

Schøyen.

Dogwhelk accumulate TBT by eating blue mussel and barnacles, both of which are filter feeders. Because TBT has an affinity to attach to biological materials and particles in the sea water, it can be easily taken up by organisms that filter sea water for food.

Affects the hormone balance

TBT in female dogwhelk effects the balance of oestrogen and androgen hormones. As a result, a female dogwhelk can develop a penis vas deferens. In the most severe cases, the vas deferens completely covers the vaginal opening, and the snail becomes sterile, unable to lay eggs and reproduce. This effect is irreversible for the individual, and may potentially reduce the population size.

"Local dogwhelk populations over large areas in the North Atlantic Ocean have been severely reduced due to imposex and female sterility resulting from TBT pollution," Schøyen says.

But those times have passed.

Banning TBT explains improvement

In 2017, Schøyen and her colleagues at NIVA could not find a single case of imposex in dogwhelk for the first time since monitoring began in 1991.

Schøyen finds it particularly interesting to see the prevalence of imposex in relation to the years when the various TBT restrictions entered into force.

"The synchronous decrease in both TBT concentrations and imposex in dogwhelk coincides with the TBT bans. The use of TBT was prohibited for marine vessels shorter than 25 meters in length in 1990. This led to a decrease in TBT levels in dogwhelk, but the degree of reproductive disorder remained high. Decreased imposex was not evident until the restrictions were extended to vessels longer than 25 m in 2003. After the total TBT-ban in 2008, the occurrence of imposex stayed low," she explains.

Important long-term monitoring

Even if the TBT ban has undoubtedly been a success, NIVA is not yet done with their investigations of dogwhelk. They will continue monitoring until 2020.

"Long time series are valuable for the management because time trend analyses can give an early warning of unwanted change. The authorities need strong scientific evidence to make good regulatory decisions. Long-term monitoring provides a basis for judging the success of environmental policy and regulations," says Schøyen.

Downward trends in TBT concentrations is also evident in blue mussel. But even if the direct emissions of TBT from ships and land sources have ceased, the problem of TBT impact on organism is not gone. Leakage of TBT from sediments and certain landfills may persist for decades. This year's sampling of dogwhelk is already done.

"I am excited to see if the levels stay low in the future," she says.

The monitoring of contaminants in coastal waters of Norway is conducted by NIVA on commission by the

Norwegian Environment Agency through the Oslo-Paris Convention (OSPAR). The results are reported to the EU through the Water Framework Directive.

 [Dogwhelk with characteristic thick shell, where the last turn is 80 %. The shell has spiral shaped strips and downward ribs that form a square pattern. The opening is shaped like an outer thick lip, and the tagged edge shows adult individual. The siphon channel is short and marked. The thickness and shape vary, up to 4 cm height and over 2 cm width. The shell colour varies and reflect their food. The shell is white when it eats barnacles, and grayish when the snails have eaten blue mussel. \(Photo: Lise Tveiten, NIVA.\)](#) [5]

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