STANDARD OPERATING PROCEDURE FOR STREAM FLOW MEASUREMENTS

WILLARD SPUR
2011 MONITORING ACTIVITIES

State of Utah
Department of Environmental Quality
Division of Water Quality

Revision 1
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Utah Division of Water Quality (DWQ) Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical experts. The primary purpose of this document is for internal DWQ use. This SOP should not replace any official published methods.

Any references within this document to specific equipment, manufacturers, or supplies is only for descriptive purposes and does not constitute an endorsement of a particular product or service by the author or by DWQ. Additionally, any distribution of this SOP does not constitute an endorsement of a particular procedure or method.

Although DWQ will follow this SOP in most instances, there may be instances in which DWQ will use an alternative methodology, procedure, or process.

REVISION PAGE

Date	Revision #	Summary of Changes	Sections	Other Comments
9/10/2011	1	not applicable	not applicable	Put into new standardized format, began document control/revision tracking

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1.0 SCOPE AND APPLICABILITY

This document presents the Utah Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for performing stream flow measurements. Flow is also referred to as discharge and is measured routinely at each water quality sampling site whenever feasible. Flow measurements are performed for natural (rivers, streams) and engineered (outfalls, ditches, canals, impounded wetland outlets, etc.) surface water bodies. Flow data is used by DWQ assessment and management staff for a variety of purposes including but not limited to:

- understanding the affect of hydrologic condition on aquatic life uses
- determining pollutant loading and inputs into receiving waterbodies
- setting permit requirements for discharge of treated wastewater
- understanding groundwater/surface water interactions
- characterizing current water quality conditions and detecting long-term changes

This SOP applies to any DWQ monitor, non-DWQ cooperator, or volunteer performing flow measurements. This SOP covers flow measurements at both wadeable and non-wadeable sites using the following equipment:

- Wadeable:
  - Sontek/YSI FlowTracker Handheld-ADV®
  - Hach Marsh-McBirney Flo-Mate™
- Non-wadeable:
  - StreamPro ADCP (also referred to in this SOP as a Q-boat)

Important Considerations:

- When sampling sites where flow data is being monitored by a non-DWQ entity (e.g. wastewater treatment plant outfall or USGS gaging station), monitors should make every effort to read the flow gage or obtain a gage height (staff plate or wire weight gage), contact the wastewater treatment plant operator for discharge data, or obtain flow from the USGS (United States Geological Survey) website upon returning to the office. However, flow should *still be measured in the field* at these locations. Relying solely upon another entity for flow data may lead to missing information in the event that entity has an equipment failure.

- Some sampling sites are continuously and automatically monitored for flow by gaging stations installed and maintained by Utah DWQ (pressure transducers), although the data is not accessible in real-time. At these locations, monitors should perform the flow measurement and gage inspection and then notify the senior DWQ monitor responsible for the gaging station that a flow measurement

was performed at that site (see DWQ's SOP for Pressure Transducer Installation and Maintenance).

- The information discussed in this SOP is not a substitute for the official product user manual. Consult the appropriate manual for a complete guide of the proper use, maintenance, and troubleshooting of discharge measuring equipment (see **Section 12 - References**).

2.0 SUMMARY OF METHOD

2.1 Wadeable Sites

2.1.1 Sontek/YSI FlowTracker Handheld-ADV®

A stream cross-section is established and the Flow Tracker is used to determine velocity at each point measured. The meter is attached to a wading rod used to measure depth and keep the meter properly positioned with the current. The monitor faces the meter upstream while standing downstream of the meter and a tagline. The Flow Tracker uses acoustic Doppler technology to measure 2D flow in a small sampling volume located at a fixed distance (10 cm) from the probe. Sound generated by the transmitter bounces off suspended particles in the water. This reflected sound returns to the receivers, is averaged together by the processor, and results in water velocity measurements that are recorded at a rate of one per second. At the end of the measurement, the FlowTracker calculates the discharge.

2.1.2 Hach Marsh-McBirney Flo-Mate™

A stream cross-section is established and the Marsh-McBirney meter is used to determine velocity at each point measured. The meter is attached to a wading rod used to measure depth and keep the meter properly positioned with the current. The monitor faces the meter upstream while standing downstream of the meter and a tagline. The Marsh-McBirney is an electromagnetic velocity meter that uses an electromagnetic sensor to measure the velocity in a conductive liquid such as water. A pair of carbon electrodes measure the voltage produced by the velocity of the passing water. The measured voltage is processed by the electronics and output as a linear measurement of velocity. The velocity is in one direction and displayed on a digital display as feet per second (ft/s) or meters per second (m/s). The user must record stream width, cell depth and velocity in order to manually calculate discharge.

