

iMarine

Supporting data driven scientific
advice workflows

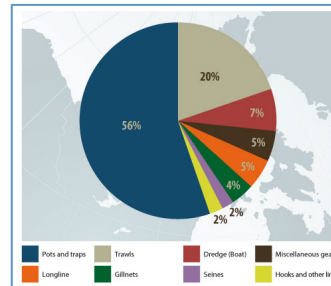


Donatella Castelli
(CNR-ISTI)

Data Infrastructure supporting the implementation of the principles of the Ecosystem Approach to Fisheries Management and Conservation of Marine Living Resources

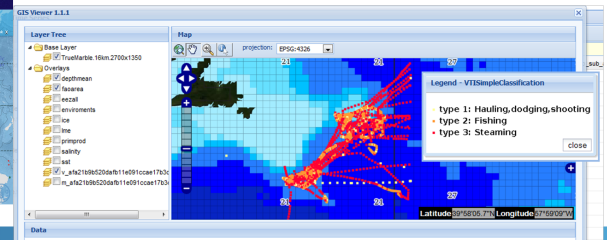
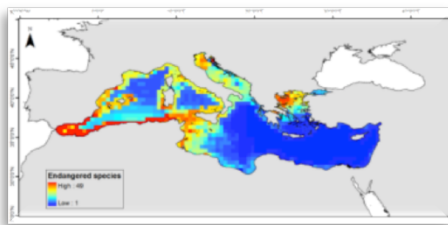
Interdisciplinary & multifacets collaboration

at the local, national, regional and international levels



Knowledge generation

- Access to large amount of heterogeneous, distributed, across-domain data
- Rich data mining, analysis and processing capabilities





Data infrastructure for research

Data infrastructure offering services for the research communities

Data infrastructure

“e-Infrastructure” offering services for collection, deposition, storage, preservation, access, retrieval, analysis/mining/processing, publication, etc.

e-Infrastructure

Electronic platform operated by a responsible entity offering an open set of basic enabling services (including access to resources) to a distributed Community of Practice.



BlueBRIDGE



SobigData
Euro Lab on Big Data Analytics
& Social Mining

The Community of Practice
(the community)



Parthenos



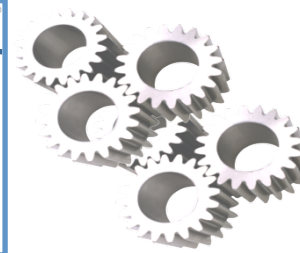
The e-infrastructure
(the operational platform)



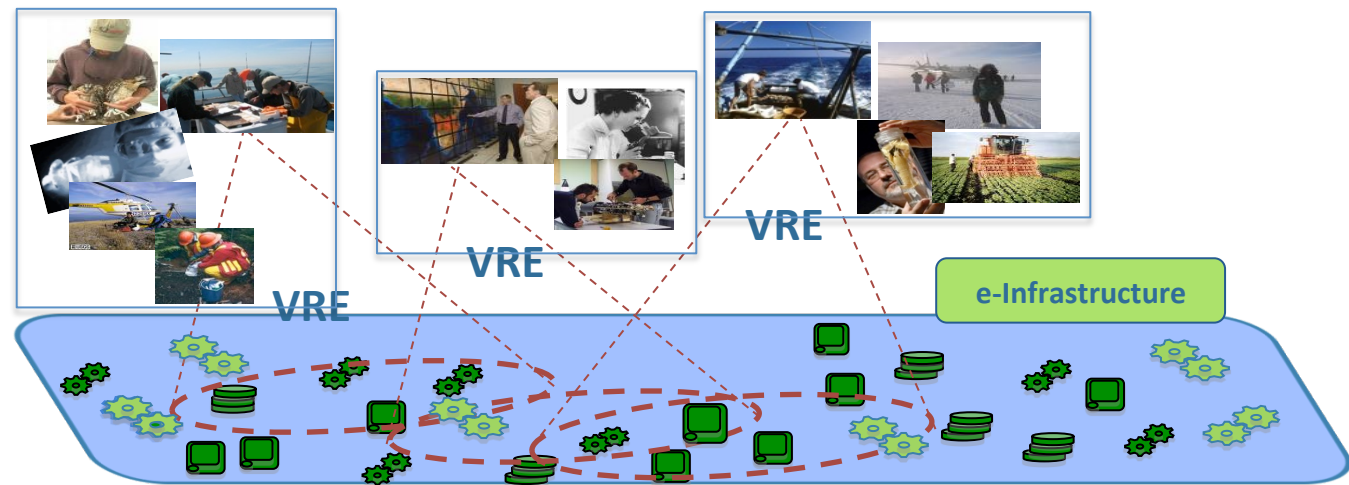
The system
(the enabling sw system)

