Fish Stocks in the River Maigue Catchment

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BALLYHOURA DEVELOPMENT CLG

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1. Introduction

The River Maigue rises in Milford area of north Co. Cork to the west of Charleville. It flows in an easterly direction and then north past Charleville, and through Bruree, Croom and Adare. It joins the Shannon Estuary at Carrigclogher Point. The 20km tidal section downstream of Adare to the Upper Shannon Estuary, is included in the Lower Shannon SAC (Special Area of Conservation). The Maigue estuary contains habitats of high conservation value that are influenced by the tide.

The Maigue catchment drains an area of 1020 km^2 predominantly in Co. Limerick, and is a significant sub-catchment of the Lower Shannon. There are a number of significant tributaries; the Glen River and the Loobagh, join near Charleville, the Morningstar downstream of Bruree, the Camoge upstream of Adare and the Greanagh and Barnakyle downstream of Adare. There are also a number of smaller tributaries such as the Gloshagh. The Camoge River is the largest of the tributaries forming an extensive sub-catchment, which, with its headwater tributaries the Ballynamona, Mahore and Drumcamoge Rivers, extends eastwards beyond Emly in Co. Limerick. Lough Gur, the only significant lake in the catchment, is part of the Camoge drainage. All of the catchment rivers are lowland in character. The only exceptions are the headwaters of the R. Loobagh which flow from the Ballyhoura Mountains and Slievereagh Hills near Kilfinnane.

Significant stretches of all major tributaries were subjected to arterial drainage work in the 1970s, and this has changed the natural character of the rivers considerably in many stretches. It involved drainage works to approximately 455 miles of channel, including about 24 miles of main river and a further 120 miles of major tributaries.

There are 7 small to medium sized natural lakes in the catchment, which are predominantly coarse fisheries; Lough Gur, Dromore Lake, Bleach Lough, Lough Nagirra and the twin Kibreedy Loughs.

2. Distribution of Fish in the Maigue Catchment

Seventeen fish species have been recorded from the estuarine (CRFB 2009) and freshwater areas of the R. Maigue catchment (**Table 1**). A fish population index (FPI) survey of the distribution of fish species in the freshwater Maigue catchment was carried out as part of the Environmental River Enhancement Programme by the IFI in 2013 (EREP 2013). Fifty-six sites, 16 in the main channel and the rest in the tributaries, were surveyed, and electro-fishing was used to examine fish community composition and status. The survey shows the relative abundance of the different fish species encountered rather than actual abundance i.e. fish population densities. All of the freshwater fish species in Table 1, with the exception of dace, were encountered in this survey.

Salmon were found in the Maigue (main channel) lower Camoge, Loobagh, Morningstar and Clonshire rivers, but were absent from the upper Camoge tributaries and Glosha and Barnakyle rivers. The relative abundance of salmon was greatest in the main channel; for example, of almost 1000 fish caught here, 39% were salmon. This was greater than the relative abundance of brown trout which was 34%. Salmon were also relatively more abundant than brown trout in the Camoge (17% vs. 7% respectively, and in the Loobagh (23% vs. 17% respectively). The report attributes the

low numbers or absence of salmon in the Maigue headwaters, upper Camogue tributaries and upper Clonshire river to "*poor water quality making the water body unfavourable for salmon survival*" (EREP 2013).

Brown trout are the principal non-migratory fish in the catchment. Brown trout live in all catchments in Ireland, provided the water quality is suitable and there are spawning areas. (Went, 1964; Kennedy & Fitzmaurice, 1971). The EREP survey found that they were present in the main channel and tributaries but were absent from the Maigue headwaters, probably because of poor water quality there. The relative abundance of brown trout varied considerably in the catchment; 40% in the Clonshire R., 59% in the Glosha, 34% in the main Maigue Channel, 32% in the Loobagh, 23% in the Morningstar; 7% in the lower Camoge and 4% in the upper Camoge tributaries.

Sea trout have not been reported from the Maigue Catchment. Sea trout are a migratory sea-feeding form of brown trout that are mainly confined to the poor acidic rivers of the west and north-west (Went 1964). So called "slob trout", or brown trout that live in the brackish tidal waters of estuaries, can be found downstream of Adare.

Eels were also found to be widely distributed in the catchment (EREP 2013). The Maigue catchment contained eel fisheries in the past. The Civil Survey of the mid 17th century mentions the presence of up to 8 eel weirs on the Camoge between the Maigue confluence and Dunkip (Went, 1960).

