Brezack & Associates Planning

James Brezack:
Water Supply & Conservation Planning in California

Osher Lifelong Learning Institute
Baywood Court

July 23, 2011 1:30-3:00pm Castro Valley

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Brezack & Associates Planning

James Brezack:

More than 25 years of experience in water resources and wastewater planning, including the master planning and design of water, sewer, water supply, and recycled water facilities.

Education:

M.S., Environmental Science, University of Michigan, 1984

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Why Is Water Important?

California's Water Development

California Hydrology

California's Major Water Projects

How Much Water Do We Use?

Why Are Plants So Thirsty?

Water Conservation Methods

Things The Water Agencies Are Doing

Water Law

Why Is Water Important?

Inadequate Water Supplies Means.....

An Adequate Water Supplies Means....

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California's Water Development...

"Mission" Years

- Meet the Needs of Mission Populations
- Localized Water Supply Projects
- Direct Use or Diversions by Earth Ditches

1823
San Francisco Solano

1769
San Diego de Alcala

Gold Rush Years (1849)

- Established Mining Ditches & Flumes
- In-stream Diversions Throughout the Sierra Foothills
- Hydraulic Mining Increased Diversion for "Cutting Head"

Gold Rush Settlements

- More Permanent, Expanding Settlement
- Increased Irrigation for Commerce to 49ers
- Development of Ditches, Storage, Diversions
- 1856 Wheat Farming in Yolo County

Los Angeles Basin

- LA River & Local Springs
- Profitable Citrus Introduced in 1854
- Made Groundwater Pumping Feasible*

The first navel orange tree, Riverside

"One of the two original trees from which all Washington Navel oranges in California have descended. Propagated from trees imported from Bahia, Brazil.

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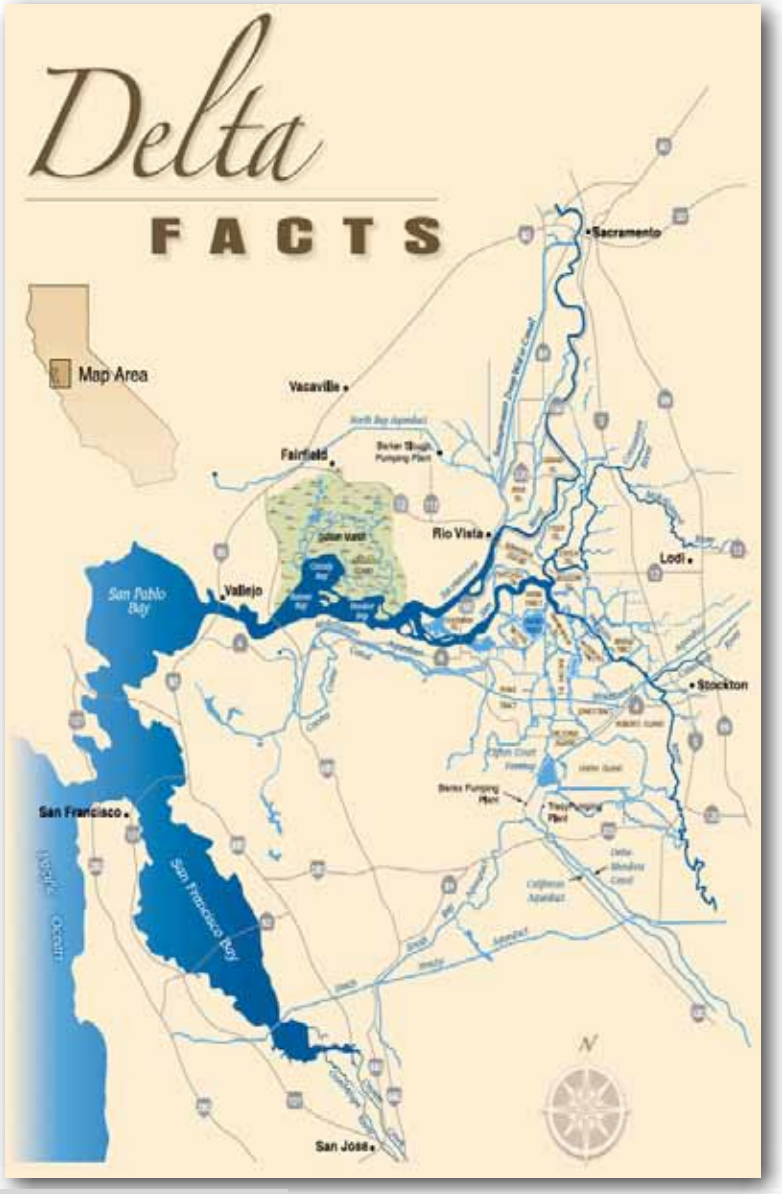
California Hydrology...

California's 10 Hydrologic Regions

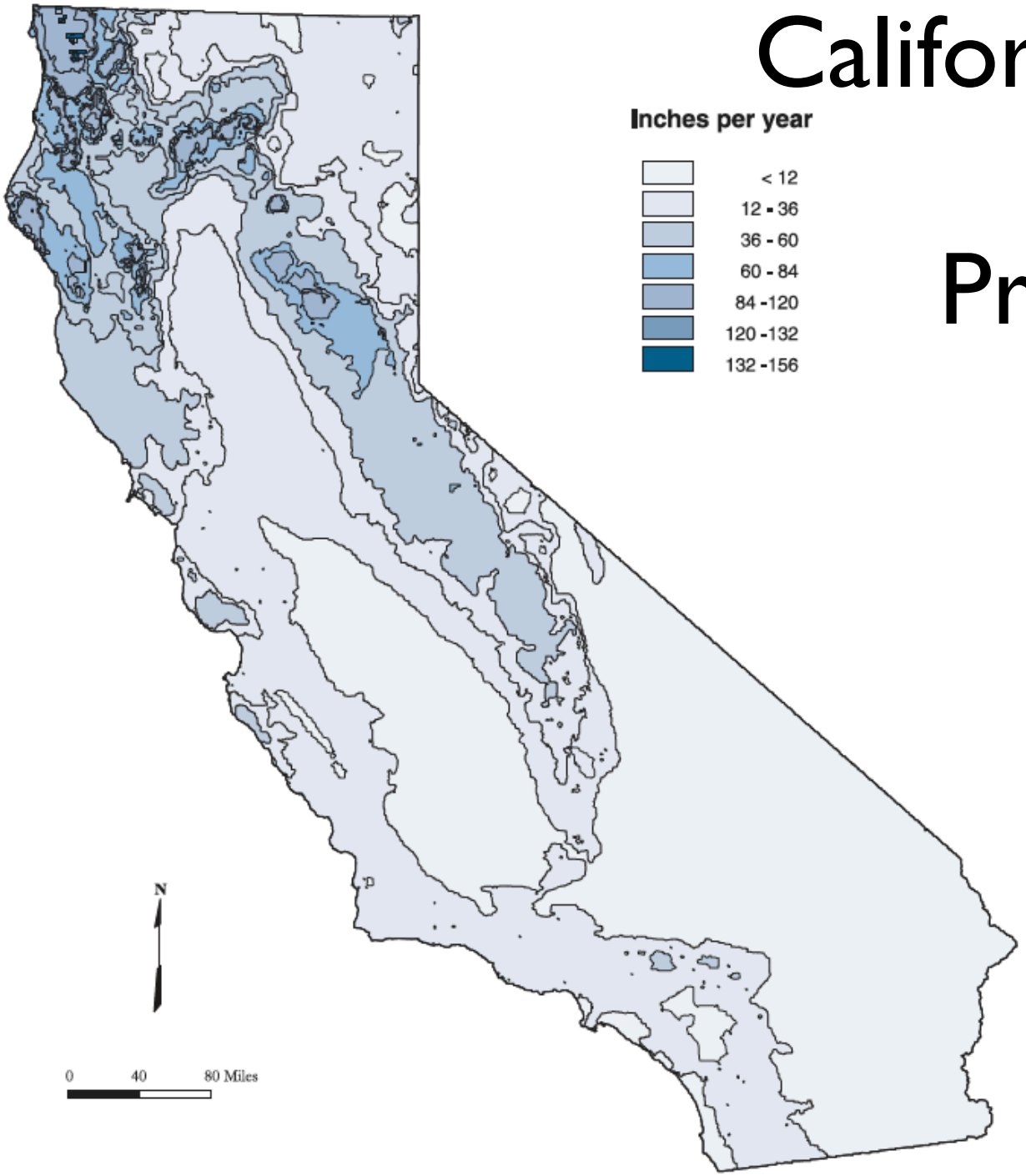
Bay-Delta



Source:
Delta Vision Foundation

- Delta is the crossroads of State & Federal water projects
- Inland estuary
- Recreation Area

