

## Summary 'Quick scan seafoam'

**During the evening of 11 May 2020, five surfers died near the Northern Harbour Head of Scheveningen. At that moment, a two-metre high layer of seafoam lay/floated in the corner between the harbour head and the beach. That elicited questions about the origin of this seafoam and how it could have accumulated there and then. This memorandum attempts to provide an answer to these questions.**

At this time of year, the seafoam almost certainly originated from the seafoam algae *Phaeocystis globosa*. During April and May, this species occurs in high numbers (with densities of more than 10 million cells per litre of seawater) as colonies in the North Sea. If at a certain point in time a shortage of light or nutrients occurs, the plankton bloom collapses. During calm weather, the deteriorating algae and algal remains float to the surface and can be transported by on-shore winds to the coast. Here the organic material, released by the decaying algae, can be beaten up by the waves into a foam.

After a strong spring bloom of the seafoam algae around the end of April 2020, with densities up to more than 38 million colony cells per litre of seawater measured in the Marsdiep on 28 April, the bloom collapsed. The remaining densities of more than 12 million colony cells per litre of seawater on 7 May 2020 were still considerable. Subsequently, on 9 May 2020, there was little wind, as result of which the algae and algal remains possibly collected on the sea surface. On 10 May 2020, there was little sun, which might have led to a further breakdown of the colonies. During the course of 10 May 2020, the wind began to increase as a result of which the waves became higher and higher, and algal remains were beaten up into a foam. The strong winds on 10 May 2020 came from the north-northeast (an unusual combination at this time of the year), as a result of which floating material from a large sea surface area was driven towards the Dutch coast and was concentrated in a strip along the beach where it was further beaten up.

It is likely that this process of foam formation and accumulation continued on 11 May 2020 under the influence of the strong north-northeasterly wind and that the foam accumulated against obstacles, such as harbour piers, that protruded into the sea, perpendicular to the coast. In the early evening of 11 May 2020, the wind turned slightly more to the north and the flood current started (towards the north). It seems likely that the foam present started moving due to the shifting winds and changing current.

Producing an automatic warning system for seafoam formation appears to be technically possible, but this still requires quite a bit of development time. It would involve a combination of models, satellite images of algae and seafoam, camera observations and manual measurements of algal densities. Now that the potential danger of seafoam is known, it would seem that the best option, for the time being, is providing public information on the conditions under which foam can develop and accumulate. Lifeguards, water sports schools and water sport enthusiasts can then better recognise local situations and subsequently make their own estimation of the risks.

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