Draft Discussion Paper: Range of Options for Agricultural Water Measurement

SBx7-7, enacted in November of 2009, includes provisions on water conservation, measurement, and reporting activities for agricultural water suppliers. DWR has coordinated with the Agricultural Water Management Council and an Agricultural Stakeholder Committee (ASC) to develop a regulation for a range of agricultural water measurement options that water suppliers may use to measure water delivered to customers.

1.0 Provisions Related to Agricultural Water Measurement

Paragraph 10608.48(i)(1) of SBx7-7 states:

> *The department shall adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).*

That paragraph refers to 10608.48(b) of SBx7-7:

> *Agricultural water suppliers shall implement all of the following critical efficient management practices:*
>
> *(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).*
>
> *(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.*

Section 10813 defines customer as "*a purchaser of water from a water supplier who uses water for agricultural purposes.*" Note however, that Section 10813 provides definitions for Part 2.8, Agricultural Water Management Planning, but not specifically for Part 2.55 of SBx7-7 which includes the paragraphs on water measurement. Therefore, DWR has developed a more specific definition of customer for use in the measurement regulation (see Attachment 1).

Section 531.10of the California Water Code , referred to above, requires that:

> *(a) An agricultural water supplier shall submit an annual report to the department that summarizes aggregated farm-gate delivery data, on a monthly or bi-monthly basis, using best professional practices.*
>
> *(b) Nothing in this article shall be construed to require the implementation of water measurement programs or practices that are not locally cost effective.*

Note also that Section 531 defines a lower size threshold for aggregate reporting purposes than SBx7-7 specifies for its measurement regulations.

Paragraph 10608.12 (a) of SBx7-7 states:

> *"Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.*

Further, agricultural water suppliers that provide water to less than 25,000 acres only need to comply if funding is provided to cover additional costs imposed (see section 10853).

In contrast, Section 531 of the Water Code states:

> *531(b) "Agricultural water supplier" means a supplier either publicly or privately owned, supplying 2,000 acre-feet or more of surface water annually for agricultural purposes or serving 2,000 or more acres of agricultural land. An agricultural water supplier includes supplier or contractor for water, regardless of the basis of right, which distributes or sells water for ultimate resale to customers.*

2.0 Timeline for Agricultural Water Suppliers to Comply with Measurement Requirements

DWR is authorized to issue an emergency regulation to provide for a range of measurement options, followed by a permanent regulation. DWR considered issuing an emergency regulation by January, 2011, but discussion with the ASC indicated that it needed more time to develop and evaluate terms of the regulation. Instead, DWR has chosen to submit the regulations in May of 20111 to allow time for agricultural water suppliers to plan and implement the water measurement requirements of SBX7-7. Several sections of SBx7-7 determine the date by which agricultural water suppliers must comply with the measurement requirements. These are:

- Subdivision 10608.48(a) of SBx7-7 sets July 31, 2012 as the date by which agricultural water suppliers shall implement efficient water management practices that include measuring the volume of water delivered to customers.
- Notwithstanding the July 31, 2012 date stated in 10608.48(a), SBx7-7 subdivision 10608.56 (b) establishes the onset of the grant and loan eligibility test to be July 1, 2013:

  > *On and after July 1, 2013, an agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.*

- An agricultural water supplier will still be eligible for grants and loans if the supplier has submitted to DWR for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the efficient water management practices (paragraph 10608.56 (d)).

To allow time for planning, financing, and implementation of water measurement programs to comply with the SBX7-7 requirement, DWR and the ASC also considered a flexible phasing of implementation of the regulation, with full compliance achieved by the year 2020. Under this approach, agricultural water suppliers would be required to report existing water measurement

and include in their 2012 Water Management Plans a plan to achieve compliance by 2020, perhaps with interim goals to be met by 2015. Many ASC members representing diverse interests supported this approach in concept. However, DWR staff ultimately determined that the law did not provide flexibility for such a phased implementation, and that full compliance with the terms of the regulation must be achieved by July 31, 2012 and as specified in the SBx7-7 statute.

