SEPA
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

CONSULTATION

The use of biomass or feed to regulate the organic output from marine pen fish farming to the environment

October 2019

Have your say: sepa.org.uk/biomassfeedconsultation

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Introduction

Scotland is the largest Atlantic salmon aquaculture producer in the European Union and third in the world after Norway and Chile. A contributing factor to this is Scotland's reputation for a high quality environment and abundant freshwater resources.

SEPA's vision is that the sector becomes a world-leading innovator in ways to minimise the environmental footprint of food production and supply; where it has a strong and positive relationship with neighbouring users of the environment and communities; and where it is valued nationally for its contribution to achieving global food security.

As one of a number of organisations regulating finfish aquaculture, in November 2018 SEPA announced firm, evidence-based proposals to strengthen the regulation of the sector. Having done more science, more analysis and more listening than ever before, including our largest ever public consultation across Scotland, this year we launched our Finfish Aquaculture Sector Plan and a new, firm, evidence-based regulatory framework.

An important purpose of the regulation of marine pen fish farming is to ensure that the quantity of organic matter released into the environment comply with environmental quality standards. Environmental quality standards ensure that the organic matter released from the farm can be assimilated by the marine environment.

When we consulted on the framework, we proposed using site specific limits on the quantity of feed that could be fed to farmed fish over a period of time as a means of controlling the quantity of organic wastes discharged. This would have represented a move from our existing regulatory controls which limit the quantity of organic wastes discharged by setting site-specific limits on the maximum weight of fish (biomass) that can be held on a farm at any one time.

We had a number of responses about this. The responses were mixed and included requests for more detail about the use of feed; and further discussion with experts.

This consultation further explores methods for how we assess the organic load from a marine pen fish farm to ensure organic residues from farms don't negatively impact local environments. We intend to provide certainty and transparency to site operators, regulators and communities. We are committed to listening and to getting this right which is why we are asking for responses to options for approaches from the broadest possible group of stakeholders with interests in our regulation of the sector.

We are interested in your views on the options we have identified; your suggestions on how to improve the use of either option; and details of any alternative options that you think would work as a regulatory control, including the reasons why.

The consultation is open until Wednesday 27 November 2019. Have your say, by completing the online consultation survey available from: sepa.org.uk/biomassfeedconsultation

Background: Regulatory tasks

This section describes the regulatory tasks required for effective environmental protection. These are generic tasks relevant to most forms of environmental regulation.

SEPA's role in setting the requirements

The discharge of a pollutant to the environment will cause harm if the quantity of the pollutant discharged (the load) is greater than the quantity of the pollutant that the environment is able to assimilate. As Scotland's environmental regulator, our job is to limit pollutant loads to environmentally safe levels so that unacceptable harm is prevented and environmental standards are maintained.

When authorising a discharge, we:

a) calculate the pollutant load that will be generated by the proposed discharge;
b) determine, using modelling, whether that load can be assimilated by the environment without compromising environmental standards;
c) if the load can be assimilated, set permit conditions that limit the scale of the discharge to the acceptable pollutant load.

Our permit conditions define the acceptable pollutant load. This tells those responsible for discharges (the operators) what they need to do to protect the environment. Once we have authorised a discharge, the operator is responsible for ensuring that the permit conditions are met.

The role of operators in managing a site

To protect the environment, an operator must be able to:

a) manage the site so as to control pollutant loads to within the limit defined in the permit at all times;
b) assess, with the appropriate level of precision, whether the required degree of control is being achieved.

The role of SEPA in monitoring performance

We undertake audits to check that operators are complying with permit limits set to control pollutant loads. This type of monitoring ensures that the regulated activity is being managed in a way that prevents harm to the environment.

We also use environmental monitoring results to check that environmental harm is not being caused. Where we find that harm is being caused, this may indicate that operators have been exceeding permit limits on pollutant loads or that the environment is not able to assimilate those pollutant loads. Annex 1 provides further information on the different purposes served by monitoring the regulated activity and monitoring the environment.

If operators discharge a greater pollutant load than their permits allow, we take appropriate enforcement action.

What options are available to control pollutant load?

For most of types of regulated discharges, wastes are discharged into the environment through pipes or chimney stacks, usually following some form of treatment[1]. For these discharges, we can set permit limits on the quantities of pollutants (the load) emitted through the chimney or pipe. Operators can monitor their discharges to check that they are meeting these limits and we can collect audit samples from the pipe or chimney to allow us to check compliance.

Ideally, we would do the same for discharges from marine pen fish farms. We would set a permit limit on the quantity of organic waste that can be emitted from the pens. Such a permit limit would require us and operators to be able to monitor and measure the quantities of organic wastes being emitted from the pens.

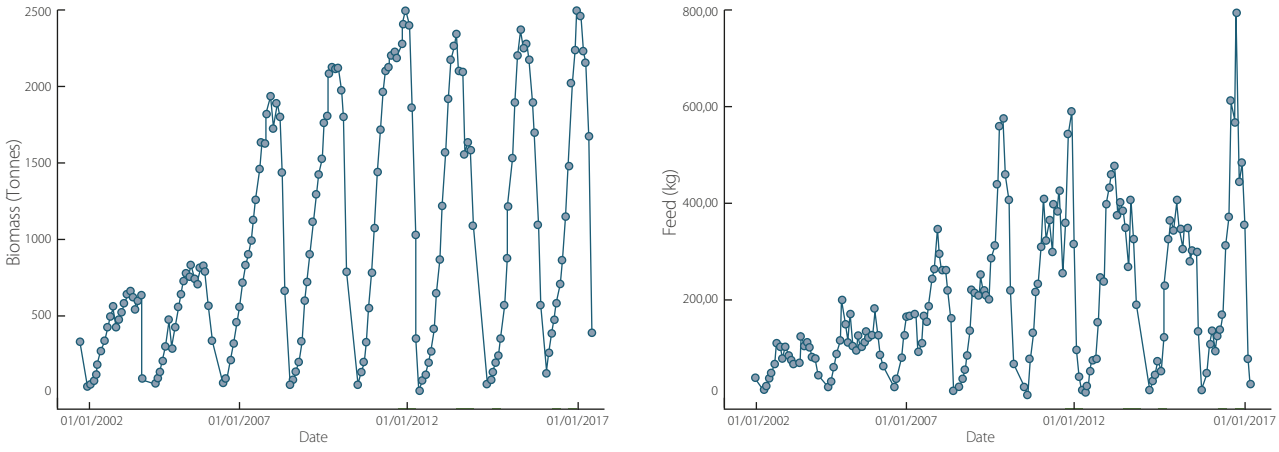
However, organic wastes are released through the open nets used by fish farms in ways that make it impractical to collect representative samples for measuring the quantities of waste in the discharges. Consequently, we need to regulate organic waste discharges from fish farms using a proxy for pollutant load that can be monitored with the appropriate degree of precision.

The quantity of excreta produced by fish is proportional to the quantity of food they eat. Food consumption depends on a number of factors including fish size, how fast the animal is growing and its level of energy expenditure. Because a large mass of fish can eat more food in absolute terms than small mass of fish, the amount of excreta produced is also proportional to the biomass of fish on a farm, assuming the fish are feeding.

