

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Bay Area Water Supply and Conservation Agency



Where Do We Go From Here As A Region? Case Study on Quantifying the Econometric Recovery and Future Conservation Strategy

October 10, 2014



MADDAUS WATER MANAGEMENT INC.

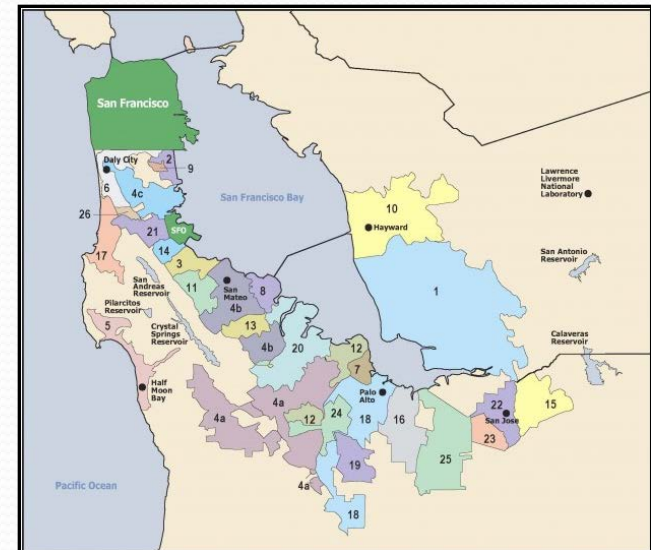


WESTERN
POLICY
RESEARCH

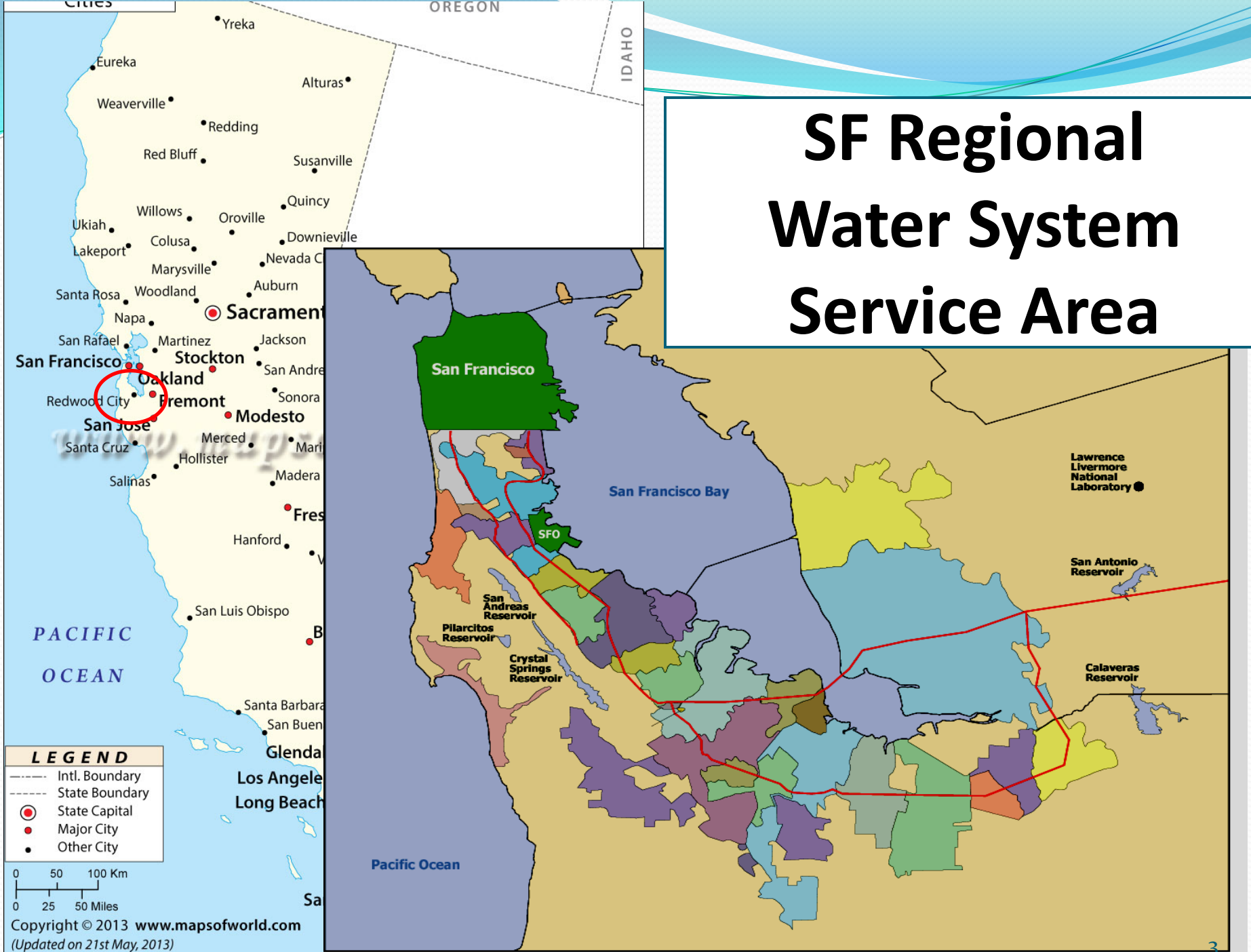
BAWSCA
Bay Area Water Supply & Conservation Agency

Presentation Topics

1. How we got here – who BAWSCA is and why is understanding our demands critical for our planning?
2. How was this different than traditional methods?
 - Econometric modeling provided advantages and new answers
3. What did we find?
4. What did we learn?
5. What are we doing next?

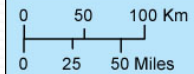


SF Regional Water System Service Area



LEGEND

- Intl. Boundary
- State Boundary
- State Capital
- Major City
- Other City



Copyright © 2013 www.mapsofworld.com
(Updated on 21st May, 2013)

What is BAWSCA?

