

European eel (*Anguilla anguilla*) throughout its natural range

ICES stock advice

ICES advises that when the precautionary approach is applied for European eel, all anthropogenic impacts (e.g. recreational and commercial fishing on all stages, hydropower, pumping stations, and pollution) that decrease production and escapement of silver eels should be reduced to – or kept as close to – zero as possible.

Stock development over time

The status of eel remains critical.

The annual recruitment of glass eel to European waters in 2017 remained low, at 1.6% of the 1960–1979 level in the “North Sea” series and 8.7% in the “Elsewhere Europe” series. The annual recruitment of young yellow eel to European waters was 24% of the 1960–1979 level. These recruitment indices remain well below the 1960–1979 reference levels, and there is no change in the perception of the status of the stock.

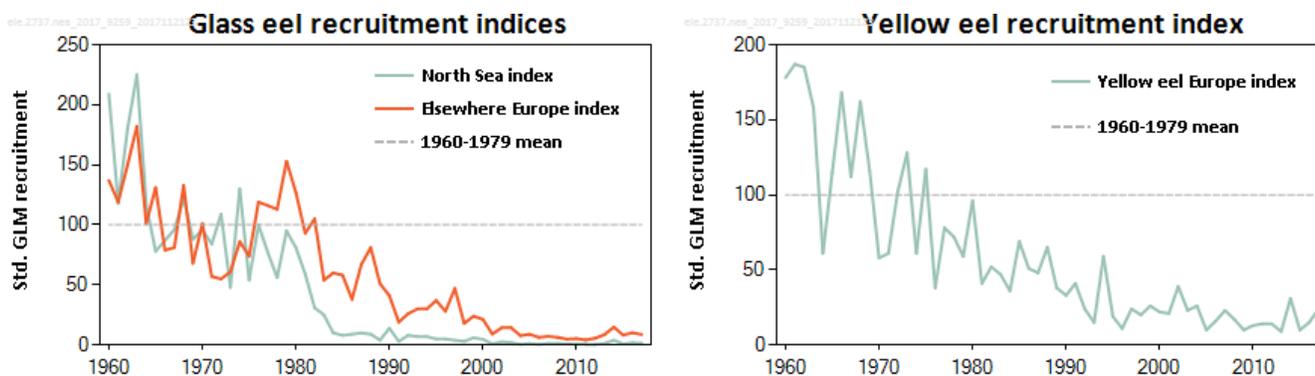


Figure 1 European eel. Left panel: indices, geometric mean of estimated (GLM) glass eel recruitment for the continental “North Sea” and “Elsewhere Europe” series. The GLM (predicting recruitment as a function of area, year and site) was fitted to 43 time-series, comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 geometric mean. The “North Sea” series are from Norway, Sweden, Germany, Denmark, the Netherlands, and Belgium. The “Elsewhere” series are from UK, Ireland, France, Spain, Portugal, and Italy. Right panel: Geometric mean of estimated (GLM) yellow eel recruitment trends for Europe. The GLM (predicting recruitment as a function of year and site) was fitted to 14 yellow eel time-series and scaled to the 1960–1979 arithmetic mean.

Stock and exploitation status

Table 1 European eel. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size		
		2014	2015	2016	2015	2016	2017
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	$MSY B_{trigger}$	⊗ ⊗ ⊗ Below possible reference points
Precautionary Approach	F_{pa} F_{lim}	?	?	?	Undefined	B_{pa}, B_{lim}	⊗ ⊗ ⊗ Below possible reference points
Management plan	F_{MGT}	—	—	—	Not applicable	B_{MGT}	— — — Not applicable
Qualitative evaluation	-	?	?	?	Unknown	Recruitment	→ → → Highly impaired recruitment

Catch options

Total landings and effort data are incomplete and therefore ICES does not have the information needed to provide a reliable estimate of total catches of eel. Furthermore, the understanding of the stock dynamic relationship is not sufficient to determine/estimate the impact any catch (at the glass, yellow, or silver eel stage) would have on the reproductive capacity of the stock.

