

Abstract

A typical summer situation was observed in the phytoplankton samples from the Skagerrak and Kattegat areas. The number of species were few and the most common species were several from the dinoflagellate genus *Ceratium* and the diatoms *Proboscia alata* and *Dactyliosolen fragilissimus*. Chlorophyll fluorescence maxima in open Skagerrak were mostly caused by *Ceratium* species and small unidentified flagellates.

The Baltic samples revealed another typical summer situation; namely, warm calm weather leading to cyanobacteria blooms. In the southern Baltic spread aggregations were observed on the surface. Samples from all of the Baltic stations showed that large quantities of cyanobacteria were present beneath the immediate surface. *Aphanizomenon* sp. dominated most of the samples but *Nodularia spumigena** was present at all stations in varying abundancies.

To follow the surface accumulations of cyanobacteria in the Baltic Sea by satellite interpretations and high resolution images: <http://www.smhi.se/en/Weather/Sweden-weather/the-algae-situation-1.11631>

The phytoplankton samples were filtered through 10 µm polycarbonate filters before being analysed using a light microscope. Potentially toxic species are marked with *. To observe which of the cyanobacteria species were dominating the surface accumulations, bucket sampling was performed at most of the Baltic stations, and are listed on page 5.

It was impossible to analyse small species on board. Chlorophyll *a* will be analysed on land and is not reported here.



A beautiful day on the R/V Argos. Photo: Philip Axe.

More detailed information on species composition and abundance

The Skagerrak

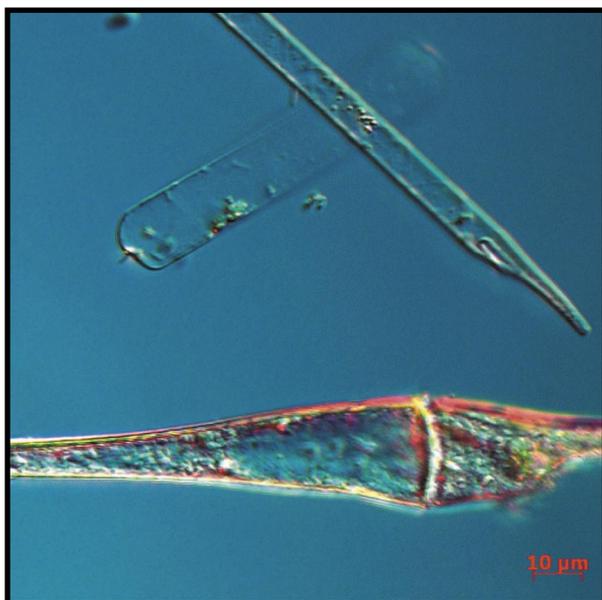
Å17 28/6

Species from the dinoflagellate genus *Ceratium* were the most common and *C. fusus* the most numerous amongst them. The small flagellate *Emiliana huxleyi* was present.

Chlorophyll fluorescence maxima were found at Å16 and Å17 at 20 meters depth and caused by small species hard to analyse on the filters used on board the Argos. A few cells of the flagellate *Emiliana huxleyi* was seen however and the species was probably a major part of the total cell counts at the fluorescence maxima. Last month Skagerrak and parts of the North Sea were coloured turquoise by *E. huxleyi*.

Släggö 28/6

The diatom *Proboscia alata* dominated the phytoplankton sample. Dinoflagellate species were the most numerous though and *Ceratium* species above all. The dinoflagellate *Dinophysis norvegica** was common.



Three of the most common species in the Kattegat and Skagerrak areas this month was the dinoflagellate *Ceratium fusus* (bottom) and the diatoms *Proboscia alata* (pointing rightwards) and *Dactyliosolen fragilissimus*.

The Kattegat

N14 Falkenberg 29/6

The diatoms *Dactyliosolen fragilissimus* and *Proboscia alata* and the dinoflagellate *Ceratium fusus* dominated the phytoplankton sample. A few filaments of the cyanobacteria (bluegreen algae) *Anabaena* sp. were observed. This species is one of the three cyanobacteria that dominate the surface accumulations in the Baltic during summers.

Anholt E 29/6 and 3/7

The phytoplankton situation was the same as at N14 at both visits except that *Ceratium tripos* was more common than *C. fusus* at Anholt E. The dinoflagellate *Dinophysis norvegica** was abundant.

W Landskrona 29/6

A chlorophyll fluorescence peak at 15 meters depth was dominated by the diatoms *Proboscia alata* and *Dactyliosolen fragilissimus*. The dinoflagellate *Dinophysis norvegica** was common and a few filaments of the cyanobacterium *Nodularia spumigena** were found.

The Baltic Sea

Summary of visually observed surface accumulations.