Bay Area Water Supply & Conservation Agency

- 26 cities, water districts and water companies in San Mateo, Santa Clara, and Alameda Counties
- 1.7 million residents, over 30,000 businesses
- Significant diversity among member agencies in size, demographics, and water use profiles (single-family, multi-family, non-residential)
- All rely on the San Francisco Regional Water System



Conservation Program Is Key Element of BAWSCA's Mission

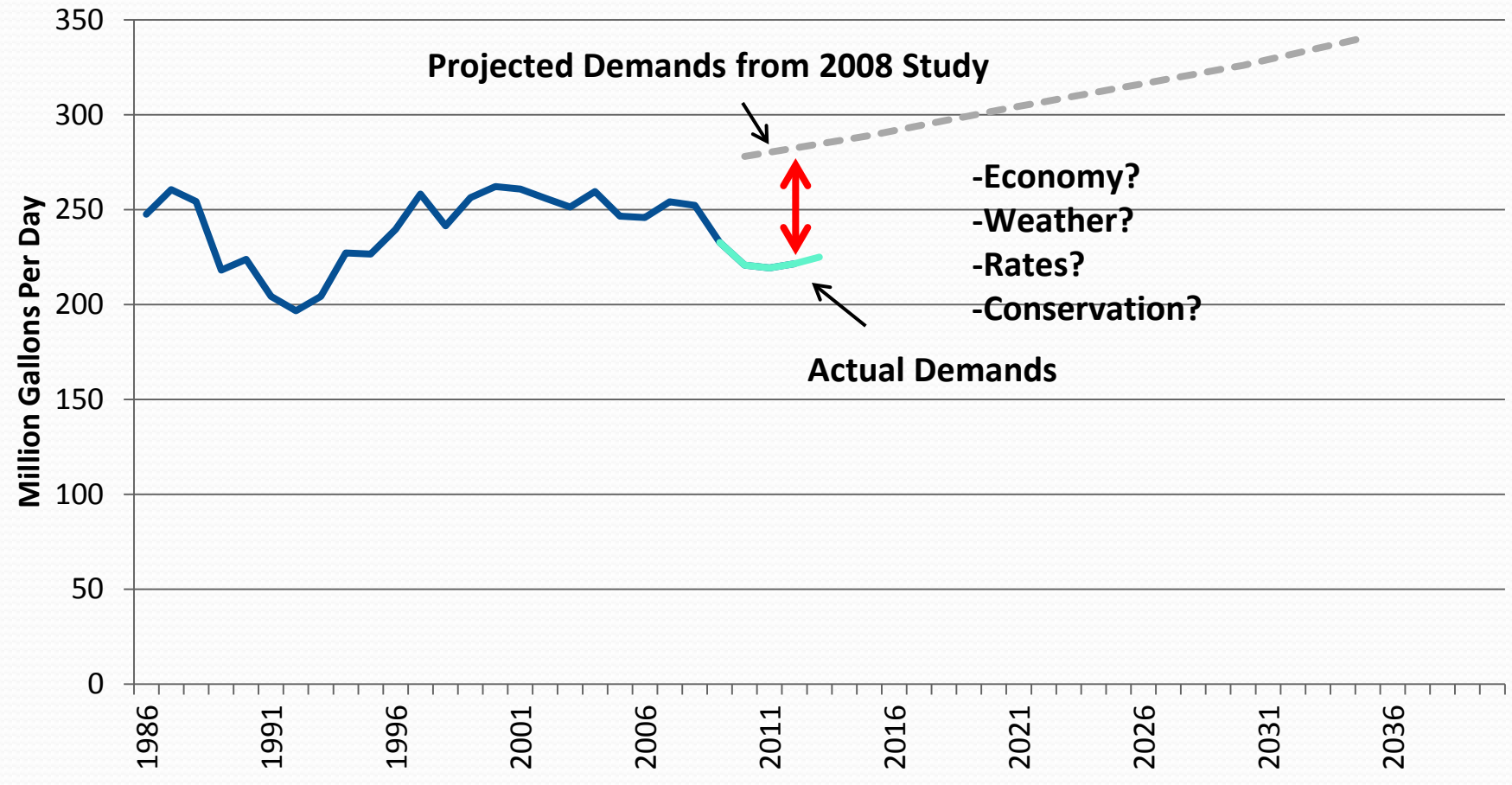
- BAWSCA manages a variety of conservation programs regionally and on a subscription basis for its member agencies
- Current programs include:
 - Four rebate programs
 - Toilets, washing machines, turf removal, and rain barrels
 - Four public outreach program
 - Three school programs
 - Large landscape audit program
 - Home water use reports program
 - Water conservation database



Why Understanding Our Demands Is Critical for Planning

- Demand projections are a critical component for BAWSCA's Long Term Reliable Water Supply Strategy
 - Goal is identify projects and programs to increase the water supply reliability
- During Strategy development, BAWSCA identified a need to update the water demand and conservation projections for BAWSCA member agencies
 - Actual demands since 2010 had been significantly different than Urban Water Management Plan projections for many agencies
 - Individual agency projections relied on different approaches and were not easily combined
 - Lack of understanding/quantification of the significant decrease in demands in recent years (so many variables could be responsible)

Demands Were Trending Much Lower than Previous Projections

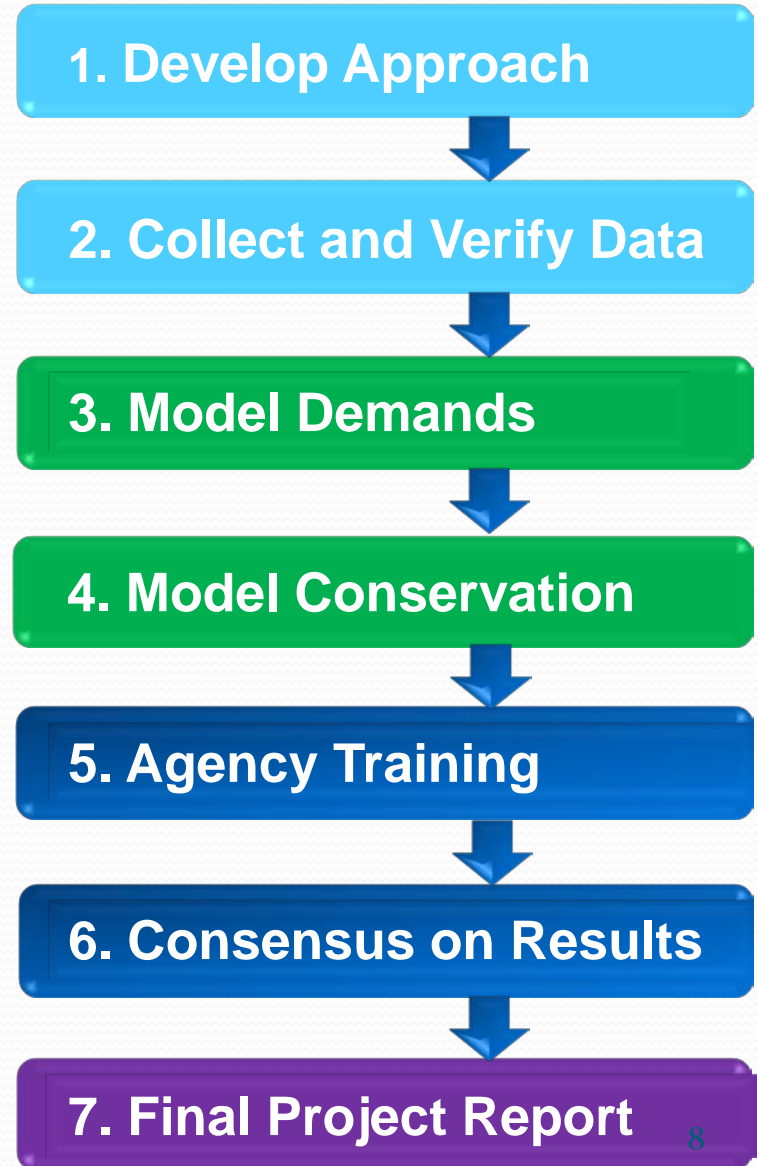


— Historical Demand (MGD) — Demand Since 2008 Study
- - - 2008 Study Projected Demands with Plumbing Code

