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Stage-Discharge Rating with ADCP Measurements

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Presentation Outline

- Introduction
- Discharge measurement techniques
- ADCP data analysis
- Stage-discharge rating
- Conclusions

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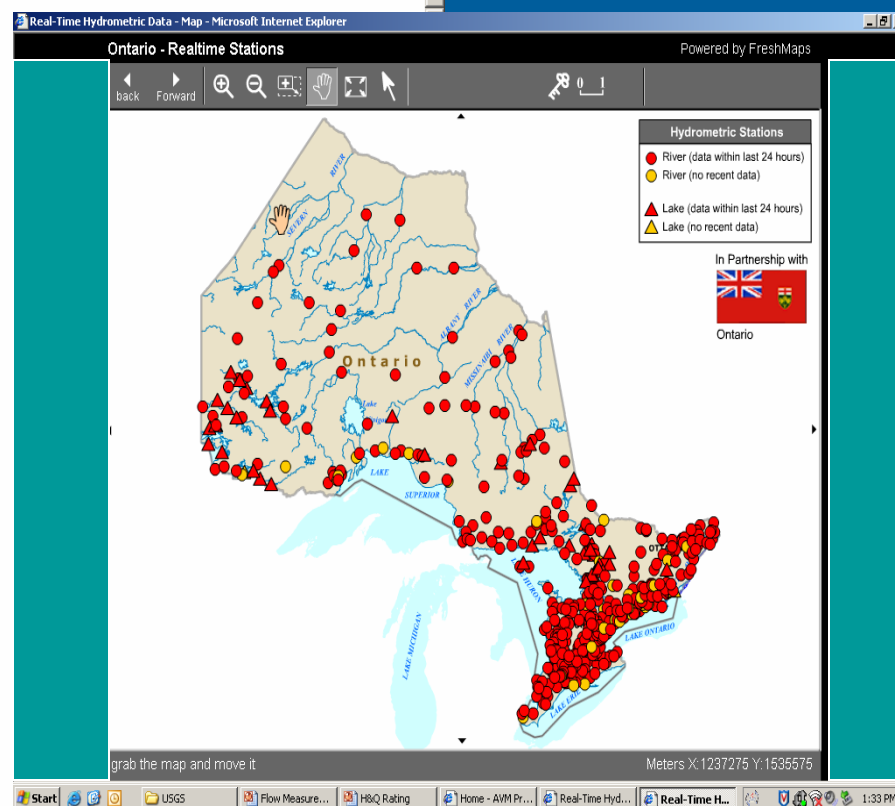
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Comments to: Water Survey Branch
Information last updated: 2006/05/24

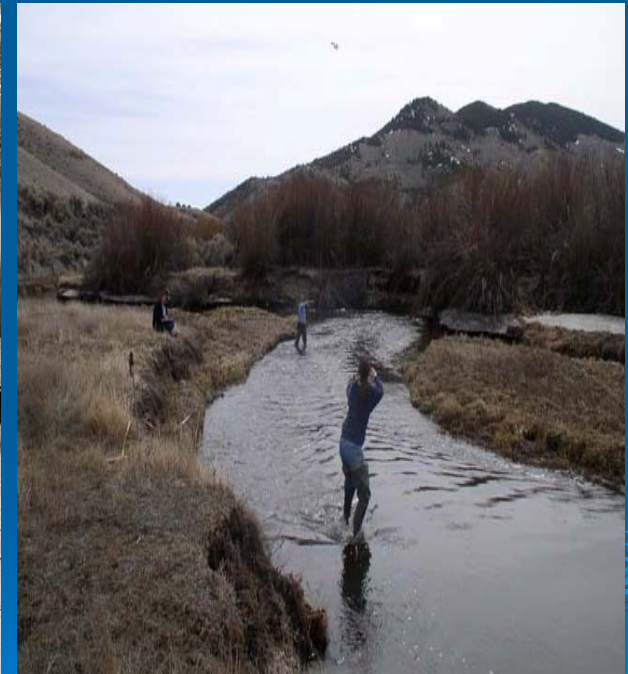
Start USGS Flow Measurements H&Q Rating Home - AVM Project Water Survey Ca... 1:28 PM



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Discharge Measurement with Traditional Techniques



Limitations of Current Meter Measurement

- Discrete points and assumed vertical velocity profile
- Limited range of velocity (>6 cm/s)
- Time consuming
- Safety concerns

