

This presentation premiered at WaterSmart Innovations

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Planning in a Perfect Storm: Poor Economy, Wet Weather and Budget Cuts

Water Smart Innovations Conference
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Bill Maddaus and Michelle Maddaus

Presentation Overview

1. The challenge – reduce water consumption
2. The reality of the last few years – recession!
3. Key ways to adapt planning to the perfect storm:
 - More sophisticated demand forecasting
 - Methods utilities use to adapt to reduced conservation budget
4. Case studies
 - Marin Municipal Water District
 - East Bay Municipal Water District
 - City of Santa Barbara
5. Questions



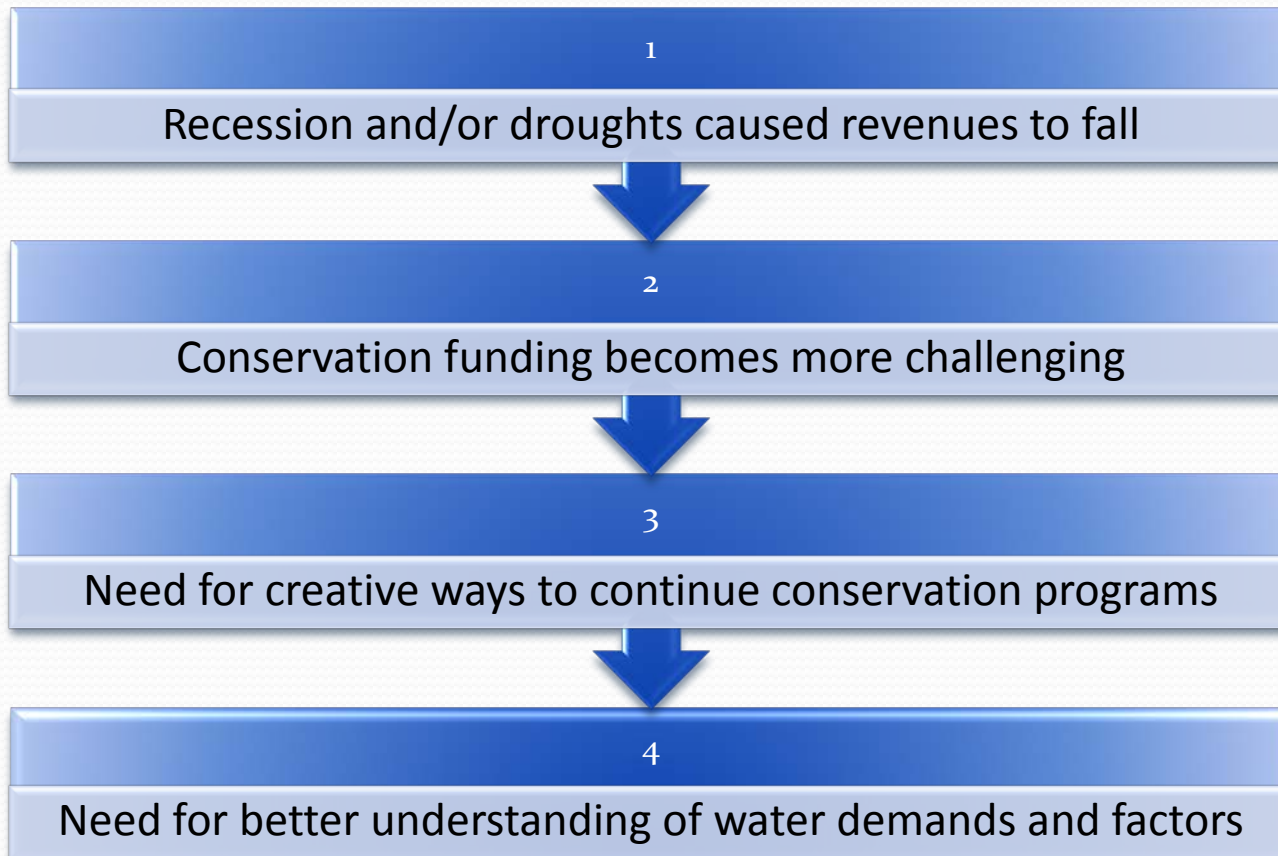
The Water Demand Reduction Challenge

Why are U.S. water utilities in water short areas are under intense pressure to reduce consumption?

- Hydrologic deficit
- Rulings by judges
- Water use reduction targets set by politicians
- Other reasons including economics, long term changes in weather (climate) and environmental goals

