Stop the Spread of Aliens!

Illegal aliens are posing a major threat to our waters and aquatic life. Anglers have a key role in preventing their introduction and spread, according to **Dr Joe Caffrey** and **Mark Corps** of **Inland Fisheries Ireland.**

Alien species – invasive non-native species as scientists call them – are defined as species whose introduction and/or spread threaten biological diversity or have other unforeseen impacts. They occur in all major groups including animals, plants, fungi and microorganisms. Invasive species represent one of the greatest threats to biodiversity worldwide, second only to that caused by direct habitat destruction. They also pose the greatest threat to fragile ecosystems, such as islands. Their introduction is acknowledged to be one of the major causes of species extinction in freshwater ecosystems. Because rivers, lakes and watercourses generally provide efficient conduits for the dispersal of many invasive species, these habitats are particularly vulnerable to the spread of these aggressive newcomers.

Ireland has a unique set of flora and fauna that is the product of geographic, climatic and more recently human influences. Under natural circumstances this flora and fauna is in a state of environmental equilibrium. However, this equilibrium can be easily altered by the addition or removal of species. This alteration can be positive or negative, although usually systems rebalance themselves in time. Throughout history it has been seen that humans are very effective at altering the environment around them. For example, after the last Ice Age, Ireland only had some nine freshwater fish species, whereas today we have over 20.

Invasive non-native species pose a growing threat to Ireland's unique biodiversity and a significant threat to economic interests such as agriculture, forestry, fisheries and tourism. Changes bought about intentionally can be bad enough, but those due to the Law of Unintended Consequences can be significantly more detrimental. This law is an adage or idiomatic warning that an intervention in a system can create unanticipated and often undesirable outcomes. Akin to Murphy's Law, it is commonly used as a warning against the hubristic belief that humans control the world around them.

Unintended consequences can broadly be divided into three types: positive, unexpected benefits (serendipity), negative, unexpected or detrimental outcomes occurring in addition to the desired effect of the policy and a perverse effect that is contrary to that intended (for example when an intended solution of a problem actually makes the problem worse).

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Famous Last Words

Many animals have disappeared due to intentional removal, or introduction of competitor/predatory species or diseases. In Ireland both the wolf and beaver were hunted to extinction whilst other species have been intentionally introduced such as roach, rainbow trout and chub. Species apparently harmless in their original niche have proved disastrous in new environments. The well-known and possibly classic example of a disastrous introduction of a species to a new environment is the rabbit to Australia. Rabbits originated in the Iberian Peninsula, and were bought to the British Isles by the Romans/Normans. This proved to be a positive addition as they represented a valuable source of both food and clothing. In 1859 the rabbit was transported to Australia by Thomas Austin, a British landowner. He released 12 rabbits on his Barwon Park estate, near Winchelsea, Victoria, because he missed hunting them. He

Sign at Glenade asking anglers to clean boats to avoid transporting Zebra mussels.

is famously quoted as having said: "The introduction of a few rabbits could do little harm and might provide a touch of home, in addition to a spot of hunting."

Since their introduction the effect of rabbits on the Australian ecology has been devastating. Rabbits are the most significant known factor in native species loss on this continent, as well as destroying farmland through burrowing and vegetation removal. The Australian government has spent tens of millions of dollars in control and eradication programmes with, as yet, minimal success.

Unintentional introductions can occur when species are transported by human vectors. Three species of rat (the black, Norwegian and Polynesian) have spread to most of the world as hitchhikers on ships and they have been blamed for the extinction of many species, including the ground-nesting dodo. Numerous marine organisms have been introduced via ballast water. These include the zebra mussel and the Japanese sea squirt.

Non-native plants are commonly introduced outside their range as either ornamental plants or for erosion control, stock feed, or forestry. Whether an 'exotic' will become an invasive species is seldom clear in the beginning and many non-native ornamentals languish in the trade for years before suddenly naturalising and becoming invasive.

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Being an Island on the edge of Europe, Ireland has a relatively restricted list of invasive species by comparison with the UK or most continental countries. Some of the most notorious invasive species in Ireland are the aquatic plants. These commonly and robustly oust resident native species and they have the capacity to dramatically alter the ecology of our waterways. As a consequence, waterways can be completely choked with a single species, leading to impeded navigation, restricted angling and impaired water based recreation.

