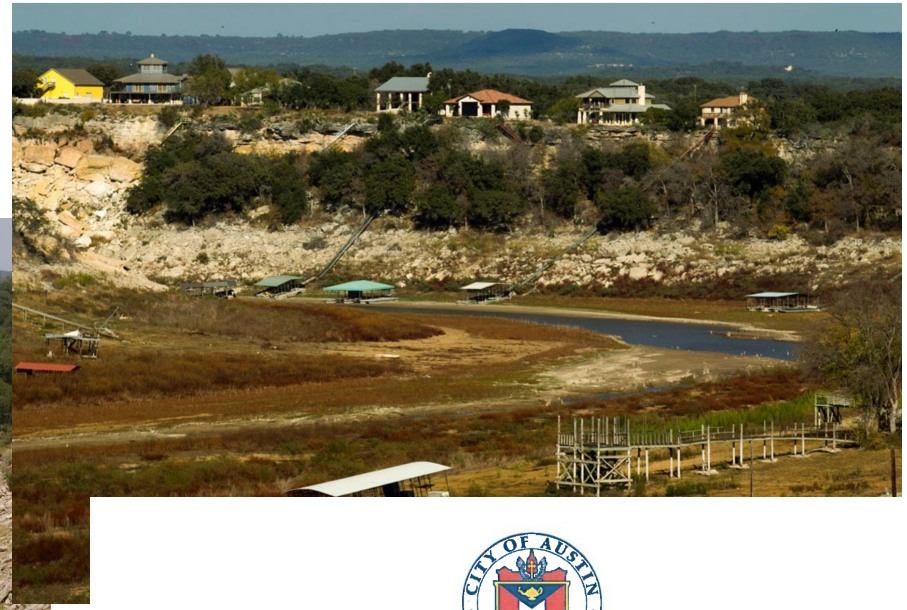
What's Happening Upstream: Austin Water Supply Planning

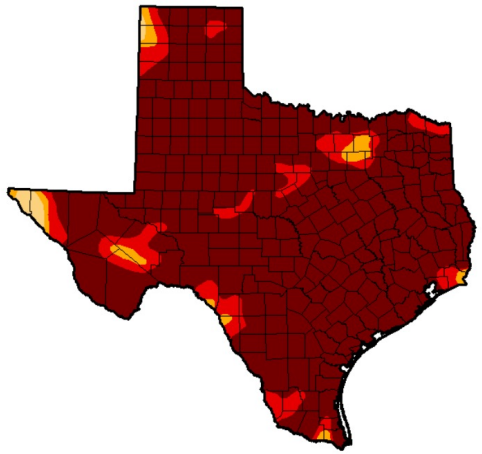
Jennifer Walker
Director, Texas Coast and Water Program

TEXAS LIVING WATERS PROJECT

National Wildlife Federation
Texas Coast and Water Program

How One Water came to Austin (and TX)





October 4, 2011
(Released Thursday, Oct. 6, 2011)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	99.16	96.99	87.99
Last Week 9/27/2011	0.00	100.00	100.00	99.16	96.65	85.75
3 Months Ago 7/5/2011	2.41	97.59	95.73	94.39	90.21	71.30
Start of Calendar Year 1/4/2011	13.55	86.45	66.68	36.30	13.04	0.00
Start of Water Year 9/27/2011	0.00	100.00	100.00	99.16	96.65	85.75
One Year Ago 10/5/2010	75.60	24.40	2.43	1.01	0.02	0.00

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

CITY OF AUSTIN FOUNDED 1839

MEMORANDUM

To: Mayor and Council Members

From: Greg Meszaros, Director, Austin Water

Date: July 3, 2014

Subject: Austin Water Resource Planning Task Force Recommendations

I am forwarding the Austin Water Resource Planning Task Force report on behalf of Sharlene Leurig who serves as the Chair. The Council appointed the Water Resource Planning Task Force in April 2014 (Resolution 20140410-033).

Based on the Task Force's recommendation, the next key step will be for the City of Austin and Austin Water to develop an Integrated Water Resource Plan.