Project Approach

Two Main Goals

1. Identify and quantify factors impacting water demands for BAWSCA member agencies, and
2. Incorporate the findings into developing water demand projections and conservation savings targets for each agency

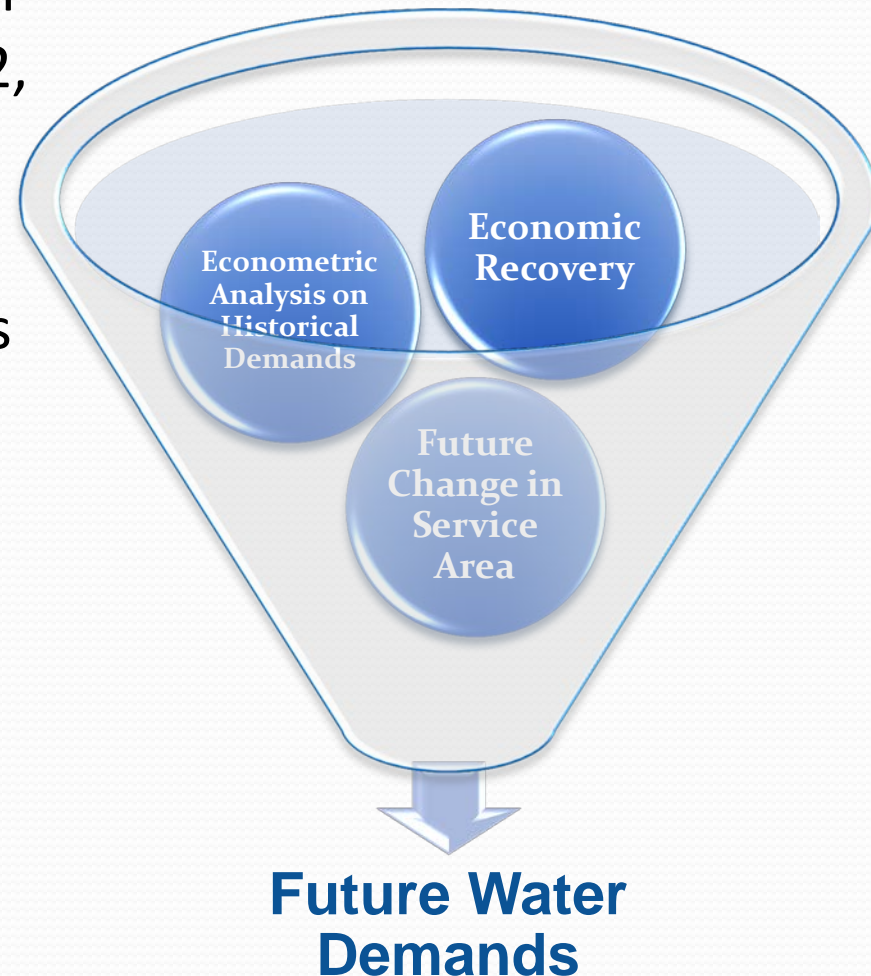


Econometric Modeling Used to Identify Factors Impacting Demands

- Econometric modeling is a statistical approach used to determine the impact on water demands of factors such as:
 - Economic conditions
 - Weather
 - Rates
 - Conservation
- Analysis of historical data provides helpful information for answering questions such as:
 - How much and at what rate will demand rebound as the economy expands?
 - How much will future price increases continue to depress demand?
 - How does demand respond to weather?
- R-square: indicates the explanatory power of a statistical model. High R-square = greater explanatory power

Data Collection and Verification

- Data was collected for all individual BAWSCA agencies from 1995- 2012, including:
 - Water Production
 - Consumption by Customer Class
 - Top 100 non-residential users
 - Pricing/Rates
 - Service Area Unemployment
 - Weather
 - Population / Employment
 - Conservation Data
- Individual model for each agency



Independent Variables Evaluated for the Econometric Analysis

Variable Type	Variables	Units	Data Source	Comment
Weather	Precipitation	Inches per month	NOAA Weather Data	
Weather	Avg Daily Max Air Temp	Fahrenheit	NOAA Weather Data	
Weather	Avg Air Temp	Fahrenheit	NOAA Weather Data	Max temp better
Weather	Min Air Temp	Fahrenheit	NOAA Weather Data	Max temp better
Weather	Reference ETo	Inches	Not available	
Economy	# of Jobs	Jobs per capita	ABAG	Unemployment better
Economy	# of Jobs	Jobs	ABAG	Unemployment better
Economy	Unemployment	Unemployment rate	CA EDD / BLS	
Service Area Demographics	SF Units	Dwelling units	DOF	Insufficient variation
Service Area Demographics	MF Units	Dwelling units	DOF	Insufficient variation
Service Area Data	Rates	\$/HCF	Provided by Agencies	
Service Area Data	Population	People	ABAG or other selected source	
Service Area Data	# Customers	Accounts	Agency billing data	Not favored, collinear with population
Conservation	Conservation	Conservation activity	BAWSCA WCDB	Used to convert actual GPCD to baseline GPCD

Forecasting Methodology – 3 Key Steps

Econometric Analysis:

Determine significant variables
Determine impact of economy

Historical View
1995-2012
(Large amount of data)

Economic Recovery:

Determine % demand increase and over what time period

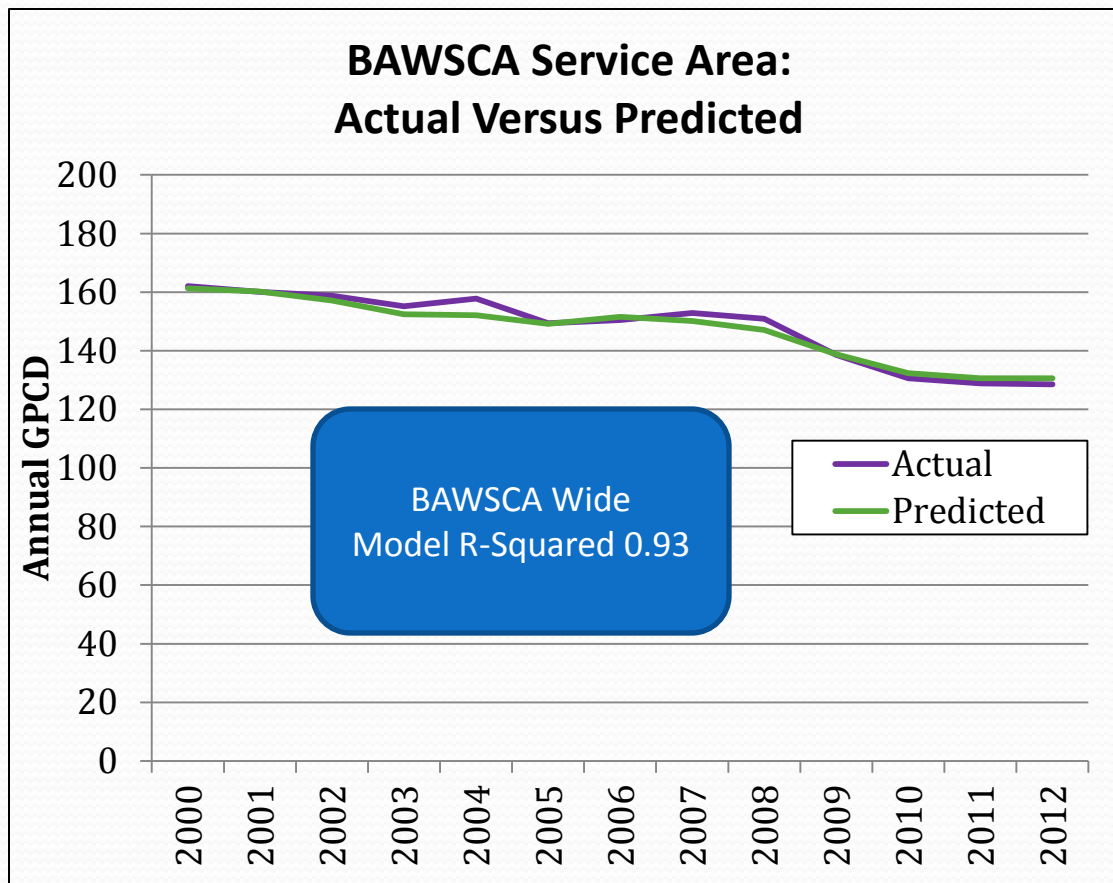
Short Term Future
6-7 years
(Some near term predictive data available)

Service Area Changes:

Add change in population/employment
Development patterns
Conservation efforts

Long Term Future
Out to 2040
(Limited predictive data available)

Econometric Models: BAWSCA Wide Historical Results



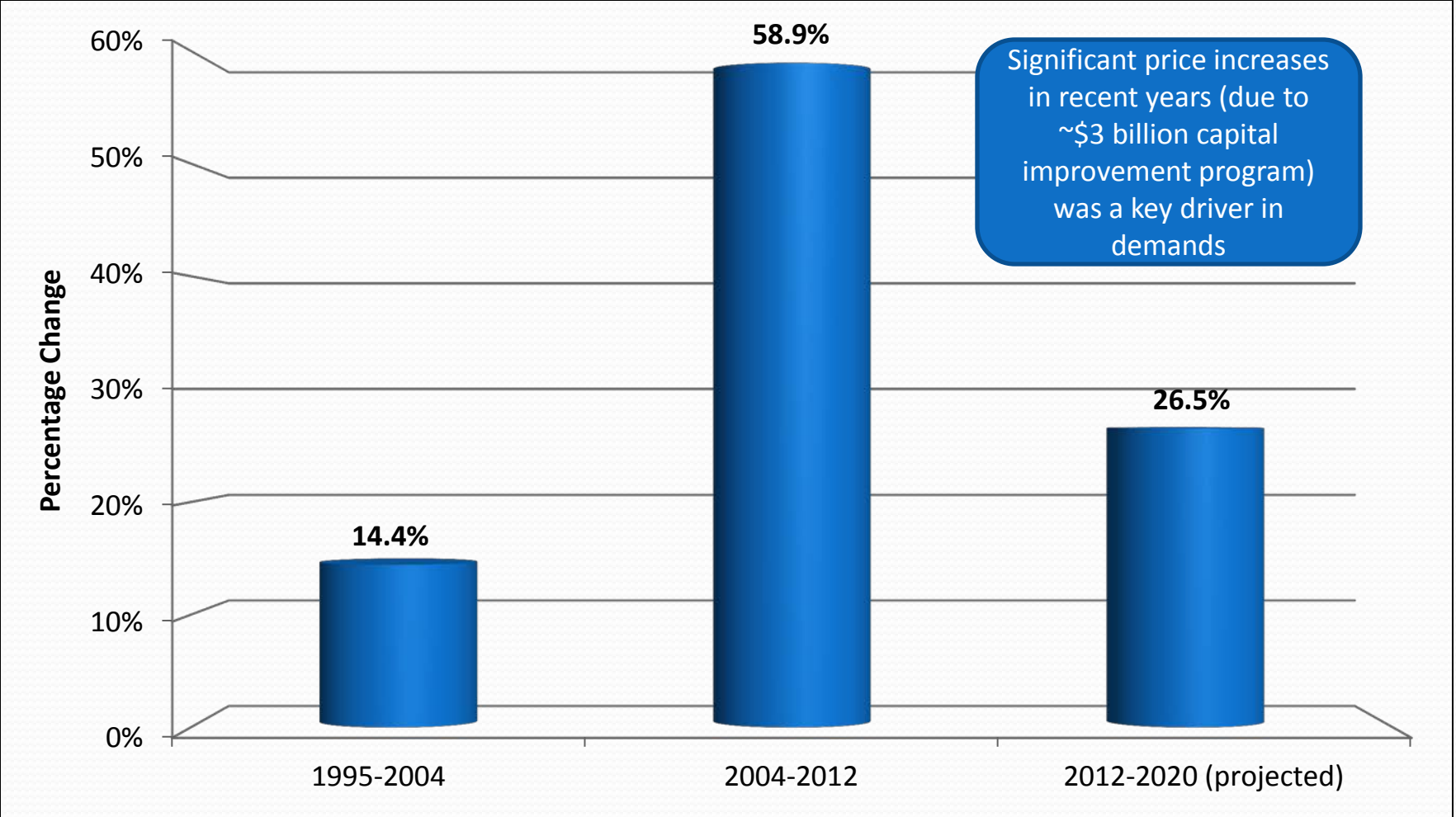
Demand Decrease from 2008-2011 BAWSCA-wide

