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Oceanographic Unit
No 6, July 2025

Algal situation in
Marine Waters surrounding Sweden

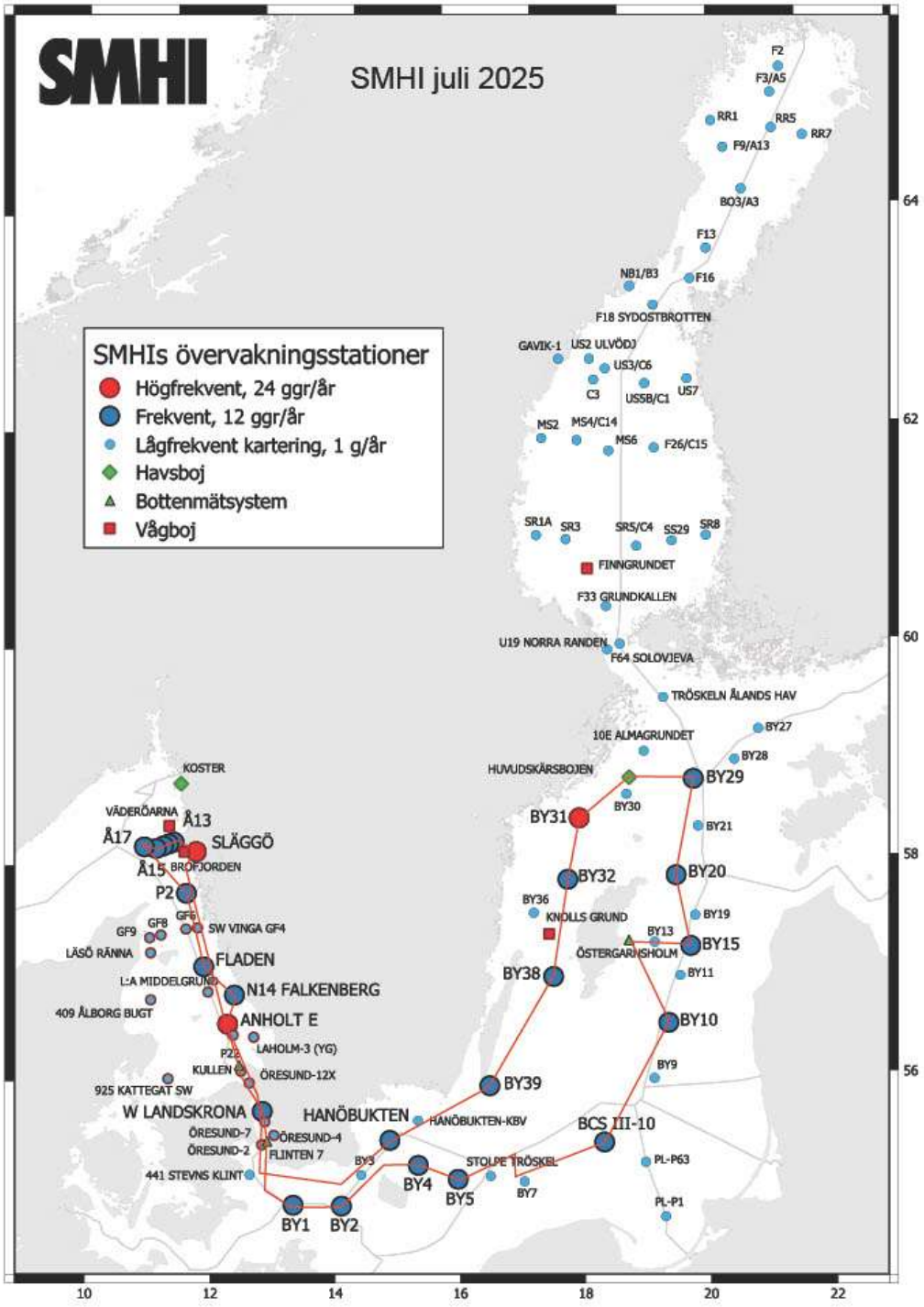

Fig 1. Planned sampling route of R/V Svea July 2025

Sammanfattning

Analyserna utfördes ombord på fartyget R/V Svea under expeditionens gång. Ytprover togs vid alla stationer i Östersjön för att specifikt övervaka blomningen av cyanobakterier. Vatten från integrerade djup eller diskreta djup provtogs och filtrerades genom 5 µm filter, varefter proverna analyserades med ett rättvänt mikroskop. Denna metod gör det möjligt att identifiera större celler, medan mindre celler ofta blir svåra att bestämma och förbises i högre utsträckning.

Cyanobakterieblomningen var mycket kraftig under årets juliexpedition. Ytansamlingar av cyanobakterier observerades i stora delar av Egentliga Östersjön. De kraftigaste ansamlingarna återfanns i sydöstra Östersjön och längs Ölands ostkust samt i Hanöbukten, där den potentiellt giftiga arten *Nodularia spumigena** var mycket vanlig. Även östra och norra Östersjön hade höga halter cyanobakterier i vattnet och ytansamlingar förekom fläckvis. Inga ytansamlingar observerades i Arkonabassängen, vilket överensstämde väl med satellitanalyserna från SMHI:s övervakning. Blomningen bestod till stor del av en jämn fördelning av *N. spumigena** tillsammans med *Aphanizomenon flosaquae* i södra, östra och norra Östersjön, medan *Dolichospermum* spp blev mer vanlig i västra Östersjön. Vid samtliga stationer noterades högre koncentrationer av filament i ytprover jämfört med integrerade prover (0-10 m), vilket indikerar att filamenten främst var koncentrerade nära ytan.

Artdiversiteten och den totala mängden celler var allmänt låg i både Skagerrak och Kattegatt. Centriska kiselalger var den vanligaste gruppen i växtplanktonsamhället. Vid de flesta stationer dominerades de större cellerna av kiselalgen *Proboscia alata*. Arter inom släktet *Tripos* var också vanliga. Det