

Vlab 5: Global Fisheries Atlas

IRD, FORTH, CNR and partners (FIRMS, FAO..)



Funded by
the European Union



- Description
- Vlab aim & methodology
- Data sources in brief
- Technical Requirements (for developers or end-users)
- Objectives & Work plan
- Appendix: Current status of the two Blue-Cloud VLabs
 - GRSF
 - Fisheries Atlas



- **Task 4.6, VLab 5:** Global Fisheries Atlas
- **Duration:** Jan 2023 (M1) – May 2026 (M42)
- **Partners:** IRD (Task Leader), FORTH, CNR
- **Main objective:** **Integration** of 2 connected fisheries data resources to improve the discovery, access and understanding of the state of stocks and fisheries worldwide
 - Global Record of Stocks and Fisheries (GRSF) for **knowledge** management
 - Fisheries Atlas (FA) for **data** management
- **Phases:**
 - *Year 1:* **inventory** of updated data sets and sources
 - *Year 2:* **implementation** of new services and workflows
 - *Year 3:* **publish** new datasets
 - *Year 4:* **disseminate** VLab results

Aim: merge **two existing Vlabs** inherited from Blue-Cloud project into a new **single Vlab** dedicated to fisheries for Blue-Cloud 2026, end products driven by the community of users (*e.g.* FIRMS and scientists needs)

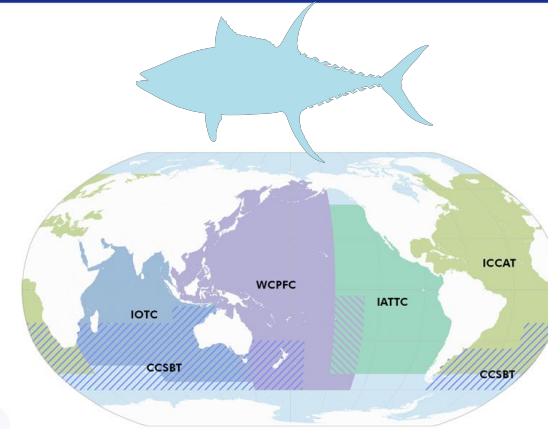
- [Fisheries Atlas VLab](#): **Data** management oriented
 - Standardization of (meta)data format and access protocols: compliance with CWP & OGC standards, DOIs assignment (data & code)
 - Time-series of biological or fisheries variables: catches, fishing efforts, size class, conversion factors (number to tons)..
- [GRSF VLab](#): **Knowledge** management oriented
 - Descriptive information of stock & fisheries records (species, areas, fishing gears, management authorities, etc.): semantic Web
 - Linked data: Time-series (i.e. catches, landings, abundance level, fishing pressure, etc.)

Methodology:

- two different workflows run separately to extract knowledge or data from different sources (2 runtime environments)
- new VLab **GUIs**: specifications for a new ergonomoy, step by step:
 - 2 Vlabs maintained side by side so far are imported in the same VLab => 1 new Vlab gathering all needed software components (not shared) with a common menu and specific sub-items
 - common software components are shared when possible
- new VLab **content**: link knowledge to data and data to knowledge
 - interest of the “tuna use case”: tuna and billfish are the major species for Fisheries Atlas and GRSF
 - Plugging workflows: create new GRSF competence queries as inputs of Fisheries Atlas workflow
 - GRSF URIs
 - added in Fisheries Atlas OGC metadata
 - added in fisheries datasets
 - “The VLabs will be extended to capture fisheries data and [environmental parameters](#) on a global scale.”