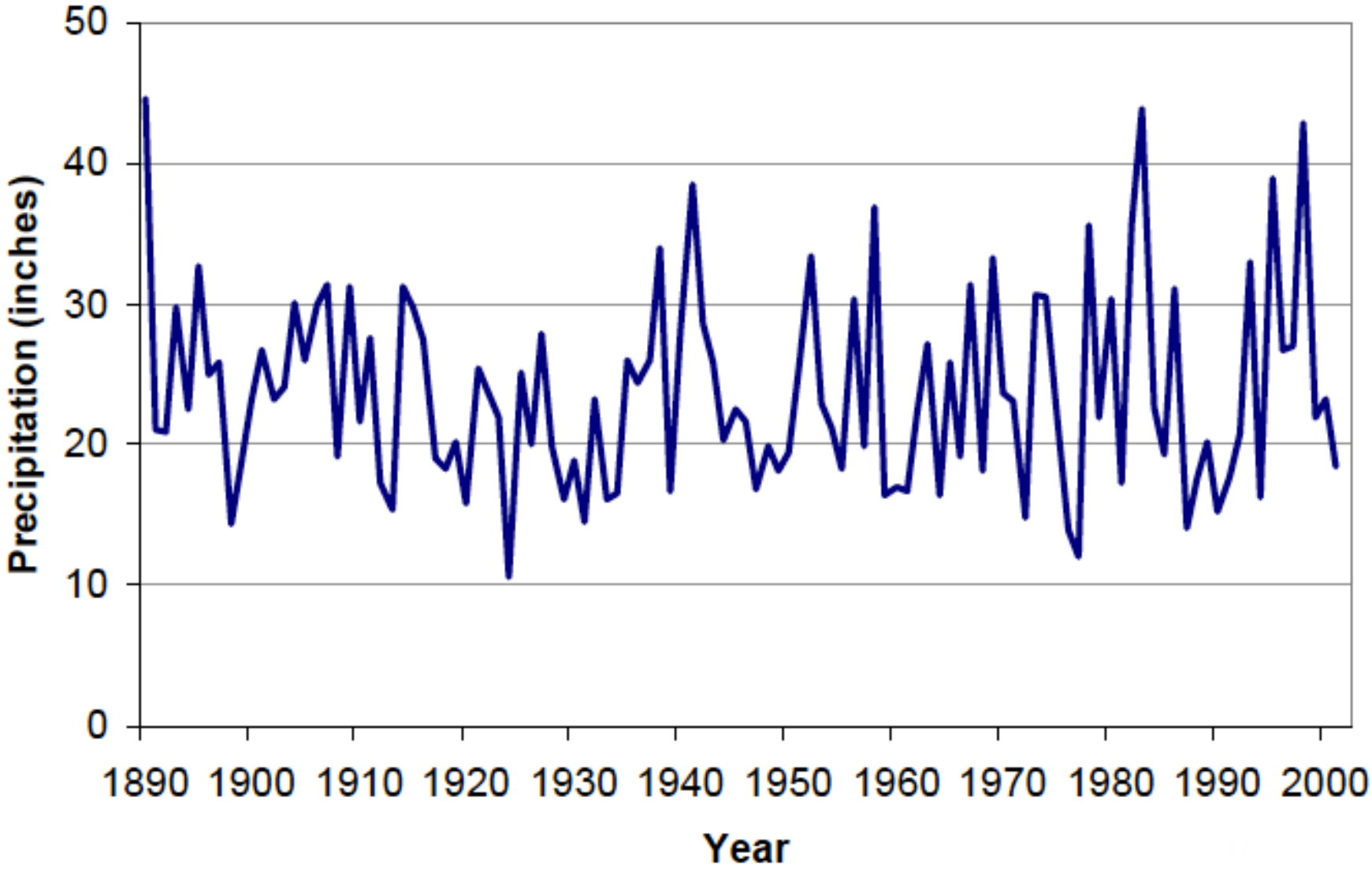
California's Mean Annual Precipitation



Variable Precipitation

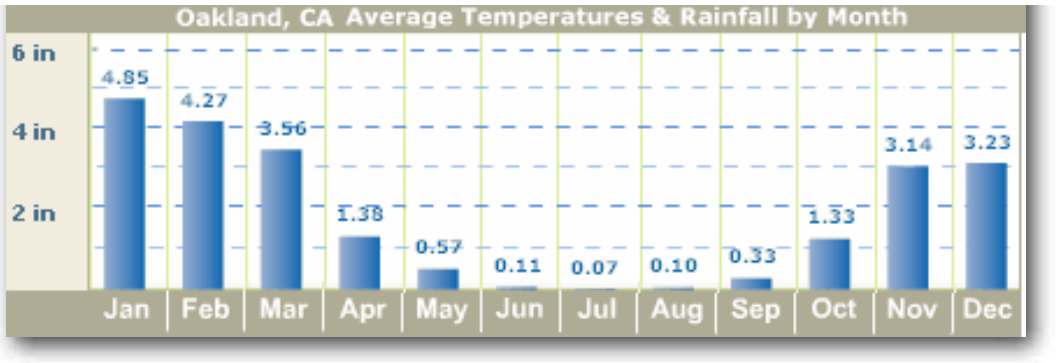
- Statewide Average = 2 feet/year
- In Location (Regionally):
  - 0 in Desert
  - 100 inches in Mountains
  - 40% of Runoff In North Coast Region

California's Average Annual Precipitation (1890 - 2002)



