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DESC Technical Work group

Seasonal Normal Review Update
** Additional Slides **

15 October 2014

Background

- Ref: Final slide in main presentation *"Xoserve investigating use of Loess method for smoothing"*
- Although main action was for Xoserve to apply a 5 day centred moving average there were some comments from TWG about using the LOESS method (which is used in the current SNCWV)
- Xoserve have investigated how the LOESS smoothing method looks using SAS analytical software. The SAS Loess procedure provides an automatic smoothing parameter selection in which SAS will select a smoothing parameter which minimises the 'AICC criteria' that strikes a balance between the residual sum of squares and the complexity of the fit
- Alongside using the recommended smoothing parameter, we felt it was important to assess other smoothing parameter options. In some cases, fits with different smoothing parameters might reveal important features of the data that cannot be discerned by looking at a fit with just a single "best" smoothing parameter

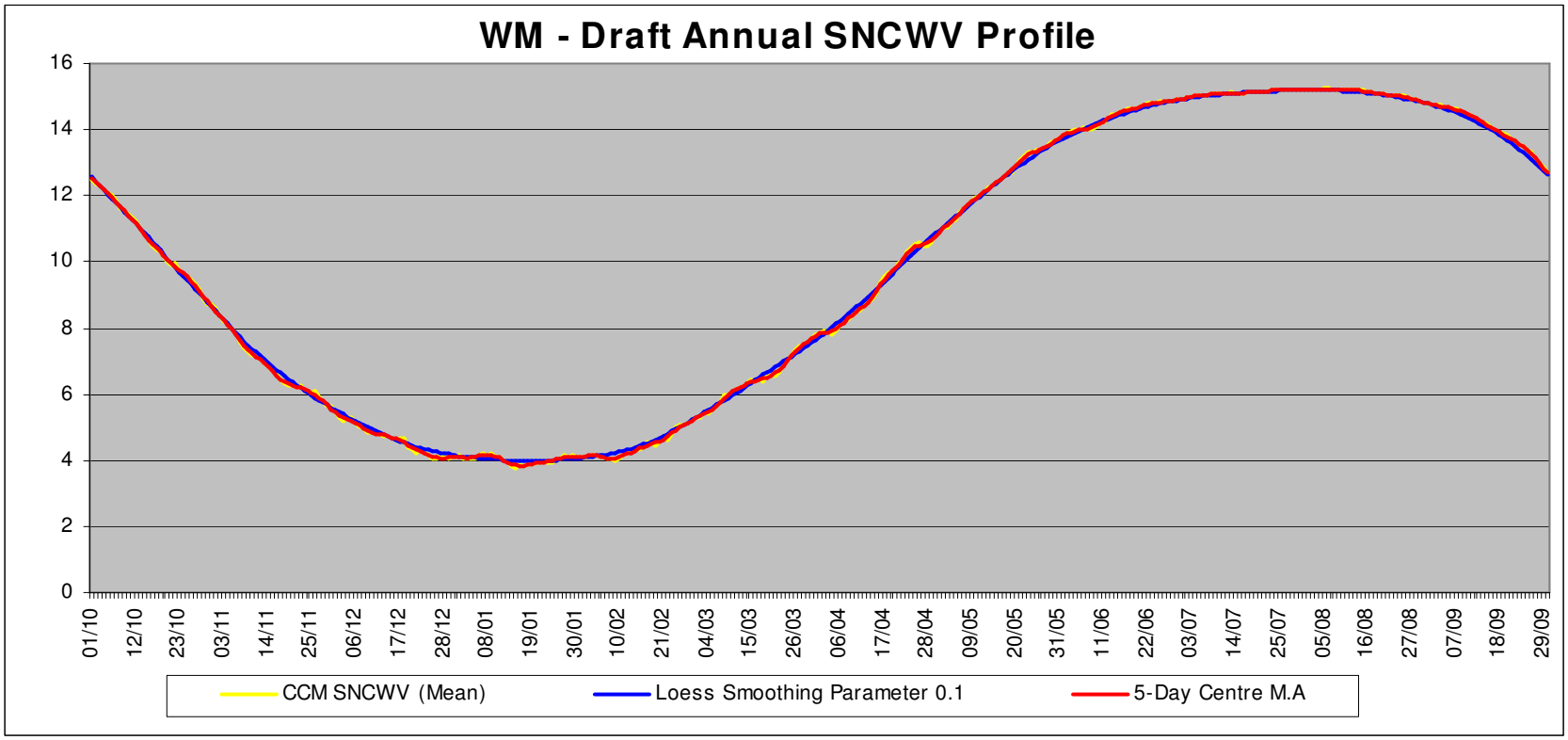
Draft SNCWV calculations

- Results are shown for WM at an annual level and by quarter using various smoothing parameters, namely:
  - 0.1 (10%), 0.03 (3%) and recommendation as per SAS 0.01948 (1.9%)

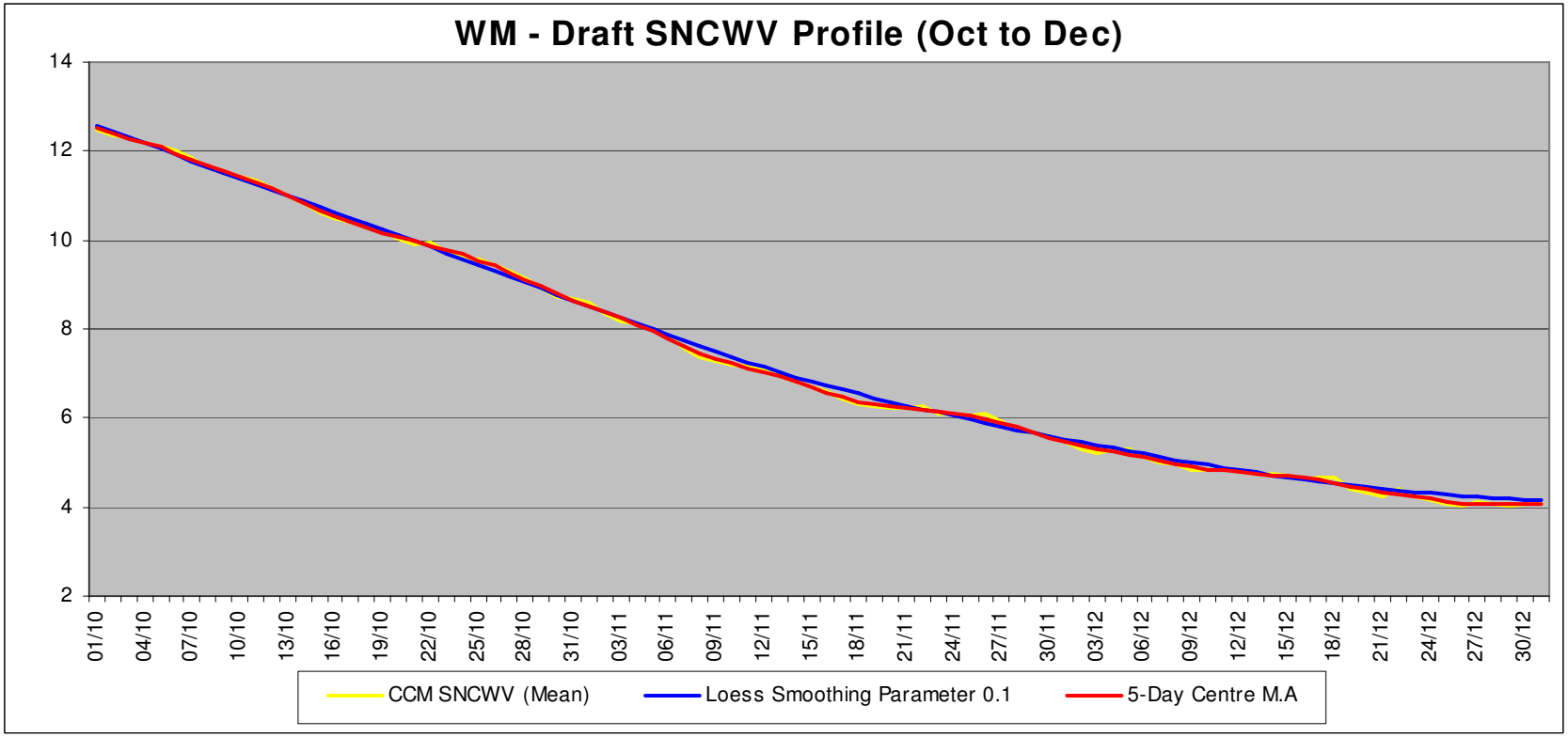
- There are 5 charts displaying SNCWV profiles:
  - *CCM Mean Unsmoothed vs 5 day Smoothed vs Loess Smoothed: Annual*
  - *CCM Mean Unsmoothed vs 5 day Smoothed vs Loess Smoothed: Oct to Dec*
  - *CCM Mean Unsmoothed vs 5 day Smoothed vs Loess Smoothed: Jan to Mar*
  - *CCM Mean Unsmoothed vs 5 day Smoothed vs Loess Smoothed Apr to Jun*
  - *CCM Mean Unsmoothed vs 5 day Smoothed vs Loess Smoothed Jul to Sep*

Trial LDZ – WM
SNCWV Profiles
Loess Smoothing Parameter 0.1 (10%)

