

# The ADCP, Sediview Software & the estimation of Suspended Sediment Concentration

This Presentation is Designed to Give a "Brief" overview of what an ADCP is and a software package that is available, which may enable us to value add to data we already collect.





- An Acoustic Doppler Current Profiler uses the doppler principle to calculate water velocity.
- What's that?
- Well, To put it very simply, it uses sound waves, something like a depth sounder on a boat. The sound waves reflect off particles in the water and the speed at which the sound waves return to ADCP allow the instrument to determine velocity.
- I could go on for a great deal longer, but I won't.



### Department of NR&W ADCP Stream Flow Gauging setup



## We currently use Acoustic Doppler Backscatter to collect stream flow information



### ADCP File captured during stream flow measurement Fitzroy River Jan. 2008





- The Department of Natural Resources & Water, currently runs the SMP.
- However, the methods developed to collect sediment samples in flooded rivers can be extremely hazardous to the staff involved.
- So is there another way?



## Sediview?

What is it and what does it do?

Sediveiw is a software package which calculates TSS concentrations from ADCP backscatter. We currently already collect the backscatter data during stream flow measurements. So why not extract as much information as possible.



Sampling devices such as the P61 sediment sampler have been used to collect point water samples.

Current methods do work. However, there are inherent dangers involved with sampling methods.

Having a large weight (60kg) connected to the vessel in flooded rivers can be hazardous



#### **SMP Sampling Procedure**

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- Currently data is being collected and loads are calculated using discharge/point water sample technique.
- Sediview derives suspended solid estimates from raw binary files collected by the ADCP.
- The aim in using Sediveiw is to reduce the amount of sampling required and reduce the potential dangers to those collecting the data.



#### An alternative method of collecting water samples



#### **Modified Van Dorn sampler (5Kg)**



#### Sampling Transect & Locations Fitzroy 2008





- We require ADCP backscatter
- We also require calibration samples
- Why?
- The ADCP backscatter cannot tell us particle size or the actual concentration of the sediment (TSS).
- So, we still need to collect water samples to provide TSS and PSA information.



- P61 method requires 13 samples per cross section using a large boat and a minimum of five sample runs per hydrograph and a minimum of 4 staff.
- Sediview method, the number of samples can be determined by viewing ADCP backscatter, 2 - 3 staff.
- Possibly 4 6 calibration samples per cross section, collected using a small punt (depending on size of event).
- P61 calculation uses single points in time taken over many hours.
- Sediview uses ADCP data from across the entire cross.



## 4.6m vessel required for P61 work





## ADCP Backscatter Profile Nogoa River





## **Sediview Calibration Screen**

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#### Individual beam backscatter prior to calibration





## The Basic Backscatter Relationship





## Individual beam post calibration





#### Average of the backscatter from the four beams

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- By using Sediveiw we hope to establish a correlation between cross sectional sediment distribution and the loads carried.
- Will that be of any use?
- By establish a relationship between TSS and discharge we should be able produce real time TSS data, which can then be translated into an event based sediment curve, in much the same way a hydrograph is created.



- We will still need to collect samples to calibrate Sediview.
- However, we will reduce the amount of time required to collect samples due to the method used to collect them.
- Which in turn should minimise the exposure to hazards
- By using the Backscatter data we will have real time data showing the cross stream concentration, the effects that eddies may have on load as well as changes in velocity.
- As well as the actual discharge of course.







## Fitzroy River 2008, P61 vs. Sediview





## ADCP Backscatter over a 12 day period

