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How Low Can We Go? Codes and Measures Push Beyond 20% Savings by 2020

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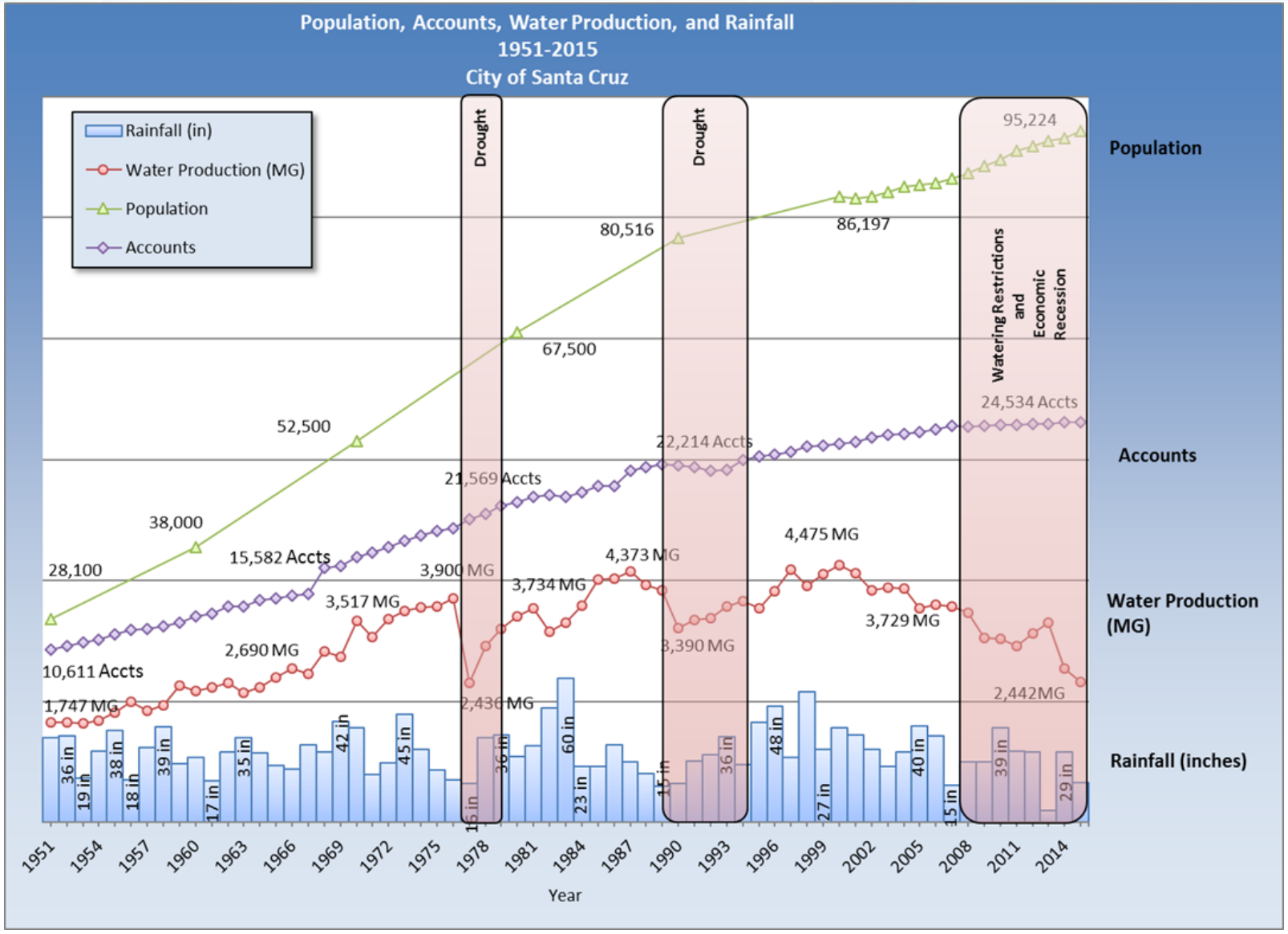
Surf City Saves
Water For Our Future

Presentation Overview

- Baseline Survey
- Water Conservation Modeling
  - Passive Code Savings
  - Active Conservation Measures
- Stakeholder Process
- Summarize Key Findings
- Recommended Program
- Questions, Discussion