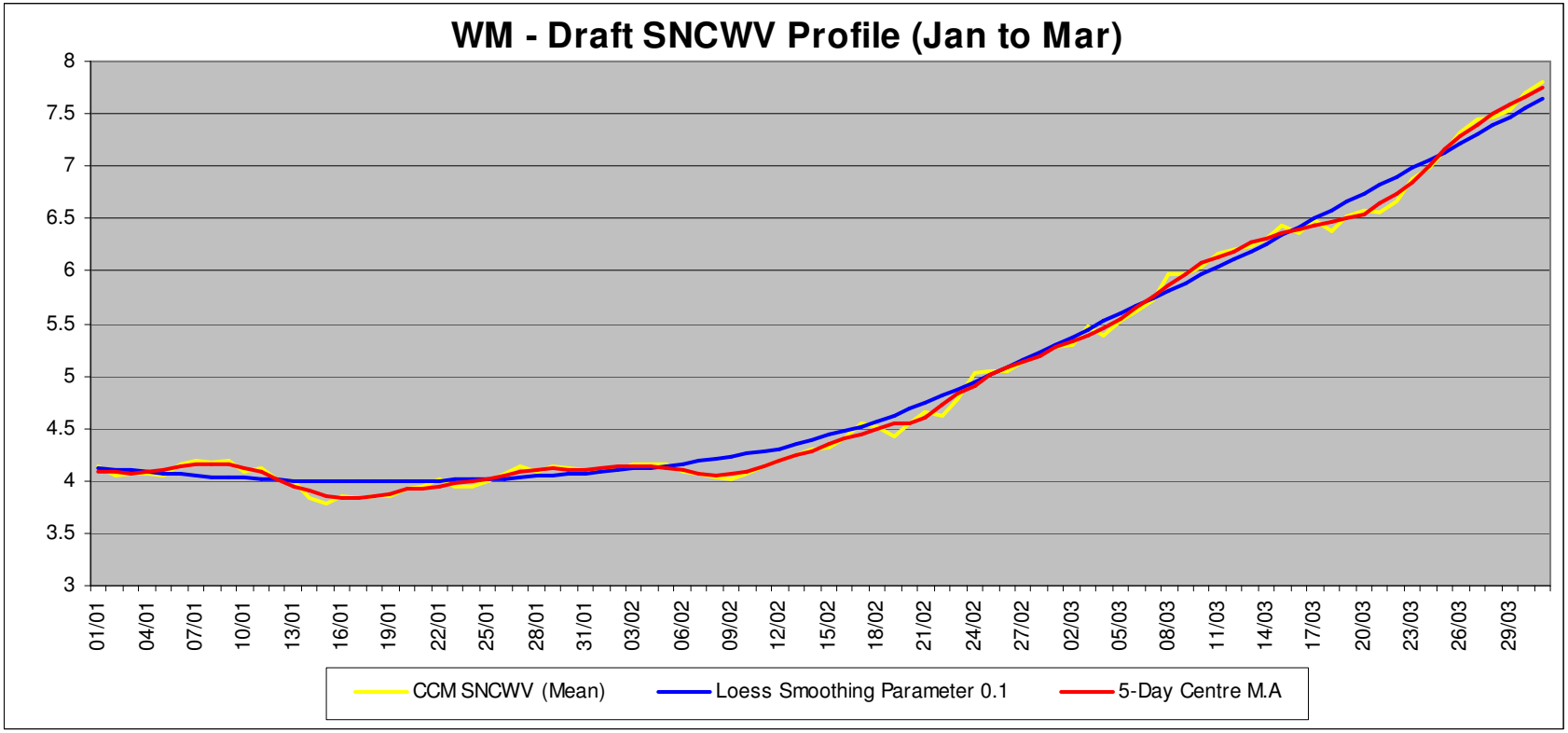
Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Annual Profile



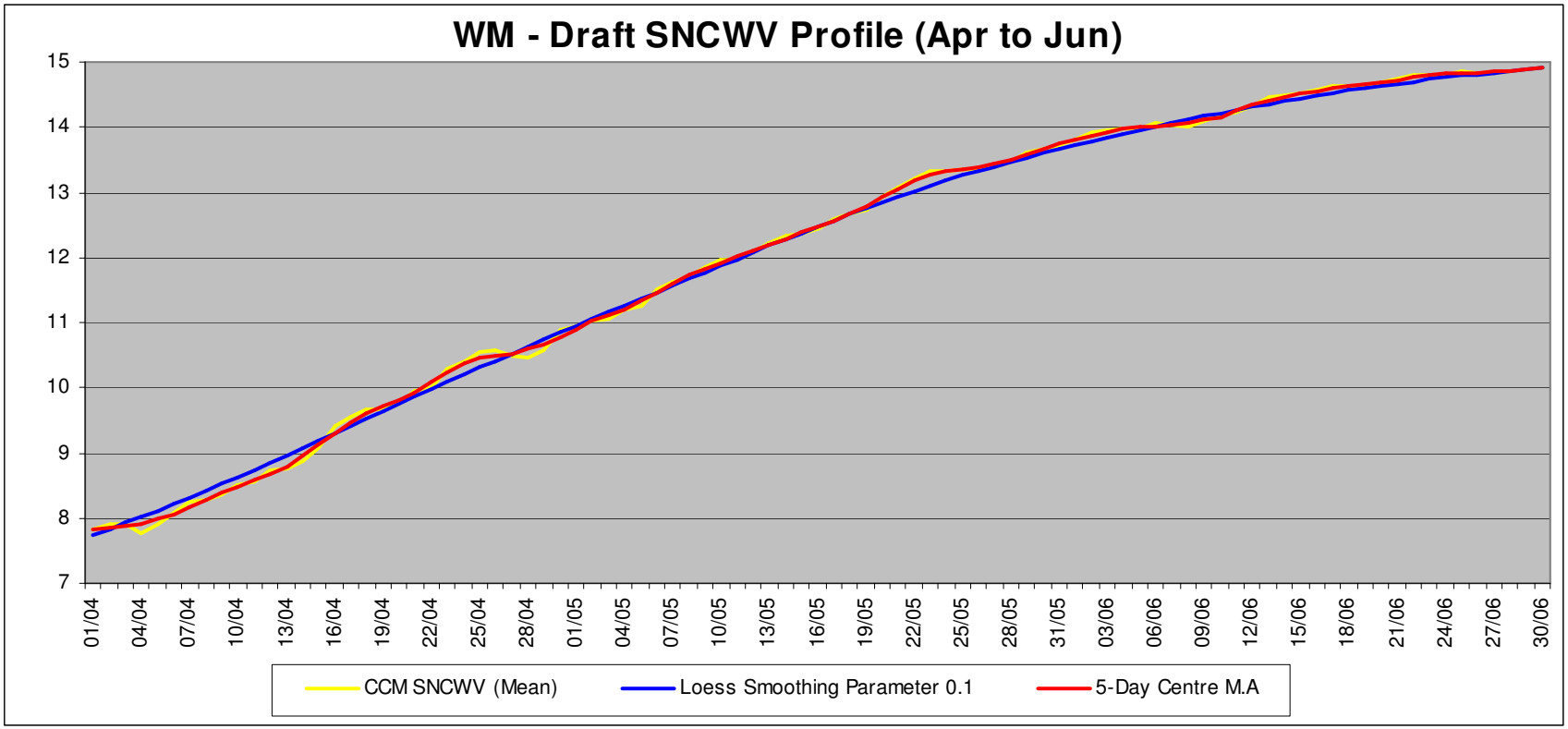
Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Oct to Dec



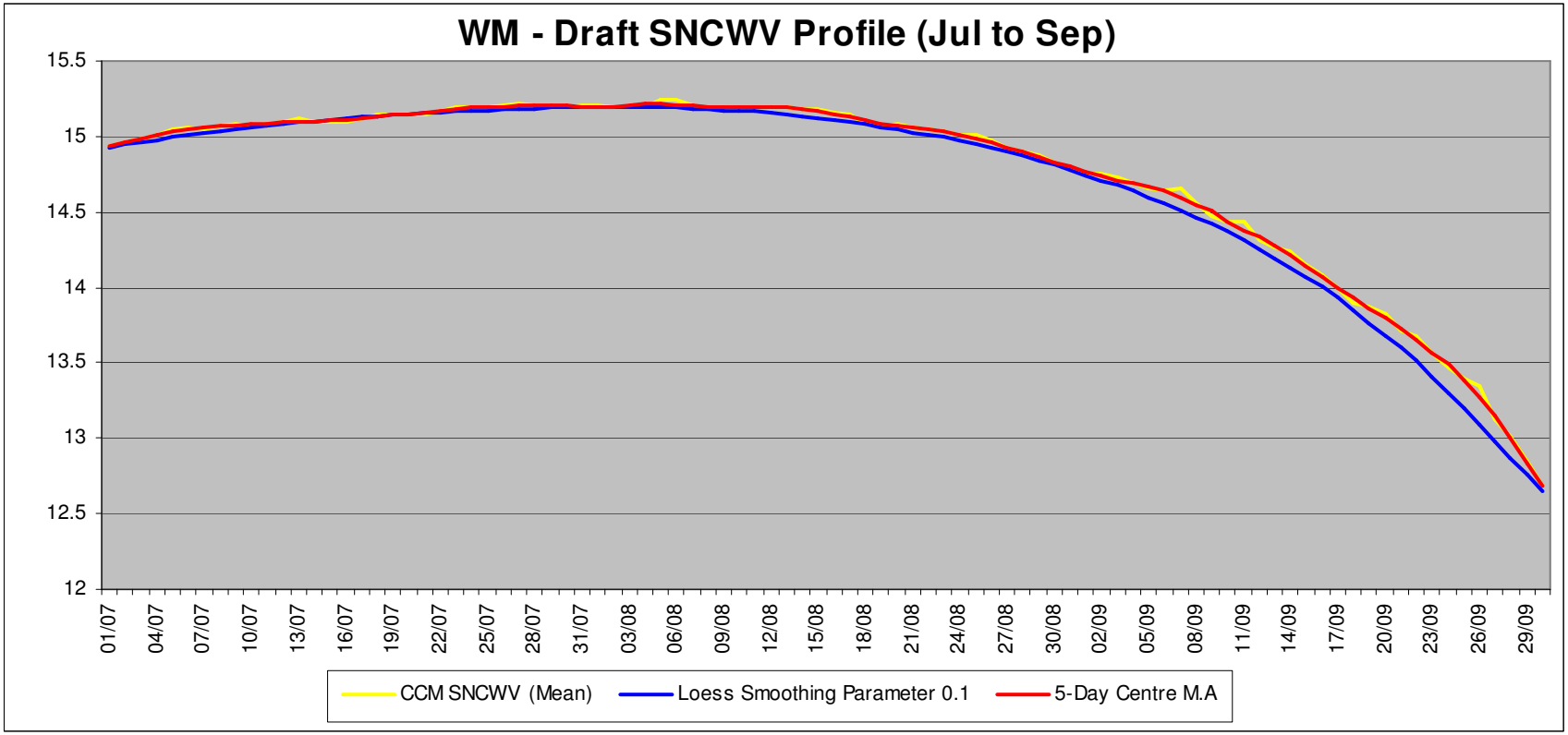
Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Jan to Mar



Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Apr to Jun

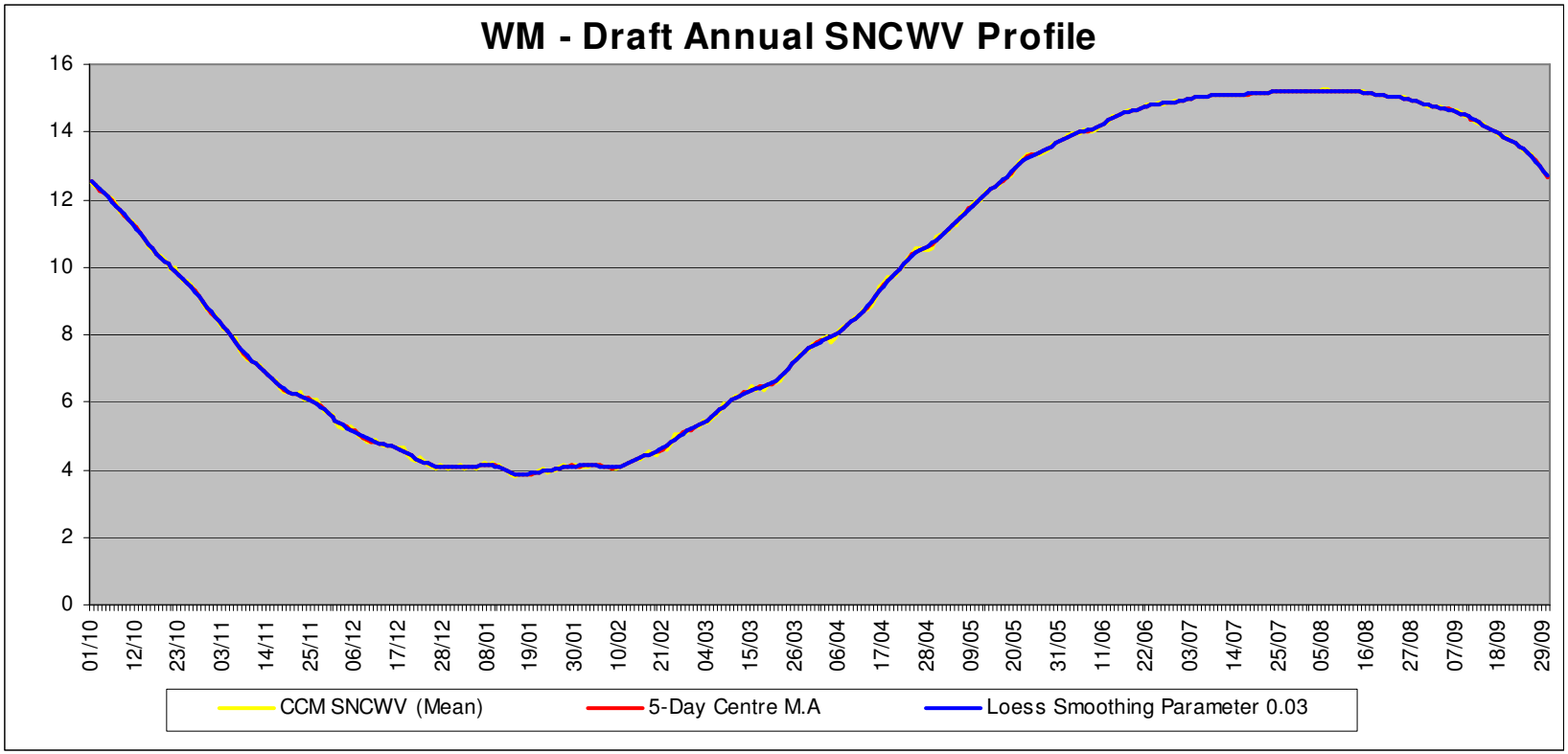


Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Jul to Sep

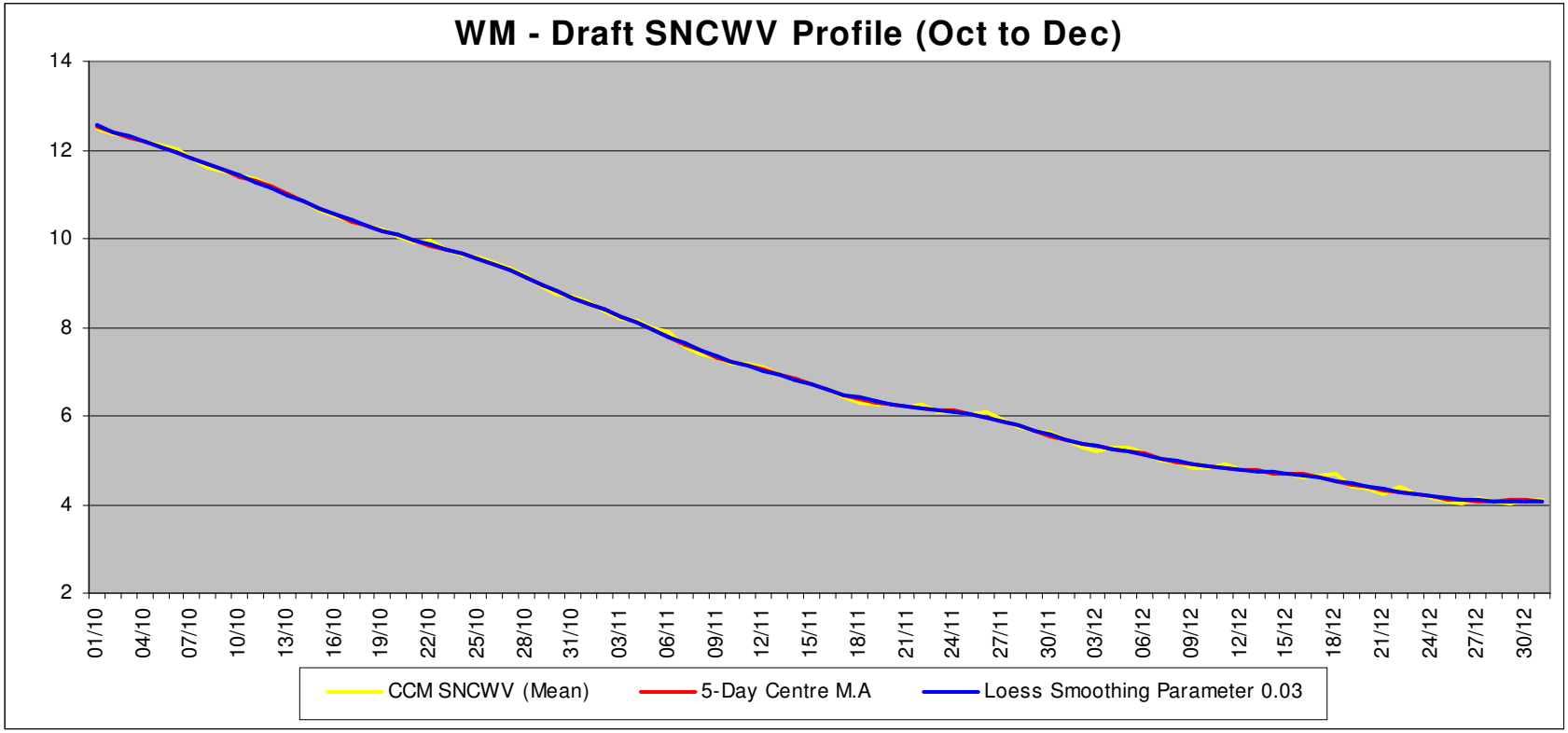


Trial LDZ – WM
SNCWV Profiles
Loess Smoothing Parameter 0.03 (3%)

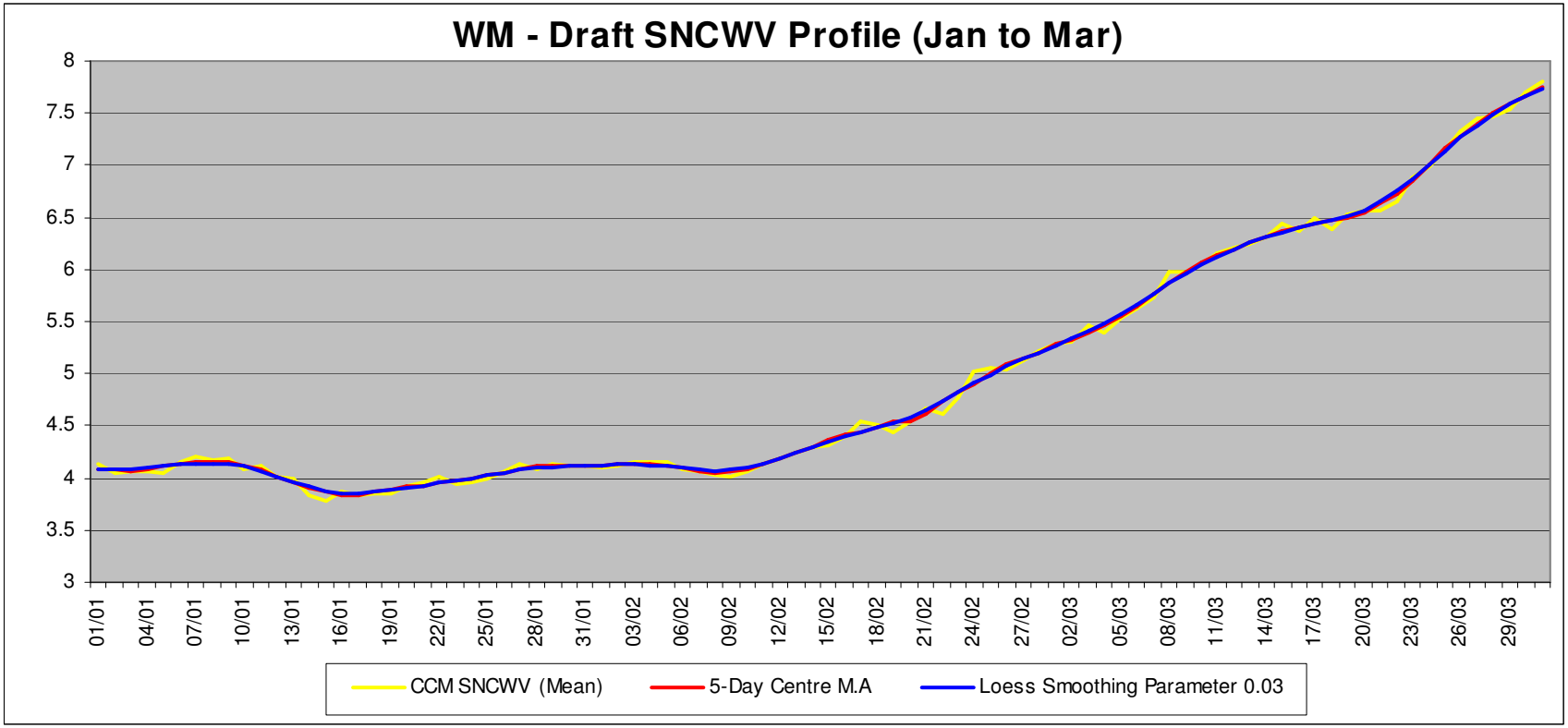
Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Annual Profile



Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Oct to Dec



Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Jan to Mar



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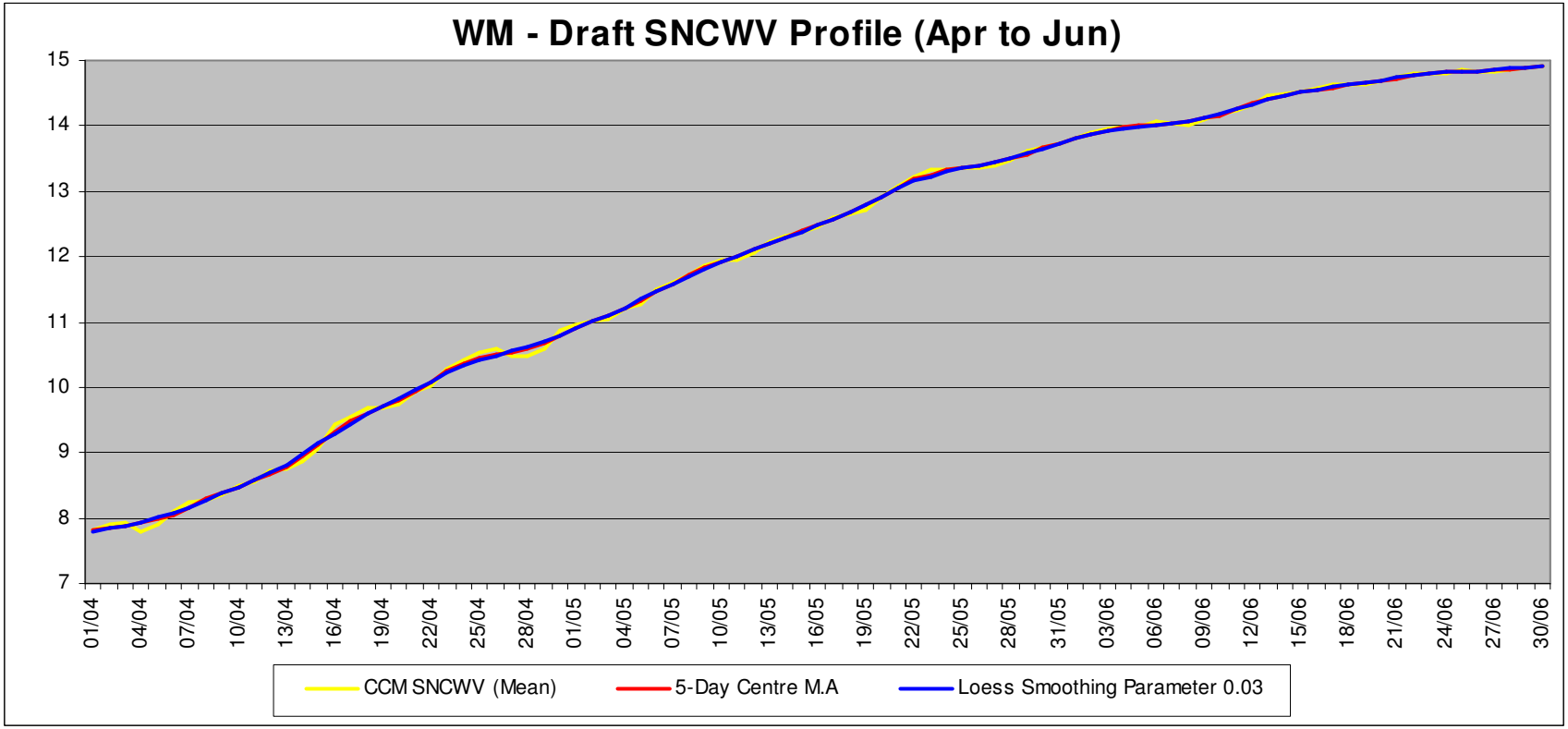
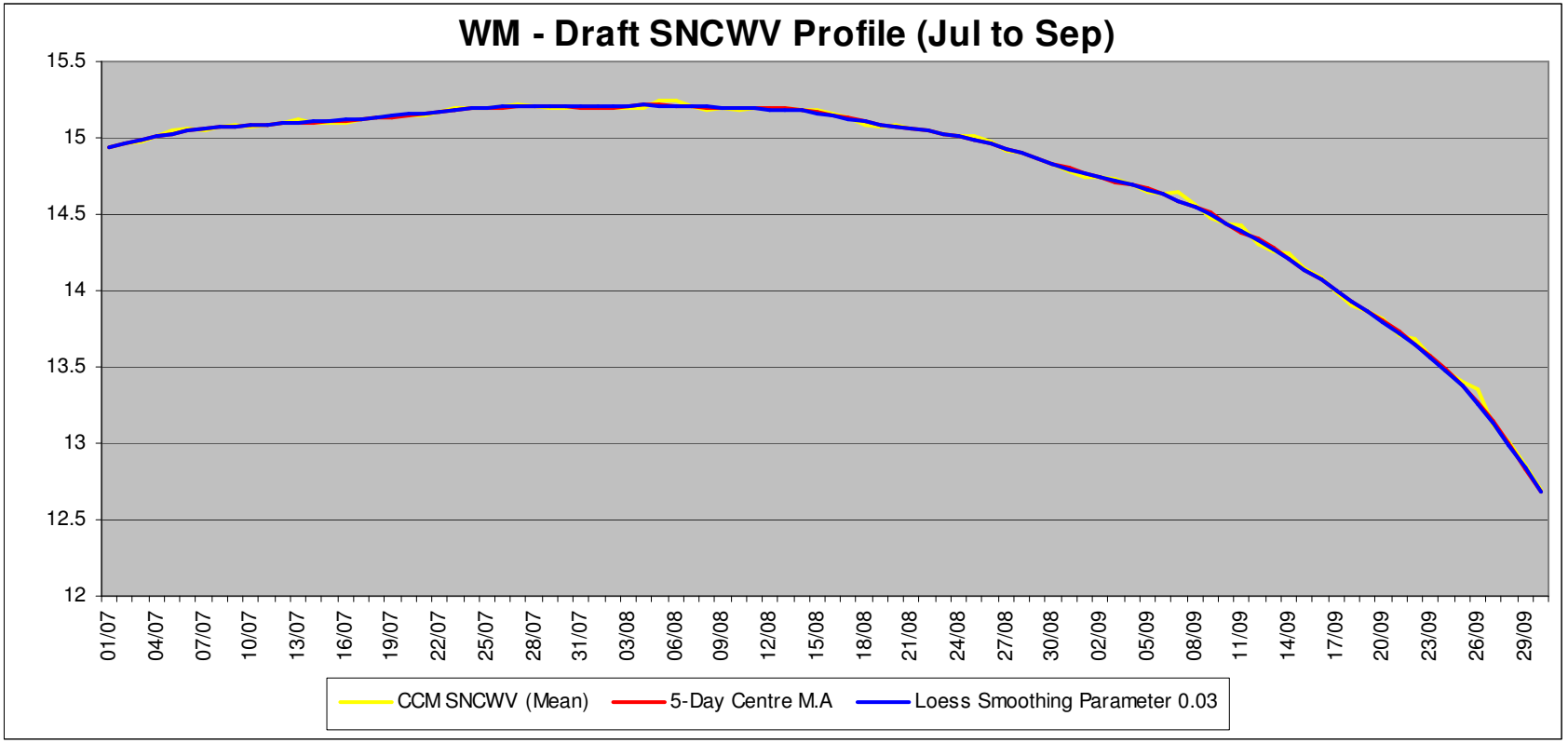


Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Jul to Sep



Trial LDZ – WM
SNCWV Profiles
Loess Smoothing Parameter
SAS Recommendation 0.01948

