INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

Tenth Session of the IOC Intergovernmental Panel
on Harmful Algal Blooms
UNESCO Headquarters, Paris, 12-14 April 2011

AN INTERNATIONAL HARMFUL ALGAL INFORMATION SYSTEM

- VISION, DESIGN AND PARTNERSHIPS –

As adopted by IPHAB-IX April 2009

-
AN INTERNATIONAL HARMFUL ALGAL INFORMATION SYSTEM
- VISION, DESIGN AND PARTNERSHIPS -

IN PARTNERSHIP WITH:
Table of Contents:

1 PREFACE 2
2 Background and context for an international information system 3
3 Vision 4
4 Users, and answers to be offered to users 6
  4.1 Scientists 6
  4.2 Managers and policy makers 7
  4.3 The education sector 7
  4.4 Industry and the general public 7
5 Description of data modules 7
  5.1 Taxonomic Reference List 8
    5.1.1 Interoperability 9
  5.2 Harmful algal event data 9
  5.3 Monitoring system data 10
  5.4 Biogeographic data 11
  5.5 Expert roster data 12
  5.6 Harmful algae-related illness data 12
  5.7 Bibliographic data 13
6 Data Products 13
7 User interface 13
8 Links and partners – data flow & exchange 14
9 Data acquisition 15
  9.1 Taxonomic Data 15
  9.2 Harmful Algal Event Data 15
  9.3 Monitoring System Data 17
  9.4 Biogeographic Data 18
  9.5 Expert Roster Data 18
  9.6 Bibliographic Data 18
10 Data Management and Quality Assurance 18
11 Longer-term development 19
12 Work plan 2009-2010 20
13 Funding requirements 27

ANNEX I: HAEDAT format for data on harmful algal events 29
ANNEX II: MONDAT format for data on monitoring system design 34
ANNEX III: HABMAP format for biogeographical data and regional editors 36
ANNEX IV: Joint IPHAB/IODE Task Team on the development of HAIS 41
ANNEX V: US HABISS 44
ANNEX VI: List of Organisations, Acronyms and Links 46
1 PREFACE

This document describes the vision, structure and partnerships for an international information system on the occurrence, impacts, identification, and monitoring of marine and brackish water planktonic and benthic microalgae perceived as harmful by humans. The document was developed by the Joint IPHAB/IODE (Document IOC/IPHAB-VIII/3 see http://www.ioc-unesco.org/hab) Task Team on the development of the Harmful Algal Information System (HAIS) at a Workshop 8-9 January 2008, Oostende, Belgium.

The Task Team and the involved organizations acknowledge with appreciation the United States National Oceanic and Atmospheric Administration/National Ocean Service, the Government of Flanders and the United Kingdom for their financial support, without which the initiation of an International Harmful Algal Information System would not have been possible.

The document will remain ‘in progress’ as clarification is achieved concerning specific technical solutions and relationships with partners. The date is therefore indicated on the coverpage of this document.

Pending issues:

   i) Clarification of formalised links IOC-EoL
   ii) Clarification of OBIS or HAEDAT platform for HABMAP data
2 Background and context for an international information system

The establishment of a Harmful Algal Information System (HAIS; http://www.iode.org/haedat/) is a response to the need for an authoritative and co-ordinated world-wide on-line source of information about a growing environmental problem. It builds on the evolution over the past 15 years of a number of separate databases and data products on harmful algae developed in partnerships between IOC (Intergovernmental Oceanographic Commission) of UNESCO (United Nations Educational, Scientific and Cultural Organization), the International Council for the Exploration of the Seas (ICES; http://www.ices.dk/indexfla.asp), the North Pacific Marine Science Organization (PICES; http://www.pices.int/), and the International Society for the Study of Harmful Algae (ISSHA; http://www.issha.org/). This document constitutes a joint basis that uses newer aggregation or mashup approaches to link the contents of and promote further development of these databases and their data products.

In 2007 the IOC Assembly adopted the IOC Strategic Plan for Oceanographic Data and Information Management. The vision of this Plan is to establish a “comprehensive and integrated ocean data and information system, serving the broad and diverse needs of IOC Member States, for both routine and scientific use”. Summarized to its essence, the Strategy will “develop a system that provides access to data and information collected by all IOC Programmes and Projects in a uniform and transparent way to all users”. HAIS will be a component of this integrated system.

Worldwide there are approximately 10,000 known species of microalgae which make up the phytoplankton. Of these, some 300 species have been reported to have harmful effects on the ecosystem or on the human use of the ecosystem when the population of such a species reaches a certain size.

A distinction must be drawn between large biomass blooms and toxin producing algae. Large biomass blooms can cause problems by restricting light to macroalgae and seagrasses or when the bloom declines and oxygen is consumed during the breakdown of the cells, leading to deoxygenation of the water and fish mortality. Noctiluca is one of the organisms which causes this problem, large blooms of which result in ‘red tides.’ Some species such as Phaeocystis also produce foam or scum that can accumulate on beaches, create unpleasant smells or clog fishing nets. Toxin-producing algae produce toxins that can directly affect marine fauna or can accumulate in shellfish or in other marine animals. If eaten these can cause human health problems and in severe cases death. Examples include species of Dinophysis, which produce toxins causing diarrhetic shellfish poisoning, and species of Alexandrium, which produce toxins causing paralytic shellfish poisoning. Shellfish such as mussels can become toxic when there are only very low concentrations of algae (a few hundred cells per litre) in the water. Species of the diatom Pseudo-nitzschia produce domoic acid, which can cause amnesic shellfish poisoning.

The last two decades have been marked by a new appreciation of the serious impacts of the phenomena we now refer to as harmful algal blooms (HABs). These occurrences of toxic or harmful microalgae represent a significant and seemingly expanding threat to human health, fishery resources, tourism and marine ecosystems throughout the world. Many causes, both natural and anthropogenic, may be responsible for this dramatic expansion in HAB effects; it is likely that
increased human exploitation of coastal areas is making the problems more evident and in some cases worsening it through, for example, increased nutrient inputs, and transportation and discharge of ballast waters.

Given that HAB problems may be expanding, what can be done about them in a practical sense? We need to know what is required for efficient management of affected marine ecosystems that simultaneously protects public and ecosystem health, encourages and supports aquaculture development, and contributes to policy decisions on coastal zone issues such as wastewater disposal, aquaculture development, and dredging? We need to capture all available knowledge both previously collected and in real time, we need to know what research and monitoring should be conducted to determine the extent to which human activities may contribute to making the HAB problem worse and what steps should be taken to minimize further impacts? The answers to these important practical questions, and the research needed to provide them, require easy access to a large pool of reliable existing data, information, and experience.

3 Vision

The overall goal of the IOC Harmful Algal Bloom Programme is to foster the effective management of, and scientific research on, Harmful Algal Blooms (HABs) in order to understand their causes, predict their occurrences, and mitigate their effects.

As part of this goal, in 2007, the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB) recommended the development of a Harmful Algal Information System.

Vision:

An easy-to-navigate, dynamic, integrated, and distributed system with: visual and interactive quality-assured data and scientific information on harmful algae provided by experts, coupled with general information on authorities and institutions involved with sea food safety, statutory monitoring of harmful algae / toxins and institutions involved in HAB research.

The IPHAB/IODE Task Team sets to establish the HAIS as the premier Internet-based facility for a “one-stop shopping” range of quality-assured data and information on HABs, toxin-producing algae and associated events in the world oceans. In addition to providing a wide range of information to support the needs of a broad customer base, HAIS will contain data on national monitoring programmes and scientific expertise provided by national experts. By collating this material and making it available, HAIS will facilitate the global exchange of information on HABs and toxin-producing algae (TPA), as well as provide a safe archive of HAB and TPA data for future generations.

HAIS will dynamically incorporate expert information from specialist / focussed web accessible sources. Individuals and agencies are concerned that new large systems may take away their reason for existence. HAIS is being designed to use ‘aggregation technology’ to dynamically integrate data from other projects into a larger framework that can lead to a more comprehensive information environment, will make the work of individuals and projects more meaningful to extended audiences, will increase the value of work, and will promote standardization. HAIS acknowledges
that academics, research groups, and governments need to continue what they do, and will complement and extend that work but not duplicate it.

**HAIS**

*Figure 1.* HAIS will be an information system with one entry point for human or machine access to data and information on harmful algal species, their effects, their occurrences, expertise on HABs, and access to key literature and references.

HAIS will be a dynamic, integrated, and distributed system. That is, it will always be ‘dynamic’, changing as a result of input; ‘integrated’, as it integrates multidisciplinary data; and ‘distributed’, as it has interoperability with other specialized datasets.

We propose that HAIS contain the following:

a) **Background material:**
   - information on harmful algal species: taxonomy of each species, reference and access to scientific papers most relevant to original descriptions as well as to contemporary literature;
   - toxins: their toxicities and effects with deep links to specialist web sites;
   - other effects not caused by toxin production;
   - health issues: public health, protective measures, etc.;
   - biological descriptions of each species: morphology, life cycles, seasonal and geographical distributions, ecophysiology;
   - availability and location of cultures and toxin reference materials with deep links to appropriate web sites.

Data products to be retrieved via dynamic and distributed interoperable links; for example, the occurrence of a species may be combined with data from other data systems to create new composite and synthetic aggregates of information:

- a reference list of names of harmful algal species and flexible and easy to use keys to assist with correct identifications, as well as molecular barcoding. The list will be an authoritative IOC reference list of species, and will be automatically updated;
Intergovernmental Oceanographic Commission of UNESCO

- species and strain distribution maps;
- harmful algal event reports: location, type, density, bloom conditions, impact, etc;
- details of existing HAB monitoring programmes, including regulatory levels for each toxin and threshold levels of the abundance of each toxin-producing species;
- directory of experts.

b) An interactive web site, for example:
- links to experts who can provide advice;
- links to listservers where questions can be addressed to the scientific community;
- a forum where individuals could, e.g. post a picture of a species and ask for comments.

