

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

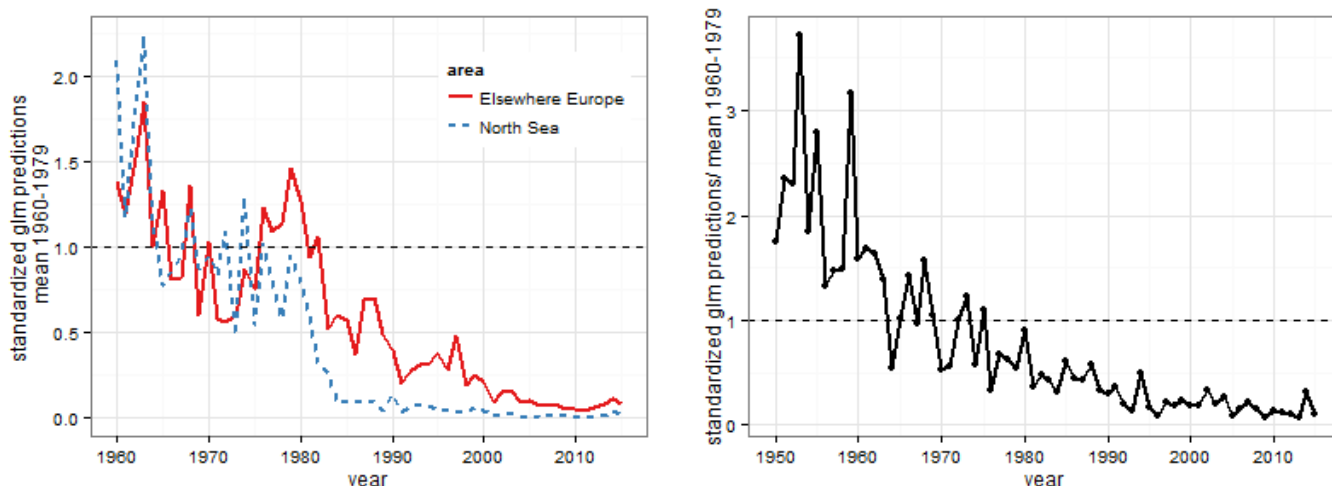
#### ICES stock advice

ICES advises that when the precautionary approach is applied for European eel, all anthropogenic mortality (e.g. recreational and commercial fishing on all stages, hydropower, pumping stations, and pollution) affecting 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 2015 decreased compared to 2014, from 3.7% to 1.2% of the 1960–1979 level in the ‘North Sea’ series, and from 12.2% to 8.4% in the ‘Elsewhere Europe’ series. The annual recruitment of young yellow eel to European waters decreased to 11% of the 1960–1979 level. These recruitment indices are well below the 1960–1979 un-impaired reference levels, and there is no change in the perception of the status of the stock.



**Figure 9.3.10.1** European eel. Left panel: Recruitment index, geometric mean of estimated (GLM) glass eel recruitment for the continental North Sea and “Elsewhere Europe” series. The GLM (recruit = [area year–1] + site) was fitted to 39 time-series, comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 average. 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 and smoothed trends for Europe. The GLM (recruit = year + site) was fitted to 12 yellow eel time-series and scaled to the 1960–1979 average.

#### Stock and exploitation status

**Table 9.3.10.1** European eel. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size					
		2012	2013	2014	2013	2014	2015			
Maximum sustainable yield	$F_{MSY}$	?	?	?	Undefined	$B_{trigger}$	?	?	?	Undefined
Precautionary approach	$F_{pa}$ , $F_{lim}$	?	?	?	Undefined	$B_{pa}$ , $B_{lim}$	?	?	?	Undefined
Management plan	$F_{MGT}$	-	-	-	Not applicable	$SSB_{MGT}$	-	-	-	Not applicable
Qualitative evaluation	-	?	?	?	Undefined	-	⊗	⊗	⊗	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 of any catch above zero (at glass, yellow, or silver eel stage) on the reproductive capacity of the stock.

**Basis of the advice**

**Table 9.3.10.2** 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 (<a href="#">EC Regulation No. 1100/2007</a>; EC, 2007), but there is no internationally coordinated management plan for the whole stock area. 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 (EMP) 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, 2013). The EU Member States produced progress reports in 2012 and 2015. The 2015 reports have not been examined by ICES at the time of writing this advice.</p> <p>The management plan 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**

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. This advice is based on the fact that these 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 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. IUU fishing is believed 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 mortality due to predators, 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 and the Marine Strategy Framework 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 limited by 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.

