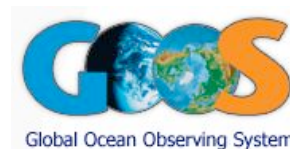




# Marine Fishes as a data management case study

*Robert Branton  
Ocean Tracking Network  
Dalhousie University,  
Halifax Canada*

[Bob.Branton@dal.ca](mailto:Bob.Branton@dal.ca)



*Using Atlantic cod as an example, let us see how various existing data systems are enabling reuse of scientific data and information...*

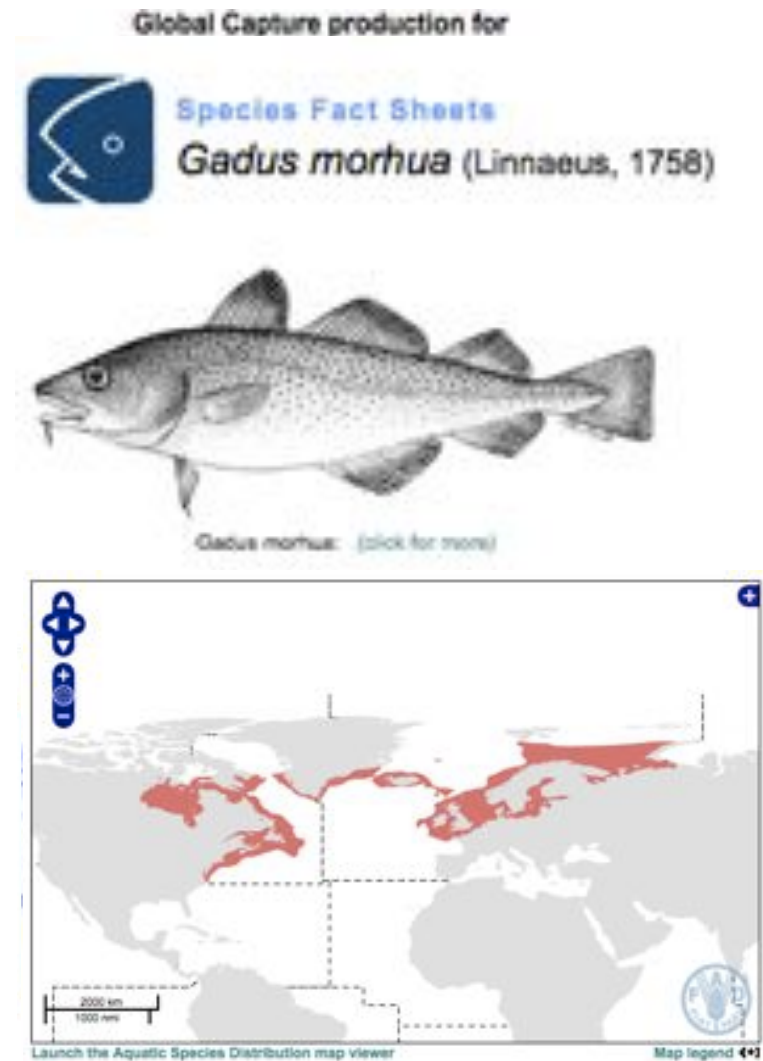
- Why Atlantic cod?
- Authority
- Discovery
- Access
- Interoperability
- Sustainability

# Why Atlantic cod?

[www.fao.org/fishery](http://www.fao.org/fishery)

## FAO fact sheets ...

- Among the most important of all commercial fishes, cod has been called "beef of the sea". The Atlantic cod has been exploited ever since man began to fish in the seas of Europe. Its value as a prime food-fish is enormous ...



# Why Atlantic cod?

[www.cosewic.gc.ca](http://www.cosewic.gc.ca)



Government of Canada / Gouvernement du Canada

Canada

Français | Contact Us | Help | Search | Canada Site  
COSEWIC Home | Stay Informed | Special Reports | FAQ | Links

## Wildlife Species Search

Database of wildlife species assessed by COSEWIC

Last updated January 7, 2013

Search for a particular wildlife species using the wildlife species search. Or, search by any of the five group-search criteria to obtain a user-defined set of results. To obtain all the records of wildlife species designated by COSEWIC, leave all fields blank.

**Wildlife Species Search:** Search by either Common or Scientific Name. Enter any part of the name.

Common Name:

Scientific Name:

**Group Search:**

**Status Category:**

Extinct  Special Concern  
 Extirpated  Not at Risk  
 Endangered  Data Deficient  
 Threatened

**Taxonomic Group:**

Amphibians  Mammals (marine)  
 Arthropods  Mammals (terrestrial)

# Authoritative

*Using reliable names and hierarchical classifications ...*

- World Register of Marine Species (WoRMS)
- FishBase
- MarineRegions.org

# WoRMS – World Register of Marine Species

[www.marinespecies.org](http://www.marinespecies.org)

The screenshot displays the WoRMS website interface. At the top, the logo features a stylized fish and the text "WoRMS World Register of Marine Species". Below the logo is a navigation menu with links: Home, About, Search taxa, Taxon tree, Literature, Distribution, Specimens, Match taxa, Editors, Statistics, Users, Webservice, Photogallery, Info downloads, Sponsors, Glossary, and Log in. The main content area is titled "Search WoRMS" and includes two search forms. The first form is for "Common name" with a dropdown menu set to "contains" and an empty input field. The second form is for "Scientific name" with a dropdown menu set to "begins with" and the input field containing "gadus morhua". Both forms have "Search" buttons. To the right of the search forms is a "Statistics" section with the following data: 215,357 accepted species; of which 198,548 checked (92%); 372,287 species names including synonyms; 465,292 taxa (infraspecies to kingdoms); 31,481 images; Last update: 44 minutes ago. Below the statistics is a paragraph celebrating the 300th birthday of Linnaeus, stating that the target of 100,000 accepted species names was reached by the end of 2007, and 200,000 species were reached by October 2010. The final goal is to capture all of the estimated 230,000 described marine species, with 14,643 still to go. At the bottom right, there is an "About WoRMS" section with a paragraph stating the mission and a "Read more..." link.

