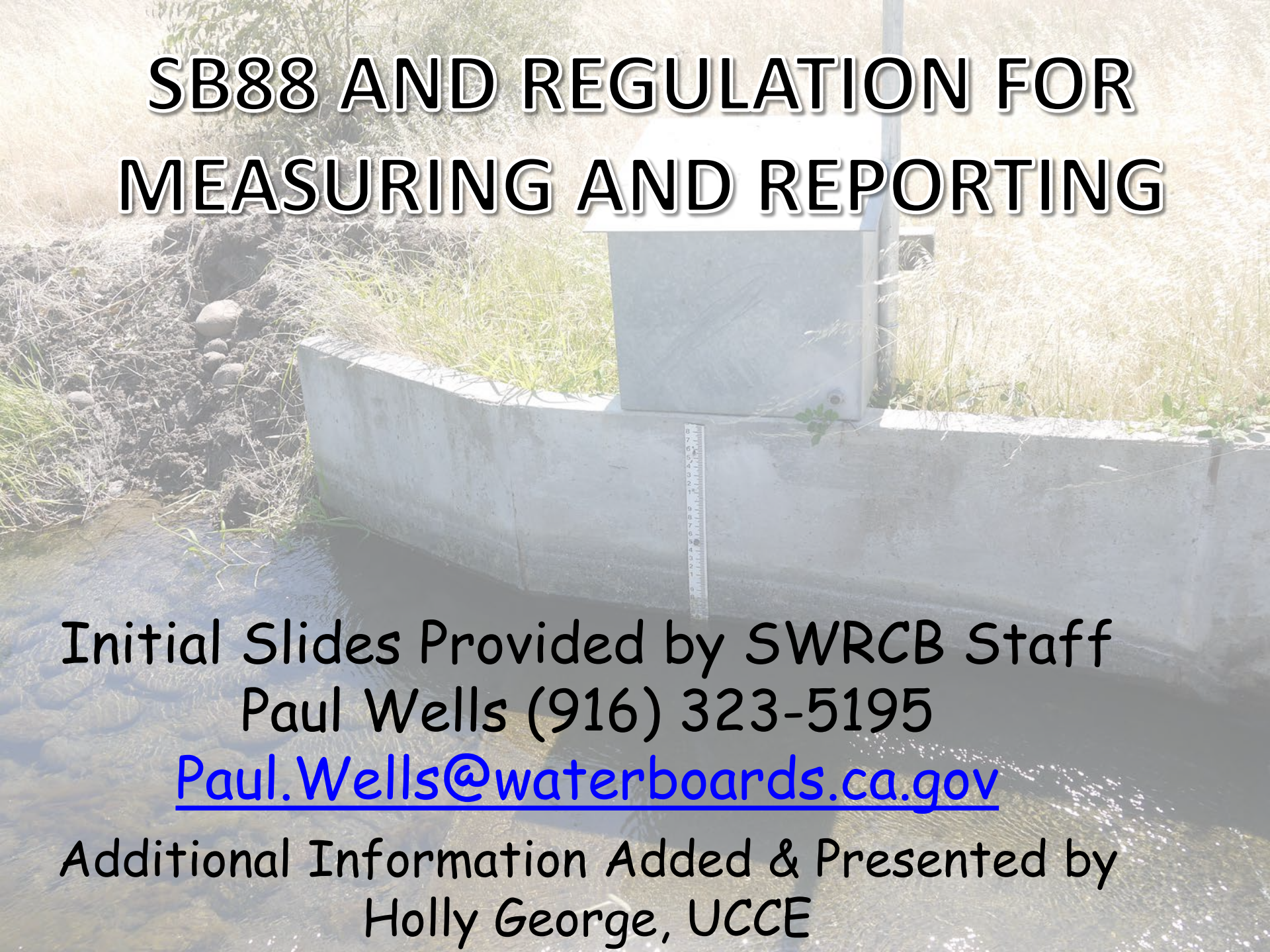
SB88 AND REGULATION FOR MEASURING AND REPORTING