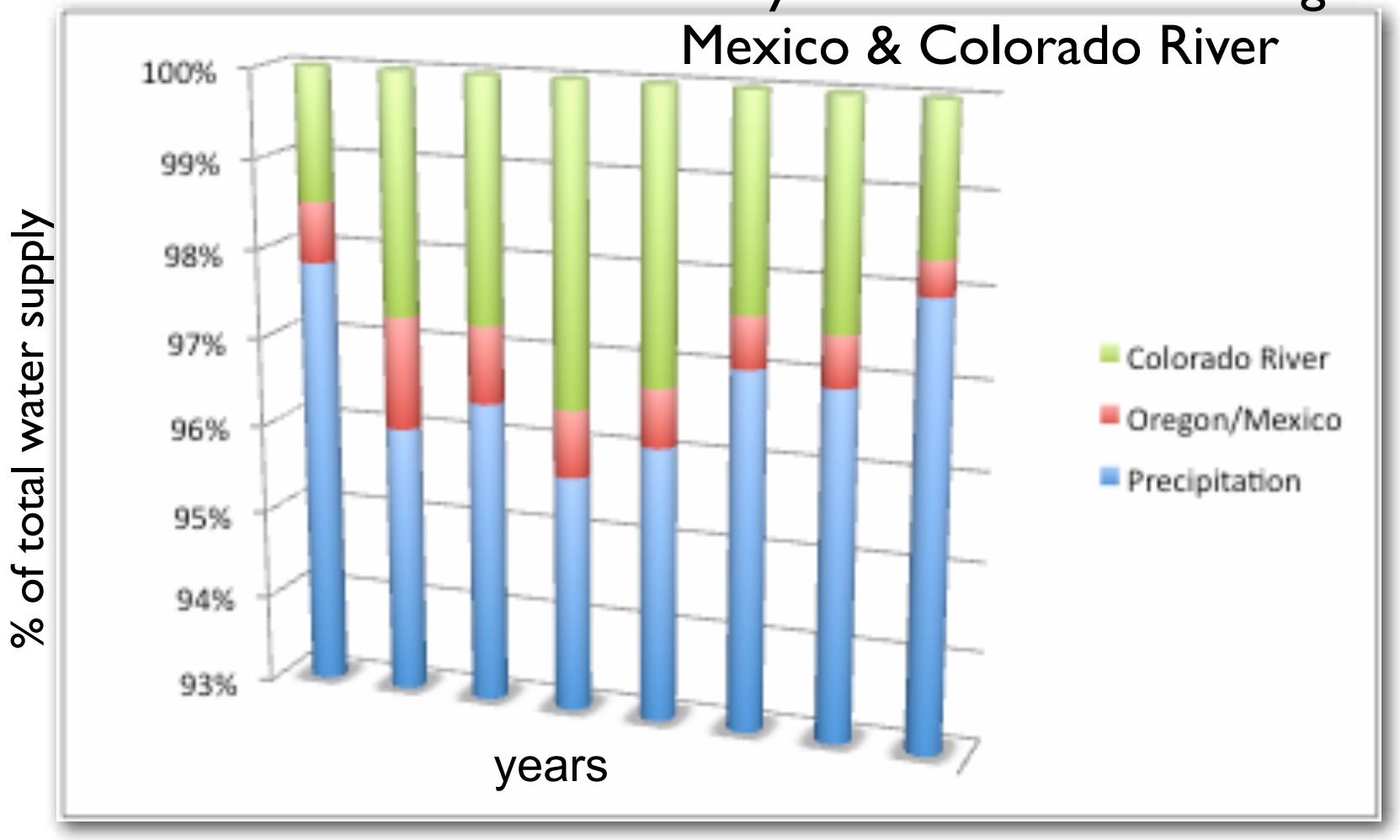
Oakland Average Precipitation

Rainfall



California's Surface Waters

Only last 4.5% is from Oregon/ Mexico & Colorado River



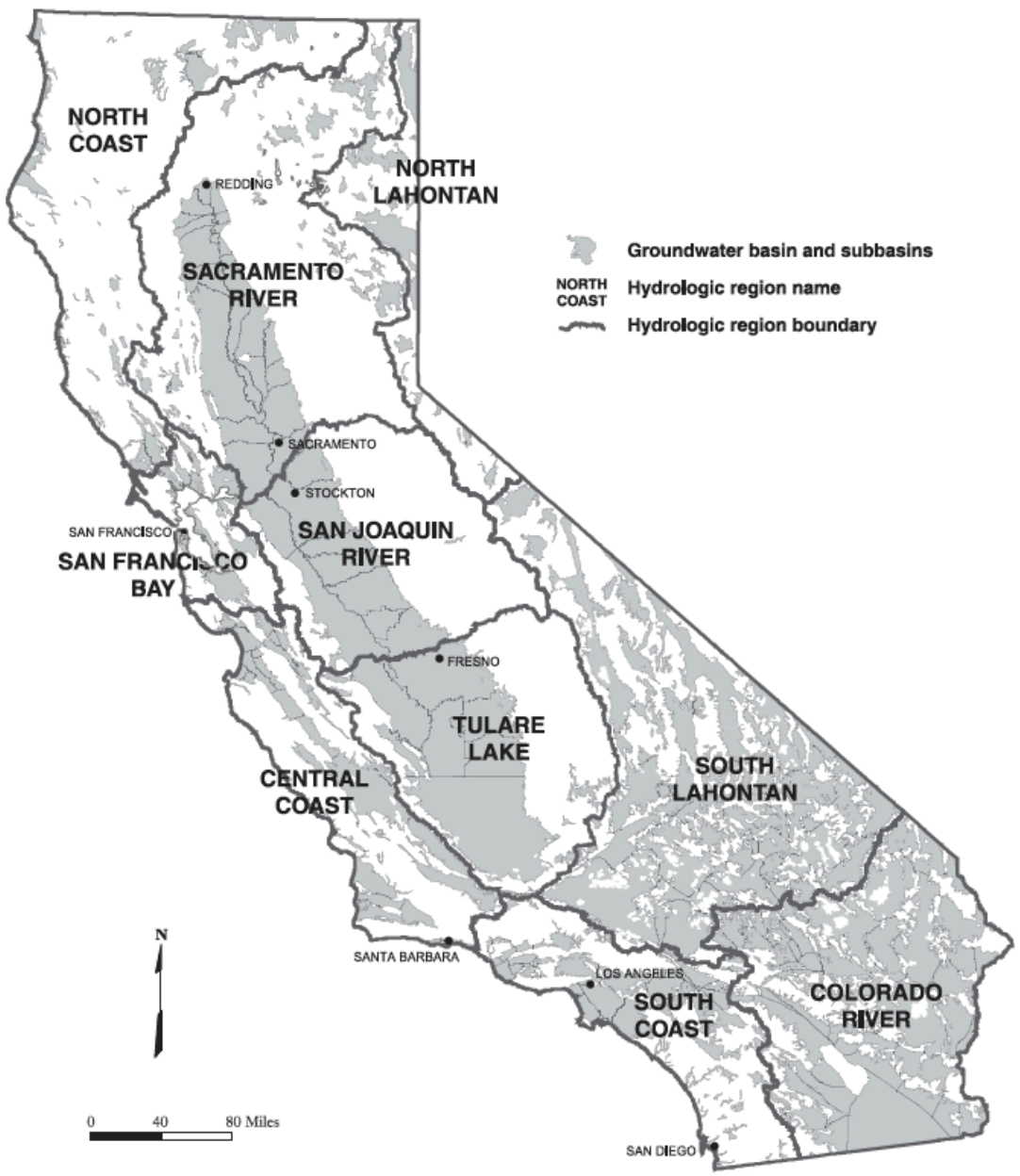
~95 % of water our surface water is precipitation

Sierra Snow Pack

- 15 MAF in Storage
- Represents the Single Largest Surface Reservoir
- 2010-2011 Season, 144% of Average Water Content

California's Groundwater

- 450 Basins with ~850 MAF in Storage
- California Surface Water Storage ~ 40,741 TAF
- ~21 X More Ground than Surface Water Storage.*



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California's Major Water Projects...

Major Water Development Systems

State Water Project
- State of CA
- 1950s
- 700 miles

Mokelumne River
- EBMUD
- 1926
- 80 miles

Hetch Hetchy
- SFPUC
- 1912
- 150 miles

Central Valley
- USBOR
- 1920
- 500 miles

Owens River
- LADWP
- 1904
- 223 miles

Colorado River
- MWDSC
- 1914
- 242 miles

State Water Project & Central Valley Project

	SWP	**CVP**
O&M	CDWR	USBOR
Reservoirs	20 (5.8 MAF)	22 (11 MAF)
Urban (people)	25,000,000	2,000,000
Agriculture (acres)	750,000	3,000,000

Major Water Deliveries

- California State Water Project (SWP)
  - Allocation = 80% of Contractor "Request"
    - Up 30% from previous year
- Federal Central Valley Project (CVP)
  - Allocation = 100% of Contractor Request

Water Savings Glossary

- **Demand Management:**
  - California Water Code: "Demand Management means those water conservation measures, programs and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies."

- **Drought Preparedness/Response:**
  - *temporarily* reducing water demand and finding alternate water sources in a response to an emergency condition*

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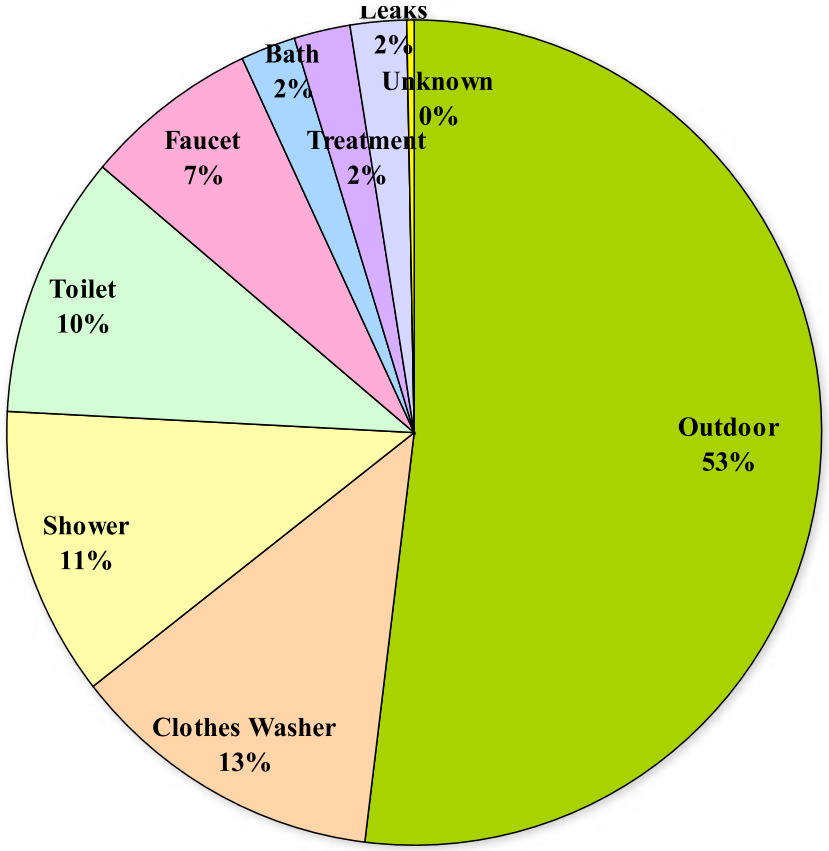
How Much Water Do We Use?

Per Capita Water Demands Are Variable

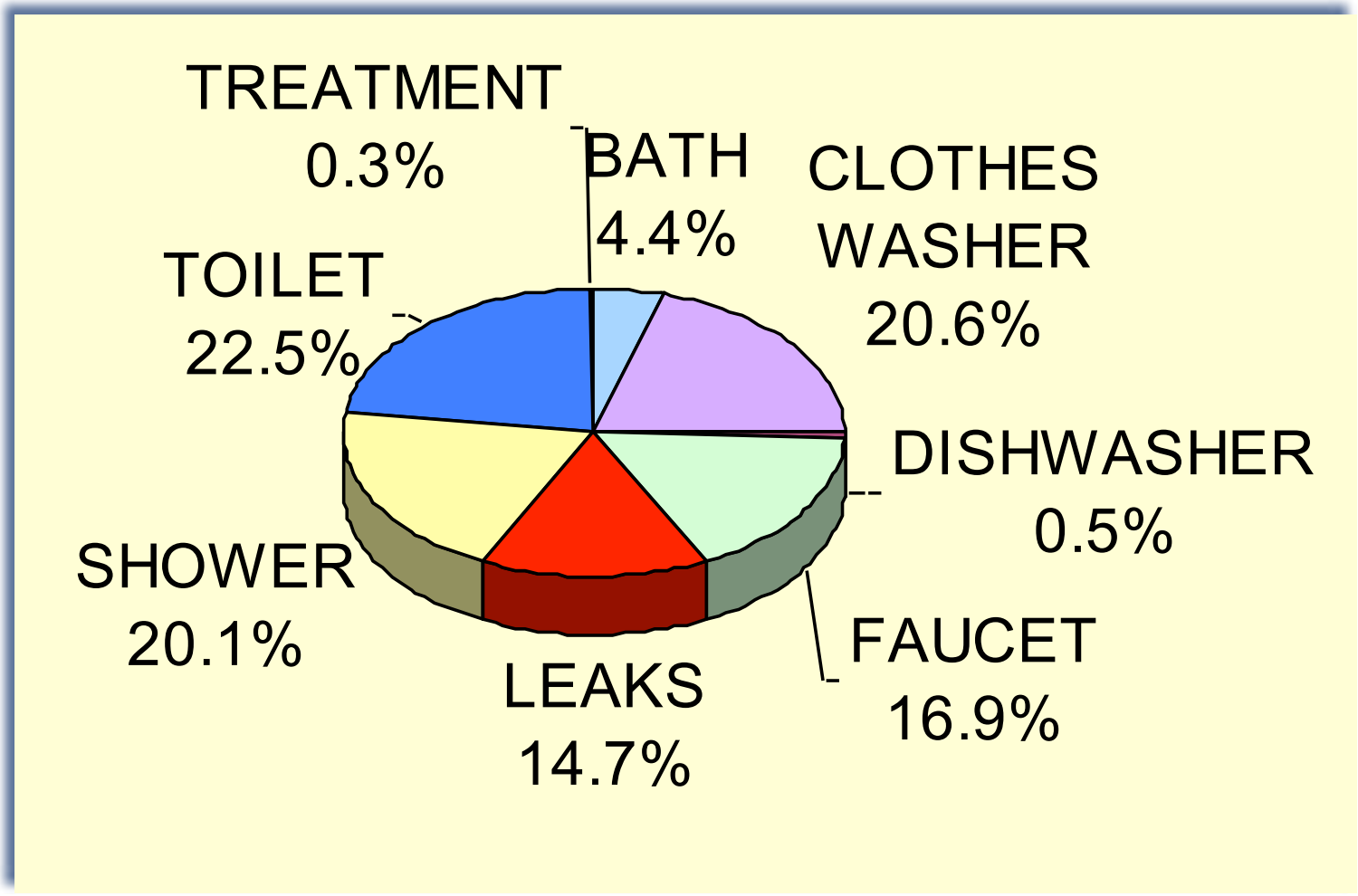
Water Agency	GPCD
San Francisco	95
Santa Barbara	127
Marin	136
Los Angeles	142
Contra Costa	157
San Diego	157
East Bay	166
Victorville	246
Bakersfield	279
Sacramento	279
San Bernardino	296
Fresno	354

