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Rural Affairs and Islands Committee
The Scottish Parliament
Edinburgh
EH99 1SP

Tuesday 10th December, 2024

Re Inquiry into the implementation of the session 5 Rural Economy and Connectivity (REC) Committee's inquiry into salmon farming

Dear Members of the Rural Affairs and Islands Committee (RAI),

Thank you for your work in relation to the aforementioned ongoing inquiry. I hope this letter finds you well.

As your evidence-gathering and deliberations begin to come to a close, I wish to inform you of two critical issues that have been drawn to my attention and are of particular relevance to the inquiry.

- **80,000 unreported escaped salmon**
  Somewhat alarmingly, an incident that took place last year and resulted in the escape of over 80,000 farmed Scottish salmon was not - and indeed still is not - reported on the Government's 'Scotland's Aquaculture' site. We identified the incident only as it is referenced in the recently published Scottish Fish Farm Production Survey. This marks the biggest Scottish salmon escape incident in a decade, but until now has remained entirely under the radar.

- **17 million on-farm mortalities is the tip of the iceberg**
  Deficiencies in mortality datasets and complex reporting hide the real number of deaths taking place on Scottish salmon farms. Fish who die during transport, are culled, fall within the 'six-week grace period', or die before the specific reporting thresholds are met, are not reported by the Fish Health Inspectorate (FHI). Juvenile fish who die in hatcheries in freshwater farms are not reported by Salmon Scotland. Additionally, so-called 'cleanerfish' - used to eat the lice off of the salmon that are rife in unnatural sea cages - are not reported by the FHI, Salmon Scotland, SEPA or even in the Government's own Scottish Fish Farm Production surveys. The true scale of death on Scotland's salmon farms is masked as a result.

Such serious and undeniable data mismanagement is problematic and unacceptable. Without having a clear view of the salmon escaping from, or dying on, Scotland's farms, there is no way of adequately monitoring animal welfare, impacts on wild fish stocks, supply chain

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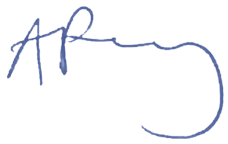
sustainability, waste management, or more. The true extent of the Scottish farmed salmon industry's impact on animals and the environment cannot truly be known.

I provide further details below. If you require additional information or clarification please do not hesitate to contact me.

Yours sincerely,



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UNREPORTED ESCAPES

On page 56 of the 2023 Scottish Fish Farm Production survey, released by the Scottish Government in October 2024, it states: *'There were two incidents involving the loss of 80,001 fish from seawater Atlantic salmon sites in 2023. There were 13 additional incidents reported where the companies confirmed there was no loss of fish.'*

The actual dataset, however, fails to show the deaths of those 80,000 fish. It instead references 14 incidents: in 1 of those incidents, a single fish was reported to have escaped; in the remaining 13 incidents, the companies confirmed that there was no loss of fish.

This data can be found here: https://aquaculture.scotland.gov.uk/data/fish_escapes.aspx The site is overseen by a number of Scottish Government regulators, namely: SEPA, Marine Scotland, Food Standards Scotland, Crown Estate Scotland and NatureScot.

The failure to publicly report an incident in which 80,000 farmed Scottish salmon escaped from a farm is very serious indeed.

I need not remind the RAI Committee of the 2018 Rural Economy & Connectivity Committee recommendations (37) stating: *'The Committee notes that strict penalties are in place in Norway to deal with escapes and recommends that appropriate sanctions should be developed and introduced in Scotland.'*

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UNREPORTED MORTALITIES

As the Committee has uncovered, over recent years salmon farms have experienced very high mortality levels. While 2024 shows a slight improvement, the mortality rate remains significantly higher compared to previous years. Specifically, the current mortality rate is 2.4 times the 2018 levels, and continues to exceed the mortality rates of 2019, 2020, and 2021[1]. One farm has reported an especially high mortality rate of 87% this year[2].

