

4th SADC GROUNDWATER CONFERENCE

10th -12th of November 2021
VIRTUAL CONFERENCE



- Robin Petersen (SANParks), Fhedzisani Ramusiya (DWS), Eddie Riddell (SANParks)

Re-establishing the groundwater monitoring network in SANParks



International Association
of Hydrogeologists
the World-wide Groundwater Organisation



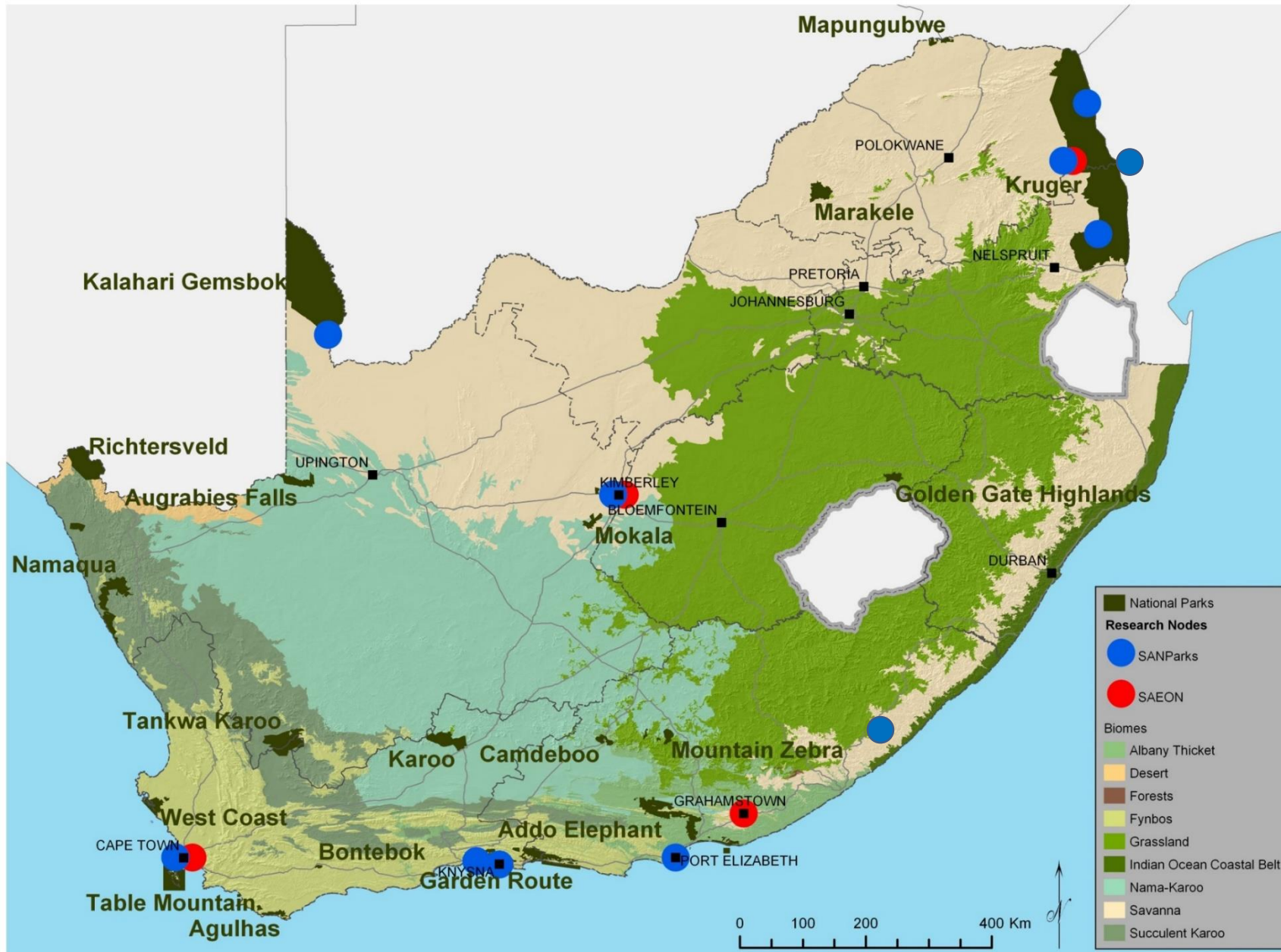
GRIPP
GROUNDWATER SOLUTIONS
INITIATIVE FOR
POLICY AND PRACTICE



British
Geological
Survey



South African National Parks

