# National Research Survey Programme

## Lakes 2019

## Tawnyard Lough

**Iascach Intíre Éireann**
**Inland Fisheries Ireland**

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**Fish Stock Survey of Tawnyard Lough,
September 2019**

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## ACKNOWLEDGEMENTS

## 1.1 Introduction

Tawnyard Lough forms part of the Erriff system and is located approximately 12km northeast from the village of Leenaun, Co. Galway.  The lake lies between the Sheeffry Hills to the north and Ben Gorm to the south (Plate 1.1, Fig. 1.1).  The lake has a surface area of 50ha and a maximum depth of 24.3m and has been characterised as typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Tawnyard Lough is located in The Mweelrea/Sheeffry/Erriff Complex SAC, an area of scenic hills in south Mayo.  The western limit of the SAC is at Dooaghtry, south of Kinnadoohy, County Mayo.  The southern margin is bounded by Killary Harbour and the Erriff River, including Lough Glenawough.  The Aille River, part of the Lough Mask catchment, forms the eastern limit, and to the north the boundary includes the Sheeffry Hills and the Mweelrea Mountains (NPWS, 2005).  The Mweelrea/Sheeffry/Erriff Complex contains active blanket bog, lagoons, machair, decalcified dunes and petrifying springs - all priority habitats on Annex I of the E.U. Habitats Directive.  The site was also selected for containing many species listed on Annex II of the same Directive - freshwater pearl mussel, Atlantic salmon, otter, the snails *Vertigo angustior* and *V. geyeri,* the plant slender naiad and the liverwort petalwort (NPWS, 2005).

The River Erriff system is a state owned migratory salmonid fishery which is managed by Inland Fisheries Ireland (IFI).  The fishery is comprised of the River Erriff, its tributaries and a number of small lakes, including Tawnyard, Derrintin and Glenawough.  The lake holds a stock of brown trout and gets a run of sea trout and salmon (O' Reilly, 2007).  Salmon angling is carried out along the lower 10km of the River Erriff main channel while Tawnyard Lough is the principal sea trout fishery.

The Erriff system has been designated by IFI as the National Salmonid Index Catchment (NSIC) and is also one of IFI's index catchments for long-term climate change monitoring.  A dedicated research station, managed by IFI, with fish counting and trapping facilities is located at Aasleagh Falls near the mouth of the fishery which flows into Killary Harbour fjord.  A downstream wolf-type trap has also been in operation on the Black River downstream of Tawnyard Lough since 1985, and detailed monitoring of sea trout stocks have been undertaken (Gargan *et al*., 2016).

The lake was previously surveyed in 1991 to provide an initial insight into the relative densities and age structure of brown trout populations in the lake.  One monofilament single panel survey gill net (30m, 12.5mm mesh) was used on each sampling occasion.  Netting was carried out during March, April, May,

July and September. Salmon, sea trout smolts, brown trout and returned sea trout were recorded at that time (Gargan, 1991).

This report summarises the results of the 2019 fish stock survey carried out on the lake.
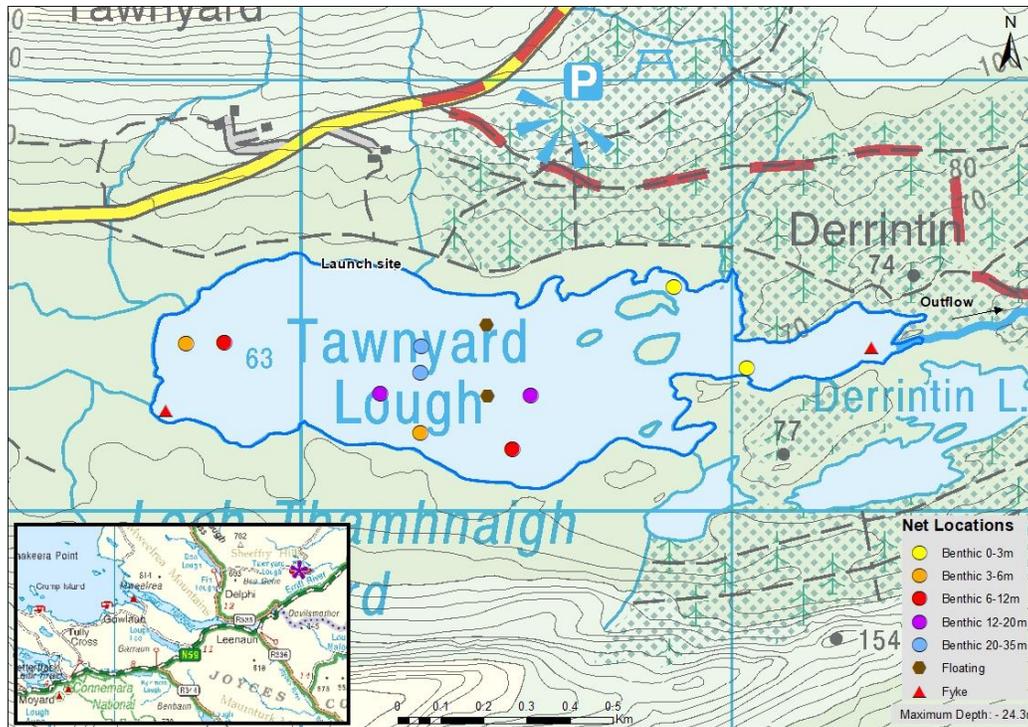


