Norwegian Environment Agency

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Assessment of risk and risk-reducing measures as a result of the introduction and further dispersion of *Didemnum vexillum* in Norway

The Norwegian Environment Agency refers to the agreement between the Norwegian Environment Agency and the Norwegian Scientific Committee for Food and Environment (VKM) on 31 January 2019, as well as an authorization for assignments to VKM relating to risk assessment in 2021. VKM hereby agrees to carry out a risk assessment regarding establishment of the invasive species Didemnum vexillum along the Norwegian coast, as well as listing possible measures to prevent new establishments and further dispersion, and if possible, measures of eradication

Introduction

Didemnum vexillum, a colonial sea squirt, has been discovered at several locations on the west coast of Norway. The species was first observed in Norway on November 2nd, 2020, in Engøysundet in Stavanger by the diver Erling Svensen. It has so far been found in Engøysundet in Stavanger, at several locations in Karmøy and Haugesund, and at Askøy north of Bergen. An updated overview of confirmed findings can be seen in the Norwegian Species Map Service. Didemnum vexillum is an introduced invasive species that naturally lives in the Pacific Ocean. The Norwegian Biodiversity Information Centre considers the species to be of very high risk with great invasion potential and high ecological effect on biodiversity. It is also considered to pose a potential risk to marine industry, with possible major negative impact.

The Institute of Marine Research, which has done some mapping of Didemnum vexillum in Norway, believes it is likely that it was introduced by biofouling and international ship traffic. The species has dispersed to large parts of the world

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and is known in Europe from, among others, the Netherlands, France, Ireland, and the United Kingdom.

After the species was discovered in Engøysundet in Stavanger, collaboration was established between the Institute of Marine Research (HI), the County Governor in Rogaland, Stavanger Museum, Stavanger Harbour, and Stavanger Municipality. The recommendation from the researchers was initially to map and monitor the development of the species, as well as have an overview of boat traffic in the area. In December 2020, HI launched a monitoring and mapping project of Didemnum vexillum, in collaboration with Stavanger Museum and Stavanger Diving Club, to monitor the development of the colonies in Engøysundet. Through grants from the Norwegian Environment Agency to the County Governor, Stavanger Municipality was able to initiate a mapping of 70 locations in Rogaland in the spring / summer of 2021, carried out by HI. No new colonies of Didemnum vexillum was detectet. During the autumn of 2021, however, several new findings of the species has been registered in Rogaland and Vestland counties.

Internationally, attempts have been made to remove Didemnum vexillum from areas it has invaded, but we do not know of any successful attempts without the species returning immediately. Measures to limit dispersion can, however, limit the growth where the species is already established and avoid introduction to new places along the coast. On its own, dispersion of Didemnum vexillum to new areas takes a long time, but with the help of vectors such as ships, barges, leisure boats, fishing gear or other, parts of the colonies that grow on these can drip down to new locations and thus disperse to new places quickly.

The Norwegian Environment Agency has so far given priority to obtaining information about the situation and guidance to the authorities and persons responsible for activities in the relevant areas. Activities that can lead to faster dispersion of Didemnum vexillum will be affected by the general precautionary provision in section 18 of the Regulations on Alien species.

Assignment for VKM

The Norwegian Environment Agency needs more knowledge about Didemnum vexillum in Norway as a basis for prioritizing measures to reduce possible consequences. Good understanding of the species dispersion biology, as well as an assessment of the risk and impact of the establishment, is important to be able to prioritize efficient measures. In the Action Plan on the control of invasive

alien species, it is specified that "comprehensive analyses in line with the assessment instructions should be used as a basis for prioritizing which measures are to be implemented". The knowledge base and the assessment of measures from VKM will be used by the Norwegian Environment Agency to make a professional assessment of which measures are correct to implement.

Description
According to the risk assessment by The Norwegian Biodiversity Information Centre Didemnum vexillum in 2018, the species is considered to pose great ecological impact. The species can overgrow and outcompete other species where it establishes. On gravel and stone beds, it forms a mat-shaped cover that can transform the habitat for small species that depend on protection and access to natural substrate. Strong overgrowth has been reported in shellfish farms in New Zealand. In Engøysundet in Stavanger, where the species was first discovered in Norway, we already see a clear impact of the establishment, and it has been reported that the species now covers more than 50% of the seabed in parts of the area. The species has been discovered in several places in Vestland and Rogaland county, and based on what we know about the dispersion, it is likely that we will soon see a similar development here as in Engøysundet. Both dispersal from established colonies and new imports are a major threat along the coast.

In addition to the ecological effect, it is expected that the species can have major economic consequences for the aquaculture industry as well as negatively affect the fishing industry, ship traffic and general activity along the coast in affected areas.

Assignment:
We ask VKM for a risk assessment of the alien species Didemnum vexillum which has now established in Western Norway. The assignment's delivery is divided into two. In the first part, relevant immediate short-term measures (1-3 years) will be listed and assessed. In the second part, a comprehensive report shall be submitted in response to the assignment.

The assignment includes two different time periods: Short term (1-3 years) and long term (3-20 years). This includes:

- Background assessment
- Knowledge of the species dispersion biology and experiences from

international environments where this is established.

- Description of the species' total distribution area, distribution in Norway and any areas the species does not have the potential to establish in (based on the Norwegian Biodiversity Information Centre risk assessment in the alien species list of 2018).
- Assess important dispersion paths and vectors, as well as the expected timeline for dispersion along the Norwegian coast and to Svalbard.
- Describe the null alternative (Expected development without new measures and instruments).
- Assess the potential consequences of Didemnum vexillum for biological diversity, industries and other activity along the coast, and the probability that these will occur. All activities the species may have consequences for must be identified. The assessment shall include a description of the uncertainty in the estimates.
- Describe possible measures that can limit the spread of established colonies, combat established colonies and prevent new colonies from establishing.
- Identify current risk-reducing measures.
- Suggest any action plan towards goal achievement.
- Give a description of the positive and negative consequences of the relevant measures, compared with the null alternative. Including assessment of uncertainty compared to risk described under the null alternative.

Objectives:
Objectives for the assignment will be reviewed in collaboration with VKM after start-up. The Norwegian Environment Agency's goal is to reduce the consequences for biological diversity, and any other negative consequences the species' establishment and dispersion may have.

Legal background:
The results from the report will be used in work with regulatory development.

Relevant articles:
Artskart: Vis utvalg i kart | Artskart 2 (artsdatabanken.no)
Fremmedartslista 2018: https://artsdatabanken.no/fremmedarter/2018/N/2199
Miljødirektoratets temaside om havnespy: Havnespy (japansk sjøpung) - Miljødirektoratet (miljodirektoratet.no)

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Conditions:
The risk assessment report must be written in English with a Norwegian summary. The report is published in dialogue with the Norwegian Environment Agency. We also refer to the collaboration agreement between the Norwegian Environment Agency and VKM.

Deadline for submission of the report is:
The first part of the assignment will be delivered on 20 April 2022.

An evaluation of the assignment description can be done in dialogue between VKM and the Norwegian Environment Agency after the first part of the assignment has been delivered. The deadline for delivery of the assignment part two in the autumn of 2022 will be decided after part one is handed over.

Contact information:
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Best regards
Norwegian Environment Agency

This document has been signed electronically

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seksjonsleder

Nora Nedkvitne
rådgiver

Vedlegg
1 Vurdering av risiko og risikoreduserende tiltak som følge av introduksjon og videre spredning av havnespy i Norge