# WoRMS – Match taxa

The screenshot shows the WoRMS website interface. A red box with the text "Using lists of names." is overlaid on the page. Two red arrows point from this box to the "Match taxa" button in the left sidebar and the "scientificname" input field in the main search area. The main search area contains a list of species names, including: 1 scientificname, 2 Acipenser oxyrinchus, 3 Alosa sapidissima, 4 Amblyraja hyperborea, 5 Anguilla rostrata, 6 Boreogadus saida, 7 Carcharodon carcharias, 8 Gadus morhua, 9 Halichoerus grypus, 10 Homarus americanus, 11 Morone saxatilis, 12 Myoxocephalus quadricornis, 18 Reinhardtius hippoglossoides, 19 Salmo salar, 20 Salvelinus alpinus, 21 Salvelinus fontinalis, 22 Somniosus microcephalus, 23 Squalus acanthias, 24 Thunnus maccoyii, 25 Thunnus thynnus, 26 Acipenser medirostris, 27 Acipenser transmontanus, 28 Cancer magister, 29 Cyanea capillata, 30 Dosidicus gigas, 31 Enteroctopus dofleini, 32 Hexanchus griseus, 33 Hydrolagus collii, 34 Lamna ditropis, 35 Notorynchus cepedianus, 36 Oncorhynchus clarki, 37 Oncorhynchus keta, 38 Oncorhynchus kisutch.

1/25/13

Website and databases developed and hosted by VIZI - Page generated 2013-01-19 - contact: [info@marinespecies.org](mailto:info@marinespecies.org)

7 / +6

# FishBase

[www.fishbase.org](http://www.fishbase.org)



## FishBase

*A Global Information System on Fishes*

- Media
- FishBase Tour
- Fish Quiz
- Fish Forum
- Ordering FishBase
- Useful Links
- E-mail Us
- Guest Book
- FishBase 99 Book, French
- FishBase 97 Book, Portuguese
- FishBase 99 Book, Spanish
- FishBase Book 2000

### Download

- Download Section

### Database

- [Search FishBase](#)
- Search LarvalBase
- Food Web Data
- FishBase in Species 2000

### Training

- Training Program

Welcome to the world of fishes. The purpose of this page is to give you background information on FishBase, a global information system with all you ever wanted to know about fishes. FishBase is a relational database with information to cater to different professionals such as research scientists, fisheries managers, zoologists and many more. FishBase on the web contains practically all fish species known to science. **FishBase 2004** is also available on DVD or CD-ROMs with full information on 28,500 species. It comes together with the FishBase 2000 book and can be ordered for 95 US\$ including air-mail.



FishBase was developed at the WorldFish Center in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and many other partners, and with support from the European Commission (EC). Since 2001 FishBase is supported by a consortium of nine research institutions (see below).

Get more information on how to order a copy of FishBase! Or e-mail [FishBase](#) for comments and further details.

### Search FishBase FishBase Team

#### Fish Forum

Are you looking for a particular piece of information? Ask your colleagues in our Fish Forum.

#### The FishBase Blog

#### Be a Collaborator!

Do you want to become a FishBase collaborator? Find out more on how to become a FishBase collaborator.

#### We're Fishing for Fish Photos

We are looking for fish photos. Learn how to become a collaborator by contributing pictures to FishBase. See complete list of missing pictures. Or download TXT file.

#### We're Fishing for Maximum lengths

We are looking for reported maximum length in literature. Please provide us with such references, or better send us in PDF if available. Technical reports and documents are appreciated as well. See complete list of species for which we are missing maximum length. Or download TXT file.



# MarineRegions.org

[www.marineregions.org](http://www.marineregions.org)



Marineregions.org

towards a standard for georeferenced marine names

About **Marine Gazetteer** EEZ boundaries Sources Statistics Downloads

## About Marine Regions

Marine Regions is a standard list of marine georeferenced place names and areas. It integrates and serves geographic information from the VLIMAR Gazetteer and the MARBOUND database and proposes a standard of marine georeferenced locations, boundaries and regions.

[Read more...](#)

## Statistics

25,487 marine georeferenced places  
32,604 marine place names  
5,596 polygons of geographic places  
12 marine geographic regional/global classifications  
Maritime Boundaries (EEZ) of the world

## News

### Launch marineregions.org

Added on: 2012-11-20 09:40:03 by Claus Simen

We are happy to launch marineregions.org, a list of marine georeferenced place names and areas. The objective of marineregions.org is to work towards a global standard of georeferenced marine names. [\[Read more\]](#)

# Discoverable

*Listed in publicly searchable online catalog systems ...*

- Global Change Master Directory (GCMD)
- GOOGLE, BING
- Wikipedia

# Global Change Master Directory (GCMD)

[gcmd.nasa.gov](http://gcmd.nasa.gov)

The screenshot shows the NASA Goddard Space Flight Center Global Change Master Directory (GCMD) website. The header includes the NASA logo, the text "GODDARD SPACE FLIGHT CENTER", and a link to "Visit NASA.gov". Below the header is the "Global Change Master Directory" title with the tagline "Discover Earth science data and services" and a "Preview the New GCMD Site" button. A navigation bar contains links for Home, Data Sets, Data Services, Portals, Add to GCMD, What's New, Participate, CEOS IDN, and About GCMD. The main content area is titled "Find Data" and features a grid of 14 categories, each with a representative image and a list of sub-topics. A red arrow points to the "Biological Classification" category. To the right of the grid is a "Find Data Services" section with a list of service links and a "Data Services Text Search" input field. At the bottom of the grid is a "Data Set Text Search" input field with a "Search" button. The footer includes the CEOS International Directory Network logo.