cc: Marc A. Ott, City Manager
Robert Goode, P.E., Assistant City Manager

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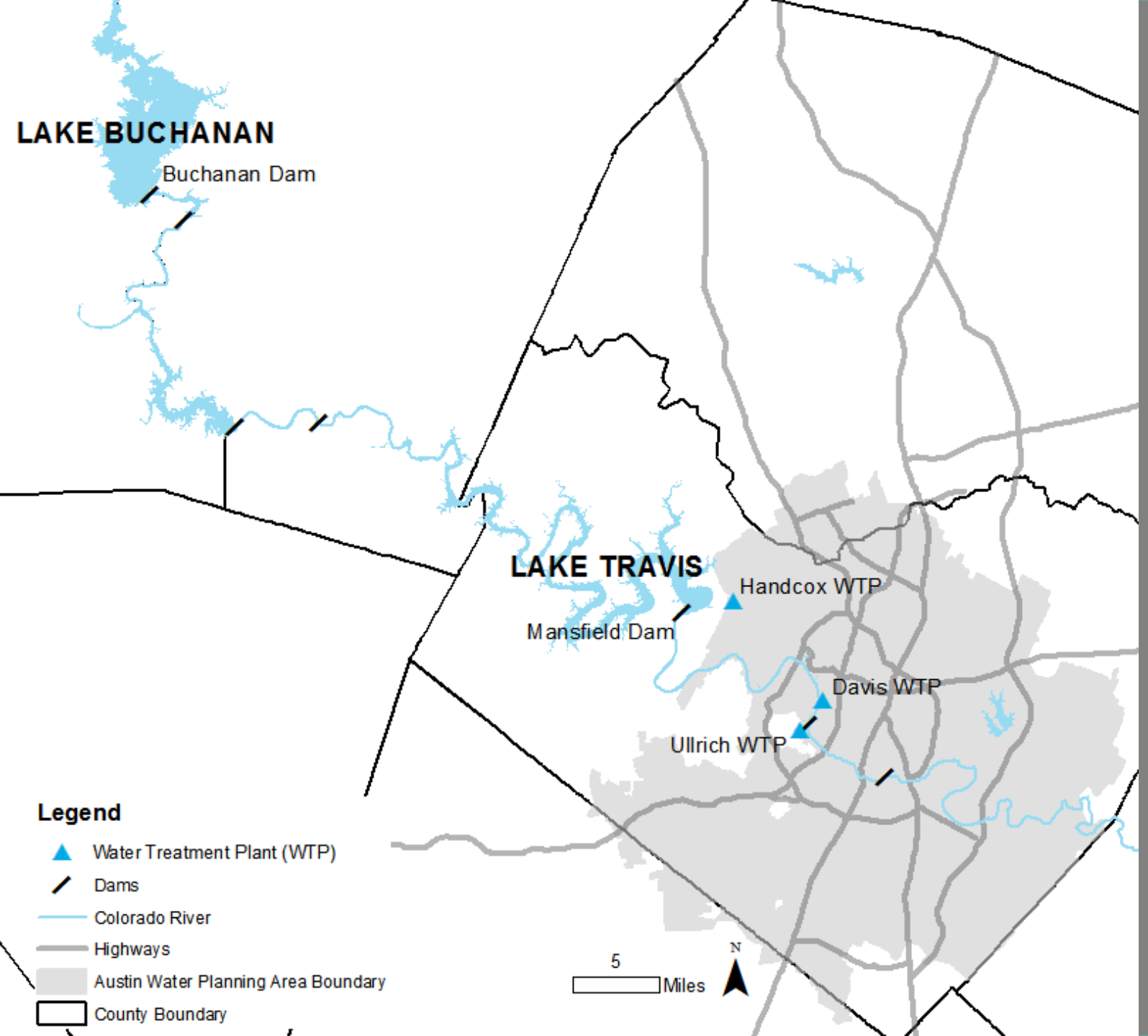
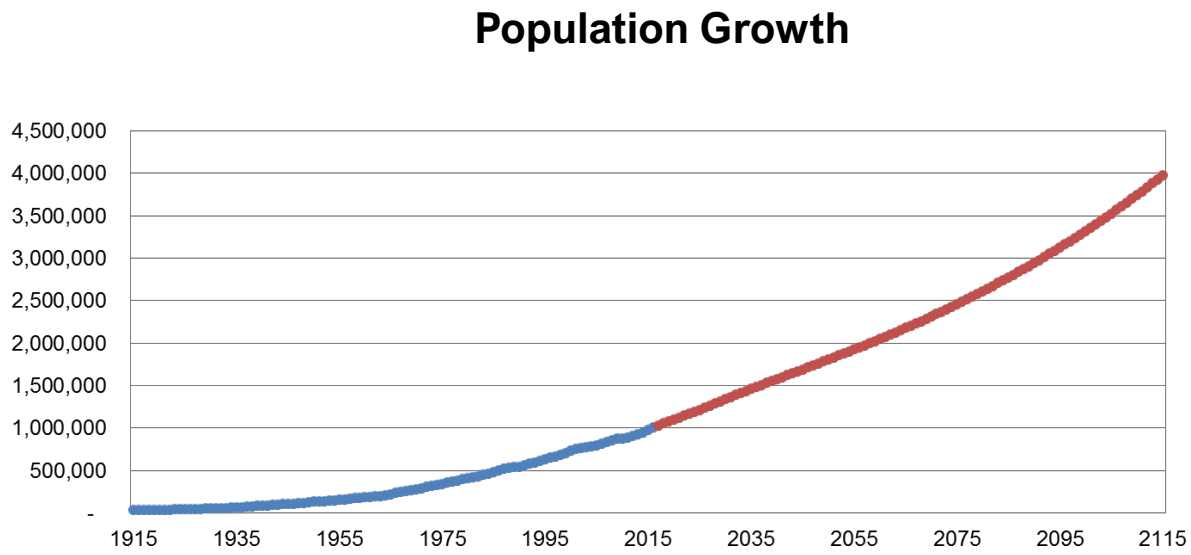
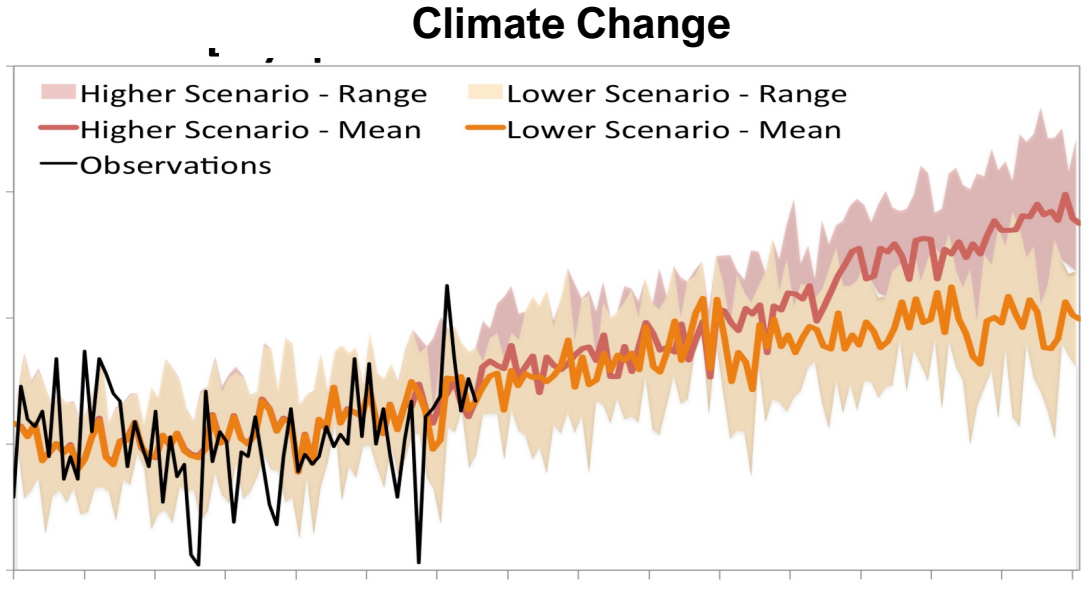