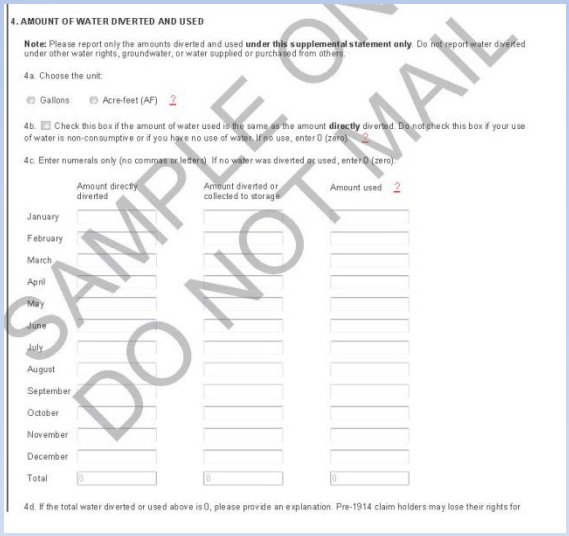


Initial Slides Provided by SWRCB Staff
Paul Wells (916) 323-5195
Paul.Wells@waterboards.ca.gov

Additional Information Added & Presented by
Holly George, UCCE

Primary Components of the Regulation

- Reporting
- Measurement



4. AMOUNT OF WATER DIVERTED AND USED

Note: Please report only the amounts diverted and used **under this supplemental statement only**. Do not report water diverted under other water rights, groundwater, or water supplied or purchased from others.

4a. Choose the unit:

Gallons Acre-feet (AF) 2

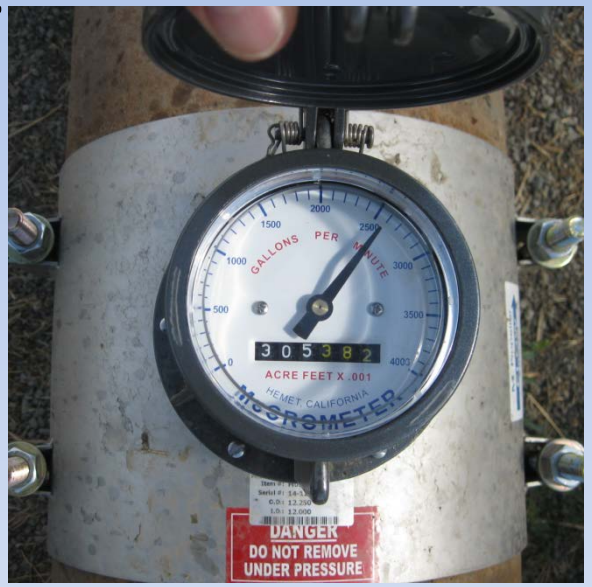
4b. Check this box if the amount of water used is the same as the amount **directly** diverted. Do not check this box if your use of water is non-consumptive or if you have no use of water. If no use, enter 0 (zero). 2

4c. Enter numerals only (no commas or letters). If no water was diverted or used, enter 0 (zero).

	Amount directly diverted	Amount diverted or collected to storage	Amount used 2
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Total	0	0	0

4d. If the total water diverted or used above is 0, please provide an explanation. Pre-1914 claim holders may lose their rights for

SAMPLE ONLY DO NOT MAIL



Applies to Surface Water Diversions – Those in Watermaster Areas should be covered by Measuring/Reports DWR Watermaster Completes. **Others must Measure/Report Themselves**.

Background

- The Governor signed **Senate Bill 88** into law in June 2015 - **which - in part - added measurement requirements to water rights that are 10 acre-feet or more in size.**
- **1 CFS = ~2ac ft/day…so if 5 ac, you're at 10acf**
- The State Water Board adopted a regulation to implement the new law at its January 19, 2016 Board Meeting.

Benefits

- Increase understanding of water use through more accurate measurement
- Improve water rights administration and transparency of records
- Provide more accurate data on available water supplies and improve forecasting of demand
- Provide for efficient management and use of water during times of shortage

Reporting Requirements

- Annual water use reports are required for all water right holders.
  - Annual reporting was already required for permit and license holders.
  - Statement holders and registration holders will now have to file the report every year.
- **During times of water shortage in a watershed or sub-watershed, monthly or more frequent reporting may be required.**

Reporting Requirements

DIVERSION/STORAGE PERIOD	WATER USE REPORT DEADLINES				
	PERMITS	LICENSES	STATEMENTS	REGISTRATIONS	CERTIFICATES
2015	JULY 1, 2016	JULY 1, 2016	JULY 1, 2016	VARIES	NOT REQUIRED
2016	APRIL 1, 2017	APRIL 1, 2017	JULY 1, 2017	APRIL 1, 2017	APRIL 1, 2017

Measurement Requirements

The regulation provides a phased approach to compliance with the new measurement and monitoring requirements.

