

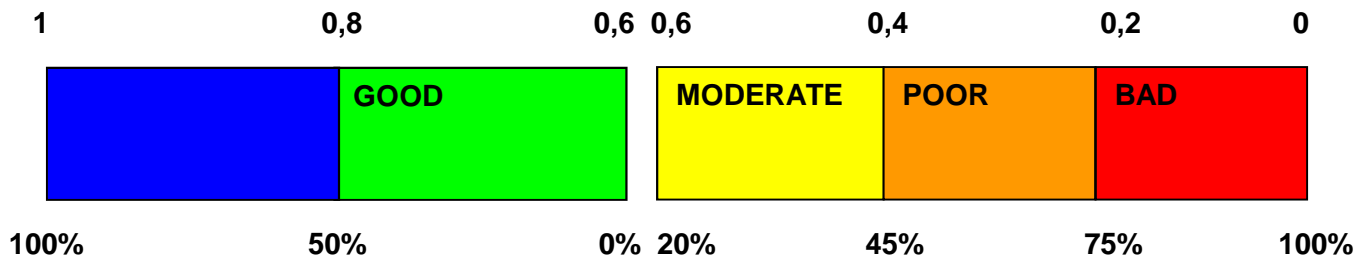
# Overview WFD phytobenthos EQR Rivers Flanders (EQR VL) Belgium (BE)

Luc Denys  
Phytobenthos intercalibration  
CB Rivers  
Paris - 22-2-2006

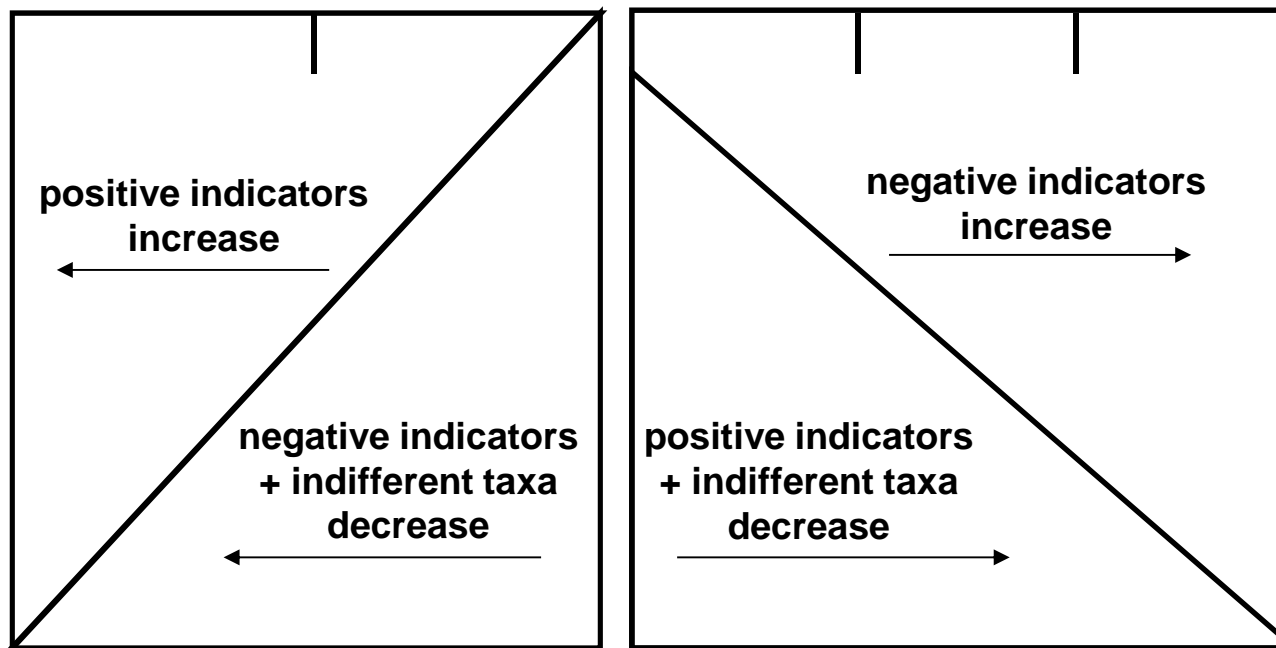
- principle
- relations to impact variables
- boundary setting
- results

# EQR Flanders – general principle

EQR



RELATIVE ABUNDANCE (no averaging!)



So far only for: lowland brooks in the Campine region (kbK) – excl. acid headwaters  
lowland rivulets in the Campine region (gbK)  
lowland brooks elsewhere (kb)  
(and all lake types)

## **characteristics\***

- integration of hydrochemical pressures (nutrient enrichment + organic pollution + salinisation + acidification); not for biomonitoring individual effects\*\*
- type specific
- reflects change in species composition as required by WFD – not in weighted generalized attributes (which are not fine-tuned to water type, imply loss of information and do not give a complete picture of distance-to-target, as such)
- uses relative abundance
- maximizes impact signal

\* this method is based on and related to the Dutch assessment method (see van den Berg et al. 2004; van der Molen et al. 2004)

\*\* additionally % deformed valves is used to signal possible effects of micropollutants, but not included in EQR

## Positive and negative indicators

Selection:

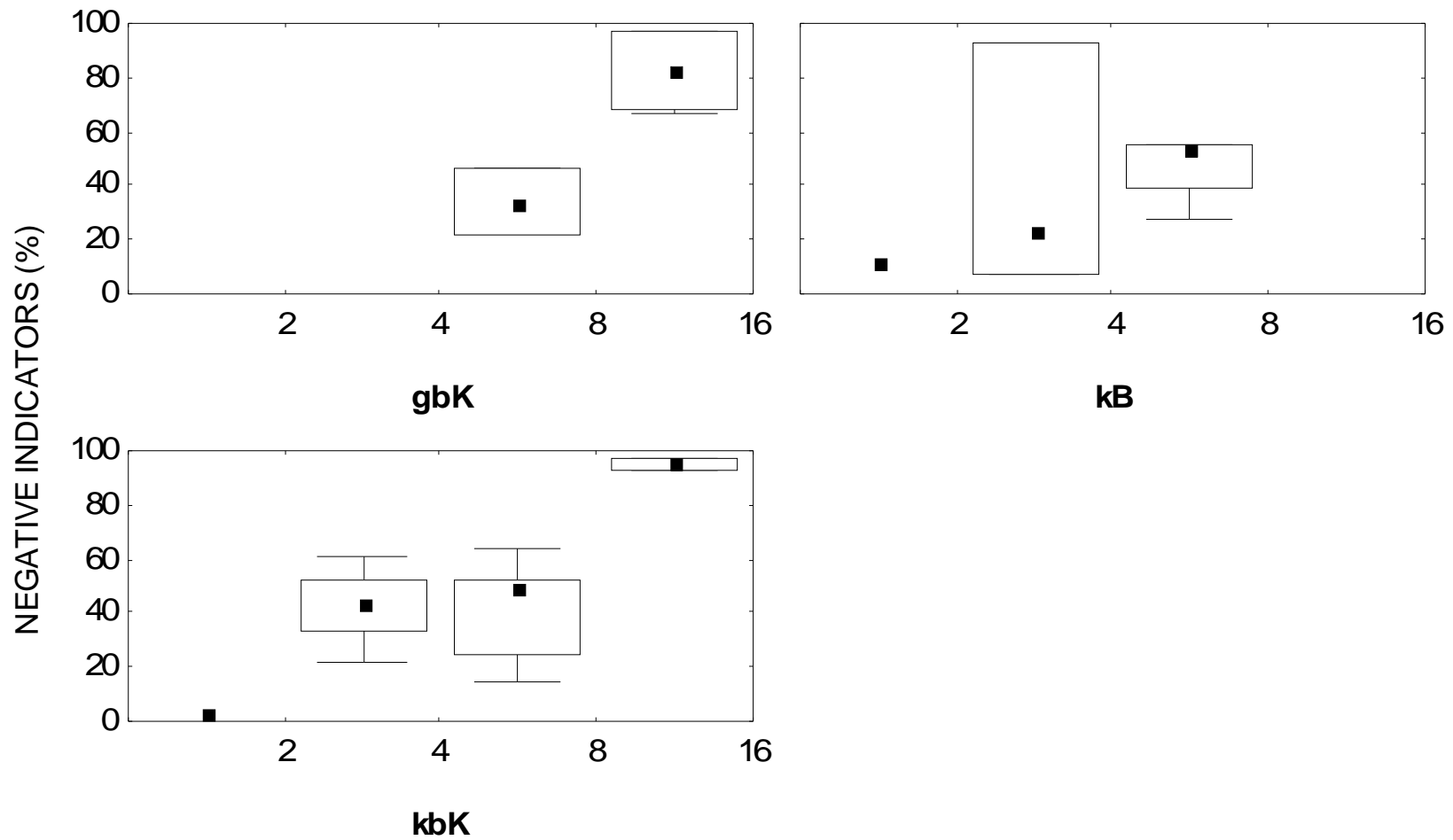
- DCCA constrained to BOD<sub>5</sub>, NH<sub>4</sub> or ortho-P: 20% taxa with lowest and highest score and  $N_2 > 10$ th percentile
- IPS value  $\geq 3.4$  (positive) or  $\leq 2$  (negative)
- literature data and listing in existing assessment methods
- judgment-based final screening

numbers:

type	kbK	gbK	kb
positive taxa	206	259	233
negative taxa	126	104	107

e.g., *Achnanthydium minutissimum* s.s. is a positive indicator for gbK, only;  
*Psammothidium oblongellum* is a positive indicator for all types;  
*Nitzschia paleaeformis* and *Ulnaria ulna* are negative indicators for kbK;  
*Fragilaria fasciculata* and *Luticola goeppertiana* are negative indicators for all types

