



Investing in Conservation: Cascade Water Alliance's Experience with Value and Return

AWWA – PNWS Conference
May 1, 2015

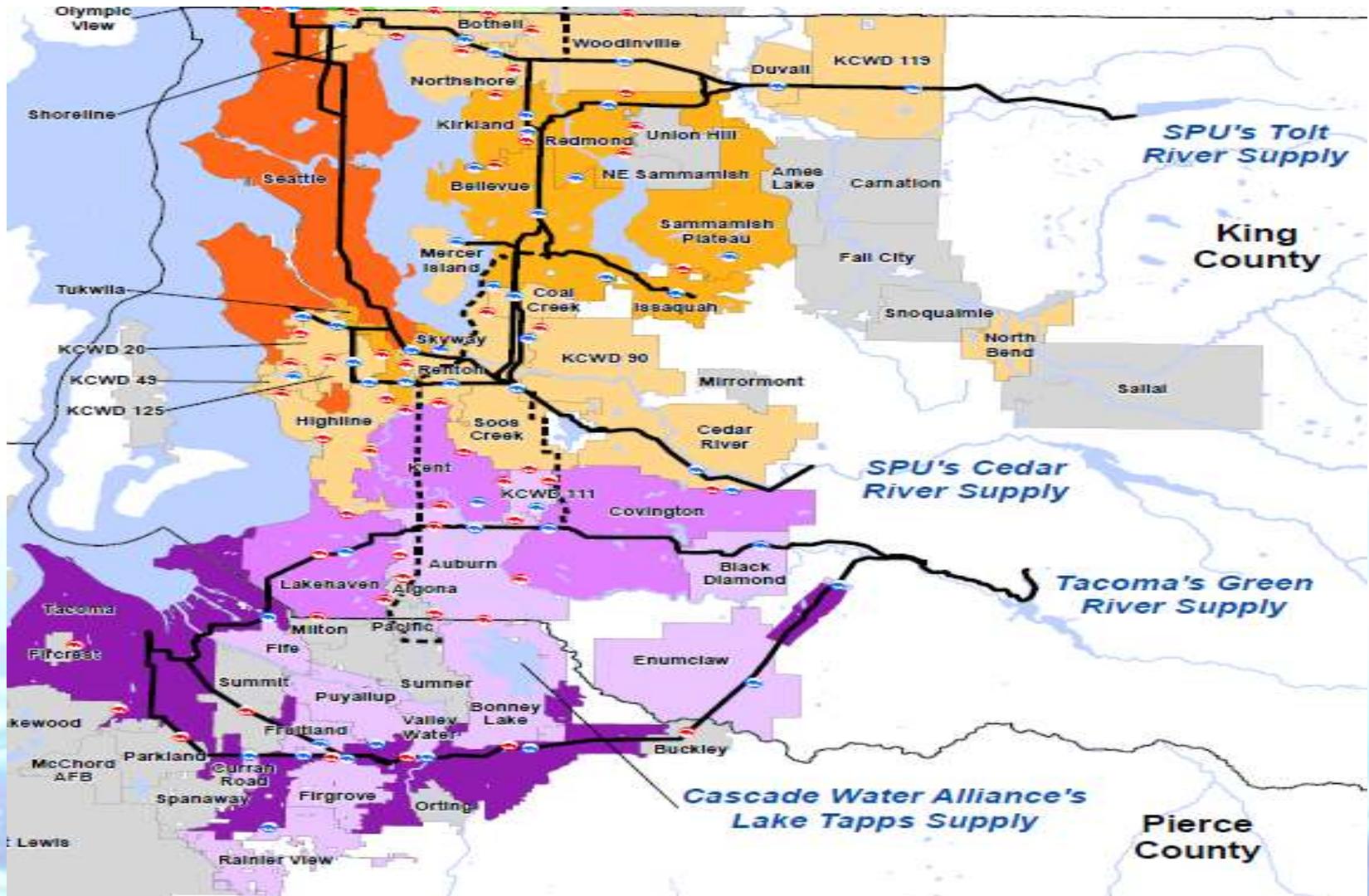
Outline of Session

- About Cascade Water Alliance
- Cascade's Water Resource Planning
- Cascade's Conservation Program
- Analytics and Results
- Conclusions

Cascade Water Alliance

- Regional Water Authority serving about 350,000 people in Seattle's suburban east and south
- Formed in 1999 following a decade of regional governance discussions
- Formed by agencies convinced that they needed to take control of their future water supplies to provide for regional water needs
 - Projected need for new supply to serve rapidly growing suburbs
 - Skepticism regarding absolute reliance on conservation and system efficiency improvements to meet growth

