



FIRMS

FISHERIES AND RESOURCES MONITORING SYSTEM

Report of the e-TWG on the Global Tuna Atlas (GTA)

Related to Doc. FIRMS FSC12/2021/3e



FISH STOCK



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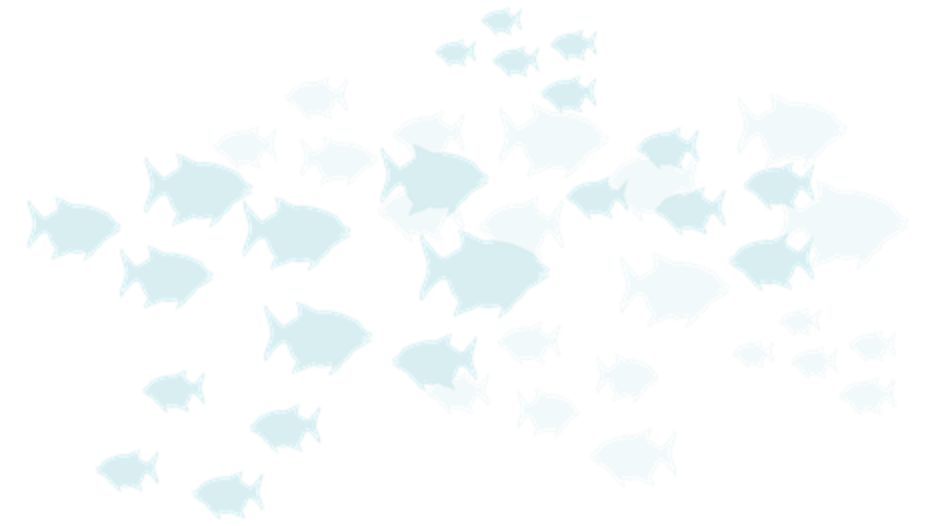


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Outline of this presentation

- i. Introduction to the FIRMS Global Tuna Atlas (GTA)
- ii. The TWG framework
- iii. GTA map viewer and metadata catalogue | **live demo**
- iv. Consolidated recommendations to the FIRMS SC
- v. Additional recommendations from the core group
- vi. Acknowledgements
- vii. Q & A



Introduction to the FIRMS Global Tuna Atlas (GTA)



Reasons for a *global* atlas of tuna fisheries

- monitor **fishing capacity** and effort;
 - identify changes in **fishery strategies** (e.g., changes in FAD usage);
 - detect **common patterns** across oceans (e.g., temporal changes in nominal CPUEs);
 - quantify the **economic value** of tuna fisheries;
 - explore **global management scenarios** (e.g., closure of the high seas);
 - address **ecological questions** (e.g., contraction of tuna distribution in relation with the reduction in abundance);
 - understand **habitat preferences** of pelagic populations and communities;
 - analyse the effects of **climate change**.
-
- **[SPOILER ALERT]** “[World Global Tuna fisheries](#)” is by far the most frequently accessed landing page of the FIRMS website (beside the home page, see [FIRMS FSC12/2021/Inf.7](#))

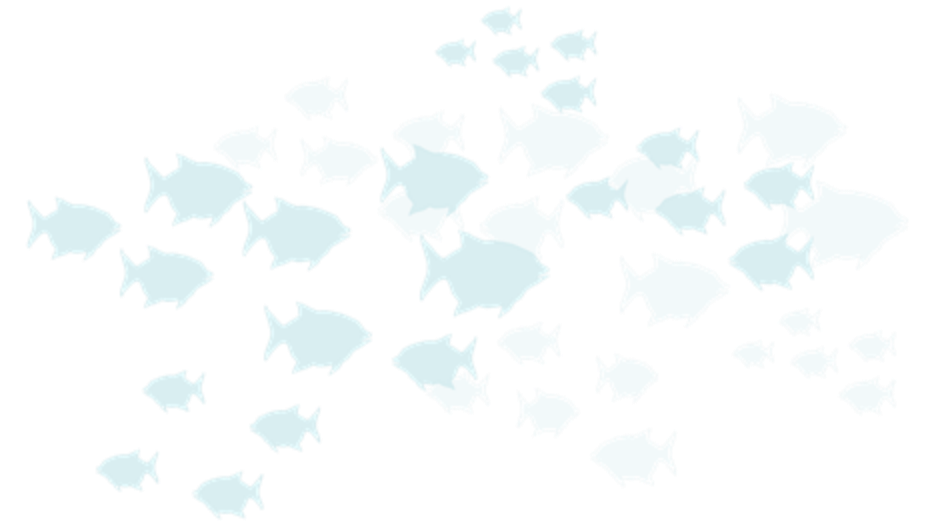
Introduction to the FIRMS Global Tuna Atlas (GTA)

A bit of history of previous (and current) attempts:

