

UK Technical Advisory Group on the Water Framework Directive

Revised classification of aquatic alien species according to their level of impact

The changes made to the table are set in context in the UKTAG paper entitled *Aquatic alien species and the WFD: proposed amendments to the impact classification in the UKTAG alien species guidance*.

This Guidance Paper is a working draft defined by the UKTAG. It documents the principles to be adopted by agencies responsible for implementing the Water Framework Directive (WFD) in the UK. This method will evolve as it is tested, with the working draft amended accordingly.

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WFD Requirement: Review role of alien species
in classification

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Classification of aquatic alien species found in the UK in terms of their impact on native habitats and biota.

Habitat classification: R, rivers; L, lakes; T, transitional waters; C, coastal waters

	Species	Plant/ Animal	Habitat	Reason for impact classification level	
HIGH IMPACT	Australian swamp stonecrop	<i>Crassula helmsii</i>	P	L	Well documented impacts, very invasive
	Floating pennywort	<i>Hydrocotyle ranunculoides</i>	P	R	Spreads rapidly
	Water fern	<i>Azolla filiculoides</i>	P	R/L	
	Water fern	<i>Azolla caroliniana</i>	P	R/L	
	Parrot's feather	<i>Myriophyllum aquaticum</i>	P	L	Spreads rapidly
	Curly water-thyme	<i>Lagarosiphon major</i>	P	L	
	Water primrose	<i>Ludwigia grandiflora</i>	P	L	Known to cause significant problems in continental Europe but not yet widespread in UK
	Canadian pondweed	<i>Elodea canadensis</i>	P	R/L	Well documented impacts
	Nuttall's pondweed	<i>Elodea nuttallii</i>	P	R/L	Well documented impacts
	Japanese knotweed	<i>Fallopia japonica</i>	P	R	Well documented impacts, very invasive
	Himalayan balsam	<i>Impatiens glandulifera</i>	P	R	Well documented impacts, very invasive
	Giant hogweed	<i>Heracleum mantegazzianum</i>	P	R	Well documented impacts, very invasive
	Rhododendron	<i>Rhododendron ponticum</i> (+ hybrids)	P	R	
	Common cord-grass, Townsend's grass or ricegrass	<i>Spartina anglica</i>	P	T/C	Spreads rapidly, very invasive. Well documented adverse ecological impacts.
	Japanese weed	<i>Sargassum muticum</i>	P	T/C	Spreads rapidly. Well documented impacts: ecological and economic consequences.
	North American signal crayfish	<i>Pacifastacus leniusculus</i>	A	R/L	Evidence of major impacts
	Red swamp crayfish	<i>Procambarus clarkii</i>	A	R/L	
	Marbled crayfish	<i>Procambarus</i> spp.	A	R/L	
	Spiny cheeked crayfish	<i>Orconectes limosus</i>	A	R/L	
	Freshwater amphipod	<i>Crangonyx pseudogracilis</i>	A	R/L	
Freshwater amphipod	<i>Dikerogammarus villosus</i>	A	R/L		
Mysid crustacean	<i>Hemimysis anomala</i>	A	R/L		

