Coherent Assessments of Europe’s Marine Fishes
Show Regional Divergence and Megafauna Loss


Author affiliations are at end of the paper.

ABSTRACT

Europe has a long tradition of exploiting marine fishes and is promoting marine economic activity through its Blue Growth strategy. This increase in anthropogenic pressure, along with climate change, threatens the biodiversity of fishes and food security. Here, we examine the conservation status of 1,020 species of European marine fishes and identify factors that contribute to their extinction risk. Large fish species (greater than 1.5 m total length) are most at risk; half of these are threatened with extinction, predominantly sharks, rays and sturgeons. This analysis was based on the latest International Union for Conservation of Nature (IUCN) European regional Red List of marine fishes, which was coherent with assessments of the status of fish stocks carried out independently by fisheries management agencies: no species classified by IUCN as threatened were considered sustainable by these agencies. A remarkable geographic divergence in stock status was also evident: in northern Europe, most stocks were not overfished, whereas in the Mediterranean Sea, almost all stocks were overfished. As Europe proceeds with its sustainable Blue Growth agenda, two main issues stand out as needing priority actions in relation to its marine fishes: the conservation of marine fish megafauna and the sustainability of Mediterranean fish stocks.

Marine fishes exhibit high biodiversity1,2 and have been culturally and nutritionally important throughout human history3. Europe in particular has a well documented history of exploiting marine fish populations, written records of which commence in the classical works of ancient Greece. Although this historical exploitation has undoubtedly altered populations4,5 and changed many seascapes6, marine defaunation in the region has not been as great as in terrestrial systems7. However, the use of ocean space and resources is increasing due to Europe’s Blue Growth strategy8, the nutritional requirements of an expanding human population are growing9,10 and marine ecosystems will experience unusually rapid changes in future due to climate change11,12. Consequently there are imminent threats both to European marine biodiversity and fish resources13. It is important, therefore, to assess the threats of extinction to fish species and to ensure consistency in the management approach by the various agencies involved.

We analysed data on the conservation status of 1,020 species of Europe’s marine fishes from the recent International Union for Conservation of Nature (IUCN) Red List assessments14 to identify characteristics that make Europe’sfishes most susceptible to extinction risk. We then compared the Red List with 115 fish stock assessments (of 31 species) made by intergovernmental agencies charged with providing advice on the exploitation of commercial fishes. Previous comparisons of this sort applied criteria under various modelling assumptions15–17 or limited the comparison to biomass reference points18.

Results

Of the 1,020 European marine fish species that were assessed, 67 (6.6%) were threatened with extinction and 202 species (19.8%) were assessed as Data Deficient (DD). Given that, the percentage of threatened species was estimated at 8.2%, with lower and upper bounds of 6.6% and 26.4%, respectively (see Methods). Of the 67 threatened species, 2.1% (21 out of 1,020 species) were Critically Endangered (CR), 2.3% (23 species) were Endangered (EN) and 2.3% (23 species) were Vulnerable (VU; see Supplementary Table 1). A further 2.5% (26 species) were considered Near Threatened (NT). The vast majority of species (71.1%, 725 species) were considered to be Least Concern (LC). Extinction risk in European marine fishes fell within the medium to low range compared with that of terrestrial and other aquatic species in the region14. In the eastern tropical Pacific19 and eastern central Atlantic20, the only other regions of the world where all marine fishes of the continental shelf have been assessed, 12% and 6.1% of species were assessed as threatened, respectively. In Europe, most species were assessed as threatened based on the reduction in total size of their populations (measured over the longer of ten years or three generations), whereas some were threatened due to restricted geographic range, combined with a severely fragmented population and a continuing decline. Others were classed as threatened due to their very small total population size. Fishing, both in targeted fisheries and as bycatch, was the most common threat to marine fishes; other threats included pollution, coastal development, climate change, energy production and mining14. To assess which characteristics were most important in determining the vulnerability of Europe’s fishes to...
extinction risk, we used a conditional random forest (RF) model. The model was able to predict IUCN threat categories correctly in 757 of 818 cases where there were sufficient data (see confusion matrix in Supplementary Table 2). Taxonomic class and maximum fish size were the variables of most importance (Fig. 1a): extinction risk was greater in cartilaginous fishes (sharks, rays and chimaeras) and fishes that attained a large size. A simple classification tree (Supplementary Fig. 1) indicated that a size threshold of 149 cm was important in classifying threatened status. For fish species smaller than this size, 97% (710 species) were not threatened (LC or NT). For fish species greater than or equal to this size (84 species), more than half (51%, 43 species) were threatened (CR, EN or VU) and, of these, 32 were cartilaginous. Further examination revealed a significant trend in threat category with size (Fig. 1b): the larger the fish species, the more highly threatened the category.

The risk of a population or species extinction is a function of intrinsic sensitivity (biology) and exposure to an extrinsic threatening process. Hence, body size in itself is not likely to be the cause of extinction risk; rather, it is the combination of fishing mortality and body size that determines risk. Much like the terrestrial mammals of the Late Quaternary, marine megafauna are more susceptible to population decline because they are more sought after21, and the rate at which their populations can replace themselves is low relative to the fishing mortality rate. This is due to late age at maturity, low maximum rates of population increase (and often) strong density dependence in recruitment24, which gives large fishes reduced resilience to fishing, compared with smaller species. Maximum population growth rate and related ‘speed-of-life’ traits may be the ultimate correlate of extinction risk, whereas body size is only the proximate, but more easily measured, correlate25.

Most analyses of life history correlates have been for species within assemblages (limited geographic scale) rather than species across different assemblages. Focusing on ‘speed-of-life’ traits may be necessary for the latter case to control effectively for the filtering effect of temperature on the life histories of communities. Temperature drives local adaptation strongly, shaping variation in population growth rates26, and hence may explain some of the differences in responses between cooler and warmer seas.

Clearly, the analyses presented here would have benefited from including other life history traits, such as growth rate and related ‘speed-of-life’ traits, directly. However, extracting such data for all of the species considered here would be a major undertaking, because these traits are hard to measure consistently across large numbers of species. It would require an exercise akin to the Red List assessment; so here, we can only recommend these to be considered in future when such exercises are repeated. In our study, size is used as a reasonable proxy for other life history traits, which is in-keeping with other studies showing size to explain extinction risk27,28.

