

Central Area Water Supply

10 Sept 2015



Presenter: A C Mostert (Pr.Sci.Nat)
Manager: Hydrology (Cell 081 127 9266)

Introduction

Short -Term: 1-3 years, NO INFLOW

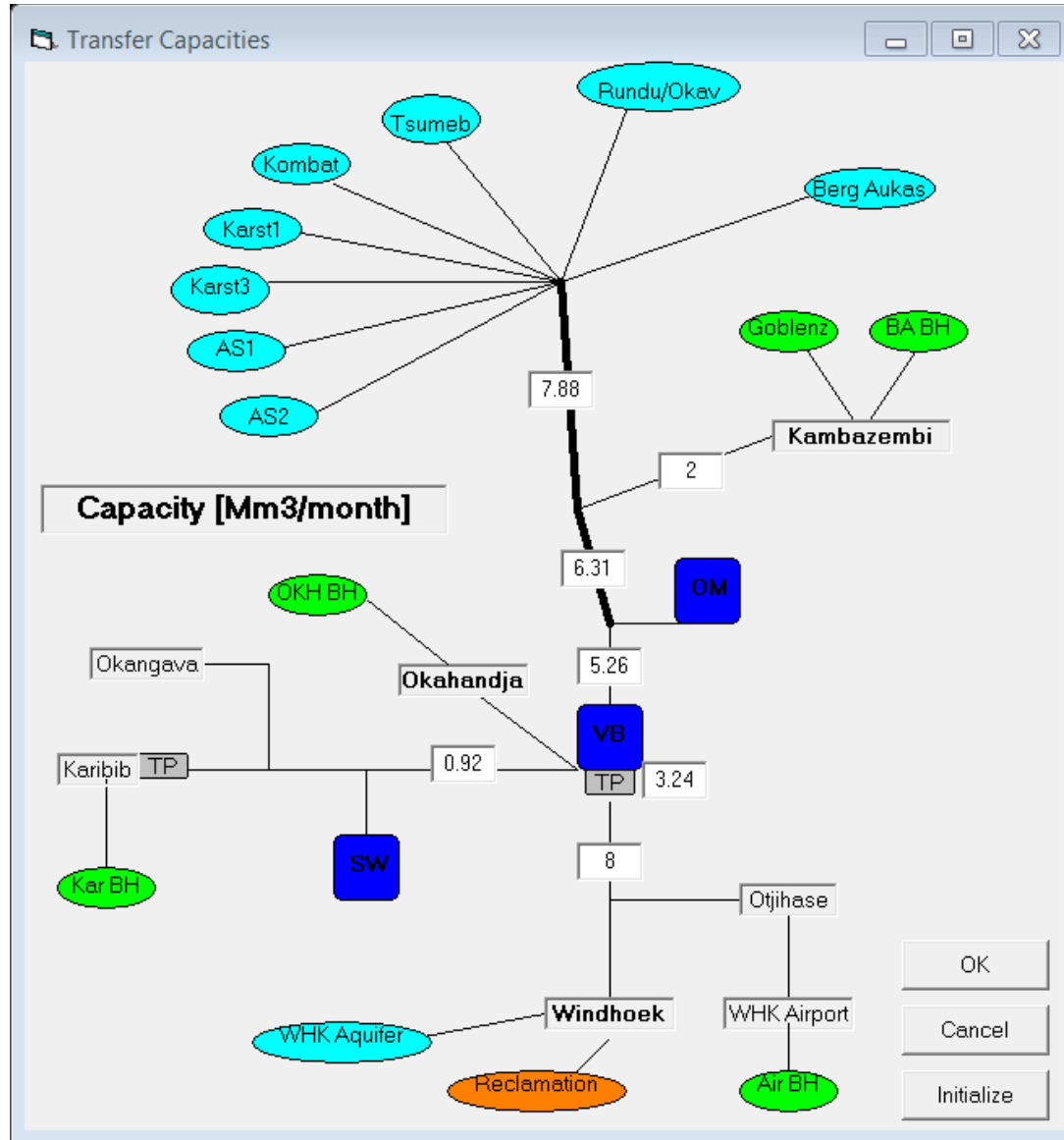
- **Area/Sources for Water Supply**
- **Demands and source inputs**
- **Dam Volumes/Dead Storages/Transfers**
- **Emergency Supply from ground water sources**