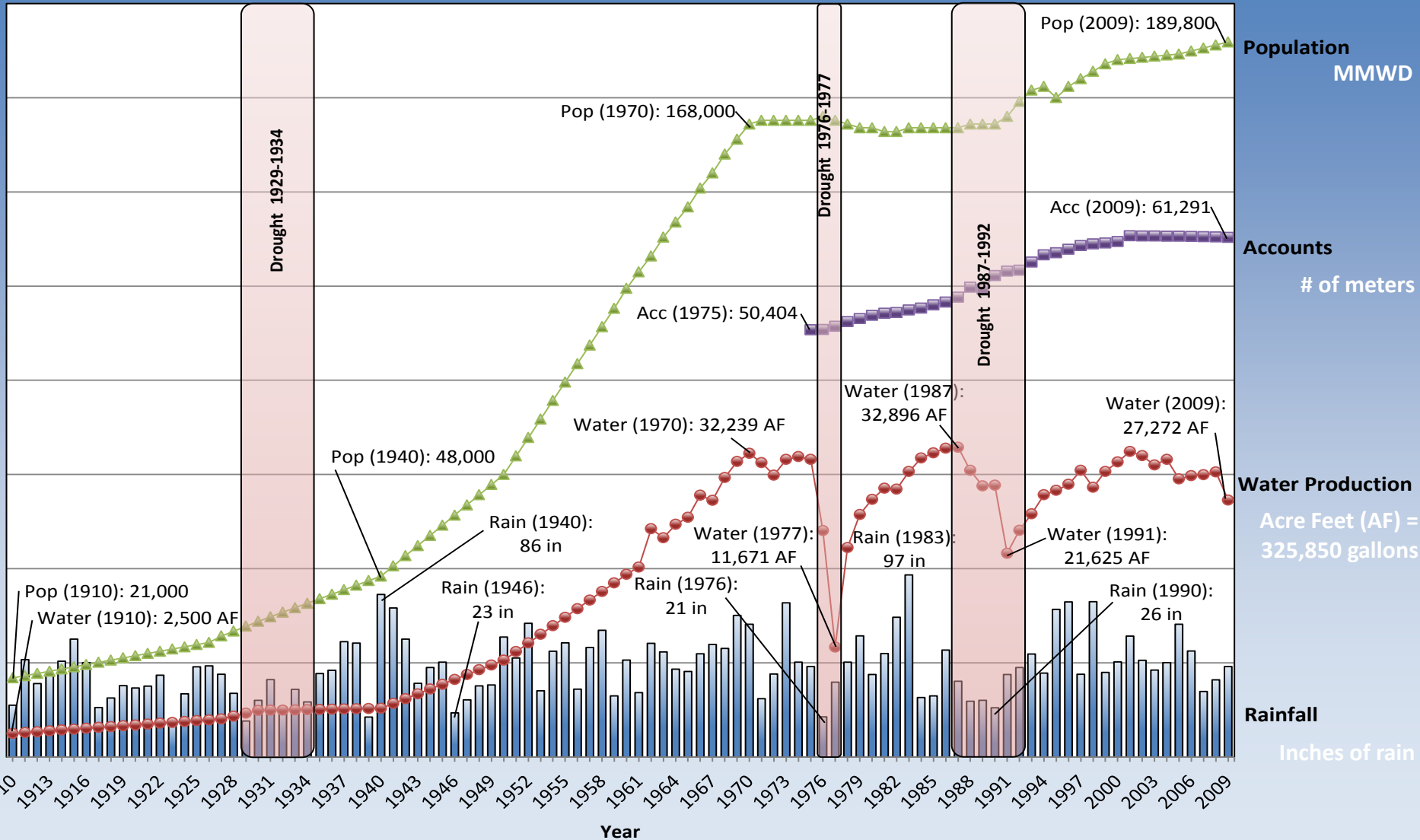


The Reality of the Last Few Years



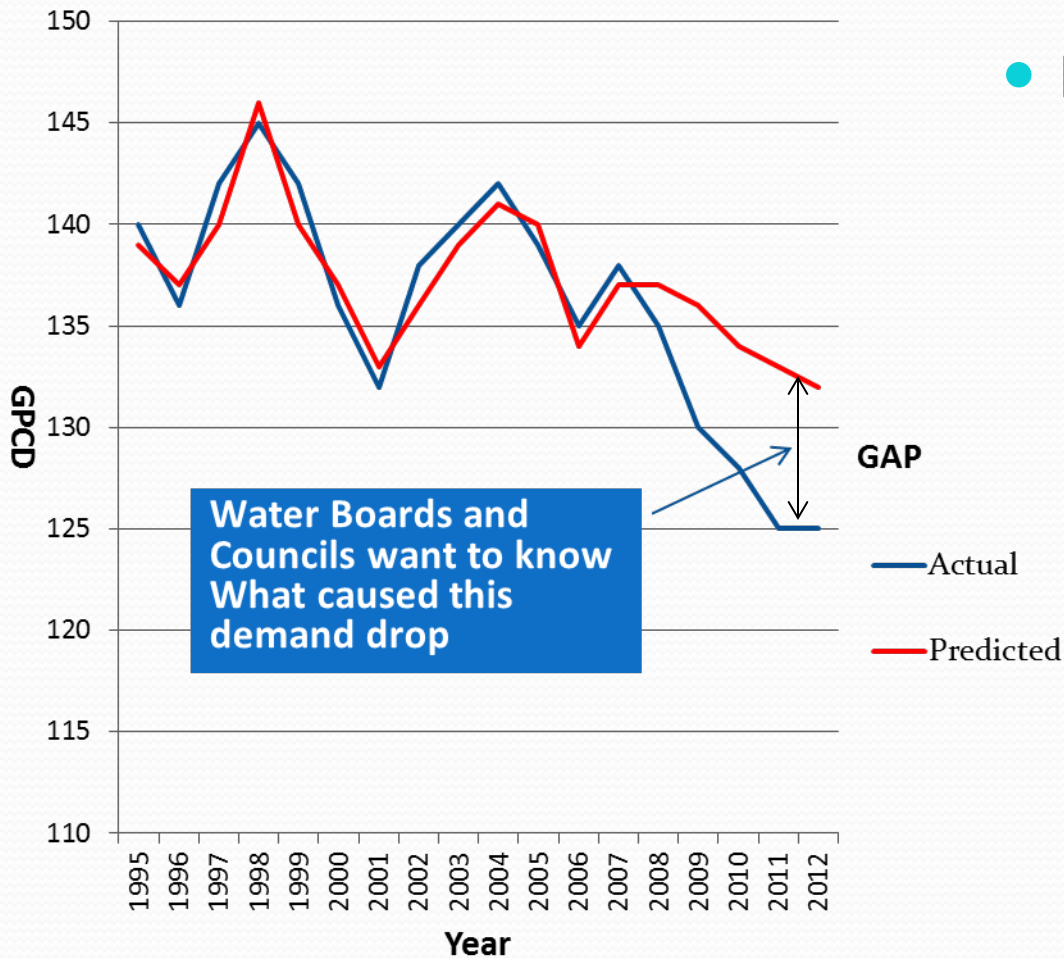
A look at 100 years of data...

Population, Accounts, Water Production and Rainfall
1910-2009
Marin Municipal Water District



Demand Forecasting-The Issue

Model Prediction vs. Actual Water Use



- Demand Forecasting:
 - Originally many forecasts were based on population or employment
 - This worked well in the past, but no longer tracking water use
 - Need for more detailed methods that include larger number of water demand variables



Demand Variables to Consider

- Understand the Long-Term Trends
 - Demands are leveling off
- Planned Conservation Efforts Increasing
- Weather Effects
 - Weather normalize historical data
- Climate Change
 - Change in water supply, change in irrigation season, change in frequency of extreme events, etc.
- Economic Impacts (Recession)
 - Unemployment correlated with water use

