

## AQUATIC ALIEN SPECIES AND THE WFD: PROPOSED LIST OF 'LOCALLY ABSENT' SPECIES AND GUIDANCE ON ITS INTERPRETATION

**NB:** In this paper the term 'translocated' was used to refer to species that are 'locally absent'.

### 1. Background and Methodology

- 1.1 An important aspect of aquatic alien species introductions is the 'translocation' of species within a nation state, i.e. from waters in which a species occurs naturally to waters where it does not occur naturally (Copp *et al.*, 2005). In a broader sense, this refers to species (aquatic or terrestrial) that are 'locally non-native' (Usher 2008). These terms recognize that species introductions are a biogeographical phenomenon (i.e. between hydrological catchments), rather than political. The term 'translocation' and a review of invasion biology terminology (Copp *et al.*, 2005) resulted in the following definition:

*'Translocation — the introduction of a species, i.e. 'translocated species', from one part of a political entity (country) in which it is native to another part of the same country in which it is not native.'*

- 1.2 Translocations of species may pose an equally high risk to native species and ecosystems as the introduction of alien species from other countries, and this is recognized internationally (ICES, 2004; EIFAC, 2007). However, with the exception of the UK's Wildlife & Countryside Act 1981, the 'translocation' of aquatic organisms in Europe has generally not previously been subjected to much regulation, either in terms of legislation or in practice (Copp *et al.* 2005). To redress this, EU legislation is beginning to deal directly with translocation issues, in particular with regard to aquaculture (e.g. draft Council Regulation on 'Alien species in aquaculture') and within the context of the Water Framework Directive. To this end, in 2006 the UKTAG Alien Species Group produced '*Aquatic alien species and the WFD: proposed amendments to the impact classification in the UKTAG alien species guidance*'. This paper included a list of species native to one part of the UK and known to have been translocated to other parts of the UK outside their assumed native range.
- 1.2 In order to assess the nature and extent of species translocations within the UK, the aim of the present paper is to attempt to reconstruct, based on available bibliographic reviews, the historical distribution in Britain of freshwater fishes known or suspected of being the subject of translocation. Specifically, the present paper will endeavour to clarify the interpretations of: 1) the meaning attributed to 'translocation' in a British context, and 2) the bibliographic information on species distributions. In scrutinizing the available literature, some surprising information was unearthed. Although little information on original British distributions could be gleaned from very early sources, some interesting information was discovered. For example, Pennant (1812) provides some insight on the origins of northern pike *Esox lucius* (pg. 424–426): "According to the common saying, these fish [pike] were introduced into *England* in the reign of *Henry VIII* in 1537. They were so rare, that a pike was sold for double the price of a house-lamb in *February*, and a pickerel for more than a fat capon." Given the assumed 'native status' of pike in (at least some parts of) Britain, this historical account highlights the difficulties that can be

encountered in attempting to define the native ranges of fish species, in particular those that were not of culinary interest.

As in the original list, the geographical scale used is that of WFD river (or lake) basin districts (RBDs; Figure 1), and the 'translocation' of a native species is defined as given in section 1.1 here above, i.e. this is irrespective of national 'political' boundaries (e.g. those separating England and Wales, England and Scotland, Northern Ireland and the Republic of Ireland). If required, then the list provided here can be amalgamated at the next biogeographic level (i.e. Great Britain and Ireland). Notable in their absence in the present paper are aquatic organisms other than fish. The reason for this is that scant information exists for most fish species and even less for other aquatic organisms. Perhaps the lone exception to this is *Nymphoides peltata*, a floating, water-lily like plant, which is said to be native in the Humber RBD but alien to the other RBDs (Dee, Severn, West Wales) where it has been translocated (based on Preston *et al.* 2002).

- 1.3 Because the bibliographic information on the natural (i.e. post-glacial) distribution is variable between species, with popular or nuisance species more likely to be documented than other species, the level of certainty surrounding the translocation status of a species may vary. Therefore, the native vs. translocated distribution profile of each species is attributed a 'certainty rating', which should be to guide interpretation by the reader. References and comments are given in support of the species distribution profiles.