Basis of the advice

Table 2 European eel. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	<p>A management framework for eel within the EU was established in 2007 through an EU regulation (EC Regulation No. 1100/2007; EC, 2007), but there is no internationally coordinated management plan for the whole stock area, which extends beyond the EU. The objective of the EU regulation is the protection, recovery, and sustainable use of the stock. To achieve the objective, EU Member States have developed Eel Management Plans (EMPs) for their river basin districts, designed to allow at least 40% of the silver eel biomass to escape to the sea with high probability, relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock. ICES has evaluated the conformity of the national management plans with EC Regulation No. 1100/2007 (ICES, 2009, 2010) and progress in implementing EMP actions (ICES, 2013a, 2013b). The EU Member States produced progress reports in 2012 and 2015. The 2015 reports have not been post-evaluated at the time of writing this advice.</p> <p>The EC Regulation of 2007 (EC, 2007), establishing measures for the recovery of the stock of European eel, has not been evaluated by ICES for its conformity with the precautionary approach and has for this reason not been used as the basis for the advice.</p>

Quality of the assessment

An eel data call was issued for the first time in 2017, which has substantially improved the coverage and completeness of the data being reported to the WGEEL. However, data on fisheries and other anthropogenic impacts remain incomplete.

The advice is based on two glass eel recruitment indices and a yellow eel recruitment index. The indices are based on data from fisheries and scientific surveys and form the longest and most reliable time-series that constitute an index of abundance. The current advice is based on the fact that the indices used by ICES are still well below the 1960–1979 levels.

Total landings and effort data are incomplete. There is a great heterogeneity among the time-series of landings because of inconsistencies in reporting by, and between, countries, as well as incomplete reporting. Changes in management practices have also affected the reporting of commercial, non-commercial, and recreational fisheries.

Issues relevant for the advice

In September 2008, and again in 2014, eel was listed in the IUCN Red List as a critically endangered species.

The assessment and management of the fisheries and non-fisheries mortality factors are carried out by national and regional authorities. Fisheries take place on all available continental life stages throughout the distribution area, although fishing pressure varies from area to area, from almost nil to heavy overexploitation. Illegal, unreported, and unregulated (IUU) fishing is known to occur. The non-fishing anthropogenic mortality factors can be grouped as those due to (a) hydropower, pumping stations, and other water intakes; (b) habitat loss or degradation; and (c) pollution, diseases, and parasites. In addition, anthropogenic actions may affect predation mortality, e.g. conservation or culling of predators.

Environmental impacts in transitional and fresh waters, which include habitat alteration, barriers to eel passage, deterioration in water quality, and presence of non-native diseases and parasites, all contribute to the anthropogenic stresses and mortality

on eels and also affect their reproductive success. It is anticipated that the implementation of the Water Framework (WFD) and the Marine Strategy Framework (MSFD) directives may result in improvements to the continental environment and that this may have a positive effect on the reproductive potential of silver eel.

ICES notes that stocking of eels is a management action in many eel management plans, and that this stocking is reliant on a glass eel fishery catch. There is evidence that translocated and stocked eel can contribute to yellow and silver eel production in recipient waters, but evidence of contribution to actual spawning is missing due to the general lack of knowledge of the spawning of any eel. Internationally coordinated research is required to determine the net benefit of restocking on the overall population, including carrying capacity estimates of glass eel source estuaries as well as detailed mortality estimates at each step of the stocking process.

When stocking to increase silver eel escapement and thus aid stock recovery, an estimation of the prospective net benefit should be made prior to any stocking activity. Where eel are translocated and stocked, measures should be taken to evaluate their fate and their contribution to silver eel escapement. Such measures could be batch marking of eel to distinguish groups recovered in later surveys (e.g. recent Swedish, French, and UK marking programmes), or implementing tracking studies of eel of known origin. Marking programmes should be regionally coordinated.

A management framework for eel within the EU was established in 2007 through an EU Regulation (EC Regulation No. 1100/2007; EC, 2007), but there is no internationally coordinated management plan for the whole stock area.

The framework required EU Member States to report on progress in 2012, 2015, and 2018. In 2012, many EU Member States did not completely report stock indicators (22 of 81 EMPs did not report all biomass indicators, and 38 did not report all mortality indicators), and there are differences in the approaches used to calculate reported stock indicators. A complete reporting of verified indicators covering the distribution area of the European eel is required for a full assessment of the stock. The 2015 reports have not been evaluated by ICES.

Reference points

The EC Regulation (EC, 2007) sets an escapement limit 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.

Recruitment at the 1960–1979 level is regarded as an un-impaired recruitment level.

ICES has advised the EU CITES Scientific Review Group on reference points for the eel stock that could be used in developing, and reviewing, an application for a non-detriment finding (NDF), under circumstances of any future improvement of the stock (ICES, 2015a). These reference points were developed specifically using CITES guiding principles for NDF.

Basis of the assessment

Table 3 European eel. Basis of the assessment.