Fish species	**Maigue Estuary**	**Rivers**
Brook Lamprey *Lampetra planeri**		✓
Brown Trout *Salmo trutta*	✓	✓
Common Goby *Pomatoschistus microps*	✓	
[1]Dace *Leuciscus leuciscus*	✓	✓
Eel *Anguilla anguilla*	✓	✓
Flounder *Platichthys flesus*		✓
Greater Pipefish *Syngnathus acus*	✓	
[1]Minnow *Phoxinus phoxinus*	✓	✓
[1]Perch *Perca fluviatilis*	✓	✓
River Lamprey *Lampetra fluviatilis**	✓	✓
Salmon *Salmo salar*		✓
Sea Bass *Dicentrarchus labrax*	✓	
Smelt *Osmerus eperlanus*	✓	
Sprat *Sprattus sprattus*	✓	
[1]Stoneloach *Barbatula barbatula*		✓
Thick Lipped Grey Mullet *Chelon labrosus*	✓	
Three-Spined Stickleback *Gasterosteus aculeatus*	✓	✓

[1]Non native species in Ireland, introduced sometime after the 12th century (Fitzmaurice 1984)

Table 1. Fish species recorded in the Maigue catchment.

Lampreys were found in 16 of the 56 sites sampled in the 2013 FPI survey, and mainly in the upper parts of the catchment. Brook lamprey and the river lamprey are difficult to distinguish from each other; their separation into separate species has been questioned (Schreiber and Englehorn 1998). It is possible "that the river lamprey is an anadromous form of the brook lamprey" (Igoe et al. 2004).There are no published records of sea lamprey from the R. Maigue or tributaries.

Perch and flounder were found only in the Clonshire River. Pike were not recorded in the 2103 river survey, but there are anecdotal reports of them occurring in the slower reaches of the Camoge. The 17th century Civil Survey refers to a weir at Mainistir where eels and pike were trapped. Pike are regarded as an introduced species, and this is one of the earliest references to their occurrence in Ireland (Went, 1960).

Dace are a non-native and invasive species first recorded in the R. Maigue near Adare by electro-fishing in 2004 (Caffrey, et al. 2007). It is surmised that the Maigue may have been colonized by migrants from the Ahaclare R., which drains Doon Lough in Co. Clare and which flows into the Shannon Estuary opposite the Maigue Estuary. Up to their discovery downstream of Doon Lough in 1980, dace were unknown in Ireland except for the R. Blackwater, into which dace had been accidently introduced by anglers in 1889. Of the six rivers surveyed for dace in 2004, the fastest growth rate exhibited by dace was in the R. Maigue.

The lakes in the catchment are predominantly coarse fisheries. Fish populations in Lough Gur, the largest lake in the catchment, were surveyed in 2009, 2012 and 2015 (Kelly et al. 2013a; Kelly et al. 2016). Four species were recorded: rudd*, perch, pike and eel. Rudd was the dominant fish in terms of numbers and biomass. Using the FIL2 classification tool (Kelly et al., 2012), Lough Gur was assigned an ecological status of "Bad" for 2009 and "Poor" for 2012 and 2015 based on the fish populations present (Kelly et al. 2016).

(*Charles Dineley, who travelled around Ireland in the first half of the 17th century, visited L. Gur and remarked "*The Lough aboundeth in fishes, pikes eels and roches in vast quantity"* (Went 1960). The "roches" were almost certainly rudd, a native species; roach were introduced to Ireland in the 19th century.)

Perch and pike are reputed to occur in L. Nagirra. Dromore Lough contains rudd and pike. Bleach Lough is a trout fishery managed by Bleach Lough Anglers who stock it with brown and rainbow trout. Perch, rudd, roach and pike are also found in the lake (http://www.bleachloughanglers.ie).

White–clawed crayfish (*Austropotamobius pallipes*), Ireland's only native crayfish, was also recorded in the 2013 EREP river survey. They were widely distributed in the main channel of the Maigue and in the larger tributaries, but were absent from, or restricted in the smaller tributaries. Crayfish are likely to occur in at least some of the lakes, but there are no published records. Crayfish are a keystone aquatic invertebrate in limestone rivers and lakes, and are an important food item for fish, especially trout and eels. White-clawed crayfish are protected in Ireland under the Wildlife Act. The species has been declining rapidly in its main European range under the impacts of introduced non-native crayfish species, crayfish plague (an introduced fungal disease), and deteriorating water quality. Although declines have occurred here as well, the Irish populations are still fairly robust, and in a conservation context they are of international importance (Reynolds 1997).

3. Fish population densities

Hard data on the size of fish populations (i.e. population densities) in the rivers of the Maigue catchment are scarce. A fish stock survey was carried out along a 517m stretch of the R. Maigue River above and below Castleroberts Bridge in July 2008 by the then Shannon Regional Fisheries Board, and was repeated on the same stretch in 2012 (Kelly et al. 2009; Kelly et al. 2013b). The 2008 survey employed four boat-based electric-fishing units in three electro-fishing passes. The 2012 survey employed only one pass on a shorter length of river.

