Habitats Directive & Red Data Book Fish Species

Executive Report 2010

Iascach Intíre Éireann
Inland Fisheries Ireland

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National Programme: Habitats Directive and Red Data Book Fish species

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1. Introduction

The Habitats Directive and Red Data Book fish programme focuses on those species listed in either Annex II or V of the Habitats Directive, the Irish Red Data Book or in both. The exception is the Atlantic salmon, which is investigated under national salmon programmes within IFI's R&D division. The species as a group are often referred to as the "conservation fish species", a reference to the fact that the majority are considered to be of vulnerable status and in need of conservation and protection. The majority are considered to be native species, the initial colonisers of Irish waters after the last glaciation and the pollan is considered to be at the most southerly extreme of the distribution range for the whitefish species.

The programme and its outputs provide an expanding data base to service Ministerial obligations under the Irish Habitats Directive Regulations and to national requirements under the Biodiversity Programme. There is also a strong element of synergy and shared service, both with other teams within the Inland Fisheries service and with other state agencies.

In 2010, the Central and seven Regional Fisheries Boards were merged into a new national body, Inland Fisheries Ireland (IFI). The programmes of work described in this report involved extensive surveying and many of the surveys were undertaken with staff of the various Regional Fisheries Boards and, subsequently, the regionally-based IFI staff attached to individual River Basin Districts. Some of the Special Areas of Conservation (SACs) designated for the Habitats Directive species - e.g. lamprey and shad - are focussed into particular river catchments. The shad SACs consist of the Slaney, Barrow-Nore, Suir and Munster Blackwater catchments. These lie within the Southeastern or Southwestern River Basin Districts (RBDs) - the geographical management units under the Water Framework Directive. These shad SACs are also listed as SACs for the three

lamprey species. The very limited distribution of the shad species creates an annual survey demand on colleagues in the pertinent RBDs. In a similar way, the three known locations of pollan all lie within the large lakes of the R. Shannon, in the Shannon RBD with consequent focussed demand for the expertise of local staff.

The programme in 2010 followed many of the strands developed over previous years for the particular species and their various life history stages:

- Catchment-wide status surveys for juvenile lamprey
- Sea lamprey spawning effort in selected SAC main stem rivers
- Spring sampling for smelt in selected estuarine waters
- Surveys for char in selected lakes using the WFD standard netting procedure

As each of the fish groups has quite distinct habitat and ecological requirements, the monitoring programmes for each group are quite distinct. Progress on developing sampling protocols that are robust and repeatable, in statistical and logistical terms, was made during 2010. .

New strands or synergies were developed during 2010. The survey team worked with colleagues in the Loughs Agency in waters of the Foyle catchment lying within the Republic of Ireland. The teams sampled jointly for evidence of spawning smelt the Foyle as well as in the Finn and Deele. Following training provision by the IFI team, Loughs Agency undertook the catchment-wide juvenile lamprey survey in the Finn and Deele, the data generated being available to both bodies.

The planned telemetry studies on sea lamprey migration dovetailed with the requirements of the Mulkear LIFE project and the two teams worked as one in developing an experimental approach to release of radio-tagged sea lamprey, in the context of barriers to migration of the species within the Mulkear catchment.

Trials using bongo-nets to sample for larval and post-larval fish, particularly shad, were undertaken on the Barrow estuary with some success and auger well for further refinement.

2. Lamprey Programme

2.1 Juvenile lamprey catchment-wide surveys:

Background - This package is operated on a catchment basis, with a focussed sampling effort in a predetermined number of sites spread along individual channels in a catchment, in habitat characteristic of juvenile lamprey (Figure 2.1). An electric fishing technique is used and a team consists of two staff members. The number of sites to be surveyed in a catchment is dependant on the catchment size and density of the channel network. Survey work is undertaken during the period late August – late October.

Figure 2.1. Electric fishing for juvenile lamprey and also juvenile lamprey captured during a survey on the Liffey catchment.

The programme built on the network of catchments already examined and the catchments scheduled for 2010 were (Figure 2.2)

- Liffey (Eastern RBD) 56 sites
- Suck (Shannon RBD) 63 sites
- Laune (Southwestern RBB) 35 sites
- Owenmore-Unshin (Western RBD) 24 sites
- Finn and Deele systems (Loughs Agency) 37 sites

The Deele and Finn lie within the Republic but within the jurisdiction of the Loughs Agency. The IFI team gave a training presentation to staff of Loughs Agency, who subsequently carried out the survey and compiled the relevant information. The data generated was then available to both Loughs Agency and to IFI R&D Division. The Laune and Liffey surveys were completed working with locally-based IFI staff. Weather conditions halted the Suck survey, with high water levels in this lowland catchment leading to flooding of potential sites and of access roads to other sites. That survey was rescheduled for 2011. Similarly, weather and logistics prevented the Owenmore – Unshin survey from going ahead in 2010.

The outcomes were quite different from one catchment to another (Table 2.1). There was a high degree of negative sites, those where no juvenile lamprey were recorded, in the majority of catchments. This was not particularly surprising, given the topography of the four catchments surveyed in 2010 – all of which had extensive areas of hilly or mountainous terrain with channels liable to torrential flows. Many channels had limited habitat containing suitable sediments for juvenile lamprey. The Liffey catchment was a contrast, with good population density values and population structures at many sites.

At all sites, information was compiled on presence/absence (Figure 2.3), population density (Figure 2.4) and population structure (Figure 2.5) of juvenile lamprey. The presence/absence provided an immediate overview of the distribution in a catchment - identifying important sites or channels as well as possible problem areas. Of the fifty six sites surveyed across the Liffey and Tolka catchments, suitable habitat was present at 73% of sites. Of the fourteen sites which were located on the main Liffey channel, twelve contained lamprey juveniles.

Table 2.1. Summary lamprey data from catchments surveyed in 2010.

Catchment	Date (2010)	Total no. Sites	Mean Density (no./m^2)	Range (no./m^2)	No. Suitable Sites	% Positive Sites	Brook/River Juveniles	Sea Juveniles	Transformers
Liffey	8-10	56	3.31	0 - 44	41	50	yes	yes	yes
Laune	10	40	5.75	0 - 34	21	52.5	yes	yes	yes
Finn	8-10	24	72	-	23	95.8	yes	no	yes
Deele	8-10	12	6	0 - 24	8	66	yes	no	yes

Note: Mean density calculated across sites with suitable habitat present.

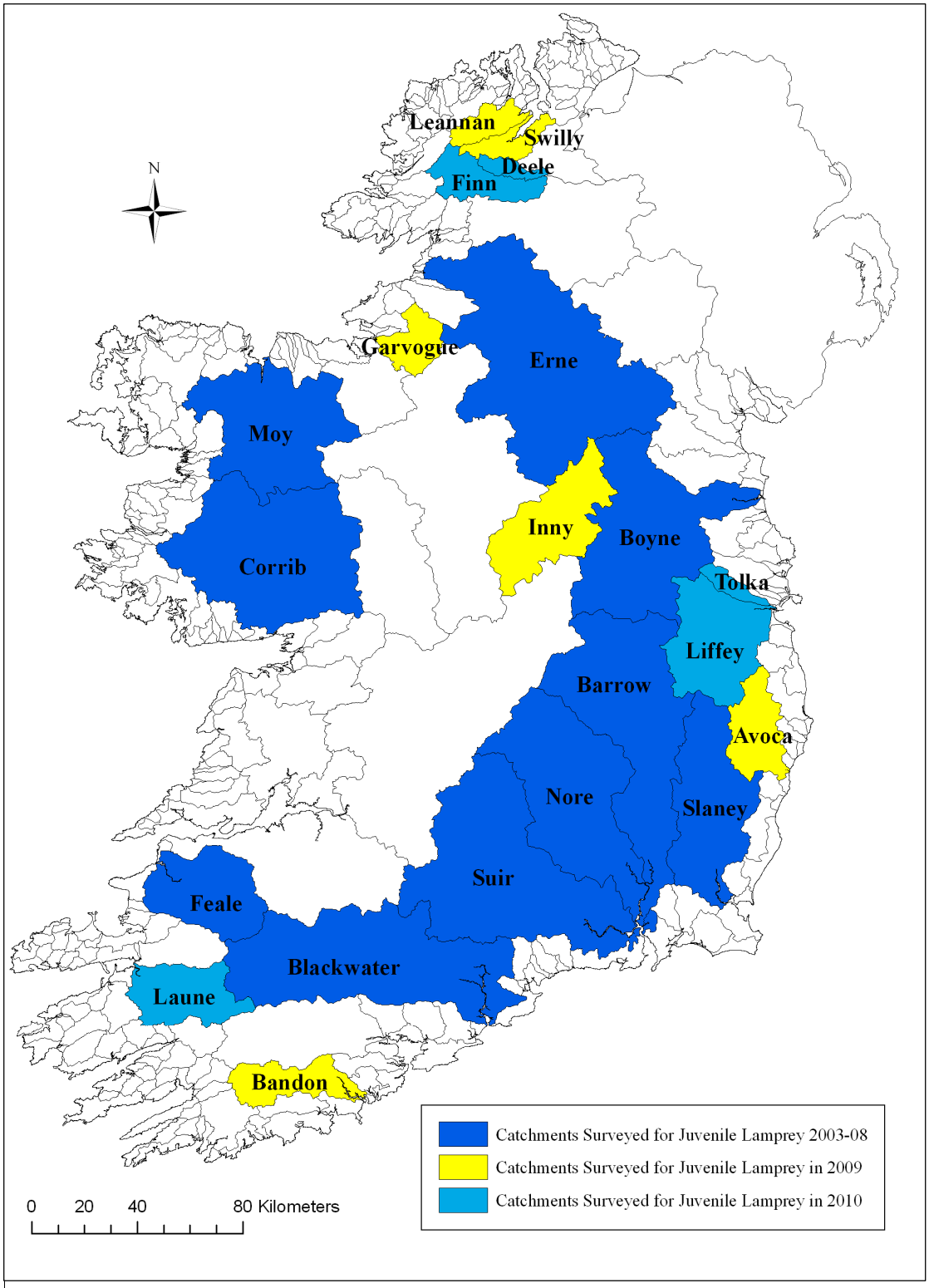

Figure 2.2. Catchments surveyed for juvenile lamprey between 2003 and 2009 (including NPWS – funded and Fisheries Board initiatives).

