Benten water solutions

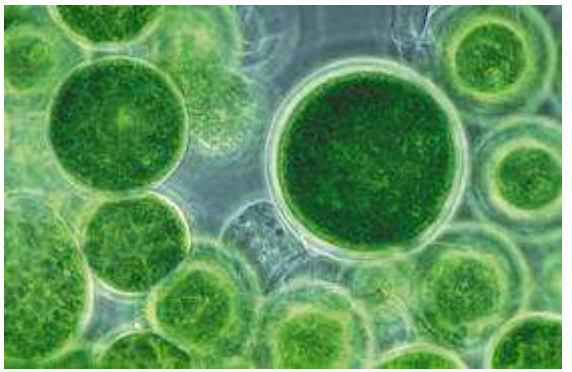
Hazem M. Kalaji, Marine Skonieczny, Oksana Sytar, Marian Brestic,
Karolina Bosa, Stefan Pietkiewicz & Corina Carpentier

Application of an Alert Level Framework based on cyanobacterial chlorophyll-*a* for early-warning water quality monitoring

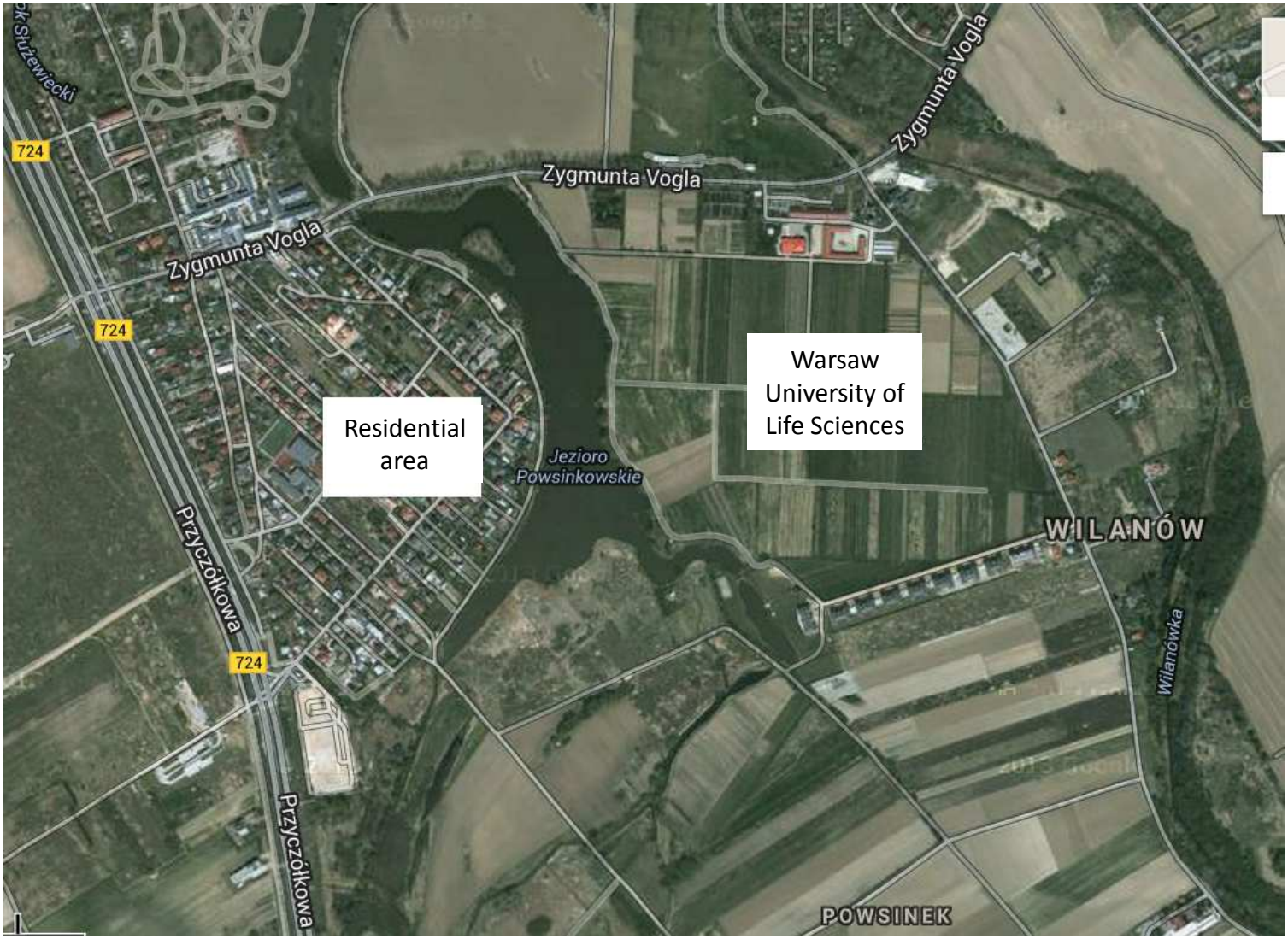
AquaLife Workshop
3-4 June
Kiel, Germany