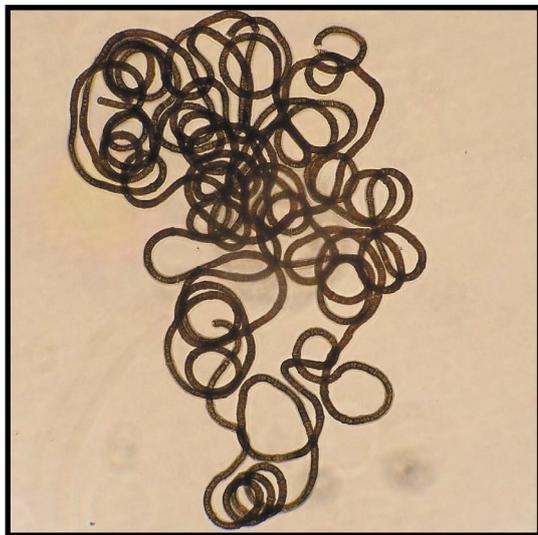
As sampling was preceded at the station BY5, the first cyanobacteria aggregations were observed. In size, the aggregations were from small pollen grains up to the size of a human fist floating in the surface. No coherent mats of cyanobacteria were seen. Visible aggregations reappeared in the sound of Kalmar. The cyanobacteria were aggregated to small grains abundant in the water, but not in the surface yet. On our way from the station Ref. M1V1, the aggregations increased into spread surface accumulations. In the middle of the Hanö bight surface accumulations decreased and at the sampling site cyanobacteria were back to the size of pollen grains, abundant but below the surface.

Results from the integrated (0-10 m) phytoplankton samples and chlorophyll fluorescence peak samples.

Super saturated oxygen values in the southern Baltic surface samples revealed the ongoing cyanobacteria blooms. Note that the high oxygen saturation might partly be explained by the sudden increase in temperature due to the fact that warm water has less oxygen binding capacity than cold water.

Arkona Basin BY2 29/06

Aphanizomenon spp. dominated the phytoplankton sample and the chlorophyte *Planctonema lauterbornii* was very common.



The cyanobacterium *Nodularia spumigena**.

Bornholm Basin BY5 30/06

The chlorophyte *Planctonema lauterbornii* dominated the sample and a few filaments of the cyanobacteria species *Aphanizomenon* sp. and *Nodularia spumigena** were present. Note that surface accumulations was observed ergo cyanobacteria were abundant in the surface sample. The diatoms *Chaetoceros danicus* och *C. similis* were present.

Southeastern Baltic BCS III-10 30/06

Both *Aphanizomenon* spp. and *Nodularia spumigena** were present, but the dominance of *Aphanizomenon* spp. and the chlorophyte *Planctonema lauterbornii*. was obvious. A chlorophyll fluorescence peak at 15 meters depth was caused by *P. lauterbornii* and the dinoflagellate *Dinophysis norvegica**.

Eastern Gotland Basin BY15 1/7

The chlorophyte *Planctonema lauterbornii* dominated the sample and *Aphanizomenon* sp. was common. *N. spumigena* was present*. A chlorophyll fluorescence peak at 20 meters depth was caused by *P. lauterbornii* and the dinoflagellate *Dinophysis norvegica**. *D. acuminata** and the diatom *Chaetoceros wighamii* were common 20 meters below the surface. The prasinophyte *Pterosperma* sp. was numerous.

Fårö Deep BY20 and Norrköping Deep BY32 1/7

Chlorophyll fluorescence peaks at 15 meters depth revealed small populations of the dinoflagellates *Dinophysis acuminata** och *D. norvegica**. The diatom *Chaetoceros wighamii* was common.

Western Gotland Basin BY 38 1/7

Aphanizomenon spp. was abundant both in aggregations and as spread filaments. *N. spumigena** was common. A chlorophyll fluorescence peak at 15 meters depth was caused by small populations of the dinoflagellates *Dinophysis acuminata** och *D. norvegica**. The diatom *Chaetoceros wighamii* was common.

Blå Jungfrun Northern Kalmar Sound 2/7

Aphanizomenon spp. was abundant both in aggregations and as spread filaments and *N. spumigena** was common. The dinoflagellate *Dinophysis acuminata** was very common. A third filamentous cyanobacterium, *Anabaena* sp. was common in the phytoplankton sample along with a few chains of the diatom *Skeletonema marinoi*.

Kalmar Sound Ref. M1-V1 2/7

Aphanizomenon spp. dominated the sample and *Anabaena* sp. and *N. spumigena** were found in low quantities. A few species of diatoms and dinoflagellates were present in low cell numbers.

