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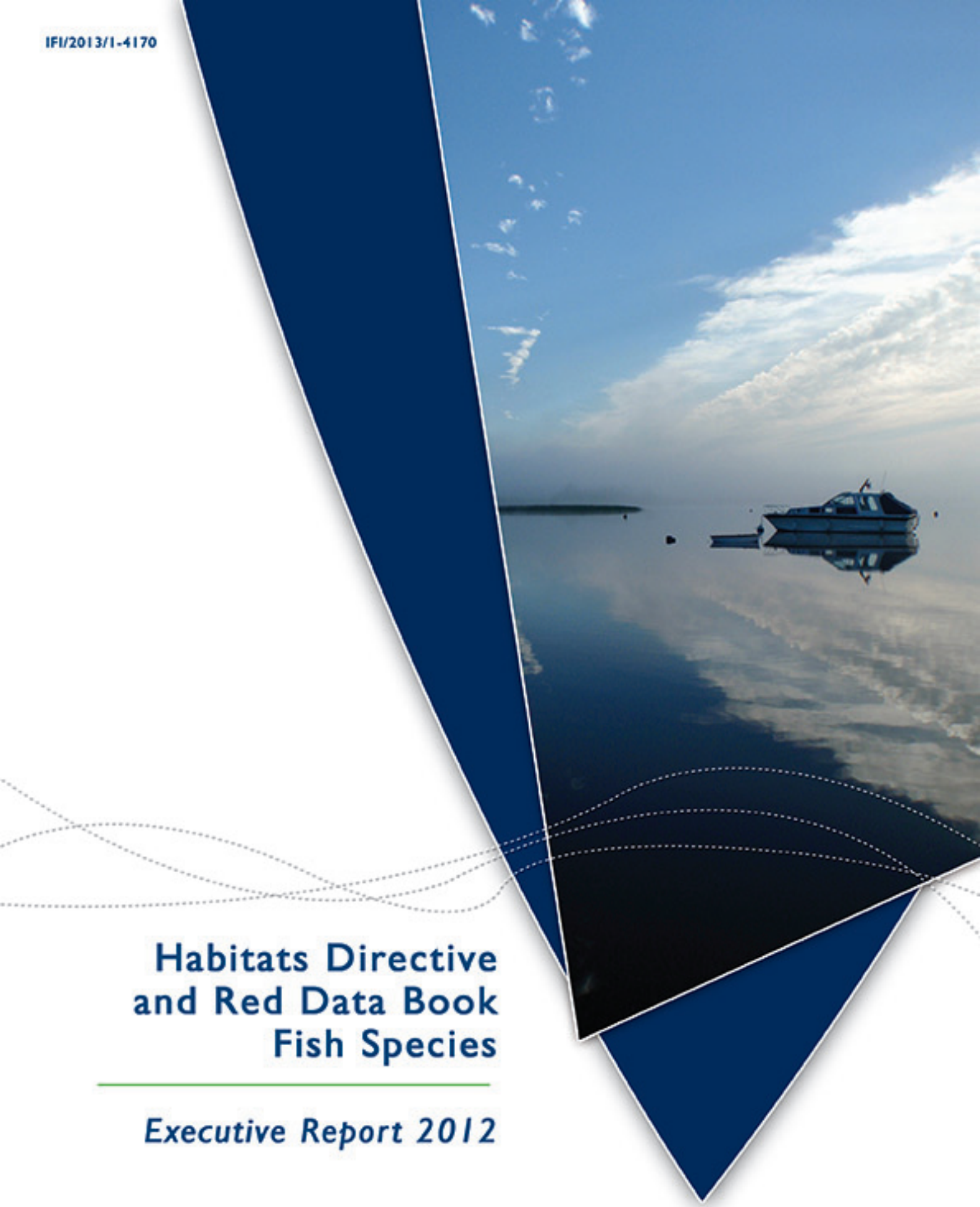

Habitats Directive and Red Data Book Fish Species

Executive Report 2012

Iascach Intíre Éireann
Inland Fisheries Ireland

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National Programme: Habitats Directive and Red Data Book Fish species

Executive Report 2012

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IFI Report Number: IFI/2013/1-4157

CITATION: Rooney, S.M., O'Gorman, N.M., King, J.J. (2013) National Programme: Habitats Directive and Red Data Book Species Executive Report 2012. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin, Ireland.

Habitats Directive and Red Data Book Fish species 2012: Executive Report

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1. Introduction

As outlined in earlier annual reports, the Habitats Directive and Red Data Book Fish programme focuses on those species listed in either Annex II or V of the Habitats Directive, as well as in the Irish Red Data Book - the exception being the Atlantic salmon, which is investigated under national salmon programmes within IFI's R&D division.

2012 was the final year of a 6-year cycle (2006-2012) for reporting to the EU under Article 17 of the Habitats Directive. This being the case, the programme aimed to consolidate on and validate a series of sampling protocols for various life stages of the target species. The programme also consolidated the geographical spread of catchment-wide surveys of juvenile lamprey status.

The project team, working with Frank Greene (IFI NRBD), also had a peer-reviewed manuscript accepted for publication:

ASPECTS OF BROOK LAMPREY (*LAMPETRA PLANERI* BLOCH) SPAWNING IN IRISH WATERS. *Biology and Environment: Proceedings of the Royal Irish Academy*
Sean M. Rooney, Nicola M. O'Gorman, Frank Greene and James J. King

This publication, which will be published in early 2013, provides a comprehensive overview of spawning habitat attributes of brook lamprey in a range of Irish channels.

Over the period 2009 - 2011 the project team had undertaken a series of catchment-wide juvenile lamprey habitat surveys in non Special Areas of Conservation catchments. This programme was intended to complement the series of NPWS commissioned studies conducted in the lamprey SAC catchments in the 2003 - 2006 period. The current Habitats Directive National Programme's work served to fill in a number of missing pieces of the jigsaw, with annual incremental increase in knowledge base. In 2012, the team focussed on catchments in the greater River Shannon basin, with four catchments examined. These included the River Mulkear system that forms part of the Lower Shannon SAC.

Adverse weather conditions were a feature of the 2012 sampling season. The proposed float-over surveys for sea lamprey spawning, using recently-learned canoeing skills, had to be abandoned on the main stem channels programmed due to Health and Safety reasons and pure logistics arising from continuous high water levels, high velocities and zero visibility to the channel bed. Surveys to monitor juvenile/larval shad and smelt were due to be undertaken in both June and July using bongo nets. Only the July survey was completed across the five rivers, as water levels were too high during June.

In 2011 a combination of sampling using angling and plankton net trawling (Bongo-netting) provided useful cross-referencing in sampling for migratory shad in estuaries. The angling indicated the presence of adult shad adjacent to traditional spawning grounds while the Bongo netting provided an indication of spawning success and presence of post-larval juvenile fish. A similar strategy was adopted in 2012, with angling effort focussed on the Rivers Barrow - Nore. However, flood flows and high turbidity eliminated any potential for this strategy. Subsequent Bongo netting yielded no positive outcomes i.e. post-larval shad, in any of the SAC main stem channels surveyed.

A new strand in the shad programme, that of acoustic telemetry, was highly successful and was able to operate independently of flow and turbidity. A series of listening stations were installed on the River Barrow from the spawning area in St. Mullins down to Barrow Bridge, at the confluence with the River Suir. Drift net sampling with IFI colleagues based on the River Barrow yielded a small sample of adult shad on migration upriver to the spawning areas in early May. Eight of these fish were tagged, released and their movements tracked *via* the array of listening stations. Seven of the eight fish were active and their movements were recorded. The study was designed to give some insight on rates of movement and duration of residency of the adult shad in the spawning areas. It was also envisaged that the study would identify aspects of shad behaviour post-spawning, in particular regarding their persistence in riverine and estuarine habitats and their eventual return to sea. The initial positive indications from this programme have led to a proposal to continue this strand on the River Barrow in 2013 and to set up the same process on the Munster Blackwater, where very encouraging angling returns were made in 2011.

The survey team worked with IFI's Water Framework Directive (WFD) team on a fish survey of Lough Derg on the River Shannon. The Habitats team had a particular interest in pollan - Lough Derg being one of the few known locations of this species in the country. The WFD team used both hydroacoustic and conventional netting procedures. In the long-term, it is hoped that hydroacoustics will provide an accurately-informed and non-invasive method of status assessment of pollan in the major Shannon lakes. It is also hoped that this strategy can be applied to the Killarney shad scenario and also to char populations.

The project team was represented at a two-day scientific meeting in Cardiff, Wales, organised by the Institute of Fisheries Management (IFM) concerned solely with the conservation fish species i.e. those under investigation in this programme. The IFI team gave two presentations, one covering the shad sampling programme and one dealing with the juvenile lamprey catchment-wide surveys. In both cases, emphasis was placed on using the sampling as a tool to undertake species status assessment.

One of the outcomes of attendance at the IFM Conservation Fish meeting in Cardiff was a meeting with colleagues from Agri-Food and Biosciences Institute Northern Ireland (AFBINI) investigating pollan in Lough Neagh. These colleagues are also using a plankton trawling technique for examining post-larval pollan recruitment, with some success. A follow-up field visit was made by the Habitats team to observe the NI team in action and it is planned to have a further visit during the 2013 sampling period. The Habitats team propose to trial this technique on Lough Ree in 2013 and have invited the NI colleagues to visit Lough Ree and provide guidance on sampling site locations etc. It is also proposed that an inter-calibration of sampling gears be undertaken in Loughs Neagh and Ree. This is an exciting opportunity and may yield some positive results in a topic area that has been frustratingly blank to date. Successful capture of post-larval pollan in Lough Ree holds the possibility of transporting these fish to the IFI Roscrea fish farm for on-rearing, with potential for learning regarding growth, captive feeding, imaging, etc., and subsequent return to Lough Ree.

2. Lamprey Programme

2.1 Juvenile lamprey catchment-wide surveys

A number of catchments are chosen annually for survey to assess the juvenile lamprey status. The number of sites to be sampled is based on catchment area, on the basis of one site per 25km^2. Across all catchments sites were evenly distributed in order to sample all main channels and tributaries. During the process of pre selection, access to the site was a factor. All preselected sites were visited and examined for suitable juvenile lamprey habitat i.e. areas of fine silt deposition. If no suitable habitat was identified an alternative site was located using a Discovery Map of the local area. In the case where the alternative site provided no suitable habitat, another replacement site was identified. Where this third location provided no juvenile lamprey habitat, the site was deemed to have 'No Suitable Habitat.'

2.1.1 The Fergus Catchment

The source of the river Fergus is in the north west of the catchment, 16 kilometres northwest of Corofin. The River Fergus is 43 km in length and drains a limestone catchment of 1041 km^2. Over its course, it flows through seven lakes, the largest of which, Inchiquin Lough, is close to its source. The lower reaches of the catchment is a designated SAC for the three species of lamprey as part of the Lower Shannon SAC. The exposed or bedrock limestone nature of much of the catchment resulted in limited sediment deposition conducive to juvenile habitat. In total 48 sites were examined for the presence of juvenile lamprey. Of these, 25 presented with no suitable habitat. Juvenile lamprey were only recorded at 18.75% of sites. Sampling was undertaken between 03/09/2012 and 23/10/2012, high water levels on a number of occasions during the survey led to a prolonged sampling period.

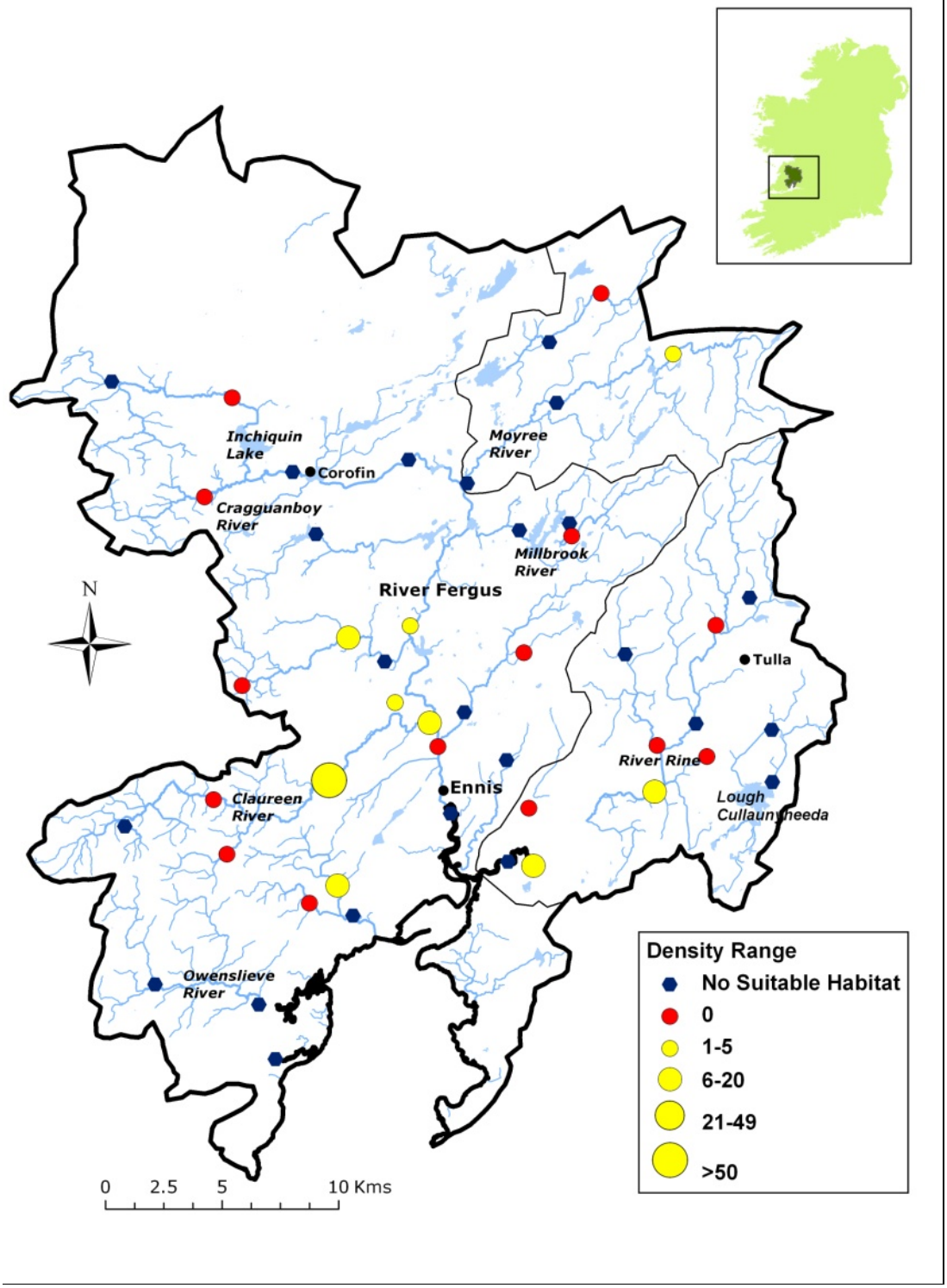

Figure 2.1. Map of sample sites across the River Fergus catchment.

Of the 23 sites which presented with suitable habitat, juvenile lamprey were only recorded at nine sites (Figure 2.1). Given the area of the catchment (1042 km^2), this gives a poor reflection of the status of lamprey across the catchment. Many of the channels consisted of exposed bedrocks, large stone and cobble, generally associated with upland channels. However, on the Fergus catchment, this substrate was the norm. Given that the river flows through the Burren, to the north of the catchment and over limestone, one would expect this to be the case. Densities recorded varied between 1 and 51 fish/m^2 (Figure 2.2). The latter was recorded on the Claureen River, west of Ennis.

