



Surface Area Weighted Stage Estimation in AADF, cont'd
Presented to the Swan Falls Technical Working Group
April 27, 2016
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Overview

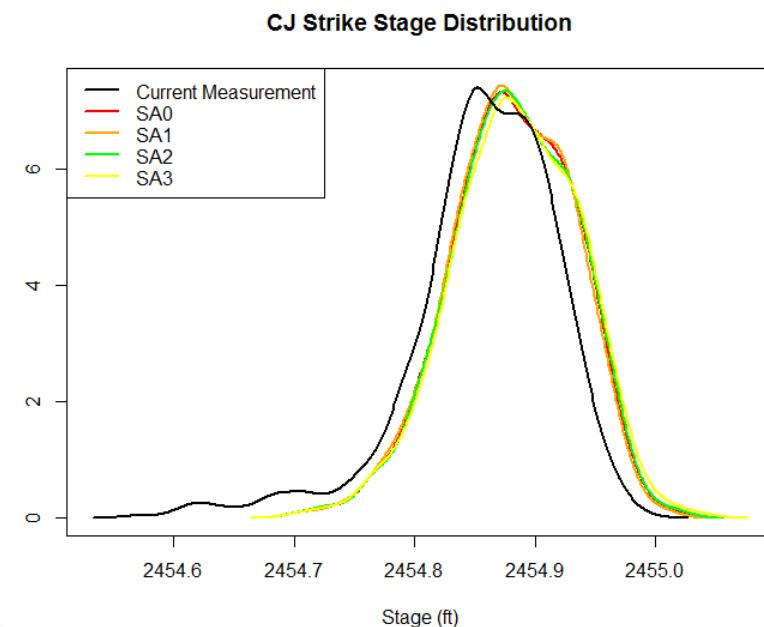
- Review of previous findings
- Evaluation of weighted stage method SA1
 - AADF Analysis
 - Stage, Δ Stage Analysis of 2015
 - Impact to 2015 Shortfall
- Conclusions and Recommendations

Storage by Arm Options



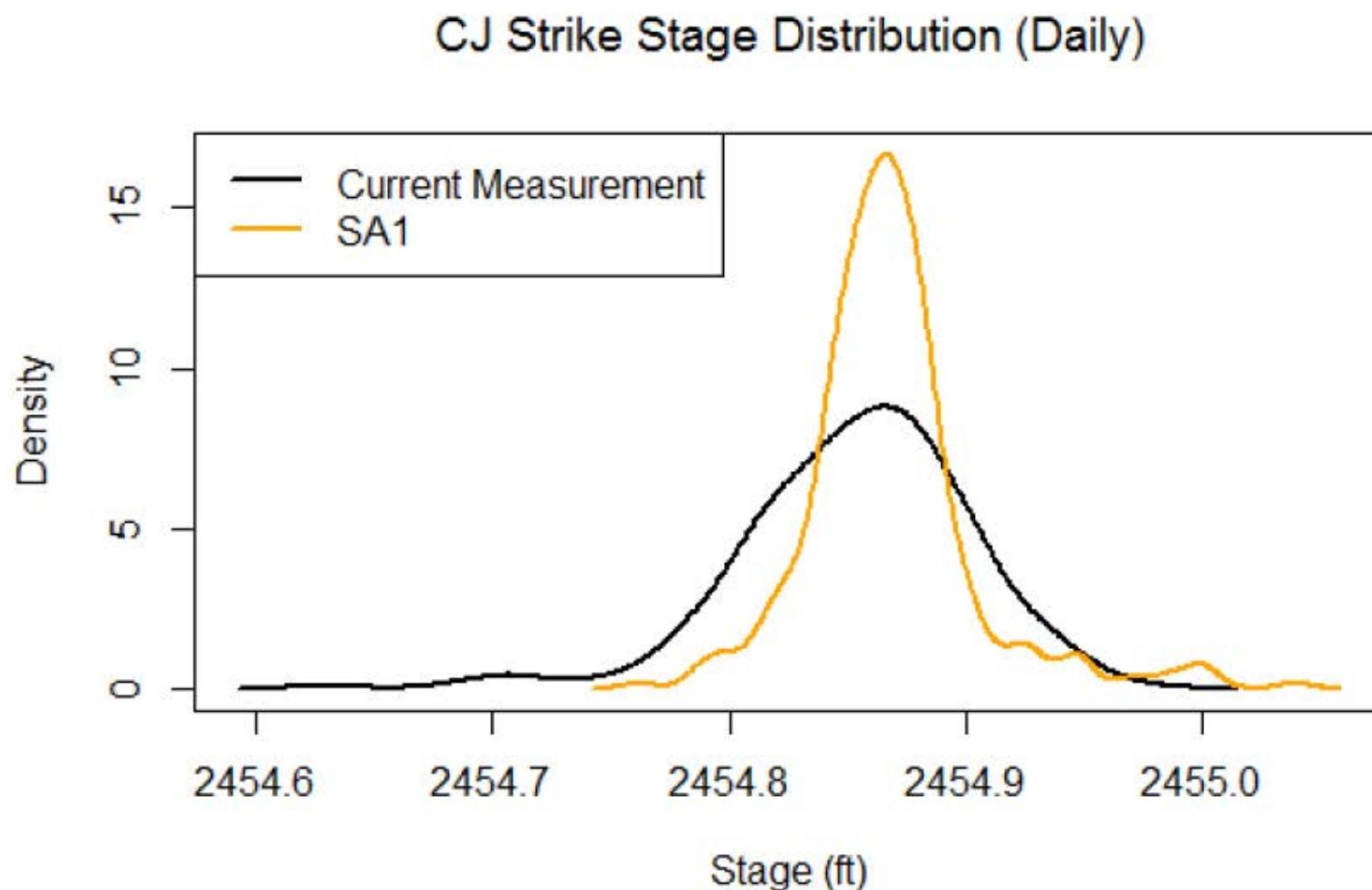
From IPCo's 12/1/2015 presentation to the SFTWG