4 Users, and answers to be offered to users

HAIS will be designed to address the needs of a broad customer base, including scientists (research / policy support), managers (regulation, resource), the marine sector (fisheries, tourism), the education sector (teachers and students), politicians, and the general public. However, in the first phase of development the primary target will be the community from whom data will come and the expert users.

The following outlines the expected value of HAIS to these different user groups. The assessment was based on responses in 2007/08 to questions from representatives of the above user groups through the IOC IPHAB, the ICES-IOC Working Group on Harmful Algal Bloom Dynamics (WGHABD) and on feedback from interviews with selected individuals. The user groups identified were:

4.1 Scientists

We anticipate that scientists will be the main user group. This will include scientists in government research institutions, universities, and private sector laboratories that serve as the focal point for advice to the authorities responsible for seafood safety, monitoring of harmful algal and biotoxin occurrences, bathing water quality, and environmental monitoring. For these users, HAIS will act as a “one-stop shop” for comprehensive and up-to-date information and data that will facilitate qualified and fast responses to authorities, industry, and the general public on occurrences of harmful / toxin-producing algae and associated events.

As the site will also accept information from experts, it will not only be a shop, but also a bank where information can be deposited and where it will gain value by being vetted by the editors (see Annex III) and user community, as this will remove questionable content, or by forming dynamic connections with other data sets.

It is anticipated that HAIS will provide background information and data for research projects and be an aid in the preparation of research proposals. HAIS will therefore contribute to answering questions such as:
- Which ecophysiological conditions favour HABs and TPA?
- Which species are exhibiting changes in frequency or impact?
What factors, such as climate change and anthropogenic nutrient enrichment, are responsible for changes in HAB distributions over time?
What controls regional differences in toxicity?

4.2 Managers and policy makers
The second group of users will include individuals involved in managing policy for seafood safety, the implementation and operation of statutory monitoring programmes (including those concerned with the occurrence of HABs and TPA, and bathing water quality). Individuals employed in these areas will have direct access to background materials on HABs and toxins, information on regulatory agencies and monitoring programmes in other countries, current legislation in other countries, and links to on-line resources made available by these bodies. The information on HAIS will allow such persons to provide authoritative briefings to senior management, the public, and media outlets.

4.3 The education sector
HAIS will be a reference and data source for those who build resources (e.g. educational exercises designed to meet the specifications and standards laid out in curricula) for teachers and students from high school to university level, as well as for people involved in public outreach programmes. Secondarily, teachers and students at all levels will themselves have access to a wide range of data and information for teaching and training purposes.

4.4 Industry and the general public
The fishing industry (commercial harvesting of wild stocks and farmed fish and shellfish), together with other commercial marine sectors such as tourism and the general public, will benefit from having access to an easy to navigate site with information that is readily understandable and provides visual and interactive quality assured material contributed by experts. Such information includes authorities and institutions involved with seafood safety and monitoring of harmful algae to meet statutory requirements, and research institutes involved in HAB research. HAIS may, for example, serve as a reference and resource for designing national web sites on HABs.

The first and foremost priority will be for HAIS to become the authoritative site for relevant sectors of industry, their specialised staff and other specialists. HAIS will be a content partner to the Encyclopedia of Life (EOL; http://www.eol.org/), and a portion of data and information held in HAIS will contribute to the species pages in EOL. Users visiting EOL will find links back to HAIS.

5 Description of data modules
The data modules of HAIS will be a further development of a number of existing databases and data products that will be fully or partly integrated and implemented in new software platforms and systems. Below, is each module, and what data it needs to contain to develop it.
5.1 Taxonomic Reference List

The Reference List exists as the ‘IOC Taxonomic Reference List of Toxic Plankton Algae’. The List provides a reference for the use of each taxonomically correct name, as well as authoritative information on each species of toxic microalgae. The top priority will be the toxic HAB species, and content on non-toxic HAB species will follow.

The Reference List was established in the form of a web site (http://www.bi.ku.dk/ioc/) rather than a database. The List provides the list of species in the current HAB databases described in this section and will be integrated as the taxonomic backbone in HAIS.

As the first step in developing HAIS, the Reference List has been integrated into the World Register of Marine Species (WoRMS). Their site (http://www.marinespecies.org/hab/index.php) was established on 15 June 2008, and is ready for upload and transfer of data. The List has a user interface separate from that of WoRMS, but all data will also appear in WoRMS.

The Taxonomic Reference List will be developed to include the following data and information:

- Genus and how to identify the genus
  - Description
  - Flexible and easy-to-use matrix keys to discriminate species within the genus. The overall key structure may be part of the navigational structure and the two might have a common foundation.
- Species
  - The current name and all synonyms
  - Other names (for indexing the literature – may not be shown)
  - Location of molecular identification data (e.g. molecular barcoding)
  - Taxonomic notes, including a morphological and morphometric description
  - Photographs (light and electron micrographs) for each species, including those most relevant to the original description and drawings
- Life cycle
- Distribution – (the data contained in the HAIS component HABMAP) and OBIS (http://www.iobis.org/), comments on distribution
- Ecology/ecophysiology: including references, notes
- Geographical locations of harmful events for each species
- Toxicity / harmful effect
  - Levels of toxicity (mode of action / symptoms)
  - References
- Availability and sources of cultures or toxin reference material
- Genetic information (Quality Control), including links to proper codes
- Literature: with DOI references. This will allow the references to cross-link to other documents on the web, and improve access into the Biodiversity Heritage Library and legacy literature.
- Molecular fingerprints

Information can be presented either in the narrative or atomic format. Whereas the List will initially provide information in the atomic format, as given by the database structure, it will be the
goal to also provide the information in a narrative format. It is obviously key to ensure that the two
stay in synchrony. EOL is foreseen to provide some new tools that will allow comparisons of what
is written in a paragraph with the entries in a database.

5.1.1 Interoperability

HAIS will pursue a model in which it retains responsibility for the definitive informational content,
but in which we delegate the tasks of integrating the content into other dynamic web sites and
gathering additional comments and value to its partners.

As the first step in developing HAIS, the Reference List has been integrated into the World Register
of Marine Species (WoRMS). Their site (http://www.marinespecies.org/hab/index.php) was
established on 15 June 2008, and is ready for upload and transfer of data. The List has a user
interface separate from that of WoRMS, but all data will also appear in WoRMS. Furthermore, the
List will hold inform descriptive, ecological, systematic, other information to populate the
information fields that exist on species pages in EOL. EOL in its turn will provide web services
that will allow information indexed by it to flow back to HAIS. The additional information may
include taxonomic information provided by experts, links to taxonomically relevant documents
provided by the Biodiversity Heritage Library (http://www.biodiversitylibrary.org/, an international
multi-library initiative that intends to digitize and index all out-of-copyright literature about
organisms), sightings, and occurrences information, images, etc.

To achieve interoperability with these environments, HAIS will work with the Bioinformatics team
at the MBL, home to the informatics for the EOL project. The content of HAIS will be configured
to comply with the TDWG Species Profile Model (http://wiki.tdwg.org/SPM). This is a standard
structure that, when coupled with appropriate APIs (web services) allows exchange of HAIS
information with other web sites.

Through its collaborations with WoRMs and the MBL informatics team, HAIS will be provided
with high visibility user interfaces that will allow users to submit additions, corrections, pictures or
sightings for the editors of HAIS to validate and include in the databases.

HAIS will also have access to Lifedesk / ScratchPad content management systems. These are
modular environments whereby experts can accumulate information about organisms. They will be
freely available, are based on DRUPAL software and are being developed and will be supported by
EOL and the European Distributed Institute of Taxonomy (EDIT).

5.2 Harmful algal event data

Harmful algal event data are compiled and stored in ‘The Harmful Algal Event Database’
(HAEDAT; http://www.iode.org/haedat/). It is a database containing records of harmful algal
events, but not the known geographical occurrence of individual species. It is a joint activity
between ICES and PICES. HAEDAT contains records from the ICES area (North Atlantic) since
1985, and the PICES area (North Pacific) since 2000. IOC Regional networks in South America
and North Africa are preparing to start contributing.

HAEDAT has a comprehensive data field design, which is included as Annex I. HAEDAT does not
contain complete datasets, time series or primary data, but summarised data that describes what in a
given national monitoring system was registered as a HAB or TPA. Metadata includes information
on methods used to collect data, and information on which institution holds input data and full data
sets. In 2006-2007, HAEDAT was moved to a newly designed platform. Further development is in
progress, including: on-line submission of data (expected 2009); integration and linkage with other
modules; and upgrading of user interface and mapping capabilities.

5.3 Monitoring system data

Detailed data on HAB monitoring systems, legislation, thresholds / action levels for species and
toxins, and responsible agencies in most of the countries that have such systems in place, are
currently compiled and stored in the ‘Design and Implementation of Some Harmful Algal
Monitoring Systems’ data component (MONDAT). Data were compiled in 1995/96 and 2000/01.

MONDAT contains data and information on:

- Resources to be protected by HAB monitoring
- Type of organisation / institution responsible for implementation of HAB
  monitoring
- Funding
- Monitoring parameters
- Organization / institution carrying out HAB monitoring
- Identification and quantification of algae
- Action limits – Algae
- Institutions responsible for evaluation and dissemination of HAB data
- Data released and method used for dissemination
- Management actions imposed upon harvest of shellfish
- Monitoring parameters – Shellfish
- ASP action limits and analytical methods
- PSP action limits and analytical methods
- DSP action limits and analytical methods
- Management actions – Shellfish
- Cost / benefit

Up to March 2007, MONDAT was available on-line but the database application is out of date.
Work is in progress to retrieve MONDAT data from its present software, and import it into the
HAEDAT platform. Hereafter, the data need to be updated.