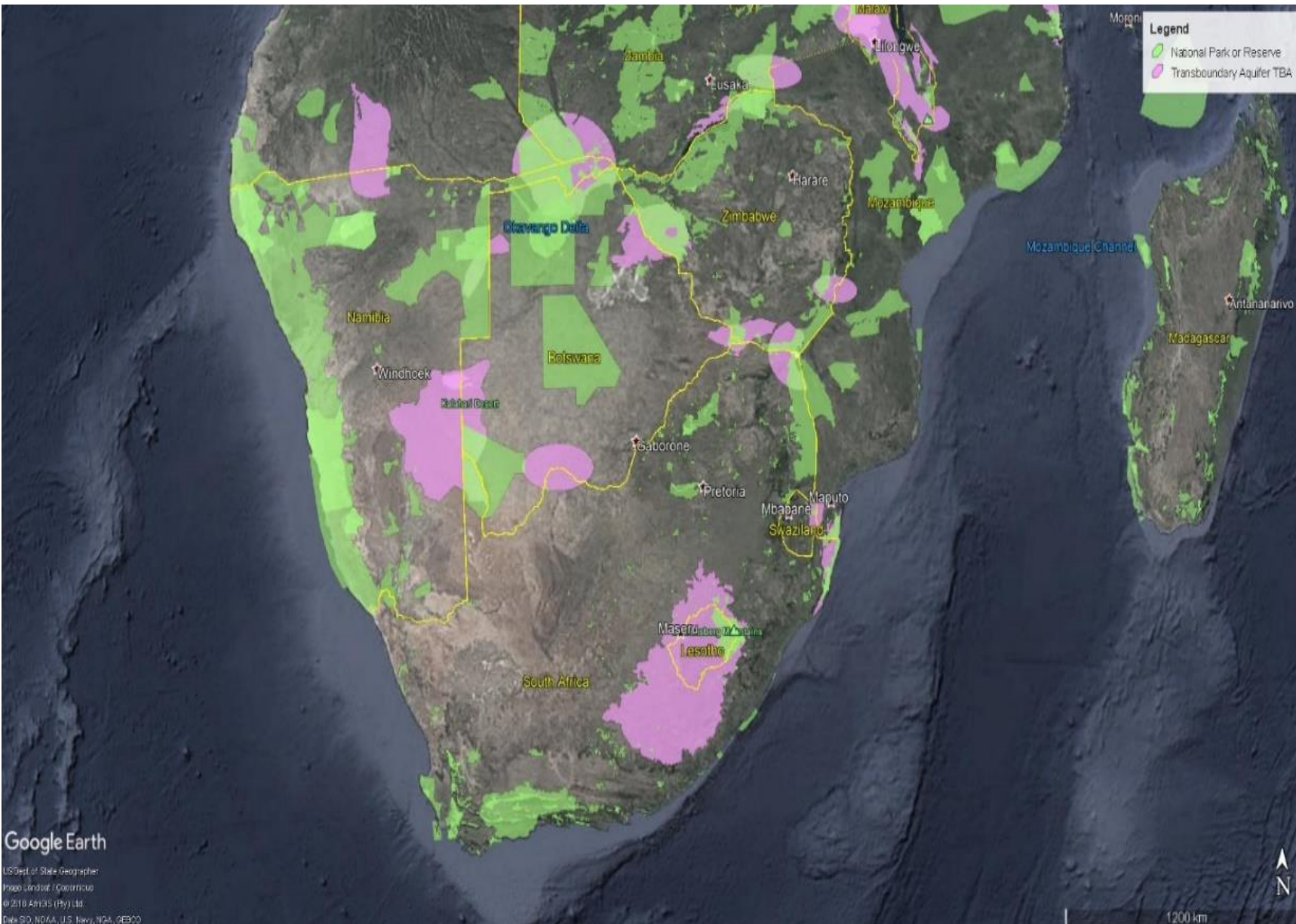


- Custodian of 54% of formal protected areas
- 22 National Parks
- 8 Biomes
- Approx. 4 million ha of land

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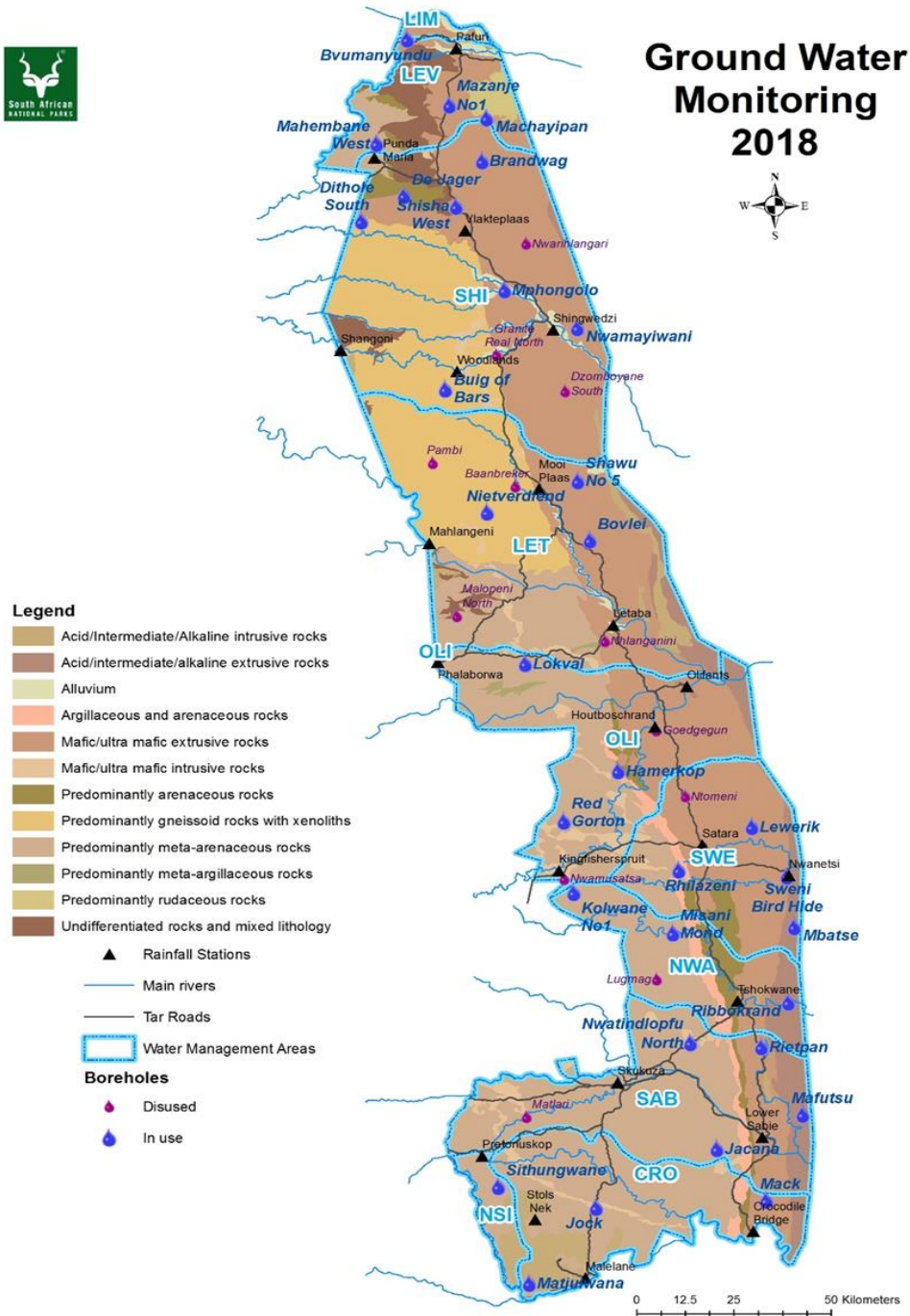
Transboundary Aquifers (TBAs) in SANParks



- 4 TBA's are located in a National Parks
- Tuli-Karoo aquifer (Mapungubwe NP)
- Strampriet aquifer (Kgalagadi Trans frontier Park)
- Karoo sedimentary aquifer (Golden Gate highlands NP)
- Limpopo Basin (Kruger Park)

