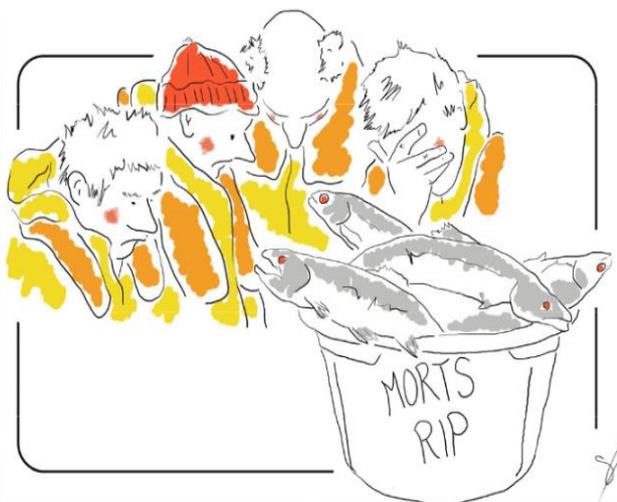


Media Backgrounder: Mort Disposal of Scottish Farmed Salmon (May 2017)

Ewan Kennedy - The €10 Million Mort Man

Following a complaint by Ewan Kennedy of Save Seil Sound to the European Commission in 2013, the UK Government avoided a fine of nearly €10 million (£8.2 million) and "possible daily substantial fines of thousands of pounds for continued non-compliance" for breaching a Directive on the disposal of Scottish farmed salmon mortalities since 2003.

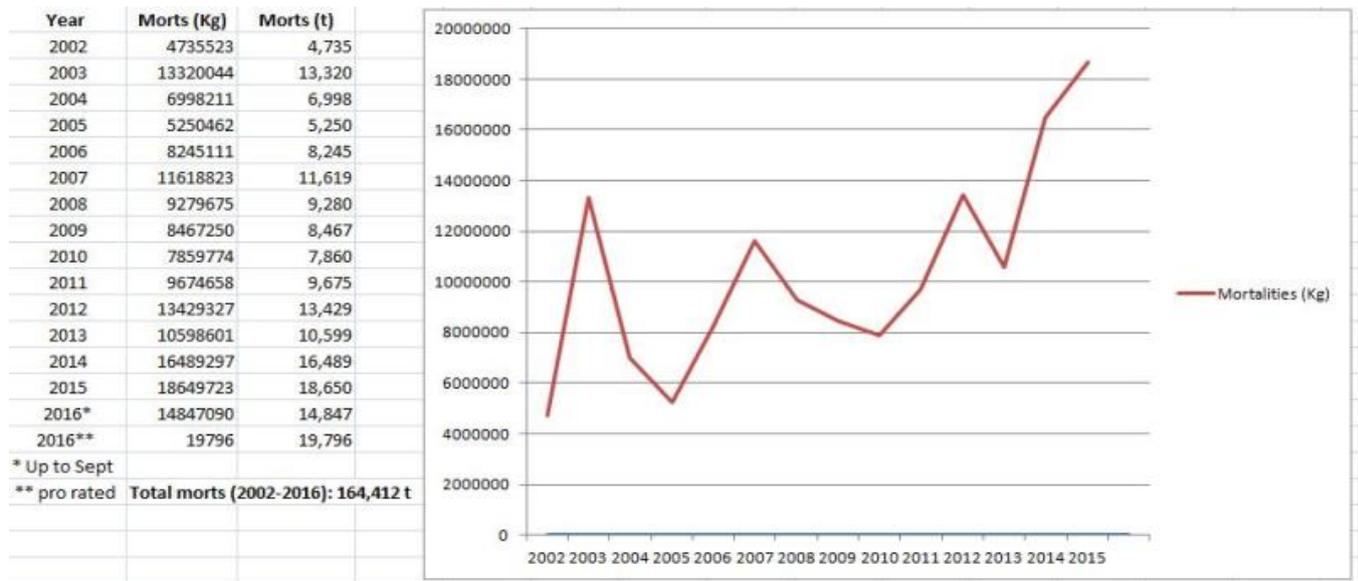


Implementation of the EC Directive - after 13 years of non-compliance by disposing of morts via landfill rather than incineration or ensiling - has cost Scottish landfill sites an estimated £228,149.

Mort disposal costs the industry "at least £2 million per year" but the changes (made from 1 January 2016) may have lead to cost reductions for some companies who "will be able to secure low cost contracts with more sustainable processes".

In Shetland, morts are now macerated and ensiled in a central storage point from where the waste is "collected by a specialist waste carrying vessel and taken to Norway for disposal".

Mortalities in 2016 are estimated at 20,000 tonnes (around 10 million farmed salmon) with a mortality rate in the sea of 23.7% (according to the latest data published by the Scottish Government).



Since 2002, a total of 164,412 tonnes of dead farmed salmon (equivalent to Scotland's salmon farming production in 2013) has occurred on Scottish salmon farms.

There seems to be a general trend of both mortalities increasing with time and also with the proportion of production that is lost (i.e. morts increase both in absolute terms and as proportion of production).

