

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

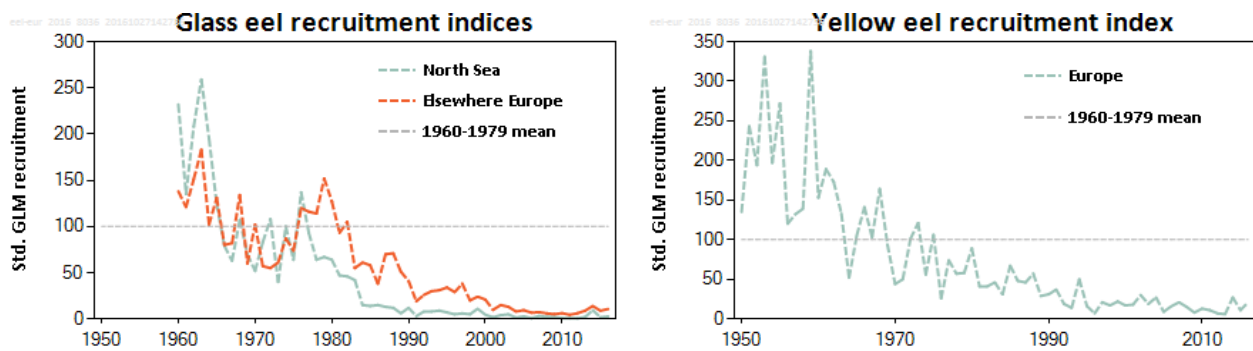
#### ICES stock advice

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) decreasing 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 2016 remained low at 2.7% of the 1960–1979 level in the “North Sea” series, and 10.7% in the “Elsewhere Europe” series. The annual recruitment of young yellow eel to European waters was 21% of the 1960–1979 level. These recruitment indices are well below the 1960–1979 reference levels, and there is no change in the perception of the status of the stock.



**Figure 9.3.8.1** European eel. Left panel: Recruitment indices, geometric mean of estimated (GLM) glass eel recruitment for the continental North Sea and “Elsewhere Europe” series. The GLM (recruit ~ area:year + site) was fitted to 40 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 and smoothed trends for Europe. The GLM (recruit ~ year + site) was fitted to 12 yellow eel time-series and scaled to the 1960–1979 arithmetic mean.

#### Stock and exploitation status

**Table 9.3.8.1** European eel. State of the stock and fishery relative to reference points.

|                           |                         | Fishing pressure |      |      | Stock size     |                      |      |   |   |                             |
|---------------------------|-------------------------|------------------|------|------|----------------|----------------------|------|---|---|-----------------------------|
|                           |                         | 2014             | 2015 | 2016 | 2014           | 2015                 | 2016 |   |   |                             |
| Maximum sustainable yield | $F_{MSY}$               | ?                | ?    | ?    | Undefined      | $B_{trigger}$        | ?    | ? | ? | Undefined                   |
| Precautionary approach    | $F_{pa}$ ,<br>$F_{lim}$ | ?                | ?    | ?    | Undefined      | $B_{pa}$ , $B_{lim}$ | ?    | ? | ? | Undefined                   |
| Management plan           | $F_{MGT}$               | -                | -    | -    | Not applicable | $SSB_{MGT}$          | -    | - | - | Not applicable              |
| Qualitative evaluation    | -                       | ?                | ?    | ?    | Undefined      | Recruitment          | →    | → | → | Highly impaired recruitment |

**Catch options**

Total landings and effort data are incomplete; 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 above zero (at glass, yellow, or silver eel stage) would have on the reproductive capacity of the stock.

**Basis of the advice**

**Table 9.3.8.2** European eel. The basis of the advice.

|                             |  |
|-----------------------------|--|
| Advice basis                | Precautionary approach.  |
| Management plan (Recovery?) | <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 entire 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, 2013). The EU Member States produced progress reports in 2012 and 2015. The 2015 reports have not been evaluated by ICES at the time of writing this advice.</p> <p>The EU Regulation “Recovery 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, forming 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 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 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 predation mortality, e.g. conservation or culling of predators.

Impacts on the environment 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 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. 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 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 unimpaired 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, 2015). These reference points were developed specifically using CITES guiding principles for NDF.

### Basis of the assessment

**Table 9.3.8.3** European eel. Basis of the assessment.

|                          |   |
|--------------------------|---|
| ICES stock data category | 3 (ICES, 2016a).  |
| 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 (WGEEI; ICES, 2016b).  |

## Information from stakeholders

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

## History of the advice, catch, and management

**Table 9.3.8.4** European eel. History of ICES advice.

| Year | ICES advice*   | Predicted catch corresponding to the 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.                    | -  | -    | -                  |
| 2017 | All anthropogenic impacts as close to zero as possible.                      | -  | -    | -                  |

\* No TAC ever for this stock.

