



Eel Assessment – *Scandinavian Silver Eel AB*, Box 902 251 09 Helsingborg, Sweden

Completed by Richard Wailes

31st May 2013

DRAFT

1. Introduction

This document presents the report completed following the audit carried out under the Sustainable Eel Standard (Version 3, 13th May 2011 & Version 5, May 2013), Section 5, 'Cultured Eel' and Section 7, 'Traceability'.

The assessment is of an eel farming business (*Scandinavian Silver Eel AB*, hereafter referred to as SSE) based in Helsingborg, in Sweden.

SSE buys in and grows on glass eels for on growing, sale and restocking and also sells whole frozen and smoked certified eels (produced by an approved subcontractor) to the local market.

SSE has been operating since 1985/1986 with the operation originally set up to utilize warm brackish cooling water, pumped from Öresund, produced by three sulphuric acid plants.

The original planned target of 100 tonnes per year was reached by 1988 and further tanks were constructed bringing the production capacity of consumption eels to 150 tonnes per annum.

The farm is designed around three separate water and filtration systems so that bio security is maintained and risk is minimized – one for Glass Eels and two for growing on Eels.

Currently it has 100 glass fibre and concrete tanks with one system for Glass Eels (32 tanks) and two for growing on larger eels (40 x tanks 2 x 2m for fingerlings + 28 x D ended tanks 3 x 11m tanks for larger eels)

The farm is able to batch lots of glass eels (1200/1300 kgs per annum in two batches from main supplier UK Glass Eels) at any one time. These glass eels are first put into a quarantine facility which normally lasts about 70 days before the eels are approved. Within 7 days of arrival at the quarantine120 glass eels are tested for all viruses. The remaining glass eels are kept with 'sentinel' rainbow trout and 120 rainbow trout are tested after 50 days to ensure that they are also free of any viruses, but especially: IHN, VHS and IPN, which pose a risk to the Swedish trout and salmon industry. These fingerlings grown in quarantine are for the main purpose of restocking, but remaining fingerlings after all restocking requirements are fulfilled are grown on in a larger facility for





consumption.

Eels are then moved to the growing on section after a further six weeks or when the size after grading is 1-2g.

They are then moved through the system until market weight 150g for the export market (to Hein Dil in Holland) or approximately 1000g for the domestic market is reached.

The units have separate circulation systems, where after leaving the tanks water is first mechanically cleaned using a drum filter, then biologically cleaned and finally oxygenated before being pumped back to the fish tanks. The sludge, faeces and any feed waste collected during mechanical filtration is used as a fertiliser. The biological filtration (nitrification) process occurs in concrete tanks filled with water and where small plastic rings are kept in motion by vigorous aeration.

All the main tanks are supplied by a 'timed' feeding system (every five minutes). Glass eels in the quarantine are fed cod roe for the first 20 days of development during which time they are slowly weaned on to a paste and then crumbled pelleted feed (supplied by Skretting and BioMar). After the quarantine the eels for consumption are only fed on pelleted feed.

The farm sells live eels to the Dutch market (about 4000/5000kgs per time) and frozen whole eels (no processing is done on the premises) to a number of local clients – these are despatched every two weeks. In addition in the months of June and July large numbers of eels are sold live for stocking in Sweden and Finland.

Traceability was demonstrated to the Auditor and it was possible to see exactly which eels had come from which supplier in 2011, 2012 and 2013 (Glass eels only).

2. The assessment

The assessor was Richard Wailes of MacAlister Elliott and Partners Ltd, who visited SSE on the 31st May 2013.

The visit included a tour of the facility and a review of paperwork.

3. Client Contact Details

Client Contact Name	Richard Fordham
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Client Phone Number	+46 42 142433

4. Results of the assessment

The outcome of this assessment is that SSE scored **eight green scores** and **four amber scores**, and therefore **should be considered sustainable under the SEG standard**.





One condition was raised by the auditor in relation to the chain of custody/traceability system in place at the farm;

CONDITION 1: It was noted that it was difficult to assess batches of eels that had been sent to Hein Dil in Holland for processing/smoking as no batch details were included on the documentation (although all eels were certified). In future both SSE and Dil will state the batch details on the respective invoices to allow full traceability. A copy of these invoices will be sent to the Certification Body (MEP) once set up.

