



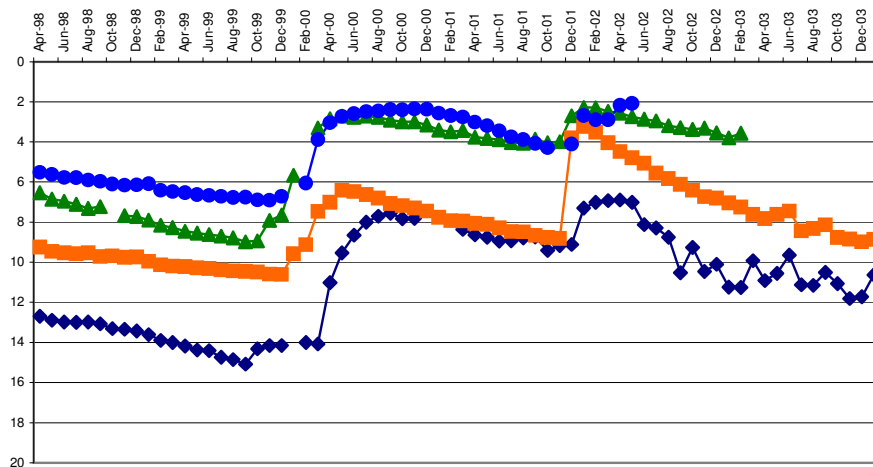
# water affairs

Department:  
Water Affairs  
**REPUBLIC OF SOUTH AFRICA**

## LIMPOPO REGION

### DIRECTORATE WATER REGULATION AND USE

#### STATUS REPORT ON MONITORING & GROUNDWATER LEVEL TRENDS AUGUST 2009 – AUGUST 2010



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OCTOBER 2010**

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## 1) EXECUTIVE SUMMARY

### Groundwater levels

This report deals with water levels pertaining to the corresponding period last year, August 2009, the start of the dry season, May 2010 and midway of the dry season, August 2010.

Data was collected in August 2010. Due to various factors eg. Locked gates, vandalized stations and wetland conditions along the Nile River valley, not all stations could be visited.

For reasons such as; some stations not accessed previously, caved-in boreholes, tree roots in boreholes, vandalized boreholes and extreme wet conditions not all stations have data available for all the dates used for comparison.

The 34 stations in the Kruger National Park will be visited again in November 2010. The 30 Special purpose monitoring stations (Projects) were visited in September and data downloaded (**MAPS 1 & 2**)

Only the data for stations on the permanent reference network located outside the Kruger Park is used for reporting.

- Active stations = 174
- Stations visited and included in this report = 160
- Stations inaccessible due to wet conditions = 5
- Other access problems = 7
- Visited stations in A2 drainage not included in this report = 2

#### **Comparison of water levels with the previous quarter: (May 2010 to August 2010)**

Stations with data for the whole period available = 143/160 (89.4%) of stations visited)

	<b>No of stations</b>	<b>% of stations With data</b>	<b>Average</b>
Water level down more than 1 m	12	8.4%	-2.1m
Water level down less than 1m	77	53.8%	-0.32m
Water levels up more than 1m	4	2.8%	2.62m
Water levels up less than 1m	50	35%	0.24m
No difference in water level			
<b>Total</b>	<b>143</b>	<b>100%</b>	

The table above reflects the situation from the beginning to midway of the current dry season.

As can be expected for the dry season, 89 (62.2%) of stations with data indicate lower water levels averaging -0.5m. 54 Stations (37.8%) indicate higher water levels midway through the dry season than was the case at the start of the season. This reflects the recharge resulting from the good rains received in April-May 2010 at the end of the wet season, especially in the A6 and upper A7 drainages.

The average water level of the 143 stations is only 19cm lower than at the start of the dry season.

### Comparison of water levels with the corresponding time last year: (August 2009 to August 2010)

Stations with data for the whole period available = 139/160 (86.9% of stations visited)

	No of stations	% of stations	Average
Water level down more than 1 m	5	3.6%	-2.4m
Water level down less than 1m	52	37.4%	-0.34m
Water levels up more than 1m	31	22.3%	2.9m
Water levels up less than 1m	51	36.7%	0.40
No difference in water level			
<b>Total</b>	<b>139</b>	<b>100%</b>	

82 of the 139 stations with data for the year (59%) indicate higher water levels than the same time last year. The overall average rise is 1.05m.

The 57 (41%) of stations with lower water levels indicate an average -0.5m.

This is not a true reflection of the situation all over. Some areas may have a concentration of higher levels while lower water levels may be concentrated in another area.

MAP 4 indicates the water level fluctuation since the start of the dry season. There is no prominent trend in the concentration of higher or lower water levels.

Map 5 compares the current levels with last year. The higher water levels are concentrated in the central and eastern part of the province.

Delineation of the concentration of stations with similar water level trends is depicted on (Map 6) Blue hatching indicate areas with higher water levels with orange hatching for lower water levels.

**GRAPHS 48 & 49 were again updated and included to gain better perspective of the current situation.** The graphs illustrate the current water level situation in relation to the past 20 years. The stations used are widely spread over the 2 drainages and is regarded as representative of the general conditions. It is clear that the current situation represent a very healthy state in general. The trend at station A6Klipput as seen on graph 48 clearly show the effect of over abstraction in an area, indicating that local anomalies may occur and strengthens the argument for sound management of groundwater resources.

**GRAPH 50** gives a good indication of long-term trends, both natural and related to human activity. The positive effect of changing water use patterns is also clear.

## 2) STATUS OF MONITORING NETWORK

Limpopo Province's Groundwater Level Monitoring Network currently consists of 208 active monitoring stations, including 34 in the KNP. 1 Caved in borehole still have to be re-drilled, 1 borehole was already re-drilled and equipped, 13 new boreholes are currently planned to be drilled additionally to fill gaps in the existing network and 2 existing boreholes are targeted for possible inclusion in the network. (Maps 1 & 2)

Upgrading of existing stations and delivering of concrete outer rings to stations continues and construction of the concrete structures were completed at 35 stations.

Regional and Head Office jointly service a total of 55 stations for the National Groundwater Quality Program in the Limpopo Province which is sampled bi-annually. Sampling to verify the suitability of selected sites for extension of the National Groundwater Quality Monitoring was done at 138 boreholes. 80% of analysis results were received from the laboratory (**Map 3**)

### **3) DATA COLLECTION, EVALUATION AND REPORTING**

Data was collected during August 2010. Comparisons were drawn between 1 August 2009, (Corresponding period the previous year) 1 May 2010 (End of the wet season) and 1 August 2010 (Current situation, midway of the dry season) (**Maps 4 & 5**)

### **4) LIMPOPO WATER MANAGEMENT AREA.**

The area consists of secondary drainage areas A4, A5, A6, A7 and A8.

#### **4.1 A4 Drainage Area. (Matlabas, Mokolo Rivers)**

Hardly any fluctuations water levels over the past year (**GRAPH 1**)

#### **Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

8 Stations indicate higher water levels and 4 lower. **GRAPH 2**

**Past year; August 2009 to August 2010**

6 of the 9 Stations with data indicate slightly lower levels over the past year (**GRAPHS 3 & 4**)

#### **4.2 A5 Drainage Area. (Lephalale River)**

As in the A4 drainage, hardly any fluctuations water levels over the past year (**GRAPH 5**)

#### **Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

3 of 5 stations, indicate lower water levels. (**GRAPH 6**)

**Past year; August 2009 to August 2010**

Same as for the past quarter with 3 indicating lower levels (**GRAPHS 7 & 8**)

#### **4.3 A6 Drainage Area. (Nile, Sterk, Mogalakwena & Dorps Rivers)**

Late recharge evident in this drainage (**GRAPH 9**)

#### **Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

Data is available for 30 stations. 16 Stations (53.3. %) indicate lower and 14 stations (46.7%) higher water levels, overall an average slight decline of -0.11m was recorded (**GRAPHS 10 & 12**)

**Past year; August 2009 to August 2010**

Data is available for 29 stations of which 11 Stations (37.9%) indicate lower water levels than last year and 18 (62.1%) stations a rise in water levels. An overall rise of 0.65m was recorded over the past year. (GRAPH 11 & 12)

Current average water levels are below the long-term average values but as stated previously, due to the extension of the network into areas characterized by deeper water levels the average values are distorted and can not be realistically compared until long-term data is available for all (GRAPH 13)

**4.4 A7 Drainage Area. (Sand, Blood, Diep, Hout, Dwars & Brak Rivers)**

Varying trends but some indications of recharge over the previous the wet season (GRAPH 14)

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

Data for 36 stations is available. 24 Stations (66.7%) indicate lower, with 12 stations (33.3%) indicating higher water levels. Overall a decline of 0.30m was recorded over the last quarter (GRAPHS 15&17).

**Past year; August 2009 to August 2010**

Data is available for 37 stations, 10 (27%) Indicate lower water levels, average -0.91m. 27 Stations (73%) indicate higher water levels, average 0.96m. Overall a rise of 0.79m was recorded for the period (GRAPHS 16&17).

As with A6, due to the extension of the network into areas characterized by deeper water levels the average values are distorted and can not be realistically compared until long-term data is available for al (GRAPH 18).

**4.5 A8 Drainage Area ((Nwanedzi, Nzhelele Rivers)**

Fluctuations in water levels are generally limited but some recharge the previous wet season is evident (GRAPH 19)

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

6 Stations with data for the period indicate lower water levels, average -0.36 while 2 stations indicate higher water levels (GRAPHS 20 & 22).

**Past year; August 2009 to August 2010**

5 Stations indicate higher, and 4 lower water levels with an overall average rise of 0.14m (GRAPHS 21 & 22).

**5) LEVHUVHU-LETABA WATER MANAGEMENT AREA.**

The area consists of secondary drainage areas A9, B8 & B9.

**5.1 A9 Drainage Area. (Mutale, Levhuvhu Rivers)**

Trends varying from declining to stable to slightly rising (**GRAPH 23**).

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

Data is available for all 18 stations, 15 of which indicate lower water levels and 3 higher (**GRAPHS 24 & 26**).

**Past year; August 2009 to August 2010**

12 stations indicate declining water levels for the past year and 6 stations indicate higher water levels (**GRAPHS 25&26**).

Overall an average decline of -0.22m was recorded over the area the past year.

**5.2 B8 Drainage Area. (Groot, Middel & Klein Letaba Rivers)**

Little fluctuation in groundwater levels is evident the past year (**GRAPH 27**).

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

Data is available for 14 stations with 10 indicating lower water levels, and 4 higher (**GRAPHS 28 & 30**)

**Past year; August 2009 to August 2010**

4 Stations indicate lower water levels, average -0.39m with 10 indicating higher levels, average 0.3m, overall a rise of 0.27m was recorded (**GRAPHS 29& 30**)

**5.3 B9 Drainage Area. (Shingwidzi, Mphongolo Rivers)**

Very stable water levels is indicated (**GRAPH 31**)

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

2 of the 3 stations indicate lower water levels with 1 rising very slightly

(**GRAPHS 32 & 34**)

**Past year; August 2009 to August 2010**

As above, 2 stations indicate a decline in water level and 1 rising (**GRAPHS 33 & 34**)

**6) OLIFANTS WATER MANAGEMENT AREA.**

The part of this Water Management Area within the Limpopo Province mostly consists of the B3, B5 & B7 secondary drainage areas.

**6.1 B3 Drainage Area. (Elands, Gotwane Rivers (Springbok flats area)**

The water levels at Tuinplaas & Settlers rose considerably over the past year but Settlers has since started to decline again(**GRAPH 35**)

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

All 3 stations indicate higher levels, average 2.3m (GRAPH 36)

**Past year; August 2009 to August 2010**

All 3 stations indicate higher water levels again (GRAPH 37)

The water levels at Settlers and Tuinplaas are well above the worst recorded (GRAPH 38)

**6.2 B5 Drainage Area. (Olifants, Nkumpi Rivers)**

Varying trends with a considerable fluctuation related to late rains at Modderfontein (GRAPH 39)

**Comparison with previous levels:**

**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

Water levels at 3 stations each rising or falling. (GRAPHS 40 & 42)

**Past year; August 2009 to August 2010**

5 of 6 stations used indicate higher water levels than the same time last year (GRAPHS 41 & 42)

Current average water levels compare very favorable with long-term average and the lowest average recorded at stations with long-term data (GRAPH 43)

**6.3 B7 Drainage Area (Olifants, Selati, Klaserie, Makhutswi Rivers)**

Relative stable water levels with some late recharge (GRAPH 44)

**Comparison with previous levels:**

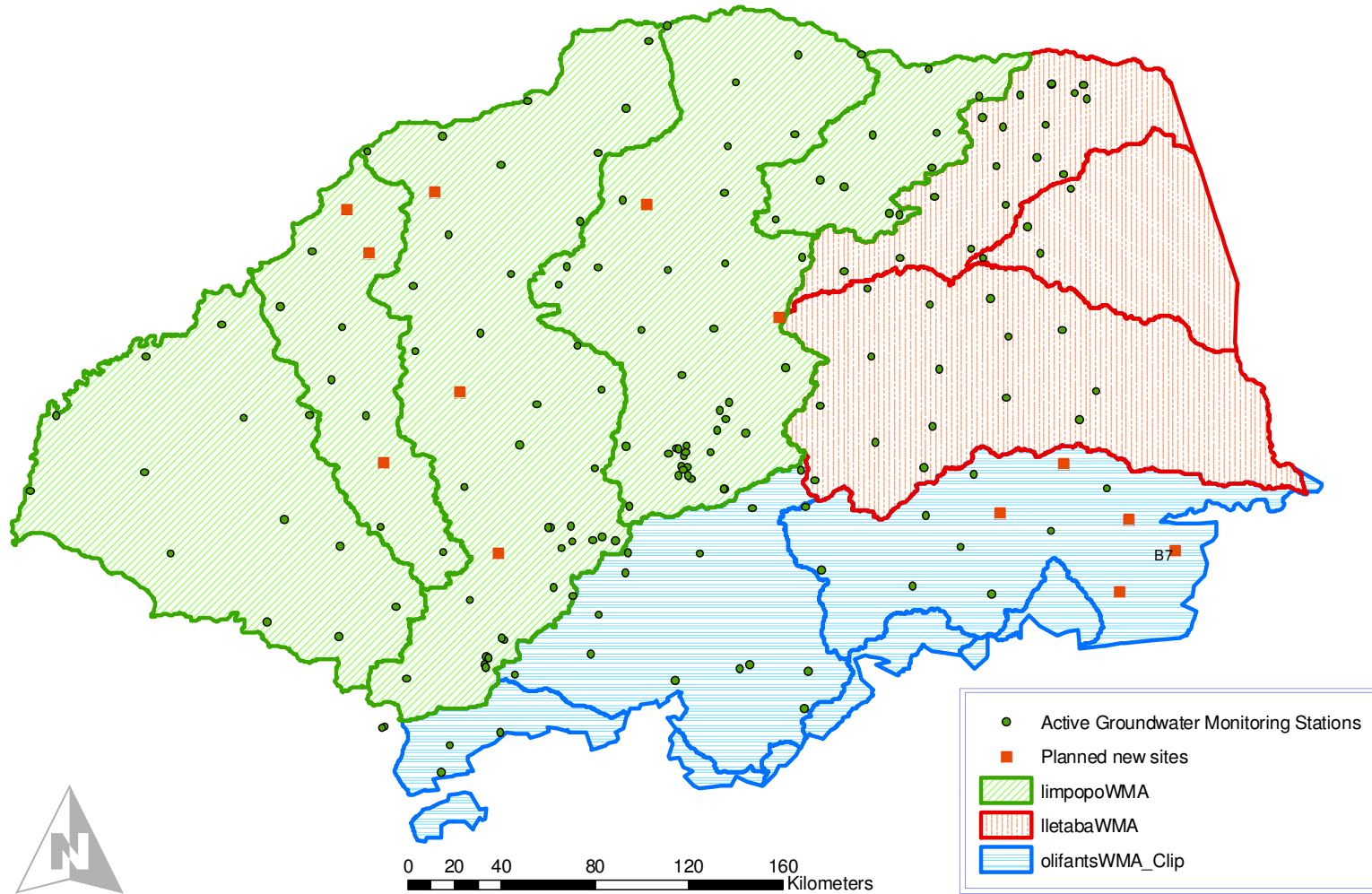
**Last quarter; May 2010 to August 2010 (Start to midway of the current dry season)**

6 stations with data indicate lower water levels, average -0.47m with 2 indicating a rise (GRAPHS 45 & 47)

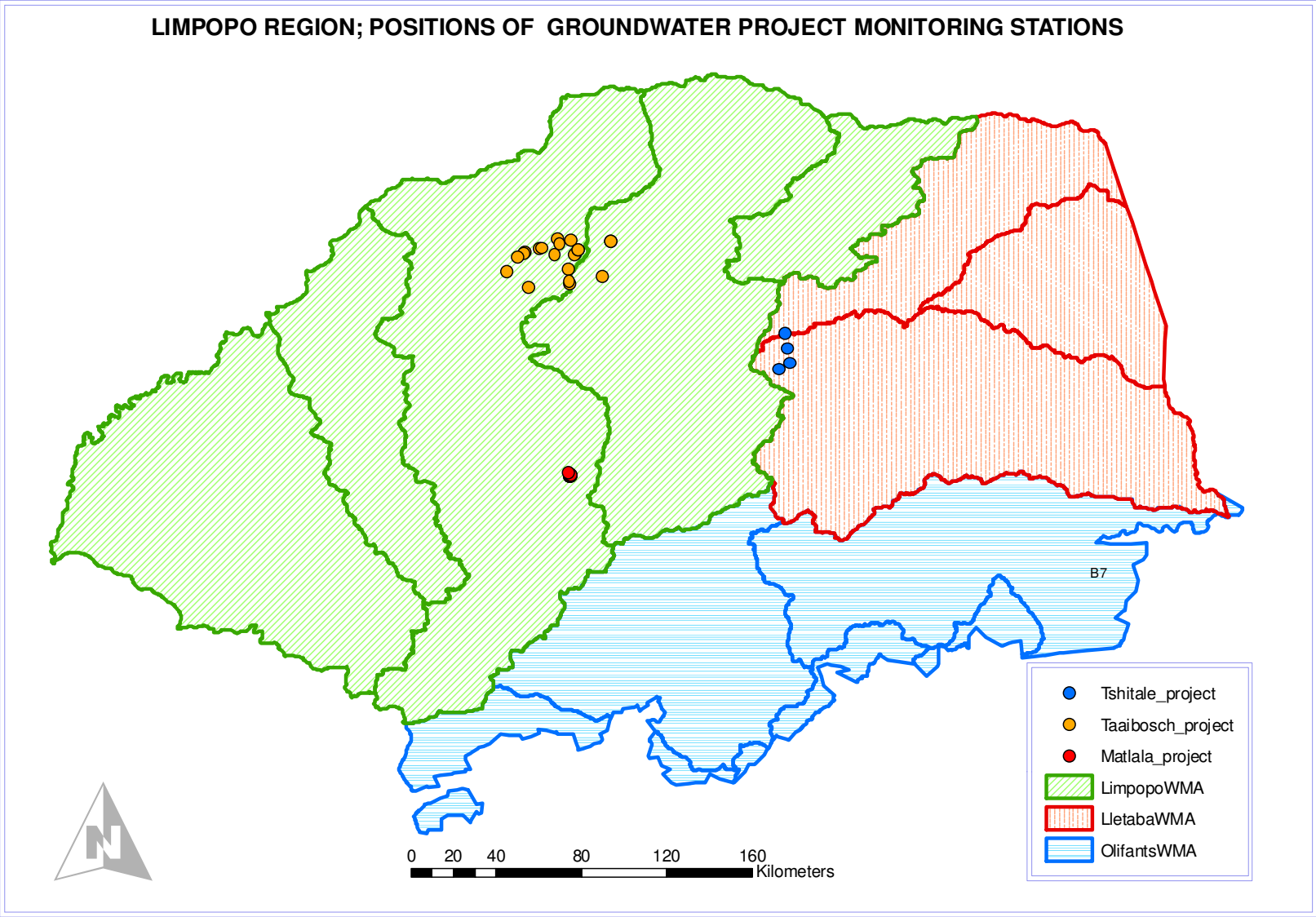
**Past year; August 2009 to August 2010**

2 Stations indicate higher water levels and 4 lower (GRAPHS 46 & 47).

LIMPOPO REGION; POSITIONS OF ACTIVE AND CURRENTLY  
PLANNED GROUNDWATER MONITORING STATIONS

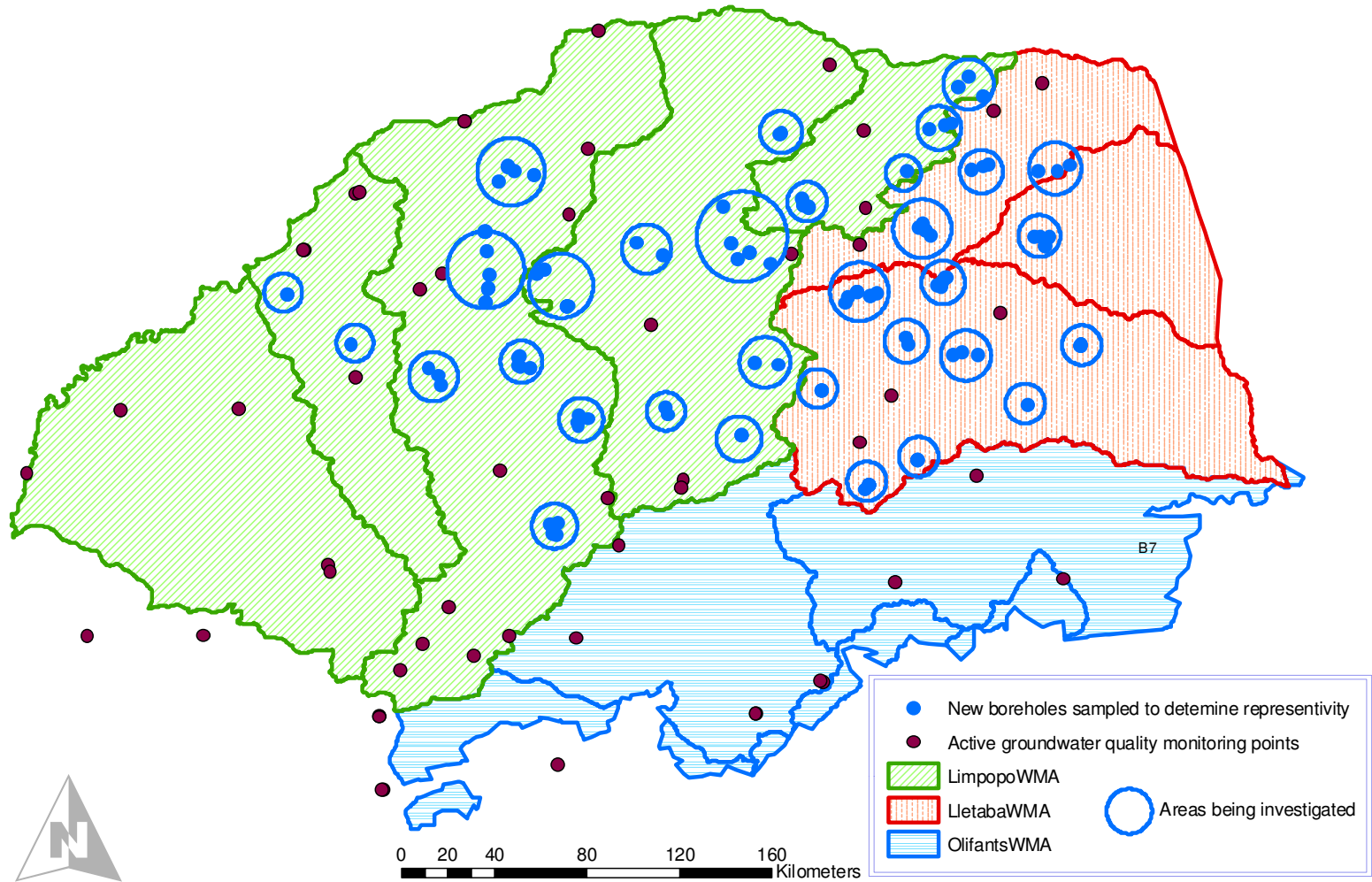


MAP 1



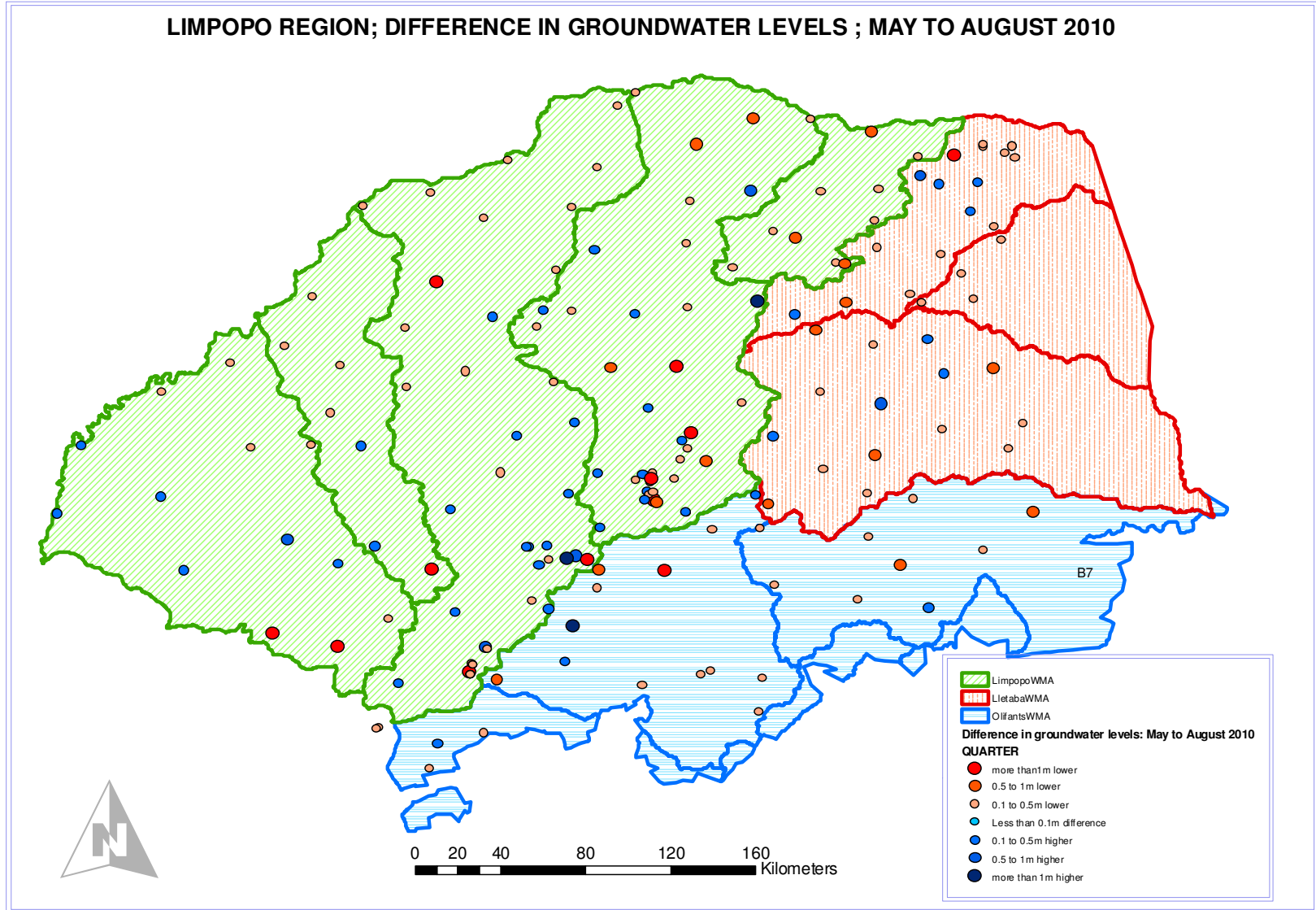
MAP 2

**LIMPOPO REGION; POSITIONS OF GROUNDWATER QUALITY MONITORING STATIONS AND POSSIBLE NEW SITES BEING INVESTIGATED TO EXTEND THE NETWORK**