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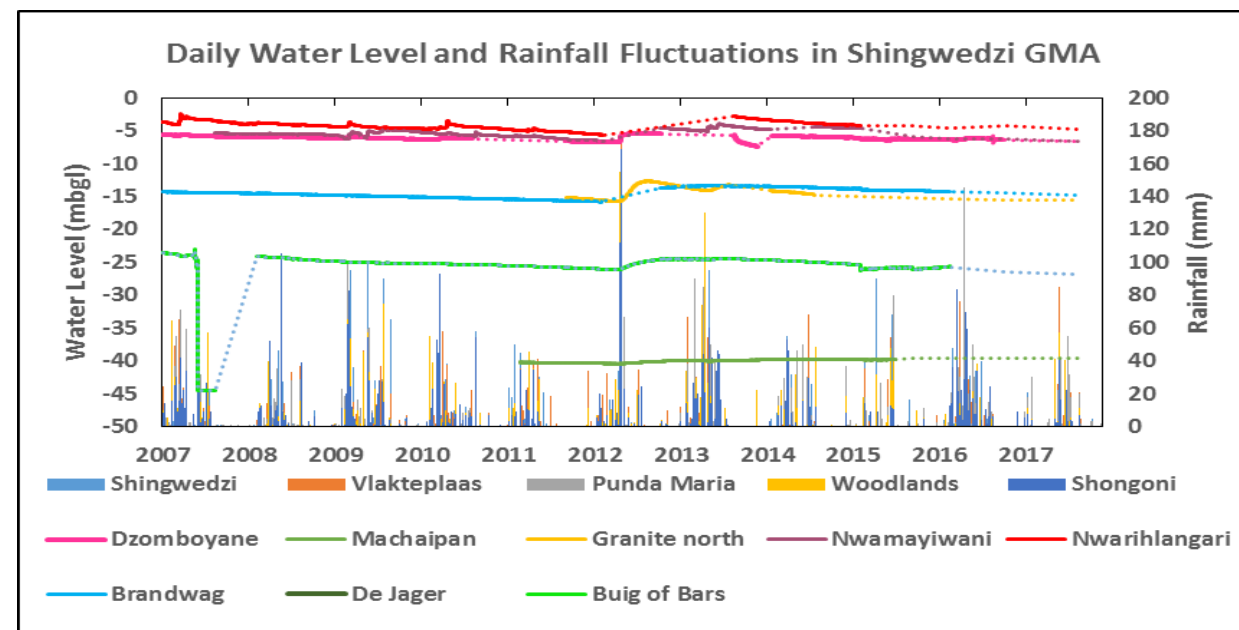
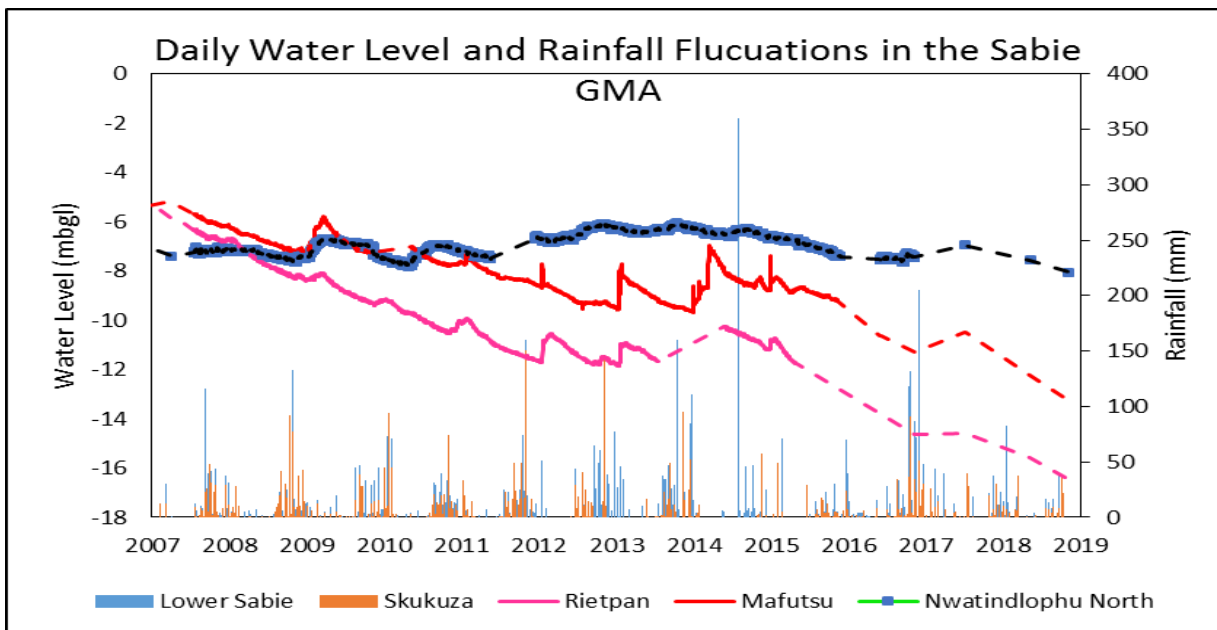
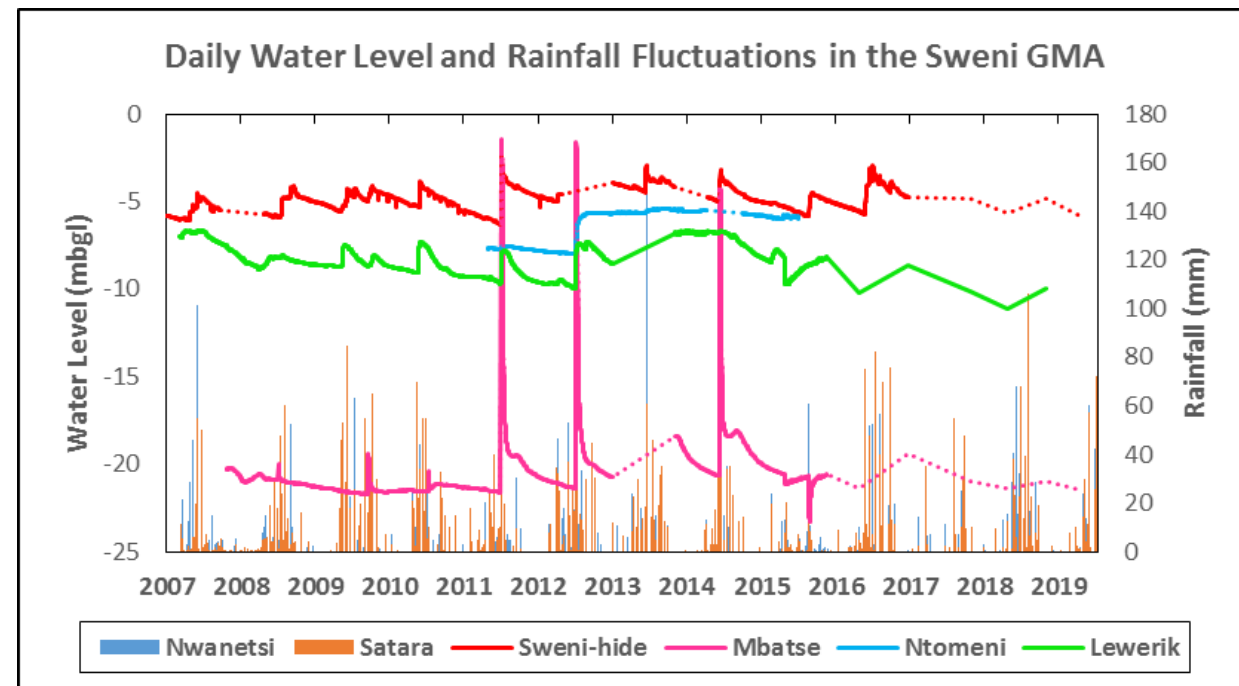
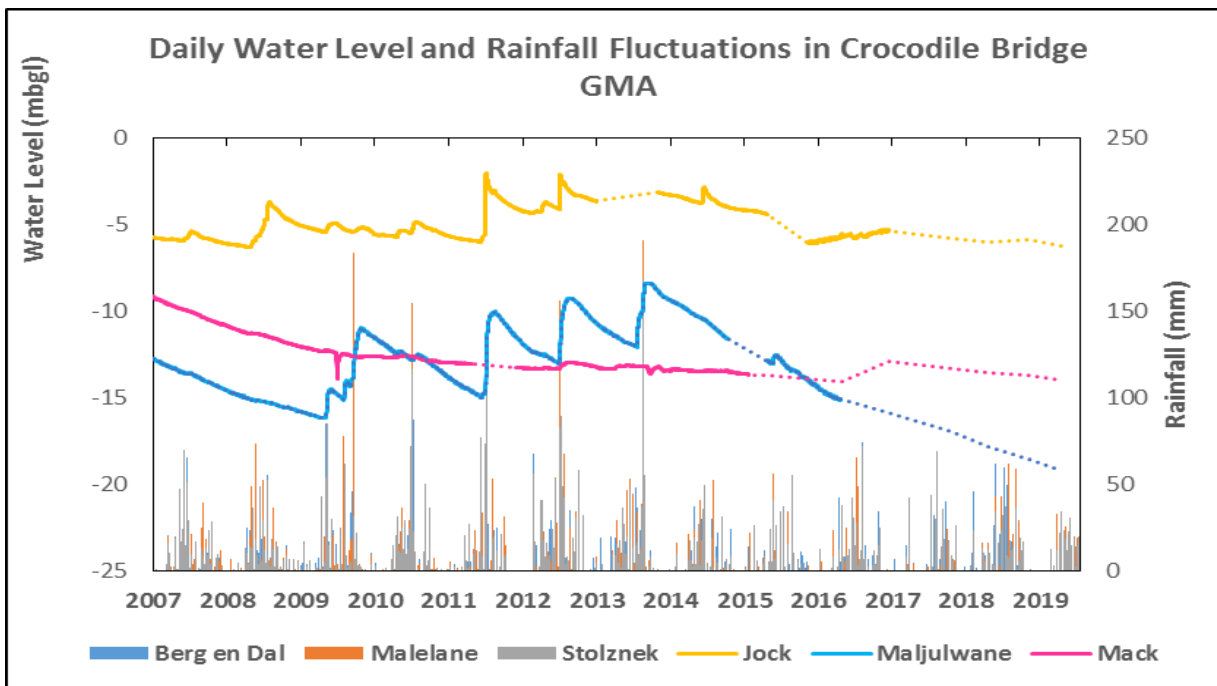
Groundwater Monitoring in the KNP-Limpopo Basin TBA

