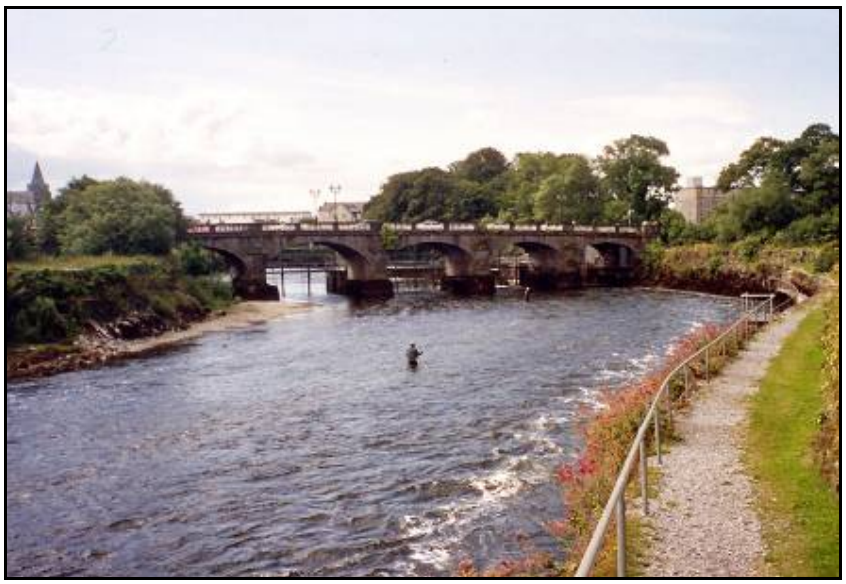
A survey of juvenile lamprey populations in the Corrib and Suir catchments



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DEPARTMENT OF THE ENVIRONMENT, HERITAGE AND LOCAL GOVERNMENT

A Survey of Juvenile Lamprey Populations in the Corrib and Suir Catchments.

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EXECUTIVE SUMMARY

Corrib

- A qualitative survey of lampreys present in the Corrib catchment was undertaken incorporating 20 rivers and 17 smaller tributaries. In total, 77 sites were visited, and an area of 437.5m^2 was surveyed. Lampreys were present at 49% of the sites investigated.

- Juvenile lampreys have a patchy distribution in the Corrib catchment. A total of 33 out of the 38 survey areas (87%) that had lampreys present were tributaries and sub-tributaries of the Lough Corrib sub-catchment. Lampreys were present at five sites investigated in the Lough Mask sub-catchment (13%), and no lampreys were recorded in the Lough Carra sub-catchment. The general distribution recorded during the current the survey is broadly similar to that recorded by Byrne *et al* (2000).

- Only one species of lamprey was confirmed from the Corrib catchment: brook lamprey *Lampetra planeri*. Sea lampreys *Petromyzon marinus* are present in the catchment but seem to be confined to below the Galway Regulating Weir. Although there are records of sea lampreys in some of the tributaries of Lough Corrib, these records pre-date the construction of the existing weir. The success of sea lamprey spawning below the regulating weir in Galway is unknown.

- Where lampreys were recorded, their densities ranged from 0.10 lampreys per m^2 to 11.71 lampreys per m^2 with a mean lamprey density of 0.92 per m^2 for the entire Corrib Catchment. Two tributaries of the Clare River yielded the highest lamprey densities in the Corrib catchment: the Sinking (11.71 per m^2) and the Nanny (11.40 per m^2).

- Lampreys recorded during the current survey ranged in size from 3.1cm to 16.0cm. The lamprey population recorded from the main channel of the River Clare was restricted to a smaller number of age groups than on the Nanny and Sinking Rivers. Evidence of recent recruitment was recorded on the Nanny, Sinking and Bealnabrack Rivers. However, no 0+ individuals were recorded at any of the sites investigated during the Corrib survey. Corrib brook lampreys had a mean myomere count of 61 with a range from 59 to 65. This is the same range as recorded in previous studies (Potter & Osborne, 1975). The overall observed transformation rate during the current survey was 12.3%.

- Most of the areas fished during the current survey were considered to be sub-optimum habitats. The Corrib catchment has been subjected to a number of drainage schemes in the past and many of the channels in the catchment have never fully recovered physically or ecologically. A few areas which were considered to have near optimum lamprey nursery habitat were also assessed. These were generally located in areas where backwater habitats developed behind bridges, at cattle drinks, or due to channel meandering and erosion. The highest densities of lampreys were found in these areas. However, based on the assessment method proposed by English Nature, lampreys are present at an unfavourable status in the Corrib catchment.

- It is concluded that the main lamprey populations in the Corrib catchment are currently protected within the existing SAC boundary area and no recommendations are made to extend the boundary area.

Suir

- Lampreys are widely distributed in the Suir catchment. A total of 58 of the 75 sites examined during the current survey had lampreys present (77%). Overall a total of 1,924 lampreys were recorded in a survey area of 663 m^2.

- During the current study lampreys were identified on the basis of their external pigmentation characteristics using the key provided by Gardiner (2003). Specimens with ambiguous pigmentation characteristics, and all sea lamprey ammocoetes, were subjected to myomere counting. Unlike the Corrib, lampreys with unusual pigmentation were common throughout the Suir catchment.

- All of the three Irish lamprey species were recorded in the Suir catchment. Sea lampreys were recorded on the main channel of the Suir downstream of Caher, Co Tipperary. This species was also present in the lower reaches of the River Tar. However, only nominal numbers of sea lampreys (n=10) were recorded. A nominal number of transformed river lampreys were also recorded on the main channel of the Suir downstream of Clonmel during October. River and brook lampreys are difficult to separate up until early winter.

- Where river/brook lampreys were recorded, their densities ranged from 0.06 per m^2 to 19.25 per m^2. An overall mean river/brook lamprey density of 2.88 per m^2 was recorded for the Suir catchment. The highest densities of lampreys recorded were on the Tar (19.25 per m^2), Outeragh (16.50 per m^2), Thonogue (9.50 per m^2) and Dawn (8.22 per m^2) river systems.

- Lampreys recorded during the current survey on the Suir ranged in size from 1.4cm to 18.9cm. Suir brook/river lampreys had a mean myomere count of 62 with a range from 57 to 66. Sea lampreys on the Suir had a mean myomere count of 72 with a range of 69 to 75. These are in the same range as reported previously from UK rivers. Overall, a total of 232 (11.7%) of the brook/river lampreys captured during the current survey were identified as being transformers.

- Most of the areas fished during the current survey were considered to be optimum habitats. Based on the assessment method proposed by English Nature, river/brook lampreys are present at a favourable status in the Suir catchment. The status of sea lampreys in the catchment is unfavourable however.

- It is concluded that the main lamprey populations in the Suir catchment are currently protected within the existing SAC boundary area and no recommendations are made to extend the boundary area.

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1. INTRODUCTION

Until recently, lampreys were widely distributed in aquatic systems throughout much of Europe. A considerable decline in lamprey populations has however been observed in recent decades (Holcik, 1986; Maitland, 1980). While the reasons for European decline can be attributed to specific factors, such as water pollution and the erection of barriers across rivers, the Irish decline cannot be quantified due to insufficient information (Kurz and Costello, 1999).

Ireland, however, still retains extensive lamprey populations enabling further efforts of conservation and research to progress. Three species of lamprey occur in Ireland: brook lamprey *Lampetra planeri*; river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus*. All three Irish lamprey species are listed on Annex II of the European Union Habitats Directive (92/43/EEC). This directive legally protects each of these species in designated Special Areas of Conservation (SACs) and requires the monitoring and protection of lamprey species coupled with the conservation and maintenance of their preferred habitat. The National Parks and Wildlife Service (NPWS) of the Department of Environment, Heritage and Local Government (DEHLG) are currently undertaking a programme of surveys in all river SACs designated for lampreys. Since 2000, catchment-wide studies have been completed on the Slaney, Munster Blackwater, Feale, Moy, Boyne and the Barrow.

This report incorporates two studies undertaken to investigate lamprey abundance and distribution during 2006. The first survey concerns the Corrib catchment, which is found largely in counties Galway, Mayo and Roscommon and was undertaken during September 2006. The assessment involved qualitative electrical fishing investigations at 77 sites throughout the catchment. The second survey entails the Suir catchment, located mostly in Counties Tipperary, Waterford and Kilkenny, and was undertaken during the period August to October 2006. Here, 75 sites were examined for lampreys. Both quantitative and qualitative investigations were undertaken in the Suir catchment. The qualitative results are presented in the current report.

The overall aim of the Corrib and Suir investigations was:-

- To establish the distribution and abundance of lamprey species in the subject catchments;
- To determine the age structure of the populations present in order to assess production levels;

This study was undertaken by Ecofact Environmental Consultants Ltd. on behalf of NPWS.

2. THE STUDY AREAS

2.1. The Corrib Catchment

The Corrib Catchment (hydrometric area no. 30, OS catchment no. 143) is located in Counties Galway, Mayo and Roscommon in the Western River Basin District. It has a total catchment area of 3,101 km^2 (McGinnity *et al*, 2003). Loughs Corrib (17,000 ha), Mask (8,000 ha), Carra (1,500 ha) and numerous tributaries, are included in this catchment. The total lake and river area in the Corrib catchment has been estimated as 277.67 km^2 and 6.87 km^2 respectively (McGinnity *et al*, 2003). The long term mean annual flow rate in the River Corrib is 94.3 m^3 sec^{-1}, ranging from an August minimum of 35.53 m^3 sec^{-1} to a January maximum of 165 m^3 sec^{-1} (McGovern & McCarthy, 1992).

A total of 469 km of main river channels are present in the catchment (Toner *et al*, 2005). Lough Carra is drained via the short Keel River (1.4 km) into the northeast end of Lough Mask. The Cong Canal flows south for 5.7 km connecting Lough Mask to Lough Corrib. The River Corrib drains Lough Corrib and runs for 7.7 km before entering the sea in Galway City. The largest tributary in the catchment is the River Clare which rises near Ballyhaunis, Co Mayo and flows for 93 km before entering Lower Lough Corrib. The Robe River (56 km) is the second largest tributary in the catchment and flows into Lough Mask. Details of sub-catchments of the Corrib are provided in Table 1

Table 1 Details of the Sub-Catchments of the Corrib (adapted from Gargan *et al*, 2002).

Sub-Catchment	Sub-Catchment Area (km^2)	Lake Surface Area (ha)
Corrib (excluding the Clare sub-catchment)	1415	16500
Clare (upstream of Corofin)	695	
Mask	782	8275
Carra	109	1570

The geology of the Corrib catchment to the east of Lough Corrib, Lough Mask and Lough Carra is dominated by Carboniferous limestone whereas the catchment geology to the west and north-west of Lough Corrib and to the west of Lough Mask consists of Silurian quartzite, schists and gneiss, with smaller outcrops of granite (Gargan *et al*, 2002).

The Environmental Protection Agency (EPA), and its predecessors (An Fóras Forbatha, Environmental Research Unit), has assessed water quality (Chemical and Biological) in the Corrib catchment since 1985 as part of the National Water Quality Monitoring Programme (Toner *et al*, 2005). A summary of the overall results for the Corrib catchment during the period 2001-2003 are presented in Table 2. Overall, water quality in the Corrib catchment is just above the national average with 73.3 % of river channel classified as being satisfactory (National average is 69.2%). Pollution problems have been noted in some parts of Lough Corrib, and rivers such as the Robe (Mask), Dalgan (Clare), and Sinking (Clare) had moderately polluted sections during the most recent EPA survey (Toner *et al*, 2005). McCarthy *et al* (1999) investigated eutrophication processes in Loughs Corrib and Mask during the period 1995-1997.

In general, water quality in both lakes was satisfactory during the period 1995-1997. During their 2001-2003 survey of Irish lakes the EPA rated Lough Corrib as being 'Mesotrophic' but noted increased phytoplankton growth in the upper basin during this period (Toner *et al*, 2005).

Table 2 Summary of Water Quality Results from EPA Hydrometric Area 30 Showing overall results for the Corrib catchment (adapted from Toner *et al,* 2005).

Catchment	Class A	Class B	Class C	Class D	Total (km)
Hydrometric Area 30 (km)	343.5	93.0	31.5	0.0	468.0
Hydrometric Area 30 (%)	73.29	19.81	6.9	0.0	

The Corrib catchment, with the exception of some western tributaries of Lough Corrib, was subjected to major drainage schemes during the mid 1800's, the 1950's and the 1980's. These schemes had major impacts on the hydrology and fisheries of the catchment and resulted in the reduction in size of Loughs Corrib and Mask and the loss of other lakes in the catchment. The impact of these schemes remains apparent today. The River Corrib itself has been subjected to major engineering works since the Middle Ages when the Franciscan monks dug a channel to shorten the river (Friar's cut) (Wilkins, 1989). During the Drainage and Navigation Scheme (1848-1858) of Loughs Corrib, Mask, and Carra the river was deepened and a regulating weir was built to control water levels in the lake (IEI, 2000). During the 1950's further drainage works were undertaken in the catchment as part of the Corrib-Clare Arterial Drainage Scheme (O'Reilly, 2002). Works associated with this project involved more extensive blasting and dredging of the River Corrib and the replacement of the Galway regulating weir with the structure that exists today (IEI, 2000). In an attempt to mitigate the impact of the drainage schemes, a salmon hatchery was set up in Cong during the 1970's and during the 1990's, an EU funded physical rehabilitation programme for fisheries was undertaken in some areas of the catchment (Gargan *et al*, 2002).

2.1.1. River, Brook and Sea Lampreys in the Corrib Catchment

Brook lampreys have previously been reported to be widespread in the Corrib catchment (Kurz & Costello, 1999; Byrne *et al*, 2001), and sea lampreys have been reported to regularly spawn below the regulating weir in Galway (Igoe *et al*, 2004; Seamus Hartigan, pers. comm.). However, the existing regulating weir at Galway is thought to be a barrier to anadromous lampreys (Byrne *et al*, 2000). Although records for sea lampreys from Lough Corrib and its tributaries, such as the Owenriff and Bealanabrack do exist, these are going back some time and, in some cases, pre-date the construction of the current weir (Igoe, 2004). Kurz & Costello (1999) reported that there were no records for river lamprey in the Corrib catchment.

Plate 1 The River Corrib at Menlo Castle near Galway City.

Plate 2 The Dalgan River near Ballyhaunis, Co Mayo.

2.2. The Suir Catchment

The Suir catchment (EPA hydrometric Area: 16, OS Catchment 182) is largely situated in County Tipperary and part of County Waterford, as well as marginal areas of Counties Limerick, Cork, Laois and Kilkenny. The catchment lies in the South Eastern River Basin District and has an area of 3,601 km^2 (Lucy, 1998). The Suir is commonly referred to in the context of the "Three Sister" catchments (Barrow, Nore and Suir) which join together in their estuarine reaches. The Suir, at 182 km long, is the largest of the three sisters and has a mean discharge of 47 m^3/sec (Lucey, 1998). Overall, it has a total of 34 tributaries and is one of the largest river systems in Ireland.

The Suir catchment overlies limestone in the upper reaches of the catchment and at Newcastle it crosses Old Red Sandstone. However, most of the rivers in the catchment are influenced by Carboniferous limestone. The purer limestone formations are extensively karstified, particularly south of Cashel. Such karst areas are characterised by swallow holes, sinking streams, caves, and large karst springs. The Suir River and the bulk of its tributaries exhibit relatively hard waters. This is best exemplified by the waters of the Anner sub-catchment which are limestone streams. However, some Suir tributaries display less calcareous features. The Nier, for example, runs off the Silurian slates and Old Red sandstones of the Comeragh and Monavullagh Mountains and has low alkalinity and hardness levels (Lucey, 1998).

Table 3 Details of the Suir Catchment (adapted from Mac Carthaigh, 1997).

Catchment / Sub-Catchment	Catchment / Sub-Catchment Area (km^2)
Total Suir Catchment	*3,601 km^2*
North of Clonmel	*1,173 km^2*
North of Thurles	*236 km^2*

As is commonly found in Ireland, the rivers of the Suir catchment have been used extensively for water supply, waste disposal, fishing, agricultural, recreational and to limited extent navigation (Lucy, 1998). A large number of mills were built in the catchment during the 1800's and many of these mills continue to be operated today as small hydroelectric stations. Agriculture and related agri-based industries comprise one of the main activities in the catchment and the organic waste resulting from these has a negative impact on water quality in some areas.

The EPA (and predecessors) has assessed water quality in the Suir catchment since 1976 (Toner, *et al*, 2005). A summary of the overall results for the Suir catchment during the period 2001-2003 are presented in Table 4. Overall, the EPA states that the water quality in the Suir catchment is just below the national average with 68% of river channel classified as being satisfactory. Pollution problems have been noted in some parts of the Suir catchment including the Halfway House Stream in Waterford City, which was listed as partially seriously polluted (Class D) and St. John's River, which was given a Q-value rating of 2. The main channel of the Drish has recently been given a Q-value of 2-3/0, where the '0' indicates a toxic effect on the river.

Table 4 Summary of Water Quality Results from EPA Hydrometric Area 16 Showing overall results for the Suir catchment (adapted from Toner *et al,* 2005).

Catchment	Class A	Class B	Class C	Class D	Total (km)
Hydrometric Area 16 (km)	477.5	144.0	84.0	0.5	706.0
Hydrometric Area 16 (%)	68	20	12	0	

The Drish River is located downstream of the Minorco lead and zinc mine at Lisheen. Ongoing pollution originating from the mine has caused sections of this river to be closed to anglers and public warning notices regarding heavy metal contamination have been posted. In fact, in April 2006, an advisory was issued by the EPA that the waters of the Drish and the Rossestown

Rivers should not be accessed by livestock until further notice. After further investigation, the EPA, in consultation with other relevant authorities, advised that as of 24th October 2006, the affected rivers were safe for animal access. Other rivers in the catchment with pollution problems include the Suir main channel, Multeen, Outeragh, Rossadrehid, Moyle and Farneybridge Rivers.

2.2.1. River, Brook and Sea Lampreys in the Suir Catchment

All three of the Irish lamprey species are thought to occur in the lower reaches of the Suir catchment (Kurz and Costello, 1999). There are also historical records of lampreys (unspecified) from several other areas of the catchment (i.e. Ara, Anner, Aherlow, Linguan, Clodiagh and Drish)

Plate 3 The lower River Suir near Carrick-on-Suir.

Plate 4 The Clodiagh (Tipperary) River at Rathkennan Bridge.

3. METHODOLOGY

3.1 Selection of Sites

Juvenile lamprey habitat was identified from the descriptions given in Maitland (2003). Such sections generally had fine-grained bed material and a water depth suitable for wading. When available, an area of up to 10 m^2 was selected for surveying in the vicinity of the closest EPA water quality station.

3.2 Electrical Fishing Assessment

Sites were investigated using the standard electrical fishing methodology described for previous NPWS surveys (O'Connor, 2005a and b, 2004). The work was undertaken under licence from the Department of Communications Marine and Natural Resources (DCMNR). The surveys were undertaken during the period mid-August to mid-October 2006. A Smith-Root LR-24 portable electrical fishing unit was employed during this survey. This machine can automatically set voltage and power to the pertaining site conditions (conductivity, water depth). This automatic set up routine was used during the current survey to ensure that a constant effort was applied at each site.