28% due to weather

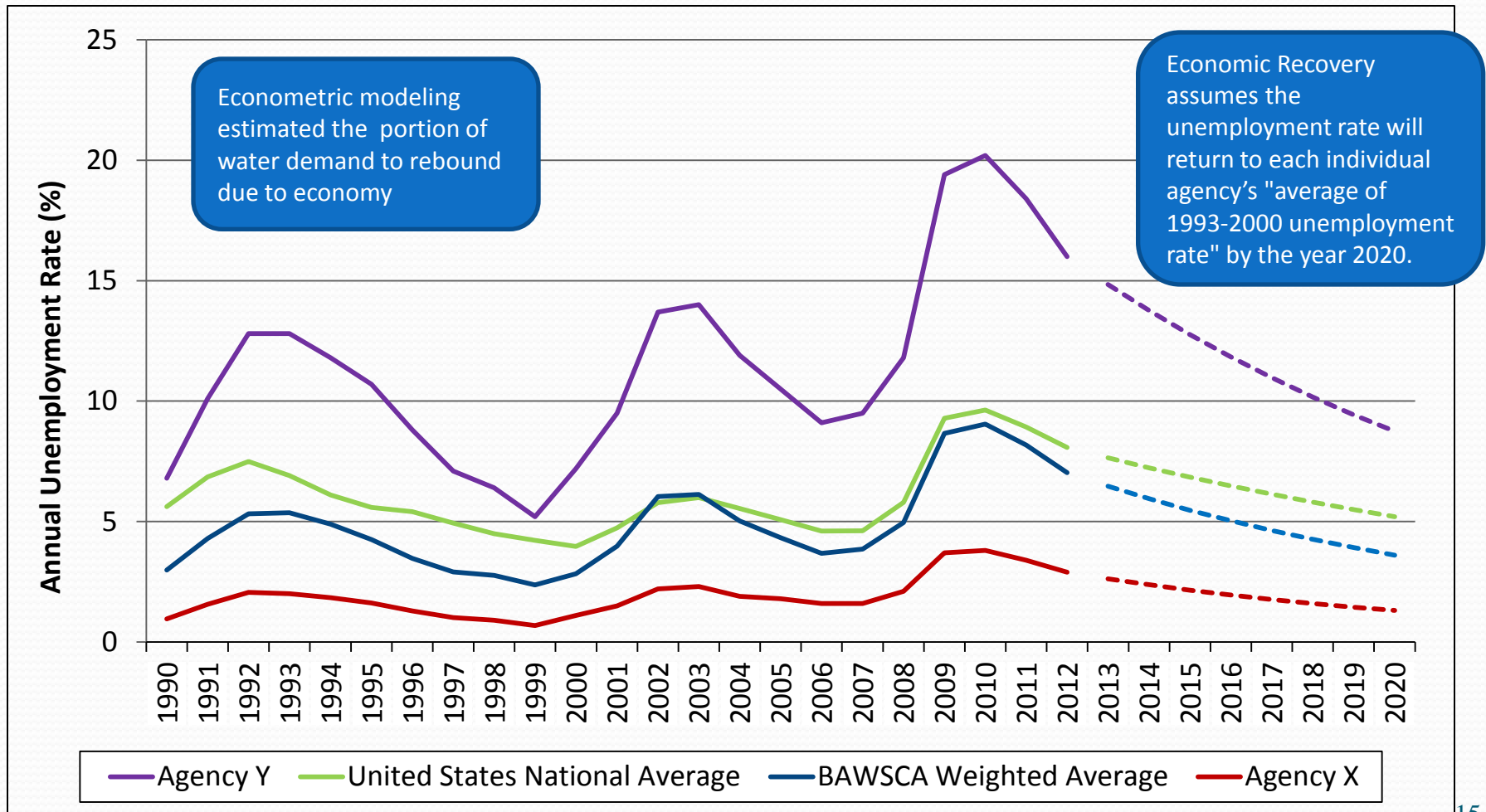
23% due to economy

50% due to rates / passive / active conservation and service area changes

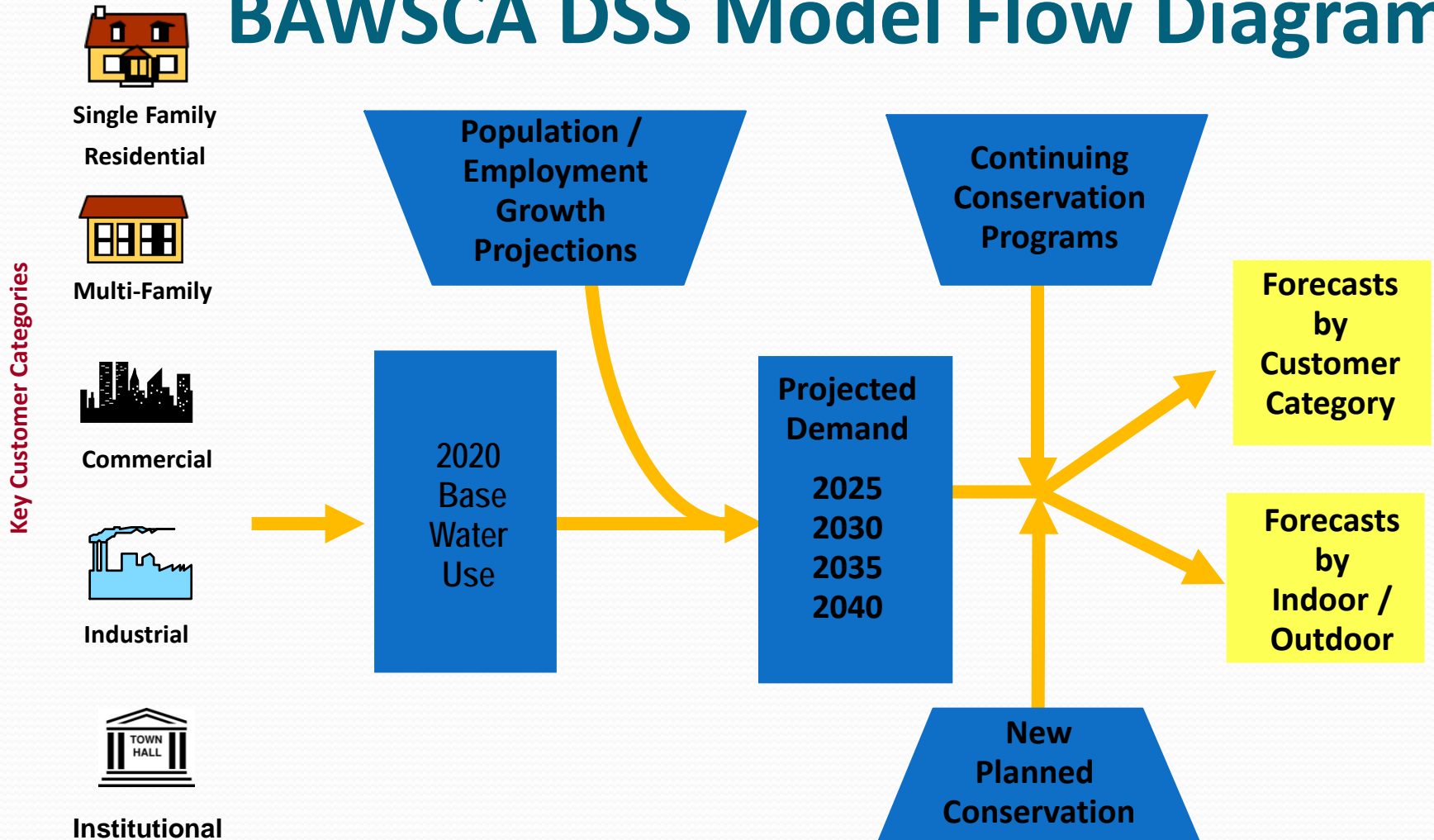
Econometric Models: Price Data 1995-2020