**Find Data**

- Agriculture**  
forest science, soils ...
- Atmosphere**  
precipitation, air quality ...
- Biosphere**  
ecosystems, vegetation ...
- Biological Classification**  
animals/invertebrates, plants ...
- Climate Indicators**  
air temperature, drought ...
- Cryosphere**  
frozen ground, sea ice ...
- Human Dimensions**  
land use, population ...
- Data Centers**
- Projects**
- Instruments / Sensors**
- Platforms / Sources**
- Land Surface**  
erosion, topography ...
- Oceans**  
ocean temperature, salinity ...
- Paleoclimate**  
ice cores, land records ...
- Solid Earth**  
geochemistry, seismology ...
- Spectral / Engineering**  
radar, visible imagery ...
- Sun-Earth Interactions**  
sunspots, solar activity ...
- Terrestrial Hydrosphere**  
ground water, water quality ...
- Map / Data Search**  
or  
**Location Name Search**

**Find Data Services**

- Data Analysis and Visualization
- Data Management / Data Handling
- Education / Outreach
- Environmental Advisories
- Hazards Management
- Metadata Handling
- Models
- Reference and Information Services
- Web Services


Data Services Text Search


Find Data Only

**CEOS**  
International Directory Network

Data Set Text Search

# GCMD via Commercial Search Engines






Web Images Maps More Search tools


About 1,450 results (0.54 seconds)

**DFO Maritimes Research Vessel Trawl Surveys Fish ... - GCMD**  
[gcmd.nasa.gov/.../Metadata.do?...\\_DFOgfsDBfish](#)  
 DFO Maritimes Research Vessel Trawl Surveys Fish Observations (OBIS Canada),  
 Entry ID: OBIS.DFOgfsDBfish. [ Get Data ] [ Update this Record ] Updating ...

**Extracting groundfish survey indices from the Ocean Biogeographic ...**  
[icesjms.oxfordjournals.org/content/16/7/4/638.full](#)  
 by D Ricard - 2010 - Cited by 4 - Related articles  
 Dec 13, 2009 - ... DFO Maritimes Research Vessel Trawl Surveys Fish  
**Observations** data was ... The metadata records contained in the **GCMD** also appear  
 on ...

**OBISCanada\_CMB\_AGM2008\_Update.doc - Centre for Marine ...**  
[www.marinebiodiversity.ca/cmb/activities/.../file](#)  
 File Format: Microsoft Word - Quick View  
 Completed **GCMD** Metadata Updates per OBIS Canada Make Over Project and ...  
 article: **DFO Maritimes Research Vessel Trawl Surveys Fish Observations** ...





417 RESULTS Narrow by language Narrow by region

**Ceratias holboellii (Deepsea Angler) - Welcome to ZipcodeZoo**  
[zipcodezoo.com/Animals/O/Ceratias\\_holboellii](#)  
 Institute of Marine and Coastal Sciences, Rutgers University: **DFO Maritimes Research  
 Vessel Trawl Surveys Fish Observations** (OBIS Canada) Institute of Marine and  
 Coastal ...

**Bathypterois dubius (Mediterranean spiderfish)**  
[zipcodezoo.com/Animals/B/Bathypterois\\_dubius](#)  
 Institute of Marine and Coastal Sciences, Rutgers University: **DFO Maritimes Research  
 Vessel Trawl Surveys Fish Observations** (OBIS Canada) Institute of Marine and  
 Coastal ...

**GROUNDFISH INTEGRATED FISHERIES MANAGEMENT PLAN**  
[www.mar.dfo-mpo.gc.ca/fisheries/res/imp/2000gmdfish.htm](#)  
 ... species from summer **DFO research vessel surveys**. ... These complement the **DFO  
 Science** multipurpose bottom **rawl surveys** ... fish caught by another **vessel** or to put  
**fish** ...

**Science.gov v5.0 : Main View : Search Results for Full Record ...**  
[www.science.gov/topicpages/s/kenoturbella+bocki+phylum.html](#)  
 Metadata - **Global Change Master Directory (GCMD)** ... **DFO Maritimes Research**

## WIKIPEDIA The Free Encyclopedia

### Pages in category "Fisheries databases"

The following 10 pages are in this category, out of 10 total. This list may not reflect recent changes ([learn more](#)).

