Per Capita Baseline and Target Calculations

Peter Brostrom
Urban Water Use and Efficiency Branch
California Department of Water Resources

January 5, 2011

Topics to be covered

- Distribution System Delineation
- Base per Capita Water Use
  - Gross Water Use
  - Service Area Population
- Target Calculations
- Minimum Reduction Requirement
- Documentation to be reported in the UWMP
- Other Gross Water Exclusions
  - Process
  - Indirect Potable Reuse

Distribution System Delineation

Delineate Distribution System

- This is the first step because it is the basis for subsequent calculations
- Flexible definition of 'Distribution System' because of the wide variety of water agencies within the state
- The Distribution System is generally considered to be the potable distribution system . . .

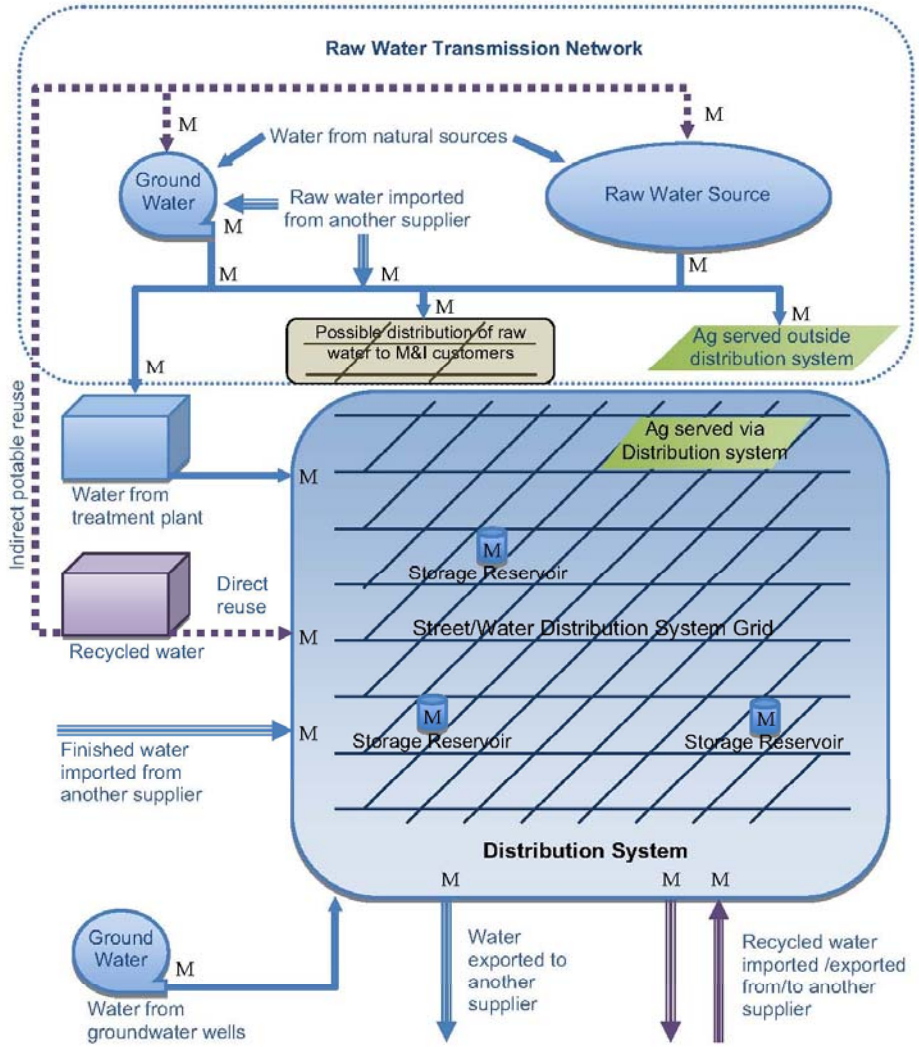
Distribution System delineation Principles

- Distribution system boundary points should be points of metering or measurement
- The way a distribution system is defined should be the same in the base period as in the compliance years
- The area of the distribution system itself can change
  - New developments can be incorporated into the distribution system area without changes to the baseline.
  - Annexations and mergers are more complicated how they are handled depends on data availability

