Section 1:

Metropolitan Water District Service Area Version

WHERE OUR WATER COMES FROM

LEARNING OBJECTIVES

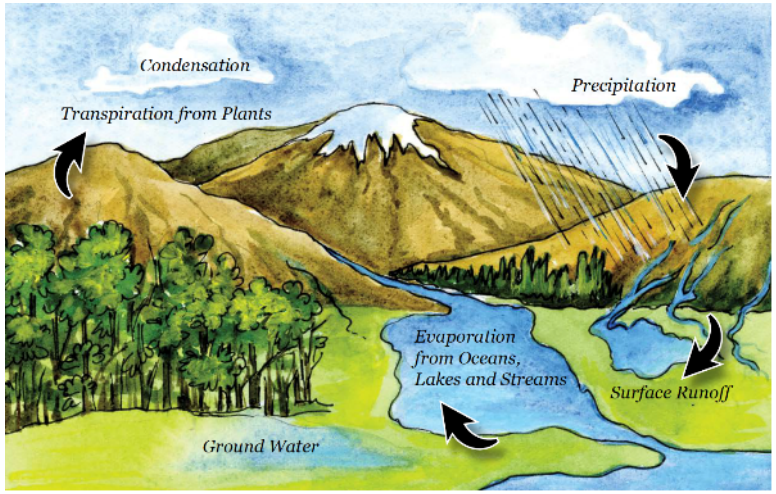
1. Understand the water cycle and the concept of a watershed
2. Understand the big picture of water supply in California
3. Understand water supply sources within Southern California
4. Understand how we use water
5. Be knowledgeable about California water law
6. Be knowledgeable of national and statewide programs for water use efficiency
7. Be knowledgeable of local utility sponsored programs for water use efficiency
8. Be able to read water meters, understand their uses and perform basic leak detection

1. WATER CYCLE & WATERSHED

Understand the water cycle and the concept of a watershed

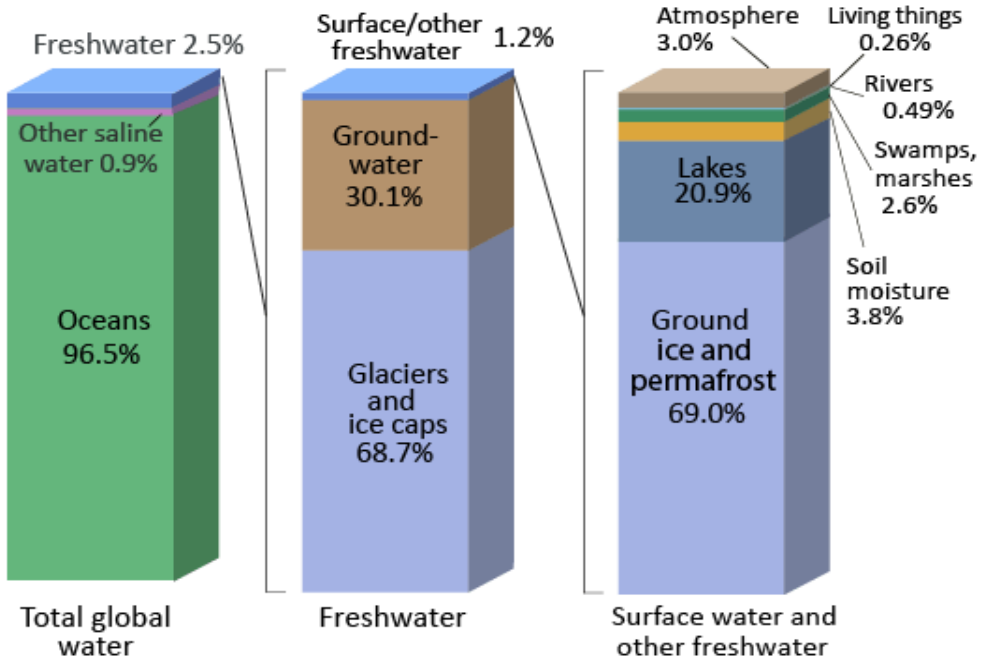
1.1 WATER CYCLE

- The water cycle is essential to understanding where your water comes from and how water moves between the earth's land, atmosphere, and oceans
- Evaporation occurs when the sun's energy turns liquid water on the earth's surface into water vapor, which enters the atmosphere
- Water vapor leaves plants in a process called transpiration
- Together, they are called evapotranspiration



1.1 WATER CYCLE

- Over 96% of the earth's water is salt water
- Over 68% of freshwater is contained in ice and glaciers
- 30% of freshwater is in the ground
- Less than 0.3% of freshwater is contained in lakes and rivers



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources.
NOTE: Numbers are rounded, so percent summations may not add to 100.

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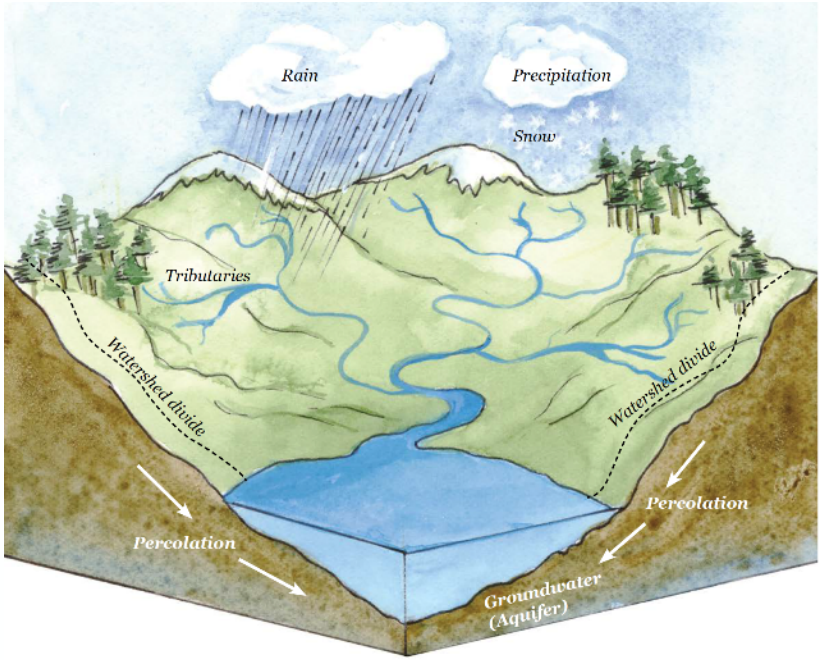
1.2 WATERSHED

