Executive summary

The Joint EIFAAC/ICES/GFCM Working Group on Eel [WGEEL] met at FAO HQ, Rome, Italy from 3–7 November 2014. The group was chaired by Alan Walker (UK) and there were 44 participants representing 20 countries, the General Fisheries Commission of the Mediterranean (GFCM) and the EU's DG MARE. Information was also provided by correspondence from Estonia and Finland for use by the Working Group.

WGEEL met to consider questions posed by ICES (in relation to the MoU between the EU and ICES), EIFAAC and GFCM and also generic questions for regional and species Working Groups posed by ICES. The terms of reference were addressed by reviewing working documents prepared ahead of the meeting as well as the development of documents and text for the report during the meeting. The work is summarised in the following points:

The WGEEL glass eel recruitment index has increased in the last three years, to 3.7% of the 1960–1979 reference level in the 'North Sea' series, and to 12.2% in the 'Elsewhere' series. The 'recruiting yellow eel' index has risen to 36% of the same reference period, from a low of 7% in 2013. The reference period for glass eel indices starts at 1960 because there is only one dataset meeting the index requirements before this year. The reference period for 'recruiting yellow eel' is set as the same years to be consistent with the glass eel indices.

Statistical analyses of recruitment indices using segmented regression ANOVA and Bayesian approaches detected a significant breakpoint (an upturn) in both North Sea and Elsewhere indices in 2011–2012. It was not possible to determine whether this upturn can be considered a trend shift, as this short positive trend could be the result of the time-series auto-correlation. However, if these positive trends are confirmed and continue in the future without any changes, the recruitment indices would be expected to exceed the reference level around 2030 in "North Sea" and 2045 in "Elsewhere" indices. Better understanding of the functioning of the population is required to make these analyses more robust. There is no statistical evidence of an upturn in the recruiting yellow eel time-series.

Following the 2012 reporting of the assessed area, the levels of silver eel escapement biomass were as follows: escaping silver eel ($B_{current}$ 12 000 t), present potential escapement in the absence of anthropogenic mortality (B_{best} 49 000 t), and 'pristine' potential escapement with no anthropogenic mortality (B_o 194 000 t). This indicates that current (2012) silver eel escapement biomass from the assessed area was at 6% of the 'pristine' state, or equal to 25% of the present potential if no anthropogenic impacts existed.

The total landings from commercial fisheries in 2013, provided in Country Reports, were 2470 t of eel. The current state of knowledge on level of underreporting, misreporting and illegal fisheries is insufficient to include these in the assessment. Catch and landings data for recreational fisheries are not consistently reported in the Country Reports: inconsistencies in environments, fishing gears, life stages sampled. Therefore, it was not possible to assess the most recent total landings and catches of recreational and non-commercial fisheries.

About 39 million glass eels and 15 million yellow eels were stocked in 2013. Aquaculture production has slowly decreased to about 5000 t in 2013. No new data on the impacts of non-fishing anthropogenic factors were available to WGEEL 2014: EU Member States will provide updates next year within their 2015 Eel Management Plan Progress Reports to the EU Commission.

The working group reviewed the life-history trait (LHT) information available in the Country Reports that would be required to conduct an eel stock assessment based on methods proposed for "Data-limited stocks" (DLS) by WKLIFE. Data were limited but large variations in LHTs were found, both for regional populations as a whole and for the sex (male, female) and eel stage (glass, yellow, silver) categories, leading the working group to tentatively conclude that DLS approaches based on LHT may not be suitable for eels. Furthermore, the working group noted that the presently adopted national and 'whole stock' spatial scales of eel assessment were more relevant than the standard ICES Ecoregions.

The data requirements for international stock assessment, the data available and the gaps in those data were reviewed by the working group. Reported commercial landings from countries that have not implemented Eel Management Plans (because they are not subject to the EC Eel Regulation) accounted for about 27 to 39% of the total reported eel catch in some years. Therefore, the addition of data from countries not covered by the stock assessment so far is urgently required, but so too are improvements in the spatial coverage and quality of data for the EU countries implementing and reporting on EMPs. The GFCM is working with the Mediterranean countries to provide their required data, with the support of the working group.

The working group reviewed the application of approaches used to estimate local or national silver eel escapement, categorised as methods based on catching and counting silver eels versus methods based on yellow eel proxies, with the latter including short descriptions of 'eel models' summarising model approach and processes, data requirements and model outputs. This review is intended as a starting point for those wishing to implement new local and national eel stock assessments.

The working group further developed the methods proposed to conduct the international, whole-stock assessment, noting that the Eel Regulation's limit for the escapement biomass of (maturing) silver eels at 40% of the natural escapement (in the absence of any anthropogenic impacts) is equivalent to the ICES B_{lim}. Given that the estimate of present silver eel escapement biomass from reporting EU countries is 6% of B_0, far below the 40% limit set by the EU Eel Regulation, the working group focussed attention on the shape of the line of the modified Precautionary Diagram below B_{lim} (i.e. 40%). The Review Group for ICES-WGEEL (2013) suggested the application of criteria for short-lived stocks (ICES 2013a), implying total anthropogenic mortality (ΣA) = 0 for $B_{current}$ <40% of B_0. The working group considered that because the spawning escapement comprises many year classes and annual perturbations in recruitment, production or spawning stock were buffered by up to 40+ year classes alive in any one year, the eel was 'long lived' in relation to ICES harvest control rules. Therefore, in the absence of indication on the required rate of stock recovery (the Eel Regulation terms it "in the long term"), and pending an improvement of the analysis of stock-and-recruit data, the working group proposed the basis of the harvest control rule for quantitative assessments (category 1), i.e. a proportional reduction in ΣA_{lim} below B_{lim} down to ΣA_{lim} = 0 at $B_{current}$ = 0. The working group noted, however, that the unusual form of the tentative stock–recruitment relationship might suggest that the mortality rate would have to reach zero at a spawning–stock biomass > 0, but the shape of the line is more important for setting advice in the immediate future than the point at which it intersects the x-axis.

A standardized assessment approach applied across the entire eel-producing countries would provide a means to address gaps in data reporting, and to examine the comparability of national estimates that are presently based on different data and analyses.

The working group reviewed and tabulated the eel- and anthropogenic-data available from eel-producing countries. The most common data available are yellow eel densities. However, these are not available from lakes, large/deep/wide river sections and transitional waters, and since these habitats can represent the majority of the wetted area in an EMU, this will require new methods to convert catch per unit effort data to density data. The working group proposed a coordinated research program to develop this standardised / cross-calibrating assessment method.

The working group recommended the creation of a digitised data reporting database, to make the preparation of assessments more efficient, to provide a readily accessible historical archive, and to facilitate national reporting to all international fora (e.g. ICES, EU, CITES, DCF). The long-term objective of such standardization is to facilitate the creation of an international database of eel stock parameters updated annually. The working group catalogued the existing eel databases (recruitment, POSE, eel quality) and developed a structured plan for storing data within the ICES Data Portal.

The working group catalogued the variety of management measures that are being implemented within the national and local Eel Management Plans. These actions were categorised as those relating to commercial fisheries; recreational fisheries; hydropower and obstacles; habitat improvement; stocking; and, others. This catalogue is intended as a starting reference for those wishing to implement new programs of management measures.