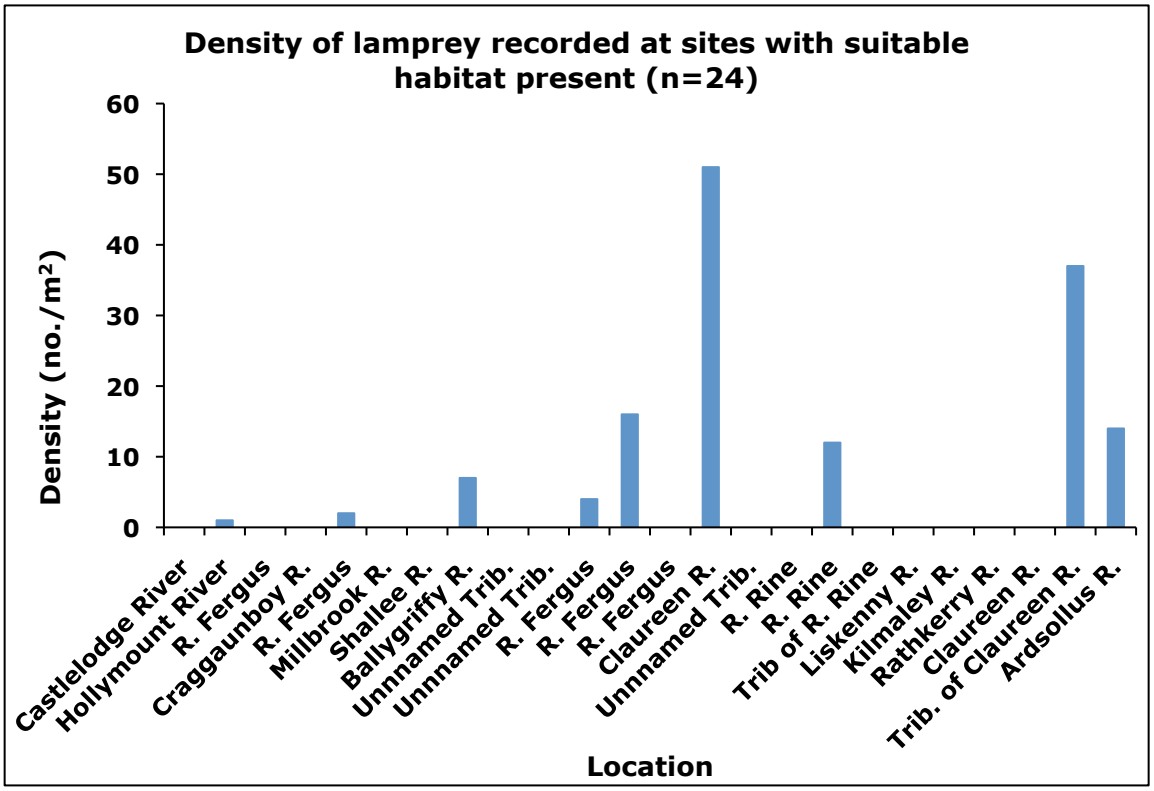

Figure 2.2. Density of fish recorded at sites which presented with suitable habitat across the River Fergus catchment.

In total 144 individual lamprey were captured across the Fergus catchment. The length of fish varied between 16 and 112 mm (Figure 2.3). Three transformers were identified at two different sites. Three definite size classes were identified across the catchment, reflecting on-going recruitment. However, the number of fish recorded across a catchment of its size reflects a poor population distribution and status.

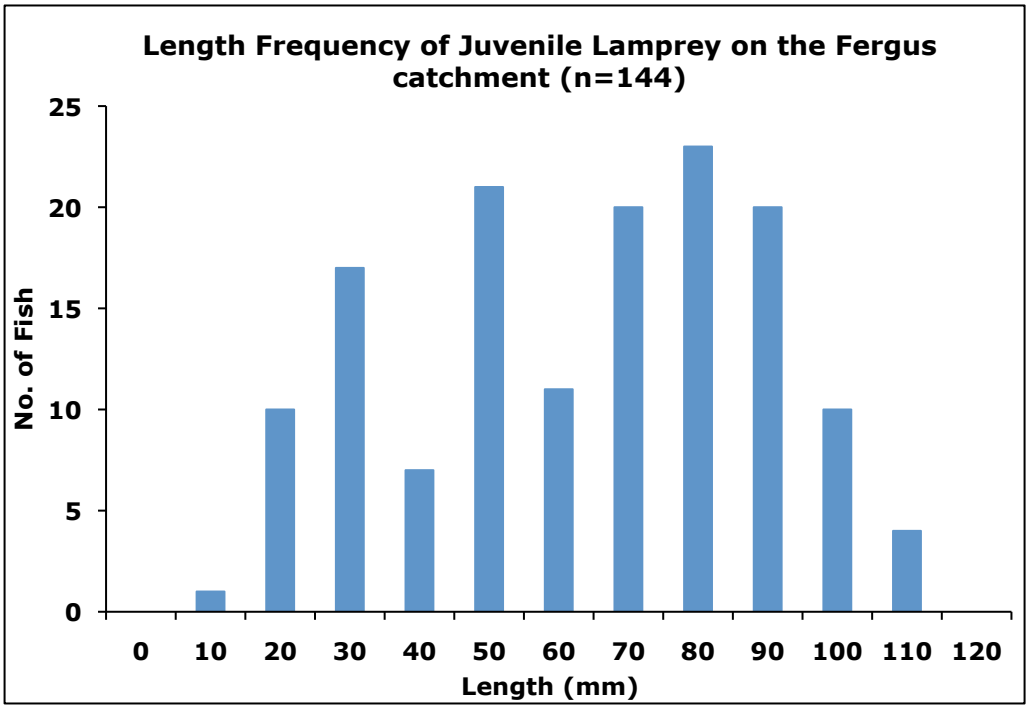

Figure 2.3. Length frequency of juvenile lamprey captured across the Fergus catchment.

The River Fergus catchment displayed poor density and distribution of lamprey. Many of the tributaries in the lower reaches were similar to those sites encountered in upland areas across other catchments. The Fergus catchment does not come under the remit of the OPW arterial drainage scheme and thus the paucity of juvenile lamprey habitat is due to the topography of the area.

2.1.2 The Lung-Boyle-Breedoge catchments

The Rivers Lung, Breedoge and Boyle sub-catchments were sampled during September 2012. The Lung and Breedoge are tributaries of the River Boyle which in turn is a tributary of the River Shannon. Downstream of Lough Gara the river is known as the Boyle River. This flows for approximately 11 kilometres to Lough Key in a south west – north east direction to Lough Key where it joins the River Shannon (Figure 2.4). Six sites were pre-selected on the Boyle sub-catchment (137km^2), none of which had suitable habitat present. Alternative locations for each site were also investigated, none of which presented with optimal habitat.

The source of the River Lung (246km^2) lies west of Ballaghaderreen. Here the river is known as the Black River and is joined by the Anaderryboy to become the River Lung downstream of Cloonagh Lake. The River Lung meanders for approximately 40km in an overall north east direction to Lough Gara. Sixteen sites were preselected across the River Lung sub-catchment. Of these there was no suitable habitat present at four sites. Of the remaining twelve sites

which presented with optimal habitat present, lamprey were present at seven sites. The densities of lamprey recorded varied between 1 and 11 lamprey/m^2.

The source of the River Breedoge (160km^2) is west of Elphin in Co. Roscommon. It flows in a North West direction for approximately 19 kilometres to Lough Gara. Ten sites were sampled across the Breedoge sub-catchment. Of these seven sites had no suitable habitat, there was suitable sediment at two locations but no lamprey. Lamprey were recorded at one location, despite trying a number of alternatives at each site.

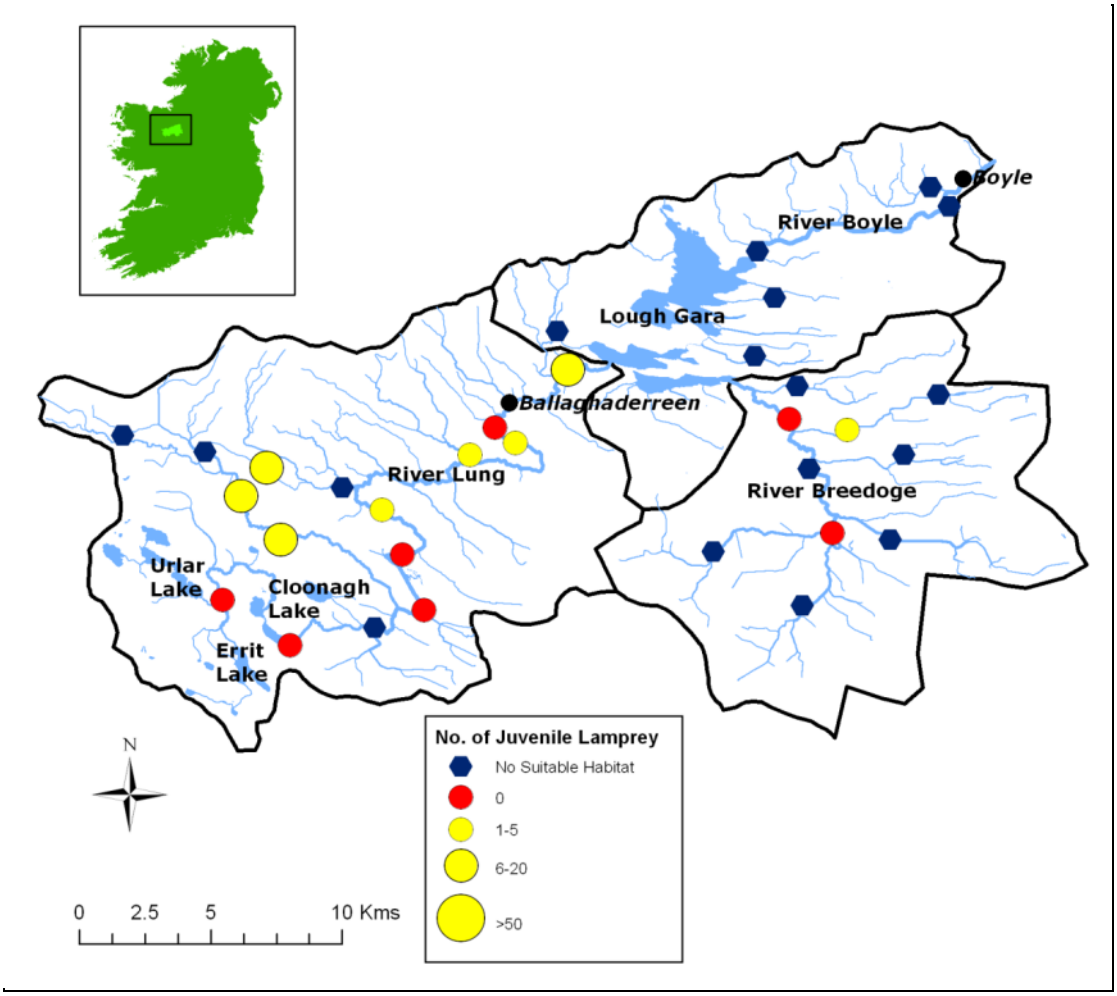

Figure 2.4. Map of the Boyle/Breedoge/Lung sub-catchments indicating sampling location and densities recorded.

In total thirty two sites were visited across the three sub-catchments, of which seventeen were deemed to have no suitable lamprey habitat present. Juvenile lamprey were recorded at eight of the sites sampled. The density of juvenile lamprey varied between 1 and 11 fish/m^2 (Figure 2.5).

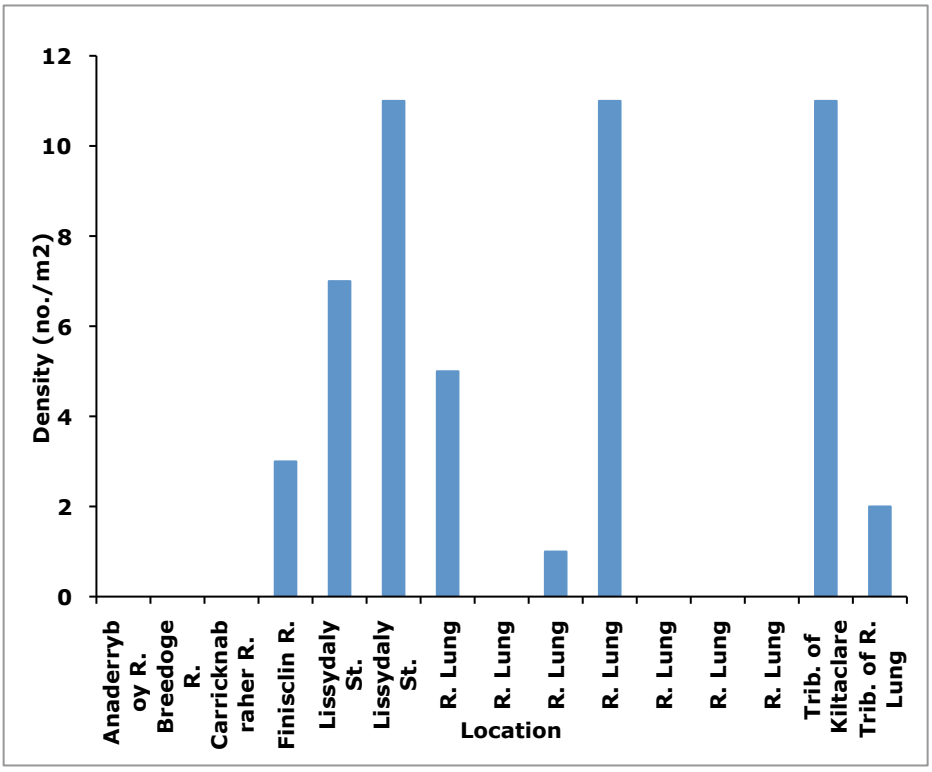

Figure 2.5. Density of lamprey recorded across sites with suitable sediment present.

In total 54 juvenile lamprey were captured across eight sites on the Lung and Breedoge sub-catchments (Figure 2.6). The length of fish varied between 25 and 140 mm.

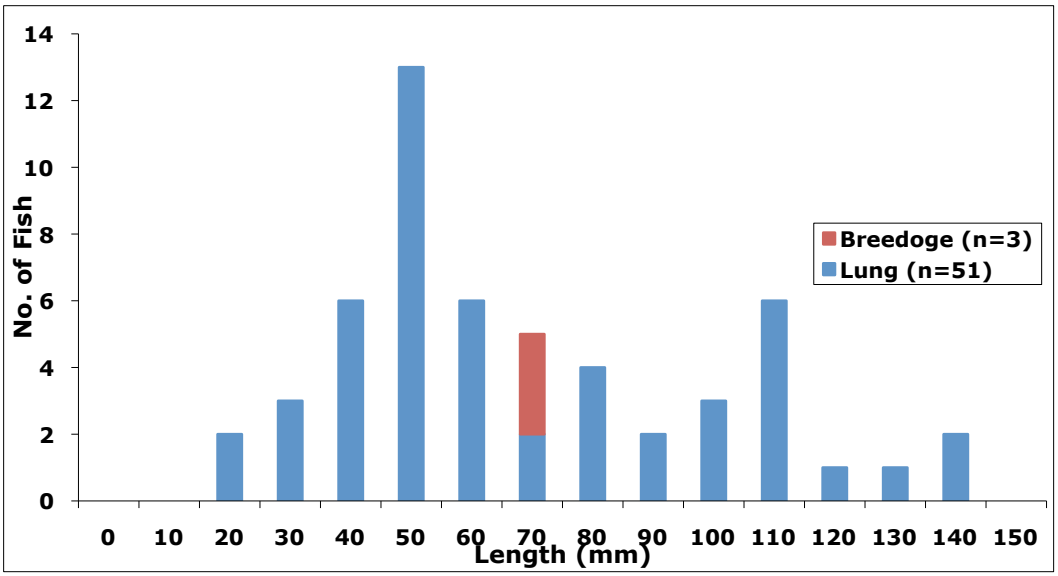

Figure 2.6. Length frequency of juvenile lamprey captured on the Lung and Breedoge sub-catchments.