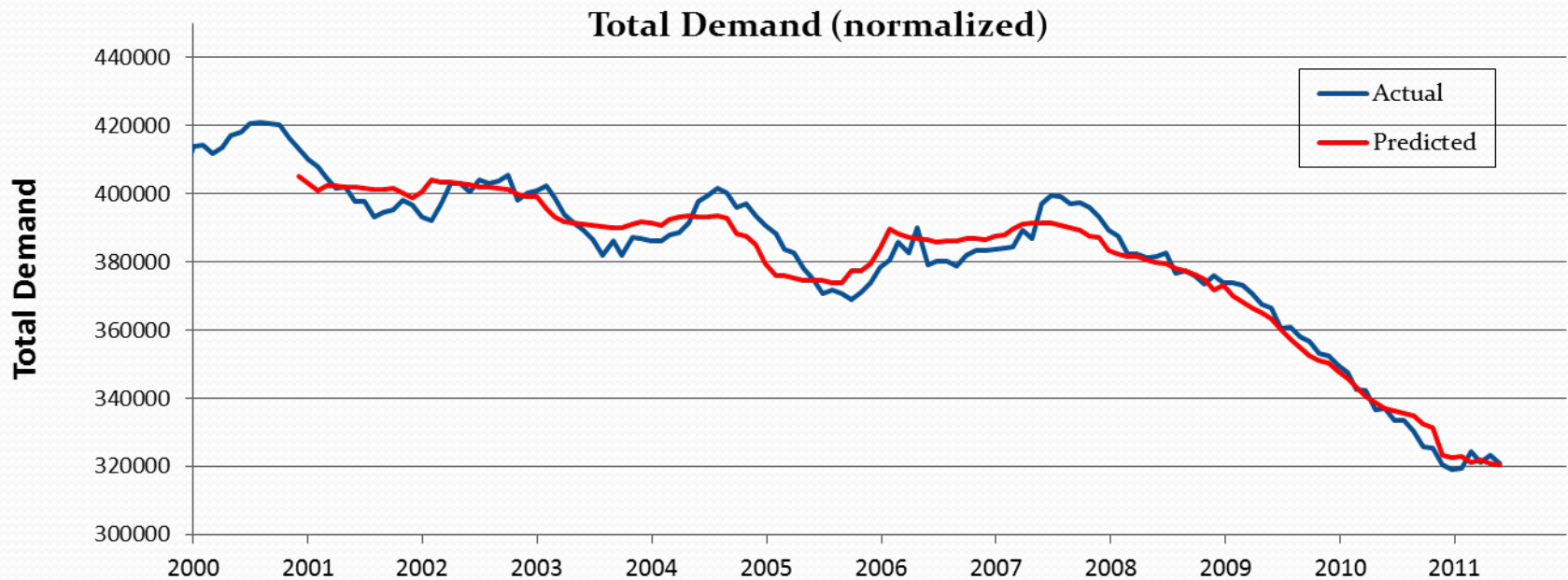


Closer Look at Variables to Consider

Variable Type	Variables	Units	Data Source
Weather	Precipitation	Inches per year	Weather data
Weather	Avg Daily Max Air Temp	Fahrenheit	Weather data
Weather	Avg Air Temp	Fahrenheit	Weather data
Weather	Min Air Temp	Fahrenheit	Weather data
Weather	Eto	Inches	Weather data
Economy	Employment	People	CA EDD / US Bureau
Economy	Unemployment	Unemployment %	CA EDD / US Bureau
Service Area Demographics	SF Units	Dwelling units	2010 Census
Service Area Demographics	MF Units	Dwelling units	2010 Census
Service Area Data	Rates	\$/CCF	Provided by Agencies
Service Area Data	Population	People	Various sources
Service Area Data	# Customers	Accounts	Agency billing data
Conservation	Conservation	Conservation activity	Historical conservation data



Analyzing Historical Demand w/ Recession



- $R^2 = 0.95$
- 13 Factors analyzed, 4 were statistically significant:
 - Weather – **Precipitation, Eto**, Air Temp
 - Economy – **Unemployment**, Employment, Household income
 - Service Area Data – SF / MF Housing Units, **Rates**, Population, # Accounts



DSS Model - Demand Forecasting



DSS Model created in 1999

Endorsed by the California Urban Water Conservation Council

End Use Model with Billing Data

Using Factors to Forecast Demand Scenarios

MADDAUS WATER MANAGEMENT

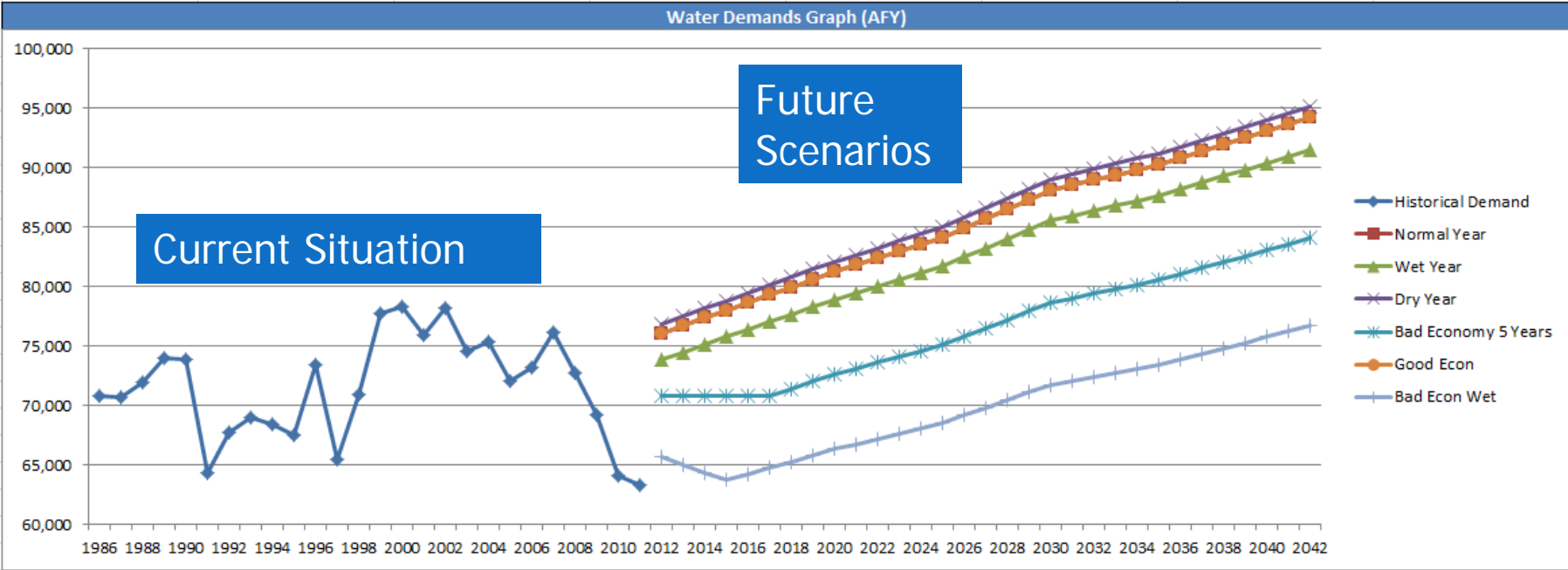
8. Water Demand Scenarios

Review Demand Scenarios

Agency X

Previous Step | Edit Scenarios | Normal Year | Wet Year | Dry Year | **Bad Economy 5** | Good Econ | Bad Econ Wet | Review Graphs | Next Step

! Review all of the demand scenarios.



- Normal Year
- Good or Bad Economy
- Wet or Dry Year
- Bad Economy, Wet Year



Innovative Conservation Measures Need to be Evaluated

- Automatic meter infrastructure systems (AMI)
- Green building codes and standards
- New development ordinances
- Landscape and irrigation management using advanced technology
- Use of recycled water to replace potable uses
- Innovative programs to influence customers behaviors and attitudes towards water efficiency
- Water loss reduction
- High efficiency fixtures
- Water pricing
- Rain collection systems