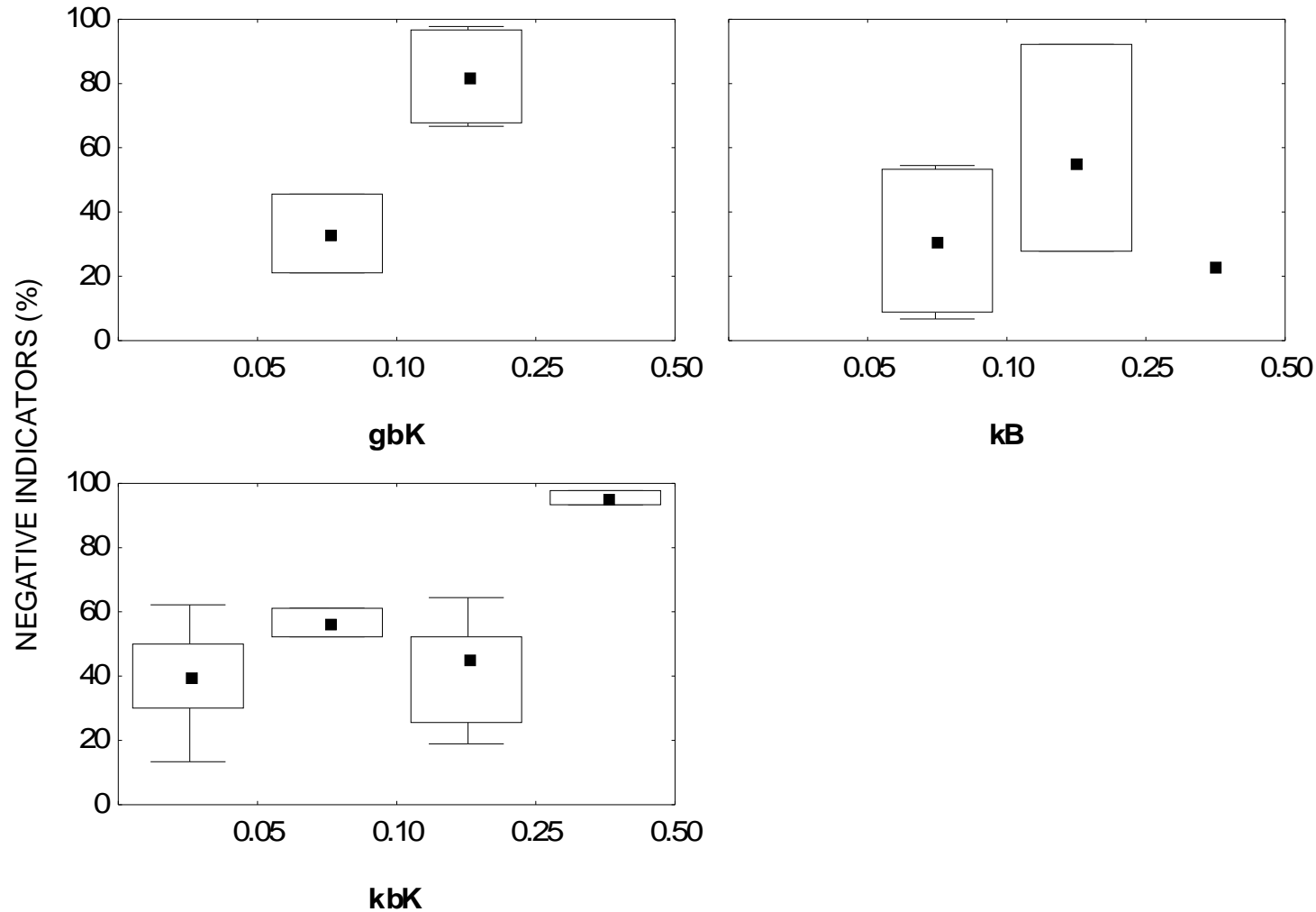
## Relations % negative group



BOD (average; mg l<sup>-1</sup>)

% negative indicators vs. BOD (median, 10- and 90-percentile, 25 and 75-percentile) for gbK (N = 6), kb (N = 8) en kbK (N = 41).

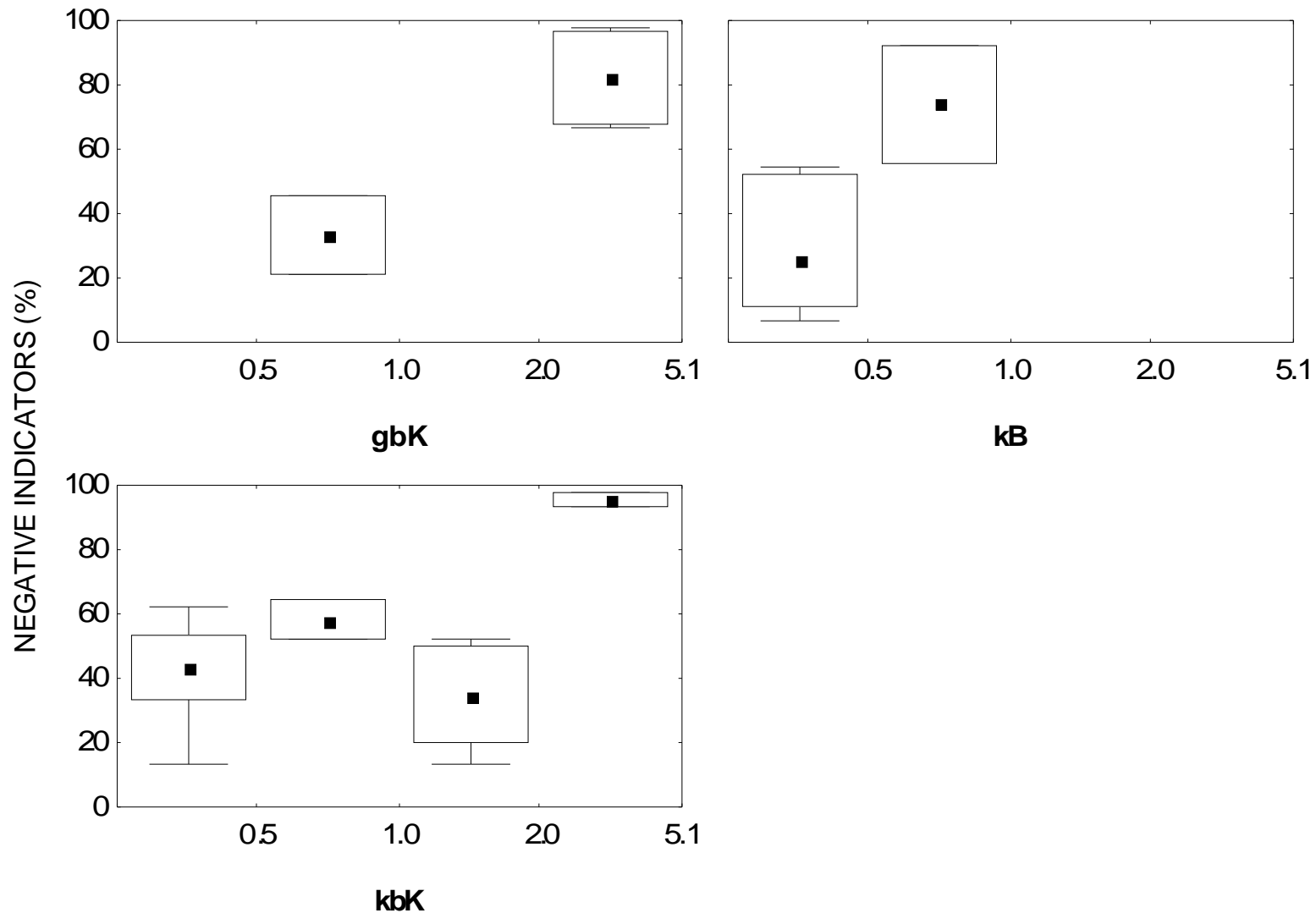
## Relations % negative group



ortho-P (average; mg l<sup>-1</sup>)

% negative indicators vs. ortho-P (median, range, 10- and 90-percentile, box 25- and 75-percentile) for gbK (N = 6), kb (N = 8) en kbK (N = 41).