The length frequency distribution of juvenile lamprey recorded displayed the presence of individuals in various size classes. The total numbers recorded, however, indicated a poor population of juvenile lamprey across the three sub-catchments. During the 1980s and 1990s the area was arterially drained by the Office of Public Works (OPW) and these drained channels are currently maintained by the OPW.

2.1.3 The Maigue Catchment

The catchment of the River Maigue, as with the adjacent Mulkear, represents a significant sub-catchment of the Lower Shannon, draining an area of 1020km^2 (Figure 2.7). The catchment comprises a major section of rural County Limerick as well as small sections of Counties Cork and Tipperary. Unlike the Mulkear, only a small section of the Maigue, namely the 20km tidal section downstream of Adare to the Upper Shannon Estuary, is included in the Lower Shannon SAC (Special Area of Conservation).

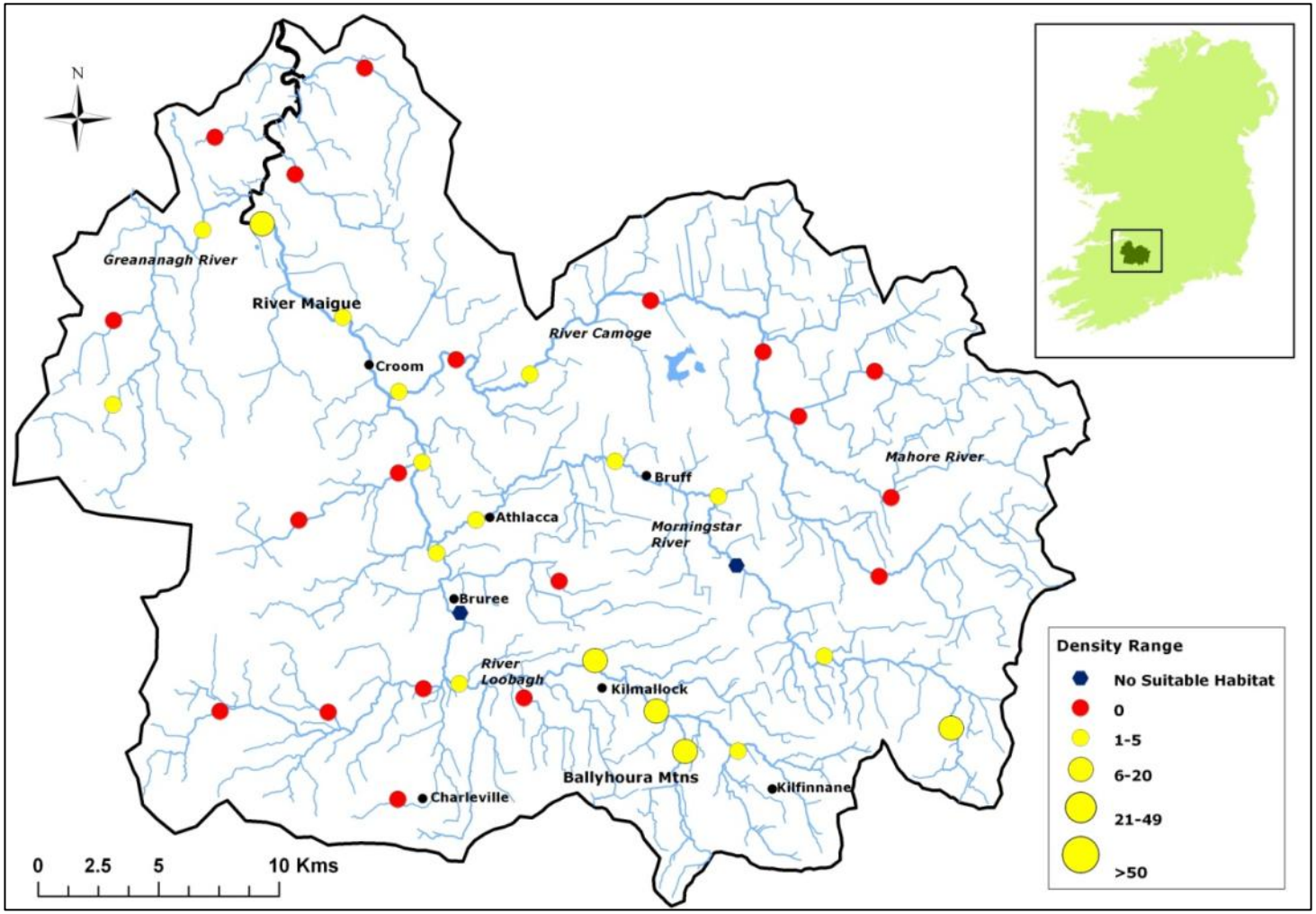

Figure 2.7. Map of the Maigue catchment indicating sampling locations and densities recorded.

The River Maigue rises in north Co. Cork to the west of Charleville. It flows in an easterly direction into south Co. Limerick where it is joined by the Glen River, emanating from Charleville, and the River Loobagh. The latter tributary rises in the south of the catchment, fed by streams flowing from the Ballyhoura Mountains and Slievereagh Hills near the town of Kilfinnane. From here it flows in a north westerly direction through Kilmallock and shortly afterwards joins with the River Maigue to flow northwards through Bruree. At this point the Maigue is joined from the east by the Morningstar River, a major tributary rising in the south eastern corner of the catchment and flowing in a west / north westerly direction through Bruff and Athlacca. The next major tributary is the Camoge River, an extensive system including the Ballynamona and Mahore Rivers, draining much of the eastern portion of the catchment and entering the Maigue immediately upstream of Croom. The River Maigue continues to flow northwards to Adare. Under tidal influence at this point, the river meanders towards the Upper Shannon Estuary west of Limerick City. Results of river maintenance operations are evident throughout the catchment, with significant stretches of all major tributaries subjected to drainage works.

Thirty-nine sites were pre-selected for surveying across the Maigue catchment during 2012. Site visits were undertaken during October (4th to 31st). Surveying was frequently hindered and prevented by elevated water levels due to rainfall. Twenty-four of the original 39 pre-selected sites had adequate access and suitable habitat to conduct a survey. Fifteen sites had poor access and/or no suitable habitat and required relocation. In some cases up to five prospective sites were visited before an adequate survey location was identified. A total of 72 sites were inspected across the Maigue catchment in order to complete the survey as required. Semi-quantitative surveying *via* electrofishing and quantitative surveying *via* push net sampling was undertaken at 37 independent locations (Figure 2.7). Juvenile lamprey were located at 18 survey sites. An absence of ammocoetes was recorded at 19 sites. Despite extensive searching, no suitable habitat was recorded along two sections of river, namely the Morningstar River at Ballydaly and the River Maigue at Bruree.

An overall total of 88 juvenile lamprey were obtained from the 18 positive sites. Larvae ranged in size from 33mm to 154mm in length (mean = 95.5mm). This includes five transforming individuals (132mm – 154mm). No juvenile sea lamprey were evident amongst the sampled ammocoetes. The majority of larvae encountered were medium to large (≥80mm) in length (Figure 2.8). No extremely small individuals (<30mm) were obtained, despite complementary push net sampling at the majority of survey sites.

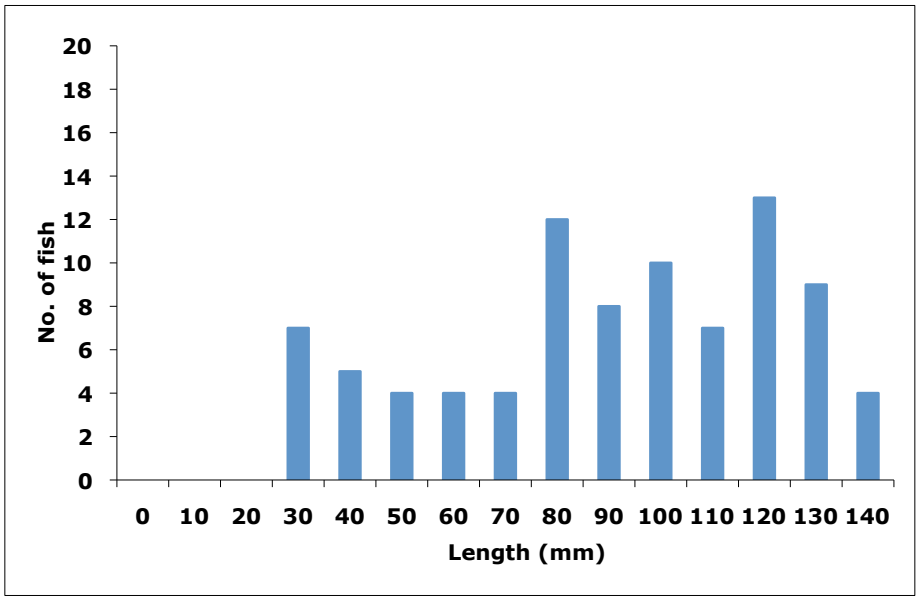

Figure 2.8. Length frequency distribution for juvenile lampreys (n=88) pooled across 18 sites within the Maigue catchment.

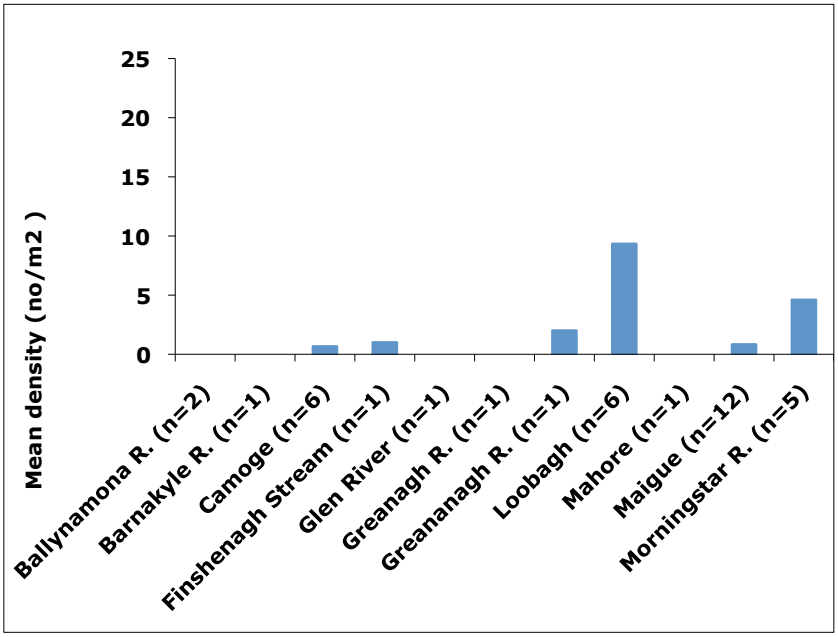

Figure 2.9. Average densities of juvenile lamprey recorded in sub-catchments of the Maigue.

Densities of juvenile lamprey at sites with suitable nursery habitat (n = 37) ranged from 0 to 20 ammocoetes per m^2 (Figure 2.9). Highest densities (20 ammocoetes/m^2) were recorded in the Flemingstown Stream, a tributary of the River Loobagh. Of all the sub-catchments, the River Loobagh contained the highest densities of ammocoetes (6 sites, average density 9.3 ammocoetes/m^2). The Morningstar River had average densities of 4.6 ammocoetes/m^2 across 5

separate sites. Densities on the River Maigue main stem ranged from 0 to 6 ammocoetes per m^2 (12 sites, average density 0.83 ammocoetes/m^2), whilst densities on the Camoge River ranged from 0 to 3 ammocoetes per m^2 (6 sites, average density 0.66 ammocoetes/m^2). These latter two rivers had high proportions of negative sites, namely 66% for both the Maigue (8/12) and the Camoge (4/6), respectively.

2.1.4 The Mulkear catchment

The Mulkear is a major catchment within the Lower Shannon region, draining an area of 650km^2 and straddling Cos. Limerick and Tipperary. A large proportion of the Mulkear system is included in the Lower Shannon SAC (Special Area of Conservation), whilst large tracts of upland where some of the tributaries rise are classified as a Special Protected Area (SPA).

The Upper Mulkear rises in the Silvermines Mountains in Co. Tipperary and flows south-westerly towards the town of Newport. From Newport it becomes known as the Newport and further downstream the Killeenagarriff River. The Bilboa River is the major tributary in the north eastern of the Mulkear catchment. The Bilboa flows in a south westerly direction to the town of Cappamore, Co. Limerick. From Cappamore the river becomes the Mulkear (not to be confused with the Upper Mulkear upstream of Newport) and flows in a southerly direction. From its confluence with the Dead River, the Mulkear meanders in a north westerly direction. It is joined by the Killeenagarriff River and continues towards its eventual confluence with the River Shannon (Figure 2.10).

