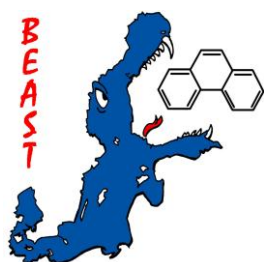


## Biological Effects of Anthropogenic Chemical Stress: Tools for the assessment of Ecosystem Health



Project Acronym	BEAST
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## Introduction

In general, the BEAST project fulfilled all its milestones and deliverables planned for each three WPs and tasks (subregions) for the year 2009. BEAST is, by number of participating institutions (16), the biggest of the BONUS+ projects, and involves, including PhD students, approx. 40 researchers. Similar to the other BONUS+ projects, a significant cut to the original research budget of BEAST was made prior to the start of the project. These two factors caused some problems in co-ordination, management and execution of the project during the first year. Some modifications to the sampling and analysis programme had to be made along the way; mainly, some of the intended number of analyses, target species and parameters had to be reduced. Associated uncertainties concerning the sampling campaigns and number of samples also occurred. To find solutions to these problems the reinforced BEAST Steering Group (6 persons) held an extra meeting in October 2009 in Hamburg to carefully go through the practical problems and uncertainties encountered during the project so far. Also, a useful document clarifying the role and duties of project partners was produced as an annex to the minutes of the meeting.

So far, four major BEAST sampling campaigns have been carried out on board Finnish and German research vessels, including a major multidisciplinary sampling campaign in the Gulf of Finland in Aug/Sept 2009, aiming at an integrated assessment of the ecosystem health of the Gulf of Finland. In addition, coastal samplings were organised by the regional BEAST Task Leaders. As a result, samples were obtained in all five BEAST sub-regions (Gulf of Bothnia, Gulf of Finland, Gulf of Riga, Gulf of Gdansk, Belt Sea) and first results are available that will be entered into the first version of the common BEAST/BALCOFISH database which is ready for testing. Methodologies applied have been standardised to a great extent and the development of guidelines and Standard Operating Procedures is progressing. A number of training workshops and intercalibration activities have been carried out in this context, partly in collaboration with the BONUS+ project BALCOFISH.

At the kick-off meeting of the BONUS programme in January 2009, BEAST received excellent media coverage in Finland (TV news, two national radio and main national newspaper interviews of co-ordinator, press release cited in half a dozen main national newspapers). In addition to the direct project work, many BEAST partners made significant contributions during the year concerning the main themes of the project related to activities carried out at international organisations, most importantly in the ICES groups SGEH, WGBEC and WGDPMO, and HELCOM (inputs to the HOLAS HAZAS). Contributions were also made to several international conferences and workshops. BEAST was also well presented in the BONUS conference with 2 oral presentations and 6 posters.

BEAST achieved close collaboration with the BALCOFISH project, and common samplings, experimental and workshop activities are planned to be continued during 2010 and 2011. Furthermore, BEAST attracted a number of various non-BONUS projects related to biological effects of contaminants and ecosystem health, and collaboration (sample sharing, testing of new analytical methods and approaches) with these projects will be continued, while new interested parties are actively sought for.

The scientific progress achieved in the first year of the BEAST project is detailed in the specific WP reports.

## **WP 1: Field studies and experiments in selected sub-regions of the Baltic Sea**

### **Gained scientific results during the reporting period**

The largest research activity in 2009 was the GOF-IA (Integrated Multidisciplinary Assessment of the Ecosystem Health of the Gulf of Finland) joint 2-week research cruise of r/v Aranda (FI) and r/v Walther Herwig III (DE) in August-September. Unfortunately, no permission to sample in Russian waters could be obtained and the original sampling plan had to be adjusted. Sampling was carried out at 20 point stations (Aranda) and 9 fishing areas (WHIII) in different parts of the Gulf of Finland within the Finnish and Estonian EEZ. Fish i.e., herring, flounder and eelpout were collected for analyses of fish disease and histopathology, and biomarker analyses. *Macoma balthica*, and zooplankton were collected for analyses of oxidative stress and sediment was for contaminant analyses and laboratory experiment with amphipods. Results showed higher mortality on contaminated sites.

