SHORT ARTICLES AND REVIEWS

STATUTORY PROTECTION OF FRESHWATER FLORA AND FAUNA IN BRITAIN

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Introduction

The conservation of freshwater habitats and the species they harbour demands a diversity of approaches. Over the past 50 years, the emphasis of conservationists in general has gradually changed from one merely of preservation to one of active management and habitat restoration. Even where such measures are successful, threats to individual species may remain; for example, from wilful destruction or commercial exploitation. In these cases, legislation designed to protect habitats, whether nationally (such as the provisions for Sites of Special Scientific Interest (SSSIs)), or internationally (such as the designation of sites under the Ramsar Convention), cannot be wholly effective.

The aim of this paper is to summarise the present legislation aimed at protecting freshwater species in Britain, and briefly to review its effectiveness. Some areas have been deliberately omitted, such as fisheries legislation designed to conserve stocks, and the statutory protection of birds associated with fresh waters which forms a large subject area in its own right. Interested readers are referred to other publications such as those by Howarth (1987), Royal Society for the Protection of Birds (1989) and Jones **(1**991).

Species rarity

Species protection legislation is naturally focused on those species which are rare or endangered. Rarity may arise for different reasons. Some species have very specific ecological requirements and are unable to adapt and colonise other areas. Some have become rare either as a result of exploitation or due to the destruction or degradation of their habitats. Rarity thus becomes an important criterion in the assessment of conservation value (Ratcliffe 1977), but does not necessarily qualify

species as appropriate candidates for statutory protection. As the coverage, intensity and frequency of freshwater survey and monitoring increases, so the status of individual species becomes clearer. The rarest species are listed in British Red Data Books; those including freshwater species are now available for vascular plants (Perring & Farrell 1983) insects (Shirt 1987), and other invertebrates (Bratton 1991), with volumes covering lower plants (charophytes, bryophytes and lichens), fish and other vertebrates in preparation. Other reviews of the status of particular groups include Palmer & Newbold (1983) for wetland and riparian plants, Wallace (1991) for Trichoptera, Foster (in preparation) for the Coleoptera, and Maitland & Lyle (1991) for fish. In this paper we have not attempted to provide a complete list of rare British freshwater species as there is no straightforward way of deciding what should or should not be included, and the amount of information available for some groups is far greater than for others.

National Legislation - The Wildlife and Countryside Act 1981

General provisions for species protection

This Act is the main instrument for species protection in Britain. Parallel arrangements apply to Northern Ireland and the Isle of Man under separate legislation.

Section 9 (1) of the Act states that:

"Subject to the provisions of this Part, if any person intentionally kills, injures or takes any wild animal included in Schedule 5, he shall be guilty of an offence".

It is also an offence under Section 9(4) to:

". . . damage or destroy or obstruct access to any structure or place which any wild animal included in Schedule 5 uses for shelter or protection, or disturbs any such animal while it is occupying a structure or place which it uses for that purpose".

Section 9(2) makes an offence of the

". . . possession or control of any live or dead wild animal included in Schedule 5 or any part of, or anything derived from, such an animal".

The protection of plants is contained within Section 13, where:

"Subject to the provisions of this Part, if any person intentionally picks, uproots or destroys any wild plant included in Schedule 8, he shall be guilty of an offence".

Sections 9 and 13 also include prohibitions on a wide range of activities relating to the sale and commercialisation of wild specimens of certain scheduled species and their derivatives.

Freshwater species listed on Schedules 5 and 8

Table 1 gives details of all freshwater plants and animals currently protected under the Act (including some which only spend a part of their life-cycle in water, e.g. *Aeshna isosceles).*

The Wildlife and Countryside Act contains provisions for a regular review of scheduled species. Section 22(3) empowers the Secretary of State, on a representation made to him by the Joint Nature Conservation Committee (JNCC) (acting on behalf of the three statutory successor bodies to the NCC: the Nature Conservancy Council for England, Scottish Natural Heritage, and the Countryside Council for Wales) to add to Schedules 5 or 8:

". . . any animal or plant which, in his opinion, is in danger of extinction in Great Britain or is likely to become so endangered unless conservation measures are taken".

