

## Stock Annex: Sole in subdivisions VIIIc and IXa

<b>Stock Annex</b>	Stock specific documentation of standard assessment procedures used by ICES.
<b>Stock</b>	Sole in Subdivisions VIIIc and IXa
<b>Working Group:</b>	Working Group for the Bay of Biscay and Iberian Waters Ecoregion WGBIE
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### A. General

#### A.1. Stock definition

*Solea Solea* is a widely distributed species in Northeast Atlantic shelf waters with a range from southern Norway including North Sea and western Baltic and Mediterranean Sea, to the Northwest of Africa inhabiting sandy and muddy bottoms at depths near to 100 and 200 meters (Quero *et al.*, 1986). At present there is no information on stock unit definition for sole in ICES subdivision VIIIc and IXa. It was considered that in the absence on specific information on stock structure, the Subdivisions VIIIc and IXa may be used as a management unit.

#### A.2. Fishery

Portugal and Spain are the main participants in this area fisheries. Figure 1 illustrates *Solea* species (*Solea solea*, *Solea senegalensis* and *Pegusa lascaris*) landings by Divisions VIIIc and IXa. In Portugal there is evidence of market *solea* species misclassification which means *solea solea* Portuguese official landings might not correspond only to this species but be mixed with *Solea senegalensis* and *Pegusa lascaris*. In Portugal trammel nets are the most used métier to catch soles with about 90% of the total landings.

Based on DCF harbour length sampling data it was possible to separate the soles complex using scientifically identified proportions of each species: *Solea solea*, *S. senegalensis* and *Pegusa lascaris*, and this was estimated for the landings in Portugal (Division IXa). This analysis revealed that *solea senegalensis* constitutes the highest proportion of the landings followed by *Pegusa lascaris* and that *Solea solea* has the least contribution to the landings, as indicated in Figure 2 (Borges, *et al.*, (2014). The group recommends these proportions estimated from DCF sampling be applied to correct the official catches by species.

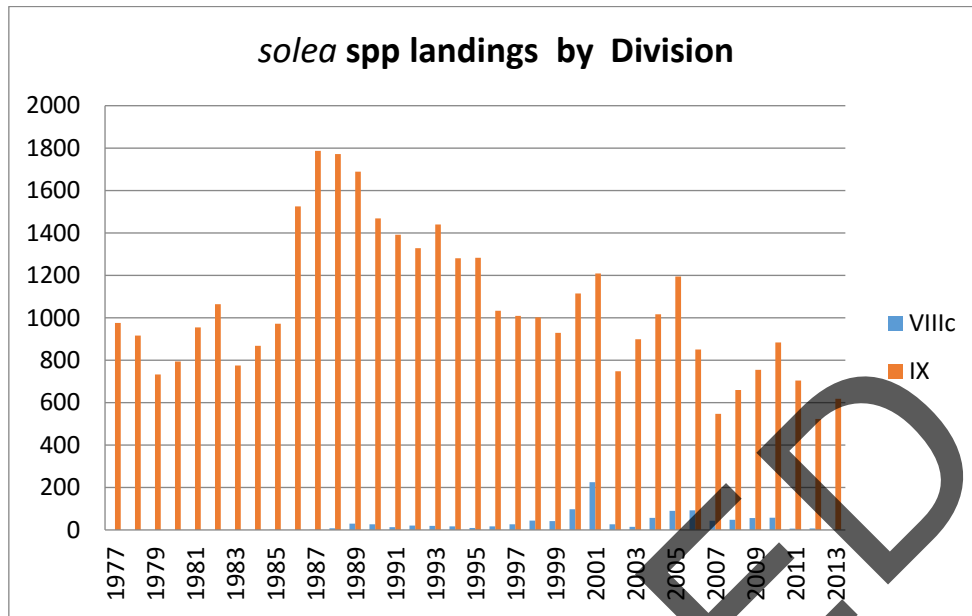


Figure 1 Sole in Divisions VIIIc and IXa. Official landings of solea spp: *Solea solea*, *Pegusa Lascaris* and *solea senegalensis*, by division (in tonnes).