Captured lampreys were measured to the nearest millimetre (standard length) and were identified on the basis of their external pigmentation and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003). In the current survey all lampreys which did not exhibit clear cut typical brook/river lamprey pigmentation were subjected to myomere counting. Previous lamprey surveys undertaken on behalf of NPWS have found that significant numbers of brook lampreys with unusual caudal and oral hood pigmentation can be present in some rivers. No unusually pigmented lampreys were recorded during the Corrib survey but were widespread in the Suir catchment. Lampreys subjected to myomere counting were also weighed to the nearest 0.01g.

3.3 Description of Sites

Following completion of the fishing, the dimensions and physical habitat characteristics of each site were recorded. General physical habitat characteristics recorded included river width, mean depth, substrate type and rooted vegetation cover. Site photographs were taken with a digital camera and site location was recorded with a handheld GPS unit. Conductivity and water temperature were measured on site using portable meters.

3.4 Limitations of the current study

The current survey was undertaken during a restricted timescale with licences for the current work being made available during the period mid-August to mid-September on the Corrib and mid-August to the end of September on the Suir. These licences were extended by the DCMNR to the end of September on the Corrib and to mid-October on the Suir. However, much of late September and early October 2006 was wet and high water levels prevented surveying over most of this time. Because of this, some areas of both the Corrib (Corrib River)

and Suir (Linguan and upper Anner) could not be surveyed. A number of other areas were surveyed during sub-optimal conditions (elevated but clear water). This is likely to have reduced the fishing efficiency at these sites.

Ammocoetes of river and brook lampreys cannot be separated by visual examination. The transformers can however be identified at later stages but are still difficult to separate up until early winter (Gardiner, 2003). As the current survey was undertaken during early to mid autumn, very few fully transformed lampreys were encountered.

Plate 5 (a-f) (a, b, c) Electrical fishing with a Smith-Root LR-24 backpack electrical fishing unit, (d) quantitative electrical fishing survey on the River Suir at Ardfinnan, (e) survey section on the River Sinking – the site of the highest lamprey catch in the Corrib catchment, (f) the lower River Tar produced the highest lamprey catch in the Suir catchment.

4. RESULTS

4.1 Introduction

The Suir and Corrib catchments are two of the largest river catchment systems in Ireland. A combined total of 152 sites were surveyed in both catchments; 77 in the Corrib catchment and 75 in the Suir catchment. A total of 406 juvenile lampreys were recorded during the Corrib survey. It was concluded that all these were brook lampreys (*L. planeri*). Overall a total of 1,969 river/brook lampreys and 10 sea lampreys were recorded during the Suir survey. Figures 1 and 2 illustrate the recorded juvenile lamprey distribution in the Corrib and Suir catchments respectively.

The results of both surveys are presented in the following sections and in the series of figures and tables provided at the end of this chapter. Habitat data for the sites investigated in the Corrib catchment is presented in Tables 5 and 6 while recorded lamprey densities on the main river systems in the Corrib shown in Table 7. The length descriptive statistics for all the lampreys captured during the Corrib survey are listed in Table 8. Length percentage frequency distributions of lampreys collected from selected river channels in the Corrib catchment are provided in Figure 3.

Habitat information for the sites investigated in the Suir catchment is presented in Tables 9 and 10. The overall results from this catchment in terms of lamprey densities recorded in each river system are listed in Table 11. Table 12 and 13 respectively give the length descriptive statistics for brook/river lampreys and sea lampreys captured in the Suir catchment. Length percentage frequency distributions of juvenile river/brook lampreys collected from selected river channels are shown in Figures 4 and 5. The length-weight relationship for lampreys captured during the survey of the Corrib and Suir catchments are presented in Figures 6 and 7. Comparative information on the numbers of trunk myomeres recorded and length characteristics of juvenile and transforming lampreys from the Corrib and Suir catchments is given in Tables 14 and 15.

4.2 The Corrib Catchment

Overall a total of 438 m^2 of habitat was surveyed in the Corrib catchment during August and September 2006. A total of 77 sites were examined and lampreys (n=406) were present in 38 sites (49%). The overall mean lamprey density of lampreys recorded for the entire Corrib Catchment was 0.92 per m^2. The highest density recorded was on the Sinking River (11.71 individuals per m^2).

No sea or river lampreys were found during the study. The regulating weir at Galway is thought to prevent the movements of anadromous lampreys into this system. The short Corrib River downstream of the regulating weir was not surveyed due to high water levels during late September 2006. However, physically suitable lamprey nursery habitats seem to be absent from this area. The Corrib River upstream of the regulating weir was surveyed by the author during May 2005 and no lampreys were recorded (Ecofact, 2006). The location of all areas investigated and the lamprey distribution recorded is presented in Figure 1. A list of the areas

surveyed is also provided in Appendix 1. Photographs of the river channels in the vicinity of the survey sites are provided on the attached CD-ROM.

For the purpose of the current study, the Corrib catchment is considered under the following sub-catchments headings; Lough Corrib, Lough Mask and Lough Carra sub-catchments. Within the Lough Corrib sub-catchment, the Clare River sub-catchment is considered separately

Plate 6 The River Corrib and Galway Regulating Weir.

Plate 7 The River Clare at Claregalway, Co Galway.

4.2.1 Electrical fishing site characteristics

The general characteristics of the electrical fishing sites in the Corrib catchment are given in Table 5 and a summary of the microhabitat characteristics is provided in Table 6. Sites investigated were located throughout the catchment and the wetted width of the channels

investigated ranged from 2 to 17m while depths ranged from 15 cm to >200 cm. The mean depth of the areas surveyed for juvenile lampreys was 28 cm and the flow in the areas surveyed was generally below 0.10 $m^2 sec^{-1}$. Areas were fished for a minimum of one minute per m^2 and up to five minutes per m^2 when significant numbers of lampreys were present.

4.2.2 Distribution of lampreys in the Corrib catchment

Only one species of lamprey was confirmed from the Corrib catchment; *Lampetra planeri*. Sea lampreys are present in the catchment but seem to be confined below the Galway Regulating Weir. This weir, installed in the 1960's, comprises of 16 hydraulic gates and is adjusted to maintain water levels in Lough Corrib at 8.3 m OD (McGovern & McCarthy, 1992). The original regulating weir at the site was constructed in the mid 1800's during the Loughs Corrib, Mask, and Carra Drainage and Navigation Scheme (1848-1858) (IEI, 2000). The installation of this weir may have resulted in the extinction of some migratory fish species in the river (Quigley *et al*, 2004). Although there are records of sea lampreys in some of the tributaries of Lough Corrib, these records pre-date the construction of the existing weir.

The success of sea lamprey spawning below the regulating weir in Galway is unknown. There are no suitable nursery areas in the lower River Corrib. This stretch of river has been deepened by blasting and it has a substrate of bedrock and cobble/rubble. Sea lamprey ammocoetes may however use the tidally influenced sediments in the docks area of Galway. However, these areas could not be investigated during the current survey due to high water levels during late September 2006.

Overall, lampreys were present at 38 out of the 77 locations surveyed in the Corrib catchment and were largely recorded in the eastern Corrib catchment with the exception of seven sites in the western catchment and two sites in the northern catchment. A total of 33 out of the 38 survey areas (87%) that had lampreys present were tributaries and sub-tributaries of the Lough Corrib sub-catchment. The Lough Mask sub-catchment contained five survey areas with lampreys present (13%) and no lampreys were recorded on survey sites of the tributaries of Lough Carra. The general distribution recorded during the current the survey is broadly similar to that recorded by Byrne *et al* (2000).

In the Lough Corrib sub-catchment, brook lampreys were evenly distributed throughout the eastern sub-catchment but in the western sub-catchment were largely concentrated on the Bealanabrack system with the exception of two sites on the Drimneen. Survey areas where lampreys were recorded in the Lough Mask sub-catchment were dispersed with two sites on the Robe system, two on the Allie system and one on the Fooey River.

4.2.2 Characteristics of lampreys in the Corrib catchment

The overall results from the Corrib catchment in terms of lamprey densities recorded in each river system are listed in Table 6. Where lampreys were recorded, their densities ranged from 0.10/m^2 to 11.71/m^2 with a mean lamprey density of 0.96/m^2 for the entire Corrib Catchment. Two tributaries of the Clare River yielded the highest lamprey densities in the Corrib catchment; the Sinking (up to 11.71/m^2) and the Nanny (up to 11.40/m^2). The length

descriptive statistics for the 406 Brook lampreys captured during the Corrib survey are given in Table 8. Captured lampreys ranged in size from 3.1 cm to 16.0 cm. Both the largest and smallest lamprey recorded, were from the River Nanny near Tuam, Co Galway. Length percentage frequency distributions of lampreys collected from selected river channels in the Corrib catchment are provided in Figure 3. The lamprey population recorded from the main channel of the River Clare was restricted to a smaller number of age groups than on the Nanny and Sinking Rivers. Evidence of recent recruitment was recorded on the Nanny, Sinking and Bealnabrack Rivers. However, no 0+ individuals were recorded at any of the sites investigated. Recent recruitment on the River Finny seems to have been poor. The length-weight relationship for 57 brook lampreys captured on the River Nanny is given in Figures 6. This chart indicates that weight increases exponentially with length in lampreys in the Nanny River. Exponential weight increase with length increase is an expected response for lampreys in order to store energy needed for transformation and reproduction. It is clear that feeding conditions on the Nanny are therefore optimal for juvenile lampreys.

Information on the numbers of trunk myomeres recorded and length characteristics of juvenile and transforming lampreys from the Corrib catchment is provided in Table 14. Corrib brook lampreys had a mean myomere count of 61 (sample size 62) with a range from 59 to 65. This is the same range as recorded in previous studies (Potter & Osborne, 1975). Trunk myomere counts were found by Potter & Osborne (1975) to be able to provide an unambiguous corroboration of identification – the counts ranged from 69–75 in sea lamprey, but only 57–66 in river and brook lamprey. In the current study, transforming lampreys had a size range of 9.3cm to 15.3cm. The observed transformation rate during the current survey was 12.3%. Overall, a total of 50 transformers were recorded in the current survey of the Corrib catchment. A total of 32 of these were found in the River Fooey (this site was examined towards the end of the survey) with the remaining transformers occurring in the Clare, Robe, Black, Cross and Joyce's sub-catchments.

Plate 8 Brook lamprey ammocoete (top) and transformer from the River Nanny near Tuam, Co Galway.

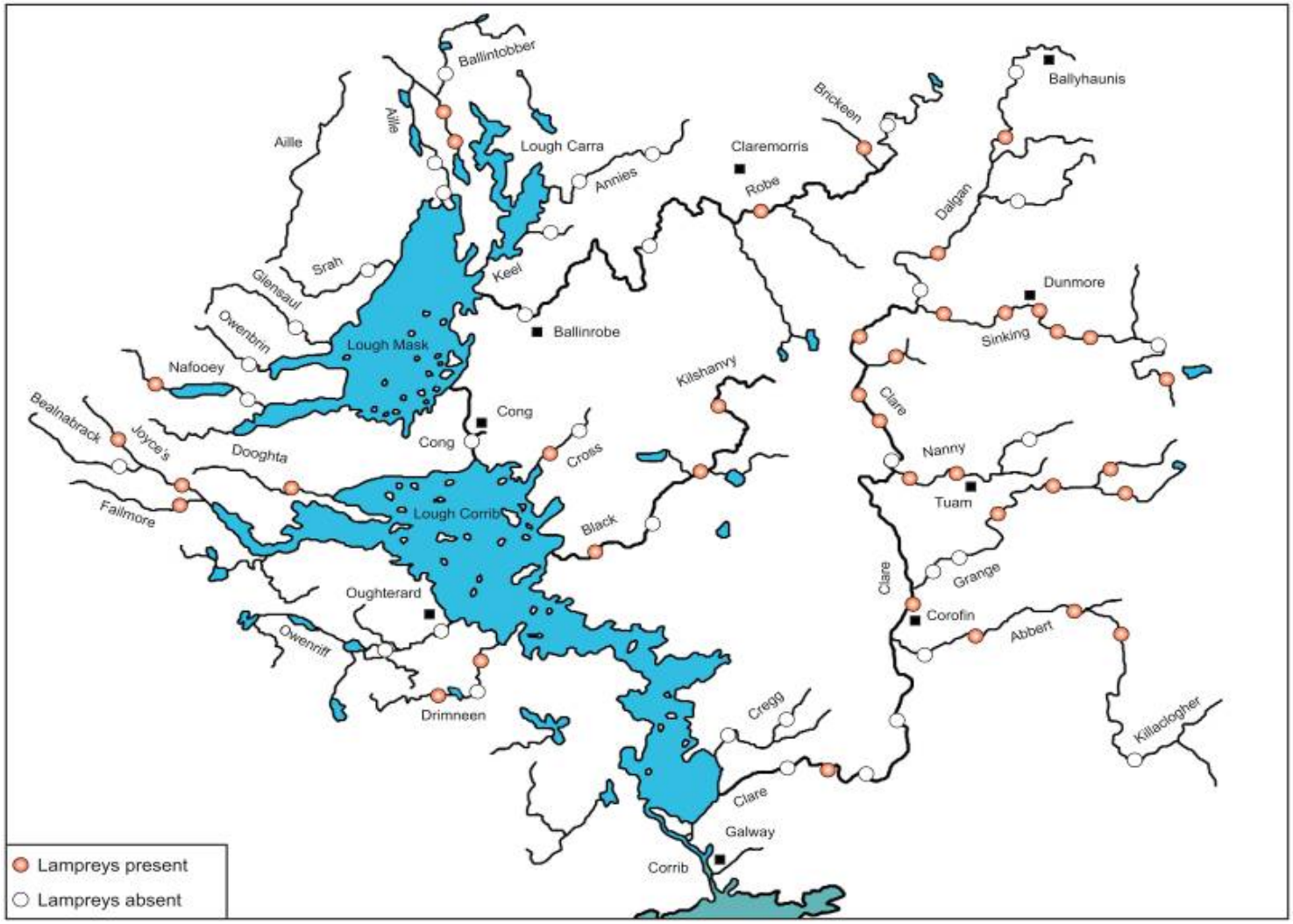

Figure1 Map of the Corrib Catchment and the 77 sites investigated during the 2006 survey.

4.2.3 Lough Corrib Sub-Catchment - Excluding the Clare Sub-Catchment

4.2.3.1 Introduction

A total of 19 sites (112m^2) representing eight rivers and their sub-tributaries were surveyed in the Lough Corrib sub-catchment (excluding the Clare River). Overall, lampreys (n=97) were present at 9 out of the 19 sites investigated (47%) with densities ranging from 0.20 – 10.80 lampreys per m^2, where present. The highest density of lampreys in this sub-catchment occurred on Joyce's River, a tributary of the Bealanabrack, where 54 lampreys were recorded in an area of 5 m^2.

4.2.3.2 Cregg River

The Cregg is an 11 km long river which enters eastern Lough Corrib near Muckrush Island. Water quality in this river is very good and was listed as being Class A throughout its length in the most recent EPA survey. Surveys were undertaken on two sites, one on the lower Cregg (CG1) and one on the upper Cregg (CG2). An area of 5 m^2 was surveyed at each site with no lampreys recorded at either site. Habitats were however considered to be sub-optimal for lampreys at both sites.

4.2.3.3 Black River

The Black River tributary forms a large part of the Galway/Mayo border. Four sites (BL1 – BL4) surveyed on this sub-catchment, including the Kilshanvy River. The Black river is drained and generally exhibits high levels of rock, with silt and sand dominating the fine substrate areas. The river dries up in parts during dry summers. A weir on the upper Black may prevent the movement of lampreys upstream of the Kilshanvy confluence. Water quality in this river is generally good with 83% of the channel length rated as being Class A in the most recent EPA survey. There is typically sub-optimal lamprey habitat on this river and lampreys were present at two out of the four sites investigated.

Black River - Main Channel

Three sites were surveyed on the main channel of the Black River main (BL1 – BL3). Lampreys were present in two of the three sites investigated (67%) (Maximum density 0.70 per m^2). The survey area on the lower Black (BL1) was approximately 4 km east of Lough Corrib on the Galway/Mayo border. A total of 10m^2 was surveyed at BL1, yielding seven lampreys. Salmon were also present at this site. The middle section of the Black River (BL2 and BL3) had lower numbers of lampreys recorded with none found at BL2 and three present at BL3 in an area of 5 m^2. The middle reaches of the Black River has a low proportion of suitable lamprey habitat; BL3 was located in a cattle drinking area.

The Kilshanvy River

The Kilshanvy River is a tributary of the upper Black River. One site was surveyed (BL4) and no lampreys were recorded.

4.2.3.4 The Cross River

The Cross River enters upper Lough Corrib near Gibbs Islands, roughly 2 km south of Cross. This river general had optimal lamprey habitat with instream habitats of sand and silt. Two sites were surveyed here (CS1 and CS2) and lampreys were present at one of the two sites. Eight lampreys were recorded in a 7m^2 area in the lower Cross (CS1), giving it a density of 1.14 lampreys per m^2. Salmon were also present at this location. No lampreys were recorded on the upper Cross (CS2) which was severely drained.

4.2.3.5 The Cong River

The Cong River enters Lough Corrib from the north, and one location with optimal lamprey habitat was surveyed (CNG1). No lampreys were recorded in the 5 m^2 survey area. Water quality in the Cong River is considered to be very good. The Cong Canal was built during the period 1848-1853 but was never opened to boat traffic due to changing economic priorities in the 1850's and ongoing engineering problems with the waterway (O'Reilly, 2002). The canal was deepened for drainage purposes in 1983 (O'Reilly, 2002). The porous limestone of the canal bed causes the canal to become dry in sections and run underground in summer. In the winter, migratory fish are prevented from entering Cong Canal by a grid placed in the canal at Cong. The attempted construction of a fish pass on the canal between Loughs Corrib & Mask in 1852 was unsuccessful due to financial and engineering constraints (Wilkins, 1989).

Plate 9 The Cong Canal near Cong, Co Mayo.

4.2.3.6 Dooghta River

This is a high gradient river which flows into Lough Corrib on the northern side of the Cloonbrone peninsula. Water levels were high on the day of the survey and work at only one site could be completed. Approximately 500m upstream of the town of Cornamona the Dooghta forks; the northern fork leads to Ballydoo Lough and the southern fork runs through Dooghta to Crumlin. One site was investigated on the southern fork in Dooghta (DT1) and

one lamprey was recorded in a 5 m^2 survey area (0.20 per m^2). River enhancement has been undertaken place here to improve salmonid habitat. The fine substrate is sandy with little or no silt. All 10 km of the Dooghta (EPA site code 30D02) is listed as a class A river.

4.2.3.7 Bealanabrack River

The Bealanabrack lies approximately 5 km west of the Dooghta River and is partially navigable. Four sites on the Bealanabrack were surveyed (BB1 – BB4) including two tributaries, the Failmore and Joyce's Rivers. Lampreys were present at three out of the four surveyed areas investigated (75%). Overall, a total of 62 lampreys were recorded in an area of 20 m^2 on the Bealanabrack system, resulting in a mean lamprey density of 3.10 per m^2. In 2003, the EPA listed 11.5 km of the total 17 km of the Bealanabrack River as Class A (68%), while 3.5 km (21%) was listed as class B and 2 km (12%) was listed as class C.