Distribution System Dilineation Principles *cont*

- Raw or non potable water supplied to a municipal or industrial end use in an urban area should be included in the distribution system
- Sections of transmission canals or pipelines that directly supply municipal or industrial water to retail customers can be included
- Recycled water is excluded from the gross water calculations – recycled water systems should not be included in the distribution system

Distribution System Delineation



M = water system measurement points

Base Daily Per Capita Water Use Calculation

Developing Base Daily Per Capita Water Use Values

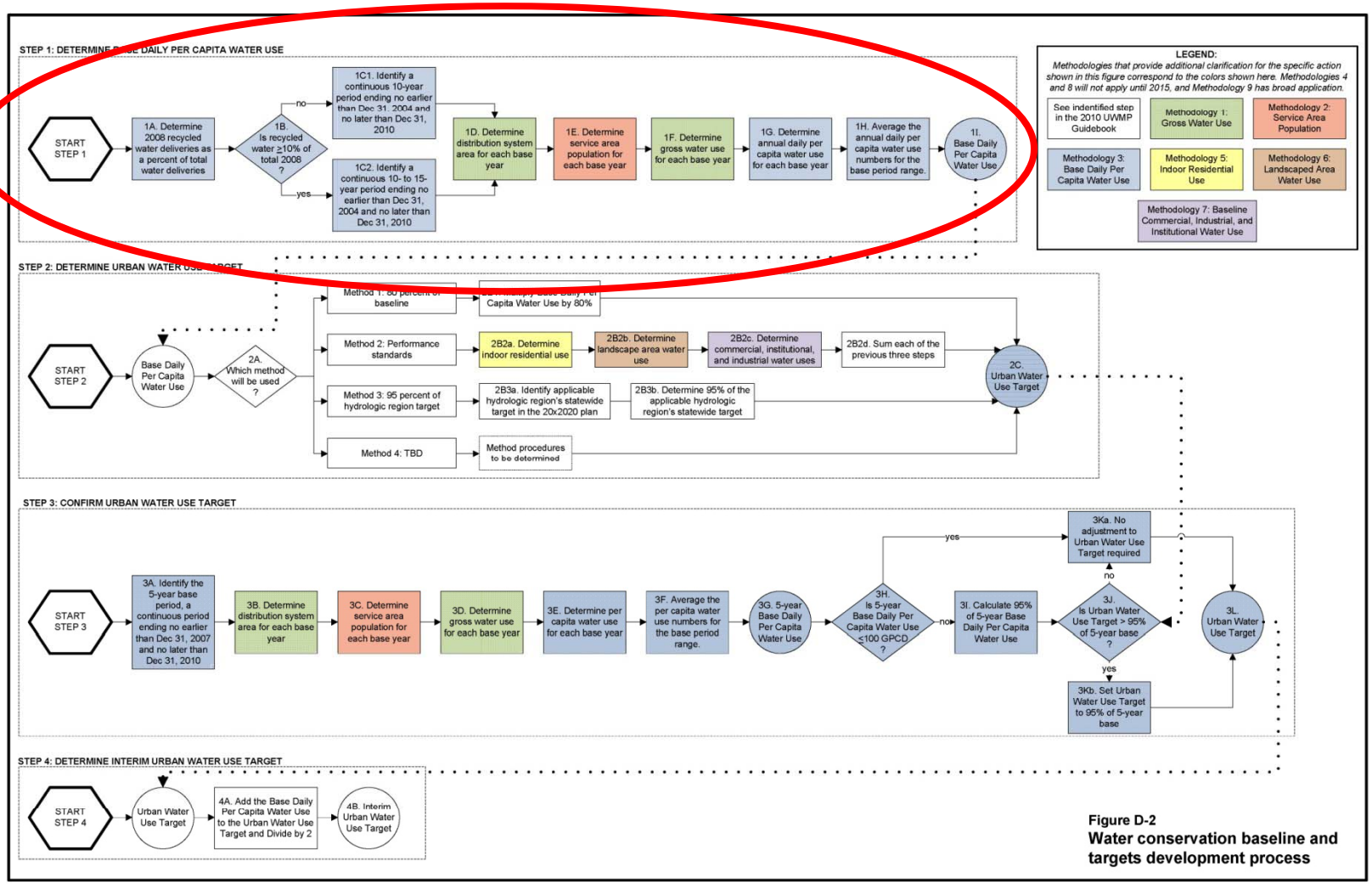
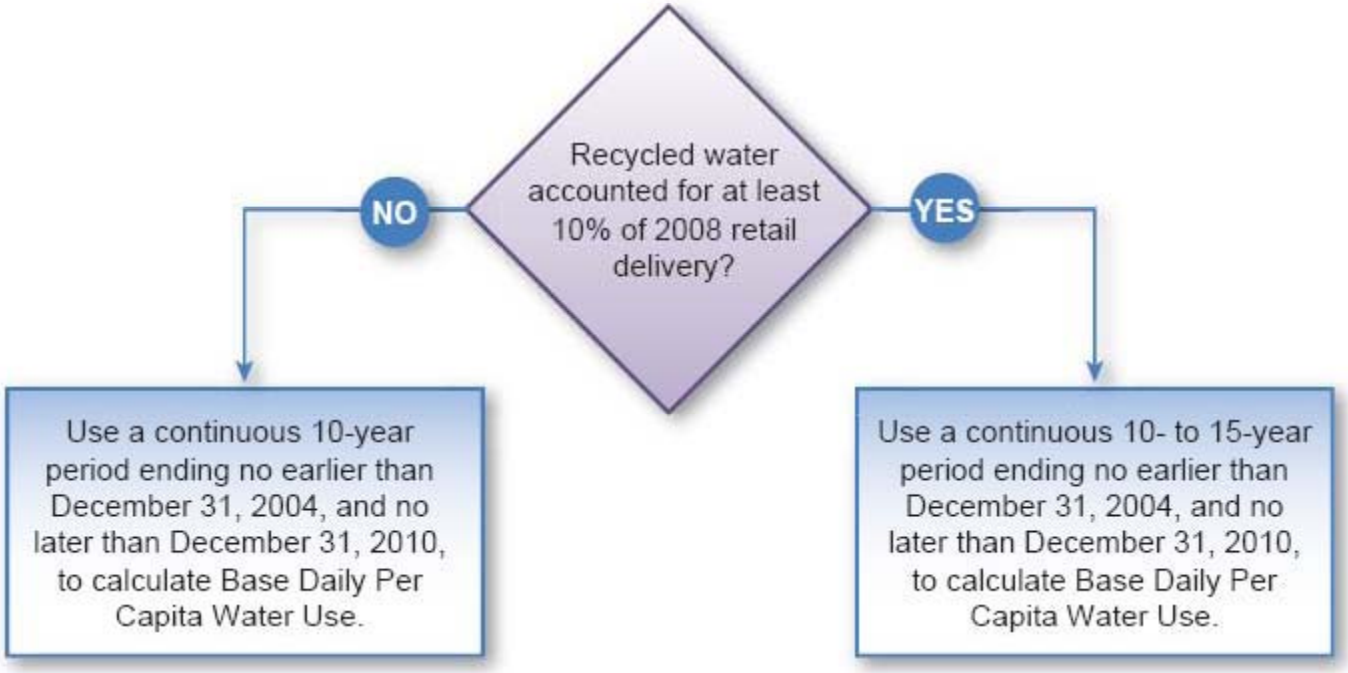