The following are some of the more high impact invasive plant species present in Ireland.

Lagarosiphon major (Curly-Leaved Waterweed)
Elodea nuttallii (Nuttall's Pondweed)
Crassula helmsii (New Zealand Pygmy weed)
Azolla filiculoides (Red Water Fern)
Fallopia japonica (Japanese Knotweed)
Heracleum mantegazzianum (Giant Hogweed)
Impatiens glandulifera (Himalayan Balsam)
Gunnera tinctoria (Chilean Rhubarb)

To try control or remove invasives once they have taken hold takes time, money and effort. If left to their own devices, the invasives can cause the complete eradication of native species and alteration of native habitats. They can also preside over other long term environmental impacts that once started cannot easily be stopped or reverted. These effects are not just simply ecological. Often they have appreciable economic and or social impacts.

Japanese Knotweed (*Fallopia japonica*) is an invasive species listed by the World Conservation Union as one of the world's 100 worst invasive species. Its root system and strong growth can damage foundations, buildings, flood defences, roads, paving, retaining walls and architectural sites. The prodigious growth of the plant can also reduce the capacity of channels in flood defences to carry water. The success of this species is attributed to its tolerance of a wide range of soil types, pH and salinity. Its rhizomes can survive temperatures of -35°C and can extend up to 7m horizontally and 3m deep, making removal by excavation extremely difficult.

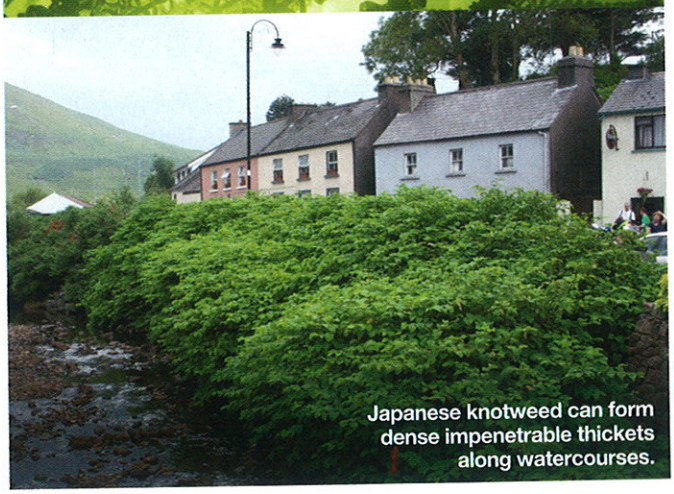
The first confirmed sighting of Curly-leaved Waterweed (*Lagarosiphon major*) in Lough Corrib was at Rinnerroon Bay in April 2005. This plant is a tall, canopy-forming and submerged macrophyte, native to southern Africa. It is an aggressive invasive species. Since 2005 it has expanded its range throughout the northern and middle sections of the lake, colonising shallow sheltered bays. It can form dense infestations in suitable habitats and is capable of occupying the full water column in waters up to 5m deep. It has stems that are easily broken and float freely within the watercourse.

Lagarosiphon dramatically alters the ecology for native plants, insects and importantly fish, creating a poorer ecosystem. It can cause fish kills through oxygen depletion. In Lough Corrib infestations have made bays impossible to fish as well as making the environment more suitable for coarse rather than the game fish for which the Corrib has worldwide renown. It therefore poses a serious threat to tourism, angling, boating and other recreational pursuits and of the utmost importance the local economy.

For Irish salmon anglers, a doomsday scenario would be the introduction of *Gyrodactylus salaris*, a small, leech-like parasite. Attachment of the parasite to salmon can cause large wounds allowing for secondary infection. *G. salaris* can build up to very high infection intensity of several thousand parasites on


Rainbow trout – an exotic that has not turned invasive.


Lagarosiphon can fully carpet an area up to 5 m deep.