As you have heard throughout the evidence-gathering sessions, the causes of mortality are numerous and include post vaccination fungus, viral disease, gill health, transportation, treatment, sea lice, seal damage, plankton blooms, water quality, jellyfish and more.

Industry optimism vs reality

In the October evidence session, a question was raised about Mowi releasing post-smolts to the Isle of Muck. Tavish Scott - CEO of Salmon Scotland - confirmed that the industry was adopting this strategy more widely. Ben Hadfield - COO of Mowi Scotland - sounded hopeful about reducing mortality *"by up to 50 per cent".* However, the actual outcomes have been far less promising. At Muck, nearly 250,000 salmon died within the first five weeks of their sea release, with current data indicating approximately 5% mortality each week[3].

In the same session Kimberley McKinnell - Head of Health at Bakkafrost Scotland - discussed Applecross's plans to get the *"best possible robust large smolt out to sea"*. Despite these plans, Applecross has experienced significant losses, with over 2.3 million fish dying so far this year.

Movement of fish, resulting in death

Companies are increasingly relocating fish between seawater sites in an effort to address challenges such as jellyfish and gill disease. However, the stress caused by crowding and transportation negatively affects fish health, and losses can be significant.

In Salmon Scotland's submission to the inquiry, Dr Ralph Bickerdike - Head of Fish Welfare for Scottish Sea Farms - recounts transferring fish from Bloody Bay to Dunstaffnage for a couple of months before moving them back. Despite noting that the fish grew well at Dunstaffnage, the reasoning for their return remains unclear but it seems unlikely it was for reasons of fish health.

It is recommended, though not required, to conduct risk assessments before transferring fish between seawater sites. In August 2023 fish were transferred from Macleans Nose to Bagh Dail Nan Cean. The risk assessment states: *'Fish from MacLean's Nose were tested positive for AGD. The stress from crowding and transport is a high risk factor. Fish will be treated with hydrogen Peroxide once they arrive in Bagh Dail Nan Cean[4].'* Despite there being a 'high risk factor' the transfer went ahead anyway. The transfer and hydrogen peroxide treatment ended up killing over 10% of the fish.

---

[1] FHI reported salmon mortality Jan-Oct: https://www.gov.scot/publications/fish-health-inspectorate-mortality-information/

[2] See corrections for the full production cycle of Culnacnoc https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-august-2024

[3] https://www.gov.scot/publications/fish-health-inspectorate-mortality-information/

[4] https://www.gov.scot/binaries/content/documents/govscot/publications/foi-eir-release/2024/07-c/foi-202400411054/documents/foi-202400411054---information-released---risk-assessment/foi-202400411054---information-released---risk-assessment/govscot%3Adocumen

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Scrutinising statements

Salmon Scotland makes a number of claims on behalf of the industry; they must be understood in the correct context[5].

"Over the course of a year the average monthly survival rate was 98.7%, resulting in a loss of 1.3% each month".

The figures cited for mortality rates in the Scottish salmon farming have not been updated to show the huge losses in 2022 and 2023. They also only account for losses in seawater farms, excluding the significant mortality that can occur in freshwater farming stages such as hatcheries and smolt production facilities. By focusing solely on the marine phase, the data underrepresents the full scope of mortality across the entire lifecycle of farmed salmon.

"Scottish Government data from the survey traps on River Dee tributaries (on Scotland's east coast) show that, even of the fish which survive from hatching to going to sea, the number returning to breed is below 2%."

While it is true that Atlantic salmon have evolved a reproductive strategy involving high egg production and naturally high mortality rates, this comparison is misleading in the context of salmon farming. In the wild, high mortality rates are part of an ecological balance, with predators and environmental factors shaping populations. Farmed salmon, however, exist in controlled environments where high mortality rates often result from preventable causes like disease outbreaks, sea lice infestations, and farming practices. Comparing farmed salmon mortality to wild survival rates overlooks the ethical and operational expectations of controlled farming, which aim to minimise such losses. The comparison is also flawed by the fact that Salmon Scotland's data does not include any of the losses from the freshwater stages of the salmon life-cycle.