SIAMPT



NAMWATER

CAN Source For Water Supply



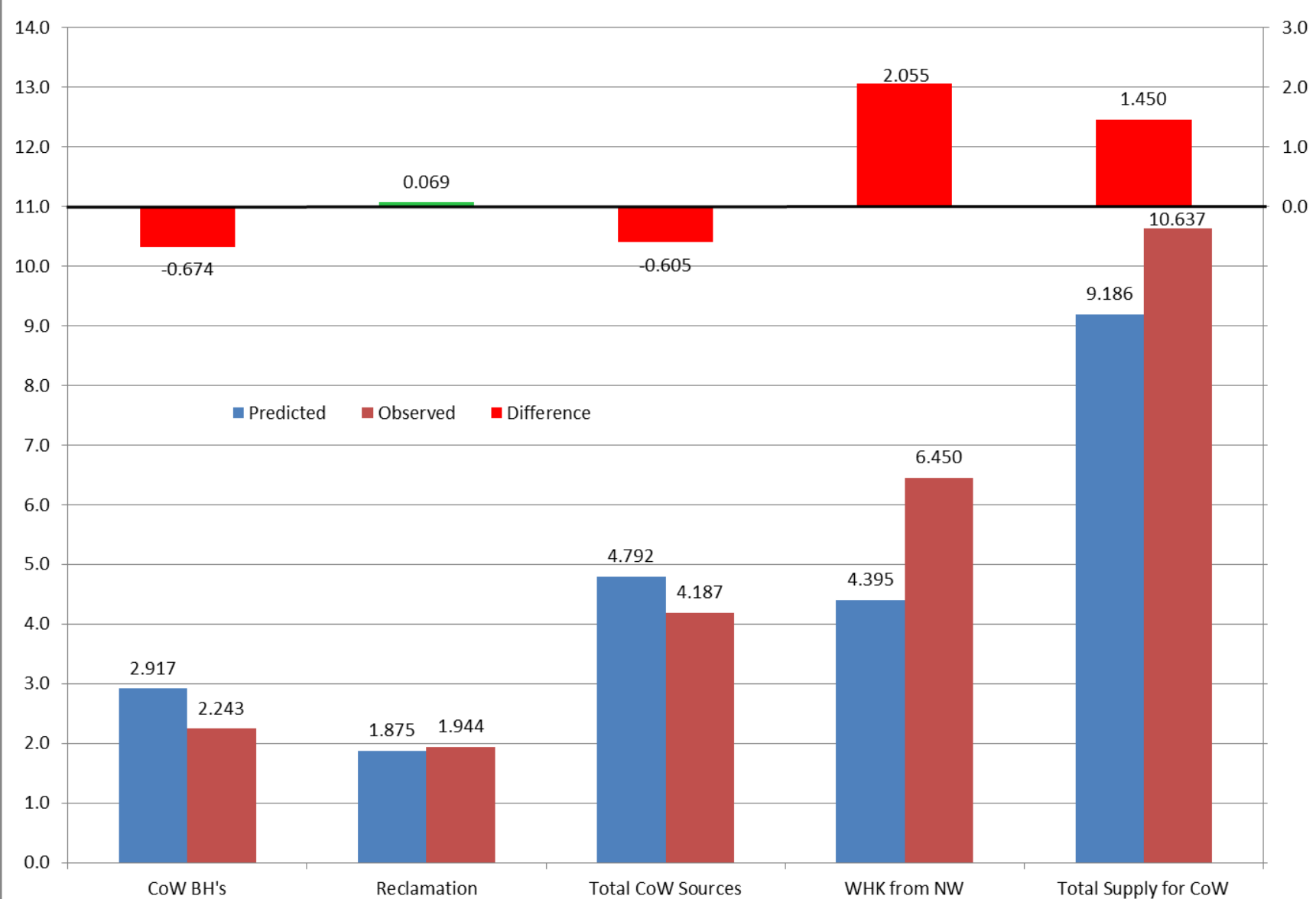
Water Demand – Base on Last 5 Months sales (Mm³)

