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Data collection, restocking of eels in Swedish waters

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This document describes, in brief, data collection of eel restocking in Sweden. The document contains background and brief history, implementation, data collection, end users, and quality assurance.

The European eel (*Anguilla anguilla*) hatches in the Sargasso Sea and as small leptocephalus larvae they are then transported by the ocean currents towards the European continent. During transport, the larvae develop into transparent glass eels. Once on the coast of Europe, the glass eels begin to develop pigment and when they find their way up into the watercourses along the coast, they are called elvers. Since the number of glass eels and/or elvers that reach the coasts of Europe and migrate up into watercourses has decreased sharply, restocking have been made.

Background and brief history

Historically, translocation of eels within the country, in order to strengthen stocks and maintain fisheries, has been common in Swedish waters (Nyström and Trybom, 1902; Wickström, 1979). In connection with the development of various water activities that have prevented the eel from entering watercourses in a natural way (such as hydropower plants and dams), water courts have also decided that so-called restocking should take place as a compensatory measure. The restocking can either consist of eels that have naturally migrated to Swedish waters and been collected in elver traps, or of imported glass eels from other countries. These eels have generally been released upstream of migration obstacles. In accordance with the Swedish Eel Management Plan, imported eels have also been restocked for conservation purposes since 2009 (Ålförvaltningsplanen, Jo2008/3901) (the state-funded restocking have been paused since 2020 pending evaluation of the measure). Restocking of imported eels means that glass eels are caught in areas in southwestern Europe, such as on the French and English Atlantic coasts. The eels are then transported with the help of humans to areas where there are assumed to be good nursery environments and low natural mortality. Since the 1980s, the imported eels to Sweden have been kept in quarantine before release (Wickström, 1982). Since 2009, all imported eel released in Sweden has been chemically marked with Strontium (Sr). The chemical marking makes it possible to distinguish restocked eels from natural recruits through chemical analysis of the eel's otoliths (hearing stones). Since 2009, import, quarantine and chemical marking have been handled by the company Scandinavian Silver Eel (SSE) in Helsingborg (previously there were several importers such as Sejrbo & son AB and Flygeltofta).

With the decline of the eel stock in both Sweden and Europe, the Swedish Board of Fisheries (now SLU Aqua and the Swedish Agency for Marine and Water Management), as part of a larger European study, did a solid job in 1995 to compile data on the translocated and restocked eels that have been performed in Swedish waters. Further efforts were made in 2006 when funds were developed to enable the Swedish Inland Fishermen's Federation (SIC) to compile the information that existed about historical restocking of eels in their archives. That compilation also included information from agricultural societies, fishing

committees, fishing water area associations (FVOF), fishing water owners and professional fishermen. Unfortunately, a large part of the historical documentation of eel restocking in Swedish waters had been destroyed when SIC moved its office a few years earlier. Since these compilations were made, the Swedish Board of Fisheries and later SLU Aqua have continued to collect data annually on eel restocking.

Implementation and data collection

Every year, SLU Aqua receives information regarding rerestocking from Scandinavian Silver Eel (SSE). Data is collected on the number of eels (estimated by weight) sold, to which county and in which water the eel has been planned to be released, the date of release and whether the financier has been state, private, power company or company. In cases where SSE also had information about coordinates for the restocking site, these have been included. In many cases, annual restocking plans have also been sent to SLU Aqua. These have mainly come from the County Administrative Board in Skåne, which, since 2010, has been responsible for all restocking of eels financed by the state, but also from, for example, other county administrative boards, SIC and various research projects (e.g. the 8+fjords project). From the restocking plans, data on the number of eels, water names, water systems, site coordinates, and contact information for each contact person have been collected. The number of restocked eels has not always corresponded between what SSE has stated and what has been stated in the restocking plan (restocking plans can be changed if financial grants change or if the price of the eel changes). SLU Aqua has therefore decided to mainly use data from SSE (since 2017), as these are figures on the actual amount of glass eel sold that have been restocked. As part of a validation process, SLU Aqua has started up a reporting option via SLU's website where those who restock eel can voluntarily report data about the restocking such as year, supplier, financier, county, municipality, water name, water system, name of restocking site, site coordinates, total weight and number of eels directly via a website (https://www.slu.se/institutioner/akvatiska-resurser/radgivning/bevarandebiologi-och-invasiva-arter/utsattning-av-al/) or via a form that can be emailed to SLU Aqua. In 2023, the reporting portal was tested by the City of Borås, with good results. Further dissemination of information regarding the reporting portal began in 2024, which will continue in 2025 by SSE sending out information about the reporting portal to everyone who buys glass eels for restocking.

