

*LODDON FISHERIES AND CONSERVATION
CONSULTATIVE*



**THE STATE OF THE
LODDON**

A REVIEW OF PROBLEMS AND IMPACTS

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Introduction

Angling catches at least on the lower Loddon and the lower Blackwater appear to have crashed over the last 10 -15 years. But why? Whatever the issues we do not have a scientific control with which to compare the current situation.

There are fewer, far fewer, 'coarse fish' anglers on the rivers than 15 to 20 years ago, but does this reflect poor fish stocks, an underlying change in the habits of many anglers (possibly both), or even simply less interest in angling? The popularity of carp fishing, often in prolifically stocked fisheries, has undoubtedly enticed many off the rivers, or better captured the attention of the younger angler. At the same time there has been a significant decline in interest for match angling, the remnants of which have also been drawn to the intensive still water fisheries. Some of these anglers cite the poor access to the actual water as a hindrance to their angling.

There still remains however an interest in our rivers, from a 'hard core' who probably enjoy the different species and challenges of the more natural environment provided by flowing water. This is certainly reflected by the continued popularity of trout angling on the 'headwaters' of the Loddon, Whitewater and Lyde. Many match anglers are still interested in pitting their skills against the different challenges offered by the rivers, but are reportedly deterred by the poor catches and the restrictions of either heavily weeded stretches or excessive marginal tree cover, particularly on the smaller rivers like the Loddon. This has certainly resulted in a reduction in bait entering the water, which could have caused fish to be less likely to accept unfamiliar food items.

But are there fewer actual fish present, if so what are the causes and what if anything can we do about it? Any measures that can reduce the pressure on stocks may help restore fish populations and the wider aquatic flora and fauna to more natural levels. An expansion of Environment Agency (EA) surveys would be invaluable in providing a more robust data set, but any extra surveys need to target those parts of the catchment giving most concern, unfortunately the very areas where efficient surveying is particularly challenging.

The most recent perceived decline has come on the back of significant summer flood events during 2007 and 2014. These warm water floods are possibly much more likely to stimulate fish movements, occurring close to spawning time and during a period when their metabolic activity is enhanced. The apparent reduction of stocks in the Loddon and lower Blackwater (and also the nearby Kennet) has seemed to have been accompanied by an increase in catches on the main River Thames. Has there been a simple re-location of stocks? Certainly following the floods of July 2007, carp from still waters in the Windrush valley upstream of Oxford were found in the Thames as far downstream as Reading, whilst a known 'Mirror' from a lake at Twyford was found in the Thames tideway in London, both movements of around 60 miles (96 km). In a fully natural system these movements would be of little impact, fish would almost certainly repopulate stretches in their own time. However there are many man made barriers to fish movements, which are at the best slowing these natural processes.

Further support for this theory could possibly be found in barbel (*Barbus barbus*) stocks in the Thames catchment and its tributaries. Barbel are a natural species in the Thames and are accepted as having been present in the river since the last ice age. Prior to the restrictions to movement from weirs they probably naturally populated many Thames tributaries. However there is some, admittedly inconclusive anecdotal evidence, that they were absent in the Loddon at least as far upstream as Swallowfield, until some stocking occurred in the late 1960s or early 70s. It is conceivable that this species, which may not naturally be as prolific, it certainly produces less eggs and requires slightly different spawning conditions to most other coarse fish species, could effectively have been washed out of a system like the Loddon over a period of time, only to re-populate with human assistance.

(Grayling found in neighbouring tributaries may also be absent for similar reasons).

However this issue cannot adequately explain the apparent decline in barbel and other species in St Patrick's Stream (a tributary of the Thames at Shiplake) where there are no obstructions to the return of fish into the watercourse from the Thames. St Patrick's Stream has been a notable fishery, mentioned in many publications, for a considerable period at least as far back as the 1950s.

The issue of lack of connectivity is however being addressed. The construction of the bypass channels at Arborfield and Stanford End along with baffle installation on gauging weirs at Swallowfield and Sheepbridge, is being supported by a proposed project on the Emm Brook in Wokingham. The issue at Stanford End is interesting in that the weir at this location was washed out during the 1987 storm, with the apparent result of the establishment of a good barbel spawning area a few hundred metres upstream. Unfortunately the rebuilding of this weir has drowned out this particular spawning site, although it is hoped that the accompanying by-pass channel and habitat improvements upstream may mitigate against this loss. As well as limiting access to spawning gravels there is also a possible problem of genetic isolation when populations are no longer able to mix to any great extent. This is little studied and the implications are not well understood.

The problem of weirs reducing connectivity between reaches of a river has long been accepted with the iconic migratory species such as Atlantic salmon (*Salmo salar*) and European eel (*Anguilla anguilla*), but it must not be forgotten that virtually all species are migratory, it is just that their ranges may be far smaller. There are references at least as far back as the mid 1800s when Buckland acknowledge that dace in the Thames were interrupted in their spawning migrations, and he suggested “a plan for fish passes either through or round all the weirs on the Thames which are found to obstruct fish.”⁽¹⁾

Are we simply in the midst of a similar event or are there other factors at play? Habitat degradation, pollution, predation and invasive species to name but a few may all be playing a supporting role to varying levels. Many of these issues are accepted as pressures on both flora and fauna worldwide. There is no reason why our local fish populations are not under similar pressures. There seems to be a common pattern in rivers such as the Great Ouse and Kennet where a population of large and therefore old barbel has declined rapidly in recent years. While the two rivers did not follow the exact same pattern of decline it appears that a lack of recruitment into the adult population may be affecting a number of rivers.

Some aspects of these problems are closely interlinked. For example the invasive Signal crayfish can be a direct predator of fish eggs, but at the same time altering habitat by restricting aquatic plant growth, facilitating river bank collapse and increasing siltation of gravels through its burrowing habits and competing for food. They can at the same time become a prey item for fish, or possibly reduce the impact of other predators by becoming their prey.

Habitat degradation

Arguably one of the major impacts on the Loddon alongside installation of weirs is the dredging that occurred in the period after World War II, when there was a significant effort, not always to control flooding but to also improve land drainage. This resulted in disruption and modification to river channels, river gravels being dumped along the banks, and the removal of many of the bays and backwaters vital for fry survival. More recent attitudes to river management have enabled the start of a long period of natural recovery, which even 50 years later is still ongoing.

It is not simply water that flows down a river. Apart from all the more mobile material, gravel also slowly travels downstream. This process helps to keep the gravels loose, something that is further

supported by fallen trees which create localised high energy sections that throw up cleansed assorted gravels. Gravel supply is also enhanced by the natural wanderings of a river channel, This process is often influenced by those riparian trees, which can sometimes initiate a sudden supply of gravels locked up in the banks. River engineering can often disrupt this process further starving the system of gravel.

That good gravel permeability can provide increased surface area for colonisation by invertebrates, good water circulation within the gravel, and plentiful crevices for fish eggs and the fry of some species, to avoid predation. Some studies have shown that over 98% of rainbow trout eggs (*Oncorhynchus mykiss*) have been lost in heavily silted gravels ⁽²⁾. The effects on barbel, chub (*Squalius cephalus*), dace (*Leuciscus leuciscus*) and bullheads (*Cottus gobio*) could be equally dramatic. Gravel removed from the system during its journey downstream coupled with deepening and widening of the channels has hugely disrupted this process resulting in the loss of those clean, mobile gravels. This situation (coupled with impoundments) has also undoubtedly contributed to problems with brown trout (*Salmo trutta*) recruitment further up the system.

Again there are attempts underway to improve conditions. There has been some limited introductions of gravel at Greywell on the Whitewater, at Swallowfield on the Blackwater and on the main Loddon at Sandford, with further projects planned. Gravel washing has also taken place in a few locations, whilst instream habitat works, mainly using woody materials are also hoped to improve and maintain the quality of existing gravels. However these improvements are small in terms of the size of the catchment. These types of interventions can be expensive to fund, time consuming to administer and gain permits for and opportunities are not always easy to manage. Every effort should be made to encourage and facilitate such works by fishery managers, landowners and the regulatory bodies.