Figure D-2
Water conservation baseline and targets development process

Base Period


Recycled water accounted for at least 10% of 2008 retail delivery?
NO
YES
Use a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010, to calculate Base Daily Per Capita Water Use.
Use a continuous 10- to 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010, to calculate Base Daily Per Capita Water Use.

2008 Recycled Water % Example

Example agency used 1287.6 ac-ft of recycled water in 2008. Retail deliveries were 21537.7 ac-ft.

1287.6 ÷21537.7 = 6%

The example agency should use the 10-year base period.

Developing Base Daily Per Capita Water Use Values

There are 2 key components for determining Base Daily Per Capita Water Use

TABLE 4
BASE DAILY PER CAPITA WATER USE CALCULATION FOR SECTION 10608.20

Utility Name: _____

12-month Period: _____ to _____

(1)	(2)	(3)	(4)
Base Years*	**Service Area Population**	**Gross Water Use (gal. per day)**	**Daily Per Capita Water Use (3) ÷ (2)**
Year 1			
Year 2			
Year 3			
Year 4			
Year 5			
Year 6			
Year 7			
Year 8			
Year 9			
Year 10			
Year 11			
Year 12			
Year 13			
Year 14			
Year 15			
		Total of Column (4):	
		Divide Total by Number of Base Years:	

* Enter the actual year of the data in this column. The most recent year in base period must end no earlier than December 31, 2004, and no later than December 31, 2010. The base period cannot exceed 10 years unless at least 10 percent of 2008 retail deliveries were met with recycled water.