Cascade Water Alliance



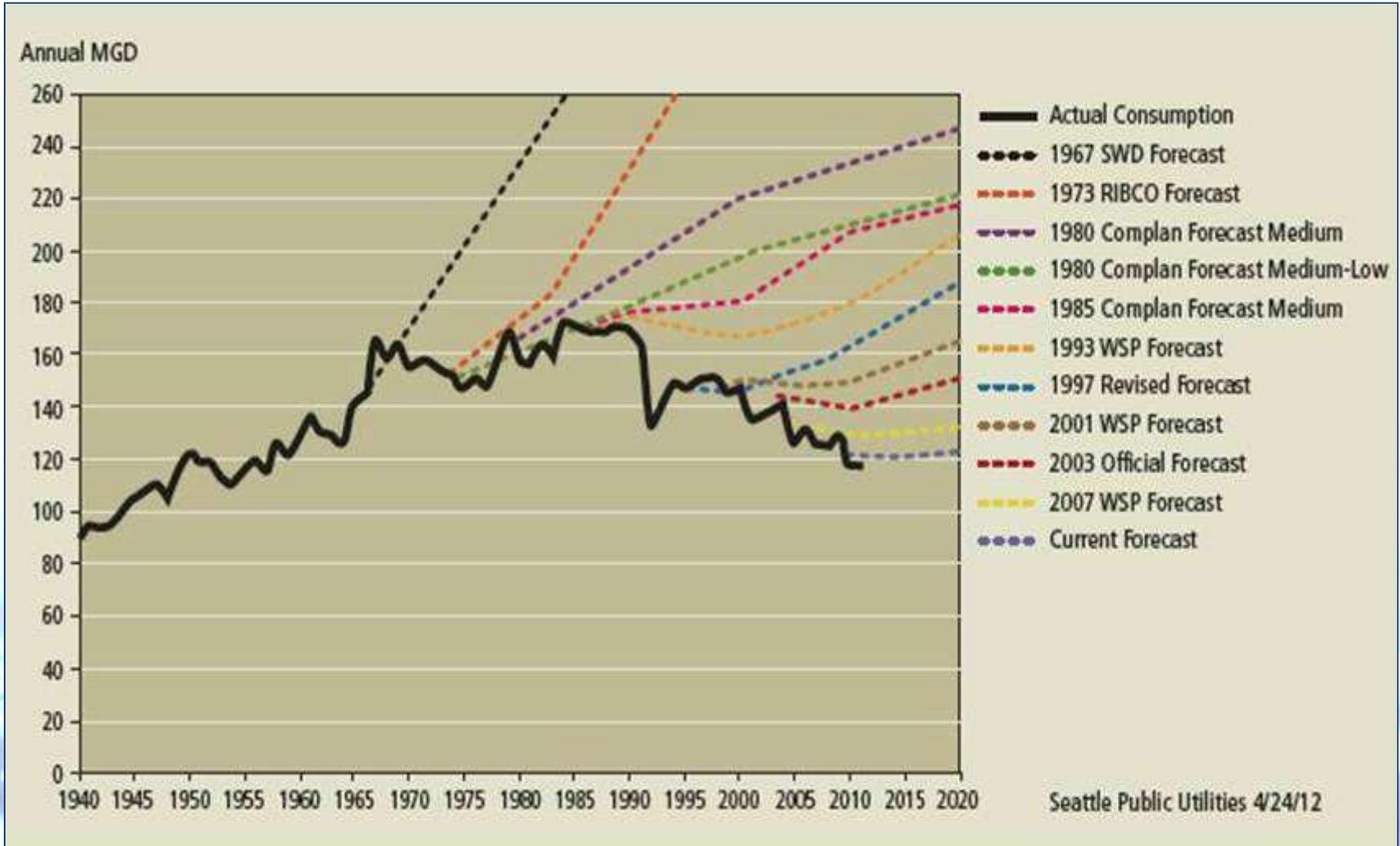
Cascade's Initial Supply Strategy

- “Declining Block” contract with Seattle
 - Block supply through 2023
 - Supply declines 85% from 2024-2045
- Aggregate demands already consume initial supply
 - Block was based on migrating wholesale agencies
 - New fast-growing suburban members were added to the Cascade system
- New major supply by 2024
- New interim supplies by 2009
- Conservation was initially essential to help cover the deficit

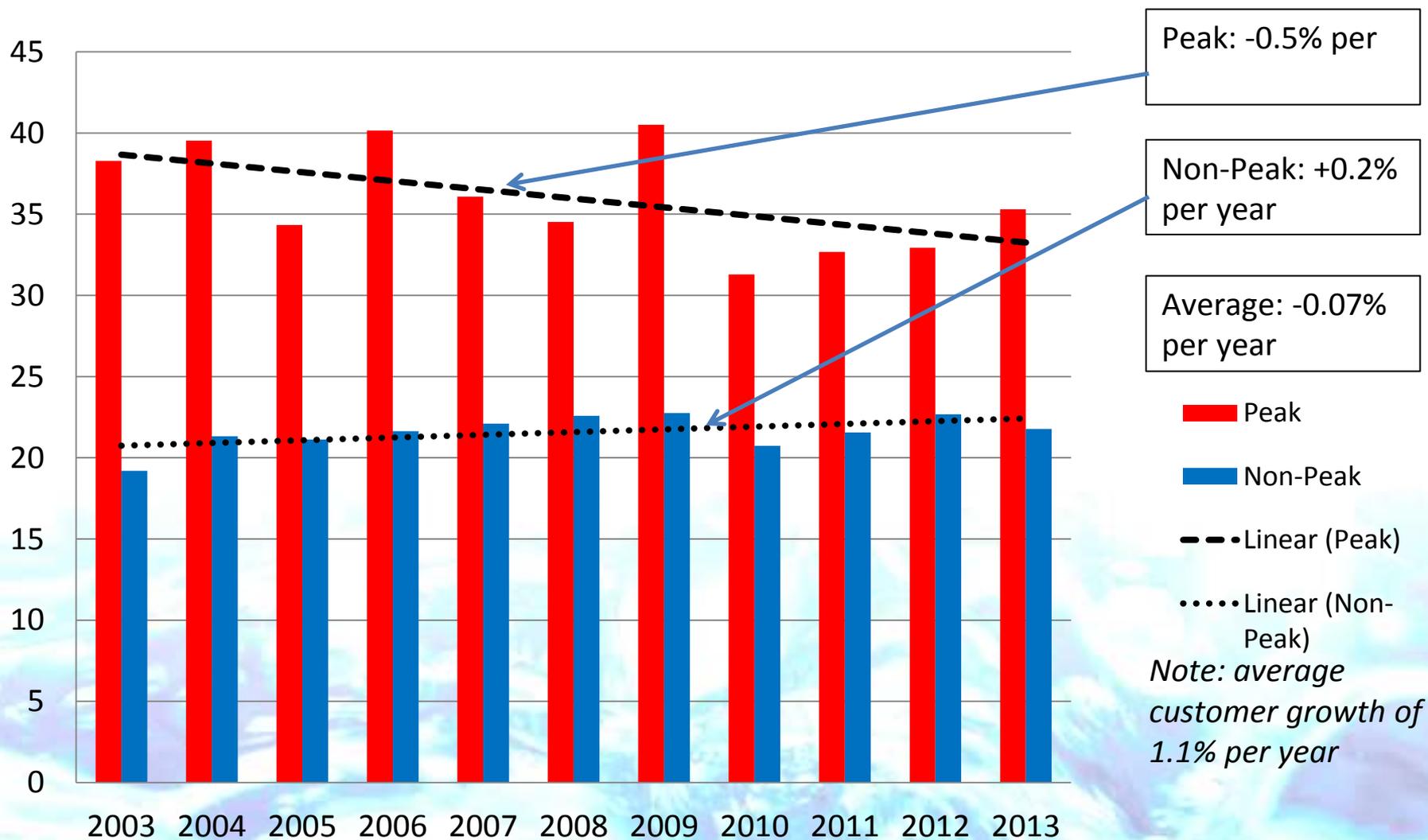
Initial Struggles with Demand Forecasting

- “Year Zero” demand exceeded reality by 25%
- Supplies projected to be outgrown by 2009
- Demand estimates extrapolated unit demands
- Conservation was discounted as a reliable resource
- Cost (price elasticity) was ignored as a demand variable