The site BB1 was on the main channel in Maum, roughly 1.5 km upstream of the Failmore River confluence. A 5 m^2 area was surveyed here and 5 lampreys were recorded. As part of a navigable channel, the depth here was high and surveying was only possible in small backwater areas near the water's edge at the docking quarter just downstream of the bridge. Optimal lamprey habitat existed in these areas but the overall depth and landing side for water crafts made field conditions difficult. Survey area BB2 was located approximately 1km upstream of the Joyce's River confluence. No lampreys were recorded in this area.

Failmore and Joyce's River Tributaries

The Failmore River (BB3) joins the Bealanabrack approximately 100m upstream of Lough Corrib and was listed as a class A river in the most recent EPA survey. The lamprey habitat at this site was considered to be optimal and three lampreys were recorded in the 5 m^2 survey area (0.60 lampreys per m^2). Approximately 4 km upstream of the Failmore, Joyce's River (BB4) joins the Bealanabrack. This river is also a class A' river and the survey area here yielded the highest density of lampreys (10.80 per m^2) on the Bealanabrack system. An attempt was made to survey another optimal habitat just downstream of the site but after a short fishing period the silty substrate proved too soft for safe electrofishing. Significant quantities of lampreys were seen but could not be captured.

4.2.3.8 Owenriff and Bunowen Rivers

The Owenriff River flows out of Lough Ateeann and enters Lough Corrib near Oughterard. It is listed as a class A river by the EPA. Two areas were surveyed on this system (OR1 and OR2). The site on the main channel of the river (OR1) had small areas of sandy backwater. The site on the Bunowen River (OR2) flows into Lough Ateeann approximately 1 km downstream of Glengowla and was used by cattle to cross the river. No lampreys were recorded at either of the surveyed areas. The Bunowen (EPA site code 30B03) is also listed by the EPA as a class A watercourse.

4.2.3.9 Drimneen River

Three sites were surveyed on the Drimneen system (DM1 – DM3), two on the main channel (DM1 and DM2) and one on the minor tributary at Magheramore (DM3). Two out of the three sites surveyed had lampreys present (67%). Densities ranged from 1.20 – 2.50 lampreys per m^2, where lampreys were recorded.

The lower site on the Drimneen (DM1) had the highest density of lampreys of the three surveyed areas with 10 lampreys recorded in a $4m^2$ area. This site was located downstream of an underground section on this river. On the upper reaches of the Drimneen (DM2), no lampreys were recorded. Lampreys were present at site DM3, however, where 6 lampreys were recorded in a 5 m^2 area. The EPA lists all 9 km of the Drimneen (EPA site code30D03) as a class A river.

4.2.4 The Clare River Sub-Catchment

4.2.4.1 Introduction

The Clare River is the largest tributary of Lough Corrib and qualitative surveys were carried out on 37 sites. During the 1850's, river works took place on the Clare which provided a new permanent overland connection between the lower river at Turloughgeorge and above (Wilkins, 1989). Prior to these works, this river was only partially accessible to migratory fish. Lampreys were present at 24 out of 37 of the survey sites (64.8 %) investigated with the highest lamprey density of 11.71 per m^2 occurring on the Sinking River at the Dunmore Castle Bridge (S2). Within this sub-catchment, a mean density of 1.2 lampreys/m^2 was recorded (248 lampreys/205 m^2). A total of 51.5 km of the Clare is listed as class A (87%) and 7.5 km is listed as class B (13%) waters.

4.2.4.2 Clare River -Main Channel

Ten sites were investigated on the main channel of the Clare (CG1 – CG10) and lampreys were found at 6 out of the 10 locations investigated (60%). A mean density of 0.48 lampreys per m^2 was recorded, ranging from 0.2/ m^2 to 1.40/m^2, where present.

One of the three sites examined on the lower Clare (CG1 – CG3) had lampreys present. Sites CG1 and CG3 yielded no lampreys while CG2 (Claregalway Bridge) yielded six lampreys in a 6 m^2 area fished at a cattle drink. Generally the lower Clare has sub-optimal lamprey habitat but site CG2 was comprised of small areas of silty sand. The EPA rated site CG2 as having a quality status of slightly polluted (Q 3-4). The middle Clare (CG4 – CG7, between Claregalway and Tuam) follows a channelised course. Lampreys were recorded at sites CG5 (8 m^2 area surveyed and 5 lampreys recorded) and CG6 (5 m^2 area surveyed and 4 lampreys recorded).

The upper Clare (CG8 – CG10, between the Nanny tributary inflow point and Milltown) has also been physically altered in the past and had no optimal lamprey habitat. Nonetheless, small numbers of lampreys were present at all three sites surveyed. Lampreys were present at CG8 and the highest density of lampreys was at CG9 (1.40 per m^2). A nominal lamprey density was

recorded at the uppermost site on the Clare River (CG10), approximately 6 km downstream of the Dalgan and Sinking Rivers confluence.

4.2.4.3 River Abbert

The Abbert River flows into the Clare approximately 2.5 km south of Corrofin. Five sites were surveyed in this sub-catchment (A1 – A5), including the Killaclogher tributary (A5). Lampreys were present at 3 out of the 5 sites investigated (60%). The densities ranged from 0.29 per m^2 to 2.0 per m^2, where lampreys were present. Sites A1 and A2 were situated on the lower reaches of the river. No lampreys were recorded at A1, and site A2 yielded the highest density of lampreys on the Abbert system with 2.0 lampreys per m^2. Site A2 was the only site on the lower Abbert to exhibit optimal habitat with a silt-sand substrate (70% and 30% respectively). The upper Abbert (A3 and A4) had lampreys present at both surveyed areas with a mean density of 0.33 lampreys per m^2. No lampreys were found on the Killaclogher River (A5). The EPA lists the Abbert River as having 18.5 km of class A waters (53%), 12.5 km of class B waters (36%) and 4.0 km of class C waters (11%).

4.2.4.4 Grange River

The Grange River joins the main channel of the Clare approximately 2 km north of Corrofin. The entire Grange River is listed by the EPA (site code 30G02) as having 14 km of class A waters (54%), 9.5 km of class B waters (37%) and 2.5 km of class C waters (9%). Six sites (G1 – G6) were surveyed and lampreys were recorded at four out of six sites (67%). Maximum lamprey density was 1.80 per m^2. The surveyed area was 5 m^2 at all sites with the exception of G1 where an area of 10 m^2 was investigated. On the lower Grange (G1 and G2), no lampreys were recorded and habitats were suboptimal. Further upstream at Aghloragh (G3), there was more suitable lamprey habitat with a sandy silt fine substrate with 40% rooted vegetation cover. Three lampreys were recorded here, along with both salmon and white-clawed crayfish. The EPA rates this part of the Grange as Q 3-4 (slightly polluted). At G5, the highest lamprey density in this sub-catchment was recorded with nine lampreys present. Crayfish and salmon were also recorded at G5 along with recent otter spraints. The Grange River was subjected to extensive fisheries rehabilitation works during the 1990s.

4.2.4.5 River Nanny

The River Nanny joins the Clare near Tuam, Co Galway. The river has a long history of pollution; however a new waste water treatment plant has now been provided in Tuam and the most recent EPA survey rated all 8.5 km of this river as class A.

Of the three sites (N1 – N3) surveyed on the Nanny, lampreys were present at two sites. The mean density of lampreys here was 4.27 per m^2 with a maximum density of 11.4 per m^2. At the lower reaches of the River at Weir Bridge (N1), seven lampreys were found in a 5 m^2 survey area. Site N2, in the town of Tuam, yielded the second largest lamprey catch within the Clare sub-catchment with 57 lampreys in a 5 m^2 area. The substrate at N2 was a silt clay mix (45% and 45%) with rooted vegetation. No lampreys were recorded at Birmingham (N3)

where a 7 m^2 area was surveyed. This section of river has been known to dry up in the past. Figure 3 shows the length-weight relationship for lampreys captured on the River Nanny.

Plate 10 The River Grange at Site G3.

4.2.4.6 Tonmoyle Stream

A minor tributary of the Clare, the Tonmoyle Stream (T1), lies approximately 7 km northwest of Tuam. There is a fairly even distribution of cobble, gravel and fine substrate here with the fine largely composed of sand and silt. The area of the surveyed site was 5 km^2 and had two lampreys present with a lamprey density of 0.4 per m^2. Salmon were also present at this site despite a degraded physical habitat.

4.2.4.7 Sinking River

The Sinking River forms part of the upper reaches of the River Clare. Seven sites (S1 – S7) were surveyed on this river, including two sites on the Ballintava tributary (S6 and S7). The Sinking is listed by the EPA as having 8 km of class A water (43%) and 10.5 km of class B water (57%). Lampreys were present at 6 out of 7 sites investigated (86%).

Of the sites where lampreys were recorded densities ranged from 0.1 – 11.71 per m^2 with the highest lamprey density occurring at Dunmore Castle Bridge (S2) where 82 lampreys were recorded in an area of 7m^2. An accumulation of sludge sediment around the pillars of the bridge (originating from the upstream sewage outfall) served as apparently optimal habitat for lampreys. This site was also assessed as having a Q 3-4 rating by the EPA. Site S1, on the lower Sinking, yielded a low lamprey catch of one lamprey in a 10 m^2 area. Sites S3 – S7 all had a survey area of 5 m^2. Sites S3 and S4, between Dunmore and the Yellow River tributary, had a total of 14 and 6 lampreys respectively. Upstream of the Yellow River confluence (S5) 2 lampreys were recorded.

Ballintava Stream

The Ballintava Stream flows into the Sinking just north of Dunmore and is a well known salmon spawning tributary. Sites S6 and S7 were located on this watercourse. Lampreys were absent at Site S6, while nine lampreys were recorded at site S7 with a density of 1.8 per m^2. The Western Regional Fisheries Board has undertaken some development works on this river.

4.2.4.8 Dalgan River

The Dalgan River is really the upper section of the River Clare and joins the Sinking River upstream of Miltown. Five sites were surveyed (D1 – D5) including the Cloonfad sub-tributary (D5). A total of 2 out of the 5 locations had lampreys present (40%). Densities ranged from 0.0 – 1.0 lampreys per m^2 with the highest density occurring at the site at Doonmacreena Bridge (D2) (1 per m^2). Upstream of the Cloonfad inflow point (D3) the lamprey density was 0.2 per m^2. The upper Dalgan and Cloonfad Stream (D4 and D5) yielded no lampreys. Salmon were present at all sites investigated.

The Dalgan River has a history of pollution and was visibly polluted at the time of the current survey. The channel was clogged with excessive growth of macrophytes at the time of the survey and had excessive filamentous algal growth at Doonmacreena Bridge. Overall, the most recent EPA survey on the river lists 67% of the river as Class A, 19% as Class B and 14% as Class C.

4.2.5 Lough Mask Sub-Catchment

4.2.5.1 Introduction

The Lough Mask sub-catchment lies largely in County Mayo north of the Lough Corrib sub-catchment. Lamprey surveys were carried out on 17 sites representing 7 rivers and their sub-tributaries. Lampreys were present at 5 out of 17 of the surveyed areas (29%) with the lamprey density ranging from 0.20 lampreys per m^2 on the Allie River (AL5, sub-tributary of the Cloon River) to 10.20 per m^2 on the Fooey River (FO1, sub-tributary of the Finney River). A total area of 98 m^2 was surveyed resulting in a lamprey catch of 61 lampreys and a mean density of 0.62 lampreys per m^2.

4.2.5.2 Robe River

The Robe is a major tributary of Lough Mask with an inflow point on the eastern side of the lake, approximately 5 km west of Ballinrobe. The Robe River is listed by the EPA as having 43 km of class A water (76%), 11 km of class B water (19%) and 2.5 km of class C water (5%). Lamprey surveys were undertaken on five sites on this river (R1 – R5) including the Brickeen (R4) and Cloonycollaran (R5) tributaries. Lampreys were recorded at 2 out of the 5 sites surveyed (40%) with the lamprey density ranging from 0.14 per m^2 on the main channel of the upper Robe (R3) to 0.25 per m^2 on the Brickeen sub-tributary (R4). Crayfish were common at the sites investigated.

A total of 15 m^2 of lamprey habitat was surveyed on the lower Robe (R1 and R2) and no lampreys were recorded. Few areas of optimal habitat exist on the Robe as it is principally rocky and deep. Site R2 is denoted as having a Q3 rating by the EPA and rubbish had been dumped into the river adjacent to the surveyed area. The upper Robe (R3) site had a recorded lamprey density of 0.14 lampreys per m^2.

Brickeen and Cloonycollaran Tributaries

The Brickeen tributary (R4) flows into the upper Robe and was surveyed at the N60 crossing in the Village of Brickeen. The highest lamprey density in the Robe system was recorded at this site (0.25 per m^2). The Cloonycollaran stream (R5) also inflows into the upper Robe. No lampreys were recorded at the survey site on this stream.

4.2.5.2 Aille River

Five sites were surveyed on the Allie (AL1 – AL5), including the Claureen tributary (AL5). Of the sites surveyed 2 out of the 5 yielded lampreys (40%). The density of lampreys (where they were present) ranged from 0.2 per m^2 (AL4) to 1.2 per m^2 (AL3). The fine substrate on the bed of the Aille was predominantly composed of sandy silt. Two sites were surveyed on the lower Aille River but lampreys were not encountered. Sites AL3 and AL4 were positioned upstream of the Claureen tributary inflow point, and at each site, 5 m^2 were surveyed where 6 and 1 lampreys were recorded respectively. Water quality in the Aille River is generally good. Part of this river flows underground.

Claureen Tributary

The survey site on the Claureen tributary (AL5) was located roughly 1 km upstream of its inflow point into the Aille (approximately 2 km south of Lough Cooley). An area of 5 m^2 was surveyed and no lampreys were recorded.

4.2.5.3 Srah Stream

The Srah Stream is a minor tributary of Lough Mask and is a rocky stream dominated by rock and cobble. It flows into the Lough approximately 1.5 km west of the Aille inflow point. Two sites (SH1 and SH2) were surveyed, one on the lower Srah (SH1) and one on the upper Srah (SH2). The surveyed areas generally had sub-optimal lamprey habitat containing mainly gravel with no rooted vegetation cover. No lampreys were recorded at either of these survey areas.

4.2.5.4 Glensaul River

An attempt was made to survey the Glensaul River at Toormakeady (GL1), roughly 500m from its inflow point into western Lough Mask. After a thorough investigation, no areas of suitable habitat were found and no electrofishing was undertaken.

4.2.5.5 Owenbrin River

The Owenbrin River is a mountainous river which flows from the Partry Mountains into Lough Mask approximately 6 km south of where the Glensaul River confluences. Areas of backwater with sand and detritus were scattered throughout this wide eroding river. An area of 9 m^2 was surveyed (OB1) and no lampreys were recorded. This river is listed by the EPA (site code 30O01) as having 6.5 km of class B water (72%) and 2.5 km of class C water (28%).

4.2.5.6 Srahnalong River

The Srahnalong (EPA site code 30S03) lies roughly 2 km north of Lough Nafooey and is a class A river (100%). It flows into south-western Lough Mask and an area of 5 m^2 was surveyed (SR1) for lampreys and none were recorded. There was a waterfall on this section of the river and the areas both upstream and downstream were surveyed. SR1 offered sub-optimal lamprey habitat with 85% gravel and 15% sand substrate.

4.2.5.7 Finny

The Finny River flows from Lough Nafooey into southern Lough Mask. Two sites on the Finny system were investigated, one on the main channel of the Finny (F1) and one on its tributary the Fooey River (FO1). The F1 survey area was located approximately 1 km upstream of Lough Mask in a large area of pooled backwater with silty clay substrate. No lampreys were recorded here. The Finny is listed by the EPA as having Class A water.

4.2.5.8 The Fooey River

The Fooey River flows into western Lough Nafooey and is a tributary of the Finny River. The survey area here (FO1) was located roughly 700m from the Lough Nafooey inflow point and had a lamprey density of 10.20/m^2. An area of 5 m^2 of optimal habitat was surveyed. The substrate of the river was almost entirely sand; with most lampreys found in and around patches of vegetation on sandy mounds. These characteristics along the slow flow and the trees growing along the banks and in the river itself offered a good deal of shade, providing an optimal habitat for lampreys. Plate 11 shows some of the lampreys found at this site. The EPA lists the Fooey as Class B water (Q3-4).

4.2.6 Lough Carra Sub-Catchment

Lough Carra is situated to the north-east of Lough Mask in County Mayo. Four sites were investigated within the Lough Carra catchment. A total survey area of 23 m^2 was surveyed yielding no lampreys. The upper Annies River below Lough Carrownacon (AN1) and its tributary, the Mountpleasant Stream (AN2) were investigated, along with the Rocksborough Stream (RX1) and the River Keel (K1).

Plate 11 Brook lamprey transformers from the Fooey River.

4.3 The Suir Catchment

4.3.1 Introduction

A total of 75 sites (70 qualitative and 5 quantitative) were undertaken in the Suir catchment during the 2006 survey. A total of 58 of the 75 sites examined had lampreys present (77%) with the lamprey density ranging from 0.06 per m^2 to 19.25 per m^2, where lampreys were present. In total, 663 m^2 was surveyed resulting in a mean lamprey density of 2.88 per m^2. A total of 1,914 individual *Lampetra* sp., and 10 confirmed (by myomere counting) *P. marinus* were recorded. Full details of site locations and lamprey catches can be found in Appendix 2 and photos of each site are included on the enclosed CD-ROM. Areas where White-clawed crayfish was observed in the Suir catchment are also indicated in the table in Appendix 2.

4.3.2 Electrical fishing site characteristics

The Suir catchment had extensive favourable lamprey nursery habitat with 43 of the 75 sites surveyed (64%) considered to have optimal habitat. The general characteristics of the electrical fishing sites in the catchment are given in Table 9 and a summary of the microhabitat characteristics are provided in Table 10. Figure 2 indicates the locations of all areas assessed in the Suir catchment during the 2006 survey and the recorded lamprey densities for rivers throughout the catchment are listed in Table 11.

4.3.3 Distribution of lampreys in the Suir catchment

Juvenile river/brook lampreys were distributed throughout the Suir catchment. Sea lamprey ammocoetes were found in the middle Suir sub-catchment between the Anner and Aherlow confluences. The majority of the individuals were recorded on the main channel of the Suir River with one site on the Tar River having a single sea lamprey.

4.3.4 Characteristics of lampreys in the Suir catchment

The overall results from the Suir catchment in terms of lamprey densities recorded in each river system are listed in Table 11. The highest densities of lampreys recorded were on the Tar (19.25 per m^2), Outeragh (16.50 per m^2), Thonogue (9.50 per m^2) and Dawn (8.22 per m^2) river systems. Table 12 and 13 respectively give the length descriptive statistics for brook/river lampreys and sea lampreys captured. Length percentage frequency distributions of juvenile river/brook lampreys collected from selected river channels are shown in Figures 4 and 5. The length-weight relationship for lampreys captured during the survey of the Suir catchment is presented in Figure 7. As with the Corrib sample, an exponential growth rate is apparent.