For MONDAT specifications on data fields for input and conventions, identification of which data
fields permit exchange with other data systems (see section 7) and which data fields allow to be
searched, see Annex II.
5.4 Biogeographic data

Data on the known geographical occurrence of individual species will be derived from published material and checked by regional experts for consistency and synonymies. The HAIS component on biogeographical data is the ‘HABMAP’ and is a joint initiative of IOC and ISSHA. Data are initially structured to match the HAEDAT format (see Annex I). For each of the toxic species listed in the Taxonomic Reference List (see Section 4.1), findings in a given area are summarised with the information on whether: 1) the species has been found with no apparent toxicity / harmful effect; 2) the species has been found and revealed to be toxic in laboratory analyses; or 3) the species has been associated with an impact (e.g. toxin accumulation in seafood, intoxication of animals or humans). Data have already been compiled for test regions. Further progress awaits availability of the database platform and the on-line input facility. The solution may be a customised HAEDAT platform or the OBIS platform with extensions to the OBIS Schema.

As compared to HAEDAT (4.2), which lists the harmful events, HABMAP collects the information on the distribution of potentially harmful species, regardless of their impacts. In this respect, HABMAP can be used to trace the dynamic biogeography of the harmful species and the risk associated with them.

Distribution records will be shared with the Ocean Biogeographic Information System (OBIS; http://www.iobis.org/): data in HABMAP will be made available through a DiGIR provider to OBIS for re-publishing of the distribution records through the international portal of OBIS (iOBIS). This will facilitate interpretation of the HABMAP data in the context of distribution of other species, as recorded in OBIS. Making the data available through iOBIS will make all OBIS functionality available for the HAEDAT data:

- The OBIS search interface, which includes tools for modelling species distributions and for querying on physical oceanography parameters, will be available to interact with the HABMAP data
- OGC-compliant web services
- Quality control procedures and archiving facilities

Also, any data published through OBIS is made available to the Global Biodiversity Information Facility (GBIF; http://www.gbif.org/). GBIF is to play an important role in the Group on Earth Observations (GEO; http://www.earthobservations.org/) and its Global Earth Observation System of Systems (GEOSS; http://www.earthobservations.org/). as well as in the GEO-Biodiversity Observation Network (GEO-BON; http://www.earthobservations.org/cop_bi_geobon.shtml). OBIS, as the thematic sub-network of GBIF responsible for marine data, will be responsible for interacting with and contributing to the marine components of GEO-BON and of GEOSS. The latter is the Global Ocean Observing System (GOOS; http://www.ioc-goos.org/) of IOC. By publishing its data through iOBIS, HAIS will automatically contribute to all these global initiatives.

GBIF and OBIS data on species involved in HABs will be incorporated within HABMAP. This would allow incorporation of distribution records from many more sources than the HABMAP team would be able to handle, and substantially increase the data holdings available to HABMAP.

For specifications on data fields for input and conventions, data fields for exchange and possible searches, see Annex III. In the full design of the for the structure of the data to be exchanged the OBIS Schema will betaken into account and the DiGIR (http://digir.net/)as the transport protocol.
5.5 **Expert roster data**

The International Directory of Experts in Harmful Algae and Their Effects on Fisheries and Public Health (HABDIR) is a specialised section of the IOC Ocean Expert directory [http://www.oceanexpert.net/](http://www.oceanexpert.net/). It is a roster established over the past 15 years and its integration into HAIS will be as a link to the specific user interface of Ocean Expert for HABDIR. Experts and contact persons held in MONDAT, data providers to HAEDAT, and experts with curatorial responsibilities for the Taxonomic Reference List will all be cross-referenced and included in HABDIR, if not already there. Beyond this, HABDIR serves as a roster for the broad scientific and managerial community working with harmful algae.

5.6 **Harmful algae-related illness data**

Harmful algae-related illness data are at present not compiled internationally or regionally. However, an ideal Harmful Algae Information System is considered to include such data. A template and starting point for compiling and including such data is the US ‘Harmful Algal Bloom-related Illness Surveillance System’ HABISS, which is an active surveillance system that can be accessed online through the Web. HABISS requires users to input several key indicators (e.g. dates, agency contact info, state codes, route of exposure, patient’s chief complaint, etc). If data is available, HABISS prompts users to report the following data elements for a suspected human illness report:

- Point of contact with the system
- Identifying information for the case
- Case demographics
- Environmental information
- Exposure information
- Signs and symptoms
- Medical Review (including laboratory analysis)
- Case assessment and follow-up
- Parallel modules for animal events

Human illness reports can be easily linked to data collected on algal blooms. It is intended to synthesize not only regional algal blooms across multiple sites, but also active blooms in residential ponds, reservoirs, natural springs, and other water bodies.

Users are requested to report the following data elements for an algal bloom report:

- Water sample & collection information
- Geographic coordinates via link to Google map
- Toxin Identification

US HABISS is accessible through CDC’s Rapid Data Collector and is limited to individuals who have specifically requested and obtained digital certificates for security purposes. See Annex V for details on HABISS.
5.7 Bibliographic data

Literature references on HABs are compiled and stored in ‘The IOC Bibliographic HAB Database’, (HABBIB; http://ioc.unesco.org/RIS/RISWEB.ISA). HABBIB is a specialised section of the Aquatic Science and Fisheries Abstracts (ASFA; http://www.fao.org/fishery/asfa). Key taxonomic papers referred to in the Taxonomic Reference List and HABMAP will either link to HABBIB or in OceanDocs (http://iodeweb1.vliz.be/odin/). OceanDocs is a depository of research and publications in marine science in digital form, including preprints, published articles, technical reports, working papers, and more.

It may also become relevant for HAIS to make use of a tool to find and index original taxonomic and nomenclatural acts that is being developed within the Biodiversity Heritage Library (BHL) holdings. This will depend on a deeper analysis as HAIS is being developed. BHL will also introduce a ‘safe harbour’ environment for copies of taxonomic papers. These may be papers that are under copyright control, but the structure of the safe harbour will allow the papers to be freely available until such time as there is a concern from a copyright owner, at which point the article is removed. By using the BHL system, HAIS would commit to getting copies of all relevant documents into this safe harbour.

6 Data Products

HAIS will deliver a number of data products to serve the users and stimulate and justify continued and additional new data submission.

1. **Dynamic mapping:** On-line mapping tool for all data, and combination of data, on species distribution, events, syndromes, etc.

2. **Species fact sheets and a species identification system** (see Section 4.2): An easy-to-use key for identification of genera and species within a genus, for the relevant taxa.

3. **High-quality visualizations:** Pre-prepared maps and graphics with, e.g. yearly and decadal distribution of syndromes, species and events, ready for download as high-resolution PDF files. User surveys will define specific maps and graphics.

4. **HAIS publication series:** Pending the assessment of a user survey, selected high-quality visualizations may be published as an annual printed report to serve the users and to stimulate and justify continued and additional new data submission.

5. **Discussion forum:** A dynamic, participatory forum for discussion and direct access to other experts.

7 User interface

The vision includes the design of an integrative HAIS frame, or user interface, for HAIS, which will be built using the same codebase that underpins Encyclopedia of Life (EOL).
The collaboration with OBIS, WoRMS and the adoption of the EOL code-base will provide HAIS with cost-effective solution to its needs for an information management environment that will include participatory interfaces, services that aggregate distributed information on harmful algae, capacity to display ‘species pages’ with a HAIS-specific appearance yet be adapted to suit the needs of different audiences.

The EOL codebase has been placed in an open-source environment. We will work with the team based at the MBL and who are developing the EOL codebase to configure and extend the code to meet the special needs of HAIS. This arrangement also allows HAIS to participate in and benefit from global biodiversity informatics initiatives. These include access to complementary information from databases worldwide, the development of new tools such as identification systems that will be designed to manage information about any species, in any location, for any audience. Interestingly, one of the first taxonomic areas to be explored as this toolkit is developed will be dinoflagellates. Another benefit is the integration of EOL with the efforts of GBIF, the Census of Marine Life and the Bar Code of Life initiatives. The use of the EOL codebase will provide HAIS site with access the biodiversity informatics standards being developed by the Taxonomic Database Working Group (TDWG; http://www.tdwg.org/).

It is to be expected that HAIS will have master and slave development and production environments to protect HAIS services in the event of a short term break in services at one location. The EOL codebase is now available in an opensource environment, and this provides reassurance that HAIS is not at risk should the EOL project come to an end.

8 Links and partners – data flow & exchange

HAIS is a multi-partner system. It is overall an IOC activity as a joint undertaking under the IPHAB and the International Ocean Data Exchange Programme (IODE). IOC will develop and maintain the HAIS platform. Some data modules are developed and maintained in partnership with other organisations, as described under Section 4. These organisations have equal ownership to the respective data. HAIS will acknowledge all partnerships with inclusion of organisation name and logo.

The applied technology will allow for indexing of content at as many remote sites as we wish, to exchange data with remote sites, or to interconnect them to and within authoritative species pages. The connections can for example be at the level of ‘subject area for a particular species’, thereby having a single point of access to all information on, say, the biogeography of each species. There is a risk that in federated systems, authoritative and correct content can become incompatible (e.g. ‘site 1’, which deals with blooms in the US, may state “blooms known only from California”, whereas a source with world-wide relevance might say “from the US and Mexico”). This will be addressed by having commenting and forum functions associated with the data objects, so that users can post comments to the site.
Overall data policy is the IOC data policy (Resolution IOC-XXII-6 entitled ‘IOC Oceanographic Data Exchange Policy’, see http://www.iode.org/index.php?option=com_content&task=view&id=51&Itemid=95).