Other variables in the RF were of lower importance (Fig. 1a). The binary variable ‘Present in freshwater’, indicating whether the species has any part of its life cycle in freshwater or not, was not particularly important. This may be because, of the 54 species that were classed as occurring in freshwater, only 11 (20%) were threatened. Similarly, and somewhat unexpectedly, the binary variable ‘fished’, indicating whether the species was subject to fishing (including bycatch; see Methods) or not, also did not have a high importance (Fig. 1a). Of the 365 species that were fished, only 65 (18%) were classed as threatened, and one-third (33%) of species classed as Least Concern are fished, so fishing per se does not determine vulnerability to extinction risk. In terms of the threats to the species, fishing was by far the most ubiquitous, affecting 365 of the 818 species. The next largest threat identified was pollution, with only 54 species affected by this, but 427 species were recorded with unknown threats. The lack of information on the specific threats to fishes, other than fishing, could also be better addressed in future. This analysis does not suggest that fishing is not important, it indicates, rather, that susceptibility to extinction risk (or not) is not driven purely by this threat (because many fish species

Figure 1 | Factors that affect the conservation status of European fishes. a, Variable importance plot for the conditional RF that modelled the IUCN Red List category as a function of the factors as labelled. Taxonomic class and maximum size were almost an order of magnitude more important than any other variable. b, Box plots of IUCN Red List category against size. Red List categories are Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), and Least Concern (LC). Middle band is the median, boxes indicate the interquartile range (IQR), whiskers min(max(x), Q3 + 1.5 × IQR) and max(min(x), Q1 – 1.5 × IQR), where Q1 and Q3 are the 1st and 3rd quartiles respectively, and dots are outliers from the whiskers. The LC category was bootstrapped 1,000 times, downsampling 26 species at random from the 725 in that category. All 1,000 bootstraps of a general linear model were significant at P < 0.0001. The y axis is on a square root scale.
face it), but by the ability of the species to counteract it. The Chondrichthyes and fishes of large size have life history traits that make them much more susceptible to high mortality rates, chief among which is fishing.

We explored the effect of commercial fishing in more detail by examining 115 stock assessments of 31 commercially exploited marine fish species in European waters. Of these, 95 assessments had enough information to determine their status (see Methods). Only 19 stocks were sustainable, with 46 being overfished, 19 declining and 11 recovering. There was a significant geographical discrepancy: a much higher fraction of the fish stocks in the Mediterranean were overexploited (Fig. 2) and depleted in biomass.
(Fig. 3) compared with the northeast Atlantic. Similar observations have been reported before29,30, albeit separately and in different formats for the two areas: examining both simultaneously and using the same criteria demonstrates the relative magnitude of the overfishing problem in the Mediterranean. Not one of the 39 assessed Mediterranean fish stocks examined here was classed as sustainable (Figs 2 and 3; Supplementary Table 4). Hake (Merluccius merluccius) is particularly problematic: of the 12 examined hake stocks in the Mediterranean, 9 have exploitation rates that are more than 5 times the rate that is consistent with maximum sustainable yield (MSY). Biomass estimates show a similar discrepancy: only one Mediterranean stock has more than half of the biomass that would be consistent with sustainable levels, while 15 Mediterranean stocks have less than 5% of that biomass. Compared with the northeast Atlantic, the warmer Mediterranean would be expected to have fish assemblages that reach smaller maximum sizes and have faster population growth rates31, so populations and species should be able to recover from severe overfishing32. Our findings are, therefore, contra to these metabolic expectations, which may explain why Mediterranean fish populations have avoided complete collapse in the face of such severe overfishing. It should also be noted that the Mediterranean is a semi-enclosed sea with a much longer history of human impacts compared with the Atlantic. At present, the Mediterranean is heavily impacted, in addition to fishing, by multiple stressors ranging from temperature increase and acidification to habitat modification and pollution in coastal areas33.

In the northeast Atlantic, the situation continues to improve29: of the 56 stocks there, almost twice as many are sustainable (19) as

![Figure 3](image-url)
overfished (10); 8 stocks are recovering, but 19 are declining. The stocks in most peril are those of Atlantic cod (Gadus morhua), with some still having relatively low biomass and high exploitation rates, although there has been an improvement in North Sea cod in recent years. The problems here are of a different nature, with recovering stocks likely to present challenges under the new landings obligation: for example, previously scarce species with low quotas are rapidly caught as they recover, closing the mixed fishery and ‘choking’ quotas of other species. It is interesting to note the status of the three stocks under Faroese jurisdiction: haddock (Melanogrammus aeglefinus) and cod were overfished, and saithe (Pollachius virens) was declining. The Faroese have their own management arrangements, unique from the Common Fisheries Policy, and manage these three stocks not by regulating catches through quotas, but by regulating effort through days at sea. Effort control, rather than catch control, is the main management tool implemented in the Mediterranean as well; hence, the poor state of stocks in both areas may imply a general inadequacy of effort controls alone to secure sustainable fisheries. The Faroese and Mediterranean fisheries differ from the rest of Europe in several other ways, most notably the contribution of fishing to local communities, a factor that presents challenges to the implementation of fisheries management.

