National Salmonid Index Catchment Erriff Annual Report 2024

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1 Scope

This document reports on research activities undertaken in the National Salmonid Index Catchment (NSIC) River Erriff during 2024. The document recounts the data recorded in the NSIC for this year and sets it in the context of the long-term annual data time series collected as part of the core NSIC Erriff research programme. Summaries of specific research activities conducted in the relevant reporting year are also provided. More detailed and comprehensive information on methods used and outputs from specific areas of interest can be found in associated literature as this is made available. The research undertaken aims to address knowledge gaps on migratory salmonids to better inform fisheries management in Ireland as well as to inform national and international scientific advice provision and the reporting obligations of IFI.

2 Introduction

The River Erriff system (Co. Mayo) has been designated by Inland Fisheries Ireland (IFI) as the National Salmonid Index Catchment (NSIC). A dedicated research station with fish counting and trapping facilities is located at Aasleagh Falls by the mouth of this prestigious Atlantic salmon and sea trout fishery which flows into Killary Harbour fjord on the western Irish Atlantic coast. The research facility is managed by IFI and supports a wide range of scientific research and monitoring activities principally on the resident salmonid populations and their migratory component as undertaken by the state agency and its national and international partners.

This work aims to contribute to developments in the scientific understanding of the biology, marine and freshwater ecology, life histories and population dynamics of Atlantic salmon and sea trout, and the effects of environmental and anthropogenic factors on their continued sustainability. In this regard, as an “index catchment” for salmonids, the Erriff acts as a representative model system to better inform the conservation and management of salmon and sea trout stocks throughout Ireland and further afield, meeting national and international obligations through the focused research activities described herein.

Such obligations notably include providing scientific information on Atlantic salmon stock status for national assessments (for the Technical Expert Group on Salmon, North-South Standing Scientific Committee for Inland Fisheries, IFI, Department Climate, Energy and the Environment and Habitats Directive reporting) and international assessments (for the International Council for the Exploration of the Sea, the EU and North Atlantic Salmon Conservation Organisation). As such, the research activities aim to support EC Habitats Directive conservation objectives which are “to restore the favourable conservation condition of Atlantic Salmon” in Irish SACs.

3 Site description

3.1 Study area

The NSIC Erriff comprises the Erriff Catchment and Killary Harbour fjord area, with research activities further extending out into the adjacent marine zone. The catchment comprises the Erriff River, a number of its tributaries such as the Black, Owenmore and Derrycraff rivers and three primary lakes, Loughs Tawnyard, Lugacolliwee and Glenawough, encompassing a total catchment area of 169.9 km^2. The primary research infrastructure in the NSIC comprises fixed fish trapping facilities and a laboratory facility at Aasleagh Falls (for monitoring of upstream migrating adult salmon and sea trout) and at Tawnyard Lough outflow (for monitoring downstream migrating juvenile salmon and sea trout smolts and kelts). Additional research resources include deployment of rotary screw traps during the main smolt run, annual catchment-wide juvenile salmonid electrofishing surveys, acoustic telemetry arrays to support studies of salmon and trout migration behaviour and a climate/environmental monitoring programme of stream and lake environments (Figure 1). The river discharges into the Atlantic Ocean *via* Killary Harbour at Aasleagh Falls located at the innermost point of the fjord. The Harbour is 14 km long extending from the townland of Aasleagh to the outer end of Inishbearna Island and has a maximum depth of 45 m. A commercial salmon farm, operates at two sites in Killary and surrounding waters, namely west of the pier in the village of Rosroe and on the eastern shore of Inishdeighil island outside the mouth of the Harbour. Extensive cultivated mussel farms also extend the length of the Killary along its south shore (Figure 1). The majority of the Erriff catchment is within the Mweelrea/Sheeffry/Erriff Complex Special Area of Conservation (SAC). Killary Harbour is also bordered by the Twelve Bens Garraun Complex and Maumturk Mountains SACs on its southern side.

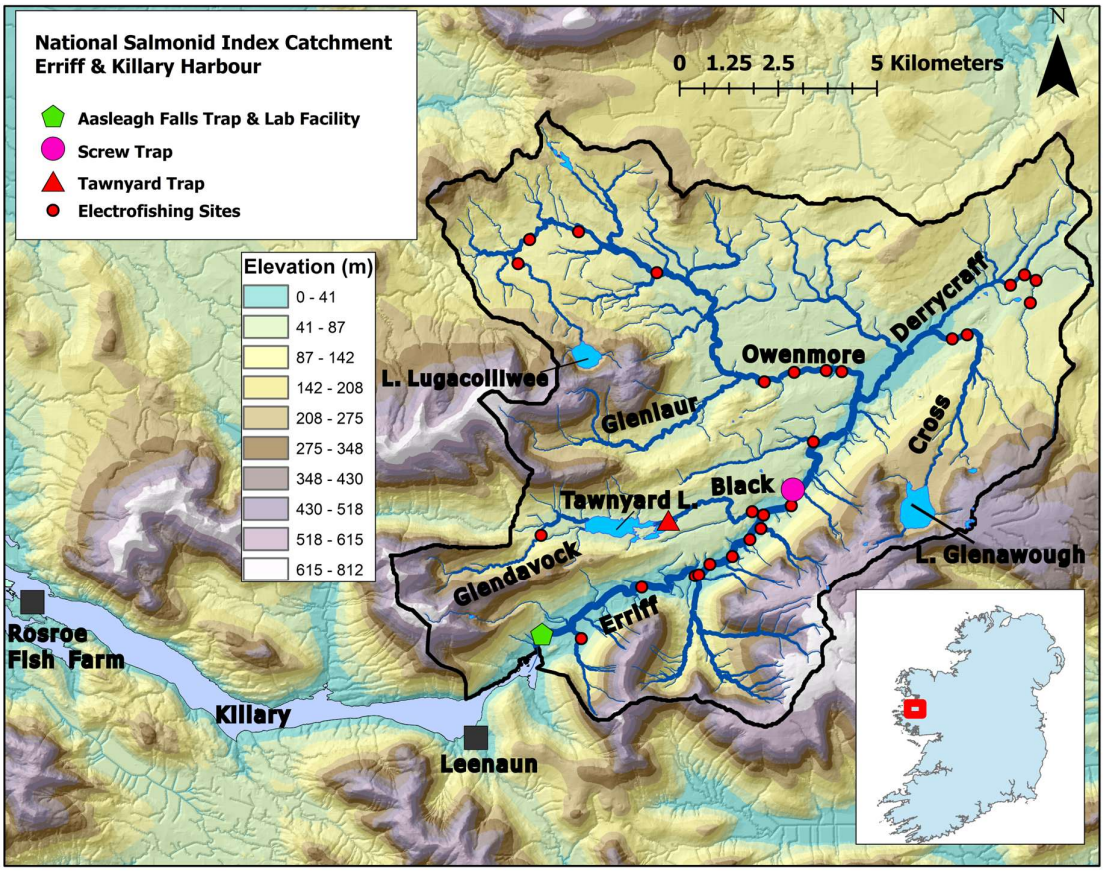

Figure 1 National Salmonid Index Catchment (Erriff Catchment and Killary Fjord) showing fixed trapping infrastructure and principal tributaries, lakes and estuarine zone.

3.2 Resident and migratory fish species

Erriff fish stocks principally comprise Atlantic salmon, sea trout and brown trout. European eels, minnow and three-spined stickleback are also present. The salmon conservation limit for this river system is 1385 and the Erriff salmon stock is predominately made up of one-sea-winter grilse. Annual sea trout returns are principally comprised of finnock (i.e. return in the same year as smolt migration), more notably so since the wider collapse of sea trout stocks in the west of Ireland in the early 1990s which has been associated with commercial salmon farming (e.g. Gargan et al. 2016). The Tawnyard sub-catchment is the focal point of long-term studies on Erriff sea trout stocks. Brown trout are present throughout the catchment, notably more abundant in the smaller order streams and lakes, although specific stock information is not available, nor is there specific stock information available for eels.

Salmon ranching for scientific purposes (i.e. studies on the effects of sea lice on marine survival) were undertaken in the Erriff from 2003 with smolts released annually until 2019 when this work ceased. However, ranching (smolt releases) solely for angling purposes commenced in 2021 (see Section 3.3.). Ranching strays from the nearby Bundorragha River are also

intercepted annually in the lowermost reaches of the Erriff in the upstream fish trap and by anglers at Aasleagh Falls and typically removed to prevent further upriver migration. Farmed salmon and Pacific pink salmon have on occasion been intercepted attempting to enter the river and removed in the same manner.

3.3 Fisheries

Game angling is an important activity in the Erriff main channel and at Aasleagh Falls with salmon the primary species targeted. A catch and release policy has been implemented in recent years by local agreement with all wild salmon caught released and a ranched salmon provided *in lieu*. A tightly regulated and licensed commercial draft-net fishery for salmon operates in Killary Harbour each summer if such a quota is available. Both angling and commercial fishing activity is managed locally by IFI and subject to catch quotas which are informed by annual scientific stock assessments undertaken by the Technical Expert Group on Salmon and published in national regulations.

3.4 Research infrastructure

A detailed overview of the preexisting operational fisheries research infrastructure was provided in Kelly et al. 2024. Plates 1 to 3 briefly recap this. No further fisheries research infrastructure was installed or developed during 2024.

Plate 1 Erriff upstream adult fish trap with VAKI Riverwatcher counter and Biomark antenna (dark rectangular unit). Fish migrating upstream past Aasleagh Falls (tidal limit) enter through the trap door and are manually identified as sea trout or salmon (grilse or multi-sea winter); and ranched salmon are intercepted and removed. Detections of PIT tagged fish are registered and typically tagged fish are sampled for length, weight and scale sampled and released (see Section 4.2.1).

Plate 2 Wolf-trap located along the outflow from Tawnyard Lough captures downstream migrating smolts and kelts. In 2024, this trap was operated daily from March through mid-June. All fish entering the trap were visually classified as salmon or sea trout (kelt or smolt) and a subsample were measured and PIT or acoustically tagged (Section 4.2.2 & 4.2.3)

Plate 3 Rotary screw trap for capturing smolts in operation on the main river channel at Erriff Bridge. This trap was deployed during April-May in 2024 primarily for the purposes of capturing emigrating salmon and sea trout smolts for PIT and DST tagging (Section 4.2.3)

4 Research objectives and activities

4.1 Background

The principal guiding objective informing the research undertaken in the NSIC Erriff is:

> *to assess current status and address key knowledge gaps to better understand the biology, ecology and stock dynamics of migratory salmonids and the associated influences of environmental and anthropogenic pressures and threats to their continued sustainability to better inform their wider protection, fisheries management and conservation in Ireland and further afield*.

Dedicated research on migratory salmonids (i.e. Atlantic salmon and sea trout) has been undertaken in the NSIC Erriff since the early 1980s. This has primarily focused on monitoring the annual stock status of returning adults and out-migrating smolts and kelts, as well as quantifying the impacts of sea-lice associated with salmon aquaculture on wild stocks. Since 2007, catchment-wide juvenile fry production has been assessed annually. This annual programme of work has enabled the collation of valuable long-term time series which are used to monitor stock trends; identify, quantify and better understand threats and pressures; comply with Ireland's reporting obligations; and provide necessary data to develop and populate national and international stock assessment models which are used to inform fisheries management. The latter includes the provision of data to establish conservation limits and set catch quotas to protect against the over-exploitation of salmon stocks and better ensure their long-term sustainability.

In addition, the unique setting of both downstream and upstream traps facilitate annual sub-sampling of wild juvenile and adult salmon and sea trout populations to record pertinent biological information such as length and weight and to retrieve scale samples for further analyses (Plate 4). Such information can provide insight into freshwater and marine growth rates, which can ultimately affect marine survival and fecundity.