2.2 Non-Wadeable Sites

2.2.1 Teledyne RD Instruments StreamPro Acoustic Doppler Current Profiler (StreamPro ADCP)

A StreamPro is used when stream depth or velocity is such that a monitor cannot safely enter the water to take a flow measurement. The unit is designed for operation in

stream depths ranging from 15 cm to 2 m (0.5 to 6.6 ft). The instrument is pulled across the stream as the monitor walks across a bridge or the unit can be attached to a tagline or pulley system and operated from the bank if a bridge is not present. The unit uses acoustic Doppler technology and bottom tracking to measure current velocity from the top of the water column to the bottom at the same instant with a 5 cm resolution. Data is collected continuously as the unit is pulled across the stream and is sent wirelessly to a PDR (portable data recorder). Software on the PDR saves the data transmitted by the StreamPro. The complete discharge measurement is computed via a second software on a PC.

3.0 DEFINITIONS

ADCP:	acoustic Doppler current profiler
ADV:	acoustic Doppler velocimeter
Discharge:	A term used this SOP interchangeably with "flow". This is the volume of water flowing past a fixed point per unit of time. Units are typically cubic feet/second (ft^3/s of cfs) or cubic meters/second ((m^3/s).
Flow/discharge measurement:	A manual measurement of flow/discharge performed by a DWQ monitor/cooperator/volunteer.
PC:	Personal computer
PDR:	Portable data recorder
USGS:	United States Geological Survey
Velocity:	Distance water travels per unit time. Units are typically centimeters or meters/second (cm/s or m/s) or feet/second (ft/s).

4.0 HEALTH AND SAFETY WARNINGS

Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of flow measurement, it is recommended that the measurement be rescheduled. If hazardous conditions arise during measurement, such as lightning, high winds, rising water, or flash flood warning, personnel should cease sampling and move to a safe location.

Field personnel should take appropriate precautions when operating equipment and working on, in, or around water, as well as possibly steep and unconsolidated banks. All field crews should follow EPA, OSHA, and specific health and safety procedures and be equipped with safety equipment such as proper wading gear, personal flotation devices (PFDs), gloves, first aid kits, cellular phone, etc.

Always use caution when measuring from a bridge and take appropriate actions to make the situation as safe as possible; suspend the measurement if conditions are unsafe.

5.0 CAUTIONS

Use caution when handling flow equipment. Flow meters must be placed in a travel case or in a safe place within a vehicle to prevent damage during transport.

Submersion of the StreamPro's electronics housing is strongly discouraged by the manufacturer. The StreamPro should be kept as level as possible during the measurement.

If the electronics in the StreamPro reach a temperature of 50°C, the Bluetooth connection will likely be lost. When performing discharge measurements on very hot days, be aware of this issue; the instrument may need to cool down in the shade or in a cooler before it can be used.

Always be observant of potential debris floating from upstream that could potentially damage equipment and/or cause harm to the operator.

6.0 INTERFERENCES

The physical makeup of a stream may prevent an accurate flow measurement. If the stream is shallow and has a substrate dominated by cobble, a FlowTracker may have difficulty reading the speed of particles. When establishing the cross section, look for an area of laminar, smooth flow with minimal obstructions. Obstructions, including large rocks, can be moved out of the way of the cross section, but only before flow measurements begin, never during the measurement. The StreamPro works best with uniform straight stream reaches, stream bottoms made up of smaller substrate material with or no aquatic vegetation or debris, little turbulence, no standing waves or "boils", depths between 1 and 14 feet, and velocities <6-7 ft/s.

A quality control test must be performed each day prior to taking a flow measurement with the FlowTracker or StreamPro to ensure the equipment is operating properly.

For wadeable sites, be sure to place the flow meter downstream of the tape measure and be sure to stand downstream of the flow meter.

Discharge measurements performed on low-velocity streams with the StreamPro can be highly variable. Research has shown dramatic increase in variability when flow velocities are < 0.8 ft/s (Blachard 2005). The manufacturer recommends that if water velocity is <20 cm/s (0.66 ft/s) and the depth is <1.0 m, the operator should use the StreamPro software's "Low Noise Profiling Mode" to reduce variability. For all other conditions, use the standard profiling mode.

7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

Monitors performing flow measurements are required to read this SOP annually and acknowledge they have done so via a signature page (**Appendix 1**) that will be kept on-file at DWQ along with the official hard copy of this SOP.

New personnel must be trained in performing stream flow measurements by an experienced monitor. Monitors must read through the product manuals for the discharge equipment described in this SOP (see **Section 12 – References**) prior to their training session as well as keep these manuals on-hand in the field, as this SOP does not cover all details regarding equipment setup and use, trouble shooting, precautions, software setup and use, and downloading/reviewing of data.

Monitors have the responsibility of maintaining flow meters and flagging the equipment if it is in need of repair.

