European anchovy & European pilchard

Adriatic Sea, Aegean Sea, Alboran Sea, Gulf of Lion, Ionian Sea, Ligurian Sea, Spain/Mediterranean, Strait of Sicily, Black Sea

Unassociated purse seine (non-FAD), Midwater trawls

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Seafood Watch Standard used in this assessment: Fisheries Standard v2

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About Seafood Watch

Monterey Bay Aquarium's Seafood Watch program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. Seafood Watch makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from www.seafoodwatch.org. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Watch Assessment. Each assessment synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic to arrive at a recommendation of "Best Choices," "Good Alternatives" or "Avoid." This ethic is operationalized in the Seafood Watch standards, available on our website here. In producing the assessments, Seafood Watch seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch Research Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch's sustainability recommendations and the underlying assessments will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Watch assessments in any way they find useful.

Guiding Principles

Seafood Watch defines sustainable seafood as originating from sources, whether fished[1] or farmed that can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems.

The following guiding principles illustrate the qualities that fisheries must possess to be considered sustainable by the Seafood Watch program (these are explained further in the Seafood Watch Standard for Fisheries):

- Follow the principles of ecosystem-based fisheries management.
- Ensure all affected stocks are healthy and abundant.
- Fish all affected stocks at sustainable levels.
- Minimize bycatch.
- Have no more than a negligible impact on any threatened, endangered or protected species.
- Managed to sustain the long-term productivity of all affected species.
- Avoid negative impacts on the structure, function or associated biota of aquatic habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.

These guiding principles are operationalized in the four criteria in this standard. Each criterion includes:

- Factors to evaluate and score
- Guidelines for integrating these factors to produce a numerical score and rating

Once a rating has been assigned to each criterion, we develop an overall recommendation. Criteria ratings and the overall recommendation are color coded to correspond to the categories on the Seafood Watch pocket guide and online guide:

Best Choice/Green: Buy first; they're well managed and caught or farmed responsibly.

Good Alternative/Yellow: Buy, but be aware there are concerns with how they're caught, farmed or managed.

Avoid/Red: Take a pass on these for now; they're overfished, lack strong management or are caught or farmed in ways that harm other marine life or the environment.

[1] "Fish" is used throughout this document to refer to finfish, shellfish and other invertebrates

Summary

European anchovy and Atlantic sardine are small, schooling species, found throughout the eastern Atlantic Ocean and its associated seas. This report is for European anchovy and Atlantic Sardine caught in small pelagic fisheries in the Mediterranean region, including the Black Sea.

The abundance of European anchovy relative to abundance conservation goals is largely unknown throughout the region. The abundance level of sardine is also uncertain in many areas, but some populations are depleted. Fishing levels on anchovy and sardine are above sustainable levels in several areas. While anchovy and sardine are the primary target species in the small pelagic fisheries in the Mediterranean, other small pelagic fishes are caught as well (e.g., mackerels, horse mackerels, Spanish sardine, sprat). Fishing levels on chub mackerel in these fisheries are thought to be high and the fisheries may sometimes catch threatened and endangered dolphins.

European anchovy and Atlantic sardine fisheries are managed in international waters by the General Fisheries Commission for the Mediterranean but also by individual countries. Management is currently relatively poor, except in the Adriatic Sea where a management plan has just been introduced.

The purse seines and pelagic trawls used to capture European Anchovy and Atlantic sardine fish at or near the water surface and therefore have little impact on bottom habitats. However, because European Anchovy and Atlantic Sardines are an important prey species in pelagic food webs, there are concerns about the effects of these fisheries on the food web and overall ecosystem.

Anchovy in the Adriatic Sea is rated "yellow" or "good alternative", but all other anchovy and sardine fisheries in the region are rated "red" or "avoid" due to poor management and/or rampant overfishing.

Final Seafood Recommendations

SPECIES | FISHERY	CRITERION 1 TARGET SPECIES	CRITERION 2 OTHER SPECIES	CRITERION 3 MANAGEMENT	CRITERION 4 HABITAT	OVERALL RECOMMENDATION
European anchovy | Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.414	1.414	3.162	**Avoid (1.819)**
European anchovy | Aegean Sea | Mediterranean and Black Sea | Midwater trawls	3.318	1.732	2.000	3.162	**Avoid (2.455)**
European anchovy | Alboran Sea | Mediterranean and Black Sea | Midwater trawls	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Black Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.732	1.414	3.162	**Avoid (1.914)**
European anchovy | Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Ionian Sea | Mediterranean and Black Sea | Midwater trawls	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	2.644	1.414	1.414	3.162	**Avoid (2.022)**
European anchovy | Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.414	1.414	3.162	**Avoid (1.819)**
European anchovy | Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.318	1.732	2.000	3.162	**Avoid (2.455)**
European anchovy | Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.732	1.414	3.162	**Avoid (1.914)**
European anchovy | Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European anchovy | Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.644	1.732	1.414	3.162	**Avoid (2.127)**

SPECIES | FISHERY	CRITERION 1 TARGET SPECIES	CRITERION 2 OTHER SPECIES	CRITERION 3 MANAGEMENT	CRITERION 4 HABITAT	OVERALL RECOMMENDATION
European anchovy | Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.644	1.414	1.414	3.162	**Avoid (2.022)**
European anchovy | Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	3.053	1.414	1.414	3.162	**Avoid (2.096)**
European anchovy | Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	3.053	1.414	1.414	3.162	**Avoid (2.096)**
European pilchard | Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	1.414	1.732	1.414	3.162	**Avoid (1.819)**
European pilchard | Aegean Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.732	2.000	3.162	**Avoid (2.087)**
European pilchard | Alboran Sea | Mediterranean and Black Sea | Midwater trawls	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European pilchard | Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	2.159	1.732	1.414	3.162	**Avoid (2.022)**
European pilchard | Ionian Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.732	1.414	3.162	**Avoid (1.914)**
European pilchard | Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	1.414	1.732	1.414	3.162	**Avoid (1.819)**
European pilchard | Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.414	1.732	1.414	3.162	**Avoid (1.819)**
European pilchard | Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.732	2.000	3.162	**Avoid (2.087)**
European pilchard | Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.644	1.732	1.414	3.162	**Avoid (2.127)**
European pilchard | Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.159	1.732	1.414	3.162	**Avoid (2.022)**
European pilchard | Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.732	1.414	3.162	**Avoid (1.914)**
European pilchard | Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.414	1.732	1.414	3.162	**Avoid (1.819)**

SPECIES | FISHERY	CRITERION 1 TARGET SPECIES	CRITERION 2 OTHER SPECIES	CRITERION 3 MANAGEMENT	CRITERION 4 HABITAT	OVERALL RECOMMENDATION
European pilchard | Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	1.414	1.732	1.414	3.162	**Avoid (1.819)**
European pilchard | Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	1.414	1.732	1.414	3.162	**Avoid (1.819)**

Scoring Guide

Scores range from zero to five where zero indicates very poor performance and five indicates the fishing operations have no significant impact.

Final Score = geometric mean of the four Scores (Criterion 1, Criterion 2, Criterion 3, Criterion 4).

Best Choice/Green = Final Score >3.2, and no Red Criteria, and no Critical scores

Good Alternative/Yellow = Final score >2.2-3.2, and neither Harvest Strategy (Factor 3.1) nor Bycatch Management Strategy (Factor 3.2) are Very High Concern2, and no more than one Red Criterion, and no Critical scores

Avoid/Red = Final Score ≤2.2, or either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern or two or more Red Criteria, or one or more Critical scores.

[2] Because effective management is an essential component of sustainable fisheries, Seafood Watch issues an Avoid recommendation for any fishery scored as a Very High Concern for either factor under Management (Criterion 3).

Introduction

Scope of the analysis and ensuing recommendation

This report is on the Mediterranean and Black Seas small pelagic fisheries for European anchovy (*Engraulis encrasicolus*) and Atlantic Sardine (*Sardina pilchardus*) in FAO region 37.

Species Overview

European anchovy are a small pelagic species found in the eastern Atlantic and Mediterranean, Black, and Azov Seas (Whitehead 1984). Atlantic Sardine are found in the eastern Atlantic Ocean from the North Sea into the Mediterranean and Black Seas, as well as along the north coast of Africa to Senegal. These species are found in large schools along the coast and in the Mediterranean and Black Seas are primarily targeted by purse seine fisheries but also by pelagic trawlers. Environmental changes, including those caused by the Mediterranean Oscillation Index (WeMOi), appear to impact the survival, spawning activitiy and growth of these species, and hence their overall population abundance (Guisande 2001)(Catalan et al. 2006)(Ganias 2009)(Solari et al. 2010)(Martin et al. 2012)(Bonanno et al. 2013).

Within the Mediterranean basin there are many sub-populations of European anchovy and sardine (Traina et al. 2011) (WGSASPS 2012)(Kristoffersen and Magoulas 2008). The General Fisheries Commission for the Mediterranean (GFCM) manages both species in the Mediterranean and Black Sea. Individual countries manage these species in their respective waters.

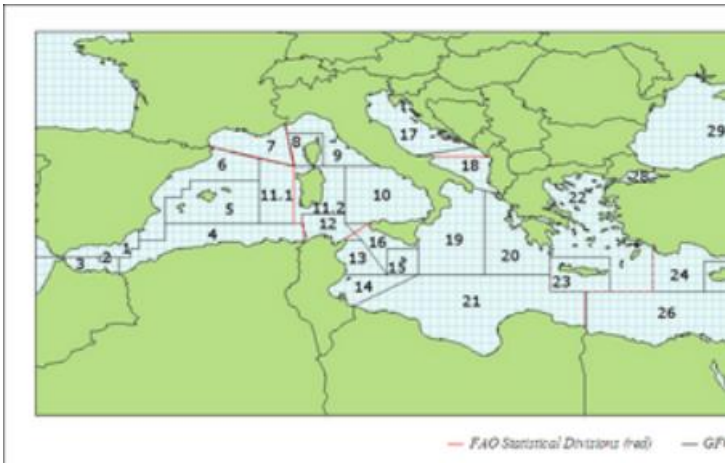

Figure 1: Geographical sub-areas within the Mediterranean Basin (Image by the General Fisheries Commission for the Mediterranean). In this report we evaluate Anchovy and sardine fisheries in the Alboran Sea, Northern Spain, Gulf of Lion, Ligurian and North Tyrrhenian Sea, Strait of Sicily (South Sicily), Adriatic Sea, Ionian Sea, Aegean Sea, and the Black Sea (Anchovy only).

Production Statistics

European anchovy are one of the most commercially important small pelagic species in the Mediterranean (Lleonart and Maynou 2003). Around 5% or 563,000 t (1,241,000,000 lbs.) of worldwide anchovy catches come from the Mediterranean and Black Seas (EIO 2012). Catches in this region have varied from 260,627 t to 765,827 t (574,500,000-1,688,000,000 lbs) since 2001 (FAO 2013a). Within the Mediterranean Sea, the highest catches occur in the North and Central Adriatic Sea (by Italy, Croatia, and Slovenia), with catches in excess of 40,000 t (Casey et al. 2012). High catches also occur in the Aegean Sea off eastern Greece (14,000-24,000 t) and Northern Spain (8,000-10,000 t). Lower catches occur in the Alboran Sea, the Gulf of Lion, the Strait of Sicily, the Ligurian and North Tyrrhenian Seas, and the Ionian Sea (Casey et al. 2012). In the Black Sea, Turkey accounts for the majority of European anchovy catches, with catches ranging from 138,569 t to 385,000 t between 2000 and 2011, followed by Georgia, with catches ranging from 927 t to 39,857 t (FAO 2013a).

Atlantic Sardine are also an important resource in the Mediterranean (FAO 2013b). Catches increased dramatically during the 1990's peaking in 2001 and subsequently declining again. In recent years (2009-2011), the countries catching the most Atlantic Sardine in the Mediterranean/Black Sea region have been Croatia (30,000-46,000 t), Turkey (28,000-35,000 t), and Algeria (31,000-55,000 t). Other important countries catching sardine include Tunisia (15,000-20,000 t), Spain (15,000-20,000 t) and Italy (~15,000 t) (FAO 2013a).

Importance to the US/North American market.

Import statistics for the United States do not break anchovy imports out by species. The United States is one of the top importers of prepared and preserved anchovies (EIO 2012). In 2012, the US imported 3,313 t (7,304,000 lbs) of canned "anchovies" and 994 t (2,191,000 lbs) of pickled or salted "anchovies" (NMFS 2013). Import information specific to the Mediterranean and Black Sea is not available. During 2012, the US imported 694 t of anchovy from Italy, 247 t from Spain, 50 t from Turkey, and very small amounts from France and Greece (NMFS 2013). However, it is unclear if all of the imported "anchovy" from these countries was caught in the Mediterranean and Black Seas.

During 2012, nearly 33,000 t of sardine were imported into the US. Most of this was canned sardine (NMFS 2013). The US imported 400 t of Atlantic Sardine from Spain, as well as small amounts from Croatia, France, Italy, Slovenia, and Turkey.

Common and market names.

European anchovy is the accepted common name. Atlantic Sardine are also known as European pilchard.

Primary product forms

European anchovy and Atlantic Sardine are found frozen, fresh, prepared and preserved and salted (EIO 2012).

Assessment

This section assesses the sustainability of the fishery(s) relative to the Seafood Watch Standard for Fisheries, available at www.seafoodwatch.org. The specific standard used is referenced on the title page of all Seafood Watch assessments.

Criterion 1: Impacts on the species under assessment

This criterion evaluates the impact of fishing mortality on the species, given its current abundance. When abundance is unknown, abundance is scored based on the species' inherent vulnerability, which is calculated using a Productivity-Susceptibility Analysis. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores. The Criterion 1 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Factor 1.3 (Fishing Mortality) is Critical.

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level*

Criterion 1 Summary

EUROPEAN ANCHOVY				
REGION / METHOD	**INHERENT VULNERABILITY**	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Black Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)

EUROPEAN ANCHOVY				
REGION / METHOD	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	3.000: Low	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	3.000: Low	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)

EUROPEAN PILCHARD				
REGION / METHOD	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)

EUROPEAN PILCHARD				
REGION / METHOD	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	3.000: Low	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)

There are a number of populations of European anchovy and sardine within the Mediterranean and Black Seas. The abudance of European anchovy relative to sustainable abundance targets or conservation goals is largely unknown. Some Atlantic sardine populations are considered depleted so their population stauts is some areas is of higher concern than European anchovy. For both species fishing levels on several populations are too high and unsustainable.