During the current study lampreys were identified on the basis of their external pigmentation characteristics using the key provided by Gardiner (2003). Specimens with ambiguous pigmentation characteristic, and all sea lamprey ammocoetes, were subjected to myomere counting. Unlike the Corrib, lampreys with unusual pigmentation were common throughout the Suir catchment. In Plate 12, brook lamprey ammocoetes from the Rossesstown River near Thurles are shown. The lower specimen can be seen to have an unusual pigmentation pattern on the caudal fin and oral hood and was initially identified as a sea lamprey. However, following myomere counting this specimen was reclassified as a brook lamprey. Two lightly coloured albino like lamprey ammocoetes were recorded on the River Nire. The numbers of trunk myomeres recorded and length characteristics of juvenile and transforming lampreys from the Suir catchment is given in Table 14. Suir brook/river lampreys had a mean myomere count of 62 (sample size 223) with a range from 57 to 66. Sea lampreys on the Suir had a mean myomere count of 72 (n=10) with a range of 69 to 75. These are the same range as recorded in previous studies (Potter & Osborne, 1975).

Overall, a total of 232 (11.7%) of the brook/river lampreys captured during the current survey were identified as being transformers. Transforming lampreys in the Suir catchment had a size range of 9.9 cm to 18.9cm.A number of the transformers recorded broadly corresponded to the "*silvered, slender looking, and laterally flattened. Prominent eye (eye length often 2.4 to 2.8% of total length). May have sharp teeth. Lateral line organs on and around the head generally not conspicuous. No signs of sexual maturation. Less than 120 mm, and typically 90–115 mm*" description of river lamprey transformers given by Gardiner (2003) and it is concluded that at least some of these specimens were *Lampetra fluvialitis*. However, Gardiner (2003) also notes that "*It may not be possible to distinguish the two species* [of *Lampetra*] *unambiguously in the field, particularly up to early winter*". Plate 13 shows confirmed River lamprey and Sea lamprey specimens from the lower River Suir at Clonmel.

Plate 12 Brook lamprey ammocoetes from the Rossesstown River near Thurles. Note the unusual pigmentation on the lower specimen with pigmentation on the caudal fin and extending ventrally on the oral hood.

4.3.5 The Lower Suir Sub-Catchment – Waterford to Clonmel

A total of 21 sites were surveyed in this area of the catchment (total surveyed area of 188 m^2). Lampreys were recorded at 17 survey sites (81%). Where lampreys were recorded, the densities ranged from 1.0 lamprey per m^2 on the Killenaulle River to 8.38 lampreys per m^2 on the Clodiagh (Portlaw) River. A total of 212 m^2 was examined in the lower Suir catchment with 662 individual lampreys captured and a mean lamprey density of 3.12 per m^2. Seven sea lampreys were recorded at site SR3 (quantitative) downstream of Clonmel, where the Glenmorgan stream meets the Main Suir. Water levels at this site were moderate-high at the time of survey. In fact, the chairman of the local angling club confirmed that the exact location of the surveyed area was dry for much of the summer months and was submerged only a few weeks previously.

4.3.5.1 River Suir – Main Channel

Three sites were surveyed on the main channel of the lower River Suir (SR1 - SR3) between Carrick-On-Suir (SR1) and Clonmel (SR3). The sites investigated on the lower River Suir generally had optimal habitat with SR1 and SR3, in particular, exhibiting high percentages of sand and silt substrates in the surveyed areas. The majority of lampreys caught at SR1 were taken from silt that had accumulated in the interstices of the cobble and rock riverbed. Water quality in this stretch of the River Suir is currently rated by the EPA as slightly polluted (Q3-4). Lampreys were present at all three of the sites surveyed, the densities recorded ranging from 0.47/m^2 to 6.0/m^2. The total number of lampreys recorded at these three sites was 136; with 129 (95%) *Lampetra* sp. and 7 (5%) *P. marinus*.

Plate 13 River lamprey macrophthalmia and sea lamprey ammocoete from the lower River Suir at Clonmel.

Plate 14 Brook lamprey ammocoetes from the Nier River. The top and bottom specimens have an unusual albino like pigmentation pattern.

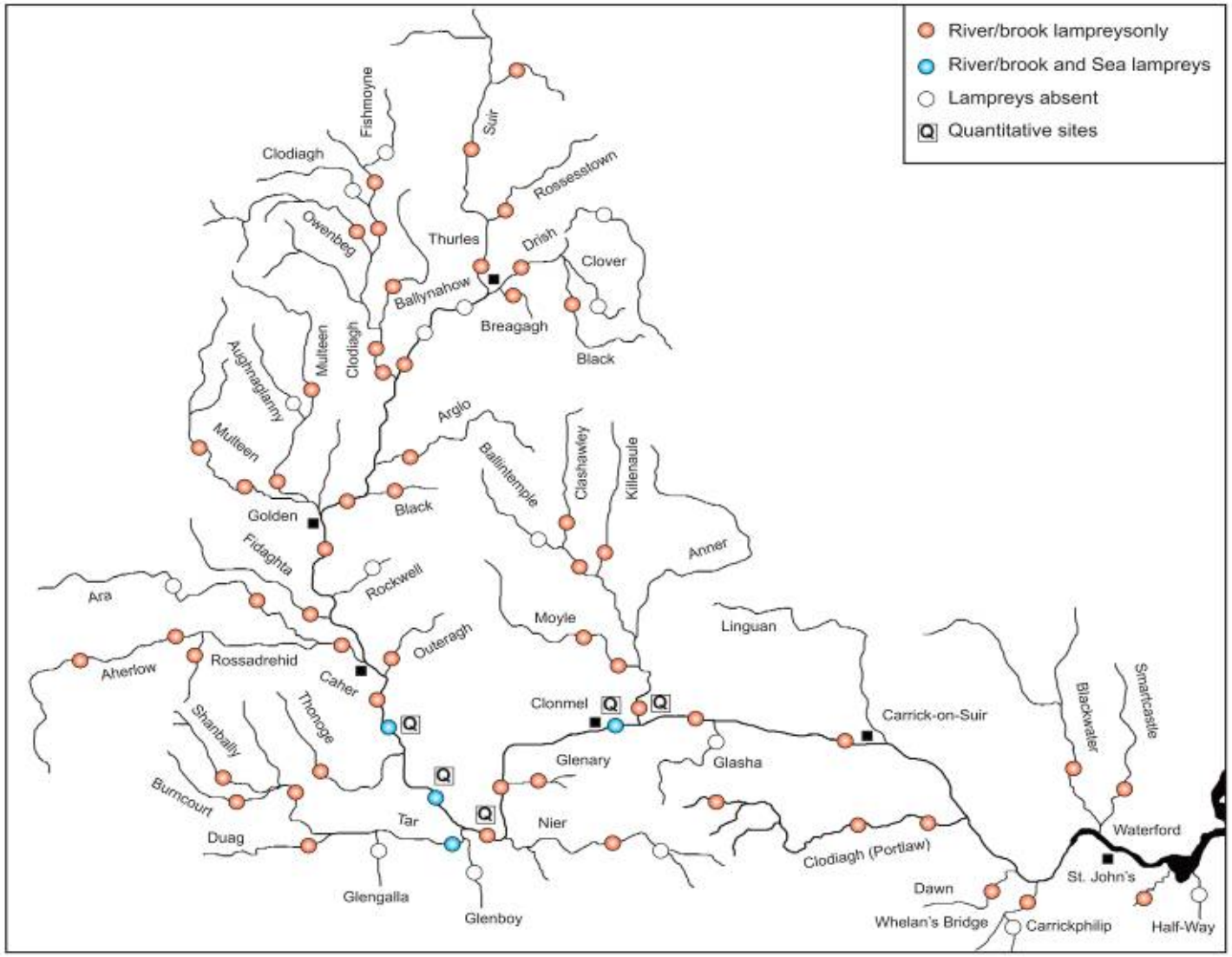

Figure 2 Map of the Suir Catchment and the 75 sites investigated during the 2006 survey.

4.3.5.2 Tributaries – Waterford City Area

Four tributaries with inflow points near Waterford City were surveyed: the Halfway House Stream (HH), St. John's River (JR), the Blackwater (Kilmacow) River (BW1) and its sub-tributary, the Smartscastle (BW2). Lampreys were present at all areas surveyed, with the exception of site HH. The Halfway House Stream (HH) is one of the most polluted rivers in the Suir catchment and was listed in the most recent EPA survey as having class D water (25%) with the remainder listed as class B waters. The physical habitat at the surveyed site was also sub-optimal for lampreys with a compacted gravel substrate.

Where lampreys were recorded, their densities ranged from 4.71 per m^2 on the St. John's River to 7.00 per m^2 on the Blackwater (Kilmacow) River. On the Blackwater site, the majority of lampreys were found behind the stump of a tree which allowed the accumulation of a silt bed roughly 2 m^2 in area. A total of 15 km (75%) of the Blackwater (Kilmacow) River is rated as Class A. The St. John's River (JR) is listed as seriously polluted by the EPA with a Q-value of Q2 but the stretch surveyed had optimal physical lamprey habitat with a soft, silty substrate and a regular glide/pool sequence. The Blackwater (Kilmacow) River has two small hydroelectric schemes in its lower reaches and electric barriers are used to prevent fish moving into the tailraces of these schemes. The fish passes present on the weirs in this area are unlikely to be able to facilitate upstream migrating lampreys.

4.3.5.3 Tributaries – Waterford to Carrick-On-Suir

There were five tributaries (WB1, DW and CL1-CL3) and one sub-tributary (WB2) surveyed on this section of the Lower Suir catchment. Overall a total of six sites were investigated. Lampreys were recorded at 5 sites with a density range of 2.08 to 8.38 lampreys per m^2, where present. The Whelansbridge River site (WB1) had optimal lamprey nursery habitat with a silty sand substrate accumulated behind a tree. A lamprey density of 2.53 per m^2 was recorded at the site on this river. No lampreys were recorded at the site surveyed on its tributary - the Carrickphilip Stream (WB2). This site was on a drained section of the stream and was also considered to have optimal lamprey habitat. This stream is located upstream of the Knockaderry Reservoir, which may contribute to the absence of lampreys in this part of the stream.

The site investigated on the Dawn River (DW) had moderately soft sandy substrate inter-mixed with cobble. It was considered to be ideal lamprey nursery habitat and a density of 8.22 lampreys per m^2 was observed. All three sites on the Clodiagh (Portlaw) had lampreys present with the highest lamprey density (8.38 per m^2) recorded at site CL1. The EPA recently rated site CL2 as 'Q3 Moderately Polluted' and the entire river as having 21.5 km of class A water (86%), 2.5 km of class B water (10%) and 1 km as class C water (4%). The upper Clodiagh (Portlaw) (CL2 and CL3) was largely unsuitable as a lamprey nursery with a higher gradient and a gravel dominated substrate. The Linguan River was visited during the current survey but could not be fished due to high water levels.

4.3.5.4 Tributaries – Carrick-On-Suir to Clonmel

The Anner Sub-Catchment

The Anner sub-catchment joins the Suir immediately downstream of Clonmel. Six sites on the Anner system (ANR1 – ANR7) were surveyed and 6 out of the 7 sites yielded lampreys (86%). Lamprey densities ranged from 1.00/m^2 to 7.17/m^2, where lampreys were present. The main channel of the Anner is currently rated by the EPA as having 19.5 km of class A water (58%), 4.5 km of class B water (13%) and 10 km of class C water (29%) in 2002. Site ANR1 was a quantitative site. A depletion was observed as follows; 1st fishing (n=43); 2nd fishing (n=4) and 3rd fishing (n=1). The lamprey density was 4.80 lampreys per m^2. The substrate of the Anner was composed largely of gravel with fine material and a small amount of rock and cobble. The river was elevated at the time of the survey. An otter was seen searching for fish in the pool just upstream of the N24 primary road. The bulk of the Anner River had high water levels during the time of its examination, and electrofishing was not possible while these conditions prevailed.

Plate 15 The River Moyle approximately 0.5 km upstream from the Anner confluence.

The Moyle tributary is currently rated by the EPA as being class C water (83%). The two sites on the Moyle (ANR2 and ANR3) were surveyed and lamprey densities of 1.00 and 2.80 per m^2 were recorded correspondingly at these sites. Fishing was hampered at both these sites by dense growth of aquatic plants, chiefly fool's watercress (*Apium nodiflorum*). Despite the large proportion of consolidated cobble/gravel in the river bed of the uppermost site on the Moyle (ANR 3), lampreys were found in a relatively thin layer of silt on top of the hard calcified layer. The Clashawley tributary (ANR4 and ANR5) had the highest recorded lamprey densities on the Anner system with 3.25 lampreys per m^2 on the lower Clashawley (ANR4) and 7.17 per m^2 on the upper (ANR5). This river is drained upstream of the Killenaule confluence and exhibited very low water levels during the survey period. This site is rated by the EPA as having poor water quality with a Q-value of Q2-3. The site is located beside an active quarry. . Further downstream at site ANR4, the river was strewn with large debris (corrugated iron, gates etc.).

An attempt was made to survey the Killenaule sub-tributary (ANR6) at Saucestown Bridge but it was discovered the river had completely dried up at this location, most likely due to the low rainfall throughout the summer and the karst nature of the region. However, a site upstream was inspected and found to contain sufficient water for the purposes of electrofishing. Sub-optimal habitat (mostly cobble and bedrock) at this site yielded a lamprey catch of 7 individuals in an area of 7 m^2. The Ballintemple sub-tributary (ANR7) also had extremely low water levels and had some pools of water with little or no connectivity. No lampreys were recorded at a site investigated in one of these pools, which had a sub-optimal bed of cobbles. In 2002, the Ballintemple Stream was listed as a class A river while the Clashawley River was listed as having 14.5 km of class A water (69%), 4 km of class B water (19%) and 2.5 km of class C water (12%). In 2003, the EPA reported the Killenaule Stream as having 6.5 km of class A water (59%), 2.5 km of class B water (23%) and 2 km of class C water (18%).

The Glasha River

The Glasha River joins the Suir approximately 5 km downstream of the River Anner confluence. The entire length of this river is currently listed by the EPA as Class A and flows through high gradient hilly terrain. One site was surveyed on the Glasha (GS1) and no lampreys were recorded. Habitats on the Glasha River are generally more suited to juvenile salmon than lamprey ammocoetes.

4.3.6 The Middle Suir Sub-Catchment – Clonmel to Golden

For the purpose of the current study, the middle Suir catchment included the area between Clonmel and Golden. Six sites on the main Suir River were examined as well as the Tar and Aherlow sub-catchments. Seven other minor tributaries were also inspected. A total of 21 out of the 26 sites surveyed had lampreys present (81%). Lamprey densities ranged from 0.11 per m^2 to 19.25 per m^2, where lampreys were present. The total surveyed area of the middle Suir catchment was 227 m^2 and a mean lamprey density of 4.69 per m^2 was recorded. Three sea lampreys were recorded in this sub-catchment; two on the main channel of the Suir (SR6 and SR7) and one on the lower Tar River (T1).

4.3.6.1 Suir River – Main Channel

Six sites were surveyed on the middle reaches of the Suir River (SR4 – SR9). Lampreys were present at all sites investigated. This section of the River has optimal lamprey habitat with backwater pools, low flow side channels and instream mounds of soft substrate at various locations. The lamprey densities ranged from 0.20 per m^2 to 4.89 per m^2 with a mean density of 2.52 lampreys per m^2 recorded.

Site SR4, located upstream of Clonmel (Knocklofty Bridge), had 56 lampreys in an area of 11.5 m^2 (4.87 per m^2), most dwelling along the river bank. Sites SR5, SR6 and SR7 had a lamprey density range of 0.20 per m^2 to 3.0 lampreys per m^2. One juvenile sea lamprey was recorded at SR6 (Suir, Ardfinnan) and one at SR7 (Suir, Caher). Water levels at the Ardfinnan site (quantitative) were elevated, but clear at the time of the survey in October. Indeed, the area fished was known to have been dry for most of the summer. Site SR9, upstream of the bridge in Golden Town, had the highest recorded lamprey density in this area of the river with 4.89

lampreys per m^2. This stretch of the river is currently rated as being 'Slightly Polluted - Q 3-4' by the EPA.

4.3.6.2 Tributaries – Clonmel to Caher

Three tributaries (Nier, Glenary and Thonogue), joining the Suir between Clonmel and Caher, were assessed during the current survey. Lampreys were present at three out of the four sites investigated. Lamprey densities ranged from 0.11 per m^2 on the Glenary (GL1) to 9.50 per m^2 on the Thonogue (TH1). The Nier is generally a fast flowing river and there were few areas of suitable lamprey habitat. Nonetheless, a lamprey catch of 62 individuals was recorded on the lower Nier (N1) in an area of 9 m^2. The majority of these lampreys were captured in a backwater area behind an outcrop of bedrock. No lampreys were recorded at the site on the upper Nier (N2). The most recent EPA report rated both the Thonoge and the Nier as 'Class A Unpolluted'.

The Tar Sub-Catchment

The Tar flows into the Suir between Newcastle and Ardfinnan. The majority of the Tar main channel was listed as a Class A river (94%) in the most recent EPA report. Seven sites (T1 – T7) were surveyed, two on the main channel (T1 and T2) and five on its sub-tributaries: the Glenboy (T3), Glengalla (T4), Duag (T5), Shanbally (T6) and Burncourt (T7). Five out of the seven sites surveyed had lampreys present (71%) with the highest lamprey density on the entire Suir Catchment occurring on the main channel of the Tar (T1) with 19.25 lampreys per m^2. A single sea lamprey was also recorded from site T1.

The mean density of lampreys in the Tar sub-catchment was 7.94 lampreys per m^2 and the density of lampreys recorded ranged from 0.20 per m^2 to 19.25 per m^2. Sites T1 and T2 had a high densities of lampreys present (19.25 and 18.60 lampreys per m^2). The lower Tar and the Duag have significant amounts of pool habitat with a relatively soft sandy substrate. The Duag (T5) had a lamprey density of 14.33 per m^2 and the majority of its water listed as class A (88%) by the EPA. Both the Glenboy and the Glengalla sub-tributaries are listed as Class A rivers by the EPA but no lampreys were found at either of these sites. Both are mountain streams running off the Knockmealdown mountains. An area of 15m^2 was surveyed on each of the Shanbally (T6) and Burncourt (T7) rivers where 48 and 3 lampreys were recorded respectively. These two watercourses are listed as 'Class A – Unpolluted' by the EPA.

4.3.6.3 Tributaries - Caher to Golden

Three minor tributaries were surveyed within the section of the Suir catchment between Caher and Golden: the Outeragh (O1), the Rockwell (RW1) and the Fidaghta (F1). Of the three streams surveyed, two had lampreys present (67%) with a maximum lamprey density of 16.50 per m^2 recorded. The highest lamprey density occurred on the Outeragh which is listed as a Class C (Q3) river by the EPA. Site RW1 was located upstream of the Rockwell Lake and no lampreys were recorded here. Site F1 is rated by the EPA as being largely a Class B river with 5.5 km of Class B water (69%) and 2.5 km of Class A water (31%). It flows into the Suir upstream of the Aherlow and produced 8 lampreys in an area of 6 m^2 (1.33 per m^2), however, this was a very difficult stream to fish due to the luxuriant vegetative growth. The bulk of the lampreys at this site were caught in an area of 2m^2.

The Aherlow Sub-Catchment

The Aherlow River joins the Suir approximately 2 km upstream of Caher. Six sites (A1 – A6) were surveyed within this sub-catchment, three on the River Aherlow itself (A1 – A3), two on the Ara tributary (A4 and A5) and one on the Rossadrehid tributary (A6). Out of the six sites surveyed, five had lampreys present (83%). Where lampreys were present, the densities ranged from 1.10 per m^2 to 6.60 per m^2. Four of the six sites had sub-optimal habitat (A2 and A4 had ideal lamprey habitats present).

