4th SADC GROUNDWATER CONFERENCE

10th -12th of November 2021

VIRTUAL CONFERENCE

GROUNDWATER MANAGEMENT INSTITUTE

Managed Aquifer Recharge in Windhoek

Evaluation and Future Challenges

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Acknowledgements

City of Windhoek: Project and supply of data

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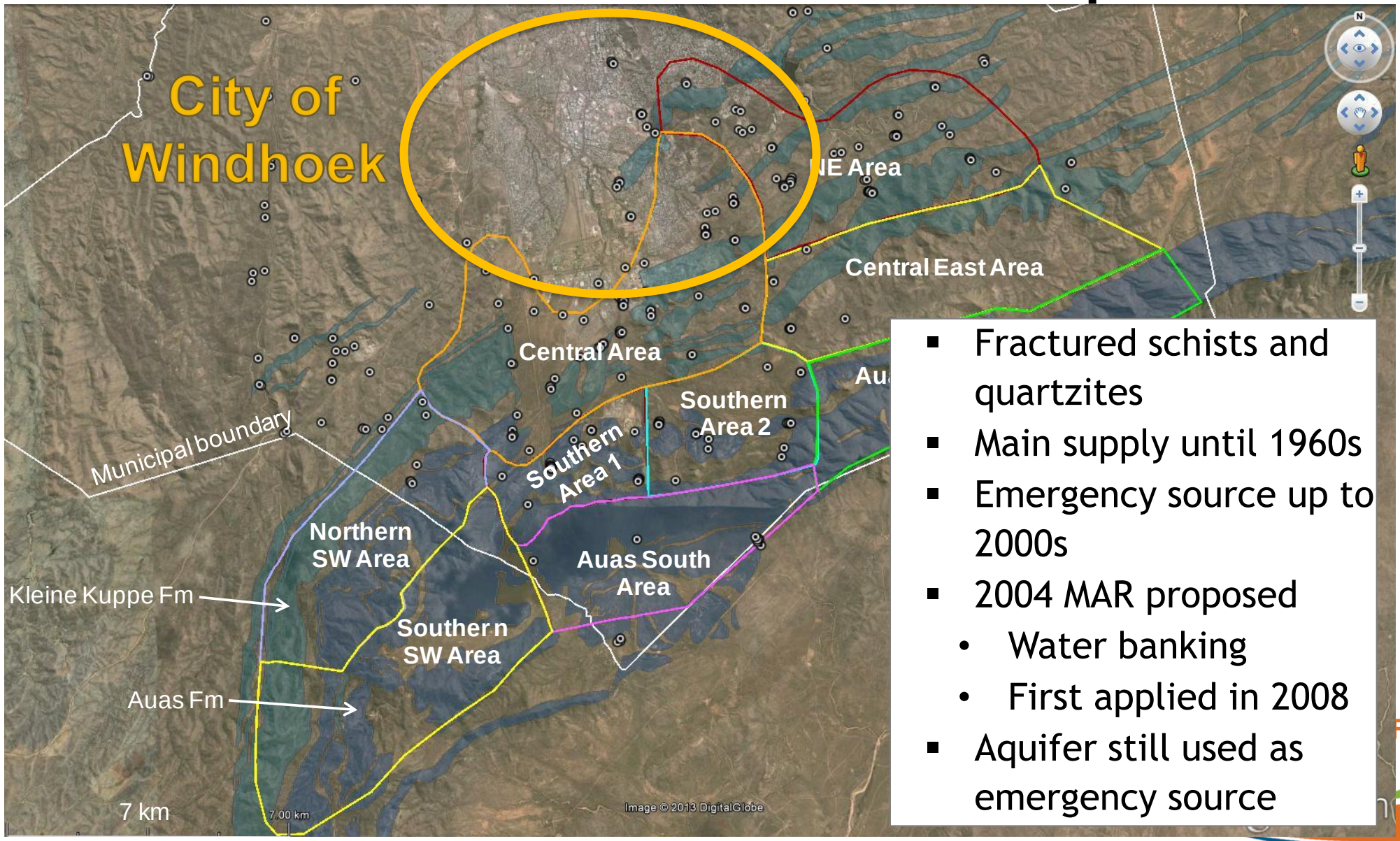
Introduction: Windhoek Aquifer