City of Santa Cruz Water Service Area

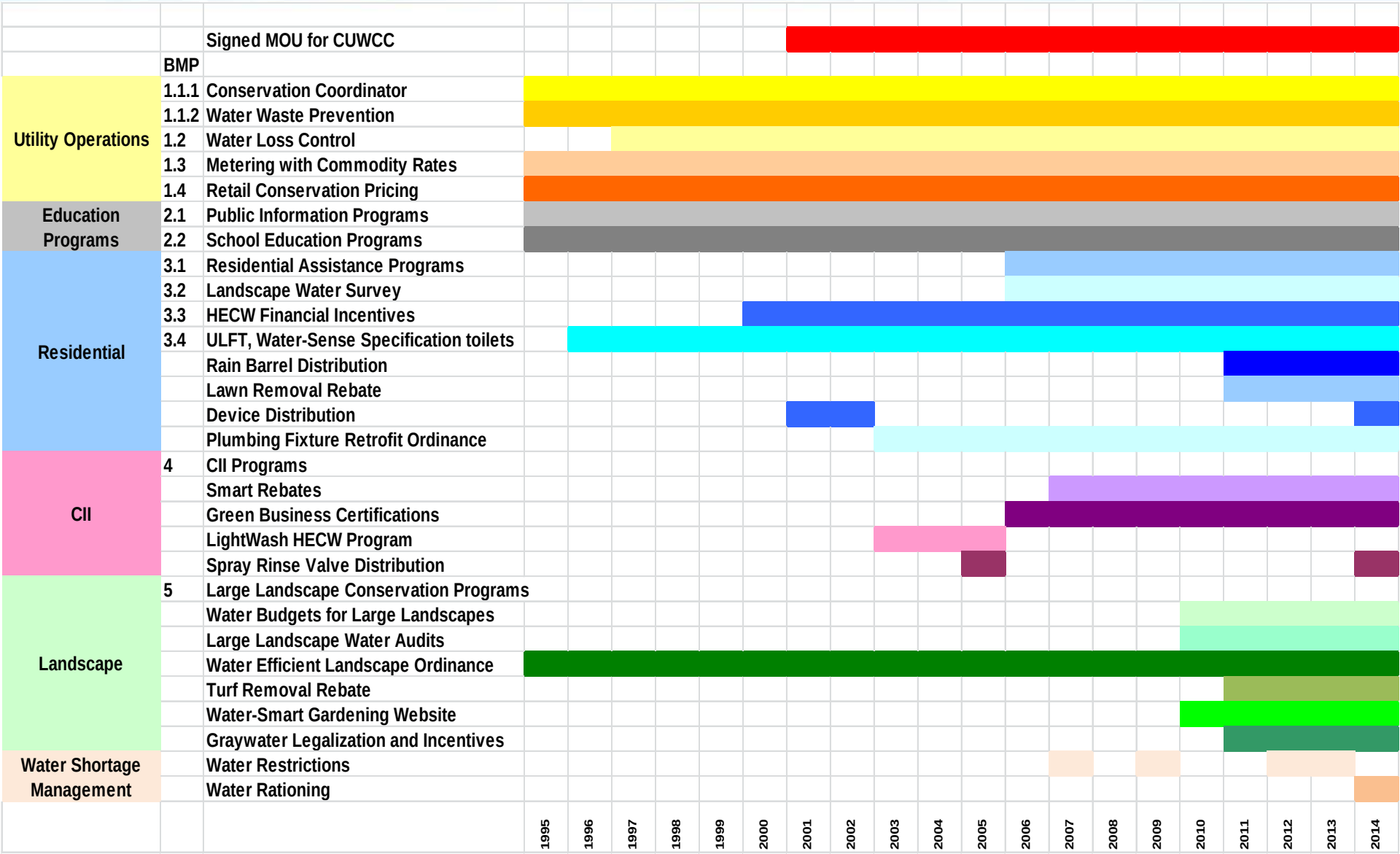
Historical Demands & Droughts



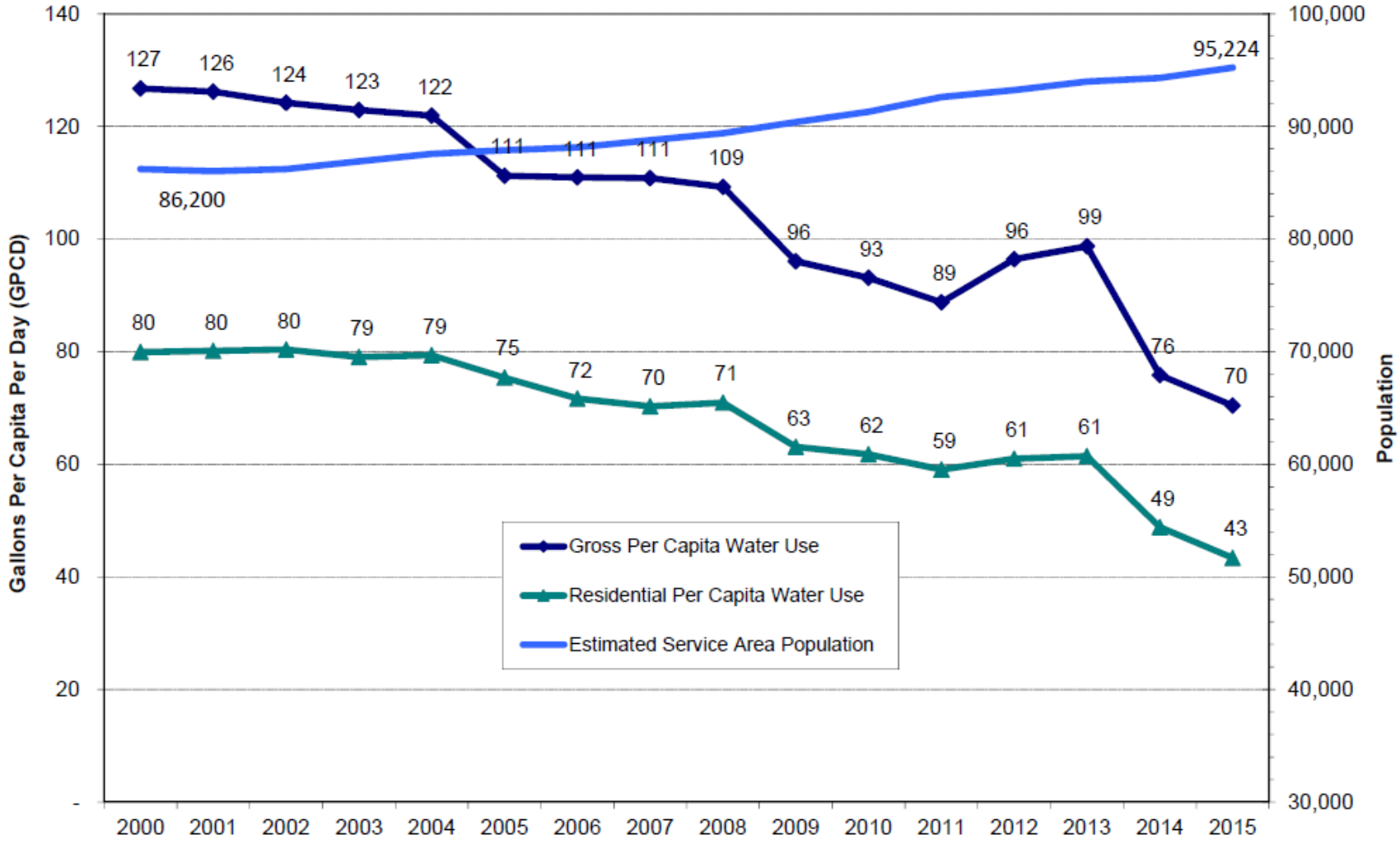
Background

- 2000: City adopted its first formal Water Conservation Plan and joined the California Urban Water Conservation Council
- Actively developed and implemented various programs and Best Management Practices over the following decade – focusing mainly on long-term measures
- Senate Bill SB X7-7: 20% by 2020 passed in 2009
- 2012-13 Conducted Baseline Survey