The IUCN Red List and fish stock assessments address different issues: IUCN is concerned with extinction risk, whereas fisheries assessments are concerned with sustainable exploitation. Clearly, if a fish stock is classified as sustainable, it may seem contradictory (though theoretically possible) for IUCN to place the species in a threatened category. In our analysis, none of the stocks classified as sustainable were placed by IUCN in a threatened category. Hence sustainable fishery criteria seem to be consistent with low extinction risk. With very few exceptions, even stocks classed as overfished or subject to overfishing were placed by IUCN in low risk categories. Four species were classed in IUCN threat categories: turbot (Scophthalmus maximus) and golden redfish (Sebastes norvegicus), classed as VU; and round-nosed grenadier (Coryphaenoides rupestris) and spurdog (Squalus acanthias) classed as EN. Sardine (Sardina pilchardus) was classed as NT. Where assessments exist for stocks of all of these species, they were not classed as sustainable. The two classification schemes can, therefore, be seen as complementary graduated indicators of status, with the stock sustainability representing the first level of concern. If a stock is overfished then further examination under the IUCN framework is merited to determine if there is an extinction risk. Conversely, if a species is deemed to have a low risk of extinction (LC), it is not to say that certain local stocks may not be at risk. However, as stock assessments are updated every year and IUCN Red List assessments are much less frequent, discrepancies may yet occur. An important feature of the IUCN system is that it can be applied to species for which there is no analytical stock assessment. So it may be pertinent for Red List assessments to be appended to stock assessments, particularly in cases where those stocks are
overfished or where data are deficient (for example, in terms of reference points or fishing mortality).

Most of Europe’s commercial fish stocks are not threatened with extinction. However, most of the larger fish species are, particularly sharks and rays. In addition to these cartilaginous fishes, the large fishes that are threatened include six species of sturgeon, the northern wolfish (Anarhichas denticulatus), blue ling (Molva dippertya), the dusky grouper (Epinephelus marginatus), the Atlantic halibut (Hippoglossus hippoglossus) and (wild) Atlantic salmon (Salmo salar); although, of these, only the sturgeons are CR. In terms of the conservation of commercially fished species, management agencies in northern Europe have succeeded in reducing fishing pressure and, in some cases, populations are recovering.

The food security, economic performance, and political and cultural importance of the fisheries of northern Europe are clearly significant enough to merit the substantial effort required in scientific assessment and effective compliance. Such efforts are not effective in the Mediterranean and are insufficient for the megafauna in both regions. Greater efforts to conserve our large fish species are essential prior to the imminent expansion of anthropogenic activity in marine space (mineral exploitation, aquaculture, renewable energy, blue biotechnology and tourism), the so called Blue Growth. Loss of these large, ecologically important species could have extended consequences that cascade to other trophic levels that include important commercial species, particularly in overfished northern European stocks: this could ultimately undermine sustainable Blue Growth.

Methods

Red List assessment to assess risk of extinction. Here, we considered the Red List assessments of 1,020 species of Europe’s marine fishes that were assessed as part of the IUCN Red List of marine and freshwater fishes. The areas considered included the Mediterranean Sea, the Black Sea, the Baltic Sea, the North Sea and the European part of the Atlantic Ocean, including the exclusive economic zones of the Macaronesian islands belonging to Portugal and Spain. Marine and anadromous fishes with breeding populations native to or naturalized in Europe before AD 1500 were included. However, species that are primarily freshwater or catadromous were excluded as the major threats affecting them occur in the freshwater, rather than marine, environment. Species for which occurrence within European waters could not be verified and rarely documented species, presumably waifs of populations primarily occurring outside Europe, were also excluded, as were species with a marginal occurrence within European waters. To assess the extinction risk of each species, the IUCN Red List categories and criteria and the IUCN Red List guidelines were applied. There are nine IUCN Red List categories: Extinct (EX), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD) and Not Applicable (NA). The latter is particularly important to determine the variable importance (the output statistic that ranks the importance of each variable in predicting the class). The RF model was built using the Party package in the R statistical software language. The model was run with 10,000 trees and weighted to account for the number of species within the training set are split into two groups on the basis of a binary threshold value in CR 1/21, EN 1/23, VU 1/23 and NT 1/26. The results of the RF were examined balanced dataset. Weights on each observation were 1/number of the appropriate species, for example, in terms of reference points or fishing mortality. The model was run with 10,000 trees and weighted to account for the number of species within the training set are split into two groups on the basis of a binary threshold value in CR 1/21, EN 1/23, VU 1/23 and NT 1/26. The results of the RF were examined balanced dataset. Weights on each observation were 1/number of the appropriate species, for example, in terms of reference points or fishing mortality.

In CR 1/21, EN 1/23, VU 1/23 and NT 1/26. The results of the RF were examined balanced dataset. Weights on each observation were 1/number of the appropriate species, for example, in terms of reference points or fishing mortality. In CR 1/21, EN 1/23, VU 1/23 and NT 1/26. The results of the RF were examined balanced dataset. Weights on each observation were 1/number of the appropriate species, for example, in terms of reference points or fishing mortality.
importance\textsuperscript{21}. We also constructed a simple classification tree with the same formulation as the RF (Equation (1)).

**Stock assessments.** We examined 115 analytical stock assessments conducted by the International Council for the Exploration of the Sea (ICES) and the Scientific, Technical and Economic Committee for Fisheries (STECF) of the European Commission (EC), the recognized authorities that provide scientific advice to managers. Assessment data for the northeast Atlantic were provided by ICES and data from the Mediterranean were compiled from individual STECF reports. We obtained additional data from individual expert group reports of assessments of Irish Sea cod, and examined every single species in the IUCN threatened categories to determine if any stock assessments for these species were available in 2015 when the IUCN Red List was updated. We found that 114 stock assessments were fulfilled. There were three main reference points used in providing advice. These reference points, based on the theory of MSY, were: (1) fishing mortality (F\textsubscript{MSY}) with a 20\% surplus fishing mortality; (2) a spawning stock biomass (SSB) that triggers a cautious response (MSY F\textsubscript{BSSB}, the SSB that triggers advice to reduce exploitation rates below F\textsubscript{MSY}); and (3) the spawning stock biomass (SSB) that triggers a lower response (MSY B\textsubscript{BSSB}, the SSB that triggers advice to reduce exploitation rates below F\textsubscript{MSY}). For most stocks these MSY reference points were available; where they weren’t, we used target reference points from the management plan specific to the stock. Because there is a particular geographic area, we used the 

**References**


Supplementary Figure 1 | Classification tree for the determination of IUCN extinction risk category of 818 fish species in European waters. The designated categories are indicated in the terminal nodes (in boxes, where 1.CR=Critically Endangered; 2.EN=Endangered; 3.VU=Vulnerable; 4.NT=Near Threatened; 5.LC=Least Concern). Underneath these are the classification rates at the terminal node, expressed as the number of correct classifications and the number of observations in the node. Splitting variables are (from top): maximum size (cm); taxonomic class, depth range (m), area occupied (m²), minimum latitude (degrees North). At each split, the condition is stipulated according to the text. For example, at the first node (maximum size >=149 cm), species for which this is false proceed to the right, they are then subject to the condition related to taxonomic class: chondrichthyans pass to the left and other [bony] fish classes to the right, resulting in 651 species of bony fish smaller than 150 cm (out of a total of 674) which are classed as Least Concern (LC) by the tree at the rightmost terminal node.
### Supplementary Table 1 | List of European marine fish species listed as regionally threatened according to the Red List conducted by the International Union for Conservation of Nature.