Introduction

- Study area
- Set-up of experiment
- Alert Level Framework
- Results
- Conclusions



Study area


Zygmunta Vogla
Zygmunta Vogla
Zygmunta Vogla
724
724
724
Residential area
Warsaw University of Life Sciences
Jezioro Powsinkowskie
WILANÓW
Wilanówka
Przyczółkowa
Przyczółkowa
POWSINEK

Hypothesis

Higher algal biomass

Lower algal biomass

Method

- AlgaeTorch
  - 20 cm depth
  - 3 measurements per sampling point

- Sampling points:
  - 5 on each side of the lake
  - average results per lake side
- Measurements once per week
- May - July

Alert Level Framework

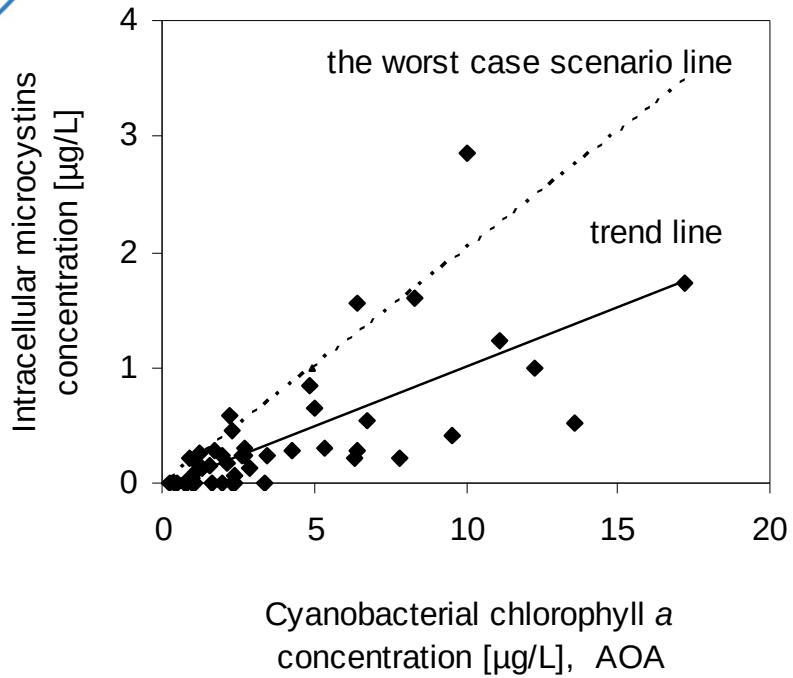
Levels	Cyanobacterial cells [cells/mL]	Microcystin-LR [µg/L]
Detection Level	500	0.1
Alert Level 1	2,000	0.4
Alert Level 2	5,000	1.0
Alert Level 3	50,000	10.0

- 2 x 5 locations
- Triplicates
- 10 weeks
- 3 hours per sample

300 samples

900 hours

Alert Level Framework



	µg microcystins per µg cyano-chl.-*a* (fluor.)
maximum	0.28
90 percentile	0.20
average	0.08