	Chinese mitten crab	<i>Eriocheir sinensis</i>	A	R/T/C	Evidence of major impacts: ecological and economic consequences
	Slipper limpet	<i>Crepidula fornicata</i>	A	T/C	Spreads rapidly. Well documented impacts. Considered a pest on commercial oyster beds and competes with other filter-feeding inverts.
	Zebra mussel	<i>Dreissena polymorpha</i>	A	R/L	
	Quagga mussel	<i>Dreissena bugensis</i>	A	R/L	
	Leathery sea squirt	<i>Styela clava</i>	A	T/C	Spreads rapidly. Well documented impacts: ecological and economic consequences.
	American oyster drill	<i>Urosalpinx cinerea</i>	A	T/C	Slow and limited natural dispersal. But has shown well documented impacts: ecological and economic consequences.
	Pacific oyster	<i>Crassostrea gigas</i>	A	T/C	
	Colonial tunicate	Non-native <i>Didemnum</i> spp.	A	C	
	Marine tubeworm	<i>Ficopomatus enigmaticus</i>	A	T/[C]	
	Common carp¹	<i>Cyprinus carpio</i>	A	R/L	
	Topmouth gudgeon	<i>Pseudorasbora parva</i>	A	L	Spreading rapidly. It is known to harbour a pathogen that threatens salmonids and cyprinids, but other potential impacts remain unknown.
	Goldfish	<i>Carassius auratus</i>	A	R/L	
LOW IMPACT	Sweetflag	<i>Acorus calamus</i>	P	R	
	Montbretia	<i>Crocsmia x crocosmiiflora</i>	P	R	
	Orange balsam	<i>Impatiens capensis</i>	P	R	
	Lupin	<i>Lupinus nootkatensis</i>	P	R	
	Pink purslane	<i>Montia sibirica</i>	P	R	
	Cape pondweed	<i>Aponogeton distachyos</i>	P	L	
	Giant butterbur	<i>Petasites japonicus</i>	P	R/L	
	Tapegrass	<i>Vallisneria spiralis</i>	P	R	
	Captain pike's weed	<i>Pikea californica</i>	P	T/C	Very restricted distribution and limited by temp.
	Orfe	<i>Leuciscus idus</i>	A	R/L	Reason for impact classification level: 'Ide (aka golden orfe) are widely distributed in England & Wales, but no evidence of impacts has been reported

	Pumpkinseed	<i>Lepomis gibbosus</i>	A	R/L	Pumpkinseed have become established in still waters principally in East and West Sussex, with a few isolated pond populations elsewhere and no apparent success in establishing in watercourses. Their impact appears to be limited to specific locations, where other human impacts have been severe and few if any other native fish species occur naturally
	Rainbow trout	<i>Oncorhynchus mykiss</i>	A	R/L	Rainbow trout have only become established in a few places under certain conditions. Their impact is thus restricted to a limited number of specific locations, where densities are high enough to result in adverse interactions with native fish species.
	Grass carp	<i>Ctenopharyngodon idella</i>			Grass carp are occasionally used as tools in aquatic habitat management, but because of their habitat requirements the species cannot become established – they need to be restocked (under licence) at regular intervals. Thorough research in the 1970s showed that the evidence for adverse impacts was equivocal, except perhaps when stocked in high densities. It would be unwise to stock the species into waters of high conservation value, particularly those with rare aquatic plant species"
	Marine amphipod	<i>Corophium sextonae</i>	A	T/C	Well dispersed but with apparently negligible effects.
	Bamboo worm	<i>Clymenella torquata</i>	A	T/C	Long established with very restricted distribution.
	Marine polychaete	<i>Marenzellaria viridis</i>	A	T/C	
	New Zealand flat oyster	<i>Tiostrea lutaria</i>	A	T/C	Very restricted distribution. Very slow dispersal rate.
	Magellan mussel	<i>Aulacomya ater</i>	A	C	Very restricted distribution.
	American hard-shell clam	<i>Mercenaria mercenaria</i>	A	T/C	Long established. Well documented. But current populations are thought to be very low.
UNKNOWN IMPACT	Barnacle species	<i>Elminius modestus</i>	A	T/C	Spreads rapidly, very invasive. Well documented impacts, evidence of ecological impacts.
	Large-flowered water-thyme	<i>Egeria densa</i>	P	L	
	Least duckweed	<i>Lemna minuta (minuscula)</i>	P	R/L	
	Monkey-flowers	<i>Mimulus cupreus</i> , <i>M. guttatus</i> and hybrids	P	R	
	Other non-native <i>Myriophyllum</i> species		P	L	