Cat = IUCN Red List Category, where CR=Critically Endangered, EN=Endangered; VU=Vulnerable. Criteria follow those of the IUCN (see Methods).

<table>
<thead>
<tr>
<th>Class</th>
<th>Order</th>
<th>Species</th>
<th>Cat</th>
<th>Red List Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actinopterygii</td>
<td>Acipenseriformes</td>
<td>Acipenser gueldenstaedti</td>
<td>CR</td>
<td>A2bcde</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Acipenseriformes</td>
<td>Acipenser naccarii</td>
<td>CR</td>
<td>A2bcde; B2ab(i,ii,iii,iv,v)</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Acipenseriformes</td>
<td>Acipenser nudiventris</td>
<td>CR</td>
<td>A2cd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Acipenseriformes</td>
<td>Acipenser stellatus</td>
<td>CR</td>
<td>A2cde</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Acipenseriformes</td>
<td>Acipenser sturio</td>
<td>CR</td>
<td>A2cde; B2ab(ii,iii,v)</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Acipenseriformes</td>
<td>Huso huso</td>
<td>CR</td>
<td>A2bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Lamniformes</td>
<td>Carcharodon carcharias</td>
<td>CR</td>
<td>C2a(ii)</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Lamniformes</td>
<td>Lamna nasus</td>
<td>CR</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Lamniformes</td>
<td>Carcharias taurus</td>
<td>CR</td>
<td>C2a(iii)</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Odontaspis ferox</td>
<td>CR</td>
<td>A2bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Gymnura altavela</td>
<td>CR</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Pteromyalaeus bovinus</td>
<td>CR</td>
<td>A2c</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Pristis pectinata</td>
<td>CR</td>
<td>A2b; D</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Pristis pristis</td>
<td>CR</td>
<td>A2b; D</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Dipturus batis</td>
<td>CR</td>
<td>A2bcd+4bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Leucoraja melitensis</td>
<td>CR</td>
<td>A2bcd+3bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Rostroaja alba</td>
<td>CR</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td>Centrophorus granulosus</td>
<td>CR</td>
<td>A4b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squatiniformes</td>
<td>Squatina aculeata</td>
<td>CR</td>
<td>A2bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squatiniformes</td>
<td>Squatina oculata</td>
<td>CR</td>
<td>A2bcd+3cd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squatiniformes</td>
<td>Squatina squatina</td>
<td>CR</td>
<td>A2bcd+3d</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Cyprinodontiformes</td>
<td>Aphanius ibers</td>
<td>EN</td>
<td>A2ce</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Gadiformes</td>
<td>Coryphaenoides rupestris</td>
<td>EN</td>
<td>A1bd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td>Anarhichas denticulatus</td>
<td>EN</td>
<td>A2b</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td>Epinephelus marginatus</td>
<td>EN</td>
<td>A2d</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td>Pomatoschistus tortonesei</td>
<td>EN</td>
<td>B2ab(ii,iii)</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Scorpaeniformes</td>
<td>Sebastes mentella</td>
<td>EN</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Carcharhiniformes</td>
<td>Carcharhinus longimanus</td>
<td>EN</td>
<td>A2b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Carcharhiniformes</td>
<td>Carcharhinus plumbeus</td>
<td>EN</td>
<td>A4d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Lamniformes</td>
<td>Alopia superciliosa</td>
<td>EN</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Lamniformes</td>
<td>Alopia vulpinus</td>
<td>EN</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Lamniformes</td>
<td>Cetorhinus maximus</td>
<td>EN</td>
<td>A2abd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Mobula mobular</td>
<td>EN</td>
<td>A2d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Leucoraja circularis</td>
<td>EN</td>
<td>A2bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Raja radula</td>
<td>EN</td>
<td>A4b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Glaucoctegus cemiculus</td>
<td>EN</td>
<td>A3bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td>Rhinobatos rhinobatos</td>
<td>EN</td>
<td>A2b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td>Centrophorus lusitanicus</td>
<td>EN</td>
<td>A4b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td>Centrophorus squamosus</td>
<td>EN</td>
<td>A4b</td>
</tr>
<tr>
<td>Class</td>
<td>Order</td>
<td>Species</td>
<td>Cat</td>
<td>Red List Criteria</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>-----</td>
<td>-------------------</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Deania calcea</em></td>
<td>EN</td>
<td>A4d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Dalatias licha</em></td>
<td>EN</td>
<td>A3d+4d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Echinorhinus brucus</em></td>
<td>EN</td>
<td>A2bcd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Centroscymnus coelolepis</em></td>
<td>EN</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Squalus acanthias</em></td>
<td>EN</td>
<td>A2bd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Beryciformes</td>
<td><em>Hoplostethus atlanticus</em></td>
<td>VU</td>
<td>A1bd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Clupeiformes</td>
<td><em>Alosa immaculata</em></td>
<td>VU</td>
<td>B2ab(v)</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Gadiformes</td>
<td><em>Molva dypterygia</em></td>
<td>VU</td>
<td>A1bd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td><em>Mycteroperca fusca</em></td>
<td>VU</td>
<td>B2ab(v)</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td><em>Bodianus scrofa</em></td>
<td>VU</td>
<td>B2ab(iv,v)</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td><em>Labrus viridis</em></td>
<td>VU</td>
<td>A4ad</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td><em>Umbrina cirrosa</em></td>
<td>VU</td>
<td>A2bc</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td><em>Orcynopsis unicolor</em></td>
<td>VU</td>
<td>A2bde</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td><em>Dentex dentex</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Pleuronectiformes</td>
<td><em>Hippoglossus hippoglossus</em></td>
<td>VU</td>
<td>A2ce</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Pleuronectiformes</td>
<td><em>Scophthalmus maximus</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Salmoniformes</td>
<td><em>Salmo salar</em></td>
<td>VU</td>
<td>A2ace</td>
</tr>
<tr>
<td>Actinopterygii</td>
<td>Scorpaeniformes</td>
<td><em>Sebastes norvegicus</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Carcharhiniformes</td>
<td><em>Galeorhinus galeus</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Carcharhiniformes</td>
<td><em>Mustelus mustelus</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Carcharhiniformes</td>
<td><em>Mustelus punctulatus</em></td>
<td>VU</td>
<td>A4d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td><em>Dasyatis centoura</em></td>
<td>VU</td>
<td>A2d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td><em>Dasyatis pastinaca</em></td>
<td>VU</td>
<td>A2d</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td><em>Myliobatis aquila</em></td>
<td>VU</td>
<td>A2b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td><em>Leucoraja fullonica</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Rajiformes</td>
<td><em>Raja maderensis</em></td>
<td>VU</td>
<td>D2</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Centrophorus uyato</em></td>
<td>VU</td>
<td>A2b</td>
</tr>
<tr>
<td>Chondrichthyes</td>
<td>Squaliformes</td>
<td><em>Oxynotus centrina</em></td>
<td>VU</td>
<td>A2bd</td>
</tr>
</tbody>
</table>
**Supplementary Table 2 | Confusion matrix for the conditional random forest predicting IUCN Red List Category.** Predicted class in rows, actual class in columns. Shaded areas indicate agreed classes (757 in total). The weighted kappa statistic, which is the proportion of specific agreement was 0.70, which is just short of ‘excellent’ for such models; the normalized mutual information statistic was 0.45.