The table below gives the standard with for each element a discussion of the system at SSE in relation to the given element of the standard and a rationale for the 31st May 2013 score given, with the source of information. The score is highlighted in the appropriate colour.

PART ONE - EEL FARMING OPERATIONS

1. The total morta	ality rate during the culture process is low	
green score	Total mortality rate of eels in culture, from one	e week after receipt of glass eels to killing is
indicator	less than 10% in the current and previous sea	
	seasons.	_
amber score	Total mortality rate of eels in culture, from one	
indicator	less than 15% in the current and previous sea	ason, or on average over the last five
	seasons.	
NOTES	Note 11: Mortality during first week in cult	
	It was agreed between glass eel buyers and	
	group that mortality during the first ~3-5 day p	
	handling during fishing and holding/transport, eel farmer's control. This period was therefore	
	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 17: 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 su	
	measured directly and evaluated reliably by the	
	for a direct statement about the mortality rate	rather than a series of indirect statements
	about techniques, as for the fishery.	
	Farms may have varying quality of past recor	d keeping. We have focused on the mortality
	rate during the current and previous season,	
	years may also be taken into account.	
COMMENTS &	Detailed records are kept of daily mortality, as	nd this data was reviewed back to 1984
SCORE	(the first year SSE operated). Mortality record	
	weight back- calculated to piece using average	
	In an ideal world, the other eel growing faciliti	es would track mortality in the same way.
	Total manufality materials for the close 5 years are all	tion to the table below
	Total mortality rates for the last 5 years are g	ven in the table below:
	YEAR	% MORTALITY
	2008	4.8
	2009	4.5
	2010	4.4 (UK Glass Eels / French eels)
	2011	3.7 (UK Glass Eels / French eels)
	2012	3.7 (UK Glass Eels / Fielich eels) 3.7 (UK Glass Eels – Severn eels)
		,
	MEAN IN LAST 5 YEARS	4.22





A peak in mortality rates during 2008/2009 is obvious. This is attributed to a problem with the water source for the facilities which was only recently understood. The water (mains water) comes from a lake which was connected to other lakes for water management purposes. This connection was cut off to upgrade the infrastructure, leading to the water coming into the plant being harder – i.e. more buffered against changes in pH. Previously, the farm had relied on the pH being drawn down naturally by the respiration of the eels (generating CO₂ which dissolves to carbonic acid). The harder water led to the pH remaining close to 8 instead of dropping to around 7, causing problems with ammonia toxicity.

The problem was resolved by using acid (HCI) to drop the pH.

Scoring - Green- the mortality is well below the 10% threshold

2. The fish meal/oil ingredients in the feed come from a sustainable source

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.

NOTES

Note 18: 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 19: Sustainable fisheries

In this statement we follow MSC and other eco-labels 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 over-fished?), 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 size 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.

COMMENTS & SCORE

As for all eel farms, the eels are started feeding on cod roe (in the quarantine facility only) and then moved on to commercial eel food. The cod roe comes from the fish auction at Gothenburg on the west coast of Sweden. The cod roe must be fresh, but does not have to be in perfect physical condition, so usually offcuts and slightly squashed pieces are used which cannot be sold for smoking and would probably otherwise be discarded or sold cheaply with other offcuts. SSE note that they have tried to cut down on the cod roe, but do not believe that it can be eliminated entirely.





As for all eel farms, the eels are started feeding on cod roe (10 days) and then moved on to commercial eel food manufactured by BioMar (99%) & Skretting (1%) (for the Glass Eel feed – 0.5-0.8mm - up to the first grading – 5g – two months – slurry then pellets)

The fishing method for the cod roe is likely to be trawling and currently the area of fishing (north of Sweden) is not MSC certified (confirmed through conversation with the suppliers who are MSC certified). It is possible that in 2014 the roe will be certified and so the score will be upgraded.