Service Area Population Key Points

1. Service area = distribution system

   Population with private supply (wells) should be excluded

   Population based on year round residents (residents counted by census)

2. Population estimates based or consistent with census or Department of Finance

   Persons per connection is acceptable, but the multiplier used must be developed for the specific agency and be based on census data. (See Methodologies Appendix A)

Example Agency Service Area Population

Year	Population
1995	40980
1996	41176
1998	42893
1999	43955
2000	44941
2001	46415
2002	50533
2003	52962
2004	53970
2005	55264
2006	56931
2007	57667
2008	58038
2009	58402

Gross Water Use Calculations

1. Define 12 month period
2. Calculate water supplies into distribution system
3. Subtract water supplies that can be excluded from the gross water calculation

Water Supply Sources

- Calculate own sources of water
  - Water from treatment plant(s), groundwater, nonpotable water used for irrigation or other M&I use
- Calculate imported sources of water

Subtract Excluded Water

1. Water entering the distribution system that is exported to another supplier
2. Any significant changes in distribution system storage
3. Indirect recycled water
4. Water delivered for agricultural use may be excluded
5. Water delivered for process water use

GROSS WATER USE CALCULATION	Utility Name: Example Agency							
	12-month period from:			1-Jan		to:	31-Dec	
	Volume Units:			Acre Feet				
	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
1 Volume from Own Sources (raw data)		392						
Meter error adjustment (+/-)								
Subtotal: Corrected Volume from Own Sources								
2 Volume from Imported Sources (raw data)	12,185	14069	13029.8	17155	18982	18616.7	22614.3	21450.4
Meter error adjustment (+/-)								
Subtotal: Corrected Volume from Imported Sources	12,185	14609	13029.8	17155	18982	18616.7	22614.3	21450.4
3 Total Volume Into Dist. System = Line 1 + Line 2	12,185	14461	13029.8	17155	18982	18616.7	22614.3	21450.4
4 Volume Exported to Other Utilities (raw data)	0	0	0	0	0	5.5	2.2	5.5
Meter error adjustment (+/-)								
Subtotal: Corrected Volume Exported to Other Utilities	0	0	0	0	0	5.5	2.2	5.5
5 Change in Dist. System Storage (+/-)	0	0	0	0	0	0	0	0
6 Gross Water Use Before Indirect Recycled Water Use Deductions = Line 3 - Line 4 - Line 5	***12,185***	***14461***	***13029.8***	***17155***	***18982***	***18611.2***	***22612.1***	***21444.9***
7 Indirect Recycled Water Use Deduction								
8 Gross Water Use After Indirect Recycled Water Use Deductions = Line 6 - Line 7	***12,185***	***14461***	***13029.8***	***17155***	***18982***	***18611.2***	***22612.1***	***21444.9***
9 *Water Delivered for Ag. Use (optional deduction)*	1263	2099.5	1429.5	2003	2143.9	1895.3	2380.2	2170.5
10 *Process Water Use (optional deduction)*								
11 [illegible] Water Use After Optional Deductions = Line 8 - [illegible] Line 10	**10,922**	**12361.5**	**11600.3**	**15152**	**16838.1**	**16715.9**	**20231.9**	**19274.4**
Gallons Per Day	9725068.5	11006815	10329034	13491507	14992829	14884021	18014705	17162137

Base Period

- 10-year base period should end no earlier than December 31, 2004 or later than December 31, 2010
- The same criteria apply for the 15-year base period.