8.0 EQUIPMENT AND SUPPLIES

FlowTracker:	**Marsh-McBirney:**	**StreamPro:**
Meter with case	Meter with case	Meter with case
Copy of this SOP	Copy of this SOP	Copy of this SOP
User manuals	User manuals	User manuals
Tape Measure (10ths of ft)	Tape Measure (10ths of ft)	Tagline, tow ropes
Tool box for repairs/replacement	Tool box for repairs/replacement	Tool box for repairs/replaceme
Field sheet or notebook	Field Sheet or notebook	Field sheet or notebook
(Phillips Screwdriver)	Extra batteries (2 D)	PDR
Extra Batteries (8 AA)	Waders and boots	Extra Batteries (8 AA)
Waders and boots		

9.0 PROCEDURE

9.1 Preparing Site for Measurement

9.1.1 Wadeable Sites

Appendix 2 provides a flow diagram guidance for stream flow measurements at wadeable sites.

Use the same procedure when using either the FlowTracker or Marsh-McBirney meters. Establish a stream cross section for flow measurement to occur. Desirable characteristics for the site location include:

- A straight section of stream, away from stream bends;
- Stream flow approximately parallel to stream banks;

- A constant stream gradient;
- No obstacles protruding from water surface (i.e. stones, plants, bridge piers).

Attach a tape measure (marked in 10ths of feet) to one stream bank and string across the stream securing onto the opposite bank. The tape should create a line perpendicular to the flow of the stream. Make sure the tape is tightly stretched across the stream and not in danger of sagging onto the water surface.

9.1.2 Non-wadeable Sites

Typically the StreamPro, also referred to by DWQ as a Q-boat, will be dragged across a transect from a bridge crossing the river/stream. If a bridge is not available, a tagline twice as long as the water body is wide can be stretched from bank to bank, with the StreamPro in the middle. As one person feeds out the tagline, another will pull the StreamPro across the water body. The tagline should be marked in 10ths of feet. If measuring from a bridge, the bridge should either be marked off or a tape measure laid along the bridge rails.