Plate 4 Recording length of a sea trout kelt, undertaking its second emigration from Tawnyard Lough to the marine environment. The NSIC Erriff infrastructure and biological sampling programme offers unprecedented insights into the ecology of wild anadromous trout.

Reporting obligations for IFI include:

- Provision of adult returns, biological data and catch information to the Technical Expert Group on Salmon for the annual national stock assessment. Biological information is used to determine necessary inputs to the stock assessment model.
- Provision of catch and biological information on salmon to the European Union Multi-Annual Programme (EU DCMAP).
- Article 17 reporting of stock status under EC Habitats Directive.
- Provision of fisheries and biological data on salmon to the International Council for the Exploration of the Sea (ICES) and the North Atlantic Salmon Conservation Organisation (NASCO). Biological information is primarily used to determine necessary inputs to the ICES stock assessment model.
- Provision of sea trout smolt and kelt output and adult returns to determine marine survival and other biological data.

More recent research (since the mid-2010s) has focused on quantifying the survival of migratory stocks during their freshwater and the marine life stages and identifying the key contributory pressures (such as impacts from salmon aquaculture) and migration bottlenecks (such as predation hot-spots and migration barriers) that may unduly suppress stocks. This is principally conducted through tagging / telemetry studies.

The NSIC Erriff has also provided a valuable dedicated resource to undertake disease surveillance (notably of sea lice infestation, red vent syndrome, red skin disease and other parasites), and invasive species surveillance (for farmed escapees and Pacific Pink salmon) annually throughout the seasons. Furthermore, the NSIC Erriff has recently been developed as key index site in Ireland for an IFI project to monitor and assess the impacts of climate change on fish and their surrounding environment through the establishment of a catchment-wide environmental sensor network. Research in the NSIC Erriff is often undertaken in collaboration with international partners which contribute to the research objectives.

4.2 Research methodologies in 2024

This section describes the core long-term research activities undertaken at the NSIC Erriff in 2024, including the general methodology utilised, as well as any novel research activities that occurred.

4.2.1 Adult salmonid stock monitoring programme

Returning wild adult Atlantic salmon and sea trout are monitored at the fixed trapping infrastructure at Aasleagh Falls for enumeration, biological sampling and disease surveillance purposes. Total counts for stock assessment purposes, measurements of lengths, weights and scale sampling and surveillance for disease (red skin disease (RSD), red vent syndrome (RVS), sea lice infestation and invasive species monitoring (Pacific pink salmon and escaped farmed salmon) are conducted here. Upstream migrating fish are visually classified as wild one-sea winter grilse, multi-sea winter salmon or sea trout and total numbers recorded daily. A subsample of adult fish (approximately 100 sea trout and 100 salmon, inclusive of PIT tagged fish (Section 4.2.2)) are briefly removed from the trap, anaesthetised and sampled in the lab facility adjacent to the trap. Lengths and weights of sampled fish are recorded and typically a scale sample is taken. Observations related to predation or net marks are noted. Sea lice infestation rates are documented for the subsampled adult sea trout run by visually counting and recording numbers of both chalimus juvenile and pre-adult/adult lice present (Appendix 1). In 2024, the revised classification system developed in association with the Environment Agency UK, Marine Scotland and Natural Resources Wales to align reporting between Ireland and Britain was used to assess the prevalence and severity of red skin disease (RSD) in salmon (RSD Severity Field Guide, 2022, Appendix 2). In addition, the classification system used by the Environment Agency UK and Marine Scotland was adopted to assess the severity of RVS in salmon (RVS Severity Field Guide, 2011, Appendix 3).

4.2.2 Juvenile and post-spawner salmonid stock monitoring programme

Out-migrating Atlantic salmon and sea trout smolt and kelt monitoring occurs at the fixed trapping infrastructure at Tawnyard during the annual smolt/kelt run (March to June). A

complete count of all out-migrating fish is possible using the Wolfe-type trap. This enables year-to-year estimates of smolt output at this key tributary, particularly for sea trout. Each fish entering the trap is visually classified as a salmon or sea trout and enumerated. A subsample form the basis of the various tagging programmes carried out in the NSIC (Section 4.2.3). In addition, the majority of sea trout kelts entering the Tawnyard trap are measured for lengths to continue the long-term monitoring programme of sea trout age-classes, which has been in place since 1985.

4.2.3 Tagging programmes

Owing to the ability to capture wild salmonids on their downstream and upstream migrations passively, tagging programmes represent a core element of the NSIC research activities. A medium-to-long term component of NSIC tagging activities comprises the mark-recapture passive integrated transponder (PIT) tagging programme of Atlantic salmon and sea trout. Annually, out-migrating smolts are tagged at the fixed trapping facility at Tawnyard, a primary tributary of the Erriff, and at a temporarily deployed rotary screw trap on the main Erriff channel. 500-1000 salmon and sea trout smolts are captured, anaesthetised, measured and tagged with a unique PIT tag each year. Subsequent salmonid returns to the Aasleagh upstream trap are monitored for the presence of PIT tags, both through an automated Biomark PIT tag antenna located at the entranceway to the trap and through the use of a handheld Biomark PIT tag scanner. Efforts are made to retrieve PIT tagged fish to include as part of the core biological sampling programme (Section 4.2.1), which in turn can provide information on marine return rates, time period spent at sea and marine growth rates. Additional tagging programmes which arise year-to-year include acoustic tagging of sea trout smolts and deployment of acoustic receivers throughout the Erriff River and Killary Harbour, in an effort to document sea trout migratory movement and behaviour, especially in the context of aquaculture interactions. In recent years, a subsample of Atlantic salmon smolts have been tagged with data storage tags (DSTs) (Plate 5) as part of the EU NASCO-coordinated SMOLTrack project (https://smoltrack.eu/). DSTs record at set intervals the ambient water temperatures experienced by tagged fish, which could ultimately inform on marine migration routes. DST-tagged salmon also received a PIT tag, which would allow their subsequent detection and recapture at the Aasleagh trap upon return.

4.2.4 Catchment-wide juvenile salmonid electrofishing survey

Catchment-wide electrofishing is carried out for the purposes of stock assessment of juvenile salmonids (fry and parr) at sampling locations throughout the Erriff catchment during late summer (August-September) (Figure 2). Weather-dependent, survey sites are kept consistent year-to-year and the methodology involves timed (5-minute) electrofishing in riffle habitat to provide a semi-quantitative estimate of juvenile salmonid abundance at each location. Each

captured fish undergoes fork length measurements to nearest mm and is visually classified as salmon or trout.

4.2.5 Climate change research programme

In collaboration with IFI's Climate Change Mitigation Research Programme (CCMRP) a catchment-wide array of thirty-five stream and river water temperature data loggers are maintained and turned-over annually (Figure 2). Data loggers record water temperature at 30-minute intervals and were strategically placed at locations throughout the catchment to enable comprehensive coverage of all stream and river types, in order to characterise the response of the Erriff watershed to climate variations throughout the year, a critical element of salmonid ecology during their freshwater phase. A fully-automated meteorological station is present at the Aasleagh Falls trap. In addition, a thermistor array, dissolved oxygen sensors, water level gauges and a shoreline meteorological station are deployed year-round in Lough Tawnyard (Plate 6) to enable limnological appraisals of this lake system, which is a critical habitat element of the migratory and resident trout populations of this sub-catchment.

Plate 5 Pit tag and DST tag inserted into sea trout smolt captured at Tawnyard downstream trap.

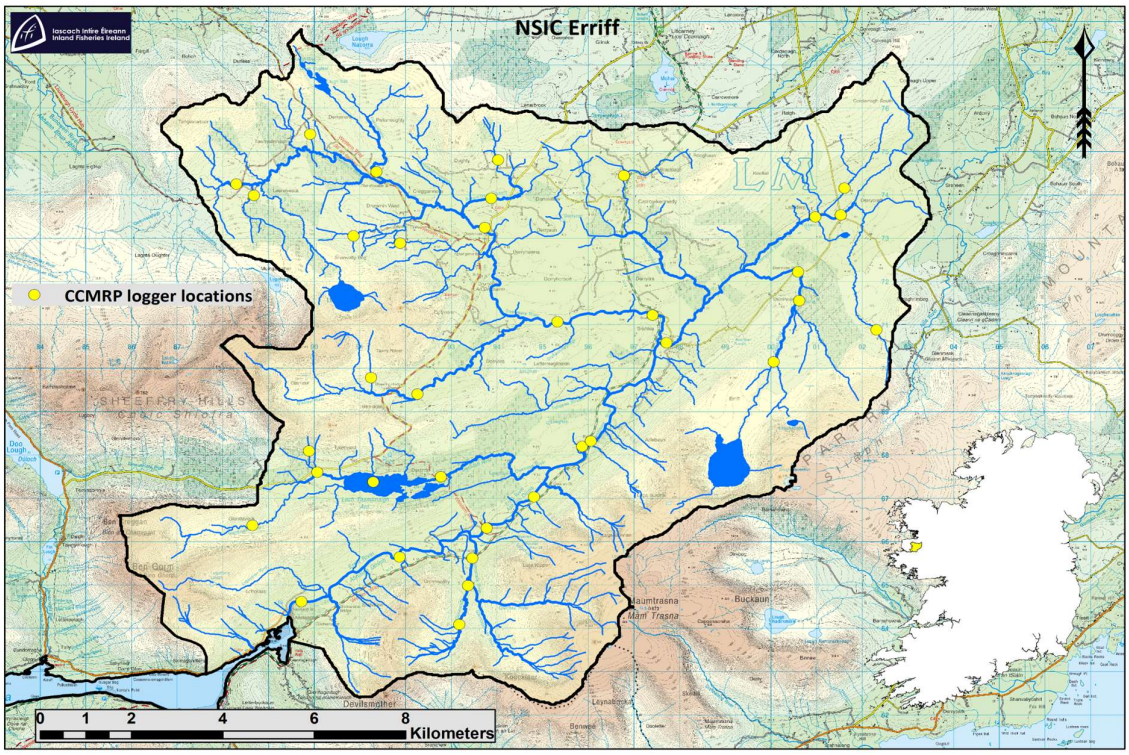

Figure 2 Catchment-wide water temperature monitoring network in NSIC Erriff for IFI's Climate Change Mitigation Research Programme (location of data loggers and thermistor array in Tawnyard Lough).

Plate 6 Tawnyard Lough, December 2023.

5 Results

5.1 Atlantic salmon adult returns

In 2024, the total number of adult wild salmon counted and released upstream through the Aasleagh fish trap was 990. Commencing in 2023, counts of adult upstream migrating salmon were partitioned between one-sea winter grilse and multi-sea winter components, primarily through expert-judgement of research staff operating the trap. These visual classifications were underpinned by findings of length-frequency modal analysis of Erriff adult salmon, which implied that fish with a length greater than 69-70 cm are most likely multi-sea winter salmon (Kelly et al. 2024; Kelly et al. 2025a; Section 5.4). Furthermore, scale reading of sampled fish was used to corroborate visual categorisation of sea-age class based on size criteria alone. Of the 990 wild adult salmon counted through the trap in 2024, 110 fish were classified as multi-sea winter and 880 as grilse (Figure 3). 601 ranched salmon also returned to the Aasleagh trap, where they were intercepted and removed to prevent any further migration upstream (Appendix 4, Table 1).