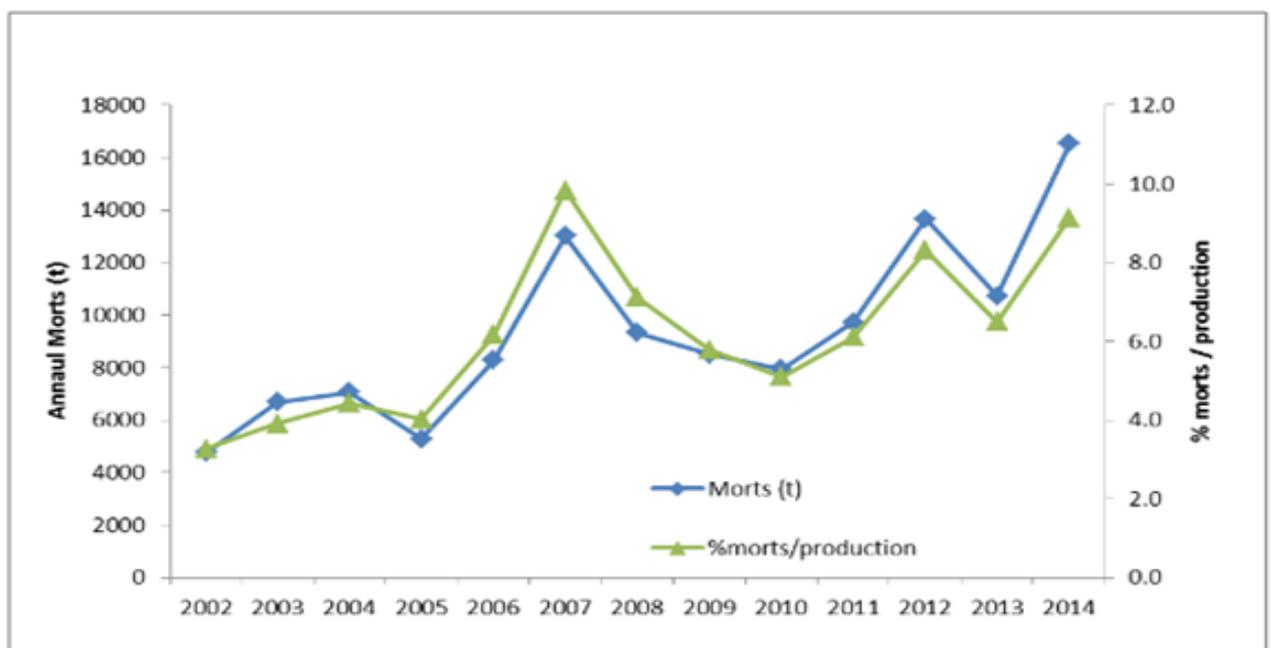


Figure 1. Trends in mortality and mortality normalised by production.

Please read in conjunction with ['FOI Backgrounder: FOI Replies & FOI Requests Re. Mort Disposal \(Scottish Government, European Commission, Scottish Environment Protection Agency & Local Authorities\)'](#) [download Word version with links to all the documents [online here](#)]

Summary:

1) An [EC Complaint by Save Seil Sound in 2013](#) forced the Scottish Government to introduce [new rules on mort disposal in 2016](#)



[Photo](#): Dead farmed salmon from a Marine Harvest salmon farm, Isle of Arran

2) The EC Complaint could have cost the Scottish salmon farming industry [an infraction fine of €9,666,000 and "possible daily substantial fines of thousands of pounds for continued non-compliance"](#)



3) Since 2003, the UK have breached an EU Directive on the disposal of morts. In 2015, the EC complaint prompted the Scottish Government to [consult on a change of policy to avoid "large fines"](#)

4) In January 2016, the Scottish introduced new ['Guidance on the Disposal of Aquaculture Animal By-Products'](#) and published the new report: "[Zero Waste Report - Finfish Mortalities in Scotland](#)"

5) Mortalities in 2016 are [estimated at 20,000 tonnes \(around 10 million farmed salmon\)](#) with a [mortality rate in the sea of 23.7% \(according to the latest data published by the Scottish Government\)](#)

6) The Scottish Government [proposed a six-month derogation in Shetland](#) (i.e. landfill disposal of morts was allowed in Shetland until July)



[Photo:](#) Dead farmed salmon from Grieg Seafood in Shetland

7) An unnamed company in the Western Isles also [requested a six month derogation](#)

8) The Scottish Salmon Producers Organisation [issued 'General Guidance on the Disposal of Fish' in August 2015](#)

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1) EC Complaint by Save Seil Sound in 2013 forces the Scottish Government to introduce new on mort disposal in 2016

The Sunday Herald and Evening Times [reported](#) in April 2016:

A LOCAL complaint to the European Commission over the poor regulation of the disposal of dead fish from salmon farms has forced the Scottish Government to rewrite the rules.

For years the caged salmon industry has been allowed to dump diseased fish in landfill sites because of a loophole in public health law. But ministers have now had to close the loophole and oblige fish farm companies to dispose of dead fish in safer ways.

From the start of 2016 salmon farms must abide by the rules introduced in the wake of the outbreak of mad cow disease (BSE) in the 1980s. The farms have to incinerate, sterilise or compost their wastes, and not just tip them into landfill sites.

Read more via "[European Commission complaint over dead fish dumping forces rule change](#)"

The [complaint to the European Commission](#) was made by Ewan Kennedy of Save Seil Sound in 2013. The complaint included:

We have two complaints against the United Kingdom Government:

- (i) Failure to supervise the disposal of Category Two waste in specific instances, including the December 2011 incident; and
- (ii) Failure to respect the meaning of the Directive by designating almost the whole of the aquaculture coast as remote and so exempting almost an entire industry from regulation.

And:

The list of remote areas appears to cover almost all of the aquaculture coast. All of the Scottish offshore fish farms are located within five local authority areas, namely Argyll & Bute, Comhairle nan Eilean Siar (the Western Isles), Highland, North Ayrshire, Orkney and Shetland Islands. Ardmaddy is situated within the parts of Argyll & Bute that are subject to the derogation.

It is regrettable that although the derogations were intended to be temporary they are still in place after nearly ten years. We understand that to date there is no facility in Scotland for disposal of Category Two waste. The most significant area to which the derogation does not apply is the Island of Arran and there is anecdotal evidence to the effect that waste produced in event mortalities there is taken by road to a disposal facility in Widnes in Cheshire for ensiling.

It can be argued that the Island of Arran is neither more nor less remote than for example the islands of Skye or Mull. In any of these cases the waste has to be removed from the cage or well-boat where the fish died, transhipped to a (presumably enclosed) road vehicle and then taken to a disposal site. For a mainland site like Ardmaddy there will be no ferry journey involved and it can be argued that the area is in fact less remote than Arran.

In view of this and the obligations specified in Article 19 2, 3 and 4 to justify the categorisation of remote areas and the extent to which the derogations are used we respectfully ask the Commission to inform us about any information given to you by the United Kingdom in respect of these matters. We are suspicious that the United Kingdom has taken the opportunity to exempt almost all of its aquaculture industry from the ABPR Directive by this expedient.

Read the EC complaint by Save Seil Sound in full [online here](#)

Read a letter from the EC to the UK Government summarising the complaint in 2014 [online here](#)

Read more background via:

["European Commission complaint over dead fish dumping forces rule change"](#) (The Evening Times, 10 April 2016)

["Where have all the dead fish gone?"](#) (The Sunday Herald, 10 February 2013)

["Farmed salmon killed by disease leaps to 8.5 million"](#) (The Sunday Herald, 10 February 2013)

["Scottish watchdog labelled 'lapdog' after agreeing to keep fish farm deaths secret"](#) (The Sunday Herald, 10 October 2013)

2) The EC Complaint could have cost the Scottish salmon farming industry [an infraction fine of €9,666,000 and "possible daily substantial fines of thousands of pounds for continued non-compliance"](#)

The Scottish Parliament addressed the disposal of morts in [December 2015 via the Rural Affairs, Climate Change & Environment Committee](#) - citing an estimated cost increase of at least £2 million per year for the Scottish salmon farming industry (based on an average of 10,000 tonnes of morts per year):

Financial Effects

A partial Business and Regulatory Impact Assessment (BRIA) was included with the August 2015 consultation. A full BRIA has since been completed, having regard to the consultation responses. The impact of amending the remote areas derogation on business is as follows:

- Fish and shellfish farms located within the ABP remote area will need to use an approved ABP disposal route e.g. disposal via an incineration or processing (rendering plant), or by sending it to a compost or anaerobic digestion (biogas) plant. They can no longer send their waste to a landfill site for disposal.
- Landfill sites that currently accept fish waste from fish or shellfish farms will lose any potential revenue from no longer accepting this type of waste.
- Local transporters delivering fish waste to landfill sites will no longer take place but the fish waste will still need to be transported to an approved ABP disposal site.