i-marine gateway

Third-party portals & applications

- **Distributed and dynamically created** environment
- where **subset** of data, services, computational, and storage **resources**
- regulated by **tailored policies**
- are **assigned to a subset of users** via interfaces
- for a **limited timeframe**
- at **very little cost** for the providers of the participatory data e-infrastructures



Name: MyPersonalVRE
 Designer: Pasquale Pagano (pasquale.pagano)
 VRE Manager: Leonardo Candela (leonardo.candela)
 Description: The environment for my research

Life time
 From: November 22, 2014
 To: November 22, 2015

- Taxonomic Data Comparison
- ConnectCube
- Enhanced Documents Management
- Information Objects Discovery
- Messaging
- Shared Workspace
- Social Networking Facilities
- GeosCube
- Geospatial Data Discovery
- Geospatial Data Processing
- StatsCube

1. Specify VRE metadata (including policies)

2. Select applications

Available Resources for Occurrence and Taxonomic Data Discovery

Name	Description	Se
CatalogueOfLife	A virtual biodiversity repository of Catalogue of L...	
GBIF	A virtual biodiversity repository of GBIF data. T...	
BrazilianFlora	A virtual biodiversity repository of List of Sp...	
ITIS	A virtual biodiversity repository of ITIS data.	
WoRDSS	A virtual biodiversity repository of WoRDSS da...	
OBIS	A virtual biodiversity repository of OBIS data. The...	
WoRMS	A virtual biodiversity repository of WoRMS data. Th...	
ASFIS	Runtime Resource for ASFIS Plugin	
IRMNG	A virtual biodiversity repository of IRMNNS data. The...	

Reset Commit cha

Available Resources for Statistical Service

Name	Description	Se
S_OBS...	Algorithm returning most observed species in a sp...	
OBIS_SPECIES_OBSERVATIONS_PER_MEOW_AREA	Algorithm returning most observed species in a specific years range from OBIS database).	
STDBSCHEMA	Algorithm that allows to view the schema names of...	
Intersection	GIS intersection process. The native algorithm is i...	
Spread	Spread	
SPECIES_OBSERVAT...	Algorithm returning most observed species in a sp...	
OCCURRENCES_DU...	A transducer algorithm that produces a duplicate fr...	
XYEXTRACTOR_TABLE	An algorithm to extract values associated to a table...	

Reset Commit cha

4. Select data collections

3. Configure applications

Software deployment and hardware setup completely hidden

Evolving needs of its users completely supported

The screenshot shows the iMarine Gateway website interface. At the top, it says "iMarine Gateway" and "Data e-Infrastructure Initiative for Fisheries Management and Conservation of Marine Living Resources". Below this, there are navigation links for "Home", "gCube 3.5.0", and "See Research Environments". The main content area is titled "You can see below the list of Virtual Research Environments iMarine offers, organised by category." and is divided into four sections:

- Must Have:** Contains two VREs: "BiodiversityLab" (Public, Free Access) and "TabularDataLab" (Public, Free Access).
- Recommended:** Contains three VREs: "BiOrnym" (Public, Free Access), "EcologicalModelling" (Public, Free Access), and "ScalableDataMining" (Public, Free Access).
- Exclusive:** Contains five VREs: "AquaMaps" (Request Access), "BOBLME_HilsaAWG" (Request Access), "BlueBridgeProject" (Request Access), "FAO_TunaAtlas" (Request Access), and "TBT_VRE" (Request Access).
- Demonstrative:** Contains three VREs: "DocumentsWorkflow" (Public, Free Access), "VesselActivitiesAnalyzer" (Public, Free Access), and "iSearch" (Public, Free Access).