“Did you know? The Scottish salmon farming sector is the only UK farming sector to publish monthly stock mortality rates.”

This figure is calculated using the monthly sector wide and openly published figures which detail the rate of survival of growing salmon at the marine stage. Publishing data, of course, does not absolve any industry from scrutiny or imply acceptable practices if high mortality rates persist. For a sector reliant on maintaining public confidence, transparency is a baseline expectation, not a substitute for significant improvements in fish welfare and survival.

[5] https://www.salmonscotland.co.uk/facts/fish-welfare/mortality-rates-in-scottish-salmon-farming

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DEFICIENCIES IN DATASETS

Mortality data is collected by various organisations. All of these datasets rely on figures which are reported by the farms themselves. As can be seen on the following pages, mortality records are often inadequately maintained and reported. Despite the various datasets, there is no source of data which shows the total number of fish who die each month or year.

This summary outlines the main data sources and their deficiencies. The following pages provide a detailed analysis of each dataset's shortcomings.

Fish Health Inspectorate: mortality information

- Only reporting above specific thresholds
- Incomplete or errors in data
- Frequently not reported in a timely manner
- Transport losses not reported
- Cleanerfish deaths not reported
- Culls not reported
- Six-week grace period

Salmon Scotland: monthly mortality data

- Freshwater farms not listed
- Actual numbers of fish not listed
- Cleanerfish deaths not reported
- Some farms appear not to be reporting losses
- Complications when fish are moved between sites

SEPA: monthly weight of mortalities

- Errors in the data
- Delay in publication
- Cleanerfish deaths not reported
- Only marine data, not freshwater
- Actual numbers of fish not listed, only weight

Scottish fish farm production surveys

- Cleanerfish deaths not reported
- Not farm or company specific
- Delay in reporting

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ASSESSING FISH HEALTH INSPECTORATE DATA

Under a voluntary agreement with the Scottish Government (Fish Health Inspectorate), Aquaculture Production Businesses report instances of mortality above specified thresholds.

This data contains the weekly loss as a percentage of the total number of fish on the farm each week. It also contains the number of actual fish deaths and other additional information. Reports are used as part of the wider aquatic animal health surveillance programme to direct further investigations as required.

This data is updated monthly and is published on the Scottish Government website at https://www.gov.scot/publications/fish-health-inspectorate-mortality-information/

These are the mortality figures that often get reported by the press as they are the most up-to-date. However, this article from the Herald suggests the number of actual deaths may be double that reported https://www.heraldscotland.com/news/24185372.salmon-farm-deaths-nearly-twice-numbers-frequently-quoted/

Only reporting above specific thresholds

Fish farms only report mortality instances over specified thresholds as follows:

Site Average Weight	Weekly Mortality Maxima
Egg to 1st feed	6.00%
1st feed to 5g	3.00%
5g to smolting	1.50%
<750g	1.50%
>750g	1.00%

These reporting thresholds mean that some farms can suffer over 100,000kg of dead fish in a single month and it doesn't need to be reported to the FHI[6].

Incomplete data, or errors in data

There appears to be little in the way of validation of the data entered into the FHI reports:

- 394 incidents where '*Total mortality during event'* is not disclosed.
- Several sites are incorrectly labelled as freshwater / seawater throughout the data.
- Several incidents have incorrect Site Numbers making simple analysis of the data impossible.

Incidents not reported

Since 2018 there have been over 400 incidents where fish mortalities have not been reported with 30 days of them occurring. Many of these are only reported months or even years later when they are discovered during routine inspections.