Six fish species were recorded in the 2008 survey; in order of abundance they were: brown trout, eel, stone loach, salmon, minnow and lamprey. The population densities of all fish were regarded as low. For example, the population densities of brown trout expressed as numbers of fish per square metre (no./m^2) was 0.0106. This translates into 155 brown trout in the 517 m stretch of river. The equivalent number for salmon was 24.

The age class, size and growth rate of trout and salmon were also examined in the 2008 survey. Brown trout ranged in length from 17.0cm to 42.5cm and had a mean length of 25.3cm. The ages of trout, determined from scales, ranged from 1+ years (completed the first full year) to 4+. The 2+ age class accounted for the majority of the population, and no fry (0+ class) were encountered at all (**Fig. 1**). According to the classification of brown trout growth in rivers by Kennedy and Fitzmaurice (1971), the growth rate of brown trout in the Maigue was "very fast". The absence of trout fry (0+) and the preponderance of older trout suggest that this area of the river was unsuitable for trout spawning (Jane Gilleran , IFI, pers. comm.).

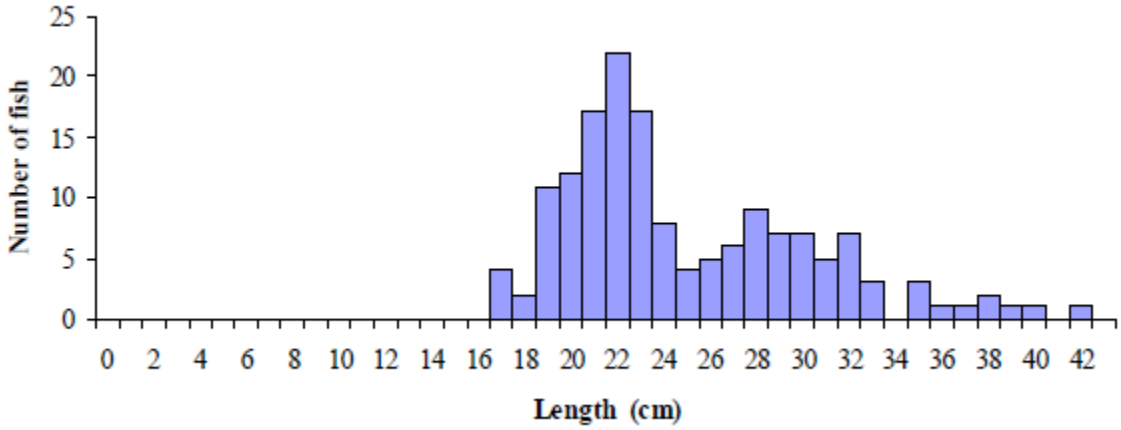

Fig.1. Length frequency distribution for brown trout in the Maigue River, July 2008 (n = 156). From Kelly et al. 2009.

How do these survey results for brown trout compare with other rivers of similar ecology? Fortuitously, the R. Deel near Newcastle West was surveyed around the same time as the Maigue (EREP 2013). It had much the same range of fish species except for salmon, and similar water

chemistry and substrate, although smaller in volume flow. The growth of Deel brown trout was similar to the Maigue, but strikingly, the brown trout densities were almost 14 times greater (0.149/m^2).

Maigue salmon in the 2008 survey ranged in length from 7.6cm to 75.2cm (Fig. 4.63), with a mean length of 40.6cm. Four age classes, 0+, 1+, 2+ and 3+ were present, with most of the population consisting of 2+ and 3+ fish (**Fig. 2**). The latter were returned spawning fish. Approximately 25% of the surveyed salmon were juveniles. Similar to brown trout, these fish had a very fast growth rate in the Maigue.

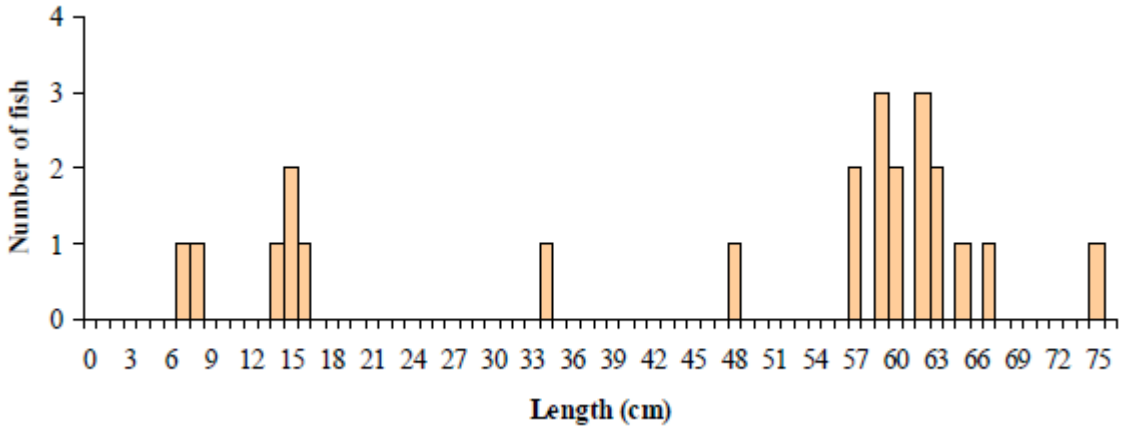

Fig. 2. Length frequency distribution for salmon in the Maigue River, July 2008 (n = 23). From Kelly et al. 2009.