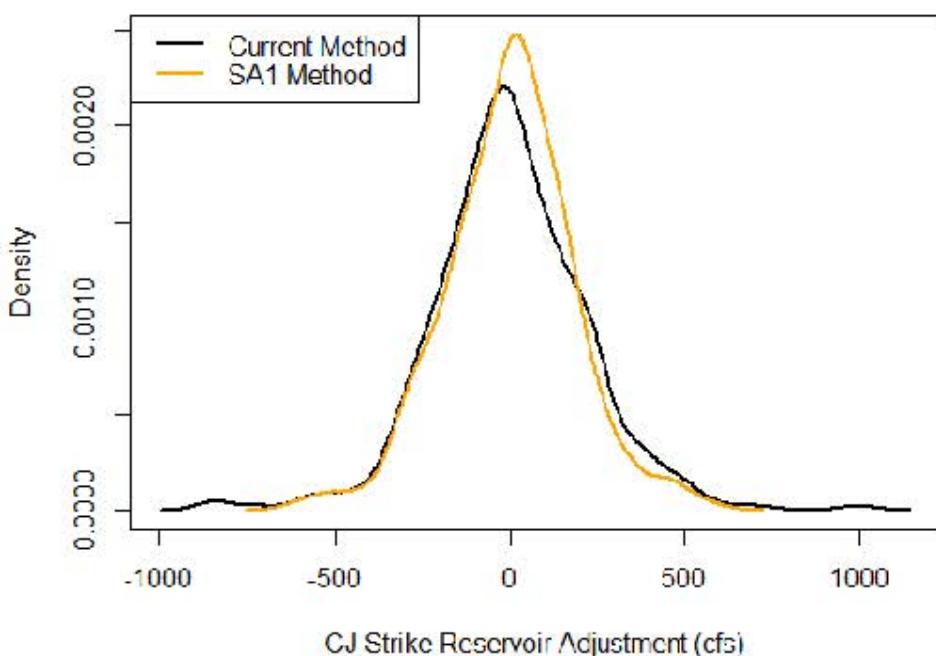
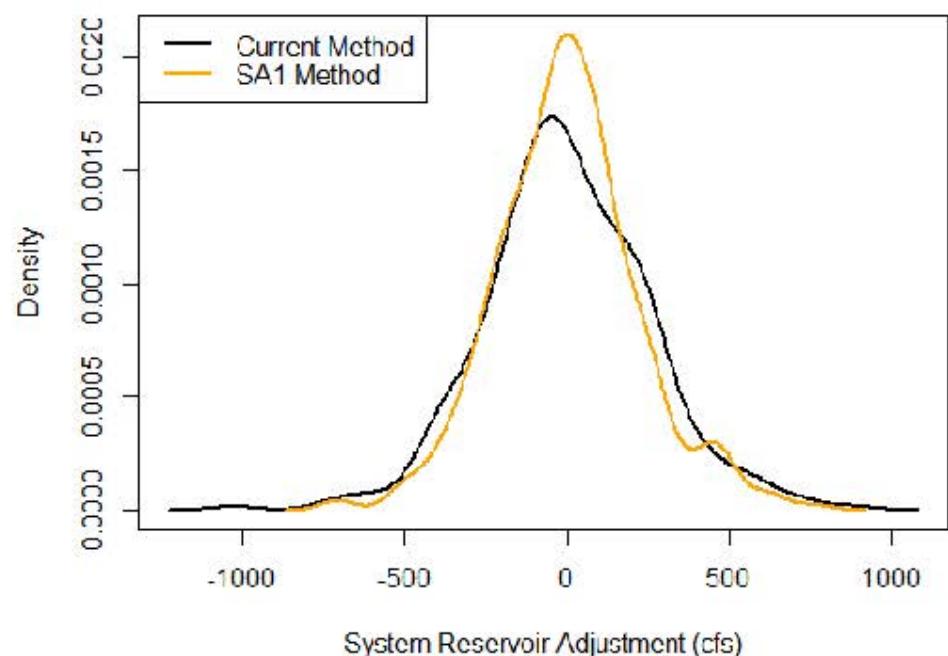
- Previous analysis limited to December 2015
- Findings
 - Two methods are from distinct distributions
 - Composite gage distributions showed less variance and reduced potential for outliers
 - All 5 methods were in good agreement with daily Δ stage $< 0.05'$
 - Methods diverge with Δ stage $> 0.05'$
 - Single gage method exaggerated change
 - Composite methods show slight differences
 - SA1 method was selected for further analysis
 - Least weight attributed to Loveridge
 - Tightest distribution

