

A selection of invasive non-native species identification sheets follows that includes species already present and others that are potential new invaders which should be watched for so that early control action can be taken.

Care should be taken to clean and dry equipment thoroughly when moving it from one site to another if a non-native species is thought to be present.

The Environment Agency has further information leaflets that give details of the appropriate control measures for each species.

<u>Species</u>	<u>Status in Middle Level Catchment</u>
American Mink <i>Mustela vison</i>	Thinly but widely spread
Chinese Mitten Crab <i>Eriocheir sinensis</i> channels	Spreading into all main
Floating Pennywort <i>Hydrocotyle ranunculoides</i>	Not yet present, be watchful
Giant Hogweed <i>Heracleum mantegazzianum</i>	Occasional, locally frequent
Himalayan Balsam <i>Impatiens glandulifera</i>	Occasional
Japanese Knotweed <i>Fallopia japonica</i> tracks	Regular especially near rail
Killer Shrimp <i>Dikerogammarus villosus</i>	Not yet present, be watchful
New Zealand Pigmyweed <i>Crassula helmsii</i>	Not yet present, be watchful
Parrot's Feather <i>Myriophyllum aquaticum</i>	Not yet present, be watchful
Signal Crayfish <i>Pacifastacus leniusculus</i>	Present in small numbers, Whittlesey Dike, nr Whittlesey
Water Fern <i>Azolla filiculoides</i>	Widespread in 'bad' years, localised in normal years

American Mink

Species Description

Scientific name: *Mustela vison*

AKA: Feral Mink and Minc (Welsh)

Native to: North America

Habitat: Aquatic habitats, including coastal, but mainly rivers and lakes

Established throughout the UK. Mostly nocturnal or active at dusk (but may be active at any time). Introduced for fur farming in the 1920s, with a peak in the 1960s. Established in the wild as a result of escapes and deliberate introductions. First recorded breeding in the wild in 1956. Has significant impact on native wildlife, especially water voles, sea birds, domestic fowl and fish on which it predates.

American mink is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to release or allow the escape of this species into the wild.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features



Body length
30-47cm

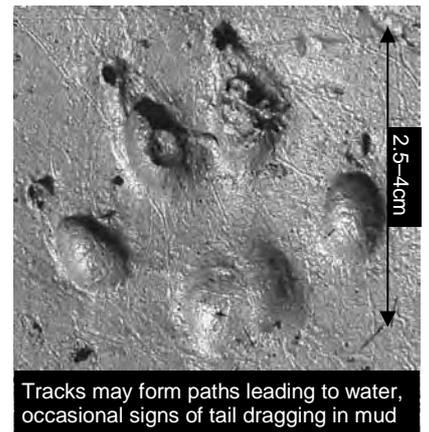
Glossy dark
brown/black fur



Tail length 13
-23cm (about
half body
length)



Usually has white patches on chin and throat (small amounts of white fur may be present on the upper lip)



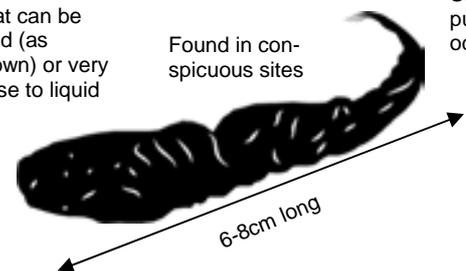
2.5-4cm

Tracks may form paths leading to water, occasional signs of tail dragging in mud

Scat can be solid (as shown) or very loose to liquid

Found in conspicuous sites

Strong pungent odour



6-8cm long

Usually contains fur, pieces of bone and feather

Sausage-like, but twisted and drawn out to a point

Similar Species

Mink are very similar to polecats but can be distinguished by the white markings on their face. While ferrets are also similar size and shape, they are usually very different in colour. Note that polecats and ferrets may interbreed producing offspring with intermediate characteristics. The only other species that may be confused with mink is otter, however this is easily distinguished by its considerably larger size as well as through field signs such as tracks.

Mink

For comparison



Mink generally do not have white above the lower lip

Mink are elusive and field signs are therefore useful to aid identification, however these will not allow you to distinguish between mink and polecat

Polecat

Native (*Mustela putorius*)

White tips to ears



White above upper lip creates a mask

Otter

Native (*Lutra lutra*)

Pale upper and lower lips, pale cheek patches



Much larger- twice the length and 7-10 times the weight (1-1.2m long from head to tail, 7.5-10.3kg weight)

Chestnut brown fur with paler underside

Distribution

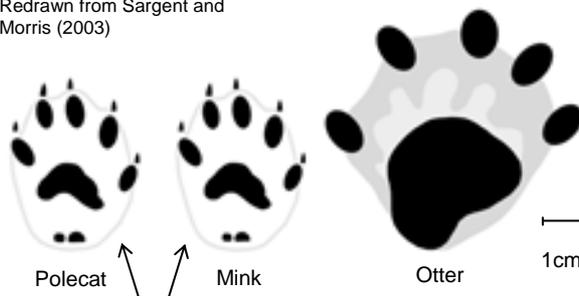
Widespread throughout Britain, limited mainly to aquatic habitats, population stable

Source: NBN Gateway. Check website for current distribution



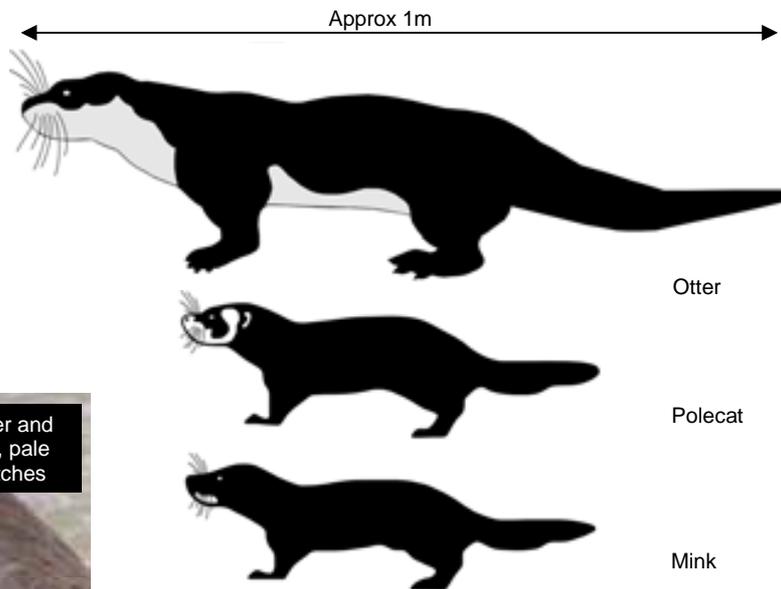
Tracks

Redrawn from Sargent and Morris (2003)



Note that mink and polecat prints are identical

Size and Shape



References and further reading:

Bang, P and Dahlstrom, P (2006) "Animal Tracks and Signs. OUP Pocket Guide Series". Oxford University Press

MacDonald, D (2005) "Collins Field Guide to the Mammals of Britain and Europe". Harper Collins

Sargent, G, and Morris, P, (2003). "How to find and identify mammals". The Mammal Society

Sterry, P (2005) "Collins Complete British Animals". Harper Collins

Chinese Mitten Crab

Species Description

Scientific name: *Eriocheir sinensis*

AKA: Moon crab, Cranc menigog (Welsh)

Native to: China

Habitat: Tidal streams, rivers and estuaries. Adults migrate to estuaries and the sea to breed.

The Chinese mitten crab was first recorded from the River Thames in 1935 having been discharged from the ballast tanks of ships. It is now well-established in the Rivers Thames, Humber, Medway, Tyne, Wharfe and Ouse.

Chinese mitten crabs prefer to moult in freshwater but are unable to lay eggs at low salinities. Adults therefore migrate down rivers in the autumn to gather in estuaries to breed. Once eggs hatch in spring, juveniles and adults migrate back up the river. They can travel large distances and have been recorded up to 1,500km from the sea in their native China. They are also able to cross dry land and have been found in isolated freshwater ponds.

Its ability to travel large distances up river systems and cross dry land means that all waterbodies in Britain have the potential to be invaded.

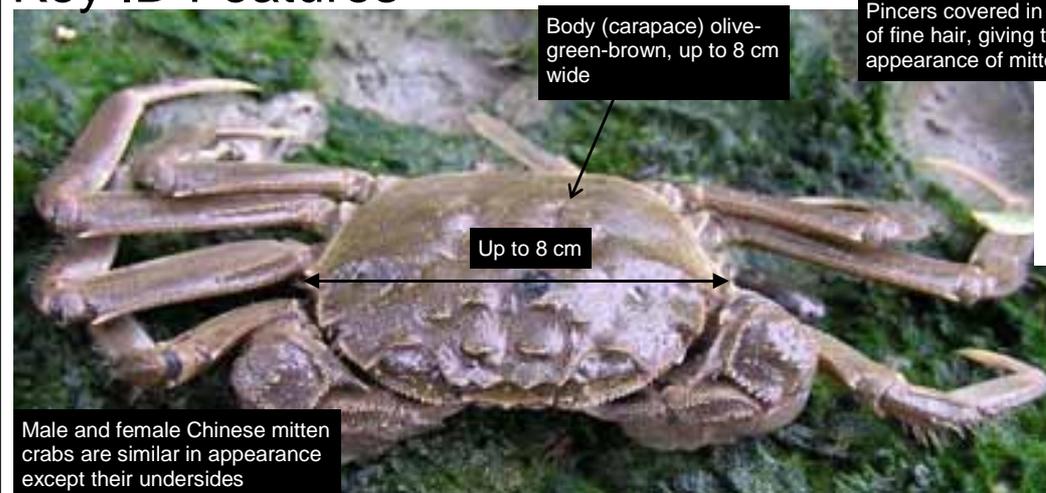
Chinese mitten crabs burrow into river banks, affecting their integrity and so can cause considerable damage. It has been placed on the IUCN 100 of the world's worst alien species list.