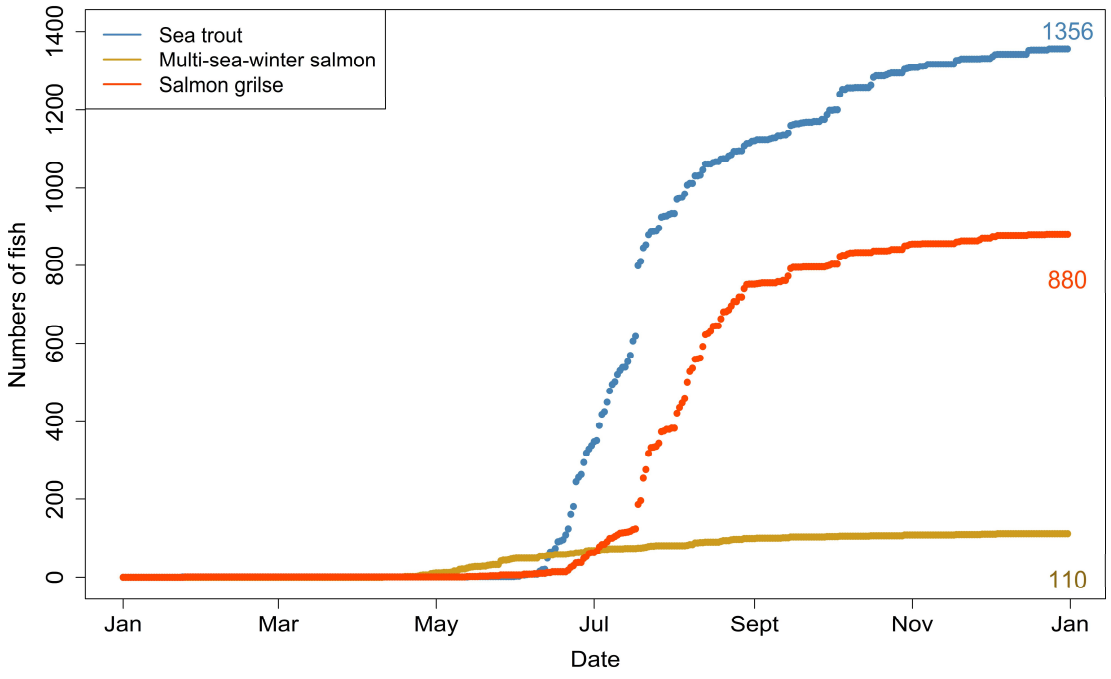

Figure 3 Cumulative returns of wild Atlantic salmon grilse (orange), wild multi-sea winter salmon (yellow) and sea trout (blue) to the River Erriff upstream Aasleagh trap over the 2024 season.

In addition to fish counted through the trap, 79 adult wild salmon were caught below Aasleagh falls by anglers and released above the falls, thereby bypassing the trap counts, and a single angling mortality of a wild salmon occurred on the angling beat below the trap, which brought the total estimated adult salmon returns for 2024 to 1,070, falling below the conservation limit of 1,385 (Figure 4). Total returns of wild salmon in 2024 were lower compared to 2023 (1,424 fish), were considerably lower than the annual average recorded in the preceding 5-year period 2019-2023 (2,044 fish) and in the context of the full available timeseries (1986-2024) represented a poor return year overall (Figure 4; Appendix 4, Table 1).

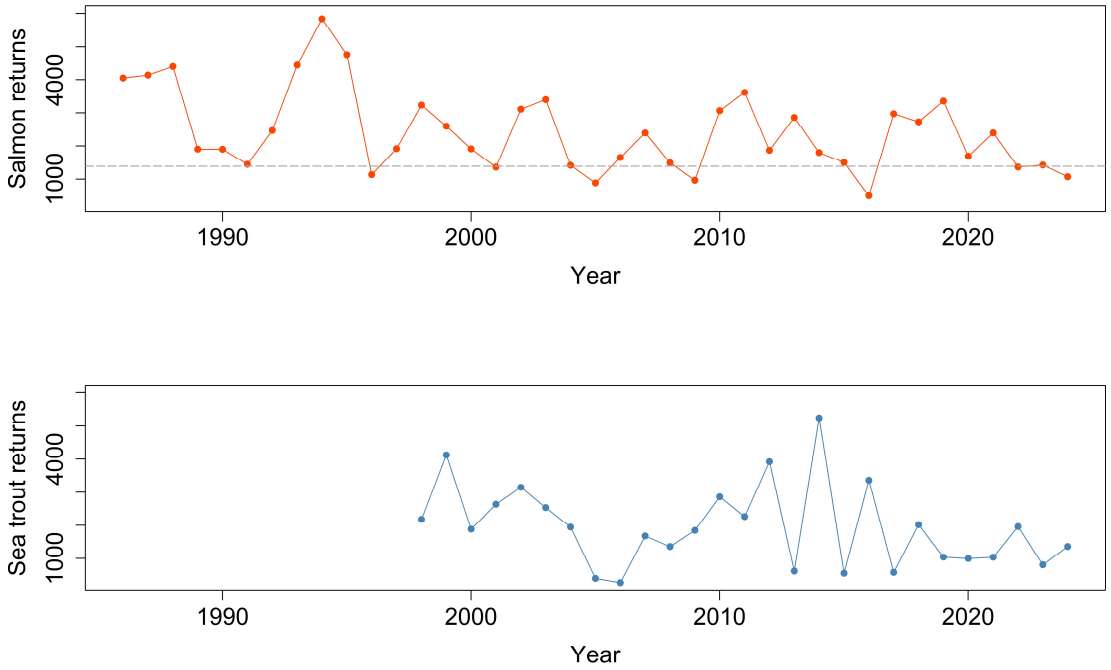

Figure 4 Annual total returns of wild Atlantic salmon (top panel) and sea trout (bottom panel) to the upstream Aasleagh trap. Dashed line in upper panel represents the river-specific conservation limit for Erriff Atlantic salmon.

Observations of the timing of adult returns and upstream migration showed an initial run of multi-sea winter “spring fish” between April and May (Figure 5). However, larger multi-sea winter salmon continued to return sporadically throughout the entire summer period, with small numbers returning in autumn through to winter. The grilse run commenced later compared to 2023, with very small numbers counted through June and early July, and largest return numbers occurring through July and August (Figure 5; Appendix 4, Table 2). Notably, the later run of grilse from September through to December was considerably lower in 2024 (127 fish) when compared to the late returns in 2023 over the same months (321).

5.2 Sea trout adult returns

Returns of sea trout in 2024 counted through the Aasleagh trap was 1,356 (Figure 3; Appendix 4, Table 1). This represented an increase over numbers recorded for 2023 (803 fish) and also an increase over the preceding 5-year mean (2019-2023) of 1,164 fish (Figure 4). Whilst representing a general improvement over recent years and when compared to particularly poor annual returns of sea trout since 1998, the sea trout returns in 2024 were below the long-term average for the Erriff (Figure 4; Appendix 4, Table 1).

The majority of upstream migrating sea trout occurred earlier in the summer period during June and July, the bulk of which was comprised by finnock (Figure 5). Smaller numbers of returns continued to occur sporadically from August through to the autumn/winter months.

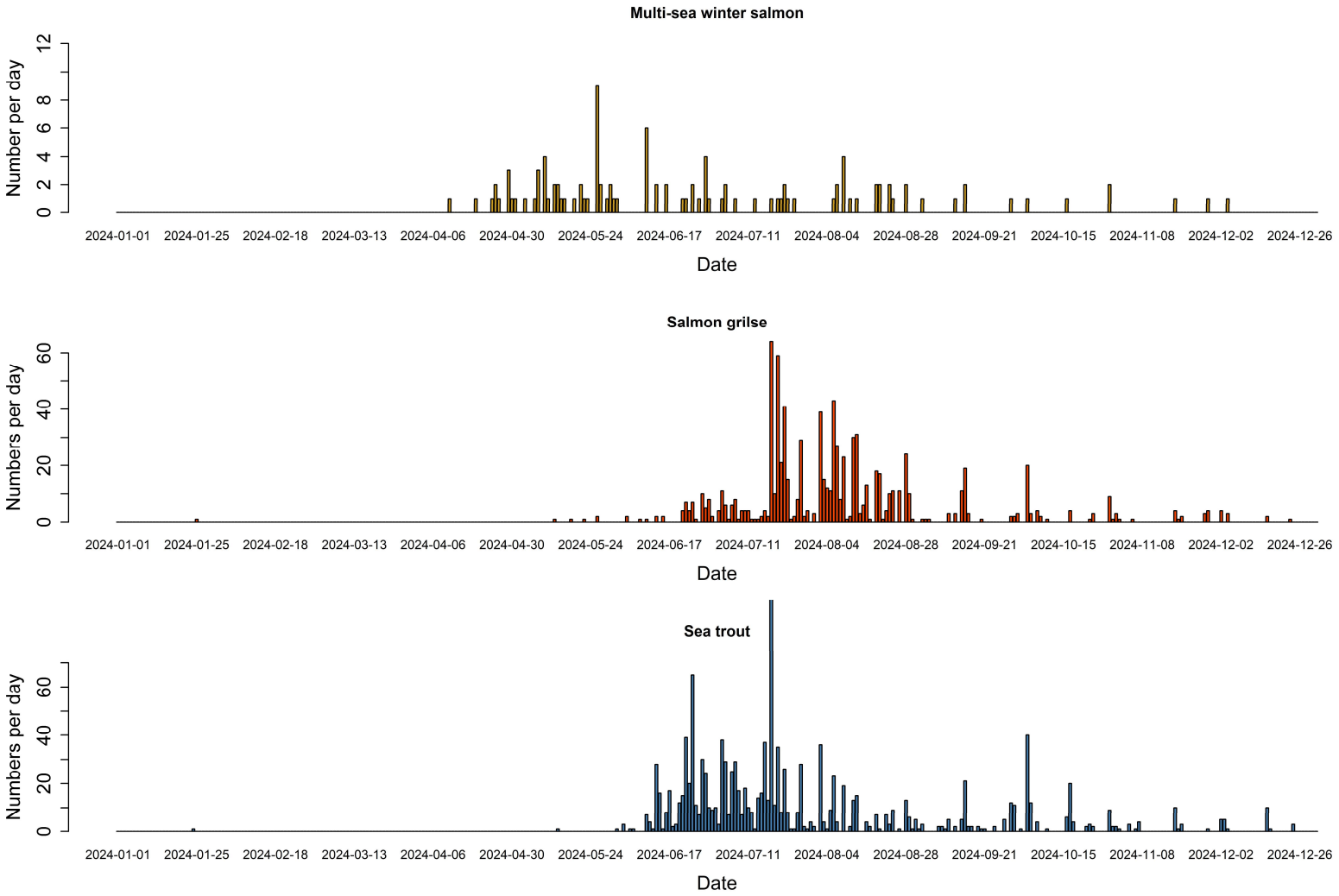

Figure 5 Daily counts of multi-sea winter salmon (top panel), salmon grilse (middle panel) and sea trout (bottom panel) through the upstream Aasleagh trap over the course of 2024.

5.3 Out-migrating smolts and kelts

In 2024, structural damage to one of the fish screens that block further downstream migration of smolts and kelts and guide them to enter into the Tawnyard trap was identified on the 3rd of May, following a suspicious period of no fish captures. Precisely when the damage occurred which allowed fish to bypass the trap is unknown, but given that downstream migrating smolts were being trapped in typical numbers up until the 16th April would imply that the trap was not operational for approximately 16 days during a period when large numbers of emigrating salmon and sea trout smolts are likely to be encountered (April 16th – May 3rd). *Therefore, the numbers reported here for 2024 represent a partial count of the smolt and kelt run and should not be compared to previous years' totals.* 404 wild salmon and 408 sea trout smolts and 18 sea trout kelts and zero salmon kelts were recorded at the Tawnyard trap during 2024 (Appendix 4, Table 1 and Figure 6).