Narrow-clawed (Turkish) crayfish	<i>Astacus leptodactylus</i>	A	R/L	
Noble crayfish	<i>Astacus astacus</i>	A	R/L	
Freshwater coelenterate	<i>Craspedacusta sowerbyi</i>	A	R/L	
Freshwater triclads	<i>Dugesia tigrina</i> <i>Phagocata woodworthi</i> <i>Planaria torva</i>	A	R/L	
Freshwater molluscs	<i>Corbicula fluminea</i> <i>Ferissia wautieri</i> <i>Marstoniopsis scholtzi</i> <i>Menetus dilatatus</i> <i>Musculium transversum</i> <i>Physa acuta</i> <i>Physa gyrina</i> <i>Physa heterostropha</i>	A	R/L	
Jenkin's spire shell	<i>Potamopyrgus antipodarum</i>	A	R/L/T/C	Spreads rapidly. Well documented impacts: ecological and economic consequences.
Freshwater oligochaetes	<i>Branchiura sowerbyi</i> <i>Limnodrilus cervix</i>	A	R/L	
Freshwater copepods	<i>Achtheres percarum</i> <i>Ergasilus briani</i> <i>Ergasilus sieboldi</i> <i>Neoergasilus japonicus</i> <i>Tracheliastes polycolpus</i>	A	R/L	
Other freshwater malacostracans	<i>Asellus communis</i> <i>Corophium curvispinum</i>	A	R/L	
Brook charr	<i>Salvelinus fontinalis</i>	A	R/L	Some evidence that brook charr interfere with brown trout feeding; potential for hybridizing with Arctic charr
Black bullhead	<i>Ameiurus melas</i>	A	R/L	
Sunbleak	<i>Leucaspis delineatus</i>	A	L	Host for two parasites affecting other fish species
Bitterling	<i>Rhodeus amarus</i>	A	R/L	Very few studies have been carried out on the ecological impact of bitterling. This species depends on the presence of mussels as hosts for its eggs. There is some evidence that mussels might be adversely affected but this is equivocal

Sterlet/Sturgeons	All species except <i>A. sturio</i> , which is protected on Schedule 5 of the Wildlife & Countryside Act	A	R/T/C	There is some evidence that introduced non-native <i>Acipenser</i> species prey on the eggs of other gravel-spawning fish
European (wels) catfish	<i>Silurus glanis</i>	A	R/L	Lack of studies on ecological impact in the UK. Studies elsewhere suggest that impact may not be severe in Northern European locations.
Pikeperch (zander)	<i>Sander lucioperca</i>	A	R/L	A thorough review of this species has suggested that its impact may not be as great as originally thought.
Diatoms	<i>Odontella sinensis</i> <i>Pleurosigma simonsensii</i> <i>Thalassiosira punctigera</i> <i>Thalassiosira tealata</i> <i>Coscinodiscus wailesii</i>	P	C	Some are well dispersed. Unknown impacts.
Red seaweeds	<i>Asparagopsis armata</i> <i>Bonnemaisonia hamifera</i> <i>Grateloupia doryphora</i> <i>Grateloupia filicina</i> var. <i>luxurians</i> <i>Agardhiella subulata</i> <i>Solieria chordalis</i> <i>Antithamnionella spirographidis</i> <i>Antithamnionella ternifolia</i> <i>Polysiphonia harveyi</i>	P	T/C	Well dispersed – unknown impact Well dispersed – unknown impact Spreads slowly – unknown impact. Spreads slowly – unknown impact. Spreads slowly – unknown impact. Spreads slowly – unknown impact. Well dispersed – unknown impact. Well dispersed – unknown impact. Well dispersed – unknown impact
Japanese kelp	<i>Undaria pinnatifida</i>	P	T/C	Unknown impact.
Green seaweeds	<i>Codium fragile</i> subspp. <i>atlanticum</i> and <i>tomentosoides</i>	P	T/C	Well dispersed – known to have a displacement effect but impact unknown.
American piddock	<i>Petricola pholadiformis</i>	A	T/C	Very long established and well dispersed. Unknown impact.
Soft-shelled clam	<i>Mya arenaria</i>	A	T/C	Very long established and very well dispersed. Unknown impact.
American jack knife clam	<i>Ensis americanus</i>	A	T/C	Recent introduction that has the capacity to spread rapidly. Unknown impact.
Oyster thief	<i>Colpomenia peregrina</i>	A	T/C	Well dispersed – unknown/negligible impacts.
Zebra mussel sp.	<i>Mytilopsis leucophaeta</i>	A	C	Recent introduction – unknown impact.
Barnacle sp.	<i>Balanus amphitrite</i>	A	T/C	Well dispersed – unknown impact.