The main channel of the River Aherlow (A1 – A3) had a mean lamprey density of 2.69 per m^2 with the highest density (4.71 lampreys per m^2) occurring on the middle Aherlow (A2). The most recent EPA water quality report listed the entire Aherlow River as having 33.5 km of Class A water (78%), 4 km of Class B water (9%) and 5.5 km of Class C water (13%).

The Ara is largely a class B river with 18 km (75%) of Class B water and 6 km (25%) of Class C water. The lower Ara (A4) yielded the highest lamprey catch on this system with 33 lampreys recorded in an area of 5 m^2. This site is currently rated by the EPA as 'Q3-4 -Slightly Polluted'. The site investigated on the upper Ara (A5) had no lampreys present and is rated by the EPA as 'Q3 – Moderately Polluted'. Eutrophication was obvious from the amount of dead filamentous in the stream. The Rossadrehid (A6) is a Class C watercourse (Q3) and a lamprey density of 2.0 per m^2 was recorded during the current survey.

Plate 16 The lower River Tar c.1 km downstream of Goat's Bridge. This site produced the highest density of lampreys recorded in the 2006 surveys. Both river/brook and sea lamprey were recorded at this site.

Plate 17 The lower reaches of the Aherlow River.

4.3.7 The Upper Sub-Suir Catchment – Golden to Templemore

For the purpose of the current survey, the upper Suir catchment encompasses the catchment area between Golden and Templemore. A total of 28 sites (225 m^2) were investigated in this area during the current survey. Overall, a total of 20 out of the 28 sites surveyed had lampreys present (71%), and a mean density of 2.95 lampreys per m^2 was observed. Where they were recorded lamprey densities ranged from 0.06/m^2 to 13.43 /m^2. The highest lamprey density was recorded on the uppermost site on the main channel of the Suir River (Knocknageragh Bridge, SR15).

4.3.7.1 Suir River – Main Channel

Six sites (SR10 – SR15) were investigated on the upper Suir River and lampreys were recorded at four of these (67%). Where lampreys were present, the recorded density ranged from 0.13 per m^2 to 13.43 per m^2. Site SR10 (Camus Bridge) is located approximately 5 km upstream of the Multeen confluence. Water levels were elevated at the time of the survey making fishing conditions difficult. A lamprey density of 1.67 per m^2 was recorded here. Upstream of the Clodiagh River confluence the Suir River breaks into two channels for 2 km before joining together again. Survey area SR11 was located on the western distributary and a lamprey density of 0.13 per m^2 was recorded here. Water levels were again high at the time of the survey and fishing efficiency was likely to have been much reduced.

No lampreys were recorded at the sites investigated on the Suir between Holycross and Thurles. The EPA denotes site SR12 as having a Q-rating of Q3-4 and S8 has a current rating of Q3. One lamprey was present at SR14 (downstream of Rossesstown confluence) in an area of 5 m^2. The uppermost site on the Suir (SR15) had a lamprey density of 13.43 per m^2 with 94 specimens in area of 7 m^2. Extensive mats of dead filamentous algae were observed at sites throughout the upper Suir and there is evidence of past or ongoing drainage works. Some fishery development works has been undertaken in the vicinity of sites SR12 and SR13.

4.3.7.2 Tributaries – Golden to Holycross

The Black Stream is a drained water course with an inflow point roughly 3 km upstream of the Multeen confluence. It has a length of 10 km with 3 km of Class A water (30%), 6.5 km of Class B water (65%) and 0.5 km of Class C water (5%). One site was surveyed on the Black Stream (BLK1) and no lampreys were recorded. This site had a Q-value of Q2-3 in 2002. The Arglo River joins the Suir upstream of the Black Stream and is rated most recently as a Class B river. One site was surveyed on this tributary (ARG1) yielding a lamprey density of 2.63/m^2 from a high density silt substrate mixed with detritus.

The Multeen

The Multeen is a Class A river which flows into the main channel of the Suir River just north of Golden. It is dominated by bedrock with high levels of filamentous algae and generally has sub-optimal lamprey habitat. Five sites (M1 – M5) were surveyed on this system, including one tributary, the Aughnaglanny (M5), and lampreys were present at all but one of them (80%). Where lampreys were recorded, the densities ranged from 1.15 per m^2–11.13 per m^2.

The main channel of the Multeen (M1 – M4) had a mean lamprey density of 5.64 per m^2 with the highest density of lampreys recorded at M2 (89 lampreys/8 m^2). The lower Multeen River had an unstable and soft riverbed substrate. M3 and M4 had lamprey densities of 8.43/m^2 and 1.15/m^2 in that order. During the course of this survey, no lampreys were recorded on the Aughnaglanny (M5), which is a Class A river. The upper Multeen and Aughnaglanny had riverbed characteristics similar to that found on the Arglo; high levels of rocks with overlying thick silty detritus.

The Clodiagh (Tipperary)

The Clodiagh (Tipperary) is a major tributary of the Suir and is listed as a class A river by the EPA. Eight sites (C1 – C8) with a total area of 74.5m^2 were surveyed for the presence of lampreys; four sites on the main channel (C1 – C4) and four tributaries: the Ballynahow (C5), Owenbeg (C6), Fishmoyne (C7), and Borrisoleigh (C8) Rivers. Lampreys were present at 75% of the sites investigated. The maximum lamprey density recorded was 10.86/m^2 at site C3.

The lower Clodiagh (Tipperary) included numerous areas of optimal habitat for lampreys, though it must be said that the depth of the river in the lower reaches made finding suitable sites difficult. At the hydrometric weir at Rathkennan Bridge, sites C1 (upstream) and C2 (downstream) had densities of 5.6 and 5.14 lampreys per m^2 respectively. No lampreys were recorded on the uppermost site on the main channel (C4). Site C5 had a very low lamprey density of 0.06/m^2. The average lamprey density recorded at the two sites investigated on the Owenbeg was .25 lampreys per m^2. The Borrisoleigh Stream (C7) showed signs of recent drainage. No lampreys were recorded on the Fishmoyne River (C8), which had sub-optimal habitat and extensive riverbed calcification. Crayfish were abundant at this site.

4.3.7.3 Tributaries - Holycross to Templemore

Two minor tributaries of the upper Suir between Holycross and Templemore were investigated; the Rossesstown Stream (R1) and the Clonmore Stream (CM1). Lampreys were recorded at both of these tributaries with densities of 0.67 (R1) and 5.43 (CM1) lampreys per m^2. The Clonmore Stream is a Class A watercourse. During the current survey, an area of

detritus of approximately 2 m^2 provided the best lamprey habitat. The best sample of 0+ juveniles came from this site. The EPA lists the Rossestown River (site code 16R01) as having 4 km of Class A water (31%), 4 km of Class B water (31%) and 5 km of Class C water (38%). Contaminated water from the nearby Lisheen mine enters this stream. The Rossesstown River is severely drained with 3.5 m bedrock banks in places. The majority of the specimens caught on this river came from small silt deposits immediately downstream of undulating bedrock.

The Drish Sub-Tributary

The Drish River flows into the Suir just south of Thurles. A total of five sites (D1 – D5) were surveyed for the presence of lampreys, including three of its tributaries: the Breagagh (D3), Black (D4) and Clover (D5) Rivers. Of the five sites surveyed, lampreys were recorded at three of them (60%). Where lampreys were present, the densities ranged from 0.22/m^2 to 11.75/m^2.

Survey area D1 had 13 lampreys present in an 8m^2 area and no lampreys were recorded at site D2. Site D2 is located downstream of Lisheen Mine and has a Q-value of Q2-3/0, the '0' suffix denotes a toxic effect either apparent or suspected. Site D3 had a lamprey yield of 47 in a survey area of 4 m^2, the highest lamprey density on the Drish system during this study. Sites D4 and D5 had a peaty substrate and high levels of dead organic matter. At site D4, only 2 lampreys were recorded in a survey area of 9 m^2 and the corresponding EPA Q-value is Q2-3. No lampreys were recorded at site D5. The Drish is largely a Class B river (60%) with 27% of its water Class C and 13% Class A. The Clover tributary (D5) is also chiefly Class B with 1.5 km Class B (42%), 1 km Class A (29%) and 1 km Class C (29%).

Plate 18 Warning signs regarding industrial pollution on the River Drish River near Thurles.

Table 5 General characteristics of the areas where juvenile lamprey sampling was conducted during the 2006 survey of the Corrib catchment.

River	Wetted Width (m)	Water Quality (Q-Value)	Water Conductivity (ms cm -1)	Water Temperature (ºC)	River Depth (cm)	Bank Height (m)	Canopy Cover (%)	Fine Substrate (%)	Gravel Substrate (%)	Riffle Habitat (%)	Glide Habitat (%)	Bank Slope (degrees)
Clare	9.20 (3 to 17)	Q4 (Q3 to Q4-5)	589.1 (429 to 789)	15.5 (10.9 to 18.8)	36.2 (15 to >200)	2.03 (0.4 to 6)	6.7 (0 to 70)	24.06 (0 to 100)	22.81 (0 to 70)	19.86 (0 to 90)	65.54 (0 to 100)	69.57 (0 to 90)
Cregg	10.00 (5 to 15)	Q4	589.5 (571 to 608)	16.1 (13.6 to 18.5)	>100 (35 to >100)	20.50 (1 to 40)	2.5 (0 to 5)	15 (10 to 20)	30 (0 to 60)	2.5 (0 to 5)	77.5 (65 to 90)	80 (70 to 90)
Black	6.13 (3.5 to 9.0)	Q4 (Q4 to Q4-5)	629 (610 to 660)	14.1 (12.1 to 15.4)	46.3 (25 to >100)	1.50 (0.5 to 2.0)	38.75 (25 to 60)	7.5 (5 to 10)	12.5 (5 to 20)	25 (5 to 50)	50 (40 to 60)	70 (60 to 80)
Cross	5.50 (3 to 8)	n/a	643.5 (603 to 684)	12.3 (12 to 12.5)	65.0 (60 to >100)	2.62 (0.8 to 4.5)	15 (10 to 20)	10	22.5 (15 to 30)	25 (0 to 50)	50 (40 to 60)	90
Cong	15.00	Q4-5	268	17.4	30.0	0.50	5	30	10	50	20	90
Dooghta	6.50	Q4-5	52.9	14.9	40.0	0.40	15	10	30	25	60	30
Bealanabrack	11.00 (8 to 15)	Q4 (Q4 to Q4-5)	61.3 (61.1 to 77.1)	13.8 (13.2 to 15.1)	46.7 (40 to >100)	0.88 (0.5 to 1.5)	3.75 (0 to 5)	21.25 (5 to 55)	38.75 (30 to 45)	20 (0 to 50)	61.25 (45 to 80)	58.75 (40 to 80)
Owenriff	12.50 (10 to 15)	Q4	69.6 (64.4 to 74.8)	15.6 (15.2 to 15.9)	45.0 (40 to 100)	0.38 (0.25 to 0.5)	15.0 (5 to 25)	12.5 (10 to 15)	20	70 (60 to 80)	20 (10 to 30)	55 (30 to 80)
Drimneen	4.17 (2 to 5.5)	Q4	120.4 (58.6 to 158.6)	15.0 (14.5 to 15.7)	33.3 (25 to >100)	0.73 (0.4 to 1.0)	31.7 (20 to 50)	8.3 (5 to 10)	11.7 (5 to 20)	56.67 (20 to 90)	36.67 (10 to 60)	53.3 (30 to 80)
Robe	6.50 (2 to 9)	Q3-4 (Q3 to Q4)	540.6 (447 to 604)	14.2 (13.8 to 15.1)	72.5 (50 to >200)	1.04 (0.3 to 2.0)	7 (0 to 20)	24 (10 to 75)	44 (10 to 60)	23 (0 to 40)	65 (50 to 80)	59 (45 to80)
Allie	7.80 (3 to 11)	Q4 (Q3-4 to Q4-5)	153.5 (140 to 167)	18.1 (16.8 to 19.4)	35.2 (20 to 71)	1.40 (0.2 to 3.5)	11 (0 to 40)	7 (5 to 15)	9 (0 to 25)	10 (0 to 40)	82 (30 to 100)	84 (60 to 90)
Srah	3.75 (2 to 5.5)	Q4 (Q4 to Q4-5)	101	17.0	20.0 (10 to 40)	1.25 (1.0 to 1.5)	35 (30 to 40)	5	10	35 (30 to 40)	30	70
Owenbrin	12.00	Q3-4)	41.8	12.9	30.0	0.40	0	15	50	25	70	90
Strahnalong	5.00	Q4	34.2	12.0	50.0	1.00	0	10	20	60	30	45
Finny	8.50 (8 to 9)	Q4 (Q3-4 to Q4-5)	53.25 (48.3 to 58.2)	13.6 (13.2 to 13.9)	65.0 (50 to >200)	0.53 (0.3 to 0.8)	5 (0 to 10)	42.5 (5 to 80)	30 (20 to 40)	25 (0 to 50)	60 (40 to 80)	35 (30 to 40)
Annies	4.00 (3 to 5)	n/a	574 (547 to 601)	15.2 (14.7 to 15.6)	40.0 (30 to >100)	4.00 (2.0 to 6.0)	65 (50 to 80)	15 (10 to 20)	25 (20 to 30)	20	75 (70 to 80)	90
Rocksborough	2.00	n/a	604	12.1	30.0	2.50	20	5	60	0	80	90
Keel	12.00	n/a	241	18.20	70.0	0.30	0	90	0	0	100	90

Table 6 Characteristics of micro habitats in the Corrib catchment 2006 lamprey survey.

River	Mean Depth (cm)	Flow (m3 sec-1)	Sand Substrate (%)	Silt Substrate (%)	Clay Substrate (%)	Substrate Density (index)	Shade (%)	Rooted Vegetation Cover (%)
Clare	21.1 (5 to 60)	0.02 (0 to 0.20)	37.1 (0 to 85)	37.9 (0 to 100)	13 (0 to 85)	3.2 (1 to 4)	18.9 (0 to 100)	27.2 (0 to 60)
Cregg	30	0.05 (0 to 0.1)	7.5 (0 to 15)	25.0 (0 to 50)	15.0	4 (2 to 5)	20 (0 to 40)	50.0 (40 to 60)
Black	28.75 (15 to 50)	0.025 (0.01 to 0.05)	28.75 (0 to 95)	26.25 (0 to 50)	2.5 (0 to 10)	3.5 (3 to 5)	15 (0 to 40)	26.25 (5 to 50)
Cross	40 (20 to 60)	0.04 (0.02 to 0.05)	70	30	0	2.5 (2 to 3)	30 (10 to 50)	35 (0 to 70)
Cong	25	0.01	20	70	10	2	0	30
Dooghta	40	0.03	100	0	0	3	50	0
Bealanabrack	35 (25 to 60)	0.028 (1 to 4)	47.5 (0 to 100)	23.75 (0 to 80)	5 (0 to 20)	2.75 (1 to 4)	5 (0 to 20)	12.5 (0 to 40)
Owenriff	17.5 (15 to 20)	0.075 (5 to 10)	45 (0 to 90)	0	0	3	5 (0 to 10)	0
Drimneen	16.67 (15 to 20)	0.073 (0.02 to 0.1)	30 (0 to 80)	13.3 (0 to 20)	23.3 (0 to 70)	2.7 (1 to 5)	1.67 (0 to 5)	1.67 (0 to 5)
Robe	39 (25 to 50)	0.026 (0 to 0.05)	26 (0 to 50)	45 (5 to 80)	12 (0 to 30)	2.5 (1 to 4)	4 (0 to 10)	27 (10 to 60)
Allie	21 (5 to 35)	0.025 (0 to 0.05)	49 (0 to 90)	48 (10 to 100)	3 (0 to 15)	2.3 (1 to 4)	2 (0 to 10)	10 (0 to 50)
Srah	10	0.00	5 (0 to 5)	0	0	5	0	0
Owenbrin	15	0.05	100	0	0	2	0	5
Strahnalong	35	0.015	15	0	0	5	0	10
Finny	35 (20 to 50)	0.05 (0 to 0.10)	47.5 (0 to 95)	25 (0 to 50)	25 (0 to 50)	3.25 (1.5 to 5)	25 (0 to 50)	47.5 (20 to 70)
Annies	30	0.05	60 (30 to 90)	10	0	4.25 (4 to 4.5)	25 (0 to 50)	15 (0 to 30)
Rocksborough	20	0.02	0	15	0	4	80	0
Keel	45	0.00	30	0	70	1.5	0	30

Table 7 Lamprey densities on each river surveyed on the Corrib Catchment.

Sub-Catchment	River	Number of Sites	Area Sampled (m^2)	Brook/River Lamprey Density (Number m^{-2})	*Lampetra* sp. Length (cm)
Lough Corrib	*Clare*	37	204.5	1.17 (0.00 to 11.71)	9.3 (3.1 to 16.0)
	Cregg	2	10	0.00	n/a
	Black	4	28	0.33 (0.00 to 0.70)	8.2 (5.4 to 11.8)
	Cross	2	11	0.57 (0.00 to 1.14)	9.2 (6.7 to 11.6)
	Cong	1	5	0.00	n/a
	Dooghta	1	5	0.20	10.7
	Bealanabrack	4	20	3.10 (0.00 to 10.80)	9.1 (3.5 to 11.0)
	Owenriff	2	19	0.00	n/a
	Drimneen	3	14	1.23 (0.00 to 2.50)	9.7 (7.1 to 11.9)
Lough Mask	*Robe*	5	36	0.08 (0.00 to 0.25)	13.8 (12.5 to 14.9)
	Allie	5	28	0.28 (0.00 to 1.20)	6.5 (3.9 to 9.5)
	Srah	2	10	0.00	n/a
	Owenbrin	1	9	0.00	n/a
	Srahnalong	1	5	0.00	n/a
	Finny	2	10	5.10 (0.00 to 10.20)	9.8 (5.8 to 12.1)
Lough Carra	*Annies*	2	13	0.00	n/a
	Rocksborough	1	5	0.00	n/a
	Keel	1	5	0.00	n/a

Table 8 Length descriptive statistics for 406 Brook/River lampreys captured during the 2006 Corrib survey.