<table>
<thead>
<tr>
<th>Actual IUCN Red List Category</th>
<th>Predicted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>EN</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>NT</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LC</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicted Red List Category</th>
<th>CR</th>
<th>EN</th>
<th>VU</th>
<th>NT</th>
<th>LC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>18</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>EN</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>NT</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>LC</td>
<td>1</td>
<td>8</td>
<td>15</td>
<td>17</td>
<td>72</td>
<td>764</td>
</tr>
</tbody>
</table>

Actual Total: 21 23 23 26 725 818
**Supplementary Table 3** | Definition of status of fish stocks from analytical stock assessments, defining the colour coding used in Figures 2 and 3.

<table>
<thead>
<tr>
<th>Stock status</th>
<th>Status indicator</th>
<th>Explanation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable stock</td>
<td>Green</td>
<td>Stock for which SSB (or a biomass proxy) is at or above MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt; (or a relevant proxy) and F is at or below F&lt;sub&gt;MSY&lt;/sub&gt;. The stock is at a level sufficient to ensure that, on average, the MSY can be obtained from the stock and for which fishing pressure is adequately controlled to avoid the stock becoming overfished. The appropriate management is in place.</td>
<td>SSB/MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt; ≥1 and F/F&lt;sub&gt;MSY&lt;/sub&gt; ≤1</td>
</tr>
<tr>
<td>Recovering stock</td>
<td>Yellow</td>
<td>Biomass is below the level required to derive the MSY (SSB &lt; MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt;) and F is at or below F&lt;sub&gt;MSY&lt;/sub&gt;, but management measures are in place to promote stock recovery, and recovery is expected to occur. The appropriate management is in place, and the stock biomass is expected to recover.</td>
<td>SSB/MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt; &lt;1 and F/F&lt;sub&gt;MSY&lt;/sub&gt; ≤1</td>
</tr>
<tr>
<td>Declining stock</td>
<td>Orange</td>
<td>Biomass is above level required to derive the MSY (SSB ≥ MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt;) but fishing pressure is too high (F &gt; F&lt;sub&gt;MSY&lt;/sub&gt;) and moving the stock in the direction of becoming overfished. Management is needed to reduce F to ensure that biomass does not decline to an overfished state.</td>
<td>SSB/MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt; ≥1 and F/F&lt;sub&gt;MSY&lt;/sub&gt; &gt;1</td>
</tr>
<tr>
<td>Overfished stock</td>
<td>Red</td>
<td>SSB is below level required to derive the MSY (MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt;) and F is above F&lt;sub&gt;MSY&lt;/sub&gt;. The stock has been reduced by fishing, so that average recruitment levels are significantly reduced. Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable improvements. Management is needed to recover the stock.</td>
<td>SSB/MSY B&lt;sub&gt;TRIGGER&lt;/sub&gt; &lt;1 and F/F&lt;sub&gt;MSY&lt;/sub&gt; &gt;1</td>
</tr>
<tr>
<td>Undefined</td>
<td>Grey</td>
<td>Not sufficient quantitative information exists to determine stock status</td>
<td>Data to assess the stock status is required</td>
</tr>
</tbody>
</table>
### Supplementary Table 4. Information on the assessment of fish stocks from ICES & STECF.

