2010

River Faughan and Tributaries Catchment Status Report

Loughs Agency of the Foyle Carlingford and Irish Lights Commission

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Picture of cock salmon in breeding dress courtesy of Atlantic Salmon Trust

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1.0 INTRODUCTION

Welcome to the 2010 series of Loughs Agency catchment status reports. Written in 2011 and reporting on 2010 the reports provide a review of fisheries and other associated information collected and management measures implemented within the freshwater catchments of the Foyle and Carlingford areas.

This is one of an annual series of catchment status reports produced by the Loughs Agency. The primary objective of the catchment status reports is to disseminate catchment specific information to all interested stakeholders. The reports continue to be consulted widely by a variety of stakeholders including local angling associations, fishery owners, statutory bodies, environmental consultants, students, conservation Non Governmental Organisations and private individuals. The catchment status reports provide summary data which demonstrates the work that the Loughs Agency conducts within specific catchments and outlines catchment specific objectives.

2010 witnessed significant regulatory change within the Foyle area with the implementation of the Foyle Area (Control of Fishing) Regulations 2010. This regulation expanded upon existing regulation governing the in season management of commercial and recreational Atlantic salmon and trout fisheries. The regulation also created a mechanism for regulating fisheries based on an assessment of the attainment of management targets for returning adult Atlantic salmon. In the event that set numbers of fish have not ascended key fish counter sites on the Rivers Roe, Faughan, Mourne and Finn prescribed management actions including suspension of commercial fisheries and recreational fisheries can be made. Additionally if management targets have not been met for a prescribed number of years the recreational fisheries can be made to adhere to compulsory catch and release and the commercial fisheries curtailed until prescribed conditions are met.

Due to the failure of the River Finn in Co Donegal to meet its management target for the prescribed period the commercial fisheries in Lough Foyle and the River Foyle were suspended in 2010 and the recreational game fisheries in the Rivers Foyle and Finn became compulsory catch and release.

Populations of Atlantic salmon are currently experiencing the lowest levels of marine survival on record. The Loughs Agency is continuing to conserve and protect the freshwater resources and habitats of the Foyle and Carlingford areas to ensure optimum conditions are available for all fish populations and the aquatic and riparian ecosystems that they form an integral part of.

The theme for the 2010 series of catchment status reports is fisheries biodiversity, monitoring and conservation. In 2010 the Loughs Agency in partnership with other statutory agencies has developed monitoring programmes for salmonids, lake fish, lampreys and European smelt. A series of individual reports on these surveys are available at www.loughs-agency.org under the publications section.

2010 saw the first specific lamprey surveys which we hope can contribute towards condition monitoring reports under reporting requirements for the European Union Habitats Directive. Baseline surveys of the native European smelt another fish species of conservation importance were also conducted demonstrating the diversity of fish populations within the Foyle and Carlingford areas.

A number of lake fish surveys following sampling methodologies developed under the Water Framework Directive were conducted in addition to the annual Water Framework Directive fish in rivers monitoring programme.

Other partnership programmes were also developed including the Lough Derg, wild trout conservation project.

The increasing diversity of freshwater monitoring programmes within the Foyle and Carlingford areas contributes towards the development of the area for sustainable recreation sympathetic towards the significant biodiversity resources present throughout the catchments.

All these programmes and more are presented and discussed across the 2010 series of fourteen catchment status reports.

Loughs Agency staff have continued to contribute significantly towards the conservation and protection of the fishery and aquatic resources of the Foyle and Carlingford areas, encouraging partnership building and actively engaging in participatory processes designed to ensure the sustainable development of our aquatic resources.

1.1 The Faughan Catchment

The River Faughan flows through a valley of glacial origin with large deposits of sand and gravel present throughout the catchment. Rising in central Co Londonderry on the western slopes of the Sperrin mountain range the river flows in a north-westerly direction where it eventually discharges into Lough Foyle.

The geology of the upper reaches consists predominantly of thin deposits of peat overlying schist and quartzite from the upper Dalradian period. The headwaters are located in undulating terrain dominated by peat bogs and associated vegetation with some commercial coniferous forestry plantations. Downstream the lithology changes to boulder clay with significant deposits of sand, gravel and alluvium in the river plain.

Land use is predominantly marginal rough grazing in the uplands moving to lowland grazing and arable in the lower reaches. The River Faughan and tributaries have a channel length of approximately 66.5 km and has a catchment area of 295 km^2.

The Faughan catchment is impacted upon by a wide range of anthropogenic factors within both the terrestrial and aquatic environments. A diverse array of impacts include amongst others; agriculture, sand and gravel extraction, commercial forestry, commercial and recreational fishing, industry, water abstraction, sewage treatment, diffuse and point source pollution, invasive plant species, urban sprawl and flood defences.

Increasing pressures on the aquatic environment within the Faughan catchment requires appropriate monitoring, control and remediation if native biodiversity is to be preserved. The proximity of the Faughan catchment to a large urban area exacerbates many of these issues.

Fig 1.1. Recently improved stretch of nursery water on the Bonds Glen, tributary of the River Faughan

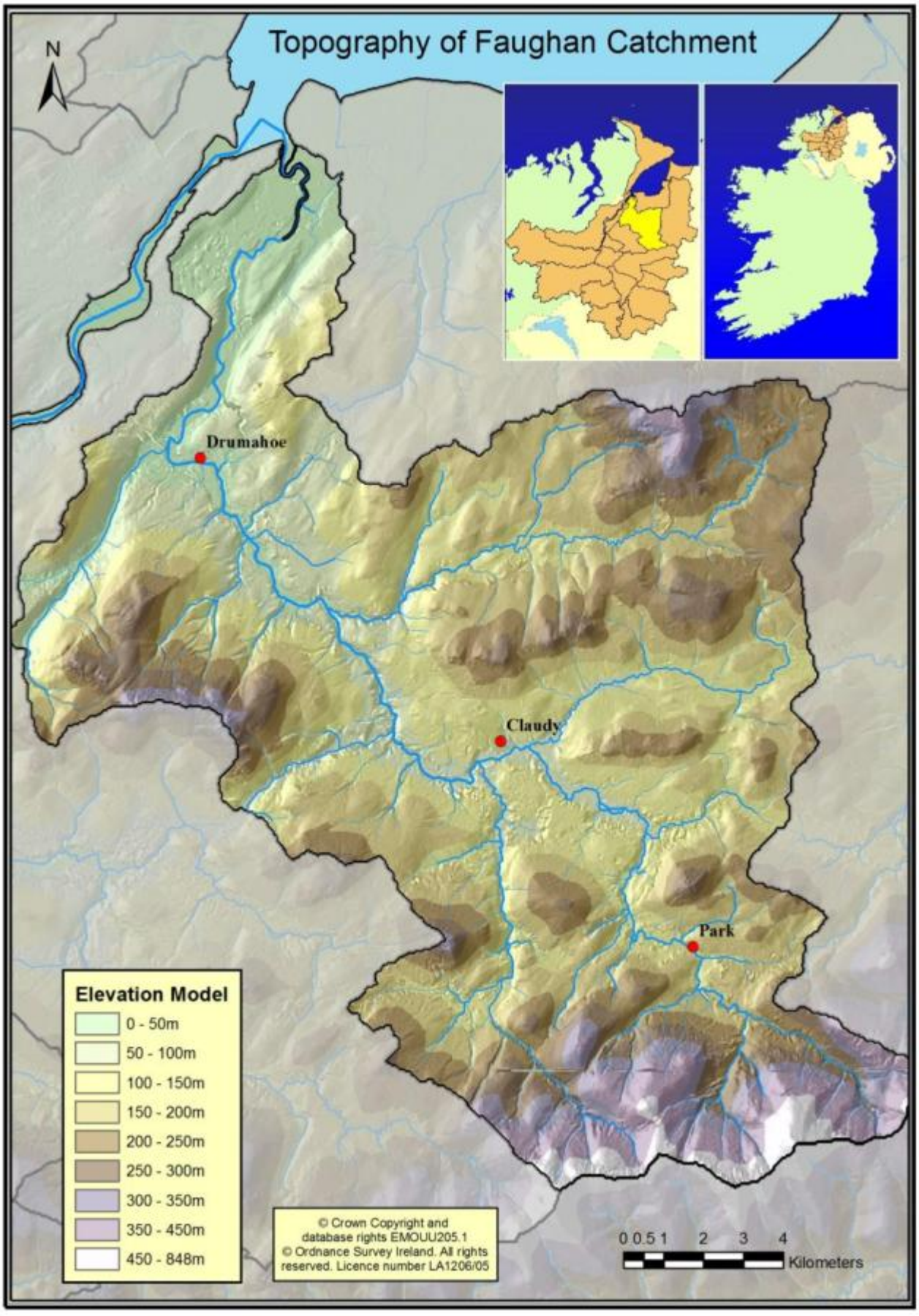

Fig 1.11. Faughan catchment topographical map with river network.

1.2 Atlantic Salmon and Sea Trout

Salmon and Sea Trout are referred to as being anadromous meaning that they migrate between the freshwater and marine environments returning to freshwater to reproduce. This complex life history exposes them to varied environmental pressures and recreational and commercial fisheries.

Adult Atlantic salmon return to their natal rivers where spawning takes place. Sea trout also demonstrate an ability to return to their natal river but their homing instinct may not be as strong as those of the Atlantic salmon. After the eggs hatch the juveniles (initially referred to as fry and then parr) remain in freshwater for up to three years.

Smoltification is the physiological adaptation which occurs when the juvenile salmon change from the parr stage (freshwater phase) to the smolt stage (marine phase). In the Foyle system this can occur after one, two or three years. Most Foyle salmon (referred to as post smolts) will remain after smoltification in the North Atlantic for one year and are referred to on their return to the coast and rivers as grilse. Salmon which stay at sea for longer than one year are referred to as multi sea winter (MSW) salmon.

1.3 Non Salmonid Fish Species

As highlighted earlier populations of other non salmonid fish species occur within the Faughan catchment. In the past monitoring was targeted at salmonid species however with obligations under the Water Framework Directive other non salmonid fish species are being monitored more closely.

Fish species presence and abundance can act as a good environmental/ecological indicator demonstrating the ability of the aquatic habitat to support a diverse array of native species. Populations of the European Eel, European Smelt, River/Brook and Sea Lamprey form an important part of the native fisheries biodiversity of the Faughan catchment. Maintaining high standards of water quality and appropriate habitat for these species is essential for the overall health of the aquatic ecosystem.

Fig 1.3 Sample of fish from the Foyle estuary

2.0 ATLANTIC SALMON STOCKS

In order to describe the status of salmon stocks each of the following points need to be considered:

- Redd Counts
- Juvenile abundance
- Marine survival
- Adult abundance
- Exploitation

2.1 Redd Counts

Redds are spawning nests created by salmon or trout. Differentiation between salmon and trout redds can be made as salmon redds tend to be larger in size and trout tend to spawn earlier than salmon within the Foyle system. Research within the Foyle system using extensive annual redd count data has highlighted a good relationship between the number of redds and the total annual catch of salmon. Table 2.1 shows redd count data for the Faughan catchment and the Foyle system. Water flow is of significance when monitoring redds as in high water conditions the ability to see and count redds in rivers is impaired. Figure 2.11 outlines redd counts within the Foyle area and the Faughan catchment.

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Foyle System	5354	*1338	3039	5507	4000	3382
Faughan Catchment	766	*35	387	637	442	298
Faughan as a % of Foyle	14	*3	13	12	11	9

Table 2.1 Redd counts for Foyle system and Faughan catchment *Note 2006/07 had extremely poor water conditions for redd counting

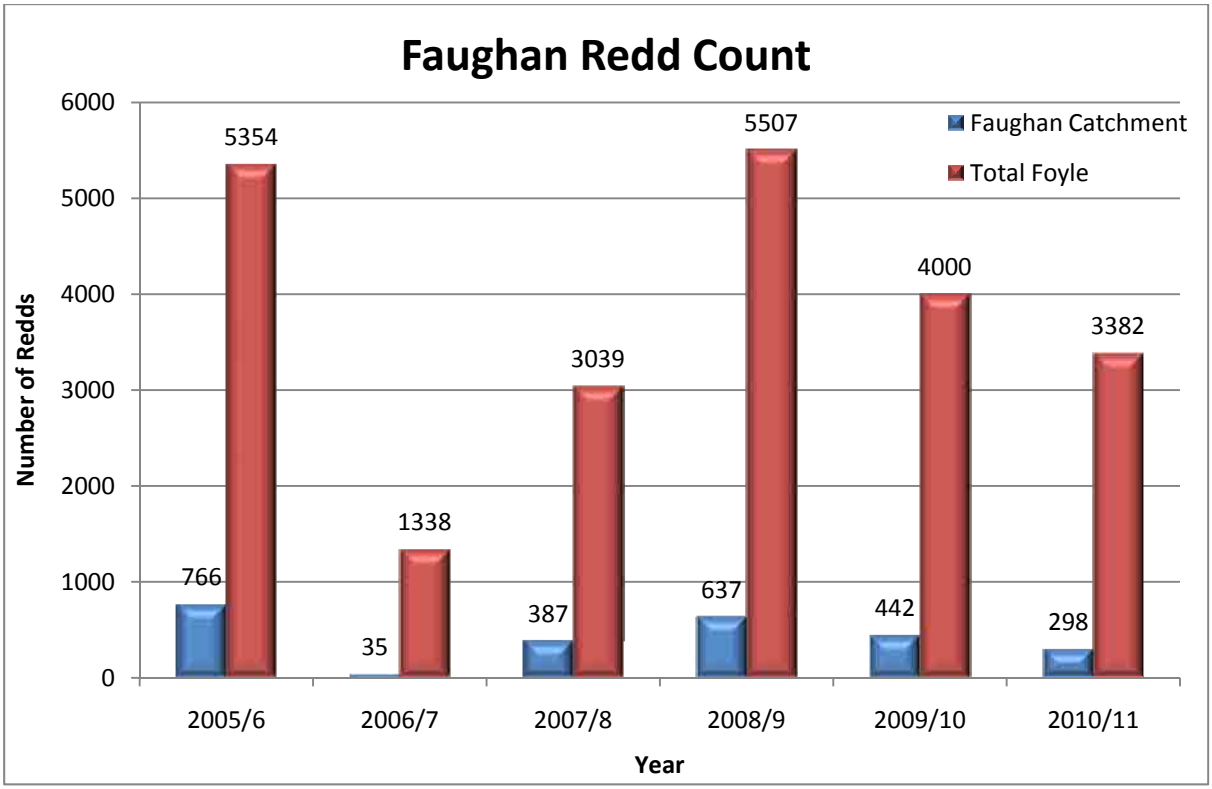

Fig 2.11 Redd counts for Foyle system and Faughan catchment 2005/06 – 2010/11. *Note 2006/07 had extremely poor water conditions for redd counting

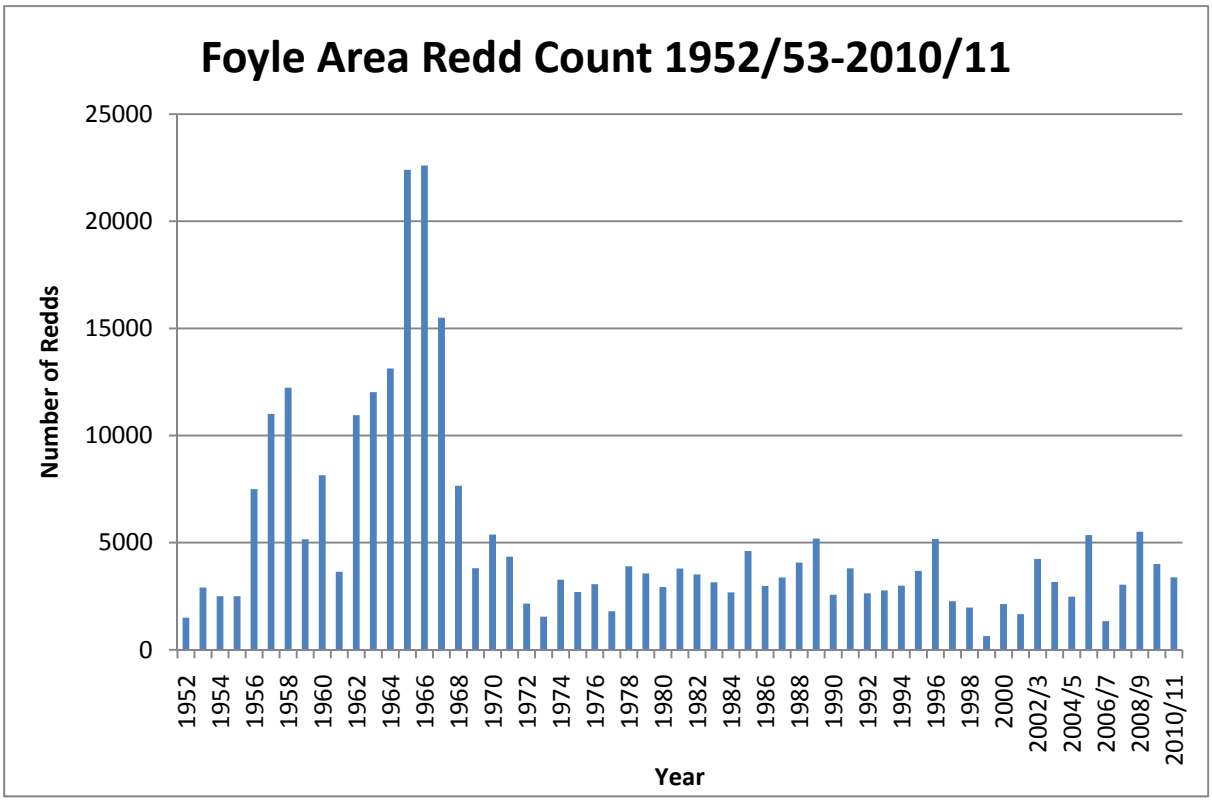

Fig 2.12 Redd counts for Foyle system 1952/53 – 2010/11

2.2 Juvenile Abundance

Within the Loughs Agency jurisdiction trends in abundance of juvenile salmonids are monitored by annual semi-quantitative electrofishing surveys. The numbers, age and species of fish captured during five minute timed electrofishing surveys are compared with previous year's data allowing for change to be monitored, facilitating suitable fishery management practices to be implemented.

In 2010 a total of 473 sites were semi-quantitatively electrofished within the Foyle system. The results for each site for salmon and trout are classified as excellent (>25 fish), good (15-24 fish), fair (5-15 fish), poor (1-4 fish) and absent (0 fish), Table 2.2. Figures 2.21 - 2.22 outline the salmon 0+ electrofishing results and site classifications for the Faughan catchment in 2010. Please consult previous status reports for site classifications in other years.

Semi-quantitative electrofishing was developed to monitor 0+ salmonids (fry/young of the year). In order to quantify the abundance of 1+ salmonids (parr and older) fully quantitative electrofishing surveys are required which can be used to calculate fish densities within a defined area. Rivers and tributaries with good environmental quality are more likely to support good populations of each year class.

Fish populations can vary considerably over time and location, it is therefore necessary to monitor the populations over a period of years to highlight meaningful trends before considering remedial activities such as habitat improvement works. These trends are being continually monitored by the Loughs Agency and the most appropriate management options considered.

There are a variety of reasons why electrofishing sites may be perceived to be under producing, these can include, lack of suitable juvenile habitat, the presence of impassable obstacles to migratory fish species on lower sections of a tributary, pollution, inconsiderate channel maintenance, tunnelling by bank side vegetation, stream gradient and poor forestry practices etc. The critical point is to recognise the major factors at play and to investigate all possible reasons for underproduction accepting that there may be inherent reasons as to why production may not be improved upon in certain areas. When the same areas are surveyed for other non salmonid species it may be discovered that they provide habitat more suited to these species. Habitat improvement works and the rationale behind them are discussed in greater detail later.

Obligations under the Water Framework Directive are driving quantitative surveys of both salmonid and non salmonid species under proposed Surveillance, Operational, Investigative and Protected Area monitoring programmes.

Symbol	Grade	Number of 0+ Salmonids
	Excellent	>25
	Good	15-24
	Fair	5-14
	Poor	1-4
	Absent	0

Table 2.2 Loughs Agency semi-quantitative electrofishing classification system for 0+ salmon and trout

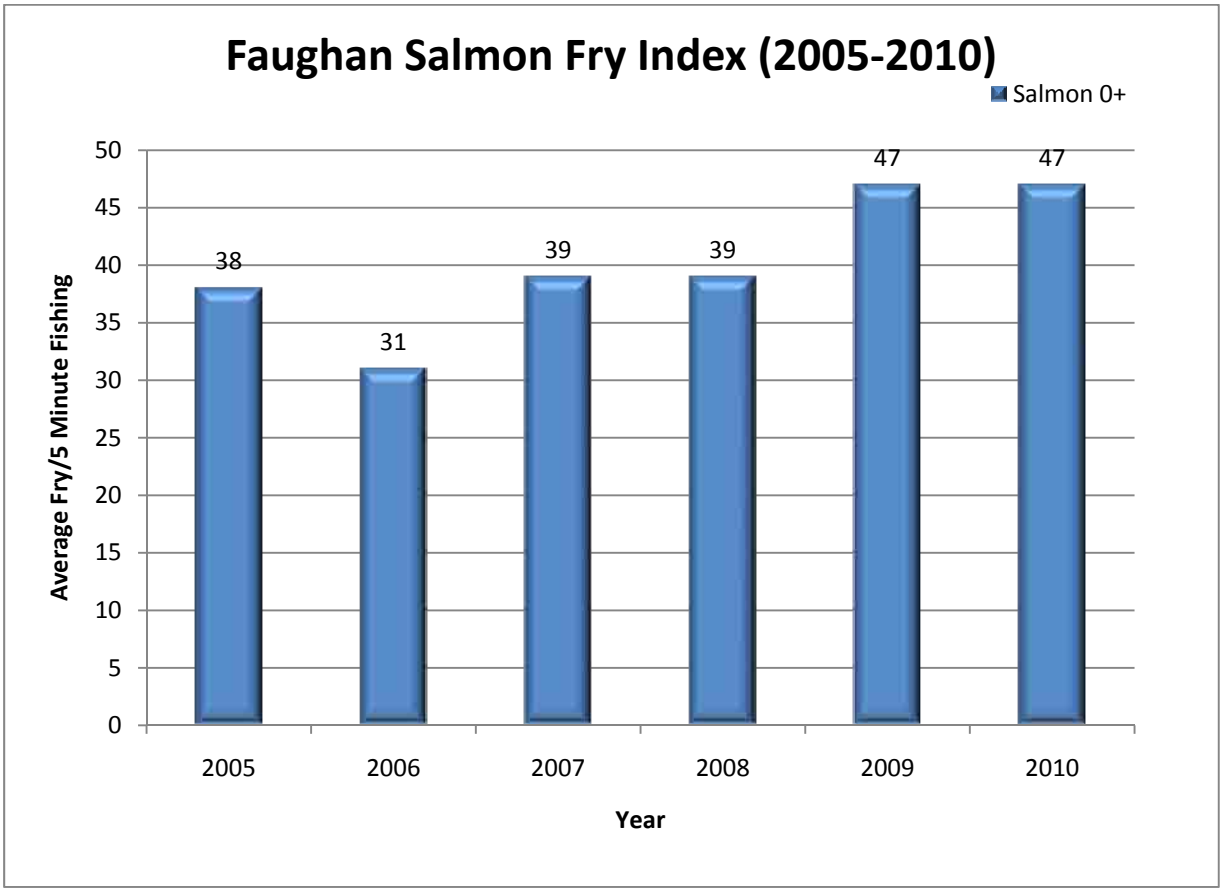

Fig 2.21 River Faughan catchment salmon fry index 2005-20010, based on mean salmon fry numbers at 26 standard sites surveyed annually.

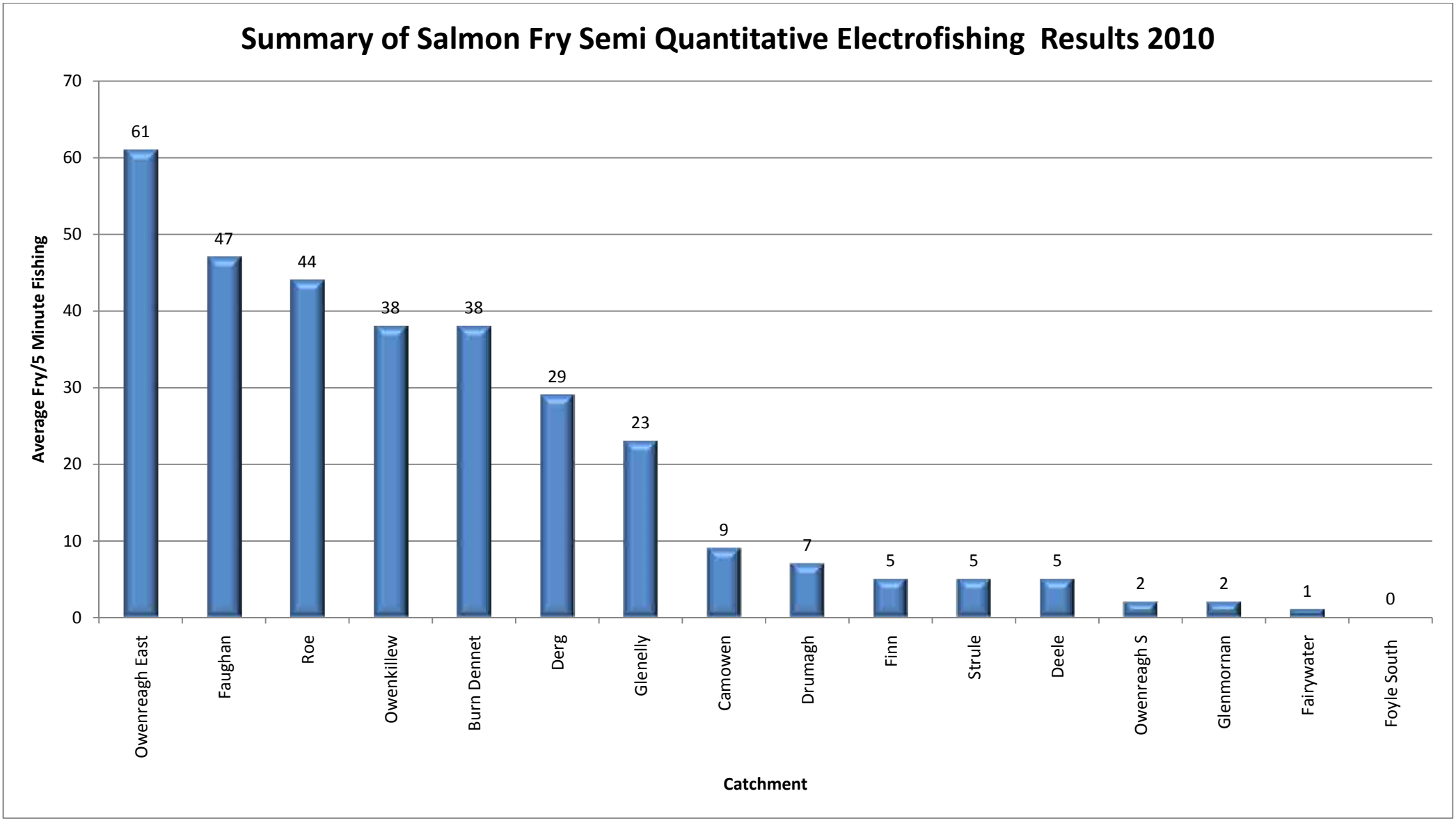

Fig 2.22. The mean abundance of salmon fry in 16 catchments in 2010 from all semi quantitative electrofishing sites in 2010.