Criterion 1 Assessments

SCORING GUIDELINES

Factor 1.1 - Abundance
Goal: Stock abundance and size structure of native species is maintained at a level that does not impair recruitment or productivity.

- *5 (Very Low Concern) — Strong evidence exists that the population is above an appropriate target abundance level (given the species' ecological role), or near virgin biomass.*

- *3.67 (Low Concern) — Population may be below target abundance level, but is at least 75% of the target level, OR data-limited assessments suggest population is healthy and species is not highly vulnerable.*
- *2.33 (Moderate Concern) — Population is not overfished but may be below 75% of the target abundance level, OR abundance is unknown and the species is not highly vulnerable.*
- *1 (High Concern) — Population is considered overfished/depleted, a species of concern, threatened or endangered, OR abundance is unknown and species is highly vulnerable.*

Factor 1.2 - Fishing Mortality
Goal: Fishing mortality is appropriate for current state of the stock.

- *5 (Low Concern) — Probable (>50%) that fishing mortality from all sources is at or below a sustainable level, given the species ecological role, OR fishery does not target species and fishing mortality is low enough to not adversely affect its population.*
- *3 (Moderate Concern) — Fishing mortality is fluctuating around sustainable levels, OR fishing mortality relative to a sustainable level is uncertain.*
- *1 (High Concern) — Probable that fishing mortality from all source is above a sustainable level.*

European anchovy

Factor 1.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Low
European Anchovy have a FishBase vulnerability score of 14 out of 100 (Froese and Pauly 2013), which is considered a low vulnerability to fishing. They reach sexual maturity early in life at around 1 year of age and 10-13 cm (4-5 in) in length, and live to around 4 years of age (Giraldez and Abad 1995)(Pertierra and Lleonart 1996) (Uriate et al. 1996)(Somarakis and Nikolioudakis 2007)(Somarakis et al. 2004)(Froese and Pauly 2013). European Anchovy are broadcast spawners, releasing their eggs into the water column. They spawn multiple times a year, producing around 13,000 to 500,000 eggs (Whitehead et al. 1988)(Froese and Pauly 2013). Anchovies are an important food source for many species.

Factor 1.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
There are several different populations of European anchovy in the Mediterranean Sea (Traina et al. 2011) (WGSASPS 2012)(Kristoffersen and Magoulas 2008) and population assessments are conducted for each individual population. Population abundances of European anchovy in the Mediterranean Sea range from low to moderate, and for some populations abundance is unknown (see detailed rationale section below). Climate changes may affect populations sizes from year to year (Martin et al. 2012).

In the Black Sea, there have been large declines in European anchovy abundance over time, but since 2007 the abundance of sexually mature fish has remained stable around 600,000-700,000 t. Recruitment (i.e. the amount of new fish entering the population) has varied between 2002 and 2011 (Daskalov et al. 2012).

No European anchovy populations have been declared overfished or depleted, but for the majority of populations, abundance conservation goals have not been determined, making it difficult to evaluate whether abundances are at healthy or unhealthy levels (Casey et al. 2012)(GFCM 2012c)(GFCM 2011b). We therefore consider abundance levels to be uncertain throughout much of this region. Since European anchovy has a low vulnerability to fishing, the population status is rated a 'moderate concern'.(Palomera et al. 2008)(Casey et al. 2012)
Justification:
Within the Mediterranean Sea, the European anchovy population in Northern Spain is considered to have a low abundance. Abundance declined between 2003 and 2006, from 3486 million fish to 1456 million fish (Tugores et al. 2010). Declines in abundance in this region were also observed during the 1990's (Giraldez et al. 2006) (Palomera et al. 2008)(Casey et al. 2012). The population in the Gulf of Lion (French waters) is also at a low abundance, though abundance is thought to have remained stable since 2005 (Casey et al. 2012)(GFCM 2011b) (GFCM 2012c)(GFCM 2013b). In the Gulf of Lion, the age/size structure of European anchovy is skewed toward younger/smaller individuals; as well, reduced mean length at age, a distortion of the sex-ratio, reduced growth rate, and reduced size-at first maturity have all been observed (Casey et al. 2012)(GFCM 2012c). Neither of these of populations are considered overfished, but no abundance conservation goals have been established.

In the Strait of Sicily, the current abundance of European anchovy is at 56% of the target abundance level or the abundance needed to produce the maximum sustainable yield/catch (BMSY). This is considered a low abundance. However abundance is still slightly above the limit abundance reference point, so the population is not considered overfished but the population is overexploited and this could lead to population declines in the future (GFCM 2012c).

In the Northern and Central Adriatic Sea (north Italy, Croatia, and Slovenia), abundance is considered to be at a medium abundance level and is above both the limit/overfished abundance reference point and the precautionary abundance reference point/goal (GFCM 2012c). However, it has been recommended that these abundance reference points/goals be revised (GFCM 2013b). In the Southern Adriatic Sea (south Italy, Montenegro, and Albania), the abundance of European anchovy is uncertain (Casey et al. 2012)(GFCM 2013b). It has been recommended that these two areas be assessed as a single population. We therefore consider the abundance of anchovy for the entire area unknown.

Abundance is also uncertain for other populations in the Mediterranean. In the Ionian Sea (western Greek waters), abundance has generally decreased since 2002, but there was a slight increase from 2006-2008 (Casey et al. 2012). In the Aegean Sea (eastern Greek waters), although a large amount of uncertainty surrounded the results, abundance appears to have increased from 2006 to 2008 (Cardinale et al. 2012). Information on the abundance of European anchovy in the Ligurian and North Tyrrhenian Seas (northwestern Italy) is not available (Casey et al. 2012). In the Alboran Sea (south Spain, Morocco, and Algeria), managers are currently working towards a population assessment of European anchovy, but as of 2012, there was not enough information to complete a formal assessment. Abundance for this population is unknown (GFCM 2013b)(Casey et al. 2012).

Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Low Concern
European anchovy abundance was above BMSY in 2018, based on the most recent stock assessment (GFCM 2019a). Biomass was increasing in recent years and was the highest in the time-series in 2018; however, it should be noted that uncertainty in the assessment was considered fairly high (GFCM 2019a). Because abundance was above BMSY and relative biomass trends were positive, a score of 'Low Concern' was awarded.

Factor 1.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

High Concern
For European anchovy in some regions, scientists and managers have recommended a maximum sustainable exploitation rate (fishing mortality/fishing mortality + natural mortality) of 0.4 (Casey et al. 2012)(GFCM 2012c). If exploitation rates are above this level, this indicates that fishing levels are unsustainable or that overfishing is occurring. Fishing exploitation levels are currently considered to be greater than the recommended level of 0.4 for the populations in the Adriatic and Black seas, where the current exploitation rates are 1.32 and 0.46, respectively (GFCM 2017)(FAO 2019)(GFCM 2019b). Therefore, overfishing is considered to be occurring for these stocks and a high concern score was awarded for these regions.

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Low Concern
Based on the most recent stock assessment, fishing mortality for anchovy in the Aegean Sea has been declining for several years and most recently was below FMSY (F/FMSY = 0.78) (GFCM 2019a). Uncertainty in the assessment was considered fairly high. Because fishing mortality was at a sustainable level, a score of low concern was awarded.

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
Fishing mortality reference points have not been determined for several small pelagics stocks in the Mediterranean Sea. In these cases fishing mortality was considered unknown. This is true for anchovy stocks in the Alboran Sea, Gulf of Lion, Straight of Sicily, Ligurian Sea, and Ionian Sea (Casey et al. 2012)(FAO 2019)(GFCM 2019a). In these cases there were no indications, based on available data, that overfishing is occurring. We have awarded a moderate concern score for these regions where fishing mortality was unknown.

Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
Fishing mortality was below FMSY based on most recent stock assessment (GFCM 2019a); however, confidence in this estimate was not high and GFCM (2019a) advised not increasing fishing mortality. Based on this information, a score of 'Moderate Concern' was awarded.

European pilchard

Factor 1.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Low
FishBase has assigned a low vulnerability score of 27 out of 100 for Atlantic sardine {Cheung et al., 2005}. Atlantic sardine grow quickly reaching sexual maturity between 11 and 16 cm (4-6 in) or by 1 year of age. The maximum reported age of Atlantic sardine is over six years (Santojanni et al. 2005)(Silva et al. 2008)(Bigot and Ross 2009) (Bellido et al. 2009)(Giannoulaki et al. 2009)(Quintanilla et al. 2009)(Omar and Hachem 2009). Atlantic sardine are broadcast spawners producing between 50,000 to 490,000 eggs (McEvoy and McEvoy 1992)(Froese and Pauly 2013). Atlantic sardine are an intermediate species in the food web (Froese and Pauly 2013).

Factor 1.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

High Concern
Based on most recent estimates, abundance of sardine in the Adriatic Sea was below Blim (although above Bpa), indicating overfishing was occurring (FAO 2019). Based on this information, a score of high concern was awarded.

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
There are many populations of Atlantic sardine in the Mediterranean Sea and populations are assessed individually. Sardines have natural fluctuations in abundance levels, which can be related to climate changes (Sabates et al. 2006).

In the northern and central Adriatic Sea, abundance has increased greatly in recent years and is now above both the limit and precautionary abundance reference levels/goals (GFCM 2012c). However, it has been recommended that

these abundance reference levels/goals be revised (GFCM 2013c). The abundance of sardine in the southern Adriatic Sea relative to sustainable reference levels/goals is unknown (GFCM 2012b). It has been recommended that these two areas be assessed as a single population. We therefore consider the abundance level of sardine for the entire Adriatic Sea to be uncertain. In the Aegean Sea, abundance has fluctuated since 2003. The abundance level of sardine relative to sustainable abundance targets/goals is uncertain (Cardinale et al. 2012). No formal assessments have been conducted for sardine in the Alboran Sea so the population status is unknown (GFCM 2013b). The status of sardine in the Ionian Sea is also unknown (Casey et al. 2012) We have awarded a moderate concern score for these regions because the abundance of sardine relative to sustainable abundance targets is unknown and sardine have a medium vulnerability to fishing.

Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High Concern
In the North Spanish Mediterranean, the abundance of sardines declined from 3902 million fish to 1210 million fish between 2003 and 2006 (Tugores et al. 2010). Abundance for this population is considered low and there is a risk of population collapse (Casey et al. 2012). In the Gulf of Lion (French waters), the abundance level of adult sardines was very low from 2008-2011, increasing in 2012; however it is uncertain if this trend will continue (GFCM 2013b). This population is also considered to be at risk of collapse.

In the Strait of Sicily, abundance of sardine has increased slightly in recent years, but the current abundance is only at 48% of the target abundance level, i.e., the biomass needed to produce the maximum sustainable yield (BMSY). Although this population is not considered overfished by managers (GFCM 2012c)(GFCM 2013b)(Casey et al. 2012), because abundance is below 50% of BMSY, we consider this population depleted/overfished.

We have awarded a high concern score for these regions due to the low population sizes.

Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

High Concern
There are many populations of Atlantic sardine in the Mediterranean Sea and populations are assessed individually. Sardines have natural fluctuations in abundance levels, which can be related to climate changes (Sabates et al. 2006). In the Strait of Sicily, abundance has increased slightly in recent years, but the current abundance is only at 48% of the target abundance level, i.e., the biomass needed to produce the maximum sustainable yield (BMSY). Although this population is not considered overfished by managers {GFCM 2012c, 2013b, Casey et al. 2012}, because abundance is below 50% of BMSY, we consider this population depleted/overfished and have rated this factor high concern.

Factor 1.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

High Concern
For sardine populations in some regions, scientists and managers have recommended a maximum sustainable exploitation rate (fishing mortality/fishing mortality + natural mortality) of 0.4 (Casey et al. 2012)(GFCM 2012c). If exploitation rates are above this level, this indicates that fishing levels are unsustainable or that overfishing is occurring. Fishing exploitation levels are currently considered to be greater than the recommended level of 0.4 for the populations in the Adriatic and Ionian seas, where the most recent exploitation rates are 1.71 (GFCM 2017) (FAO 2019) and 0.46 (STECF 2014), respectively. Therefore, overfishing is considered to be occurring for these stocks and we awarded a high concern score.

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High Concern
Based on the most recent stock assessments, fishing mortality for sardine in several regions were above FMSY. In the Aegean Sea, fishing mortality has likely been decreasing slightly in recent years; however, F/FMSY = 1.03 (GFCM 2019a). In the Strait of Sicily, fishing mortality has likely been decreasing slightly in recent years; however, Fcur/FMSY=3.8 (GFCM 2019a). In Northern Spain, fishing mortality has likely been increasing in recent years and F/Fmsy= 2.11(GFCM 2019a). Uncertainty in these assessments was considered moderately high in all thee stock assessments, but based on this evidence overfishing was occurring in each region. Because fishing mortality was not at a sustainable level, a score of high concern was awarded.

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
Fishing mortality reference points have not been determined for several small pelagics stocks in the Mediterranean Sea. In these cases fishing mortality was considered unknown. This is true for sardine stocks in the Gulf of Lion and Alboran Sea. The exploitation rate is very low in Gulf of Lion (E=0.01) due to small fish size and lack of market demand, but a reference point could not be established due to uncertainty in the most recent stock assessment (GFCM 2019a). Fishing mortality is unknown in the Alboran Sea, although some indicators suggested reductions in fishing mortality may be needed for achieving sustainable harvest (FAO 2019). We have awarded a moderate concern score for these regions due uncertainty regarding fishing mortality.

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated under Criterion 2. Seafood Watch defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. Species are evaluated using the same guidelines as in Criterion 1. When information on other species caught in the fishery is unavailable, the fishery's potential impacts on other species is scored according to the Unknown Bycatch Matrices, which are based on a synthesis of peer-reviewed literature and expert opinion on the bycatch impacts of each gear type. The fishery is also scored for the amount of non-retained catch (discards) and bait use relative to the retained catch. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard/bait score. The Criterion 2 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Factor 2.3 (Fishing Mortality) is Crtitical

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level.*
- *Minimize bycatch.*

Criterion 2 Summary

Criterion 2 score(s) overview

This table(s) provides an overview of the Criterion 2 subscore, discards+bait modifier, and final Criterion 2 score for each fishery. A separate table is provided for each species/stock that we want an overall rating for.