River	Tributary	Sub-Tributary	N	Mean	Min	Max	St. Dev.
Allie			7	6.5	3.9	9.5	2.2
Bealanabrack			9	9.0	7.2	9.9	1.2
Bealanabrack	Failmore		3	8.3	7.5	9.0	0.8
Bealanabrack	Joyce		50	9.1	3.5	11.0	1.4
Black			10	8.2	5.4	11.8	2.3
Clare			27	9.4	6.0	12.4	1.3
Clare	Abbert		18	11.1	6.9	13.7	1.7
Clare	Dalgan		6	9.5	7.1	12.1	1.8
Clare	Grange		17	11.1	7.5	14.3	1.7
Clare	Nanny		64	8.7	3.1	16.0	3.3
Clare	Sinking		105	9.1	3.6	14.7	1.9
Clare	Sinking	Ballintava Stream	9	9.2	6.5	12.4	2.2
Clare	Tonmoyle		2	11.7	9.6	13.8	3.0
Cross			8	9.2	6.7	11.6	1.9
Dooghta			1	10.7	10.7	10.7	
Drimneen			10	9.8	7.1	11.9	1.5
Drimneen	Magheramore		6	9.4	8.0	10.2	0.8
Finny	Fooey		51	9.8	5.8	12.1	1.4
Robe			1	14.0	14.0	14.0	
Robe	Brickeen River		2	13.7	12.5	14.9	1.7

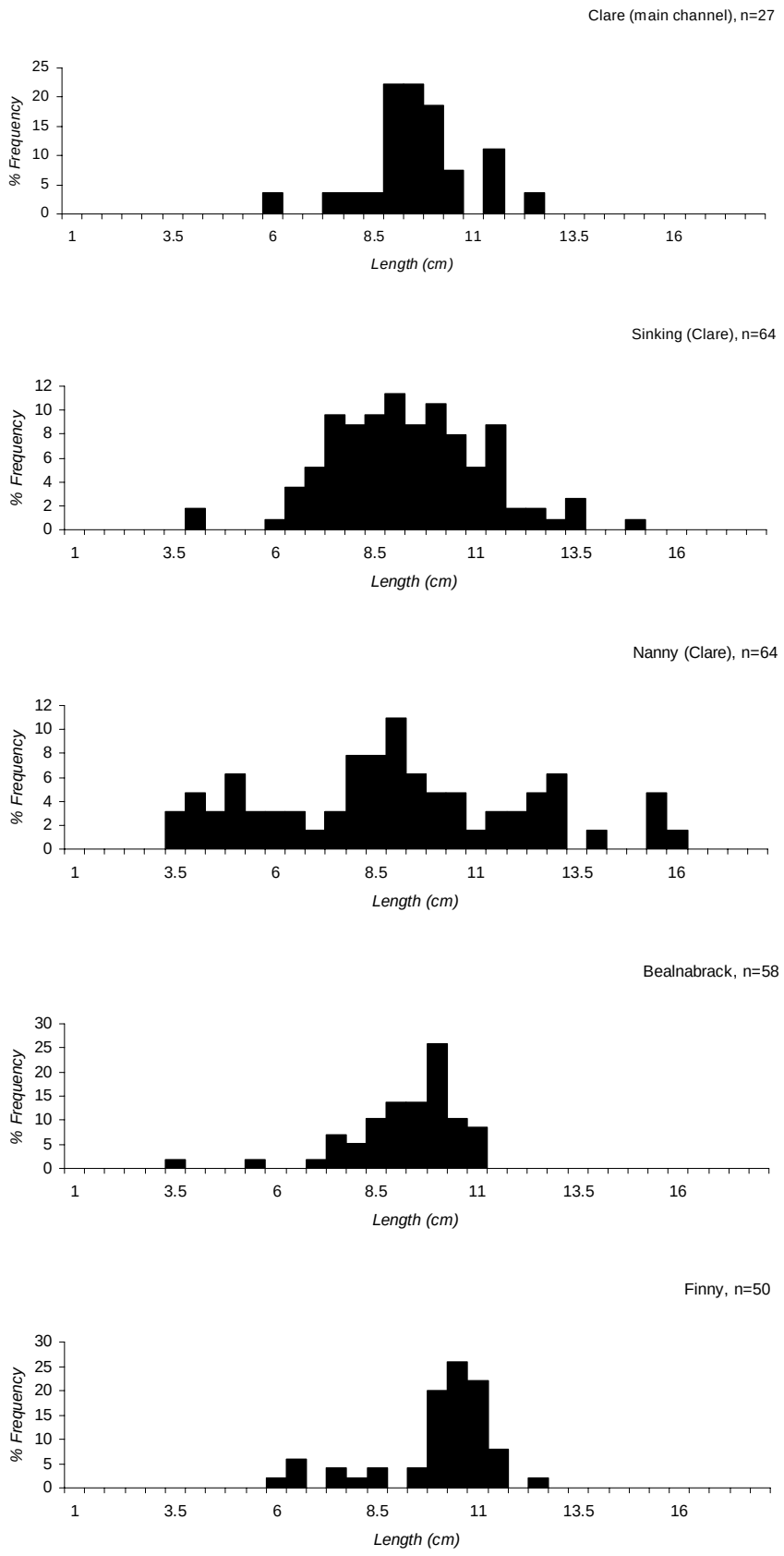

Figure 3 Length percentage frequency distributions of juvenile *Lampetra* sp. lampreys collected from selected river channels in the Corrib catchment during 2006.

Table 9 General characteristic of the sites investigated during the 2006 Suir lamprey survey.

River	Wetted Width (m)	Water Quality (Q-Value)	Water Conductivity (ms cm -1)	Water Temperature (°C)	River Depth (cm)	Bank Height (m)	Canopy Cover (%)	Fine Substrate (%)	Gravel Substrate (%)	Riffle Habitat (%)	Glide Habitat (%)	Bank Slope (degrees)
Suir	23.7 (6.5 to 50)	Q3-4 to Q4-5	567.2 (407 to 722)	15.0 (12.9 to 18.7)	51.0 (30 to >200)	1.2 (0.2 to 2.0)	8 (0 to 30)	21 (5 to 50)	40 (20 to 70)	21 (0 to 45)	62 (10 to 40)	60.5 (30 to 90)
Halfway House Stream	2.5	Q3-4	511	12.1	20.0	1.0	90	20	40	25	25	50
St. John's	8.0	Q2	404	15.7	40.0	1.5	40	55	30	0	50	90
Anner	4.69 (2.5 to 8.0)	Q2-3 to Q4	608.8 (466 to 712)	15.0 (11.6 to 18.6)	36.4 (20 to >100)	1.2 (0.5 to 2.0)	45.0 (5 to 90)	19.4 (10 to 55)	35.6 (15 to 60)	11.9 (0 to 25)	31.9 (0 to 60)	75 (50 to 90)
Blackwater	8.3 (4.5 to 12.0)	Q3-4 to Q4	381.5 (296 to 467)	14.8 (14.4 to 15.2)	40.0 (40 to 60)	1.3 (0.5 to 2.0)	67.5 (55 to 80)	32.5 (20 to 45)	25 (10 to 40)	22.5 (20 to 25)	60 60	55 (50 to 60)
Whelansbridge	2.8 (2.0 to 3.5)	n/a	359 (291 to 427)	14.9 (14.7 to 15.1)	22.5 (20 to 40)	1.5 (1.0 to 2.0)	65 (5 to 80)	50 (40 to 60)	25 (20 to 30)	25 (0 to 50)	50 (40 to 60)	62.5 (45 to 80)
Clodiagh (Portlaw)	10.83 (5.0 to 14.0)	Q3 to Q4-5	117.93 (96.0 to 154.7)	15.4	36.7 (30 to 70)	1.5 (1.0 to 2.0)	63.3 (50 to 80)	11.7 (10 to 15)	36.7 (20 to 50)	35 (25 to 40)	46.7 (40 to 50)	76.7 (60 to 90)
Glasha	5.5	Q4-5	113.6	14.5	35.0	1.5	75	5	15	60	35	45
Dawn	4.5	n/a	294	15.7	25.0	1.0	15	20	30	50	45	70
Nier	12.5 (12 to 13)	Q4 to Q4-5	71.15 (62.7 to 79.6)	14.4 (14.2 to 14.5)	42.5 (25 to >150)	1.8 (1.0 to 2.5)	47.5 (45 to 50)	5	15	65 (60 to 70)	25 (20 to 30)	70
Glenary	8.0	n/a	133	15.4	20.0	1.0	65	10	35	35	40	55
Blackstream	3.0	Q2-3 to Q4	752	12.8	20.0	2.5	30	20	30	15	55	50
Arglo	3.0	Q3-4	704	12.5	20.0	1.0	25	15	40	20	50	45
Drish	6.8 (2.5 to 15)	Q2-3/0 to Q4	398.9 (8.75 to 789)	15.85 (15.8 to 15.9)	40.0 (20 to >100)	1.16 (0.5 to 2.0)	26 (5 to 60)	26 (10 to 85)	36 (5 to 80)	5 (0 to 20	48 (30 to 70)	51 (30 to 80)
Multeen	8.10 (7 to 12)	Q4 to Q4-5	380.2 (302 to 437)	12.6 (11.5 to 13.5)	35.0 (25 to 100)	0.82 (0.3 to 1.5)	54 (30 to 80)	15 (5 to 40)	39 (15 to 70)	28 (0 to 50)	31 (20 to 50)	61 (40 to 80)
Rossestown	3.0	Q3	810	16.0	60.0	3.5	80	20	10	0	60	90
Tar	8.64 (4.0 to 20.0)	Q3-4 to Q4-5	205.8 (308 to 374)	13.8 (11.4 to 14.7)	26.4 (10 to 100)	1.11 (0.5 to 2.0)	42.14 (10 to 80)	30 (5 to 55)	34.3 (25 to 50)	32.14 (0 to 70)	49.29 (40 to 80)	65.7 (25 to 90)
Thonoge	8.0	Q4-5	101.7	15.5	10.0	0.5	75	55	20	80	10	60
Clodiagh (Tipperary)	9.80 (4 to 18)	Q3-4 to Q4-5	500.16 (275 to 716)	15.6 (14.3 to 17.9)	30.0 (20 to 100)	1.75 (1 to 3.5)	30 (0 to 90)	18.75 (10 to 45)	50 (30 to 60)	30 (0 to 50)	41.25 (20 to 50)	75 (60 to 90)
Fidaghta	4.5	Q4	720	13.5	80 (	1.5	5	15	40	20	60	70
Outeragh	3.0	Q3	755	14.1	20.0	1.0	75	5	85	0	20	90
Rockwell	3.5	n/a	711	13.5	25.0	0.5	85	55	35	0	60	30
Clonmore	3.5	Q4	570	15.9	10.0	1.5	25	50	50	0	25	90
Aherlow	6.25 (2 to 11)	Q3 to Q4	427.3 (119.7 to 641)	16.0 (14.9 to 19.2)	29.2 (10 to 100)	1.00 (0.75 to 1.5)	29.2 (5 to 75)	17.5 (5 to 30)	41.7 (10 to 75)	34.2 (15 to 50)	45.8 (30 to 75)	83.3 (70 to 90)

Table 10 Selected micro-habitat characteristics at the sites investigated during the 2006 survey of the Suir catchment.

River	Mean Depth (cm)	Flow (m3 sec-1)	Sand Substrate (%)	Silt Substrate (%)	Clay Substrate (%)	Substrate Density (index)	Shade (%)	Rooted Vegetation Cover (%)
Suir	36.7 (15 to 60)	0.04 (0.0 to 0.10)	44.5 (10 to 90)	32.5 (0 to 70)	7.0 (0 to 30)	3 (1 to 5)	34 (0 to 80)	37.5 (0 to 85)
Halfway House Stream	20	0.01	60	5	0	5	50	5
St. John's	30	0.01	5	75	20	1	30	10
Anner	22.9 (5 to 45)	0.014 (0 to 0.05)	23.1 (0 to 70)	40 (5 to 75)	15 (0 to 50)	2.75 (1 to 5)	47.5 (0 to 90)	10 (0 to 40)
Blackwater	20 (20 to 20)	0.04 (0.03 to 0.05)	45 (30 to 60)	45 (30 to 60)	5 (0 to 10)	1.75 (1.5 to 2)	70 (60 to 80)	22.5 (0 to 45)
Whelansbridge	20 (15 to 25)	0.035 (0.02 to 0.05)	45 (40 to 50)	50 50	5 (0 to 10)	1.5 (1 to 2)	95 (90 to 100)	20 (0 to 40)
Clodiagh (Portlaw)	16.7 (15 to 20)	0.01 (0.10 to 0.015)	75 (40 to 95)	8.3 (5 to 10)	0	2.3 (2 to 3)	70 (50 to 90)	36.7 (5 to 75)
Glasha	20	0.15	50	5	0	4	85	0
Dawn	10	10.00	34	33	33	3	5	0
Nier	30 (15 to 45)	0.05 (.05 to .05)	42.5 (0 to 85)	7.5 (0 to 15)	0	4 (3 to 5)	52.5 (20 to 85)	2.5 (0 to 5)
Glenary	5	0.08	90	10	0	4	90	0
Blackstream	20	0.07	50	30	20	4	90	0
Arglo	15	0.07	15	85	0	5	70	50
Drish	23 (15 to 30)	0.022 (.01 to .04)	32 (20 to 50)	44 (10 to 70)	20 (0 to 60)	2.9 (1 to 5)	45 (5 to 85)	10 (0 to 20)
Multeen	21 (15 to 30)	0.046 (0.01 to 0.10)	89 (80 to 95)	11 (5 to 20)	0	2.4 (2 to 3)	27 (0 to 60)	4 (0 to 20)
Thonoge	8	0.02	60	30	10	2	5	5
Rossestown	30	0.02	0	80	20	3.5	80	30
Tar	13.9 (7 to 20)	0.103 (0.02 to 0.25)	76.4 (0 to 95)	7.9 (0 to 10)	1.4 (0 to 10)	2.9 (2 to 5)	44.2 (15 to 85)	19.3 (0 to 50)
Clodiagh (Tipperary)	13.9 (4 to 20)	0.043 (0.02 to 0.08)	36.9 (0 to 80)	26.9 (0 to 80)	8.8 (0 to 40)	3.1 (1 to 5)	41.3 (0 to 90)	12.5 (0 to 40)
Fidaghta	60	0.10	40	45	15	2	50	40
Outeragh	10	0.01	0	50	50	1	75	20
Rockwell	15	0.03	60	30	10	3	75	40
Clonmore	10	0.01	30	30	0	4	10	5
Aherlow	14.7 (8 to 25)	0.065 (0.02 to 0.15)	32.5 (10 to 70)	61.7 (30 to 80)	7.5 (0 to 30)	2.5 (1.5 to 5)	42.5 (10 to 80)	12.5 (0 to 50)

Table 11 Lamprey densities on each river surveyed on the Suir Catchment.

River	Number of Sites	Area Sampled (m^2)	Brook/River Lamprey Density (Number m^{-2})	*Lampetra* sp. Length (cm)	Sea Lamprey Density (Number m^{-2})	*P. marinus* Length (cm)
Suir	15	120.5	2.76 (0.00 to 13.43)	10.2 (3.1 to 16.4)	0.06 (0.00 to 0.5)	11.8 (7.8 to 16.4)
Halfway House Stream	1	11	0.00	n/a	0.0	
St. John's	1	7	4.71	6.5 (3.6 to 12.1)	0.0	
Blackwater	2	20	6.18 (5.36 to 7.00)	6.7 (3.9 to 12.3)	0.0	
Whelansbridge	2	22.5	1.26 (0.00 to 2.53)	11.0 (6.2 to 14.6)	0.0	
Dawn	1	9	8.22	7.6 (2.6 to 12.9)	0.0	
Clodiagh (Portlaw)	3	37	4.30 (2.08 to 8.38)	9.6 (3.9 to 14.0)	0.0	
Glasha	1	13.5	0.00	n/a	0.0	
Anner	7	53	2.86 (0.00 to 7.17)	10.1 (2.5 to 15.2)	0.0	
Glenary	1	9	0.11	12.2	0.0	
Nier	2	24	3.44 (0.00 to 6.89)	8.1 (2.8 to 13.8)	0.0	
Tar	7	65	7.94 (0.00 to 19.25)	8.3 (3.0 to 13.0)	0.25	7.2
Thonoge	1	10	9.50	7.8 (2.6 to 11.9)	0.0	
Outeragh	1	2	16.50	3.9 (2.1 to 6.0)	0.0	
Aherlow	6	51	2.78 (0.00 to 6.60)	7.4 (1.4 to 13.4)	0.0	
Rockwell	1	10	0.00	n/a	0.0	
Fidaghta	1	6	1.33	5.9 (4.0 to 9.7)	0.0	
Multeen	5	43	4.51 (0.00 to 11.13)	10.0 (4.1 to 17.2)	0.0	
Blackstream	1	9	0.00	n/a	0.0	
Arglo	1	8	2.63	7.7 (3.8 to 13.7)	0.0	
Clodiagh (Tipperary)	8	74.5	2.77 (0.00 to 10.86)	12.4 (2.5 to 18.9)	0.0	
Rossestown	1	9	0.67	8.7 (6.8 to 11.3)	0.0	
Clonmore	1	7	5.43	3.4 (1.7 to 7.3)	0.0	
Drish	5	42	2.72 (0.00 to 11.75)	9.40 (3.4 to 16.0)	0.0	

Table 12 Length descriptive statistics for 1969 Brook/River lampreys captured during the 2006 Suir lamprey survey. This table includes lampreys captured during both quantitative and qualitative surveys.

River	Tributary	Sub-Tributary	N	Mean	Min	Max	St. Dev.
Aherlow			53	8.0	4.2	13.4	2.3
Aherlow	Ara		33	7.5	3.2	12.5	2.6
Aherlow	Rossadrehid		9	3.3	1.4	8.3	2.0
Anner			48	8.9	5.5	13	2.1
Anner	Clashawley		69	9.9	2.5	14.2	2.2
Anner	Killenaule		7	14.0	11.8	14.7	1.0
Anner	Moyle		21	12.2	9.2	14.7	1.5
Arglo			21	7.7	3.5	13.8	2.9
Blackwater			63	6.7	3.9	12.3	2.6
Blackwater	Smartscastle		59	6.7	4.0	12.2	2.0
Clodiagh (Portlaw)			134	9.6	3.9	14.0	2.4
Clodiagh			101	12.2	2.5	18.4	3.2
Clodiagh	Ballynahow		1	15.6	15.6	15.6	
Clodiagh	Fishmoyne	Borrisoleigh Stream	3	15.4	12.2	18.9	3.4
Clodiagh	Owenbeg		2	12.3	10.5	14.1	2.5
Clonmore			38	3.4	1.7	7.3	1.7
Dawn			74	7.6	2.6	12.9	2.3
Drish			13	7.0	5.4	10	1.6
Drish	Black River		2	5.8	5.2	6.3	0.8
Drish	Breagagh		47	10.2	3.4	16	3.3
Fidaghta			8	5.9	4.0	9.7	1.9
Glenary			1	12.2	12.2	12.2	
Multeen			177	10.0	4.1	17.2	2.9
Neir			62	8.1	2.8	13.8	2.3
Outeragh			33	3.9	2.1	6	1.0
Rossestown			6	8.7	6.8	11.3	1.9
St.Johns River			33	6.5	3.6	12.1	1.8
Suir			425	10.3	3.1	16.1	2.8
Tar			170	8.1	3.0	12.7	2.2
Tar	Duag		86	8.4	3.6	13	2.4
Tar	Shanbally		48	9.1	4.9	12.1	2.0
Tar	Shanbally	Burncourt	3	8.4	6.0	11.5	2.8
Thonoge			95	7.8	2.6	11.9	2.5
Whelansbridge			24	11.0	6.2	14.6	1.7

Table 13 Length descriptive statistics for 10 sea lampreys captured during the 2006 Suir survey. This table includes lampreys captured during both quantitative and qualitative surveys.