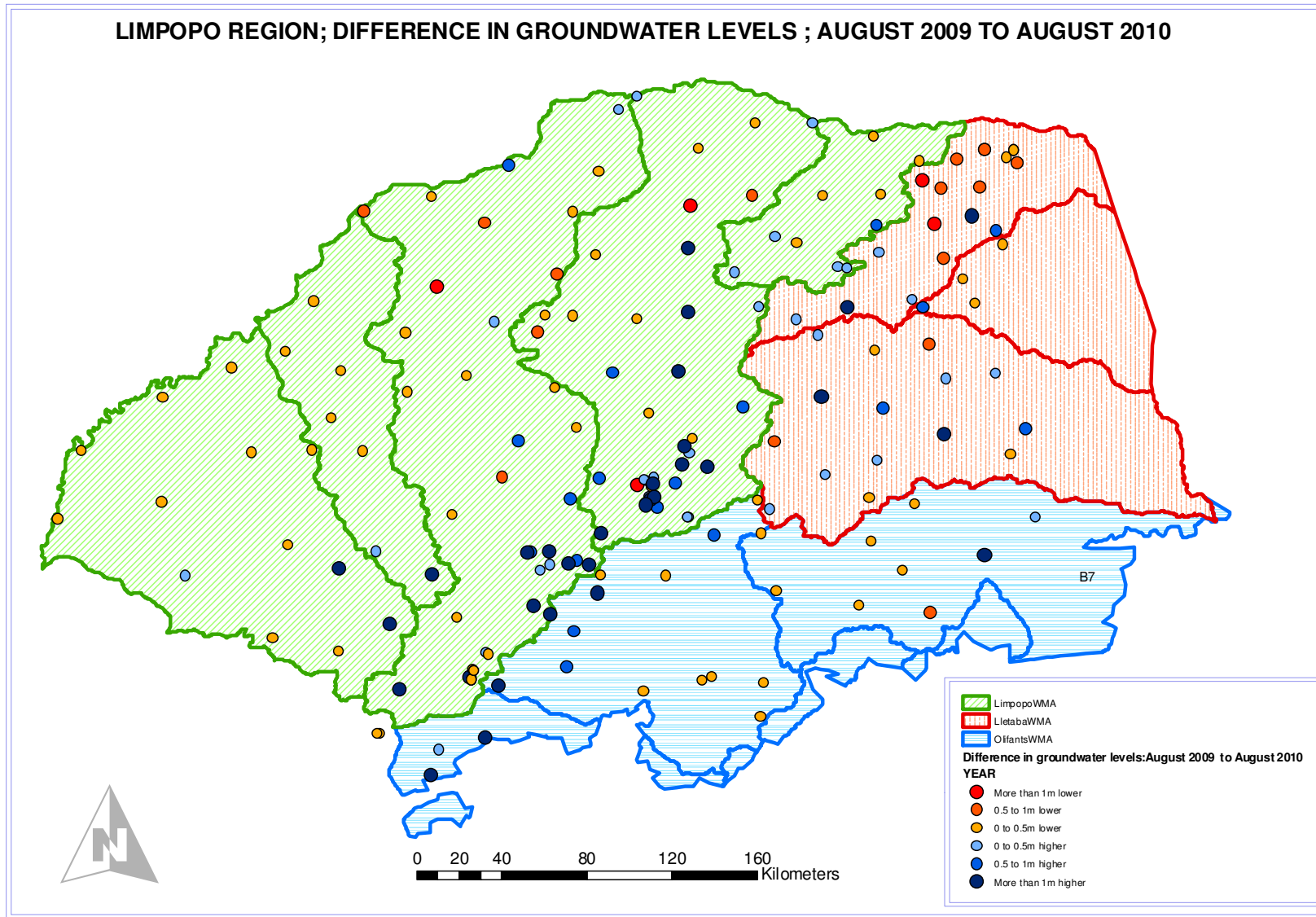
**MAP 3**

LIMPOPO REGION; DIFFERENCE IN GROUNDWATER LEVELS ; MAY TO AUGUST 2010



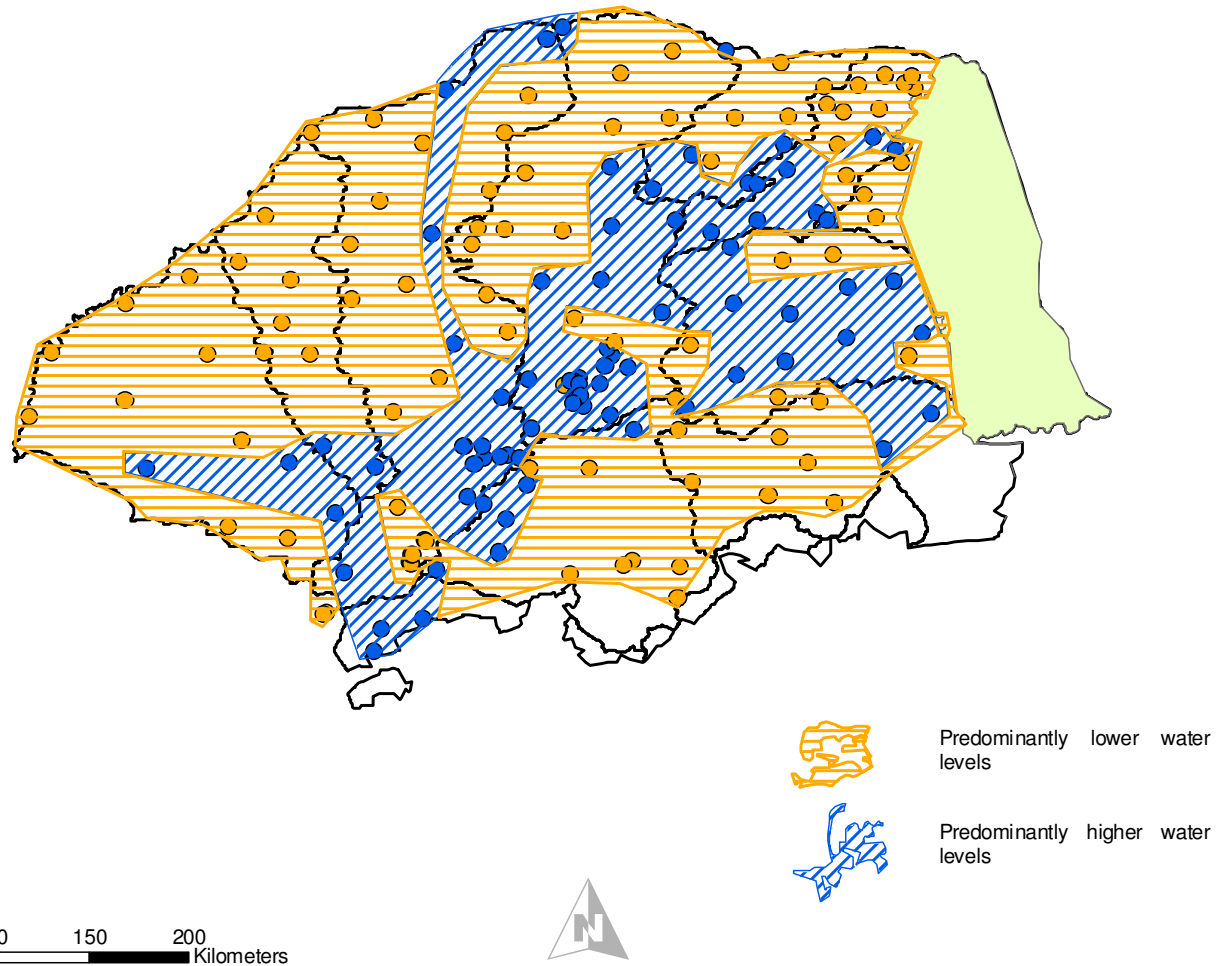
MAP 4

LIMPOPO REGION; DIFFERENCE IN GROUNDWATER LEVELS ; AUGUST 2009 TO AUGUST 2010



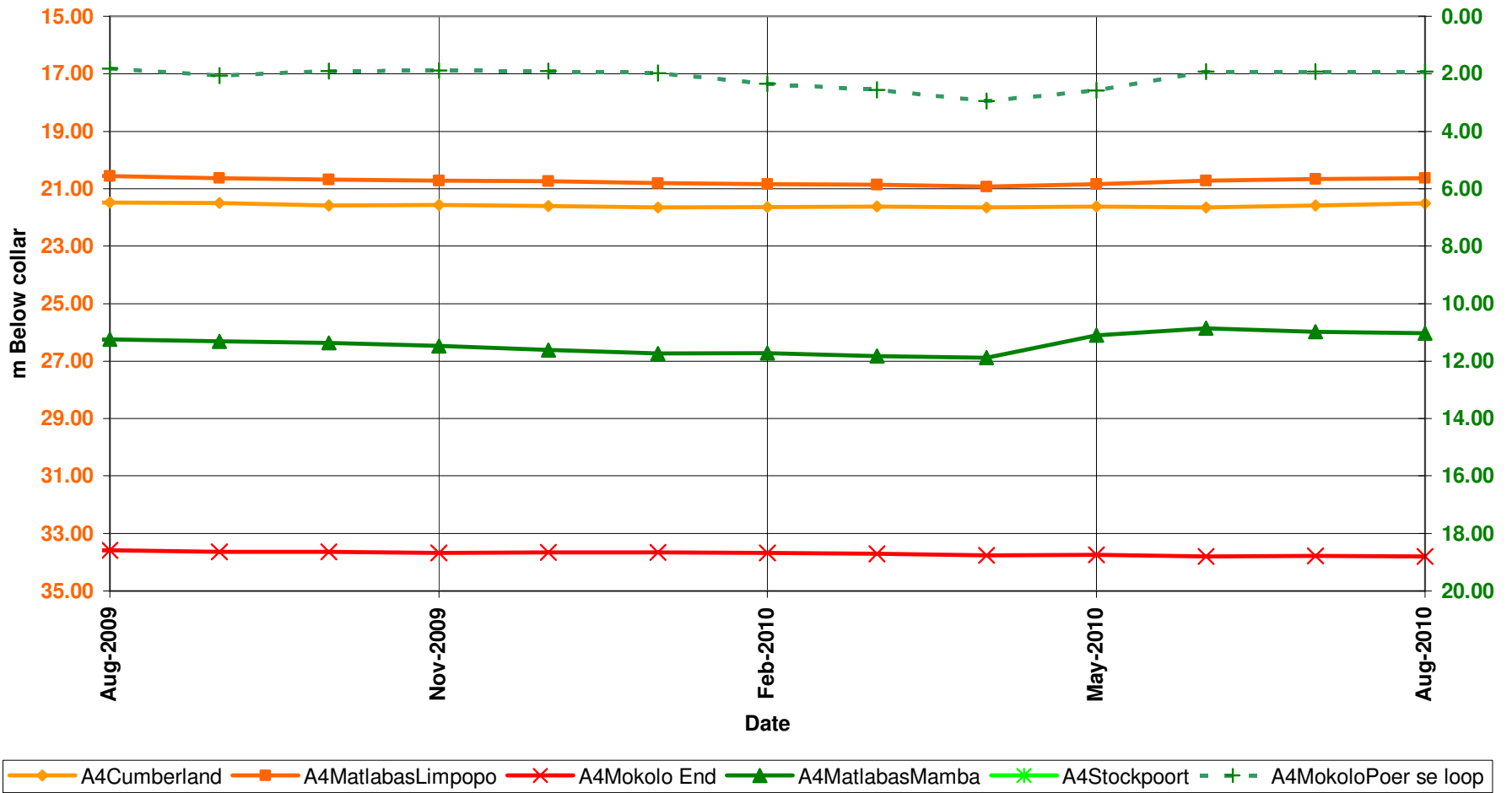
MAP 5

**LIMPOPO REGION; PATTERNS IN GROUNDWATER LEVEL BEHAVIOUR ; AUGUST 2009 TO AUGUST 2010**



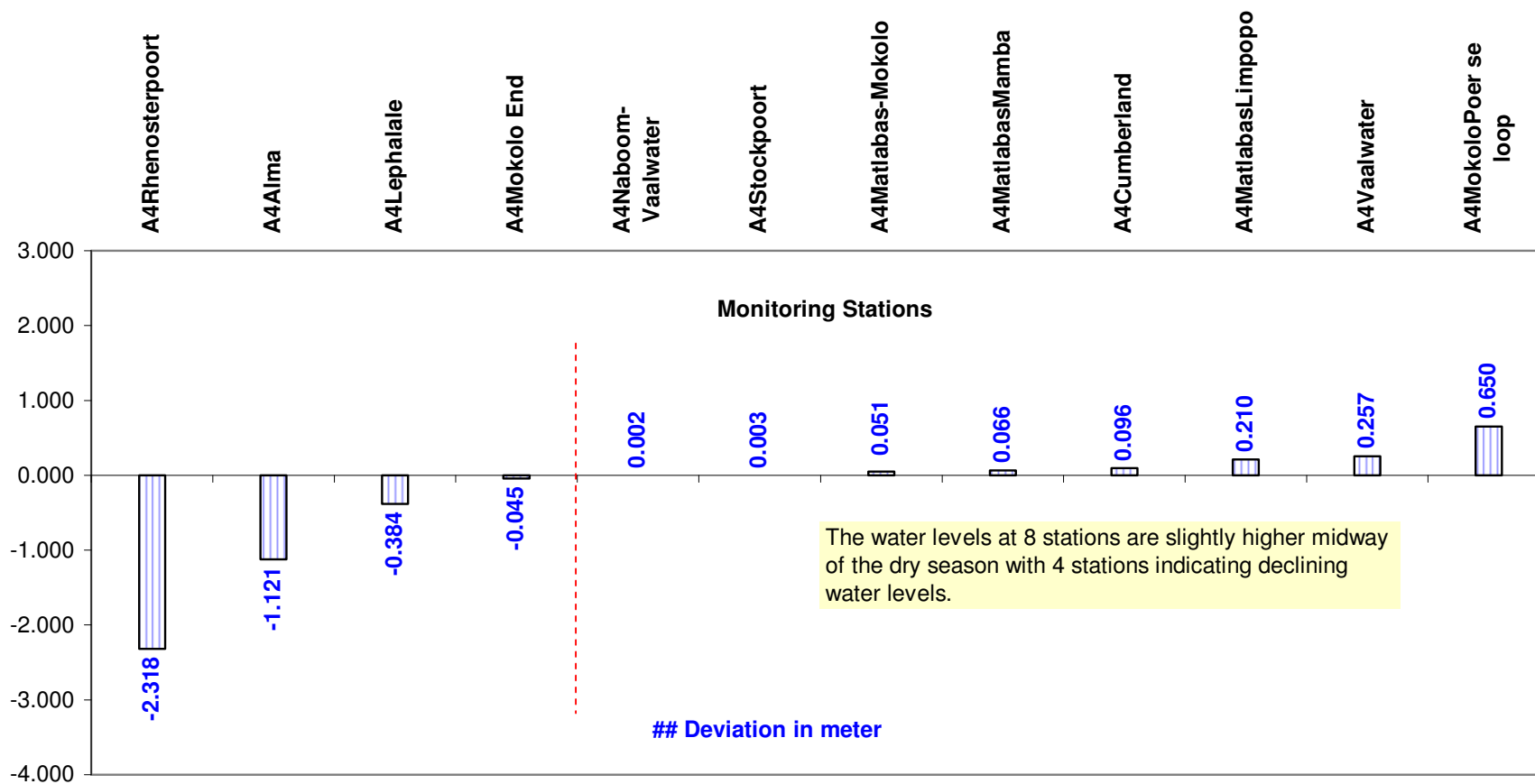
**MAP 6**

Water level trend of some stations in A4 drainage:  
1 August 2009 to 1 August 2010



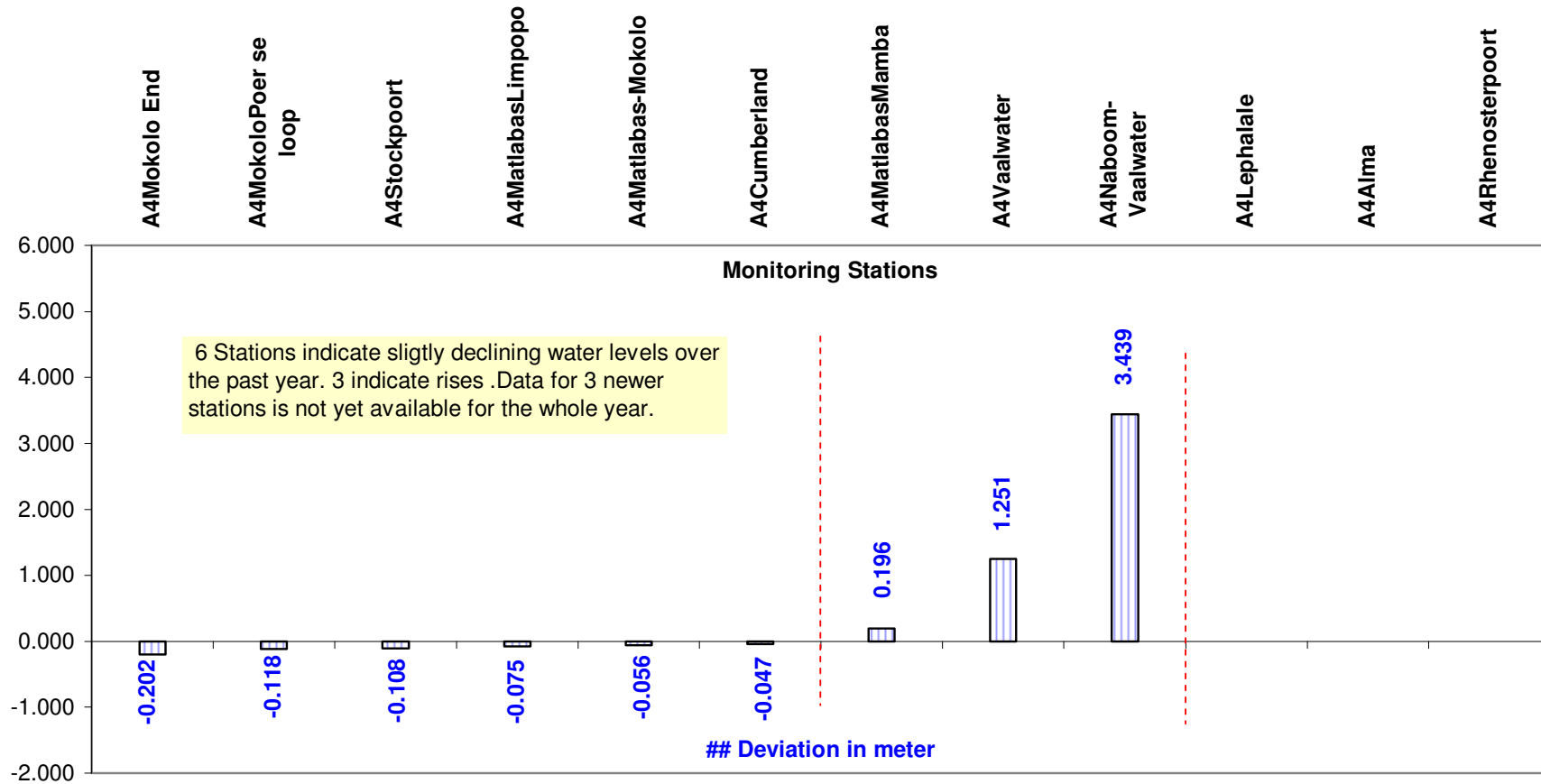
GRAPH 1

**A4 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



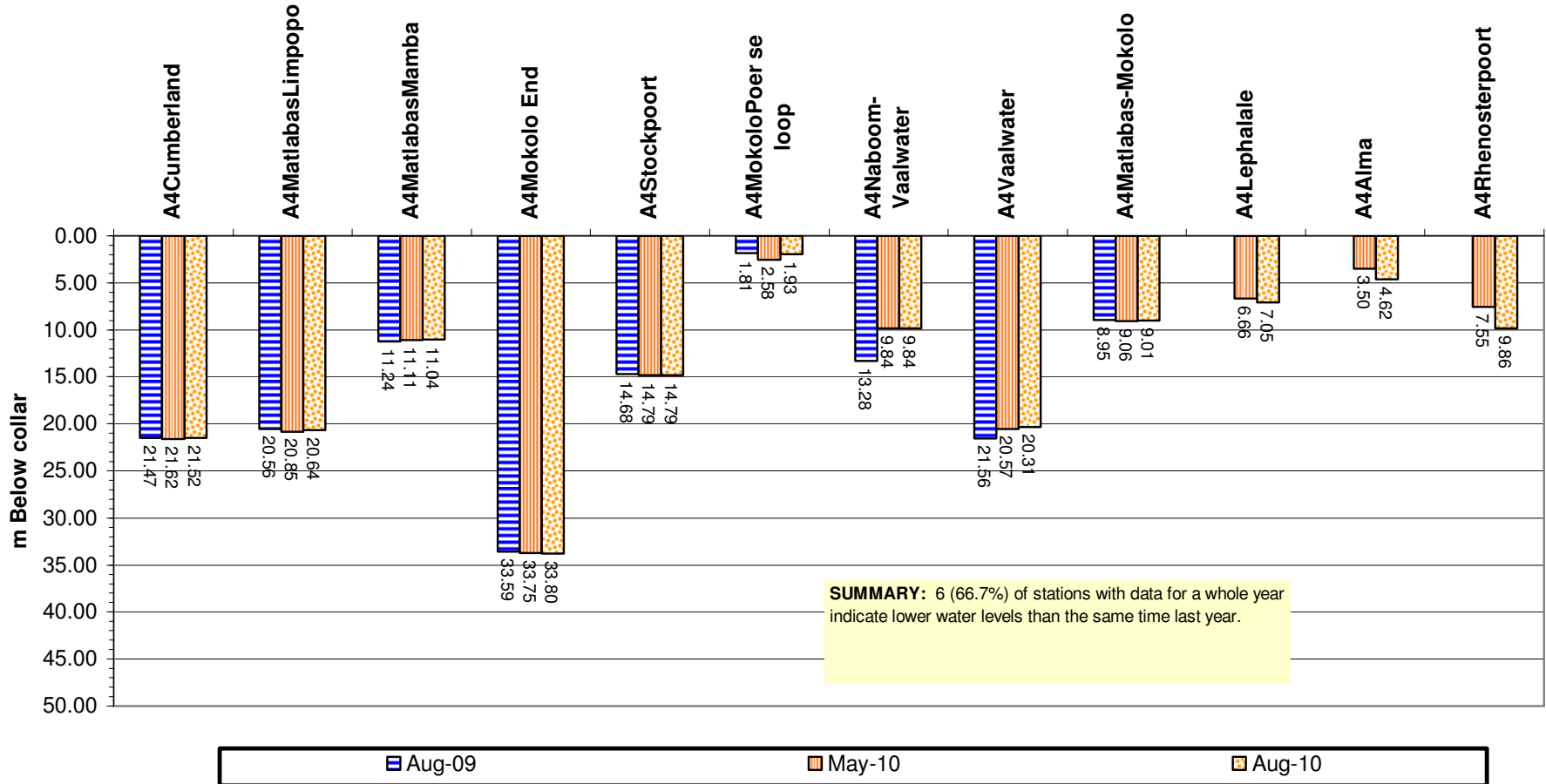
**GRAPH 2**

**A4 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



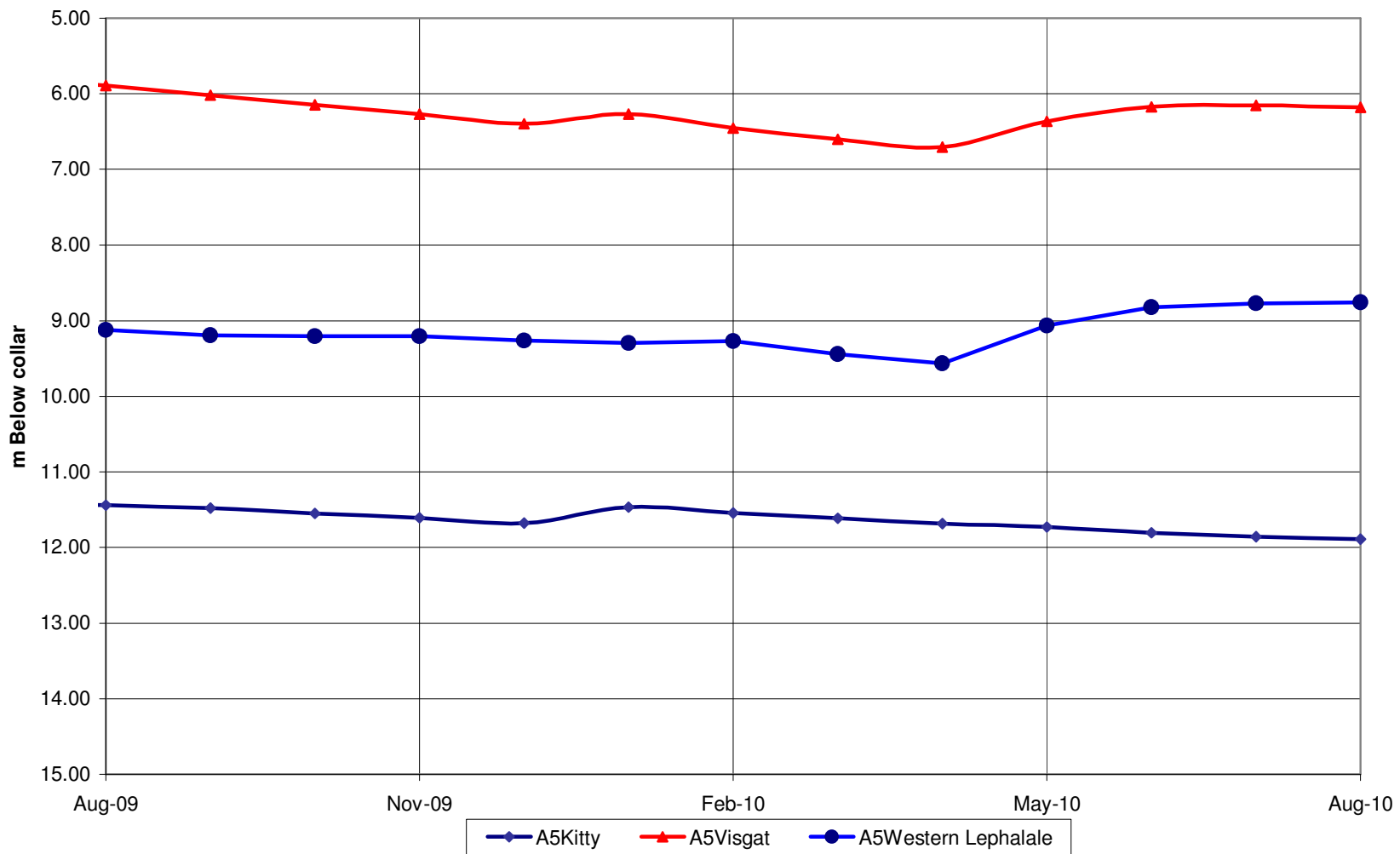
**GRAPH 3**

**A4 DRAINAGE AREA**  
**Comparison between water levels: 1 August 2009,**  
**1 May 2010 and 1 August 2010**  
**Monitoring Stations**



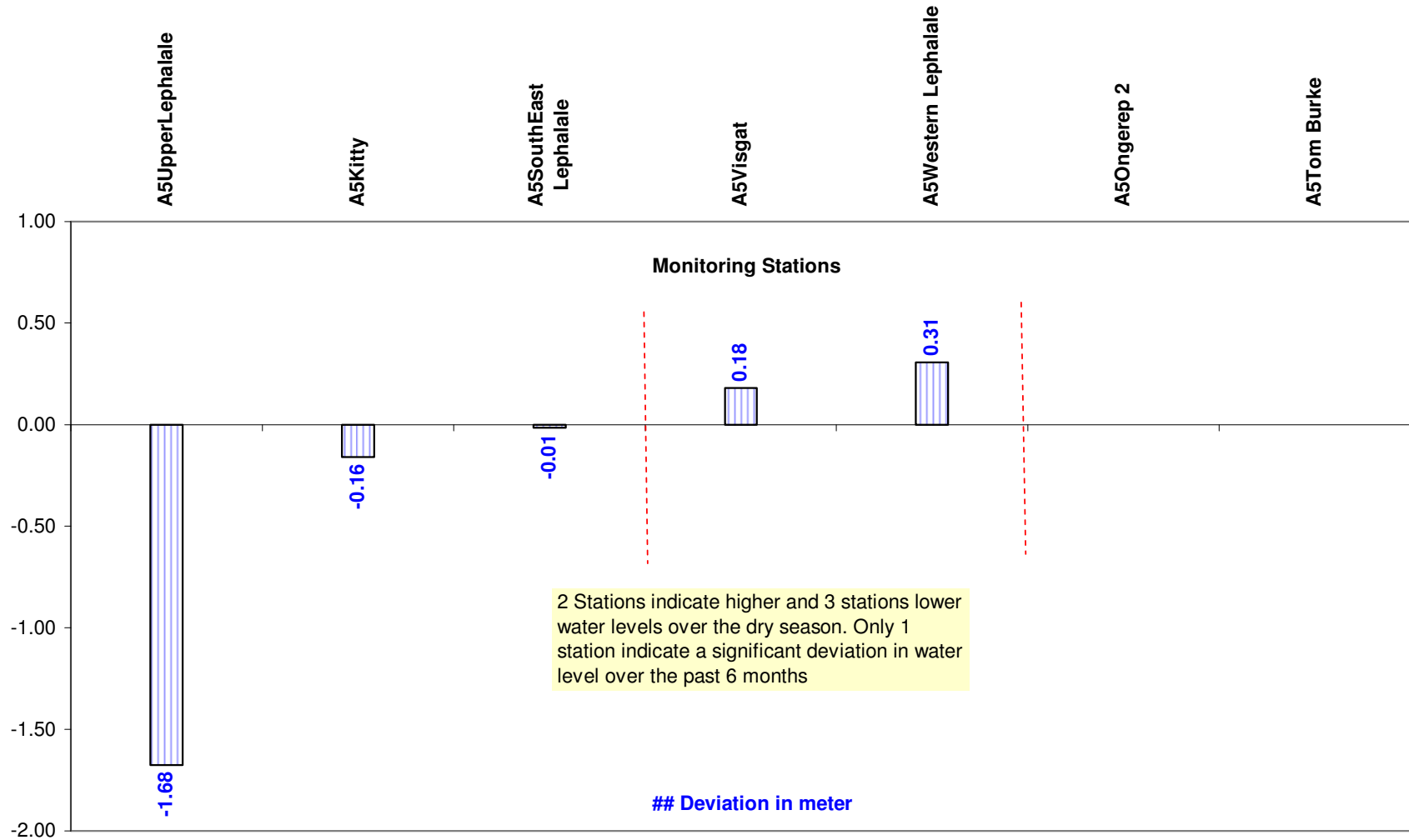
**GRAPH 4**

Comparison of water level trends at some stations in A5 drainage: 1 August 2009 to 1 August 2010