## 2. Translocated species distribution profiles

- 2.1 The proposed list of translocated native species for Britain (Table 1) reveals the extent to which fishes have been moved beyond their native distributions. The defined river basin districts may, however, under-estimate the extent of translocation. This is evident in recent translocations. For example, the southeastern range limit of spined loach *Cobitis taenia* in East Anglia was previously the River Great Ouse, with no historical presence in rivers that drain into the North Sea southeast of the Wash. However, this species was discovered in 2005 (Copp & Wade 2006) in a reservoir that receives water from the River Stour (Essex), which itself receives water from the River Great Ouse via a water transfer scheme. So, although all these rivers fall within the 'Anglia' river basin district, translocations are taking place between river catchments within districts not only by direct human introductions but also indirectly (e.g. water transfers).
- 2.2 Of particular note in the translocated species distributions is the uncertainty surrounding a number of the small bodied and more cryptic species. Large bodied species, especially those of commercial interest (as a food stuff, sport or ornamental use), were more likely to be mentioned in early documentation, resulting in a greater knowledge of these species distributions prior to the onset of active species translocations and introductions, which probably began in earnest about 150-200 years ago. An overall certainty level for a species is therefore complemented by '?' for those river basin districts for which it remains unsure whether the species was native or was translocated in at some point.
- 2.3 Also of note is that within a river basin district, there may be water bodies or even parts of the RBD in which a given species did not naturally occur despite the species being

native to other parts of that RBE. For example, roach may have been native to some parts of the Northwest RBD but was alien to water bodies such as Lakes Bassenthwaite and Windermere, where they are known to have been introduced (e.g. Winfield *et al.* 1996).

## References

- Copp, G.H. & Wade, P.M. 2006. Water transfers and the composition of fishes in Abberton Reservoir (Essex), with particular reference to the appearance of spined loach *Cobitistaenia*. *Essex Naturalist* **23**, 137-142.
- Copp, G.H., Bianco, P.G., Bogutskaya, N., Erős, T., Falka, I., Ferreira, M.T., Fox, M.G., Freyhof, J., Gozlan, R.E., Grabowska, J., Kováč, V., Moreno-Amich, R., Naseka, A.M., Peñáz, M., Povž, M., Przybylski, M., Robillard, M., Russell, I.C., Stakėnas, S., Šumer, S., Vila-Gispert, A. & Wiesner, C. 2005. To be, or not to be, a non-native freshwater fish? *Journal of Applied Ichthyology* **21**, 242-262.
- Culling, M.A. & Côté, I.M. 2005. *Genetics and ecology of spined loach in England: implications for conservation management*. Science Report SC000026/SR, Environment Agency, Bristol. 40 pp.
- EIFAC 2007. EIFAC *Ad hoc* Working Party on Introductions and Stocking. Information and PDF documents available at: <ftp://ftp.fao.org/fi/body/eifac/eifac.asp>
- Hänfling, B., Hellemans, F.A., Volckaert, A.M. & Carhalho, G.R. 2002. Late glacial history of the cold-adapted freshwater fish *Cottus gobio*, revealed by microsatellites. *Molecular Ecology* **11**, 1717-1729.
- ICES, 2004. *ICES Code of Practice on the Introductions and Transfers of Marine Organisms 2003. Code de Conduite du CIEM pour les Introductions et Transferts d'Organismes Marins 2004*. ICES, Copenhagen.
- Maitland, P.S. 1972. *A key to the freshwater fishes of the British Isles with notes on their distribution and ecology*. Scientific Publication No. 27. Ambleside: Freshwater Biological Association. 139 pp.
- Maitland, P.S. 1977. Freshwater fish in Scotland in the 18<sup>th</sup>, 19<sup>th</sup> and 20<sup>th</sup> Centuries. *Biological Conservation* **12**, 265-277.
- Maitland, P.S. 2004. *Keys to the freshwater fish of Great Britain and Ireland with notes on their distribution and ecology*. Scientific Publication No. 62, Freshwater Biological Association, Ambleside, Cumbria. 248 pp.
- McCarthy, I.D. 2007. The Welsh torgoch (*Salvelinus alpinus*): a short review of its distribution and ecology. *Ecology of Freshwater Fish* **16**, 34-40.
- Pennant, T. 1812. *British Zoology*, 5th edition. Vol. 3. Walker *et al.*, London, 546 pp.
- Preston, C.D., Pearman, D.A., Dines, T.D. 2002. *New Atlas of British Flora: an atlas of the vascular plants of Britain, Ireland, the Isle of Man and the Channel Islands*. Oxford University Press, Oxford.
- Tomlinson, M.L. & Perrow, M.R. 2003. Ecology of the bullhead. Conserving Natura 2000 Rivers Ecology Series 4. English Nature, Peterborough. 19 pp.
- Usher, M.B. 2008. Nativeness or non-nativeness of species. Information and Advisory Note No. 112, Scottish Natural Heritage, Edinburgh. 9 pp.
- Wheeler, A.C. 1977. The origin and distribution of the freshwater fishes of the British Isles. *Journal of Biogeography* **4**, 1-24.