9.2 Performing the Flow Measurement

9.2.1 Sontek/YSI FlowTracker Handheld-ADV®

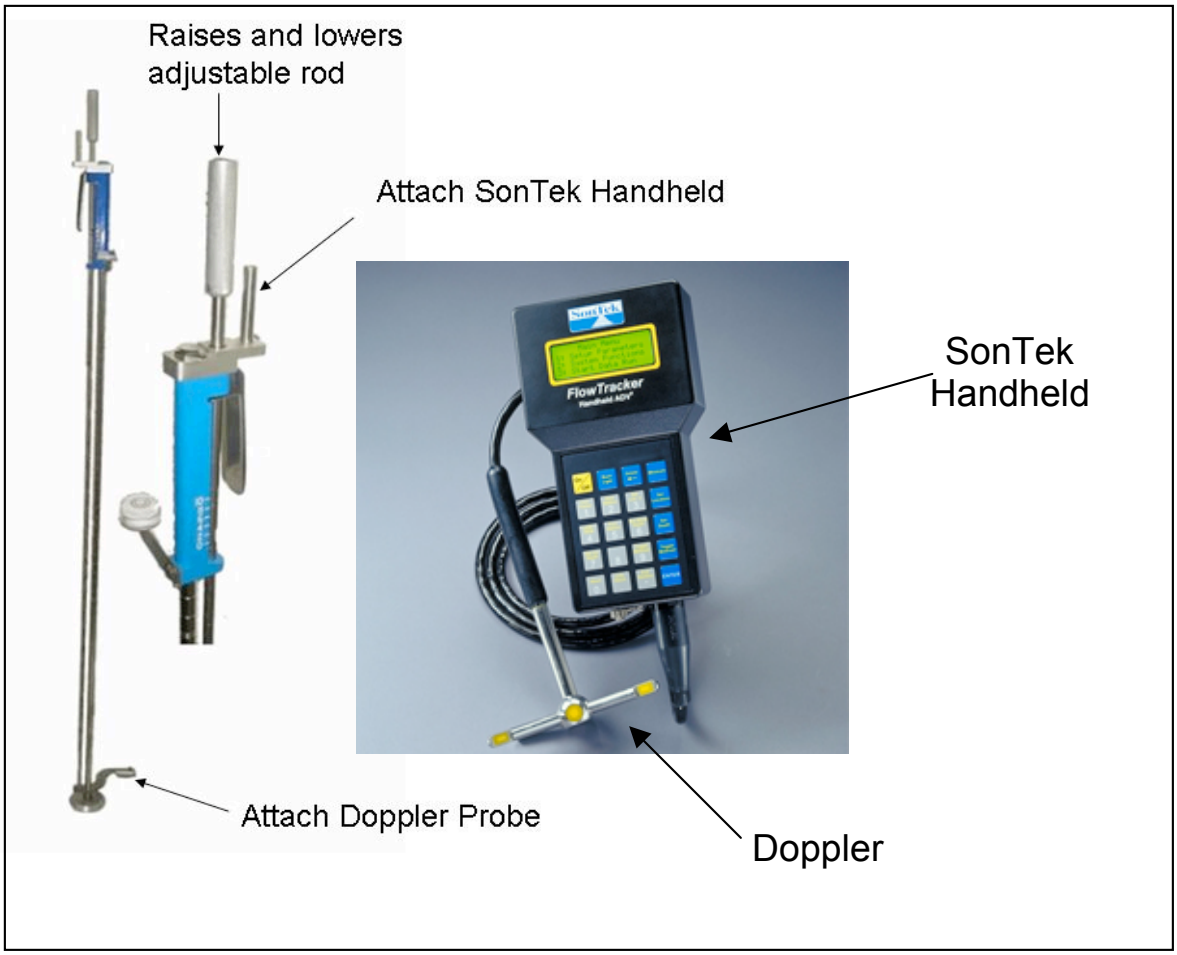
Flow Tracker Assembly

Assemble the wading rod by matching up the two sections of the graduated rod (marked in 10ths of feet). Raise the adjustable rod up so that it is easier to tighten the graduated rod. Once the graduated rod is assembled and secure, lower the adjustable rod to match up with the threaded section. Twist the top of the adjustable rod to tighten.

Attach the SonTek handheld display to the top of the wading rod and tighten using the attached wing nut.

Secure the Doppler probe to the appropriate outlet and secure using a Phillips screwdriver or by tightening the wing nut (if available).

Figure 1. FlowTracker assembly.



Determine Measurement Interval

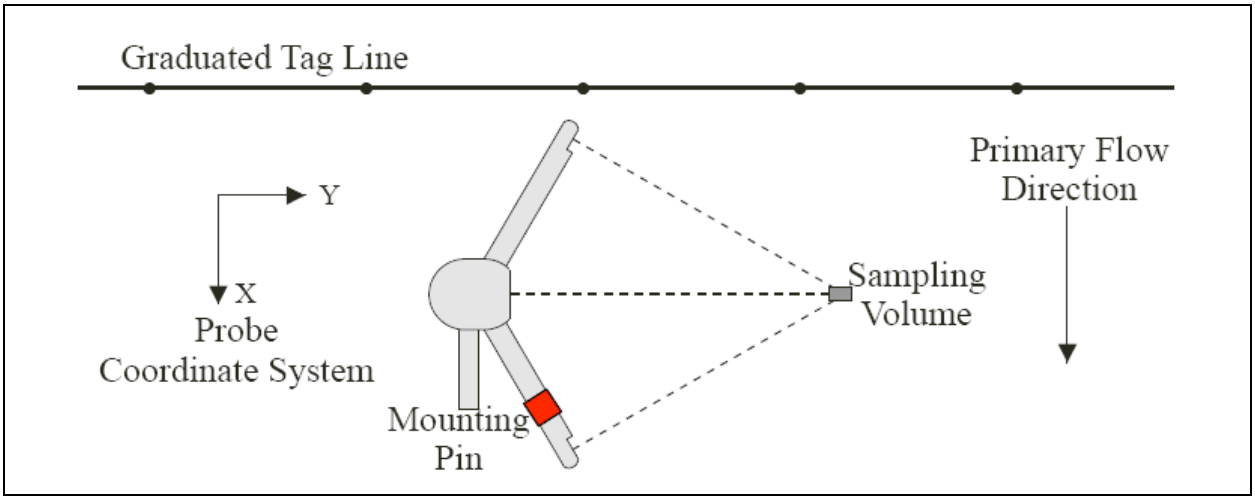
If stream width < 10 feet, collect data every 0.5 feet; start 0.25 feet (half of interval) from edge.

If stream width > 10 feet, collect 20 evenly divided measurements across the entire stream; start at half of the determined interval from edge.

Data Collection

Figure 2 shows the proper orientation of the probe while performing discharge measurements. Be sure to take flow measurements on the *downstream* side of tape measure and to stand *downstream* of the flow meter.

Figure 2. FlowTracker orientation in stream (image from user manual).



On the SonTek handheld, hold on/off button down for one second.

Select Main Menu…Setup Parameters and System Functions will be set, refer to manual for details.

Press #3 Start Data Run…follow on screen instructions (use last four digits of the STORET number as site name).

If data storage is full, erase the previous data. To do this, return to the "Main Menu" screen. Press #2 "System Functions", then press #3 "Format Recorder"; the system will prompt you to press 123 to confirm your decision to erase all previously recorded data.

Select the option to run the QC (quality control) test once at the beginning of the day (press "skip test" the rest of the day). Instructions for performing the QC test will automatically pull up; go through the entire QC test.

After the QC test, you will be taken to the "Starting Edge" screen. Move to the water's edge of one stream bank and place the wading rod into the water to measure depth. Press "*Set Location*" button and enter the distance value (what the tape measure reads at waters edge). Press the "*Set Depth*" button and enter the depth of the water level at your starting location (measuring with graduate rod). If the bank is sloping, this depth will likely be zero but there will be a depth measurement if the bank is undercut. Press "Next Station" to continue to the next measurement interval.