Chinese mitten crab is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England and Wales. As such, it is an offence to release or allow the escape of this species into the wild.

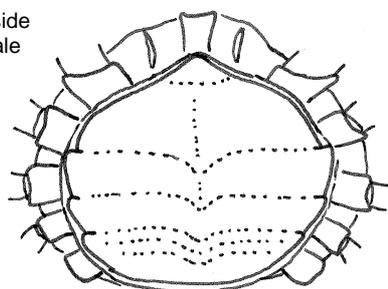
For details of legislation go to www.nonnativespecies.org/legislation.



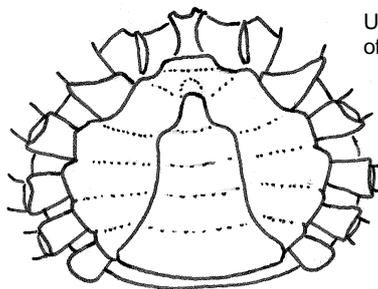
Key ID Features



Underside of female



Underside of male



Identification throughout the year

Chinese mitten crabs do not vary through the year. After adults gather to breed in estuaries, females carry the eggs overwinter until they hatch in spring.

Field Signs

They burrow into river banks causing holes about 3 cm in diameter. Dead bodies (carapaces) may be found though positive identification would require the mittens to be present.



Distribution

Present in the Rivers Thames, Humber, Medway, Tyne, Wharfe and Ouse.



Source: various

There are no other freshwater crabs present in Britain. As adults migrate to estuaries in autumn there is a possibility of confusion with native marine crabs such as the shore crab. However none of our native crabs possess the distinctive hairs (mittens) on the claws.

Similar Species

Shore crab
Native
(*Carcinus maenas*)



References and further reading:

Gilbey, V, Attrill, MJ and Coleman, RA (2008) Juvenile Chinese mitten crabs (*Eriocheir sinensis*) in the Thames estuary: distribution, movement and possible interactions with the native crab *Carcinus maenas*. *Biological Invasions* 10 pp. 67-77

Floating Pennywort

Species Description

Scientific name: *Hydrocotyle ranunculoides*

AKA: Dail-ceiniog arnofiol (Welsh), *Hydrocotyle nova zealandiae*

Native to: North America

Habitat: Emergent or floating on the surface of still or slowly moving freshwater

Free-floating or rooted. The characteristic leaves and growth form help to make this plant easy to identify. It is found mostly in the south-east of England and occasionally in the north-west of England and Wales. Spreading rapidly.

First naturalised in 1990 as a result of discarded plants from garden ponds. Can grow up to 20cm per day and may quickly dominate a waterbody forming thick mats and impeding water flow and amenity use. May out-compete native species by blocking out light, causing deoxygenation, obstructing air breathing insects from reaching the water surface and reducing water temperatures.

Floating pennywort is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such, it is an offence to plant or otherwise cause this species to grow in the wild.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features

Grows horizontally

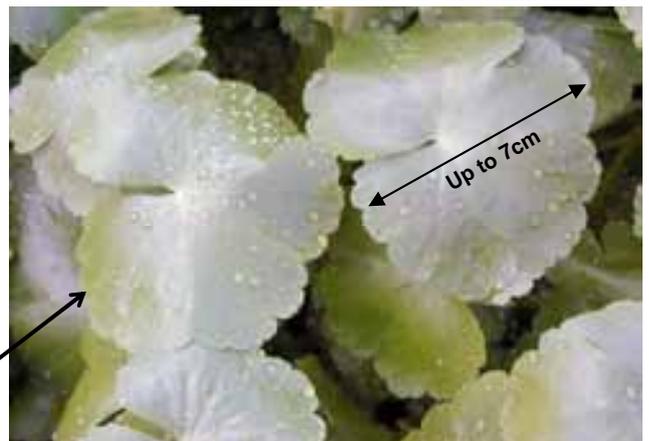


Leaves can be floating or emergent



Fleshy stalks

Fine roots



Up to 7cm

Shiny, kidney-shaped leaves with crinkled edge, frequently broader than long

Identification throughout the year

Varies little throughout the year, although in the winter it is most likely to be found at the water's edge. Tiny white flowers are rare, but if present, they appear between July and August.

Distribution

Common in the south-east of England, and spreading to other parts of the British Isles.

Similar Species

Marsh Pennywort Native (*Hydrocotyle vulgaris*)



Grows on damp ground in bogs and fens. Always rooted in the ground, never free-floating

Source: NBN Gateway. Check website for current distribution

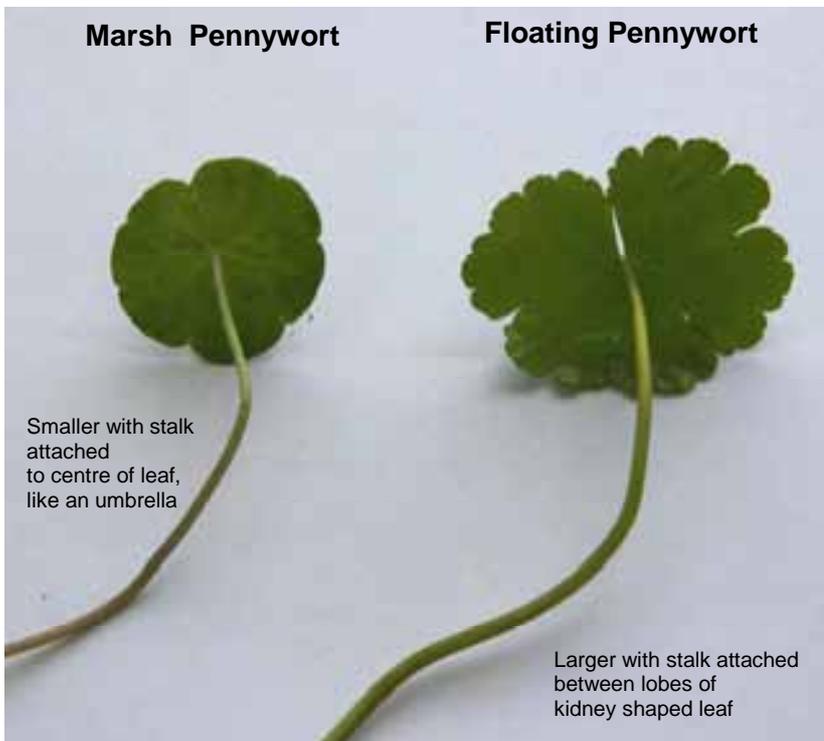


Floating Pennywort can form dense mats that need to be physically removed



Marsh Pennywort

Floating Pennywort



Smaller with stalk attached to centre of leaf, like an umbrella

Larger with stalk attached between lobes of kidney shaped leaf

References and further reading:

Blamey, M, Fitter, R and Fitter, A (2003) "*The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora.*" A & C Black

Preston, C D and Croft, J M (1997) "*Aquatic plants in Britain and Ireland.*" Harley Books

Preston, C D, Pearman D A and Dines, T A (editors) (2002) "*New Atlas of the British and Irish Flora.*" Oxford University Press

Stace, C (1999) "*Field Flora of the British Isles.*" Cambridge University Press

Giant Hogweed

Species Description

Scientific name: *Heracleum mantegazzianum*

AKA: Efwr enfawr (Welsh)

Native to: Caucasus mountains in south west Russia and Georgia

Habitat: Widespread, most common on river banks

Easy to identify when fully grown by height, size of leaves and size of flowers. Can be confused with native hogweed when not fully grown or when growth is stunted (e.g. regrowth after cutting).

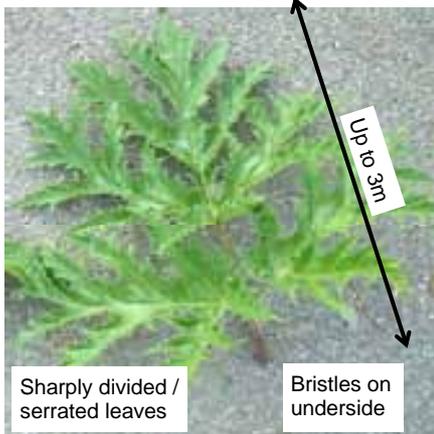
Introduced as an ornamental. First recorded wild in the UK in the late 19th century. Spreads solely by seeds, mainly through deliberate planting, wind dispersal and in water courses. Now common across much of the UK. Contact with any part of this plant must be avoided as even minute amounts of sap can cause blistering of the skin following exposure to sunlight. Other negative impacts include out-competing native flora, river bank erosion and increase in flood risk. Can cause delays/additional costs on development sites where the plant must be removed as controlled waste in order to comply with legislation.