DSS Model - Conservation



Case Study #1: Marin Municipal Water District



Marin County, California



Local storage in
surface
reservoirs

Service area
population:
190,000

Average water
demand in 2010
was ~23 MGD



Marin Municipal Water District, California

Innovative Conservation Measures

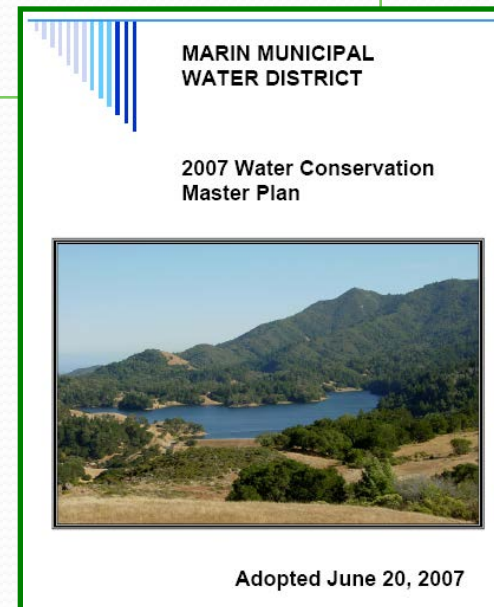
Water Loss Reduction Landscape Programs

Planned Conservation Program Total Budget

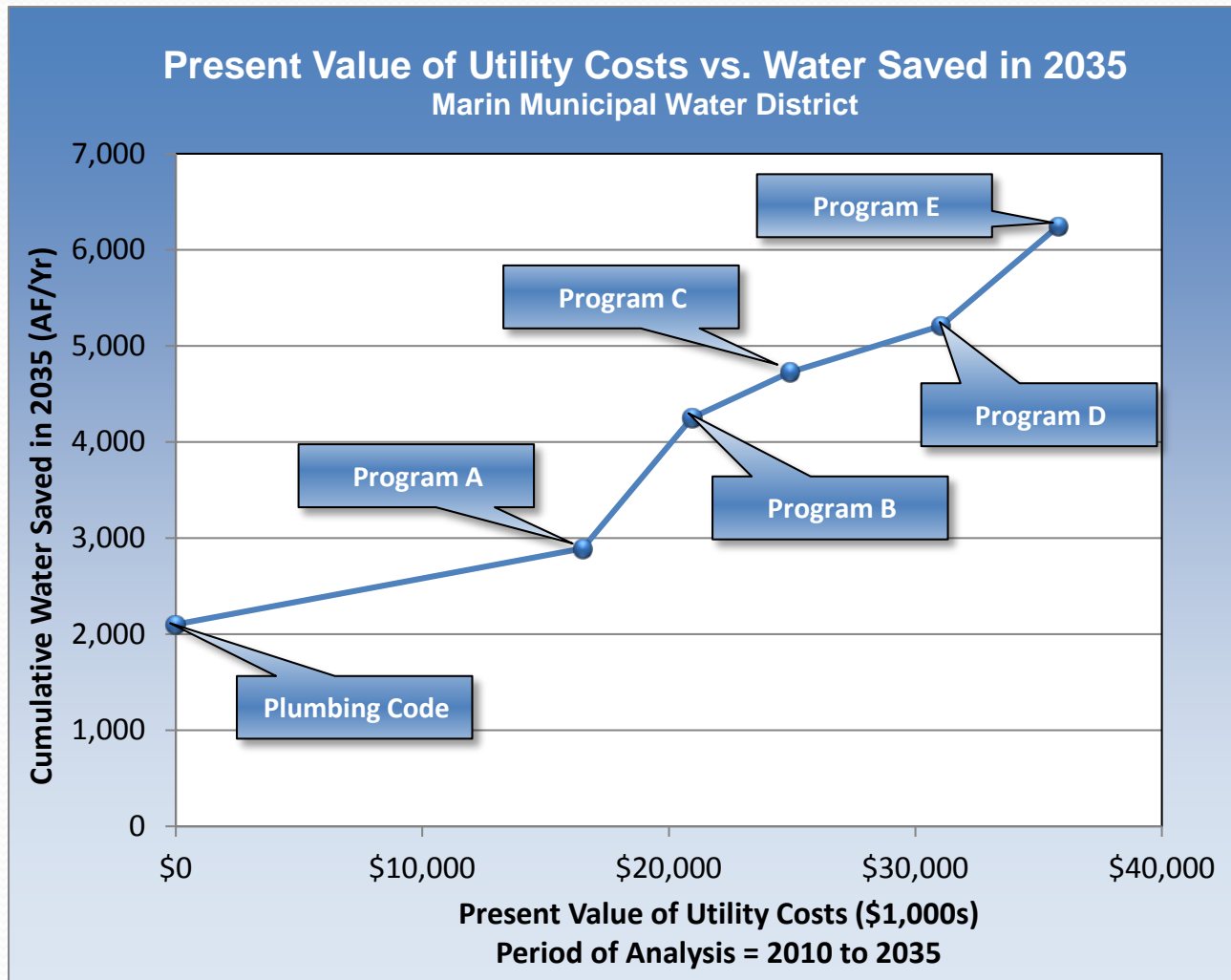
**\$31M
30 year Present Value Cost for 30 conservation measures**

