



FIRMS

FISHERIES AND RESOURCES
MONITORING SYSTEM

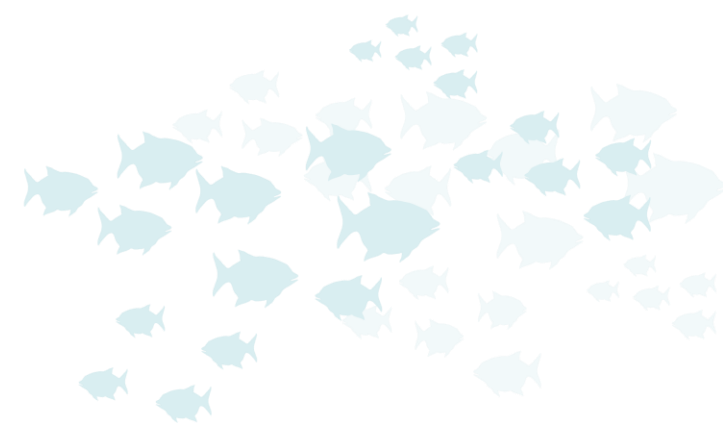
Report of the e-TWG on the Global Record of Stocks and Fisheries (GRSF)

Related to Doc. FIRMS FSC12/2021/4c





Outline



- **Background: Process; introduction to GRSF**
 - **Live Demo**
- **Recommendation of the TWG**
 - **Status of GRSF system**
 - **The UN SDG14.4.1 national questionnaires**
 - **Further enhancements considered by the TWG**
 - **Recap on the TWG recommendations on GRSF for FSC12**
- **Additional recommendations for consideration**
- **Discussions and Conclusions**

Acknowledgments

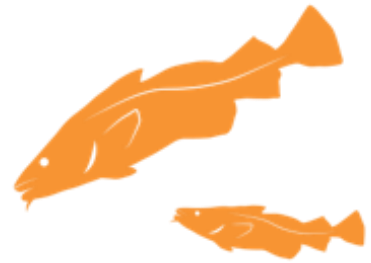
We would like to say thank you to all present and past colleagues who contributes to this endeavor

- ✚ FAO (NFI & FIRMS): E. Blondel, N. Bougouss, N. Cummings, A. Ellenbroek, A. Gentile, G. Gorelli, N. Gutierrez, A.E. Nieblas, B. van Niekerk, A. Muñoz, J. Ryder, R. Sharma, M. Taconet, T. Vicary, Y. Ye
- ✚ UW (RAM database): C. E. Ashbrook, R. Hilborn, D. Hively, M. Melnychuk
- ✚ SFP (FishSource): P. Amorim, M. Mendes, M. Patel, S. Segurado, B. Spear
- ✚ FORTH: Y. Marketakis, Y. Tzitzikas
- ✚ CNR (under projects and the iMarine MoU with FAO): M. Assante, G. Frosini, F. Mangiacrapa, P. Pagano
- ✚ ... and the RFBs colleagues, members of FIRMS, who attended the GRSF meetings to drive the development.



Background on process of TWG on GRSF

- ✕ The **core GRSF group** (FIRMS Secretariat, FORTH, SFP, delegation by UW) organized and delivered the e-TWG on GRSF to highlight to partners the work carried out on the GRSF during the intersession period and achievements, and for TWG members to provide feedback and recommendations to the FSC12.
- ✕ The **online meeting** was held on the **30th of September and 1st of October 2021**.
- ✕ Participants include FAO, FCWC, GFCM, IOTC, ICES, SEAFDEC, SEAFO, SIOFA, and WECAFC.
- ✕ The TWG on the GRSF was chaired by GRSF co-ordinator Ms N. Cummings. Discussions were held over the two days.
- ✕ **Three breakout groups** discussed aspects on i) IT interoperability, ii) stock status and monitoring, and iii) Traceability.
- ✕ The **TWG formulated recommendations** for further evaluation and possible endorsement at FSC12.



Presentations are available as documents FIRMS FSC12/2021/Inf.8 and FIRMS FSC12/2021/Inf.9

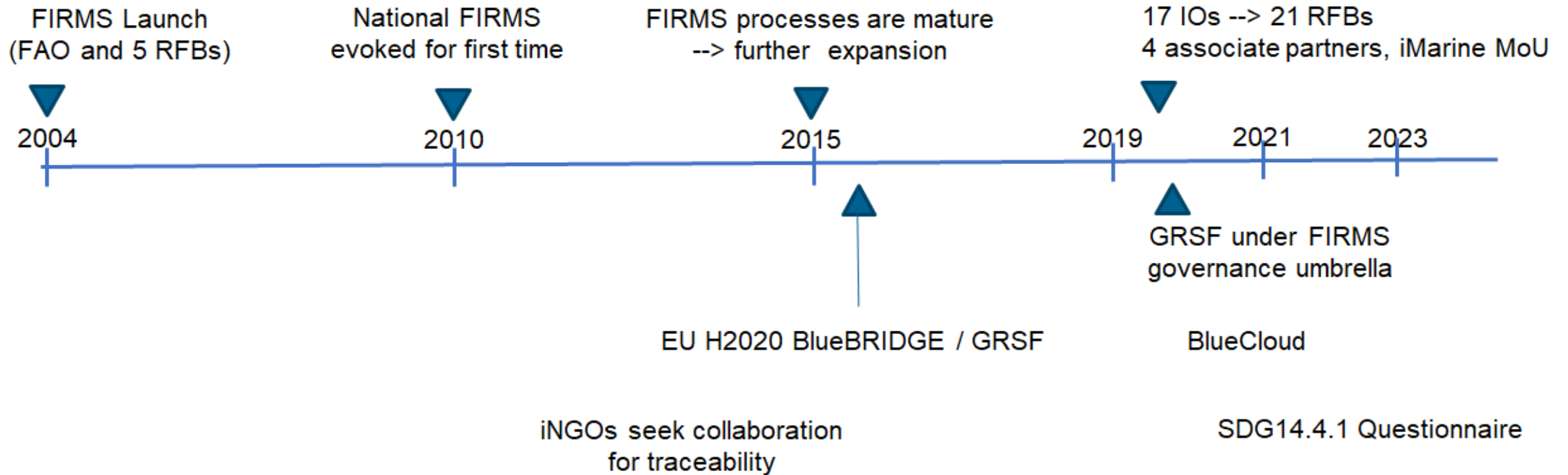
Report as doc. FIRMS FSC12/2021/4

Introduction to GRSF

Origins of GRSF

The SOFIA indicator on the status of stocks should be supported through a collaborative and transparent internet-based process, where those having monitoring responsibilities share information on individual stock status.

Starting with RFBs and extending to Countries.



Introduction to the GRSF

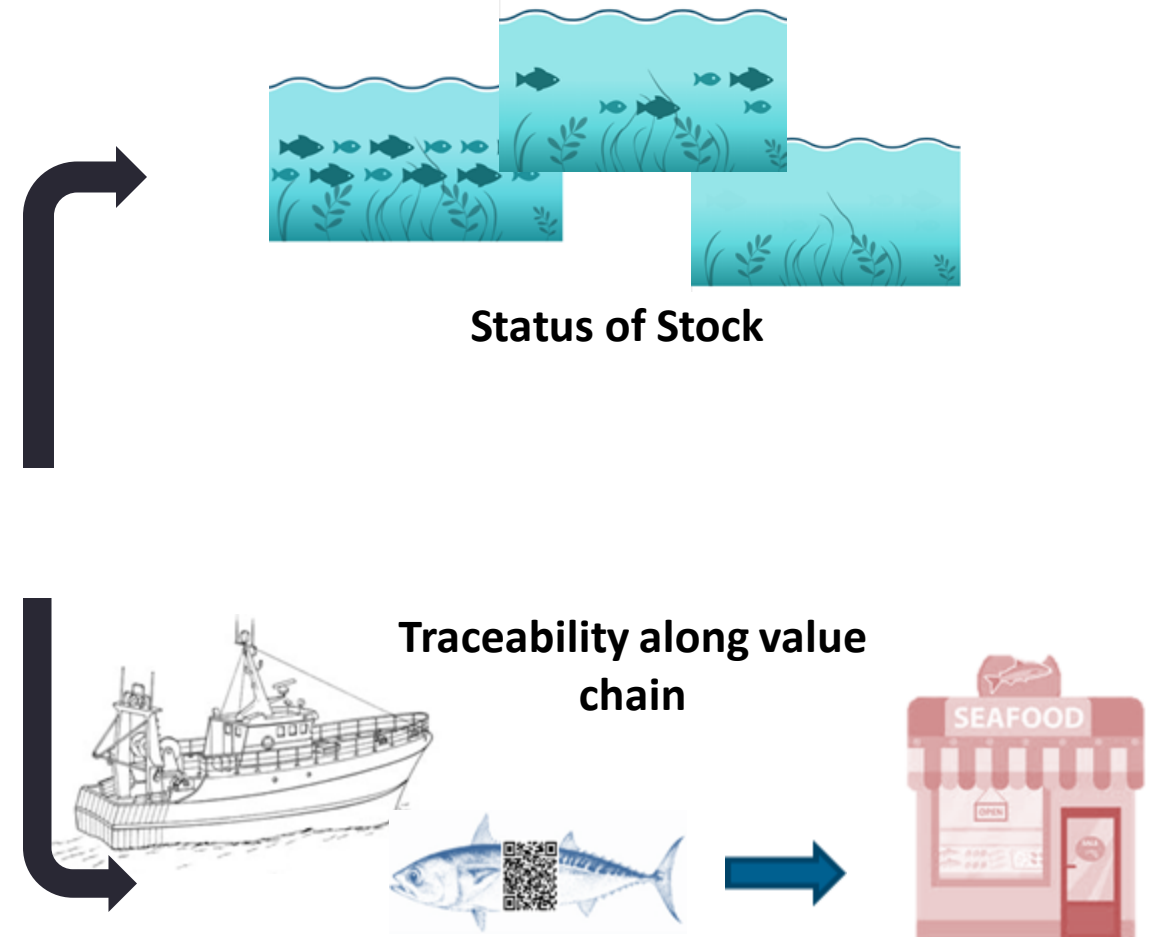
GRSF has two technical objectives in support of two policy goals

1. Register a comprehensive list of distinct stocks and fisheries as part of a global repository
2. Federate knowledge on status/trends of stocks and fisheries across various sources,

--> provisioning for key services to:

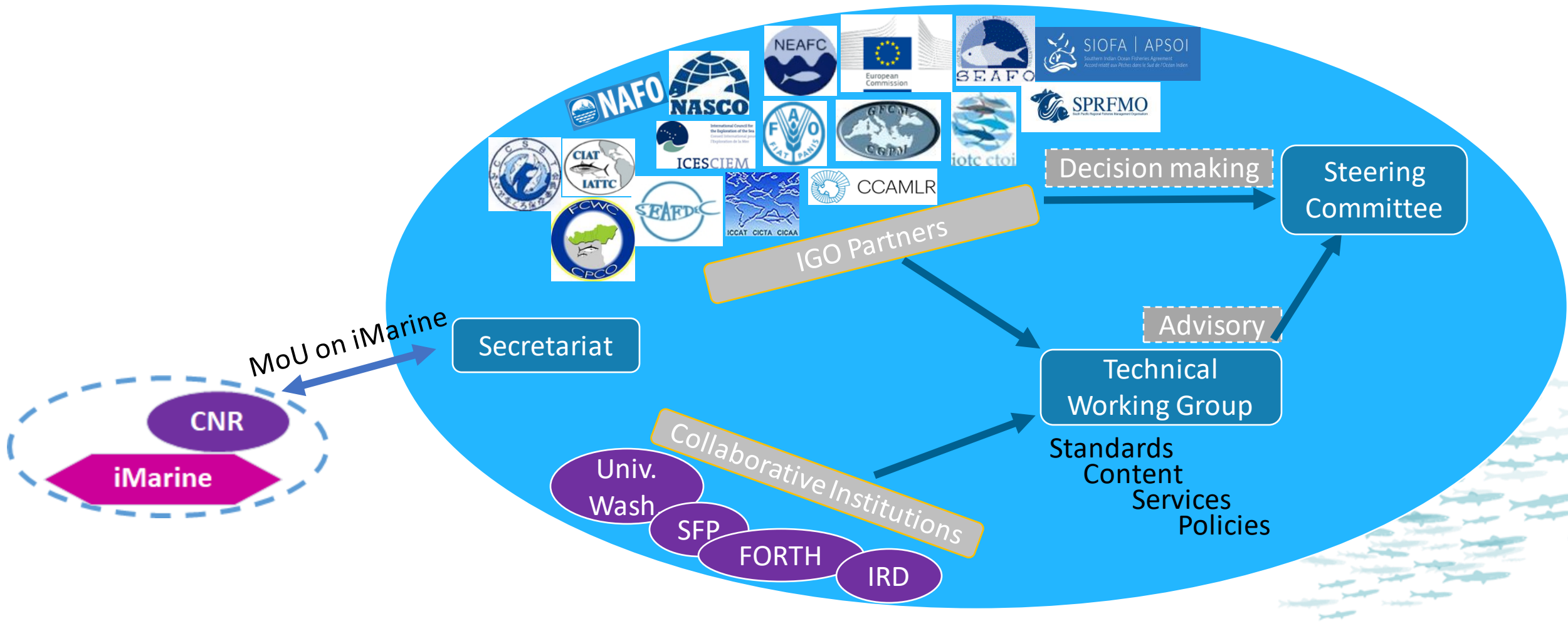
I. Science stakeholders involved in “regional/global state of stocks indicators”

II. Public and private actors involved in ecolabelling, traceability and sustainable fisheries



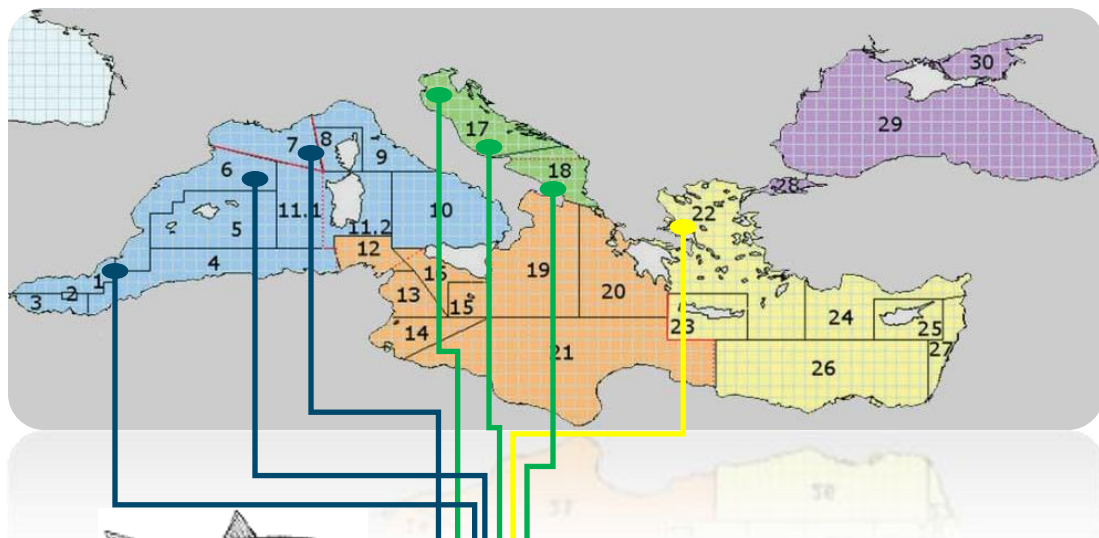
Introduction to the GRSF

GRSF relies upon a strong partnership operating under the FIRMS governance umbrella



Introduction to the GRSF

Universally Unique Identifiers (UUIDs) applied to Stocks and Fisheries a new innovative global standard



- Anchovy - Adriatic Sea ID ANE + GSA17-18 UUID [6e44250b-fd04-337e-91d7-f7b6840bb862](https://www.fao.org/grsf/f21113e9-0794-37aa-b7fe-bf49101361f3)
- Anchovy - Aegean Sea ID ANE + GSA22 UUID [63d689ec-ef49-3b22-a37a-bb49d00e1638](#)
- Anchovy - Gulf of Lion ID ANE + GSA7 UUID [a965318a-4b29-3b6f-b9a6-4ed6a676c779](#)
- Anchovy - Northern Adriatic Sea ID ANE + GSA17 UUID [72a47857-eb5a-324f-8f69-78b622bc55e7](#)
- Anchovy - Northern Alboran ID ANE + GSA1 UUID [834d0773-23ed-3d34-bbde-253a3ef5eaa6](#)
- Anchovy - Northern Spain ID ANE + GSA6 UUID [e5de7186-6b88-325e-8cd1-68d933943cb4](#)
- Anchovy - Southern Adriatic Sea ID ANE + GSA18 UUID [4c437c98-d37c-37a5-99d9-d5e4cd82360e](#)

Universally Unique Identifier (UUID)

a web-resolvable digital identifiers to respond to whatever IT standard

Example www.fao.org/grsf/f21113e9-0794-37aa-b7fe-bf49101361f3

- The resolver can be customized
- UUIDs persist in case of changes of the semantic identifiers (i.e. updates of a record)



Try the (example) QRCode: Identifies as a FAO resource



UUID's: A de-facto standard for information collation and sharing


Introduction to the GRSF



Epinephelus morio - Gulf of Mexico

Short Name: Red grouper - Gulf of Mexico USA waters
 GRSF Semantic identifier: asfis:GPR+lme:5
 Record URL: <https://data.d4science.org/ctlg/GRSF/02fecff-caa0-37b7-8f60-b1c9d21650a7>

Stock location



FAO Status maximally sustainably fished [Ref. Year: 2013]

Example of what a user could get by clicking on the QR code of a commodity etc.



STANDARD CODING SYSTEM FOR:

- ▶ Stocks <Species> + <Assessment Area(s)>
- ▶ Fisheries <Species> + <Fishing area(s)/Management area(s)> + <Management Authority(ies)> + <Geartype> + <Flag State>









EXAMPLE OF SEMANTIC IDENTIFIER, AND OF ITS FULL LABEL

asfis:COD + fao:21.3.M + authority:INT:NAFO + isscfg:03.12 + iso3:LTU
 Gadus morhua - Atlantic, Northwest/21.3.M - Northwest Atlantic Fisheries Organization (NAFO) - NAFO area of competence - Single boat bottom otter trawls - Lithuania

Species: *Gadus morhua*
 Species code: COD
 Fishing Area: FAO 21.3.M
 Management Authority: Northwest Atlantic Fisheries Organization (NAFO)
 Jurisdiction: NAFO area of competence
 Fishing Gear: Single boat bottom otter trawls
 Fishing Gear code: 03.12
 Flag State: Lithuania
 Flag State Code: LTU
 ID: asfis:COD + fao:21.3.M + authority:INT:NAFO + isscfg:03.12 + iso3:LTU
 UUID: <http://.../b99fd03e-709e-3139-9f5d-133df0b103fd>



Source: FAO SOFIA 2018.

-  **Abundance Level (FIRMS Standard)**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **Abundance Level**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **Biomass**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **Fishing Pressure (FIRMS Standard)**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **Fishing Pressure**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **State and Trend**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **Fao Categories**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)
-  **Catches**
 Epinephelus morio - Gulf of Mexico
[Go to resource](#)

Introduction to the GRSF

Semantic Identifier: each UUID also has a **human-readable identifier, a new standard coding system** for stocks and fisheries. This is useful for **identification & validation, product labelling, etc.**

Stocks <Species> + <Assessment Area(s)>

Fisheries <Species> + <Fishing Area(s)> + <Management Authority(ies)> + <Geartype> + <Flag State>



Examples of semantic identifiers for stocks and fisheries

☞ **Stocks:** asfis:**GAL** + fao:**34.3.13**; fao:**34.3.3**

➔ *Galeoides decadactylus* - Sherbro - Atlantic, East central

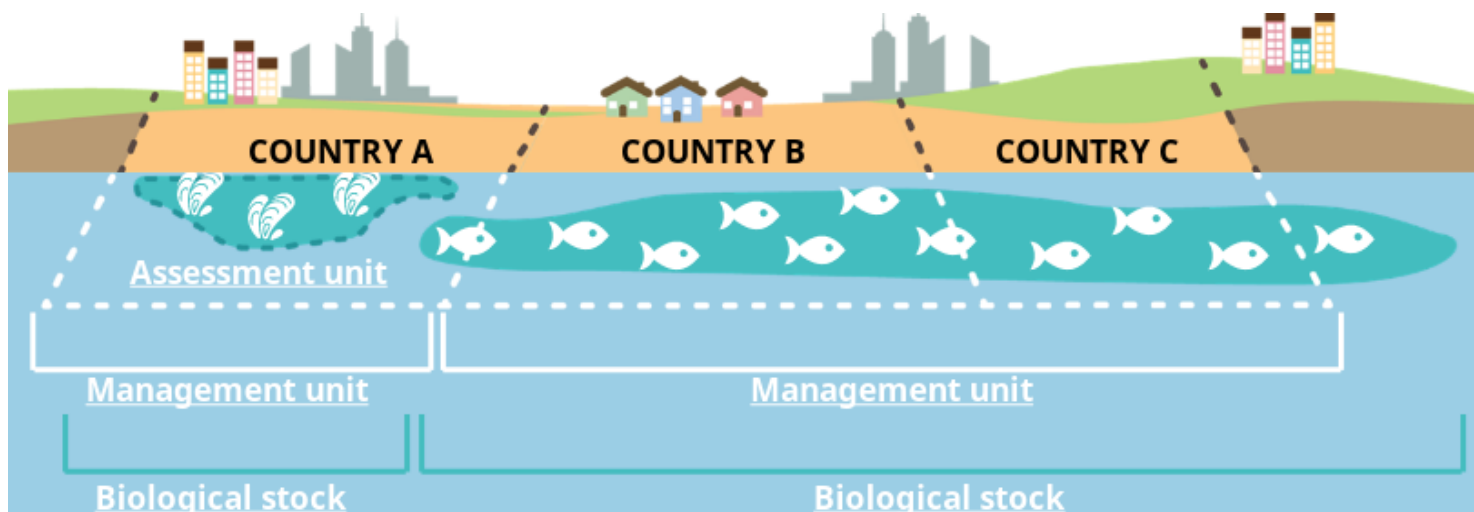
☞ **Fishery:** asfis:**COD** + fao:**21.3.M** + int:**NAFO** + isscfg:**OTB** + iso3:**LTU**

➔ *Gadus morhua* - Atlantic, Northwest/21.3.M -
Northwest Atlantic Fisheries Organization (NAFO) -
Bottom otter trawls – Lithuania flag state

**A semantic identifier implements a flexible combination of standards
from CWP, FIRMS and other standards**

Introduction to the GRSF

Enrichment of FIRMS records with the new descriptors



Source: FAO, 2019. Elearning: SDG Indicator 14.4.1 - Fish stocks sustainability.