- A watershed is all of the land that drains to a single water body such as a creek, river, lake, or ocean
- Determine where water flows and infiltrates into the ground
- The concept of a watershed can be used for large areas of land or can be focused to an area as small as a residential lot
- Watersheds are important for water supply, storm water management, and sustainable landscaping



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2. WATER SUPPLY IN CALIFORNIA

Understand the big picture of water supply in California

2.1-2.3 WATER SUPPLY IN CALIFORNIA

- In California we rely on snow melt from the Sierras, rainwater runoff into reservoirs, and groundwater
- The majority of precipitation occurs between October and April
- Water demand is highest during the summer months

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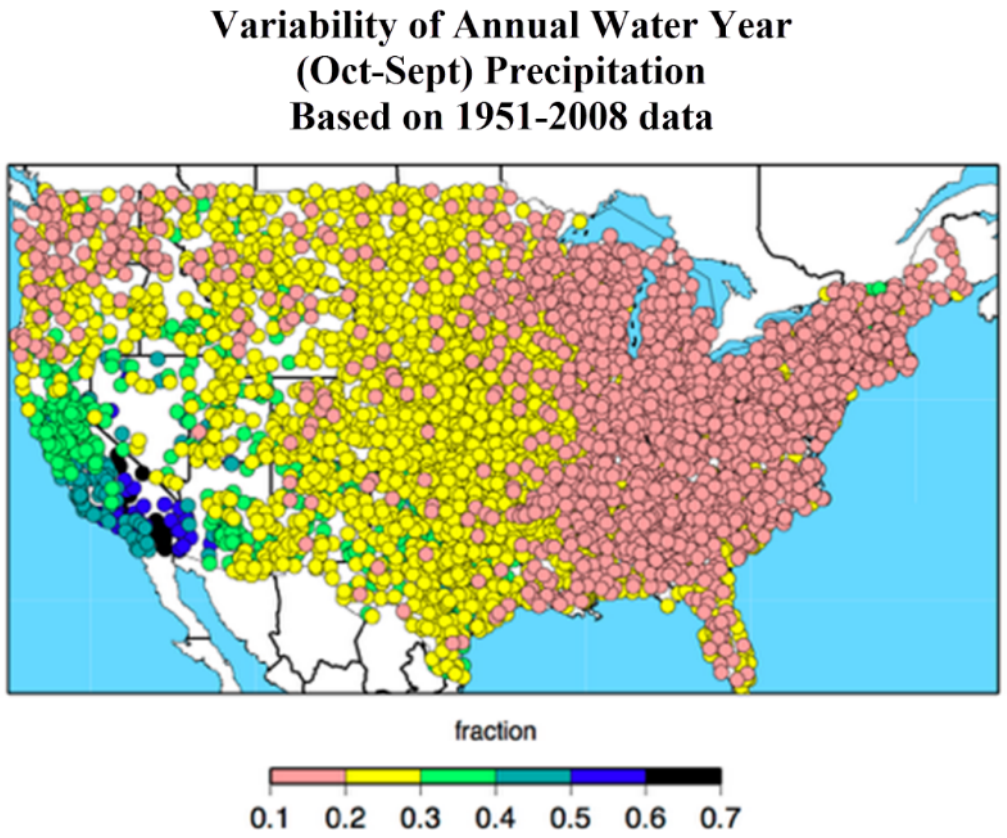
2.1-2.3 WATER SUPPLY IN CALIFORNIA

- California's climate is highly variable and is prone to cyclical periods of drought
- Continued population growth highlights the importance of water conservation



