

Welcome, this podcast was developed by the USGS Hydroacoustics Work Group to help users master the WinRiver II Measurement Wizard when using a Rio Grande ADCP. I'd like you to remember that the use of trade names does not imply endorsement by the USGS.

- As you know, the measurement wizard in WinRiver II takes field condition information provided by the user and it uses that information to optimize the ADCP configuration, displaying a summary of how the instrument will be configured. After this podcast, we hope you will be able to use the wizard more effectively as another tool to help collect the best final product possible, our river flow.

-The wizard is accessed by selecting File > New Measurement, or by selecting the lightning bolt in the toolbar.

-First, the measurement wizard has panels for site information and rating information. These panels hold information useful to the collection of a discharge measurement, but have no effect on the configuration of the ADCP. The station number and measurement number may be important to enter as they are both used in the file name for data output as a default.

-Once the configuration dialog is opened the software attempts to connect to the ADCP using the port settings defined in the Configure>Peripherals menu option. If the connection is successful, the red indicator light in the upper left corner of the dialog should change to green. The ADCP type, frequency and serial number should also be populated automatically. The available water modes and bottom modes in the connected unit are also determined.

-If the connection is unsuccessful, the wizard will prompt the user to check and/or change the settings and provides an opportunity to have the software automatically find the correct settings. If you are having communications issues, it is best to exit the wizard and go back to Configure>Peripherals menu option and verify the ADCP com port settings and baud rate in that dialog.

-When using the wizard, dynamic windows may pop-up to alert you of fields that need to be populated or they will display considerations for data collection based on the conditions you've entered. Be sure to address these pop-ups before moving on.

-Once the connection with the ADCP is established, there is an opportunity to connect with other devices, such as GPS, depth sounders or external heading sensors.

-The communication settings for these peripherals also should have been defined in the Configure > Peripherals menu before entering the wizard

-A successful connection for any device would be indicated by a green light to the left of the check box

-The next step in the wizard is to enter the measured transducer depth.

-When using GPS, you must also enter a magnetic variation here. Both the transducer depth and the magnetic variation can be edited in playback, if necessary.

-The measuring section characteristics are entered in the ADCP Wizard Configuration section. If characteristics are known from previous measurements or knowledge of the site, use those; otherwise, a best guess should be entered.

-Start with entering the Max. Water Depth, Max. Water Speed and Max. Boat Speed. Discussion on use of Secondary Depth will come later.

-It's important to keep in mind that these settings can be changed if a test pass indicates they might be a little bit off. Entering estimated velocity and depth values that are not close to actual values can have consequences on the data. These consequences could include incorrect water and/or bottom mode selection, incorrect bin sizing and incorrect ambiguity settings.

-These settings cannot be changed during playback, so ensure they are as close to the real river conditions as possible before collecting the discharge measurement.

-Next, select the streambed type that best describes your conditions

-The bottom modes available with a Rio Grande ADCP are 5 and 7.

-Using the Auto option for bottom mode will typically select bottom mode 5, as long as depths are greater than 2 ft.

-Bottom mode 7 may work better in shallow water or when the bottom is sloping. This mode pings slower, which increases the time between ensembles. Bottom mode 7 does not seem to work as well in high sediment conditions.

-Typically, the bottom mode selection is set to auto.

-Now we will work on selecting the water mode. Water Mode Auto is the default selection and will select either water mode 12 or water mode 11 based on the frequency of the unit being used and the water speed and water depth you've entered.

-The typical order of progression for selecting a water mode starts with those with the lowest instrument noise, water modes 5 and 11. These water modes will give you the most accurate velocity data using short pulses with a long lag, an ambiguity resolving bin and bin-to-bin tracking. Water modes 5 and 11 are very similar, but in limited situations one may work better than the other. If the wizard selects water mode 11 and it isn't working reliably across the channel, try water mode 5.

-The short pulses and long lag in water modes 5 and 11 limit them to a depth of 13 ft (with the 1200 kHz Rio) and 26 ft (with the 600 kHz Rio) with relative velocities up to 3.3 ft/s. If conditions are too fast, too deep or too turbulent for these low noise water modes the next best choice is water mode 12.

-Water mode 12 averages multiple pings in a single ensemble, which can result in longer time between pings and errors in dynamic conditions, where water mode 1 would be the best option.

