



## DATA QUALITY AND SUMMARY STATISTICS

## FLUME DATA

## Annual Report 2015

*This report complements the data available on the data portal and is designed to help users by giving an overview of the quality and key statistics of the flume data.*

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## 1 15 MINUTE DATA

- Catchments arranged from largest to smallest across tables (left to right) for each farmlet.
- Where PLC switch = 0, this refers to timesteps when flume flow was <0.2 l/s (flow conditions not met) and so the pump is not activated to fill the by-pass flow cell. Therefore, flume data are considered invalid and are classified as missing values ('NA') in the quality control process.
- Where PLC switch = 1, flume flow is >0.2 l/s (flow conditions met) and so the pump is activated to fill the by-pass flow cell.
- For further explanation, refer to Sections 3.3 & 7.1.2 in the 'User Guide to 15 Minute Data' (FP\_UG.Doc.002\_15MinData) available on the Farm Platform website: <http://resources.rothamsted.ac.uk/farm-platform-national-capability/data-portal-guides-and-information>

### 1.1 Counts of PLC switch settings

Variable	Catchment Number														
	Green					Blue					Red				
	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
PLC Switch = NA (missing)	48	2422	2200	1891	3037	0	88	11478	101	1	1	0	2590	101	119
PLC Switch = 0 (no flow)	18082	22020	22232	31869	29171	23631	24959	15938	31785	30517	25349	21251	17104	31133	25291
PLC Switch = 1 (flow)	16909	10597	10607	1279	2831	11408	9992	7623	3153	4521	9689	13788	15345	3805	9629

Table 1: Counts of PLC switch settings - missing data, no flow, flow

### 1.2 Zero values

Variable	Catchment Number															
	Green					Blue					Red					
	units	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Flow	l/s	25205	30343	31933	32828	31375	32188	31266	22109	34495	33855	30467	30525	27784	34328	33806
Nitrate+nitrite	mg/l	795	184	978	717	712	389	2762	389	44	2215	2234	820	2825	31	514
Ammonia	mg/l	13955	10127	10415	1173	2823	11391	9897	7495	3033	4440	9580	13689	15205	3797	9556
Ammonium	mg/l	13944	10031	10372	1202	2797	11385	9554	7421	2996	4437	8824	13616	15156	3787	9068
Conductivity	uS/cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved oxygen	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pH	unitless	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flow cell water temperature	°C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turbidity	FNU	1984	763	400	0	0	507	33	61	42	83	223	524	2227	27	1154
Total phosphorus	mg/l	NA	8216	NA	NA	NA	NA	7940	NA	NA	NA	11052	NA	NA	NA	NA
Dissolved organic matter	ug/l QSU	NA														
Ortho-phosphorus	mg/l	NA														

Table 2: Number of zero values (out of 35039)

## 1.3 Missing values

### 1.3.1 Total number of missing values

Variable	Catchment Number														
	Green					Blue					Red				
	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Flow	1986	2	1427	1894	3039	1	92	11558	2	116	1112	6	141	221	5
Nitrate+nitrite	20140	24565	24913	33787	32262	23994	26055	28014	31922	30595	25458	21466	20512	31289	25757
Ammonia	21084	24912	24624	33866	32216	23648	25141	27544	32006	30599	25459	21350	19834	31242	25483
Ammonium	21084	24912	24622	33762	32216	23648	25141	27542	32006	30600	25459	21350	19834	31242	25484
Conductivity	18237	24912	24623	33761	32216	23649	25142	27554	32007	30883	25460	21351	19836	31243	25485
Dissolved oxygen	21012	24912	24624	33865	32216	23648	25141	27544	32006	30599	25459	21351	19836	31243	25483
pH	18235	24912	24622	33762	32216	23648	25141	27542	32006	30599	25459	21350	19834	31242	25483
Flow cell water temperature	18235	24912	24622	33761	32216	23648	25141	27542	32006	30599	25459	21350	19834	31242	25483
Turbidity	21119	24913	24637	33986	32216	23730	25144	29640	32084	30607	25484	21917	19963	31326	25958
Total phosphorus	35039	26823	35039	35039	35039	35039	27099	35039	35039	35039	23987	35039	35039	35039	35039
Dissolved organic matter	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039
Ortho-phosphorus	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039

Table 3: Total number of missing values (out of 35039)

### 1.3.2 Total number of missing values as a percentage

Variable	Catchment Number														
	Green					Blue					Red				
	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Flow	6	0	4	5	9	0	0	33	0	0	3	0	0	1	0
PLC Switch	0	7	6	5	9	0	0	33	0	0	0	0	7	0	0
Nitrate+nitrite	57	70	71	96	92	68	74	80	91	87	73	61	59	89	74
Ammonia	60	71	70	97	92	67	72	79	91	87	73	61	57	89	73
Ammonium	60	71	70	96	92	67	72	79	91	87	73	61	57	89	73
Conductivity	52	71	70	96	92	67	72	79	91	88	73	61	57	89	73
Dissolved oxygen	60	71	70	97	92	67	72	79	91	87	73	61	57	89	73
pH	52	71	70	96	92	67	72	79	91	87	73	61	57	89	73
Flow cell water temperature	52	71	70	96	92	67	72	79	91	87	73	61	57	89	73
Turbidity	60	71	70	97	92	68	72	85	92	87	73	63	57	89	74
Total phosphorus	100	77	100	100	100	100	77	100	100	100	68	100	100	100	100
Dissolved organic matter	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Ortho-phosphorus	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 4: Total number of missing values as a percentage

**1.3.3 Total number of missing values when PLC switch = 1**

Variable	Catchment Number														
	Green					Blue					Red				
	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Flow	21	2	2	0	1	1	4	60	1	1	37	3	2	120	1
Nitrate+nitrite	2010	123	481	27	54	363	1008	598	36	77	108	215	818	55	347
Ammonia	2954	470	192	106	8	17	94	128	120	81	109	99	140	8	73
Ammonium	2954	470	190	2	8	17	94	126	120	82	109	99	140	8	74
Conductivity	107	470	191	1	8	18	95	138	121	365	110	100	142	9	75
Dissolved oxygen	2882	470	192	105	8	17	94	128	120	81	109	100	142	9	73
pH	105	470	190	2	8	17	94	126	120	81	109	99	140	8	73
Flow cell water temperature	105	470	190	1	8	17	94	126	120	81	109	99	140	8	73
Turbidity	2989	471	205	226	8	99	97	2224	198	89	134	666	269	92	548
Dissolved organic matter	16909	10597	10607	1279	2831	11408	9992	7623	3153	4521	9689	13788	15345	3805	9629
Ortho-phosphorus	16909	10597	10607	1279	2831	11408	9992	7623	3153	4521	9689	13788	15345	3805	9629

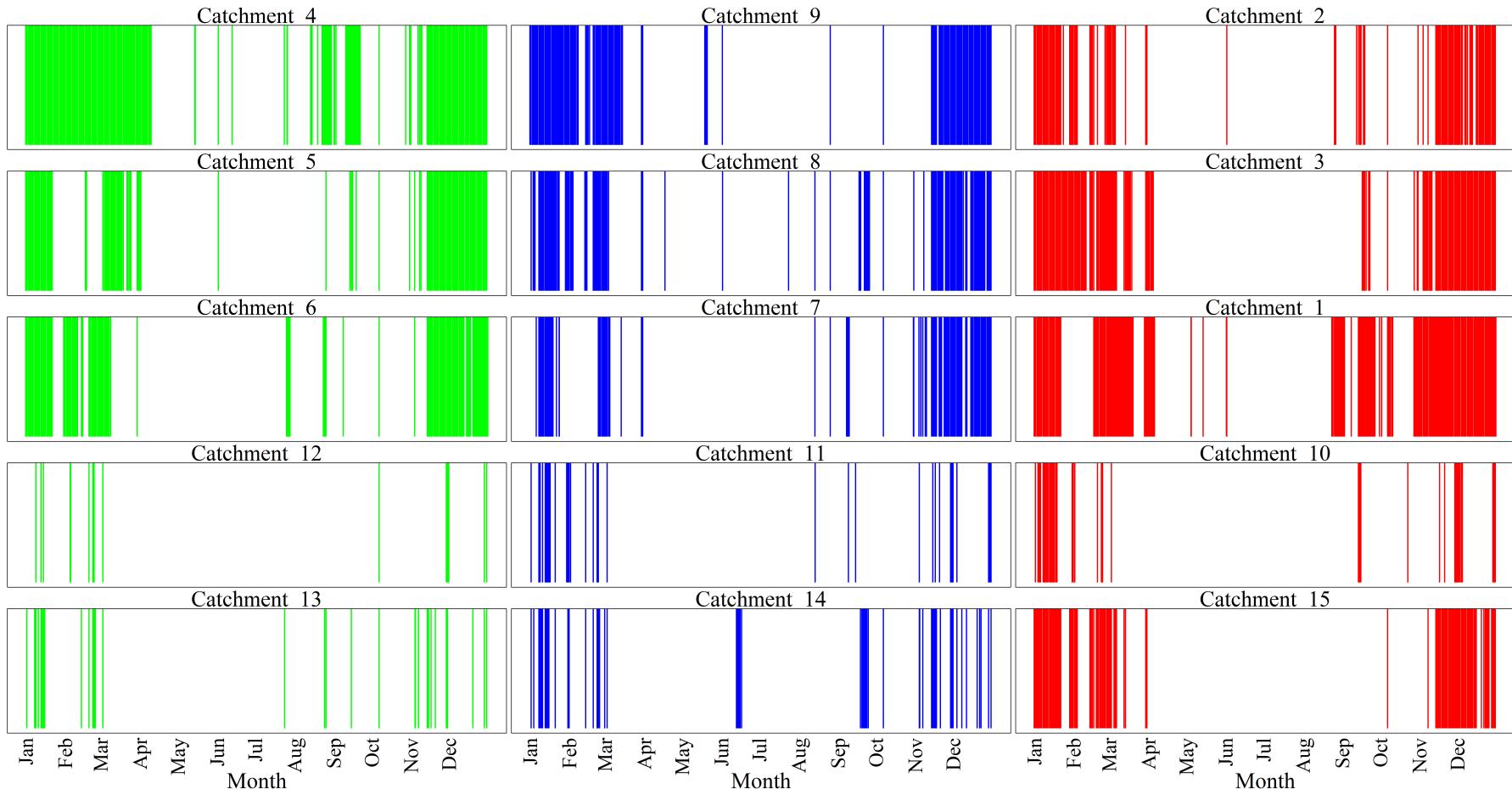
**Table 5:** Total number of missing values when PLC switch = 1 (flow >0.2 l/s)**1.3.4 Total number of measured values in flume data as a percentage of possible values when PLC switch = 1**

Variable	Catchment Number														
	Green					Blue					Red				
	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Flow	195	331	317	2591	1130	307	350	308	1111	772	350	254	227	915	364
Nitrate+nitrite	88	99	95	98	98	97	90	92	99	98	99	98	95	99	96
Ammonia	83	96	98	92	100	100	99	98	96	98	99	99	99	100	99
Ammonium	83	96	98	100	100	100	99	98	96	98	99	99	99	100	99
Conductivity	99	96	98	100	100	100	99	98	96	92	99	99	99	100	99
Dissolved oxygen	83	96	98	92	100	100	99	98	96	98	99	99	99	100	99
pH	99	96	98	100	100	100	99	98	96	98	99	99	99	100	99
Flow cell water temperature	99	96	98	100	100	100	99	98	96	98	99	99	99	100	99
Turbidity	82	96	98	82	100	99	99	71	94	98	99	95	98	98	94
Dissolved organic matter	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho-phosphorus	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

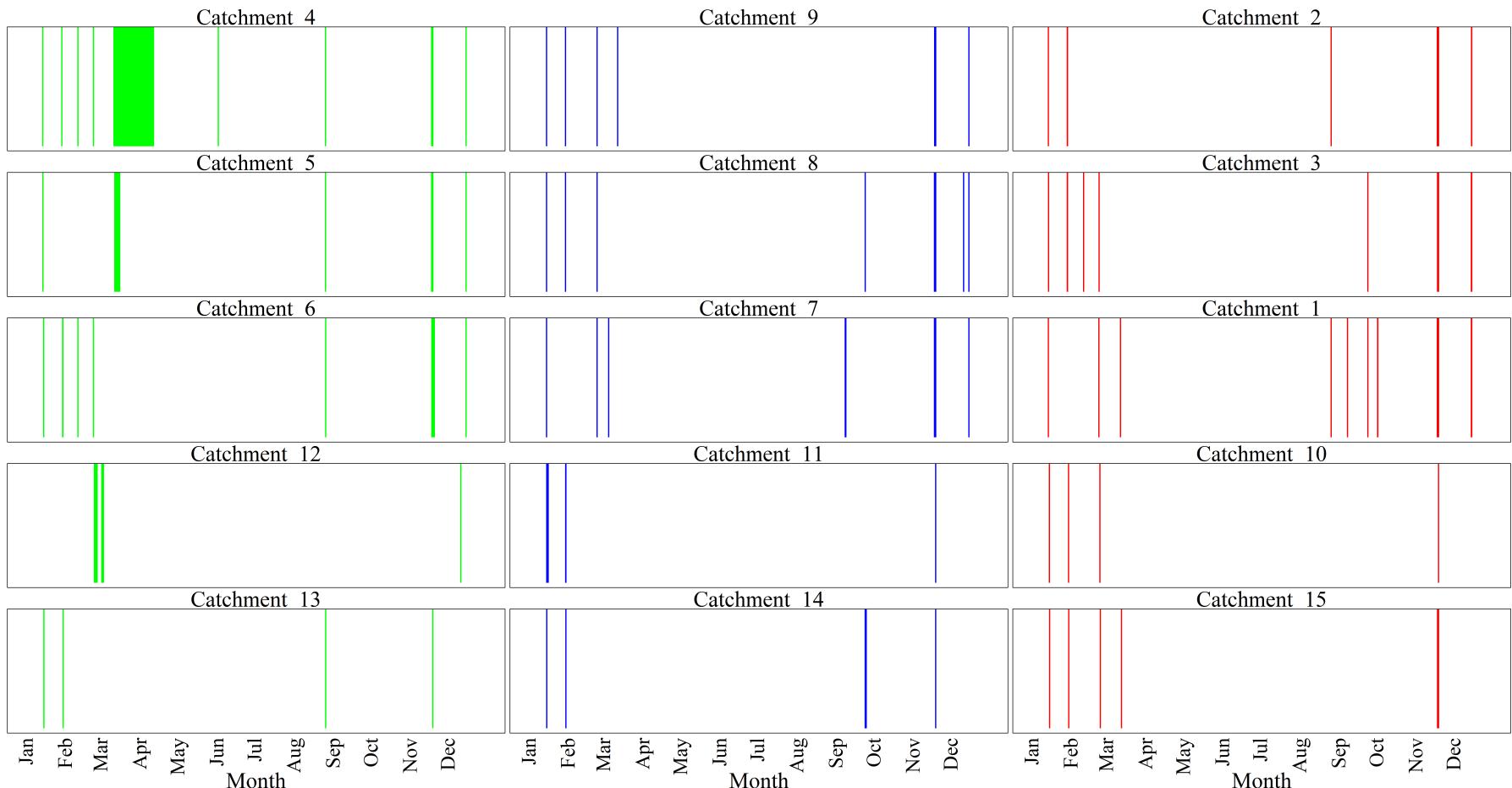
**Table 6:** Total number of measured values in flume data as a percentage of possible values when PLC switch = 1 (flow >0.2 l/s)

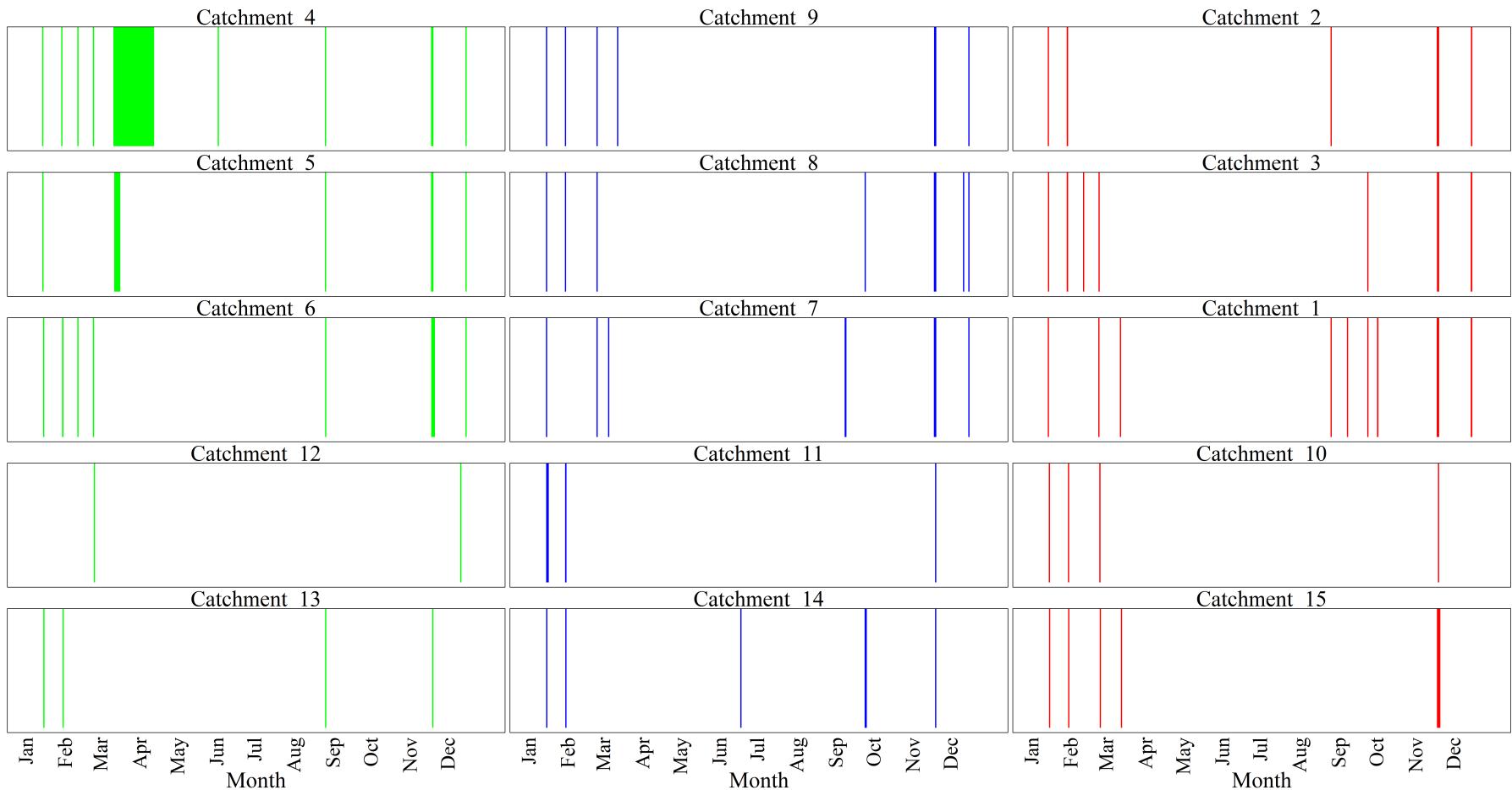
### 1.3.5 Timesteps of missing 15 minute data when PLC switch = 1 (flow >0.2 l/s)

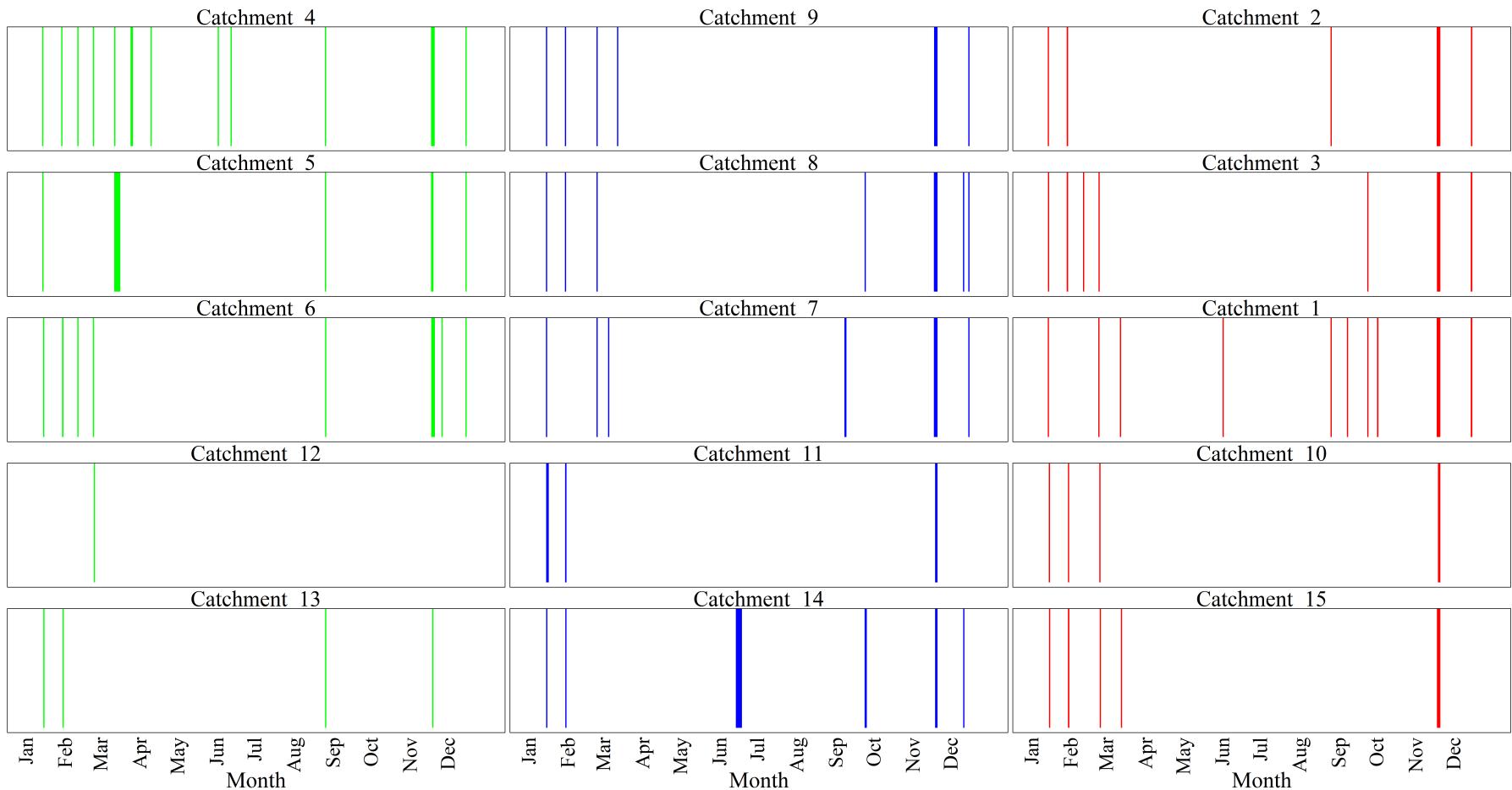
- Data are in farmlet/catchment/triplet order with catchments arranged from largest to smallest down the page.
- Colour bars represent missing 15 minute timestep water quality data for each farmlet when flow >0.2 l/s and may reflect data loss due to sensor downtime or where data failed the quality control process.
- NB. Total phosphorus, ortho-phosphorus and flume temperature not included as sampling and measurement are not influenced by the PLC switch values.

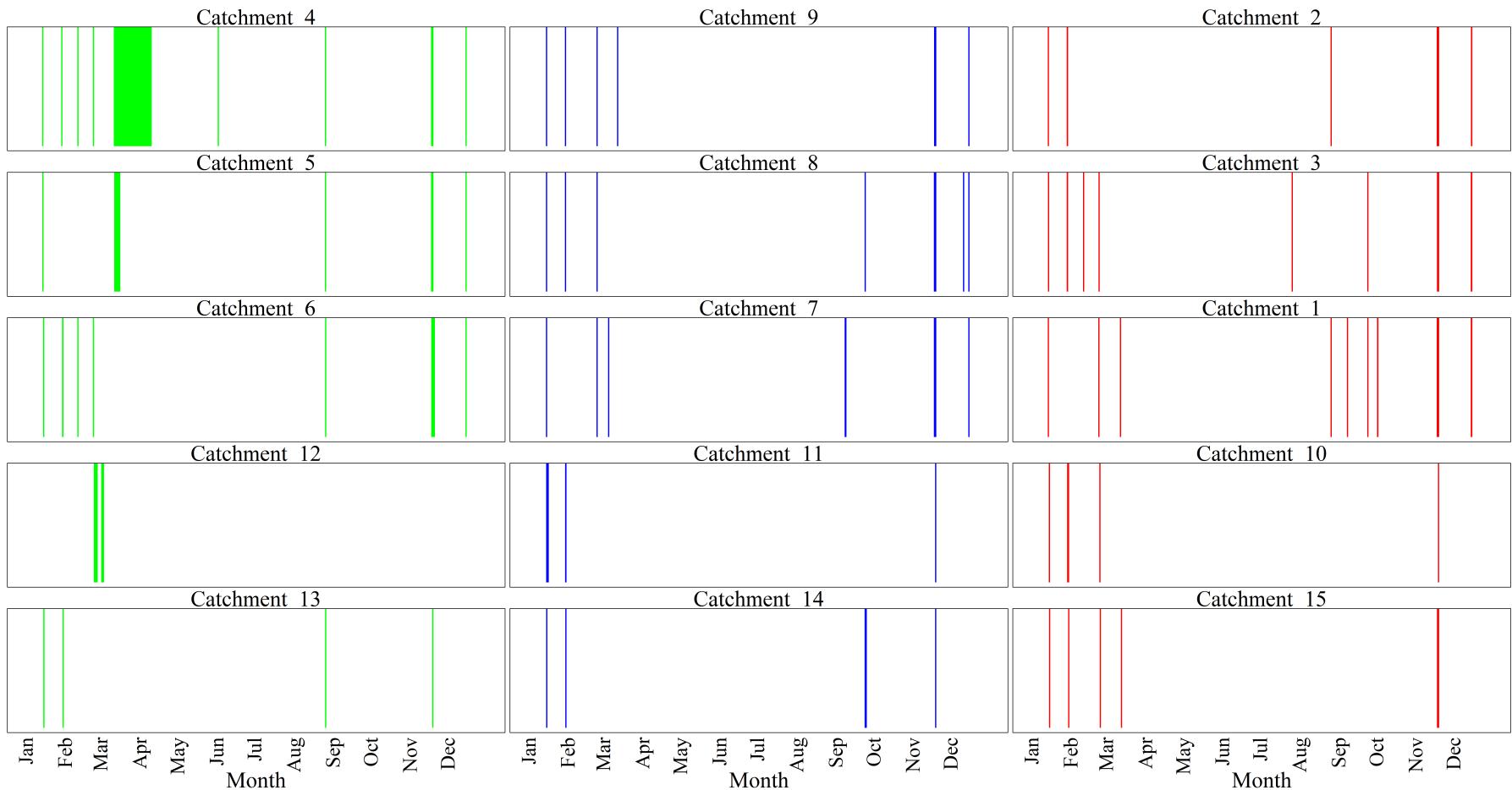


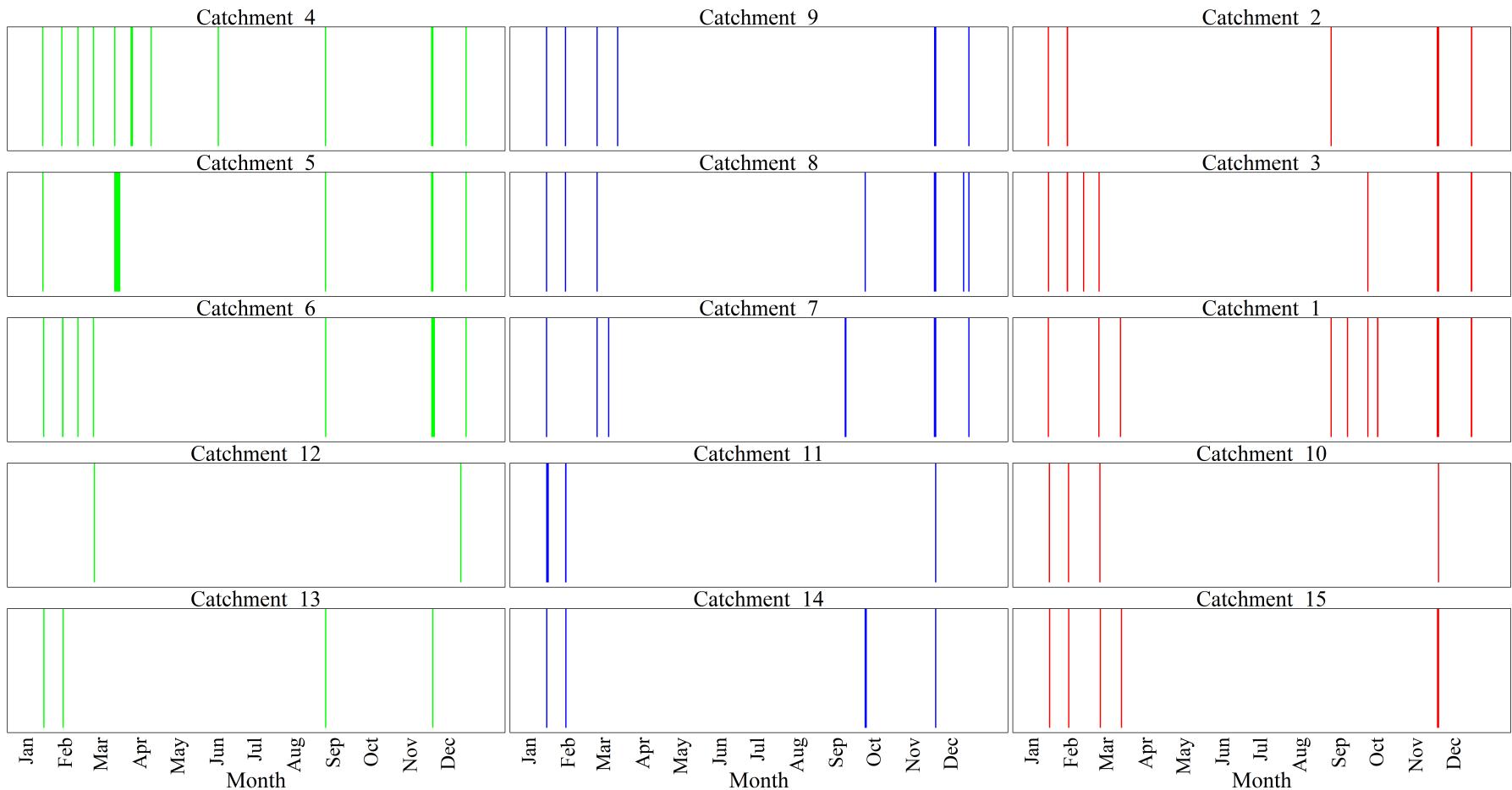
**Figure 1:** Timesteps of missing nitrate+nitrite data