Tree management has also had many effects, perhaps in a variety of ways. Riparian Willows (*Salix*) and Alders (*Alnus*) certainly provide important habitat for many species. Their fibrous submerged root systems can be the perfect spawning medium for the sticky eggs of many species not only of fish, such as Roach (*Rutilus rutilus*) and Bream (*Abramis brama*), but for many aquatic invertebrates. These roots, and the complex mat of submerged branches of fallen trees and boughs, then go on to provide vital refuges for all manner of aquatic life.

The Loddon system still fortunately has many such features, but their clearance, in the name of flood control, and sometimes fishery management, has certainly disrupted the security of some local fish populations. This clearance is also not always directed at the trees and branches that have actually entered the river. In attempts to reduce this perceived risk healthy riparian trees have also been cleared in a pre-emptive strategy, thus removing the future instream material.

Fish surveys at Hawley Meadows near Camberley clearly illustrated this point. A Willow, that provided secure habitat for a shoal of roach, was cleared with the result of the loss of those roach from the survey section, only for the return of some of those fish when some woody structures were re-established at the location. There is currently growing interest in the value of Natural Flood Management (NFM) in slowing flood events. The appreciation of the ability of some of these fallen trees to contribute to NFM should certainly be good for fish and hopefully welcomed by many anglers. The Loddon Fisheries & Conservation Consultative (LFCC) has encouraged this approach and locally supported the EA in producing a management document for landowners.⁽³⁾

This approach is however still not universally accepted, even within the EA, it is further compromised by a desire by some individuals wishing to improve navigation in parts of the river near the Thames confluence, and many who remain convinced that dredging is the answer to flooding. These management practises have conditioned many to view trees in the river with

suspicion, and formed an often deep rooted impression that they are messy, out of place and need to be 'tidied up'. This is despite the fact that there is no associated flood risk or other good reason to remove them.

Conversely it must also be considered that you can have too much tree cover. Over shading can result in suppression of aquatic plant growth and hence biodiversity. Parts of the river are undoubtedly in need of considered tree management to restore some of this diversity. Some matchmen wishing to trot a float through a swim have expressed concern over excess in channel tree debris, although its removal should, perhaps in this case, be carefully considered. A balance needs to be struck between providing the habitat for the fish and access for angling. This principle holds true as much for match angling, as specimen hunting, and for fly fishing, although with an admittedly different slant in each case.

In stream aquatic plants are a further consideration. Dredging has almost certainly affected their distribution, whilst increased nutrients, such as phosphates can further affect growth. Certainly on the upper Loddon upstream of Sherfield a period where beds of Water Crowfoot (*Ranunculus*) were very dominant, was then followed by a change to Club Rush / Bulrush (*Schoenoplectus lacustris*), which now appears to be starting to revert back to Water Crowfoot. This section is regularly weed cut, but it is also receives the discharge from Basingstoke Sewage Treatment Works. It is known that phosphates were a significant issue at this works, but improvements have taken place and appear to be at least partially helping the return of the Water Crowfoot. (Increased water flows are also thought to be an important stimulus to this plant).

Further downstream on both the Blackwater and Loddon stands of Club Rush are a very familiar summer sight, notably in areas free from the shading effects of trees. This plant is typically found in slower moving water and there can be little doubt that dredging has boosted its abundance. There appears to be a tendency for it to start to collect and filter out silt and focus summer flows. This has led to the build-up of instream silt beds that have been colonised by other plants such as Reed Canary Grass (*Phalaris*). As these beds consolidate they are pinching the water flow and possibly returning the river to a width closer to pre-dredging dimensions. The value of these reedbeds in respect to fish populations is difficult to assess but they should be providing some in channel diversity, and with any submerged plants potentially providing a spawning medium and cover for fry.

Enhanced nutrient levels are obtained from many sources, not simply agriculture and sewage. Road run-off, urban development, crayfish burrowing can all play their part. Coupled with slower flows and increased water temperatures, the nature of algal drift in the water and growth on gravels and other substrates can have complex influences.

Water Flows

Floods

As already discussed earlier it is highly likely that floods are having some impact on fish populations. Apart from the lack of connectivity, due to weirs which could be impeding natural fish movements, the dredging deposited a significant amount of material along river banks. These levees are likely to be impeding some movement of fry onto the floodplain during the early stages of a flood and then having the opposite effect as the water recedes, by trapping fry on the floodplain, in much the same way as a tidal fish weir is used to harvest fish. Both these issues could be resulting in some fry loss during floods.

The severity and timing of floods also appears to be changing and this may be a problem with which fish are struggling to cope. This does not simply affect the adult spawners, but also the fry, and can disrupt food supplies at a critical period. The principle of slowing the flow, through NFM and other methods, can help to mitigate against these events. However floods can also bring benefits. Within a properly functioning system they can help to loosen, clean and mobilise river gravels.

It is likely that the rapid urbanisation in the catchment has affected the Loddon significantly by changing drainage patterns. Development of both residential and business areas will have led to a substantial increase in hard, impermeable areas which will have in turn led to a change from slower run-off of rainfall to quickening run-off into surface drains which then discharged into the Loddon, leading to rapid and high flood peaks. In the older developments, sewage and surface water discharges were often combined leading to unmanaged discharges during times of heavy rain.

Low flows / over abstraction

There is no doubt that the Loddon catchment is subject to heavy abstraction which contributes to low flow problems in times of low rainfall. The most recent EA Licensing Strategy Report was released in March 2019.⁽⁴⁾ In the headwater area around Basingstoke, groundwater supplies are considered to be fully exploited meaning no further extraction would be possible without impacting on rivers which rely on groundwater supplies such as chalk streams. For much of the year the Loddon is considered to be exploited to such an extent that additional abstraction can only be made in conditions of high flow. In the Blackwater, the low flows now mean that summer flows are often composed of up to 80% treated sewage effluent. The planned development of Basingstoke and Wokingham, both of which are expected to complete several thousands of new dwellings in the next few years will make this situation worse and it is not clear how any water deficit could be met. Importing water from outside the catchment is a possible option but this could exacerbate existing flooding problems when this water is returned to surface waters via treated effluents.

Low flows are known to cause a number of problems in rivers. Low flows often result on more sediments building up, especially on key habitats such as spawning gravels. This can mean that populations of gravel-spawning fish such as chub and barbel are impacted and it can render gravels unsuitable for some invertebrates. In addition, sediments can cause the death or stunt the growth of some plants such as water crowfoot which function as key habitats for many invertebrates and fish. The build-up of sediments is also a potential flood risk and a fully-functioning river would normally flush these out in times of high flow. If permanent low flows become the norm, sediments can build up and have to be removed mechanically at substantial cost.

Agriculture

Agriculture plays a huge role in the ecology of the catchment. It is often forgotten that many farmers do have an interest themselves with the environment and may often be balancing their farming activities with these desires, whilst some may also be receiving some rent from the fishery. The Loddon like most catchments has a Catchment Sensitive Farming Officer⁽⁸⁾ whilst there are EA staff dedicated to liaising with the farming community⁽⁹⁾, backed up by some useful legislation. In addition University of Reading provides an invaluable role in disseminating information between the various disciplines, through its Loddon Observatory.⁽¹⁰⁾

However poor agricultural practises can undoubtedly have a significant impact on the health of our rivers. Land drainage dredging dramatically altered the river channels, whilst the use of fertilizers, herbicides and pesticides, the type of crops grown, the variety and density of livestock, even the direction of ploughing continue to influence the aquatic and wider environment. The significant

push to increase agricultural production after WWII led to a great deal of replacement of established meadows with more productive grassland which required fertilisers to maintain a high productive level. The installation of field drains also contributed to greater and faster run-off from fields.

The pressure to provide food at ever reducing cost to the consumer also led to higher stock densities and more intensive livestock farming and in turn, as a consequence, to compaction of fields and bank erosion, all compounding the loss of infiltration and loss of potentially productive soil to rivers, where it negatively impacts the system. In more recent times there is an increasing focus within the farming community on soil management and a recognition that healthy soils benefit the farming business. This in turn is beneficial in terms of reducing levels of soil erosion and run-off.