[6] In November 2022 Eilean Grianain suffered 118,889 kg of mortalities but was not required to report this to FHI as it was under the reporting threshold.
https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=24262
https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=24167

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Site Name	Date reported	Start Date	End Date	Mortality rate recorded(%)	Total mortality during event	Action taken by FHI
Noust Geo	24/02/2022	10/07/2017	16/07/2017	1.53	2344	Historic mortality event picked up during remote inspection on 23/02/2022. No further action required.
Clachbreac	02/03/2023	13/04/2020	19/04/2020	20.54	56495	Retrospective report, remainder of stock culled the following week. FHI had followed up on 24/04/2020.
Ardnish	27/03/2024	16/08/2021	22/08/2021	2.03	1543	Historical mortality event identified during inspection on the 26/03/2024; 20240100. No further action.
Colonsay	09/06/2022	04/11/2019	10/11/2019	1.66	18825	Picked up during routine inspection. Mortlaity was notified to FHI as required (email confirmation submitted by company as evidence). No further action.
Ardnish	27/03/2024	23/08/2021	29/08/2021	4.41	3276	Historical mortality event identified during inspection on the 26/03/2024; 20240100. No further action.

In 2024 alone we found 13 inspection reports highlighting that mortality records are inadequately maintained or mortality is not reported to the FHI.

For example, Case Inspection: 2024-0154

> Mortality records were inspected and found to be inadequately maintained.
>
> Mortality levels had exceeded the reporting criteria since the last inspection and had not been reported to the Fish Health Inspectorate. I would like to remind you of the industry agreement in relation to mortality reporting as detailed in A Code of Good Practice for Scottish Finfish Aquaculture.

Transport losses

FHI Case Inspection 2023-0044 for Loch Lochy shows that losses are not recorded if they occur during transport: *"Case Notes: Wk50 2022 - transfer mortality, oxygen in lorry 3 froze that day. Site tried to suspend delivery due to weather conditions but the fish were already loaded. 5400 mortality in one delivery during transport. Fish never made it into the loch. Mortality not reported due to being during transport.[7]"*

Cleanerfish

Cleanerfish are used as a biological control to remove sea lice. They are either farmed or wild caught. Their mortality rates are not recorded in any publicly available records but they are sometimes listed in the FHI case inspection. Some examples are in the table below.

7 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2022/03/fish-health-inspectorate-case-information-2022/documents/january-2022/cases-20210001-20210008/cases-20210001-20210008/govscot%3Adocument/Cases%2B20230036-20230074.pdf

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Species	Date	Site	Details
Lumpfish	May 2022	Ardcastle	"site has put in place measures to mitigate against cleanerfish loss" mortality Wk20, 101.62%[8]
Lumpfish	November 2020	Plocrapol	mortality wk 44 2020 - 32 258 - 100%[9]
Lumpfish	October 2022	Plocrapol	Wk41, 9159, 99.71% (FW treatment related)[10]
Wrasse and Lumpfish	2022	Scotasay	Wk18, 8405, 14.80% (FW treatment) Wk19, 17029, 35.18% (black losses) WK23, 4990,16.56% (black losses) Wk24, 4687, 18.65 (black losses)[11]
Lumpfish	2022	Stulaigh	"Of the 91,930 lumpfish put into the site, only 32,680 remain"[12]
Wrasse and Lumpfish	2024	Ardessie A	Wrasse mortality since input: 66% Lumpfish mortality since input: 86%[13]

8 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2022/03/fish-health-inspectorate-case-information-2022/documents/january-2022/cases-20210001-20210008/cases-20210001-20210008/govscot%3Adocument/Cases%2B20220174-20220199.pdf

9 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2022/03/fish-health-inspectorate-case-information-2022/documents/january-2022/cases-20210001-20210008/cases-20210001-20210008/govscot%3Adocument/Additional%2BCases%2B20220012-20220027.pdf

10 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2022/03/fish-health-inspectorate-case-information-2022/documents/january-2022/cases-20210001-20210008/cases-20210001-20210008/govscot%3Adocument/Cases%2B20220425-20220468.pdf

