

Sustainable Eel Standard with explanatory notes
Final draft – approved by SEG subgroup

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Summary

The objective of the sustainable eel standard is to create an objective, third-party standard and eco-label to allow the consumer to choose eel products produced in a sustainable way. Whilst the focus is on the European eel (*Anguilla anguilla*), the standards and eco-labelling can also be applied to other anguillid species imported into Europe. The key issues covered by the standard are: i) wild eel are caught in a way which does not impact significantly on natural escapement rates of silver eel from the catchment or river basin district; ii) wild eel come only from catchments/river basin districts where the available data suggests that the required EU standard for silver eel escapement is being met; iii) the mortality rate of the eels throughout the fishing and culture process is minimised so that a minimum number of eels go to produce the final product and iv) there are no other significant ecological impacts associated with the fishing or culture process.

The standard for the label includes all the elements of the eel fishery/culture process: i) glass eel fishing; ii) storage and transport of glass eels; iii) eel culture; iv) restocking and v) yellow/silver eel fishing. For an end product to carry the eco-label, all the relevant elements will need to be certified as meeting the standard, and there will also need to be an assessment of traceability.

The glass eel fishery standard covers the following elements:

- The required EU target of silver eel escapement of 40% is met;
- The fishery is well managed (licensing, data collection and analysis, gear restrictions, enforcement etc.);
- Mortality of glass eels during fishing is minimised;
- Restocking targets are met by the fishery;
- No impacts on bycatch species, rare or protected species and habitats;

The glass eel storage standard is aimed at minimising glass eel mortality from leaving the fishermen's net to arriving at the culture facility or restocking location. The standard includes direct measures of mortality during the stocking period (for which good traceability is essential) and also covers good handling practice: density in the storage system, design of the facility; water quality; hygiene and disease; handling and welfare and transport, all of which have impacts on mortality rates.

The eel culture standard covers the following elements:

- Low mortality rate throughout the culture process;
- Feed from a sustainable source and used efficiently;
- Pollution;
- Disease;
- Handling, transport and welfare;
- Participation in restocking programmes

The standard for restocking includes three issues: i) restocking forms part of management activities under an approved EMP; ii) minimising mortality during transport and

handling; iii) ensuring that survival and growth in the new environment is monitored and iv) ensuring that restocking does not introduce disease into wild populations.

Finally, the yellow/silver eel fishery covers the following elements:

- Eels only come from catchments/river basin districts where the 40% escapement target is being achieved (as for glass eels above);
- The fishery is well managed (as for glass eels above);
- No wider ecological impacts (as for glass eels above)

1. Introduction

This document is the final draft of the sustainable eel standard as approved by the standard sub-group of the Sustainable Eel Group (SEG) – see www.sustainableeelgroup.com. The document should be read in conjunction with the second draft of the sustainable eel assessment methodology, which explains how it is proposed that the standard be implemented (note that this document is still for the moment only available in draft form).

The aim of this document is to create a standard for sustainable production for the European eel (*Anguilla anguilla*) (although it may also in principle be applied to other eel species). The standard may be applied in any area. The standard has been created because existing standards (the Marine Stewardship Council, the Aquaculture Stewardship Council etc.) do not apply to the particular circumstances of eel fisheries, culture and restocking. Nonetheless, these standards have both been extensively used in developing this standard, along with the GlobalGAP, Friend of the Sea, FairTrade, the Marine Aquarium Council and FAO guidelines for marine ecolabelling.

The basis for the standard is the EU Regulation 1100/2007 setting out the recovery plan for *Anguilla anguilla* in EU countries, as well as the Eel Management Plans (EMPs) that have been required as the basis for the implementation of 1100/2007 by each Member State. There is no such clear basis for the aquaculture and restocking elements of the standard, and these have been developed by reference to similar standards (as referenced above) as well as from the views of expert members of SEG.

2. General structure of standard

Eel products may be produced by three routes: i) farmed from wild-caught glass eels; ii) fished from waters restocked with either glass or yellow eels and iii) fished from waters which are not restocked. Each of these routes can be broken down into a variety of steps, as shown in Table 1. (We have chosen to incorporate transport into the other steps rather than create a separate standard.)