Discharge Measurement with Acoustic Techniques



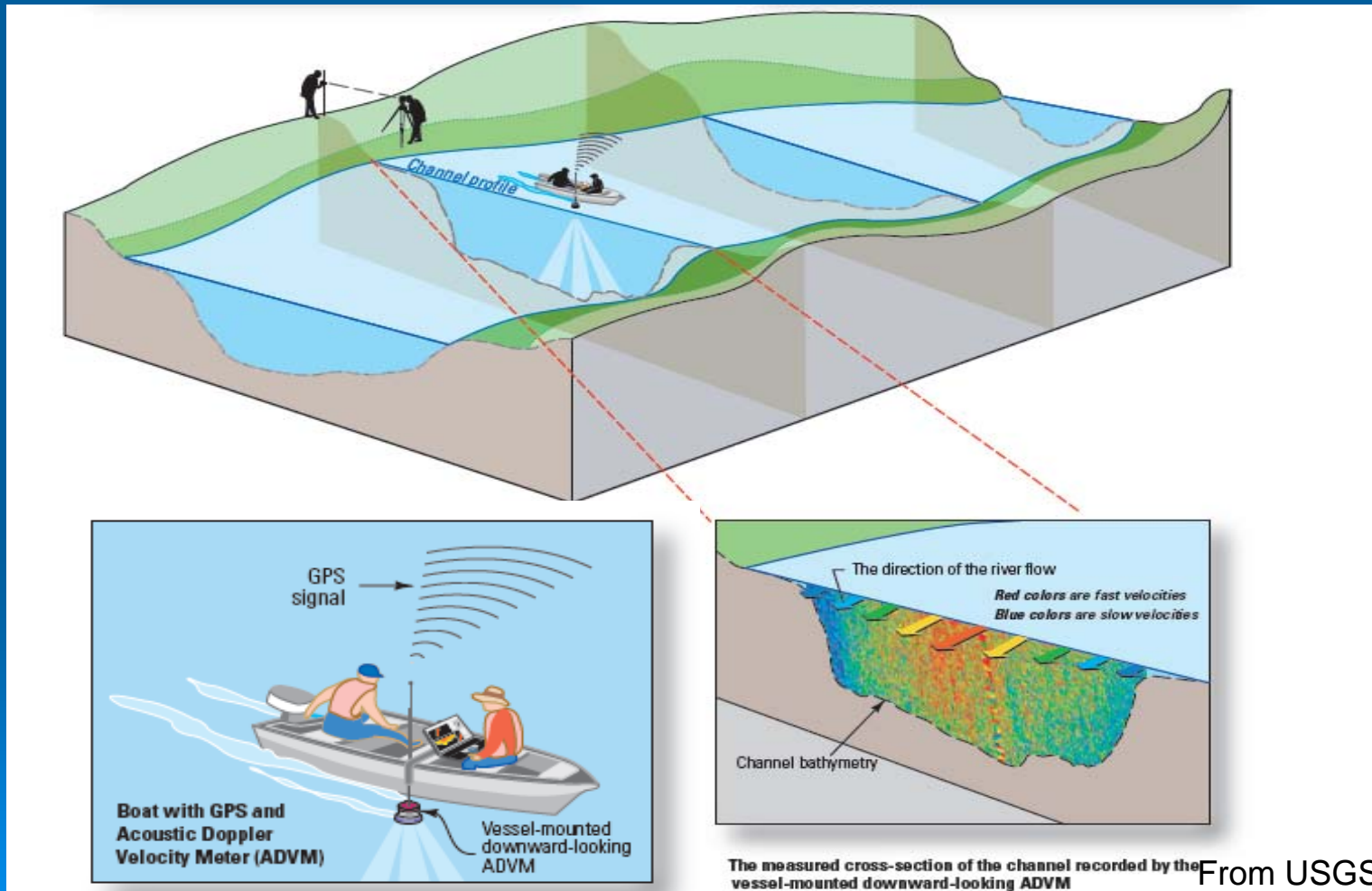
Advantages of Acoustics Techniques



- Continuous velocity profiling with directional capability
- Extended range of velocity measurement
- Shortened field measurement time
- Ability to correct data files in post-processing
- Safety concerns decreased

