

Reserve determination study for selected Surface Water, Groundwater, Estuaries and Wetlands in the F60 and G30 Catchment within the Berg-Olifants Water Management Area (WP11340):

G30F60 Integration Workshop September 2022

Water Quality



DEPARTMENT: WATER AND SANITATION

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WATER QUALITY RESERVE

- ▶ Inception:
- ▶ Standard methodology will be followed - with adaptation for non-perennial rivers (i.e. determining Reference conditions)
- ▶ Integration critical between:
 1. Surface and groundwater specialists to understand the systems
 2. Rivers and wetland and estuary specialists as these systems are closely linked...more so in the semi-arid environment

WATER QUALITY RESERVE

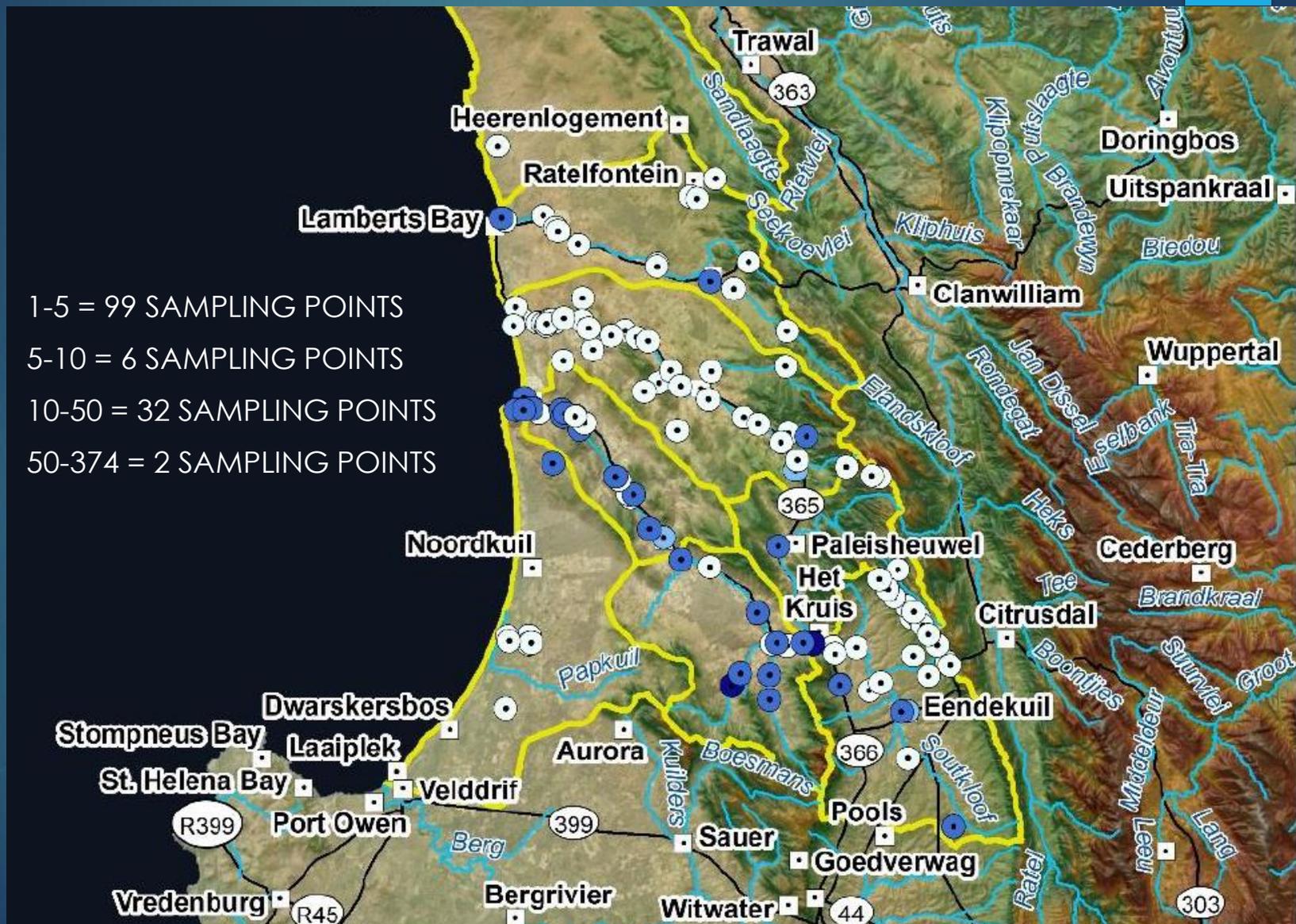
- ▶ Water quality will be assessed for each identified river EWR sites....where the is water
- ▶ Assessments will include the following:
 1. Determine reference condition....if possible
 2. Current water quality (PES) and trends
 3. Recommending an Ecological Reserve Class, and
 4. Water Quality Objectives.

WATER QUALITY RESERVE

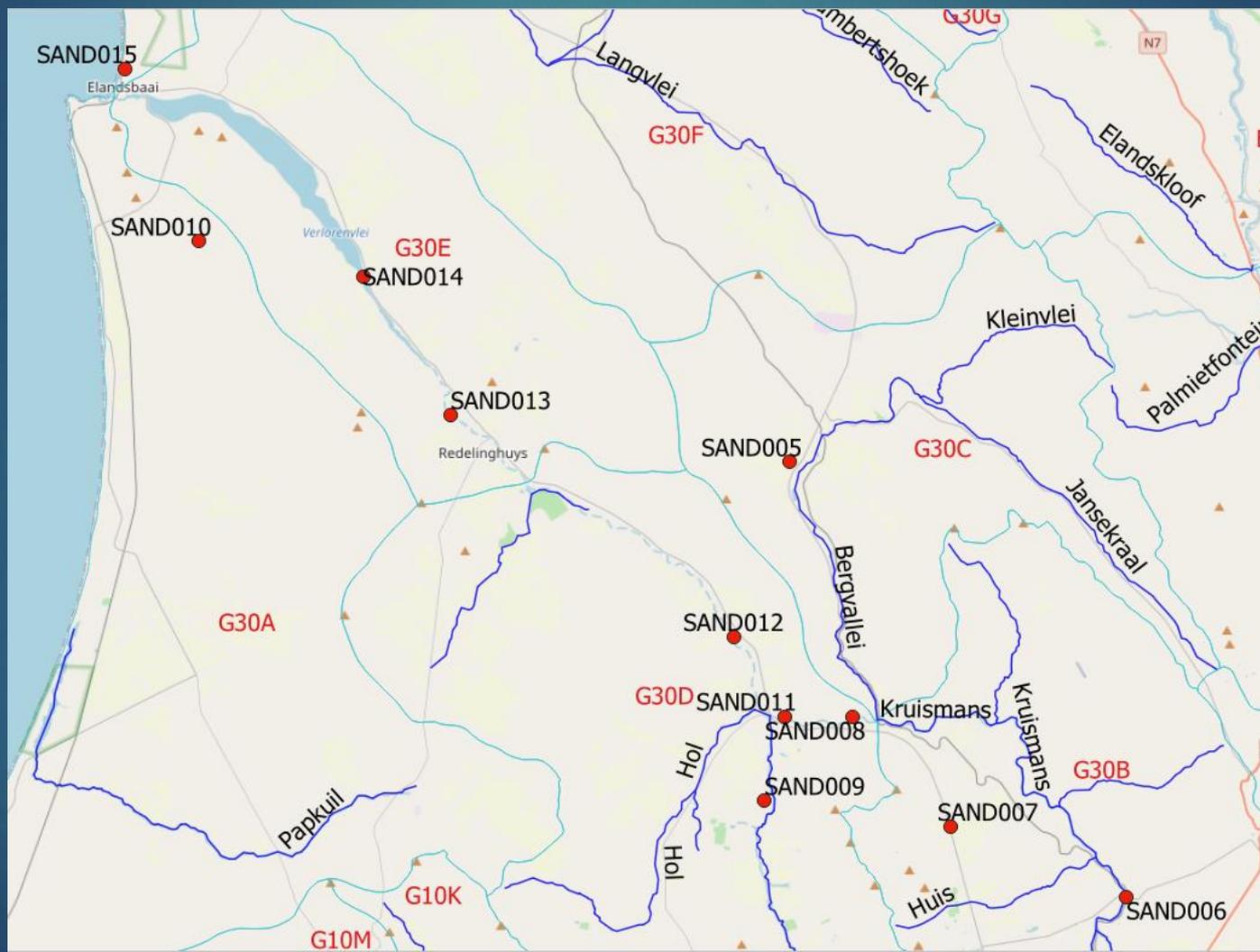
► Challenges:

1. Scarcity of water quality data for both systems (none for F60)
2. Extrapolation between Reserve sites unlikely because of the spatial and temporal variability of a non-perennial system
3. The next component of the project was the Gap Analysis
4. The challenges identified during the Inception was confirmed
5. The following is proposed for G30 and F60 catchments
 1. Wet and Dry season once off water quality sampling at the EWR sites....completed
 2. Using non-perennial river methodology to determine reference conditions...PES and one DWS gauging site
 3. Close cooperation between the different specialists is essential in understanding the water quality...this workshop critical

DWS water quality monitoring network G30



WC Regional Office water quality monitoring network G30 (12 SITES)



WC Regional Office water quality monitoring network G30 (12 SITES) – sampling frequencies

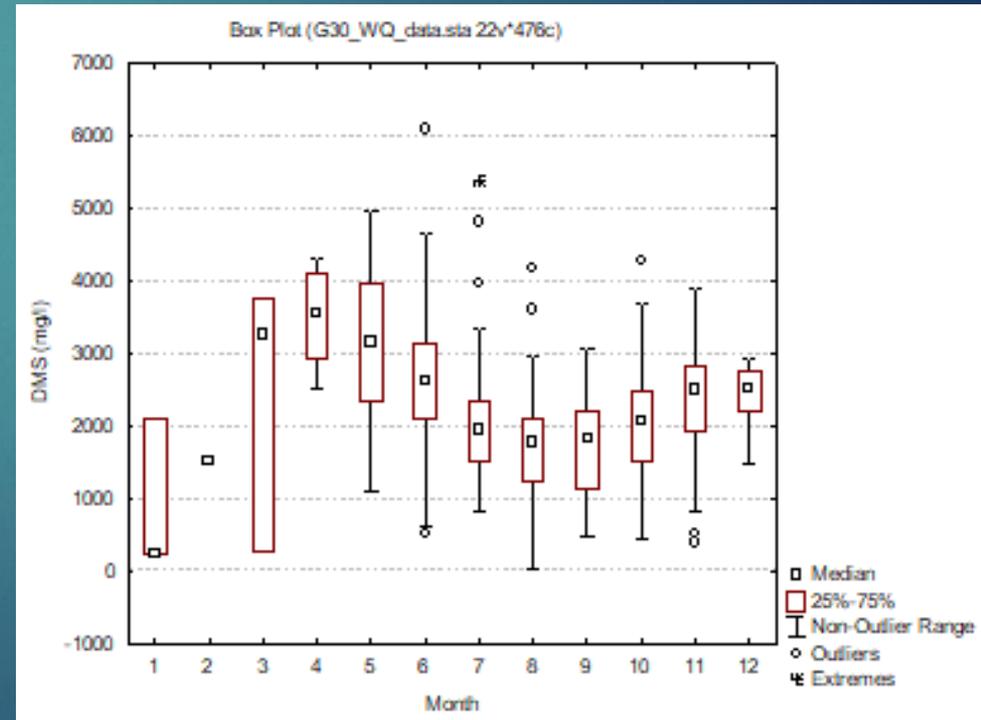
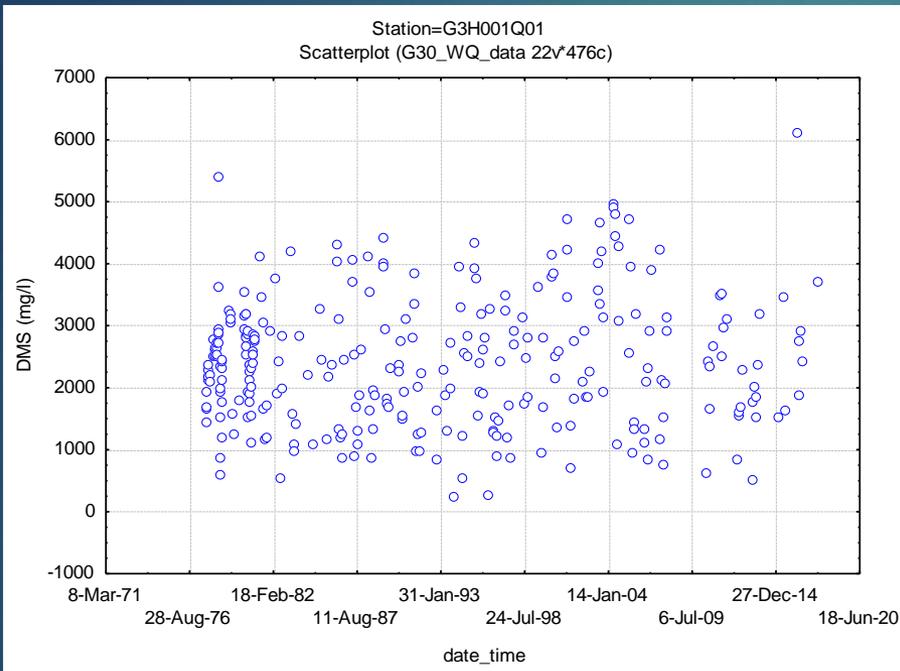
RIVER/MONITORING SITE NAME	SITE CODE	FLOW	CO-ORDINATES	FREQUENCY OF MONITORING
Lamberts Bay Estuary	SAND001	Medium Flow	32° 05.122' S 18° 18.890' E	Quarterly
Lang River 1	SAND004	Dry	32° 51.195' S 18° 19.233' E	Quarterly
Bergvallei River	SAND005	Dry	32° 29.032' S 18° 42.719' E	Quarterly
Kruismans River	SAND006	Dry	32° 40.972' S 18° 52.974' E	Monthly
Huis River	SAND007	Dry	32°39'03.31"S 18°47'18.35"E	Monthly
Kruismans River	SAND008	Dry	32° 36.102' S 18° 44.992' E	Quarterly
Krom Antonies River	SAND009	Dry	32°40'06.4"S 18°41'19.3"E	Monthly
Hol River	SAND010	Dry	32°38'19.9"S 18°38'51.7"E	Monthly
Verlorenvlei Bridge 2	SAND011	Dry	32° 36.004' S 18° 41.573' E	Monthly
Verlorenvlei point E after Hol River Confluence	SAND012	Dry	32°33'49.3"S 18°40'19.5"E	Monthly
Verlorenvlei point F after Redelinghuys Confluence	SAND013	Dry	32°27'42.5"S 18°31'12.83"E	Quarterly
Verlorenvlei point G at Grootdrif Farm	SAND014	Dry	32°23'53.9"S 18°28'23.4"E	Monthly
Verlorenvlei Estuary	SAND015	Dry	32° 18.964' S 18° 20.436' E	Monthly