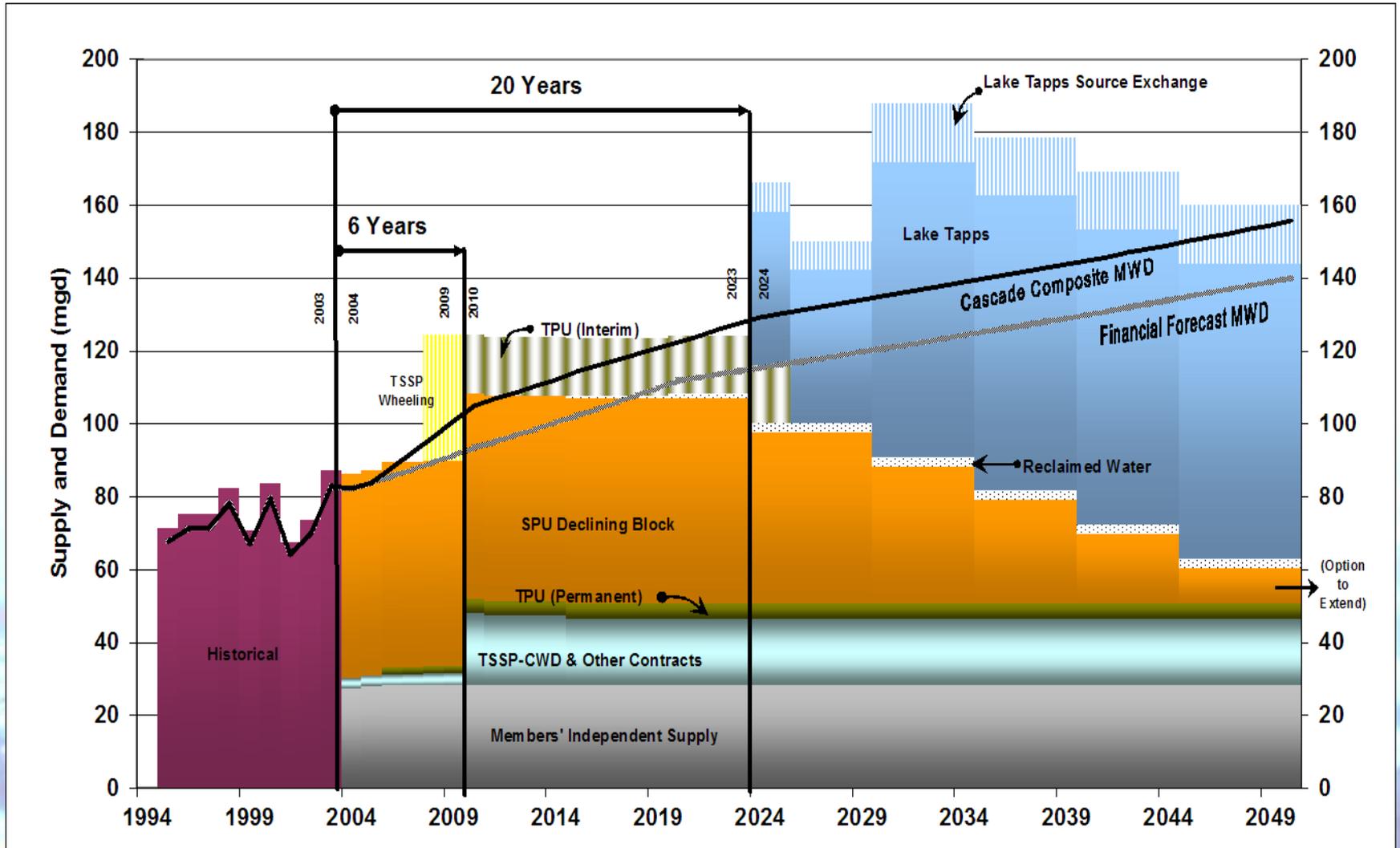
Decision-making based on Demand Forecasting



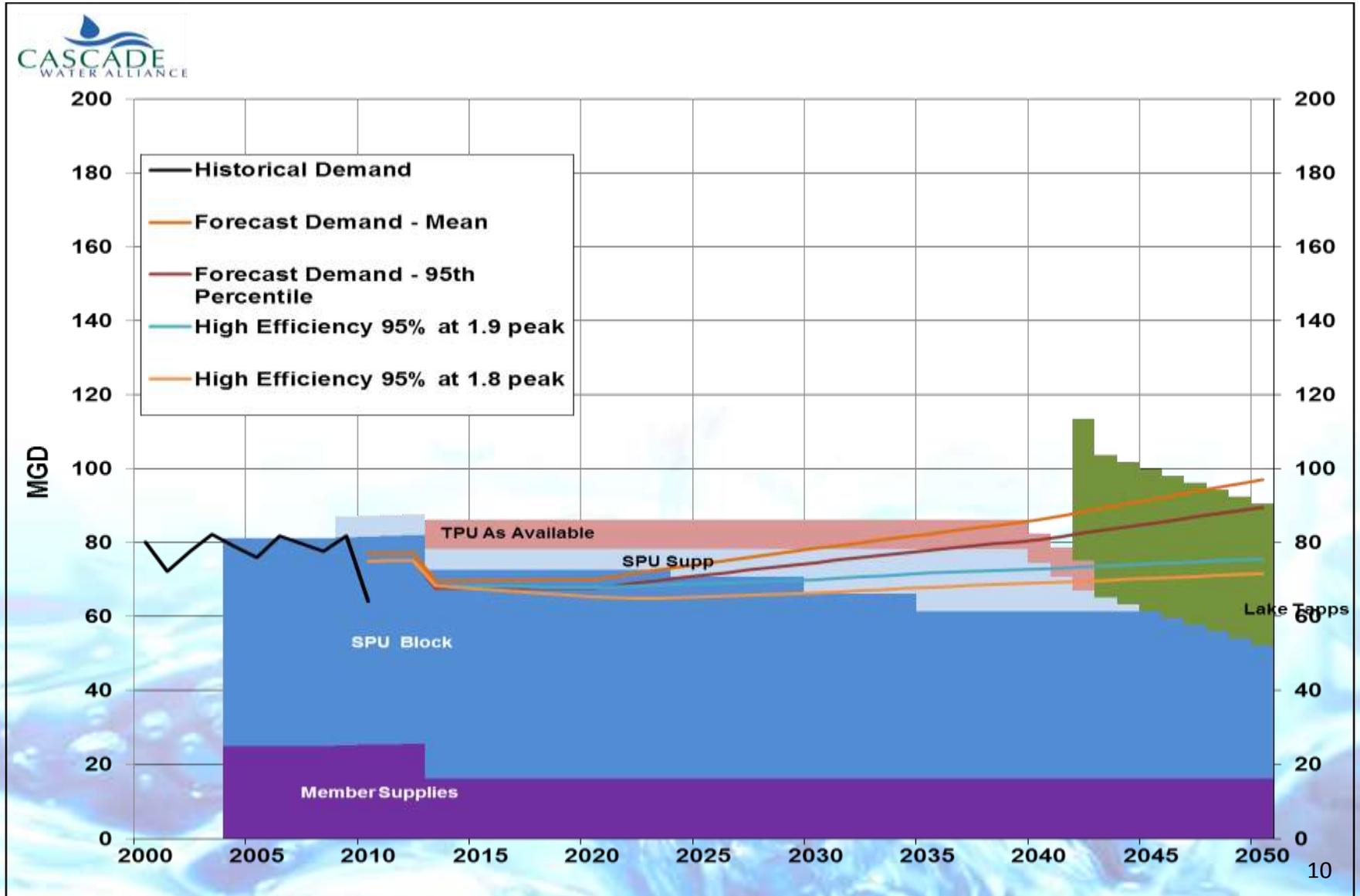
Embedded Trends in Water Demands (mgd)



DEMAND FORECAST AS OF 2004



DEMAND FORECAST AS OF 2012



Economic Evaluation of Cascade's Conservation Program: Purpose

- 1) Determine Cost-effectiveness of conservation program
- 2) Evaluate economics of alternative scenarios related to scale and orient the program
- 3) Help inform as to the value of conservation investments
- 4) Incorporate economics into the conservation decision process
- 5) Prompt potential changes to enhance program effectiveness and value