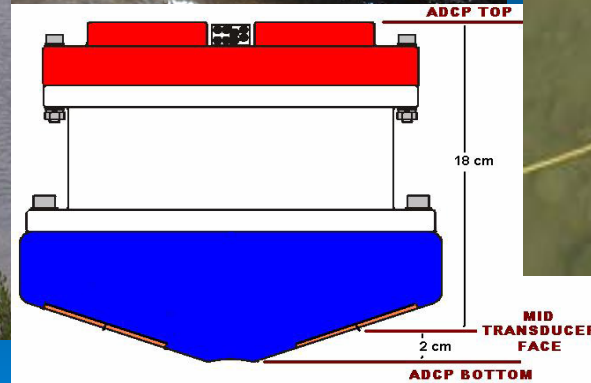


Discharge Measurement with ADCP

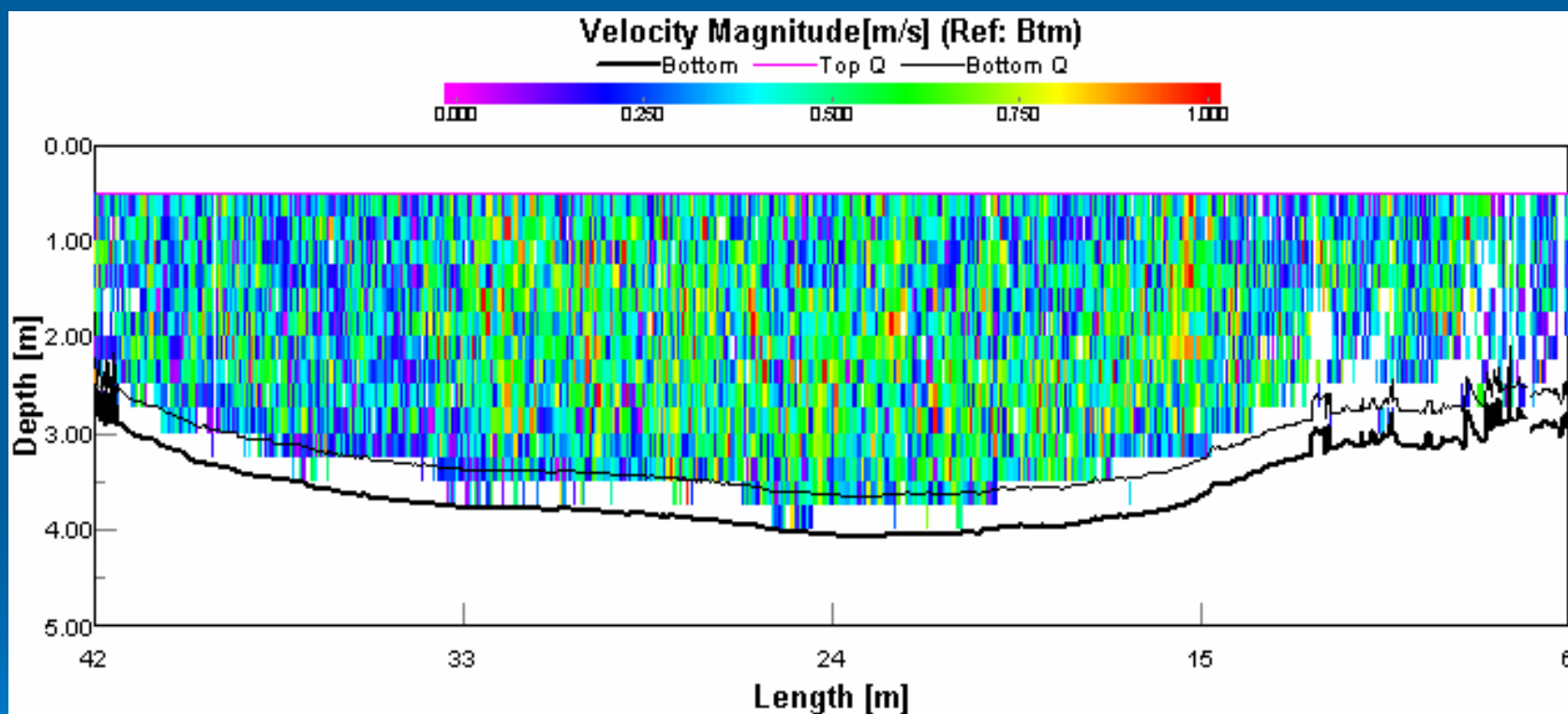


From USGS report

Discharge Measurement with ADCP (Cont'd)



