

The legislation for prevention of the spread of invasive non-native species (INNS or FINNS) is **The Wildlife & Countryside Act 1981**. It is a prosecutable offence to knowingly spread these species under the Act. So taking thorough, sensible precautions should be seen to be a reasonable defence for a fishing club and will definitely be in the rivers ecological interest.

A bio-security station, situated on-site, visited before and after fishing is commenced helps to facilitate control of invasive species. Fishers should log in and log out confirming they have observed proper bio-security measures by confirming that they have cleaned and inspected their equipment. It is irksome but use will bring realisation and consideration of the growing problems we have and with that understanding and a measure of control.

The strategy is that those organisms that contaminate equipment stay on the contaminated part of the catchment and is not spread by anglers. Similarly, decontamination before you fish prevents the introduction of INNS & FINNS to a previously uncontaminated site if you come from an unprotected site. Do not move from a contaminated site to an uncontaminated site without taking action to decontaminate.

Monthly invertebrate monitoring as promoted by the River Fly Initiative should give fisheries a rapid assessment of any recently introduced problems. This should flag up a potential breakdown in bio-security.

We can only protect against the interventions of humans. Wildlife presents another vector that we can do little to alter. However, human intervention is by far the most potent method of dispersal of INNS & FINNS and water-borne activity enthusiasts must figure strongly in the list of potential human vectors. It is clear that all recreational users of water should follow these procedures and we can hardly be critical of others if we are not prepared to protect the river ourselves.

THE IMMEDIATE PERCEIVED THREAT

INNS of particular interest (that we know about) to us are :-

Dikerogammarus villosus (KILLER SHRIMP)**, **Dikerogammarus haemobaphes (DEMON SHRIMP)****. A rapid risk assessment by Cambridge University has concluded that the ecological risk from these species is high (with high confidence). The impact in GB is likely to be high leading to decreased bio-diversity in the invaded range by competing with or preying upon a broad range of invertebrates and small fish. All riverside dependant wild life will be affected.

Signal Crayfish harbours the water mould fungus *Aphanomyces astaci* which is lethal for our native White Clawed Crayfish. The invasive Signal Crayfish has made dramatic inroads into the distribution of our native White Clawed Crayfish and are a significant destabilizer of river banks worsening the silting of river beds and the effects of flooding. It is a considerable challenge in as much that it can exist in much higher densities than our native crayfish and

can interbreed with the native crayfish but the offspring are sterile. Trapping may reduce the larger Signal Crayfish population and may offer a valuable control technique if carried out diligently over a considerable period. It is very labour intensive and would need to involve a whole catchment to be effective. The presently available traps are designed for commercial use and they do not take out whole populations. Removal of large adult breeding Signal Crayfish may be counter productive since it is likely to exhibit the phenomenon of the recruitment of suppressed juveniles into the breeding cohort and there are many more of them than the presently breeding adults. It seems that the presence of larger (female?) Signals suppresses the ability of younger Signals to breed, possibly by chemical means (pheromone suppression?). Additionally, the larger Signals predate their young providing some measure of control. Our freshwater invertebrate insects are vulnerable to younger stages of Signal Crayfish especially the slow moving species such as caddis. The occupation of niches protected from the current by Signals also displaces fingerlings and parr from vital shelter.

NOTE that the Signal Crayfish is one of 6 invasive crayfish known to be present in the UK.

Gyrodactylus** is a trematode parasite of salmonids, invisible to the naked eye, originating as a severe problem in Norwegian fish farms which has transferred to wild stock, with 80% mortality. It is a freshwater parasite and may infect salmon, sea trout, brown trout, rainbow trout, grayling and char. It is not yet present in the UK and is fortunately a relatively easy organism to eradicate from anglers kit using 1% Virkon or 3% salt water immersion for 20 mins (CEFAS), freezing for 24 hrs or thorough drying out for at least 48 hrs, offering anglers a solution to their equipment problems.