\*\* Catch estimates were 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 9.3.8.5** European eel. Recruitment indices, geometric means of estimated (GLM) recruitment for glass eel in the continental North Sea and “Elsewhere Europe”, and yellow eel in Europe. The glass eel GLM (recruit ~ area:year + site) was fitted to 40 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 (recruit ~ year + site) was fitted to 12 yellow eel time-series and scaled to the 1960–1979 arithmetic mean.

| Year | Glass eel recruitment |           | Yellow eel recruitment |
|------|-----------------------|-----------|------------------------|
|      | Elsewhere Europe      | North Sea | Europe                 |
| 1950 |                       |           | 135                    |
| 1951 |                       |           | 243                    |
| 1952 |                       |           | 194                    |
| 1953 |                       |           | 331                    |
| 1954 |                       |           | 197                    |
| 1955 |                       |           | 272                    |
| 1956 |                       |           | 120                    |
| 1957 |                       |           | 132                    |
| 1958 |                       |           | 139                    |
| 1959 |                       |           | 338                    |
| 1960 | 138                   | 232       | 153                    |
| 1961 | 121                   | 135       | 189                    |
| 1962 | 151                   | 208       | 173                    |
| 1963 | 183                   | 259       | 133                    |
| 1964 | 102                   | 195       | 52                     |
| 1965 | 131                   | 124       | 105                    |
| 1966 | 80                    | 79        | 141                    |
| 1967 | 82                    | 63        | 103                    |
| 1968 | 134                   | 107       | 164                    |
| 1969 | 60                    | 70        | 94                     |
| 1970 | 102                   | 52        | 44                     |
| 1971 | 57                    | 83        | 50                     |
| 1972 | 55                    | 108       | 101                    |
| 1973 | 61                    | 40        | 121                    |
| 1974 | 87                    | 100       | 56                     |
| 1975 | 74                    | 64        | 106                    |
| 1976 | 120                   | 137       | 26                     |
| 1977 | 116                   | 93        | 74                     |
| 1978 | 114                   | 64        | 57                     |
| 1979 | 152                   | 67        | 58                     |
| 1980 | 127                   | 64        | 89                     |
| 1981 | 93                    | 47        | 41                     |
| 1982 | 105                   | 46        | 41                     |
| 1983 | 55                    | 42        | 46                     |
| 1984 | 61                    | 15        | 31                     |
| 1985 | 58                    | 14        | 67                     |
| 1986 | 38                    | 15        | 48                     |
| 1987 | 70                    | 13        | 46                     |
| 1988 | 71                    | 12        | 57                     |
| 1989 | 51                    | 6         | 29                     |
| 1990 | 41                    | 12        | 31                     |
| 1991 | 19                    | 3         | 37                     |
| 1992 | 26                    | 8         | 19                     |
| 1993 | 30                    | 8         | 14                     |
| 1994 | 31                    | 9         | 50                     |

| Year | Glass eel recruitment |           | Yellow eel recruitment |
|------|-----------------------|-----------|------------------------|
|      | Elsewhere Europe      | North Sea | Europe                 |
| 1995 | 34                    | 7         | 16                     |
| 1996 | 29                    | 5         | 7                      |
| 1997 | 38                    | 6         | 21                     |
| 1998 | 20                    | 5         | 17                     |
| 1999 | 24                    | 11        | 22                     |
| 2000 | 20.9                  | 4.5       | 17                     |
| 2001 | 9.8                   | 1.8       | 18                     |
| 2002 | 15                    | 4         | 30                     |
| 2003 | 13.1                  | 4.9       | 19                     |
| 2004 | 8                     | 1.4       | 27                     |
| 2005 | 9.4                   | 2.8       | 9                      |
| 2006 | 6.7                   | 0.8       | 16                     |
| 2007 | 7.3                   | 3.2       | 21                     |
| 2008 | 6                     | 2.1       | 15                     |
| 2009 | 5.1                   | 2.1       | 8                      |
| 2010 | 6.2                   | 0.9       | 13                     |
| 2011 | 4.5                   | 0.9       | 11                     |
| 2012 | 6.1                   | 0.7       | 7                      |
| 2013 | 8.9                   | 2         | 6                      |
| 2014 | 13.9                  | 9.4       | 27                     |
| 2015 | 8.8                   | 1.7       | 11                     |
| 2016 | 10.7                  | 2.7       | 21                     |

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