- **Atlas of tropical tuna fisheries**, A. Fonteneau, IRD (1997)
- **SARDARA**, A. Fonteneau et al., IRD (2001)
- **FAO Tuna Atlas**, F. Carocci et al., FAO (2005)
- **Global harmonized database for tuna fisheries**, P. Taconet et al., IRD, FAO (2015)
- **BlueBridge Tuna Atlas**, IRD, FAO, CNR + BlueBridge consortium (2018)
- **FIRMS Global Tuna Atlas**, FAO / FIRMS (2019)

The objectives of the FIRMS Global Tuna Atlas

- Renew FAO offering in terms of **data sets and services for tuna fisheries**;
- Involve t-RFMOs in the **harmonization process** (together with other WGs);
- Create partnership between institutions to **maximize return and reduce duplications**;
- Leverage metadata to improve **visibility** and **transparency** of data processes;
- Facilitate use of **global datasets** by user communities;
- Improve **recognition of t-RFMOs** as data providers.



The TWG framework



The TWG framework

The **FIRMS Global Tuna Atlas TWG** was established by the FSC11 in 2019

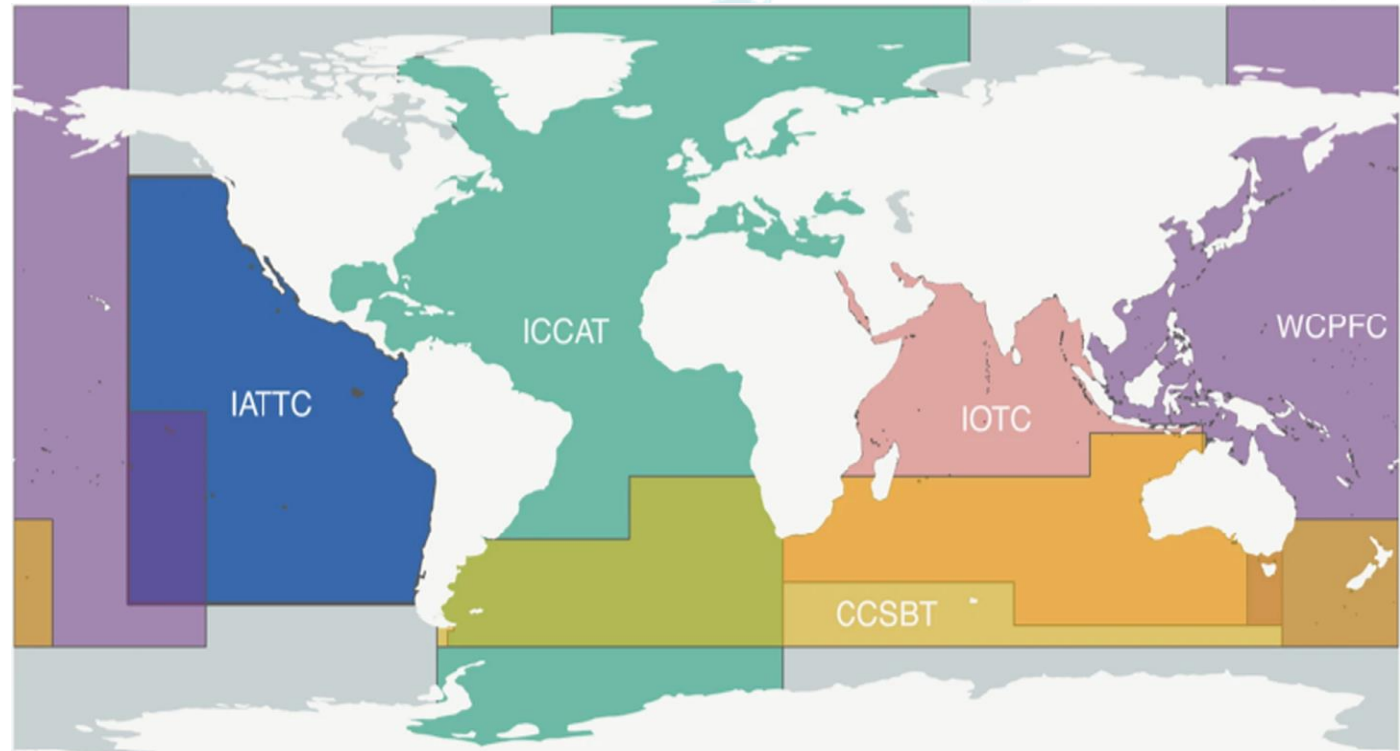
Core group members:

- J. Barde (**IRD**, Data scientist and IRD tuna atlas lead)
- E. Blondel (**FAO / FIRMS**, Geographic Information Systems expert)
- A. Charef (**FAO**, Fishery statistician and CWP TG Ref. Harm. lead)
- F. Fiorellato (**FAO / IOTC**, Coordinator)
- A. Gentile (**FAO / FIRMS**, Information Manager)

The TWG framework

Contribution from t-RFMO data managers (FIRMS **partners** and *observers*)

- **CCSBT** (C. Millar)
- **IATTC** (S. Caillot, N. Vogel)
- **ICCAT** (C. Palma, C. Mayor)
- **IOTC** (F. Fiorellato, E. Chassot)
- **WCPFC** (T. Jones, P. Williams)



The TWG framework | activities

- The first (remote) session of the TWG was convened in February 2021;
- Two one-day sessions to help t-RFMOs data managers:
 - Familiarize with the **current state-of-the-art** of the GTA workflow;
 - **Verify consistency** of GTA data with original sources;
 - Collaboratively **review metadata**;
 - Initiate the **release process**.