EUROPEAN ANCHOVY			
REGION / METHOD	**SUB SCORE**	**DISCARDS+BAIT / LANDINGS**	**SCORE**
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	1.414	1.000: < 20%	Red (1.414)
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Black Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	1.414	1.000: < 20%	Red (1.414)
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.414	1.000: < 20%	Red (1.414)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)

EUROPEAN ANCHOVY			
REGION / METHOD	**SUB SCORE**	**DISCARDS+BAIT / LANDINGS**	**SCORE**
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.414	1.000: < 20%	Red (1.414)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	1.414	1.000: < 20%	Red (1.414)
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	1.414	1.000: < 20%	Red (1.414)

EUROPEAN PILCHARD			
REGION / METHOD	**SUB SCORE**	**DISCARDS+BAIT / LANDINGS**	**SCORE**
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	1.732	1.000: < 20%	Red (1.732)
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.732	1.000: < 20%	Red (1.732)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	1.732	1.000: < 20%	Red (1.732)
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	1.732	1.000: < 20%	Red (1.732)

Criterion 2 main assessed species/stocks table(s)

This table(s) provides a list of all species/stocks included in this assessment for each 'fishery' (as defined by a region/method combination). The text following this table(s) provides an explanation of the reasons the listed species were selected for inclusion in the assessment.

ADRIATIC SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.414 | DISCARD RATE: 1.000 | **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
European anchovy	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European sprat	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

ADRIATIC SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.414 | DISCARD RATE: 1.000 | **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
European anchovy	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European sprat	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

ADRIATIC SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.414 DISCARD RATE: 1.000 SCORE: 1.414

AEGEAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
European pilchard	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
Bogue	2.000: Medium	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)
European anchovy	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)

AEGEAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
European pilchard	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
Bogue	2.000: Medium	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)
European anchovy	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)

ALBORAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE

ALBORAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Atlantic saury	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Bullet tuna	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European pilchard	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

ALBORAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Atlantic saury	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Bullet tuna	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European pilchard	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)

ALBORAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

BLACK SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European anchovy	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)

BLACK SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European anchovy	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

GULF OF LION | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
European pilchard	3.000: Low	2.000: High Concern	2.330: Moderate Concern	Red (2.159)

GULF OF LION | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European sprat	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

GULF OF LION | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
European pilchard	3.000: Low	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European sprat	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

IONIAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)

IONIAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
Bogue	2.000: Medium	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)
Picarel	2.000: Medium	5.000: Very Low Concern	5.000: Very Low Concern	Green (5.000)

IONIAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
European pilchard	3.000: Low	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
Bogue	2.000: Medium	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)
Picarel	2.000: Medium	5.000: Very Low Concern	5.000: Very Low Concern	Green (5.000)

LIGURIAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 | DISCARD RATE: 1.000 | **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE

LIGURIAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

LIGURIAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.732 DISCARD RATE: 1.000 **SCORE: 1.732**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

MEDITERRANEAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS | SPAIN

SUB SCORE: 1.414 DISCARD RATE: 1.000 **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)

MEDITERRANEAN SEA | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS | SPAIN

SUB SCORE: 1.414 DISCARD RATE: 1.000 **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Atlantic saury	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Bullet tuna	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
European anchovy	3.000: Low	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)

MEDITERRANEAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD) | SPAIN

SUB SCORE: 1.414 DISCARD RATE: 1.000 **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Atlantic saury	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Bullet tuna	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

MEDITERRANEAN SEA | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD) | SPAIN

SUB SCORE: 1.414 DISCARD RATE: 1.000 **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European anchovy	3.000: Low	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)

STRAIT OF SICILY | MEDITERRANEAN AND BLACK SEA | MIDWATER TRAWLS

SUB SCORE: 1.414 DISCARD RATE: 1.000 **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

STRAIT OF SICILY | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)

SUB SCORE: 1.414 DISCARD RATE: 1.000 **SCORE: 1.414**

SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
European pilchard	3.000: Low	2.000: High Concern	1.000: High Concern	Red (1.414)
Atlantic chub mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Mediterranean horse mackerel	2.000: Medium	3.000: Moderate Concern	1.000: High Concern	Red (1.732)
Short-beaked common dolphin	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Atlantic mackerel	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
European anchovy	3.000: Low	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)

STRAIT OF SICILY | MEDITERRANEAN AND BLACK SEA | UNASSOCIATED PURSE SEINE (NON-FAD)				
SUB SCORE: 1.414	DISCARD RATE: 1.000		**SCORE: 1.414**	
SPECIES	**INHERENT VULNERABILITY**	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Spanish sardine	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Striped dolphin	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)

European anchovy and Atlantic sardine are the main target species in the Mediterranean small pelagic fisheries. However, several other species of lower commercial importance can be caught as well, with the composition of species varying slightly among areas. In all areas, the majority of the species caught are retained, so discards (fish thrown back to sea) are typically low.

In the Aegean and Ionian Sea purse seine fisheries, five species make up over 97% of the marketable catch: European anchovy, Atlantic sardine, Spanish sardine, bogue, and chub mackerel in the Aegean Sea and picarel in the Ionian Sea. In these regions, European anchovy and sardine make up around 39% and 29% of the catch, respectively (Tsagarakis et al. 2012). In the Ionian Sea, chub mackerel was also included in the assessment because it was reported to occasionally be caught and there is some concern about the status of chub mackerel in the Mediterranean. In other areas within the Mediterranean Sea, commonly reported bycatch includes Atlantic mackerel, Chub mackerel, horse mackerels (Trachurus spp.), and Spanish sardine (GFCM 2008){GFCM 2011}{Santojanni et al. 2005}(Casey et al. 2012). As well, in the Alboran Sea and northern Spanish Mediterranean, Atlantic saury and bullet tuna were reported in the bycatch (GFCM 2008) and sprat was reported as a common bycatch species in the Adriatic Sea and the Gulf of Lion (since 2008) {GFCM 2011}{Santojanni et al. 2005}(Casey et al. 2012). The small pelagic fisheries in the Mediterranean Sea have the greatest impact on Atlantic chub mackerel and in some areas Atlantic sardine, because there is concern about their abundance and fishing levels are unsustainable. There is also some concern about incidental catches of the endangered short-beaked common dolphin in the Mediterranean Sea fisheries. In the Black Sea, the only common bycatch species in the anchovy fisheries is the Mediterranean horse mackerel (Sahin et al. 2008). There is also the potential for incidental catches of short-beaked common dolphins in the Black Sea; in the Black Sea this species is considered vulnerable.

Criterion 2 Assessment

SCORING GUIDELINES

Factor 2.1 - Abundance
(same as Factor 1.1 above)

Factor 2.2 - Fishing Mortality
(same as Factor 1.2 above)

Factor 2.3 - Modifying Factor: Discards and Bait Use
Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

Ratio of bait + discards/landings	Factor 2.3 score
<100%	1
>=100	0.75

Atlantic chub mackerel

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Medium
Chub mackerel have a medium vulnerability to fishing score of 46 out of 100 according to FishBase (Froese and Pauly 2013). They reach sexual maturity at a length of 18 cm and around 2 to 3 years of age (Froese and Pauly 2013)(Cengiz 2012). Females spawn several batches a year with an average annual fecundity rate of 100,000 to 400,000 eggs {Collete and Nauen 1983}. Chub mackerel have a maximum reported age of 18 years and maximum size of 30 cm fork length(Collette and Nauen 1983)(Hernandez and Ortega 2000). Within the food chain, Atlantic chub mackerel are an intermediate species (Froese and Pauly 2013).

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
The International Union for Conservation of Nature (IUCN) considers Atlantic chub mackerel a species of 'Least Concern' globally. However, in the IUCN assessment, they note that chub mackerel are 'Near Threatened' in the Mediterranean (Collette et al. 2011b). No other assessments for this species have been conducted in the Mediterranean region. Due to the lack of information on their status in this region, we have awarded a moderate concern score.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High Concern
No comprehensive population assessment of Atlantic chub mackerel in the Mediterranean Sea has been conducted. However, a study that estimated fishing mortality levels of Atlantic chub mackerel in the Aegean Sea suggested fishing levels were high and that overfishing was likely occurring (Cengiz 2012). The International Union for Conservation of Nature has also identified that current fishing exploitation levels of Atlantic chub mackerel in the Mediterranean are "intense" and that catches since the 1980's have been declining (Collette et al. 2011b). We have awarded a high concern score because fishing mortality rates are unknown but may be high, the status of the population is unknown and there are no management measures in place.

Atlantic mackerel

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Medium
Atlantic mackerel have a medium vulnerability to fishing score of 44 out of 100 according to FishBase (Froese and Pauly 2013). Atlantic mackerel are broadcast spawners (Watson et al. 1992) with a fecundity range of 88,000 to 1.98 million eggs (Froese and Pauly 2013). Sexual maturity is reached around 30-34 cm and 1-3 years of age. Atlantic mackerel live around 12-18 years and reach 60 cm in size (Collette et al. 2011c)(Froese and Pauly 2013). Within the food chain, they are an intermediate to top level species.

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
The International Union for Conservation of Nature (IUCN) considers Atlantic mackerel a species of 'Least Concern' for the entire North Atlantic, but abundance is decreasing (Collette et al. 2011c). Within the Mediterranean region, population assessments of this species have not been conducted, so the abundance of Atlantic mackerel with regard to abundance targets and reference points is unknown. Since Atlantic mackerel have a medium inherent vulnerability to fishing, abundance is rated a moderate concern.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
No population assessments of Atlantic mackerel in the Mediterranean Sea have been conducted, and thus fishing levels on Atlantic mackerel are uncertain. We have therefore rated fishing mortality a moderate concern.

Atlantic saury

Factor 2.1 - Inherent Vulnerability

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Medium
Atlantic saury have a medium vulnerability score of 50 out of 100 according to Fishbase (Froese and Pauly 2013). Atlantic saury are considered a fast growing species of fish, living less than 4 years and reaching sexual maturity at 25 cm (~10 in) or 2-3 years (DFO 2009). Atlantic saury reach a maximum size of 50 cm (20 in) (Froese and Pauly 2013). Atlantic saury are broadcast spawners (Nesterov and Shiganova 1976) but information on fecundity/egg production is not available. Atlantic saury are an intermediate species in the food web (Froese and Pauly 2013).

Factor 2.2 - Abundance

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
The status of Atlantic saury in the Mediterranean is unknown and no population assessments of this species have been conducted (GFCM 2013b). We have awarded a moderate concern score since abundance is unknown and Atlantic saury have a medium inherent vulnerability to fishing.

Factor 2.3 - Fishing Mortality

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
The fishing mortality of Atlantic saury in the Mediterranean is unknown and no population assessments of this species have not been conducted (GFCM 2013b). They are reported to be caught in anchovy and sardine fisheries in the Alboran Sea and northern Spain (GFCM 2008). We have awarded a moderate concern score because of a lack of information.

Bogue

Factor 2.1 - Inherent Vulnerability

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Medium
Bogue have a medium FishBase vulnerability score of 41 out of 100 (Froese and Pauly 2013). Bogue have been reported to live up to 17 years in age, but more commonly live for 7-13 years (Allam 2003)(Hernandez 1989) (Khemiri et al. 2005). They reach a maximum size of around 21 cm (8 in). Sexual maturity is reached around one year of age and 13 cm (5 in) in length (Allam 2003)(Froese and Pauly 2013). Bogue are broadcast spawners and produce up to 395,000 eggs (Bauchot and Hureau 1986)(Froese and Pauly 2013). Bouge are an intermediate species in the food web (Froese and Pauly 2013).

Factor 2.2 - Abundance

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
Bogue are reported to be caught in Anchovy and sardine fisheries in the Aegean and Ionian Seas. In the Aegean Sea, abundance is only at 66% of the target abundance level, which is biomass at the maximum sustainable yield (BMSY). However, no limit reference point/overfished threshold has been determined for this population, so it is unclear whether the population is overfished or not. The results of the assessment conducted in the Ionian Sea are considered unreliable so abundance in relation to sustainable abundance targets/goals is unknown (Cardinale and Osio 2012). Since the statuses of these populations are unknown and bogue have a medium vulnerability to fishing, we have awarded a moderate concern score.

Factor 2.3 - Fishing Mortality

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Low Concern
In the Aegean Sea, bogue are currently thought to be sustainably fished, with current fishing levels at only 62% of the fishing mortality at maximum sustainable yield. However, it has been noted that further data is needed to fully evaluate that status of this population. In the Ionian Sea, the results of the latest population assessment are considered unreliable and the fishing mortality is unknown, but catches of Bogue in this region account for less than 3% of the total Mediterranean catch (Cardinale and Osio 2012). Since fishing levels on bogue in these two areas appear to be sustainable or low, we have awarded a low concern score.

Bullet tuna

Factor 2.1 - Inherent Vulnerability

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Low
Bullet tuna have a low vulnerability score of 34 out of 100 according to FishBase (Froese and Pauly 2013). Bullet tuna reach sexual maturity around 35 cm (14 in) and two years of age (Rodriguez-Roda 1983). The maximum length is 50 cm (20 in). Bullet tuna are broadcast spawners with a fecundity range of 31,000 to 103,000 eggs per spawning event (Collette and Nauen 1983).

Factor 2.2 - Abundance

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
In the Mediterranean, bullet tuna are assessed together with other "small tuna" by a joint General Fisheries Commission for the Mediterranean (GFCM) and International Commission for the Conservation of Tuna (ICCAT) committee. The last assessment conducted in 2008, determined there was not enough information available to determine the population status of bullet tuna or any other small tuna species (ICCAT 2008). The International Union for Conservation of Nature (IUCN) has classified bullet tuna as a species of 'Least Concern' with a stable population trend (worldwide), based on the fact they are widely distributed (Collette et al. 2011a). We have awarded a moderate concern score based on their medium vulnerability to fishing and lack of information on their population status in the Mediterranean Sea.