ICES stock data category	3 (ICES, 2016).
Assessment type	Trend analysis.
Input data	Glass eel and yellow eel recruitment indices.
Discards and bycatch	Not included.
Indicators	None.
Other information	Landing statistics, while improved by the Data call in 2017, remain incomplete and reporting inconsistent. Stock indicators are incomplete from eel management units/countries in the EU and from non-EU states. There is no international legislative requirement to collect and provide data for the entire stock area.
Working group	Joint EIFAAC/ICES/GFCM Working Group on Eels (WGEEI; ICES, 2017).

Information from stakeholders

Data on recruitment collected by stakeholders are included in the assessment where appropriate.

History of the advice, catch, and management

Table 4 European eel. History of ICES advice.

Year	ICES advice *	Predicted catch corresponding to the advice *	TAC *	ICES catch **
1999	A recovery plan	-		
2000	No fishery and a recovery plan	0	-	-
2001	-	-	-	-
2002	No fishery and a recovery plan	0	-	-
2003	All anthropogenic mortality as close to zero as possible and a recovery plan	-	-	-
2004	-	-	-	-
2005	-	-	-	-
2006	All anthropogenic mortality as close to zero as possible and a recovery plan	-	-	-
2007	All anthropogenic mortality as close to zero as possible and a recovery plan	-	-	-
2008	All anthropogenic mortality as close to zero as possible	-	-	-
2009	All anthropogenic mortality as close to zero as possible	-	-	-
2010	All anthropogenic mortality as close to zero as possible	-	-	-
2011	All anthropogenic mortality as close to zero as possible	-	-	-
2012	All anthropogenic mortality as close to zero as possible	-	-	-
2013	All anthropogenic mortality as close to zero as possible	-	-	-
2014	All anthropogenic mortality as close to zero as possible	-	-	-
2015	All anthropogenic mortality as close to zero as possible	-	-	-
2016	All anthropogenic mortality as close to zero as possible	-	-	-
2017	All anthropogenic impacts as close to zero as possible	-	-	-
2018	All anthropogenic impacts as close to zero as possible	-	-	-

* There has never been a TAC for this stock.

** Catch estimates considered too incomplete to be presented.

History of catch and landings

Reported catches are considered too incomplete to give a reliable indication of the level of total catches; they are therefore not presented. Recreational landings are likewise considered too incomplete to be presented but are believed to be of a similar order of magnitude to the commercial landings.

Summary of the assessment

Table 5 European eel. Recruitment indices – geometric means of estimated (GLM) recruitment for glass eel in the continental “North Sea” and “Elsewhere Europe”, and recruitment of yellow eel in Europe. The glass eel GLM (predicting recruitment as a function of area, year and site) was fitted to 43 time-series, comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 geometric mean. The yellow eel GLM (predicting recruitment as a function of year and site) was fitted to 14 yellow eel time-series and scaled to the 1960–1979 arithmetic mean. These indices are updated on an annual basis and, as they are presented in relative terms, these updates may change the historical values.

Year	Glass eel recruitment		Yellow eel recruitment
	Elsewhere Europe	North Sea	Europe
1960	137	209	178
1961	119	118	187
1962	150	180	185
1963	182	225	158
1964	101	117	61
1965	131	78	115
1966	79	87	168
1967	81	96	112
1968	133	122	162
1969	68	88	116
1970	101	96	58
1971	57	84	61
1972	55	109	102
1973	61	48	128
1974	86	130	61
1975	74	54	117
1976	119	100	38
1977	116	77	78
1978	113	56	72
1979	153	95	59
1980	127	81	96
1981	93	59	41
1982	105	31	52
1983	54	25	47
1984	60	10	36
1985	58	8	69
1986	38	9	51
1987	67	10	48
1988	81	9	65
1989	51	4	38
1990	41	14	33
1991	19	3	41
1992	26	8	24
1993	30	7	15
1994	30	7	59
1995	37	5	19
1996	28	5	11
1997	47	4	24
1998	18	3	20
1999	24	6	26
2000	21.3	4.7	22
2001	9.1	1	21
2002	14.3	2.6	39
2003	14.5	2	23

Year	Glass eel recruitment		Yellow eel recruitment
	Elsewhere Europe	North Sea	Europe
2004	7.8	0.6	26
2005	8.9	1.2	10
2006	6.3	0.5	16
2007	7.2	1.3	23
2008	6.3	1.3	17
2009	4.8	0.9	10
2010	5.3	0.7	13
2011	4.2	0.5	14
2012	5.6	0.4	14
2013	8.6	1.2	9
2014	14.9	4	31
2015	8.2	0.9	10
2016	10.2	1.8	15
2017	8.7	1.6	24

Sources and references

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