River	N	Mean	Min	Max	St. Dev.
Suir	9	12.2	7.8	16.4	2.7
Tar	1	7.2	7.2	7.2	

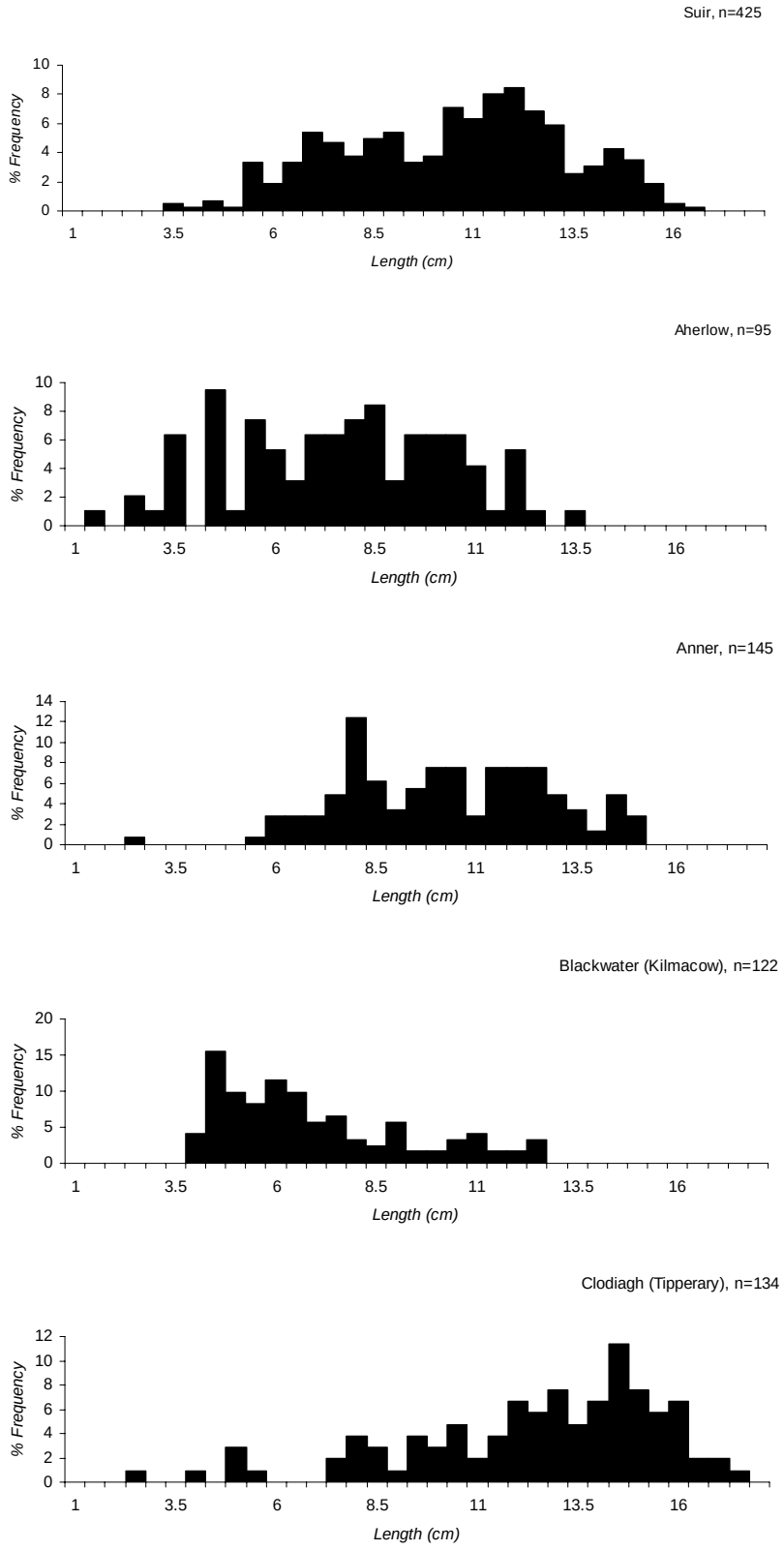

Figure 4 Length percentage frequency distributions of juvenile *Lampetra* sp. lampreys collected from selected river channels in the Suir catchment during 2006.

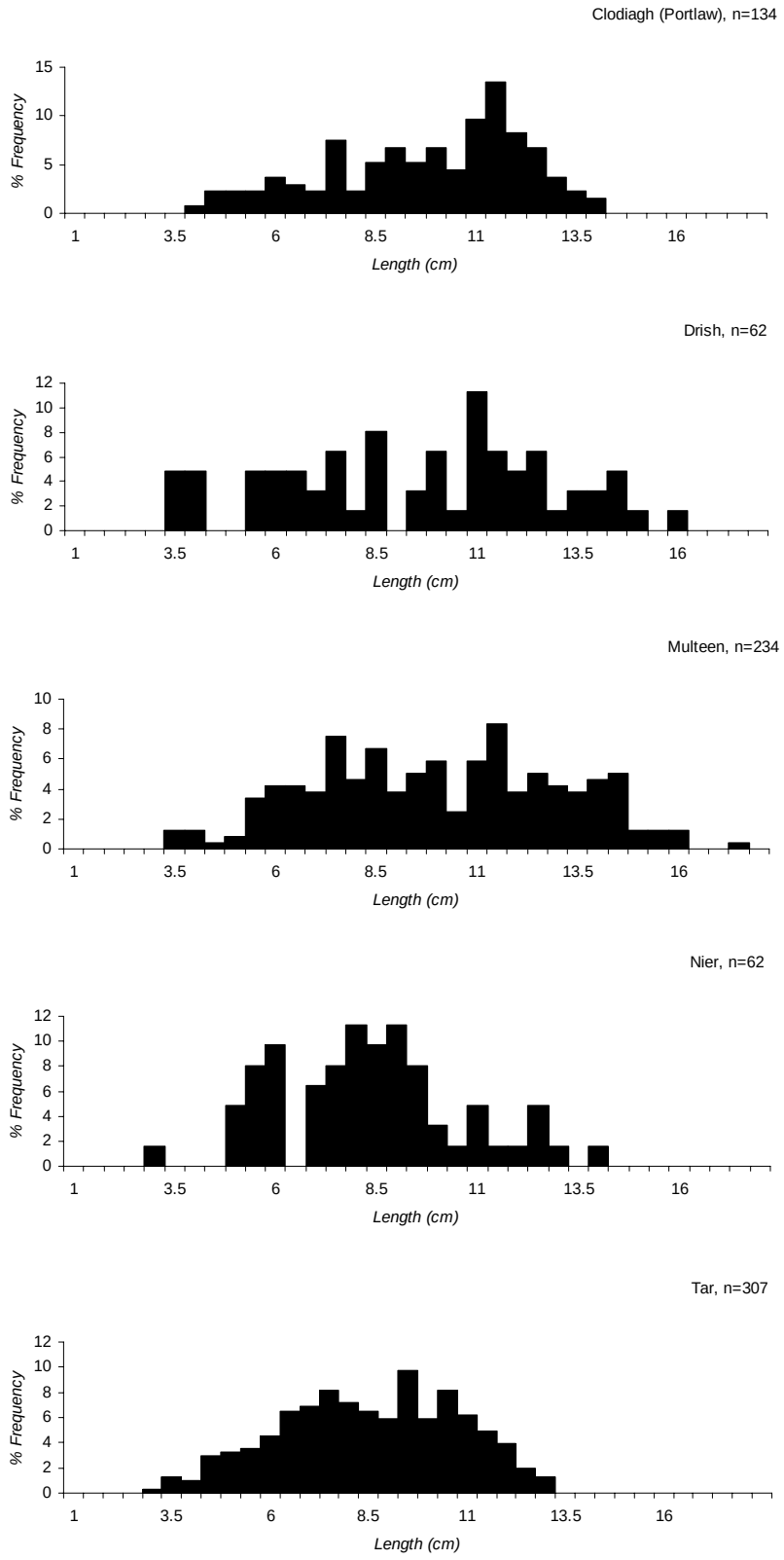

Figure 5 Length percentage frequency distributions of juvenile *Lampetra* sp. lampreys collected from selected river channels in the Suir catchment during 2006.

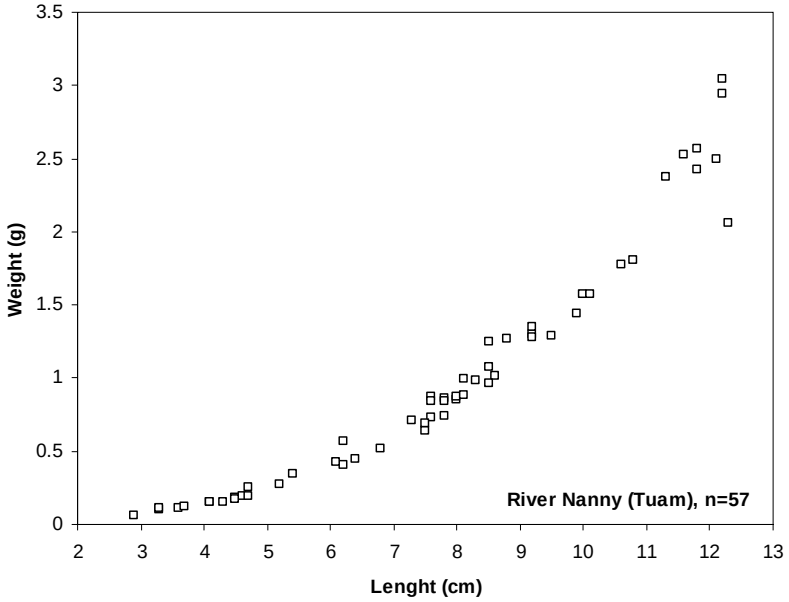

Figure 6 Length-weight relationship for 57 brook lampreys captured on the River Nanny at Tuam, Co Galway.

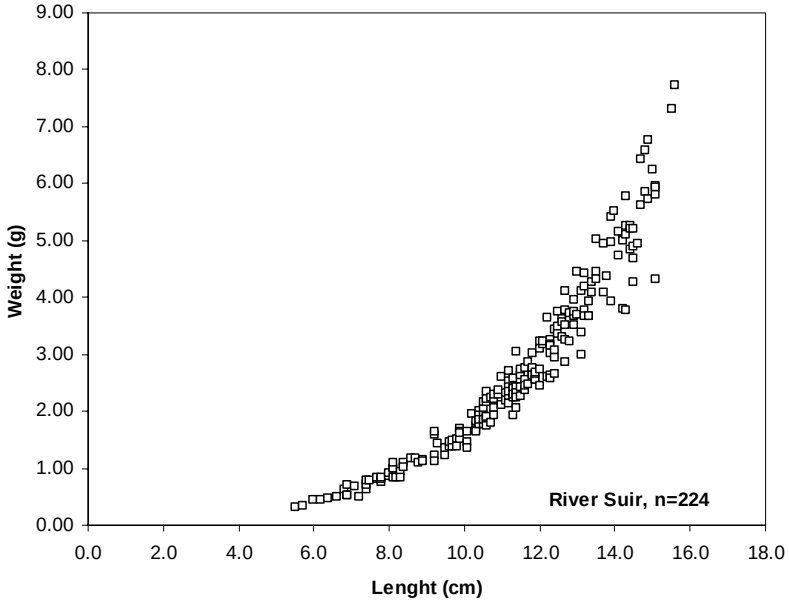

Figure 7 Length-weight relationship for 224 *Lampetra* sp. lampreys captured on the River Suir.

Table 14 Descriptive statistics for numbers of trunk myomeres recorded from lampreys on the Corrib and Suir during the 2006 surveys.

	Corrib	Suir	
	L. planeri	*Lampetra* sp.	*P. marinus*
N	62	223	10
Mean	61.2	62	72
Median	61	62	72
Mode	60	62	72
Standard Deviation	1.6	2	2
Sample Variance	2.5	4	6
Minimum	59	57	69
Maximum	65	66	75

Table 15 Comparison of the length characteristics of juvenile and transforming *Lampetra* sp. lampreys captured during the 2006 surveys of the Corrib and Suir Rivers.

Catchment	Transformation status	N	Mean	Min	Max	St. Dev.
Corrib	Non-transformer	351	9.1	3.1	16.0	2.1
	Transformer	50	11.2	9.3	15.3	1.5
Suir	Non-transformer	1737	8.5	1.4	17.2	0.1
	Transformer	232	12.7	9.9	18.9	1.7

5 DISCUSSION AND CONCLUSIONS

5.1 The Corrib Catchment

Juvenile lampreys have a patchy distribution in the Corrib catchment and were present at 38 out of the 77 locations investigated. A total of 33 out of the 38 (87%) survey areas that had lampreys present were tributaries and sub-tributaries of the Lough Corrib sub-catchment. Lampreys were present at five sites investigated in the Lough Mask sub-catchment (13%), and no lampreys were recorded in the Lough Carra sub-catchment.

Only one species of lamprey was confirmed from the Corrib catchment: brook lamprey. Where lampreys were recorded, densities ranged from 0.10 per m^2 to 11.71 per m^2 with a mean lamprey density of 0.92 per m^2 for the entire Corrib Catchment. The lamprey densities recorded in the Corrib catchment were generally much lower than those on the Suir and other rivers surveyed on behalf of NPWS in recent years (i.e. Boyne, Feale, Moy). The general water quality in the Corrib catchment is satisfactory; therefore, the assumption can be made that this is not a contributing factor to the comparatively low numbers of lampreys in this catchment. Indeed, the highest lamprey density in the Corrib catchment was found in a sludge deposit downstream of the Dunmore sewage outfall on the Sinking River. It is likely that arterial drainage works and the presence of a large regulating weir in the lower reaches of the catchment have had a dramatic influence on lamprey abundance and diversity in the catchment.

Sea lampreys are present in the Corrib catchment but seem to be confined to below the Galway Regulating Weir. Although there are records of sea lampreys in some of the tributaries of Lough Corrib (Kurz & Costello, 1999), these records pre-date the construction of the existing weir. Sea lampreys are known to spawn below the weir and have been recently seen by fisheries board staff in Galway (Seamus Hartigan, pers. comm.). However, the success of sea lamprey spawning activity below the regulating weir is unknown. There is little or no suitable nursery habitat in the deepened limestone cut between the regulating weir and Galway Bay. Sea lamprey ammocoetes may however utilise estuarine silts in the docks area of Galway. High water levels on the Corrib during September 2006 prevented survey work on the Corrib River.

The general distribution recorded during the current survey is broadly similar to that recorded by Byrne *et al.* (2000) (see Appendix 3); however there were significant differences in the results obtained in both investigations. The Byrne study found lampreys at 14.9% of the sites investigated and collected a total of 93 ammocoetes and 11 transformers in 374 sites. The current survey recorded lampreys at 49.3% of the sites investigated and captured a total of 351 ammocoetes and 50 transformers in 77 sites. The differences obtained between both surveys can be largely attributed to the methodology used. The Byrne study involved recording lamprey presence at sites surveyed for salmonids. Although a relatively large number of sites were investigated during that survey, many of the larger channels (e.g. Clare River) were not surveyed. Moreover, the Byrne survey focused on salmonid nursery habitats rather than lamprey nursery habitats which were investigated during the current survey.

Most of the areas fished during the current survey were considered to be sub-optimum habitats. The Corrib catchment has been subjected to a number of drainage schemes in the past and many of the channels in the catchment have never fully recovered either physically or ecologically. A few areas which were considered to have near optimum lamprey nursery habitat were also

assessed. These were generally located in areas where backwater habitats developed behind bridges, at cattle drinks, or due to channel meandering and erosion. The highest densities of lampreys were found in these areas. However, based on the assessment method proposed by English Nature, lampreys are present at an unfavourable status in the Corrib catchment.

It is concluded that the main lamprey populations in the Corrib catchment are currently protected within the existing SAC boundary area and no recommendations are made to extend the boundary area.

5.2 The Suir Catchment

Lampreys are widely distributed in the Suir catchment. Indeed, a total of 58 of the 75 sites (77%) examined during the current survey had lampreys present. Overall a total of 1,924 lampreys were recorded. All of the three Irish lamprey species were recorded. Sea lampreys were recorded on the main channel of the Suir downstream of Caher, Co Tipperary. This species was also present in the lower reaches of the River Tar. However, only nominal numbers of sea lampreys (n=10) were recorded. It is likely that more extensive surveying in the lower and middle reaches of the Suir may have resulted in the capture of more sea lampreys. However, high water levels during the latter part of September and in early October made surveying in this area of the river impossible.

A nominal number of transformed river lampreys were recorded on the main channel of the Suir downstream of Clonmel during October. Again high water levels prevented additional surveying for river lampreys and ideally the survey should have been extended into winter to assess the presence and distribution of this species. Overall, a total of 232 (11.7%) of the brook/river lampreys captured during the current survey were identified as being transformers. The highest percentage of transformers occurred in the Clodiagh sub-catchment where, out of 206 lampreys recorded, 41 (20%) were classified as transformers. Most of the transformers collected were in the earlier stages of transformation so no definite identification could be made for many of the transformers captured. It is certain that by surveying sites during the winter period, lampreys in later stages of transformation could be collected and these would be easier to identify. Electrical fishing during winter is not normally approved by the DCMNR. However, as lamprey microhabitats are generally located away from salmonid spawning areas work at this time of year at a number of carefully selected sites would not disturb salmonids.

The water quality on the Suir has a higher percentage of unsatisfactory areas than the Corrib catchment. However, this does not seem to have any bearing on lamprey distribution. The St. John's River (Q2) and the Drish (Q2-3/0) both had lampreys present. In fact, lampreys seem to favour slightly elevated levels of organic material and filamentous algae in the water.

Where river/brook lampreys were recorded, their densities ranged from 0.06 per m^2 to 19.25 per m^2. An overall mean river/brook lamprey density of 2.88 per m^2 was recorded for the Suir catchment. The highest densities of lampreys recorded were on the Tar (19.25 per m^2), Outeragh (16.50 per m^2), Thonogue (9.50 per m^2) and Dawn (8.22 per m^2) river systems. The densities of lampreys recorded were considered to be high and similar to those obtained on productive catchments such as the Boyne.

During the current study lampreys were identified on the basis of their external pigmentation characteristics using the key provided by Gardiner (2003). Specimens with ambiguous pigmentation characteristics, and all sea lamprey ammocoetes, were subjected to myomere counting. Unlike the Corrib catchment, lampreys with unusual pigmentation were common throughout the Suir catchment. Suir brook/river lampreys had a mean myomere count of 62 (sample size 223) with a range from 57 to 66. Sea lampreys on the Suir had a mean myomere count of 72 (n=10) with a range of 69 to 75. These are the same range as recorded in previous studies (Potter & Osborne, 1975).

Most of the areas fished during the current survey were considered to be optimum habitats. Based on the assessment method proposed by English Nature, river/brook lampreys are present at a favourable status in the Suir catchment. The status of sea lampreys in the catchment is unfavourable however.

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APPENDICES

APPENDIX 1 List of Sites Investigated for the 2006 Corrib Catchment Lamprey Survey.