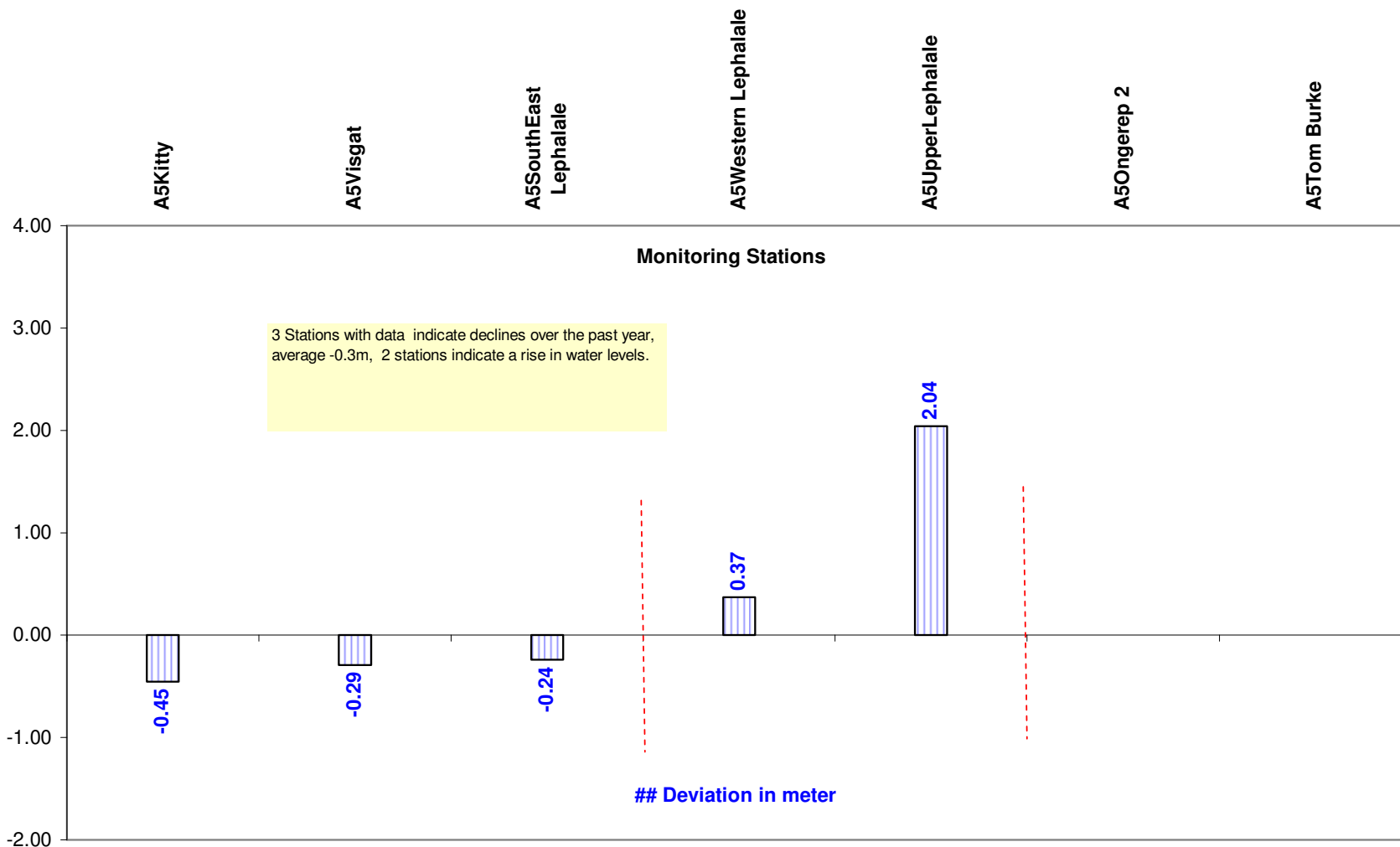
GRAPH 5

**A5 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



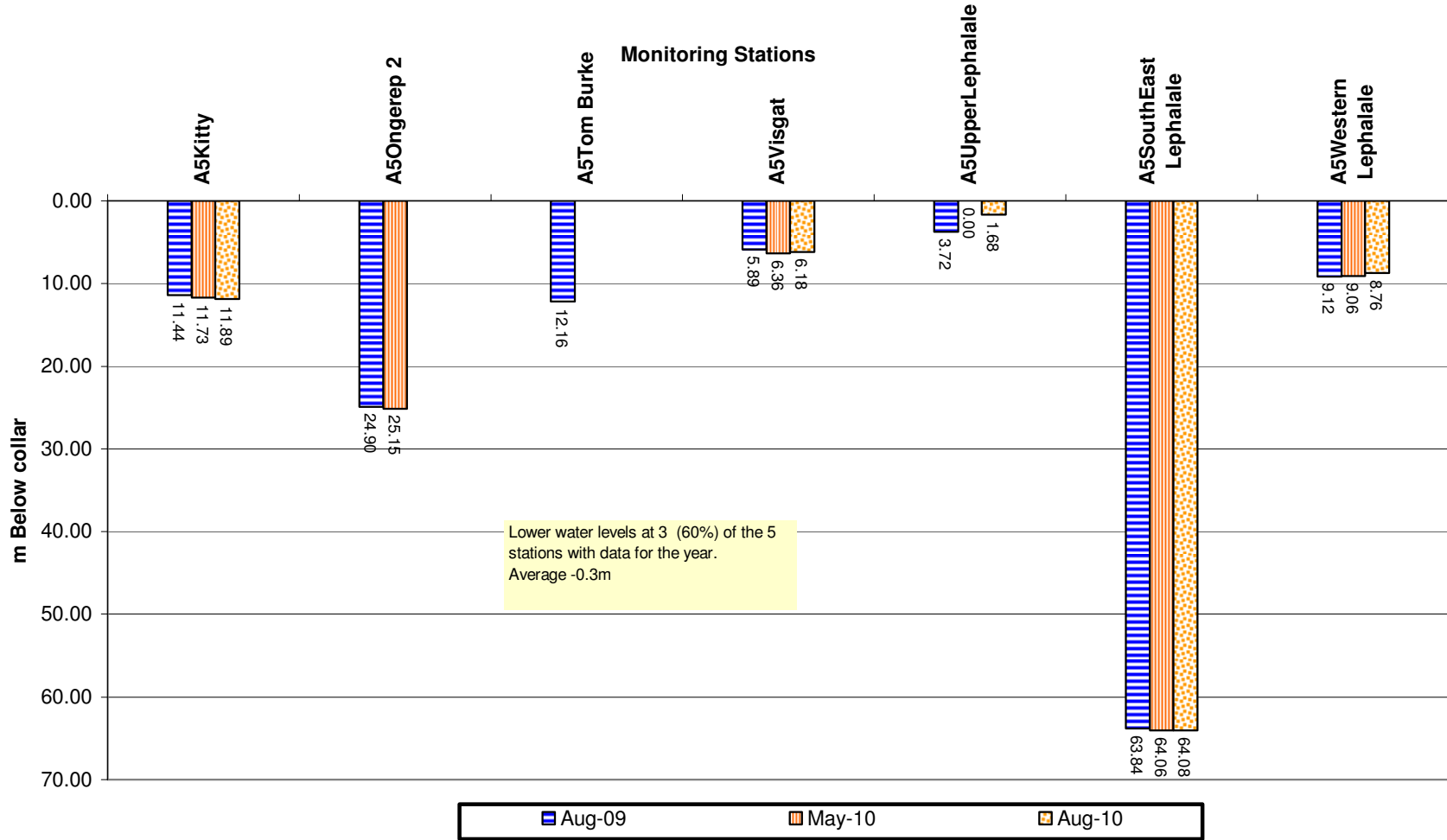
**GRAPH 6**

**A5 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



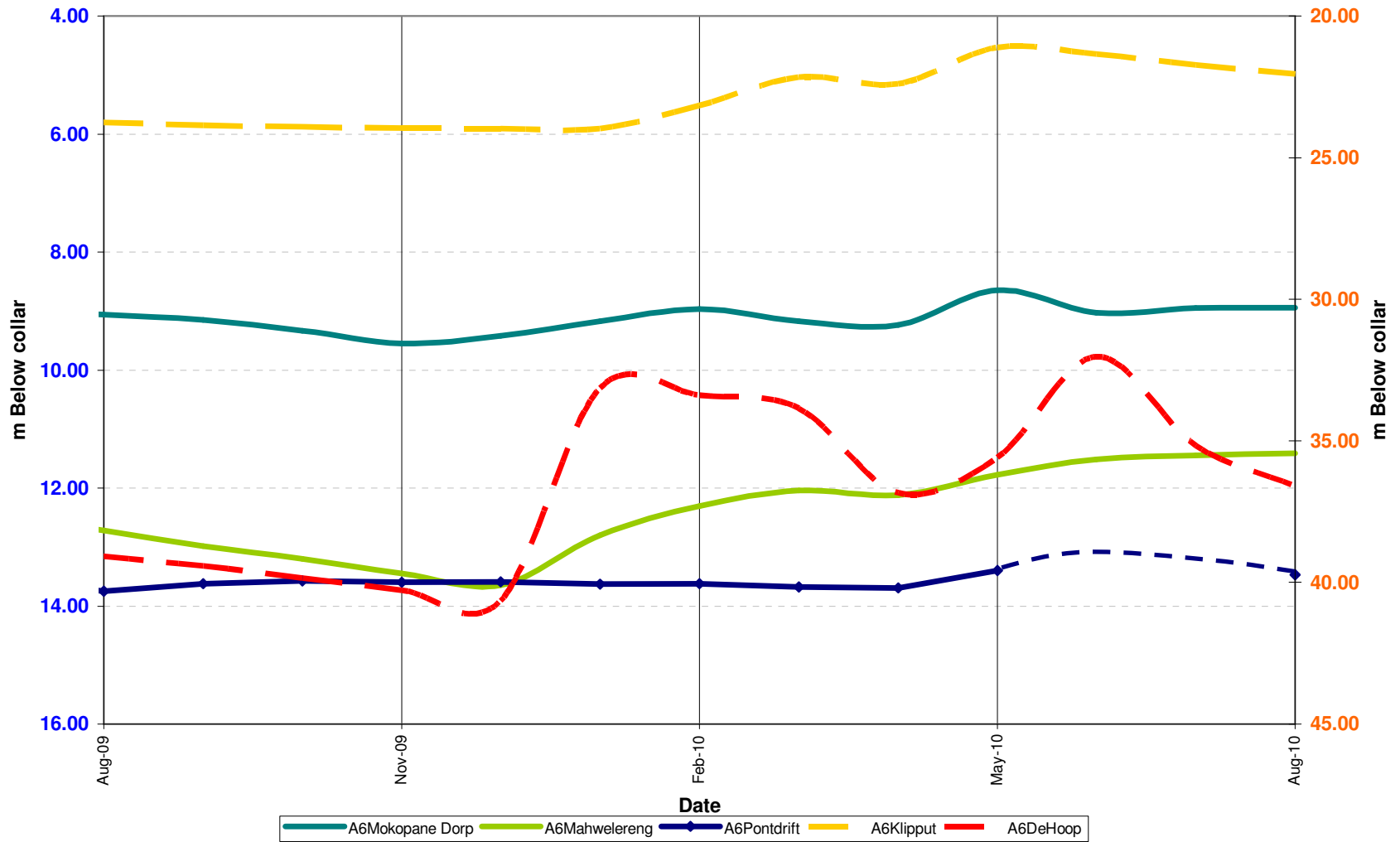
**GRAPH 7**

**A5 DRAINAGE AREA**  
**Comparison between water level depths : 1 August 2009,**  
**1 May 2010 and 1 August 2010**



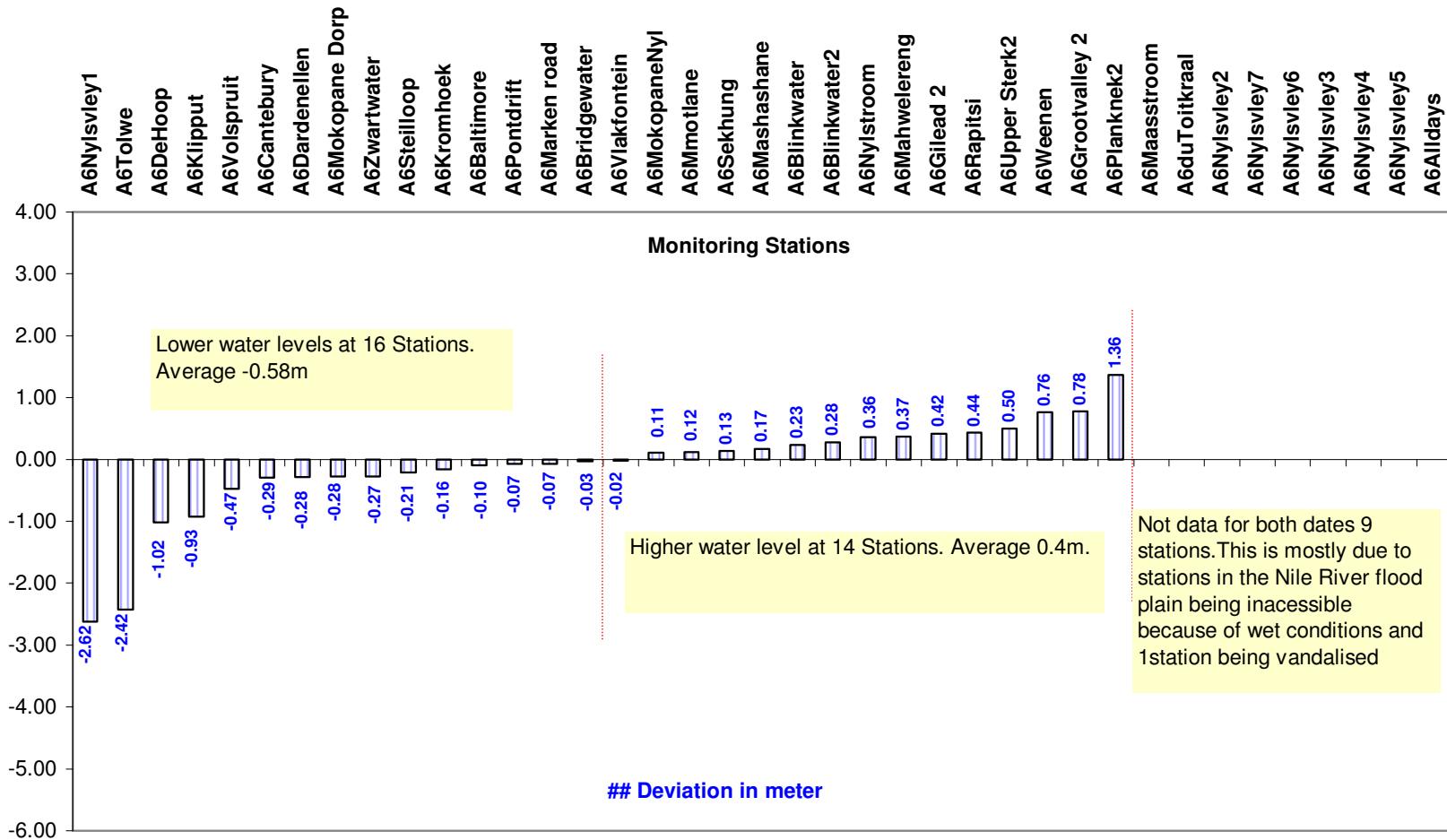
**GRAPH 8**

Comparison of water level trends at some stations in A6 drainage: 1 August 2009 to 1 August 2010



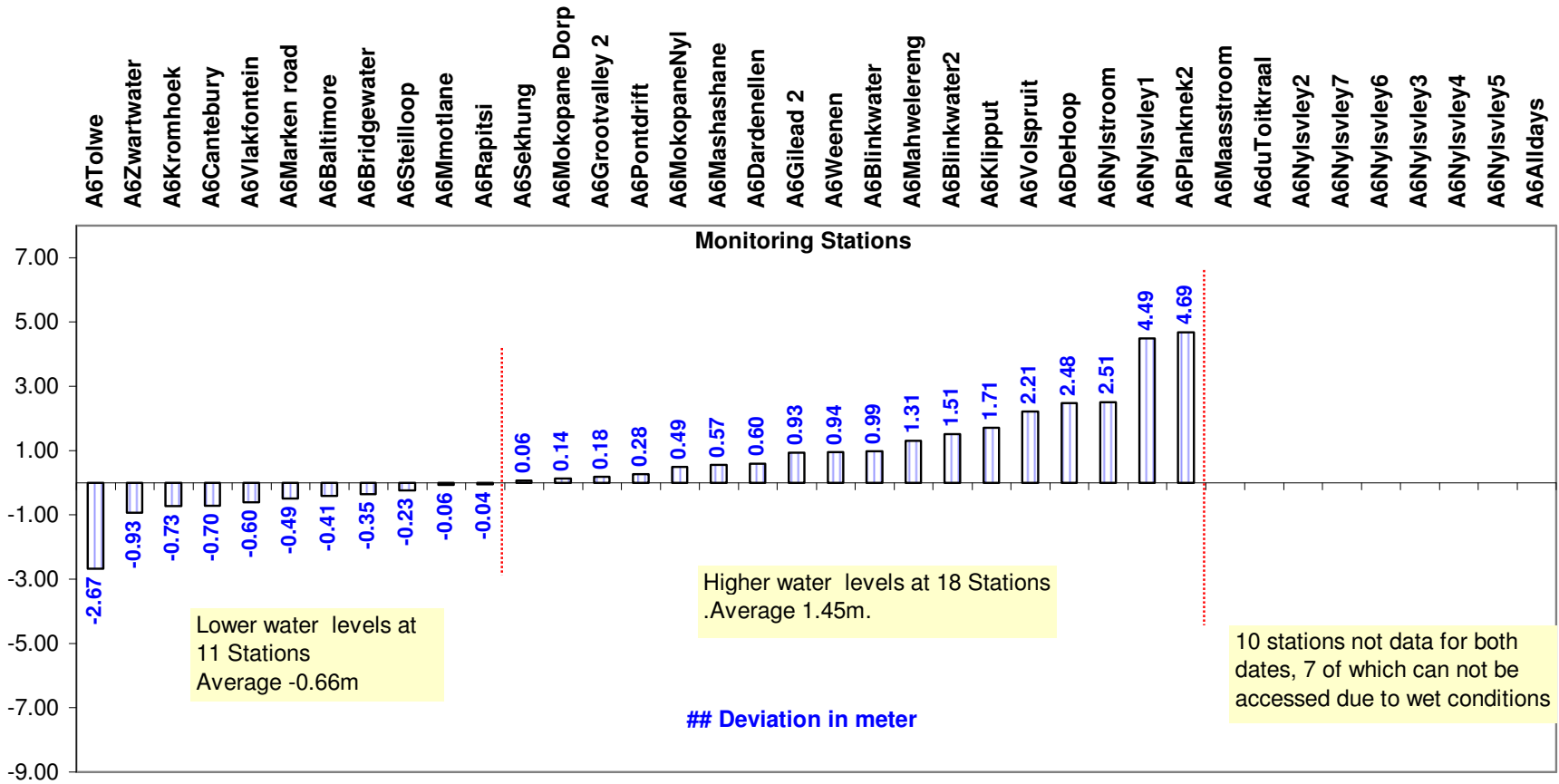
GRAPH 9

**A6 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



**GRAPH 10**

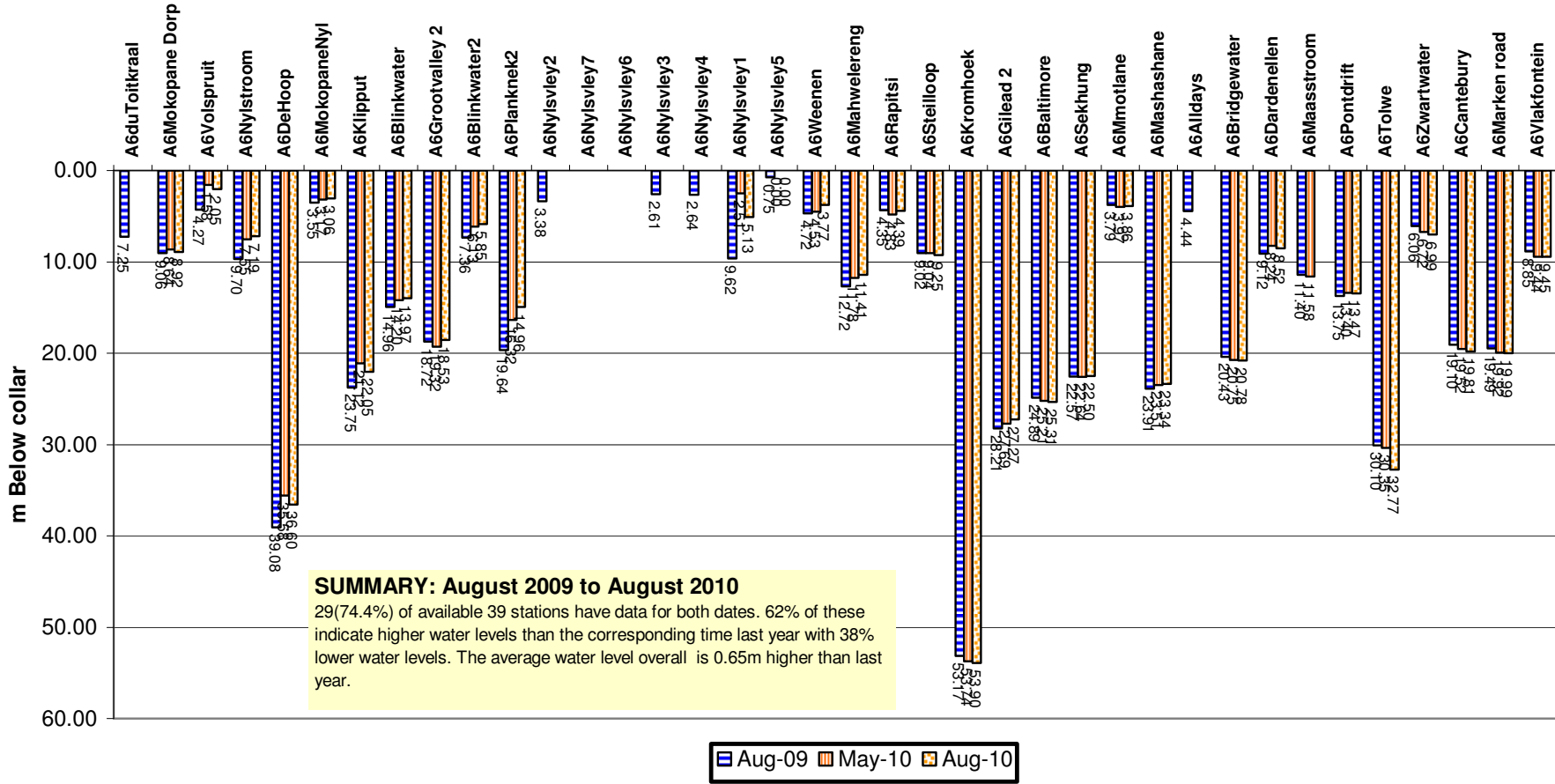
**A6 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



**GRAPH 11**

**A6 DRAINAGE AREA**  
**Comparison between water level depths: 1 August 2009,**  
**1 May 2010, and 1 August 2010**

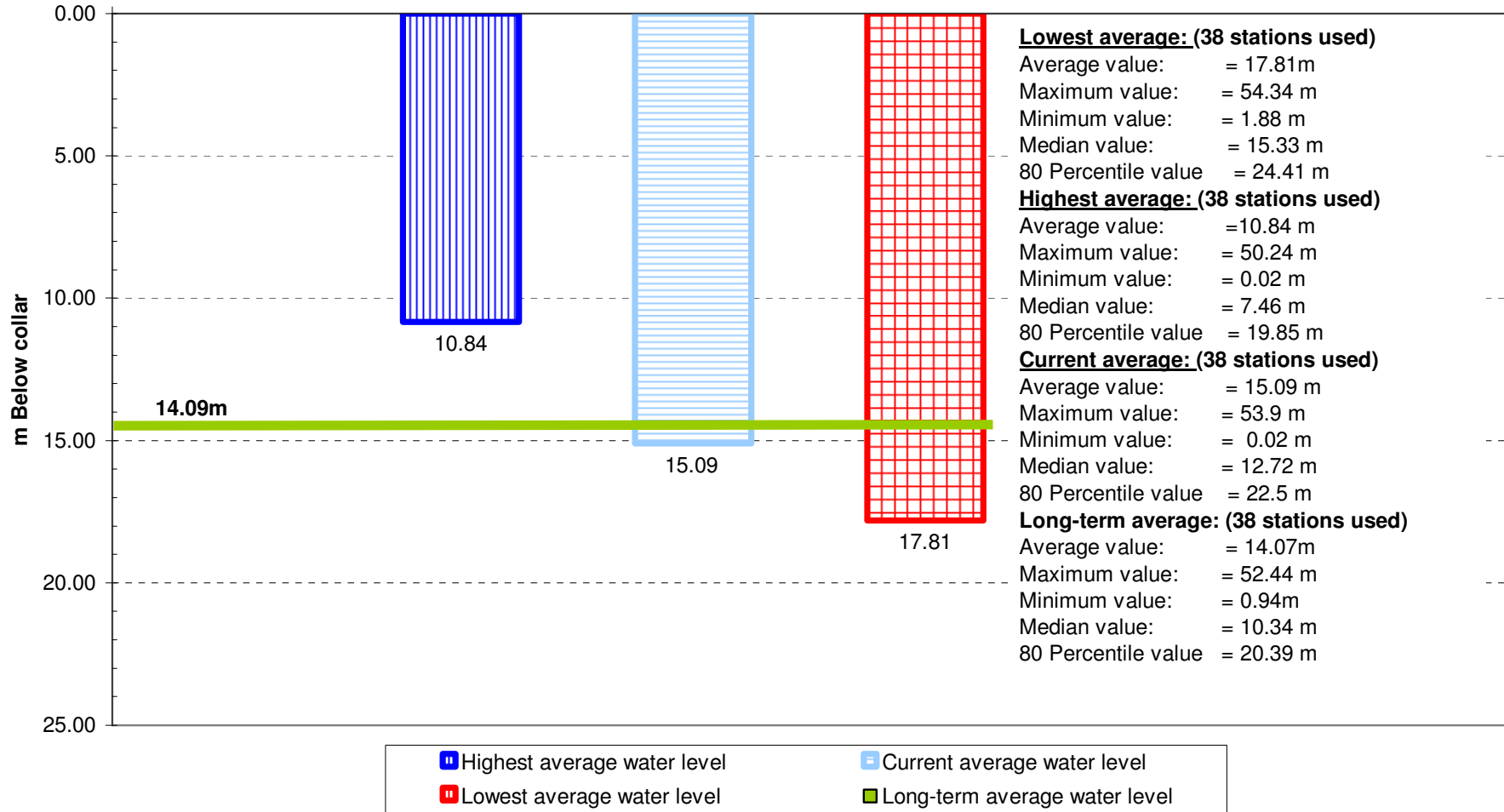
**Monitoring Stations**



■ Aug-09 ■ May-10 ■ Aug-10

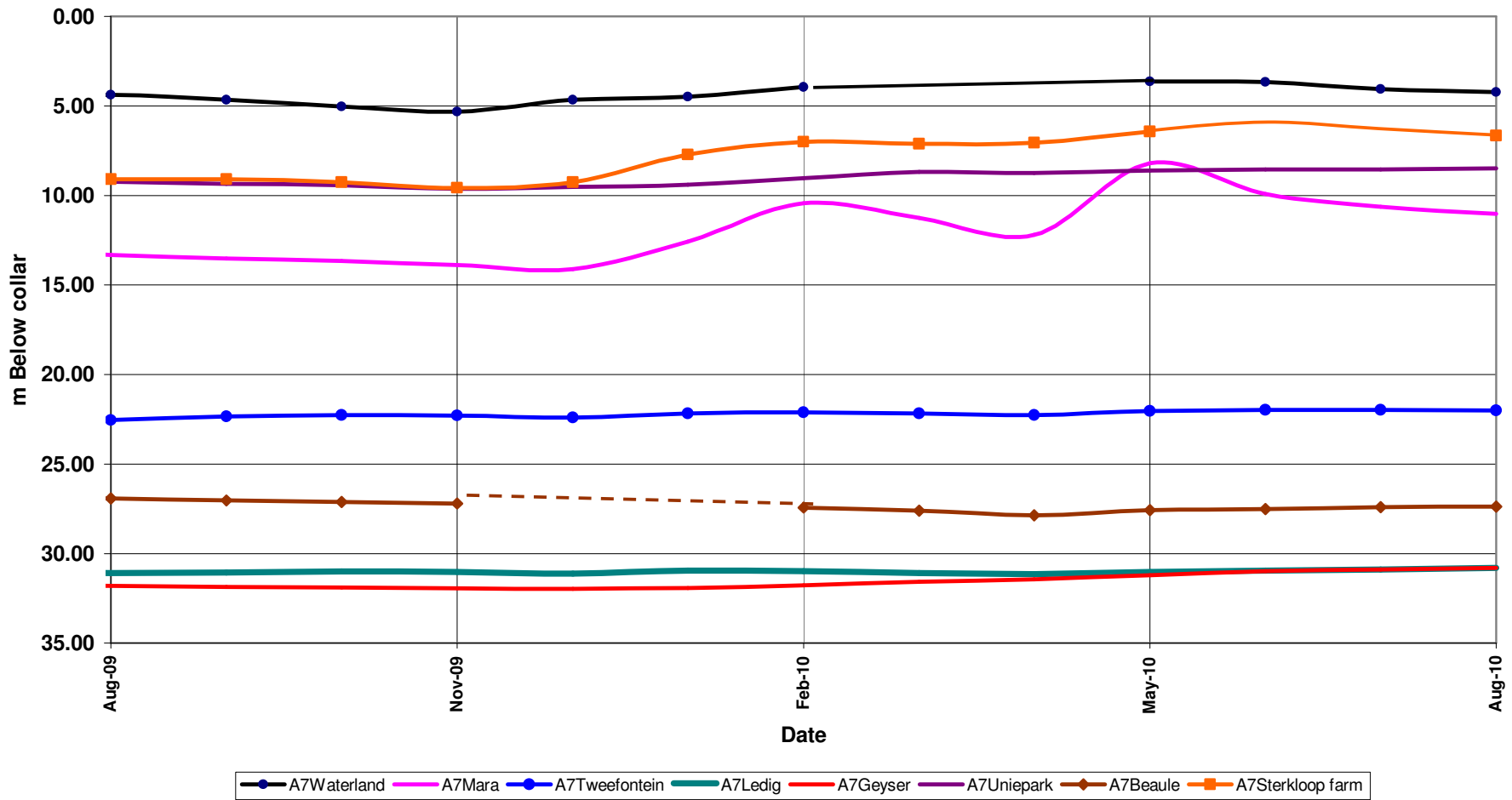
**GRAPH 12**

**A6 DRAINAGE AREA**  
**Comparison of average current water level depths with highest, lowest & long-term average water level depths recorded**