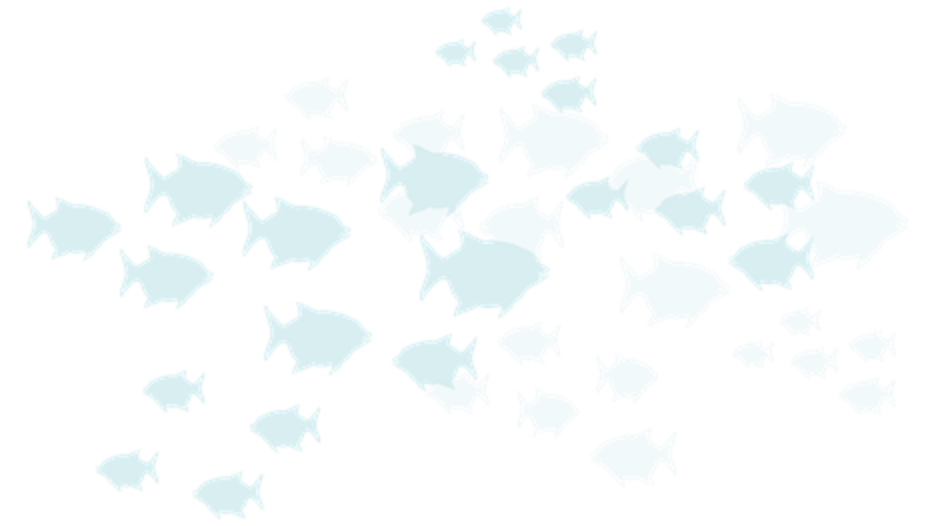
The TWG framework | activities

Several activities were carried on by the core group during the meeting, as well as in the intersessional periods before and after the TWG, including:

- Three major **data updates** (April + November 2020, July 2021);
- Formal description of harmonization steps taken to resolve **confidentiality issues**;
- Formal **endorsement** of the GTA harmonization workflow;
- Drafting of a **data exchange format** with a look at CWP reference harmonization;
- Agreement on progressive **transfer of responsibility** to t-RFMOs for the production of harmonized input data;
- Introduction of the ***Fishing fleet*** concept;
- Preparation for the release of the updated **Map Viewer** and **Metadata Catalogue**;
- Discussions on approaches to assign **DOIs** to the main datasets.

Current state-of-the-art

- ISO-compliant metadata;
- Consistent use of CWP reference codes (CWP grids, ISSCFG, ASFIS);
- Fully reproducible R-based data harmonization workflow;
- Four global datasets under management of the FIRMS Global Tuna Atlas (FIRMS *level 0*):
 - [Global annual catch of tuna and tuna-like species](#)
 - [Global monthly catch of tuna and tuna-like species aggregated by 1x1 or 5x5 degrees statistical squares](#)
 - [Global monthly catch of tuna and tuna-like species aggregated by 5x5 degrees statistical squares](#)
 - [Global monthly catch of tuna and tuna-like species from surface fisheries, aggregated by 1x1 degrees statistical squares](#)
- Interactive [map viewer application](#) and [metadata catalogue](#) hosted by the d4science infrastructure.