Where/How Do we Use Water?



- Average total residential 176.3 gpcd
- Measured 132 gpcd
- Enabled Accurate Projects for New Development of 102 gpcd

Demands "Disaggragated" by Use Yield Accurate Projections



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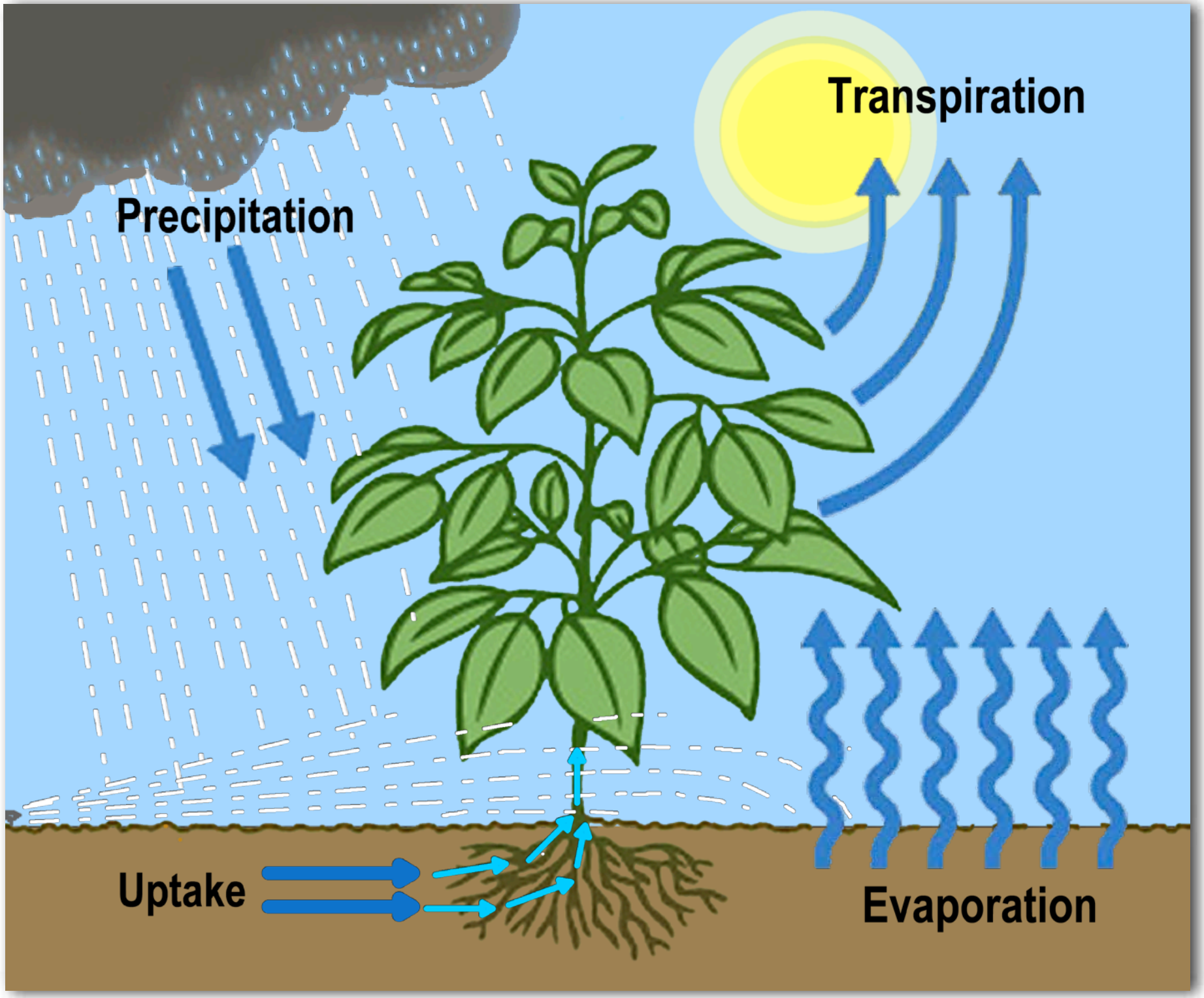
Why Are Plants So Thirsty?

"EVAPOTRANSPIRATION"

Why Are Plants So Thirsty?

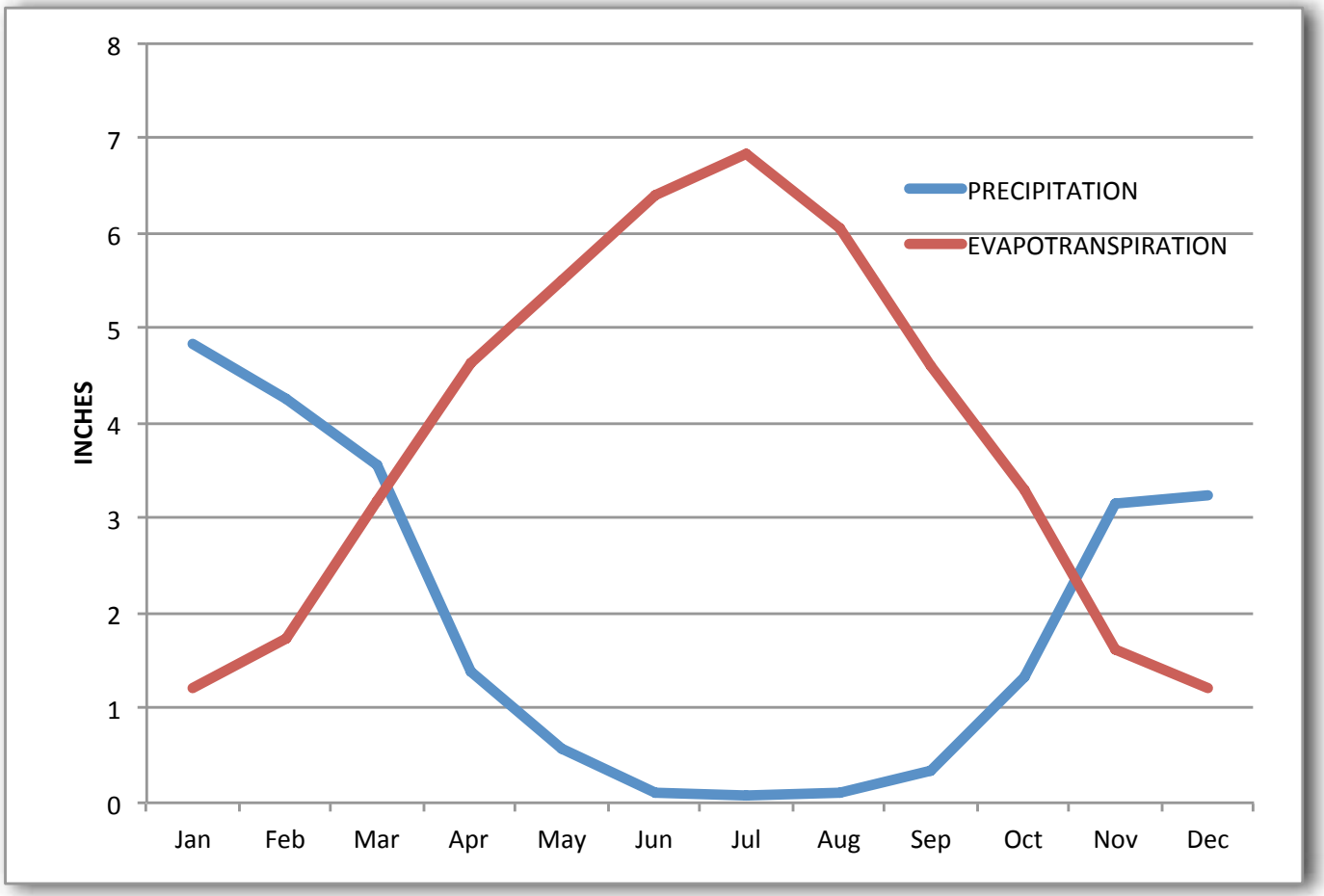
- Like Us, They Loose Water In 2 Important Ways:
  - Transpiration = Water Loss From Plant Tissue
  - Evaporation = Soil + Plant Surface


Transpiration
Precipitation
Uptake
Evaporation

Monthly Average ETo Report for Oakland (inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
1.21	1.73	3.18	4.64	5.50	6.40	6.85	6.06	4.59	3.31	1.62	1.20	46.29

Oakland ETo vs Precipitation




Reference EvapoTranspiration (ETo) Zones
Monthly Average Reference Evapotranspiration by ETo Zone (inches/month)
California Irrigation Management Information System (CIMIS)
REFERENCE EVAPOTRANSPIRATION

*

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Water Conservation Methods...