DWS water quality monitoring network F60

Very little to no surface water



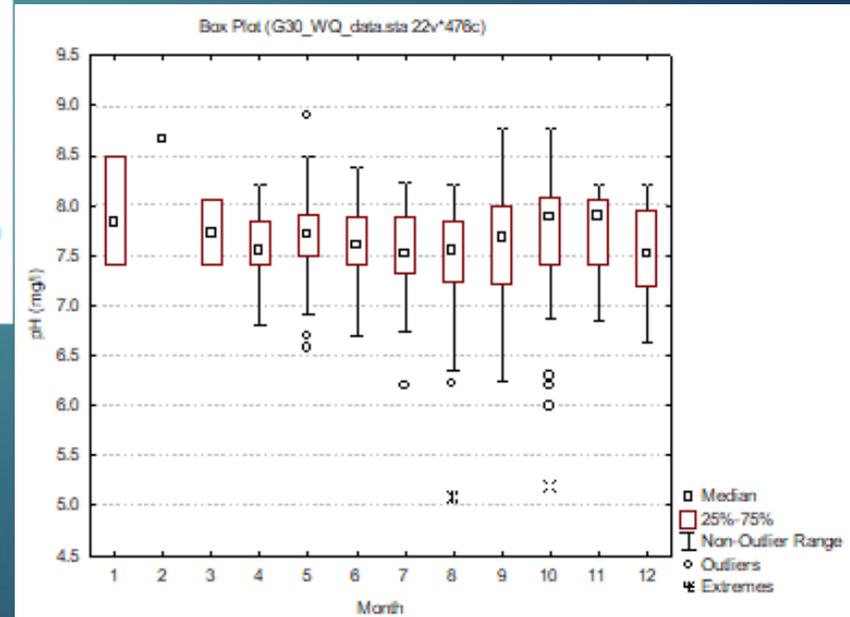
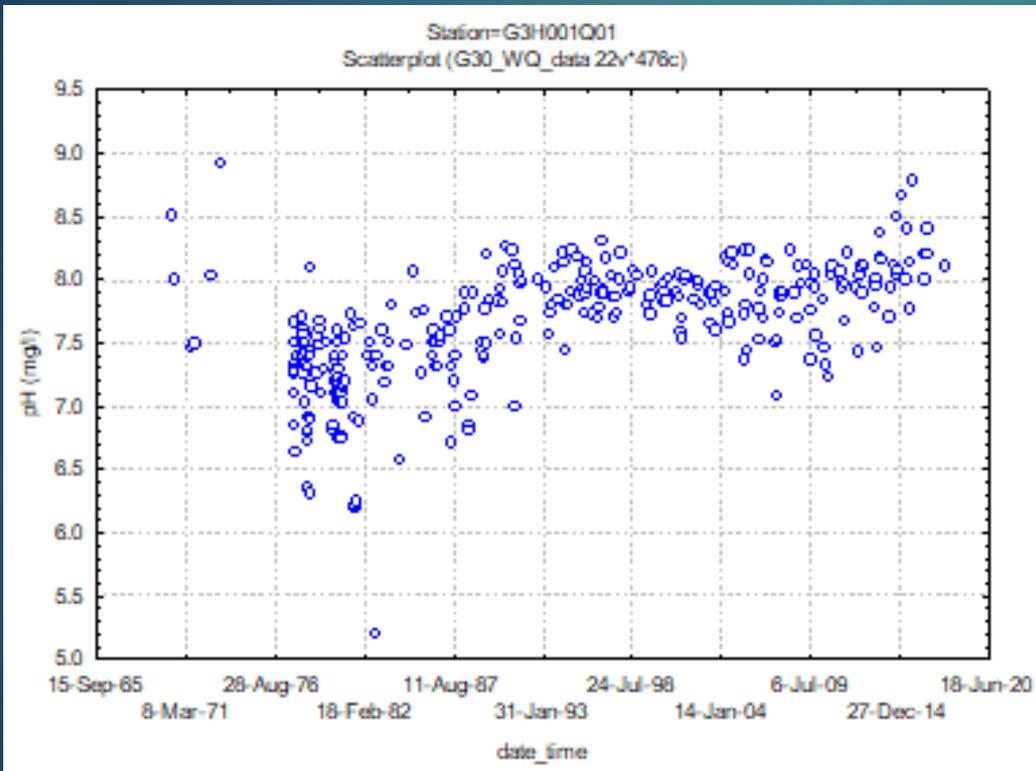
Temporal water quality patterns G3H001 – Kruis River at Eendekuil Salinity



