

## Nabbens Wetland for increased biodiversity and climate-adapted stormwater management



It is an increasingly priority task to take care of and circulate water in our society in a safe and sustainable way so that our sea is not damaged. The city's environmental program contains environmental goals that reduce the city's environmental impact on coastal waters, beaches and watercourses. There are also environmental goals that we should develop the city's land use in a way that ensures proximity to green areas, biodiversity, the possibility of a sustainable lifestyle and resilience to climate change.

**The stormwater - the water that "cleans" the city.** The length of the city's stormwater network is 57 km. A more efficient use of plots of land has led to an increase in the number of paved areas within the city and thus the volume of stormwater has also increased. Parts of the city's stormwater network have been provided with various types of treatment.

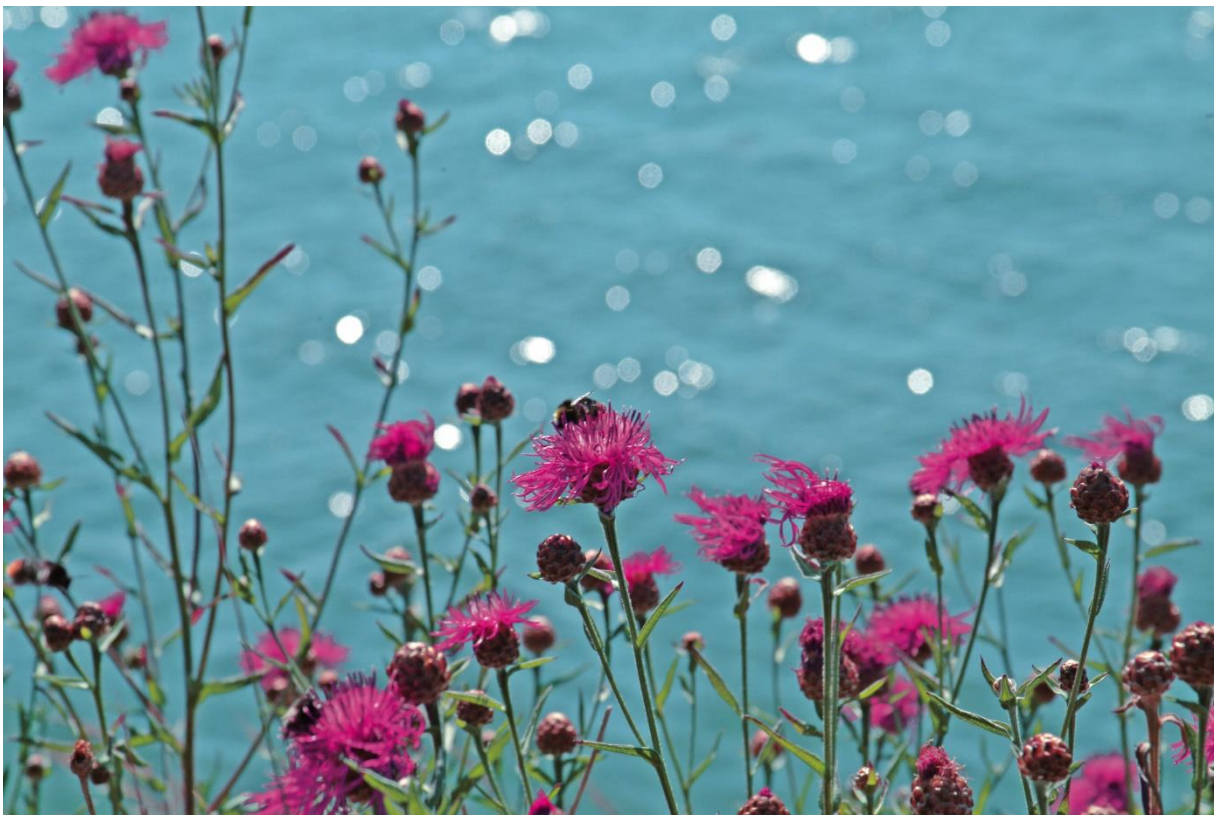
**Future challenges.** The expected changes in the climate will lead to increased precipitation in the winter and heavier rainfall throughout the year. With increased precipitation, more and more pollutants risk being carried out with the stormwater to the nearby bays.

By constructing Nabbens wetland, one of the largest stormwater flows can be purified. And at the same time we have create a good biotope for both fish, bird life and pollinators.