**Figure 2:** Timesteps of missing ammonia data

**Figure 3:** Timesteps of missing ammonium data

**Figure 4:** Timesteps of missing conductivity data

**Figure 5:** Timesteps of missing dissolved oxygen data

**Figure 6:** Timesteps of missing pH data

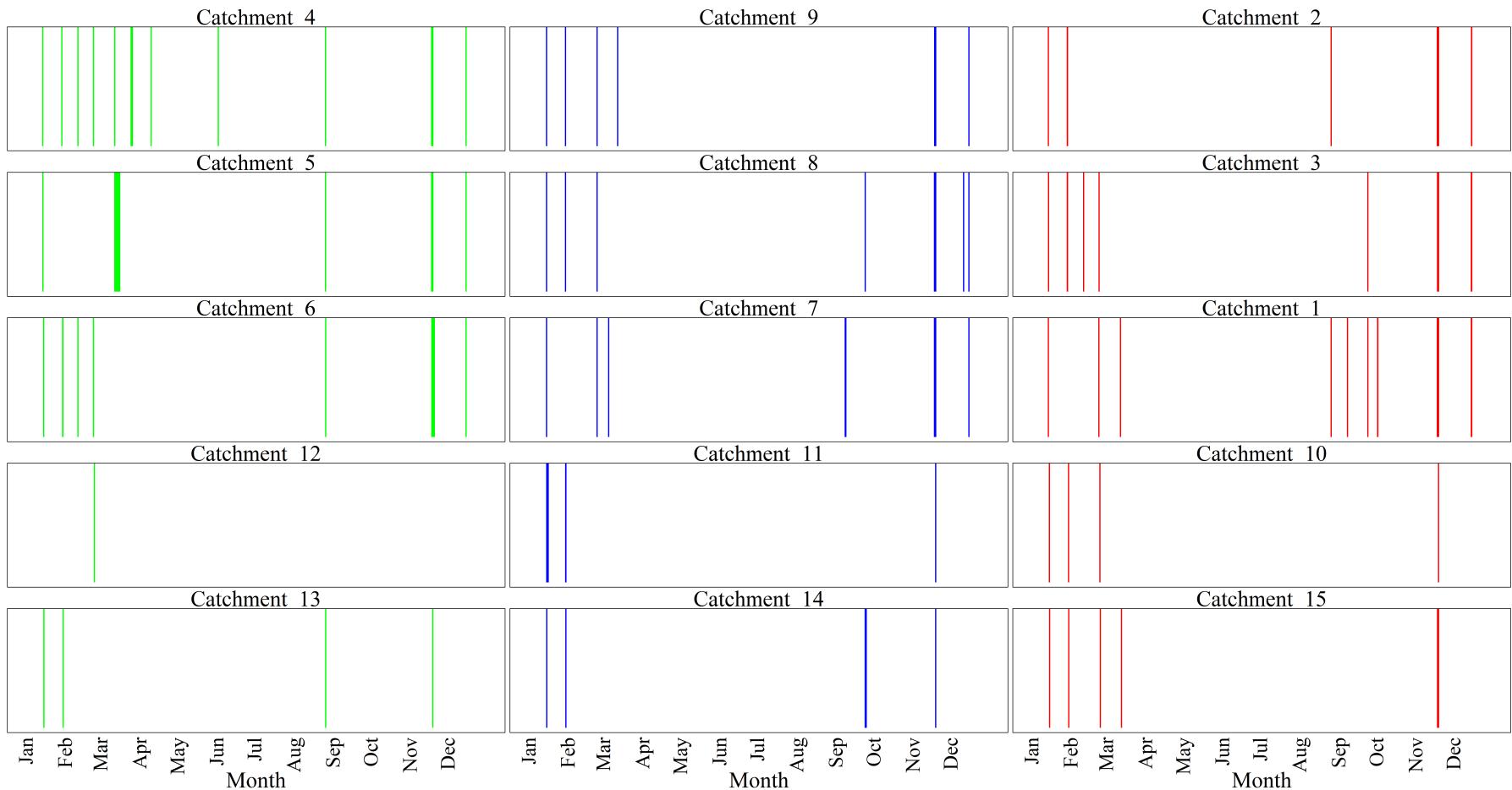
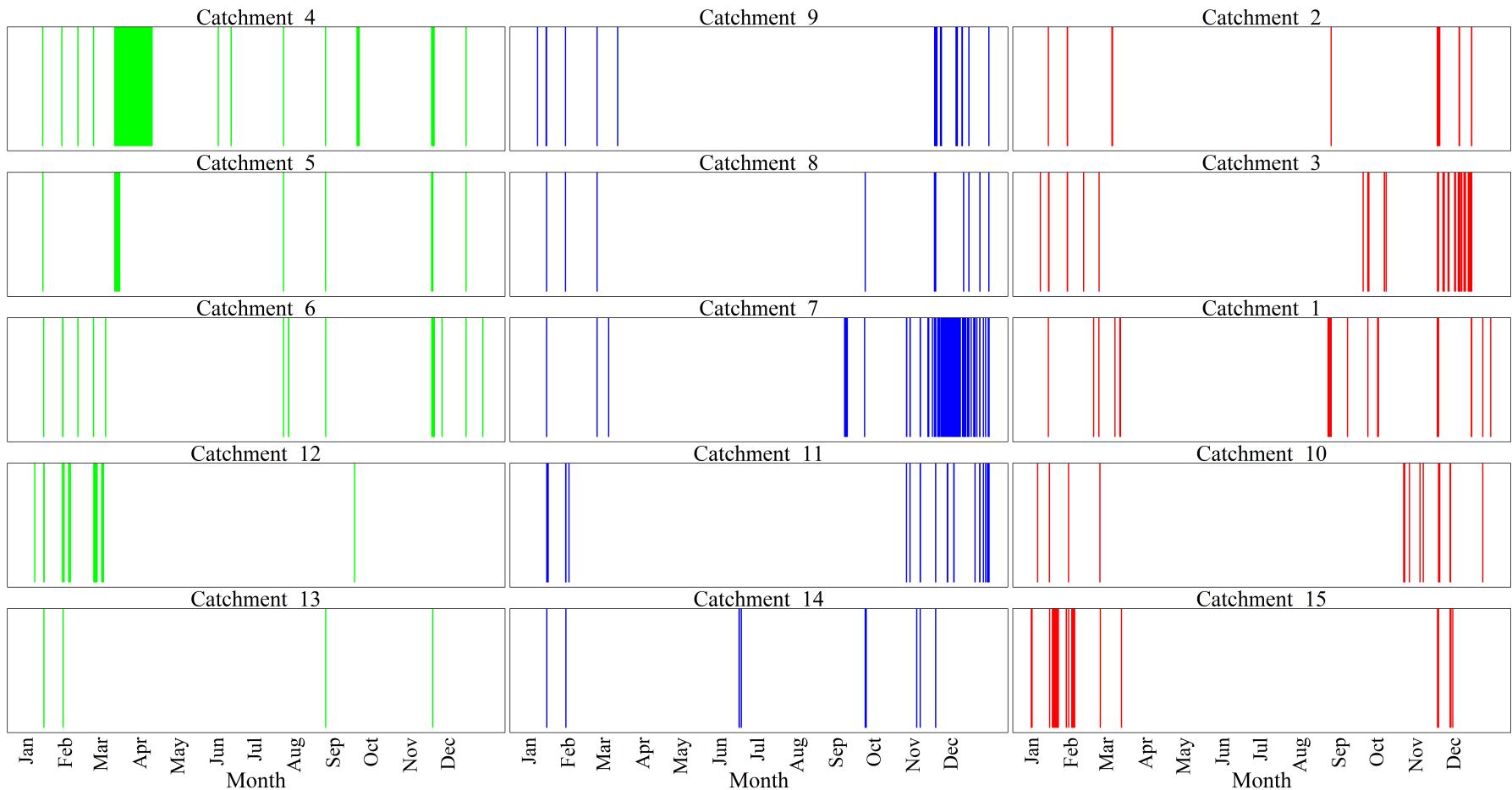
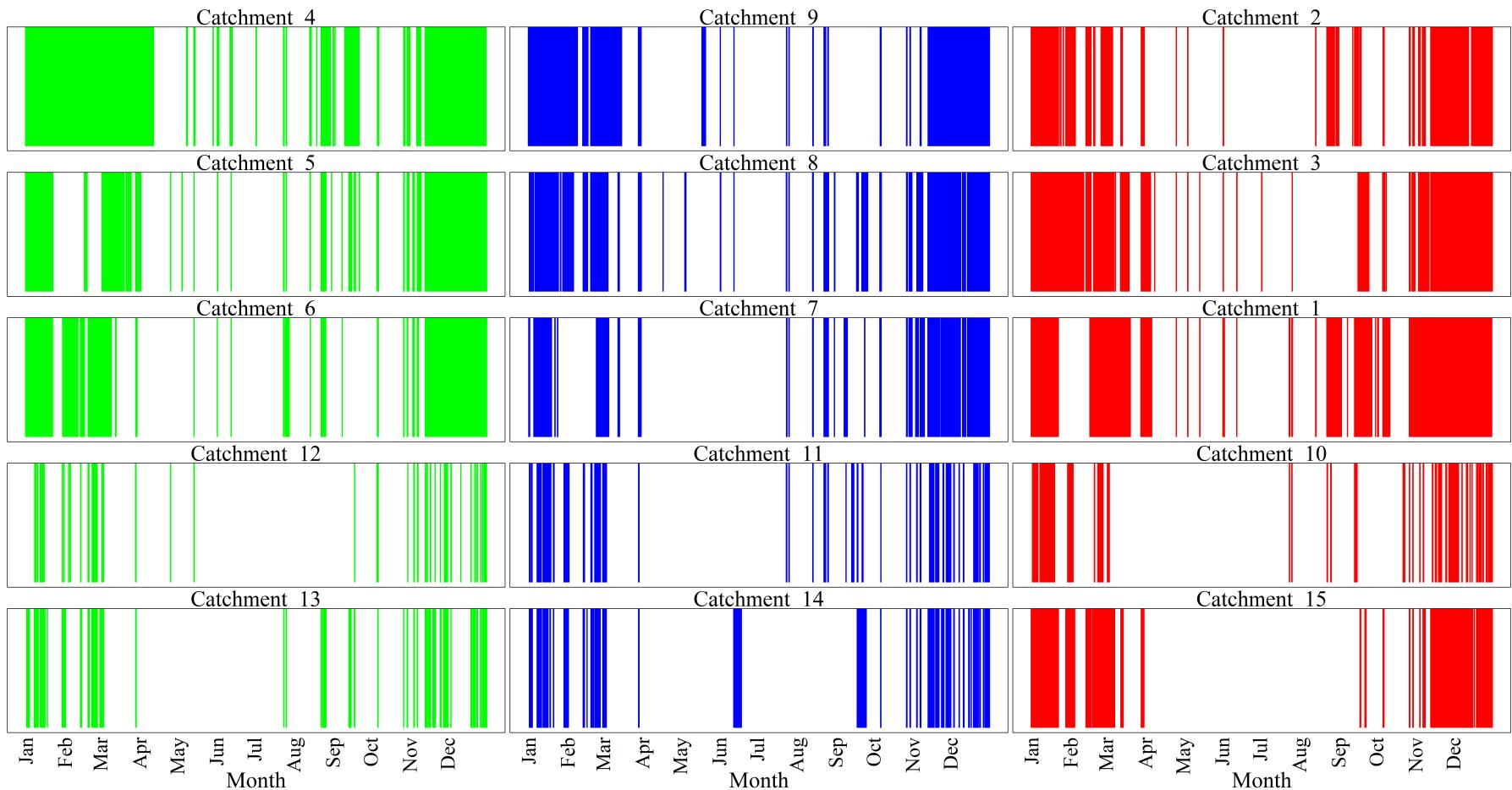
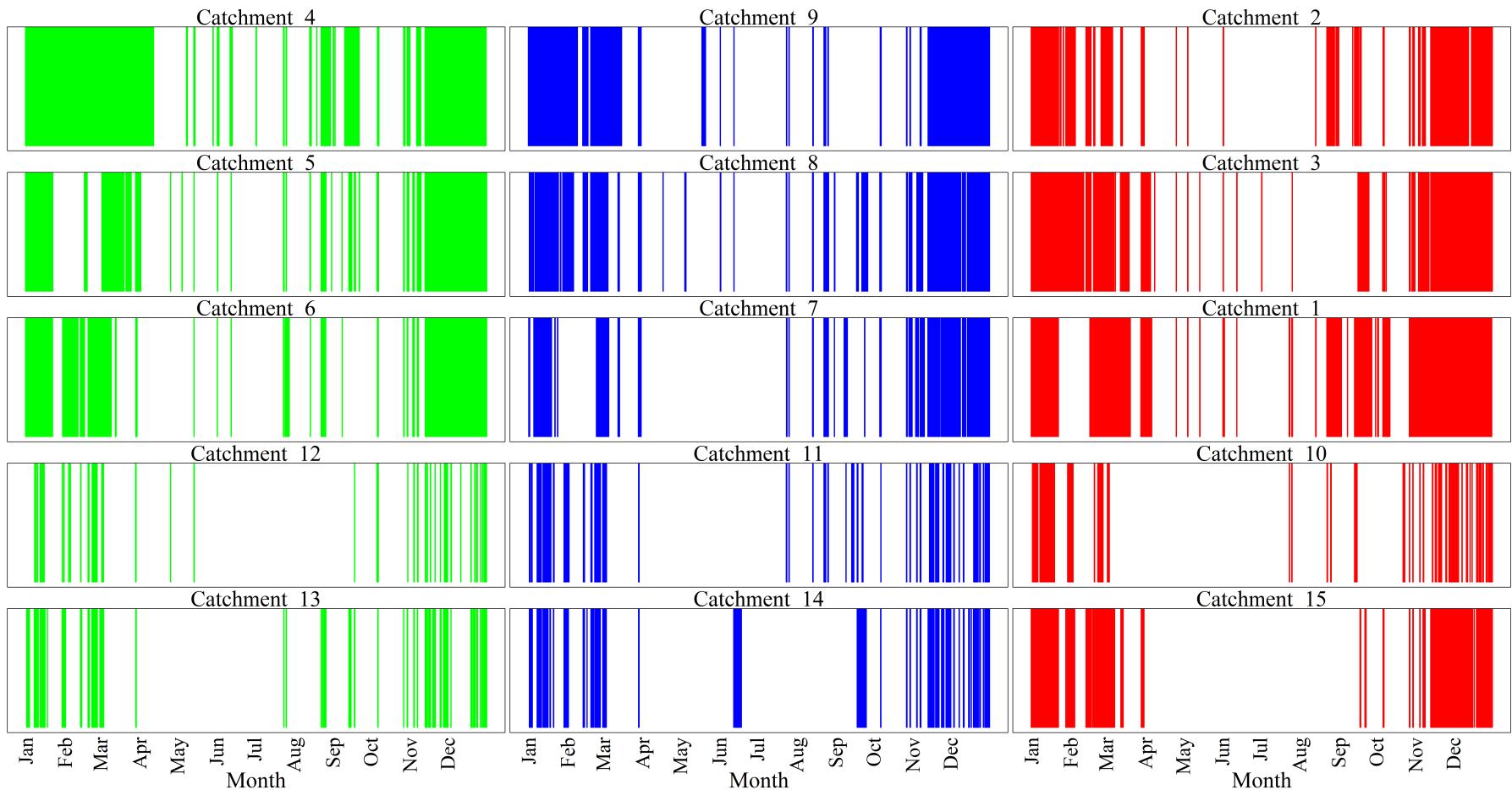


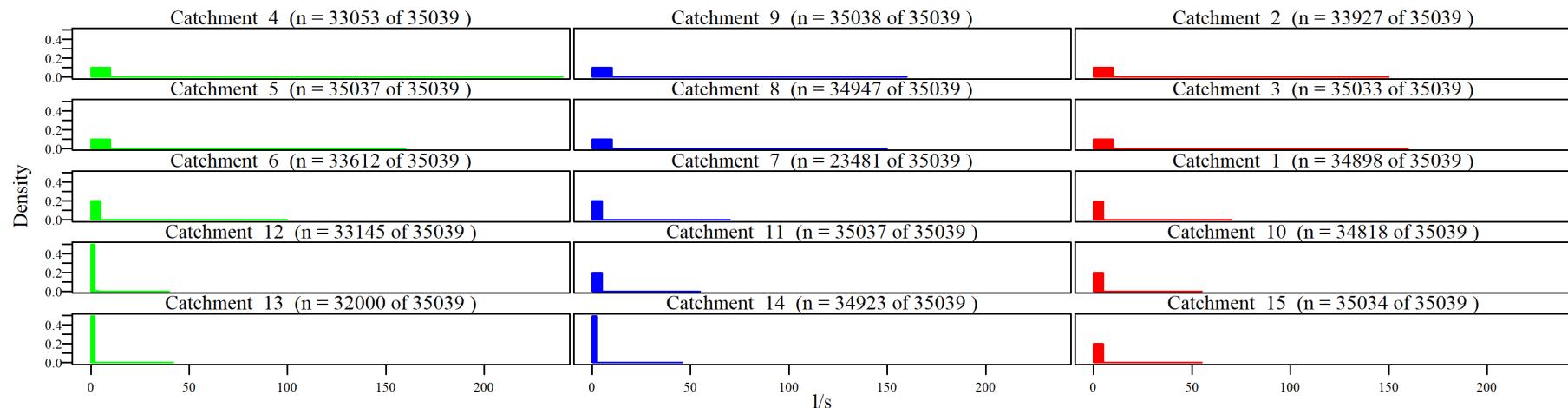
Figure 7: Timesteps of missing flow cell water temperature data

**Figure 8:** Timesteps of missing turbidity data

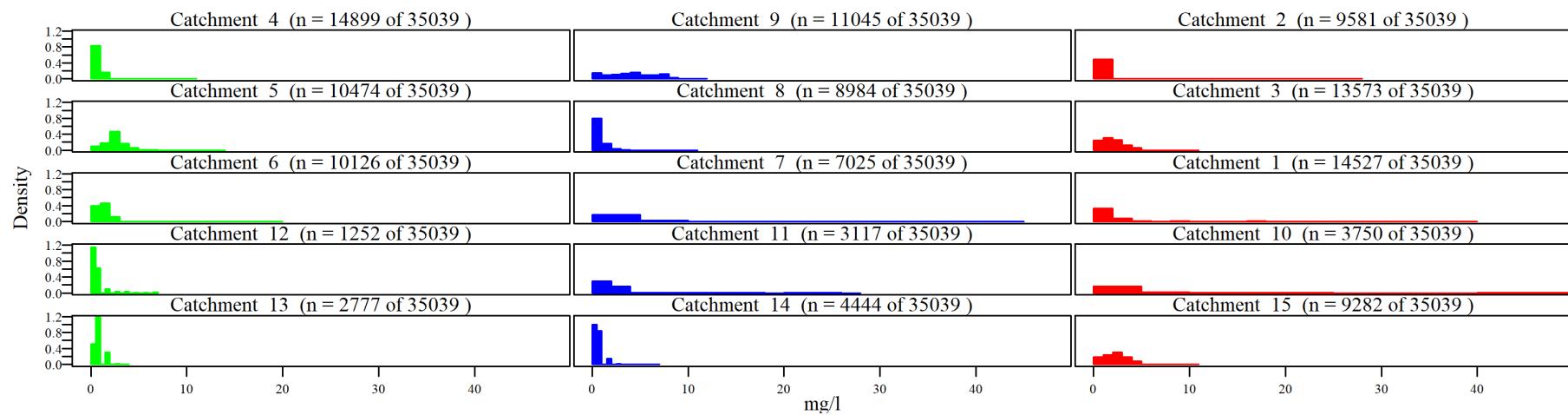
**Figure 9:** Timesteps of missing dissolved organic matter data

**Figure 10:** Timesteps of missing ortho-phosphorus data

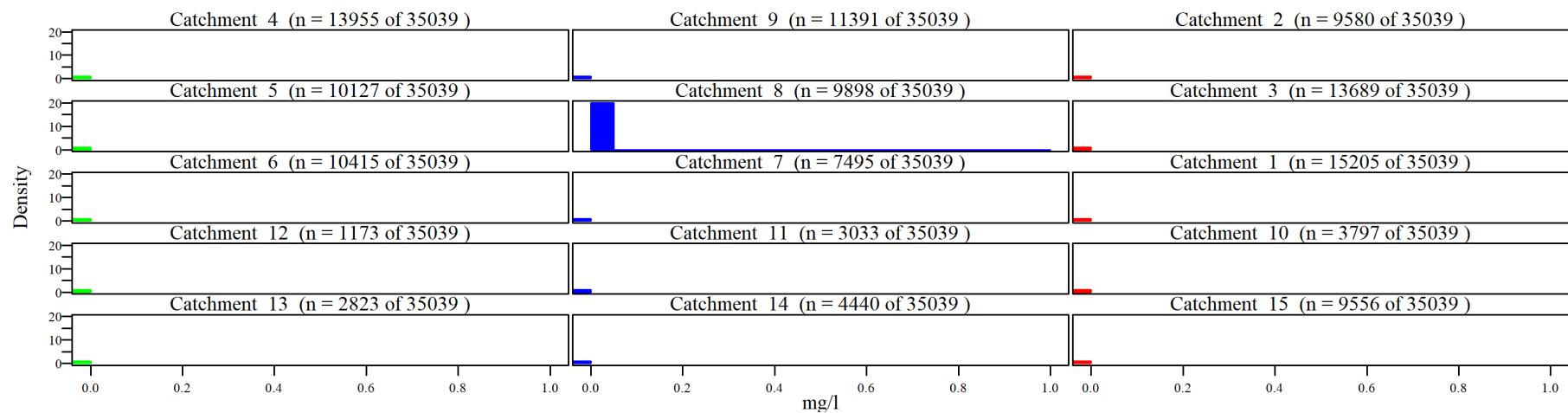
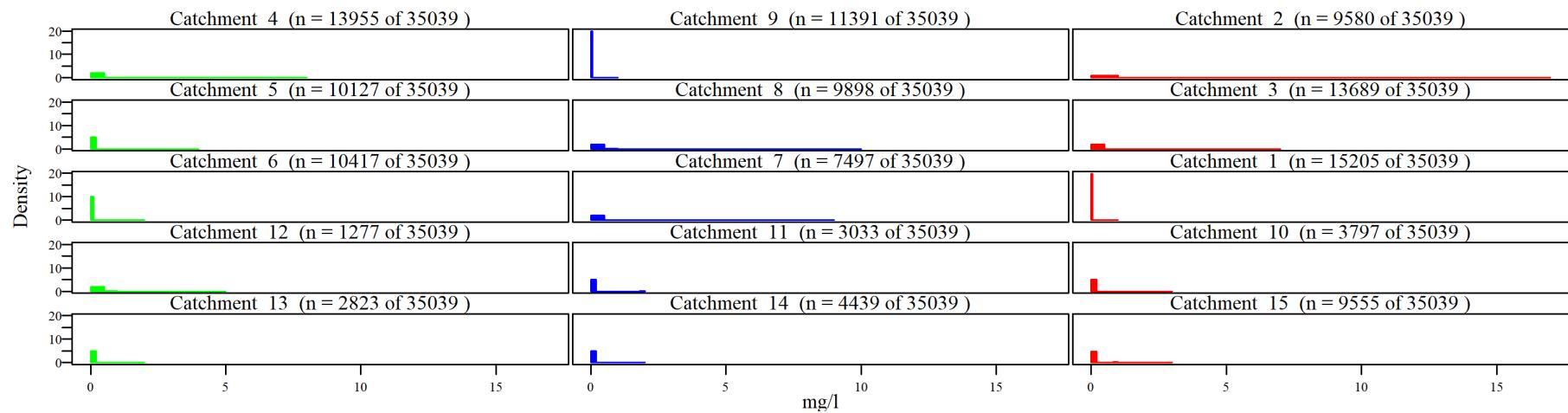
## 1.4 Histograms of 15 minute data distribution

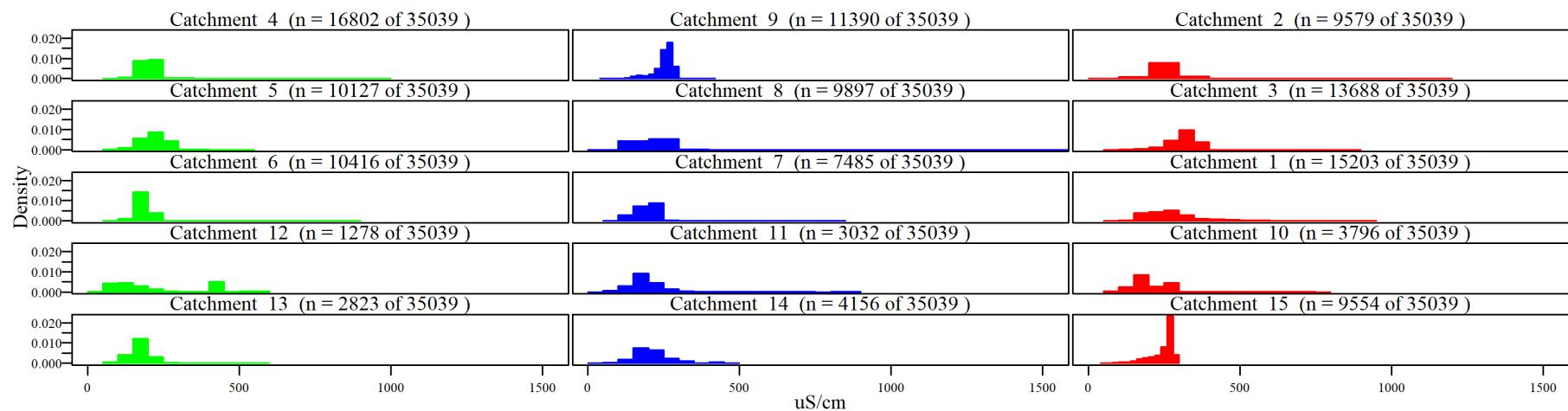
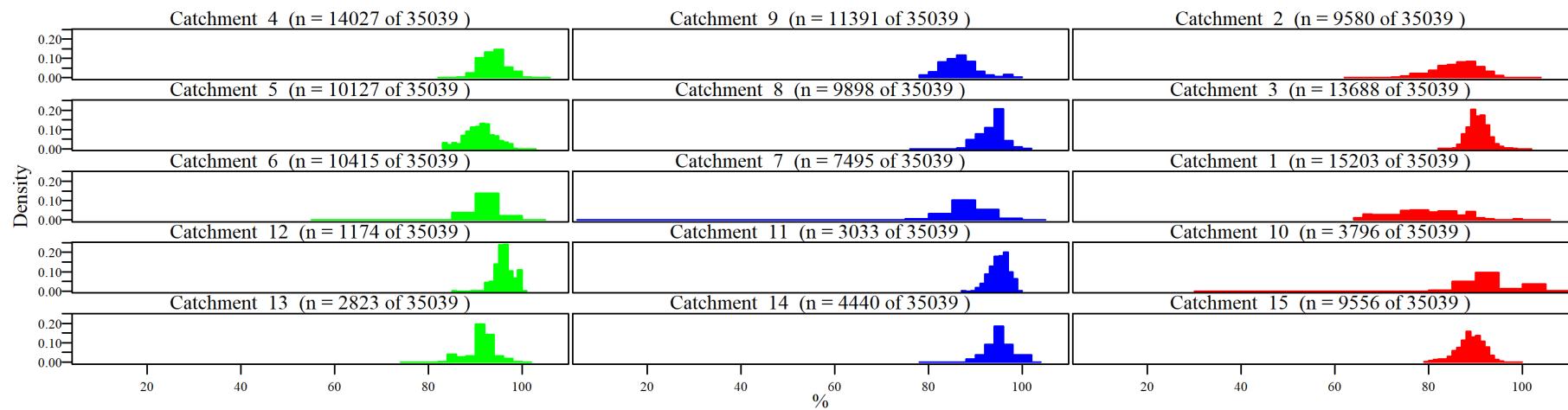


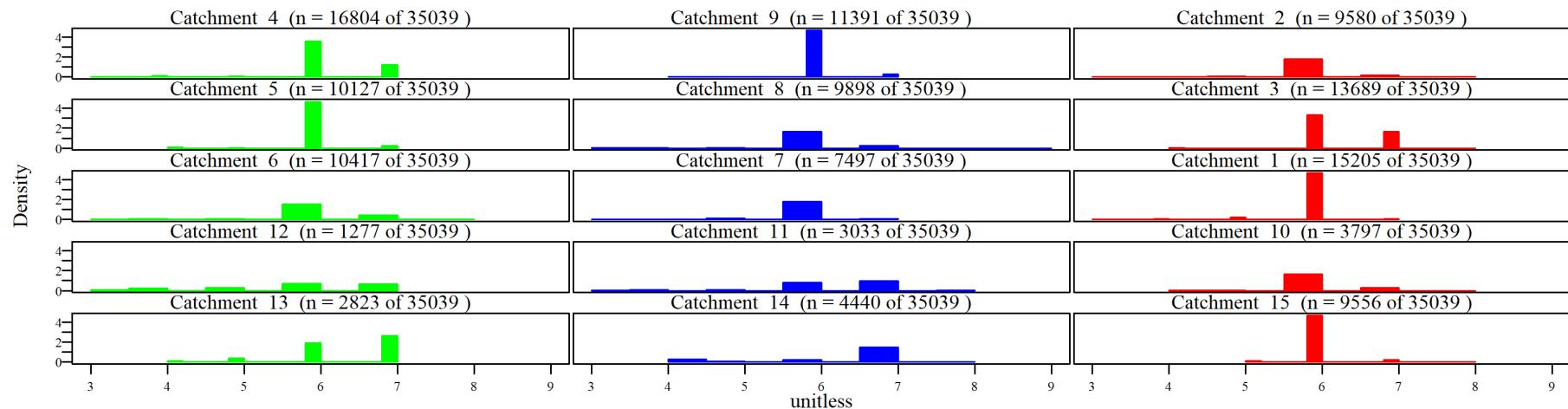
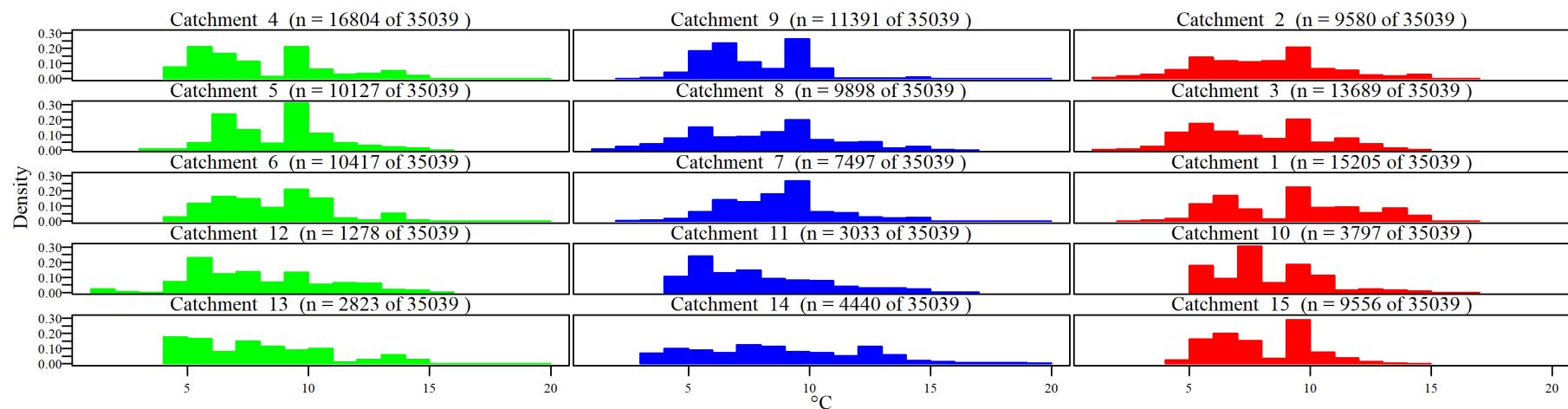
**Figure 11:** Distribution of data - flow

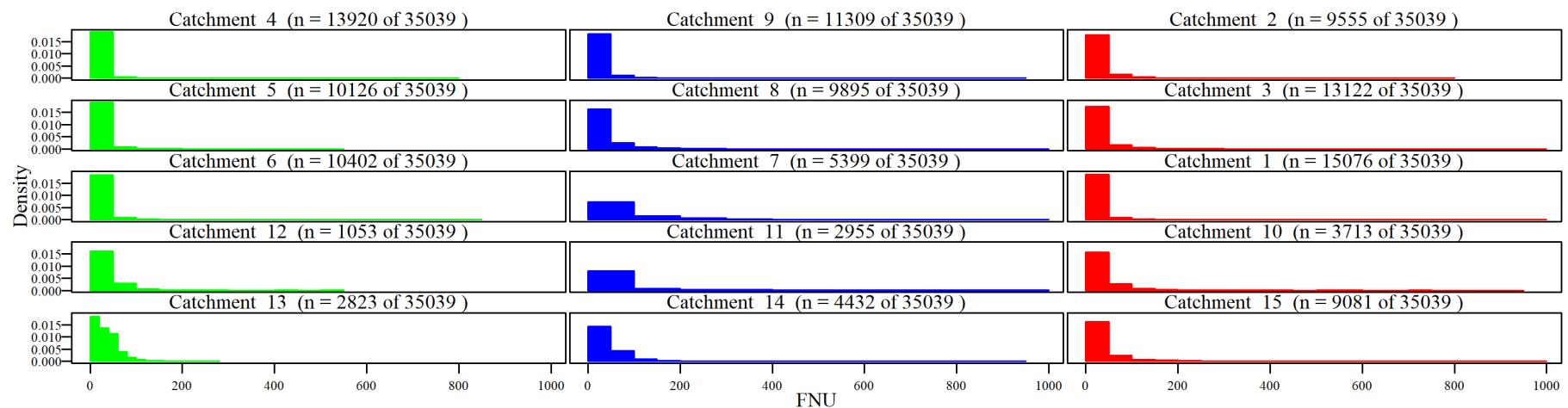
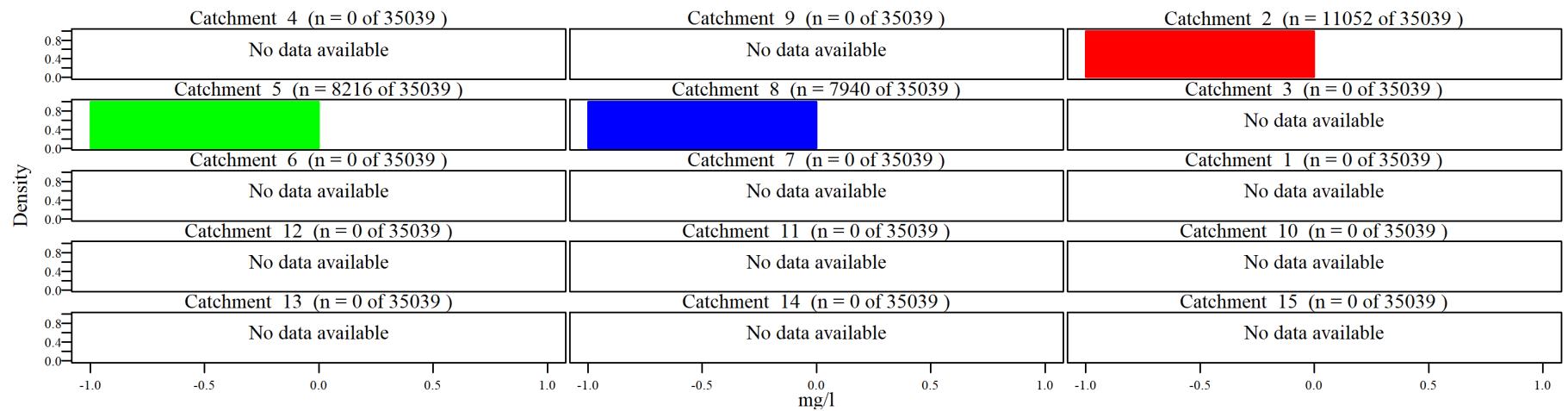


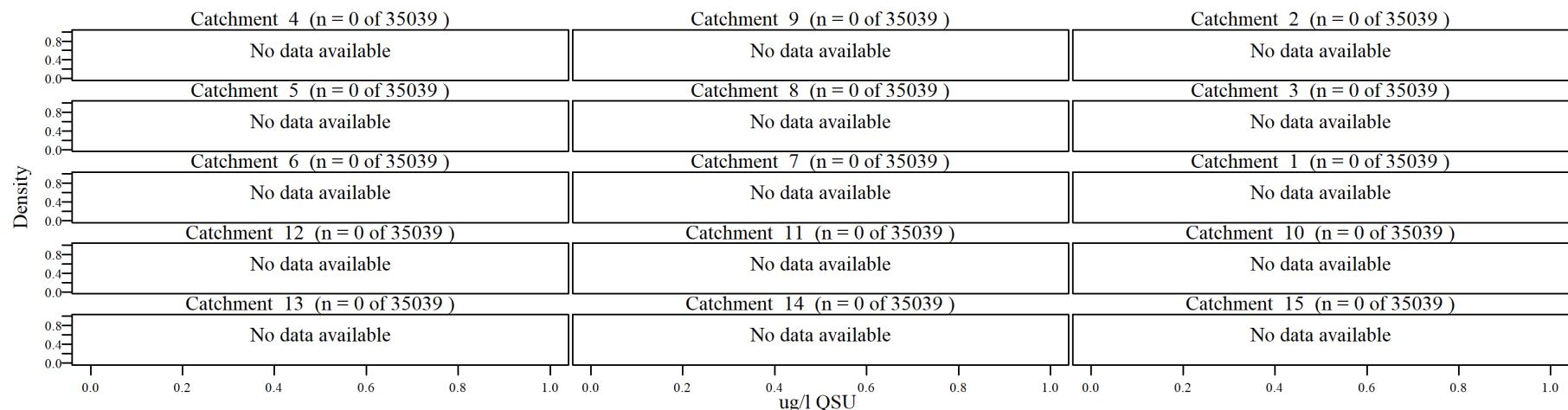
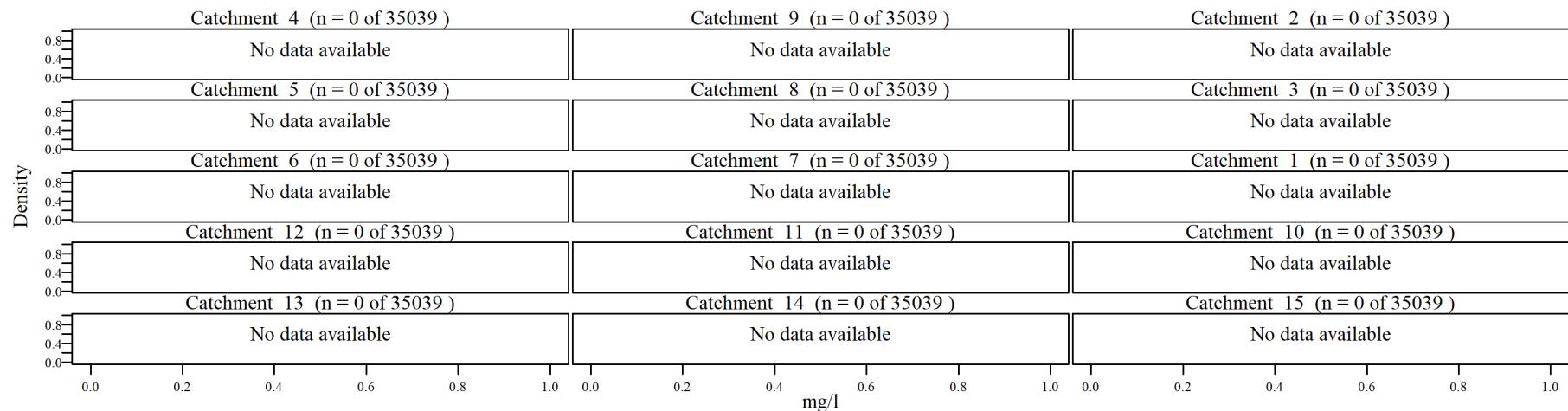
**Figure 12:** Distribution of data - nitrate+nitrite

**Figure 13:** Distribution of data - ammonia**Figure 14:** Distribution of data - ammonium

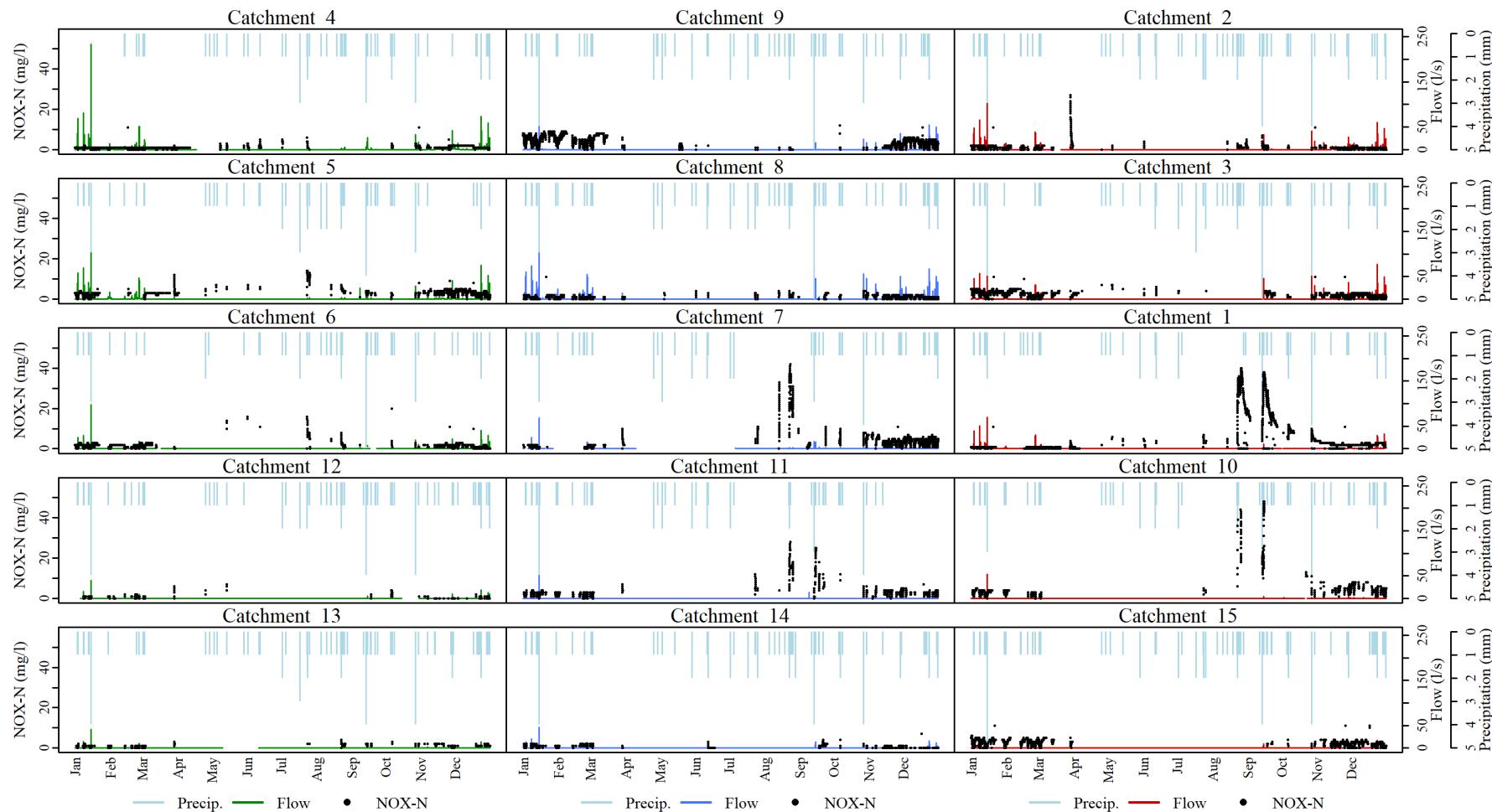
**Figure 15:** Distribution of data - conductivity**Figure 16:** Distribution of data - dissolved oxygen

