

Revised Water Balance

Maintenance (Continuation) of the Crocodile West River System Reconciliation Strategy

SSC Meeting 4

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Presentation Layout

- Previous results – SSC3
- New Information since previous meeting
- Explanation of risk analysis results
- Water balances
- Salinity simulation results at key points in the system
- Summary of Results and Conclusions

Summary of Previous SSC



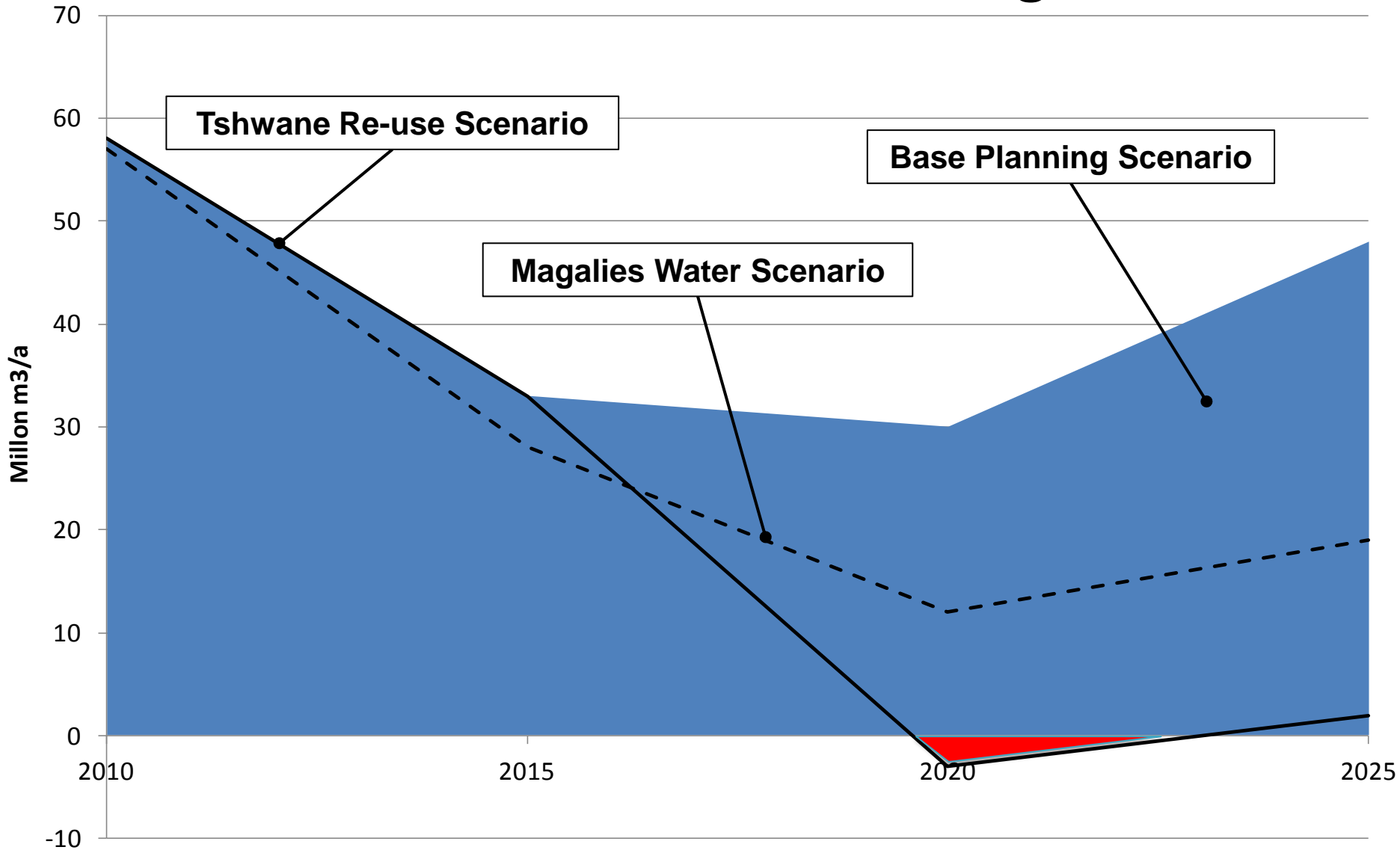
Previous Results (SSC Meeting 3)

- Water balance conducted for 3 scenarios:
 - 2011 Base scenario
 - Magalies Water demand scenario
 - Tshwane re-use scenario

2011 Base Scenario

- Water requirement scenarios
 - High population growth rate used for planning purposes
 - Medium WC/WDM efficiency (15% saving in 5 years)
 - Updated water requirement projections for Rand Water supply area from Vaal Reconciliation Strategy
 - Water requirement projections for other areas updated with recent water supply figures

Water balance: SSC Meeting 3



Conclusions from SSC Meeting 3

- For the 2011 Base Scenario a surplus in the Crocodile River catchment similar to the projected future water transfer to Lephalale
- Tshwane Re-use Scenario and Magalies Water Scenario resulted in surplus being depleted and catchment going into negative balance for some periods
- A technical workshop was held to discuss differences in scenarios and to align planning information

New Information

Summary of Technical Workshop

- Main outcomes of technical workshop:
 - Proposed prioritisation of surplus utilisation:
 - 1: Supply water requirements outside Rand Water supply area
 - 2: Transfer to Lephalale (strategic water use)
 - 3: Re-use within Rand Water supply area to offset supply from Rand Water
 - Revision of Tshwane's Potable Water Augmentation Program.
 - Nokeng Tsa Taemane incorporated into Tshwane Metro
 - Once Tshwane revises water requirements for Nokeng Tsa Taemane, these will be compared to the Base Scenario

New Information Received (1)


- Liaison and information sharing with the *Consolidation of Feasibility studies in the Bojanala Platinum DM Study* - general agreement on major water requirement projections
- Some differences:
 - Madibeng
 - Mining water requirements
- Information still preliminary - to be considered for subsequent SSC

New Information Received (2)

- Magalies Water asked to take over water supply to Moretele
- Magalies Water proposed to supply Moretele from their Klipdrift WTP and a new WTP at Klipvoor Dam
- Magalies Water plan to supply growth in water requirements in Bela-Bela, Modimolle and Mookgophong from a new WTP at Klipvoor Dam
- All above water requirements already included in the 2011 Base Scenario - are basically an abstraction point swap

Planning Scenarios for Lephhalale

- Revised water requirements for Lephhalale area
 1. Base demand Scenario 2012 - includes 3 coal-fired power stations plus two phases of coal to Mpumalanga
 2. High demand Scenario 2012 - includes 4 coal-fired power stations plus four phases of coal to Mpumalanga