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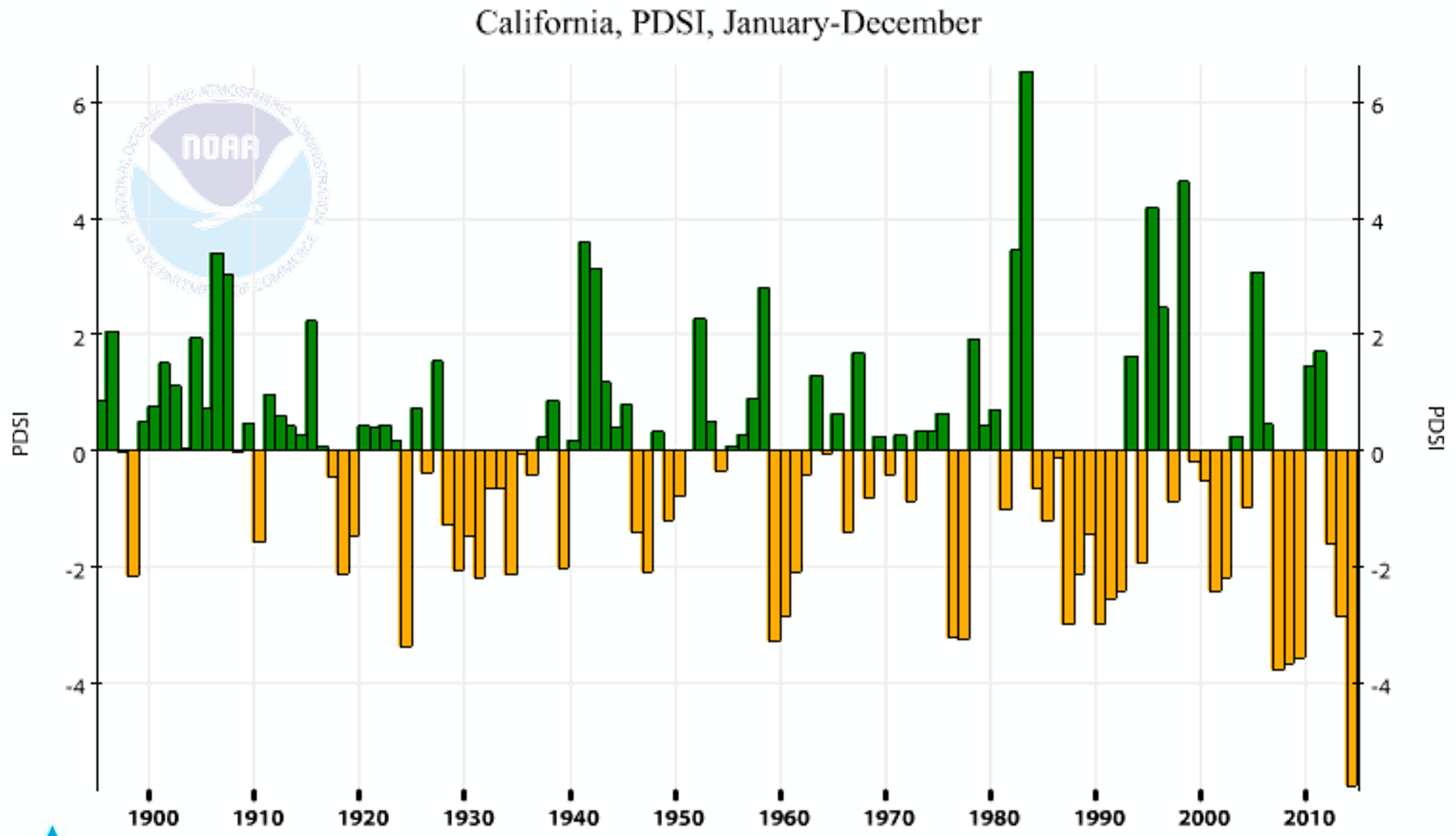
2.2 PALMER DROUGHT SEVERITY INDEX



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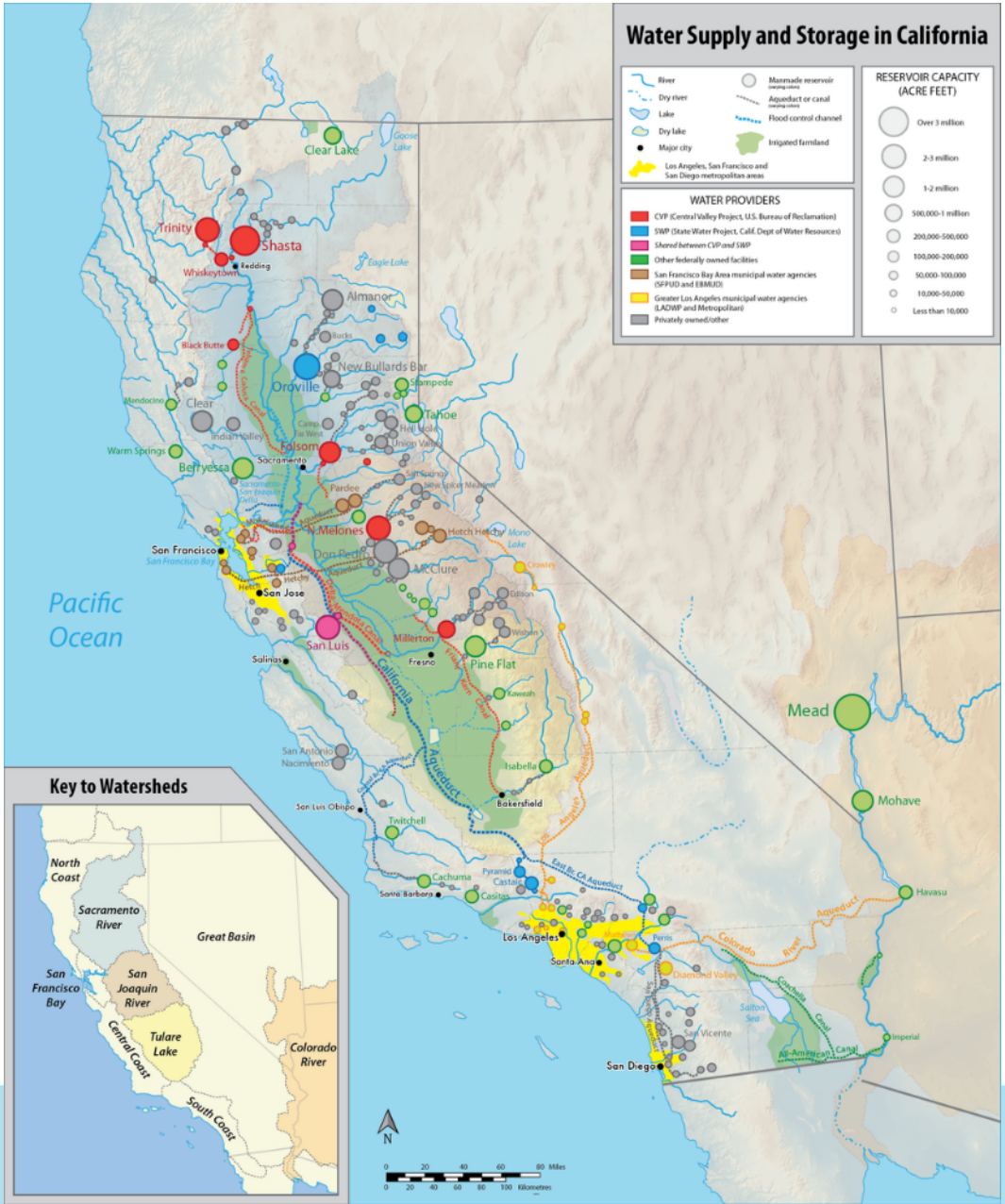
2.4 WATER SUPPLY IN CALIFORNIA