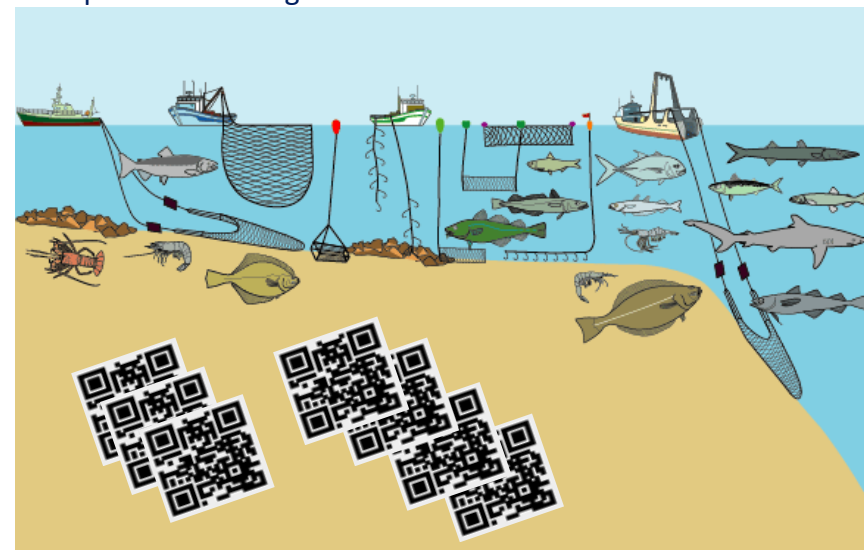
Biological stock: "A subpopulation of a species inhabiting a particular geographic area, having similar biological characteristics (e.g. growth, reproduction, mortality) and **negligible genetic mixing** with other adjacent subpopulations of the same species (FSC11, May 2019)."

Assessment unit: A group of individuals of **one (or more) species** that is the object of a **stock assessment** and/or any other analysis aiming to investigate stock status. The assessment unit is ideally consistent with the biological stock extent, but can be established on another basis according to the purpose of assessment and the nature of the fishery concerned (FSC11, May 2019).

Information exchange requires common standards

Management unit: The area where the fish is caught and which is targeted by a **unique set of measures**. This unit (i.e., one [or more] species in a particular area) has generally been defined at a regional, national or local scale by a management authority, including through stakeholder consultation. For example, the Management unit uses the assessment done in the Assessment unit to define management regulations. (FSC11, May 2019).

Fishing Unit: A fishery targeting a **single species** (or group of species) conducted by a **single flag state** using a **single fishing gear** operating in a water area, which is possibly managed by a single empowered management authority or treaty under a unique set of management measures.



Source: Adapted from FAO Fishing techniques fact sheets

Live demo of the GRSF interfaces

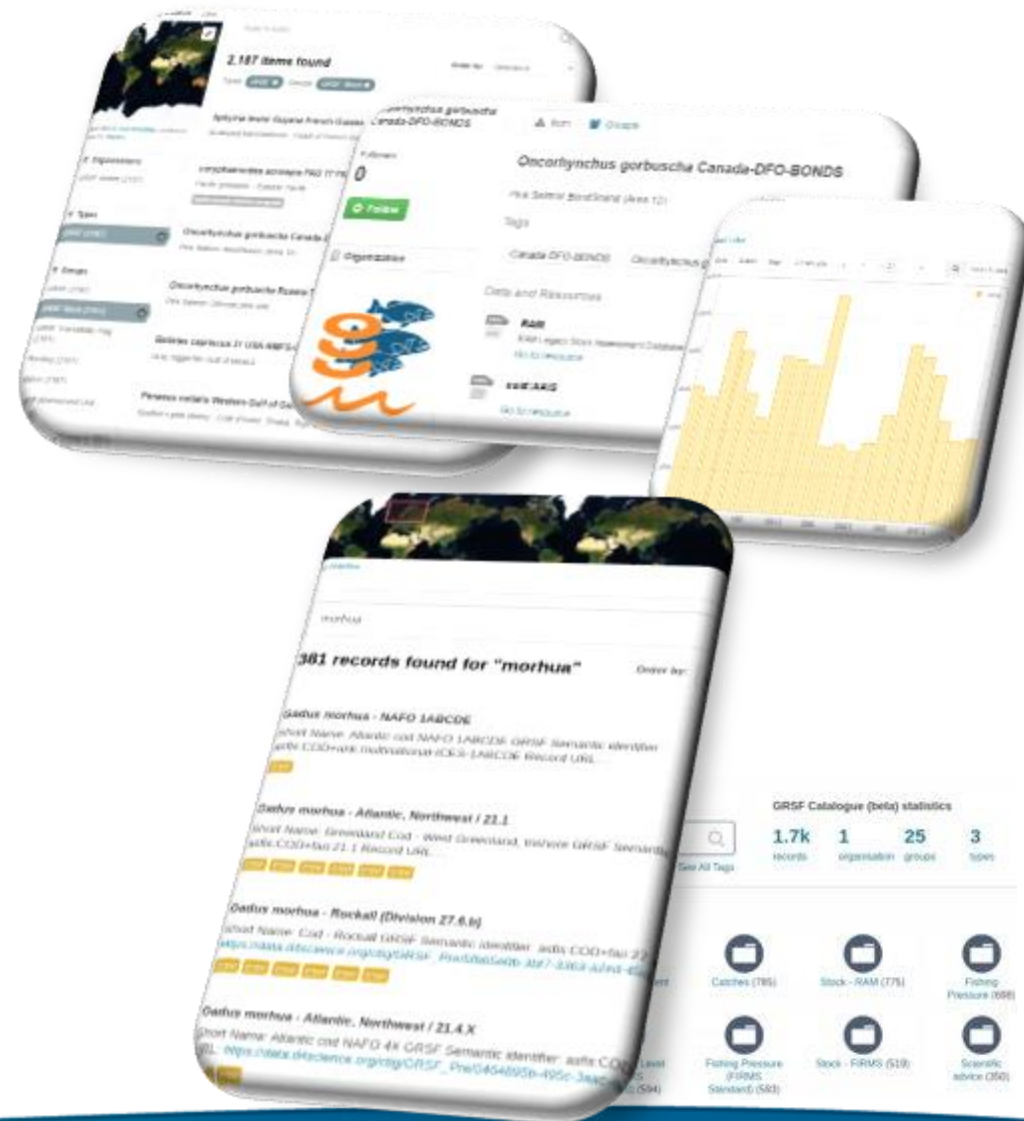
The GRSF is handled in two environments:

- The GRSF **Admin** – for the review/approval/archival of records
- The GRSF **Public** – any users with rights to accessing the catalogue of records and the map viewer



Browse the:

- **Catalogue** <https://i-marine.d4science.org/web/grsf/data-catalogue>
- **Map Viewer** <https://i-marine.d4science.org/web/grsf/map-viewer>
- **Web services and competency queries**



Analysis of time-dependent data

Programmatic access to GRSF through APIs enables simple and advanced analyses

Example extracting time-dependent data on, e.g. Yellowfin tuna – Atlantic

Custom or prefilled competency queries via SPARQL

- GRSF Stock records
- GRSF Fishery records
- All GRSF Stock records with type "Assessment Unit"
- All GRSF Fishery records with the following fields Species Name / Area / Management Entity / Flag State / Fishing Gear
- All GRSF Fishery records flagged for traceability purposes

SPARQL query
SPARQL query
SPARQL query
SPARQL query
SPARQL query

SWAGGER queries

```

"resource_type": "assessment unit",
"sdg_flag": true,
"status": "approved",
"species": [
  {
    "species_code": "ANE",
    "species_name": "Engraulis encrasicolus",
    "species_type": "ASFIS"
  }
],
"assessment_areas": [
  {
    "assessment_area_code": "27.9.a",
    "assessment_area_name": "Portuguese Waters - East (Division 27.9.a)",
    "assessment_area_type": "FAO"
  }
],
"source_urls": [
  "http://firms.fao.org/fishery/xml/resource/13833/en"
],
"data_owner": "Food and Agriculture Organization (FAO)",
"fao_categories": [
  "Underexploited [Ref. Year: 2009]"
],
"state_and_trend": [
  "The indicators of this record seem underexploited [Ref. Year: 2009]"
],
"abundance_level": [

```

Connection via R API

```

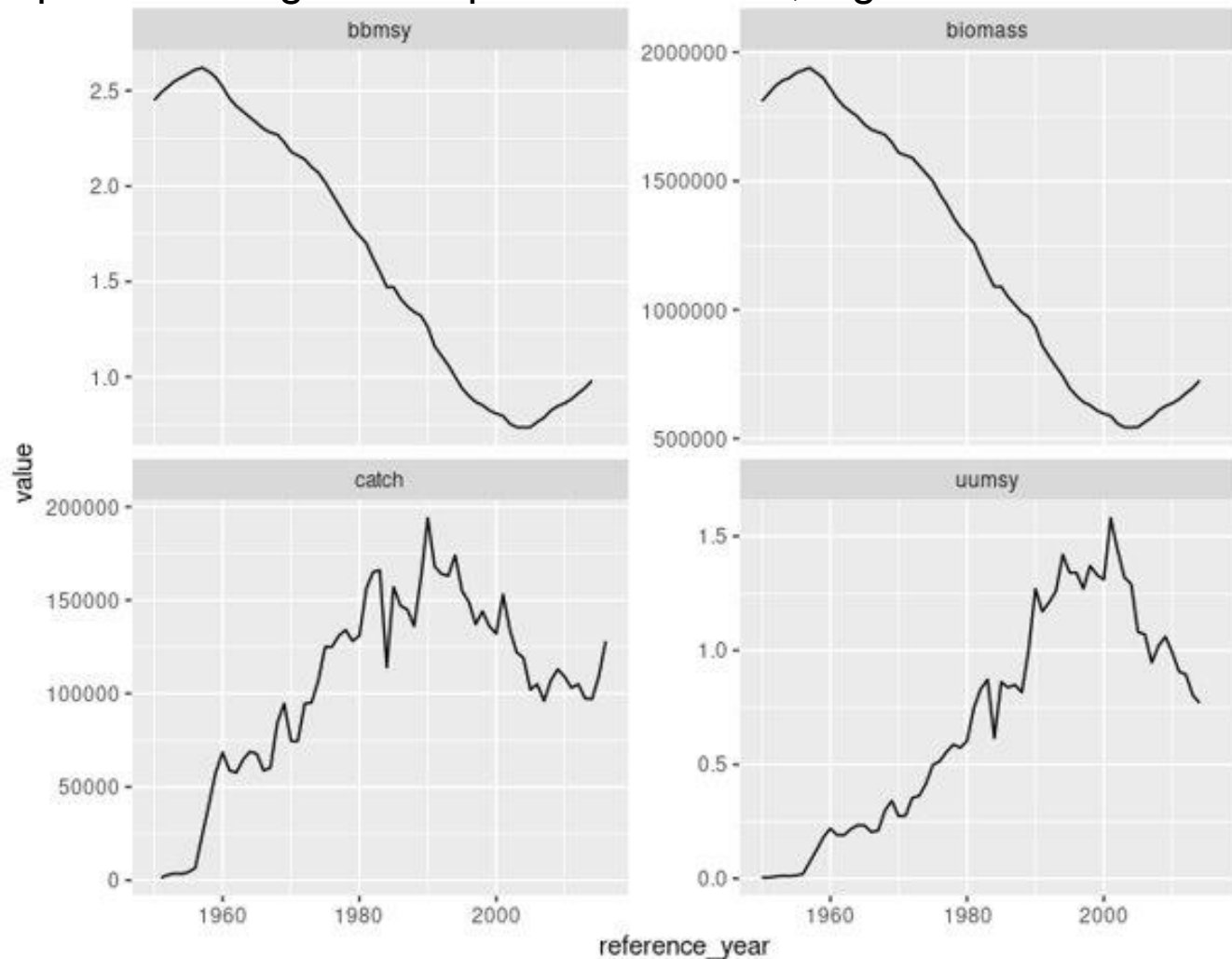
connect to grsf via api
library(rapiclient)
grsf_api <- get_api(url = "https://api.swaggerhub.com/apis/ymark/grsf-api/2.1.2/swagger.json")
operations <- get_operations(grsf_api)

# identify the areas you'd like to search, including pending
req_sp_area <- operations$getstocks(area_code = '37', pending=TRUE)

## extract the content of the records found
req_c = httr::content(req_sp_area)

# convert to data frame
df = do.call(rbind, lapply(req_c$result, function(x) {

```



Report of the TWG on the GRSF

Key points and associated recommendations



FIRMS/FSC12/2021/4

The Fisheries and Resource Monitoring System (FIRMS) Technical Working Group
Seventh Session
Global Record of Stocks and Fisheries (GRSF)
Online, 30 September 2021 – 1 October 2021
Report
Author: FIRMS Secretariat

Executive Summary

The FIRMS seventh e-TWG was held virtually in two sessions, the first on the Tuna Atlas (22 February 2021, 25 and 26 February 2021), and the second on the GRSF (30 September 2021 and 1 October 2021).