Velocity Magnitude Contour



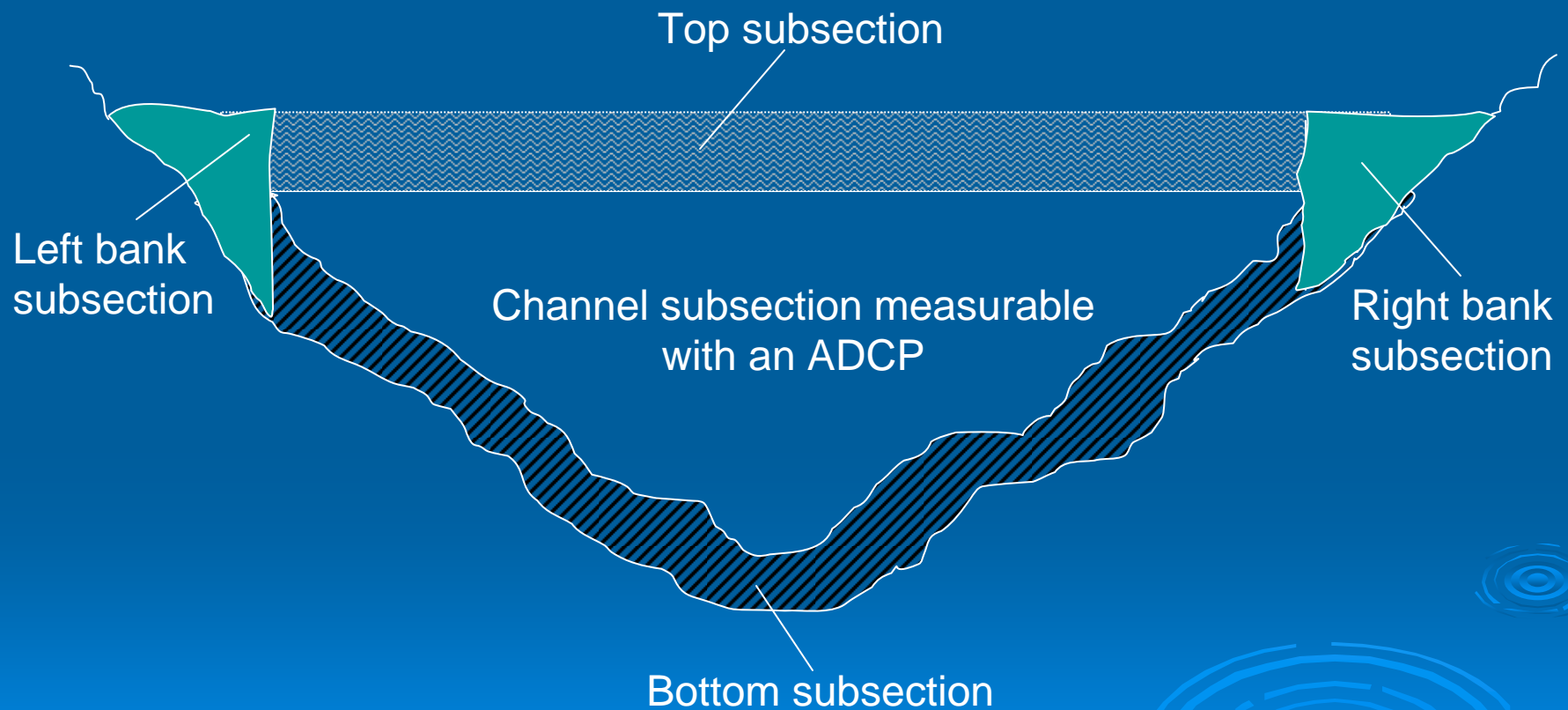
Discharge Measurement June 11, 2002



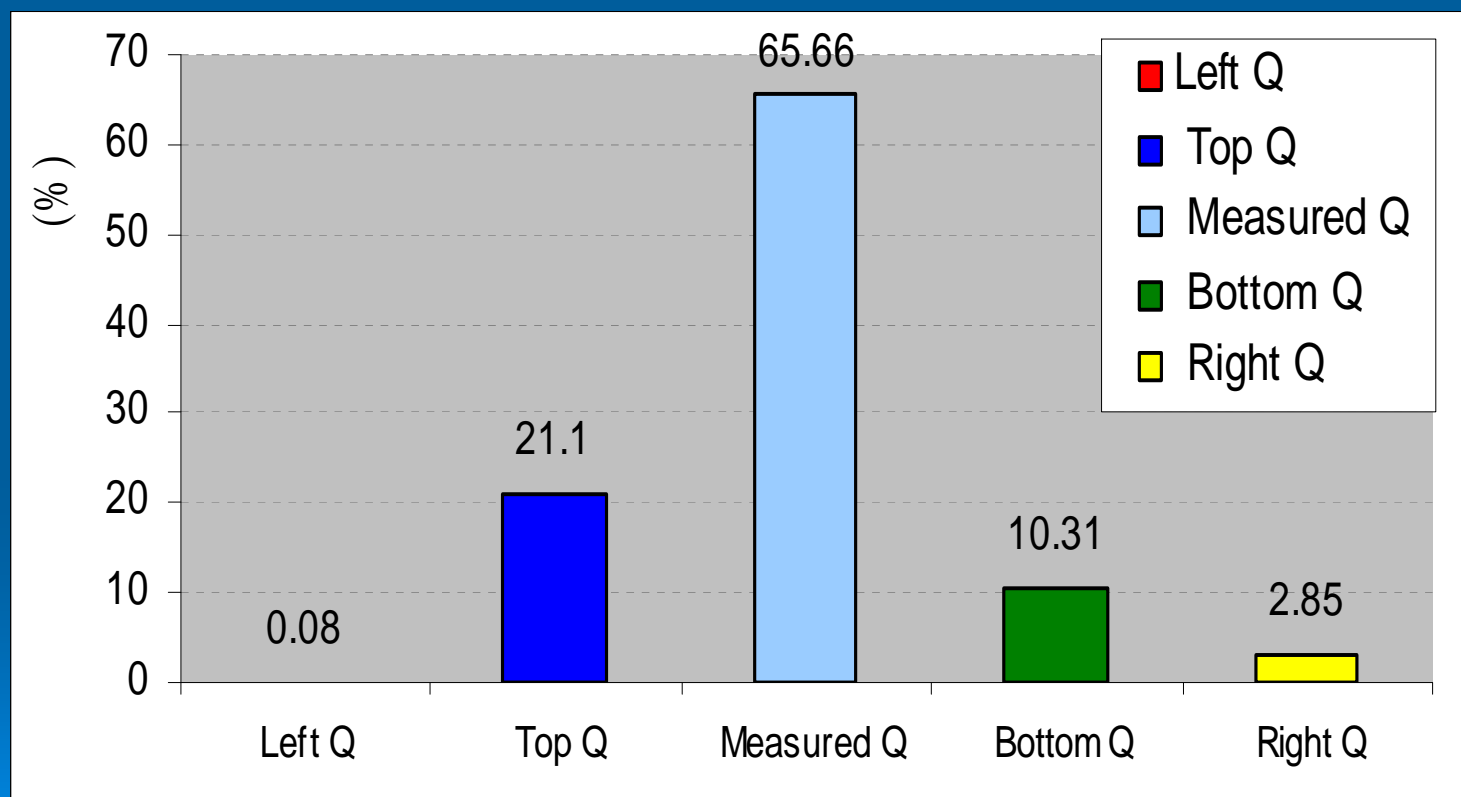
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Discharge Measurement with ADCP – 5 Components



Percentage of ADCP Measured Component Q



Correlation Among Component Discharges (Q-Q)



	Q_{total}	Q_{left}	Q_{top}	Q_{m}	Q_{bottom}	Q_{right}
Q_{total}	-					
Q_{left}	0.655	-				
Q_{top}	0.936	0.851	-			
Q_{m}	0.997	0.626	0.914	-		
Q_{bottom}	0.981	0.753	0.981	0.964	-	
Q_{right}	0.503	0.310	0.473	0.471	0.538	-