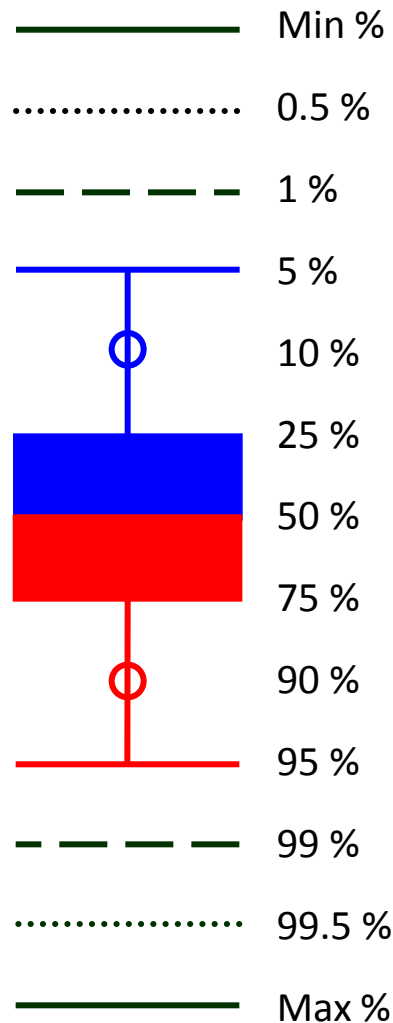


Explanation of Risk Analysis Results

Risk Based Analyses

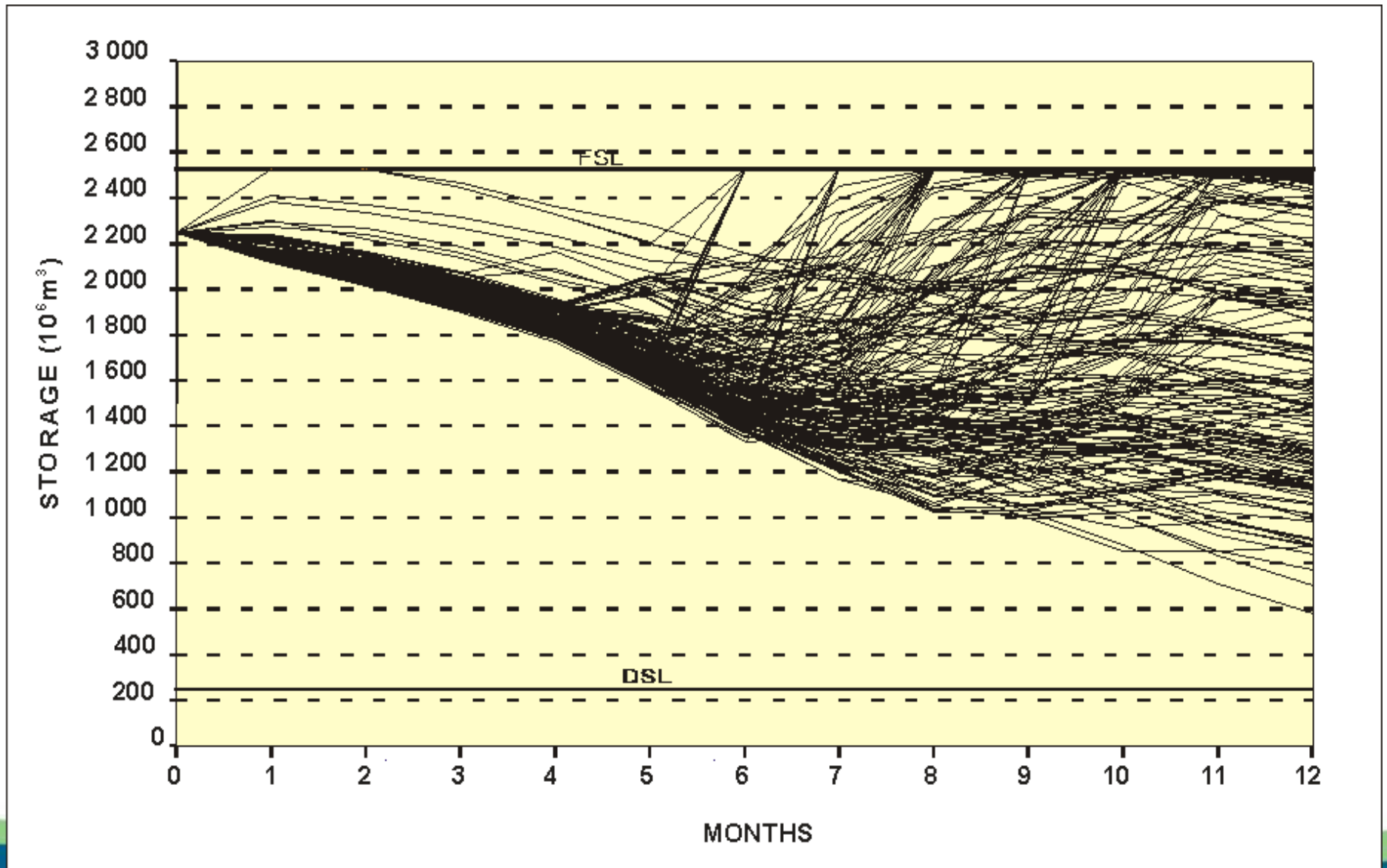
- Analysis conducted using the Water Resources Planning Model (WRPM)
- Surplus in Crocodile River catchment determined for dynamic simulation analysis using projected water use and return flows up to 2040
- Surplus in the catchment determined iteratively by increasing the surplus abstraction while ensuring the risk criteria of all downstream users were not violated