- Groundwater monitoring network consisting of 43 boreholes equipped with loggers – Hourly reading since 2007.
- Downloaded twice annually.
- Groundwater mimics the topography
- Flows from west to east
- Recharge is estimated at 12mm/pa (2.3% of average rainfall (550mm/pa)).

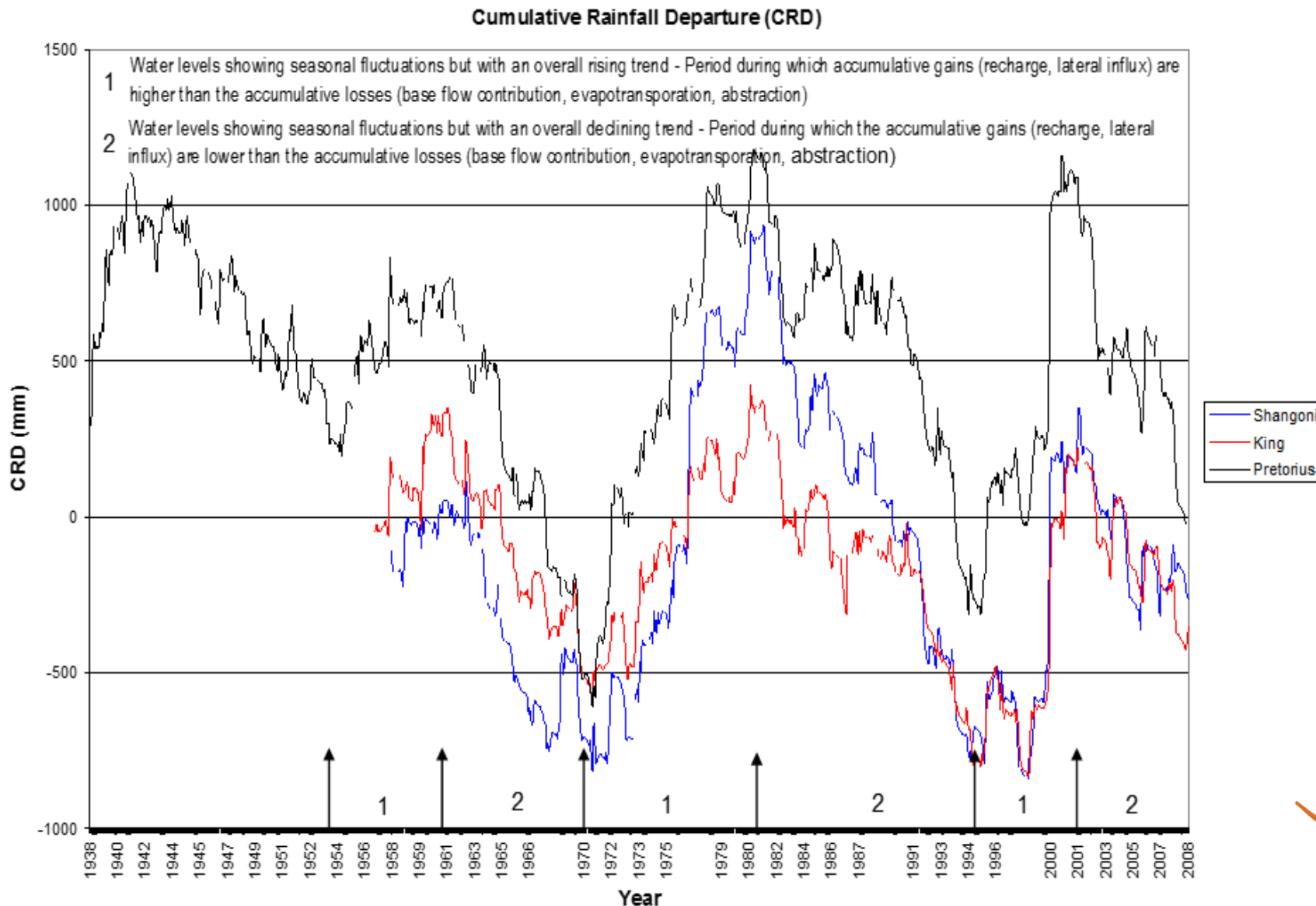
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Example of water levels vs rainfall