Econometric Models: Unemployment Rate w/ Recovery in 2020



BAWSCA DSS Model Flow Diagram

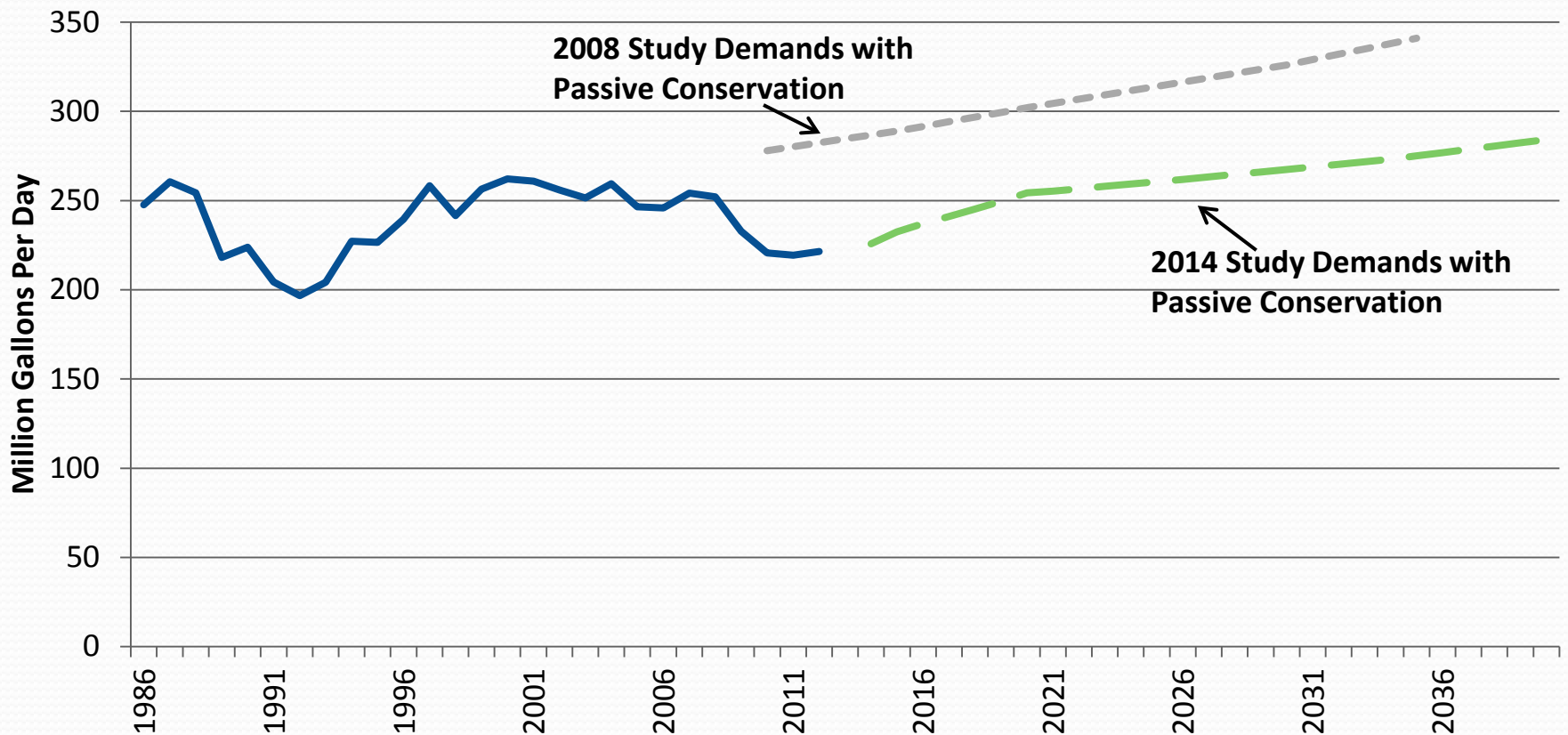


DSS Model Forecast 2021 to 2040

Agency X



Projected Demands are 20% Lower than 2008 Demand Study



— Historical Demand (MGD)