"Best Management Practices"
BMP's

Best Management Practices (BMPs)

A policy, program, practice, rule, regulation or ordinance or the use of devices used by water suppliers to:

- result in more efficient use or conservation of water.
- achieve conservation or conservation-related benefits.
- be technically and economically reasonable.

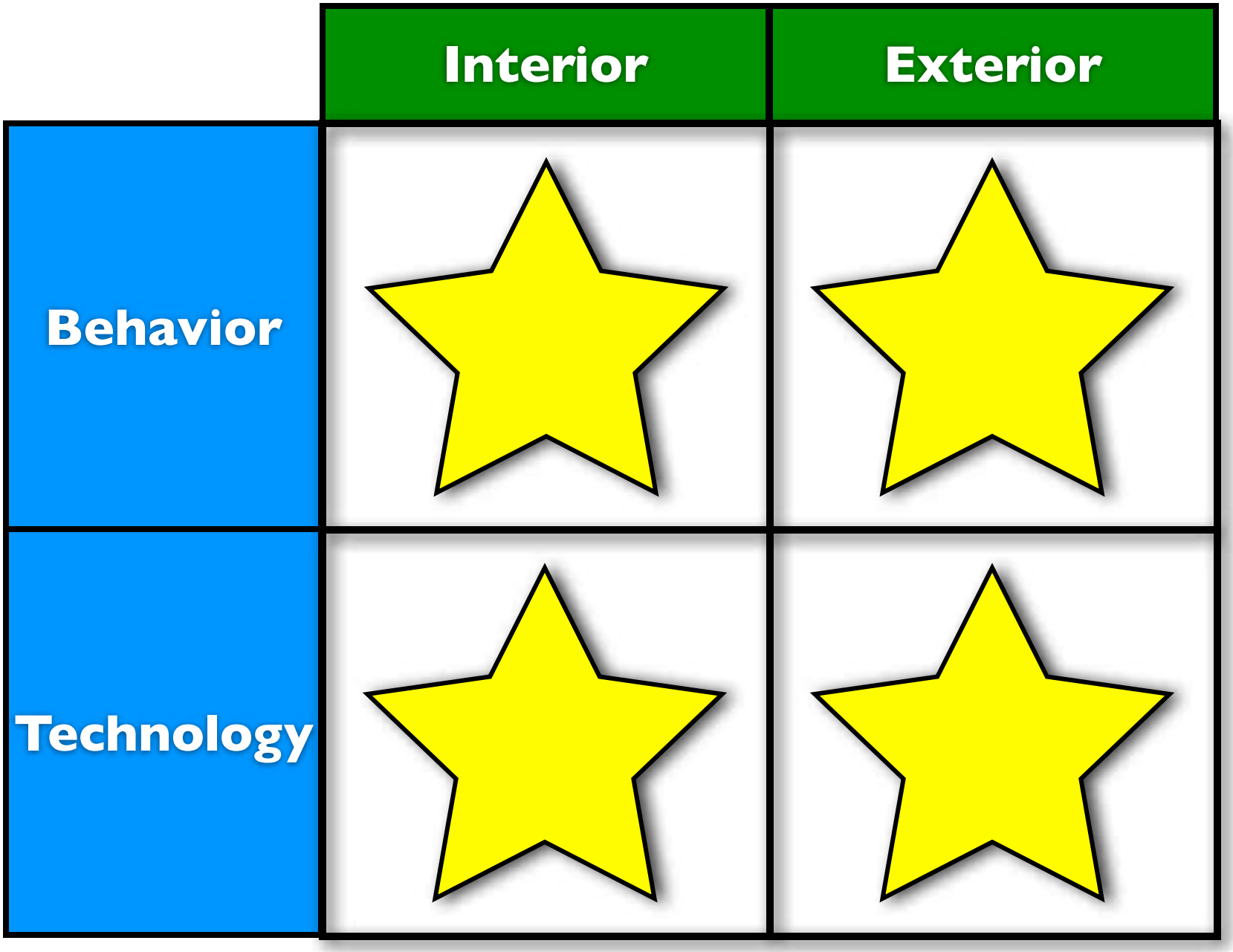
Development of A Water Conservation Plan

- Signatory to the CUWCC **Memorandum of Understanding (MOU)**
- Annual Report of Progress for Implementation of 14 **Best Management Practices** (BMPs) for Water Conservation

How Can We Use Water Better?

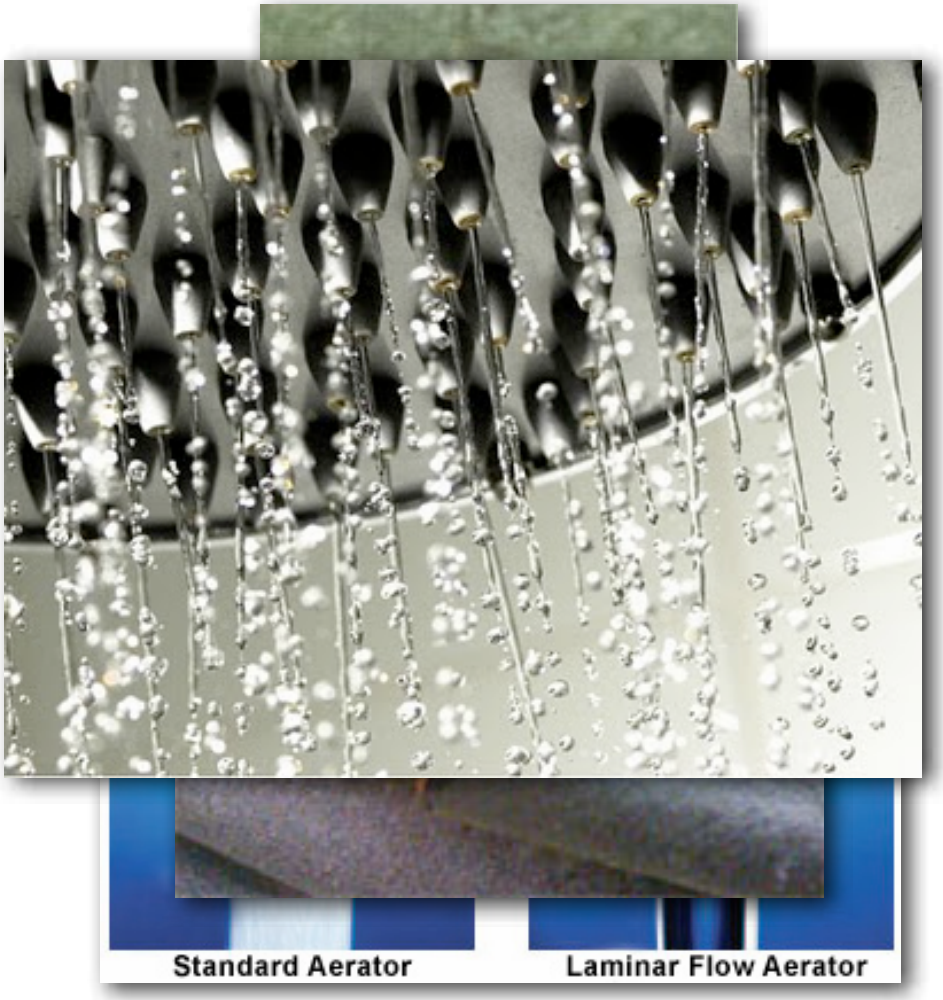
Residential Conservation Practices

Best Management Practices



Interior Fixtures

- Low-flow shower heads & toilets.
- Faucet aerators on sinks.
- Insulated hot water pipes.



	Interior	Exterior
Behavior		
Technology	★	

Energy Rebates and Incentives

Interior Fixtures

EPA WaterSense

Look for the Logo!

Ultra Low Flow Toilets (UTLF's) & Dual Flush

	Interior	Exterior
Behavior		
Technology	★	

Tankless Hot Water Heater

Energy Rebates and Incentives

Interior Fixtures

EPA WaterSense

Look for the Logo!

- High efficiency clothes washer.
- High efficiency dishwasher.