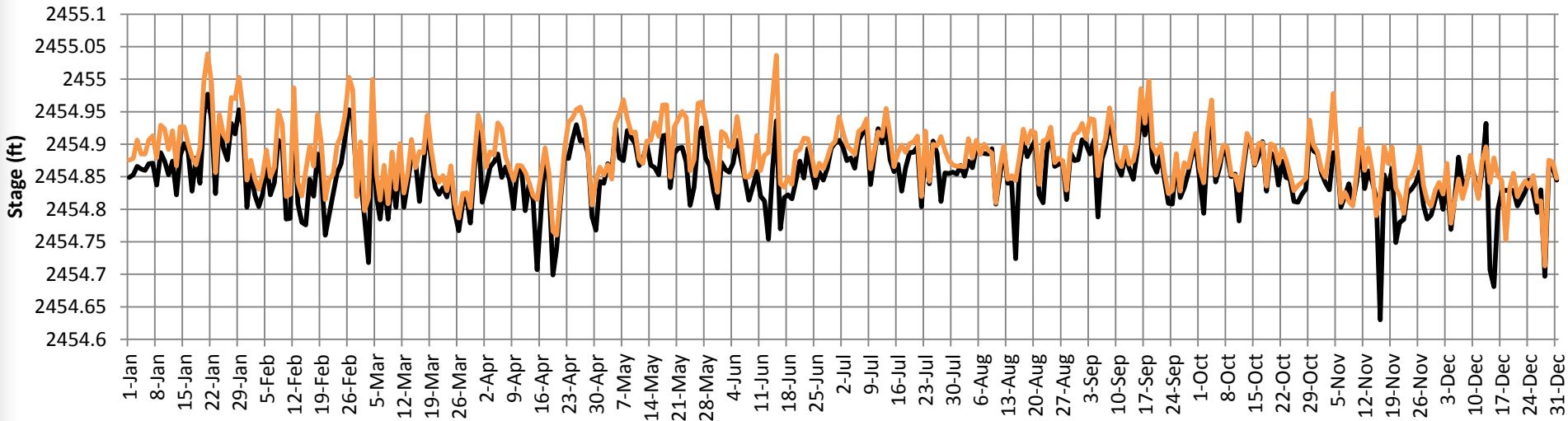
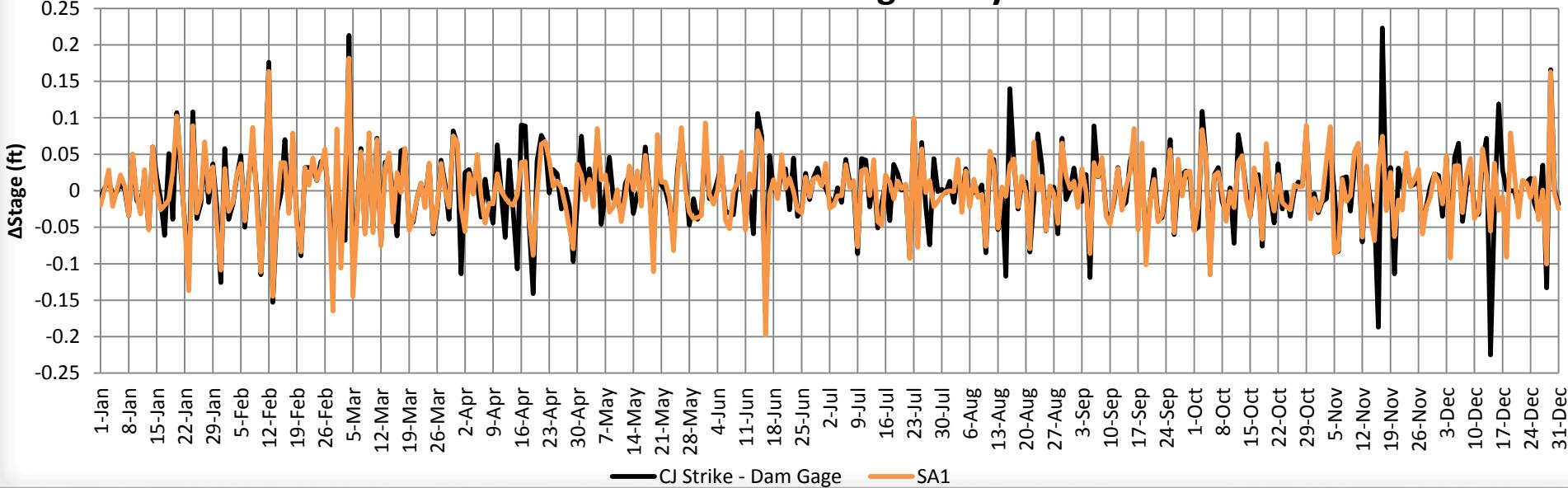