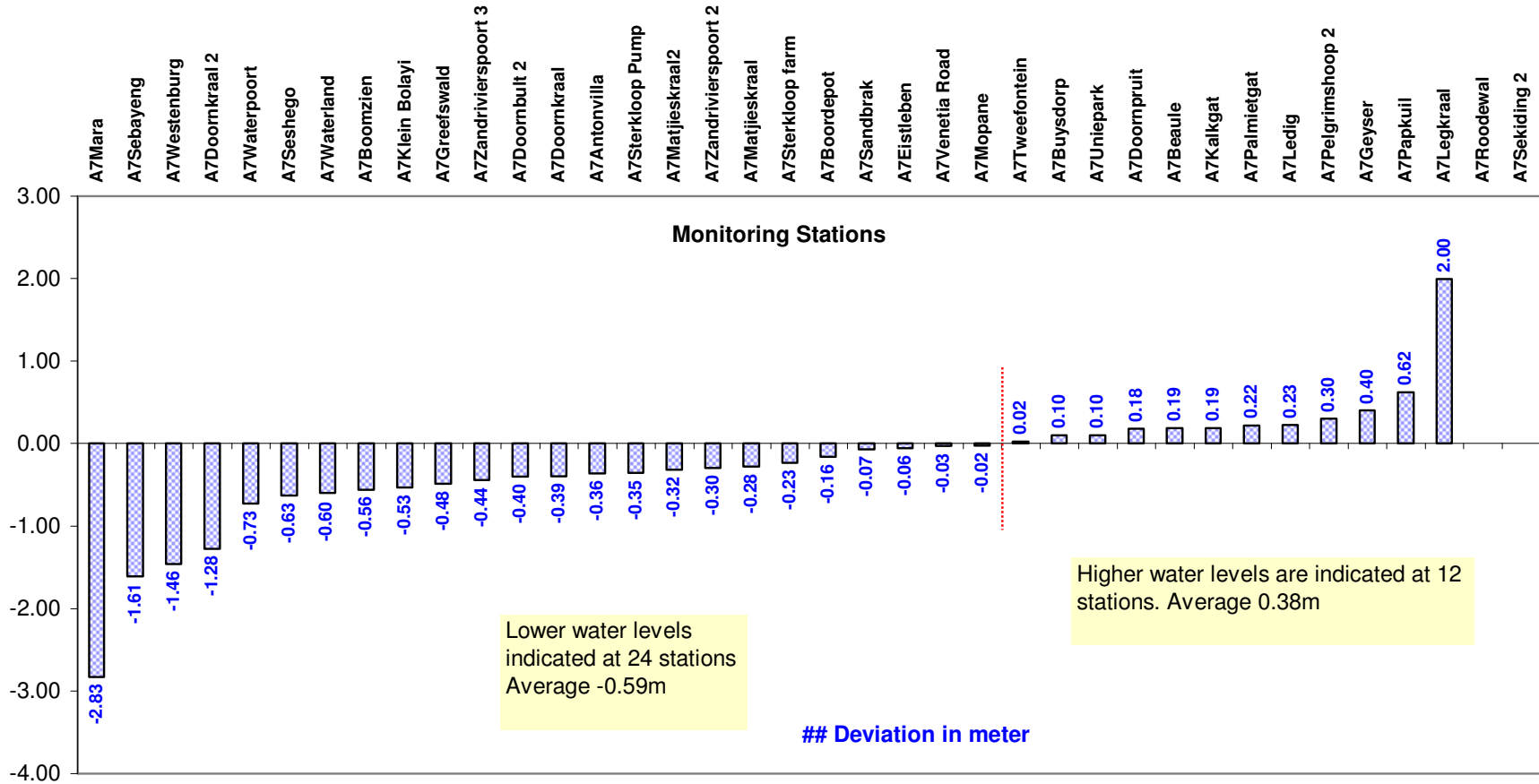
**GRAPH 13**

Comparison of water level trends at some stations in A7 drainage:  
1 August 2009 to 1 August 2010



GRAPH 14

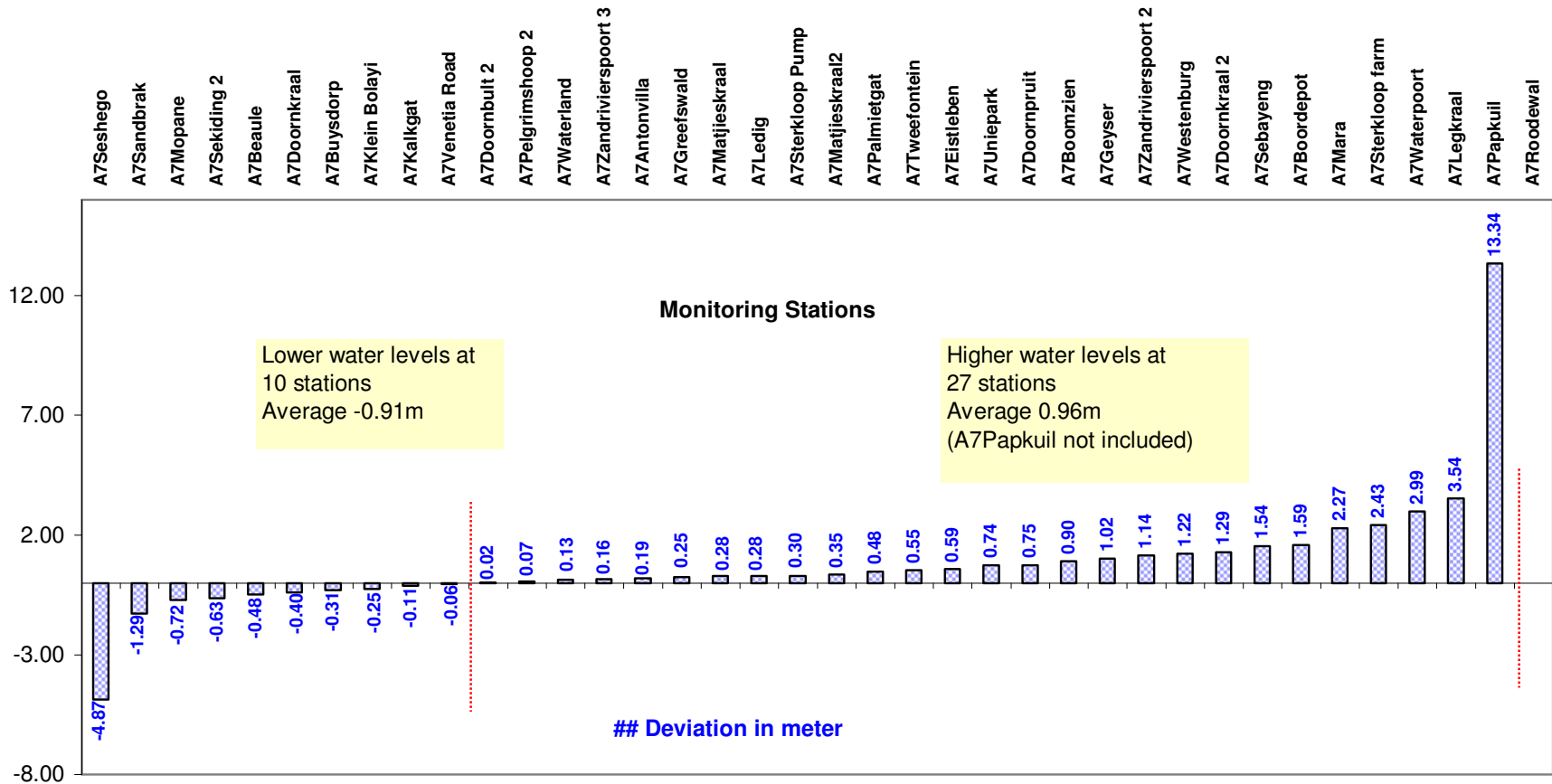
**A7 DRAINAGE AREA**  
**Deviation of water level depths: 1 May 2010**  
**to 1 August 2010**



**GRAPH 15**

## A7 DRAINAGE AREA

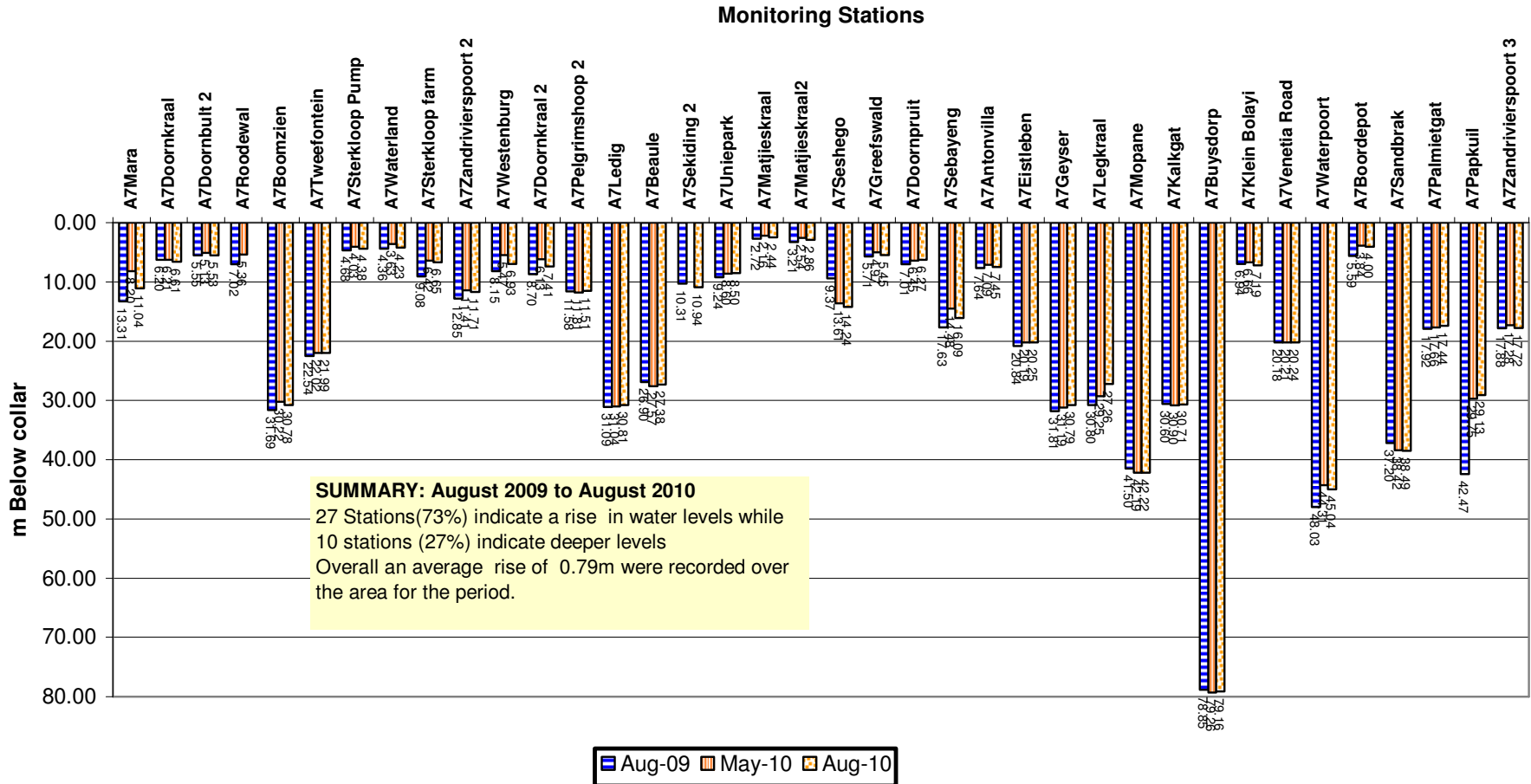
### Deviation of water level depths: 1 August 2009 to 1 August 2010



**GRAPH 16**

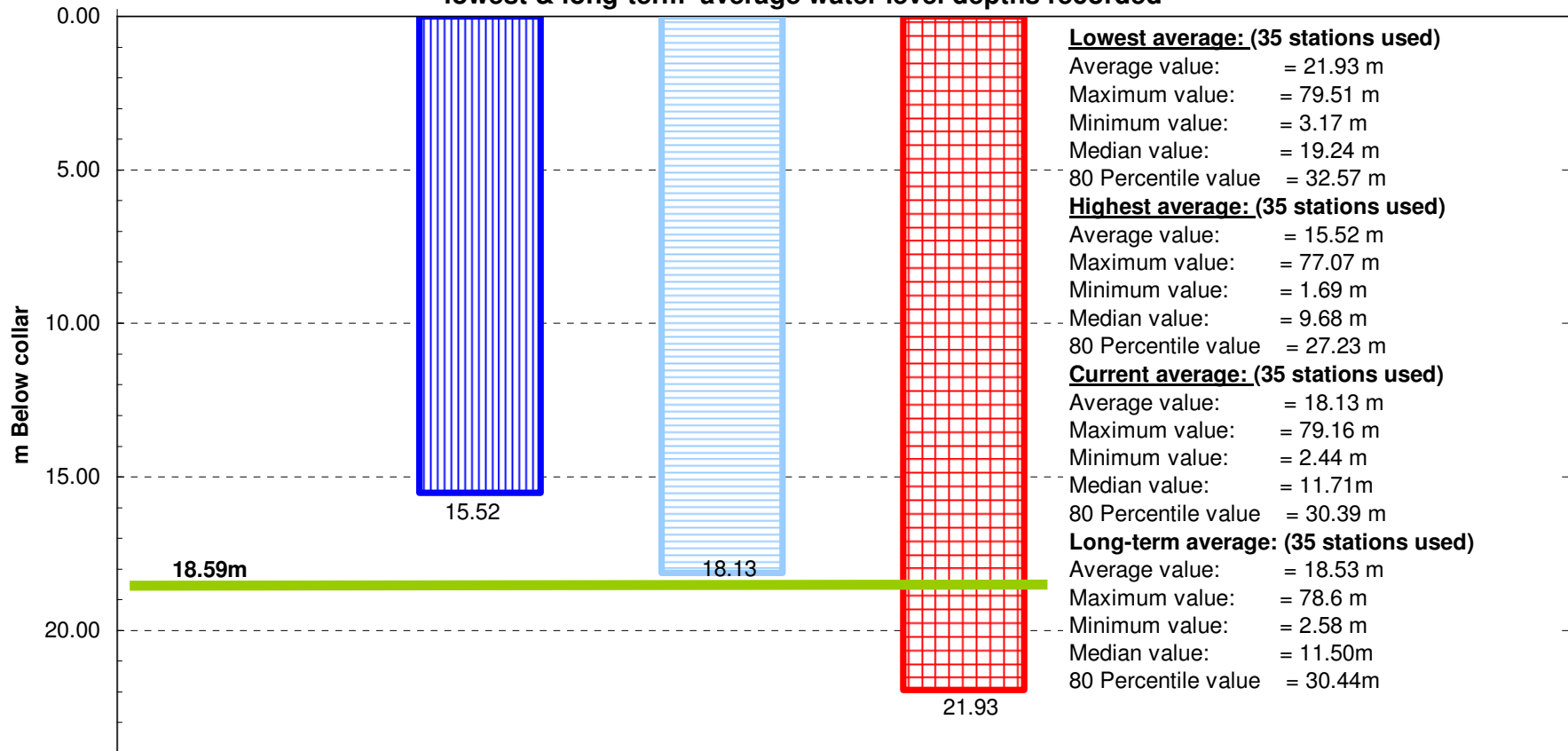
## A7 DRAINAGE AREA

### Comparison between water level depths: 1 August 2009, 1 May 2010 and 1 August 2010



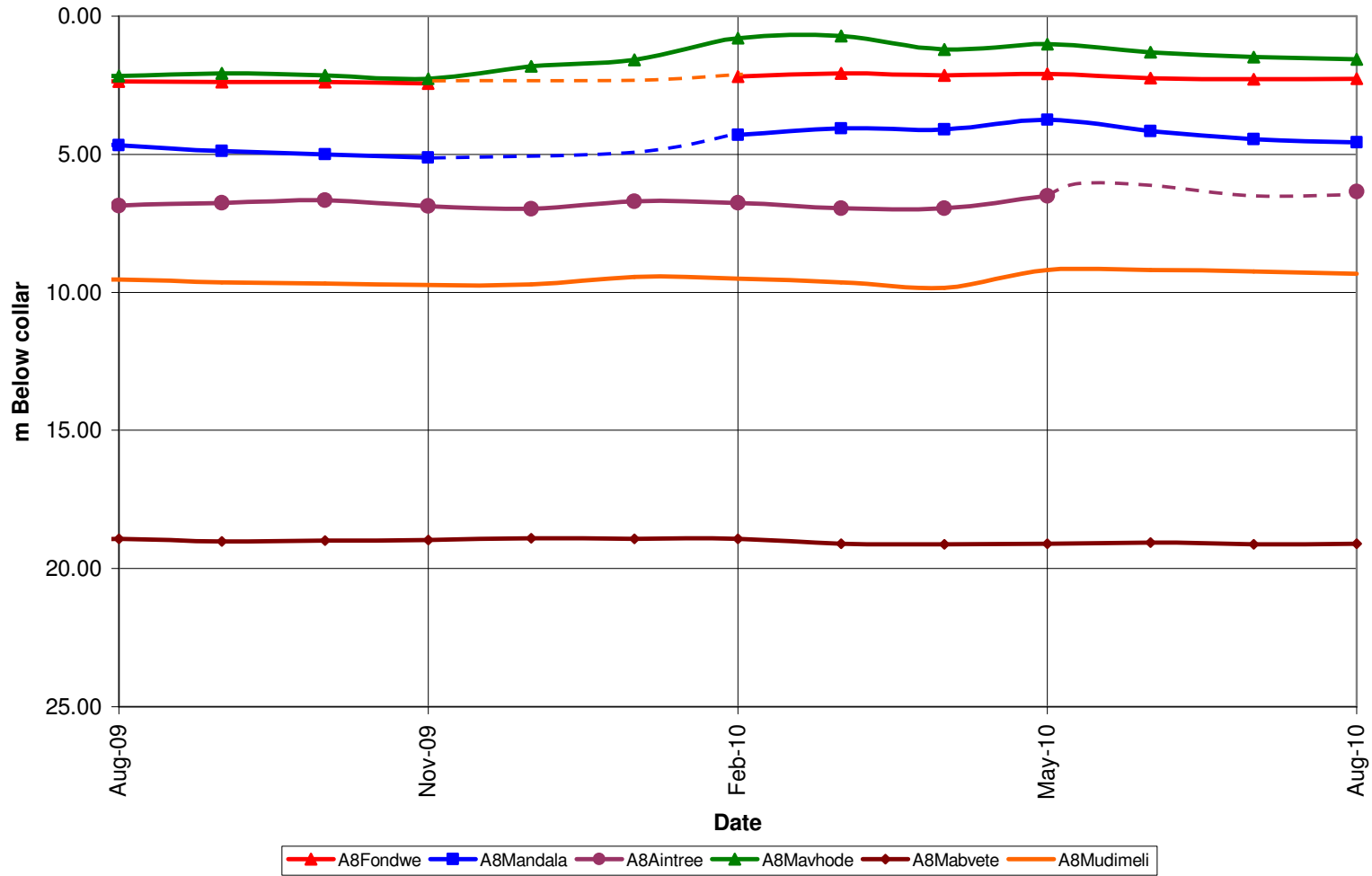
**GRAPH 17**

**A7 DRAINAGE AREA**  
**Comparison of average current water level depth with highest, lowest & long-term average water level depths recorded**



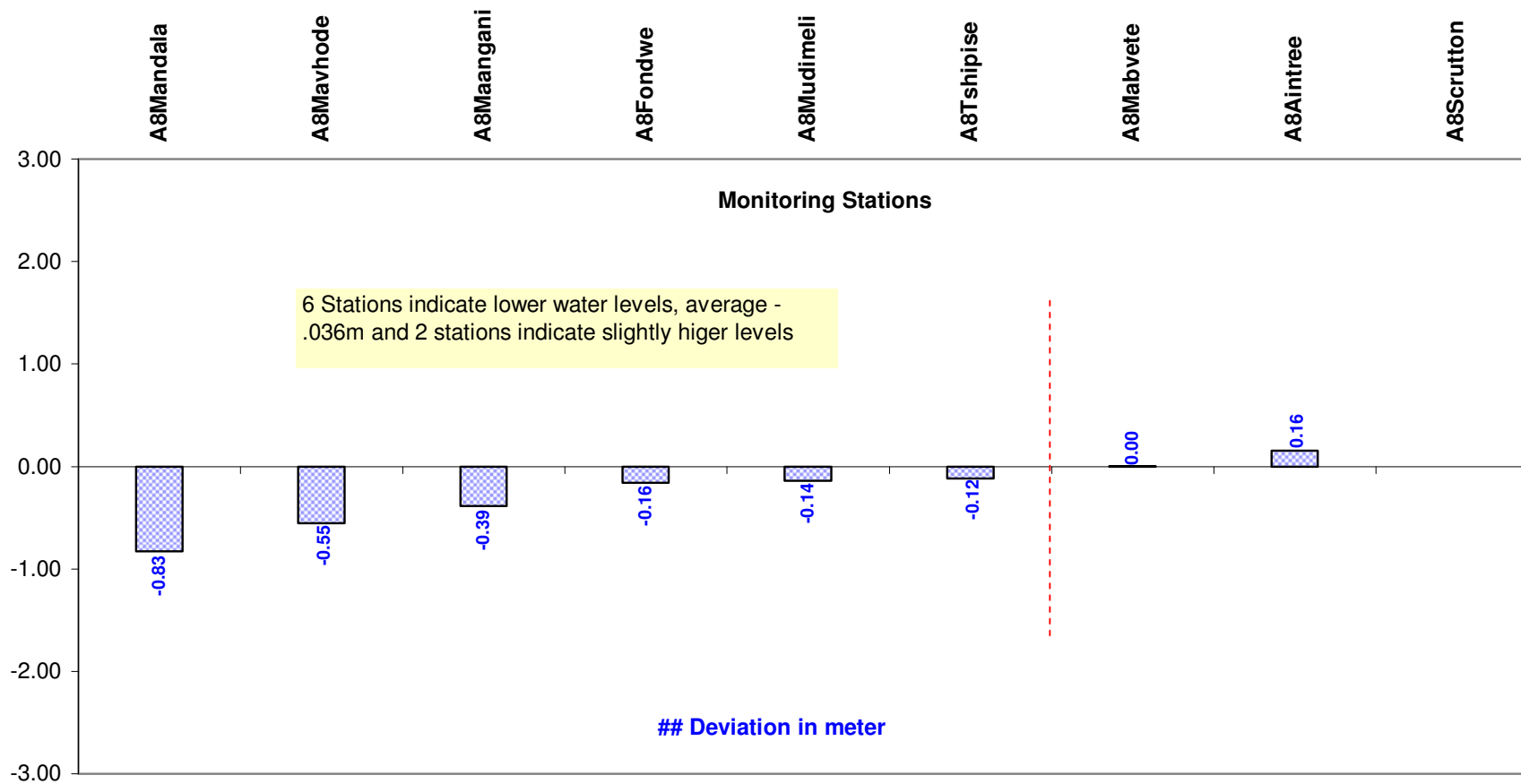
**GRAPH 18**

Comparison of water level trends at some stations in A8 drainage:  
1 August 2009 to 1 August 2010