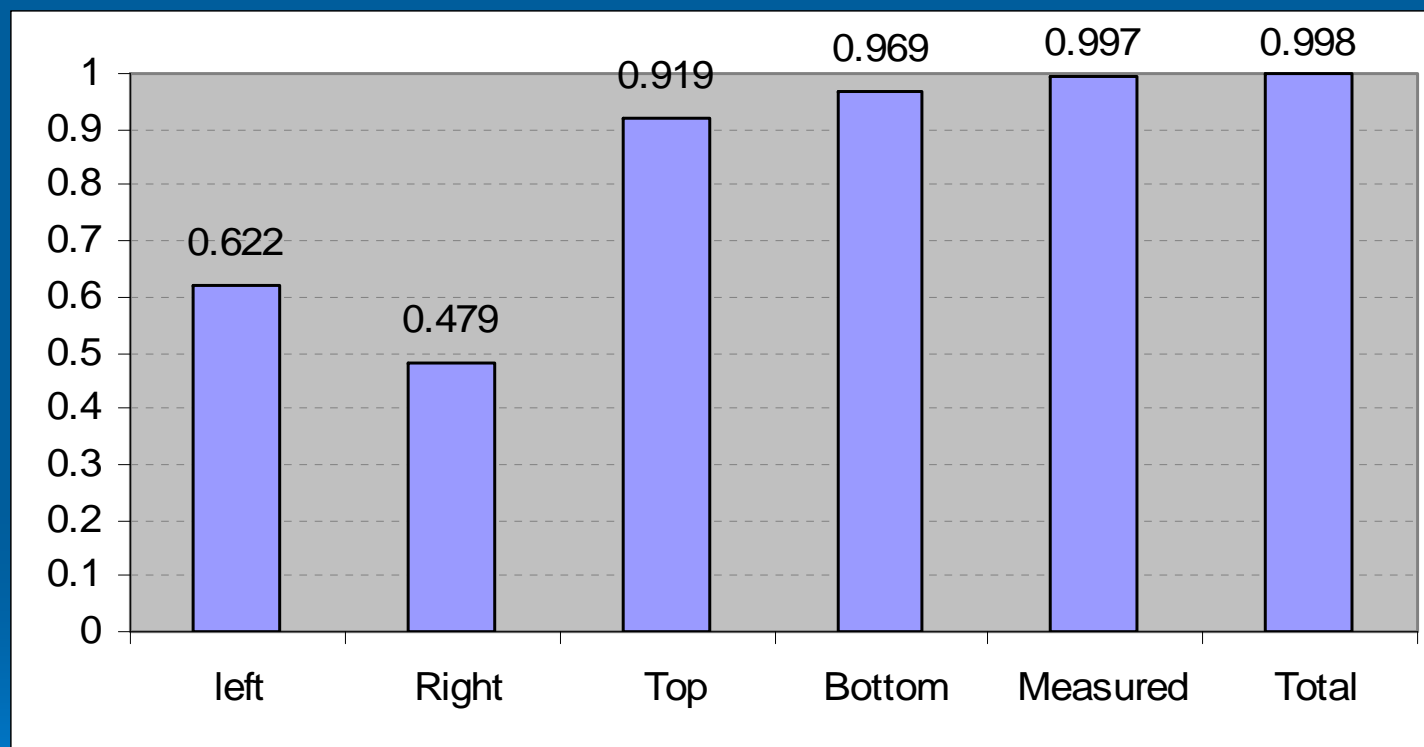
Pearson Correlation



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Correlation Analysis of Component Discharge (H-Q)