Coordination of data calls through FIRMS network:

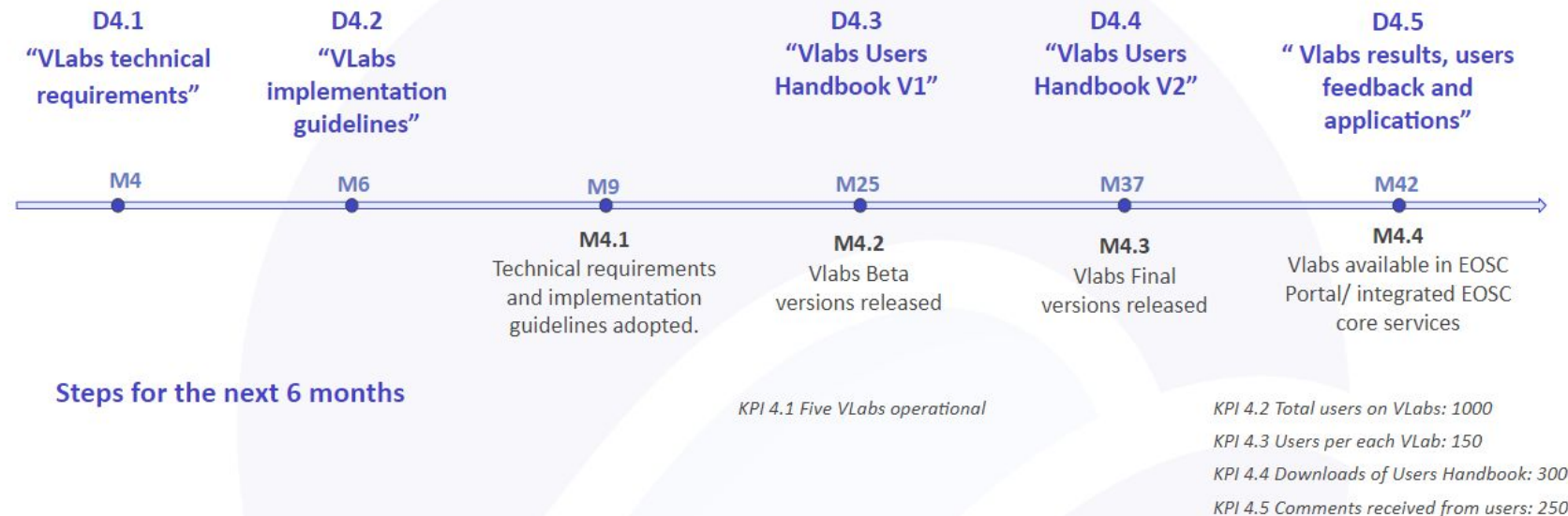
- [Fisheries Atlas VLab](#) workflow extracts data from multiple sources, *eg* Tuna fisheries:
 - **5 different data sources** for tuna fisheries (5 RFMOs: [IOTC](#), [ICCAT](#), [IATTC](#), [WCPFC](#), [CCSBT](#))
 - Different types of data:
 - **Aggregated data**: time series of biological or fisheries variables (catches & fishing effort, conversion factors / number to tons, size class..)
 - **High resolution data** (confidentiality issues to be discussed): tagging, AIS/VMS, fishing operations, Fish Aggregating Devices / FADs..
 - ETL workflow: heterogeneous data are transformed to comply with CWP standards for fisheries and disseminated with OGC (FAIR) services for spatial data.
- [Global Record of Stocks and Fisheries VLab](#) workflow extracts knowledge from **4 different sources** : [FIRMS](#), [Fishsource](#), [RAM legacy database](#), [FAO SDG14.4.1 Questionnaire](#)
 - Fact sheets: descriptive information of stock & fisheries records (species, areas, fishing gears, management authorities, etc.)
 - Linked data / time-series of catches, landings, abundance level, fishing pressure, etc.)