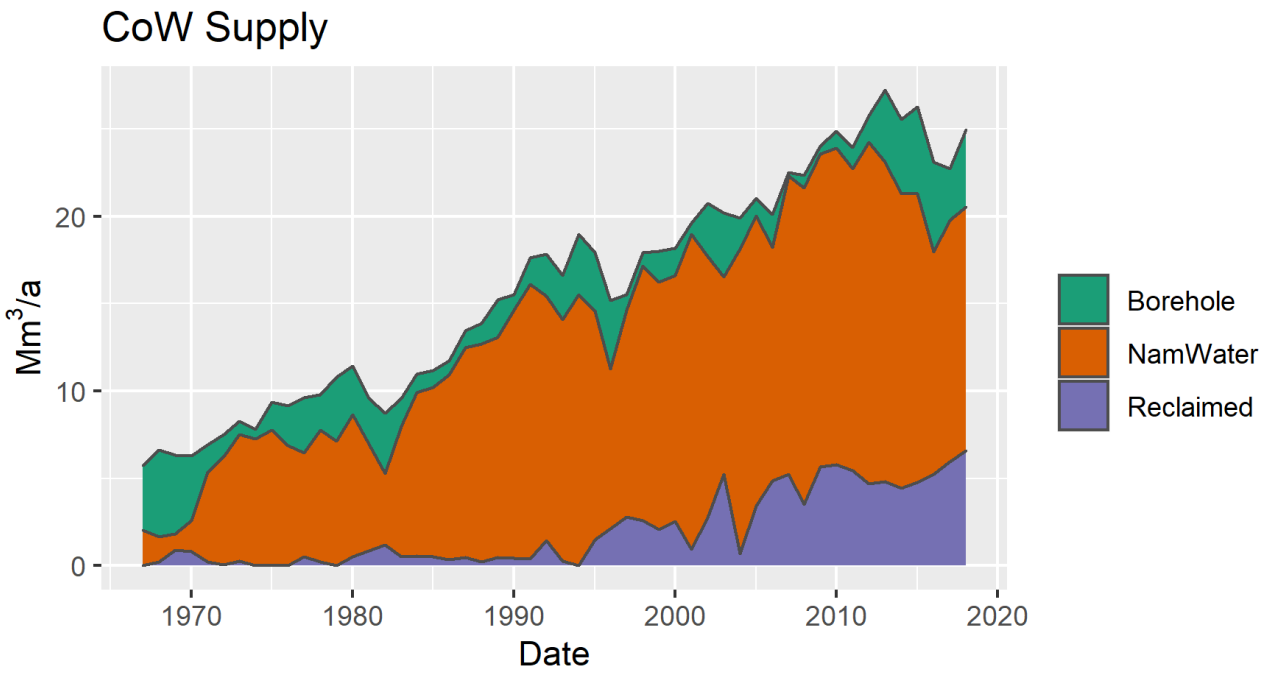
- Fractured schists and quartzites
- Main supply until 1960s
- Emergency source up to 2000s
- 2004 MAR proposed
  - Water banking
  - First applied in 2008
- Aquifer still used as emergency source

MAR Philosophy

- Goal: High quality recharge water
  - Avoid damaging aquifer as a valuable source
  - Minimise post-treatment
- Recharge WQ stricter or equal to potable WQ standards
- EC, chloride, sulphate, DOC / AOC key parameters