**Figure 17:** Distribution of data - pH**Figure 18:** Distribution of data - flow cell water temperature

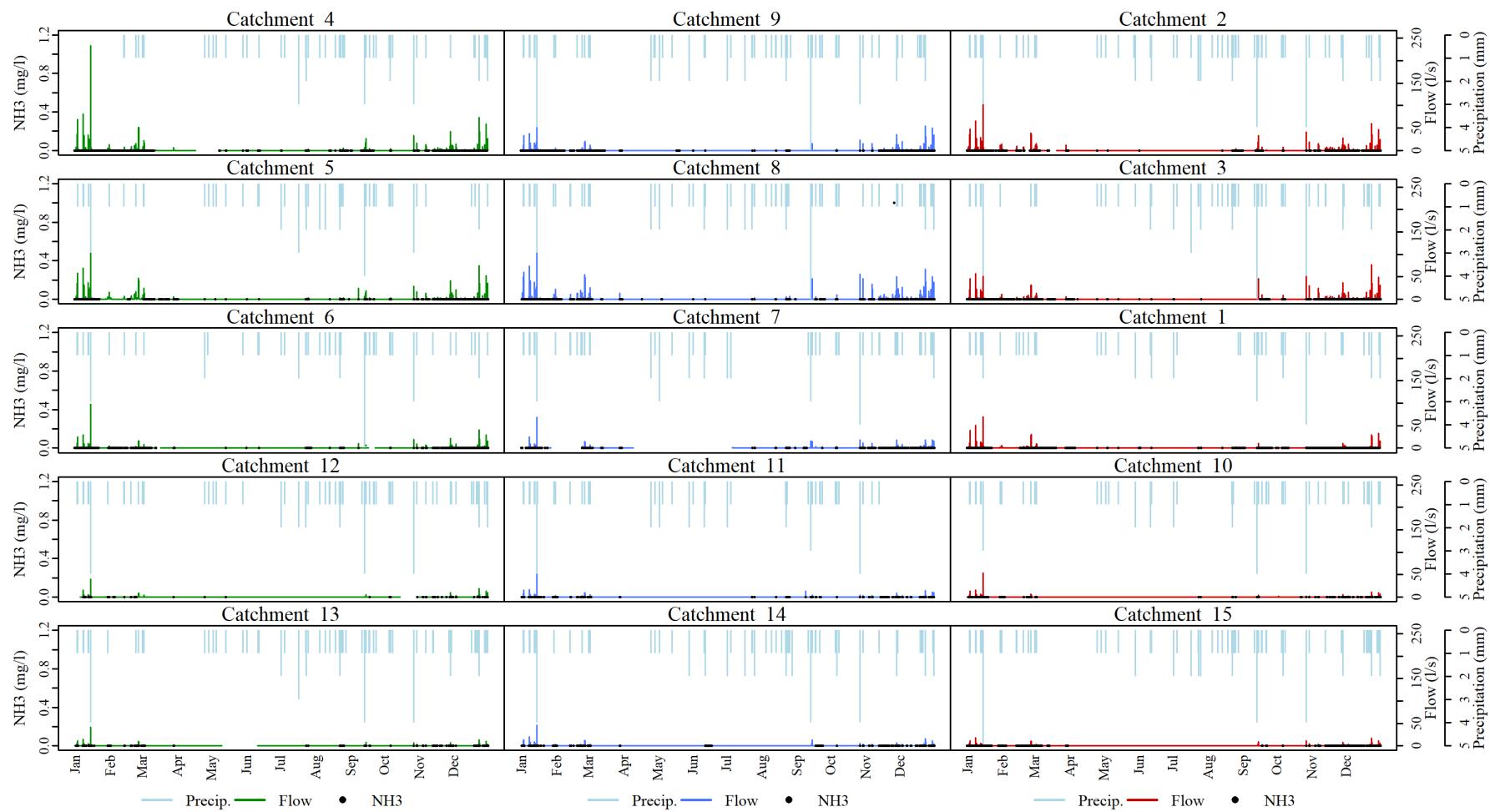
**Figure 19:** Distribution of data - turbidity**Figure 20:** Distribution of data - total phosphorus

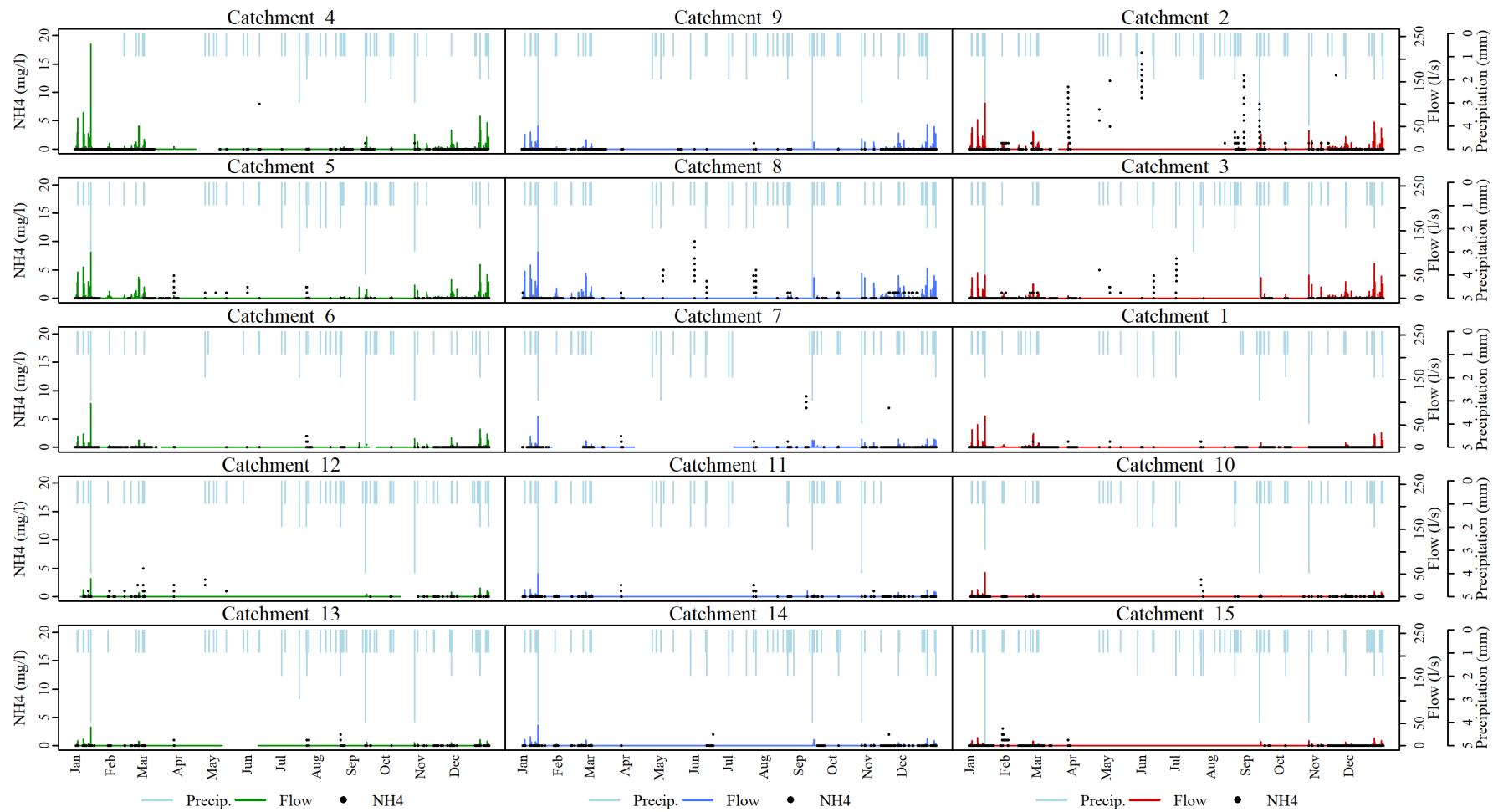
**Figure 21:** Distribution of data - dissolved organic matter**Figure 22:** Distribution of data - ortho-phosphorus

## 1.5 Time series

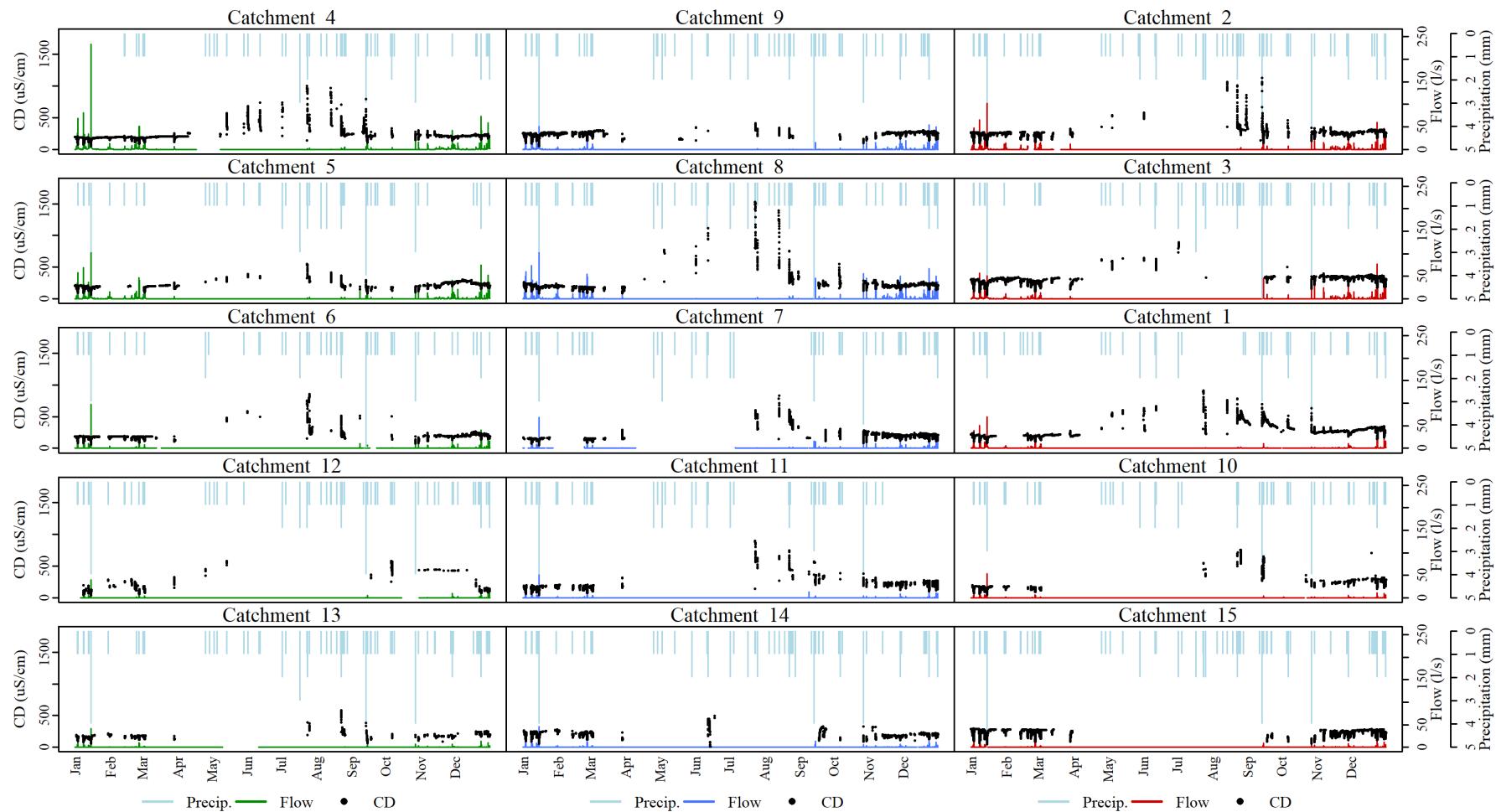


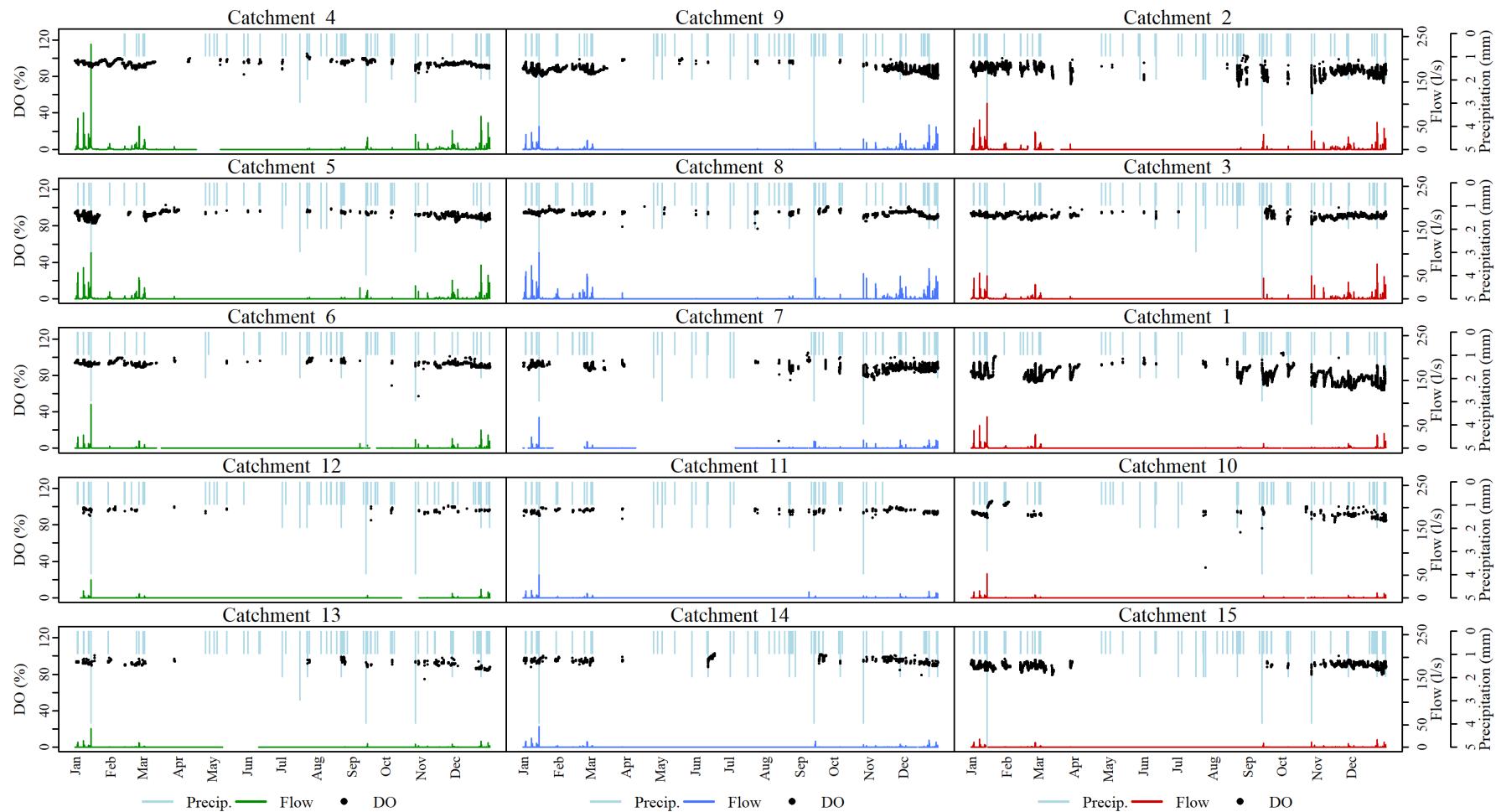
**Figure 23:** Time series of precipitation, flow and nitrate+nitrite (NOX-N)

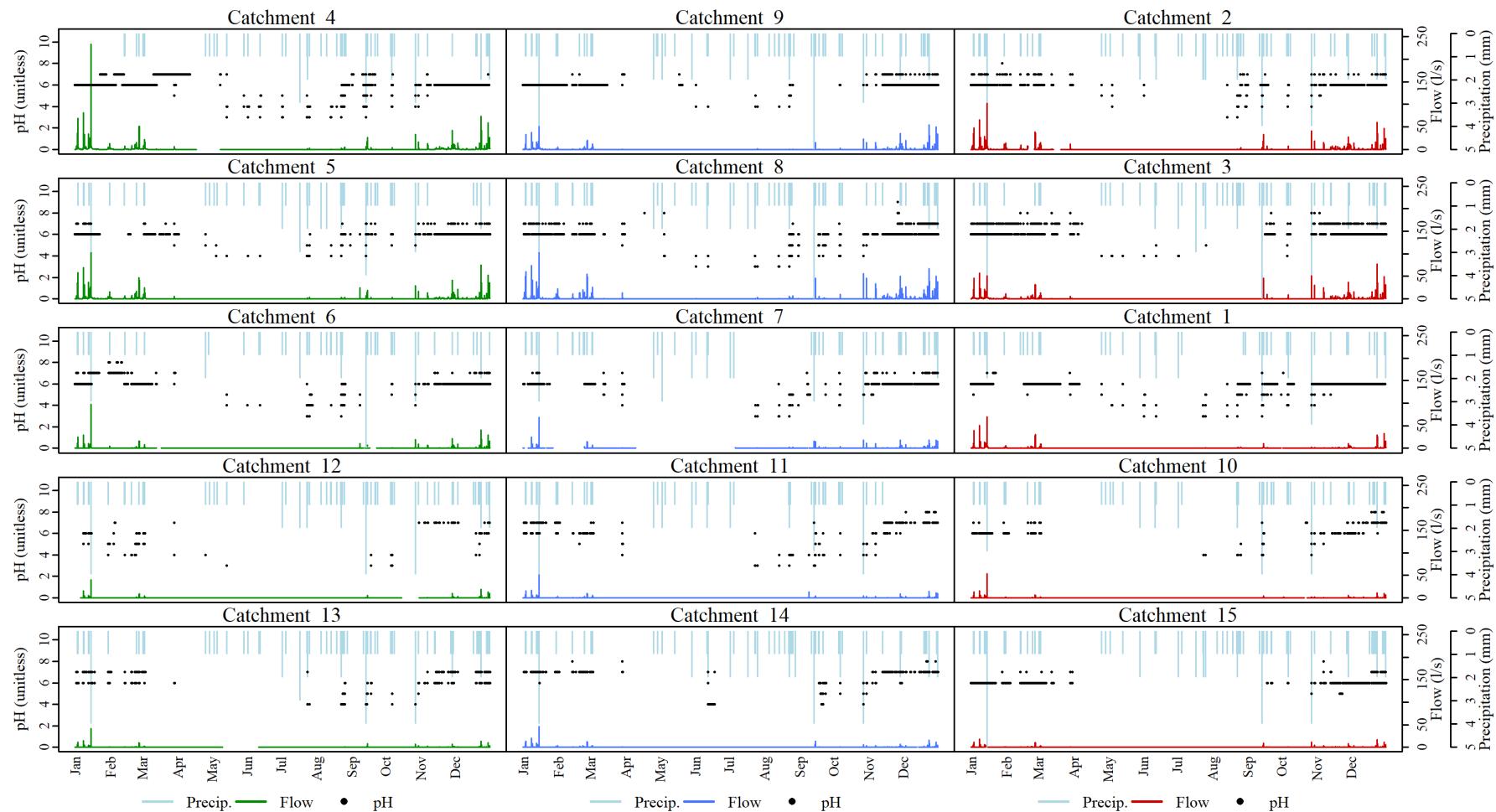
**Figure 24:** Time series of precipitation, flow and ammonia (NH3)

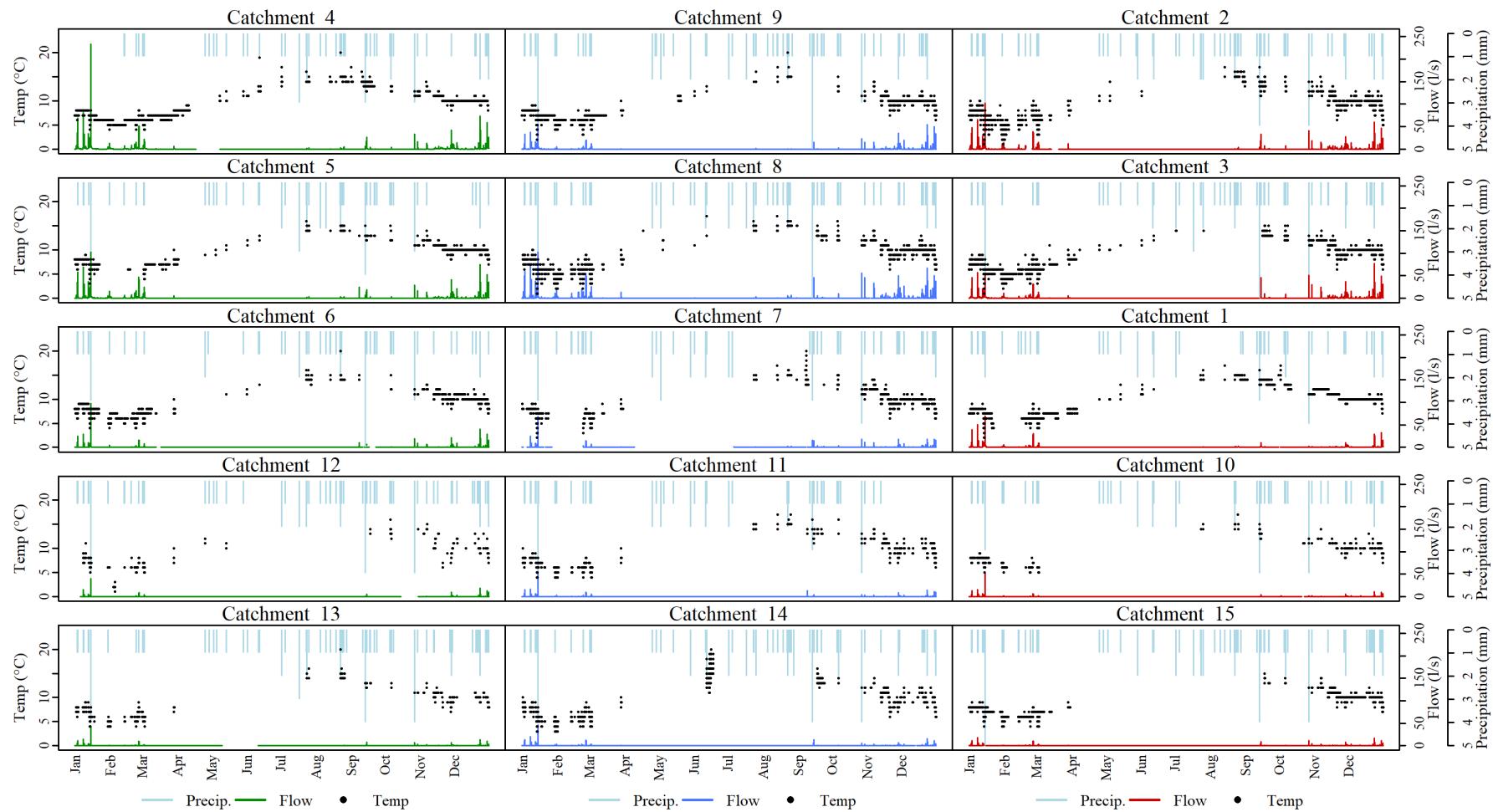


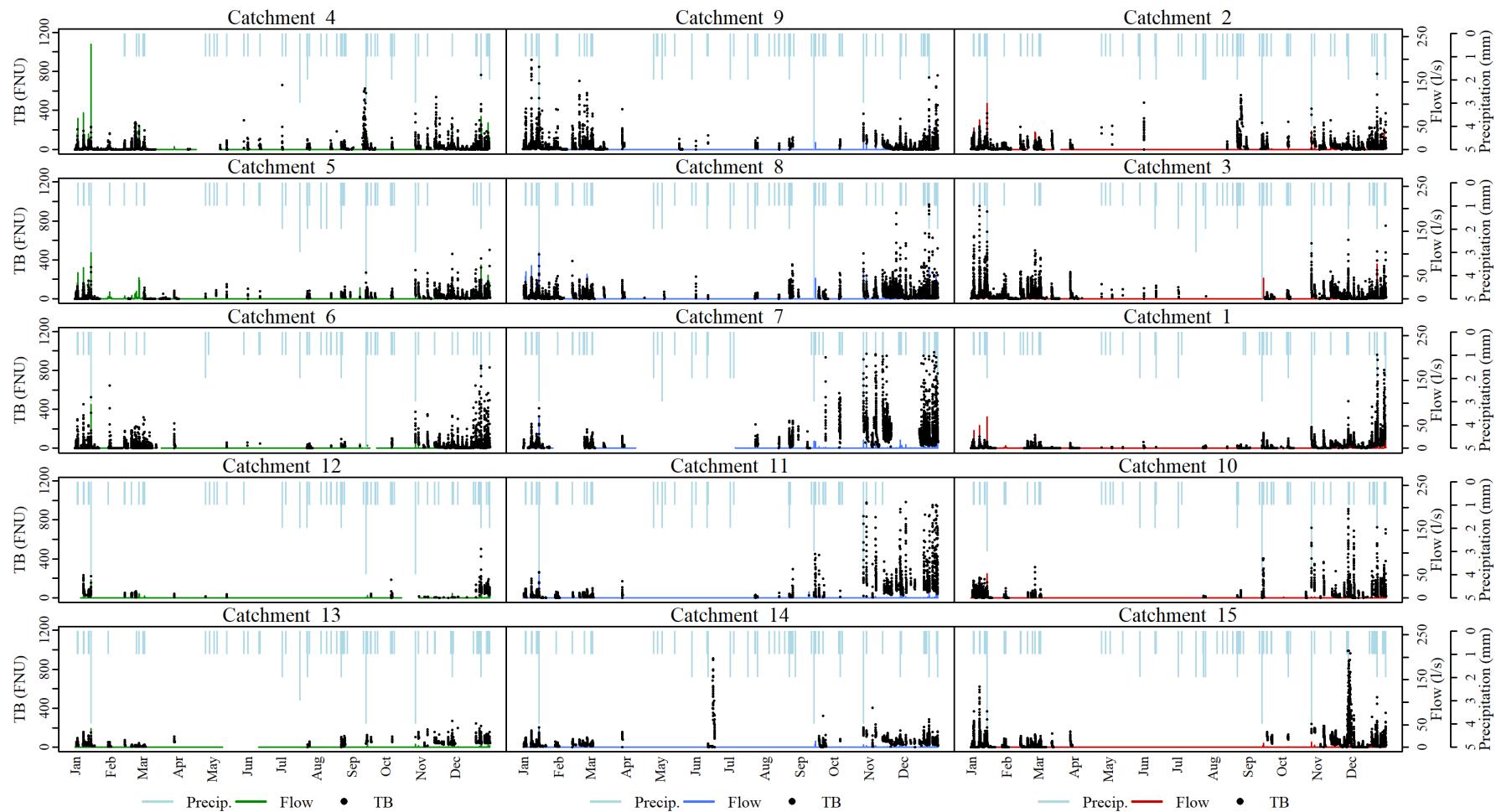
**Figure 25:** Time series of precipitation, flow and ammonium (NH4)

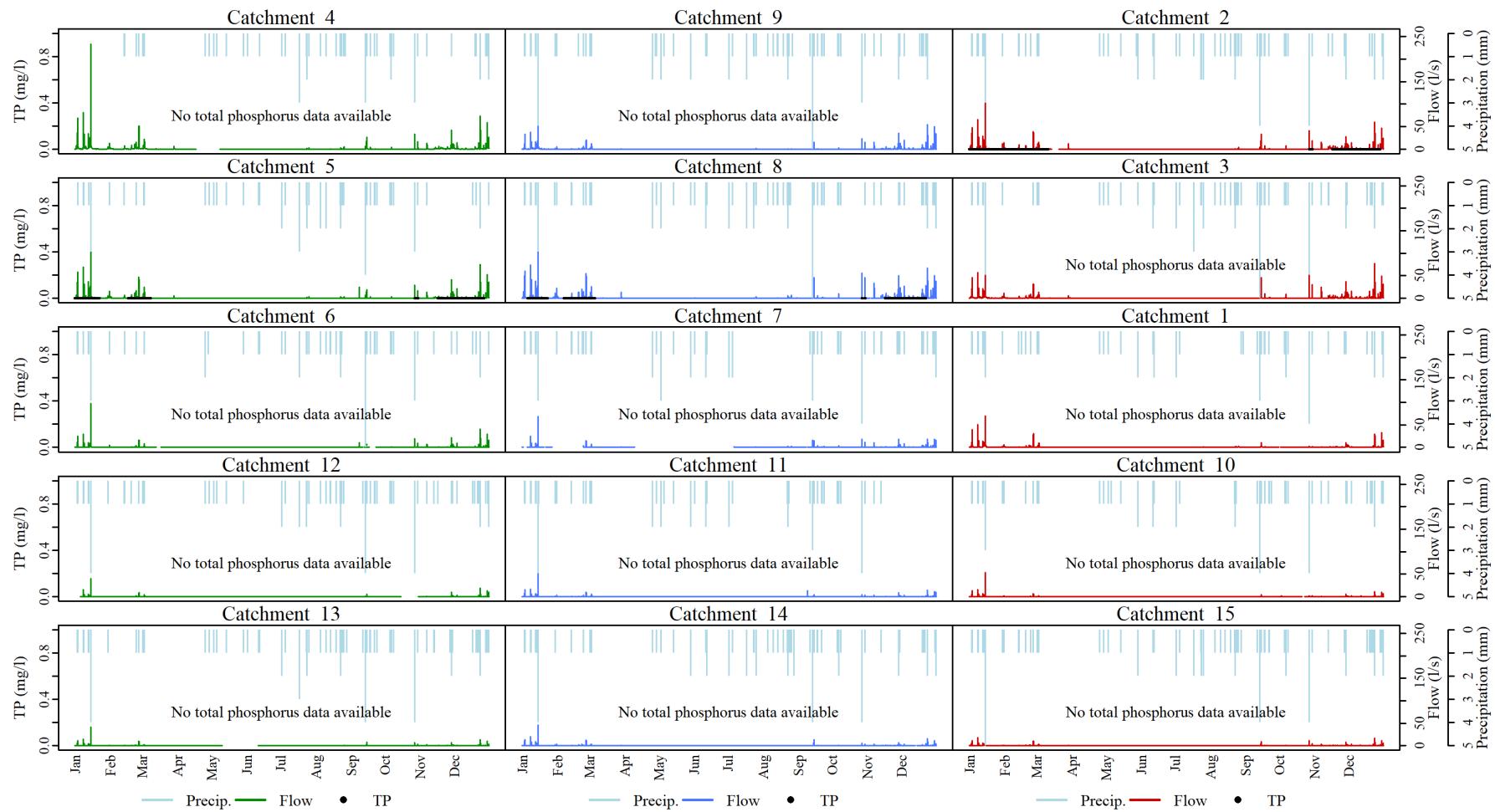
**Figure 26:** Time series of precipitation, flow and conductivity (CD)

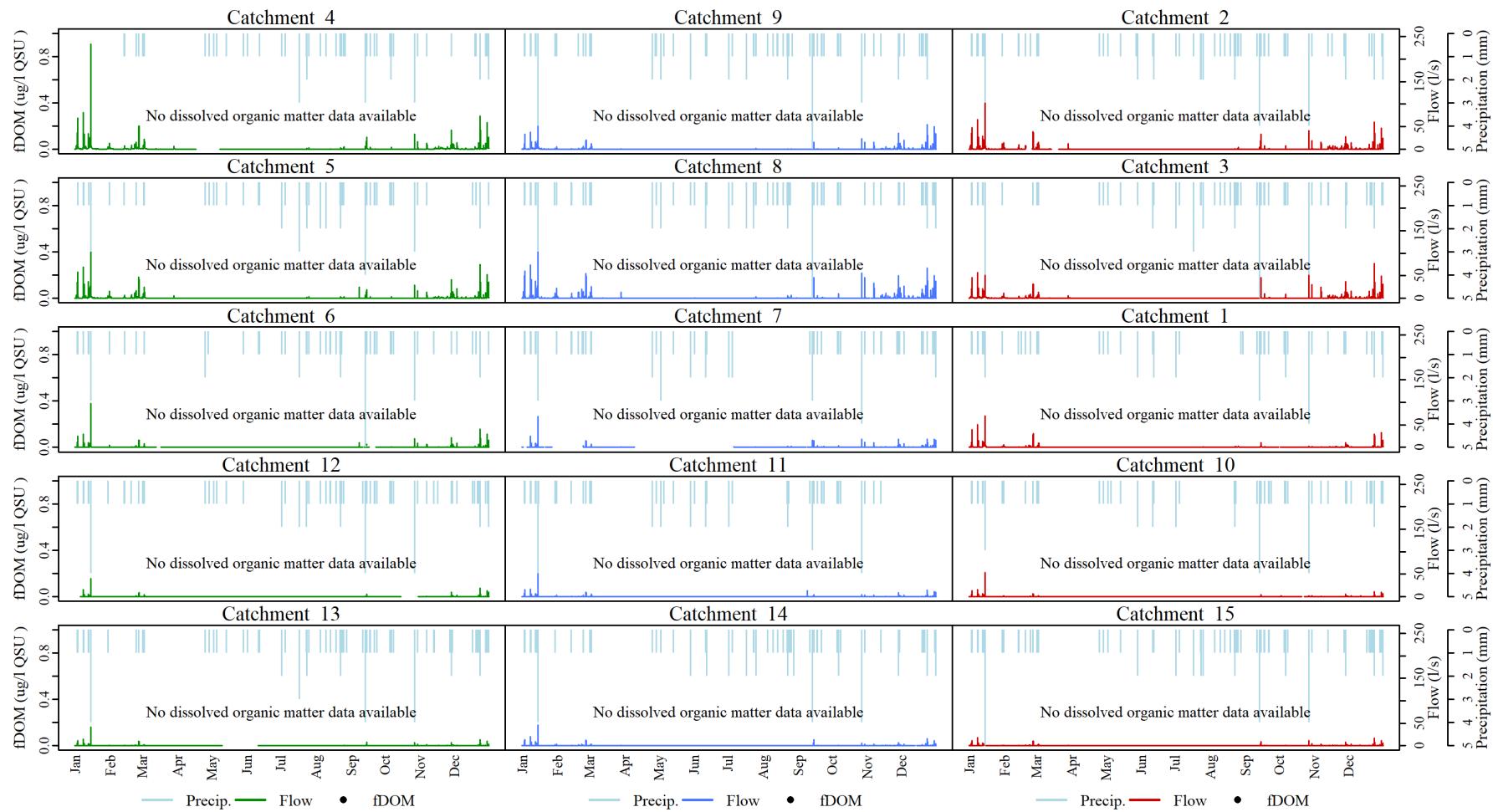
**Figure 27:** Time series of precipitation, flow and dissolved oxygen (DO)

**Figure 28:** Time series of precipitation, flow and pH (pH)

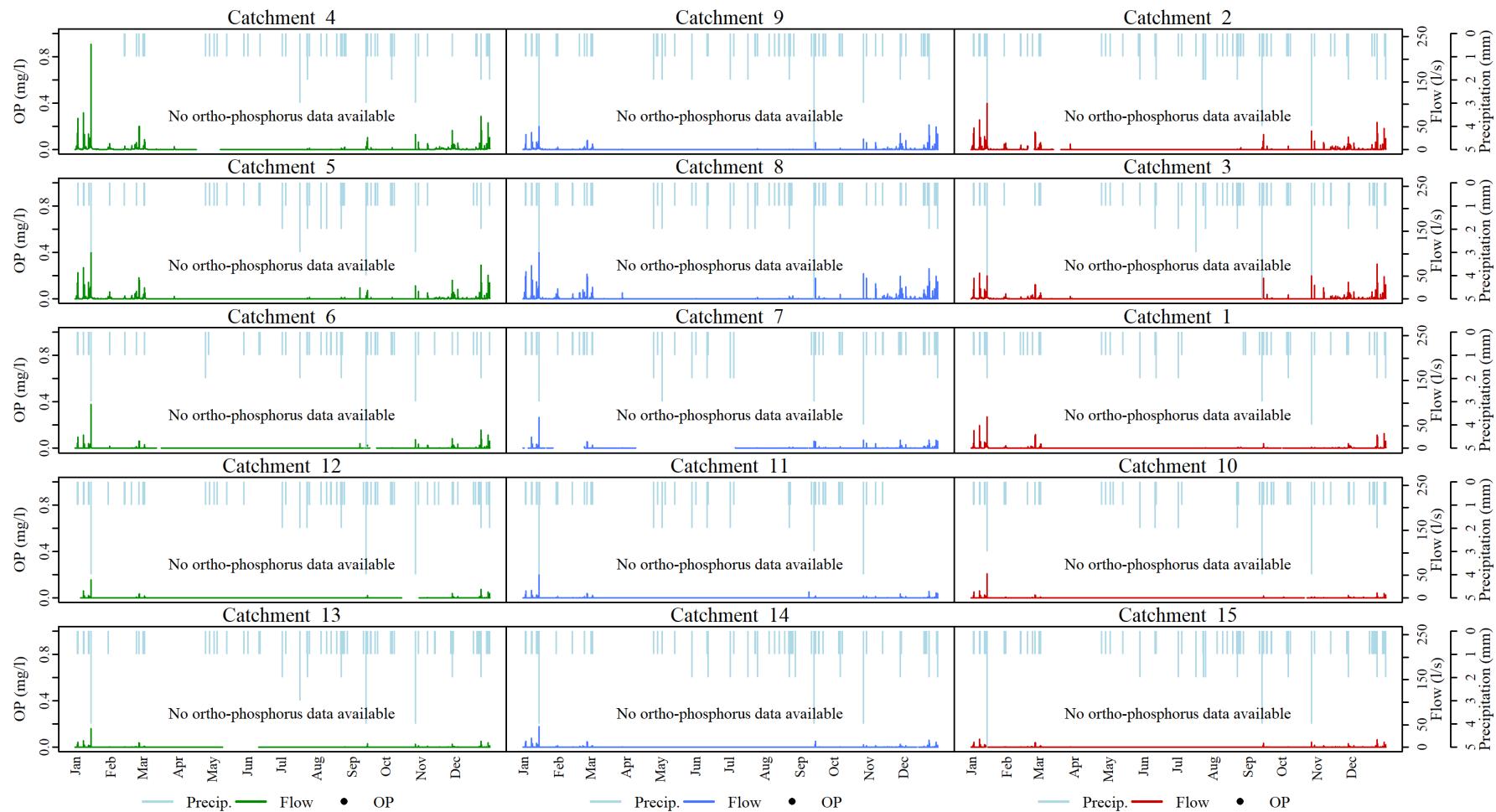
**Figure 29:** Time series of precipitation, flow and flow cell water temperature (Temp)

