



## The EMECO Marine Data Tool – an ‘on-line’ data integration and synthesis information system for marine environmental assessments

David Mills (1), Kathryn Keeble (2), Rodney Forster (1), Simon Keeble (2), Stephen Malcolm (1), and Jon Rees (1)

(1) Cefas, Lowestoft, United Kingdom (david.mills@cefas.co.uk), (2) Blue Lobster, Lowestoft, United Kingdom (simon@bluelobster.co.uk)

Delivering the evidence needed to demonstrate compliance with a new generation of European marine environmental policy drivers requires new informatics tools. The data and information must be available at national and regional scale, range from physics to fish and provide a transparent audit trail from environmental assessment to quality assured data. To meet these challenges we have built regional partnerships such as EMECO (European Marine Ecosystem Observatory) and developed a data integration and assessment system (EMECO Marine Data Tool) using web technologies.

The Marine Data Tool is built on the, Open Source, LAMP (Linux, Apache, MySQL, PHP) framework. Flash, Flex, and JavaScript were used for creating the user interface, the bespoke ‘assessment’ maps and charts. The application resides on a Web Server and is therefore platform independent i.e. users can be working on Windows, Mac OS, or Linux. The application is available in any of the main browsers including Firefox, Safari, Internet Explorer 6, 7, and 8. A set of interfaces have been developed for a variety of data sources, along with a generic interface for use with less complex data structures. The interface(s) convert the data into the EMECO XML Schema and so promotes interoperability between different data sets. Data processing for each data set can be unique depending on data format and type. The EMECO Marine Data Tool currently accepts data in a large number of common data formats, including NetCDF, XML, Excel, Access, ASCII, KML/Z, TXT and others. Data are converted into XML and read into the EMECO data stream.

Users are able to query the EMECO data stream using the web-based data interrogation tool via the user interface in order to generate data and information in a number of defined outputs. These include time-series charts and bespoke ‘assessment’ maps. It also outputs data for subsequent visualisation in Google Earth and outputs common data formats (XML, CSV) to allow for further post-processing or visualisation in other software packages. The driving force for the development has been to meet the policy based assessment needs but the application also has broader capability for oceanography. Assessment maps are a key output from the application with the design based on feedback from end-users with a specific role environmental assessments and policy implementation. The assessment maps are composed of a data “mash-up” displayed in policy defined water bodies (polygons) for the greater North Sea and UK maritime area. A key element of the assessment map is an indication of the level of confidence in specific parameters that are used as environmental indicators in the formal environmental assessment process. All of these outputs are generated “on the fly”.

As a result of this work we have built a web-based application that provides an open ‘on-line’ mechanism for rapid integration and visualisation of multi-platform (e.g. ships, satellites, data buoys), multi-parameter (e.g. chlorophyll, nutrients, temperature) and multi-national data. The application provides a highly cost-effective process for creating the key building blocks of formal environmental assessments. It does so by facilitating the sharing of information in an efficient and transparent manner, and can bring all relevant data together, including data sets from novel as well as established sampling platforms and numerical models. Making best use of all relevant data it can improve our confidence in the evidence base used for environmental assessments that may be challenged in the European court. It has the potential for automation meaning that environmental assessments can be updated automatically and published to the web in near real-time