The objectives of this e-TWG on the GRSF were to highlight to partners the work carried out so far on the GRSF and its developments during the inter-session period, and for TWG members to provide feedback and recommendations to the FSC12.

The topics presented during the e-TWG are summarized in the two presentations referenced in Annex 5.

Following discussions held over the two days (Annex 3 and 4), the TWG formulated recommendations for further evaluation and possible endorsement at FSC12.

CONDUCT OF THE MEETING

The Seventh Session of the FIRMS Technical Working Group (TWG) e-meeting, on the Global Record of Stocks and Fisheries (GRSF), was opened by its coordinator, Ms Nancee Cummings (NOAA – WECAFC-FIRMS regional focal point) at 14:00 hrs, Rome time (CET) on Thursday 30th September 2021. She welcomed the representatives of the following FIRMS Partners: FCWC, IATTC, ICCAT, ICES, NAFO, IOTC, SEAFO, SPRFMO, WECAFC and of the FIRMS associated Partners: SFP, FORTH, also noting that UW could not attend but had prepared contributions to be delivered during the meeting (see Annex 1 List of Participants).

ANNEX 3 - SUMMARY DAY 1

The TWG was presented the status of the GRSF system and database, with contributions testifying:

- A robust and well-functioning system periodically refreshed, offering a v access and dissemination features, ranging from a simple Map viewer to general public, through to competency queries for pre-defined extracted web-based services (APIs) for advanced analyses
- A closely-controlled and monitored validation mechanism for Stock Identifier which aims at ensuring the quality and uniqueness of records, compliant with agreed standards or conventions
- The GRSF infrastructure and the UUIDs offer interoperability for data exchange and mutual enrichments with other databases (federation of systems)
- With over 1500 stocks approved to date, and over 1600 still pending approval, GRSF may be considered a central repository to access the World's unique stocks and stock status data and information.

Stocks in GRSF have operational-level granularity. Geographic coverage, presently:

- The oceans and seas around Europe, Africa, North and South America and New Zealand are well covered
- South Asia, South-East Asia, and the Pacific are not as well covered

Content and temporal coverage of the various indicators supporting stock status monitoring, presently:

- Time series of 25 years
- Recent data within 1 year

The UN SDG14.4.1 national significantly increase GR

- Applying UUIDs for contributing to stock validation burden
- SDG 14.4.1 Data will be published, by FAO unless otherwise

Likewise for Stocks, a complete "store" of over 12,000 Fish

ANNEX 4 - BREAKOUT ROOM DISCUSSIONS DAY 2

Break out group: GRSF IT services and interoperability aspects

- The GRSF returns stocks and fisheries identifiers to data providers once records are validated, the data providers remain the owner of its stocks & fisheries list.
- A test endpoint is desirable to initiate testing submission and receipt of stock information.
- GFCM is already considering the use of both unique identifiers and semantic IDs to improve stock assessment data management, hence there is a solid ground to streamline interoperability with the GRSF. In this connection, the GFCM Secretariat will explore the standards developed so far in the remit of the GRSF APIs.
- The GFCM advises the preparation of guidelines documenting good practices for the implementation of data flows from RFMOs to the FIRMS/GRSF and ultimately to SOFIA (e.g. required metadata, stocks descriptors and indicators). These should include both technical and general provisions (i.e. to ensure proper

RECOMMENDATIONS FOR FSC12

The TWG outlined GRSF topics which required further consideration by FSC12 including

1. Note that classifications of FIRMS stock as Biological, Assessment or Management Units are on-going and will require inputs or validations from FIRMS partners.
2. Recognition of the importance of the timely submission of updated stock status and fishery reports.
3. Recommendation to incorporate FishStat in GRSF and further investigate how FishStat - GRSF relationships can improve global stock status analysis.
4. Recommendation to continue working on the integration of SDG 14.4.1 data into the GRSF.
5. Recommendation to develop approaches and standards for increased geospatial resolution.
6. Recommendation to review the proposed Traceability Unit standard in conjunction with the planned revision of the SDG questionnaire.
7. Recommendation that GRSF data providers consider how to best complement each other in order to optimize data collection efforts of the Partnership.
8. Recommendation to improve and simplify communication and to develop guidelines on GRSF data requirements and the streamlining flow to SOFIA. Such could take into account the levels of knowledge on stocks (including data poor situations) to improve guidance to partners on data priorities and to optimize the efficiency of reporting.

Status of GRSF system

Key points (1)

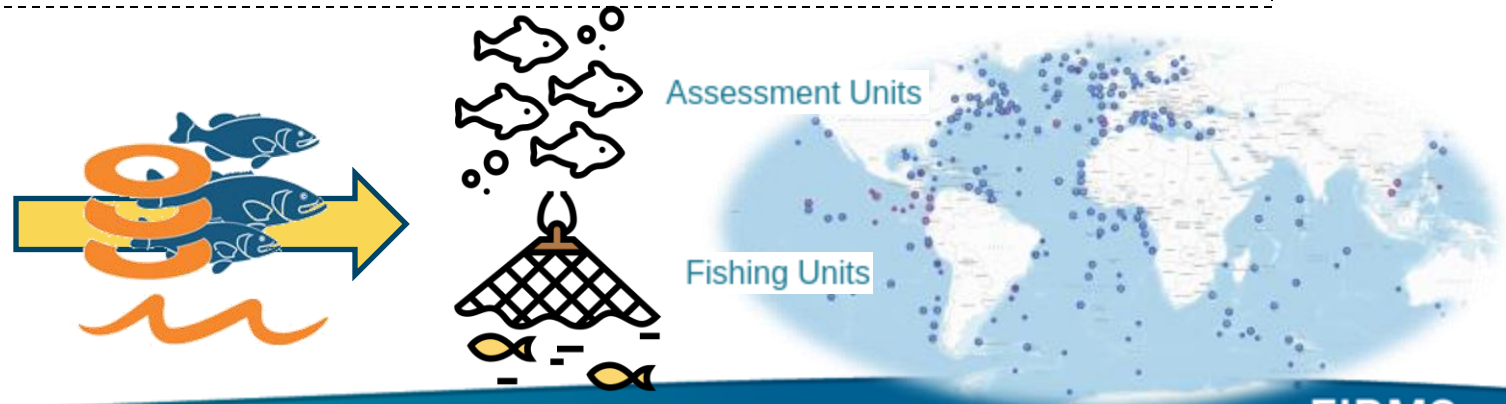
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- A closely-controlled and monitored **validation mechanism** for Stock Identifiers which aims at ensuring the quality and uniqueness of records, compliance with agreed standards or conventions.
- The GRSF **infrastructure and the UUIDs offer interoperability for data exchanges** and mutual enrichments with other databases (federation of systems).

FIRMS
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MONITORING SYSTEM

 **FISHSOURCE**

RAM LEGACY STOCK ASSESSMENT DATABASE



Status of GRSF system

Key points (1 cont.)

- With **over 1500 stocks approved to date**, and over 1600 still pending approval, GRSF may be considered a central repository to access the World's unique list of stocks and stock status data and information.
- **UUID and semantic identifiers** assigned to all published GRSF records.
- Likewise **for Stocks**, a controlled process prevails for the generation of a very **significant "store" of over 12,000 Fishing units**.

Record types	Total number			
	Total	App	Arch	Pend
Assessment unit	2807	1519	72	1216
Marine resource	481	22	9	450
Stocks from source systems	3645			

Fishing unit	12622	91		
<u>Other fishery</u>	905			
Fisheries from source systems	4287			

Database coverage – the contribution of various sources

Record types	Total number				Uniquely sourced from			Jointly sourced from			
	Total	App	Arch	Pend	FIRMS	FishSource	RAM	FIRMS FishSource RAM	FIRMS RAM	FishSource RAM	FIRMS FishSource
Assessment unit	2807	1519	72	1216	589	769	1195	73	90	54	37
Marine resource	481	22	9	450	27	454	0	-	-	-	-
Stocks from source systems	3645				836	1397	1412				
Fishing unit	12622	91			8869	3753	-	-	-	-	-
Other fishery	905				896	9	-	-	-	-	-
Fisheries from source systems	4287				279	4008	-				

Status of GRSF system

The integration of UUIDs in partners DBs

Testing the GRSF proposed standards by integrating the new fish stock and fisheries identifiers in multiple databases for different possible utilizations

RAM Database: UUIDs added in the RAMLDB for all the approved/archived records (974 out of 1412)

ICES: UUIDs are not yet enacted in ICES databases but the task has been included in the ICES Secretariat's workplan. UUIDs will be incorporated in the ICES vocabularies and then visible through [Stock Assessment Graphs](#) and the [Stock Information Database](#). Hence, UUIDs will be visible against ICES stock keys.

FIRMS Database: UUIDs returned for each FIRMS record. Not yet displayed due to the ongoing upgrade of the FIGIS engine and the new FAO-NFI website

FishSource Database: UUIDs for approved records displayed on FishSource stock and fishery profiles

Others: ...

Partners are encouraged to give a try!

Status of GRSF system

Key points (1) - recap

The TWG was presented the status of the GRSF system and database, with contributions testifying:

- *A robust and well-functioning system periodically refreshed, offering a variety of access and dissemination features, ranging from a simple map viewer and catalogue for the general public, through to competency queries for pre-defined extractions, and web services (APIs) for advanced analyses.*
- *A closely-controlled and monitored validation mechanism for Stock Identifiers which aims at ensuring the quality and uniqueness of records, compliance with agreed standards or conventions.*
- *The GRSF infrastructure and the UUIDs offer interoperability for data exchanges and mutual enrichments with other databases (federation of systems).*
- *With over **1500** stocks approved to date, and over **1600** still pending approval, GRSF may be considered a central repository to access the World's **unique** list of stocks and stock status data and information.*
- ***UUID** and **semantic** identifiers assigned to all published GRSF records.*
- *Likewise **for Stocks**, a controlled process prevails for the generation of a very significant "store" of over **12,000** Fishing units.*

TWG recommendations on GRSF for FSC12

In completing the validation of the records:

1. Note that **classifications of FIRMS stock** as Biological, Assessment or Management Units are on-going and **will require inputs or validations from FIRMS partners.**

Status of GRSF system

Key Points (2)

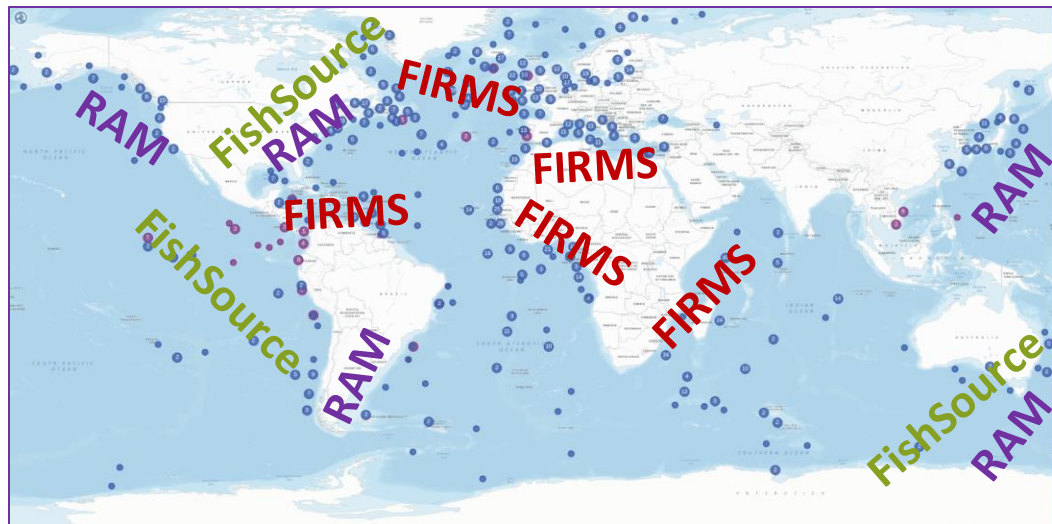
Stocks in GRSF have **operational-level granularity**.