- Wheeler, A.C. 2000. Status of the crucian carp, *Carassius carassius* (L.), in the UK. *Fisheries Management & Ecology* **7**, 315-322.
- Wheeler, A.C. & Jordan, D.R. 1990. The status of the barbel, *Barbusbarbus* (L.) (Teleostei, cyprinidae), in the United Kingdom. *Journal of Fish Biology* **37**, 393-399.
- Winfield, I.J., Cragg-Hine, D., Fletcher, J.M. & Cubby, P.R. 1996. The conservation ecology of *Coregonus albula* and *C. lavaretus* in England and Wales, UK. pp. 213-223 In: *Conservation of Endangered Freshwater Fish in Europe*. BirkhaeuserVerlag, Basil.

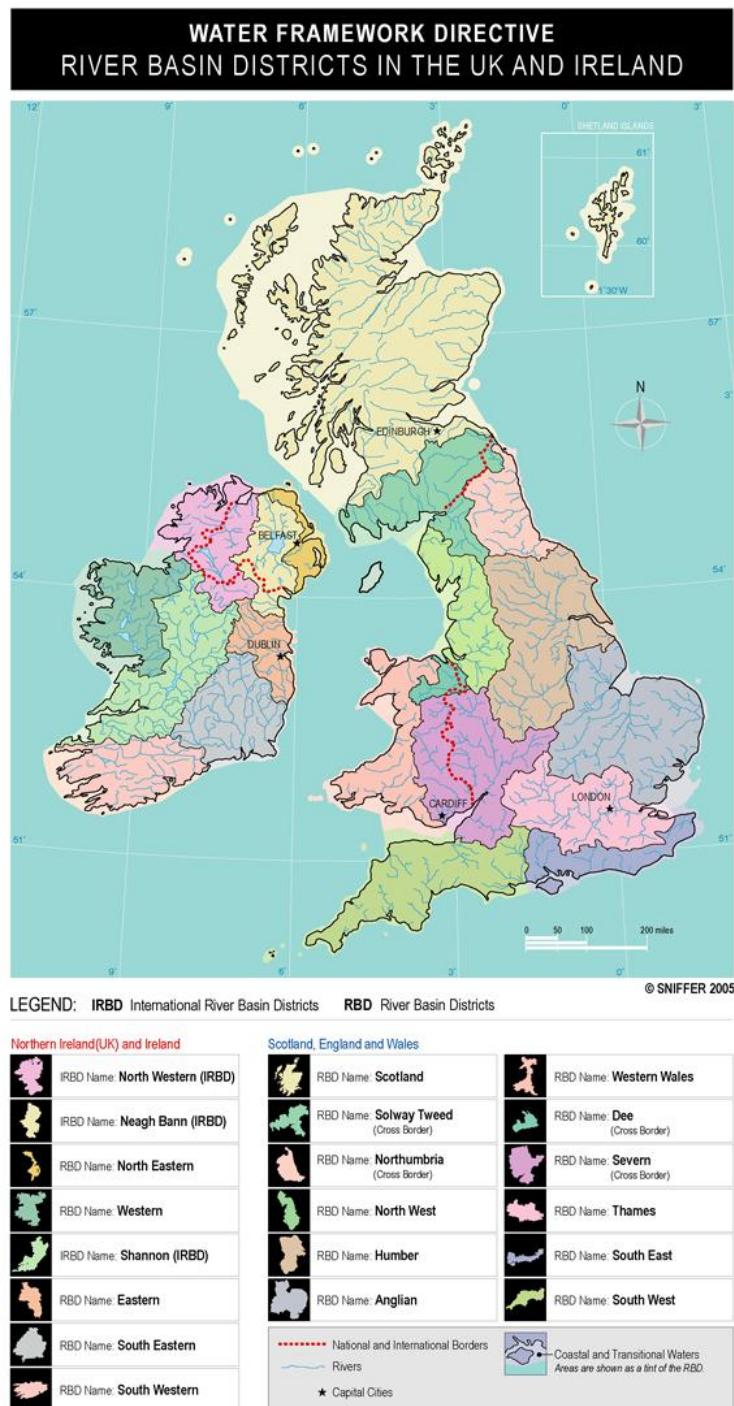


Figure 1. Map of river basin districts in the UK and Ireland ([www.wfduk.org/implementation/](http://www.wfduk.org/implementation/)).

**Table 1: List of ‘locally absent’ freshwater fish species native to some parts of mainland Britain that are known or thought to have been introduced to other parts of the island (N = native within RBD; TS = species introduced into RBD from elsewhere in mainland Britain), including the level of certainty (Fairly high, Fairly low) and the distributions, by river basin district (RBD). Blank spaces indicate absence in that RBD, and ‘?’ indicates uncertainty as regards the species’ N and/or TS distributions (see notes for bibliographic references).**

Species name	Note No.	RBD:												
		Certainty level	Scotland	Sol & Tweed	North-umbria	North West	Humber	Anglia	West Wales	Dee	Severn	Thames	South East	South West