All data in HAIS may also be accessed via or shown in OBIS, WoRMS and EOL, as relevant, provided proper acknowledgement of origin.

9 Data acquisition

This section describes the current mechanisms for data acquisition and how they need to be strengthened.

The data in HAIS are multidisciplinary and originate from a variety of institutions and agencies. Furthermore, the agencies that hold the data may vary from country to country and may be embedded in different sectors of governments with different data policies. The approach for the same data may therefore be different between countries or regions. There are thus several data acquisition mechanisms in place in order to obtain full and comparable datasets from the participating countries. It is the expectation to maintain these mechanisms in the onward development of HAIS.

9.1 Taxonomic Data

Data are compiled and maintained by a Task Team on Taxonomy under the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB; http://www.ioc-unesco.org/hab/index.php?option=com_content&task=view&id=10&Itemid=0). The Task Team is composed of Ø. Moestrup (Denmark) (Chair), R. Akselman (Argentina), G. Cronberg (Sweden), M. Elbraechter (Germany), S. Fraga (Spain), Y. Halim (Egypt), G. Hansen (Denmark), M. Hoppenrath (Germany), J. Larsen (Denmark), N. Lundholm (Denmark), L.N. Nguyen (Vietnam), and A. Zingone (Italy).

The new HAIS platform will allow the user community to submit comments and contributions (text, pictures, etc) to the editors for validation and upload.

9.2 Harmful Algal Event Data

Data acquisition is organised according to regions.

North Atlantic: Data are compiled by the ICES-IOC Working Group on Harmful Algal Bloom Dynamics (WGHABD; http://www.ioc-unesco.org/hab/index.php?option=com_content&task=view&id=11&Itemid=0), Data are submitted on-line and reviewed annually. IOC has requested ICES to investigate if ICES member states could assign a national focal point for submission of data independent of the WGHABD, and let the
WGHABD only review and assess data. Country representatives (WG members) are identified by National ICES delegates.

**North Pacific:** Data are compiled by the HAB Section of PICES (http://www.pices.int/). Data are submitted on-line and reviewed annually. Country representatives are identified by National PICES delegates.

**South West Pacific:** At present, there is no data submission. IOC is investigating with PICES to use a capacity-building project as a vehicle to establish capacity and interest to contribute data (2008-2010).

**Mediterranean North Africa:** Data are planned to be compiled by the IOC Network Harmful Algae in North Africa (HANA; http://www.ioc-unesco.org/hab/index.php?option=com_oe&task=viewDoclistRecord&doclistID=63). Capacity building for on-line submission is required. The goal is to have retroactive submission dating back to 2000. Start 2008/2009.

**Latin America:** Data are planned to be compiled by the IOC Networks Floraciones Algales Nocivas en Sudamérica (FANSA; http://ioc-unesco.org/index.php?option=com_oe&task=viewDoclistRecord&doclistID=60) and ‘Algas Nocivas en el Caribe y Regiones Adyacentes’ (ANCA; http://www.ioc-unesco.org/hab/index.php?option=com_content&task=view&id=17&Itemid=0). Capacity building for on-line submission is required. The goal is to have retroactive submission dating back to 2000. Start 2008/2009.
Individual countries: Individual countries will be welcome to participate when the on-line submission module is launched. The following countries will be invited individually: Australia, New Zealand, India, South Africa, Namibia, Italy, Greece, Turkey, and Black Sea countries. Capacity building for on-line submission is required. The goal is retroactive submission dating back to 2000. Start 2008/2009.

There is a need to assess to what extent GOOS Regional Alliances can facilitate or coordinate data compilation and submission and to what extent IODE National Ocean Data Centres could catalogue and archive primary data (as available) and make data available internationally.

The required promotion to strengthen new input sources and training in on-line submission of data will be offered by the IOC Science and Communication Centres as part of the work package of establishing HAIS.

9.3 Monitoring System Data
Data are compiled through questionnaire surveys to national focal points responsible for HAB management. These focal points are originally identified through IPHAB and WGHABD.
9.4 Biogeographic Data
Data are compiled by a team of regional editors organised under ISSHA. Work is on hold until online platform for the element has been launched. Expected 2009. See Annex III for format for data and a list of regional editors.

9.5 Expert Roster Data
Data are compiled by individual on-line submission. In the development of HAIS all experts referred to in other data components will be encouraged to submit their data. The system automatically requests participants to update data regularly.

9.6 Bibliographic Data
Data and document files can be entered in OceanDoc and / or the BHL system (see Section 4.6), as required to back up references in other HAIS components. This is part of work task in establishing HAIS. Subsequent maintenance and update will be carried out by the editors of HAIS elements.

10 Data Management and Quality Assurance

HAIS data management will reflect that it is a unique system offering an integrated user interface (see Section 5) for access to data acquired through different mechanisms and stored in different software systems.

Figure 2 illustrates how the core of HAIS is the Taxonomic Reference List. The list provides the species names for HAEDAT, HABMAP and MONDAT and thus for all data products.

There are auxiliary data that will be drawn on or linked to, such as HABBIB, HABDIR, OBIS, EOL, as well as a reference list of current and correct for toxin names. Some of these will be two-way links, as HAIS is also feeding those auxiliary databases.

There will be two main entry points for data to HAIS: i) The Taxonomic Reference List will be fed through a customised data input module of WoRMS, and will be stored in the WoRMS platform; ii) HAEDAT, HABMAP and MONDAT will have a common data input tool, as they share a common platform.

HAIS quality assurance (QA) will be embedded in the overall system design through:

- Controlled vocabularies
- Parameter limits
- Outlier detection (for biogeographical data)
- Standardized data where possible, 

However, as the different modules have different acquisition mechanisms, the QA (validation) responsibility lies with the respective Task Teams, Groups and Editors compiling the sub-sets of data.
Figure 3. HAIS Elements and linkages: Data flow between the elements of HAIS, as well as to the data products and to larger systems such as WoRMS, OBIS and EOL.

The system keeps track of the provenance of any object so that credit is given to the authors and user comments can be directed back to the authors so that any uncertainties can be addressed.

For all data, the HAIS user-interface will allow users to submit, to the respective editor, amendments, corrections, and additional material for validation and upload by the editor. This will constitute a user quality control and validation.

The overall management of the System will be a joint effort of the IODE Project Office, the IOC Science and Communication Centre on Harmful Algae, and the EOL Secretariat. Back-up of all data will be archived at the IODE Project Office.

The Joint IPHAB/IODE Task Team on the development of HAIS will function as the guiding group of experts and its members will be involved in the work as required and as time and funding allow.

11 Longer-term development

The short to medium term development plans for HAIS are the focus of this document. The Joint IPHAB/IODE Task Team has further more identified as a potential long-term challenge, the inclusion and access to primary time-series data and near real-time data on events and species
occurrences. A detailed analysis of data accessibility is required for development of a strategy for achieving this.

The inclusion of harmful algae-related illness data is also a medium to long term challenge.

As part of the overall strengthening and consolidation of data acquisition mechanisms an analysis is required to assess the feasibility and practicalities involved of using IODE NODCs and the OceanDataPortal for HAIS data acquisition.

12 Work plan 2009-2010

The work plan is structured in an immediate phase for (2008) 2009-2010 for developments expected to be achieved within the budgetary resources available, and a second phase for which separate extra-budgetary funding is required.

Table 1 shows the status and tasks relative to HAIS for each data module regarding data acquisition, data management, product development, partnership and by whom action is required.
TABLE 1. Summary of status and tasks for the immediate and short-term development of HAIS.