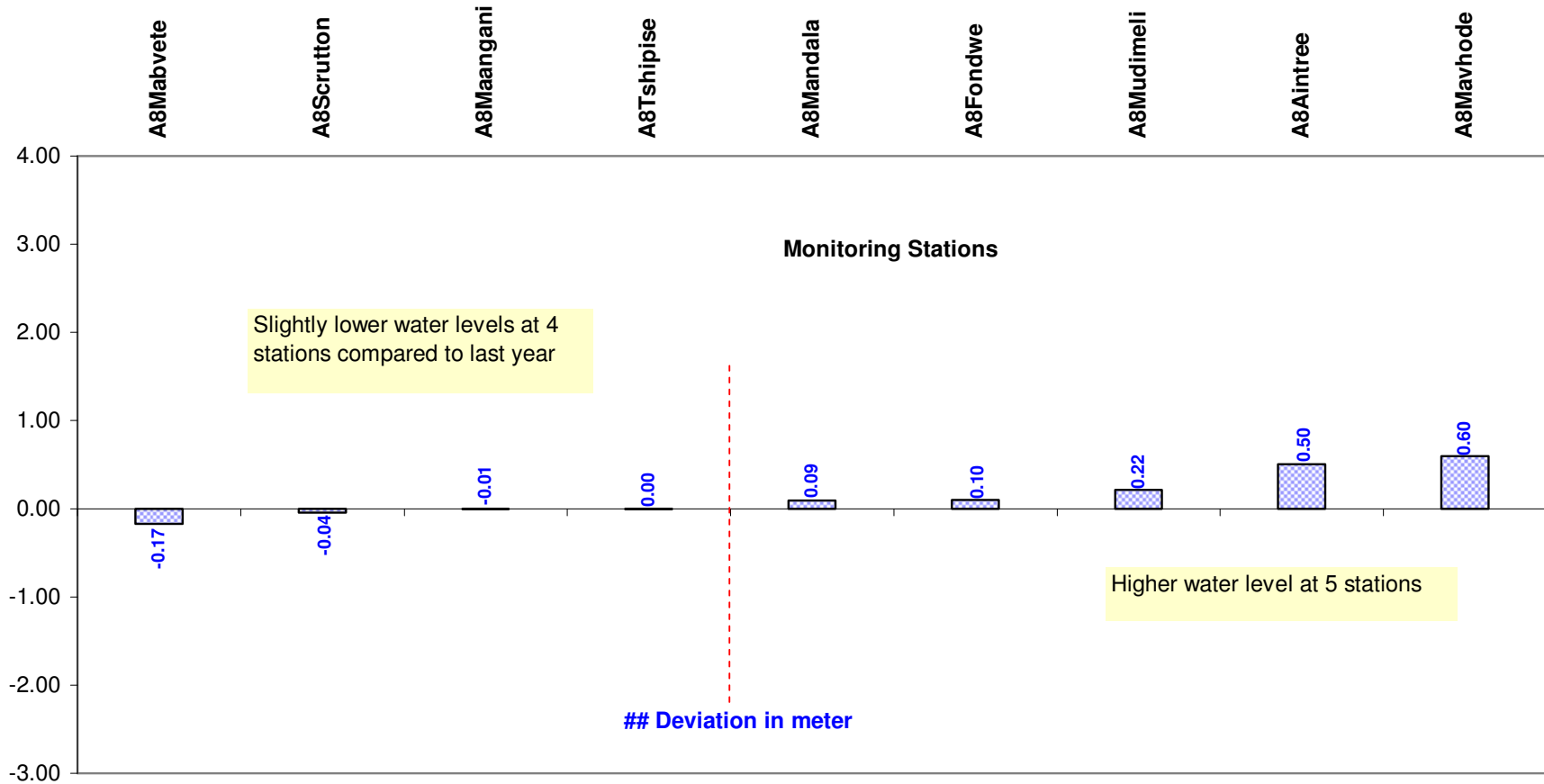
GRAPH 19

**A8 DRAINAGE AREA**  
**Deviation of water level depths: 1 May 2010 to 1 August 2010**



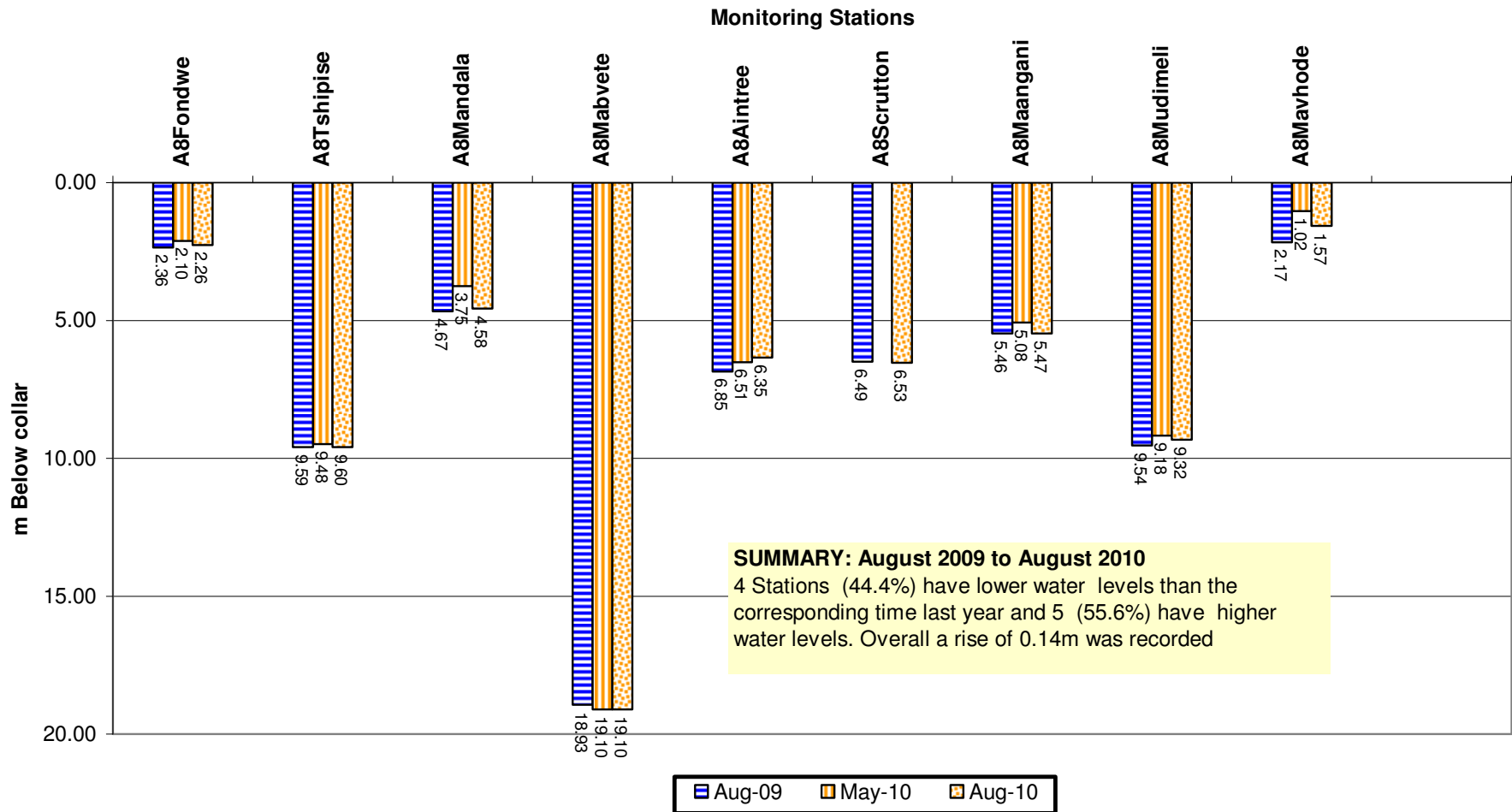
**GRAPH 20**

**A8 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



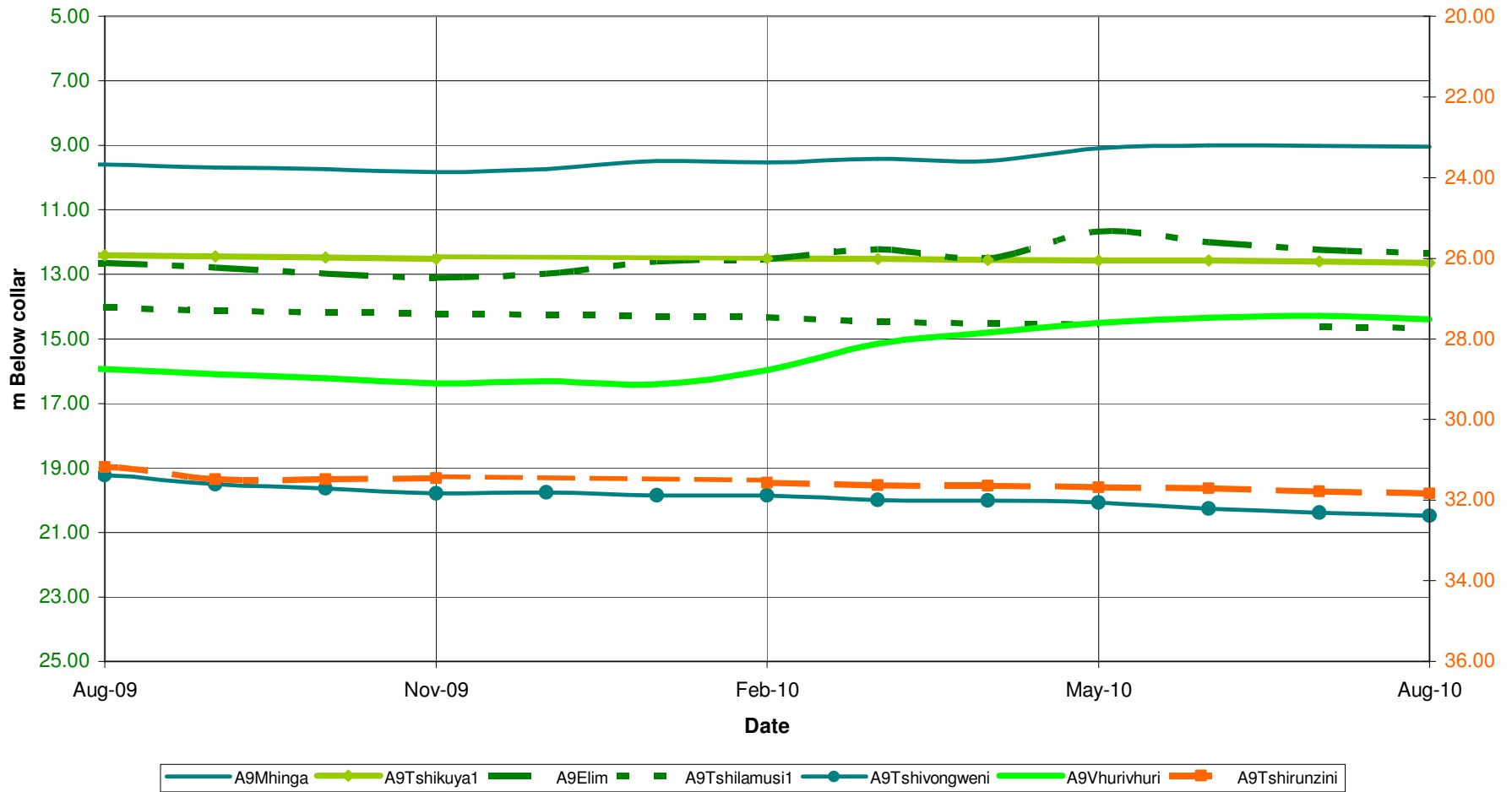
**GRAPH 21**

**A8 DRAINAGE AREA**  
**Comparison between water level depths: 1 August 2009,**  
**1 May 2010 and 1 August 2010**



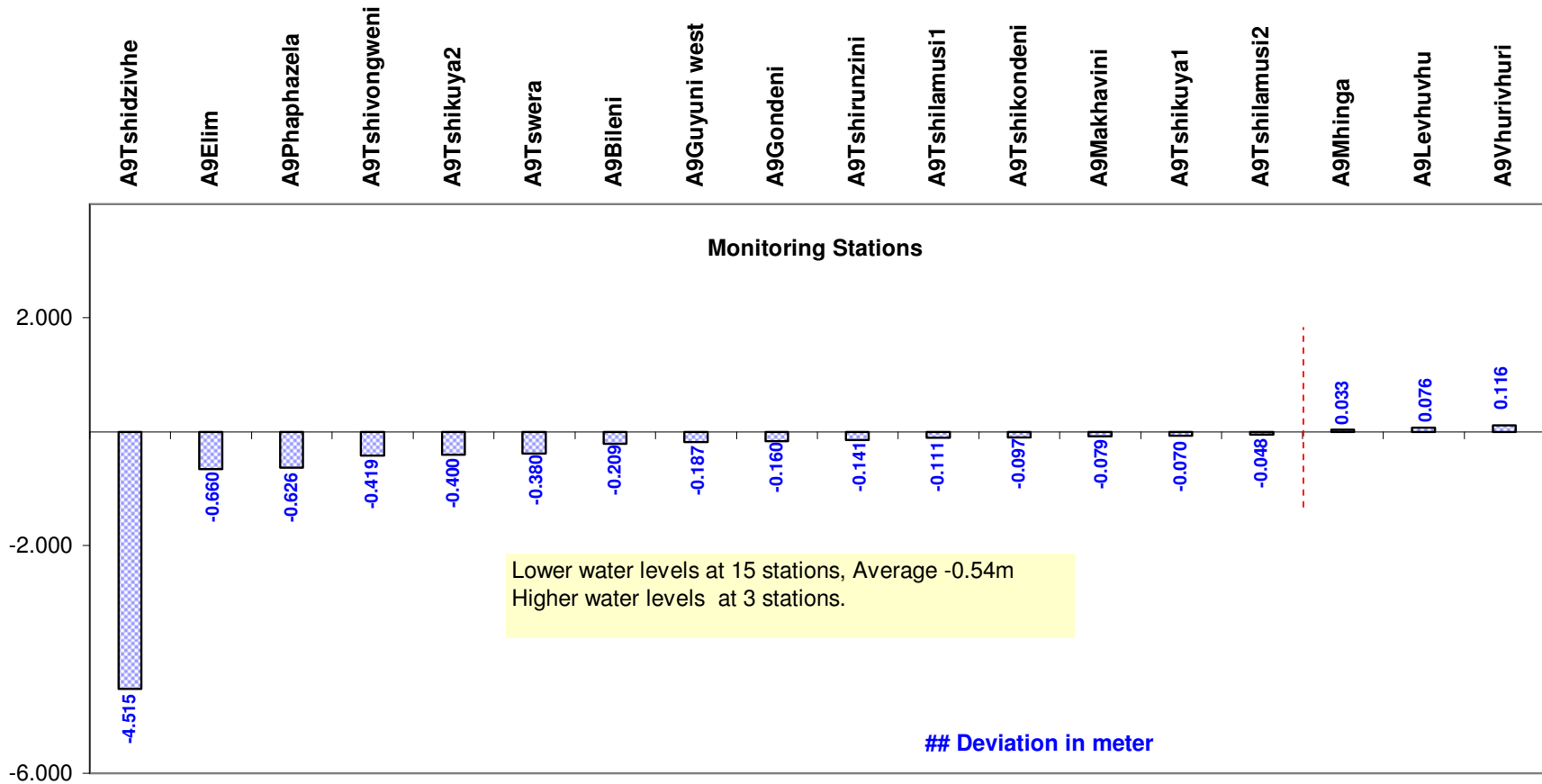
**GRAPH 22**

**Comparison of water level trends at some stations in A9 drainage :  
1 August 2009 to 1 August 2010**



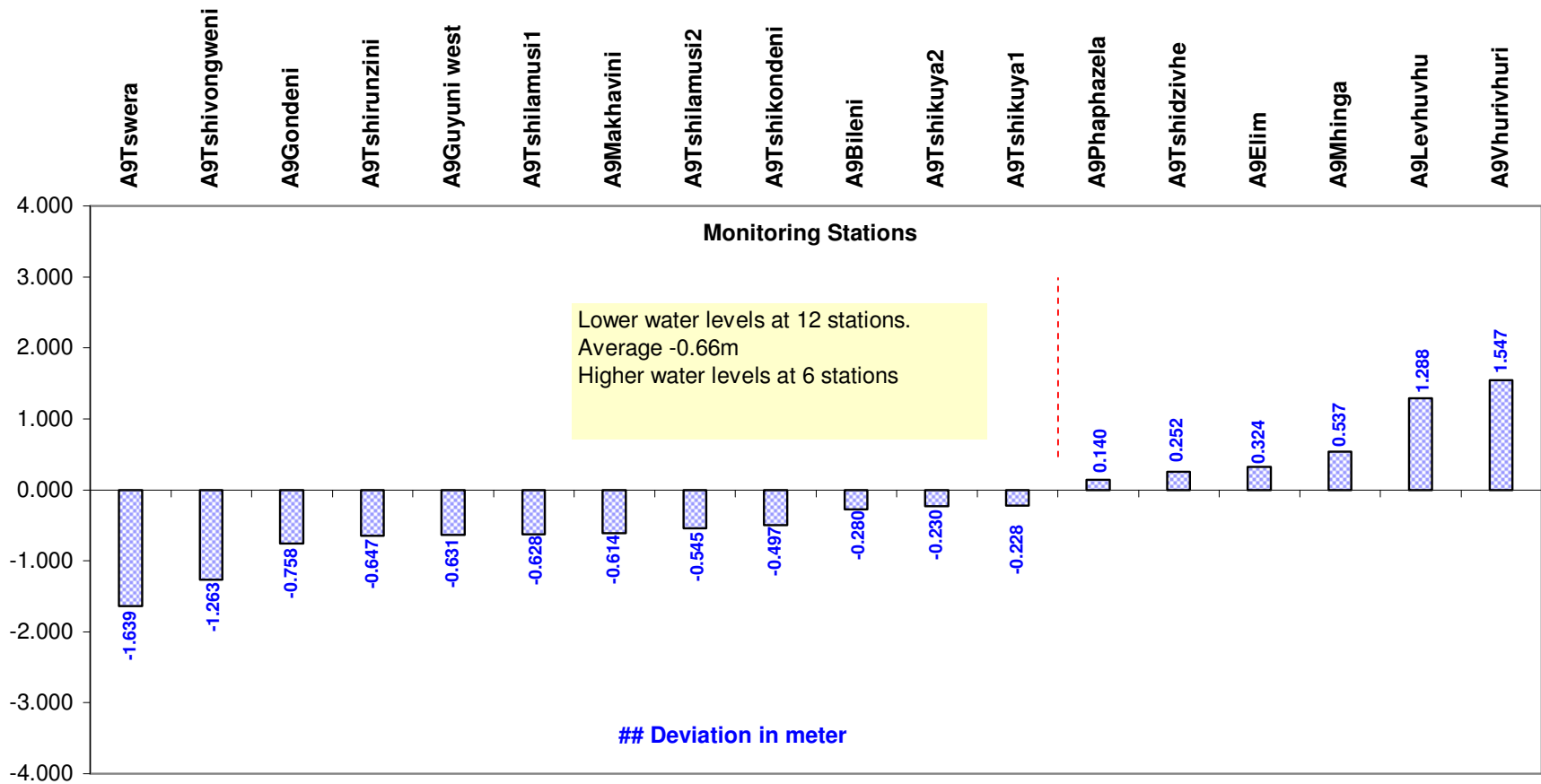
**GRAPH 23**

**A9 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



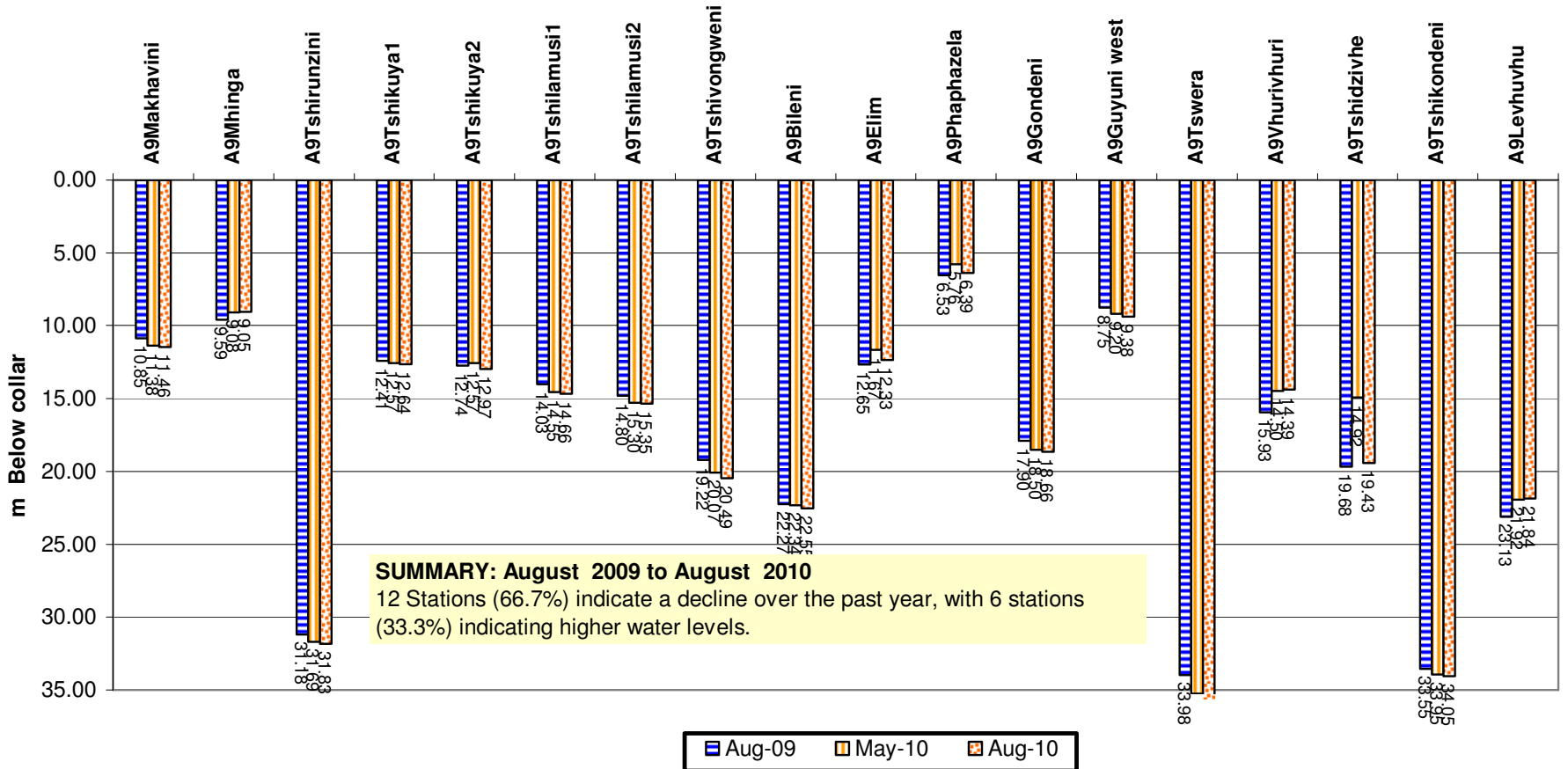
**GRAPH 24**

**A9 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



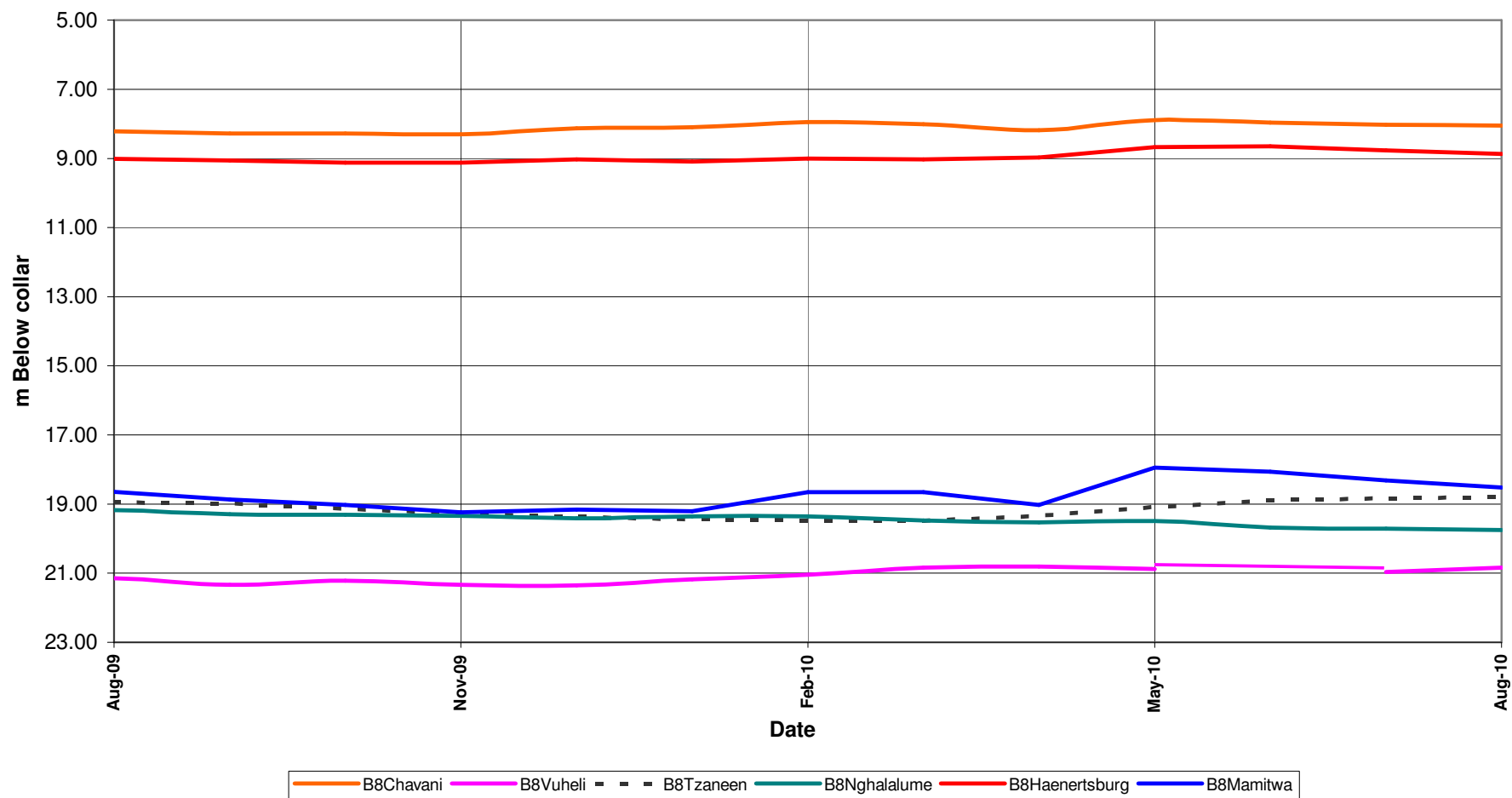
**GRAPH 25**

**A9 DRAINAGE AREA**  
**Comparison between water level depths: 1 August 2009,**  
**1 May 2010 and 1 August 2010**  
**Monitoring Stations**