Levels	**Cyanobacterial cells [cells/mL]**	**Microcystin-LR [µg/L]**	**Cyanobacterial chlorophyll-*a*, AOA [µg/L]**
Detection Level	500	0.1	0.5
Alert Level 1	2,000	0.4	1.9
Alert Level 2	5,000	1.0	4.9
Alert Level 3	50,000	10.0	49.4

Reduction of time necessary for analysis

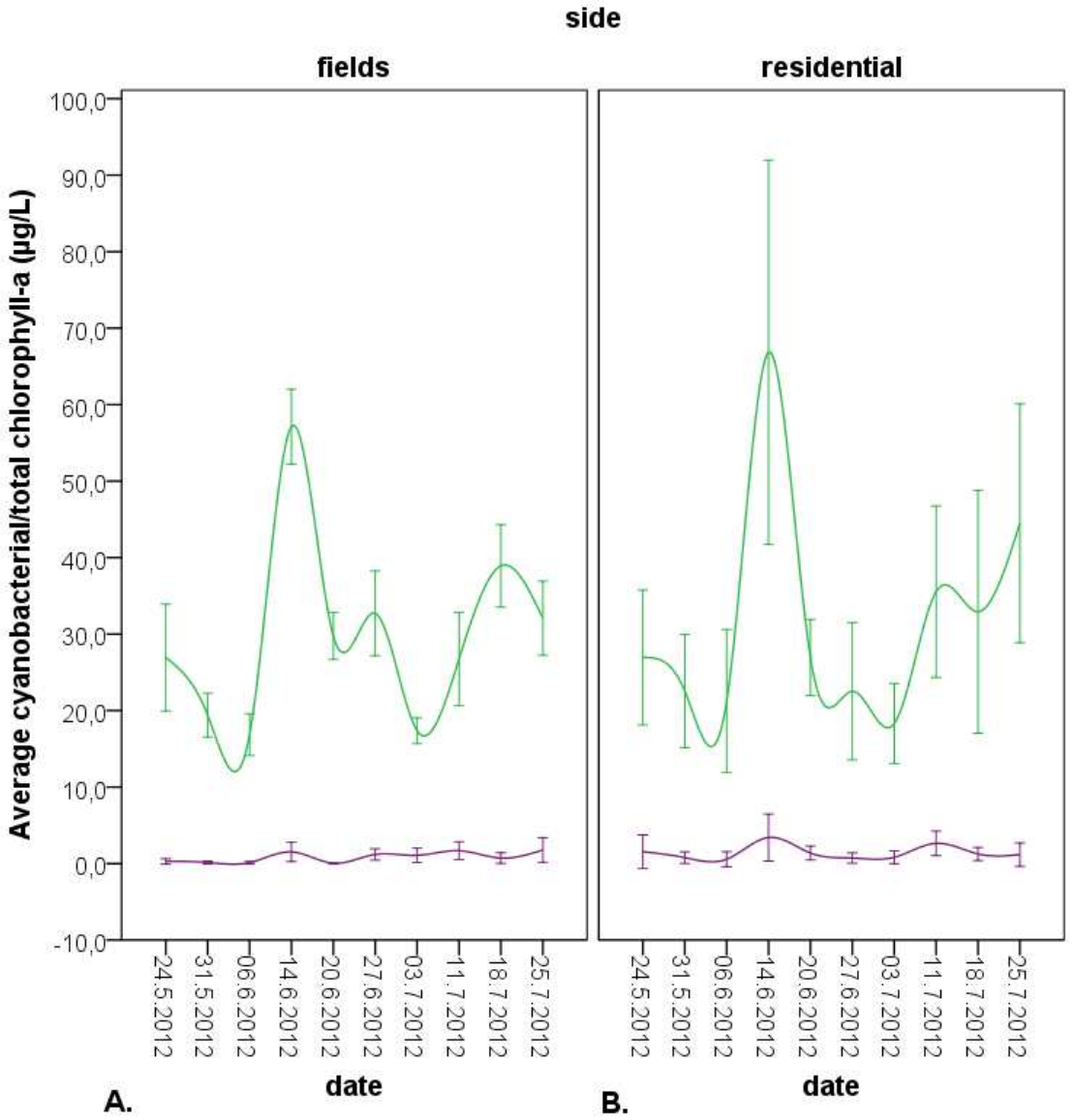
- 2 x 5 locations
- Triplicates
- 10 weeks
- 3 hours per sample