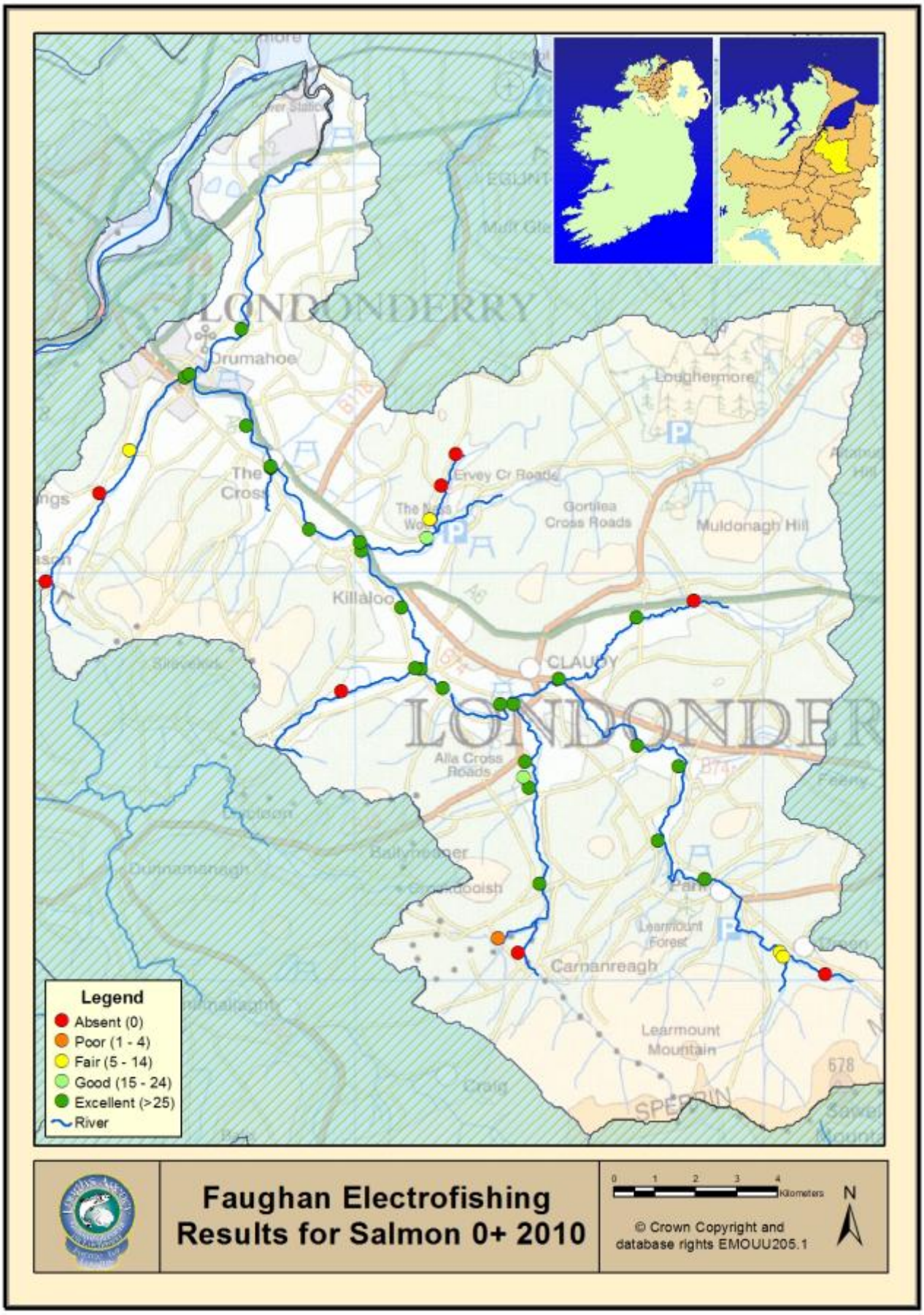

Fig 2.23 Salmon 0+ electrofishing site classification 2010

3.0 TROUT STOCKS

Annual trends in the populations of juvenile trout are also monitored within the Loughs Agency jurisdiction using the same methodology and classification system as those employed for salmon. The semi quantitative electrofishing results for trout fry in the Faughan catchment and site classifications are displayed in Figs 3.1, 3.11 & 3.12.

Fig 3 Electrofishing survey and trout parr

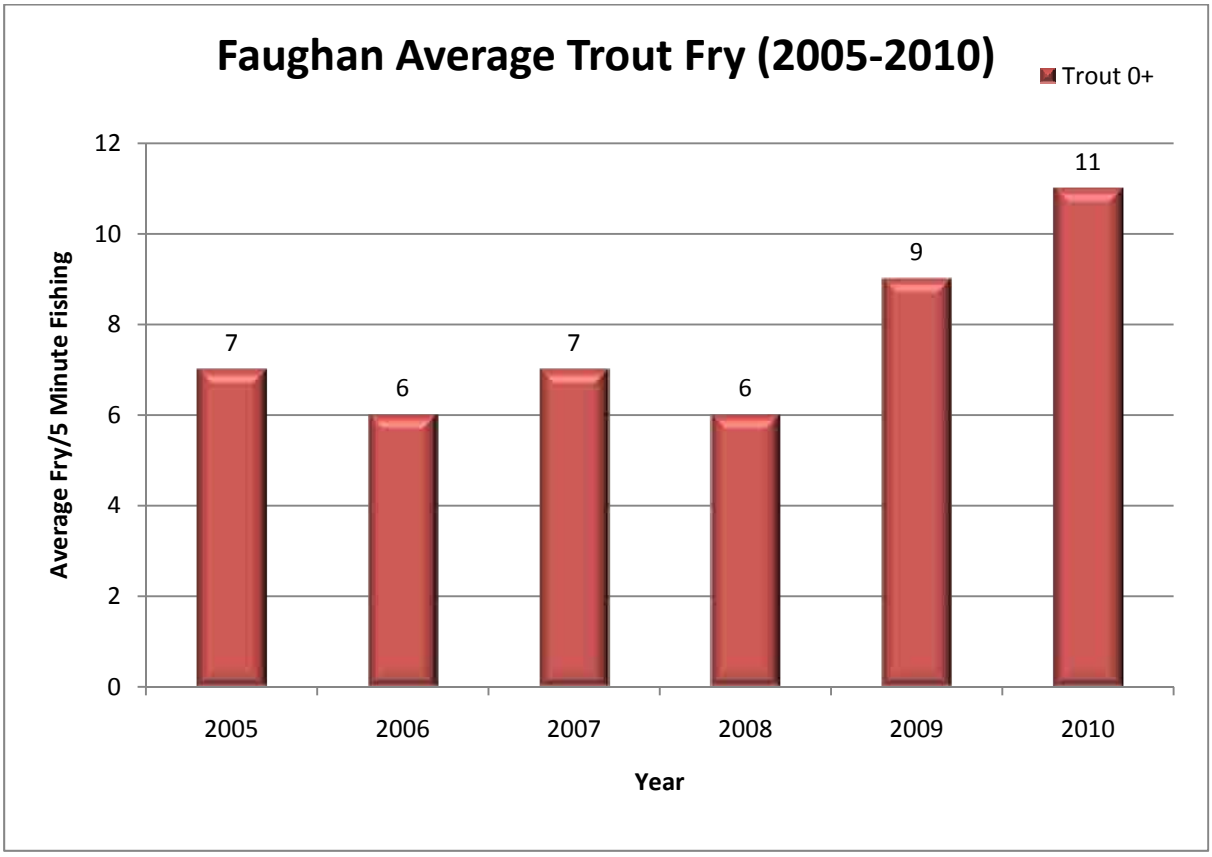

Fig 3.1 River Faughan catchment trout fry index 2005-2010, based on mean salmon fry numbers at 26 standard sites surveyed annually.

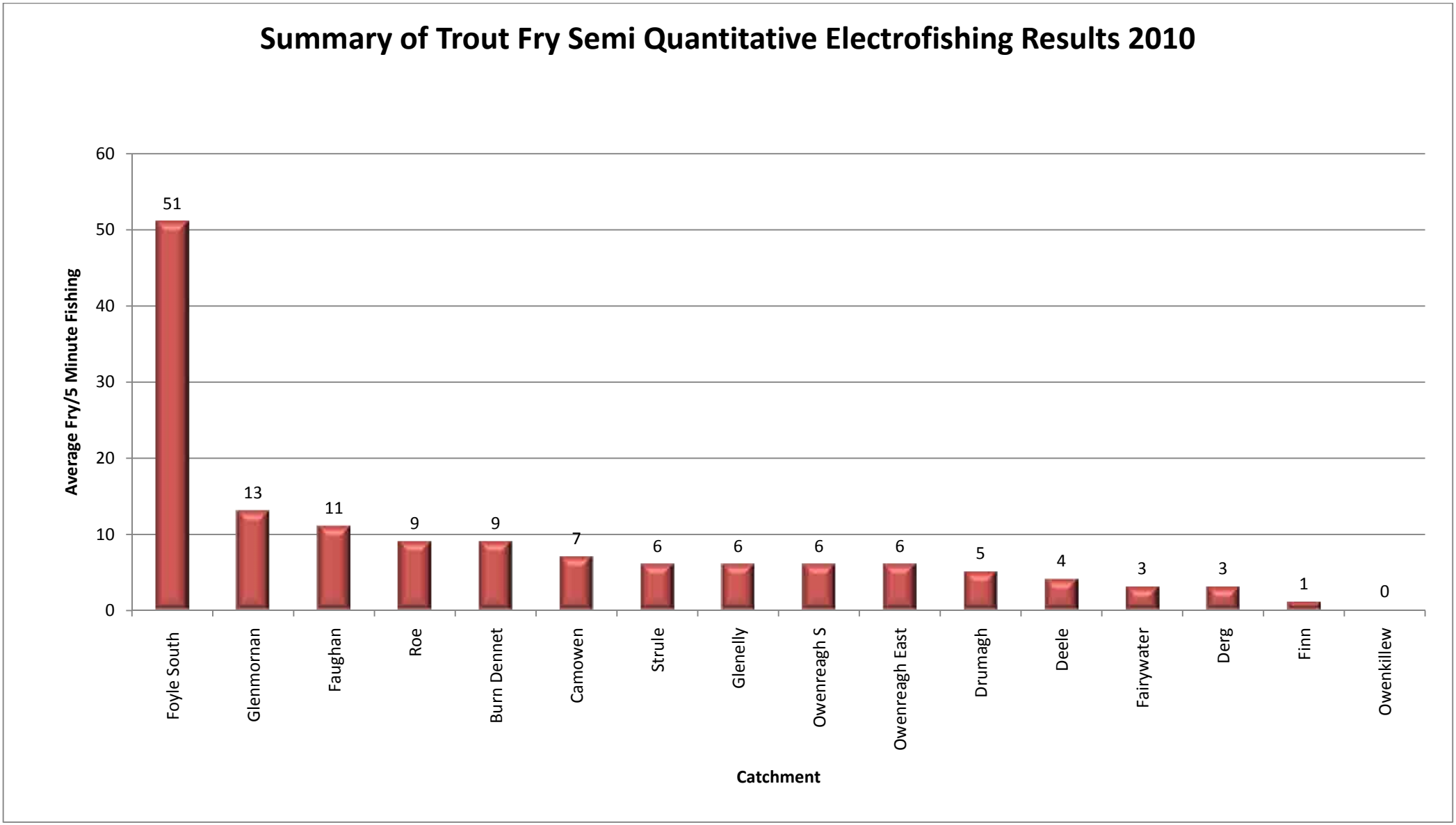

Fig 3.11. The mean abundance of trout fry in 16 catchments in 2010 from semi quantitative electrofishing.

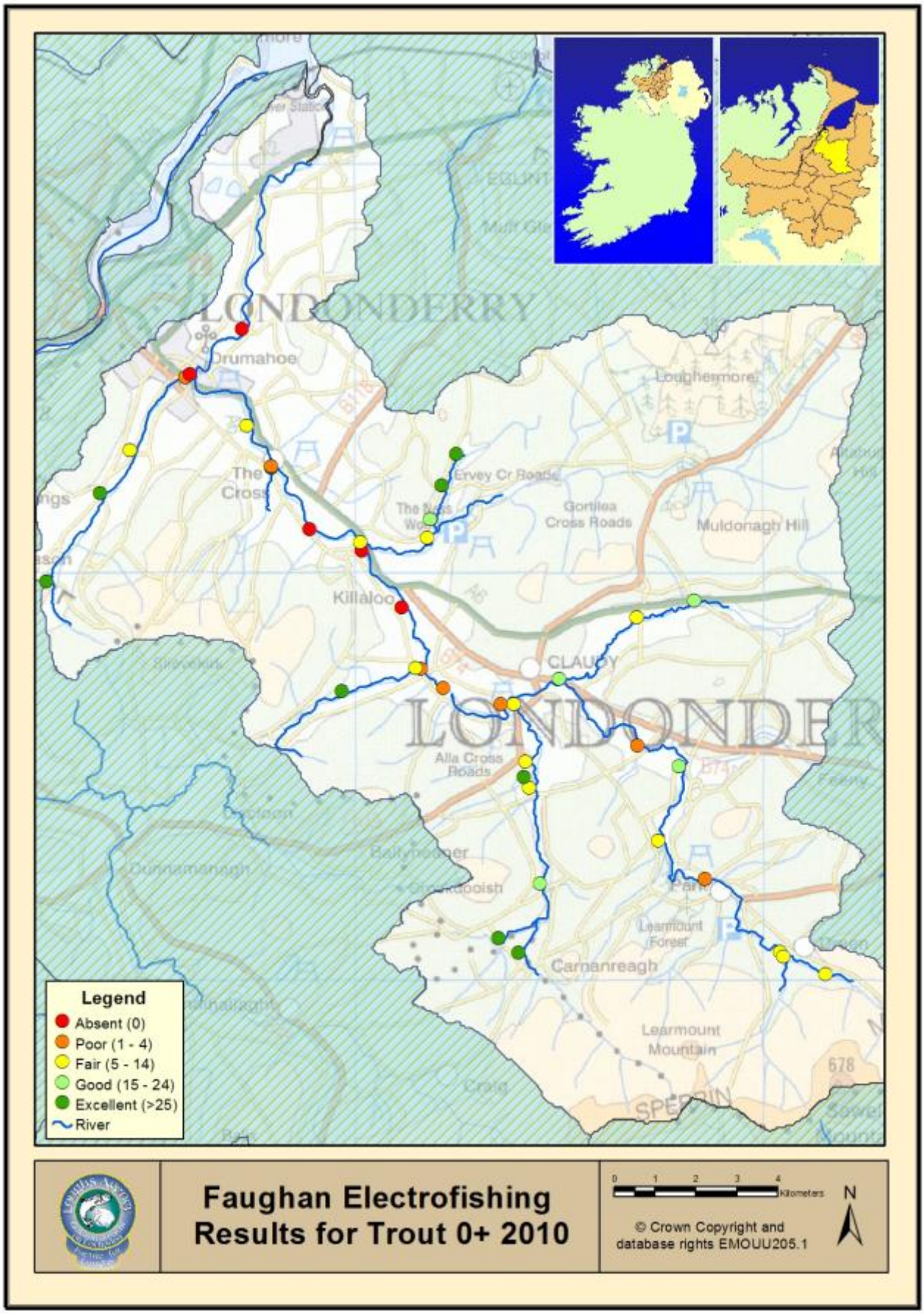

Fig 3.12 Trout 0+ electrofishing site classification 2010

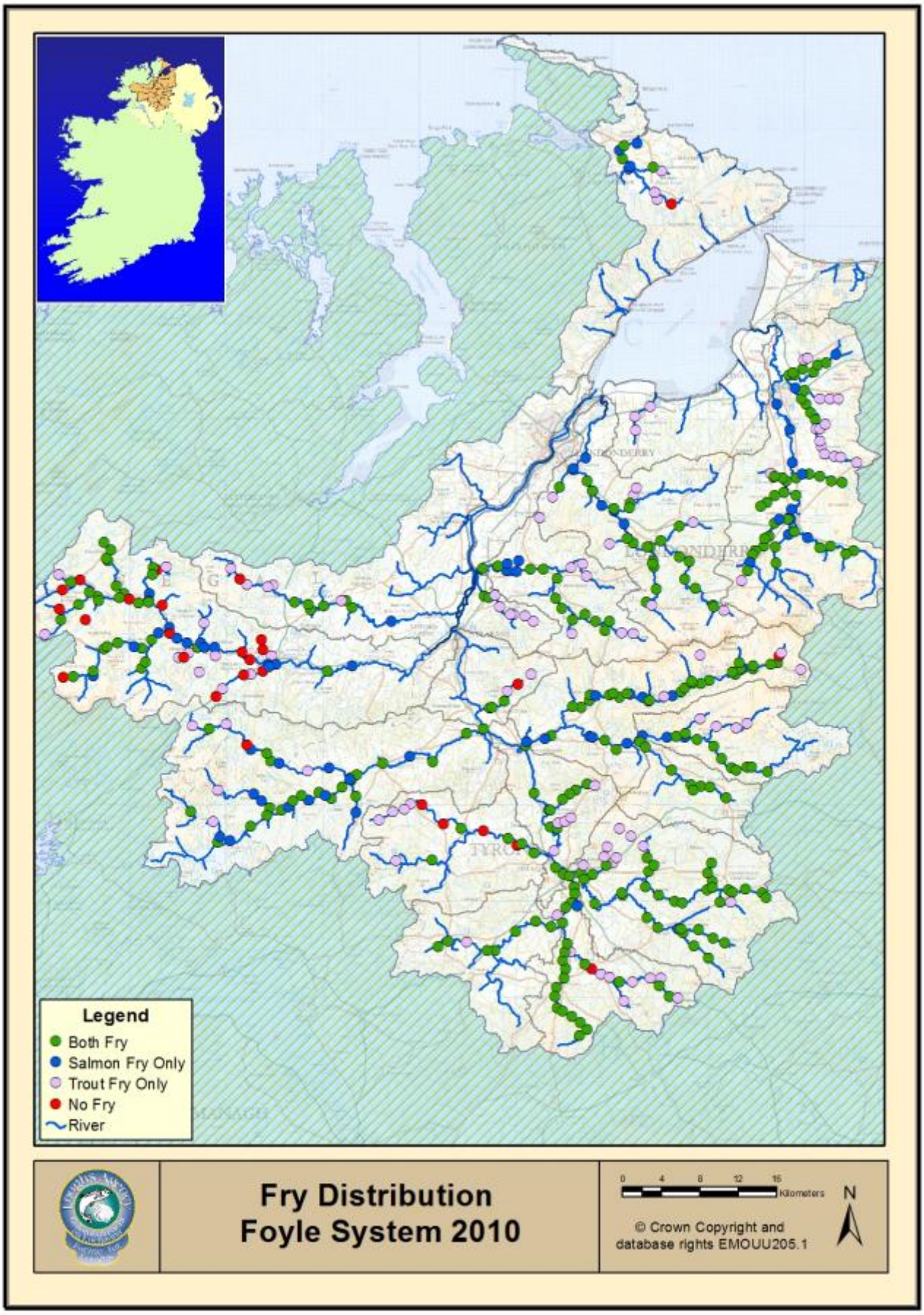

Fig 3.13 Salmon and Trout fry distribution 2010

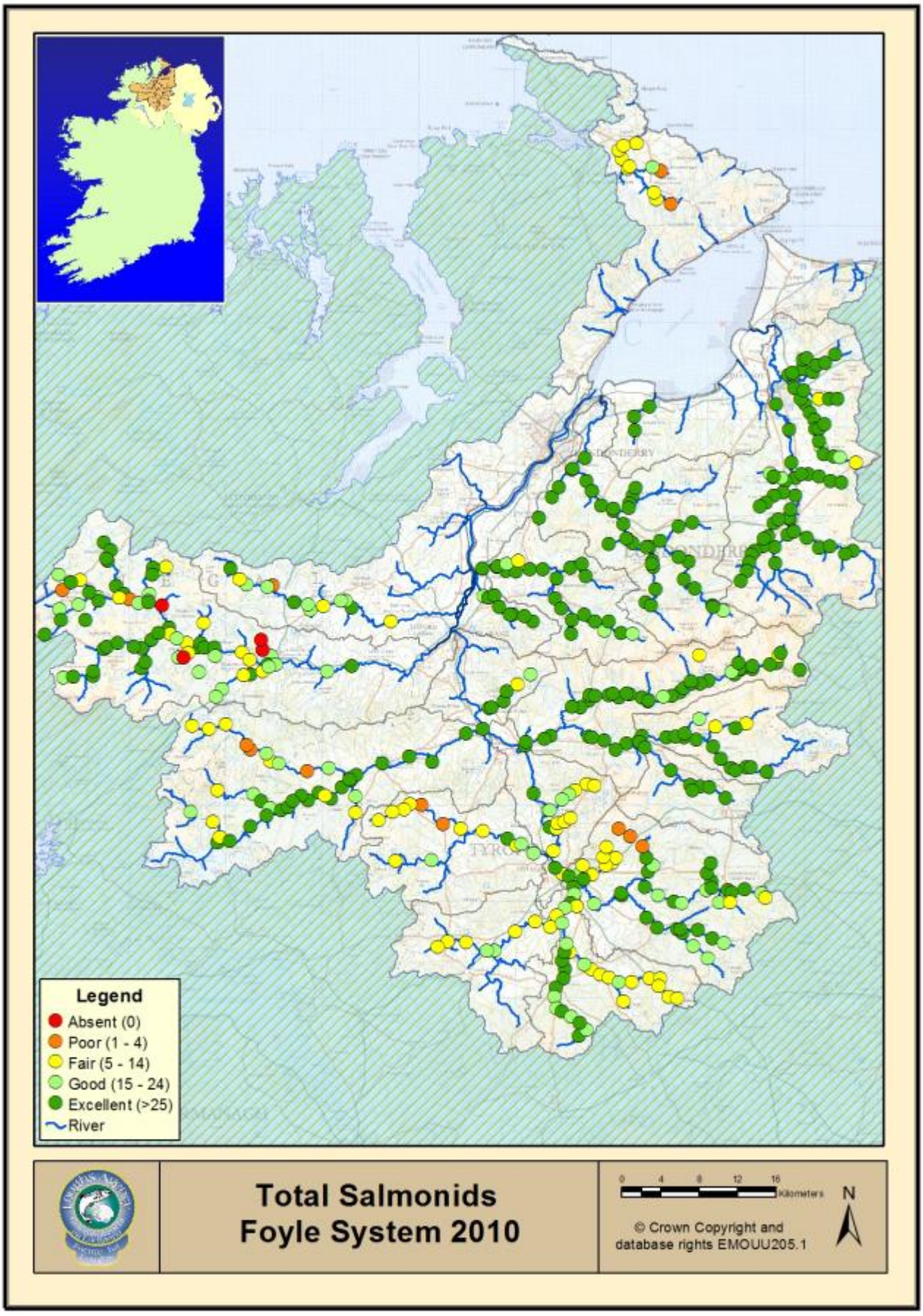

Fig 3.15 Total salmonid (salmon/trout fry and parr) distribution 2010

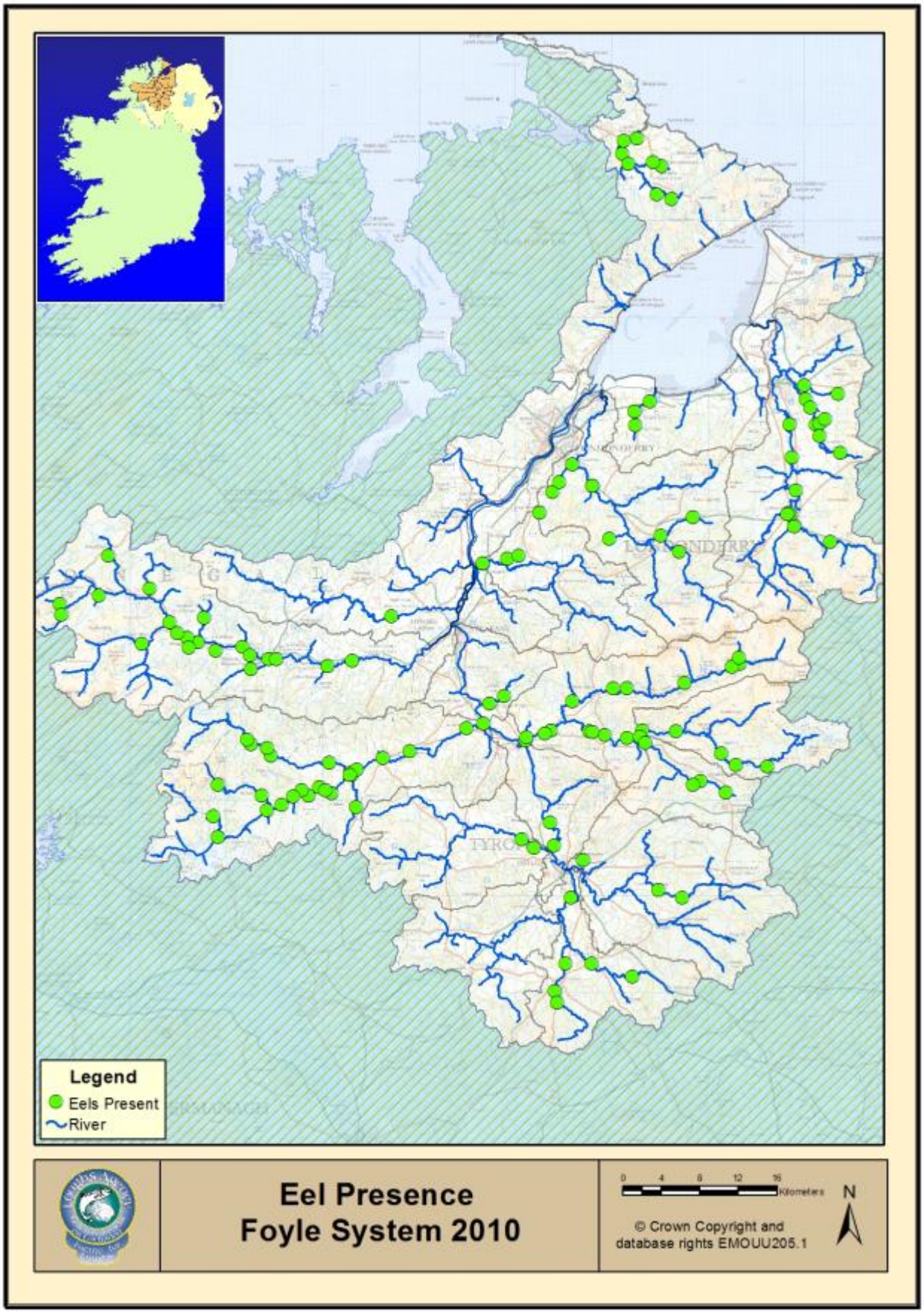

Fig 3.16 Eel presence as recorded during semi quantitative electrofishing surveys 2010. *Note technique used is designed specifically for salmonids.

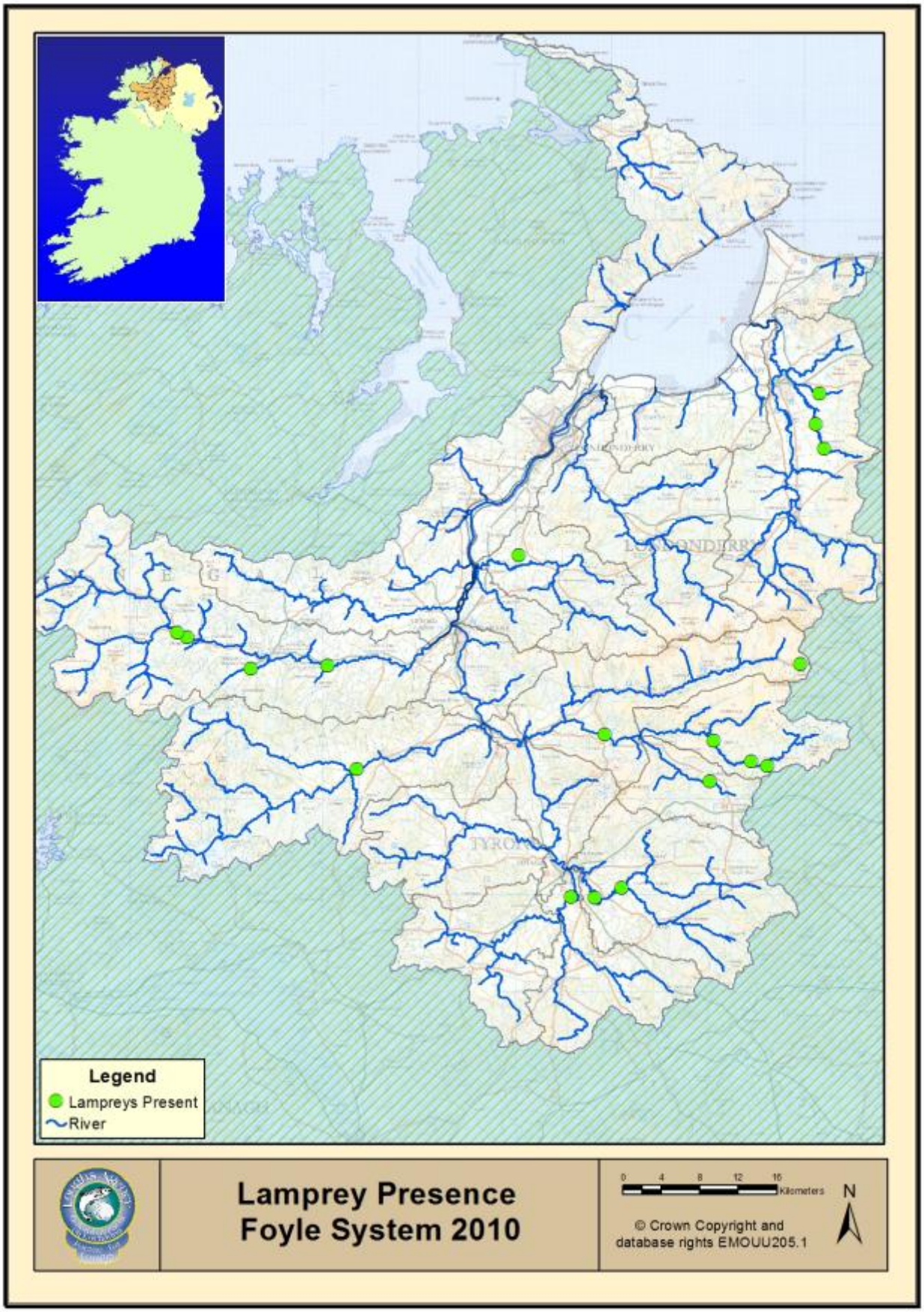

Fig 3.17 Lamprey presence as recorded during semi quantitative electrofishing surveys 2010. *Note technique used is designed specifically for salmonids. Further surveys will be required to accurately monitor lamprey populations.

