Strategic Water Supply Assessment: Water Conservation Element Peer Review

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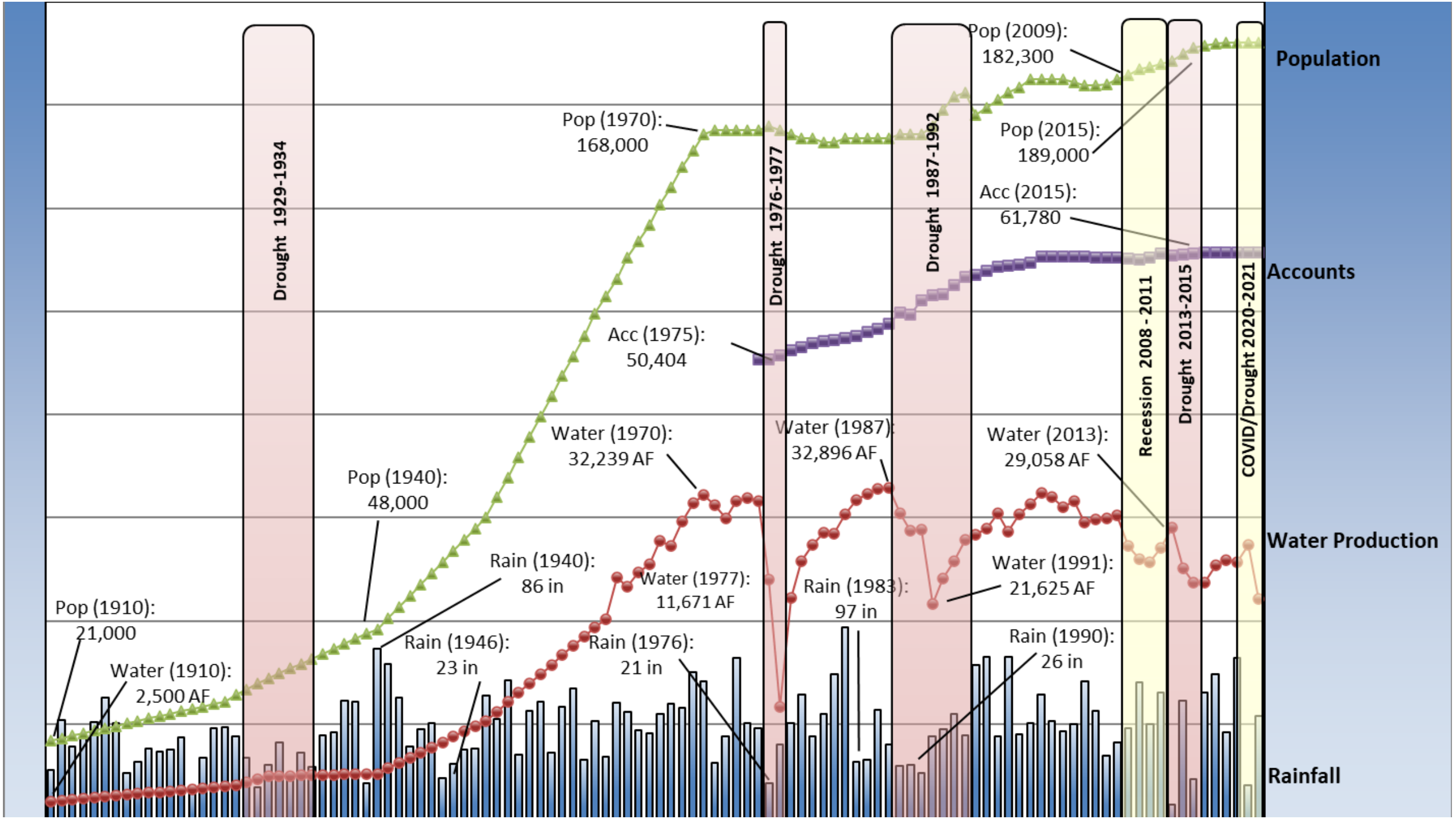
November 15, 2022