At the bottom of the page, there is a footer with "iMarine Website | Contact Us | Terms of Use | Privacy" and a small logo for the European Union.

iMarine Gateway

<https://i-marine.d4science.org/>

- *Public VREs* (used to offer an application environment to a subset of users of a community)
- *Private VREs* (used for experiments, data access and preparation, and data analytics)

A single point to

- Get status and updates from applications and other users they are interested in;
- Get notifications about messages, jobs completion, new generated products, etc.

The screenshot shows the marine Gateway interface. Handwritten annotations include:

- Workspace**: points to the 'ws' icon in the top navigation bar.
- Messages**: points to the envelope icon in the top navigation bar.
- Notifications Page**: points to the speech bubble icon in the top navigation bar.
- Search in your Workspace**: points to the search input field in the top navigation bar.
- Home Social**: points to the home icon in the top navigation bar.

 The main content area is divided into three sections:

- Share updates**: A text input field with a red callout box labeled **Share Updates**.
- News feed**: A list of updates with a red callout box labeled **User news feed**. The first update is from Massimiliano Assante about Facebook's new Graph Search.
- My Virtual Research Environments**: A grid of VREs including AquaMaps, BiodiversityResearchEnv, DocumentsWorkflow, EcologicalModelling, and others. A red callout box labeled **VREs user is a member of** points to this section.

Feed from Users →

Feeds from Applications →

The screenshot shows a 'News feed' interface with the following elements:

- News feed header:** 'All Updates' and 'Only Me'.
- User Post:** Luca Frosini shared a link. The link is titled 'iMarine @ EUBrazilOpenBio and Brazilian Virtual Herbarium joint workshop in Recife, Brazil - i-marine.eu'. The text below the link reads: 'Representing the overview of the w fisheries manage coming...'. A red box highlights the interaction options: 'Reply - Favorited - Message'.
- Application Post:** AquaMapsDataManagement A. The post includes a globe icon and the text 'Import_fabio.s' and '/group/devvre/ai Imported csv file'. A red box highlights the interaction options: 'Reply - Favorite - go App [devVRE] January 17, 7:49 PM'.
- Application Post:** StatisticalManager. The text reads: 'The operator Hспен Filter has been added: An algorithm producing a HSPEN table with only some selected species'. A red box highlights the interaction options: 'Reply - Favorited - go App [devVRE] January 16, 6:00 PM'.
- User Post:** Gianpaolo Coro Good! January 16, 6:03 PM.

Overlaid on the right is a 'Compose Message' dialog box with the following fields:

- To:** Luca Frosini
- Subject:** (empty)
- Attachments:** select from workspace
- Body:** (empty text area)
- Buttons:** Cancel, Send

A single point to

- Manage data, store and preserve them
- Share data

Workspace > My Shared Projects > iMarine > Meetings > Internal Project Meetings > 2013.06.17-20 6th TCom @ Skiathos > Day 2

Search in workspace Search

Tree Smart Folder

- Castilleja
- Corso Patente Nautica
- MOST_OBSERVED_SPECIES_param(10_1800_2020)
- My Articles
- My Data
- My Shared Projects
 - 2013.09 iMB4
 - Completed Projects
 - ENVRI
 - ENVRI Meetings
 - EUBrazilOpenBio
 - iMarine
 - Clusters Supporting Material
 - Deliverables
 - Graphics
 - Meetings
 - External Dissemination Events
 - Internal Project Meetings
 - 2011.11.16-18 Kick-off Meeting
 - 2012.01.17 CNR-FAO Meeting
 - 2012.03.14-16 1st TCom Meeting
 - 2012.03.19 1st Advisory Council Meeting