Analysis Overview

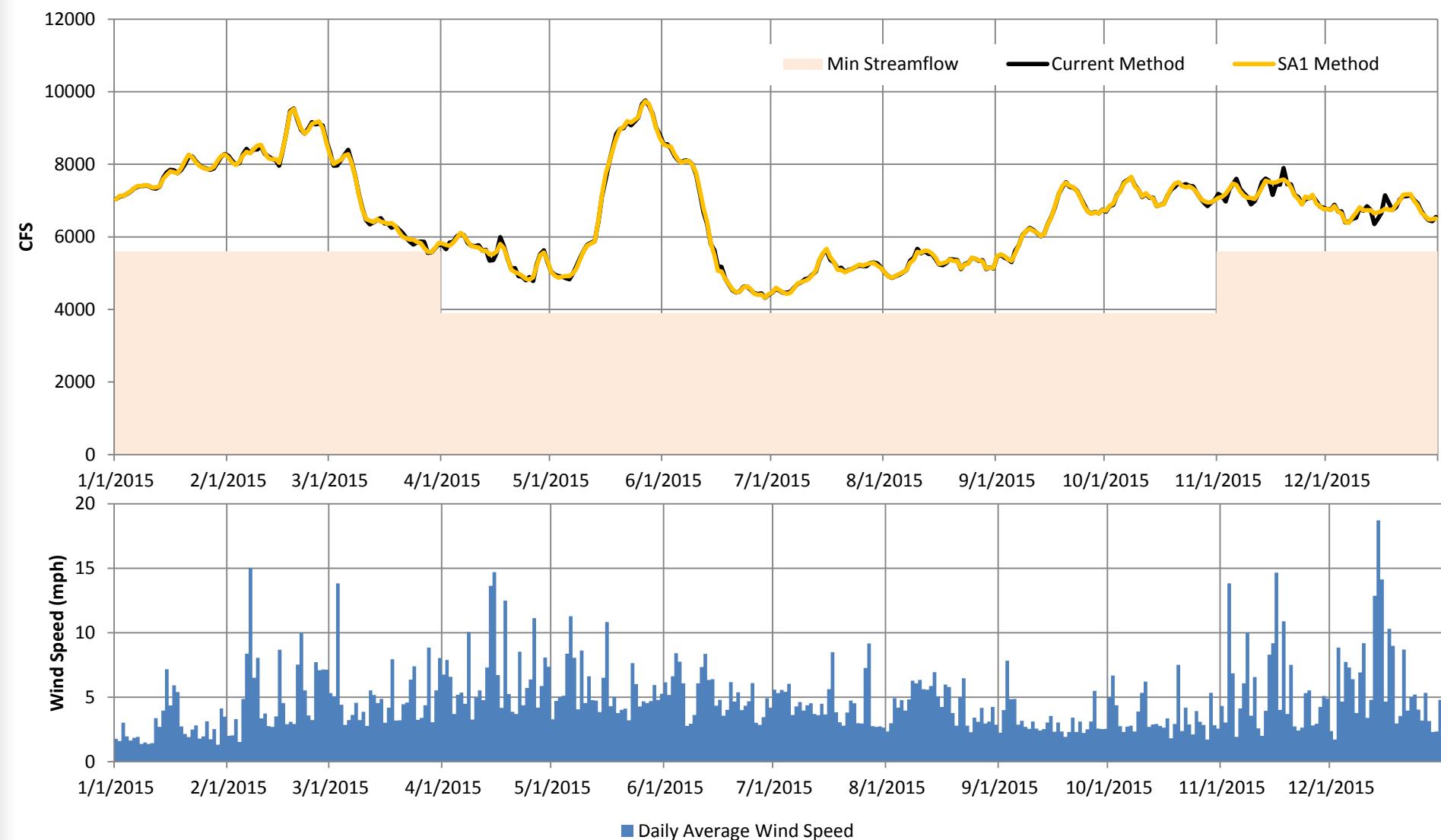
- I. Extend analysis to 2015 dataset
 - I. Distribution of 2015 daily stage, Δ stage
 - II. Impact to 2015 Shortfall



