Report on the eel stock, fishery, and other impacts in:

Norway

2023-2024

Note to the reader – this document accompanies a series of spreadsheet tables that provide the bulk of the data in a format most suitable for the working practices of WGEEL. Summaries of these data are provided in this document.

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1 Summary of national and international stock status indicators

1.1 Escapement biomass and mortality rates

Table 1. Stock indicators of silver eel escapement, biomass and mortality rates, and assessed habitat area.

Year	EMU_code	Assessed Area (ha)	B_0 (kg)	B_{curr} (kg)	B_{best} (kg)	Bcurr/B_0 (%)	∑F	∑H	∑A
2016	NO_total	2387	No data	36021	39612	No data	0.095	No data	0.095
2017	NO_total	12375	No data	36346	47244	No data	0.26	No data	0.26
2018	NO_total	5406	No data	45681	49084	No data	0.072	No data	0.072
2019	NO_total	6821	No data	54158	58158	No data	0.071	No data	0.071
2020	NO_total	7587	No data	50225	54225	No data	0.077	No data	0.077
2023	NO_total	No data	No data	No data	No data	No data	No data	No data	No data

Key: EMU_code = Eel Management Unit code (see Table 2 for list of codes); B_0 = the amount of silver eel biomass that would have existed if no anthropogenic influences had impacted the stock (kg); B_{curr} = the amount of silver eel biomass that currently escapes to the sea to spawn (in the assessment year) (kg); B_{best} = the amount of silver eel biomass that would have existed if no anthropogenic influences had impacted the current stock (kg); ∑F = mortality due to fishing, summed over the age groups in the stock (rate); ∑H = anthropogenic mortality excluding the fishery, summed over the age groups in the stock (rate); ∑A = all anthropogenic mortality summed over the age groups in the stock (rate); Assessed area (ha) = combined area total (ha) of transitional and inland waters.

1.2 Recruitment time series

The WGEEL uses these time series data to calculate the Recruitment Indices, relative to the reference period of 1960-1979, and the results form the basis of the annual Single Stock Advice reported to the EU Commission. These recruitment indices are also used by the EU CITES Scientific Review Group in their annual review of the Non-Detriment Finding position.

The only available time series of elvers is from a trap at the mouth of the River Imsa in south-western Norway (58°50′ N, 5°58′ E) (Figure 1 and 2, table 1, 2 and 3). The staff at the Norwegian Institute for Nature Research (NINA) Research Station at Ims have been trapping and recording upstream migration of elvers annually since 1975. There is a wolf trap across the river at this site, collecting all downstream migrating fish as well. A few elvers may be able to migrate upstream at this site without being trapped, but probably not in large numbers. Larger elvers (> 3 mm diameter) are counted, whereas smaller ones are measured in litres, with the assumption that there are 2000 elvers per litre. In recent years, numbers have been so low that all eels are counted individually. In Imsa, recruits migrating upstream are not true glass eel, but have already achieved a brown colour, and are here therefore termed elvers.

Figure 1. Map of Norway showing the location of the eel monitoring sites River Imsa and Skagerrak coast.

2 Overview of the national stock and its management

2.1 Describe the eel stock and its management

Durif and Skiftesvik 2018 (in Norwegian) summarizes the monitoring program started in 2017.

2.2 Significant changes since last report

No changes

3 Impacts on the national stock

3.1 Fisheries

3.1.1 Glass eel fisheries

No glass eel fisheries

3.1.2 Yellow eel fisheries

Data are in the data spreadsheet.

3.1.3 Silver eel fisheries

There are no silver eel fisheries

3.2 Restocking

There is no restocking

3.3 Aquaculture

There is no aquaculture

3.4 Entrainment

Approximately one third of the water covered areas are influenced by hydropower development. There are between 600 and 700 hydropower stations with an installed effect larger than 1 MW in operation. Effects by hydropower development on eel and eel distribution have not been studied or quantified.

3.5 Habitat Quantity and Quality

Norway has abundant rivers and lakes, and 6% of the total area of 323 802 km^2 is covered by freshwater. There are 144 river systems with a catchment area ≥ 200 km^2.

Eels is present everywhere along the Norwegian coastline. It's also been registered inland, in every one of Norway's administrative regions (Thorstad et al. 2010). Eel fisheries were traditionally located in southern Norway (Skagerrak coast). However, there have also been eel fishers in the western and central part of Norway. These fishers operate in saltwater but mostly in fjords and wind protected areas.