Fully assessing the actual impacts of agriculture would be a huge task, but flagging potential problems and mitigating against them may, and in many cases is already, being actioned. Simple measures such as establishing wide riparian strips, restricting livestock poaching of river banks, ensuring fields are not left bare during the winter, can all be beneficial, not just for the river but often also for the farmer.

In addition to all these potential sources there is also very little knowledge of the effects on aquatic flora and fauna from the interaction with the cocktail of pollutants, combining with those from an agricultural source, entering watercourses.

Pollution

This is a very wide umbrella to what is undoubtedly a complex and significant pressure on stocks. Acute pollution events have fortunately become a relatively rare event. The River Blackwater, at least up to the mid-1980s, was regularly affected with these types of events. They can result in significant fish losses, but it should at least be possible to identify the cause, if not always necessarily the source. They should be short term events and it can be expected that the water quality at least will quickly return to the previous satisfactory status. If there have been effects on the aquatic flora and fauna then recovery is likely to be more prolonged.

However chronic pollutions are a more challenging problem. They can come from many sources.

Sewage Treatment Works (STW)

STWs are highly regulated, but are permitted to release untreated water under certain conditions. However discharge licences do not detail every type of pollutant that can be discharged. STWs are tasked with attempting to treat a huge variety of substances with which the population as a whole are consciously and subconsciously, and not always legally, challenging the system.

The effluent from STWs is typically high in phosphates and nitrates. The Loddon is fortunate in having one of the country's leading works in phosphate removal just downstream of Basingstoke, but despite increasing legislation to tighten the allowed threshold limits, these are generally still well above the maximum affect level in the catchment as a whole. This impacts river macrophyte and diatom growth, with understandable knock on effects throughout the food web.

Examples of less well investigated and regulated discharges of chemicals include oestrogen from 'the pill' and other sources, which is turning some fish into hermaphrodites, whilst cocaine been detected in shrimp and has shown to impact eel behaviour.^{(5) (6)}

Despite improvements to some works around the catchment, there is still a huge likelihood of a persistent discharge of problematic substances into the river system, not to mention instances of

accidental discharges of untreated sewage due to mistakes and equipment failures. In addition untreated sewage can be released, through the already mentioned, Combined Sewage Overflows (CSOs), during periods of high rainfall when systems can be overwhelmed. Fortunately, but not always, there is typically significant dilution on these occasions.

There is a new initiative launched in September 2019 to develop water drainage management plans (WDMP).⁽⁷⁾ The South East Rivers Trust (SERT) is not alone in considering this drive is somewhat under ambitious and does not tackle the monitoring of the non-consented discharges (overflows and CSOs) to rivers and the wider catchment., or carries a realistic assessment of current infrastructure (sewerage network) condition and capacity.

Industrial pollution

Information on historic levels of industrial pollution is lacking but it is assumed that the presence of industry in the catchment will have impacted on the river in the past. Several aeronautic factories may have led to pollution and it is thought that there was at least one plating factory in the area. Add to this possible pollution, perhaps due to run-off from the Royal Aircraft Establishment and it is possible that industrial pollution might have significantly affected the ecology and fish populations in the past.

There are many cases that demonstrate that the legacy of industry, which are locked up in sinks of contaminated sediment, especially behind weirs. A change in conditions, such as the removal of a weir with significant amounts of contaminated sediment behind, can then become a source of contamination.

Road run-off

This is probably the greatest under assessed problem to our watercourses. The Loddon catchment has an increasing population and road network. In addition we have 2 major motorways passing across the system. Increased urban development is resulting in increased usage of the roads, some of which are inadequate for the volume and size of vehicles using them. Many narrow country lanes are having their verges reduced to bare earth in the summer and quagmires during the winter. This situation is locally exacerbated by the spread of the seeds of invasive plants, notably Himalayan Balsam (*Impatiens glandulifera*), on vehicle tyres and by run-off. This annual plant does not leave roots that bind the soil together in the winter, thus increasing soil erosion.

Not only is this resulting in increased run-off of silt and a cocktail of contaminants (notably hydrocarbons and heavy metals) but also reduces the ability of the road side plants to filter that run-off. These verges have potential to be an important filter of run-off, but they are much undervalued.

At the same time the larger roads have little if any measures to treat water, mainly relying on balancing ponds sometimes accompanied by oil traps. This is again occurring at a time of more intense rainfall and increased road use (a further service area is under discussion on the M3 at Basingstoke). There is student project at Reading University looking at discharges from the M4 into the River Lambourn, whilst the Environment Agency has been attempting to investigate run-off into the Whitewater from the M3.

Allied to this is very little information into run off from railway lines. Certainly there is evidence of suspect quality water leaching into the River Loddon near Basingstoke to highlight but one site.

Silt

Silt can enter the watercourse in all manner of ways but as discussed earlier it can have a huge impact on the viability of our river gravels. Poor agricultural practices, narrow riparian strips, the effects of crayfish and Himalayan Balsam, road run-off and dust from quarries can all contribute to the problem. Previous dredging also affects silt pathways. Deposition in the slow flows of dredged channels (this also commonly occurs upstream of weirs) can increase build-up of organic matter in channel, altering the aquatic environment and species mix, whilst the levees that were raised during dredging now prevent and slow the deposition of silt onto the floodplain during floods, a means by which a river should be able to clean itself. This process can also recapture some of lost productive soils.

Silt fills the interstices of gravel, those crevices vital for the safe incubation of some fish eggs and early fry development, whilst cutting off the circulation of oxygenated water within the gravel. The resultant compaction of the gravel beds can also reduce the ability of the gravel to move and cleanse itself during periods of high flows.

Plastics

Concern is growing about plastics in the environment, and one that is increasingly being researched in freshwater systems. Micro-plastics are being found in many marine food chains and their presence in freshwater ones is surely in little doubt. Time will probably confirm the scale of the problem and its likely implications. Ongoing research on the Thames has revealed that microplastic pollution is very widespread.

A little addressed input is from cigarette filters that not only contain plastic, but will leach into the rivers, those very toxic chemicals they are designed to protect the smoker from. This type of littering is still not recognised by many – and is almost seen as socially acceptable. Roadside kerbs and road drains are a particular conduit for this pervasive pollutant as smokers do not appear to consider filters as litter. ⁽¹¹⁾

Temperature pollution

River water temperatures can be affected by a variety of sources. Riparian tree management has the ability both to raise and lower temperatures by regulating the amount of sunlight and wind exposure to a river. Temperature is typically raised at sewage treatment outfalls whilst on-line ponds, lakes and mill pools can act as solar panels significantly raising water temperatures. In addition we have climate change.

Noise and vibration pollution

To date, this has not been considered a significant problem. However little research has taken place on the possible loss of connectivity in a river system caused by bridges, especially the effect of heavily used multiple lane bridges such as those that carry the M4. Noise in the aquatic environment could also affect predator / prey interactions, by masking the sounds of either. However it is recognised that sound requires more investigation.⁽¹²⁾ Research has found significant issues in regard to sound / noise pollution in the sea and oceans, in particular to engine noise and associated with power generation schemes.

Climate Change

The well documented increase in temperatures and the resultant changes to our climate can be a root

cause in complicating many of the issues discussed here. A simple increase in seasonal water temperature can impact fish stocks in a variety of ways. Metabolism is directly influenced by temperature in any cold blooded creature. This can lead to increased activity at a time when food availability could be limited. The timing of spawning is likely to vary and if this occurs out of step with subsequent food availability for fry recruitment can be severely affected.

Less subtle impacts are obviously extreme weather events. Prolonged periods of drought can result in the drying out of smaller tributaries. In the summer higher water temperatures and slower flows can increase stress levels on fish (increased oxygen demand due to enhanced metabolism at a time when aquatic dissolved oxygen levels will be low), this resulting in reduction in appetite, potentially weakening winter survival, particularly if slightly raised winter water temperatures maintain activity of the fish.