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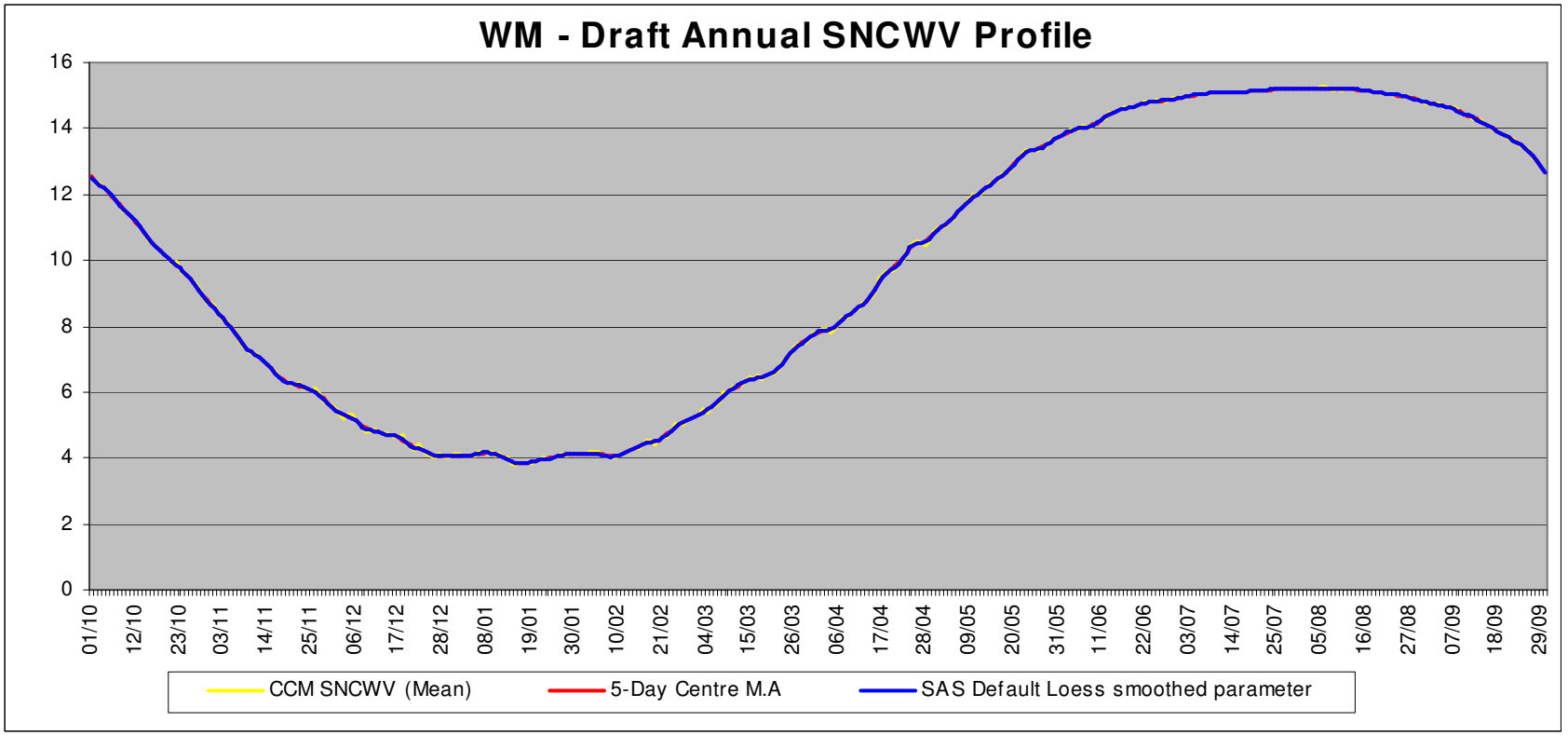
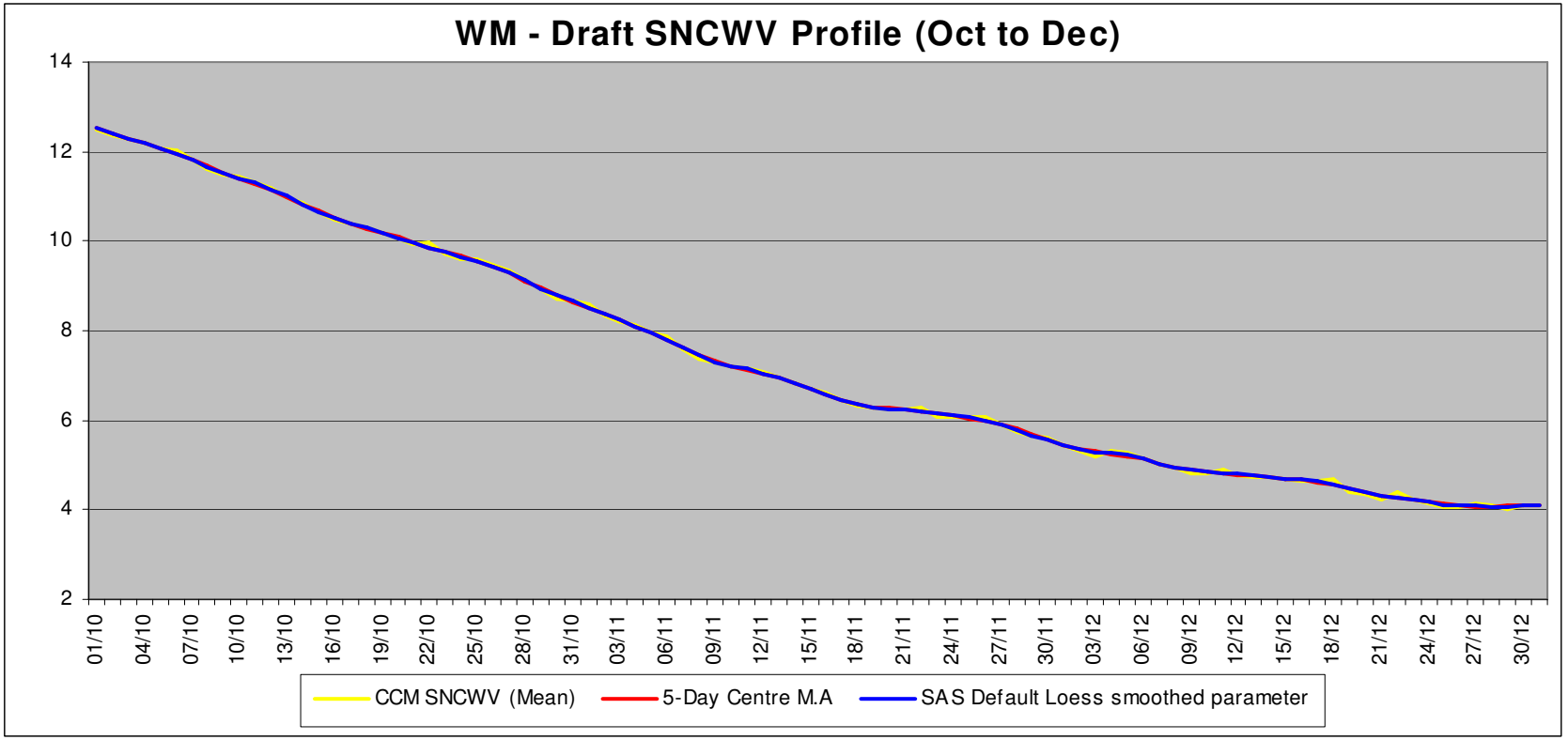
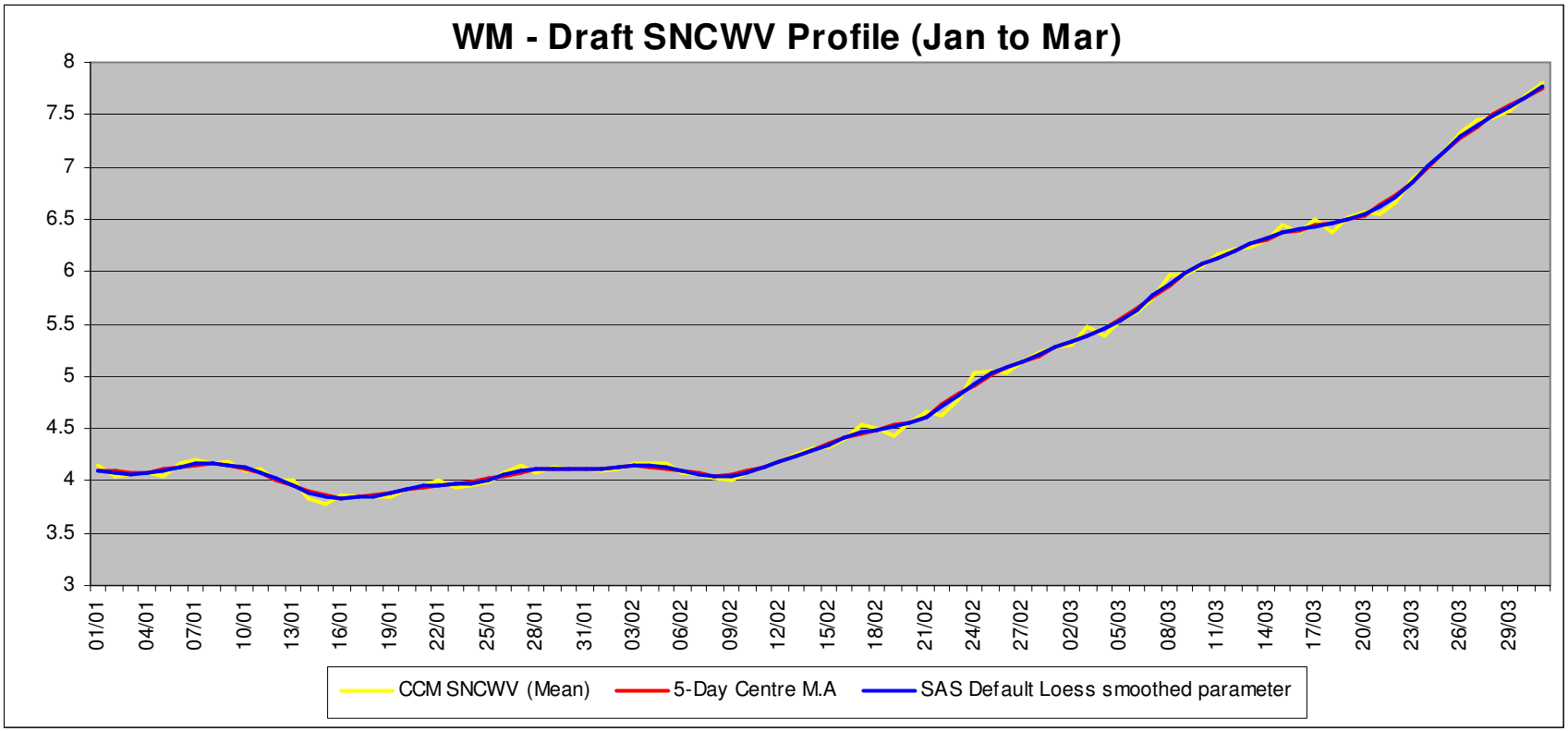
Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Annual Profile



Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Oct to Dec



Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Jan to Mar



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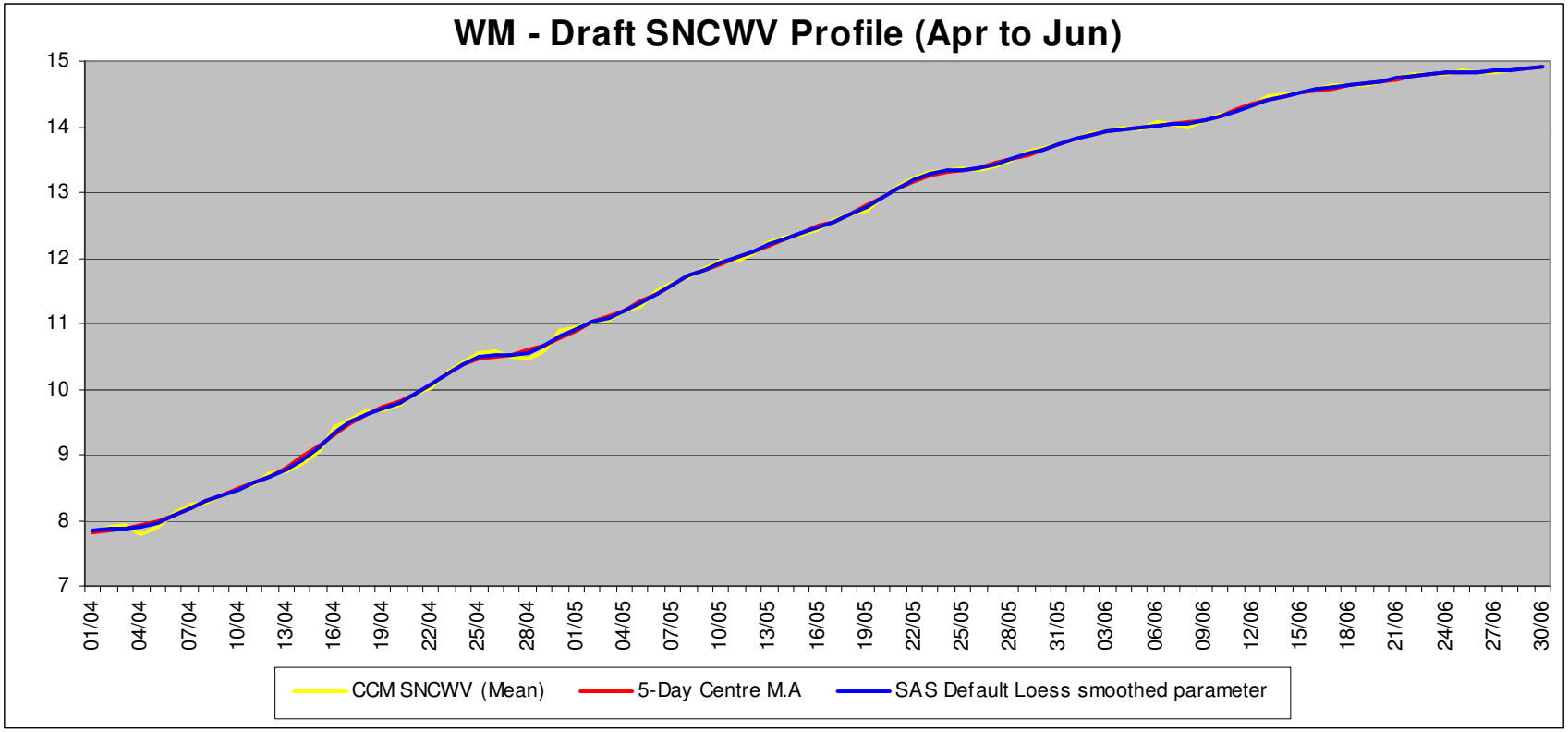
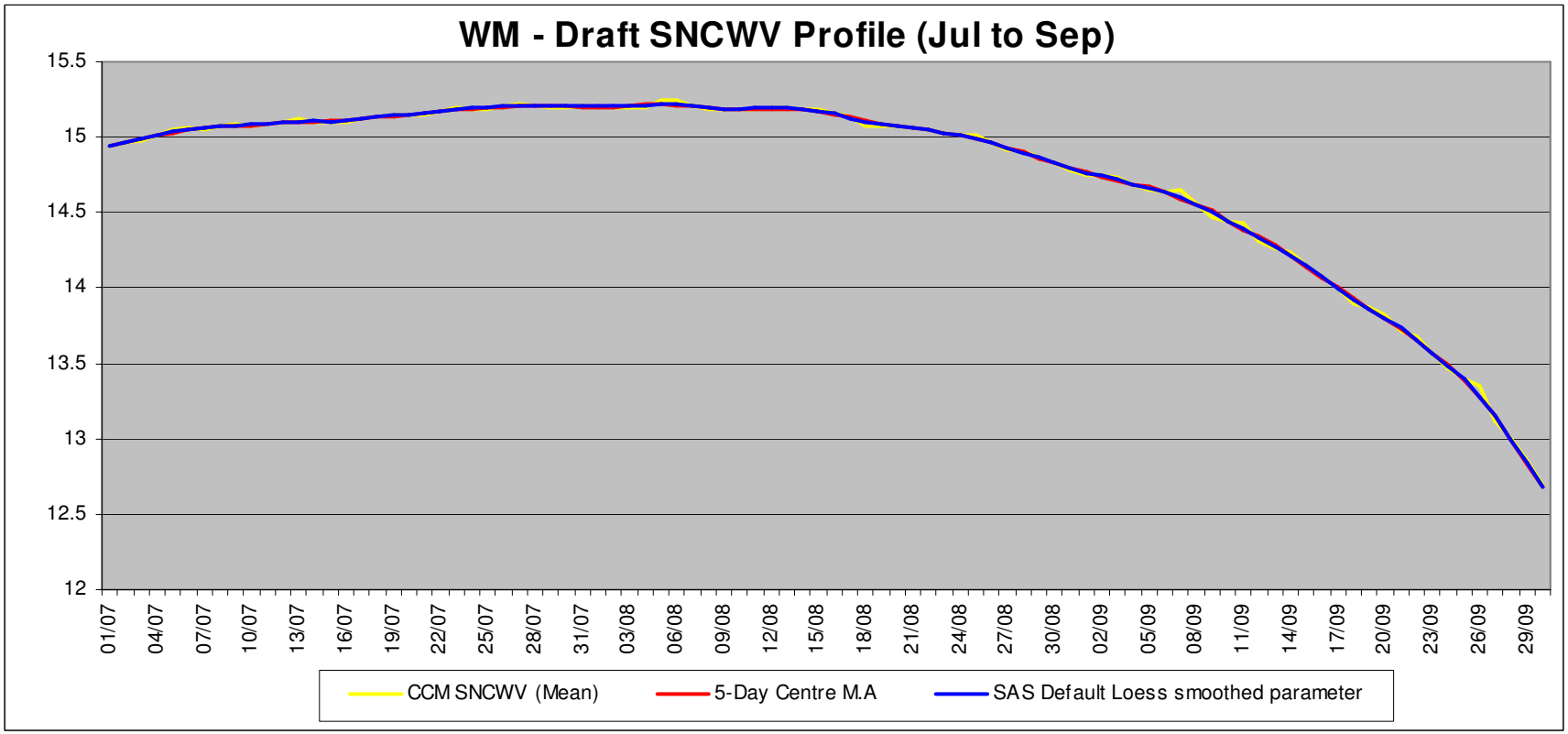
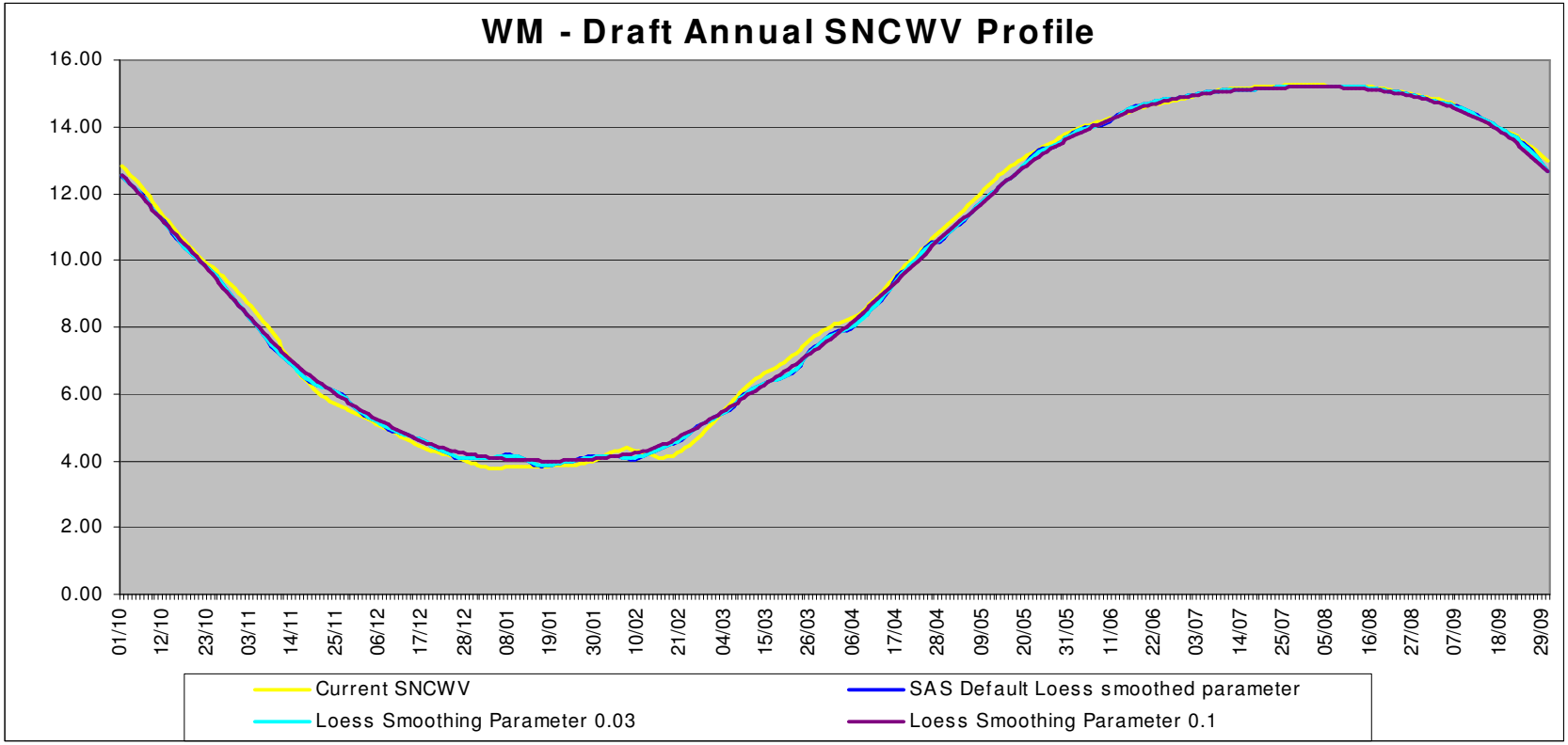