Marine copepod	<i>Acartia tonsa</i>	A	T	Well dispersed – unknown impact.
Marine amphipod	<i>Caprella mutica</i>	A	T	Recent introduction – unknown impact.
Marine ostracod	<i>Eusarsiella zostericola</i>	A	T	Restricted dispersion, spreads slowly but unknown impact.
Zuiderzee or dwarf crab	<i>Rhithropanopeus harrisii</i>	A	T	Recent introduction – unknown impact.
Marine hydrozoan	<i>Gonionemus vertens</i>	A	T/C	Patchy distribution – unknown impact.
Orange-striped sea anemone	<i>Haliplanella lineata</i>	A	T/C	Well dispersed. Now very common but with unknown impact.
Marine polychaete	<i>Goniadella gracilis</i>	A	C	Restricted distributions - unknown impact.
Marine hydroid	<i>Clavopsella navis</i>	A	T	Very restricted distribution, i.e. single site, but been there since the 1970s. Unknown impact.
Marine tubeworms	<i>Hydroides ezoensis,</i> <i>Hydroides dianthus,</i> <i>Janua brasiliensis,</i> <i>Pileolaria berkeleyana</i>	A A A A	T/C	Restricted distributions. Unknown ecological impacts, although some suggestion that commercial impacts may occur.
Sea spider	<i>Ammothea hilgendorfi</i>	A	T	Very restricted distribution. No dispersive phase in species' life cycle. Unknown impact.

¹ The inclusion of common carp on the list of alien species is at present under discussion. A decision on whether or not to retain it is expected by UKTAG in the near future.

Appendix A

*Provisional Invasive Alien List for Ecoregion 17¹

*Note that the list does not include invasive species that have not been recorded in the Ecoregion and the list will need to be updated if additional species arrive

	Species	Common Name
Aquatic Plants	<i>Lagarosiphon major</i>	Curly waterweed
	<i>Elodea nuttallii</i>	Nuttall's waterweed
	<i>Myriophyllum aquaticum</i>	Parrots feather
	<i>Crassula helmsii</i>	New Zealand pigmyweed
	<i>Azolla filiculoides</i>	Water fern
	<i>Lemna minuta</i>	Least duckweed
	<i>Nymphoides peltata</i>	Fringed waterlily
	<i>Hydrocotyle ranunculoides</i>	Floating pennywort
Riparian species	<i>Heracleum mantegazzianum</i>	Giant hogweed
	<i>Impatiens glandulifera</i>	Indian balsam
	<i>Fallopia japonica</i>	Japanese knotweed
Invertebrate	<i>Dreissena polymorpha</i>	Zebra mussel
	<i>Crangonyx pseudogracilis</i>	Crustacean
Fish	<i>Leuciscus cephalus</i>	Chub
	<i>Leuciscus leuciscus</i>	Dace
Fish parasite	<i>Anguillicola crassus</i>	Swim bladder nematode
Marine Species	<i>Didemnum</i> spp.	Ascidian species
	<i>Spartina anglica</i>	Smooth cord-grass
	<i>Sargassum muticum</i>	Wire weed
	<i>Eriocheir sinensis</i>	Chinese mitten crab
	<i>Crassostrea gigas</i>	Pacific oyster
	<i>Styela clava</i>	Leathery sea squirt

¹ Ecoregion 17 list is for the island of Ireland