Using the Fish Classification Scheme 2 (FCS2) tool for assessing the ecological status of rivers based on fish, the Maigue was classed as "Moderate" (Kelly et al 2013b).

4. Status of Salmon in the Maigue

Historically, the Maigue was recognised as a salmon fishery fishery. Up to the middle of the 17th century, there were at least seven head weirs in the Maigue estuary below Adare where salmon were taken. There were also two salmon weirs associated with the monastic settlements in Adare up to the dissolution of the monasteries (Went 1960). By the end of the 19th century, salmon runs had declined significantly, probably because of over fishing in the Shannon Estuary:

"Let me direct your attention to the River Maigue, which flows into the Shannon estuary a few miles below Limerick. This was once a well-known salmon angling river, but according to the testimony of Mr. R., who was born on its banks, it has totally erased from people's minds as a fishing stream owing to over-netting at its mouth and in the estuary, and consequent dearth of salmon. (A Salmon Fisher's Revolt. A letter addressed by the Earl of Howth to the Irish Fisheries Inspectors 1895.)

The numbers of spawning salmon have declined markedly in the Maigue in recent years. As a Consequently, the Maigue system has been closed to salmon angling since 2006 under the Wild Salmon and Sea Trout Tagging Scheme regulations administered by Inland Fisheries Ireland.

The decline of salmon numbers in the Maigue has been paralleled in many other Irish salmon rivers. The cessation of drift net fishing for salmon in Ireland in 2007 was flowed by a recovery of rod-caught salmon numbers to a peak of 37,478 nationally in 2010 compared to a 2006 figure of 28,662. The bounce from the ending of the drift-net fishery seems to have been short-lived; numbers have been in decline since 2010, dropping to 25,107 nationally in 2015 (IFI 2016b). 2014 and 2015 exhibited the lowest number of salmon in the entire time series since 2006.

"The salmon population in Ireland has declined by 75% in recent years and although salmon still occur in 143 Irish rivers, only 43 of these have healthy populations"(Anon. 2008).

Analysis carried out by the Standing Scientific Committee on Salmon (SSCS) indicates that the number of rivers with "healthy populations" on the basis of attainment of conservation limits is now 48 (SSCS 2016).

Inland Fisheries Ireland operates a programme for determining migratory fish numbers (i.e. salmon, sea trout and lampreys) using fish counters installed on 28 rivers in Ireland. Fish counters provide the most direct assessment of salmon stock status in rivers. A Logie type counter has been operating on the Maigue since January 2015. The counter recorded 1218 salmon on their spawning run in 2015, 58% of which were grilse (**Fig. 3**). The majority of the spring and late summer salmon are likely to be multi sea-winter salmon (2SW or MSW), i.e. salmon that have returned to spawn after 2 or more winters feeding at sea. These fish are larger than the grilse, which are generally one sea-winter fish (1SW). The installation of the counter will provide more accurate estimates of returning salmon into the future.