Marine salmon farms typically follow a 20 - 22 month production cycle. Pens are stocked, the fish grow and are progressively harvested. Once all the fish have been harvested there is a minimum six week fallow period before the cycle of production can start again. Organic wastes are discharged from when fish are first stocked until all the fish are harvested.

Changes in fish biomass and food consumption mirror each other through a production cycle (see Figure 1). If we were able to plot organic waste loads, we would expect to see a similar pattern of change through the cycle. Food consumption, biomass and, hence, pollutant loads are highest during the second half of production cycles. Therefore, the greatest risk to the environment is posed during this time.

Figure 1: Typical variation in monthly total biomass and feed used



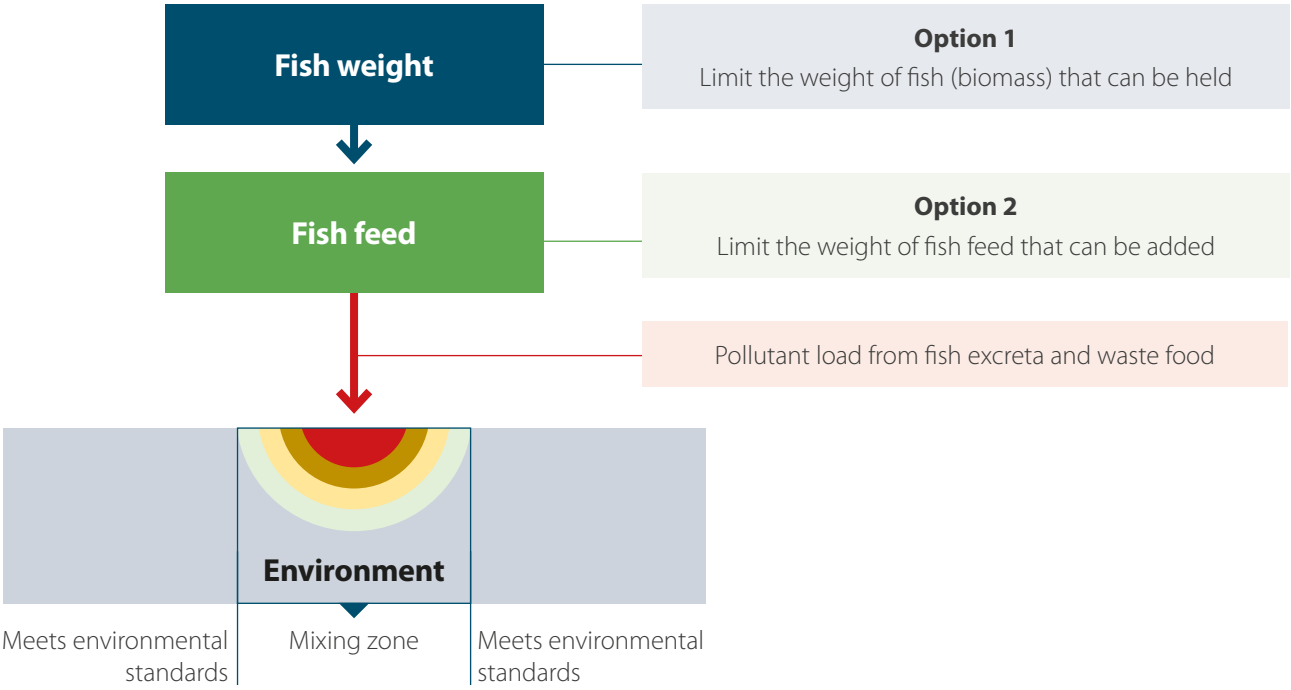
[1] Treatment is used by operators to help control the pollutant load in their discharges.

These relationships create two potential proxies for the organic waste loads from marine pen fish farms:

a) the total weight of fish (the biomass) held (option 1 in Figure 2);

b) the total weight of feed put into the pens (option 2 in Figure 2).

Figure 2: Potential options for controlling the load of organic waste released from marine pen fish farms



The approach of other regulators

There are a number of other countries that have a significant salmon fish farming industry: Norway, Chile, Canada and Faroes.

The regulatory systems in these countries are very different. For example, Norway auctions biomass quotas that give an operator the ability to grow that weight of fish. The purpose of the biomass quotas is to manage the overall production level to ensure that it does not exceed market capacity.

The operator must then get permission from a local authority to create a farm in a particular location.

We'll continue to engage with regulators from other countries to learn from their experiences in regulating organic waste discharges from marine pen fish farms.

Comparing the use of biomass and feed

Proposed criteria for choosing the right proxy for pollutant load

To be able to regulate effectively, it is important that we make the right decision about the proxy measurement that we use to limit the pollutant load released to the environment. In order to inform this decision, we have identified criteria that would allow an objective comparison between the two options. The criteria are listed below.

a) There should be a robust relationship between the proxy for pollutant load and the pollutant load.
b) The operator must be able to measure the proxy accurately and reliably at any time.
c) The operator must be able to manage the farm to ensure compliance with the permit limits set for the proxy.
d) We must be able to independently audit compliance with the permit limits set for the proxy.

Consultation question 4

Do you think that these are the appropriate criteria to allow us to make the right decision on the proxy for pollutant load?

Application of the proposed criteria

We would like to hear your views on the relative strengths and weaknesses of biomass and feed to the development of an effective and proportionate regulatory framework for marine pen fish farms

To structure responses so that we are able to compare different views, we ask that you consider how biomass and feed perform in terms of the four criteria listed. We would also like you to consider how they perform in terms of any other criteria that you consider important. The consultation questions covering the criteria appear in the appropriate sections of the consultation.

We hope that the description of the process provided in the consultation and the details in Annex 2, which describe the process from SEPA's perspective, will offer useful context.

Potential role of biomass and feed in the regulation of marine fish farming

This section of the consultation compares how the use of biomass and, separately, feed would work across the different regulatory tasks described in the Background: Regulatory tasks section (page 3).

Figure 3: Summary of the regulatory tasks that allow the delivery of effective environmental protection

Calculating the pollutant load

Biomass

As the fish grow, the biomass in the pens increases during the production cycle until harvests start to take place. We currently set a site-specific limit on the maximum biomass that can be held in the pens at any time.

To work out the pollutant load resulting from a particular biomass, we need to know the average daily quantity of feed required to feed that biomass. This is because there are no conversion factors that allow us to convert biomass directly to a pollutant load. After converting biomass to an average daily quantity of feed, we use the assumptions and approach described in the next section (see Table 1) to work out the resultant pollutant load.