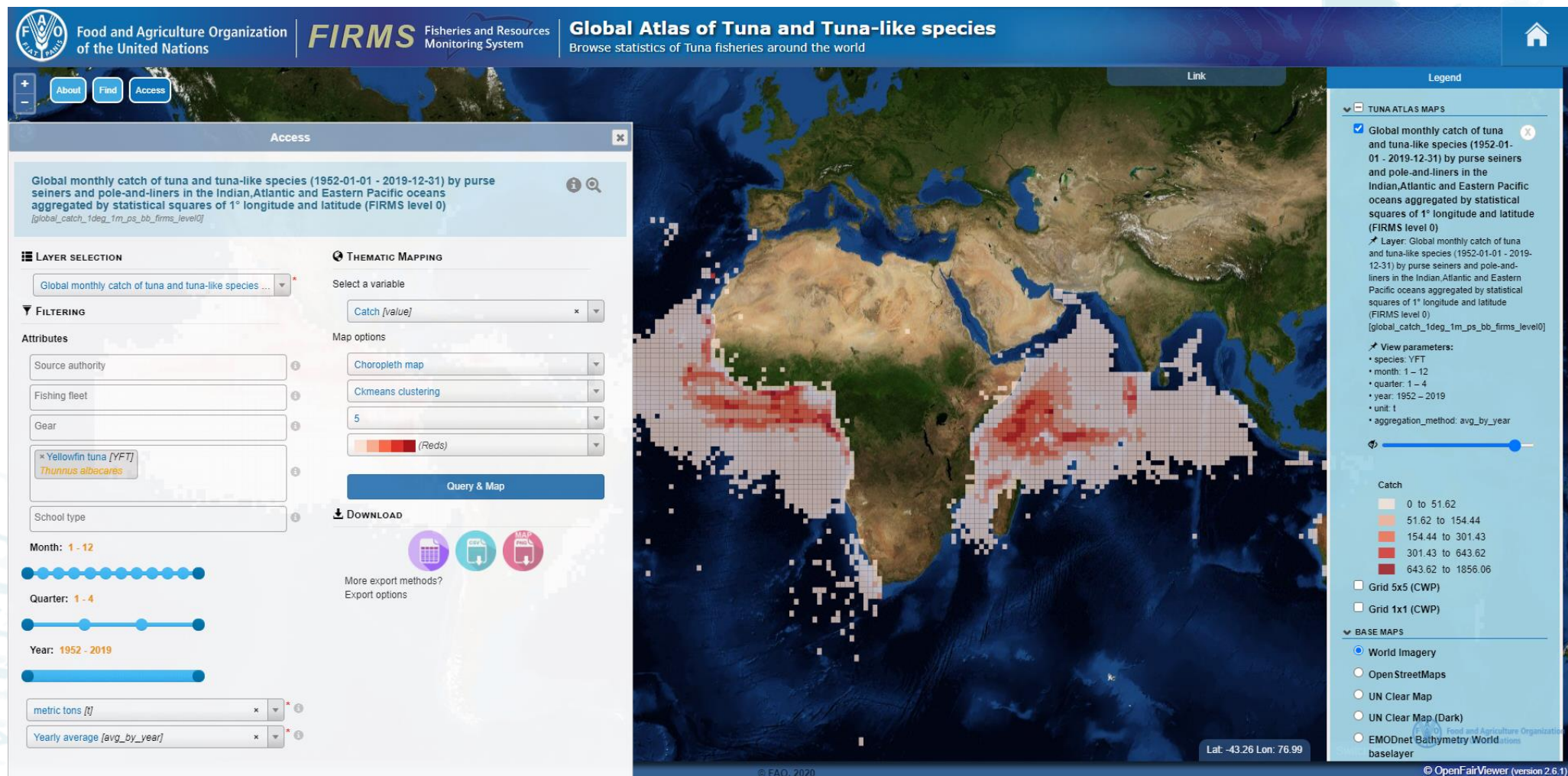


Current state-of-the-art | **Live demonstration**



The TWG framework | outputs

Current state-of-the-art – live demonstration | Map Viewer



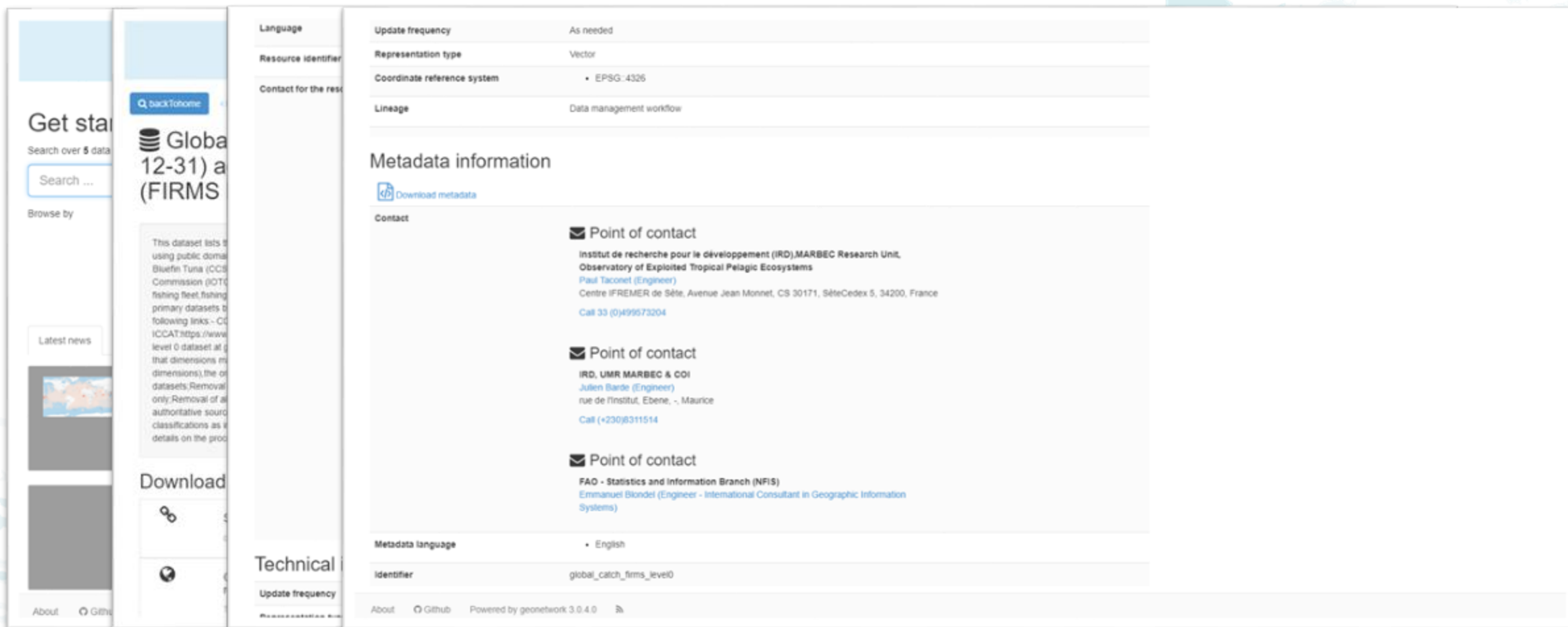
The screenshot displays the FIRMS (Fisheries and Resources Monitoring System) Global Atlas of Tuna and Tuna-like species interface. The main map shows a global view with a grid overlay, highlighting tuna catch data in the Indian, Atlantic, and Eastern Pacific oceans. The interface includes several control panels:

- Access Panel:** Contains the title "Global monthly catch of tuna and tuna-like species (1952-01-01 - 2019-12-31) by purse seiners and pole-and-liners in the Indian, Atlantic and Eastern Pacific oceans aggregated by statistical squares of 1° longitude and latitude (FIRMS level 0)".
- LAYER SELECTION:** A dropdown menu is set to "Global monthly catch of tuna and tuna-like species ...".
- FILTERING:** Includes input fields for "Source authority", "Fishing fleet", "Gear", "School type", "Month: 1 - 12", "Quarter: 1 - 4", and "Year: 1952 - 2019". A specific filter for "Yellowfin tuna [YFT] *Thunnus albacares*" is active.
- THEMATIC MAPPING:** Features a "Select a variable" dropdown set to "Catch [value]", "Map options" set to "Choropleth map", "Ckmeans clustering", and a grid size of "5". A color scale legend for "Reds" is visible.
- DOWNLOAD:** Includes icons for CSV, PDF, and MAP, along with "More export methods?" and "Export options".
- Legend:** Titled "TUNA ATLAS MAPS", it lists the selected layer and view parameters: species: YFT, month: 1 - 12, quarter: 1 - 4, year: 1952 - 2019, unit: t, and aggregation_method: avg_by_year. A color scale for "Catch" is provided with ranges: 0 to 51.62, 51.62 to 154.44, 154.44 to 301.43, 301.43 to 643.62, and 643.62 to 1856.06. Grid options for 5x5 (CWP) and 1x1 (CWP) are also shown.
- BASE MAPS:** Includes options for "World Imagery" (selected), "OpenStreetMaps", "UN Clear Map", "UN Clear Map (Dark)", and "EMODnet Bathymetry World baselayer".

At the bottom right, the coordinates "Lat: -43.26 Lon: 76.99" are displayed. The footer includes "© FAO, 2020" and "© OpenFairViewer (version 2.6.1)".

The TWG framework | outputs

Current state-of-the-art – live demonstration | Metadata Catalogue



The screenshot displays a web interface for a metadata catalogue. On the left, there is a sidebar with a search bar, a 'Get started' section, and a 'Browse by' section. The main content area shows a search result for 'Global (12-31) a (FIRMS)'. Below the search result, there is a 'Download' section with icons for various file formats. The right side of the interface shows the 'Metadata information' for the selected dataset, including technical details and contact information.

Property	Value
Language	As needed
Update frequency	As needed
Representation type	Vector
Coordinate reference system	• EPSG:4326
Lineage	Data management workflow
Metadata language	• English
Identifier	global_catch_firms_level0

Metadata information

[Download metadata](#)

Contact

- Point of contact**
 Institut de recherche pour le développement (IRD), MARBEC Research Unit,
 Observatory of Exploited Tropical Pelagic Ecosystems
 Paul Taconet (Engineer)
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- Point of contact**
 FAO - Statistics and Information Branch (NFIS)
 Emmanuel Blondel (Engineer - International Consultant in Geographic Information Systems)

Technical details: Update frequency, Identifier, Metadata language.

