

## Overview of activities of the ICES-IOC Working Group on Harmful Algal Bloom Dynamics

*Bengt Karlson (1)*

*(1) Swedish Meteorological and Hydrological Institute, Research & development, oceanography, Västra Frölunda, Sweden; Presenter contact details: bengt.karlson@smhi.se, Phone +46 31 751 8958*

### Summary

An overview of the activities of Working Group on Harmful Algal Bloom Dynamics WGHABD is presented. The group is a forum for ICES and UNESCO-IOC to review and discuss HAB events and to provide advice and updates on the state of HABs in the region. It also facilitates interaction between scientists working in diverse areas of HAB science and monitoring. WGHABD reports both to ICES and to the UNESCO-IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB). Harmful Algal Blooms is a global problem and can cause substantial economic, societal, and human health problems. Certain algae produce toxins, and filter feeders such as shellfish accumulate these toxins when feeding. Humans and other organisms become ill or even die after eating the shellfish. Syndromes are named Diarrhetic Shellfish Poisoning (DSP), Paralytic Shellfish Poisoning (PSP) etc. Another example is algae that cause fish mortalities due to damage of the gills. Other algae cause oxygen deficiency or are a nuisance during mass occurrences. Some bottom dwelling microalgae produce toxins that may also accumulate in fish. HAB development is influenced by physical oceanographic processes as well as factors such as nutrient input and interactions with grazers. Global change is also affecting HABs. Information on HABs and their effects is available in the Harmful Algal Bloom Event Database. Maps on the distribution of HAB species and HAB events are also produced.

### Introduction

Phytoplankton blooms, micro-algal blooms, toxic algae, red tides, or harmful algae, are all terms for naturally occurring phenomena. About 300 hundred species of micro algae are reported at times to form mass occurrence, so called blooms. Nearly one fourth of these species are known to produce toxins. The scientific community refers to these events with a generic term, 'Harmful Algal Bloom' (HAB), recognising that, because a wide range of organisms is involved and some species have toxic effects at low cell densities, not all HABs are 'algal' and not all occur as 'blooms'. Harmful Algal Blooms is recognized to be a problem for aquaculture, fisheries and other ecosystem services worldwide. Understanding the processes and pressures leading to HAB's is vital. Effects of eutrophication, urbanisation and climate change may increase the frequency of HAB's. Already in 1984 an ICES Special Meeting on the Causes, Dynamics and Effects of Exceptional Marine Blooms and Related Events was arranged in Copenhagen (ICES, 1984). This was the initiation of work on Harmful Algal Blooms organized by ICES. In 1992 the UNESCO IOC Intergovernmental Panel on Harmful Algae was formed (IPHAB). The WGHABD is governed both by IPHAB and ICES. The reports from the WGHABD from 1994 and onwards as well as earlier related work 1984-1993 in study groups etc. are available at [www.ices.dk](http://www.ices.dk) and at <http://hab.ioc-unesco.org/>.

### Materials and Methods

The general function of WGHABD is to exchange information and to provide advice to ICES and IPHAB. Information on Harmful Algal Events is collected nation wise and documented in reports to ICES (e.g. ICES 2013) and IPHAB. Data is collected in a systematic way and stored in the Harmful Algae Event Database <http://haedat.iode.org/> which is shared between ICES (North Atlantic), PICES (North Pacific) and the IOC. Also organisations for other sea areas are planning to use HAEDAT. HAEDAT can also be used to visualize and download data. HAEDAT contain general data on HAB's but it is partly a database with metadata. Most countries also have national databases with data on abundance of HAB-species and on toxin content in bivalves etc. These data are in general not reported to international databases at present.

WGAHBD also address specific terms of references such as on fish killing species, harmful blooms of benthic microalgae, blooms of cyanobacteria, new methods, e.g. for automated observations, new toxins and effects of climate change. A manual on methods for analyses of phytoplankton has been produced (IOC/Karlson et al. 2010). New findings are reported, these may be e.g. unpublished scientific results.

## Results and Discussion

The present work in WGHABD focus on making the data on harmful algae events available in a consistent way and to interpret the long term data sets. There is also a focus on effects of climate change on HAB's. The Workshop on Harmful Algal Blooms in a Changing World (WKHABCW) was partly initiated by WGHABD. A scientific conference on this topic is planned for year 2015. The EU Marine Strategy Framework Directive comprise something called descriptors, number five is on Eutrophication and include Harmful Algal Blooms. WGHABDs will address this. New tools for studying the dynamics of HAB's are becoming available, e.g. in situ imaging flow cytometry and molecular biology based methods. This means that today it is possible quantify and identify HAB organisms, their competitors and grazers at a level approaching the natural variability. These are exciting times for HAB-research.

## References

- ICES 1984: ICES Special Meeting on the Causes, Dynamics and Effects of Exceptional Marine Blooms and Related Events. 16 pp.
- ICES. 2013. Report of the Working Group on Harmful Algal Bloom Dynamics (WGHABD), 9-12 April 2013, Belfast, UK. ICES CM 2013/SSGHIE:09. 67 pp.
- Intergovernmental Oceanographic Commission of ©UNESCO. 2010. Karlson, B., Cusack, C. and Bresnan, E. (editors). Microscopic and molecular methods for quantitative phytoplankton analysis. Paris, UNESCO. (IOC Manuals and Guides, no. 55.) (IOC/2010/MG/55), 110 pages. (English only).

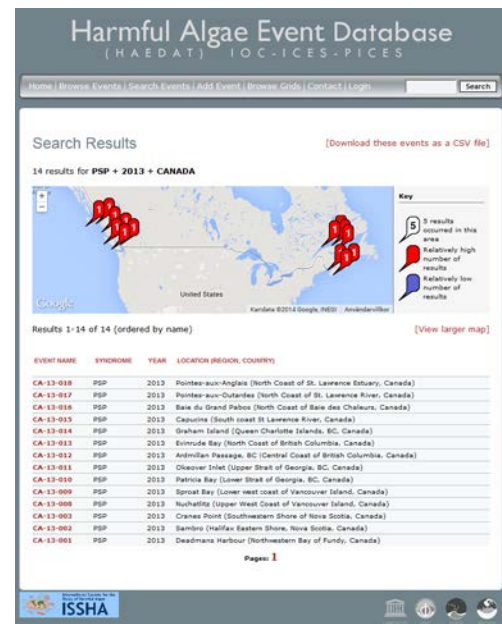


Figure 1 Screen shot from a search in the Harmful Algae Event database <http://haedat.ioede.org>