Evolution of Conservation's Role in Cascade's Supply Plan

- 1) Required by block contract to maintain a program comparable to Seattle's: *(linked to their water right conditions)*
- 2) Needed to mitigate short- and mid-term shortages in supply/demand strategy
- 3) Became contributory to a dramatically reduced demand curve
- 4) Lower demands helped enable contract extensions
- 5) Now have lengthy time horizon before next source might be needed
- 6) Cost-effectiveness now a mandate

Determining Conservation's Role in Cascade's Supply Plan

- 1) Is it cost-effective?
 - a) Return on Investment is delayed, yet life cycle of investments is short

- 2) What is the right target?
 - a) Our critical requirement is peak capacity: peak week and season
 - b) Most hardware (+/or measurable) conservation focuses on indoor use
 - c) We rejected "volume saved" and moved to "peak season capacity reduction" as the supply metric for our situation

- 3) What do we gain by conserving now?
 - a) Ability to quantify as a resource
 - b) Cumulative gains from small investments
 - c) Retention of conservation ethic
 - d) Increased likelihood of further contract extensions

- 4) What are the hazards?
 - a) "Hardening of demand" as flexibility is squeezed out of system
 - b) Loss of conservation opportunities at critical supply bottlenecks
 - c) Ongoing revenue risk and loss
 - d) Investments superseded by regulation; chasing trends with money

Economic Evaluation of Cascade's Conservation Program: Method

- 1) Inventory and Quantify Conservation Program Elements: HDR Conservation Potential Assessment
- 2) Develop a Range of Conservation Scenarios/Approaches
- 3) Incorporate Costs and Demand Impacts into Cascade Long-Range Financial/Rate Model
- 4) Evaluate Net Financial Impact of Program on Cascade Costs

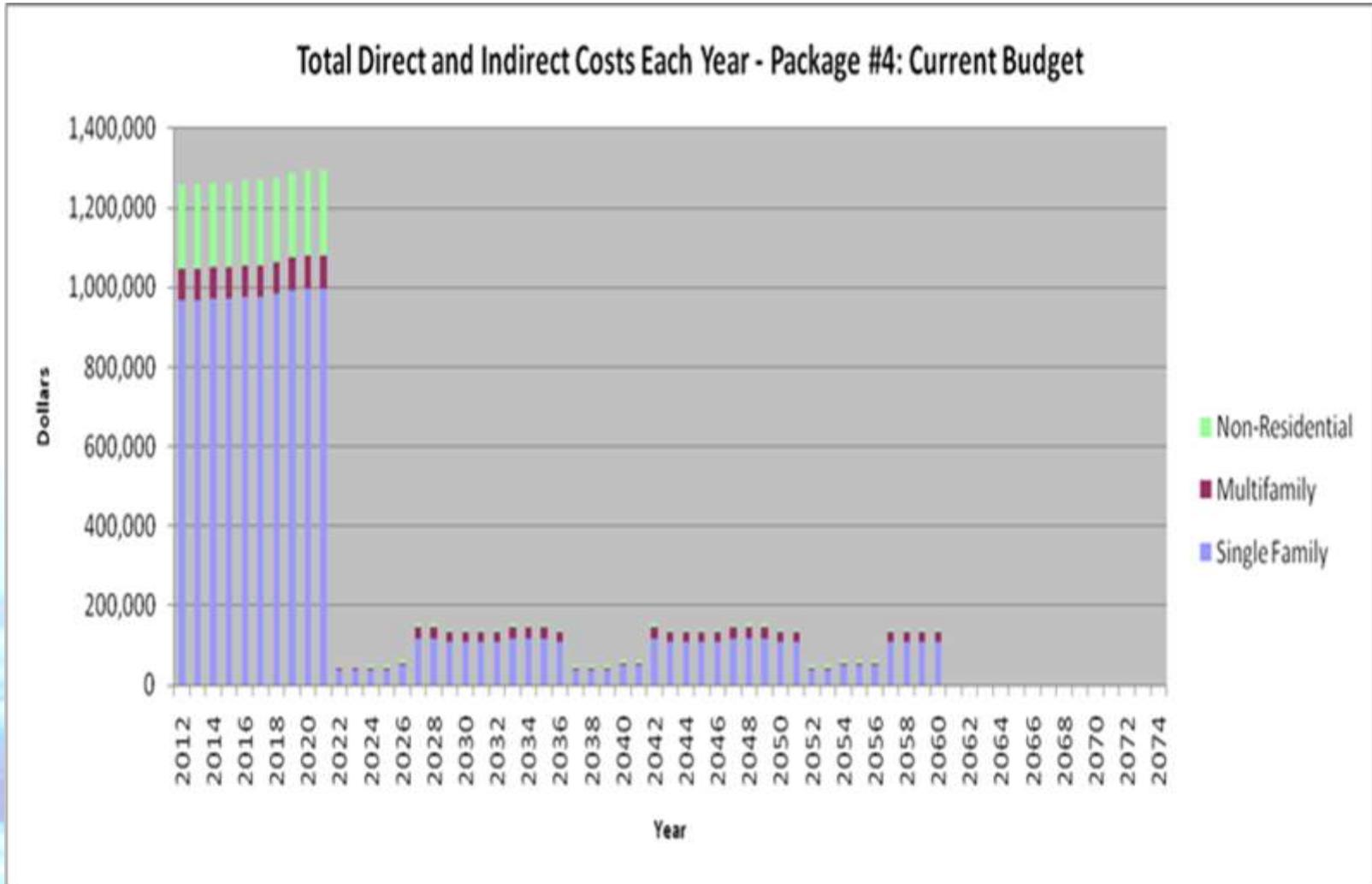
Sample Conservation Measure Documentation

Conservation Measure	PARTICIPATION	SAVINGS AT FULL IMPLEMENTATION		COSTS		
		Annual Average	Peak Season	Total Cost Over 49-Year (2012-2060) Planning Period	Cost per CCF Saved Over Measure Life	Cost per GPD of Peak Season Savings
Lawn Dormant Single-Family Peak Only <i>Behavior</i>	9,185	339,725	582,386	\$ 1,220,175	\$ 0.17	\$ 2.10
Toilets - 1.28 gpf High Efficiency Toilets (HET Rebates) Single-Family Year-Round <i>Hardware</i>	30,914	30,914	71,102	\$ 7,179,900	\$ 1.01	\$ 23.46
Capacity Purchase - Covington Water New Supply Year-Round <i>Supply/Transmission</i>	7 mgd wholesale	3,700,000	7,000,000	\$ 59,100,000	\$ 15.97	\$ 8.44
				adjusted for shared transmission	\$ 15.97	\$ 5.65

Some Metrics from other Supplies in the Cascade Portfolio (\$ per GPD of Capacity)