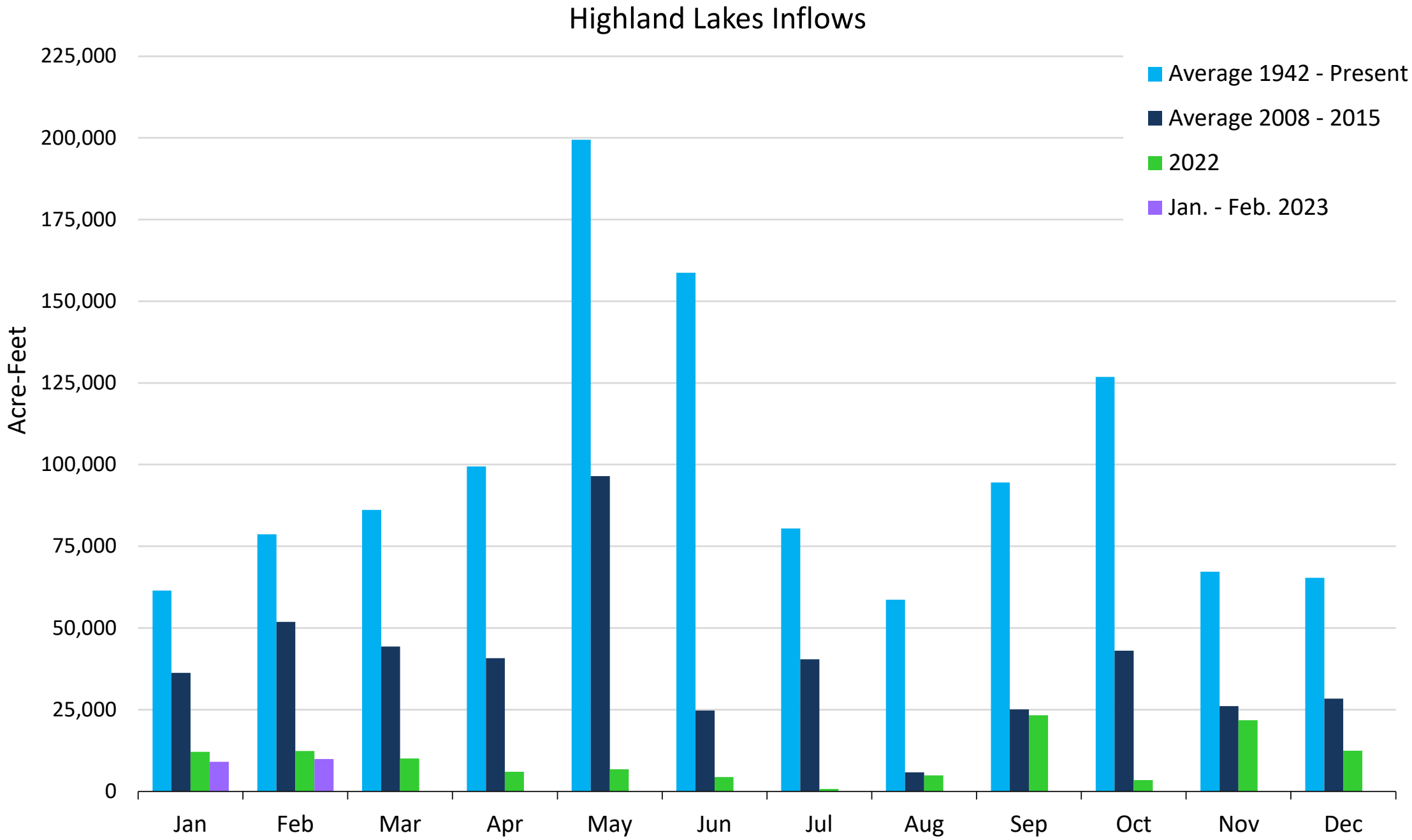
City of Austin Water Supplies

- COA has access to water supplies of up to 325,000 acre feet per year
- Municipal supply comes from a combination of:
- City of Austin senior water rights (run of river or ROR)
- Water supply contracts with LCRA (providing firm water and firm back-up to ROR rights)

Drivers – drought, pop growth, climate






Highland Lakes Inflows
225,000
200,000
175,000
150,000
125,000
100,000
75,000
50,000
25,000
0
Acre-Feet
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Average 1942 - Present
Average 2008 - 2015
2022
Jan. - Feb. 2023

Projected high-level climate trends in the Colorado River basin

Temperature

- Annual mean temperature is projected to increase
- Number of hot days with temperatures above 100°F are projected to increase

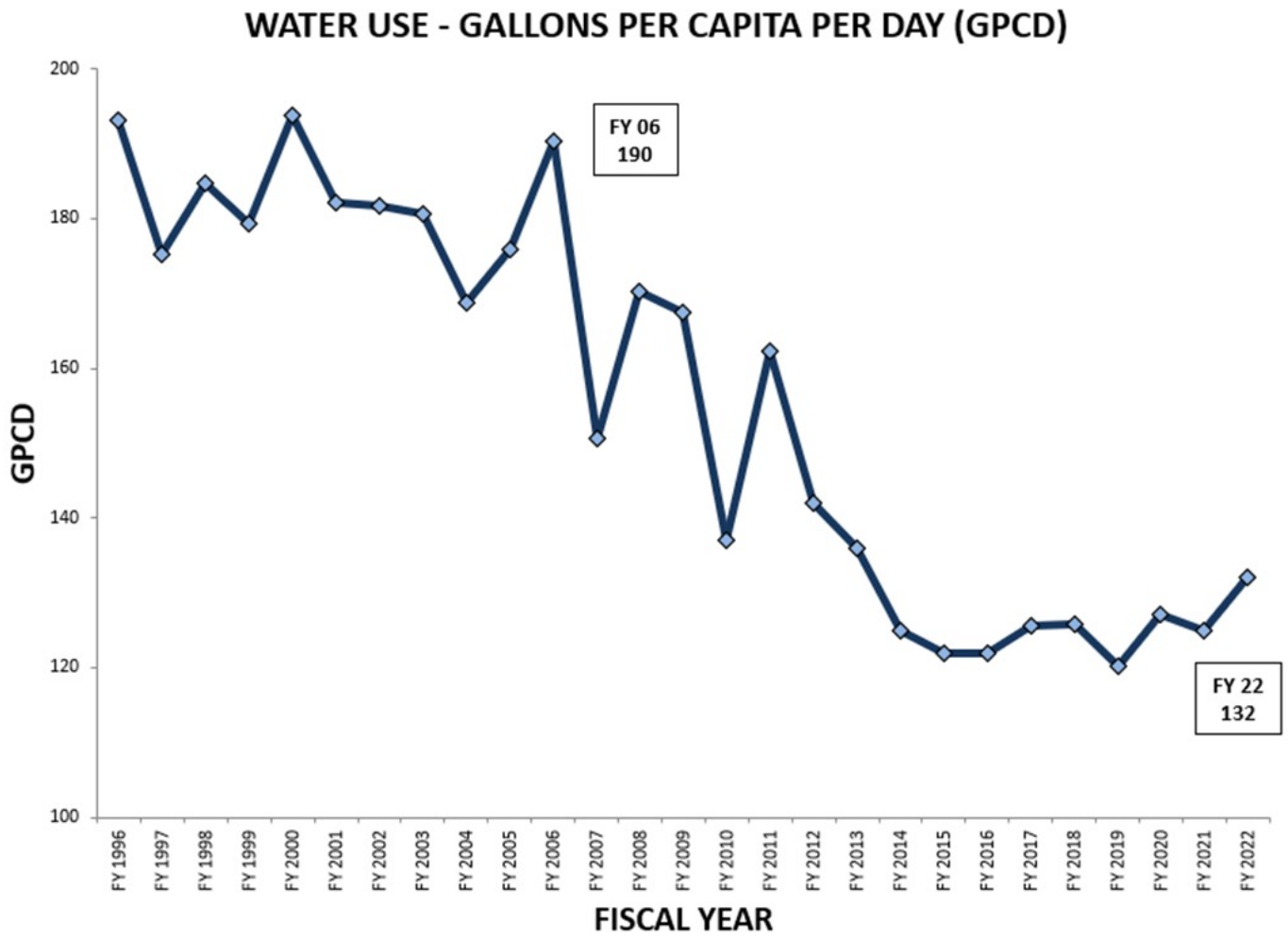
Rainfall

- Rainfall distribution is projected to change
- Less frequent and more intense rainfall events are projected