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2.4 WATER SUPPLY IN CALIFORNIA

- California has an extensive water system
- The Central Valley Project (CVP) provides 7 million acre-feet (MAF) of water a year to the Central Valley
  - 1 acre-feet = 325,851 gallons
- The State Water Project (SWP) provides 2.4 MAF of water a year from Lake Oroville to the Bay Area, the southern San Joaquin Valley, and Southern California
- California holds entitlements to 4.4 MAF of water from the Colorado River delivered to the Imperial Valley, Coachella Valley, and Southern California

3. WATER SUPPLY WITHIN METROPOLITAN WATER DISTRICT'S SERVICE AREA

Understand water supply sources in Southern California

3.1 METROPOLITAN'S WATER SUPPLY SOURCES

- 25% Colorado River Aqueduct
- 30% State Water Project From Bay/Delta
- 45% Local (Groundwater, Conservation, Recycled Water)

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3.2 THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

- As a regional wholesale water provider the Metropolitan Water District of Southern California (MWD) delivers water to:
  - 26 member public agencies
    - 14 cities
    - 11 municipal water districts
    - One water authority

- These agencies, in turn, provide water to 19 million people in Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties.
- The mission of MWD is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.
- MWD has been providing reliable supplies of drinking water since 1941.

3.3 WATER SYSTEM AND RESERVOIRS

- MWD owns and operates an extensive water system including:
  - Colorado River Aqueduct
  - 15 hydroelectric facilities
  - 9 reservoirs provide surface water
  - 830 miles of large-scale pipes
  - 5 water treatment plants
- Imported water from the Feather River and Colorado River to supplement local supplies
- Currently delivers an average of 1.5 billion gallons of water per day to 5,200 square mile service area

3.3 STATE WATER PROJECT (SWP)

700+ MILES LONG

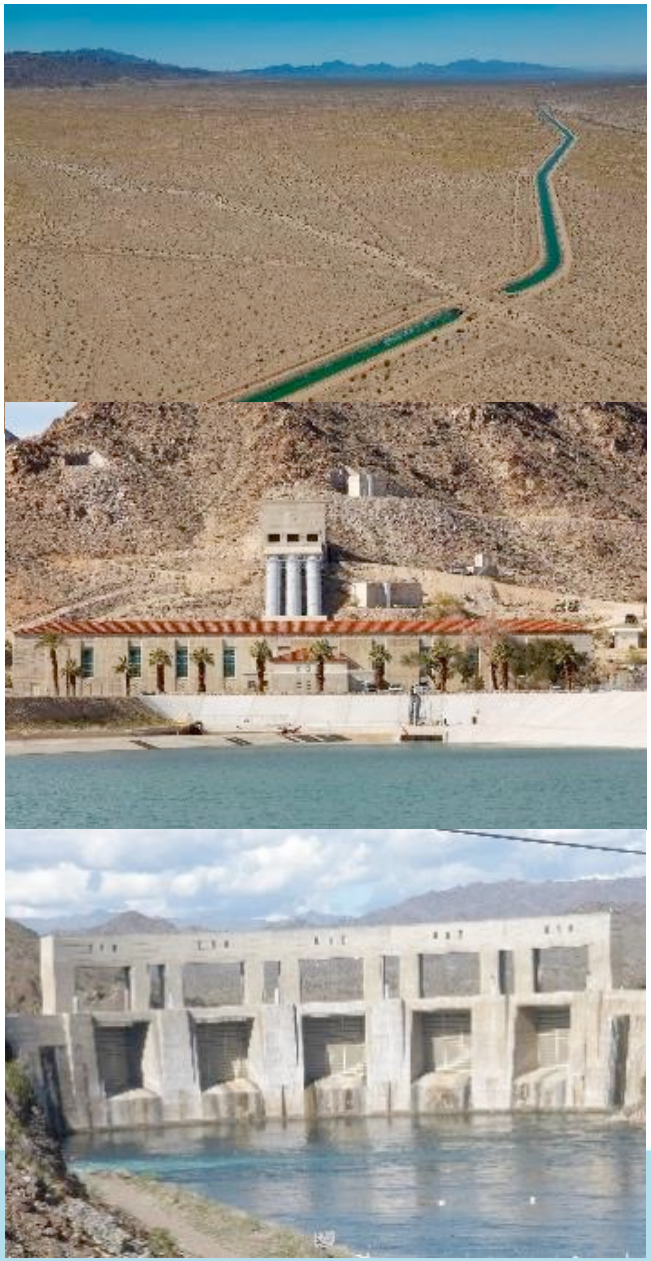
- Transfers water from the lakes and rivers of Northern California to residential communities, agricultural districts, and businesses in the San Francisco Bay area, Central Valley, and Southern California.

- Largest state built water delivery and power generation system in the nation:
  - 30 lakes and reservoirs
  - over 20 water pumping plants
  - 5 hydroelectric power plants
  - several dams
  - over 700 hundred miles of canals and pipelines