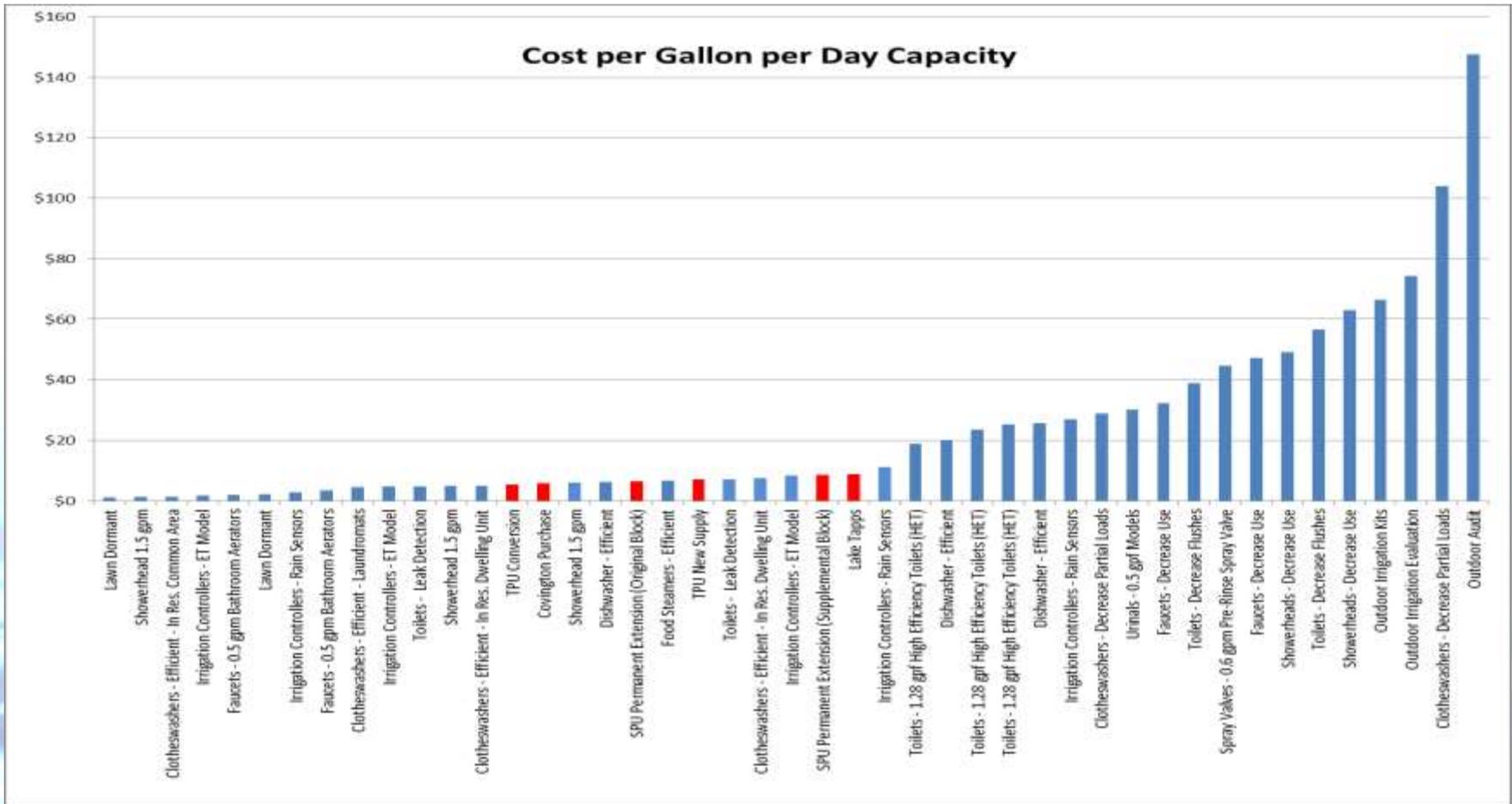
- 1) Covington WD Purchase: \$5.65 per gpd
- 2) Convert Tacoma Reserve Capacity (2025):
\$7.74 per gpd
- 3) New Tacoma Capacity (2025): \$8.53 per gpd
- 4) Lake Tapps Capacity (ca. 2030): \$8.05 per gpd
- 5) Permanent SPU Extension (beg. 2024):
\$7.67 per gpd