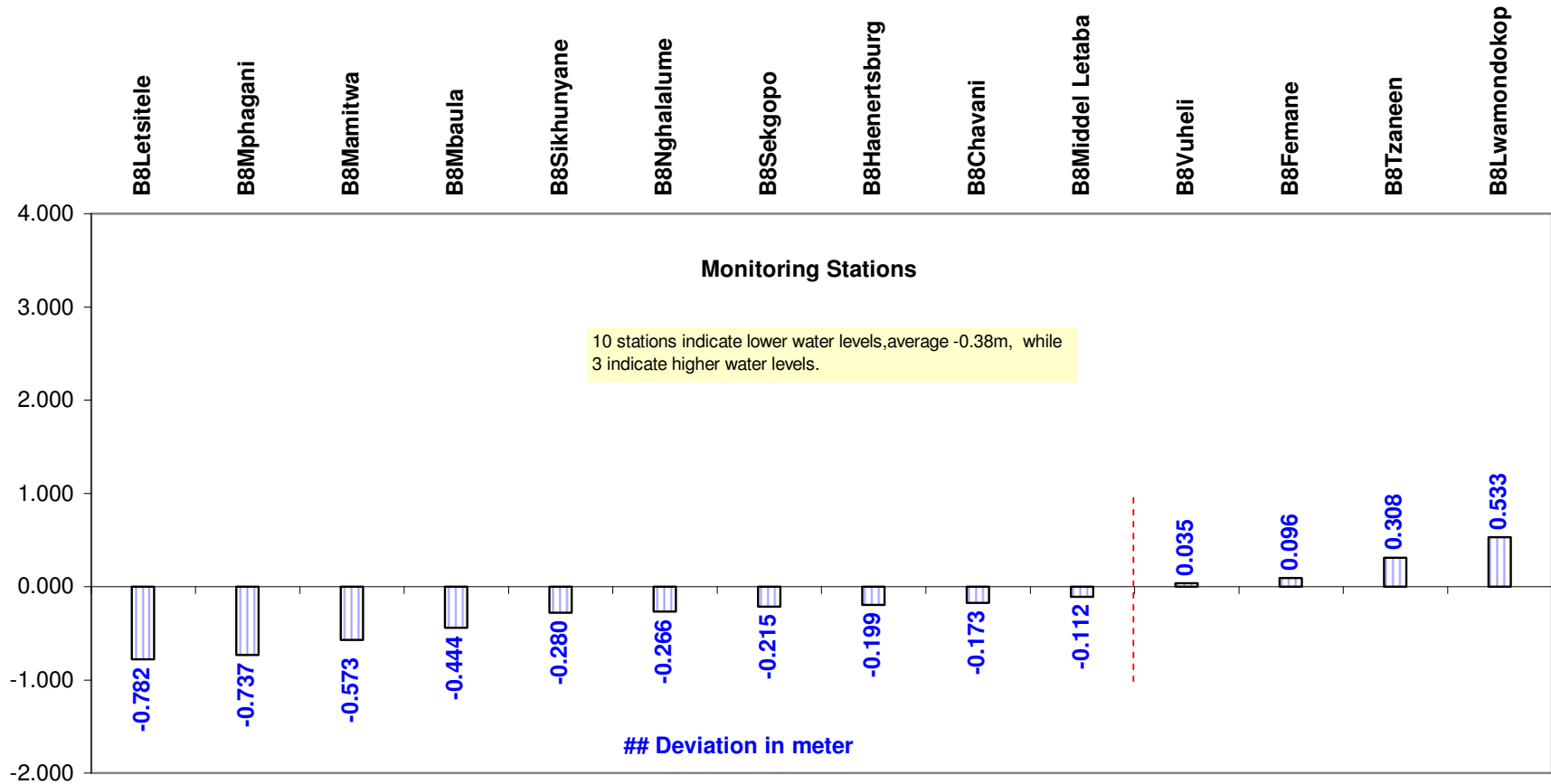
**GRAPH 26**

**Comparison of water level trends at some stations in B8 drainage:  
1 August 2009 to 1 August 2010**



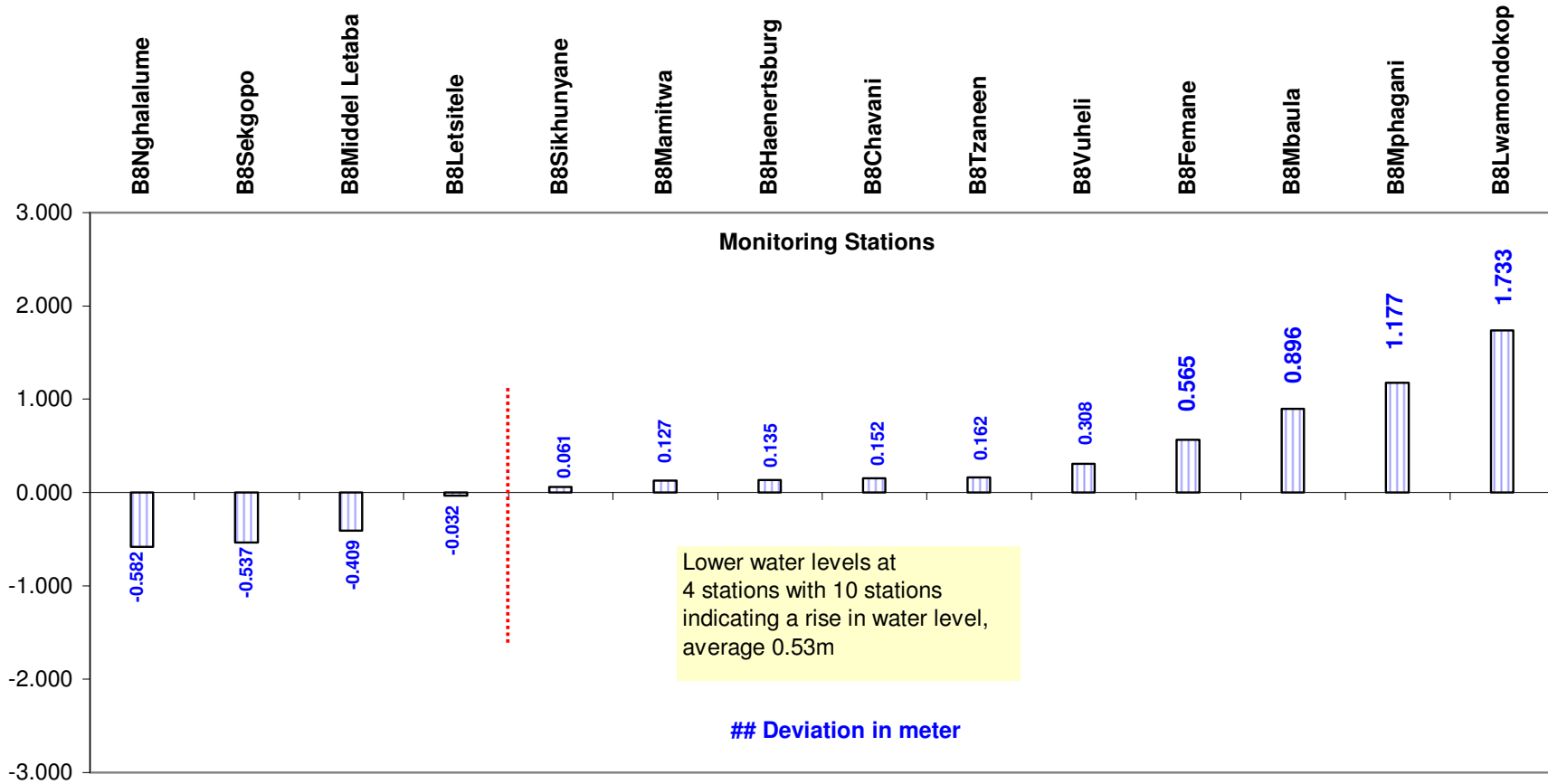
**GRAPH 27**

**B8 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



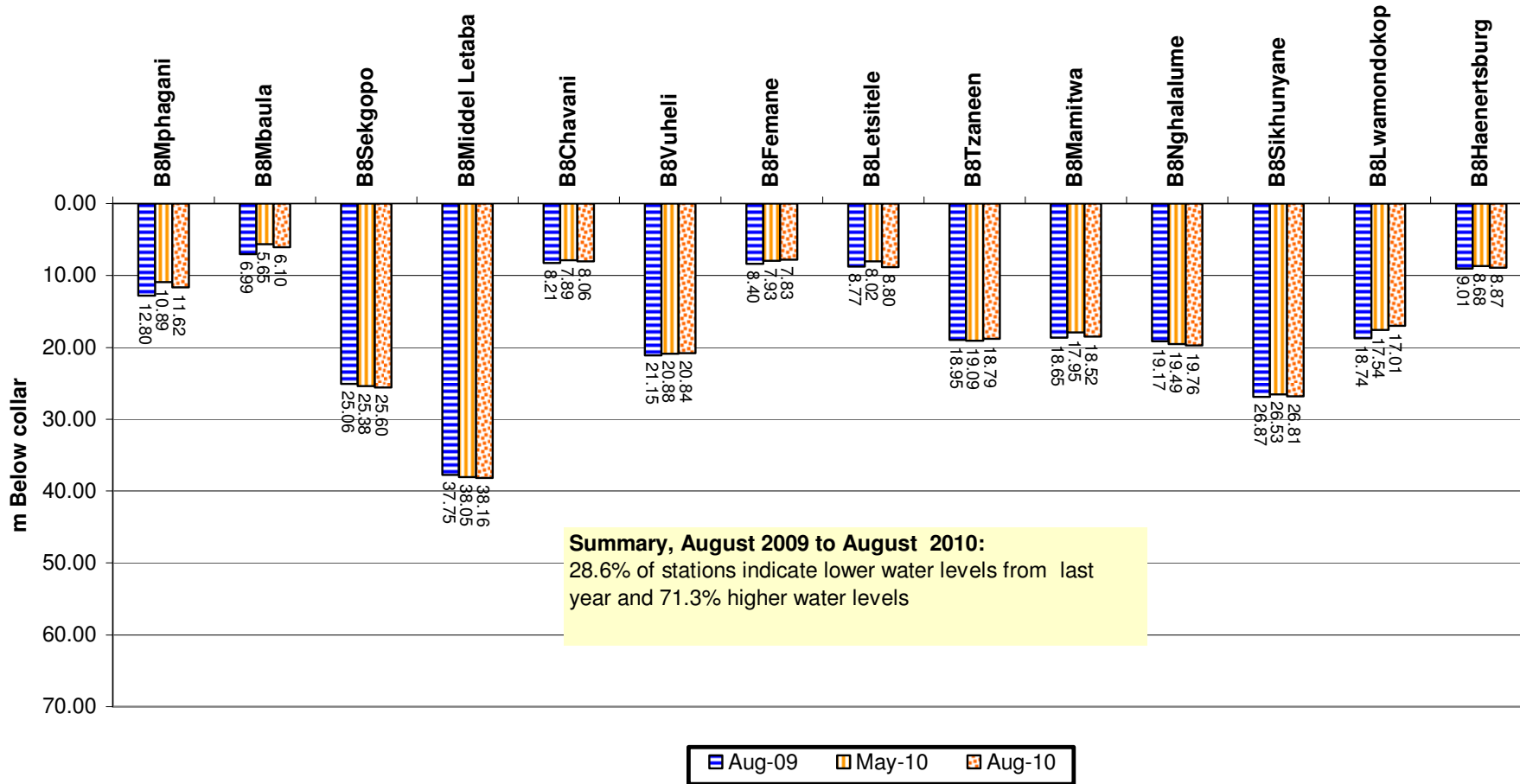
**GRAPH 28**

**B8 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



**GRAPH 29**

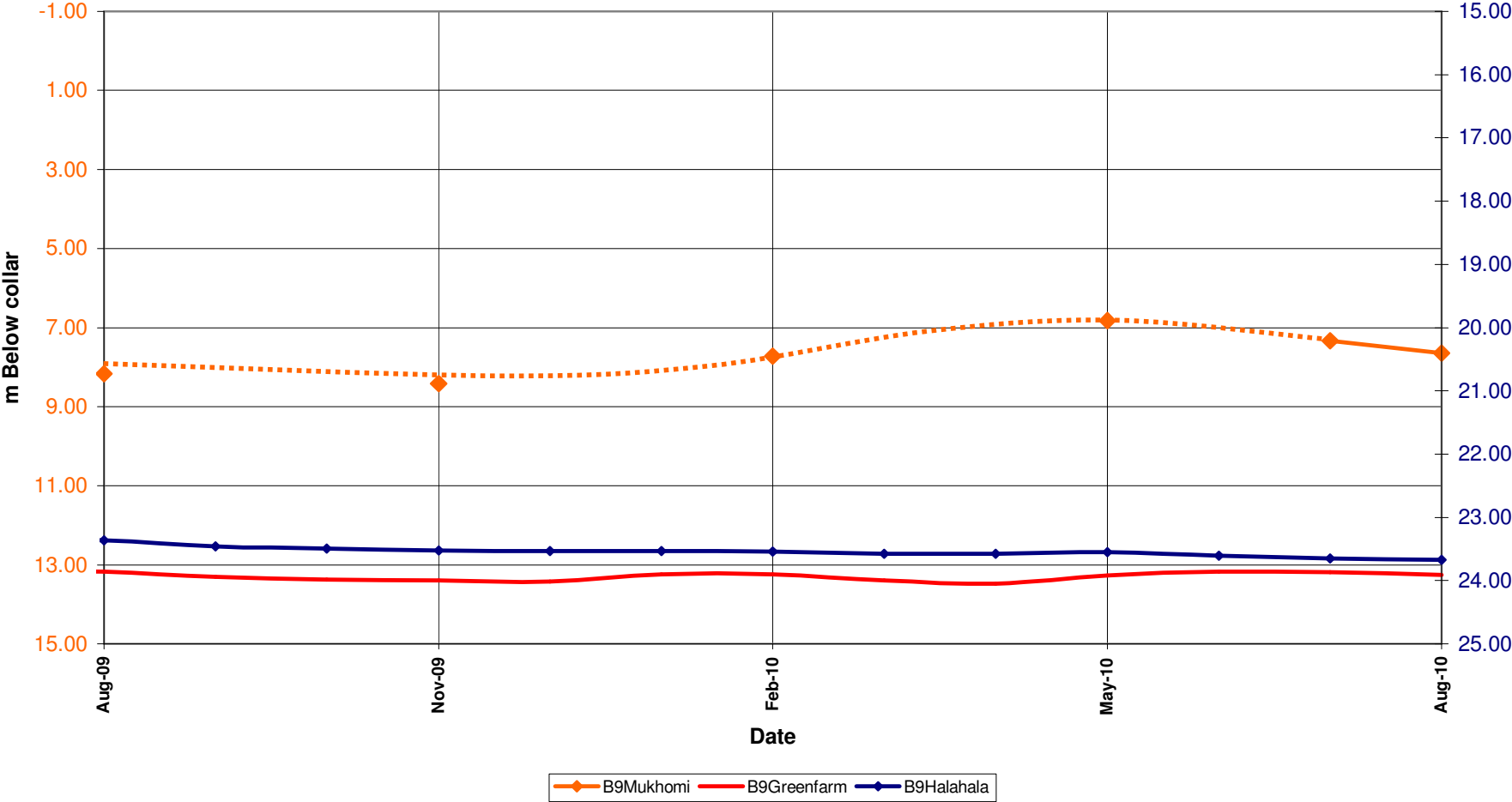
**B8 DRAINAGE AREA**  
**Comparison between water level depths: 1 August 2009,**  
**1 May 2010 and 1 August 2010**  
**Monitoring Stations**



Aug-09    May-10    Aug-10

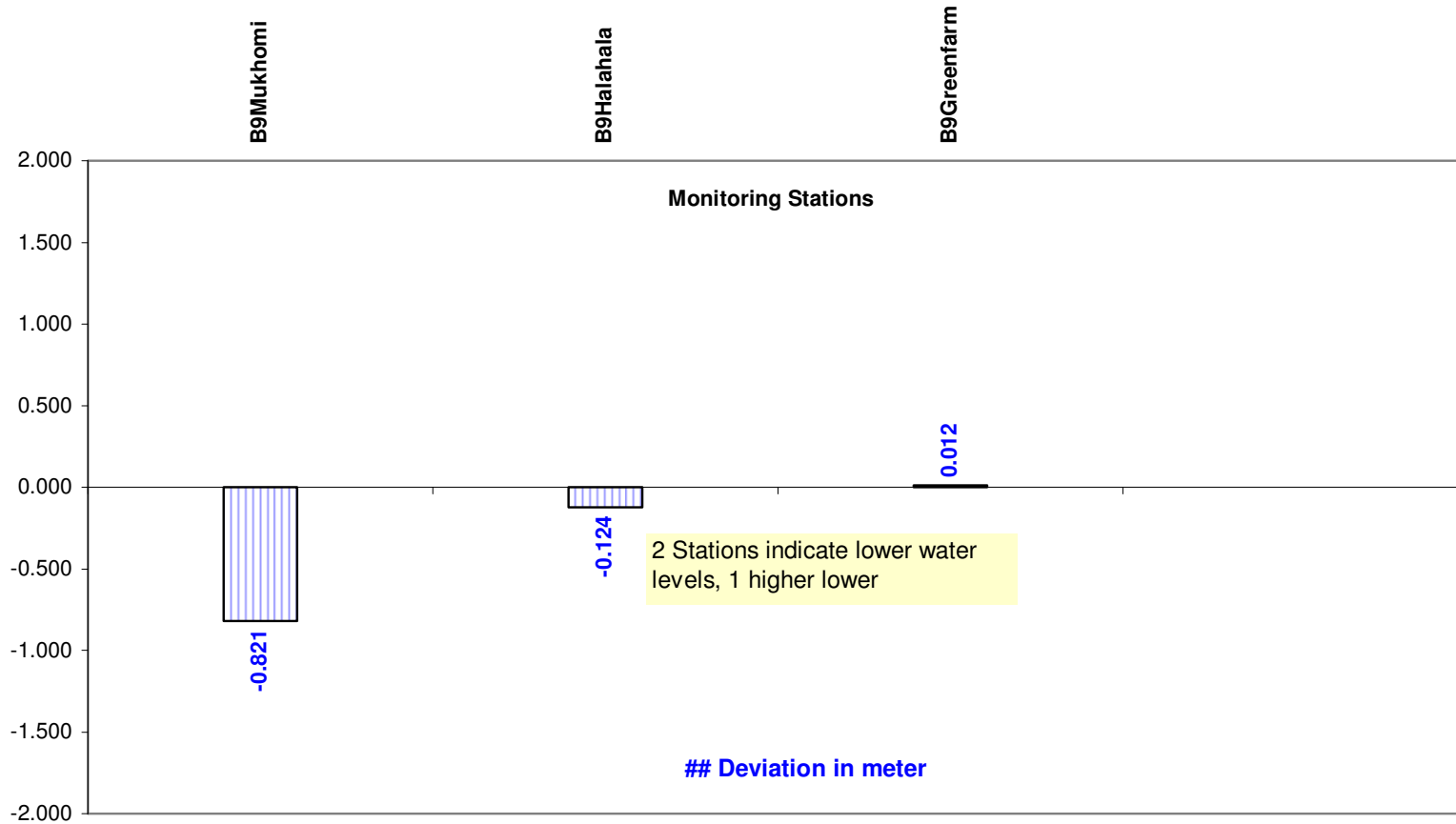
**GRAPH 30**

**Comparison of water level trends of stations in B9 drainage:  
1 August 2009 to 1 August 2010**



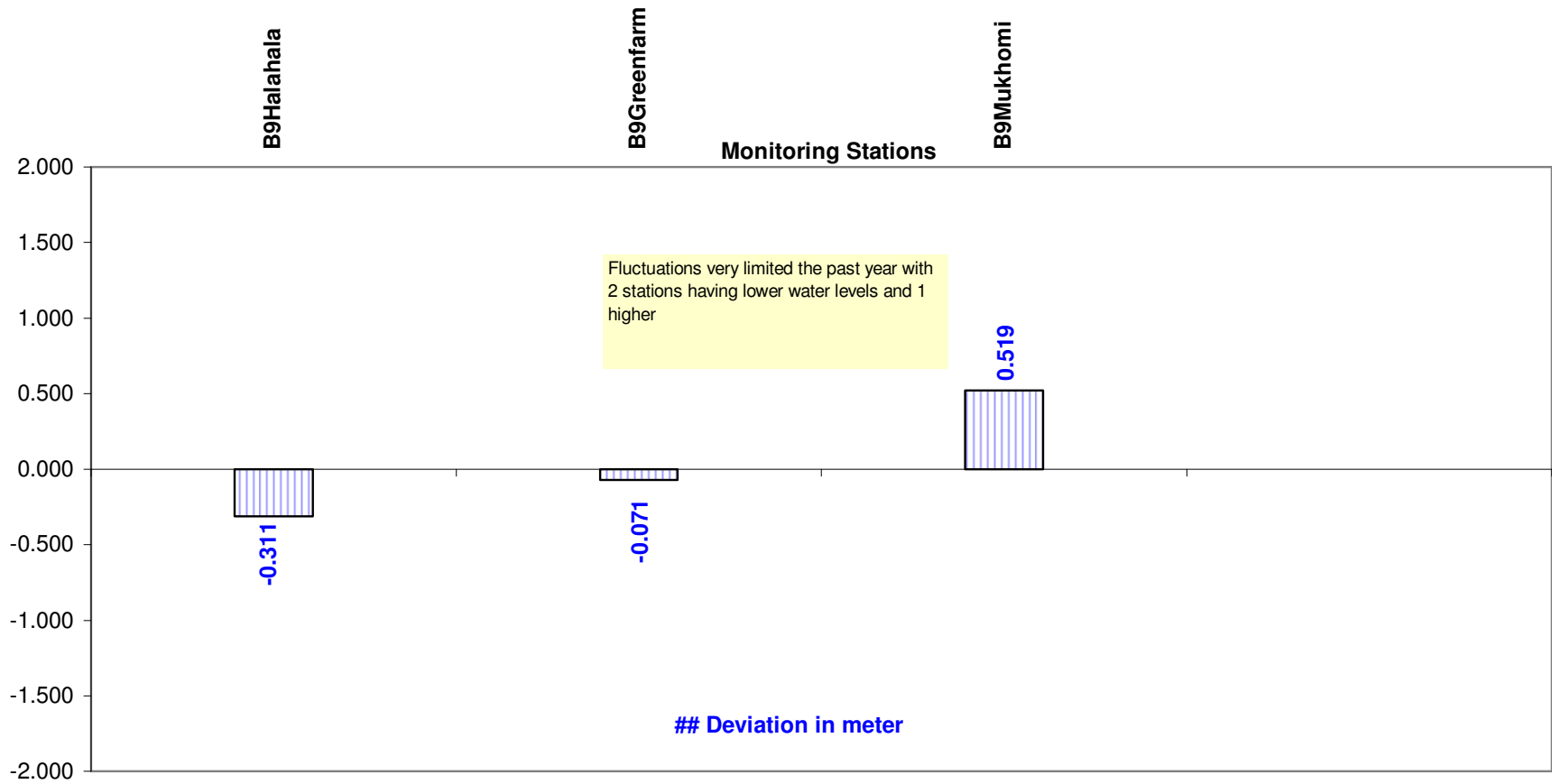
**GRAPH 31**

**B9 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



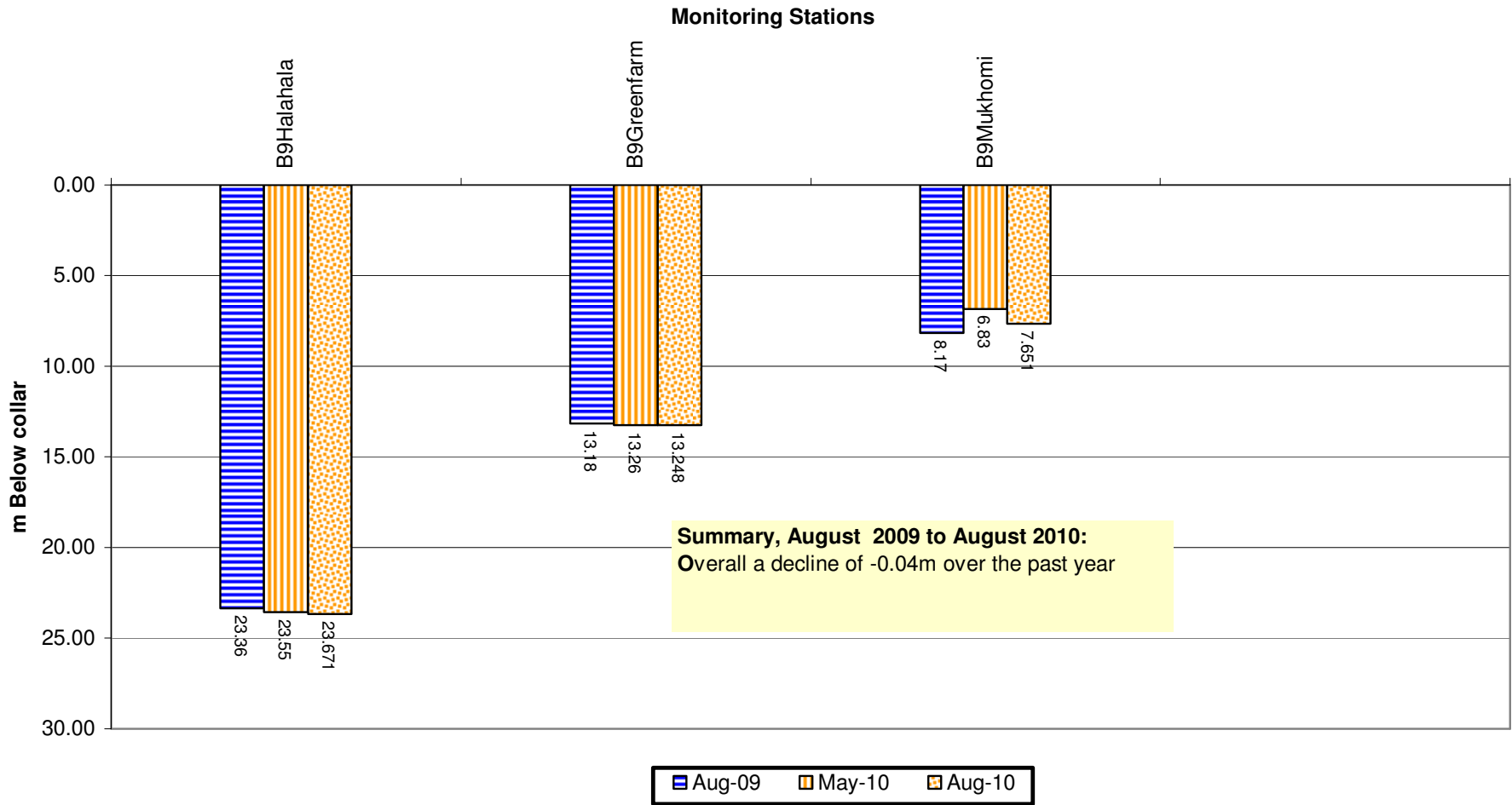
**GRAPH 32**

**B9 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



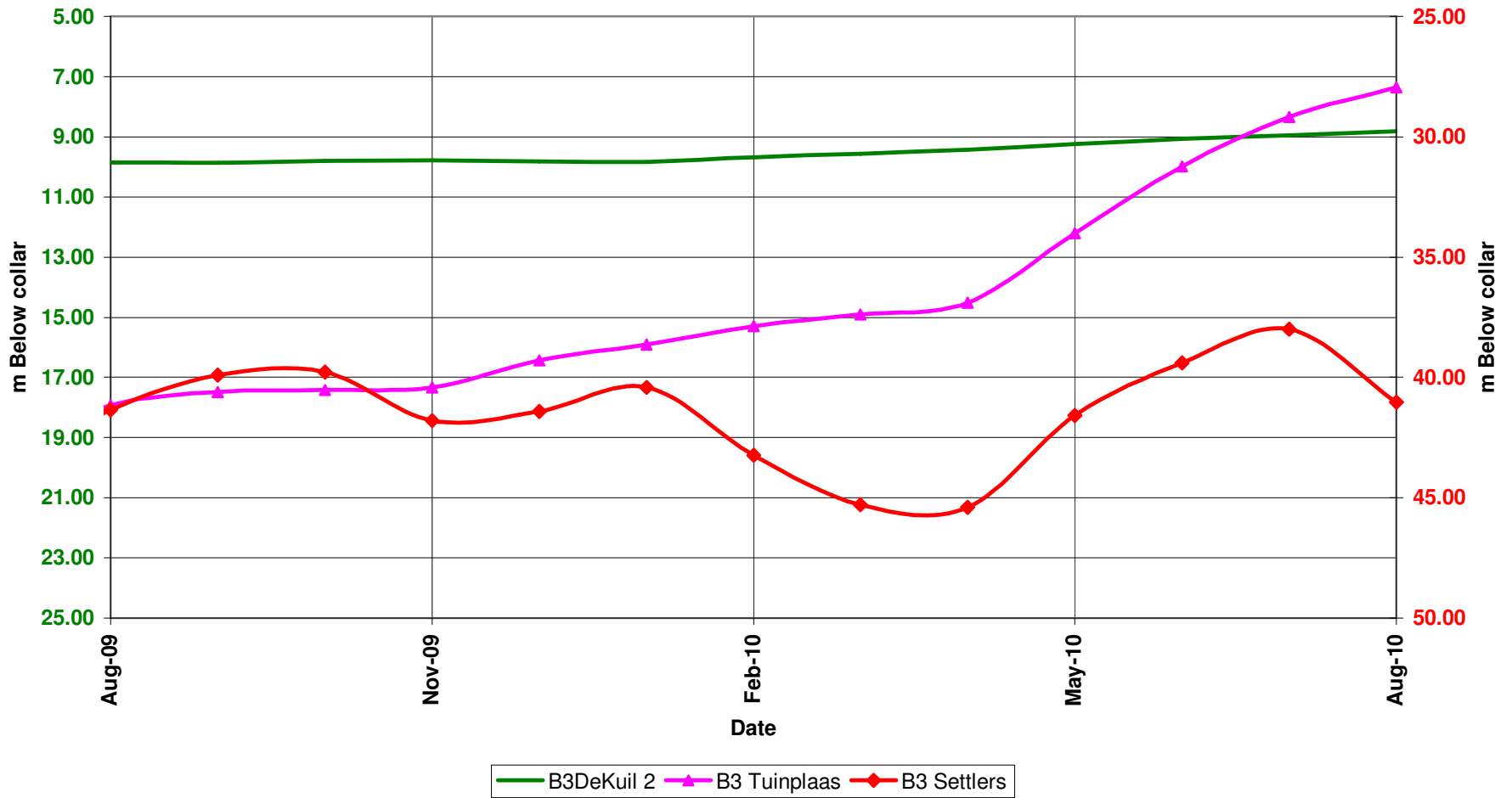
**GRAPH 33**

**B9 DRAINAGE AREA**  
**Comparison between water level depths: 1 August 2009,**  
**1 May 2010 and 1 August 2010**



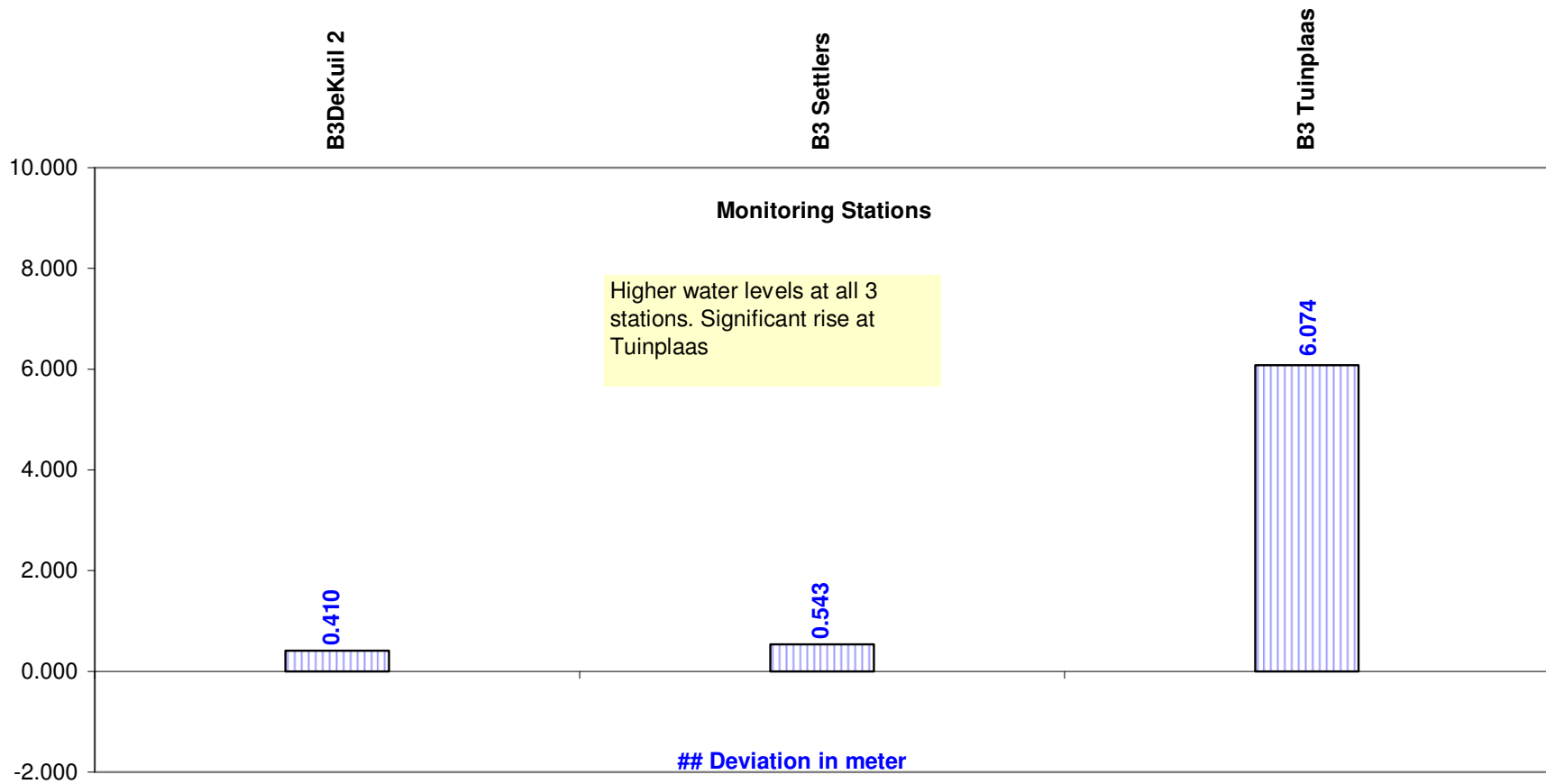
**GRAPH 34**

Comparison of water level trends at stations in B3 drainage:  
1 August 2009 to 1 August 2010