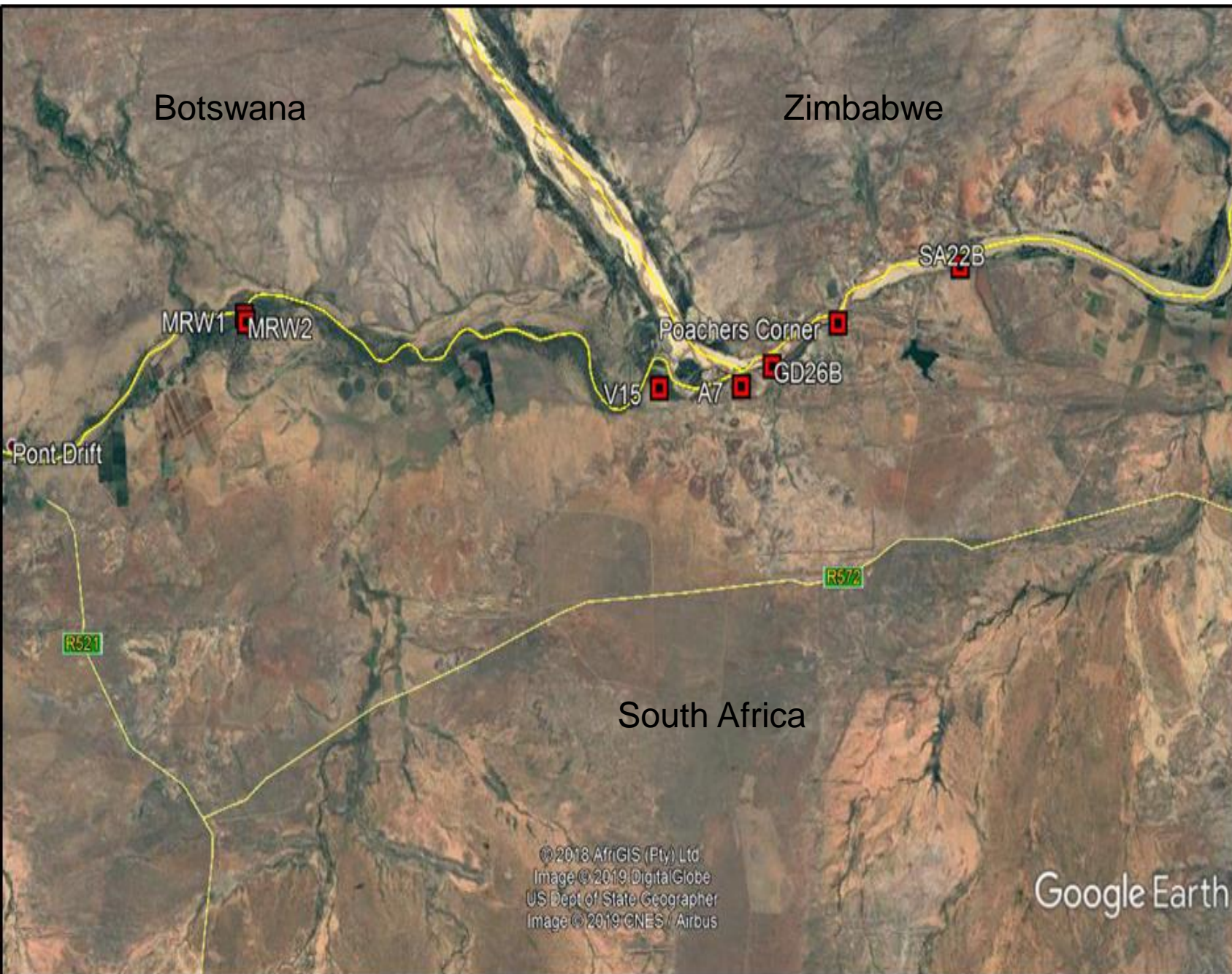


Long-term modelling



- low and high recharge periods seem to vary in duration from 4 up to 23 years averaging around 11 years.