<table>
<thead>
<tr>
<th>Data module</th>
<th>Data acquisition</th>
<th>Data management</th>
<th>Product development</th>
<th>Cooperation on platform</th>
<th>Action by</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAIS user interface</td>
<td></td>
<td></td>
<td>Interface to address:</td>
<td>MBL informatics team</td>
<td>D. Patterson to assess requirements for customising EOL interface into a draft HAIS interface</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Visualization tools, dynamic, participatory, social, contemporary discussion forum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Direct access to other experts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- How to make global changes to database</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxonomic Reference List of Toxic Species</td>
<td><strong>Have:</strong> IPHAB Task Team (Moestrup)</td>
<td><strong>Have:</strong> Simple DB at Univ. of Copenhagen server</td>
<td><strong>Need:</strong> ID-keys (LM, EM DNA, barcodes), photo/picture DB, ref to original descriptions. Maintenance as an open system with quality assurance by IPHAB Taxonomic Task Team.</td>
<td><strong>WoRMS</strong> Will feed into OBIS</td>
<td>E. Vanden Bergh/Ward Appeltans input tool and customised user interface in WoRMS: DONE. D. Patterson to advise on appropriate software for matrix keys.</td>
</tr>
<tr>
<td>Data module</td>
<td>Data acquisition</td>
<td>Data management</td>
<td>Product development</td>
<td>Cooperation on platform</td>
<td>Action by</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Biogeography:</strong> HABMAP</td>
<td><strong>Have:</strong> ISSHA Regional Editor Team</td>
<td><strong>Have:</strong> Compiled in HAEDAT compatible format in Excel</td>
<td><strong>Need:</strong> maps, interoperability with other data</td>
<td>Will feed into OBIS</td>
<td>IOC: Customise</td>
</tr>
<tr>
<td></td>
<td><strong>Need:</strong> Manpower to complement and complete</td>
<td><strong>Need:</strong> Establishment of DB and compilation of data from missing regions</td>
<td></td>
<td></td>
<td>HAEDAT platform to accommodate HABMAP data set and import data.</td>
</tr>
<tr>
<td><strong>Harmful algal event data:</strong> HAEDAT</td>
<td><strong>Have:</strong> National focal points through ICES, PICES, ANCA, FANSA, HANA</td>
<td><strong>Have:</strong> MySQL/PHP platform at IOC/IODE server developped 2006-2007</td>
<td><strong>Have:</strong> maps, Ifremer decadal maps</td>
<td></td>
<td>ISSHA: Revitalise Editor Team when ready for online data submission.</td>
</tr>
<tr>
<td></td>
<td><strong>Need:</strong> Mechanism for missing regions</td>
<td></td>
<td><strong>Need:</strong> interoperability with other data. Upgraded mapping functionalities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Upgraded data products (maps)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>IOC:</strong> Finalise online data submission function.</td>
<td><strong>IOC:</strong> Upgrade mapping function</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>WGHABD:</strong> Validate old data sets.</td>
<td><strong>ICES:</strong> Formalise national focal points independent of WGHABD.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>IFREMER:</strong> Upgrade data products (maps)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data module</td>
<td>Data acquisition</td>
<td>Data management</td>
<td>Product development</td>
<td>Cooperation on platform</td>
<td>Action by</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>--------------------------------</td>
<td>---------------------</td>
<td>-------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><strong>Monitoring system data:</strong></td>
<td><strong>Have:</strong> Questionnaire from IOC to national focal point</td>
<td><strong>Have:</strong> PinPoint platform now off line</td>
<td><strong>Need:</strong> Integration and interoperability with other data</td>
<td>IOC: Customise HAEDAT platform to MONDAT data, import data and link with related fields in HAEDAT and HABDIR</td>
<td>IOC: Update data</td>
</tr>
<tr>
<td>MONDAT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Expert roster:</strong></td>
<td><strong>Have:</strong> Roster with automated update</td>
<td><strong>Have:</strong> OceanExpert system</td>
<td></td>
<td>IOC Centres</td>
<td></td>
</tr>
<tr>
<td>HABDIR (OceanExpert)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Harmful algae-related illness data:</strong></td>
<td><strong>Have:</strong> A template and indication of interest in collaboration from US HABISS</td>
<td><strong>Need:</strong> HAIS database module for the data</td>
<td><strong>Need:</strong> Integration and interoperability with other data</td>
<td>Potentially: US HABISS WHO</td>
<td>IOC Centres</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>References:</strong></td>
<td><strong>Have:</strong></td>
<td><strong>Have:</strong> OceanDoc and</td>
<td></td>
<td>IOC Centres, phase</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data module</td>
<td>Data acquisition</td>
<td>Data management</td>
<td>Product development</td>
<td>Cooperation on platform</td>
<td>Action by</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------</td>
<td>-----------------</td>
<td>---------------------</td>
<td>-------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>HAB-BIB (ASFA)</td>
<td><strong>Need:</strong> Cross check and inclusion of missing references in Taxonomic Reference List and HABMAP</td>
<td>ASFA systems</td>
<td></td>
<td></td>
<td>2.</td>
</tr>
<tr>
<td>OceanDoc (Full papers)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TASKS 2008-2010

<table>
<thead>
<tr>
<th>Short- and medium-term:</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick-off WS</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft HAIS report</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final HAIS report</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Search for funding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication of HAIS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and user survey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work with IPHAB and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NODC etc to strengthen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>data provider network</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System architecture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>described</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish new WoRMS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>platform for Reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HABMAP in new platform</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MONDAT in new platform</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey among HAEDAT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intergovernmental Oceanographic Commission of UNESCO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>provides re</strong>&lt;br&gt;<strong>access to primary data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MONDAT update</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X - - - -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>After funding has been obtained:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Develop user interface</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Systematic</strong>&lt;br&gt;<strong>compilation of HABMAP data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Establish platform for</strong>&lt;br&gt;<strong>near real-time data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 13 Funding requirements

### A. ESTABLISHMENT BUDGET:

This budget identified budget items, but is a draft with regard to specific amounts

<table>
<thead>
<tr>
<th>Main item:</th>
<th>Staff months</th>
<th>USD</th>
<th>Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IT DEVELOPMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WoRMS: development of customised data entry tool and user interface</td>
<td>0.5</td>
<td>0</td>
<td>Done</td>
</tr>
<tr>
<td><strong>IODE PO</strong>: IT professional for HAEDAT, HABMAP and MONDAT MySQL/PHP platform development</td>
<td>2</td>
<td>22,000</td>
<td></td>
</tr>
<tr>
<td><strong>IODE PO</strong>: HABMAP data transfer to OBIS via the DiGIR protocol (unless HABMAP data is uploaded directly in OBIS)</td>
<td>2</td>
<td>22,000</td>
<td>+ dollar for dollar in kind from MBL Informatics</td>
</tr>
<tr>
<td><strong>IODE PO in cooperation with EOL</strong>: HAIS System design/architecture</td>
<td>2-3</td>
<td>15,000</td>
<td></td>
</tr>
<tr>
<td><strong>MBL Informatics</strong>: Developing customised user interface</td>
<td>2</td>
<td>60,000</td>
<td>*</td>
</tr>
<tr>
<td><strong>MBL Informatics</strong>: Taxonomic identification key development (EOL has committed US $100,000 for work to be done in conjunction with Atlas of Living Australia*)</td>
<td>5.5</td>
<td>58,000</td>
<td></td>
</tr>
<tr>
<td><strong>IOC HAB Centres</strong>: HABMAP data compilation and QA</td>
<td>5</td>
<td>55,000</td>
<td></td>
</tr>
<tr>
<td><strong>ORGANISATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPHAB-IODE Task Team oversight and development workshops (2)</td>
<td></td>
<td>40,000</td>
<td>X</td>
</tr>
<tr>
<td>HAIS System design/architecture Workshop at IODE PO</td>
<td></td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20</td>
<td><strong>322,000</strong></td>
<td></td>
</tr>
</tbody>
</table>
### B. ONGOING BUDGET/YEAR

<table>
<thead>
<tr>
<th>Main item:</th>
<th>Staff months</th>
<th>USD</th>
<th>Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IT DEVELOPMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WoRMS:</strong> maintenance of customised data entry tool and user interface</td>
<td></td>
<td></td>
<td>Covered by WoRMS</td>
</tr>
<tr>
<td><strong>IODE PO:</strong> IT professional for HAEDAT, HABMAP and MONDAT MySQL/PHP platform maintenance</td>
<td>1/year</td>
<td>11,000</td>
<td></td>
</tr>
<tr>
<td>Maintenance of user interface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IOC HAB Centres:</strong> Data compilation and QA</td>
<td>1/year</td>
<td>8,000</td>
<td>In part</td>
</tr>
<tr>
<td><strong>ORGANISATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPHAB-IODE Task Team oversight and data product development workshop every 2-3 years</td>
<td></td>
<td>30,000</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>~35,000</td>
<td></td>
</tr>
</tbody>
</table>
**ANNEX I.: HAEDAT format for data on harmful algal events**

Specifications: Data fields for input and conventions, data fields for exchanged and possible searches.

<table>
<thead>
<tr>
<th>Data field</th>
<th>Convention</th>
<th>Exchangeable</th>
<th>Searchable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Event year</td>
<td>XXXXX</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Country</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Nature of the reported event</td>
<td>Tick off box</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Has the event directly affected:</td>
<td>Tick off box (6)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Has the event directly affected:</td>
<td>Free text (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Has any toxicity been detected?</td>
<td>Tick off Y/N and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Associated syndrome</td>
<td>Tick off boxes (9)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Unexplained toxicity</td>
<td>Tick off Y/N and free text field</td>
<td>(Y)</td>
<td>Y</td>
</tr>
<tr>
<td>1. Transvector</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. is this report outcome of a monitoring programme</td>
<td>Tick off Y/N and pick list from MONDAT</td>
<td>Y</td>
<td>Y (TO BE)</td>
</tr>
<tr>
<td>1. Has the vent occurred before in this location?</td>
<td>Tick off Y/N and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Individuals to contact</td>
<td>Pick list linked to HABDIR-OceanExpert</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. Location</td>
<td>Pick list of NSEW and fields for Deg, min, Sec.</td>
<td>Y?</td>
<td>Y TO BE</td>
</tr>
<tr>
<td>2. General location information:</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Name of area</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2. General location: Region</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2. General location: HAB Area code</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2. Event date</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2. Start</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. End</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. Data of detection of quarantine levels</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. End of quarantine levels</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. Additional date-related information:</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Causative organism known?</td>
<td>y/n</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Causative species/genus</td>
<td>Pick list from WoRMS/HAB/other ?</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>3. concentration</td>
<td>Cell/L</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. comments</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Co-occurring species/genus</td>
<td>Pick list from WoRMS/HAB ?</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Data field</td>
<td>Convention</td>
<td>Exchangeable</td>
<td>Searchable</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>3. concentration</td>
<td>Cell/L</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. comments</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Chlorophyll concentration</td>
<td>µg/l</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Additional microalgae information</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Event related bibliography</td>
<td>N (at present)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Weather</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Turbidity</td>
<td>(NTU) units in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Wind direction</td>
<td>Pick list</td>
<td>N</td>
<td>Y – BUT COULD BE</td>
</tr>
<tr>
<td>4. Stratified water</td>
<td>Pick Y/N</td>
<td>Y</td>
<td>N – BUT COULD BE</td>
</tr>
<tr>
<td>4. oxygen content</td>
<td>mL/L units in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Wind velocity</td>
<td>Free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Temperature</td>
<td>C units in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. oxygen saturation</td>
<td>In % unit in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Current direction</td>
<td>Pick list</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>4. Secchi disk</td>
<td>Units in m in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Salinity</td>
<td>Free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Current velocity</td>
<td>Free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Nutrient concentrations</td>
<td>Free text fields</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Additional bloom information</td>
<td>Free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Max/Min temp and salinity</td>
<td>Free text fields (4)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Bloom location in water</td>
<td>Tick off boxes (3)</td>
<td>N</td>
<td>N – BUT COULD BE</td>
</tr>
<tr>
<td>4. Growth</td>
<td>Tick off boxes (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Ad vected comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Additional Envir info</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Species containing the toxin</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Toxin type</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>5. Toxin details</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>5. Max concentrations</td>
<td>‘(specify units)’</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Assay type</td>
<td>Pick list</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>5. Kit used?</td>
<td>Pick Y/N, and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Toxin assay comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Management decision</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Additional harmful effect information</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
**Add a New Event - Part 1**

Please enter all the relevant information that you possess about the event you are adding below. Note that some fields must be filled in. These are marked with an asterisk (*).