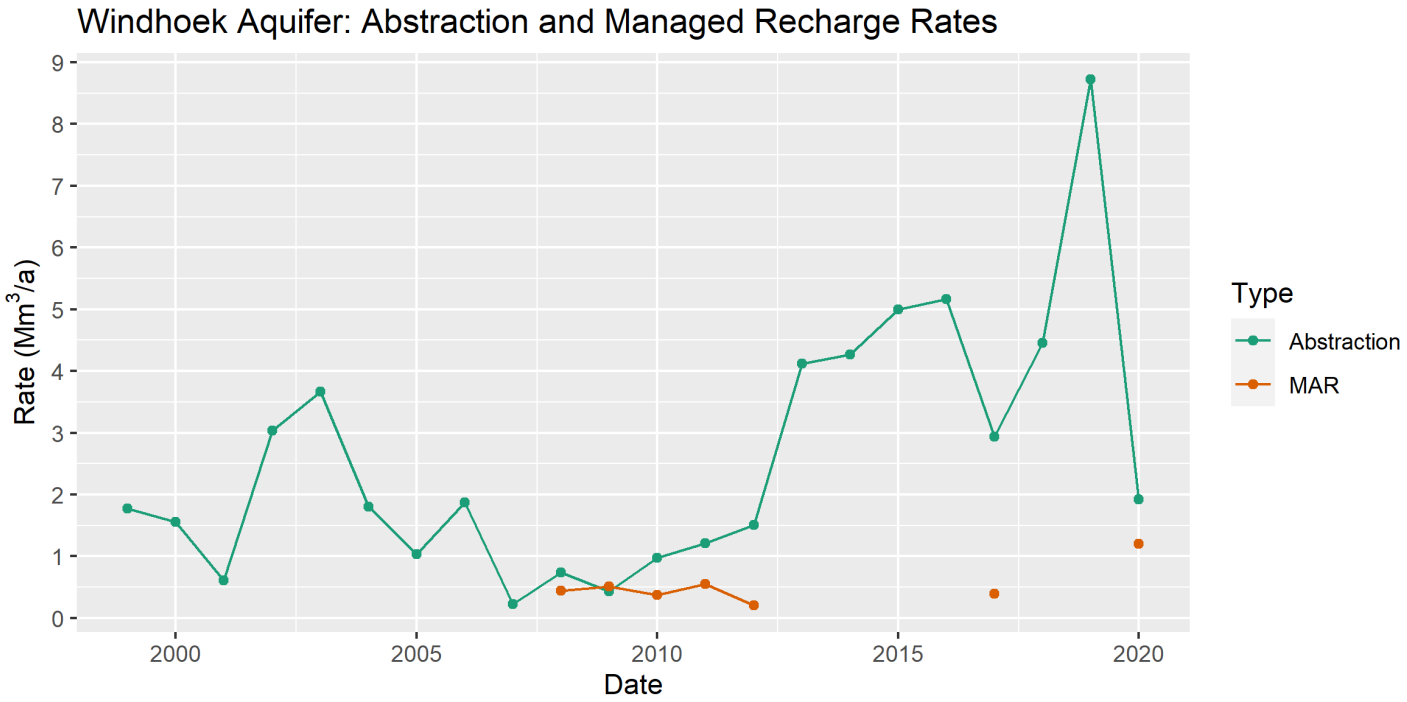
Windhoek's Water Supply

- Current demand: ~25 Mm^3/a
- Diverse sources – SW, GW, Direct-Reuse
- Role players: Bulk supplier and municipality
- NamWater – bulk supplier
  - 3 Dam System (typical)
  - Northern GW sources (emergency)
- CoW - municipality
  - Direct potable reuse (typical)
  - Windhoek aquifer (emergency)
- Recharge water
  - SW and/or reuse water