är värt att nämna att *N. spumigena** observerades i låga antal vid båda stationerna i Kattegatt, vilket belyser hur kraftig cyanobakterieblomingen var under expeditionen. Klorofyllfluorescensmaxima noterades vid olika djup och i olika intensitet vid flertalet av stationer i Västerhavet. Dessa maxima dominerades av *Leptocylindrus danicus* och arter inom släktet *Tripos*.

Abstract

The analyses were carried out onboard the vessel R/V Svea during the course of the expedition. Surface samples were taken at all stations in the Baltic Sea to specifically monitor the cyanobacterial bloom. Water from integrated depths or discrete depths was sampled and filtered through 5 µm filters, after which the samples were analyzed using an upright microscope. This method allows for the identification of larger cells, while smaller cells are often harder to identify and are more likely to be overlooked.

The cyanobacterial bloom was very intense during this year's July expedition. Surface accumulations of cyanobacteria were observed in large parts of the Baltic Proper. The most intense accumulations were found in the southeastern Baltic Sea, along the eastern coast of Öland, and in the Hanö Bay, where the potentially toxic species *Nodularia spumigena** was very common. High concentrations of cyanobacteria and patchy surface accumulations were also present in the eastern and northern Baltic Sea. No surface accumulations were observed in the Arkona Basin, which was consistent with satellite analyses from SMHI's monitoring. The bloom largely consisted of an even distribution of the potentially toxic species *N. spumigena** together with *Aphanizomenon flosaquae* in the southern, eastern, and northern Baltic Sea, while *Dolichospermum* spp. became more common in the western Baltic Sea. At all stations, higher concentrations of filaments were noted in surface samples compared to integrated samples (0–10 m), indicating that the filaments were primarily concentrated near the surface.