Re. **Geographic coverage**, presently

- The oceans and seas around **Europe, Africa, North and South America, Australia and New Zealand** are well covered.
- **South Asia, South-East Asia, and the Pacific** are not as well covered.



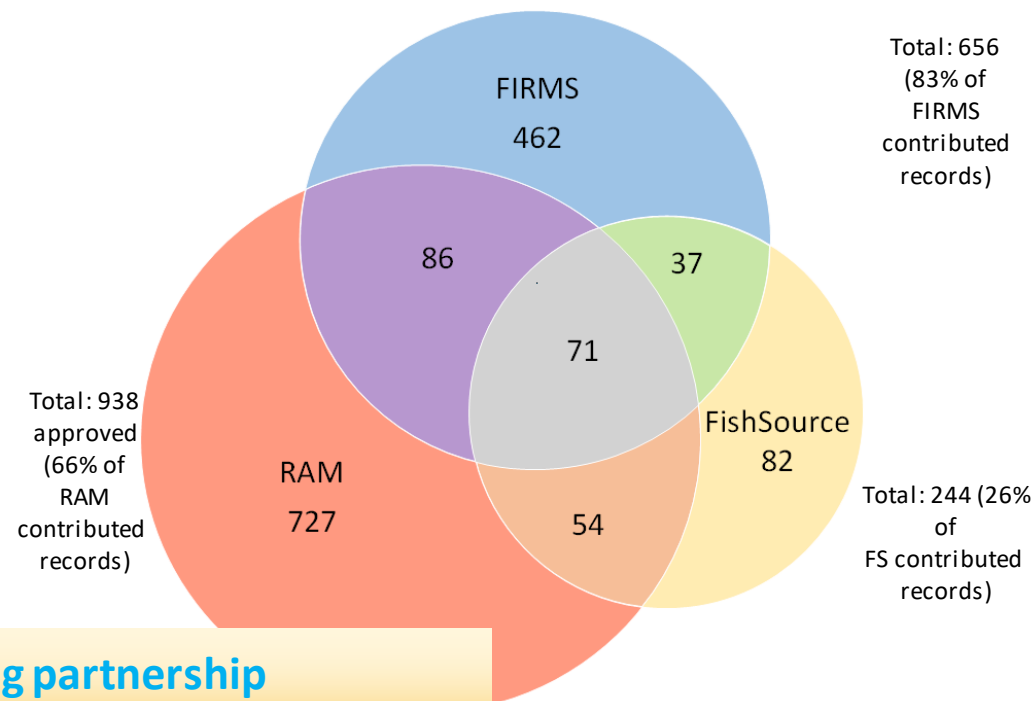
Inventory of fish stocks - Contribution of various sources to the geographic coverage



Updated 27 September 2021

Total stock records	Approved stock records with public UUIDs	Review in progress
3288	1541	1666
Number of Species		
1211		

Breakdown of total approved Assessment Units



The GRSF leverages the three sources in complementary ways:

- 🐟 Increased number of species and fish stocks
- 🐟 Increased coverage in different world areas
- 🐟 Regional vs. national sources

The power of information sharing partnership
Working together we will further improve our complementarity

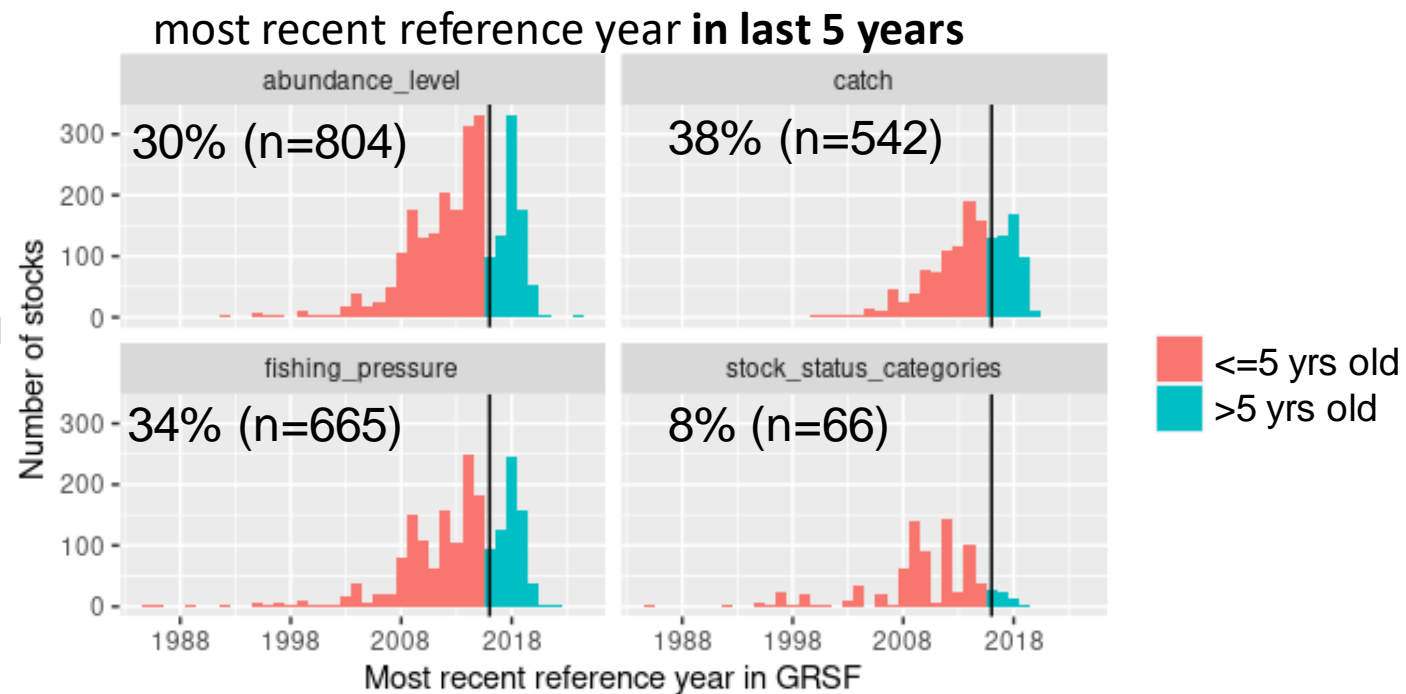
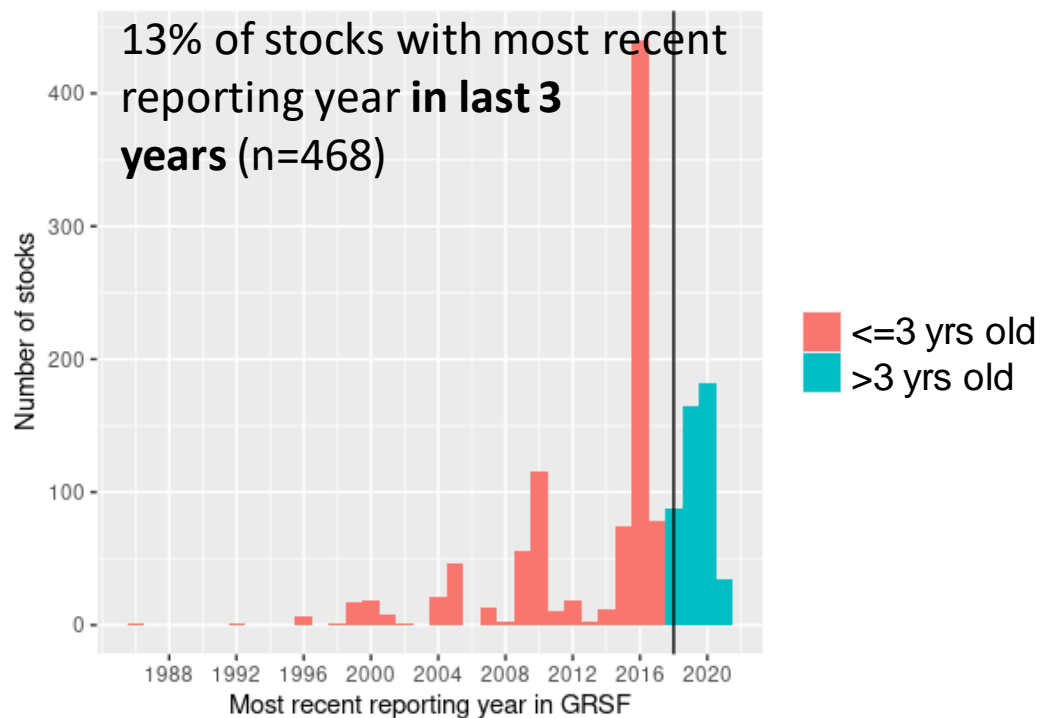
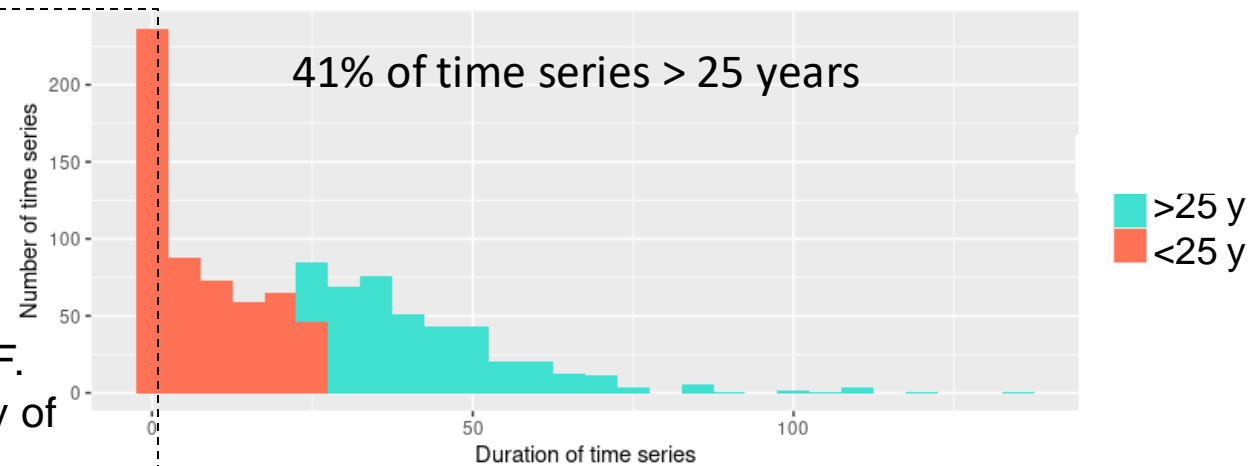
Status of GRSF system

Key Points (3)

Stocks in GRSF have **operational-level** granularity.

Re Content and **temporal coverage** of the various indicators supporting stock status and monitoring, presently

- Time series of 25 years constitutes a strong feature of GRSF.
- Recent data within the last 5 years presents a weaker reality of GRSF



Status of GRSF system

Key Points (2-3) - recap

Stocks in GRSF have operational-level granularity.