11 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2022/03/fish-health-inspectorate-case-information-2022/documents/january-2022/cases-20210001-20210008/cases-20210001-20210008/govscot%3Adocument/Cases%2B20220425-20220468.pdf

12 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2022/03/fish-health-inspectorate-case-information-2022/documents/january-2022/cases-20210001-20210008/cases-20210001-20210008/govscot%3Adocument/20220369-20220438.pdf

13 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2024/03/fish-health-inspectorate-case-information-2024/documents/march-2024/additional-cases-20240069-20240070/additional-cases-20240069-20240070/govscot%3Adocument/Add

Wrasse and Lumpfish	2024	Ardgaddan	Wrasse peaks in mortality 2023: wk 5 1400 (54.6%, wk 6 400 (32.92%), wk 9 200 (24.54%), wk 11 378 (66.20%) all recorded as black losses. Lumpfish mortalities for period checked were mainly all black losses, 2559 (91.63%)[14].

Culled fish

During email correspondence the FHI stated:
'The FHI do not retain comprehensive records of the number of fish / aquatic animals which are culled as part of the production cycle.'

It is unknown how many fish are culled but there are over 40 references to culling taking place within the FHI data without specific details, for example:
'Batch has now been culled. No further action.'
'Plan to cull some of the worst affected tanks'
'Remaining alevins culled as compromised with gas bubbles.'

Six-week grace period

According to the FHI website: *'Mortality occurring at sea water salmon farms within the first six weeks post transfer from a freshwater site is also not part of the reporting requirements.'*

The FHI confirmed via email that: *'Higher mortalities at this time are often associated with handling at transport when smolts have first went [sic] to sea.'* For instance, after a toxic ammonia incident at Applecross caused by a blocked waste discharge pipe, resulting in the death of 213,000 fish (31%), the remaining fish were transferred to Tarbert South. SEPA data indicates that Tarbert South reported 26.8 tonnes of mortalities in August 2023, despite having only 61 tons of biomass on site. These mortalities were not required to be reported to the FHI.

14 https://www.gov.scot/binaries/content/documents/govscot/publications/transparency-data/2024/03/fish-health-inspectorate-case-information-2024/documents/february-2024/cases-20240004-20240019/cases-20240004-20240019/govscot%3Adocument/Cases%2B20240004-20240

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ASSESSING SALMON SCOTLAND DATA

Salmon Scotland is an industry body that collates and produces reports on the mortality for every individual seawater fish farm. This is reported as a percentage of the total number of fish on the farm each month. Salmon Scotland also gives overall monthly mortality for the industry from January 2018 onwards.

The data also shows 'Cumulative mortality over full production cycle', which is the percentage of fish that have died on a farm during the entire production cycle. This data is updated monthly and is published on the Salmon Scotland website at https://www.salmonscotland.co.uk/reports

Missing data

By cross referencing with other datasets, we have found numerous mortality incidents which are missing from the Salmon Scotland data. This brings into question how accurate the overall figures are regarding monthly and yearly mortality.

Example: August 2023[15] [16]

SEPA Biomass Report:

Year	Site	Actual Biomass on Site (tonnes)	Mortalities Kilograms	Mortalities %
Aug 2023	Tarbert South	61	26,883	44.1%

Source: https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=89673

Salmon Scotland Report August 2023:

Company	Farm	Monthly mortality (%)	Notes	Cumulative mortality over full production cycle (%)
Bakkafrost Scotland	Tarbert South	0.0 (Farm stocked in Aug.)		In production

Source: https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-august-2023

Example: December 2023[17] [18]

SEPA Biomass Report:

Year	Site	Actual Biomass on Site (tonnes)	Mortalities Kilograms	Mortalities %
Dec 2023	Lamlash	31	11,282	36.4%

Source: https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=90920

Salmon Scotland Report December 2023:

Company	Farm	Monthly mortality (%)	Notes	Cumulative mortality over full production cycle (%)
Bakkafrost Scotland	Lamlash	0 (Farm stocked in Dec.)		In Production