## Relations % negative group



NH<sub>4</sub>-N (average; mg l<sup>-1</sup>)

% negative indicators vs. NH<sub>4</sub>-N (median, range, 10- and 90-percentile, box 25- and 75-percentile) for gbK (N = 6), kb (N = 8) en kbK (N = 41).

## Relations % negative group

	% neg.	IPS	SLA	DESCY	L&M	GENUS	CEE	SHE-TI	WAT	IDAP	TDI	IBD	ROTT-TI	EPI-D
NO <sub>2</sub>	0,38	-0,2	-0,31	-0,31	-0,27	0,12	-0,27	-0,4	-0,03	-0,27	0,33	-0,16	-0,31	-0,28
PO <sub>4</sub>	0,39	-0,37	-0,30	-0,1	-0,25	-0,21	-0,38	-0,46	-0,12	-0,32	0,55	-0,51	-0,56	-0,41
Cl	0,33	-0,26	-0,40	-0,5	-0,52	0,20	-0,31	-0,21	-0,09	-0,38	0,09	-0,08	-0,20	-0,24
SO <sub>4</sub>	-0,09	0,13	-0,02	-0,05	0,16	-0,18	0,21	0,07	0,28	0,12	-0,08	0,07	-0,13	0,19
NO <sub>3</sub>	0,02	0,18	0,06	0,12	0,12	0,08	0,19	-0,01	0,15	0,15	0,31	-0,09	-0,15	-0,19
NH <sub>4</sub>	0,29	-0,26	-0,18	-0,34	-0,19	0,14	-0,27	-0,34	0,14	-0,22	0,03	-0,03	-0,15	0,06
EC	0,27	-0,23	-0,35	0,06	-0,38	-0,21	-0,18	-0,20	-0,17	-0,10	0,56	-0,54	-0,48	-0,54
pH	0,17	-0,14	-0,23	0,25	-0,23	-0,35	-0,12	-0,13	-0,44	-0,13	0,55	-0,52	-0,42	-0,61
BOD	0,41	-0,39	-0,36	-0,37	-0,45	0	-0,50	-0,38	-0,15	-0,37	0,33	-0,36	-0,35	-0,36

Spearman-rank correlation % negative group for types kb and kbK (N = 49; p ≤ 0,5 in het red).