Move FlowTracker to next measurement interval. This location should be at ½ the determined measurement interval. (For example, if the stream is <10 feet wide, intervals will be 0.5 feet. If the edge of water is at 0.0 feet on the tape, the first interval

will be at 0.25 feet. The next measurement should be at 0.5 feet beyond the first location = 1.75 feet.) Enter in the appropriate depth on the handheld and move the adjustable rod to the corresponding depth (60% of depth of water). Press "Measure" to record the flow at that interval. Use the bubble level on the wading rod to keep the FlowTracker parallel to the stream flow.

After 20 seconds of recording, the handheld will give the velocity of the interval in feet/second. If something has caused the accuracy of the flow data to be degraded, error warnings will pop up. Some common errors include: High Angle, Low SRM, and QC out of bounds. Refer to the FlowTracker manual for instructions to correct these errors.

Select "1" to accept the measured flow and the handheld will automatically move to the next measurement interval.

Continue to enter in the depth, move the adjustable rod, and measure the flow for each interval until you reach the last measurable interval. This may be at the opposite bank or at a point where water is no longer flowing or is flowing backward or in an eddy. At this location, press "End Section." The FlowTracker will ask for confirmation of ending section and go through all the errors found for the entire reach. After going through the errors, the main screen will pop up again where the depth of the last interval can be entered. Press the "set depth" button to enter in the correct depth for the opposite edge of water and "set location" button if location needs to entered (i.e. last measurement was not performed at the bank).

Press "Calculate Discharge" to get the flow in cubic feet per second (ft^3/s) for the measured reach. The FlowTracker will ask for confirmation of calculation and then will give the flow (discharge) reading.

9.2.2 Marsh-McBirney

Marsh-McBirney Assembly

The flow sensor must be connected into the outlet on the lower portion of the flow meter. Secure the sensor by tightening its thumbscrew.

Determine Measurement Interval

If stream width < 10 feet, collect data every 0.5 feet; start 0.25 feet (half of interval) from edge.

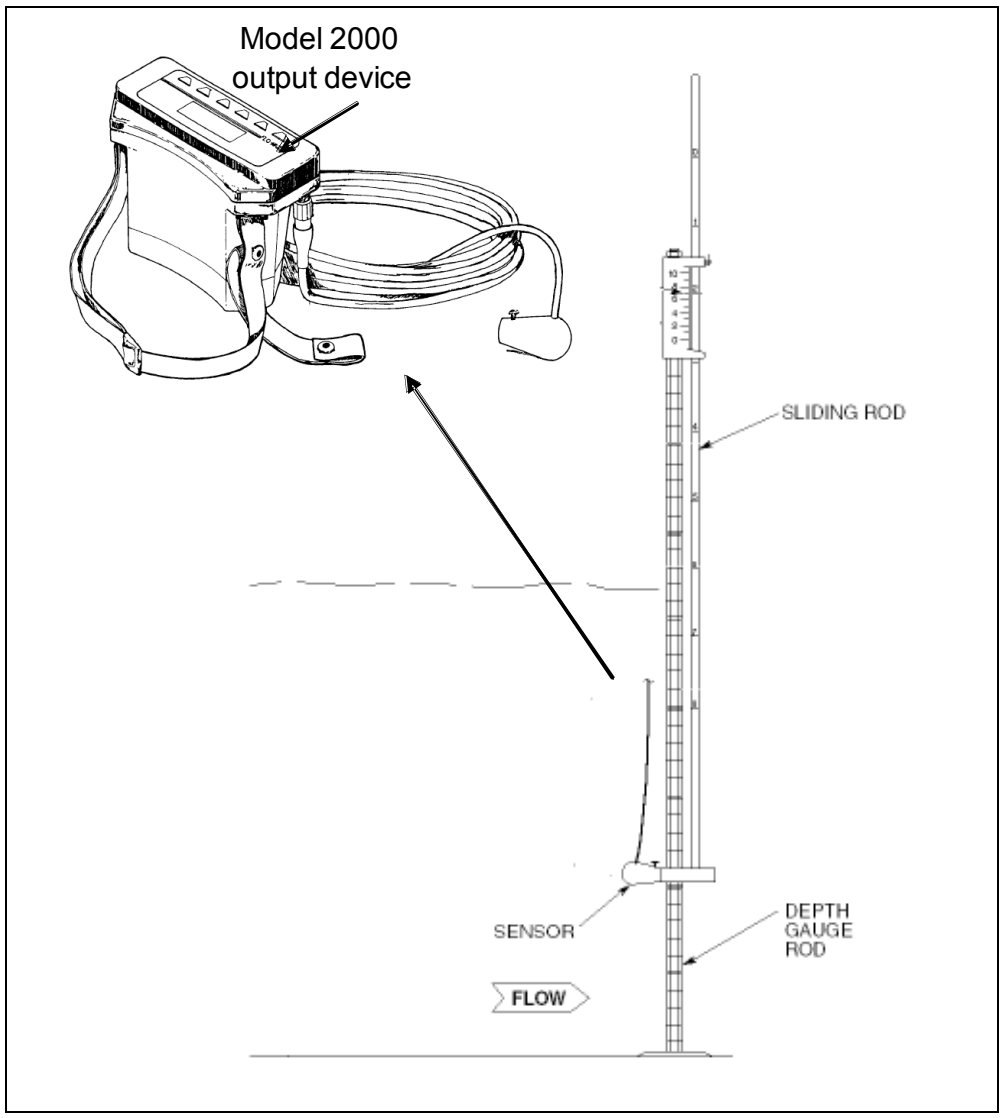
If stream width > 10 feet, collect 20 evenly divided measurements across the entire stream; start at half of the determined interval from edge.