- |   |  |  |
|---|--|--|
| <p><b>A</b></p> <ul style="list-style-type: none"> <li>• Aquatic Commons</li> </ul> <p><b>C</b></p> <ul style="list-style-type: none"> <li>• Census of Marine Life</li> </ul> <p><b>F</b></p> <ul style="list-style-type: none"> <li>• FishBase</li> <li>• Future of Marine Animal Populations</li> </ul> | <p><b>N</b></p> <ul style="list-style-type: none"> <li>• NaGISA</li> </ul> <p><b>O</b></p> <ul style="list-style-type: none"> <li>• Ocean Biogeographic Information System</li> <li>• Ocean Tracking Network</li> </ul> <p><b>P</b></p> <ul style="list-style-type: none"> <li>• Pacific Ocean Shell Tracking Project</li> </ul> | <p><b>S</b></p> <ul style="list-style-type: none"> <li>• Sea Around Us Project</li> </ul> <p><b>W</b></p> <ul style="list-style-type: none"> <li>• World Register of Marine Species</li> </ul> |
|---|--|--|
- Note: Red arrows in the original image point to the 'Census of Marine Life', 'FishBase', 'Future of Marine Animal Populations', 'Ocean Biogeographic Information System', 'Ocean Tracking Network', 'Pacific Ocean Shell Tracking Project', 'Sea Around Us Project', and 'World Register of Marine Species' entries.*

# Accessibility

*Downloadable via geo-referenced systems on marine species ...*

- Sea Around Us Project
- Ocean Biogeographic Information System (OBIS)
- Ocean Tracking Network (OTN)

# Sea Around Us Project

The screenshot shows the homepage of the Sea Around Us Project. At the top left is the project logo, a globe with fish, and the text "SEA AROUND US PROJECT Fisheries, Ecosystems & Biodiversity". To the right is the logo for "THE PEW CHARITABLE TRUSTS". Below the logos is a large banner image of a fish school and a boat. Underneath the banner is a dark blue navigation bar with three sections: "Mission statement" (with translations in French, Spanish, German, and Chinese), "NEWS & ABOUT", and "DATA & VISUALIZATION". Below the navigation bar are three sections: "HOT TOPIC" with a link to "Global mariculture database (NEW)", "SHORTCUTS" with links to "Exclusive Economic Zones (EEZ)" and "Large Marine Ecosystems (LME)", and "COLLABORATIONS" with logos for FERU, FishBase, National Geographic, CEO, BALTIC, and GAPS. A red arrow points to the "Large Marine Ecosystems (LME)" link.

SEA AROUND US PROJECT  
Fisheries, Ecosystems & Biodiversity

THE PEW  
CHARITABLE TRUSTS

Mission statement  
Déclaration de mission  
Declaración de objetivos  
Leitbild Doelstellingen  
项目宗旨

NEWS  
& ABOUT

DATA  
& VISUALIZATION

HOT TOPIC

▶ Global mariculture database (NEW)

SHORTCUTS

▶ Exclusive Economic Zones (EEZ)

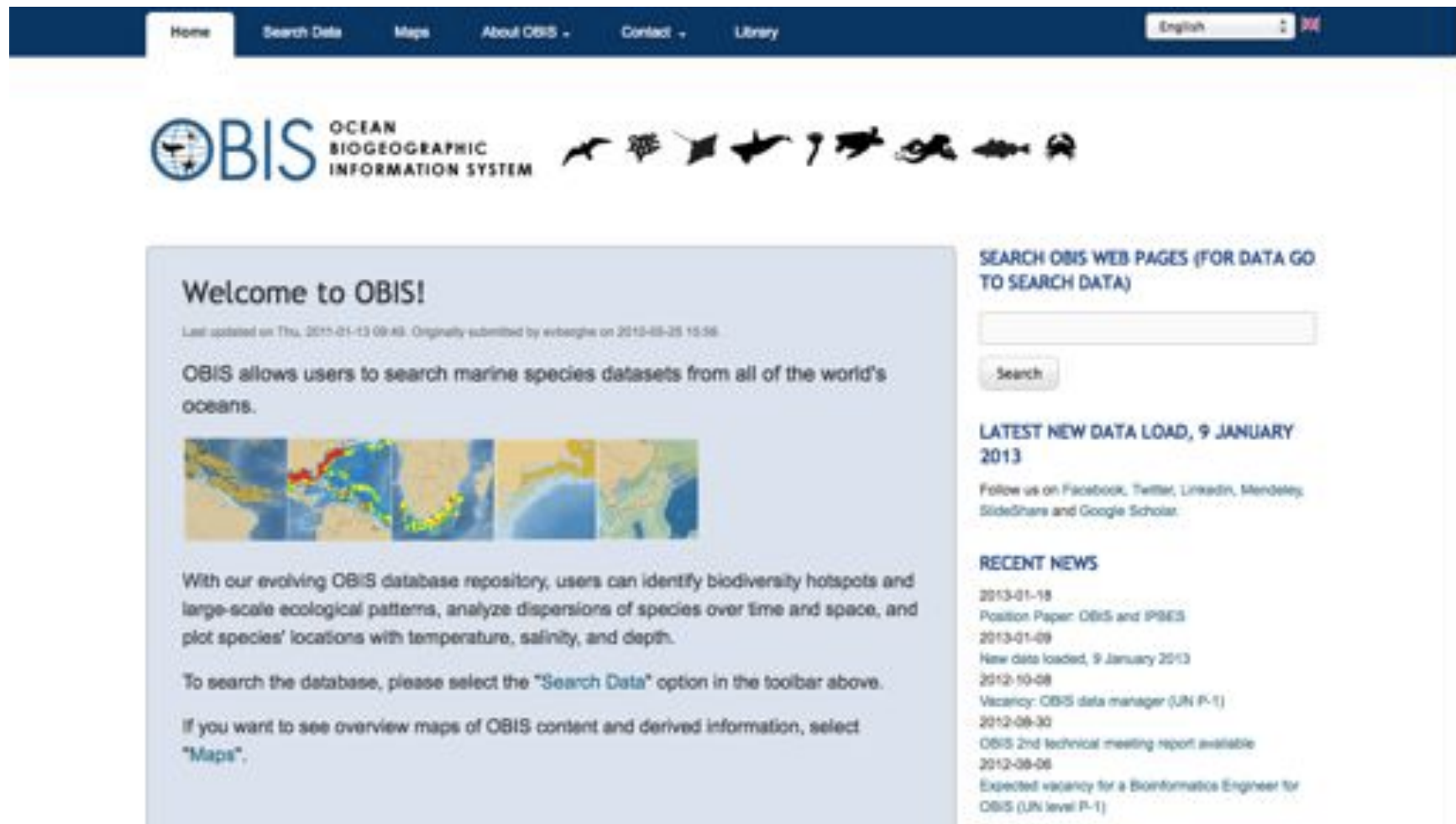
▶ Large Marine Ecosystems (LME)