**Figure 30:** Time series of precipitation, flow and turbidity (TB)

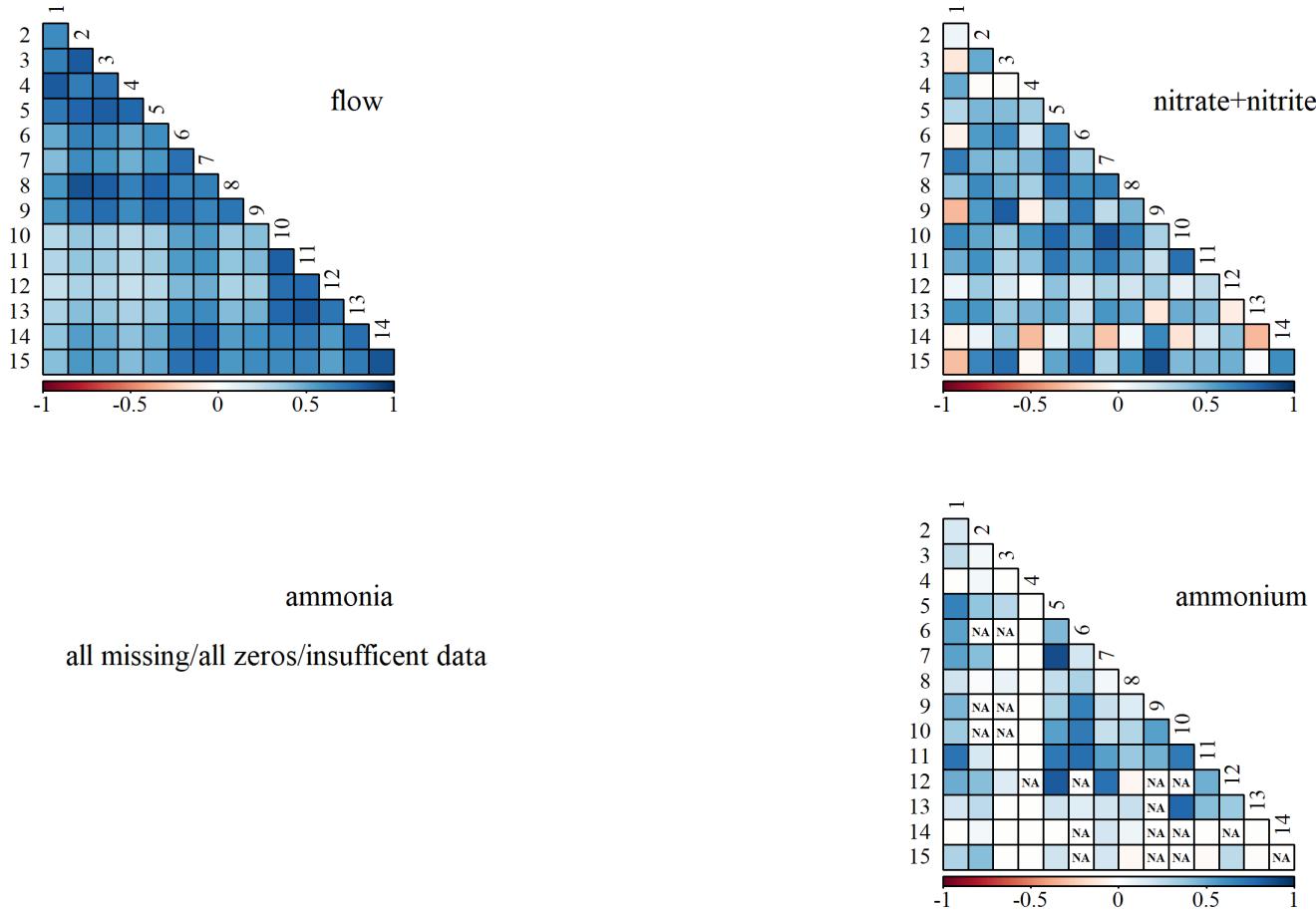
**Figure 31:** Time series of precipitation, flow and total phosphorus (TP)



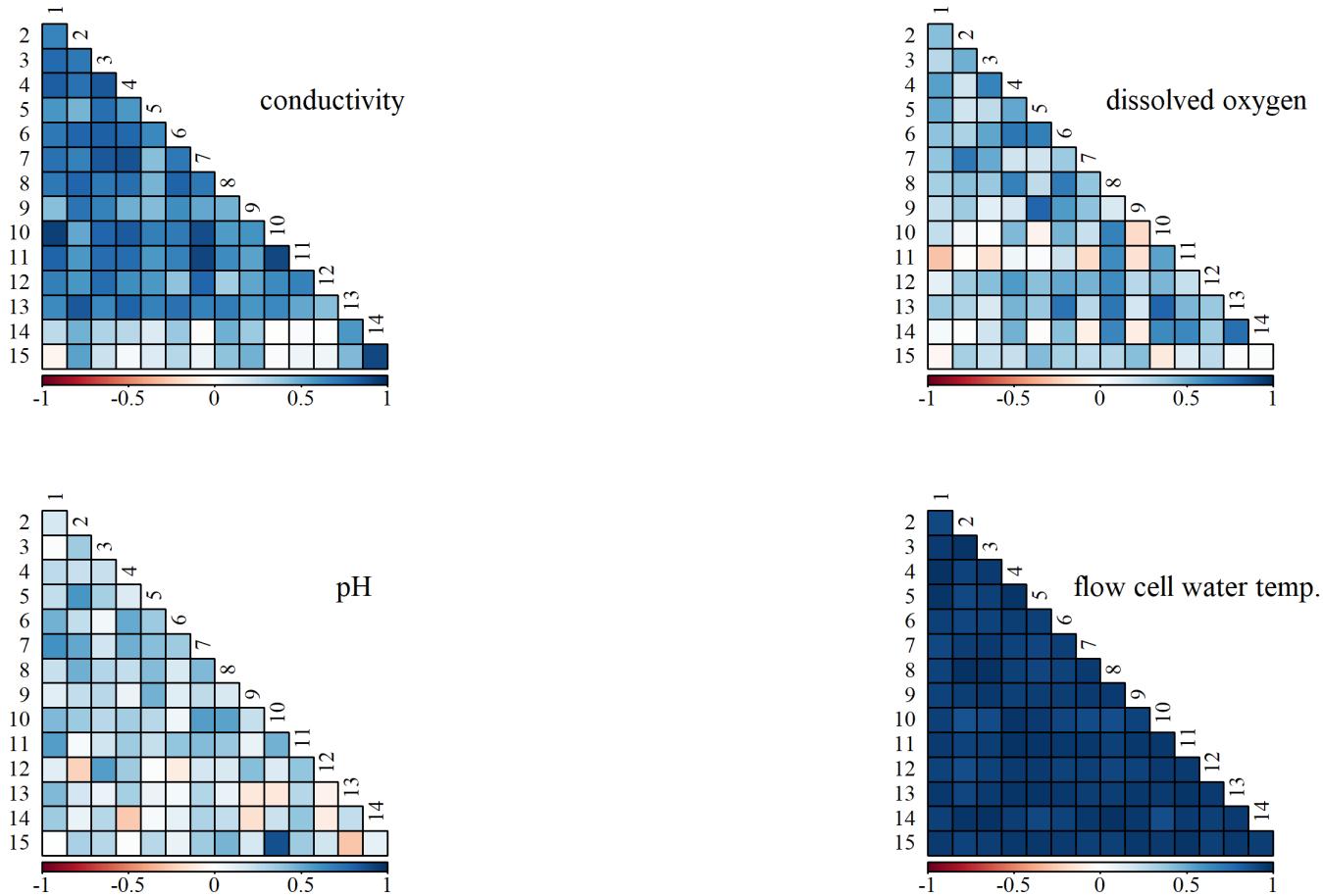
**Figure 32:** Time series of precipitation, flow and dissolved organic matter (fDOM)

**Figure 33:** Time series of precipitation, flow and ortho-phosphorus (OP)

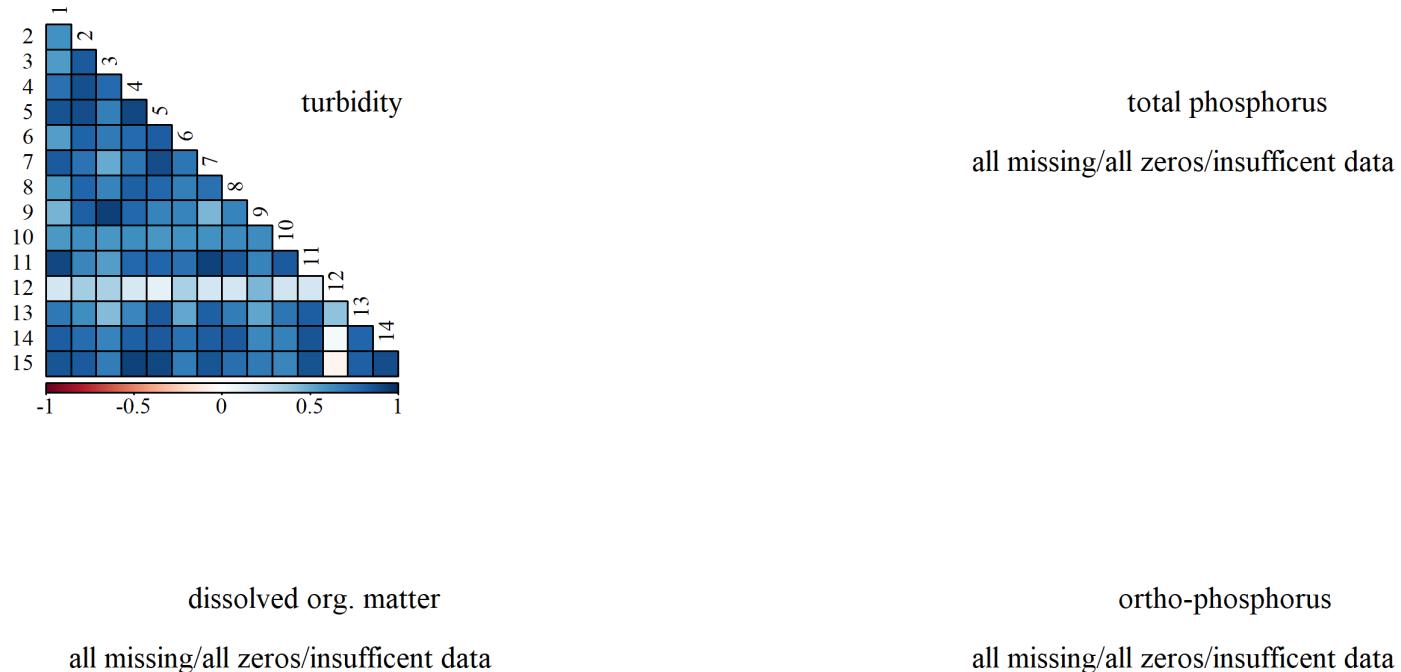
## 1.6 Correlations



**Figure 34:** Correlations between catchments - flow, nitrate+nitrite, ammonia, ammonium



**Figure 35:** Correlations between catchments - conductivity, dissolved oxygen, pH, flow cell water temperature

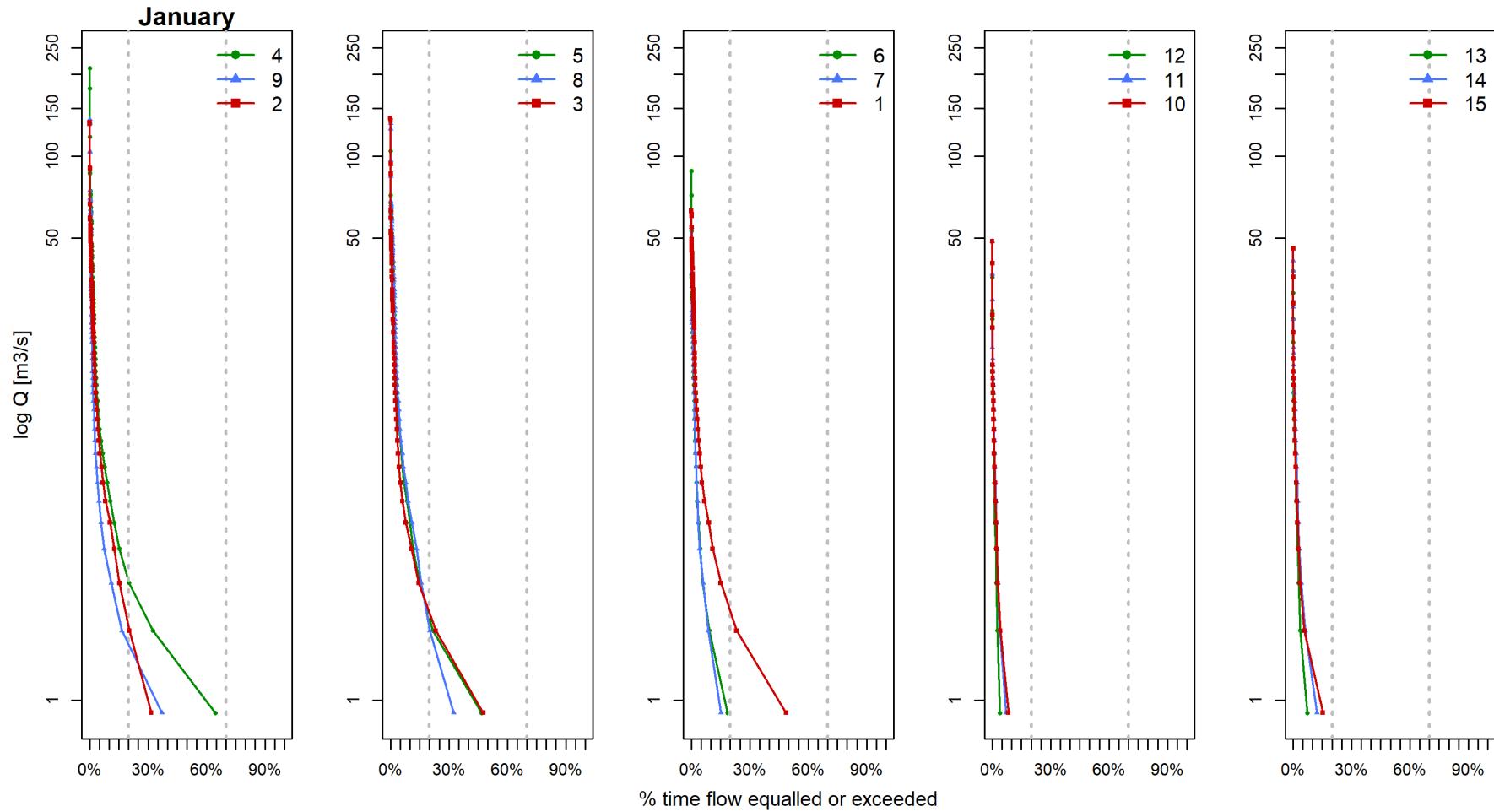


**Figure 36:** Correlations between catchments - turbidity, total phosphorus, dissolved organic matter, ortho-phosphorus

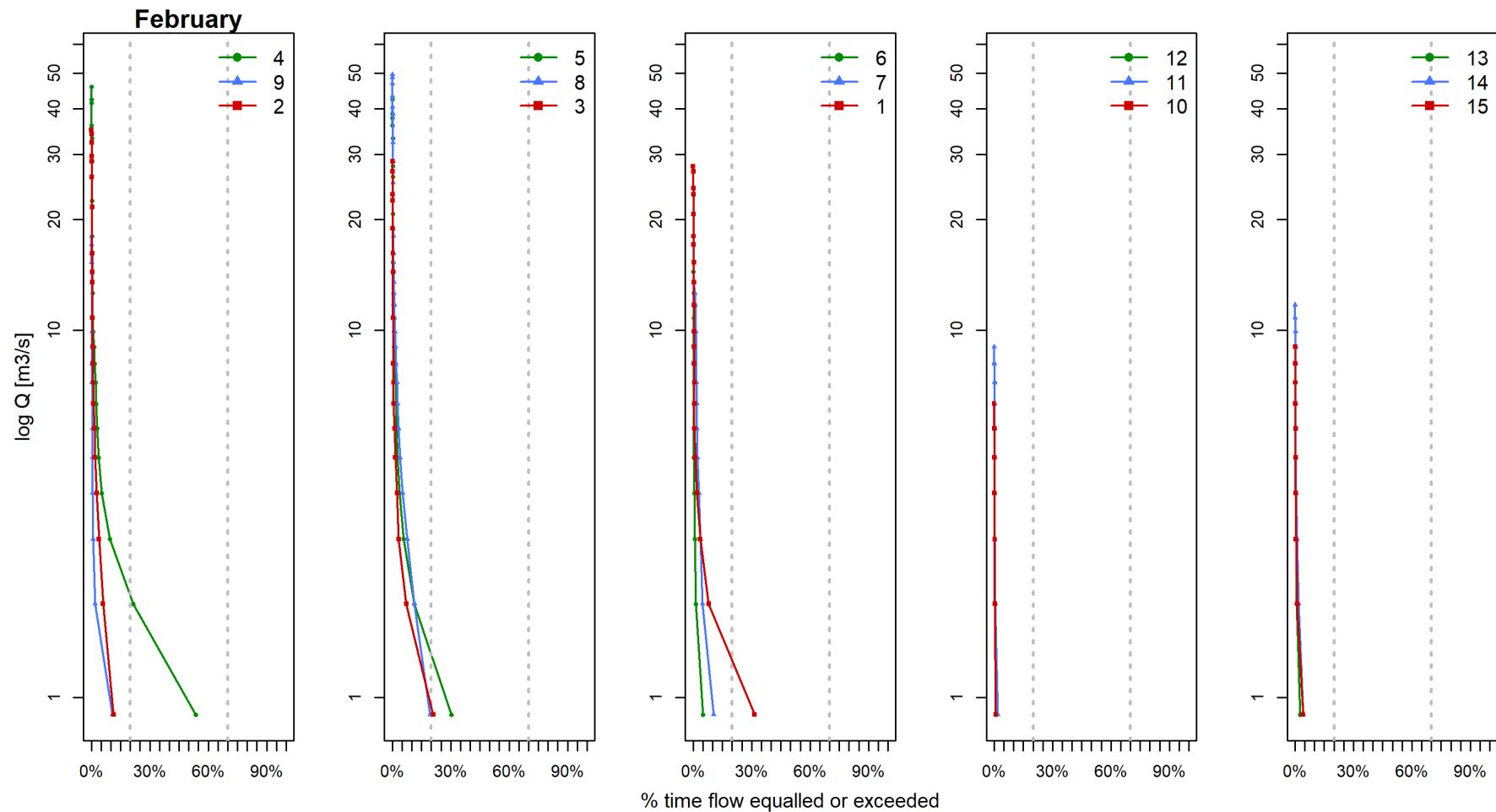
## 2 MONTHLY

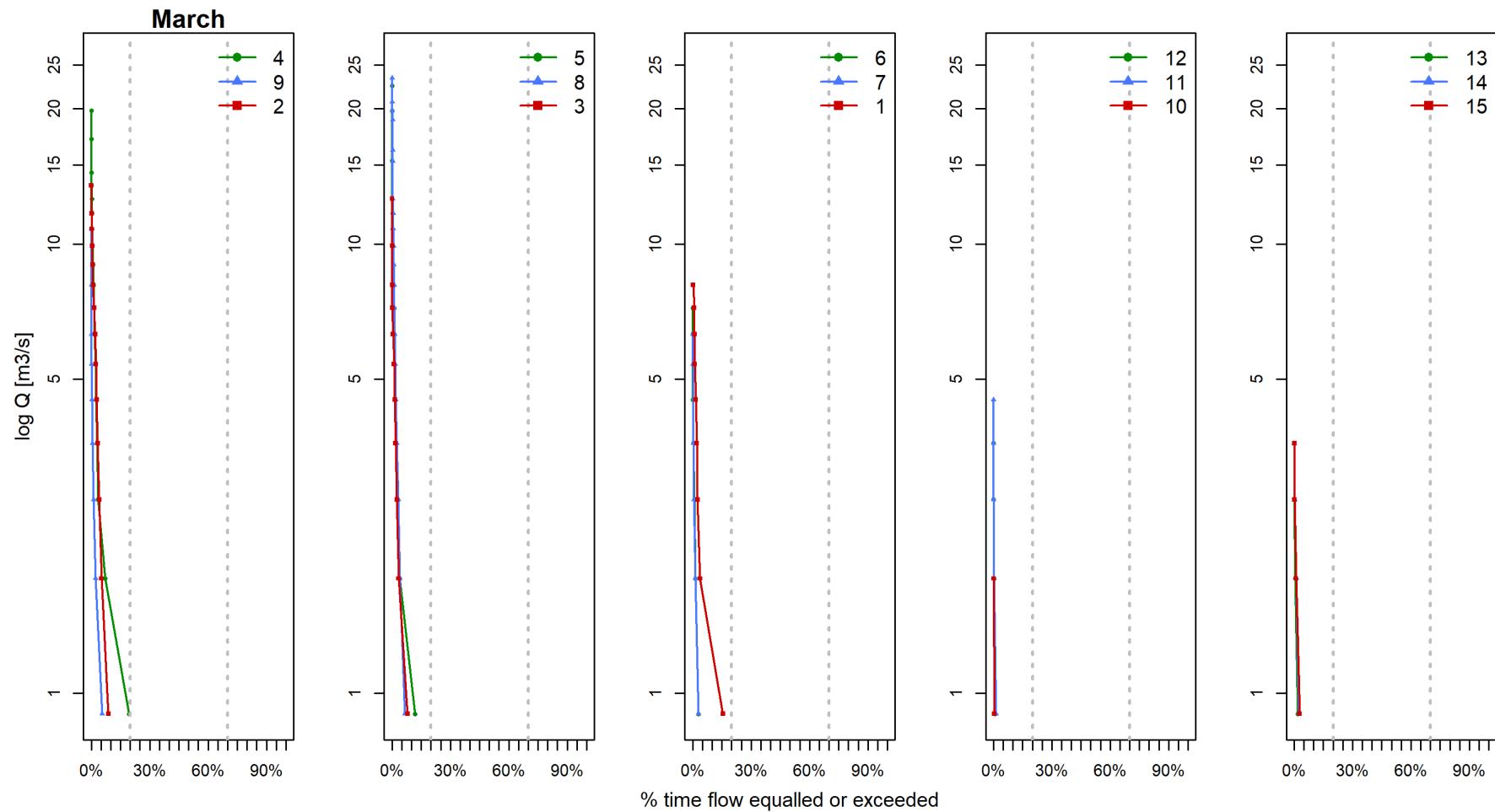
### 2.1 Flow duration curves

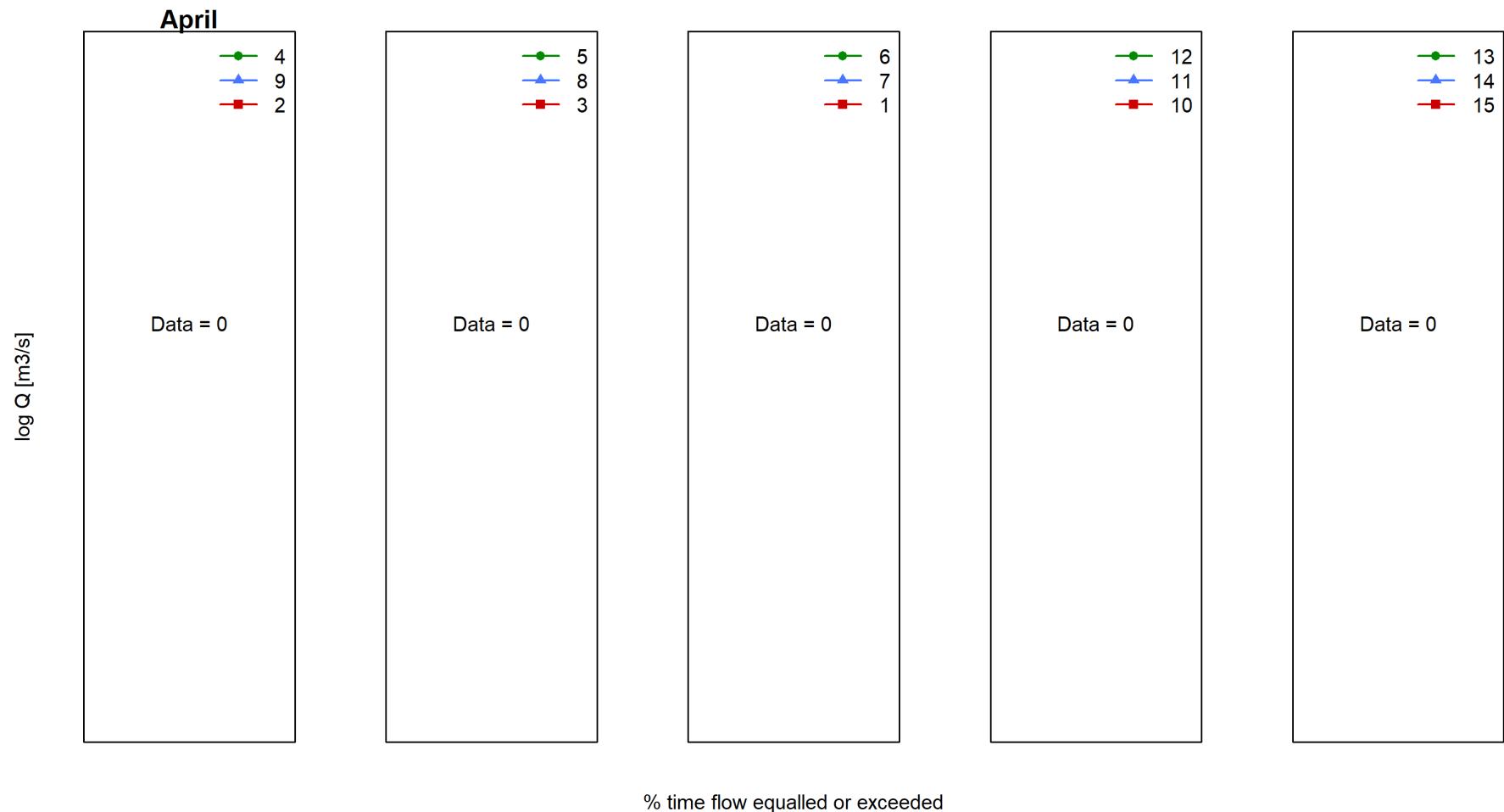
Data are in triplet/catchment order with catchments arranged from largest to smallest across the page. NB. Data may include missing values.



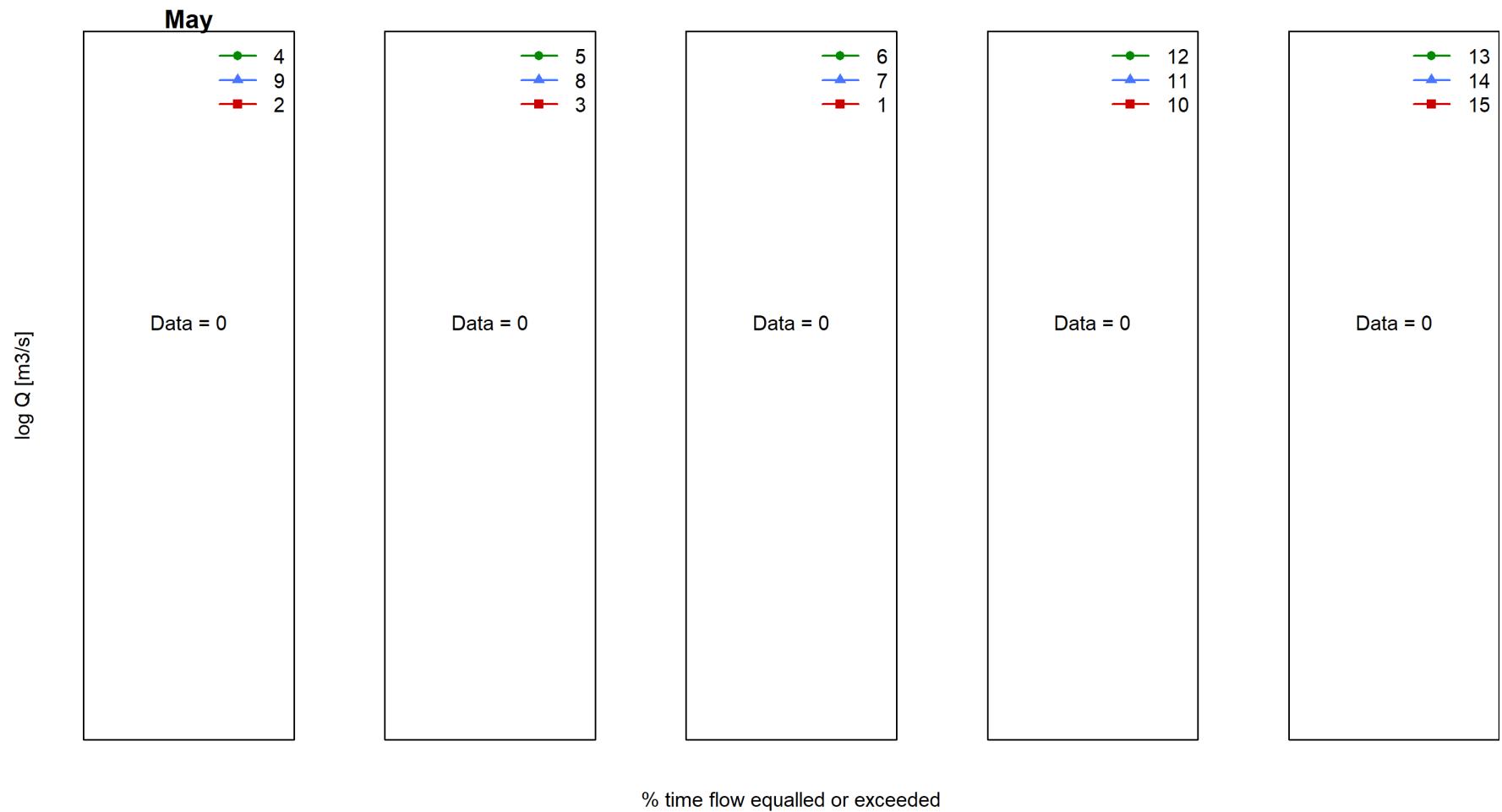
**Figure 37:** Flow duration curves for January

**Figure 38:** Flow duration curves for February

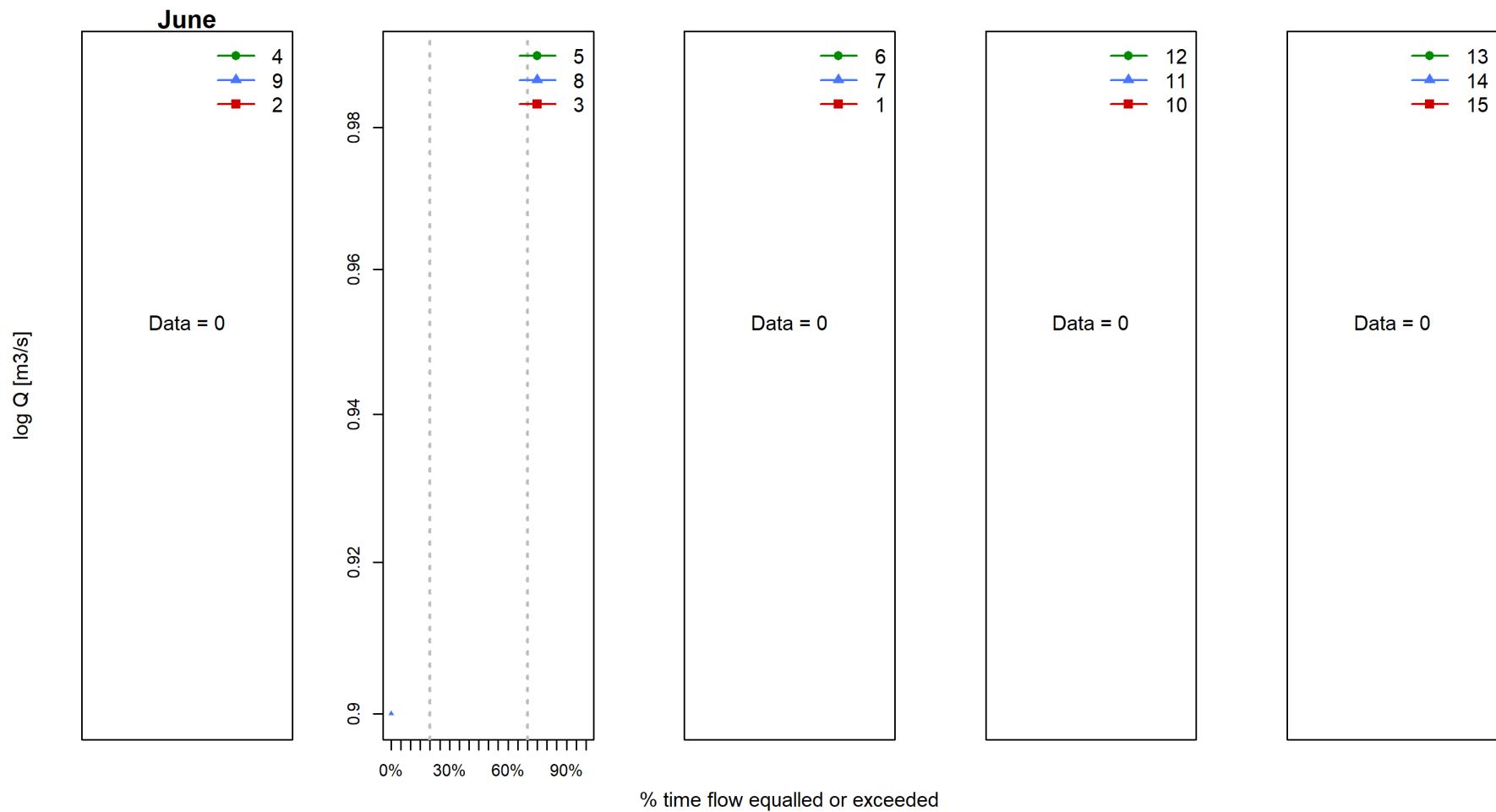
**Figure 39:** Flow duration curves for March