There are similar provisions for removing from the Schedules species no longer endangered. The JNCC may make representations at any time but is in any event bound to make a review of protected species every five years under the terms of Section 24 (1) of the Act.

The first review of schedules 5 and 8 was in 1986 and the second was submitted to the Secretary of State in October 1991. However, in practice the processes of consultation and amendment to the Schedules are so lengthy that the review becomes almost continuous. As a result of consultation (internally and externally), the proposals submitted to Government for the 1991 review comprise additional protection for 18 animal taxa and 73 plant species. These include three beetles, one fish, four lower plants and one higher plant living in freshwater habitats (Table 2). An announcement on the Government's response to these proposals is expected in 1992.

The review procedure covers species themselves threatened in Great Britain. However, there is a need for Britain to accept the wider responsibility of affording protection to species that may not be under threat nationally but are considered vulnerable at a European or global level by international forums in which we participate. Thus, Section 22(4) of the Act provides for the Secretary of State to protect any animal or plant for the purpose of complying with an international obligation.

Table 1. A list of freshwater organisms (excluding brackish-water and estuarine species) protected (+) under Schedules 5 and 8 of the Wildlife and Countryside Act 1981, with note of their status under the Bern Convention (Appendices I-III) and the EC Habitats and Species Directive (Annex IV or V). Offences covered under Schedules 5 and 8 are killing and injuring (K/I), taking (T), possessing (P), disturbance at and damage to place of shelter (D/D), picking, uprooting and destroying (P/U/D), sale (S).

Common name	*Scientific name*	*K/I*	*T*	*P*	*D/D*	*S*	*EC*	*Bern*
SCHEDULE 5								
Medicinal Leech	*Hirudo medicinalis* L.	+	+	+	+	+	V	III
Apus	*Triops cancriformis* (Bosc)	+	+	+	+	+	–	–
Fairy Shrimp	*Cheirocephalus diaphanus* Prevost	+	+	+	+	+	–	–
Atlantic Stream Crayfish	*Austropotamobius pallipes* (Lereboullet)	–	+	–	–	+	V	III
Fen Raft Spider	*Dolomedes plantarius* (Clerck)	+	+	+	+	+	–	–
Norfolk Aeshna Dragonfly	*Aeshna isosceles* (Muller)	+	+	+	+	+	–	–
Freshwater Pearl Mussel	*Margaritifera margaritifera* (L.)	+	–	–	–	–	V	III
Glutinous Snail	*Myxas glutinosa* (Muller)	+	+	+	+	+	–	–
Common Frog	*Rana temporaria* L.	–	–	–	–	+	V	III
Common Toad	*Bufo Bufo* (L.)	–	–	–	–	+	–	III
Natterjack Toad	*Bufo calamita* Laurenti	+	+	+	+	+	IV	II
Great Crested Newt	*Triturus cristatus* (Laurenti)	+	+	+	+	+	IV	II
Palmate Newt	*Triturus helveticus* Razoumoski	–	–	–	–	+	–	III
Smooth Newt	*Triturus vulgaris* (L.)	–	–	–	–	+	–	III
Burbot	*Lota lota* (L.)	+	+	+	+	+	–	–
Allis Shad	*Alosa alosa* (L.)	+	+	–	–	–	V	III
Vendace	*Coregonus albula* (L.)	+	+	+	+	+	V	III
Whitefish (Powan)	*Coregonus lavaretus* (L.)	+	+	+	+	+	V	III
Otter	*Lutra lutra* (L.)	+	+	+	+	+	IV	II
SCHEDULE 8		P/U/D						
Creeping Marshwort	*Apium repens* (Jacq.) Lag.	+				+	IV	I
Strapwort	*Corrigiola litoralis* L.	+				+	–	–
Pigmyweed	*Crassula aquatica* (L.) Schonl.	+				+	–	–
Adder's-tongue Spearwort	*Ranunculus ophioglossifolius* Vill.	+				+	–	–
Ribbon-leaved Water-plaintain	*Alisma gramineum* Lejeune	+				+	–	–
Starfruit	*Damasonium alisma* Miller	+				+	–	–
Holly-leaved Naiad	*Najas marina* L.	+				+	–	–

Table 2. A list of freshwater organisms (including brackish-water and estuarine species) which may be afforded full or partial protection in the future as a consequence of the 1991 review of the Wildlife and Countryside Act (WCA; + indicates protection), the EC Habitats and Species Directive (EC, Annex IV or V), and the Bern Convention (Appendices I–III).