Scottish Government

Directorate for Agriculture, Food & Rural Communities, November 2015

Costs

The total cost to the industry of mortality disposal is not known. However, if average current costs of disposal are conservatively estimated at greater than £200/tonne then, with an average of around 10,000 tonnes of mortalities, the industry cost is at least £2 million per year.

For option 1, we are failing to correctly apply EU legislation into domestic legislation which puts the UK at risk of the European Commission starting formal infringement against us if we do not amend the ABPR. The minimum cost of infraction to the Scottish Government could be a €9,666,000 lump sum and possible daily substantial fines of thousands of pounds for continued non-compliance.

Fish farmers presently use a limited range of routine fish mortality disposal options. The following provides a summary of the associated costs for these options:

- Landfill costs range from £130-300/tonne on island sites and £50-550/tonne in Argyll.
- Incineration off-site range from £150/tonne for mainland fish farm sites to £300/tonne for island sites.
- Disposal by anaerobic digestion ranged from £50-60/tonne.

From our stakeholder engagement we were unable to provide specific costs for on-site incineration. However, there would be an initial set up cost plus fuel and maintenance.

The consequences of the removal of the derogation allowing fish waste to be disposed of via landfill will only fall on those companies that operate in areas where landfill is presently a major disposal option. This applies especially to the Western Isles, Shetland and parts of Argyll.

• **Overview of current disposal routes/options for routine ensiled mortalities unless otherwise stated**

Group	Example location	Current disposal option	Distance to disposal site (Miles)	Current average cost
Trout farms	Loch Awe	Anaerobic Digestion	200	£66/tonne
Freshwater Smolts	Kishorn	Off-site incineration	450	£475/tonne
Western Isles	Lewis	Landfill	40	£327/tonne
North West	Ullapool	Off-site incineration	435	£139/tonne
Shetland Isles	Shetland	Landfill	40	£174/tonne
Orkney	Orkney	Anaerobic Digestions	230	£154/tonne
Southwest Mainland	Oban	Landfill	40	£110/tonne
Southwest Mainland (whole fish)	Oban	Landfill	40	£357/tonne

• **Overview of future disposal routes/options for routine ensiled mortalities unless otherwise stated**

Group	Example location	Future disposal option	Distance to disposal site (Miles)	Future disposal cost	Impact
Trout farms	Loch Awe	Anaerobic Digestion	200	£106/tonne	No change
Freshwater Smolts	Kishorn	Anaerobic Digestion	190	£470/tonne	No change
Western Isles	Lewis	Anaerobic Digestion	200	£174/tonne	Change required – reduced costs
North West	Ullapool	Off-site incineration	435	£139/tonne	No change – potential for lower mileage and cost
		Anaerobic Digestion	130	£124/tonne	
Shetland Isles	Shetland	Anaerobic Digestion	290	£174/tonne	Change required – cost neutral
Orkney	Orkney	Anaerobic Digestion	230	£154/tonne	No change
Southwest Mainland	Oban	Anaerobic Digestion	100	£106/tonne	Change required – lower cost
Southwest Mainland (whole fish)	Oban	Anaerobic Digestion	100	£106/tonne	Change required – lower cost

The information in the two tables indicates that where companies are landfilling fish farm waste at licensed landfill sites, they will be able to secure low cost contracts with more sustainable processes once the landfill prohibition is in place.

3) Since 2003, the UK have breached an EU Directive on the disposal of morts. In 2015, the EC complaint prompted the Scottish Government to [consult on a change of policy to avoid "large fines"](#)

The Scottish Government [consultation in 2015](#) included:



Consultation on a change of policy for the disposal of animal by-products in parts of Scotland currently designated as remote areas as defined under the Animal By-Products (Enforcement) (Scotland) Regulations 2013

[« Previous](#) | [Contents](#) | [Next »](#)

Summary

The European Commission received a complaint against the [UK](#) alleging breaches of Union legislation regarding the collection and disposal of animal by-products ([ABP](#)) from aquaculture establishments in Scotland. Following discussions with the European Commission, they have confirmed that the Scottish Government is not implementing the derogation for remote areas^[1] correctly.

To comply with European legislation, the Scottish Government is in the process of changing the policy that allows [ABPs](#) to be disposed of under the current derogation, i.e. "by burning or burial on site or by other means under official supervision which prevent the transmission of risks to public and animal health in the designated [ABP](#) remote areas". The current designated [ABP](#) remote area covers a large part of the Highlands and most of the Islands in Scotland.

This change in policy will limit what species of livestock can make use of the derogation. [ABPs](#) from species of animals that are not allowed to take advantage of the remote areas derogation will have to use an approved [ABP](#) disposal route e.g., disposal via an incineration or processing (rendering) plant or by sending it to a compost or anaerobic digestion (biogas) plant.

Background

[ABPs](#) are animal carcasses, parts of animals, or other materials which come from animals but are not fit or intended for human consumption. They must be dealt with in accordance with strict regulations designed to prevent harm to people, animals and the environment.

The legislation that governs [ABPs](#) is the Animal By-Products (Enforcement) (Scotland) Regulations 2013^[2] ([ABPR](#)) and this regulation implements the [EU ABP Regulation \(EC\) No 1069/2009](#)^[3] ([EU Control Regulation](#)) and its accompanying implementing Commission Regulation ([EU](#)) No 142/2011^[4] ([EU Implementing Regulation](#)).

The [ABPR](#) has a very wide scope covering all animal products including meat, fish, milk and eggs when they are not intended for human consumption and other products of animal origin including hides, feathers, wool, bones, horns and hoofs.

The [ABPR](#) puts strict controls on these [ABPs](#) as they can present a risk to human and animal health, especially in relation to transmissible spongiform encephalopathies ([TSEs](#) e.g. mad cow disease), dioxin contamination, and exotic diseases such as Classical Swine Fever and Foot and Mouth Disease.

The use and disposal of [ABPs](#) has been controlled for many years and it is the owner or producer of an [ABP](#) who is responsible for its safe and legal collection and disposal. Such controls mean that [ABPs](#) must not be buried or burnt on site or illegally diverted into the food or feed chain.

