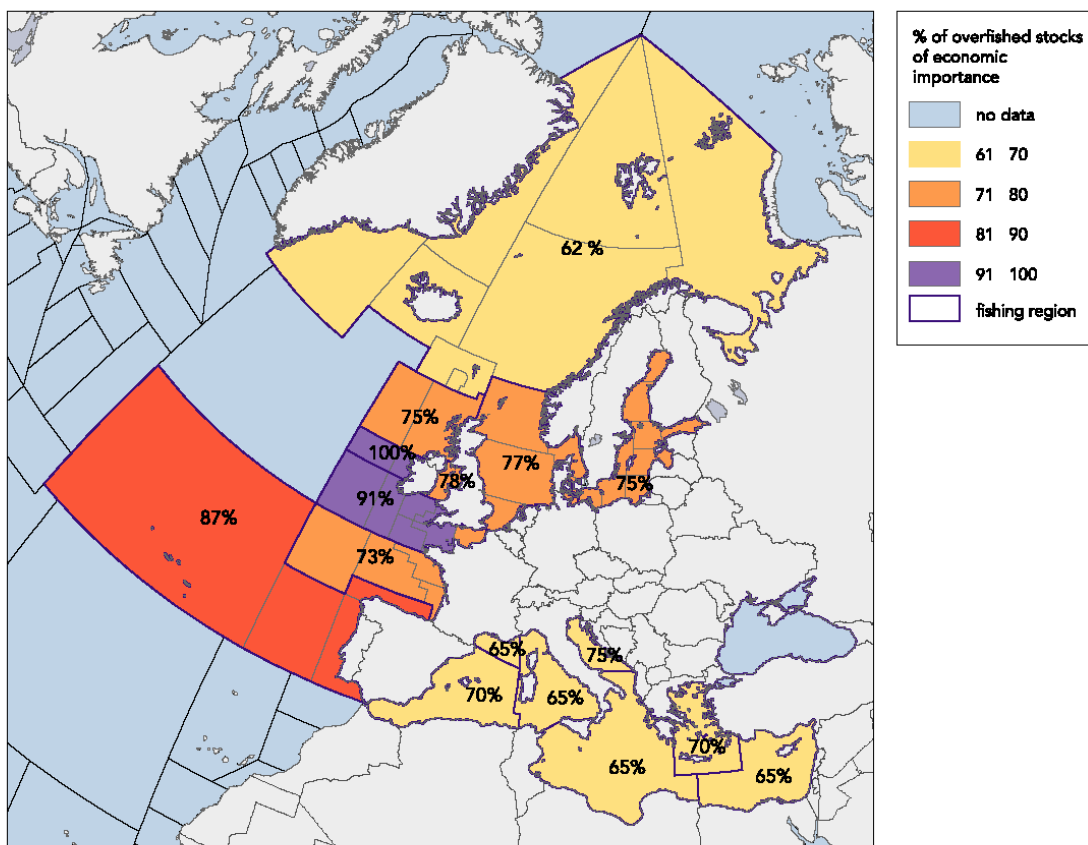


Indicator fact sheet

Fish stocks outside safe biological limits

Key message:

⊕ Most fish stocks of commercial importance in European waters appear to be outside safe biological limits (SBL)



Data sources: ICES, FAO, Papaconstantinou & Farrugio, FAO, Eurostat compiled by ETC Water

Results and assessment

Policy relevance: target or objective for the indicator

EU policies and in particular the common fisheries policy (CFP), aim for sustainable fishing over a long period of time through appropriate management of fisheries within a healthy ecosystem, while offering stable economic and social conditions for all those involved in the fishing activity. Hence not only the quantity of fish taken from the sea is important, but also their species and sizes, and, indeed, the techniques used in catching them and the areas where they are caught.

Policy context (relevance of the indicator with reference to specific policy processes)

The sustainable exploitation of the fish stocks is regulated through the eu common fishery policy (OJ C 158 27.06.1980). Based on CFP, precautionary principles and multiannual fisheries

regulation arrangements are set through the Cardiff European Council (COM(2000) 803) identifying harvesting levels. total allowable catches (TACs) and quotas are set annually by the Fisheries Council for the stocks in north-east Atlantic and the Baltic. In the Mediterranean, where no TACs have been set yet (except for the highly migratory Tunas and Swordfish) fisheries management is achieved by means of closed areas and seasons to keep fishing effort under control and make exploitation patterns more rational; the General Fisheries Council for the Mediterranean (GFCM) attempts to harmonise the process.