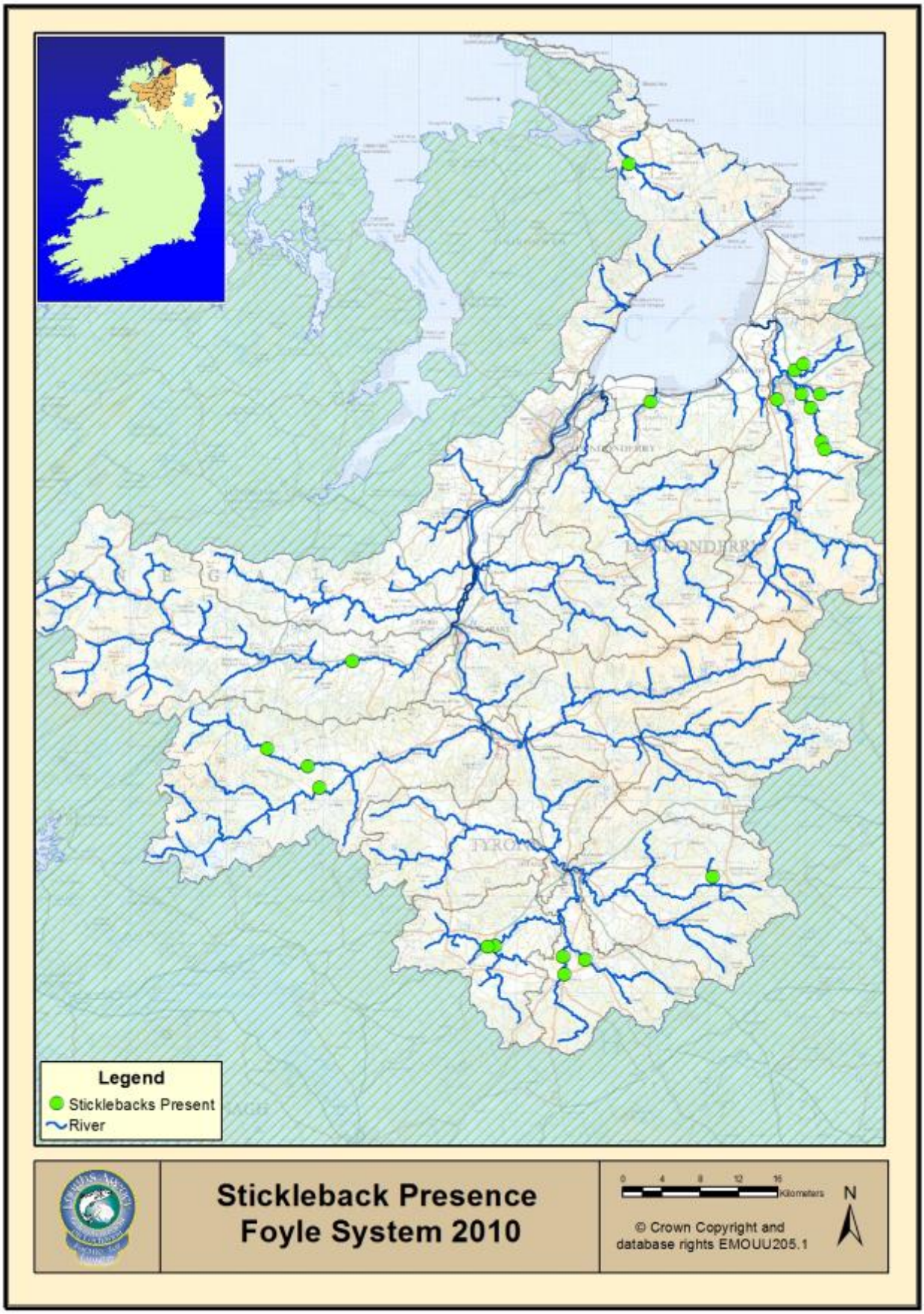

Fig 3.18 Stickleback presence as recorded during semi quantitative electrofishing surveys 2010. *Note technique used is designed specifically for salmonids.

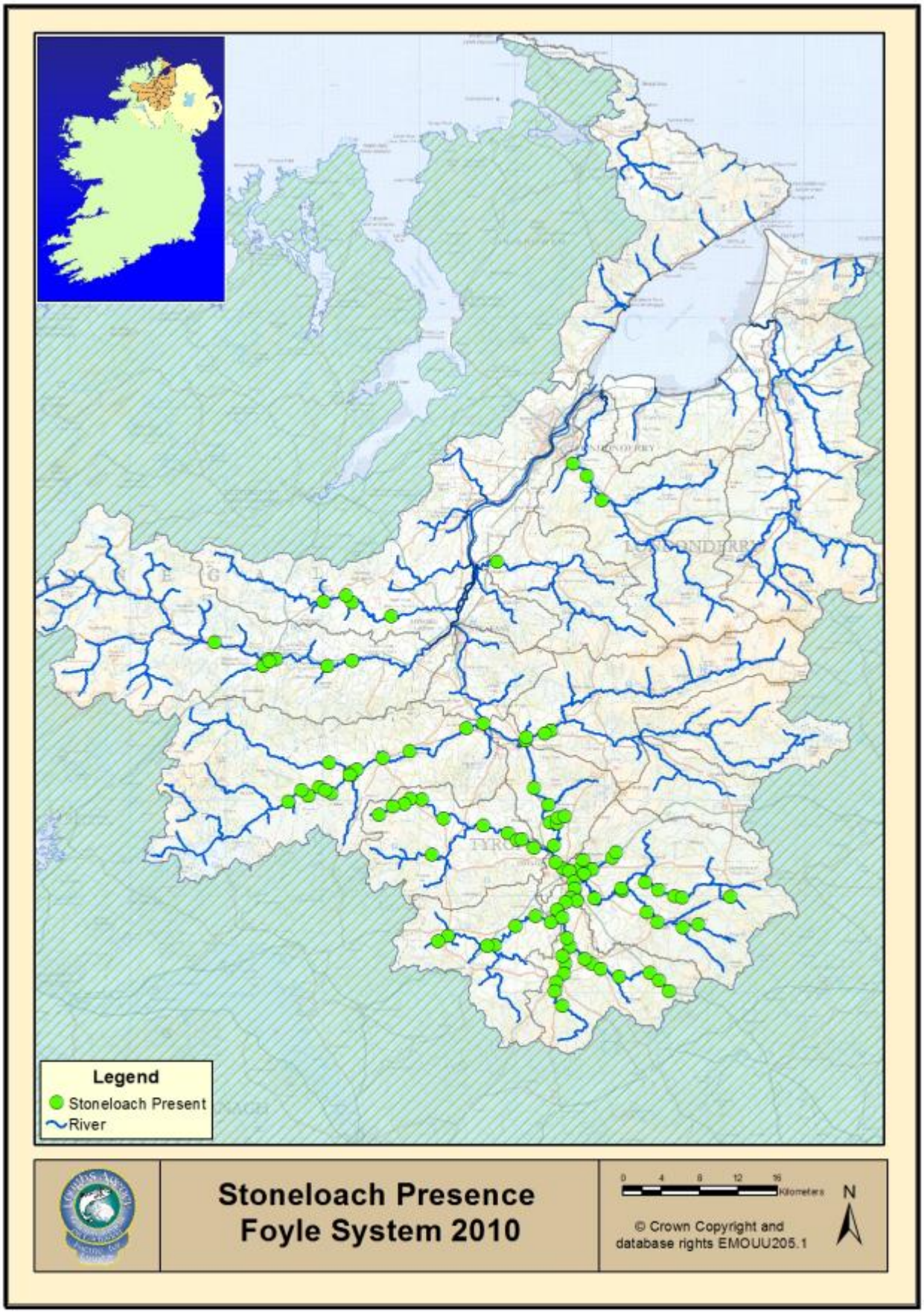

Fig 3.18 Stoneloach presence as recorded during semi quantitative electrofishing surveys 2010. *Note technique used is designed specifically for salmonids.

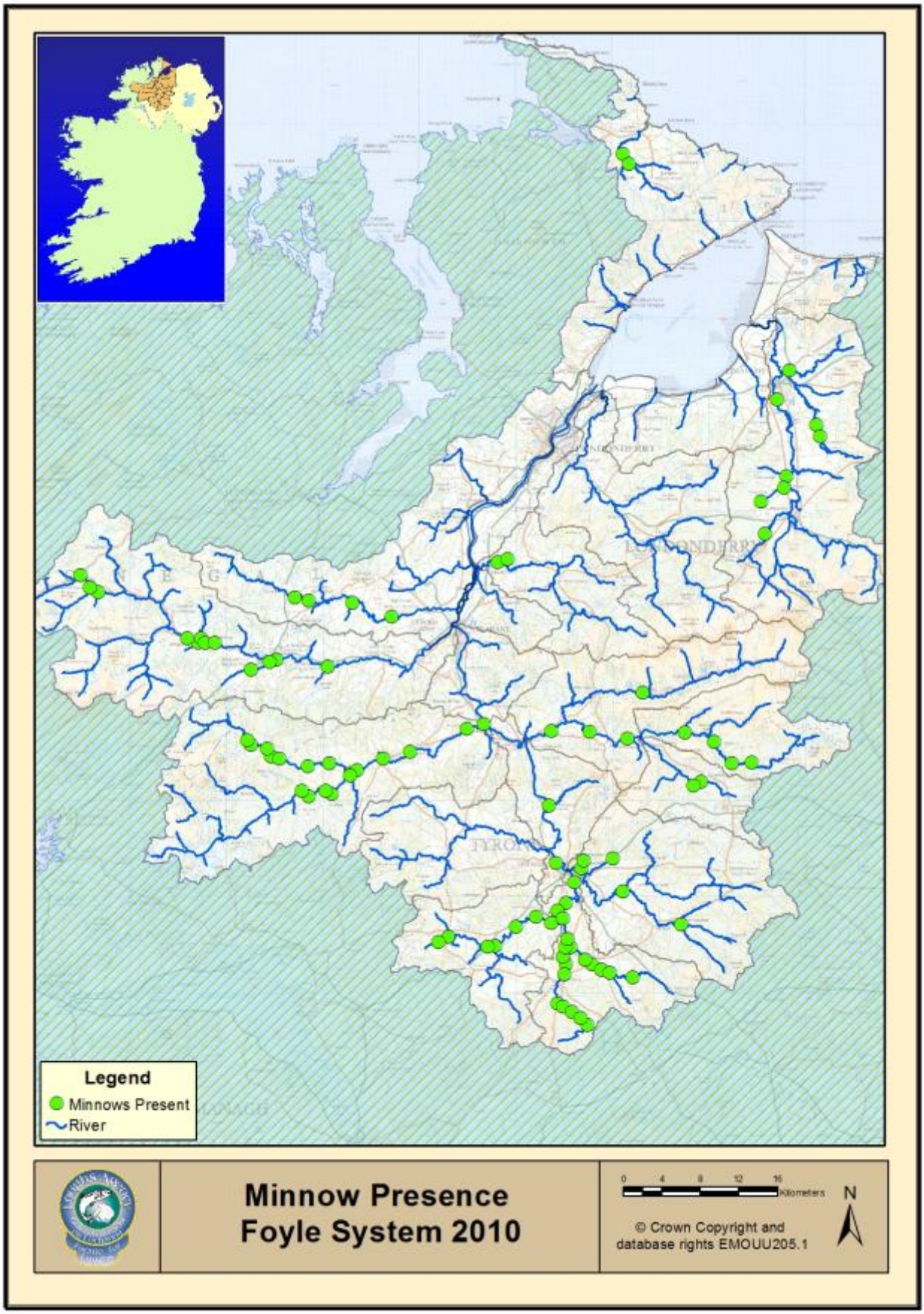

Fig 3.19 Minnow presence as recorded during semi quantitative electrofishing surveys 2010. *Note technique used is designed specifically for salmonids.

4.0 MARINE SURVIVAL

The numbers of salmon that survive to return to the freshwater environment are greatly influenced by conditions in the marine environment. Climate change leading to changes in sea surface temperatures, prey abundance, high seas fishing, marine pollution, sub lethal levels of pollution and predation all have an effect on the Atlantic salmon and indeed other migratory fish species chances of survival.

Marine survival trends are monitored on a number of index rivers in the North East Atlantic where total trapping facilities are available for both migrating juvenile and adult populations. Total trapping allows for an accurate count of all migrant smolts (total freshwater production) and returning adults to be made and therefore an accurate estimate of marine survival. These projects are facilitated by the use of Coded Wire Tags (CWT). Coded wire tags are small (2-3mm long) micro tags that are injected automatically by a CWT device into the snout cartilage of anaesthetised fish remaining there for the duration of the life of the fish. CWT fish also have their adipose fin (small fin between the dorsal fin and caudal fin (tail fin)) removed so that they can be identified in the various fisheries that may intercept them. In Ireland a comprehensive screening programme is conducted at all major landing ports and markets. This programme is important in monitoring the effect of the remaining salmon fisheries on salmon stocks from rivers both within and outside of the island of Ireland.

Trends in marine survival for the River Bush (nearest index river to the Foyle system) confirm patterns observed elsewhere on the southern stocks of North Eastern Atlantic salmon, which indicate that marine survival can be variable between stocks and years. In the River Bush marine survival has decreased considerably over recent years as outlined in Table 4.

Year of Smolt Cohort	Year of Returning 1SW Grilse	Marine Survival %
Pre 1996	Pre 1998	Circa 30%
2002	2003	5.9
2003	2004	4.3
2004	2005	4.6
2005	2006	4.2
2006	2007	13.0
2007	2008	7.5
2008	2009	3.3
2009	2010	4.9

Table 4 Marine survival rates for the River Bush of 1SW grilse (after exploitation at sea) pre 1996 and 2002-2009 smolt cohort. Data supplied by Agri Food and Bioscience Institute, River Bush Salmon Research Station

The figures outlined in table 4 are mirrored by those for other index rivers monitoring the southern stocks of North Eastern Atlantic salmon populations. These figures suggest that salmon are facing increased pressure for survival at sea. A major new international research project called SALSEA - Merge has been developed by scientists from the North Atlantic Salmon Conservation Organisation (NASCO) parties and its research wing the International Atlantic Salmon Research Board (IASRB). There are twenty consortium members in total including the Loughs Agency. SALSEA aims to monitor how Atlantic salmon use the ocean; where they go; how they use ocean currents, and the ocean's food resources, and what factors influence migration and distribution at sea. Research cruises commenced in 2008 and continued in 2009 to collect the necessary data to answer the questions listed above. In 2008 426 post smolts were caught by the two Irish cruises and 363 post smolts caught by the Faroese in the areas highlighted below. In 2009 464 post smolts were captured during the two Irish Research cruises which concentrated on the continental shelf edge to the north west of Ireland and on the North Norwegian sea. Further information and project details can be found at: http://www.nasco.int/sas/salsea.htm

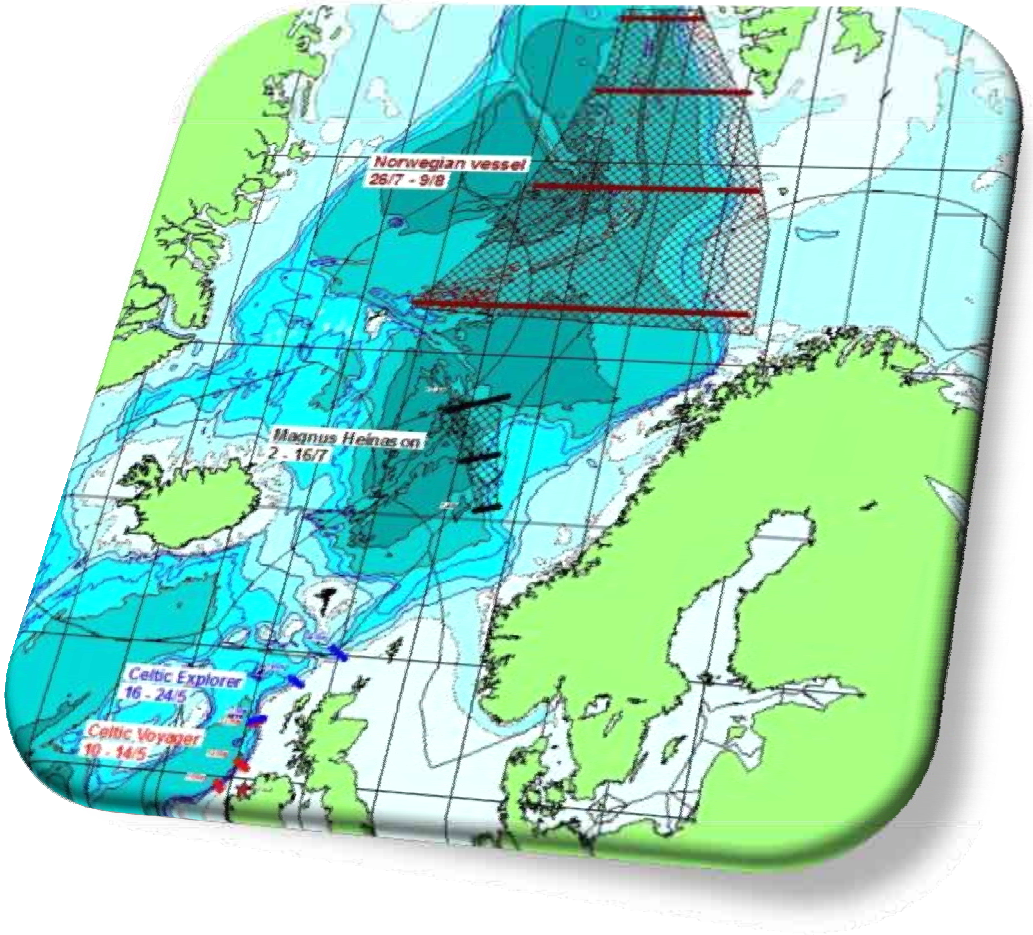

Fig 4 Marine survey areas for salmon in 2008

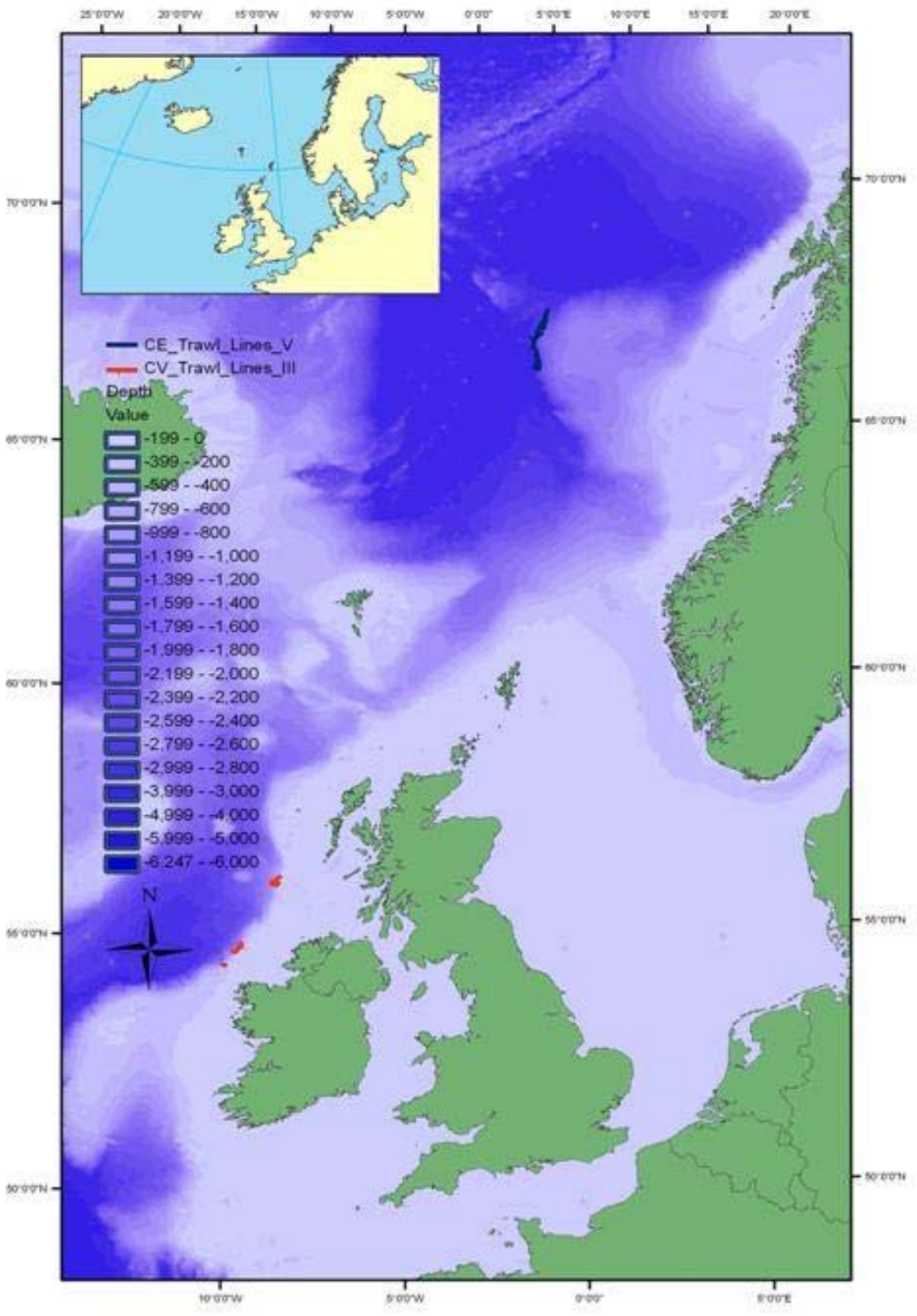

Fig 4.1 Marine survey areas for salmon in 2009

Fig 4a RV Celtic Explorer SALSEA research cruise

Figure 4b Picture from the Irish Research Vessel Celtic Explorer taken during the second SALSEA research cruise 16-24th May 2008

Since 2003 partial smolt trapping including CWT tagging has been conducted in the Faughan catchment using a rotary screw trap, Fig 4c. No trapping took place in 2010.

Figure 4c Rotary screw trap in position on the River Faughan directly below the fish pass at Campsie barrage.

Smolt trapping can have a number of objectives including the monitoring of both salmonid and non salmonid species. Sampling of the age composition, obtaining information on run timing and recording length/weight data is conducted in tandem with the tagging programme. As mentioned above total counts of migrating smolts can be made on rivers. Where this is unfeasible due to the absence of total trapping facilities, total smolt migration can be estimated by means of a mark-recapture experiment.

In 2004 an estimate of total smolt production for the Faughan catchment was made by a mark-recapture study resulting in a minimum run size estimate of 33,854 migrating salmon smolts. The estimate was a minimum due to a number of high water events that prevented the smolt trap from fishing for a period of time during the peak smolt migration period. Tables 4.1 and 4.12 outline numbers of salmon smolts tagged from 2003-2009 and recapture data for smolts tagged from 2003 to 2007.

Year	No of Salmon Smolts Tagged	Average Length (mm)	Average Weight (g)
2003	2113	149	33.45
2004	2500	134	24.6
2005	2210	133	23.6
2006	1025	133	25.36
2007	2062	135	27.1
2008	1865	130	22.1
2009	561	134	24.4

Table 4.1 Numbers and average weight and length of salmon smolts tagged on the River Faughan 2003-2009. Coded Wire Tagging equipment was purchased by the Loughs Agency in 2005 with funding secured from the European Regional Development Fund through the INTERREG IIIA Programme, administered by the Environment and Heritage Service, on behalf of the Department of Environment.

Year Tagged	Year Recaptured	Numbers Recaptured	Recapture Location
2003	2004	12	Greencastle, Burtonport, Malin Head, Belmullet and Torr Head
2004	2005	16	Greencastle, Malin Head, Donegal and Galway Bay
2005	2006	3	Greencastle
2006	2007	2	Greencastle and Ballycastle
2007	2008 2009	2 1	Greencastle Greencastle

Table 4.12 Recapture data from River Faughan CWT programme. No recaptures of fish tagged in 2008 were made in 2009. Data for fish tagged in 2009 and recovered in 2010 will not be available until 2011. It should also be noted that no commercial fishery has operated in the Foyle area since 2009. Screening of the commercial fishery produced the majority of tag recoveries in the Foyle area.

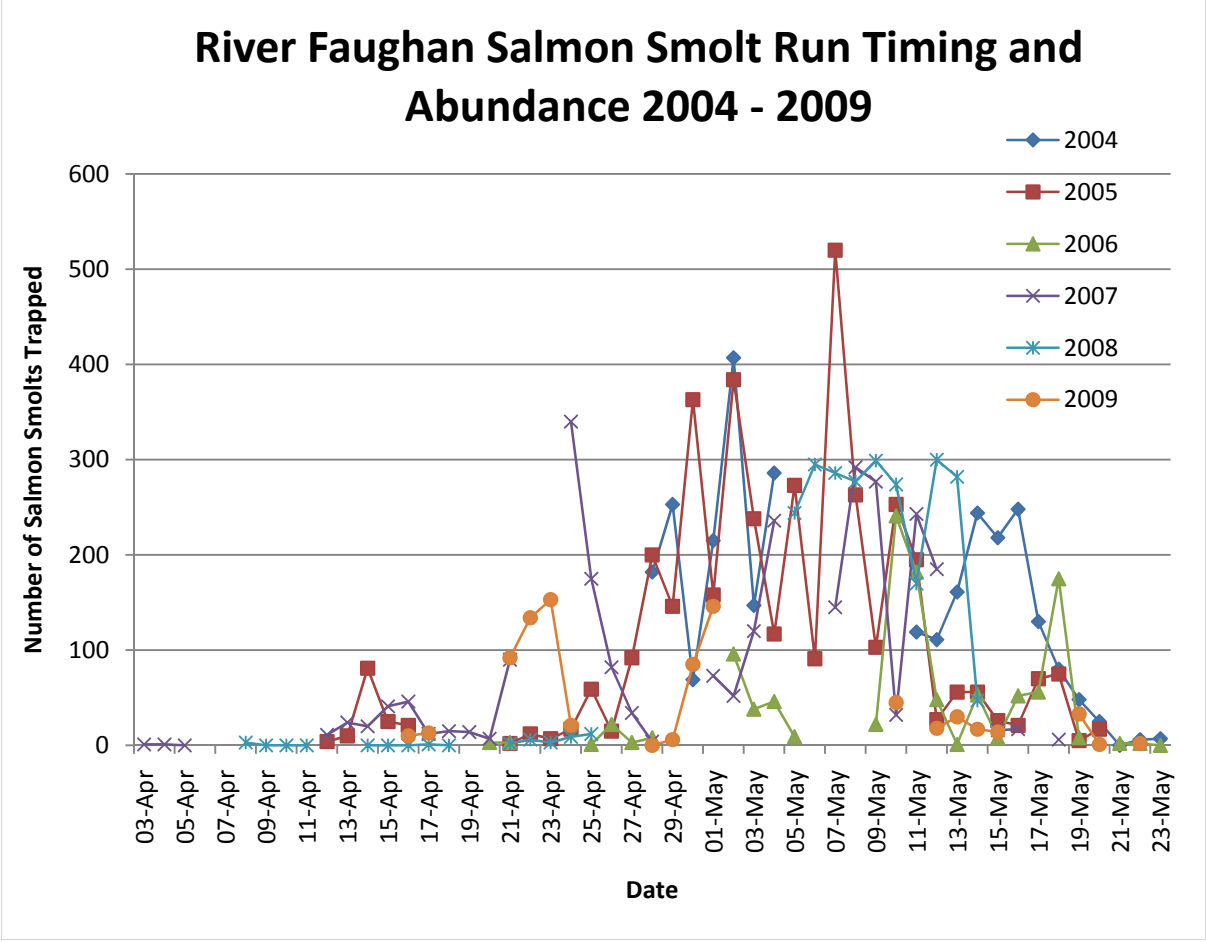

Figure 4d Salmon smolt run timing and abundance from rotary screw trap sub sample, River Faughan 2004-2009. Breaks in data are due to closure of trap during high water conditions.

In 2004 a detailed examination was carried out on the age class of migrating salmon smolts in the Faughan catchment, Table 4.13.

Age at Smolting	%
1	13
2	83
3	4

Table 4.13 Age class of salmon smolts migrating from the Faughan catchment in 2004

Fig 4.14. From top to bottom, Atlantic salmon smolts from the Faughan Catchment, brook lamprey, river lamprey and sea lamprey also caught in the River Faughan smolt trap

5.0 ADULT ABUNDANCE

Adult Atlantic salmon abundance is assessed in three ways: directly by using commercial netting/recreational rod catches and fish counters and indirectly by reference to conservation limits/spawning targets.

Using catch data as a measure of population status is a well established and extensively used technique. In the Foyle system annual commercial and recreational catch data has been recorded since the establishment of the Foyle Fisheries Commission in 1952, with some data available before this period. The relationship between catch and stock is complex and care should be applied in interpretation. A more precise measure of catch incorporates fishing effort (number of licences issued or the amount of time fished) and is referred to as catch per unit effort (CPUE).

5.1 Recreational Fisheries

One problem encountered when analysing catch data is unreported catch. All recreational fishers are required by law to make catch returns. This information facilitates management decision making and therefore it is vitally important that all catch returns are accurate and made promptly at the seasons end.

Year	Declared Rod Catch Salmon	Declared Rod Catch Sea Trout	Returns as a % of Licences Issued
1999	1022	679	3.74
2000	723	417	2.55
2001	3188	450	17.68
2002	5117	1010	27.93
2003	1844	361	15.5
2004	2285	75	13.99
2005	4084	413	25.77
2006	3476	469	37
2007	4929	379	22.11
2008	4060	815	54.94
2009	2923	*550	43.88
2010	4234	329	55.75

Table 5.1 Declared rod catch returns for salmon and trout in the Foyle and Carlingford areas. Note figures include the Clanrye and Whitewater in the Carlingford area from 2001 onwards. Carcass tagging was introduced in 2001. *Denotes all trout.