However, in Scotland we take advantage of a derogation that allows [ABPs](#), such as fallen stock, to be buried or burned in areas designated as remote as defined under regulation 8 of the [ABPR](#). A map showing the current designated [ABP](#) remote area that covers a large part of the Highlands and most of the Islands in Scotland can be found in [Annex B](#).

Currently, [ABPs](#) from all species of terrestrial and aquatic livestock located within the designated [ABP](#) remote areas may be disposed of by burning or burial on site or by other means under official supervision which prevent the transmission of risks to public and animal health.

We interpret 'by other means under official supervision' as sending [ABPs](#) to an authorised landfill or another site without endangering human health and using processing methods which do not harm the environment, in particular when they could result in risks to water, air, soil and plant and animals, through noise and odour.

And:

Discussion on why we are changing our policy

The derogated ABP remote area in Scotland was first established in 2003. To take advantage of the remote areas derogation, the UK submitted a proposal to the European Commission that provided information on Scottish agriculture. This proposal highlighted the topographical, geographical, economic and social factors which affect livestock farming in the Highlands and Islands of Scotland. It also took account of the very low sheep and cattle stocking densities and sparse human population in these areas. However, it did not take a detailed account of aquaculture (fish farming) activities in the Highlands and Islands of Scotland.

We used the same justification for the current remote areas derogation when the ABPR came into force on 1 December 2013.

The way the remote areas derogation has been implemented into the ABPR means that in Scotland's remote area all species of animals are allowed to be buried or burnt on site or by other means under official supervision which prevent the transmission of risks to public and animal health. This is not the intention of the EU Control Regulation and an amendment is needed to clarify what species of animals the remote areas derogation applies to.

The UK has a responsibility to correctly apply EU legislation into domestic legislation. We may be at risk of the European Commission starting formal infringement against the UK if we do not amend the ABPR. This could include large fines payable by the UK.

Read more via "[Consultation on a change of policy for the disposal of animal by-products in parts of Scotland currently designated as remote areas as defined under the Animal By-Products \(Enforcement\) \(Scotland\) Regulations 2013](#)

4) In January 2016, the Scottish introduced new '[Guidance on the Disposal of Aquaculture Animal By-Products](#)' and published the new report: '[Zero Waste Report - Finfish Mortalities in Scotland](#)':

The disposal of dead fish and aquatic animal by-products (ABPs) is covered by the Animal By-products (Enforcement) (Scotland) Regulations 2013. Any business generating material of aquatic origin which is not intended for human consumption needs to be aware of how these regulations apply to their business.

Zero Waste Scotland – Finfish Mortalities in Scotland Report

The Finfish Mortalities in Scotland report was commissioned by Zero Waste Scotland in order to investigate suitable alternative ABP compliant disposal routes for Scottish finfish farming waste. The report:

- Provides evidence for suitable ABP compliant disposal routes for Scottish finfish farming waste.
- Reviews the capacity already existing in Scotland to receive and utilise this material and the logistics involved for the individual solutions identified.
- Identifies other options for adding further value to this waste.

The report can be found at the following link:

<http://www.gov.scot/Topics/marine/Fish-Shellfish/FHI/healthpractice/ZeroWasteMort>

Categories of aquatic ABP

ABP from aquatic animals are categorised into one of three groups according to the nature of the hazard/risk which they could pose:

Category 1 (few aquatic animals would fall into this category):

- Aquatic animals containing certain prohibited substances above specified levels or unacceptable levels of environmental contaminants (for example fish contaminated with fuel from an oil spill or fed contaminated feed)

Category 2 (mortalities would fall into this category):

- Fish or aquatic animals which die from a notifiable disease - such as infectious salmon anaemia (ISA)
- Aquatic animal products containing unacceptable levels of residues of veterinary drugs and higher than specified minimum levels of certain contaminants.
- Fish or parts of fish that die, other than being slaughtered for human consumption, including fish killed for disease control purposes. This includes all mortalities occurring during the production cycle in aquaculture, including fish that die from disease.
- Third country imports that fail to comply with veterinary requirements for their importation into the Community.

Category 3 (processing waste would fall in to this category):

- Carcasses (heads, frames) and parts of slaughtered fish, which are fit for human consumption but are not intended for human consumption for commercial reasons.
- Carcasses and parts of slaughtered fish, which are unfit for human consumption, but derive from carcasses that are fit for human consumption i.e. viscera; internal organs containing parasites.
- Carcasses and parts of carcasses of slaughtered fish, which are rejected as unfit for human consumption, but which do not show signs of disease communicable to humans or animals.
- Fish or other sea animals, except sea mammals, caught in open sea for the purposes of fishmeal production or bait.
- By-products from fish plants manufacturing fish products for human consumption.
- Shells from shellfish that contain soft tissue or flesh.

Where the product is made up of more than one category, the highest category applies (category 1 being the highest).

[Disposal of aquatic ABP](#)

Read more via "[Animal By-Products](#)"

A "[Zero Waste Report - Finfish Mortalities in Scotland](#)" was published in January 2016:



The Finfish Mortalities in Scotland report (below) was commissioned by Zero Waste Scotland in order to investigate suitable alternative Animal By Product compliant disposal routes for Scottish finfish farming waste. Alternatives were required to be both logistically and commercially viable for the finfish farming industry with any associated costs and savings clearly identified. Alternatives were required in order to support the industry to meet the change in Regulation which removed landfill as a disposal option from January 2016. These alternatives were to be considered more environmentally sustainable and potentially allow material to be utilised higher up the waste hierarchy.

A full report is available from Zero Waste Scotland, which:

- Provides evidence for suitable ABP compliant disposal routes for Scottish finfish farming waste
- Reviews the capacity already existing in Scotland to receive and utilise this material and the logistics involved for the individual solutions identified
- Identifies other options for adding further value to this waste

This report focuses on finfish farming and does not include aquaculture as a whole i.e. does not include molluscs, crustaceans or seaweed. It also does not include waste from fish processing facilities.

The [Summary report: Finfish Mortalities in Scotland](#) includes:

2 The Fish Farming Industry and the Scale of Mortalities

The marine aquaculture sector (fish farming industry) has consolidated in recent years, leaving only a few larger farmers: there are only 6 companies operating > 10 sites and these together comprise 89% of all the active sites. The majority of the farms produce Atlantic salmon, many together with cleaner fish (wrasse and lump suckers) which act as a biological control for sea lice. There is some marine trout production and two farms produce halibut. The freshwater rainbow trout sector has 33 operators and 46 active sites i.e. it is highly unconsolidated compared with the marine sector.