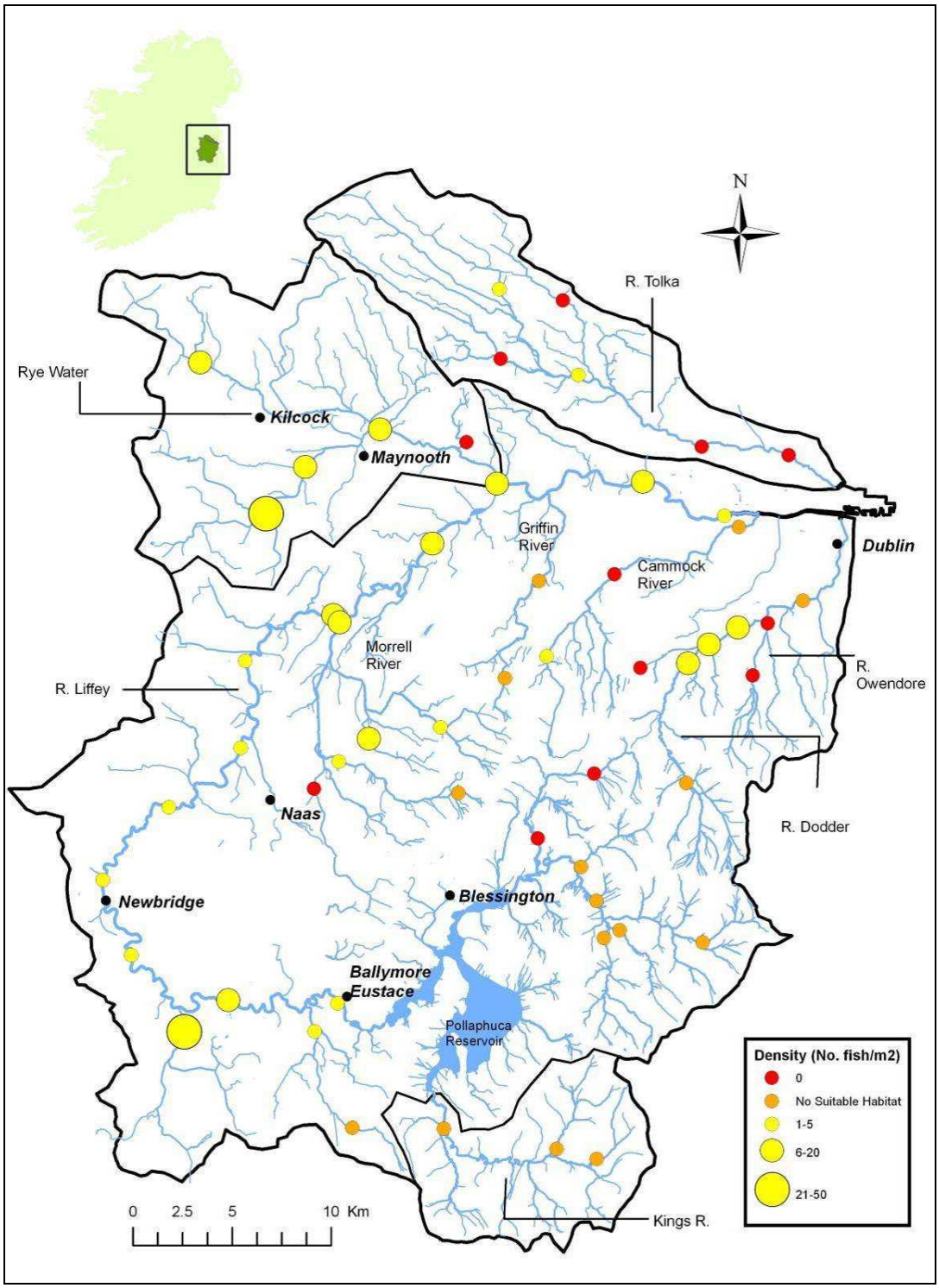

Figure 2.3. Map of the Liffey and Tolka catchments indicating the sampling locations and outcomes from the juvenile lamprey survey, Autumn 2010.

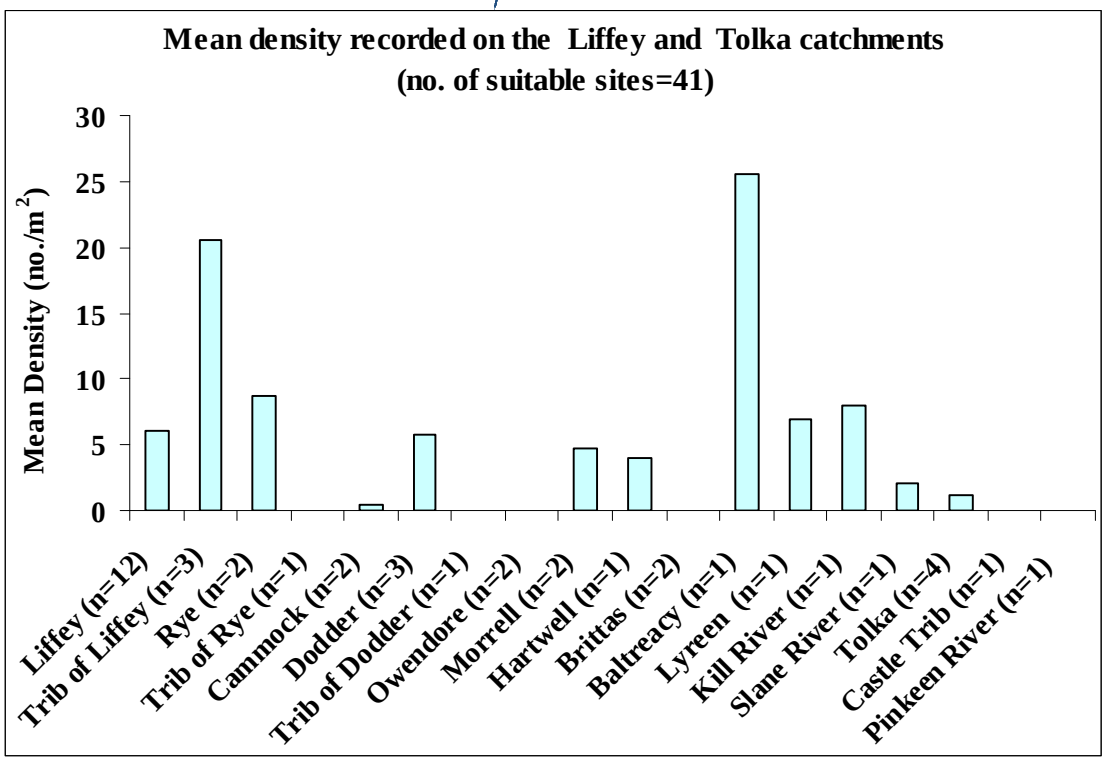

Figure 2.4. Density estimates of juvenile lamprey at sites along the main Liffey channel, August – October 2010.

The low number of negative sites contrasted with findings from other catchments. The density of fish at positive sites ranged from 0.9 to 17 per m^2, the highest number being recorded at Strawberry Beds. This would be indicative of a channel with a substantial population of juvenile lamprey.

In total, 124 individuals were captured at twelve positive sites on the Liffey main stem and two positive sites on the Tolka main channels (Figure 2.5). Older fish dominated the overall sample, however, a number of smaller individuals were captured indicating ongoing recruitment. Modal peaks are evident at three year classes, 70mm, 100mm and 120mm across the Liffey catchment. When the sample collected from the Tolka was examined, recruitment was evident from the individual captured in the 30mm age class. On the Tolka a large number of age classes were not represented with only a number of individuals recorded in the 140mm to 150mm. On the Liffey main channel eleven transformers were observed at 5 individual sites. No transformers were recovered on the Tolka main channel.

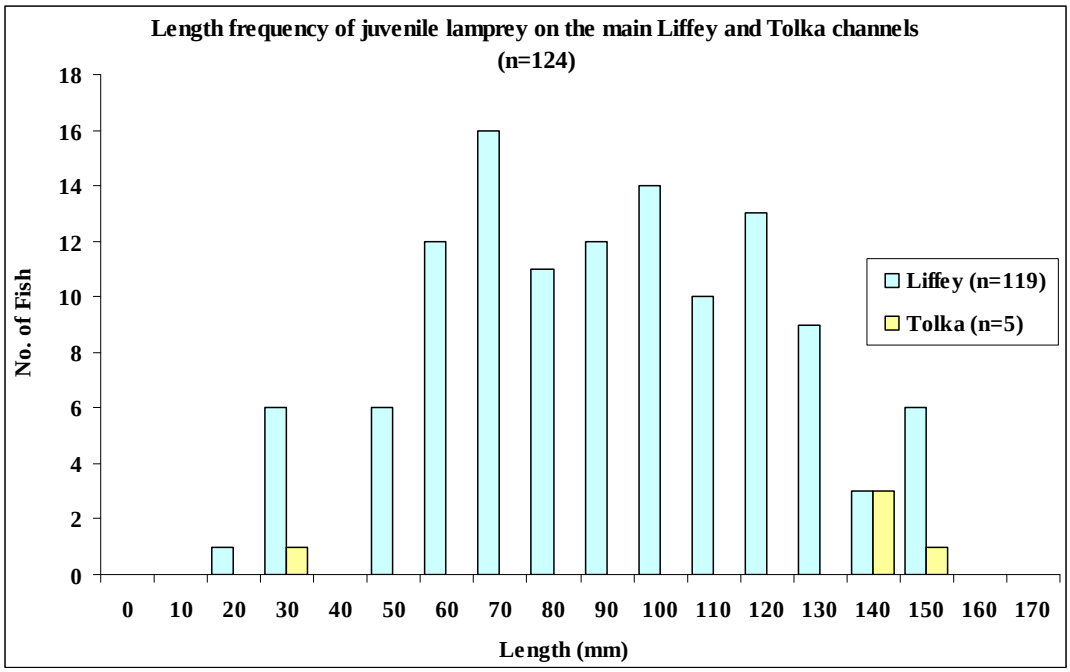

Figure 2.5. Length frequency of juvenile lamprey (n=124), pooled for locations on the Liffey and Tolka main channels, September – October 2010.

2.2 Adult lamprey surveys:

This package undertakes work on adults of all three species in the 2009 – 2013 period. The programme aims to compile baseline biology and ecology in regard to spawning migrations, times and locations of spawning and general habitat attributes of spawning sites. Spawning sites are particularly important and are likely to be used by adult lamprey in successive years. The river- and brook lamprey are indistinguishable as juveniles. For this reason, the location of spawning sites is particularly important in attempting to assess the conservation status of the river lamprey.

Brook lamprey: Surveying of brook lamprey spawning activity had been undertaken in the Erne catchment since 2004, led by locally-based officers of the then-Northern Regional Fisheries Board. The strategies for redd location and data collection were applied in 2010 in a series of streams to expand baseline information on characteristics of brook lamprey redds and spawning sites. Redd counting was undertaken in ten channels to assess the activity of brook lamprey spawning activity during April and May 2010 (Figure 2.6). Data collected on a number of Erne catchment streams between 2004 and 2007 was also included. The monitoring of brook lamprey spawning activity was undertaken in the months of April and May when most brook lamprey spawning occurred. The surveys were undertaken on channels where suitable habitat was present for spawning activity. Redds were counted and measured based on the presence of brook lamprey and/or presence of excavation consistent with active fish. The size of structures and spawning fish confirmed that only brook lamprey redds were assessed.

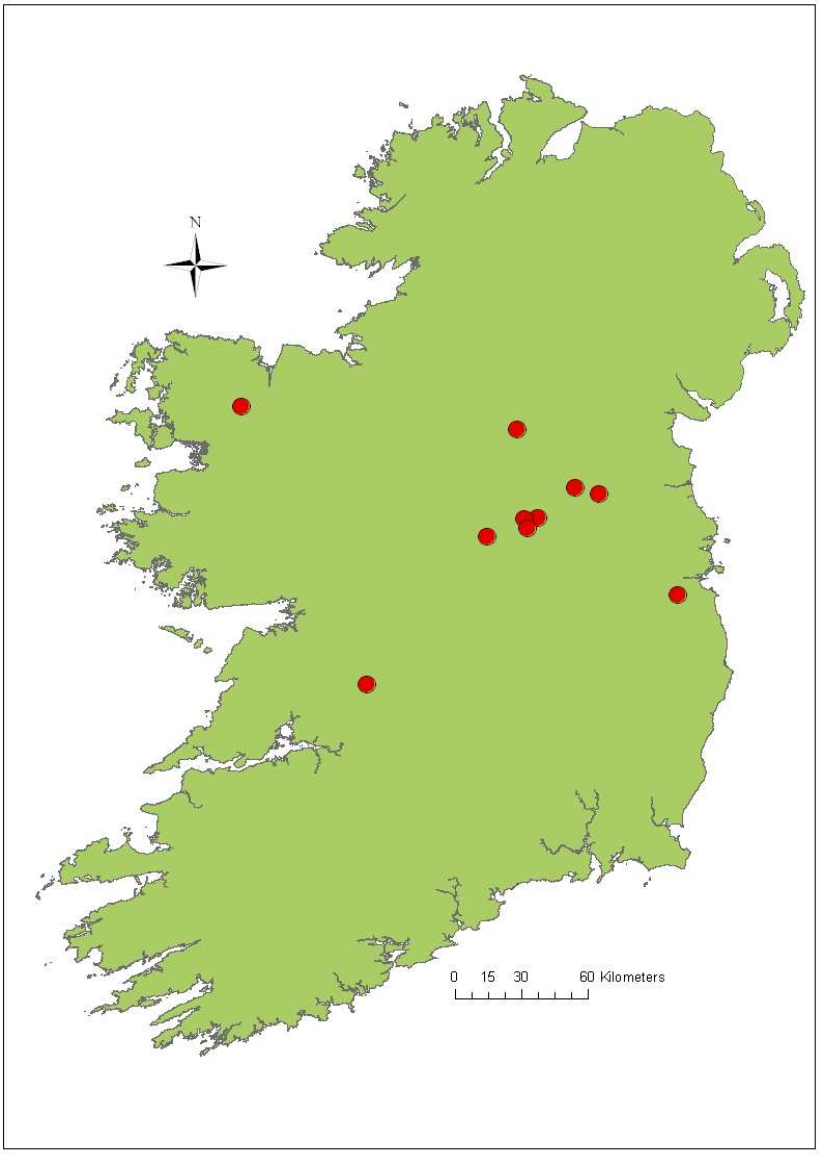

Figure 2.6. Locations of channels surveyed for brook lamprey redds.