Phytoplankton analysis and text by:
Ann-Turi Skjevik

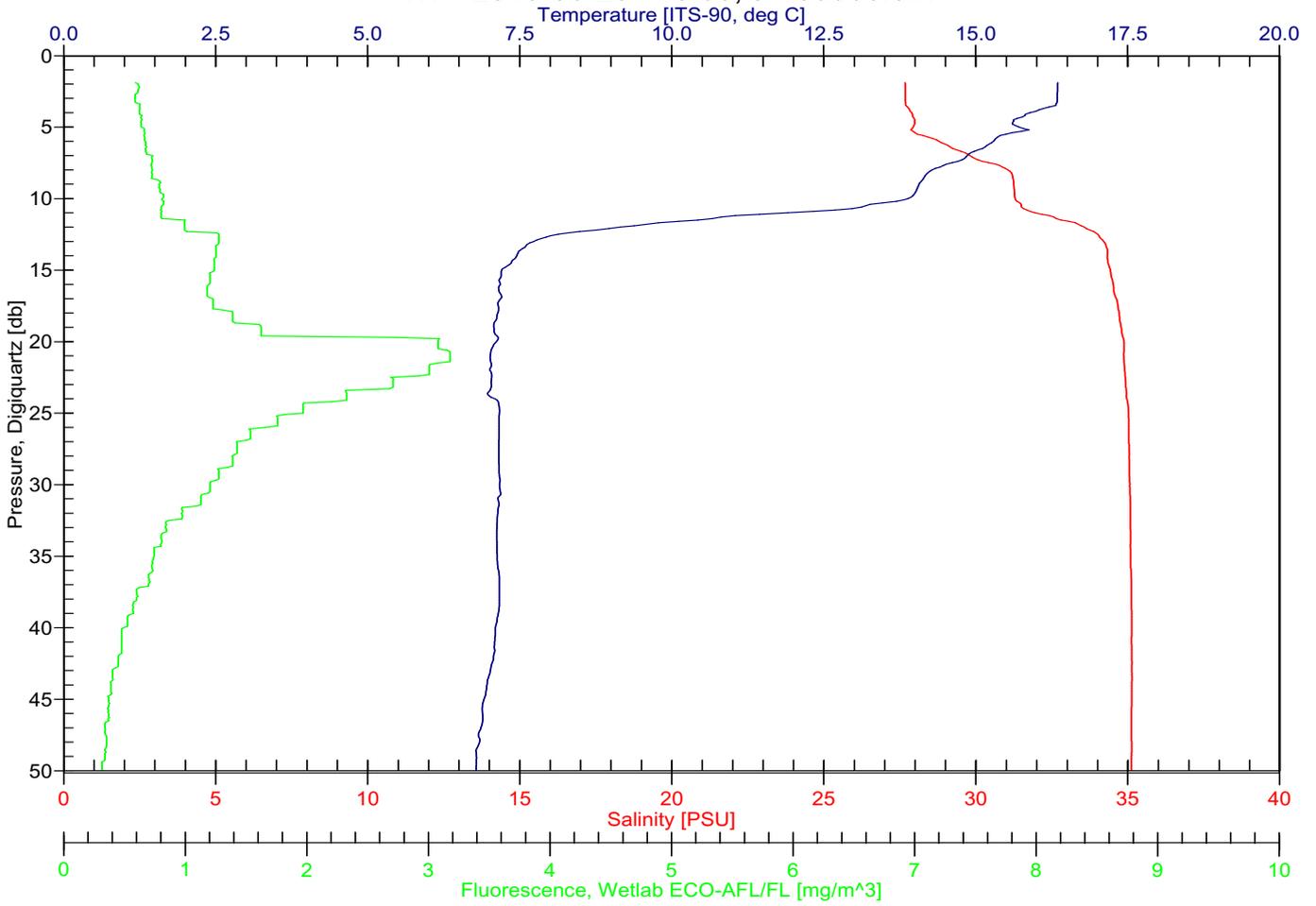
<i>Selection of observed species</i>	Å17	Släggö	N14	Anholt E	Anholt E
Red=potentially toxic species	6/28/10	6/28/10	6/29/10	6/29/10	7/3/10
Hose 0-10 m	cells/l	cells/l	cells/l	cells/l	cells/l
<i>Chaetoceros danicus</i>					observed
<i>Dactyliosolen fragilissimus</i>		common	dominating	dominating	dominating
<i>Guinardia delicatula</i>				observed	
<i>Proboscia alata</i>		dominating	dominating	dominating	dominating
<i>Rhizosolenia hebetata</i>		observed			observed
<i>Striatella unipunctata</i>		observed			
<i>Thalassionema nitzschioides</i>		observed	observed		
<i>Ceratium fusus</i>	common	common	very common	common	common
<i>Ceratium lineatum</i>		common			
<i>Ceratium longipes</i>	observed	common	observed		observed
<i>Ceratium macroceros</i>	observed	common			
<i>Ceratium tripos</i>	common	common	common	very common	very common
<i>Cladopyxis claytonii</i>					
<i>Dinophysis acuminata</i>		observed			
<i>Dinophysis norvegica</i>	observed	common			
<i>Dinophysis rotundata</i>	observed		observed		observed
<i>Gonyaulax verior</i>		observed			
<i>Gymnodinium simplex</i>			observed		
<i>Oxytoxum</i>			observed		observed
<i>Protoperdinium crassipes</i>	observed				
<i>Protoperdinium depressum</i>		observed			
<i>Protoperdinium pallidum</i>		observed			
<i>Protoperdinium pellucidum</i>		observed			
<i>Protoperdinium</i> spp.	observed	observed			
<i>Emiliana huxleyi</i>	common?	observed			
<i>Eutreptiella</i> spp.	observed				
<i>Quadricoccus euryhalinicus</i>					observed
<i>Anabaena</i> spp.			observed	observed	observed
<i>Ebria tripartita</i>					observed
<i>Leucocryptos marina</i>	observed		observed	observed	observed
<i>Telonema subtilis</i>	observed				