**Plate 1.1. Tawnyard Lough**

**Fig. 1.1. Location map of Tawnyard Lough showing net locations and depths of each net (outflow is indicated on map)**

## 1.2 Methods

### 1.2.1 Netting methods

Tawnyard Lough was surveyed over two nights from the 3rd to the 5th of September 2019.  A total of two sets of Dutch fyke nets, ten benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (2 @ 0-2.9m, 2 @ 3-5.9m, 2 @ 6-11.9m, 2 @ 12-19.9m and 2 @ 20-34.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (FM CEN) were deployed in the lake (14 sites).  A handheld GPS was used to mark the precise location of each net.  The angle of each gill net in relation to the shoreline was randomised.

All fish were measured and weighed on site and scales were removed from all brown trout and sea trout.  Live fish were returned to the water whenever possible (i.e. when the likelihood of their survival was considered to be good).  Samples of fish were retained for further analysis.  Fish were frozen immediately after the survey and transported back to the IFI laboratory for later dissection.

### 1.2.2 Fish diet

Total stomach contents were inspected and individual items were counted and identified to the lowest taxonomic level possible.  The percentage frequency occurrence (%FO) of prey items were then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\%FO_i = (N_i/\ N)\times100$$

Where:

$\%FO_i$ is the percentage frequency of prey item i,
$N_i$ is the number of a particular species with prey i in their stomach,
N is total number of a particular species with stomach contents.

### 1.2.3 Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order to prevent dispersal of alien species and other organisms to uninfected waters.  A standard operating procedure was compiled by Inland Fisheries Ireland for this purpose (Caffrey, 2010) and is followed by staff in IFI when moving between water bodies.

**1.3 Results**

*1.3.1 Species Richness*

A total of two fish species (sea trout are included as a separate 'variety' of trout) were recorded in Tawnyard Lough in September 2019, with 131 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most common fish species recorded, followed by eels and sea trout. During the previous surveys in 1991 the same species composition was recorded with the exception of eels which were not recorded in 1991 as only gill nets were deployed.

**Table 1.1. Number of each fish species captured by each gear type during the survey on Tawnyard Lough, September 2019**

| Scientific name | Common name | Number of fish captured | | | |
|---|---|---|---|---|---|
| | | BM CEN | FM CEN | Fyke | Total |
| *Salmo trutta* | Brown trout | 89 | 8 | 16 | 113 |
| | Sea trout | 2 | 0 | 0 | 2 |
| *Anguilla anguilla* | European eel | 0 | 0 | 16 | 16 |

*1.3.2 Fish abundance*

Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species captured in the 2019 survey are summarised in Table 1.2 and illustrated in Figures 1.2 and 1.3. Brown trout was the dominant species in terms of CPUE and BPUE (Table 1.2; Figs. 1.2 and 1.3).

**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Tawnyard Lough, 2019**

| Scientific name | Common name | Mean CPUE (± S.E) |
|---|---|---|
| *Salmo trutta* | Brown trout | 0.250 (0.064) |
| | Sea trout | 0.005 (0.003) |
| *Anguilla anguilla** | European eel* | 0.133 (0.033)* |
| | | **Mean BPUE (± S.E)** |
| *Salmo trutta* | Brown trout | 18.605 (5.383) |
| | Sea trout | 2.644 (1.861) |
| *Anguilla anguilla** | European eel* | 24.352 (10.328)* |

Note: On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species (Connor *et al.,* 2017).