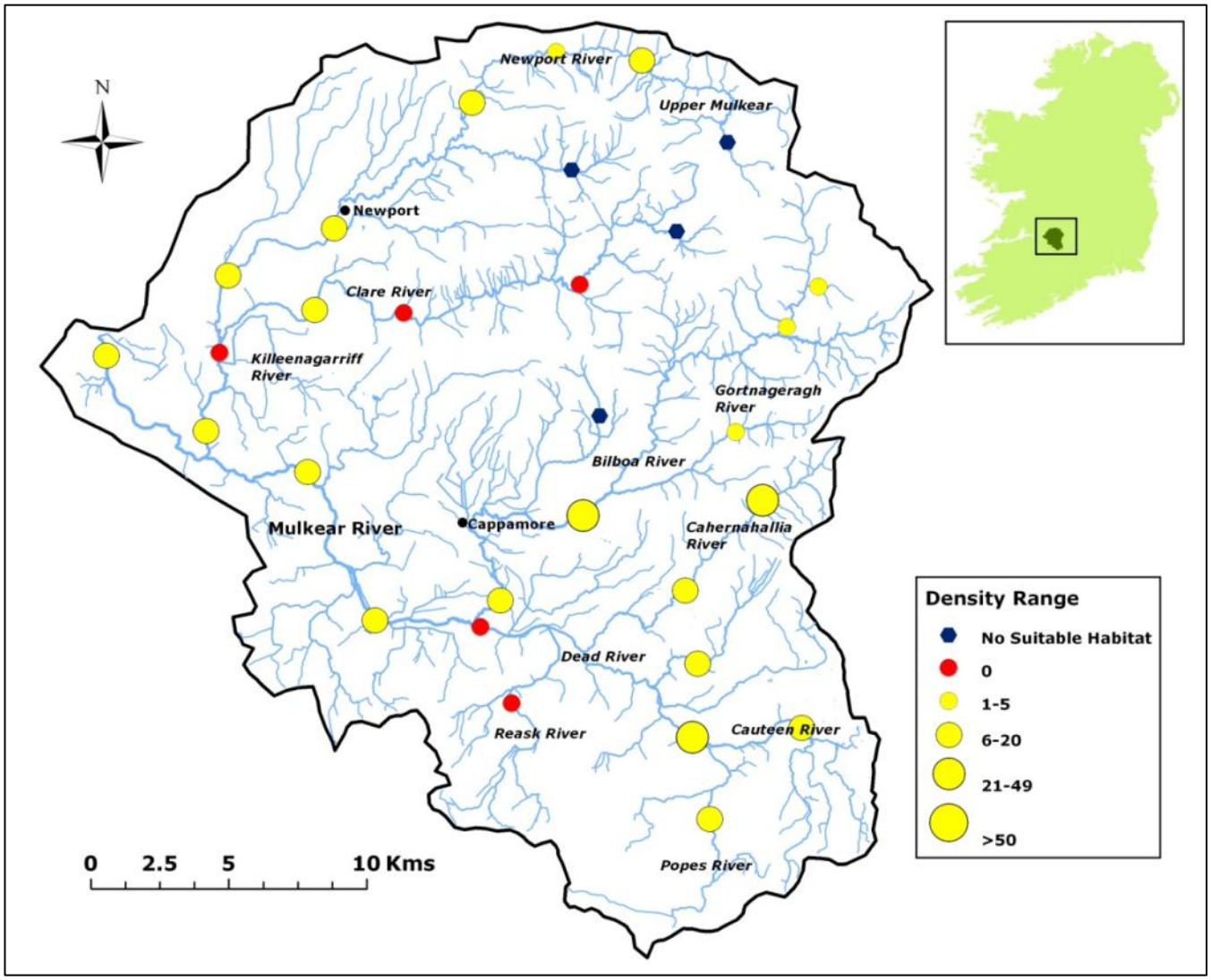

Figure 2.10. Map of the Mulkear catchment with results from juvenile lamprey surveying.

Much of the Mulkear catchment has been subject to channel maintenance operations. In addition, a number of significantly large manmade barriers are present in lower sections especially, undoubtedly impacting upon upstream movements of sea and river lampreys and limiting the extent of their spawning migration into upper sections of the catchment.

Thirty sites were pre-selected for surveying throughout the Mulkear catchment in 2012. Site visits and fieldwork were undertaken over the period September 3rd to 18th 2012. Semi-quantitative surveying *via* electrofishing and/or quantitative surveying *via* push net sampling was undertaken at 30 independent locations (Figure 2.10). Of the 30 pre-selected sites, successful surveying occurred at 27 of these locations, with the remaining 3 sites requiring relocation due to inadequate access at the original point. Four of the pre-selected sites, all located in upland areas, were characterised by an overall lack of suitable habitat, as expected given their altitude. Semi-quantitative electrofishing surveying was undertaken at 29 sites, including three of the aforementioned upland locations. Qualitative push net-only surveying was undertaken at a single site; an upland location with limited access for electrofishing equipment. Presence of juvenile river/brook lamprey was recorded at 21 electric fished sites. Juvenile sea lamprey were also present at two of these sites, both in the lower section of the Mulkear River at Annacotty (n=1, 96mm) and Abington Bridge (n=1, 106mm), respectively. A grand total of 248 ammocoetes were obtained across all positive sites, ranging in size from 22mm to 157mm (mean = 85mm; Figure 2.11). Representation of several year classes is evident from the frequency distribution of body length measurement data. Transforming larvae (n = 10, 109-154mm) were detected at 8 sites.

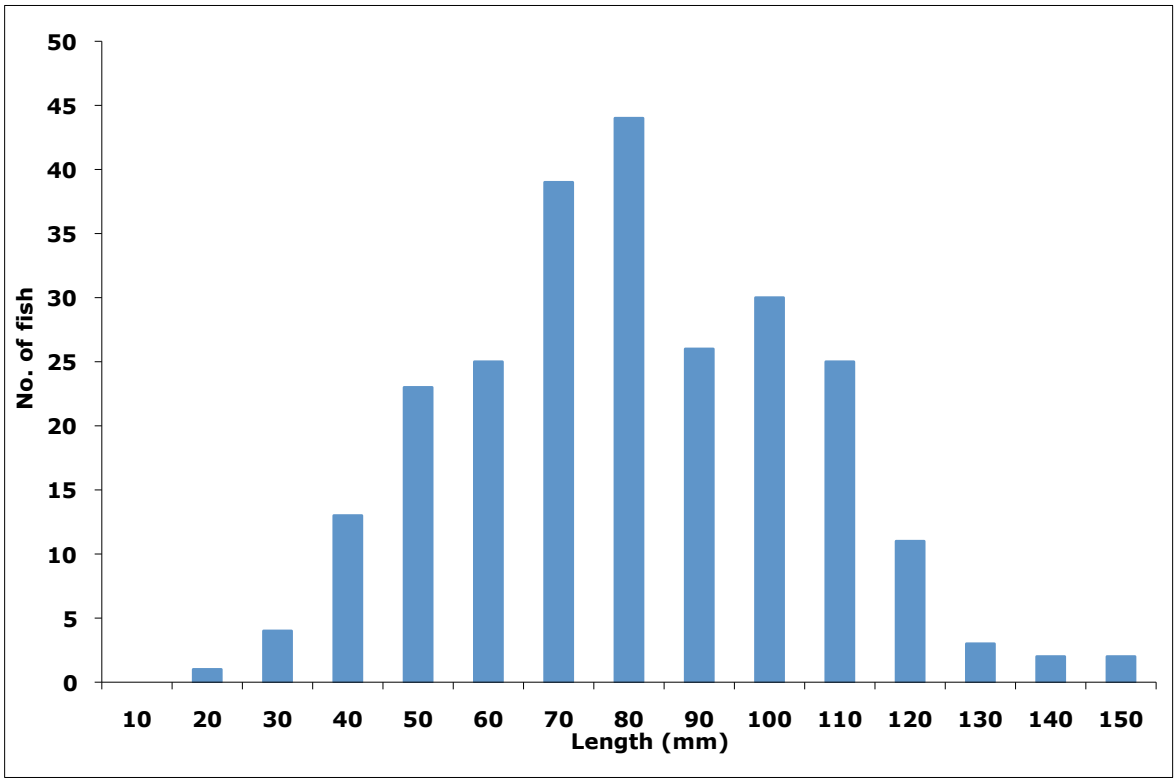

Figure 2.11. Length frequency distribution for juvenile lampreys (n=248) pooled across 21 sites within the Mulkear catchment.

Densities of juvenile lamprey at sites with suitable nursery habitat (n = 26) ranged from 0 to 41 ammocoetes per m^2. Highest densities were recorded in the Cahernahallia River (2 sites, average density 23.5 ammocoetes/m^2), followed by the Dead (3 sites, average density 15.3 ammocoetes/m^2) and Newport rivers (2 sites, average density 12.5 ammocoetes/m^2). Average densities of 4 to 8.75 ammocoetes per m^2 were recorded for the Bilboa, Clare, Cauteen, Pope's, Killeenagarriff and both Upper & Lower Mulkear rivers (Figure 2.12). No larvae were detected on the Reask River, a tributary of the Dead River.

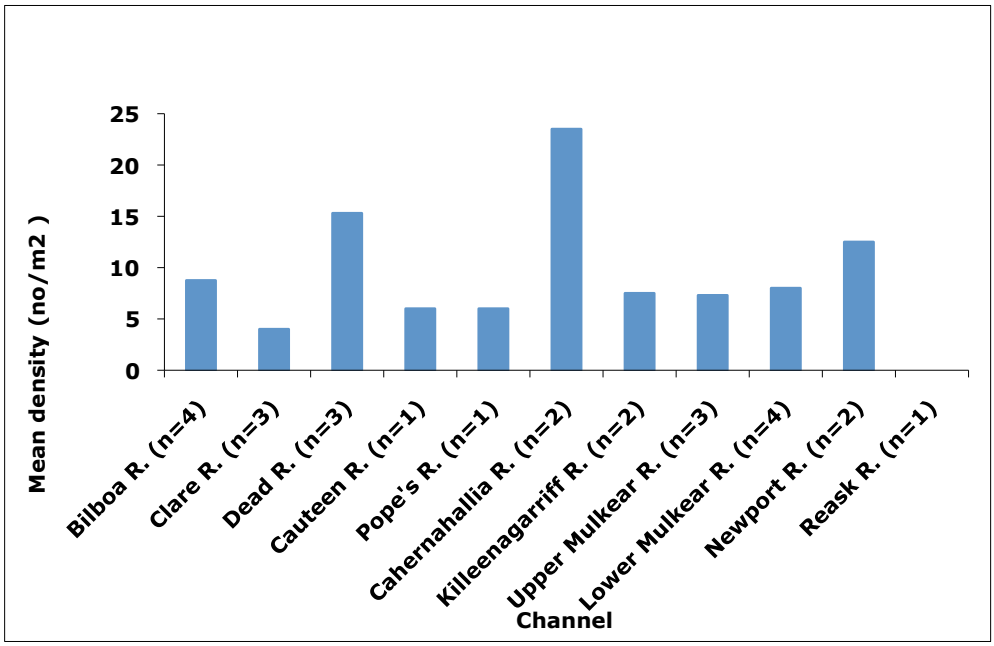

Figure 2.12 Average densities of juvenile lamprey recorded in sub catchments of the Mulkear.

2.2 Adult Lamprey Surveys

2.2.1 Telemetry Studies on sea lamprey

Following a highly successful sea lamprey radio tracking program conducted on the Mulkear River catchment during 2010-2011, working with the IFI Mulkear LIFE project team, it was decided to commence a similar study on the River Feale in north Co. Kerry in 2012. IFI Limerick staff had previously noted large numbers of returning sea lamprey impeded at the base of a substantial weir at Scartleigh, 4km downstream of Listowel (Plate 2.1). It was believed that aggregation at this obstruction could, as in the case of the Mulkear River at Annacotty, yield a large number of subject fish for a telemetry study aimed at monitoring their upstream migration and identifying spawning locations.

Plate 2.1. Scartleigh weir, River Feale, during medium flow conditions (May 2012)

On May 22nd 2012 two adult sea lamprey were observed attached to boulder material at the base of the weir. Both animals were captured and externally tagged with radio transmitters (Model F1940, 172-173MHz; Advanced Telemetry Systems, U.S.A.). River water temperature was 14.7°C. Both tagged sea lamprey were released 100m upstream of the weir (Plate 2.2).

Plate 2.2. A tagged sea lamprey ready for release

Further attempts to obtain adult sea lamprey for tagging were hampered firstly, by a lack of returning fish observed at Scartleigh weir, and secondly by a number of flood events following rainfall. Water levels became elevated for much of June and July and conditions at Scartleigh weir were too precarious to attempt sea lamprey capture.

Plate 2.3. Scartleigh weir, River Feale, during high flow conditions following rain (June 2012)

Manual tracking was undertaken using a receiver (Model R2000, Advanced Telemetry Systems) with a 3-element folding Yagi antenna. Sections of the River Feale and a tributary, the Smearlagh, were monitored on foot between May 28th and June 28th. Tracking was also undertaken from a vehicle where roads ran adjacent to river channels. One of the sea lamprey was located in a section of the River Feale running through Listowel town centre on May 28th, six days after tagging. Closer investigation the following day located sea lamprey remains with transmitter attached along the river bank following otter predation. The second tagged sea lamprey was located 1.5km upstream of Listowel town in a relatively slow-flowing section of the river alongside the golf course. The signal remained stationary during subsequent tracking, possibly due to mortality or tag-loss. Deep water at this point, however, prevented any location and retrieval of the transmitter (Plate 2.3).

During the course of radio tracking an additional number of potential barriers to sea lamprey spawning migration were identified upstream of the initial obstruction at Scartleigh. A town-centre footbridge to allow pedestrian access to the race course was one such potential barrier, particularly during low flow conditions where a pronounced bridge apron could adversely affect passability (Plate 2.4). This structure and barrier, along with others in the Feale catchment, were assessed for fish passability, using the SNIFFER barrier assessment methodology, by IFI colleagues during August of 2012. This structure was rated as impassable for salmon and lamprey, at time of survey, based on the SNIFFER process.

Plate 2.4. Pedestrian foot bridge & pronounced apron, Listowel town centre

2.2.2 Sea lamprey spawning surveys

A number of channels were selected in this programme in order to monitor the degree of sea lamprey penetration into freshwater and the spawning effort at positive sites. The Rivers Suir and Feale were the rivers which were chosen for survey in 2012. Surveys in previous years were undertaken using small inflatable RIBs in conditions of low flow and low or absent wind levels. The RIBs and other small craft used were, at times, difficult to navigate over barriers on the river corridor. It was under this guise that staff prepared for the float over survey by undertaking accredited canoeing and kayaking courses, led by the Irish Canoeing Union, in conjunction with IFI regional colleagues. Despite numerous attempts to survey the rivers in July and August, persistent flood conditions over this narrow environmental window prevented attempts to undertake the surveys, on both visibility and safety grounds.

During May and June 2012 sea lamprey in the Lower Shannon catchment were observed building redds in traditional spawning locations at Plassey and on the Mulkear River downstream of Annacotty weir.

Over this period a number successfully ascended this and other barriers in the lower section of the Mulkear River and migrated long distances upstream into a number of tributaries. Instances of redd construction and spawning activity in the Annagh, Newport, Dead and Bilboa rivers were reported by colleagues in IFI Limerick / Mulkear LIFE. Field trips were undertaken during July to locate redds, record dimensions and obtain spawning substrate samples. A number of well-known spawning sites on the Fergus (Ennis town centre), Owengarney

(Sixmilebridge) and Kilmastula (Birdhill) rivers were also investigated, with evidence of recent redd construction noted at all but the latter location.

Plate 2.5. Measuring sea lamprey redd dimensions, Annagh River, Clonsingle Bridge, Co. Tipperary.

2.2.3 River lamprey spawning surveys

During the months of October to December, river lamprey ascend rivers in order to spawn. In order to gain insight into the density and distribution of adult river lamprey a number of rivers were selected for survey. These were the Garvogue and Owenmore-Unshin in the Western River Basin District and the Rivers Lee, Bandon and Ilen in the South Western River Basin District.

Sampling on the Rivers Garvogue and Owenmore-Unshin were undertaken between 12th and 14th December 2012 using gangs of three fyke nets. These nights were preselected based on the presence of a new moon. It was envisaged that, given these were the darkest nights of the month, if fish were to be moving, they would choose these nights. Nets were located on the Garvogue between Sligo town and Lough Gill. On the Owenmore-Unshin, the nets were set between Ballysadare and Colloney. The nets were checked and reset after the first nights sampling. No lamprey were captured in the nets during the sampling period.

Proposed sampling on the Bandon, Lee and Ilen rivers during this period was directly affected by rainfall and raised water levels. Sampling on the Bandon was eventually undertaken between December 17thand18th. Six gangs of fyke nets were set throughout a 4.5km tidal

stretch downstream of Inishannon to Kilmacsimon Quay and left to fish overnight (Plate 2.6). No adult river lamprey were obtained. Subsequent persistent rainfall prevented any further netting surveys (Figure 2.13).