<i>Selection of observed species</i>	BY2	BY5	BCS III-10	BY15	BY38	Blå Jungfrun	Ref. M1-V1
Red=potentially toxic species	6/29/10	6/30/10	6/30/10	7/1/10	7/1/10	7/2/10	7/2/10
Hose 0-10 m	cells/l	cells/l	cells/l	cells/l	cells/l	cells/l	cells/l
<i>Chaetoceros danicus</i>		observed					
<i>Chaetoceros similis</i>		observed					observed
<i>Chaetoceros wighamii</i>					observed	observed	
<i>Skeletonema marinoi</i>						observed	
<i>Amylax triacantha</i>							observed
<i>Ceratium fusus</i>	observed						observed
<i>Ceratium tripos</i>	observed						
<i>Dinophysis acuminata</i>			observed	observed	common	very common	observed
<i>Dinophysis norvegica</i>		observed	common	observed			common
<i>Dinophysis rotundata</i>						observed	
<i>Heterocapsa rotundata</i>				observed			
<i>Heterocapsa triquetra</i>						observed	observed
<i>Dinobryon balticum</i>							observed
<i>Planctonema lauterbornii</i>		very common	very common	very common	observed		
<i>Pterosperma</i> spp.					observed		
<i>Ebria tripartita</i>	observed		observed			observed	
<i>Anabaena</i> spp.					observed	common	observed
<i>Aphanizomenon</i> spp.	dominating	common	common	common	common	dominating	dominating
<i>Nodularia spumigena</i>		observed	observed	observed	common	common	observed

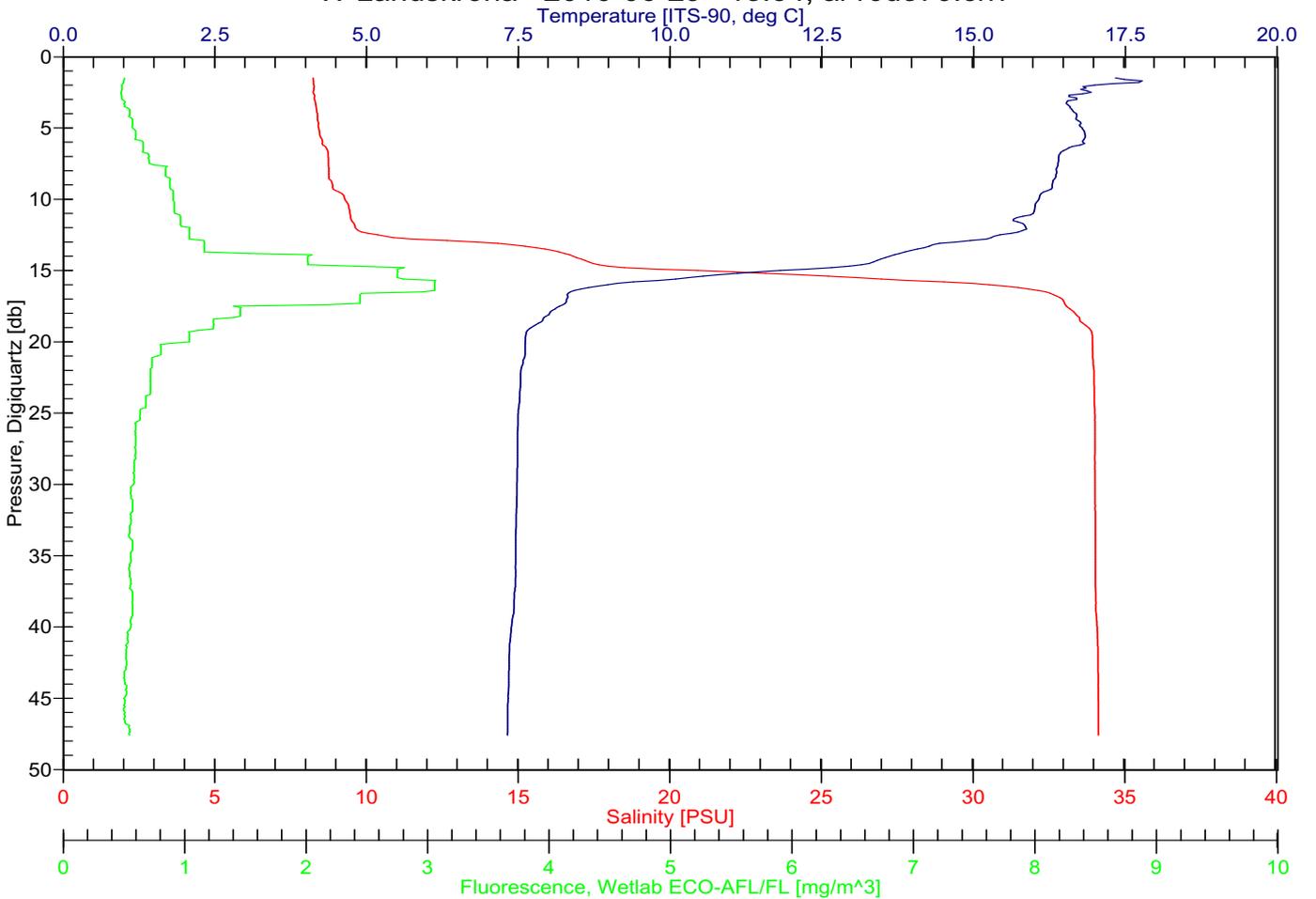
<i>Surface sampling using a bucket.</i>	<i>Observations of the following filamentous cyanobacteria:</i>		
<i>Station:</i>	<i>Aphanizomenon spp.</i>	<i>Nodularia spumigena*</i>	<i>Anabaena spp.</i>
BY4	very common	observed	
BY5	common	common	
BY10	dominating	common	
BY15	very common	common	
BY20	dominating	observed	common
BY32	dominating	common	common
BY38	dominating	common	
Blå Jungfrun northern Kalmar sound	dominating	observed	observed
Ref M1 V1	common	observed	observed
Northeast of station Hanö bight	dominating	very common	
Hanö bight	dominating	very common	observed

NB! The amounts of cyanobacteria in the surface vary due to diurnal rhythms.