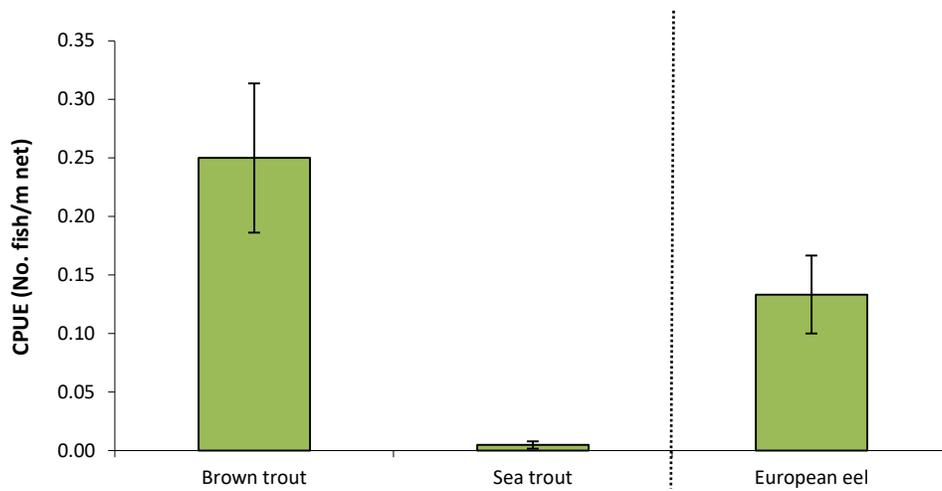*Eel CPUE and BPUE based on fyke nets only

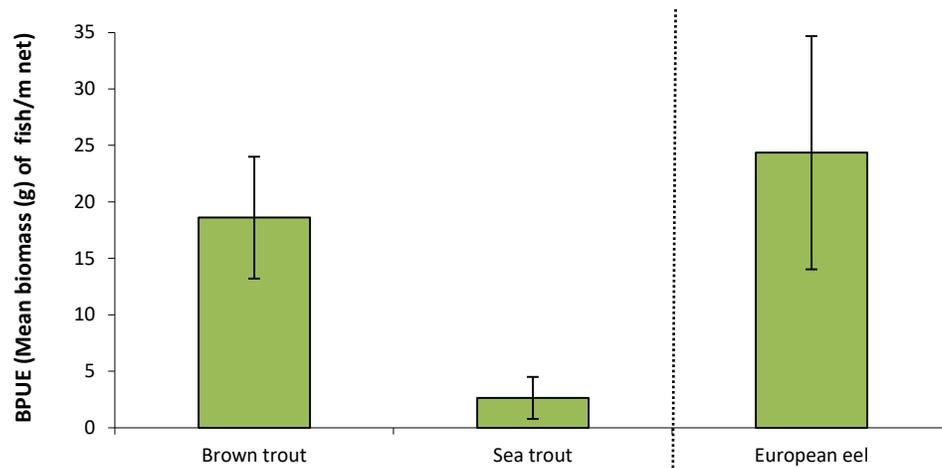**Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Tawnyard Lough (Eel CPUE based on fyke nets only), 2019**



**Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Tawnyard Lough (Eel CPUE based on fyke nets only), 2019**

### 1.3.3 Length frequency distributions and growth

**Brown trout**

Brown trout captured during the 2019 survey ranged in length from 12.5cm to 32.5cm (mean = 18.1cm) (Fig. 1.4). Four age classes were present, ranging from 1+ to 4+, with a mean L1 of 6.5cm (Table 1.4). The dominant age classes were 1+ and 2+ (Table. 1.4). Mean brown trout L4 was 21.9cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).
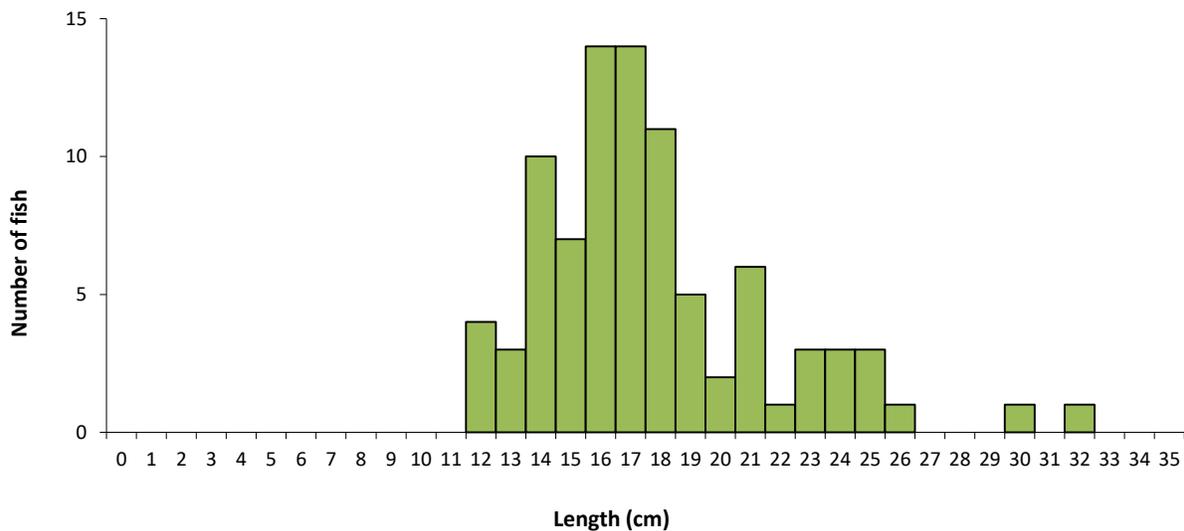