3.0 Applicability

Agricultural water suppliers that provide water to more than 10,000 irrigated acres are subject to the water measurement regulations (section 10608 (a)). Furthermore, agricultural water suppliers that provide water to more than 10,000 irrigated acres but less than 25,000 acres only must comply with water measurement requirements if sufficient funding is provided specifically for that purpose (section 10853).

Both of these acreage thresholds exclude acreage served by recycled water. For purposes of the measurement requirements, DWR staff has clarified that this exclusion applies to lands that are irrigated only using recycled water. Recycled water means municipal or industrial wastewater that has been treated for waste and is thus usable for irrigation (section 13050 (n) of the California Water Code). It does not mean untreated return flow from other irrigated lands.

It is important to distinguish between the acreage thresholds for reporting purposes under Section 531, and the acreage thresholds for the measurement requirements. All agricultural water suppliers "supplying 2,000 acre-feet or more of surface water annually for agricultural purposes or serving 2,000 or more acres of agricultural land" must meet the reporting requirements of Section 531.10(a). The following summarizes how the Section 10608 (a) water measurement requirements will apply to agricultural water suppliers depending on the size of the agricultural water supplier's irrigated area.

- **Agricultural water suppliers providing water to less than 10,000 irrigated acres, excluding acres that receive only recycled water,** are not subject to the water measurement requirements. They remain subject to measurement requirements of Section 531 of the Water Code if they deliver more than 2000 acre feet of water or irrigate 2000 or more acres of land.

- **Agricultural water suppliers providing water to 10,000 or more irrigated acres but less than 25,000 irrigated acres, excluding acres that receive only recycled water,** are not required to implement the water measurement requirements unless sufficient funding is provided specifically for that purpose.

- **Agricultural water suppliers providing water to 25,000 irrigated acres or more, excluding acres that receive only recycled water,** shall measure water deliveries consistent with the water measurement requirements of this regulation.

Any agricultural water supplier that meets the water measurement requirements developed under paragraph 10608.48(i)(1) of SBx7-7, and submits an annual report to the Department that summarizes aggregated farm-gate delivery data on a monthly or bi-monthly basis, will also be deemed to comply with the reporting and measurement requirements of section 531.10 of the Water Code.

Irrigated acres are calculated as the average of the previous five years of acreage within the agricultural water supplier's service area that has received irrigation water from the agricultural water supplier. They include private lands that are irrigated and used for managed wildlife habitat, but exclude state or federally managed wildlife refuges. The measurement of irrigated acreage within a particular field has not been specified in the proposed regulation. Therefore, water suppliers may report either gross or net irrigated acreage. Net acreage of a field includes only the land area receiving irrigation water. It excludes portions of a field used for farm roads, equipment, ditches, etc. For example, a field that measures a total of 80 acres may only hve 70-75 acres actually receiving irrigation water. Water suppliers and water users typically use net acreage for purposes of calculating aggregate irrigated acreage and water use.

Paragraph 10608.8 (d) also excludes from the measurement requirement any agricultural water supplier "that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect." Imperial Irrigation District (IID), Coachella Valley Water District (CVWD), and Metropolitan Water District of Southern California (MWD) were the water suppliers that signed the original QSA. In addition San Diego County Water Agency (SDCWA) is listed as a party to the QSA in Chapter 617 of the Statutes of 2002. The Quantification Settlement Agreement is now usually viewed by the parties as a package of agreements. The proposed regulation has not specified which agencies may fall under this exclusion. For purposes of cost and fiscal impact assessment (see the April 13, 2011 Cost Analysis), the four suppliers listed above (IID, MWD, SDCWA, and CVWD) are assumed to fall under the exclusion.

3.1 Applicability to Wholesale Suppliers

Wholesale water suppliers include entities responsible for conveyance and delivery of agricultural water to one or more other water suppliers (the receiving water suppliers). Wholesale suppliers are subject to the measurement regulation provided that they meet the size thresholds described above. DWR is specifically excluded from the definition of an agricultural water supplier. Federal agencies, such as the U.S. Bureau of Reclamation, are also excluded, based on an assumption that the State cannot mandate that a federal agency take action or spend money that Congress has not directed. Canal authorities or other entities that convey or deliver water through facilities owned by a federal agency were considered but excluded. DWR staff determined that, because the facilities are owned by, in these cases, the U.S. Bureau of Reclamation, they would also fall under the federal exclusion. Staff noted that such entities already measure and report diversions and deliveries.

