Dnr: S/Gbg-2019-80

SMHI

Oceanographic Unit
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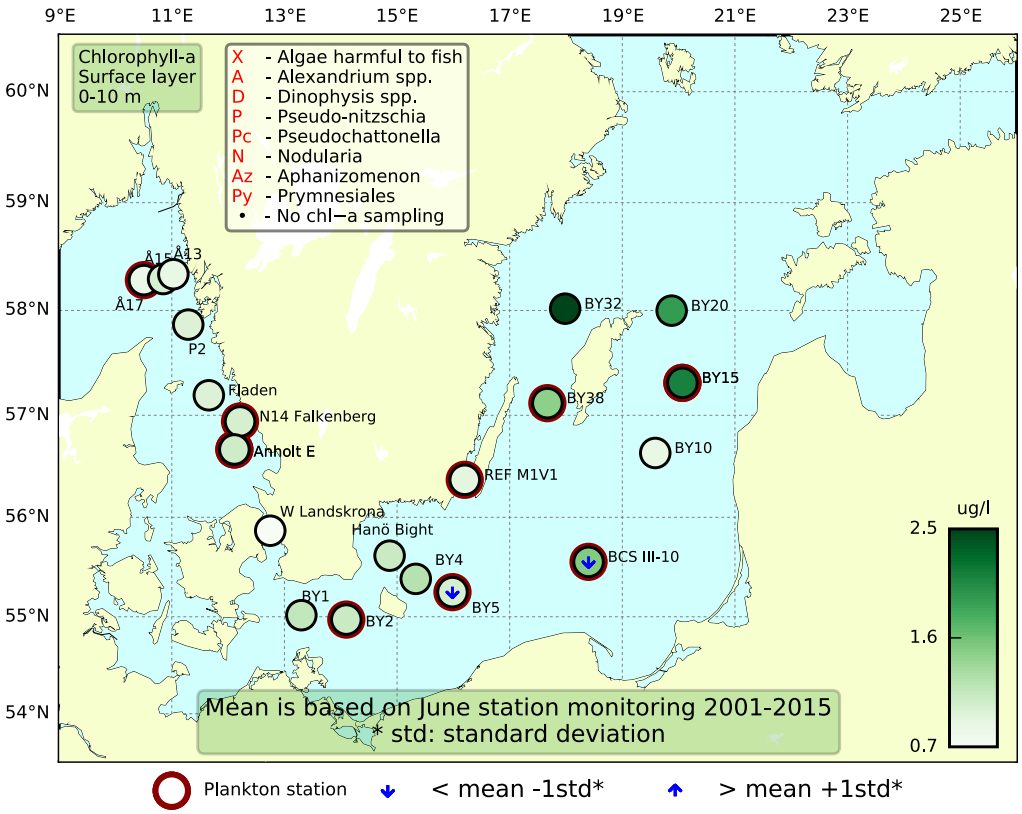
AlgAware

ALGAL SITUATION IN MARINE WATERS SURROUNDING SWEDEN

Sammanfattning

Diversiteten av växtplankton var generellt sett låg i Västerhavet, men högre i antal arter och cellantal i Skagerrak jämfört med Kattegatt. Kalkflagellaten *Emiliania huxleyi* fanns i höga cellantal framför allt vid Släggö. Klorofyllhalterna var ganska låga men normala för denna månad.

Även i Östersjön var diversiteten låg och de flesta stationerna hade mest små kolonier av cyanobakterier, flagellater, ciliater och Gymnodiniales. Bland de filamentösa cyanobakterierna fanns *Aphanizomenon flosaquae* på alla stationer utom BY20. En del filament av *Nodularia spumigena** återfanns på många stationer och *Dolichospermum* sp. hittades på BY38 och RefM1V1. Även i Östersjön var klorofyllhalterna ganska låga men normala för månaden.



Abstract

The phytoplankton diversity was generally speaking low in the Skagerrak and Kattegat areas, although the number of species and the total cell numbers were higher in the Skagerrak in comparison. The coccolithophorid *Emiliania huxleyi* was abundant, especially at Släggö. The chlorophyll concentrations were low but within normal for this month.

Also at the Baltic stations the diversity was low and small cyanobacteria colonies, flagellates, ciliates and Gymnodiniales were common. Among the filamentous cyanobacteria, *Aphanizomenon flosaquae* was present at all stations except BY20. A few filament of *Nodularia spumigena** were present at many stations and *Dolichospermum* sp. were found at BY38 and RefM1V1. As in Skagerrak and Kattegat, the chlorophyll concentrations in the Baltic Sea were low but within normal for June.

Below follows a more detailed information on species composition and abundance. Species marked with * are potentially toxic or harmful.