Geographic coverage, presently

- *The oceans and seas around **Europe, Africa, North and South America, Australia and New Zealand** are well covered.*
- ***South Asia, South-East Asia, and the Pacific** are not as well covered.*

Content and temporal coverage of the various indicators supporting stock status and monitoring, presently:

- ***Time series of 25 years constitutes a strong feature of GRSF.***
- ***Recent data within the last 5 years presents a weaker reality of GRSF.***

TWG recommendations on GRSF for FSC12

2. Recognition of the **importance of the timely submission** of updated stock status and fishery reports.

7. Recommendation that **GRSF data providers consider how to best complement each other** in order to optimize data collection efforts of the Partnership.

The UN SDG14.4.1 national questionnaires ...

... represents an additional resource which can significantly increase GRSF Geographic / Stocks / and Stocks status coverage

Key Points (4) - elaboration

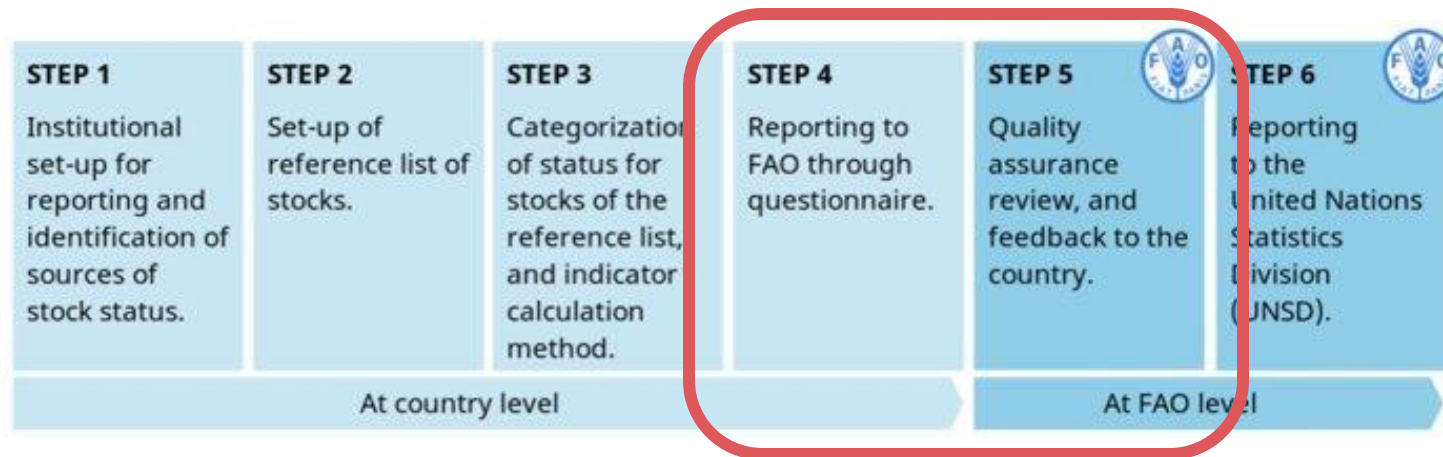


Target 14.4

By 2020, effectively **regulate harvesting** and **end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices** and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

14.4.1

Proportion of fish stocks within biologically sustainable levels



The UN SDG14.4.1 national questionnaires ...

... represents a resource which can significantly increase GRSF Geographic / Stocks / and Stocks status coverage

Key Points (4) - elaboration



- ✕ GRSF will integrate the reference lists of stocks proposed by countries, and new stocks will be assigned a UUID to collate new and existing data via semi-automated workflow
- ✕ First-level quality assurance of questionnaires
 - ✕ Verify species, area, stock type
 - ✕ Facilitate reviews and updates
- ✕ UUIDs will be integrated into next questionnaires and distributed to countries
 - ✕ Stabilise countries' reference list of stocks; and
 - ✕ Streamline country reporting

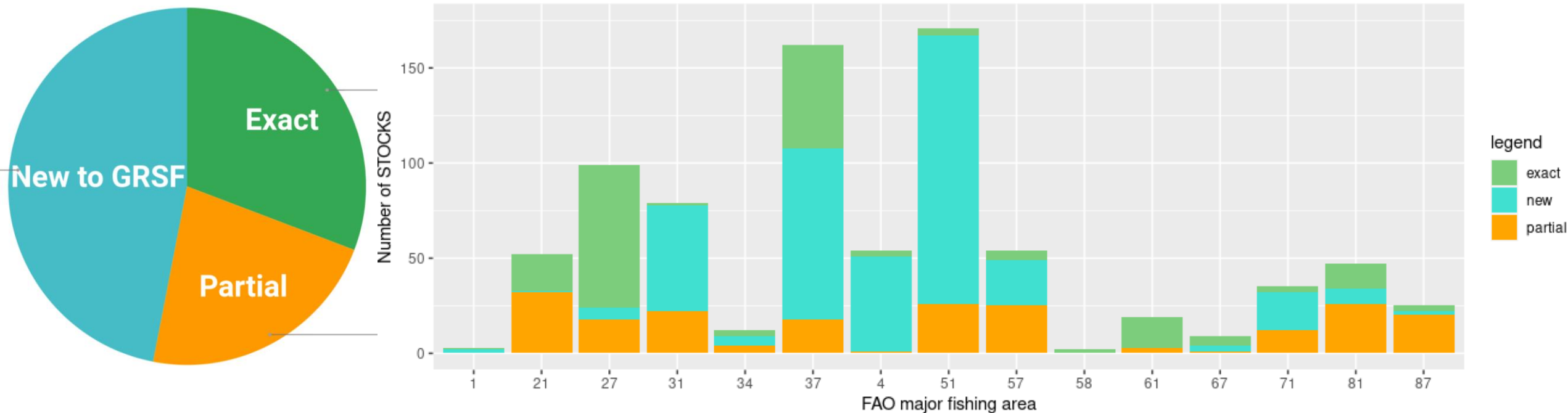
The UN SDG14.4.1 national questionnaires ...

Key Points (4) - elaboration

Prospects from the integration of new data source from national SDG14.4.1 questionnaires

- While GRSF coverage is good, SDG stocks can add important number of stocks and records
- GRSF will grow with new records from countries, available for consideration in the global indicator

SDG stocks mapped to GRSF for 36 of the higher-quality questionnaires, i.e. 65% of stocks reported via



The UN SDG14.4.1 national questionnaires ...

Key Points (4) - recap

The SDG 14.4.1 national questionnaires represent a resource which can significantly increase GRSF Geographic / Stocks / and Stocks status coverage through:

- *Applying UUIDs for SDG14.4.1 sourced stocks enhance Quality Assurance contributing to stability of national reference stocks list, and to reduce the validation burden.*
- *SDG 14.4.1 Data dissemination policy: only UUIDs and key identity information will be published, while content/time dependent data remains confidential for use by FAO unless otherwise agreed to by countries.*

TWG recommendations on GRSF for FSC12

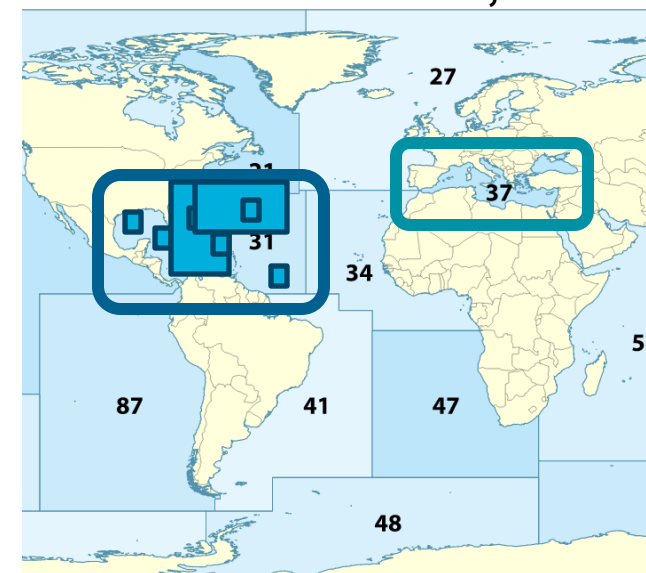
4. Recommendation to **continue working on the integration of SDG 14.4.1 data** into the GRSF.

Key Points (5)

Considering the respective strengths and weaknesses of GRSF and FishStat regarding coverage, granularity and timeliness, the TWG identified benefits of combining FishStat and GRSF records for global stock status analysis.



Pilot areas 31, 37



Key Points (5) - elaboration

FishStat has high global coverage of species by area and timely catch data

GRSF may complement FishStat by :

1) increased **granularity** available in GRSF relative to FishStatJ

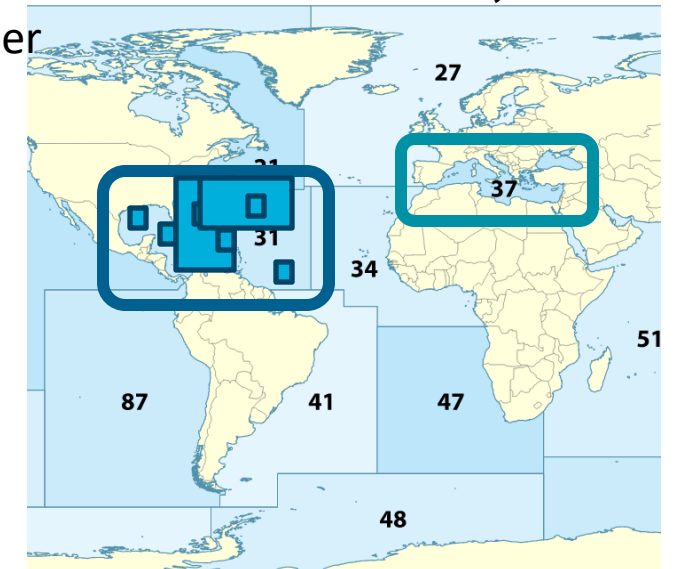
- GRSF data can map single-species records to higher-order taxonomic groups in FishStatJ; e.g. 9 different species in GRSF mapped to "Serranidae" in FishStat
- GRSF can add "new" species that are not currently reported in FishStat, e.g., In Area 31, GRSF has 34 species not found in FishStat
- GRSF records are at the assessment unit, and can map multiple assessment units per country or per FAO major fishing area (or subarea) relative to FishStat, e.g., In Area 37, GRSF has up to 16 UUIDs per species

2) GRSF can add other **time-dependent data** in addition to FishStatJ catch.