Temporal water quality patterns

G3H001 – Kruis River at Eendekuil

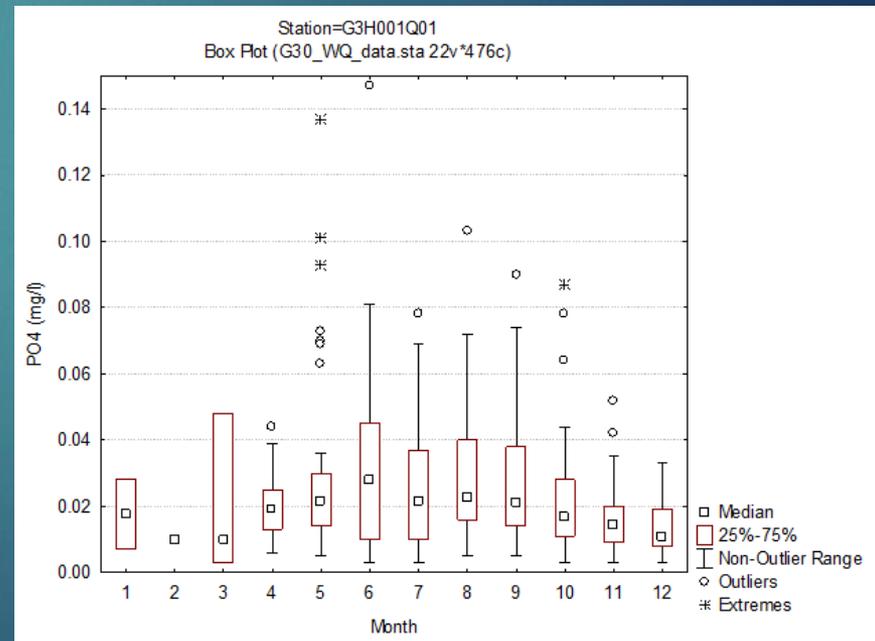
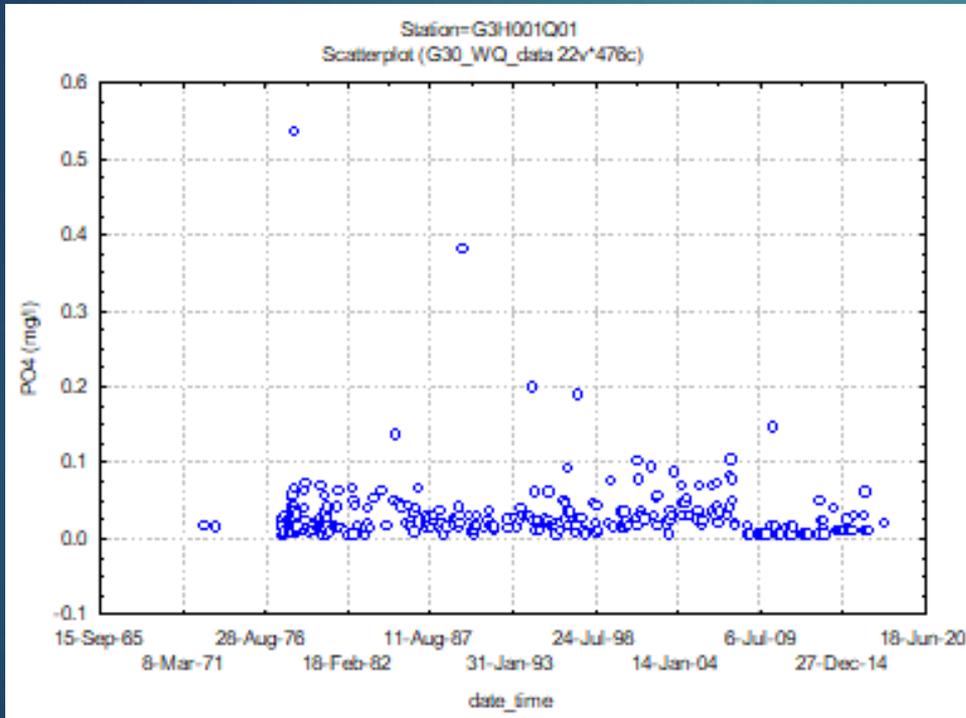
pH



Temporal water quality patterns

G3H001 – Kruis River at Eendekuil

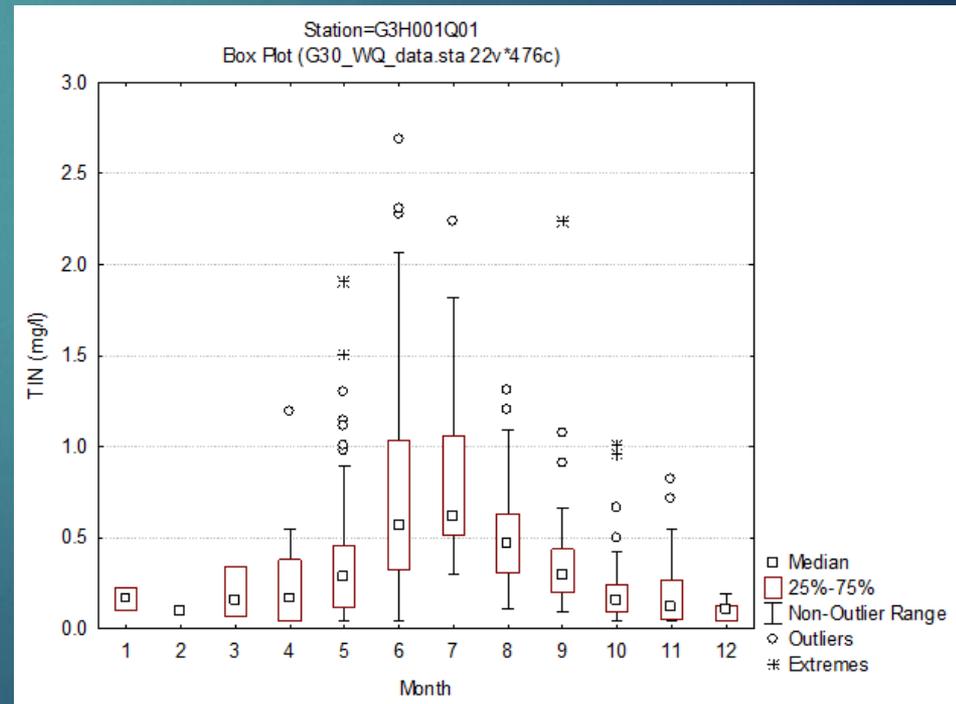
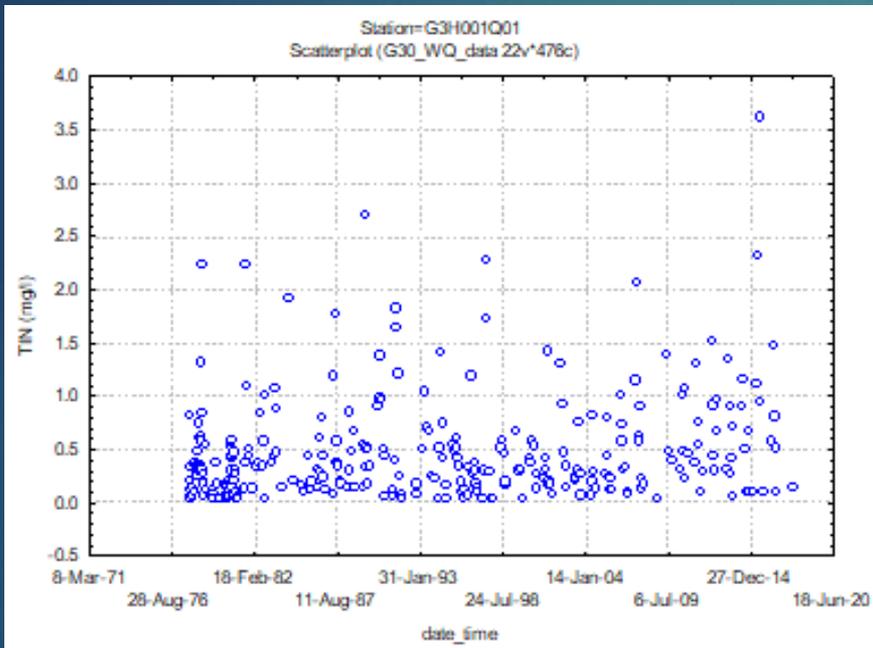
PO₄-P