Agenda

1. Purpose
2. Firm Background
3. Review Process
4. Conservation Savings
5. Water Loss
6. Conclusions
7. Q & A

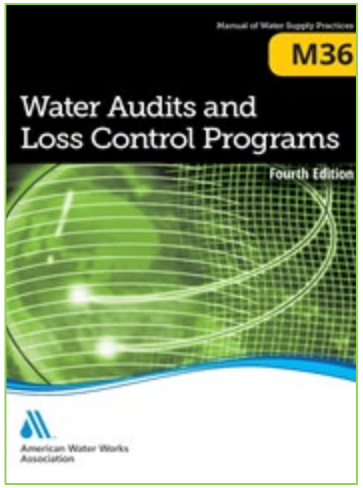
Purpose

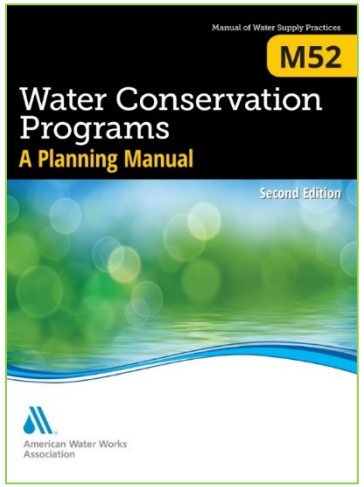
- MMWD is focused on strengthening the reliability of its water supply. Currently completing a Strategic Water Supply Assessment (SWSA).
- SWSA includes a Water Conservation Element (WCE) which focuses largely on MMWD's incentive program.
- Maddaus Water Management Inc. (MWM) was asked by District staff to conduct a peer review of the conservation measures, savings, and participation level assumptions in the WCE.

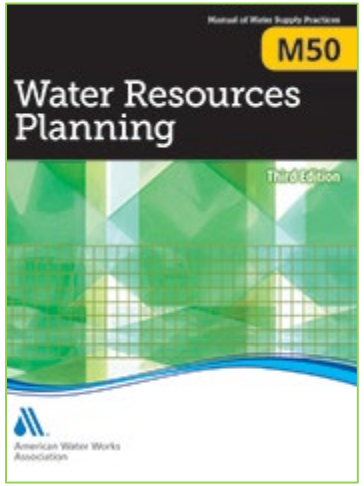

Drought 1929-1934
Drought 1976-1977
Drought 1987-1992
Recession 2008 - 2011
Drought 2013-2015
COVID/Drought 2020-2021
Pop (2009): 182,300
Pop (1970): 168,000
Pop (2015): 189,000
Acc (2015): 61,780
Acc (1975): 50,404
Water (1970): 32,239 AF
Water (1987): 32,896 AF
Water (2013): 29,058 AF
Pop (1940): 48,000
Rain (1940): 86 in
Water (1977): 11,671 AF
Rain (1983): 97 in
Water (1991): 21,625 AF
Pop (1910): 21,000
Water (1910): 2,500 AF
Rain (1946): 23 in
Rain (1976): 21 in
Rain (1990): 26 in
Population
Accounts
Water Production
Rainfall

Firm Background

- **Maddaus Water Management Inc. (MWM)**
  - Worked with MMWD since 2008 on numerous projects.
  - Family-owned, Bay-area based engineering firm.
  - California Small Business/Women Owned Business.
  - Completed 500+ conservation models in over 30 states and internationally.
  - Widely recognized experts in the industry.
  - Authored numerous national peer reviewed manuals and research reports.
  - Certified AWWA Water Loss Audit Validator.







Conservation Measure Review Process

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Review MMWD Savings Assumptions

- Are the estimated measure savings: Too high? Too low? About right?
- Are there additional opportunities for savings (e.g. reducing water loss)?

Review MMWD Participation Rate Assumptions

- Are the assumed measure participation rates: Too high? Too low? About right?

MWM Provides Recommendations

- Provide recommendations on reliability of WCE measure savings.
- Provide recommendations on opportunities for additional reliable savings.

Review Process

- MWM reviewed the following:
  - 3 Excel workbooks provided by MMWD staff with AWE Tool data, assumptions, and staff calculations
  - MMWD DSS Model developed by MWM in 2019
  - MMWD 2020 UWMP
  - MMWD SWSA and Regular Board Meetings
  - MMWD 2018-2021 validated water loss audits
  - Water Conservation Industry reports
  - MMWD staff provided local data
- MWM hosted 4 meetings with MMWD staff.