A number of parameters were measured at individual redds. These included, redd depth, redd diameter, water depth and the height of the gravel mound downstream of the excavated redd (Figure 2.7).

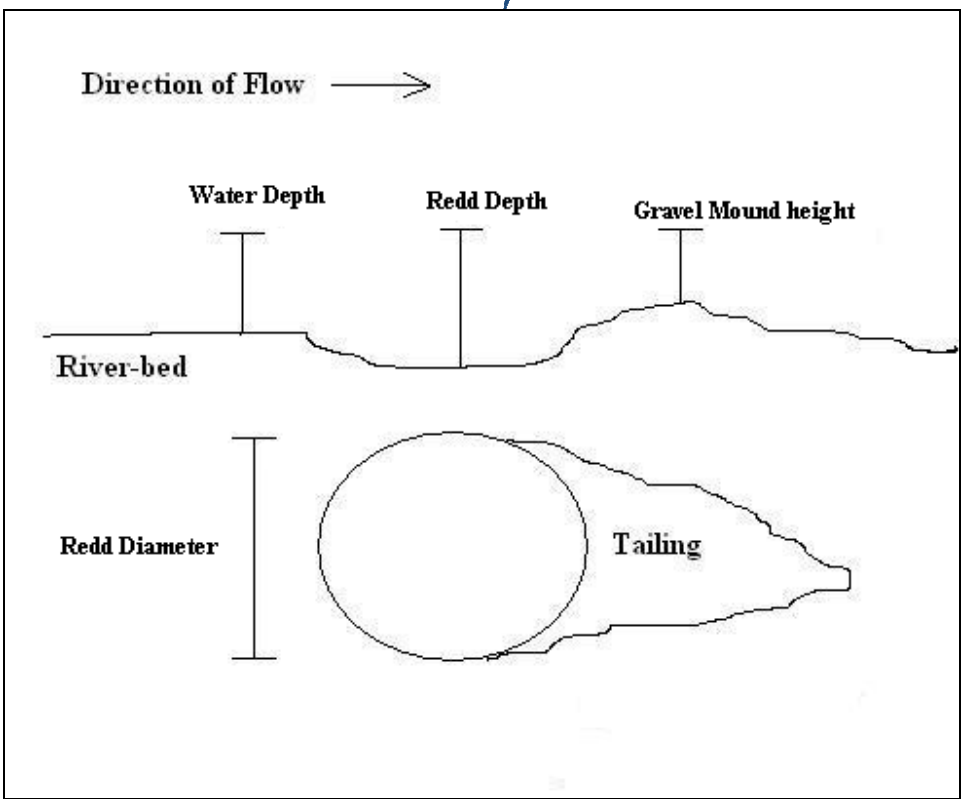

Figure 2.7. Diagram illustrating measurements collected from brook lamprey redds.

Redd dimensions: The majority of redds were shallow excavations between 20-49mm deep (Figure 2.8).Redd diameters ranged between 70 to 100mm for the majority of sites (Figure 2.8). The gravel mound height was generally 20mm on the majority of occasions (Figure 2.8).

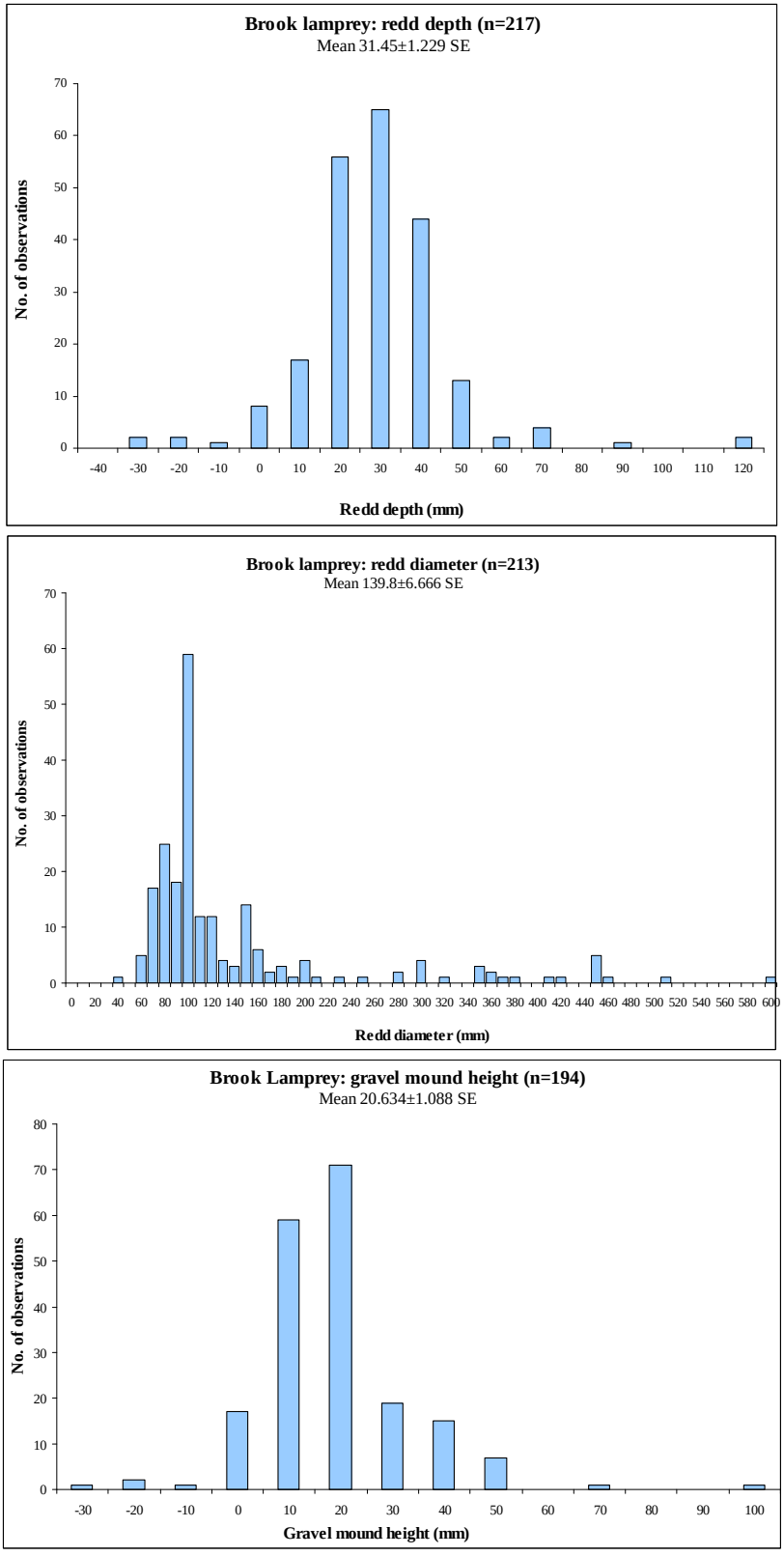

Figure 2.8. Redd dimensions at brook lamprey spawning sites on a number of channels recorded between 2004 and 2010.

Lamprey observed actively digging a redd were generally solitary fish (n=23). At 51% of sites 2 – 4 adult fish were observed. Over the study period (2004 - 2010) the earliest survey was undertaken on 10/04/2007 at which time 21 redds were observed with 29% active. The latest survey was undertaken on 27/05/2004 when nine redds were encountered of which 1 was active.

River lamprey: No specific survey work was undertaken for river lamprey in 2010. No evidence of river lamprey spawning activity was recorded during brook lamprey spawning surveys.

It had been planned to radio tag adult river lamprey in their autumn migration upriver in specified catchments. However, the tag technology proposed was considered unsuitable in view of tag size relative to lamprey size. The underlying intention had been to radio-track adult river lamprey to their spawning locations and pinpoint actual sites of spawning.

Sea lamprey: The Habitats Directive team worked closely with the Mulkear LIFE Project, one of whose project strands was looking at status of sea lamprey and issues for passage over weirs and barriers in the Mulkear catchment. The two teams worked together and radio-tagged 50 sea lamprey, captured downstream of the weir in Annacotty in late May 2010. One batch was released at the locations of capture while a second batch was released upstream of the Annacotty weir. The tagged fish were tracked on a series of occasions during May, June and into July 2010. There was no evidence of tagged fish successfully negotiating upstream over Annacotty weir, whereas a number of the fish released upstream dropped back downstream over time. Some of the fish released upstream swam further upstream to the next barrier, *circa* 1 km above Annacotty. There was no evidence of any success in passing this weir and considerable tag loss occurred at the downstream side of this barrier. In addition to those fish dropping down below the Annacotty weir, some sea lamprey dropped downstream altogether back into the main-stem R. Shannon itself.

The study to date has yielded valuable results in regard to capacity to surmount barriers, tag loss and downstream 'retreat' in search of spawning areas. It was planned to undertake complimentary tracking of sea lamprey within a second catchment, in this instance the R. Barrow. Efforts to capture, radiotag and track adult sea lamprey in this river were, however, largely unsuccessful. One single individual was captured *via* fyke-netting in the upper tidal limits of the river at St. Mullins during early May 2010. This sea lamprey was radiotagged and released immediately upstream of a major barrier, the St. Mullins weir. Over the subsequent 3 weeks the sea lamprey slowly but steadily travelled upriver, ultimately arriving at the base of the next major barrier, Carriglead Weir, 2.5 km upstream. No movement was recorded beyond this point.

A second strand of the sea lamprey work in 2010 involved float-over surveys on the main stem of two selected SAC channels – the Slaney and Munster Blackwater - to identify locations of sea lamprey spawning and to enumerate redds. This survey replicated one previously undertaken in 2003 (King and Linnane 2004). There were indications of redd concentration downstream of major weirs, an issue identified in previous float-over surveys by IFI staff.

The River Slaney was surveyed on the 5-6th and 9th of July 2010. The survey was performed by boat between Bunclody and Enniscorthy (Figure 2.10). Once an area of suitable spawning gravels was encountered a GPS reading was taken at the start and the end of the section. The gravelled riffle was surveyed and the number of redds present were counted.

No redds were identified upstream of the weir at Clohamon. However, two redds were identified immediately downstream of the weir with a further seven located within a 1.5km stretch downstream of the weir. The length of stretches at which suitable spawning habitat was present varied between 20 meters and 540 meters, with the number of redds present varying between one and nine redds at suitable spawning locations. In total, 39 areas of suitable spawning conditions were encountered, of which 21 displayed evidence of redd excavation.

The data was compiled and presented displaying the number of redds observed and the distance upstream/downstream of the sizable Clohamon Weir (Figure 2.9). Another possible impediment to upstream migration was Ballycarney Bridge. At the time of the survey water levels were relatively low and a steep gradient was encountered immediately downstream of the bridge. From the data collected, 75% of redds observed were downstream of this bridge. A high density of redds was located between Scarawalsh bridge and Enniscorthy. Between these locations there were fifteen areas of suitable bed material, with redds identified at twelve of these graveled areas. Higher densities of redds were recorded, in total 61 redds, in this 8 kilometer stretch. (Figure 2.9).

Figure 2.9. Clohamon Weir, at extremely low water levels.