-That's why we built Nabben's wetland, says Ulf Simolin, environmental coordinator for the city of Mariehamn .

## POLLINATORS



The thriving meadow environment along the dam walls that stretch around the wetland is not only nice to see, it also contributes with many important functions for the area. The flowering herbs contribute to biological diversity in the area's vegetation at the same time as the plants' roots bind the soil together in the dam walls. In this way, the soil in the dam walls does not erode as easily. The wetland's flower-covered dikes also function during the summer as a buffet for butterflies and other pollinators. The seed mixture used in the construction of the dam walls contained different types of grass and herbs that are butterflies, bees and bumblebees like to attract.

## AMPHIBIANS

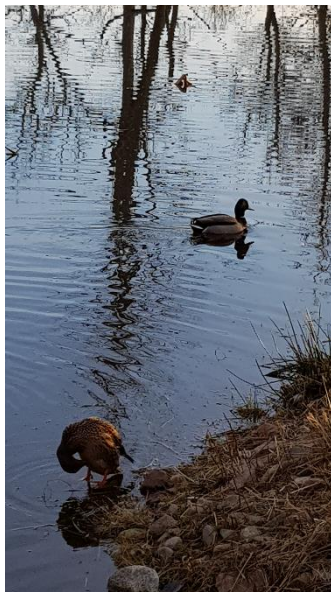


The biggest threat to the batrachians in Europe is the draining of wetlands and other areas for living and reproduction. To help the frog and the great crested newt, we have constructed four frog ponds in the deciduous forest grove at the wetlands of Nabben.

And already after a year the first frogs had moved into one of the ponds. and very recently we found rum from frogs in the wetland.

-it's really fun to see that it has been given effects so quickly, says Ulf Simolin.

## BIRDS



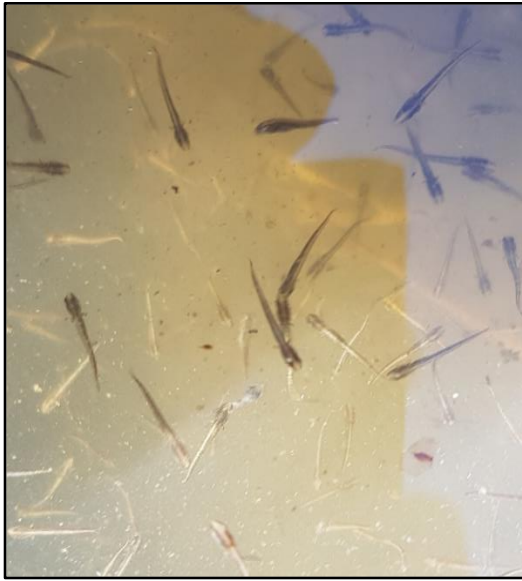
The wetlands create better conditions for the bird life. The wetlands at Nabben offers good access to food and good protection against birds of prey. Most of the birds that live and nest here are different kinds of anseriformes. Migratory birds like to stay here to rest and eat. Bird-watchers get a nice excursion spot too.

### Bird houses

There is a lack of natural nesting holes for cavity-nesting birds. In Europe, 419 species of birds have been studied and 60 of them (14 percent) need cavities for nesting. Putting up bird houses can increase bird populations substantially. Therefore, Strandnäs school has contributed with several different types of bird houses around the wetlands.



## PIKE



The numbers of pike has decreased in the Baltic Sea. Partly because natural flooding areas has been destroyed. In these wetlands, we have created a place where the pike can reproduce. The wetlands can supply the sea with 25 000 pike fry every year. The pike spawn occurs in groups for about a week in the spring.

During Easter earlier this year, an inventory was made of pike in the wetland. An estimated 20 pike were noted during the visit.

-It is gratifying proof that pike are already finding their way here and that the wetland works for their spawning, says Ulf Simolin, environmental coordinator at the City of Mariehamn.

The pike often returns to the place where it was born to play and lay rum. In the spring of 2020 and 2021, the city released approximately 10,000 pike fry in Nabben's wetland. Hopefully, those pike fry will also find their way back to Nabben when they become sexually mature in two to three years. The city is releasing another 10,000 pike fry this spring.

## WETLANDS CLEANING PROCESSES



Two natural methods that are often used to purify stormwater are to build wetlands and ponds. The methods have proven to be effective for cleaning contaminants including microplastics.