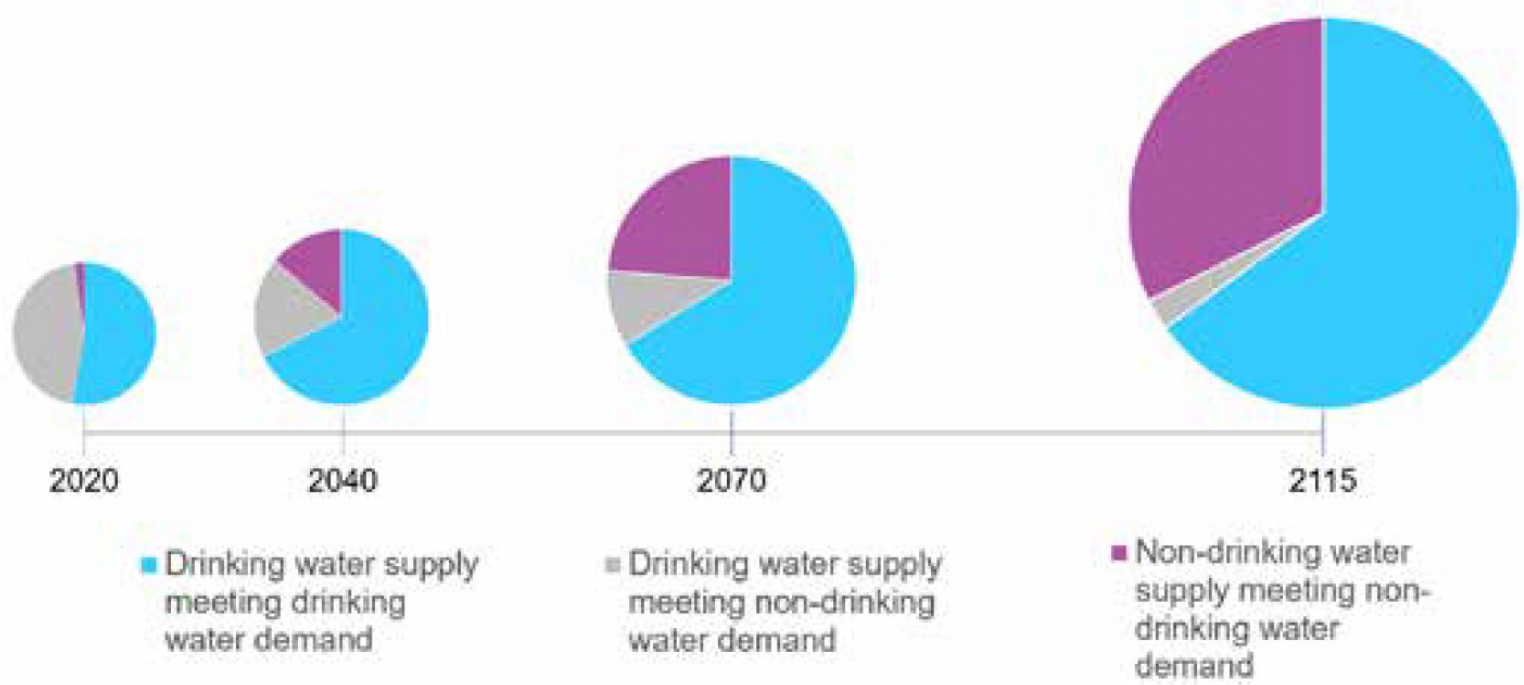
Dry Days

- Number of dry days with precipitation below 0.01” are projected to increase

Austin's Water Use



Water Forward Adopted Dec 2018



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Water Forward Recommended Strategies yield 120,000 afy of water supply by 2040.

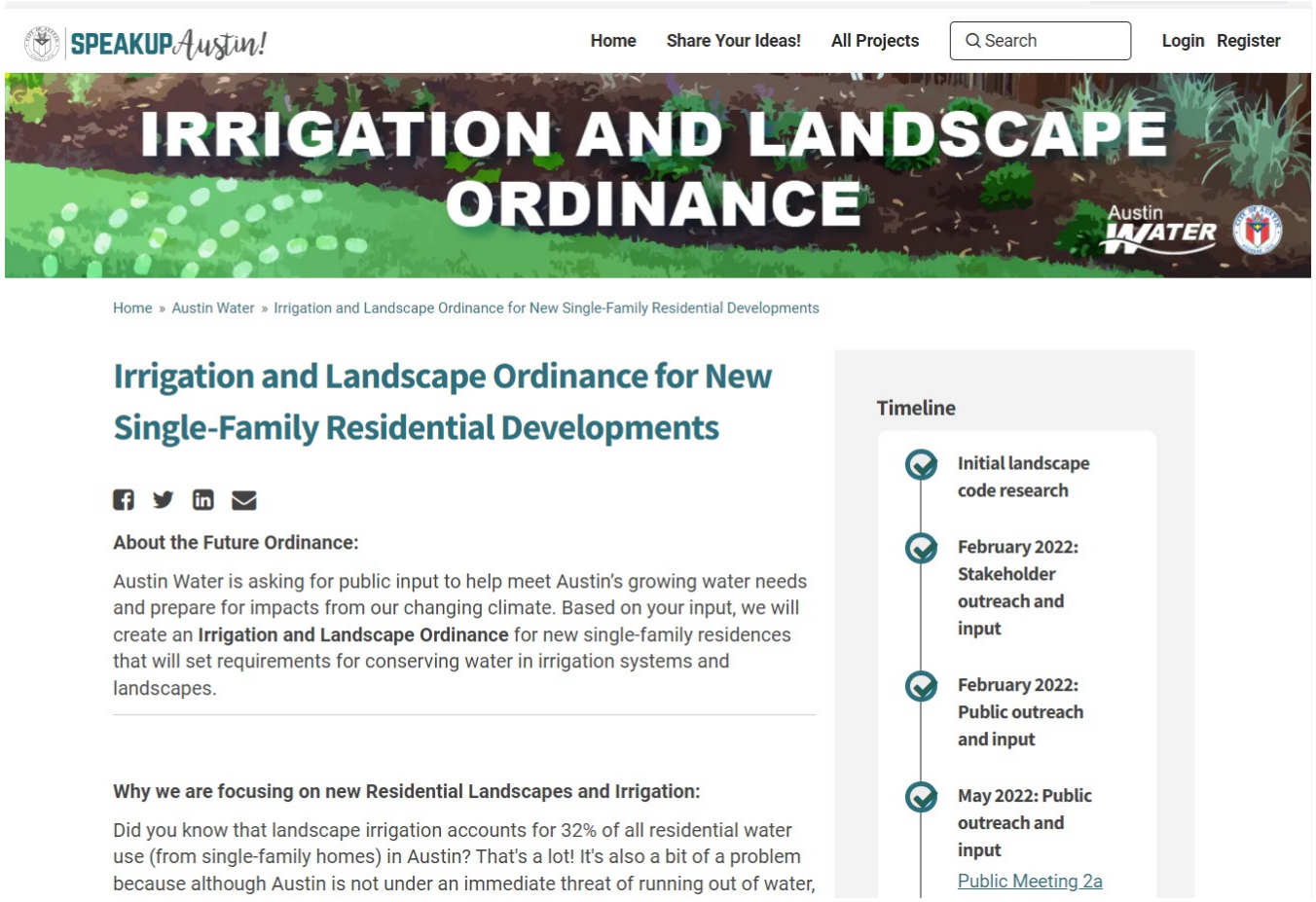
This is in addition to Austin's Colorado River/Highland Lakes Water Supply