Arctic charr	1	F. high	N	N	TS	N			N	TS?	TS?			
Barbel	2	F. high	TS	TS	TS	TS	N	N	TS	TS	TS	N	TS	TS
Bleak	1	F. high		TS	TS	TS	N	N	TS	TS	TS	N	TS	TS
Bullhead	3	F. low	TS	TS	N	N?	N	N	N?	N?	N	N	N	N
Chub	1	F. high	TS	TS	N	N	N	N	TS	TS	TS	N	N	N
Common bream	1	F. high	TS	TS	N	N	N	N	TS	TS	TS	N	N	N
Crucian carp	4	F. high	TS	TS	TS	TS	N	N			TS	N	TS	TS
Dace	1	F. low	TS	TS	N	N	N	N	TS?	TS?	N?	N	N	N
Grayling	1	F. high	TS	TS	N	N	N	N	TS	N	N	N	N	N
Gudgeon	1	F. low	TS	TS	N	N?	N	N	TS?	TS?	N	N	N	N
European minnow	1	F. low	N	N	N	N?	N	N	N?	N?	N	N	N	N
Eurasian perch	1	F. high	N	N	N	N?	N	N	N	N	N	N	N	N
Roach	1	F. low	N	N	N	N?	N	N	TS	N?	N	N	N	N
Rudd	1	F. low	TS	TS	N	N?	N	N	N?	N?	N	N	N	N
Common ruffe	1	F. high	TS	TS	TS	TS	N	N	TS	TS	TS	N	N	N
Silver bream	1	F. high			TS	TS	N	N	TS	TS	TS	TS	TS	TS
Spined loach	5	F. high					N	N					TS	
Stone loach	1	F. high	N	N	N	N	N	N	N	N	N	N	N	N
Tench	1	F. low	TS	TS	N?	N?	N	N	TS	TS	TS	N	N	N

**Notes** (BDW&M = Based on Descriptions of Wheeler (1977) and Maitland (1972, 1977, 2004): 1) BDW&M and McCarthy (2007); 2) A notably large fish that has attracted mention in historical records — these are reviewed by Wheeler & Jordan (1990); 3) BDW&M, see also Hänfling *et al.* (2002) and Tomlinson & Perrow (2003); 4) Although previously thought to be non-native, archaeological evidence suggests that crucian carp is native to southeast England (Lever 1977, Wheeler 1977, 2000); 5) BDW&M, see also Culling & Côté (2005) and Copp & Wade (2006).