Factor 2.3 - Fishing Mortality

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
Fishing mortality estimates are not available for bullet tuna. Catches from the combined Atlantic and Mediterranean since 2000, have varied from a low of 3798 t to (2003) to a high of 9307 t (2010) (ICCAT 2013). In the Mediterranean, they are reported to be caught in anchovy and sardine fisheries in the Alboran Sea and northern Spain (GFCM 2008). We have awarded a moderate concern score due to the lack of information.

European sprat

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Low
FishBase assigned a low vulnerability to fishing score of 33 out of 100 for sprat (Froese and Pauly 2013). Sprat reach sexual maturity between 8-12 cm in length and 2-4 years of age. They reach a maximum size of 16 cm and live around 6 years (Froese and Pauly 2013). Sprat are broadcast spawners with a fecundity ranging from 2,000 to 36,000 eggs (Koli 1990). Within the food chain, they are an intermediate species (Froese and Pauly 2013).

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
In the Northern Adriatic Sea, sprat are caught in the small pelagic fishery that targets anchovy and sardine. No abundance goals have been established for sprat in this region and no formal assessment has been conducted, therefore the population status is unknown (Casey et al. 2012). Sprat have also been reported to be caught in the Gulf of Lion since 2008 (GFCM 2011b). Information on abundance of sprat in the Gulf of Lion is not available. We have therefore awarded a moderate concern score since abundance levels are unknown and sprat have a low vulnerability to fishing.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderate Concern
In the northern Adriatic Sea, European sprat are caught in the same fisheries targeting European anchovy and sardine. Sprat are discarded (thrown back to sea) by the Italian fishing fleet but kept by the Slovenia and Croatia fishing fleets. The amount caught is not known, and no assessments have been conducted on sprat in this region to evaluate fishing levels (Casey et al. 2012). Sprat have also been caught in the Gulf of Lions fisheries since 2008 (GFCM 2011b), but fishing levels are not known. We have therefore awarded a moderate concern score.

Mediterranean horse mackerel

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Medium
Mediterranean horse mackerel have a medium FishBase vulnerability score of 46 out of 100 (Froese and Pauly 2013). Mediterranean horse mackerel reach a maximum length of 60 cm (FL) {Bauchot 1997} and 12 years of age and mature around 20 cm (Froese and Pauly 2013). Spawning occurs multiple times during a season and the average fecundity per spawning event has been reported to range from 9,433 to 10,839 eggs. This species is an intermediate to top-level species within the food chain. For European horse mackerel, FishBase assigned a moderate-high vulnerability score of 56 out of 100 (Froese and Pauly 2013). However, this species reaches sexual maturity early in life, between 3-4 years of age (21-30 cm in length), lives to around 10 years of age, and grows to a maximum length of 70 cm. They are broadcast spawners with a fecundity range of 12,700 to 344,700 eggs (Froese and Pauly 2013). They are also intermediate to top levels species within the food chain. Taking into account the FishBase vulnerability scores and the life history information for these species, we have scored vulnerability as medium.

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
An assessment of Mediterranean horse mackerel has been conducted in the Black Sea but is considered preliminary. The Black Sea assessment did estimate a recent increase in the population of recruits (i.e. new fish entering the population), but a decrease in abundance of sexually mature fish (Bernal 2012}. No assessments in the remainder of the Mediterranean Sea have been conducted for horse mackerel species. We have awarded a moderate concern score because of their medium vulnerability to fishing and lack of information on population sizes.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High Concern
The most recent stock assessment of Mediterranean horse mackerel was considered by to have overfishing occurring as of 2016 (FAO 2018). No subsequent stock assessments for the Mediterranean stock were available. Horse mackerel have been assessed in the Black Sea as 'in overexploitation on a precautionary basis' (GFCM 2019b). Because overfishing was occurring, a score of high concern was awarded for all regions.

Picarel

Factor 2.1 - Inherent Vulnerability

Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Medium
Picarel have a medium FishBase vulnerability score of 39 out of 100 (Froese and Pauly 2013). Picarel begin life as females and become males later in life (Vidalis and Tsimenidis 1996). Females reach sexual maturity around 9 cm (3.5 in) in length (Froese and Pauly 2013). The maximum life span in Greek waters is reported to be 5 years for females and 7 years for males {Vidalis and Tsimenidis 1996}. Picarel spawn multiple times during a season with fecundity ranging from 2,000 to 16,000 eggs per spawning event (Karlou-Riga and Petza 2010)(Karlou-Riga et al. 2007). Picarel are an intermediate species in the food web (Froese and Pauly 2013).

Factor 2.2 - Abundance

Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Very Low Concern
Picarel are reported to be a primary accompanying species in the anchovy fisheries in the Ionian Sea (Tsagarakis et al. 2012). In the Ionian Sea, the abundance of picarel is above the target abundance level, which is the biomass at maximum sustainable yield (BMSY) (Cardinale and Osio 2012). Current abundance is at 115% of BMSY. We have therefore awarded a very low concern score for picarel in this region.

Factor 2.3 - Fishing Mortality

Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Very Low Concern
In the Ionian Sea, picarel are sustainably fished, with current fishing levels at only 30% of the fishing level at maximum sustainable yield (FMSY)(Cardinale and Osio 2012). Therefore we have awarded a very low concern score.

Short-beaked common dolphin

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High
Marine mammals are considered to have a high vulnerability to fishing because they are long-lived and have low reproductive rates.

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Very High Concern
Short-beaked common dolphins were at one time abundant and widespread throughout the Mediterranean. However, in recent years this species has declined in the Mediterranean, being now only abundant in the Alboran Sea, along with small concentrations around the Maltese Islands, Aegean, Tyrhenian and eastern Ionian Seas (Bearzi et al. 2003). For example, in the Ionian Sea, the number of animals present decreased from 105 in 1996 to only 15 in 2007 (Bearzi et al. 2008). The International Union for the Conservation of Nature (IUCN) classifies the Mediterranean population of short-beaked common dolphin as Endangered (Bearzi 2003). Habitat degradation and environmental changes, in addition to incidental capture by fisheries, have been identified as potential reasons for recent and quick population declines (Bearzi et al. 2003). We have awarded a very high concern based on the IUCN classification.

Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

High Concern
Short-beaked common dolphins in the Black Sea may be a different subspecies than the Mediterranean Sea species, though this remains uncertain. The International Union for the Conservation of Nature (IUCN) classifies the Black Sea species/population as "Vulnerable" (Birkun 2008). We have awarded a high concern based on the IUCN classification.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Low Concern
Although the majority of small pelagic purse seine fisheries in the Mediterranean do not have high incidental capture rates with dolphins or other marine mammals, there is some suggestion that the Spanish fleet in the Alboran Sea has had a history of catching large numbers of dolphins, primarily short-beaked common dolphins. For example, estimates from the 1990's suggest up to 300 dolphin moralities occur per year and that as many as 5700 may be caught per year, although most are released alive. There has been some suggestion that low interaction rates in other fisheries are the result of a loss of short-beaked common dolphins along the remaining Spanish Mediterranean coast (Tudela 2004). Purse seine fisheries in the Black Sea also reported common dolphin interactions during the late 1990's (Payne et al. 2004). Still, other fishing gears such as driftnets, static nets (gillnets) and longlines are thought to have a much greater impact on dolphin populations (Tudela et al. 2005) (GFCM 2012e). As well, in some areas, like the Ionian Sea, the decline in short-beaked common dolphins has been primarily attributed to prey depletion caused by overfishing, rather than incidental fisheries catches (Bearzi et al. 2008). To help protect marine mammals, managers established the Pelago Marine Mammal Sanctuary in 2007, which encompasses part of the territorial waters of France, Italy and Monaco and includes the Ligurian Sea and parts of the Corsican and Tyrrhenian Seas (GFCM 2007). As well, recently (2012), the General Fisheries Commission for the Mediterranean adopted a regulation that bans the use of certain gillnet gear and requires countries to report all marine mammals catches so they can better assess the impacts on their populations (GFCM 2012d). Overall, there is some suggestion that the small-pelagic fisheries in the Mediterranean impact short-beaked common dolphin populations to some degree. However, since other fisheries in the region likely have a much greater impact on this species, we have rated fishing mortality a low concern.

Spanish sardine

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Medium
Spanish sardine have a medium FishBase vulnerability score of 36 out of 100 (Froese and Pauly 2013). In the Northern Aegean Sea Spanish sardines have been reported to live up to 5 years and reach 24.8 cm (~10 in) in size. Sexual maturity is reached between 12 and 22 cm (4.7-8 in) and prior to 3 years of age {Froese and Pauly 2011}. Spanish sardines are broadcast spawners with fecundity ranging from 9,700 to 72,70 eggs per spawn (Froese and Pauly 2013). Spanish sardines are an intermediate species in the food web.

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
Although Spanish sardine are considered a priority species by the General Fisheries Commission for the Mediterranean, they are not currently assessed (GFCM 2013b). We have awarded a moderate concern score based on their medium vulnerability and lack of information on their population status.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Moderate Concern
Spanish sardine are captured in the small pelagic fisheries that target Anchovy and sardine in several areas. However information on fishing mortality on Spanish sardine is not available. We have therefore awarded a moderate concern score.

Striped dolphin

Factor 2.1 - Inherent Vulnerability

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High
Marine mammals are considered to have a high vulnerability to fishing because they are long-lived and have low reproductive rates.

Factor 2.2 - Abundance

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

High Concern
The International Union for Conservation of Nature (IUCN) has classified striped dolphin as a species of 'Least Concern' with an unknown population trend globally, but the Mediterranean population is considered 'Vulnerable' (Aguilar and Gaspari 2012). We have therefore awarded a high concern score.

Factor 2.3 - Fishing Mortality

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Low Concern
Although the majority of small pelagic purse seine fisheries in the Mediterranean do not have high incidental capture rates with dolphins or other marine mammals, the Spanish fleet in the Alboran Sea has had a history of catching large numbers of dolphins. Catches of striped dolphins appear to be less frequent than catches of short-beaked common dolphins {Tuelda et al. 2004}. It has been estimated that 100 striped dolphins are killed annually by the Spanish fleet in Catalonia and the Gulf of Lions (UOB 1995). Other fishing gears, like driftnets, gillnets, and longlines, are thought to have much greater impact on dolphin populations in Mediterranean compared to pelagic purse seines and trawls (Tudela 2004)(Tudela et al. 2005)(GFCM 2012e). To help protect marine mammals, managers established the Pelago Marine Mammal Sanctuary in 2007, which encompasses part of the territorial waters of France, Italy and Monaco and includes the Ligurian Sea and parts of the Corsican and Tyrrhenian Seas (GFCM 2007). As well, recently (2012), the General Fisheries Commission for the Mediterranean adopted a regulation that bans the use of certain gillnet gear and requires countries to report all marine mammals catches so they can better assess the impacts on their populations (GFCM 2012d). Overall, there is some suggestion that the small-pelagic fisheries in the Mediterranean impact striped dolphin populations to some degree. However, since other fisheries in the region likely have a much greater impact on this species, we have rated fishing mortality a low concern.

Factor 2.3 - Modifying Factor: Discards and Bait Use

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

< 20%
The two main target species in the Mediterranean small pelagic fisheries are European anchovy and sardine. However, other small pelagic species are also caught and at times can make up a substantial proportion of the total catch. The composition of species varies among areas, but other species caught include horse mackerels (Trachurus spp.), Atlantic mackerel, chub mackerel, Spanish sardine, bullet tuna, Atlantic saury, and sprat (GFCM 2008)(GFCM 2011b)(Casey et al. 2012). Discards of these species (those thrown back to sea) varies among areas. On average 4.6% of the total catch (weight) in the Aegean Sea is discarded and only 2.2% is discarded in the Ionian Sea. Sardine and mackerel are not typically discarded but during the fall recruitment season, large amounts of small European anchovy are discarded. The discarding rates for the other species (bogue, picarel and Spanish sardine) varies in this region from 0-100%, depending on the market (Tsagarakis et al. 2012). However, in the Adriatic Sea, discard ratios (discards/total retained catch) appear to be higher, ranging from 2% to 15% for pelagic trawls and midwater trawls. Similarly, discard ratios in the western Mediterranean have been estimated to range from 13% to 15% (Santojanni et al. 2005)(Kelleher 2005). In the north eastern Black Sea, discard ratios in the small pelagic purse seine fishery have been estimated to be very low, around 1% (Sahin et al. 2008).

Criterion 3: Management Effectiveness

Seven subfactors are evaluated: Management Strategy, Recovery of Species of Concern, Scientific Research/Monitoring, Following of Scientific Advice, Enforcement of Regulations, Management Track Record, and Inclusion of Stakeholders. Each is rated as 'ineffective,' 'moderately effective,' or 'highly effective.'

- *5 (Very Low Concern)—Rated as 'highly effective' for all seven subfactors considered*
- *4 (Low Concern)—Management Strategy and Recovery of Species of Concern rated 'highly effective' and all other subfactors rated at least 'moderately effective.'*
- *3 (Moderate Concern)—All subfactors rated at least 'moderately effective.'*
- *2 (High Concern)—At minimum, meets standards for 'moderately effective' for Management Strategy and Recovery of Species of Concern, but at least one other subfactor rated 'ineffective.'*
- *1 (Very High Concern)—Management exists, but Management Strategy and/or Recovery of Species of Concern rated 'ineffective.'*
- *0 (Critical)—No management exists when there is a clear need for management (i.e., fishery catches threatened, endangered, or high concern species), OR there is a high level of Illegal, unregulated, and unreported fishing occurring.*

The Criterion 3 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Criterion 3 Summary

FISHERY	HARVEST STRATEGY	BYCATCH MANAGEMENT STRATEGY	SCORE
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	2.000	2.000	**Red (2.000)**
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	2.000	2.000	**Red (2.000)**
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**
Black Sea | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**

FISHERY	HARVEST STRATEGY	BYCATCH MANAGEMENT STRATEGY	SCORE
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	1.000	2.000	**Red (1.414)**
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	1.000	2.000	**Red (1.414)**
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	1.000	2.000	**Red (1.414)**
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	1.000	2.000	**Red (1.414)**

Factor 3.1 Summary

FISHERY	STRATEGY	RECOVERY	RESEARCH	ADVICE	ENFORCE	TRACK	INCLUSION
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Black Sea | Mediterranean and Black Sea | Midwater trawls	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective

FISHERY	STRATEGY	RECOVERY	RESEARCH	ADVICE	ENFORCE	TRACK	INCLUSION
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Moderately Effective

Factor 3.2 Summary

FISHERY	ALL SPECIES RETAINED?	CRITICAL?	STRATEGY	RESEARCH	ADVICE	ENFORCE
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Black Sea | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective

FISHERY	ALL SPECIES RETAINED?	CRITICAL?	STRATEGY	RESEARCH	ADVICE	ENFORCE
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	No	No	Moderately Effective	Ineffective	Moderately Effective	Moderately Effective

The General Fisheries Commission for the Mediterranean, which manages European Anchovy and Atlantic Sardine in international waters of the Mediterranean and Black Sea, has implemented very few management measures for these two target species or other species caught in the small pelagic fisheries. Some individual countries have implemented measures such as minimum size limits, fishing effort restrictions, and gear restrictions. Unfortunately, measures to date have been unable to rebuild populations with low abundances or adequately control fishing levels. However, a new management plan was recently implemented for the Adriatic Sea population, which should help sustain these populations, and thus management is rated more highly for the Adriatic Sea. There is limited monitoring of bycatch species, like marine mammals, in these fisheries.