Species diversity and total cell abundance were generally low in both Skagerrak and Kattegat. Centric diatoms dominated the phytoplankton community. At most stations, the larger cells were dominated by the diatom *Proboscia alata*. Species within the genus *Tripos* were also very common. It is worth noting that *N. spumigena** was observed in low numbers at both stations in Kattegat, highlighting the intensity of the cyanobacterial bloom during the expedition. Chlorophyll fluorescence maxima were noted at various depths and intensities at several stations in the Skagerrak-Kattegat region. These maxima were dominated by *Leptocylindrus danicus* and species within the genus *Tripos*.

* Potentially toxic

The Skagerrak

Släggö 14th of July

The integrated sample (0-10m) contained relatively low total cell numbers but had moderate biodiversity. Smaller cells dominated the samples, including *Heterocapsa rotundata* and cells belonging to the order gymnodiniales. Several potentially toxin producing taxa were observed, including *Dinophysis norvegica**, *Pseudo-nitzschia**, cf. *Azadinium** and cells belonging to the order *Prymnesiales**.

Å13 14th of July

A distinct fluorescence maximum was found at 15 meters, mainly containing chain-forming diatoms and dominated by the species *Leptocylindrus danicus*.

Å15 14th of July

A less distinct fluorescence maximum was found at 15 meters. The sample however contained relatively few cells, mainly dominated by a mix of species of the dinoflagellate genus *Tripos*, including *Tripos muelleri*, *Tripos fusus* and *Tripos longipes*.

Å17 14th of July

The integrated sample (0-10m) at Å17 showed very low total cell abundance and low biodiversity. Among the larger cells, the diatoms *P. alata* and *Psuedo-nitzschia* spp.* were dominant. Smaller cells were represented by small naked dinoflagellates and *H. rotundata*. A fluorescence maximum was found at 35 meters, and contained a diverse mix of diatoms and dinoflagellates. Although no taxa was clearly dominating the sample, *L. danicus* was the most common diatom species, followed by *Pseudo-nitzschia* spp.*. Several *Tripos* species were also common at the chlorophyll peak, including *T. muelleri*, *Tripos macroceros*, *T. fusus* and *T. longipes*.

The Kattegat

N14 Falkenberg 15th of July

The biodiversity was low, but the total cell numbers were high. The sample was dominated by larger diatoms, primarily *P. alata*. The larger cells were mainly various species of the genus *Tripos*, with *T. muelleri* and *T. fusus* found in the highest amounts, along with *P. micans*. Interestingly, several filaments of *Nodularia spumigena** was recorded.

Anholt E 15th of July

The biodiversity and total cell numbers were moderate. The sample was dominated *P. alata*. Various dinoflagellate species were also common including *Prorocentrum cordatum** and several *Tripos* species. Notably, several *N. spumigena** filaments were also observed at Anholt E. A distinct fluorescence peak at 25 meters depth was dominated by *Tripos* species, where *T. lineatus* was the most common species.

Anholt E 20th of July

Anholt E was sampled twice during the July cruise. The biodiversity and the total cell numbers were higher than on the 15th. The sample continued to be dominated by *P. alata* and the *Tripos* species *T. muelleri* and *T. fusus*. Several cyanobacteria filaments were observed, belonging to *N. spumigena** and *Dolichospermum* spp.