Past and Current Conservation Programs



Per Capita Water Use

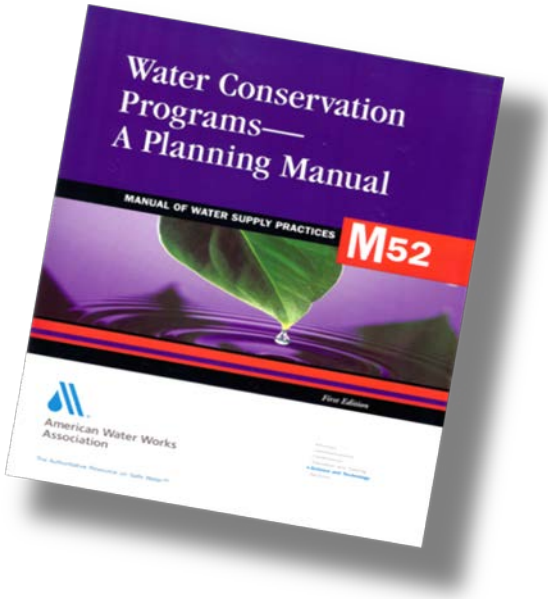


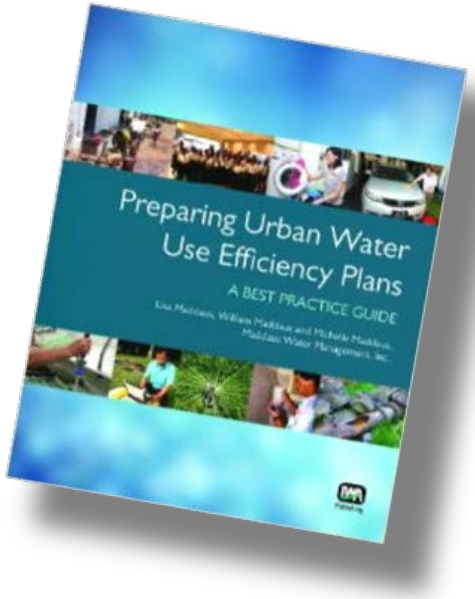
Project Goals and Objectives

- Systematically evaluate and quantify through scenario planning the City's remaining long-term water conservation potential;
- Determine which set of measures and implementation mechanisms represent the best approach to achieve future water savings; and
- Produce a master plan to guide the City's in carrying out future water conservation programs.

Getting Going

- City contracted with Maddaus Water Management, Inc.





Plan Development : 2 Phases

Phase 1: Technical Analysis (2013 - 2014)

- Analyze water use/review baseline survey results
- Identify, screen, and prioritize measures, with significant public input
- Model measures, evaluate costs, water savings
- Developed program scenarios
- Formulate programs leading to a recommended Program “C” optimized for “maximum potential” least cost for most savings
- Water shortage emergency strikes

Modeling Process

1. Set-up Demand Forecast & Water Balance Calibration
2. Codes and Standards
3. Active Conservation Measures
4. Design Conservation Program "Scenarios"
5. Recommend "Preferred Scenario"

Between Phases 1 & 2: WSAC Review

- Stakeholder process engaged on the supply alternatives that includes maximizing “peak” water conservation
- Water Supply Alternatives Committee (WSAC) undertook detailed review of modeling results
- Shifted conservation program emphasis to peak season water savings
- New econometric-based water demand forecast
- Produced several recommendations for additional conservation to be included in the plan

WSAC: Emphasize Peak Season Savings

Example of Recent Turf Removal Site

Phase 2: Recommended Program October 2015 to Present

- Recalibrated model to new demand forecast
- Extended planning horizon to year 2035
- Incorporated input from WSAC process, with focus on peak season savings
- Incorporated new plumbing code changes arising from Statewide Emergency Regulations
- Formulated the “Recommended Program”
- City Council approved in April 2016
- Urban Water Management Adopted in August 2016

2015 Updated CA Codes and Standards

- California Governor's Executive Order on April 1, 2015
- Emergency Drought Update to Green Building Code
  - Adopted by the California Building Standards Commission on July 1, 2015.
- Efficiency of fixtures installed
  - Adopted by the California Energy Commission (CEC) on September 1, 2015.
- References to Model Efficient Landscape Ordinance.
  - Adopted by the California Department of Water Resources on December 15, 2015
- More information: California Building Standards Commission (and State Architect for schools) http://www.bsc.ca.gov/Rulemaking/emergency.aspx

Other Applicable Codes and Standards

- Federal Clothes Washer Standards (S.398)
- 2009 Senate Bill 407 – Statewide Fixture Replacement
  - January 1, 2017 for Residential
  - January 1, 2019 for Commercial
- Local Ordinances
  - Retrofit on Resale
  - Water Waste

New 2015 CA Plumbing Codes
(Update Mandated by Governor's Executive Order B-29-15)

Fixture	Previous Flow Rates in California or National Standard[a]	CA 2015 Code Update (Effective July 1, 2016)[b]
Lavatory Faucets - Residential (gpm @ 60 psi)	1.5[c]	1.2
Kitchen Faucets (gpm @ 60 psi)	2.2	1.8
Public Faucets – Commercial (gpm @ 60 psi)	0.5[c]	0.5
Metered Faucets (gallons per cycle)	N/A	0.25
Showerheads (gpm @ 80 psi)	2.5	2.0 (1.8[d])
Tub Spout Diverters Leakage (gpm)	0.01[e]	0.01[e]
Pre-Rinse Spray Valves (gpm)	1.25[c]	1.25[c]
High Efficiency Toilets (gpf)	1.28	1.28
Urinals – wall mounted (gpf)	0.5	0.125

Notes: (a) Flow rate standards adopted California Code of Regulations (CCR) Title 20 CA Appliance Efficiency Standards are superseded by National Standards included in the CA Building and Plumbing Codes, given state codes and standards can only be more restrictive than national codes and standards. (b) More information online for California Code of Regulations Title 20, Appliance Efficiency Standards, Updated February 2016: http://www.energy.ca.gov/appliances/ (c) Per American National Standards Institute (ANSI) existing national product standard for U.S. and Canada: ASME A112.18.1/CSA B125.1; (d) Showerhead standard changes to 1.8 gpm as of July 1, 2018; (e) Standard based on maximum leakage under testing conditions, new 0.01 gpm and after 15,000 cycles, 0.05 gpm.