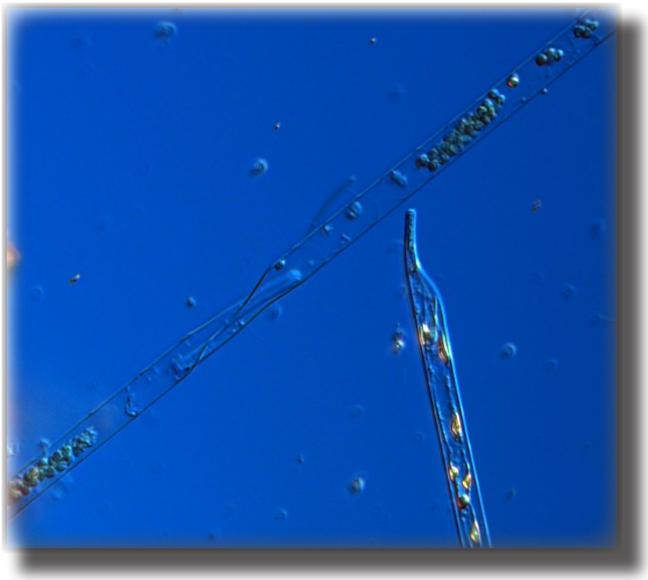
The Skagerrak

Å17 (open Skagerrak) 13th of June

The species diversity was high although the total cell numbers were low. The coccolithophorid *Emiliania huxleyi* was abundant. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.

Släggö (Skagerrak coast) 13th of June

The station was sampled outside the cruise and the chlorophyll data will not be handled here, only the phytoplankton data.
The phytoplankton diversity was high and the cell counts were low. The diatom *Proboscia alata* was rather abundant though as well as the coccolithophorid *Emiliania huxleyi*. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.



The diatom *Proboscia alata* was abundant in the Kattegat samples and at Släggö.

The dinoflagellate *Ceratium tripos* was numerous at Anholt E. The Tintinnid cup is filled with two *Dinophysis* cells.

The Kattegat

Anholt E 12th and 13th and 14th of June N14 Falkenberg 14th of June

The phytoplankton diversity, both total cell numbers and number of species, was low at both visits and consequently the chlorophyll concentrations were low also. The diatom *Proboscia alata* was abundant and so were the small coccolithophorid *Emiliania huxleyi* and small cryptomonads. The dinoflagellate *Ceratium tripos* was rather common.

The Baltic Sea

BY2 12th of June

Low total cell numbers were found and the sample was mainly represented by small cyanobacteria colonies, flagellates, *Binuclearia lauterbornii* and Gymnodiniales. The filamentous cyanobacteria *Aphanizomenon flosaquae* and *Nodularia spumigena** were present with several filaments. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.

BY4 and BY5 12th of June

Low total cell numbers were found and the samples were mainly represented by small cyanobacteria colonies, flagellates, *Binuclearia lauterbornii* and Gymnodiniales. The filamentous cyanobacteria *Aphanizomenon flosaquae* and *Nodularia spumigena** were present with several filaments at BY5, while no filaments of *N. spumigena** were found on BY4. *Dinophysis acuminata** and *D. norvegica** were both present at BY5, but only *D. norvegica** on BY4. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month at BY4. At BY5 the chlorophyll concentration at 0-10 m was lower than normal.

BCSIII-10 11th of June

Low total cell numbers were found and the sample was mainly represented by small cyanobacteria colonies, flagellates, *Binuclearia lauterbornii*, ciliates and Gymnodiniales. The filamentous cyanobacteria *Aphanizomenon flosaquae* and *Nodularia spumigena** were present with several filaments. *Dinophysis acuminata** and *D. norvegica** were both present this station. The integrated (0-20 m) chlorophyll concentrations were low but within normal for this month, while 0-10 m the concentration was lower than normal.

BY10 11th of June

Total cell numbers was moderate and were mainly represented by small cyanobacteria colonies, flagellates, *Binuclearia lauterbornii*, ciliates and Gymnodiniales. *Dinophysis norvegica** was present and the filamentous cyanobacteria *Aphanizomenon flosaquae* and *Nodularia spumigena** were found. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.

BY15 11th of June

This station had the highest total cell numbers and the cells were mainly represented by small cyanobacteria colonies, flagellates, *Binuclearia lauterbornii*, ciliates and Gymnodiniales. *Dinophysis acuminata** and *D. norvegica** were both present. The filamentous cyanobacteria *Aphanizomenon flosaquae* was very common and a few filaments of *Nodularia spumigena** were found. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.

BY20 11th of June

Total cell numbers was moderate and were mainly represented by *Amphidinium longum*, flagellates, *Binuclearia lauterbornii*, ciliates and Gymnodiniales. *Dinophysis acuminata** and *D. acuta** where both present, while *D. acuminata** had quite high cell numbers. No filaments of cyanobacteria were found at this station. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.