Type of Diversion (af = acre-feet)	Installation Deadline	Required Accuracy	Required Monitoring Frequency	Qualifications For Installation And Certification
Direct Diversion ≥ 1,000 af/year Storage ≥ 1000 af	January 1, 2017	10%	Hourly	Engineer/Contractor/Professional
Direct Diversion ≥ 100 af/year Storage ≥ 200 af	July 1, 2017	10%	Daily	Engineer/Contractor/Professional
Direct Diversion > 10 af/year Storage ≥ 50 af	January 1, 2018	15%	Weekly	Individual experienced with measurement and monitoring
Storage > 10 af	January 1, 2018	15%	Monthly	Individual experienced with measurement and monitoring

Water right holders may request reasonable extension of time.

Measurement Already Required

- Many permits and licenses have conditions requiring measurement.
- Diverters of water who filed Statements were required to measure their monthly water diversions *using best available technologies and best professional practices.*
  - *However, there was a provision that allowed parties to claim that implementation of those practices is not locally cost effective.*

University of California
Agriculture and Natural Resources

ANR Publication 8490 | February 2013
http://anrcatalog.ucanr.edu
UC PEER REVIEWED

Low-Cost Methods of Measuring Diverted Water

LARRY FORERO, UC Cooperative Extension Livestock and Natural Resources Advisor, Shasta County; and ALLAN FULTON, UC Cooperative Extension Irrigation and Water Resources Advisor, Tehama County

The California State Water Resources Control Board requires that the amount of water diverted from the surface waters of the state be reported. For many years diverters were able to estimate the amount of water they diverted and report this estimate. Legislation passed in 2010 requires that the amount of water diverted be measured. Many water right owners are seeking to comply with this regulatory requirement.

Other reasons to measure water could include the following:

- to assure that the appropriate amount is diverted
- to divide shared interest in water
- to identify opportunities to save water for other uses

This publication focuses on simple and inexpensive methods of measuring surface water to irrigate pastures and other lower-value crops where more advanced methods of measurement may not be as feasible. A simple method of estimating flow in open channels, along with installation and use of contracted rectangular and V-notch weirs, are discussed. Examples of how to apply the flow measurements are also provided.

Basic Water Measurement in Open Channels (Float Method)

The volume of water passing through a point on a stream per unit of time is used to measure stream flow. Two factors are required to determine volume (quantity) of water: cross-sectional area, generally in square feet (ft^2), and flow velocity, generally in feet per second (ft/sec). Flow is usually expressed in cubic feet per second (cfs). (For converting

Examples in this Free Online Publication ANR 8490

If interest, maybe local RCDs could host a water measuring workshop?