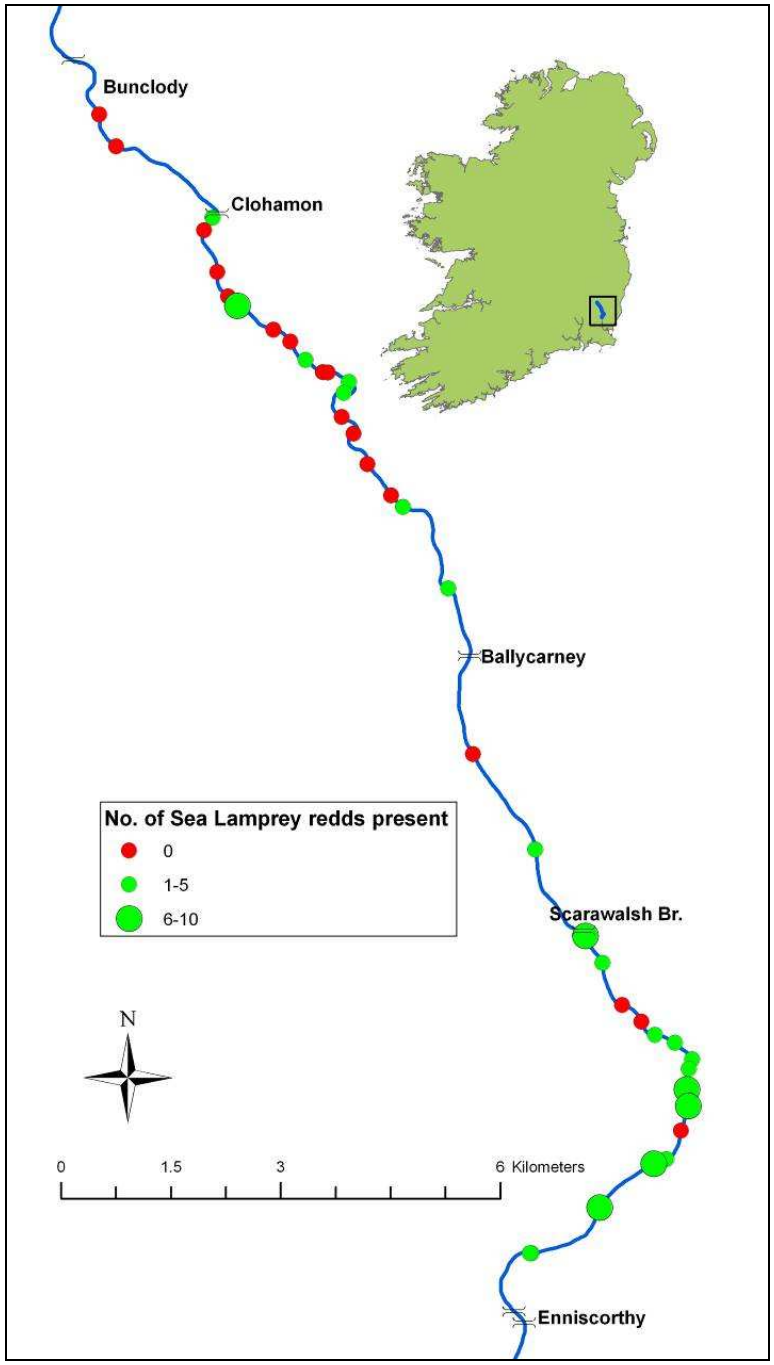

Figure 2.10. Map displaying the section of the River Slaney surveyed and the locations and numbers of Sea Lamprey redds.

As part of the float-over surveys, data was collected on sea lamprey redd dimensions and samples of bed material were taken adjacent to redds. This information was added to a developing baseline. Results for bed material were averaged across all sites from each of the rivers surveyed during 2010 to produce a single cumulative frequency distribution for each river, respectively. For comparison, these were plotted alongside similar curves generated for rivers (n=5) surveyed during 2009 (Figure 2.11). The composition of typical sea lamprey spawning habitat across the seven systems was highly consistent throughout.

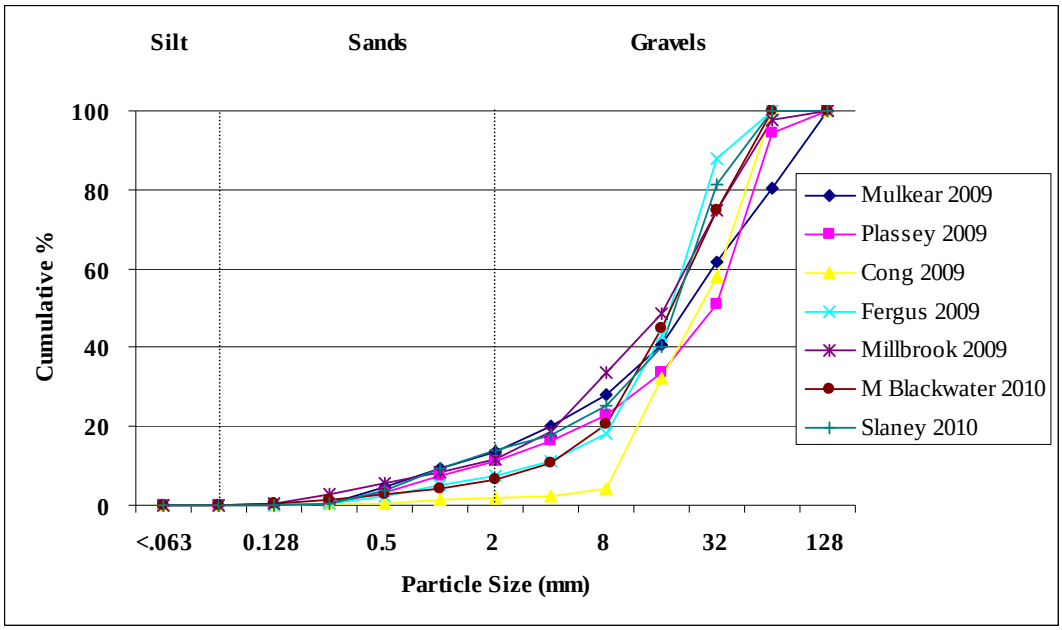

Figure 2.11. Averaged cumulative frequency plots of sediment composition from sea lamprey spawning locations collected during 2009 and 2010

The various individual observations (n=20) were further pooled to derive a single average cumulative frequency distribution for sea lamprey in general (Figure 2.12). The median particle size (D_{50}) was 46.2mm. Particle size fractions of 32mm-64mm and 64-128mm (large gravels and small-medium cobbles) dominated, accounting for 55.5% by mass of the averaged sample.

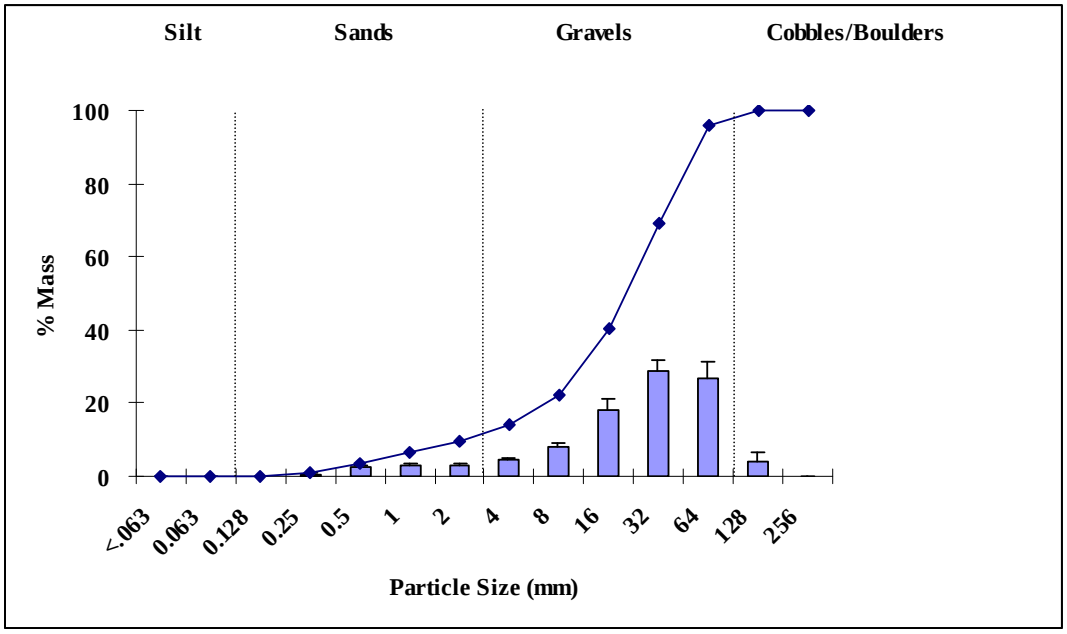

Figure 2.12. Averaged cumulative frequency & distribution plot of sediment composition from sea lamprey spawning locations collected during 2009 and 2010

2.3 Non-migratory adult lamprey:

Information collection and access to samples in 2009 indicated the occurrence of non-migratory lamprey in a number of Irish lakes, with information coming from L. Derg (Shannon), L. Conn and the Killarney lakes.

In 2010, staff of the Western RBD working out of Ballina carried out a substantial canvassing and information campaign to alert anglers on L. Conn and to elicit their support in retaining samples of lamprey that might emerge attached to their catch. Despite many stories of lamprey, only a small number of samples came into the possession of the Western RBD staff. These were retained for examination. All proved to be sea lamprey, based on the dental patterns, and tissue samples were retained for genetic investigations.

A similar data collection campaign was underway in L. Derg, headed by the L. Derg Native Fish Biodiversity group. That group kindly shared information with the IFI Habitats Directive team and duplicate samples of tissue were retained for genetic analysis.

A single specimen of non-migratory lamprey was presented from L. Corrib in 2010 and a single sample was also presented from Muckross Lake in Killarney, where long-distance swimmers occasionally act as 'hosts' to these lamprey.

In the majority of cases, the lamprey were captured during the mayfly season when a high level of angling activity occurred on these lakes.

Figure 2.13. Non-migratory lamprey found attached to swimmer, Muckross Lake, Killarney, July 2010

Figure 2.13. Dental structure of anadromous sea lamprey from coast off Ballycotton (left) and non-migratory sea lamprey from L. Derg (right).

3. Shad Programme

There are three principal components to this programme – one each for adult and juvenile anadromous shad (Figure 3.1) and one for the land-locked Killarney shad. These programmes are largely confined to the Special Areas of Conservation (SACs) designated in respect of shad – the Slaney, Barrow-Nore, Suir and Munster Blackwater for anadromous shad and L. Leane for the Killarney shad. As with 2009, the survey investigations in 2010 focussed on the anadromous shad.

Figure 3.1. Adult and juvenile anadromous shad from the River Barrow.

3.1 Adult anadromous shad surveys:

Observations on shad spawning were undertaken at St. Mullins on the R. Barrow on two occasions in early June 2010. Staff, working in pairs, walked the riverbank in the area known anecdotally as the stretch where spawning activity occurred. Observations took place between the hours of 23.00 and 01.00. The first set of observations took place at full tide condition and the second series at low tide. On both occasions activity, consistent with reports of shad spawning in the scientific literature, was noted. The degree of water disturbance and of noise from fish slapping the water surface was low but the disturbance noted was not consistent with any other animal life activity.

Water and air temperature were recorded and the transect lines where activity occurred were GPS-recorded. Following the second set of spawning observations, information was collected on water depth, velocity and bed condition across four transects where activity had been recorded. Transects ranged from 50 – 60 metres in length and the water depth, at time of sampling on low tide, ranged from 0.26 to 0.8 metres. The recorded velocity distributions fluctuated widely across each transect, ranging between low levels of 0.22 metres/s to a maximum value of 1.1 metres/s.