Step	Farmed	Fished from glass eel restocking	Fished from yellow eel restocking	Fished without restocking
glass eel fishing	X	X	X	X
glass eel holding	X	X	X	
glass eel restocking		X		
eel culture	X		X	
yellow eel restocking			X	
yellow/silver eel fishing		X	X	X

An eel standard to apply to each of these activities can thus be made via a series of specific standards for each of the steps, which can be built up into a full standard appropriate to the activity in question. Each of the activities are linked via a chain of custody standard which ensures traceability between one step and the next.

3. Structure and scoring of each specific standard

Each of the specific standards takes the form of a series of statements against which the activity can be scored (e.g. ‘the fishery is well-managed’). Associated with each statement are score indicators which provide definitions and give guidance on the appropriate score level. It is proposed that scoring is semi-quantitative on a traffic light system – this obviously requires two score indicators (higher, lower) to define the three possible scores (red vs. amber vs. green). The higher indicator defines ‘best practice’, and in cases where this indicator is met or exceeded, the score will be green. The lower indicator defines the minimum acceptable level. Cases where this indicator is not met will score a red, and will automatically fail the assessment. Cases where this lower indicator is met, but the higher indicator is not met are considered to be acceptable but not ideal, and would require improvement over the long term and will score amber. It is proposed that to pass, the fishery (or other step) will require at least two-thirds¹ green scores, while any single red score will lead to a fail.

Below, a section of the report is devoted to each standard. There are also a series of explanatory notes for each standard, which are given in Annex 1. An example of scoring a standard (not based on any existing enterprise but provided only for the sake of clarity) is given in Annex 2.

4. Glass eel fishery standard

4.1 Key issues

The glass eel fishery standard addresses the following key issues, along the lines identified by the EU Regulation:

- Sustainability of the fishery – it should not impact on future escapement from the catchment;
- Management of the fishery – data are provided, no evidence of illegal activities in the fishery;
- Mortality rate of glass eels in the fishery is low;
- Restocking targets from the EU Regulation or the EMPs;
- Impacts on other species or habitats.

¹ Note: There was agreement that this ratio should be certainly greater than half, but may be defined finally after some pilot assessments have taken place. As with the rest of this standard, it is subject to review as the situation evolves.

4.2 Proposed standard

The draft standard is presented below, with various explanatory notes in the following section.

1. The 40% escapement target is being achieved (see notes 1 and 2)	
green score indicator	The EMP is approved and there are good data ² which show with reasonable confidence that the EU silver eel escapement target is being achieved in the eel management district.
amber score indicator	The EMP is approved and the EU silver eel escapement target is being achieved in the eel management district according to best estimates from the data available.
2. The fishery is well-managed	
green score indicator	Fishers are licensed and provide logbook data. Data on catch and effort are collected and analysed as regularly as possible (in real time if such a system is in place, and at least monthly). Data are considered to be accurate, useful for statistical purposes and provide a comprehensive picture of the glass eel fishery under assessment. Fishermen only use legal gear; enforcement is in place throughout the fishing area with no evidence of systematic non-compliance.
amber score indicator	Fishers are licensed. Data on catch and effort are collected and analysed regularly (minimum of annually after the end of the season). Data are considered to be accurate and provide enough information on the glass eel fishery under assessment for management and to track annual trends in glass eel arrival. Sufficient catch and effort data are collected for management purposes, in line with local EMPs. Fishermen only use legal gear. There is no evidence of systematic non-compliance.
3. Mortality during fishing is minimised (see notes 3 and 4)	
green score indicator	Fishing is by hand-held nets OR Fishing from vessels meets the following criteria, in addition to those for amber: i) fishing is at slow speed (anchored in current or speed no more than 1 knot ³ relative to water); ii) average haul duration no longer than 20 minutes, with the maximum duration not more than 30 minutes; (iii) mesh size of cod end no greater than 1mm (iv) rest of the net designed such that glass eels do not become trapped or abraded (see note 4); v) vivier tank on board and in use; OR Fishermen can demonstrate convincingly by another method less than 4% mortality of the catch from emptying the net to the end of the first 24 hours in the storage facility.

² 'Good data' is defined as data that can be used for statistical analysis with reasonable power.