The research performed consists of measurements of several biological and chemical parameters with emphasis on selected biomarkers. The main aim is to use the data (plus additional existing data sets) for an integrated assessment of ecosystem health in the different sub-regions of the Gulf of Finland by using methods tested and developed under WP3. Analyses of genotoxic effects in terms of nuclear abnormalities indicated some areas as heavily polluted.

The planned field campaign in Gulf of Gdansk and Gulf of Riga was performed in the beginning of December and despite problem with the vessel R/V Walter Herwig III, both areas could be sampled. KVB 005 visited the Bothnian Bay and Bothnian SEa in the middle of December for collecting the Baltic key species *Monoporeia affinis* in contaminated and reference areas. Despite -15 °C and hard wind all stations were visited and analyses of reproduction variables have been finished. Results show comparatively high incidences of reproduction disorders several km from point sources.

**Comparison with the original research and financial plan:** Work in BEAST WP 1 proceeded according to plan.

Do results of third parties will have influence on the working programme? **It is possible that recent research results could influence e.g. the core programme and result in other prioritizations. Financial problem could also influence the original schedule.**

## **WP 2: Application and validation of methods in monitoring and assessment in the Baltic Sea**

### **Gained scientific results of BEAST WP 2 during the reporting period:**

The identification and validation of suitable methods for integrated monitoring and assessment (BEAST WP 2 Deliverable 1) is underway and will be finalised at the end of the project, based on the practical experiences made and the results of the integrated data assessment (BEAST WP 3 task).

In collaboration with BEAST WP 1 and the regional Task Leaders for the five Baltic Sea sub-regions under study (Gulf of Bothnia, Gulf of Finland, Gulf of Riga, Gulf of Gdansk, Belt Sea), the field sampling programme was designed accordingly (location of sampling sites, timing of sampling, number of sampling campaigns, target species (algae, bivalves, gastropods, crustaceans, fish), sample sizes (number of specimens & replicates), parameters to be measured (biomarkers, chemistry in biota and sediments, bioassays, supporting parameters), sample storage and distribution etc.). Use was made of existing concepts and guidelines (OSPAR, HELCOM, ICES, BSRP, ICES/OSPAR WKIMON, SGIMC etc.) and experiences made in previous integrated studies (EU-funded BEEP project, ICON North Sea project etc.).

A first draft of a Handbook with Guidelines and Standard Operating Procedures (SOPs) for integrated monitoring and assessment of contaminant and biological effects in sub-regions of the Baltic Sea, ultimately supposed to cover all aspects relevant for sampling, laboratory analyses, data collection, analysis and assessment (BEAST WP 2 Deliverable 2; due month 37) has been prepared and solicited to BEAST partners for review. The SOPs will be updated with new information as required. The goal is to publish the handbook and make it available for future national and HELCOM Baltic Sea monitoring and assessments.

Plans were made to organise a number of BEAST training workshops (open to BEAST partners and other interested participants) and intercalibration exercises (largely BEAST internal) over the entire project period (BEAST WP 2 Deliverables 3.1, 3.2, 3.3), out of which four were held in 2009 (BEAST WP 2 Deliverable 3.1): (1) Training and intercalibration of methods for field sampling of biomarkers and fish disease studies (Lead: vTI/FOE), (2) Workshop on reproduction and developmental disorders in crustaceans/amphipods (Lead: ITM), (3) Practical workshop on eelpout sampling and examinations (in collaboration with BONUS+ BALCOFISH)(Lead: NERI), (4) Workshop on measurement of enzymatic biomarker in bivalves (Lead: SYKE). An intercalibration exercise on measurement of PAH metabolites in fish bile has been initiated end of 2009 (Lead: vTI/FOE).