Giant hogweed is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to plant or otherwise cause this species to grow in the wild. Under the Environmental Protection Act 1990, giant hogweed is also classified as controlled waste.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features



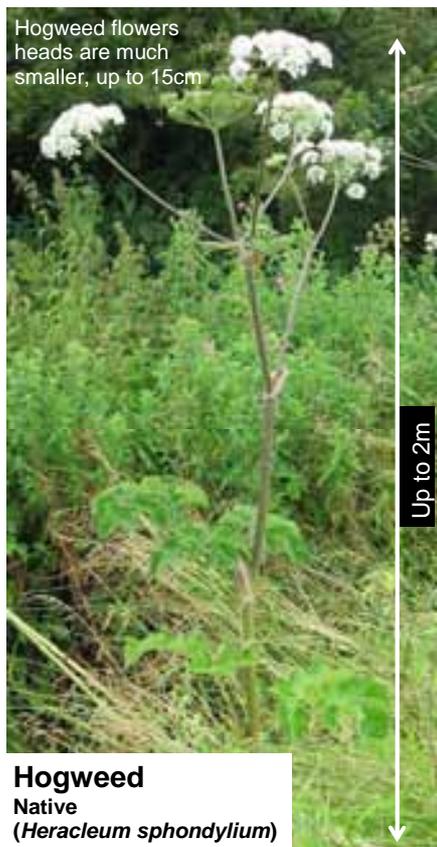
Identification throughout the year



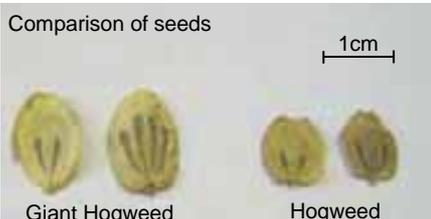
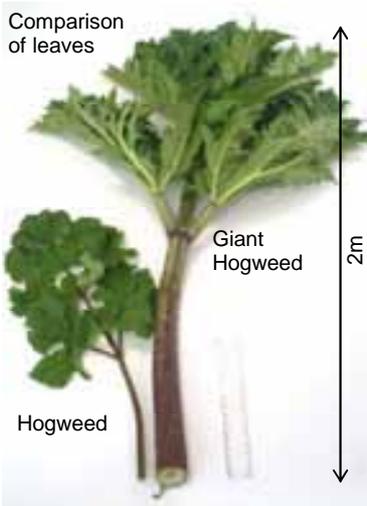
Similar Species

When in full height it is difficult to confuse giant hogweed with any other plant. While still growing or stunted, possibly as a result of disturbance, it can be confused with some other native plants. The most likely species with which it might be confused is hogweed.

Key differences between hogweed and giant hogweed include the height, width of stem, size of leaf, size of flower head and size of seed.



Hogweed
Native
(*Heracleum sphondylium*)



Distribution

Widespread and common across much of the UK. Extensive infestations are found particularly in Scotland and the north of England. Less abundant in Cornwall. Often associated with large rivers.

Source: NBN Gateway. Check website for current distribution



References and further reading:

- Blamey, M, Fitter, R and Fitter, A (2003) "The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora." A & C Black
- Booy, O and Wade, P M (2007) "Giant Hogweed Management in the United Kingdom". RPS Group plc
- Pyšek P, Cock, M J W, Nentwig, W & Ravn, H P (2007) "Ecology and Management of Giant Hogweed (*Heracleum mantegazzianum*)". CAB International
- Stace, C (1999) "Field Flora of the British Isles". Cambridge University Press

Himalayan Balsam

Species Description

Scientific name: *Impatiens glandulifera*

AKA: Policeman's Helmet, Indian Balsam, Jac y Neidiwr (Welsh)

Native to: West and central Himalayas

Habitat: Found mostly on river banks and in damp woodland, can grow in other damp habitat

A tall, attractive, annual herb with explosive seed heads. Although easy to identify as a mature plant with its pink-purple flowers, fleshy stem and characteristic leaves, the seedlings and last year's dead stems of this annual are more difficult to spot.

Introduced as a garden plant in the early 19th century and first recorded in the wild in 1855. Often favoured by the general public for its aesthetic appeal and is still deliberately planted on occasion. Now widespread in the UK, especially along urban rivers. Spreads solely by seeds, which are small and easily carried by wind or water.

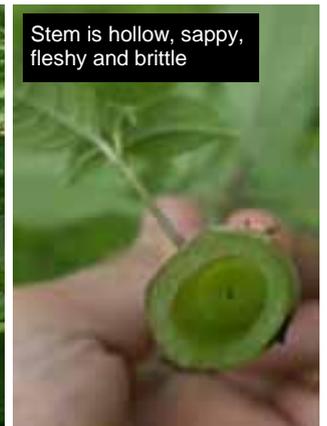
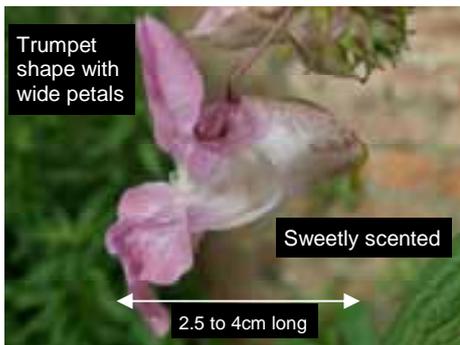
Out-competes native species in ecologically sensitive areas, particularly river banks. Where it grows in dense stands along river banks it can impede flow at times of high rainfall, increasing the likelihood of flooding. Die back of extensive stands over winter can leave river banks bare and exposed to erosion.

Himalayan balsam is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England and Wales. As such, it is an offence to plant or otherwise allow this species to grow in the wild.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features



Identification throughout the year

Can be identified at most times of the year: March-June by its seedlings, stem and leaf shape, from July to September by its stem, leaf shape and flowers. More difficult to identify over winter (October to February), look for hay like remains and distinctive root structure.



Hay like remains in winter



Root structure in winter

Similar Species

Orange Balsam
Non-Native
(*Impatiens capensis*)



Smaller leaves, with fewer serrations

Flowers slightly earlier, June to August

Orange balsam is much less aggressive than Himalayan balsam, forming smaller less dense stands

Flower is similar in shape but orange in colour

Smaller than Himalayan balsam, growing to a height of 1.2m



Distribution

Widespread and common across the whole of the UK. Primarily on riverbanks and in other damp areas.

Source: NBN Gateway. Check website for current distribution



References and further reading:

Blamey, M, Fitter, R and Fitter, A (2003) "*The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora*". A & C Black

Preston, C D, Pearman, D A and Dines, T A (editors) (2002) "*New Atlas of the British and Irish Flora*". Oxford University Press

Stace, C (1999) "*Field Flora of the British Isles*". Cambridge University Press

Japanese Knotweed

Species Description

Scientific name: *Fallopia japonica*

AKA: Japanese Bamboo, Pysen saethwr (Welsh), *Polygonum cuspidatum*, *Reynoutria japonica*

Native to: Japan, Taiwan, northern China

Habitat: Common in urban areas, particularly on waste land, railways, road sides and river banks

Tall herbaceous perennial with bamboo like stems. Often grows into dense thickets. Characteristic leaves and stems, persistence of last year's dead canes and distinctive rhizome (underground root-like stems) enables year round identification.

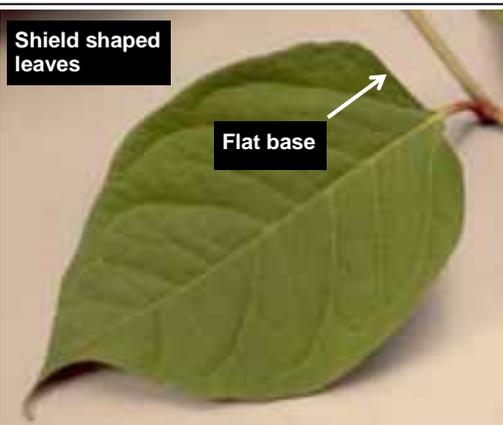
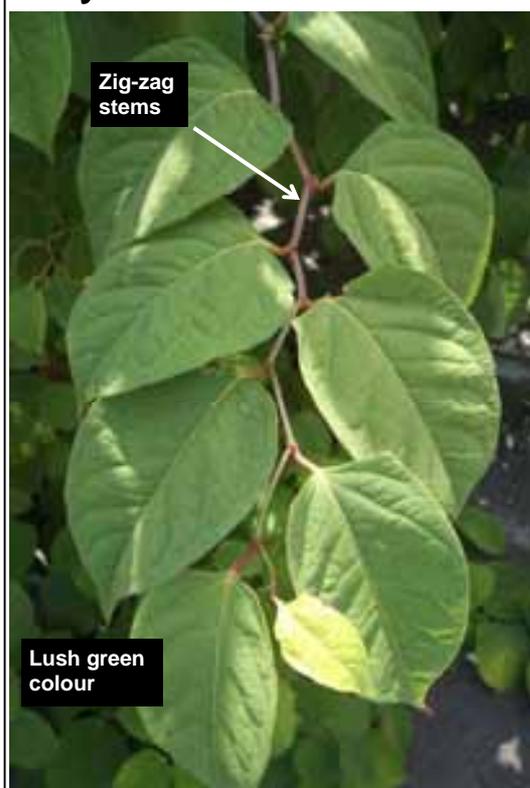
Introduced in the early 19th century as an ornamental plant. Now common and widespread across the UK. Spreads rapidly in the wild by natural means and as a result of spread by humans. Spread is solely by vegetative means, either fragments of rhizome or stem. Does not produce seed in the UK. Negative impacts include outcompeting native flora, contributing to river bank erosion and increasing the likelihood of flooding. Can also cause significant delays and cost to development as well as structural damage (it can grow through asphalt and some other surfaces).

