

# Answers Lesson #10

## Part 2

- Which ROIs are classified as 'High' according to WFD limits?

Considering that stations 1 and 2 are located in humic lakes and Station 3 in a non-humic lake, Station 1 can be classified as 'Good', while Station 2 and Station 3 as 'High'.

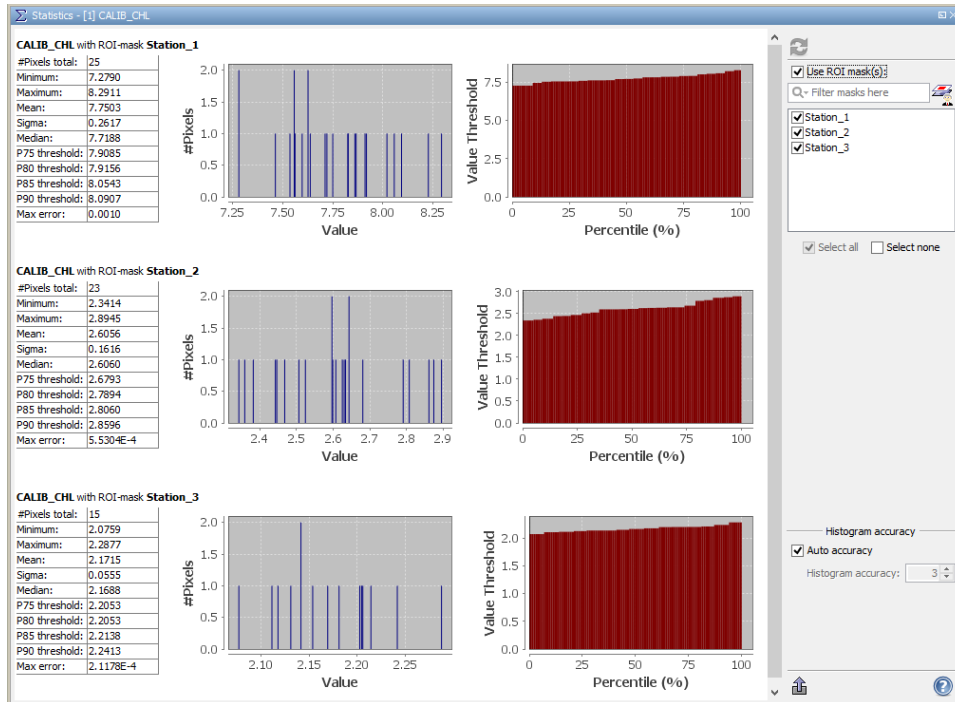


Figure 1 Statistics tool window showing Chl statistics computed for sample ROIs provided.

## Part 3

- What's the worst year for each sub-basin? What's the WFD class for that year?

The worst year for each ROI, in terms of Chl concentration is reported in Tab. 1.

Table 1 Maximum values extracted in each Lake Vänern ROI, parted in humic and non-humic, and corresponding WFD classification.

ROI	Year	Chl	Humic	WFD class
Arasviken	2005	6.44	No	G
Arnofjorden	2003	13.71	Yes	M/P/B
Asfjorden	2004	3.73	No	H
Borstorpsviken	2003	11.19	Yes	M/P/B
Brandsfjorden	2007	12.16	Yes	M/P/B
Dalbosj_Amal	2004	2.86	Yes	H
Dalbosjon Pelagic	2008	2.99	No	H
Dalbosjon Coastal	2007	5.83	No	G
Gatebolsviken	2010	5.34	No	G
Hagelviken	2007	8.46	No	G
Hammarosjon	2004	4.32	No	H

Kattfjorden	2002	3.48	No	H
Kavelstocken	2008	15.08	Yes	M/P/B
Lunnerviken	2007	10.10	No	M/P/B
Mariestadssjön	2003	7.99	Yes	G
Olmeviken	2006	15.40	Yes	M/P/B
Satterholmsfj	2007	3.46	No	H
Sjorasviken	2010	11.56	Yes	M/P/B
Ullesund	2005	13.70	Yes	M/P/B
Värmlandssjön Coastal	2007	3.60	No	H
Värmlandssjön Pelagic	2007	3.04	No	H
Varnumsviken	2006	12.03	Yes	M/P/B

- Calculate Chl average values on the whole period for each ROIs: where 'Good' sub-basin are located?

As reported in Tab. 2 Arnofjorden, Brandsfjorden, Kavelstocken, Lunnerviken, Mariestadssjön, Sjorasviken, Ullesund, Varnumsviken ROIs can be classified as 'Good'. All these ROIs are located in coastal areas.