Not so easy, perhaps, for other river users.

The Norwegians have opted, experimentally, to kill all life in two of their salmon rivers that were infected, so severe do they view the effect of Gyrodactylus on salmonids (they used the **organophosphate** parasiticide Rotenone). Newer treatments (using aluminium and weak sulphuric acid solutions) less damaging to wild life have been tried in Norway with success in 20 of the 48 rivers treated.

Infectious salmon anaemia (ISAv)** is a viral disease which is the first of the risk diseases classified on List One of the European Commission's Fish Health Regime. As the name implies it produces anaemia by infecting the DNA of red blood cells. Its presence has been confirmed on Scottish fish farms and death rates may approach 100%.

Ulcerative Dermal Necrosis of salmonids, causal agent unidentified but is known to be complicated by the fungus Saprolegnia. The most severely affected fish die before spawning with a high mortality rate in the remainder post-spawning. Seen in the R Spey as a recurrence in 2012, 2013 and there are reports of infected salmon and trout in 2014. It shows high mortality rates if the lesions are found on the body as well as the head. Anecdotally, I have noted Saprolegnia infections in brown trout usually around the mouth which

may be related to hook trauma.

FINNS of particular interest (that we know about) are :-

Floating Pennywort* which can grow up to 20cms a day forming dense mats that float to the water surface, blocking out light and squeezing out our native species including fish and invertebrates and increasing flood risk and reducing access to water sports enthusiasts.

Water Primrose** has similar consequences to the Floating Pennywort and should be reported immediately to the NNS Secretariat.

Giant Hogweed which grows up to 5m in height, produces thousands of seeds is a really problematic plant on catchments and may cause very severe skin irritation. It can make the riverside unapproachable.

Himalayan Balsam is a shallow rooted garden escapee which shades out plants which have deeper root systems and destabilises river banks making them prone to erosion and promotes silting of the river bed. Eradication is time consuming and very precise techniques are required for successful removal. However, removal from our water courses is a possibility. The **good news** is that from 2015 the EA is to trial a biological control method. A Himalayan Balsam specific fungal rust infection is to be introduced into three counties in the South of England. This has been developed over the last eight years by CABI and should reduce the problems associated with this species – in the meantime we should continue our efforts.

Japanese Knotweed is another garden escapee. It is considered to be of low ecological importance (except on building sites) by DEFRA, difficult to eradicate and is estimated to cost upwards of £8/m² to remove. It can grow very densely on river banks affecting access and shading out other vegetation.

CONCLUSIONS

This is a very brief list of some presently perceived threats to our fisheries. There are many more waiting to be imported into the UK, and the threat increases the more we travel and take part in water based activities.

BIO-SECURITY IS ABOUT RECOGNISING THE PROBLEMS OF TODAY AND THE POTENTIAL RISKS OF TOMORROW. IT INVOLVES US THINKING CAREFULLY ABOUT THE WAY WE PERSUE OUR ACTIVITIES AND FORWARD PLANNING.

BIOSECURITY IS NOT AS SIMPLE AS CLEANLINESS, USING CHEMICAL SPRAYS AND OTHER TECHNIQUES TO DECONTAMINATE OUR KIT BUT ALSO THE WAY WE OPERATE. IMPORTANTLY IT HELPS US TO THE ACKNOWLEDGE THE RISKS AND RESPONSIBILITIES THAT MUST BE ACCEPTED TO PROTECT OUR WATER BODIES AND OUR FISHING.

**IF WE WISH TO PROTECT OUR WATERSIDE ENVIRONMENT
BIO-SECURITY HAS TO BE AT THE FOREFRONT OF OUR THINKING**

**THE GOLDEN RULE IS TO BRING NOTHING TO YOUR RIVER AND TAKE
NOTHING AWAY WHEN YOU LEAVE**

REGRETABLELY THERE ARE NO SHORT CUTS!