Omitting the partial count for 2024, the annual output of sea trout smolts has shown successive decreases since 2020 and the periodic relatively large runs recorded prior to 2009 have not been observed since that time (Figure 7). A marginal upward trend is apparent in salmon smolt runs since the time series low of 2013, although the annual output of salmon smolts has generally remained stable since 2018 (annual mean smolt output of 1,188 fish 2018-2023). The annual sea trout kelt run is variable year-to-year and generally reflects the upstream returns of finnock in the previous year (Figure 7). Whilst the sea trout kelt total for 2024 is considered a partial count, only 17 fish had been captured while the trap was fully operational from March 4th until April 16th, a period that historically would have encountered a high proportion of the annual sea trout kelt run (for example, in 2022 and 2023 a total of 100 and 164 sea trout kelts were counted migrating downstream respectively prior to April 16th). This implies that the total 2024 sea trout kelt run was poor and is consistent with the poor returns of adult sea trout to the Erriff River in 2023. In general total sea trout kelt numbers in the last 5-year period (up to 2023) have not reached timeseries highs recorded during the late 1990s, early 2000s and early-mid 2010s (Figure 7).

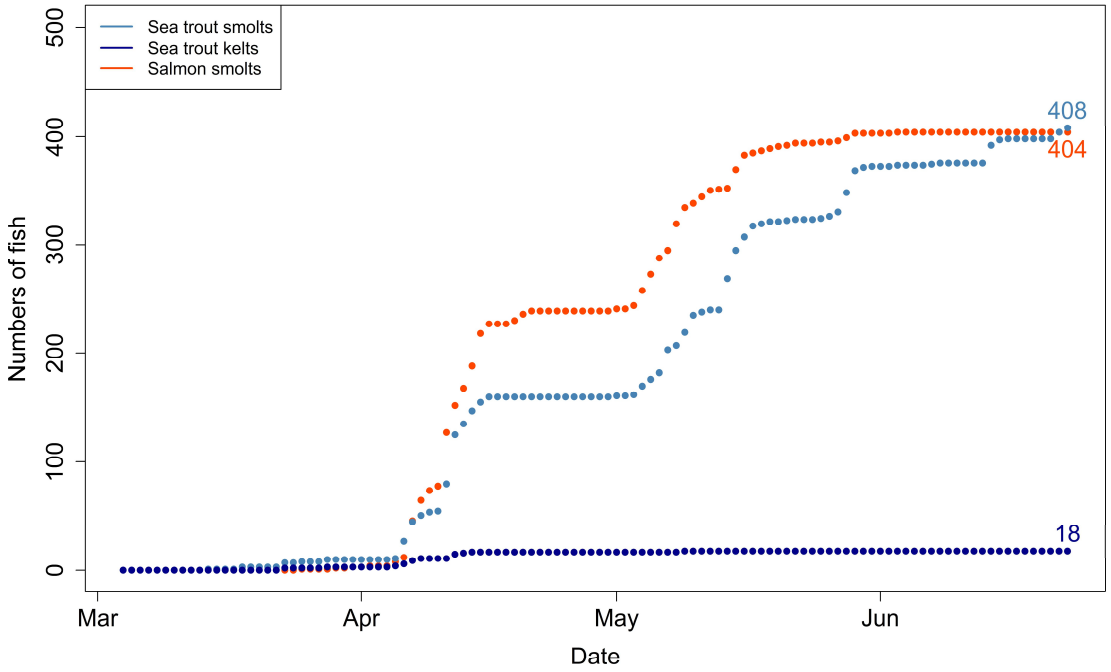

Figure 6 Cumulative outputs of wild Atlantic salmon smolts (orange), sea trout smolts (light blue) and sea trout kelts (dark blue) from the Tawnyard trap over the 2024 season. Note that this numbers represent a partial count for 2024.

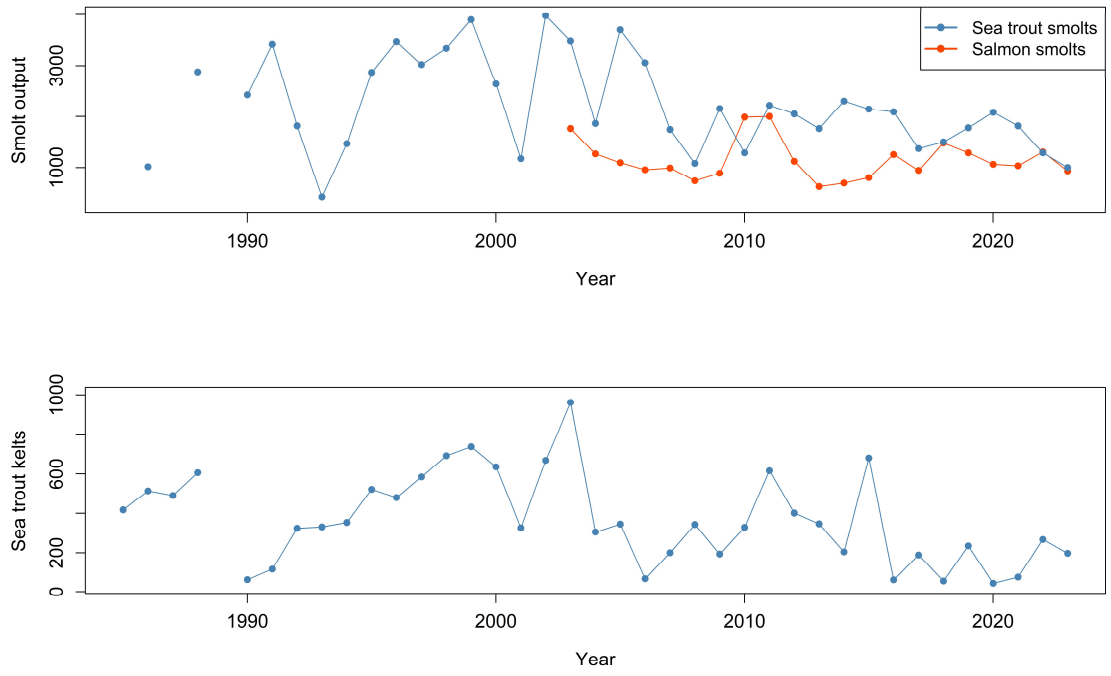

Figure 7 Annual total downstream counts of wild Atlantic salmon smolts (orange, top panel), sea trout smolts (blue, top panel) and sea trout kelts (bottom panel) from the Tawnyard trap, 1985-2023. (Note that 2024 partial count was excluded from this timeseries plot).

5.4 Salmonid biological data

Ninety-five wild adult salmon were sampled for lengths and weights during the adult return run in 2024 (Appendix 4, Table 3), with ten of these fish classified as multi-sea winter and 85 classed as grilse. The overall mean length and weight of sampled multi-sea winter fish was 71.8 cm and 3.92 kg respectively, smaller compared to multi-sea winter fish sampled in 2023 (mean length 75.0 cm, mean weight 4.23 kg (n=5)). Grilse sampled during 2024 had a mean length of 56.1 cm and a mean weight of 1.85 kg, marginally smaller than grilse sampled in 2023 (mean length 56.2 cm, mean weight 1.91 kg (n=101)) (Appendix 4,Table 3). The mean condition index [$log_{10}(Weight(kg)/Length(m)^3$] of sampled adult salmon returns in 2024 was 1.01, similar to values for 2022 and 2023.

The lengths of adult wild salmon sampled in 2024 were added to sampled fish for 2021, 2022 and 2023 (n=339 fish) in order to assess the overall length-frequency histogram for Erriff salmon stocks and further refine size-based estimates of the difference between one-sea winter grilse and multi-sea winter age-classes (Figure 8). Statistical testing for the number of population modes present (following Silverman, 1981) revealed one size mode centred around 56.4 cm (i.e. median size for one-sea winter fish) and one centred around 73.5 cm (i.e. median size for multi-sea winter fish). An estimated anti-mode implied that a size cut-off of 70.2 cm effectively partitions between multi-sea and one-sea winter fish for the River Erriff (further refined from the value of 69.2 cm determined from 2021, 2022 and 2023 samples alone (Kelly et al. 2025a)). Some overlap between size classes occurs in the range 66 – 69 cm and these potentially represent small multi-sea winter fish, large one-sea winter grilse, or perhaps most likely, previously spawned grilse (Figure 8). Of sampled fish in the period 2021-2024, 33% of those fish classified as multi-sea winter salmon returned during spring months (prior to June 1st). That is to say that the majority of multi-sea winter salmon of the Erriff population sampled during 2021-2024 were not true “spring fish”, as larger multi-sea winter salmon returned to the river environment throughout the summer period, into autumn months. Assessment of the trap totals for 2024, in which all salmon (including unsampled fish) are visually assigned to either multi-sea winter or one-sea winter categories by trap operators corroborates the ratios in sampled fish, with 57.3% of multi-sea winter fish returning after June 1st. Given that accurately determining inter-annual variation in body size of different age-classes, the proportion of the run comprised of multi- and one-sea-winter fish returns and knowledge of the timing of multi-sea winter returns is critical for estimating overall spawning fecundity and stock assessment analysis, this is an actively developing area of research currently underway in the Erriff system which may help to inform effective conservation management in other Irish salmon rivers over the coming years.

100 adult sea trout migrating upstream through the Aasleagh trap underwent biological sampling during their main river ascent period in 2024. Average length of sea trout returning to the Erriff river in 2024 was 28.5 cm, with a mean weight of 0.30 kg (compared to 28.6 cm and 0.29 kg in 2023 (n=120)) (Appendix 4, **Error! Reference source not found.**). Given the greater diversity in adult sea trout age classes compared to salmon (zero-sea winter finnock up to multi-sea winter repeat spawners), sizes ranged from 21.3 cm and 102.5 g up to 50.5 cm and 1,430 g (Plate 7).

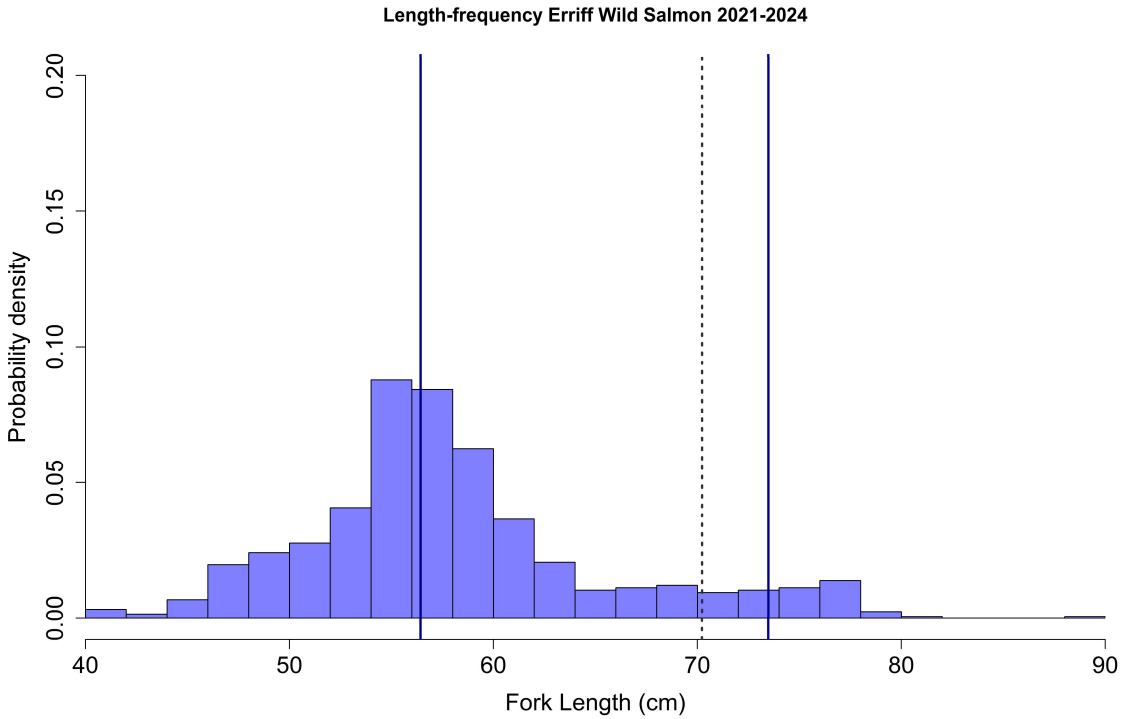

Figure 8 Length-frequency of fork length (cm) for returning wild adult salmon sampled during 2021, 2022, 2023 and 2024 (n=339). Solid vertical lines indicate estimated size modes for median grilse (56.4 cm) and multi-sea winter (73.5 cm) lengths. Dashed vertical line denotes anti-node (70.2 cm).