Sample Conservation Measure Documentation

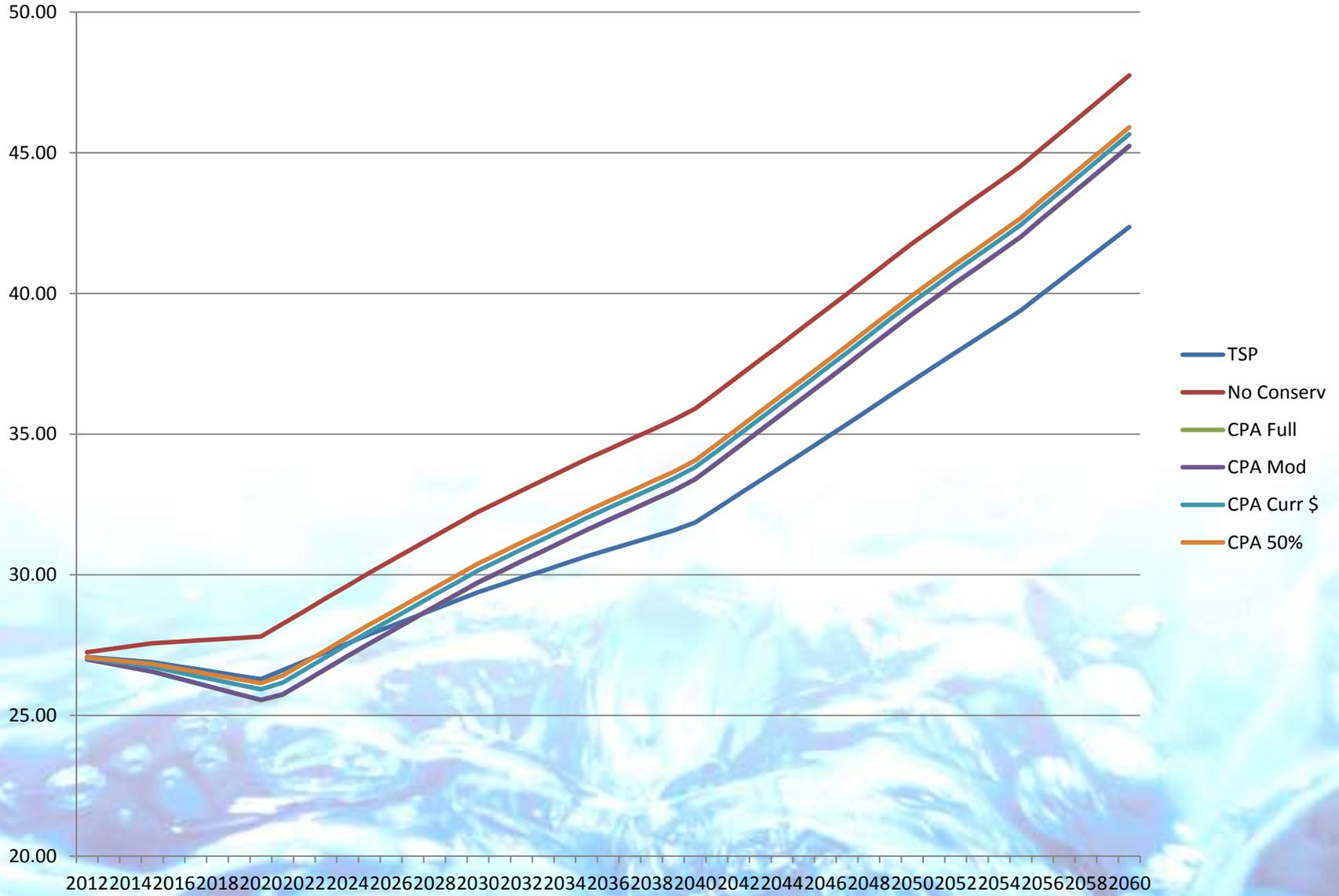


Conservation Measure	Sector	Seasonality	Hardware vs Behavior	Customer Definition	SAVINGS			COSTS		
					Savings For All Customers At Full Implementation (gpd)		Savings For All Customers Over Measure Life	Total Cost Over 49-Year (2012-2060) Planning Period	Cost per CCF Saved Over Measure Life	Cost per GPD of Peak Season Savings
					Annual Average	Peak Season	CCF ¹			
Clotheswashers - Efficient - In Res. Dwelling Unit	SF	Year Round	Hardware	SF Households	224,597	224,597	4,657,831	\$1,100,960	\$0.24	\$4.90
Clotheswashers - Efficient - In Res. Dwelling Unit	MF	Year Round	Hardware	MF Households	49,336	49,336	1,023,161	\$364,440	\$0.36	\$7.39
Clotheswashers - Efficient - In Res. Common Area	MF	Year Round	Hardware	MF Households	59,730	59,730	1,238,710	\$83,540	\$0.07	\$1.40
Clotheswashers - Efficient - Laundromats	NR	Year Round	Hardware	NR Accounts	2,688	2,688	55,745	\$12,210	\$0.22	\$4.54
Faucets - 0.5 gpm Bathroom Aerators	SF	Year Round	Hardware	SF Households	159,949	159,949	3,781,460	\$538,526	\$0.14	\$3.37
Faucets - 0.5 gpm Bathroom Aerators	MF	Year Round	Hardware	MF Households	65,262	65,262	1,542,963	\$124,508	\$0.08	\$1.91
Showerhead 1.5 gpm	SF	Year Round	Hardware	SF Households	301,523	301,523	7,128,499	\$1,800,878	\$0.25	\$5.97
Showerhead 1.5 gpm	MF	Year Round	Hardware	MF Households	125,367	125,367	2,963,854	\$609,144	\$0.21	\$4.86
Showerhead 1.5 gpm	NR	Year Round	Hardware	NR Accounts	23,760	23,760	561,735	\$31,858	\$0.06	\$1.34
Toilets - 1.28 gpf High Efficiency Toilets (HET)	SF	Year Round	Hardware	SF Households	306,091	306,091	7,094,722	\$7,179,900	\$1.01	\$23.46
Toilets - 1.28 gpf High Efficiency Toilets (HET)	MF	Year Round	Hardware	MF Households	87,358	87,358	2,024,816	\$2,192,280	\$1.08	\$25.10
Toilets - 1.28 gpf High Efficiency Toilets (HET)	NR	Year Round	Hardware	NR Accounts	89,855	89,855	2,082,695	\$1,695,690	\$0.81	\$18.87
Urinals - 0.5 gpf Models	NR	Year Round	Hardware	NR Accounts	37,414	37,414	867,190	\$1,127,980	\$1.30	\$30.15
Spray Valves - 0.6 gpm Pre-Rinse Spray Valve	NR	Year Round	Hardware	NR Accounts	3,692	3,692	79,585	\$165,075	\$2.07	\$44.71
Food Steamers - Efficient	NR	Year Round	Hardware	NR Accounts	35,568	35,568	811,221	\$233,946	\$0.29	\$6.58
Dishwasher - Efficient	SF	Year Round	Hardware	SF Households	26,493	26,493	614,071	\$530,670	\$0.86	\$20.03
Dishwasher - Efficient	MF	Year Round	Hardware	MF Households	7,542	7,542	174,812	\$193,300	\$1.11	\$25.63
Dishwasher - Efficient	NR	Year Round	Hardware	NR Accounts	22,544	22,544	522,528	\$138,070	\$0.26	\$6.12
Clotheswashers - Decrease Partial Loads	SF	Year Round	Behavior	SF Households	42,265	42,265	881,666	\$1,220,175	\$1.38	\$28.87
Clotheswashers - Decrease Partial Loads	MF	Year Round	Behavior	MF Households	13,914	13,914	290,255	\$1,447,200	\$4.99	\$104.01
Faucets - Decrease Use	SF	Year Round	Behavior	SF Households	37,836	37,836	789,279	\$1,220,175	\$1.55	\$32.25
Faucets - Decrease Use	MF	Year Round	Behavior	MF Households	15,197	15,197	317,015	\$716,850	\$2.26	\$47.17
Showerheads - Decrease Use	SF	Year Round	Behavior	SF Households	24,869	24,869	518,775	\$1,220,175	\$2.35	\$49.06
Showerheads - Decrease Use	MF	Year Round	Behavior	MF Households	11,398	11,398	237,761	\$716,850	\$3.02	\$62.89
Toilets - Decrease Flushes	SF	Year Round	Behavior	SF Households	31,352	31,352	654,027	\$1,220,175	\$1.87	\$38.92
Toilets - Decrease Flushes	MF	Year Round	Behavior	MF Households	12,664	12,664	264,179	\$716,850	\$2.71	\$56.61
Toilets - Leak Detection	SF	Year Round	Behavior	SF Households	103,092	103,092	2,241,126	\$725,342	\$0.32	\$7.04
Toilets - Leak Detection	MF	Year Round	Behavior	MF Households	39,794	39,794	865,169	\$191,687	\$0.22	\$4.82
Irrigation Controllers - ET Model	SF	Peak Only	Hardware	SF Households	60,573	103,839	1,403,985	\$875,810	\$0.62	\$8.43
Irrigation Controllers - ET Model	MF	Peak Only	Hardware	MF Accounts	9,949	19,897	230,592	\$92,900	\$0.40	\$4.67
Irrigation Controllers - ET Model	NR	Peak Only	Hardware	NR Accounts	56,866	97,484	1,318,057	\$168,480	\$0.13	\$1.73
Irrigation Controllers - Rain Sensors	SF	Peak Only	Hardware	SF Households	10,249	17,570	237,555	\$471,260	\$1.98	\$26.82
Irrigation Controllers - Rain Sensors	MF	Peak Only	Hardware	MF Accounts	1,684	3,368	39,034	\$37,440	\$0.96	\$11.12
Irrigation Controllers - Rain Sensors	NR	Peak Only	Hardware	NR Accounts	9,582	16,427	222,099	\$46,390	\$0.21	\$2.82
Outdoor Irrigation Kits	SF	Peak Only	Hardware	SF Households	20,975	35,958	456,044	\$2,389,823	\$5.24	\$66.46
Outdoor Audit	SF	Peak Only	Behavior	SF Households	3,074	5,269	66,314	\$4,634,934	\$69.89	\$879.66
Outdoor Audit	NR	Peak Only	Behavior	NR Accounts	8,676	14,873	185,897	\$2,194,800	\$11.81	\$147.56
Outdoor Irrigation Evaluation	MF	Peak Only	Behavior	MF Accounts	1,350	2,700	29,105	\$200,601	\$6.89	\$74.29
Lawn Dormant	SF	Peak Only	Behavior	SF Households	339,725	582,386	7,086,878	\$1,220,175	\$0.17	\$2.10
Lawn Dormant	MF	Peak Only	Behavior	MF Accounts	37,078	74,155	773,464	\$73,800	\$0.10	\$1.00
Total					2,520,926	2,935,072	56,333,876	\$39,924,867	\$0.71	\$13.60