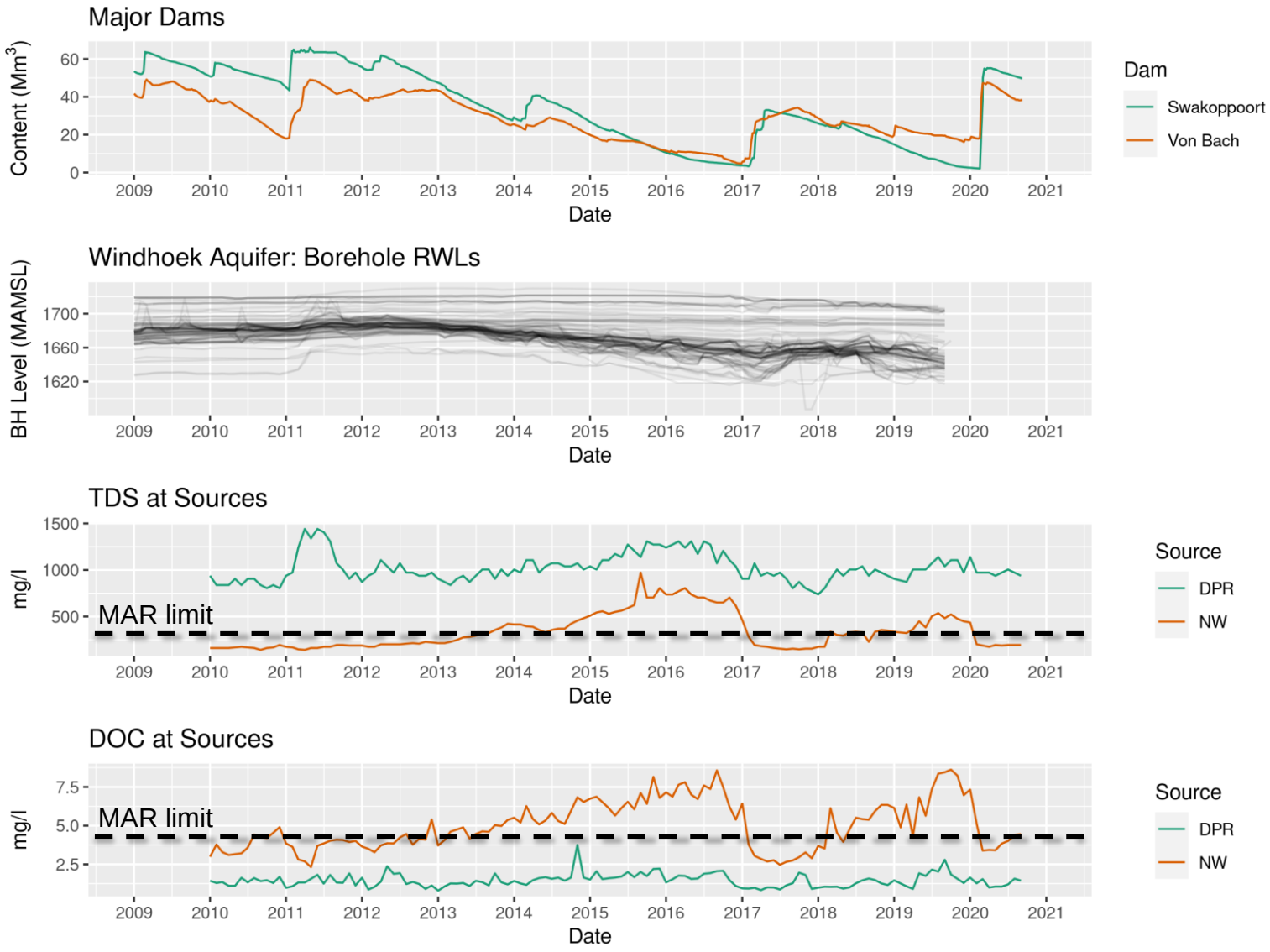


MAR Challenges: Quantity

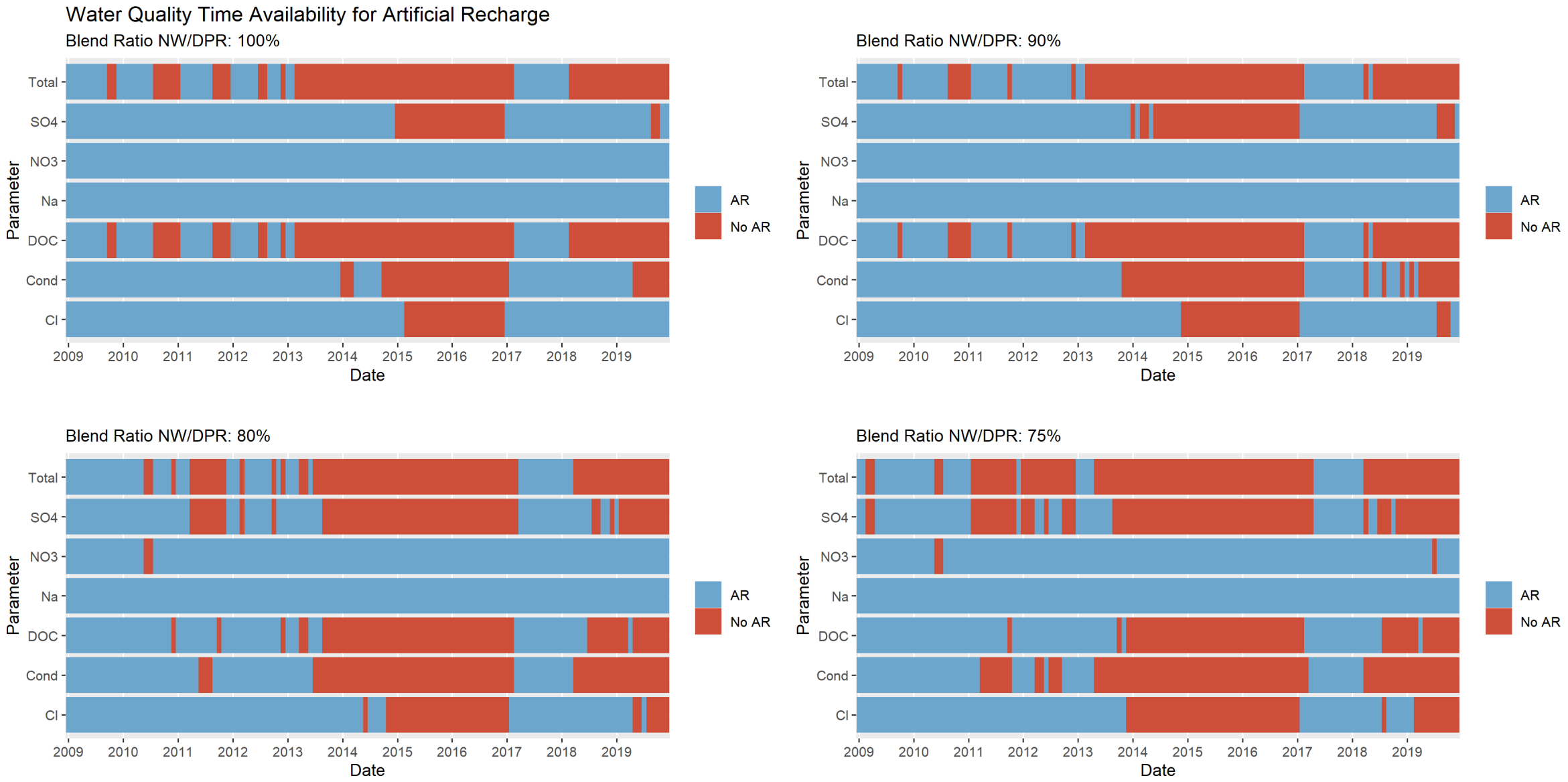
Storage (Mm^3)	Current	Additional BHs	Max Potential
	60	90	110
Abs Rate (Mm^3/a)	**Recent**	**Potential**	**Likely Max**
	~9	11	16-19
Recharge (Mm^3/a)	**Concept (2013)**	**Concept (2018)**	**Actual**
	5.4	8	2