Plate 7 Large three-sea winter sea trout (51.5 cm & 1.43 kg) sampled at the Aasleagh trap on return to the River Erriff on 8th July 2024. Scale reading indicated that this fish had previously spawned twice. Captures of adult sea

trout reaching this size and age-class have become exceptionally rare in the Erriff and other Connemara sea trout fisheries since the 1980s (Gargan, 2025).

Analysis of length-frequency distribution of salmon smolts sampled in 2024 (n=721) revealed a mean length of 12.1 cm. Partitioning sampled salmon smolts between the Tawnyard trap and the Erriff main channel screw trap revealed that smolts emigrating from the lake were on average 1.87 cm (~14%) larger compared to smolts captured in the main river channel trap (Figure 9). Average length of seaward migrating sea trout smolts sampled from the Tawnyard trap in 2024 (n=564) was 19.37 cm. Only 15 sea trout were sampled from the main Erriff channel screw trap, with considerably fewer numbers of trout smolts caught in this location compared to salmon smolts. The average length of sea trout smolts captured at the Erriff main channel was 17.38 cm.

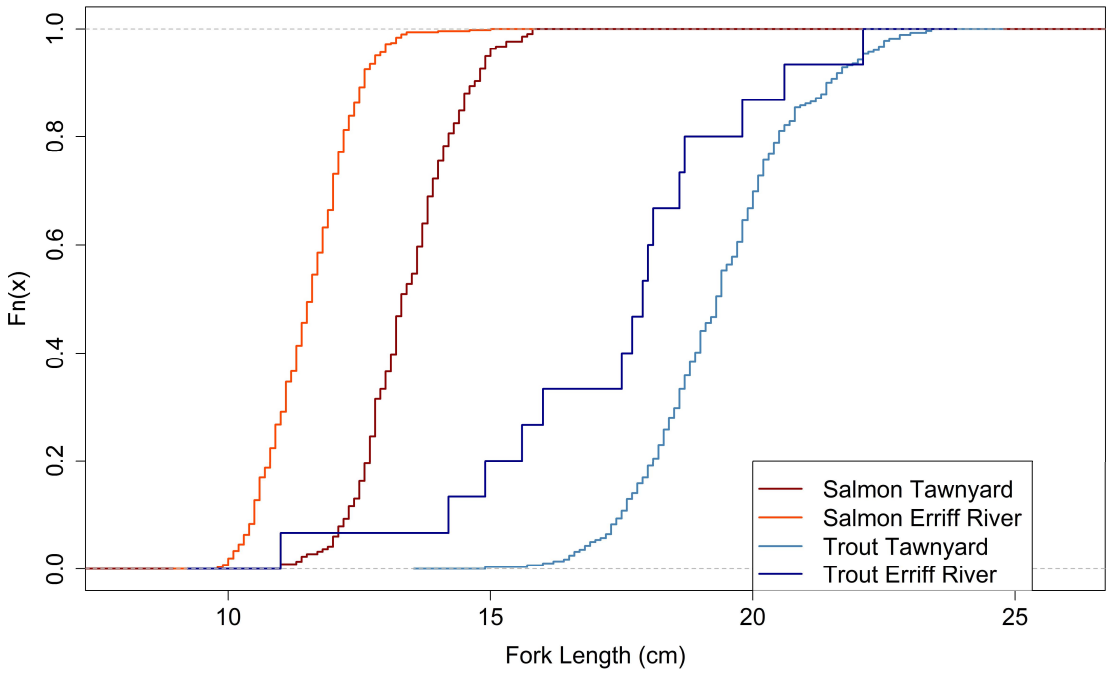

Figure 9 Empirical cumulative distribution function of fork length (cm) of Atlantic salmon and sea trout smolts sampled during 2024 smolt run.

5.5 Predation marks and net marks on wild adult returns

Monitoring of predation marks and net marks on wild salmonid returns is undertaken by examining adult salmon and sea trout intercepted for routine sampling in the Aasleagh upstream trap as they entered the river on their upstream migration. The prevalence of obvious predation marks recorded on sampled fish in 2024 was 16.7%, considerably higher than the typical range observed since 2020 of 1.1% to 7.0%. The prevalence of net marked fish sampled in 2024 was 3.0%, similar to the figure of 2.6% for 2023. Prevalence of predation marks and net marks separated by salmon and sea trout for 2024 relative to preceding years is summarised in Appendix 4, Table 4.

5.6 Catches

In 2024, the total rod catch of adult salmon was 261 fish with 184 of these wild (Appendix 4, Table 5). The total number of ranched fish caught was 77 (all retained). The vast majority (~84%) of salmon rod catch was at Beat 9 (the lowermost beat on the river), which experiences considerably more angling pressure compared to any other beat. The total commercial harvest in the mixed-stock fishery in Killary in 2024 was 103 salmon (Appendix 4, Table 6). An estimated 82% (n=85) of the commercial fishery catch was comprised of Erriff fish. Utilising the ratio of wild to ranched fish returning through the Aasleagh trap in 2024 (65% wild fish), 55 fish retained in the commercial fishery in 2024 were estimated to be wild Erriff salmon.

5.7 Juvenile salmon abundance

Mean salmon fry abundance in the River Erriff catchment from catchment-wide electrofishing surveys in 2024 was 31.6 fry per 5-minute site fished. This represented an increase from the mean salmon fry abundance in 2023 and well exceeded the threshold mean value of 17 salmon fry used to indicate healthy stock status in Irish rivers more widely (Figure 10; Appendix 4, Table 7). Whilst lower compared to the timeseries' high values in 2021 and 2022, the 2024 mean fry abundance in the Erriff was generally higher compared to most years surveyed since 2007. Site-specific results of the CWEF survey in 2024 are presented in Figure 11.

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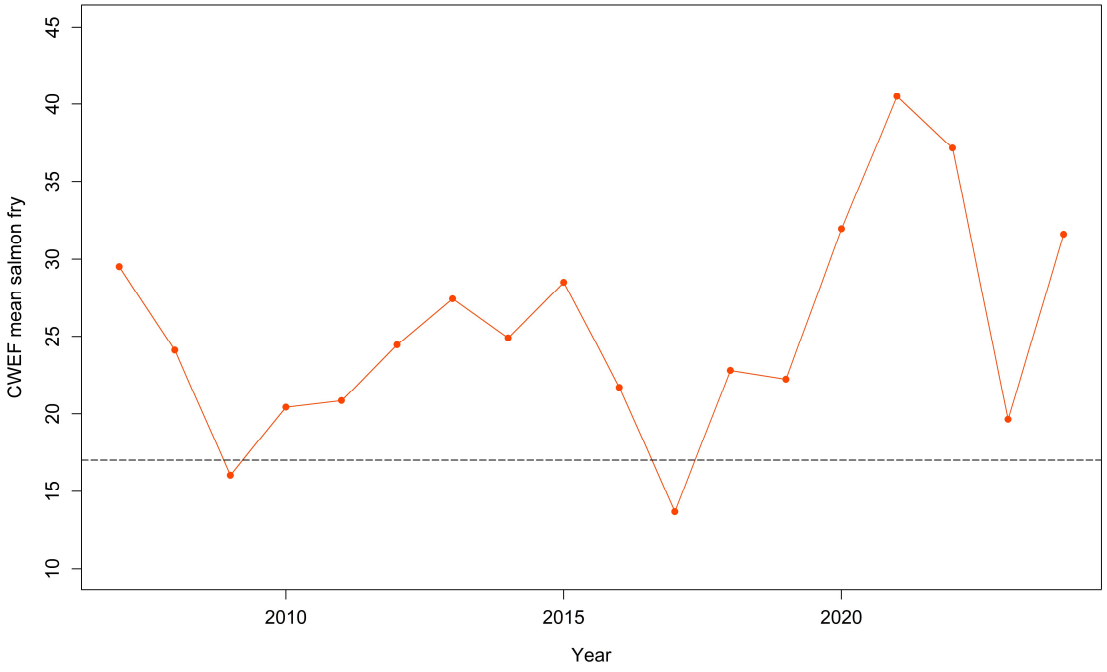

Figure 10 Results of mean salmon fry abundance in the River Erriff catchment from catchment-wide electrofishing surveys since 2007.

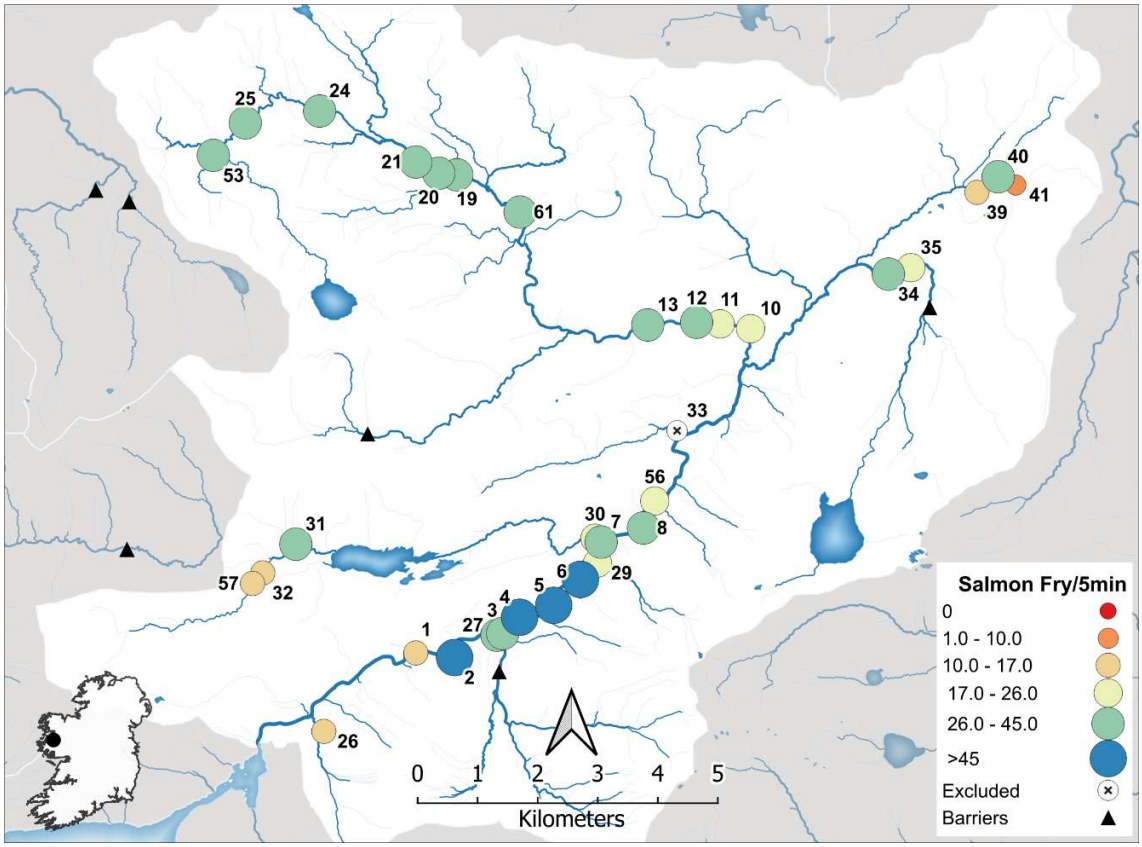

Figure 11 Site-specific results of mean salmon fry abundance in the River Erriff catchment from catchment-wide electrofishing surveys in 2024.