A wholesale supplier or other, non-retail entity subject to the water measurement requirements must measure deliveries to its customers only. It is not required to measure deliveries that its retail customers make to their customers. For example, if a wholesale supplier delivers water only to ten retail agricultural water suppliers, and those retail suppliers serve a total of more than 25,000 irrigated acres, the wholesale supplier must measure deliveries to each of the ten retail suppliers, but not to the individual customers served by each of the ten retail suppliers. If the wholesale supplier also delivers water to final agricultural customers, it must also measure deliveries to each of those customers.

To determine whether it meets acreage thresholds for compliance, the wholesale water supplier or other entity must include all customers' irrigated acres that fall within the service boundary of the wholesale supplier.

4.0 Requirements and Criteria

The following requirements and criteria apply to the agricultural water suppliers.

- Suppliers must measure water delivered to customers. The measurement must be accurate enough to allow the water supplier to charge its customers at least in part based on volume of water delivered (section 10608.48(b)(1));

- Measurement in 10608.48(i)(1) refers only to water delivered under the control of the water supplier. For example, water delivered by the retail supplier to a customer at a turnout is subject to the measurement requirements; however, the customer may route that delivery to one or more fields on his or her farm, and delivery to each of those fields would not be subject to the measurement requirements. Similarly, a wholesale supplier must measure the delivery to its customers. The wholesale supplier is not responsible for measuring water delivered to each of the retail supplier's customers.

- A customer is defined in section 10813 as a "purchaser of water from a water supplier who uses water for agricultural purposes."

- In most cases a water supplier's customers would correspond to its billing accounts. Nevertheless, measurement must occur at discrete physical locations, so if a supplier delivers water to one customer at more than one location, the measurement requirements apply at each of those delivery locations.

- Measurement in 10608.48(i)(1) refers only to water delivered to customers by an agricultural water supplier. It does not include groundwater pumped from private wells even though the groundwater may be managed by a public agency. Groundwater pumped by wells owned by the agricultural water supplier and provided to customers as part of its delivered irrigation water is subject to the requirements. DWR staff and the ASC considered whether water that a supplier uses to recharge groundwater should be considered as delivered water covered by the measurement accuracy standards. Staff concluded that water used for groundwater recharge need not be subject to the standard. Most agricultural water suppliers subject to the regulation have no control over the private wells that make use of the recharged water. Those that do have such control also have an incentive to measure recharged water. In addition, water is recharged under a wide range of circumstances, including the opportunistic diversion of flood flows. It may not be possible to measure accurately the volume diverted and recharged in some situations.

- Irrigation return flow leaving fields, farms, or water supplier boundaries is not subject to the measurement requirements, except if it is collected by the water supplier and provided as irrigation delivery to other customers.

5.0 Frameworks Considered for Creating a Range of Water Measurement Options

DWR is required by CWC §10608.48(i)(1) to develop and adopt a regulation that provides for a range of measurement options. These options allow for a range of conditions and delivery system configurations, including pressurized pipe delivery, non-pressurized pipe delivery, and open-channel delivery.

5.1 Frameworks Considered for Creating a Range of Water Measurement Options

DWR staff, with input from the Agricultural Stakeholder Committee and the A2 Subcommittee, considered three alternative frameworks for developing a range of options for measuring agricultural water deliveries:

(1) **DWR list of acceptable devices:** Develop a regulation that includes a list of acceptable measurement devices maintained in defined manners to achieve desired accuracy. Suppliers could choose among those devices based on their local conditions.

(2) **DWR performance standards for device accuracy:** Develop a regulation setting a performance standard that defines minimum benchmarks for device accuracy that could be met or bettered by a range of devices. Suppliers could measure delivery using greater accuracy than the standard, based on their and their customers' demands. Included under this option would be requirements defining standards for device rating or calibration but could also set minimum standards for administration, monitoring and maintenance protocols for devices.