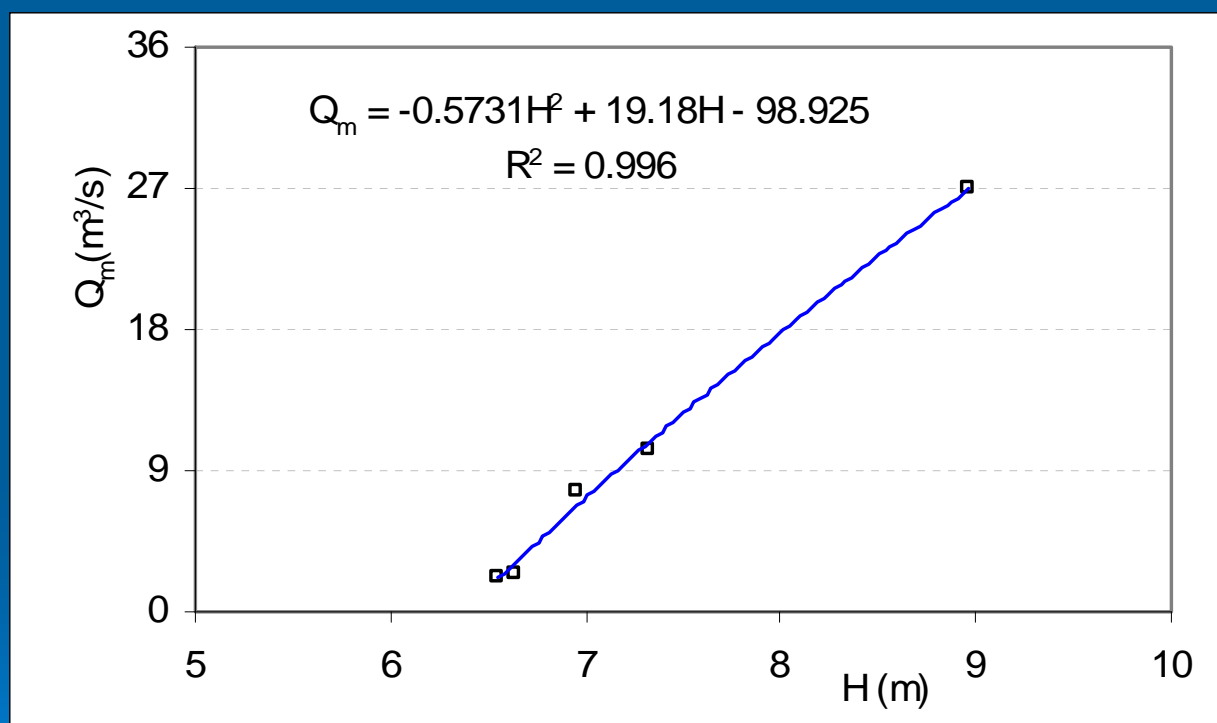
Discharge Computation Methods



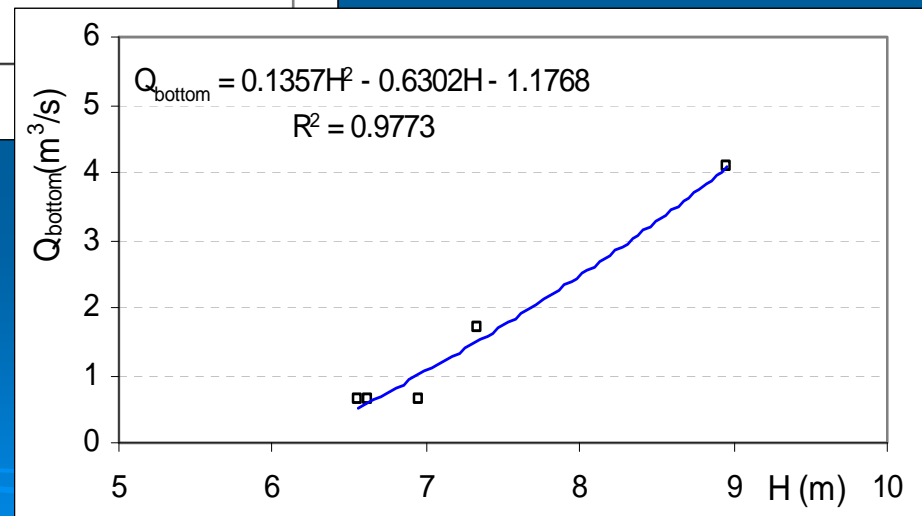
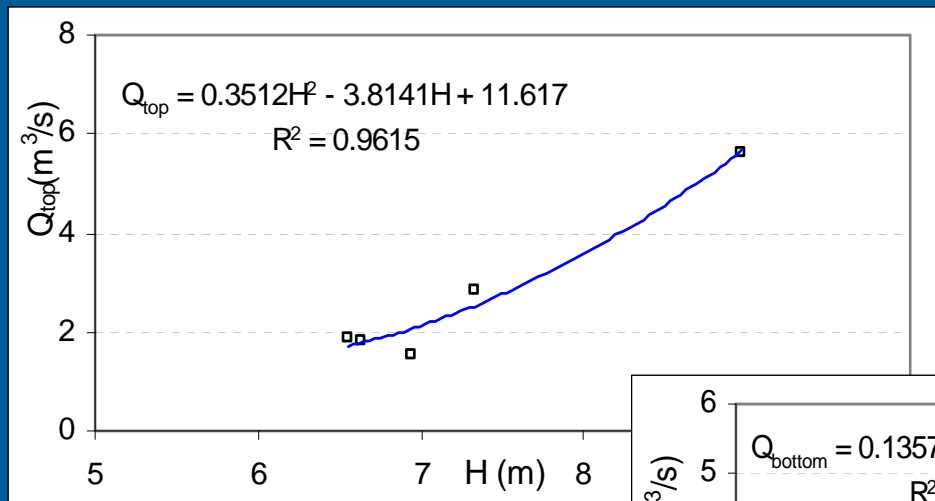
- Standard stage-discharge rating
- Non-standard methods for discharge computation
 - Index-velocity rating
 - Flow-velocity distribution



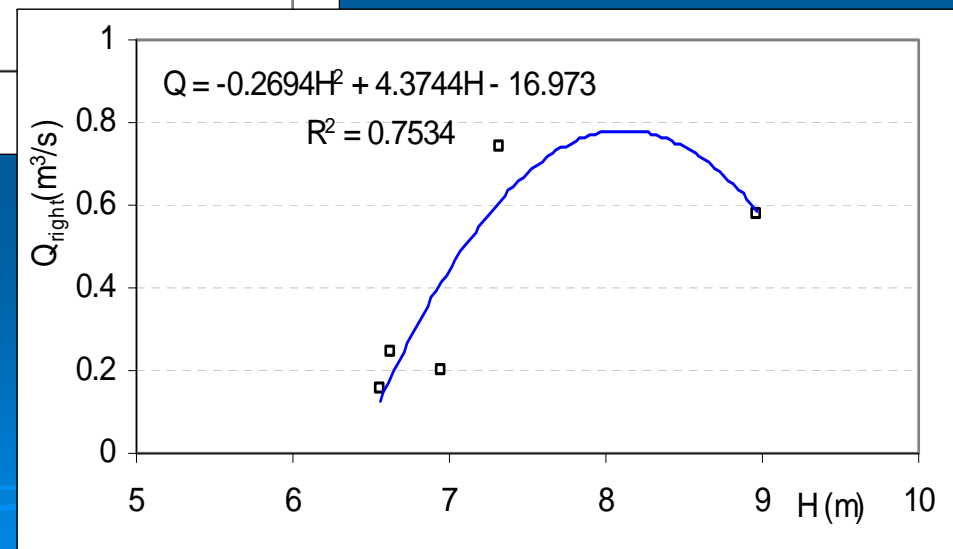
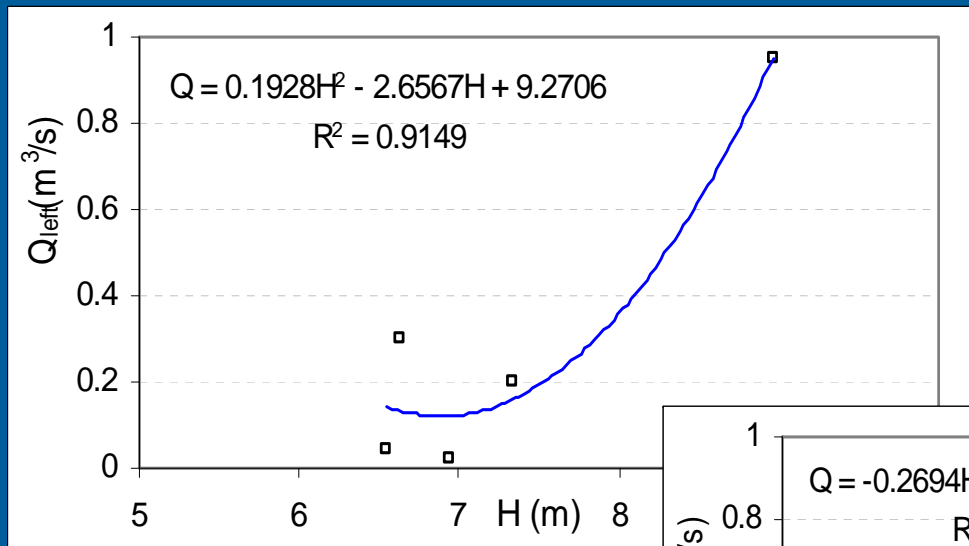
Stage vs. Measured Q Rating