VLab Content	Fisheries Atlas	Global Record of Stocks and Fisheries
Programming language	R and geospatial libraries	Java
Data storage and access	RDBMS (Postgres), SQL queries and OGC Web Services	Semantic Web Triplestore, SPARQL GRSF Competency Queries (HTTP hosting) and GRSF-API (HTTP hosting)
Online IDE	RStudio, Jupyter	-
Runtime environment	<ul style="list-style-type: none"> - workflow can be executed on the VLab or PCs. - same environment / configuration wherever the script is executed (eg RStudio, Jupyter, Shiny servers should share the same core system or software (R) packages (declared in Docker images, conda env..) ? - Docker management => problem to access the results of workflows 	Data Miner
Applications	<ul style="list-style-type: none"> - Catalogs (CKAN and GeoNetwork) - SDI components: Map viewer (Open Fair Viewer), Postgis, GeoNetwork, GeoServer - Shiny apps (dockerized then deployed on ShinyProxy server) 	<ul style="list-style-type: none"> - Catalog (CKAN) - Map viewer (Open Fair Viewer)
Machine resources	> 32 GB RAM for RStudio, Postgres ?	-

VLab Content	Fisheries Atlas	Global Record of Stocks and Fisheries
GUIs / VLab ergonomoy	To be discussed with FAO and CNR (decision)	
Plan - methodology	<ol style="list-style-type: none"> 1. Create the VLab with all the necessary applications (some of them duplicated) 2. Merge similar applications 	
Dashboard for VLab content ?	<p>A public page in each VLab which summarizes what the Vlab is made of :</p> <ul style="list-style-type: none"> ○ machines resources : storage, RAM, CPU.. ○ Apps / software : RShiny, Postgres, Jupyter... ○ Users 	

Timeline to align Global Fisheries Atlas with: Beta version must be ready in M25



- M6** setup Global Atlas Fisheries VLab (merge GRSF & FA)
- M12** Identification of additional sources and new services
- M24** Beta release of VLab (interconnected GRSF-FA records)
- M36** VLab with extended data sources
- M42** VLab results disseminated to satisfy KPIs

- Keep the contents of fisheries data resources up to date
- **Year 1:** identify new datasets to include
 - (Tuna) fisheries dataset with new variables: conversion factors (number to tons), fishing efforts, size class,...
 - EOVs relevant to ecological modelling (WorkBench for ecosystem-level EOVs, for physics: temperature and salinity, for eutrophication: chlorophyll, nutrients, oxygen)
 - Biodiversity data
 - Well Known Data Sources (i.e. WoRMS, FishBase, etc. to improve searchability)
- **Year 2:** implementing new data services, enhancing ETL workflows based on the new data sources/datasets
- **Year 3:** semestral publication of new data (VLab + DOIs)
- **Year 4:** disseminate results including fisheries specific services related to EOVs.

Next slides give additional details about the current content of GRSF and Fisheries Atlas