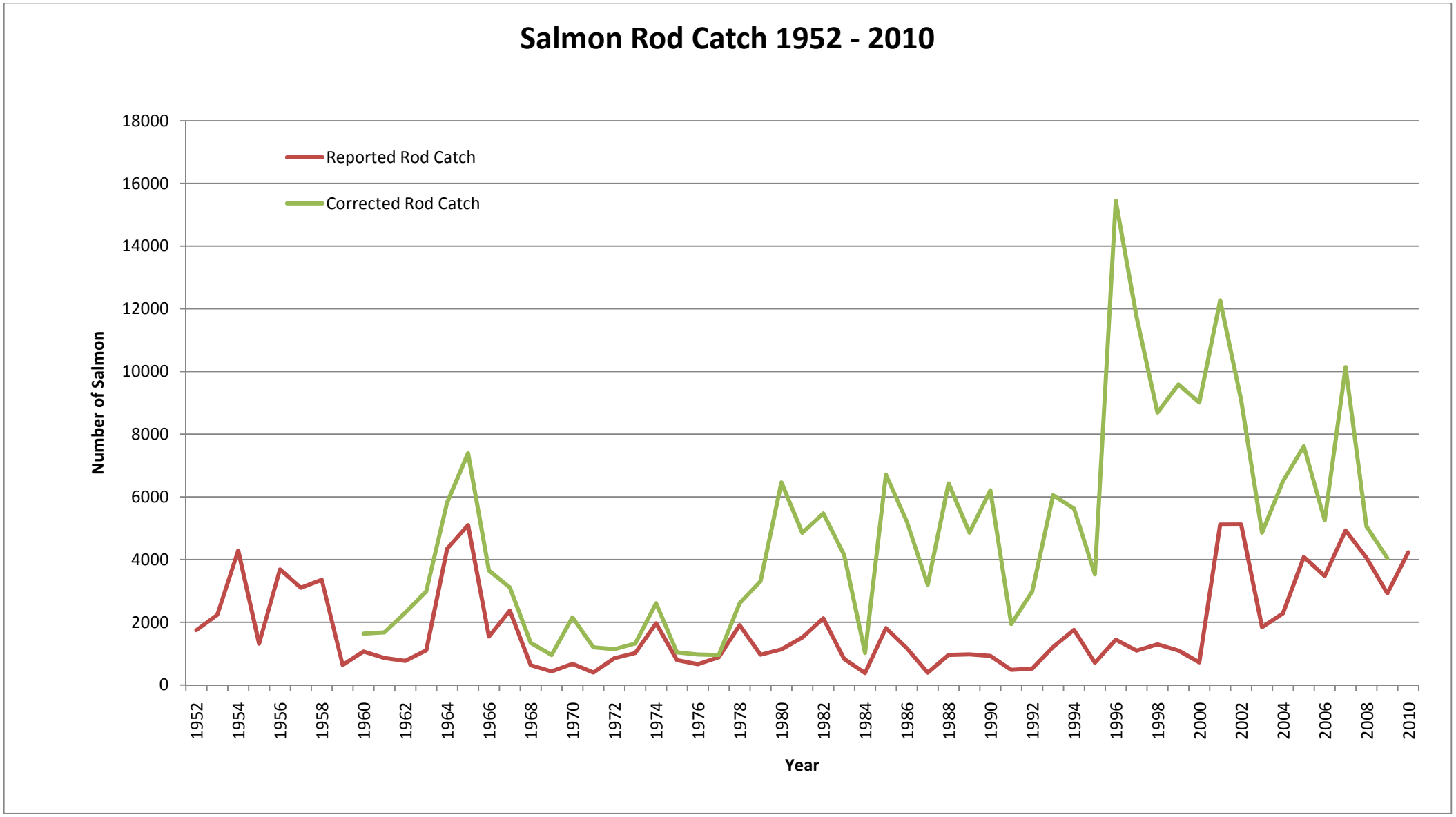

Table 5.1 Declared salmon rod catch

Year	Declared Catch Faughan Catchment Salmon	Declared Catch Faughan Catchment Sea Trout
2001	656	450
2002	597	319
2003	335	187
2004	464	14
2005	822	213
2006	501	182
2007	1132	57
2008	861	196
2009	458	148
2010	1231	122

Table 5.1 Declared catch from the Faughan catchment for salmon and sea trout 2001-2010

Fig 5.11 Angler on the upper reaches of the Faughan River

5.2 Commercial Fisheries

Commercial fisheries have traditionally operated within the Foyle sea area, Lough Foyle and tidal River Foyle. The drift net and draft net fisheries as well as the rod fisheries have been closely regulated with a real time management regime in place to monitor the numbers of fish migrating up key rivers. If predetermined numbers of fish have not been counted by the strategically placed electronic fish counters at Sion Mills weir (River Mourne), Campsie Barrage (River Faughan) and the Plumb Hole (River Roe) then specified closures of the commercial and/or recreational fisheries are enforced.

In 2007 new regulations were introduced to reduce the number of commercial nets operating within the Foyle area and all mixed stock interceptory drift nets seaward of Lough Foyle were curtailed. This decision was made to comply with the EU Habitats Directive, similar curtailment of mixed stock fisheries were introduced in the Republic of Ireland. Within the Foyle area this was achieved through a voluntary hardship scheme. Regulations were also introduced to limit the numbers of fish which could be retained by the recreational rod fishery throughout the Foyle and Carlingford areas. In 2010 The Foyle Area (Control of Fishing) Regulations 2010 were

introduced which prescribes conditions for the suspension of the remaining commercial fisheries and the enforcement of catch and release on the recreational fisheries if pre determined numbers of fish are not recorded at key fish counting sites and attainment of prescribed management targets are not met against listed criteria.

Year	Drift Catch	Draft Catch	Total Drift and Draft
1998	31296	11141	42437
1999	15397	7893	23290
2000	22333	10339	32672
2001	13500	9476	22976
2002	28851	11917	40768
2003	15741	16991	32732
2004	12800	9490	22290
2005	13391	12143	25534
2006	6145	6031	12176
***2007**	2598	2774	5372
2008	1248	2916	4164
2009	611	1326	1937

Table 5.2 Declared catch from the commercial salmon fisheries 1998-2009. Note 100% rate of catch returns. * Reduced numbers of commercial nets operating in the Foyle area from 2007. No commercial Atlantic salmon fisheries have been pursued in the Foyle area since 2009 as a result of the enforcement of The Foyle Area (Control of Fishing) Regulations 2010, this does not prevent the reinstatement of commercial fisheries if prescribed conditions are met in the future.

Fig 5.21 Commercial Fishing. Draft netting on the tidal River Foyle

5.3 Counters

Within the Foyle system a number of river catchments have electronic fish counting facilities that provide estimates on the run timing and abundance of fish >45cm. A time series of counts for the Faughan catchment is outlined in table 5.31.

Fig 5.3 Fish counting facilities on fish pass at Campsie barrage, River Faughan

Year	Number of fish >45cm
2002	4228
2003	3097
2004	2855
2005	4245
2006	3625
***2007**	*1257
***2008**	*604
2009	831
2010	1825

Table 5.31 River Faughan fish counter figures 2002-2008. * Note due to high water levels during the summer and peak run timing period for the Faughan catchment in 2007 and 2008 this figure is deemed to be significantly below the actual escapement to river. The counting facility on the River Faughan at Campsie Barrage is sited on a Denil fish pass in the centre of a series of movable gates used to regulate water heights for water abstraction. In high water conditions as experienced in 2007 and 2008 the gates are raised allowing for migrating fish to migrate upstream without being counted. The differential water height between the downstream and upstream side of the barrage is also reduced resulting in fish being able to leap over the gates.

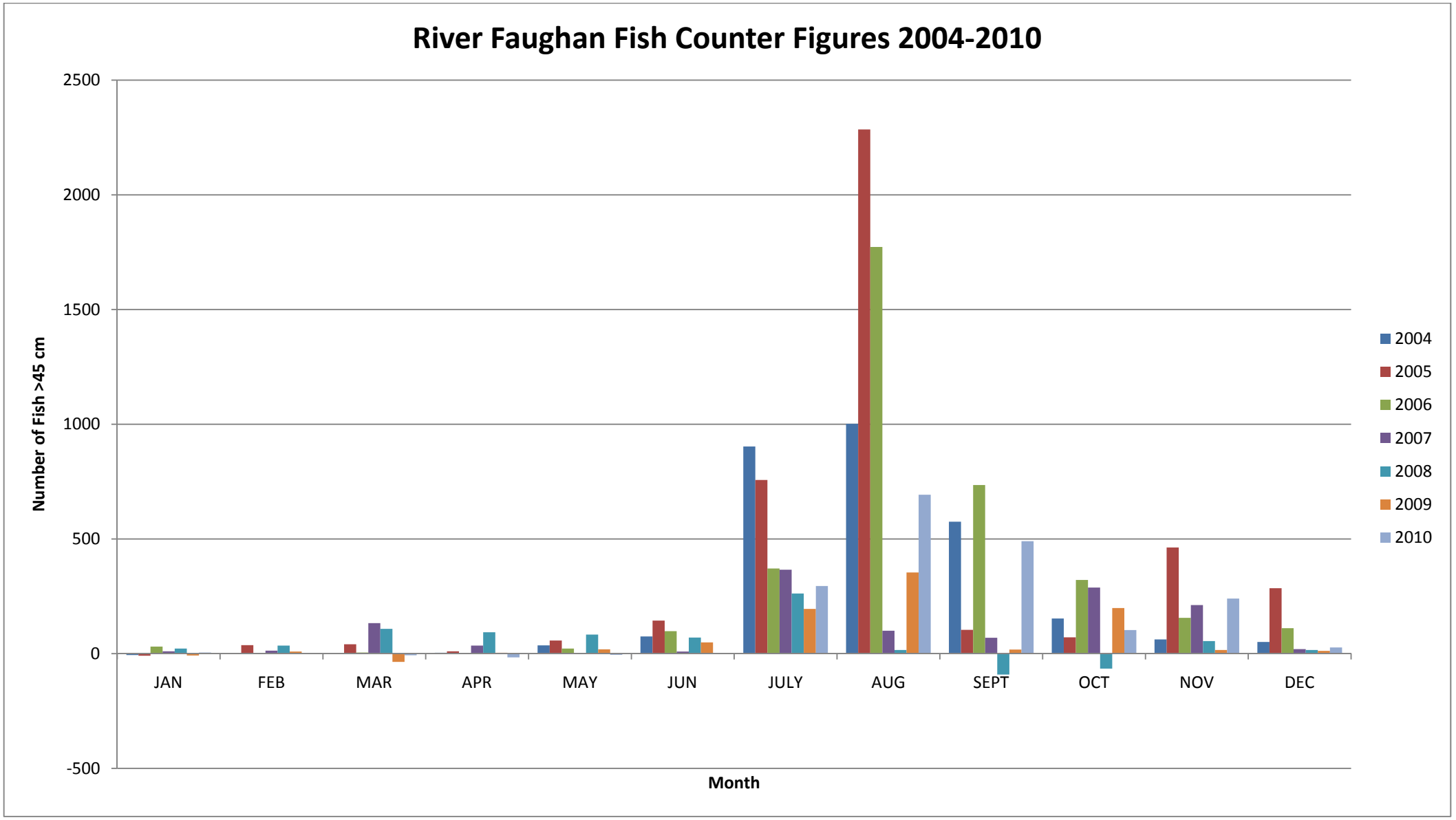

Fig 5.32 Monthly fish counts on the River Faughan 2004-2010 as recorded at Campsie barrage

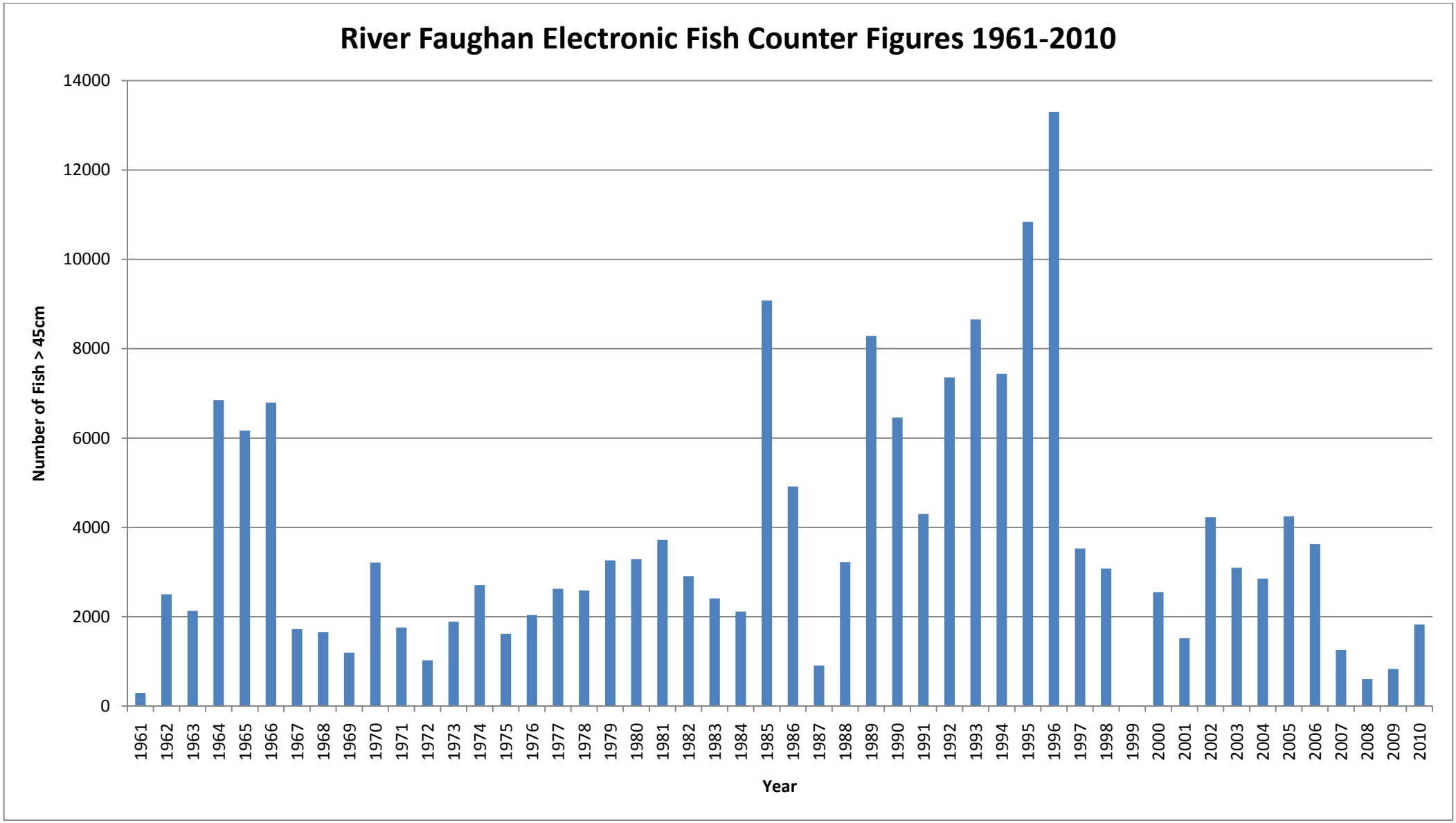

Fig 5.33 Annual fish counts on the River Faughan 1961-2010 as recorded at Campsie barrage. *Reliability of the counter figures fluctuates due to environmental conditions

5.4 Conservation Limits/Spawning targets

Another way to assess adult salmon stock status is to monitor run sizes on rivers and to compare them with predefined reference points called conservation limits. In the Foyle system the conservation limits define a level of spawning that optimises the sustainable catch by commercial and recreational fisheries. If exploitation rates increase above the sustainable catch levels the catch may increase in the short-term but the stock will eventually reduce. Conservation limits demarcate the spawning stock level at which recruitment would begin to decline significantly (NASCO). The real time management regime incorporating the setting of management targets and spawning targets implemented in the Foyle aims to manage the fisheries and spawning populations in a sustainable manner. The management and spawning targets are set for the various river catchments based on the amount and quality of nursery habitat present. River habitat surveys are carried out along each stretch of river and graded according to the type and quality. Egg deposition levels are set according to the quality grading of each section of nursery habitat.

There are four grades of nursery habitat, however for the purpose of setting egg deposition levels only grades 1-3 are utilised. Grade 1 denotes the best quality habitat. The egg deposition rate/carrying capacity is set as follows. Grade 1 = 10 eggs per m^2, grade 2 = 5 eggs per m^2 and grade 3 2.5 eggs per m^2. The total number of eggs is calculated by multiplying the area of each grade of nursery habitat by the appropriate density of eggs per m^2. 25% is deducted from the management target allowing for loss of salmon by angling (15%) and poaching and predation (10%). The remaining figure is referred to as the conservation limit/spawning target.

Year	No of Fish Across Counter	Declared Rod Catch (Salmon)	Declared Rod Catch % of Fish Over Counter
2003	3071	335	11
2004	2855	464	16
2005	4245	822	19
2006	3399	501	15
***2007**	1257	1132	*
***2008**	604	861	*
2009	831	148	18
2010	1825	1231	**

Table 5.4 River Faughan declared salmon rod catch as a % of fish over the fish counter. * Note due to high water in 2007 and 2008 significant numbers of fish bypassed the Faughan counter. **Ongoing issues around the counters and rod catch

Once the number of eggs required for each river has been established this can be converted to a total number of fish required to achieve the management targets and conservation limit/spawning targets. The average fecundity (number of eggs produced per female) of Foyle salmon has been estimated at 2500 and the ratio of female to male salmon estimated at 60:40. When combined with the amount of nursery habitat of the various grades this equates to the conservation limit/spawning target. A management target of 800 adult Atlantic salmon has been set for the Faughan Catchment, this equates to a conservation limit/spawning target of 640 or 900,000 eggs.

Year	No of Fish Across Counter	Estimated Egg Deposition
2003	3071	3454875
2004	2855	3211875
2005	4245	4775625
2006	3399	3823875
***2007**	1257	1414125
***2008**	604	679500
2009	831	934875
2010	1825	2053125

Table 5.41 River Faughan estimated egg deposition 2003-2010 * Note in 2007 and 2008 significant numbers of fish bypassed the Faughan counter

6.0 HABITAT MONITORING

The Loughs Agency has carried out extensive habitat surveys on all the major rivers and tributaries within the Foyle and Carlingford catchments. Habitat surveys are carried out on foot. Although time consuming this is at present the best method for classifying the various grades of habitat. Habitat is classified into one of three life cycle units Fig 6, the presence and order of which is essential to the productive capacity of a salmonid river. Other non salmonid species also benefit from diverse in-channel habitat. The life cycle unit categories include spawning, nursery and holding habitat. Each category is then graded on a scale of 1-4, 1 representing the best quality attainable and 4 the worst. Other data collected during these surveys include channel width and impassable barriers to migratory fish species.

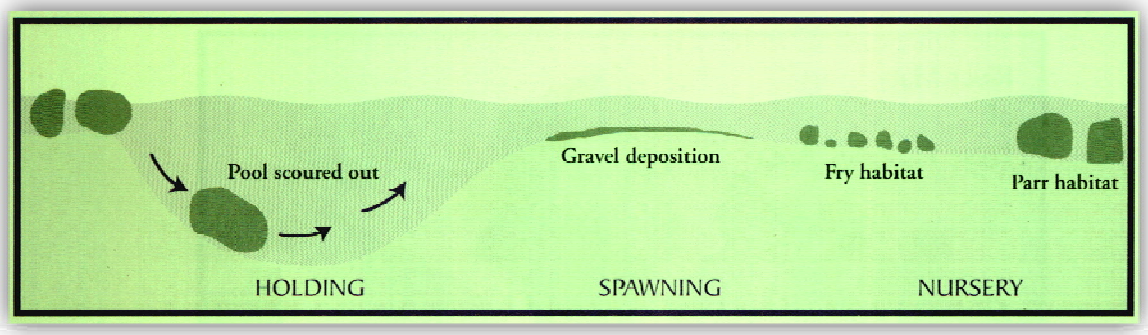

Fig 6 Life cycle unit depicting the type of habitat found in spawning, nursery and holding zones