### 1. General Information

<table>
<thead>
<tr>
<th><strong>Event Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
</tr>
</tbody>
</table>

**Indicate the nature of the reported harmful event:**
- Water Discoloration
- High Phyto concentration
- Seafood toxins
- Mass mortalities
- Foam/Muclage in the coast
- Other effect

**Has the event directly affected:**
- Pathogenic life
- Benthic Life
- Aquatic Mammals
- Other Terrestrial (please specify)
- Natural Fish
- Aquaculture Fish
- Humans
- Shellfish
- Seaweed

**Comments:**

**Has any toxicity been detected?**
- Yes (if yes, approximate range):
- No

**Associated syndrome:**
- Aerosolized toxins effects
- ASP
- AOP
- CTP
- Cyanobacterial toxins effects
- DSP
- HAB
- Other
- PSP

**Unexplained toxicity:**
- Yes (if yes, comments):
- No

**If intoxications occurred, please indicate the species implicated in the transmission of toxins (transvector):**

**If this report the outcome of a monitoring programme?**
- Yes (if yes, which programme):
- No

**Has the event occurred before in this location?**
- Yes (if yes, comments):
- No

**Individuals to contact:**
- Contact 1: [Please Select] [Click here to add a new contact]
- Contact 2: [Please Select] [Click here to add a new contact]
- Contact 3: [Please Select] [Click here to add a new contact]

### 2. Location & Date

**Location:**
- Latitude: [N] [Deg: ] [Min: ] [Sec: ]
- Longitude: [E] [Deg: ] [Min: ] [Sec: ]

**Name of the area:**

**Region:**

**General location information:**
- HAB Area code *
- AR-01
- AR-02
- AR-03
- AR-04
- AR-05

**Additional location information:**
(i.e. length of covered shoreline or aerial coverage of bloom, ecosystem type, etc.)

**Event date:** [ ] [ ] [ ] (dd/mm/yyyy)

**Start of bloom event:** [ ] [ ] [ ] (dd/mm/yyyy)

**End of bloom event:** [ ] [ ] [ ] (dd/mm/yyyy)

**Date of detection of quarantile level:** [ ] [ ] [ ] (dd/mm/yyyy)

**End of quarantine levels:** [ ] [ ] [ ] (dd/mm/yyyy)

**Additional date-related information:**

---

31
### 3. Microalgae

<table>
<thead>
<tr>
<th>Causative organism known?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### Causative Species/genus

<table>
<thead>
<tr>
<th>Causative Species/genus</th>
<th>Cells/L (max.)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please Select</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Co-Occurring Species/genus

<table>
<thead>
<tr>
<th>Co-Occurring Species/genus</th>
<th>Cells/L (max.)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please Select</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Chlorophyll concentration, if known (μg/L):

<table>
<thead>
<tr>
<th>Chlorophyll concentration, if known (μg/L):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### Additional microalgae information:

<table>
<thead>
<tr>
<th>Additional microalgae information:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### Event-related bibliography:

<table>
<thead>
<tr>
<th>Event-related bibliography:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

[Proceed to Next Step]
Add a New Event - Part 2

4. Environmental Conditions

- Weather: [ ]
- Turbidity (NTU): [ ]
- Wind direction: [ ]
- Wind velocity: [ ]
- Stratified water: [ ] Yes [ ] No
- Oxygen content (ml/l): [ ]
- Wind velocity: [ ]
- Temperature (°C): [ ]
- Current Direction: [ ]
- Oxygen saturation %: [ ]
- Current Velocity: [ ]
- Salinity: [ ]

Nutrient concentrations:
- AMMONIUM [ ]
- NITRATE [ ]
- NITRITE [ ]
- PHOSPHATE [ ]
- SILICATE [ ]
- NITRATE + NITRITE [ ]
- DIN [ ]

Additional bloom information [ ]

If available, indicate maximum/minimum temperature and salinity recorded during the whole duration of the event:
- Max. Temp (°C): [ ]
- Min. Temp (°C): [ ]
- Max. Salinity: [ ]
- Min. Salinity: [ ]

Bloom location in the water column:
- Whole column: [ ]
- Surface: [ ]
- Subsurface: [ ]

Growth:
- [ ] Actively
- [ ] In situ

Additional comments:

5. Toxin Assay Information

- Species containing the toxin [ ]
- Toxin type: [ ]
- Toxin details: [ ]
- Max. concentration (specify units): [ ]
- Assay type: [ ]

- Kit used?: [ ] Yes [ ] No
- If yes, kit type: [ ]

Toxin assay comments:
(eg positive animal assay, chemical details, analytical methods, etc.)

Economic losses: [ ]

Management decision: [ ]

Additional harmful effect information: [ ]

Submit Your Event
ANNEX II: MONDAT format for data on monitoring system design

Specifications: Data fields for input and conventions, data fields for exchanged and possible searches. Numbers of data fields refer to the format below the table.

<table>
<thead>
<tr>
<th>Data field</th>
<th>Convention</th>
<th>Exchangeable</th>
<th>Searchable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting year</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Responding institution Questions 1-10</td>
<td>Format link to HABDIR OceanExpert</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>11.</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>12</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>13</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>14</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>15</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>16</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Free text - but should be gazetteer</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>18</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>19</td>
<td>Pick list</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>20</td>
<td>Pick list</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>21</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>22</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>A1</td>
<td>Tick off (7)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>A2</td>
<td>Tick off (3)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>A3</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>A4</td>
<td>Tick off (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>A5</td>
<td>Tick off Y/N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>B1</td>
<td>Tick off (3)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>B2</td>
<td>Tick off (3)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>B3</td>
<td>Number</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>B4</td>
<td>Tick off (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>B5</td>
<td>Tick off Y/N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>B6</td>
<td>HABDIR OceanExpert</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>C1</td>
<td>Tick off (3)</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>C2</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>D1</td>
<td>Tick off (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>D2</td>
<td>Tick off (17) and free text fields (3)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>D3</td>
<td>Tick off (3) and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>D4</td>
<td>Tick off (2)</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>D5</td>
<td>Tick off (8) and free text fields (2)</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>D6</td>
<td>Tick off (3)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Data field</td>
<td>Convention</td>
<td>Exchangeable</td>
<td>Searchable</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>E1</td>
<td>Tick off (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>E2</td>
<td>Tick off (11) and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>E3</td>
<td>Tick off (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>E4</td>
<td>Tick off (4 and free text field)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>F1</td>
<td>Tick off (6)</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>F2</td>
<td>Tick off (4)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>G1</td>
<td>Tick off (2) and free text</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>G2</td>
<td>Tick off (3) and free text</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>G3.1</td>
<td>HABWoRMS pick list (multiple)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>G3.2</td>
<td>Unit cells/L</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>G3.3</td>
<td>Tick off (3)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>G4</td>
<td>Toxin reference pick list (multiple)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>G5</td>
<td>Tick off (3) and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>H1</td>
<td>Tick off Y/N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>I.1.1</td>
<td>Currency unit pick list</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>I.1.2</td>
<td>number</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>I.1.3</td>
<td>Number</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>I.1.4</td>
<td>Number</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>I.1.5</td>
<td>Number</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>I.1.6</td>
<td>Number</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>I.2.</td>
<td>Format needs to be reworked</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**ANNEX III: HABMAP format for biogeographical data and regional editors**

Specifications: Data fields for input and conventions, data fields for exchanged and possible searches. Fields are same as for HAEDAT. Dimmed fields are HAEDAT fields not use for HABMAP datasets.