Environmental context: (scientific soundness and choice and definition of the indicator)

The ratio of the number of overfished stocks (used here to denote stocks outside safe biological limits) to the number of commercial stocks (for which assessment of their status has been carried out) per fishing area is presented in Figures 1 and 2. As commercial stocks have been defined as the stocks of economic importance, on which the fishing effort is focused upon in each area aiming at a profit. It is a broader term encompassing target species, bycatches and industrial species that are of economic importance to the market. Since stock assessment is based on fishing areas for the majority of the stocks the indicator depicts areas with heavy fishing pressure.

In general terms stocks are characterised as being outside safe biological limits (or overfished stocks) when the fishing pressure (mortality) exerted on them, exceeds sustainability i.e. when mortality exceeds recruitment and growth. By comparing trends over time in recruitment (R) (the number of new fish produced each year by the mature part of the stock), spawning stock biomass (SSB), landings (estimate of the most likely removal from the stock, sometimes including discards) and fishing mortality (F), a fairly reliable picture of stock development can be derived.

More precise, with the introduction of the precautionary approach, a stock is considered to be outside safe biological limits (SBL) when the spawning stock biomass (SSB) (the mature part of a stock) is below a biomass precautionary approach reference point (Bpa), or when the fishing mortality (F) (an expression of the proportion of a stock that is removed by fishing activities in a year) exceeds a fishing mortality precautionary approach reference point (Fpa). However, a stock can be considered within safe biological limits even when the spawning stock biomass is lower than the biomass precautionary approach reference point (Bpa) but the Fishing mortality is lower than the fishing mortality precautionary approach reference point (Fpa) ($SSB < Bpa$ but $Fpa < F$).

Within the EU such reference points have been decided for about 10 stocks but no such points have been defined for the Mediterranean stocks. For the north-east Atlantic and Baltic detailed stock assessments are obtained through the International Council for the Exploration of the Sea (ICES). For the Mediterranean, stock assessments are based mainly on landings in the absence of complete or independent information on fishing intensity or fishing mortality. On the Mediterranean such work has been carried out by the Fisheries DG, and a number of internationally funded bottom trawl surveys such as:

- the MEDITS project that covered the north coasts of the Mediterranean Sea
- the stock assessment in the Mediterranean SAMED project, and,
- research activities realised by GFCM (General Fisheries Council for the Mediterranean) on local/national level.

Assessment

Status of commercial stocks of high economic importance in the NE Atlantic and Baltic Seas:

Only for stocks that ICES has carried out an assessment

⊗ For most of the north-east Atlantic 62–91 % of commercial stocks are outside safe biological limits

⊗ In the West of Ireland Sea 100 % of commercial stocks are outside safe biological limits

⊗ In the Baltic, 75 % of commercial stocks are outside safe biological limits

Assessments on stocks per area are shown in Tables 1 and 2. According to the ICES ACFM data on stock development:

- almost all round fish stocks have declined and are currently not sustainable;
- cod and hake stocks dramatic decline causes alarm leading to total allowable catch (TAC) cuts up to 50 % in 2001;
- whiting causes concern too (TAC cut to 35 % for the west of Scotland);
- deep-sea species show signs of overexploitation;
- flatfish stocks are heavily exploited but close to sustainable levels;
- pelagic and industrial species are in better condition but need to be subject to reduced fishing rates;
- in general, a 10 % cut in the TACs for 2001 for most of the species has been implemented.

For the wider Atlantic area knowledge of the biology of most targeted species (mainly deep-sea species) is insufficient, but it is suggested that stocks can sustain low rates of exploitation. Bpa and Fpa have not been determined for all stocks, as stated above.