³ It is not completely clear at present how this will be assessed – a review will be carried out after the pilot assessments.

amber score indicator	Fishing from vessels meets the following criteria: i) fishing is at slow speed (no more than 1.5 knots relative to water); ii) maximum haul duration no longer than 30 minutes; iii) mesh size of cod end no greater than 1mm; iv) rest of the net designed such that glass eels do not become trapped or abraded (see note 4); v) vivier tank on board and in use; OR Fishermen can demonstrate convincingly by another method less than 8% mortality of the catch from emptying the net to the end of the first 24 hours in the storage facility.
4. The required percentage of glass eels from the fishery is being used for restocking (see note 5)	
green score indicator	The fishery makes glass eels available for restocking at least 5% greater than requirements of the EU Regulation.
amber score indicator	The fishery makes glass eels available for restocking according to the requirements of the EU Regulation.
5. The fishery has negligible impacts on bycatch species (see note 6)	
green score indicator	Either i) the fishery has <1% bycatch by weight OR ii) bycatch is returned to the water alive as gently and rapidly as possible. Note: infrequent but large catches of gelatinous zooplankton in glass eel nets during bloom periods may be excluded from these criteria.
amber score indicator	Either i) the fishery has <5% bycatch by weight OR ii) bycatch is returned to the water alive as gently and rapidly as possible, following an appropriate protocol. Note: infrequent but large catches of gelatinous zooplankton in glass eel nets during bloom periods may be excluded from these criteria.
6. The fishery has negligible impacts on rare or protected species	
green score indicator	The fishery has no direct interactions with species that are considered vulnerable, threatened or endangered, or are protected under national or international law.
amber score indicator	The fishery has no direct interactions resulting in mortality or injury with species that are considered vulnerable, threatened or endangered, or are protected under national or international law.
7. The fishery has negligible impacts on habitats	
green score indicator	The fishing gear does not touch the bottom.
amber score indicator	Damage to the bottom by gear is rare and accidental.
8. Research – Bonus (see note 7)	
green score indicator	The fishery actively participates in or contributes to research and monitoring to support implementation of the EMPs (this excludes provision of logbook data and other legal requirements which are covered above).

5. Standard for glass eel storage

5.1 Key issues

The key issue for storage (with a buyer) is that the mortality rate should be to as close to zero as possible. Glass eels with a buyer will have two sources of mortality: first, mortality can arise from injuries and/or stresses received during fishing but which are unseen at the time of sale, and second, mortality can arise from poor handling and care during storage and transport. Buyers have little ability to reduce early mortality and we have assumed here that it will be minimised by application of the fishery standard above. The standard for storage and transport focuses on the second source of mortality.

5.2 Proposed standard

The proposed standard for glass eel storage and transport is given below. As for the glass eel fishery standard above, there are potential issues around glass eel ‘laundering’, so that direct criteria about the mortality rate are only reliable when linked to very robust traceability, which has been made a mandatory requirement.

The first task is therefore to decide which of the two avenues should be used in each case (direct questions about mortality, or indirect requirements on husbandry practices). We propose that this is done via the following question, which is pass/fail.

1. Traceability (see note 8)	
PASS	Traceability allows each eel in each batch delivered to a buyer to be connected back to a river and date with high confidence. This should include as a minimum: i) separation and detailed labelling of batches at all times; ii) labels which connect each batch back to an individual fishermen or group of fishermen or supplier or river, and a date; iii) daily record-keeping of mortality according to a set procedure; iv) recording of weight in and weight out for each batch (see note 8); v) rectification of supplier invoices, shrinkage and buyer invoices at frequent intervals.
FAIL	Any lack of confidence in any aspect of the above procedures should lead to a failure in certification: this might include for example any unlabelled batches, labels being insufficiently detailed, amalgamation of several batches, failure of record keeping, problems rectifying invoices etc.
2. Mortality in storage facility	
green score indicator	Mortality rate over the season is <2% on average (excluding the first 24 hours in the storage facility, which is considered under the fishery above)
amber score indicator	Mortality rate over the season is <5% on average (excluding the first 24 hours in the storage facility, which is considered under the fishery above)
3. Transport and initial holding if transported to farm (see note 9 – explain why done this way)	