Plate 2.6. Fyke net location, River Bandon, Kilmacsimon Quay, Co. Cork

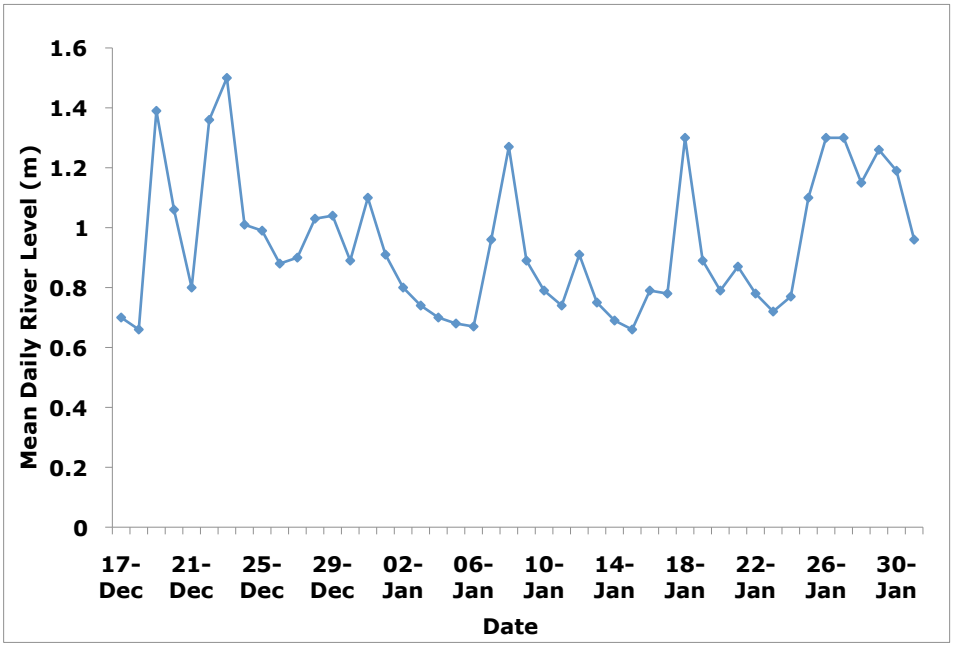

Figure 2.13. Highly fluctuating river levels from mid-December 2012 to late January 2013, recorded from an OPW hydrometric station at Curranure, 1.5km upstream of the tidal limits at Inishannon.

2.2.4 Brook lamprey spawning surveys

During Autumn 2011, catchment-wide juvenile lamprey surveying on the River Lee and its tributaries identified a number of suitable habitats for spawning brook lamprey throughout. Follow-up surveying was undertaken at these sites in April 2012 (18^{th}-20^{th}). Spawning adult brook lamprey were observed excavating redds at two locations; the River Lee at Ballingeary, Co. Cork, close to its source at Gougane Barra, and the Toon River to the southwest of Macroom. A dead fish was located beside suitable spawning habitat on the River Bride at Coolmucky Bridge, Farnanes. No recent excavations were evident at this site. Redds were located on the Cooldorragha River at Kilmichael, however, no adult fish were present in or around the excavations (Plate 2.7). At this time the opportunity to re-survey a number of candidate sites in the adjacent Bandon catchment was availed of. A dead adult was found on the Ballymahan River, north of Bandon town. A number of possible redds were observed but could not be positively confirmed due to the ingress of cattle into the stream.

Plate 2.7. Brook lamprey redd, Cooldorragha River, Kilmichael, Co. Cork

3. Shad programme

3.1 Adult Anadromous shad surveys

3.1.1 Angling surveys

Over the past number of years, angling surveys have been undertaken on a number of rivers in order to ascertain the distribution of shad. During 2012, focused attempts were made on both the Rivers Barrow and Nore. IFI staff along with Terry Jackson, a well-seasoned shad fisherman, targeted suitable fishing tides on the Rivers Nore and Barrow in order to examine comparative availability of angling-sized shad on both rivers. The presence of shad on the River Barrow is well documented. However, little information was available about the distribution of shad on the River Nore. This river was fished from low tide to high tide twice on the 23rdMay 2012. The area fished was from Inistioge to the 'Red House', located 3 kilometres downstream of Inistioge. Many of the areas downstream of Inistioge were deemed unsuitable for shad, as the water was either too turbid (the fish would not see the lure), or the water was too slow flowing. At high tide there was no barrier to the upward navigation of shad through Inistioge, enabling any fish present to migrate unimpeded to Thomastown. Over the survey period no shad were captured on the River Nore.

On the 22nd and 24th May, the survey team undertook an angling survey on the River Barrow. An evening rising tide was fished on the 22nd May and a rising tide on 24th May (Figure 3.1). The fish were aged using scales and were calculated to be between five and seven years old (Plate 3.1). A number of fish were spawning for their fifth time.

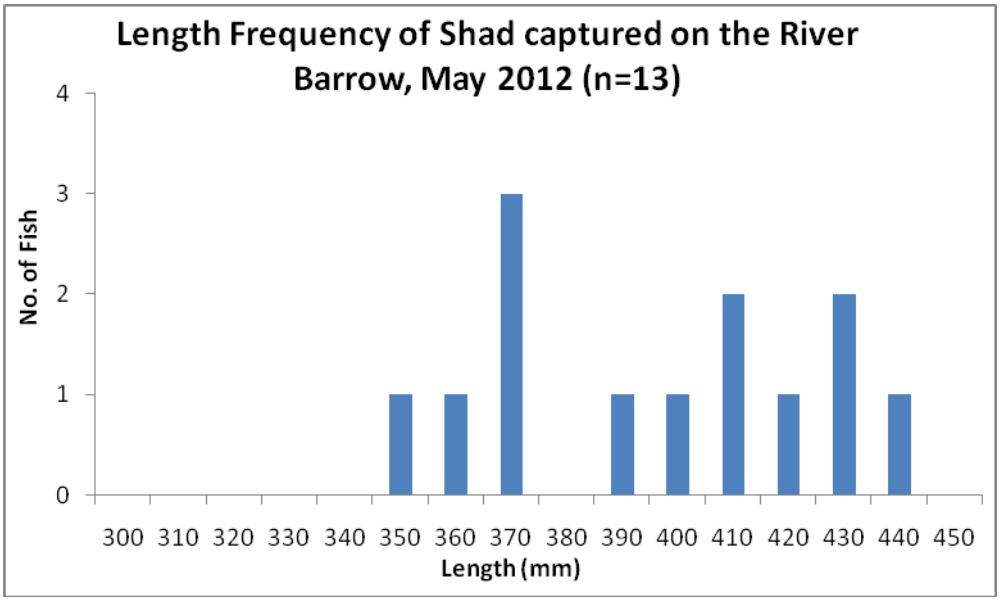

Figure 3.1. Length Frequency of shad captured during an angling survey on the River Barrow at St. Mullins, May 2012.

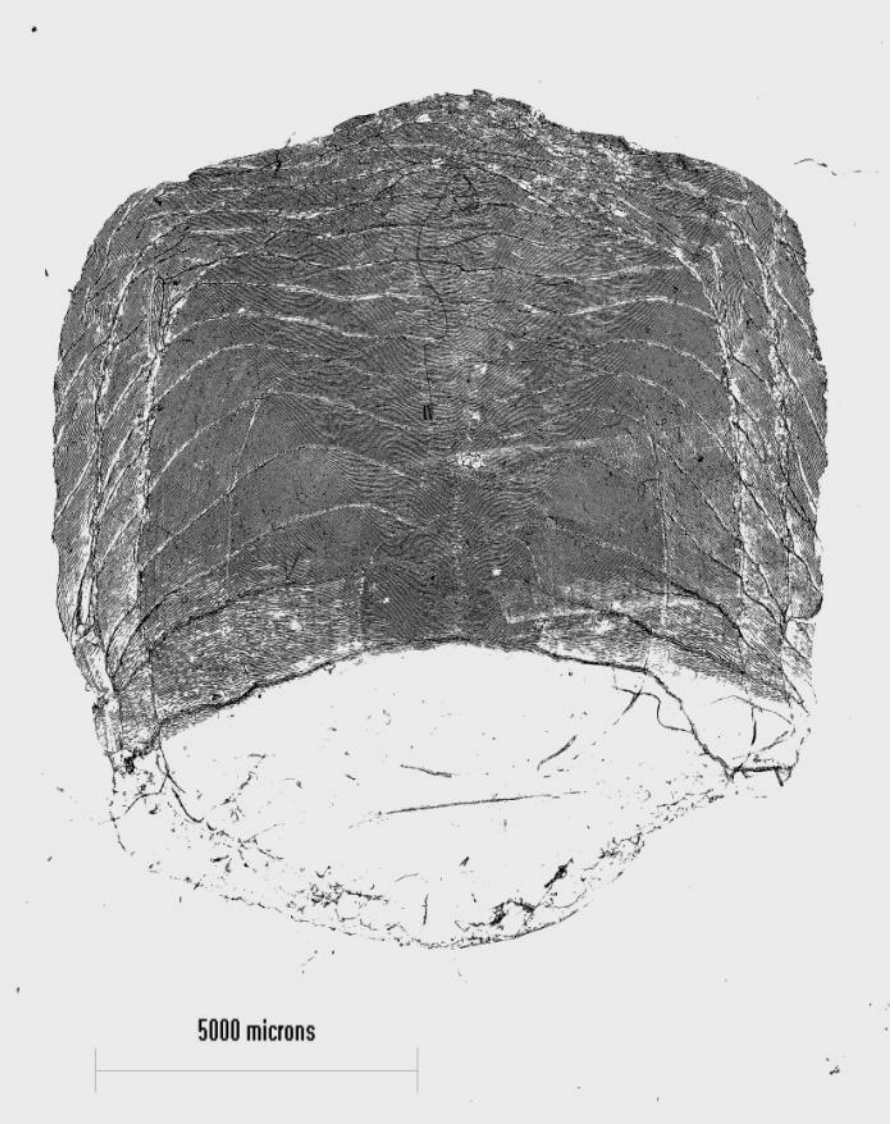

Plate 3.1. Image of a Twaite Shad scale.

3.1.2 Telemetry surveys

The annual spawning migration of Twaite shad into the River Barrow and River Nore SAC is well documented. The upper tidal limits of the River Barrow at St. Mullins are particularly noteworthy for the aggregation and associated spawning behaviour of *Alosa fallax* during May and June. Little information is available, however, regarding their general behaviour and movement throughout this waterbody during this period of their life-history. A program of acoustic telemetry was initiated in 2012 to specifically address these knowledge gaps (Plate 3.2).

Plate 3.2. Tagged twaite shad prior to release

Adult twaite shad (n = 8, 400-430mm, 1170-1350g) were captured *via* boat-based drift netting in a section of the River Barrow immediately downstream of the Barrow-Nore confluence, a distance of 3km upstream of New Ross. All fish were captured between 10:30am and 4:30pm on May 10th 2012. Upon entering the net, subject fish were carefully removed, tagged externally with an individually coded acoustic transmitter (VEMCO V9) and released at point of capture. An array of underwater hydroacoustic receivers (VEMCO VR2) recorded the locations of individual tagged fish during the study period. Acoustic receivers were deployed at well-spaced locations throughout the Barrow-Nore SAC from Barrow Bridge, immediately upstream of the Barrow-Suir confluence, to the upper tidal limits at St Mullins, Co. Carlow. At this latter location a group of 3 receivers were spaced more closely at 1km intervals in order to elucidate spawning behaviour in the upper tidal section. Two receivers were also deployed in the adjacent River Nore to monitor potential migration towards the tidal limit at Inistioge, Co. Kilkenny.

Fish location data were downloaded from receivers on a monthly basis. Manual tracking using an acoustic hydrophone (VEMCO VR100) was also undertaken on two occasions. A range of environmental variables were recorded to examine their potential impact on spawning migration and movements. Water temperature data were recorded hourly on submerged dataloggers (Tinytag Plus, Gemini Dataloggers) at three tidal locations throughout the SAC, attached to acoustic receiver moorings at New Ross, St Mullins and Inistioge (Plate 3.3). Freshwater temperatures from the River Barrow upstream of the tidal limits were provided by a fourth datalogger located at the entrance to St. Mullins canal cut (Figure 3.1). Tidal regimes

and lunar phase (percentage illuminated) were obtained from internet resources (www.tidetimes.org.uk/new-ross-tide-times ; www.calendar-12.com/moon_phases)(Figure 3.2). Flow data for both rivers at locations upstream of the tidal limits were obtained from hydrometric stations (OPW; http://waterlevel.ie) at Graiguenamanagh (River Barrow) and Brownsbarn (River Nore).

Plate 3.3. Barrow Bridge, immediately upstream of the Barrow-Suir confluence

Locational data were obtained for 7 of the 8 tagged fish. Manual tracking located one of the shad (9743) stationary, close to the point of tagging and release. It was assumed this shad was dead or had lost its transmitter. Another shad (9749) was lost after 9 days. The remaining 6 tagged fish provided extensive data during the study period. All were recorded at least 24rkm downstream at Barrow Bridge following their release. Five of the shad made their way upstream to the River Barrow tidal limits at St. Mullins during the latter half of May, coinciding with a rise in air and water temperatures, neap tides, low rainfall and a waxing moon. All five were recorded simultaneously in this area during the last week of May, with some lingering into early June. Some of the tagged fish remained in this area constantly (9744, 9750) whilst others made repeated forays upriver from the lower Barrow at New Ross (9745, 9746, 9748). The sixth shad (9747) ventured into the River Nore and was similarly detected at the tidal limits in Inistioge over the same period (Plate 3.4). All tagged fish promptly moved downstream during early June, presumably returning to sea after spawning. Fish were detected occasionally at Barrow Bridge during the remainder of June, July and early August.

Plate 3.4. Location of acoustic receiver & temperature logger on River Nore downstream of Inistioge

Acoustic tracking of twaite shad has provided an extensive suite of information regarding their movements, timing of spawning migration, persistence in the spawning habitats, post-spawning seaward migration and the potential role of environmental variables as behavioural cues. It is hoped to repeat and extend this study during 2013. The data will be subjected to detailed statistical analysis in order to expand our knowledge of the ecology and habitat requirements of this species.

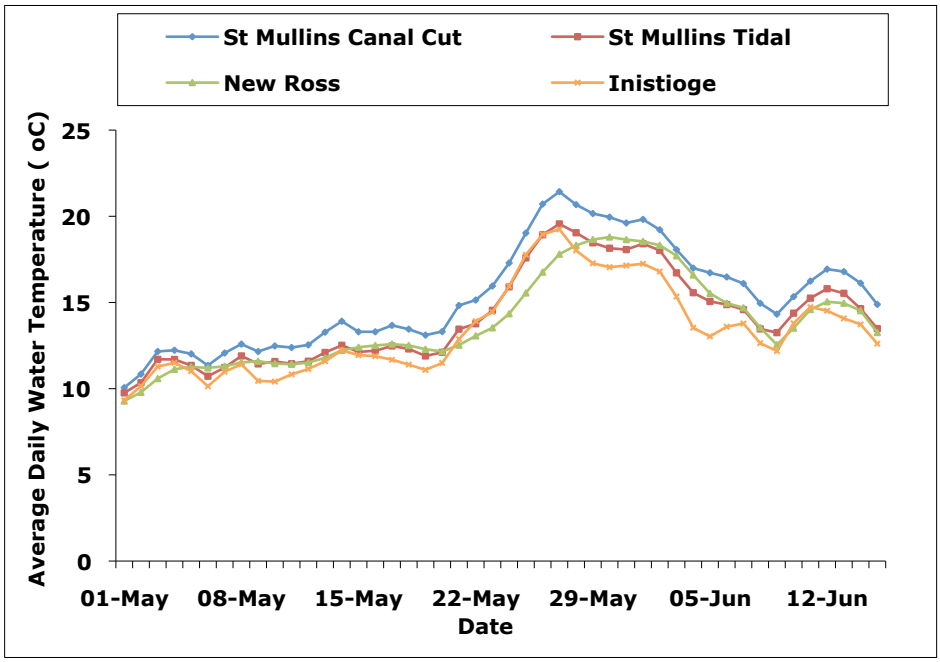

Figure 3.1. Average daily water temperatures measured at 4 locations across the River Barrow & River Nore SAC.