BY32 16th of June

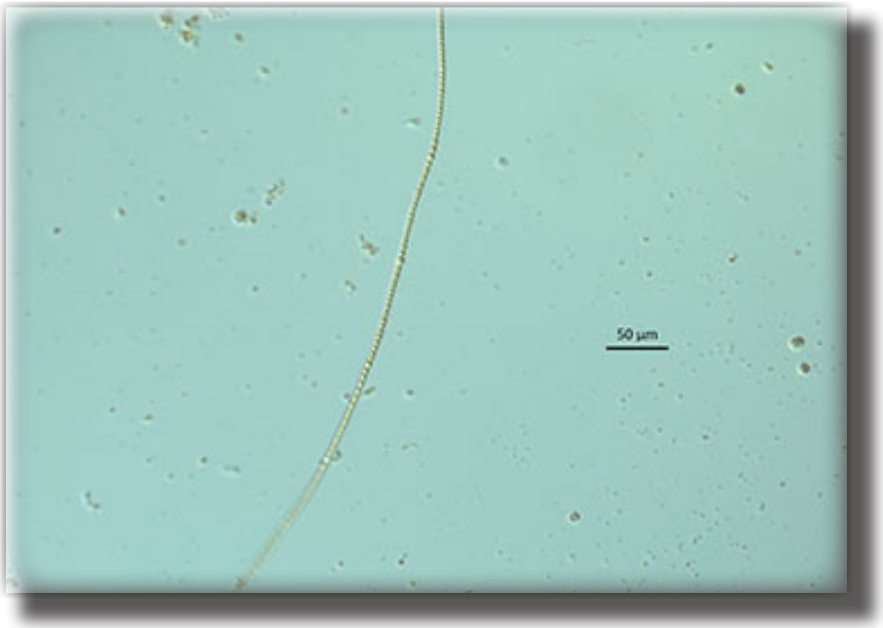
Total cell numbers was moderate and were mainly represented by flagellates, *Binuclearia lauterbornii*, ciliates, *Pyramimonas* spp. and Gymnodiniales. *Dinophysis acuta** was present, while *D. acuminata** and *D. norvegica** and had quite high cell numbers. The filamentous cyanobacteria *Aphanizomenon flosaquae* was common but no filaments of *N. spumigena** were found at this station. A few cells of *Noctiluca scintillans* were also present. The integrated (0-10 and 0-20 m) chlorophyll concentrations were high but within normal for this month.

BY38 16th of June

Total cell numbers was moderate and were mainly represented by flagellates and *Binuclearia lauterbornii*. The filamentous cyanobacteria *Aphanizomenon flosaquae* was very common and a few filaments of both *Nodularia spumigena** and *Dolichospermum* sp. were found. *Dinophysis acuminata** and *D. norvegica** were both present. The integrated (0-10 and 0-20 m) chlorophyll concentrations were normal for this month.

REFM1V1 15th of June

Total cell numbers was moderate and were mainly represented by flagellates, *Dinobryon faculiferum*, *Protoperidinium bipes*, ciliates, and Gymnodiniales. *Dinophysis acuminata** and *Alexandrium* sp.* were present, while both the filamentous cyanobacteria *Aphanizomenon flosaquae* and *Dolichospermum* sp. were represented with quite high cell numbers. The integrated (0-10 and 0-20 m) chlorophyll concentrations were low but within normal for this month.