green score indicator	Mortality during transport and for the first two weeks at the farm is <3% on average
amber score indicator	Mortality during transport and for the first two weeks at the farm is <6% on average
4. Eel density in storage system (see note 10)	
green score indicator	Stocking density never exceeds 10kg/m ² . Density allows eels space to settle at all times.
amber score indicator	Stocking density rarely exceeds 10kg/m ² . Density allows eels space to settle except during short, temporary periods, always lasting less than one day.
5. Storage system	
green score indicator	Biosecurity plan in place; water from borehole, ground or potable (to avoid importing disease); loss of electricity, water pressure, overflow or air pressure (for oxygen levels) connected to a permanent alarm system with back-up
amber score indicator	Loss of electricity, water pressure, overflow or air pressure (for oxygen levels) connected to a permanent alarm system.
6. Water quality	
green score indicator	Daily monitoring of temperature, pH, ammonia, nitrate and oxygen show that these are kept within optimum bounds to the greatest extent possible and spikes are dealt with rapidly; water quality management procedures are in place. Effluent quality meets national standards and effluent is highly unlikely to have ecological impacts.
amber score indicator	Daily monitoring of temperature, pH, ammonia, nitrate and oxygen show that these are generally kept within optimum bounds; water quality management procedures are generally understood. Effluent quality meets national standards.
7. Hygiene and disease (see note 11)	
green score indicator	All tanks and associated infrastructure are washed and effectively disinfected between batches. Eels are checked for parasites, bacteria and fungus before shipping and treated if necessary according to agreed procedures. During long-term storage (>4 weeks) eels are checked periodically and treated or given prophylaxis according to established procedures.
amber score indicator	All tanks and associated infrastructure are washed and effectively disinfected between batches. Eels are checked for parasites and fungus before shipping and treated if necessary.
8. Handling and welfare (see notes 12 and 13)	
green score indicator	Systems are in place and the facility is designed to keep handling to an absolute minimum. Procedures are in place for handling, and handling, where necessary, is careful (see note 12). The infrastructure is designed to avoid injuries, and so that the use of nets is rarely necessary. When used, nets are small-mesh (1mm maximum). Eels are moved without being allowed to dry out.
amber score indicator	The facility may not be optimally designed, but systems are in place to keep handling as low as possible within the constraints of the facility

	(see note 13). Handling, where necessary, is careful. The infrastructure has been optimised as far as possible to avoid injuries. Nets are small-mesh (1mm maximum). Eels are moved without being allowed to dry out.
9. Transport (see note 14)	
pass/fail score indicator	Transport is carefully planned to minimise travel time. Packing is done in a way that minimises handling, time and stress. Eels are kept cool and wet with an adequate supply of oxygen.
10. Research – Bonus (see note 7)	
green score indicator	The enterprise actively participates in or contributes to research and monitoring to support implementation of the EMPs (this excludes legal requirements which are covered above).

6. Standard for cultured eel

6.1 Key issues

There are two main types of eel farms: either i) indoor and based on intensive recirculation systems; or ii) outdoor semi-intensive pond rearing. European farms are nearly all of the former type. For now, the standard has been designed with this type of farm in mind (i.e. the key issues identified are relevant to this type of set-up). In the future, the standard may be expanded to include pond rearing, but additional criteria might have to be added to reflect additional issues.

The key issues identified for intensive glass eel culture are the following:

- Mortality rates of eels in the culture process
- Feed - sources and sustainability, conversion ratios
- Water use, water quality, effluent treatment; ecological impacts of effluent
- Chemical and medical treatment
- Handling and welfare

6.2 Proposed standard

The proposed standard for glass eel culture is set out below.

1. The total mortality rate during the culture process is low (see notes 9 and 15)	
green score indicator	Total mortality rate of eels in culture, from two weeks after receipt of glass eels (see note 9) to killing is less than 10%
amber score indicator	Total mortality rate of eels in culture, from two weeks after receipt of glass eels (see note 9) to killing is less than 15%
2. The fish meal/oil ingredients in the feed come from a sustainable source (see	