(3) **Locally-determined standards for device accuracy:** Develop a regulation that provides a process for suppliers to assess and report their measurement accuracy. For example, the regulation could specify a set of information that a supplier would report to DWR documenting 1) the procedures by which it determined sufficient accuracy, and 2) information documenting its measurement devices and accuracies. The information must demonstrate that the supplier's measurement accuracy is sufficient to meet the two purposes stated in SBx7-7: submit an annual report to the department that summarizes aggregated farm-gate delivery data, and adopt a pricing structure based in part on the volume delivered.

In evaluating these frameworks, DWR staff considered the following criteria:

- *CWC §10608.48(b) directs a qualifying agricultural water supplier to measure with sufficient accuracy to (1) allow it to report to DWR a summary of aggregated farm-gate deliveries [CWC §531.10(a)], and (2) enable its adoption of a pricing structure based in part on the volume delivered to customers. This latter objective is tied to the stated intent in Section 1 of Assembly Bill 1404 that "[a]ppropriate measurement of water use facilitates better water management by making information available to local, state, and federal water managers and planners."*[1]

[1] AB 1404 was approved by the Governor on October 14, 2007. Section 1 includes several legislative findings and declarations that demonstrate the intent of the statutes enacted by the bill.

- *The need for a certain degree of confidence – through use of a minimum benchmark - that data submitted to DWR [under CWC §531.10(a)] closely represents actual deliveries.*

- *The need to provide a reasonable degree of flexibility to agricultlural water suppliers to accommodate a wide range of water delivery circumstances and supplier/customer relationships.*

- *The recognition that an agricultural water supplier and its customer have a business relationship associated with the delivery of water and the payment for such services. This relationship in itself can provide incentives necessary to measure accurately.*

- *The need to balance theoretically potential accuracy with economically and technically practical accuracy while meeting the objectives of the statute.*

- *The recognition that the term "sufficient accuracy" in the statute refers to the measurement of a volume of water delivered to customers, which would be stated as a numeric value. Measuring and determining a numeric value would imply a numeric standard.*

- *The recognition that the delivery of water by most agricultural water suppliers is not equivalent to the sale of a commodity, which would be more responsive to market forces. Thus, the relationship between an agricultural water supplier and its customer and the need for accuracy may not be driven primarily by incentives associated with the cost of water and its delivery.*

Based on these considerations, DWR staff proposed that the second framework – specifying a performance standard that defines minimum device accuracy benchmarks – provided the most appropriate framework to establish a range of measurement options. A performance standard meets the intent of the legislation in the most flexible and cost-effective manner.

Staff did not recommend adopting a list of acceptable measurement devices for the following reasons:

- *Dictating specific devices can unintentionally constrain suppliers or impose unreasonable or unnecessary costs to accommodate the defined devices.*

- *Measurement technology changes over time, so a list of approved devices would need frequent review and modification.*

- *Measurement requirements are to assure agricultural water suppliers are able to meet 10608.48(b), which states "Measure the volume of water delivered to customers with sufficient accuracy…" The paragraph is stated in terms of measurement accuracy, not specific devices or technologies.*

Staff considered the request by several water suppliers that the regulation allow local conditions to determine appropriate measurement accuracy. The rationale suggested was that, once all suppliers adopt a pricing structure for water customers based at least in part on quantity delivered [CWC §10608.48(b)(2)], all will have adequate incentive to measure accurately as needed to serve that and other local purposes. DWR staff did not recommend this for the following reasons:

- *Volumetric pricing is only one of the purposes of sufficient accuracy. The accuracy must also be sufficient from the State's viewpoint to provide reliable reporting of aggregate farm-gate delivery*

data. For example, a supplier could set a volumetric price that is so low that both the supplier and its customers would accept measurement accuracy that the State would deem insufficient for aggregate reporting purposes.