Japanese Knotweed is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to plant of otherwise cause Japanese knotweed to grow in the wild. Under the Environmental Protection Act 1990, Japanese Knotweed is classified as controlled waste.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features



Identification throughout the year

Winter

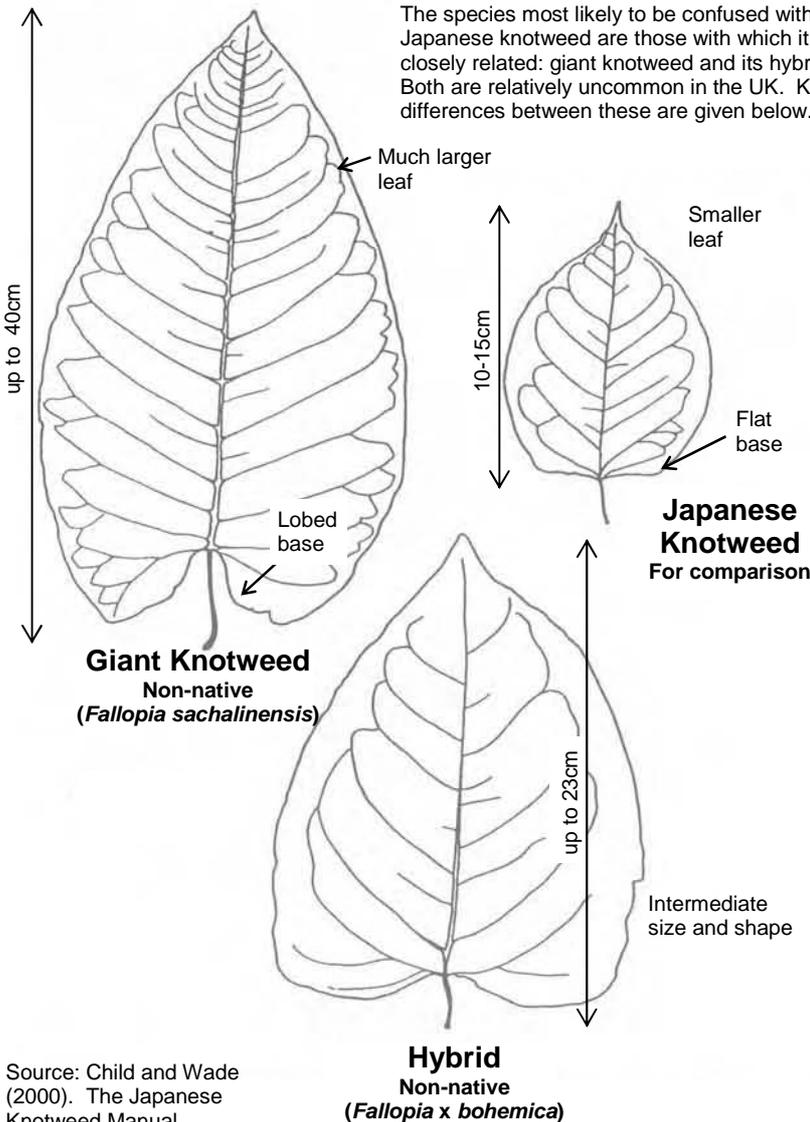
Summer

Spring



Similar Species

The species most likely to be confused with Japanese knotweed are those with which it is closely related: giant knotweed and its hybrid. Both are relatively uncommon in the UK. Key differences between these are given below.



Source: Child and Wade (2000). The Japanese Knotweed Manual

Distribution

Widespread and common across the UK. Notably extensive infestations are found in the south-west of England, south Wales and Greater London, however similarly extensive populations can also be found elsewhere.

Source: NBN Gateway. Check website for current distribution



References and further reading:

- Blamey, M, Fitter, R and Fitter, A (2003) "The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora." A & C Black
- Child, L E and Wade, P M (2000) "The Japanese Knotweed Manual". Packard
- Environment Agency (2006) "The Japanese Knotweed Code of Practice". Environment Agency
- Preston, C D, Pearman, D A and Dines, T A (editors) (2002) "New Atlas of the British and Irish Flora". Oxford University Press
- Stace, C (1999) "Field Flora of the British Isles". Cambridge University Press

Killer Shrimp

Species Description

Scientific name: *Dikerogammarus villosus*

AKA: Killer Shrimp

Native to: South-east Europe

Habitat: Still or flowing freshwater and brackish water, often among hard surfaces or vegetation.

A highly invasive shrimp, with only a few known populations in GB. A key ID feature is the presence of cone shaped protrusions on the tail. Often larger than native freshwater shrimp species and sometimes with a striped appearance.

It is a voracious predator, killing invertebrates and small fish. It quickly dominates habitats it invades and can significantly alter their ecology.

It is tolerant of poor water quality and can survive in damp conditions for up to five days. It could therefore be spread in ballast water and also by people on kit used in the water, including angling gear, boats, kayaks and trailers. Good biosecurity is essential to reduce the risk of spread.

As a non-resident species it could be an offence to release or allow the escape of this species into the wild.

Suspected records of this species should be sent with a photograph to: alert_nonnative@ceh.ac.uk



Key ID Features



Usually has striped back, but can be more uniform in colour

Larger than native shrimps. Size varies depending on age. Can grow to 30mm from tip of tail to tip of head, more commonly 10-20mm (relatively large for a freshwater amphipod).

Tail with distinctive cones

Additional Information about this species can be found at:

www.nonnativespecies.org

Recording

If you suspect you have found this species please send a record, including a photograph to:

alert_nonnative@ceh.ac.uk

Non-native European Distribution



Source: Daisie. Map © V. Panov (2008)

Similar Species

Dikerogammarus villosus

Non-native
For comparison



← Tail with distinctive cones

Usually considerably larger than native species. Can grow to 30mm from tip of tail to tip of head, more commonly 10-20mm.

Gammarus pulex

Native (except in Ireland)

Lacks dark stripes of *D. villosus*



← Tail without cones

Brown-yellow body

Usually smaller, approx. 11mm, growing to a maximum of 20mm

Gammarus tigrinus

Non-native

Dark marks but lacks banding of *D. villosus*



← Tail without cones

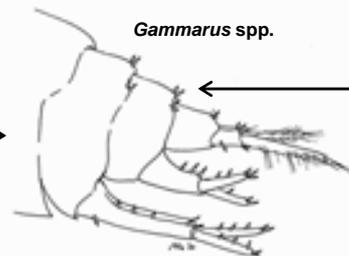
Usually smaller, approx. 10-15mm long

Tail features can be used to distinguish *D. villosus* from other species as follows:



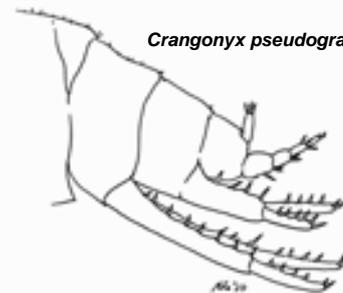
Dikerogammarus villosus

Two distinctive cone-shaped protrusions topped with small spines.



Gammarus spp.

Small clusters of spines or hairs, but no protrusions.



Crangonyx pseudogracilis

May have small hairs, but lacks spines or protrusions.

Line drawings © M.Dobson/FBA

References and further reading:

Daisie Factsheet (www.europe-aliens.org)

Nobanis Factsheet (www.nobanis.org)

www.habitas.org.uk/invasive/

New Zealand Pigmyweed

Species Description

Scientific name: *Crassula helmsii*

AKA: *Tillaea aquatica*, Australian Swamp-stonecrop, Briweg Seland Newydd (Welsh), *Tillaea recurva*

Native to: Australia and New Zealand

Habitat: Aquatic up to 3m deep in still or slow flowing water bodies or terrestrial around pond or lake margins

Can be submerged, emergent and terrestrial. Readily recognisable when growing at the edges of water bodies by its fleshy leaves. Submerged leaves are less easy to see and recognise. Reproduces from very small stem fragments but does not produce viable seed in the UK.

Introduced in 1911 as an oxygenating plant for ponds and, since the 1970s, has spread rapidly. Forms dense mats and can impede drainage, causing flooding. Displaces other aquatic plant species and reduces amenity use of the waterbody.

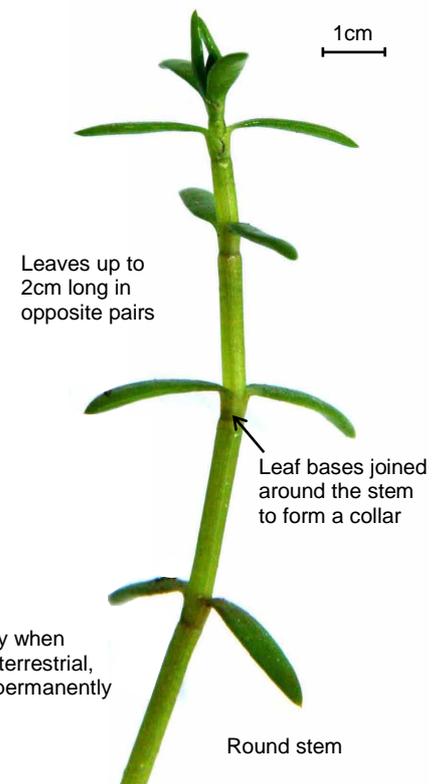
New Zealand Pigmyweed is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such, it is an offence to plant or otherwise cause this species to grow in the wild.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features

Forms dense mats within the water body



Leaves fleshy when emergent or terrestrial, flatter when permanently submerged

Identification of terrestrial, emergent and submerged forms

Terrestrial: Growing away from the water's edge or left stranded as water level falls, creeping stems and aerial, fleshy leaves.



Emergent: Densely packed leaves in water, intermediate between terrestrial and submerged form (occurs in water <0.6m deep).



Submerged: Elongated stems with leaves sparse and flat, able to form extensive mats on bed of the water body.



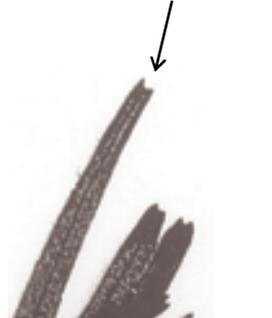
Similar Species

A group of species known as water-starworts are most likely to be confused with New Zealand pigmyweed. Water-starworts are distinguished from New Zealand pigmyweed by their non-fleshy leaves, which are usually notched at the tip (hold up to light or use hand lens), and lack of collar at leaf base.

Water-starworts
Native
(*Callitriche* species)



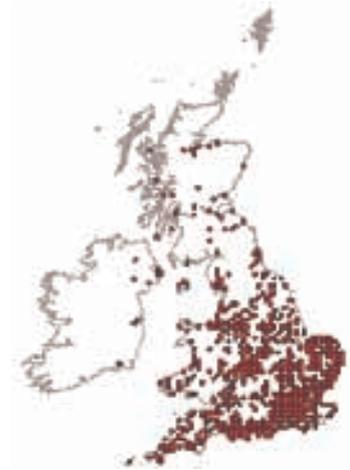
Water-starwort leaf with typically notched tip, a hand lens is usually required to see this properly



Distribution

Widespread in England and Wales. Spreading northwards, though much less common in Scotland. Very common in the south-east of England.