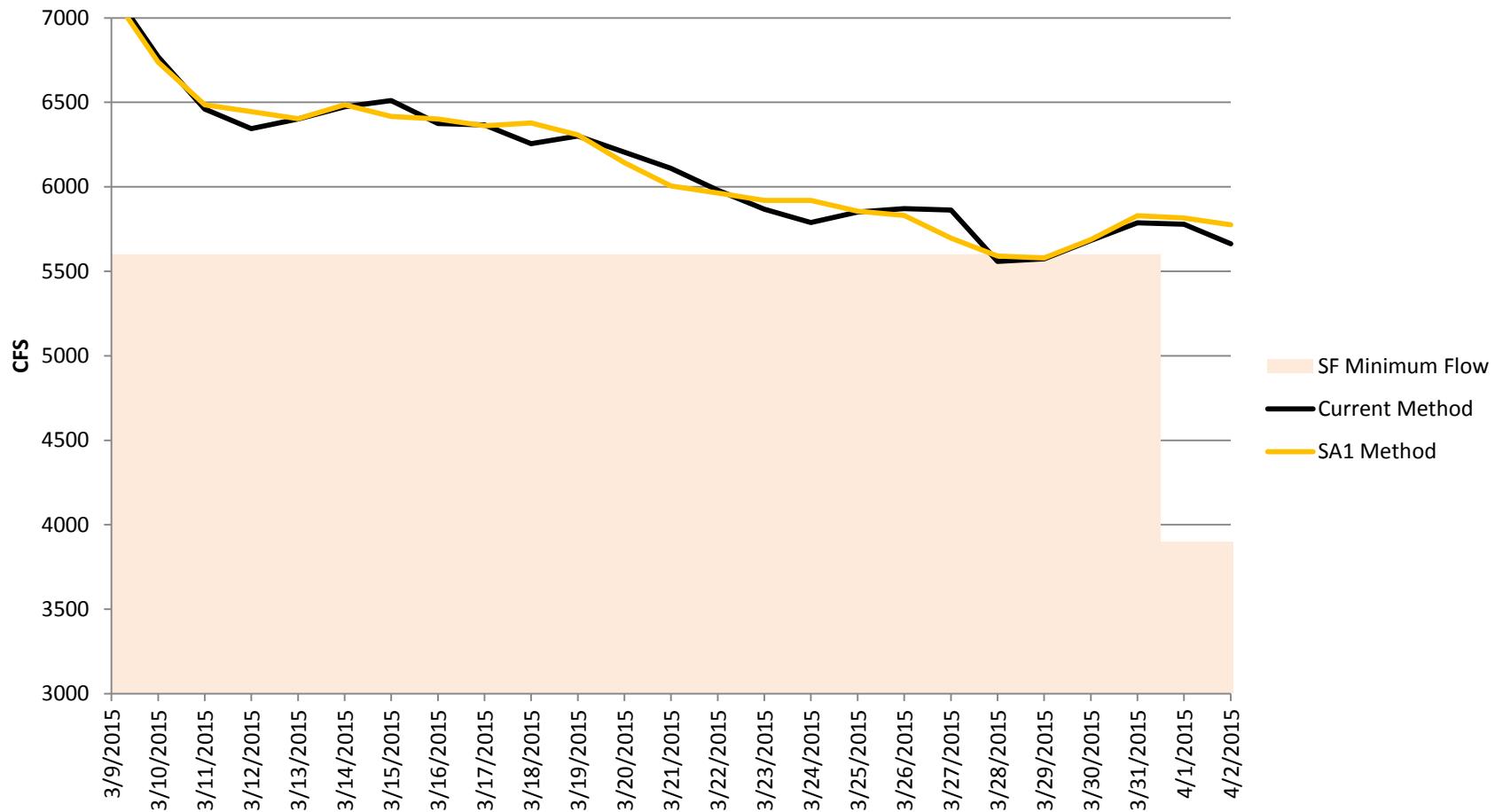
CJ Strike Reservoir Adjustment Distribution (Dally)**System Reservoir Adjustment Distribution (Dally)**