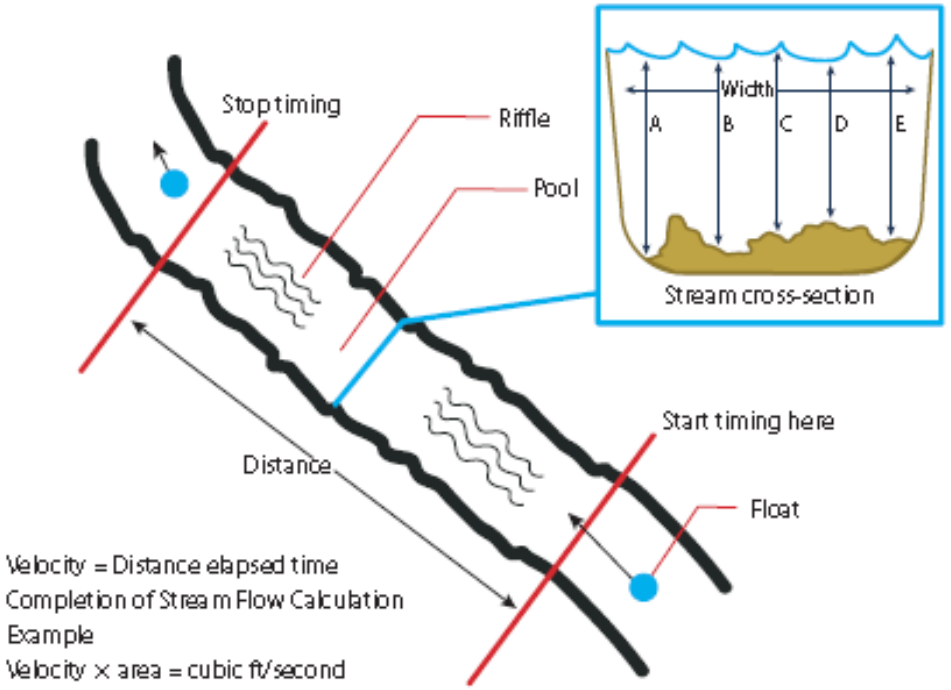


Figure 1. Simple method for determining water velocity.
Source: Adapted by Elizabeth Wilson from Nader et al. 1997.

Figure 1 illustrates the float technique for determining velocity.

Determining Flow (Q)

To determine flow, the formula is

$$\text{flow} = \text{cross-section} \times \text{velocity}$$

The examples above note a cross-sectional area of 2.5 square feet and a water velocity of 2 feet per second. Multiplying these two attributes together gives a total stream flow of 5 cubic feet per second (cfs), as shown below:

$$\text{total stream flow} = 2.5 \text{ ft}^2 \times 2 \text{ ft/sec}$$
$$= 5 \text{ cfs}$$

Using Flow Data to Determine Acre-Feet

Sometimes it is necessary to determine the amount of water diverted during a production season in acre-feet (ac-ft). To determine this, multiply the flow by the length of time water is diverted and divide by the number of square feet in an acre (43,560). For example, if the water is diverted for 150 days (d) and flow is 5 cubic feet per second during the entire season, the volume of acre-feet diverted can be calculated as follows:

$$(150 \text{ d} \times 24 \text{ hr/d} \times 60 \text{ min/hr} \times 60 \text{ sec/min} \times 5 \text{ cfs}) \div 43{,}560 \text{ ft}^2\text{/ac} = 1{,}488 \text{ ac-ft of water diverted}$$

The formula shown below can be used as a shortcut to determine the quantity of water diverted. To apply the shortcut, the flow rate must be expressed as cfs and the irrigation time must be expressed in hours. Multiplying the flow rate (cfs) by the irrigation time (hours) will give the volume of diverted water in acre-inches. The volume of diverted water in acre-inches can then be converted to acre-feet by dividing by a constant of 12 (there are 12 acre-inches in 1 acre-foot of water).

$$A = Q \times T \div 12 \qquad \text{[Eq. 2]}$$

where:

A = the volume of water diverted, expressed in acre-feet
Q = the stream flow, in cfs
T = the total hours (days × 24 hours/day)
12 = constant

Using the example above and equation 2 [5 cfs × (150 days × 24 hours/day) ÷ 12], the volume of water diverted would be

$$A = 5 \text{ cfs} \times (150 \text{ d} \times 24 \text{ hr/d}) \div 12 = 1{,}500 \text{ ac-ft}$$

Expressing Flow Conversions

Water flow can be expressed in several ways; cubic feet per second (cfs) is probably the unit most commonly used. Table 1 shows different units and conversion factors.

Measurement Weirs

Weirs are good tools that work well to measure water flow in ditches and streams that convey water to irrigate pastures and other lower-value crops. They are relatively inexpensive, while improving accuracy over the most basic float technique of measuring flow in open channels. Properly installed, they provide an accurate measure of cross-sectional area and water velocity. To measure water flow accurately, weirs must be designed specifically for each water-conveyance system and installed correctly. Head (or H, the height of water passing over the weir crest) is key to measuring water flow with weirs. It is measured at a point upstream from the crest of the weir, where the surface drawdown from water spilling over the weir does not affect the measurement. Once installed, the flow should be