Source: NBN Gateway. Check website for current distribution.



New Zealand Pigmyweed
For comparison



New Zealand pigmyweed collar around stem at base of leaves

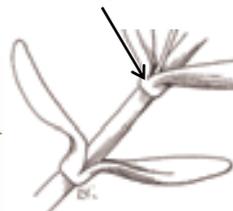


Illustration from IFAS, Centre for Aquatic Plants, University of Florida, Gainesville 1990

Fleshy leaves without notched tips



References and further reading:

- Blamey, M, Fitter, R and Fitter, A (2003) *The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora.* A & C Black
- Preston, C D and Croft, J M (1997) *Aquatic plants in Britain and Ireland.* Harley Books
- Preston, C D, Pearman, D A and Dines, T A (editors) (2002) *New Atlas of the British and Irish Flora.* Oxford University Press
- Stace, C (1999) *Field Flora of the British Isles.* Cambridge University Press

Parrot's Feather

Species Description

Scientific name: *Myriophyllum aquaticum*
AKA: Brazilian Watermilfoil and Myrdd-ddail (Welsh), *Myriophyllum brasiliense*, *Myriophyllum proserpinacoides*
Native to: Central and South America
Habitat: Still or slowly flowing water

Emergent growth, blue-green colour and feather-like leaves make this a distinctive water plant. Present year round. Unlikely to be found in fast flowing water.

Aquatic perennial, grows in emergent and submerged form. Both forms are similar in appearance. Most often found in nutrient rich waters. Grown in water gardens in UK since 1878, first recorded in the wild in 1960. Initial spread by improper disposal of garden and aquarium plants. Still found in some garden centres, often under one of its pseudonyms. Spreads by vegetative fragmentation, no seeds are produced in the UK.

Causes flooding by blocking watercourses and drainage channels. Can rapidly dominate a water body displacing native species.

Parrot's feather is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such, it is an offence to plant or otherwise allow this species to grow in the wild.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features

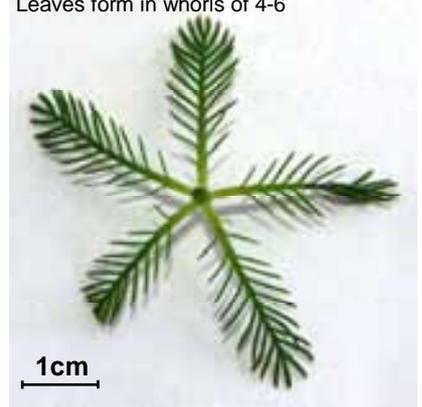
Changes form depending on the conditions, varying between submerged to emergent foliage. Both forms are similar in appearance. Emergent leaves are stiff, bright green and the most distinctive form. Submerged leaves are more fragile and, after death, decompose quickly.

Leaves bright to blue-grey green



Stem breaks easily, brown roots present around nodes

Leaves form in whorls of 4-6



1cm



Stems can grow to 2m tall

Emergent leaves more robust

Forms inconspicuous flowers at base of leaves between May and August. Small (2mm) and white. Can be difficult to see.



Finely divided leaves, feather-like

Identification throughout the year

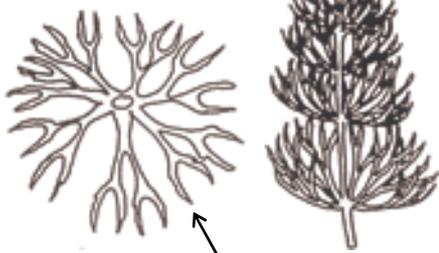
Dies down in winter, can be found submerged throughout the year. Emergent shoots appear in spring when the plant becomes more conspicuous. Blue-green colour of leaves is useful for identification. Flowers are present from May to August, but are inconspicuous.

Similar Species

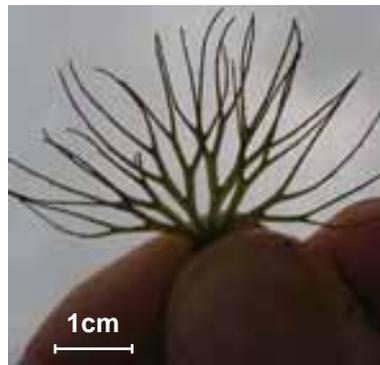
The emergent stems of parrot's feather distinguish it from native water-milfoil species (spiked water-milfoil *Myriophyllum spicatum*, alternate water-milfoil *Myriophyllum alterniflorum* and whorled water-milfoil *Myriophyllum verticillatum*) which are never emergent, although the native species can produce short emergent flower spikes. Parrot's feather is also rarely, if ever, found in fast flowing water, unlike some native water-milfoil species. Submerged parrot's feather is difficult to distinguish from these species and expert assistance may be required.

Other species that can be confused with parrot's feather:

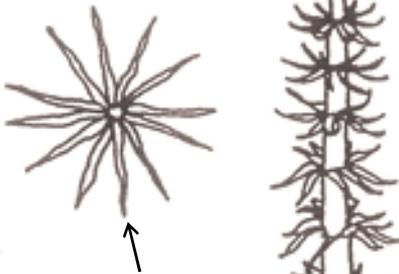
Hornwort species Native (*Ceratophyllum* species)



Leaves have 'tuning fork' ends



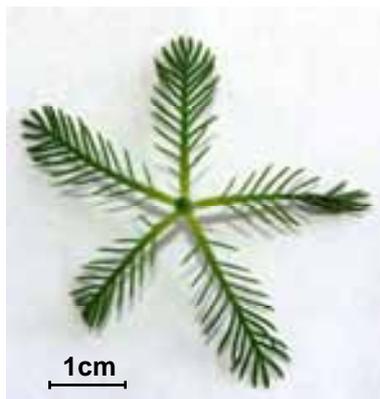
Mares Tail Native (*Hippuris vulgaris*)



Leaves not divided



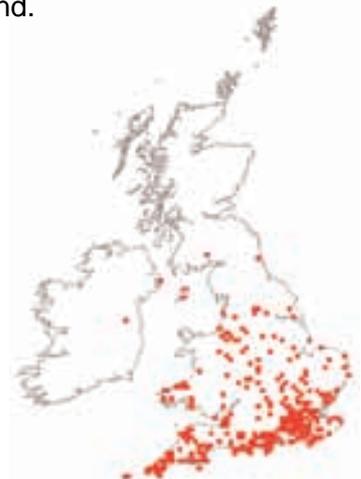
Parrot's Feather (and other *Myriophyllum* species) For comparison



Distribution

Mainly a lowland plant. Widespread in south of England, spreading northwards. Rare in Northern Ireland and Scotland.

Source: NBN Gateway. Check website for current distribution



Fanwort Non-Native (*Cabomba caroliniana*)

Floating leaves, when present, are linear and inconspicuous, with an alternate arrangement, submerged leaves are finely divided



Leaves in pairs up the stem (not in whorls)

References and further reading:

Blamey, M, Fitter, R and Fitter, A (2003) "The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora." A & C Black

Preston, C D and Croft, J M (1997) "Aquatic plants in Britain and Ireland". Harley Books

Preston, C D, Pearman, D A and Dines, T A (editors) (2002) "New Atlas of the British and Irish Flora". Oxford University Press

Stace, C (1999) "Field Flora of the British Isles". Cambridge University Press

Signal Crayfish

Species Description

Scientific name: *Pacifastacus leniusculus*

AKA: Cimwch dir Croyw (Welsh)

Native to: North America

Habitat: Most freshwater habitats

Their small lobster-like appearance makes crayfish easy to recognise. Distinguishing non-native species from the threatened native white-clawed crayfish is essential. Compared to the native species, the signal crayfish is much larger and its claws are red underneath with a small turquoise / white blotch on the surface. There are several other non-native crayfish species, but these are relatively rare.

Introduced for food in the late 1970s and 1980s but spread quickly across much of the UK. Distribution in Scotland is limited. Spreads up and downstream and may cross land to colonise adjacent water bodies. Human transfer, although illegal, still continues. Negative impacts include the almost complete loss of the native crayfish through the spread of disease and direct competition. Also undermines riverbanks through burrowing and can predate on native fish eggs and aquatic invertebrates.

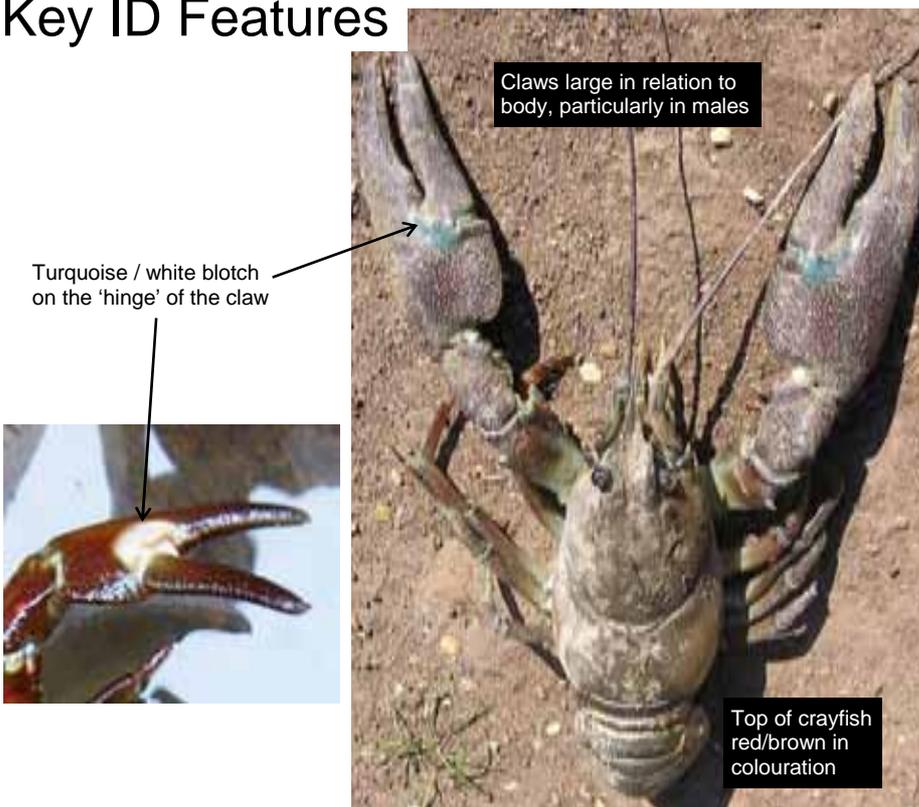
Signal crayfish is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to release or to allow the escape of this species into the wild. In the UK it is an offence to keep any crayfish without a license, except in some parts of southern England. If trapping of signal crayfish is planned, an application should be made to the relevant environmental protection agency.

