

# Development of the Impulsive Noise Register System<sup>1</sup>

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## Introduction

Underwater noise, sound that has the potential to cause negative impacts on marine life<sup>2</sup> is one of the key descriptors of marine ecosystem health under the Marine Strategy Framework Directive (MSFD). Noise is further categorized into ambient (background noise without distinguishable sources) and impulsive (sound comprising one or more short duration pulses, from sources such as airgun arrays, impact pile driving, powerful military search sonars and explosions) – in this system we focus solely on impulsive noise.

The reporting and monitoring of impulsive underwater noise events is a relatively new requirement in national and regional monitoring programmes. The establishment of an impulsive noise register system for OSPAR and HELCOM, to be used for assessment purposes of the North East Atlantic and Baltic regions respectively.

In essence the end users are the regional assessment leads working within their expert groups to deliver indicator based assessments on impulsive noise to the OSPAR Intermediate Assessment 2017, and the 2<sup>nd</sup> Holistic assessment (HOLAS II) in HELCOM. Their requirement was for a system that would comprise a web interface where noise events would be uploaded, quality controlled, displayed via a map interface and downloaded via a number of services. In addition, the system should be capable of calculating indicators of impulsive noise into a standard data product that can be stored, downloaded or queried from the web map interface.

The system relies on national registers of licenced activities, as such it was not suitable to make a continuous harvesting of data between the national registers and the Impulsive Noise Register as the national registers are fluid – the activities change in between when the licence is granted and the activity is carried out. Whereas the purpose of the Impulsive Noise Register is to show an inventory in a reporting year of actual activity that can be used directly to produce an indicator (pulse block days per assessment unit).

## Reporting mechanism

The first challenge of developing the system was to define a standard reporting format. The starting point was the TG Noise format – a tabular description of required fields transposed into Excel. ICES defined a data model from this description and developed an Excel template which was then underpinned with an XML schema representing the noise format. A macro button in the Excel template then exports (and validates) the filled spreadsheet into the XML file following the XML Noise Schema.

Data submitters have therefore have 2 options to provide validated data into the International noise register; either by filling in the Excel form template and using the macro button, or creating directly from their national database/system the XML files using the XML NOISE schema. The validated files are uploaded via the 'upload service' on the web interface (Figure 1).

The spatial reporting units are heterogenous in size and shape. Data submitters can report according to licence areas (polygons), ICES sub-square (the same unit as the indicator) or by points (lat/lon,

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<sup>1</sup> ICES, 2016 <http://underwaternoise.ices.dk>

<sup>2</sup> TGNOISE final report, Feb 2012  
[http://ec.europa.eu/environment/marine/pdf/MSFD\\_reportTSG\\_Noise.pdf](http://ec.europa.eu/environment/marine/pdf/MSFD_reportTSG_Noise.pdf)

WGS84). This creates a challenge when displaying the events on a map, and calculating a indicator based on a standard spatial assessment unit.

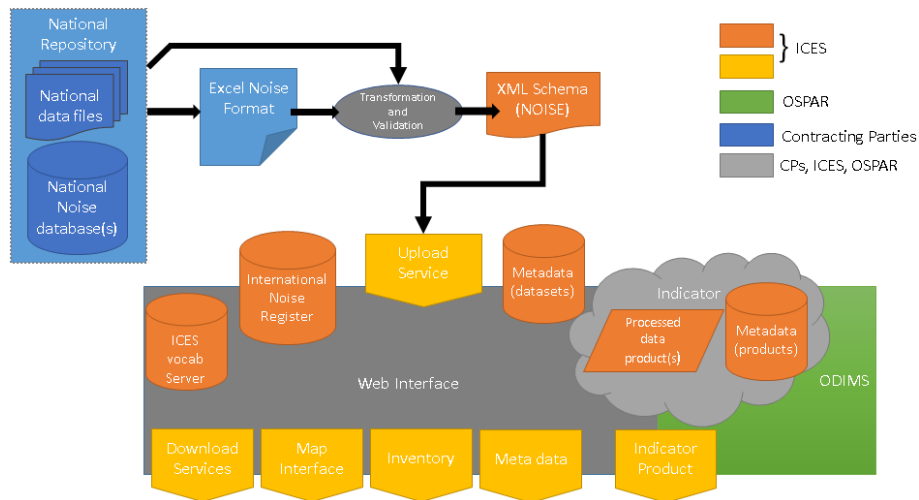


Figure 1 - Data workflow for international noise register and operational indicator

### Output and visualization

The output calculation is simple, but based on some arbitrary decisions on the spatial extent of a noise event. All the reporting is converted into ICES sub-squares. In the case of reported polygons events, any overlapping ICES sub-square that intersects the reported polygon is included as a pulse block day event.

ICES has developed a map interface (currently only available to HELCOM/OSPAR for Beta testing) for the visualization of the noise base data, the calculated indicators and the reference layer reporting units. Users can query the Impulsive noise base data by year, noise value codes, source events, and mitigation systems.

Also available are the indicators (Pulse Block Days per OSPAR Region [see figure 2], Pulse Block Days per ICES sub-square or pulse block days by value code) and the reporting units (ICES sub-rectangle, UK Licence Blocks, German Naval Polygon). All these layers/data are available for download as shapefiles, images, and in some cases as excel files.

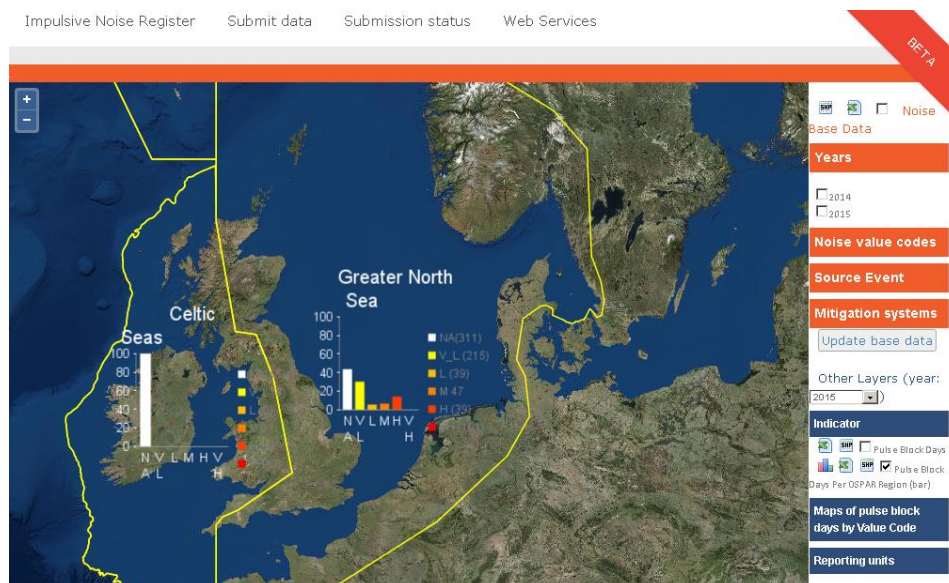


Figure 2: Map facility showing the indicator of Pulse Block days per OSPAR Region