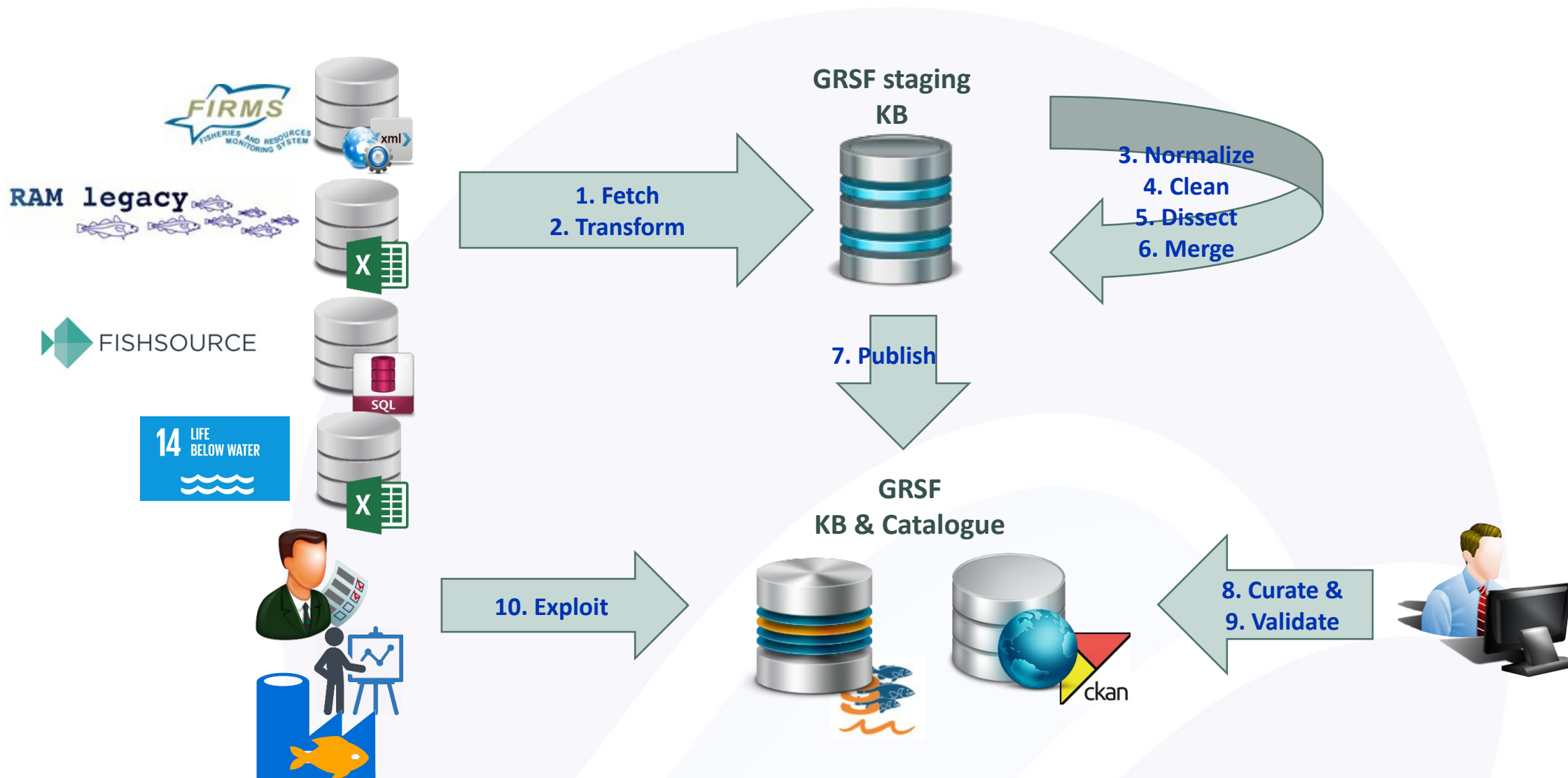
- Global Record of Stocks and Fisheries (GRSF)
- Fisheries Atlas (FA)