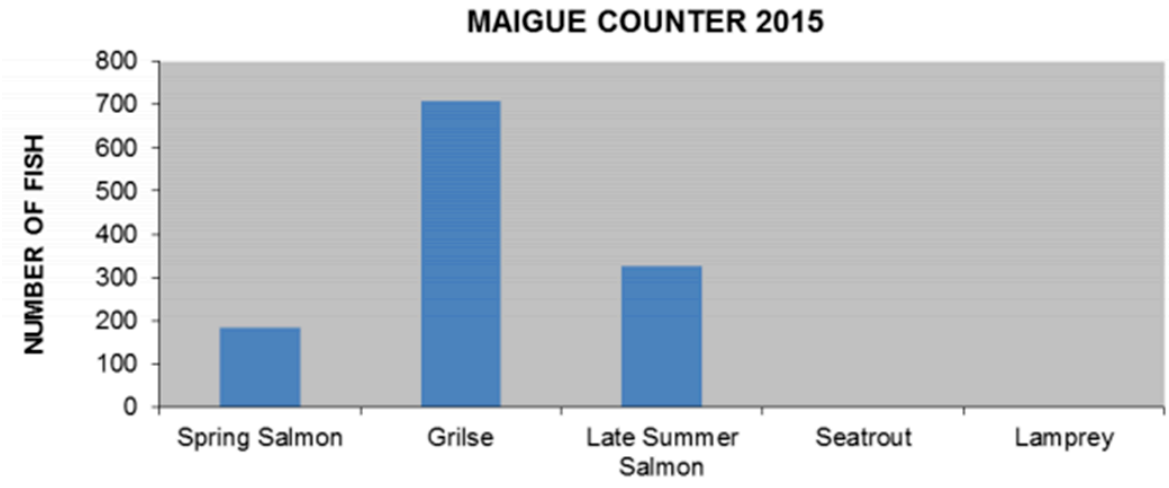

Fig. 3. Maigue counter salmon numbers, 2015 (IFI 2016a).

Under current regulations, a salmon river is required to meet a Conservation Limit (CL) for the numbers of returning salmon annually before harvesting of salmon can take place. The CL is based on the concept of sustainable harvesting, and can be envisaged as follows. Every river has its own unique population of salmon because individual salmon rarely stray to a non-natal river; i.e. a river other than that in which there born. These spawning salmon produce the next generation of juvenile salmon in the river, and these juvenile salmon grow for one or more years in the river

before returning to sea as smolts. The number of juvenile salmon a river can support is limited by the size of the river (space or *fluvial area*) and food. Competition for these two resources limits the number of juveniles a river can support. The number of spawning salmon required to produce this sustainable population of juvenile salmon is the CL.

If the number of returning salmon exceeds the CL, the excess spawners will not be able to contribute additional juveniles and smolts to the population. These additional salmon can therefore be harvested sustainably-that is without a negative impact on the population. In 2015 the Conservation limit (CL) for salmon in the Maigue system was 4632 fish*, but the number of returning salmon was only 1218 or 26% of the CL (SSCS 2016). The river was therefore closed to salmon fishing in 2016 as it has been since the regulations came into force, because of the consistently low numbers of returning salmon. The IFI allow for a river to be open to salmon fishing on a catch-and-release (CR) basis if there is a high probability that the salmon run will achieve 65% of the CL. It is highly unlikely that the Maigue will be open to salmon fishing on even a CR basis in the foreseeable future. Sadly, this situation is not unique to the Maigue catchment; of 148 salmon fisheries in Ireland only 46 have a harvestable surplus and are open to salmon fishing in 2017, while 29 are catch-and-release.

(*For a description of the methodology for calculating the salmon Conservation Limit (CL) for Irish rivers, please refer to: http://www.fisheriesireland.ie/fisheries-management-1/salmon/639-the-status-of-irish-salmon-stocks-in-2015-with-precautionary-catch-advice.)

The scarcity of salmon in the Maigue system is significant in a national context. The Maigue catchment was ranked 10th in a survey of 173 national salmon river systems in terms of it fluvial area (in m^2) that is accessible to salmon (McGinnity et al. 2003). A salmon system is one that has a self-perpetuating salmon population. The fluvial area of the Maigue catchment was estimated to be 2,437,307 m^2, all of which was regarded as accessible to salmon. This represents 2.16% of the total national fluvial area that is accessible to salmon. For comparative purposes, this is 10% greater than the fluvial areas of the nearby catchments of either the Feale or Laune, both which have harvestable salmon surpluses above their CLs (although also in decline). Limerick, along with Waterford and Kerry, have the largest quantity of accessible medium-gradient habitat nationally, indicating a higher potential for the production of juvenile salmon compared to other districts, (NASCO-FAR 2008). The status of salmon habitat in Ireland was classified as poor in the "Status of EU Protected Habitats and Species in Ireland Report", (NPWS), 2008. In NASCO's Atlantic Salmon Rivers Database, the Maigue is one of 396 North Atlantic rivers "threatened with loss" of its salmon population (http://www.nasco.int/RiversDatabase.aspx).

The causes of low salmon densities in the Maigue catchment are complex and probably include: the impact of arterial drainage in the 1970s; impact of past episodes of poor water quality in the past and up to the present; impact of the mixed-stock fisheries up to 2006; poor survival of adult salmon in the marine phase of their life cycle.

- The detrimental impacts of poor water quality on juvenile salmon are well known. In a study of Irish rivers Kelly *et al*. (2007) found that unless Q values are equal or greater than 3-4, then the river reach cannot support significant juvenile salmon numbers. As water quality improves, so will the numbers of juvenile salmon.