Common name	*Scientific name*	*WCA*	*EC*	*Bern*
ANIMALS				
Orange-spotted Emerald Dragonfly	*Oxygastra curtisii* (Dale) (extinct in Britain?)	–	IV	II
Southern Damselfly	*Coenagrion mercuriale* (Charpentier)	–	–	II
Water Beetle	*Graphoderus zonatus* (Hoppe)	+	–	–
Water Beetle	*Graphoderus bilineatus* (Degeer) (extinct in Britain?)	–	IV	II
Water Beetle	*Hydrochara caraboides* (L.)	+	–	–
Water Beetle	*Paracymus aeneus* (Germar)	+	–	–
River Lamprey	*Lampetra fluviatilis* (L.)	–	V	III
Brook Lamprey	*Lampetra planeri* (Bloch)	–	–	III
Sea Lamprey	*Petromyzon marinus* (L.)	–	–	III
Twaite Shad	*Alosa fallax* (Lacepede)	–	V	III
Sturgeon	*Acipenser sturio* L.	+	IV	III
Grayling	*Thymallus thymallus* (L.)	–	V	III
Salmon	*Salmo salar* L.	–	V	III
Barbel	*Barbus barbus* (L.)	–	V	–
Spined Loach	*Cobitis taenia* L.	–	–	III
Houting	*Coregonus oxyrinchus* (L.) (extinct in Britain?)	–	IV	III
PLANTS				
Bearded Stonewort	*Chara canescens* Desv. & Lois	+	–	–
Derbyshire Feathermoss	*Thamnobryum angustifolium* (Holt) Crundw.	+	–	–
Bog Moss	*Sphagnum* – all species	–	V	–
River Jelly-lichen	*Collema dichotomum* (With.) Coppins & Laundon	+	–	–
Tarn Lecanora	*Lecanora achariana* A.L.Sm.	+	–	–
Welsh Mudwort	*Limosella australis* R. Br.	+	–	–
Floating-leaved Water-plantain	*Luronium natans* (L.) Rafin.	–	IV	I
Slender Naiad	*Najas flexilis* (Willd.) Rostk. & W.L.E. Schmidt	–	IV	I

Defences and exemptions

There are provisions contained within the Act which, under certain circumstances, afford a defence against actions which would otherwise be illegal. For example, under Section 10 an otherwise unlawful act with respect to a protected species is not illegal if the person shows that it was the incidental result of a lawful operation and could not reasonably have been avoided. Whether any particular action was incidental and whether it could reasonably have been avoided is a matter for the Courts, but as an example a fisherman who unintentionally catches a powan or a vendace (Table 1) while fishing for other species may not have committed an offence, although there would be a presumption that the fish would be returned to the water unharmed. Similarly the possession or control of a protected species is not an offence if the person involved shows that the specimen in question had not been taken or killed illegally. An important provision under Section 16 allows licences to be granted by the "appropriate authority" to permit otherwise illegal activities if they are being undertaken for purposes such as scientific research, education, or photography. In most of these cases the successor bodies to the NCC are now the licensing authorities. Since the passing of the Act, the NCC has regularly issued licences, particularly for research on species such as the medicinal leech and the Atlantic stream crayfish (Table 1).

It should be noted that with respect to plants and all animals except birds, the Act only relates to *wild* specimens; that is to say specimens which were living wild before they were killed, taken, uprooted, or picked. In any court proceedings, however, the specimen will be assumed to be wild unless the contrary is shown.