As in other forms of animal production, aquaculture suffers stock mortalities (commonly referred to as morts). Since the majority of Scottish fish farm production is in the marine sector, this contributes the majority of the morts (Figure 1 below). On average, there are around 10,000 tonnes of morts from an average annual production of around 150,000 t, i.e. about 6.7%.

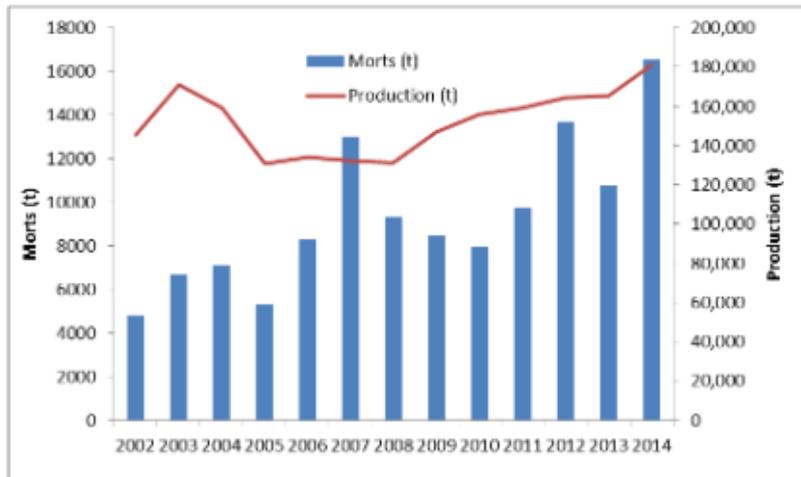


Figure 1 - Annual Scottish marine fish farm mortalities & production (Atlantic salmon & rainbow trout).

4.2 The impacts on Rural Landfill Operators

Ten remote landfill site operators were contacted (using the most recent, SEPA, 2013 database) to quantify the economic impacts that will result from a future change to regulations which prohibits the landfilling of fish farm waste. The tonnages identified amount to approximately 23% of the estimated arisings of fish mortalities in the country, with the loss of income for Scottish landfill sites as a whole, shown to be £228,149.

Read the full report [online here](#) - including:

Scottish Government figures (2014) show mortality rates for salmon put to sea in 2012 at 14.6% by number (~6 million fish)³. Fish mortalities are normally classed as Category 2 animal by-products and must be disposed of in accordance with the Animal By-Product (Enforcement) (Scotland) Regulations 2013. On 1st January 2016, the Scottish Government amended the regulations to remove a previous derogation that had allowed the disposal of aquatic mortalities arising within ABP remote areas to be disposed of in suitably supervised landfill sites. Due to this amendment, alternative disposal and recovery options which move the material up the waste hierarchy needed to be considered, and form the basis of this report.

Another way of considering this is to look at the temporal trends in mortalities and mortalities normalised by production on the same figure. Figure 1 shows that although there is variation, probably caused by years where there were particular issues that caused higher than usual mortalities (e.g. 2007), there seems to be a general trend of both mortalities increasing with time and also with the proportion of production that is lost. In other words, increased production does not necessarily lead to increased mortalities in any one interval but, over the longer term, mortalities do increase both in absolute terms and as proportion of production. This is important given the strategic industry target of increasing the salmon sector to 210,000 t annual production by 2020⁸.

However, it is worth remembering that several factors contribute to the mortality data. If all things were equal, we would expect an increase in mortalities with increased production as there are more potential disease hosts in the water. But all things are not equal both in terms of disease factors and improvements to farming that may reduce mortalities. For example, Amoebic Gill Disease (AGD) caused real problems for farmers in 2012 but less in subsequent years at least in part because of collaborative work on understanding the epidemiology and management of AGD (personal communication, industry source). New medicines, vaccines and husbandry practices (e.g. use of cleaner species for removal of sea lice) are introduced to prevent and reduce the impact of diseases on a regular basis. This makes extrapolating weak underlying trends into the future highly problematic.

⁸ Production data was obtained from Scottish Fish Farm Survey reports.

<http://news.scotland.gov.uk/News/Scottish-Fish-Farm-Production-Survey-2014-1cbd.aspx#downloads>

⁹ <http://www.gov.scot/Topics/marine/Fish-Shellfish>

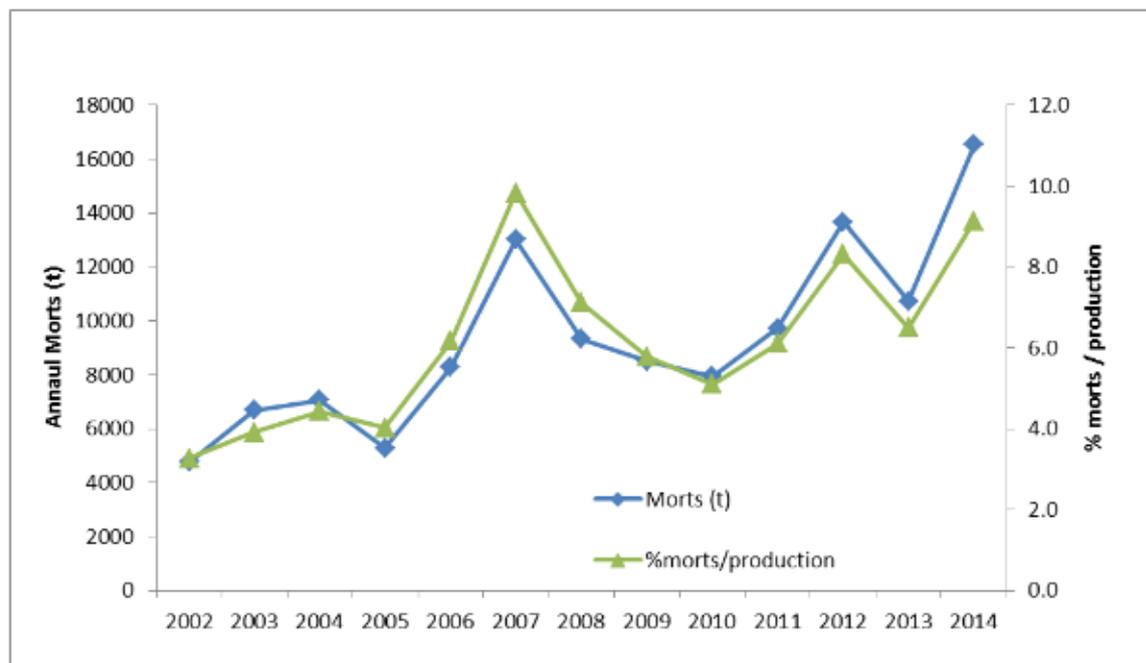


Figure 1. Trends in mortality and mortality normalised by production.