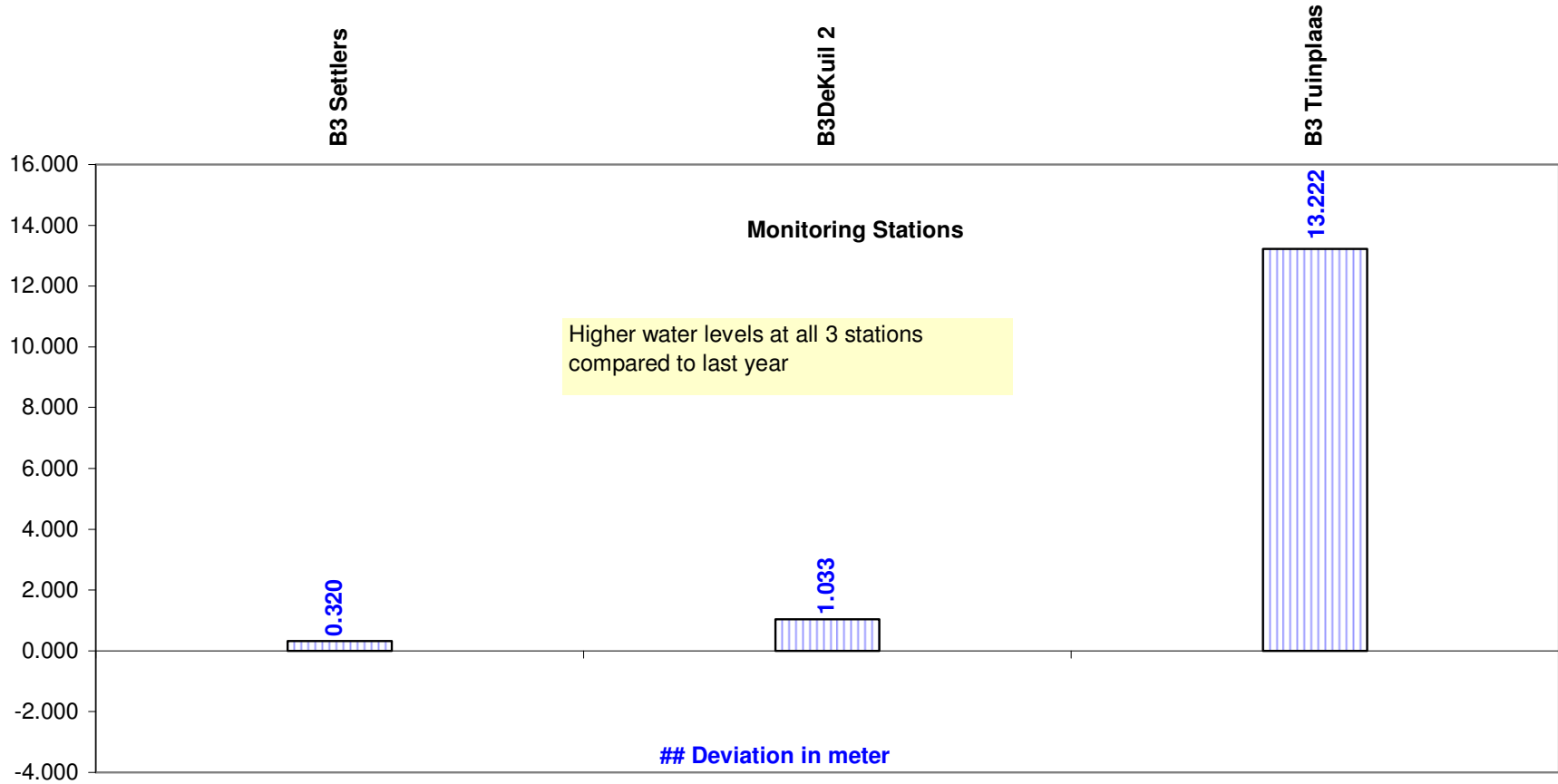
GRAPH 35

**B3 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



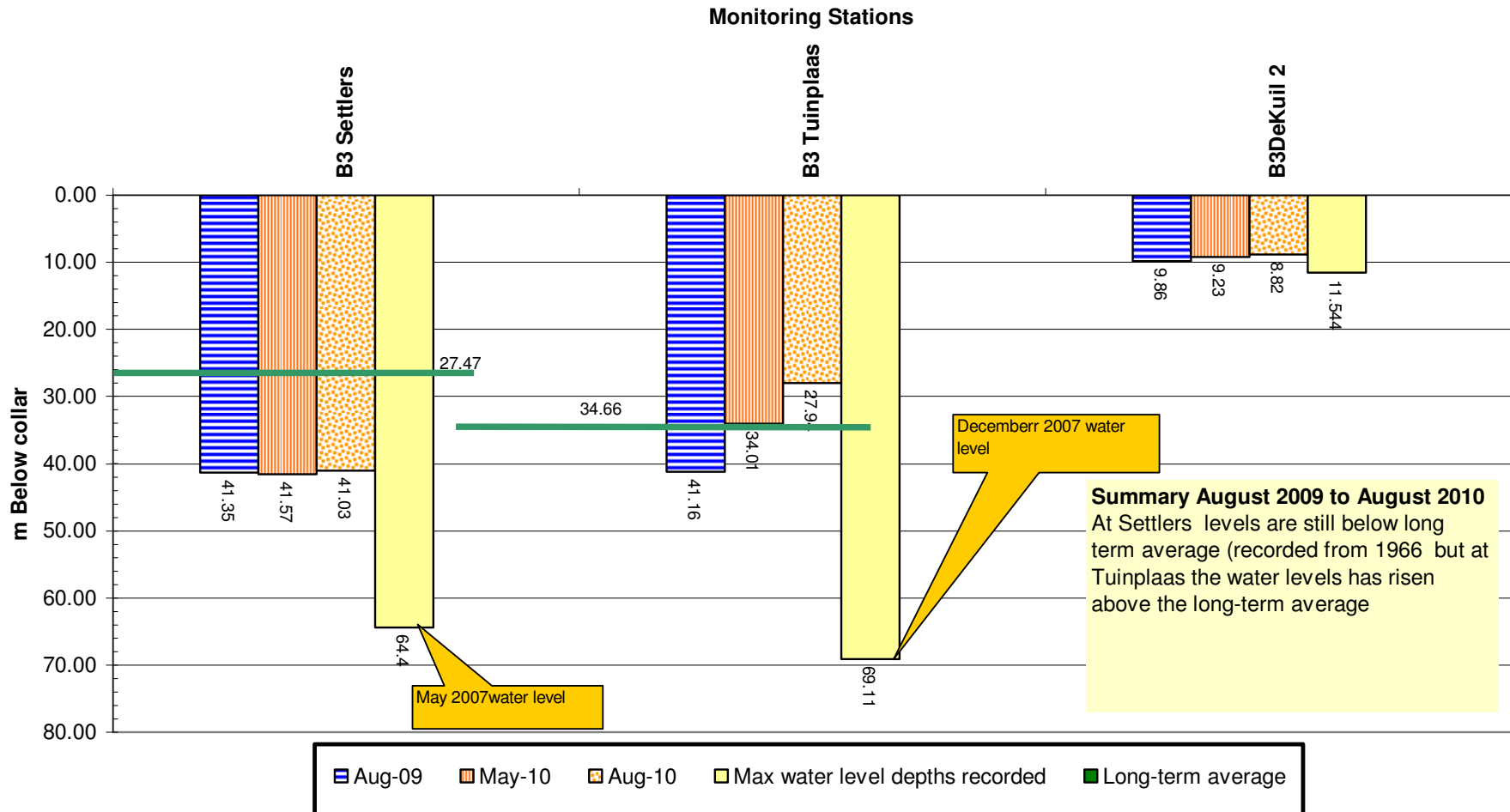
**GRAPH 36**

**B3 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



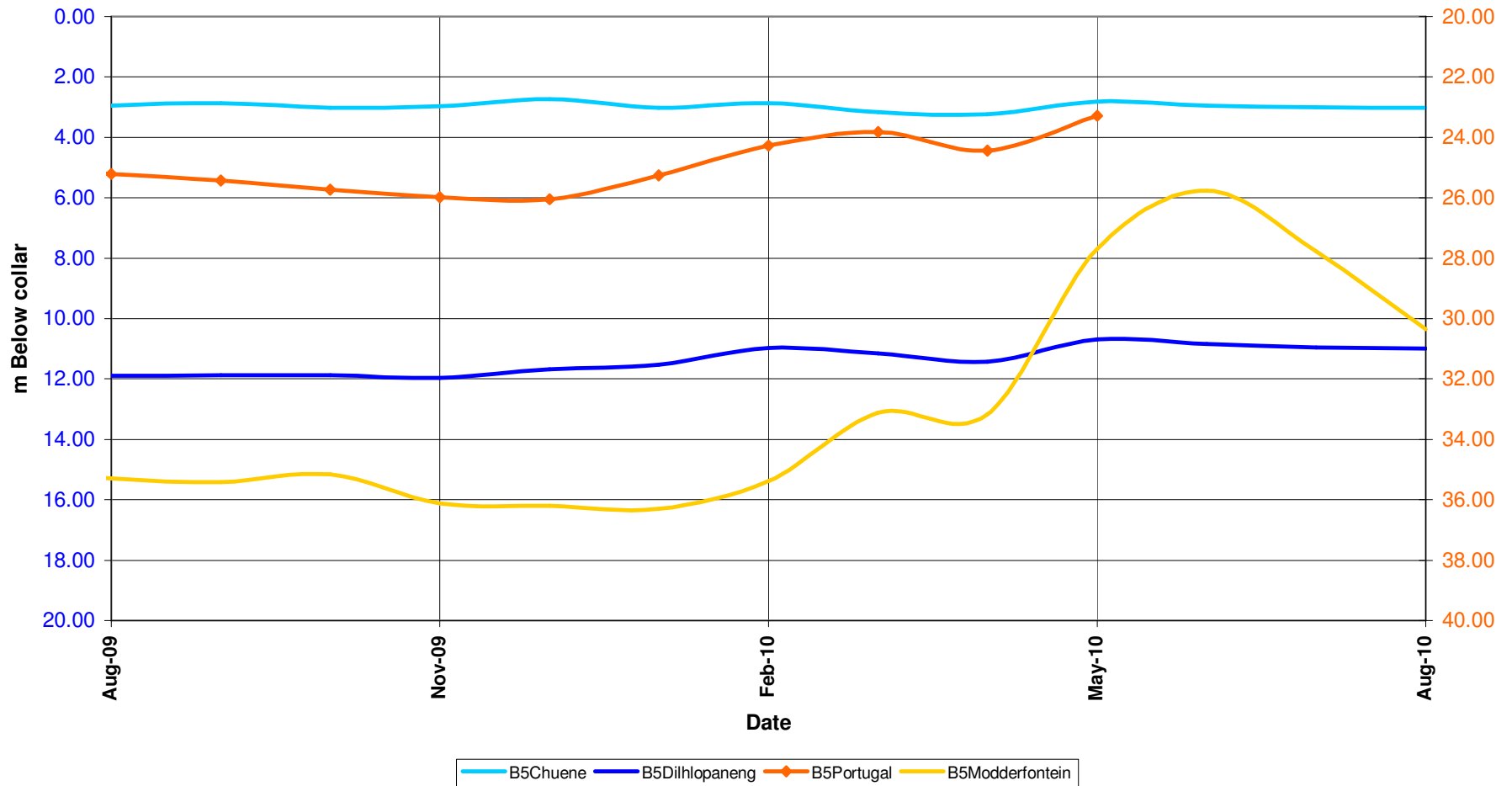
**GRAPH 37**

**B3 DRAINAGE AREA**  
**Comparison between water level depths: 1 August 2009**  
**1 May 2010, 1 August 2010 and maximum depths recorded**



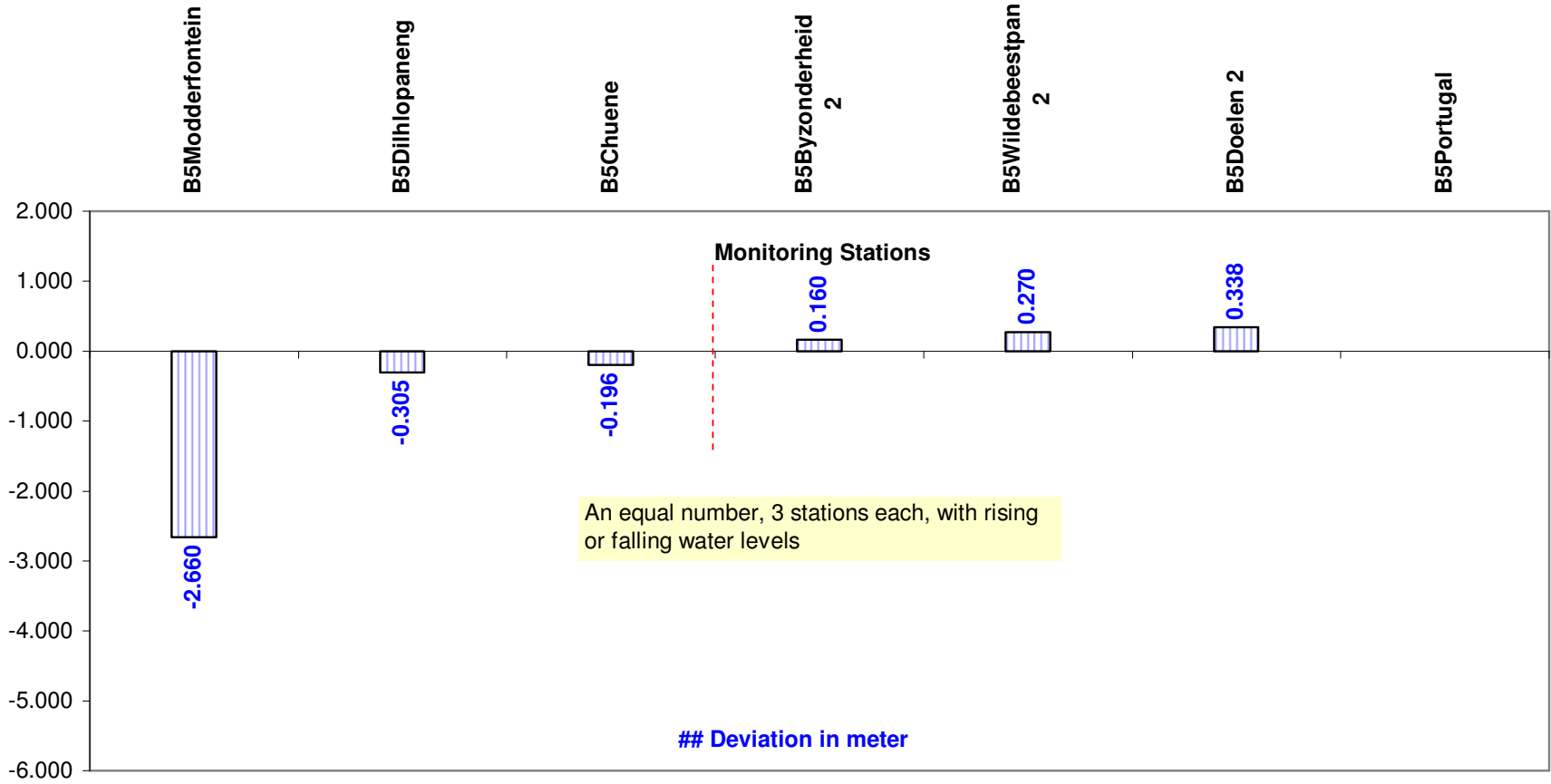
**GRAPH 38**

**Comparison of water level trends at stations in B5 drainage:  
1 August 2009 to 1 August 2010**



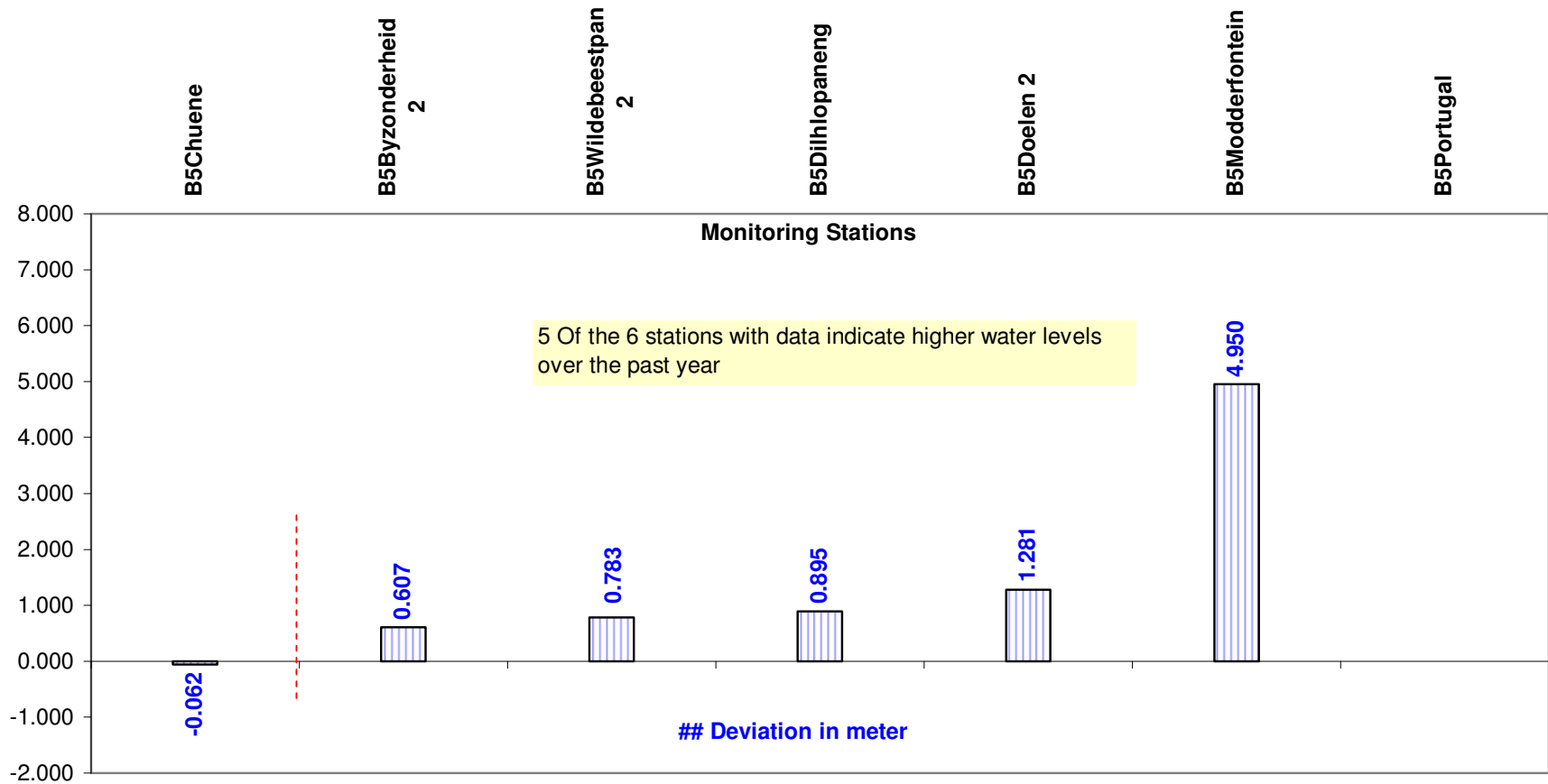
**GRAPH 39**

**B5 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



**GRAPH 40**

**B5 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**

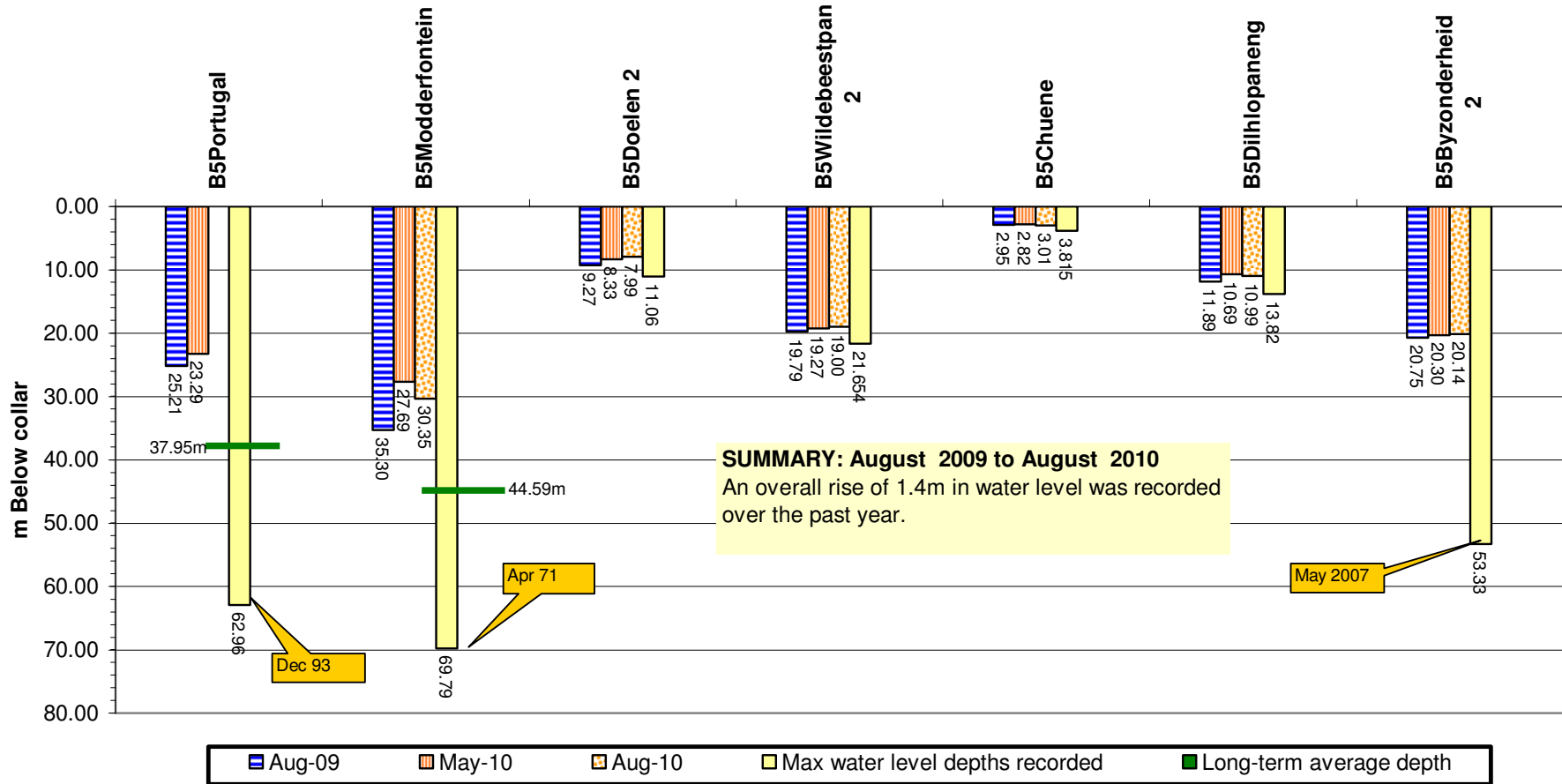


**GRAPH 41**

### B5 DRAINAGE AREA

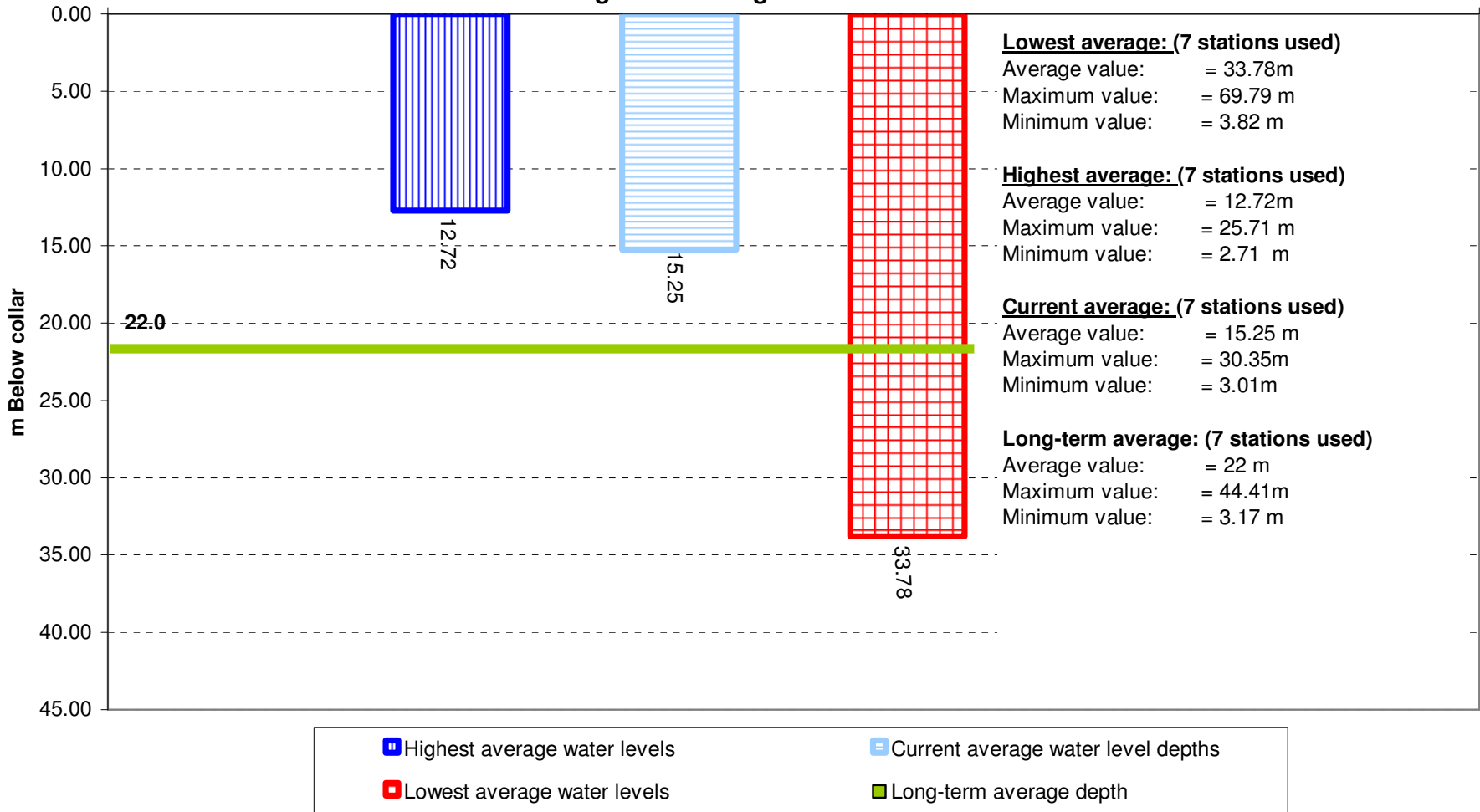
Comparison between water level depths: 1 August 2009,  
1 May 2010, 1 August 2010 and maximum depths recorded