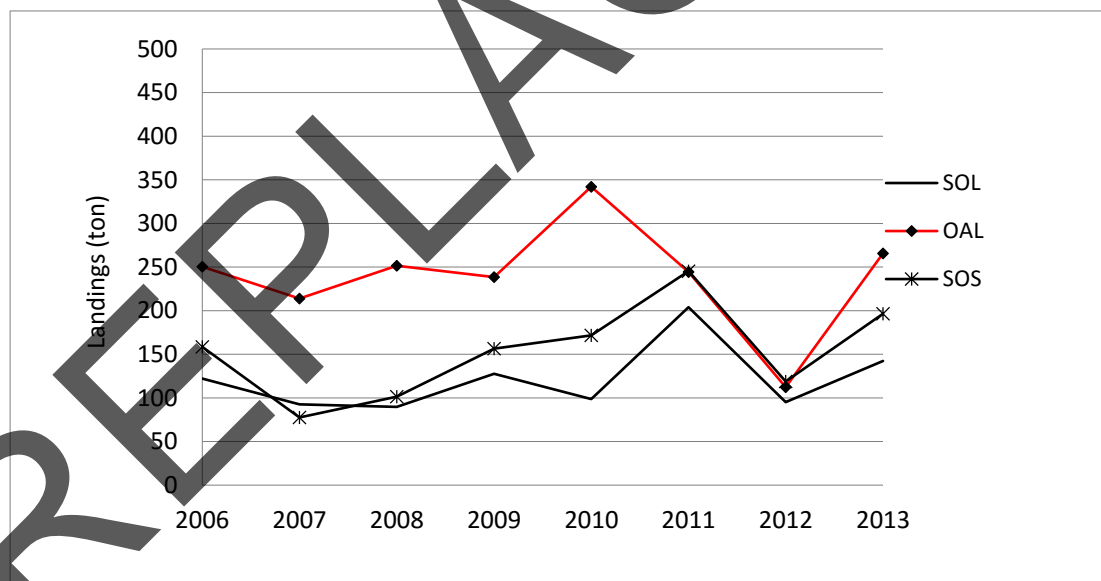


Figure 2. Estimated landings of *Solea solea* (SOL), *Solea senegalensis* (OAL) and *Pegusa lascaris* (SOS) for Div. IXa (Portugal)

### A.3. Ecosystem aspects

Sole (*Solea solea*) spawning takes place in winter/early spring and varies with latitude starting earlier in the south. Larvae migrate to estuaries where juveniles concentrate until they reach approximately 2 years of age and move to deeper waters. Sole is a nocturnal predator and therefore more susceptible to be captured by fisheries at night than in daytime. It feeds on polychaetes, molluscs and amphipods. *S. solea* is abundant in the Tagus estuary and uses this habitat as nursery ground. (Cabral and Costa, 1999).

## B. Data

### B.1. Commercial catch

In Portugal *Solea solea* (SOL) is caught together with and other similar species *Solea senegalensis* (OAL) and *Pegusa lascaris* (SOS) and there are evidences of misreporting sole (*Solea solea*) with the other two species. Landings length compositions for *Solea solea* are presented for the Portuguese area (Figure x.2) (Borges, *et al*, 2014). Based on the DCF discard sampling in Portugal discards for Sole (*Solea solea*) only occur in negligible small amounts due to the minimum landing size or damaged specimens (Prista, *et al*, 2014)

### B.2. Biological

Recent growth studies based on *S. solea* otolith readings in the Portuguese coast indicate  $L_{inf}$  52.1cm (females) and 45.7cm (males) while the growth coefficient (k) estimate of females ( $K=0.23$ ) was slightly higher than for males ( $k=0.21$ ) and to -0.11 and 1.57 for females and males respectively, (Teixeira and Cabral, 2010). Maximum length observed between 2004 and 2011 from the landings sampling program (PNAB-DCF) attained 60cm. According to Vinagre (2007) *S. solea* off the Portuguese coast presents higher growth rates in comparison with the northern European coasts. *Solea solea* maturity ogives by sex, length-weight relationship, sex-ratio by length based on harbour DCF sampling were presented in 2012 for IXa division (Jardim, *et al*, 2011).

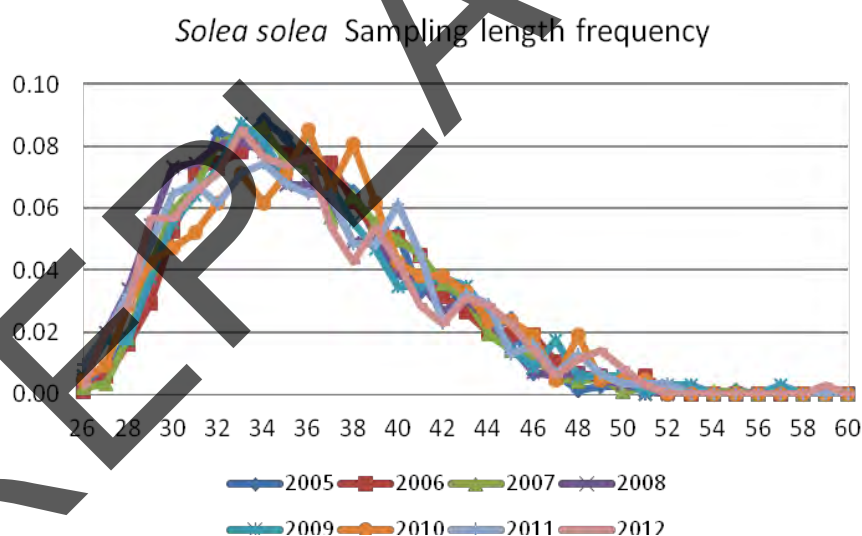


Figure 3- Division IXa (Portugal. *Solea solea* sampling length frequency from all métiers harbour sampling DCF-IPMA

### B.3. Surveys

*Solea solea* is rarely caught in the existing Portuguese bottom trawl research surveys (Autumn BTS, Jardim *et al*, 2011). This species may be found along the Portuguese coast mainly from very shallow waters and estuaries up to 100 m depth. To monitor sole species a dedicated independent research survey is necessary.

#### B.4. Commercial CPUE

Commercial indices were not available but exploration of logbook data may produce useful information.

#### B.5. Other relevant data

### C. Assessment: data and method

For data limited stocks without information on abundance or exploitation (Category 5) ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current exploitation is appropriate for the stock. For this stock, ICES advises that catches should decrease by 20% in relation to the average catch of the last three years.

### D. Short-Term Projection

### E. Medium-Term Projections

### F. Long-Term Projections

### G. Biological Reference Points

### H. Other Issues

### References

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