- Drainage schemes in the past tended to make river channels more uniform and shallower. This generally has reduced the potential of drained rivers for salmonid spawning, the ability of these to support populations of juvenile salmonids (O'Grady 2006).
- Marine survival and the numbers of fish returning to their native rivers, tend to fluctuate for reasons that are not understood. Prior to 1996, estimates of marine survival rates generally exceeded 15%; i.e. for every 100 smolts that went to sea from Irish rivers, 15 returned to spawn as adults. Since 1996, there has been a sharp decline in marine survival; currently marine survival rates for Irish salmon are just above 5%. These figures refer to wild salmon. For hatchery salmon, marine survival rates are only half this at best (SSCS 2016).

SALSEA-Merge was 3-year project initiated in 2008 with the aim of investigating aspects of the ecology of salmon in the north-east Atlantic that would shed some light on the marine survival problem. While the project greatly advanced understanding of salmon stock migratory patterns, genetic differentiation of salmon populations, and feeding patterns, the causes of the decline in marine survival of salmon remain uncertain, but are possibly linked to climate warming. The North Atlantic Salmon Conservation Organization (NASCO), the principal sponsor of the SALSEA research programme, concluded that-

"It seems clear that the marine environment of the North Atlantic is changing in a way that will cause additional pressures on the wild Atlantic salmon, particularly those in the southern part of the range. We conclude that there are no quick-fix solutions ..... the rational management approach is to re-double efforts to address factors impacting on productivity to ensure that the 2,500 salmon rivers that flow into the North Atlantic produce the maximum number of healthy wild salmon smolts. That will entail further sacrifices in harvests, more emphasis on habitat protection, restoration and enhancement and further progress in addressing impacts of salmon farming. It will mean more outreach to politicians and the public and to those industries that are impacting salmon habitat.

.....in the absence of even stronger conservation action for the salmon, there are warnings from the scientists that the species could become extinct in the southern parts of its range in less than 30 years time." (Malcom et al. 2012, p17).

5. River and fishery enhancement in the Maigue catchment

"It is worthy of mention that the Maigue throughout its upper waters can hardly be surpassed as a trout river in regard to the size and quality of its fish" (Grimble 1913).

The Maigue was regarded as one of Ireland's premier trout rivers up until the start of an arterial drainage scheme in the 1970s, which subsequently channelised the river, destroying its natural character" (O'Reilly, 2002).

Given its potential as an angling resource, it is not surprising that efforts have been made in recent years to restore and improve the aquatic environment of the Maigue catchment. The two principal impediments to restoration are water quality and the legacy of arterial drainage. The negative impacts of arterial drainage on river habitat are well known; channelization, reduced heterogeneity and depth of river the river channel, loss of the natural riparian vegetation, loss of pools, and loss of spawning gravel and compaction of river bed due to alteration of the river's flow. All of these

changes are evident in rivers of the Maigue catchment. They, in combination with deteriorating water quality, can make life difficult for fish, especially salmonids (O'Grady 2006). It is generally recognised that Maigue drainage in the 1970s and 1980s, while bringing many benefits to the region, also heralded a decline in the river habitat and fishery. It may also have had a significant negative impact on the invertebrate fauna on which trout depend. The mayfly (*Ephemera danica*) hatch on the Maigue and tributaries, once a significant event in the angling calendar for anglers local and from further afield, is now patchy and erratic.

In 2008 the OPW initiated the Environmental River Enhancement Programme (EREP). This is funded by the OPW and co-ordinated and managed by Inland Fisheries Ireland (IFI). This 5-year programme focused on the enhancement of six drained salmonid rivers/catchments in Ireland of which the Maigue catchment is one. The programme involved two different approaches to enhancement, capital enhancement works and enhanced maintenance works.

Capital enhancement works are carried out in order to ameliorate the negative effects of drainage on a river channel and it biology. They usually involve the importation of materials such as gravel (for spawning beds), boulders, the construction of deflectors, construction of vortex and other types of weirs, excavating pools, riffles and thalwegs, stabilisation of banks, fencing and restoration of riparian vegetation. These measures provide much improved conditions for salmonid spawning and habitat for larger trout (O'Grady 2006). Enhanced maintenance works are smaller-scale works that use on-site materials and require less investment. (EREP 2014)

Both types of works have been carried out in the Maigue catchment, principally on the tributaries, in order to improve spawning conditions for salmon and habitat conditions for trout. Capital enhancement works have been carried out extensively on the Camoge, Morningstar and Loobagh (the latter with funds from the General Municipal Allocation of Limerick County Council and assistance from local angler groups, following a serious pollution incident in 2014 (Catchments.ie 2016. Catchment Case Study: The River Loobagh https://www.catchments.ie/catchment-case-study-river-loobagh/). Enhanced maintenance works have been carried out on the Clonshire River, the Mahore and the Ballynamona, the latter receiving funding from the Salmon Conservation Fund.

The capital works have been accompanied with stocking of salmon fry in the tributaries and main channel in an effort to stabilize salmon returns in the catchment and to start the process of rebuilding salmon stocks.