- *This framework is essentially the status quo - suppliers already measure water according to local conditions, cost-effectiveness, the suppliers' accounting needs, and customer demands. Nevertheless, SBx7-7 specifically directs DWR to adopt a regulation.*

Attachment 2 provides examples of similar performance standards developed by USBR and other western states. It is worth noting that, of the six states (Arizona, Colorado, Idaho, Kansas, Oregon, and Washington) surveyed for the 2003 CALFED report only one, Arizona, had numerical accuracy standards for points of irrigation water delivery by suppliers to individual customers. None of those surveyed required specific hardware devices (though some included examples of devices that would comply).

5.2 Range of Water Measurement Options

Using the framework described above, DWR staff has developed a potential range of options that would ultimately be defined in the regulations promulgated by the Office of Administrative Law.

Water suppliers subject to the requirement shall use one of the following options to measure water delivered to customers (for exact language of the options, see the proposed regulation):

- The first option applies to measurement at the location of delivery to individual customers.
- The second option applies to measurement upstream of the point of delivery to individual customers. Under certain circumstances and with justification acceptable to DWR, this option allows the supplier to measure water at a point on the lateral upstream of delivery to more than one customer.

Within the two options, the proposed regulation provides additional flexibility to demonstrate compliance. For newly-installed devices, the supplier may use a laboratory certification or a defined non-laboratory certification procedure. For existing measurement devices, the supplier may use in-field testing, sampling or analysis and certification of design and installation at the farm gate and field testing at the lateral.

A third option was considered that would allow CVP water suppliers to meet the requirements by delivering water through devices that meet the accuracy standards in Reclamation's Conservation and Efficiency Criteria Standards of 2008, or future amendments to those Standards that meet the proposed regulation's numerical accuracy standard. DWR received comments from federal water suppliers and NRDC for removal of the third option. Currently, the language pertaining to the CVP water suppliers has been removed from the May 11 version of the Draft Regulation.

5.2.1 Rationale for proposed options

The options attempt to provide flexibility for agricultural water suppliers to measure water with sufficient accuracy to meet the two purposes stated in the legislation: to submit an annual report of aggregated farm-gate delivery and to adopt a pricing structure for water customers based at least in part on quantity delivered. The options also encompass existing measurement devices and newly-installed devices. The specific numerical accuracy standards are proposed based on the following considerations:

- DWR staff, with the assistance of ASC members, compiled information on the accuracy capabilities of different types of measurement devices. The purpose of the compilation was to determine that the proposed measurement options and their associated numerical standards provided suppliers with a range of feasible hardware options.
- Suppliers that rely on a laboratory certification must meet a higher accuracy standard than those using a non-laboratory (in-field or as-installed) standard. This accounts for the additional uncertainties and ranges of conditions encountered under installed field conditions.
- Suppliers that choose to measure upstream of the point of delivery to individual customers must meet a higher accuracy standard. Such aggregate measurements must be apportioned to individual customers and this process introduces additional error into the calculation of final volume delivered. Therefore, the proposed regulation requires that the measurement device itself be more accurate to offset and achieve a comparable level of accuracy for water delivered to individual customers.

5.2.2 Evaluating accuracy of existing devices

5.2.3 Considerations and requirements for using lateral-level measurement

5.2.4 Timeline and protocols for assessing, replacing, or modifying existing devices

DWR staff and the ASC considered how rapidly and intensively suppliers must proceed to assure that all existing measurement devices meet the proposed numerical accuracy standards. Many members of ASC expressed concerned that the date of July 31, 2012 was insufficient time to assess and potentially replace many thousands of measurement devices. They explained that water suppliers are mostly public agencies that must provide water service to customers and follow existing laws and procedures when undertaking capital improvements. Their concerns included the following:

- Assessments of existing devices are labor-intensive. Suppliers have limited staff to perform the added requirement, so they must add staff or hire contractors, both of which take time.
- Large new capital expenditures to repair or replace devices will require financing, and public agencies generally issue bonds for such purposes. This is a lengthy process that includes staff work, bond feasibility study, underwriting, rating, marketing, and sale of the bonds.
- Costs of compliance, including capital expenditures, will require suppliers to raise assessments or water rates. Many suppliers expect to put the increases to a vote as needed to comply with State Constitutional requirements (Proposition 218).
- Implementation includes planning, engineering, and construction. Irrigation water suppliers must provide reliable service during the crop growing season, so any system downtime associated with construction must be scheduled at other times of the year and when weather permits.