Option #/ Type	Recommended Strategies	Average/ Drought	Estimated Yield Capacity (Acre Feet per Year)[1]			
			2020	2040	2070	2115
	Demand Management Options					
D1	Advanced Metering Infrastructure (AMI)	Both	600	3,880	5,770	9,370
D2	Utility Side Water Loss Control	Both	3,110	9,330	10,918	13,060
D3	Commercial, Industrial, and Institutional (CII) Ordinances	Both	1,060	1,060	1,060	1,060
D4	Water Use Benchmarking and Budgeting	Both	-	5,950	11,670	25,230
D5	Landscape Transformation Ordinance	Both	-	3,040	7,430	15,050
D6	Landscape Transformation Incentive	Both	-	320	630	930
D7	Irrigation Efficiency Incentive	Both	40	210	430	390
D8	Lot Scale Stormwater Harvesting	Both	-	330	870	2,280
D9	Lot Scale Rainwater Harvesting	Both	-	1,550	4,030	9,250
D10	Lot Scale Graywater Harvesting	Both	-	2,130	5,620	12,670
D11	Lot/Building Scale Wastewater Reuse	Both	-	1,320	3,670	7,880
D12	Air Conditioning (AC) Condensate Reuse	Both	100	1,080	2,710	5,150
	Demand Management Strategies Sub-Total	-	4,910	30,200	54,810	102,320
	Water Supply Strategies					
S1	Aquifer Storage and Recovery	Drought	-	60,000	60,000	90,000
S2	Brackish Groundwater Desalination	Both	-	-	5,000	16,000
S3	Direct Non-Potable Reuse (Centralized Reclaimed Water System)	Both	500	12,000	25,000	54,600
S1a	Indirect Potable Reuse (IPR) through Lady Bird Lake	Drought	-	11,000	20,000	20,000
S1b	Capture Local Inflows to Lady Bird Lake (infrastructure also included as part of IPR, above)	Average	-	3,000	3,000	3,000
S7	Off Channel Reservoir	Both	-	-	25,000	25,000
S9	Distributed Wastewater Reuse	Both	-	3,150	14,470	30,050
S10	Sewer Mining	Both	-	1,000	2,210	5,280
S11	Community Scale Stormwater Harvesting	Both	-	160	240	500
	Drought Supply Strategies	-	-	71,000	80,000	110,000
	Average/Both Supply Strategies	**-**	**500**	**19,310**	**74,910**	**134,440**
	Water Supply Strategies Sub-Total		**500**	**90,310**	**154,910**	**244,440**
	Water Forward Recommend Strategies Overall Total		5,410	120,510	209,720	346,750