300 samples
900 hours

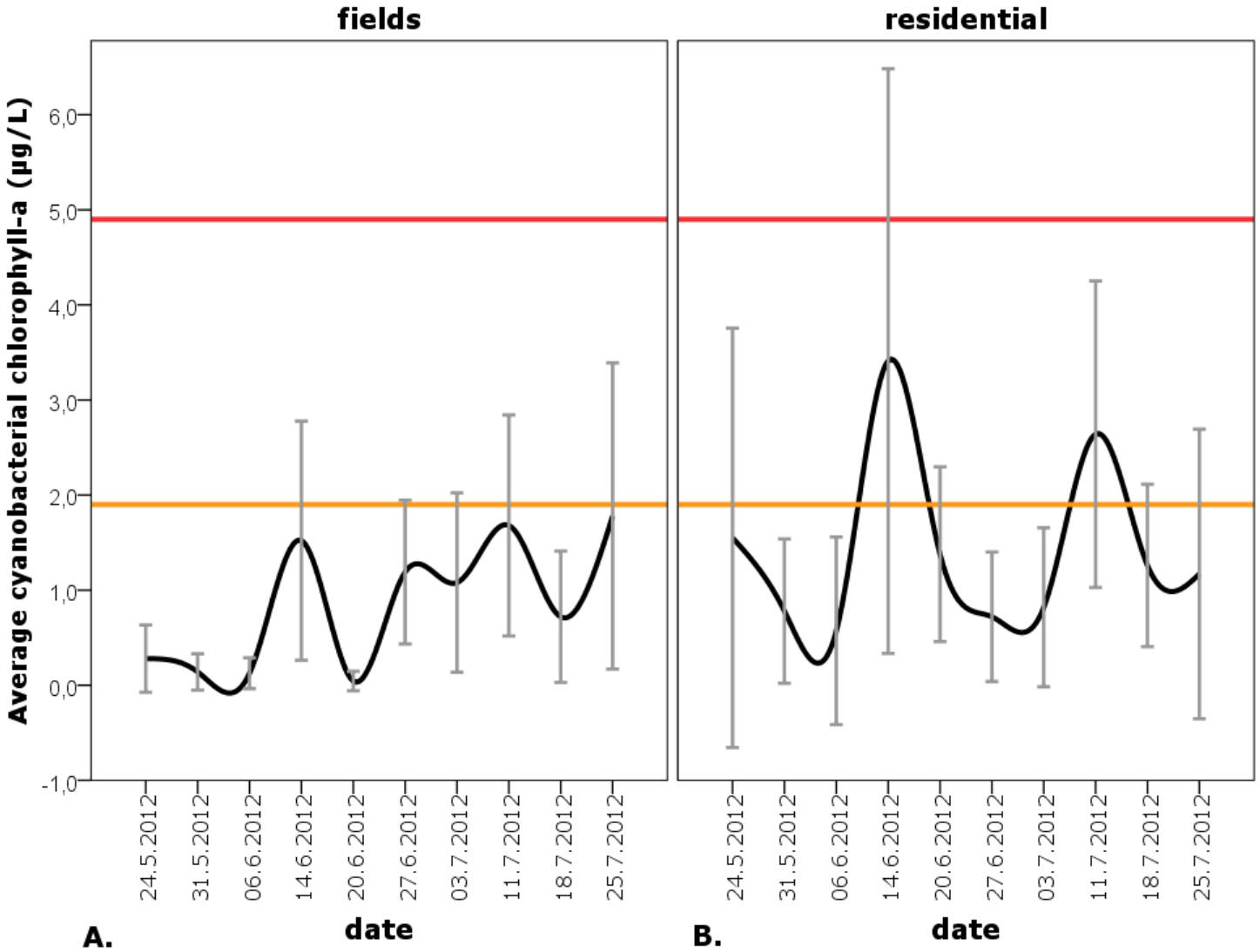
- 2 x 5 locations
- Triplicates
- 10 weeks
- 8 hours per week