Box-and-whisker plot definitions

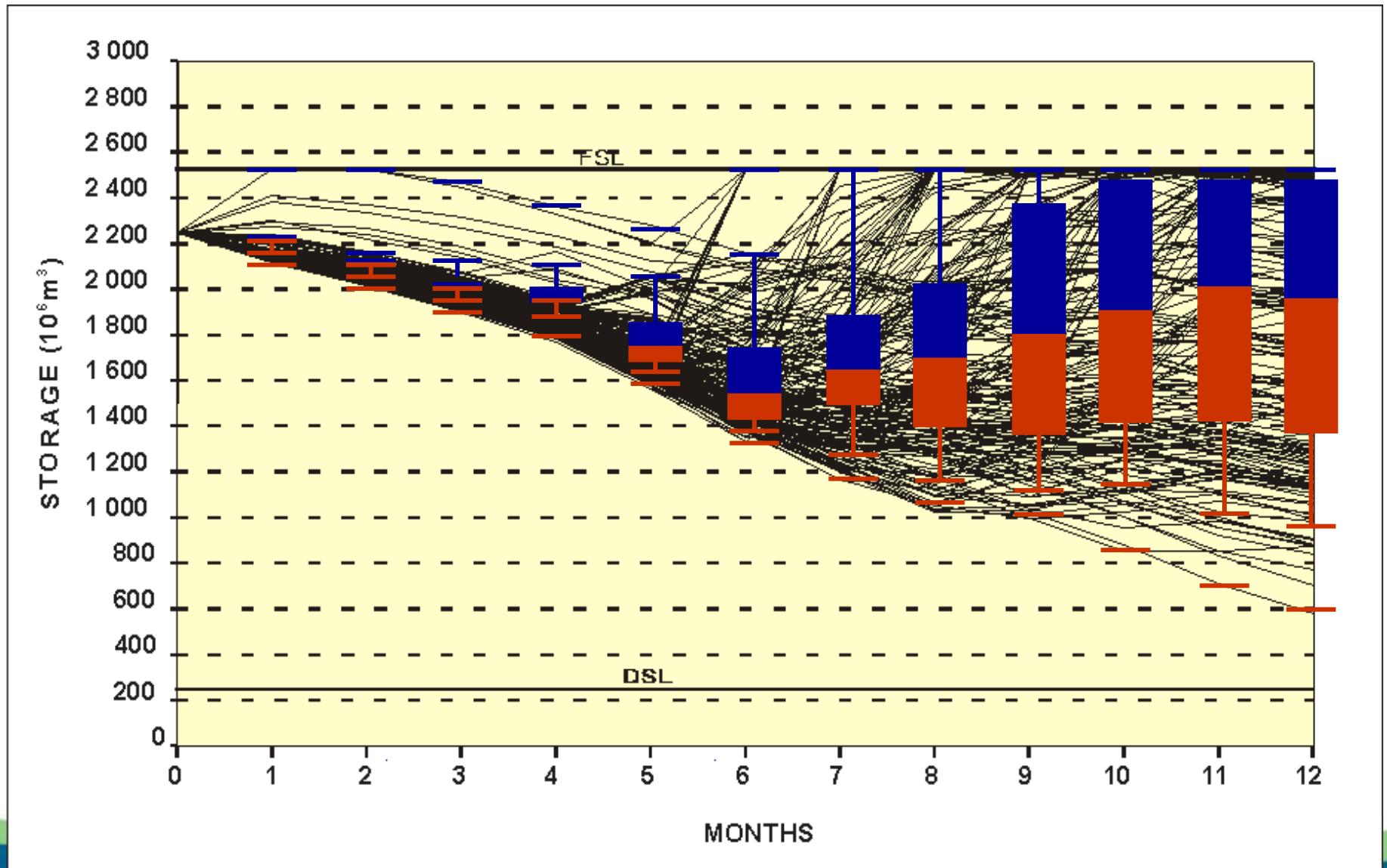


Percentage of sequence results exceeding given value

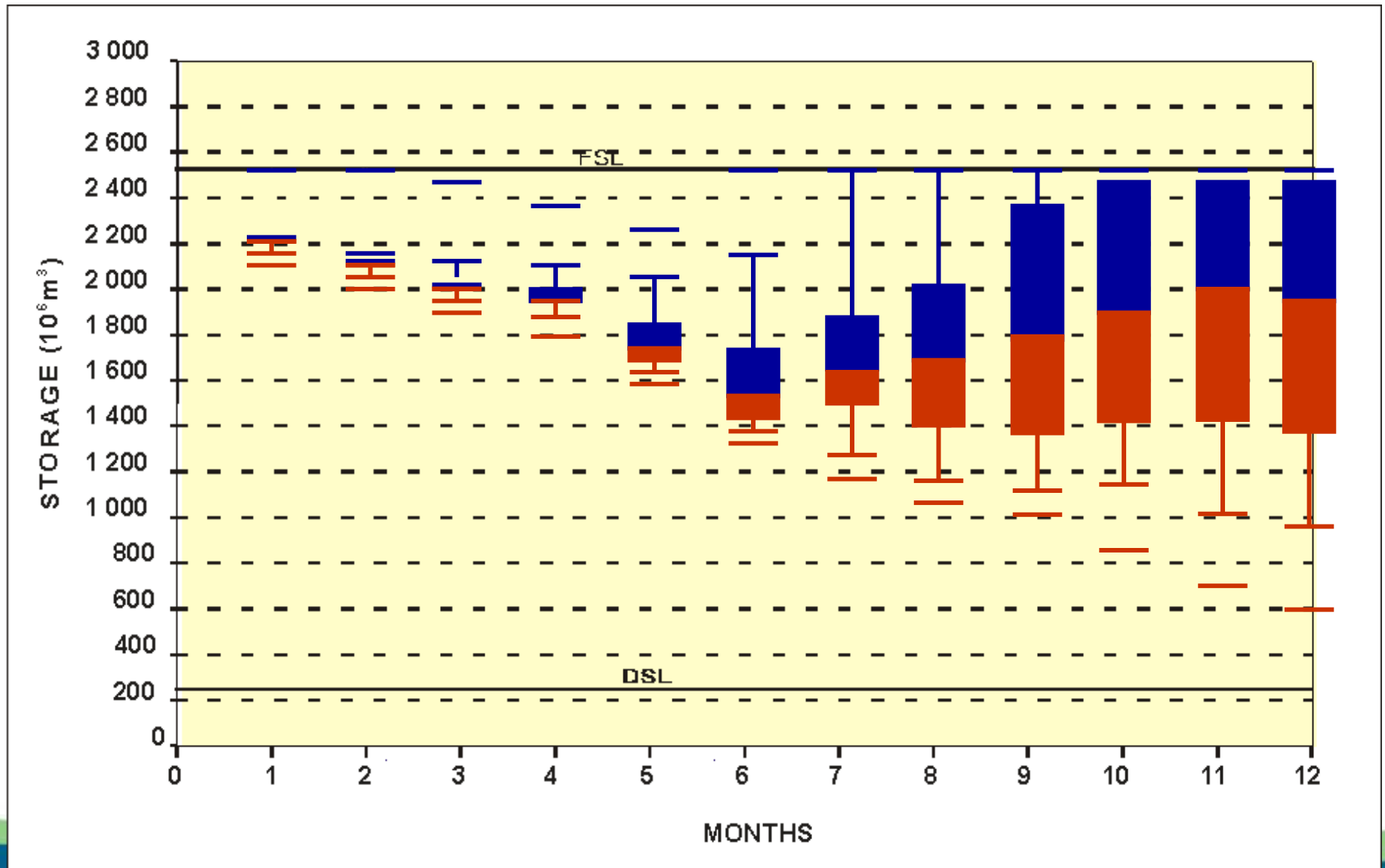
Example: System volume trajectories



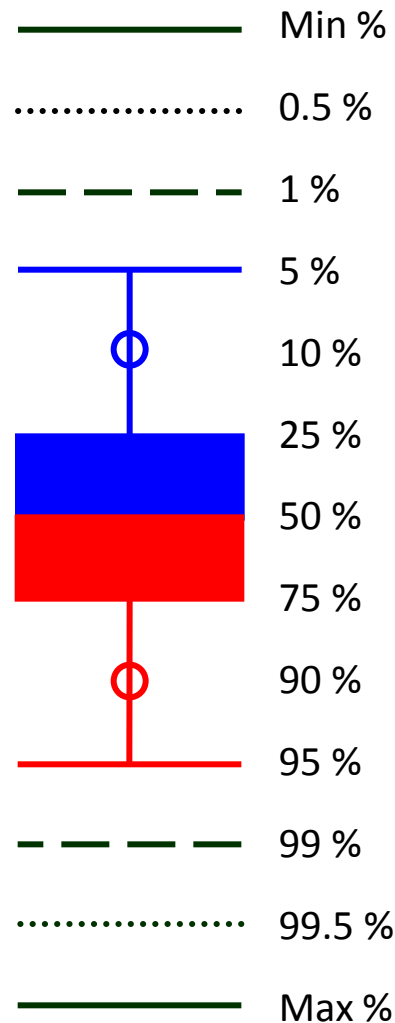
Derive boxplots from simulations



Boxplots (Probability distribution)