Name	Owner	Type	Creation Date	Size
Documents				
VirtualRepository@TCOM.pdf	Fabio Simeoni	application/pdf	Mon Jun 17 15:...	2,991...
6th TCom - Statistical Data Analysis.pptx	Gianpaolo Coro	application/vnd....	Mon Jun 17 15:...	7,994...
T10.4_XSearch_iMarine_6th_TCOM_nocomments.pptx	Yannis Marketa...	application/vnd....	Tue Jun 18 08:...	1,146...
WP10_Data_Fusion_Federated_Search.pptx	Alex Antoniadis	application/vnd....	Tue Jun 18 10:...	483 KB
Visualisation_6thTCOM.pptx	Nikolas Laskaris	application/vnd....	Tue Jun 18 10:...	1,657...
WP8_PE2ng.pptx	Test User	application/vnd....	Tue Jun 18 13:...	385 KB
ASL&WP6.pptx	Panagiota Kolts...	application/vnd....	Tue Jun 18 13:...	436 KB
WP6 - Social Portal@Skiathos.pptx	Massimiliano A...	application/vnd....	Tue Jun 18 14:...	1,630...
T10.4_XSearch_iMarine_6th_TCOM.pdf	Yannis Marketa...	application/pdf	Wed Jul 03 12:...	586 KB

- The Social Portal extended with

Share an update or a link, use "@" to mention and "#" to add a topic

Discussion topic

Notification to a user

 Loredana Liccardi Would you like to connect to a database in the Infrastructure to improve your data investigation? Lack of connection information and databases heterogeneity ar manage, but our system solves them!


DatabaseManag...

See More

iMarine Gateway - i-marine.d4science.org

<https://i-marine.d4science.org/group/gcubeapps/dbs-manager>

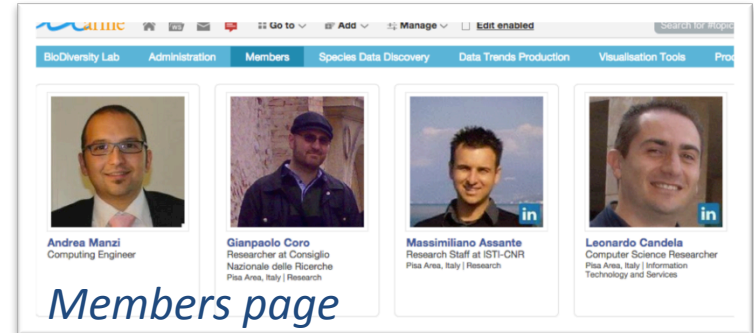
Reply - Favorited - Message November 21, 2:53 PM 6 2

 Pasquale Pagano This is what Nicolas Bailly was looking for.
November 21, 3:13 PM

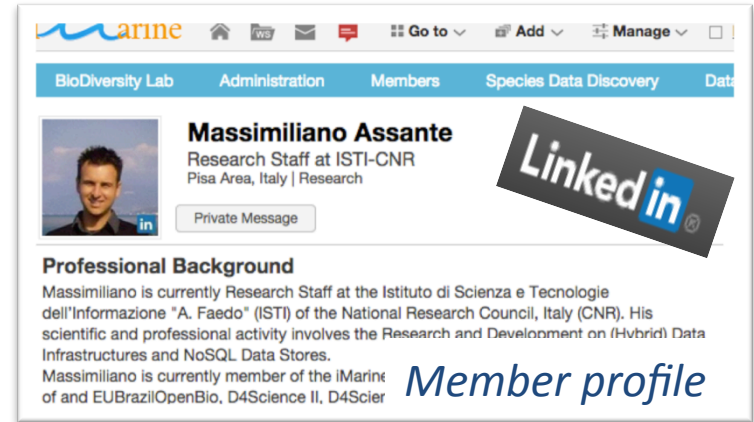
Top Topics

#gcubefeature

#softwarequality



Members page



Member profile

 massilivorno
 m.assante
 <https://www.linkedin.com/pub/massimiliano-assante/8/402/365>
 @maxassante

Member contacts

Start a Hangout





Management and interpretation of biological and ecological data in the environment



Complete full life-cycle data framework, from observational data to aggregated data repositories enriched with validation and analytical tools

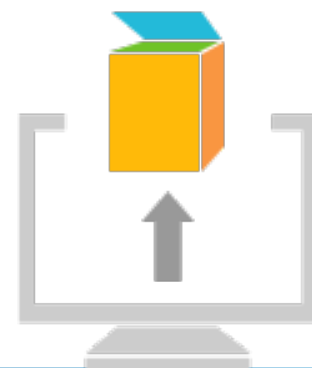


Storage and interpretation of geospatial explicit information, including WPS processing