Summer floods can also disrupt spawning and fry survival, possibly compromising growth and ability to survive the following winter. Fry can also easily become trapped on disconnected flood plains during these floods.

We are increasingly experiencing a swing from extremes. 2020 in particular, has seen severe flooding over much of the country in February, to near drought conditions in May/June. While these extremes pose acute problems for aquatic ecosystems, in the longer term recovery may prove harder as resilience is weakened by degraded river function resulting from a combination of the pressures described above; degraded habitat, poor hydrological diversity, poor connectivity and siltation / water quality problems.

General Flora and Fauna

A full discussion about the general flora and fauna of the rivers and how it fits in with concerns about the fish stocks is outside the scope of this document. However many of the factors that influence the health of the fish stocks will undoubtedly have impacts on the aquatic plants and animals found in the catchment. Many of these interactions are touched on within this document but there is further survey data available on the EA's informative Ecology and Fish Data Explorer website.⁽¹³⁾ This website contains data from most EA surveys since 1995, but it should be noted that the survey program is designed to meet requirements of the Water Framework Directive (WFD), and not normally to assess local issues.

One useful scheme that is used by some anglers in the catchment, is the Riverfly Monitoring Initiative. ⁽¹⁴⁾ “The Anglers’ Riverfly Monitoring Initiative (ARMI) has been established throughout the UK since 2007 and is coordinated by the Riverfly Partnership. Anglers and conservation volunteers from more than 100 partner organisations carry out regular freshwater invertebrate surveys to check for severe changes in water quality. The ARMI network continues to develop a high level of coverage across UK river systems and, coupled with a high survey frequency, works in partnership with all of the UK’s relevant authorities to: protect the water quality of our rivers, further the understanding of riverfly populations and to conserve riverfly habitats.”

Invasive Non Native Species (INNS)

Both nationally and locally there are a number of non-native invasive species of plants and animals that are of concern to the environment and information on these can be found at the [Non-Native Species Secretariat](#). Currently within the catchment there are two plants and two animals of particular concern to fish stocks or the wider riverine environment. The problem with Signal crayfish (*Pacifastacus leniusculus*) and North American Mink (*Neovison vison*) are discussed

further in sections below. The plants that are of particular concern are Floating pennywort (*Hydrocotyle ranaunculoides*) and Himalayan balsam.

Floating Pennywort has been found in less than 10 sites in the catchment. This plant forms dense mats of rounded leaves that float across the water surface and has the potential to completely cover channels, ponds and lakes. It crowds out native plant species, chokes drainage systems, reduces the availability of oxygen in the water thus threatening fish and other aquatic life. The dense mats can make angling almost impossible. With the exception of the incident on St Patricks Stream, which was almost certainly the result of drift of fragments from a major incident on the Foudry Brook, a Kennet tributary in Reading, incidents are so far restricted to the Blackwater catchment around Fleet and Yateley.

It is hoped that the EA, with help, has removed this plant from St Patricks Stream, but it is still present in the Thames and vigilance needs to be maintained. In the Blackwater catchment a number of partners have had some encouraging results in dealing with most of the incidents. These include the EA, the Blackwater Valley Countryside Partnership,⁽¹⁵⁾ The Basingstoke Canal Authority,⁽¹⁶⁾ Thames Water the various landowners, with significant support from the LFCC. Work and post treatment monitoring is still very much ongoing. Results on the Blackwater itself are very encouraging but the Basingstoke Canal in Fleet is the major current concern.

Himalayan balsam, introduced to the UK in the 19th century, is a common site along many of the catchments river banks. Its 'effective explosive' seed dispersal system can result in individual plants firing its 600 seeds up to 5 metres from the parent plant. These seeds can then be further dispersed by flowing water, in clothing or muddy shoes, or as discussed in the road verges section on vehicles. Growing annually from seed, the plants can form dense stands, out competing native vegetation. Then as they die back, they leave a bare bank, devoid of any binding root system that is as a result vulnerable to erosion thus increasing the rivers silt load.

Control is technically straight forward, effected by the early season mowing or strimming of known stands, or later on by 'Balsam Bashing' – simply pulling up the growing plant before it has a chance to produce viable seeds. There are a number of groups working on this invasive in the catchment but there is no reason why individual anglers could help support these efforts on their favourite stretches. The main problem with eradication of the plant is its widespread occurrence.

Predation

There are a wide range of potential predators operating within the catchment. These are both native and non-native species, operating at varying densities and some are more active at certain times of the year. It is possible that prey avoidance of some of the predators may not be as well developed as would be expected due to their novelty within the catchment. In addition the activity of some predators could be driving fish from some parts of the river, which could explain the apparent better density of fish stocks in the main River Thames, where prey fish could have 'more room to manoeuvre'.

It should also be considered that many species can be both prey and predator at any time during their life cycle. There is often a misconception that prey and predators in a healthy system will be in a natural balance. This is however a rare state and is not likely to remain so for any prolonged period. It is not unreasonable however for a natural system to be capable of supporting predator pressures without a significant impact on the prey availability, tolerating a cyclical pattern of boom and bust in predator/prey populations. However no one can imagine that the Loddon catchment is in a typical natural state. As a result predators may be applying unsustainable pressures on a system

that is already under other stresses.

Significant predators on the catchments fish population come from a variety of animals, invertebrates, birds and mammals, some of which may be targeting certain life stages within the fish population. This may be made worse by the loss of some key habitats such as woody debris and in-stream plant growth which can provide shelter for many life stages of fish.

Invertebrates / crayfish

Crayfish are without doubt the most significant issue from this group. Many other invertebrates (e.g. Beetles, Damselfly and Dragon Flies) are capable of preying on fish eggs and early fry, but there are no indications that these are having any significant effects and may well be under threat themselves from the crayfish. There is little available information on the effects of the indigenous White-clawed crayfish (*Austropotamobius pallipes*), prior to its probable complete disappearance from the catchment during the late 1970s and early 1980s. This was undoubtedly the result of the introduction of Signal crayfish, during the mid-1970s, and its accompanying disease The Crayfish Plague (*Aphanomyces astaci*).

It is likely that White-clawed crayfish were present in significant numbers, possibly as high as Signal crayfish are now, in many parts of the catchment. However as a species they are known to prefer a more stony substrate, are less likely to burrow, are less aggressive and do not grow as large as Signal crayfish. They would also have been a natural presence in the system, one that the remainder of the ecosystem was conditioned to tolerate. It is also probable that their numbers had already been under environmental pressure from mill/weir impoundments and dredging prior to the introduction of Signal crayfish.

The escape of Signal crayfish will certainly have had an impact. Initially their numbers were low and concentrated in hotspots. However the effects of the Crayfish plague (*Aphanomyces astaci*) were more widespread, and will have quickly decimated White-clawed crayfish populations. This could well have had the impact of temporarily reducing crayfish pressure on the fish population, although at the same time being a potential loss of prey for some fish species, particularly the larger individuals.

However there is now a very well established population of Signal crayfish present through much of the catchment. The population is large and active enough to be causing physical habitat modification, possible through its grazing of some aquatic plants but more notably to the river banks where burrowing can result in the 'honey-combing' and subsequent collapse of the bank. This activity can be resulting in increased downstream siltation of river gravels, along with other less appreciated impacts on the aquatic flora and fauna.

The actual density of the Signal crayfish population in the various parts of the catchment is not currently documented, whilst in some areas it is being, or has been trapped, which could be modifying its effects. However crayfish in general are known to be a predator of fish eggs and probably early larval stages post hatching. It is doubtful that they are capable of taking healthy fry but may be reducing availability of other food items for all sizes of fish. It may be that a healthy population of fish should be capable of coping with predation on their eggs. Certainly most coarse fish species lay high numbers of eggs, which have a relatively short incubation period, with the fry becoming free swimming reasonably quickly. However this does occur at a time of the year when crayfish activity is pronounced, due to raised summer water temperatures. Conversely in sections of the catchment where Trout are the dominant species, crayfish activity will be reduced by lower water temperatures, but at the same time egg incubation takes significantly longer.