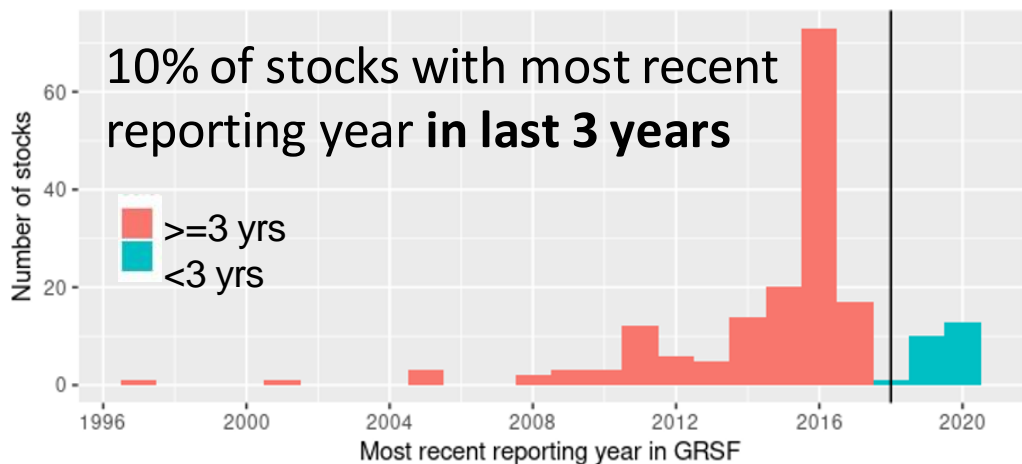
- e.g., 226/298 UUIDs for these areas have some time-dependent data, with utility of these data assessed for :
 - **timeliness** (data within last 5 years)
 - **duration** of time series (>25 years of data)



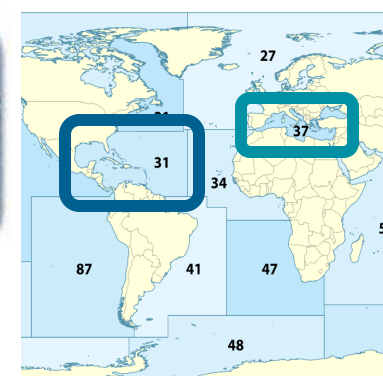
Pilot areas 31, 37



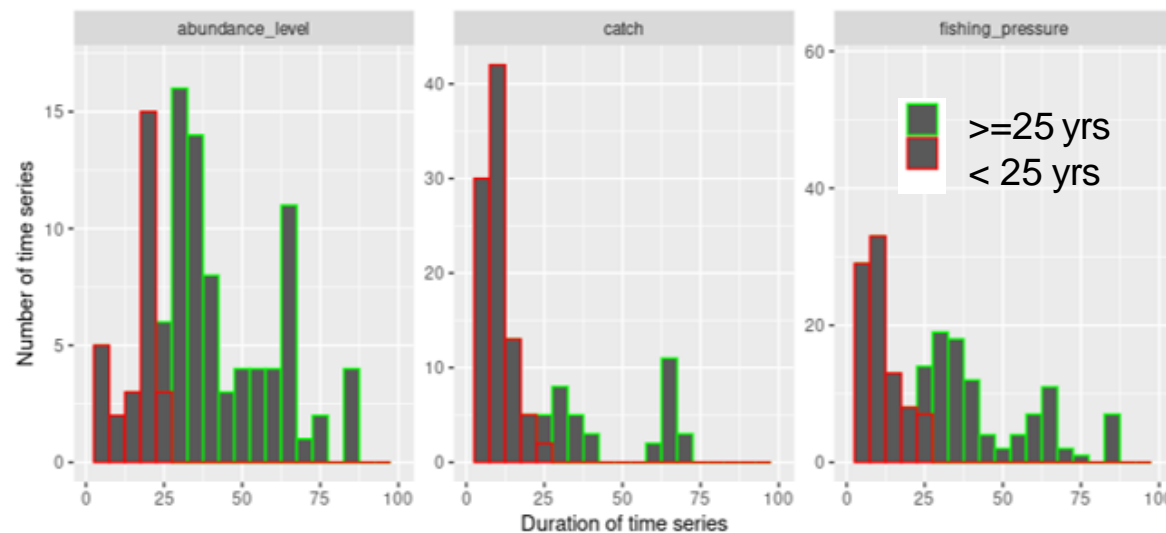
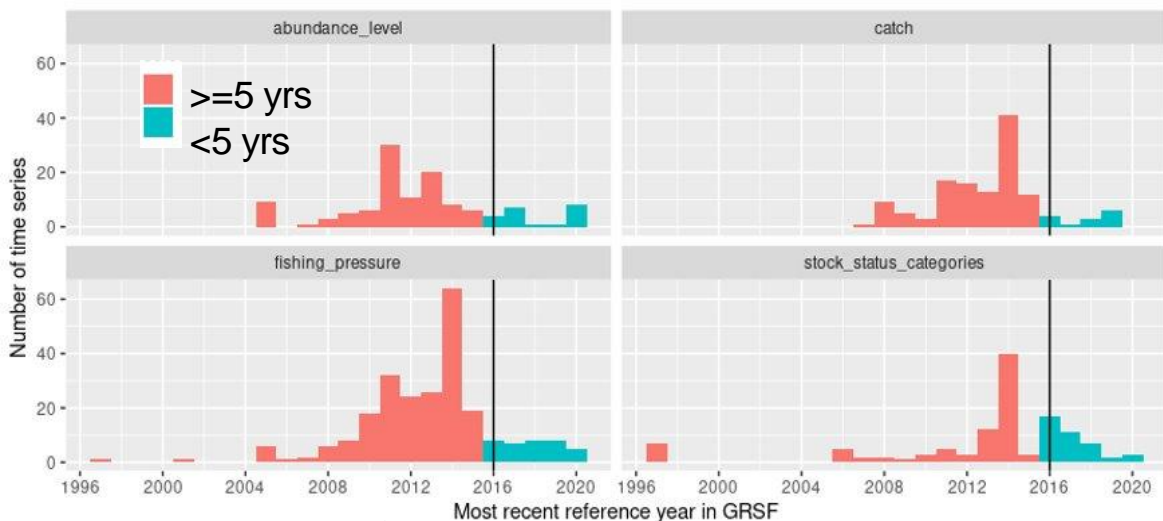
Timeliness of reporting



Pilot areas 31, 37



Length of time series



Between 11-17% of stocks with time series data, and 32% with stock status categories with reference years **within last 5 years**

Time series ≥ 25 years long : 62% abundance level, 26% catch, 40% fishing pressure

Key Points (5) - recap

Considering the respective strengths and weaknesses of GRSF and FishStat regarding coverage, granularity and timeliness, the TWG identified benefits of combining FishStat and GRSF records for global stock status analysis.

TWG recommendations on GRSF for FSC12

3. Recommendation to incorporate FishStat in GRSF and further investigate how FishStat - GRSF relationships can improve global stock status analysis.

(from the breakout groups)

- Identify reporting gaps on either FishStat or GRSF to improve complementarity with the addition and validation of new records to GRSF.
- A more detailed analysis on what the three data sources (FIRMS, FishSource, RAM) cover and how they complement FishStat
- Enhanced granularity with GRSF. Mapping at the level of 1:1 between FishStat and GRSF, to investigate percentage of catch is covered by the GRSF to determine how to raise finer-scale stocks in GRSF to larger-scale species-by-area and thus how to assign UUIDs to FishStat records.

Key Points (6)

Regarding the GRSF in support of Traceability, the need for a **refined and unambiguous concept of "Traceability unit" (TU)** was presented to the TWG, with "fishing area" broken down between "**Assessment area**" and "**Management area**". The TWG supports further elaboration of this new concept, noting:

- A workflow generating TUs can build on the existing GRSF data model (Assessment Units and Fishing units), while validation of TUs (including the new Management area field) will be performed by traceability business partners.

ASSESSMENT UNIT	MANAGEMENT UNIT	FLAG COUNTRY	FISHING GEAR
		France	Set gillnets (anchored)
		Portugal	Bottom trawls
1. European hake	NE Atlantic southern stock	Spain	Bottom trawls
			Longlines
			Set gillnets (anchored)

Required improvements on standards – New concept/definitions - Traceability units

Seafood industry actively requiring an ID to identify fisheries:

- Identification of their sources throughout supply chain
- Support evaluations of sustainability

To meet this requirement, **3 main needs** in relation to fishing units:

1. Fishery linked to a single stock record
2. Define management units via “management or reporting areas” instead of “fishing areas”
3. Resolve how to identify the Marine Resource type of Stock record - where no assessment is conducted

The proposed **Traceability Unit** semantic ID is structured as follows:

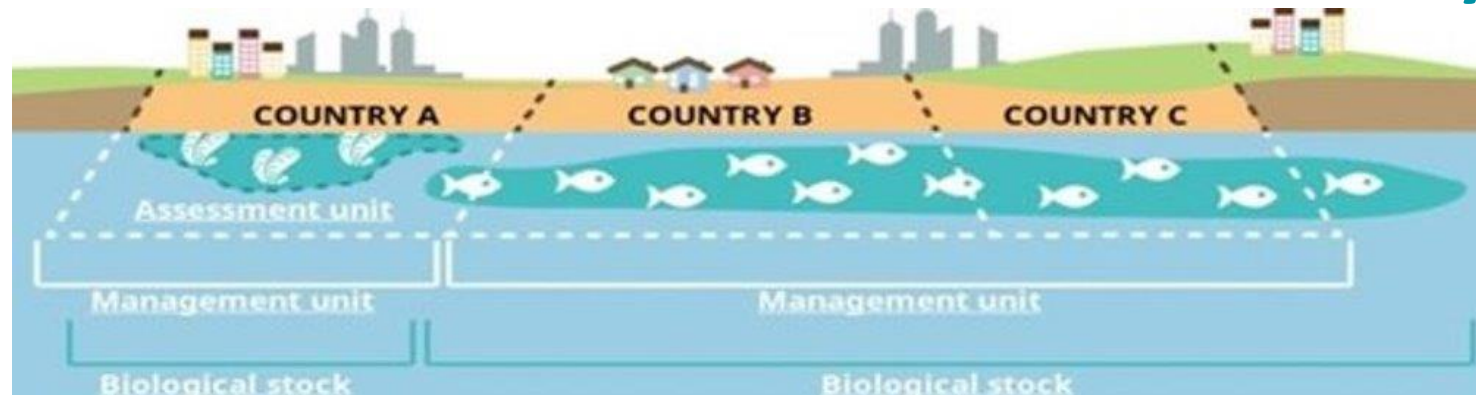
<Species> + <Assessment Area(s)> + <Management or Reporting Area(s)> + <Management Authority(ies)> + <Gear type> + <Flag State>

Example of a semantic ID:

asfis:**HAD** + FAO: **27.4, 27.6.a, 27.3.a.20** + eu: **HAD/5BC6A** + authority: int:**EC, NEAFC** + isscfg:**OTB** + iso3:**ESP**

Further enhancement considered by the TWG

Key Points (6) - elaboration



- Assessment unit : **Species + Assessment Area**
- Management unit : **Species + Management Area**
- Other, e.g. marine resource, biological stock : **Species + other area definition**

Assessment area – geographical delineation/boundary for the area over which the stock is assessed.

Geographic boundaries based on – Statistical areas, ecological areas such as LMEs or ecoregions, ICES functional units

Management area – geographical delineation/boundary for the area where specific management measures apply

Boundaries based on – RFB competence areas, Jurisdictional areas, species specific management areas, such as for ICCAT.

Management Unit Original: “The area where the fish was caught and which is targeted by a unique set of measures. This unit (i.e. one - or more - species in a particular area) has generally been defined at regional, national or local scale by a management authority including through stakeholder consultation.”

Note: Management units may be used for setting the basis for stock status determination, and may not correspond to the biological stock.

Management Unit Proposed: “*A group of individuals of one (or more) species in an area* where the fish were caught and which is targeted by a unique set of measures. This unit ~~(i.e. one or more species in a particular area)~~ has generally been defined at regional, national or local scale *and includes information of the management authorities that set the measure* including through stakeholder consultation.”

Note: Management units may be used for setting the basis for stock status determination, and may not correspond to the biological stock.