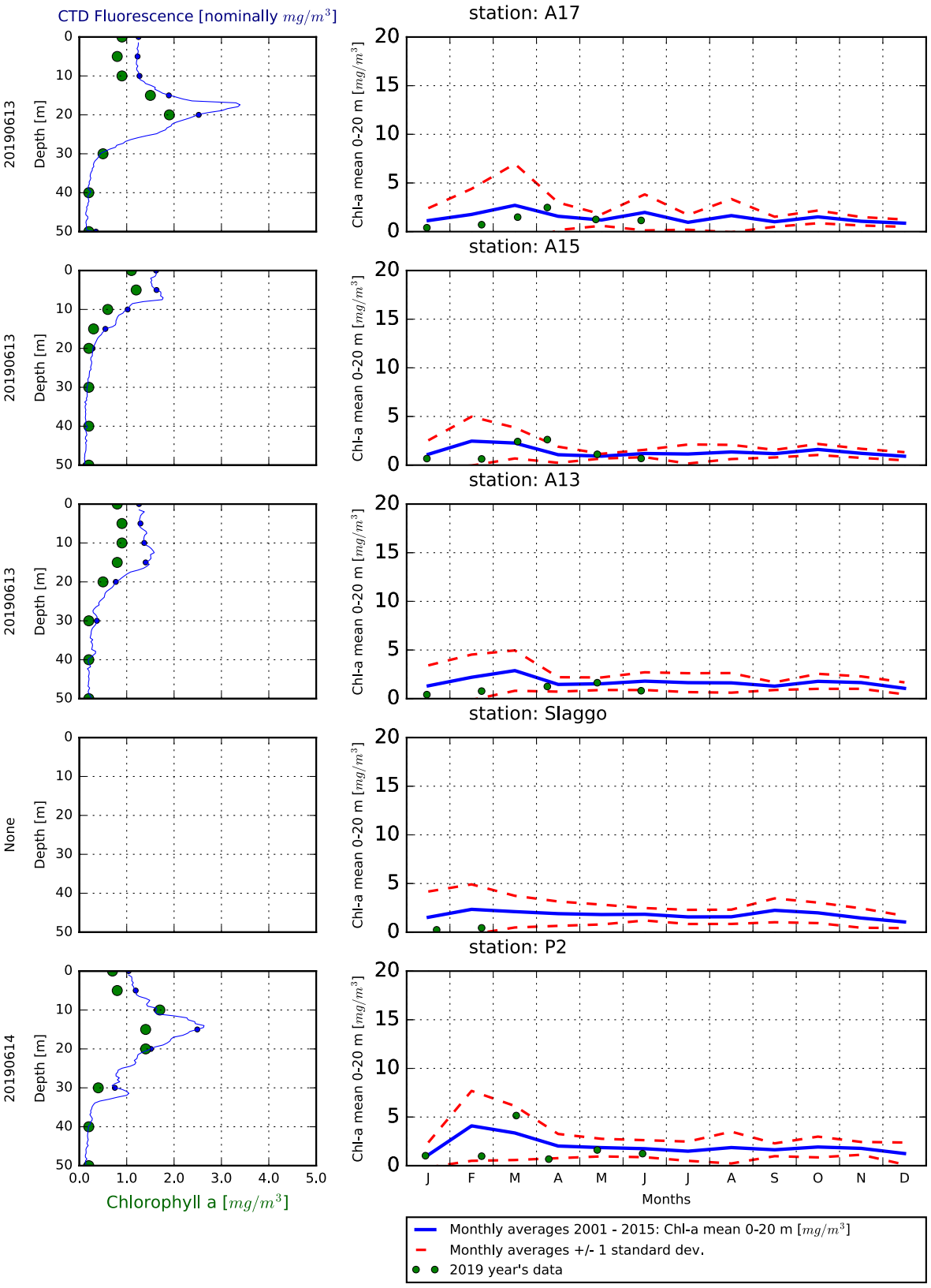


The filamentous cyanobacterium *Dolichospermum* sp. was present at BY38 and REFM1V1 in the Western Baltic.

Phytoplankton analysis, text and photos:
Maria Karlberg and Ann-Turi Skjevik.