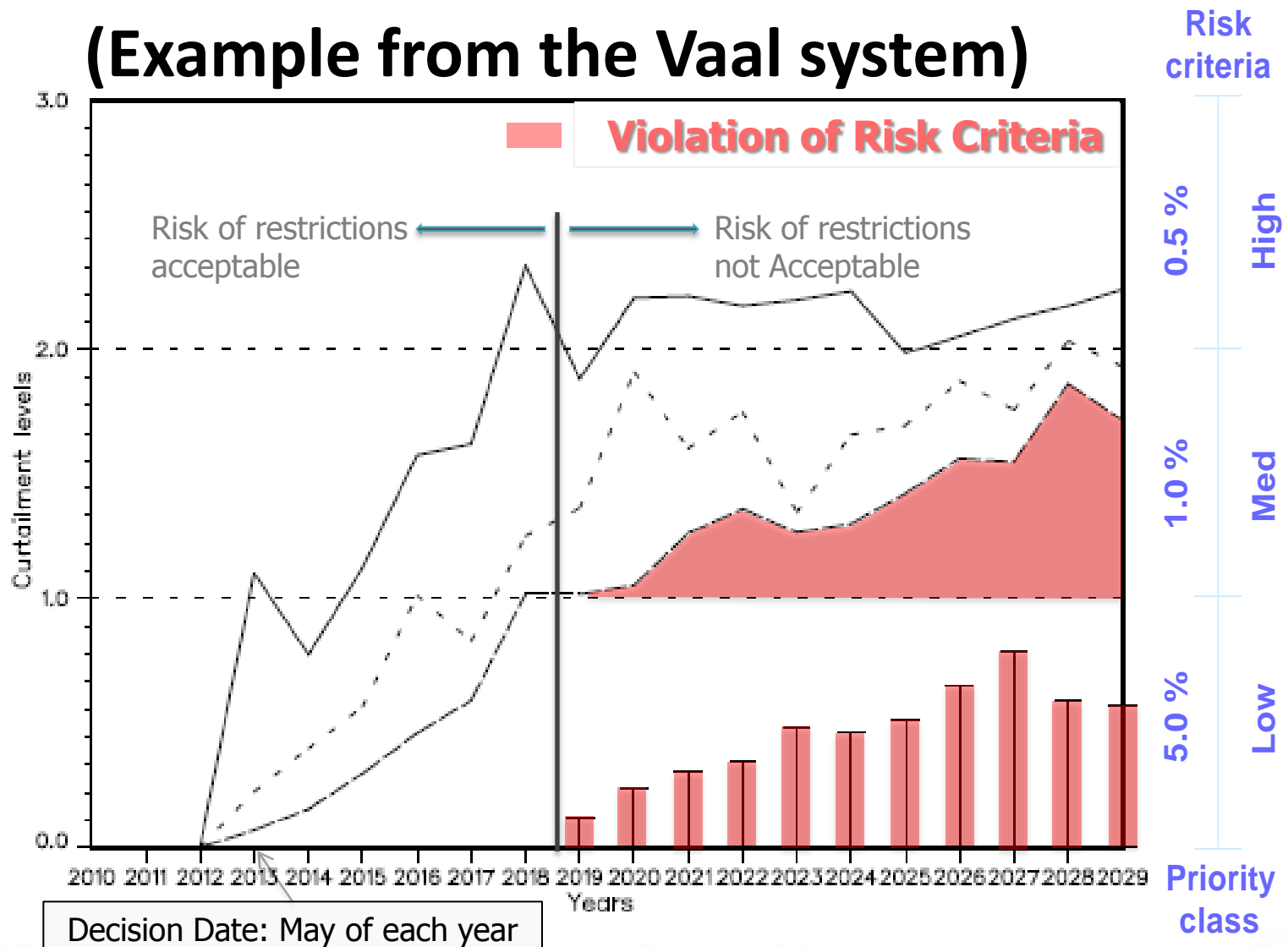


Box-and-whisker plot definitions



Percentage of
sequence results
exceeding given
value

Risk of Drought Restrictions (Example from the Vaal system)

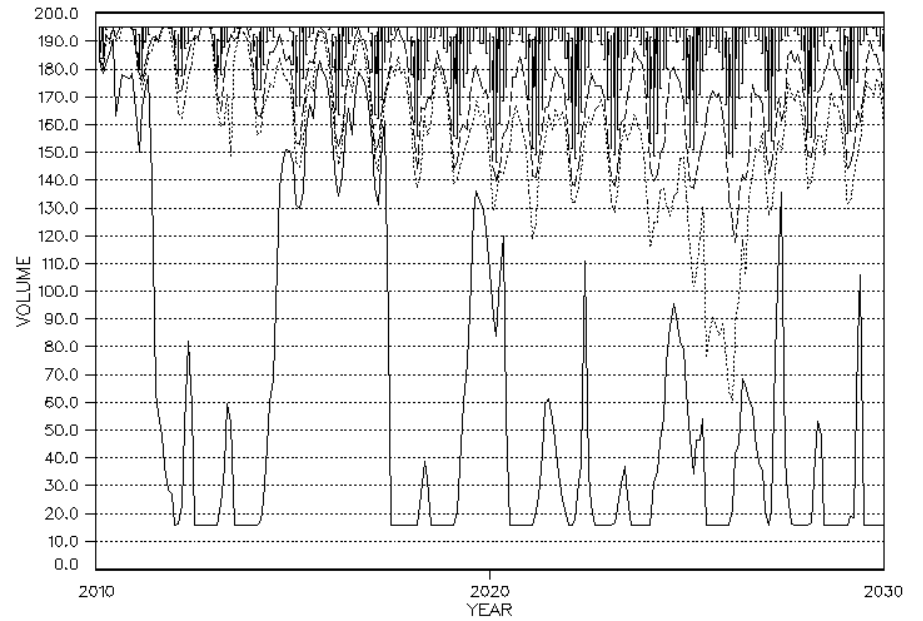


Results of Water Balance Analyses

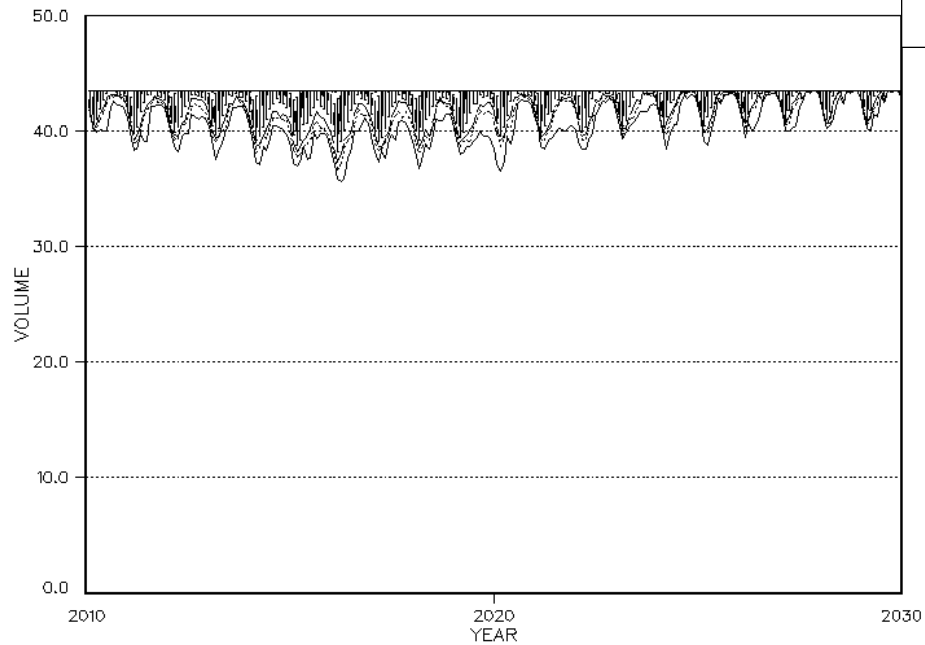
Water balance analyses

- Water balance scenarios
 1. Impose the 2012 Base Scenario for Crocodile River and check balance
 2. Determine surplus available for 2012 Base Scenario
 3. Reconcile 2012 Base and High water demand scenarios for Lephalale with surplus available in Crocodile River
 4. Conduct analyses of other scenarios, i.e. Tswane Re-use and Magalies Water supply, within the framework of the Reconciliation Strategy