Projected Program Savings with Plumbing Code

**~16% by 2035
4.6 MGD**

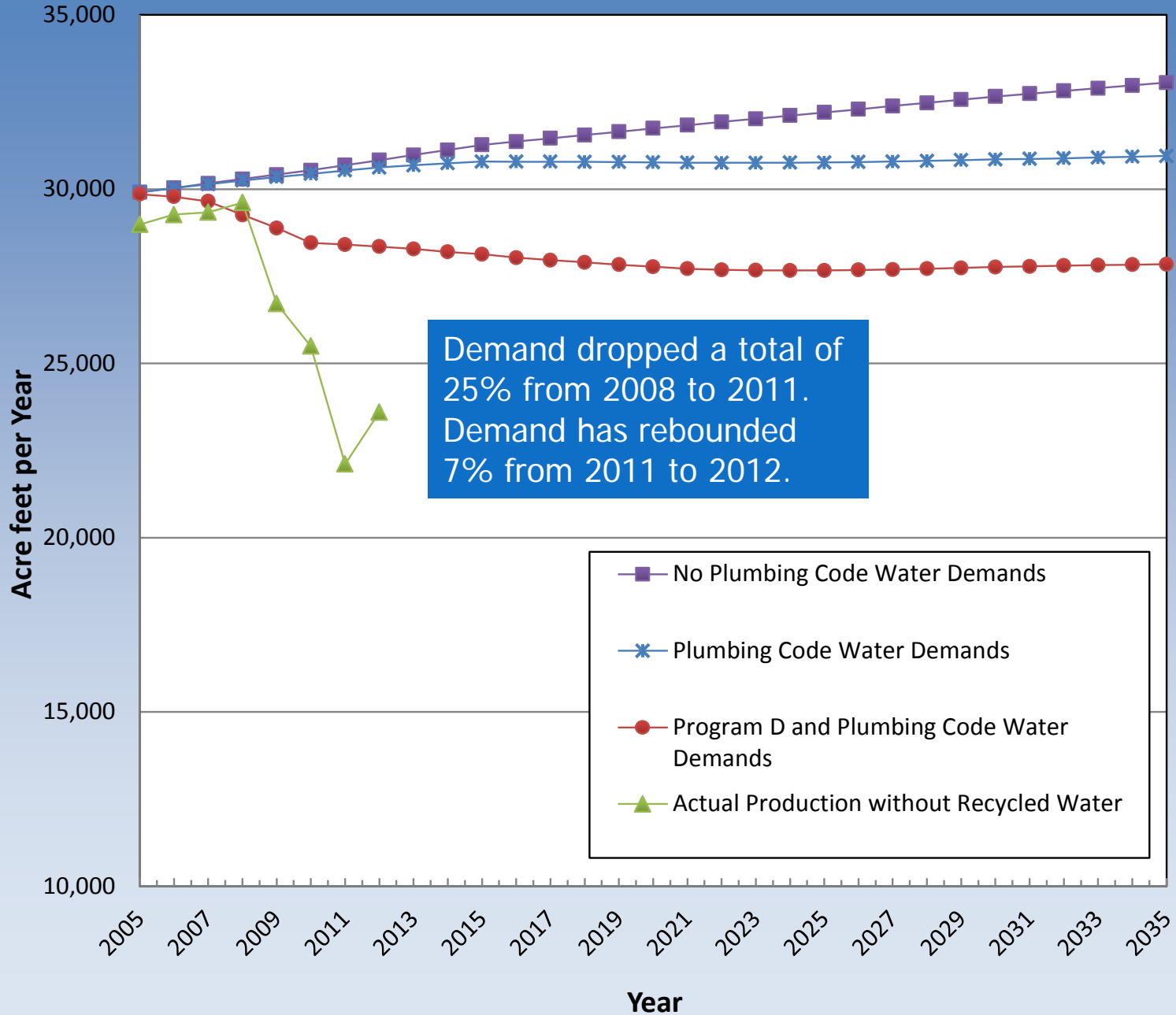


Evaluating Cost Effectiveness of Alternative Conservation Programs



Water Demands with Conservation Savings

Marin Municipal Water District



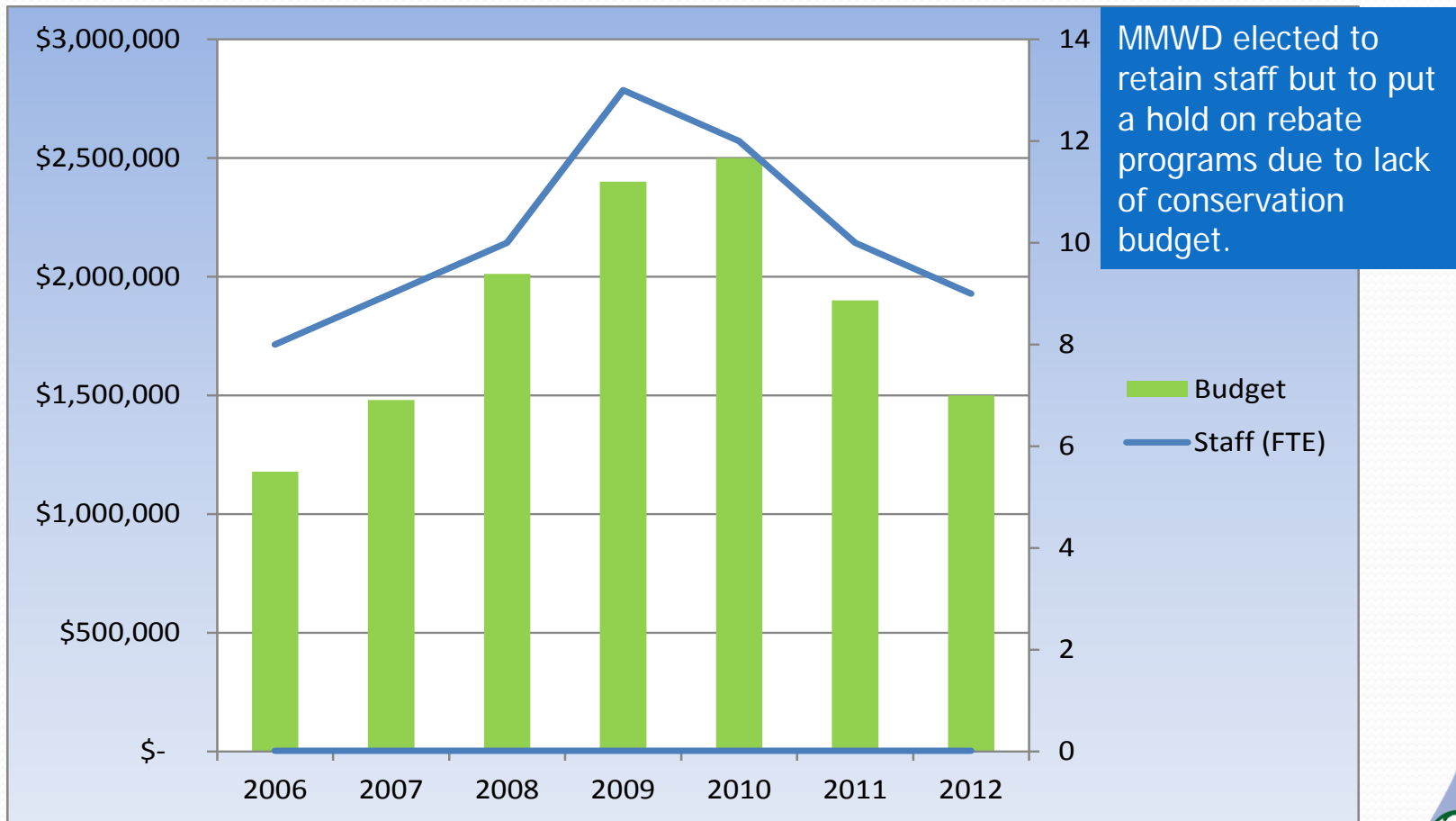
w/o Plumbing Code

w/ Plumbing Code

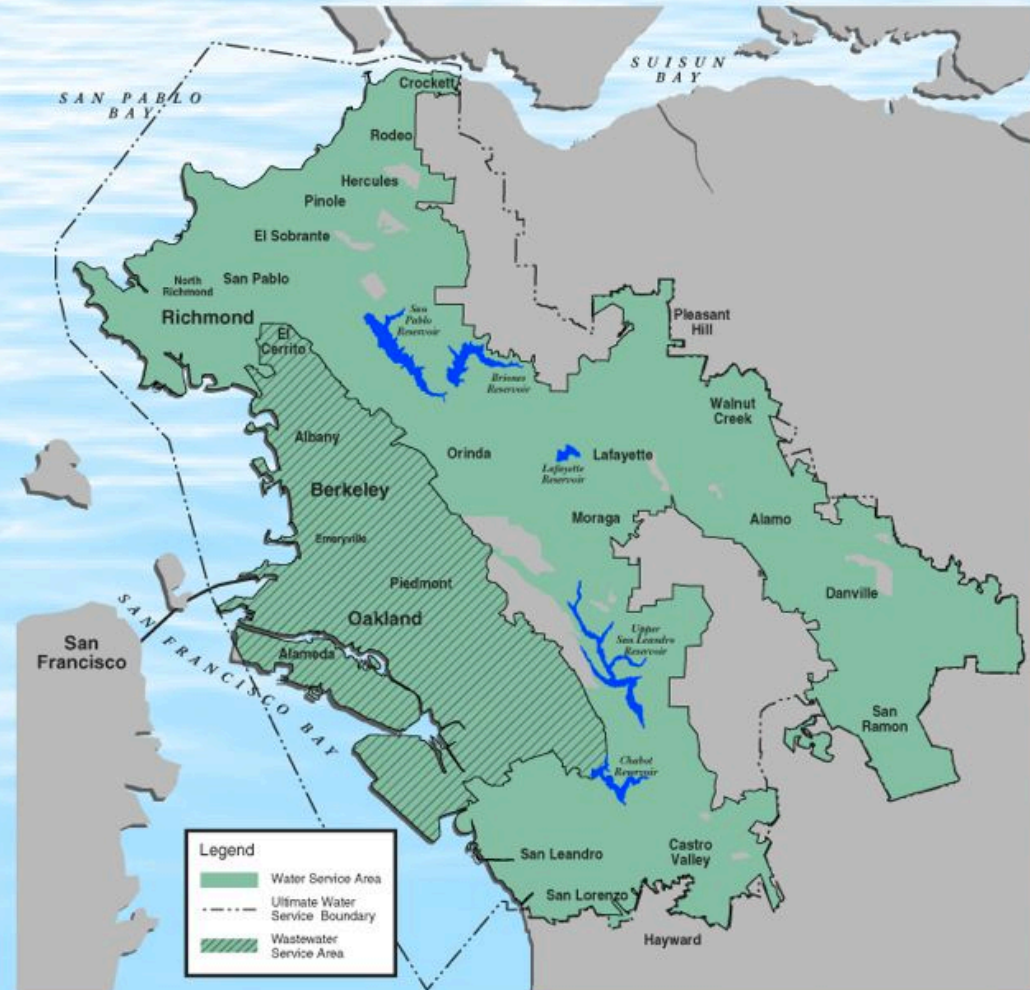
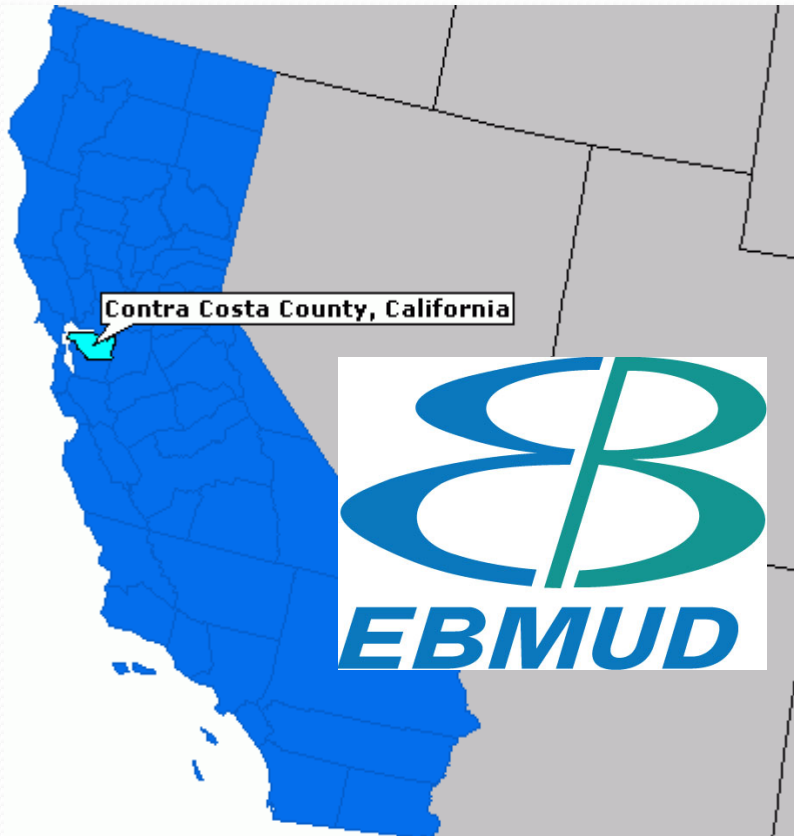
MMWD Adopted Conservation Program D