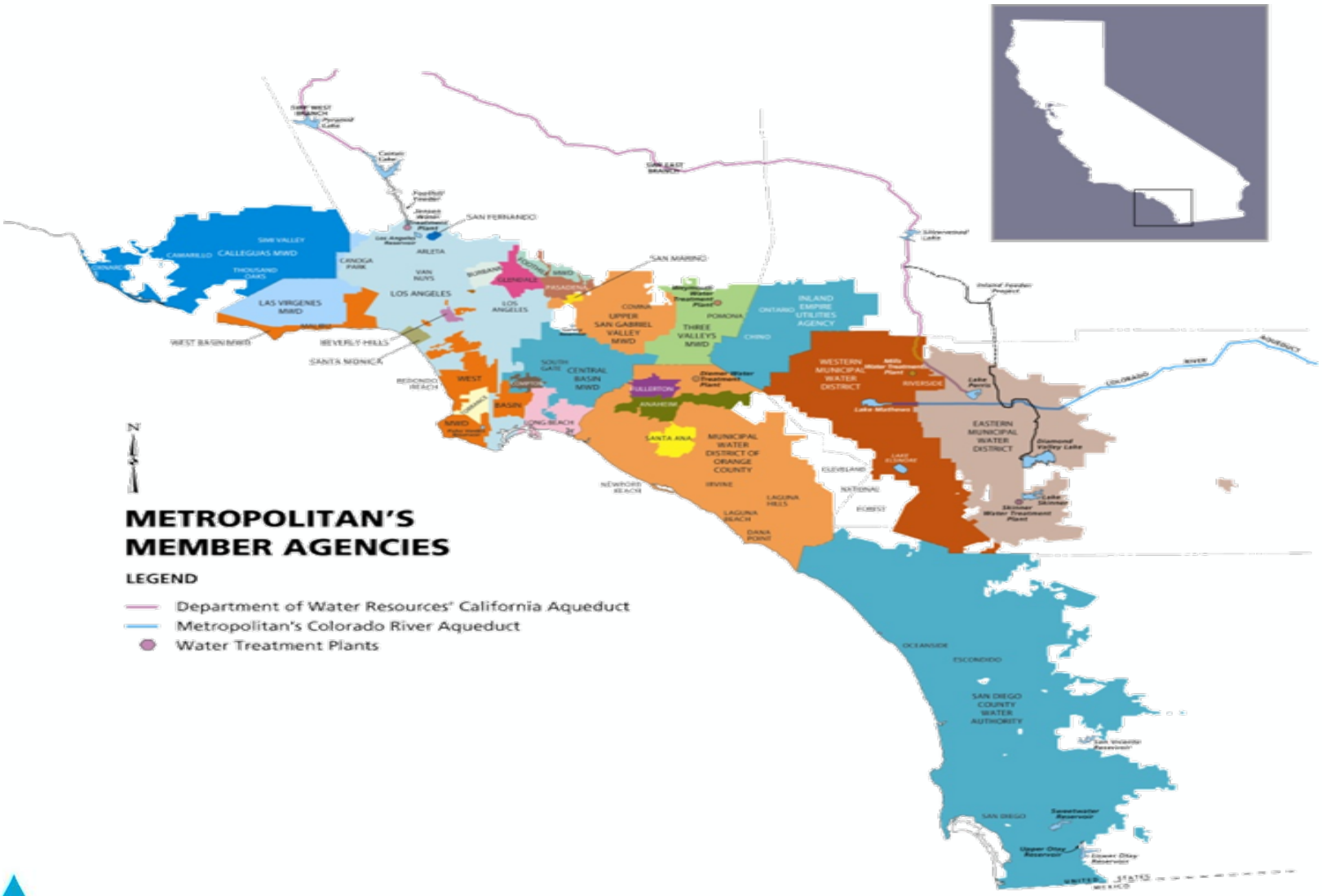
3.3 COLORADO RIVER AQUEDUCT (CRA)

242 MILES LONG

- The Colorado River is an essential water supply for Southern California.
- The CRA transports water 242 miles west from Lake Havasu on the California/Arizona border to Lake Mathews in Riverside County.
- Owned and operated by MWD, the CRA began delivering water to southern California in 1941 and was the largest public works project in southern California during the Great Depression.
- Five pumping plants push water through the aqueduct and up over 1,617 feet of mountainous terrain.



3.4 IMPORTED WATER SUPPLY DELIVERY



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3.5-3.10 SOURCES OF WATER

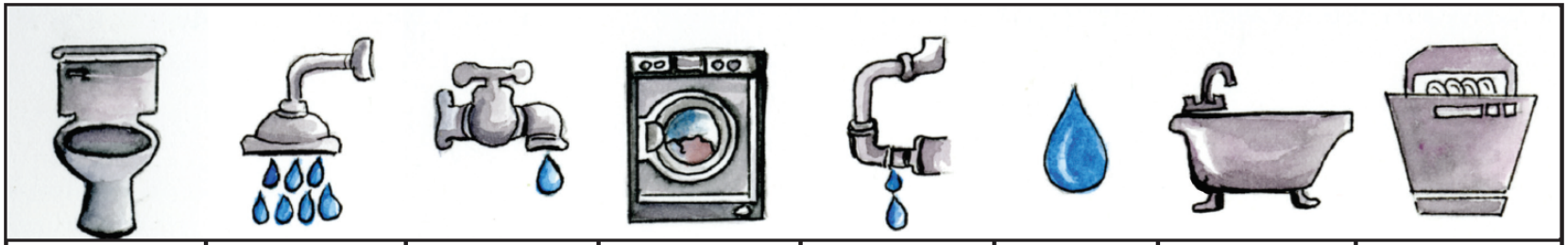
- Imported Water: Delivered by MWD to member agencies to supplement local supplies
- Surface Water: Stored and delivered by MWD to member agencies to supplement local supplies
- Groundwater Recovery: A significant source of water supply
  - Provides over 35% of Southern California's drinking water
- Exchanges & Water Banking
- Recycled Water: Used to irrigate landscapes
  - Recycled Water is highly treated wastewater used to irrigate landscapes, agricultural crops, vineyards, golf courses, parks, cemeteries, freeway embankments, and street medians
  - Local water agencies have largely led development of groundwater recovery and recycled water projects, many incentivized by MWD's Local Resources Program
- Water Use Efficiency Programs: Providing water saving education and incentives to homeowners and businesses
  - Using water more efficiently reduces water demand and helps ensure an adequate water supply