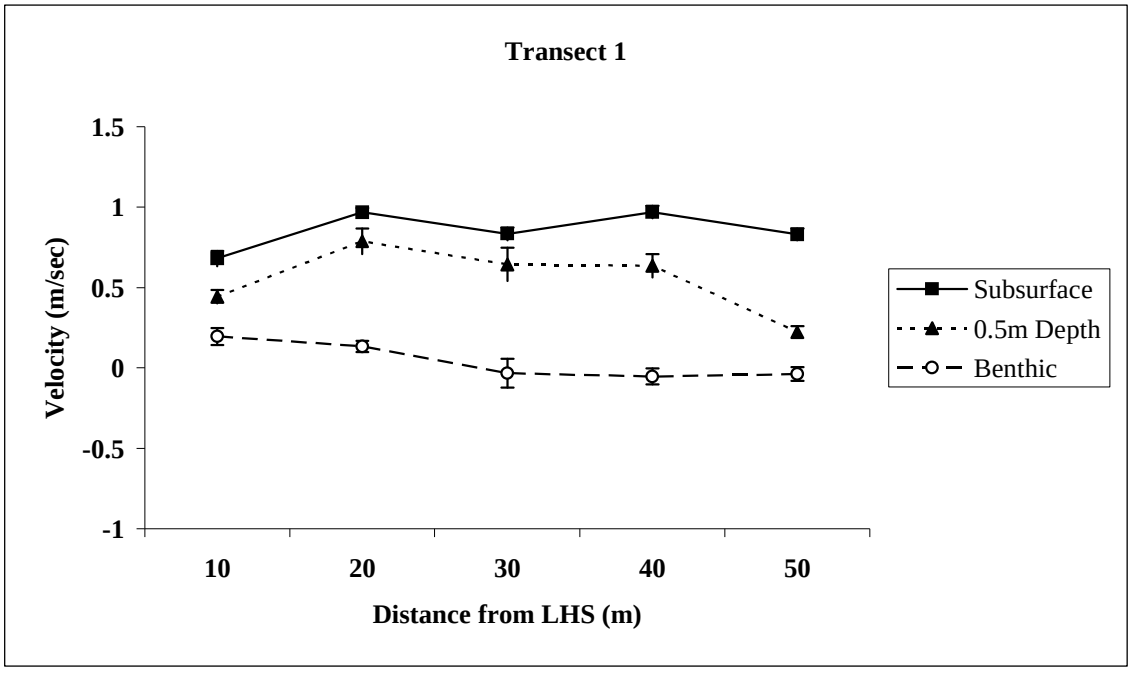

Figure 3.2. Velocity distributions at three depth levels on a transect at St. Mullins shad spawning grounds, June 2010.

At 10-metre spacings, velocity was measured at three points in the water column. The subsurface and 0.5 m depth readings showed a similar pattern whereas the benthic samples, measured 5 cm from the bed, showed a consistent pattern of low velocity (Figure 3.2). The shad release their eggs into the open water, where fertilization may take place. Eggs may settle to the bottom or may float and develop as they travel. The low velocity regime at the channel bed may be conducive to egg development. However, direct observation of the channel bed indicated a wide range of niches. Some areas consisted of gravel and cobble material with substantial interstitial spaces available for eggs. Other areas of the bed were heavily covered with filamentous algal cover and/or macrophytes (Figure 3.3 a and b)

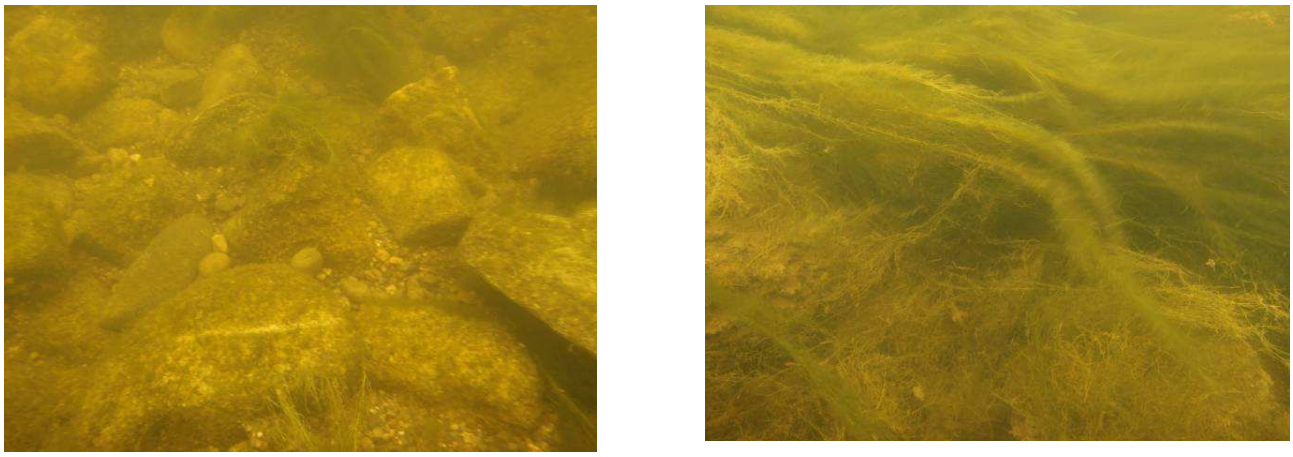

Figure 3.3. Bed material encountered along transects at shad spawning locations (a) cobble – gravel deposits and (b) overlay of filamentous algae.

The plant overlays would not be considered conducive to development of the larval and post-larval stages of the shads. A further problem, of potentially greater significance, emerged during 2010 with confirmation of the presence of large populations of the highly invasive bivalve cockle *Corbicula fluminea*. This mollusc can self-fertilise and can form areas of dense monoculture cover on the river bed. Rates of filtration and size of material retained is high and there must be concern for the spawning shad population of the R. Barrow, in terms of smothering-out of eggs dropping to the bottom and of filtering-out of eggs and larvae from the water column.

3.2 Juvenile shad surveys:

Trials using a bongo-net set-up (Figure 3.4) were undertaken in June 2010 on the R. Barrow downstream of St. Mullins. The apparatus consists of a light-weight metal frame with two fine-mesh conical nets attached. The frame can be towed behind a boat or, in this case, suspended from the front of the boat. The open mouths of the nets (50 cm diameter) are set to face the direction of flow and the gear can fish passively, by holding station with the boat's engine, or can be fished actively by driving slowly into the flow. Start and finish points were recorded using GPS and water velocity was recorded using a flow meter. Planktonic material, including fish eggs, larvae and juvenile fish collect in the cod-end of each net.

Figure 3.4. Bongo net and IFI boat crew, St. Mullins, June 2010.

Transits of 15 minute duration were undertaken and material collected was rinsed through a fine-mesh sieve (Figure 3.5), debris removed and any biotic material stored in alcohol for later examination.

Figure 3.5. Crustaceans and post-larval fish collected from bongo net.

The sampling indicated the presence of juvenile smelt and gobies. No juvenile shad were recorded in 2010. This may have been due to an insufficient time lapse between spawning time and occurrence of juvenile shad (post-larvae) in the water column. The presence of smelt pointed to successful recruitment by this species in the Barrow in 2010. The Bongo netting technique will be trialled further in 2011.

4. Pollan Programme in 2010

Pollan are found in a small number of large lakes in Ireland and are considered a glacial relict form. They are known from L. Derg and L. Ree on the Shannon as well as L. Neagh and Lower L. Erne in Northern Ireland. More recently, they have been found in L. Allen on the Shannon (Figure 4.1).

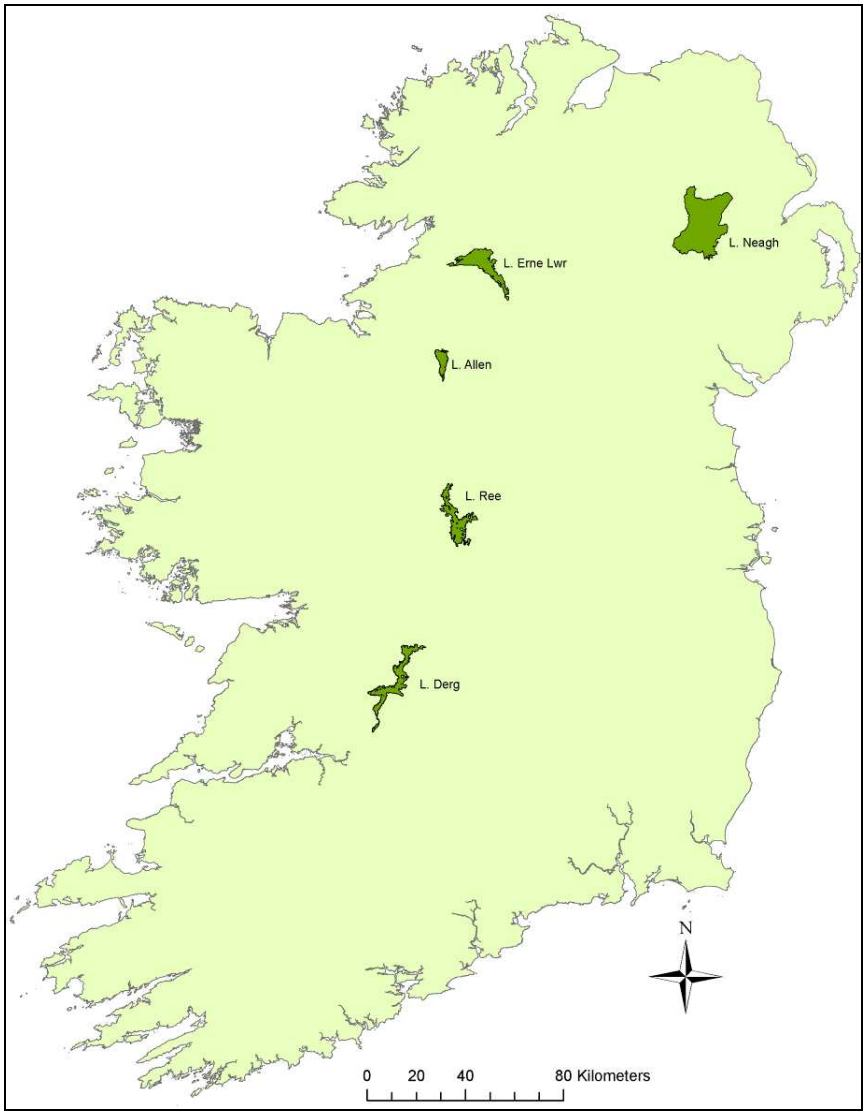

Figure 4.1. Locations of pollan lakes in Ireland.

4.1 Status survey in L. Ree:

In 2010, the survey team linked in with the Water Framework Directive (WFD) fish survey team of IFI in undertaking a scheduled WFD fish survey on L. Ree. This would generate information on pollan, as well as the other fish species present. Additional focussed sampling for pollan was also undertaken. This approach was cost-effective, accommodating both WFD and Habitats Directive requirements. The WFD survey included both conventional netting and remote sensing with hydroacoustics (Figure 4.2). Weather conditions during the L. Ree survey were very suitable for deployment of hydroacoustic gear and a series of 'clouds', consistent with occurrence of pollan, were identified. Ground truthing confirmed the presence of pollan in shoal patterns and a number of pollan, of varying sizes, were taken in the overall survey.