2015 CJ Strike Headwater**2015 CJ Strike Δ Stage Daily**

2015 AADF



AADF Comparison - Shortfall 2015



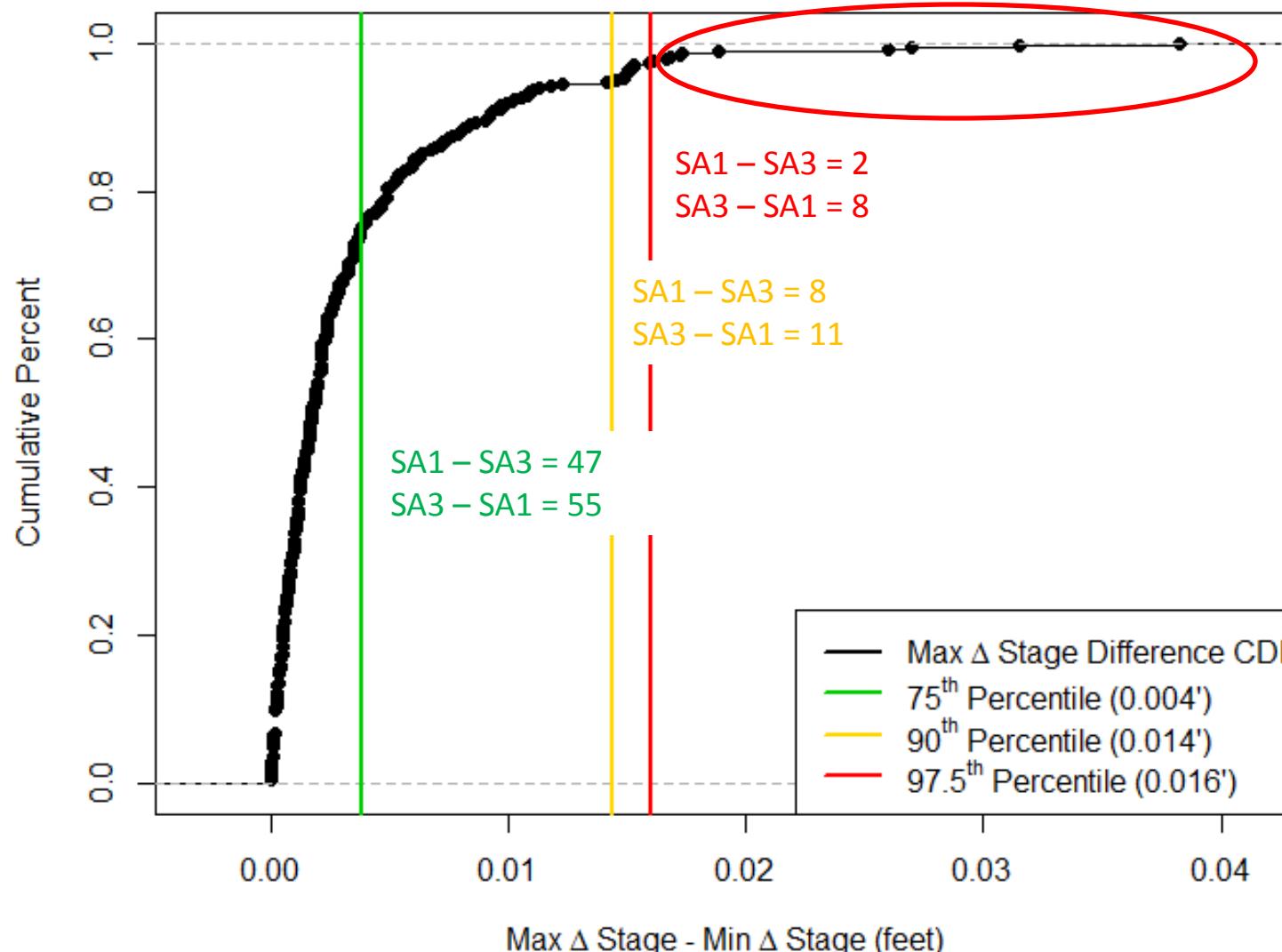
Date	3 day AADF (cfs)			
	Current Method		SA1 Method	
	Res Adjust (cfs)	Flow (cfs)	Res Adjust (cfs)	Flow (cfs)
3/26/2015	116	5883	106	5831
3/27/2015	55	5860	-18	5696
3/28/2015	-370	5541	-136	5590
3/29/2015	244	5563	130	5579
3/30/2015	450	5675	372	5689
3/31/2015	-76	5839	83	5828
Total Shortfall		190		61