The stormwater that empties into Slemmern comes from a 260-hectare catchment area, from both the city of Mariehamn and Jomala municipality. In these catchment areas, exploitation has increased markedly over the past twenty years and is still ongoing. With increased exploitation, there is also an increase in stormwater flows. The proportion of paved surfaces, including roads, industrial areas and parking areas, is quite high. During a normal year, just over 1,000,000 m<sup>3</sup> of stormwater passes through Nabben's wetland facility.

The water that flows through the wetland comes from two ditches (1, 2), of which the largest flow is in the ditch (2) along Nabbenvägen. The first purification takes place in two sand filters (3), two artificial meanders, where the water stops and sedimentation of particle-bound contaminants begins. The water is then led further down to a sedimentation pond. The depth of the water in the sedimentation pond (4) is on average 0.6 meters. The pond is designed to provide efficient purification of suspended matter and thereby particulate contaminants. Pollutants that are purified in the pond are phosphorus, oil, heavy metals and other metals. The water level is regulated by means of two level wells. At high water flows, part of the flow is led away by means of the high-flow ditch (5) which leads the water out to the smoking ditch (1) and further out into Slemmern (6). High

flows need to be diverted away because too much flow in the wetland can cause the sediment to loosen up and follow out to Slemmern. After the sedimentation pond, the water is led further out into the wetland (7), where the water is purified once more as it flows through the vegetation found in the area. In addition to continued purification of the pollutants that are purified in the dam, so-called nitrogen conversion also takes place in wetlands.

In order to achieve good water status in Slemmern, as the bay outside is called, it is above all the nitrogen content that must be reduced.

The wetland was completed in 2020. During the two years that the wetland has been in operation, the nitrogen reduction is about 30 to 40 percent, which is really good for a newly constructed wetland.

**Recreation and outdoor life.** Wetlands are also of great importance for social well-being and they are important for creating green spaces in connection with urban development. Therefore, it was important to plan hiking trails in the area so that they provide the greatest opportunity to get close and take part in plant and wildlife.

I would like to mention our **choice of materials**. Another of the city's environmental goals is that we should choose eco-labeled goods as far as possible.

When our bridges, hiking trails and wooden footbridges were to be built in the area, we actively chose only eco-labeled materials.

For example, our benches. The **Nordic Swan Ecolabel** is one of the most stringent environmental certifications in the world, and five years ago Vestre, a Danish company, became the very first to offer outdoor furniture with a Nordic Ecolabel.





The **Nordic Swan Ecolabel** is one of the most stringent environmental certifications in the world. Of course we chose these environmentally friendly and comfortable benches.

## What else has Mariehamn City done for biodiversity?

Living grassy areas provide biodiversity. Meadow land is a rich nature that is important for many animals, not least pollinating insects such as butterflies and bees. In the city's latest residential area Södra Lillängen, special measures were required for the management of the stormwater. In the area there are protected biotopes, including the lime moisture, which is dependent on maintaining the moisture balance. Therefore, measures were taken to ensure that the stormwater is naturally led to filtration ditches and stormwater pools and then run out into the green area so that the moisture balance is kept as natural as possible. On the Dammvallarna in the stormwater pools, new flowering environments were created during 2021 with the help of a new type of plant cloths that were integrated with suitable seed mixture of meadow flowers. The trial worked well and the plan is to be able to continue using these in other suitable areas.





Southern Lillängens stormwater pool with meadow flowers.

**Buffet for pollinators!** In 2021, the city has made a conscious choice to leave some green areas uncut - in favor of pollinators. Meadow care of this type of care benefits the meadow flora and pollinators. Only when most of the plants have finished flowering will the uncut grass surface be mowed.



Active meadow management creates a buffet for pollinators.

**Dead wood creates biodiversity.** During the year, Mariehamn received her first high stumps. We create high stumps of trees that otherwise would have had to be cut down for safety reasons. As a maximum, the tree is no longer risk tree. Instead, the stump benefits as it becomes sunlit standing dead wood. High stumps are important for biodiversity, as an excellent life and development environment for many red-listed species. By creating high stumps in the center, we contribute to the diversity in our urban environment. The City of Mariehamn will follow the stumps so that they do not become a danger to passing during their change. When the stumps have done their thing, we will remove them.





Mariehamn's stumps contribute to biodiversity, dead wood attracts insects which in turn attract birds.