There appears to be little information on Signal crayfish predation of sticky surface laid fish eggs, as produced by many of our native cyprinids, but there are indications that eggs buried in gravels are reasonably resilient to interference. Investigations on interaction between Signals and Atlantic salmon eggs by Findlay, Riley and Lucas, observed that there was no evidence of substantial excavations or predation upon buried eggs by crayfish of any size⁽¹⁷⁾. They did however note that larger Signal crayfish (16.3mm carapace length) are the greatest threat to salmonid eggs, and high quality spawning habitat might reduce predation, whilst further research is needed. These conclusions could however form an argument in favour of trapping if it is likely to remove the largest most potentially harmful individuals from the population.

In addition there has been some research on predation of amphibian (Frog and Toad) eggs in Sweden, with reported negative impacts, whilst investigations into vendace (*Coregonus albula*) egg predations reports little additional impact on the fish population again from Sweden.⁽¹⁸⁾

Nevertheless there are concerns that the Signal crayfish population on the lower Blackwater may be impacting fish recruitment, something that does not appear to be as prevalent on the upper Blackwater, where Signal crayfish are thought to be less prolific. This opinion is supported by research such as that carried out by Copp *et al* on the Predation by Signal crayfish on the early life stages of European barbel⁽¹⁹⁾ where observations noted that Signals appeared to be more active over gravels containing barbel eggs and fry, than White-clawed crayfish.

Reports from Stratfield Saye indicate that Signal crayfish populations are of less concern, particularly as they have virtually ceased any trapping which appears to have resulted in a numerical drop in the population. However this area was one of the first sites in the catchment where Signal crayfish became established and it is conceivable that the population has naturally dropped back from the original peak, following escape into the Loddon in the mid 1970's. Fry sampling immediately downstream of Stratfield Saye revealed one of the best catches during the 2019 survey, although the significance of this result is difficult to quantify at present. Trapping returns have also been reported to have reduced on the lower Loddon, downstream of Charvil, although the reasons for this are unclear.

Recent changes in crayfish trapping legislation may alter the current picture but it is difficult to predict in which direction. The general aim appears to be to reduce cropping and interference of the population, in the hope that numbers will be reduced through cannibalism by the larger individuals, those that are normally taken by trapping.

Against this, crayfish do provide a food source for fish and may have contributed to the large size for some fish such as barbel. However, it is difficult to separate this effect from that of the increased use of anglers' baits such as boilies and pellets which have a high nutrient density.

Avian Predators

It is unlikely that the piscivorous birds such as Herons (*Ardea cinerea*) and Kingfishers (*Alcedo atthis*) are causing any significant impact on fish populations. Densities of these birds are probably little changed over the last 40 – 50 years. This may however not be the case with species such as Cormorants (*Phalacrocorax carbo*) and to a lesser extent Goosanders (*Mergus merganser*). Populations of Goosanders have reportedly levelled off since their UK arrival the late 1800s. They are only a passing winter migrant in the catchment, and although they do sometimes occur in flocks, their impact should be relatively local and passing.

Cormorants on the other hand may well be having a significant impact. Their numbers have soared since the mid 1970's when they were a rare site on inland waters. An increase of what are believed

to be the inland breeding race (*Phalacrocorax carbo sinensis*) during the 1980's may have been the result of the closure of the Dutch national fish farm at Lelystad, which itself was due to uncontrolled predation from up to 3000 Cormorants per day⁽²⁰⁾. Cormorant behaviour also appears to have modified over the years, in that initially their foraging mainly targeted larger, open water bodies, with river visits more likely during periods of still water winter ice cover. However it is now not at all unusual to find them feeding on very small waters (>0.1 ha), and our smaller watercourses. Cormorant activity is not however consistent over the whole length of the rivers, but whether this is a reflection of lack of prey or possibly unsuitable foraging locations is unclear.

Research suggests that cormorants are known to change their feeding habits according to fish species availability on their fishing grounds, whilst feeding patterns observed in some studies are consistent with exploitation of fish stocks in proportion to their local abundance and profitability for feeding birds. ⁽²¹⁾

At the same time the absence of large numbers of fish in the target size range of 15-15cm in length, could suggest that their predation is having a major impact on fish in the pre-maturity stages of their growth. This picture is extremely noticeable on unprotected still waters, where current populations typically consist of large numbers of fry and young up to 10-15cm in length, the result of spawning from small numbers of older mature fish that are sufficiently large to escape predation. It is not difficult to extend this picture to a time where fry recruitment could be compromised as these older individuals die out. A similar picture appears to be occurring on our rivers with species such as dace becoming increasingly rare.

It must however be conceded that this view is not supported by the apparent current picture on the main River Thames. The loss of prey fish availability to Cormorants may in time be reflected in a reduction in their population size.

Another bird that is steadily becoming established is the Egret, most noticeably at present the Little Egret (*Egretta garzetta*) but sightings of the Great White Egret (*Ardea alba*) are also increasing. They are almost exclusively a predator in shallow water targeting fish and invertebrates and their current impact is probably very light.

Mammalian Predators

There are only two significant mammalian predators present in the catchment. The North American Mink is an introduced or more accurately escaped non-native species that has become established over the last 100 years. It is a particularly bold animal often showing little concern to the presence of humans. There is little information on population density although an active trapping effort between Basingstoke and Sherfield on Loddon for two or three years around 2010 did result in the capture of over 20 individuals. An opportunistic predator its impact on fish stocks may not be high and probably seasonal, but particular animals may specialise and if fish stocks are reduced predation could be a significant problem. The loss of water voles in the catchment may at least partially be due to mink, as they are able to access burrows more easily than our native European otter (*Lutra lutra*). There is some opinion that mink may be displaced by the otter.

Recent years have revealed the return of otters to the catchment. Numbers are low but may actually reflect a typical density to be expected from a territorial animal. It is difficult to assess their impact. Their predation could be a significant pressure on fish stocks when fish numbers are already low and recruitment is subject to other pressures. The predator avoidance response of some species may be a further issue, particularly when many generations of those species have not had to deal with this type of predation. Species such as barbel typically will use cover when threatened and remain relatively static once in that cover, making them particularly vulnerable. Some shoaling species

such as bream do appear to be better able to cope with otter predation. At the same time otter predation is to a certain extent being focussed onto our rivers. The understandable fencing of many still water carp fisheries will remove those waters from the home range of the otter, arguably increasing pressures on riverine fish populations. Further factors that would be at play include the response of fish to disturbance by otters and other predators, which could displace them from their usual home range. There is also some opinion that Trout appear to be more resilient to predation than many coarse fish species. Otters seem to take small prey if it is abundant and may feed heavily on small species such as bullheads. They are however likely to be opportunistic, particularly if preferred prey is not readily available. Without examination of spraint from the Loddon it is difficult to be sure what otters are eating in the catchment.

At the same time as these negative pressures are at play there can be positives. Otters are known to be a predator of crayfish and as such may assist in reducing their numbers. If this was occurring it would be expected that they may be taking a wider range of sizes than would perhaps be removed by trapping, thus possibly not having the effect of increasing overall Signal numbers. It is also conceivable that they may learn to specialise in a particular prey species, possibly becoming a preferential predator of crayfish, particularly if fish are less available.

Public Access

Gaining support for protecting the environment relies on public opinion lobbying attention from legislators. We are in the landscape – and part of it. Ecosystems are constantly evolving (although the rate at which that happens is often out of step with pressures on it). Maintaining support for our environment is enhanced by increased access generating awareness for the benefits it brings. Covid 19 has emphasised the link between mental (and physical) health and well-being and access to good quality green / blue spaces. However, this has to be balanced.

Increased public access to the river bank may be having mixed impact. Predation by some animals may be reduced. However littering can noticeably increase whilst disturbance particularly by dogs can be often manifest itself with locally increased erosion of banks and disturbance of aquatic and semi aquatic animals and birds, particularly during nesting / breeding seasons. There are also some concerns about the chemicals in flea and tick treatments entering the wider environment through this route. Shallow gravels may however benefit from the extra disturbance, although this could disrupt the activities of fish, if they try to use these areas for spawning.