notes 16 and 17)	
green score indicator	Fish meal/oil in the feed comes from a fishery where the stock is at or above a target or precautionary reference point, or a stock which is certified by MSC or another eco-label, or comes from fish waste from processing that would otherwise be discarded. The fishing method used does not directly or indirectly threaten any other species, habitats or ecosystems.
amber score indicator	Fish meal/oil in the feed comes from a fishery where there is evidence that the stock is healthy and a low risk that it is depleted, or comes from fish waste from processing that would otherwise be discarded. The fishing method used does not directly or indirectly threaten any rare or protected species or habitats.
3. Feed is used as efficiently as possible (see note 18)	
green score indicator	The average feed conversion ratio across the life cycle (from weaning on to adult food to killing) is less than 1.7
amber score indicator	The average feed conversion ratio across the life cycle (from weaning on to adult food to killing) is 1.7-1.9
4. There are no ecological impacts from effluent discharge	
green score indicator	Effluent discharge complies with all local and national requirements. Effluent is regularly tested for solids, nutrients and other relevant residue e.g. any drug treatment residues, and has not been found to be non-compliant in the past 5 years. The residue produced will meet national guidelines.
amber score indicator	Effluent discharge complies with all local and national requirements. Effluent is periodically tested for solids, nutrients and other relevant residue, and has not been found to be non-compliant in the last 2 years.
5. Disease is treated rapidly and appropriately (see note 19)	
green score indicator	Eels are handled and held in a way that minimises the spread of disease. Eels are inspected for disease daily, and disease is treated rapidly following well-defined procedures. There is a periodic veterinary inspection following national/EU requirements. Records are kept of disease outbreaks and medications. No chemical is used that risks ecological impacts at low concentrations, unless there are effective procedures for removal of residue before discharge.
amber score indicator	Eels are handled and held in a way that minimises the spread of disease. Eels are regularly inspected for disease. Records are kept of disease outbreaks and medications. No chemical is used that risks ecological impacts at low concentrations, unless there are effective procedures for removal of residue before discharge.
6. Handling, transport and killing are carried out with respect for welfare	
green score indicator	A carefully thought-out culture process ensures that handling is minimised, as far as is compatible with the above requirements. There are well-defined procedures for handling, transport and killing which have been formulated with respect for welfare. These procedures are always followed carefully.
amber score	Handling is avoided where possible during the culture process.

indicator	Procedures for handling, transport and killing show respect for welfare.
7. The farm makes eels available for restocking – BONUS (see notes 20 and 21)	
green score indicator	The farm makes a proportion of annual production available for restocking. This restocking should be for the primary purpose of conservation / escapement.
8. Research – Bonus (see note 7)	
green score indicator	The enterprise actively participates in or contributes to research and monitoring to support implementation of the EMPs (this excludes legal requirements).

7. Standard for restocking

7.1 Key issues

If restocking is wholly or partly for the purpose of supplying a fishery, then a standard is needed for this element for the final product to be eligible for a sustainability label. If restocking is solely for conservation purposes, obviously no standard is required since there will be no final product to be labelled, although restocking carried out according to the standard would nonetheless be preferable in this case as well.

The key issues identified in relation to restocking are i) minimising mortality in transport and during restocking; and ii) monitoring to ensure that the survival rate of restocked eels makes restocking at this location an appropriate use of the resource.

7.2 Proposed standard

1. An approved EMP has been implemented in the restocked system (see note 1)	
PASS	The EMP is approved.
FAIL	The EMP is NOT approved.
2. Survival and growth rates of restocked eels can be estimated (see note 22)	
green score indicator	A formal monitoring programme estimates survival rates and growth rates of restocked eels such that there is good evidence that restocking is significantly enhancing eel biomass and contributing to escapement. There is active research on means of improving the restocking programme or restocking techniques.
amber score indicator	A monitoring programme estimates survival and growth. The existing evidence suggests that restocking is significantly enhancing eel biomass and contributing to escapement.
3. The risk of restocked eels introducing disease into wild populations has been assessed and is minimal (see note 23)	

green score indicator	Eels are tested before restocking and found to be free of disease AND/OR eels are from a known source which is tested on a regular basis and known to be free of disease.
amber score indicator	Eels are tested before restocking when first sourced from a new area, and periodically (at least annually) thereafter to ensure they are free from disease OR eels are from a known source where available evidence suggests that disease levels are low/zero (although it may not be tested regularly) OR eels from an area where a disease is endemic in the wild population are being restocked into an area with similar prevalence of the same disease(s).

8. Standard for yellow / silver eel fishing

8.1 Key issues

The most important issue for wild or restocked fisheries is that they do not impact on escapement of silver eels in any significant way. Aside from that, issues are the same as for glass eels fisheries (management, ecological impacts and research). Note that this standard is the same as the glass eel standard, except that certain criteria applied to glass eel fisheries do not apply here – such as restocking.