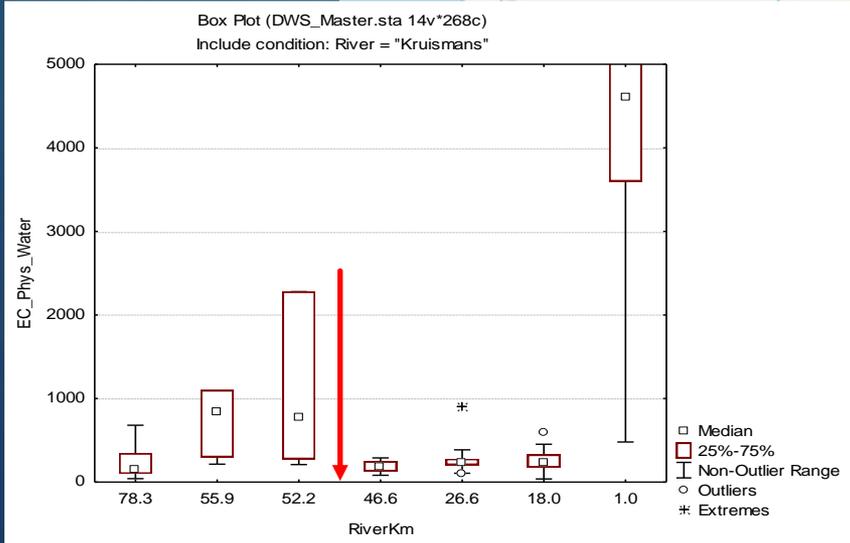
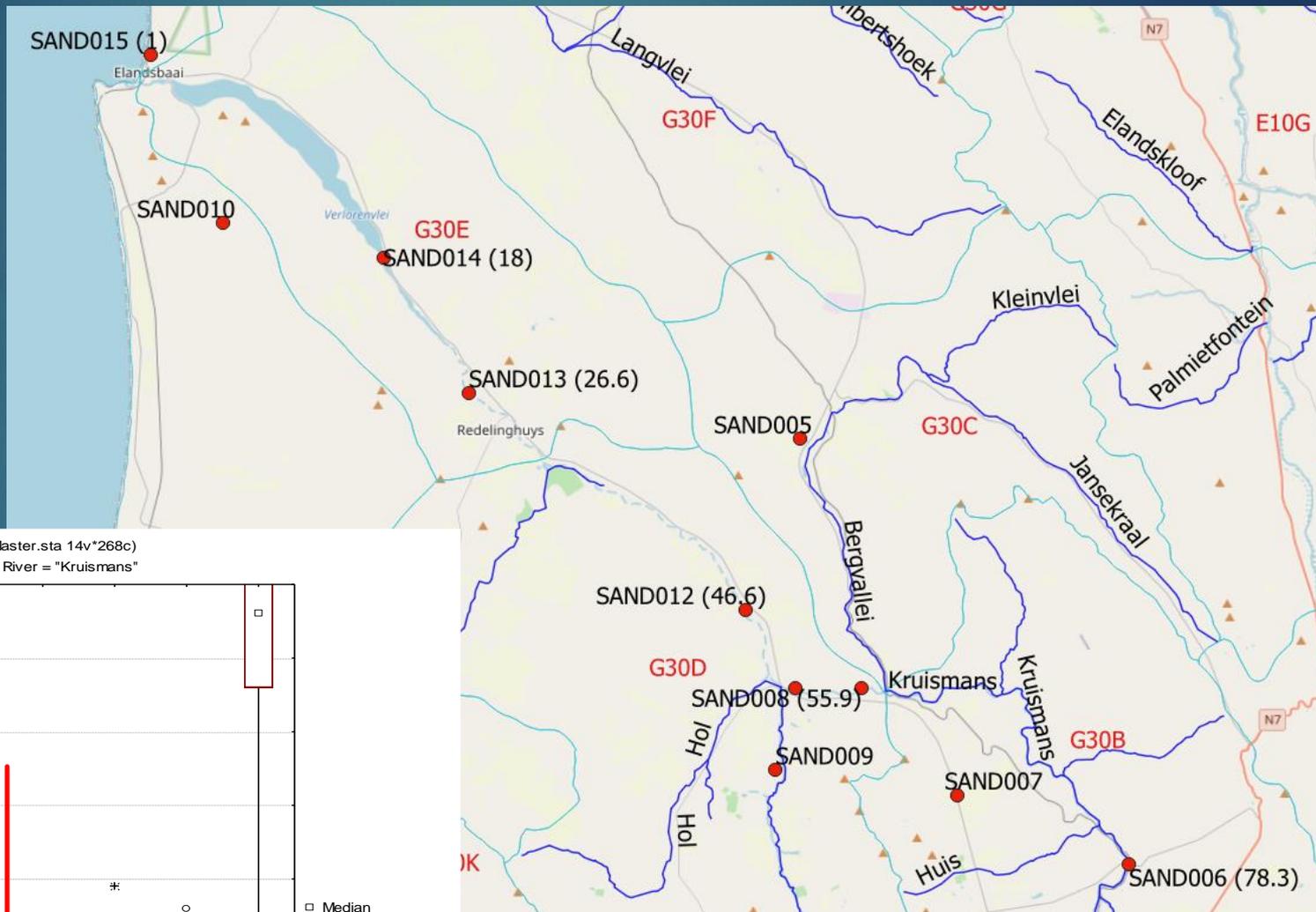
Temporal water quality patterns

G3H001 – Kruis River at Eendekuil

Total inorganic nitrogen (TIN)