Fig 6.1 Examples of spawning, nursery and holding habitat

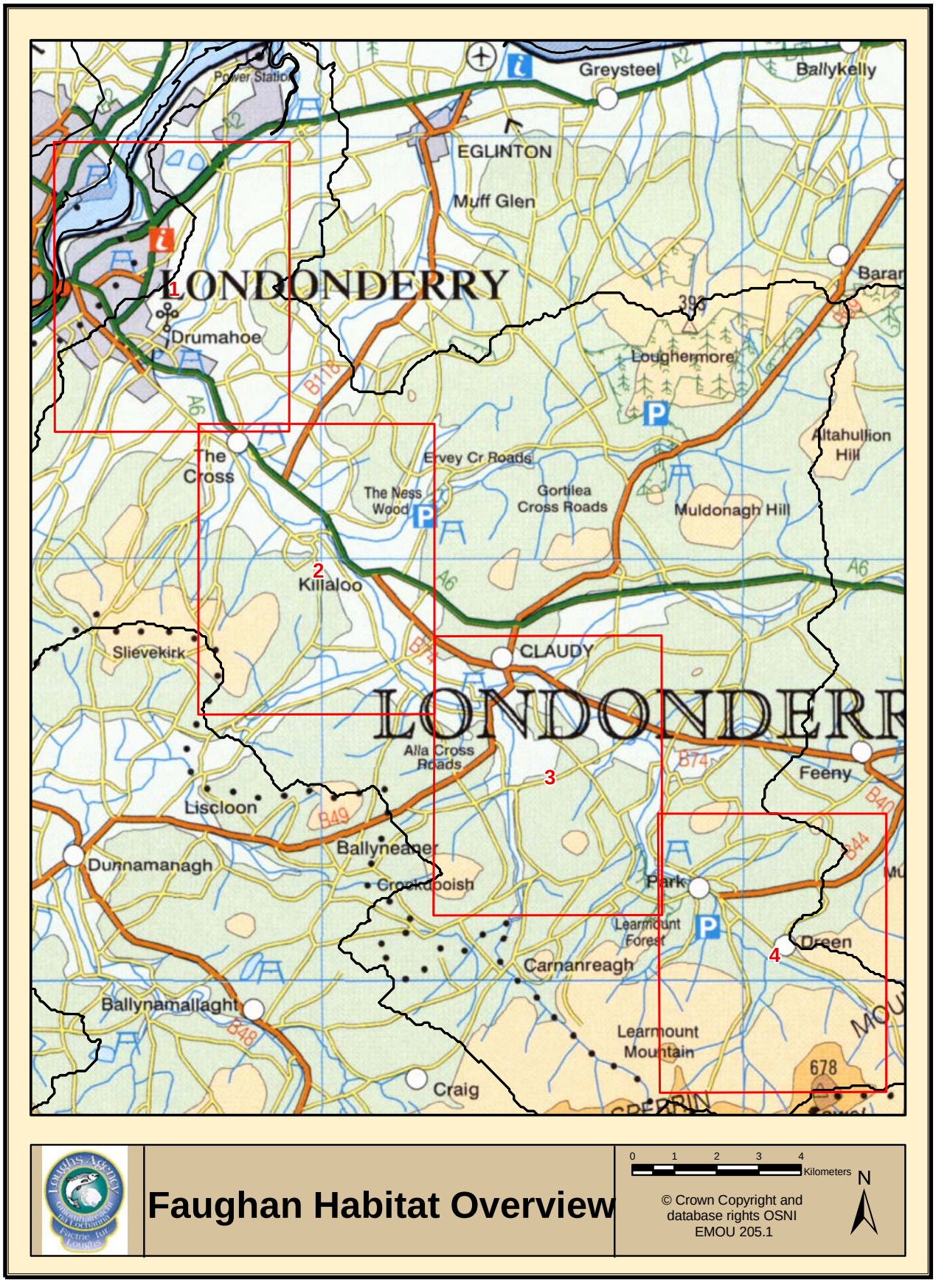

Fig 6.11 Habitat overview key for Faughan Catchment

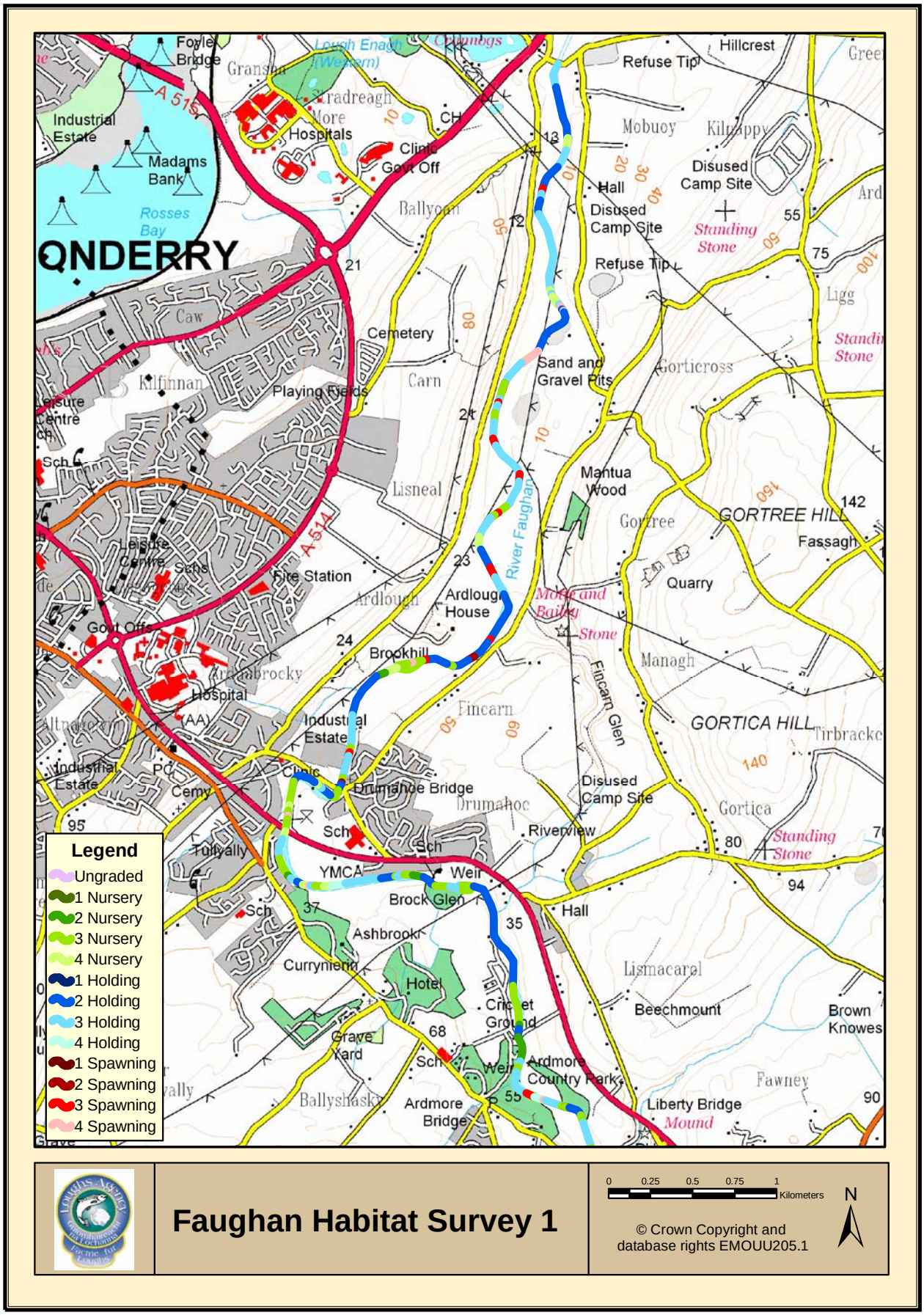

Fig 6.12 Faughan catchment habitat survey map 1

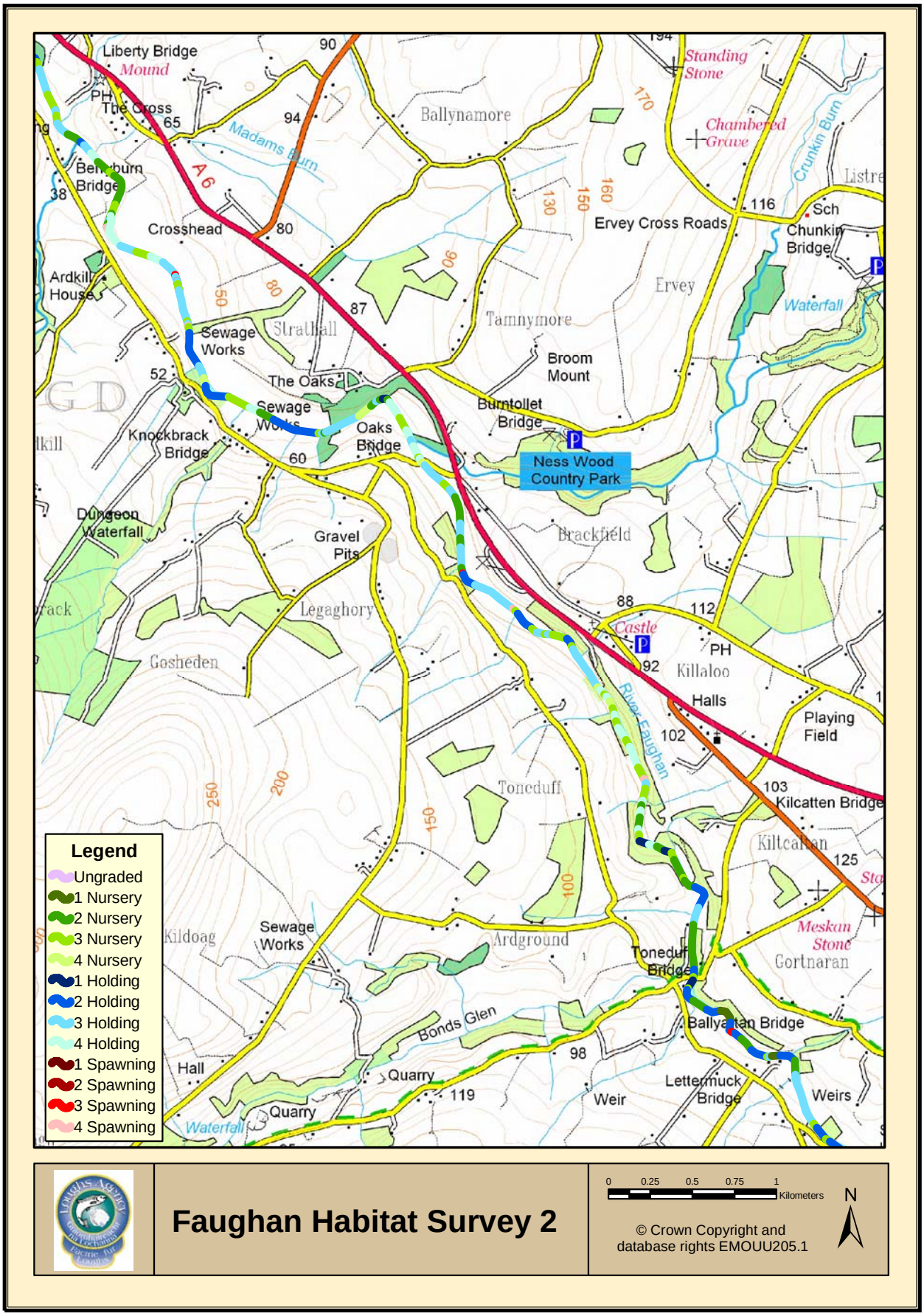

Fig 6.13 Faughan catchment habitat survey map 2

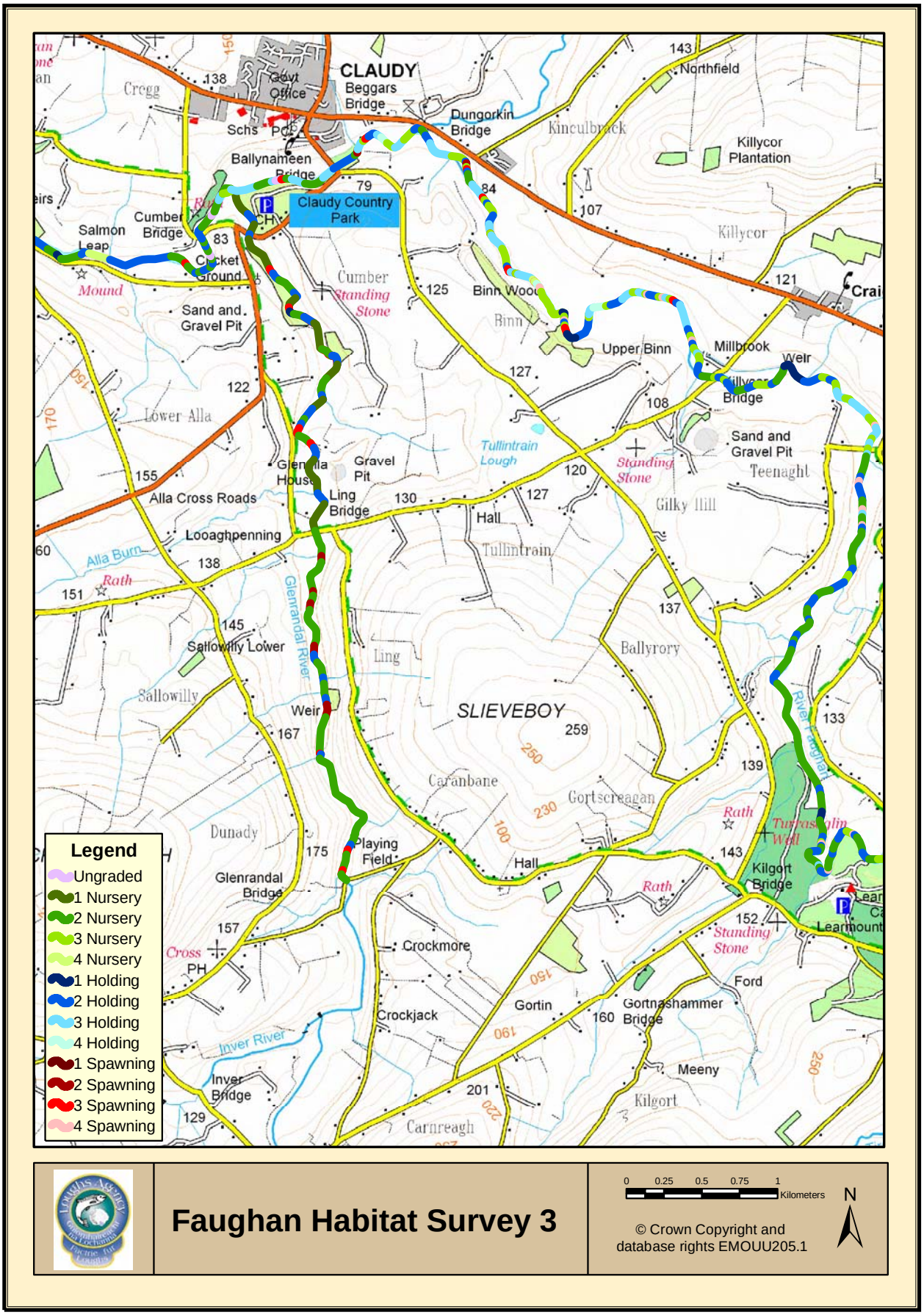

Fig 6.14 Faughan catchment habitat survey map 3

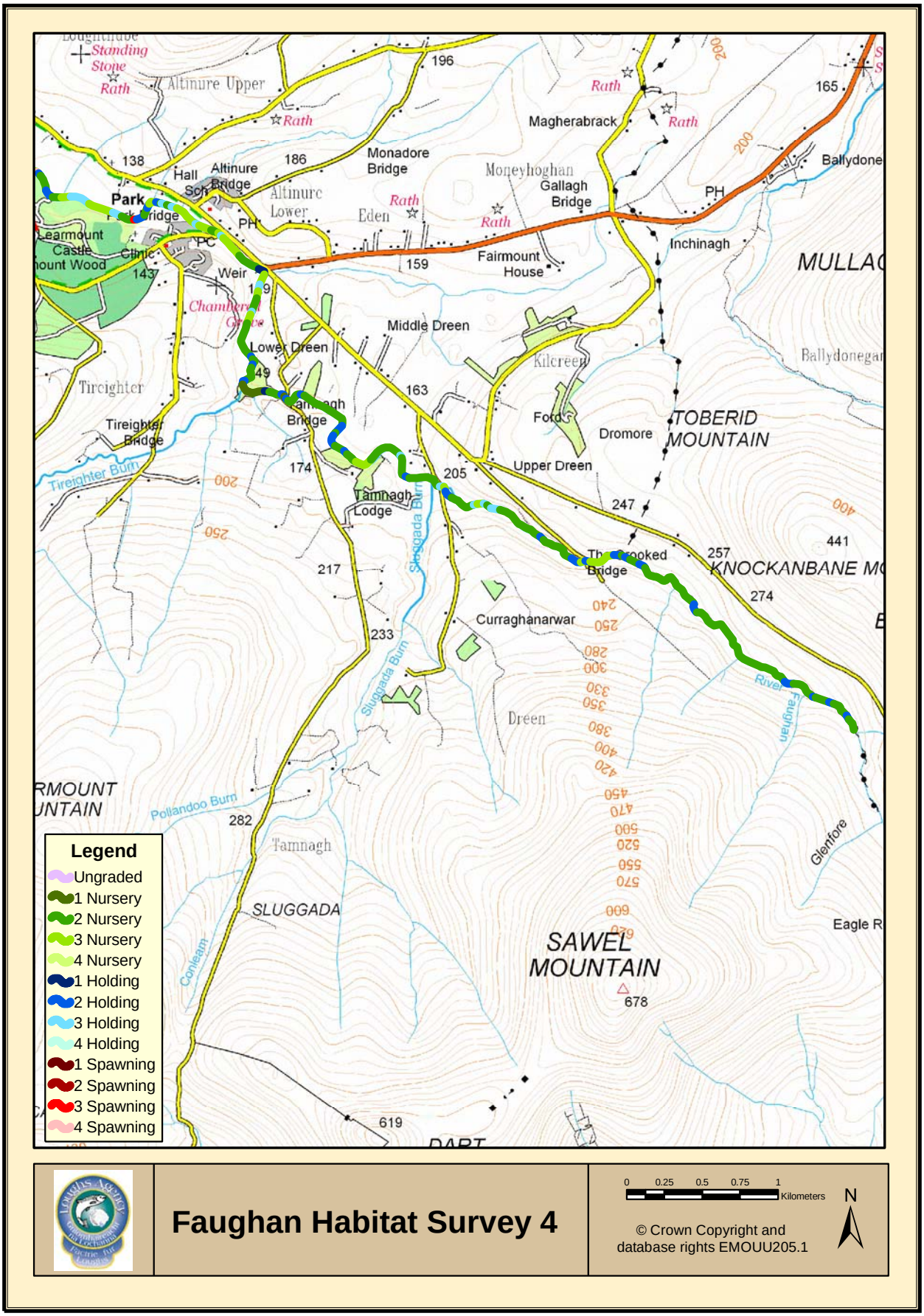

Fig 6.15 Faughan catchment habitat survey map 4

7.0 LAND USE

Land use classification is an important tool when assessing the potential impacts within a particular river catchment or indeed when looking at specific land use and land management practices. Land use impacts could have either a positive or negative impact on rivers and tributaries. A good understanding of the land use within a catchment is therefore imperative in managing at a catchment scale.

Land use in Northern Ireland has been captured using satellite imaging technology and classified to type. The following figures outline the broad land use classification within the Faughan Catchment.

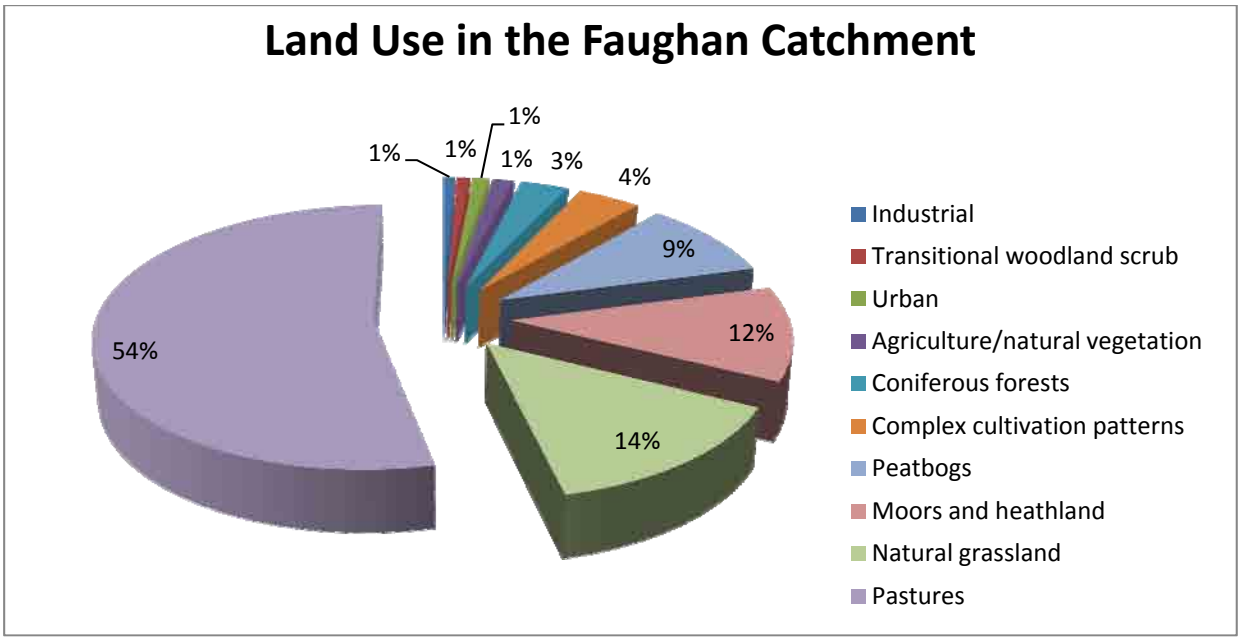

Fig 7 Faughan catchment land use classification

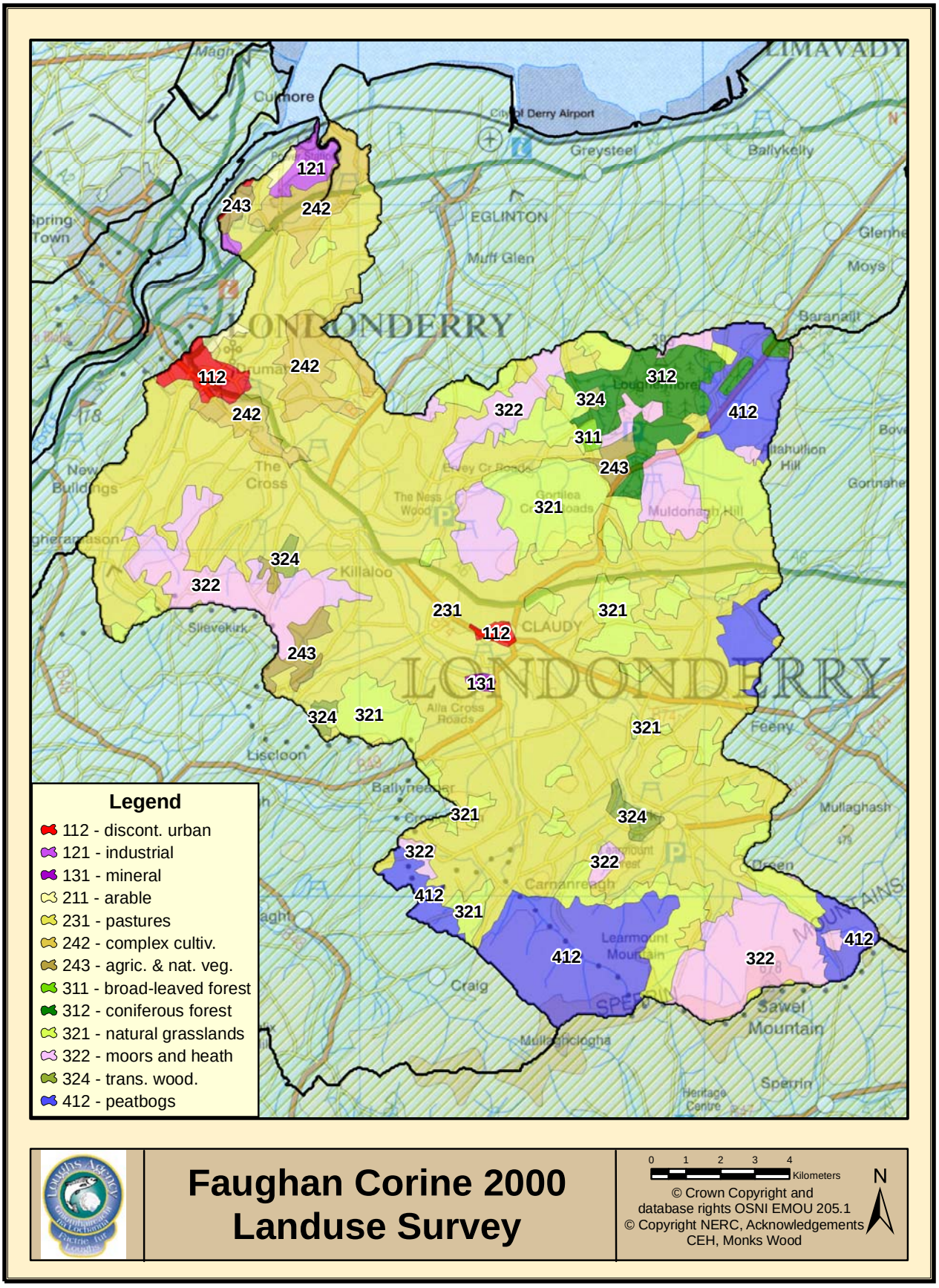

Fig 7.1. Faughan catchment land use classification map

8.0 BARRIERS AND PARTIAL BARRIERS TO MIGRATION

In 2008 a survey was conducted within the Faughan catchment to map all complete and partial barriers to fish migration. This was done utilising a methodology under development by partners from throughout the UK including the Loughs Agency.

Barriers to migration can significantly reduce the access of native fish species to suitable available habitats. It is of vital importance that consideration is given to developing appropriate fish easement facilities to ensure the long term conservation of native fish communities. At a time when new barriers are also being considered for the development of “green energy” projects harnessing hydro power, full consideration should be given to the essential requirements of native fish species in terms of water quantity and access to suitable habitats for all life history stages.

As a “bolt on” to the barriers survey three species of riparian invasive species were also mapped in the river corridor using Trimble handheld GPS units.

Fig 8.0. Partial barrier to migration on the main River Faughan

Fig 8.1. Partial barrier to migration on the main River Faughan

Fig 8.2. Riparian invasive species survey River Faughan 2008

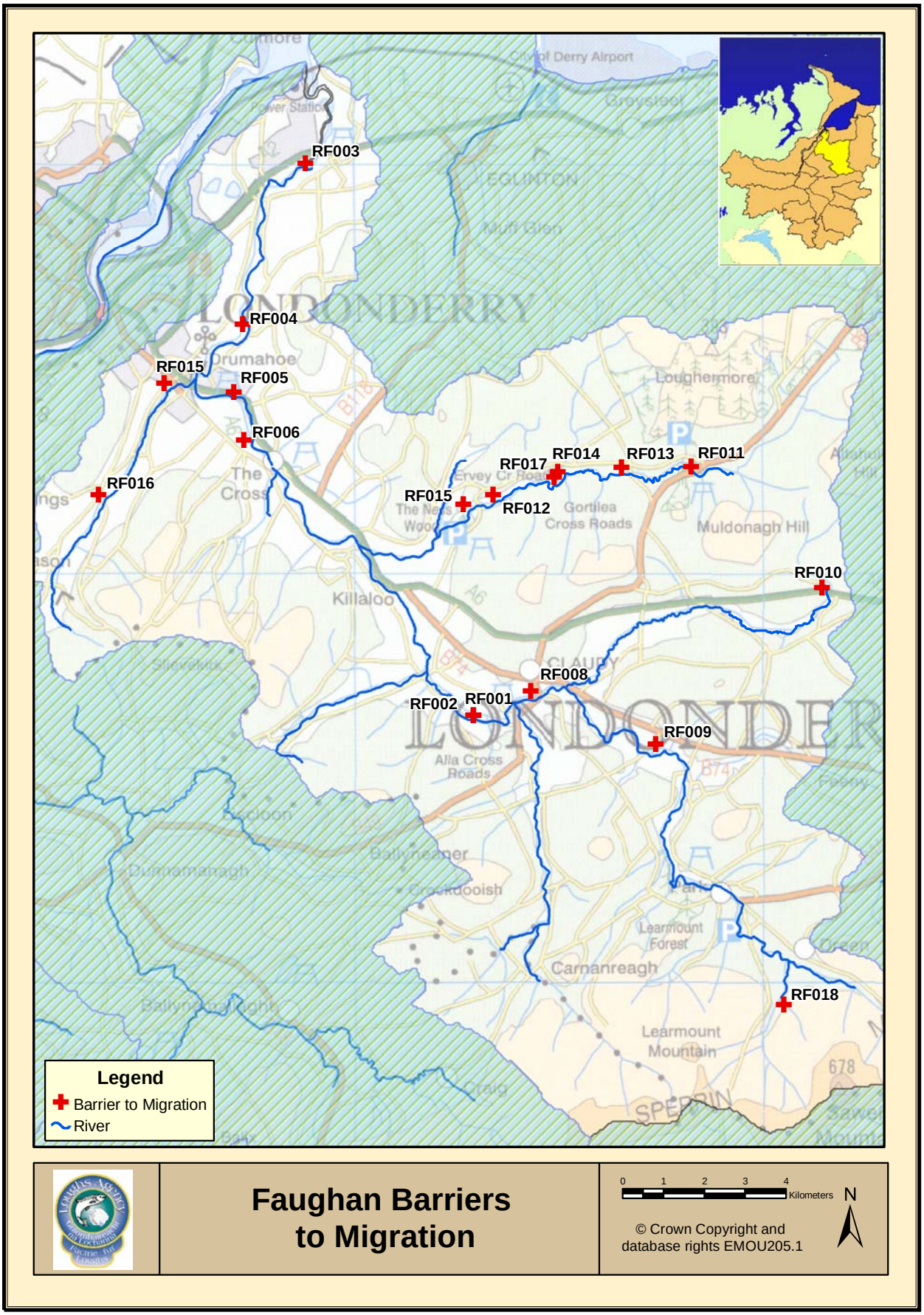

Fig 8.3. Barrier to migration survey River Faughan 2008

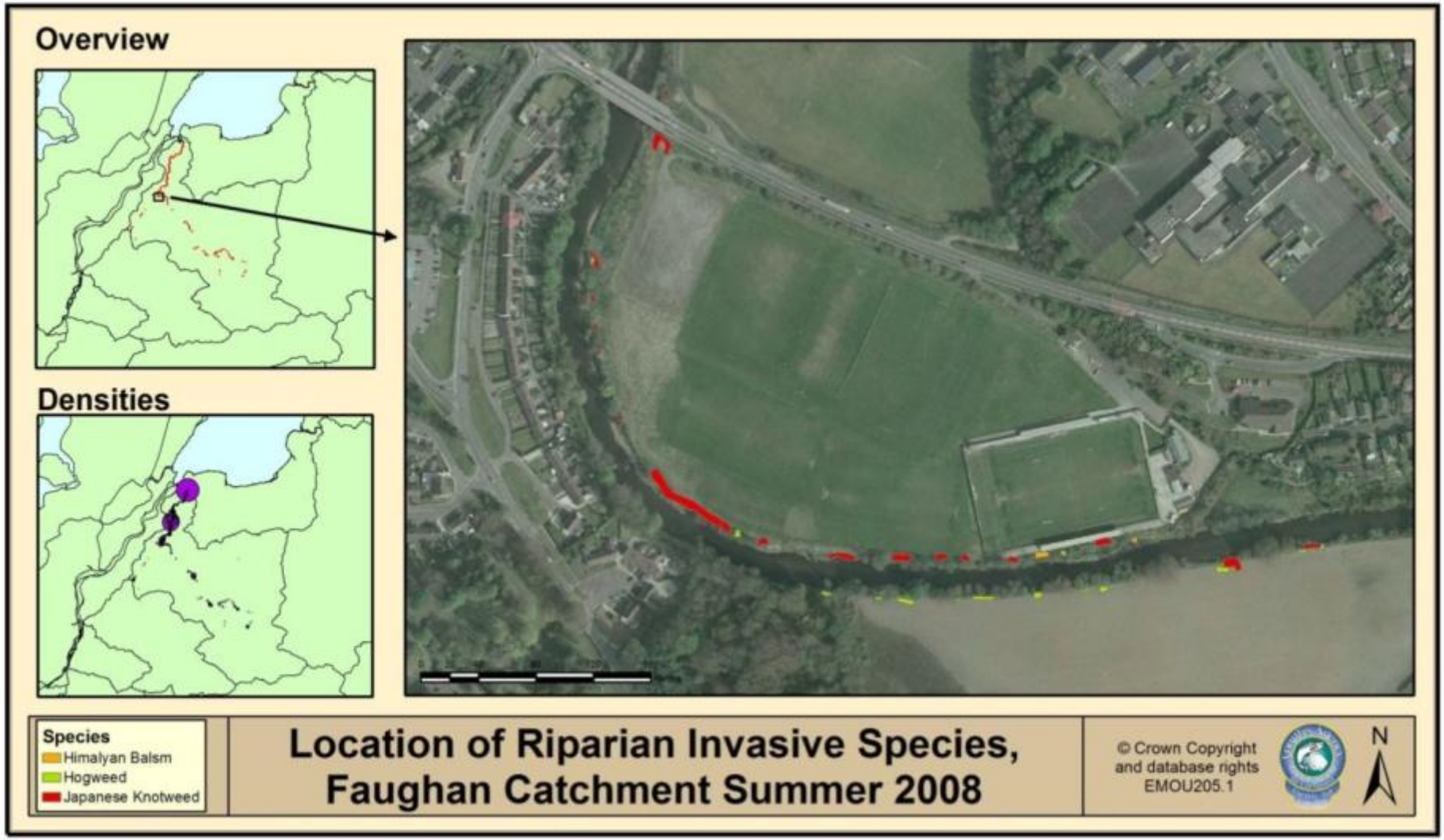

Fig 8.4. Riparian invasive species survey River Faughan 2008

9.0 WATER QUALITY

The Northern Ireland Environment Agency (NIEA) in Northern Ireland and the Environmental Protection Agency in the Republic of Ireland are the designated competent authorities for implementation of the Water Framework Directive (WFD).

The WFD is a pan European directive designed to ensure that all waters reach good ecological status by 2015. Extensive monitoring is conducted on all water bodies to facilitate this aim.

In addition to the routine river monitoring carried out by the NIEA and the County Councils for WFD monitoring the Loughs Agency conducts proactive and reactive pollution investigations to investigate or highlight problems or potential problems which may have an effect on the aquatic environment and ultimately on the fish species and aquatic habitats.

In 2007 the Loughs Agency instigated a programme of monitoring at the tributary level for assessments of chemical and biological water quality. Six stations on tributaries of the River Faughan are monitored for chemical water quality parameters including Biological Oxygen Demand (BOD), Suspended Solids, Ammonia and Phosphorous. Biological water quality was assessed using the Biological Monitoring Working Party (BMWP) a biotic scoring index.

Fig 9.0 Loughs Agency chemical water quality testing in the laboratory

The Loughs Agency also maintains a mobile pollution response unit containing aerating equipment and absorbent and non absorbent booms for oil and chemical spills. The unit can be rapidly deployed to the site of a pollution incident.

Water Quality Parameters

The following water quality parameters are monitored through the Loughs Agency monitoring programme and determined from water samples in the laboratory:

- Biochemical Oxygen Demand (BOD)
- Ammonia
- Phosphorus
- Suspended Solids

BOD

Any organic matter discharged into a river provides an immediate source of food for bacteria. These bacteria will break down the organic matter eventually into simple compounds such as carbon dioxide and water. Biochemical Oxygen Demand or Biological Oxygen Demand (BOD) is a chemical procedure for determining how fast biological organisms use up oxygen in a body of water. It is considered as an indication of the quality of a watercourse

Ammonia (NH_3)

Ammonia is generally found in small amounts in rivers and streams. This is due to microbiological activity and the resultant reduction of compounds containing nitrogen. High levels of ammonia can occur as a result from sewage pollution and have detrimental impacts on fish species.

Phosphorus (PO_4)

The over-loading of nutrients such as phosphorus in watercourses often leads to a process known as eutrophication. Eutrophication is a major environmental issue in Irish rivers and lakes. Sources of phosphorus include agricultural fertilizers and household detergents.

Suspended Solids

Particulate matter may be organic or inorganic in nature. Organic solids may consist of algal growths, indicative of eutrophic conditions. Inorganic solids generally are the result of discharge washings from sand and gravel extraction activities or quarries. Suspended solids can affect plant growth and fish habitats.

The following parameters are also recorded at each sample station by means of an electronic measuring probe:

- pH
- Temperature
- Dissolved Oxygen
- Conductivity

pH

This is a measure of the hydrogen ion concentration of a solution and therefore an indication of whether a liquid is acid or alkaline. The pH scale ranges from 0 (very acid) to 14 (very alkaline), with results generally influenced by geological conditions. Fish can be susceptible to changes in pH. Low pH levels are generally found in catchments with high forestry operation impacts.

Temperature

The effect of changes in temperature on living organisms, such as fish, can be critical. Thermal discharges from urban and industrial sources can lead to temperature increases in watercourses and increased stress on aquatic habitats and associated species.

Dissolved Oxygen

Sufficient levels of oxygen saturation in fresh waters are generally an indication of good ecological status and ideal for fish life. The main point to remember about oxygen solubility is that it has an inverse relationship with temperature. This helps explain why DO levels are generally lowest during summer low flow conditions, increasing the risk of pollution from discharges at this time.

Conductivity

The conductivity or electrical conductivity of a watercourse is a measure of its ability to conduct an electric current. Electrical conductivity estimates the amount of total dissolved salts, or the total amount of dissolved ions in the water. Electrical Conductivity is controlled by geology and any variations may be sourced to increased ions from wastewater from sewage treatment plants or urban run-off from roads.