In the data on restocking in Swedish waters, there are, in some cases, no coordinates for the restocking site. Work is ongoing to fill these gaps by contacting those responsible for the restocking. In some cases where it is not possible to obtain exact coordinates, coordinates have been given for the outlet of the lake or watercourse where the restocking was made.

The obtained data is stored in the database Sötebasen, which is managed by SLU Aqua, the Institute of Freshwater Research.

End user

Data on the number of eels that are imported and restocked are used in the national stock assessment of eels in Swedish waters. The stock assessment is carried out by SLU Aqua on behalf of the Swedish Agency for Marine and Water Management every three years, in accordance with the Swedish Eel Management Plan (van Gemert et al., 2024). Data is also delivered by SLU Aqua to the international working group for eels, WGEEL, via annual data requests (so-called data-calls) where data is used for

various stock assessments for the European eel. The data is also used by other end users such as county administrative boards and researchers.

Quality assurance

Data collection of eel restocking is partly funded by the EU and takes place within the framework of the EU's Data Collection Framework (DCF). Within DCF, three-year work plans are written (Swedish Work Plan 2022–2024) which include quality assurance of the data collected (Annex 1.1 in the Swedish Work Plan 2022–2024). As part of improving the process of quality assurance, all points in Annex 1.1 are listed here with an accompanying comment describing the issue and quality assurance (Table 1).

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Table 1: Quality assurance of data from restocking of eel according to Annex 1.1 of the Swedish national work plan within DCF (Swedish Work Plan 2022–2024).

Category	Question	Comment
Summary	Target species and sampling area	European eel (*Anguilla anguilla)*. All individual eel being restocked into Swedish fresh and coastal waters.
	Population sampled	All individual eels being restocked are registered.
	Population unreachable for sampling	All individual eels being restocked are registered.
	Stratification	All individual eels being restocked are registered.
Sampling - design and protocol	Sampling design description	All individual eels being restocked are registered.
	Compliance with the 4S principle	NA
	Regional coordination	No
	Documentation of sampling design	This document
	Design compliance with international recommendations	There are no international recommendations for data collection on eel restocking.
	Documentation of sampling data	This document
	Protocol compliance with international recommendations	International recommendations from WGEEL for data collection on recruitment are followed.
Sampling implementation	Recording of refusal rate	NA
	Sampling progress	Eels are primarily being restocked during summer and early autumn. Data on restocking numbers are delivered or asked for from SSE when the restocking for each area has been completed. If an organisation that restock eels have not reported, they are contacted and asked to provide data.
Data collection	Means of data capture	No material is needed since the data collection is on number of restocked eels per site and year.
	Data capture documentation	This document
	Documentation of quality checks	This document. Primary data cannot be checked by SLU.
Data Storage	National database	Data is stored on SLU Aqua's database "Sötebasen"
	International database	Processed data is delivered to ICES via WGEEL Data Calls and stored in the WGEEL database.
	Quality checks and data validation documentation	This document (and work in progress).
Sample storage	Sample storage	No sampling is done, only numerical data
	Sample analysis	No sampling is done, only numerical data
Data processing	Evaluation of data accuracy (bias and precision)	This document (and work in progress)
	Editing and imputation methods	This document (and work in progress)
	Quality documents associated to a dataset	This document (and work in progress)
	Validation of the final dataset	Processed data is validated within Data Calls and the annual ICES WGEEL working group meetings.

References

ANNEX 1.1 - Quality report for biological data sampling scheme. Del av: Swedish Work Plan 2022–2024. Swedish Work Plan for data collection in the fisheries and aquaculture sectors. Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (recast). https://dcf.ec.europa.eu/wps-and-ars/work-plans_en

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