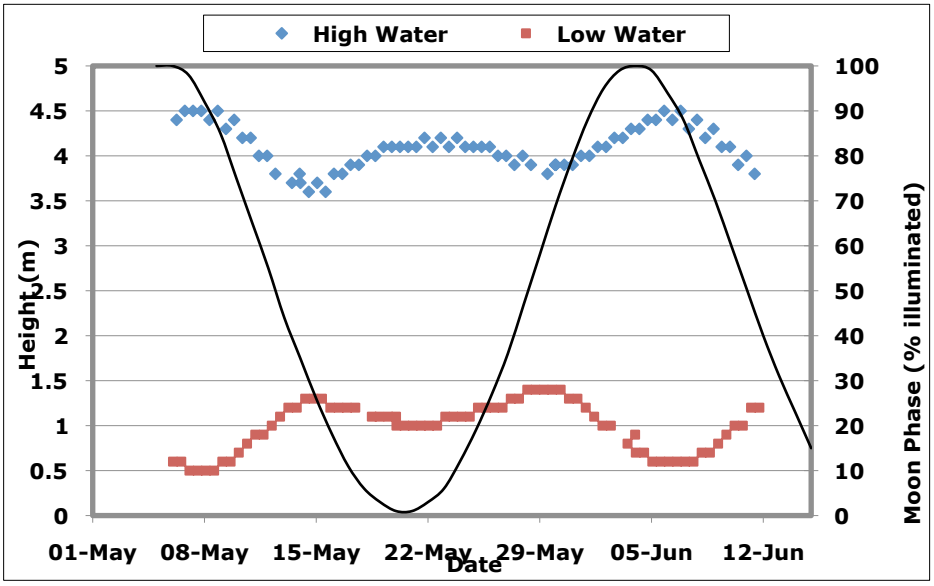

Figure 3.2. Profile of tidal patterns measured at New Ross, Co. Wexford during the study period. Also displayed is the daily moon phase (expressed as % illuminated; 0 = new moon, 100 = full moon).

3.2 Juvenile Anadromous shad surveys

Over the past number of years IFI has been refining a method of monitoring populations of juvenile shad on the Southern estuaries. The method used to sample these fish is bongo netting. The bongo net is suspended over the bow of a boat and catches fish as it is slowly propelled through the water (Plate 3.5). A GPS location was taken at the start and the finish of each trawl. Using this information the distance travelled was calculated.

In 2012 a strategic approach was made towards bongo netting. It was decided to sample the five SAC rivers included in this programme – Slaney, Barrow-Nore, Suir and Blackwater - from the top of the tide to the lower reaches of the estuary, fishing against the tidal flow. Trawl locations were pre-determined at spacings of 2 km. In 2012, the programme was to include two samplings on each river, one in June and then repeated in July. It was envisaged that this would allow for a comparison of the density, distribution and size of the fish sampled. However, heavy persistent rain during late June and early July led to swollen river/estuarine levels. This hampered the sampling programme and thus only one sampling event was undertaken in late July 2012.

Plate 3.5. Profile of the Bongo Net

The rivers sampled were the Rivers Barrow (15 trawls), Nore (8 trawls), Suir (16 trawls), Blackwater (10 trawls) and Slaney (10 trawls).In total 59 trawls were undertaken across the five rivers sampled. Only one juvenile shad was recovered on the River Barrow in a trawl

downstream of New Ross. No juvenile shad were captured on any of the other rivers sampled. In comparable samplings in 2011, juvenile shad were recovered on the Rivers Barrow and Nore. It was thought that the heavy rains and, in turn, higher water levels washed the juvenile shad, which were not able to hold station, away.

What was interesting to observe was the presence of juvenile smelt on the Rivers Barrow and Suir. Smelt spawn during March and April, thus the fish were better able to hold their own in the higher water flows than the smaller shad (Figures 5.1 and 5.2).

4. Pollan Programme

4.1 Lough Derg Pollan survey

Habitats Directive team members accompanied colleagues from the WFD Lakes Survey Unit during hydroacoustic surveys on Lough Derg on two occasions during June 2012 (19th-20th and 26th-27th) with the aim of locating and identifying pollan aggregations (Plate 4.1). Surveying concentrated on a 9km section of the lower lake from Parker Point (to the west of Garrykennedy) south to Rinnaman Point (north of Killaloe). Surveying took the form of consecutive parallel east-west/west-east transects, each separated by 100m, gradually progressing southwards in order to maximise coverage of a deep (> 20m) section of lake bed running in a north-south direction at this point.

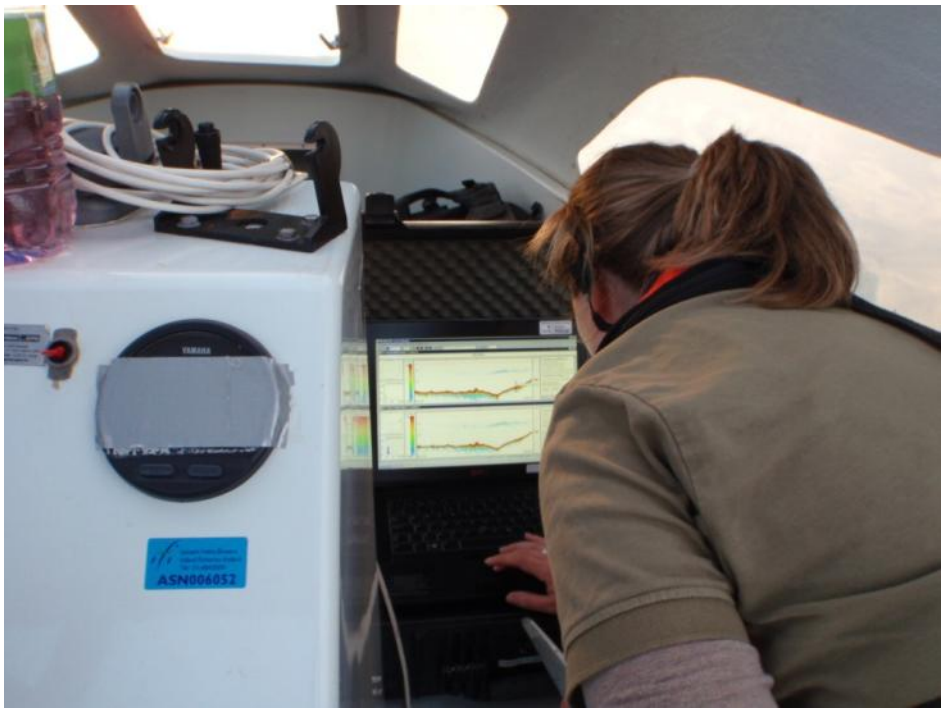

Plate 4.1. Monitoring hydroacoustic output during transect surveys

During the second survey, a mid-depth pelagic net was deployed in a location where putative pollan-like fish were encountered (Plate 4.1). A single pollan (19cm) was captured in this net.

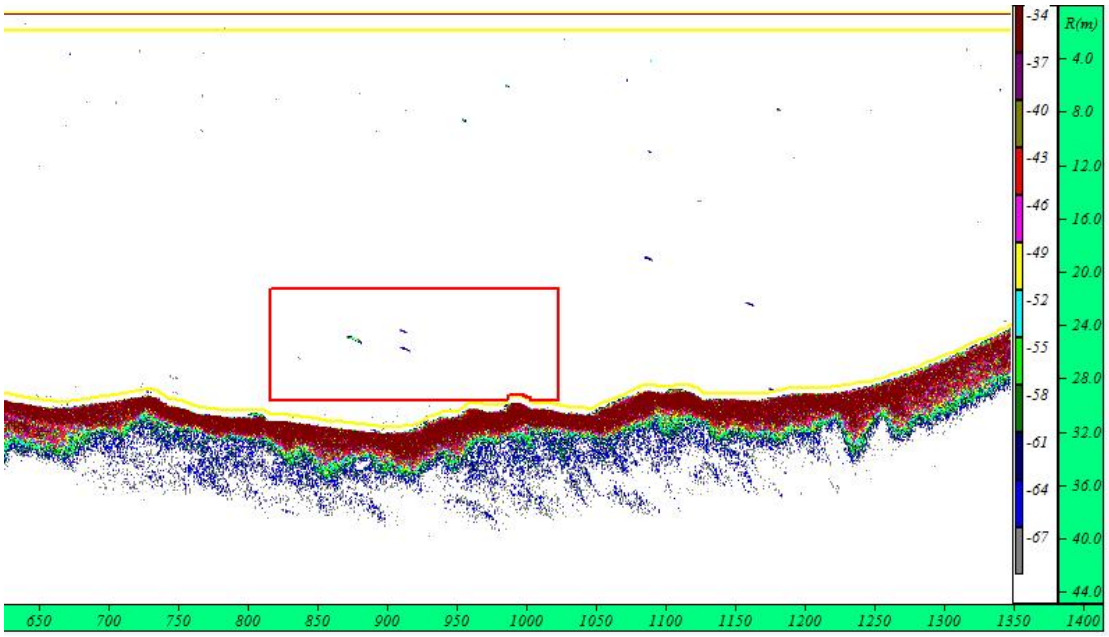

Plate 4.2. Echogram showing potential pollan at a depth of *circa* 25m

4.2. Pollan by-catch during eel conservation netting at Killaloe

Small numbers of pollan have been taken as by-catch of eel sampling undertaken at Killaloe since 2009. The eel sampling is done in the late autumn – early winter when the silver eel downriver migration is underway. Staff of IFI Limerick, liaise with the eel netting operations and have been vigilant in retaining any pollan by-catch for this National Programme. This by-catch has become a very valuable source of information.

In 2012, a total of 9 fish were retained as by-catch. The fish ranged in size from 111 to 235 mm (Figure 4.1). Of particular interest was the occurrence of three female fish with developed gonads, with one of these being fully ripe and ready to discharge its eggs. The presence of ripe and near-ripe female fish, and the dates of capture, point to the possibility of a spawning area being present in the vicinity of the Killaloe Bridge, where the eel sampling takes place. The dates of capture of the ripe fish point to a possible earlier spawning date than was previously believed (Plates 4.3 & 4.4).

Plate 4.3. Pollan by-catch from Killaloe, Nov – Dec 2012.

This information will be valuable in planning any sampling for adult spawning fish in the winter of 2013.

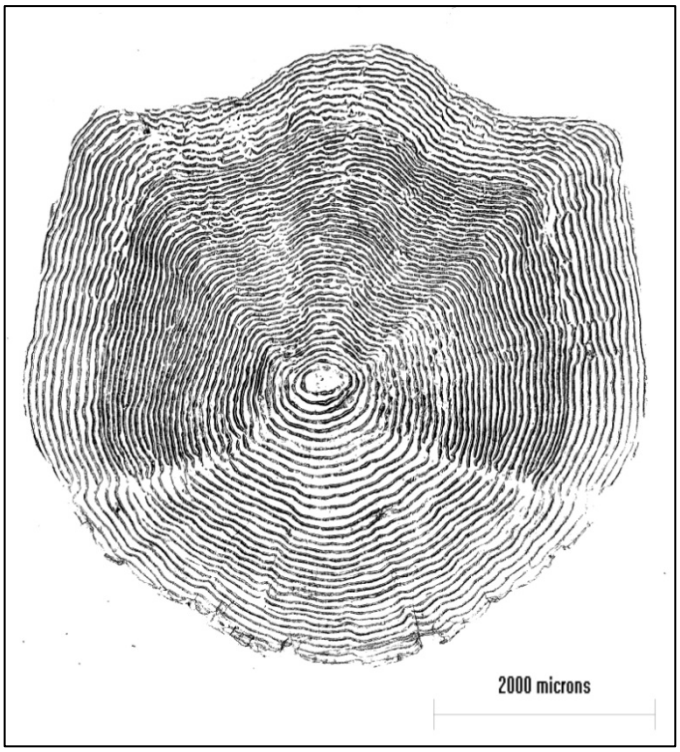

Plate 4.4. Image of a pollan scale.

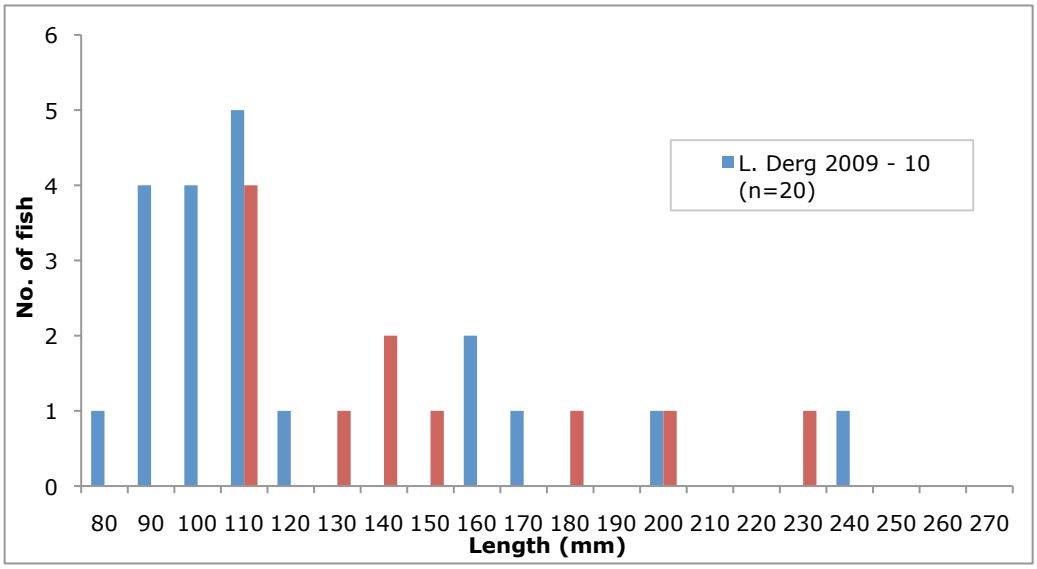

Figure 4.1. Length frequency of pollan from Killaloe by-catch, 2009 – 2012.

5. Smelt Programme

Juvenile smelt sampling was undertaken in conjunction with the juvenile anadromous shad sampling programme (Section 3.2). As with the juvenile shad sampling, five rivers were sampled, of which smelt were only present in two, the Rivers Barrow and Suir. It was proposed to sample for the juvenile stage fish in both June and July but due to adverse weather conditions and very high flows, only the July sampling event was undertaken. In total 23 trawls were undertaken on the Rivers Barrow and Nore (Figure 5.1.).