Year	Rundu	NYSS	Waterberg	Navachab	Karibib	Okahandja	WHK
FY2016	0	0.123	2.685	1.16	0.329	1.947	25.528
FY2017	0	0.124	2.766	1.16	0.332	1.996	26.294

Year	Otjihase	Whk Airport	Canal 1	Canal 2	OM-VB OT	SW-VB OT	SW-Okongawa OT	VB-WHK OT
FY2016	0.138	0.084	0.147	0.002	0.032	0.070	0.035	1.503
FY2017	0.139	0.087	0.148	0.002	0.033	0.071	0.035	1.549

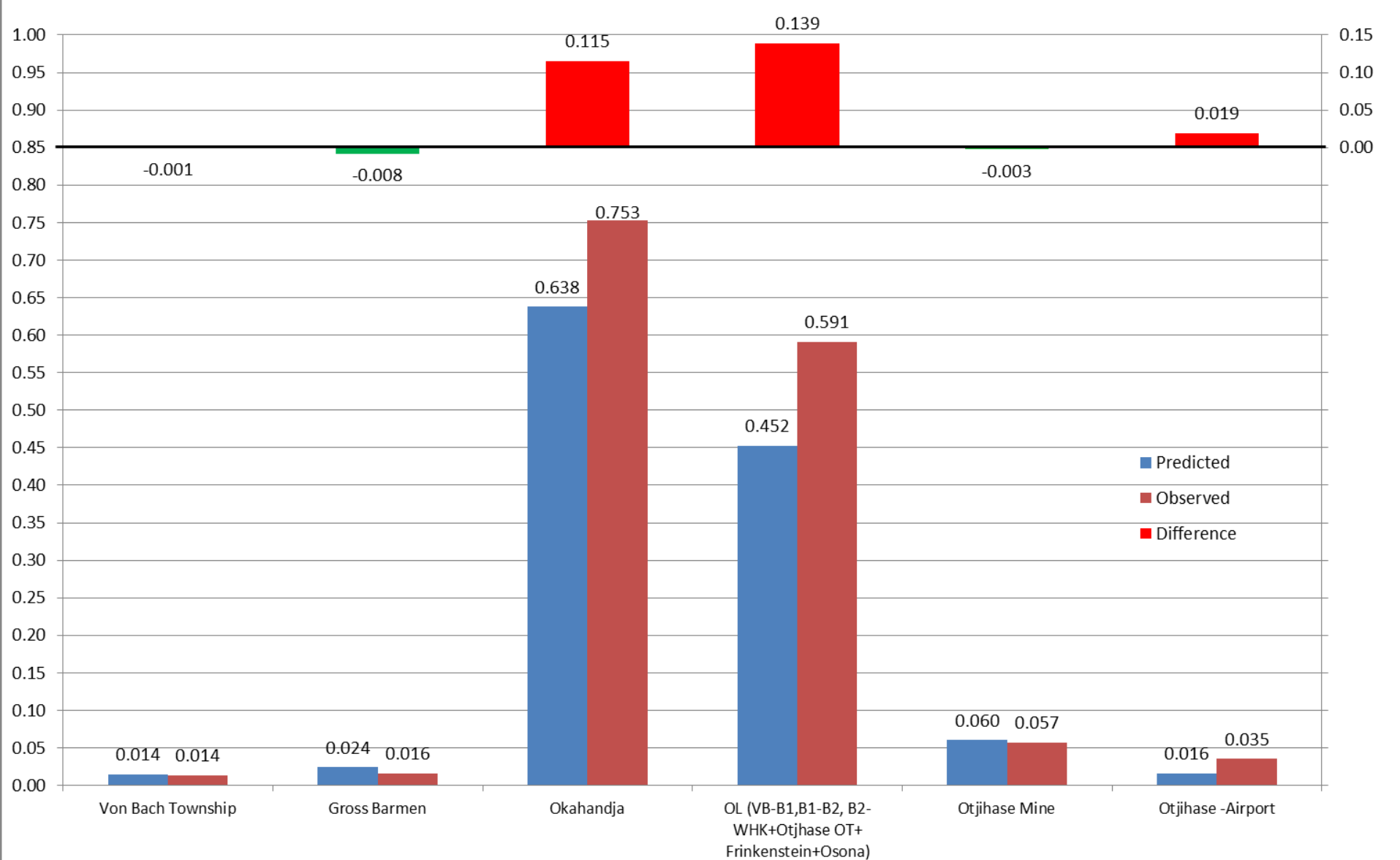
CoW Demand

CoW Demand (Mm³) April 2015 to August 2015



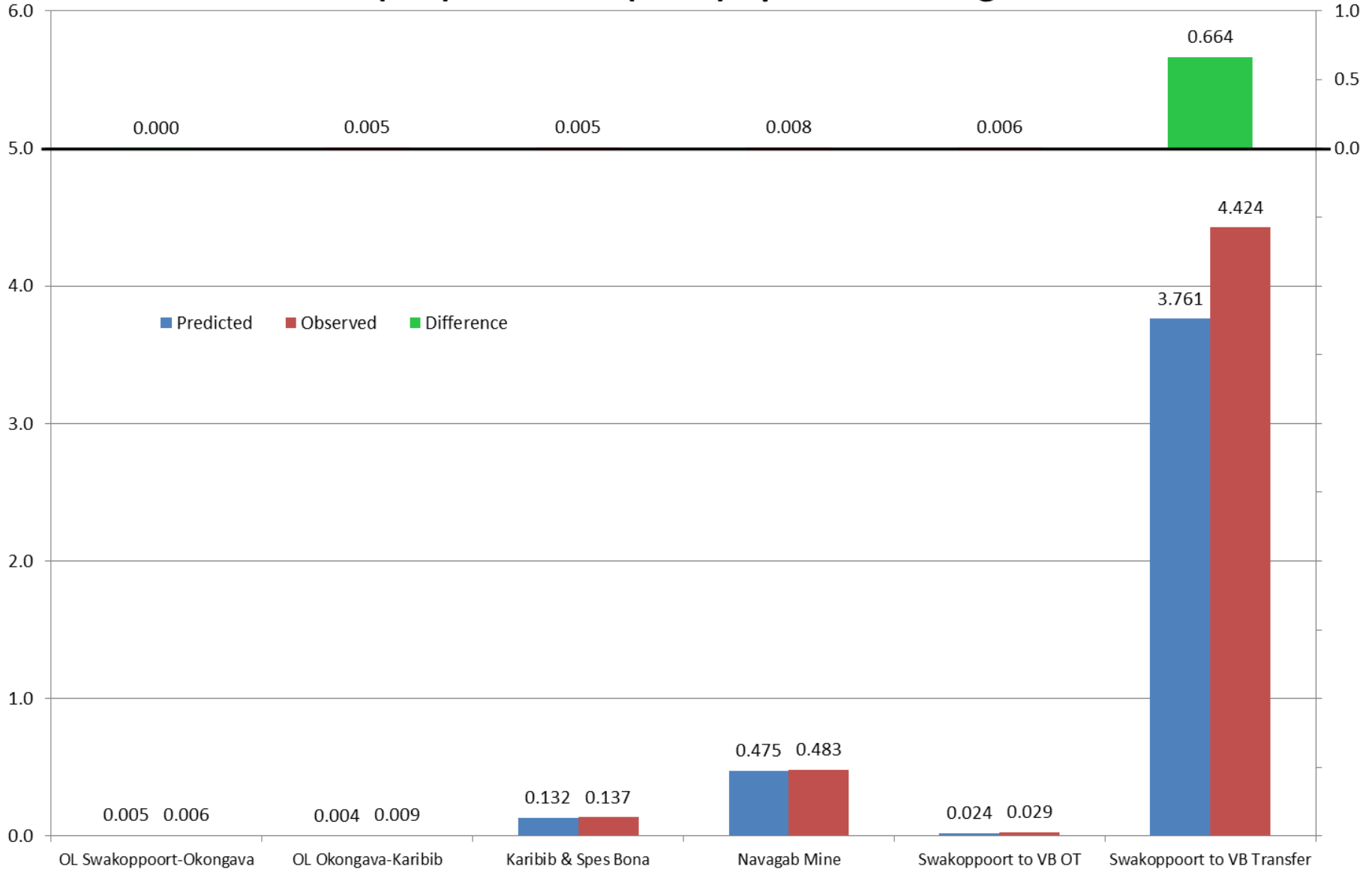
Khomas Demand

Khomas (VB) Demands (Mm³) April 2015 - August 2015



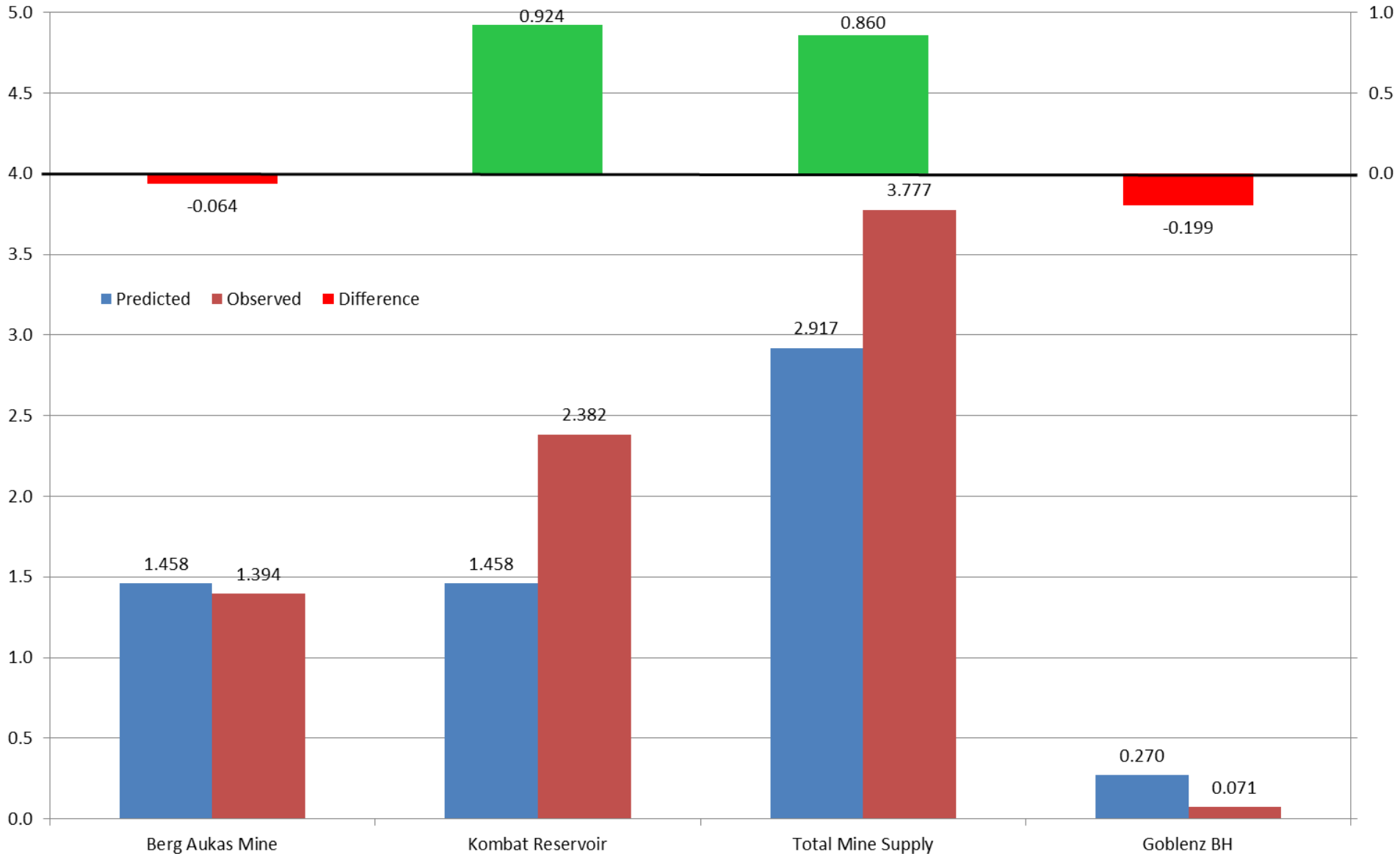
Khomas Demand

Khomas (SW) Demands (Mm³) April 2015 - August 2015