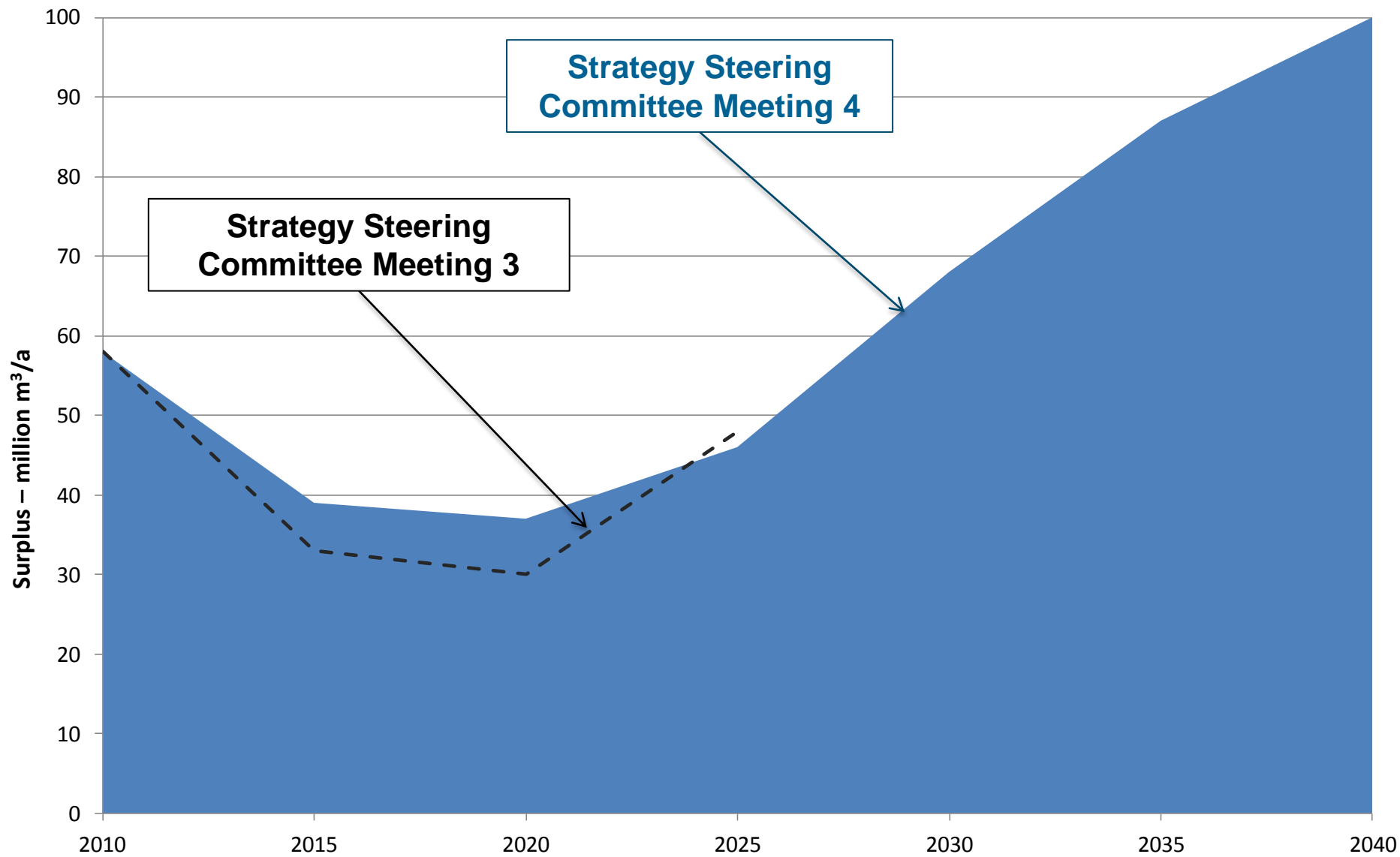
Hartbeespoort Dam storage



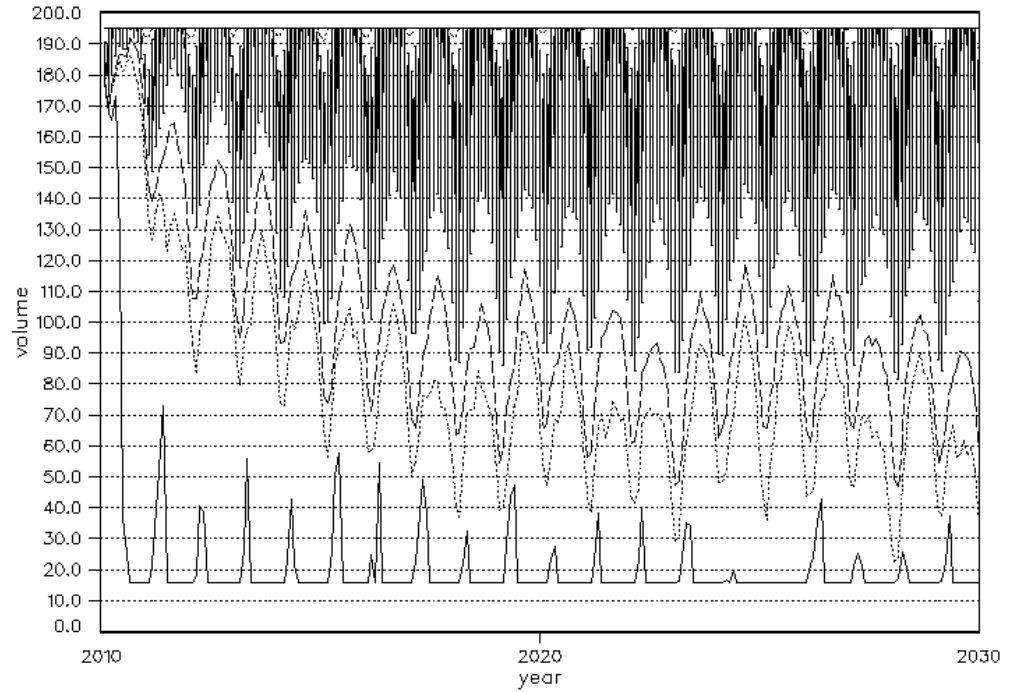
Roodeplaat Dam storage



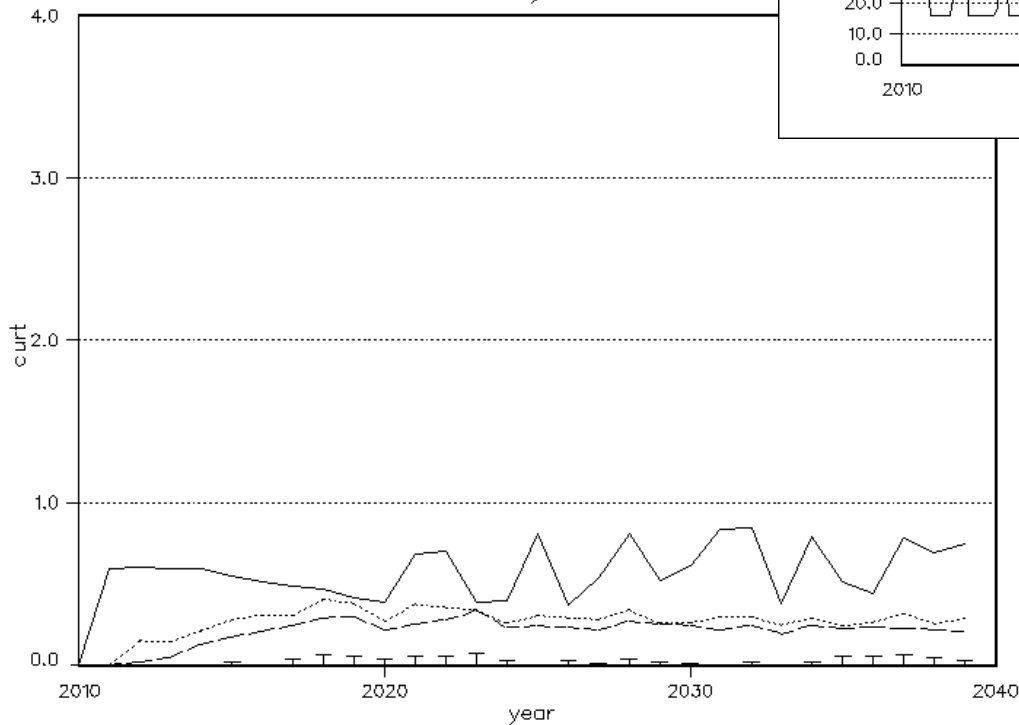
Total water balance for Crocodile catchment – Base scenario