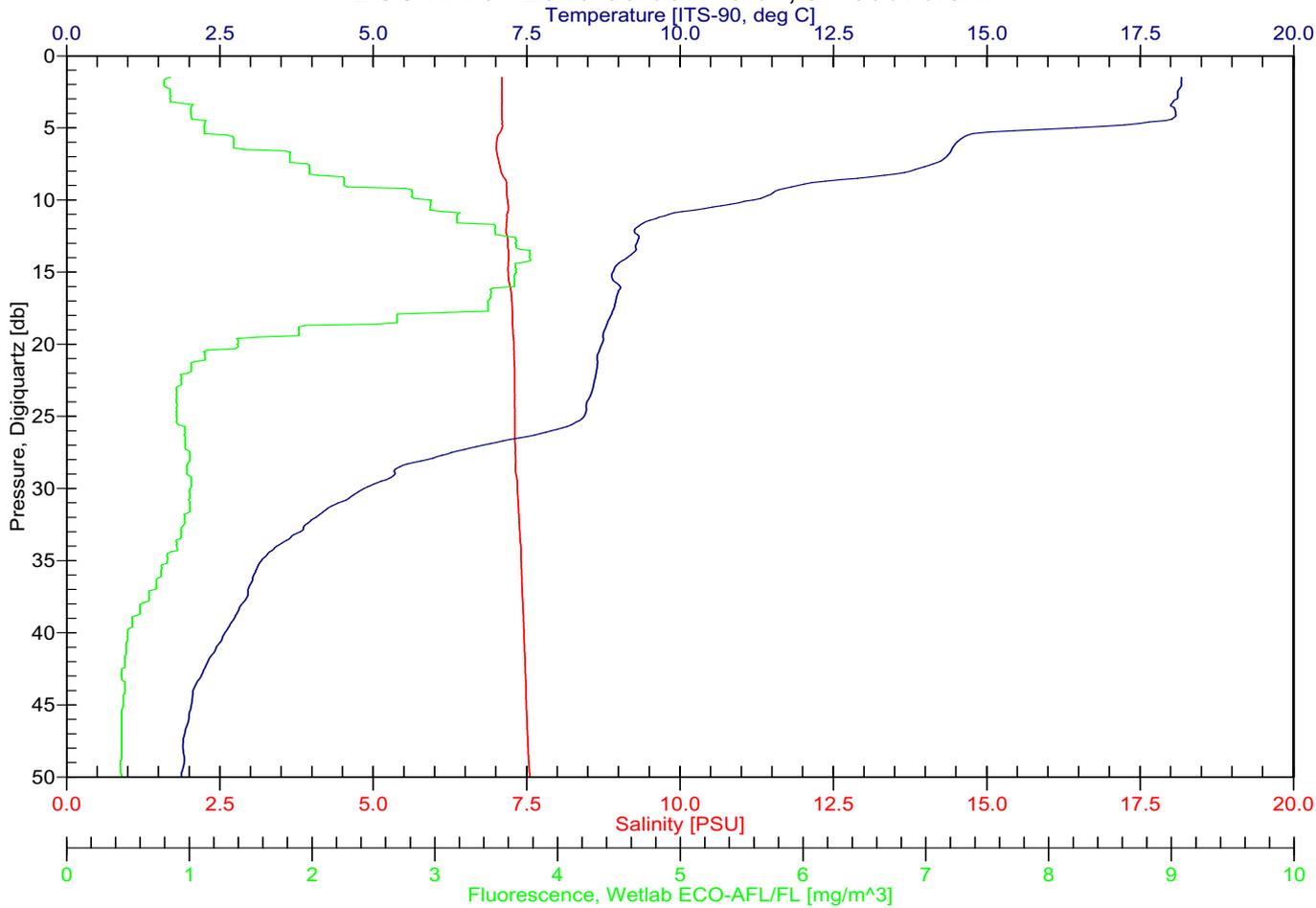
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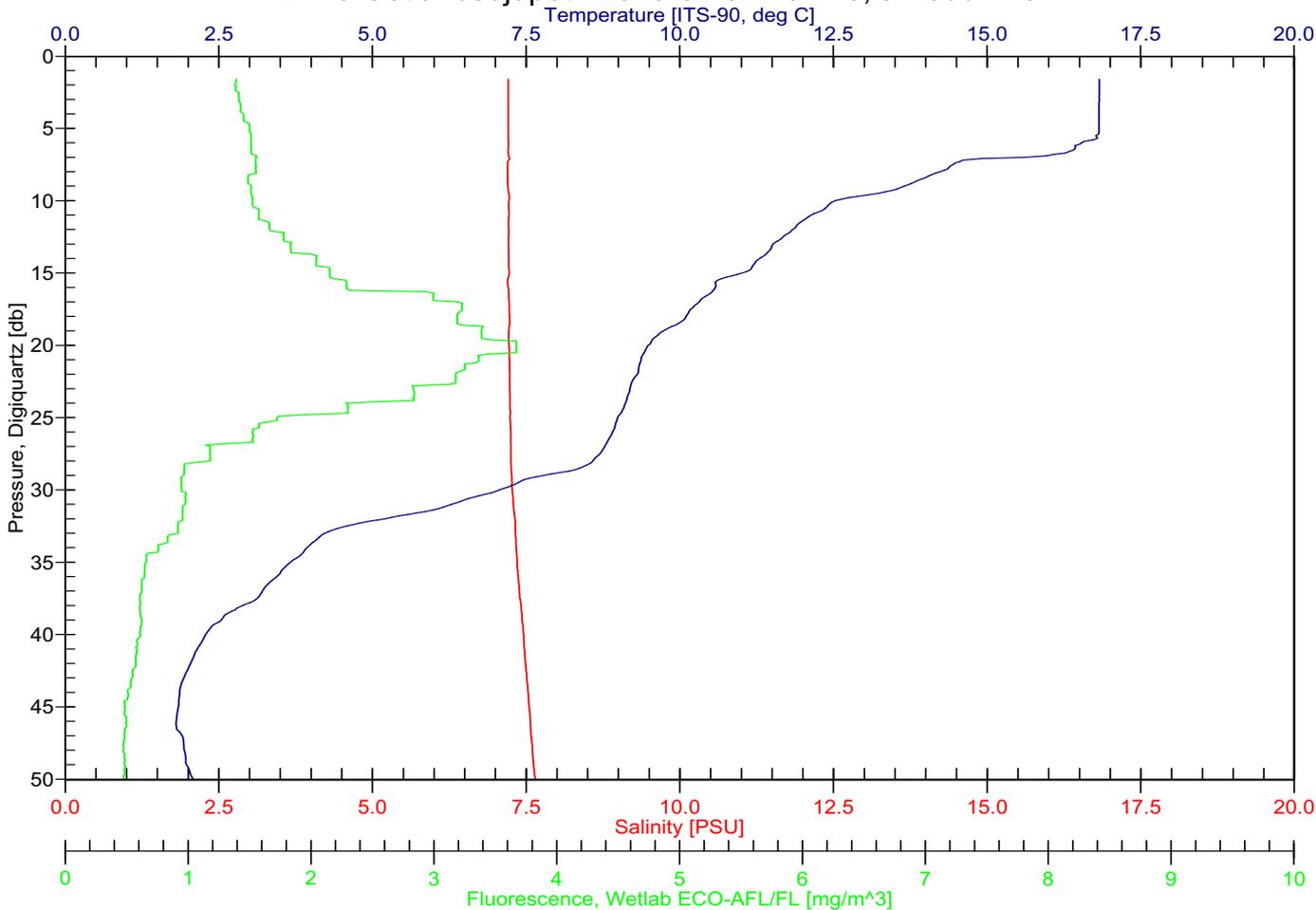