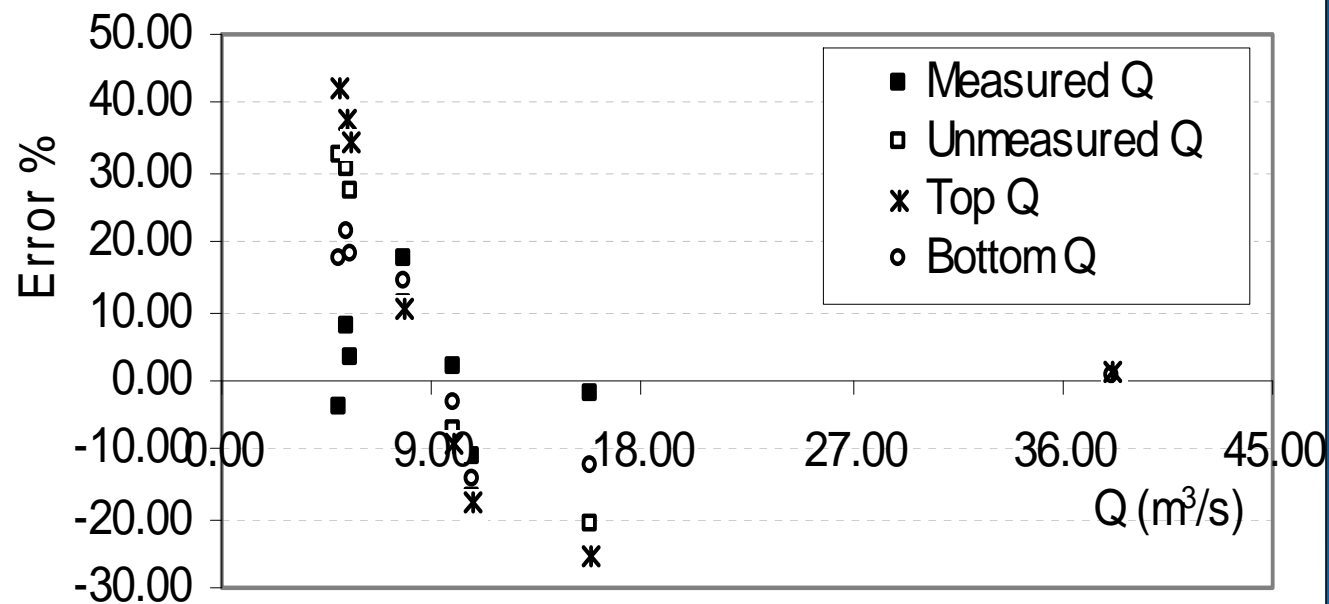
Stage vs. Estimated Top, Bottom Components Q Rating