Data Collection

Collecting flow data with the Marsh-McBirney works best with a team of two people. One person handles the flow meter while the other records water depth and the real-time stream velocity.

The operator will handle the Marsh-McBirney while the recorder writes down the stream width, depths, and velocities. The operator will stand at the starting location and turn on the Model 2000 (output device). The display will automatically give a real-time flow reading. Make sure Model 2000 is reading flow in feet per second and the allotted time for reading flow is set at twenty seconds. The sensor must be facing upstream.

Figure 2. Marsh-McBirney assembly.



The operator will measure the water depth using the wading rod and call it out to the recorder who will record it on the field sheet. The flow meter is adjusted to 60% of the water depth. The “On/C” button on the Model 2000 will be pushed to start the measure of velocity. After ten seconds, the display will give an average velocity. The operator will call out the velocity to the recorder and then move on to the next reading location. This procedure is repeated until all readable locations are sampled.

Calculations must be performed using the recorded velocity and depth readings. The formula for flow in an even channel is: CFS = average velocity (ft/s) x average depth (ft) x width (ft).

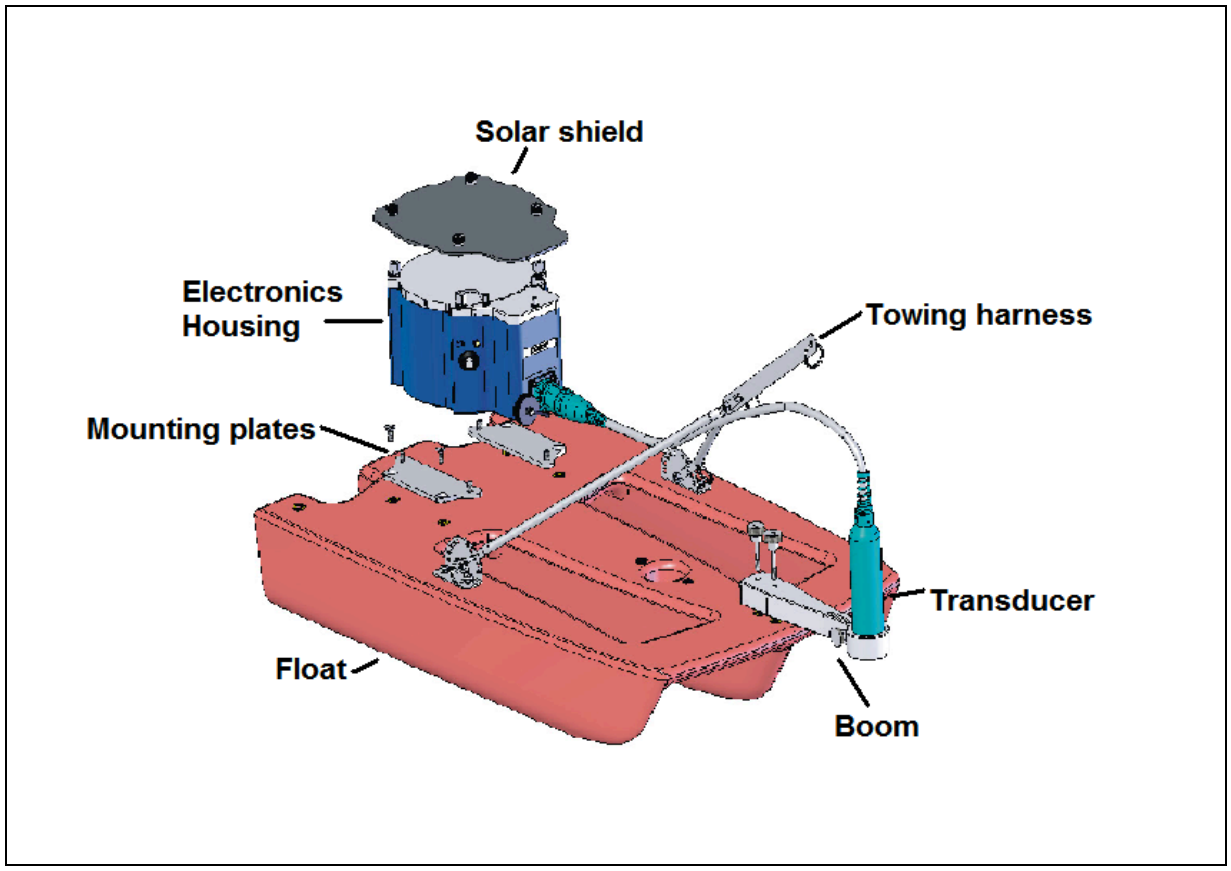
9.2.3 StreamPro ADCP

General directions are given here but the operator should follow along with the StreamPro Quick Start Guide for detailed directions incorporating easy-to-follow PDR/software screen shots.