8.2 Proposed standard

1. The 40% escapement target is being achieved (see note 1)	
green score indicator	The EMP is approved and there are good data which show with reasonable confidence that the EU silver eel escapement target is being achieved in the eel management district.
amber score indicator	The EMP is approved and the EU silver eel escapement target is being achieved in the eel management district according to best estimates from the data available.
2. The fishery is well-managed	
green score indicator	Fishermen are licensed and provide logbook data. Data on catch and effort are collected and analysed as regularly as possible (in real time if such a system is in place and at least monthly). Data are considered to be accurate, are useful for statistical purposes and provide a comprehensive picture of the glass eel fishery under assessment. Fishermen only use legal gear; enforcement is in place throughout the fishing area with no evidence of systematic non-compliance.
amber score indicator	Fishermen are licensed. Data on catch and effort are collected and analysed regularly (minimum of annually after the end of the season). Data are considered to be accurate and provide enough information on the glass eel fishery under assessment for management and to track

	annual trends in glass eel arrival. Sufficient catch and effort data are collected for management purposes. Fishermen only use legal gear. There is no evidence of systematic non-compliance.
3. The fishery has negligible impacts on bycatch species	
green score indicator	Either i) the fishery has <1% bycatch by weight OR ii) discards are returned to the water alive as rapidly as possible.
amber score indicator	Either i) the fishery has <5% bycatch by weight OR ii) discards are returned to the water alive as rapidly as possible.
4. The fishery has negligible impacts on rare or protected species	
green score indicator	The fishery has no direct interactions with species that are considered vulnerable, threatened or endangered, or are protected under national or international law.
amber score indicator	The fishery has no direct interactions resulting in mortality with species that are considered vulnerable, threatened or endangered, or are protected under national or international law.
5. The fishery has negligible impacts on habitats	
green score indicator	Mobile fishing gear does not touch the bottom, or the fishing gear is fixed.
amber score indicator	Damage to the bottom by gear is rare and accidental.
6. Research – Bonus (see note 7)	
green score indicator	The fishery actively participates in or contributes to research and monitoring to support implementation of the EMPs (this excludes provision of catch data and other legal requirements which is dealt with above).

Annex 1 – Explanatory notes

Note 1 : Definition of a sustainable eel fishery

This note applies to both glass eel fisheries and fisheries for adult eels.

We have tried to find an objective external definition of sustainability for eel fisheries, and on this basis have turned to the EU Regulation (1100/2007) on stock rebuilding for *Anguilla anguilla*. The regulation requires each Member State with eel stocks to produce eel management plans (EMPs) with the long-term objective of ‘reduc(ing) anthropogenic mortalities so as to permit with high probability the escapement to the sea of at least 40 % of the silver eel biomass relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock’ (Article 2 paragraph 4). The EMPs were required to be approved by the European Commission and an external review body (ICES).

Based on this objective, we have developed two definitions of a sustainable eel fishery: either i) (a higher level definition) - one from a catchment where the 40% escapement target is being met with reasonable probability; or ii) (a lower level or interim definition) – one from a catchment where the EMP is approved and being implemented and the 40% escapement target is being achieved. The difference between these two definitions centres around the quality of the data available and therefore the certainty with which we can say that the escapement target is being achieved. These are the definitions we have used to correspond to our score indicators for criterion 1 above. SEG UK have taken the same approach with their definition of sustainability⁴. Note that with the review and revision of the EMPs in 2012, this definition of sustainability may change.

Note 2 : Situation in which eels are highly unlikely to survive at all in the wild

In some situations (e.g. in very polluted rivers) the vast majority of glass eels entering the system will not survive to become adult eels or to contribute to escapement. In this case, it might be arguable that the most ‘sustainable’ course of action would be to remove the entire or the majority of annual recruitment for culture / restocking.

There was some discussion about whether an exception in this case should be made such that eels can be fished from systems in which the 40% escapement target will not be met. Stakeholders concluded, however, that eels removed for culture, restocking or trap-and-transport from rivers or other habitats in which they are highly unlikely to survive should still be subject to the requirements of the standard..

Note 3 : Mortality rates during fishing

This note applies to glass eel fisheries only.

It would be more straightforward to have only a direct statement about the mortality rate, but stakeholders were concerned that i) the mortality rate is variable e.g. over the season;

⁴ <http://www.sustainableeelgroup.com/page911>

ii) the mortality rate is difficult to measure because eels may look fine but have invisible injuries that subsequently cause mortality outside the specified timeframe and iii) it would be relatively easy for fishermen to ‘put on a good show’ for inspectors in this regard. (For example, poor physical condition can be masked by raising salinity of the tank water with salt to between 10 and 16 ppt.) Therefore, we have chosen to include a series of criteria about the fishing method, such that the standard requires fishermen to use techniques that are known by the industry to result in low mortality rates. Note that these represent informal industry ‘best practice’ – no published criteria are available.