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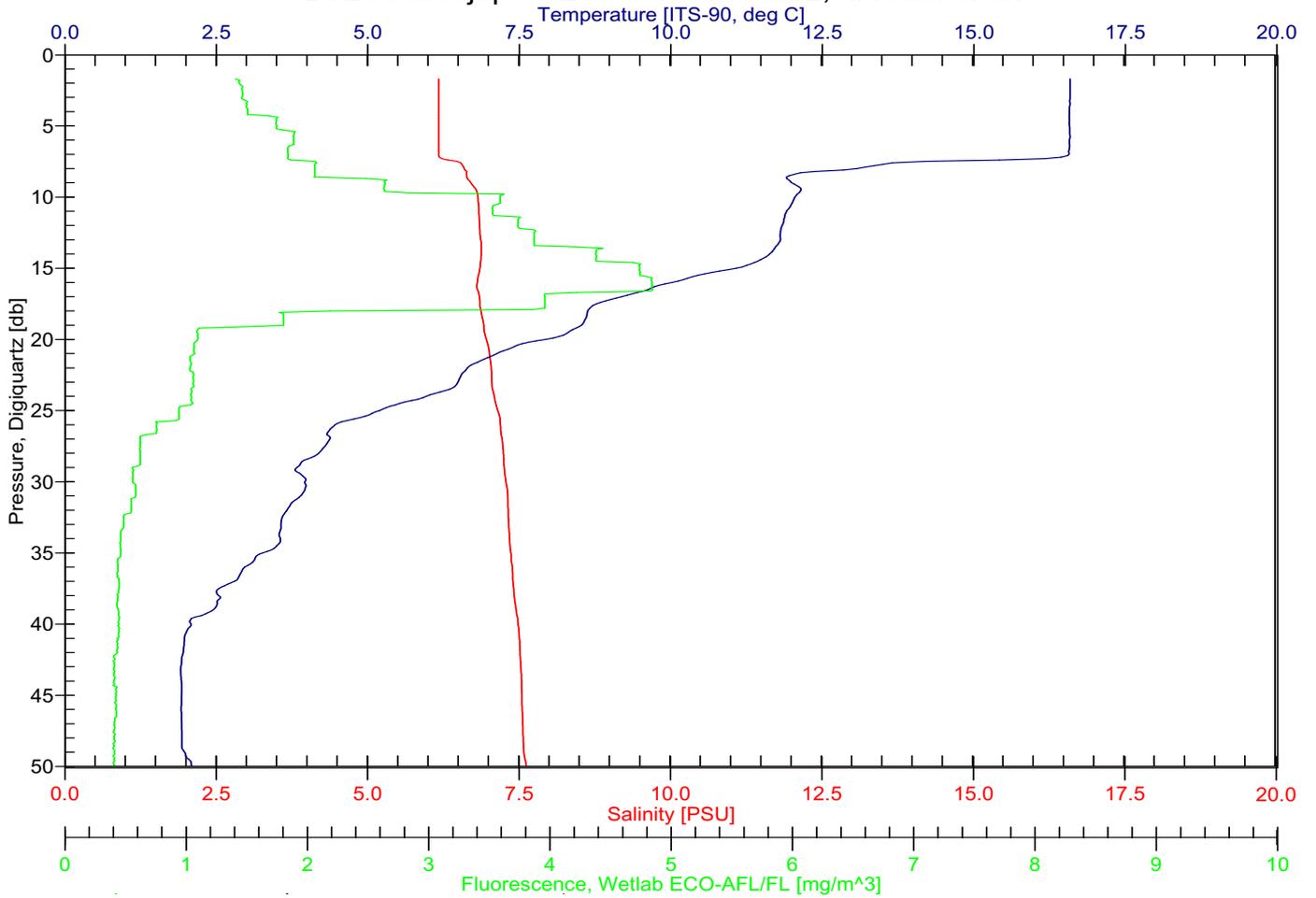