4. HOW WE USE WATER

Understand how we use water

4.1-4.3 RESIDENTIAL WATER USE

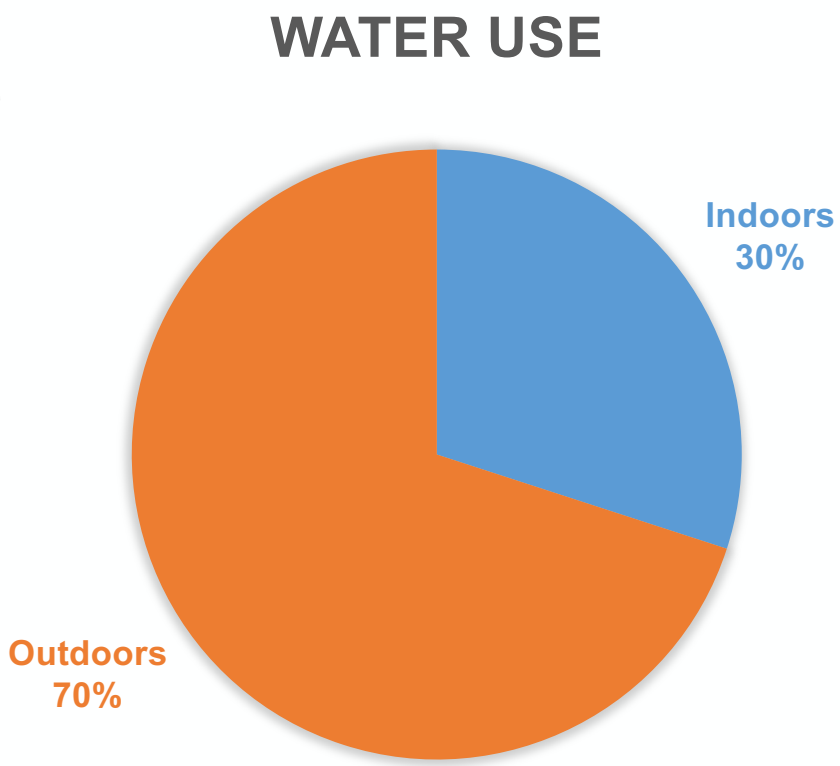
- Average annual residential water use in the United States is 88,000 gallons per household per year (gphy)
  - Household = 2.65 people
- Average indoor annual water use in single-family homes is 50,000 gphy



TOILET	SHOWER	FAUCET	CLOTHES WASHER	LEAK	OTHER	BATH	DISHWASHER
24%	20%	19%	17%	12%	4%	3%	1%
33.1 GPHD	28.1 GPHD	26.3 GPHD	22.7 GPHD	17.0 GPHD	5.3 GPHD	3.6 GPHD	1.6 GPHD

4.4 OUTDOOR WATER USE

- Outdoor use is more variable than indoor use due to differences in climate and weather patterns
- A typical home in Southern California uses up to 70% of its water outdoors
- Landscape water management is a dynamic process
- Understanding the plant-soil-water relationship is key to effective landscape water management and sustainable landscaping



5. CALIFORNIA WATER LAW

Be knowledgeable about California water law

5.1 BASIC CONCEPTS

- All water use must be reasonable and beneficial, and cannot be wasted
  - Beneficial uses include irrigation
  - Reasonable use varies as the current situation changes, e.g. drought
- The water user does not own any water, water rights are the legal entitlement to divert water from a specified source
- Dual system of water rights
  - Riparian rights come with owning a parcel of land that is adjacent to a source of water
  - Appropriative rights allow water to be diverted for use at a separate location
  - Riparian rights have priority over appropriative rights; appropriative rights have priority according to date

5.2 CalEPA

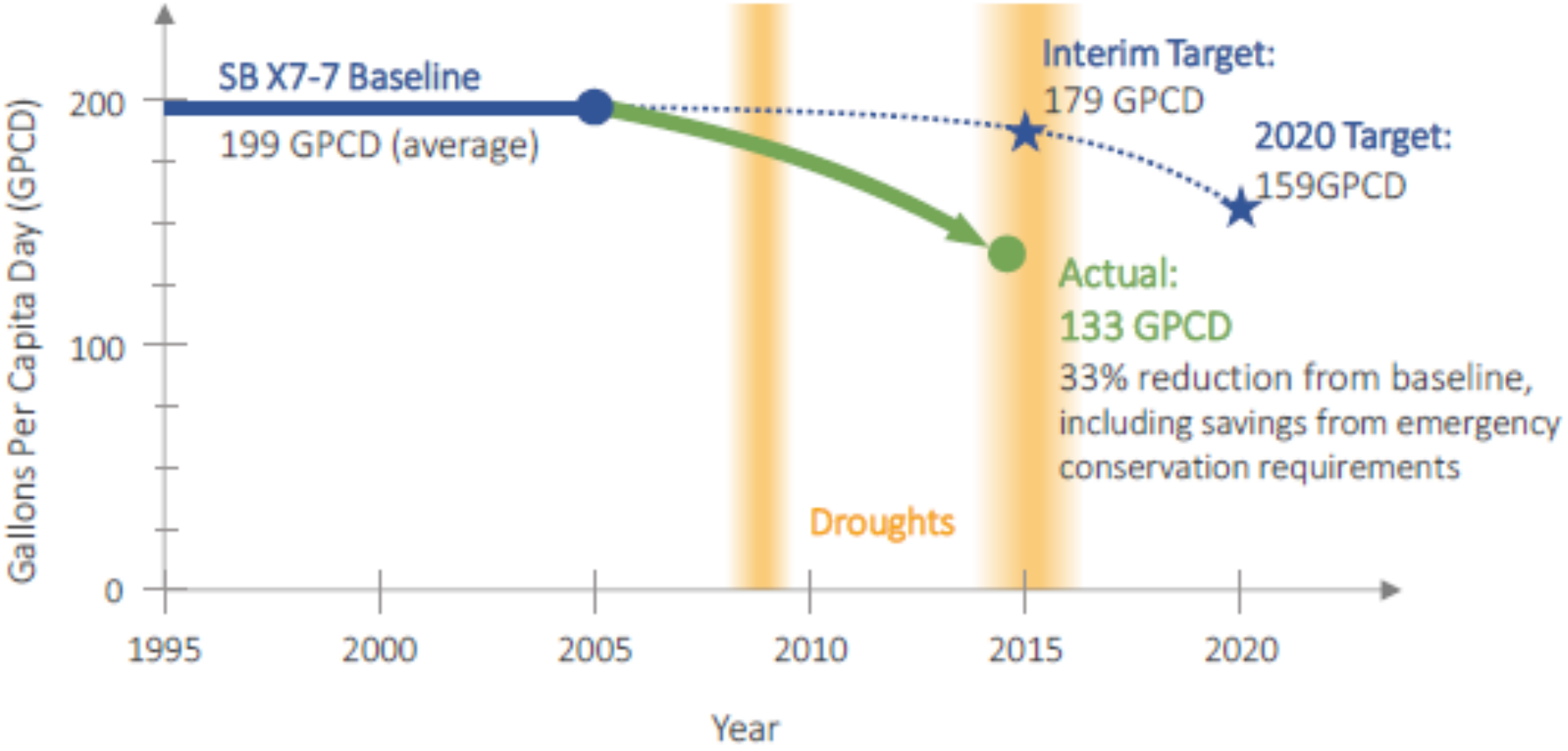
- The California Environmental Protection Agency (CalEPA) is California's environmental authority
- Responsible for developing, implementing, and enforcing environmental laws that regulate air, water and soil quality, pesticide use and waste recycling and reduction
- Six agencies:
  - The State Water Resources Control Board (SWRCB) has regulatory responsibility to protect water quality and allocate surface water rights
  - The Department of Pesticide Regulation (DPR) has the primary responsibility for regulating all aspects of pesticide sales and use to protect the public health and the environment
  - Air Resources Board (ARB), CalRecycle, the Department of Toxic Substances Control, and the Office of Environmental Health Hazard Assessment (OEHHA)