Poaching

Poaching where fish are actually being removed should have a relatively low impact. However in some areas it is a significant and arguably increasing problem, and where stocks may already be low can be a further unsustainable pressure on stocks. Enforcement resources are insufficient to tackle the problem, whilst the lack of a prompt response can reduce motivation to report incidents. The Angling Trust has attempted to improve education of seasonal workers from overseas about UK legislation as some of this poaching arises from differing rules and cultural practices between the UK and their home countries. It is also true that some poaching is “home grown”.

Fishery Management

Fisheries have been exploited for centuries, formally mainly for food but more recently predominantly by anglers for recreation. This has resulted (and still is) in significant manipulation of the aquatic environment in pursuit of providing better catches, and ease of access. This includes modifying the banks and bed of the river, controlling vegetation and predators, and manipulating

fish stocks, not always to the long term benefit of the general ecology. Current attitudes are developing a more environmentally sensitive approach, but there are undoubtedly further lessons to be learnt. Angling clubs and societies can assist with this process whilst the availability of past records could help future management.

Fish species

The composition of the fish population would be expected to be an ever changing situation even in a fully natural state. With centuries of human interference in the wider catchment it is impossible to have a clear picture of the make-up of the fish population that would naturally be expected to inhabit the River Loddon.

Fluctuations in populations should be expected. Spawning success can be influenced by numerous impacts, as can subsequent fry survival. Water temperature, flows, food availability and species interactions are only a few of the naturally occurring factors.

There is some doubt that all the species, we currently expect to be present, are even native to the catchment. There has over the years been various and varied stocking of coarse fish into the system both from cropping coarse fish in predominantly Trout angling stretches of the Kennet and parts of the Loddon and Whitewater, during the 1970s-80s, and more recently by the EA and others with fish farm reared stock. The Trout fisheries on the upper sections of the Loddon and Whitewater rely to a great deal on stockings of both rainbow and brown Trout. This introduction of fish can mask underlying problems, giving an impression that populations are healthier than the reality of the situation. Fish introductions can distort the reporting of WFD status with regard to the fish populations and hence possibly inhibit funding applications for improvements. Although this can be a valuable short term measure to boost angling and mitigate against other pressures, a self-sustaining healthy fish population should be the ultimate goal. In a system that operates almost entirely on catch and release this ought to be achievable.

There is some evidence that some of the headwaters appear to have a healthier fish population than that of the middle and lower reaches. This is an inconsistent picture. The Blackwater in the Camberley / Yateley area reportedly has reasonable head of roach, dace and chub. However the reasons for this are unclear. A lower abundance of the Signal crayfish could be resulting in better spawning success, yet Signal crayfish are relatively common on the upper Loddon, Whitewater and Lyde where trout recruitment, appears to be consistent, and reports suggest reasonable chub numbers. Cormorant predation could be reduced on the smaller watercourse, whilst the fact that it is an area with heightened human presence could be further hindering their activity. Discharges from STW's and CSO's may further complicate the picture.

Fish surveys by the EA and its predecessors have regularly been carried since the late 1970s. The survey records (at least from 1995) are available on the EA's Ecology and Fish Data Explorer website, already mentioned earlier in this document.⁽¹³⁾ An overview of the available data would be invaluable but it currently appears to be beyond the scope of currently available resources. Regrettably much of the pre 1995 survey data has been lost, and as a result a 1995 or 2000 baseline is being applied to current surveys, with the inevitable skewing of results. (The issue of shifting baseline syndrome is a concern to many, including commentators such as George Mombiot⁽²²⁾). Nevertheless there is much valuable information available. It would be interesting to attempt to use the few pre 1995 surveys to extrapolate a wider picture. This would obviously be open to opinion, but may back up some of the anecdotal evidence.

These more recent baselines are being applied to the WFD obligations, possibly making it easier to attain targets, although in many cases these are likely to fail despite this less challenging objective.

These surveys have been supported by other more ad hoc surveys conducted by the LFCC and more recently by Bournemouth University. Interpretation of these surveys is rarely easy. For operational reasons they are normally restricted to the shallower wadeable sections of river, and typically only cover a roughly 100 metre long section. The actual survey sites have also varied over the years. The most valuable data will probably be produced from sites regularly sampled over long time spans, when annual fluctuations and inefficiencies are less likely to influence results, whilst long term trends may begin to be revealed. More analysis of the data available in these surveys would be very useful, however resources are currently unavailable for this work. The LFCC would however actively support the continuation of the survey program.

The species discussed below are those that are either a typical quarry of the angler or may occupy a significant niche in the catchment.

Barbel

As already mentioned, there may be some doubt as to whether Barbel (*Barbus barbus*) are indigenous to the River Loddon and its tributaries. There appear to be few if any reports of barbel in the catchment before the early 1980s, with the exception of St Patricks Stream and the Loddon downstream of Twyford. The Nicholson's Guide to the Thames actually reports that barbel are “not reported in the Loddon south of the railway bridge at Twyford”⁽²³⁾, although they are mentioned as being present in the Loddon (but not where) in Memorable Coarse Fish by Faddist, 1953 (p.10). If they were absent it could be the natural state of the distribution or it could feasibly be due to barbel being lost from the wider catchment as a result of downstream washout during floods with a subsequent inability to return upstream due to weirs. There is opinion that in the River Dnieper (a major eastern European river) “due to the construction of dams and formation of impoundments, the range of the species underwent drastic reductions”⁽²⁴⁾. During the period when these impoundments were becoming established freshwater fish, including barbel, were caught for the table which may have been an early additional pressure on stocks. Its distribution in the Loddon could more recently have been further impacted by the loss of spawning sites due to dredging and compaction.

As a species they differ from other cyprinids found in the catchment in that they are exclusively a gravel spawner and lay non sticky eggs that rely on dropping into crevices in the gravel to incubate. In addition the eggs are relatively larger and laid in far lower numbers than other cyprinids. Coupled with a low population size, this arguably makes the species less resilient to a deterioration in its environment. These issues are by no means unique to the Loddon, and there have been similar experiences on populations locally on the River Kennet and on the upper Thames upstream of Lechlade, to name but two examples.

Barbel were certainly stocked into the river in the early 1990s as far upstream as Swallowfield by the National Rivers Authority, but anglers diaries also report catches and stockings during the 1980s. Further stocking has been conducted by the Environment Agency during the first 20 years of the current millennium, whilst limited introductions have been co-ordinated by the Loddon Fisheries and Conservation Consultative during the same period. Barbel on the Loddon have been seen near the confluence with the Bow Brook in the mid 2010's, the Whitewater to Risely Weir (1990's) and the Blackwater as far upstream as Yateley (2016). EA surveys struggle to detect barbel. This obviously could be a reflection on their abundance, but it may also demonstrate that this type of sampling is not particularly effective in measuring their presence. Relatively short (100 metre) survey sections can easily miss fish present in low numbers, whilst survey sections also tend to be selected with a consideration on the water depth that can be effectively electrofished. However these limitations would not tend to rule out the capture of individuals within a prolific population. EA surveys also appear to under-represent small barbel, with fish of less than 450mm often absent

from surveys.

There are certainly barbel present in the Yateley area, but it is unclear if these are the result of stocking or natural recruitment. Numbers do not appear to be large but if there are some suitable spawning areas available, this could be a valuable source of fry. However the surveys carried out by Bournemouth University in 2019 have not recorded any barbel fry, at least as far upstream as Eversely.

Barbel are one of the prime angling species on the Loddon and deterioration in catch results is without doubt a significant reason for loss of angler interest in the river. It is hoped that recent stockings may help to re-establish the population and stimulate angling interest, but this can hardly be regarded as a way to sustain the fishery in the long term.