**Figure 40:** Flow duration curves for April



**Figure 41:** Flow duration curves for May



**Figure 42:** Flow duration curves for June

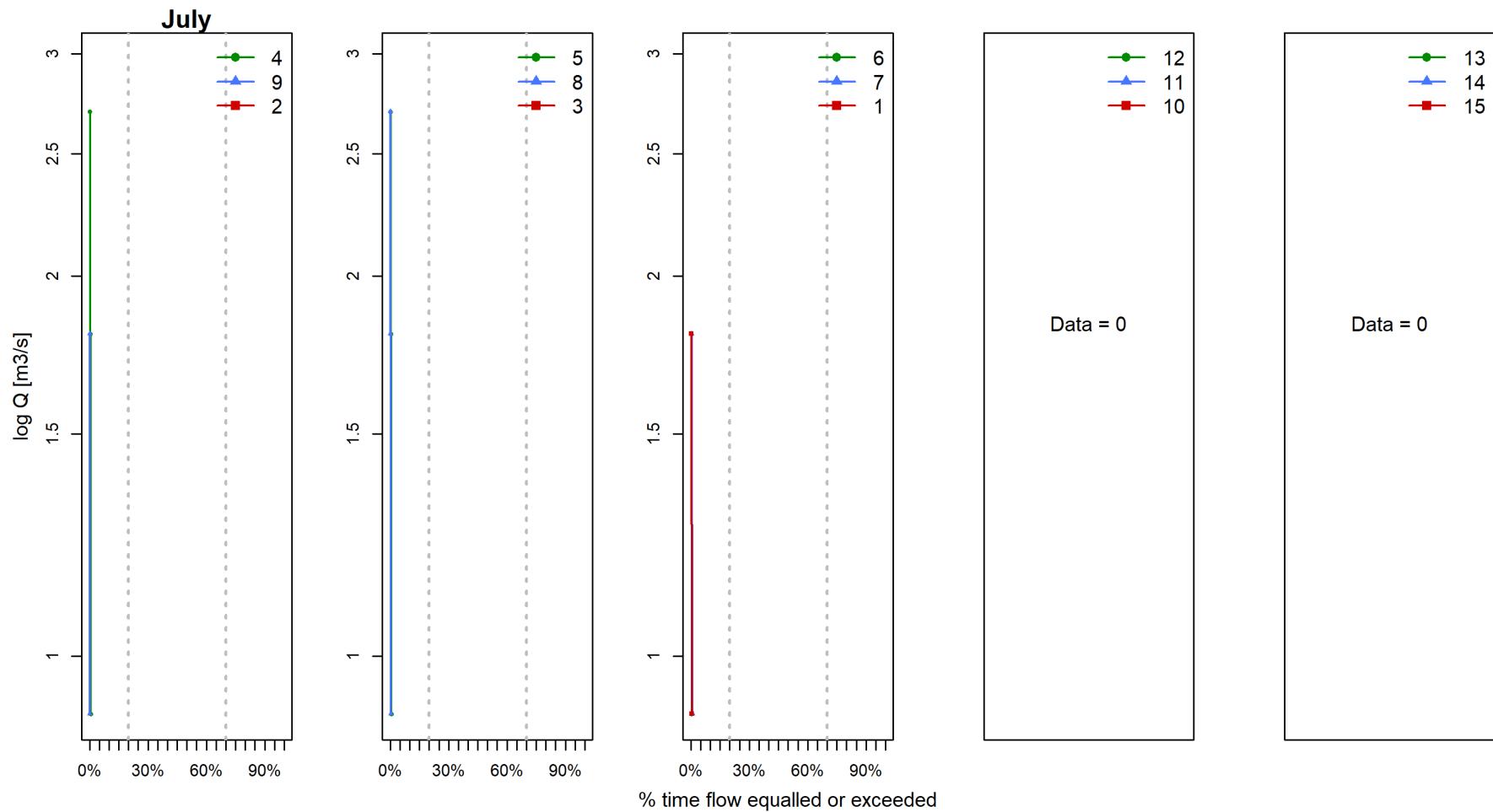
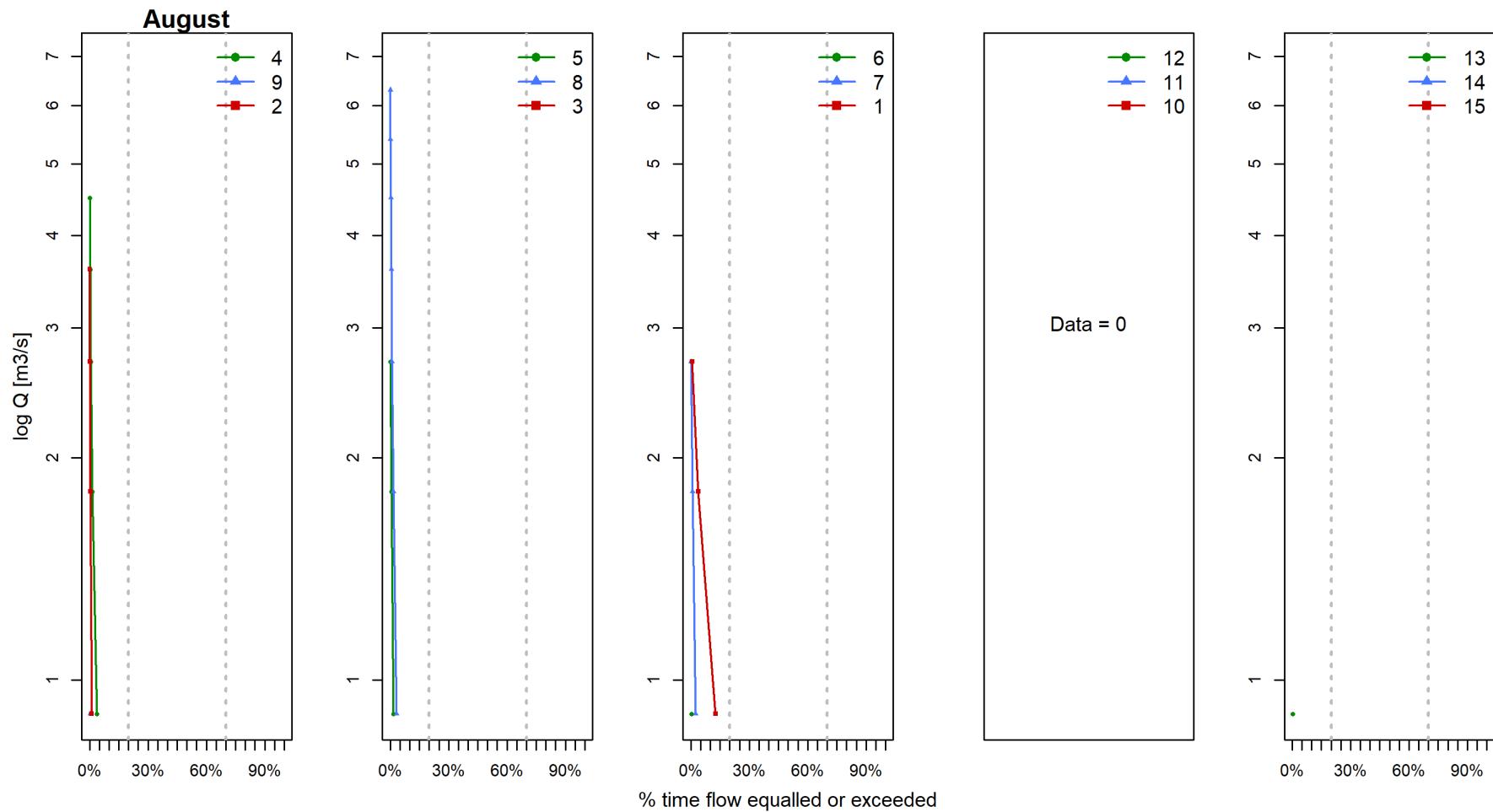
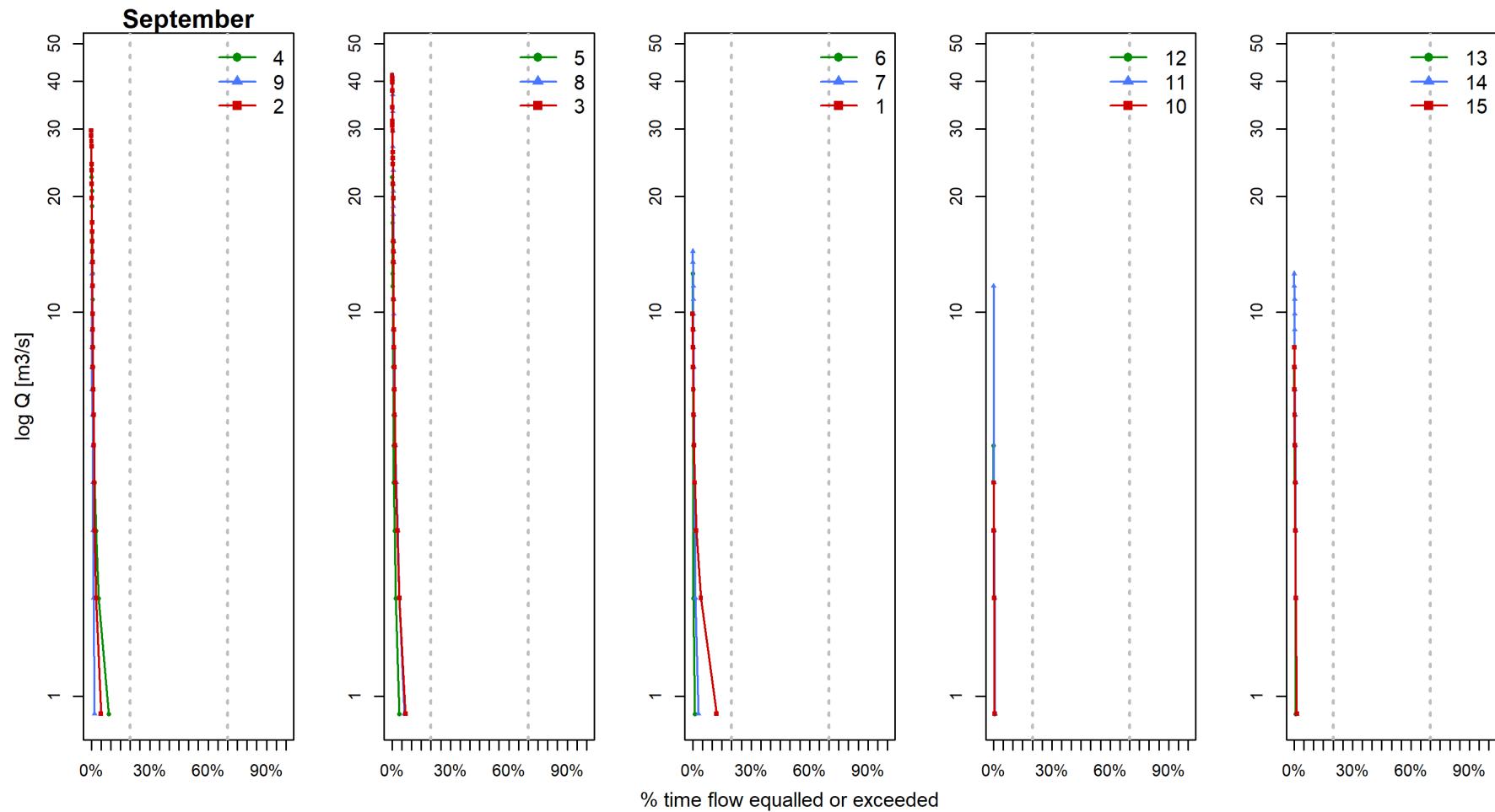
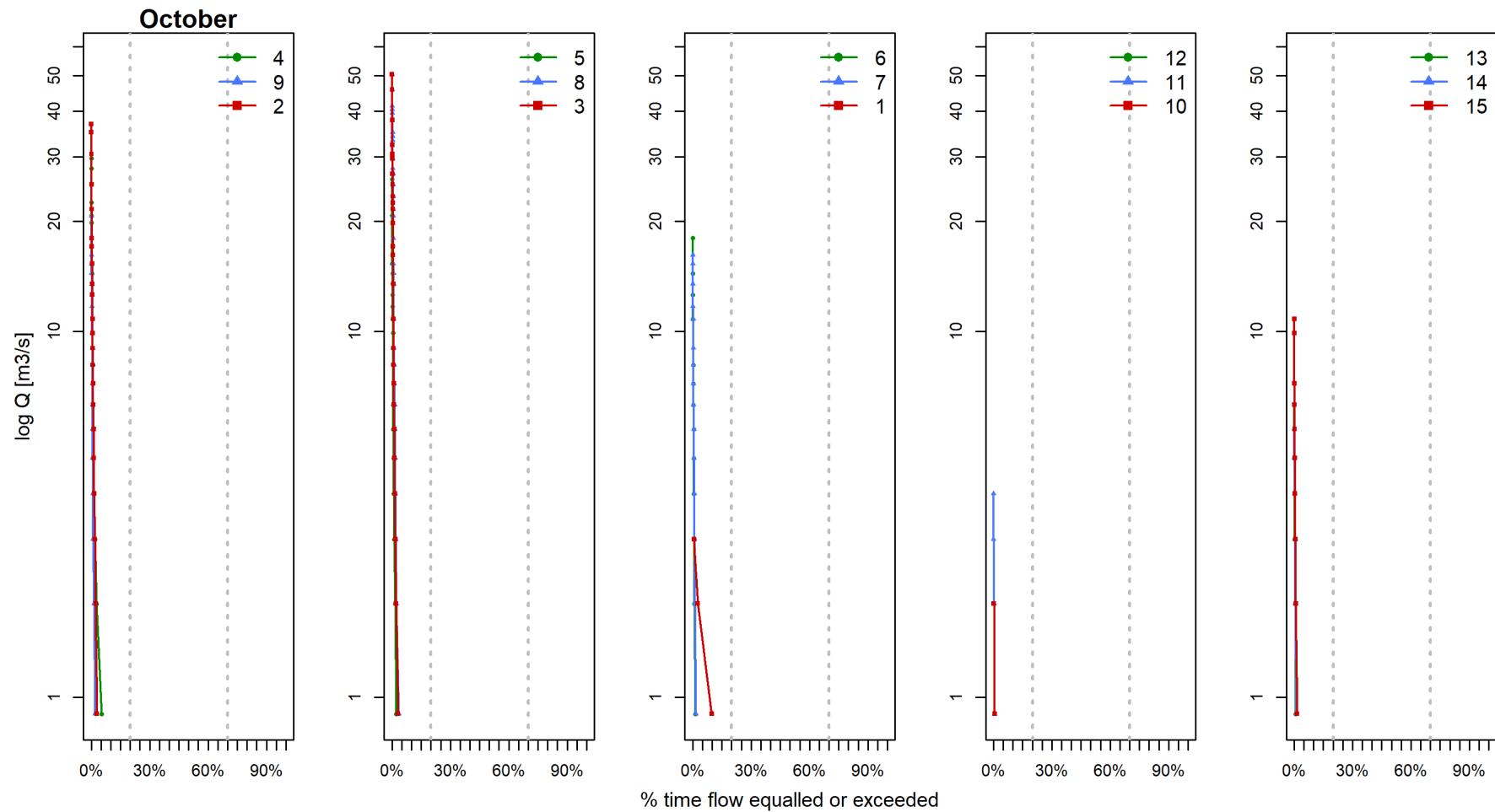
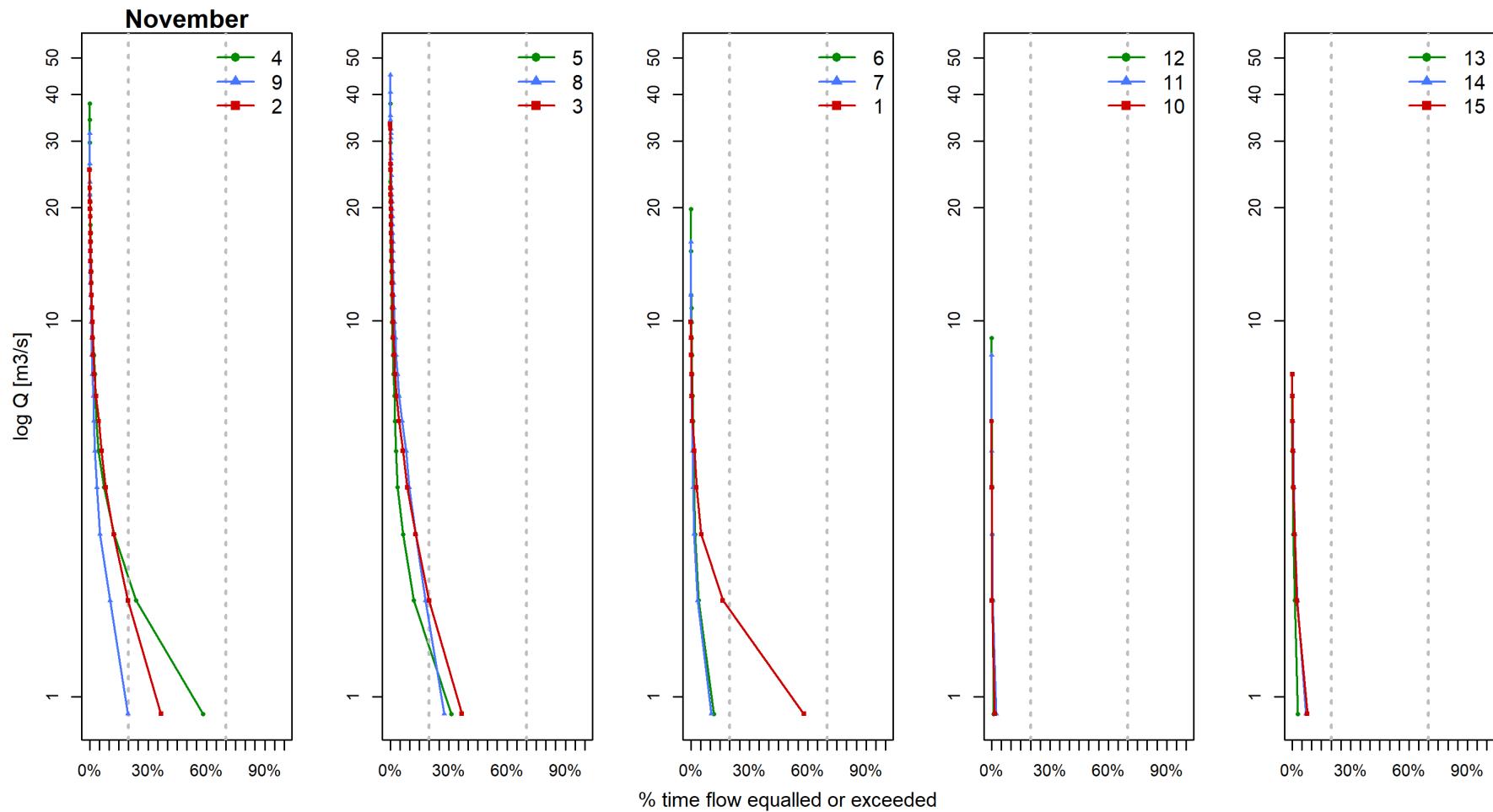


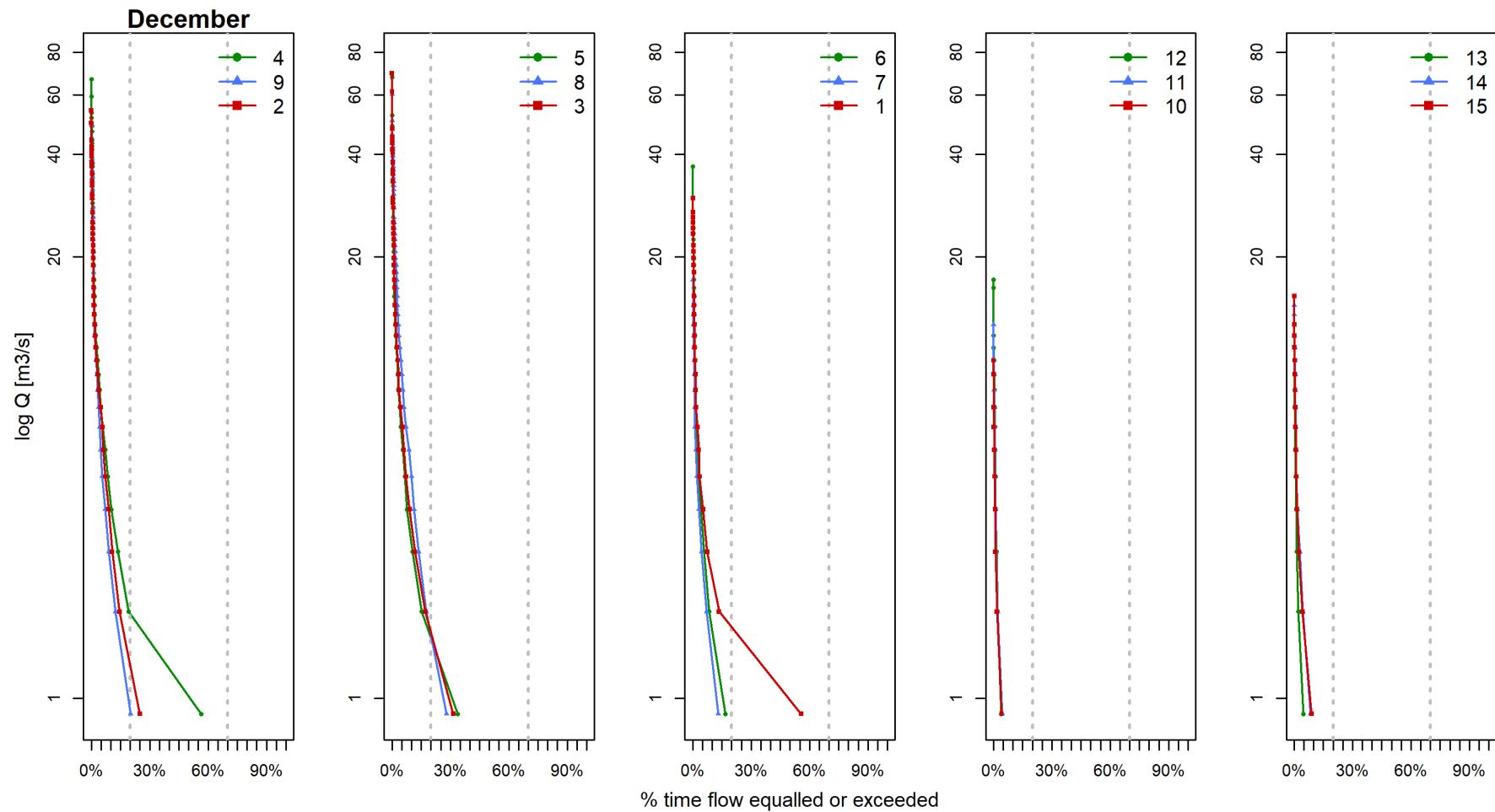
Figure 43: Flow duration curves for July

**Figure 44:** Flow duration curves for August

**Figure 45:** Flow duration curves for September

**Figure 46:** Flow duration curves for October

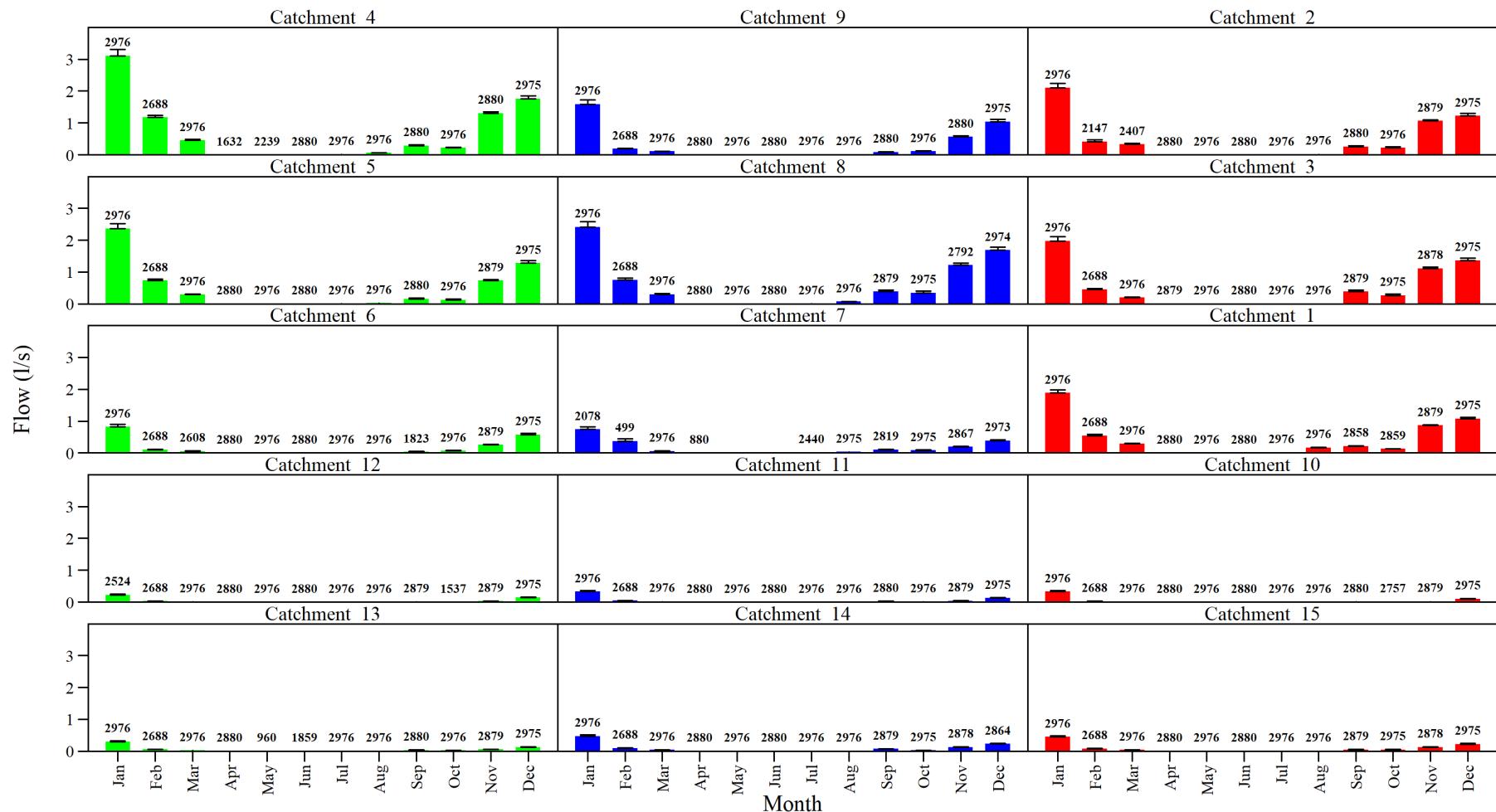
**Figure 47:** Flow duration curves for November

**Figure 48:** Flow duration curves for December

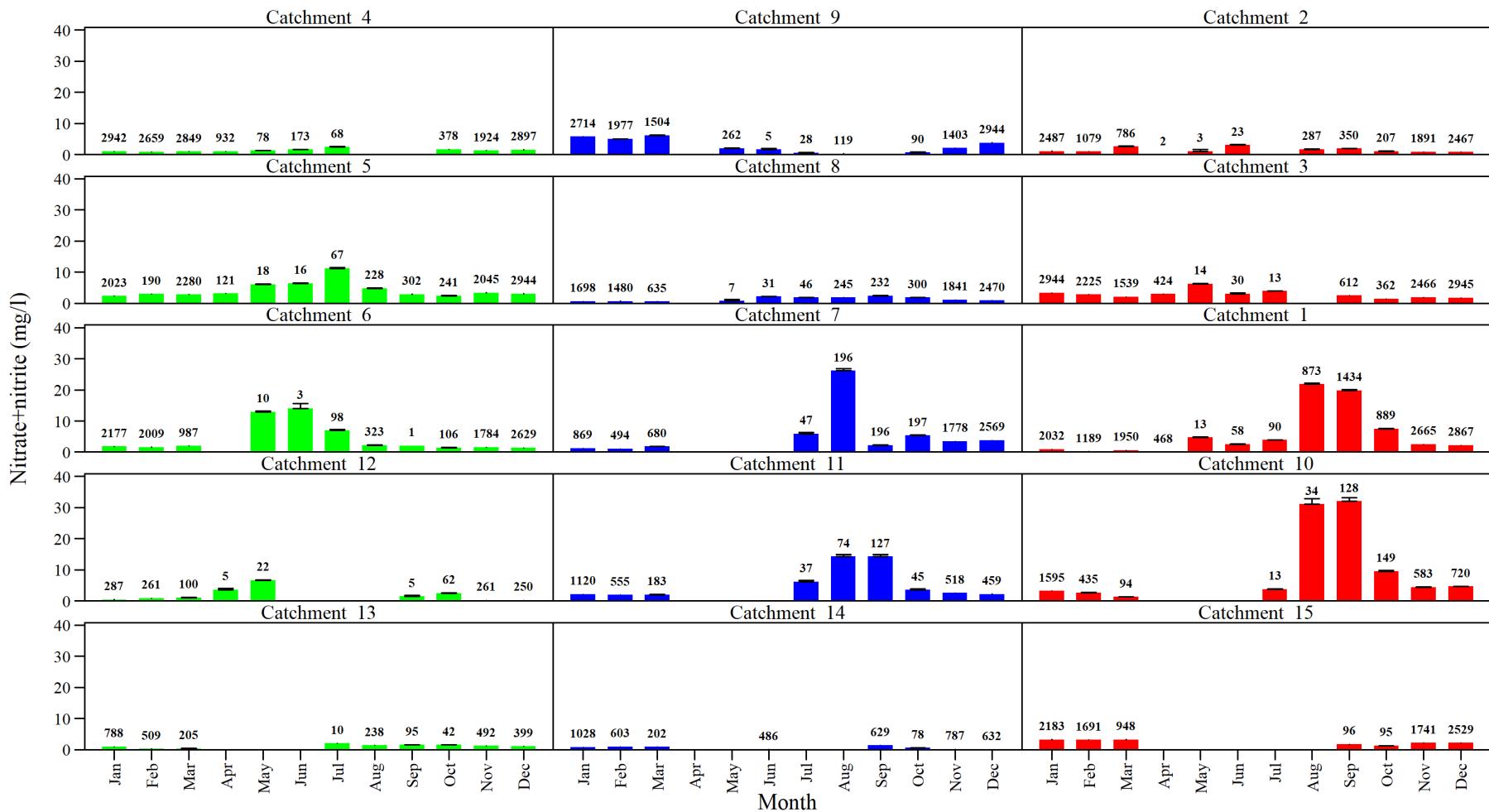
## 2.2 Means

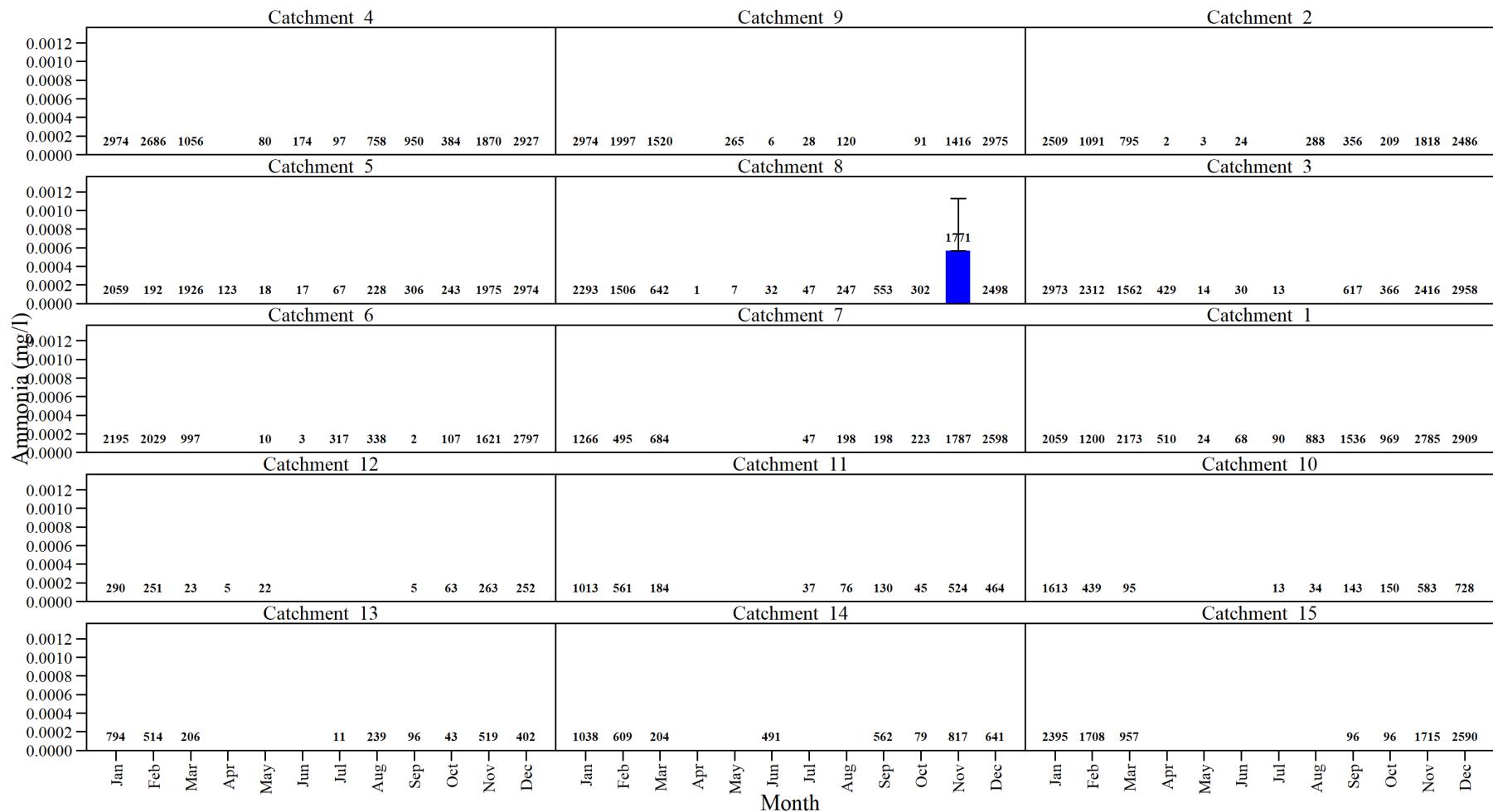
Please be aware that the means are based on data that may contain missing values. Full data summaries are available on request.

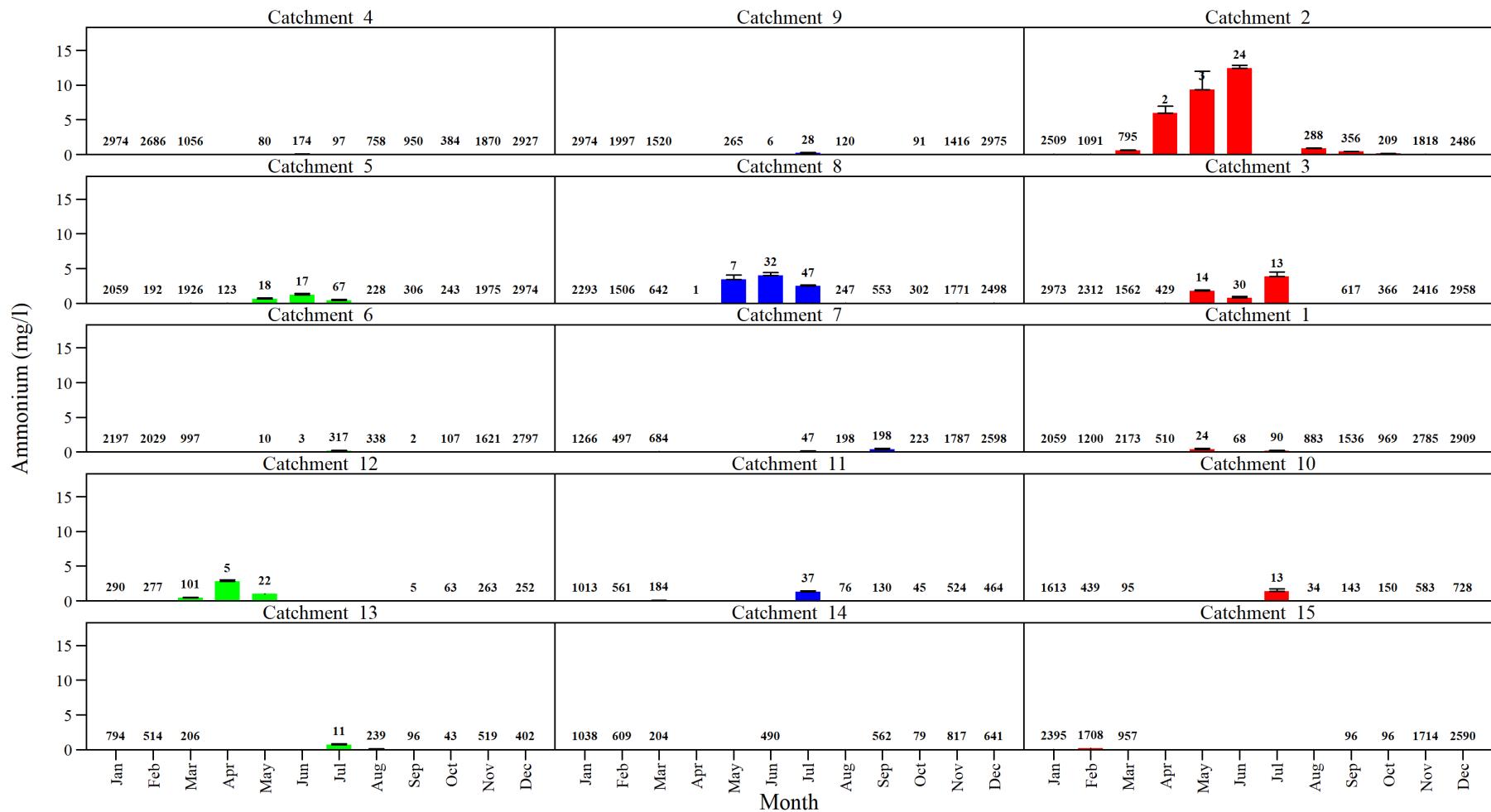
*Vertical lines = positive standard error of the mean. Values above bars = number of observations.*