-Water mode 12 Auto will optimize the water mode 12 bin size based on the max. water depth

-To use water mode 5 or water mode 1, the user must make the selection manually in the wizard

-The update rate is only applicable to water mode 12 for the Rio Grande

-Lowering the update rate may be appropriate when using water mode 12 and when smooth and steady boat movement is not possible or if the conditions are dynamic. The update rate should be set fast enough that the boat speed and boat direction would be constant during the time between ensembles. If depths allow, water mode 1 should be used in these dynamic conditions.

-In the discharge section, extrapolation methods are typically evaluated post-measurement, so the default of power-power can be used for data collection and changed during playback, if necessary.

-When the measuring section has non-triangular banks the coefficient can be modified as needed

- A triangular edge shape will draw a line from the river bottom under the adcp to the shore, going to zero based on the edge distance entered by the user.

-A square edge shape draws a line from the river bottom under the adcp to the shore. This distance is equal to the edge distance, and assumes a smooth, vertical wall at the edge

-Regardless of the edge shape, it is important to ensure the estimated edge flow is reasonable. These coefficients for edge shape can be edited during playback if field notes or observations indicate the values used were not correct.

-The number of shore pings used to estimate the edge discharge defaults to 10, and is typically not changed

-We now move to the output filename options, where the filename prefix and output directory are set in the software. Hopefully, your office has established guidelines for naming and storing of ADCP data. Those guidelines should be followed here.

-After setting the output filename and the directory for saving these files the commands page should be reviewed.

-The commands page lists the fixed commands, which are initially sent to the ADCP to override hardware defaults.

-It also lists the wizard commands, which are changes to the fixed commands based on the wizard settings. User commands are rare, and should only be used if there is a good understanding on their consequence on the data.

-Next, the summary page provides details on the unit and the settings the wizard plans on using based on your input.

-The Devices area outlines the ADCP you are connected to and its frequency. The green check marks do not indicate the modes that will be used for data collection, but the modes that are available in the unit. It also outlines any peripherals you might be connected to.

-The recording settings are also displayed, along with the extrapolation methods, bank coefficients, transducer depth and other settings. Scan these fields and be sure they are consistent with your intended settings.

-The ADCP wizard configuration section outlines the user input for maximum water depth and speed and also outlines the wizard settings for water mode, bottom mode, update rate, depth cell size and the number of bins. Additional information for water mode 12 is shown, if applicable.

-The Measurement Characteristics area is valuable in that it displays the minimum profile depth for 1 cell and 2 cells of data collection. It also shows the maximum profile depth with the proposed settings and the horizontal standard deviation, if water mode 1 or 12 has been chosen.

- The horizontal standard deviation is an indicator of how much random error to expect in the individual depth cell velocities. For example, if the true water speed was 1 ft/sec and the reported horizontal velocity std. dev. was 0.4 ft/sec it is expected that most (or about 68%) of the measured velocities would be between 0.6 and 1.4 ft/sec. To lower the horizontal standard deviation there are a few options. Use of water modes 5 and 11 are the best options, if conditions allow. Other options include larger depth cells, more sub-pings or more time between ensembles.

-If the minimum profile depth for 2 depth cells is not adequate to profile in the expected conditions when using water mode 12 a secondary depth can be entered. It's important to remember that the secondary depth only applies to water mode 12. Use of the secondary depth should be done with the understanding that the software will try and configure the ADCP to profile in this depth with a minimum 3 bins. It's also important to understand that the software will select bottom mode 7 if the secondary depth indicates the water is too shallow for bottom mode 5.

-Changes to bin size and bottom mode based on the secondary depth entry may have consequences on the data in the deeper part of the river. A smaller bin size could lead to a higher standard deviation in each depth cell. This would cause increased uncertainty in the velocity measurements across the entire channel to allow data collection in one specific area

-A test pass is always a great way to check that settings for river depth and velocity are appropriate. It will also allow you to understand if the modes and adcp settings chosen by the wizard are going to allow you to collect the best possible measurement.

-To change wizard settings after a test pass, stop pinging and select Acquire... Configuration Wizard from the menu, or navigate to the measurement control window, expand the collect data tab, expand the next transect tab and right click on field configuration. This will also allow you to get into the configuration wizard. It's important to remember, however, that ADCPs will not work in every situation, no matter how the unit is configured.

-Hopefully this USGS Hydroacoustics Work Group podcast has given you a better understanding of the wizard and how it configures your Rio Grande. The USGS hydroacoustics website, found at hydroacoustics.usgs.gov, has more information on WinRiver II, the water modes and bottom modes for a Rio Grande and many other topics. The USGS hydroacoustics forum, which is linked on the USGS hydroacoustics webpage, is another great resource for help and troubleshooting. Thanks for your time and happy streamgaging.