Federal S. 398 Efficiency Standards FOR CLOTHES WASHERS Summary (Water Factors)

Category	2015 Standard	2018 Standard
Top-load, std size	8.0	6.0
Front-load, Std size	4.5	
Top-load, Compact	14.0	11.6
Front-load, Compact	8.0	

Key Findings - Plumbing Code

- Significant impact over 20 years
- Estimated savings of **329 mgy by 2035**
- 8.6% reduction in water demand

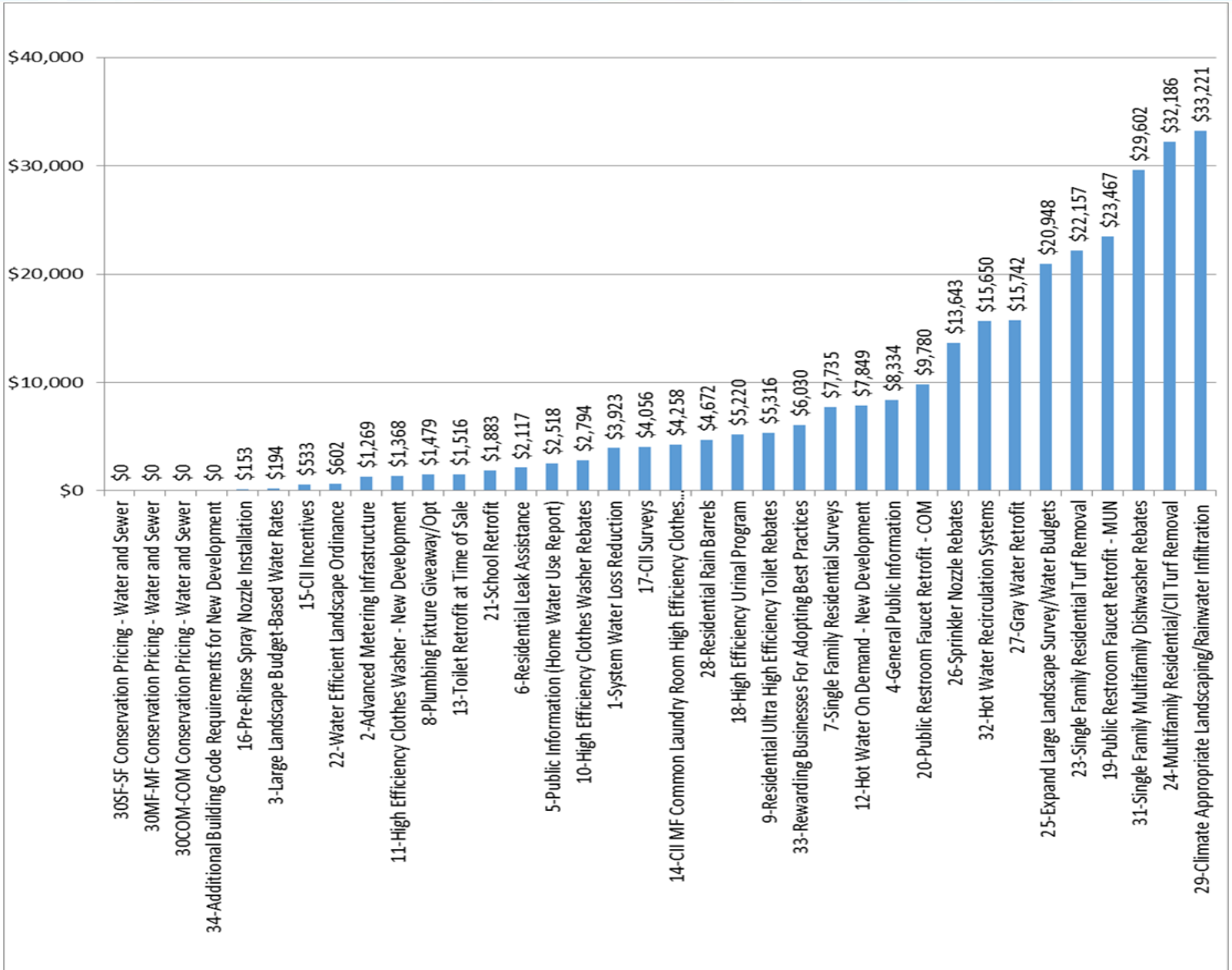



Source	Toilet	Faucet	Shower	Clothes Washer	Leak	Bath	Other	Dishwasher
2016 WRF Residential End Uses of Water, Version 2	24% 32.6 gphd	20% 27.0 gphd	20% 26.9 gphd	16% 22.0 gphd	13% 18.0 gphd	3% 4.0 gphd	3% 4.4 gphd	2% 2.2 gphd