**Comparison with the original research and financial plan:** Work in BEAST WP 2 proceeded according to plan.

**Statement if the research plan and schedule of deliverables had to be adapted:** The schedule for BEAST WP 2 Deliverable 1 (Identification and validation of suitable methods for integrated monitoring and assessment) was changed from 28.02.2009 to 31.01.2012 because this task can only be fulfilled at the end of the project after all data generated have been analysed and assessed (Note: a progress report on this Deliverable was nevertheless prepared and submitted to the EPSS).

**Do results of third parties will have influence on the working programme?** This cannot entirely be excluded since there are other activities underway (e.g., under ICES and OSPAR), addressing integrated monitoring and assessment of contaminants and biological effects, the results of which may be relevant for the BEAST project.

**Are there any changes in the future working plan expected?** No major changes expected.

**Are there any changes expected for the deliverables?** No major changes expected except for the modified schedule for BEAST WP 2 Deliverable 1 (Identification and validation of suitable methods for integrated monitoring and assessment) (see above).

### **WP 3: Developing tools for Ecosystem Health assessment in the Baltic Sea**

#### **Gained scientific results of BEAST WP 3 during the reporting period**

##### **Activities in 2009**

One of the main tasks for 2009 has been the set-up of a database to host all relevant data produced within the BEAST project but also other data already available concerning biological effects (e.g. BEEP data).

Some general ideas concerning the set-up of the BEAST database were already presented during the BEAST Kick-off meeting in Helsinki (Jan. 2009). In the following months the overall database structure was developed (M3.1). In autumn/winter a more detailed structure was available, developed in interaction with the BEAST partners and the BEAST steering group.

When setting up the database, a further aim has been to provide the same database structure for two BONUS projects, i.e. BEAST and BalcoFish. To ensure this, the Joint BalcoFish/BEAST workshop in October 2009 (Holbæk, DK) was used to present and discuss the structure and status of the database.

Since the end of 2009 the BEAST database (BonusHAZ) is in operation. The Report Format is based on Excel with a coupled Access database including a brief "user manual". The Report Format has been sent out to all BEAST partners. It has its own e-mail address: [Bonushaz@dmu.dk](mailto:Bonushaz@dmu.dk). BEAST partners have started to test BonusHAZ and to fill in data.

From the beginning, the ICES code lists have been used as a foundation for data exchange and consistency between institutes. As of 2010 BEAST has a formal arrangement with ICES to use their code lists from their RECO database <http://www.ices.dk/datacentre/reco/reco.asp>. At present these code lists are being implemented in the BonusHAZ structure. During the development of the BEAST database a close collaboration with ICES data managers was established, among others to give technical advice. The collaboration with ICES also allows that data from BonusHAZ can be submitted to ICES at a later stage. Submission of data to ICES has to be decided by the BEAST partners and an output format has to be coded.

Another task in 2009 has been to reassemble the BEEP database. This has been done in collaboration with the former BEEP data manager Jacek Beldowski, Polish Institute of Oceanography, (IO-PAN). Presently the BEEP data are in the process to be imported into BonusHAZ.

The BonusHaz database forms the bases for the planned multivariate analyses and integrated assessment later in the project. First ideas concerning integrated analyses have been developed

during 2009 and presented as poster during the Bonus annual conference in Vilnius in January 2010.

**Comparison with the original research and financial plan:** Work in BEAST WP 3 proceeded according to plan.

**Statement if the research plan and schedule of deliverables had to be adapted:** no changes were necessary.

**Do results of third parties will have influence on the working programme?** This cannot entirely be excluded since there are other activities underway (e.g., under ICES and OSPAR), addressing in the HELCOM integrated monitoring and assessment of contaminants and biological effects, the results of which may be relevant for the BEAST project.

**Are there any changes in the future working plan expected?** No major changes expected.

**Are there any changes expected for the deliverables?** No major changes expected.