

# The use of the IOC-ICES-PICES Harmful Algal Event Database (HAE-DAT) to detect spatial and temporal trends in harmful algal bloom events in UK waters

Eileen Bresnan<sup>1</sup>, Keith Davidson<sup>2</sup>, Richard Gowen<sup>3</sup>, Steve Milligan<sup>4</sup>, Catherine Belin<sup>5</sup> and Henrik Enevoldsen<sup>6</sup>



<sup>1</sup> Marine Scotland Science (MSS), UK, <sup>2</sup> Scottish Association for Marine Science (SAMS), UK, <sup>3</sup> Agri-Food and Biosciences Institute, UK, <sup>4</sup> Centre for Environment, Fisheries and Aquaculture Science (CEFAS), UK, <sup>5</sup> Institut Français de Recherche pour l'exploitation de la Mer, (IFREMER), France, <sup>6</sup> Intergovernmental Oceanographic Commission (IOC) Science and Communication Centre for Harmful Algae, Denmark

## Background

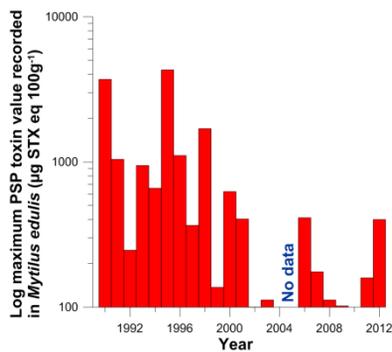
- The Intergovernmental Oceanographic Commission (IOC) - International Council for the Exploration of the Sea (ICES) - North Pacific Marine Science Organisation (PICES) Harmful Algal Event database (HAE-DAT) (<http://haedat.iode.org/index.php>) contains records of harmful algal events such as shellfish harvesting closures, fish kills, and benthic mortalities from across the globe.
- Records extend back over 30 years. These data are planned for inclusion in a 'Global HAB Status report' to be produced by the Intergovernmental Panel for Harmful Algal Blooms (IP-HAB). HAE-DAT is currently being upgraded by the IOC to improve the data extraction functionality and make the quality control of historic data more efficient.
- HAE-DAT can produce maps which show the regional distribution of harmful algal events (HAEs) and the number of HAEs over a defined time scale. Area codes need to be added to historic data in HAE-DAT to facilitate this functionality. This work is in progress.
- HAE-DAT contains data about shellfish closures in fulfilment of the EU Shellfish Hygiene Directive from UK waters since 1990.
- HAE-DAT data from high concentrations of the toxins responsible for paralytic and amnesic shellfish poisoning (PSP and ASP) in UK and Scottish shellfish are examined here to consider if these data can be used to investigate the impacts of environmental drivers such as climate change on HAEs.

## UK data in HAE-DAT: PSP

- The distribution of HAEs associated with PSP reflects the distribution of *Alexandrium* around the UK coast. This genus is prevalent in Scottish waters and the south coast of England.
- PSP toxicity in Scottish waters is associated with *Alexandrium tamarense* Group I strain (now called *A. fundyense*). In contrast, PSP toxicity along the south coast of England is associated with *A. minutum* (Collins et al., 2009, Percy 2006).
- Examination of the maximum HAE PSP concentrations reveal a decrease in the toxicity of Scottish shellfish since the 1990s despite monitoring effort remaining relatively constant. This may be due to a change in the diversity of *Alexandrium* species in Scottish waters (see poster by Winterton et al.).



Map showing the distribution of HAEs associated with PSP in the UK. Numbers in the bubbles will be updated as area codes are added to historic data within HAE-DAT.



Log maximum PSP toxin values recorded in Scottish shellfish since routine monitoring began.

## Acknowledgements

This analysis was performed under the Scottish Government Schedule of Service ST02a.



## The HAE-DAT Database (<http://haedat.iode.org/index.php>)



## UK data in HAE-DAT: ASP

- The distribution of closures as a result of high concentrations of ASP toxins in shellfish flesh from 1998 – 2005 and from 2006 – 2014 are shown below.
- A large reduction in the number of closures can be clearly seen in the data.
- The majority of closures prior to 2005 were enforced in offshore *Pecten maximus* fishing areas. In 2005 new EU legislation was introduced into the UK.
- The EU decision (2002/226/EC) permits end product testing of *Pecten maximus* which allows non-toxic parts of scallop flesh to be marketed. This eliminated the requirement to enforce the closure of scallop fishing areas. As a result the number of HAEs associated with ASP toxins decreased markedly in Scottish waters.



Maps showing the change in distribution of HAEs associated with ASP in the UK. Numbers in the bubbles will be updated as area codes are added to historic data within HAE-DAT.

## Use of HAE-DAT

- HAE-DAT is a useful tool for showing the regional distribution of HAEs.
- HAE-DAT can show changes in HAE frequency in a region. Additional information is required if trends are to be investigated statistically.
- HAE-DAT data will also reflect changes in monitoring programmes.
- These changes need to be accounted for when using HAE-DAT to examine the influence of environmental drivers on HAEs.

## References

Collins et al., (2009). J. Phycol., 49, 692 – 703.  
Percy L. (2006). An investigation of the phytoplankton of the Fal Estuary, UK and the relationship between the occurrence of potentially toxic species and associated algal toxins in shellfish. University of Westminster Ph.D. thesis. London U.K.