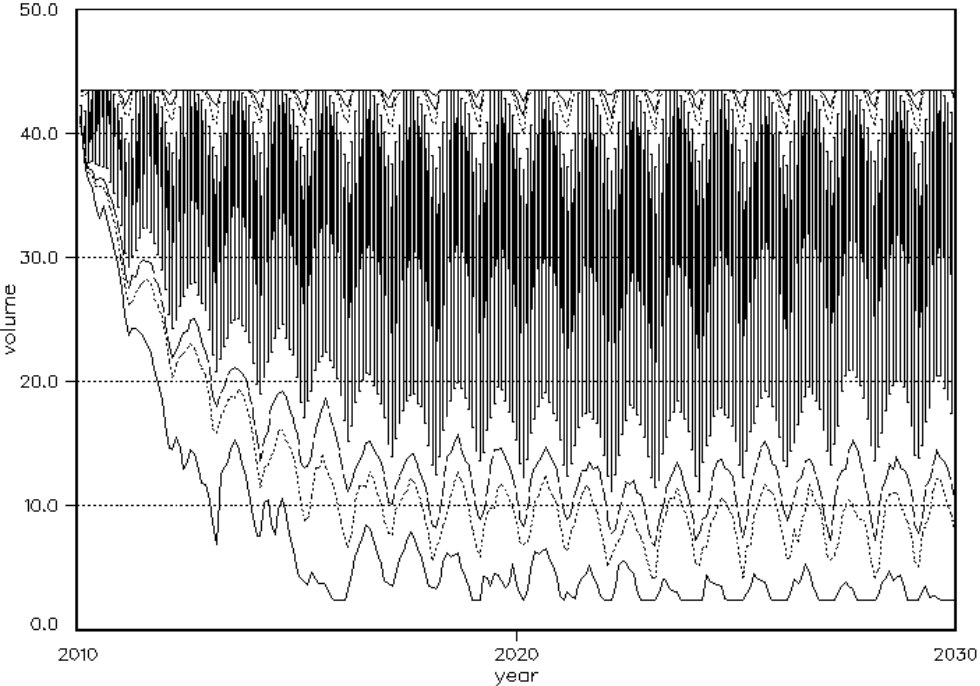
Hartbeespoort Dam storage



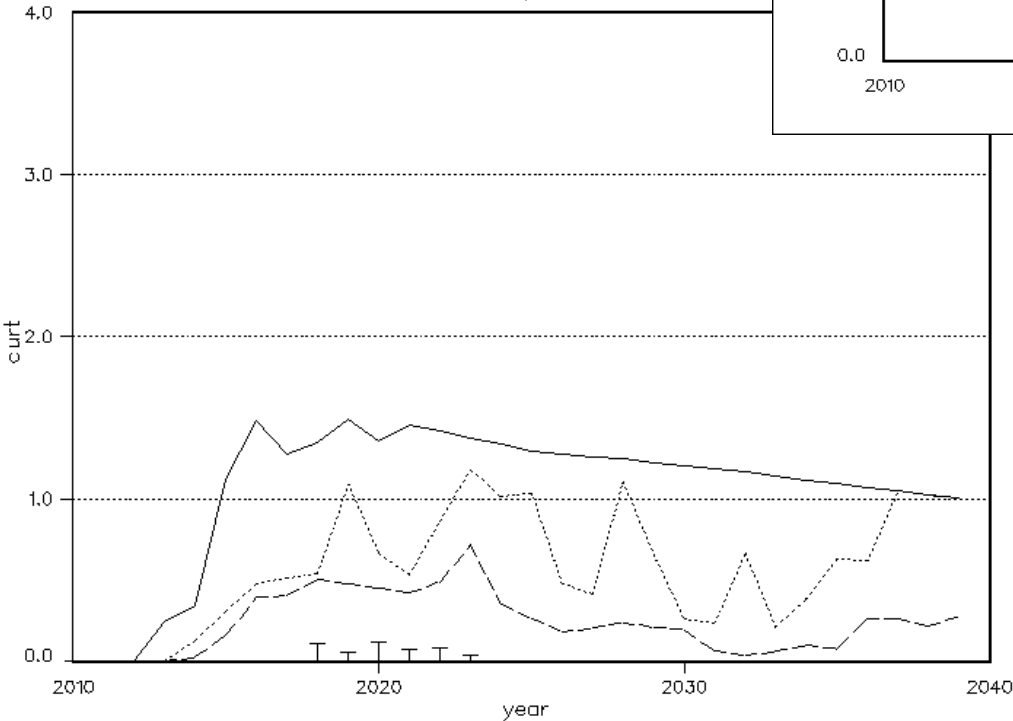
Hartbeespoort restriction levels



Roodeplaat Dam storage



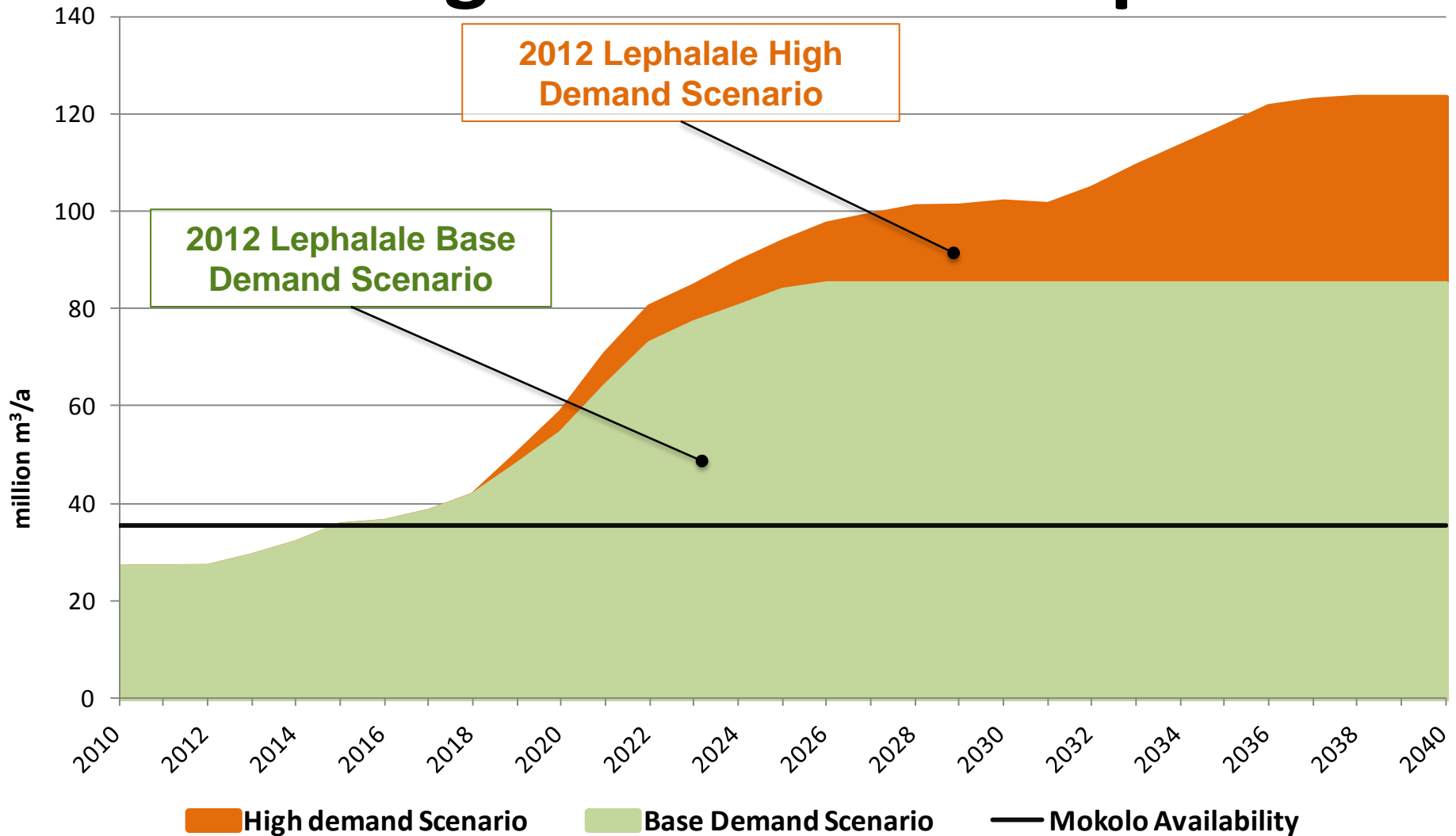
Roodeplaat restriction levels



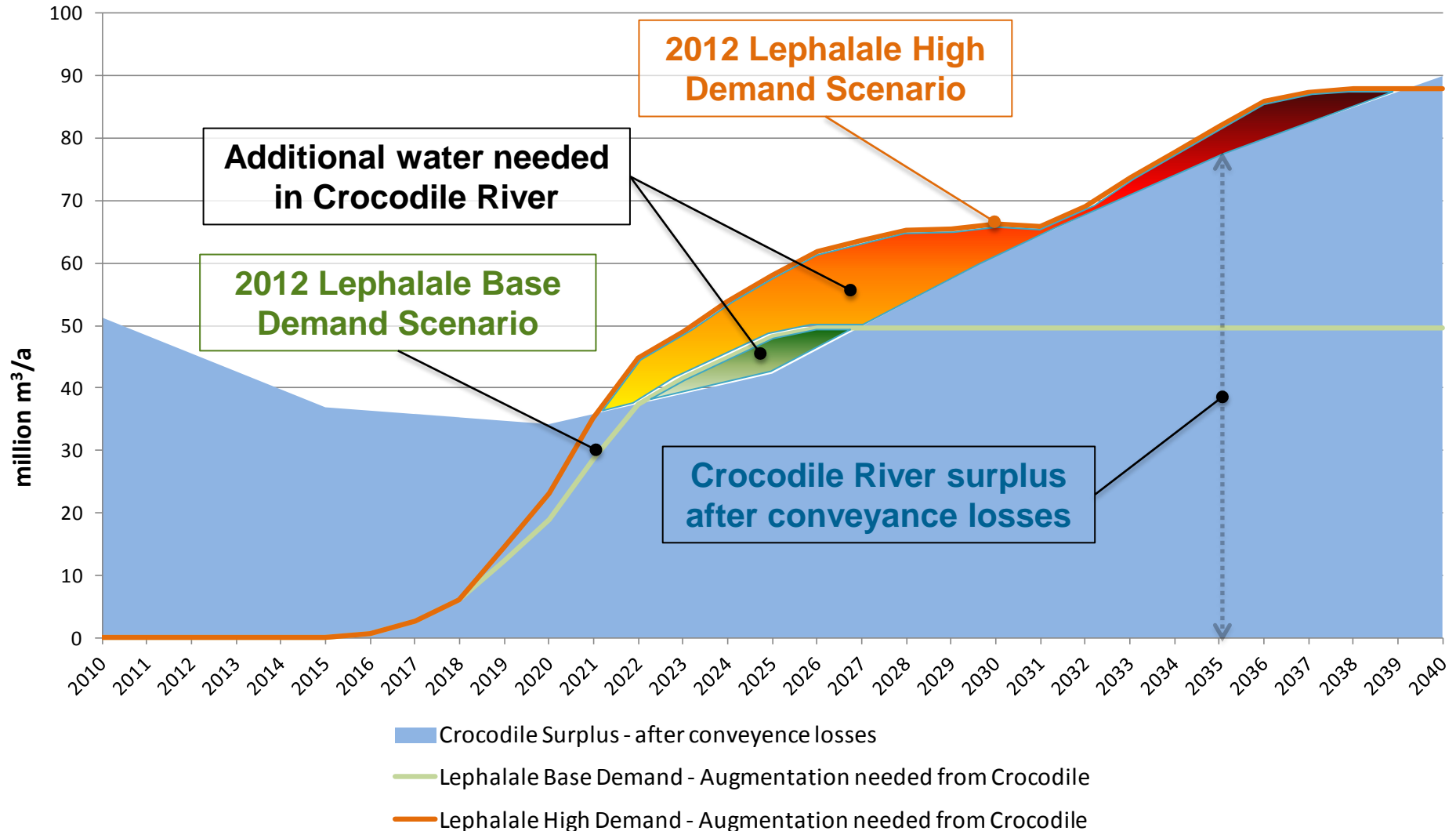
Downstream Users

- When determining the surplus, the impact on downstream users was assessed and used as a limiting criteria
- Supply of water to downstream users (Crocodile West Irrigation Board and Makoppa Irrigators) was checked to ensure it was within acceptable criteria

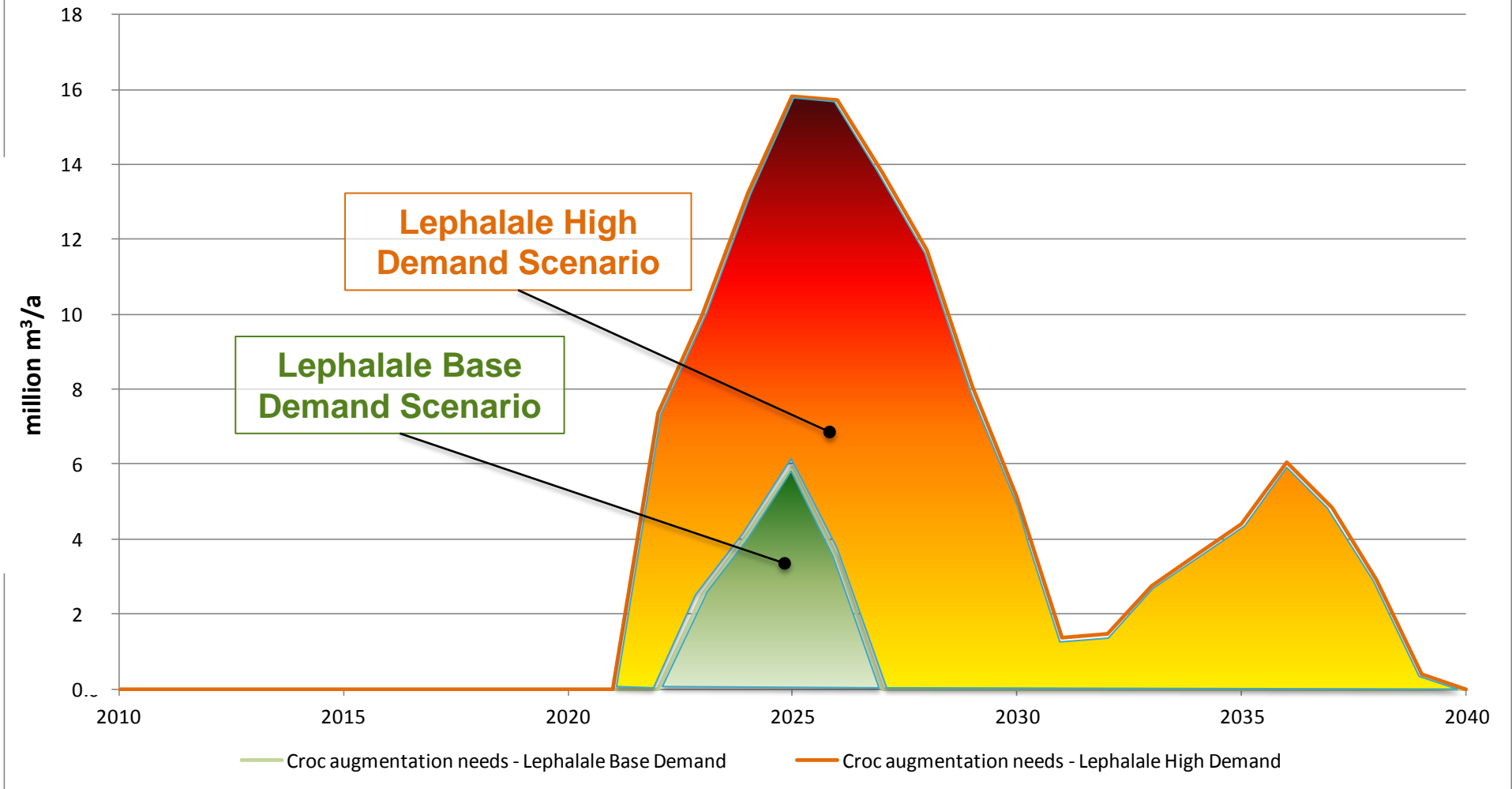
Planning scenarios for Lephhalale



Water balance including transfer to Lephhalale



Shortfall in Crocodile River to supply Lephhalale



Summary of results and Conclusions

Results summary (1)

- Based on water balance results and Lephale water requirements scenarios:
 - Insufficient surplus in the Crocodile to meet all water required for transfer to Lephale (Phase 2 of MCWAP) over the entire planning period
 - Shortfall is relatively small and temporary
 - Either infrastructure or demand side interventions could be considered to achieve a positive water balance

Results summary (2)

- Additional re-use only possible over the long-term once surplus in the catchment has increased beyond transfer needs to Lephallale
 - After 2027 for Lephallale Base Scenario
 - After 2040 for Lephallale High Scenario

Other uses of return flows

- Transfer of water supply to Moretele from Tshwane to Magalies Water and Magalies Water plans to supply growth in Bela-Bela, Modimolle and Mookgophong will not have a negative impact on the water balance provided:
 - The license for this water is transferred from Temba WTP to Klipdrift WTP
 - Surface water is not used to replace groundwater supply in the Moretele area around Klipvoor Dam until return flows grow beyond Lephthalale's water requirements

Water Conservation and Water Demand Management

- The water balance in the Crocodile River assumes WC/WDM is implemented by all municipalities
- Monitoring of saving targets required by municipalities
- Successful implementation of WC/WDM measures are essential to maintain a positive water balance