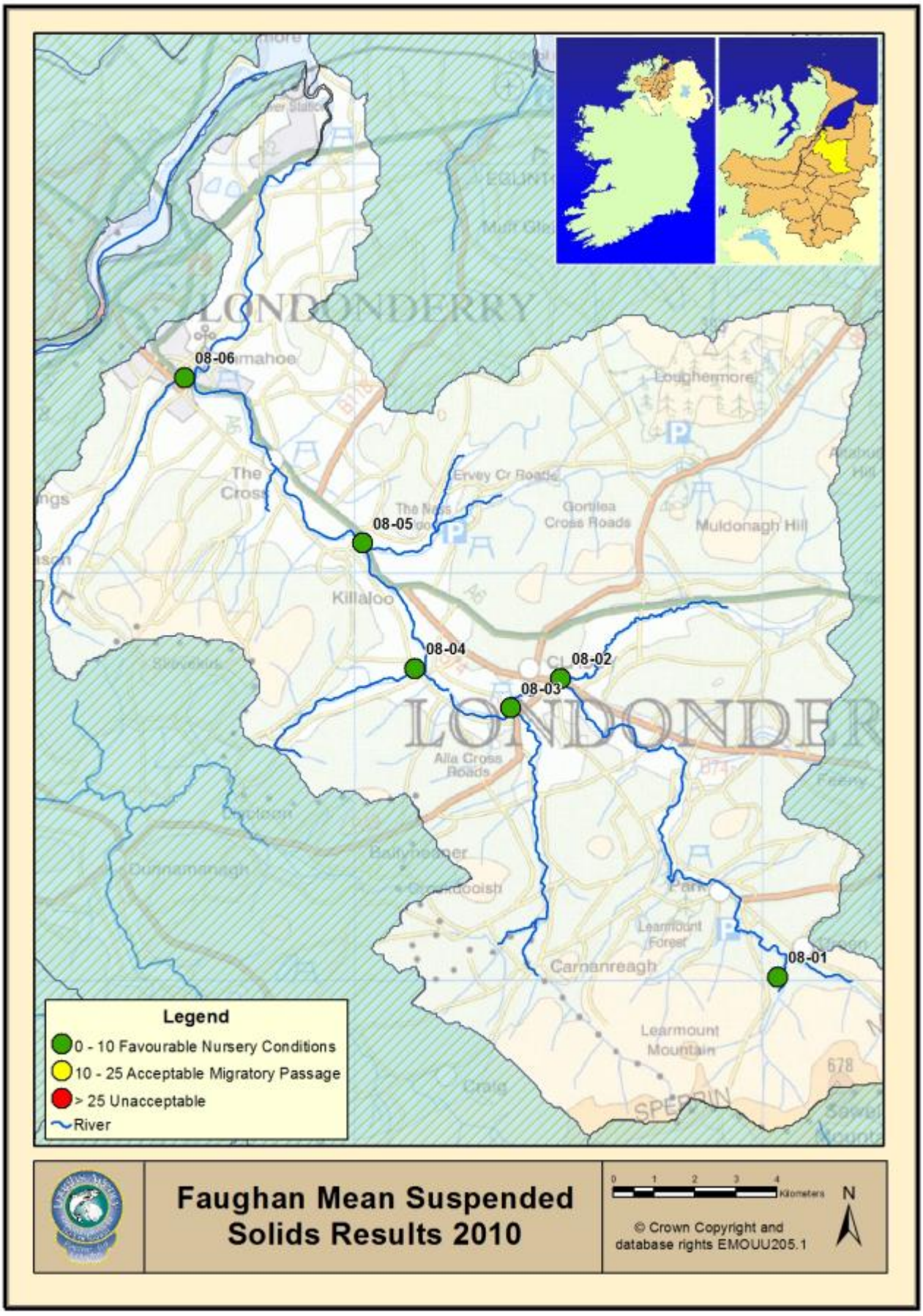

Fig 9.01 Faughan catchment average suspended solids results 2010. Values are in mg/l

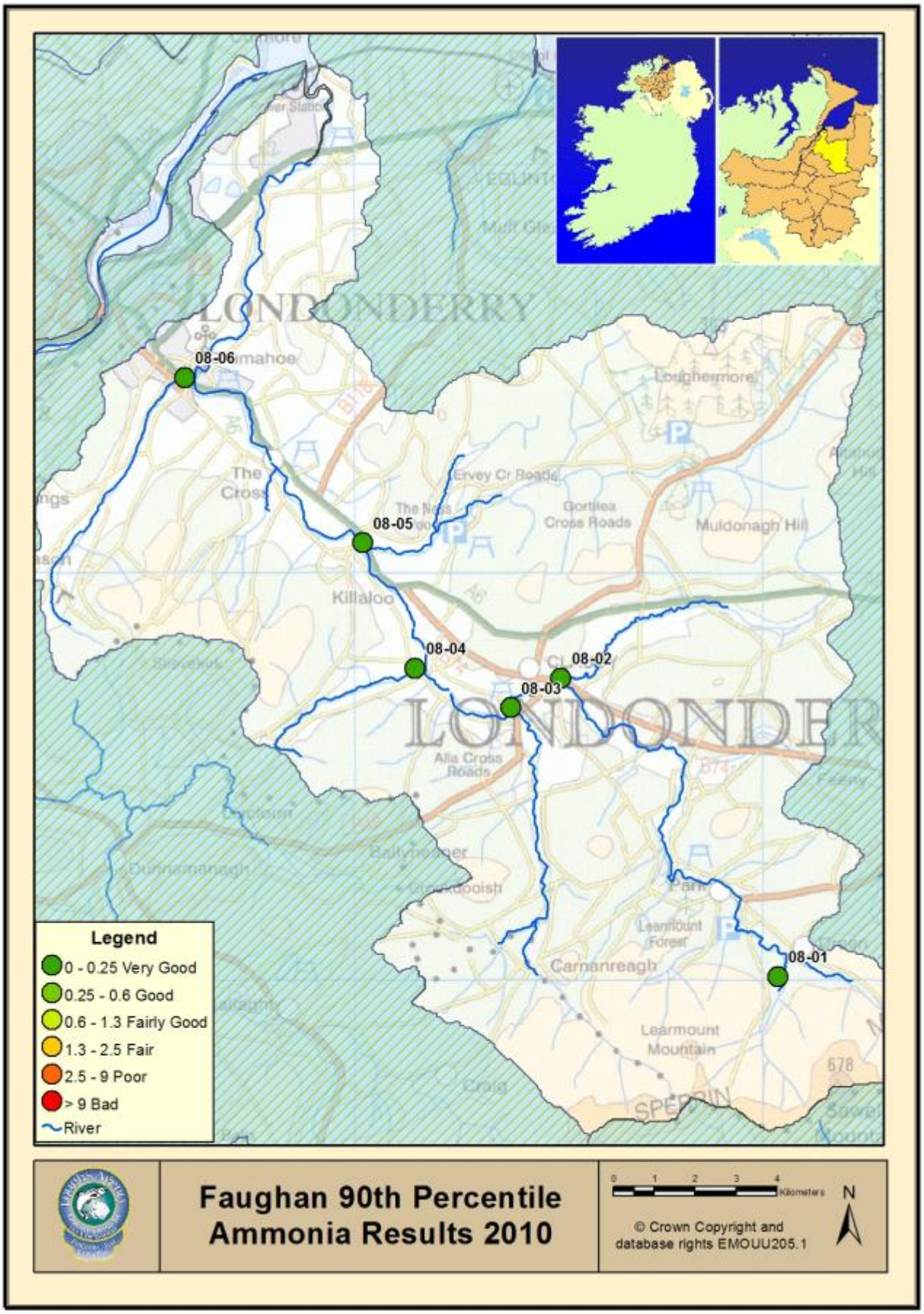

Fig 9.02 Faughan catchment Ammonia results 2010. Values are in mg/l

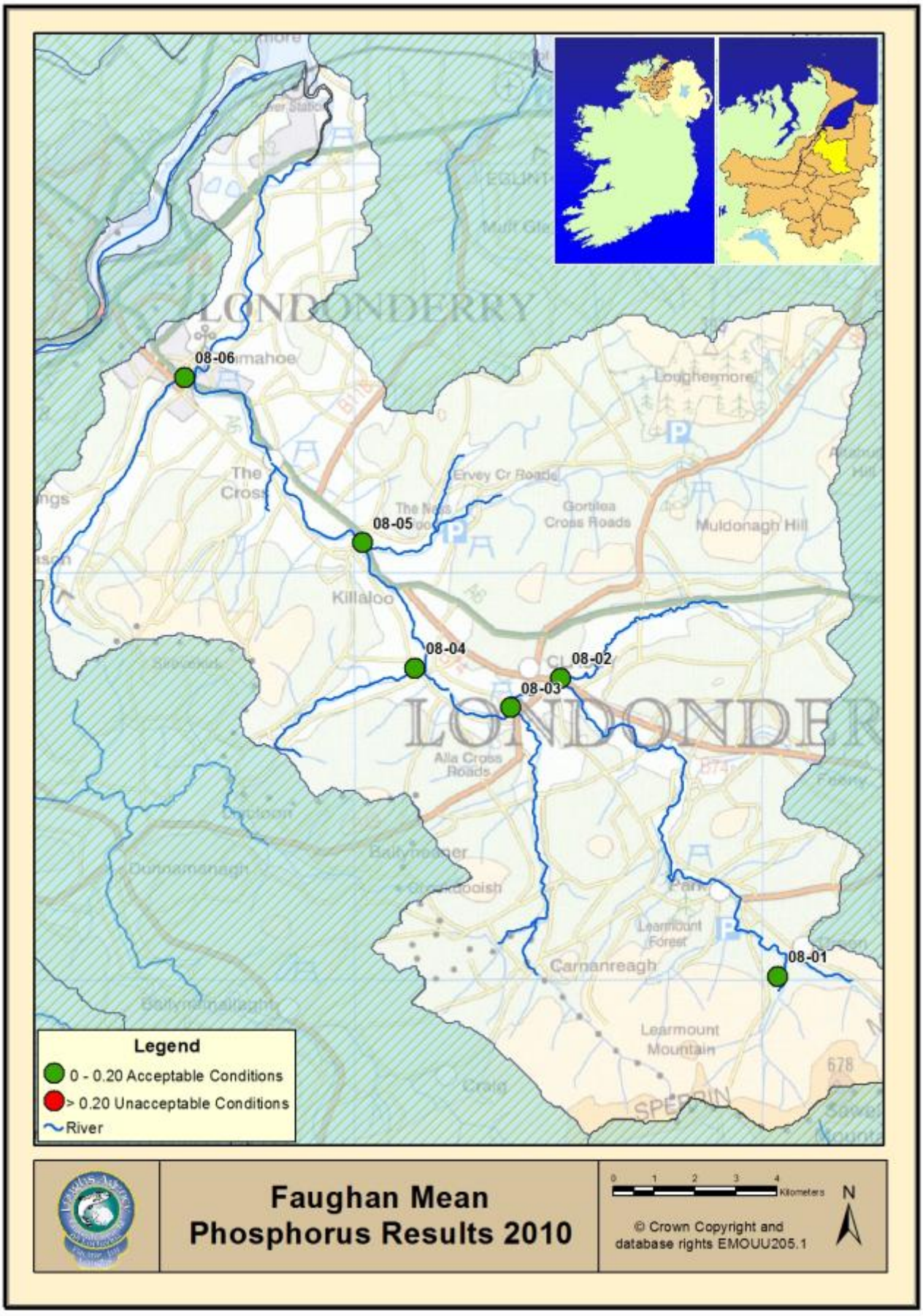

Fig 9.03 Faughan catchment phosphorous results 2010. Values are in mg/l

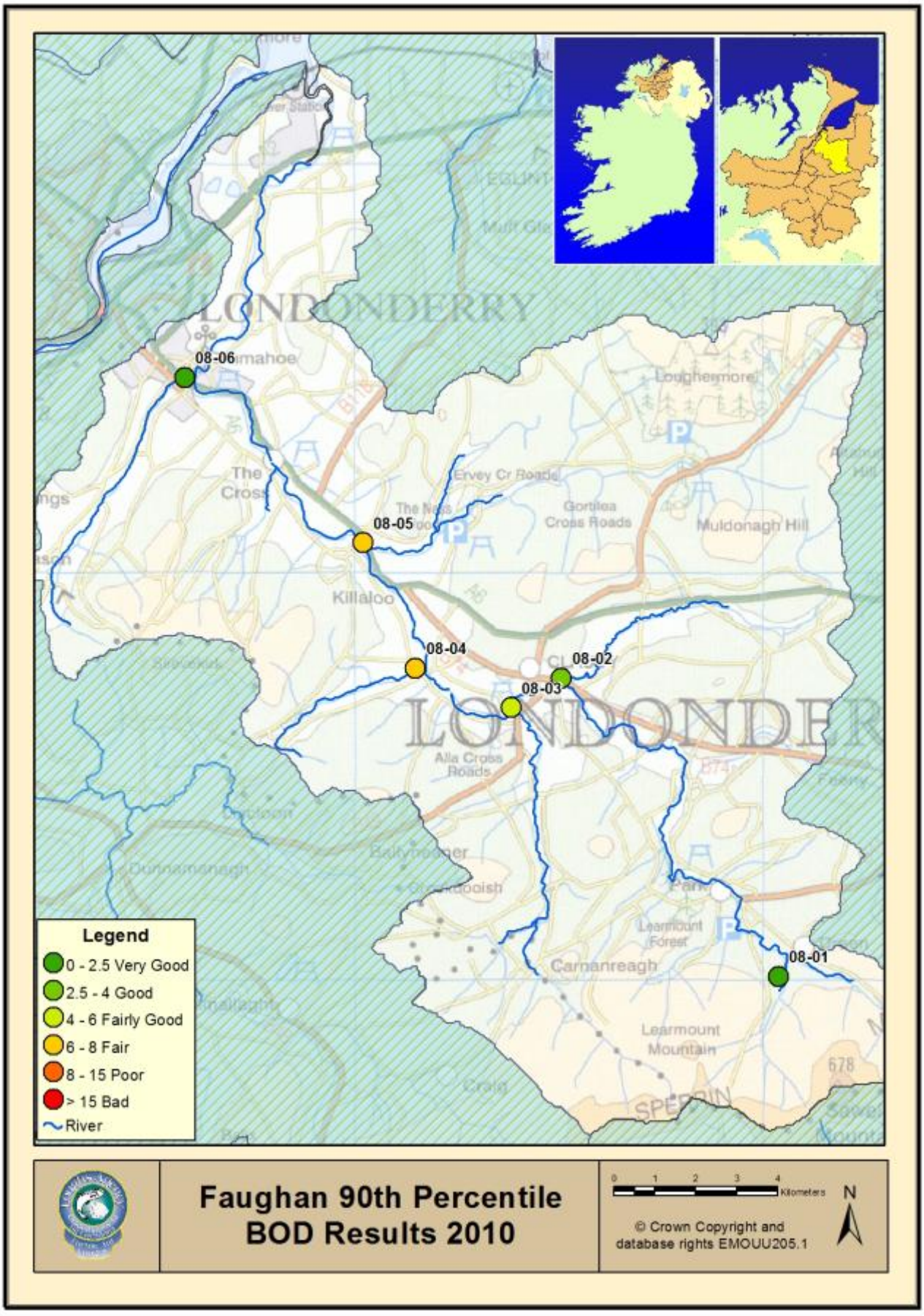

Fig 9.04 Faughan catchment Biological Oxygen Demand (BOD) results 2010. Values are in mg/l

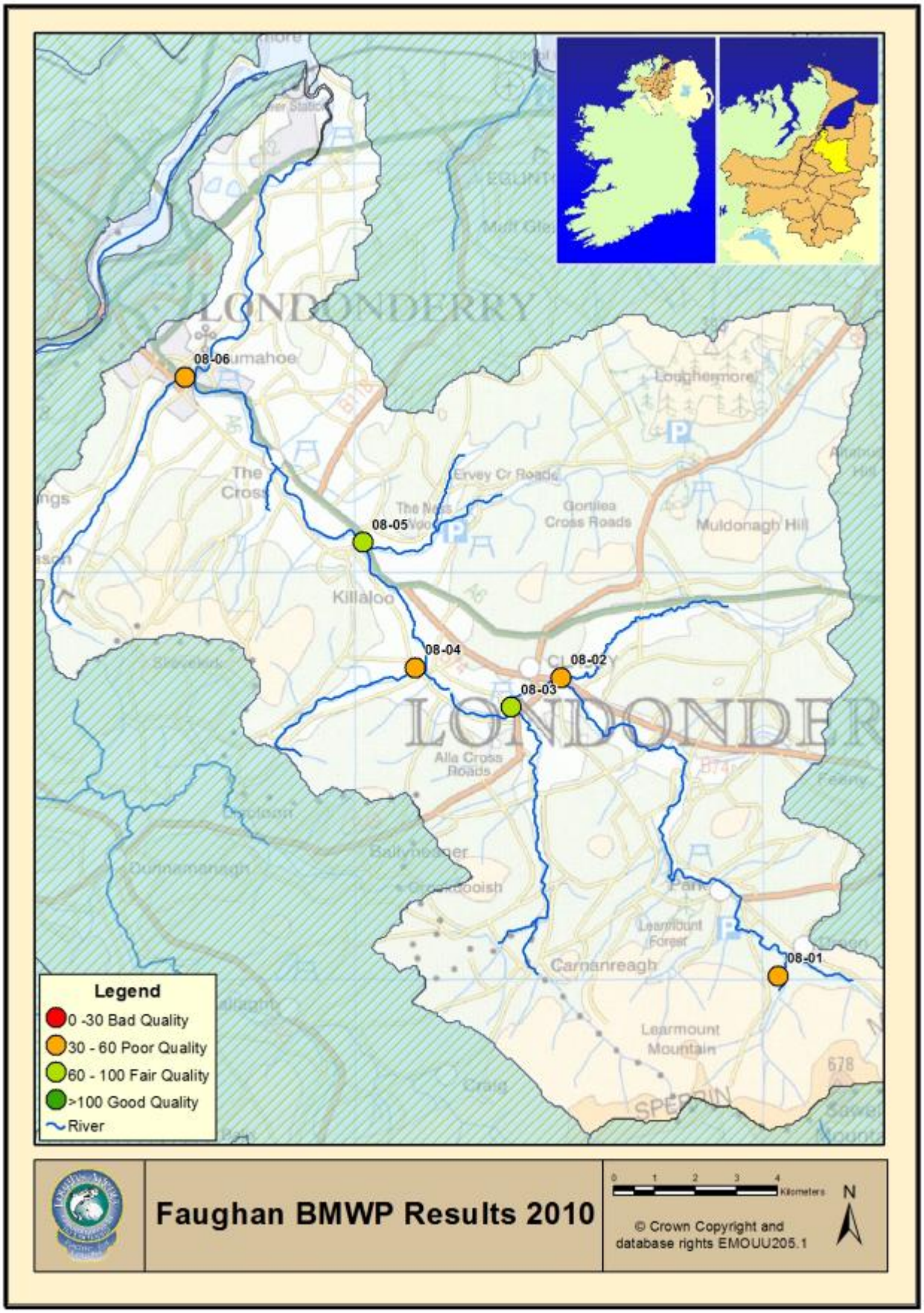

Fig 9.05 Faughan catchment Biological Monitoring Working Party results 2010 * Note Loughs Agency invertebrate monitoring was conducted during the summer months of 2010

Prior to 2008 NIEA employed the General Quality Assessment (GQA) system to classify and monitor the chemical and biological water quality of the rivers of Northern Ireland. With the implementation of the Water Framework Directive a new approach to freshwater classification has been adopted following the United Kingdom Technical Advisory Group (UKTAG) guidelines developed for WFD implementation.

An overall classification status for a water body is obtained by the amalgamation of biological, chemical and physical elements. Fig. 9.06 details how these elements combine to create ecological and chemical statuses which are then combined to create the overall surface water status.

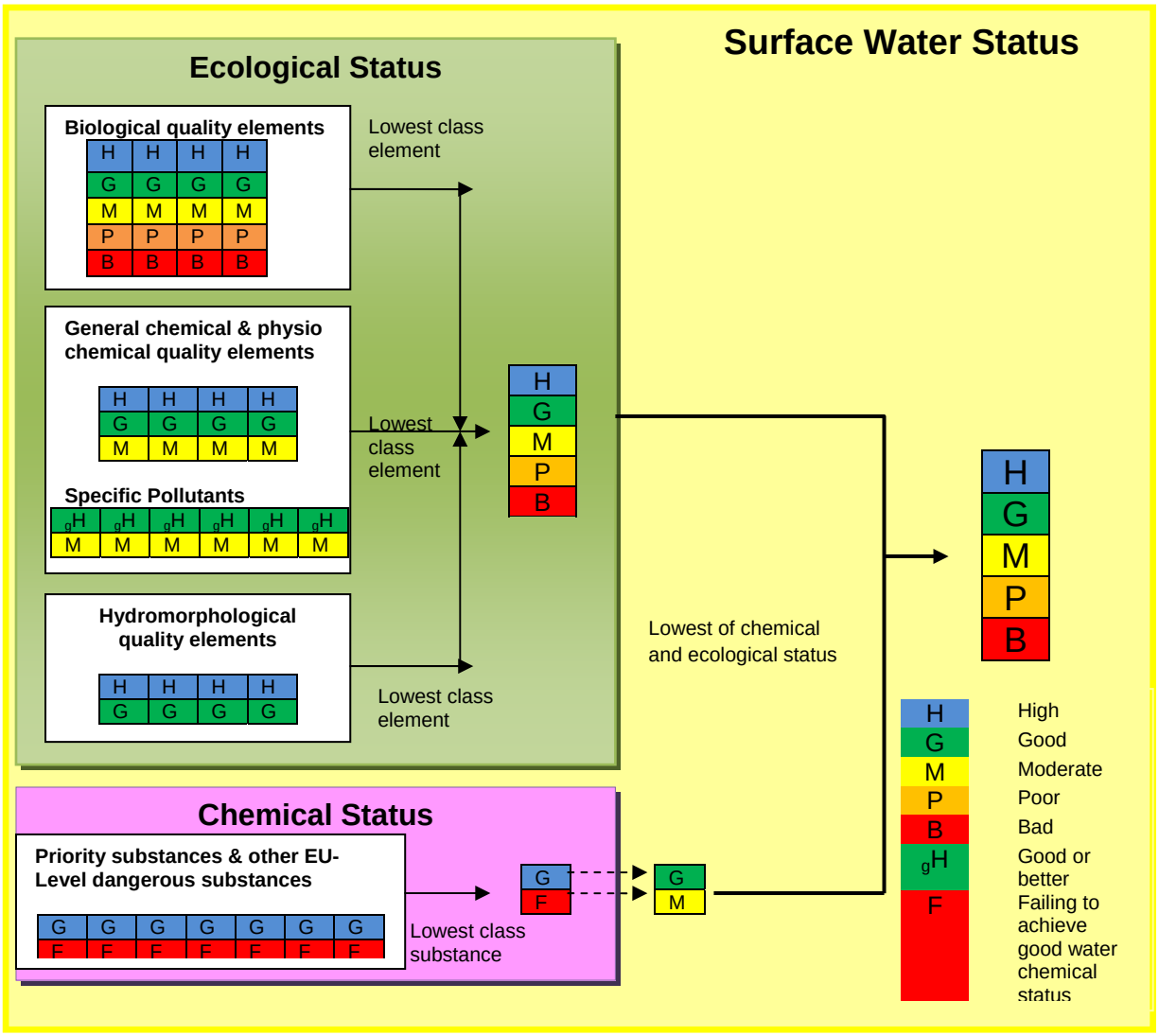

Fig. 9.06: How the different water quality element results are combined to classify ecological status, chemical status and the overall surface water status: Adapted from the 'Recommendations on Surface Water Classifications Schemes for the purposes of the Water Framework Directive' UKTAG 2006.

The ecological status is determined primarily by the lowest class of the biological component. The general and physiochemical element can lower the status to moderate only. If both these elements are classified as high the hydromorphological element can only lower the overall ecological status to good. Whilst the ecological

status has five classes (High, Good, Moderate, Poor and Bad), the chemical status has two (High and Moderate). The lowest status of the two determines the overall surface water status. This is termed the 'one out – all out' principle.

Ecological Status: Classification of Quality Elements

The various elements monitored for ecological classification are listed in table 1.

Biological	General/Physiochemical	Hydromorphological
1. Macroinvertebrates 2. Macrophytes 3. Phytobenthos 4. Fish	1. Dissolved Oxygen (% Saturated) 2. Soluble Reactive Phosphorus (SRP) 3. pH 4. Specific Pollutants (includes ammonia)	1. Quantity & dynamics of water flow 2. Connection to groundwater 3. River continuity 4. River depth & width variation 5. Structure & substrate of the river bed. 6. Structure of the riparian zone

Table 9.07. Quality elements which are monitored for the ecological status.

Biological Quality Elements

Macro-invertebrates

Different species of macro invertebrates are more sensitive to specific forms of pollution and therefore environmental quality ratios (EQRs) based on biological results may be used to assess water quality. Macro invertebrates are also the dominant prey of both salmonid and some non salmonid fish species. The measure of diversity of a macro invertebrate community can be a more reliable indicator of the pollution pressures within a catchment than relying solely on an assessment of chemical water quality. The impacts of pollution on a macro invertebrate community are longer lasting and can highlight intermittent pollution impacts that may be missed through chemical water quality monitoring.

RIVPACS had been previously used to classify the biological quality of a site in terms of Macroinvertebrates. This has since been updated to meet WFD requirements and is called the **R**ivers **I**nvertebrate **C**lassification **T**ool (RICT). RICT utilises the same principle of a biotic scoring system to produce the EQRs on which the classes are based:

$$\text{EQR Taxa} = \frac{\text{BMWP Observed number of Taxa}}{\text{BMWP Predicted number of Taxa (As derived from RICT)}}$$

$$\text{EQR ASPT} = \frac{\text{BMWP Observed ASPT (Average Score Per Taxon)}}{\text{BMWP Predicted ASPT (As derived from RICT}}$$

Class	ASPT EQR	NTAXA EQR
High	0.97	0.85
Good	0.86	0.71
Moderate	0.75	0.57
Poor	0.63	0.47

Table 9.08. Environmental Quality Ratio classifications for ASPT and NTaxa.

Macrophytes

Macrophytes (aquatic vegetation) have been included in the classification as a measure of the effects of nutrient enrichment. The tool employed is Leafpacs which assesses species composition, diversity and abundance.

Diatoms

Diatom (microscopic organisms) species presence and relative abundance are also indicative of nutrient enrichment in both rivers and lakes. To assess the effect of these on the ecological status the **D**iatoms **A**ssessment for **R**ivers and **L**akes **E**cological **Q**uality (DARLEQ) tool has been developed which classifies on levels of nutrient sensitivity and tolerance. The higher the EQR the more sensitive diatom species present. A minimum of three samples over several years is necessary for this classification resulting in few water bodies being classified at present.

Class	Diatoms EQR	Macrophytes EQR
High	0.93	0.8
Good	0.78	0.6
Moderate	0.52	0.4
Poor	0.26	0.2
Bad	0	0

Table 9.09. Environmental Quality Ration Classifications for Diatoms and Macrophytes.

Fish

At present there is no tool available for the classification of fish. It has been determined by expert judgement based on the quantitative electrofishing surveys undertaken by the Loughs' Agency (Foyle and Carlingford Areas) and AFBI (for other rivers in Northern Ireland).

General Chemical and Physiochemical Quality Elements

The general chemical elements required for WFD purposes are Dissolved Oxygen (% saturated), pH, and Soluble Reactive Phosphorus (SRP). Notably BOD is no longer used to classify a water body. It is still being monitored for investigative purposes where DO standards are not being met. In addition to these elements a number of 'specific pollutants' were also to be identified from a WFD list. These are pollutants which are being discharged in significant quantities. Of particular importance from a fishery aspect is Ammonia. There are 18 other pollutants listed

(Full list detailed in NIEA's Rationale for Water Framework Directive Freshwater Classification).

Class	DO (% saturation) (10 – percentile)	pH	SRP (µg/l) (annual mean)	Ammonia (mg/l)
High	80	(5 & 95 percentile) >=6 to <=9	20	0.2
Good	75		40	0.3
Moderate	64	4.7 (10 percentile)	150	0.75
Poor	50	4.2 (10 percentile)	500	1.1

Table 9.10. Classification for General Chemical & Physiochemical Quality Elements.

Hydromorphological Elements

Hydromorphological elements have been incorporated into the classification system to assess the impact that morphological alterations (e.g. sediment removal and channelisation) have on the ecological status of a river. The procedure employed to classify these elements is based on the previous NS Share method, **R**apid **A**ssessment **T**echnique (RAT). The new method is the **R**iver **H**ydromorphological **A**ssessment **T**echnique (RHAT) and has been developed to be fully compliant with the WFD.

Chemical Status: Classification of Quality Elements.

Although chemical elements are already being assessed for the ecological status, the Chemical Status refers solely to those chemicals which have been defined as priority substances which are *'those which present a significant risk to or via the aquatic environment'*. These include Pentachlorophenol, Carbon Tetrachloride, Aldrin, Isodrin and Napthalene. The full list and their Environmental Quality Standards (EQS) are detailed in the framework's 'daughter' Directive 2008/105/EC.

The principal objective of the Water Framework Directive is to achieve good surface water status in all water bodies by 2015. The classification of the water bodies are to be published in the River Basin Management Plans, the first of which was published in Dec 2009.

The directive has separate classification schemes for heavily modified water bodies, and protected areas. Heavily modified water bodies have been classified on their ecological potential, details of which are available on the NIEA website (www.ni-environment.gov.uk/wfd). For protected areas (e.g. River Foyle and its tributaries) maps are to be included in the River Basin Management Plans to indicate whether the objectives, established through legislation to define these areas, have been achieved.

The Habitat's Directive (92/43/EEC) indicates that the water quality in these protected areas should achieve targets that are necessary for the designated species. The favourable conditions specific for salmonid rivers have been based on

publications from Conserving Natura 2000 Rivers, the European Life Series, Ecology Series; No 7 Ecology of the Atlantic Salmon, *Salmo Salar* L (Table 9.11).