Status of commercial stocks of high economic importance in the Mediterranean Sea:

- ⊗ In the Mediterranean demersal stocks are outside safe biological limits
- ⊙ Small pelagic stocks in the same area exhibit large scale fluctuations but do not seem to be fully exploited anywhere, except for the case of anchovy in Balearic, Adriatic and Aegean Seas

Status of Tuna stocks:

Since the International Commission for the Conservation of Atlantic Tuna (ICCAT) and ICES/OSPAR management areas do not coincide there is no region specific data on the highly migratory tuna species. Uncertainties on stock assessment and lack of documented reporting (including EU Member States) hinder management of these highly migratory species. Bluefin tuna catches exceed the sustainable rate by 25 % and despite ICCAT recommendations (for both the Atlantic and the Mediterranean), no measures (despite TAC reductions) have been enforced or respected as yet.

- ⊗ Concern has been raised about the overexploitation of Bluefin tuna and swordfish.

Status of total number of exploited stocks:

As exploited stocks have been considered, the stocks present in the landings, which also include those of no significant economic importance. It shows the general state of the stocks in the area. It is a different indicator compared to that in figure 1 and 2, where ratio of overfished to commercial stocks is depicted.

The ratio of stocks outside safe biological limits to the total exploited stocks in the NE Atlantic and Baltic region range from 7 to 14 % (table 3). The Southern (Iberian and Bay of Biscay) and Arctic Sea appear in this sense to be in the best shape (with 7 % of it's exploited stocks being outside safe limits) and the Irish Sea the worst (with 14 % of exploited stocks being outside safe limits). The North Sea, West of Scotland, West of Ireland and Celtic Seas have ratios of 9–12 %.

For the Mediterranean the state appears to be worse with ratios ranging from 20 % (Aegean and Ionian Seas) to 44 % (Adriatic)

Subindicator: Status of commercial stocks in the north-east Atlantic, Baltic and Mediterranean Sea

Table 1. State of commercial stocks in the north-east Atlantic and Baltic

(Overfished stocks per area are coloured red, safe stocks blue, grey cells denote stocks that ICES has not carried out an assessment, and blank cells indicate stocks of non commercial importance in the particular area).

Commercial stocks	Baltic Sea ICES: IIIbcd, 22-32	North Sea and Skagerrak/Kattegak & Eastern Channel ICES IIIa,IV, VIId	West Scotland and Rockall Sea ICES: VI	Irish Sea ICES: VIIa	West Ireland ICES: VIIb,c, h-k	Celtic Sea and Western Channel ICES: VIIf-k, VIIe	Bay of Biscay ICES: VIIa,b-d, e	Iberian Peninsula ICES: VIIc, IX,X	Arctic ICES: I, II, Va,b, XII, XIV,
Albacore									
Anchovy									
Anglerfish									
Blue whiting									
Bluefin tuna									
Brill									
Capelin									
Cod									
Conger									
Chub mackerel									
Dab									
Flounder									
Haddock									
Hake									
Halibut									
Herring	1								
Horse mackerel.									
Ling									
Mackerel									
Megrim									
Norway pout									
Plaice									
Pouting									
Red fish									3
Saithe									4
Salmon									
Sandeels									
Sardine									
Seabreams									
Sole		2							
Elasmobranchs									
Sprat									
Swordfish									
Turbot									
Whitefish									
Whiting									

Data sources: OSPAR, ICES, FAO, compiled by ETC Water

NB: Anglerfish in the Celtic Sea and Bay of Biscay consists of two different species/stocks.
 1. Considered safe in Gulf of Riga; eastern stock mixes with that of the North Sea with uncertain status, 2. Within safe limits in the Eastern Channel, 3. Within safe limits in the continental shelf in areas V, VI and XIV, 4. Outside safe limits in the Faeroe islands.

Table 2. State of commercial stocks in the Mediterranean.

(Overfished stocks per area are coloured red; stocks within safe limits are coloured blue.)