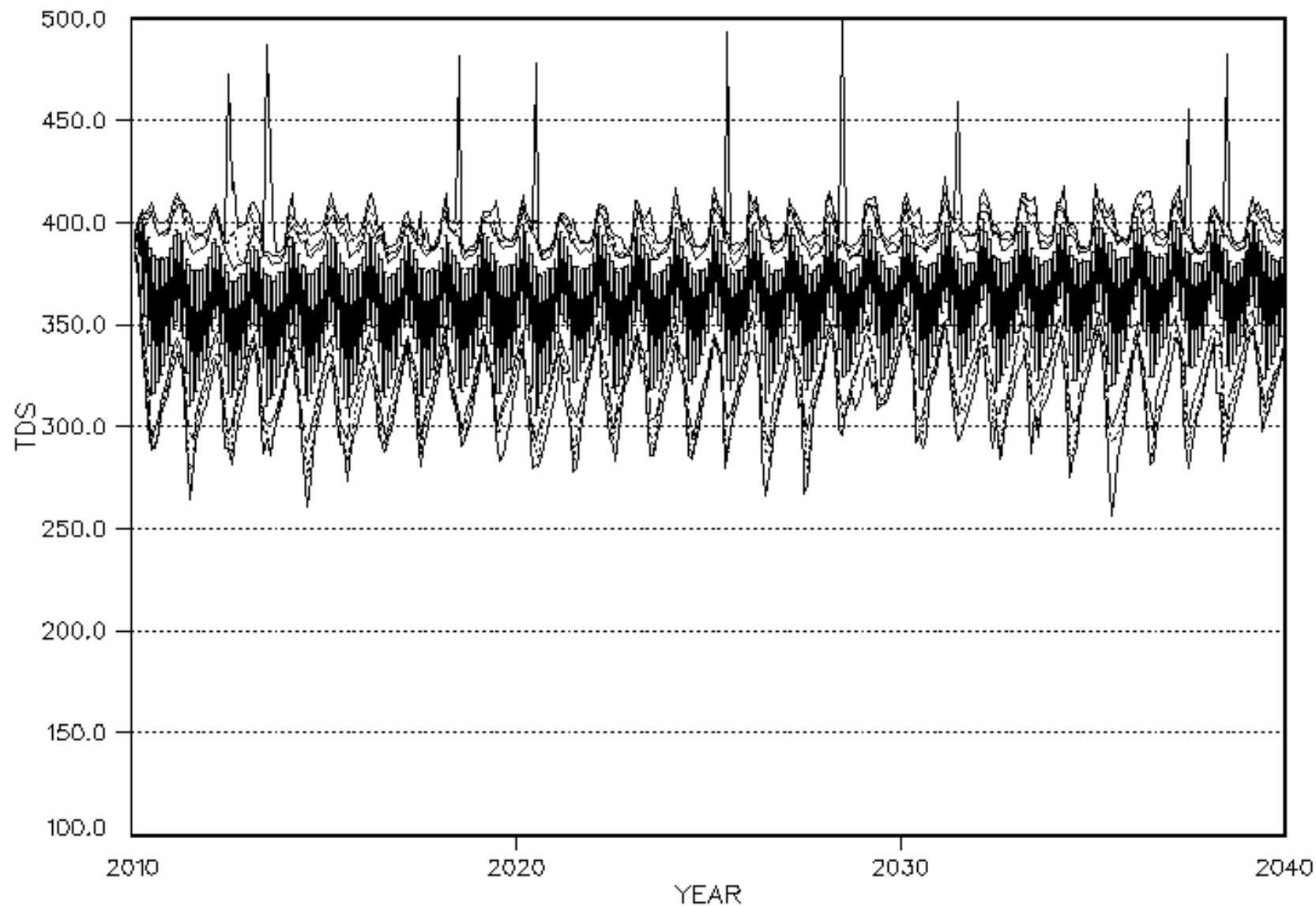
Water Quality - Salinity

Water Quality

- Results for dynamic simulation up to 2040
- Graphs for monthly TDS concentrations at Hartbeespoort and Roodeplaat dams

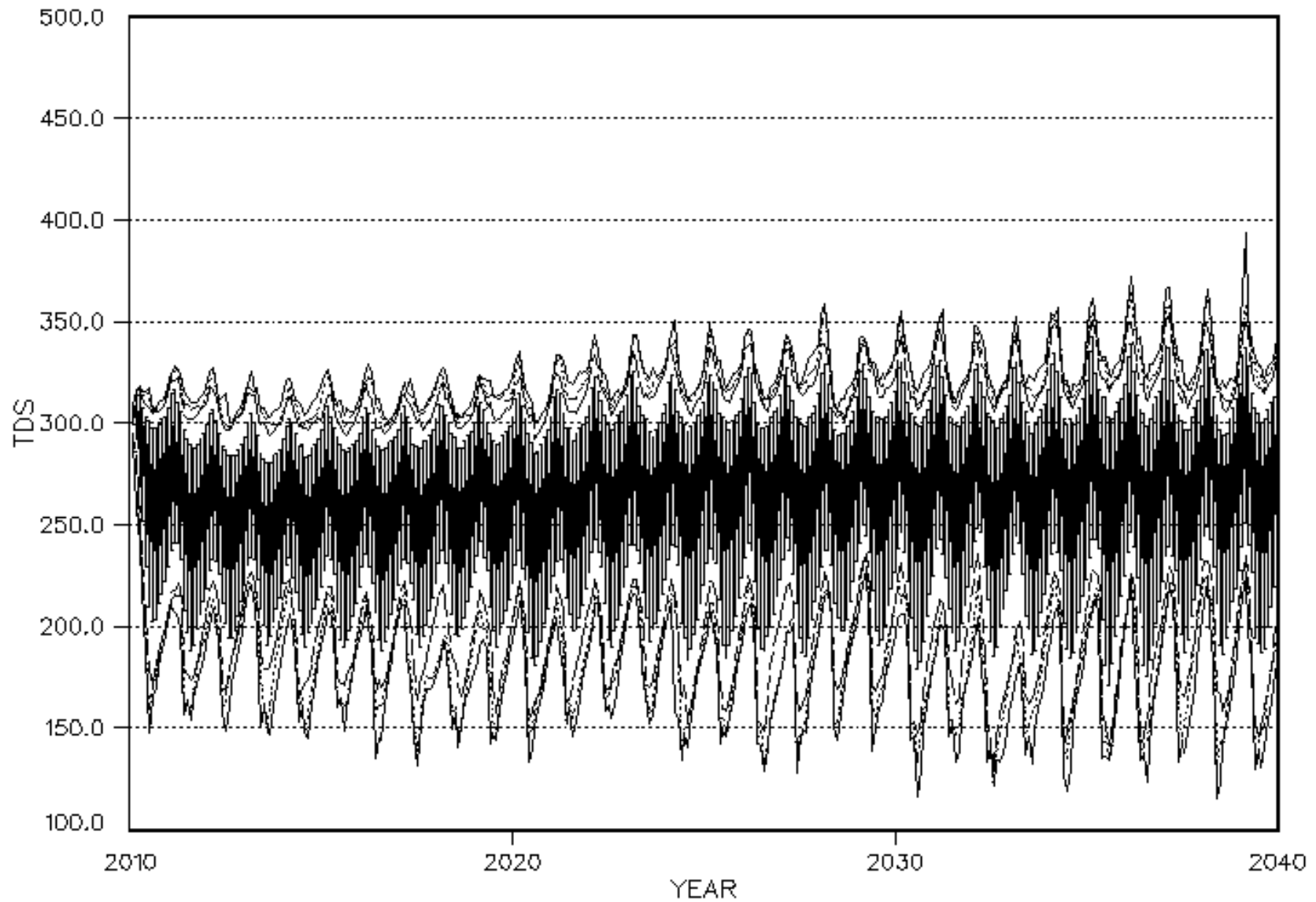
Hartbeespoort Dam TDS

Lephalale High demand scenario



Roodeplaat Dam TDS

Lephalale High demand scenario



Any questions for clarification?

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Thank you