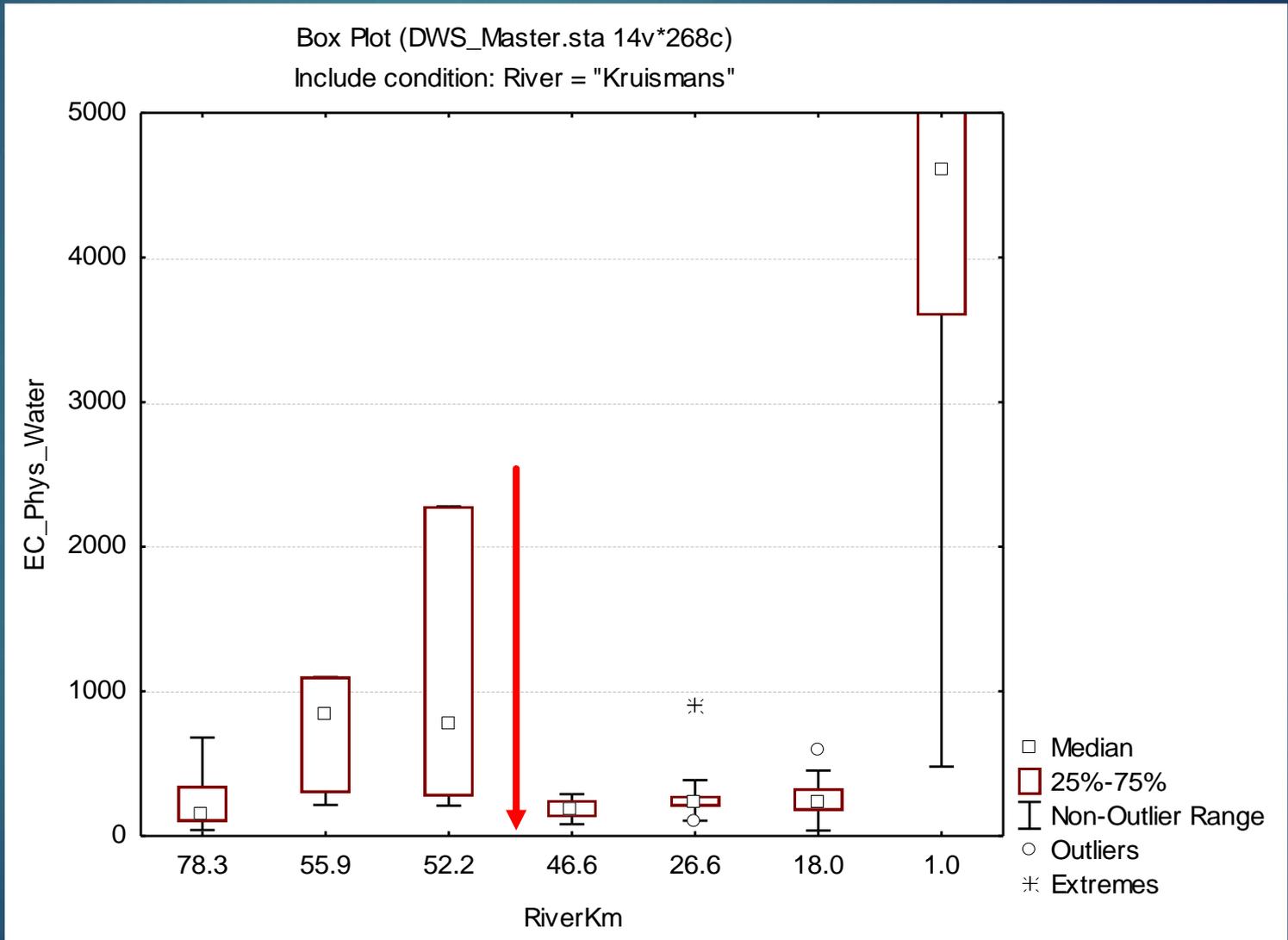


Spatial water quality changes (Regional office data)