COLLABORATIONS

FERU FishBase National Geographic CEO BALTIC GAPS

# Ocean Biogeographic Information System (OBIS)


<http://www.iobis.org>



The screenshot shows the OBIS website homepage. At the top is a dark blue navigation bar with links for Home, Search Data, Maps, About OBIS, Contact, and Library. A language dropdown menu is set to English. Below the navigation bar is the OBIS logo, which includes a globe icon and the text "OBIS OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM". To the right of the logo is a horizontal row of icons representing various marine organisms: a shark, a jellyfish, a squid, a fish, a crab, a shrimp, and a sea slug.

**Welcome to OBIS!**  
Last updated on Thu, 2013-01-13 09:43. Originally submitted by evberghs on 2010-08-25 15:58.

OBIS allows users to search marine species datasets from all of the world's oceans.



With our evolving OBIS database repository, users can identify biodiversity hotspots and large-scale ecological patterns, analyze dispersions of species over time and space, and plot species' locations with temperature, salinity, and depth.

To search the database, please select the "Search Data" option in the toolbar above.

If you want to see overview maps of OBIS content and derived information, select "Maps".

**SEARCH OBIS WEB PAGES (FOR DATA GO TO SEARCH DATA)**

Search

**LATEST NEW DATA LOAD, 9 JANUARY 2013**

Follow us on Facebook, Twitter, LinkedIn, Mendeley, SlideShare and Google Scholar.

**RECENT NEWS**

- 2013-01-18  
Position Paper: OBIS and IPBES
- 2013-01-09  
New data loaded, 9 January 2013
- 2012-10-08  
Vacancy: OBIS data manager (UN P-1)
- 2012-08-30  
OBIS 2nd technical meeting report available
- 2012-08-08  
Expected vacancy for a Bioinformatics Engineer for OBIS (UN level P-1)

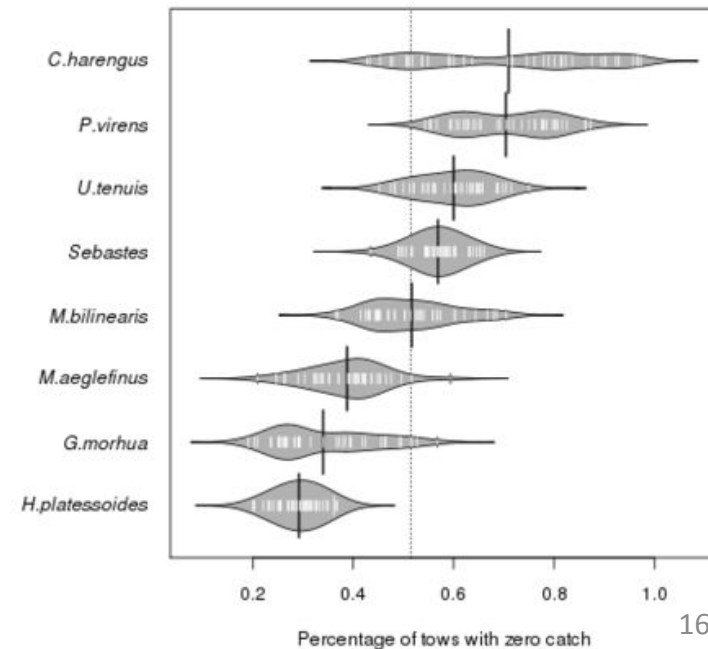
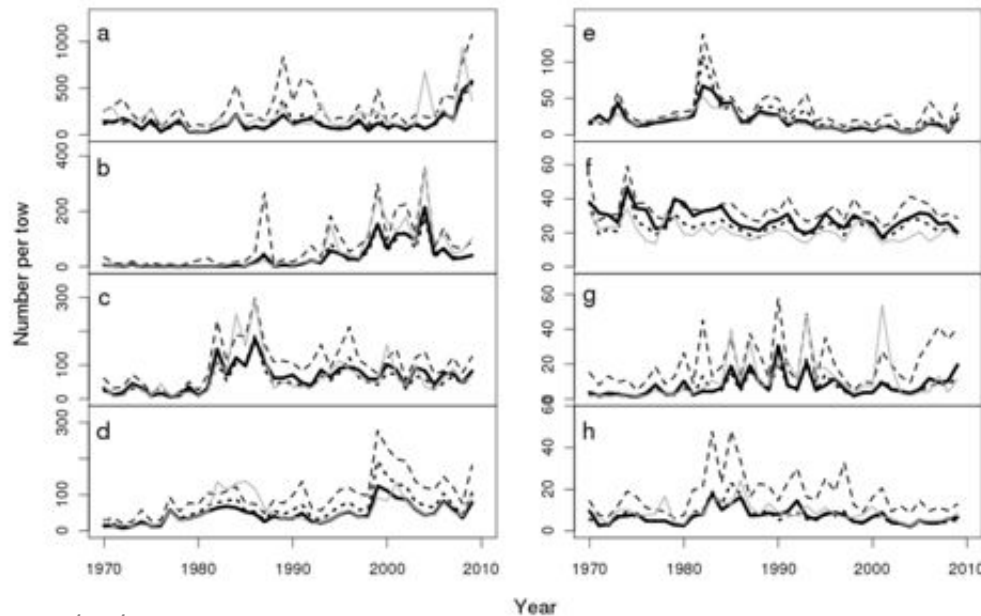
# R Statistical Computing