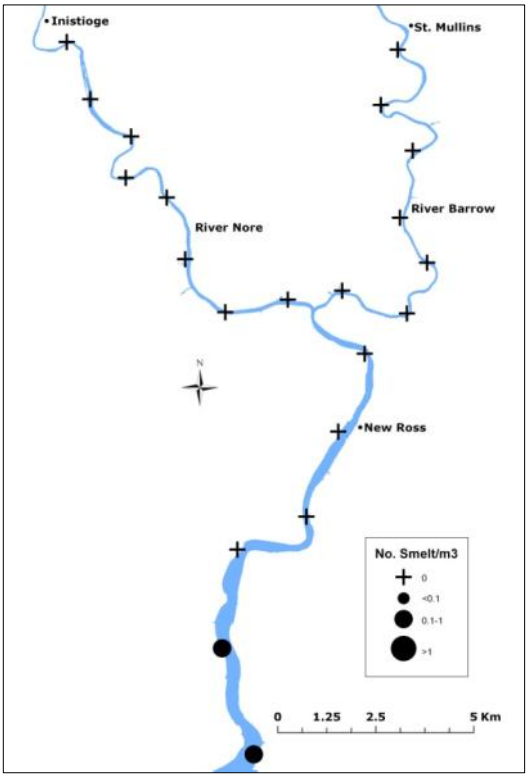

Figure 5.1. Map of juvenile smelt distribution on the Rivers Barrow and Nore, July 2012.

Smelt were only captured in the two most-downstream trawls on the River Barrow/Nore. When data from July 2011 was compared, juvenile smelt were located in a similar location, all but slightly upstream. No juvenile smelt were captured on the River Nore in 2012. It is interesting to note that during adult surveys in March, historically more adult smelt have been caught on the River Nore than the River Barrow. However, given that spawning occurs in March and the survey was undertaken in July, the fish caught are the result of spawning on both rivers combined. The fidings indicate that the post-larval and very young fish can be dispersed rapidly downstream. While tidal flow is likely to carry these small fish both up- and

downstream, depending on tidal conditions, there is an overall downstream dispersal with time.

Sampling for juvenile fish on the River Suir was undertaken on the 25th July 2012. Samples were collected between Carrick-on-Suir and the Barrow Bridge, where the River Suir joins the River Barrow. Of the sixteen trawls on the River Suir, five were positive for smelt. The positive findings were not dispaced as far downstream on the Suir as were those from the Barrow-Nore (Figure 5.2).

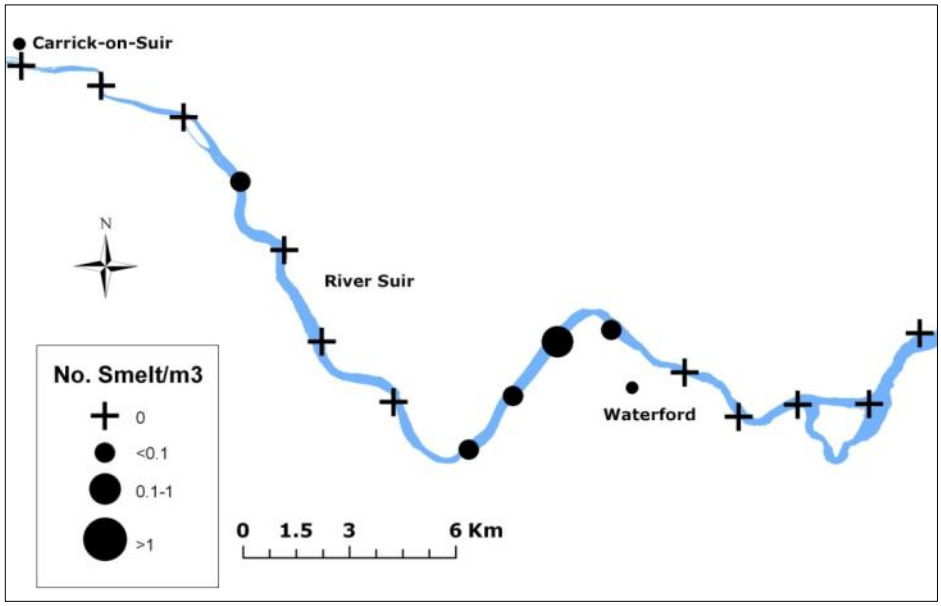

Figure 5.2. Map of juvenile smelt distribution on the River Suir, July 2012.

The length range of fish sampled in the two rivers displayed a great variation - 32mm to 49mm (Figure 5.3). The wide differences recorded in the length of fish sampled may infer that spawning occurred over an extended period, rather than on just one night. The 49mm fish from the River Barrow was on the larger scale of those captured by the bongo nets and was readily identifiable, with the naked eye, as a smelt. The previous maximum length of smelt taken in a bongo net in these investigations was 40-42mm.

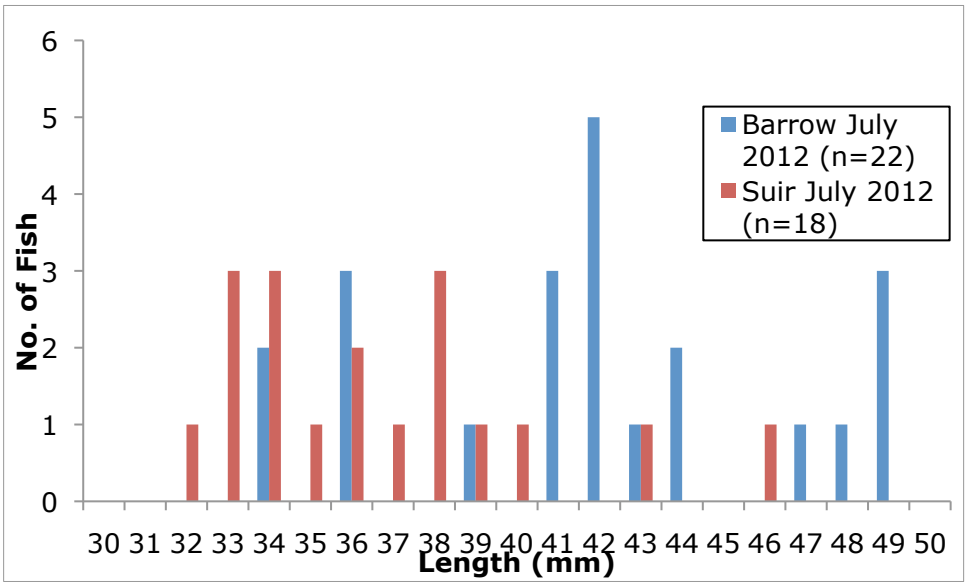

Figure 5.3. Length frequency of juvenile smelt on the Rivers Barrow and Suir.

The distribution of juvenile smelt varied between the Rivers Barrow and Suir, in that juvenile fish were found closer to the upper tidal limit on the Suir than on the Barrow. It is thought that the smelt spawn at Carrick-on-Suir, on the River Suir. Fish were found seven kilometres downstream of the spawning grounds on this river. On the River Barrow, smelt were not encountered until twenty four kilometres downstream of the spawning area at St. Mullins (or Inistioge on the River Nore). The reason for this difference requires further investigation. The possibilities could be that the population of smelt is larger on the River Barrow-Nore, thus accounting for the wider distribution. Alternatively, the flood event during June and July was stronger on the River Barrow than the River Suir thus displacing the juvenile fish faster. Spawning may have taken place somewhat earlier on the Barrow – Nore, giving slightly more time for downstream dispersal and for a greater proportion of the Barrow fish to be of larger size. These are possibilities which will be considered during future sampling efforts for this species and its life stages.

6. Char Programme

The char programme dovetails with the IFI's WFD lakes programme in terms of sampling methods and of waterbody selection – the choice of lakes complementing the WFD list. There has been much concern about the status of char and the species has been lost from both Lough Corrib and Lough Conn in the last 30 years. The current char lake survey programme within the Habitats Directive and Red Data Book Fish ambit is built around recent and historical published records on char status. The lakes chosen for survey in 2012 were previously surveyed during 2005/2006 under the remit of the North-South Share project (Plate 6.1). The four lakes all face pressures including water abstraction and it was for this reason it was decided to repeat the previous surveys. The surveys completed during 2005/6 were undertaken using CEN Lake survey methods and these methods and net locations were repeated for monitoring during 2012 (Table 6.1).

Plate 6.1. Lough Eske, August 2012.

In total, seven species of fish were captured across the four lakes. Loughs Eske and Gartan displayed the greatest species richness with four native species of fish present. Rudd, a non-native coarse fish was identified in Lough Fad (West), when surveyed in 2005. During the 2012 survey roach, rudd and hybrids were encountered (Table 6.1).

Table 6.1. List of fish species recorded in the four lakes surveyed during 2012.

Scientific name	Eske (387ha, 30m)	Gartan (204ha, 13m)	Keel (60ha, 25m)	Fad (West) (37ha, 18m)
Native Species				
Anguilla anguilla	Yes	Yes		Yes
Salmo trutta	Yes	Yes	Yes	Yes
Gasterosteus aculeatus	Yes	Yes		
Salvelinus alpinus	Yes	Yes	Yes	Yes
Non Native Species (influencing ecology)				
Rutilus rutilus				Yes
Non Native Species (generally not influencing ecology)				
Scardinius erythropthalmus				Yes
Hybrids				
Rutilus rutilus x Scardinius erythropthalmus				Yes

In 2012, the largest population of char was recovered from Lough Gartan. This was dominated by a large number of fish with a modal peak of 13 – 14 cm. No fish in excess of 20 cm were captured here. Data from Lough Eske displayed two, possibly three, size classes, indicating a healthy reproducing population of char. Both Loughs Keel and Fad (West) yielded very low numbers of char. Two size groups were present in Lough Keel but a single size group was present in Lough Fad.

Across all four lakes, fewer char were captured in 2012 than in the 2005/2006 surveys. In order to directly compare the results obtained the Catch per unit effort (CPUE) was calculated (Figure 6.2). This provides the ability to directly compare the number of fish caught per meter of net across all four lakes over the two sampling events.

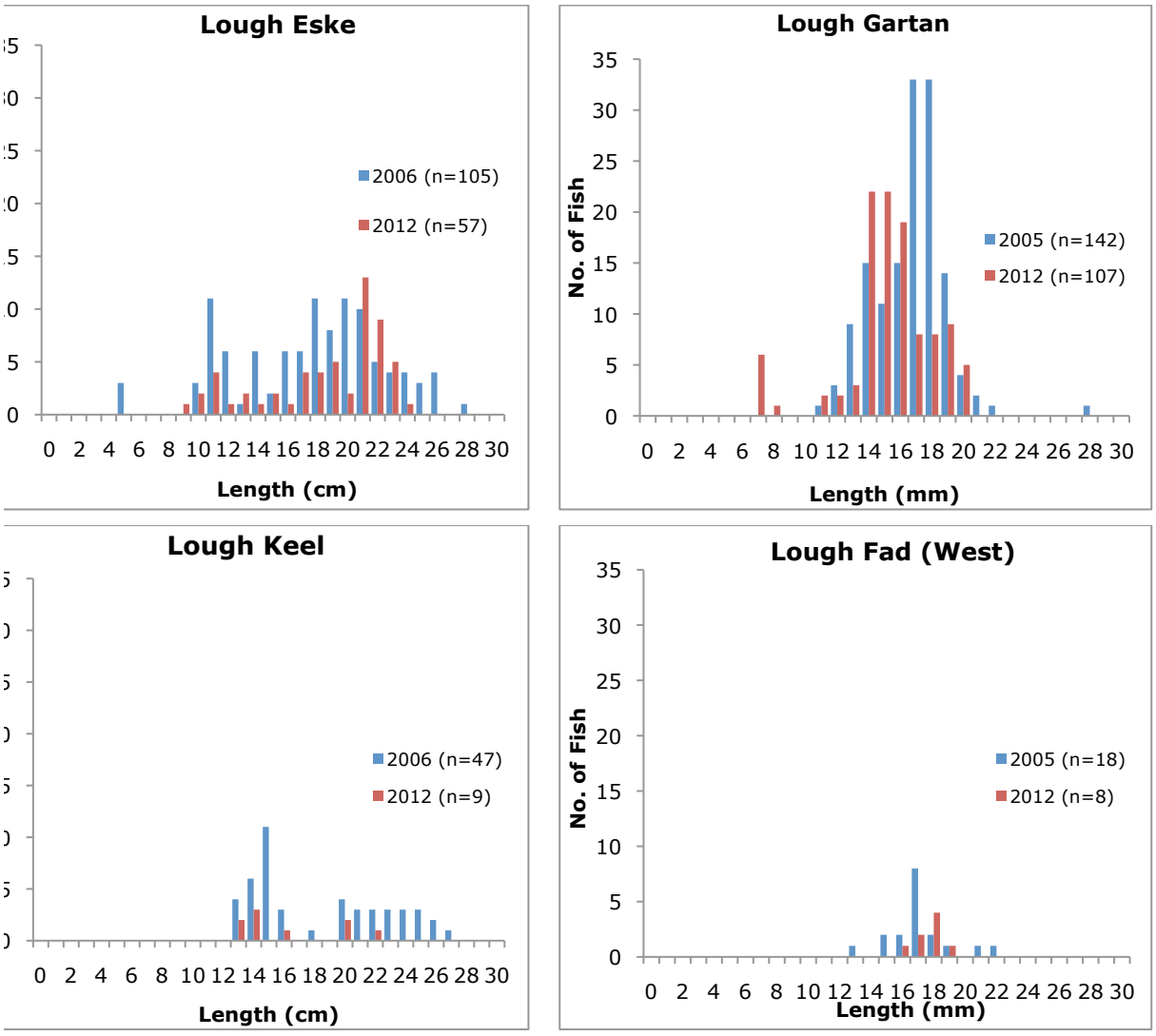

Figure 6.1. Length Frequency of char captured on four lakes during August 2012 and comparison with previous surveys.

CPUE results indicate a reduction in the number of char captured across all lakes sampled. This is particularly notable on Lough Keel, with CPUE results falling from 0.075 to 0.01 fish per m^2 over the two sampling periods.

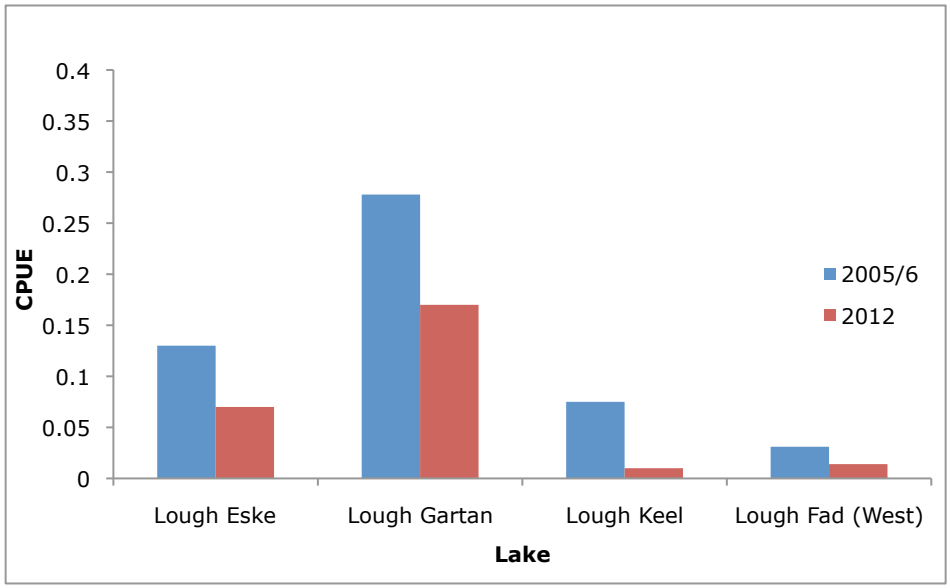

Figure 6.2. Comparison of CPUE data for char across three Donegal lakes.