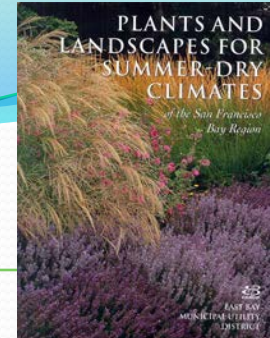
What Happened in Last few Years Since Conservation Plan Adopted



Case Study #2: East Bay Municipal Water District



Service area population:
~1,300,000



Case Study #2: East Bay MUD

<p>Innovative Conservation Measures</p>	<p>New Home Ordinance AMI for Water Loss Reduction</p>
<p>Planned Conservation Program Total Budget</p>	<p>\$271M 30 year Present Value Cost for 43 measures</p>
<p>Projected Program Savings including Plumbing Code</p>	<p>~14% by the year 2040 37 MGD by 2040</p>

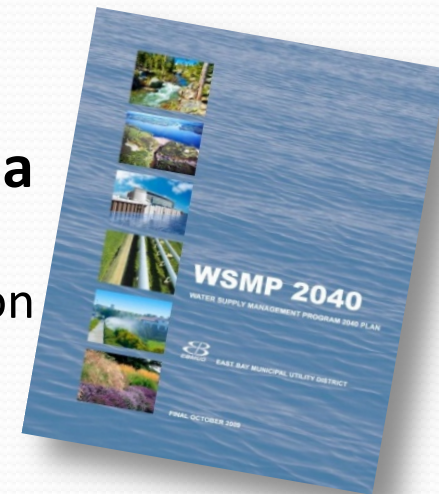
AMI meter pilot tests and on line access to data and home water reports

Email Home Water Report (eHWR)

Example of a Truly Integrated Water Resource Plan

Water Supply Management Program 2040, East Bay Municipal Utility District (EBMUD), California

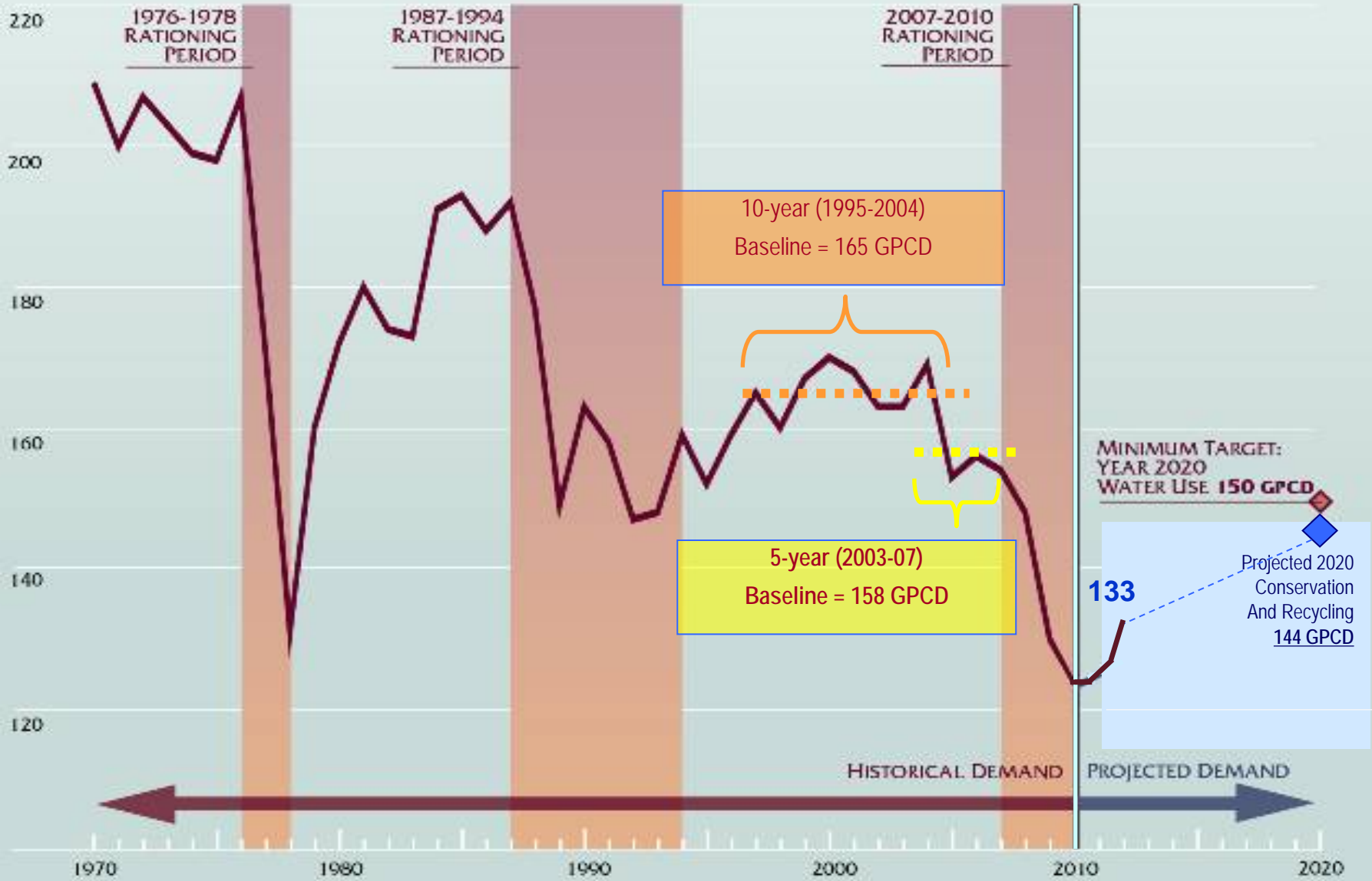
- Conservation was a key element of plan
 - Board adopted a plan with high level of conservation
- Wastewater reuse also a component
- Other elements included in plan:
 - Participation in a regional Desal project
 - Tapping supply from another river, jointly with another agency
 - Raising the dam on main supply
 - Developing local ground water supplies
- Plan developed with help of the “Citizens Liaison Committee”