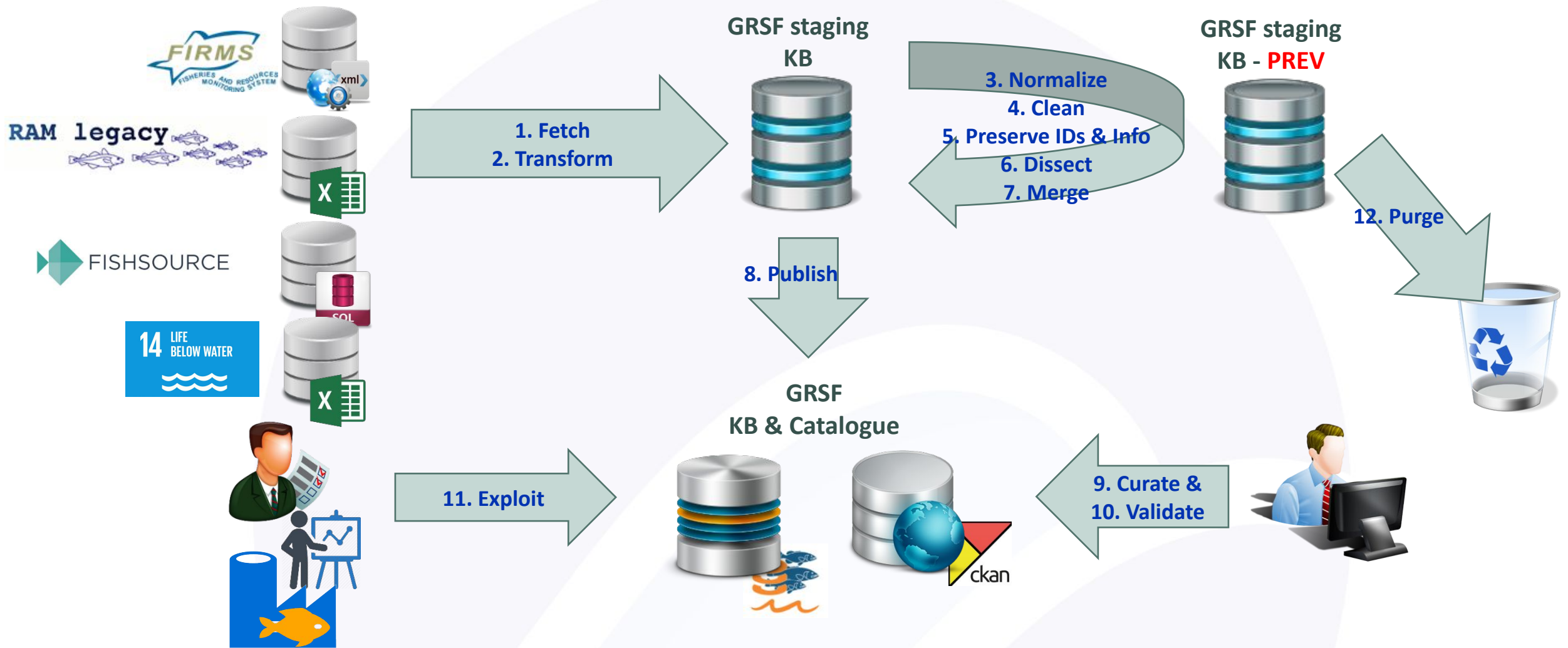
- Global Record of Stocks and Fisheries (GRSF)
 - For monitoring global stocks status (*SOFIA, FAO SDG 14.4.1, regional monitoring systems*)
 - To support traceability in the value chain
- Activity started in 2015


















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 Stocks	816	1,500	1,465	468	3,398
 Fisheries	297	-	4,036	0	14,708
 Species	783	386	599	281	1,258 (+40K)
 Water Areas	287	809	503	226	1,460 (+2K)
 Fishing Gears	39	-	70	0	87
 Flag States	96	-	126	0	153
 Management Authorities	39	-	138	0	268
 Timeseries	30,049	302,264	158,052	16	490,381
 Mergings	-	-	-	-	612
 Dissections	-	-	-	-	10,649 (February 2023)

- GRSF can be accessed through a VRE catalogue
- GRSF-API
- Competency Questions

Organisations / GRSF Admin / *Sebastes fasciatus* - ...

Sebastes fasciatus - 21.4.X - 21.4.W

Followers
0

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Organisation

GRSF Admin
The GRSF Admin VRE is the environment to manage GRSF records by authorized users. The approved and published records are available to public users in the GRSF VRE [read more](#)


License
Creative Commons Attribution Share-Alike 4.0

Record Groups

Sebastes fasciatus - 21.4.X - 21.4.W PRIVATE

Short Name: Acadian redfish - Scotian Shelf
GRSF Semantic Identifier: asfis:REN+fao:21.4.W:fao:21.4.X
Record URL: https://data.d4science.org/ctip/GRSF_Admin/5510fc9b-3a3c-30fb-aa2c-a2a389614daa

Dataset extent



Map data © OpenStreetMap contributors
Tiles by MapBox

Tags
Assessment Unit Code 21.4.W System fao Name 21.4.W
Code 21.4.X System fao Name 21.4.X

GRSF API ^{3.5.0}

[Base URL: <https://api.forth.gr/grsf-api/resources>]
[Base URL: <https://api.swaggerhub.com/apis/markgrsf-api/3.5.0/swagger.json>]

This is the API (Application Programming Interface) of the Global Record of Stocks and Fisheries
Contact Yannis Marketakis