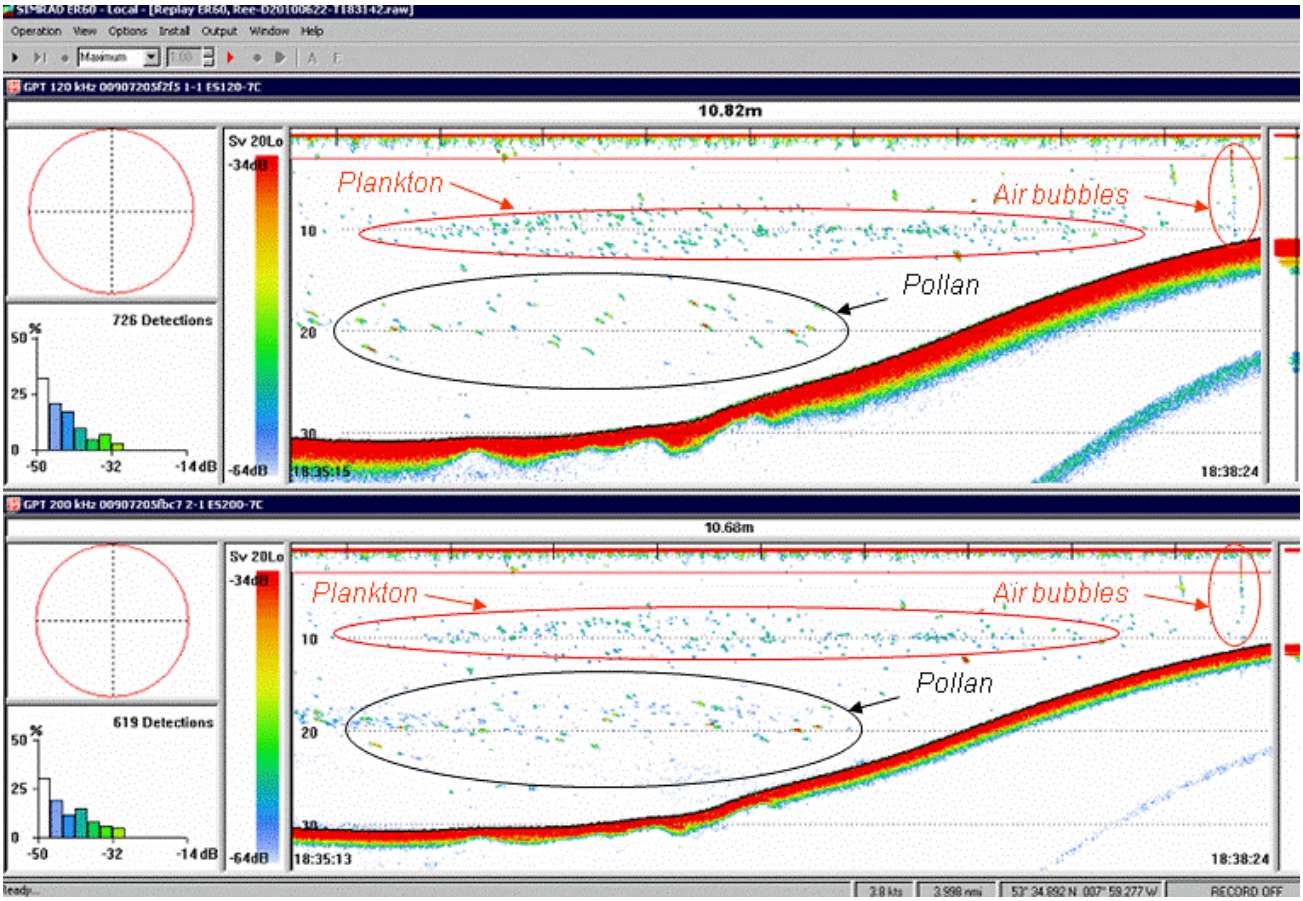

Figure 4.2. Hydroacoustic patterns of pollan recorded on Lough Ree.

Analysis of the hydroacoustic patterns indicated a modest population of pollan in L. Ree. The population appeared to be larger than was thought to occur and the ground-truthing indicated a range of sizes or age classes (Figure 4.3). However, it is considered premature to think that the L. Ree population is at good conservation status.

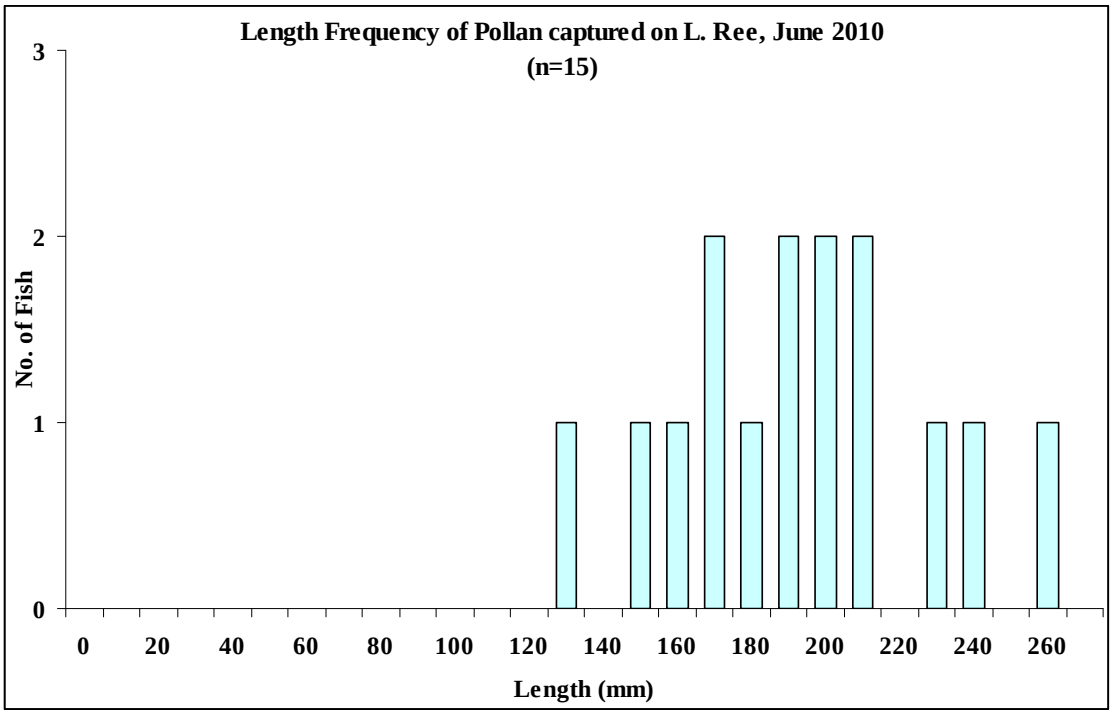

Figure 4.3. Length frequency of pollan from Lough Ree.

4.2 Pollan by-catch in Killaloe eel fishery:

Pollan, presumed to be of L. Derg origin, were made available by IFI colleagues working out of Limerick and were collected over the winter period December 2010 – January 2011. As with material collected by IFI Limerick colleagues in winter 2009, these fish came from by-catch of eel nets set at Killaloe. Individual fish were found over a period of different dates from early November to mid December 2009. All fish were sexually immature, including two fish of 20 and 24 cm. The presence of two distinct size groups, even in such a small sample, would point to the presence of two age groups, indicating that spawning of pollan is ongoing. Comparison with by-catch of 2009-10 (Figure 4.4) indicated broad overlap in sizes, with the larger fish in 2011 being of greater size than

those taken the previous winter.

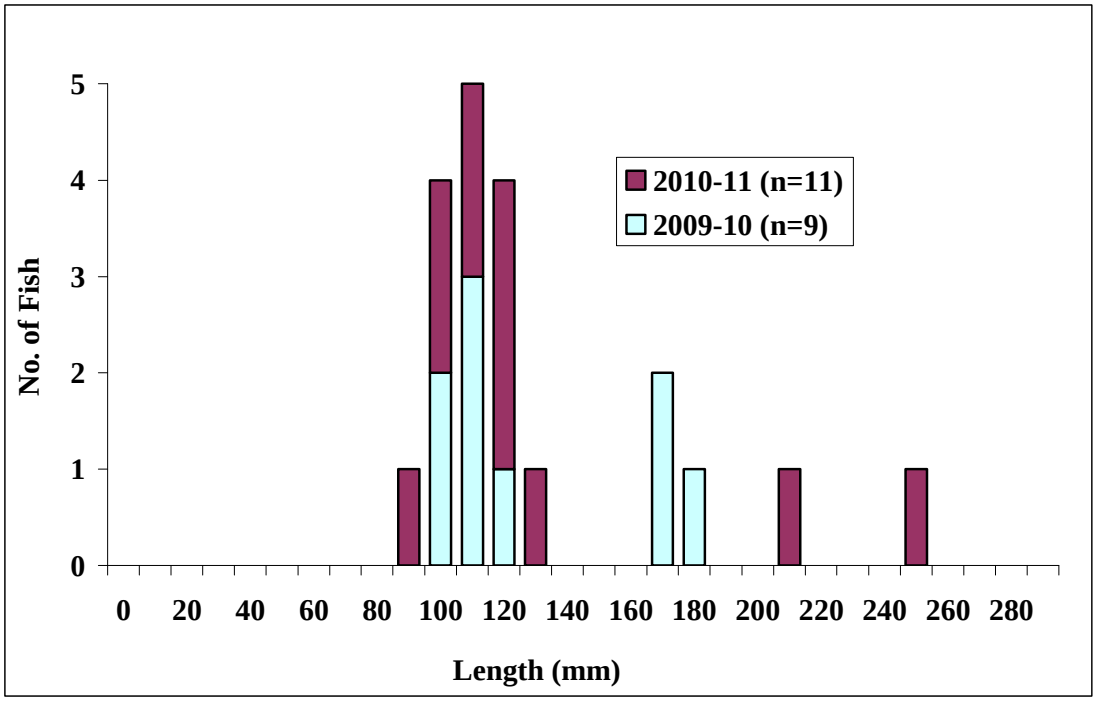

Figure 4.4. Length-frequency of pollan from eel net by-catch, Killaloe, Autumn-Winter 2009 and 2010.

4.3 Captive breeding programme for pollan:

The All-Ireland Species Action Plan (SAP) for pollan identified the tenuous status of the species in its known habitats on the island, apart from the apparently robust population on L. Neagh. The idea of creating 'reservoir' or 'ark' populations as a conservation measure was one of the proposals in the SAP. The underlying idea is that ripe adult fish would be captured from e.g. L. Derg and be stripped for rearing-on of juveniles. These juveniles could then be introduced into a 'donor' water or 'reservoir' where the physical, chemical and biological conditions would permit them to grow on, survive and spawn in turn. These would be the unique genetic progeny of the parent lake and could be used to re-populate the parent lake, as well as acting as a genetic reservoir. In essence, one such 'reservoir' would be required for each Irish lake population.

Successful artificial fertilisation and on-rearing has been undertaken at the Movanagher Hatchery in Northern Ireland. During 2009, CFB staff involved in fish husbandry visited the Movanagher unit and reviewed husbandry requirements with staff there. IFI has now established facilities at the Roscrea fish farm with a view to captive breeding being undertaken. These include an isolated area for rearing, to reduce contamination issues, a recirculation system to maintain low temperatures and tanks for hatching and fry development (Figure 4.5). The facilities were developed in the context of overall developments at the IFI Roscrea installation and with advice of the Marine Institute's Fish Health Unit. The unit was completed and the installation commissioned in autumn 2010 in readiness for any pollan material.

Figure 4.5. Pollan unit. Isolation unit and recirculation unit prior to full commissioning, 2010.

4.4 Sampling for spawning pollan in L. Derg:

As part of the overall captive breeding programme, winter sampling for spawning pollan was undertaken in L. Derg. Fyke nets were set overnight in a series of shallow, exposed shoreline area adjacent to deep water in L. Derg on a series of occasions between November 2010 and January 2011. This sampling was undertaken with colleagues from IFI based in Limerick. Weather conditions were severe, with extended periods of snow, and low water temperatures were a feature. No spawning pollan were taken in any of the sampling events.

Future sampling for spawning fish would be aided by preliminary assessment and selection of 'most-likely' spawning habitat, based on exposure, bed materials and proximity to deep water. Hydroacoustic surveys to detect pollan shoals in pre-spawning locations during November - December would be highly desirable, should suitable calm weather conditions permit.

5. Smelt Programme in 2010

The smelt has a curiously dispersed distribution on the island of Ireland, being represented by populations in the Foyle, the Shannon and in the large estuaries of the southeast (Figure 5.1). It is of importance for smelt conservation to determine if populations in a waterbody are spawning, rather than merely visitors, and if so, what the level of recruitment is.