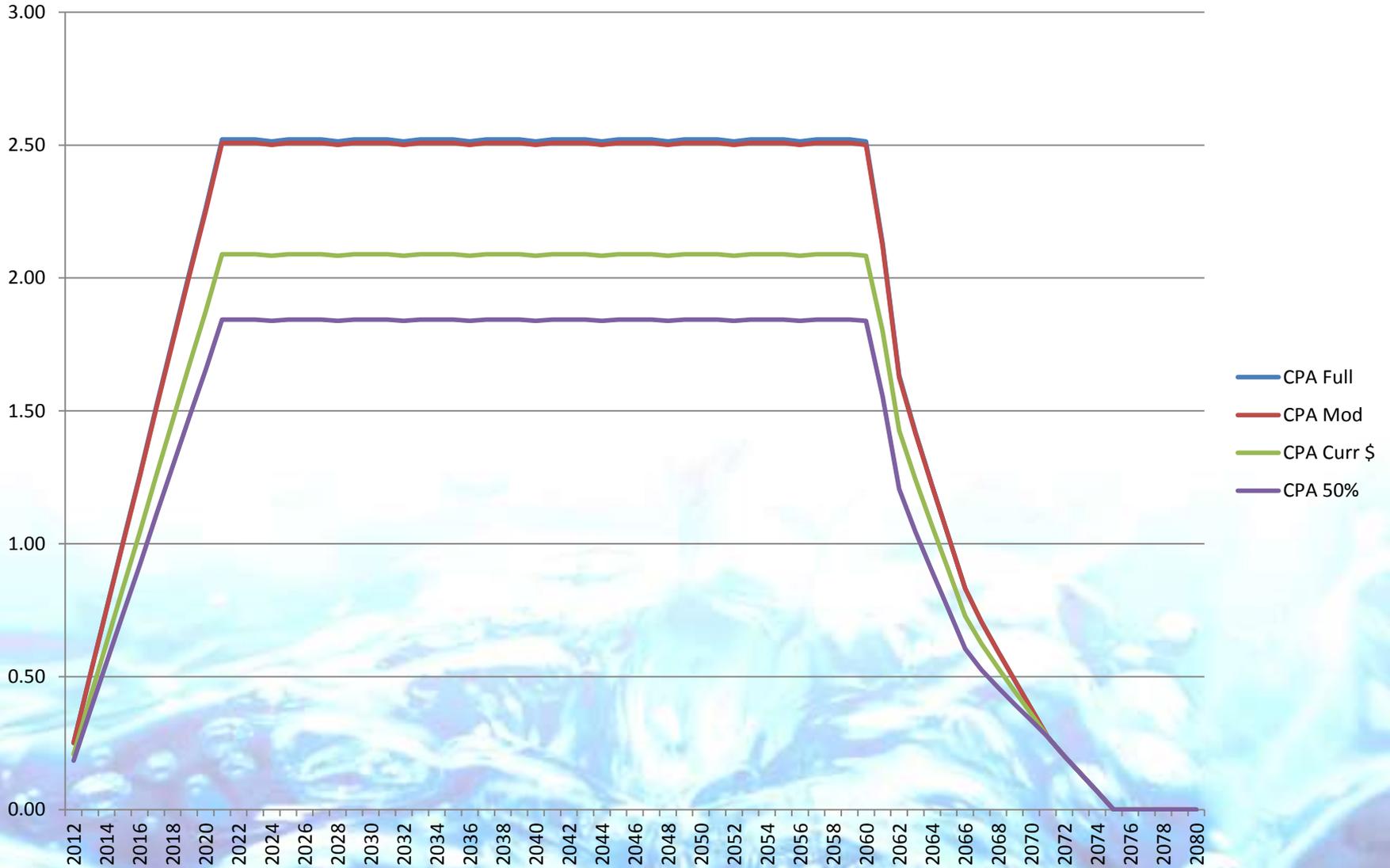
Summary of Cascade Conservation and Supply Measures