For details of legislation go to www.nonnativespecies.org/legislation.



DH

Key ID Features



Identification throughout the year

Least active during winter when much time is spent in a state of torpor often in burrows in riverbanks. Peak activity is during the summer. Mating takes place in autumn and early winter and females carry the developing eggs in a dense cluster attached to the underside of their tail over the winter. When the eggs hatch, young remain attached to the female. Release of the young usually begins in May-June. The life cycle then proceeds through a series of moults.

Field signs

- Burrows in banks of water body
- Parts of dead animals including claws and body shell either on shoreline or stream edge, in bird or rodent nests, or discarded by predators
- Unlike natives, active during daylight hours

Similar Species

The only native crayfish in the UK is the white-clawed crayfish, which is under serious threat from non-native species. It is therefore essential to be able to distinguish between this and non-native species.



Claws are dirty white to pink on the underside

White-clawed crayfish are considerably smaller than signal, generally have a brown to olive colour, unlike the red / brown of the signal and are usually more docile and less aggressive than the signal crayfish.

White-clawed Crayfish
Native
(*Austropotamobius pallipes*)

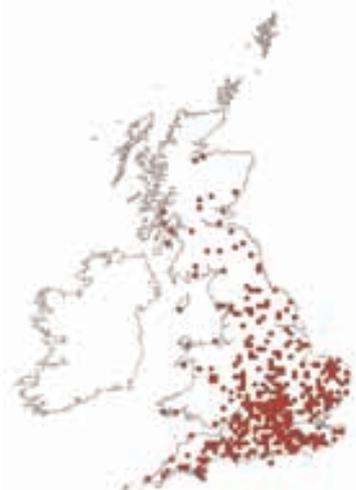
The cervical groove (line between head and body) of the white-clawed crayfish has spikes whereas the signal crayfish is smooth.



Signal Crayfish
For comparison

Distribution

Wide spread throughout England and Wales. Limited to a few water bodies in Scotland.



Source: NBN Gateway. Check website for current distribution

A number of other non-native crayfish have been introduced into the UK though they are less prevalent than the signal crayfish, these include:

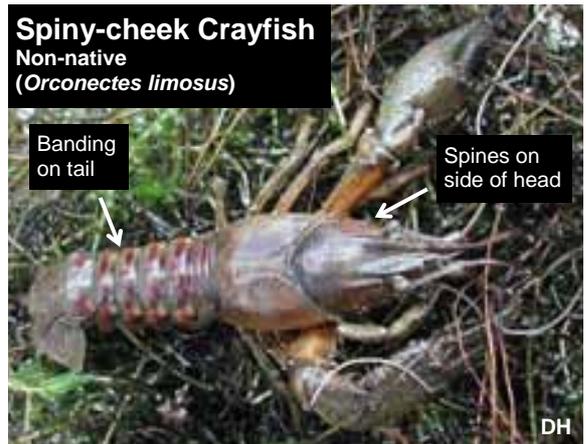
Narrow-clawed Crayfish
Non-native (aka Turkish Crayfish)
(*Astacus leptodactylus*)



Uniquely shaped claws

usually up to 15cm, but can be larger
(from tip of tail to front of head)

Spiny-cheek Crayfish
Non-native
(*Orconectes limosus*)



Banding on tail

Spines on side of head

up to 14cm
(from tip of tail to front of head)

References and further reading:

Pöckl, M, Holdich, D and Pennerstorfer, J (2006) "Identifying Native and Alien Crayfish Species in Europe". Craynet

Souty-Grosset, C, Holdich, D, Noël, O, Reynolds, J and Haffner, P, (eds) (2006). *Atlas of crayfish in Europe*. Museum national d'histoire naturelle, Paris

Water Fern

Species Description

Scientific name: *Azolla filiculoides*

AKA: Fairy Fern, Cyfrdwy (Welsh)

Native to: North and Central America

Habitat: Still and slow flowing water bodies (e.g. ponds, drainage channels, ditches, canals)

Very small free-floating water plant that forms dense mats. Unmistakeable when in its red form and relatively easy to distinguish from duckweeds in its green form. Can be seen most months of the year. Spreads mainly vegetatively though can produce minute spores.

Introduced for ornamental use in ponds and aquaria. First recorded in 1883 and has spread rapidly throughout England in the last 50 years. Infrequent in Scotland and Northern Ireland. Can be inadvertently carried on water plants from garden centres. Out-competes native species by forming a dense covering on the surface of the water, blocking out light, causing deoxygenation, preventing air-breathing insects from reaching the surface and reducing water temperatures. Dense and continuous stands can be a health hazard as the water surface appears solid.

Water fern is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to plant or otherwise cause this species to grow in the wild.

For details of legislation go to www.nonnativespecies.org/legislation.



Key ID Features

Usually green but often has a reddish tinge and can be completely red when exposed to stresses (such as cold temperatures, brackish waters or shading)



Forms dense mats but can also be present as a few fronds amongst emergent or other floating vegetation

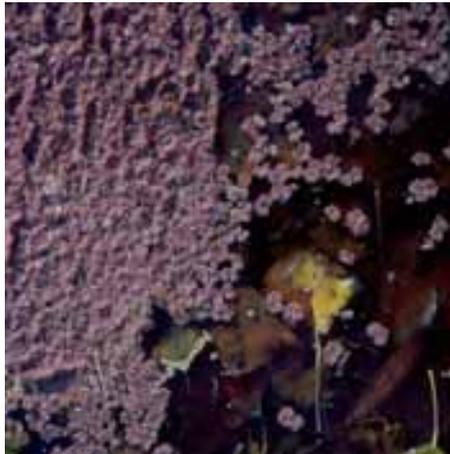
Identification throughout the year

Plants can be present year round, but often die back in winter. Colour can vary considerably through the year. Green in spring/summer often turns red during cold weather in autumn/winter.

Green form



Red form



Distribution

Sporadic distribution in southern and central England. Has spread north to Yorkshire and into Wales but relatively few locations in Scotland and Northern Ireland.

Source: NBN Gateway. Check website for current distribution



Similar Species

Duckweeds
3 native and
2 non-native species
(*Lemna* species)



Common Duckweed

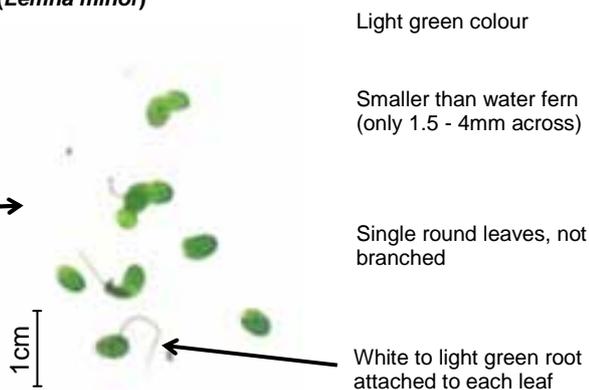
Native
(*Lemna minor*)

Light green colour

Smaller than water fern
(only 1.5 - 4mm across)

Single round leaves, not
branched

White to light green root
attached to each leaf



Water Fern For comparison

Multiple dark
brown roots

Leaves are much larger (up
to 2.5cm) and branching



**Duckweed and water
fern growing together**



Water fern

Duckweed

References and further reading:

Blamey, M, Fitter, R and Fitter, A (2003) "*The Wild Flowers of Britain and Ireland. The Complete Guide to the British and Irish Flora*". A & C Black
Preston, C D and Croft, J M (1997) "*Aquatic plants in Britain and Ireland*". Harley Books
Preston, C D, Pearman, D A and Dines, T A (editors) (2002) "*New Atlas of the British and Irish Flora*". Oxford University Press
Stace, C (1999) "*Field Flora of the British Isles*". Cambridge University Press