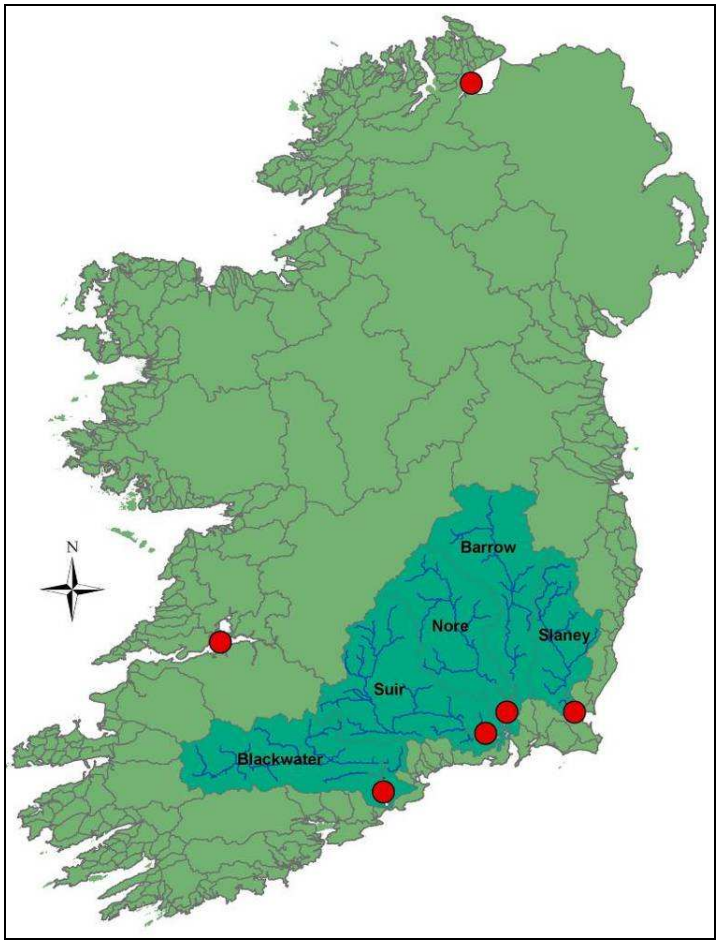

Figure 5.1. Map of Ireland indicating locations of smelt populations.

5.1 Spawning surveys:

In March 2010, overnight fyke netting was undertaken with colleagues of the Loughs Agency in the upper tidal limit areas of the Foyle and its tributaries, the Deele, Finn and Dennet to ascertain the presence of ripe or spawning smelt. Adult fish (n = 121), comprising both ripe males (n = 93) and females (n = 16) were captured in the main Foyle, the Finn and Deele. Lengths ranged from 142 mm to 221 (average =177 mm, Figure 5.1).

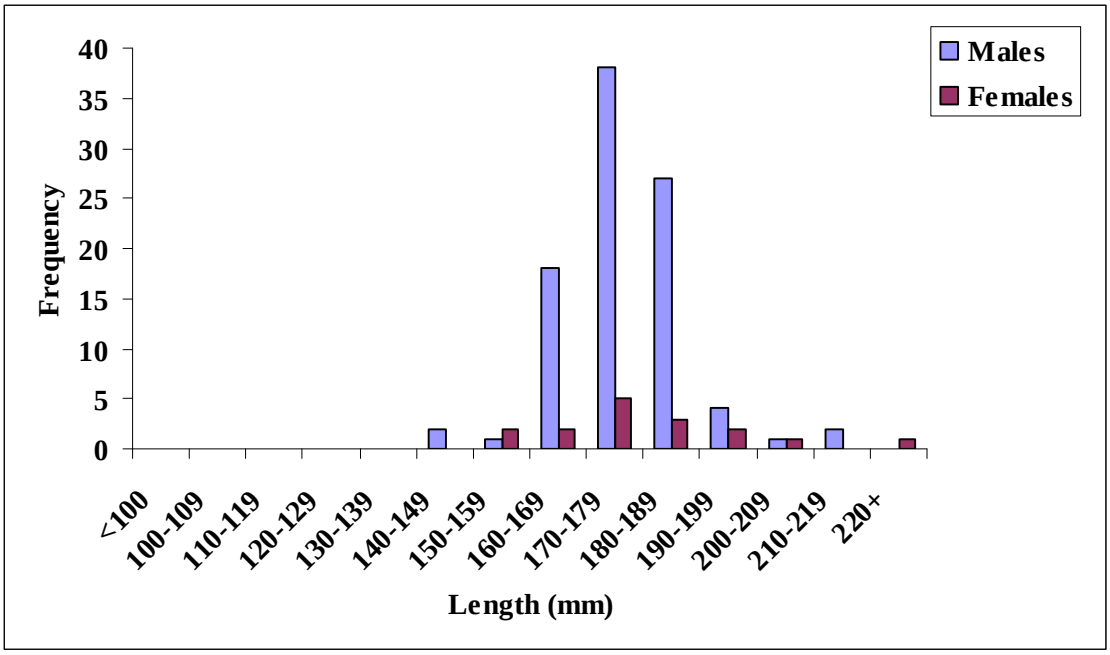

Figure 5.1. Length frequency distribution of adult smelt (n = 121) captured at four locations in the Foyle Estuary & tidal tributaries during March 2010.

These locations were re-sampled four weeks later during April 2010. Substantially smaller catches were registered on this occasion (n = 7), suggesting the main spawning run had finished. All fish were male, with an average length of 155 mm (range 134 – 180 mm, Figure 5.2)

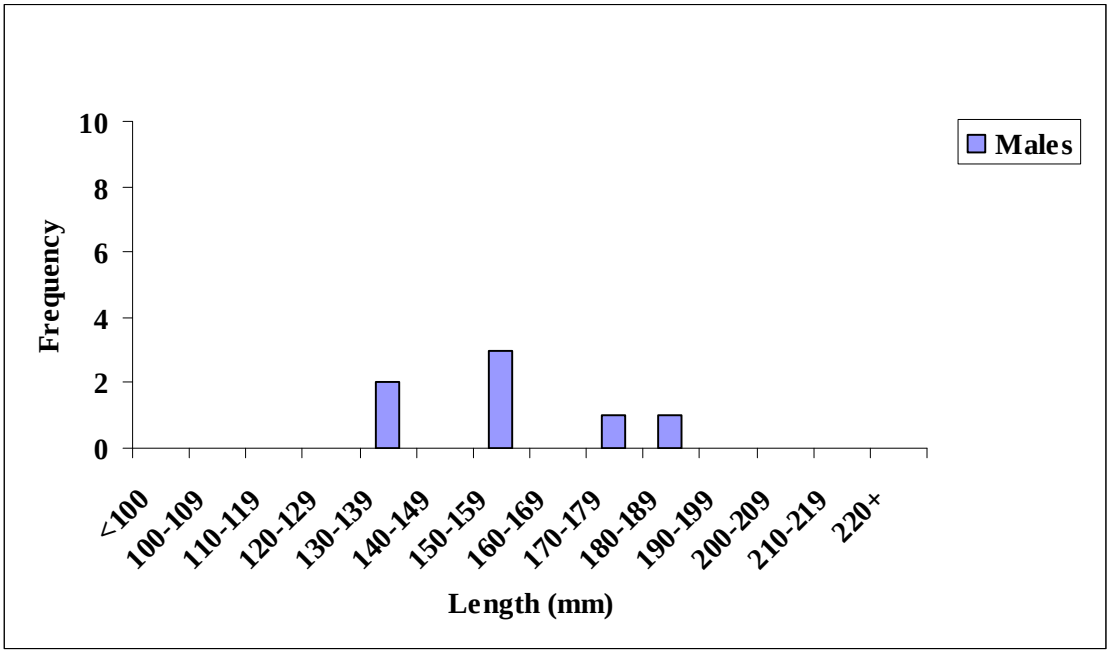

Figure 5.2. Length frequency distribution of adult smelt (n = 7) captured at four locations in the Foyle Estuary & tidal tributaries during April 2010.

Fyke net surveying was undertaken at two locations on Shannon Estuary during March 2010, namely the R. Shannon in Limerick City and the R. Fergus at Clarecastle, Co. Clare. Large numbers of smelt were encountered at the former location (n = 278). Adults ranged in size from 113 mm to 216 mm (average = 157, Figure 5.3).

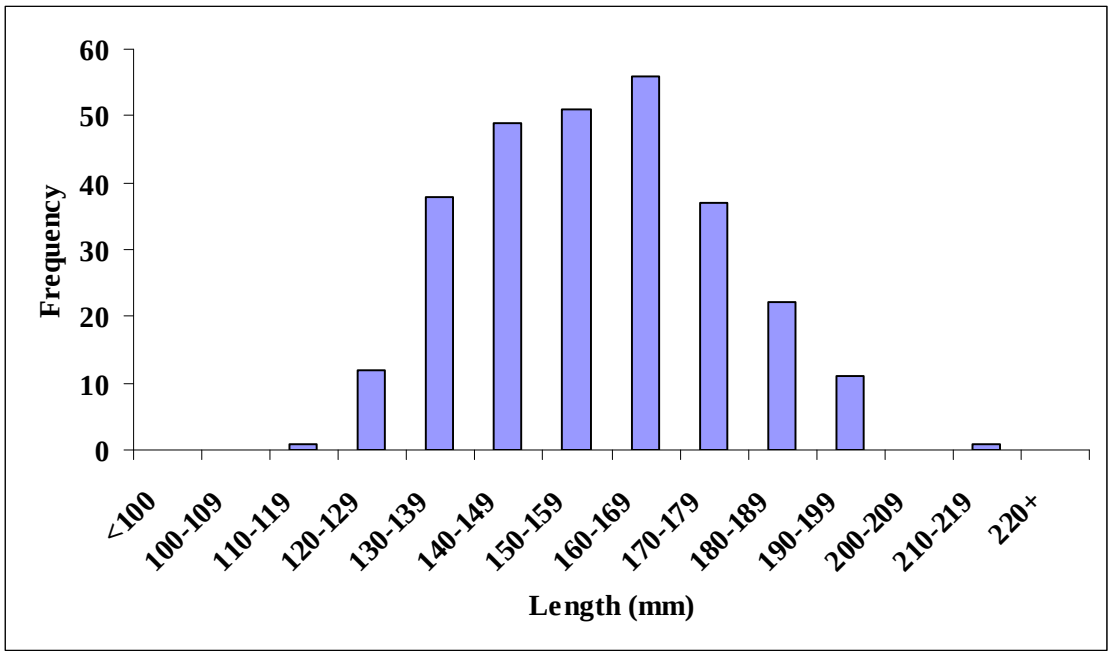

Figure 5.3. Length frequency distribution of adult smelt (n = 278) captured on the R. Shannon in Limerick City during March 2010.

Fewer individuals (n = 10) were encountered on the R. Fergus at Clarecastle. Smelt in this smaller sample ranged from 141 mm to 183 mm in length (average = 161.4, Figure 5.4).

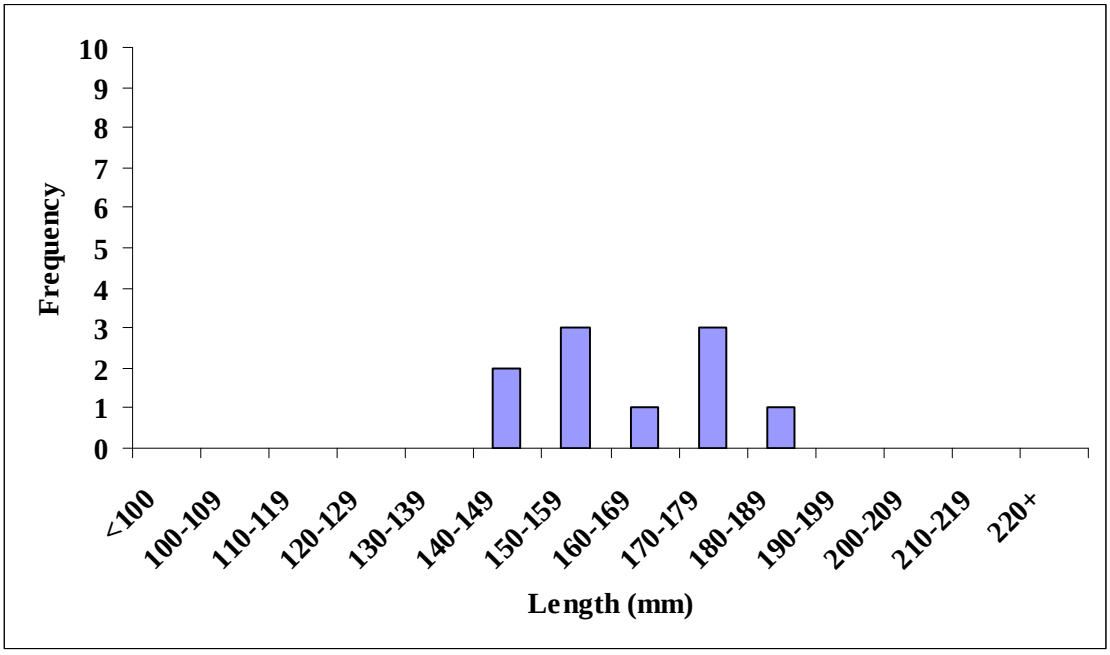

Figure 5.4. Length frequency distribution of adult smelt (n = 278) captured on the R. Fergus at Clarecastle, Co. Clare during March 2010.