WCE Conservation Measure Assumptions

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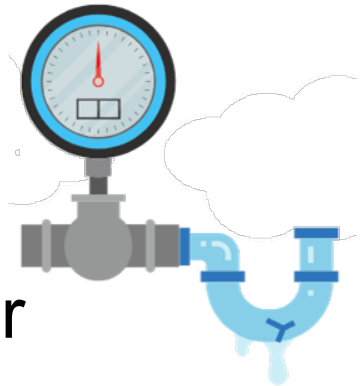
SWSA Conservation Element Measures Projected Through 2045	Annual Participation	Past Annual Participation		Unit Cost ($/AF)	Cumulative Water Savings in 2045 (AF)
		Pre-Drought	2021 Drought		
AMI Leak Detection (leak letters/yr)	1,250	1,140	1,601	$287	9,990
Non-Functional Turf Conversion (sqft/yr)	70,000	0	0	$2,132	4,505
Residential Turf Conversion (sqft/yr)	100,000	7,736	410,000	$1,985	4,282
Pool Covers (covers/yr)	90	12	399	$877	642
SMART Irrigation Controllers (controllers/yr)	100	50	480	$1,035	586
Conservation Assistance Program (residential surveys/yr)	500	195	667	$13,763	378
Laundry to Landscape Graywater Kits (kits/yr)	40	5	44	$4,988	154
Rain Barrels (gallons/yr)	15,000	460	43,497	$8,820	58

AMI Leak Detection

- **Savings Estimate:**
  - MMWD assumes 100% of average home leaks are resolved by the AMI Leak Detection Program saving 18 GPD per home with a short life of savings.
  - MWM assumes 20% savings on internal and external leakage, or 6 GPD per home. MWM uses a longer-term savings period.
  - MWM found this savings assumption reasonable.
- **Participation Estimate:**
  - MWM found 1,250 leak letters/yr is reasonable for the 5,000 installed meters.
- **Recommendation:**
  - Future savings may increase once AMI is fully installed for MMWD service area.



Non-Functional Turf (NFT) Conversion

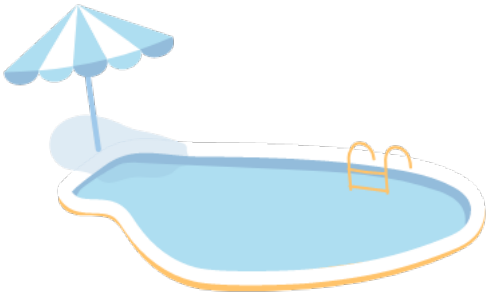
- **Savings Estimate:**
  - MMWD identified approx. 700 non-functional turf parcels.
  - MMWD estimates 1.7 million sq ft non-functional turf.
  - MWM found the savings assumption to be reasonable.
- **Participation Estimate:**
  - MMWD assumed rate of 70,000 sq ft/year.
  - MWM found the 4% of total non-functional conversion per year could and should ideally be increased, if ordinances or policies are put in place with associated enforcement.
- **Recommendation:**
  - No change in projection for WCE.
  - Explore additional opportunities to increase participation with ordinances, enforcement.

Residential Turf Conversion

- **Savings Estimate:**
  - MMWD estimates 15 to 37 million sq ft turf
  - Savings estimate based on local data - average from NMWD and Santa Rosa AWE Landscape Transformation Study (2019).
  - MWM found the savings estimate to be reasonable
- **Participation Estimate:**
  - MWM found projected 100,000 sq ft turf per year equates to 125 sites/year or 10/month reasonable.
- **Recommendation:**
  - No change in projection for WCE.