Appendix 10 Middle Level IDB BAP Targets Summary

Summary of BAP Species Actions

Board Number	Drainage Board	Barn owl boxes by 2015	Bat boxes by 2015	Black Poplars by 2015	Kingfisher sites by 2015	Otter holts by 2015
303	Benwick	4	3	2	2	1
352	Bluntisham	1	1		1	
306	Churchfield & Plawfield	1	1		1	
307	Conington & Holme IDB	2	2	2	1	
308	Curf & Wimblington Combined	4	3	2	3	2
358	Drysides	1	1		1	
361	Feldale	1	1		1	
309	Euximoor	2	2	2	1	
345	Holmwood & District	4	3	2	3	
347	Hundred Foot Washes		3	2	2	2
346	Hundred of Wisbech	2	2		1	
355	Ladus DDC	1	1		1	
317	Manea & Welney DDC	3	3	2	1	
316	March & Whittlesey	4	4	2	3	
312	March East	4	3	2	2	
314	March Fifth DDC	1	1		2	
315	March Sixth DDC	1	1		2	
313	March Third DDC	1	1		2	
319	Needham, Burial & Birdbeck DDC	2	2		2	
320	Nightlayers	2	1		2	
321	Nordelph	1	1		1	
1602	Ramsey First (Hollow)	2	1	2	1	
326	Ramsey Fourth (Middlemoor)	1	1		1	
328	Ramsey Upwood & Great Raveley	2	2	2	1	
329	Ransonmoor DDC	2	2	2	1	
342	Sawtry	2	2	2	2	
350	Sutton & Mepal	5	4	2	3	1
360	Swavesey	1	1		1	
331	Upwell	5	4	2	3	1
332	Waldersey	3	3	2	2	
333	Warboys, Somersham & Pidley	3	3	2	3	
335	White Fen DDC	1	1		2	
337	Whittlesey	5	5	4	5	
325	Ramsey (was 2nd [325] & 5th [327])	2	1	2	1	
340	Woodwalton	1	1		1	
	MLC	8	8	10	4	4
	Totals:	85	79	50	66	11

Middle Level IDB BAP Reporting Forms Example

Appendix 11

Notes

This example of an annual IDB BAP report shows possible reports for the different actions. As an example it is rather unrealistic as a board will not have something to report under every action but it gives an idea of the responses that could be included. The report would normally be completed by the Environmental Officer after discussion with the District Officer or Chairman.

Barn Owl Boxes

A stock of suitable barn owl boxes is held at the MLC Depot for Boards to draw on when suitable sites are located. Internal boxes for installation inside buildings and external boxes for attachment to poles or trees are £45 each. These are produced for us virtually 'at cost' by John Stimson of Wilburton and are well made and very good value. The proposed target of boxes for the Board to install is found in their IDB BAP and in Appendix 10 above.

Bat Boxes

A stock of specially designed bat boxes is held at the MLC Depot for Boards to draw on when suitable sites are located. The boxes have been designed by Maurice Webber of Conservation Constructions to offer summer roosting sites for a range of bat species. They incorporate a section of slate that acts as a heat storage area. They are made of sustainably forested larch and are built to last, without the use of preservatives which would deter bats. They are available to boards at a reduced price of £80 each, which includes stainless steel mounting brackets.

Once sites have been agreed, bat boxes and barn owl boxes can be brought out and installed with the assistance of the District Officer.

Cliff Carson

Environmental Officer to the Middle Level Biodiversity Action Plan Partnership.

Drainage Ditch Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Target Date	Indicators	Reporting
1	Manage ditches for biodiversity as well as for drainage	1.1	Establish and maintain a management plan for routine IDB operations incorporating key biodiversity features	Environmental Officer	2015	Plan finalised and followed each year	<i>Plan in the process of establishment. Rotational alternate side bank cutting is practiced where possible.</i>
		1.2	Look for opportunities to provide natural erosion protection such as marginal plant ledges when re-profiling ditches	Environmental Officer	Ongoing	If re-profiling is carried out, opportunities identified	<i>Some appropriate sites for this method were identified during the period and mapped. To be considered if re-profiling is carried out. Several naturally occurring sedge margins are being conserved.</i>
		1.3	Provide natural erosion protection as in 1.2 if opportunities available	Environmental Officer	Ongoing	Length of ditch with ledge / natural vegetation revetment	<i>See above.</i>
2	Identify ditches of conservation interest and manage appropriately	2.2	Ensure appropriate management of ditches for priority species	Environmental Officer, Plantlife, Wildlife Trust	Ongoing	Specified in management plan	<i>Several ditches already identified. Any further priority ditches will be identified as the management plan is developed.</i>

3	Support the Environmental Officer in working with landowners to benefit wildlife in the district	3.1	Refer private landowners to the Environmental Officer for advice on creating field margin buffer zones and wildlife-friendly ditch management	Environmental Officer, Natural England, Wildlife Trust, FWAG	Ongoing	Number of contacts received and passed to Environmental Officer	<i>One. An inquiry from A Farms Ltd was passed to the Environmental Officer who spoke discussed opportunities with the farm manager.</i>
4	Control invasive species	4.1	Report any sightings of non-native invasive species immediately to the Environmental Officer and control as appropriate (see Appendix F for species list)	Environmental Officer, Environment Agency, Plantlife, Wildlife Trust	Ongoing	Reports to Environmental Officer	<i>Water fern, (Azolla) found in drains 1 to 7. A treatment of the control weevil introduced by the EA.</i>
5	Plant black poplars to increase existing population	5.1	Identify suitable sites and plant at least 2 young black poplars	Environmental Officer	2015	Number of trees planted	<i>Sources of appropriate local black poplar stock are being investigated by the EO. Suitable sites are being identified.</i>

Reedbed Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Identify, assess and map any areas of reedbed over 0.5ha in size	1.1	Pass details of any known areas to MLC Environmental Officer	Wildlife Trust, Natural England, Environment Agency	2012	Review of reedbed areas carried out	<i>No areas of reedbed over 0.5ha identified.</i>
2	Support appropriate reedbed creation	2.2	Manage the District adopted drains, where possible, to assist private landowners who wish to create areas of reedbed on their own land	Wildlife Trust, Environment Agency	Ongoing	(a) Number of requests received (b) Number of landowners assisted.	<i>(a)One approach received. (b)One landowner assisted by EO.</i>
3	Take conservation value of reedbed into account when planning and carrying out ditch and river maintenance	3.2	Where reeds are present, commence mowing or cleansing work outside the bird breeding season (7 th April – 15 th July). Where reeds are growing in water be aware of the potential for late-nesting reed warblers being present until late August and avoid mowing in that location. In exceptional circumstances where this is not possible, seek advice from the Environmental Officer.	Environmental Officer, Wildlife Trust, RSPB	Ongoing	Reeds not cut during bird nesting season	<i>Reeds were not cut during bird nesting season.</i>

Grazing Marsh Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Identify, assess and map areas of existing floodplain grazing marsh	1.1	Pass details of any known areas to Environmental Officer	Wildlife Trust, RSPB, WWT, Natural England, Environment Agency	2012	Review of potential grazing marsh area carried out	<i>Report due in 2013</i>
2	Support landowners in creating or restoring grazing marsh / wet grassland	2.1	Manage District adopted drains where possible to assist private landowners and organisations undertaking habitat creation	Environmental Officer, Natural England, RSPB, WWT, Wildlife Trust	Ongoing	(a) Number of requests received (b) Number of landowners assisted	<i>(a) no new requests received (b) the Board supports the maintenance of the wet grassland project at Example Bridge and makes water available when possible.</i>

Open Water Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Promote the creation of ponds, lakes and reservoirs in appropriate areas	1.1	Consider pond creation as mitigation when a ditch has to be filled in or culverted	Local authorities, Amphibian & Reptile Conservation, Wildlife Trust	Ongoing	(a) Number of mitigation opportunities (b) Number of ponds created	<i>(a) One mitigation opportunity occurred, (b) 2 pond areas were created on ditch corner sites and a ditch widened with a conservation shelf at ditch adjacent to 12-13.</i>
		1.2	Support creation of flood storage areas and reservoirs	Environment Agency, Natural England, Wildlife Trust, RSPB	Ongoing	Number of projects involved with	<i>No application for flood storage areas or reservoirs received.</i>
		1.3	Assist private landowners with advice, information or contacts as necessary	Amphibian & Reptile Conservation, Wildlife Trust	Ongoing	(a) Number of information requests (b) Number responded to	<i>(a) One information request received, (b) EO responded with information on management for amphibians.</i>
2	Look for opportunities to create open water habitat when managing ditches	2.1	Create a pool at an appropriate ditch junction when re-profiling (see the Drainage Channel Biodiversity Manual, technique CL3))	Environmental Officer	2010	One pool successfully created	<i>During re-profiling of ditch 45-46 a ditch corner pond area was created at point 46. Marked on management map.</i>

3	Support appropriate habitat creation as part of gravel pit restoration	3.1	Support inclusion of wetland habitats such as wet woodland, wet grassland, scrub and open water in gravel pit restoration schemes	Aggregates companies, local authorities, RSPB, WWT, Wildlife Trust	Ongoing	Number of schemes involved with	<i>No current schemes active.</i>
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Water Vole Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Manage ditches according to the law and to best practice for water vole	1.1	Assume water voles are present when carrying out works (discuss special circumstances with the Environmental Officer) and follow the ADA water vole mitigation guide	Environmental Officer	Ongoing	Measures incorporated in management plans	<i>Water vole friendly ditch maintenance practices were adhered to.</i>
		1.2	Publicise good practice for rat control near drainage ditches	Environmental Officer, Wildlife Trust	Ongoing	Good practice publicised	<i>Good practice for rat control to be publicised via Environmental Officers newsletter.</i>

2	Enhance drainage ditch habitat to benefit water vole	2.1	Look for opportunities to add a marginal shelf when re-profiling banks	Environmental Officer	Ongoing	(a) Opportunities identified (b) Measures taken	<i>(a) One opportunities identified (b) 150 meters of shelf created during re-profiling process, mapped on management plan.</i>
		2.2	Consider using coir roll to stabilise banks and provide marginal vegetation	Environmental Officer	Ongoing	(a) Sites considered (b) Measures taken	<i>(a) A possible site for this measure identified on ditch 17-18. (b) marked on Management Man</i>
3	Monitor water vole populations	3.1	Set up a survey programme to monitor water vole populations	Environmental Officer, Wildlife Trust	2010	Surveys carried out	<i>Informal surveys carried out by EO as part of the Management Plan creation, mapped on M Plan</i>
		3.2	Provide data on water vole to the relevant Biological Records Centres	Environmental Officer, CPBRC, NBIS	Ongoing	Data sent via Environmental Officer annually	<i>Records passed to Wildlife Trust & Biological Records Centre.</i>
4	Control mink as necessary	4.2	Carry out mink control as part of the Middle Level programme and report all sightings to the Environmental Officer	Environmental Officer	Ongoing	(a) Number of trapping days (b) Number of mink caught	<i>Mink trapping contacts required within the District. Traps, training, support available from Environmental Officer.</i>