Parameter	Level	Percentile	Reason
BOD (mg/l)	2.5	90	High Status
Ammonia (mg/l)	0.25	90	High Status
Dissolved Oxygen % Saturation	80	10	High Status
Unionised Ammonia (mg/l)	0.025	95	Favourable Conditions Habitat Forming
Suspended Solids (mg/l)			Specific for Atlantic Salmon
Nursery Grounds	10	-	
Migratory Passage	25	-	
Soluble Reactive Phosphorus (mg/l)	Background	-	Specific for Atlantic Salmon

Table 9.11. Favourable condition targets for Atlantic salmon

Figure 9.12. Flattened mayfly nymph from the order *ephemeroptera* high scoring macro invertebrate indicative of good water quality

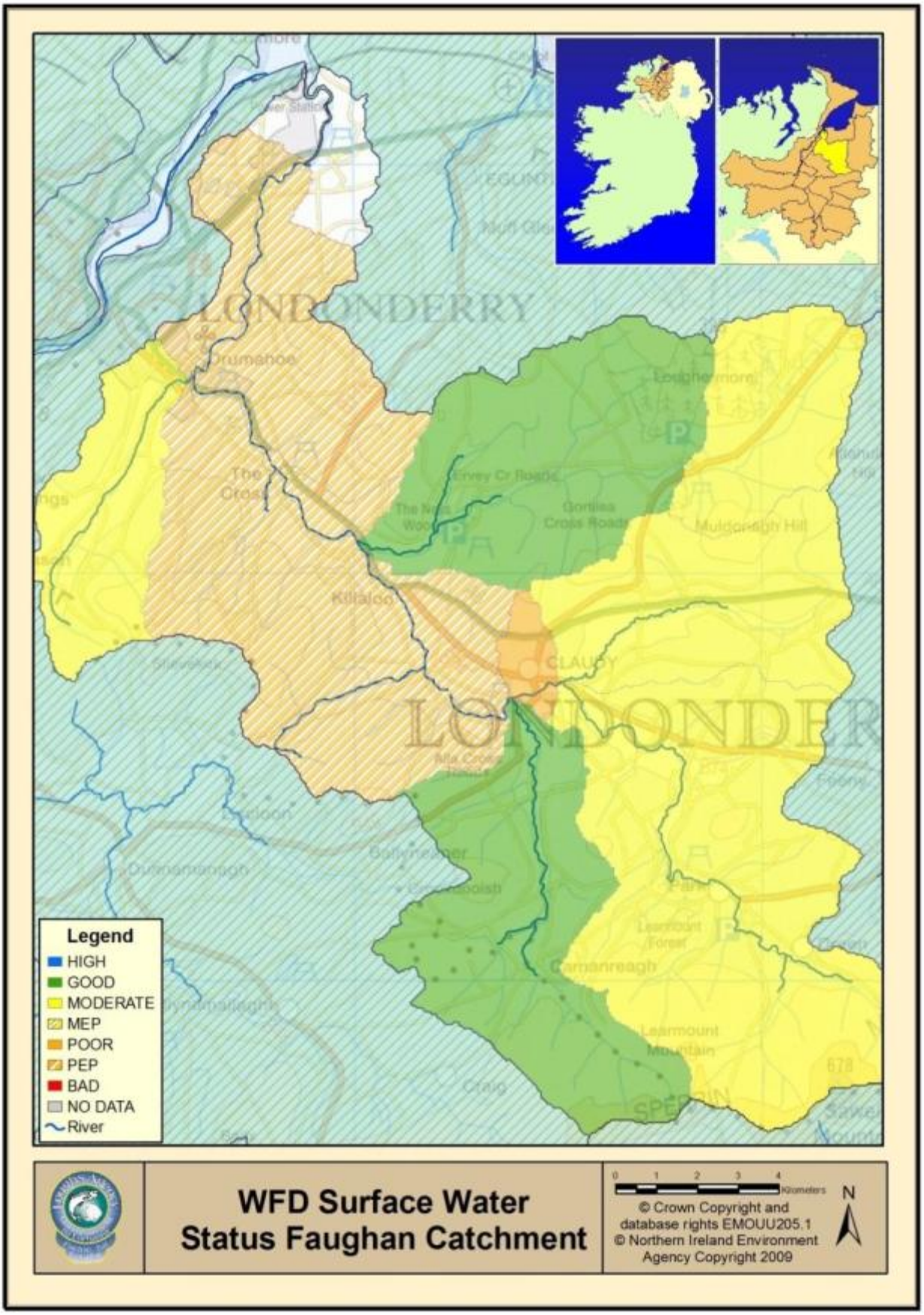

Figure 9.13. Overall WFD surface water status for the Faughan catchment 2009. At the time of writing (June 2010) no update of surface water classification for 2010 was available.

9.1 WFD Fish Classifications 2010

The Loughs Agency is monitoring freshwater fish within the Foyle and Carlingford areas for reporting under the WFD. Working under the direction of the Northern Ireland WFD Fish Group (composed of NIEA, Loughs Agency, AFBI and DCAL personnel) surveillance monitoring stations are surveyed for fish populations once during each WFD reporting cycle.

Eight Water Framework Directive fish surveillance monitoring stations were surveyed within the Loughs Agency jurisdiction in 2010, Five in NI and three in ROI. 100% were classified as good status

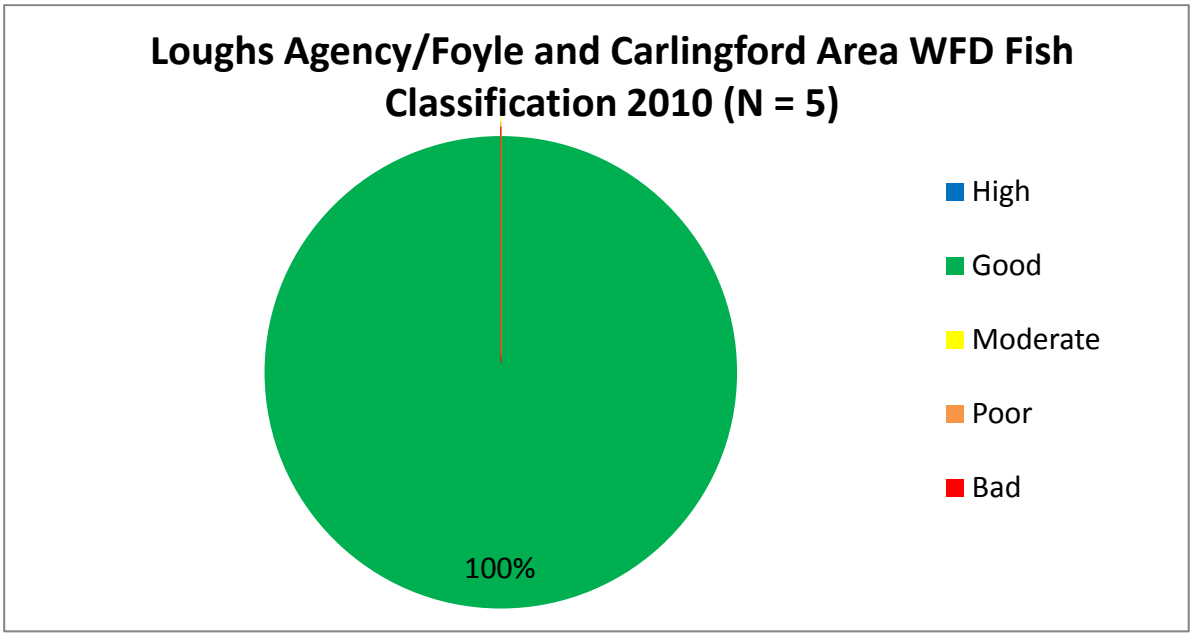

Figure 9.11. LA fish classification 2010 based on seven sites surveyed within the Foyle and Carlingford areas

In the absence of a finalised fish in rivers classification tool (currently under development) professional judgement has been used to classify selected river sites for fish. These have then been incorporated into ecological status classifications and final surface water classifications.

Data collection was conducted in the field during the summer of 2010 and involved the use of a quantitative electrofishing methodology commonly used for wadable rivers. This technique requires the netting off of a small section of river approximately 100m² using stop nets.

Removal sampling is then conducted utilising electrofishing equipment with the numbers, age class and species of each fish being recorded for each pass. After an appropriate depletion has been achieved, which facilitates a density estimation to be made all fish are returned alive to the river. If the river is too large for this technique then a multi method survey approach is conducted incorporating the use of electrofishing, seine netting and fyke netting.

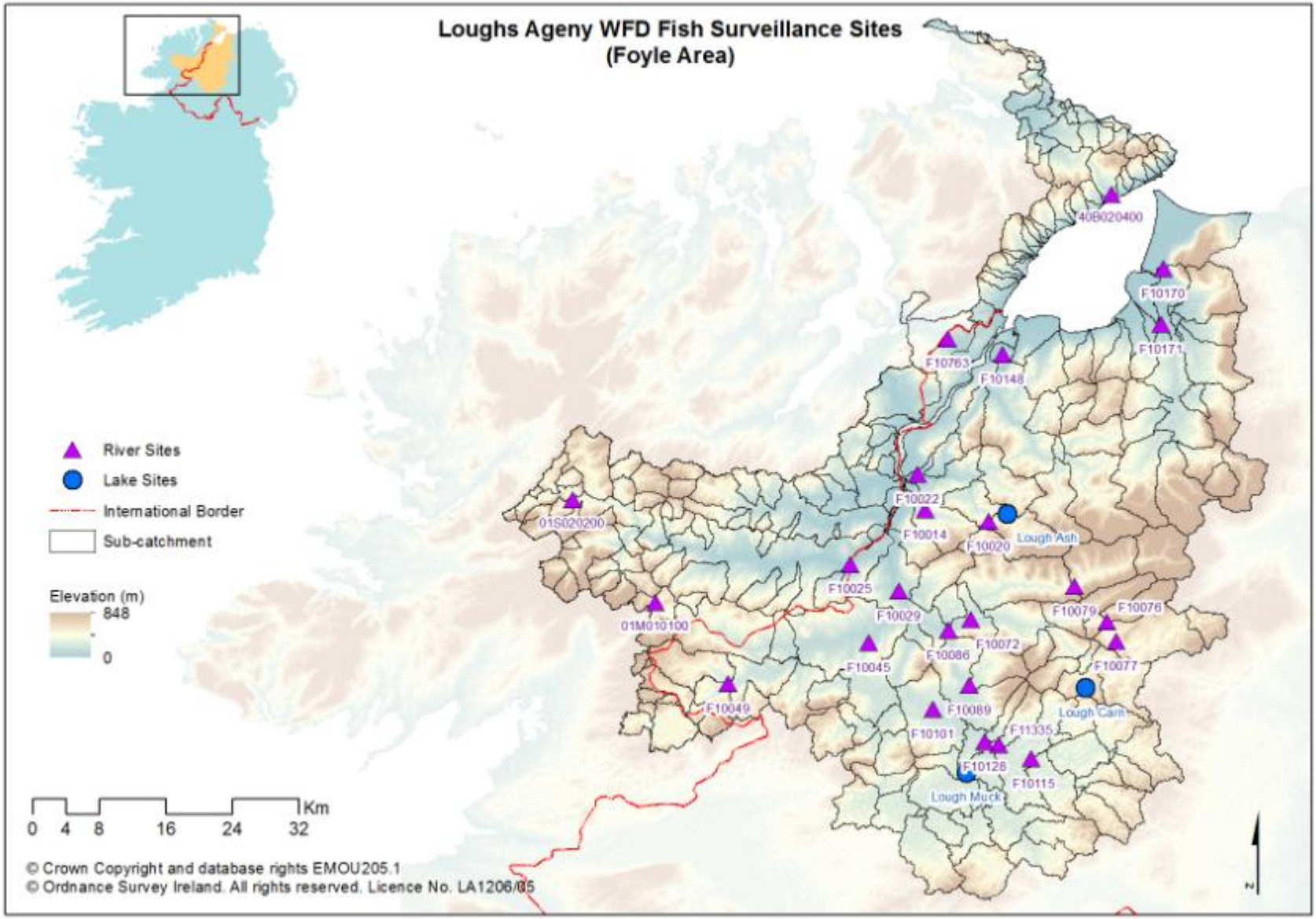

Figure 9.12. WFD fish surveillance monitoring stations in the Foyle system

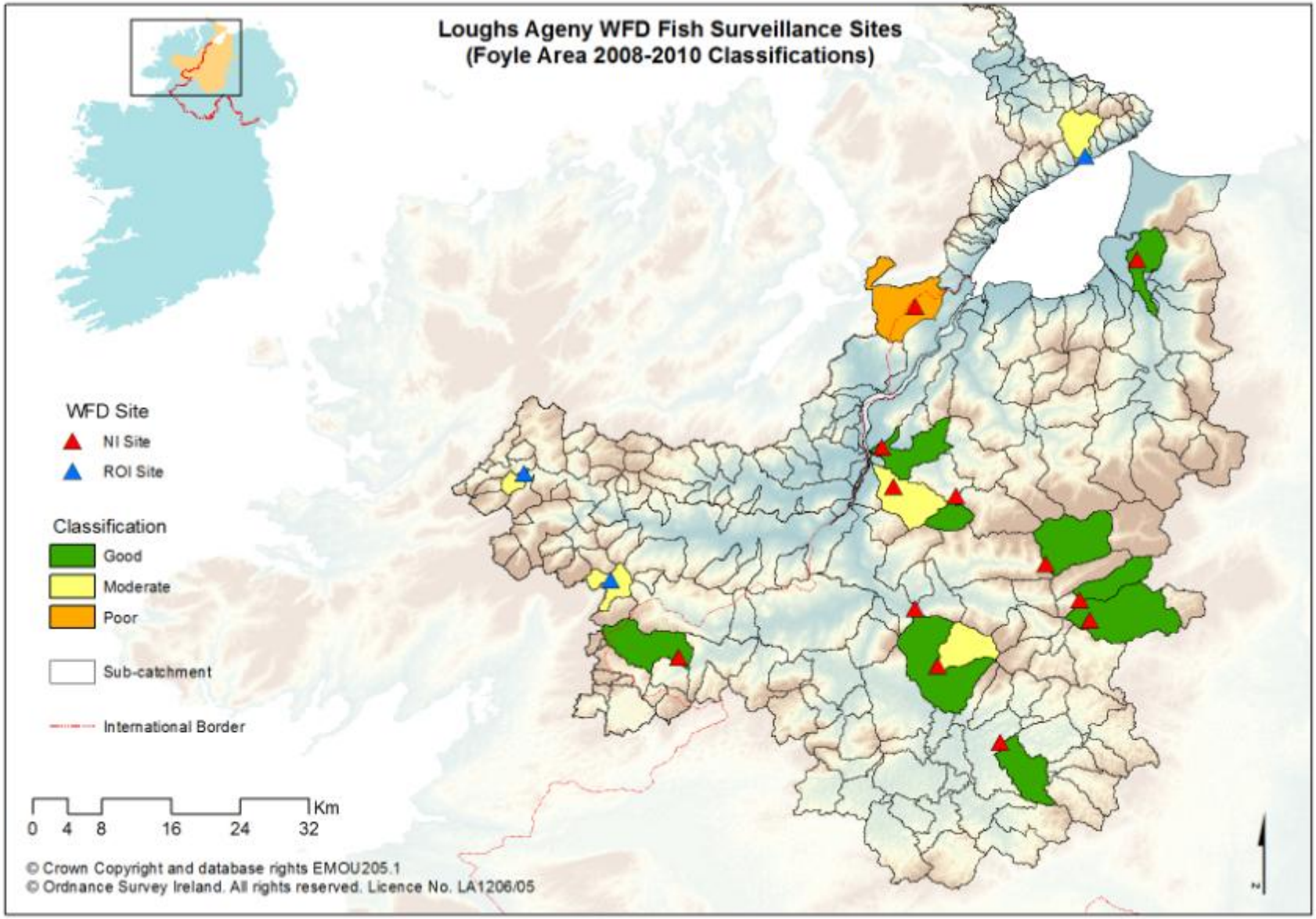

Figure 9.13. WFD fish classifications in the Foyle system

In addition to directed WFD fish surveillance monitoring the Loughs Agency has collated other suitable fishery data collected from 2005-2010 and derived WFD fish classifications from this. An example of this data is outlined below.

Fishing	Salmon 0+	Salmon 1+	Trout 0+	Trout 1+	Total
5 Minute	31	5	1	0	37
1st	39	2	5	1	47
2nd	30	1	5	1	37
3rd	31	0	2	6	39
4th	19	0	0	1	20
Total	150	8	13	9	180

Table 9.14 Depletion sampling results from quantitative electrofishing survey on the Bonds Glen 2007

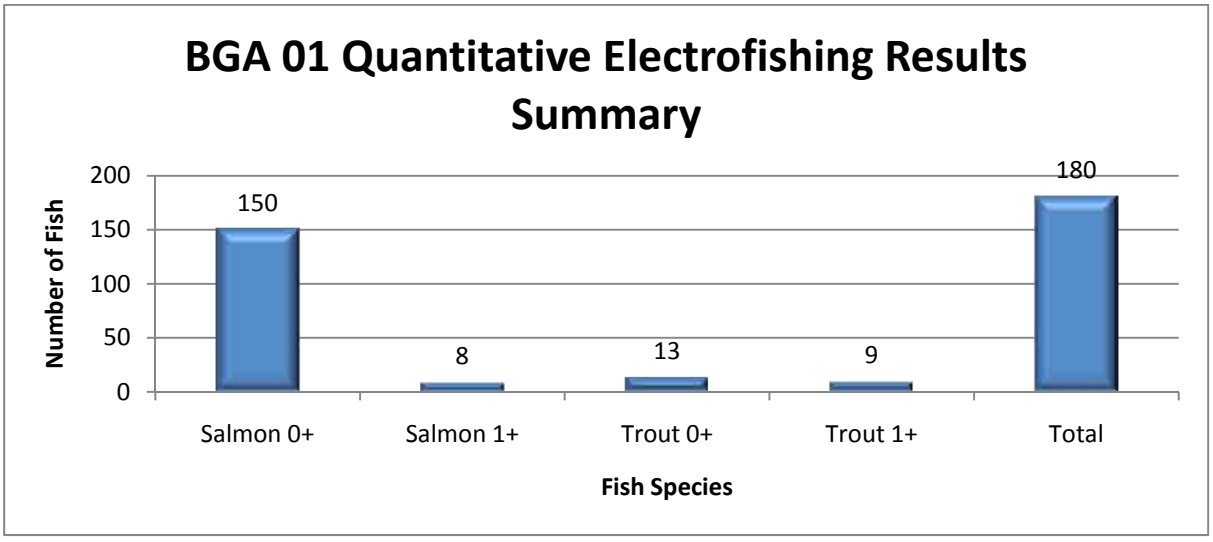

Table 9.15 Species and numbers caught

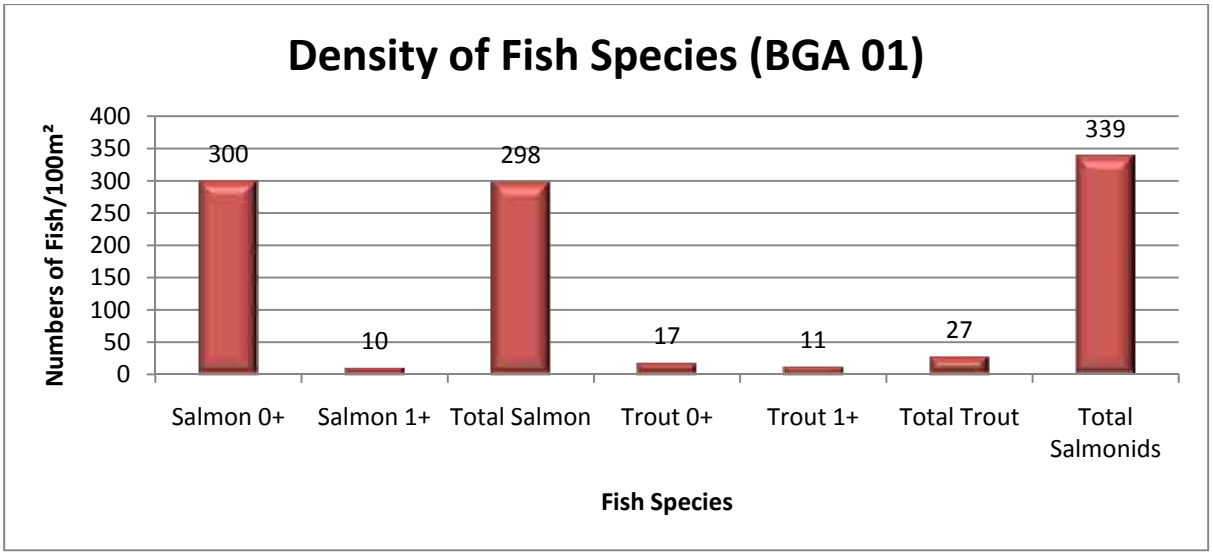

Table 9.16 Density of species by age class per 100m^2

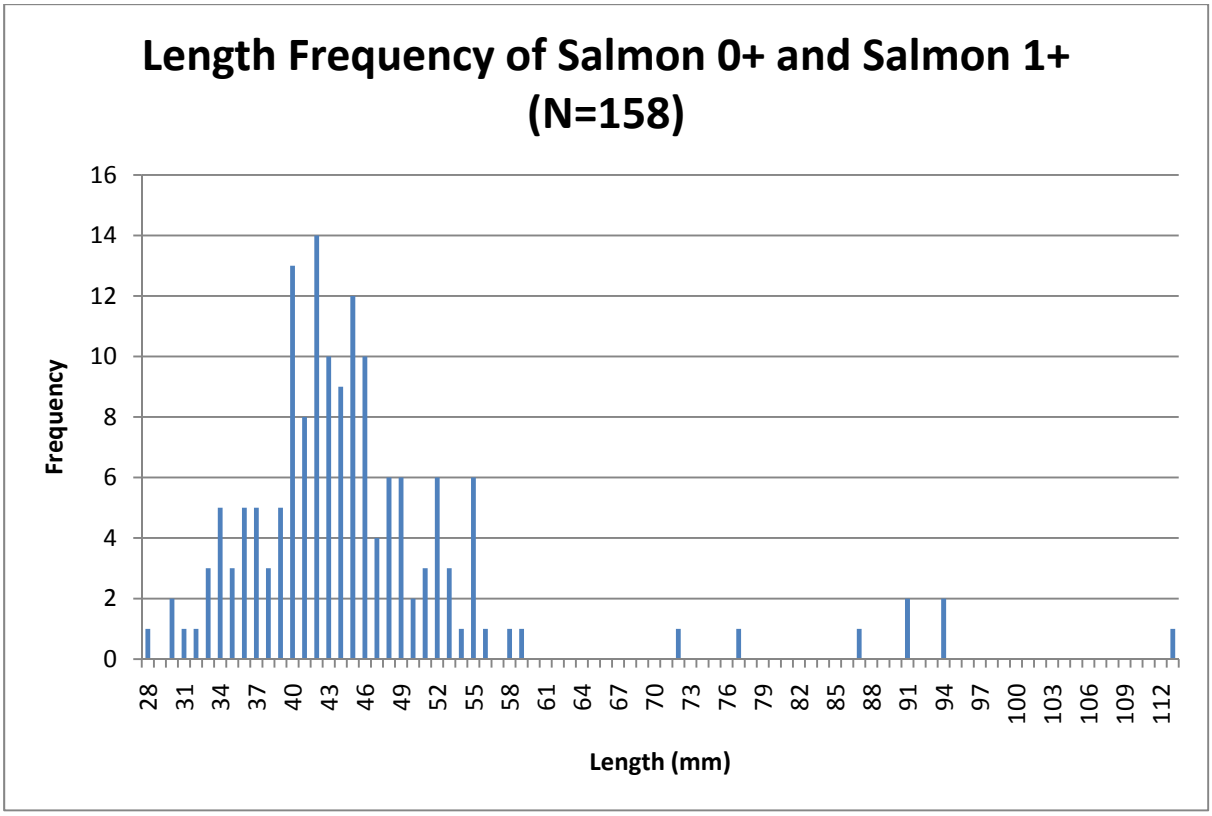

Figure 9.17 Length frequency distribution of juvenile salmon

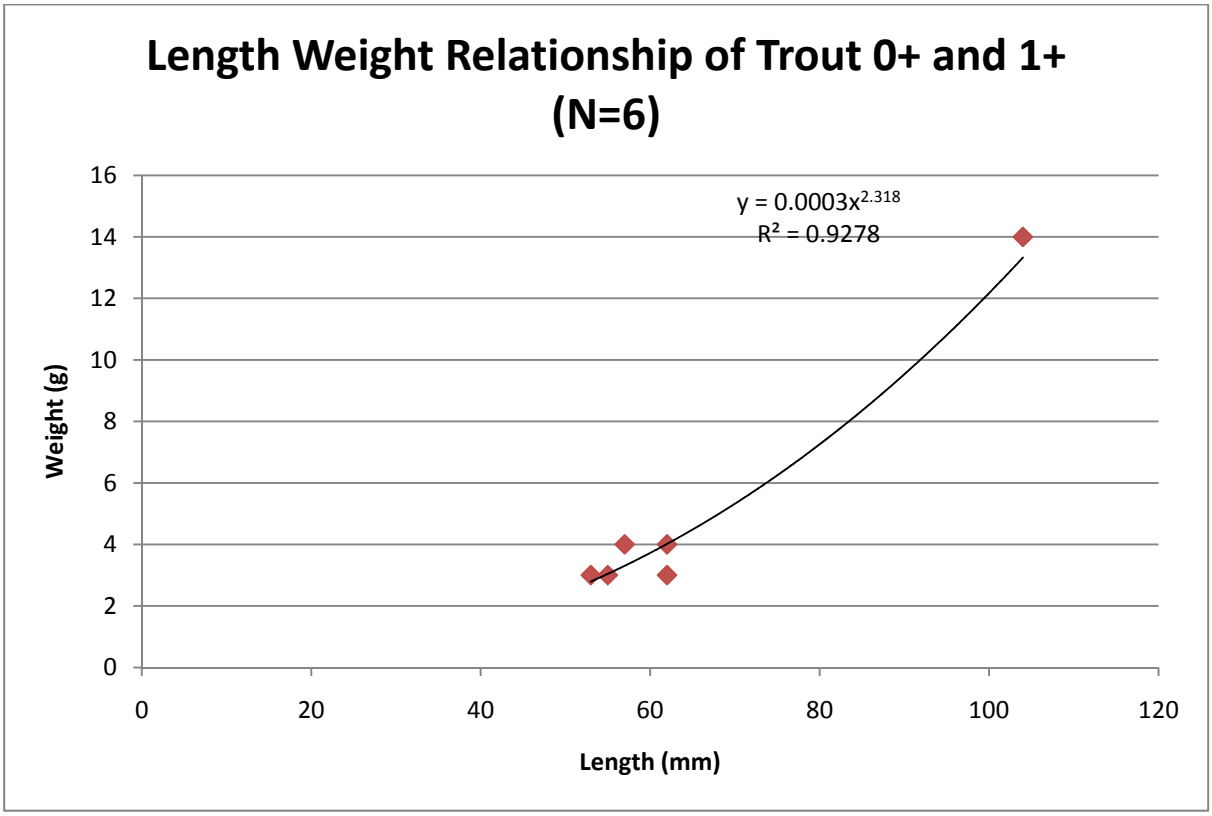

Figure 9.18 Length weight relationship of juvenile trout

10.0 CONSERVATION AND PROTECTION

The Loughs Agency continues to carry out an active fishery protection role throughout the catchments of the Foyle and Carlingford areas including the sea area, River Foyle and on all tributaries. Tables 10 and 10.1 outline the number of patrols and some duties carried out by the Loughs Agency staff in the Faughan catchment and seizures for the Foyle area.

A team of Fishery Officers are responsible for the Faughan catchment splitting their time between the Roe catchment the Burndennet catchment, Glenmornan catchment, Moor Lough, Lough Ash and Binevenagh. This is in addition to regular fishery protection patrols on the River Foyle.

Year	No of Patrols	No of Licence Checks	Joint Patrols	On-site Inspections
2002	41	257	0	121
2003	35	192	1	31
2004	49	161	2	39
2005	54	219	5	35
2006	66	209	5	15
2007	100	211	4	54
2008	147	121	5	13
2009	127	101	5	16
2010	172	162	4	7

Table 10. Breakdown of conservation and protection duties in the Faughan catchment 2002-2010

Year	2010	2009	2008	2007	2006	2005	2004	2003
Nets	136	128	109	100	97	114	181	198
Salmon	104	6	92	56	91	118	130	155
Rod & Reel	66	96	136	85	26	10	16	12
Vehicles	0	0	1	0	2	1	1	0

Table 10.1 Seized nets, salmon, rod/reels and vehicles in the Foyle system 2002-2010

Year	Nets	Salmon/Trout	Rod/Reel	Vehicles	Boats
2006	1	0	0	0	0
2007	1	4 Salmon	10	0	0
2008	7	1/1	20	0	0
2009	1	0	5	0	0
2010	0	0	8	0	0

Table 10.2 Seizures in the Faughan catchment 2006-2010

10.1 Habitat Improvement Works

In addition to the traditional protection duties carried out by the Loughs Agency staff conservation and improvement of habitat has been increasing over recent years.

Over time man has imposed significant changes on the natural courses of many rivers and flood plains. The driving forces behind these changes have included amongst others; arterial drainage schemes to provide more suitable land for agricultural purposes, urban sprawl, infrastructure expansion (roads etc.), flood defences, water abstraction and hydro power generation. All have had a significant impact on the natural meanderings and discharges of rivers and tributaries resulting in faster runoff of floodwaters ultimately leading to a change in the morphology and flow regime of rivers and resultant impacts on fisheries.