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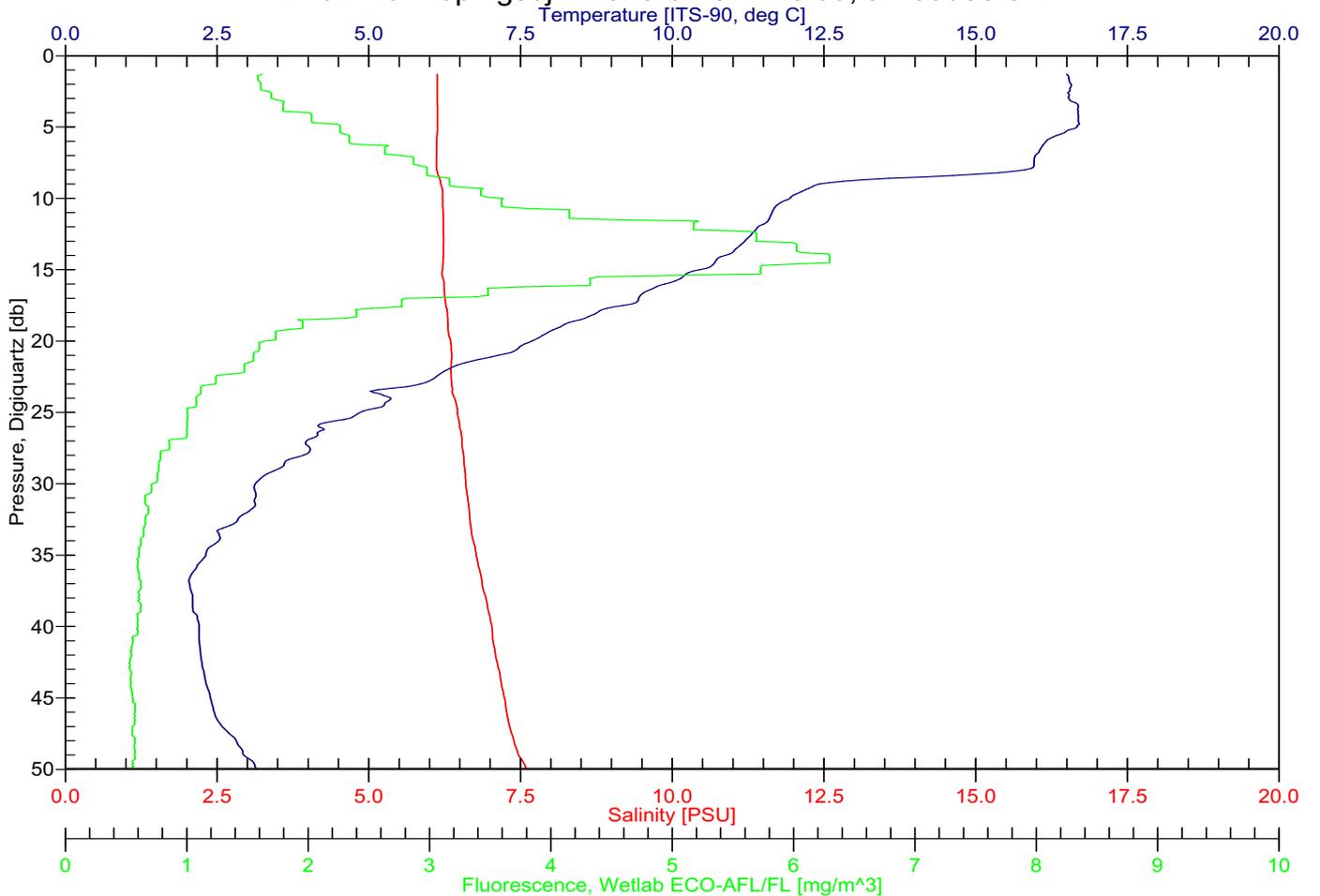
BY15 Gotlandsdjupet 2010-07-01 04:18, ar10d377.cnv