THE FPI survey (2013) carried out as part of the EREP programme concluded that-

"*There is extensive potential for river restoration either through capital work or enhanced maintenance in the Maigue catchment..... The Loobagh upstream of Killmallock and the Morning star upstream of Ballynahinch Bridge both have potential for increased salmon production. The main Maigue channel from Bruree downstream to below Croom had the highest densities of salmon fry and parr recorded, as part of the FPI survey, and has significant scope for river enhancement.* (EREP 2013),

However, a major impediment to future enhancement works of this kind in much of the Maigue catchment is inadequate water quality. Based on the research of Kelly et al. (2007), it is recognised that enhancement work is not cost-effective in terms of increasing trout and salmon numbers, if it is carried out in areas where Q values are at 3 or less. **Fig 3** summarises changes in water in the Maigue catchment from 1970s to 2014. In the 1970s, almost one-third of the sites sampled were high status sites (Q4-5, Q5); there are none today. Almost 50% of sites currently have poor water quality (Q3 or less) compared to only 15% in the 1970s.

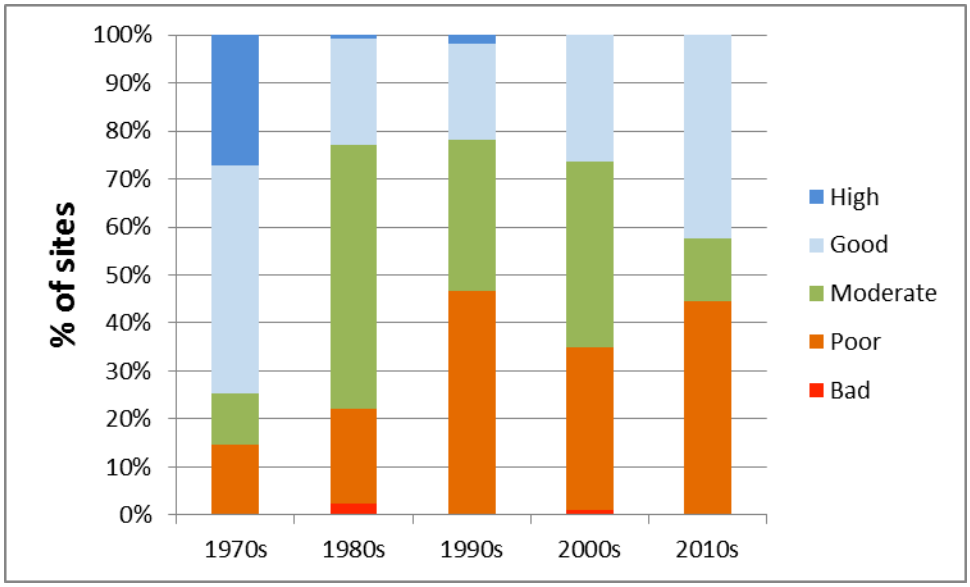

Fig. 3 Changes in water quality at monitored sites in the Maigue catchment, 1970s to 2014. (Data from: http://www.epa.ie/QValue/webusers/HAResults.asp.)

Water quality shows a considerable variation within the catchment (**Fig. 4**). The Morningstar, Greanagh, Loobagh, and the Maigue main channel had the best water quality (2010-2014), while the Charleville Stream, Barnakyle, Clonshire and Mahore had poorer water quality.

Fish kills are the most extreme evidence of the threats to water quality. Extensive fish kills occurred on the Drumcamoge in 2015, the Loobagh in 2014, and Morningstar 2010. Events like this are very destructive and justifiably grab the headlines. However, gradual deterioration in water quality, caused by diffuse pollution and nutrient pollution, is more insidious and less obvious, but is much more destructive to salmonids. This kind of pollution affects large parts of the Maigue catchment. For more detailed information on the water quality in different parts of the catchment, consult www.catchments.ie. and http://www.epa.ie/QValue/webusers/HAResults.asp.