Preparation for Deployment

The Q-boat should be assembled according to the StreamPro user manual. Visually inspect all components for damage. Check that the transducer beams are aligned correctly and that the transducer head is set to the correct depth (3-6 cm below water surface) (see manual). A PDR is used along with the Q-boat. Before deploying the Q-boat, it must be powered on and synchronized with the Bluetooth on the PDR; a successful link is indicated by the blue light on the StreamPro electronics housing. When the StreamPro is turned on, the amber light on the electronics housing should not be blinking; if it blinks, the batteries (8 AA) should be replaced. Follow the steps in the user manual to load the default configuration file. Before the StreamPro is put into the water, run the Self-Test (see manual) to verify that the StreamPro's electronics and transducers are functioning. The test can be run with the StreamPro out of the water.

Figure 3. StreamPro assembly.



Set up the Configuration File

Once the Self-Test has been passed, the StreamPro will be used to calculate the maximum depth and maximum velocity of the cross section to be measured. Following the detailed instructions in the manual, move the StreamPro across the stream and note the maximum depth and velocity that comes up on the PDR screen. Record these on the field sheet. Edit the configuration file according to the maximum depth and velocity. If the max depth is <1.0 m (3.3 ft) and the max velocity is < 0.25 m/s (0.8 ft/s), select the "Low Noise Mode". If using Low Noise Mode, tow velocity should be half the current velocity. Once the configuration is set, save the configuration file.

Determining Edge Distances

Before collecting data, you must determine the edge locations. Edge measurements are taken as close to the bank as possible where the StreamPro can still read valid data – defined as a minimum of two good depth cells (a cell is a portion of the vertical velocity profile measured by the StreamPro – max depth cells per profile is 20). With the StreamPro close to the bank, select "Start Pinging" and pay attention to the display. Move the StreamPro far enough from the bank to produce a solid two-depth cell measurement (indicated by Number of Good Bins = 2 on the display). Stake or otherwise mark this location; line the mark up with the center of the StreamPro transducer head. This point is the starting point for the transect. Measure the distance between the edge location and the physical edge of the stream; record this distance on field sheet or as a note on the PDR. For measuring these distances, you can wade out into the stream or use a metered tape lined along the railing of the bridge. If using the bridge option, lower a weighted tape to the edge of water and note the distance on the tape running along the railing. Then lower the tape to the center of the StreamPro transducer head and note that distance; the difference between the two is the edge distance for the transect. Repeat finding the edge of transect and actual physical edge for the opposite bank along the transect. The StreamPro should not be used against a vertical bank/wall even if there are an adequate number of good bins available due to interference. Position the StreamPro from a vertical wall at a distance that is equal to or greater than the depth of water at the vertical wall.

Data Collection

Data collection is performed by at least 2 people – one to maneuver the StreamPro and the other to operate the PDR. The StreamPro can be towed from a bridge or from shore. Either method is acceptable as long as slow, steady control of the raft is maintained. In a bridge situation, make sure the transect is downstream of the bridge so that the StreamPro is visible to the operator at all times but make sure to keep an eye out for debris floating from upstream. Move the StreamPro to the transect starting point and press "Transect Start" to initiate data recording. The StreamPro will start the measurement by confirming the edge of the transect, once the edge measurements have been taken, the StreamPro will prompt the user to proceed with the transect. Tow

speed should be less than the water velocity for the most accurate and precise measurements. During the measurement, keep an eye on the Good Bins Indicator on the PDR screen. If the indicator is green, three or more cells in the profile are good. Use the indicator to help determine when you need to slow down the StreamPro at the opposite bank, trying not to overshoot the predetermined transect edge. Once again the StreamPro will confirm the edge of the transect and then stop recording. Repeat the transect measuring process in the opposite direction. Continue until you've captured at least four good transects.

Data Review

Use the "History" tab to compare the measured transects. If the "Delta Q" value (the difference (expressed as a percentage) between the measured discharge of a particular transect and the mean of all the measured transects) for any measurement file is >5%, that particular file should not be used for calculating the discharge measurement. If at least four good transects are not available, measurements should be performed for additional transects. If Delta Q is still > 5% after eight transects use best professional judgment to determine if more transects are necessary. A new cross sectional location may be needed. Once the data is downloaded to a PC, WinRiver software is used to perform the summary discharge calculation for the measurement.