Criterion 3 Assessment

SCORING GUIDELINES

Subfactor 3.1.1 – Management Strategy and Implementation
Considerations: What type of management measures are in place? Are there appropriate management goals, and is there evidence that management goals are being met? To achieve a highly effective rating, there must be appropriate management goals, and evidence that the measures in place have been successful at maintaining/rebuilding species.

Subfactor 3.1.2 – Recovery of Species of Concern
Considerations: When needed, are recovery strategies/management measures in place to rebuild overfished/threatened/ endangered species or to limit fishery's impact on these species and what is their likelihood of success? To achieve a rating of Highly Effective, rebuilding strategies that have a high likelihood of success in an appropriate timeframe must be in place when needed, as well as measures to minimize mortality for any overfished/threatened/endangered species.

Subfactor 3.1.3 – Scientific Research and Monitoring
Considerations: How much and what types of data are collected to evaluate the health of the population and the fishery's impact on the species? To achieve a Highly Effective rating, population assessments must be conducted regularly and they must be robust enough to reliably determine the population status.

Subfactor 3.1.4 – Management Record of Following Scientific Advice
Considerations: How often (always, sometimes, rarely) do managers of the fishery follow scientific recommendations/advice (e.g. do they set catch limits at recommended levels)? A Highly Effective rating is given if

managers nearly always follow scientific advice.

Subfactor 3.1.5 – Enforcement of Management Regulations
Considerations: Do fishermen comply with regulations, and how is this monitored? To achieve a Highly Effective rating, there must be regular enforcement of regulations and verification of compliance.

Subfactor 3.1.6 – Management Track Record
Considerations: Does management have a history of successfully maintaining populations at sustainable levels or a history of failing to maintain populations at sustainable levels? A Highly Effective rating is given if measures enacted by management have been shown to result in the long-term maintenance of species overtime.

Subfactor 3.1.7 – Stakeholder Inclusion
Considerations: Are stakeholders involved/included in the decision-making process? Stakeholders are individuals/groups/organizations that have an interest in the fishery or that may be affected by the management of the fishery (e.g., fishermen, conservation groups, etc.). A Highly Effective rating is given if the management process is transparent and includes stakeholder input.

Subfactor 3.2.2 – Management Strategy and Implementation
Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and how successful are these management measures? To achieve a Highly Effective rating, the primary bycatch species must be known and there must be clear goals and measures in place to minimize the impacts on bycatch species (e.g., catch limits, use of proven mitigation measures, etc.)

Subfactor 3.2.3 – Scientific Research and Monitoring
Considerations: Is bycatch in the fishery recorded/documented and is there adequate monitoring of bycatch to measure fishery's impact on bycatch species? To achieve a Highly Effective rating, assessments must be conducted to determine the impact of the fishery on species of concern, and an adequate bycatch data collection program must be in place to ensure bycatch management goals are being met

Subfactor 3.2.4 – Management Record of Following Scientific Advice
Considerations: How often (always, sometimes, rarely) do managers of the fishery follow scientific recommendations/advice (e.g., do they set catch limits at recommended levels)? A Highly Effective rating is given if managers nearly always follow scientific advice.

Subfactor 3.2.5 – Enforcement of Management Regulations
Considerations: Is there a monitoring/enforcement system in place to ensure fishermen follow management regulations and what is the level of fishermen's compliance with regulations? To achieve a Highly Effective rating, there must be consistent enforcement of regulations and verification of compliance.

Factor 3.1.1 - Critical?

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

No

Factor 3.1.2 - Mgmt Strategy / Implement

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Ineffective
In international waters of the Mediterranean and Black Seas, management regulations for small pelagic fisheries that catch European anchovy, sardine, and other species are established by the General Fisheries Commission for the Mediterranean (GFCM). Individual countries are expected to implement these regulations and are responsible for the management of the fisheries in their respective waters. To date, the GFCM has adopted few regulations pertaining to the small pelagic fisheries. In 2006, they established a regulation to develop a fishing effort program for pelagic trawl and purse seine fisheries targeting European anchovy and other small pelagic species (GFCM 2012a), but this does not appear to have been developed yet. However, individual countries have implemented their own management regulations to regulate their small pelagic fisheries.

In 2013, the GFCM adopted a multi-annual management plan for European anchovy and sardine in the Adriatic Sea, which includes the countries of Italy, Croatia, Slovenia, Montenegro, and Albania. The plan includes fishing mortality and abundance goals/targets, monitoring recommendations as well as the directive to determine management measures based on the status of the population, required size limits for both species, and area closures to protect fish during their first year of life (GFCM 2013a). Although the management plan has been in place since 2013, and exploitation levels of small pelagic species in the Adriatic Sea are intended to be at the maximum sustainable yield by 2020, stock biomass was low and overfishing was still occurring as of the most recent stock assessment (GFCM 2019a). Although it is commendable to have a management plan, an improved strategy (e.g., lower catch limits) is needed to ensure sustainability based on available information. Emergency measures for the fishery were discussed by GFCM working groups in 2019 but successful implementation is uncertain (GFCM 2019c). It has been suggested that the main reasons for the poor condition of most Mediterranean Sea stocks are the ineffectiveness of the current effort system to control fishing mortality, the continuous non-

adherence to the scientific advice, and inadequacies of existing national management plans as a key management measure (Cardinale et al. 2017).

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
In international waters of the Mediterranean and Black Seas, management regulations for small pelagic fisheries that catch European anchovy, sardine, and other species are established by the General Fisheries Commission for the Mediterranean (GFCM). Individual countries are expected to implement these regulations and are responsible for the management of the fisheries in their respective waters. To date, the GFCM has adopted few regulations pertaining to the small pelagic fisheries. In 2006, they established a regulation to develop a fishing effort program for pelagic trawl and purse seine fisheries targeting European anchovy and other small pelagic species (GFCM 2012a), but this does not appear to have been developed yet. However, individual countries have implemented their own management regulations to regulate their small pelagic fisheries.

In the Aegean sea (Greek waters) there are regulations on how far from shore purse seine fishermen must operate, gear and mesh size restrictions, vessel size limits, a closed period from mid-December until the end of February, and a minimum size limit of 11 cm for sardines and 9 cm for European anchovy (Casey et al. 2012). It is not clear if these regulations are responsible, but fishing mortality has generally declined over recent years (below FMSY for anchovy and just above FMSY for sardine), while abundance has increased. Although abundance reference points were not used, it appears the stock health has improved for both species. Catch did not increase greatly as abundance increased, suggesting management may be constraining fishing pressure. Based on these positive stock trends and the use of some management measures, a score of moderately effective was awarded.

Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Ineffective
In international waters of the Mediterranean and Black Seas, management regulations for small pelagic fisheries that catch European anchovy, sardine, and other species are established by the General Fisheries Commission for the Mediterranean (GFCM). Individual countries are expected to implement these regulations and are responsible for the management of the fisheries in their respective waters. To date, the GFCM has adopted few regulations pertaining to the small pelagic fisheries. In 2006, they established a regulation to develop a fishing effort program for pelagic trawl and purse seine fisheries targeting European anchovy and other small pelagic species (GFCM 2012a), but this does not appear to have been developed yet. However, individual countries have implemented their own management regulations to regulate their small pelagic fisheries. In northern Spain, a two month closure to protect European anchovies and sardine during the December-January recruitment period has been in place since 1993

(Palomera et al. 2008). There is also a minimum size limit of 11 cm for anchovy and sardine, gear and mesh size restrictions, vessel size limit restrictions, and no fishing on weekends (GFCM 2011b). In the Gulf of Lion (French waters), there are fishing effort limitations (no fishing on weekends or during certain hours) and limits on vessel size and power; however a few of the regulations are not followed (GFCM 2011b). In Italy, fishing is not allowed on the weekends and there is a closed season for pelagic trawlers in August, but not for purse seiners (Cardinale et al. 2012). In the Aegean and Ionian Seas (Greek waters) there are regulations on how far from shore purse seine fishermen must operate, gear and mesh size restrictions, vessel size limits, a closed period from mid-December until the end of February, and a minimum size limit of 11 cm for sardines and 9 cm for European anchovy (Casey et al. 2012).

In the Black Sea, Georgia has an annual catch limit of 60,000 t (132,300,000 lbs.) for European anchovy. This catch limit was instituted in 2007 and will last ten years (Ozturk et al. 2011). However, Turkey accounts for the majority of the catches in the Black Sea region, and they have not adopted an annual catch limit for anchovy.

To date management measures have not been able to control fishing levels on many anchovy and sardine populations and in some areas this has led to stock declines and depletions. As well, there are no regulations in place for other pelagic species that are sometime caught in these fisheries. Scientists have recommended that catch limits be established to control fishing levels, rather than solely relying on regulations that control fishing effort, and that management plans be adopted (Casey et al. 2012). Due to the lack of adequate regulations to control fishing on anchovy and sardine in most of the Mediterranean and Black seas regions, we have awarded an ineffective score.

Factor 3.1.3 - Recovery of Stock Concerns

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
European anchovy and Atlantic sardine populations are currently thought to be at healthy abundance levels in the northern and central Adriatic Sea, but there is some uncertainty as to whether the abundance reference points for this population are appropriate. There is also uncertainty with regard to their abundance in the southern Adriatic Sea. As well, fishing levels on sardine are above sustainable levels. A new fishery management plan was recently established for these species in the Adriatic Sea, which should help to sustain these populations (GFCM 2013a). However, there is also concern about the abundance and fishing levels on chub mackerel in the Mediterranean (Collette et al. 2011b) and no specific management measures are in place for this species. It is unclear how much chub mackerel may be caught in the Adriatic Sea fisheries. Because it is unclear if a recovery strategy is needed for chub mackerel, we have awarded a moderately effective score.

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
Sardine and anchovy populations in these regions are not considered overfished, though for several population the current population status is uncertain. As well, in the Strait of Sicily, abundance is slightly below 50% of the biomass at maximum sustainable yield, and thus by our criteria this population is overfished; but fishing levels in the Strait of Sicily are currently around sustainable levels (GFCM 2012c)(Casey et al. 2012). There is also concern about the abundance and fishing mortality of chub mackerel in the Mediterranean Sea (Collette et al. 2011b) and no specific management measures for this species have been established. Because it is unclear if recovery strategies are needed or not in these regions, we have rated this factor moderately effective.

Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain

Ineffective
In the Gulf of Lion the sardine population is considered collapsed or depleted and in north Spain the sardine population is also considered at risk of collapse (GFCM 2012b)(GFCM 2012c)(GFCM 2013c)(Casey et al. 2012). In the Gulf of Lion, targeting of sardine no longer occurs due to the very low abundance and it has been recommended that fishing levels are not increased until the species recovers (GFCM 2012c)(GFCM 2013c). In north Spain it has been recommended that fishing be decreased to the lowest possible levels (GFCM 2012b). However, no catch limits have been established for these populations to control fishing levels and rebuilding plans are not in place. As well, there is concern about the abundance level and fishing mortatlity of Chub in the Mediterranean and measures have not been established for this species. Due to the lack of adequate management measures to rebuild sardine populations in these regions, we have awarded an ineffective score.

Factor 3.1.4 - Scientific Research / Monitoring

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
The major European anchovy and sardine populations in the Mediterranean basin are assessed regularly by the General Fisheries Commission for the Mediterranean (GFCM) (GFCM 2008)(GFCM 2011b)(GFCM 2012c). In the majority of European Union member states, assessments are also conducted by Expert Working Groups of the Scientific, Technical and Economic Committee for Fisheries (STECF). Catch and effort information is collected and acoustic surveys and Daily Egg Production Method (DEPM) are used in some areas to estimate abundance. However, for some populations there is not sufficient data to conduct population assessments or determine population status. In addition, for other retained species, data is not regularly collected and population assessments are not conducted (Casey et al. 2012). We have therefore awarded a moderately effective score.

Factor 3.1.5 - Scientific Advice

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
The small pelagic working group in charge of assessing European anchovy and sardine populations in the Mediterranean basin and the Scientific Advisory Committee provide management advice to the General Fisheries Commission for the Mediterranean (GFCM) (GFCM 2012d)(GFCM 2013b). This advice is provided for each assessed population. Scientific advice for fisheries/populations of the European Union is also provided by the Scientific, Technical, and Economic Committee for Fisheries (STECF)(Casey et al. 2012). For most populations it has been recommended that fishing levels be reduced or kept at current levels. However, no catch limits have been put into place. It also been recommended that management plans be created for each population and that they take into account the multi-species nature of the fishery when appropriate (Casey et al. 2012). Recently, a management plan was adopted for the Adriatic Sea and managers will now consider the state of the both the Anchovy and sardine populations when setting regulations (GFCM 2013a). However, management plans have not yet been developed for other populations. Since managers appear to only sometimes follow scientific advice, we have awarded a moderately effective score.