Supply from the North

Supply (Mm³) from the North April 2015 - August 2015



Dam Volumes: 31 Aug 2015

	Volume in Mm ³	Volume in %
Omatako Dam	Below Dead Storage	0
Von Bach Dam	15.801 (13.728)	32.5
Swakoppoort Dam	16.161 (14.730)	25.5
Total	31.962 (28.458)	20.5 (18.3)

Transfer Rates

 **Transfer Omatako Dam -> Von Bach Dam**

 **Above DS: 30 Mm³/a**

 **Below DS: 10 Mm³/a**

 **Transfer Swakoppoort Dam -> Von Bach Dam**

 **Above DS Mm³: Transfer = 9.5 Mm³/a**

 **Below 1.431 Mm³: Reverse flow starts**

 **CONSTANT PUMPING**



Results Short Term Analysis

- **Actual Demand projected (DM not achieved)**
- **OM and SW transferring 1 May 2015**
- **No Manage Recharge**
- **VB WTP losses at 3%**
- **SW Run Dry 30 Aug 2016**



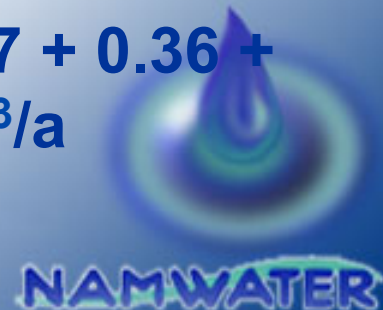
Results Short Term Analysis

- Do nothing!

Scenario	Berg Aukas (Mm ³ /a) Yr 1/2	Kombat (Mm ³ /a)	Karst 1	BA BH	Goblenze BH	WGOc	CoW BH (Mm ³ /a) Yr 1/2,	DM ALL(%)
31 Aug WL	3.5/3.5	3.5/3.5	0.5	0.2	0.2	4.5/4.5	5.7/5.7	0

Scenario	Von Bach Run Dry Date	SW Run Dry Date	2015					2016					2017										
			A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
31 Aug WL	4-Sep-16	30-Aug-15																					

- After 4 Sep 16, COW and NW supply = Max 5.7 + 0.36 + 2.76 = 8.820 Mm³/a of the required 31.763 Mm³/a
- Only about 28% of supply



Results Short Term Analysis

- Only 15% DM

Scenario	Berg Aukas (Mm ³ /a) Yr 1/2	Kombat (Mm ³ /a)	Karst 1	BA BH	Goblenze BH	WGOc	CoW BH (Mm ³ /a) Yr 1/2,	DM ALL(%)
31 Aug WL	3.5/3.5	3.5/3.5	0.5	0.2	0.2	4.5/4.5	5.7/5.7	15

Scenario	Von Bach Run Dry Date	SW Run Dry Date	2015												2016												2017											
			A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J												
31 Aug WL	5-Dec-16	30-Aug-15	[Blue bar]												[Blue bar]												[Blue bar]											

- After 5 Dec 16, COW and NW supply = Max 5.7 + 0.69 + 3.24 = 9.63 Mm³/a of the required 26.914 Mm³/a
- Only about 36% of supply