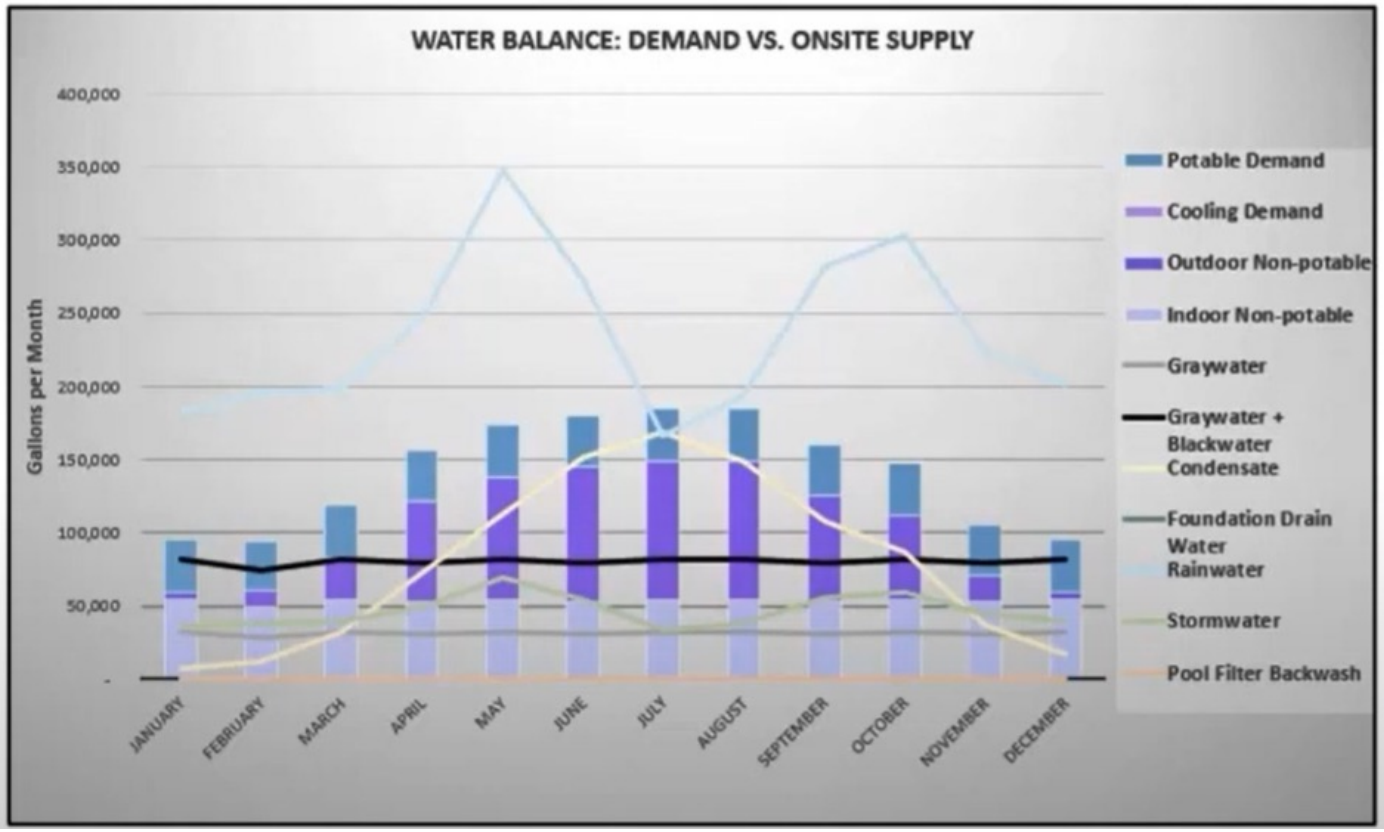
Irrigation and Landscape Ordinance

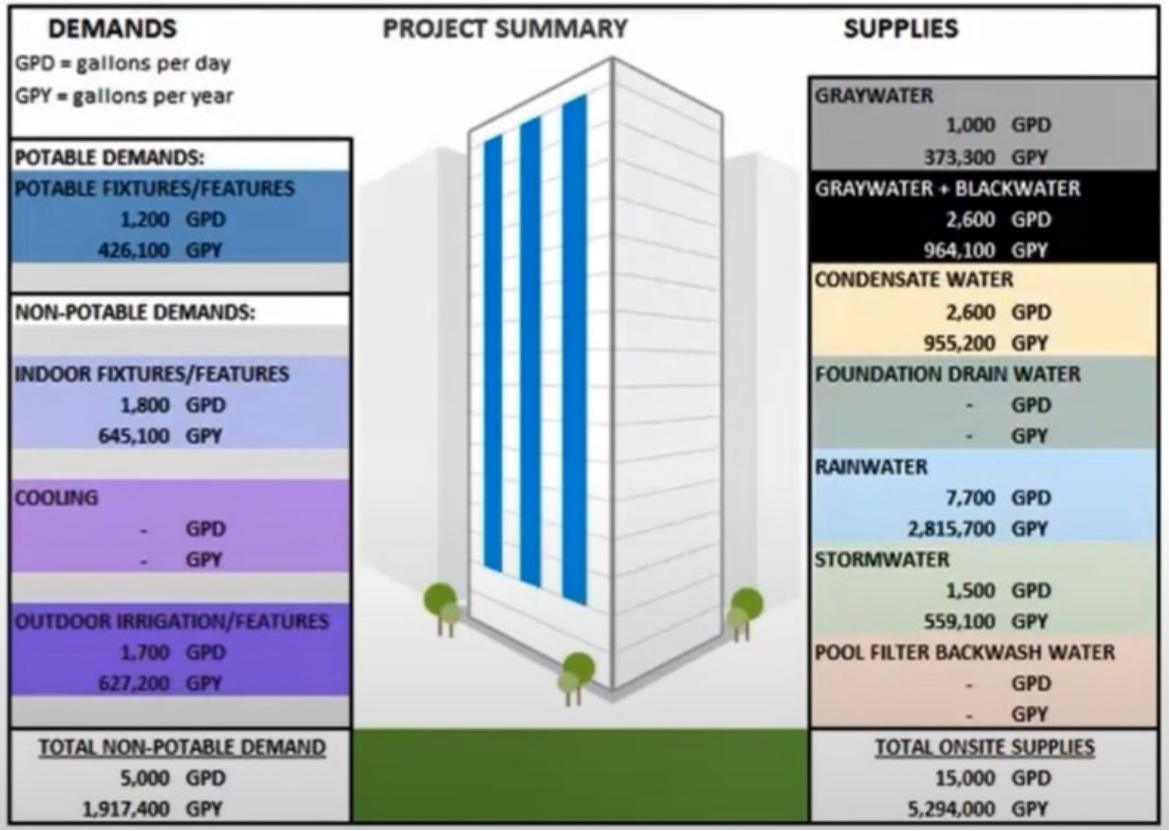
- Currently in the stakeholder engagement phase
- Ordinance will apply to new single-family residences and will set requirements for conserving water in irrigation systems and landscapes

- Water Supply/Savings by 2040 = 4000 acre/feet per year



Water Use Benchmarking





- Water Supply/Savings by 2040 = 6000 acre/feet per year

www.austintexas.gov/page/water-benchmarking

Onsite Water Reuse System Program

Phase I went into effect December 2020

Voluntary* OWRS Program

- New OWRS regulations in Title 15 (Utility Regulations) for the design, permitting and operation and maintenance of multi-family & commercial systems
- Encourage voluntary adoption of OWRS in new development to test out the new regulatory framework with pilot incentive

*Mandatory for 100 ton+ cooling towers

Phase 2 to take effect December 2023

Mandatory OWRS Program

- Mandatory installation of OWRS for commercial and multi-family developments >250,000 sq. ft. in Title 25 (Land Development Code)
- Rules will be posted on the applicability for the mandate along with provisions for enforcing the mandate