<table>
<thead>
<tr>
<th>Year</th>
<th>Species Name</th>
<th>Common name</th>
<th>FishStockCode</th>
<th>SSB</th>
<th>Mean F</th>
<th>F_{MSY}</th>
<th>MSY B_{trigger}</th>
<th>Area</th>
<th>Stock status</th>
<th>IUCN Cat</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Ammodytes marinus</td>
<td>Rätt’s Sändeel</td>
<td>san-ns1</td>
<td>178,712</td>
<td>0.37</td>
<td>NA</td>
<td>215,000</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Ammodytes marinus</td>
<td>Rätt’s Sändeel</td>
<td>san-ns2</td>
<td>91,545</td>
<td>0.07</td>
<td>NA</td>
<td>100,000</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Ammodytes marinus</td>
<td>Rätt’s Sändeel</td>
<td>san-ns3</td>
<td>202,124</td>
<td>0.52</td>
<td>NA</td>
<td>195,000</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Brosme brosme</td>
<td>Torsk</td>
<td>usk-icel</td>
<td>6,027</td>
<td>0.26</td>
<td>0.20</td>
<td>NA</td>
<td>Iceland</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Capros oper</td>
<td>Boar Fish</td>
<td>boc-nea</td>
<td>1</td>
<td>1.85</td>
<td>NA</td>
<td>347,063</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-2532-gor</td>
<td>1,000,071</td>
<td>0.16</td>
<td>0.22</td>
<td>600,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-30</td>
<td>669,461</td>
<td>0.15</td>
<td>0.15</td>
<td>316,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-31</td>
<td>1</td>
<td>0.78</td>
<td>NA</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-3a22</td>
<td>129,845</td>
<td>0.26</td>
<td>0.32</td>
<td>110,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-47d3</td>
<td>2,215,525</td>
<td>0.20</td>
<td>0.27</td>
<td>1,000,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-67bc</td>
<td>194,194</td>
<td>0.09</td>
<td>0.16</td>
<td>410,000</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-irle</td>
<td>89,397</td>
<td>0.19</td>
<td>0.26</td>
<td>54,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-nirs</td>
<td>17,633</td>
<td>0.25</td>
<td>0.26</td>
<td>9,500</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-noss</td>
<td>3,946,000</td>
<td>0.11</td>
<td>0.15</td>
<td>5,000,000</td>
<td>Norway</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Clupea harengus</td>
<td>Herring</td>
<td>her-riga</td>
<td>90,347</td>
<td>0.34</td>
<td>0.32</td>
<td>60,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2013</td>
<td>Coryphaenoides rupestris</td>
<td>Roundnosed grenadier</td>
<td>grn cel</td>
<td>0.21</td>
<td>0.39</td>
<td>1</td>
<td>1</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>EN</td>
</tr>
<tr>
<td>2015</td>
<td>Dicentrarchus labrax</td>
<td>Bass</td>
<td>Bss-47</td>
<td>6,925</td>
<td>0.38</td>
<td>0.13</td>
<td>8,000</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-1</td>
<td>756</td>
<td>1.05</td>
<td>0.43</td>
<td>6,432</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-6</td>
<td>20,367</td>
<td>0.89</td>
<td>0.43</td>
<td>52,513</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-9</td>
<td>5,216</td>
<td>1.72</td>
<td>0.43</td>
<td>18,736</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-16</td>
<td>10,734</td>
<td>0.86</td>
<td>0.35</td>
<td>32,363</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-17</td>
<td>266,254</td>
<td>1.33</td>
<td>0.58</td>
<td>NA</td>
<td>EU.Med</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2008</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-20</td>
<td>1,191</td>
<td>0.28</td>
<td>0.53</td>
<td>3,259</td>
<td>EU.Med</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Engraulis encrasicolus</td>
<td>Anchovy</td>
<td>Anc-29</td>
<td>669,282</td>
<td>1.55</td>
<td>0.41</td>
<td>NA</td>
<td>EU.Med</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-2224</td>
<td>23,742</td>
<td>0.84</td>
<td>0.26</td>
<td>38,400</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-347d</td>
<td>148,896</td>
<td>0.39</td>
<td>0.33</td>
<td>165,000</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-7e-k</td>
<td>7,676</td>
<td>0.57</td>
<td>0.32</td>
<td>10,300</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-arct</td>
<td>1,139,000</td>
<td>0.48</td>
<td>0.40</td>
<td>460,000</td>
<td>Norway</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-farp</td>
<td>18,781</td>
<td>0.41</td>
<td>0.32</td>
<td>40,000</td>
<td>Faroe</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-icig</td>
<td>546,376</td>
<td>0.28</td>
<td>0.22</td>
<td>220,000</td>
<td>Iceland</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-kat</td>
<td>1</td>
<td>0.36</td>
<td>NA</td>
<td>10,500</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-scow</td>
<td>3,363</td>
<td>0.89</td>
<td>0.19</td>
<td>22,000</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Gadus morhua</td>
<td>Cod</td>
<td>cod-iris</td>
<td>3,037</td>
<td>1.15</td>
<td>0.40</td>
<td>8,800</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Lepidorhombus boscii</td>
<td>Four-spot Megrim</td>
<td>mgb-8c9a</td>
<td>6,573</td>
<td>0.39</td>
<td>0.17</td>
<td>4,600</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Lepidorhombus whiffidragonis</td>
<td>Megrim</td>
<td>meg-4a6a</td>
<td>2</td>
<td>0.32</td>
<td>1.00</td>
<td>1</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Lepidorhombus whiffidragonis</td>
<td>Megrim</td>
<td>mgw-8c9a</td>
<td>1,089</td>
<td>0.36</td>
<td>0.17</td>
<td>910</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Lophius budegassa</td>
<td>Black-bellied Angler</td>
<td>anb-8c9a</td>
<td>1</td>
<td>0.59</td>
<td>1.00</td>
<td>1</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>Year</td>
<td>Species Name</td>
<td>Common name</td>
<td>FishStockCode</td>
<td>SSB</td>
<td>Mean F</td>
<td>F_{act}</td>
<td>MSY_{Bergey}</td>
<td>Area</td>
<td>Stock status</td>
<td>IUCN Cat</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------------</td>