Site Code	EPA Code	Q-Value	Sub-Catchments	River	Tributary	Sub-Tributary	Location	Grid Reference	Lampreys Present	Cray fish
CG1	30/C/01.1300	Q4	Lough Corrib	Clare			Curraghmore Bridge	M32161 32815		
CG2	30/C/01.1200	Q3-4	Lough Corrib	Clare			Claregalway Bridge -N17	M37273 33185	●	
CG3	30/C/01.1100	Q4	Lough Corrib	Clare			Crusheeny Bridge	M39792 33958		
CG4	30/C/01.1000	Q3-4	Lough Corrib	Clare			Lackagh Bridge	M41779 36420		
CG5	30/C/01.800	Q3-4	Lough Corrib	Clare			Corrofin	M43103 44646	●	
CG6	30/C/01.700	Q4-5	Lough Corrib	Clare			Yellow Bridge- N17	M40976 49764	●	
CG7	30/C/01.650	Q3-4	Lough Corrib	Clare			Weir Road Bridge	M41782 52836		
CG8	30/C/01.500	Q4	Lough Corrib	Clare			Ballygaddy Bridge	M42012 53716	●	
CG9	30/C/01.400	Q4	Lough Corrib	Clare			Kilcreeverty Bridge -1km upstream	M40046 57485	●	
CG10	30/C/01.200	Q3	Lough Corrib	Clare			Liskeavy Bridge	M39190 61325	●	
A1	30/A/01.500	Q3-4	Lough Corrib	Clare	Abbert		Ballaun Bridge	M43670 40791		
A2	30/A/01.400	Q4	Lough Corrib	Clare	Abbert		Pallas Bridge	M4726 4231	●	
A3	30/A/01.300	Q3-4	Lough Corrib	Clare	Abbert		Chapelfield Bridge	M4365 5169	●	
A4	30/A/01.200	Q3-4	Lough Corrib	Clare	Abbert		Abbert Bridge	M4281 5571	●	
A5			Lough Corrib	Clare	Abbert	Killaclogher	Killaclogher Bridge	M3792 3788		
G1	30/G/02.700	Q4	Lough Corrib	Clare	Grange			M44069 46076		
G2	30/G/02.300	Q4	Lough Corrib	Clare	Grange		Ballinderry Bridge	N44545 46888		
G3	30/G/02.400	Q4	Lough Corrib	Clare	Grange		Aghloragh	M49135 51293	●	●
G4	30/G/02.300	Q3-4	Lough Corrib	Clare	Grange		Cornacarthe Bridge	M50976 51672	●	
G5	30/G/02.200	Q4	Lough Corrib	Clare	Grange		Levally Crossing	M54674 52465	●	●
G6		Q3	Lough Corrib	Clare	Grange		Cloondahamper Upper Tributary	M55247 51515	●	
N1	30/N/01.300	Q4	Lough Corrib	Clare	Nanny		Weir Bridge	M41782 52836	●	
N2	30/N/01.200	Q3	Lough Corrib	Clare	Nanny		Tuam	M43771 52252	●	
N3	30/N/01.100	Q4	Lough Corrib	Clare	Nanny	Birmingham	Birmingham Bridge	M46808 52599		
T1			Lough Corrib	Clare	Tonmoyle		Tonmoyle Bridge	M41135 59450	●	
S1	30/S/01.400	Q3	Lough Corrib	Clare	Sinking		Cloonagh Bridge upstream Dalgan	M6328 6354	●	
S2	30/S/01.200	Q4	Lough Corrib	Clare	Sinking		Dunmore Castle Bridge	M50065 63934	●	
S3	30/S/01.100	Q3-4	Lough Corrib	Clare	Sinking			M52501 62130	●	
S4	30/S/01.60		Lough Corrib	Clare	Sinking		Bridge south of Carrowkeelanaghglass	M54653 61856	●	
S5	30/Y/01.055	Q4	Lough Corrib	Clare	Sinking			M58866 61994	●	
S6		Q4	Lough Corrib	Clare	Sinking	Ballintava Stream	Ballintava Stream	M50889 64145		

APPENDIX 1 (Continued) List of Sites Investigated for the 2006 Corrib Catchment Lamprey Survey.

Site Code	EPA Code	Q-Value	Sub-Catchments	River	Tributary	Sub-Tributary	Location	Grid Reference	Lampreys Present	Cray fish
S7			Lough Corrib	Clare	Sinking	Ballintava	Ballintava townland	M51970 66208	●	
D1	30/D/01.600	Q3-4	Lough Corrib	Clare	Dalgan		Dalgan Bridge	M43011 66039		
D2	30/D/01.500	Q4	Lough Corrib	Clare	Dalgan		Doomaereena Bridge	M43101 67536	●	
D3	30/D/01.200	Q3	Lough Corrib	Clare	Dalgan		Ballyhaunis -second site downstream	M48090 72936	●	
D4	30/D/01.300	Q4	Lough Corrib	Clare	Dalgan		Agloragh Bridge	M48654 76552		
D5	30/C/11.300	Q3-4	Lough Corrib	Clare	Dalgan	Cloonfad Stream	Blackford Bridge	M49154 71070		
C1	30/C/30.200	Q4	Lough Corrib	Cregg			Headford Road Bridge	M32294 35050		
C2	30/C/03.100	Q4	Lough Corrib	Cregg			Creggcastle Bridge	M3784 3538		
BL1	30/B/02.400	Q4	Lough Corrib	Black			Ower Bridge	M4835 2251	●	
BL2	30/B/02.300	Q4	Lough Corrib	Black			Moyne Bridge	M4912 2561		
BL3	30/B/02.200	Q4-5	Lough Corrib	Black			Shrule Bridge	M3165 5767	●	
BL4	30/B/02.100	Q4	Lough Corrib	Black	Kilshanvy		Bridge 1.5km south of Ardour Bridge	M31873 57706		
CS1			Lough Corrib	Cross			Riverside Inn	M19347 55309	●	
CS2			Lough Corrib	Cross			Knockapisha Bridge	M21600 56905		
CNG1	30/C/06.250	Q4-5	Lough Corrib	Cong			Cong Town	M14729 55491		
DT1	30/D/02.100	Q4-5	Lough Corrib	Dooghta			Farm Road Bridge in Dooghta	M01394 52884	●	
BB1	30/B/01.200	Q4	Lough Corrib	Bealanabrack			Maum-Main Channel at T-junction	L96549 52855	●	
BB2	30/B/01.50	Q4	Lough Corrib	Bealanabrack			Raigh Bridge	L92539 54398		
BB3	30/F/01.100	Q4-5	Lough Corrib	Bealanabrack	Failmore		Teernakill Bridge	L96005 52041	●	
BB4	30/J/01.200	Q4	Lough Corrib	Bealanabrack	Joyce		Breenaun-Tertiary Road off R345	L93003 54880	●	
OR1	30/O/02.100	Q4	Lough Corrib	Owenriff			The Shrubbery Park in western Outeragh	M11473 42599		
OR2	30/B/08.100	Q4	Lough Corrib	Owenriff	Bunowen		Knockbaun -parallel to N59	M07259 42096		
DM1	30/D/03.600	Q4	Lough Corrib	Drimneen			Lagntgannon -Off east N59 on Secondary	M14716 40931	●	
DM2			Lough Corrib	Drimneen			Drimneen	M14704 38999		
DM3			Lough Corrib	Drimneen			Bridge at Drimneen Road	M14465 40093	●	
R1	30/R/01.700	Q4	Lough Mask	Robe			Bridge NE of Springvale	M18080 64874		
R2	30/R/01.400	Q3	Lough Mask	Robe			Hollymount Bridge	M25979 68576		●
R3	30/R/01.200	Q4	Lough Mask	Robe			Christinas Bridge - 150m upstream	M34557 70951	●	●
R4			Lough Mask	Robe	Brickeen		Brickeen Brigde on N60	M41723 74811	●	●
R5	30/R/01.50		Lough Mask	Robe	Cloonycollaran		Bridge after Level Crossing on N60	M38217 74936		●

APPENDIX 1 (Continued) List of Sites Investigated for the 2006 Corrib Catchment Lamprey Survey.

Site Code	EPA Code	Q-Value	Sub-Catchments	River	Tributary	Sub-Tributary	Location	Grid Reference	Lampreys	Crayfish
AL1	30/A/02.400	Q3-4	Lough Mask	Allie			Derrymore Bridge	M13531 72663		
AL2	30/A/02.200	Q4-5	Lough Mask	Allie			Bridge West of	M13445 77836		
AL3	30/A/02.100	Q4-5	Lough Mask	Allie			Upstream of	M11625 80446	•	
AL4	30/A/02.50	Q4	Lough Mask	Allie			Westport Road	M09637 80039	•	
AL5	30/C/12.700	Q4	Lough Mask	Allie	Claureen		Claureen Bridge	M13194 80256		
SH1	30/S/02.400	Q4-5	Lough Mask	Srah			Bridgeupstream of	M11803 72508		
SH2			Lough Mask	Srah				M11305 73769		
GL1	30/G/01.200	Q4-5	Lough Mask	Glensaul			Tormakeady	M07712 63115		
OB1	30/O/01.200	Q3-4	Lough Mask	Owenbrin			Crossing on R300 in	M05257 62543		
SR1	30/S/03.100	Q4	Lough Mask	Srahnalong			Crossing at Minor	M00175 61568		
F1	30/F/03.100	Q4-5	Lough Mask	Finny			Bridge off Main	M01049 58671		
FO1	30/F/02.100	Q3-4	Lough Mask	Finney	Fooey		Road Crossing in	L94689 59965	•	
AN1			Lough Carra	Annies			South Lough	M20498 76435		
AN2			Lough Carra	Annies	Mountpleasant		Eastern side of	M20651 78339		•
RX1			Lough Carra	Roxborough			Roxoborough Road	M19128 68922		
K1			Lough Carra	Keel			Keel Bridge	M16310 67972		•

APPENDIX 2 List of Sites Investigated for the 2006 Suir Catchment Lamprey Survey

Site Code	EPA Code	Q-Value	River	Tributary	Sub-Tributary	Location	Grid Reference	Lampreys Present	Crayfish Present
SR1	16/S/02.2850	Q3	Suir			Carrick-on-Suir	S4372 1511	●	
SR2	16/S/02.2700	Q3	Suir			Kilsheelin Bridge	S2863 2324	●	
SR3	16/S/02.2600	Q3-4	Suir			Thomas Bridge, Clonmel	S23847 22761	●	
HH	16/H/02.200	Q3-4	Halfway House			Ballygunnertemple	S65947 08689		
JR	16/S/03.50	Q1-2	Johns			R675 Bridge	S59596 07726	●	
BW1	16/B/02.300	Q4	Blackwater			Dangan Bridge	S57015 19995	●	
BW2	16/S/07.500	Q3-4	Blackwater	Smartscastle		Bridge 1km east of N6 bridge	S59406 16036	●	●
WB1	16/W/01.400	none	Whelansbridge			Whelans Bridge -500m southeast of Kilmeadan	S52269 10074	●	
WB2	16/C/05.100	none	Whelansbridge	Carrickphilip		Carrickphilip Bridge	S49125 06527		
DW	16/D/04	none	Dawn			Kilmeadan Road	S51420 10863	●	
CL1	16/C/03.400	Q4	Clodiagh			King Johns Bridge in Knocknacrohy	S4373 1512	●	●
CL2	16/C/03.300	Q3	Clodiagh			Clonea Bridge	S3839 1424	●	●
CL3	16/C/03.100	Q4-5	Clodiagh			Shanakill Bridge	S3436 1595	●	
GS1	16/G/01.200	Q4-5	Glasha			Landscape Glen Bridge at end of forestry	S3039 2261		
ANR1	16/A/02.1100	Q4	Anner			First Bridge Upstream in backwater	S24471 23191	●	●
ANR2	16/M/01.400	Q3-4	Anner	Moyle		0.5km Upstream of Anner confluence	S24414 28030	●	
ANR3	16/M/01.270	Q3	Anner	Moyle		Baptistgrange Bridge	S21388 29991	●	
ANR 4	16/C/01.470	Q2-3	Anner	Clashawley		1.5km SE of Fethard	S19898 36290	●	●
ANR 5	16/C/01.400	Q4	Anner	Clashawley		Bridge 400m northwest of Moglass	S18879 41483	●	
ANR 6	16/K/05.200	Q4	Anner	Clashawley	Killenaule	Bridge 400m east of Milltown St. John	S22892 41473	●	
ANR 6a *	16/K/05.300	Q3-4	Anner	Clashawley	Killenaule	Sauces Bridge	S21956 36336		
ANR 7	16/B/07.800	Q4	Anner	Clashawley	Ballintemple	Farm Road Bridge at edge of forestry	S17947 37049		
SR4	16/S/02.2300	Q4-5	Suir			Knocklofty Bridge	S1443 2056	●	●
SR5	16/S/02.2200	Q4	Suir			Newcastle	S 13023 13640	●	
SR6	16/S/02.2000	Q3-4	Suir			Ardfinnan	S08230 17537	●	
SR7	16/S/02.1900	Q4	Suir			Caher	S04890 24681	●	●
SR8	16/S/02.1800	Q4-5	Suir			Caher	S05060 24678	●	
SR9	16/S/02.1500	Q3-4	Suir			Golden town	S01241 38431	●	●

*Site ANR6a was dried up and no survey could be conducted.

APPENDIX 2 (Continued) List of Sites Investigated for the 2006 Suir Catchment Lamprey Survey

Site Code	EPA Code	Q-Value	River	Tributary	Sub-Tributary	Location	Grid Reference	Lampreys Present	Crayfish Present
GL1	16/G/02.200	none	Glenary			Kilmanahan Bridge	S1524 1831	●	
N1	16/N/01.200	Q4	Nier			Deerpark Bridge	S1848 1355	●	
N2	16/N/01.70	Q4-5	Nier			Birchells Bridge (called Nier Bridge at site)	S2419 1417		
T1	16/T/01.500	Q4-5	Tar			1km Downstream Goats Bridge	S10331 13486	●	●
T2	16/T/01.200	Q4-5	Tar			Garrymore Bridge	R98499 15628	●	●
T3	16/G/03.200	Q4	Tar	Glenboy		Skeaghatooreen Bridge	S11883 11677		
T4	16/G/05.100	Q4-5	Tar	Glengalla		Glangalla Bridge	S07196 12978		
T5	16/D/03.900	none	Tar	Duag		Upstream of Cloghleen at Shanrahan Crossroads	R99018 13392	●	
T6	16/S/01.400	Q4	Tar	Shanbally		0.75km SE of Burncourt	R95124 16940	●	
T7	16/B/04.300	Q4-5	Tar	Burncourt		First Bridge on road to Burncourt	R94246 18168	●	
TH1	16/T/02.80	Q4	Thonoge			Bridge in Ballylooby	S01156 19471	●	
O1	16/O/01.150	Q3	Outeragh			Outeragh Bridge	S07014 29603	●	
RW1	16/R/02.100	none	Rockwell			Rockwell Bridge	S07564 34563		
F1	16/F/01.300	Q4	Fidaghta			Fidaghta Bridge	S98485 33361	●	
A1	16/A/01.900	Q4	Aherlow			Killardry Bridge	S01711 29480	●	●
A2	16/A/01.300	Q4	Aherlow			Stonepark Bridge	R88788 29836	●	
A3	16/A/01.80	Q3-4	Aherlow			Keylogues Bridge	R80286 27461	●	
A4	16/A/03.500	Q3-4	Aherlow	Ara		Bansha Bridge	S95587 33100	●	
A5	16/A/03.300	Q3	Aherlow	Ara		Tipperary Town, at Sewerage Plant	S89787 35156		
A6	16/R/06.100	Q3	Aherlow	Rossadrehid		Dromamarka Bridge	R92183 29423	●	
SR10	16/S/02.1400	Q4	Suir			Camus bridge -15m upstream	S04657 43119	●	●
SR11	16/S/02.1200	Q4	Suir			Twoford Bridge	S07049 51618	●	
SR12	16/S/02.1100	Q3-4	Suir			Holycross Bridge	S09043 54144		
SR13	16/S/02.700	Q3	Suir			Bridge south of Thurles	S13304 56930		
SR14	16/S/02.500	Q4	Suir			Rossesstown Bridge-downstream	S13376 62481	●	●
SR15	16/S/02.200	Q4	Suir			Knocknageragh Bridge	S13090 72519	●	
BLK1	16/B/05.100	Q2-3	Black Stream			400m east of Suir at Bridge	S04485 41101		
ARG1	16/A/04.200	Q3-4	Arglo			Thurlesburg Bridge	S07167 44153	●	●
M1	16/M/02.900	Q4-5	Multeen			Morpeth Bridge -100m downstream	R94152 41760	●	

APPENDIX 2 (Continued) List of Sites Investigated for the 2006 Suir Catchment Lamprey Survey.

Site Code	EPA Code	Q-Value	River	Tributary	Sub-Tributary	Location	Grid Reference	Lampreys Present	Crayfish Present
M2	16/M/02.700	Q4-5	Multeen			Ironmills Bridge	R91581 46726	●	●
M4	16/M/08.200	Q4	Multeen			Rossmore Bridge-1km downstream	R99153 50364	●	
M5	16/A/05.100	Q4-5	Multeern	Aughnaglanny		Carrow Bridge	R98116 49305		
C1	16/C/02.500	Q4	Clodiagh			Rathkennan Bridge - upstream of weir	S05113 53097	●	●
C2	16/C/02.600	Q4	Clodiagh			Rathkennan Bridge- 10m downstream	S05129 53062	●	●
C3	16/C/02.200	Q4	Clodiagh			Drumminnagleagh Bridge	S04538 59833	●	●
C4	16/C/02.80	Q4-5	Clodiagh			1.25km Upstream Pallas Bridge	S00866 64000		
C5	16/F/02.600	Q3	Clodiagh	Ballynahow		Farney Bridge	S06702 57933	●	●
C6	16/O/02.400	Q4	Clodiagh	Owenbeg		Metal Bridge at Crossroads and Picnic Area	S01650 59257	●	●
C7	16/F/03.200	Q4	Clodiagh	Fishmoyne		Rathmoyne Bridge	S04800 65676		●
C8	16/B/06.700	Q3-4	Clodiagh	Fishmoyne	Borrisoleigh	Monroe Bridge- upstream	S05070 62538	●	●
R1	16/R/01.40	Q3	Rossestown			Bridge at Ballyduag	S15045 64305	●	
CM1	16/C/11.1000	Q4	Clonmore			Second Bridge south of Clonmore	S14639 74015	●	
D1	16/D/02.300	Q4	Drish			Drish Bridge on N75-downstream	S14961 58273	●	
D2	16/D/02.70	Q2-3/0	Drish			Bridge at Castletwon	S20661 63444		
D3	16/B/03.300	none	Drish	Breagagh		Lahardan Bridge- downstream	S16485 56064	●	●
D4	16/B/01.90	Q4	Drish	Black River		Newhill Bridge - upstream	S19651 55877	●	
D5	16/C/04.300	Q4	Drish	Clover		Clooncleagh Road Bridge	S20680 58309		●

APPENDIX 3

Records of lamprey ammocoetes and adult *L.planeri* in the Corrib catchment between 1996 and 1998 obtained during electrofishing operations of 374 sites (Byrne *et al*. 2000)

Sub-Catchment	River	Tributary	No. Sites Surveyed	% of sites where lampreys were recorded
Lough Corrib	Clare	Grange	30	20% (6)
		Sinking	4	50% (2)
		Dalgan	3	100% (3)
		Minor Tributaries	3	66% (2)
	Kilroe		1	100% (1)
	Black		36	31% (11)
	Cross		9	11% (1)
	Dooghta (Cornamona)		53	4% (2)
	Bealanabrack (Maam)		5	0%
		Failmore	24	4% (1)
		Joyce's	9	33% (3)
		Minor Tributaries	14	0%
	Owenriff	Tributaries	15	0%
	Drimneen		8	25% (2)
		Magheramore	10	80% (8)
Lough Mask	Robe	Tributaries	53	4% (2)
			23	17% (4)
	Srah		15	0%
	Glensaul		21	0%
	Owenbrin		4	0%
Lough Carra	Keel		3	0%
	Rocksborough		4	25% (1)
	Brownstown		1	0%
	Carrowkilleen		8	25% (2)
	Annies		15	33% (5)
	Ballintubber		1	0%
	Partry		2	0%