5.8 Telemetry and tagging studies

A range of telemetry and tagging studies have been undertaken in the NSIC Erriff in recent years to assess survival and monitor migration of both salmon and sea trout through the freshwater, estuary and marine environment and better understand the factors that influence these.

5.8.1 PIT tagging

In 2024, a total of 721 salmon and 294 sea trout smolts, respectively, were PIT tagged (Appendix 4, Table 8). This comprised 216 and 505 salmon smolts at Tawnyard trap and at the screw trap in the main channel, respectively, and 279 and 15 sea trout smolts at Tawnyard trap and at the screw trap in the main channel, respectively (Appendix 4, Table 9).

From the cohort tagged in 2023, a total of 12 PIT tagged adult salmon returned to the Erriff during 2024 representing a provisional marine survival of 1.2% for 1-sea winter (grilse) returns. Any PIT-tagged multi-sea-winter fish which return in 2025 will have to be considered when finalising this estimate. Additionally, no two-sea-winter salmon returned in 2024 from the smolt

cohort tagged in 2022. For salmon PIT tagged in 2016, 2018, 2019, 2020, 2021 and 2022 marine survival was 3.5%, 3.8%, 3.2%, 1.5%, 2.1% and 2.4% respectively (Appendix 4, Table 10).

From the sea trout smolt cohort tagged in 2023, a total of seven PIT tagged adult sea trout returned to the Erriff during 2024. These returns represented a combination of two one-sea-winter maidens (i.e. fish that remained either at sea over the winter period without returning to freshwater or overwintered in a river system other than the Erriff) and five zero-sea-winter finnock that returned to the Erriff river during 2023 to overwinter in freshwater, descended again during the 2024 smolt run period and returned to the Erriff river during summer 2024. In addition, a single sea trout tagged as a smolt during the 2022 smolt run was detected returning to the Erriff river in 2024. This fish had returned to the Erriff river in summer 2022 as a zero-sea-winter finnock and again as a one-winter adult in 2023. Of the 293 sea trout smolts PIT tagged during the 2024 smolt run, 28 fish subsequently returned during the same year (i.e. zero-sea-winter finnock), representing a zero-sea-winter return rate of 9.5%. Again, there is the potential for further returns of this tagged cohort in future years. A more comprehensive picture of sea trout marine survival trends and migratory dynamics will become available through assessment of a longer-term time series of mark-recapture data (2019-2025).

5.8.2 Acoustic tagging

Prior to the acoustic tagging of sea trout smolts, 16 acoustic receivers were deployed across the River Erriff and, Killary Harbour to monitor the movements of tagged individuals (Figure 12). A total of 30 sea trout smolts were acoustic tagged between 3-14 May, 2024 at Tawnyard trap. The mean length and weight of the tagged smolts were 19.2 cm and 60.1 g, respectively.

Survival rates were calculated based on the number of tagged fish that successfully returned to the River Erriff after their marine migration. These rates represent minimum estimates, as some individuals may remain at sea for extended periods, exceeding the battery life of the acoustic tags (377 days).

Two sea trout smolts successfully returned to the River Erriff while one overwintered in the Bundorragha River, corresponding to a survival rate of 12.5%. During their migration, 80% of the smolts survived to Killary Harbour, with two mortalities occurring during freshwater migration. An additional 25% were lost during migration through Killary Harbour to the open sea. The largest losses (42%) occurred at sea. Five smolts (21%) were lost in Killary Harbour following their seaward migration.

No premature return behaviour was observed in smolts, although seven smolts were detected in the Bundorragha River between 19th June and 19th September. One of these fish successfully over-wintered and was lasted detected on 3rd April 2025.

An overview of acoustic tagging activities on the River Erriff for 2014-2024 is presented in Appendix 4, Table 11.

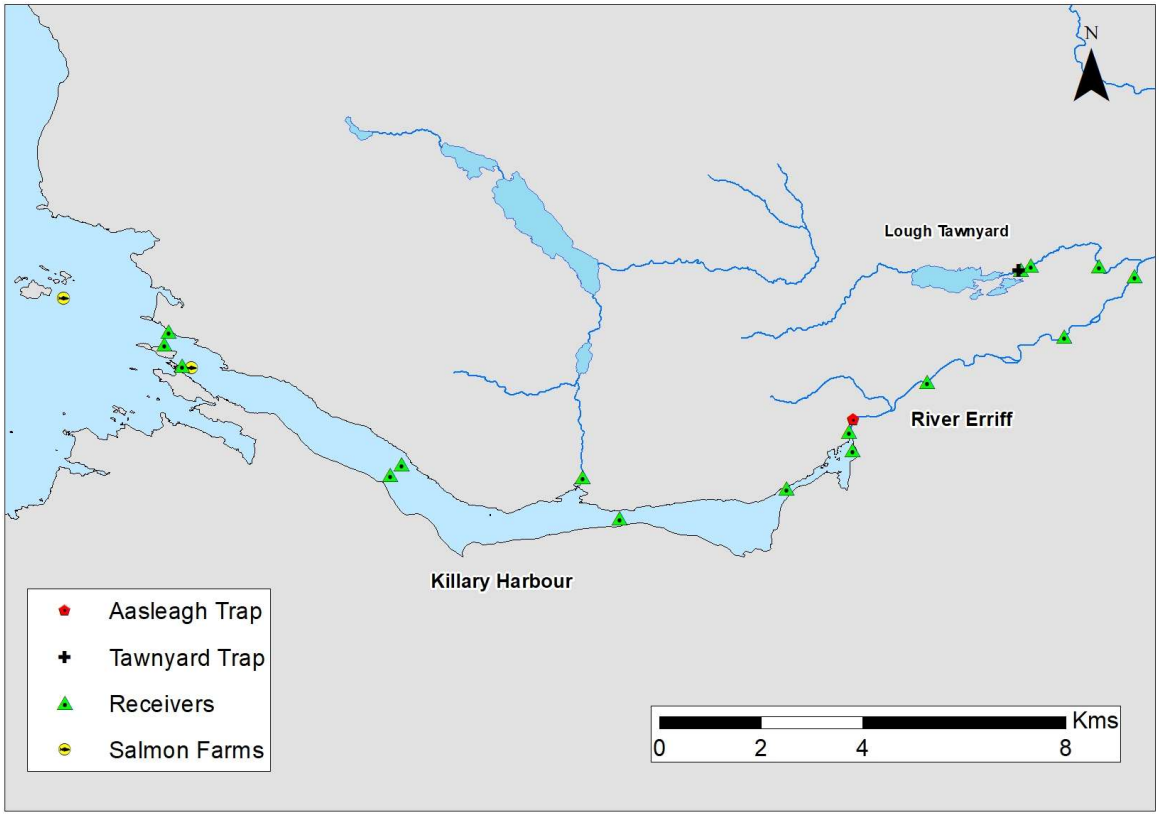

Figure 12 Location of acoustic receivers in Killary Harbour and the Erriff catchment.

5.8.3 Sea trout temperature project

The Sea Trout Temperature (ST Temp) project aims to document the range of temperatures experienced by migrating sea trout (*Salmo trutta*) smolts during their riverine and marine migrations. This research seeks to enhance understanding of temperature-related factors that may influence marine survival. Rising temperatures have been identified as a potential contributor to the decline of migratory salmonid populations at both local and oceanic scales, with climate change representing a significant long-term threat to these species.

Tagging was conducted in 2022 (n=60) and 2023 (n=50). Each fish was also fitted with a Passive Integrated Transponder (PIT) tag to enable identification upon return for tag recovery.

No tagged fish returned in 2024.

5.8.4 SmolTrack III (Eval-Smolt)

Eval-smolts investigated wild salmon smolt survival by assessing two tagged groups (treatment and control). Both groups were intercepted in freshwater and tagged with acoustic transmitters and PIT tags during their outward migration. The control group was released in freshwater at the Tawnyard Trap after a transport of equal distance/duration as the treatment group. The treatment group was transported downstream and released to avoid existing identified smolt-loss bottlenecks in previous SmolTrack work packages. Survival was measured during migration via the acoustic transmitters.

The Eval-Smolt study concluded in 2022. Two one-sea winter salmon smolts tagged during 2022 returned in 2023. One salmon smolt from the treatment group returned in 2024 as a two-sea winter fish. This smolt was originally tagged on April 18, 2022, at the Tawnyard trap, measuring 15.0 cm in length and weighing 34 g at the time of tagging. Upon its return to the trap on April 25, 2024, the fish had grown to 74.9 cm in length and 4.47 kg in weight. This event provided a proof-of-concept for the Ocean-Temp project.

5.8.5 SmolTrack IV (Ocean-Temp)

The Ocean-Temp project aims to record the temperature ranges experienced by Atlantic salmon from the smolt stage to adult return throughout their oceanic migration. Outgoing smolts were equipped with miniature Data Storage Tags (DSTs) to capture temperature data across freshwater, transitional, and marine environments. The tags record temperature every 30 minutes for the first year and hourly thereafter, continuing until mid-September 2025. PIT tags were also applied to facilitate identification upon fish return.

In 2024, 70 wild salmon smolts were tagged at the rotary screw trap at Erriff Bridge (n=54) and Tawnyard trap (n=16) between April 19 and May 8. The tagged fish ranged from 12.9 to 16.3 cm in fork length (mean 13.7 cm) and 20.0 to 40.0g in weight (mean 26.0 g). These fish are expected to return in 2025. Similarly, 84 smolts were tagged in 2023 using the same methodology; however, no returns were recorded in 2024.

An overview of DST tagging activities on the River Erriff from 2014-2024 is presented in Appendix 4, Table 11.

5.9 Invasive and introduced fish species

No Pacific pink salmon were recorded migrating upstream through the Aasleagh trap in 2024. A total of 35 escaped farmed salmon were captured entering the Erriff river during August and September 2024 following an escape event at the salmon farm located at the mouth of Killary Fjord; seven of these fish were intercepted in the Aasleagh upstream trap and 28 were captured by anglers on Beat 9, below the trap. All suspected farmed salmon were retained and underwent further examination to verify farm-origin. A summary of the Killary farm escape event with details on the biology, genetics and estimated abundance of escaped farm salmon captured in the Erriff river and other rivers throughout the region is provided in Kelly et al. 2025b.

5.10 Disease

5.10.1 Sea lice

Monitoring of sea lice loads on wild sea trout returns is undertaken as part of the routine sampling of sea trout intercepted in the Aasleagh upstream trap as they enter the river on their upstream migration (Appendix 1). Of the sampled upriver migrating sea trout returning from the marine environment in 2024, 100 underwent full sea lice counts. 62% of fish showed some presence of sea lice (higher compared to the value of 57% in 2023 sampled fish (n=107)).