* Potentially toxic

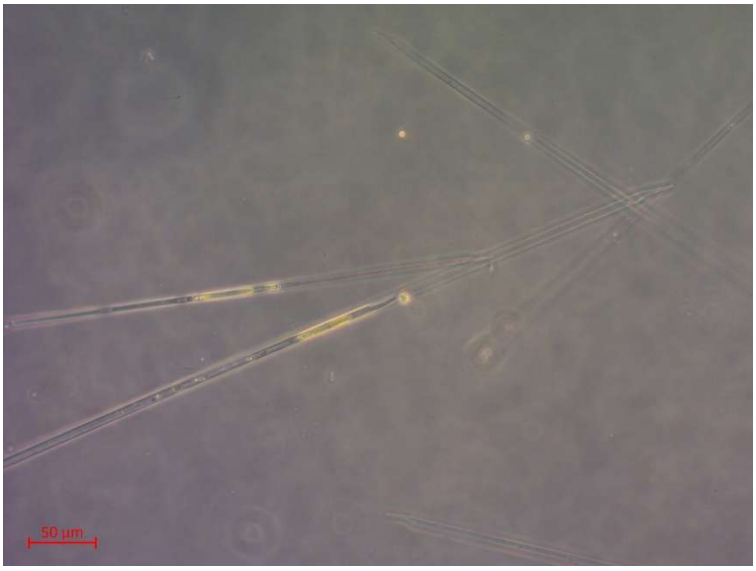

Fig 1. The samples on the west coast were generally dominated by the diatom Proboscia alata. Photo taken by Anders Torstensson.

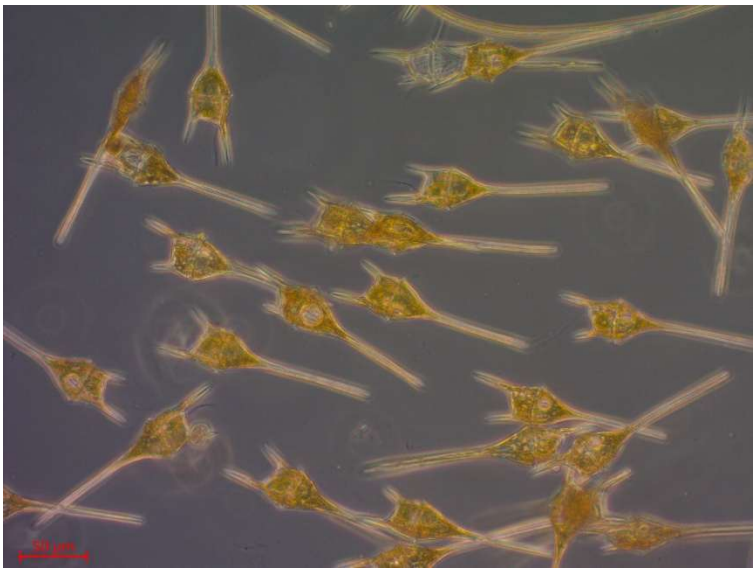

Fig 2. A Tripos lineatus bloom at Anholt E at 25 m depth. Photo taken by Anders Torstensson.

The Baltic Sea

W Landskrona 15th of July

No surface accumulations were seen. The surface sample contained few amounts of *N. spumigena** and *Dolicho-spermum* spp.

BY1 16th of July

The station was sampled at night, so no aggregations could be seen from the ship. The surface sample contained moderate amounts of *N. spumigena** and *Dolichospermum* spp.

BY2 Arkona Deep 16th of July

The station was sampled at night, so no aggregations could be seen from the ship. The surface sample contained high amounts of *N. spumigena* and small amounts of *A. flosaquae* and *Dolichospermum* spp. The integrated sample (0-10m) had moderate biodiversity and total cell numbers. The larger cells were represented by filamentous

* Potentially toxic

cyanobacteria, primarily *N. spumigena*, and the diatom *Chaetoceros castracanei*. Among the smaller cells, the dinoflagellate *P. cordatum** was found in relatively high cell numbers.

BY4 Christiansö 16th of July

No surface accumulations were observed. The surface sample was dominated by *N. spumigena** and contained moderate amounts of *A. flosaquae* and small amounts of *Dolichospermum* spp.

BY5 Bornholms Deep 16th of July

The wind stress created waves, and no aggregations were seen with the naked eye. The surface sample contained some filaments of *N. spumigena** and *A. flosaquae*. The integrated sample (0-10m) had quite high total cell numbers but relatively low biodiversity. The sample was dominated by the green algae *Binuclearia lauterborni*, followed by smaller taxa such as *Oocystis* spp., and *Cyclotella choctawhatcheeana*. The cyanobacterial community mainly consisted of *N. spumigena**, *A. flosaquae* and *Snowella* spp.