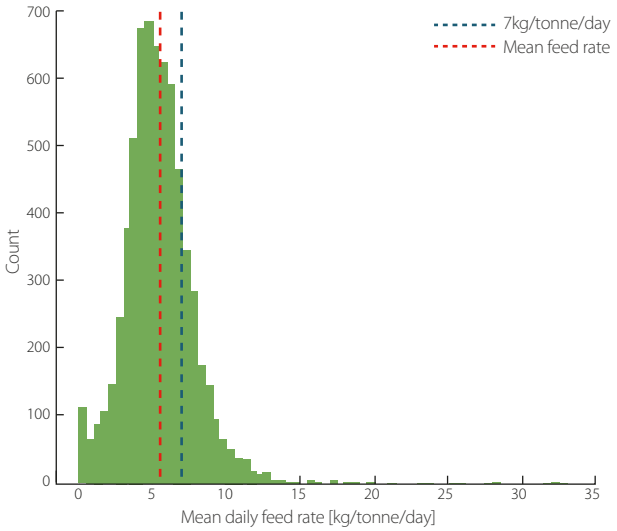
The average daily quantity of feed used varies from around 15kg per tonne of fish at the start of a production cycle when the fish are small (but growing rapidly) to values closer to 7kg per tonne of fish when the fish are at, or close to, market size. When we model pollutant loads, we currently convert biomass to feed using a conversion factor of 7kg of fish feed per tonne of fish per day. This is because fish are normally large when farms reach peak biomass.

We have reviewed this factor by comparing information collected over the last six years on the weight of feed used by farms and the biomass held by them (Figure 4).

Our analysis[2] of feed rates at different farms identified that the average daily quantity of feed when biomass was close to maximum was 5.5kg of feed per tonne of fish per day. The rate of 7kg represents the 80th percentile statistic. This means that 80% of the data points have feed rates lower than 7kg. We consider that continuing to use 7kg of feed per tonne of fish per day represents a suitable level of precaution.

[2] This analysis was carried out using the monthly feed data returns sent to us by the industry. The average daily feed rates are calculated by taking the weight of feed used in a month and dividing it by the number of days in that month.

Figure 4: Typical variation in mean daily feed rates per tonne of fish.



Biomass does not directly drive the pollutant load and there are some circumstances where the actual food usage at maximum biomass would be very different from the standard assumption of 7kg of feed per tonne of fish. For example, some farms rear small fish and then transfer them to other farms to continue the growth cycle. A farm rearing small fish consuming around 15kg of food per tonne would generate a greater pollutant load than one with the same biomass limit but where large fish consumed around 7kg per tonne. If we use biomass to control pollutant load, we would need to take account of how the farms are operated so as to ensure that the pollutant load did not exceed the capacity of the environment.

Consultation question 5

Do you have any evidence for changing our standard assumptions for converting biomass to feed rate?

Feed use

Food consumption by fish varies hourly and daily, depending on factors such as time of day, water temperature, the age and health of the fish and the presence of predators, such as seals, near the pens.

For managing environmental risk, it is the resulting average pollutant load, or base load, rather than any short-term variations in load that is important. Consequently, a control on feed use would limit the average daily quantity of feed. The daily average would be measured over a specified period of days. That period would be short enough to capture the period of peak feed use within a production cycle but long enough to smooth out short-term, daily variability in feed use.

We think the average daily quantity of feed used in a period of 90 days would appropriately reflect the base load of organic wastes discharged during the period of peak feed use. In identifying this period, we have taken account of the variability in feed use indicated by the monthly data provided to us by the fish farm companies.

To work out the pollutant load resulting from a particular average daily quantity of feed, we use standard assumptions and conversion factors to calculate how much of the feed is converted into waste (Table 1).

Table 1: Conversion of feed quantity into pollutant load		
		Solid waste (grams)
Quantity of feed (grams)	1,000	-
Less water content (assumed 9%)	910	-
Less quantity uneaten (assumed 3%)	882.7	(27.3)
Quantity of eaten food incorporated into fish or respired as carbon dioxide (assumed 85%)	750.3	(132.4)
Total solid waste generated per kilogram of feed		(159.7)

The standard assumptions we use are average values. At any one time, the actual values will vary depending on a range of factors, including fish health, feed composition, how feed is delivered and even the genetics of the fish stock.

Changes can be made to any of the assumptions we use where evidence from the applicant indicates that a different assumption should apply. These changes can be applied across the board or in a way that reflects differences between companies in how they operate their farms. We can and do check that the assumptions we use are producing realistic estimates of environmental risk. The computer models used to assess environmental risk already incorporate the standard assumptions and we compare the outputs of these models with environmental monitoring results.

Consultation question 6

Do you have any evidence for changing our standard assumptions for converting feed usage to pollutant loads?

Consultation question 7

Do you consider that a feed-based control in the form of daily feed usage averaged over 90 days would appropriately capture the period of peak feed use within a production cycle but be long enough to smooth out short-term, daily variability in feed use?

Modelling environmental effects of the pollutant load

We use the pollutant load calculated from the biomass or feed rate proposed by the applicant to assess whether the farm's wastes could be assimilated by the environment without causing environmental harm beyond the allowed mixing zone. If the wastes can be assimilated, we can set permit limits based on the proposed biomass or feed rate. If they cannot, we can calculate the pollutant load that can be assimilated and back-calculate the corresponding limits on biomass or feed rate.

Consultation question 8

Do you have any comments on, or suggestions for improving how, we calculate the pollutant load and undertake the modelling?

In particular is the relationship between:

- biomass and pollutant load robust?
- feed use and pollutant load robust?

Setting permit conditions

Biomass

To use biomass as a control over pollutant load, we would include the following types of conditions in permits:

The maximum weight of <<Atlantic Salmon OR Rainbow Trout>> held on site at any one time must not exceed <<Enter Value>> tonnes.

Maximum weight in tonnes of <<Atlantic Salmon OR Rainbow Trout>> held on site during each month must be recorded and reported to SEPA at the end of each quarterly reporting period.

This condition would control the biomass held at a fish farm but would not be as directly linked to pollutant load as feed usage. This is because other factors, such as the age of the fish or water temperature, affect the amount of feed required and therefore the pollutant load produced.

Feed rate

To use feed as a control over pollutant load, we would include the following types of conditions in permits:

The maximum quantity of feed used must not exceed <<Enter Value>> tonnes over any 90 day period.

The daily quantity of feed used, in tonnes, must be recorded and reported to SEPA at the end of each quarterly reporting period.

This feed condition would control the input of material into the fish farm that has a direct link to the pollutant load. The more feed added, the higher the pollutant load.

Consultation question 9

Do you have any comments on, or suggestions for improving, the proposed permit conditions?

Managing sites to ensure compliance

To ensure they comply with their permit conditions, operators need to be able to:

- take action when the biomass or their use of feed is approaching the permitted limits in order to avoid non-compliance;
- monitor the quantity of feed they are using or the biomass of fish they are holding on the farm, depending on which control is used.