Flexible sharing, storage, reporting, search and retrieval, aggregation and projection facilities

A BUNDLE is a set of services and technologies grouped according to a family of related tasks for achieving a common objective



- ✓ Collaboration
- ✓ Sharing
- ✓ Visualization
- ✓ Publication
- ✓ Storage
- ✓ Processing
- ✓ Analysis
- ✓ Modeling
- ✓ Integration
- ✓ Enrichment
- ✓ Transformation
- ✓ Validation
- ✓ Access
- ✓ Discovery
- ✓ Collection



Occurrence and Taxonomic Data Discovery
Occurrence Data Processing
Species Distribution Modeling
Species Distribution Maps Discovery
Taxonomic Data Comparison
Taxonomic Data Matching



Code List Discovery
Code List Management
Statistical Engine
Tabular Data Discovery
Tabular Data Enrichment
Tabular Data Management
Tabular Data Processing

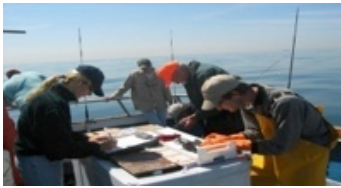


Geospatial Data Discovery
Geospatial Data Processing

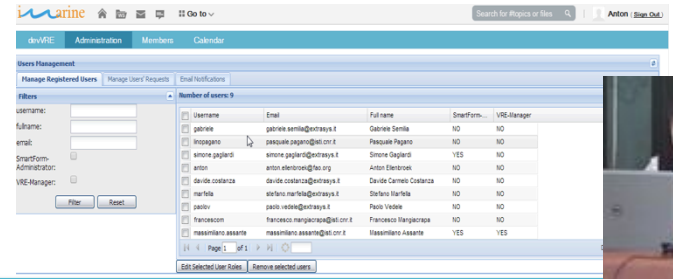


Enhanced Documents Management
Fact-sheets Management
Information Object Discovery
Messaging
Shared Workspace
Social Networking Facilities

On Board Bycatch recording



- Dutch Elasmobranch society
- SEAFO RFB,



Define forms, controlled vocabularies, ...

Select a Fishery survey



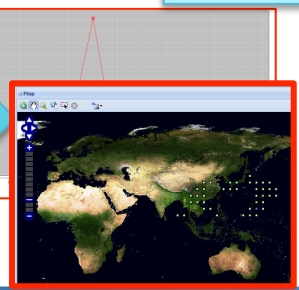
Observation form details:

- Species: *Alopias vulpinus*
- Date: 03-04-2015
- GPS Coordinates: Latitude: 1574.0, Longitude: 228.0
- Sex: Male
- State Life: Alive
- Size (cm): 70
- Weight (kg): 100

Validate & Enrich

Mobile app interface showing species identification for *Alopias vulpinus* with fields for Date, GPS Latitude, and Longitude.

Analyse



marine Data curation & integration: Tuna Atlas VRE



- Data collected by RFBs maintained in FAO managed DBs
- The Atlas of Billfish Catches
- The Global Tuna Catches by Stocks

Curation

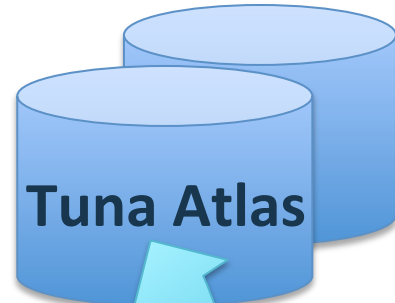
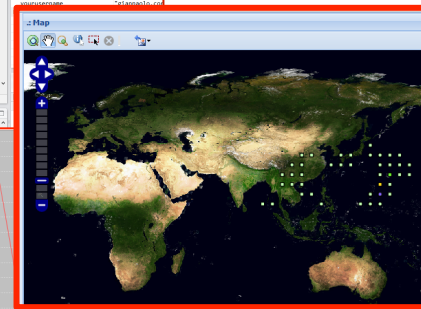
Normalise data, delete columns and aggregate catch, delete duplicated records, aggregate valid duplicates, aggregate time dimensions, apply reference data codes, discovery error in codes, fix errors in codes, simple preprocessing, ...