<http://www.ebmud.com/our-water/water-supply/long-term-planning/water-supply-management-program-2040>



AVERAGE DAILY WATER DEMAND IN GALLONS PER CAPITA PER DAY (GPCD)



Source: EBMUD 2013

Water Conservation Master Plan (2011-2020)



Water Management

Web services
Calculators
How to videos
Water surveys
Water budgets
Leak notification



Education & Outreach

Public education
Marketing
Community events
Conservation workshops
Training & certifications



Conservation Incentives

Plumbing Fixtures
Appliances
Landscaping
Irrigation Systems
Process Equipment
Customized



Regulation & Legislation

Water-Efficiency Requirements
Individual & Landscape Metering
CalGreen
Model Landscape Ordinance



Supply Side Conservation

Leak Detection
Pipeline Replacement
Water Facility Audits
Pressure anagement
Distribution Monitoring



Research & Development

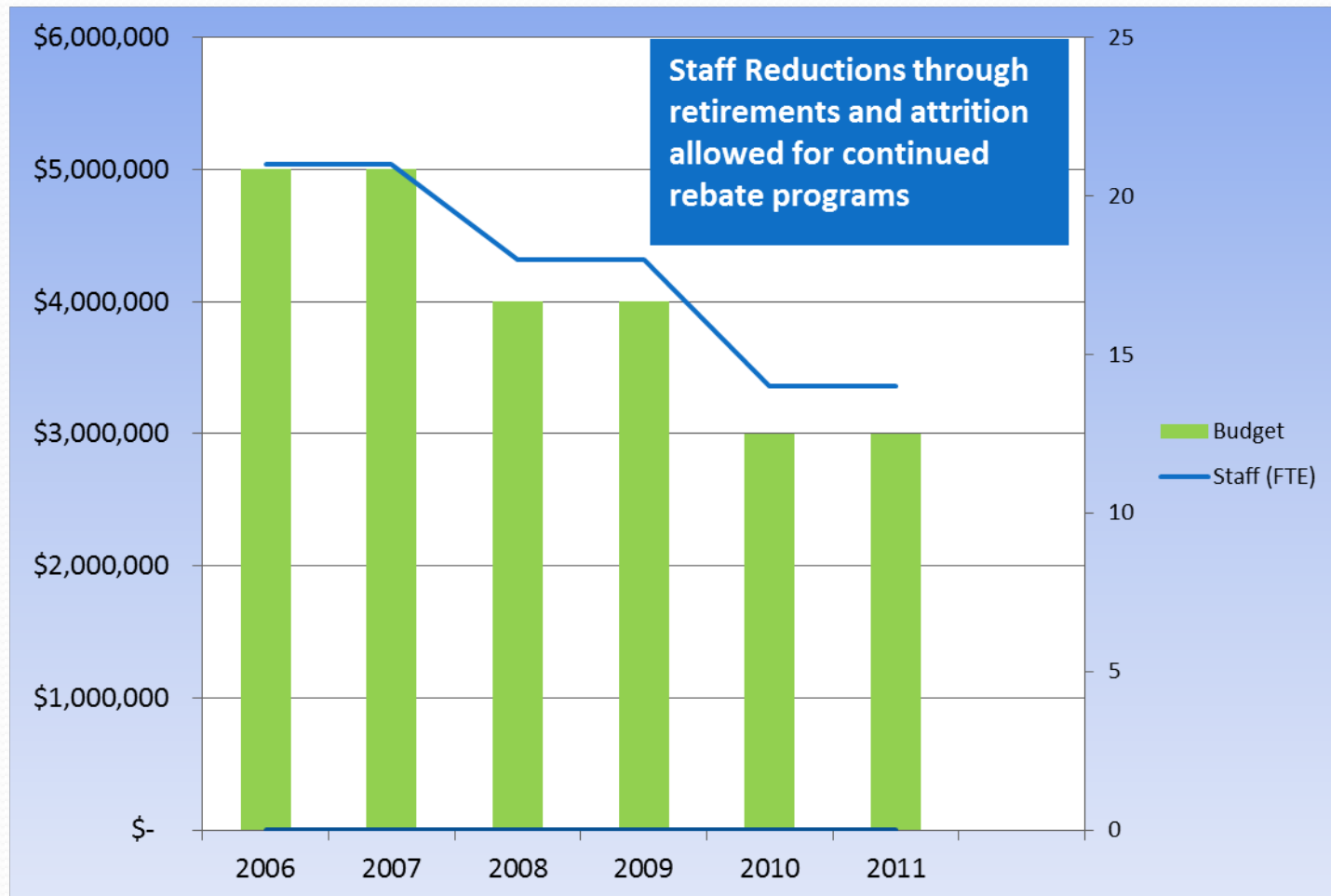
Water-Use Information
Meter Technology
Product testing and labeling (i.e. WaterSense, Energy Star)
Plan check review

- Reviewed programs due to reduced conservation budget.
- Looked at market maturity and conservation technology transformation.
- Kept rebates at a lower value to reflect economic conditions.

Provided by personal communication, Charles Bohlig at EBMUD, September 2013



What Happened in Last few Years Since Original Conservation Plan Adopted



Case Study #3:

City of Santa Barbara, California

- **94,000 service area population in 2010**
- **12 MGD in 2010**
- **12.5 MGD in 2035**
w/o Conservation
2% increase in 25 years