Chub

Probably Chub (*Leuciscus cephalus*) is the species that provides the widest overlap of interest between specimen, pleasure and match anglers. This is a common species throughout the catchment, often occurring in some of the less significant watercourses. They lay sticky eggs, on weed and gravel, but the alevins do need to drop into gravel crevices before they become free swimming fry. Impoundments do not seem to affect chub as much as barbel, possibly because they are better able to tolerate conditions in the smaller streams and are less demanding as far as spawning requirements are concerned.

Their presence is recorded in a very high proportion of fish surveys, although a clear picture of population trends is difficult to ascertain. Some angling catch results do indicate that the population is prone to fluctuations, but whether the apparent decline in medium to large individuals is a true picture of the current situation is not clear. The 2019 fry sampling did indicate some reasonable spawning success, but due to the lack of previous data it is impossible to put any weight on these results. EA surveys indicate a lack of smaller sizes and suggest early year classes may be lacking. Whether this is a real lack or whether it represents sample bias is not clear. Sampling by University of Bournemouth and LFCC in autumn 2019 did reveal a healthy population of, probably, 1+ to 3+ chub in some sites. The presence of large numbers of 0+ chub fry at some sampling sites suggests a reasonable spawning population, despite poor angler catches.

As with many species the eggs may be susceptible to crayfish predation, whilst Cormorants could be impacting numbers before they reach maturity.

Dace

Dace (*Leuciscus leuciscus*) is similar in habit to chub, numbers of this species seem to be currently far lower than they were during the 1980s. As already discussed this could be due to normal natural population fluctuations, but there is much anecdotal evidence that shoals of many hundreds of individuals were present during that period. This is one species that could be hit hard by predation, as the mature individuals fall directly in the prime size range for Cormorants. They are for anglers, a less widely targeted species, but have in the past played a significant role in match catches.

Roach

Roach (*Rutilus rutilus*) is probably the most popular species for the general angler, which is one of the backstays for match anglers whilst the larger specimens are a greatly prized catch. It is also like the chub probably one of the top 3 most common species in the catchment. It rarely appears to be as prone to population fluctuations as many species possibly a reflection of a tolerance to a greater

range of environmental pressures. Nevertheless densities and general structure of the population may be reflecting some stresses.

Gudgeon

Gudgeon (*Gobio gobio*) are not of huge angling interest, except possibly during matches, this small species is widespread throughout the catchment. Some of the EA surveys suggest the population may be susceptible to fluctuations, an impression that may be supported by match results on the lower Blackwater.

Perch

Perch (*Perca fluviatilis*) appears to have made a recovery from the Perch Ulcer Disease that hit numbers during the 1970s. The species may still be under represented in the catchment and its spawn (laid in lace like ribbons draped over submerged plants, rocks and twigs) could be particularly vulnerable to crayfish predation. There still appear to be reasonable numbers of prey fish available for the larger individuals, but recruitment could be affected by reduced availability of smaller invertebrates due to crayfish presence. The larger specimens are the target quarry of a small group of anglers.

Pike

Pike (*Essox lucius*) has a fairly widespread distribution around the catchment. Angling pressure is relatively low and it is difficult to estimate the probable health of the population.

Brown trout

As already mentioned above the brown trout (*Salmo trutta*) fisheries are very much supported by the annual stocking of farm reared fish, both our native brown trout and the 'exotic' rainbow trout. Over the years it has been noted that there are regular reports of trout captures downstream of the recognised trout fisheries and there are unconfirmed reports that some of these fish could be sea trout that have managed to migrate back up through the Thames and into the Loddon.

Natural brown trout recruitment generally appears poor with some notable exceptions on parts of the headwaters of the Loddon and Lyde, probably the result of poor gravel availability, but some predation could be further impacting the numbers. There are small initiatives underway in some of the headwaters to improve conditions but these need to be extended.

Eels

As with most of the UK numbers of eels (*Anguilla anguilla*) appear to be under steady decline. In recent memory the Loddon catchment has had a reputation of producing small numbers of relatively large individuals. There is an ongoing initiative to provide eel passes on impoundment structures, although currently there is no information available on the success of these measures. If numbers of this species were to improve they could have an impact on the Signal crayfish population. The presence of an eel fishery on the Loddon in the past suggests that at one time it had a thriving eel population, much like the neighbouring River Kennet. At the time of writing there are reports of a significant run of elvers in the lower Thames. It will be interesting to see if this results in any future impacts in the Loddon.

Minor Species

Although often overlooked the populations of species such as stone loach (*Barbatula barbatula*), bullheads, sticklebacks (*Gasterosteus aculeatus*) and in particular Common minnows (*Phoxinus phoxinus*) occupy an important role in the river system. It is interesting to note the potential for these species when looking at the fish survey results on the Emm Brook in Wokingham, where huge numbers of these species were recorded upstream of a small weir, that was excluding the larger cyprinids. Minnows especially can be a significant prey item not only for other larger fish species, but also for the charismatic kingfisher. Shoals of minnows can also provide cover for similar sized coarse fish fry reducing the impact of predation on the developing young. As with the other species already discussed, the current status of these populations is difficult to assess.

The Rivers

A short round-up of the various rivers within the catchment. There are a great number of smaller watercourses that are not described here, many of which could be a source of fry for the whole catchment, whilst all of which will undoubtedly be the source of diffuse pollution of varying quality. Without doubt the underlying problem with all these rivers is the variety and intensity of human activities already mentioned above, potentially exacerbated by changes in climate. It is almost impossible to identify even a short section of a watercourse in the catchment that is in its pristine natural state, possibly one or two of the very minor tributaries originating in areas controlled by the Ministry of Defence may come close to meeting this standard, whilst some sections of the Loddon upstream certainly give that impression.

There are a number of useful site reports on sections of some of the rivers mentioned below that can be found on the website of the Wild Trout Trust.⁽²⁵⁾

Blackwater

The largest and major tributary of the Loddon. Rising in Aldershot, it rapidly turns into a heavily engineered watercourse, flowing at least initially through an extensively urbanised part of the catchment. As it progresses it becomes increasingly rural towards the confluences with the Whitewater and then main river Loddon at Swallowfield. There are a number of STW discharging into the Blackwater one of the more significant ones being the works near Ash which during the summer months provides the bulk of the flow. It is joined in the Camberley area by the Cove Brook a very urbanised stream originating close to Farnborough Airport, and the Wish Stream flowing south-west off Olddean Common through the grounds (and lakes) of Sandhurst's Royal Military Academy. The Wish Stream is effectively isolated from the rest of the Blackwater by the dams forming the lakes and lying in a relatively untouched part of the catchment is thought to contain a relic population of the original strain of brown trout living in the system. During the late 1970's and the 1980's the Blackwater was subject to fairly regular acute pollution events, but these fortunately are nowadays of a relatively rare and minor occurrence.

A significant part of the passage of the river has well used public access along at least one of its banks. The Blackwater Valley Countryside Partnership are engaged in regular restoration works as part of River Week with the aim to improve the habitat in this area. Part of this section currently appears to be holding some reasonable fish stocks, arguably not displaying the same downward trend of much of the rest of the catchment. The reason for this is unclear. The Blackwater in the area of Camberley and Yateley is a popular coarse fishery for a relatively limited group of anglers, but it does not receive as much attention downstream until nearing the confluence in the Riseley and Swallowfield sections.

The middle part of the Blackwater is not immune from diffuse pollution although the general habitat appears reasonable. There is little information on Crayfish numbers, but some reports

suggest they may not be as prolific as in parts of the lower Blackwater, and many of the other sections of the Loddon system where coarse fish are found. At the same time it is likely that cormorant predation of the river may be reduced by human activity along the banks.

Further downstream match results following the land drainage motivated dredging of the 1960s' and 70's appeared to show healthy populations of Roach, Bream and Chub. These appear to have significantly reduced since cormorant and crayfish activities increased, but it is feasible that other factors may also be of influence.

Hart

Mainly draining a combined rural and in the case of its main tributary the Fleet Brook an urban area, this is a small clay catchment of relatively little angling interest. It should however have some value as a fry nursery, but there are concerns about the performance of the STWs discharging into it.