- Water Supply/Savings by 2040 = 5000 acre/feet per year

austintexas.gov/department/onsite-water-reuse-systems

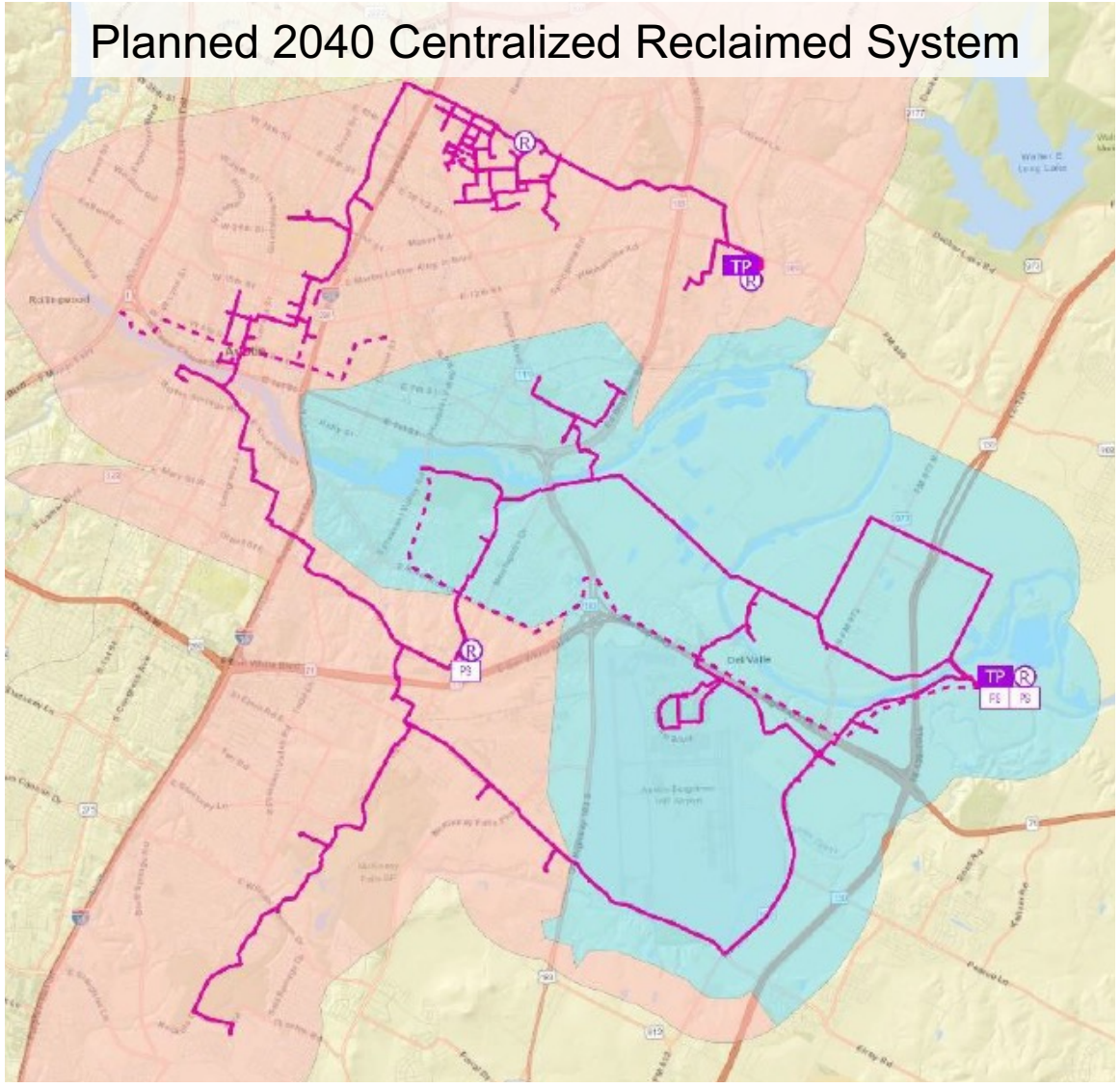
Onsite Water Blackwater Reuse Pilot

OSCAR (On-Site Collection and Reuse) and CLARA (Closed-Loop Advanced Reclaimed Assembly)