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The framework required EU Member States to report on progress in 2012 and 2015. 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. The 2015 reports were not available to ICES at the time of writing. A complete reporting of verified indicators covering the distribution area of the European eel is required for a full assessment of the stock.

### Reference points

The EC Regulation 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 EC 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 9.3.10.3** European eel. Basis of the assessment.

ICES stock data category	3 ( <a href="#">ICES, 2015b</a> ).
Assessment type	Trend analysis.
Input data	Glass eel and yellow eel recruitment indices.
Discards and bycatch	Not included.
Indicators	None.
Other information	Landing statistics are incomplete and reporting inconsistent. Stock indicators are incomplete from eel management units/countries in the EU. Stock indicators and other data are missing 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 (WGEEEL; <a href="#">ICES, 2015c</a> ).

## Information from stakeholders

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

## History of advice, catch, and management

**Table 9.3.10.4** European eel. History of ICES advice.

Year	ICES advice*	Predicted catch corresponds to advice*	TAC*	ICES catch** Total
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.	-	-	-

\* No TAC ever for this stock.

\*\* Catch estimates considered too incomplete to be presented.

## History of catch and landings

Catch data were considered too incomplete to be presented.

**Summary of the assessment**

**Table 9.3.10.5** European eel. Recruitment index, geometric mean of estimated (GLM) glass eel recruitment for the continental North Sea (NS) and “Elsewhere Europe” (EE) series. The GLM (recruit = [area year<sup>-1</sup>] + site) was fitted to 39 time-series, comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 average.

Year	EE	NS	Year	EE	NS	Year	EE	NS	Year	EE	NS	Year	EE	NS	Year	EE	NS
1960	138	209	1970	103	95	1980	127	79	1990	40	14	2000	21.4	4.7	2010	4.9	0.5
1961	119	117	1971	58	84	1981	95	59	1991	20	3	2001	9.7	0.9	2011	4.3	0.5
1962	152	178	1972	57	109	1982	106	32	1992	27	8	2002	15.0	2.6	2012	6.3	0.5
1963	185	224	1973	60	48	1983	53	26	1993	31	7	2003	15.5	2.1	2013	8.6	1.1
1964	100	117	1974	87	129	1984	60	10	1994	31	7	2004	8.9	0.6	2014	11.2	4.3
1965	133	77	1975	75	54	1985	57	9	1995	38	5	2005	10.1	1.3	2015	8.4	1.2
1966	81	86	1976	123	102	1986	37	9	1996	28	5	2006	7.2	0.4			
1967	83	95	1977	109	80	1987	69	10	1997	48	4	2007	7.9	1.3			
1968	136	122	1978	114	58	1988	70	10	1998	19	3	2008	7.1	0.8			
1969	60	87	1979	146	95	1989	49	4	1999	25	6	2009	5.0	0.9			

**Table 9.3.10.6** European eel. Geometric mean of estimated (GLM) yellow eel recruitment for Europe. The GLM (recruit = year + site) was fitted to 12 yellow eel time-series and scaled to the 1960–1979 average.

Year	Index	Year	Index	Year	Index	Year	Index	Year	Index	Year	Index	Year	Index
1950	175	1960	158	1970	52	1980	90	1990	30	2000	18	2010	13
1951	236	1961	168	1971	56	1981	37	1991	37	2001	18	2011	12
1952	230	1962	164	1972	100	1982	47	1992	21	2002	34	2012	11
1953	372	1963	139	1973	123	1983	43	1993	14	2003	20	2013	7
1954	184	1964	55	1974	58	1984	32	1994	50	2004	26	2014	31
1955	278	1965	102	1975	109	1985	62	1995	16	2005	9	2015	11
1956	132	1966	142	1976	34	1986	45	1996	9	2006	15		
1957	146	1967	97	1977	68	1987	44	1997	21	2007	22		
1958	148	1968	156	1978	62	1988	58	1998	18	2008	15		
1959	316	1969	104	1979	54	1989	33	1999	23	2009	8		

**Sources and references**

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