While all these processes have had some impact within the Foyle system, it is considered to be a relatively natural system with natural river structure present in the catchments headwaters. In areas that have been altered methods for reinstating lost habitat are investigated and where appropriate action taken.

In 2004 a series of habitat improvement measures were carried out on lower sections of the Faughan catchment between Campsie Bridge and Campsie Barrage. The scheme was designed to improve the in-channel flow, to provide holding and cover for migrating fish and to encourage silt dispersal.

The in-stream works have included the construction of a paired deflector Figure 10.11. Paired deflectors are designed to create a run of faster flowing water by constricting the flow through a narrowed channel. This aids in the removal of silt and when used in conjunction with plumb stones provides cover for migrating fish.

A broken toothed weir was also constructed upstream from the paired deflector. Alternating high and low boulders were placed in a “V” shape with the apex of the “V” pointing upstream Fig 10.12. The weir creates holding areas for migrating fish and assists in silt dispersal and has changed the river at that location from a uniform stretch of flat water into a more diverse section incorporating holding pools and runs.

Fig 10.11 Paired deflector

Fig 10.12 Broken toothed weir

A single deflector Fig 10.13 was also constructed with the intention of increasing the velocity of the river and to emulate the meandering course of a river creating varied in-stream characteristics. This will also facilitate in the dispersal of silt and provide cover for fish.

Fig 10.13 Single deflector

The placement of 2 ton submerged stones (plumb stones) in groups of 3-4 between Campsie Bridge and the paired deflectors has created increased flow velocities and further cover for migrating fish by encouraging the scouring out of pools.

In 2006 Faughan Anglers Ltd made a successful bid for significant Building Sustainable Prosperity (BSP) funding through a local rural development organisation, Rural Area Partnership in Derry (RAPID). The River Faughan Development Project ran until August 2008 and had a number of components including fishery habitat improvement, improving access to the river and improved signage and interpretation of local species and habitats.

The Loughs Agency provided match funding for the habitat improvement and habitat improvement monitoring components and were asked by Faughan Anglers Ltd to manage this aspect of the project. The River Faughan Development Project provides a significant opportunity to develop partnership working within the Faughan catchment and to quantify the effects of habitat improvement works on the fish species present within selected areas of the catchment. The Loughs Agency will continue to monitor the effects of the works over the coming years.

The Loughs Agency selected sites that would benefit most from habitat improvement works based on site visits, habitat survey data, electrofishing results and water quality information. Figures 10.15 – 10.18 highlight some of the sites that have benefited from sensitive habitat improvement.

Fig 10.15-10.18 Clockwise from top right, before works, site where habitat units and bankside fencing where installed on the Bondsglen, before works picture at site for habitat units on the Foreglen, example of fine sediment input to the Bondsglen and site for improved fish passage on the Bondsglen.

In-channel habitat improvement works and riparian fencing were completed along approximately 1km of the Bonds Glen in 2007. Works included the creation of habitat units, which are composed of repeated sequences of holding, nursery and spawning habitat. Riparian fencing was also installed to reduce the input of fine sediment to the watercourse which is an important spawning and nursery area. The pictures below demonstrate some of the works conducted on the Bonds Glen where cobble substrate was introduced to facilitate the development of high quality feeding territories.

Fig 10.19-10.22 sections of improved nursery habitat on the Bonds Glen immediately post introduction

Prior to the in-channel and riparian habitat improvement measures being implemented baseline surveys of the juvenile salmonid populations were conducted within the areas to be improved on both the Bonds Glen and the Foreglen tributaries. The same sites will be resurveyed over the coming years to assess the impacts the works have had. Initial results for the project one year post completion are outlined below. The next scheduled survey to monitor the longer term trends in the fish populations as a result of the habitat improvement works is scheduled for 2012. Planned monitoring of all habitat improvement works is an essential component of any post project evaluation. Pragmatic decisions are made on the frequency of sampling based on available resources and biological requirements. It is an acknowledged fact that all habitat improvement sites cannot be surveyed each year and a degree of flexibility is essential. The Loughs Agency is committed to meeting the long term monitoring requirements required to appropriately assess the impacts of habitat improvements at appropriate intervals.

Fig 10.23-10.24 sections of improved nursery habitat on the Foreglen

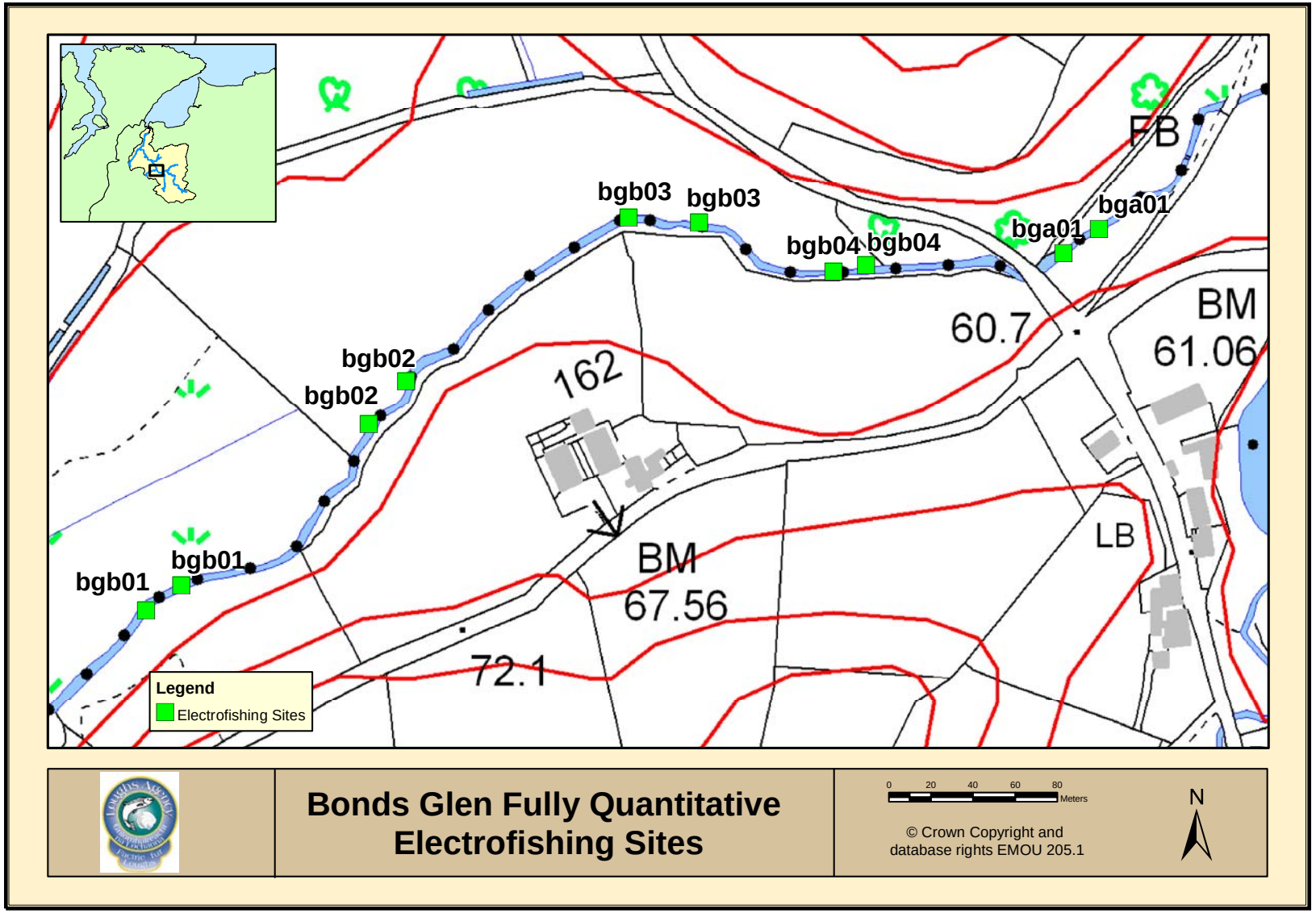

Fig 10.25. Location of quantitative electrofishing monitoring stations for habitat improvements project on the Bonds Glen. Not all sites are monitored annually

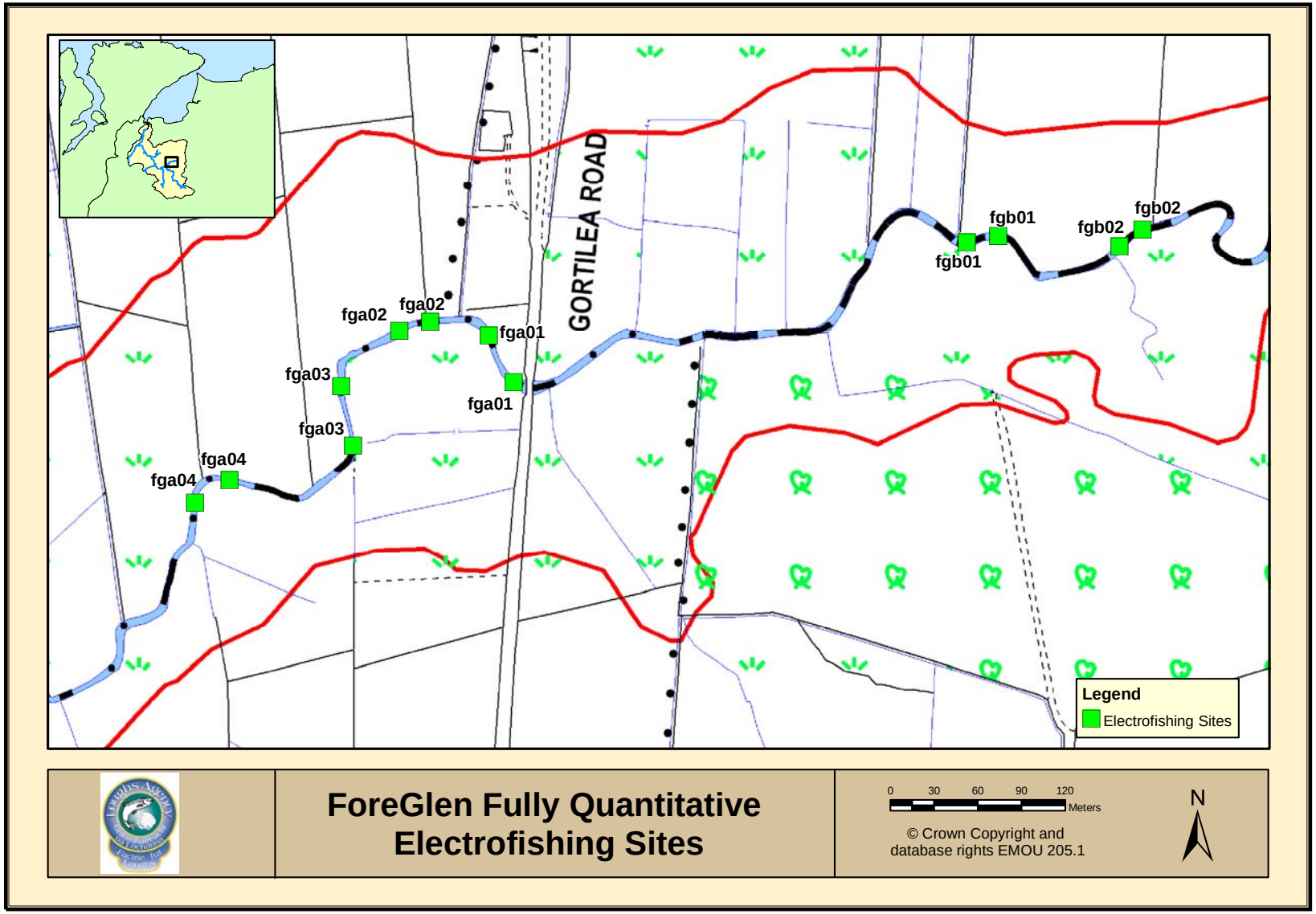

Fig 10.26. Location of quantitative electrofishing monitoring stations for habitat improvements project on the Foreglen

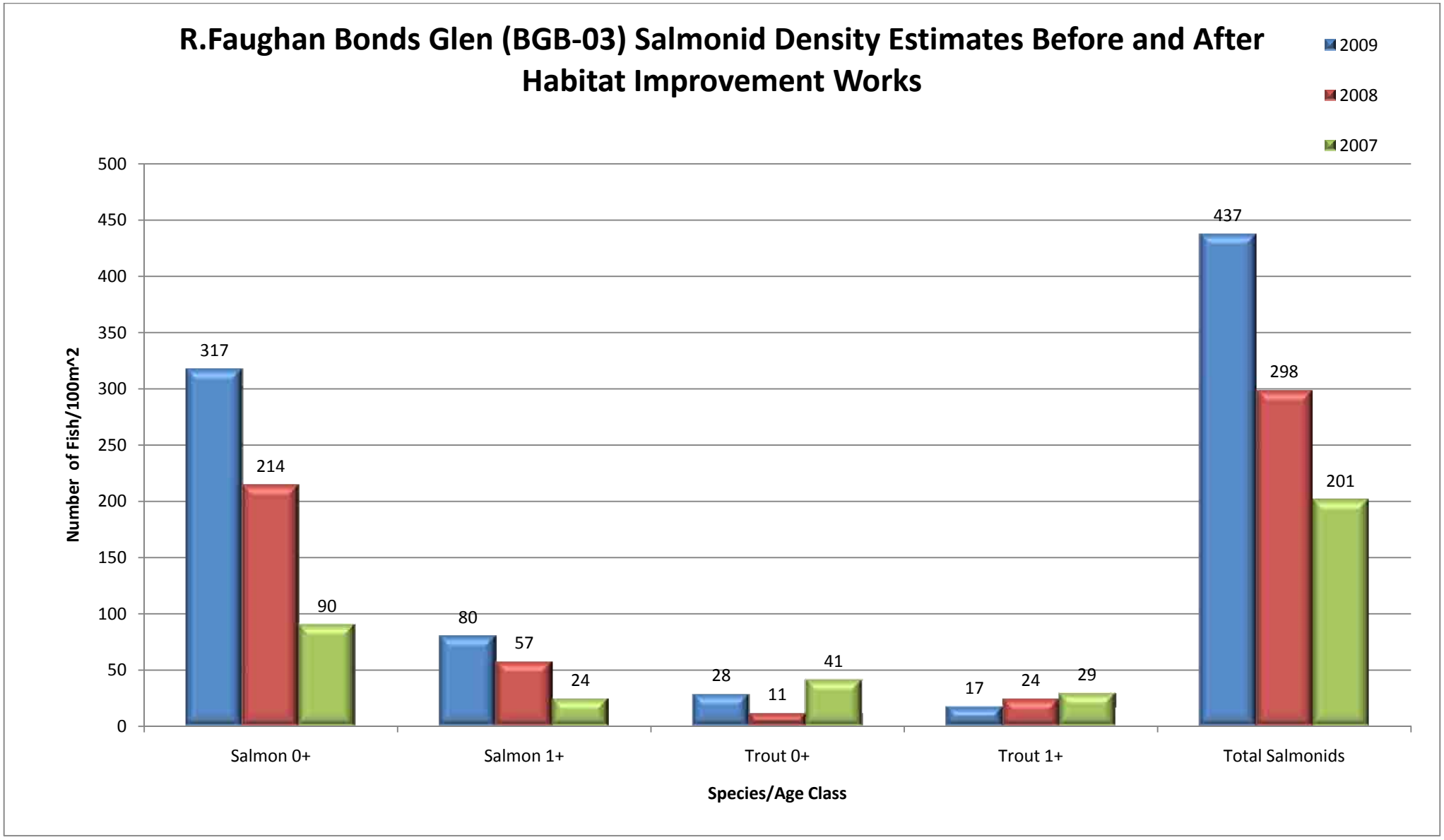

Fig 10.27. Bondsglen before (2007) and after (2008 & 2009) habitat improvement salmonid densities. *Note next scheduled survey is in 2012.

11.0 ENVIRONMENTAL ISSUES

Some environmental issues affecting water quality have already been outlined previously. The following list presents some of the main habitat pressures to salmonids within the Foyle system:

- Agricultural activities – enrichment from natural and artificial fertilisers often make their way into watercourses, enhancing problems with eutrophication.
- Forestry activities – planting and felling operations can lead to increased loading of suspended solids in watercourses. Established forestry as a major upland land use has been attributed to increased acidification.
- Barriers to migration – a range of natural and anthropogenic features on rivers can lead to barriers for migrating salmonids and other fish species. These can include weirs and hydro-electric schemes.
- Gravel removal – gravel is extremely important for the creation of redds for spawning fish. Removal of gravel from the river bed in sensitive areas can destroy potential spawning and nursery habitat.
- Quarrying activities – the extraction of aggregates such as rock, sand and gravel has the potential to cause increased levels of suspended solids in nearby watercourses. Sufficient mitigation measures should be in place at such sites to trap increased sediment loads entering rivers and streams.
- Abstraction – water abstraction from watercourses for a range of uses is increasing throughout the Foyle and Carlingford catchments. Unless appropriately assessed and licenced, these activities have the potential to reduce residual flow levels and alter the ecological status of our rivers. This is even more concerning in the light of climate change.
- Peat harvesting – Peat harvesting still occurs in small upland pockets throughout the Foyle system. It has the potential to increase sediment loading in receiving waters.
- Sewage treatment – sewage and waste water treatment works are under considerable pressure with the increase in urban development in our towns and villages. Several inadequate systems throughout the Foyle system continue to pollute rivers.
- Hydropower – small-scale hydropower schemes are beginning to appear on rivers throughout the Foyle and Carlingford catchments. Baseline fishery data must be provided to allow for sufficient assessment of any proposed scheme, unless located above an impassable fish barrier.
- Urban development – the expansion of large-scale housing developments and the associated pressures on waste water and sewage treatment works are a potential source of water pollution in the event of overflows.
- Drainage and canalisation – these have direct impacts on the quality of available fishery habitat within the catchments. Canalisation in particular can lead to the removal of important spawning, nursery or holding areas of rivers.
- Industrial discharges – larger urban areas with industrial discharges have the potential to cause pollution through toxic discharges and can alter the temperature of the watercourse.

- Septic tanks – a proliferation of single dwellings and their septic tanks is an ongoing area of concern. Initial research from parts of the Foyle system indicate that this is major contributor to decreased water quality and local increases in suspended solids.

12.0 DESIGNATED AREAS

The European Commission Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (EU Habitats Directive 92/43/EEC) requires that all member states designate Special Areas of Conservation (SACs) in order to protect threatened habitats and species. One of Northern Irelands most recent additions to its list of SACs is the River Foyle and Tributaries SAC. However this does not include the River Faughan. The Foyle and its tributaries have been designated as an SAC to protect its Atlantic salmon populations, otter population and its floating vegetation habitat dominated by water-crowfoot.

Atlantic salmon is listed as an Annex II and Annex V species within the directive meaning that they are of community interest requiring the designation of an SAC (only in fresh water).

"*The River Foyle and its tributaries have the largest population of Atlantic salmon in Northern Ireland. The majority of the salmon returning are grilse (single wintering salmon), with a smaller but important number of spring salmon (multi-wintering salmon) also occurring. Research has indicated that individual sub-catchments within the system support genetically distinct salmon populations*" (Environment and Heritage Service).

The Faughan catchment has a number of other designated areas including; the mouth of the River Faughan to Campsie Bridge which has been designated an Area of Special Scientific Interest (ASSI). ASSIs are areas of land that have been identified as being of the highest degree of conservation value. This area has also been designated as a site of importance for waterfowl habitat under the terms of the Convention on Wetlands of International Importance (RAMSAR site) and a Special Protected Area (SPA). SPAs are designated under the European Commission Directive on the Conservation of Wild Birds (The Birds Directive) and together with SACs designated under the Habitats Directive form part of the NATURA 2000 network of protected sites.

A number of other areas within the Faughan catchment have also been designated as ASSIs including two sections of the Burntollet River at Ervey Wood and Ness Woods and the Bonds Glen. A section of the headwaters of the Faughan catchment incorporating the upper section of the Glenrandal River, Tireighter Burn and Sluggada Burn are within the Sperrin Area of Outstanding Natural Beauty (AONB).

In 2008 the River Faughan and Tributaries was designated as an Area of Special Scientific Interest. This is the first step in designating the River Faughan and Tributaries as an SAC. Under the Habitats Directive any site that has been proposed as an SAC has the same legal protection as any fully designated SAC. Any plan or project happening within or likely to have an impact on any selection feature of the River Faughan and Tributaries ASSI is required to have an appropriate assessment carried out as outlined by Article VI of the Habitats Directive. The River Faughan and Tributaries ASSI and Proposed SAC have been designated for its population of Atlantic salmon which is of international importance, Otter and upland Oak woodland.

13.0 GENETIC STUDY

A baseline genetic survey was carried out in the Foyle system in 2003 and a resurvey conducted between 2006 and 2008 to analyse the populations of Atlantic salmon present within the Foyle catchment. Results confirmed the existence of genetically distinct populations between and within the rivers and tributaries of the Foyle area. An understanding of these genetically differentiated populations is required to facilitate appropriate management of conservation measures and the commercial/recreational fisheries.

The report concluded that genetic diversity is high between and within the various salmon populations present in the Foyle system. Each population has evolved over time creating distinct populations (with some gene flow from straying fish) that are best suited to the conditions present in a particular river or tributary. The non-uniform nature of the populations adds to the diversity of life history strategies exercised by Foyle salmon. Distinct differences such as run-timing and age at smolting can act as natures insurance policy to any catastrophic events which would threaten a homogenous population.

The report stated that the current genetic structure and diversity of Foyle salmon is representative of what might be regarded as the native structure of wild salmon populations. The maintenance of genetic diversity is a core requirement for the long-term sustainability of wild populations, preserving the biodiversity of the wild salmonids of the Foyle system is therefore a primary objective of the Loughs Agency.

The re-survey reported in 2010 and has shown that there is a high degree of stability in the salmon population genetics over time as well as location.

14.0 POLLUTION MONITORING

The Loughs Agency has a statutory obligation to monitor the pollution of watercourses. In conjunction with the Northern Ireland Environment Agency all reported pollution incidents are investigated.

15.0 FISHERY OFFICERS FAUGHAN AREA REPORT 2010

In 2010 Fishery Officers Emmett Carten, David Robinson and David O'Brien continued to work within the Faughan catchment. Their report follows.

15.1 Fishery Officers Report

2010 saw the Eastern Crew target the River Faughan and its entire catchment with a mix of routine and specialised patrols. Working closely with the protection staff of the River Faughan Angling Association Ltd and the water quality team of the NIEA potential threats to the Faughan catchment were identified and all reports investigated.

The beginning of 2010 presented some of the coldest weather experienced in Northern Ireland for many years with temperatures in the minus range hitting double figures, this coupled with heavy snow falls led to many challenges. During late December 2009 and Jan 2010 it was feared that a full redd count of the Faughan catchment may not be achieved with many of the water courses frozen over, however the Eastern crew did manage a full walk through of the catchment with good numbers of redds recorded. The harsh weather passed for a while in the first week of January before more cold weather returned which resulted in snow melt washing over a considerable number of redds.

On a more positive note a pleasant and most welcome period of fine spring weather and early first summer quarter led to good egg hatching conditions and survival. Testimony to this was highlighted with the electrofishing survey of 2010. Although a wet summer and early autumn did lead to a rather fragmented and frustrating electrofishing field season the Eastern crew did manage to complete the electrofishing of the entire catchment with healthy populations of both salmon and trout recorded throughout.

The wet summer of 2010 did present both advantages and disadvantages to the fishing on the River Faughan. The wet summer and autumn did provide perfect spate waters for the angling fraternity with good catches of both salmon and sea trout recorded throughout the main stem of the River Faughan. The road works around the main A2 at Campsie bridge did reduce angling effort many anglers did seek out and find many more enjoyable beats throughout the summer. The increased water

levels throughout the summer did present increased incidents of water pollution especially as a result of erosion and a rather frustrating silage making season for the agricultural community. However pollution reports were down during 2010 . The Eastern crew continued to monitor water quality with a series of proactive and reactive site/premises visits with particular attention paid to those that posed the highest risk to adjacent watercourses. Again a close working relationship was maintained with the water quality team from Northern Ireland Environment Agency with all relevant information shared and responded to. Routine water quality monitoring was carried out monthly by the Eastern crew throughout the River Faughan catchment and the samples sent to the in-house Loughs Agency laboratory for analysis.

Although no habitat enhancement schemes were carried out on the River Faughan during 2010 there remains scope for many small scale schemes especially in the smaller tribs. Possible habitat enhancement schemes include;

1. Bankside reinstatement and reinforcement d/s of Killycorr Bridge to protect spawning beds and reduce in-stream braiding and dewatering.
2. Programme of hedge/brush/tree bankside trimming throughout the catchment to reduce tunnelling and promote light penetration. Priority should be given to the Ness/Glenrandal Rivers.
3. Possible gravel placement on the lower section of the River Ness in order to promote spawning activity.

The Eastern crew continued to protect the fishery of the River Faughan catchment with a mix of both foot and boat patrols with the latter concentrated around the tidal zone. All reports of illegal activity were investigated and a close working relationship maintained with the protection team from the River Faughan Anglers Ltd.

The Eastern crew intend to continue to protect the river Faughan and its catchment and to fully implement the objectives and achieve the targets set out in the Loughs Agency 2011 business plan.

16.0 ACTIONS FOR 2011

In order to fully utilise the extensive data resources collected and held by the Loughs Agency on the fish populations and habitats of the Faughan catchment it is necessary to focus attention on specific management objectives.

The Loughs Agency has stated in its corporate plan 2011-2013 that it will conserve, protect, manage and improve the fisheries of the Foyle and Carlingford areas. By way of fulfilling these objectives a targeted series of actions utilising data collected

over recent years will be implemented. Fishery owners and Faughan Anglers Ltd will continue to be consulted regarding any proposed works and stakeholder input sought.

16.1 Foyle and Carlingford Areas Ongoing Actions for 2011

Good water quality is essential for the conservation of productive aquatic ecosystems. Fish populations rely on unpolluted water for survival and feeding. The Loughs Agency is committed to ensuring deleterious matter does not enter any watercourse. Routine monitoring is conducted throughout the Foyle and Carlingford areas. Proactive pollution visits and water quality monitoring will continue in 2009.

Water quantity is becoming an increasingly important issue from a fisheries management perspective with continuing demand from a variety of sources including industry, hydro power generation and abstraction for meeting the ever growing needs of industry and the wider population. The Loughs Agency are aware of the conflicting needs of aquatic environments and water resource users and comment on development issues which may have an impact on the important aquatic resources of the Foyle and Carlingford areas with reference to national and international obligations.

In-channel and riparian habitat improvement projects provide an important mechanism by which to improve and protect valuable fishery resources. Over recent years the Loughs Agency has developed a number of projects designed to improve the survival and production of robust populations of juvenile salmonid and other native fish species. These programmes will continue where funding is available, The Loughs Agency also encourages local stakeholder groups to source appropriate funding to develop collaborative habitat improvement projects. The Loughs Agency can provide advice and recommendations for in-channel and riparian improvements and are eager to facilitate the development of such programmes.

Work is continuing to assess and record all **Barriers to Migration** within the catchments of the Foyle and Carlingford areas and these will be incorporated into the Loughs Agency Geographical Information System (GIS). Where finances are available the removal of artificial barriers will be investigated.

Predation by cormorants and seals of economically important fish species continues to be a contentious issue. The Loughs Agency will continue to promote the development of a management strategy incorporating economic, social and environmental factors.

The Loughs Agency will continue to monitor the salmon and inland fishery resources of the Foyle and Carlingford areas, utilising best practice methods including fish counters, juvenile population surveys and catch returns. The

importance of the Atlantic salmon resource has been further highlighted by recent genetic studies which have identified the presence of genetically distinct populations of salmon between and within main river catchments. This information will be utilised when developing habitat improvement programmes to ensure the presence of a diverse resource capable of withstanding change.

Invasive species in both aquatic and riparian habitats have become an important issue in fisheries management and in wider environmental management. Invasive species have the potential to significantly alter ecosystems and their function. The Loughs Agency is contributing towards the development and implementation of invasive species codes of practice.

16.2 Faughan Catchment Potential Habitat Improvement Schemes for 2011

- Bankside reinstatement and reinforcement downstream of Killycor Bridge to protect the spawning beds and reduce braiding of this section.
- Programme of hedge/bush/tree trimming throughout the catchment to reduce tunnelling and create better light penetration to the watercourse. Priority given to the Glenrandall, Ness and Crunkin rivers.

16.3 Faughan Catchment Specific Actions for 2011

- Continue to maintain the high standards of conservation and protection within the Faughan catchment
- Target all areas/individuals brought to Loughs Agency attention
- Implement habitat improvement schemes as dictated by business plan/corporate plan
- Conduct annual fish population surveys and spawning surveys
- Conduct ongoing water quality monitoring and investigate areas highlighted as being of concern
- Develop potential habitat improvement projects including riparian buffer zone creation, fencing, native species planting and in-channel habitat improvements including spawning bed and nursery habitat improvement
- Monitor forestry operations adjacent to watercourses or areas likely to impact on watercourses

- Assist with Water Framework Directive fish monitoring programme
- Monitor all sand and gravel extraction sites and onsite water management practices
- Ensure all fish passes, dams and mill races meet required standards
- Contribute as a partner to the INTERREG funded CIRB project targeting the removal and monitoring of invasive species within the Faughan and other catchments.