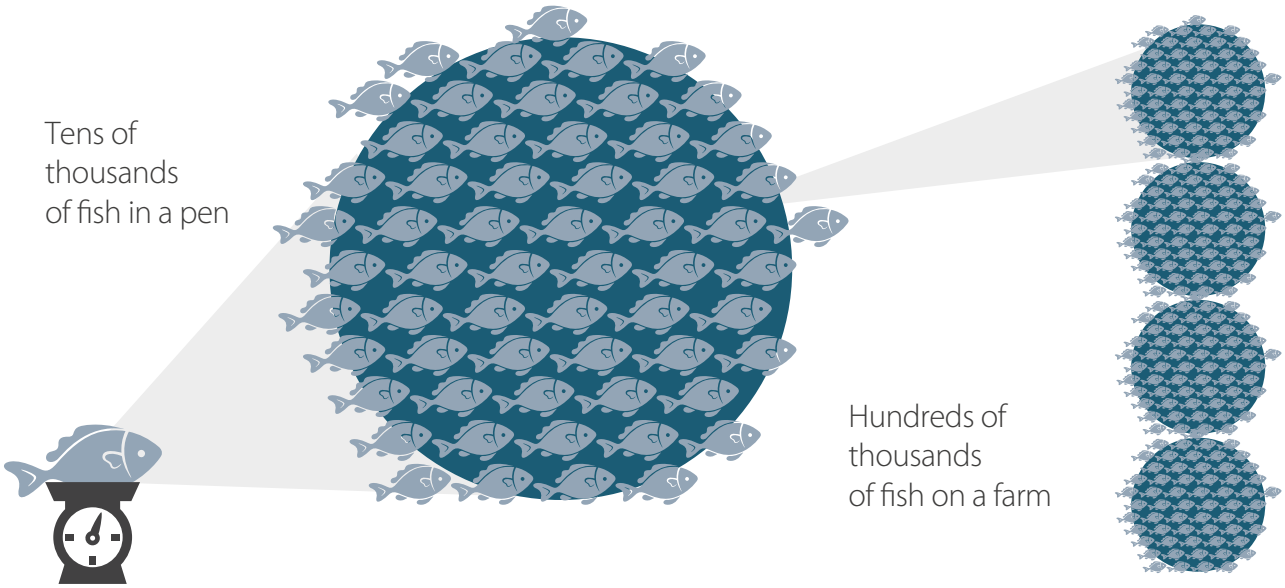
Monitoring (biomass)

Biomass changes slowly as the fish grow. Typically, fish progressively put on weight unless they are stressed, for example, by disease. Biomass management does not require the same type of hour-to-hour monitoring that farms use to manage feed rates.

To measure biomass accurately, it is necessary to weigh each fish to calculate the total biomass present. This is not practical while the fish are in the pens because of the very large number of fish held.

As a result of the difficulties in directly measuring biomass described above, operators normally[3] estimate the biomass held. This usually involves predicting the biomass on the basis of the estimated number of fish, the feed rate and environmental factors, such as temperature. Many companies use proprietary computer programmes to predict biomass and it is figures produced by these programmes that the operators report to us in their monthly biomass returns. Some operators take sub-samples of fish, weigh them and multiply the average weight by the assumed number of fish. Some operators also use sensors to count sub-samples of the fish.

Figure 5: Scale of the task involved in estimating the biomass of a farm.



Monitoring (feed)

A key focus for operators is to ensure that the appropriate quality of feed is given in the appropriate quantities to ensure that the fish grow at the rate planned. To ensure this, feed use is actively managed and monitored on a daily basis and detailed records of the quantity of feed used over the course of each fish growth cycle are kept. Because operators monitor feed rate in real time, they would be able to continuously check their compliance with feed rate based permit limits.

[3] There are some situations where it is possible to weigh all the fish.

- Production weight. Each fish is weighed after harvesting when it passes to the processing plant (typically after bleeding and gutting). These figures would allow the biomass harvested from a farm to be calculated. However, it would not provide a real time estimate of the maximum biomass held. Most sites progressively harvest large fish during the last six months of the cycle and the total biomass harvested is normally greater than the maximum biomass reached in the pens during the cycle.
- If all the fish are temporarily removed from the pens into a well-boat for treatment then it is possible to count and weigh the fish. Weighing fish in well-boats would only provide an occasional measurement of biomass as many farms do not use well-boat, for example for treatment with medicines, then if they do, it happens relatively infrequently, and not necessarily when the biomass of fish held is at its peak.

Consultation question 10

Do you have any comments on, or suggestions for improving how, the monitoring of feed or biomass is undertaken?

In particular could operators precisely measure:

- biomass at any time?
- feed rates at any time?

Taking action to avoid non-compliance (biomass)

With a biomass control, fish farmers applying for permission to increase production would estimate the maximum biomass needed to be held at any one time to achieve their target levels of production. They may choose to add a safety margin to this figure when applying.

The operator would be able to track the estimated biomass from the computer programme (plus sub-sampling). If it became apparent that the biomass was going to exceed the limit in the permit, then grading out of fish would be necessary. This involves removing the larger fish for processing to lower the biomass held.

Taking action to avoid non-compliance (feed)

Operators can predict the quantity of feed required to produce their target level of production. If a feed-based control was used, when applying to us for permission, they would know the quantity of feed they wanted permission to use. The quantity they applied to use could include an amount (safety margin) for managing any periods of unexpectedly high fish feeding rates. If the waste that would be generated by their proposed quantity of feed could be assimilated by the environment, we would grant permission to use that quantity of feed.

In some years, survival rates of fish may be higher than normal and, as a result, biomass will increase faster than projected. In many situations, a higher biomass than planned would not result in the need to take action because of the safety margin around feed quantity included in the application. Under these circumstances, a higher than normal biomass could be maintained until the fish reach the ideal harvesting size. However, if it became apparent that the feed rate would exceed that permitted, operators would have two choices:

- grade out enough of the larger fish to lower the biomass and, therefore, the feed rates so that the latter stay within the permit limits;
- reduce their feed rates and, therefore, slow the rate of growth of the fish.

Any decision on grading out the larger fish will be facilitated by the use of a permit limit expressed as an average feed rate over 90 days. This allows periods of high feeding rate and also allows time for the operator to plan any intervention to avoid any animal health concerns. If there were animal health concerns, we would expect the operator to contact us to discuss how to address the situation.

Comparison of biomass and feed

Under a biomass control, operators would use selective harvesting to ensure that fish farms remain within their permitted biomass limits. Operators would take the same approach (ie selective harvesting of fish) to ensure that their farms remained within their permitted feed limits. They may also be able to design different feeding strategies to stay within feed quantity limits.

Consultation question 11

Do you have any comments on how we have described the site management implications of using feed or biomass? In particular, do you agree that operators can manage compliance with a:

- biomass limit?
- feed rate limit?

Assessing compliance and enforcement

It is our job to audit the records and management of sites to ensure that operators are complying with permit conditions. This process is a core part of regulation and ensures that the public can have confidence in the reported environmental performance of sites.

How would we audit information on biomass?

There is normally no direct measurement of maximum biomass so we would have to audit the output of the computer programmes operators use to calculate biomass. It would also be possible to audit the estimates of biomass derived from weighing sub-samples of fish. However, this estimate is dependent on the total number of fish held by the farm and it is difficult[4] for us to independently count the fish during the sea-phase of the growth cycle.

If we use biomass, SEPA would have to consider the challenge of auditing the accuracy of the computer programme.

How would we audit information on feed?

There are a number of mechanisms that we could use to audit the feed data provided by fish farm companies.

- Records of feed use are derived from the direct measurements made by operators of the feed usage on their farms. We would be able to access farms' computer records holding the raw data;
- Farms hold records of feed deliveries and the quantities in storage. These records can be compared to their records of feed used.