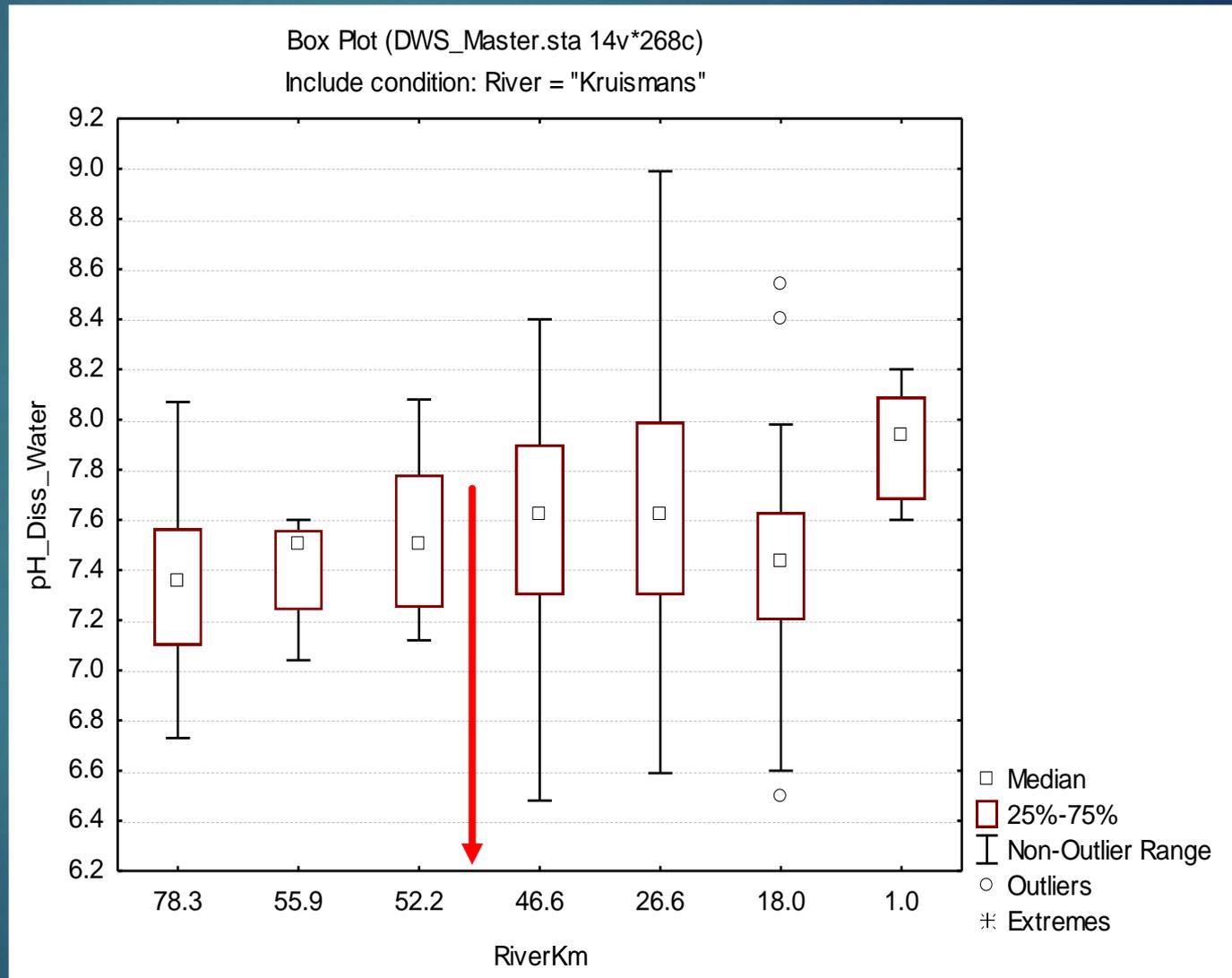
Spatial water quality changes

Salinity



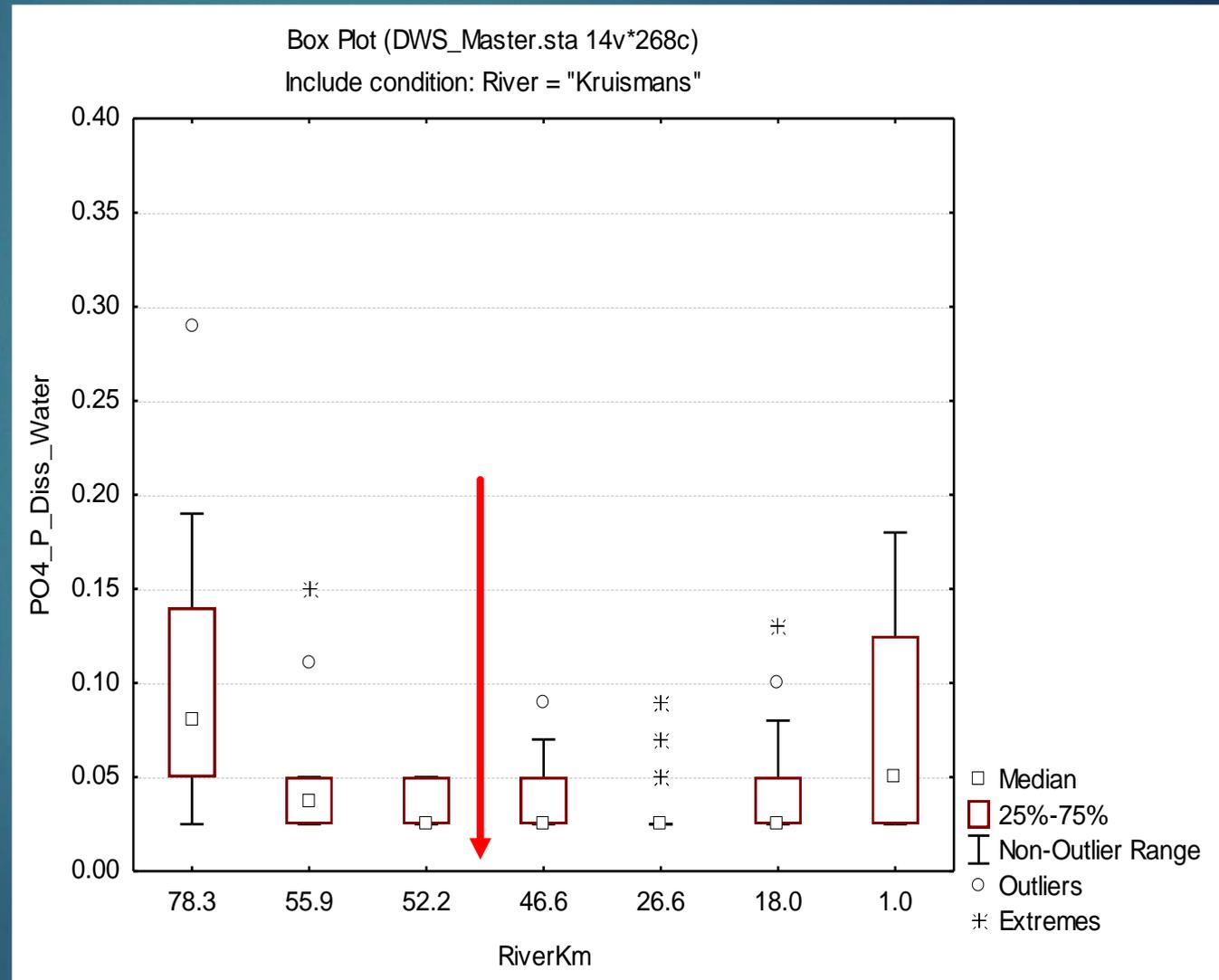
Spatial water quality changes

pH



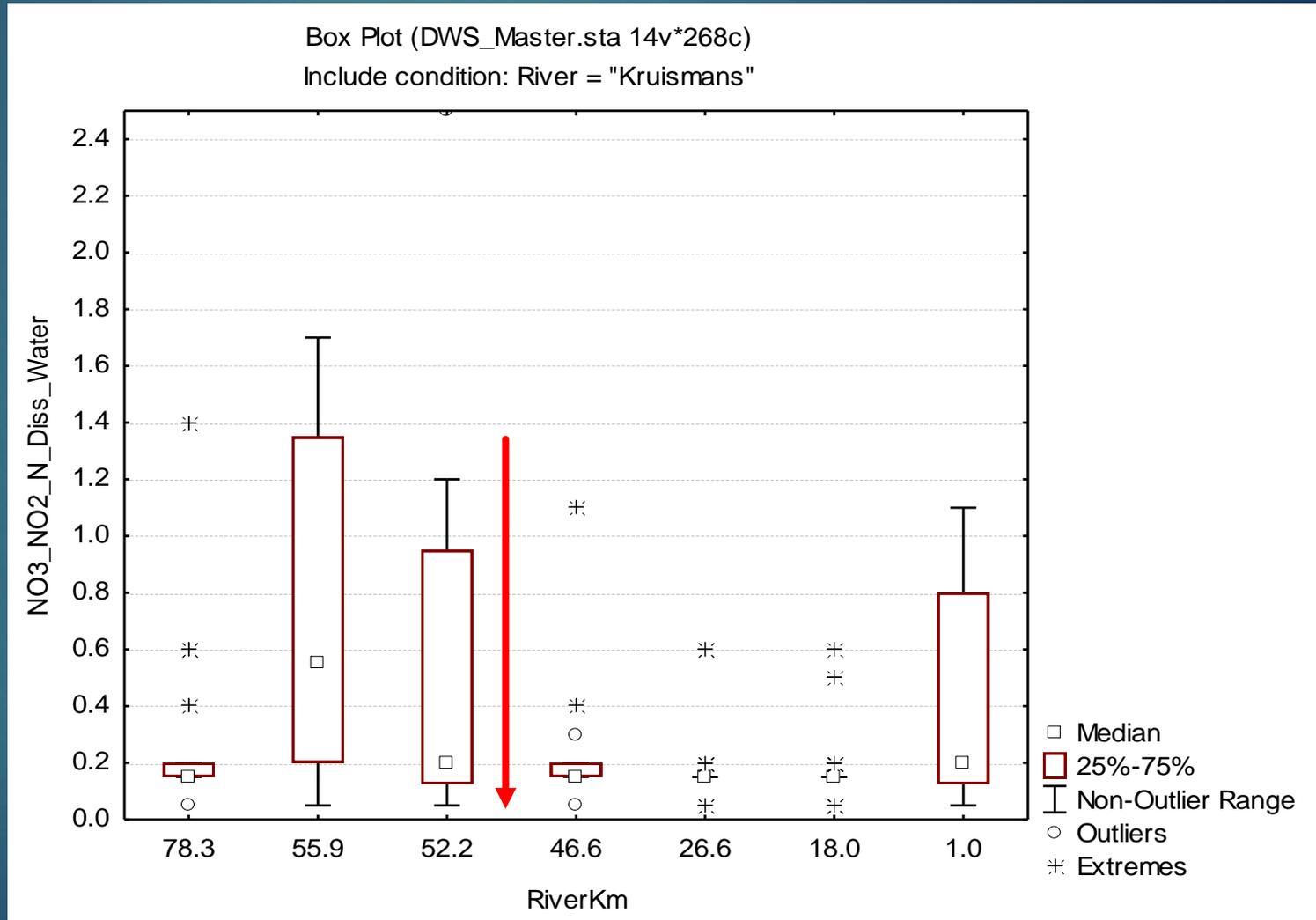
Spatial water quality changes

Ortho-P



Spatial water quality changes

Nitrate Nitrite - N



Water quality at EWR Site 7 Jakkals River

Water Quality Variable	Dry Season	Wet Season	Change
pH (at 25°C)	7.39	7.12	↓
Electrical Conductivity (mS/m)	10100	2200	↓
Total Dissolved Solids (mg/l)	61200	14600	↓
Turbidity (NTU)	14.0	0.88	↓
Total Suspended Solids (mg/l)	14	19	↑
Ortho Phosphate (mg/l as P)	<.20	<.20	-
Ammonia Nitrogen (mg/l N)	<.10	<.10	-
Nitrate Nitrogen (mg/l N)	<.20	<.20	-
Nitrite Nitrogen (mg/l N)	<.20	<.20	-
Total Inorganic Nitrogen (mg/l N) Calculated	<.50	<.50	-