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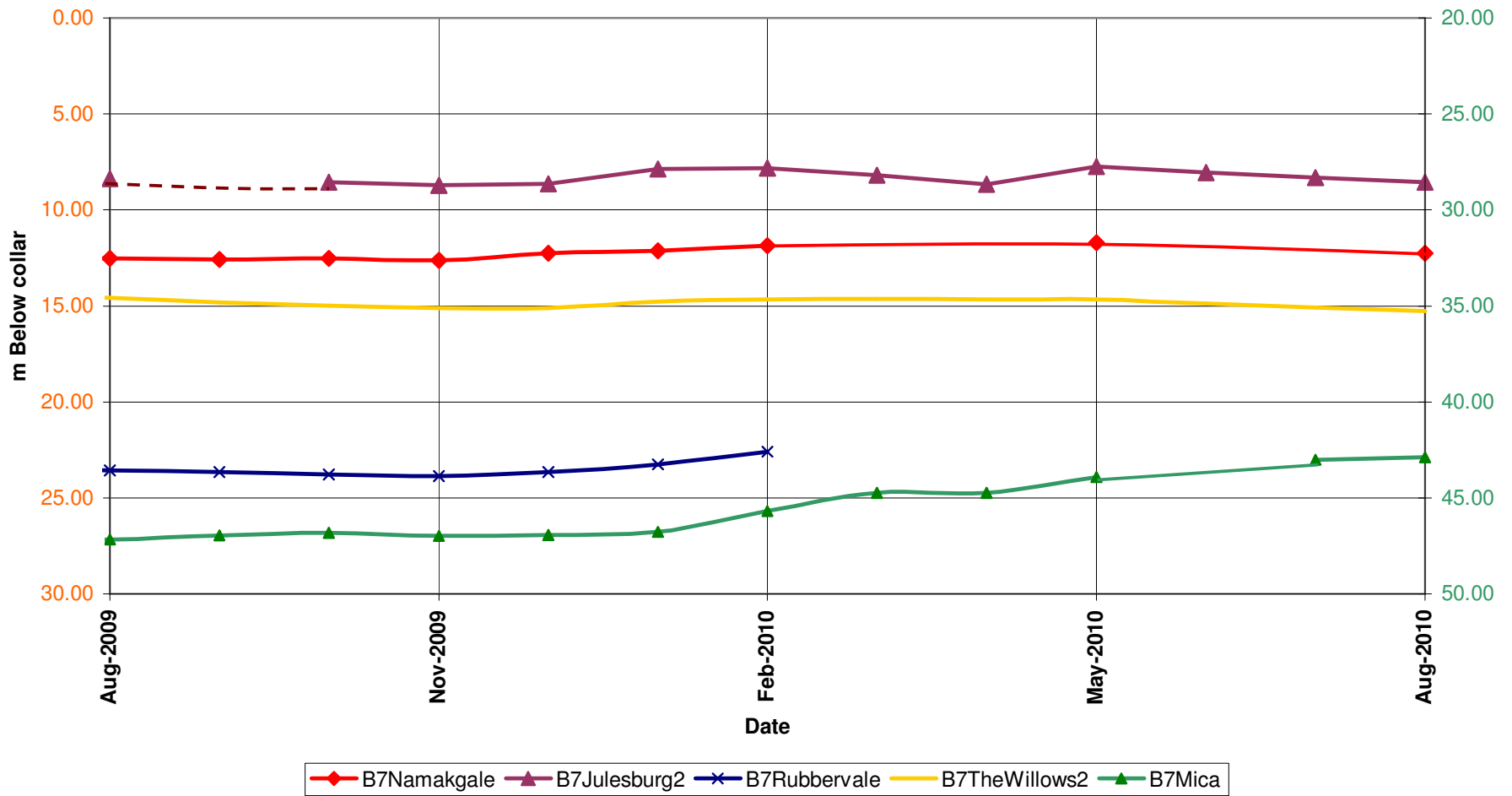
GRAPH 42

**B5 DRAINAGE AREA**  
**Comparison of average current water level with highest,  
lowest & long-term average water levels recorded**



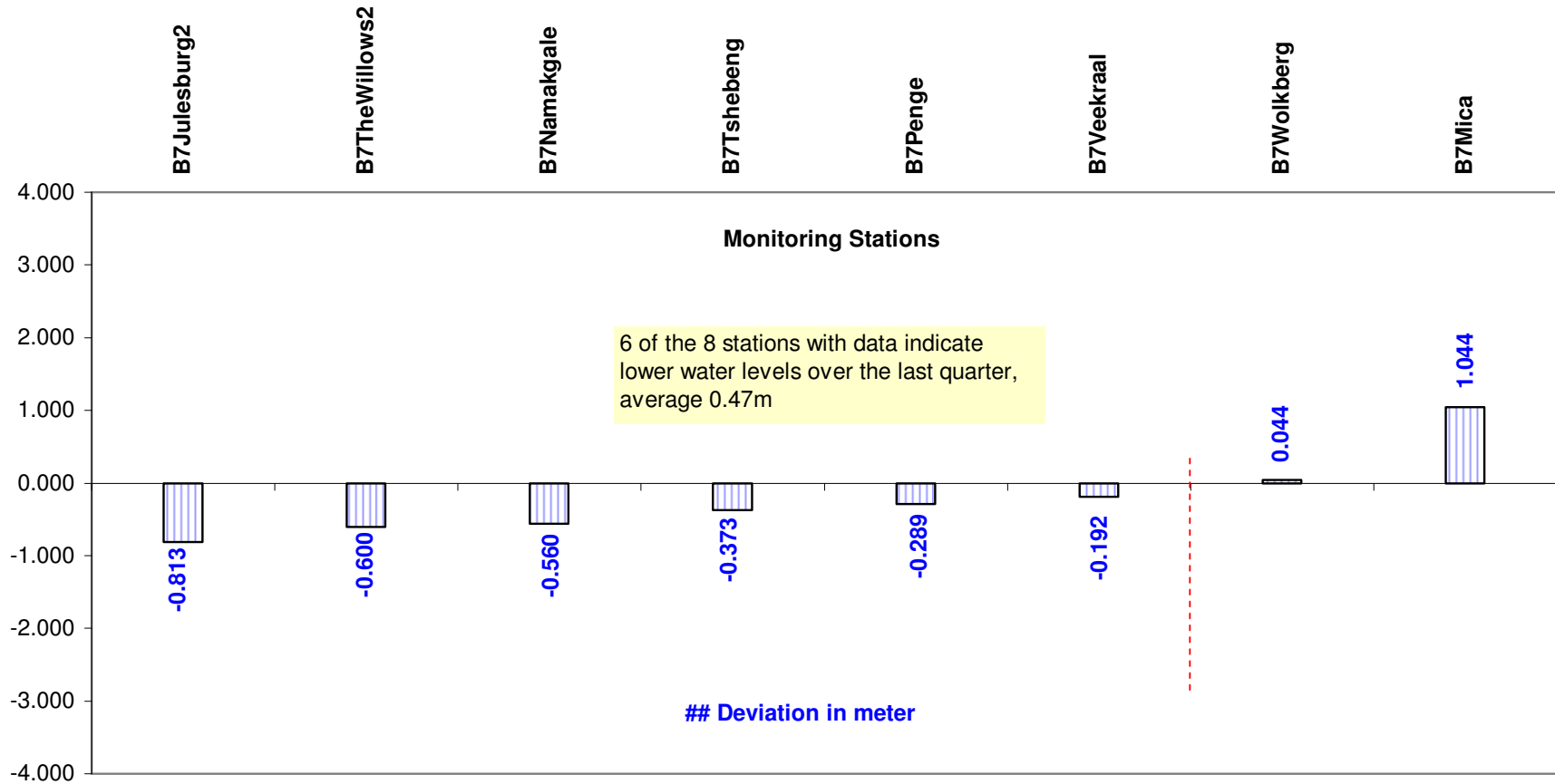
**GRAPH 43**

Water level trend of some stations in B7 drainage:  
1 August 2009 to 1 August 2010



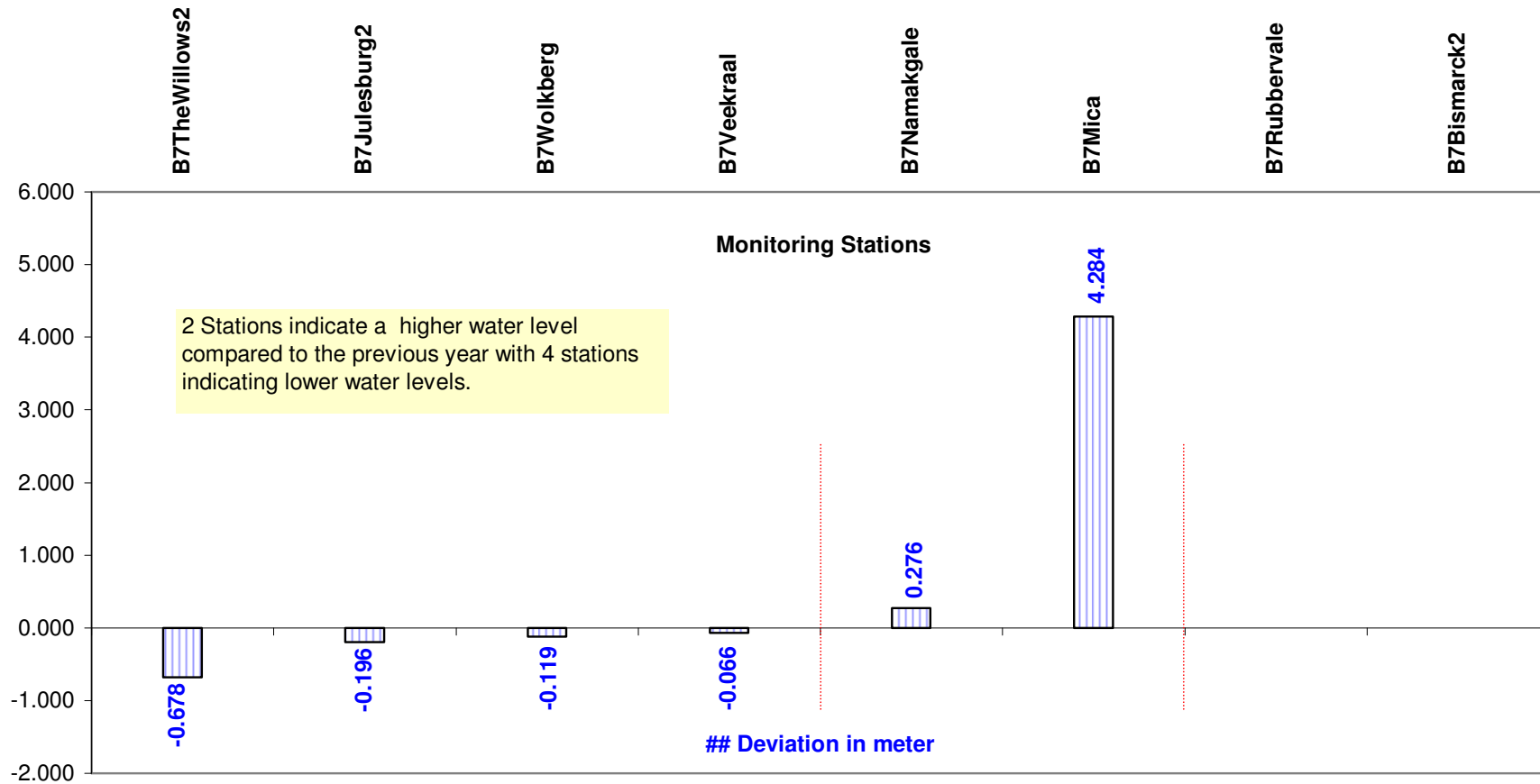
GRAPH 44

**B7 DRAINAGE AREA**  
**Deviation of water levels: 1 May 2010 to 1 August 2010**



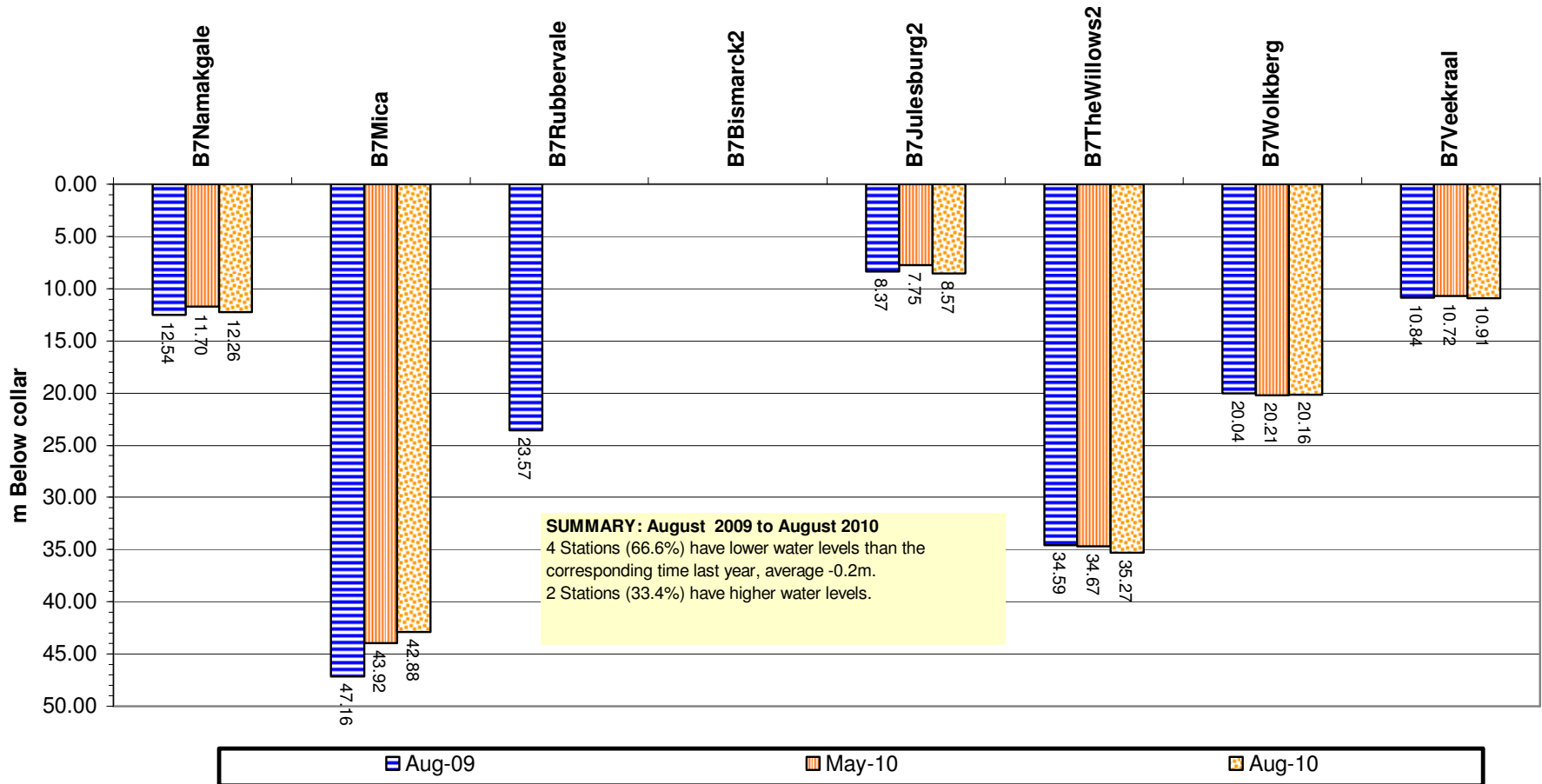
**GRAPH 45**

**B7 DRAINAGE AREA**  
**Deviation of water levels: 1 August 2009 to 1 August 2010**



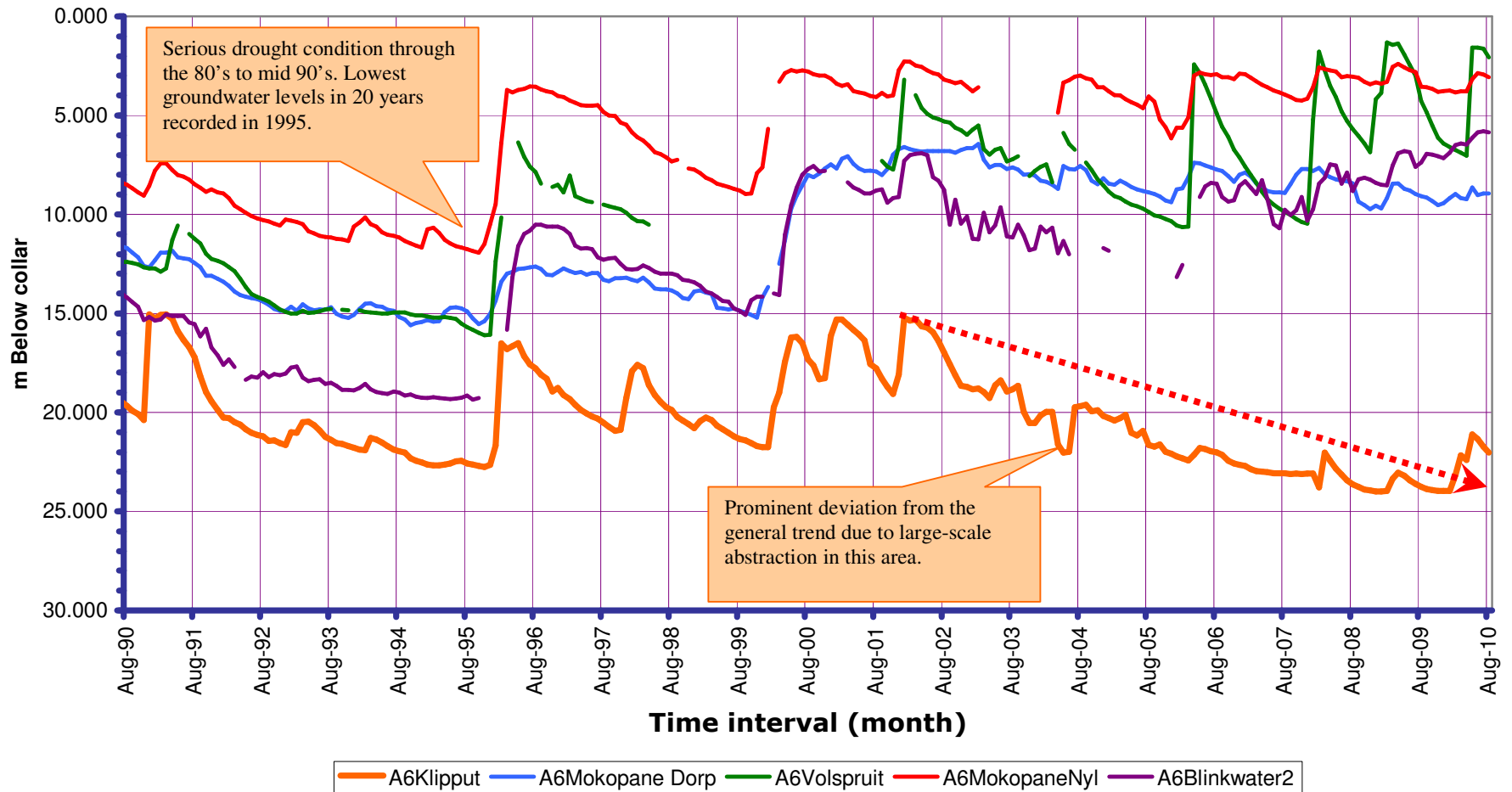
**GRAPH 46**

**B7 DRAINAGE AREA**  
**Comparison between water levels: 1 August 2009,**  
**1 May 2010 and 1 August 2010**  
**Monitoring Stations**



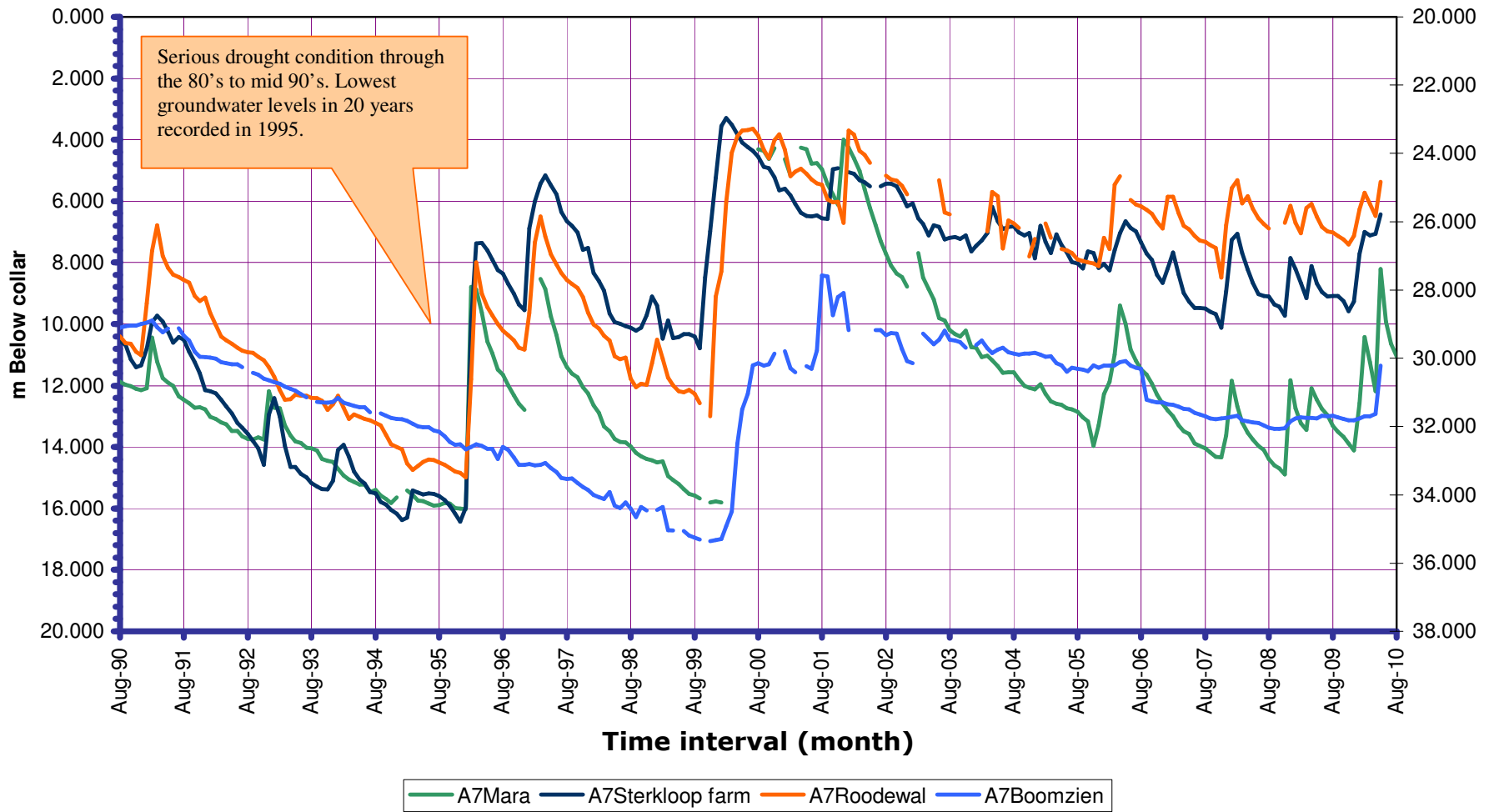
**GRAPH 47**

### 20 Year groundwater level trends at some stations in the A6 drainage



GRAPH 48

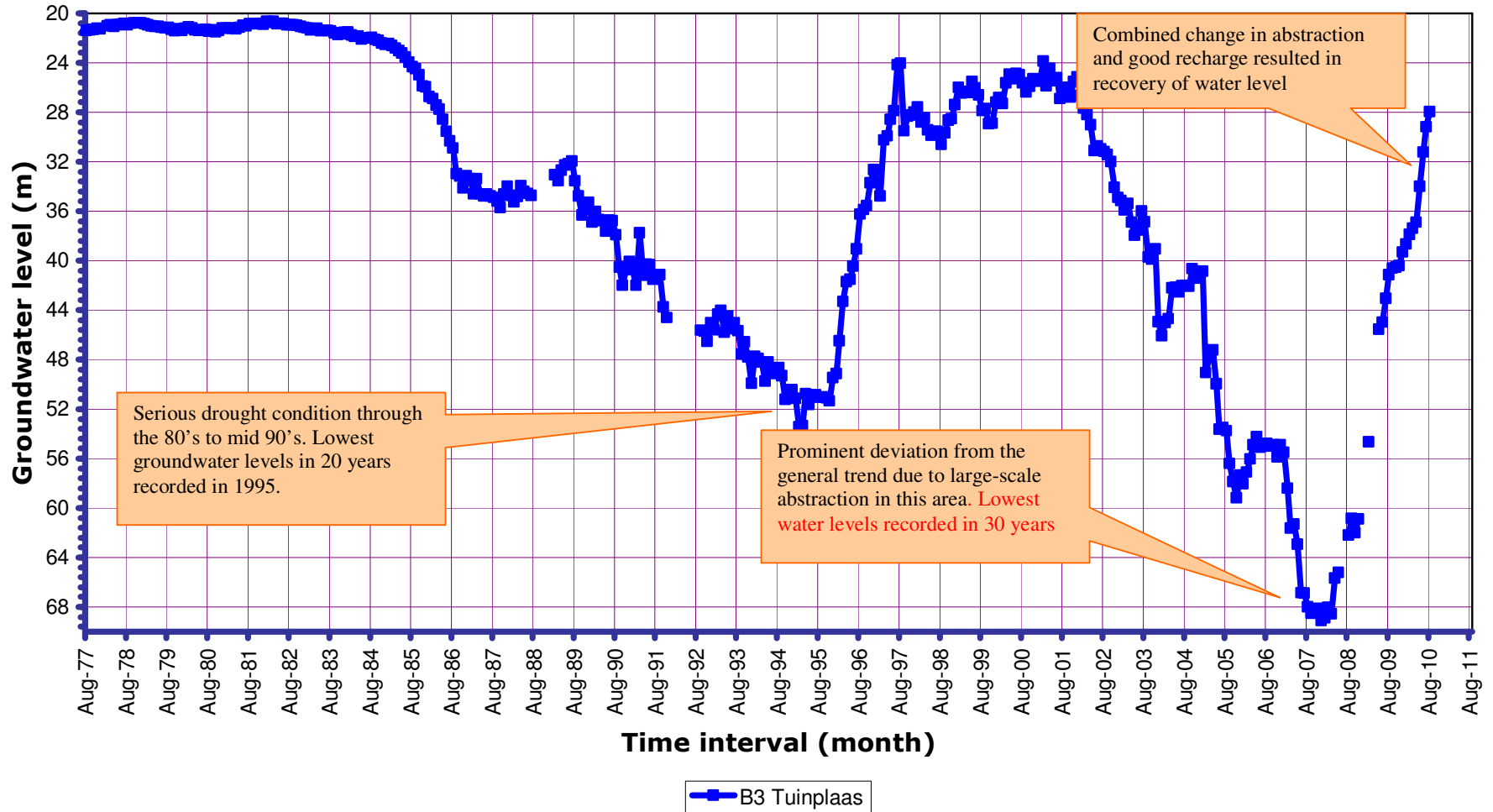
## 20 Year groundwater level trends at some stations in the A7 drainage



GRAPH 49

## B3 DRAINAGE

### Groundwater level time serie of station B3N012 (Tuinplaas)



GRAPH 50