Factor 3.1.6 - Enforce

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
The General Fisheries Commission for the Mediterranean, has a compliance committee that is tasked with reviewing compliance and implementation of adopted measures, enforcement of regulations, and monitoring illegal, unreported and unregulated (IUU) fishing (GFCM 2012a). Current measures adopted by the GFCM related to ensuring compliance and enforcement of regulations include, requiring that vessel monitoring systems are installed, that countries provide a list of any vessels engaged in IUU fishing, and that they implement inspections and rules at vessels landing sites (ports) for foreign vessels. However, a performance review of the GFCM conducted during 2009 and 2010 indicated that compliance and enforcement within the organization could be improved (GFCM 2011a). There are many member countries that have not implemented or only partially implemented several of the adopted regulations. The GFCM is working on addressing these instances of non-compliance (GFCM 2013a). We have therefore awarded a moderately effective score.

Factor 3.1.7 - Track Record

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
Anchovy and sardine are not thought to be overfished in the Adriatic Sea, though there is some uncertainty regarding their abundance level. Fishing levels on sardine have been above sustainable levels {Casey et al. 2012, GFCM 2013a}. However, a new management plan was recently implemented for the Adriatic Sea anchovy and sardine fisheries, which should help to sustain to these species. Therefore the track record for the Adriatic Sea is considered moderately effective.

Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Ineffective
Sardine population in the Gulf of Lion and North Spain are considered depleted. To date, measures enacted by managers have not been able to adequately control fishing levels or rebuild depleted populations in these regions (Casey et al. 2012)(GFCM 2013a).

Populations of European anchovy and Atlantic sardine in other areas are currently not considered depleted, but fishing levels on several European anchovy and Atlantic sardine populations are too high. Continued high fishing is likely to lead to the depletion of more population in the future. Because the current management system has been ineffective at control fishing levels and there have been no new management efforts to ensure the sustainability of sardine and anchovy populations (with the exception of the Adriatic Sea region)(Casey et al. 2012), we have the rated the track record ineffective for all areas other than the Adriatic Sea.

Factor 3.1.8 - Stakeholder Inclusion

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
A performance review of the General Fisheries Commission for the Mediterranean found that cooperation with both member countries and non-member countries could be improved, and that there was a need to improve assistance to developing nations (GFCM 2011a). Representatives from governmental and non-governmental organizations are invited to participate in the commission meetings on proposed management regulations (GFCM 2013a). However, overall stakeholder inclusion in the management process appears limited.

Factor 3.2.1 - All Species Retained?

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

No

Factor 3.2.2 - Critical?

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

No

Factor 3.2.3 - Mgmt Strategy / Implement

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
In the European anchovy pelagic fisheries in the Mediterranean, most species are retained. Discards (fish thrown back to sea) are typically low. However, bycatch of some marine mammals, primarily dolphins, is reported to occur. The General Fisheries Commission for the Mediterranean (GFCM) recently (2012) adopted a regulation that bans the use of some gillnet gear, requires that all marine mammals be released alive and unharmed when possible, and that countries collect data on bycatch interactions with mammals and submit this data to the GFCM (GFCM 2012d). Because there has been limited data collection of dolphin catches in these fisheries to this point, and it uncertain if additional measures are need to reduce dolphin catches, we have awarded a moderately effective score.

Factor 3.2.3 - Scientific Research / Monitoring

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Ineffective
There has been limited monitoring of discards (fish thrown back to sea) in the small pelagic fisheries that catch anchovy, but studies that have estimated discards in these fisheries all suggest discards are fairly low and that most of the catch is retained. However, incidental catches of dolphins may occur in these fisheries and there has been limited monitoring of these catches or studies to investigate the impact on dolphin populations (GFCM 2012e). Recently, the General Fisheries Commission for the Mediterranean (GFCM) did adopt a new measures that requires countries to monitor, record and report incidental captures of marine mammals (GFCM 2012d). However, since it remains to be seen whether countries will follow this regulation and because bycatch collection to this point, has been limited, we have awarded an ineffective score.

Factor 3.2.5 - Scientific Advice

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
We awarded a moderately effective score for the following of scientific advice (see harvest strategy section for the rationale for this rating).

Factor 3.2.6 - Enforce

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Moderately Effective
We have awarded a moderately effective score for enforcement (see harvest strategy section for the rationale for this rating).

Criterion 4: Impacts on the Habitat and Ecosystem

This Criterion assesses the impact of the fishery on seafloor habitats, and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment. The final score is the geometric mean of the impact of fishing gear on habitat score (factor 4.1 + factor 4.2) and the Ecosystem Based Fishery Management score. The Criterion 4 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

FISHERY	FISHING GEAR ON THE SUBSTRATE	MITIGATION OF GEAR IMPACTS	ECOSYSTEM-BASED FISHERIES MGMT	SCORE
Adriatic Sea | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**
Aegean Sea | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**
Alboran Sea | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**
Black Sea | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**
Ionian Sea | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**

FISHERY	FISHING GEAR ON THE SUBSTRATE	MITIGATION OF GEAR IMPACTS	ECOSYSTEM-BASED FISHERIES MGMT	SCORE
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain	None	Not Applicable	High Concern	**Yellow (3.162)**
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain	None	Not Applicable	High Concern	**Yellow (3.162)**
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls	None	Not Applicable	High Concern	**Yellow (3.162)**
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)	None	Not Applicable	High Concern	**Yellow (3.162)**

Criterion 4 Assessment

SCORING GUIDELINES

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate
Goal: The fishery does not adversely impact the physical structure of the ocean habitat, seafloor or associated biological communities.

- *5 - Fishing gear does not contact the bottom*
- *4 - Vertical line gear*
- *3 - Gears that contacts the bottom, but is not dragged along the bottom (e.g. gillnet, bottom longline, trap) and is not fished on sensitive habitats. Or bottom seine on resilient mud/sand habitats. Or midwater trawl that is known to contact bottom occasionally. Or purse seine known to commonly contact the bottom.*
- *2 - Bottom dragging gears (dredge, trawl) fished on resilient mud/sand habitats. Or gillnet, trap, or bottom longline fished on sensitive boulder or coral reef habitat. Or bottom seine except on mud/sand. Or there is known trampling of coral reef habitat.*
- *1 - Hydraulic clam dredge. Or dredge or trawl gear fished on moderately sensitive habitats (e.g., cobble or boulder)*
- *0 - Dredge or trawl fished on biogenic habitat, (e.g., deep-sea corals, eelgrass and maerl)*
  Note: When multiple habitat types are commonly encountered, and/or the habitat classification is uncertain, the score will be based on the most sensitive, plausible habitat type.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts
Goal: Damage to the seafloor is mitigated through protection of sensitive or vulnerable seafloor habitats, and limits on the spatial footprint of fishing on fishing effort.

- *+1 —>50% of the habitat is protected from fishing with the gear type. Or fishing intensity is very low/limited and for trawled fisheries, expansion of fishery's footprint is prohibited. Or gear is specifically modified to reduce damage to seafloor and modifications have been shown to be effective at reducing damage. Or there is an effective combination of 'moderate' mitigation measures.*
- *+0.5 —At least 20% of all representative habitats are protected from fishing with the gear type and for trawl fisheries, expansion of the fishery's footprint is prohibited. Or gear modification measures or other measures are in place to limit fishing effort, fishing intensity, and spatial footprint of damage caused from fishing that are expected to be effective.*
- *0 —No effective measures are in place to limit gear impacts on habitats or not applicable because gear used is benign and received a score of 5 in factor 4.1*

Factor 4.3 - Ecosystem-Based Fisheries Management
Goal: All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning

ecosystem and food web. Fishing activities should not seriously reduce ecosystem services provided by any retained species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity. Even non-native species should be considered with respect to ecosystem impacts. If a fishery is managed in order to eradicate a non-native, the potential impacts of that strategy on native species in the ecosystem should be considered and rated below.

- *5 — Policies that have been shown to be effective are in place to protect species' ecological roles and ecosystem functioning (e.g. catch limits that ensure species' abundance is maintained at sufficient levels to provide food to predators) and effective spatial management is used to protect spawning and foraging areas, and prevent localized depletion. Or it has been scientifically demonstrated that fishing practices do not have negative ecological effects.*
- *4 — Policies are in place to protect species' ecological roles and ecosystem functioning but have not proven to be effective and at least some spatial management is used.*
- *3 — Policies are not in place to protect species' ecological roles and ecosystem functioning but detrimental food web impacts are not likely or policies in place may not be sufficient to protect species' ecological roles and ecosystem functioning.*
- *2 — Policies are not in place to protect species' ecological roles and ecosystem functioning and the likelihood of detrimental food impacts are likely (e.g. trophic cascades, alternate stable states, etc.), but conclusive scientific evidence is not available for this fishery.*
- *1 — Scientifically demonstrated trophic cascades, alternate stable states or other detrimental food web impact are resulting from this fishery.*

Factor 4.1 - Impact of Fishing Gear on the Habitat/Substrate

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

None
European anchovies and Atlantic sardines are primarily caught by purse seines that fish at or near the surface in the Mediterranean basin (GFCM 2013b). They are also caught by pelagic trawlers in some areas (GFCM 2012c)(Casey et al. 2012). These types of fishing gears rarely come in contact with bottom habitats so we have awarded a no concern score.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

Not Applicable
Purse seines and pelagic trawls that capture small pelagic species rarely come in contact with the bottom, so mitigation techniques are not required.

Factor 4.3 - Ecosystem-based Fisheries Management

Adriatic Sea | Mediterranean and Black Sea | Midwater trawls
Aegean Sea | Mediterranean and Black Sea | Midwater trawls
Alboran Sea | Mediterranean and Black Sea | Midwater trawls
Gulf of Lion | Mediterranean and Black Sea | Midwater trawls
Ionian Sea | Mediterranean and Black Sea | Midwater trawls
Ligurian Sea | Mediterranean and Black Sea | Midwater trawls
Strait of Sicily | Mediterranean and Black Sea | Midwater trawls
Adriatic Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Aegean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Alboran Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Gulf of Lion | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ionian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Ligurian Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Strait of Sicily | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)
Mediterranean Sea | Mediterranean and Black Sea | Midwater trawls | Spain
Mediterranean Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD) | Spain
Black Sea | Mediterranean and Black Sea | Midwater trawls
Black Sea | Mediterranean and Black Sea | Unassociated purse seine (non-FAD)

High Concern
European anchovy and sardine are considered "species of exceptional importance" because they are important prey species in pelagic food webs, providing food for numerous species. Explicit efforts have not been made by the General Fisheries Commission for the Mediterranean (GFCM) to evaluate how much anchovy/sardine need to be left in the ocean to ensure there is enough food for their predators and that food webs are not disrupted (GFCM 2012b) (Casey et al. 2012). The Scientific Committee has recommended that role of small pelagic fish in the ecosystem be taken into account when setting abundance reference point/conservation goals for these species (GFCM 2013b), but since scientific assessments to account for their role in the ecosystem do not seem to be underway yet, we have awarded a high concern score.

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Scientific review does not constitute an endorsement of the Seafood Watch® program, or its seafood recommendations, on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

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References

Aguera, A. and D. Brophy. 2012. Growth and age of Atlantic saury, Scomberesox saurus saurus (Walbaum), in the northeastern Atlantic Ocean. Fisheries Research 131-133:60-66

Aguilar, A. and S. Gaspari. 2012. Stenella coeruleoalba (Mediterranean subpopulation). In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. . Downloaded on 13 August 2013.

Allam, S.M. 2003. Growth, mortality and yield per recruit of Bogue, Boops boops (L.), from the Egyptian Mediterranean waters off Alexandria. Mediterranean Marine Science 4:87-96.

Alvarez de Quevedo, I., L. Cardona, A. De Haro, E. Publill, and A. Aguilar. 2009. Sources of bycatch of loggerhead sea turtles in the western Mediterranean other than drifting longlines. ICES Journal of Marine Science 69:677-685.

Anato, C.B. and M.H. Ktari. 1986. Age et croissance de Boops boops (Linne, 1758) poisson teleosteen Sparidae des cotes tunisiennes. Bulletin de l'Institut National Scientifique et Technique d'Oceanographie et de Peche de Salammbo 13:33-54

Antonakakis, K., M. Giannoulaki, A. Machias, S. Somarakis, S. Sanchez, L. Ibaibarriaga, A. Uriarte. 2011. Assessment of the sardine (Sardina pilchardus Walbaum, 1792) fishing in the eastern Mediterranean basin (North Aegean Sea). Mediterranean Marine Science 12:333-357.

Bauchot, M.-L. 1987. Poissons osseux. p. 891-1421. In W. Fischer, M.L. Bauchot and M. Schneider (eds.) Fiches FAO d'identification pour les besoins de la pêche. (rev. 1). Méditerranée et mer Noire. Zone de pêche 37. Vol. II. Commission des Communautés Européennes and FAO, Rome.

Bauchot, M.-L. and J.-C. Hureau. 1986. Sparidae. p. 883-907. In P.J.P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen and E. Tortonese (eds.) Fishes of the north-eastern Atlantic and the Mediterranean. volume 2. UNESCO, Paris.

Bearzi, G. 2003. Delphinus delphis (Mediterranean subpopulation). In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1.

Bearzi, G., R.R. Reeves, R.R. G. Notarbartolo-Di-sciara, E. Politi, A. Canadas, A. Frantzis, and B. Mussi. 2003. Ecology, status and conservation of short-beaked common dolphins Delphinus delphis in the Mediterranean Sea. Mammal Review 33:224-252.

Bearzi, G., S. Agazzi, J. Gonzalvo, M. Costa, S. Bonizzoni, E. Politi, C. Piroddi, and R.R. Reeves. 2008. Overfishing and the disappearance of short-beaked common dolphins from western Greece. Endangered Species Research 5:1-12

Bellido, J.M., L. Quintanilla, P. Torres, A. Giraldez, C. Ceruso, F. Alemany, and M. Iglesias. 2009. Sardine (Sardina pilchardus) in GSA 06 (northern Spain). General Fisheries Commission for the Mediterranean (GFCM) Scientific Advisory Committee 11th Session. Malaga, Spain, 2009.

Bernal, M. 2012. Stock assessment for small pelagics. General Fisheries Commission for the Mediterranean.