Brown trout were recorded in all four lakes with one sea trout captured (61cm) on Lough Eske. On both Loughs Eske and Gartan, similar length frequency curves were recorded (Figure 6.3). The Lough Eske population had a substantially wider length range than Lough Gartan with a number of trout larger than 25 cm recorded. The Gartan population was dominated by fish in the 12 – 20 cm range, likely to represent at least two age categories. The Lough Keel trout structure also displayed a range of size categories. Older fish tended to dominate the population. Lough Fad (West) produced a very small sample for brown trout. Three distinct age groups were evident, the smaller size classes indicating young of the year and recent recruitment.

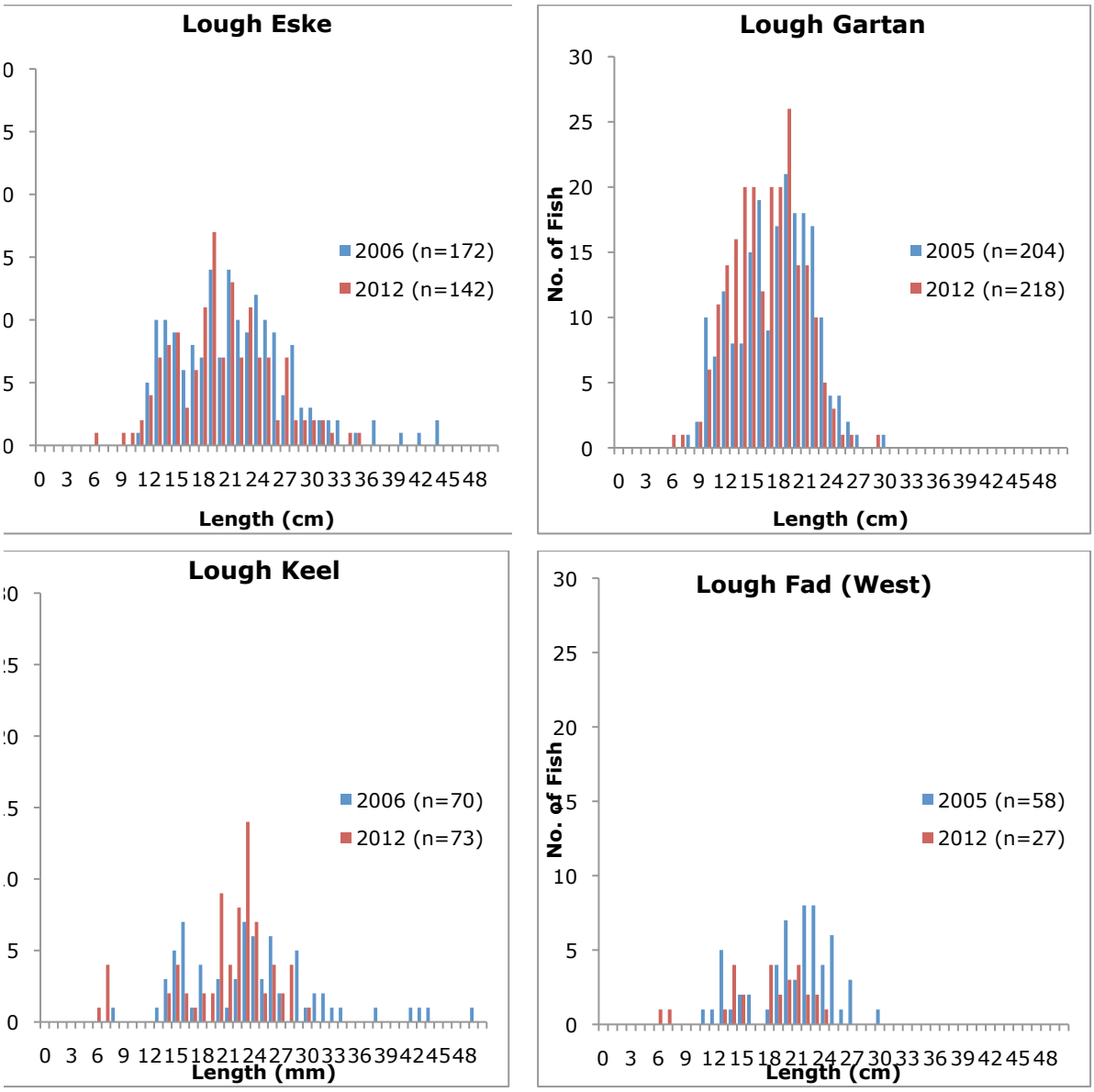

Figure 6.3. Length Frequency of brown trout captured on four lakes during August 2012 and comparison with previous surveys.

CPUE results calculated for brown trout displayed an increase in two of the lakes sampled, Loughs Gartan and Keel. Falling CPUES were noted on both Loughs Eske and Fad (West). The greatest decrease was noted on Lough Fad (West) with CPUE results falling from 0.106 to 0.046 over the seven year sampling period.

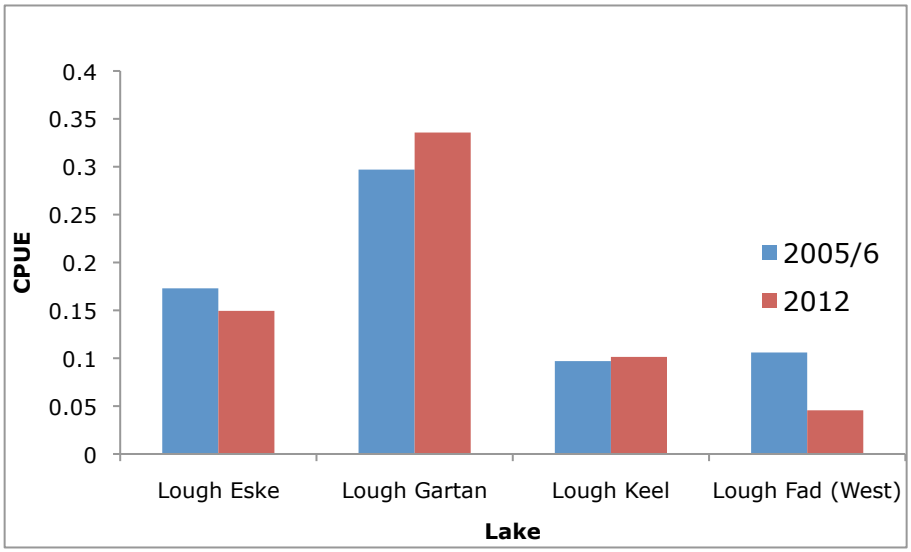

Figure 6.4. comparison of CPUE data for brown trout across three Donegal lakes.

The need for on-going fish stock assessment is evident from the differences recorded across both sampling period. Stresses such as water abstraction or eutrophication could be possible factors in inhibiting the number of fish recorded on the fours lake. The lakes will be encompassed within the Habitats Directive sampling programme in order to monitor any further changes in fish stocks.

7. Looking Forward

A fundamental requirement of this national programme is the need to input to Article 17 status assessment of Habitats Directive fish species on a six-year rolling cycle. The present national programme of IFI commenced in 2009 and built on datasets and published reports generated by the National Parks and Wildlife Service (NPWS) in the period 2003 - 2007. The NPWS work was focussed on status of Annex II fish species within Special Areas of Conservation (SACs). However, the Article 17 reporting process to the EU requires status reporting covering the entire national territory.

For this reason, the IFI studies in this programme have focussed, in the case of lamprey, on any SAC catchments not covered by the earlier NPWS investigations and on non-SAC catchments. This IFI approach reached its conclusion with the 2012 investigations reported here. A combining of the two sets of information - NPWS and IFI - provides a substantial baseline cover on lamprey status in the national territory. This baseline, in turn, will provide a platform for a new 6-year programme on lamprey status for the 2013 to 2018 period. The baseline will permit comparison with any repeat studies of channels or catchments undertaken in the 2013 - 18 period, the aim being to identify trends in regard to population status.

The strategy of sampling for juvenile lamprey in appropriate habitat using electric fishing techniques has proved to be satisfactory and repeatable. Sampling for adults and reporting on adult status is a preferred option of the EU in Article 17 reporting. However, it is the view of IFI that this approach is not very practicable for brook lamprey and river lamprey. It is feasible, in the case of sea lamprey, to survey extended sections of large river habitat and georeference locations of spawning and enumerate spawning effort. However, as indicated in this series of reports, this strategy is highly weather- and river flow-dependant. Sampling for juveniles permits a high degree of consistency in regard to habitat selection, sampling effort and it is not bound to a particular sampling window. IFI proposes to continue using juvenile sampling as a cornerstone of its lamprey status assessment procedure.

One major issue that continues to present itself in regard to sea lamprey status is that of barriers to migration for adult fish. The congregation of spawning fish and accumulation of redds downstream of artificial barriers does suggest a significant and repeat problem. Failure to penetrate upriver in catchments, to the farthest extent consistent with spawning site attributes, is not considered to be advantageous to sea lamprey. IFI established a working group in 2011 to examine the issue of barriers and to bring forward proposals that IFI might implement. This group was building on recent work done on salmon and eel passage in the Nore catchment and further developed a form for data collection. The working group also liaised with the Northern Ireland Environment Agency who invited members to attend

accreditation training on the new SNIFFER barrier assessment tool, in use in Scotland and Northern Ireland. A stepwise use of the two approaches, a simple georefererncing and photolog of structures, followed by a detailed survey of the structures for dimensions and flow readings, would provide a consistent platform for assessing barriers and prioritising structures requiring alteration to accommodate passage. The IFI group identified the need for a national inventory of structures or features in rivers that may constitute fish passage issues. The inventory has the 'salmon wetted area' study as a foundation but substantial walkover surveying is required to identify barriers that may be problematic for non-salmon species. In the absence of a national survey team from within IFI to survey and georeference barriers, building up of the national inventory will require input from a range of IFI sources. There is scope for the Habitats Directive and Red Data Book fish team to contribute to this process on a measured, annual basis. In particular the team would require to focus on barriers to passage for sea lamprey in major SAC rivers. Much of this could be done working with IFI colleagues based in individual catchments of relevance.

Reference has been made in previous annual reviews to the need for having sampling procedures that generate results and that provide consistency, repeatability and replicate generation. This can be problematic for some life stages and has been likened by international colleagues to "looking for a needle in a haystack". The repeatability of the juvenile lamprey electric fishing approach has been referred to above. Likewise, trials with bongo-netting - zooplankton-type trawling for post-larval fish - have proved to be repeatable and findings from 2010 and 2011 for shad and for smelt have been encouraging. The potential of this technique in sampling for pollan has been identified by our colleagues in AFBI in Northern Ireland and shared trials are proposed for 2013 in one of the large Shannon lakes. If this technique is a success then it will be continued over the 2013 - 2018 period on Lough Derg, Lough Ree and Lough Allen.

The programme has had a degree of success in telemetry studies undertaken, as well as learning of shortcomings of the process. Working with the Mulkear LIFE project team provided an ideal opportunity for pooling of resources, generating a larger and more robust data set of radio-tagged sea lamprey adults, and the outcomes identified initial response to barrier issues by sea lamprey and also the various strategies availed of by fish detained at barriers. One interesting outcome related to loss of radiotags by fish delayed over extended periods at barriers. The Habitats team is now looking at further telemetry trials on a large sea lamprey catchment where barriers are not a major issue. The aim would be to identify the degree of penetration into a main stem and major tributaries and locations of spawning effort. Trials using a helicopter to trace radio tagged fish have been successful in recent studies by IFI and access to aerial surveillance would significantly enhance the speed, thoroughness and efficiency of the tracking process.

A second telemetry strategy was trialled in 2012 with shad in the Barrow - Nore estuary. The approach here was, again, to externally mount tags on fish and release them. In this case, a series of listening stations was installed along the full tidal length of both rivers. These were activated when a tagged fish was adjacent to them, rather than having the study team trying to track the fish. An initial review of outcomes looks very promising. A major concern related to the robustness of the adult shads and their ability to cope with the stress of surgically mounting of a transmitter onto their bodies. Of eight shad captured and so treated, signals were received from seven of these during the lifetime of the survey. This is a high rate of return and encourages further similar work in the coming years. For 2013, it is planned to capture and tag a further set of shad in the Barrow-Nore system, where the listening stations have been left in place. In addition, it is planned to carry out the same exercise of tagging and installation of listening stations in the Munster Blackwater, where an angling survey for adult shad in 2011 yielded very positive results. A subsequent study will be undertaken on the River Suir estuary in due course. The Barrow - Nore work is being done in conjunction with the IFI National Eel Programme. Members of that team have captured a number of large eels and equipped them with surgically implanted transmitters. Movement data for these tagged eels are recorded on the same array of listening stations as used for the shad project.

A combined hydroacoustics - groundtruthing strategy has been developed by IFI's Water Framework Directive team and this has been rolled out in several large lakes, including the pollan lakes of Lough Derg and Lough Ree on the Shannon. In both cases pollan 'targets' have been detected via the hydroacoustics and validated by netting. This work was done on Lough Derg in 2012, with assistance from the Habitats team. The Habitats Directive team has put considerable effort into trying to source spawning pollan in target spawning sites on Lough Derg and Lough Ree to no avail. It is evident that hydroacoustic surveying in winter, weather permitting, could be very valuable in identifying how pollan are behaving and where shoals are resident. Residency may then point to areas where spawning may occur. Such areas would be of major conservation importance. The potential to find spawning sites would improve the possibilities of capturing ripe fish for the purposes of captive breeding at IFI's fish farm, with return of on-reared young fish to the lake of origin. These strategies are identified in the All-Ireland Species Action Plan (SAP) for pollan.

It is clear from the current report that a substantial body of information has been collected in regard to the conservation fish species. It is also clear that many questions remain unanswered and that new technologies, as well as traditional methods, can help in the search for answers. An immediate task for the team is to lay out a six-year survey programme that will address the issue of species status, through comparison of the to-be collected data sets with the current baseline.

Project Personnel and Acknowledgements

The IFI Swords team involved in the Habitats Directive and Red Data Book fish investigations during 2012 initially comprised Dr. James King, Ms. Nicola O'Gorman and Dr. Sean Rooney. An existing member of staff, Mr. Daniel Cierpial, joined the team during 2012, carrying his Library duties with him. During 2012 he has worked extensively with Dr. Rooney and Ms. O' Gorman on field and laboratory activities and has worked with Dr. King in cataloguing and analysing an archive of shad and smelt scales.

In all waters surveyed, the team received full support from our colleagues within the individual IFI River Basin Districts (RBD) and thanks are due to the RBD Directors and their Inspectors, who organised logistics and support, and to officers within each area where surveys were undertaken.

The R&D Division recruited staff on 4-month contracts to assist in a series of project areas. These staff were rotated among surveys and activities in the WFD, National EEL Programme and Habitats Programme. Dr. Letizia Cochiglia, Mr. Sam Thomas, Mr. Cillian Kelly and Ms. Sinead O' Reilly worked with the Habitats team and their assistance and input to field surveys and lab/desk-based activities is much appreciated.

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