[icesjms.oxfordjournals.org](http://icesjms.oxfordjournals.org)

## Extracting groundfish survey indices from the Ocean Biogeographic Information System (OBIS): an example from Fisheries and Oceans Canada

Daniel Ricard, Robert M. Branton, Donald W. Clark, and Peter Hurley

Ricard, D., Branton, R. M., Clark, D. W., and Hurley, P. 2010. Extracting groundfish survey indices from the Ocean Biogeographic Information System (OBIS): an example from Fisheries and Oceans Canada. – ICES Journal of Marine Science, 67: 000–000.







# Ocean Tracking Network

<http://oceantrackingnetwork.org>

- The Ocean Tracking Network (OTN) data warehouse at Dalhousie University in Halifax Canada now holds 29 million records on 28 thousand tagged animals from 70 plus institutions in 13 countries, including 8 million records recently acquired from the former Pacific Ocean Shelf Tracking (POST).



*OTN receiver deployments (small white dots) overlaid with total number of unique tags detected by station (log scaled and colored by type of detection, where ANIMAL is green, MYSTERY is red and SENTINEL is yellow).*

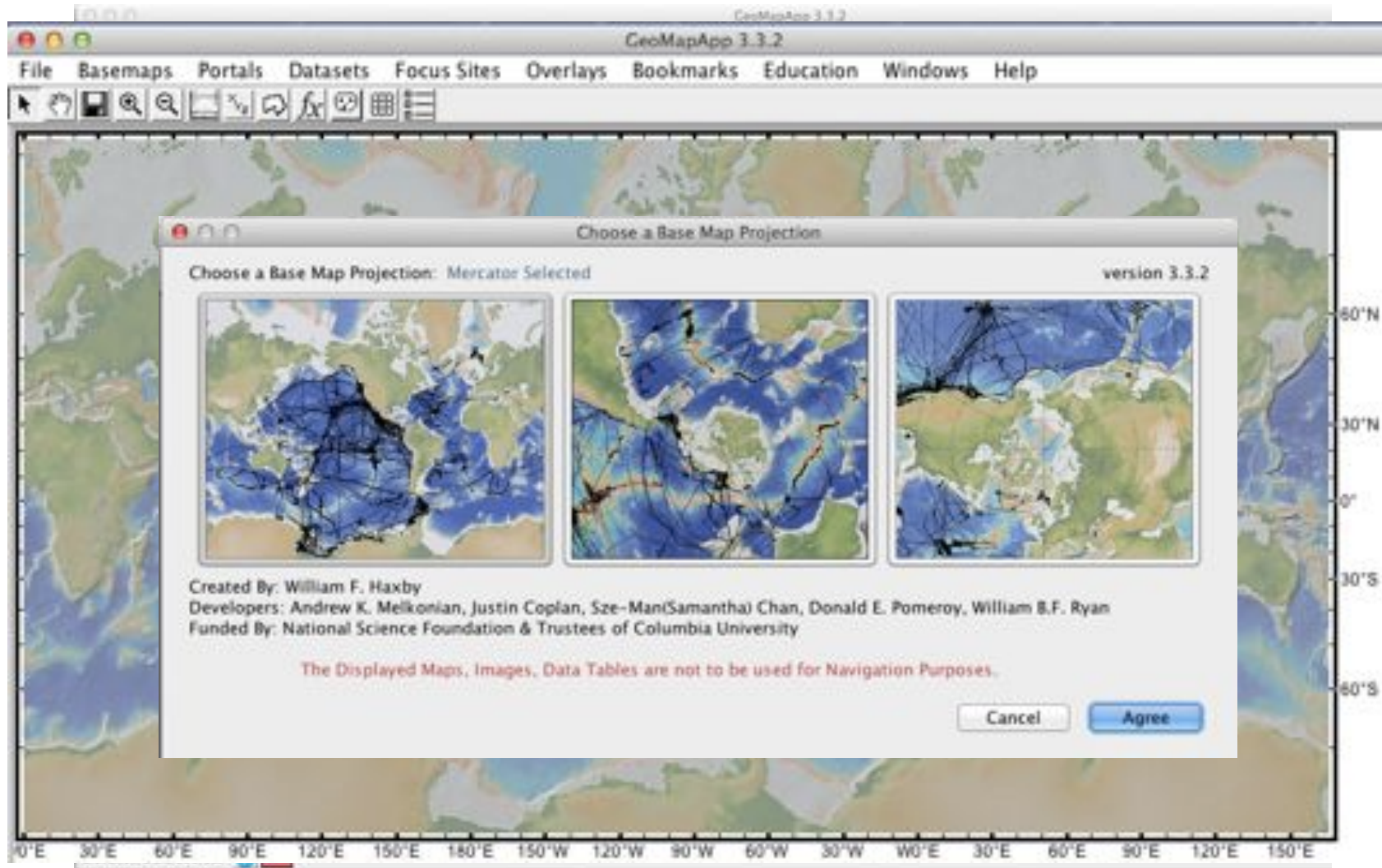
# Interoperability

*Integration with data and software  
from other disciplines*

- Comma Separated Variable (CSV)
- Shapefiles
- Keyhole Markup Language (KML)
- Web Mapping and Feature Services (WMS, WFS)
- Network Common Data Form (NetCDF)