— Projected Demand with Plumbing Code Savings

— Demand Since 2008 Study

— 2008 Study Projected Demands with Plumbing Code Savings

1. Outline Approach*

2. Verify Data*

3. Modeling Demands

4. Modeling Conservation

5. Consensus on Results*

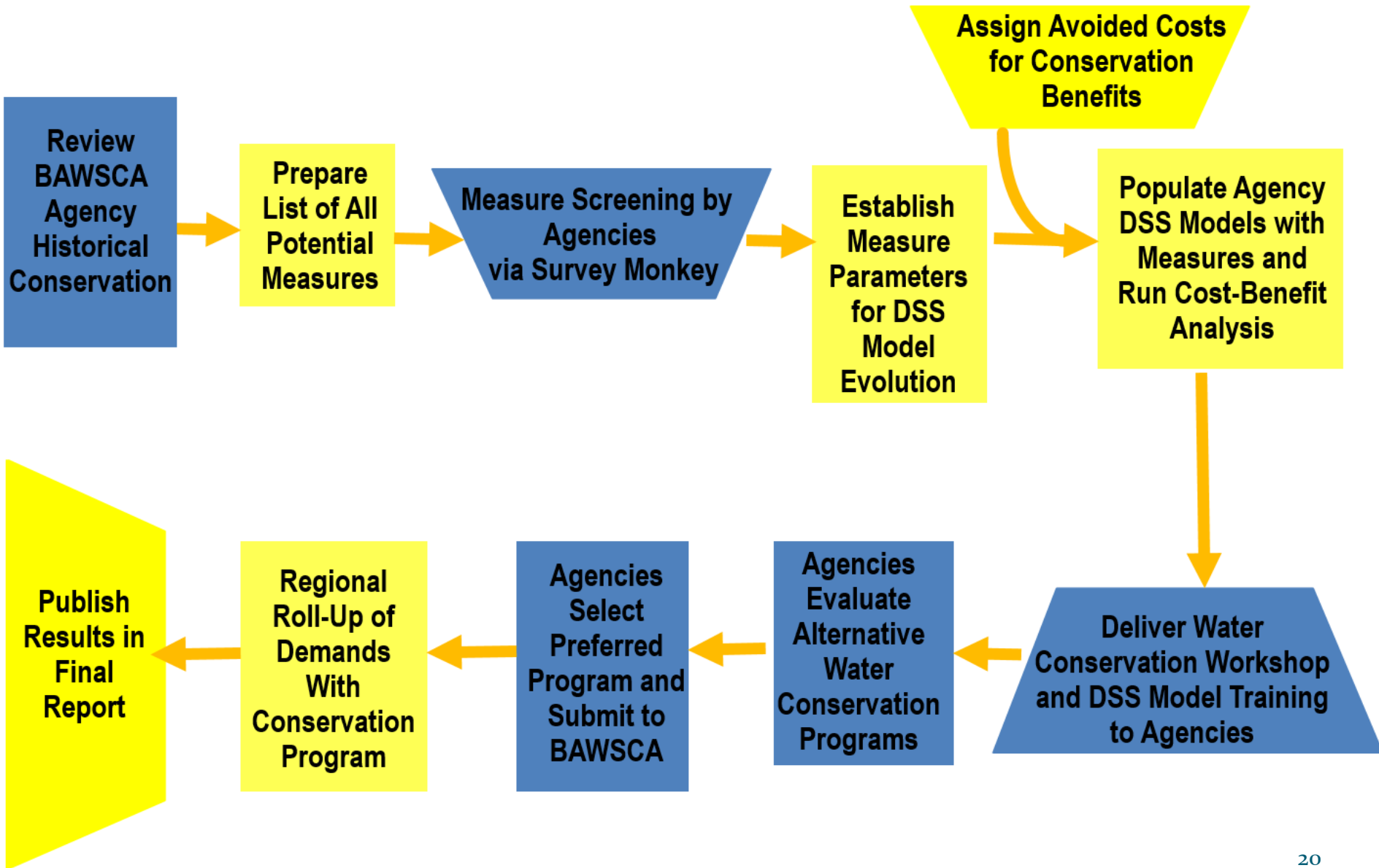
6. Model Training

7. Final Report

Conservation Savings

1. Incorporate passive conservation savings (plumbing codes, CALGreen state building code)
2. Identify potential active conservation measures
3. Evaluate conservation programs
4. Select future conservation plan

BAWSCA's 10 Step Process to Develop Conservation Strategies



Agency X

Service Area Information [Show](#)

Demand Analysis [Show](#)

Conservation Analysis [Hide](#)



Conservation Settings & Targets [Edit](#)



End Uses [Edit](#)



Avoided Costs [Edit](#)



Conservation Measures [Edit](#)



Program Scenarios [Edit](#)



Final Check [Edit](#)

Implementation Tracking [Hide](#)



Import/Input Data [Edit](#)



Track Measures & Savings [Edit](#)

Results [Hide](#)



Reports and Graphs [Edit](#)

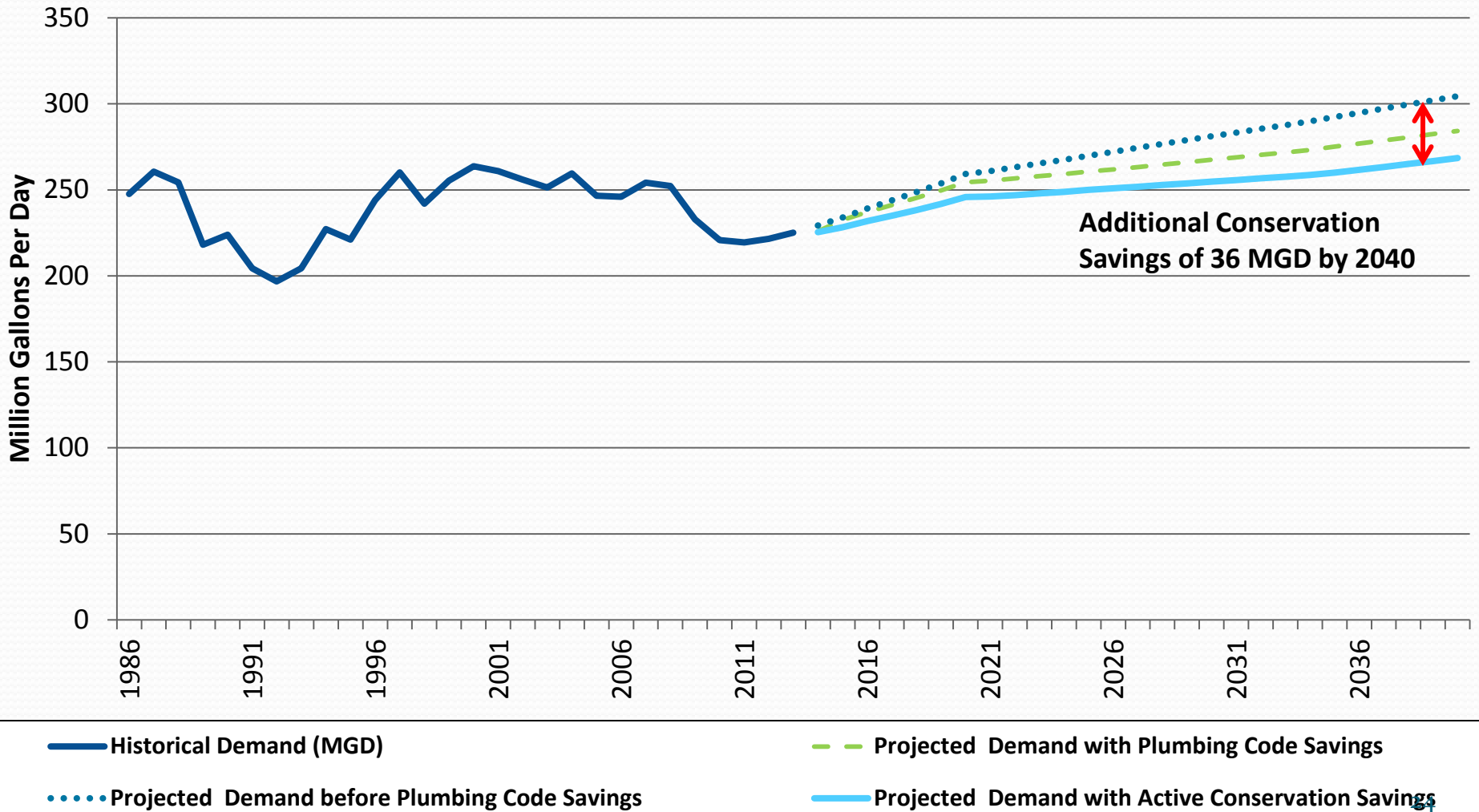
Active Conservation Analysis

- Conservation Measures – Menu of 25 measures
- Individual Measure Parameters (individual measure budget, activity level, start date, etc.)
- Evaluated 3 Program options for each agency
 - Continue current conservation program
 - Optimized program based on costs & water savings
 - All 25 conservation measures analyzed
- Each agency made adjustments for its model and selected its final conservation savings plan