In order to assess the relative sea lice pressure experienced by sea trout smolt cohorts annually, sea lice load was calculated for sampled zero-sea winter fish ("finnock"). Finnock are considered a more appropriate representative group for this assessment, as they migrate as first-time smolts during spring and return to the Erriff after a period of approximately two months at sea, thus providing a more informative annual index of sea lice infestation pressure in Killary Fjord that migrating salmon and sea trout smolt cohorts may be exposed to. Sampled finnock were extracted from the overall adult sea trout sampling based on a cut-off length of 32 cm. This cut-off length was informed based on the multi-year PIT tagging programme 2018-2024, which indicates that sea trout returning in the same summer following smolt emigration are consistently < 32 cm. Sea lice load was calculated as the number of lice per gram of body mass (n g^{-1}) and an assessment of the severity of individual lice infestation rates performed using the established salmon lice risk index (so-called 'traffic-light system' as used in Norway (Taranger *et al*. 2015)). Of the 2024 sampled finnock (n=83), 0% were in the high-risk category (100% probability of lice-related mortality), 0% in the medium-risk category (50% probability of lice-related mortality) and 9.6% in the low-risk category (20% probability of lice-related mortality). These categories were then used to assess lice-related increased mortality risk at the whole-population level (Taranger *et al*. 2015; Gargan *et al*. 2016). Results show that 9.6%

of fish had lice infestation rates > 0.1 n g^{-1}, denoting that lice levels impacting the 2024 Erriff sea trout cohort had a lower probability of increasing population-level mortality risk. This represents an improvement over returning finnock sampled at Aasleagh trap during 2023, 2022 and 2021, of which 12.0%, 34.1% and 33.3% of fish had lice infestation rates > 0.1 n g^{-1} respectively. These figures indicate that during those years it was likely that sea lice infestation represented an intermediate (in 2023) or high (in 2021 and 2022) population-level mortality risk.

Over 60% of the historical surveys carried out in Killary Harbour and in the estuarine zone of the primary river inflows to Killary, including the Erriff, indicated high mortality risk levels during the 1990s, 2000s and 2010s (Gargan *et al*. 2016). Given that the sea lice sampling reported here is carried out on individual fish that have spent variable amounts of time back in freshwater (and thus would be anticipated to have lost a proportion of their lice load), the population-level risk reported here should be considered an absolute minimum, and lice-induced mortality risk is likely higher in the adjacent coastal habitat utilised by Erriff sea trout, and by extension, out-migrating salmon smolts. It should be further noted that sea lice counts are carried out only on those fish that have survived and successfully return to freshwater and is not fully representative of sea trout lice infestation rates at sea as it omits any sea lice counts from fish that do not survive the marine migration phase.

5.10.2 Red skin disease

Anecdotal observations suggest that mild RSD-like signs have been observed in Irish salmon for many decades. However, there has been no specific focus in this regard until 2019 when more obviously diseased fish were encountered in some Irish rivers. Routine surveillance for RSD in the NSIC Erriff commenced in 2020 when ranched salmon were examined to assess prevalence and severity of this emerging phenomenon. Since 2021, surveillance for RSD has been undertaken by examining wild adult salmon intercepted for routine sampling in the Aasleagh upstream trap as they entered the river on their upstream migration. Assessment of severity of disease is classified according to the scheme used in the RSD Severity Field Guide, 2022 (Appendix 2). In 2024, eight of the 95 wild Erriff adult salmon examined had signs of RSD, with 25% of these cases classed as moderately severe and 75% classed as mildly severe. This represents a prevalence rate of 8.4% in the total numbers of wild salmon examined, an increase over 2023 (5.6%) and a notable decrease compared to the prevalence of 34% in 2022 (Appendix 4, Table 12).

It should be noted that although the majority of recorded cases of RSD in Ireland are observed in one-sea-winter grilse, this is not the case elsewhere in Europe (notably Scandinavia) where

RSD is principally observed in multi-sea-winter salmon stocks. This may be a consequence of the Irish stock being pre-dominantly one-sea-winter.

5.10.3 Red vent syndrome

Red vent syndrome (RVS) is a pathological condition observed in wild Atlantic salmon with swollen, protruded and bloody vents a defining symptom of afflicted fish. The syndrome arises due to parasitic infection by the widespread marine nematode *Anasakis simplex*, which utilises fish such as Atlantic salmon as an intermediate host for larval stages before completing the adult stage of its life-cycle in marine mammal hosts. The larvae migrate from the fish gut wall into various body tissues and can invade in very high numbers the vent region, leading to the pathologised vent condition observed in fish with RVS. Routine surveillance for RVS in the NSIC Erriff commenced in 2020 when ranched salmon were examined to assess prevalence and severity of this disease. A standardised classification method to record RVS has been introduced to align with the mild-moderate-severe severity scale used in Britain by the Environment Agency and Marine Scotland (RVS Severity Field Guide, 2011; Appendix 3). Since 2021, surveillance for RVS has been undertaken by examining wild adult salmon intercepted for routine sampling in the Aasleagh upstream trap as they entered the river on their upstream migration. In 2024, 12 of the 95 wild Erriff adult salmon examined had signs of RVS, of which 75% of cases were classed as mild, 16.6% as moderate and 8.3% severe (Appendix 4, Table 13). This represents a prevalence rate of 12.6% in the total numbers which is marginally lower than the 14.1% prevalence recorded in 2023, comparable to 2022 and lower than 2021 prevalences.

5.11 Climate and Environmental Research Programme

River water temperatures and water levels on the main channel of the Erriff River as recorded by the Office of Public Works' hydrometric station located just below Aasleagh Falls varied largely across 2024 (Figures 13 & 14). Hourly water temperatures ranged from a low of 1.7 °C during March to a high of 19.7 °C during July (Figure 13). In general, during the early part of the year water temperatures remained below 10 °C and gradually rose from April onwards, peaking during the month of July. A period of anomalously warm water temperatures were experienced during May but overall summer water temperatures on the Erriff in 2024 were average or cooler compared to climatological norms for the reference period 2007-2023 (Figure 14). Following summer, water temperatures decreased but periods in autumn and winter showed elevated temperatures relative to climatological norms, particularly in early November and late December. These warmer winter periods were punctuated by a brief cold snap in mid-November with heavy snowfall (Plate 8).

As expected for a spate catchment, water levels on the Erriff exhibited high variation and rapid transitions between high flood events and low water conditions across 2024. Levels were generally high during the early part of the year (Figure 13), with levels in March and April often in excess of typical mean conditions during 2007-2023 (Figure 14). Levels decreased substantially from May through to July, with notable periods of anomalously low water levels recorded during this period. Water levels rose in August with several peak flood events and remained well above climatological norms for the month before dropping again in September and early October. Hydrological conditions were variable from late October through to winter, with record low water levels during early-to-mid November followed by flooding in late November coincident with snow-melt and heavy rainfall.

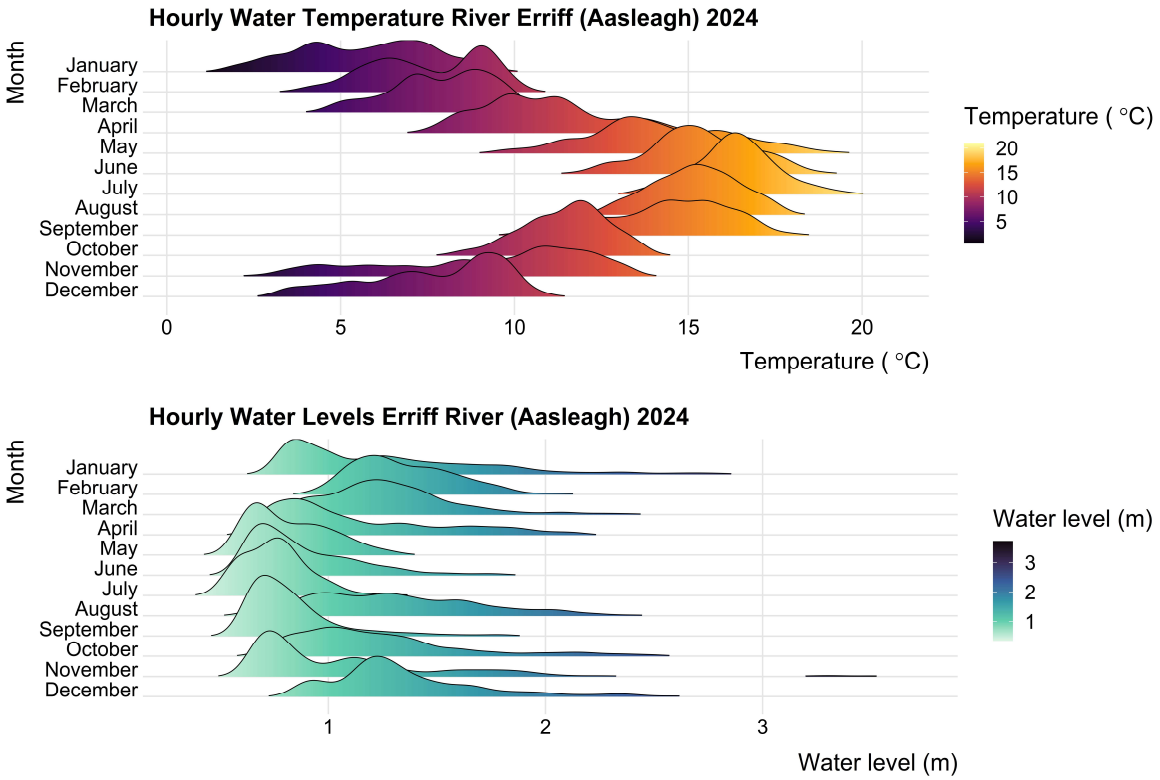

Figure 13 Distribution of river water temperatures (top panel) and river water levels (bottom panel) by month on the River Erriff main channel during 2024 (using data recorded by the hydrometric gauging station below Aasleagh Falls maintained by the Office of Public Works).

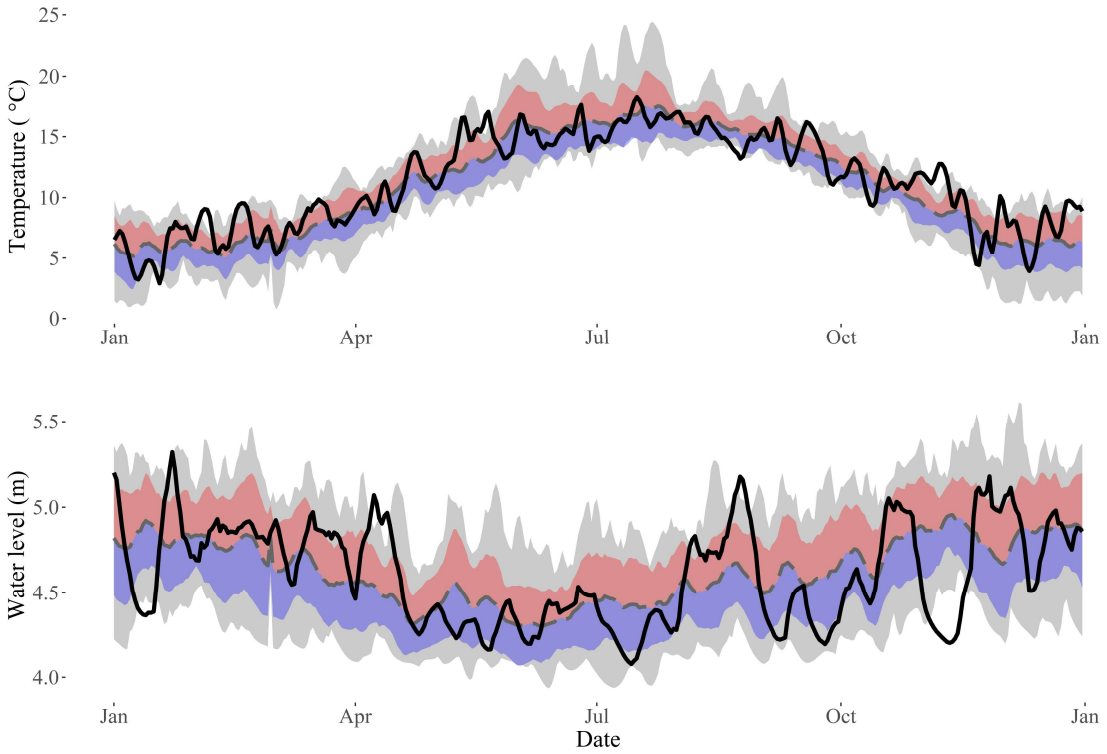

Figure 14 Comparison of river water temperatures (top) and water levels (bottom) on the River Erriff main channel in 2024 (thick solid black line) with climatological conditions during the period 2007-2023. Dashed grey line is climatological mean, red and blue shaded areas denote standard deviation around the climatological mean and grey shaded areas indicate historical maxima and minima. Temperatures were filtered using a 3-day moving average and water levels using a 7-day moving average to improve plot interpretation. (Data was obtained from the hydrometric gauging station below Aasleagh Falls maintained by the Office of Public Works)

Monitoring of climatic and limnological variables continued in 2024 through the IFI Climate Change Mitigation Research Programme (CCMRP). Thirty-five water temperature loggers and a fully-automated meteorological station installed during summer 2019 continue to record the thermal dynamics of fishery habitat throughout the Erriff river system every 30-minutes. Analysis of the water temperature data recorded during the first 6-years of logger deployments is currently underway, which will allow detailed assessment of the thermal response of salmonid habitat to climatic conditions. This will include the delineation of thermally vulnerable and resilient habitat-types based on the relationship between water temperatures and other key variables such as meteorological conditions, groundwater influences and landscape factors (e.g. riparian shading). In addition, limnological monitoring of Tawnyard Lough was continued in 2024 through downloading and redeployment of a full water column thermistor array and dissolved oxygen loggers at strategic locations through the water column to inform on oxythermal conditions. A shoreline meteorological station was also maintained, providing local information on wind conditions and solar radiation, which drive physical conditions in the lake and will eventually be utilised to inform on potential linkages between climatic conditions and the lake's resident and anadromous trout populations.