These considerations imply that some suppliers simply may not be able to bring all existing devices up to the numerical accuracy standard by July of 2012. Therefore, the proposed regulation provides that suppliers will be compliant by including in their 2012 AWMP a plan and schedule for bringing all existing devices up to the applicable numerical standard.

Attachment 1 – Glossary

The following definitions apply to this Discussion Paper. They define words and phrases that DWR used in developing and describing measurement options and requirements. Words and phrases that are already defined within legislation are noted as such in the Reference column. Definitions not specifically drawn from legislation were proposed by DWR staff for purposes of clarifying the concepts used to develop the proposed regulation.

Term	Definition	Reference
Accuracy	The measured flow rate, velocity, or volume relative to the actual flow rate, velocity, or volume, expressed as a percent. The percent shall be calculated as 100 x (measured value – actual value) / actual value, where "measured value" is the value indicated by the device and "actual value" is the value as determined through laboratory, design or field testing protocols that use best professional practices.	
Accuracy Standard	The specific measurement requirement stated in the adopted regulation, including the numerical value of measurement accuracy.	
Aggregated farm-gate delivery data	Information reflecting the total volume of water an agricultural water supplier provides to its customers, calculated by totaling its deliveries to individual customers.	AB 1404 531(a)
Agricultural water management plan	An agricultural water management plan prepared pursuant to SBX7-7, Part 2.8. Agricultural Water Management Planning.	SB x7-7 10811
Agricultural water supplier (SB X7-7)	A water supplier, either publicly or privately owned, that provides water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.	SB x7-7 10608.12.(a)
Agricultural water supplier (AB 1404)	A supplier either publicly or privately owned, supplying 2,000 acre-feet or more of surface water annually for agricultural purposes or serving 2,000 or more acres of agricultural land. An agricultural water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells water for ultimate resale to customers.	AB 1404 531(b)
Best available technologies	Technologies at the highest technically practical level, using flow totaling devices, and if necessary, data loggers and telemetry.	AB 1404 5100(a)
Best professional practices	Practices attaining and maintaining accuracy of measurement and reporting devices and methods.	AB 1404 531(d)
Community	A lateral canal used for delivery of irrigation water that is not	

Term	Definition	Reference
Ditch	owned nor controlled by the agricultural water supplier.	
Customer	The purchaser of water from an agricultural water supplier who has a contractual arrangement with the agricultural water supplier for the service of conveying water to the customer delivery point.	
Delivery point	The location at which the agricultural water supplier transfers control of delivered water to a customer or group of customers.	
Device rating	Measurement devices may be rated for accuracy. Rating may be done by the manufacturer, by an independent testing laboratory, or by the field personnel after installation. If the manufacturer uses an independent testing laboratory, the measurement and reporting of the rating will be standardized and comparable across devices. Accuracy of a device typically depends on operating conditions, so the rating may be expressed as a schedule or equation related to flow rate, head difference, or other important factor affecting the device's accuracy.	
Diversion	Water taken by gravity or pumping from a surface stream or subterranean stream flowing through a known and definite channel, or other body of surface water, into a canal, pipeline, or other conduit, including impoundment of water in a reservoir.	AB 1404 5100(c)
Farm-gate	The point at which water is delivered from the agricultural water supplier's distribution system to each of its customers. Defined in Water Code §531(f).	AB 1404 531(f)
In-house Built Device	A measurement device that is manufactured by an agricultural water supplier or by others to specifications provided by an agricultural water supplier.	
Irrigated acres	For purposes of applicability of the proposed regulation, irrigated acres are calculated as the average of previous five-year acreage within the agricultural water supplier's service area that has received irrigation water from the agricultural water supplier.	
Irrigation return flow	The portion of applied irrigation water that is not stored in the crop root zone or does not evaporate from the field, Irrigation return flow includes surface return to surface water bodies such as drainage ditches, ponds, and streams. It also includes flow of applied water to groundwater.	
Lateral	A ditch, canal, or pipeline that delivers irrigation water directly to one or more farm-gates.	
Manufactured Device	A device that is manufactured by a commercial enterprise, often under exclusive legal rights of the manufacturer, for direct off-the-shelf purchase and installation. Such devices are capable of directly measuring flow rate, velocity, or totalizing the volume of water delivered, without the need for additional components that are built on-site or in-house.	