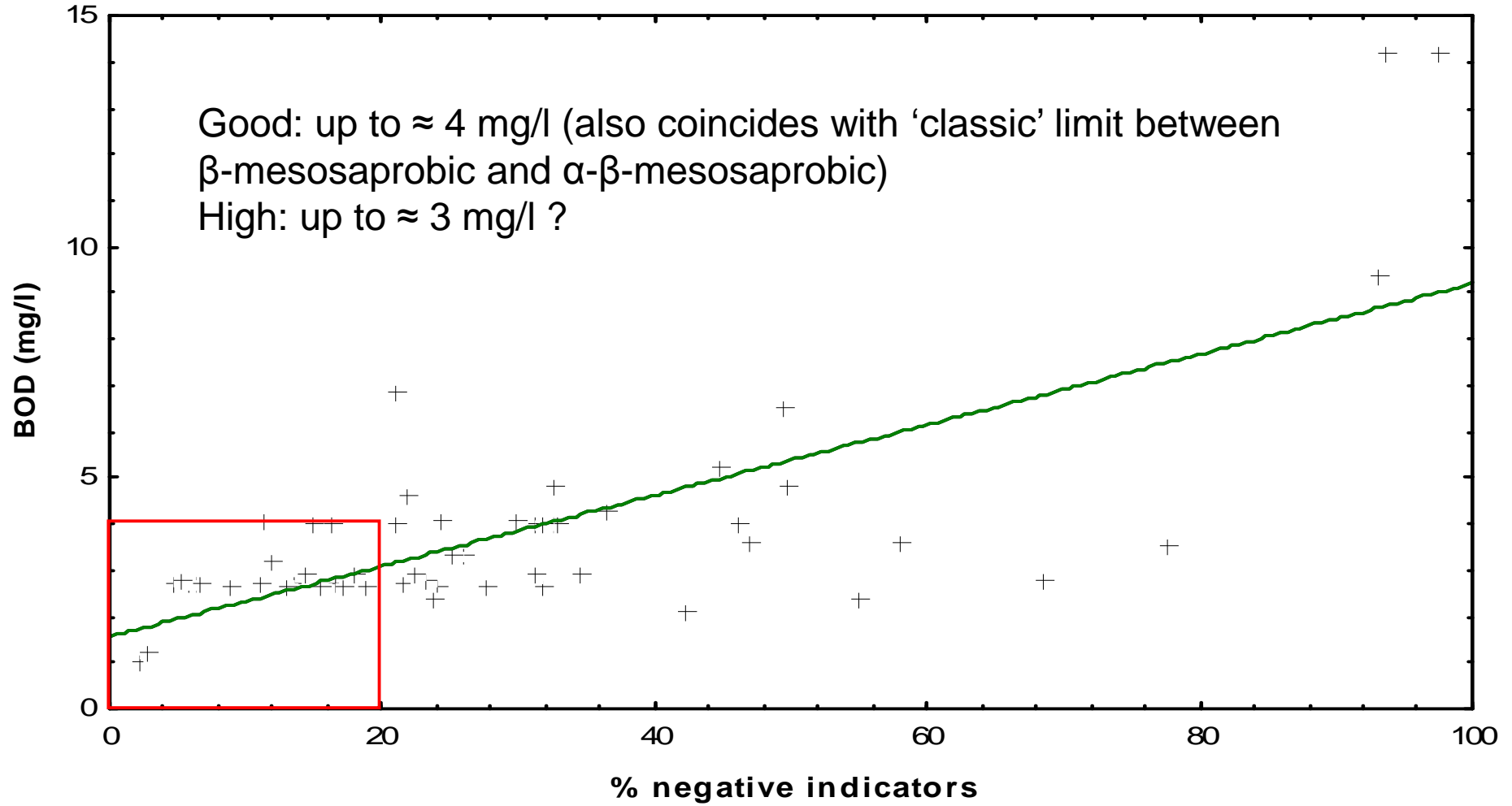


## Relations % negative group

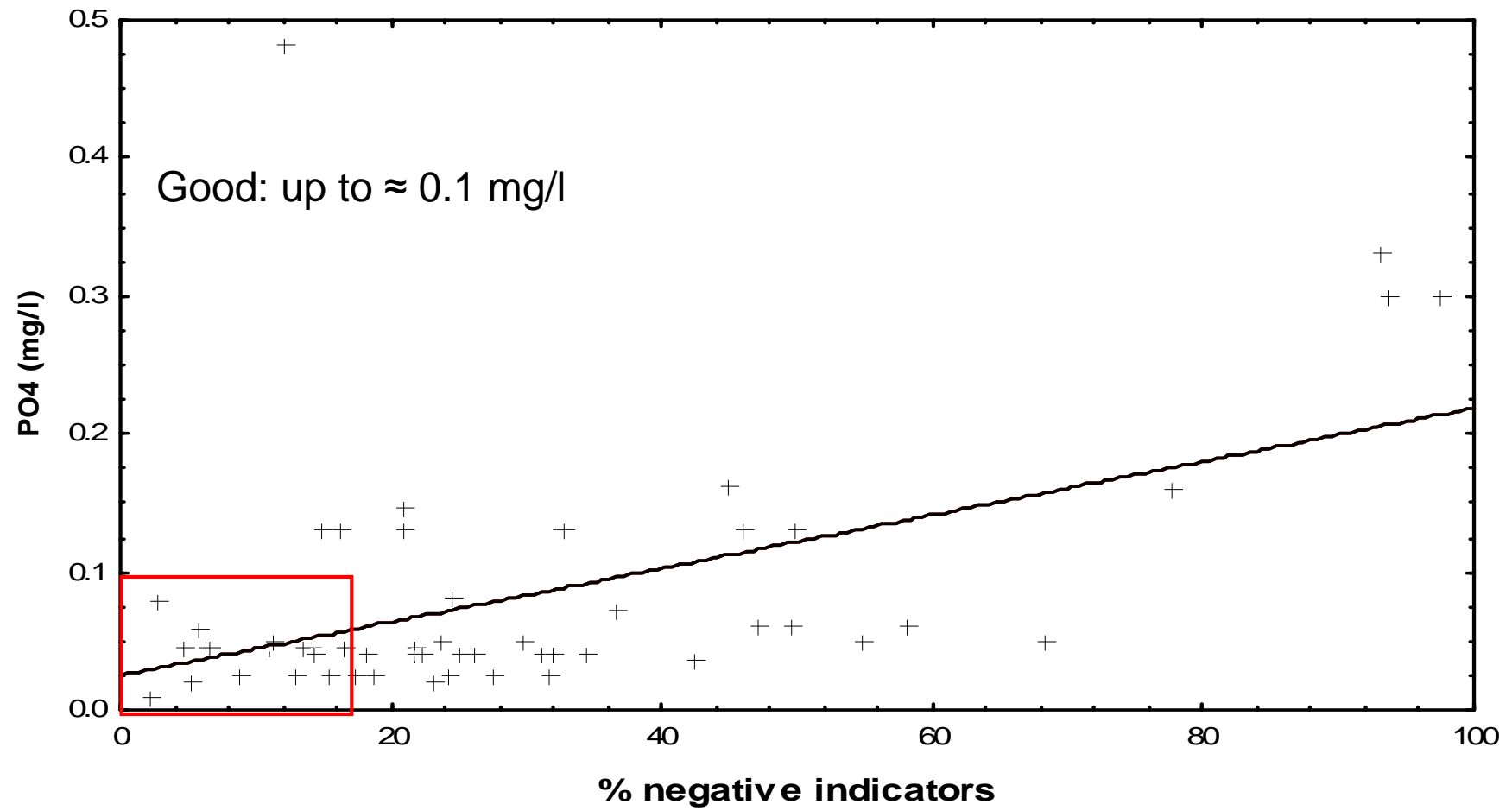
	% neg.	IPS	SLA	DESCY	L&M	GENUS	CEE	SHE-TI	WAT	IDAP	TDI	IBD	ROTT-TI	EPI-D
NO <sub>2</sub>	0,48	-0,27	-0,31	-0,53	-0,38	0,06	-0,38	-0,47	-0,06	-0,35	0,36	-0,21	-0,40	-0,33
PO <sub>4</sub>	0,51	-0,44	-0,30	-0,43	-0,31	-0,13	-0,52	-0,58	-0,14	-0,54	0,46	-0,40	-0,55	-0,33
Cl	0,46	-0,38	-0,51	-0,47	-0,67	0,05	-0,41	-0,30	-0,23	-0,41	0,37	-0,36	-0,37	-0,53
SO <sub>4</sub>	0,08	-0,03	-0,03	-0,20	0,05	-0,22	0,05	-0,06	0,19	0,04	-0,13	0,07	-0,14	0,17
NO <sub>3</sub>	0,30	-0,02	-0,01	-0,27	-0,15	0,23	-0,01	-0,19	-0,01	-0,06	0,13	0	-0,13	-0,24
NH <sub>4</sub>	0,25	-0,30	-0,16	-0,43	-0,19	-0,04	-0,31	-0,33	0,21	-0,25	0,10	-0,15	-0,30	0,03
EC	0,47	-0,36	-0,52	-0,40	-0,63	0,01	-0,32	-0,33	-0,22	-0,39	0,42	-0,41	-0,44	-0,50
pH	0,38	-0,28	-0,34	-0,04	-0,44	-0,15	-0,26	-0,26	-0,63	-0,38	0,44	-0,42	-0,35	-0,63
BOD	0,35	-0,32	-0,31	-0,48	-0,36	0,09	-0,50	-0,34	-0,04	-0,43	0,38	-0,32	-0,29	-0,25