FOR A GIVEN SPECIES:

<table>
<thead>
<tr>
<th>Data field</th>
<th>Convention</th>
<th>Exchangeable</th>
<th>Searchable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nature of the harmful effects</td>
<td>Tick off box</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Has the species directly affected?</td>
<td>Tick off box (6)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Has the species directly affected?</td>
<td>Free text (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Has any toxicity been detected?</td>
<td>Tick off Y/N and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Associated syndrome</td>
<td>Tick off boxes (9)</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>1. Unexplained toxicity</td>
<td>Tick off Y/N and free text field</td>
<td>(Y)</td>
<td>Y</td>
</tr>
<tr>
<td>1. Transvector</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Is this report outcome of a monitoring programme?</td>
<td>Tick off Y/N and pick list from MONDAT</td>
<td>Y</td>
<td>Y (TO BE)</td>
</tr>
<tr>
<td>1. Has the event occurred before in this location?</td>
<td>Tick off Y/N and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>1. Individuals to contact</td>
<td>Pick list linked to HABDIR-OceanExpert</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. Location</td>
<td>Pick list of NSEW and fields for Deg, min, Sec.</td>
<td>Y?</td>
<td>Y (TO BE)</td>
</tr>
<tr>
<td>2. General location information:</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Name of area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. General location: Region</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2. General location: HAB Area Code</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2. Event date</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2. Start</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. End</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. Data of detection of quarantine levels</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. End of quarantine levels</td>
<td>Dd/mm/yyyy</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>2. Additional date-related information:</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Causative organism known?</td>
<td>y/n</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Causative species / genus</td>
<td>Pick list from WoRMS/HAB</td>
<td>?</td>
<td>Y</td>
</tr>
<tr>
<td>3. Concentration</td>
<td>Cell/L</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Comments</td>
<td>n</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Data field</td>
<td>Convention</td>
<td>Exchangeable</td>
<td>Searchable</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>3. Co-occurring species / genus</td>
<td>Pick list from WoRMS/HAB</td>
<td>?</td>
<td>N</td>
</tr>
<tr>
<td>3. Concentration</td>
<td>Cell/L</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Comments</td>
<td>n</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Chlorophyll concentration</td>
<td>ug/l</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Additional microalgae information</td>
<td>n</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3. Event-related bibliography</td>
<td>N (at present)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Weather</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Turbidity</td>
<td>(NTU) units in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Wind direction</td>
<td>Pick list</td>
<td>N</td>
<td>N – BUT COULD BE</td>
</tr>
<tr>
<td>4. Stratified water</td>
<td>Pick Y/N</td>
<td>Y</td>
<td>N – BUT COULD BE</td>
</tr>
<tr>
<td>4. Oxygen content</td>
<td>mL/L units in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Wind velocity</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Temperature</td>
<td>C units in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Oxygen saturation</td>
<td>In % unit in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Current direction</td>
<td>Pick list</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>4. Sechhi disk</td>
<td>Units in m in free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Salinity</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Current velocity</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Nutrient concentrations</td>
<td>Free text fields</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Additional bloom information</td>
<td>Free text fields</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Max/Min temp and salinity</td>
<td>Free text fields (4)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Bloom location in water</td>
<td>Tick off boxes (3)</td>
<td>N</td>
<td>N – BUT COULD BE</td>
</tr>
<tr>
<td>4. Growth</td>
<td>Tick off boxes (2)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Advected comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4. Additional Environmental info</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Species containing the toxin</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Toxin type</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>5. Toxin details</td>
<td>Pick list</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>5. Max concentrations</td>
<td>‘(specify units)’</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Assay type</td>
<td>Pick list</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>5. Kit used?</td>
<td>Pick Y/N, and free text field</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Toxin assay comments</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Management decision</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5. Additional harmful effect</td>
<td>Free text</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
HABMAP REGIONS and REGIONAL EDITORS:

Region 1, GEORGIA, USA to GREENLAND: Paul Hargraves, Editor (possible contributors include: Lucie Maranda, Sandy Shumway, JoAnn Burkholder, Jennifer Martin, Ted Smayda and others).

Region 2, EAST COAST OF FLORIDA, CARIBBEAN AND CENTRAL AMERICA (INCLUDING VENEZUELA): Patricia Tester, Editor (possible contributors include: Tracy Villareal, Amelia LaBarbera, David Hernandez-Becerril, Emilia Calvo, Maribelle Vargas-Montero. (WILL YOU INCLUDE PACIFIC COAST OF CENTRAL AMERICA?)

Region 3, SOUTH AMERICA MINUS VENEZUELA: Beatriz Reguera and Rut Akselman, Editors (possible contributors include: Martha Ferrario, Eugenia Sar, Celia Villac and Gemita Pizarro. Beatriz Reguera offered to do South America because of recent reviews that she and South Americans had been doing for their teaching classes.

Region 4, WEST COAST, USA, WEST COAST CANADA, AND ALASKA: Rita Horner, Editor (possible contributors include: Max Taylor, Peter Franks, Vera Trainer, and others).

Region 5, AUSTRALIA AND NEW ZEALAND: Gustaaf Hallegaef, Editor (possible contributors include: Lincoln McKenzie, Ho Chang, Allison Haywood, Ian Falconer and others).

Region 6, SOUTHEAST ASIA, INDONESIA, PHILIPPINES: Rhodora Azanza, Editor (possible contributors include: Yasuwo Fukuyo).


Region 8, INDIAN OCEAN and the GULF: Jean-Pascal Quod, Editor (possible contributors include: Jean Turquet, Muna Hussain, L. Kannan, Seleha Khan).

Region 9, BENGUELA: Grant Pitcher, Editor (possible contributors include: Bronwen Currie).

Region 10, WESTAFRICA: Cyril Ajuzie, Editor.


Region 12, PORTUGAL, SPAIN, UK, FRANCE, GERMANY, SCANDINAVIA and GREENLAND: Henrik Enevoldsen and Beatriz Reguera, Editors (possible
contributors include: Jane Lewis, Patrick Gentien, Øjvind Moestrup, Edna Granéli, Malte Elbraechter, Robin Raine, Teresa Moita, and others).
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| NSMHA HAB MAP FIELD | Indicate nature of the harmful effects | Has the species been directly affected? | If yes, has the species been detected? | Additional comments (e.g. color of banding, morphology) | Additional geographic characteristics | Additional location information | Additional biological information | Bibliographic reference | Salinity (PSU) | Nutrient information | Location in the coastal region | Toxicity information | Method used for toxin detection | Other environmental characteristics | Ecological conditions |
| 1 | Format of input | Text of susceptible test with a 50% | Text of susceptible test with a 90% | Short text | Short text | Short text | Short text | Short text | Short text | Short text | Short text | Short text | Short text | Short text | Short text |
| 2 | ACTION | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 3 | Water temperature | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 4 | Water quality | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 5 | Planktonic life | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 6 | Fishes | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 7 | Aquatic invertebrates | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 8 | Aquatic mammals | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 9 | Aquatic birds | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 10 | Other terrestrial (text) | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 11 | Humans | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 12 | Yes | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 13 | No | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 14 | Latitude N | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 15 | Latitude S | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 16 | Longitude E | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
| 17 | Longitude W | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here | Text here |
ANNEX IV: Joint IPHAB/IODE Task Team on the development of HAIS

List of Members, Joint IPHAB/IODE Task Team on the development of the Harmful Algal Information System

(not attending Design Workshop*)

Jim Ammerman*
Institute of Marine and Coastal Sciences
Rutgers University
71 Dudley Road
New Brunswick, NJ 08901-8521
USA
Phone: 732-932-6555 x339
Fax: 732-932-8578
E-mail: ammerman@imcs.rutgers.edu
http://marine.rutgers.edu/faculty_jammerman.html

Živana Nincevic Gladan
Institute of Oceanography and Fisheries
Setaliste I. Mestrovica 63
21000 Split
CROATIA
tel: 385 21 408 015
tax: 385 21 358 650
e-mail: nincevic@izor.hr

Richard Gowen
AFBI Headquarters
Newforge Lane
Belfast
BT9 5PX
Northern Ireland
United Kingdom
AFBI Fax: +44 (0)28 90 255035
AFBI Headquarters: +44 (0)28 90 255689
Richard.Gowen@afbini.gov.uk

Francisco (Tjess) HERNANDEZ
VLAAMS INSTITUUT VOOR DE ZEE
vzw (VLIZ vzw)
Wandelaarkaai 7
B-8400 Oostende
Belgium
e-mail: tjess@vliz.be

Dr Edward Vanden Berghe
Executive Director, Ocean Biogeographic Information System
Institute of Marine and Coastal Sciences, Rutgers University
71 Dudley Road, New Brunswick,
New Jersey 08901-8521
USA
Phone: +1 (732) 9326555 x 565;
Fax: +1 (732) 9328578 URL
http://www.iobis.org
E-mail: evberghe@iobis.org

Antoine Huguet, IFREMER, France
Ifremer
BP 21105
44311 NANTES cedex 03
France
tel 02 40 37 41 10 (international +33 2 40 37 41 10)
tax 02 40 37 40 73 (international +33 2 40 37 40 73)
E-mail: Antoine.Huguet@ifremer.fr
http://www.ifremer.fr/envlit/index.htm

Antoine Huguet, IFREMER, France
Ifremer
BP 21105
44311 NANTES cedex 03
France
tel 02 40 37 41 10 (international +33 2 40 37 41 10)
tax 02 40 37 40 73 (international +33 2 40 37 40 73)
E-mail: Antoine.Huguet@ifremer.fr
http://www.ifremer.fr/envlit/index.htm

Catherine BELIN
coordinatrice nationale du REPHY
(Réseau de Surveillance du Phytoplancton et des Phycotoxines)
Ifremer
BP 21105
44311 NANTES cedex 03
France
tel 02 40 37 41 10 (international +33 2 40 37 41 10)
tax 02 40 37 40 73 (international +33 2 40 37 40 73)
E-mail: Catherine.Belin@ifremer.fr
http://www.ifremer.fr/envlit/index.htm

Richard Gowen
AFBI Headquarters
Newforge Lane
Belfast
BT9 5PX
Northern Ireland
United Kingdom
AFBI Fax: +44 (0)28 90 255035
AFBI Headquarters: +44 (0)28 90 255689
Richard.Gowen@afbini.gov.uk

Francisco (Tjess) HERNANDEZ
VLAAMS INSTITUUT VOOR DE ZEE
vzw (VLIZ vzw)
Wandelaarkaai 7
B-8400 Oostende
Belgium
e-mail: tjess@vliz.be

Dr Edward Vanden Berghe
Executive Director, Ocean Biogeographic Information System
Institute of Marine and Coastal Sciences, Rutgers University
71 Dudley Road, New Brunswick,
New Jersey 08901-8521
USA
Phone: +1 (732) 9326555 x 565;
Fax: +1 (732) 9328578 URL
http://www.iobis.org
E-mail: evberghe@iobis.org
Intergovernmental Oceanographic Commission of UNESCO