BCS III-10 16th of July

The station was sampled at night, but dense surface accumulations were still observed. The surface sample contained very high abundances of *N. spumigena**. The integrated sample (0-10m) contained lower amounts of cyanobacteria filaments, supporting that the filaments were mainly in the surface water. High amounts of cells were observed, where *B. lauterborni* was the most abundant taxa, followed by *N. spumigena**. Among the smaller cells, *Oocystis* spp. were abundant.

BY10 17th of July

No surface accumulations were observed from the ship. The surface sample contained high amounts of *A. flosaquae*, and *N. spumigena** was also common.

Östergarnsholm 17th of July

Surface accumulations were observed while transiting from BY10 to Östergarnsholm, but no surface aggregation was present at the station. The surface sample contained high amounts of both *A. flosaquae*, and *N. spumigena**.

BY15 Gotlands Deep 17th of July

No surface accumulations were observed at the station, although high amounts of filaments could be observed in the first few meters, suggesting that surface accumulation may occur rapidly under calm conditions. Surface aggregations were observed between Östergarnsholm and BY15. The surface sample contains very high amounts of cyanobacterial filaments and was dominated by a mix of *N. spumigena** and *A. flosaquae*. The hose sample (0-10m) contained a moderate diversity and very high abundances, with a dominance of *A. flosaquae* and *N. spumigena**. Among the dinoflagellates, *Phalachroma rotundatum**, *Dinophysis norvegica** and *Dinophysis acuminata** were observed. More filamentous cyanobacteria were observed in the surface sample compared to the hose sample, suggests that the filaments were mostly distributed in the surface.

BY20 Fårö Deep 17th of July

The station was sampled at night, so no aggregations could be seen from the ship. The surface sample however, contained many filaments, with *N. spumigena**, *A. flosaquae* being very common.

* Potentially toxic

BY29 18th of July

No aggregations were seen from the ship, although several streaks of surface aggregations were observed in transit to and from BY29. The surface sample however, contained high amounts, although somewhat lower amounts of filaments compared to BY20, and was dominated by *N. spumigena** followed by *A. flosaquae*. *Dolichospermum* spp. was also common. The integrated sample (0-10m) had filamentous cyanobacteria in somewhat lower amounts compared to the surface sample, suggesting that the filaments were mainly distributed to the surface. The diatom *Actinocyclus octonarius* was also common. Additionally, there were a few cells of *D. norvegica** and *P. rotundatum**.

Huvudskär buoy 18th of July

No aggregations were seen from the ship, but some aggregations were observed after leaving the station. A surface sample was collected, revealing somewhat lower total amounts of filaments compared to the Eastern Baltic Sea. The sample was dominated by *A. flosaquae*, followed by *N. spumigena** and *Dolichospermum* spp.

BY31 Landsort Deep 18th of July

Some visible surface aggregations were seen. The surface sample contained high amounts of filaments, yet lower total amount compared to the Eastern Baltic Sea. The surface sample was dominated by *N. spumigena** . Both *Dolichospermum*, and *A. flosaquae* were also common. The integrated sample (0-10m) had low biodiversity but high total abundances, and was dominated by filamentous cyanobacteria along with *B. lauterborni*. The hose sample (0-10m) contained fewer filaments than the surface sample, suggesting that most of the filaments were located near the surface.

BY32 Norrköping Deep 18th of July

No visible surface aggregations were seen, yet the conditions were still calm and there are plenty of filaments in the upper water mass. The surface sample contained similar amounts of filaments compared to BY31, and mainly comprised of a mix of *A. flosaquae*, *N. spumigena**.