Groundwater Monitoring in Mapungubwe- Tuli Karoo TBA

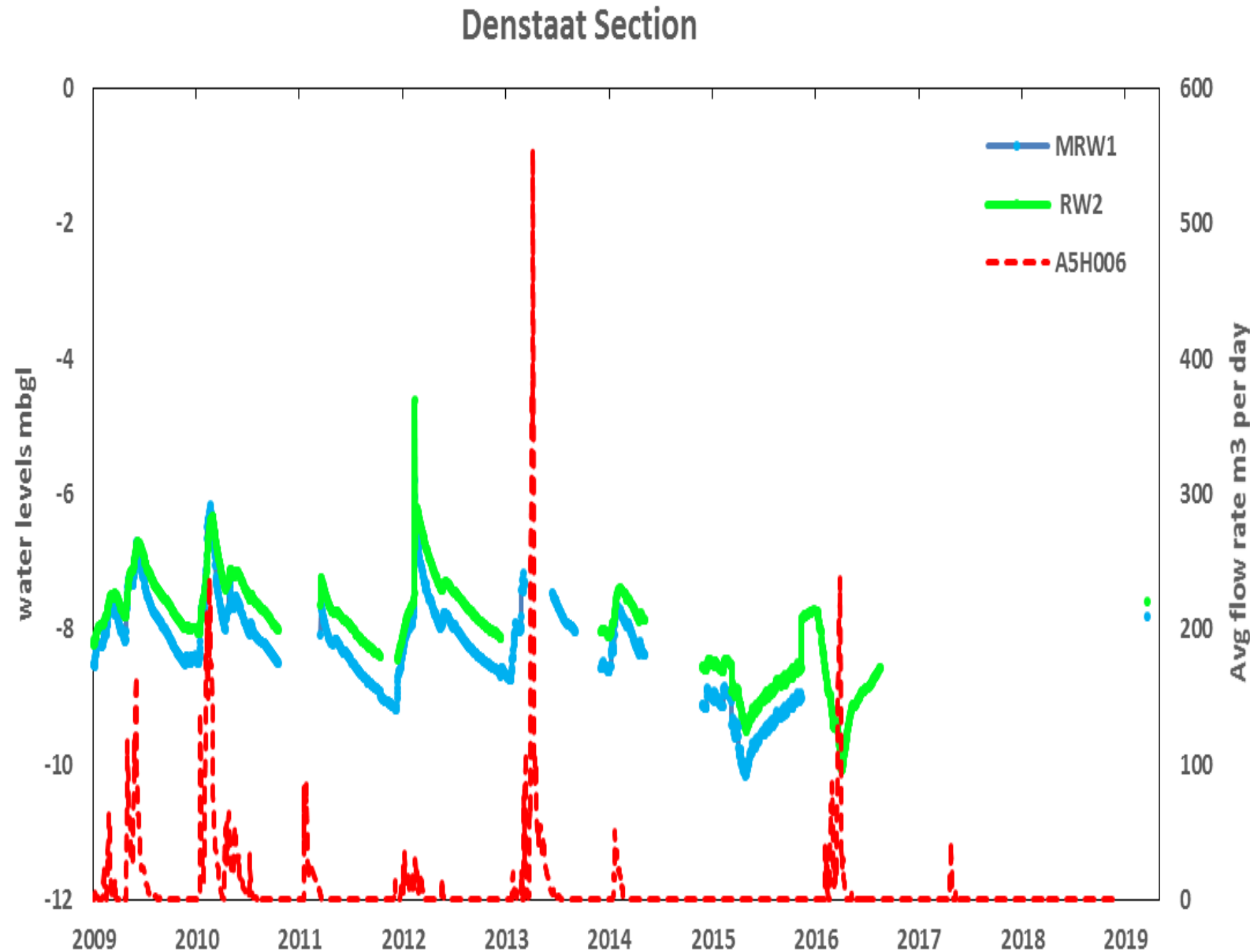


- Groundwater monitoring network consisting of 7 boreholes equipped with level loggers – Hourly reading since 2009.
- Downloaded twice annually.

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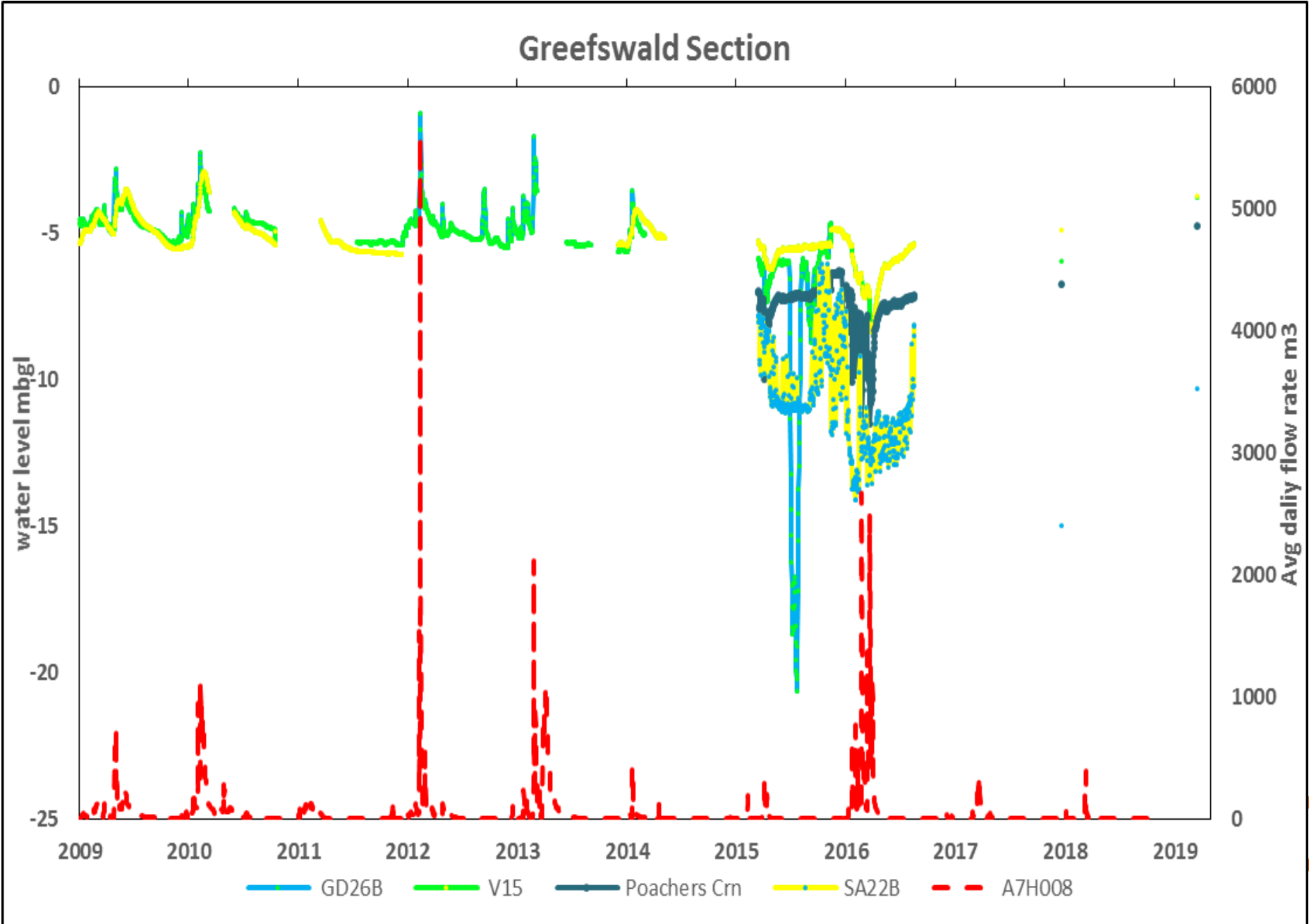
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Results: Denstaat- Alluvial aquifer