Commercial stocks	Balearic Sea 1.1	Gulf of Lions 1.2	Sardinia 1.3	Adriatic Sea 2.1	Ionian Sea 2.2	Aegean Sea 3.1	Levant Sea 3.2	Sea of Marmara 4.1	Black Sea Sea of Azov 4.2 and 4.3
Anchovy	Red	Blue	Blue	Red	Blue	Red	Blue	No data available	Fisheries have collapsed due to eutrophication, pollution and introduction of <i>Mnemiopsis leidyi</i> , now at the process of recovering
Black sea whiting	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Blue whiting	Red	Red	Red	Red	Red	Red	Red		
Bogue	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Megrim	Red	Red	Red	Red	Red	Red	Red		
Flat fish	Red	Red	Red	Red	Red	Red	Red		
Greater forkbread	Red	Red	Red	Red	Red	Red	Red		
Gurnads	Red	Red	Red	Red	Red	Red	Red		
Hake	Red	Red	Red	Red	Red	Red	Red		
Horse mackerel	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Mackerel	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Grey mullet	Red	Red	Red	Red	Red	Red	Red		
Pilchard	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Poor cod	Red	Red	Red	Red	Red	Red	Red		
Red mullet	Red	Red	Red	Red	Red	Red	Red		
Sardinella	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Sea bass	Red	Red	Red	Red	Red	Red	Red		
Sea bream	Red	Red	Red	Red	Red	Red	Red		
Sole	Red	Red	Red	Red	Red	Red	Red		
Sprat	Blue	Blue	Blue	Blue	Blue	Blue	Blue		
Bluefin tuna	Red	Red	Red	Red	Red	Red	Red		
Swordfish	Red	Red	Red	Red	Red	Red	Red		
Percentage of overfished to total number of exploited stocks	28	26	36	44	20	20	23		

Data sources: Papaconstantinou & Farrugio, FAO, Eurostat, compiled by ETC Water.

References

- OSPAR: 'Quality Status Report 2000', OSPAR Commission, London 2000
 OSPAR: 'Quality Status Report 2000', Region I Arctic Waters, OSPAR Commission, London 2000
 OSPAR: 'Quality Status Report 2000', Region II Grater North Sea, OSPAR Commission, London 2000
 OSPAR: 'Quality Status Report 2000', Region III Celtic Seas, OSPAR Commission, London 2000
 OSPAR: 'Quality Status Report 2000', Region IV Bay of Biscay and Iberian coast, OSPAR Commission, London 2000
 OSPAR: 'Quality Status Report 2000', Region V Wider Atlantic, OSPAR Commission, London 2000
 ICES/ACFM Report 2001, 'Report on the state of the resources and their expected development', <http://www.ices.dk/>
 Papaconstantinou, C., and Farrugio, H., 2000, 'Fisheries in the Mediterranean', *Mediterranean Marine Science*, 1/15–18.
 Eurostat, *Environmental Pressure indicators for the EU*.
<http://europa.eu.int/comm/eurostat>
 FAO Fisheries Circular No 920 FIRM/C920 Rome, 1997, 'Review of the state of world fishery resources: marine fisheries'.

Data

Table 3. Numbers of exploited, commercial and overfished fish stocks by sea area in the north-east Atlantic, Baltic and Mediterranean

Sea area	Numbers of exploited stocks	Numbers of overfished stocks	Numbers of stocks of economic importance = commercial stocks	Percentage of overfished/ Exploited stocks	Percentage of non assessed /stocks of economic importance	Percentage of overfished/ stocks of economic importance	Commercial stocks within 'safe' limits
North-east Atlantic Ocean							
Baltic Sea	43	3	9	7	55	75	1
North Sea	84	10	15	12	13	77	3
W. Scotland	76	6	15	8	40	75	2
Irish Sea	50	7	15	14	40	78	2
West Ireland	48	5	12	10	58	100	0
Celtic Sea Western Channel	78	10	20	13	47	91	1
Iberian peninsula	88	7	16	8	50	87	1
Bay of Biscay	99	8	17	8	35	73	3
Arctic	65	5	9	8	8	62	3
Mediterranean Sea							
Balearic Sea	50	14	20	28		70	7
Gulf of Lions	50	13	20	26		65	8
Sardinia	36	13	20	36		65	8
Adriatic Sea	32	14	19	44		70	7
Ionian Sea	65	13	20	20		65	8
Aegean Sea	70	14	20	20		70	7
Levant Sea	57	13	20	23		65	8
Area 37 Tunas	6	2	5	33		40	3

Spreadsheet file: Stocks outside safe biological limits in Mediterranean

Stocks outside safe biological limits in north-east Atlantic and Baltic

Meta data

Technical information

1. Data sources:

ICES/ACFM Report 2001: ices.info@ices.dk

OSPAR, 'Quality Status Report', 2000, <http://www.ospar.org/>

Eurostat, 'Environmental Pressure indicators for the EU', <http://europa.eu.int/comm/eurostat/>

MEDITS, 'Fisheries in the Mediterranean', *Mediterranean Marine Science*

Dr Papaconstantinou & Farrugio, H.Pap@ncmr.gr

FAO Fisheries Circular No 920 FIRM/C920₁

<http://www.fao.org/docrep/003/w4248e/w4248e00.htm>

2. Description of data:

Sources mentioned above state which fish stocks are overfished i.e. outside safe biological limits in effort to assist the management of the stocks.