Spearman-rank correlation % negative group for type kbK (N = 41; p ≤ 0,5 in het red).

## Boundaries?



## Boundaries?



## **PRELIMINARY BOUNDARIES**

<b>EQR</b>	<b>Values</b>	<b>types kb, kbK en gbK</b>
	<b>reference</b>	<b>≥ 75 % pos.</b>
<b>0,8</b>	<b>high-good</b>	<b>≥ 50 % pos.</b>
<b>0,6</b>	<b>good-moderate</b>	<b>≤ 20 % neg.</b>
<b>0,4</b>	<b>moderate-poor</b>	<b>≤ 45 % neg.</b>
<b>0,2</b>	<b>poor-bad</b>	<b>≤ 75 % neg.</b>

More data needed!

calculation:

**if % negative indicators > boundary G/M:**

$$EKR = EKR_a + \frac{(x - a)}{(b - a)} * 0,2$$

**if % negative indicators < boundary G/M:**

$$EKR = EKR_a + \frac{(y - a)}{(b - a)} * 0,2$$

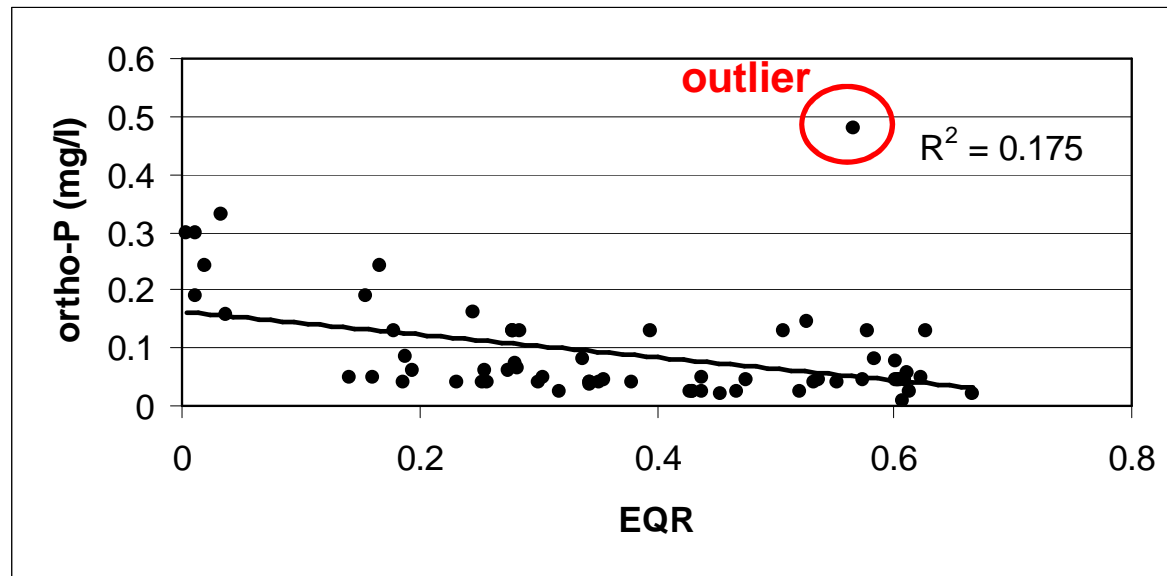
x = % negative indicators

y = % positive indicators

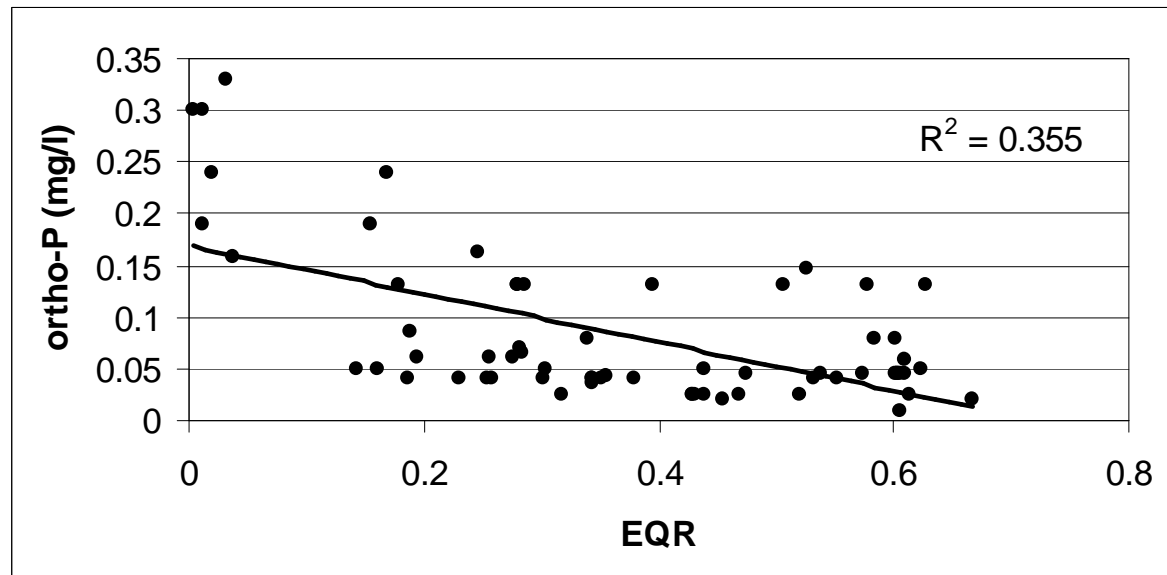
a = lower class limit

b = upper class limit

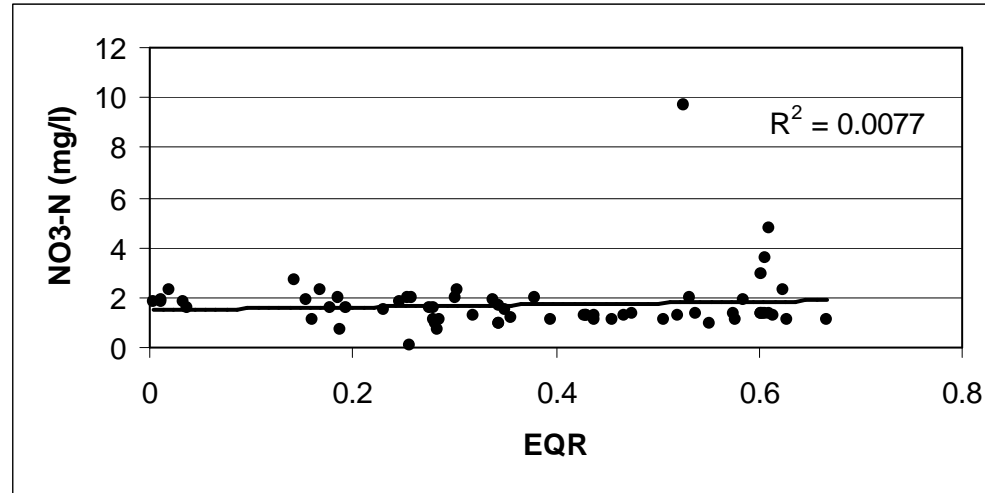
## Relation EQR to ortho-P (kbK+gbK+kb; N=66)



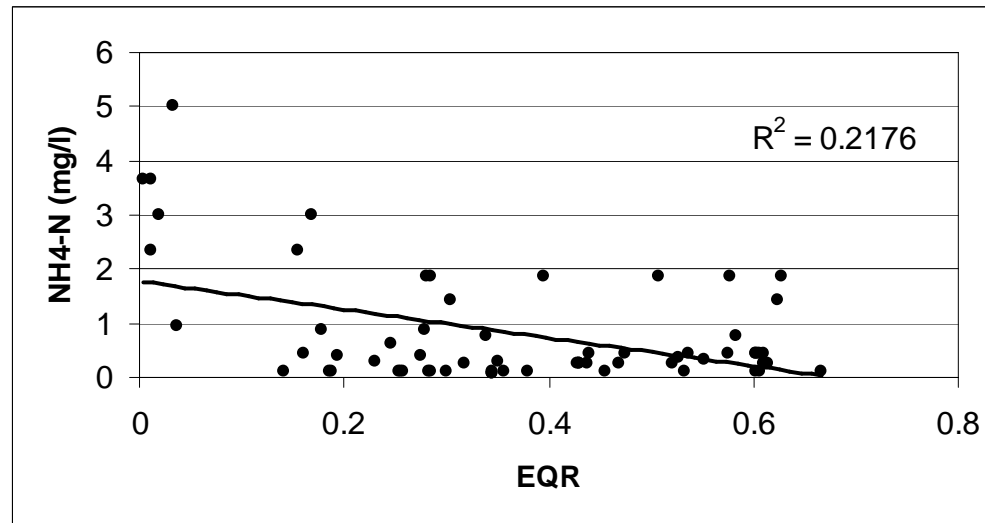
1 outlier excluded...