Schemes
HTTP

default

GET	/getstock	Retrieves information about a particular stock record that exists in the GRSF KB, and has the given UUID.
GET	/getstocks	Retrieves information about GRSF stock records that exists in the GRSF KB, and match the given criteria
GET	/getfishery	Retrieves information about a particular fishery record that exists in the GRSF KB, with the given UUID
GET	/getfisheries	Retrieves information about GRSF fishery records that exists in the GRSF KB, and match the given criteria
GET	/getstockbasic	Retrieves some basic information about a stock record that exists in the GRSF KB, with the given UUID. Its purpose is to provide a generic view of the record.
GET	/getstocksbasic	Retrieves some basic information about stock records that exist in the GRSF KB, with the given criteria. Its purpose is to provide a generic view of the records.
GET	/getfisherybasic	Retrieves some basic information about a fishery record that exists in the GRSF KB, with the given UUID. Its purpose is to provide a generic view of the record.
GET	/getfisheriesbasic	Retrieves some basic information about fishery records that exist in the GRSF KB, with the given UUID. Its purpose is to provide a generic view of the records.
GET	/gettraceabilityunit	Retrieves information about GRSF traceability unit records that exists in the GRSF KB, and match the given UUID

GRSF Geospatial Queries

- G3.1 Get geographic information (polygons) for GRSF Stocks [🔗](#) [📄](#) SPARQL query
G3.2 Get geographic information (polygons) for GRSF Fisheries [🔗](#) [📄](#) SPARQL query

GRSF Summary Queries

- G4.1 [List GRSF Stock records with their original IDs](#) [🔗](#)
G4.2 List GRSF Fishery records with their original IDs [🔗](#)
G4.3 List GRSF Traceability Units with their referred GRSF records [🔗](#)

GRSF Resources Queries

G5.1	Species	🔗	codes	🔗	code types	🔗	names	🔗
G5.2	Assessment / Fishing Areas	🔗	codes	🔗	code types	🔗	names	🔗
G5.3	Fishing Gears	🔗	codes	🔗	code types	🔗	names	🔗
G5.4	Countries/Flag States	🔗	codes	🔗	code types	🔗	names	🔗
G5.5	Management Authorities	🔗	codes	🔗	names	🔗		
G5.6	FAO categories	🔗	values	🔗				
G5.7	Abundance Level - FIRMS standard	🔗	values	🔗				
G5.8	Fishing Pressure - FIRMS standard	🔗	values	🔗				
G5.9	Assessment Methods	🔗	values	🔗				

A publicly available SPARQL endpoint for the GRSF KB can be found [here](#)

- Fisheries Atlas
 - First focus on Tuna Atlas / Fisheries data
 - Fisheries / Biological variables : catch (tons / biomass), fishing efforts..
- Activity started in 2011

Nov'11

Sep'15

Oct'19

Jan'23

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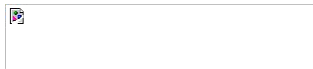
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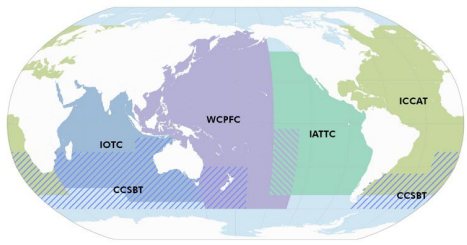
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- In partnership with


Food and Agriculture Organization
of the United Nations

Consiglio Nazionale
delle Ricerche




Tuna RFMOs areas of management



1
Collation
& Harmonization

2
Import & storing in SQL
database

3
Compute global datasets on
tuna fisheries

Global datasets on tuna
fisheries



4
Extraction and data services
for easy exploitation



Discover available data
*Which datasets exist?
How they were built?*



Access the data and code
How to access the data?



Process the data
How to create own tuna atlas?



Visualize the data
How to easily create maps, plots?