Draft SNCWV for WM – LOESS Smoothing vs 5 day Moving Avge. – Jul to Sep



Trial LDZ – WM
SNCWV Profiles
Comparison of Loess Profiles
(vs Current SNCWV)

Draft SNCWV for WM – LOESS Smoothing vs Current SNCWV – Annual Profile



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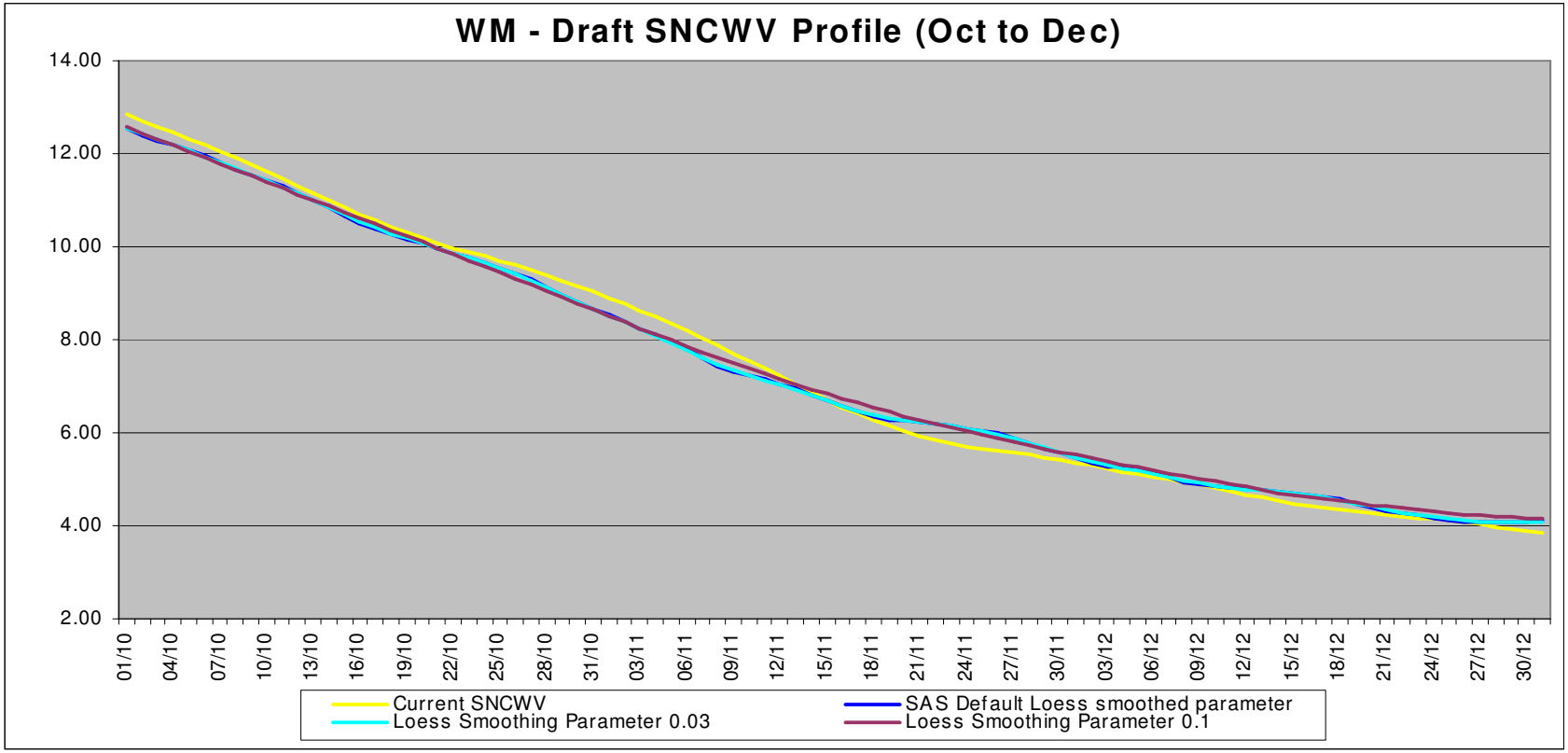
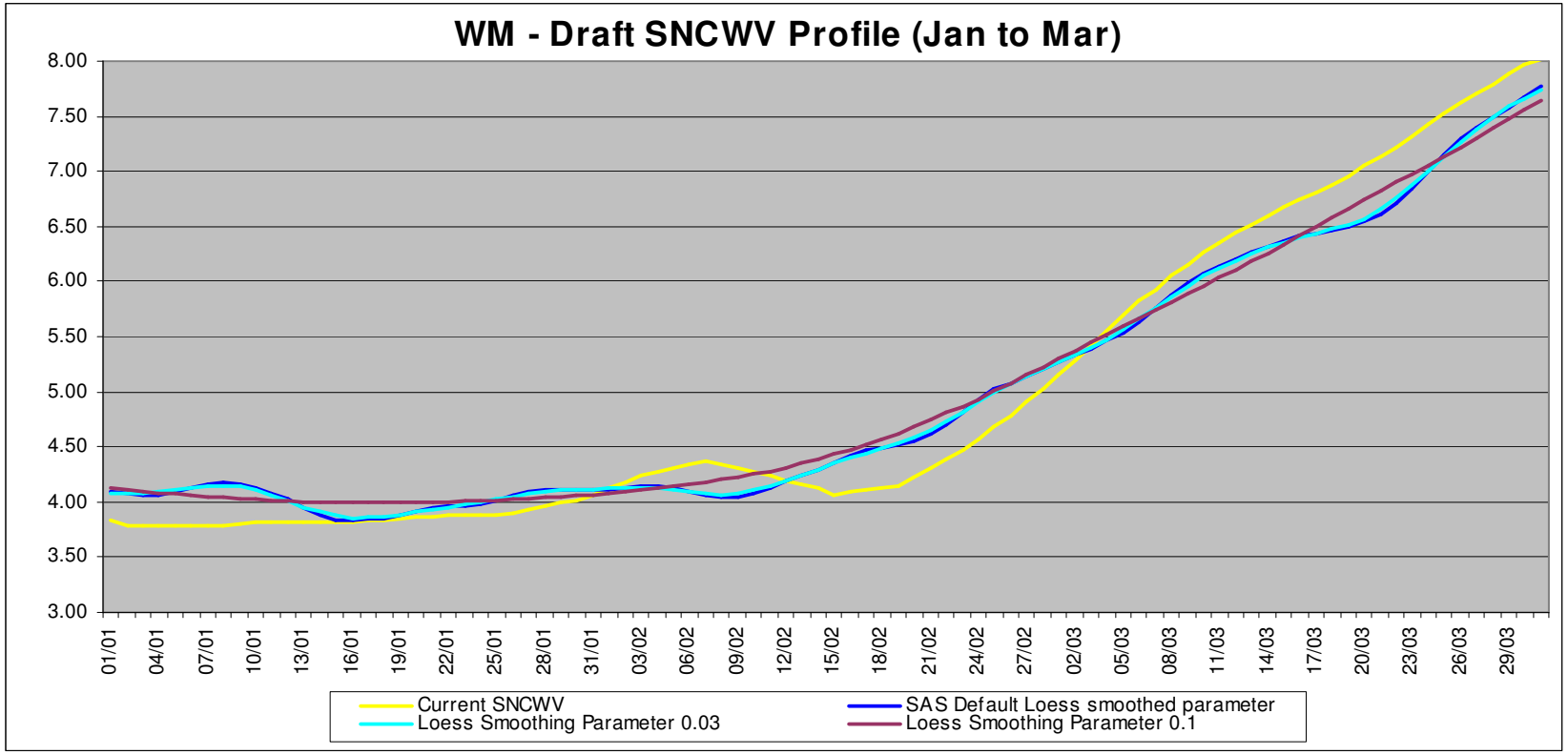
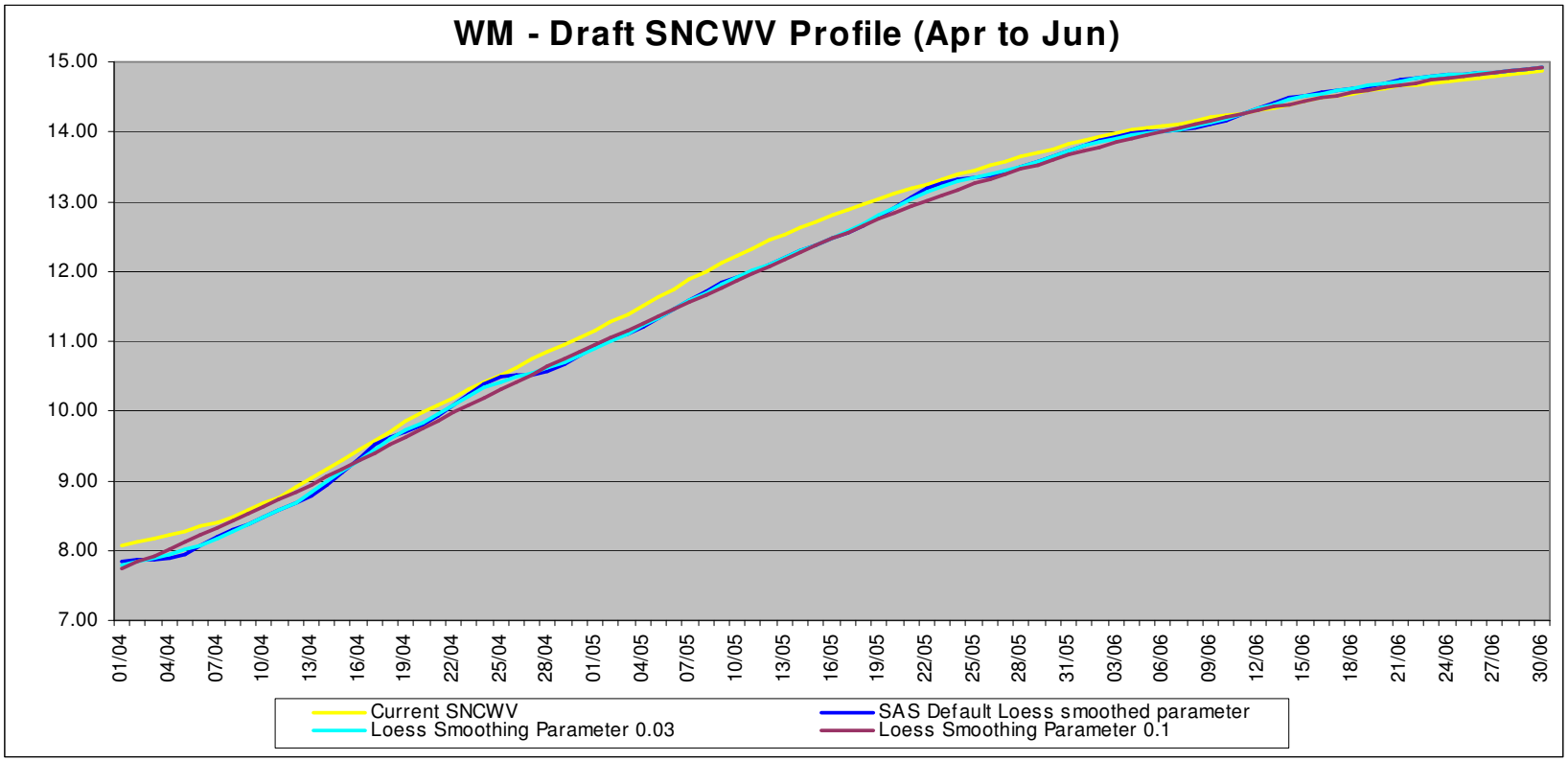
Draft SNCWV for WM – LOESS Smoothing vs Current SNCWV – Oct to Dec



