Experiences from artificial nest structure pilot from the Archipelago Sea

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Action C2.2 Piloting of the artificial nests for Baltic ringed seals in the Archipelago Sea,
and The Archipelago Sea part of **Action D.2** Monitoring the nesting success in artificial nests and in man-made snowdrifts

Deliverable C2.2: Report: Experiences from artificial nest structure pilot from the Archipelago Sea,
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Abstract

The subpopulation of the Baltic ringed seal (*Pusa hispida botnica*) living in the Archipelago Sea, SW Finland is small and spread out within a large geographic area. Currently, the population is estimated at ca. 200-300 individuals. Climate change is considered as the major threat for the southern populations of ringed seal in the Baltic Sea. Nowadays the outer parts of the Archipelago Sea are free of ice in most winters, and in the future ice cover is expected to become even more exceptional. This may have severe effects to the reproductive success for a species which is highly dependent on ice and snow for its breeding.

Ringed seals have evolved to use snow-lairs on sea-ice as protection for their pups, but in modern ice- and snow-free winters in the Archipelago Sea the pups are forced to be born exposed to harsh weather conditions and predation. Thus, climate warming challenges ringed seal breeding success in the southern populations and calls for concrete conservation measures, such as artificial nests, that could improve breeding success of the species under changing environment. Our Saimaa Seal LIFE -project developed and tested artificial nest structures to offer shelter for breeding ringed seals and the pups. The tests produced valuable experiences on suitability of materials and models for the artificial nests for ringed seals, as well as on features of good deployment spots for them. Visitors at the nests were monitored and, as a top result, a ringed seal female accepted an artificial nest for protection to its pup. This report summarizes the progress and findings of the sub-action C2.2, “Piloting of the artificial nests for Baltic ringed seals in the Archipelago Sea”, and the related monitoring action D.2, “Monitoring the nesting success in artificial nests and in man-made snowdrifts“.

Due to sensitive nature of the sites and to avoid disturbance to the animals, the exact locations of the artificial nests are not presented in this public report. The detailed information is provided to the authorities for conservation and management purposes (Annex 1).

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Hanke on saanut rahoitusta Euroopan unionin LIFE-ohjelmasta. Aineiston sisältö heijastelee sen tekijöiden näkemyksiä, eikä Euroopan komissio tai CINEA ole vastuussa aineiston sisältämien tietojen käytöstä.

1. Introduction

The subpopulation of the Baltic ringed seal (*Pusa hispida botnica*) in the Archipelago Sea, SW Finland (see Fig. 2) is small and spread-out over a large geographic area. Currently, the population is estimated at ca. 200-300 individuals (Nordström et al. 2011; Halkka & Tolvanen 2017). At the end of the 1800s' and early 1900s' the Archipelago Sea was still one of the significant areas for the species in Finland and ringed seals were abundant (Bergman 1956). However, overhunting and consecutive mild winters resulted the collapse of the population in 1930s (Bergman 1956; Stenman et al. 2008). In the early 21st century, WWF Finland raised a concern of the state of the Archipelago Sea ringed seal population, resulting inventories carried out between 2002 and 2011 (Nordström et al. 2011). The current population estimate is based on the results of these surveys and later inventories have not brought indication of population increase (Luke 2013 unpublished and this project action A3.2).

Climate change is considered as the major threat for the southern populations of ringed seal in the Baltic Sea. Nowadays the outer parts of the Archipelago Sea are ice-free in most winters, and even when ice is present there is usually no snow on ice to enable protective snow lairs for the ringed seals. In the future, ice cover is expected to appear even more rarely. This supposedly has severe effects to the reproduction of the species which is highly ice- and snow-dependent for its breeding.

In the sub-action C2.2, "Piloting of the artificial nests for Baltic ringed seals in the Archipelago Sea", artificial nest shelters for the Baltic ringed seals in the Archipelago Sea were developed and tested. This documents also reports the activities conducted in the related monitoring action D2: "Monitoring the nesting success in artificial nests and in man-made snowdrifts". All these activities were carried out by TUAS.

The main goals for these activities were: **1. Develop and test artificial nest structures suitable for marine conditions**, and **2. Monitor if ringed seals find and accept the nests**.

2. Development of the artificial nest structures for ringed seals in the Archipelago Sea

In the beginning of the preparatory phase of the development work, TUAS members visited lake Saimaa area for taking a closer look at the artificial nest models used there. Suitable principles and

features of these were utilized as a basis of the development work for the artificial nest structure models in the Archipelago Sea. One of the main special requirements in the Archipelago Sea is to consider the strong movements of the sea both in ice-free and ice-covered situations. Water level varies within roughly one meter and waves have power to move any lightweight structures especially in exposed shores. Winter storms get even more crushing power from potential ice they drive along. Using any floating structures was decided to be too vulnerable against these conditions. Therefore, it was essential to use structures at sheltered locations on land. Other prerequisites of the nest models were practical transferability and deployment, minimized maintenance-needs and the main purpose of the structures: good protection for ringed seal pups against predation and harsh weather conditions.