RFMOs



CL_FAO_MAJID	un_country	CL_SPECIES	Year	obsvalue	unit
27	56	HER	2008	0	t
27	833	HER	1990	552	t
27	833	HER	1991	629	t
27	833	HER	1992	856	t
27	833	HER	1993	775	t

catch	country	year	quantity	species	country	year	quantity	species
17	1972	1972	1000	HER	1972	1000	HER	1972
18	1972	2012	1000	HER	1972	2012	1000	HER
19	1972	2012	1000	HER	1972	2012	1000	HER



Public

0110000
1001000
1110100

Access to the Data Space

The data space contains the set of input and output data sets of the users. It is possible to upload and share tables. Data sources can be chosen from those hosted by the infrastructure. Outputs of the computations can be even saved in this space.



Execute an Experiment

This section allows to execute or prepare a Niche Modeling experiment. The section is endowed with a list of algorithms for training and executing statistical models for biological applications. Evaluation of the performances is possible by means of several kinds of measurement systems and processes.



Check the Computations

This section allows to check the status of the computation. A list of processes launched by the user is shown along with meta-information. By clicking on the completed jobs it is possible to visualize the data set contents.



STATISTICAL MANAGER

Feed Forward ANN Distribution

Classification

Function Selection

Performance Evaluation

Species Selection

Training

Time Series

Task

Model

Species Network

Observed Species Data

Workspace

My Shared Projects

Internal Project Settings

2013.06.17-20.49h.TCOM.8.Situat...

Day 2

Name	Owner	Type	Creator	Date	Size
VirusRepository@TCOM.pdf	Fabio Simoni	application/pdf		Mon Jun 17 15:...	2,951...
8th.Tcom - Statistical Data Analysis.pptx	Gianpaolo Caro	application/vnd...		Mon Jun 17 15:...	7,954...
T10_XSearch_Marine_8h_TCOM_annotations.pptx	Yanis Markatos	application/vnd...		Tue Jun 18 08:...	1,148...
WP10_Data_Fusion_Federated_Search.pptx	Alex Antoniad	application/vnd...		Tue Jun 18 10:...	483 KB
Visualisation_8hTCOM.pptx	Nikolas Laskaris	application/vnd...		Tue Jun 18 10:...	1,657...
WP10_P102ng.pptx	Test User	application/vnd...		Tue Jun 18 13:...	305 KB
				Tue Jun 18 13:...	438 KB
				Tue Jun 18 14:...	1,630...
				Wed Jul 03 12:...	508 KB

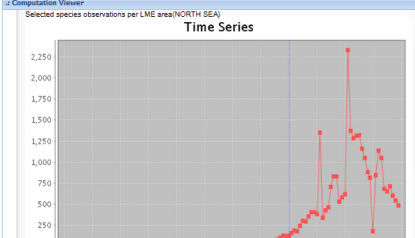
ID	NAME	OPERATOR	INFRASTRUCTURE	START DATE	END DATE	STATUS
2.	Species Observation Lme Area Pe...	Species Observation Lme Area P...	LOCAL	10/08/20...	10/08/20...	Complete
2.	Aquamaps Suitable-2013-08-10 15:14	Aquamaps Suitable	DASCIENCE	09/19/20...	09/19/20...	Complete
2.	Maps Comparison-2013-08-12 09:37	Maps Comparison	LOCAL	09/12/20...	09/12/20...	Complete
2.	Taxonomy Observations Trend Pe...Year-2013-08-09 10:21	Taxonomy Observations Trend Pe...	LOCAL	09/17/20...	09/17/20...	Complete
2.	Fin Taxa Match-2013-08-09 10:20	Fin Taxa Match	LOCAL	09/09/20...	09/09/20...	Complete

Data preparation & access

- 100+ statistical models
- Transparent use of cloud computing
- Automatically generated interfaces
- Integration with R