10.0 DATA AND RECORDS MANAGEMENT

Flow Tracker: All flow readings are stored in the hand held of the FlowTracker until they are deleted by the user. See the FlowTracker manual for instruction on how to recover stored flow readings. Once flow has been calculated by the FlowTracker, the user should record the reading on the trip sheet associated with the sample trip. Trip sheets containing flow measurements will be scanned in at the end of the sample trip and stored electronically.

Marsh-McBirney: All flow readings are recorded on the field sheet. Once total flow has been calculated, the discharge is recorded on the trip sheet associated with the sample trip. Trip sheets containing flow measurements will be scanned in at the end of the sample trip and stored electronically.

StreamPro: Measurement files should be stored on the PDR's SD card. After collecting four transects, review the files in the field to ensure that each file (transect) is within 5% of the mean discharge for the set of transects. If any of the transects is outside of the tolerance, additional transects should be measured. All flow readings are stored in the PDR until they are deleted by the user.

If performing a flow measurement at a location that is gaged by DWQ, be sure to fill out the proper gage maintenance and inspection sheet that is kept with the portfolio folder for that site (**Appendix 3**).

11.0 QUALITY ASSURANCE AND QUALITY CONTROL

Most of the quality control for flow measurements involves reviewing data in the field. Resolution of data collection and data quality problems may include selection of a different cross section, measuring additional transects (StreamPro), troubleshooting equipment issues, adjusting settings/configurations, etc.

A quality control test must be performed at the beginning of each sampling day to assure the FlowTracker is operating properly. If the QC test fails, the operator must repeat it until the test is passed and no errors are found. If FlowTracker continuously fails QC test, it must be sent in for repair.

A quality control test must be performed at the beginning of each sampling day to assure the StreamPro is operating properly and maintaining a good Bluetooth connection with the PDR. Refer to the StreamPro Quick Start Guide for instructions for performing the Self-Test; make sure the StreamPro is working properly before deployment.

If variation between measurements (transects) by the StreamPro is greater than 5%, try repeating the measurement by moving the boat more slowly across the stream (typically needs to be done for slow-moving shallow streams). Ideally measurements should take at least 3 minutes but if the velocity is <30 cm/s or the depth is <1m, measurements should take longer to increase measurement precision.

Duplicates are unable to be performed for quality control since stream conditions can change rapidly. When a sample site requires duplicate samples, one flow reading will be used for both the original and duplicate samples.

The United States Geological Survey provides quality assurance guidance for the use of ADCPs (Oberg et al. 2005) that includes deployment and use guidance as well as guidelines for data review and rating the quality of discharge measurements.

12.0 REFERENCES

Blachard, Stephan F. 2005. Guidance on the use of RD instruments StreamPro Acoustic Doppler Profiler. United States Geological Survey, Office of Surface Water. Technical Memorandum 2005.05.

Shedd, J., Springer, C., and Clishe, C. 2008. Standard operating procedure for operation of the Teledyne RD Instruments Stream-Pro Acoustic Doppler Current Profiler. Washington State Department of Ecology Environmental Assessment Program. EAP055.

Marsh-McBirney User Manual:
http://www.marsh-mcbirney.com/manuals/Model_2000_Manual.pdf

FlowTracker User Manual:
http://www.tceq.texas.gov/assets/public/compliance/monops/water/wqm/v3.3_flow_tracker.pdf

StreamPro User Documents:
http://www.rdinstruments.com/support/documentation/cc_documents.aspx#spro

- StreamPro ADCP Operational Manual - http://www.otronix.com/kr/data/p03/StreamPro_ADCP_Operationa_Manual.pdf
- StreamPro Quick Start Guide - http://www.rdinstruments.com/support/SoftwareFirmware/x/cs/files/Manuals/SPQCKSTA.PDF
- StreamPro Software User Guide - http://www.rdinstruments.com/support/SoftwareFirmware/x/cs/files/Manuals/SPSWUSER.PDF
- StreamPro Discharge Measurement Summary – http://www.rdinstruments.com/support/SoftwareFirmware/x/cs/files/Manuals/SPDISCME.PDF

13.0 APPENDIX

Appendix 1 - SOP Acknowledgment and Training Form (front and back)

SOP Acknowledgement and Training Form

This SOP must be read and this form signed annually. This form must be kept with the current version of the SOP.

Document Title:	
Document Revision Number:	
Document Revision Date:	

Please sign below in accordance with the following statement: "I have read and understood the above referenced document. I agree to perform the procedures described in this SOP in accordance with the document until such time that it is superseded by a more recent approved revision."

Printed Name	Signature	Date

SOP Acknowledgement and Training Form (continued)

Trainee: Sign below to acknowledge that training on this SOP was received, understood, and all questions/concerns were addressed by the trainer.

Trainer: Sign below to acknowledge that training on this SOP was completed for the individual listed and that trainee is competent to perform the procedures described within.

Date of Training	Trainee Printed Name	Trainee Signature	Trainer Printed Name	Trainer Signature

Appendix 2 – Wadeable stream flow decision diagram