	Interior	Exterior
Behavior		
Technology	★	

Interior Behavior

- Shut off water while brushing teeth.
- Shorter showers.
- Run dishwasher & clothes washer only on full loads.
- Ware washing:
  - scraping instead of rinsing.
  - soaking instead of continuous stream of water.

	Interior	Exterior
Behavior	★	
Technology		

Interior Fixtures: Hot Water Return Pump

Pump/Timer

Return Valve

	Interior	Exterior
Behavior		
Technology	★	

Irrigation Efficiency

- Management
- Application

	Interior	Exterior
Behavior		
Technology		★

Management Efficiency

- ETo Controller vs. Timer
- Rain Sensor

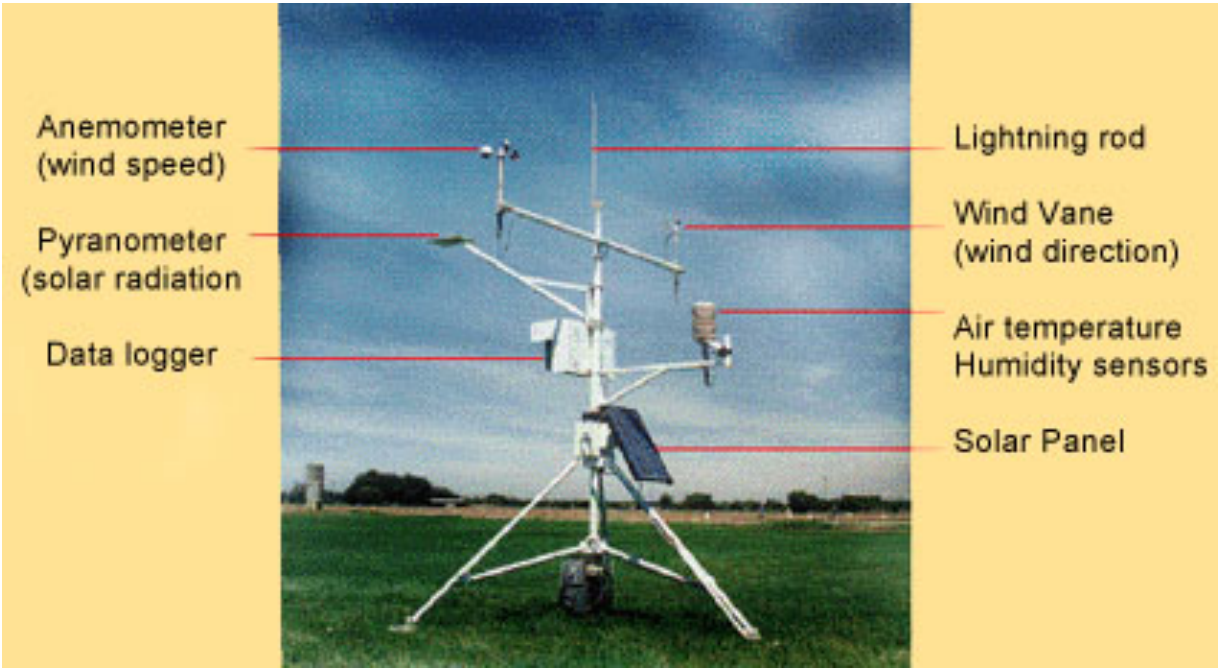
	Interior	Exterior
Behavior		
Technology		★

This is a fancy clock.

ET-Controller

Water loss from landscape due to weather factors (sunlight, wind, humidity, temperature) which cause:

- Evaporation from soil and plant surfaces
- Transpiration by plants



	Interior	Exterior
Behavior		
Technology		★

Application Efficiency
"Matched Precipitation"

Typical
Nozzle

Matched
Precipitation
Nozzle

	Interior	Exterior
Behavior		
Technology		★

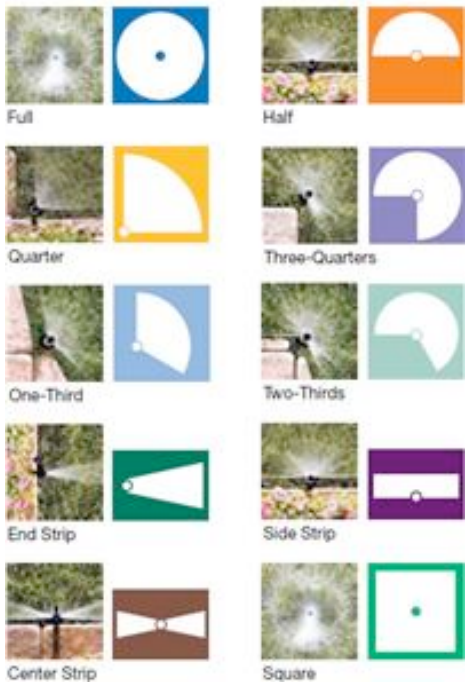
Normal Nozzle: Drift Loss

	Interior	Exterior
Behavior		
Technology		★

Matched Precipitation: Large Droplets, No Drift Loss

Matched Precipitation: Rotators

- Fine Tuning



	Interior	Exterior
Behavior		
Technology		★

- Overspray

✓Proper Coverage

✓Proper Nozzle Spacing

Application Efficiency: Zoning

- Proper zoning matches irrigation requirements of plants

	Interior	Exterior
Behavior		
Technology		★

Application Efficiency

Catch Can Testing

Micro-spray Irrigation

	Interior	Exterior
Behavior		
Technology		★

Application Efficiency: Turf Replacement

- Synthetic Turf

- *Xeriscape: landscaping method that reduces water use*
  - -Zero demand.
  - -Live within native landscape.

- Adaptive Plants
  - -Grow
  - -Little or no irrigation.

	Interior	Exterior
Behavior		
Technology		★

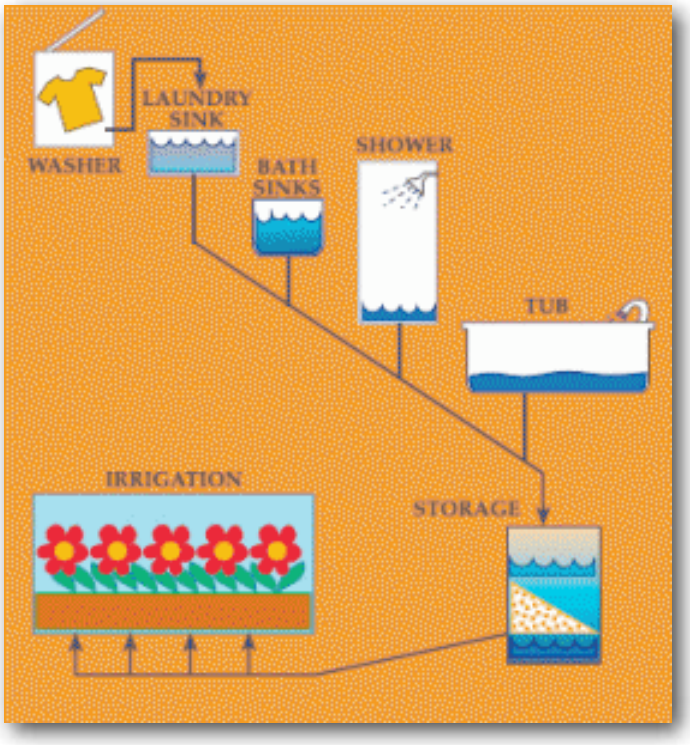
Application Efficiency: Turf Replacement

- Underturf Irrigation
  - NETAFIM™
- Hardscape
  - Permeable

	Interior	Exterior
Behavior		
Technology		★

Graywater

- Must modify interior plumbing.
- Re-plumb to flush toilets.
- Must subsurface irrigate.
- Requires management.



	Interior	Exterior
Behavior		
Technology	★	★

Rainwater Harvesting

- Requires on-site storage.
- Re-plumb to flush toilets.
- Requires management.

