# Guidelines for the monitoring of mobile and sessile epifauna

*Approved by STATE & CONSERVATION 14-2021*

## 1. Background

### 1.1 Introduction

The global vectors for the introduction and spread of aquatic non-indigenous species (NIS) include, but are not limited to ships' ballast waters and biofouling, as well as aquaculture. Regional secondary spread of NIS may further occur by recreational vessels and leisure craft. Since many NIS in the Baltic Sea originate from warmer regions, climate change and increasing water temperatures may facilitate their establishment and further spread. One of the steps to manage introductions and mitigate the impacts of NIS include establishing monitoring programs that enable early detection and rapid management responses as appropriate. Monitoring of NIS is required through several international agreements and guidelines, such as the Biodiversity Strategy, Marine Strategy Framework Directive (MSFD) and the Invasive Alien Species Regulation of the European Union. In addition, the HELCOM Baltic Sea Action Plan recognizes the issue in its Management Objectives for Maritime Activities: "No introductions of alien species from ships".

### 1.2 Purpose and aims

The Joint Harmonized Procedure by HELCOM and OSPAR (HELCOM & OSPAR, 2013) has been used to monitor mobile and sessile epifauna among other taxa, but only in port areas, and further observations on the presence of these species have been barely a side-product of other national monitoring programs and research projects. There have not been general guidelines for the monitoring of mobile and sessile epifauna in natural coastal habitats for the Baltic Sea thus far. Habitat collectors and fouling plates have been utilized in many coastal NIS sampling projects (Roche et al. 2009, Fowler et al. 2013; Brzana et al., 2019; Outinen et al., 2019). They provide a standardized and easily repeatable sampling method for crabs, fishes, mollusks and macroinvertebrates with manageable workload. Habitat collectors contain artificial habitat structures that provide refuges for these organisms instead of capturing them. Additionally, sampling of sessile species can be enhanced with PVC fouling plates that provide attachment surfaces for these organisms.

These guidelines aim to cover the monitoring of mobile and sessile epifauna in natural coastal habitats. The obtained data provides input for the assessment of the HELCOM core indicator 'Trends in arrival of non-indigenous species', which compares the diversity of NIS at pre-selected temporal intervals to a baseline and evaluates the present status relative to previous temporal periods.

## 2. Monitoring methods

### 2.1 Monitoring features

1. Monitoring with habitat collectors and fouling plates is used to detect non-indigenous mobile and sessile epifauna, as well as benthic species at natural coastal habitats.
2. The method requires generally a boat and two visits at the site (deployment and retrieval).
3. Taxonomical expertise is required for identification, as well as knowledge of NIS habitat preferences locally.
4. Site-specific procedures must be repeated periodically, therefore systematic documentation and mapping of sites is required.

5. Collectors and fouling plates increase the likelihood of detecting rare and less abundant NIS.
6. The method assists revealing temporal trends in NIS abundances and patterns of secondary spread and natural dispersal.
7. All recorded data on NIS need to be stored in a database for introduced and cryptogenic species.

## 2.2 Time and area

Sampling should be conducted during summer when the seasonal succession of mobile and sessile epifauna is at its highest. The optimum time window for sampling fluctuates annually and across different parts of the Baltic Sea. However, a minimum of three sets of habitat collectors and settlement plates per sampling site should be deployed during May or June and retrieved during August or September. A chronological order of the sampling sites should be maintained for comparable results. Sampling sites nearby coastal industrial areas may require a permission from local authorities.

## 2.3 Monitoring procedure

### 2.3.1 Monitoring strategy

Due to the diverse characteristics of the sampled habitats, a high degree of flexibility and expertise is required. The aim is to concentrate on mobile and sessile epifauna and establish a yearly rate of new observations per site with comparable effort. Depending on the surveyed site, the deployment time of collectors and plates may differ. The minimum deployment time is 6 weeks due to relatively slow organism recruitment by the fouling plates. However, deployment time can be extended according to the recommendations of national experts, if necessary. Sampling site placement requires local expertise, but in general all dominant natural habitat types (e.g. sandy and muddy sea beds, and rocky shores) per sub-basin should be surveyed (According to the 17 sub-basins defined by HELCOM).

### 2.3.2 Sampling method(s) and equipment

Sampling should be conducted by deploying a set that includes an artificial habitat collector (19×22×16 cm with 2×2 cm mesh) with different habitat materials (oyster shells, pieces of garden hose or flowerpots) as contents and a 15×15 cm PVC fouling plate (Figure 1). Each set should be constructed of rope (approximately 5-10 metres), a buoy at the surface, one plastic fouling plate and a habitat collector at the bottom. The set should be deployed at approximately 2 to 5 m of depth (considering regional variability), with the fouling plate adjusted to approximately 1 m depth.