5.3-5.4 DWR & CEC

- The California Department of Water Resources (DWR) protects, conserves, develops, and manages much of California's water supply including the State Water Project

- The California Energy Commission is the state's primary energy policy and planning agency and is tasked by legislature to develop landscape irrigation efficiency standards

5.5 20X2020



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5.6 MAKING WATER CONSERVATION A CALIFORNIA WAY OF LIFE

- Following the 2014 – 2017 drought in California five state agencies including the SWRCB and DWR issued a report detailing a long-term framework to make water conservation a California way of life
- Objectives:
  - Using water more wisely
  - Eliminating water waste
  - Strengthening local drought resilience
  - Improving agricultural water use efficiency and drought planning
- The framework will influence the direction of legislation in the future

5.7-5.8 MWELO & CALGREEN

- Model Water Efficient Landscape Ordinance (MWELO) requires that new construction and certain rehabilitated landscapes meet a water budget
  - Updated every three years if needed, in line with the cycle for CALGreen
  - Requires that landscape design, installation, and maintenance be water efficient
- CALGreen, California's green building code, requires that new development have indoor fixtures that meet specific efficiency requirements and landscapes that meet the requirements of MWELO

CALGreen

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6. NATIONAL & STATEWIDE PROGRAMS

Be knowledgeable of national and statewide programs for water use efficiency

6.1-6.3 NATIONAL & STATEWIDE PROGRAMS

- The Environmental Protection Agency (EPA) WaterSense program is a label for water-efficient products and a resource for saving water
    - WaterSense labelled products include irrigation controllers, toilets, showerheads, bathroom faucets, urinals, and pre-rinse spray valves
- Save Our Water is a statewide water conservation program in California that provides outreach and rebates to homeowners
- LEED, or Leadership in Energy and Environmental Design, is a green building rating system.

6.4-6.7 NATIONAL & STATEWIDE PROGRAMS

- The Alliance for Water Efficiency is a stakeholder-based nonprofit organization dedicated to the efficient and sustainable use of water in North America
- The California Water Efficiency Partnership (formerly CUWCC) is an organization that provides leadership on water efficiency issues in California
- The California Landscape Contractors Association (CLCA) is a non-profit trade organization of licensed landscape contractors and landscape-related professionals
- Public advocacy groups throughout California provide locally focused and statewide contributions to water use efficiency through research, publications, workshops, and education

7. LOCAL UTILITY SPONSORED PROGRAMS

Be knowledgeable of local utility sponsored programs for water use efficiency

7.1 MWD WATER SAVINGS RESOURCES

SoCal Water$mart

- Regional public outreach campaigns
- Rebate programs
- Qualified Water Efficient Landscaper Training
- Water Savings Incentive Program
- California Friendly® Landscape Classes
- Commercial Landscape Surveys

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7.2 CALIFORNIA FRIENDLY LANDSCAPING

- California Friendly Landscaping is a whole systems approach to design, construction, and maintenance of landscapes
  - Landscape Locally
  - Landscape for Less to the Landfill
  - Nurture the Soil
  - Conserve Water
  - Conserve Energy
  - Protect Water and Air Quality
  - Conserve and Protect Wildlife Habitat

7.3 LOCAL UTILITIES

- Local utilities often provide incentives, technical assistance, and education to residential and commercial water customers
  - Check with your water supplier for the services that they offer
- Residential programs are offered to single family and multi-family residential water customers
- Commercial programs are offered to Commercial, Institutional, and Industrial (CII) water customers