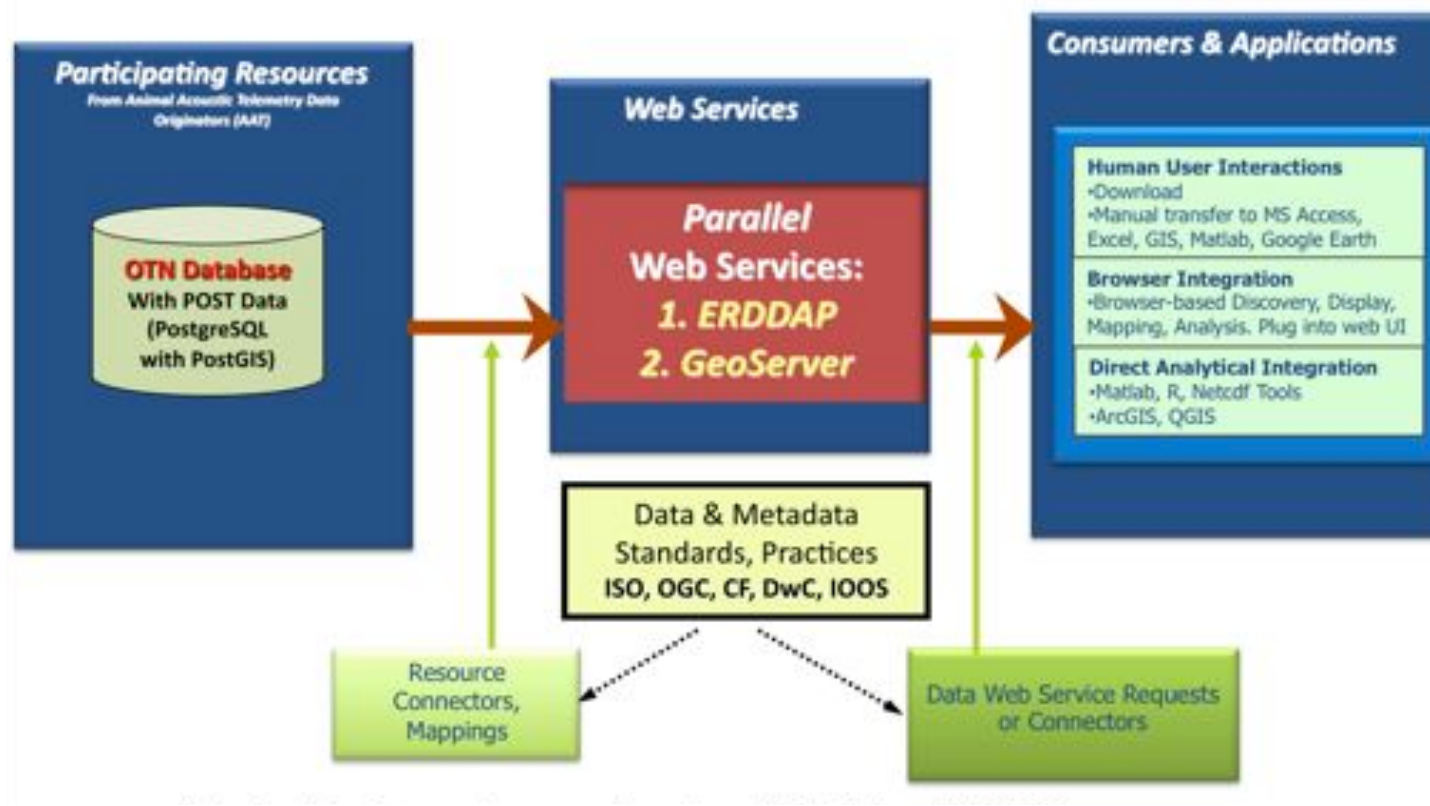
# GeoMapApp

[www.geomapapp.org](http://www.geomapapp.org)



# Parallel WMS/NetCDF Services

Global union of physical oceanographers and animal trackers.



*OTN's PostgreSQL/POSTGIS data system serving as base for IOOS POST-NANOOS US Animal Acoustic Telemetry (AAT) data integration project.*

# Intelligent Open Access

## 2011 Canadian Research Data Summit

- all data from public funded research to be made openly available in a timely manner as a condition of funding
- Exceptions being sought by OTN include:
  - not reporting location information on endangered species as a means of protecting them from illegal harvest,
  - protecting the thesis data for Highly Qualified Personnel who are in training.



# Preformed Data Citations



OTN is fairly close to recently released 'Recommended practices for citation of data published through the GBIF network' - [www.gbif.org/orc/?doc\\_id=4659](http://www.gbif.org/orc/?doc_id=4659)

For individual collections ...

Style 4	<b>Publisher (group of individuals) with frequent update or release of dataset</b>	
	Publisher 1, ..... and Publisher n <YEAR>. <Title of data resource>, <total no. of records>, published <modes of publishing>, <Primary access point>, first released on<release date>, <current version no. or last updated/released on (date)>, <Persistent Identifier>.	Publisher 1 et.al. <YEAR (Year first published/released -)>. <Version no., or last updated/released on (date)>, Persistent Identifier.

For regional and global collaborations ...