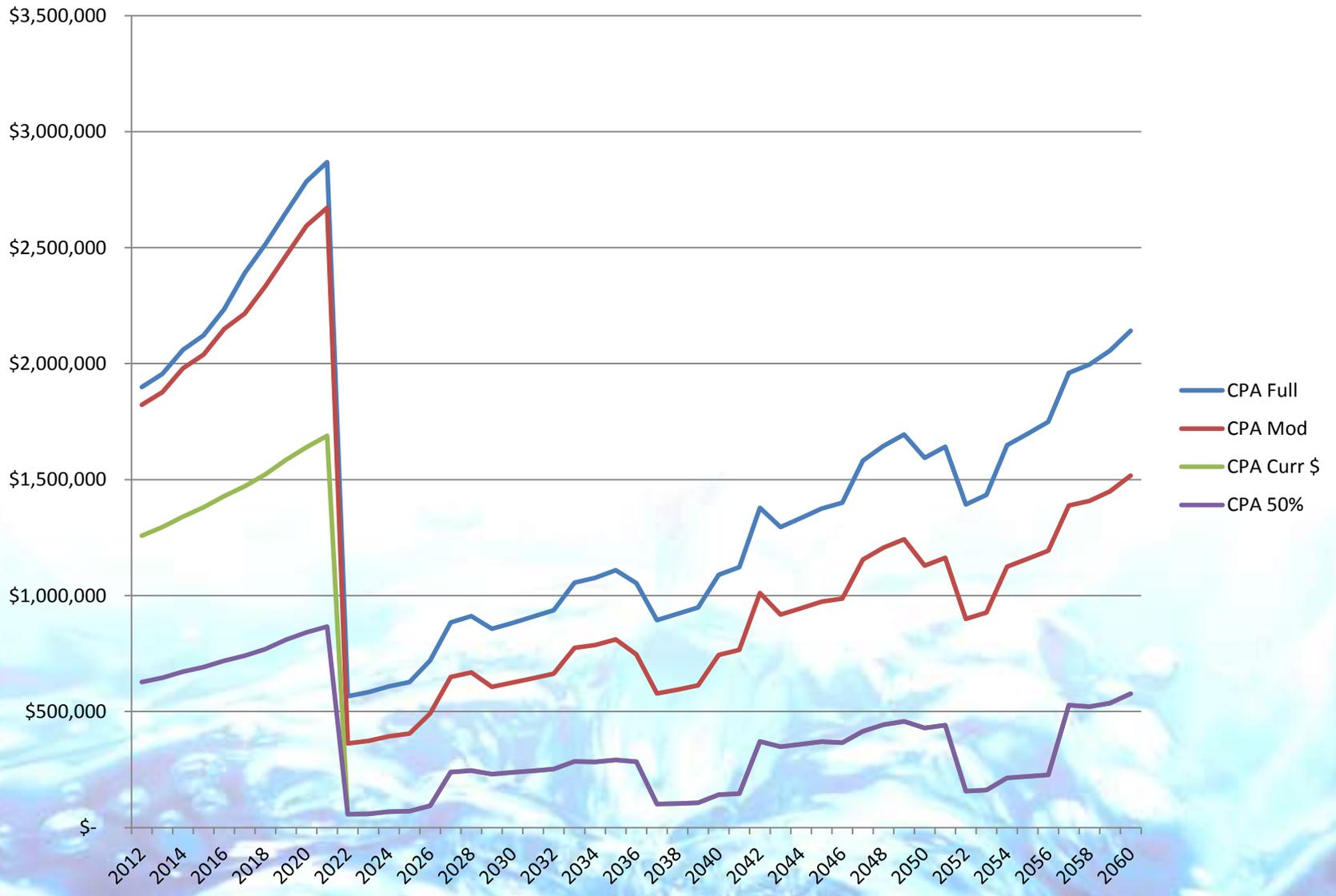
Cascade Water Demand for Conservation Scenarios



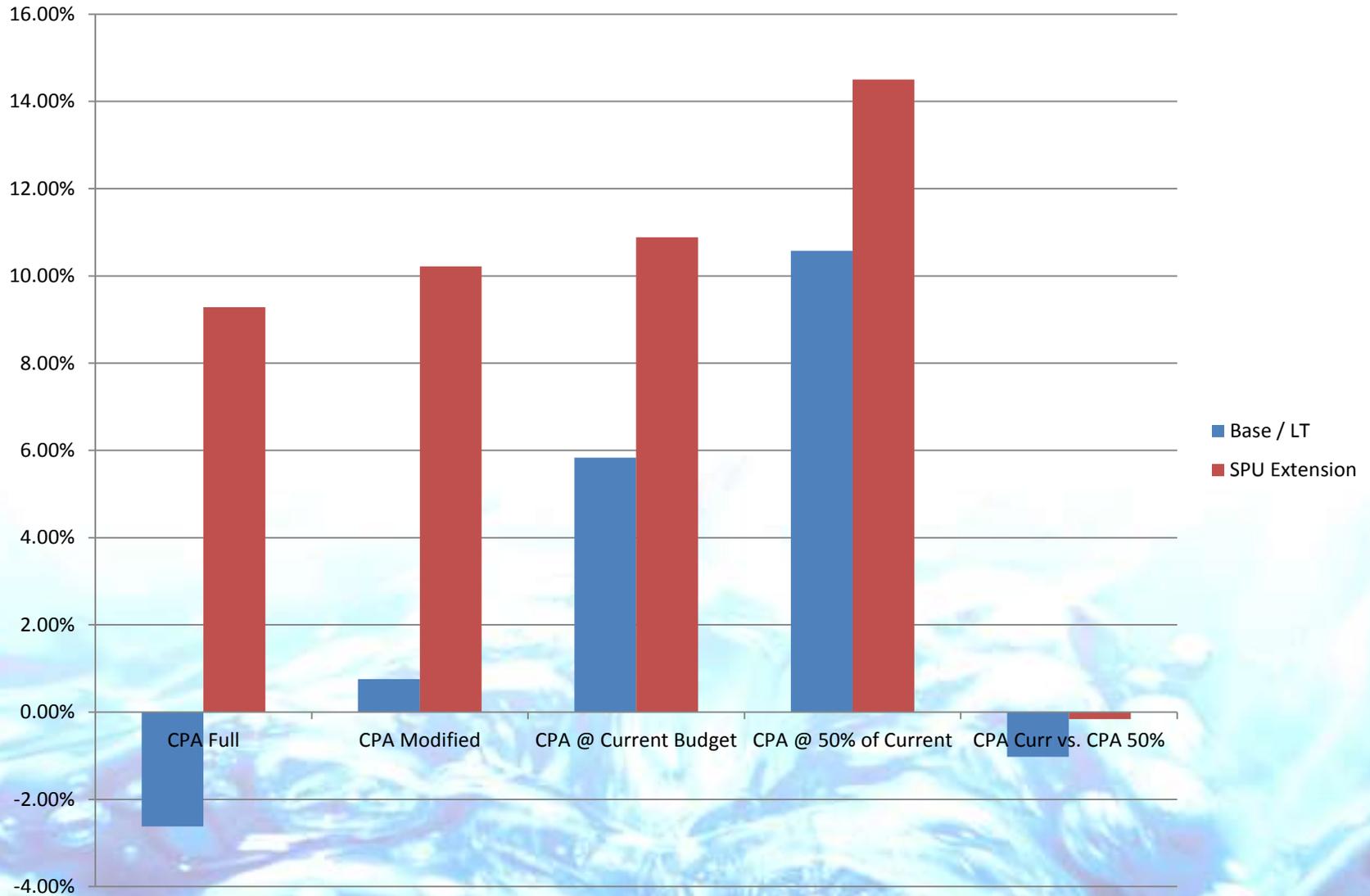
Savings from Conservation Scenarios (Annual MGD)



Annual Conservation Expenditures by Scenario



Return on Conservation Investments by Scenario



General Findings from Economic Review

- 1) Law of Diminishing Marginal Returns is in full force:
We can get most of the savings for a fraction of the conservation investment
- 2) We don't "need" the water for a long time
- 3) We can "be the laboratory" given the time we have until supply is needed

Possible Actions to be Considered from the Economic Review

- 1) Scale back funding to true cost-effective elements
- 2) Maintain non-hardware programs to promote conservation ethic
- 3) Re-orient program elements toward peak demands: **find or develop new elements** that focus on **peak season** demands
- 4) Scale back and/or re-target traditional subsidy programs:
 - a) **Link indoor program to low income rate/assistance strategies**
 - b) Evaluate programs targeting ultra-efficient new development
 - c) Re-orient some programs to legislative/regulatory, rather than subsidy
- 5) Establish practices to monitor and measure impacts of changes: this will improve our ability to meet needs when scaling back up in the future

Cumulative Rate Impacts: No Revisions vs. New Contracts