10-Year Base Period

TABLE 4
BASE DAILY PER CAPITA WATER USE CALCULATION FOR SECTION 10608.20

Utility Name: Random
12-month Perio January to: December

(1)	(2)	(3)	(4)
Base Years#	Service Area Population	Gross Water Use (gal. per day)	Daily Per Capita Water Use (3)/(2)
1995	40980	9725068.5	237.31
1996	41176	11006815.1	267.31
1997	42893	10329034.2	240.81
1998	43655	13491506.8	309.05
1999	44941	14992828.8	333.61
2000	46415	14884020.5	320.67
2001	50533	18014705.5	356.49
2002	52962	17162137	324.05
2003	53970	19051411	353.00
2004	55264	18571034.2	336.04
		Total of Column (4):	3078.35
		Divide Total by Number of Base Years:	307.83

5-Year Base Period

- Used to calculate minimum water use reduction requirement
- 5-year base period should end no earlier than December 31, 2007 or later than December 31, 2010

Five-year Base Period

TABLE 3			
BASE DAILY PER CAPITA WATER USE CALCULATION FOR SECTION 10608.22			
Utility Name:	Example Agency		
12-month Period:	1-Jan	to:	31-Dec
(1)	(2)	(3)	(4)
Base Years#	Service Area Population	Gross Water Use (gal. per day)	Daily Per Capita Water Use (3)/(2)
2006	56931	18571034.2	326.20
2006	57667	19539089	338.83
2007	57667	21482787.7	372.53
2008	58038	20045403.4	345.38
2009	58402	18049698.6	309.06
		Total of Column (4):	1692.00
		Divide Total by 5:	338.40

Target Calculations

Target Calculations

- Method 1: 80% of base per capita water use
  - Base daily per capita use equals 308 gpcd (from table 4)
  - 0.8 x 308 = 246 gpcd

Method 2

- 55 gpcd indoor residential
- 10% of baseline CII water use
- Landscape irrigated through residential or irrigated accounts to the Model efficient landscape standards (0.7 or 0.8) of ETo
- Each standard is calculated on a per capita basis
- Requires calculation of residential and dedicated meter landscape area for the service area.

Method 3

- 95% of 20x 2020 Hydrologic Region Target

#	Region	Urban Water Use Target
1	North Coast	130
2	San Francisco Bay	124
3	Central Coast	117
4	South Coast	142
5	Sacramento River	167
6	San Joaquin	165
7	Tulare Lake	179
8	North Lahontan	164
9	South Lahontan	162
10	Colorado River	200

California Hydrologic Regions and 2020 Conservation Goals
North Coast
165
151
137
North Lahontan
243
208
173
Sacramento River
253
215
176
San Francisco Bay
157
144
131
San Joaquin River
248
211
174
Central Coast
154
139
123
Tulare Lake
285
237
188
South Lahontan
237
204
170
Colorado River
346
278
211
South Coast
180
165
149
Statewide Goals
192
173
154
253 Baseline (1995-2005)
215 Interim Target (2015)
176 2020 Target
in gallons per capita per day

Method 4

- Targeting a February release
- Method 4 will be discussed at the urban stakeholder committee meeting on January 21st in Sacramento. See DWR website calendar for more information.

Minimum Reduction Requirement (Confirm Urban Water Use Target)

Minimum Reduction Requirement

The law requires that the per capita water use reduction be at least 5% of the five year base period.

Example:

5-year base daily per capita use is 338

338 x 0.95= 321

Water use target must be less than 321 gpcd.

Agencies with 5-year base daily per capita use below 100 gpcd are exempt from the minimum reduction requirement

Documentation to be Reported in the UWMP

UWMP Documentation

*An urban retail water supplier shall include in its urban water management plan required pursuant to Part 2.6 (commencing with Section 10610) due in 2010 the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, **along with the bases for determining those estimates, including references to supporting data.** (10608.20(e))*

A water supplier should include:

- Calculations
- Sources for data used in the calculations
- Assumptions or estimates and why they were made
- A map of its service area

Other Gross Water Exclusions

- Process Water
- Indirect Potable Reuse

Process water

- Exclusion applies only to process water,
- Suppliers must meet one of the following 4 criteria
  - Industrial water use is equal to or greater than 12% of gross water use
  - Industrial water use is equal to or greater than 15 gpcd
  - Non industrial water use is less than 120 gpcd and the supplier is in full compliance with BMPs
  - The population within the service area meets the criteria for a disadvantaged community.

Indirect Potable Reuse

A supplier that uses a water supply from a reservoir that has been augmented with recycled water or ground water that has been recharged with recycled water, may deduct the recycled water portion of the water supply.

The gross water use methodology step 8 provides guidance on how to calculate the recycled portion.