Footer: About, GitHub, Powered by geonetwork 3.0.4.0

The TWG framework | outputs

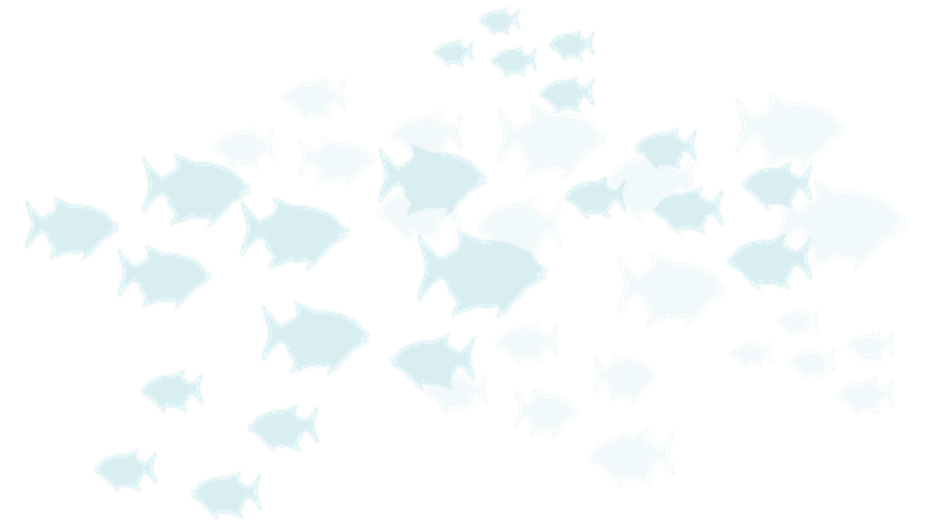
Current state-of-the-art – **live demonstration**

- **Map Viewer:**

<https://tunaatlas.d4science.org/faotunaatlas>

- **Metadata Catalogue:**

<https://tunaatlas.d4science.org/geonetwork>



Consolidated recommendations of the March plenary session of the TWG to the FSC



Consolidated recommendations to the FSC

- **Recommendation #1** (para. 11 of the TWG report):

*(...) in consultation with the t-RFMOs data manager, the group **RECOMMENDED** that the **data format adopted internally** by the Global Tuna Atlas (and consisting of a data structure definition, a series of pre-agreed concepts and a container format for digital data exchange) **be adopted in the ad-interim period as the standard of choice for future updates to the Atlas** and **RECALLED** that this might be superseded by a CWP-endorsed standard with a comparable purpose, once this is finalized and released.*

Consolidated recommendations to the FSC

Draft Data Structure Definition (DSD)

Column	Type	Definition	Target values
fishingfleet	string	Code of the fishing fleet	ISO3 code (uppercase), extended with ad hoc codes decided within the Tuna atlas working group.
gear	string	Code of the fishing gear	ISSCFG code
time_start	string	ISO 8601 format (YYYY-MM-DD)	Value should be lower than time_end
time_end	string	ISO 8601 format (YYYY-MM-DD)	Value should be greater than time_start
geographic_identifier	string	Code identifying the georeferencing unit	For gridded catches, use the CWP grid code
schooltype	string	Code of the school type	Values used in the Tuna atlas school type codelist .
species	string	Code of the species	ASFIS codes
catchtype	string		For catches, this can be used to store the type of catch values used in the Tuna atlas catchtype codelist . NA if not applicable
measurement_value	number	Measured value	
measurement_unit	string	Code of the unit	Values authorized are: <ul style="list-style-type: none"> for catches: “t” (Metric tons), “no” (Number of fishes) - until a full unit harmonization is operated for effort: use of Tuna atlas effort codelist
measurement_obs	string	Value observations	Best practice in statistical series handling, required in case notes must be set for specific series values (e.g., estimation / assumption made)

Consolidated recommendations to the FSC

- **Recommendation #2** (para. 21 of the TWG report):

(...) **CONSIDERING** the positive implications that this approach will have in terms of added **discoverability** and increased **interoperability of the Global Tuna Atlas datasets**, the group strongly **RECOMMENDED** that these are assigned a unique **Digital Object Identifier (DOI)**.

The DOI system (ISO 26324): <https://www.doi.org/>

Consolidated recommendations to the FSC

- **Recommendation #3** (para. 25 of the TWG report):

*(...) The group **ACKNOWLEDGED** that additional steps are still required to reach the **publication stage** of the updated Global Tuna Atlas datasets in the shortest time possible (considering the respective workload of all involved stakeholders) and **RECOMMENDED** to target end-April 2021 as the **deadline for the publication of the FIRMS Tuna Atlas map viewer** (FIRMS Level 0 datasets), pending the finalization of all remaining tasks that still require contribution from the t-RFMOs and / or the FIRMS Secretariat.*

Consolidated recommendations to the FSC

- **Recommendation #4** (para. 26 of the TWG report):

*(...) The group also **AGREED** to postpone all remaining matters of discussion to future meetings, and for this reason **RECOMMENDED** that important aspects not yet fully covered during this e-TWG such as the **finalization of a general-purpose data exchange standard** and the **formalization of additional concepts and dimensions** are discussed at the 27th session of the CWP (Q4 2021 (...))*

Consolidated recommendations to the FSC

- **Recommendation #4** (para. 26 of the TWG report, **continued**):

*(...) while all other aspects related to a long-term plan for the **sustainable management** of the Global Tuna Atlas, including the agreement on **future data update schedule**, the support to the **production of Level 1 and Level 2 datasets** as well as the incorporation of major **changes to the workflow and the data collation process** are deferred until the 12th session of the FIRMS Steering Committee (Q4 2021).*