7.4 LOCAL UTILITIES

Typical Residential Programs	Typical Commercial Programs

· Indoor & outdoor water smart check-ups
· Water efficient fixtures
· Rebates:
  ○ Turf removal
  ○ Weather-based irrigation controllers
  ○ High-efficiency irrigation components
  ○ Soil moisture sensors
  ○ Rainwater harvesting
  ○ Toilets
  ○ Clothes washers
· Information and events:
  ○ Classes
  ○ Guides
  ○ Videos
  ○ Weekly watering schedules
  ○ Water smart plant fairs
	· Indoor & outdoor water smart check-ups
	· Water efficient fixtures
	· Rebates:
	  ○ Turf removal
	  ○ Weather-based irrigation controllers
	  ○ High-efficiency irrigation components
	  ○ Soil moisture sensors
	  ○ Rainwater harvesting
	  ○ Toilets
	  ○ Urinals
	  ○ Food equipment
	· Commercial and industrial high-efficiency equipment and process improvements
	· Potable water retrofit to recycled water
	· Professional training

8. WATER METERS

Be able to read water meters, understand their uses and perform basic leak detection

8.1 WATER METERS

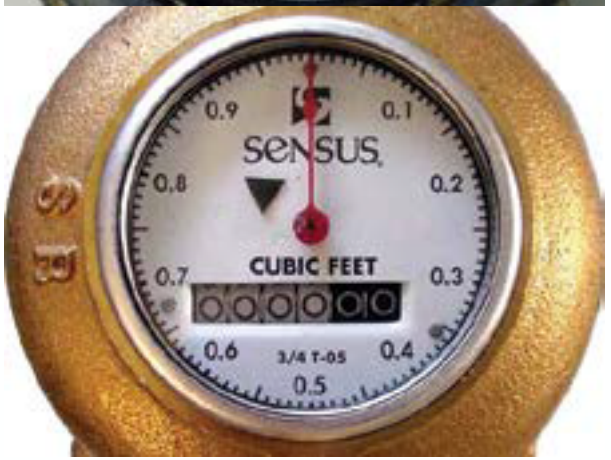
- A water meter is a device that measures the volume of water used at a home or business
- Usually installed, owned, and maintained by the water supplier
- Depends on the utility

8.2 WHAT DOES THE LAW REQUIRE?

- California
- Homes built after 1992 required to have a water meter
- Homes built before 1992 must be retrofitted by 2025
- MWELO requires that dedicated irrigation water meters be installed for:
  - Residential landscapes of 5,000 sq. ft. or greater
  - Non-residential landscapes of 1,000 sq. ft. but not more than 5,000 sq. ft.

8.3 CATEGORIES OF WATER METER

- Mixed-use meters measure both indoor and outdoor water use and are found at the majority of residential properties
- Dedicated irrigation meters measure only outdoor water use and are found at larger landscapes such as parks, HOA common areas, and sports fields
- Sub meters are installed by businesses or homeowners to measure the water use of specific fixtures or certain types of water use.
    - Water providers do not read or maintain sub meters



8.4 WATER METER USES

- Understand how much water is being used in a specified time period, by a specific fixture, or by an irrigation hydrozone
- Manage water use over time
- Check for leaks
- Utility billing

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8.5 WATER METER UNITS

- Water meters measure volume in gallons or cubic feet (CF)
- Water charges are typically based on 1,000 gallon or 100 cubic feet units
- 1 CF = 7.48 gallons
- 100 CF = 1 CCF = 748 gallons

8.6 TYPES OF WATER METER

- Straight-reading meters are very common
  - For a typical residential meter one sweep around the face is equal to 10 gallons or 1 cubic foot
  - Most have a low-flow indicator that turns as water moves through the meter, typically a small triangle, star, or gear
- Digital-reading meters are becoming more commonplace as older meters are replaced
  - Flashing indicator when water is moving through the meter
  - Display may alternate between the meter read and the flow rate
- Round-reading meters with several separate dials are less common

8.7 HOW TO READ A WATER METER

- Locate the water meter and remove the lid
  - Visually examine the area for harmful insects or other animals
- Read and record the numbers on the face and/or take a photo
  - The meter shown reads 3,699,389.3 gallons
- Subtract the previous reading to determine water usage
  - If the previous reading was 3,673 thousand gallons
    the usage would be:
  - 3,699 – 3,673 = 26 thousand gallons

8.8 BASIC LEAK DETECTION

- Ensure that no water is being used
- Check the low flow indicator for movement
- Determine size of leak by taking two readings over some time period
- Use shut-off valves to try to narrow down location of leak

8.9 WATER METER MAINTENANCE

- Almost always the responsibility of the retail water supplier
- Do not operate the shut-off valves on either side of the meter
    - Unless permitted by your water supplier
- The water account holder will be liable for the cost of any repair
- Contact the water supplier for any maintenance issues such as a leak, a strange noise, or an incorrect meter reading
- Know who to call in your area!

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9. WHERE OUR WATER COMES FROM REVIEW QUESTIONS

9. WHERE OUR WATER COMES FROM REVIEW QUESTIONS

1. Explain the concept of the water cycle.
2. What is a watershed?
3. How can a residential lot be viewed as a small watershed?
4. True or false: California's climate is highly variable and is prone to cyclical periods of drought.
5. True or false: California has built a water system to move water around the state.
6. What are the two major water projects that supply water to California?
7. Name MWD's two major sources of water.
8. Name four sources of water utilized by retail water agencies.
9. True or false: The majority of water supplied by Metropolitan Water District of Southern California is surface water?
10. How many different member agencies are served by MWD?

9. WHERE OUR WATER COMES FROM REVIEW QUESTIONS

11. What are the primary uses of water in the average household?
12. Name the two California state agencies responsible for the regulation and management of California's water supply.
13. True or false: The MWELO and CALGreen are regulations that ensure that new homes and landscapes are water efficient?
14. True or false: EPA WaterSense, Save Our Water, and LEED are national or statewide water efficiency programs.
15. Who should you check with for information about local water use efficiency programs?
16. What is a water meter?
17. What are some reasons to read a water meter?
18. What are the two units of measurement used by different water meters?
19. What are the two billing units used by retail water agencies?
20. What's the easiest way to check for a leak?