300 measurements
80 hours

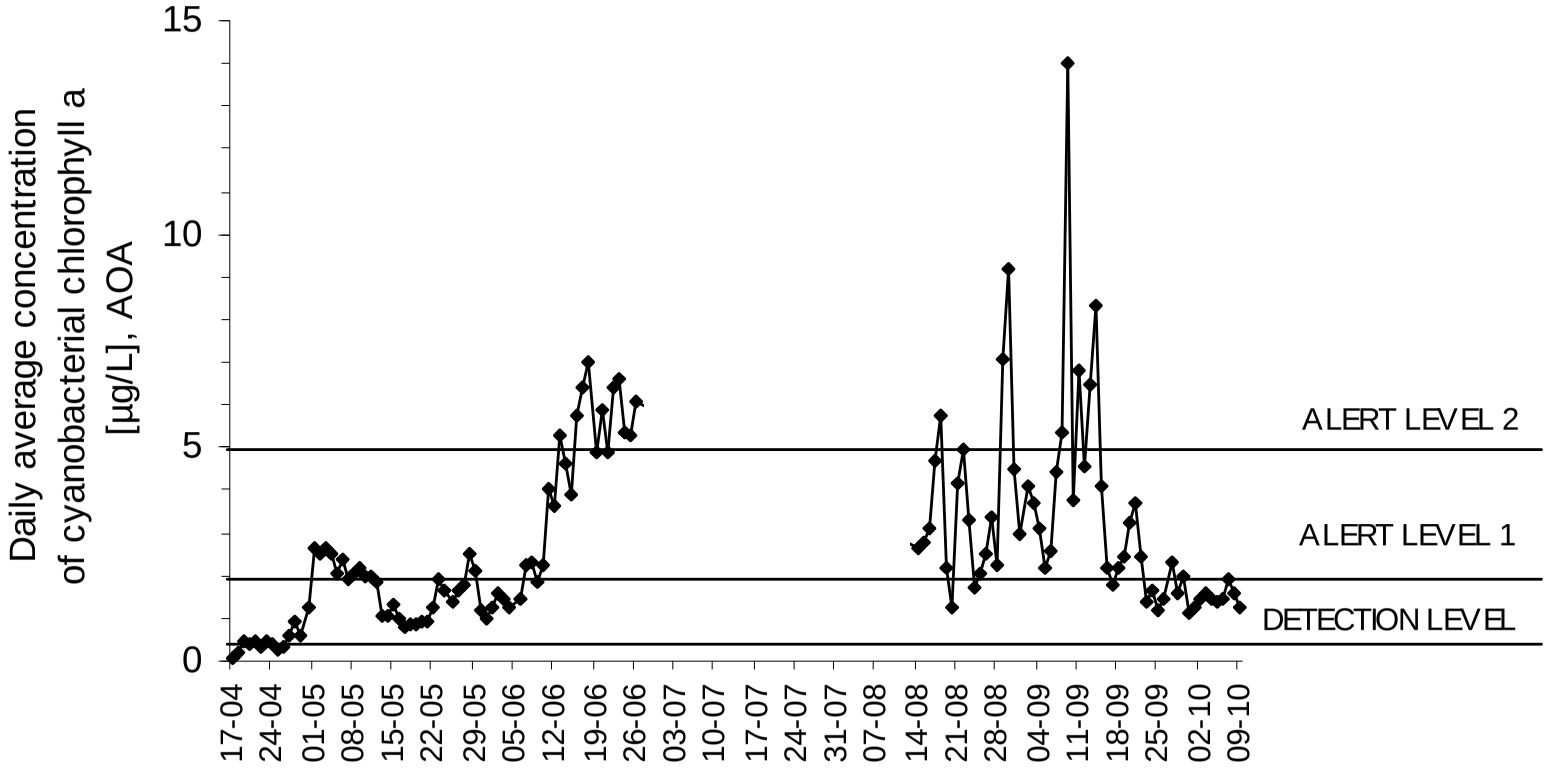
Results


side
fields
residential
Average cyanobacterial/total chlorophyll-a (µg/L)
100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
-10,0
24.5.2012
31.5.2012
06.6.2012
14.6.2012
20.6.2012
27.6.2012
03.7.2012
11.7.2012
18.7.2012
25.7.2012
date
A.
B.