<td>-----</td>
<td>--------</td>
<td>---------</td>
<td>--------------</td>
<td>------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>2011</td>
<td>Lophius budgasssa</td>
<td>Black-bellied Angler</td>
<td>Ang-7</td>
<td>1,570</td>
<td>0.54</td>
<td>0.29</td>
<td>10,051</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Lophius piscatorius</td>
<td>Monk fish (Angler)</td>
<td>anp-8c9a</td>
<td>7,546</td>
<td>0.25</td>
<td>0.19</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Maillotus villosus</td>
<td>Capelin</td>
<td>cap-icel</td>
<td>460,000</td>
<td>0.15</td>
<td>0.35</td>
<td>80,000</td>
<td>Norway</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Melanogrammus aeglefinus</td>
<td>Haddock</td>
<td>had-346a</td>
<td>145,650</td>
<td>0.24</td>
<td>0.37</td>
<td>88,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Melanogrammus aeglefinus</td>
<td>Haddock</td>
<td>had-7b-k</td>
<td>33,387</td>
<td>0.60</td>
<td>0.40</td>
<td>10,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Merlangius merlangus</td>
<td>Whiting</td>
<td>whg-47d</td>
<td>263,195</td>
<td>0.23</td>
<td>0.15</td>
<td>184,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Merlangius merlangus</td>
<td>Whiting</td>
<td>whg-7e-k</td>
<td>83,052</td>
<td>0.32</td>
<td>0.32</td>
<td>40,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Merlangius merlangus</td>
<td>Whiting</td>
<td>whg-scw</td>
<td>23,058</td>
<td>0.03</td>
<td>0.22</td>
<td>39,900</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>hke-nrtm</td>
<td>249,017</td>
<td>0.34</td>
<td>0.27</td>
<td>46,200</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>hke-soth</td>
<td>18,856</td>
<td>0.68</td>
<td>0.24</td>
<td>11,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-1</td>
<td>266</td>
<td>2.17</td>
<td>0.22</td>
<td>10,376</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-5</td>
<td>25</td>
<td>1.33</td>
<td>0.22</td>
<td>2,392</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-6</td>
<td>2,376</td>
<td>1.33</td>
<td>0.10</td>
<td>284,386</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-7</td>
<td>685</td>
<td>2.03</td>
<td>0.27</td>
<td>191,691</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-9</td>
<td>731</td>
<td>2.00</td>
<td>0.15</td>
<td>146,206</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-10</td>
<td>978</td>
<td>1.03</td>
<td>0.14</td>
<td>79,417</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-11</td>
<td>318</td>
<td>4.21</td>
<td>0.25</td>
<td>60,191</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-15.16</td>
<td>1,041</td>
<td>0.61</td>
<td>0.15</td>
<td>146,176</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-17</td>
<td>2,145</td>
<td>2.06</td>
<td>0.20</td>
<td>171,274</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-18</td>
<td>2,502</td>
<td>1.11</td>
<td>0.19</td>
<td>227,827</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-19</td>
<td>701</td>
<td>1.00</td>
<td>0.22</td>
<td>57,675</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2006</td>
<td>Merluccius merluccius</td>
<td>Hake</td>
<td>Hak-22.23</td>
<td>2,086</td>
<td>1.63</td>
<td>0.40</td>
<td>541,698</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Micromesistius poutassou</td>
<td>Blue Whiting</td>
<td>whb-comb</td>
<td>3,965,000</td>
<td>0.20</td>
<td>0.30</td>
<td>2,250,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Molva molva</td>
<td>Ling</td>
<td>lin-icel</td>
<td>66,421</td>
<td>0.25</td>
<td>0.24</td>
<td>9,500</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-1</td>
<td>805</td>
<td>1.86</td>
<td>0.30</td>
<td>2,766</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-5</td>
<td>18</td>
<td>1.08</td>
<td>0.31</td>
<td>199</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-6</td>
<td>1,432</td>
<td>1.72</td>
<td>0.38</td>
<td>26,762</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2009</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-9</td>
<td>1,168</td>
<td>0.57</td>
<td>0.40</td>
<td>6,339</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-10</td>
<td>230</td>
<td>0.98</td>
<td>0.40</td>
<td>3,804</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2010</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-11</td>
<td>356</td>
<td>1.43</td>
<td>0.48</td>
<td>6,721</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-15.16</td>
<td>1,147</td>
<td>1.50</td>
<td>0.45</td>
<td>6,507</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-17</td>
<td>16,508</td>
<td>0.55</td>
<td>0.36</td>
<td>60,926</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-18</td>
<td>844</td>
<td>1.03</td>
<td>0.50</td>
<td>6,446</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-19</td>
<td>714</td>
<td>1.28</td>
<td>0.30</td>
<td>5,759</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2006</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-22.23</td>
<td>5,286</td>
<td>1.18</td>
<td>0.53</td>
<td>51,883</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Mullus barbatus</td>
<td>Striped Mullet</td>
<td>Rmu-29</td>
<td>1,290</td>
<td>0.81</td>
<td>0.46</td>
<td>7,754</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2011</td>
<td>Mullus surmuletus</td>
<td>Red Mullet</td>
<td>Smr-5</td>
<td>192</td>
<td>0.79</td>
<td>0.29</td>
<td>1,123</td>
<td>EU.Med</td>
<td>overfished</td>
<td>DD</td>
</tr>
<tr>
<td>2011</td>
<td>Pagellus erythrinus</td>
<td>Pandora</td>
<td>Pan-15.16</td>
<td>1,146</td>
<td>0.87</td>
<td>0.30</td>
<td>26,729</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-2123</td>
<td>16,133</td>
<td>0.19</td>
<td>0.37</td>
<td>5,553</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>Year</td>
<td>Species Name</td>
<td>Common name</td>
<td>FishStockCode</td>
<td>SSB</td>
<td>Mean F</td>
<td>F_{MSY}</td>
<td>MSY_B_{F_{MSY}}</td>