Individual monthly mortality records (2002 – 2015) for each marine farm vary between 565 tonnes and zero with the distribution of records shown in Table 1. The monthly mode is zero, the monthly median is 83 kg, and the monthly mean is 2.5 t. Almost half of the monthly returns are zero and 45,658 records are < 10 t, i.e. 95% of all records, which constitutes 38% of total morts biomass. This leaves the 5% which are >10 t accounting for 62% of morts biomass over the period.

Table 2. Average mortalities (t) by region and normalised by production (2002-14)

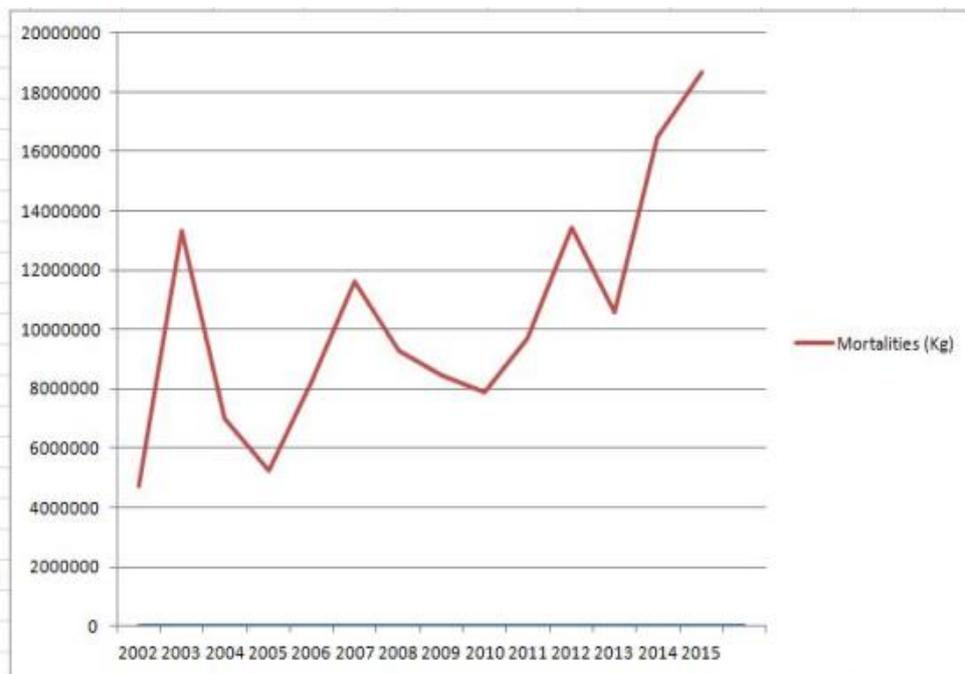
	Morts (t)	% of production
Argyll	1662	5.4
Eilean Siar	2252	8.8
Highland	2205	5.3
Orkney	581	8.1
Shetland	3298	8.0

NB Here and throughout, data from Argyll includes the farm in N Ayrshire and is equated with the SW production region in the production data.

5) Mortalities in 2016 are estimated at 20,000 tonnes (around 10 million farmed salmon) with a mortality rate in the sea of 23.7% (according to the latest data published by the Scottish Government)

Mortalities for Scottish salmon farms in 2015 were 18,650 tonnes (2016 data pro-rated up to September is nearly 20,000 tonnes). Since 2002, a total of 164,412 tonnes of dead farmed salmon (equivalent to Scotland's salmon farming production in 2013) has occurred on Scottish salmon farms:

Year	Morts (Kg)	Morts (t)
2002	4735523	4,735
2003	13320044	13,320
2004	6998211	6,998
2005	5250462	5,250
2006	8245111	8,245
2007	11618823	11,619
2008	9279675	9,280
2009	8467250	8,467
2010	7859774	7,860
2011	9674658	9,675
2012	13429327	13,429
2013	10598601	10,599
2014	16489297	16,489
2015	18649723	18,650
2016*	14847090	14,847
2016**	19796	19,796
* Up to Sept		
** pro rated	Total morts (2002-2016): 164,412 t	



The above data is source from SEPA: <http://donstaniford.typepad.com/my-blog/2017/01/fish-farmageddon-scottish-salmon-loses-chemicals-arms-race-.html>

And here's mortality vs production data sourced from the latest Scottish Government [2015 Fish Farm Production Survey](#):

Farmed salmon production (t)	Year	Mortalities (Kg)	Mortalities (t)	Year	Mortality rate (%)	# of salmon put to sea (millions)	Estimated # of morts (millions)
144,589	2002	4735523	4,735	2002	23.3	50.1	11.7
169,736	2003	13320044	13,320	2003	22	43.1	9.5
158,099	2004	6998211	6,998	2004	24.5	39	9.6
129,588	2005	5250462	5,250	2005	21.9	37.2	8.1
131,847	2006	8245111	8,245	2006	27.5	41.1	11.3
129,930	2007	11618823	11,619	2007	28.2	37.9	10.7
128,606	2008	9279675	9,280	2008	17.8	36.7	6.5
144,247	2009	8467250	8,467	2009	16.7	38.5	6.4
154,164	2010	7859774	7,860	2010	17.2	38.5	6.6
158,018	2011	9674658	9,675	2011	23	42.7	9.8
162,223	2012	13429327	13,429	2012	14.6	41.1	6
163,234	2013	10598601	10,599	2013	23.7	40.9	9.7
179,022	2014	16489297	16,489				
171,722	2015	18649723	18,650				
177,857 *	2016	14847090	14,847				
* industry estimate of projected tonnage based on stocks currently being on-grown (read 2015 Fish Farm Production Survey: http://www.gov.scot/Resource/0050/00505162.pdf)							

Note that SEPA stopped reporting actual numbers of dead farmed salmon in 2013 following lobbying from the Scottish salmon farming industry.

The Sunday Herald [reported](#) in February 2013:

"The number of salmon killed by diseases at Scottish fish farms leapt to over 8.5 million last year, sparking fresh doubts about the sustainability of the £1 billion industry. New figures released by SEPA reveal that losses from all salmon farms have reached nearly ten per cent of their production. The main problem has been the spread of Amoebic Gill Disease, blamed by some on the warmer seas caused by climate pollution. A mountain of 13,627 tonnes of dead fish had to be disposed of in 2012 by 230 fish farms along the west coast and on the islands, compared to 9,717 tonnes in 2011 and 7,159 tonnes in 2010."