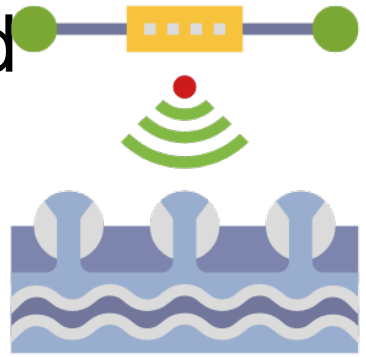
Pool Covers

- **Savings Estimate:**
  - MMWD assumes 41 GPD/pool cover.
  - MWM rarely models pool cover rebates in northern CA.
  - Customer usage of pool cover varies.
  - MWM found water savings to be too high.
- **Participation Estimate:**
  - MMWD assumed 90 pool covers per year.
  - MWM found the participation rate to be too high.
- **Recommendation:**
  - Remove from WCE. Highly variable participation and usage rates.



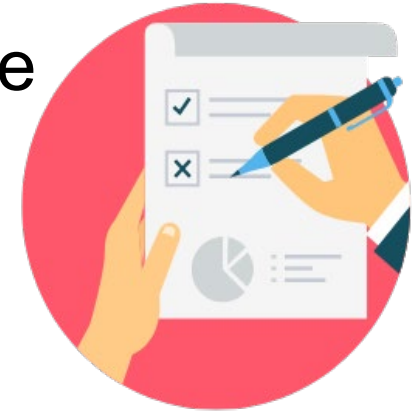
SMART Irrigation Controllers

- **Savings Estimate:**
  - MMWD assumes 10% savings on irrigation water use based on Flume data.
  - MWM found the savings to be reasonable.
- **Participation Estimate:**
  - MMWD assumes 100/year or 2,930 for the program.
  - MWM finds this to be low given the number of MMWD residential accounts and the pending regulation and focus on reducing landscape irrigation water use.
- **Recommendation:**
  - Increase the number of controllers to 200/year.



Conservation Assistance Program (Residential Surveys)

- **Savings Estimate:**
  - MMWD assumed 6.5 gpd saved per residential customer indoor and outdoor survey.
  - MWM would estimate a higher savings value for indoor and outdoor surveys.
- **Participation Estimate:**
  - MMWD assumes 500 surveys per year.
  - MWM found this is reasonable assuming AMI will refine MMWD targeting, and customer service staff will be able to address some questions remotely without field visits.
- **Recommendation:**
  - Increase water savings to 10 gpd per survey to capture more outdoor savings.



Laundry to Landscape Greywater Kits

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- **Savings Estimate:**
  - MMWD used local MMWD Flume data for inefficient washing machines at 31 gallons per load.
  - MWM assumes lower savings:
    - Inefficient machines ~ 15 gallons per load
    - Efficient machines ~ 6 gallons per load.
- **Participation Estimate:**
  - MMWD assumes 40 landscape to laundry conversions per year.
  - MWM has found that other agencies struggle to sustain savings due to extremely low participation.
- **Recommendation:**
  - Remove from the WCE. Highly variable participation.
  - Include measure as part of MMWD education efforts to reinforce outdoor water savings benefits.

Rain Barrels

- **Savings Estimate:**
  - MMWD assumed savings of 1,500 gal per barrel/year.
  - MWM found the savings estimate to be reasonable but noted that the savings yield is minimal.
- **Participation Estimate:**
  - MMWD assumes approx. 200-250 barrels/year.
  - MWM found this to be reasonable.
- **Recommendation:**
  - Remove from WCE.
  - Include measure as part of MMWD education efforts to reinforce outdoor water savings benefits.

Real Water Loss Reduction

- 4,009 AF projected savings in 2045 includes savings from conservation measures and reductions to water loss.
- MMWD staff assumed 10% savings in “Other & Non-Revenue Water” (water loss) which is ~283 AF in 2045.

	Projected Annual Consumption w/ RHNA					
	2020	2025	2030	2035	2040	2045
Single-Family	15,287	15,575	17,253	17,702	18,034	18,392
Multi-Family	3,311	3,384	3,722	3,801	3,849	3,903
Commercial (Business/Industrial)	2,282	2,875	2,922	2,945	2,952	2,959
Institutional/Governmental	1,323	1,600	1,627	1,640	1,643	1,647
Landscape	1,525	1,659	1,686	1,700	1,704	1,707
Other & Non-Revenue Water	**2,794**	**2,807**	**2,810**	**2,804**	**2,912**	**2,828**
Projected Savings	**0**	**-801.8**	**-1,603.6**	**-2,405.4**	**-3,207.2**	**-4,009**
Total Demands with Savings	26,522	27,098	28,416	28,186	27,787	27,427
Population (including RHNA)	191,269	202,510	218,444	223,251	227,005	230,996
Total GPCD	124	119	116	113	109	106