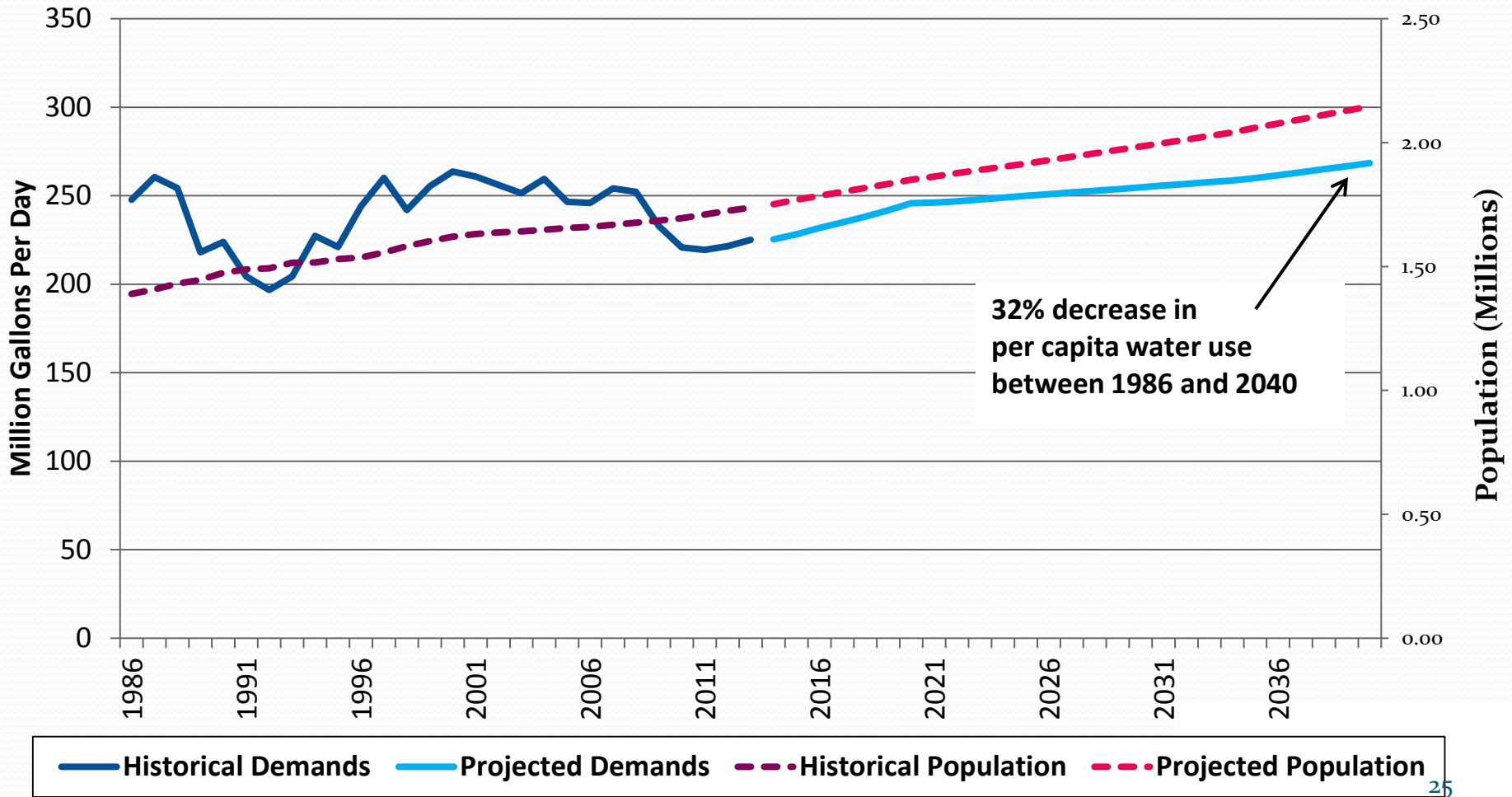
Programs Identified for Potential BAWSCA Regional Implementation

Program	Agencies Planning to Implement
Water Sense Fixtures Giveaway	23
Weather Based Irrigation Controllers (WBICs) Giveaway Program (and Classes) SF	9
Small Irrigation Hardware Incentives (Drip Irrigation and Rain Sensors)	11
Gray Water Retrofits SF Rebate	11
Water Conserving Landscape & Codes (not including WBICs and turf removal) SF MF CII	13
HE Clothes Washer CII Rebate	13
HE Urinal CII Rebates	12
Focused School Retrofit Program	5
WBICs Incentive Program (more money) MF CII Large Landscape	10
Rotating Sprinkler Nozzle Incentive Program SF MF CII Large Landscape	12

Total Water Demand Projected to Reach 269 MGD in 2040



Projected 60% Population Increase with Only 8% Demand Increase (1986-2040)



Summary and Conclusions

- Incorporating econometric modeling provided valuable insights into demand trends that influenced water supply planning efforts
- BAWSCA is finalizing Long Term Reliable Water Supply Strategy based upon demand results
- Conservation program changes are being implemented in FY 2015-16 based upon conservation analysis results
 - Continuation of existing programs (large landscape, public outreach, turf removal)
 - “Phasing out” of programs where high saturation rates have been realized (e.g. toilets, washing machine rebates)
 - Incorporating new programs with high savings potential (e.g. CII programs, irrigation hardware incentives)

Questions?

Andree Johnson: Ajohnson@bawsca.org

Michelle Maddaus: [Michelle @ Maddauswater.com](mailto:Michelle@Maddauswater.com)

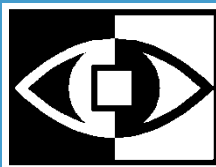


Final Report is available at:

<http://www.bawsca.org/docs/BAWSCA%20Demand%20and%20Conservation%20Projection%20FINAL%20REPORT.pdf>



MADDAUS WATER MANAGEMENT INC.



WESTERN
POLICY
RESEARCH

BAWSCA
Bay Area Water Supply & Conservation Agency