It is therefore possible for us to audit the use of feed as a proxy for pollutant load. It would also normally be a relatively straightforward process to corroborate the results of audits if we needed to take enforcement action.

Consultation question 12

Do you have any comments on, or suggestions for improving how, we could audit feed or biomass compliance?

Do you consider that it is possible to independently audit compliance with a:

- biomass limit?
- feed rate limit?

[4] We could require the operator to bring in a well-boat to count all the fish in the farm. This is a time consuming and expensive and is stressful for the fish, elevating mortality rates. Realistically, we could only require such an action if we had very clear evidence already of an operator submitting incorrect results.

Summary

Having consulted on, and implemented, a new evidence-based regulatory framework, SEPA is now seeking further information regarding how we assess the organic load from a marine pen fish farm. This next steps consultation seeks to ensure organic residues from farms don't negatively impact local environments.

It's about providing certainty and transparency to site operators, regulators and communities. We're committed to listening and to getting this right which is why we're asking for responses to options for approaches from the broadest possible group of stakeholders with interests in our regulation of the sector.

We are interested in your views on the options we have identified; your suggestions on how to improve the use of either option; and details of any alternative options that you think would work as a regulatory control, including the reasons why.

Consultation question 13

Do you consider that we should use biomass or feed as a proxy for the pollutant load from a fish farm?

Consultation question 14

Do you have any other responses to make to this consultation?

Annex 1: Types of monitoring

There are two types of measurement that we typically take into account when assessing the environmental performance of a regulated activity:

a) monitoring the pollutant load from a site; and
b) monitoring the environment.

The application of these two types of monitoring is illustrated below and shows that they have different purposes. This consultation focuses on how we monitor the pollutant load.

Monitor environment

Purpose

- Is the environment protected by operator management and SEPA permit limits?

Changes in environment caused by

- When sample is taken (relative to peak load).
- Location relative to pens.
- Storms and tidal cycle.
- Other pollutants and sources of pollutants.

Time period

- Long-term cumulative monitoring.
- Identifies when action is required to remedy environmental harm.

Monitor pollutant load

Purpose

- Management tool to ensure load does not exceed modelled limit.

Changes in load caused by

- Rate at which feed is added.
- Rate at which feed eaten and retained.
- Type of food.

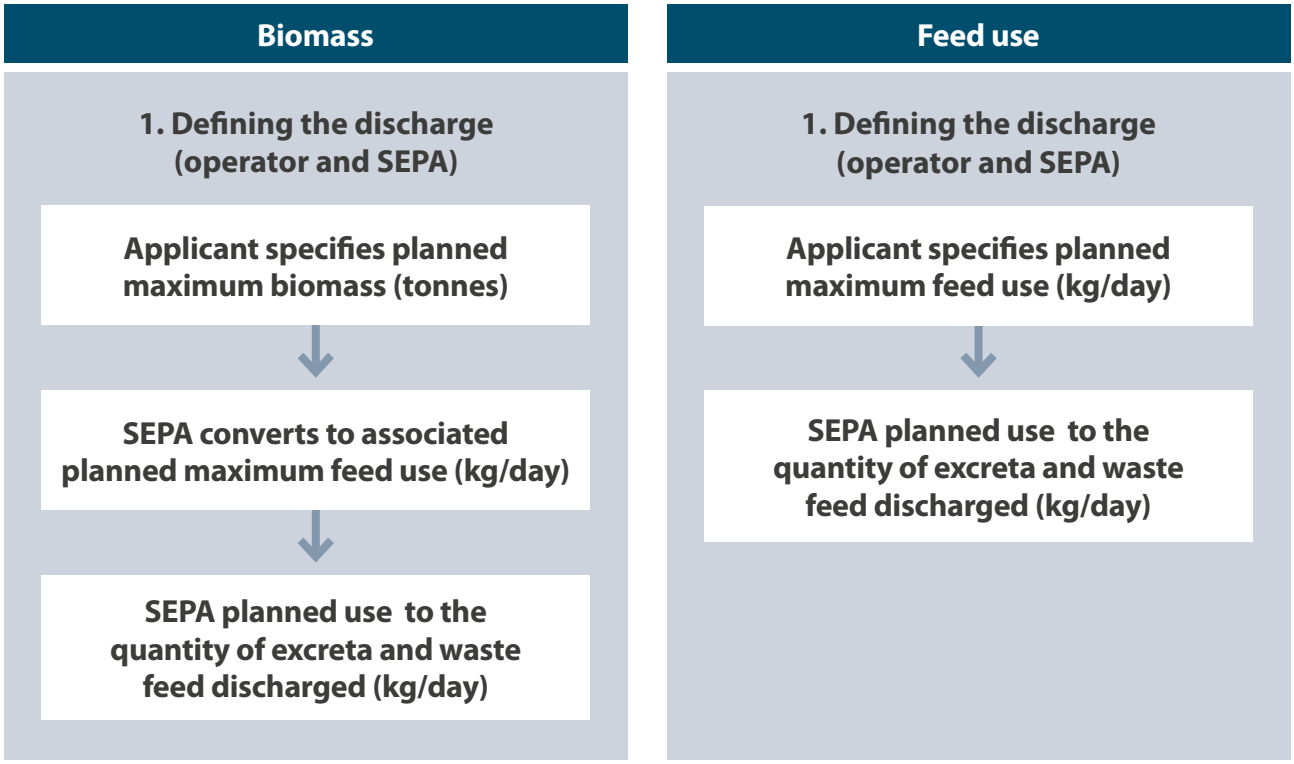
Time period

- Real time monitoring.
- Allows action to prevent environmental harm.

Annex 2:

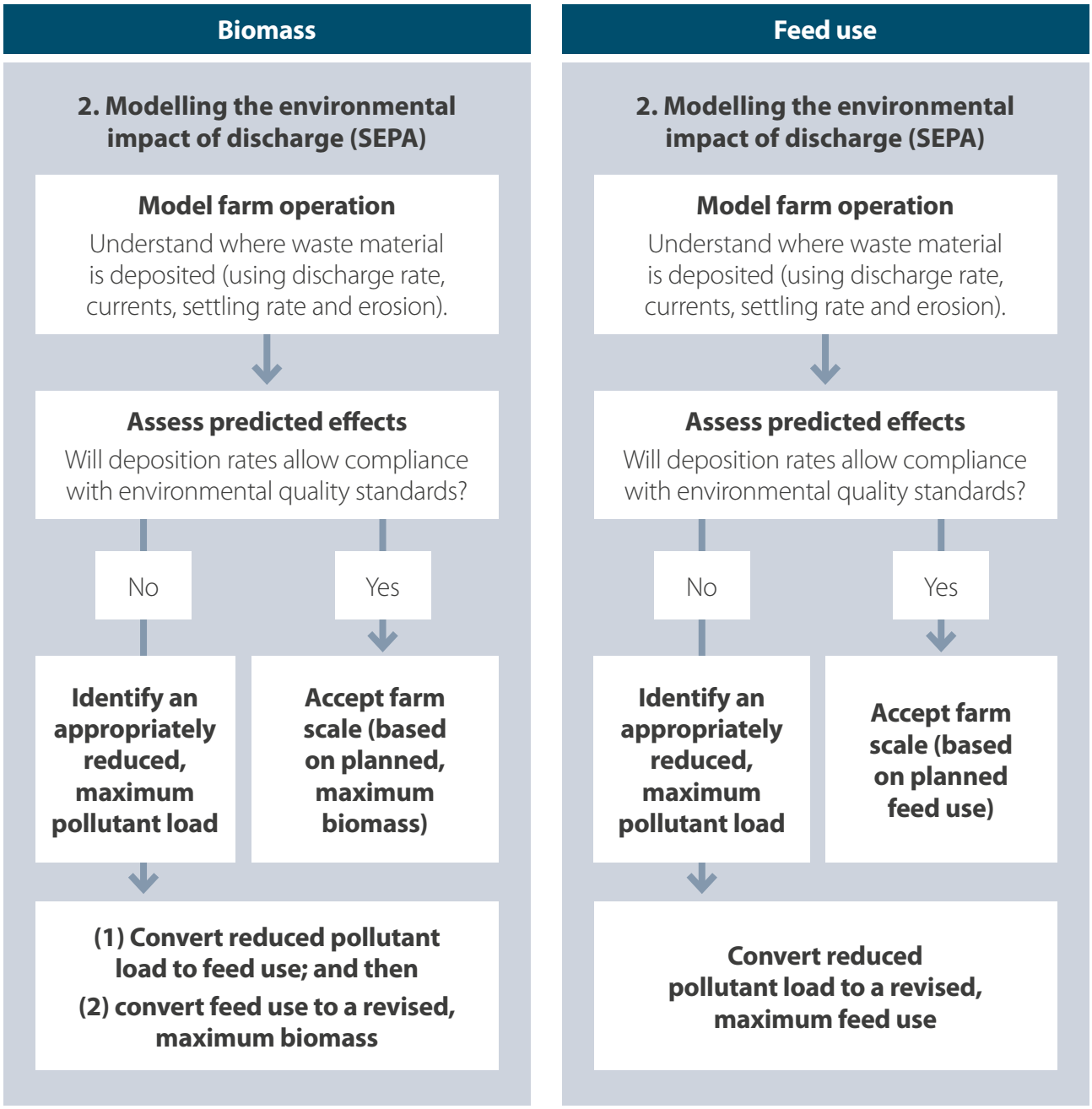
SEPA's perspective on how biomass or feed can be used as part of the regulatory process

Regulatory step 1: Calculating pollutant load



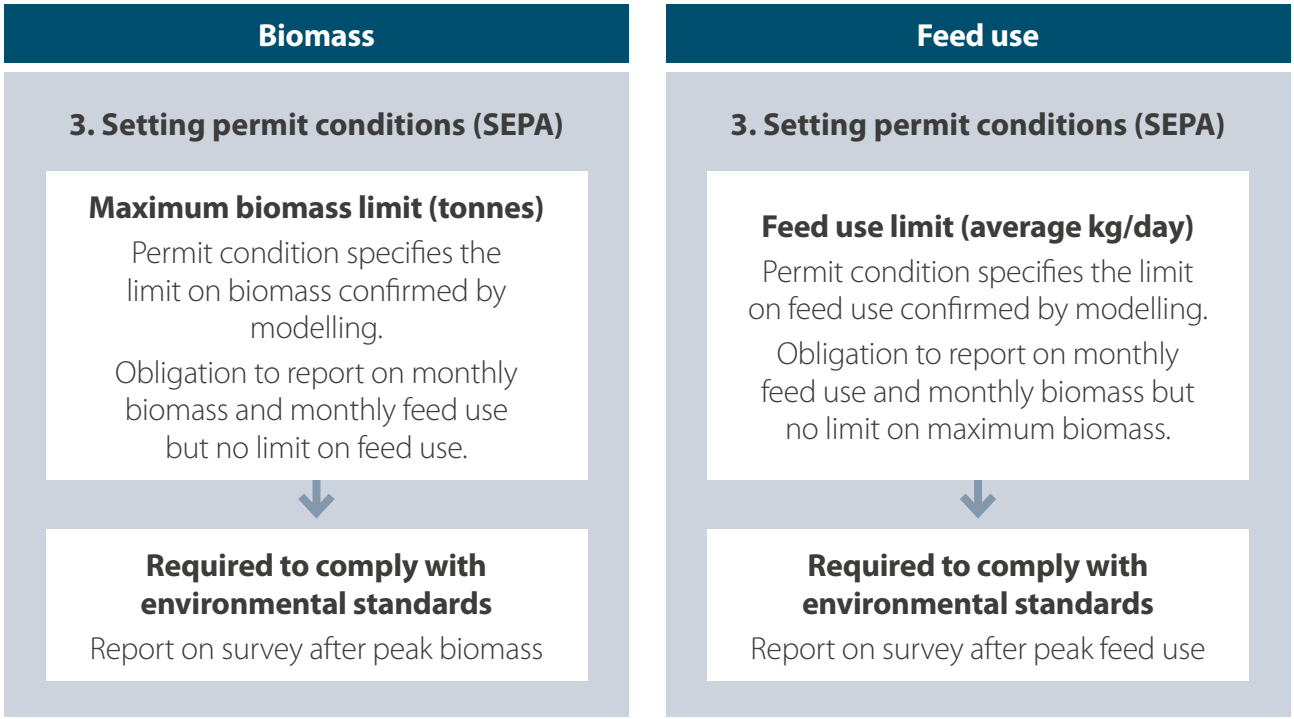
Relationship between the proxy and the pollutant load must be robust.	Relationship between feed and pollutant load is more direct than that between biomass and pollutant load. a) The required additional step in the calculation of pollutant load from a proposed biomass (conversion of biomass to feed quantity) requires the application of an additional set of assumptions. b) Calculation of pollutant load from feed quantity is more direct; involves fewer assumptions; and is more accurate than the calculation of pollutant load from a biomass.