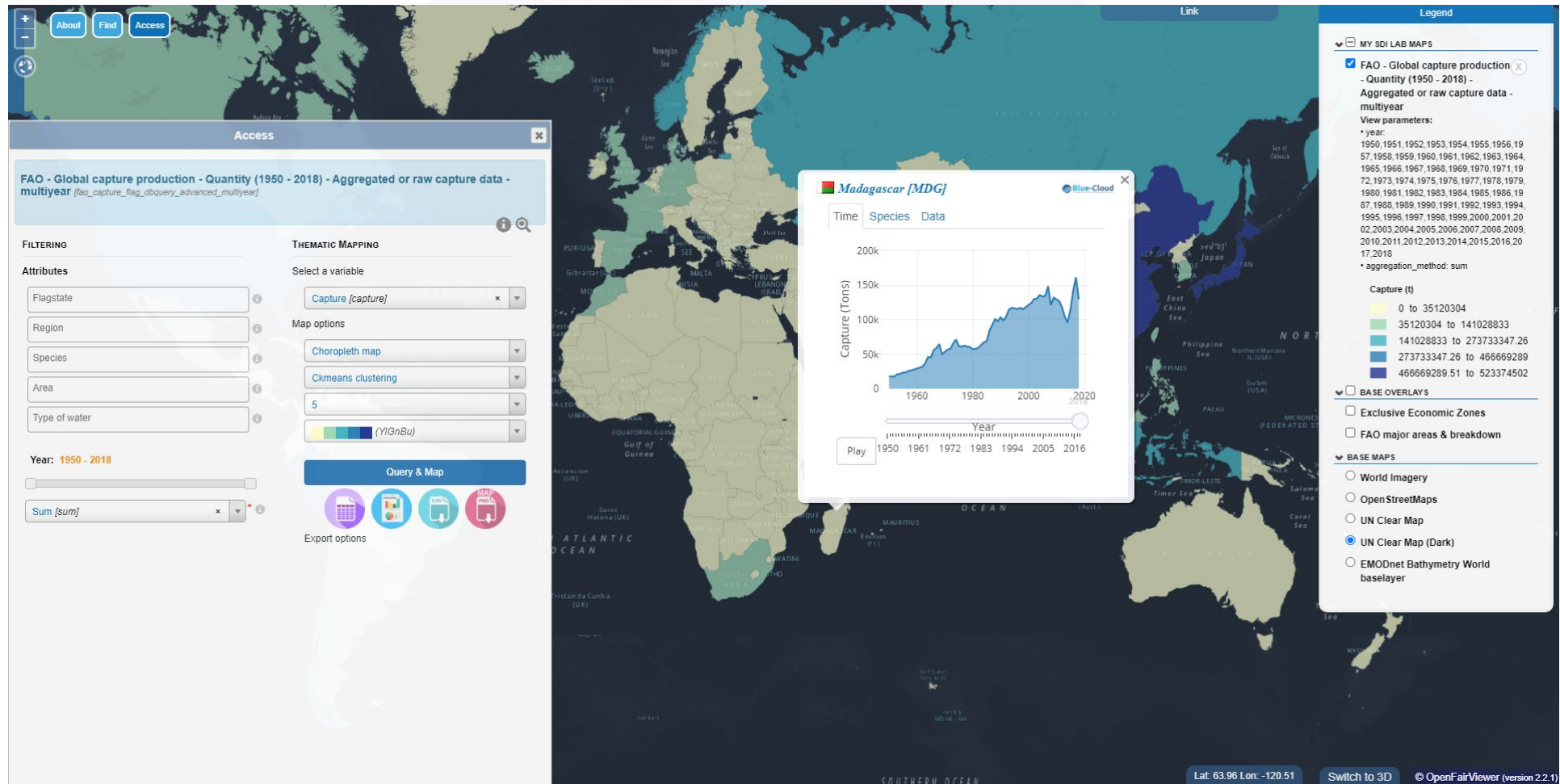


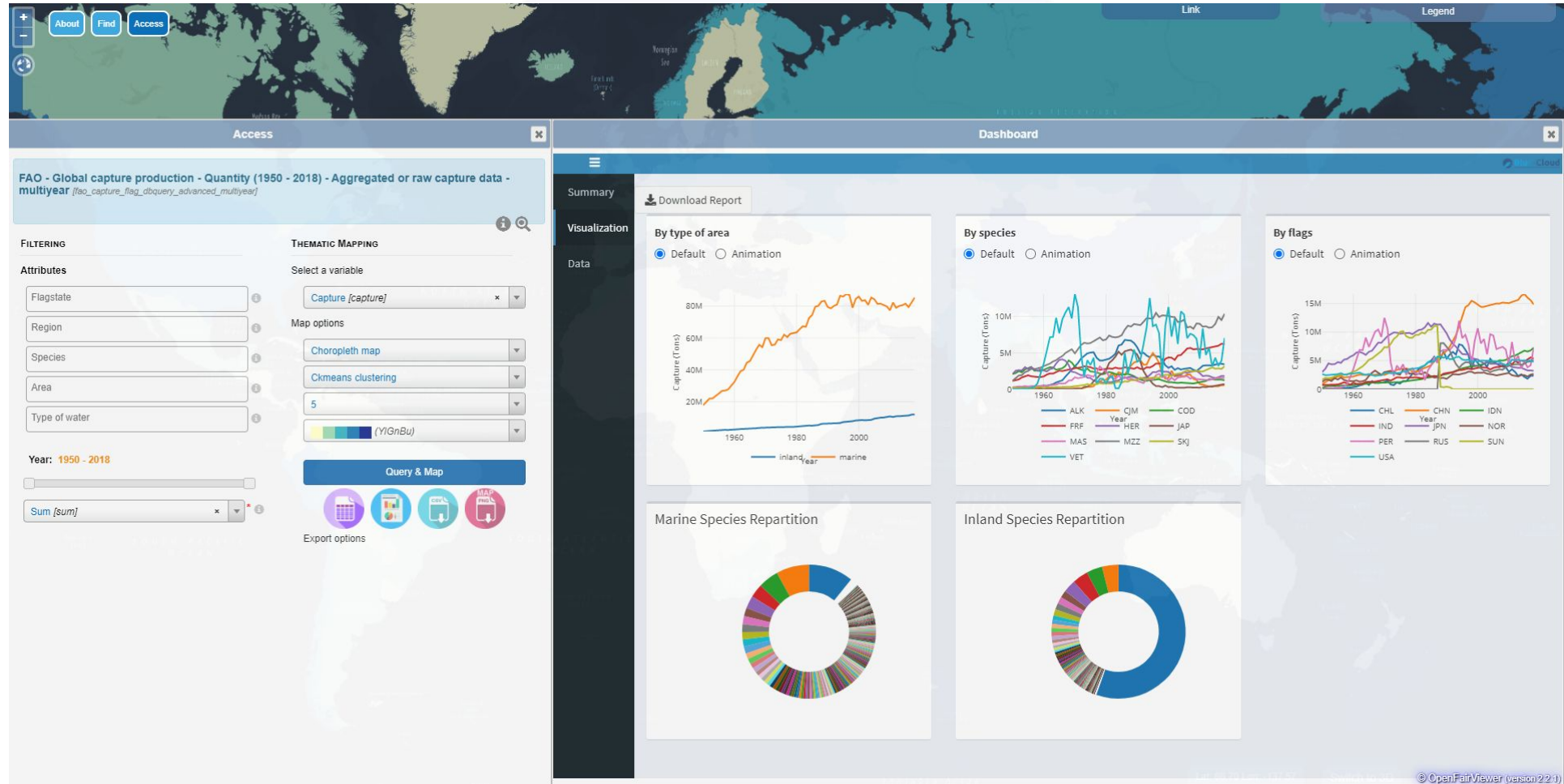
Tuna RFMOs websites
(heterogeneous)

Open SQL database
storing data +
metadata

FAIR services for fisheries data

Software components





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