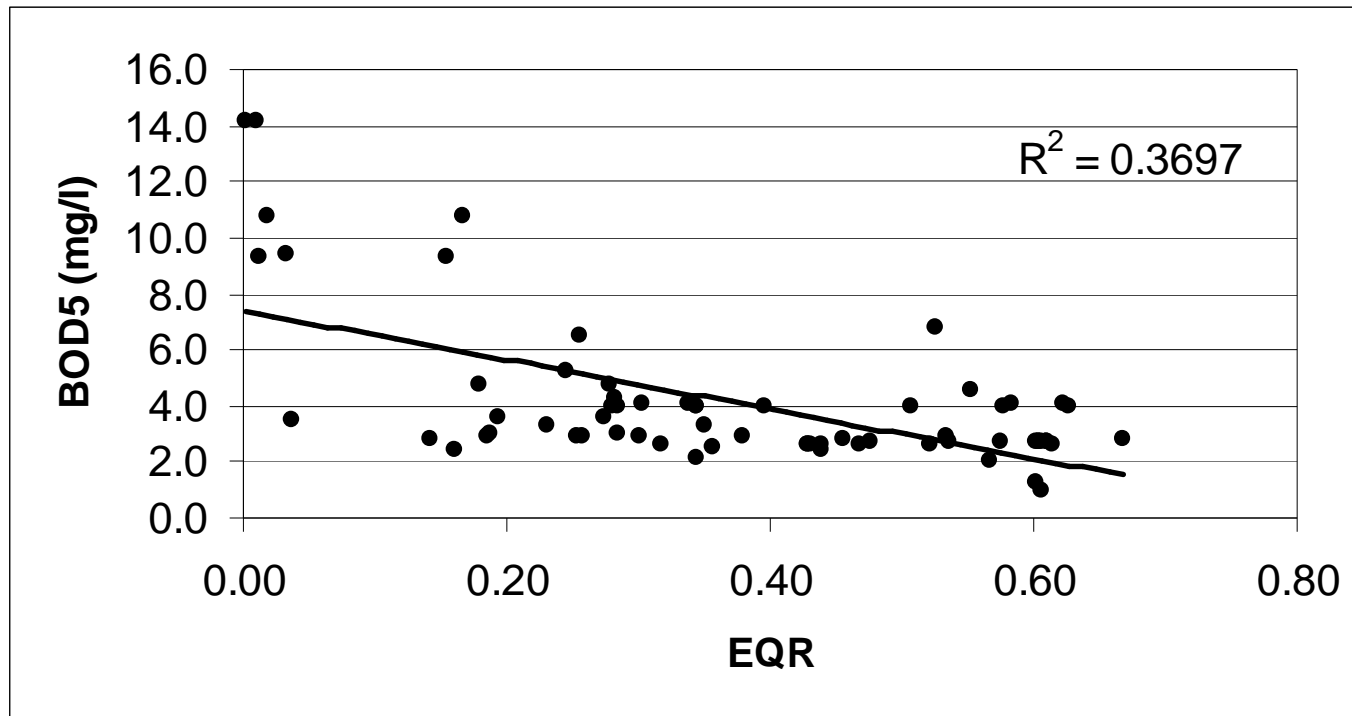
### Relation EQR to nitrate-N (kbK+gbK+kb; N=66)



### Relation EQR to ammonium-N (kbK+gbK+kb; N=66)



### Relation EQR to BOD<sub>5</sub> (kbK+gbK+kb; N=66)



## Results intercalibration sites (sites official register in bold)

	type VL	% neg.	% pos.	EQR VL	IBD	IPS	SLAD	TDI	% tolerant taxa
WB1	kbK	45,6	-	0,40	13,7	12,5	13,2	68,0	33
WB2	kbK	3,2	1,6	0,61	17,7	19,2	15,1	27,2	2,4
VB	kb	55,4	-	0,33	13,1	12,2	11,2	74,7	57,6
TB	kb	11	0,6	0,60	12,1	15,8	13,5	85,8	14,8
BS2	kb	54,4	-	0,34	12,3	10,7	12,7	65,9	55,6
KN2	kbK	51,8	-	0,35	11,0	10,0	11,2	64,4	28
BE	kb	23,4	-	0,57	12,1	14,1	11,9	83,1	19,2
VE	kb	6,6	2,6	0,61	11,2	14,7	13,2	95,8	8,4
BB	kbK	71,6	-	0,22	12,8	11,8	13,3	90,0	23
IJS1	kb	92,6	-	0,06	10,7	8,9	11,6	88,4	69
IJS2	kb	27,4	-	0,54	11,0	13,3	12,4	87,8	15
KN1	gbK	44,4	-	0,40	12,4	8,2	11,9	58,3	31,6
GN1	gbK	62,4	-	0,28	9,3	9,4	13,9	69,8	65,6
GN2	gbK	51,6	-	0,36	13,7	11,6	12,2	54,3	32,8

note lowest IPS at good status: 14.7, highest IPS at moderate status 14.1



## Comparison EQRs DL (Germany) – NL (Netherlands) – VL (Flanders)

site			Typ DL	EQR (DL)	Type NL	EQR (NL)	Type VL	EQR (VL)
Warmbeek 1	WB1	C1	D_11	*	R5	0,47	kbK	0,40
Warmbeek 2	WB2	C1	D_11	*	R5	1,00	kbK	0,61
Verrebeek	VB	C1	D_9	0,26	R5	0,45	kb	0,33
Terkleppebeek	TB	C1	D_9	0,26	R5	1,00	kb	0,60
Burggravestroom 1	BS1	C1	D_9	0,32	R5	0,68	gb	*
Brugggravestroom 2	BS2	C1	D_9	0,28	R5	0,45	kb	0,34
Kleine Nete 1	KN1	C4	D_11	*	R6	0,48	gbK	0,40
Kleine Nete 2	KN2	C1	D_11	*	R5	0,57	kbK	0,35
Berwijn	BE	C4	D_9	0,36	R5	1,00	kb	0,57
Veurs	VE	C1	D_9	0,45	R5	0,98	kb	0,61
Bosbeek	BB	C1	D_11	*	R5	0,18	kbK	0,22
IJsse 1	IJS1	C1	D_9	0,24	R5	0,17	kb	0,06
IJsse 2	IJS2	C1	D_9	0,36	R5	0,74	kb	0,54
Laan	LA	C4	D_9	0,31	I1	0,74	gb	*
Grote Nete 1	GN1	C4	D_11	*	R4	1,00	gbK	0,28
Grote Nete 2	GN2	C4	D_11	*	R5	0,44	gbK	0,36
IJzer 1	IJZ1	C4	D_9	0,20	R6	0,40	gr	*
IJzer 2	IJZ2	C4	D_9	0,13	R7	0,49	gr	*
Grensmaas 1	GM1	>C5	D_10	0,54	R16	0,80	zgr	*
Grensmaas 2	GM2	>C5	D_10	0,60	R16	0,74	zgr	*

## Dia 17

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I1

r5 of r15?  
luc\_denys, 17/02/2006