Regulatory step 2: Determining whether the pollutant load can be assimilated



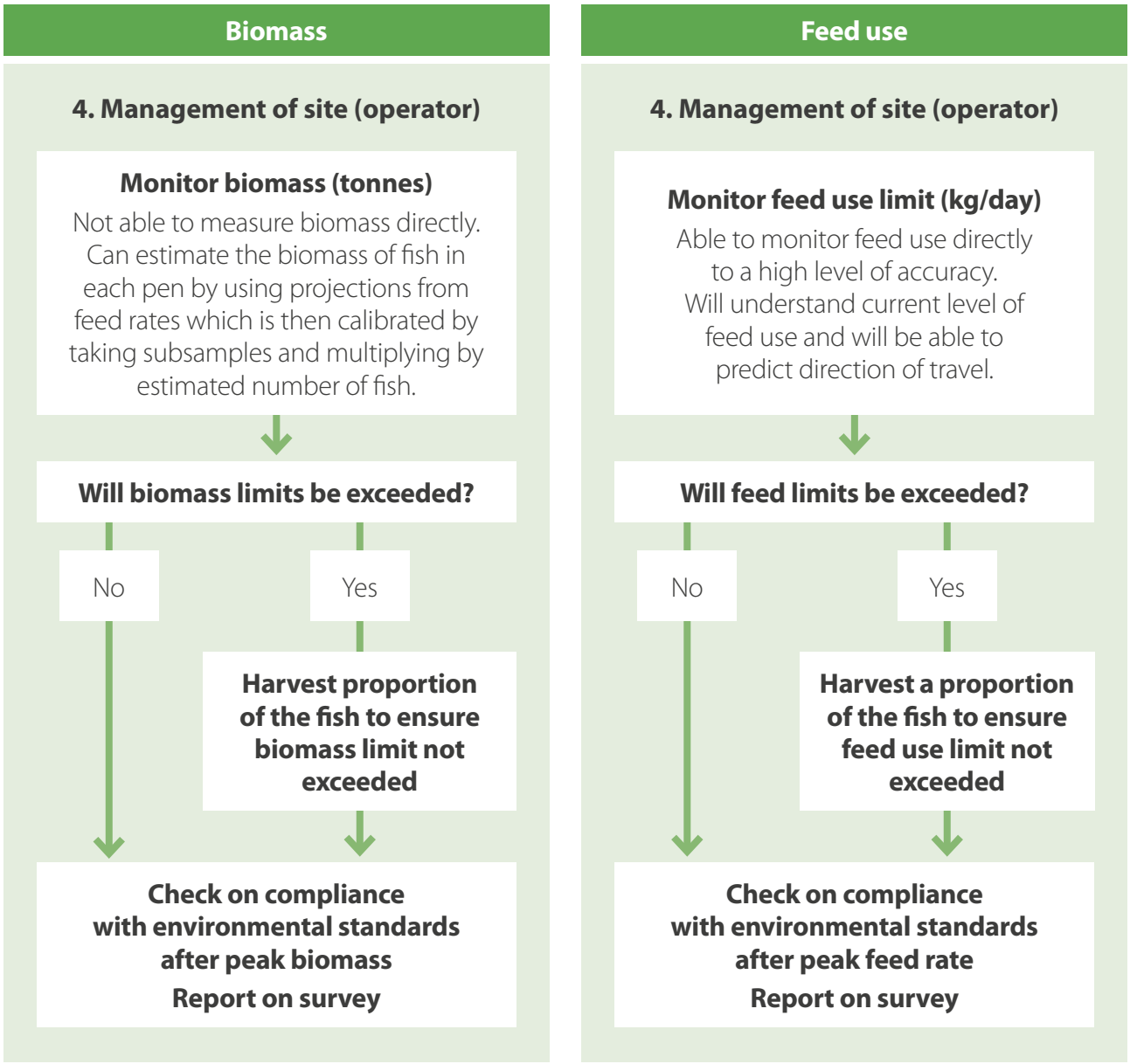
Relevant criteria applied	Discussion
Relationship between the proxy and the pollutant load must be robust.	Largely the same process for feed and biomass. Only the last step is different if the scale of the farm needs to be reduced, in which case it is simpler and more direct to use feed rather than biomass. a) For the two proxies, this step only differs if the pollutant load that would result from an applicant's proposal could not be safely accommodated by the marine environment. b) If the pollutant load cannot be accommodated, an additional step with associated assumptions is required to derive a suitably reduced maximum fish biomass compared to deriving a suitably reduced feed use limit.

Regulatory step 3: Setting permit conditions to limit pollutant load



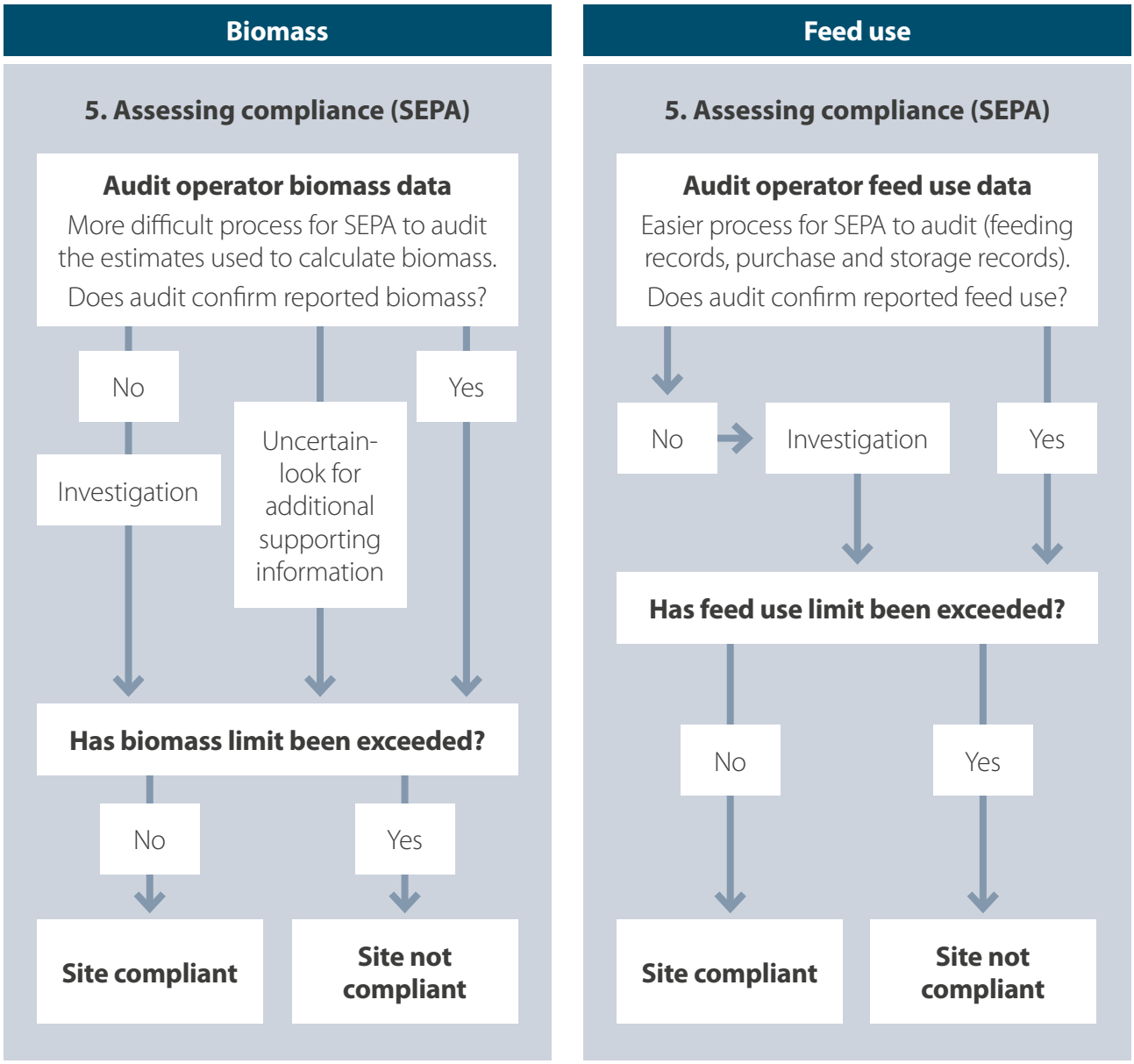
Relevant criteria applied	Discussion
Relationship between the proxy and the pollutant load must be robust.	The relationship between feed and pollutant load is simpler than that between biomass and pollutant load. Setting permit limits as maximum average daily feed quantities would be more directly related to how the environmental risk of a proposal is modelled