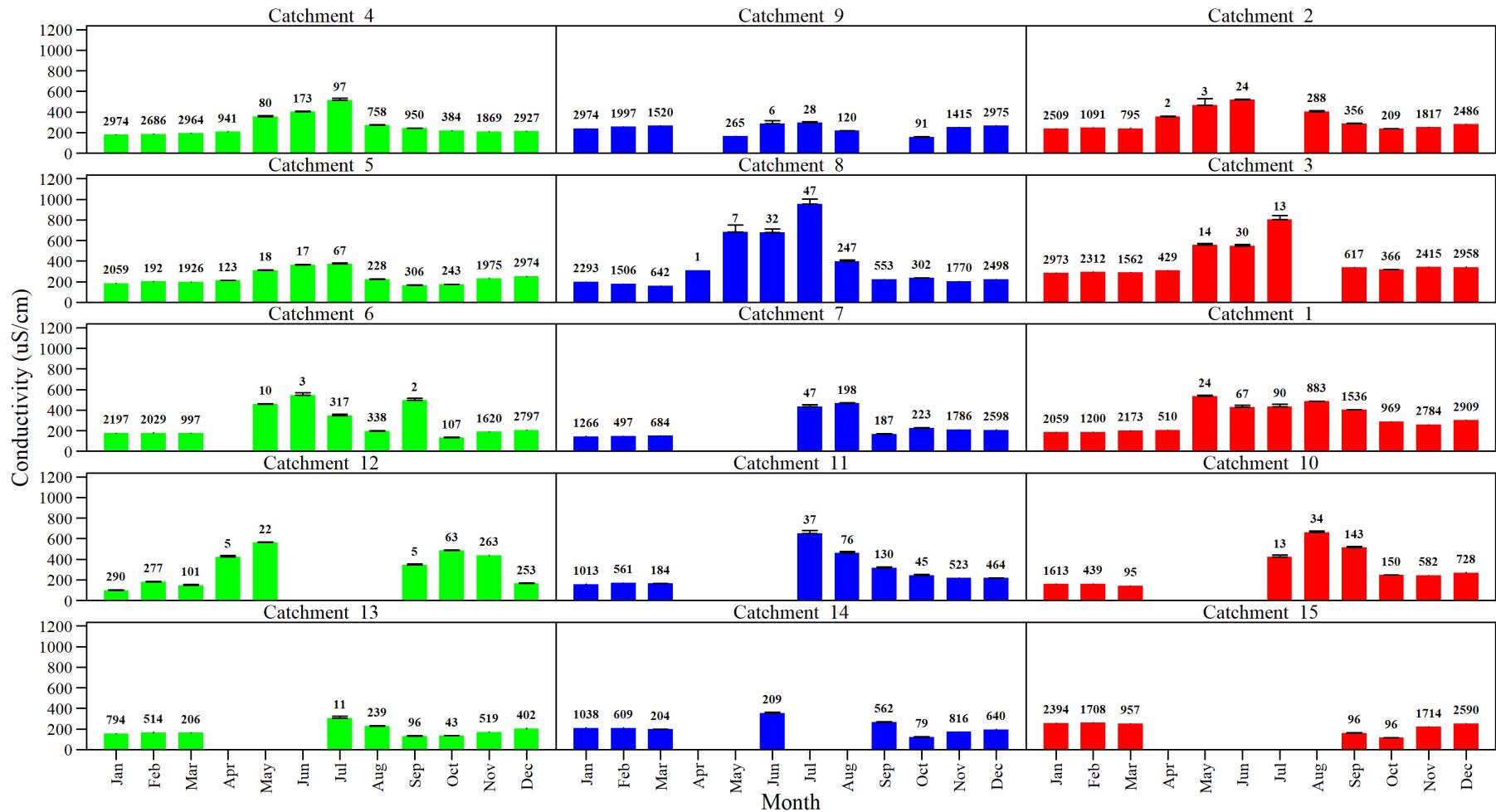


**Figure 49:** Monthly means for flow

**Figure 50:** Monthly means for nitrate+nitrite

**Figure 51:** Monthly means for ammonia

**Figure 52:** Monthly means for ammonium

**Figure 53:** Monthly means for conductivity

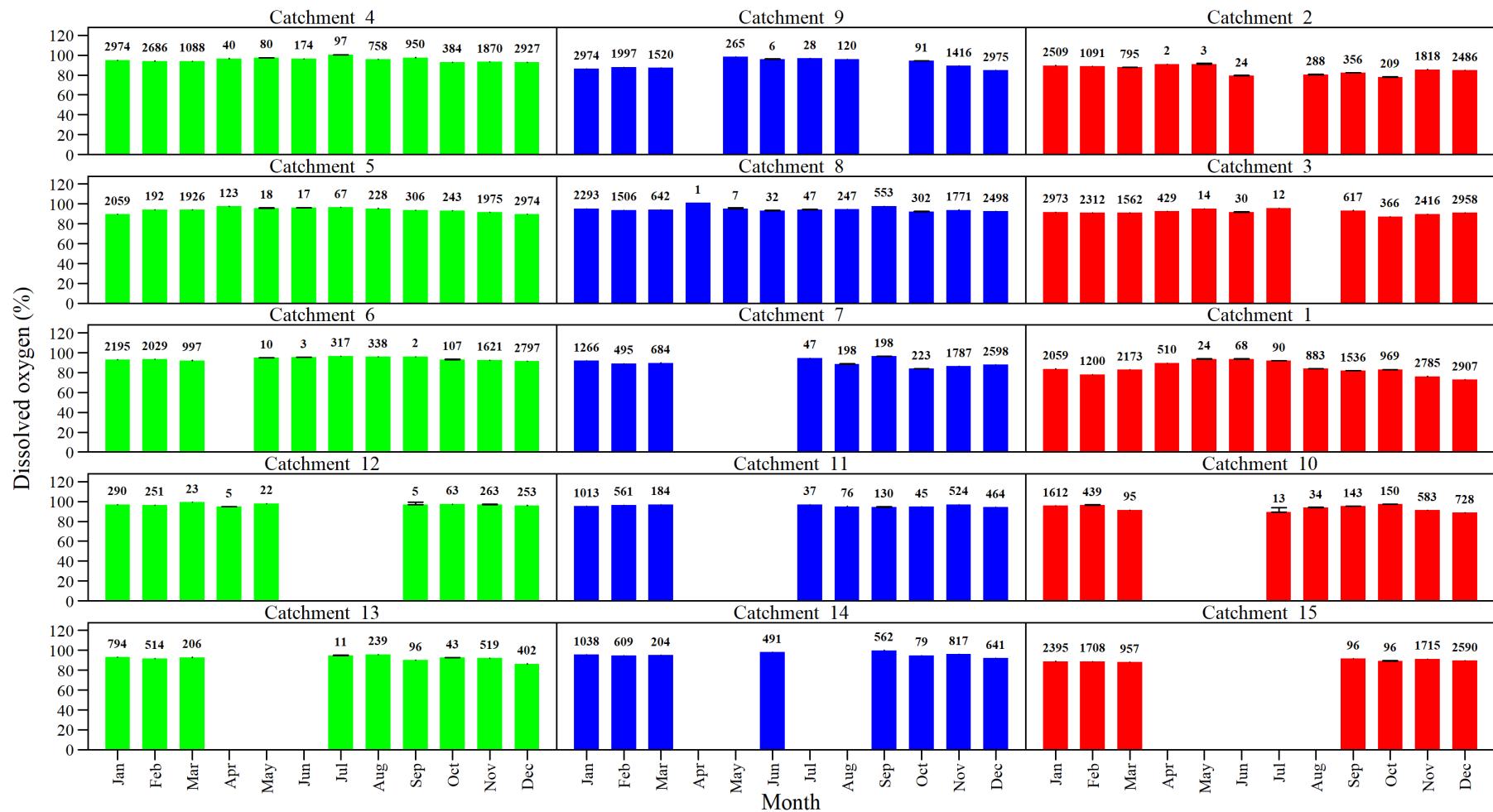


Figure 54: Monthly means for dissolved oxygen

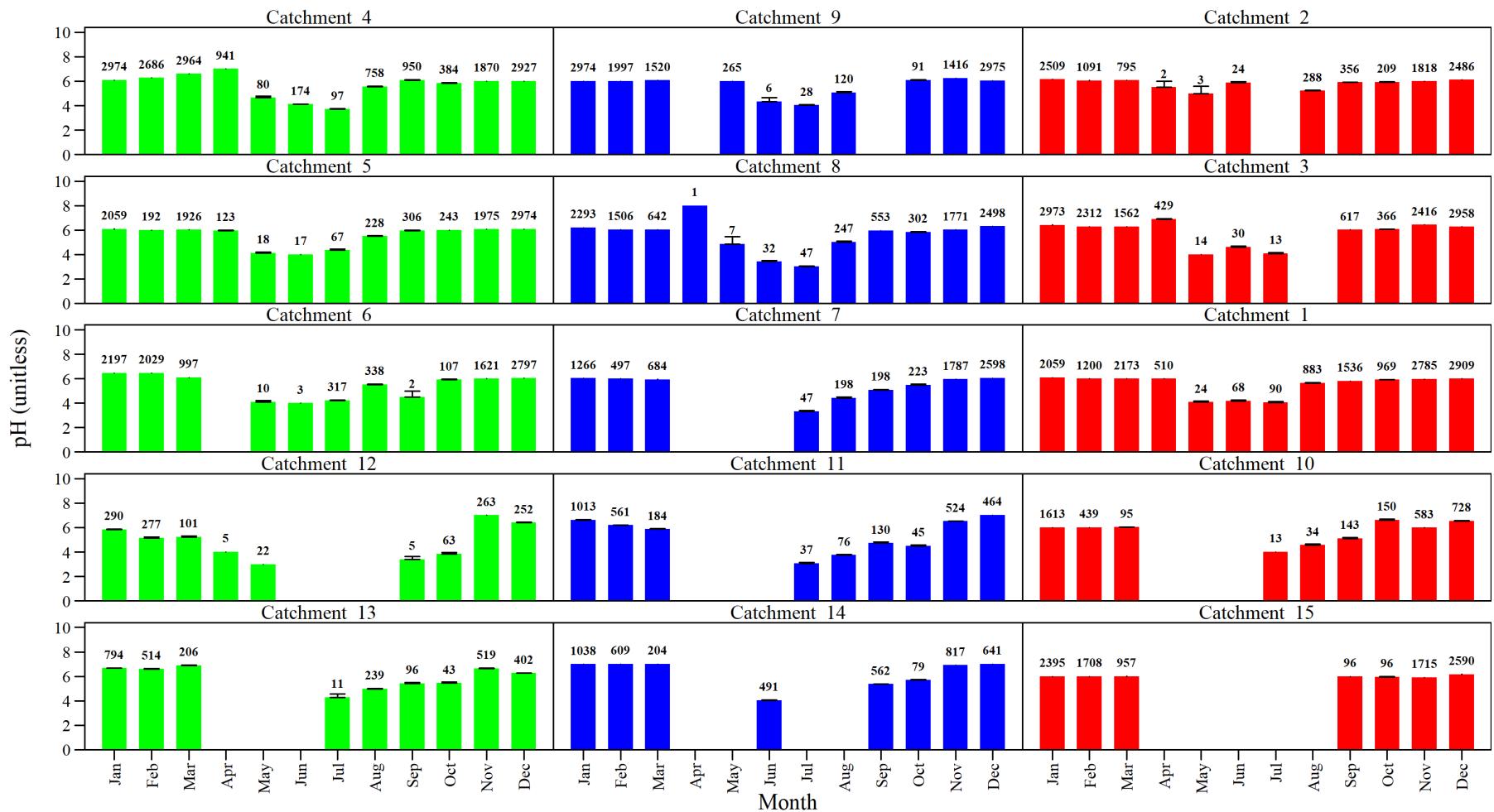


Figure 55: Monthly means for pH

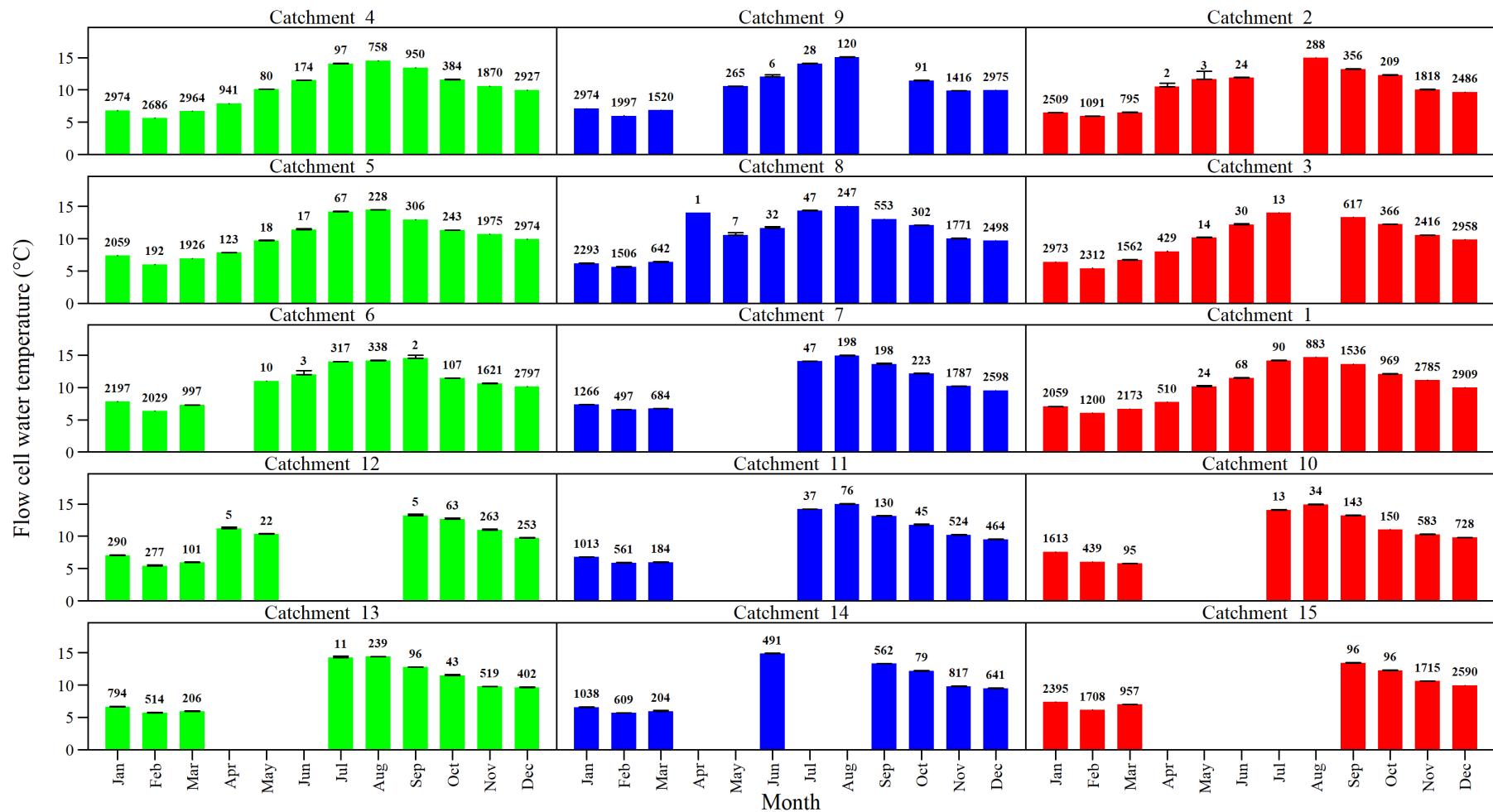
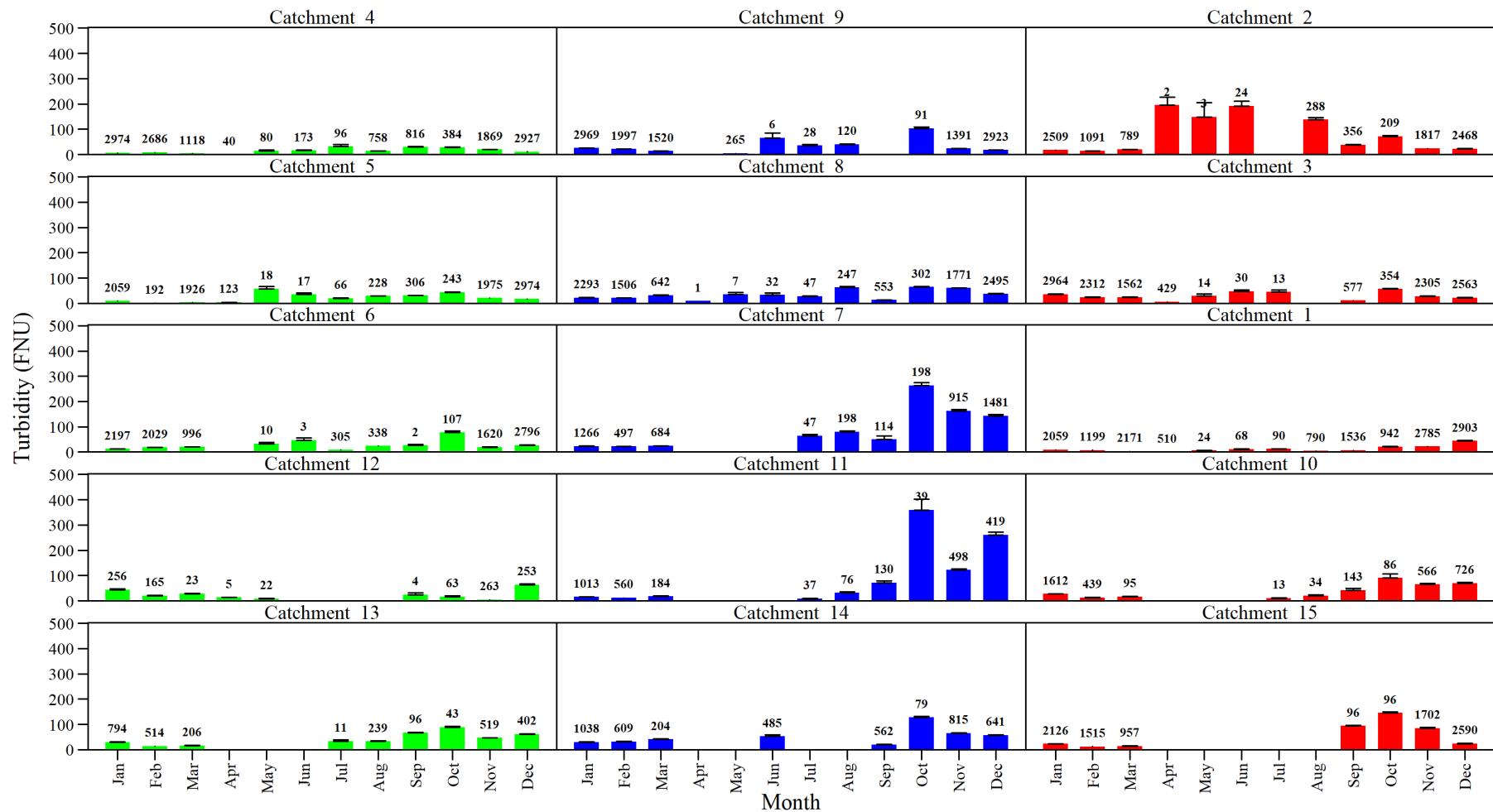
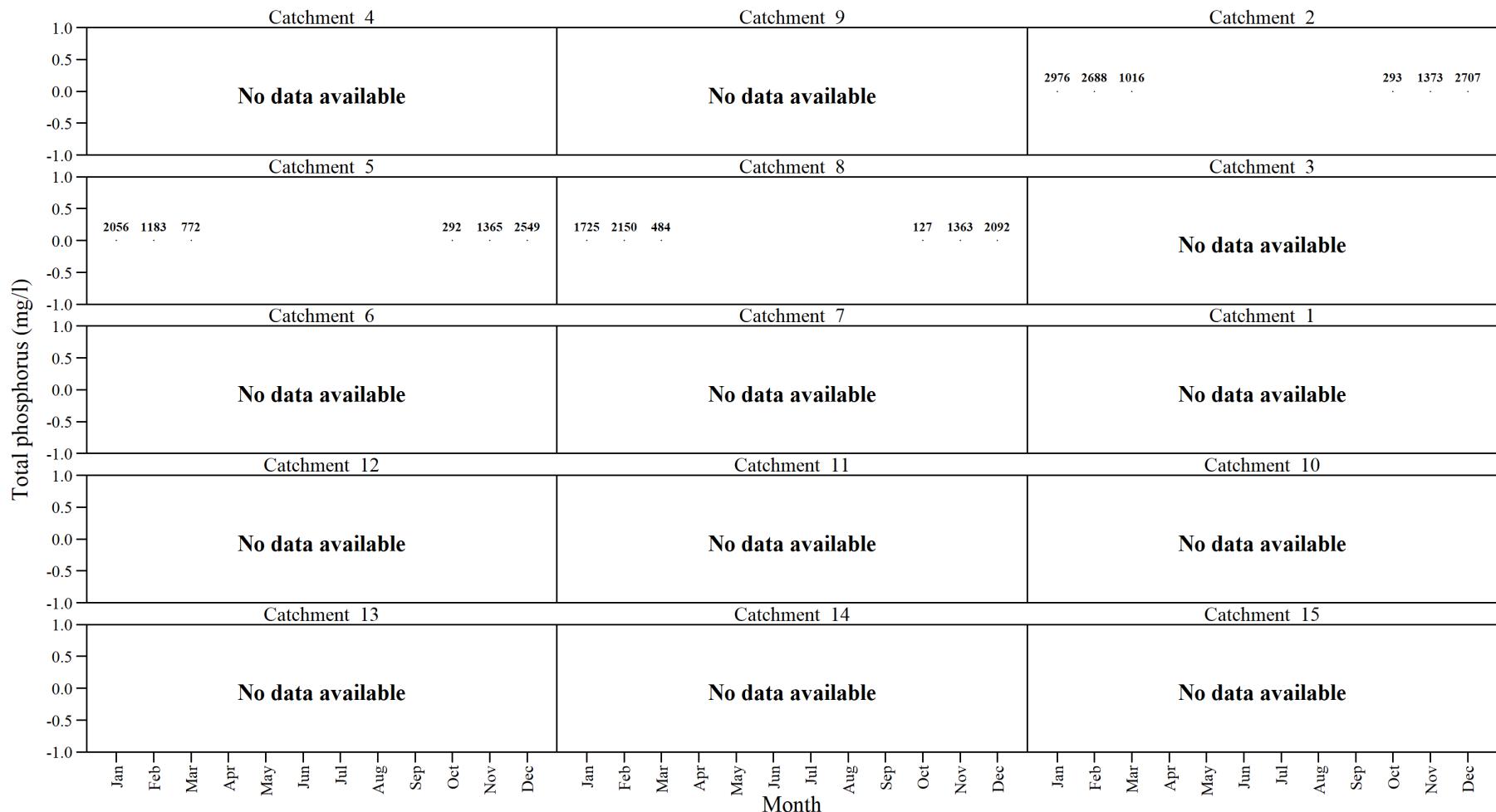
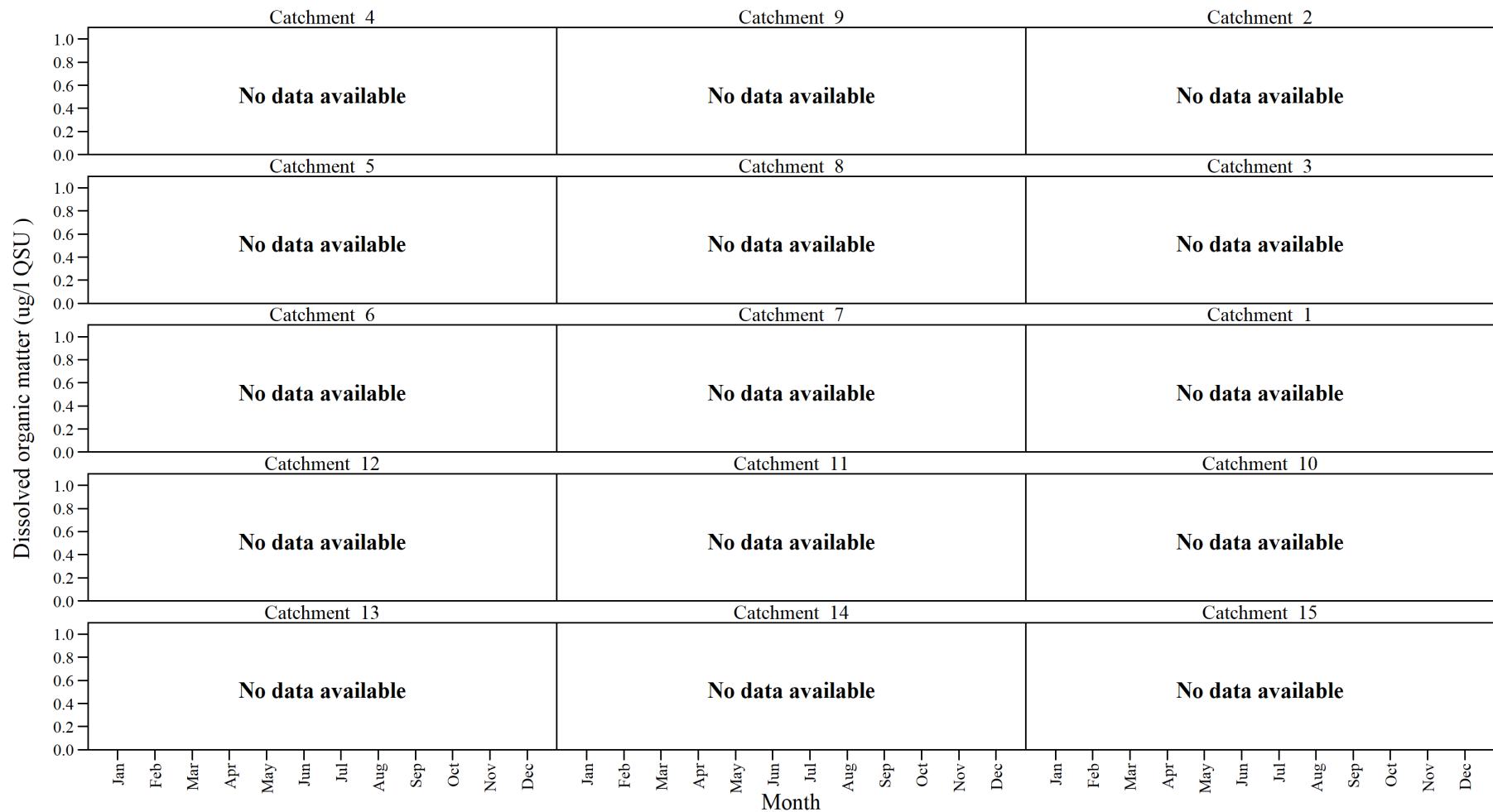
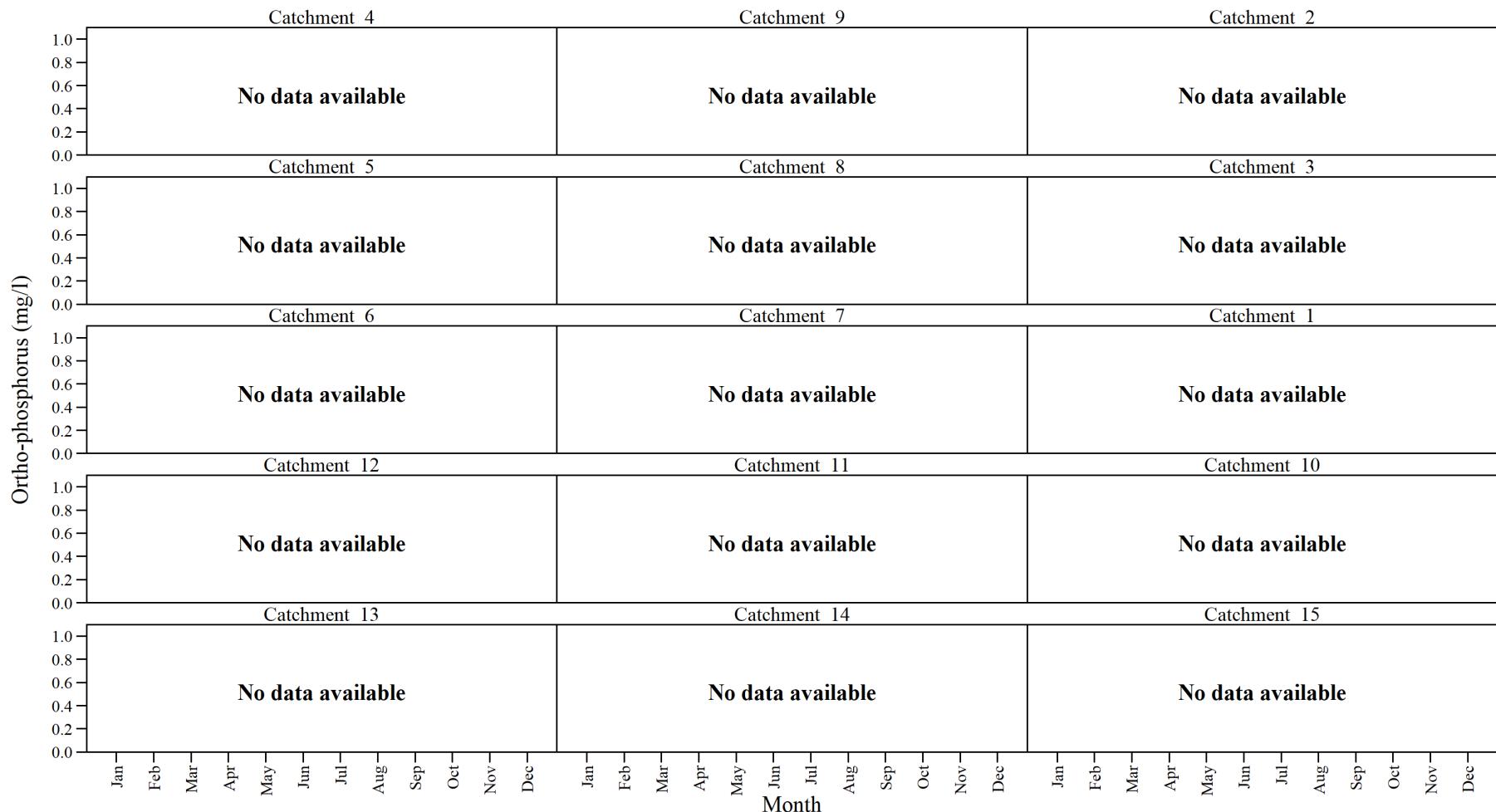


Figure 56: Monthly means for flow cell water temperature

**Figure 57:** Monthly means for turbidity

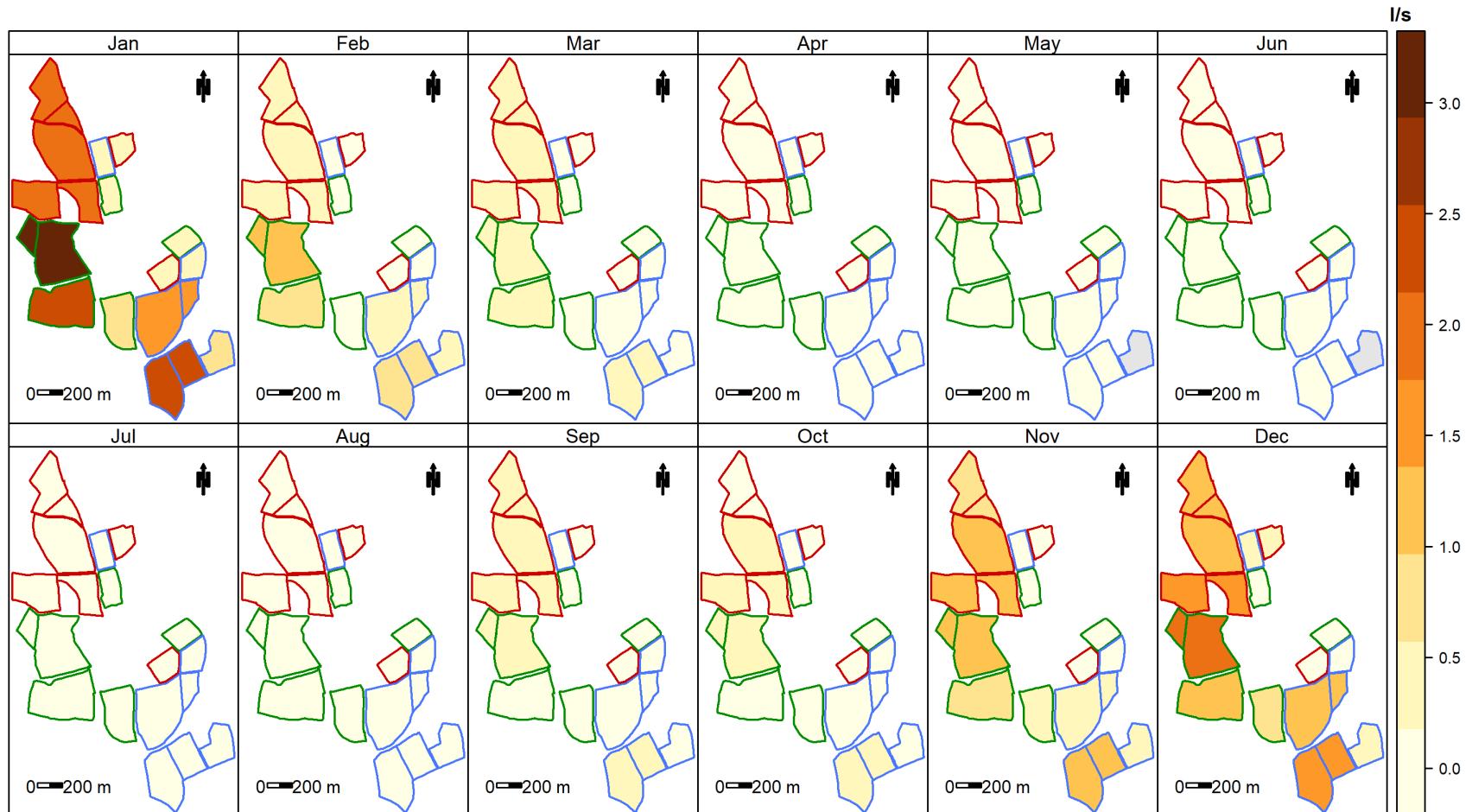
**Figure 58:** Monthly means for total phosphorus

**Figure 59:** Monthly means for dissolved organic matter

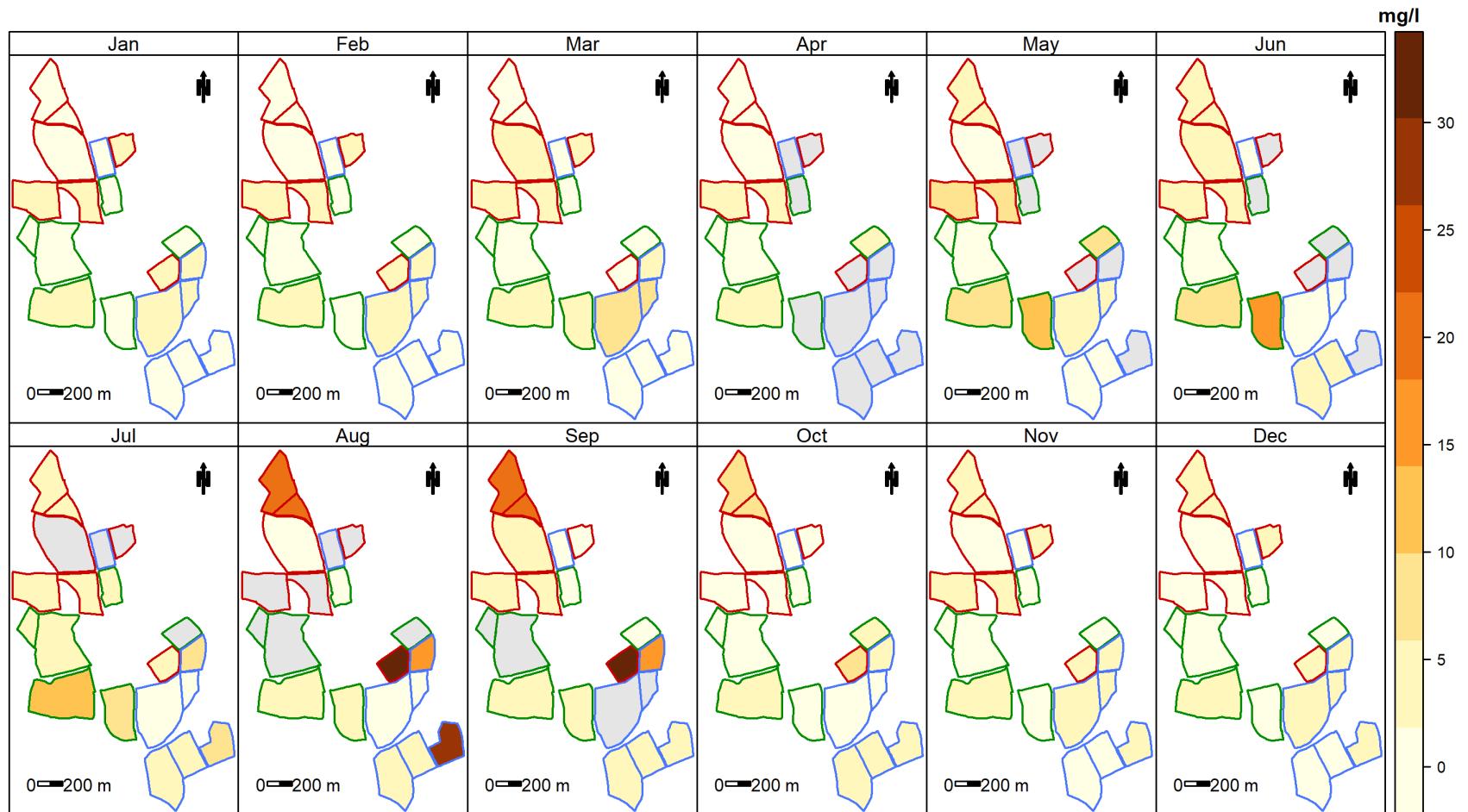
**Figure 60:** Monthly means for ortho-phosphorus