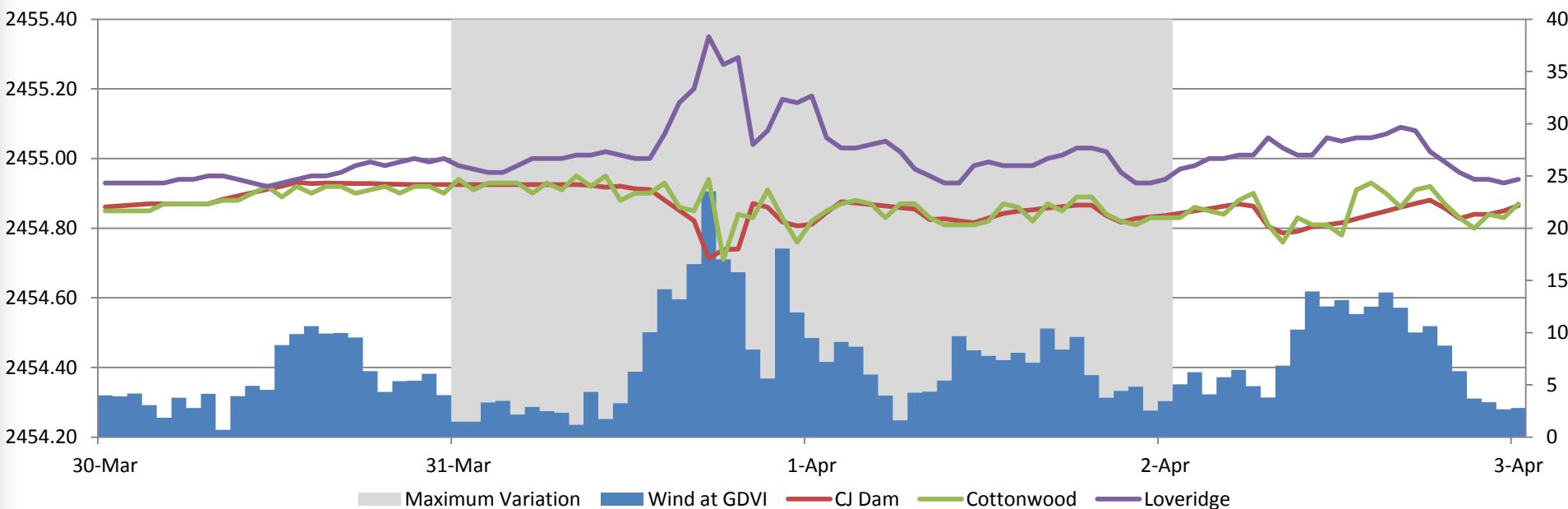
Conclusions

- Surface area weighted headwater estimation
 - Reduces variability of AADF
 - Less susceptible to wind induced error
 - Simple methodology
 - Easily implemented
- Results of December 2015 are generalized to entire year