2.1 Artificial nest models

Originally, our plan was to deploy 5-10 artificial nest structures in the Archipelago Sea area. Four different models were developed and tested. Three of them made of marine plywood, 1) one with a simple ridged roof with both ends open, 2) a ridged roof with the shore-facing end open and the land-facing closed, 3) a ridged roof with shore-facing end open and with attached sheltered entrance section. The fourth model 4) was based on a modified commercial product, a plastic leaf compost box. Altogether 13 artificial nests were deployed prior to the breeding season 2023. The primary purpose of the shelter, protection against predation and harsh weather conditions for ringed seal pups, was a challenging goal. Given the forces of the sea (changes in water level, waves and potential ice and all these combined), the nest structures were constrained to be deployed on land. In addition, variable water level led to variable distance of the structures to the shoreline and enabled potential land mammals in the area to access the nest structures. These were the compromises we needed to make with the artificial nest models.

2.2 Placing the artificial nests in the Archipelago Sea

Very little information is available on breeding site selection by ringed seals in ice-free circumstances. All available information on previous land-based breeding locations was utilised for placing the artificial nests to locations where the ringed seals would have best chances to find, accept and use them. Only a few land-born pups had been observed earlier. In addition, a handful of observations on claw-marks on dried algae on shore-line (showing locations where ringed seals

have climbed up in breeding season and in such sheltered locations where they otherwise are not hauling out) and a couple of ringed seal pup skins as white-tailed sea-eagle prey, may indicate vicinity of birth locations. All these observations were pointing towards small sheltered coves of islands in areas lacking human activities. Such locations were selected from government-owned islands, where we in this project had permission to deploy the structures and which were already nature reserves and therefore less exposed to human interests and disturbance (Annex 1).

3. Monitoring the artificial nest structures

The artificial nest structures were deployed in late autumn, well prior to ringed seal breeding season. Two wildlife cameras were deployed with each artificial nest structure, one inside and one outside of the structure. The cameras were set to take photographs triggered by movement to monitor possible visitors in and outside of the nests. For minimising human disturbance in the vicinity of the nest structures, they were not visited during the breeding season. The wildlife cameras were collected in spring, well after the weaning time of the pups.

4. Results

4.1 Experiences from the deployment and durability of the nest structures

All the nest models were pre-built in a workshop and the parts were assembled at the sites of deployment. They were equipped with steel net hem and on that anchored with stones from the site. All the models held out the circumstances well without any marked wearing or damage.

Marine plywood is a durable material, but weight and required space becomes a challenge with transportation of larger quantities. The commercial plastic leaf compost box product needs less additional structures and can be piled inside one another, making them advantageous in larger quantities.

4.2 Observations on the usage of the nest structures

4.2.1 Ringed seals

In spring 2023, one ringed seal pup was born in a plastic leaf compost box and was nursed there for a month. The pup used the nest as a shelter and moulted its lanugo fur into the nest. Two other ringed seal pups were observed nearby two artificial nests, but not in or at them while three ringed seal pups were found further from the artificial nests. Adult ringed seals were observed outside of three nests through the wildlife cameras and in the vicinity of a few other nests by human observers after the breeding season.

In early 2024 a short period of ice-cover took place in the inner parts of the Archipelago Sea. In spring 2024, two dead pups were found from a group of skerries with two artificial nests and an adult ringed seal was observed close to the nests.

In spring 2025, a few adult ringed seals were observed next to the skerries with artificial nests and a pair was seen displaying mating behaviour next to an island with two artificial nests.

4.2.2 Other species

Many of the artificial nest structures were visited by other biota, such as otters, American mink, voles, and birds. Five nests were visited by foxes in early 2024, after a short period of partial ice-cover in the inner Archipelago sea, which raises a concern of predation risk when the artificial nest structures offer an access from land. However, these nests probably protect well against avian predators, such as the white-tailed sea-eagle, which is the most common threat to land-born ringed seal pups in the Archipelago Sea.

4.3 Conclusions and future remarks

Based on our experiences, many of the developed artificial nest structures were rather well located as both adult and pup ringed seals were observed near them. One ringed seal was born at a nest. That was clear evidence of the artificial sheltering structure being accepted and utilized by the ringed seals. It remains to be further investigated if the specific model of the nest impacted the

choice and what is the role of characteristics of the actual sites where the nests were deployed. Supposedly, more can be learned about optimal spot choice for the artificial nests, both what comes to preferences by the ringed seals and optimal protection against weather and predation.

An obvious need for further improvement would be to develop better protection against land mammals. This is a challenge though when floating structures on sea would need massive anchoring structures and materials and might even then not sustain the forces of the waves and ice.

In any case, our experiences encourage further development and deployment of the artificial nest structures for improving the breeding success of the Archipelago Sea ringed seals.

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