City of Santa Cruz	17% 25.5 gpda	17% 26.1 gpda	21% 31.6 gpda	14% 21.0 gpda	10% 15.0 gpda	3% 4.5 gpda	16% 23.2 gpda	2% 3.0 gpda

Recommended Measures

- 35 individual measures
- Includes all 28 measures previously recommended by the Water Commission
- 7 Additional measures added by WSAC process
- Implementation ramps up through 2021
- **Additional 291 mgy in 2035**
- **16% total reduction in overall water use**
- Cost of water saved varies by measure

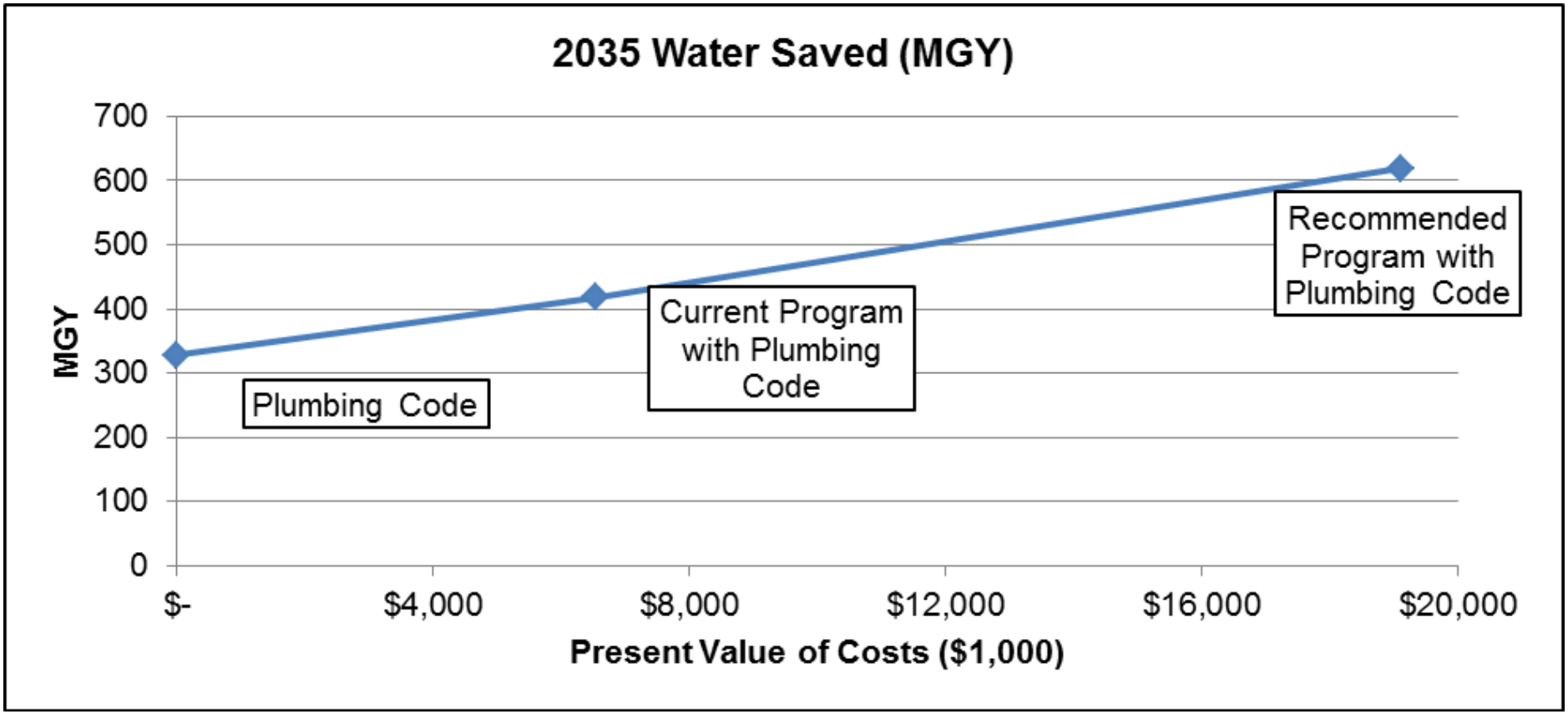
Unit Cost of Water Saved ($/MG)