	Interior	Exterior
Behavior		
Technology	★	★

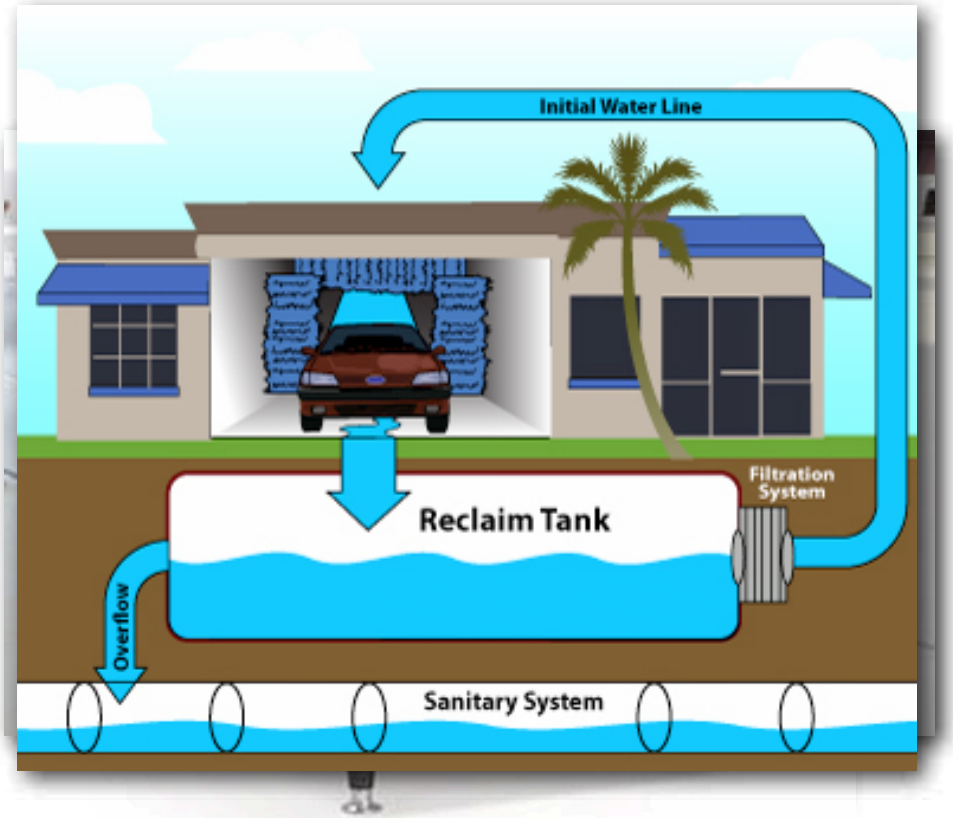
Responsible Landscaping

- Minimize irrigation areas.
- Use native and adaptive vegetation.
- Reduce turf area.
- Grow turf taller.
- Inspection and maintenance of irrigation system.
- Irrigate in morning or late evening.
- Cover pools.
- Sweep; Don't hose down walks.

	Interior	Exterior
Behavior		★
Technology		★

Commercial & Industrial Conservation Practices

- Dual flush toilet & urinal.
- Commercial clothes washer (laundromat/hotel).
- Water efficient ice machine.
- Commercial car wash- recycled water.



	Interior	Exterior
Behavior		
Technology	★	★

Conservation Facilities Deliver Reliable Water Savings

New Home Water Use Projections
EXAMPLE

Existing Home Base Rate	132 gpcd
Low Flow Toilet	- 9 gpcd
High Efficiency Clothes Washer	-10 gpcd
Low Flow Shower Fixtures	- 3 gpcd
ET_o Based Irrigation Control	-8 gpcd
Conservation Base Rate	102 gpcd

29% Water Use Savings

Best Management Practices

	Interior	Exterior
Behavior	▸Teeth Brushing ▸Shorter Showers ▸Ware-washing ▸Full Loads -Dishwasher -Clothes Washer	▸Irrigation -Inspect & Maintain -Morning/Late Evening ▸Native Plant Species ▸Reducing turf area ▸Taller Turf ▸Sweeping ▸Cover pools ▸Turn off Hose Between Uses *
Technology	▸Hot Water Return Pump ▸Low-Flow Fixtures -Shower Head -Toilet -Faucet -Clothes Washer	▸Matched Precipitation Nozzles ▸Zoned Irrigation System ▸ET-Controlled Irrigation ▸Soil-Moisture Probes

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Things The Water Agencies Are Doing...

"Best Management Practices"
BMP's

Things Your Water Agency Is Doing

- Water Audits (System Wide)
- Commercial Conservation Programs
- Dedicated Conservation Coordinator
- Leak Detection & Repair (System Wide)
- Meters on All Service Connections
- Advise Customers of Potential Leaks
- Perform Water Surveys for Customers

Leak Detection

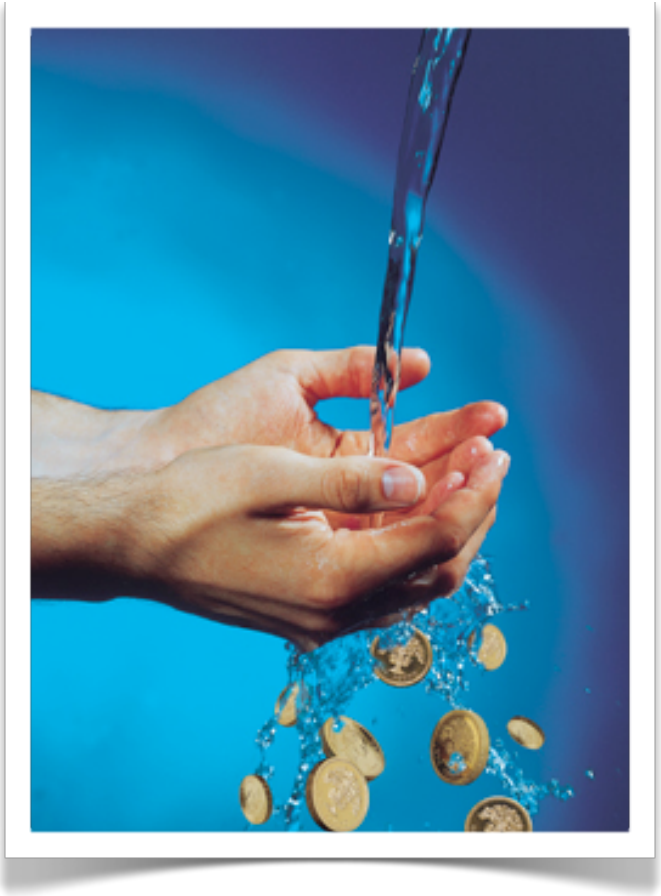
- Annual interior and exterior audits in collaboration with local provider.
- Identify and repair leaks on the consumer's side of the meter.
- Recommend additional improvements.

Public Information Programs

- Agencies create a program to promote water conservation and inform users about the benefits.

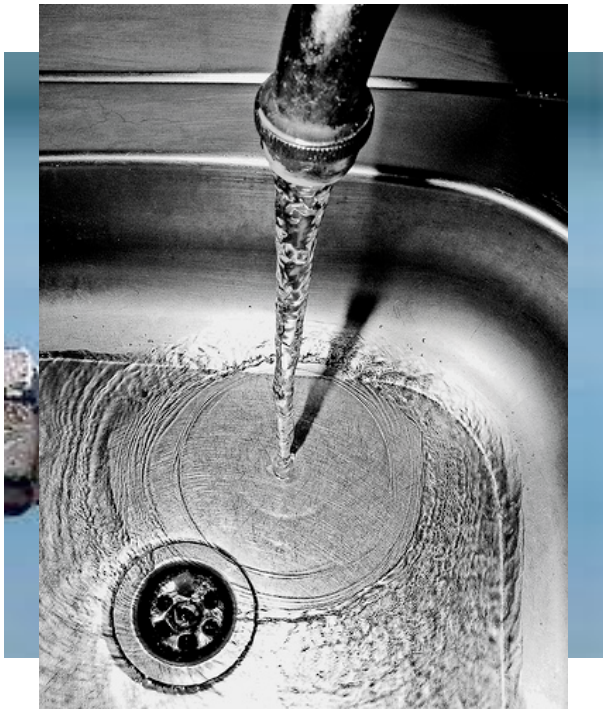
Retail Conservation Pricing

- Water purveyor determines average water use.
- Consumer is charged a greater amount for water usage above the average.



Water Waste Prevention

- Water purveyor enacts measures to respond to water shortages.
- Implement water waste prevention.
- Consumers use less water.



Rebates in Your Region

- Mulch discount coupons.
- High-efficiency toilet and clothes washer.
- Lawn conversion and replaced irrigation timer ("Cash for Grass").
- Informational services for gray water and water waste.
- www.ebmud.com/watersmart

SB x 7-7
20 by 2020 Water Conservation Plan

- Reduce statewide per capita urban water use by 20% by the year 2020
- Current statewide per capita use = 192 gpcd
- 20% reduction = 154 gpcd
- 1.59 MAF water savings
- 10% reduction by 2015; 20% reduction by 2020
- Targets vary by Hydrologic Region and Agency

Water Supply Planning Benefits From A Review of Municipal Authorities

- Agency's Current Code May Establish Drought Measures that Restrict Water Use in an Emergency.
- Determine if Water Conservation Measures Would Lower Water Demand.

BMPs and YOU

- CA Urban Water Conservation Council (CUWCC)
  - Signs MOU
  - Agencies report to CUWCC instead of state
  - Condenses and refines BMPs
- Agencies (EBMUD)
  - Must show 20% reduction in next 20 years
  - Give rebates/money/incentives/technical assistance
- Customers are encouraged to follow BMPs through EBMUD

UWMPA
Best Management Practices

- Urban Water Management Planning Act (UWMPA)
  - Sets requirements for agencies every 5 years
  - Agencies write and submit to CA Department of Water Resources (CDWR) an Urban Water Management Plan (UWMP)
- UWMP codifies CA Water Code's (CWC) BMPs
  - Agencies must annually report success of BMP implementation

BMP 1: Residential Surveys
BMP 2: Residential Retrofits
BMP 3: System Water Audits
BMP 4: Metering
BMP 5: Landscape
BMP 6: Clothes Washers
BMP 7: Public Info
BMP 8: School Education
BMP 9: CII
BMP 10: Wholesaler Incentives
BMP 11: Rates
BMP 12: Consv Coordinator
BMP 13: Waste Prohibitions
BMP 14: ULFTs

Public Trust and the Need for Water Conservation

- What is the Public Trust?
  - The State owns the "navigable waters" and the land underneath them as trustee for the public.
  - As trustee for the public, the State has a duty to protect the uses of navigable waters by the public.
- Protected Public Trust Uses:
  - Traditional view: navigation, commerce, fishing.
  - Modern view: also protects environmental resources, recreation and aesthetics.