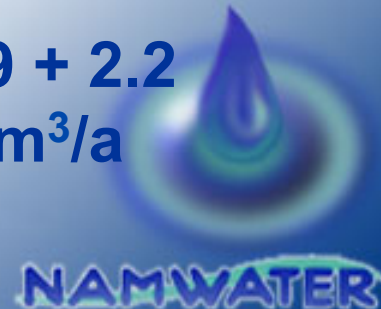
Results Short Term Analysis

- 15% DM and additional supply from sources

Scenario	Berg Aukas (Mm ³ /a) Yr 1/2	Kombat (Mm ³ /a)	Karst 1	BA BH	Goblenze BH	WGOC	CoW BH (Mm ³ /a) Yr 1/2,	DM ALL(%)
31 Aug WL	3.5/5.5	3.5/5.5	0.5	0.2	0.2	4.5/5.5	5.7/7/9	15

Scenario	Von Bach Run Dry Date	SW Run Dry Date	2015					2016					2017												
			A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
31 Aug WL	10-Apr-17	30-Aug-15																							

- After 10 Apr 17, COW and NW supply = Max 9 + 2.2 + 6.72 = 17.92 Mm³/a of the required 26.914 Mm³/a
- Only about 66% of supply



Results Short Term Analysis

- 20% DM and additional supply from sources

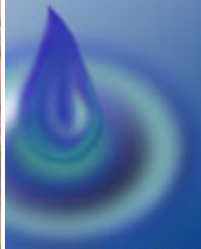
Scenario	Berg Aukas (Mm ³ /a) Yr 1/2	Kombat (Mm ³ /a)	Karst 1	BA BH	Goblenze BH	WGOB	CoW BH (Mm ³ /a) Yr 1/2,	DM ALL(%)
31 Aug WL	3.5/5.5	3.5/5.5	0.5	0.2	0.2	4.5/5.5	5.7/7/9	20

Scenario	Von Bach Run Dry Date	SW Run Dry Date	2015												2016												2017											
			A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J												
31 Aug WL	17-Jul-17	30-Aug-15																																				

- After 17 Jul 17, COW and NW supply = Max 9 + 2.2 + 6.72 = 17.92 Mm³/a of the required 25.331 Mm³/a
- Only about 70% of supply



Von Bach Dam 1996, 10.4%
Swakoppoort 1996, 13%
Omatako 1996, 2%



Summary of Short Term Results

Berg Aukas (Mm ³ /a) Yr 1/2	Kombat (Mm ³ /a)	Karst 1	WGOc	CoW BH (Mm ³ /a) Yr 1/2,	DM ALL(%)	Von Bach Run Dry Date	2015			2016						2017														
							A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
3.5/3.5	3.5/3.5	0.5	4.5/4.5	5.7/5.7	0	4-Sep-16	[Blue bar from Sep 2015 to Sep 2016]																							
3.5/3.5	3.5/3.5	0.5	4.5/4.5	5.7/5.7	15	5-Dec-16	[Blue bar from Sep 2015 to Dec 2016]																							
3.5/5.5	3.5/5.5	0.5	4.5/5.5	5.7/7/9	15	10-Apr-17	[Blue bar from Sep 2015 to Apr 2017]																							
3.5/5.5	3.5/5.5	0.5	4.5/5.5	5.7/7/9	20	17-Jul-17	[Blue bar from Sep 2015 to Jul 2017]																							



Conclusions

Supply for the next two years Need:

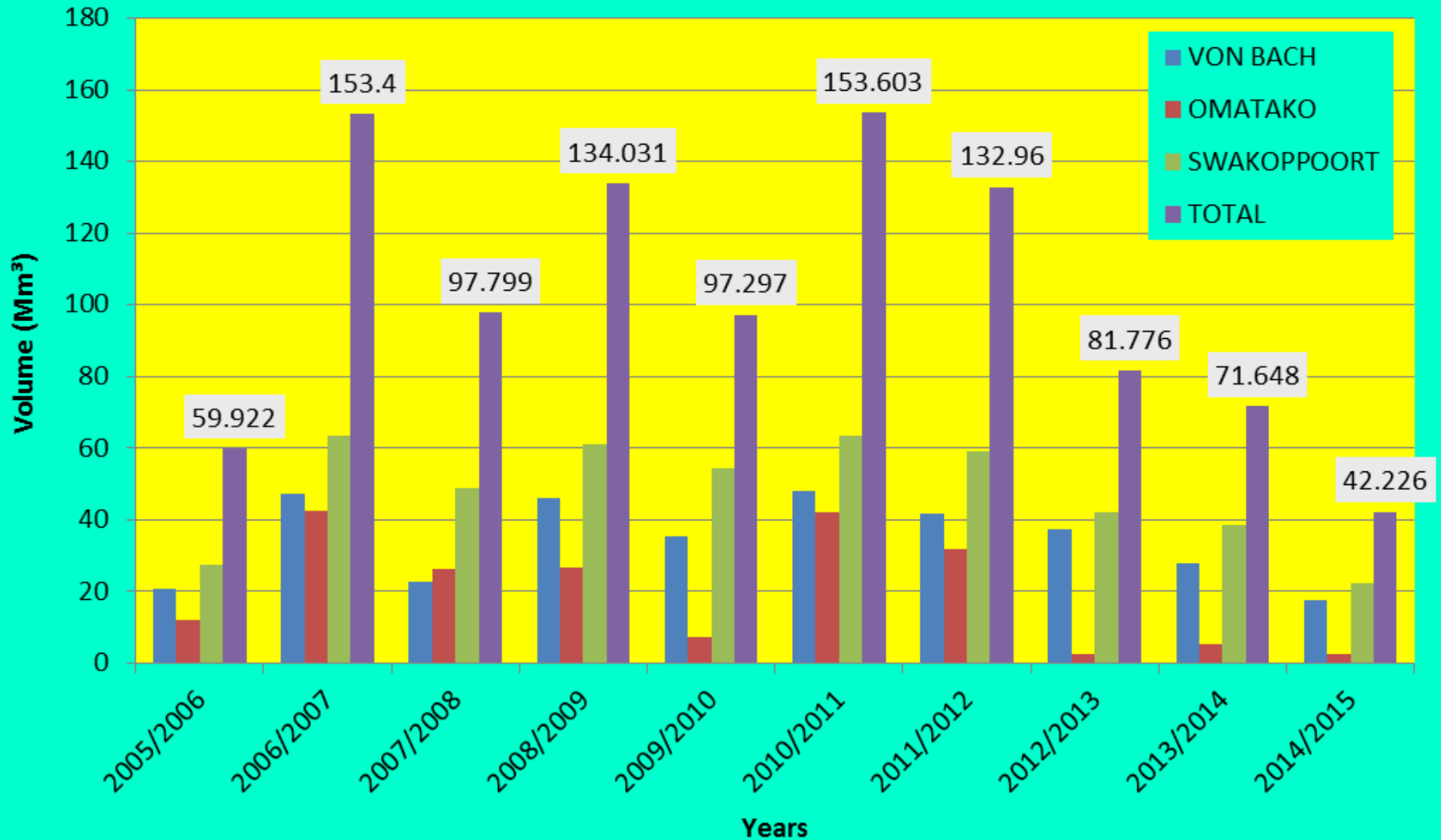
- 1. SW and OM water transferred to VB*
- 2. Full utilization of the Waterberg Areas BH*
- 3. Upgrading transfers for BA and Kombat mines to VB*
- 4. WGOC to supply 4.5 and 5.5 Mm³/a for yr1 and 2*
- 5. COW BH supply at higher rates 7 and 9 Mm³/a*
- 6. Demand Management of >15% (CoW proposing 25%)*

Full Supply for the next 2 years cannot be achieved!



Some Thought

Individual and Totals of Dam Content for the past 10 years



Some Thought

- Water is cheapest commodity on the market. Average tariff for domestic use is N\$ 12 for 1000 litres!
- Who knows how much water do you use at your residence and business?
- Southern Africa is currently water stressed!
- Water restrictions rolled out in Bloemfontein a from Monday 3 Aug, 2015, fine of R 20 000 if hosepipe is used!
- RSA is water stressed as from September 2014!
- CoW has a financing challenge to fully develop Windhoek Aquifer!
- Water intensive stakeholders to attend annual CAN workshop!
- There is doubt whether current water intensive businesses will survive if water has to be imported from external sources based on current business plans.