Results


fields
residential
Average cyanobacterial chlorophyll-a (µg/L)
6,0
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
24.5.2012
31.5.2012
06.6.2012
14.6.2012
20.6.2012
27.6.2012
03.7.2012
11.7.2012
18.7.2012
25.7.2012
date
A.
B.

Discussion

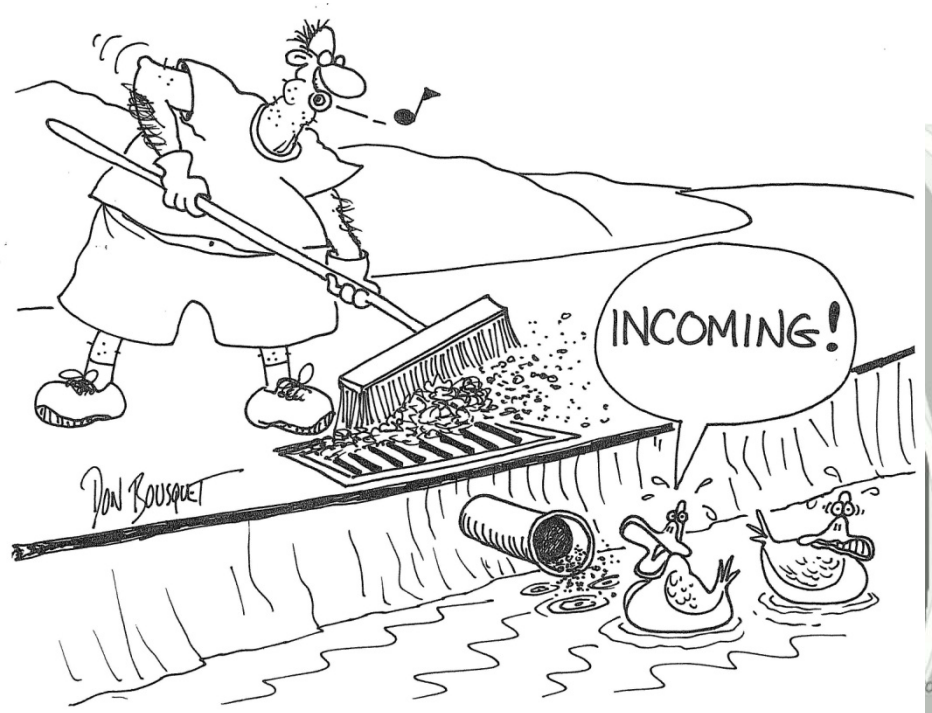

Daily average concentration of cyanobacterial chlorophyll a [µg/L], AOA
15
10
5
0
ALERT LEVEL 2
ALERT LEVEL 1
DETECTION LEVEL
17-04
24-04
01-05
08-05
15-05
22-05
29-05
05-06
12-06
19-06
26-06
03-07
10-07
17-07
24-07
31-07
07-08
14-08
21-08
28-08
04-09
11-09
18-09
25-09
02-10
09-10

Hypothesis

Lower
~~Higher~~ algal biomass

~~Lower~~ algal biomass
Higher

Hypothesis



Lower
~~**Higher**~~ **algal biomass**

~~**Lower**~~ **algal biomass**
Higher

Conclusions

- Important: efforts to inform the public about consequences of direct septic tank drainage into the lake
- ALF on basis of cyanobacterial chlorophyll-a as measured by AlgaeTorch helpful tool to assess risks

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