<td>Area</td>
<td>Stock status</td>
<td>IUCN Cat</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>---------------</td>
<td>-----</td>
<td>--------</td>
<td>----------</td>
<td>----------------</td>
<td>----------</td>
<td>----------------</td>
<td>----------</td>
</tr>
<tr>
<td>2015</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-2432</td>
<td>2</td>
<td>0.88</td>
<td>NA</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-7h-k</td>
<td>1</td>
<td>1.06</td>
<td>NA</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-ech-e</td>
<td>81,191</td>
<td>0.11</td>
<td>0.25</td>
<td>25,826</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-echw</td>
<td>2</td>
<td>0.50</td>
<td>NA</td>
<td>1,745</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-iris</td>
<td>2</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pleuronectes platessa</td>
<td>Plaice</td>
<td>ple-nsea</td>
<td>901,694</td>
<td>0.18</td>
<td>0.19</td>
<td>230,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pollachius virens</td>
<td>Saithe</td>
<td>sai-3a46</td>
<td>199,270</td>
<td>0.31</td>
<td>0.32</td>
<td>200,000</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pollachius virens</td>
<td>Saithe</td>
<td>sai-faro</td>
<td>82,089</td>
<td>0.32</td>
<td>0.30</td>
<td>55,000</td>
<td>Faroe</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Pollachius virens</td>
<td>Saithe</td>
<td>sai-icel</td>
<td>138,502</td>
<td>0.19</td>
<td>0.22</td>
<td>65,000</td>
<td>Iceland</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>sar-soth</td>
<td>139,409</td>
<td>0.27</td>
<td>0.26</td>
<td>368,400</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>NT</td>
</tr>
<tr>
<td>2010</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>Sar-1</td>
<td>44,993</td>
<td>0.15</td>
<td>0.23</td>
<td>109,553</td>
<td>EU.Med</td>
<td>recovering</td>
<td>NT</td>
</tr>
<tr>
<td>2010</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>Sar-6</td>
<td>36,816</td>
<td>0.74</td>
<td>0.44</td>
<td>218,955</td>
<td>EU.Med</td>
<td>overfished</td>
<td>NT</td>
</tr>
<tr>
<td>2011</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>Sar-9</td>
<td>20,204</td>
<td>0.47</td>
<td>0.20</td>
<td>95,450</td>
<td>EU.Med</td>
<td>overfished</td>
<td>NT</td>
</tr>
<tr>
<td>2011</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>Sar-17</td>
<td>156,071</td>
<td>0.85</td>
<td>0.51</td>
<td>NA</td>
<td>EU.Med</td>
<td>undefined</td>
<td>NT</td>
</tr>
<tr>
<td>2008</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>Sar-20</td>
<td>5,630</td>
<td>0.23</td>
<td>0.50</td>
<td>6,416</td>
<td>EU.Med</td>
<td>recovering</td>
<td>NT</td>
</tr>
<tr>
<td>2008</td>
<td>Sardina pilchardus</td>
<td>Pilchard</td>
<td>Sar-22.23</td>
<td>18,280</td>
<td>0.69</td>
<td>0.50</td>
<td>46,984</td>
<td>EU.Med</td>
<td>overfished</td>
<td>NT</td>
</tr>
<tr>
<td>2015</td>
<td>Scomber scombrus</td>
<td>Mackerel</td>
<td>mac-nea</td>
<td>3,620,056</td>
<td>0.34</td>
<td>0.22</td>
<td>3,000,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2014</td>
<td>Scophthalmus maximus</td>
<td>Turbot</td>
<td>tur-nea</td>
<td>0</td>
<td>1.14</td>
<td>NA</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>VU</td>
</tr>
<tr>
<td>2012</td>
<td>Scophthalmus maximus</td>
<td>Turbot</td>
<td>Tur-29</td>
<td>1,121</td>
<td>0.73</td>
<td>0.26</td>
<td>33,143</td>
<td>EU.Med</td>
<td>overfished</td>
<td>VU</td>
</tr>
<tr>
<td>2014</td>
<td>Sebastes norvegicus</td>
<td>Golden redfish</td>
<td>red.nea</td>
<td>335,400</td>
<td>0.102</td>
<td>0.097</td>
<td>220,000</td>
<td>EU.NEA</td>
<td>Declining</td>
<td>VU</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-7h-k</td>
<td>1</td>
<td>0.75</td>
<td>NA</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-bisc</td>
<td>12,012</td>
<td>0.48</td>
<td>0.26</td>
<td>13,000</td>
<td>EU.NEA</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-celt</td>
<td>2,620</td>
<td>0.44</td>
<td>0.31</td>
<td>2,200</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-echw</td>
<td>8,143</td>
<td>0.55</td>
<td>0.30</td>
<td>8,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-echw</td>
<td>4,452</td>
<td>0.19</td>
<td>0.27</td>
<td>2,800</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-iris</td>
<td>992</td>
<td>0.11</td>
<td>0.16</td>
<td>3,100</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-kask</td>
<td>2,162</td>
<td>0.18</td>
<td>0.23</td>
<td>2,600</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>sol-nsea</td>
<td>41,137</td>
<td>0.26</td>
<td>0.20</td>
<td>37,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2012</td>
<td>Solea solea</td>
<td>Dover Sole</td>
<td>Sol-17</td>
<td>702</td>
<td>1.38</td>
<td>0.26</td>
<td>20,191</td>
<td>EU.Med</td>
<td>overfished</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Sprattus sprattus</td>
<td>Sprat</td>
<td>spr-2232</td>
<td>753,000</td>
<td>0.41</td>
<td>0.26</td>
<td>570,000</td>
<td>EU.NEA</td>
<td>declining</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Sprattus sprattus</td>
<td>Sprat</td>
<td>spr-nea</td>
<td>576,000</td>
<td>0.65</td>
<td>0.70</td>
<td>142,000</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
<tr>
<td>2013</td>
<td>Squalus acanthias</td>
<td>Spurdog</td>
<td>spu.nea</td>
<td>243,135</td>
<td>0.014</td>
<td>0.03</td>
<td>963,700</td>
<td>EU.NEA</td>
<td>recovering</td>
<td>EN</td>
</tr>
<tr>
<td>2015</td>
<td>Trachurus trachurus</td>
<td>Horse Mackerel (Scad)</td>
<td>hom-soth</td>
<td>529,830</td>
<td>0.04</td>
<td>0.11</td>
<td>NA</td>
<td>EU.NEA</td>
<td>undefined</td>
<td>LC</td>
</tr>
<tr>
<td>2015</td>
<td>Trachurus trachurus</td>
<td>Horse Mackerel (Scad)</td>
<td>hom-west</td>
<td>723,560</td>
<td>0.12</td>
<td>0.13</td>
<td>634,577</td>
<td>EU.NEA</td>
<td>sustainable</td>
<td>LC</td>
</tr>
</tbody>
</table>