae and floating duckweed are indeed less species-rich than botanically diverse ditches.

Saline influence can bring either greater interest or a loss. Brackish water is a natural feature of upper saltmarsh and, before sea walls truncated the transition to land, was a natural part of low-lying coasts. As a consequence of its relative scarcity in England, a large proportion of the plants and invertebrates found in this narrow ribbon are uncommon or rare. Less desirable aspects of salinity arise when freshwater wetlands are occasionally inundated by saline water as a result of exceptional high tides. The effect is to cause local extinction of susceptible species, such as many molluscs and some plants.

LAND MANAGEMENT

The issues of water quality and quantity are large-scale and over-arching. At a more local scale, management has a great influence on the communities of plants and animals. The principal effect of our intervention is to retard or reverse succession to dry land, although this is not what farmers think when they put the cattle out to graze, slub out a ditch or cut reed for thatching. Conservation has taken on these activities for the reason that early successional stages are recognised as having great interest. Land management is therefore a central activity in linking water and wildlife.

THE EFFECT ON PLANTS

The plants of greatest interest in grazing marsh ditches are mainly those of open water, for example many species of *Potamogeton*, and these prosper only when ditches are cleaned out on a fairly frequent cycle of at most a few years. As tall emergent vegetation encroaches from the edges, plant litter accumulates and cattle trample the edges into the ditch, these interesting plants disappear. Relatively few uncommon plants thrive in the late stages when the ditch is choked with a thatch of litter and shaded by the tall emergent monocotyledons. Species-richness also drops as the water becomes shallow so that by the time it is only 0.25m deep, there are very few submerged species left. Fenland management for plants also hinges around maintaining more open conditions by mowing, reed-harvesting or light grazing. Fens left unmanaged usually see a loss of botanical interest, although this is not related to water regime but to the accumulation of plant litter and shading.

THE EFFECT ON INVERTEBRATES

A different story emerges for invertebrates. Early stages of a ditch support a suite of aquatic invertebrates which includes some real rarities, for example the aquatic soldierfly *Odontomyia ornata.* Because there are many wetland species which rely on saturated conditions rather than deep water, choked ditches have their own set of uncommon species which survive at the water margins, regardless of what happens just a few centimetres into the ditch. As long as the margin remains saturated, or with the shallowest of water, ditches will retain an invertebrate interest. Not surprisingly, these species are typical of fenlands. So, just as the margin of a ditch may be thought of as a strip of fenland, fens are just extensive water margins. Studies of the invertebrates of East Anglian fens showed that sites with regular mowing or reed harvesting support a less diverse fauna than the unkempt margins or infrequently managed sites. The overall conclusion is that a wide range of hydrological conditions is needed to maintain the invertebrates, although with the underlying need to keep conditions saturated for most of the year.

IN CONCLUSION

Thus, in both grazing marshes and fens, there is far less need to keep most of the resource at an early hydrological stage in order to maintain both the entomological and botanical interest. There is no doubt that this leads to a minor conflict in interest. However, management for wetland birds on grazing marshes has probably provided a partial resolution since practice on many bird-orientated sites is to provide both open water and broad shallow shelves at the margin of just one ditch. Hydrological succession is thus represented by lateral zonation, rather like that of a pond. It seems likely that a wide range of invertebrate assemblages can be accommodated this way, although I know of no data to prove that this is the case. The only loss of habitat on sites with these broadened ditches with 'battered' margin is some grassland, which is usually of low interest in the context of a wetland fauna unless, as on West Sedgemoor, the grassland is really just a well grazed example of fen.

This paper deals with wetlands in the widest sense and has not picked out peatlands for special treatment. Although there are plants and invertebrates that are confined to peatlands but are absent or scarce on alluvium or clay, the general principle remains the same for all soil types. Clean water in good supply in the winter, coupled with management to maintain a wide range of hydrological conditions through the year, is essential to maintain the huge diversity of Somerset's wetlands.