6. Char Programme in 2010

In 2010, the IFI Habitats Directive team worked closely with colleagues in IFI Galway and IFI Ballyshannon to shortlist a number of likely candidate lakes for survey. The shortlisting was aided by the baseline list compiled by Igoe et al (2004) and omitted waters that would be surveyed by IFI's Water Framework Directive team. Two waters were identified for 2010 in each River Basin District – Glendollagh and Fee in Connemara and Nacung and Nanuarragh in Donegal. The survey strategy was the same as that used by the IFI's WFD Lakes Monitoring team, enabling interchange and comparison of data sets. In all cases, a bathymetry survey is required to determine extent of netting effort and locations of nets. This data was not available for L. Nacung and for L. Fee and surveys were undertaken on both waters in August and September 2010, respectively, with locally-based IFI staff. Bathymetry surveys were undertaken on the other two waters in 2010, again working with locally-based IFI staff. However, the timing of migratory salmon and sea trout runs, coupled with unfavourable weather conditions, prevented undertaking of the netting surveys on these lakes and the surveys were deferred until 2011.

Figure 6.1. Trout & Char (bottom-left), L. Nacung, Co. Donegal, August 2010.

Figure 6.2. Char, L. Nacung, Co. Donegal, August 2010

Figure 6.3. L. Nacung, Co. Donegal, August 2010

Figure 6.4. L. Fee, Co. Galway, September 2010

The surveys indicated the presence of char in both lakes examined. L. Nacung (208 ha) was surveyed over three nights in August 2010. A total of 29 locations, representative of the area and depth profile, were sampled using nets. A total of 7 char were captured, ranging in size from 68 mm to 185mm fork length (average = 147 mm, Figure 6.5). The sample comprised both sexes (3♂, 3♀, 1 immature). All three female fish were gravid with maturing eggs evident. Char were captured in nets set at a number of depths, namely 0-3 m, 6-12 m, 20-35 m and surface floating. Other species encountered included brown trout, sea trout and eel.

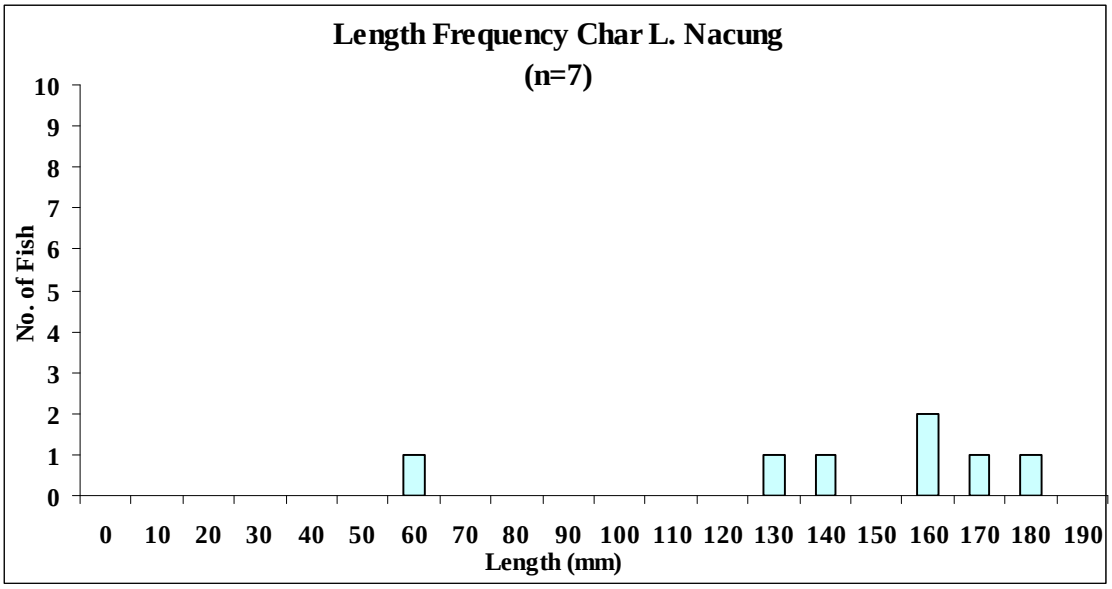

Figure 6.5. Length frequency distribution of char in Lough Nacung, based on netting survey, August 2010.

Surveying was undertaken on L. Fee over three nights during September 2010 at a total of 31 locations. The netting survey provided a large sample of char (n = 36) ranging in size from 50 mm to 213 mm fork length (average = 84 mm, Figure 6.6). Gender was discernable for individuals over 140 mm (3♂, 4♀). Egg development was particularly well-advanced for two of the female fish. Char were captured in nets set at 0-3 m, 3-6 m and 6-12 m depth. Other species encountered included brown trout, sea trout, salmon and eel.

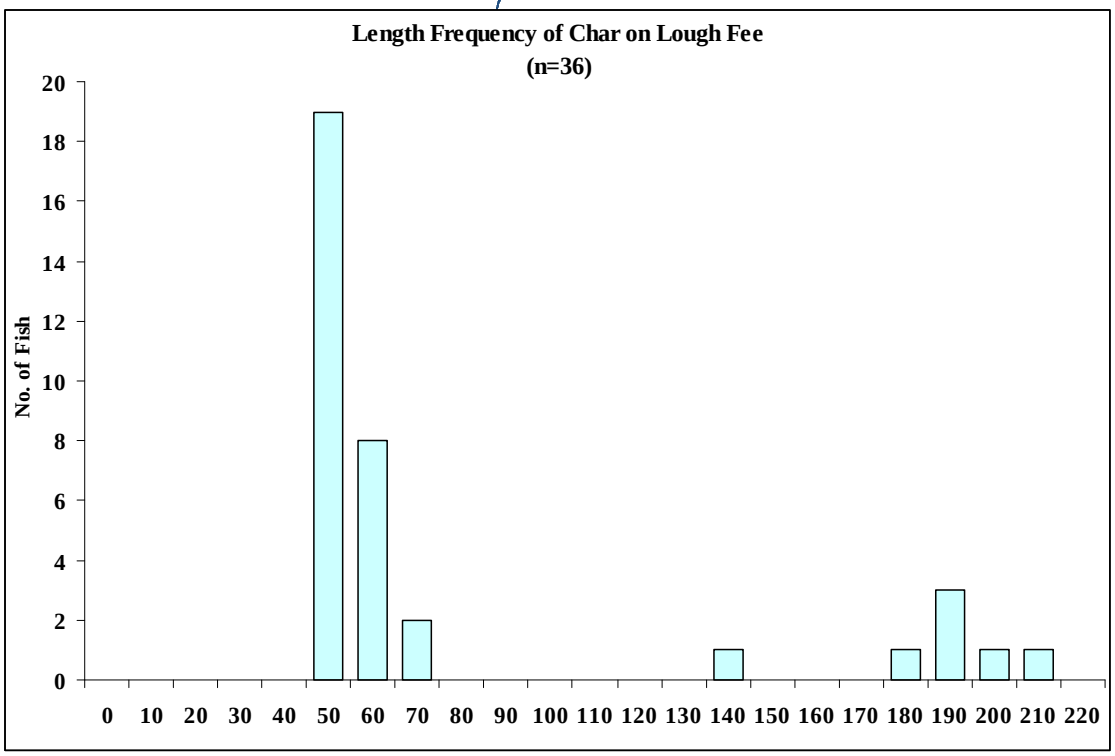

Figure 6.6. Length frequency distribution of char in Lough Fee, based on netting survey, September 2010.

7. Looking Forward

The surveys undertaken in 2010 form part of an overall suite of works that require to be completed by 2013. This is the next 'due-date' for reporting to the EU on the status of Annex II species within the national territory. This latter is significant for, while species under Annex II of Habitats Directive must have Special Areas of Conservation (SACs) designated for them, the report on status to the EU relates to the species and its status throughout the national territory, not just within SACs.

The **lamprey** programme will have a further suite of catchments targeted in 2011, as this is the most cost-effective strategy in determining status, distribution and 'health' of populations in channels. Pre-planning work completed for the Suck and Owenmore-Unshin systems identifies these as among the target catchments for 2011. It is hoped that locally-based IFI staff will be in a position to play a key role in the actual surveys, as per the catchment-wide programme for juvenile salmon. It is planned to have all major i.e. large, catchments surveyed for juvenile lamprey status by 2013. This will provide a baseline from which a subsequent round of monitoring can be developed, with emphasis on those channels with suitable habitat attributes capable of retaining viable spawning and nursery grounds for lamprey species. Delineation of spawning grounds for each species will also proceed up to and beyond 2013. Where spawning areas are identified, these locations can be assessed annually by staff of IFI to determine degree of spawning, as is the practice for salmon and brown trout. Use of telemetry may be appropriate in catchments where channels are accessible to recorders and the catchment is not excessively dendritic. In such cases, trapping and radio-tagging of upstream-migrating adult fish should permit identification of barriers or obstructions to migration as well as pinpointing the actual areas of spawning.

Surveys to date point to low population levels of **shad** and development of sampling protocols that yield consistent outcomes has proved problematic. Autumn estuary-based recruitment surveys for juvenile shad have a synergy with smelt recruitment surveys. Use of new and developing technologies, including ROVs (Remotely-operated vehicles) and

hydroacoustics may provide direct visual means of assessing presence of adult shad on the spawning grounds in the SACs of the southeast. The trials using bongo netting for eggs and larvae of shad will be pursued in 2011. The support of locally-based IFI staff with local expertise of estuarine and tidal conditions is fundamental to successful surveying for shad and other species in estuarine waters.

Assessing the status of **pollan** has proved problematic. The strategies adopted on L. Derg and L. Ree, including the synergy with the IFI's Water Framework Directive fish survey team, was appropriate and facilitated a substantial netting effort on the target water. The same overall sampling approach, for adult fish in summer and for spawning grounds, will be pursued in 2011 and beyond.

The **char** sampling protocol used in this report mirrors that used for netting lakes by the IFI's WFD team. In addition, the WFD team has a suite of waters to survey on a 3-year rolling cycle. Several of these contain significant populations of char and the information generated can feed into an overall IFI-National database on this species. The selection of lakes in any year to be surveyed by the Habitats Directive and Red Data Book fish species team will be made from the broader available listing of 'char' lakes, excluding those covered by the WFD team.

To date, conventional netting techniques have proved suitable in sampling for adult spawning populations of **smelt** and in assessing recruitment. These strategies will be continued. In addition, sampling must be extended to the other waters where smelt have been reported on the island of Ireland. This will involve on-going liaison with colleagues in the Shannon RBD waters within the extensive Shannon estuary as well as liaison with colleagues in the Loughs Agency and Northern Ireland Environment Agency in the waters of the Foyle system.

In the medium and longer term, the sampling and monitoring programmes should lead to:

- Development of rigorous and repeatable sampling protocols that provide information on status of target life stage of the species in question

- Data sets that contribute to informed management decisions

- Identification of necessary measures to safeguard or conserve specific taxa. These may include legislative instruments, such as bye laws to manage exploitation, and conservation measures, such as removal or modification of artificial barriers to fish passage (up- and down stream).

Project Personnel and Acknowledgements

The Central Fisheries Board/IFI Swords team involved in the Habitats Directive and Red Data Book fish investigations comprises Dr. James King, Ms. Nicola O' Gorman and Dr. Sean Rooney.

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