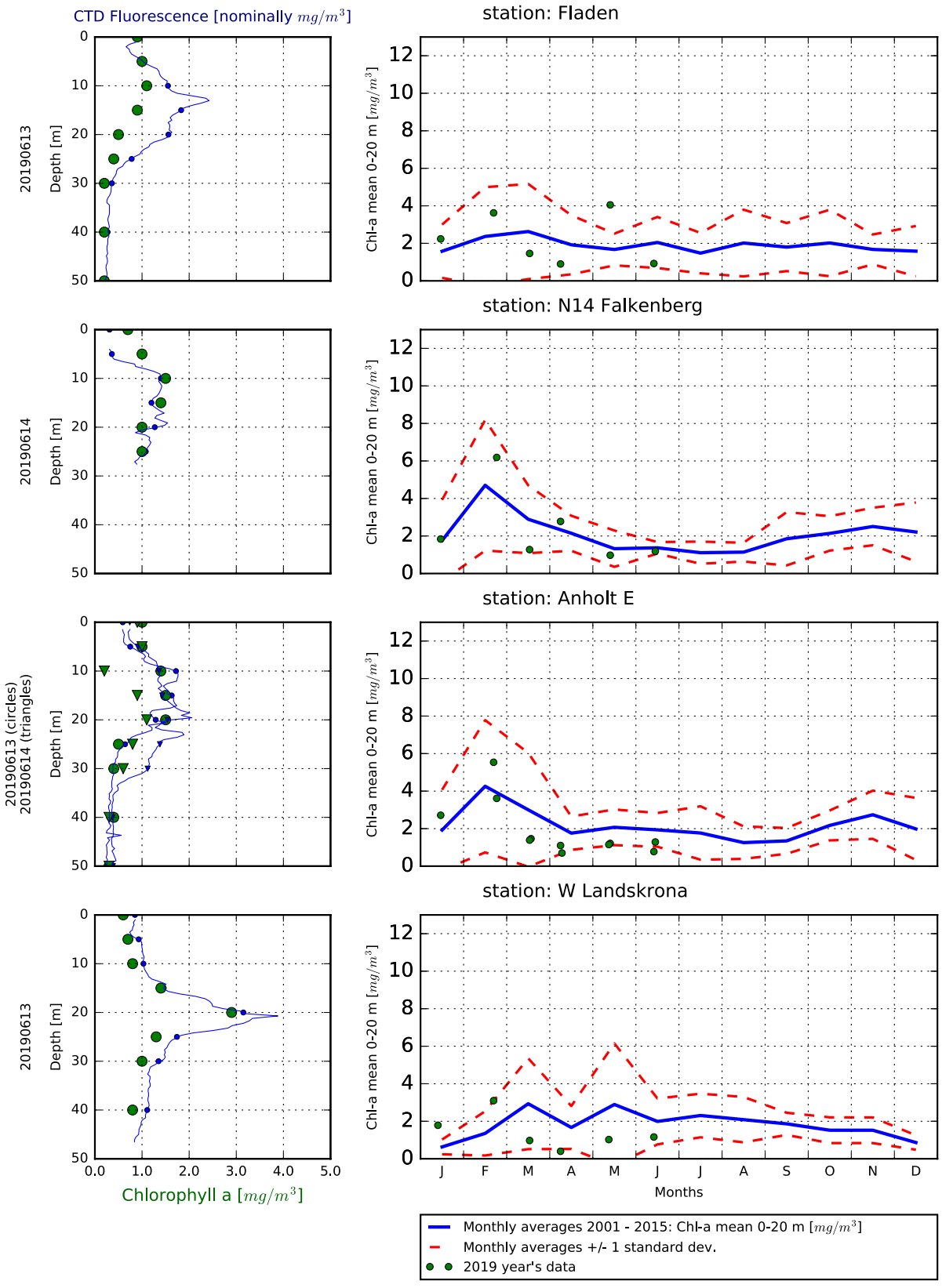
Selection of observed species	Anholt E	Anholt E	N14 Falkenberg	Släggö	Å17
Red=potentially toxic species	13/6	14/6	14/6	13/6	13/6
Hose 0-10 m	presence	presence	presence	presence	presence
Azadinium spp		present			present
Cerataulina pelagica			present	present	
Ceratium furca				present	present
Ceratium fusus	present	present	present	present	present
Ceratium lineatum				present	present
Ceratium longipes	present			present	present
Ceratium tripos	present	common	present	present	present
Chaetoceros spp					present
Chaetoceros danicus	present				
Chaetoceros debilis	present				
Coscinodiscus centralis				present	
Coscinodiscus radiatus		present	present		
Cylindrotheca closterium				present	present
Dactyliosolen fragilissimus	present	present	common		present
Dinophysis acuminata				present	present
Dinophysis norvegica		present		present	present
Guinardia delicatula	present		present	present	
Guinardia flaccida					present
Gymnodiniales		present			
Gymnodinium simplex					present
Gymnodinium verruculosum			present		
Gyrodinium flagellare	present		present		present
Heterocapsa rotundata			present		
Heterocapsa triquetra		present		present	
Karenia mikimotoi					present
Karlodinium veneficum	present	present	present	present	present
Katodinium glaucum			present		present
Leptocylindrus danicus				present	present
Licmophora spp				present	
Navicula transitans var. derasa f. delicatula				present	
Nitzschia longissima				present	
Peridiniales			present		
Phaeodactylum tricornutum	present	present	present		
Proboscia alata	very common	very common	very common	common	present
Prorocentrum compressum				present	
Prorocentrum cordatum	present	present	present		
Prorocentrum micans				present	
Protoperidinium spp					present
Protoperidinium brevipes					present
Protoperidinium oblongum			present		
Pseudo-nitzschia spp				present	present
Scrippsiella group				present	
Skeletonema marinoi			present	present	present
Thalassionema nitzschioides		present			
Acanthoica quattrospina					present
Emiliania huxleyi	common	common	present	very common	common
Prymnesiales	present	present	present	present	present
Heterosigma spp				present	
Dictyocha speculum	present	present			
Pterosperma spp				present	
Pyramimonas spp			present		
Dinobryon faculiferum	present	present			
Cryptomonadales	common	common	present	common	common
Aphanothece paralleliformis					present
Pseudanabaena spp				present	
Planctonema lauterbornii	present				
Oocystis spp	present	present	present		present
Quadricoccus euryhalinicus		present	present		
Calliacantha natans				present	
Choanoflagellatea	present	present		present	
Leucocryptos marina	present	common	present	present	present
Telonema spp					present
Ebria tripartita		present	present		
Flagellates		common			
Paulinella ovalis			present		
Laboea strobila				present	
Mesodinium rubrum		present		present	present
Strombidium spp				present	present
Ciliophora	present	present	present	present	present