The source of the feed is reported by feed companies to be from sustainable stocks, but they request confidentiality. This has been checked by SEG Auditors during a visit to the Biomar Factory in Denmark where evidence was produced to substantiate the claim (www.fishsource.com)

Scoring - For cod roe suggest amber – roe would otherwise mainly be discarded but stock status of North Sea and Northern Baltic cod and fishing method preclude green score. For dried feed informal (confidential) information from the feed companies suggests green. Overall however go for Amber

3. Feed is used as efficiently as possible

green score	The average feed conversion ratios in the farm are as follows:
indicator	glass eel to fingerlings: <1.1
	fingerlings to 200g: <1.6
	large eels: <2.0
amber score	The average feed conversion ratios in the farm are as follows:
indicator	glass eel to fingerlings: <1.3
	fingerlings to 200g: <1.8
	large eels: <2.2
NOTES	Note 20: Feed conversion ratios
	Note that these figures are from eel farmers – no national or international standards appear
	to exist for eel farming.
COMMENTS &	Close records are kept of feed conversion rates and these were inspected. Rates used in

COMMENTS & SCORE

Close records are kept of feed conversion rates and these were inspected. Rates used in calculations, based on experience, are as follows:

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5-10g - 1.1 )
10-50g - 1.4 )
50-100g - 1.5 )
100-150g - 1.6 ) Overall average 1.59 (figures 2012)
150-200g - 1.8 )
>200g - 1.9 )
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For fingerlings and large eels the green score is met. For the medium size, the average figure obviously depends on the proportion of each size class in the farm at a given time, and whether the average is calculated per eel (biasing the figures in favour of smaller eels) or per unit weight of eel (unit weight of food) (bias in favour of larger eels).

In addition, the farm managers note that these figures tend to exclude periods when the eels do not grow, making them slightly better than the real figures.

Overall, a qualitative review of the figures suggests that the farm is borderline green/amber – to be precautionary, an amber score was given.

4. There are no ecological impacts from effluent discharge

green score	Effluent discharge complies with all local and national requirements. Effluent is regularly
indicator	tested for solids, nutrients and other relevant residue e.g. any drug treatment residues, if
	necessary, and has not been found to be non-compliant in the past 5 years. The residue
	produced will meet national guidelines.





indicator COMMENTS & SCORE SET produces an environmental report every year for the Swedish authorities, detailing, among other things, tests on the effluent discharged into the Oresund. Results are given for suspended solids, CDD (formerly BOD), total P and total N. The facility has permission to discharge a maximum of 1.7 tonnes/year of P and 12 tonnes/year of N, and this has never been exceeded. No veterinary medicines are used. All chemical use (formalin, disinfectant, acid, salt etc.) must be reported. Sludge from the drum filter collects in a sump and is tested for heavy metals before being given to a pig farm for mixing with pig manure for use as fertiliser. Overall a Green score should be awarded 5. Disease is treated rapidly and appropriately green score indicator Eels are handled and held in a way that minimises the spread of disease. Eels are inspected for disease cally, and disease is treated rapidly following well-defined procedures. There is a periodic veteriary inspection following national/EU requirements. Records are kept of disease outbreaks and medications. No chemical is used that risks ecological impacts or food residues at low concentrations, unless there are effective procedures for removal of residue before discharge. NOTES		PARINERS
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COMMENTS & SCORE

Handling within the facility is mainly for grading – this is done with a grading machine similar to the other facilities, i.e. a compressed air pump lifts the eels out of the tank through a pipe, they are graded through rounded metal bars, and go straight back into a tank, in water at all times, with no physical handling. The eels are graded every six weeks

Consumption eels are starved and cooled over a minimum of five days before transport.

Before transport (e.g. to the restocking site) the fingerlings are starved and cooled. They are packed in the same boxes as they arrived in, with water and aeration. They are packed in the evening, transported overnight and restocked early in the morning.

Any killing is now done by freezing for one day so the eels gradually go to "sleep" – salt is not used any more. This is regarded as being more humane.

In general, handling and transport is very carefully done using the best possible procedures. The killing procedure is the only option at present, although other options are under consideration.

A Green Score should therefore be awarded

7. The farm provides eel for restocking

green	score
indica	tor

The farm makes more than 10% of their annual production (by number) available for restocking in their country or elsewhere. This restocking should be for the primary purpose of conservation / escapement.

amber score indicator

The farm makes 5-10 % of their annual production (by number) available for restocking in their country or elsewhere. This restocking should be for the primary purpose of conservation / escapement.