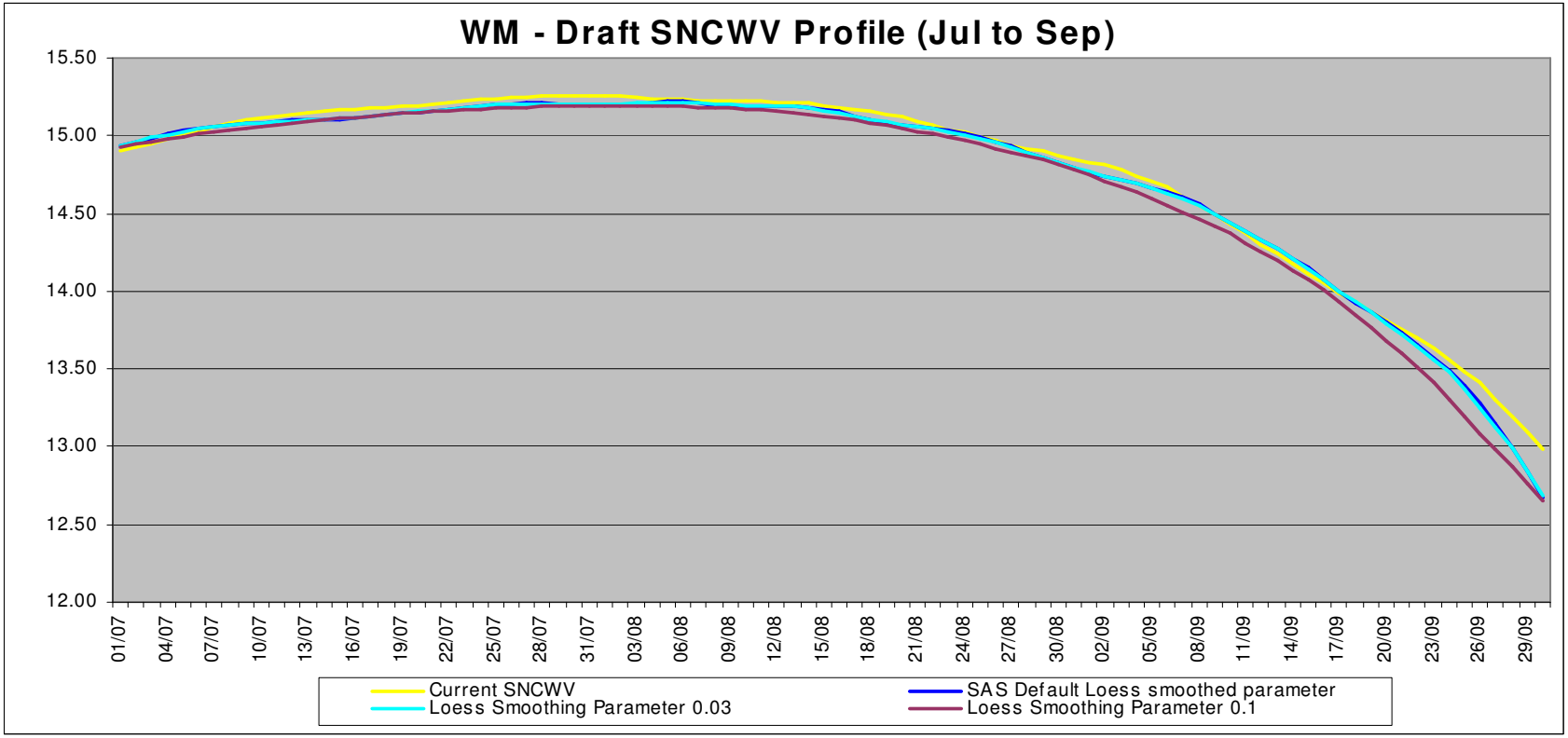
Draft SNCWV for WM – LOESS Smoothing vs Current SNCWV – Jan to Mar



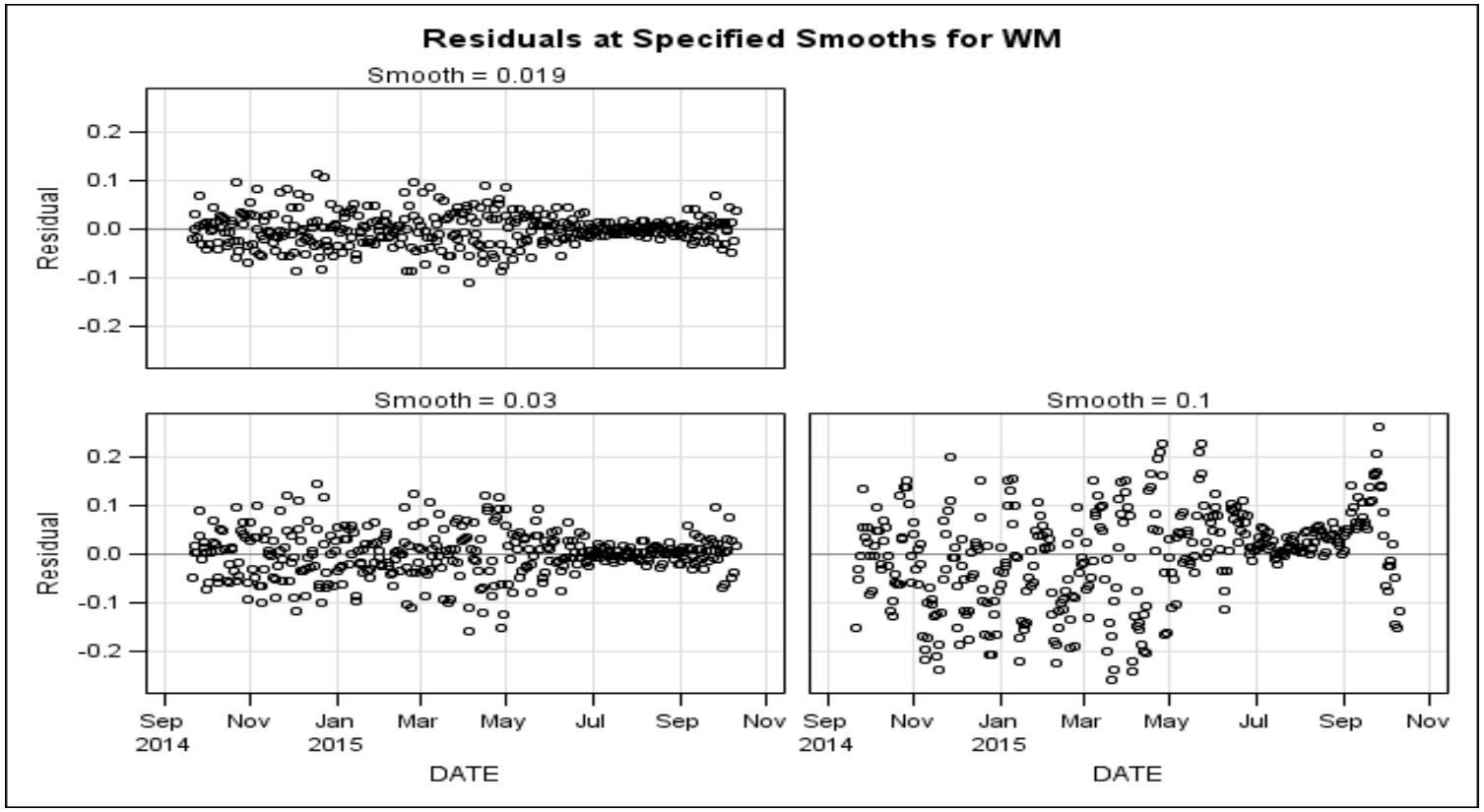
Draft SNCWV for WM – LOESS Smoothing vs Current SNCWV – Apr to Jun



Draft SNCWV for WM – LOESS Smoothing vs Current SNCWV – Jul to Sep



Draft SNCWV for WM – Comparison of Residuals for LOESS Smoothing parameters



Summary of LOESS Investigations

- The following smoothing options have been investigated by Xoserve:
  - 5 day centred moving average: This is consistent with the smoothing applied by the Met Office in their models
  - Loess 10% parameter: This appears too smooth with much of the signal averaged away
  - Loess 3% parameter: This applies a smaller level of smoothing which appears to retain some of the signal
  - Loess 1.9% parameter: Recommended statistically by SAS and appears similar to the 5 day moving average
- TWG thoughts on smoothing options to be applied to SNCWV ?