Table 1. **Conversion table for units of flow**

Units	Cubic feet per second	Gallons per minute	Millions gallons per day	Southern California miner's inches	California statutory miner's inches	Acre-inches per 24 hours	Acre-feet per 24 hours
cubic feet per second	1.0	448.8	0.646	50.0	40.0	23.80	1.984
gallons per minute	0.00223	1.0	0.00144	0.1114	0.0891	0.053	0.00442
million gallons per day	1.547	694.4	1.0	77.36	61.89	36.84	3.07
Southern California miner's inches	0.020	8.98	0.0129	1.0	0.80	0.476	0.0397
California statutory miner's inches	0.025	11.22	0.0162	1.25	1.0	0.595	0.0496
acre-inches per 24 hours	0.042	18.86	0.0271	2.10	1.68	1.0	0.0833
acre-feet per 24 hours	0.504	226.3	0.3259	25.21	20.17	12.0	1.0

Small Reservoirs

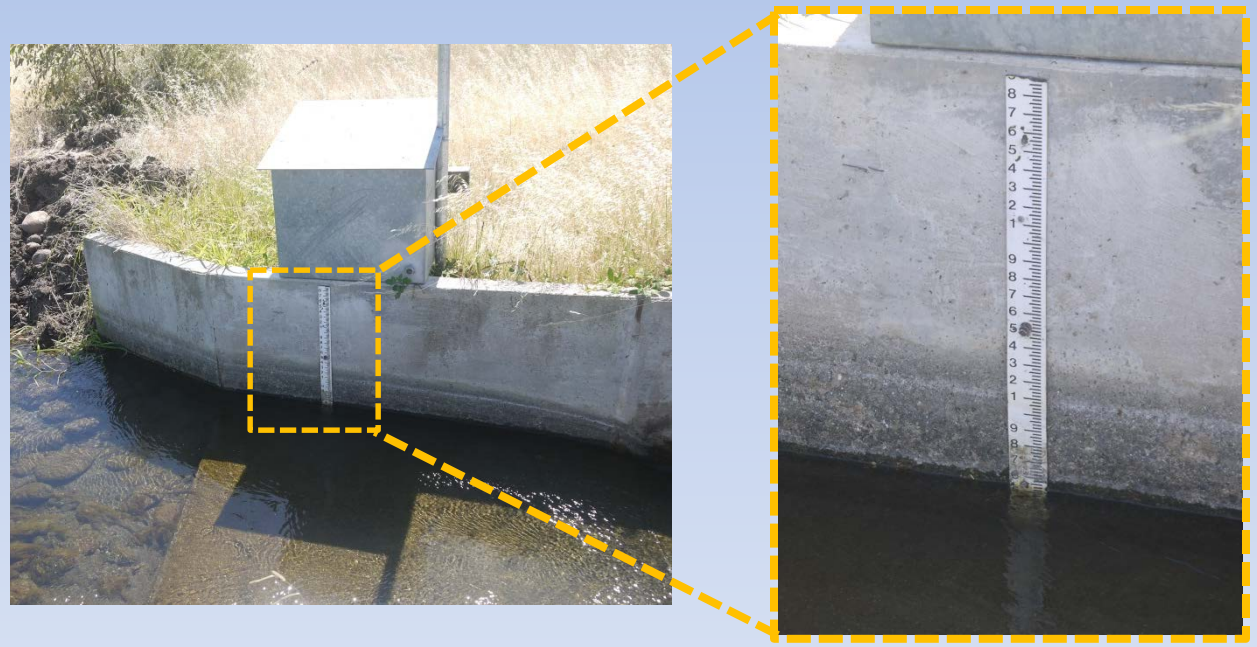
- For a reservoir with a capacity of less than 200 acre-feet.
  - A staff gauge may be installed to measure changes in water elevation. The change in water elevation may be used with a reservoir survey to determine change in storage.
  - Monthly or weekly monitoring may be done by manual observation, when practical.