Seppo Kaitala, Ph.D., Leading Scientist
Dept. of Biological Oceanography
Finnish Institute of Marine Research
Erik Palménin aukio 1 (P.O. Box 2)
FIN-00561 Helsinki, Finland
tel. +358-9-61394417 fax +358-9-3232970
mobile +358-400-609-269
E-mail:Seppo.Kaitala@fimr.fi

Sergey Konovalov, (IODE)
Marine Hydrophysical Institute
2, Kapitanskaya St.
Sevastopol
335000
Ukraine
email: sergey@alpha.mhi.iuf.net;
sergey_konovalov@yahoo.com

Jacob Larsen*
IOC Science and Communication
Centre on Harmful Algae
University of Copenhagen
Øster Farimagsgade 2D
1353 Copenhagen K
Denmark
Tel.: +45 33134446
Fax.: +45 33134447
E-mail:jacobl@bi.ku.dk

Jennifer Martins, (ICES)
Biologist
Fisheries and Oceans Canada
Marine Environmental Sciences Division
- St Andrews
St Andrews Biological Station 531
Brandy Cove Road
St Andrews, New Brunswick
Canada
ES5 2L9
Telephone: (506) 529-5921
Fax: (506) 529-5862
E-mail: MartinJL@mar.dfo-mpo.gc.ca

MSc. Silvia M. Méndez (FANSA)*
Dirección Nacional de Recursos
Acuáticos (DINARA)
Constituyente 1497, 11200 Montevideo,
Uruguay

Øjvind Moestrup (Chair IPHAB TT)
Taxonomy
Department of Biosciences
University of Copenhagen
Øster Farimagsgade 2D
1353 Copenhagen K
Denmark
Tel.: +45 33134446
Fax.: +45 33134447
E-mail: moestrup@bi.ku.dk

Gwenaëlle Moncoiffe, UK (IODE)
British Oceanographic Data Centre
Joseph Proudman Building
6 Brownlow Street
Liverpool
L3 5DA
United Kingdom
E-mail: gmon@bodc.ac.uk

David J Patterson (alternate Anne Thessen)
Bay Paul Center
Marine Biological Laboratory
Woods Hole
Massachusetts 02543
USA
Phone: 1 508 289 7260
FAX: 508-457-4727
E-mail: dpatterson@mbl.edu
http://www.mbl.edu/microscope

Vera L. Trainer, Ph.D. (PICES)
Program Manager
Marine Biotoxin Group
Northwest Fisheries Science Center
2725 Montlake Blvd. E.
Seattle, WA 98112
USA
Tel: (206)860-6788
Fax: 206)860-3335
vera.l.trainer@noaa.gov
www.nwfsc.noaa.gov/hab

Adriana Zingone
Stazione Zoologica 'A. Dohrn'

http://www.mbl.edu/microscope
Intergovernmental Oceanographic Commission of UNESCO
Villa Comunale
80121 Napoli, Italy
tel +39 081 5833295
fax +39 081 7641355
e-mail zingone@szn.it (ISSHA)

SECRETARIAT:
Henrik Enevoldsen
IOC Programme Coordinator
IOC Science and Communication Centre on Harmful Algae
University of Copenhagen
Øster Farimagsgade 2D
1353 Copenhagen K
Denmark
Tel.: +45 33134446
Fax.: +45 33134447
E-mail: h.enevoldsen@unesco.org

Monica Lion

COI-IEO Centro Científico y de Comunicacion sobre Algas Nocivas
IOC-IEO Science and Communication Centre on Harmful Algae
Instituto Español de Oceanografía Centro Oceanográfico de Vigo
Apdo. 1552
36200 Vigo, Pontevedra
SPAIN
Phone: +34 986492111
Fax: +34 986492003
e-mail: monica.lion@vi.ieo.es

Peter Pissiersssens
Intergovernmental Oceanographic Commission of UNESCO (IOC)
IOC Project Office for IODE
Wandelaarkaai 7
8400 Oostend
BELGIUM
Tel: +32 59 34 01 58
Fax: +32 59 34 01 52
E-mail: p.pissierssens@unesco.org
ANXEX V: US HABISS

3-13-09

US Harmful Algal Bloom-related Illness Surveillance System

HABISS

System Description

In response to the need to support public health decision-making, the US National Centre for Environmental Health (NCEH) has developed a Harmful Algal Bloom-related Illness Surveillance System (HABISS). HABISS is a unique surveillance system that includes not only human health data, but also animal health data and environmental data about the harmful algal blooms (HABs) themselves. Data collection is organized in modular format that can be expanded to suite the needs of state and local health and environmental protection agencies. In the future, data collected and stored in HABISS will be used to assist in predicting local HABs, thus allowing state public health and environmental health prevention activities to be in place not only in response to reports of human or animal illnesses, but also in advance of anticipated public health problems.

Timeliness of data

Timeliness depends on the data entry efforts of contributing states. There is interest among the contributing states that HABISS evolve into an outbreak alerting system by doing the following:

- Adding CDC’s Early Anomaly Reporting System (EARS) capability within HABISS. With EARS, states can develop individualized alert paradigms for specific illnesses or events.
- Providing automatic email messaging to interested parties when specific illnesses or events are recorded in HABISS.
- Encouraging frequent data entry as soon as events are identified.

HABISS internally houses human and animal health data as well as relevant environmental data. There is interest in allowing selected HABISS data to be accessible through BioPhusion so that events can be mapped.

What data are collected?

HABISS is an active surveillance system that can be accessed online through the Web. In 2008, access will also be available offline through Windows® or handheld devices. It operates on top of a secure platform, the Rapid Data Collector (RDC). The RDC tool was designed in-house, specifically for survey design and data collection purposes. Protected by approved access and password, state users can choose to enter, edit, and save data for subsequent sessions. Users may also choose to export data to Access,
Intergovernmental Oceanographic Commission of UNESCO

Excel, or XML. HABISS requires users to input several key indicators (e.g. dates, agency contact info, state codes, route of exposure, patient’s chief complaint, etc). If data is available, HABISS also prompts users to report the following data elements for a suspected human illness report:

- Point of contact with the system
- Identifying information for the case
- Case demographics
- Environmental information
- Exposure information
- Signs and symptoms
- Medical Review (including laboratory analysis)
- Case assessment and follow-up
- Parallel modules for animal events

Human illness reports can be easily linked to data collected on algal blooms. It is intended to synthesize not only regional algal blooms across multiple sites, but also active blooms in residential ponds, reservoirs, natural springs, and other water bodies.

Users are requested to report the following data elements for an algal bloom report:

- Water sample & collection information
- Geographic coordinates via link to Google map
- Toxin Identification

Future HABISS activities

HABISS continues to evolve, and several new initiatives are already underway.

- Mapping vocabulary to EARS, SNOMED, LOINC Codes, etc.
- Creating messages consistent with PHIN
- Linking reported weather conditions and meteorological factors to HAB outbreaks
- Collaborating with investigators at the National Oceanic and Atmospheric Administration (NOSS) and National Centers for Environmental Prediction (NCEP) to add a simplified prediction component to HABISS
- Collaborating with the Olympic Harmful Algal Bloom Program (ORHAB) to help build a web-based bulletin for early warning of Washington coast HAB events
- Collecting data on ocean-related diseases in animals and people to ensure that data is collected in a concurrent way that it can be linked to and overlaid with data from other surveillance systems
- Providing scientific data from HABISS to aid the discussion of HABs and global climate change (e.g., on the effects of increasing ambient air temperature, changing wind patterns, and variable tidal patterns on HABs and human health)
Intergovernmental Oceanographic Commission of UNESCO

- Expanding the HABISS network to include international partners and participants

Websites and relevant references

HABISS is accessible through CDC’s Rapid Data Collector and is limited to individuals who have specifically requested and obtained digital certificates for security purposes.

ANNEX VI: List of Organisations, Acronyms and Links

Harmful Algal Information System (HAIS; http://www.iode.org/haedat/

Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO); http://ioc.unesco.org

International Council for the Exploration of the Seas (ICES); http://www.ices.dk/indexfla.asp

North Pacific Marine Science Organization (PICES); http://www.pices.int/

International Society for the Study of Harmful Algae (ISSHA); http://www.issha.org/

Encyclopedia of Life (EOL); http://www.eol.org/


TDWG Species Profile Model; http://wiki.tdwg.org/SPM

Biodiversity Heritage Library; http://www.biodiversitylibrary.org/

Ocean Biodiversity Information System (OBIS); http://www.iobis.org/

The Harmful Algal Event Database (HAEDAT); http://www.iode.org/haedat/

Global Biodiversity Information Facility (GBIF); http://www.gbif.org/

Group on Earth Observations (GEO); http://www.earthobservations.org

Global Earth Observation System of Systems (GEOSS); http://www.earthobservations.org/

GEO-Biodiversity Observation Network (GEO-BON); http://www.earthobservations.org/cop_bi_geobon.shtml

Global Ocean Observing System (GOOS); http://www.ioc-goos.org

DiGIR (http://digir.net/)

International Directory of Experts in Harmful Algae and Their Effects on Fisheries and Public Health (HABDIR) http://www.oceanexpert.net/

IOC Bibliographic HAB Database’, (HABBIB; http://ioc.unesco.org/RIS/RISWEB.ISA )


OceanDocs (http://iodeweb1.vliz.be/odin/).


Taxonomic Database Working Group (TDWG; http://www.tdwg.org/)

Task Team on Taxonomy under the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB; http://www.ioc-unesco.org/hab/index.php?option=com_content&view&id=10&Itemid=0).

World Register of Marine Organisms (WoRMS www.marinespecies.org )


PICES (http://www.pices.int/).