Source: https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-december-2023

[15] https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=89673
[16] https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-august-2023
[17] https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=90920
[18] https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-december-2023

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Example: February 2024[19] [20]

SEPA Biomass Report:

Year	Site	Actual Biomass on Site (tonnes)	Mortalities Kilograms	Mortalities %
Feb 2024	Aird	154	37,900	24.6%

Source: https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=362

Salmon Scotland Report February 2024:

Company	Farm	Monthly mortality (%)	Notes	Cumulative mortality over full production cycle (%)
Bakkafrost Scotland	Aird	0 (Farm stocked in Feb.)		In Production

Source: https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-february-2024

Freshwater farms not listed

The Salmon Scotland reports do not contain any mortality data for freshwater fish farms. Considering freshwater mortalities make up over 30%[21] of the total number of mortalities in the FHI mortality reports that is a significant level of under-reporting.

Actual numbers of fish not listed

The Salmon Scotland data does not contain any actual numbers of fish that die, only percentages.

Complications when fish are moved around site

As a response to disease or jellyfish attacks, farms often move fish between seawater sites mid-cycle. Salmon Scotland attempts to account for this in its figures but it makes it difficult to understand and is not clear if the fish who die during transport are recorded.

In Salmon Scotland's own words:
'If the fish on a farm are divided and transferred to another farm, mid cycle, or if fish are added to a farm out with the initial stocking period, we will adjust the figures on both the original and new farm accordingly. To do this, when the fish are transferred, we transfer the total number of fish to the new farm, but for accounting purposes we also transfer the appropriate proportion of mortalities that have occurred to that point, to the new farm. The numbers relating to the original farm are also adjusted accordingly.'

[19] https://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports_record.aspx?monthly_data_id=362
[20] https://www.salmonscotland.co.uk/reports/monthly-mortality-rate-february-2024
[21] https://www.gov.scot/publications/fish-health-inspectorate-mortality-information/

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ASSESSING SEPA DATA

Data is submitted to SEPA by farmers as part of their compliance with a farm's environmental licence.

Errors in the data

FHI data shows at least 466,000kgs of fish died in Seaforth in December 2023. However, SEPA records only show 245,126kg of mortalities during the same month, around half of what the FHI reported.

FHI data:

Start Date	End Date	Average weight of affected population	Total mortality during event	Total weight
04/12/2023	10/12/2023	2.15 Kg	70,345	151,242 Kg
11/12/2023	17/12/2023	2.24 Kg	92,565	207,346 Kg
18/12/2023	24/12/2023	2.37 Kg	23,482	55,652 Kg
25/12/2023	31/12/2023	2.46 kg	21,111	51,933 Kg
			Total:	466,173 Kg

Delay in publications

As of December 2024, the most recent data reported by SEPA is from June 2024.

No cleanerfish data

The number or weight of cleanerfish mortalities are not published.

Only marine data

Freshwater sites are not included in the data.

Only weight of fish

The SEPA data only shows the total biomass of the mortalities, not the number of fish. Prior to 2020 SEPA collected the numbers of fish mortalities but decided to stop doing this after the cyber-attack in 2020 where it lost the previous records of mortality numbers[22].

[22] https://www2.sepa.org.uk/disclosurelog/ F0196871

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ASSESSING SCOTTISH FISH FARM PRODUCTION SURVEYS

In September / October Marine Scotland Directorate produced a report based on the returns of an annual survey questionnaire sent to all active authorised fish farming businesses in Scotland for the previous year. It details the smolt survival rate:
https://www.gov.scot/collections/scottish-fish-farm-production-surveys/

No cleanerfish mortality

The survey gives figures on cleaner fish production and shows how many were bought and sold but does not provide any figures for their deaths.

No breakdown of site or company

The surveys provide no data about specific companies or farms making greater scrutiny impossible.