Staff Gauge (Reservoir)

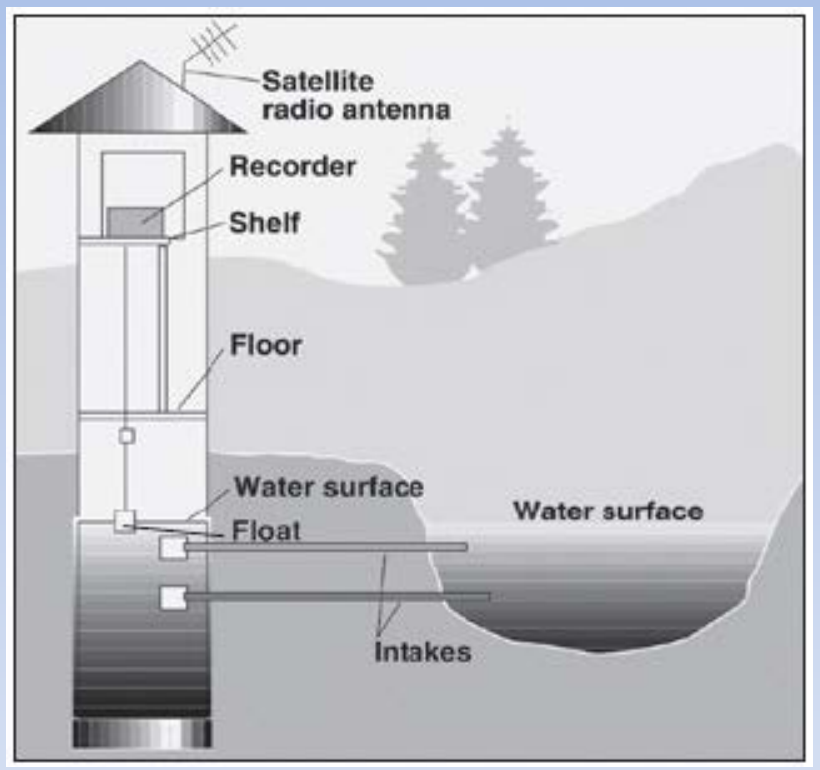
Smaller Diversions

- Have less stringent accuracy and monitoring requirements.
- Monitoring may be done with a data logger or by observation.
- Open channel flows typically measured with flumes, weirs, or submerged orifice.
- Piped flow typically measured by a mechanical or electronic flow meter.

Staff Gauge and Flume



Pressure Transducer/Float



http://water.usgs.gov/edu/streamflow1.html

Larger Diversions

- Larger diversions require a professional to install and certify the measurement device.
- Monitoring will often be done with a data logger.
- Open channel flows typically measured with flumes or weirs.
- Piped flow typically measured by a mechanical or electronic flow meter.