Bigot, J.L. and D. Roos. 2009. Sardine (Sardina pilchardus) in GSA 07 (Gulf of Lions). General Fisheries Commission for the Mediterranean (GFCM) Scientific Advisory Committee Twelfth Session. Budva, Montenegro 25-29 2010.

Birkun Jr., A.A 2008. Delphinus delphis ssp. ponticus. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. . Downloaded on 10 February 2014.

Bonanno, A., S. Zgozi, A. Cuttutta, A. ElTurki, A. DiNeieri, H. Ghmati, G. Basilone, S. Aronica, M. Hamza, and M. Barram. 2013. Influence of environmental variability on anchovy early life stages (Engraulis encrasicolus) in two different areas of the central Mediterranean Sea. Hydrobiologia 701:273-287.

Cardinale M., G.C. Osio and G. Scarcella. 2017. Mediterranean Sea: A Failure of the European Fisheries Management System. Front. Mar. Sci. 4:72. doi: 10.3389/fmars.2017.00072

Cardinale, M. and G. Osio. 2012. Report of the scientific, technical and economic committee for fisheries on assessment of Merluccius merluccius, Mullus barbatus, Mullus surmuletus, Boops boops, Spicara smaris/Spicara flexuosa and Nephrops norvegicus in Aegean and Ionian waters. JRC Scientific and Policy Reports STECF 12-21.

Cardinale, M., H. Ratz, and A. Charef, A. 2012. Report of the Scientific, Technical and Economic Committee for Fisheries on Assessment of Mediterranean Sea Stocks. JRC Scientific and Policy Reports STECF 12-03.

Casey, J., W. Vanhee, and H. Doerner, H. 2012. Review of scientific advice for 2013 consolidated advice on fish stocks of interest to the European Union. JRC Scientific and Policy Reports STECF-12-22).

Castro Hernández, J.J. and A.T. Santana Ortega, 2000. Synopsis of biological data on the chub mackerel (Scomber japonicus Houttuyn, 1782). FAO Fish. Synop. 157. 77 p. FAO, Rome.

Catalan IA, Olivar MP, Palomera I, and Berdalet E. (2006) Link between environmental anomalies, growth and condition of pilchard Sardina plichardus larvae in the northwestern Mediterranean. Marine Ecology Progress Series 307:219-231.

Cengiz, O. 2012. Age, growth, mortality and reproduction of the chub mackerel (Scomber japonicus Houttuyn, 1782) from Saros Bay (northern Aegean Sea, Turkey). Turkish Journal of Fisheries and Aquatic Sciences 12:799-809.

Cheung, W.W.L., T.J. Pitcher and D. Pauly, 2005. A fuzzy logic expert system to estimate intrinsic extinction vulnerabilities of marine fishes to fishing. Biol. Conserv. 124:97-111.

Collette, B., A. Acero, A.F. Amorim, A. Boustany, C. Canales Ramirez, G. Cardenas et al. 2011a. Auxis rochei. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2.

Collette, B., A. Boustany, K.E. Carpenter, A. Di Natale, W. Fox, J. Graves, M. Juan Jorda, O. Kada, R. Nelson and H. Oxenford. 2011. Scomber scombrus. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1

Collette, B., A.F. Amorim, A. Boustany, K.E. Carpenter, N. de Oliveira Leite Jr., A. Di Natale, W. Fox, F.L. Fredou, J. Graves, F.H. Viera Hazin, M. Juan Jorda, O. Kada, C. Minte Vera, N. Miyabe, R. Nelson, H. Oxenford, R.P. Teixeira Lessa, and P.E. Pires Ferreira Travassos. 2011. Scomber colias. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2

Collette, B.B. and C.E. Nauen, 1983. FAO Species Catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. Rome: FAO. FAO Fish. Synop. 125(2):137 p.

Daskalov, G., C. Osio, and A. Charef. 2012. Scientific, technical and economic committee for fisheries (STECF) assessment of Black Sea stocks. JRC Scientific and Policy Reports STECF-12-15.

Department of Fisheries and Oceans Canada (DFO). 2009. Opportunity for Atlantic silverside and Atlantic saury fisheries in the Nova Scotia portion of the southern Gulf of St. Lawrence. Canadian Science Advisory Secretariat Science Advisory Report 2009/081. 14 p.

Dulcic, J., A. Pallaoro, P. Centinic, M. Kraljevic, A. Solodo, and I. Jardas. 2003. Age, growth and mortality of picarel, Spircara smaris L. (Pisces: Centracanthidae), from the eastern Adriatic (Croatian coast). Journal of Applied Ichthyology 19:10-14.

Eurofish International Organisation (EIO). 2012. Overview of the world's anchovy sector and trade possibilities for Georgian anchovy products. Eurofish International Organisation, Copenhagen, Denmark. 41 pg.

European Commission (EU). 2012. Fishing TACs and quotas 2012. European Commission Fisheries.

FAO. 2018. The State of Mediterranean and Black Sea Fisheries. General Fisheries Commission for the Mediterranean. Rome. 172 pp. Licence: CC BY-NC-SA 3.0 IGO

FAO. 2019. General Fisheries Commission for the Mediterranean. Report of the twenty-first session of the Scientific Advisory Committee on Fisheries, Cairo, Egypt, 24–27 June 2019

Food and Agriculture Organization (FAO). 2013b. Species Fact sheet; Sardina pilchardus (Walbaum, 1792). Food and Agriculture Organization of the United Nations.

Food and Agriculture Organization (FAO). 2013a. FishStatJ Version 2.0.

Forcada, J., A. Aguilar, P.S. Hammond, X. Pastor, and R. Aguilar. 1994. Distribution and numbers of striped dolphins in the western Mediterranean Sea after the 1990 epizootic outbreak. Marine Mammal Science 10:137-150.

Froese, R. and D. Pauly. Editors. 2013. FishBase. World Wide Web electronic publication. www.fishbase.org, version (04/2013)

Gang, L., C. Xinjun, and B. Feng. 2008. Age and growth of chub mackerel (Scomber japonicus) in the East China and Yellow Seas using sectioned otolith samples. Journal of Ocean University of China 7: 439-446.

Ganias K (2009) Linking sardine spawning dynamic to environmental variability. Estuarine Coastal and Shelf Science 84:402-408.

Garcia, A. and I. Palomera. 1996. Anchovy early life history and its relation to its surrounding environment in the Western Mediterranean basin. Scientia Marina 60: 155–166.

Genç, Y., M. Zengin, S. Basar, I. Tabak, B. Ceylan, Y. Çiftçi, C. Üstündag, B. Akbulut, T. Sahin. 1998. Ekonomik Deniz Ürünleri Arastirma Projesi Sonuç Raporu, TAGEM/IY/96/17/3/001, Su Ürünleri Merkez Arastirma Enstitüsü, Trabzon,127s.

General Fisheries Commission for the Mediterranean (GFCM). 2007. GFCM Recommendations and resolutions on Mediterranean fisheries management. General Fisheries Commission for the Mediterranean, Rome, Italy. 39 p.

General Fisheries Commission for the Mediterranean (GFCM). 2008. Sub-Committee for Stock Assessment (SCSA). report of the ninth meeting of the Working Group on Small Pelagics, Izmir, Turkey, 22-26 September 2008.

General Fisheries Commission for the Mediterranean (GFCM). 2011a. Performance review of the General Fisheries Commission for the Mediterranean and Black Sea. General Fisheries Commission for the Mediterranean, 20 January 2011.

General Fisheries Commission for the Mediterranean (GFCM). 2012d. Recommendation GFCM/36/2012/2 on mitigation of incidental catches of cetaceans in the GFCM area. General Fisheries Commission for the Mediterranean

General Fisheries Commission for the Mediterranean (GFCM). 2013a. Report of the thrity-seventh session of the Commission seventh session of the Committee on Compliance fourth session of the Committee on Administration and Finance. Split, Croatia, 13-17 May 2013.

General Fisheries Commission for the Mediterranean (GFCM). 2013b. Draft report of the 14th session of the sub-committee on stock assessment (SCA). FAO Headquarters, Rome, Italy, 18-20 February 2013.

General Fisheries Commission for the Mediterranean (GFCM). 2019c. Workshop on the assessment of management measures for small-pelagic and demersal species in the Adriatic Sea. Rome, Italy, 17–18 May 2019.

General Fisheries Commission for the Mediterranean (GFCM). 2011b. Report of the working group on stock assessment of small pelagic species. Chania, (Crete) Greece, 24-29 October 2011.

General Fisheries Commission for the Mediterranean (GFCM). 2012b. Report of the fourteenth session of the Scientific Advisory Committee, Sofia, Bulgaria, 20-24 February 2012. FAO Fisheries and Aquaculture Report No. 1001.

General Fisheries Commission for the Mediterranean (GFCM). 2012c. Report of the working group on stock assessment of small pelagic species. Split, Croatia, 5-9 November 2012.

General Fisheries Commission for the Mediterranean (GFCM). 2013c. Report of the fifteenth session of the Scientific Advisory Committee. Rome, 8–11 April 2013.

General Fisheries Commission for the Mediterranean (GFCM). 2017. Report of the working group on stock assessment of small pelagic species. Rome, Italy, 13-18 November 2017.

General Fisheries Commission for the Mediterranean (GFCM). 2018. Report of the working group on stock assessment of small pelagic species. Rome, Italy, 19-23 November 2018.

General Fisheries Commission for the Mediterranean (GFCM). 2019a. Report of the working group on stock assessment of small pelagic species. Rome, Italy, 9–14 December 2019.

General Fisheries Commission for the Mediterranean (GFCM). 2019b. Working Group on the Black Sea. Trabzon, Turkey, 18–20 September 2019.

General Fisheries Commission for the Meditterranean (GFCM). 2012a. Compendium of GFCM decisions. Sixth Session of the Compliance Committee, Marrakech, Morocco, 14-19 May 2012.

GFCM 2012e. Review on marine mammals' bycatch issue in Mediterranean and Black Sea. Scientific Advisory Committee 14th Session. Sofia, Bulgaria, 20-24 February 2012

Giannoulaki, M. S. Somarakis, A. Machias, A. Kallianiotis, A. Siapatis, and C. Papaconstantinou. 2009. Sardine (Sardina pilchardus) in GSA 22 (Aegean Sea-NW part). General Fisheries Commission for the Mediterranean (GFCM) Scientific Advisory Committe Twlefth Session. Budva, Montenegro 25-29 January 2010.

Gira´ldez, A., P. Torres, L. Quintanilla, and J. Baro. 2006. Anchovy (Engraulis encrasicolus) stock assessments in the GSA 06 (northern Spain). In Report of the 8th session of the Sub-Committee on Stock Assessment (SCSA), General Fisheries Commission for the Mediterranean Scientific Advisory Committee, Rome, 24-27 October 2006. Document 16.

Giraldez, A. and R. 1995. Aspects on reproductive biology of the western Mediterranean anchovy from the coasts of Malaga (Alboran Sea). Scientia Marina 59:15-23.

Guisande C, Cabanas JM, Vergara AR, Riveiro I (2001) Effect of climate on recruitment success of Atlantic Iberian Sardine Sardina pilchardus. Marine Ecology Progress Series 223:243-250.

Hammond, P.S., G. Bearzi, A. Bjørge, K. Forney, L. Karczmarski, T. Kasuya, W.F. Perrin, M.D. Scott, J.Y. Wang, R.S. Wells, and B. Wilson. 2008. Stenella coeruleoalba. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2.

Hassan, M.W.A. 1990. Comparative biological studies between two species of family Sparidae, Boops boops and Boops salpa in Egyptian Mediterranean waters. M.Sc Thesis, Faculty of Science, Alexandria University. 198 p.

Hernandez, V.A. 1989. Study on the age and growth of bogue (Boops boops (L)) from the central Adriatic Sea. Cybium 13:281-288.

International Commission for the Conservation of Tuna (ICCAT). 2008. Report of the joint GFCM/ICCAT meeting on

small tuna fisheries in the Mediterranean. Malaga, Spain, 5-9 May 2008.

International Commission for the Conservation of Tuna (ICCAT). 2013. Executive summary SMT - Small tunas. ICCAT report 2012-2013(II): 171-185

Kahraman, A.E., D. Gokturk, and F.S. Karakulak. 2011. Age and growth of bullet tuna, Auxi rochei (Risso), from the Turkish Mediterranean coasts. African Journal of Biotechnology 10:3009-3013

Karlou-Riga, C., P. Anastropoulos, D. Koulmpaloglou, and D. Petza. 2007. Batch fecundity of picarel Spicara smaris (L) in the Saronikos Gulf (Greece). Rapport Commission International Mer Mediterranee 38:513-514

Karlou-Riga, C.K. and D. Petza. 2010. Spawning frequency of picarel Psicara smaris (L) in the Saronikos Gulf (Greece). Rapport Commission International Mer Mediterranee 39:646-647

Kayali, E. 1998. Dogu Karadeniz'deki Istavrit (Trachurus mediterraneus Steindchner, 1868) ve Hamsi (Engraulis encrasicolus Linnea, 1758) Baliklarinin Bazi Populasyon Parametreleri ve Beslenme Ekolojileri, Yükesek Lisans Tezi, KTÜ, Fen Bilimleri Enstitüsü, Bal. Tekn. Müh. Anabilim Dali, Trabzon, 238 pp.

Kelleher, K. 2005. Discards in the world's marine fisheries. An update. FAO Fisheries Technical Paper No. 470. Rome, FAO. 131 p.

Khemiri, S., A. Gaamour, L. Zylberberg, F. Meunier, and S. Romdhane. 2005. Age and growth of bogue, Boops boops, in Tunisian waters. Acta Adriaticas 46:159-175.

Kiparissis, S., G. Tserpes, and N. Tsimenidis. 2000. Aspects on the demography of Chub Mackerel (Scomber japonicus Houltuyn, 1782) in the Hellenic Seas. Belgian Journal of Zoology 130: 3-7.

Koli, L. 1990. Suomen kalat. [Fishes of Finland]. Werner Söderström Osakeyhtiö. Helsinki. 357 p. (in Finnish).