Whitewater

Rising near Greywell, the Whitewater is immediately subjected to impoundment due to an old mill, a theme that is repeated with consistent regularity down its whole length. Increased urbanisation at Hook is adding to its challenges. There have been small local projects to improve conditions with the addition of gravel and woody structures, but despite some encouraging localised results, the Whitewater suffers greatly from a lack of natural recruitment, not just of Trout but also coarse fish species.

The Whitewater Valley Preservation Society⁽²⁶⁾ has been instrumental in successfully lobbying for the abstraction point at Greywell Fen to be discontinued, which should result in enhanced water flows. There are problems with siltation linked to agricultural practice and road run-off as described above, along with reported incidents of sewage pollution arising from the pumping station at North Warnborough being overwhelmed during intense rainfall.

Lyde

Potentially one of the more valuable chalk streams passing through an almost exclusively rural area, there is nevertheless great potential for improvements. There are significant stretches of poor quality gravels, mainly the result of impoundments which are also reducing connectivity. Short stretches downstream of these impoundments often demonstrate its true potential, mainly as a trout stream. The results of historic dredging are also evident, with disconnected floodplains and over straightened and deepened sections resulting in lower flows and the incursion of club rush.

Upper Loddon

The head waters of the Loddon are again a chalk stream that manages to retain the characteristic for one or two miles downstream of Basingstoke. Coarse fish are present through much of its length although distribution has undoubtedly been affected by mill impoundments. Coarse fish removal on the trout sections during the 1980s may have cause further disruption of the stocks, whilst predation may be lessening the chances of recovery. The loss of coarse fish in the upper reaches may also have resulted in the trout stocks coming under further pressure as they became the only prey available to predators, at a time when other factors were also at play. Basingstoke STW discharges a couple of miles downstream of Basingstoke, but now fortunately seems to be one of the better performing works in the Thames catchment, with tertiary treatment for increased removal of phosphate. It was the source of at least one major pollution during the 1980's but the significant recent investment has hopefully minimised the repeat of such an event.

Research has shown that the reaches downstream of a treatment works with improved phosphate removal take time to recover. This is thought to arise from the increased phosphorus concentrations in formats other than the routinely measured soluble reactive phosphorus or inorganic phosphate being metabolised into more available forms by the microbial or other biota, or by changes in redox potential releasing more phosphorus bound in sediments as phosphate to the overlying waters, presumably as a result of historic phosphorus inputs being high. Recent observations on the recovery of water crowfoot in the river downstream may suggest that improvements are occurring.

Bow Brook

The major tributary of the Upper Loddon, this drains a mainly rural area. Of little direct angling importance it could potentially be the source of fry for the rest of the Loddon downstream. The National Trust at The Vyne are currently investigating possible ways to improve connectivity for fish passage through the lakes in the grounds.

Barkham Brook

As recently as the early 1990's this tributary still had a population of the native White-clawed crayfish, one of the last in the catchment. A relatively small watercourse with no direct angling interest apart from at its confluence with the Loddon, it does may well have some value as a fry nursery. It also has a significant STW discharging into it and with the current developments on the old military establishment at Arborfield, will be under increased environmental pressure. Parts of the channel have been modified by straightening and dredging with a section just south of the M4 motorway being perched above its natural course.

Emm Brook

Although not a large tributary this watercourse runs through Wokingham and is currently the subject of a project (being developed by the Loddon Catchment Partnership) to bypass a small weir at Woosehill, which will improve fish passage through this area. As with many of the tributaries it is currently of little direct angling interest, but fish surveys in the downstream of the proposed scheme do reveal a significant and diverse coarse fish presence, which has the potential for enhancing stocks on the Loddon downstream. There are some local concerns about water quality particularly from the surface water drainage network and near the confluence with the Loddon where the STW could be under performing. A local voluntary group, Friends of the Emm Brook,⁽²⁷⁾ are monitoring and on a voluntary basis tackling some environmental issues in its catchment.

Lower Loddon

The part of the catchment where much of the serious coarse angling is carried out and lies mainly downstream of the major tributaries. This is the part of the river that is perceived to be under the most strain, something that is supported by the fact that at least two angling clubs have decided to give up leases (long term leases) on parts of their Loddon fishery. This is the result of a steady decline on anglers visiting those stretches, something that is not unique in this part of the catchment. The clubs are understandably looking at the basic financial bottom line - Income against Expenditure

Angling catches have undoubtedly plummeted during the last 10 years period. This part of the river is difficult to survey effectively with present techniques owing to its depth and width, whilst access is difficult for launching a boat based unit. Like many other parts of the river system it is highly modified with impoundments, perched channels, disconnected flood plain, and historical poor land

drainage / flood management. This part of the system is also prone to virtually all the issues mentioned earlier in this document.

Initiatives

Things will not improve without work and initiatives both at a local and on a catchment wide basis. These are a wide range of actions, some capable of being carried out by small groups on a localised basis, others needing a more organised partnership approach:

- continue & develop fish surveys – fry surveys
- expand & develop river fly monitoring initiative
- support and participate in other citizen science monitoring opportunities
- continue & expand gravel introduction and cleaning program
- encourage flood plain connectivity projects
- carefully target tree management with the main aim to improve habitat diversity
- work towards, at least the control of but preferably, elimination of INNS
- support continued measures and projects to improve connectivity around impoundments
- support NFM projects, particularly use of woody material and floodplain connectivity
- aim to produce a self-sustaining fish population
- continue with stocking particularly the species that will maintain angling interest. This should not be a long term aim
- Respond to planning application consultations
- lobby for legislation supporting properly designed Sustained Urban Development Systems (SUDS) both for new developments and fitted retrospectively particularly in publicly owned spaces such as schools and car parks.
- Sewage watch. Increase in interest of wild swimming and canoeing (despite lack of legal access) could help to drive moves towards better water quality
- Engage with and respond to water drainage management plans (WDMP)
- support increased tightening and monitoring of discharge parameters from STWs
- landowner views should be sought, with continued and increased education of farmers/landowners to improve farming and riparian management practices as is currently being delivered through Loddon Farm Advice.
- support incentives for appropriate environmental delivery through agricultural environment schemes
- Engagement with the new Environmental Land Management scheme (ELMs) to reinforce public support for more sustainable land management practices for farmers and land managers
- support investigations into past and current industrial pollution
- encourage wider reporting of pollution and other incidents. This could help drive actions.
- lobby for more resources for the EA
- Lobby for a change to self-regulation / reporting and an increase in investment for regular independent monitoring of all consented and permitted discharges (EA or others).
- engage within communities to raise awareness of rivers in the catchment and educate about social pressures on the wider environment

Conclusions

The Catchment is in a far from healthy state. Our rivers may look the cleanest they have in decades but that can be very deceptive. Fish populations appear to be at an all-time low, further deterioration

is probable, whilst the prospect of an improvement in the current situation looks bleak. There are however some rays of hope. There is still a core of stock present to provide the basis for a recovery. Currently there are initiatives to improve the habitat underway and these need as much support as can be provided. The fish survey programme again needs to be supported and where possible expanded, preferably in a way that is targeted to help in assessing particular problems. Work on the control and if possible elimination of invasive non-native species needs to be continued.

Anglers are often tempted to blame other groups for the poor state of the river and particularly the lack of fish swimming in it. However there is a huge range of groups active in the catchment that are equally concerned about the condition of the natural environment. These include flood groups many of which support NFM measures, the wildlife trusts and rivers trusts who are equally concerned with invasive species, habitat and pollution, the 'birders' often considered an adversary but they well recognise that you cannot have predatory birds without prey, the bigger organisations such as Thames Water, the Local Authorities and the Environment Agency, all of which are actually charged with making things better. Often they simply need more resources, but there are also concerns that their resources are being used in a far from effective manner. Appropriate legislation can protect natural resources with advice, engagement and enforcement where appropriate. We need to work together and support each other through bodies such as the Loddon Catchment Partnership and the researchers at Reading University. The catchment of any river is a complex system with constantly changing and evolving conditions, the Loddon and its tributaries are no different.

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