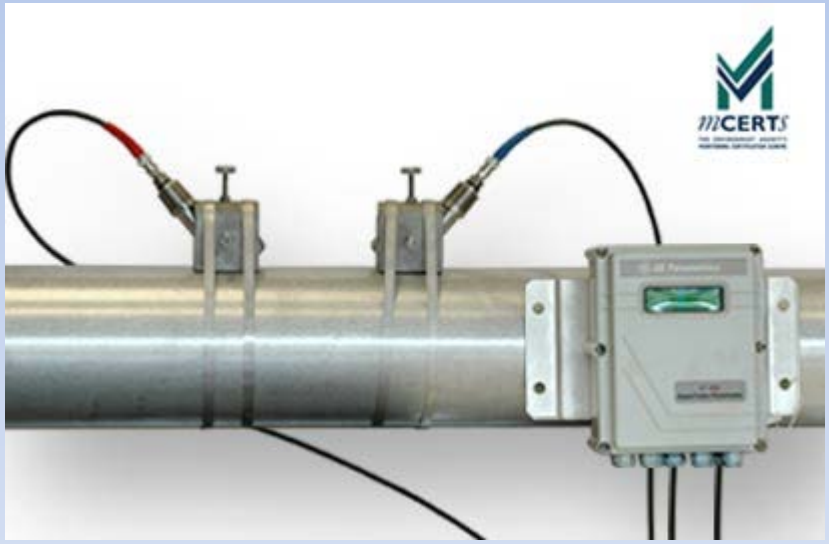
Weirs

Propeller Flowmeter

http://www.waderain.com

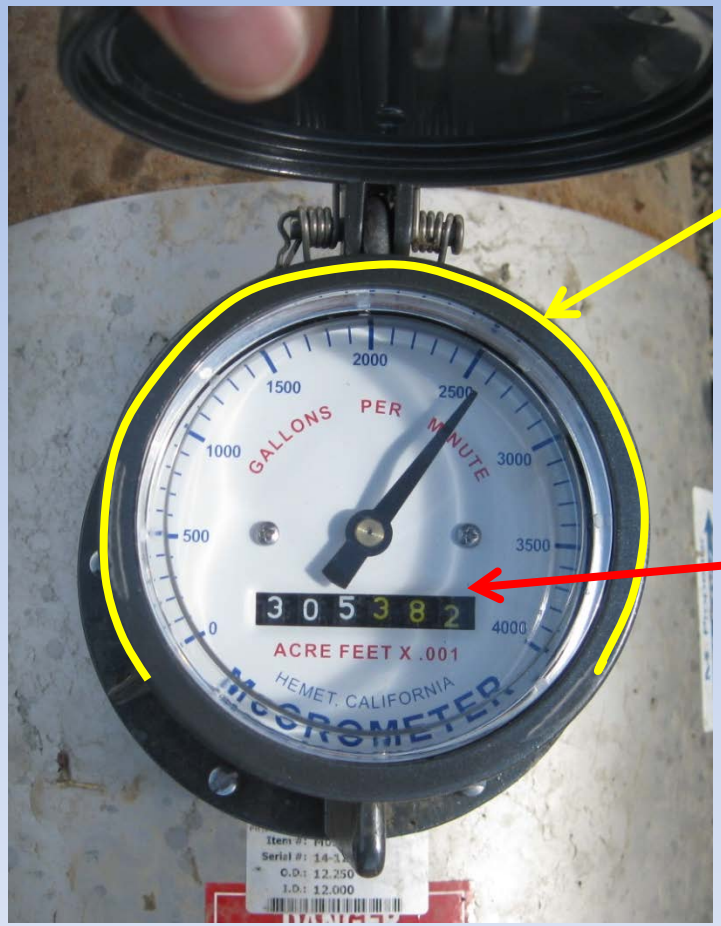
Magnetic Flow Meter

Acoustic Flowmeter



Clamp on flow meter

Rate and Totalizer



Existing Measurement Devices

- The accuracy standards adopted in the regulation were chosen to reasonably ensure that they could be met by existing devices that have been properly installed, operated, and maintained.
- The accuracy standard is ±15% for measuring devices installed on or before January 1, 2016.
- Diverters may use any measuring device or combination of devices that meet the requirements of the regulation.

AVERAGE COST OF MEASUREMENT DEVICE BY CATEGORY

Category		Device/Service	Cost Range	
			Low	High
Reservoir Storage (acre-feet)	10 < storage < 200 (78% of measured Reservoirs)	Staff Gauge	$300	$800
Direct Diversion - dd (acre-feet/year)	10 < dd < 100 (42% of measured PODs)	In-line flow meter	$1,200	$1,800
	100 ≤ dd < 1000 (34% of measured PODs)	In-line flow meter / Open Channel	$2,000	$6,000
		Data logger	$250	$600
		Total	$2,250	$6,600

Notes

1. The cost of the measurement device assumes the device is installed by a qualified individual.
2. The cost will depend whether the diverter can use an existing device or needs to install a new one.
3. The costs of measuring and monitoring water use are case specific and can vary widely based on the specific situation.

Measurement Method

- Diverters may propose a measurement method, in lieu of a measuring device, to comply with measurement and accuracy requirements under the regulation.
  Examples of measurement methods include:
  - Multiple water right holders on a single surface supply can propose a collaborative measurement approach.
  - A single water right holder with multiple points of diversion can propose a measurement method that may preclude the need to install a measurement device at each point of diversion.

Alternative Measurement

- A water right holder may request an alternative compliance approach when strict compliance is not feasible, would be unreasonable expensive, would unreasonable affect public trust resources, or would result in the waste or unreasonable use of water.
- Determination of these circumstances is situation dependent.
- A water user requesting an alternative approach should submit a reasonable plan for attaining compliance.

Additional Information

- Emergency regulation website
  - **http://www.waterboards.ca.gov/waterrights/water_issues/programs/measurement_regulation/**
- Phone Number: **(916) 341-5300**
- Email Address: **dwr-measurement@waterboards.ca.gov**