Term	Definition	Reference
Measurement device	A device by which an agricultural water supplier determines the numeric value of flow rate, velocity or volume of the water passing a designated delivery point. A measurement device may include manufactured device, on-site built device or in-house built device.	
On-site Built Devices	A measurement device that is built in-situ on a water conveyance system and may include manufactured devices or in-house built devices as components.	
Recycled water	Water that, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur, and is therefore considered a valuable resource. Defined in subdivision (n) of §13050 of the Water Code.	
Retail water supplier	Any agricultural water supplier that sells water directly to customers for irrigation or other agricultural use.	
Type of Device	A category of measurement devices that are manufactured or built to perform similar functions. For example, rectangular, v-notch, and broad crested weirs are one type of device. Similarly, all submerged orifice gates are considered one type of device.	
Volumetric pricing	A revenue mechanism by which a water supplier recovers at least part of its total operations cost by charging customers based on volume of water actually delivered. The volumetric charge must be based on measured volume of water delivered or on an estimate of volume delivered. The estimate must be sufficiently similar to the customer's actual water use pattern and must be able to account for observed changes in flow rate and duration of delivery.	
Water conservation	The efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water.	SB x7-7, 10817
Wholesale water supplier	Any agricultural water supplier that sells water to at least one other agricultural water supplier under a permanent or long-term contractual relationship. A wholesale water supplier may also act as a retail supplier to some of its customers. Canal operating authorities and other entities that convey or distribute water to other agricultural water suppliers are considered wholesale water suppliers.	

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Attachment 2 – Examples of Measurement Standards

USBR's Mid-Pacific Region has developed accuracy standards for measurement of water delivered by agricultural water suppliers to customers. Its 2008 Conservation and Efficiency Criteria (USBR, 2008) state that agricultural contractors must implement (or show a plan for implementing) certain BMPs, including one for measurement of water delivered to each customer.

- *Agricultural contractors must "measure flows with devices that are operated and maintained to a reasonable degree of accuracy, under most conditions, to +/- 6 percent by volume."*
- *The Water Conservation Criteria provide categories of measurement devices and provide examples of devices in each category. USBR does not specify particular devices that must be used or that it presumes will satisfy the accuracy standard.*

Other States. The following information is from Appendix C of the Final Report of the Independent Panel on Appropriate Measurement of Agricultural Water Use (CALFED, 2003).

The State of Arizona requires that water suppliers or other responsible parties that are subject to its measurement regulations must measure irrigation water delivered. Approved measuring devices must be installed as close as possible to the wellhead or point of delivery which the device is intended to measure.

- *Entities required to measure must use a device that meets an accuracy standard of +/-10%.*
- *At one time, Arizona maintained a list of approved devices that met the standard, but changes in technology, requests for additions to or deletions from the list, and other factors led it to abandon an "approved" list as too burdensome.*

The State of Oregon may require measurement of delivery as a condition of some water rights permits. There appears to be no universal accuracy standard for such permit restrictions. However, governmental entities are required to measure and report diversions of water.

- *Governmental entities in Oregon must measure to an accuracy of +/- 15%. No specific measurement devices are required or pre-approved.*

The State of Washington has adopted a regulation (Washington Administrative Code Chapter 173-173) for measuring diversions from surface water and groundwater. The measurement requirement "is not intended to apply to customers of a municipality or public water supply system or members of an irrigation district or similar secondary users."

- *The combined measuring device and data recording system must measure to an accuracy of +/- 10%.*
- *Washington's regulation allows for a range of devices, and identifies the USBR Water Measurement Manual (2001) and manufacturers' ratings as reference information for determining accuracy of measurement devices.*