Total 20-year Program Costs and Savings

Conservation Program	Average Cost of Water Saved $/MG	Water Savings over "Baseline" Demand in 2035 (MGY)
Recommended Program with Plumbing Code Savings	$4,572/MG	619

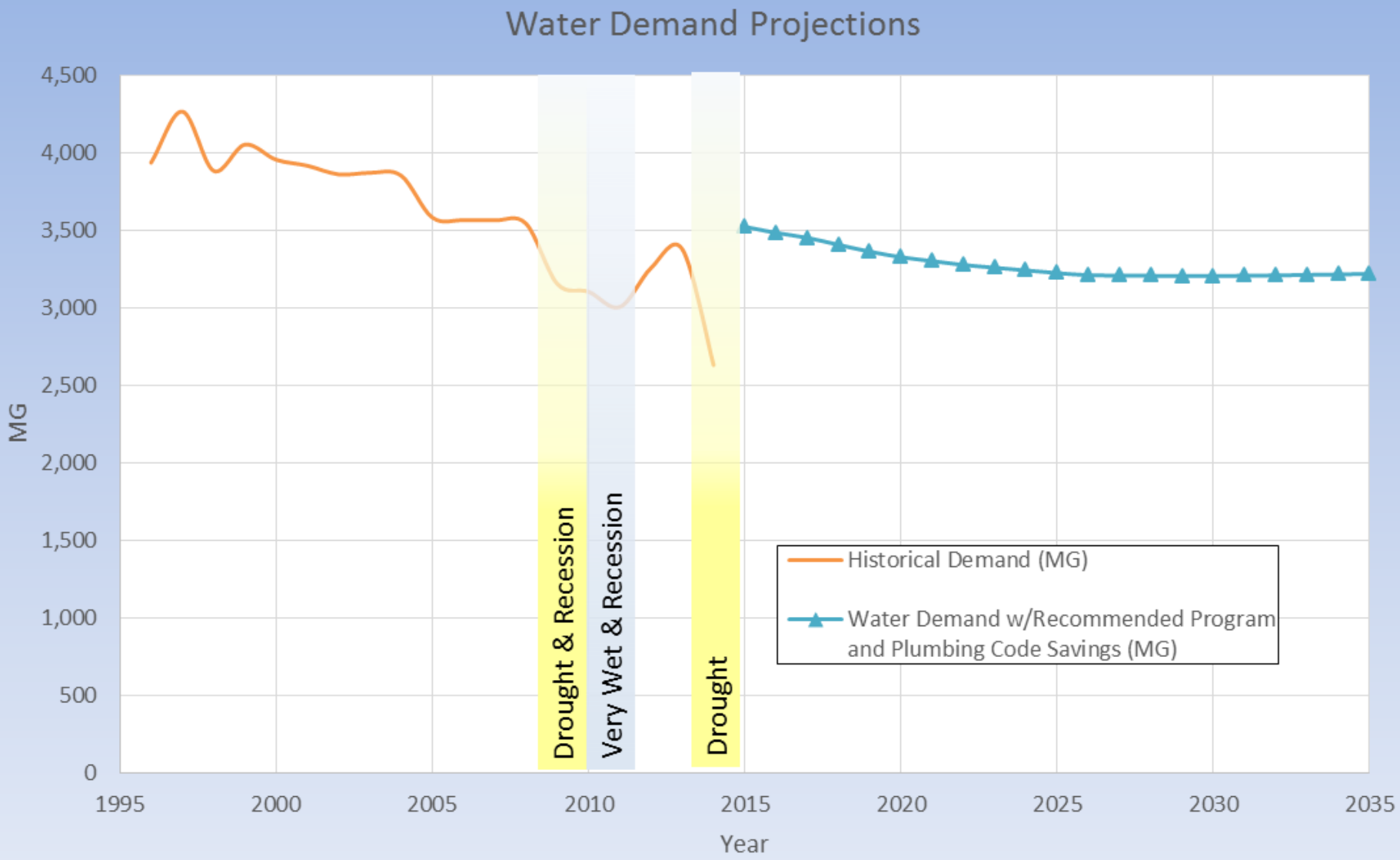
Estimated 20-Year Cost versus Water Savings