3. Geographical coverage:

MEDITS covers the Mediterranean Sea (excluding the Sea of Marmara and the Black Sea)

ICES and OSPAR cover the north-east Atlantic

Eurostat covers mainly north-east Atlantic and partially the Mediterranean (large pelagics)

Geographical coverage: EU 15 + EFTA 3 + Cyprus, Malta and Turkey

4. Temporal coverage:

State of stocks reflect a trend over a period of time. Background data exist up to 2000 allowing management predictions (TACs etc) for 2001.

5. Methodology and frequency of data collection:

Stock assessment is based on mid- to long-term trends of recruitment, spawning stock biomass, landings and fishing mortality. For the last 15 years the EU effort has been focused in the scientific surveys to be carried out on a yearly basis along with routine market sampling programmes.

6. Methodology of data manipulation, including making 'early estimates':

See 'Environmental context'. In general, by comparing trends over time in recruitment R, spawning stock biomass SSB, landings and fishing mortality F, a fairly reliable picture of stock development can be derived. So, when mortality exceeds recruitment and growth a stock can be characterised as being outside safe biological limits. For the Mediterranean, stock assessments are based mainly on landings in the absence of complete or independent information on fishing intensity or fishing mortality (Papaconstantinou & Farrugio, 2000). With the introduction of the precautionary approach, and spawning biomass and fishing mortality reference points for the major stocks in the north-east Atlantic, according to ICES (ICES report 2001) a stock is considered to be outside safe biological limits when these values are exceeded.

Stocks outside safe biological limits per area have been identified from the reports and sites mentioned above. That number was then divided by the number of commercial stocks that have been assessed (see above for definition of the term) in the same area to produce a percentage ratio reported on the graphs. Stocks that appear grey in Table 1 have not been taken into account for the calculation of the state of the area. Their number has been used to calculate the ratio of stocks that lack assessment.

The number of stocks outside safe biological limits was also divided with the total number of exploited stocks in the area.

Quality of information

7. Strength and weakness (at data level):

Strength: data sets are based on time series that can give a good account of the state of a stock. Using reference points and precautionary approach (Bpa and Fpa) allows for a buffer zone and better estimation for the management of the stock.

Weakness: different approaches are being used in the Mediterranean and the north-east Atlantic to determine if a stock is outside safe biological limits. No precautionary reference points are defined for the Mediterranean stocks. Each international organisation uses the same principle to determine the state of the stock. ICES has fine tuned the system. However decisions are based on safety margins usually set at 30 % above safe limits which in turn bear a degree of uncertainty since estimates of F and SSB area uncertain themselves; the decision of the reference points is then a task for managers and not scientists.

8. Reliability, accuracy, robustness, uncertainty (at data level):

Data sets are fragmented both temporally and spatially. Monitoring activities are based on scientific surveys rather than commercial catches leading to low values of SSB estimates and thus biased exploitation patterns (ICES, 2001). For the Mediterranean fisheries management is considered to be at early stages compared to north-east Atlantic. Catch and effort statistics are not considered to be fully reliable and a lot of effort is directed to estimation of corrective factors (Papaconstantinou & Farrugio, 2000)

9. Overall scoring (give 1 to 3 points: 1 = no major problems, 3 = major reservations):

Relevancy: 1

Accuracy: 2

Comparability over time: 1

Comparability over space: 3

Further work required

Despite the aforementioned uncertainties the indicator is a tool of paramount importance for the proper and sustainable management of the fish stocks at a European level. Stock assessment should be carried out for the rest of the commercially important stocks in the north-east Atlantic and Baltic Sea. Data on recruitment, spawning stock biomass and fishing mortality should also be based in the future on commercial catches/landings along with scientific surveys in a comprehensive way both spatially and temporally. The same approach as for the north-east Atlantic should be followed for the Mediterranean fisheries and precautionary reference limits should be set.