The analysis of telemetry data obtained on 11 eels in the sea in southern Norway (Arendal) shows that eels residing in the marine area occupy move at depths between 2 and 6 meters. Their home range varied between 2 to 5.6 km^2 .

In Norway, the landscape is quickly elevated when leaving the coast. This limits the ascension of eels high up into the watersheds. That is, 63% of the eels were registered less than 10 km from the coastline. 50% of the lakes where eel is documented are located 50 meters above sea level.

Overall, the eel density and carrying capacity of habitats in fresh- and saltwater in Norway is poorly known.

3.6 Other impacts

Acidification has caused the loss or reduction of many Atlantic salmon (*Salmo salar* L.) populations in southern Norway, and some rivers are still severely affected by chronic or episodic acid water. The areas affected by acidification have likely been among the most important areas for eel in Norway. Based on surveys in 13 rivers that are now limed, it seems that occurrence and density of eel was reduced due to acidification (Thorstad et al. 2010, Larsen et al. 2014). Densities of eel increased more than four-fold after liming when compared with pre-liming levels.

4 National stock assessment

4.1 Description of Method

Durif and Skiftesvik 2018 (in Norwegian) summarizes the monitoring program started in 2017.

4.1.1 Data collection

Eel densities (in number of eels per length of coastline) are based on mark-recapture experiments in two locations (western and southern Norway). Available habitat is calculated by GIS taking the whole coastline.

4.1.2 Analysis

Methods are described in Durif and Skiftesvik 2018.

4.1.3 Reporting

The results are reported to the Norwegian Directorate of Fisheries (last year in 2019)

4.1.4 Data quality issues and how they are being addressed

No available data

4.2 Trends in Assessment results

We only have stock indicators for two consecutive years (2017-2018).

5 Other data collection for eel

5.1 Yellow eel abundance surveys

The Skagerrak beach seine surveys data from Norway constitute the longest non-fishery dependent set of data. It is also the only potential time series on the subpopulation of marine eels. This unique monitoring program was initiated at the Norwegian Skagerrak coast (southern Norway).

The first hauls of the Skagerrak monitoring program were conducted in 1904, and during the following years, new sampling stations were added, and a standard routine for the hauls was developed. Approximately 130 stations are sampled in 20 different areas. All hauls are taken at

the same season (autumn) and always during daytime. Based on the initial results from these hauls, the monitoring program was established and reached its present form in 1919. The catching method is not ideal for eels (close to the shore, in daylight) and the number of eels caught per year is less than 100. Yet, the time series shows a reliable trend which is much like the other trends in the rest of Europe (Durif et al. 2011). For each year, we calculate the number of eels per number of hauls.

Some of the eels have been measured since 1993, but not very precisely, since the eels are not anesthetized. The stage is not determined but it is mostly yellow eels.

5.2 Silver eel escapement surveys

No available data

5.3 Life history parameters

Age and silvering stage available for around 1000 eels. Most of the data is from Imsa.

Silver stage is evaluated using Durif et al. (2005) wherever eye and fin measurements are available.

5.4 Diseases, Parasites & Pathogens or Contaminants

Prevalence of *Anguillicola crassus* in Norway. FW: freshwater; BW: brakish water; SW: saltwater

YEAR		SALINITY	N SAMPLED	% PREVALENCE
2016	Flødevigen	SW	123	18%
2017	Flødevigen	SW	106	19%
2018	Grimstad	FW	25	64%
		SW	58	3%
2019	Etne	FW	30	30%
		SW	30	30%
	Fister	SW	36	0
	Bjugn	FW	30	0
	Smøla	SW	30	0
	Orkla	FW	3	0
2020	Arendal	BW	8	75
		FW	22	82
2020	Austevoll	FW	45	0
		SW	33	0
2020	Hardangerfjord	SW	42	0

6 New Information

No new paper published in 2024

7 References

Diserud, O. H., et al. (2017). Oppvandring og bestandsstruktur hos ål i Imsa, 1975-2016, NOTAT til Miljødirektoratet**:** 13.
Durif, C. M. F. and A. B. Skiftesvik (2017). Forskningsfangst av ål- Sluttrapport HI prosjekt 81333. Rapport fra Havforskningen, Havforskningsinstituttet**:** 50.