Kristoffersen, J. and A. Margoulas. 2008. Population structure of anchovy Engraulis encrasicolus L. in the Mediterranean Sea inferred from multiple methods. Fisheries Research 91:187-195.

Lisovenko, L. A. and D. P. Andrianov, 1996. Reproductive biology of anchovy (Engraulis encrasicolus ponticus Alexandrov 1927) in the Black Sea. Scientia Marina 60:209–218.

Lleonart J. Review of the state of Mediterranean and Black Sea fishery resources. In : Basurco B. (ed.). The Mediterranean fisheries sector. A reference publication for the VII meeting of Ministers of agriculture and fisheries of CIHEAM member countries (Zaragoza, Spain, 4 february 2008). Zaragoza : CIHEAM / FAO / GFCM, 2008. p. 57-69 (Options Méditerranéennes : Série B. Etudes et Recherches; n. 62)

Lleonart, J. and F. Maynou, 2003. Fish stock assessments in the Mediterranean: state of the art. Scientia Marina 67: 37–49.

Mahmoud, B., A. Rachd, N. Benmansour, J. Brylinski, A. Moail, and K. Mahe. 2009. Age, growth and feeding of anchovy (Engraulis encrasicolus L.) in the Bay of Benisaf (SW Mediterranean, west Algerian coast. 4e Rencintres de I'chtyologie en France, 2009, Paris

Martin, P., A. Sabates, J. Lloret, and J. Vide. 2012. Climate modulation of fish populations: the role of the Western Mediterranean Oscillation (WeMOi) in sardine (Sardina pilchardus) and anchovy (Engraulis encrasicolus) production in the north-western Mediterranean. Climate Change 110:925-939.

Martin, P., N. Bahamon, A. Sabates, F. Maynou, P. Sanchez, and M. Demestre, M. 2008. European anchovy (Engraulis encrasicolus) landings and environmental conditions on the Catalan coast (NW Mediterranean) during 2000-2005. Hydrobiologia 612:185-199.

McEvoy, L.A. and J. McEvoy, 1992. Multiple spawning in several commercial fish species and its consequences for fisheries management, cultivation and experimentation. J. Fish Biol. 41(Suppl. B):125-136.

National Marine Fisheries Service (NMFS). 2013. NOAA Office of Science and Technology, US foreign trade.

Nesterov, A.A. and T.A. Shiganova. 1976. Eggs and larvae of the Atlantic saury, Scomberesox saurus (Walb.), inhabiting the northern part of the Atlantic Ocean. Vor. Ikhtiol 16:315-322.

Omar, K., and M. Hachem. 2009. Sardine (Sardina pilchardus) in GSA 03 (Southern Alboran Sea). General Fisheries Commission for the Mediterranean (GFCM) Scientific Advisory Committee 11th Session. Malaga, Spain 30 November - 3 December 2009.

Ozturk, B., C. Keskin, and S. Engin. 2011. Some remarks on the catches of anchovy, Engraulis encrasicolus (Linneaus, 1758), in Georgian waters by Turkish fleet between 2003 and 2009. Journal of the Black Sea and Mediterranean Environment 17:145-158.

Palomera, I., L. Recasens, P. Libori, I. Alverez Calleja, B. Moli, and N. Bahamon. 2008. Spawning stock biomass of the north western Mediterranean anchovy in 2007. General Commission for the Mediterranean Scientific Advisory Committee, Sub-Committee for Stock Assessment Working Group on Small Pelagic Species. Ismir, 22-26 September 2008.

Palomera, I., M.P. Olivar, J. Salat, A. Sabates, M. Coll, A. Garcia and B. Morales-Nin. 2007. Small pelagic fish in the NW Mediterranean Sea: An ecological review. Progress in Oceanography 74: 377–396.

Payne, A.I.L., C. O'Brien, and S. Rogers. 2004. Management of shared fish stocks. Ames, Iowa, Iowa State Press.

Permanent Working Group on Stock Assessment Methodology (PWGAM). 2006. Workshop on Black Sea assessment of pelagic and demersal fish stocks. Joint Meeting, General Fisheries Commission for the Mediterranean and Black Sea Commission. Istanbul, 8-10 March 2006.

Pertierra, J. P., and J. Lleonart. 1996. NW Mediterranean anchovy fisheries. Scientia Marina, 60: 257–267.

Potoschi, A. 1996. Observations about some biological aspects of Scomberesox saurus (Walbaum, 1792) in the area of the Straits of Messina. Oebalia 12:139-146.

Quintanilla, L.F., J.M. Bellido, P. Torres, A. Giraldez, A. Ceruso, F. Alemany, and M. Iglesias. 2009. Sardine (Sardina pilchardus) in GSA 01 (northern Alboran Sea). General Fisheries Commission for the Mediterranean (GFCM) Scientific Advisory Committee 11th Session. Malaga, Spain, 2009.

Raykov, V.S. and E. Duzgunes. 2017. Fisheries Management in the Black Sea—Pros and Cons. Front. Mar. Sci. 4:227. doi: 10.3389/fmars.2017.00227

Rodriguez-Roda, J. 1983. Edad y crecimiento de la melva, Auxis rochei (Risso), del Sur de España. Invest. Pesq. (Barc.), 47 (3): 397-402.

Sabates, A., P. Martin, J. Lloret, and V. Raya. 2006. Sea warming and fish distribution: the case of the small pelagic fish Sardinella aurita in the western Mediterranean. Global Change Biology 12:2209-2219.

Sahin C., N. Hacimurtezaoglu, A.M. Gözler, F. Kalayci, E. Agirbas. 2008. A Preliminary Study on Investigation of Purse Seine Bycatch Composition in the Southeastern Black Sea. Journal of Fisheries Science 2: 677-683.

Salemn, M., A.A. El_Aiatt, and M. Ameran. 2010. Age, growth, mortality and exploitation rates of round sardinella, Sardinella aurita from the east Mediterranean Sea (North Sinai coast). Research Journal of Fisheries and Hydrobiology 5:32-38

Santojanni A., N. Cingolani, E. Arneri, G. Kirkwood, A. Belardinelli, G. Giannetti, S. Colella, F. Donato, C. Barry. 2005. Stock assessment of sardine (Sardina pilchardus, Walb.) in the Adriatic Sea with an estimate of discards. Scientia Marina 69: 603-617.

Schismenou, E., M. Giannoulaki, V.D. Valavanis, and S. Somarkis. 2008. Modeling and predicting potential spawning habitat of anchovy (Engraulis encrasicolus) and round sardinella (Sardinella aurita) based on satellite environmental information. Hydrobiologia 612:201-214.

Scientific, Technical and Economic Committee for Fisheries (STECF) – Review of scientific advice for 2015 – Part 3 (STECF-14-22). 2014. Publications Office of the European Union, Luxembourg, EUR 26942 EN, JRC 92955, 404 pp.

Silva, A., P. Carrera, J. Masse, A. Uriate, M.B. Santos, P.B. Oliveira, E. Soares, C. Porterio C. and Y. Stratoudakis. 2008. Geographic variability of sardine growth across the northeast Atlantic and Mediterranean Sea. Fisheries REsearch 90:56-69.

Solari AP, Santamaria MTG, Borges MF, Santos AMP, Mendes H, Balguerias E, Castro JJ, Bas C. (2010) On the dynamics of Sardine Pilchardus: orbits of stability and environmental forcing. ICES Journal of Marine Science 67: 1565-1573.

Somarakis S, I. Palomera, A. Garcia, L. Quintanilla, C. Koutsikopoulos, A. Uriarte, and L. Motos. 2004 – Daily egg production of anchovy in European waters. ICES Journal of Marine Science 61: 944-958.

Somarakis, S. and N. Nikolioudakis. 2007. Oceanographic habitat, growth and mortality of larval anchovy (Engraulis encrasicolous) in the northern Aegean Sea (eastern Mediterranean). Marine Biology 152: 1143–1158

Traina, A., G. Basilone, F. Saborido-Rey, B. Ferreri, E. Quinci, T. Masullo, S. Aronica, and S. Mazzola. 2011. Assessing population structure of European anchovy (Engraulis encrasicolus) in the central Mediterranean by means of traditional morphometry. Advances in Oceanography and Limnology 2:141-153.

Tsagarakis, K., V. Vassilopoulou, A. Kallianiotis, and A. Machias. 2012. Discards of the purse seine fishery targeting small pelagic fish in the eastern Mediterranean Sea. Scientia Marina 76:561-572.

Tsikliras, A.C., E.T. Koutrakis, and K.I. Stergiou. 2005. Age and growth of round sardinella (Sardinella aurita) in the northeastern Mediterranean. Scientia Marina 69:231-240.

Tudela, S. 2004. Ecosystem effects of fishing in the Mediterranean: an analysis of the major threats of fishing gear and practices to biodiversity and marine habitats. Studies and Reviews: General Fisheries Commission for the Mediterranean, FAO, Rome. 58 p.

Tudela, S., A. Kai Kai, F. Maynou, M. El Andalossi, and P. Guglielmi. 2005. Driftnet fishing and biodiversity conservation: the case study of the large-scale Moroccan driftnet fleet operating in the Alboran Sea (SW Mediterranean). Biological Conservation 121:65-78.

Tugores, M. P., M. Iglesias, N. Di´az, D. On˜ate, J. Miquel, and A. Gira´ldez. 2010. Latitudinal and interannual distribution of the European anchovy (Engraulis encrasicolus) and sardine (Sardina pilchardus) in the western Mediterranean, and sampling uncertainty in abundance estimates. – ICES Journal of Marine Science, 67: 1574–1586.

Turan, C. 2004. Stock identification of Mediterranean horse mackerel (Trachurus mediterraneaus) using morphometric and meristic characters. ICES Journal of Marine Science 61:774-781

University of Barcelona (UOB). 1995. SUROESTE. A survey of interactions between marine mammals and fisheries in the southwestern waters of the EEC (SUROESTE). Final report to the General Directorate for Fisheries, EC DGXIV. Project PEM/92/3507. 113 p.

Uriarte A., P. Prouzet, and B. Villamor. Bay of Biscay and Ibero Atlantic anchovy populations and their fisheries. Scientia Marina 1996;60 Suppl. 2:237-255.

Valeiras, X., D. Macias, M.J. Gomez, L. Lema, S. Garcia-Barcelona, J.M. Ortiz de Urbina, and J.M. de la Serna. 2008. Age and growth of bullet tuna (Auxis rochei) in the western Mediterranean Sea. Collective Volume of Scientific Papers 62:1629-1637.

Vidalis, K., and N. Tsimenidis. 1996. Age determination and growth of picarel (Spicara smaris) from the Cretan continental shelf (Greece). Fisheries Research 28:395-421.

Watson, J.J., I.G. Priede, P.R. Witthames and A. Owori-Wadunde, 1992. Batch fecundity of Atlantic mackerel, Scomber scombrus L. J. Fish Biol. 40(4):591-598.

Whitehead, P.J.P. 1984. Engraulidae. p. 282-283. In P.J.P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen and E. Tortonese (eds.) Fishes of the north-eastern Atlantic and the Mediterranean. UNESCO, Paris. vol. 1. 510 p.

Whitehead, P.J.P., G.J. Nelson, and T. Wongratana. 1988. FAO Species catalogue. Vol 7. Clupeoid fishes of the world (suborder Clupeoidei). An annotated and illustrated catalogue of the herrings, sardines, pilchards, sprats, shads, anchovies and wolf-herrings. Part 2 - Engraulididae. FAO Fisheries Synopsis 125. pp. 305-579.

Working Group on Stock Assessment of Small Pelagic Species (WGSTSPS). 2012. Advances in preparing a joint assessment of anchovy, Engraulis encrasicolus, stock for GASs 01, 02, 03, and 04 of the GFCM (Algeria, Morocco and Spain). General Fisheries Commission for the Mediterranean. 14 p.

Appendix

Appendix A

Updates to the Atlantic sardine and European anchovy in the Mediterranean and Black Seas Report : Updates to the April 07, 2014, Atlantic sardine and European anchovy in the Mediterranean and Black Seas report were made on August 5, 2020:
Overall recommendations for European anchovy caught by purse seine and midwater trawl in the Adriatic Sea downgraded to "Avoid." This change was due to new information on stock status and lack of management success in constraining fishing pressure.

Updates to the report included:

- C1: Upgraded from 'Moderate' to 'Low' concern (C1.2) and from 'High' to 'Moderate' concern (C1.3) for European anchovy caught in purse seine and midwater trawls in Northern Spain. Downgraded from 'Moderate' to 'High' concern (C1.3) for European anchovy caught in purse seine and midwater trawls in the Adriatic Sea. Downgraded from 'Moderate' to 'High' concern (C1.2) for Atlantic sardine caught in purse seine and midwater trawls in the Adriatic Sea. Upgraded from 'High' to 'Moderate' concern (C1.3) for Atlantic sardine caught in purse seine and midwater trawls in the Gulf of Lion. Upgraded from 'High' to 'Moderate' concern (C1.3) for European anchovy caught in purse seine and midwater trawls in the Straight of Sicily. Downgraded from 'Moderate' to 'High' concern (C1.3) for Atlantic sardine caught in purse seine and midwater trawls in the Straight of Sicily. Upgraded from 'High' to 'Moderate' concern (C1.3) for European anchovy caught in purse seine and midwater trawls in the Alboran Sea. Upgraded from 'Moderate' to 'Low' concern (C1.3) for European anchovy caught in purse seine and midwater trawls in the Aegean Sea. Downgraded from 'Moderate' to 'High' concern (C1.3) for Atlantic sardine caught in purse seine and midwater trawls in the Aegean Sea. Upgraded from 'High' to 'Moderate' concern (C1.3) for European anchovy caught in purse seine and midwater trawls in the Ligurian Sea.
- C2: Downgraded from 'Moderate' to 'High' concern (C1.3) for horse mackerel caught in purse seine and midwater trawls in the Mediterranean and Black Seas.
- C3: Downgraded from 'Moderate Concern' to ' Very High Concern' (C3.1) for European anchovy and Atlantic sardine purse seine and midwater trawl fisheries in the Adriatic Sea. Upgraded from 'Very Concern' to ' High

Concern' (C3.1) for European anchovy and Atlantic sardine purse seine and midwater trawl fisheries in the Aegean Sea.