Selection of observed species	BCSIII-10	BY2	BY4	BY5	BY10	BY15	BY20	BY32	BY38	REFM1V1
Red=potentially toxic species	11/6	12/6	12/6	12/6	11/6	11/6	11/6	16/6	16/6	15/6
Hose 0-10 m	presence	presence	presence	presence	presence	presence	presence	presence	presence	precence
Chaetoceros castracanei	present	present	present	present						
Chaetoceros similis			present						present	present
Chaetoceros subtilis				present						
Chaetoceros tenuissimus									present	
Pennales										present
Skeletonema marinoi										present
Thalassiosira sp.	present	present	present	present						
Alexandrium sp.										present
Amphidinium longum							common			
Amylax triacantha								present		
Biecheleria baltica									present	present
Dinophysis acuminata	present			present		present	present	common	present	present
Dinophysis acuta							present	present		
Dinophysis norvegica	present		present	present	present	present	common	common	present	
Gymnodiniales	common	common	common	common	common	common	common	common	present	common
Gyrodinium spp.			present						present	
Heterocapsa rotundata	present	present		present	present					present
Heterocapsa triquetra										present
Katodinium glaucum			present			present	present			
Noctiluca scintillans								present		
Protoperidinium bipes										common
Protoperidinium brevipes							present	present		present
Dinobryon divergens							present		present	present
Dinobryon faculiferum	present			present		present		present	present	common
Ollicola vangoorii									present	present
Desmodesmus armatus	present									
Oocystis sp.		present	present	present						
Binuclearia lauterbornii	present	common	common	common	common	present	common	common	common	present
Pyramimonas spp.		present	present	present	present		present	common	present	present
Cryptomonadales		present	present	common	present	present	present	present	present	present
Eutreptiella sp.									present	
Aphanizomenon flosaquae	common	present	present	present	present	very common		common	very common	common
Aphanocapsa sp.	present	present	common	common	common	present	present	present	present	present
Aphanothece sp.	present	present	present	present	present	present			present	present
Cyanodictyon sp.		present		present	present	present				
Dolichospermum sp.									present	common
Lemmermanniella sp.	common	common	present	common	common	common		present	present	present
Nodularia spumigena	present	present		present	present	present			present	
Pseudanabaena sp.		present						present	present	present
Snowella sp.	present	present	present	present	present	present		present	present	present
Calliacantha natans		present	present		present	present	present	present	present	present
Ebria tripartita		present		present						
Ciliophora	common	present	present	common	common	common	common	common	present	common
Mesodinium rubrum	present		present	common	common	present	present	present	present	
Laboea strobila									present	present
Strombidium sp.								present		present
Flagellates	common	common	common	common	common	common	common	common	common	common