International Legislation

For the most part, international legislation does not have the force of law in Britain. It can only be applied through changes to British domestic legislation. The only exceptions are European Community Regulations; these have the direct effect of law in Britain and other countries in the Community.

(a) Bern Convention

The Convention on the Conservation of European Wildlife and Natural Habitat (the Bern Convention) came into force on 1 June 1982. The aims of the Convention are: (i) to conserve wild flora and fauna and natural habitats, (ii) to promote co-operation between States, (iii) to give particular attention to endangered and vulnerable species.

The Convention comprises 24 wide-ranging Articles and four Appendices, dealing both with habitat and species protection. Appendices I and II list plants and animals respectively for which there should be complete protection, while Appendix III lists animals where some exploitation of their populations may be permitted. Appendix IV sets down several prohibited means of killing, capture or exploitation.

Three British freshwater plant species are listed in Appendix I, six species of animals which spend all or part of their lives in fresh water are included in Appendix II, and 19 such species are listed in Appendix III (see Tables 1 and 2 of this article).

(b) EC Directive on "The Conservation of Natural and Semi-Natural Habitats and of Wild Fauna and Flora."

This Directive was agreed by Member States on 12 December 1991. The Directive has two Annexes which are directly concerned with species protection: Annex IV lists species which must receive strict protection and Annex V lists species whose exploitation must be subject to management. There are 13 native British freshwater taxa in Annex V and 10 freshwater species in Annex IV (see Tables 1 and 2). Any extra protection for these to comply with the Directive could only come about through changes to national legislation such as the Wildlife and Countryside Act 1981. The scope of possible changes of this type is summarised in Table 2.

Effectiveness of Legislation in the Protection of Freshwater Species

It is not easy to quantify the success (or otherwise) of an individual legal instrument, such as the Wildlife and Countryside Act, in the conservation of a particular species. This clearly depends upon a combination of factors, including the extent and quality of the habitat, and the intensity of the threat. Nevertheless, there are a number of benefits (and problems) which can be readily identified, associated with the statutory protection of freshwater species. (The following paragraphs refer to the Wildlife and Countryside Act, as this is the main provision for implementing species protection measures in Britain, including those laid down by international agreements such as the Bern Convention).

Benefits

It would be entirely inappropriate and wholly impractical to attempt to add *all* threatened species to Schedules 5 or 8. In considering its advice to Government, the JNCC (and NCC before) has sought only to propose species whose direct legal protection would potentially bring tangible conservation benefits to the species concerned. In many cases (especially

where there are insidious threats such as habitat loss or pollution), with the provisions of the Act as they are, no significant benefits are likely to accrue by scheduling species.

Once a species is scheduled, however, some secondary benefits become evident, such as increasing public awareness of its importance, encouraging positive habitat management, and devoting increased resources to study the species.

There may be additional benefits as planning authorities are made aware of the presence of scheduled species within an area proposed for development. This proved to be the case at a Public Inquiry held in February 1988 to consider a development proposal for Greatstone Gravel Pit, part of the Dungeness SSSI. This site is believed to contain the largest population of the medicinal leech *(Hirudo medicinalis)* in Britain, and possibly in the whole of western Europe (Wilkin 1987). *H. medicinalis* is listed in the IUCN Invertebrate Red Data Book (Wells et al. 1983), as it is now threatened in many of the 26 countries it once inhabited. In Britain, too, it has progressively declined, and its status is given as "Rare" in the recently published British Red Data Book for Invertebrates (Bratton 1991). The need to conserve the medicinal leech throughout its range has been recognised by its inclusion on Appendix III of the Bern Convention, Annex V of the EC Habitats and Species Directive, by international trade regulations, and (in November 1987) by adding it to Schedule 5 of the Wildlife and Countryside Act (see Table 1).

The subject of the Public Inquiry for Greatstone Pit was the proposed development of a windsurfing and watersports centre. Both the Nature Conservancy Council (NCC) and the Royal Society for the Protection of Birds (RSPB) opposed the scheme on the grounds of nature conservation. Apart from the direct threat to important bird populations from recreational disturbance, the remainder of the evidence centred on the potential impact of the development on the medicinal leech. Factors such as the extent of marginal vegetation, host availability, water movement and temperature regime are all important to this species, and the NCC considered that these were all liable to alteration if the development were to proceed (Boon 1988).