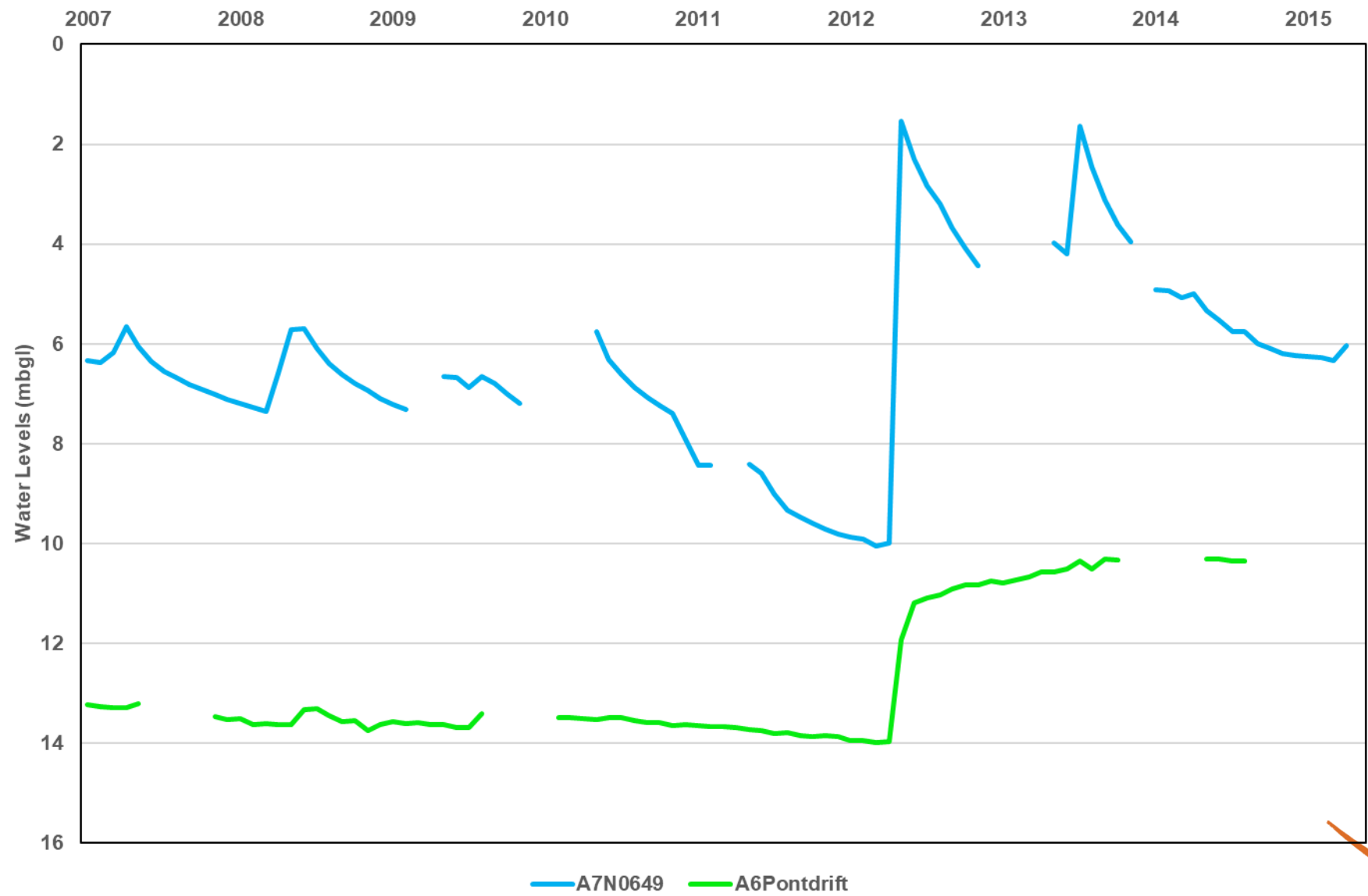
- Above the confluence with the Shashe River
- Seasonal fluctuation of WL- depended on river flow

Greefswald Section: Alluvial aquifer




Below the confluence of
the Shashe River

Secondary Aquifers:




SANParks wide Groundwater monitoring and Research

2020- 2022: Phase 1 HYDROCENSUS:

Actions	Deliverables
<ol style="list-style-type: none">1. Engage with park management to initiate hydro-census.2. Establish a hydro-census team.3. Gather existing borehole information (existing reports)4. Develop practical field forms.5. Procure all the required equipment.6. Provided training to team members.7. Conduct field surveys8. Capture data in hard copy9. Capture and disseminate data electronically10. Monitor and capture data	<ol style="list-style-type: none">1. Technicians are trained and competent in groundwater monitoring and data capture.2. Borehole distribution map3. Baseline water level and water quality assessment report. <div data-bbox="1676 1159 2542 1425"></div>

2023-2025 Phase 2 Assessment of Data

Actions	Deliverables
<p>1. Review monitoring network performance: comprehensive assessment of borehole distribution, groundwater use, water levels, flow directions, water quality, regional geology, aquifer dependant ecosystems etc. using Arc View and Spatial Analysis.</p> <p>4. Capture and interpret available borehole pumping test-data and identify any further borehole pump test sites.</p> <p>5. Report outputs to park management</p> <p>6. Identify and implement monitoring zones</p>	<p>1. Progress Report:</p> <div data-bbox="1691 1163 2542 1428"><p>4th SADC GROUNDWATER CONFERENCE 10th - 12th of November 2021 VIRTUAL CONFERENCE</p></div>

2025-Phase 3: Final report and deliverables:

Actions	Deliverables
<p>1. Produce a final report: The final report should include the following decision-making-information:</p> <ul style="list-style-type: none">- Map of High potential and low potential groundwater areas.- Map of groundwater Quality- Recharge areas and recharge rates- Daily, monthly and annual available volumes of groundwater abstraction where applicable.- Map of Existing infrastructure (reservoirs, pipelines, pumps, etc.)- Map of recommended protection zoning, sensitive biodiversity hotspots i.e. Wetlands, springs, vegetation and recharge areas.- Identify priority areas for high resolution monitoring- Develop initial groundwater TPC's	<ul style="list-style-type: none">1. Well-managed and protected groundwater resources ·2. Reliable groundwater management information3. Protection zoning of groundwater abstraction points and recharge areas.4. Effective aquifer assessment and protection protocol for all new and existing groundwater infrastructure development.5. Well-organised procedures for water use license applications when applicable.6. Motivated and well-trained staff

National Park	Hydro-census	Monitoring
Savannah & Grassland Node		
Kruger	✓	✓
Mapungubwe	✓	✓
Golden Gate*	✓	✓
Marakele	✓	✓
Arid Parks		
Kgalagadi	✓	✓
Richtersveld	x	x
Augrabies Falls	✓	x
Meerkat*	✓	x
Mokala*	✓	x
Cape region		
Agulhas	✓	✓
West coast	✓	✓
Bontebok	x	x
Table Mountain	x	x
Tankwa Karoo	✓	✓
Namaqua	x	x
Garden Route		
Knysna-Wilderness*	x	x
Tsitsikamma*	x	
Frontier region		
Karoo	✓	x
Addo Elephant	✓	x

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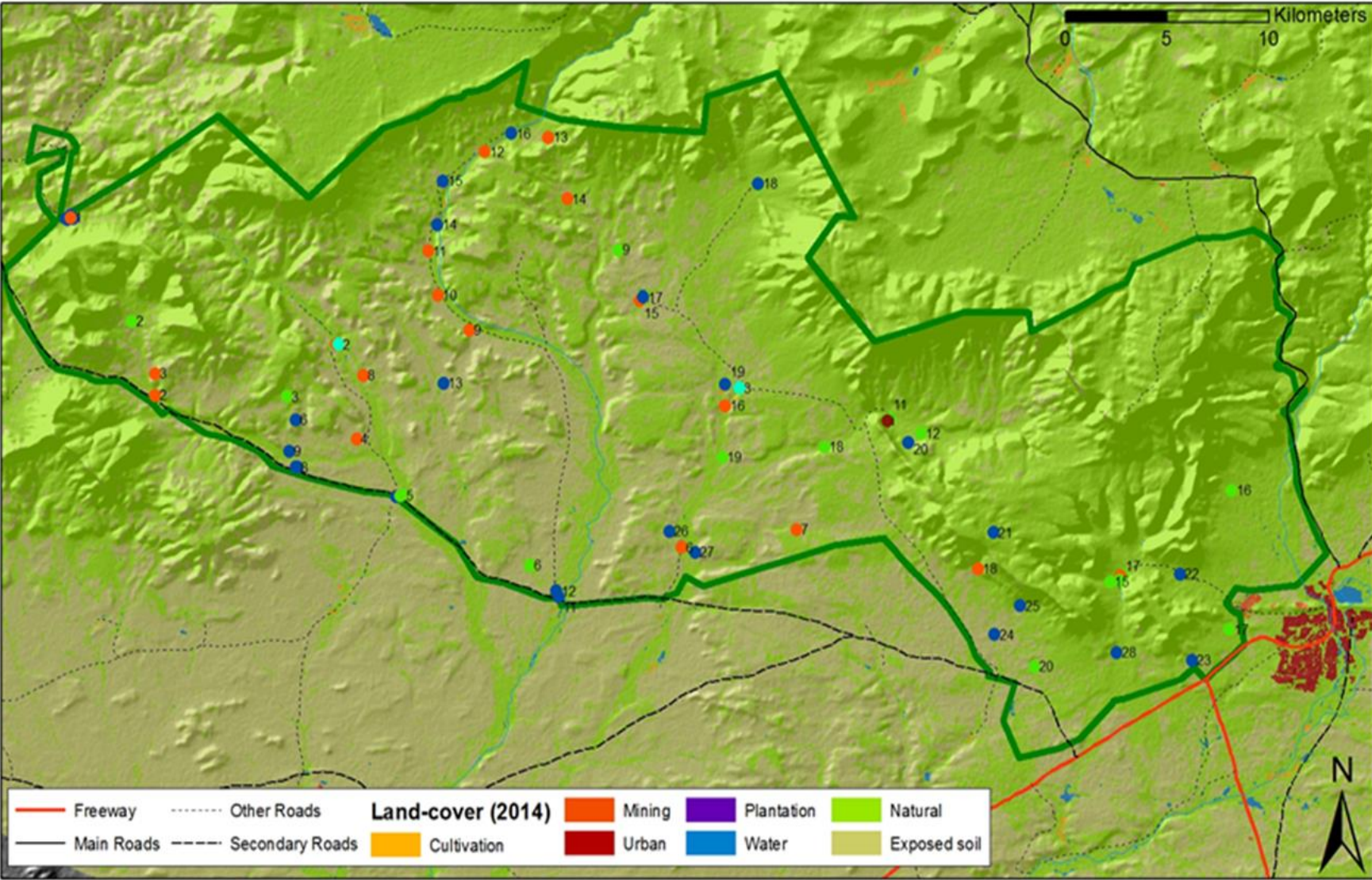
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Locations and labels of boreholes in Karoo National Park

Land-cover (the background) is dated 2014



Boreholes ● CBH ● I? ● MBH ● PBH ● Spring — River line



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The way forward

This is an excellent opportunity to re-formalize the collaborative agreement between SANParks/DWS- Provides mutual benefit for groundwater resources protection.

- SANParks offers pristine environments that provides unique opportunities to study and monitor the natural groundwater processes (recharge, discharge, SW-GW interaction, climate variability ,stressors) providing a bench mark for groundwater resources management in various biomes and regions.
- Transboundary context- Create an environment which will enable multi-country collaboration on water resources management (Multi-country data sharing platforms LIMCOM and ORASECOM).
- Creating opportunities to attract research and develop new knowledge networks.

Thank You!

Acknowledgements

- Tercia Strydom
- Angelo Johnson
- All the SANParks staff involved in the project.