Consolidated recommendations to the FSC

- **Recommendation #5** (para. 35 of the TWG report):

*(...) the group **RECOMMENDED** that the term “**Fishing fleet**” be adopted in all future documents, reports and dissemination tools related to the FAO / FIRMS Global Tuna Atlas, and that this concept is used to represent the “fleets” for which reported catches of tuna and tuna-like species exist in any of the t-RFMO, **NOTING** that the occurrences of the “Fishing fleet” concept do not necessarily correspond to a recognized country (e.g.: EUR - European Union, NEI - not elsewhere identified), nor to a distinct member / contracting party / cooperating, non-contracting party of any t-RFMO (e.g.: EU,ESP - EU (Spain), NEI - not elsewhere identified).*

Consolidated recommendations to the FSC

Recommendation #5: TWG-endorsed definition of *Fishing Fleet*

- The final decision on the concept name was reached through a poll involving representatives (data managers) from the five t-RFMOs, in consultation with key focal points from each organization;

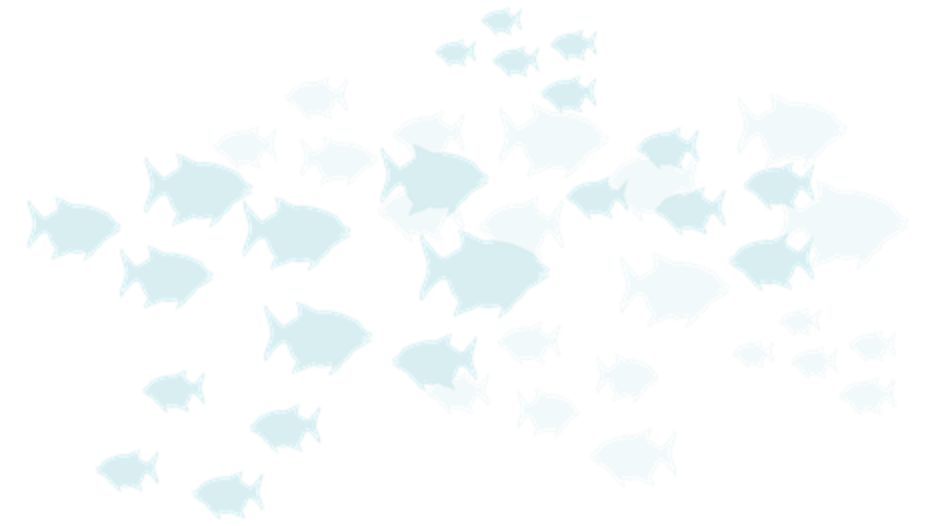
Concept name	Final score (higher is better)
Fishing fleet	11
Fishing entity	9
Reporting fleet	7
Reporting / fishing fleet	7
Entity	5
Contracting party / Cooperating non-contracting party	5
Fleet	3
Flag state	3
Member state	-2

Consolidated recommendations to the FSC

Recommendation #5: TWG-endorsed definition of *Fishing Fleet*

“Fishing fleet: a group of fishing vessels authorized to operate in a t-RFMO convention area (or area of competence), and whose fishing operations and catches of tuna and tuna-like species are responsibility of, and accounted for, by a political entity or sub-entity recognized by the corresponding t-RFMO.”

*“Actual occurrences of the Fishing fleet concept **do not necessarily refer or correspond to a recognized country** (e.g.: EUR - European Union, FRAT – French territories), **nor to a distinct member / contracting party / cooperating, non-contracting party of a t-RFMO** (e.g.: EU,ESP - EU (Spain), TWN – Chinese Taipei / Taiwan province of China – for some t-RFMOs)”*



Additional recommendations from the core group



Additional recommendations from the core group

1. To proceed with the **publication of the Map Viewer and Metadata Catalogue in the shortest time possible** (no later than 15/11/2021), by granting access to the four datasets and all related metadata aligned with FAO guidelines for statistical datasets;
2. To **approve the principle of annual updates**, following a data call by the FIRMS Secretariat (exact date to be agreed with t-RFMOs);
3. To **approve the publishing of DOIs for the GTA datasets in Zenodo**, while encouraging the FIRMS Secretariat to promote (within FAO) the development of appropriate organizational standards and policies for statistical datasets' DOIs;