Note 4 : Design of net

This note applies to glass eel fisheries only.

The crucial element in the design of fishing gear for glass eels is that it does not allow the eels to become trapped in the mesh – this leads to mechanical injuries which eventually leads to mortality even if such injuries are not immediately visible. For the cod end and for hand-held nets, this is generally solved by ensuring that the mesh size is small enough so that no part of the glass eel fits through. For the rest of a towed net, the mesh size can either be small enough as above, or large enough that glass eels can pass through without injury (in practice, most swim away from the mesh, ensuring that they remain in the net). For the cod end, we have been prescriptive about mesh size, but for the remainder of the net, fishermen may find their own solutions, so long as they fulfil the criterion of not causing injury or abrasion.

Note 5 : Restocking requirements under the EU Regulation

The EU Regulation requires under normal circumstances that 60% of glass eels from fisheries to be reserved for restocking in order to improve escapement rates – this 60% target should be achieved at the latest by 31 July 2013, with intermediate targets foreseen before this point (35% in the first year of implementation of the EMP, rising by 5% per year, or more if necessary to meet the deadline). These targets are the ones proposed above. However, the Regulation also foresees some possibilities of exceptions to this rule should the price differential between glass eels for restocking and glass eels for culture become too great, but it is not clear from the Regulation what these exceptions might be and how they would be defined and managed. Note also that these rules will be reviewed in 2012. Assessors will need to take account of the specific situation when this criterion is evaluated.

Note 6: Bycatch

Bycatch in glass eel fisheries is essentially confined to fishing by boat – hand-net fisheries have little or no bycatch since glass eels tend to swim upstream in monospecific groups. Bycatch in one glass eel boat fishery was reported to comprise juvenile fish (mainly mullet, also possibly bass and some species of wrasse), *Crangon* shrimp and detritus, with a few individuals or tens of individuals per tow.

No research is available on the mortality rate of these individuals once returned to the water. However, we note that if fishing is carried out such that the glass eels are obtained in good condition, then it is highly likely that these other species would also be in good condition. If an appropriate protocol is being following (i.e. returning to the water as soon

as possible) but mortality of bycatch is still high, it is almost certain that the fishery would fail on other criteria because the glass eels themselves are not being appropriately handled.

Note 7 : Research criterion

Stakeholders agreed with the idea that a business that participates in research over and above the legal requirements (such as providing catch and effort data for a fishery) should be rewarded, but since in some places fisheries may not be given this opportunity, they should not be penalised for not doing so. This criterion can be regarded as an opportunity to gain an extra 'green' if the score indicator statement is met – otherwise it is proposed that it is not scored. Note that this criterion cannot mitigate any 'red' scores.

In order to score green here, the contribution of the business to research would have to be significant and ongoing, rather than a one-off or relatively minor input.

Note 8: Record keeping

The key to traceability is clearly good record-keeping. It is essential that daily records are kept for mortality. Glass eels shrink during storage (they don't feed), so weight change is an important element of rectifying "eels in" with "eels out" for a batch. However, for this case there is a trade-off between frequent record-keeping and mortality. Any handling will probably result in a small amount of mortality, so that good husbandry dictates that handling is minimised – this means weighing only when necessary.

Note 9: Mortality during first two weeks in culture

It was agreed between glass eel buyers and eel farmers represented on the stakeholder group that mortality during the first two-week period in the eel culture facility is related to handling during fishing and holding/transport, rather than necessarily to anything under the eel farmer's control. This period was therefore left out of calculations for mortality rates during culture and included instead in the mortality rates for glass eel buyers. Note that if the glass eel buyer is operating according to the standard, mortality rates during this period should be low.

Note 10: Stocking density

The key element for stocking density is that eels have sufficient space in the tanks or raceways to settle on the bottom, rather than having to swim continuously. This minimises mortality and shrinkage. There do not appear to be any issues with having a minimum stocking density, according to buyers.

Note 11: Disease and medicines

The main issues in glass eel facilities are to monitor i) external protozoan parasites (white spot, costia and trichodina); ii) fungal infections and iii) bacterial infections.