BY38 Karlsö Deep 18th of July

The station was sampled at night, but surface accumulations were still observed. The majority of the bloom consisted of *N. spumigena**. The hose sample (0-10m) contained fewer filaments than the surface sample, suggesting that most filaments were at the surface. The community mainly consisted of filamentous and colonial cyanobacteria, although *B. lauterborni* and *Oocystis* spp. were also quite common.

BY39 Öland south 19th of July

Surface accumulations were observed. A surface sample was collected, revealing many filaments of *Dolichospermum*., *N. spumigena** and *A. flosaquae*. The integrated sample (0-10m) had low biodiversity, mainly comprising filamentous cyanobacteria. The presence of filamentous cyanobacteria at the surface and in the integrated sample suggests that most of the filaments were at the surface.

Bay of Hanö 19th of July

Surface accumulations were observed in streaks around the ship, but the surface sample contained fewer cyanobacteria filaments compared to the previous stations. Both *A. flosaquae* and *N. spumigena** were common in the surface sample.

* Potentially toxic

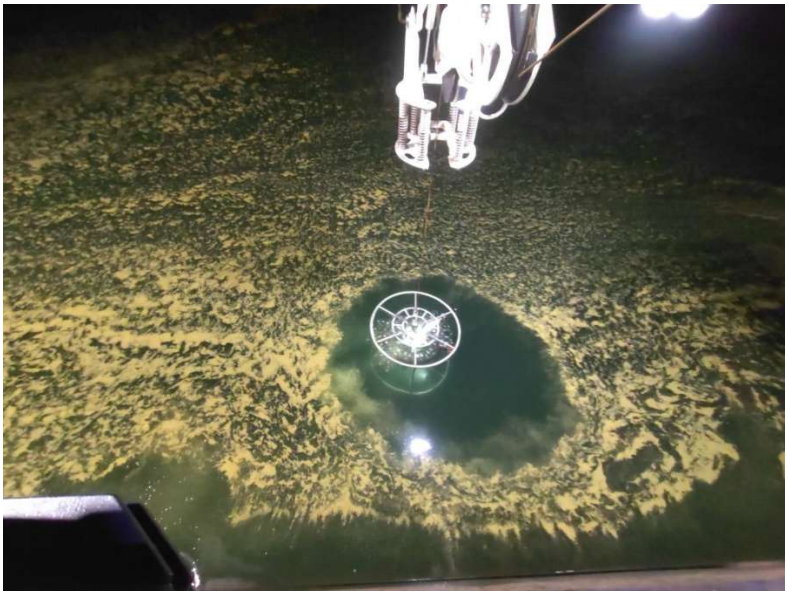

Fig 3. Surface accumulations of cyanobacteria were common in the Baltic Sea during the expedition. This image is taken at BCII-10 by Anna-Kerstin Thell.

Fig 4. The potentially toxic cyanobacterium Nodularia spumigena was the most common taxa in the Baltic Sea, followed by Aphanizomenon flosaquae. Photo taken by Anders Torstensson.

Phytoplankton analysis and text:

Anders Torstensson

* Potentially toxic

Selection of observed species	Släggö	Å17	N14 Falken-berg	Anholt E	Anholt E
Red=potentially toxic species	14/7	14/7	15/7	15/7	20/7
Hose 0-10 m	presence	presence	presence	presence	presence
Actinocyclus octonarius					present
Cerataulina pelagica				present	present
Chaetoceros	present				
Cyclotella choctawhatcheeana				present	present
Cylindrotheca closterium	present			present	
Dactyliosolen fragilissimus	present	present			
Guinardia delicatula				present	
Guinardia flaccida		present			present
Leptocylindrus danicus	present	present			
Nitzschia longissima	present				
Proboscia alata	present	common	very com-mon	very com-mon	very com-mon
Pseudo-nitzschia	present	common			
Skeletonema marinoi	present				
Thalassionema nitzschioides					present
Dinobryon	present				
Emiliania huxleyi	present				
Prymnesiales	present				
Cryptomonadales	present				
Dolichospermum				present	present
Nodularia spumigena			present	present	present
Snowella					present
Alexandrium			present		present
Alexandrium pseudogonyaulax		present			
Azadinium	present		present	present	
Dinophysis norvegica	present		present	present	present
Gymnodiniales	present	common	present	present	present
Heterocapsa rotundata	present	present		present	
Lepidodinium chlorophorum	present		present		
Lingulodinium polyedra			present		present
Peridiniales					present
Peridiniella danica					present
Phalacroma rotundatum	present		present	present	present
Prorocentrum cordatum				common	present
Prorocentrum micans	common	present	present	present	present
Protoceratium reticulatum		present	present	present	present
Protoperidinium			present		
Protoperidinium conicum				present	
Protoperidinium oblongum				present	present
Protoperidinium steinii					present
Tripos furca		present			
Tripos fusus	present	present	present	present	common
Tripos lineatus			present	present	present
Tripos longipes			present		
Tripos macroceros	present	present			
Tripos muelleri			present	present	common
Eutreptiella				present	
Favella	present				
Pyramimonas	present				
Binuclearia lauterbornii				present	present

* Potentially toxic

Selection of observed species	BY2	BY5	BSCIII-10	BY15	BY29	BY31	BY38	BY39
Red=potentially toxic species	16/7	16/7	17/7	17/7	18/7	18/7	18/7	19/7
Hose 0-10 m	presence	presence	presence	presence	presence	presence	presence	presence
Actinocyclus	present							
Actinocyclus octonarius		present	present	present	common	present	present	
Centrales					present			
Chaetoceros castracanei	present	present	present			present	present	present
Chaetoceros danicus	present							
Cyclotella choctawhatcheeana	present	common						
Cryptomonadales	present			present				
Aphanizomenon flosaquae	present	present	present	very com-mon	very com-mon	very com-mon	common	very com-mon
Chroococcales				present				
Dolichospermum	present		present	present	present	very com-mon	present	
Dolichospermum flosaquae								very com-mon
Nodularia spumigena	common	present	common	very com-mon	very com-mon	very com-mon	common	very com-mon
Snowella	present	common	present	present		present	present	present
Dinophysis acuminata				present				present
Dinophysis norvegica				present	present	present	present	present
Gymnodiniales	present	present	present	present	present	present	present	present
Phalacroma rotundatum				present	present	present		present
Prorocentrum cordatum	common	present	present					
Tripos muelleri	present							
Eutreptiella		present						
Ebria tripartita	present	present	present				present	present
Oocystis	present	common	present			present	common	
Binuclearia lauterbornii	present	very com-mon	very com-mon	present	present	common	common	present

	The following filamentous cyanobacteria were observed in the surface samples:		
Station	***Aphanizomenon flosaquae***	***Nodularia spumigena****	***Dolichospermum spp.***
W Landskrona 15/7		Present	Present
BY1 16/7	Present	Common	Common
BY2 Arkona 16/7	Present	Common	Present
BY4 Kristiansö 16/7	Common	Very common	Present
BY5 Bornholm 16/7	Present	Common	
BCS III-10 16/7	Present	Dominating	Present
BY10 17/7	Very common	Common	Present
Östergarnsholm 17/7	Very common	Very common	Present
BY15 Gotlandsdjupet 17/7	Very common	Very common	Present
BY20 Fårödjupet 17/7	Very common	Very common	Present
BY29 18/7	Very common	Very common	Common
Huvudskär buoy 18/7	Very common	Common	Common
BY31 Landsortdjupet 18/7	Common	Very common	Common
BY32 Norrköpingsdjupet 18/7	Very common	Very common	Common
BY38 Karlsödjupet 18/7	Present	Dominating	Common
BY 39 Öland södra 19/7	Common	Common	Common
Hanö 19/7	Common	Common	

* Potentially toxic