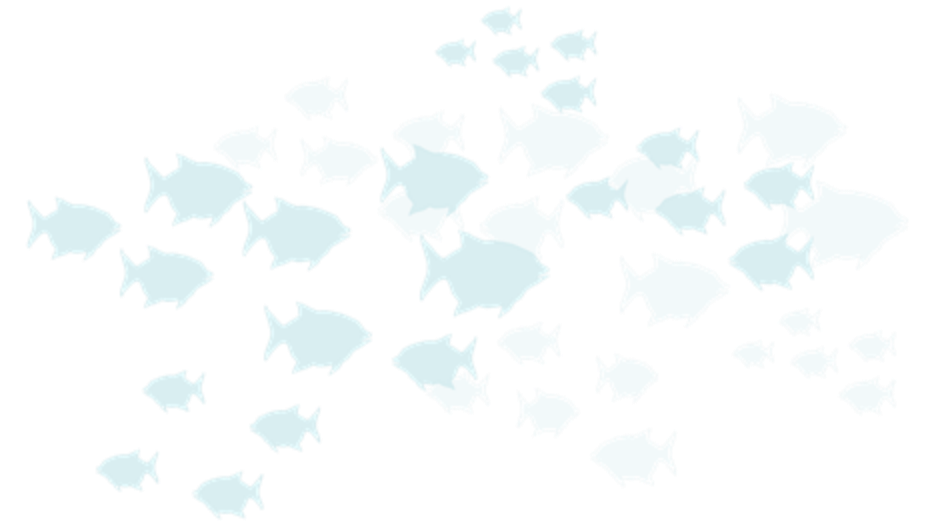
Additional recommendations from the core group

4. To **reconvene** the TWG with the mandate to evaluate the possibility of:
 - a) producing *t-RFMO endorsed Level 1 datasets* (data expressed both in weight and in numbers for the same stratum)

and optionally
 - b) to **support their development** in order to further increase the scientific value of the product and expand its reach.

Additional recommendations from the core group

5. To forward these additional requests to the CWP:
 - a) That the current definition adopted for the *Fishing fleet* concept, as well as its accompanying terminology and reference codelist, are **formally endorsed for use in the context of the Global Tuna Atlas**, and **considered for inclusion and harmonization** within future CWP data exchange formats;
 - b) That preliminary results regarding the **specifications of an exchange format** for the provision of catch data to the Global Tuna Atlas are **considered by the reference harmonization group** of the CWP when defining global / regional data exchange formats;
 - c) That t-RFMOs support improvements in the production of Level 1 and 2 datasets through the direct **provision of conversion factors** and / or raised georeferenced catches (estimated, when necessary) both in numbers and weight for the species of major interest.

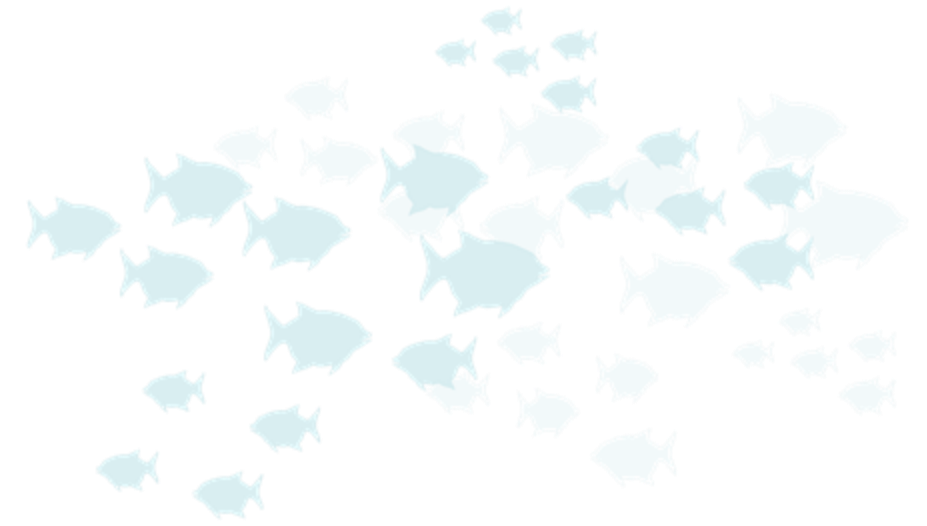


Summary of recommendations to the FSC



Summary of recommendations to the FSC

- Endorse the use of the *Fishing Fleet* concept (to be aligned with CWP)
- Assign **DOIs** to datasets (Zenodo)
- Publish the **map viewer** and **metadata catalogue** (ASAP)
- Adopt the **draft data exchange format** (continue collaboration with CWP)
- Agree on the future **update schedule** (annual FIRMS data calls)
- **Reconvene the TWG**
- Continue discussing **data exchange standards** and **additional concepts** (CWP)
- Support production of **Level 1 and Level 2 datasets** (conversion factors)



Acknowledgements



Acknowledgements

The TWG core group

- J. Barde (IRD)
- E. Blondel (FAO / FIRMS)
- A. Charef (FAO)
- F. Fiorellato (FAO / IOTC)
- A. Gentile (FAO / FIRMS)

NFI / FIRMS and partners

- M. Taconet
- J. Geehan
- Y. Laurent
- A. Nieblas
- IRD
- P. Taconet
- E. Chassot
- ISTI CNR
- d4Science
- iMarine
- BlueBridge consortium
- Blue-Cloud project

t-RFMOs

- CCSBT (C. Millar)
- IATTC (S. Caillot, N. Vogel)
- ICCAT (C. Palma, C. Mayor)
- IOTC (F. Fiorellato, E. Chassot)
- WCPFC (T. Jones, P. Williams)





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

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