Red score indicator

The farm does not provide any eels for restocking and therefore cannot be considered for certification until evidence of restocking is provided

COMMENTS & SCORE

The main business of this facility is restocking, with 'left-over' eels entering the farm. In some years, 100% of the production has gone for restocking, but the usual proportion is around 70%. In 2012 it was 79.9%. Restocking is mainly in Sweden, but is also carried out in Finland and has in the past been carried out in Germany and Poland. 50% of the Swedish restocking is funded by the state for conservation purposes, 20-25% is funded by power companies and the rest is various small clients – mainly fishing associations.

The ICES 2010 Swedish Country Report suggests that past restocking has contributed ~7% over and above natural silver eel production at present, with proposed increases in restocking projected in provide an additional 6% increase. However, recent work in the Oresund suggests that restocking may be significantly more important to escapement than this. Restocked eels can be distinguished to some extent by changes in Ca/Sr in the otolith, and migrating silver eels caught in the Oresund at two sites were 21% and 27% from restocking, with 10% wild and the remainder not able to be identified either way.

On this basis, it is reasonable to argue that the work of this facility contributes significantly to escapement / conservation.

A Green Score should therefore be awarded

8. Research / education - bonus

green score indicator

The enterprise actively participates in or contributes to research and monitoring to support implementation of the management plan for the water where the source eels were captured or for the plan local to the culture facility, or to education projects to promote eel awareness and conservation (this excludes legal requirements).

NOTES

Note 22: Bonus

A business that both deals in and grows on glass eels could potentially receive two 'bonus' scores for the same research / education – one as a glass eel buyer and one as a glass eel grower. The same project should not score two bonuses – it should be scored in the





	LIMITED
	more appropriate place.
COMMENTS & SCORE	SSE have worked with eel scientists on projects such as testing means of marking restocked eels (H.Wickström, N Sjöberg. 2013. Traceability of stocked eels – the Swedish Approach. Ecology of Freshwater fish), in order to measure the contribution of restocking to standing stock and escapement – this is over and above their work in restocking as a commercial activity. They have also contributed scientific publications such as on their experience in designing quarantine facilities (Ackerfors et al. 1986 in Grimaldi and Rosenthal eds, Efficiency in Aquacultural Production: Disease Control, Edizione de Sole, Italy, 227 pp.). They also provide significant amounts of current and historical data to the Swedish ICES scientists (see Swedish 2010 Country Report).
	Eels are sent to the Universities in Lund and Stockholm for research into Vitamin B analysis
	SSE has also participated in research using a strontium (Sr) solution to mark the otoliths in the eels. This has been used for traceability tests in Sweden and Finland and research papers published (March 2013)
	Based on this a Bonus should be awarded

PART TWO - TRACEABILITY (ex V5 new Eel Standard)

1 Incoming Product	
green score	The organisation shall operate a system which allows incoming eel products to be
indicator	traced back to a certified source
red score	The organisation is unable to demonstrate that product can be traced back to a
indicator	certified source
NOTES	Note 20 - The client will need to have copies of the certificates of all certified
	suppliers with whom they deal, to prove to the auditor that they are certified.
	These will need to be backed up by incoming invoices from these suppliers
	showing the purchase of SEG Certified product
COMMENTS &	SSE has a contract with UK Glass Eels to provide their annual requirements –
SCORE	copies of the suppliers' certificate are held and comprehensive records are held
	proving the provenance of the eels (copies enclosed).
	Formal Fal CaC Dragaduras are now in place (non-conformance at ariginal audit)
	Formal Eel CoC Procedures are now in place (non conformance at original audit)
	Scoring – Green score as traceability to supplier proved
	Goothing — Green score as traceability to supplier proved
2 Separation	and Segregation of Product
green score	The organisation shall operate a system which ensures that the product remains
indicator	separated at all stages from arrival to dispatch from non-certified eel products. The
	organisation shall ensure that any products wishing to make a claim as certified
	shall not contain any non-certified eel based ingredients.
red score	The organisation has no system in place to ensure that certified and non-certified
indicator	product remains separate at all stages OR non-certified and certified products
	have become mixed OR certified products (or products wishing to be certified)
NOTES	contain or could contain non-certified eel based ingredients
NOTES	Note 21 - Separation can be achieved through physical or temporal separation.
	However it is done it must ensure that mixing will not occur. Products cannot
	contain any non-certified eel (all eel-based ingredients must come from an SES
COMMENTS &	certified source). Certified eels can be identified at every stage of the process through physical
SCORE	separation and clear record keeping.
SCORE	separation and clear record keeping.