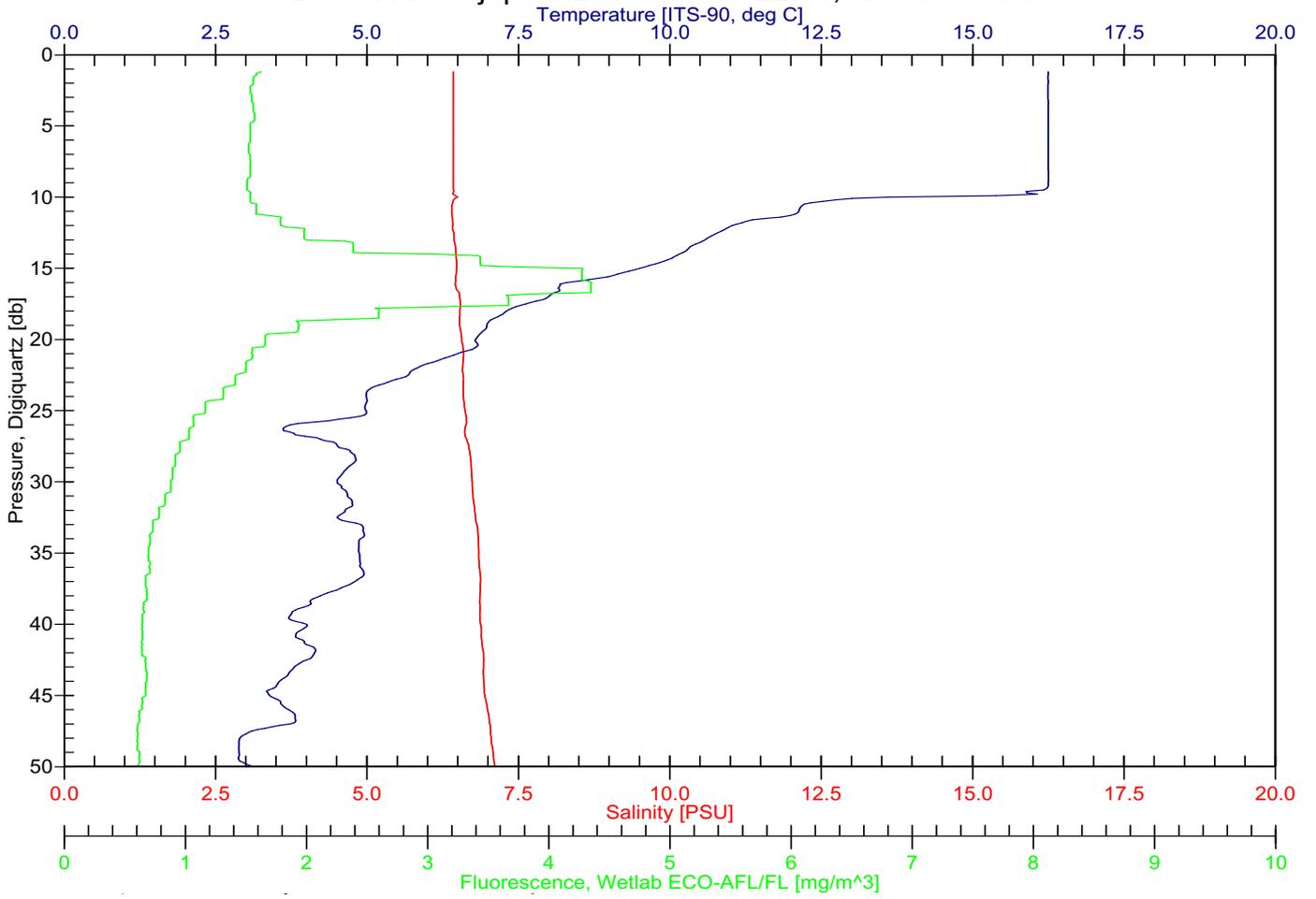


BY20 Farodjupet 2010-07-01 09:52, ar10d379.cnv



BY32 Norrkopingsdj. 2010-07-01 16:53, ar10d380.cnv





The ctd plots show temperature, salinity and chlorophyll fluorescence at the seven selected stations above.

Om AlgAware

SMHI genomför ca en gång per månad expeditioner med U/F Argos i Östersjön och Västerhavet. Resultat baserade på semikvantitativ mikroskopanalys av planktonprover samt klorofyllmätningar presenteras kortfattat i denna rapport. Information från SMHI:s satellitövervakning av algbloomingar finns på www.smhi.se.

About AlgAware

SMHI carries out monthly cruises with R/V Argos 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 SMHI:s satellite monitoring of algal blooms is found on www.smhi.se.

Art / Species	Gift / Toxin	Eventuella symptom	Clinical symptoms
<i>Alexandrium</i> 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; headache, dizziness, nausea, vomiting, diarrhoea. Extreme case Muscular paralysis; pronounced respiratory difficulty; choking sensation; death through respiratory paralysis may occur within 2-24 hours after ingestion.
<i>Dinophysis</i> spp.	Diarrhetic 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.
<i>Pseudochattonella</i> 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.
<i>Pseudo-nitzschia</i> 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.

Översikt av 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).