Plate 8 River Erriff and Devilsmother mountain in background following snowfall in November 2024.

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8 Appendices

8.1 Appendix 1 Sea lice screening of adult sea trout returns

Monitoring of sea lice loads on wild sea trout returns is undertaken as part of the routine sampling of sea trout intercepted in the Aasleagh upstream trap as they enter the river on their upstream migration. The fish are anaesthetised and held partially submerged in water during lice counts to reduce stress. Numbers of sea lice observed are recorded as juvenile chalimus or pre-adult / adult life stages (Figure 15 and Figure 16).

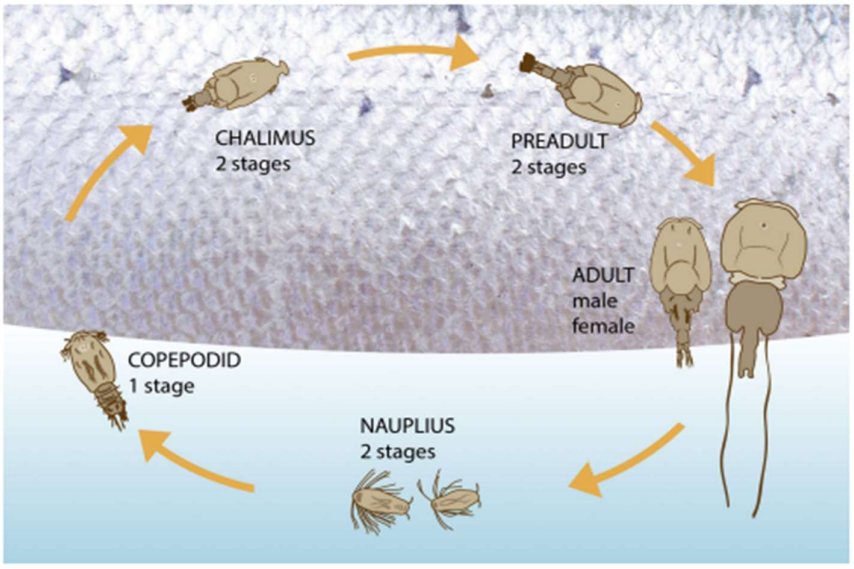


Figure 15 Life cycle of *Lepeophtheirus salmonis* showing the attached chalimus, pre-adult and adult stages which are routinely screened for as part of the NSIC annual sea trout biological sampling programme (figure from Thorstad *et al*. (2015)).

Figure 16 Counting sea lice on returning wild sea trout in the NSIC Erriff.

8.2 Appendix 2 RSD severity field guide

Environment Agency | Cyfoeth Naturiol Cymru Natural Resources Wales | marinescotland science | Iascach Intíre Éireann Inland Fisheries Ireland

Red Skin Disease in wild Atlantic salmon – a severity field guide

Red Skin Disease (RSD) is a term given to an emerging disease of wild Atlantic salmon characterised by haemorrhaging along the underside of the body, and occasionally the lower flanks. Milder symptoms of ventral haemorrhaging have been recorded in some populations of salmon for decades, but the severity and prevalence appear to have increased markedly in the last few years.

The most consistent characteristic of the condition appears to be distinct and pronounced ventral haemorrhaging in fresh run Atlantic salmon. This haemorrhaging is described as petechial or pinpoint, expressed as rounded reddened spots on the skin.

The cause and impact of RSD are currently unknown and detailed histopathological descriptions are still being established. Until then, the following field guide has been produced to standardise clinical reporting of RSD-like lesions to support ongoing monitoring of this condition across salmon rivers. It also serves to distinguish this emerging condition from other, frequently observed skin lesions in migratory salmonids.

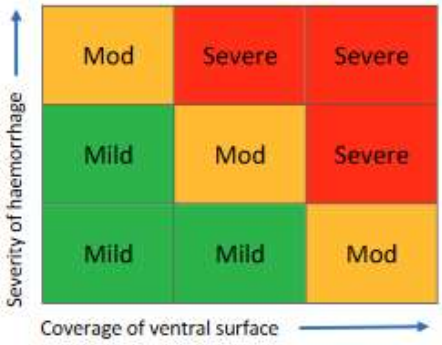
This index is not intended as a definitive diagnostic guide, but simply to standardise reporting of RSD. This document may evolve as our understanding of RSD develops and will be updated accordingly alongside a more detailed case description.

The images in this guide show the ventral surface of salmon exhibiting varying severities of ventral haemorrhaging associated with RSD, along with descriptions to assist the assessment of individual fish.

To distinguish RSD-like lesions from other skin conditions, there is a page at the end of this guide showing a range of images of wild Atlantic salmon with common symptoms and infections - none of which are considered to be consistent with RSD. Whilst secondary infections may be a typical progression of RSD-like lesions, these growths often mask underlying characteristics and hinder a reliable assessment of this condition.

Severity and characteristics of RSD

Based on observations from rivers across the UK and Ireland, it appears that RSD-like lesions can vary widely both in the extent and severity of ventral reddening. As such, the categorisation of mild, moderate, and severe lesions is based on the coverage of ventral regions of affected fish and the severity of haemorrhage/inflammation. The contribution of these two factors to the assignment of RSD severity is demonstrated in the diagram below.



Severity of haemorrhage: refers to the colour of lesions and extent of disruption to the skin, ranging from subtle pale marks with little or no skin disruption, through to deep red, aggressive lesions with notable disruption to skin surface including scale displacement.

Coverage of ventral surface: refers to the extent of the ventral surface covered by haemorrhagic/inflammatory lesions. Ranging from discrete, localised marks to extensive rash-like lesions covering most if not all of the ventral surface, and even extending on to the lateral surfaces of the fish.

Version 1. February 2022

Normal ventral surface

Clean, white ventral surface with no evidence of haemorrhaging or significant skin lesions. N.B. Some minor blemishes or imperfections in wild migratory fish are common and normal and may arise from multiple causes.

Mild RSD-like lesions

Ventral haemorrhage typically focal or diffuse, with minimal disruption to the skin. Lesions are relatively pale, discrete and typically cover less than 50% of the ventral surface.

Moderate RSD-like lesions

Coverage and severity of lesions variable with patches of more significant reddening including raised or more disrupted regions of the skin. Coverage may be extensive and variable, with either mild severity of lesions covering a large proportion of the fish, or focal regions consisting of more pronounced red marks.

Severe RSD-like lesions

Pronounced and extensive petechial or rash-like haemorrhage covering large proportions of the ventral surface, occasionally extending onto the flanks of the fish. Evidence of skin disruption including raised areas of scale displacement with marked petechiae, extending into larger patches, usually raised and deep red in colour.

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Symptoms associated with other skin conditions of wild salmon

Red Vent Syndrome, involving localised swelling and reddening of the vent.

Lice damage, with typical fine, petechia often localised posterior to the fin bases.

Abrasion, with associated scale displacement.

Severe bacterial infection with ulceration and inflammation.

Saprolegnia infection with typical rounded, cotton wool-like growths.

Mixed secondary infections involving bacteria and Saprolegnia.

Contact details

England: To report fish mortalities or fish in distress please contact the **Environment Agency** incident hotline on 0800 80 70 60. For further information on RSD please contact our National Fisheries Laboratory on 02084 745244 or email fish.health@environment-agency.gov.uk

Wales: contact the **Natural Resources Wales** hotline on 0300 065 3000, or visit the website: Natural Resources Wales / Report an incident. For further information, contact fisheries.wales@cyfoethnaturiolcymru.gov.uk

Ireland: contact **Inland Fisheries Ireland**. Tel: 0818 34 74 24, or email salmonhealth@fisheriesireland.ie

Scotland: contact the Fish Health Inspectorate at **Marine Scotland**. Telephone 0131 244 3498, or email ms.fishhealth@gov.scot

For further information on this document, please contact fish.health@environment-agency.gov.uk

Version 1. February 2022

8.3 Appendix 3 RVS severity field guide

marinescotland science | The Scottish Government | Environment Agency

Red Vent Syndrome in wild Atlantic salmon – A severity field guide

Background

Wild Atlantic salmon returning with inflamed, swollen and bleeding vents have been seen in rivers throughout the UK since 2006. This condition has been called Red Vent Syndrome (RVS). This index has been developed to standardise the recording of RVS within Britain, allowing consistent reporting and monitoring. It replaces all earlier field guides. The following images show the normal vents of salmon and vents with varying degrees of RVS. Descriptions are provided to help clarify the different stages of RVS. Please use this guide when recording RVS and report these cases to the contact details below.

Contact us: For more information about RVS or to report affected fish please contact

- In England and Wales contact the Fisheries Technical Services at the **Environment Agency**. Telephone 02084 745244, or email fish.health@environment-agency.gov.uk
- In Scotland contact the Fish Health Inspectorate at **Marine Scotland**. Telephone 01224 876544 and ask for the Duty inspector, or alternatively email MS.fishhealth@scotland.gsi.gov.uk

Vent condition

The vents of salmon can differ in appearance for natural reasons. For example, just prior to spawning the vent may become pinker and protrude slightly, but should appear clean. Some salmon may also have abrasions in the vent area or some sea lice damage as seen in the right hand image below (circled). This should not be recorded as RVS, which involves more pronounced reddening and swelling. The severity of RVS varies. Some evidence suggests that the condition of the vent can improve the longer the salmon are in fresh water. Consequently, please include date of capture, the river and location when reporting RVS cases.

Normal

Normal: Small, pink coloured vent with no evidence of swelling, lesions or haemorrhaging.

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Jan 2011

Mild RVS

Mild: Slight or no swelling. Reddening around the vent and/or a few red spots (petechial haemorrhage). No evidence of skin erosion, dead skin (necrosis) or scale loss.

Moderate RVS

Moderate: Pronounced reddening around the vent with marked swelling. Some bleeding (haemorrhage), skin erosion and scale loss may be evident.

Severe RVS

Severe: Severe swelling and/or open lesions with bleeding and/or prolapsed tissue from the vent. Eroded or dead skin (necrosis) evident around the vent. Secondary infections may also be present.

8.4 Appendix 4 Data tables

Not published.

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