Some Urban Water Management Tools

- Water Supply Management
  - Integrated Water Supply Planning (IWMP)
  - Brackish & Ocean Water Desalination (Desal)
  - Recycled Water (Exterior & Interior Use)
  - Agricultural Land Conversions
  - Water Harvesting, Banking, Wheeling …

- Water Demand Management Tools
  - Water Conservation
    - California Urban Water Conservation Council
    - 14 Water Conservation BMPs

Focus of California Water Supply Agencies

- Focus on Long-Term Water Supply Availability…
  - Regulatory "Desire" to Address Global Warming
  - Increased Attention to Groundwater Safe Yield
  - Increased Importance for Purveyors to Have a Portfolio of Water Supplies
  - Conservation Hardening (Facilities, Pricing & Practices) *

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Water Law

"Light"

Article 10, Section 2 of the California Constitution

…the water resources of the State be put to beneficial use to the fullest extent of which they are capable,

… the waste or unreasonable use or unreasonable method of use of water be prevented,

…the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.

Water Conservation References in the California Water Code

Provides that any municipality or special district:

- §10255 "… may institute a water conservation or efficient water management program.."
- §1009 "…may require, as a condition of new service, that:
  - Reasonable water saving devices [be installed] and
  - Water reclamation devices be installed to reduce water use."

California Urban Water Management Planning Act

- Enacted in 1983; Assembly Bill 797 (Klehs)
- California Water Code Division 6, Part 2.6
- Declares that:

" The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level."

- Requires that:

"Every urban water supplier shall prepare and adopt an urban water management plan."

UWMP Must Describe Demand Management Measures

A description of each water demand management measure (current & future)

- Water survey programs for single-family residential and multifamily residential customers.
- Residential plumbing retrofit.
- System water audits, leak detection, and repair.
- Metering with commodity rates for all new connections and retrofit of existing connections.
- Large landscape conservation programs and incentives.
- High-efficiency washing machine rebate programs.

Water Conservation in Landscaping Act (GOV CODE 65591-65600)

- It is the policy of the state to promote the conservation and efficient use of water and to prevent the waste of this valuable resource.
- Landscape design, installation, & maintenance can and should be water efficient
- Requires development & use of a model water efficient landscape ordinance

California's New Linkage

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Discussion

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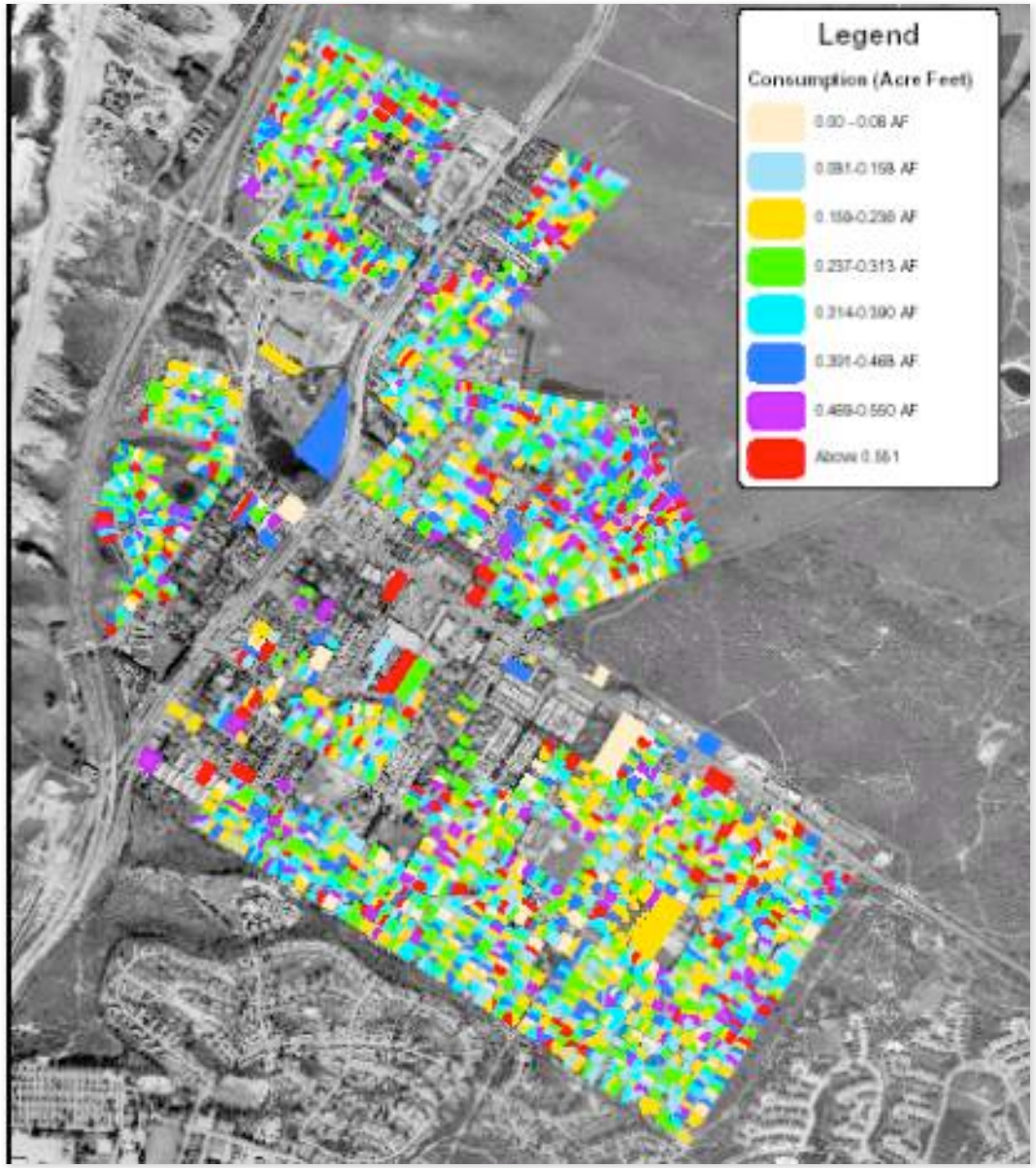
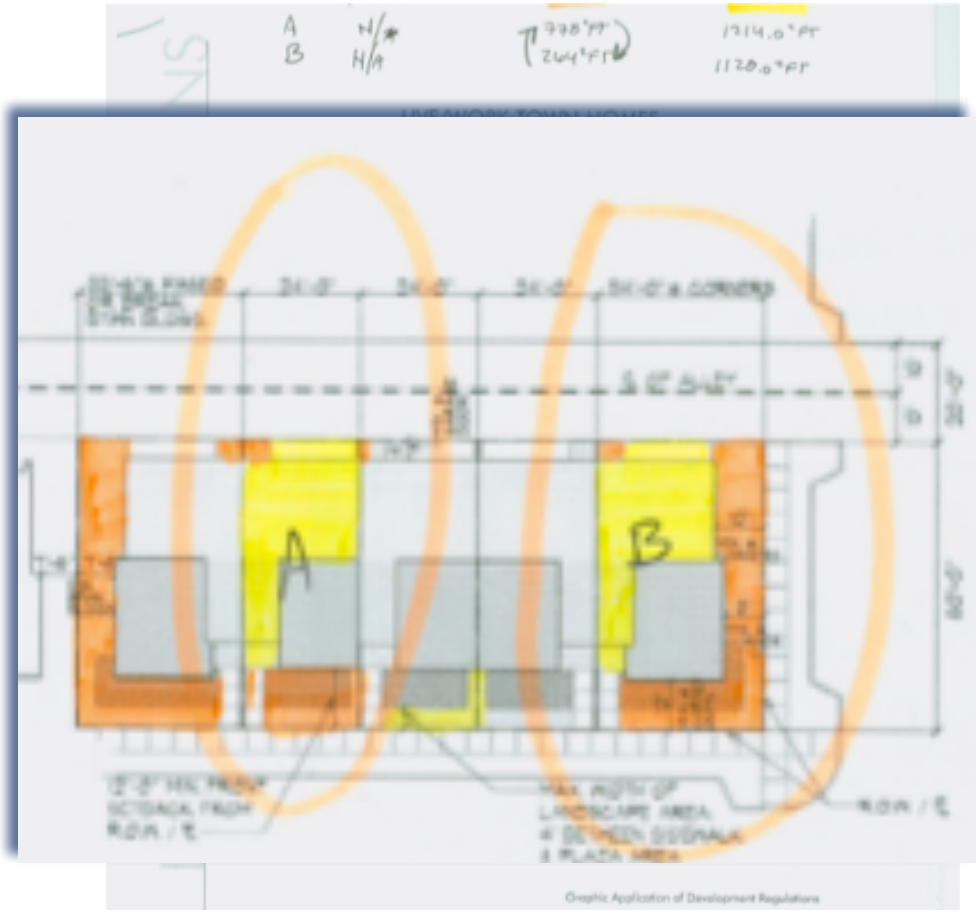
GIS Maximizes Conservation



- Identify & Target High Water Users
- Potential Applicant Contribution

Close Coordination with Applicants Results in Accurate Water Demand Forecasts



- Specific Plans Provide Detailed Information
- Allows Assessment of Interior & Exterior Uses