Japanese knotweed can form dense impenetrable thickets along watercourses.

a single salmon parr. Since the appearance of *G. salaris* in the 1970s, Norway has seen a catastrophic loss of Atlantic salmon. So far over 40 Norwegian rivers have been infected and their salmon populations effectively exterminated. This parasite is a clear threat to other salmon populations both in Norway and elsewhere in the world and the worry is that it may be introduced via fishing equipment. To survive the parasite only needs a wet environment.

In order to ensure that they play no active role in dispersing the parasite anglers must become 'Biosecurity aware' and ensure fishing equipment is disinfected both before and after use (see below). In an effort to control the spread of Zebra mussels numerous fisheries now recommend/insist that boat owners power wash their boats and trailers before launching. However, sites to do this are few in numbers and too many anglers simply do not bother. Boats can be vectors for the unintentional introduction of invasive species but so can fishing tackle. Dr Joe Caffery of Inland Fisheries Ireland (IFI) has produced the following guidelines for anglers to try to ensure that they will not be the unintentional vectors for the transportation of invasive species, be they fauna or flora.

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Disinfection of Angling Equipment

Both Aquatic Invasive Species (AIS) and fish parasites can be are readily transferred from one watercourse to another on angling tackle, boats and protective clothing. These can be very damaging to resident fish stocks, the aquatic habitat and the general environment. In order to ensure that invasive species and fish diseases are not inadvertently transferred into Ireland's waters from abroad or within the country from an infested water body to one that is free from these organisms, it is essential that all angling equipment is routinely inspected and disinfected following each fishing trip.

Items of angling equipment that require attention might include: protective clothing, wellingtons and waders; boats, outboard motors and trailers; float tubes; rods, reels and line; landing nets, keep nets, stink bags, weed rakes and unhooking mats.

Prior to leaving any watercourse following a fishing trip, the angler should routinely visually inspect all equipment that has been used in or exposed to the water. Remove and safely dispose of all attached plant or animal material. Clean and disinfect the equipment at the water's edge or later, as appropriate, making reference to the following suggestions. The best method of disinfection is drying thoroughly in direct sunlight, optimally for 48 hours.

Protective Clothing

Clean, wash or disinfect (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) all articles of clothing. Footwear should be dipped in disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards.

Angling Tackle

Rods should be sprayed or wiped down with a cloth soaked in an appropriate disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product), rinsed with clean water and dried. Spools and line should be immersed in disinfectant solution for 10 minutes, after which they should be rinsed in clean water and dried. Alternatively, they should be soaked in a bucket of hot water (at least 60°C/140°F) and then dried. Lures and floats should be immersed in disinfectant solution for 10 minutes, after which they should be rinsed in clean water and dried. Alternatively, they should be soaked in a bucket of hot water (at least 60°C/140°F) and then dried.

Giant Hogweed, which can grow to over 8ft can cause blistering of the skin if its sap gets in contact with the skin.

Nets, Storage Bags and Mats

Landing nets, keep nets and stink bags should be thoroughly dried in direct sunlight for 48 hours following each fishing trip. Alternatively, they should be immersed in disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product). They should then be rinsed in clean water and left to dry.

Weed rakes and rope should be immersed in disinfectant solution following each fishing trip and thoroughly dried afterwards. Unhooking mats should be visually inspected, cleaned and washed with disinfectant solution.

Boats, Outboard Motors and Trailers

Visually inspect the boat, outboard motor and trailer once this equipment has been removed from the water. Remove all adherent plant and animal material and dispose of in sealed bags.

Visually inspect and thoroughly clean the anchor, ropes and any other equipment used in the boat during the angling trip. These should also be immersed in disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and dried thereafter.

Drain all water from the boat and from the outboard motor before moving to a different water body.

Where possible, power hose the interior and exterior of the boat using heated water (60°C/140°F). Where this is not possible, the boat should be washed before leaving the catchment and not reintroduced to any water for a period of five days.

Cooling water should be drained from the outboard motor and, where possible, it should be flushed with disinfectant solution.

Protective gloves should always be worn when handling disinfectant and the manufacturers' guidelines should be rigorously adhered to.

Dr Joe Caffery is a senior research officer and Mark Corps is an angling advisor for Inland Fisheries Ireland. To learn more about invasive species please go to **www.caisie.ie**