*Table 2 Chl average values calculated on all extracted values in each Lake Vänern ROI, parted in humic and non-humic, and corresponding WFD classification.*

ROI	Chl	Humic	WFD class
Arasviken	4.26	No	H
Arnofjorden	8.96	Yes	G
Asfjorden	3.33	No	H
Borstorpsviken	5.33	Yes	H
Brandsfjorden	10.00	Yes	G
Dalbosj_Amal	2.62	Yes	H
Dalbosjön Pelagic	2.69	No	H
Dalbosjön Coastal	4.87	No	H
Gatebolsviken	3.67	No	H
Hagelviken	4.42	No	H
Hammarosjön	2.82	No	H
Kattfjorden	3.00	No	H
Kavelstocken	6.75	Yes	G
Lunnerviken	7.66	No	G
Mariestadssjön	6.56	Yes	G
Olmeviken	9.68	Yes	G
Satterholmsfj	3.05	No	H
Sjorasviken	7.03	Yes	G
Ullesund	8.84	Yes	G
Värmlandssjön Coastal	3.08	No	H
Värmlandssjön Pelagic	2.66	No	H
Varnumsviken	7.61	Yes	G

- What class was the most frequent in humic and in non-humic stations?

As shown in Fig. 2, the most frequent class for both humic and non-humic stations was the 'High' class.

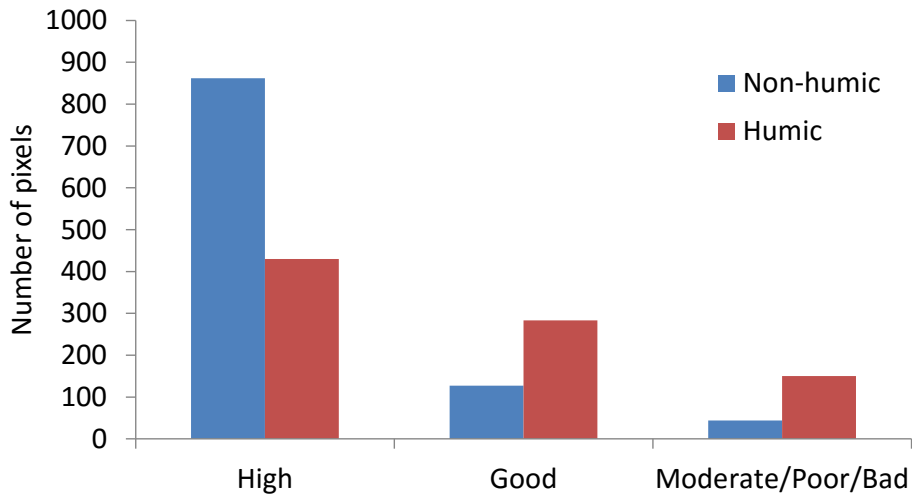


Figure 2 WFD class frequency in humic and non-humic stations in Lake Vänern.

- Are the classification results obtained through remote sensing techniques and *in situ* measurements comparable?

As shown in Tab. 3, the results are comparable but some differences can be noticed for stations Mariestadsviken1 and Mariestadsviken2 where Good and High are interchanged. Only in 2004 Mariestadsviken2 station has been classified as 'Moderate/Poor/Bad' ('Good' considering *in situ* measurements).

Table 3 WFD classification obtained through remote sensing products and *in situ* measurements, for each year and station in Lake Vänern.

Station	YEAR	WFD class - Remote Sensing	WFD class - <i>in situ</i>
Dagskärsgrund	2003	High	High
Dagskärsgrund	2004	High	High
Dagskärsgrund	2005	High	High
Dagskärsgrund	2006	High	High
Dagskärsgrund	2007	High	High
Dagskärsgrund	2008	High	High
Dagskärsgrund	2009	High	High
Dagskärsgrund	2010	High	High
Dagskärsgrund	2011	High	High
Mariestadsviken1	2002	Good	Good
Mariestadsviken1	2003	High	High
Mariestadsviken1	2004	Good	High
Mariestadsviken1	2005	High	High
Mariestadsviken1	2006	Good	High
Mariestadsviken1	2007	Good	High

Mariestadsviken1	2008	High	High
Mariestadsviken1	2009	High	High
Mariestadsviken1	2010	High	Good
Mariestadsviken1	2011	Good	High
Mariestadsviken2	2002	High	High
Mariestadsviken2	2003	Good	Good
Mariestadsviken2	2004	Moderate/Poor/Bad	Good
Mariestadsviken2	2005	High	High
Mariestadsviken2	2006	Good	Good
Mariestadsviken2	2007	Good	Good
Mariestadsviken2	2008	Good	High
Mariestadsviken2	2009	Good	Good
Mariestadsviken2	2010	High	High
Mariestadsviken2	2011	Good	Good
Megrundet	2003	High	High
Megrundet	2004	High	High
Megrundet	2005	High	High
Megrundet	2006	High	High
Megrundet	2007	High	High
Megrundet	2008	High	High
Megrundet	2009	High	High
Megrundet	2010	High	High
Megrundet	2011	High	High
Tärnan	2003	High	High
Tärnan	2004	High	High
Tärnan	2005	High	High
Tärnan	2006	High	High
Tärnan	2007	High	High
Tärnan	2008	High	High
Tärnan	2009	High	High
Tärnan	2010	High	High
Tärnan	2011	High	High