Water quality at EWR Site 7 Jakkals River Wq versus SASS site

Water Quality Variable	Results from sample collected on 6 September 2022 Water quality site	Results from sample collected on 6 September 2022 SASS site
pH (at 25°C)	7.12	6.57
Electrical Conductivity (mS/m)	2200	1225
Total Dissolved Solids (mg/l)	14600	8200
Turbidity (NTU)	0.88	2.9
Total Suspended Solids (mg/l)	19	6
Ortho Phosphate (mg/l as P)	<.20	<.20
Ammonia Nitrogen (mg/l N)	<.10	<.10
Nitrate Nitrogen (mg/l N)	<.20	<.20
Nitrite Nitrogen (mg/l N)	<.20	<.20
Total Inorganic Nitrogen (mg/l N) Calculated	<.50	<.50

Water quality at EWR Site 8 Langvlei

Water Variable	Quality	Dry Season	Wet Season	Change
pH (at 25°C)		6.83	6.9	↑
Electrical Conductivity (mS/m)		1501	1214	↓
Total Dissolved Solids (mg/l)		12400	7998	↓
Turbidity (NTU)		8.7	37.0	↑
Total Suspended Solids (mg/l)		9	41	↑
Ortho Phosphate (mg/l as P)		<.20	<.20	-
Ammonia Nitrogen (mg/l N)		<.20	0.28	↑
Nitrate Nitrogen (mg/l N)		<.20	1.5	↑
Nitrite Nitrogen (mg/l N)		<.20	<.20	-
Total Inorganic Nitrogen (mg/l N) Calculated		<.60	1.98	↑

Water quality at EWR Site 10 Kruismans River

Water Quality Variable	Dry Season	Wet Season	Change
pH (at 25°C)	7.35	7.19	↓
Electrical Conductivity (mS/m)	990	650	↓
Total Dissolved Solids (mg/l)	6800	4400	↓
Turbidity (NTU)	19.2	1.8	↓
Total Suspended Solids (mg/l)	18	5	↓
Ortho Phosphate (mg/l as P)	<.20	<.20	-
Ammonia Nitrogen (mg/l N)	<.10	<.10	-
Nitrate Nitrogen (mg/l N)	<.20	<.20	-
Nitrite Nitrogen (mg/l N)	<.20	<.20	-
Total Inorganic Nitrogen (mg/l N) Calculated	<.50	<.50	-

Water quality at EWR Site 11 Krom Antonies River

Water Variable	Quality	Dry Season	Wet Season	Change
pH (at 25°C)		7.65	7.78	↑
Electrical Conductivity (mS/m)		157	28.8	↓
Total Dissolved Solids (mg/l)		1044	202	↓
Turbidity (NTU)		18.2	1.4	↓
Total Suspended Solids (mg/l)		16	<4	↓
Ortho Phosphate (mg/l as P)		<.20	<.20	-
Ammonia Nitrogen (mg/l N)		<.10	<.10	-
Nitrate Nitrogen (mg/l N)		<.20	<.20	-
Nitrite Nitrogen (mg/l N)		<.20	<.20	-
Total Inorganic Nitrogen (mg/l N) Calculated		<.50	<.50	-

Water quality in the Krom Antonies River at EWR 11 and at Moutonshoek in the upper reaches

Water Quality Variable	Results from sample collected on 7 September 2022 @ EWR 11	Results from sample collected on 7 September 2022 @ Moutonshoek
pH (at 25°C)	7.78	8.49
Electrical Conductivity (mS/m)	28.8	12.3
Total Dissolved Solids (mg/l)	202	78
Turbidity (NTU)	1.4	0.55
Total Suspended Solids (mg/l)	<4	<4
Ortho Phosphate (mg/l as P)	<.20	<.20
Ammonia Nitrogen (mg/l N)	<.10	<.10
Nitrate Nitrogen (mg/l N)	<.20	<.20
Nitrite Nitrogen (mg/l N)	<.20	<.20
Total Inorganic Nitrogen (mg/l N) Calculated	<.50	<.50

Water quality at EWR Site 12

Lower Verlorenvlei River

Water Quality Variable	Results from sample collected on 8 September 2022
pH (at 25°C)	7.62
Electrical Conductivity (mS/m)	194
Total Dissolved Solids (mg/l)	1300
Turbidity (NTU)	4.4
Total Suspended Solids (mg/l)	7
Ortho Phosphate (mg/l as P)	<.20
Ammonia Nitrogen (mg/l N)	<.10
Nitrate Nitrogen (mg/l N)	<.20
Nitrite Nitrogen (mg/l N)	<.20
Total Inorganic Nitrogen mg/l N) Calculated	<.50

Water quality at EWR Site 16

Upper Papkuils Seep

Water Quality Variable	Results from sample collected on 8 September 2022
pH (at 25°C)	7.63
Electrical Conductivity (mS/m)	129
Total Dissolved Solids (mg/l)	868
Turbidity (NTU)	3.8
Total Suspended Solids (mg/l)	23
Ortho Phosphate (mg/l as P)	<.20
Ammonia Nitrogen (mg/l N)	<.10
Nitrate Nitrogen (mg/l N)	<.20
Nitrite Nitrogen (mg/l N)	<.20
Total Inorganic Nitrogen mg/l N) Calculated	<.50

Water quality at the Hol River

Water Quality Variable	Results from sample collected on 8 September 2022
pH (at 25°C)	6.98
Electrical Conductivity (mS/m)	720
Total Dissolved Solids (mg/l)	4820
Turbidity (NTU)	24
Total Suspended Solids (mg/l)	8
Ortho Phosphate (mg/l as P)	<.20
Ammonia Nitrogen (mg/l N)	<.10
Nitrate Nitrogen (mg/l N)	<.20
Nitrite Nitrogen (mg/l N)	<.20
Total Inorganic Nitrogen mg/l N) Calculated	<.50

Conclusions

- ▶ Water quality variable between wet and dry season
- ▶ This can be confirmed using the longterm data from G3H001, the Kruis River at Eendekuil where seasonality was identified.
- ▶ Water quality variable between different sites on the same river as was seen in the Jakkals and Krom Antonies Rivers
- ▶ Sometimes difficult to split riverine from wetland areas
- ▶ Unknown if the water quality measured is surface water only, surface and groundwater or only groundwater (dry season)



THANK YOU