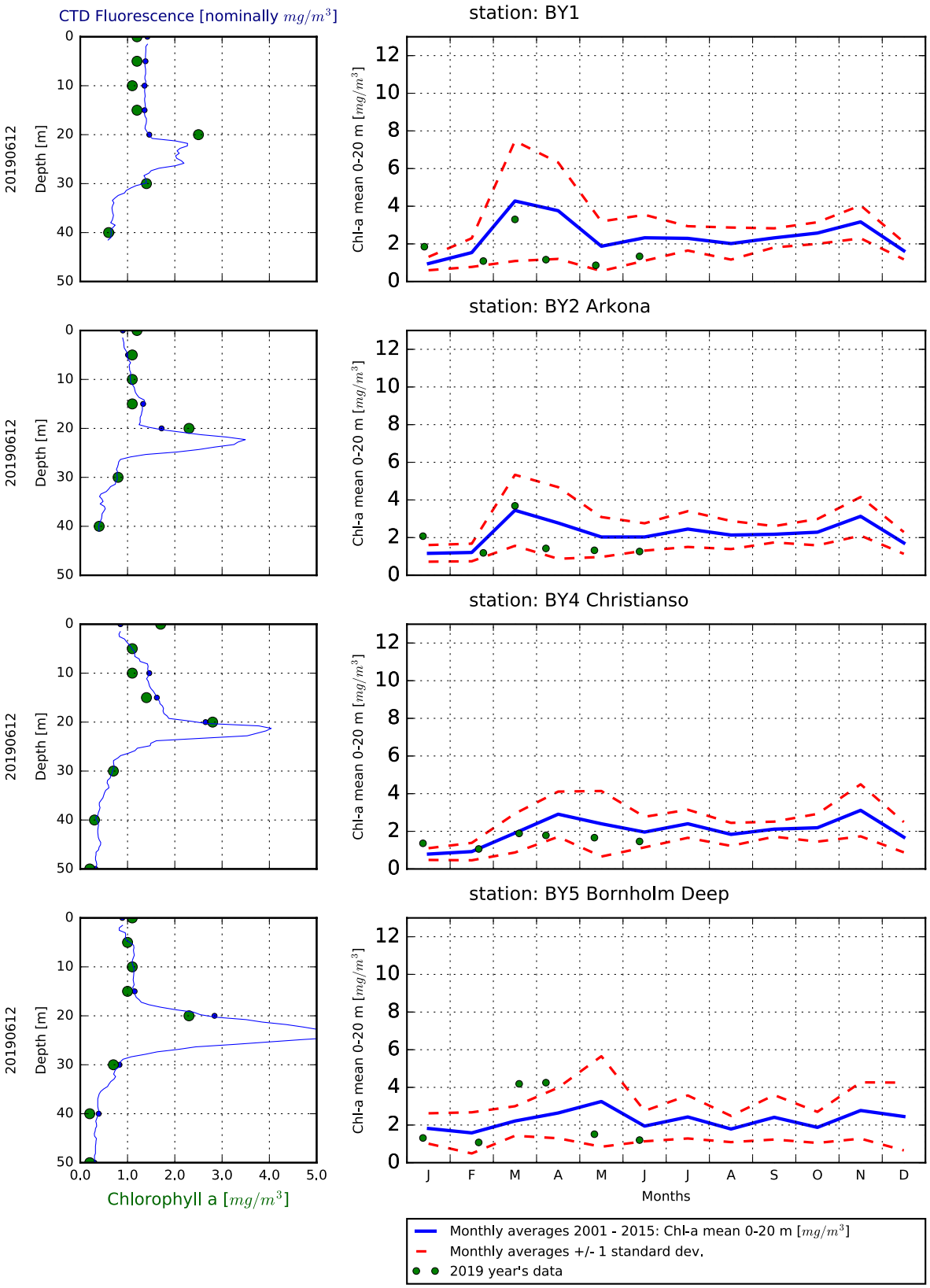


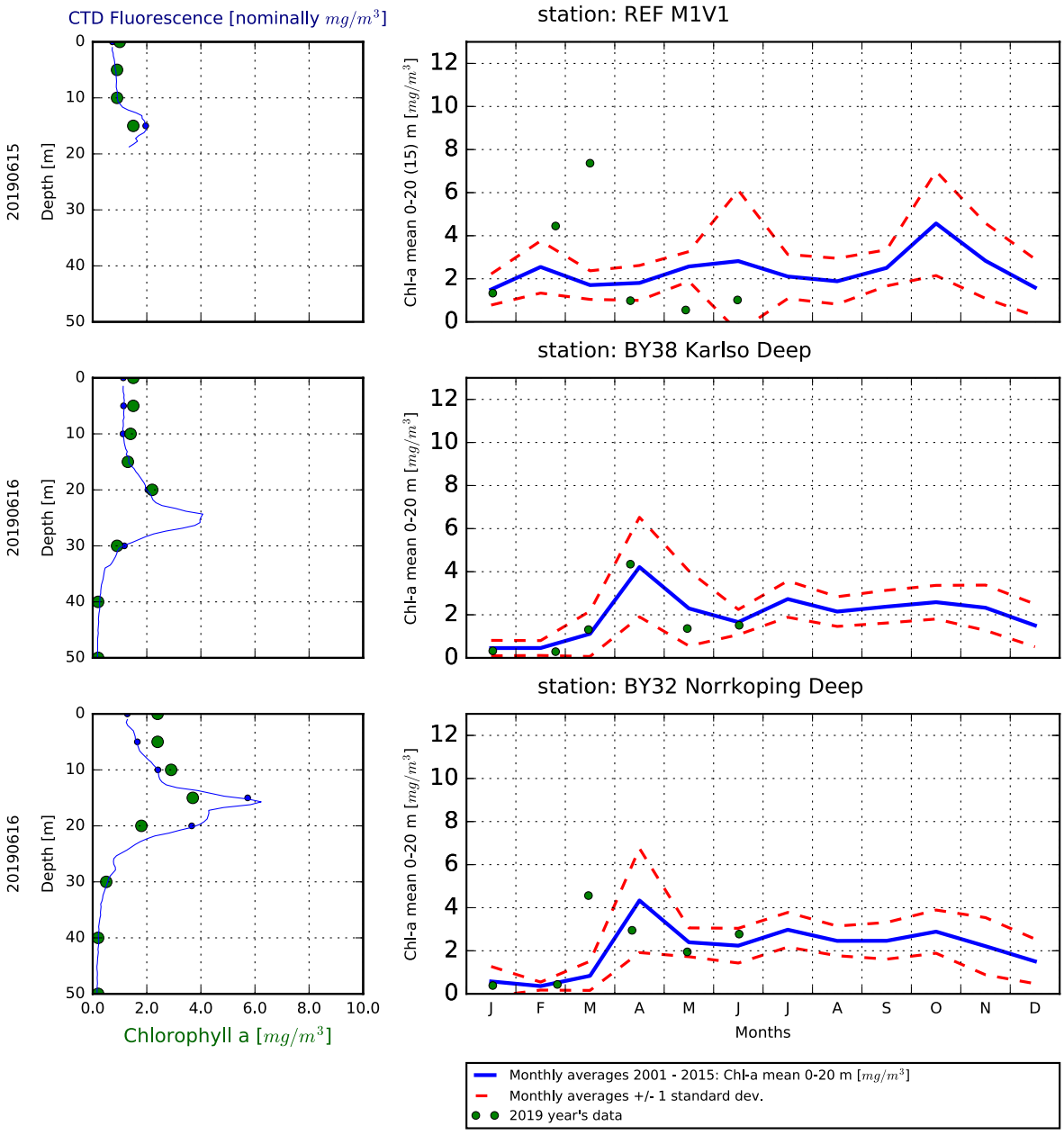
No permission was granted to sample at Släggö close to the Skagerrak coast due to using the foreign vessel R/V Aranda. The station was sampled from another vessel however, but the chlorophyll data is not shown here.