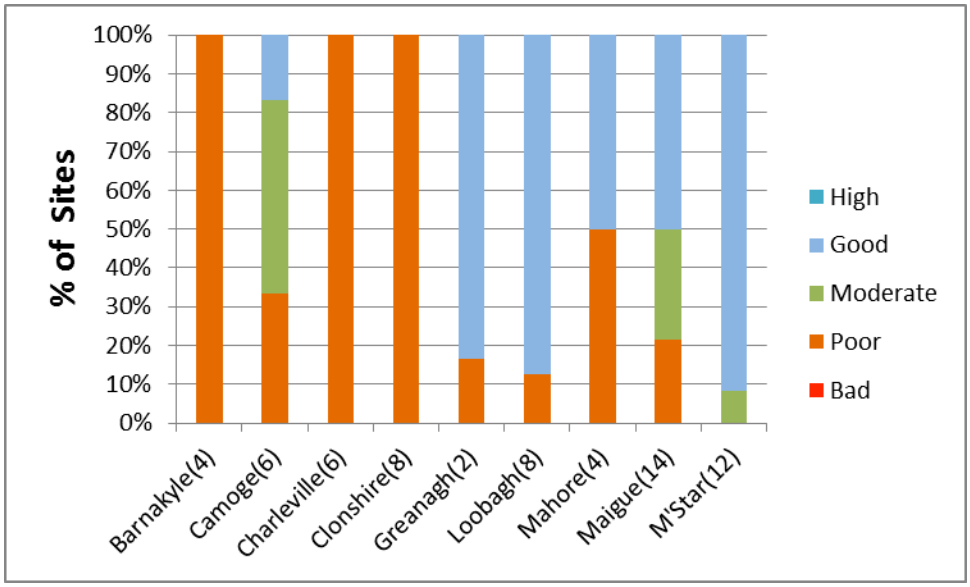

Fig 4. Water quality in the main rivers of the Maigue catchment 2010-2014. (Data from: http://www.epa.ie/QValue/webusers/HAResults.asp.)

6. Angling in the Maigue Catchment

A number of angling clubs operate in the Maigue catchment. The waters of the Camogue Angling Club extend from Glenogra Bridge downstream to Cloghanduff Bridge. A fly-fishing-only bye-law is in force on these waters. The Kilfinane & Kilmallock Anglers Association control waters on the Loobagh. Maigue Valley Anglers have fishing rights on the main channel. The IFI had until recently fishing rights on a stretch of the Maigue upstream of Castleroberts Bridge. Fishing in the rivers of the catchment is exclusively for brown trout. Fishing pressure in general is low.

Bleach Lough Anglers stock Bleach Lough with rainbow trout (*Salmo gardneri*) and brown trout. Formerly known as Dromore District Anglers, since 1982 this is one of the prime non-commercial trout fisheries in Munster (http://www.bleachloughanglers.ie), with a strong membership profile, and attracting both local and visiting anglers. I.A.S.C. Lough Gur (Irish Angling & Social Club Lough Gur) commenced implementing a development plan for a recreational fishery in Lough Gur in 2015. (http://iascloughgur.weebly.com).

Although hard data is impossible to obtain, anecdotal evidence suggests that illegal fishing is common. This is hardly surprising given the size of the catchment and the difficulty of patrolling it effectively. Particularly worrying is the Illegal targeting of salmon, the stock of which is well below its conservation limit in the catchment.

7. Conclusions

- The Maigue catchment is significant nationally in terms of fish biodiversity.
- Across the rivers of the catchment, brown trout is the most common angling fish in the catchment. Trout stocks appear to be low in some parts of the Maigue catchment, possibly

because of poor water quality and other factors. A catchment-wide trout population survey would be welcome. This would identify areas of high and low productivity and would help to prioritize measures that would improve the trout fishery. The catchment has the potential to be a very productive brown trout fishery as it was historically. Properly managed, it may be capable of generating significant angling tourism. The desirability of this needs to be discussed by the relevant stakeholders: angling clubs, IFI, landowners and local tourism interests. The MRT can act as a forum for these discussions.

- The presence of the salmon counter at Adare promises more accurate estimates of future salmon returns. Salmon stocks in the Maigue catchment are currently well below their conservation limit (CL), and are likely to remain so while marine survival rates are poor. While this is a major impediment to stock recovery, and unless it improves, may place the future viability of the Maigue salmon stock in doubt, it is imperative to continue and accelerate river enhancement and other water quality improvement measures that will enhance natural salmon spawning in the hope of rebuilding the stock above its conservation limit.
- In this regard, it is worth considering, in discussion with IFI and salmon fishery experts, the potential benefits of a salmon hatchery program on the Maigue. This may be a strategy for minimizing short-term extinction risks for the Maigue salmon, particularly if the population appears to be a approaching an extinction "tipping-point" over the coming years.
- The future viability of trout and salmon stocks in the Maigue catchment depends on rehabilitation of the riverine habitat. The availability of enhancement planning in the Maigue catchment through EREP in conjunction the OPW and IFI, is to be welcomed.
- River enhancement work in parts of the Maigue catchment are contingent on the attainment of good water quality (at least Q3-4), which is prerequisite for self sustaining salmonid populations. Efforts need to be concentrated on improving water quality across the catchment in line with Water Framework Directive objectives. Community-led initiatives coordinated by the MRT, and in conjunction with statutory agencies, may be the best way to achieve this.
- Lough Gur is an important fishery for pike and other coarse fish. An improvement in water quality would also benefit the fishing here. Other smaller lakes in the catchment may also have potential as coarse fisheries.

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