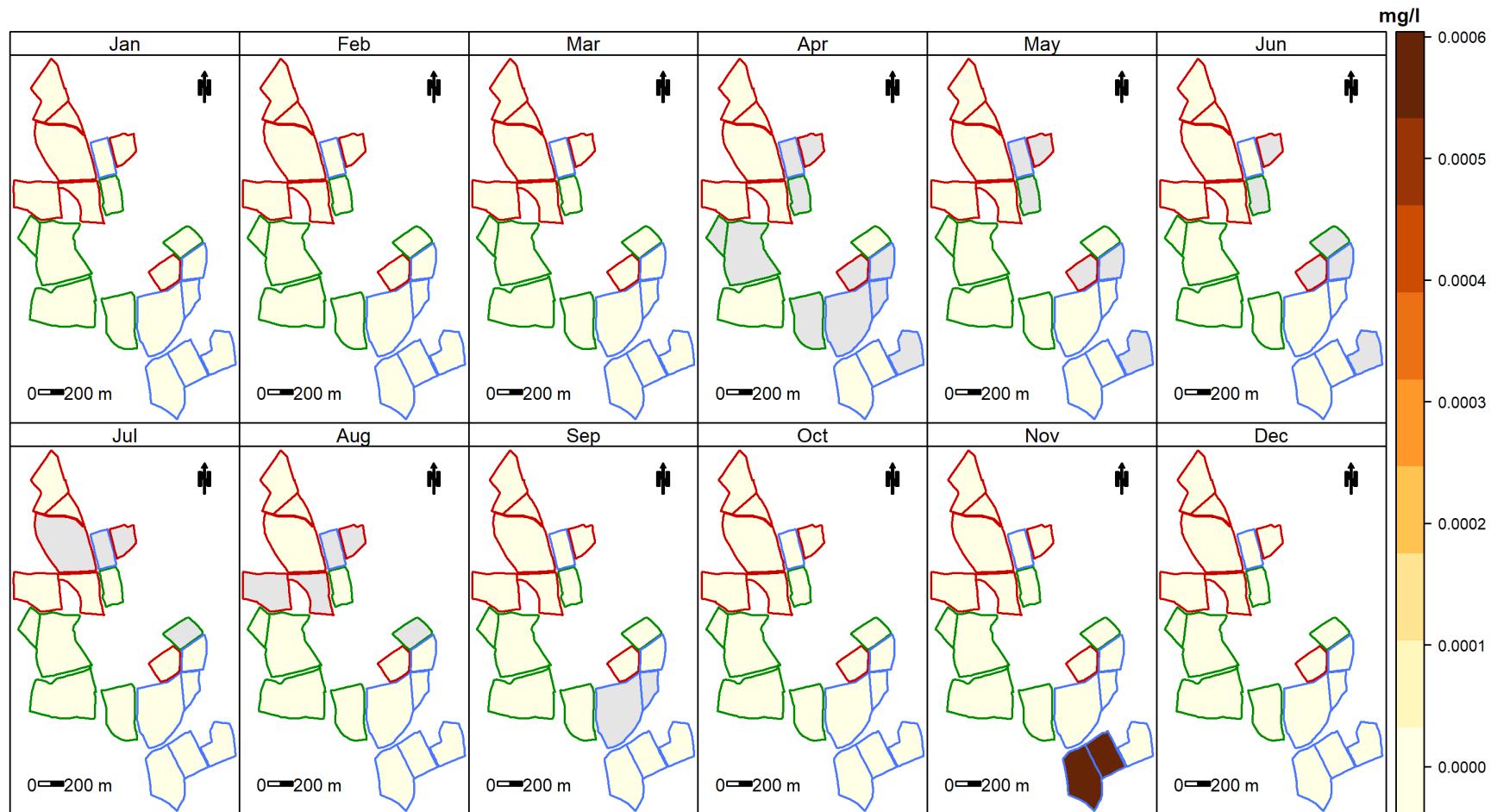
## 2.3 Chloropleth maps of means

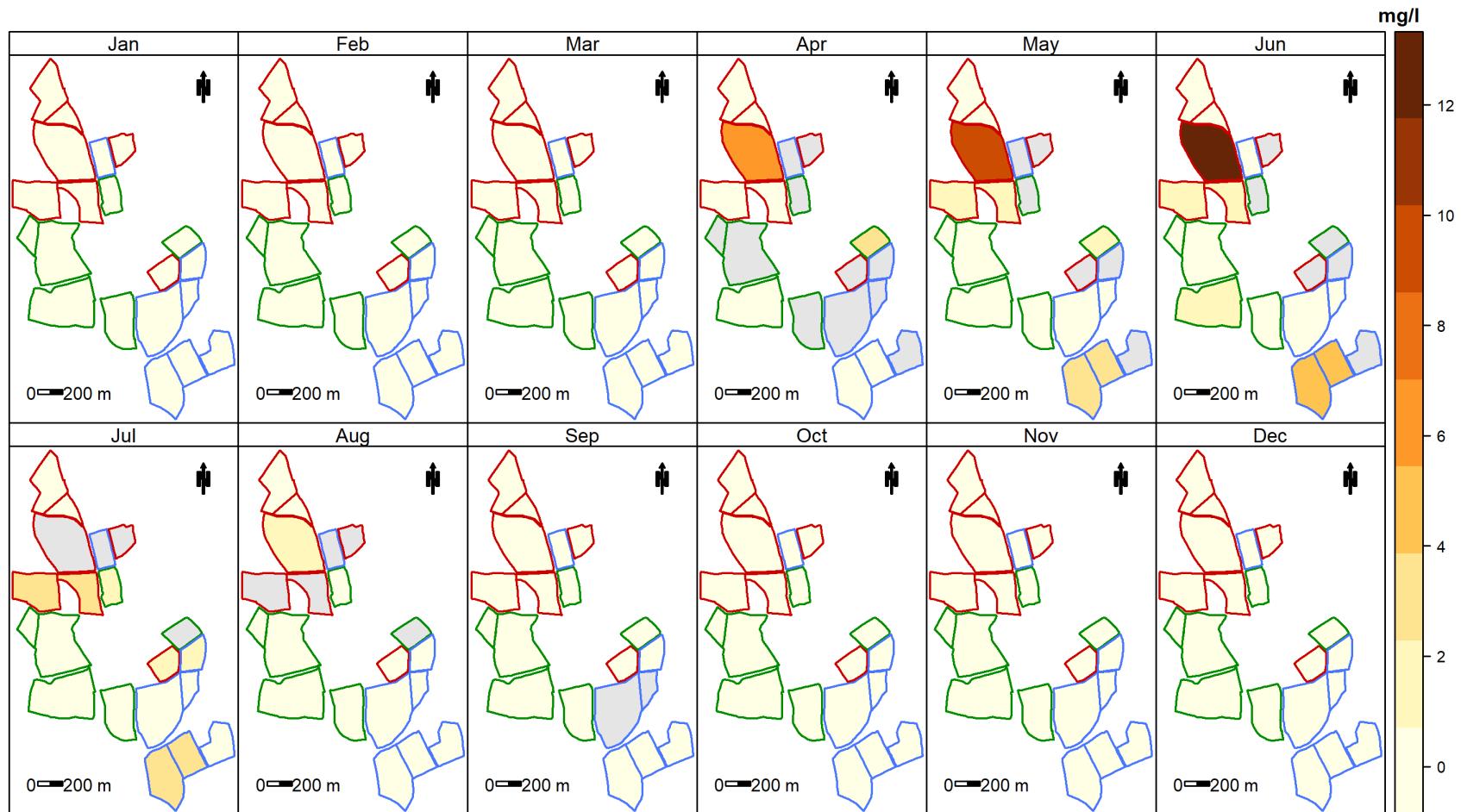
*Grey areas represent missing data*

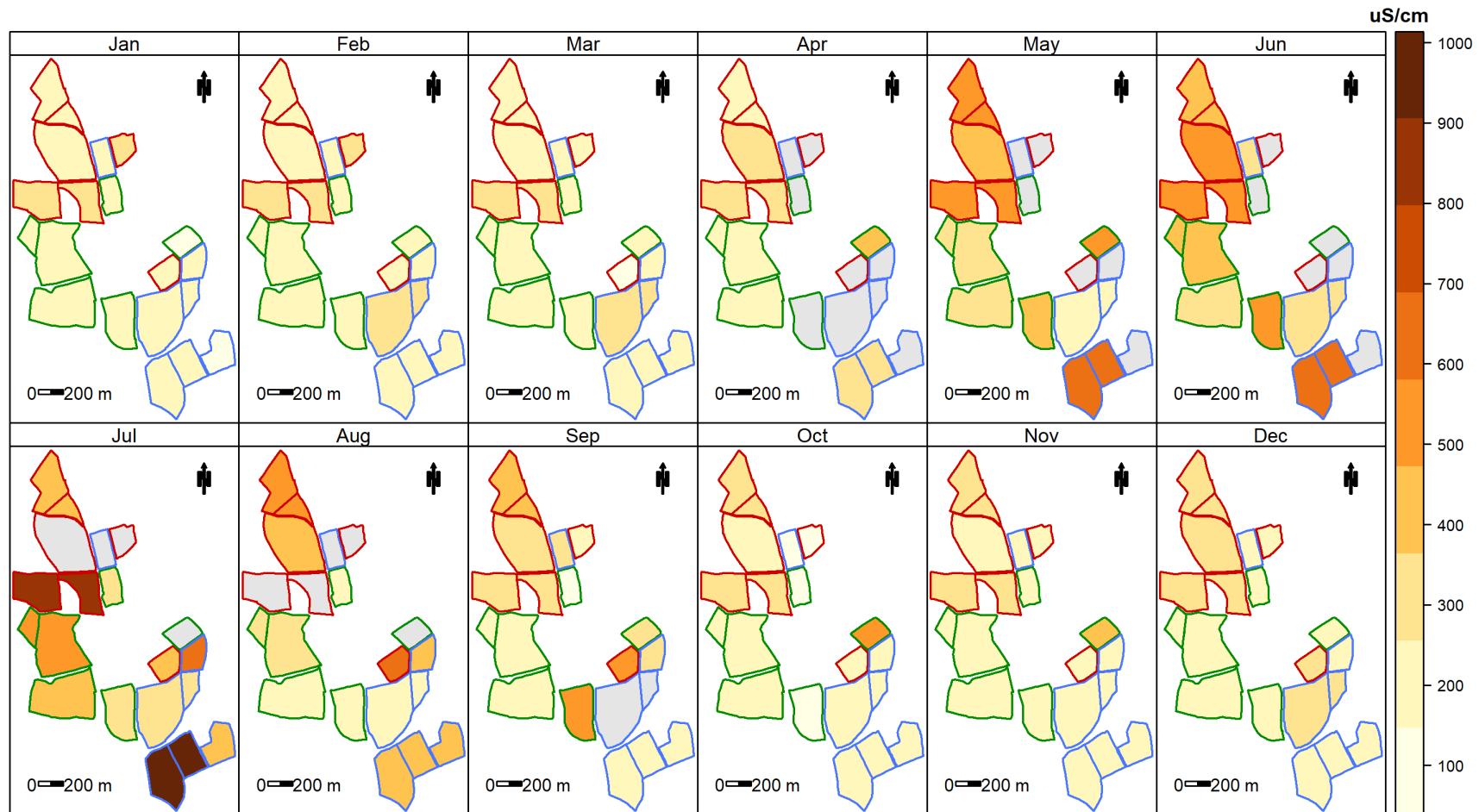


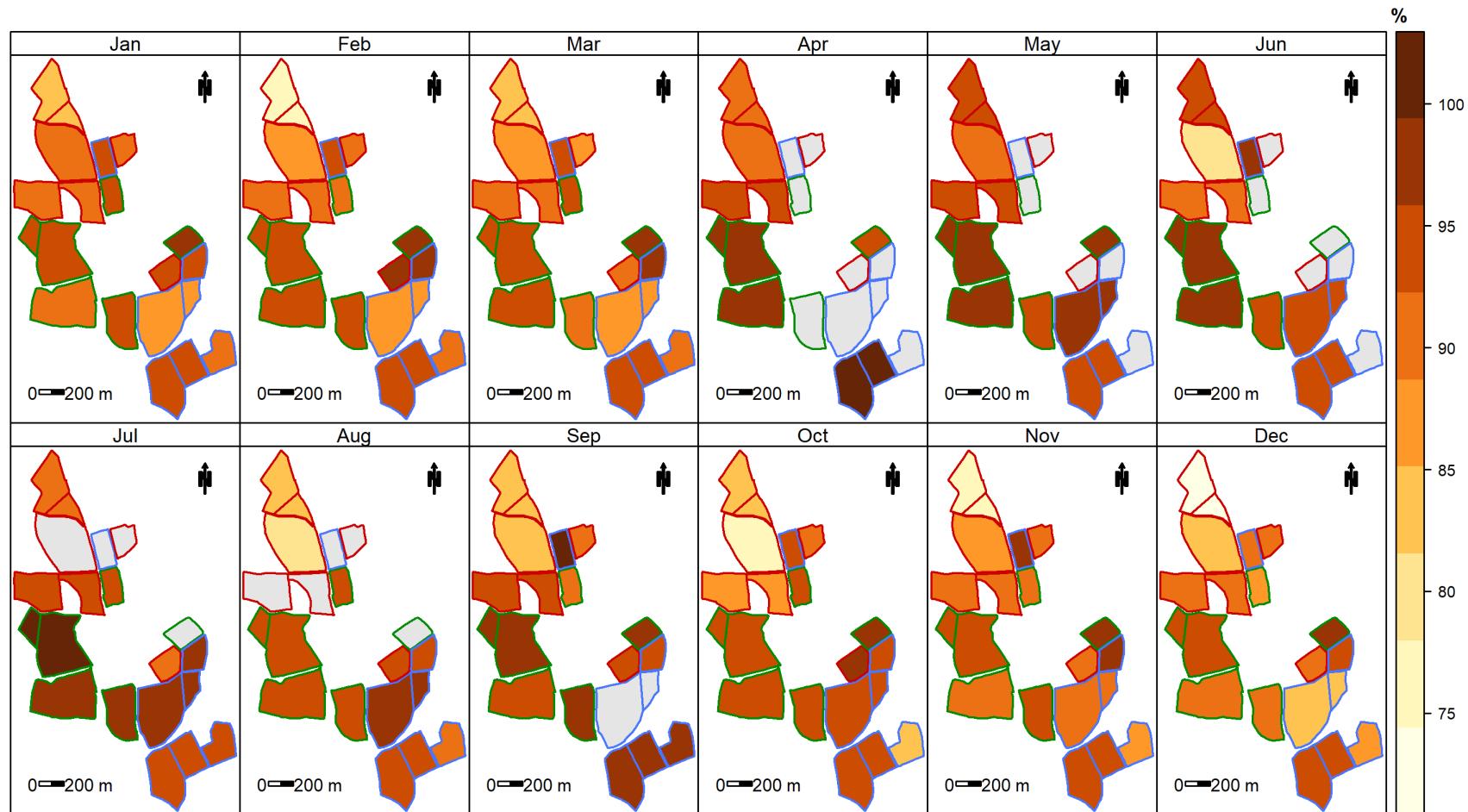
**Figure 61:** Mapped means for flow

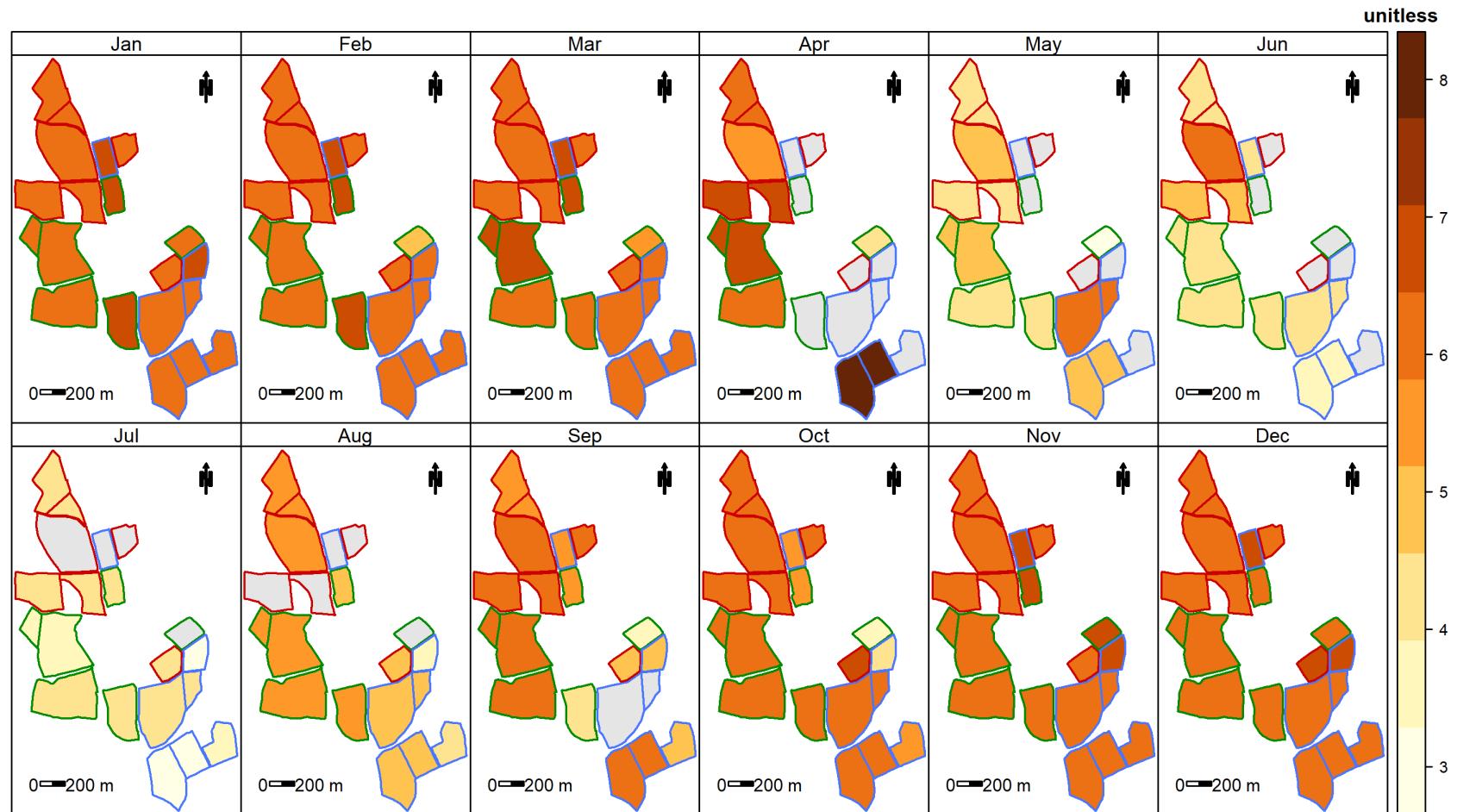
**Figure 62:** Mapped means for nitrate+nitrite

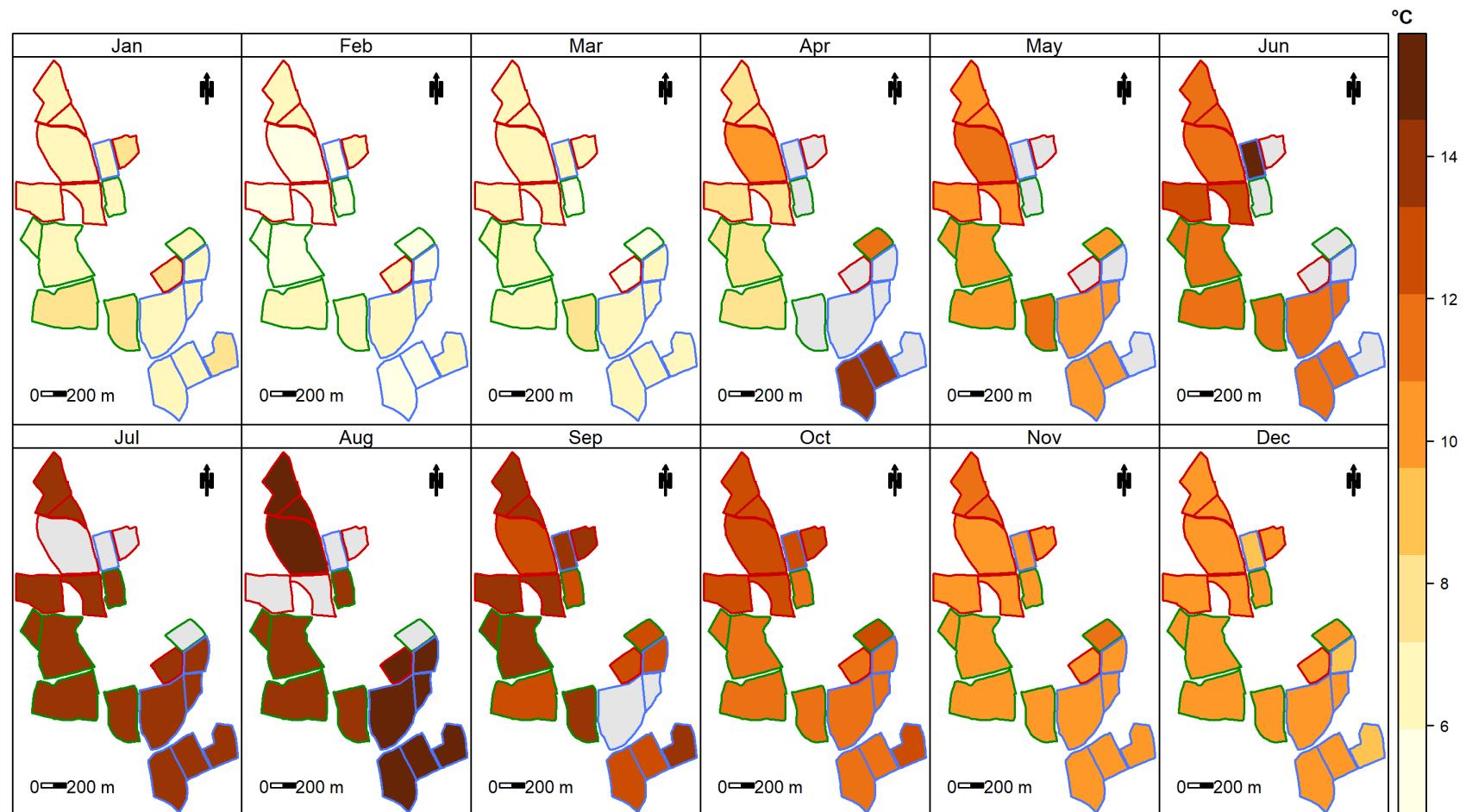
**Figure 63:** Mapped means for ammonia

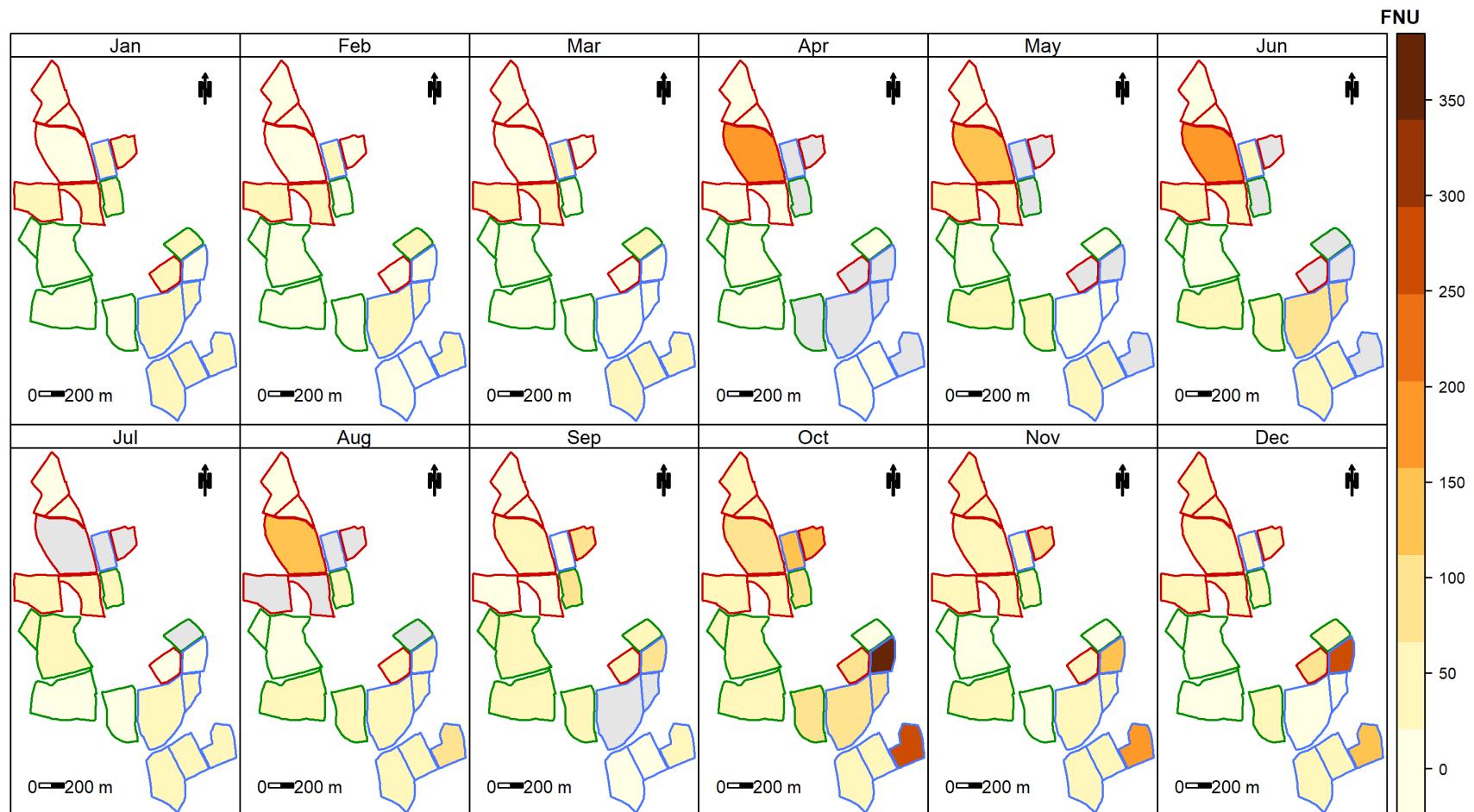
**Figure 64:** Mapped means for ammonium

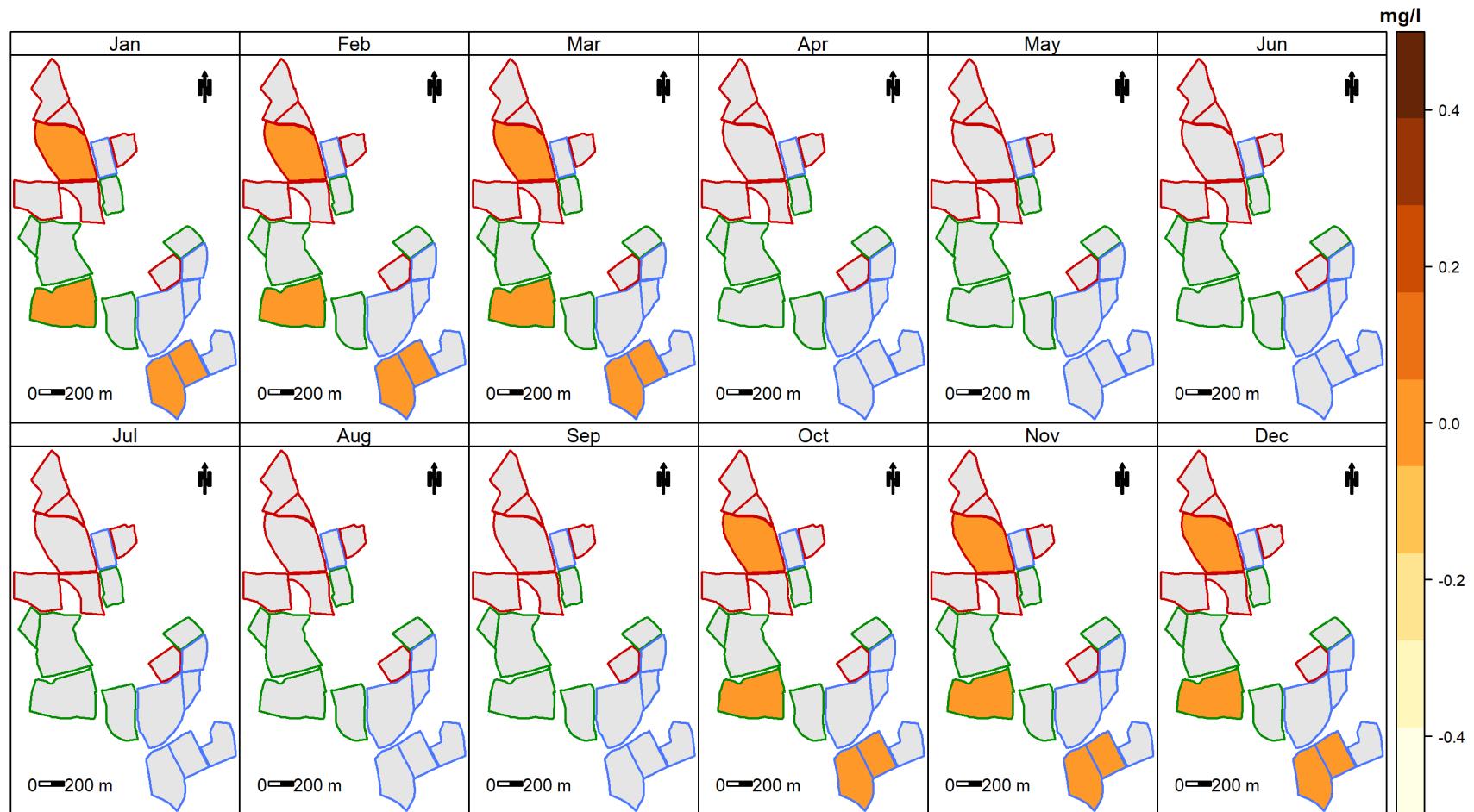
**Figure 65:** Mapped means for conductivity

**Figure 66:** Mapped means for dissolved oxygen

**Figure 67:** Mapped means for pH

**Figure 68:** Mapped means for flow cell water temperature

**Figure 69:** Mapped means for turbidity

**Figure 70:** Mapped means for total phosphorus

No dissolved organic matter mean data available

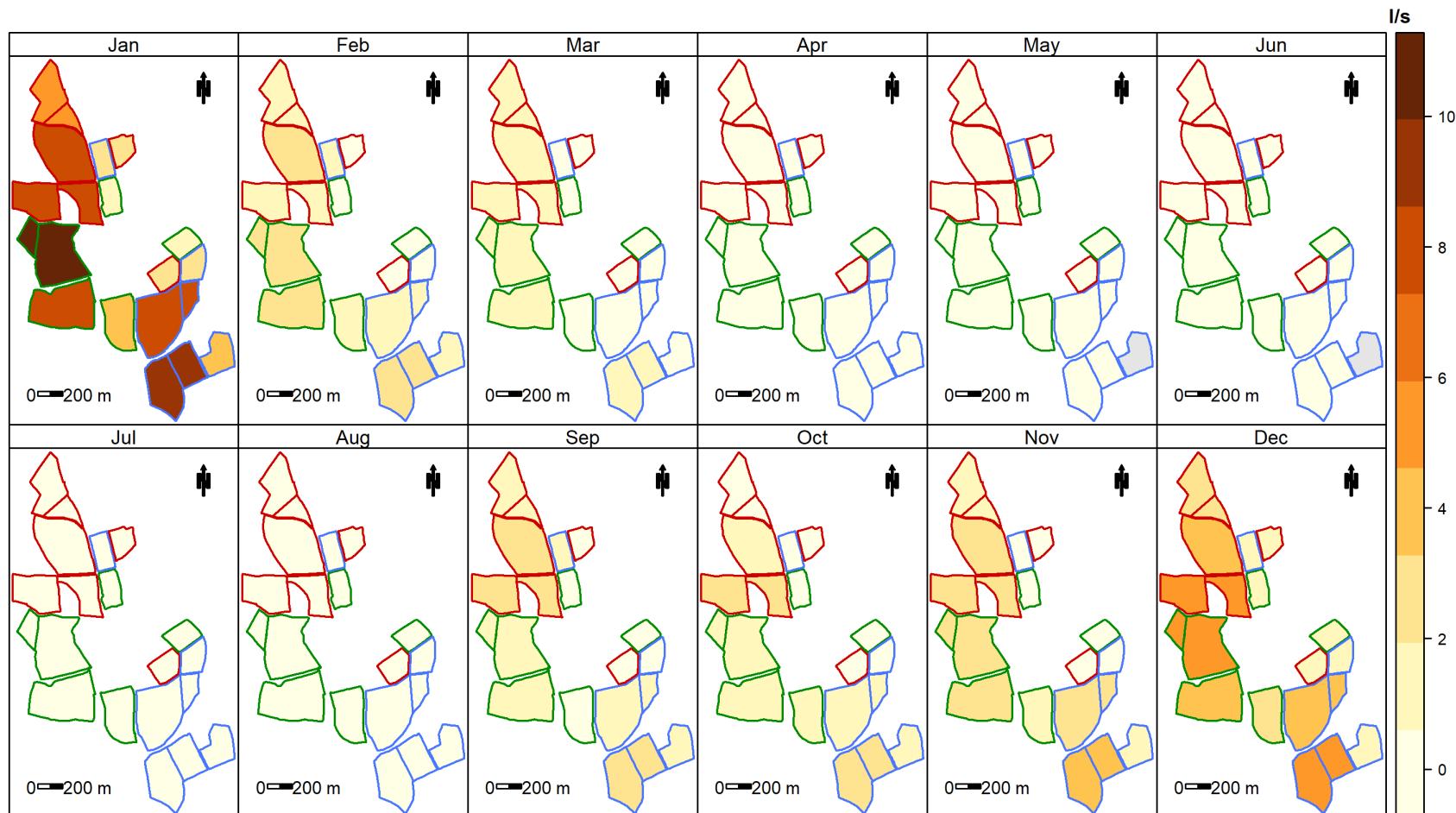
**Figure 71:** Mapped means for dissolved organic matter

No ortho-phosphorus mean data available

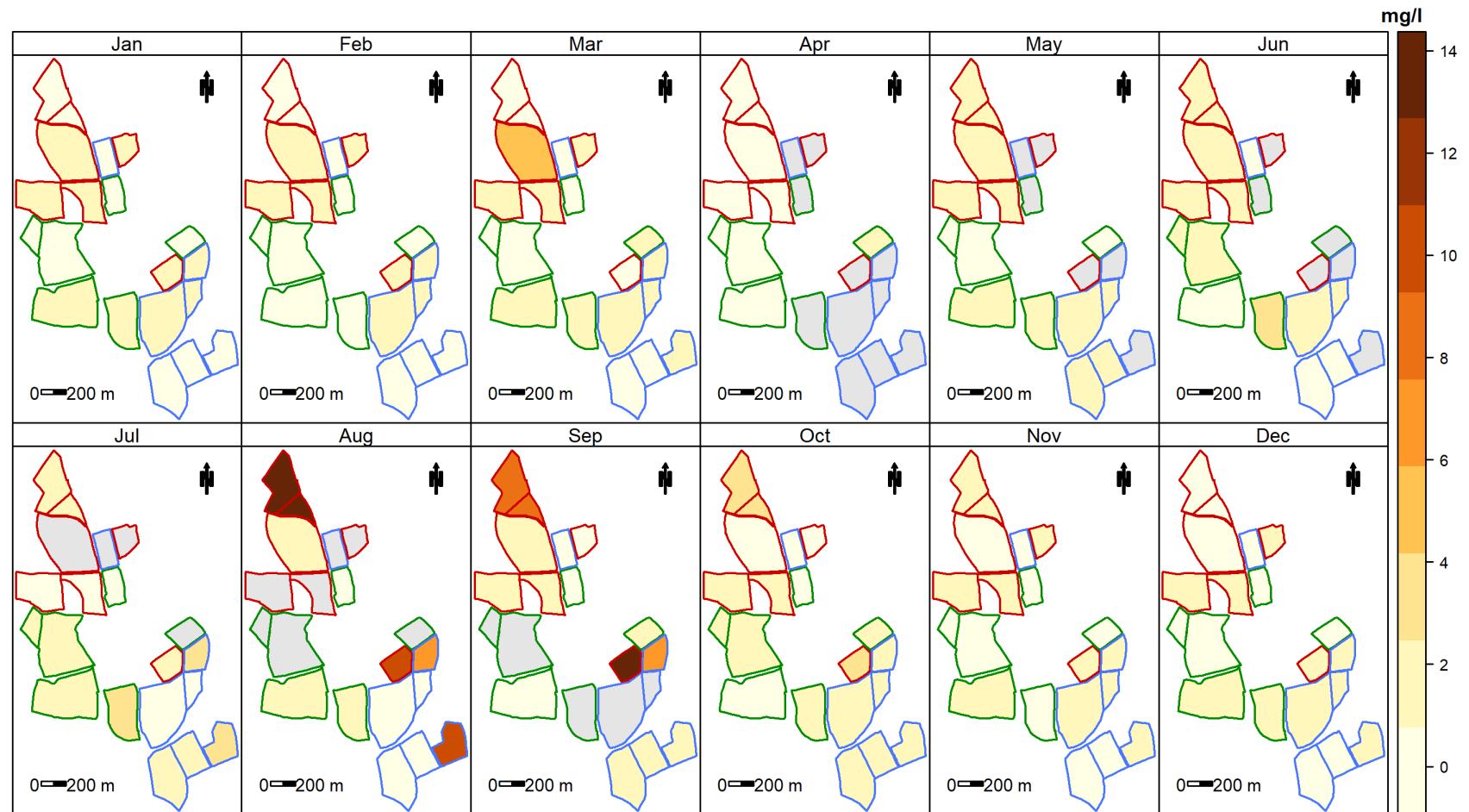
**Figure 72:** Mapped means for ortho-phosphorus

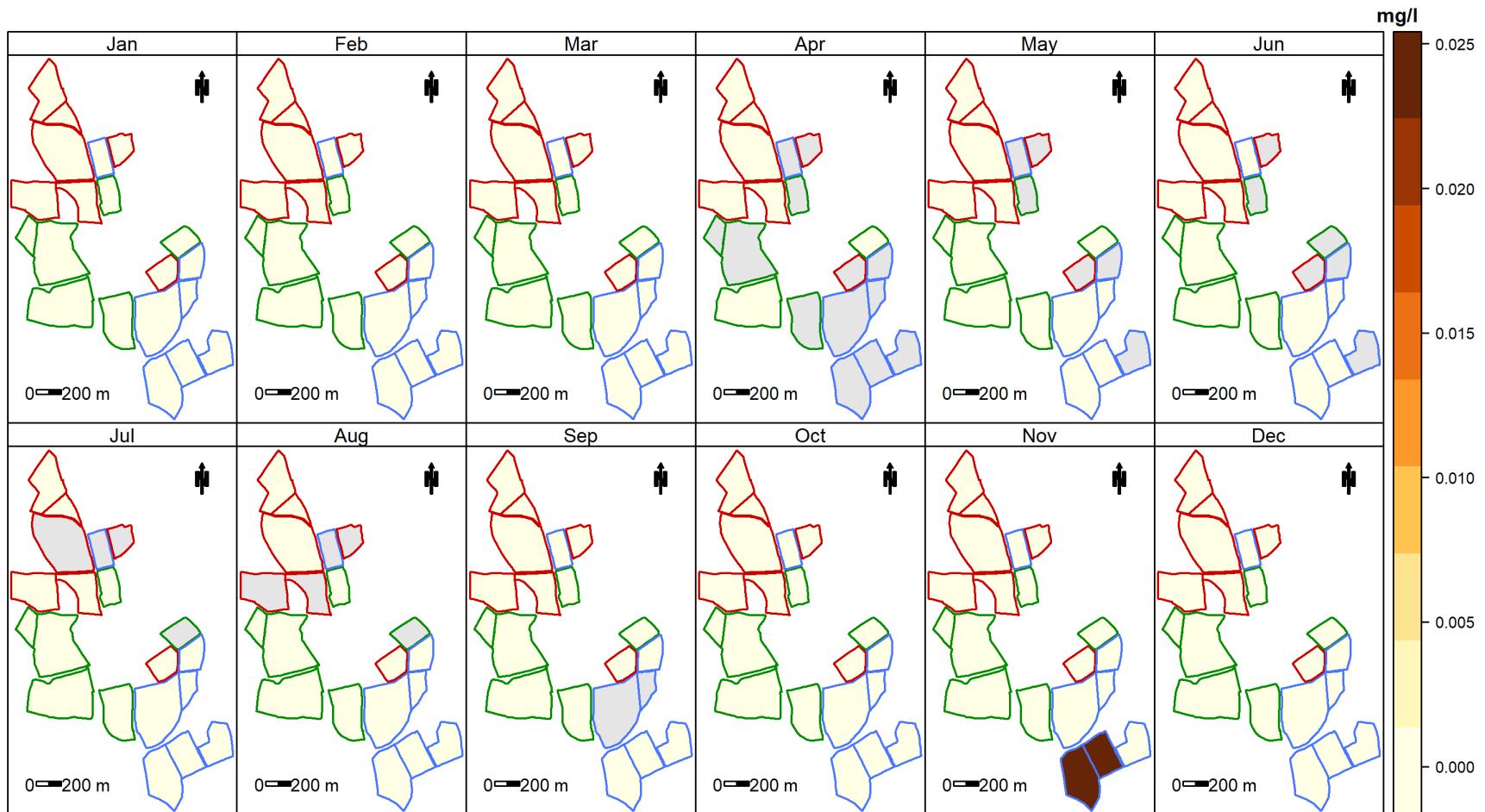
## 2.4 Chloropleth maps of standard deviations