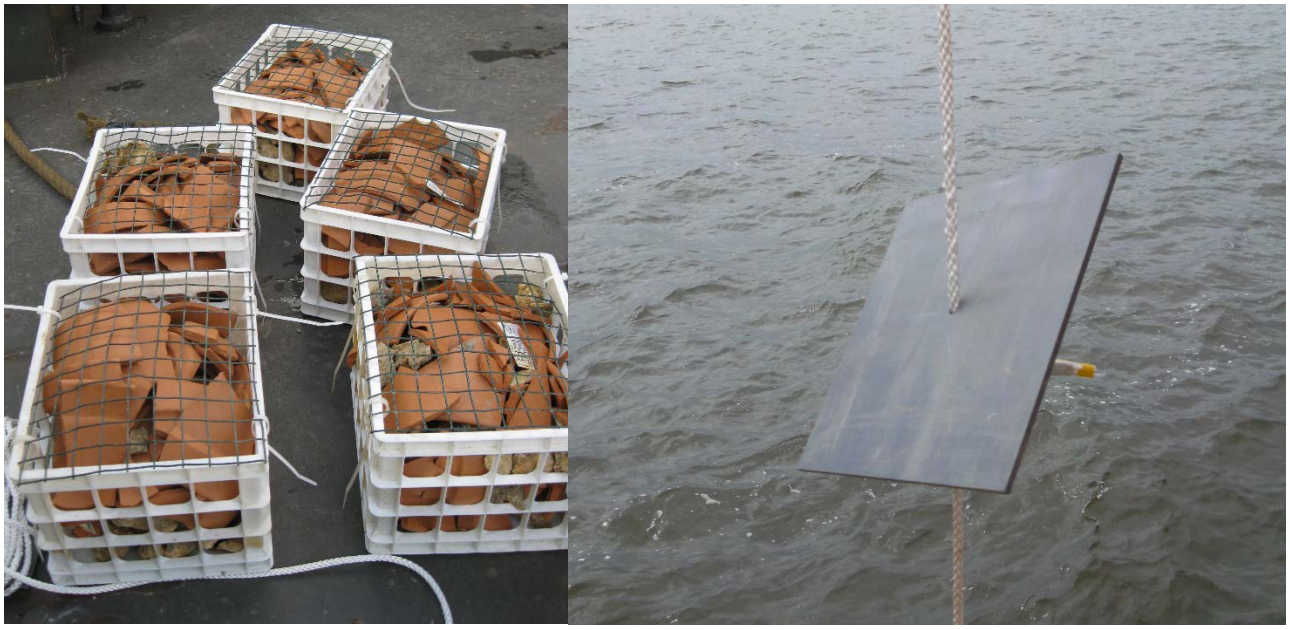

*Figure 1. A habitat collectors (left) and a fouling plate (right). Photos: Maiju Lehtiniemi.*

### 2.3.3 Sample handling and analysis

During retrieval, the collectors should be rapidly lifted and placed into a larger container with *in situ* -water. All collector contents and frames should be rinsed to collect all organisms present. The plates can be placed into individual re-sealable plastic bags and transported in a cooler. The collector samples should be placed in plastic or glass jars, preserved in 90 % ethanol and transported in a cooler. The transported samples can be stored in a fridge if they have been preserved. Otherwise samples should be stored in a freezer.

All samples should be carefully examined in the lab with stereomicroscopes. Organisms should be identified to the species level, or lowest taxonomic level possible. Species present should be listed and if possible, the abundances of NIS should be recorded. Identification should be done using established taxonomic keys and available literature. Identification procedures of rare and novel species can be time consuming and require correspondence with taxonomic experts. Specimens of concern should be preserved (alcohol, formalin/seawater etc.) and stored. For potential genetic analysis of controversial specimens, storage in ethanol may be preferable.

# 3. Data reporting and storage

All collected data should be gathered into national monitoring databases. In addition, new non-indigenous species records should be reported to AquaNIS (AquaNIS, 2015). The use of AquaNIS as a central data storage for HELCOM NIS data is currently under discussion.

# 4. Quality control

## 4.1 Quality control of methods

All samples should be analysed by local experts in a quality assured laboratory. If an unknown species is detected for the area, it should be photographed and preserved for further analyses (preferably in 96% ethanol for genetic analyses). ISO/IEC quality assured laboratories are relatively rare. Other proofs of quality assurance can be accepted also, as for example participation in HELCOM quality assurance projects such as ZEN QAI and PEG intercalibration are considered quality assured. In addition, laboratories approved by national administrations are considered quality assured.

# 5. Contacts and references

## 5.1 Contact persons

Maiju Lehtiniemi (Maiju.lehtiniemi@ymparisto.fi), Okko Outinen (okko.outinen@ymparisto.fi)

## 5.2 References

AquaNIS. Editorial Board, (2015) Information system on Aquatic Non-Indigenous and Cryptogenic Species. World Wide Web electronic publication. www.corpi.ku.lt/databases/aquanis. Version 2.36+. Accessed 2020-04-07.

Brzana R., Marszewska L., Normant-Saremba M., Błażewicz M., (2019) Non-indigenous tanaid *Sinelobus vanhaareni* Bamber, 2014 in the Polish coastal waters – an example of successful invader. Oceanological and Hydrobiological Studies 48 (1), 76-84.

Fowler, A.E., Forsström, T., von Numers, M., Vesakoski, O., (2013) The North American mud crab Rhithropanopeus harrisii (Gould, 1841) in newly colonized Northern Baltic Sea: distribution and ecology. Aquat. Invasions 8, 89–96.

HELCOM, OSPAR, (2013) Joint Harmonised Procedure for the Contracting Parties of OSPAR and HELCOM on the Granting of Exemptions Under International Convention for the Control and Management of Ships' Ballast Water and Sediments, Regulation A-4. Available from: http://jointbwmexemptions.org/ballast_water_RA.

Outinen, O., Forsström, T., Yli-Rosti, J., Vesakoski, O., Lehtiniemi, M., (2019) Monitoring of sessile and mobile epifauna – Considerations for non-indigenous species. Mar Pol Bul 141, 332-342.

Roche, D.G., Torchin, M.E., Leung, B., Binning, S.A., (2009) Localized invasion of the North American Harris mud crab, *Rhithropanopeus harrisii*, in the Panama Canal: implications for eradication and spread. Biol. Invasions 11, 983–993.