The huge rise in fish farm deaths

year / tonnes of dead fish / number

2012 / 13,627 / 8.5 million

2011 / 9,717 / 6.8 million

2010 / 7,159 / 5.5 million

The Sunday Herald [reported](#) in October 2013:

"Scotland's environment watchdog has bowed to pressure from the salmon farming industry to keep the number of fish killed by diseases secret, according to internal correspondence seen by the Sunday Herald. SEPA agreed to delete information on millions of fish deaths from [a public database](#) on fish farming launched this month because the Scottish Salmon Producers Organisation argued it would be commercially damaging."

Monthly mortalities (by weight only not number) for every salmon farm in Scotland are [available online via the Scotland's Aquaculture database](#). For example, one of the [latest data entries](#) details nearly 3,000 kg of morts at Marine Harvest's salmon farm on the Isle of Muck:

Fish Farm Monthly Biomass and Treatments Details	
Year	2016
Month	December
Submitted By	Marine Harvest (Scotland) Ltd
Licence Number	CAR/L/1109999/V3
Licence active at time of report	CAR/L/1109999
Report for Site	AMM1 Am Maol, Isle of Muck
Max licensed biomass on site (tonnes)	2500
Actual biomass on site (tonnes)	2448
Biomass Exceedance (tonnes)	0
Feed (kg)	456674
Mortalities (kg)	2967.8037400920

Another [data entry details](#) 123,454 kg of morts at Marine Harvest's salmon farm in Loch Greshornish in August 2016:

Fish Farm Monthly Biomass and Treatments Details	
Year	2016
Month	August
Submitted By	Marine Harvest (Scotland) Ltd
Licence Number	CAR/L/1002890/V6
Licence active at time of report	CAR/L/1002890
Report for Site	GRE1 Greshornish
Max licensed biomass on site (tonnes)	2195
Actual biomass on site (tonnes)	1387
Biomass Exceedance (tonnes)	0
Feed (kg)	130721
Mortalities (kg)	124453.8824990320

In November 2016, The Sunday Herald [revealed](#) that 95,400 farmed salmon had died at Marine Harvest's salmon farm in Loch Greshornish in July and August 2016 following a 'Thermolicer' treatment.

Environmental news 06.11.16 29

Revealed: how Scottish fish farm cooked thousands of salmon alive

EXCLUSIVE
BY ROB EDWARDS

ONE of the world's largest fish farming companies has accidentally killed more than 173,000 of its caged salmon in Scotland while trying to treat them for lice and disease, according to internal Government memos.

Blunders by Norwegian multinational Marine Harvest have cost millions of pounds and led to more than 600 tonnes of salmon having to be incinerated. The losses have contributed to a 16 per cent drop in the company's Scottish salmon production.

Campaigners have accused Marine Harvest of treating salmon cruelly, and warn that lice and diseases are "choke-ing the Scottish salmon farming industry to death".

The worst incident took place in July and August on a salmon farm in Loch Greshornish on the Isle of Skye. Some 95,400 fish were killed by a new device called a thermolicer, which is designed to rid salmon of the sea lice that plague them.

But the way it does this – by suddenly immersing fish in water much warmer than they are used to – can also kill the fish themselves. What happened on Skye was explained in a memo on September 12 from government officials to Rural Economy Minister Ferguson Ewing.

The "sudden temperature change" caused by the thermolicer killed 95 per cent of the lice but also caused "significant mortalities" among the salmon. It said. Officials estimated that the losses cost Marine Harvest more than £2.7 million.

"This report highlights the ongoing difficulties and costs faced by industry with regards to sea-lice management," concluded the memo, which was released under Freedom of Information law.

Another 20,000 salmon were killed at Loch Greshornish fish farm by other attempts to rid them of sea lice using chemicals. There are concerns that lice are becoming increasingly resistant to chemical treatment.

In a second memo to Ewing on September 26, officials revealed more in-advertent deaths, this time at a Marine Harvest fish farm in Soay Sound off the Isle of Harris. Earlier that month 60,000 salmon had been killed by hydrogen peroxide used to treat them for amoebic gill disease.

In the last few months, Marine Harvest fish farms in the Hebrides and Wester Ross have suffered a series of outbreaks of gill disease. Hundreds of thousands of dead fish have reportedly been transported to Wigan, near Manchester, to be incinerated.

According to the company's latest quarterly report to investors, its production of salmon in Scotland has dropped by 16 per cent since last year. Costs increased due to "incident-based mortality" that was "mainly related to gill disease and sea-lice treatment losses," the report said.

On October 26, the fish farming industry launched a plan to double its business from £1.8 billion this year to £3.6bn by 2030. The plan was backed by Ewing, who promised to set up an "industry leadership group".

But the ambition has been derided by anti-fish farm campaigners.

"With lice infestation and gill diseases already plaguing salmon farming, this is sheer lunacy," said Don Stanford, director of the Global Alliance Against Industrial Aquaculture.

It was Stanford who obtained the Government memo revealing the accidental deaths. "That Marine Harvest is desperate enough to resort to a decidedly dodgy thermolicer shows how deep-seated the industry's disease problems are," he said.

The animal welfare group, Compassion in World Farming, described the thermolicer as "a very brutal form of treatment which clearly causes distress and suffering to the fish". It currently opposes its commercial use.

"Killing fish by overheating, whether accidental or not, is simply inhumane," said the group's chief executive, Philip Lambert.

The Green MSP Mark Ruskell has lodged a parliamentary question asking for a list of fish farming incidents over the last two years.

Marine Harvest pointed out that the salmon killed in the "unfortunate" thermolicer incident had been weakened by gill disease. "We regret any loss of fish and are always mindful of the welfare of the fish and aim to continuously improve our methods to

Lice infestation and gill diseases are plaguing salmon fish farms owned by companies like Norway's Marine Harvest which has operations all over the Western Isles

address changing environmental circumstances," said the company's manager Steve Boucken.

"We have also faced challenges with amoebic gill disease, which is increasing in this part of the world as a result of climate change."

According to the Scottish Salmon Producers' Organisation, "unexpected incidents" can happen with new treatment technology.

"Any growth will be achieved in a socially and sustainably," said chief executive Scott Landsburgh.

The Scottish Government welcomes new ways of dealing with sea lice that avoided the use of medicines.

"Industry is undertaking research with a number of partners to improve the effectiveness of these innovative treatments and enhance their reliability so that they do not cause accidental killing of fish," said a spokesperson.