The Kattegat and The Sound



The Southern Baltic





Om klorofylldiagrammen

Klorofyll *a* är ett mått på mängden växtplankton. Prover tas från ett antal djup. Data presenteras både från de fasta djupen och som medelvärden 0-20 m. Utöver resultaten från laboratorieanalyserna av vattenprover mäts klorofyll *a* som fluorescens från ett automatiskt instrument som sänks ned från fartyget. På så sätt kan djupt liggande, ibland tunna lager av växtplankton observeras.

About the chlorophyll graphs

Chlorophyll *a* is sampled from several depths. Data are presented both from the discrete depths and as an average 0-20 m. In addition to the laboratory analysis from the water samples chlorophyll fluorescence is measured in continuous depth profiles from the ship. This is a way to observe thin layers of phytoplankton occuring below the surface.

Om AlgAware

SMHI genomför månatliga expeditioner i Östersjön och Västerhavet. Resultat baserade på semikvantitativ mikroskopanalys av planktonprover samt klorofyllmätningar presenteras kortfattat i denna rapport. Information från SMHIs satellitövervakning av algblomningar finns under perioden juni-augusti på www.smhi.se. Resultat från provtagningarna kan hämtas från SMHI:s databas på sharkweb.smhi.se. Hydrografidata läggs ut varje månad, växtplanktondata läggs ut en gång per år.

About AlgAware

SMHI carries out monthly cruises in the Baltic and the Kattegat/Skagerrak. Results from semi quantitative microscopic analysis of phytoplankton samples as well as chlorophyll measurements are presented in brief in this report. Information from SMHIs satellite monitoring of algal blooms is found on www.smhi.se during the period June-August. Results from the expeditions are found in the SMHI database, sharkweb.smhi.se. Data are published monthly, phytoplankton data however, are published once a year.

Art / Species	Gift / Toxin	Eventuella symptom	Clinical symptoms
Alexandrium spp.	Paralytic shellfish poisoning (PSP)	**Milda symptom:** Inom 30 min.: Stickningar eller en känsla av bedövning runt läpparna, som sprids gradvis till ansiktet och nacken; stickningar i fingertoppar och tår; Huvudvärk; yrsel, illamående, kräkningar, diarré **Extrema symptom:** Muskelförlamning; andningssvårigheter; känsla av att kvävas; Man kan vara död inom 2-24 timmar efter att ha fått i sig giftet, på grund av att andningsmuskulaturen förlamas.	**Mild case:** Within 30 min: tingling sensation or numbness around lips, gradually spreading to face and neck; prickly sensation in fingertips and toes; headake, dizziness, nausea, vomiting, diarrhoea. **Extreme case** Muscular paralysis; pronounced respiratory difficulty; choking sensation; death trough respiratory paralysis may occur within 2-24 hours after ingestion.
Dinophysis spp.	Diarrehetic shellfish poisoning (DSP)	**Milda symptom:** Efter cirka 30 minuter till några timmar: yrsel, illamående, kräkningar, diarré, magont **Extrema symptom:** Upprepad exponering kan orsaka cancer	**Mild case:** Within 30 min-a few hours: dizziness, nausea, vomiting, diarrhoea, abdominal pain. **Extreme case:** Repeated exposure may cause cancer.
Pseudo- niztschia spp.	Amnesic shellfish poisoning (ASP)	**Milda symptom:** Efter 3-5 timmar: yrsel, illamående, kräkningar, diarré, magkramper **Extrema symptom:** Yrsel, hallucinationer, förvirring, förlust av korttidsminnet, kramper	**Mild case:** Within 3-5 hours: dizziness, nausea, vomiting, diarrhoea, abdominal cramps. **Extreme case:** dizziness, hallucinations, confusion, loss of memory, cramps.
Chaetoceros concavicornis/ C.convolutus	Mechanical damage through hooks on setae	**Låg celltäthet:** Ingen påverkan. **Hög celltäthet:** Fiskens gälar skadas, fisken dör.	**Low cell numbers:** No effect on fish. **High cell numbers:** Fish death due to gill damage.
Pseudochattonella spp.	Fish toxin	**Låg celltäthet:** Ingen påverkan. **Hög celltäthet:** Fiskens gälar skadas, fisken dör.	**Low cell numbers:** No effect on fish. **High cell numbers:** Fish death due to gill damage.

Översikt över några potentiellt skadliga alger och det aktuella giftets effekt. Overview of potentially harmful algae and effects of toxins. Manual on harmful marine microalgae (2003 - UNESCO Publishing).

Kartan på framsidan visar viktat medelvärde för klorofyll *a,* µg/l (0-10 m) vid de olika stationerna. Pil upp eller ned indikerar om resultatet är över eller under en standardavvikelse från medel. Medel är beräknat utifrån aktuell månad under perioden 2001-2015. Förekomst av skadliga alger vid stationer där arter analyseras markeras med symbol.

The map on the front page shows weighted mean of chlorophyll *a*, µg/l (0-10 m) at sampling stations. The arrow up or down indicate whether the result is above or below one standard deviation from mean. The mean value is calculated using results from the actual month during the period 2001-2015. Presence of harmful algae at stations where species analysis is performed is shown with a symbol.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