Stage vs. Estimated Left, Right Components Q Rating



Stage – Discharge Rating Results Comparison



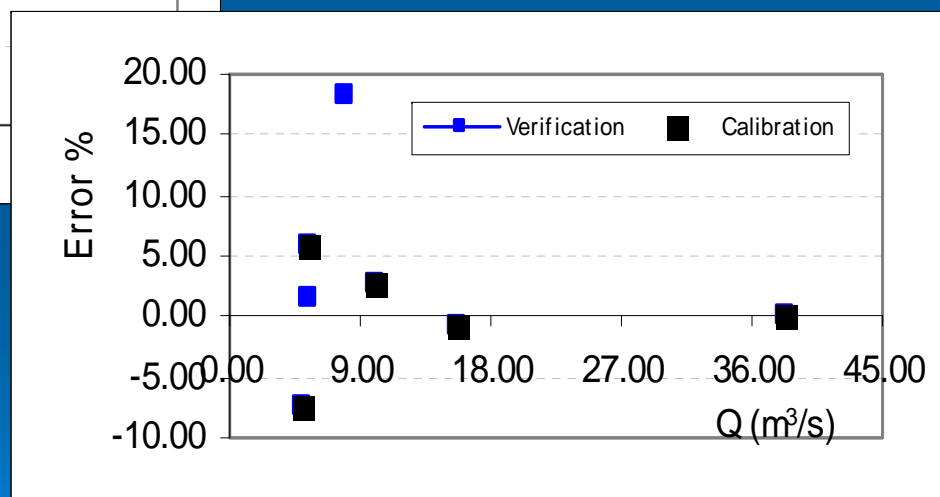
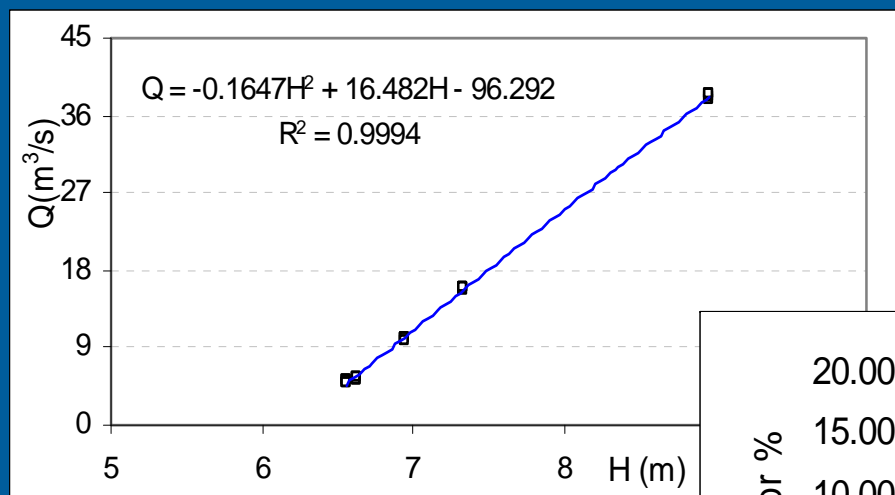
H&Q Rating with Single Transect Measurements



- Discharge measurement from each transect is considered as an independent measurement
- Significantly increase the number of measurements for rating curve development



H&Q Rating with Single Transect Measurements



Conclusions



- ADCP measurements with 5 components allow for exploration of disaggregated rating methods
- Component discharge rating
 - It appears that H-Q rating quality does not vary significantly, regardless of whether discharge components are summed prior to rating calibration, or if individual component rating results are summed
 - Component discharge percentages can provide future knowledge of error sources at particular sites

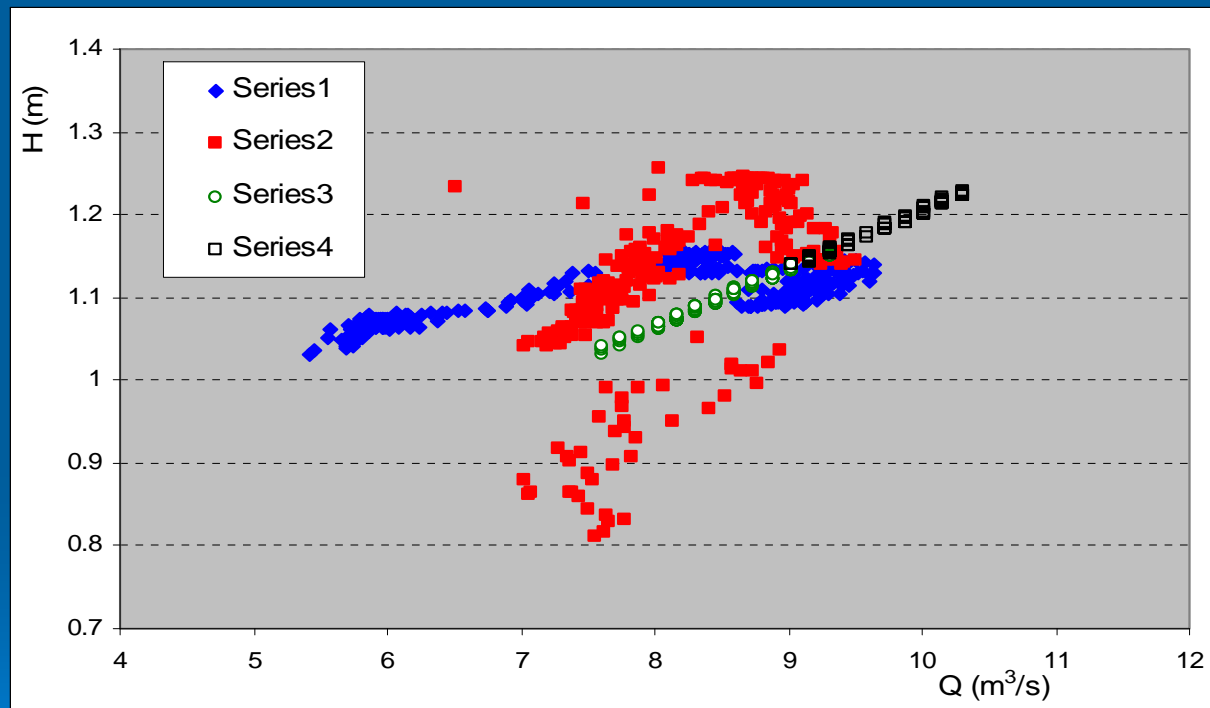
Conclusions (Cont'd)



- Single transect analysis
 - Using an average of 4 transects or individual transects does not significantly affect the H & Q rating accuracy
 - Further study with rapidly changing stage could provide more depth to this analysis



Comments on Stage Discharge Rating



Comments on Stage Discharge Rating (Cont'd)