Regulatory step 4: Operator ensures permit conditions are met



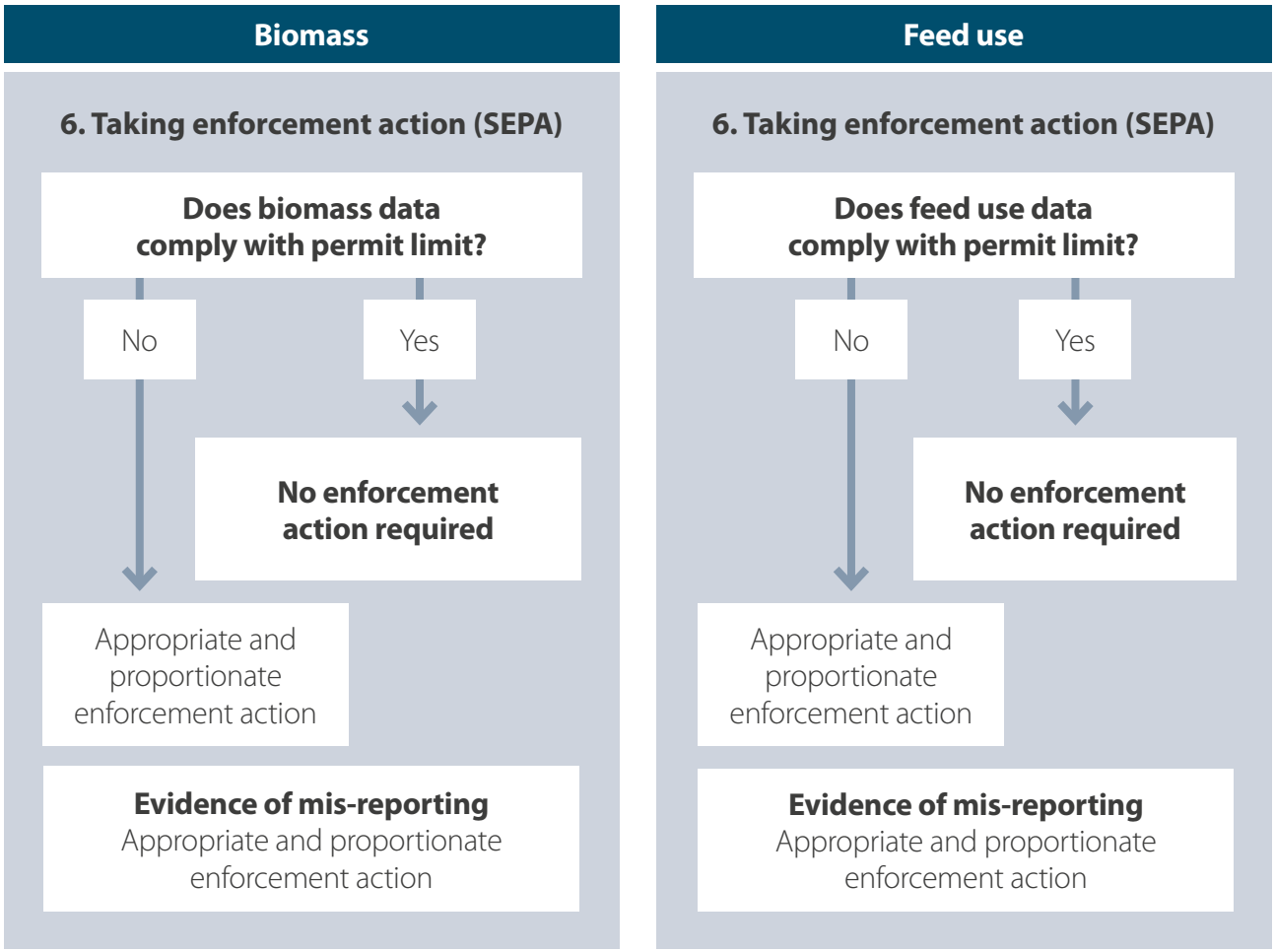
Relevant criteria applied	Discussion
The operator must be able to measure the proxy accurately and reliably at any time.	Feed can be measured more easily and precisely than biomass. Operators can be more confident that they are compliant if permits specify a feed limit rather than a biomass limit. a) Operators can track the use of feed in real time with a high level of confidence and precision. They can assess how quickly they are approaching a limit on feed. b) Operators can estimate the biomass held using computer programmes, such as Aquafarmer or Fishtalk. They may calibrate these estimates by taking sub-samples of fish and weighing them (either manually or by using sensors).
The operator must be able to manage the farm to ensure compliance with the permit limits set for the proxy.	Operators would be able to manage compliance with limits based on either proxy. a) Operators can comply with biomass limits by grading and harvesting a proportion of the fish held: They can manage compliance by directly adjusting the consented proxy (biomass of fish held). b) Operators can comply with feed quantity limits by grading and harvesting a proportion of the fish to reduce the number of fish held and hence the feed required. They may also be able to design different feeding strategies to stay within feed quantity limits.

Regulatory step 5: SEPA carries out audits to check that operators are complying



Relevant criteria applied	Discussion
SEPA must be able to independently audit compliance with the permit limits set for the proxy.	Auditing compliance with a feed limit is a simpler process than auditing compliance with a biomass limit a) Feed use is directly and precisely recorded by fish farm company computers. It would be possible to report these records directly to SEPA, ensuring transparent reporting. We could also independently check feed use by assessing other sources of information, such as feed purchases; feed deliveries; and records of feed held in stores to verify usage reports. b) To measure the biomass precisely, it is necessary to weigh all the fish. This can be done at harvesting or by transferring all the fish to wellboats. As a consequence, most farms use a computer programme to estimate the biomass on a farm from feed use and other factors. c) It is a more difficult process for SEPA to audit operators' fish biomass figures. There are alternative sources of information that can be used to check on biomass figures (production data, feed use). However, these do not allow direct comparisons but do provide a screening process that may indicate a problem.

Regulatory step 6: SEPA is able to take appropriate enforcement action



Relevant criteria applied	Discussion
The quality of the measurements that the operator can take, and the quality of the audit information SEPA can collect must be sufficient for SEPA to be confident that operators are complying with their permit limits.	To take enforcement, SEPA needs to be confident in its evidence of non-compliance with permit conditions. It is an easier process for SEPA to obtain corroborated information that feed limits are not being met. It is normally a more difficult process to obtain the evidence needed to make confident assessments of non-compliance with biomass. Enforcement action includes, among other things issuing warning notices, varying permits to reduce the permitted biomass limit or feed limit, as applicable; serving monetary penalties; and referring offences to the procurator fiscal for subsequent court action. We take a range of factors into account in deciding on the most appropriate and proportionate type of enforcement action to take. These factors include, for example, the magnitude of the non-compliance; previous compliance record; and any available evidence about environmental harm resulting from non-compliance.

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