Photograph: PA/ David Chestin

6) The Scottish Government [proposed a six-month derogation in Shetland](#) (i.e. landfill disposal of mortis was allowed in Shetland until July)

In October 2015, the Scottish Government [proposed a six month derogation in Shetland](#):

Shetland derogation

We received a proposal from the three main salmon producers in Shetland who intend to set up a waste handling facility on the island which will allow the storage and disposal of ensiled category 2 material by a specialist waste carrier in dedicated vessels. Each farming area will establish a macerating and ensiling point where fish waste can be processed. Small storage facilities (~30T) will be available at each of these points. This waste will be transported by road to a central storage point on the island (>500T) from where the waste will be collected by a specialist waste carrying vessel and taken to Norway directly for disposal. In order to achieve this aim the following milestones must be met

- Identify a suitable central storage facility (by end Nov 2015)
- Order macerating and ensiling equipment and small storage tanks (by end Nov 2015)
- Gain planning permission for construction of central storage facility (by end Mar 2016)
- Establish local macerating and ensiling equipment (by end Apr 2016)
- Construct central storage facility (by end June 2016)

It is clear that it is not possible to establish the required facilities before the end of December 2015 when landfilling is expected to cease.

We are proposing to allow a 6 month extension to landfilling in Shetland only. This will allow infrastructure to be put in place that will give the industry a suitable alternative route of disposal for category 2 waste in Shetland.

7) An unnamed company in the Western Isles also [requested a six month derogation](#):

An [update for the European Commission from the Scottish Government in January 2016](#) included:

This Western Isles company is seeking a similar 6 month derogation to the landfill ban with the aim of implementing a drying system for the processing of category 2 fish waste and mortalities. They are embarking on an environmentally sustainable alternative to landfill and ensiling of highly putrescible fish wastes and their system has been designed to eliminate any potential risk to human and animal health from the handling, processing and subsequent use of the fish oil and meal. The method of disposal will produce by-products of **fertiliser** and **fish oil** (for use locally on croft land, and for processing into biofuel to operate the drying machinery respectively). This solution will reduce the energy required to process and transport this waste stream and eliminate the need for it to be sent to landfill. **The Scottish Government is satisfied that this process meets the conditions prescribed by Point C (Processing method 3), Chapter III, Annex IV of Commission Regulation (EU) No. 142/2011** and is split into two operations as follows:

(a) Processing of the category 2 fish wastes in a single batch system that will reduce the particle size of the waste to >30mm and then sterilise this waste at temperatures prescribed by the regulation. The process will then continue heating the waste to dehydrate the solid and liquid waste to less than 5% moisture content;

(b) The dehydrated and sterilised waste will then be separated into two fractions – oil and meal by the use of a mechanical separation system.

Are you content with this proposal?

8) The Scottish Salmon Producers Organisation [issued 'General Guidance on the Disposal of Fish' in August 2015](#):

The [SSPO's guidance](#) (August 2015) included:

Practical methods for dealing with fish waste

Ensiling: formic acid

Ensiling fish mortalities is a process of stabilising fish waste by adding formic acid to macerated fish. When a pH <4 is reached, the ensiled waste is stable and can be stored safely prior to disposal. SEPA has issued a guidance note which can be found at <http://www.sepa.org.uk/media/114862/fish-farm-manual-attachment-10.pdf>. This explains the requirements for operators storing up to 10m³ of waste at shore bases. Small ensilers with storage <10m³ are excluded from requiring a Pollution Prevention Control (PPC) permit unless there is evidence of offensive odours outwith the site. Larger ensiling plants with storage >10m³ require to be authorised by SEPA under the PPC regulations.



Image courtesy of Norfab Products Ltd.

N.B. **This method is for storage only and is not a final disposal solution for fish waste.**

The ensiled waste must then be further processed at an ABP regulated site such as an incinerator, anaerobic digester, composter or rendering plant.

Routes for disposal

Ensiling: Fish Silage Processing Method (known as the Norwegian method)

This is an approved method for the treatment of *Category 2 and 3* waste. This method, approved for use in early 2015, is based on ensiling macerated (particle size <10 mm) fish waste using formic acid to pH<4, followed by heat treatment to at least 85°C for at least 25 minutes and subsequent storage for at least 24 hours. If you plan to use this process you should contact your local APHA office (<https://www.gov.uk/government/organisations/animal-and-plant-health-agency/about/access-and-opening#scotland>) to achieve approval. Small ensilers with storage <10m³ are excluded from requiring a PPC permit unless there is evidence of offensive odours outwith the site. Larger ensiling plants with storage >10m³ must be authorised by SEPA under the PPC regulations. The resulting liquid may be spread to land as a fertiliser if a licence and approval are granted by SEPA.

Incineration: On-site

Small scale incinerators are available for on-site incineration of fish waste. The operation of these incinerators to dispose of fish waste is approved by the Scottish Government through a licence, with inspections carried out by APHA. SEPA will only regulate this activity if it consistently gives rise to nuisance outside the site, such as odour.



Image courtesy of Waste Spectrum Environmental Ltd

Incineration: Combined Heat and Power Plants

There are a number of combined heat and power plants which will accept fish waste. The water content of the waste can be an issue and will limit the amount accepted. Contact details for these plants are provided in the approved ABP premises list.



Rendering Plants

Rendering plants can accept all categories of ABP fish waste and some will accept ensiled waste. Certain conditions may be placed on the acceptance of material depending on level of spoilage and the materials used to contain the materials during transport such as liner bags. Contact details for these plants are provided in the approved ABP premises list.

Anaerobic Digestion

Category 2 and 3 fish waste can be used in AD plants without prior processing provided they are approved to European standards (EC 1069/2009). If they have a capacity exceeding 10 tonnes per day they must have a permit issued by SEPA.

The plants which accept fish waste are detailed in the approved ABP premises list. Details of the locations of AD plants can be found at <http://www.biogas-info.co.uk/resources/biogas-map/>.



Image courtesy of Zero Waste Scotland

Composting

Category 2 and 3 fish waste is accepted at composting sites approved to European standards (EC 1069/2009) which are detailed in the approved ABP premises list. If they have a capacity exceeding 10 tonnes per day they must have a permit issued by SEPA.

More information can be obtained on the website of the UK industry body for composting at

<http://www.organics-recycling.org.uk/category.php?category=975&name=Compost%2Fdigestate+benefits+and+uses>.



Image courtesy of VCU Europa Ltd

Other methods

Freezing: This can be an effective way of storing small numbers of fish mortalities prior to disposal using one of the above approved methods.

De-hydration: This is a potential method to reduce water content and volume of waste prior to disposal using one of the above approved methods.

Landfill: As a last resort during a mass mortality event, where there is a risk of disease transfer or a risk to human health, APHA and SEPA may permit disposal to an appropriate landfill site.

Export: In cases where a mass mortality event has occurred, using a non-UK contractor to remove fish by boat for further processing abroad may be approved. Approval should be obtained following discussion with the appropriate Scottish Government officials.

The ABP approved premises list can be found at

<https://www.gov.uk/government/publications/animal-by-product-operating-plants-approved-premises>.