Otter Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Improve otter habitat	1.1	Identify and maintain existing key bushes and trees near watercourses likely to be important for otters	Environmental Officer	2012 and ongoing	Sites identified and listed in management plans	<i>Any key bushes and trees will be identified as the management plan is developed. An otter holt was constructed in the side of ditch 72-78 during January 2011. Otter spraints are regularly recorded at Example Bridge and occasionally seen on the outfall concrete of Example Pumping Station.</i>
2	Monitor otter populations	2.3	Ensure any dead otters are reported to the Environmental Officer and transferred to the Environment Agency for post mortem	Environment Agency	Ongoing	Otters reported to Environmental Officer, if found	<i>No dead otters were recorded within the District during the period. A post mortem report was received for a otter road casualty recovered in 2010 and passed to the Environment Agency.</i>
3	Reduce otter deaths related to eel and crayfish trapping and road traffic	3.1	Report incidents of suspected illegal netting, trapping or fishing to the Environment Agency Fisheries Officers and the MLC Environmental Officer	Environment Agency, Angling Clubs & syndicates	Ongoing	Incidents reported, if discovered	<i>No illegal netting incidents recorded. Suspicious activity reported to the Environmental Officer.</i>

Bats Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Improve habitat for bats	1.1	Put up at least 3 bat boxes at appropriate sites, e.g. pumping stations	Bat Conservation Trust	2015	Number of bat boxes sited	<i>One. A panel bat box was installed by the EO at Example PS on 01/11/11.</i>
		1.2	Pollard suitable trees to provide bat roosts		Ongoing	Number of trees pollarded	<i>Suitable trees were identified and marked on Management Map.</i>
		1.3	Identify potential sites for a bat hibernaculum, e.g. in disused buildings or tunnels	Environmental Officer , Bat Conservation Trust	As opportunities arise	(a) Potential sites looked for (b) Site created	<i>To be progressed during management plan creation.</i>
2	Collect information on bat populations	2.1	Monitor bat boxes	Bat Conservation Trust	2015 onwards	(a) Number of boxes monitored (b) Number of boxes used by bats	<i>(a) One (b) One, droppings recorded below box from 05/05/12 to 15/09/12</i>
		2.2	Pass bat box information to CPBRC and NBIS	Environmental Officer, CPBRC, NBIS	2015 onwards	Data via Environmental Officer annually	<i>Passed to CPERC</i>

Kingfisher Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Improve the quality of kingfisher habitat	1.1	Provide at least one potential nest hole in sheet pilings	Environmental Officer	Ongoing	Number of nest sites provided	<i>The sheet piles at both pumping stations present limited opportunities for this action but other potential sites are under consideration.</i>
		1.2	Leave kingfisher fishing perches where possible (e.g. occasional branch)	Environmental Officer	Ongoing	Number of perch sites left	<i>Appropriate opportunities to be identified.</i>
2	Collect records of kingfisher breeding between March and July	2.1	Note sightings of potential breeding kingfisher and pass information to CPBRC and NBIS via the Environmental Officer	Environmental Officer, CPBRC, NBIS	Ongoing	Data sent via Environmental Officer annually	<i>No specific breeding sites identified but kingfishers are regularly active on pumping station drains and the nearby River Delph.</i>

Barn Owl Action Plan

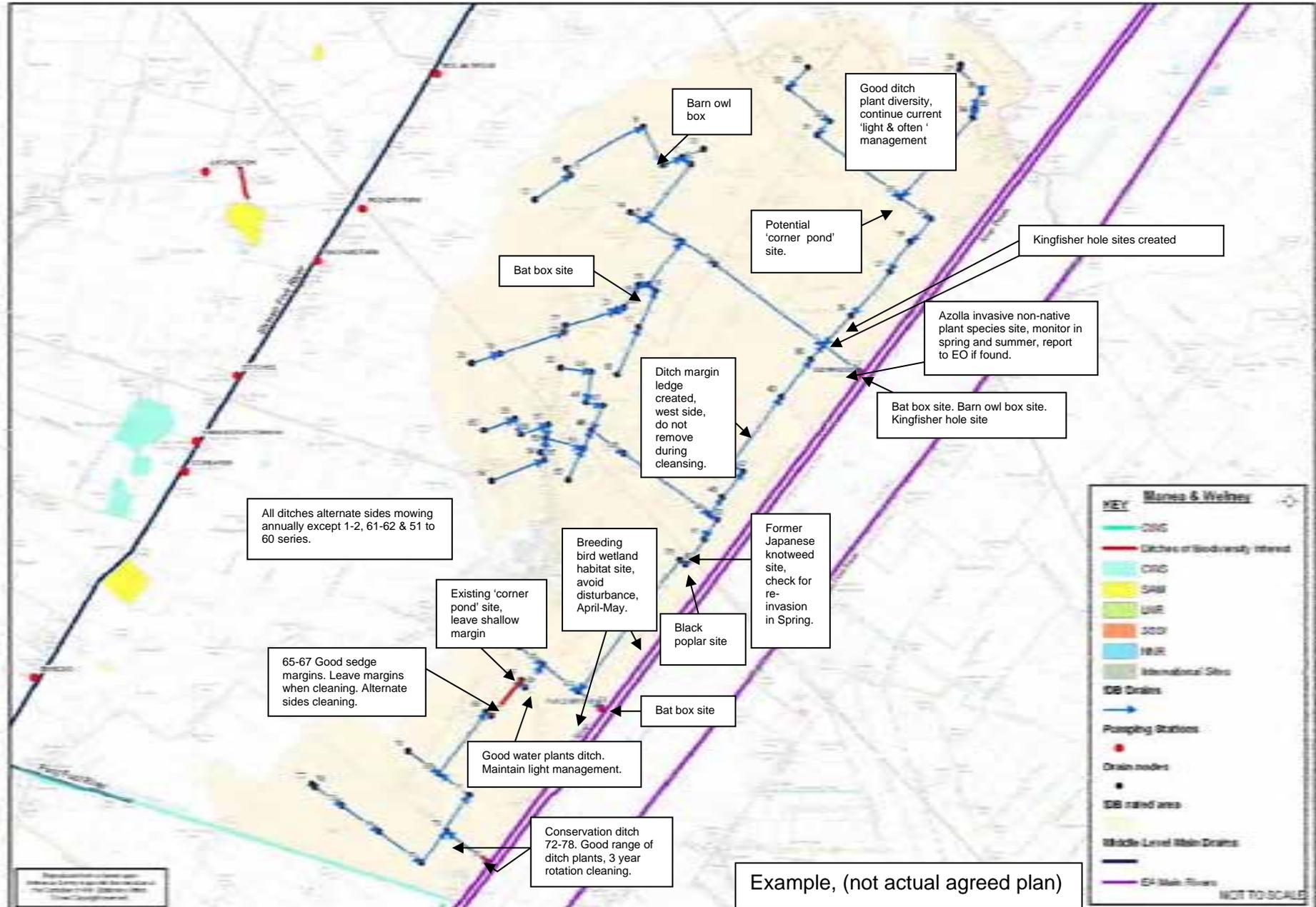
Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Improve the quality of barn owl habitat	1.1	Put up at least 3 barn owl nest boxes in suitable locations	Wildlife Conservation Partnership	2015	Number of nest boxes provided	<i>A suitable location has been identified for one of the Board boxes. Other sites to be identified.</i>
		1.2	Pollard suitable trees to provide natural nest sites	Environmental Officer	Ongoing	Number of trees pollarded	<i>Suitable trees to be identified.</i>
2	Collect records of barn owl presence	2.1	Monitor nest boxes for use. Have occupied boxes checked for success by licensed barn owl ringers.	Wildlife Conservation Partnership	2015	(a) Number of nest boxes checked by licensed ringers (b) Number of nest boxes used	<i>Annual, once boxes are installed</i>
		2.2	Pass barn owl box information to CPBRC and NBIS	Environmental Officer, Wildlife Conservation Partnership, CPBRC, NBIS	2015	Data sent via Environmental Officer annually	<i>Annual, once boxes are installed</i>

Procedural Action Plan

Target Reference	Target	Action Reference	IDB Actions	Partners	Date	Indicators	Reporting
1	Provide training on IDB BAP and conservation management of drainage channels for all relevant staff by 2013	1.1	Establish programme of 1-day courses for IDB staff and members	Environmental Officer, Wildlife Trust, Natural England, other specialists	2013	(a) Number of courses held (b) Number of Board members / staff attending courses	<i>(a) Two meetings held, BAP Launch and District Officers meeting, (b) Chairman attended first, District Officer attended second.</i>
		1.2	Establish suitable training for contractors' staff	Environmental Officer, Contractors	2013	Contractors attended training course	<i>A Workshop on 'Ditching where Water Voles are present' for ditching machine operators and managers was run during June 2010 and attended by the boards ditching machine operator.</i>
2	Take biodiversity into account when planning and undertaking capital works	2.1	Consult with the Environmental Officer and choose the best possible mitigation solutions for biodiversity, e.g. fish-friendly pumps	Environmental Officer	Ongoing	(a) Number of capital schemes undertaken (b) Number of schemes commented on	<i>(a) No capital schemes undertaken by the Board during the year (b) therefore no schemes to commented on.</i>

Middle Level IDB BAP Management Plan Map Example

Appendix 12



Example, (not actual agreed plan)