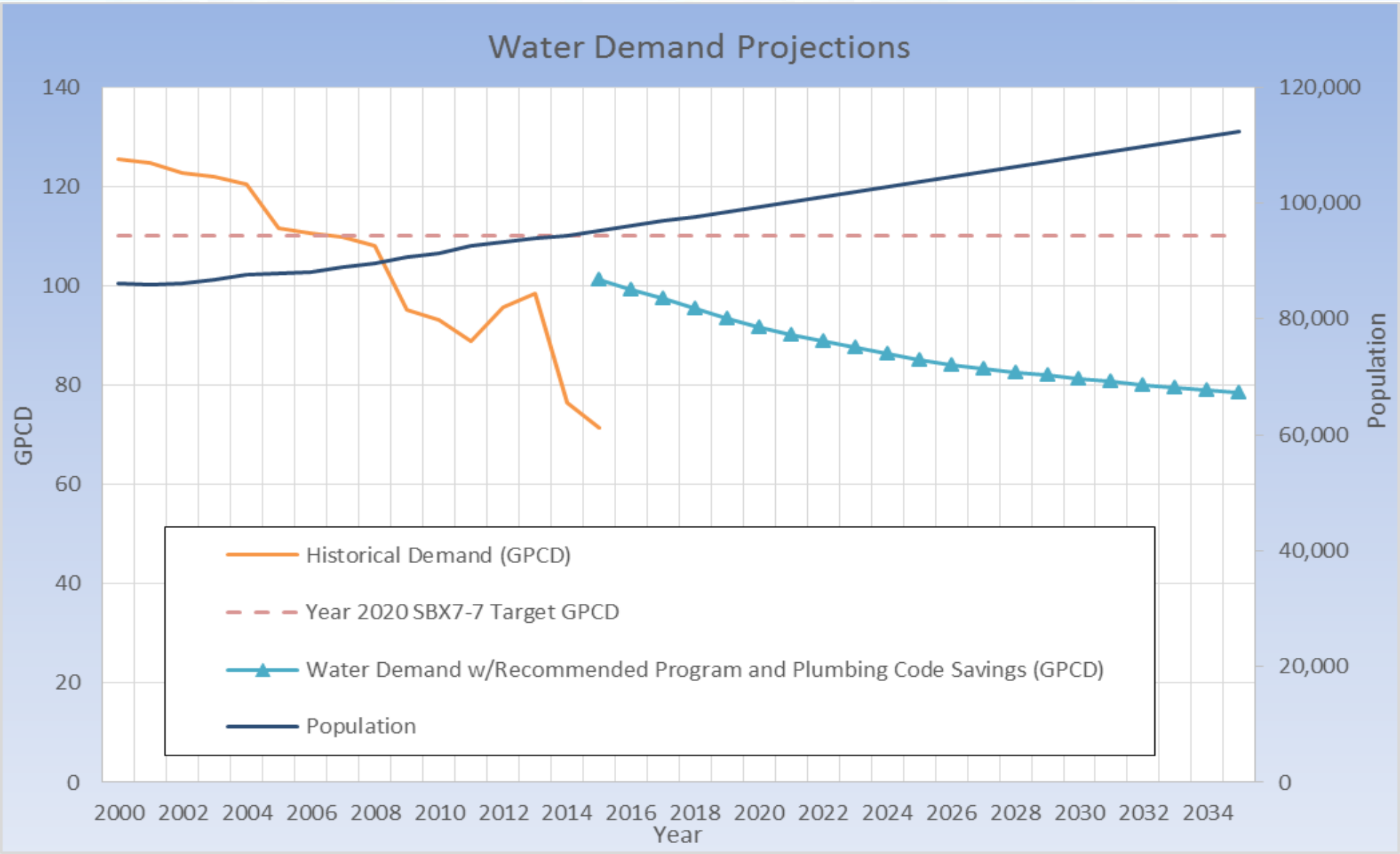
Ongoing Work

- Pre-Rinse Spray Valve Replacement project already completed
- Water Loss Control Program well underway
- Begun work expanding large landscape water budget program
- Turf replacement and clothes washer rebates were increased in July
- Water Rate Study integral to this process

Key Finding: Projected Water Demand



Population and Per Capita Water Use



Summary of Key Findings

- Coastal community in Northern California with 30 years historically and 20 years planned in water conservation investments
- During the extreme drought restrictions achieved 41 Residential (R-gpcd)
- There is anticipated rebound that is currently happening…
- Long range trend is down to ~80 gpcd with approximately half of the water savings from code and standards and half from active conservation measure savings

Questions/Discussion

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