Following the Inquiry, the Inspector stated that: "Dungeness is acknowledged as being of international importance as a wetlands area and for migratory birds, and Greatstone Pit is now known as a habitat for the medicinal leech, which is to be protected nationally and internationally." He also concluded from the evidence produced at the Inquiry that activities such as windsurfing and angling would be likely to have indirect detrimental effects on medicinal leeches through their direct impact on birds and amphibia (letter from the Departments of the Environment and Transport, 2.6.88). The Secretary of State accepted the

Inspector's recommendation and refused to grant planning permission. While there were several factors that ultimately influenced the outcome of the Inquiry, the statutory protection of *H. medicinalis* certainly played a part in the final decision in favour of conservation.

In a similar case in 1985, proposals for increased recreational activity on a lake in Worcestershire were rejected after a Public Inquiry, partly because this is the only site in Britain for ribbon-leaved water-plantain, *Alisma gramineum* - a Schedule 8 plant.

Problems

Some threatened species may be natural candidates for scheduling, owing to pressures from collection or exploitation, but such pressures only account for a part of the overall threat. For example, the native Atlantic stream crayfish *(Austropotamobius pallipes)* has suffered a drastic decline in Britain over the past decade (Holdich & Reeve 1991), a decline that has continued despite the addition of the species to Schedule 5 (Table 1). Apart from problems of physical habitat degradation, and a general decline in water quality, much of the harm to this species is caused by the spread of crayfish plague, a fungal disease particularly associated with the introduction of a plague-resistant, non-native species of crayfish. Although the statutory protection afforded to the native species is valuable in highlighting its importance and in controlling some activities, it can do little to reduce the threat from disease. Other mitigating action is needed in this case, including the addition (now underway) of non-native species to Schedule 9 of the Act, thus making illegal their release into the wild.

One of the most recent species to be granted statutory protection in Britain is the freshwater pearl mussel *{Margaritifera margaritifera).* This species illustrates another problem of scheduling: that of enforcement. Populations of the freshwater pearl mussel have continued to decline throughout its range, and in Britain this has largely been due to a combination of organic pollution and overfishing (Young 1991). The need to protect this species has been recognised internationally by its inclusion on Appendix III of the Bern Convention and Annex V of the EC Habitats and Species Directive. *M. margaritifera* was added to Schedule 5 on 27 March 1991 (Statutory Instrument 367), thus making it illegal to kill or injure it, but not to examine a mussel for pearls and return it unharmed to the river as has been the traditional practice of professional pearl fishermen. Unfortunately, evidence suggests that a great deal of damage is done to mussel populations each year by collectors who either do not know how to inspect mussels without harming them, or are unconcerned at the consequences of their actions. However, many of the sites where healthy populations still remain and where damage is occurring are

situated in the remoter parts of Scotland, and in these areas enforcement of the legislation will be difficult (Young 1991).

Future Requirements

The protection of freshwater species through concerted efforts at maintaining and improving habitat quality must remain a top priority. There is little point in focusing all the attention on legal implements applied to individual species if nothing is done to reverse declines in water quality and quantity, or in safeguarding physical habitat structure. However, alongside such measures, legislation for protecting endangered species forms an important second thread.

To be effective, statutory methods require three fundamentals. First, there must be adequate, up-to-date information on the distribution of species populations so that their status can be accurately assessed. There are still many groups of freshwater organisms where this knowledge is inadequate. Second, resources should be directed towards regular monitoring of threatened species. Only then can recommendations be made to government for adding other species to Schedules or, if appropriate, removing species no longer considered endangered. It also provides a means of evaluating the effectiveness of the legislation itself. Third, for those species which do enjoy protected status the legislation must be used to full advantage. This may entail programmes of education to increase general awareness of the importance of certain species and their habitats. It may also require improved methods of detecting infringements of the laws and better ways of enforcing it.

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