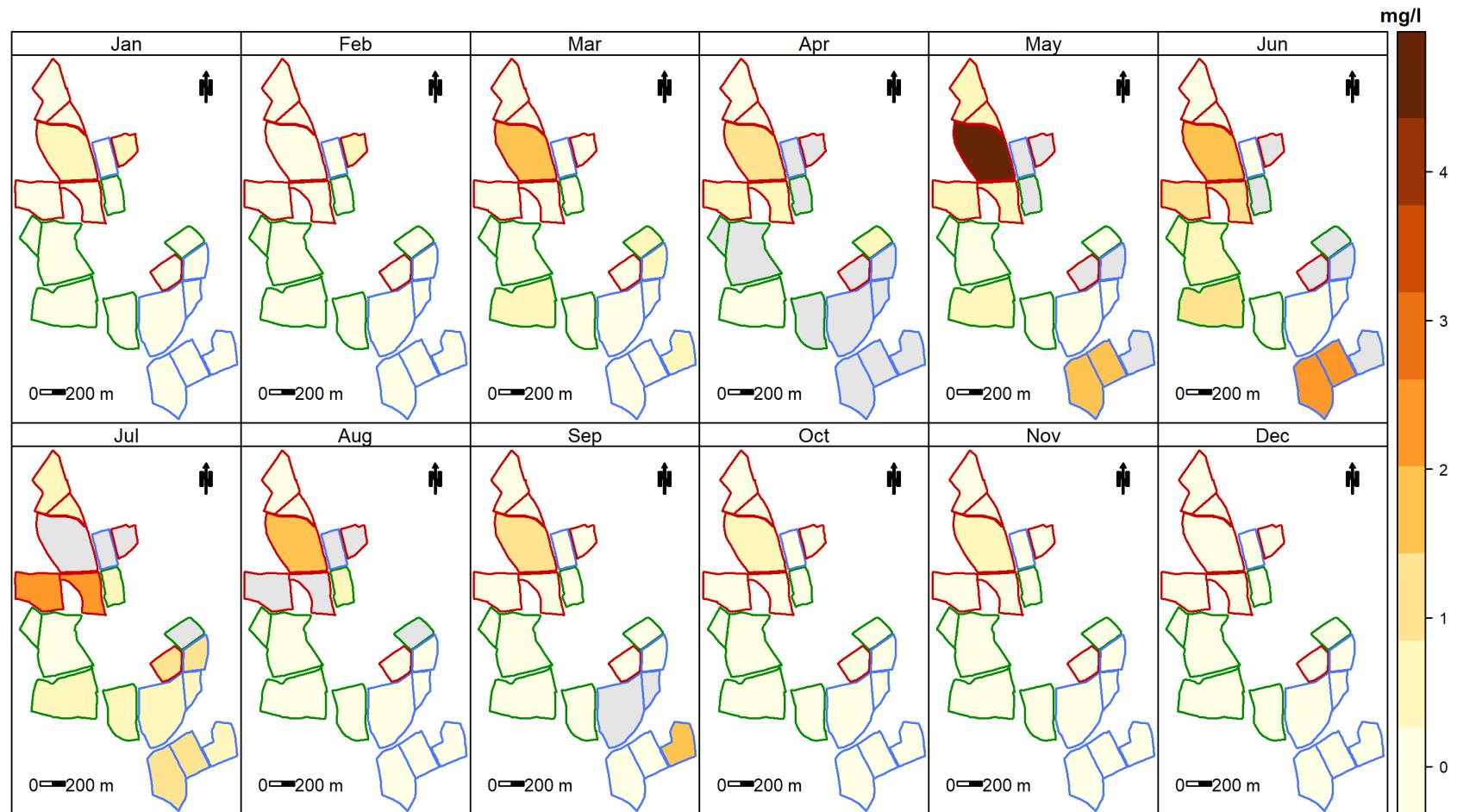
*Grey areas represent missing data*

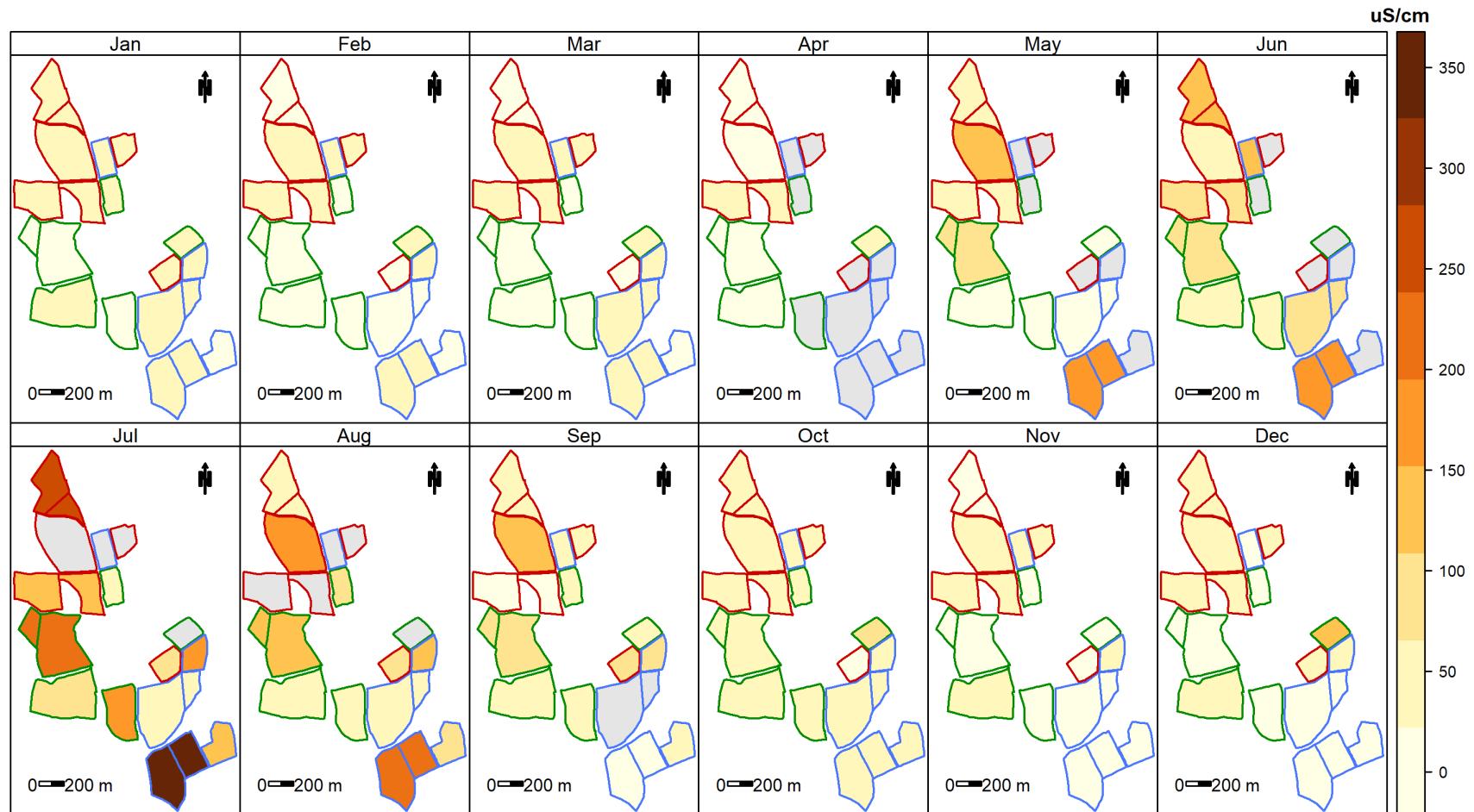


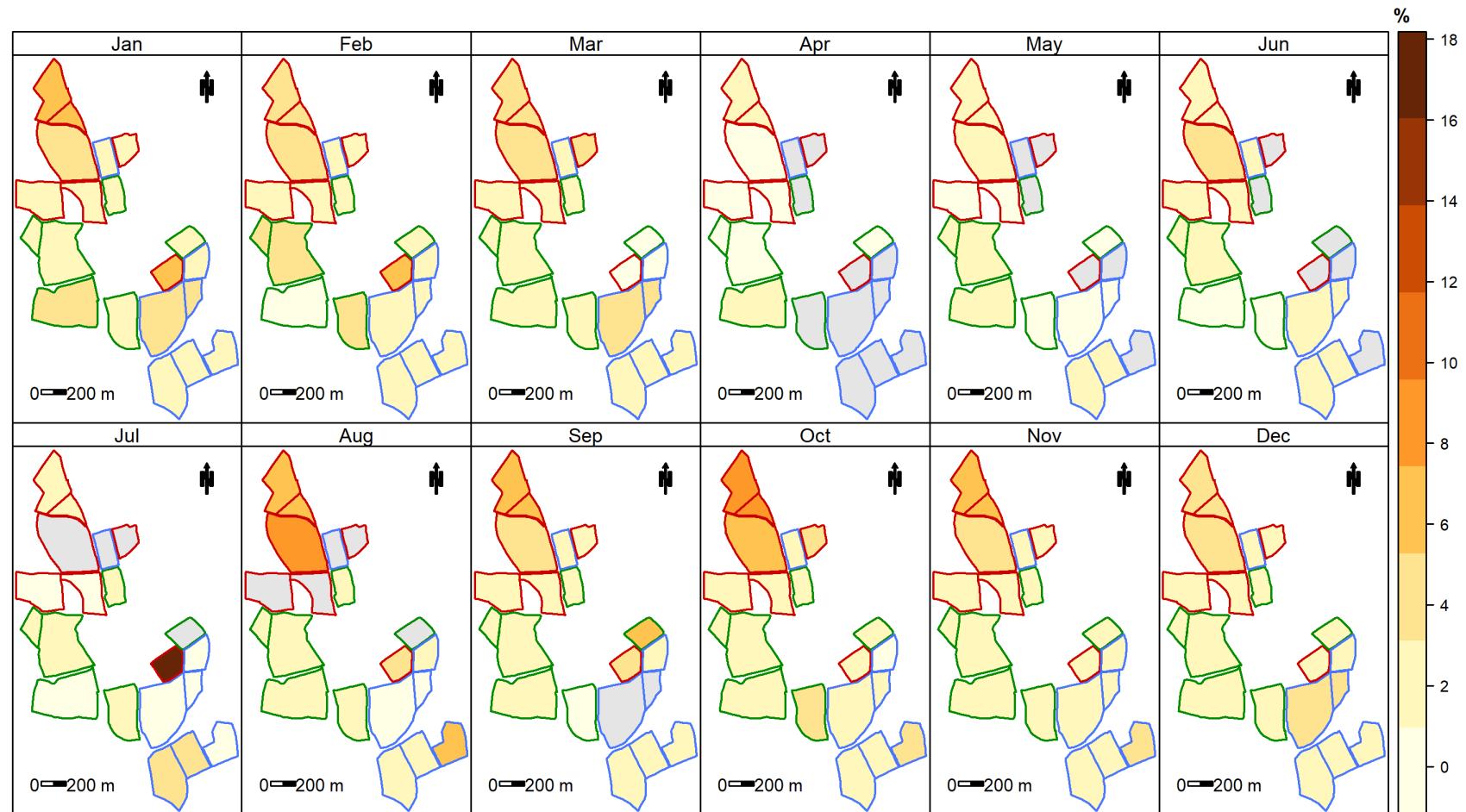
**Figure 73:** Mapped standard deviations for flow

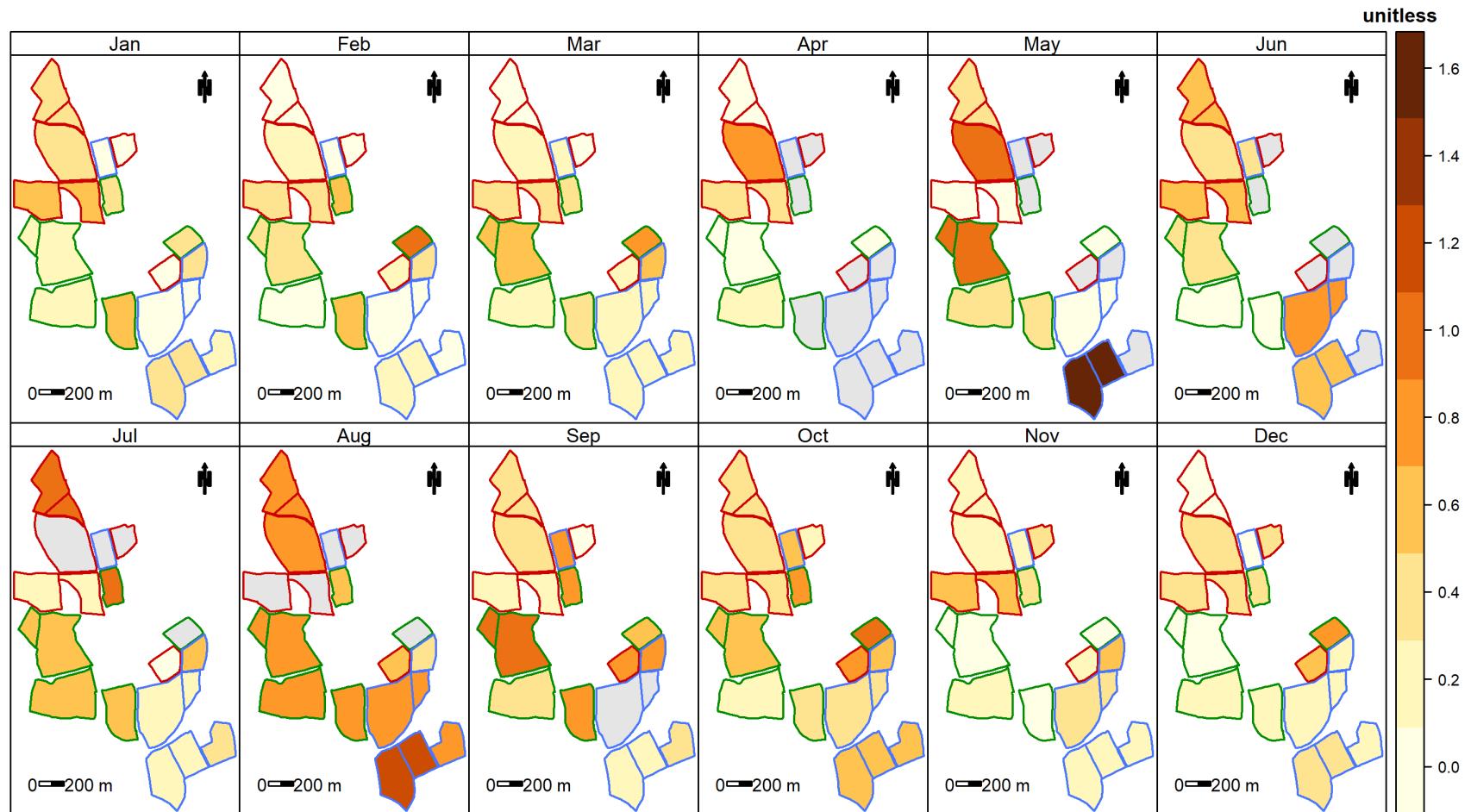
**Figure 74:** Mapped standard deviations for nitrate+nitrite

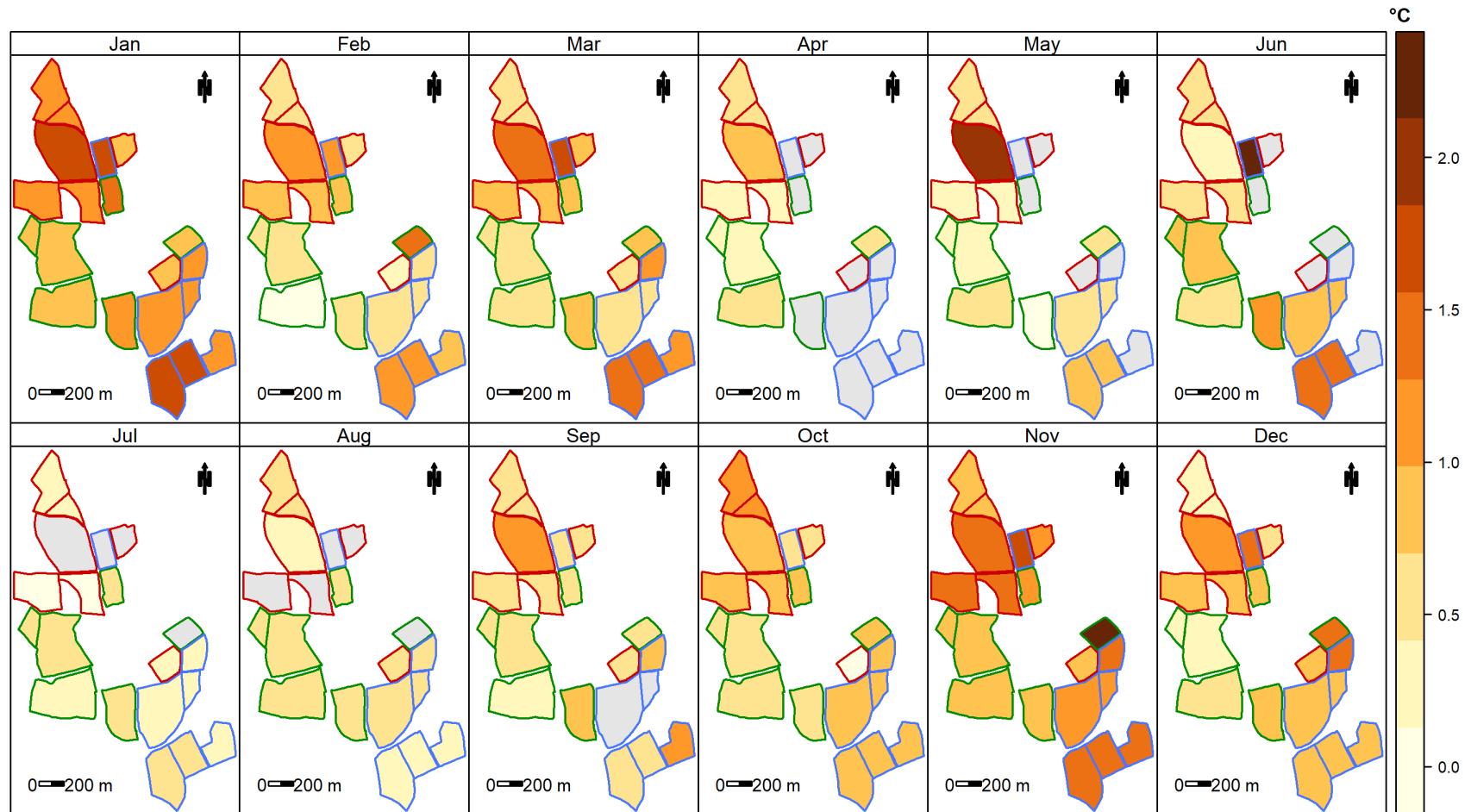
**Figure 75:** Mapped standard deviations for ammonia

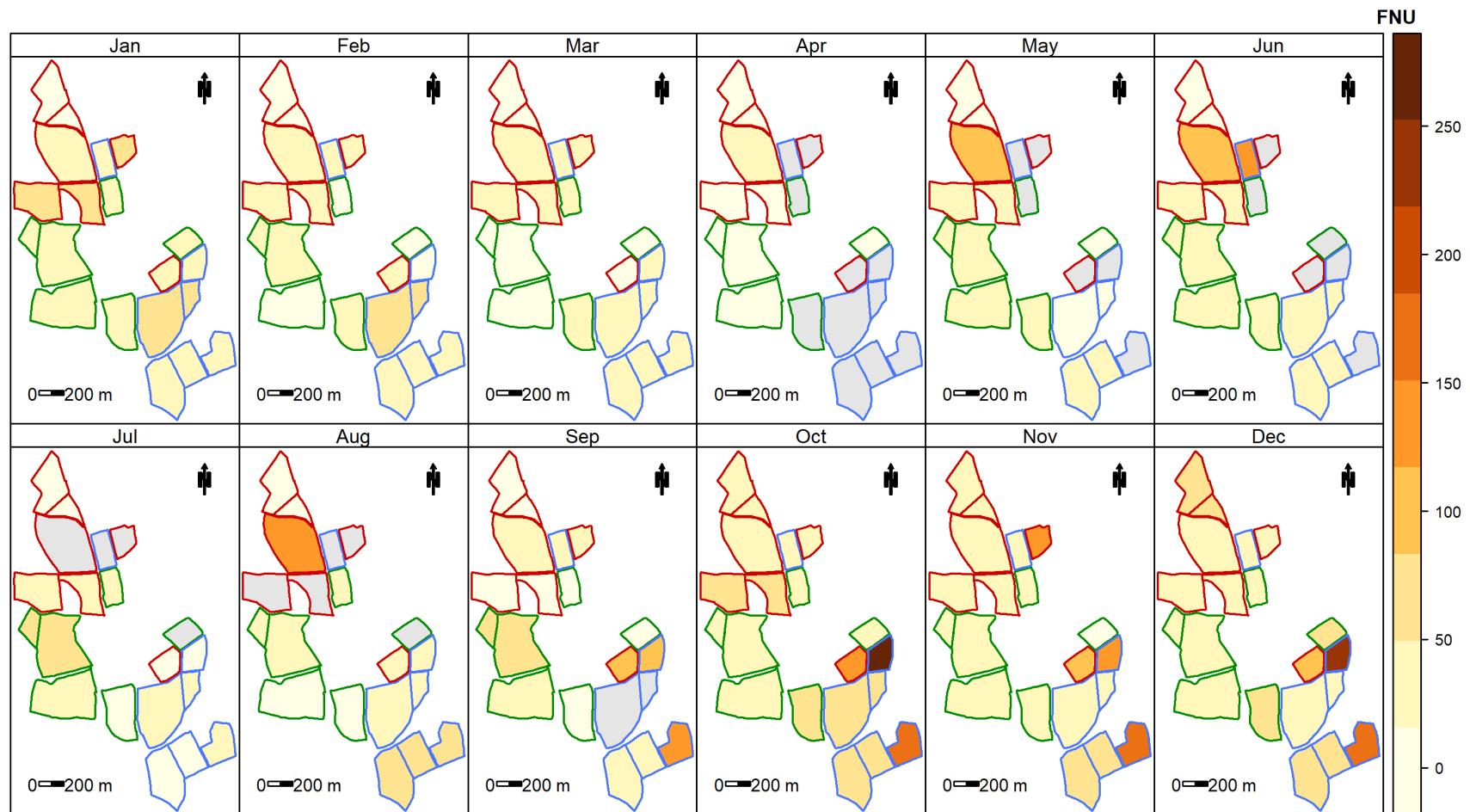
**Figure 76:** Mapped standard deviations for ammonium

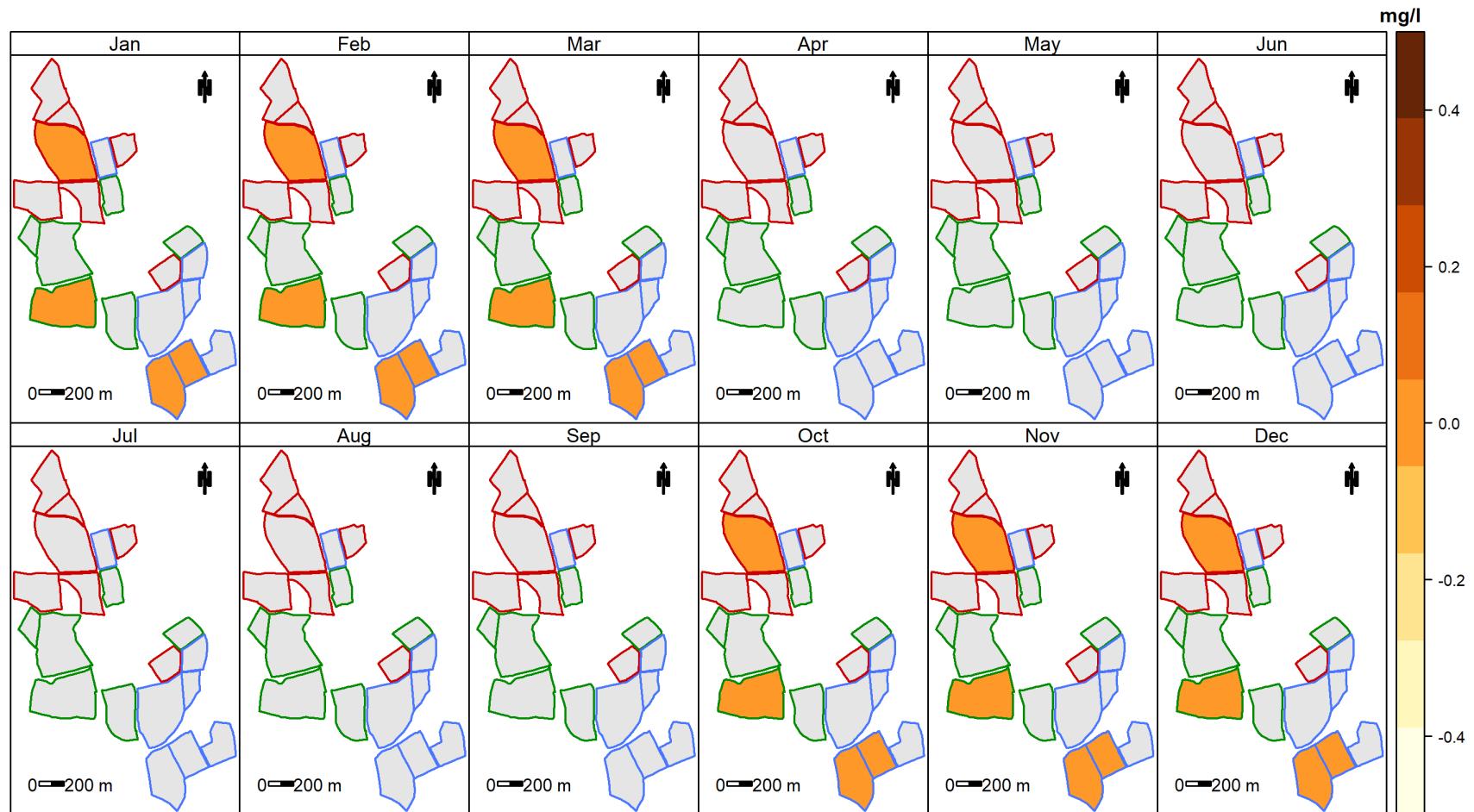
**Figure 77:** Mapped standard deviations for conductivity

**Figure 78:** Mapped standard deviations for dissolved oxygen

**Figure 79:** Mapped standard deviations for pH

**Figure 80:** Mapped standard deviations for flow cell water temperature

**Figure 81:** Mapped standard deviations for turbidity

**Figure 82:** Mapped standard deviations for total phosphorus

No dissolved organic matter standard deviation data available

**Figure 83:** Mapped standard deviations for dissolved organic matter

No ortho-phosphorus standard deviation data available

**Figure 84:** Mapped standard deviations for ortho-phosphorus

## 3 ANNUAL

### 3.1 Summary Statistics

Please be aware that statistics are based on data that may contain missing values. Full data summaries are available on request.

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	l/s	0.7	0.5	0.2	0.0	0.1	0.3	0.6	0.2	0.0	0.1	0.5	0.5	0.4	0.0	0.1
Median	l/s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Standard deviation	l/s	3.9	3.1	1.6	0.6	0.7	2.6	3.7	1.4	0.7	0.8	3.1	3.0	2.0	0.7	0.8
Inter-quartile range	l/s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coefficient of variation	l/s	5.3	6.6	9.3	16.3	11.8	8.6	6.2	7.6	14.3	9.5	6.5	6.2	4.7	15.6	9.2
Minimum	l/s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	l/s	234.0	152.0	98.0	40.0	42.0	152.0	147.0	69.0	54.0	46.0	148.0	153.0	70.0	54.0	51.0
Missing values	count	1986	2	1427	1894	3039	1	92	11558	2	116	1112	6	141	221	5
Missing values as a %	%	6	0	4	5	9	0	0	33	0	0	3	0	0	1	0

**Table 7:** Annual summary statistics for flow

Variable	units	Catchment Number														
		Green						Blue						Red		
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	mg/l	1.1	3.0	1.7	0.7	0.9	4.5	0.9	3.6	3.0	0.6	1.1	2.4	4.9	5.0	2.7
Median	mg/l	1.0	3.0	2.0	0.0	1.0	5.0	1.0	3.0	2.0	1.0	1.0	2.0	2.0	4.0	3.0
Standard deviation	mg/l	0.5	1.3	1.1	1.2	0.7	2.4	0.8	4.6	3.6	0.7	1.5	1.3	8.2	6.6	1.3
Inter-quartile range	mg/l	0.0	2.0	1.0	1.0	1.0	3.0	1.0	2.0	1.0	1.0	0.0	1.0	2.0	2.0	2.0
Coefficient of variation	mg/l	0.4	0.4	0.7	1.7	0.7	0.5	0.9	1.3	1.2	1.1	1.3	0.5	1.7	1.3	0.5
Minimum	mg/l	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	mg/l	11.0	14.0	20.0	7.0	4.0	12.0	11.0	42.0	28.0	7.0	27.0	11.0	40.0	48.0	11.0
Missing values	count	20140	24565	24913	33787	32262	23994	26055	28014	31922	30595	25458	21466	20512	31289	25757
Missing values as a %	%	57	70	71	96	92	68	74	80	91	87	73	61	59	89	74

**Table 8:** Annual summary statistics for nitrate+nitrite

Variable	units	Catchment Number														
		Green						Blue						Red		
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	mg/l	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
Median	mg/l	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Standard deviation	mg/l	0.1	0.2	0.1	0.3	0.1	0.0	0.4	0.3	0.2	0.0	1.0	0.2	0.1	0.1	0.2
Inter-quartile range	mg/l	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coefficient of variation	mg/l	56.4	11.2	16.1	4.6	11.0	43.6	6.8	14.7	9.3	47.1	5.9	17.2	17.6	21.6	4.4
Minimum	mg/l	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	mg/l	8.0	4.0	2.0	5.0	2.0	1.0	10.0	9.0	2.0	2.0	17.0	7.0	1.0	3.0	3.0
Missing values	count	21084	24912	24622	33762	32216	23648	25141	27542	32006	30600	25459	21350	19834	31242	25484
Missing values as a %	%	60	71	70	96	92	67	72	79	91	87	73	61	57	89	73

**Table 9:** Annual summary statistics for ammonium

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	uS/cm	207.3	218.6	193.1	231.9	172.7	251.6	212.8	196.7	201.7	212.3	260.0	313.9	273.8	215.3	246.0
Median	uS/cm	202.0	210.0	188.0	174.0	172.0	260.0	205.0	200.0	188.0	203.0	262.0	322.0	259.0	180.0	264.0
Standard deviation	uS/cm	55.2	42.1	51.1	154.4	40.4	33.6	85.0	62.8	87.2	63.7	61.0	47.7	94.0	94.4	42.3
Inter-quartile range	uS/cm	23.0	50.0	15.0	328.0	34.0	28.0	41.0	65.0	57.2	69.0	35.0	55.0	113.0	88.0	43.0
Coefficient of variation	uS/cm	0.3	0.2	0.3	0.7	0.2	0.1	0.4	0.3	0.4	0.3	0.2	0.2	0.3	0.4	0.2
Minimum	uS/cm	56.0	63.0	59.0	40.0	61.0	55.0	86.0	55.0	45.0	10.0	63.0	67.0	86.0	50.0	50.0
Maximum	uS/cm	999.0	550.0	854.0	584.0	583.0	411.0	1525.0	831.0	900.0	498.0	1130.0	892.0	910.0	759.0	297.0
Missing values	count	18237	24912	24623	33761	32216	23649	25142	27554	32007	30883	25460	21351	19836	31243	25485
Missing values as a %	%	52	71	70	96	92	67	72	79	91	88	73	61	57	89	73

**Table 10:** Annual summary statistics for conductivity

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	%	94.3	91.4	92.7	96.7	91.7	87.1	94.0	88.6	95.6	95.8	86.4	91.0	79.7	93.6	89.4
Median	%	94.0	92.0	93.0	97.0	92.0	87.0	95.0	88.0	96.0	96.0	87.0	91.0	79.0	92.0	90.0
Standard deviation	%	2.6	3.3	2.4	1.9	2.8	3.9	2.5	3.9	1.9	2.8	5.0	2.1	7.5	5.5	2.8
Inter-quartile range	%	4.0	4.0	3.0	2.0	2.0	5.0	4.0	5.0	3.0	3.0	7.0	2.0	10.0	6.0	3.0
Coefficient of variation	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0
Minimum	%	82.0	83.0	57.0	85.0	75.0	78.0	77.0	8.0	87.0	79.0	62.0	82.0	64.0	33.0	79.0
Maximum	%	105.0	103.0	101.0	101.0	101.0	100.0	102.0	105.0	100.0	103.0	103.0	102.0	105.0	106.0	100.0
Missing values	count	21012	24912	24624	33865	32216	23648	25141	27544	32006	30599	25459	21351	19836	31243	25483
Missing values as a %	%	60	71	70	97	92	67	72	79	91	87	73	61	57	89	73

**Table 11:** Annual summary statistics for dissolved oxygen

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	unitless	6.2	6.0	6.1	5.8	6.4	6.0	6.1	5.9	6.3	6.4	6.0	6.3	5.9	6.1	6.0
Median	unitless	6.0	6.0	6.0	6.0	7.0	6.0	6.0	6.0	6.0	7.0	6.0	6.0	6.0	6.0	6.0
Standard deviation	unitless	0.6	0.3	0.6	1.1	0.7	0.3	0.5	0.5	0.9	1.1	0.4	0.5	0.4	0.5	0.3
Inter-quartile range	unitless	0.0	0.0	0.0	2.0	1.0	0.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0
Coefficient of variation	unitless	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0
Minimum	unitless	3.0	4.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0	4.0	3.0	4.0	3.0	4.0	5.0
Maximum	unitless	7.0	7.0	8.0	7.0	7.0	7.0	9.0	7.0	8.0	8.0	8.0	8.0	7.0	8.0	8.0
Missing values	count	18235	24912	24622	33762	32216	23648	25141	27542	32006	30599	25459	21350	19834	31242	25483
Missing values as a %	%	52	71	70	96	92	67	72	79	91	87	73	61	57	89	73

**Table 12:** Annual summary statistics for pH

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	°C	8.6	9.1	9.0	8.3	8.4	8.2	8.5	9.2	8.2	9.3	8.6	8.3	9.7	8.6	8.5
Median	°C	8.0	10.0	9.0	8.0	8.0	8.0	9.0	9.0	8.0	9.0	9.0	8.0	10.0	8.0	8.0
Standard deviation	°C	2.7	2.1	2.3	2.8	2.9	2.0	2.8	2.2	2.6	3.5	2.7	2.6	2.8	2.0	2.0
Inter-quartile range	°C	4.0	3.0	3.0	4.0	4.0	3.0	4.0	2.0	4.0	6.0	4.0	4.0	5.0	3.0	3.0
Coefficient of variation	°C	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.4	0.3	0.3	0.3	0.2	0.2
Minimum	°C	4.0	3.0	4.0	1.0	4.0	2.0	1.0	2.0	4.0	3.0	1.0	1.0	2.0	5.0	4.0
Maximum	°C	20.0	16.0	20.0	16.0	20.0	20.0	17.0	20.0	17.0	20.0	17.0	15.0	17.0	17.0	15.0
Missing values	count	18235	24912	24622	33761	32216	23648	25141	27542	32006	30599	25459	21350	19834	31242	25483
Missing values as a %	%	52	71	70	96	92	67	72	79	91	87	73	61	57	89	73

**Table 13:** Annual summary statistics for flow cell water temperature

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	FNU	11.8	14.3	19.9	32.4	35.6	21.0	34.7	91.9	74.8	43.9	26.1	26.6	17.2	41.0	34.0
Median	FNU	3.0	8.0	9.0	21.0	30.0	6.0	20.0	38.0	18.0	32.0	14.0	10.0	6.0	19.0	9.0
Standard deviation	FNU	32.7	24.0	43.3	40.3	27.4	50.5	51.5	132.0	140.7	57.7	45.3	51.8	41.9	76.7	74.0
Inter-quartile range	FNU	9.0	15.0	18.0	38.0	36.0	17.0	31.0	93.0	67.0	39.0	24.0	23.0	17.0	38.0	35.0
Coefficient of variation	FNU	2.8	1.7	2.2	1.2	0.8	2.4	1.5	1.4	1.9	1.3	1.7	1.9	2.4	1.9	2.2
Minimum	FNU	0.0	0.0	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	FNU	762.0	504.0	846.0	502.0	272.0	920.0	967.0	988.0	982.0	915.0	776.0	954.0	959.0	909.0	992.0
Missing values	count	21119	24913	24637	33986	32216	23730	25144	29640	32084	30607	25484	21917	19963	31326	25958
Missing values as a %	%	60	71	70	97	92	68	72	85	92	87	73	63	57	89	74

**Table 14:** Annual summary statistics for turbidity

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	mg/l	NA	0.0	NA	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Median	mg/l	NA	0.0	NA	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Standard deviation	mg/l	NA	0.0	NA	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Inter-quartile range	mg/l	NA	0.0	NA	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Coefficient of variation	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Minimum	mg/l	NA	0.0	NA	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Maximum	mg/l	NA	0.0	NA	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Missing values	count	35039	26823	35039	35039	35039	35039	27099	35039	35039	35039	23987	35039	35039	35039	35039
Missing values as a %	%	100	77	100	100	100	100	77	100	100	100	68	100	100	100	100

**Table 15:** Annual summary statistics for total phosphorus

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Median	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Standard deviation	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inter-quartile range	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of variation	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Minimum	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maximum	ug/l QSU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Missing values	count	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039
Missing values as a %	%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

**Table 16:** Annual summary statistics for dissolved organic matter

Variable	units	Catchment Number														
		Green					Blue					Red				
		4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
Mean	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Median	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Standard deviation	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inter-quartile range	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of variation	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Minimum	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maximum	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Missing values	count	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039	35039
Missing values as a %	%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

**Table 17:** Annual summary statistics for ortho-phosphorus

## 4 APPENDIX

### 4.1 Hydrological areas - Catchments

	Catchment Number														
	Green					Blue					Red				
	4	5	6	12	13	9	8	7	11	14	2	3	1	10	15
pre-13/08/2013	11.6	6.7	4.0	1.9	1.8	7.9	7.3	2.7	1.8	1.8	6.8	6.8	5.0	1.9	1.6
post-13/08/2013	8.1	6.7	4.0	1.9	1.8	7.9	7.3	2.7	1.8	1.8	6.8	6.8	5.0	1.9	1.6

**Table 18:** Catchment hydrological areas (ha) pre- and post- change to area of Catchment 4 on 13th August 2013

### 4.2 Hydrological areas - Farmlets

	Green	Blue	Red
pre-13/08/2013	25.9	21.6	22.2
post-13/08/2013	22.4	21.6	22.2

**Table 19:** Farmlet hydrological areas (ha) pre- and post- change to area of Catchment 4 on 13th August 2013