Note 12: Careful handling

Careful handling is largely a matter of common sense, bearing in mind that glass eels are delicate animals and if suffering mechanical injury will usually not survive. Careful handling will involve, for example, no dropping or tipping, no drying out, minimal

contact with sharp edges or corners, nothing in which the tail could be caught, moving with water rather than nets etc. where possible, and the procedure to be completed as quickly as possible.

Note 13: Design of glass eel holding facilities

In order to be ideal for glass eel holding, facilities generally have to be specially designed with this in mind – there should be, for example, no sharp corners or edges, no excessive flow rates or abrupt changes in flow rate. Some buyers may use facilities that have been adapted rather than specially designed, and thus may not be ideal. The standard has been designed so that these facilities can still have an ‘amber’ score if they are used as well as possible, but a green score can only be obtained by facilities with a completely appropriate design.

Note 14: Transport – no ‘amber’ score possible

We were not able to design an ‘amber’ score criterion for transport – it appears that anything less than the optimum standard is not acceptable. There is therefore only one scoring criterion here – either pass (green) or fail (red).

Note 15: Mortality rate during culture

Good husbandry practices can minimise mortality during the culture process. Unlike for the fishery, traceability at the farm level will be sufficient to ensure that mortality can be measured directly and evaluated reliably by the assessors. On this basis, we have opted for a direct statement about the mortality rate rather than a series of indirect statements about techniques, as for the fishery.

Note 16: Feed

Two main types of feed are used during the culture process – cod roe and dried feed. When glass eels are first received, they are weaned initially using cod roe. After a few days, they are introduced on to dried food with a high protein content, and after about two weeks dried feed with a slightly lower protein content, which they then eat for the rest of the time in culture. Eels that are not successfully weaned on to dried food the first time around can be separated out and re-weaned. The statements on the sustainability of ingredients should be applied to both types of feed.

An issue with this element is that the source of fish meal is kept confidential by the feed suppliers. Contact was made with a feed supplier who provided information about the source of fish meal, but only on condition that it was not included in this report. Clearly, this will not work for a formal assessment, which needs to be public. It is proposed that the feed manufacturers will make information about the source of fish meal in their feed available to a trusted third party who will be able to assure the public that the source is sustainable. The SEG standard sub-group will be proposed to feed manufacturers as the appropriate group for this, but this remains to be finalised.

Note 17: Sustainable fisheries

In this statement we follow MSC and other ecolabels in considering i) the impact of the fishery on the stock of the target species (i.e. is the fishery causing the stock to become

depleted or overfished?), and ii) the impact of the fishery on other species and marine ecosystems more generally. As regards i), in order to meet the ‘green’ level, the stock will have to be assessed in a scientific way (e.g. in Europe by ICES or elsewhere by another similar body) such that there are quantitative estimates of stock biomass that show that the stock is highly likely to be above a pre-determined target or precautionary reference point. The ‘amber’ level assumes that while there may not be a scientific or quantitative stock assessment, all the evidence nonetheless suggests that the stock is in healthy condition.

Note 18: Feed conversion ratios

Note that these figures are from eel farmers – no national or international standards appear to exist for eel farming.

Note 19: Diseases and medicines

Formalin is also used in farms against parasites, as is salt and acetic acid in some cases. Farms can also treat against *Anguillicoloides crassus* and *Vibrio anguillarum* (a bacterial infection) with veterinary medicines – in the latter case only with the approval of a vet.

Note 20: Definition of ‘make available’

Eels can be ‘made available’ for restocking by sale or donation. If farmers can agree a sale for the appropriate number of eels, then they can sell them. If, however, prices or markets are such that a sale cannot be agreed for enough eels to meet the standard, farmers may make these eels available by other means, such as by donation.

Note 21: Sizes at restocking

This note is for information only. Restocking of eels from farms is done at the fingerling stage, but the precise size may vary by country.

Note 22: Restocking

Restocking can only be justified if it can be seen to be an efficient use of the precious glass eel resource (i.e. it adds to the escapement of silver eels when compared to leaving the glass eels at source). Monitoring of growth and survival in some form is therefore critical to a credible restocking programme.

Note 23: Disease

Disease and parasites have been implicated in the decline of the European eel population. It is obviously important that restocking does not spread disease from areas where it is endemic to areas where it is not present.