- **Avoided Cost of Imported State Project Water \$1,800/MG**



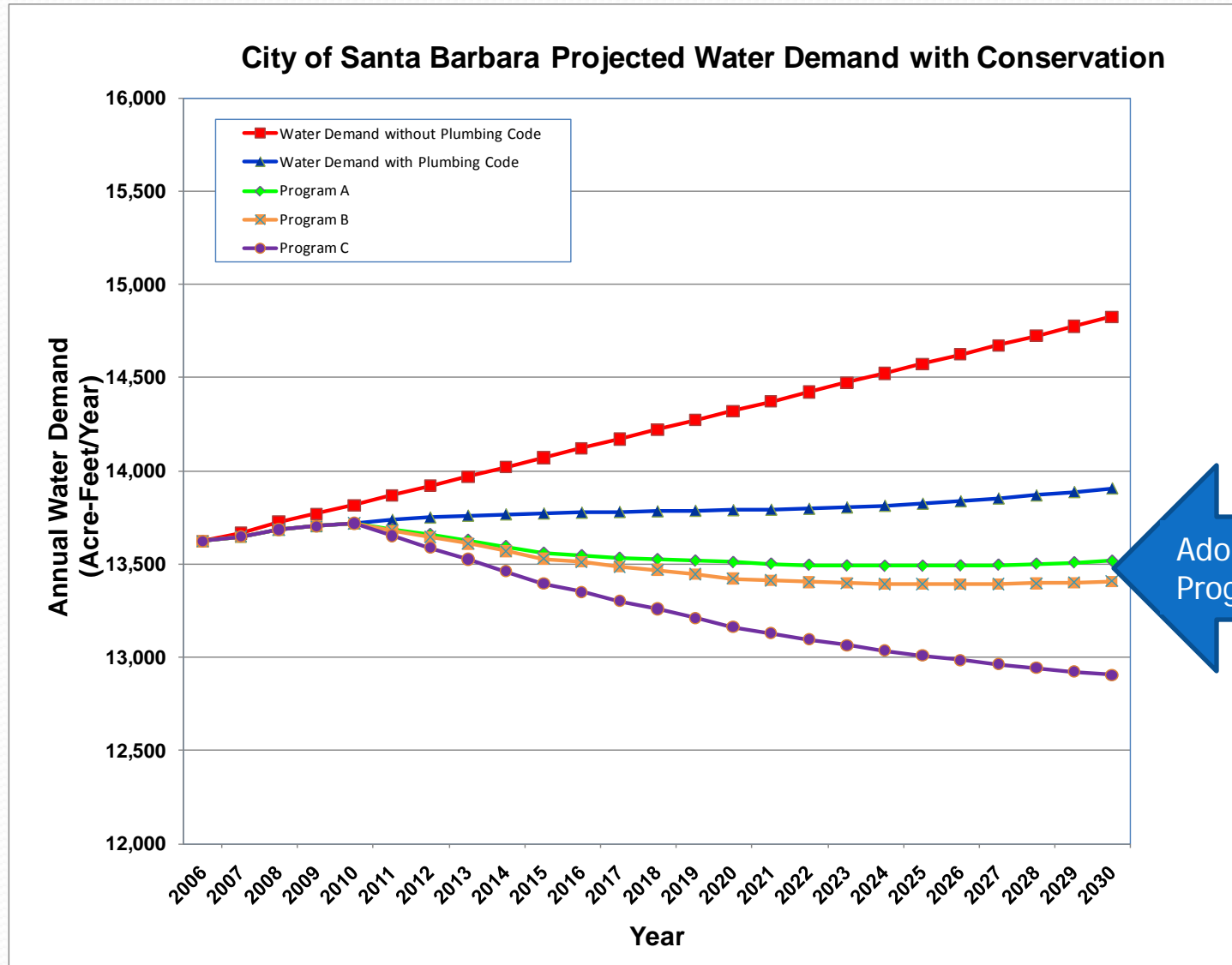
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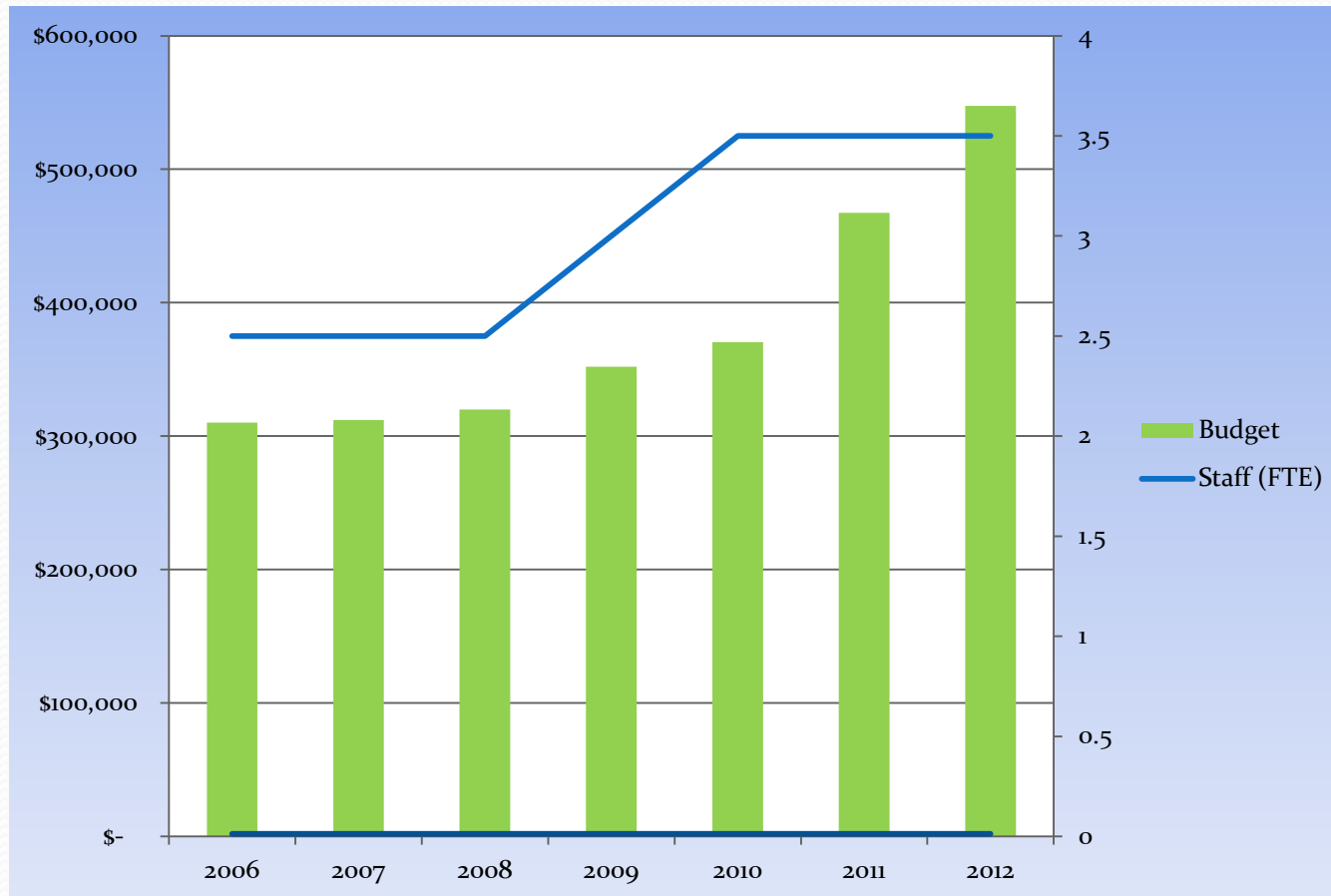
Innovative Conservation Measures	Promote Green Buildings Landscape Irrigation Upgrades Incentive High Efficiency Fixtures
Planned Conservation Program Total Budget	\$3.1M 30 year Present Value Cost for 17 measures
Projected Program Savings including Plumbing Code	~10% by the year 2030 1.3 MGD by 2030



Water Demand Reductions Over Time



What Happened in Last few Years Since Original Conservation Plan Adopted



- Budget and staff increased during recession due to a solid rate structure.
Personal communication with Alison Jordan, City of Santa Barbara, September 2013



Summary and Conclusions

1. New sophisticated methods needed to deal with fluctuations in water demand and establishing variables for forecasts, particularly the rebound from downturns in demands.
2. Planning and implementing programs in a declining water use and revenue environment is challenging.
3. With a good solid, well justified, and sometimes mandated, conservation plan & program it is easier to hold on to budget and staff.



Contact Information

Bill Maddaus, P.E.

Maddaus Water Management

925-820-1784

Bill@Maddauswater.com

Michelle Maddaus, P.E.

Maddaus Water Management

925-831-0194

Michelle@Maddauswater.com

www.Maddauswater.com



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