Key Points (6) - recap

*Regarding the GRSF in support of Traceability, the **need for a refined and unambiguous concept of "Traceability unit" (TU)** was presented to the TWG, with "**fishing area**" broken down between "**Assessment area**" and "**Management area**". The TWG supports further elaboration of this new concept, noting*

- *A workflow generating TUs can build on the existing GRSF data model (Assessment Units and Fishing units), while validation of TUs (including the new Management area field) will be performed by traceability business partners.*

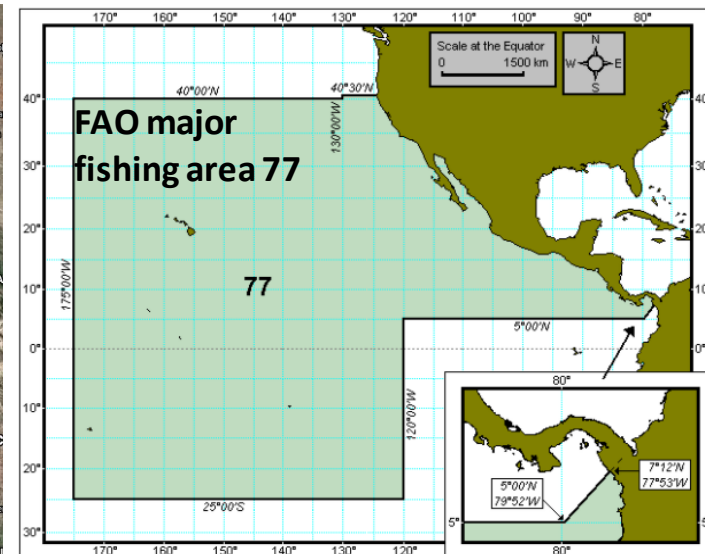
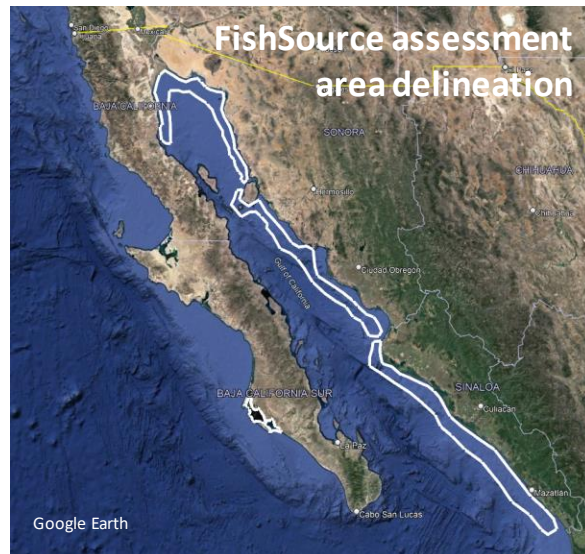
TWG recommendations on GRSF for FSC12

6. Recommendation to **review** the proposed **Traceability Unit** standard in conjunction with the planned revision of the SDG questionnaire.



Key Points (7-8)

- GRSF faces the lack of globally accepted geographic standards for the stocks identified at national levels, in particular concerning countries with extensive EEZs or with more advanced management strategies.
- The Stocks pending approval, the integration of national questionnaires, and the proposed traceability units, will greatly benefit from developing approaches and of geospatial data.



Required improvements on standards - geographic resolution of records

Example of lack of area standards:

Mexico Gulf of California shrimp:

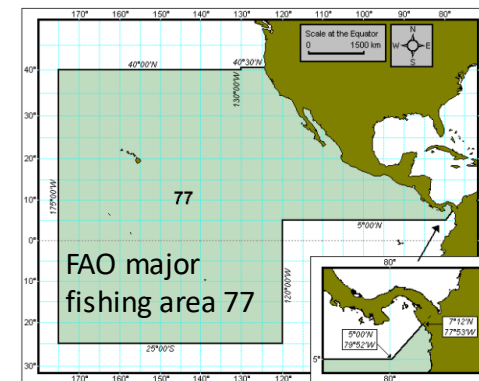
- **Three different species, assessed by state**
- Blue shrimp: 4 AUs: Sonora, Sinaloa-Nayarit, Upper GoC, Bahía Magdalena

Partial potential solution:

- Similar to EEZ which defines regional/state waters by ISO 3166 alpha-3 country code
- ISO 3166-2 defines subdivision codes, e.g., MX-SON, MX-SIN, which could be used to define state waters

Full solution: locating and compiling nationally/regionally defined areas!

- In FishSource, all were defined as within “FAO 77”
- Defining uniqueness by areas is setting a higher standard



Key Points (7-8) - recap

- *GRSF faces the lack of globally accepted geographic standards for the stocks identified at national levels, in particular concerning countries with extensive EEZs or with more advanced management strategies*
- *The stocks pending approval, the integration of national questionnaires, and the proposed traceability units, will greatly benefit from developing approaches and of geospatial data.*

TWG recommendations on GRSF for FSC12

5. Recommendation to develop approaches and standards for increased geospatial resolution.

Other Recommendations

8. Recommendation to **improve and simplify communication** and to **develop guidelines on GRSF data requirements and the streamlining flow to SOFIA**.

Such could take into account the levels of knowledge on stocks (including data poor situations) to improve guidance to partners on data priorities and to optimize the efficiency of reporting:

- a. The fields **CPUE, Effort** and **Length Frequencies** to be considered for addition in GRSF considering their particular interest if available in data poor situations.
- b. The **10 GRSF data fields to be regrouped into five main categories** (Stock status, Abundance, Fishing pressure, Catch/Landings) including a new category for Length data FIRMS Partners (and system) can work towards adapting their status reports to meet GRSF data requirements against these 5 main categories.

Time Dependent Indicators	Description	Data Provider		
		FIRMS	FishSource	RAM
Abundance (quantitative/qualitative descriptor, time series)	Biomass time series/reference points, CPUEs , FIRMS standard abundance level	✓	✓	✓
Fishing Pressure (quantitative/qualitative descriptor)	Fishing mortality time series/reference points, Effort , FIRMS standard exploitation rate	✓	✓	✓
Stock Status Categories (qualitative descriptor, narrative)	FAO categories, FIRMS standard descriptors, State and trends, scientific advice	✓		
Catches and Landings	Time series	✓	✓	✓
Length Frequencies	Time series			

Further enhancement considered by the TWG

Proposal for the Recommendation #8 (simplify the communication)

Proposed main data categories	Time-dependent indicators	Minimum reporting requirement		
		Main typologies		
		FIRMS Reports	RAM reports	SFP reports
Catch/Landings	Time series	Essential	Essential	Essential
Stock Status Categories	FAO categories or FIRMS standard descriptors	When mapped	Desirable	Desirable
	State and trends	Essential	Desirable	Essential
	Scientific advice	Essential	Desirable	Essential
Abundance	FIRMS standard abundance level	When mapped	Desirable	Desirable
	Biomass time series	Desirable	Essential	Essential
	Biomass reference points	Desirable	Essential	Essential
	CPUE	In cases where essential or desirable data are missing, when available (data poor context)		
Fishing Pressure	FIRMS standard exploitation rate	When mapped	Desirable	Desirable
	Fishing pressure time series	Desirable	Essential	Essential
	Fishing pressure reference points	Desirable	Essential	Essential
	Effort	In cases where essential or desirable data are missing, when available (data poor context)		
Length frequency	Time series	In cases where essential or desirable data are missing, when available (data poor context)		

Simplified communication via:

- grouping similar data types, which helps identify equivalences in level of knowledge on stock status across sources
- highlighting minimum data requirements for each typologies (at this stage, typologies correspond to data sources)
- noting potential contributions to aid in rapid assessment of data-limited stocks, when data are available

Legend
Essential
Desirable



Further enhancement considered by the TWG

Other recommendations

9. Recommendation that **FIRMS partners**:

- a. Work towards adapting their data reporting on stocks towards such revised GRSF data requirements/guidelines.
- b. Present their ideas for the use of GRSF.
- c. Reach out to countries on the use of UUIDs, including for SDG14.4.1 purposes.
- d. Provide any contribution to the increased geographic resolution.

10. Recommendation that **FIRMS Partners and collaborative Partners** present their intended GRSF Content/data use to FIRMS SC for review and approval.



Other recommendations

11. In terms of **reaching out**:

- a. Recommendation to well **clarify the concept of “Traceability unit”** for further discussions with stakeholders.
- b. Recommendation to **reach out to external collaborators such as MSC who if using UUIDs can bring more knowledge on stock status** including in data limited situations.
- c. Welcomes the **implementation of pilot field projects by FIRMS Partners** for testing the use of GRSF UUIDs for traceability purpose along the value chain, so to inform on stakeholders and countries feedback on the matter.

12. Recommendation that **tailored training approaches** be developed on GRSF including one-to-one meetings or workshops to better communicate on possible GRSF benefits according to the capacities of various partners.

Recap on the TWG recommendations on GRSF for FSC12

1. Note that **classifications of FIRMS stock** as Biological, Assessment or Management Units is on-going and will require inputs or validations from FIRMS partners.
2. Recognition of the importance of the **timely submission** of updated stock status and fishery reports.
3. Recommendation to **enable FishStat in GRSF and further investigate how FishStat - GRSF relations** can improve global stock status analysis.
4. Recommendation to **continue working on the integration of SDG 14.4.1 data** into the GRSF.
5. Recommendation to **develop approaches and standards for increased geospatial resolution**.
6. Recommendation to **review the proposed Traceability Unit standard** in conjunction with the planned revision of the SDG questionnaire.
7. Recommendation that GRSF data providers consider how to best complement each other in order to optimize data collection efforts of the Partnership.
8. Recommendation to **improve and simplify communication and to develop guidelines on GRSF data requirements and the streamlining flow** to SOFIA. Such could take into account the levels of knowledge on stocks (including data poor situations) to improve guidance to partners on data priorities and to optimize the efficiency of reporting:
 - a) The **fields CPUE, Effort and Length Frequencies to be considered for addition in GRSF** considering their particular interest if available in data poor situations.
 - b) The **10 GRSF data fields to be regrouped into five main categories** (Stock status, Abundance, Fishing pressure, Catch/Landings) including a new category for Length data FIRMS Partners (and system) can work towards adapting their status reports to meet GRSF data requirements against these 5 main categories.

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12. Recommendation that **tailored training** approaches be developed on GRSF including one-to-one meetings or workshops to better communicate on possible GRSF benefits according to the capacities of various partners.

Additional suggested recommendation from Secretariat, for consideration

13. Capacity building in data poor situations

Recognizing the **contrasting capacities to participate** for the different members, consider the best ways to mobilize capacities and resources in data poor regions (e.g., South-Asia) in order to bring more data and information on stocks.

Such may include:

- building collaboration towards long-term improvements in **data collection** as a starting point towards improving reporting in the region
- creating an **online questionnaire** to assess how a FIRMS partner can work with FAO/FIRMS to report the stock status of some species by some “champion” countries whose national data collection have improved recently
- **identify and publish the research and/ or datasets** supporting evidence on status of fisheries and fishery resources

Additional suggested recommendation from Secretariat, for consideration

14. ad-interim Access and Use of GRSF data and Behavior of the GRSF system

1. Publicly available data – only approved records, including:

- Stock Identities (Stock name, UUID/Semantic Identifier, Location/map, and info on available data) - available via Web interfaces and services as data dumps
 - will include validated National SDG14.4.1 records
- Stock/Fishery status, ...? , on a record-by-record query basis (e.g. via QR code)
- UUIDs integrated in Partners or external Databases, disseminated as per these databases policies

2. Restricted Access area upon granting authorization to users

- Authorized users: all FIRMS Partners and Collaborative Partners (Ref. FIRMS FSC-TWG contacts)
- ... can access: time-dependent data from published sources available via Web interfaces and services as data dumps
 - National SDG14.4.1 time-dependent data only available to relevant FAO staff
- ... should indicate to FSC (through the FIRMS Secretariat) their intended use, deemed accepted in absence of FSC's objection within a month from Secretariat notification
- Other users can be authorized in absence of FSC objection after a month FSC has been notified of the user and intended use by the Secretariat





Discussions and Conclusions



- ✕ GRSF catalogue <https://i-marine.d4science.org/web/grsf/data-catalogue>
- ✕ GRSF map viewer <https://i-marine.d4science.org/web/grsf/map-viewer>
- ✕ Report on the e-TWG7 on the GRSF
https://www.fao.org/fileadmin/user_upload/faoweb/Fl_Meetings/FIRMS/FSC12/4e.pdf





Thank you ▪ Merci
Благодарю ▪ ¡Muchas gracias!
謝謝 ▪ شكرا

FIRMS-Secretariat@fao.org