All eels purchased in the last three years have come from certified sources (UK Glass Eels & Chez Mouchet – all through UK Glass Eels) so there are no issues with mixing with non certified eels

Scoring- Green

3. – Outgoing Product

green score indicator

The organisation shall only label certified products with the 'SES' ecolabel once it has been approved to do so through the signing of an 'SES' ecolabel licence agreement.

All product to be sold as certified by an organisation shall meet the following criteria:

- Any product labelling shall be accompanied by the 'SES' logo.
- Products shall be accompanied by an invoice which shall:
 - Include the prefix 'SES' in the product description;
 - Include a record of the volume/quantity of product and to whom it was sold:
 - Include the certificate code on the invoice
- The certificate code must be clearly related to the certified product only

amber score indicator

The score shall be amber if the above requirements are met except that:

- Products have been labelled with an 'SES' logo despite no 'SES' ecolabel licence agreement being in place.
- Products have not been accompanied by the SES logo AND/OR not correctly labelled through the invoice

red indicator

Products or product invoices have been labelled as SES with the words SES or the SES ecolabel despite not being completely derived from a certified source

NOTES

Note 22 - It is a requirement that all products that wish to be labelled as meeting the SES standard also carry the logo. The use of the logo will also need to be approved through the signing of an SES logo licence agreement prior to its use. Organisations will need to use the 'SES' prefix to identify products as certified on labels and invoices. Invoices will also need to have the quantity of certified product and show the certificate code. This code needs to link clearly to the certified product (so if non-certified product is also included on the invoice, it is clear that this product is not included').

E.g. SES-C-100 – This certificate code refers to products showing the 'SES' prefix and states that the eel product has been certified as sustainable against the Sustainable Eel Standard

COMMENTS & SCORE

SSE has an ecolabel licence but have yet to use it. However they have ensured through documentation (enclosed) that any eels sold are fully traceable back to SEG approved sources.

All invoices and relevant documentation have not been marked with the required information (they have added their own non approved statement) – this was as much through ignorance and concern that they did not wish to be the first to use the logo! This was rectified during the review and a format for invoices worked out and approved.

Based on this an Amber score must be awarded

4. - Record keeping and documentation

green score indicator

The organisation shall operate a system that allows the tracking and tracing of all eel from purchase to sale and including any steps in between. In the case of live eels this should include the ability to track each eel in each batch delivered to a buyer to be connected back to a water, a time period (maximum duration one month) and specific





	LIMITED
	fisherman/vessel (if relevant).
	 The organisation shall operate a system that also allows for the
	completion of a batch reconciliation of product by weight over a given period.
	The organisation shall maintain records for a minimum of three (3) years.
orange score	The score shall be amber if the above requirements are met except that:
indicator	■ The organisations tracking and tracing system is unable to track eel from
	purchase to sale with confidence
	 Records have been maintained for less than three (3) years
red score	The organisations tracking and tracing system shows evidence that certified and
indicator	non-certified have become mixed AND/OR batch reconciliation records are unable
	to confirm that outgoing quantities are in line with incoming quantities
NOTES	Note 23 - The key to traceability is good record-keeping. Organisations will need
	to be able to produce records that allow for the tracking of product throughout their
	ownership. They will also be required to produce records that allow an auditor to
	view the quantity (in weight) of product that has been bought, lost and sold. The auditor will want to be able to ensure that the amount of certified product leaving
	the Chain of Custody is the same or less than the corresponding amount bought.
	It is noted that 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 induced by handling so that good husbandry dictates that handling is minimised – this means weighing only when necessary
COMMENTS &	SSE has very comprehensive documentation and record keeping and every
SCORE	movement has been clearly documented.
	There is an issue however that after the first year the eels from one batch will be of totally different sizes, some of which will be the same as the previous year's eels. Space considerations dictate that these eels must be mixed and although everything is traceable to a certified supply there is no way currently of identifying the mixed batches.
	Based on this an Amber score must be awarded

General Observations