STATISTICAL MANAGER

ID	Cat	Name	Operator	Infrastructure	Start Date	End Date	Status
2.		Species Observation Lme Area Pe...	Species Observation Lme Area P...	LOCAL	10/08/20...	10/08/20...	Complete
2.		Aquamaps Suitable-2013-08-10 15:14	Aquamaps Suitable	DASCIENCE	09/19/20...	09/19/20...	Complete
2.		Maps Comparison-2013-08-12 09:37	Maps Comparison	LOCAL	09/12/20...	09/12/20...	Complete
2.		Taxonomy Observations Trend Pe...Year-2013-08-09 10:21	Taxonomy Observations Trend Pe...	LOCAL	09/17/20...	09/17/20...	Complete
2.		Fin Taxa Match-2013-08-09 10:20	Fin Taxa Match	LOCAL	09/09/20...	09/09/20...	Complete



Monitoring the status of the computation

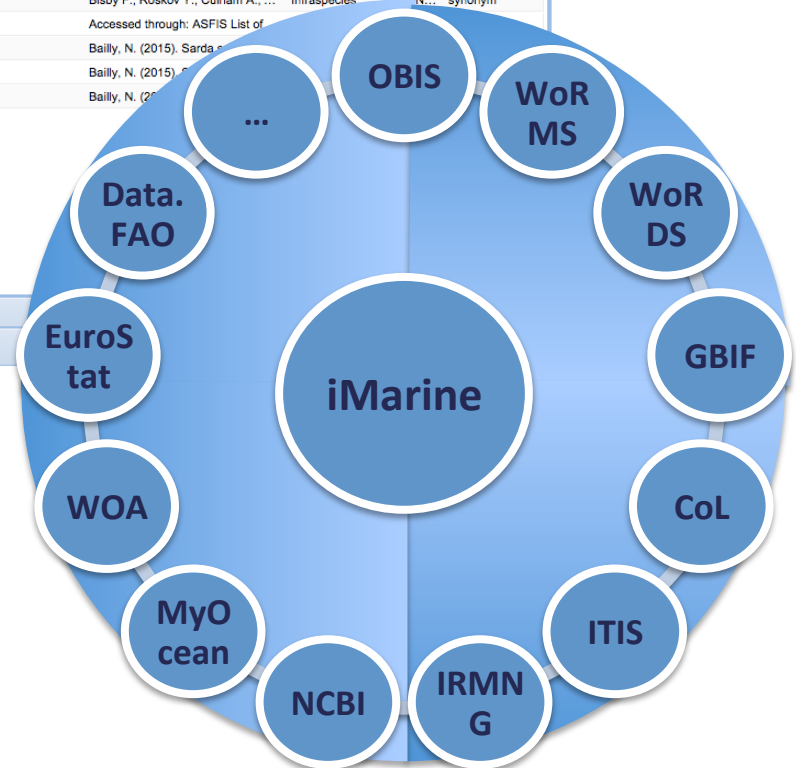
uniform access to data

Search: Taxon By: Scientific name Term: sarda sarda

Advanced Option Filter by Source Filter by BBox Filter by Date Synonyms From Expand

Filter your results Switch view Only selected View Details (Only selected) Check All Rows Uncheck All Rows Filter: None

Scientific Name	S.N. Authorship	Data Source	Citation	Rank	Status ...	Status Remarks
Sarda sarda	(Bloch, 1793)	OBIS	Intergovernmental Oceanographi...	Species	ACCEP...	not found
Sarda sarda	(Bloch, 1793)	CatalogueOfLife	Bisby F., Roskov Y., Culham A., ...	Species	ACCEP...	accepted name
Sarda sarda chilensis	(Cuvier, 1832)	CatalogueOfLife	Bisby F., Roskov Y., Culham A., ...	Infraspecies	SYNON...	synonym
Sarda sarda chilensis	(Cuvier, 1832)	CatalogueOfLife	Bisby F., Roskov Y., Culham A., ...	Infraspecies	SYNON...	synonym
Sarda sarda	(Bloch 1793)	ASFIS	Accessed through: ASFIS List of			
Sarda sarda	(Bloch, 1793)	WoRMS	Bailly, N. (2015). Sarda s			
Sarda sarda chilensis	(Cuvier, 1832)	WoRMS	Bailly, N. (2015)			
Sarda sarda chilensis	(Cuvier, 1832)	WoRMS	Bailly, N. (2015)			