Style 6	<b>Institute/consortium (multiple contributors) with frequent update or release of dataset.</b>	
	<Publisher as Institution / Research Group / Consortium> <YEAR (Year first published / released -)>, <Title of data resource>, <total no. of records>, <Contributed by contributor 1(role), contributor 2 (role)..... contributor n(role)>, <published (modes of publishing)>, <Primary access point>, <Version no., or last updated/released on (date)>, <Persistent Identifier>.	<Publisher as Institution / Research Group / Consortium> <YEAR (Year first published / released -)>, <Version no., or last updated/released on (date)>, <Persistent Identifier>

2012 work plan calls for provision of ISO/NetCDF standard discovery metadata.

# Sustainability

**Fisheries and Oceans Canada**  
www.dfo-mpo.gc.ca

Home > Science > Data and Products > Integrated Science Data Management.

**Integrated Science Data Management (ISDM)**  
Providing Access to Ocean Data

ISDM's mandate is to manage and archive ocean data collected by DFO, or acquired through national and international programmes conducted in ocean areas adjacent to Canada, and to disseminate data, data products, and services to the marine community in accordance with the policies of the Department.

**Programme Descriptions**

- Argo
- Atlantic Zone Monitoring Programme
- BioChem
- Climate Variability (CLIVAR)
- National Contaminants Information
- Tides and Water Levels
- Global Temperature-Salinity Profile
- Joint Commission on Oceanography Meteorology (J-COMM)
- Responsible National Oceanographic (RNODC)
- Ship of Opportunity Programme (SOOP) Implementation Panel

**Data Request Form**  
Requests for data, data products and additional information may be made online by completing the Data Request Form.

**Important Messages**  
Commercial Reproduction  
Post notices

**Regions**  
ICES  
J-COMM  
NAFO  
Ocean Profiles  
Offshore Oil & Gas  
Remote Sensing  
RNODC  
SOOP  
Standards  
Thermosalinographs  
Tides and Water Levels  
TWL Applications  
Waves  
WOCE

**OBIS OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM**

Welcome to OBIS!  
Last updated on Thu, 2010-05-21 21:05. Originally submitted on 2010-05-20 15:05.

OBIS allows users to search marine species datasets from all of the world's oceans.

With our evolving OBIS database repository, users can identify biodiversity hotspots and track shifts in regional patterns, species distributions of individual time and space, and use the toolbar above.

SEARCH OBIS PAGES  
Looking for the version of the OBIS website from before September 2010? OBIS version 2 is still running here.

**OBIS.ORG VERSION 2**  
Looking for the version of the OBIS website from before September 2010? OBIS version 2 is still running here.

**RECENT NEWS**  
2010-09-21 Launch of the new OBIS web site imminent  
2010-09-02 Prototype OBIS web site becomes available  
2010-08-02 iOBIS node manager on study visit  
2010-08-02 New Data on OBIS  
2010-07-18 New members of staff

**INTERNATIONAL OCEANOGRAPHIC DATA & INFORMATION EXCHANGE**

[www.iode.org](http://www.iode.org)

OBIS strives to document the world's diversity, distribution and abundance of life. Created by the Census of Marine Life, OBIS is now part of the Intergovernmental Oceanographic Commission of UNESCO, under its International Oceanographic Data and Information Exchange programme.



# Questions ?

- Links:

- COSEWIC: [www.cosewic.gc.ca](http://www.cosewic.gc.ca)
- FAO: [www.fao.org/fishery](http://www.fao.org/fishery)
- GBIF: [www.gbif.org/orc/?doc\\_id=4659](http://www.gbif.org/orc/?doc_id=4659)
- GCMD: [gcmd.nasa.gov](http://gcmd.nasa.gov)
- GEOMapApp: [www.geomapapp.org](http://www.geomapapp.org)
- FishBase: [www.fishbase.org](http://www.fishbase.org)
- IMBER - [www.imber.info](http://www.imber.info)
- ICESjms: [icesjms.oxfordjournals.org/content/67/4/638.short](http://icesjms.oxfordjournals.org/content/67/4/638.short)
- IODE: [www.iode.org](http://www.iode.org)
- ISDM: [www.meds-sdmm.dfo-mpo.gc.ca](http://www.meds-sdmm.dfo-mpo.gc.ca)
- MarineRegions.org: [www.marineregions.org](http://www.marineregions.org)
- NAFO: [www.nafo.int](http://www.nafo.int)
- OBIS: [www.iobis.org](http://www.iobis.org)
- OTN: [members.oceantrack.org](http://members.oceantrack.org)
- Sea Around Us: [www.seaaroundus.org](http://www.seaaroundus.org)
- WoRMS: [www.marinespecies.org](http://www.marinespecies.org)

# Why Atlantic cod, *Gadus morhua* Linnaeus, 1758?

‘Since first encountered by native North Americans, then later by European Adventurers and fisherman, the abundance of fish in the Northwest Atlantic never failed to amaze.’

George Rose

‘It is difficult to overestimate the economic and social impact of cod.’

Wade Kearley



[www.boulderpublications.ca/](http://www.boulderpublications.ca/)  
[boulderpublications.ca/Nature.html](http://boulderpublications.ca/Nature.html)

**Status: *Endangered* (Varies by Stock) - Committee on the Status of Endangered  
Wildlife in Canada (COSEWIC) 2010 - [www.cosewic.gc.ca](http://www.cosewic.gc.ca)**

# Bugs are everywhere!



In 1946, Grace Hopper joined the Harvard Faculty at the Computation Laboratory where she work on the [Mark II](#) and [Mark III](#). Operators traced an error in the Mark II to a [moth](#) trapped in a relay, coining the term *bug*. This bug was carefully removed and taped to the log book. Stemming from the first bug, today we call errors or glitch's [\[sic\]](#) in a program a *bug*... wikipedia