**Fig. 1.4. Length frequency of brown trout captured on Tawnyard Lough, 2019**

**Table 1.3. Mean (±S.E.) brown trout length (cm) at age for Tawnyard Lough, September 2019**

|              | L$_1$      | L$_2$       | L$_3$        | L$_4$        | Growth category |
|--------------|-----------|-------------|--------------|--------------|-----------------|
| Mean (±S.E.) | 6.5 (0.3) | 13.5 (0.5)  | 18.8 (0.8)   | 21.9 (0.6)   | Very slow       |
| N            | 31        | 20          | 9            | 2            |                 |
| Range        | 3.7 (9.1) | 9.6 (17.4)  | 15.5 (22.2)  | 21.3 (22.5)  |                 |

**Other fish species**

European eels ranged in length from 30.5cm to 78.0cm were recorded. Two sea trout were captured measuring 33.5cm and 40.9cm (latter aged at 3.1+).

### 1.3.4 Stomach and diet analysis

Dietary analysis studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items. The stomach contents of a subsample of perch and brown trout captured during the survey were examined and are presented below.

**Brown trout**

Adult trout usually feed principally on crustaceans (*Asellus* sp*.* and *Gammarus* sp.), insects (principally chironomid larvae and pupae) and molluscs (snails) (Kennedy and Fitzmaurice, 1971, O'Grady, 1981). A total of 61 stomachs were examined. Of these 18 were found to contain no prey items. Of the remaining 43 stomachs containing food, 79% contained invertebrates, 16% contained digested material, 3% contained fish and 2% zooplankton (Fig. 1.5).
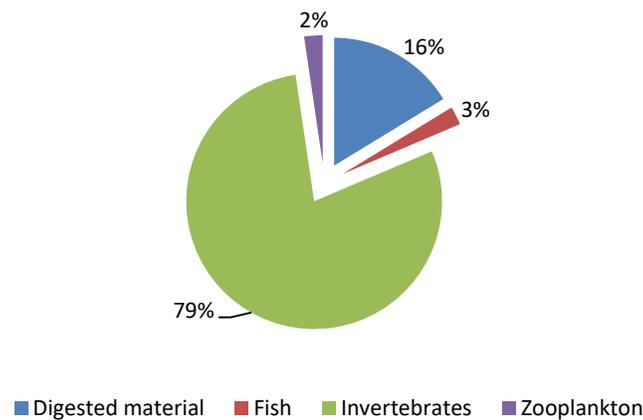


■ Digested material  ■ Fish  ■ Invertebrates  ■ Zooplankton

**Fig 1.5. Diet of brown trout (n=43) captured on Tawnyard Lough, 2019 (% FO)**

## 1.4 Summary and ecological status

A total of two fish species (sea trout are included as a separate 'variety' of trout) were recorded in Tawnyard Lough in September 2019.  Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2019 survey.

Brown trout ranged in length from 12.5cm to 32.5cm.  Four age classes were recorded ranging from 1+ to 4+, indicating reproductive success in four of the previous five years.  Length at age analyses revealed that brown trout in the lake exhibit a very slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme.  It allows River Basin District managers to identify and prioritise lakes that currently fall short of the minimum "Good Ecological Status" that is required if Ireland is not to incur penalties.  A multimetric fish ecological classification tool (Fish in Lakes – 'FIL') was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008).  This tool was further developed during 2010 (FIL2) in order to make it fully WFD compliant, including producing EQR values for each lake and associated confidence in classification (Kelly *et al*., 2012b).  Using the FIL2 classification tool, Tawnyard Lough has been assigned an ecological status of Good for 2019 based on the fish populations present.

**1.5 References**

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