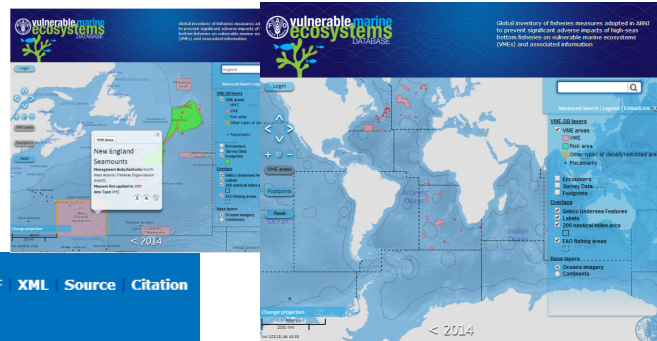


VME-DB



The **International Guidelines for the Management of Deep-Sea Fisheries on the High Seas**. VME database to assist in informed decision making and the development of further **measures to increase sustainability** and reduce impacts.

Time



Corner Seamounts Selected year: 2012 Print PDF XML Source Citation

Description | **Map** | **Management** | **Regional overview** | **Meeting reports** | **Media**

Measures specific to this VME area
 Area closed to bottom fishing until 31 Dec 2014, with exploratory fishing option. Vessels fishing this area shall have a scientific observer onboard. (Art 16.1-3)
 Period in force: 2007 – 2014
 Source of information
 NAFO Conservation and Enforcement Measures 2012 (NAFO FC Doc 12/1 Serial No. N6001) Fisheries Commission 2012

General measures
Fishing areas
 The comprehensive map of existing bottom fishing areas (as delineated by the coordinates shown in Table 1 and illustrated in Figure 4) shall be revised regularly to incorporate any new relevant information. Contracting Parties may, in the future, consider the possibility of refining the comprehensive map on the basis of haul by haul information, if available. (Art.17)

Exploratory fishing protocol
 Exploratory fishing covers all bottom fishing activities (a) outside of the existing bottom fishing area and (b) to fisheries within the existing bottom fishing area that show significant change. (Art 15.8). Exploratory fisheries must be conducted according to an exploratory fisheries protocol (Art 18; Annex 1E.I-IV) and are subject to review FC and SC. Exploratory fisheries will be allowed only if there are adequate mitigation measures to prevent SAI to VMEs (Art 19).

Encounter protocols
 In existing bottom fishing areas, encounters with VME indicator species above a threshold value are reported to the Executive Secretary and trigger a 2 nmile move on rule. In new fishing areas, such encounters also result in temporary closures of 2 nmile radius and require a more detailed report

Management Body/Authority
Northwest Atlantic Fisheries Organization (NAFO)
 The Northwest Atlantic Fisheries Organization's (NAFO) overall objective is to contribute through consultation and cooperation to the optimum utilization, rational management and conservation of the fishery resources of its area of competence, and to ensure the long term conservation and sustainable use of the fishery resources and, in so doing, to safeguard the marine ecosystems in which these resources are found.

Web site
<http://www.nafo.int/>

Regional Fishery Body fact sheet
<http://www.fao.org/fishery/rfb/NAFO/en>

Historical information on fishing areas and closed areas

Meetings & other Sources of Information

General Measures

RFMO

VME record

Description (Habitat & Biology)

Specific measures

The Tuna Atlas factsheet

Fact sheet: describes an entity (species, vessel..) and its **characteristics** (including relationships with other entities) as well as **linked data** (images, publications, indicators...) coming from different sources.

1. Blue Assessment

Assessing the status of fish stocks and producing a global record of stocks and fisheries

2. Blue Economy

Analysing socio-economic performance in aquaculture

3. Blue Environment

Fisheries & habitat degradation monitoring

4. Blue Skills

Boosting education and knowledge bridging between research and innovation in the area of protection and management of marine resources

5. Blue Commons

Publishing & re-use of scientific outcomes



BlueBRIDGE

APPLIFISH



www.i-marine.eu