Real Water Loss Reduction

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- MMWD meets the current State Water Loss Performance Standard, must maintain the same level of loss to remain in compliance.
- MMWD has a high operating pressure (109.3-109.5 psi).
- Unavoidable Annual Real Losses (UARL) (e.g., weeps and seeps, minor leakage) are significant.
- With high operating pressure and UARL, recovering losses due to leakage will be challenging.
- Typical leakage detection and repair approach unlikely to yield significant results. Need to consider long term system changes.

Reporting Year	2018	2019	2020	2021
Total Water Supplied:	25,048.2	25,517.9	27,290.7	21,533.1
Real Losses:	**1,810.8**	**1,964.4**	**1,679.5**	**1,045.2**
Total Water Losses:	2,622.8	2,787.7	2,568.0	1,757.2
Unavoidable Annual Real Losses (UARL):	**1,736.5**	**1,735.6**	**1,737.8**	**1,752.6**
Non-revenue water as percent by volume of Water Supplied:	10.5%	11.0%	10.1%	8.6%
Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.04	1.13	0.97	0.6
Average operating pressure (psi):	**109.5**	**109.3**	**109.4**	**109.4**

Recommendations to Reduce Real Water Loss

- Review system flushing volume and assess feasibility of a NO-DES system (system flushing recycling).
- Continue to prioritize leak repair and main replacement to maintain lower water losses on aging infrastructure.
- Conduct pressure study to evaluate opportunities
  - Study Goal: assess pressures prior to Level 3 analysis
- Complete planned Level 3 Component Analysis
  - Study Goal: Understand the true potential for real water loss recovery with cost assessment (support CIP budget)

Review and Recommendations Summary

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Measures Reviewed	Savings Estimate	Participation Estimate	Recommendation
AMI Leak Detection (leak letters/yr)	Reasonable	Reasonable	Increase leak alert letters when AMI is fully installed in service area
Non-Functional Turf Conversion (sqft/yr)	Reasonable	Low	No change. Explore opportunities to increase participation with ordinances, enforcement
Residential Turf Conversion (sqft/yr)	Reasonable	Reasonable	No change
Pool Covers (covers/yr)	High	High	Remove from WCE
SMART Irrigation Controllers (controllers/yr)	Reasonable	Low	Increase the number of controllers to 200/year
Conservation Assistance Program (residential surveys/yr)	Low	Reasonable	Increase water savings to 10 gpd per survey
Laundry to Landscape Graywater Kits (kits/yr)	High	High	Remove from WCE, keep as an educational effort
Rain Barrels (gallons/yr)	Reasonable	Reasonable	Remove from WCE, keep as an educational effort
Water Loss	Reasonable/Low	N/A	Investigate real losses recovery

Revised SWSA WCE Values

- Model starts with 2021 participation to ensure MMWD gets credit for the investments made during the drought.
- **Total cumulative savings** of 22,324 AF, decrease 192 AF for adjusted WCE measures.
- 2045 demand reduction of 4,000 AF, a decrease of 9 AF

SWSA Conservation Element Measure Projected Through 2045	Revised Annual Participation	Cumulative Water Savings in 2045 (AF)	Revised Cumulative Water Savings in 2045 (AF)	Difference in Cumulative Water Savings (AF)
Pool Covers (covers/yr)	0	642	91	-551
SMART Irrigation Controllers (controllers/yr)	200	586	1,054	468
Conservation Assistance Program (residential surveys/yr)	500	378	462	84
Laundry to Landscape Graywater Kits (kits/yr)	0	154	12	-142
Rain Barrels (gallons/yr)	0	58	7	-51

Additional Recommendations for Achieving Water Savings

- Develop regulations and enforcement mechanisms to ensure conservation savings will be sustained. Regulations may include:
  - Water budgets
  - Net zero development/remodel
  - Retrofit on resale
  - Non-functional turf replacement
- Install advanced metering infrastructure (AMI) throughout the MMWD service area.

Thank you!

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