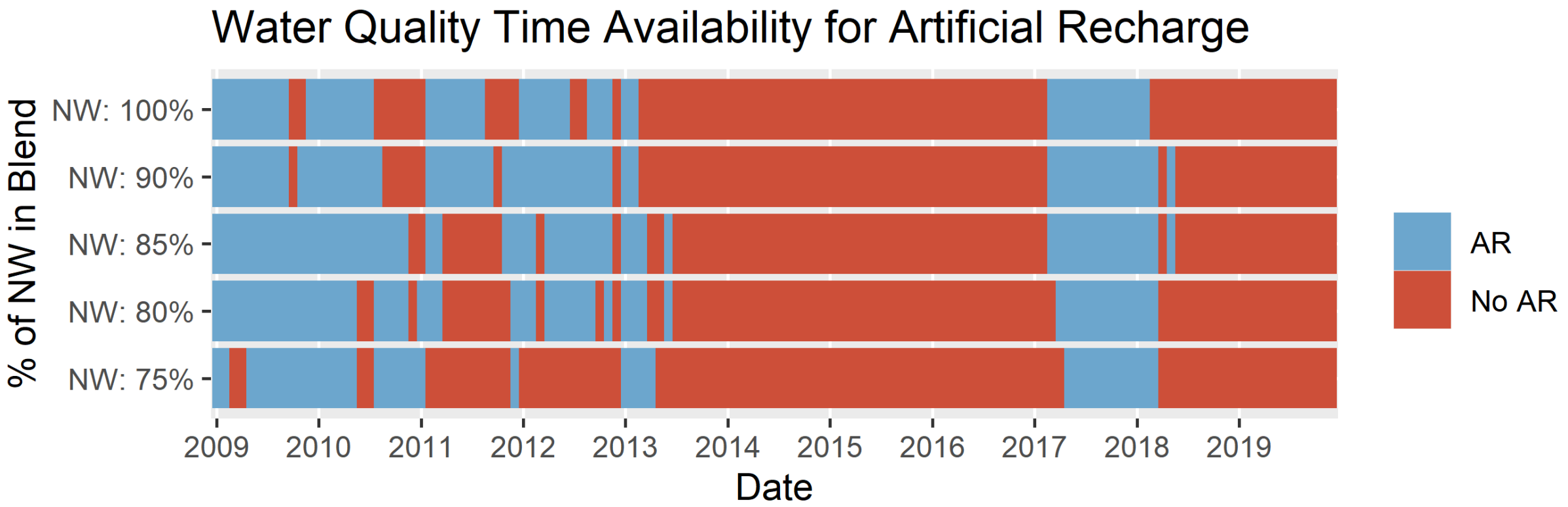
MAR Challenges: Quality



MAR Challenges: Quality



MAR Challenges: WQ



Blend Ratio	100%	90%	85%	80%	75%
% AR Opportunity	36%	42%	42%	38%	28%
Years for AR (n=11 years)	3.9	4.7	4.6	4.2	3.1

Thoughts and Conclusions

- Window of opportunity for MAR
  - Volume and WQ
  - Infrastructure sizing aspects
- Institutional arrangements not yet finalised
  - No supply agreement NW~CoW
- Future water source and utilization uncertainty
- Much more R&D needed for MAR maturity

THANK YOU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