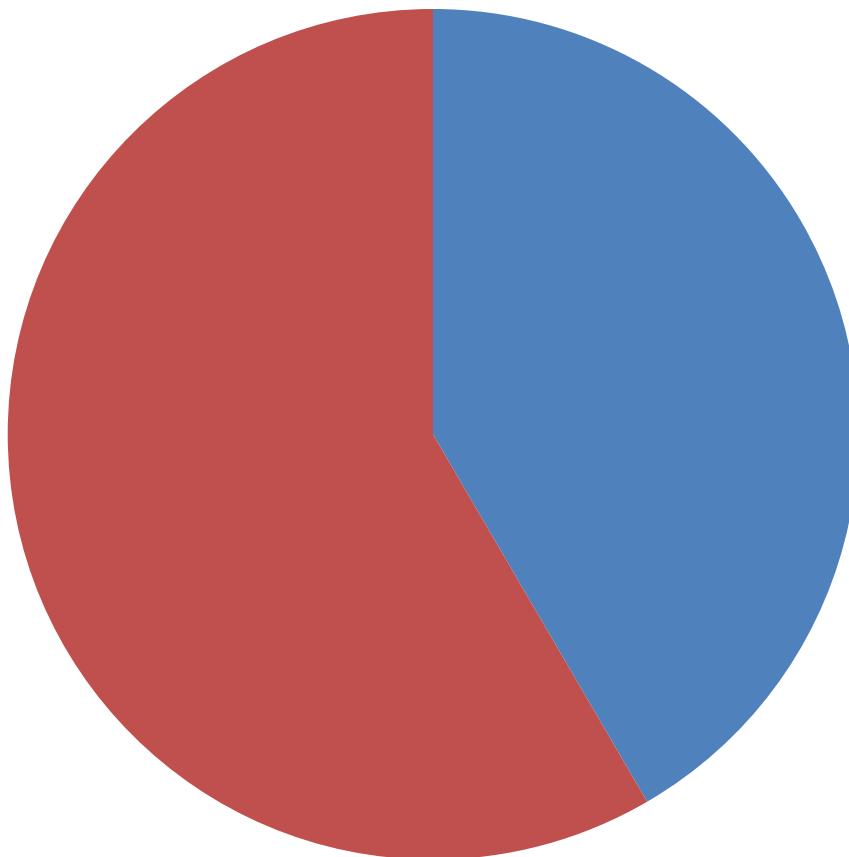
Recommendation

- Monitor 2016 with single and composite gage methodologies

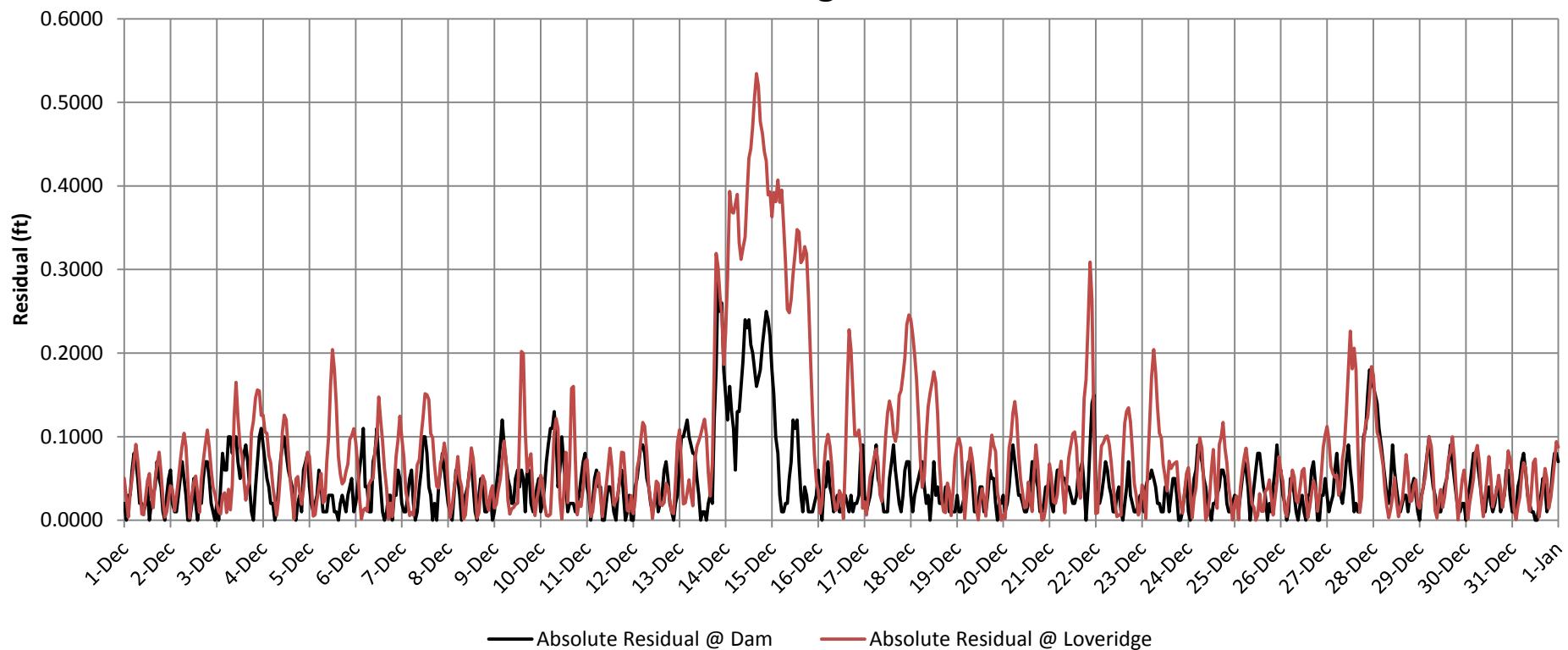
Cumulative Distribution Function of Δ Storage (Daily)



Maximum Absolute Value Frequency



■ SA1 ■ SA3

CJ Strike at Dam and Loveridge Residual from Median

Conclusions

- Weighted average stage estimation apparently reduces wind induced error
- SA1 attributes least weight to Loveridge and is most defined Δ stage distribution
- Weighted stage estimation exaggerates Δ stage when all gages show similar trends
- Smoothes AADF

Recommendations

- SFTWG should consider implementation of weighted average stage estimation
- Extend analysis beyond December 2015 data
- Further analysis of inflow and outflow to determine validity of weighted average stage
- Further analysis of potential Loveridge time lag