austintexas.gov/department/oscar-and-clara-pilot-project-faq

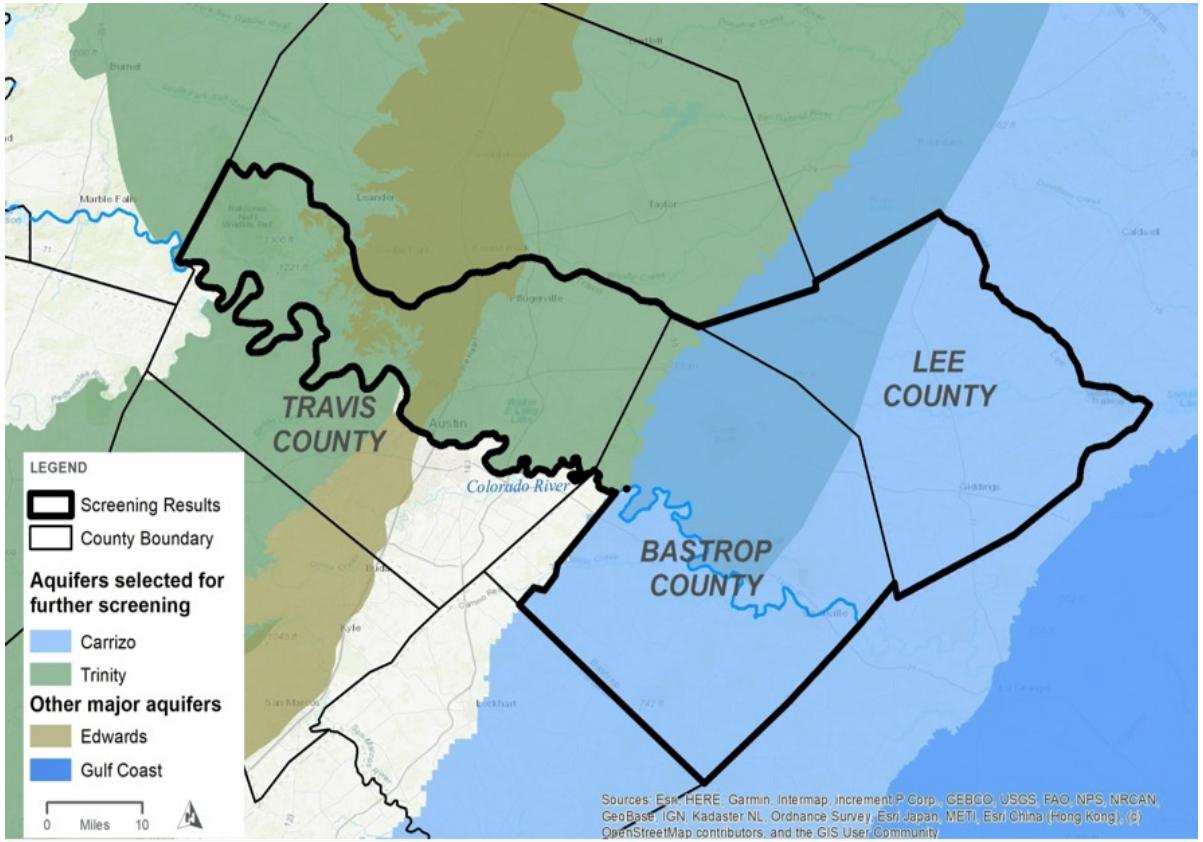
Centralized Reclaimed Water

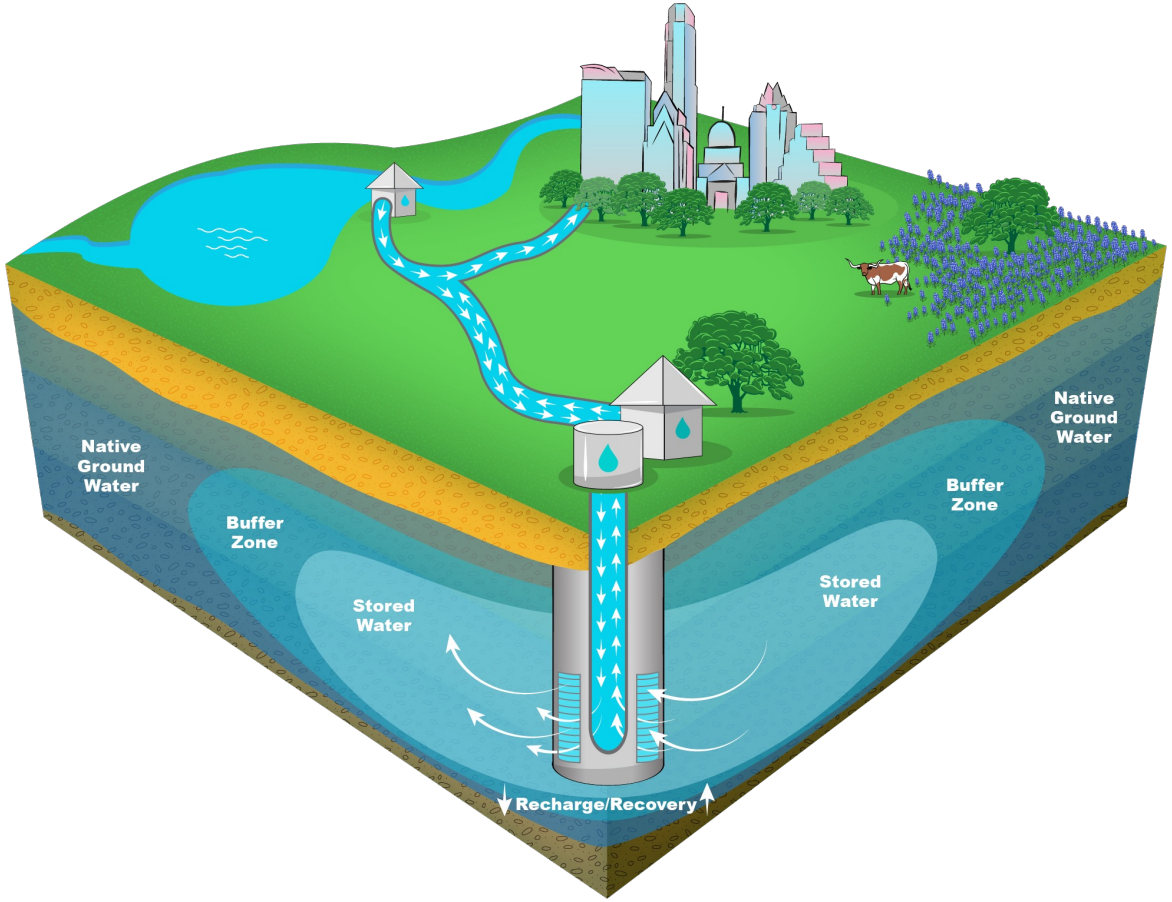
- Planned expansion of the centralized reclaimed system
- Expansion of reclaimed connection requirements for new developments



- Water Supply/Savings by 2040 = 12,000 acre/feet per year

Aquifer Storage and Recovery





- Water Supply/Savings by 2040 = 60,000 acre/feet per year

Water Forward Strategies

- Advanced Meter Infrastructure
  - 4000 afy in savings by 2040
- Water Loss Mitigation
  - 10,000 afy in savings by 2040

What does this mean downstream?

Net Diversion Metrics Summary - from WAM Results

20-Mar-18

Hybrid #1

Hydrologic Condition	Demand Projection	Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
Stationary	2020	143,547	105,598	143,547	37,949	0.264	0.736
Stationary	2040	161,397	113,642	160,677	47,755	0.297	0.704
RCP 8.5	2040	161,582	113,583	160,931	47,999	0.298	0.703
Stationary	2070	207,018	137,068	202,448	69,950	0.346	0.662
RCP 8.5	2070	207,397	136,755	203,030	70,642	0.348	0.659
Stationary	2115	285,188	177,619	279,283	107,569	0.385	0.623
RCP 8.5	2115	279,984	176,188	276,942	103,796	0.375	0.629
			Geometric Mean		60,453	0.318	0.681

Hybrid #2

Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
143,547	105,598	143,547	37,949	0.264	0.736
161,292	113,642	160,719	47,650	0.296	0.705
161,293	113,547	160,931	47,747	0.297	0.704
203,685	137,068	202,398	66,617	0.329	0.673
201,247	136,153	202,748	65,094	0.321	0.677
279,044	177,619	279,143	101,425	0.363	0.637
261,947	177,496	276,622	84,451	0.305	0.678
	Geometric Mean		56,179	0.296	0.698

Max Conservation

Hydrologic Condition	Demand Projection	Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
Stationary	2020	143,519	107,008	143,519	36,511	0.254	0.746
Stationary	2040	159,351	113,418	158,631	45,933	0.290	0.712
RCP 8.5	2040	159,629	113,418	158,920	46,211	0.291	0.711
Stationary	2070	201,685	134,744	198,171	66,941	0.338	0.668
RCP 8.5	2070	202,461	134,744	199,096	67,717	0.340	0.666
Stationary	2115	281,393	184,433	277,787	96,960	0.349	0.655
RCP 8.5	2115	276,576	184,433	275,267	92,143	0.335	0.667
			Geometric Mean		56,962	0.303	0.696

Min Cost

Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
143,523	103,526	143,523	39,997	0.279	0.721
173,944	118,420	171,032	55,524	0.325	0.681
174,563	118,420	171,146	56,143	0.328	0.678
231,752	147,016	228,114	84,735	0.371	0.634
231,056	146,744	227,714	84,312	0.370	0.635
314,579	192,368	330,067	122,211	0.370	0.612
288,911	190,592	326,029	98,319	0.302	0.660
	Geometric Mean		65,684	0.318	0.673

Notes:

All results are for the period of record simulation, February 1940 through December 2016. January 1940 is excluded because of a 1-month lag in discharging return flows in the WAM which results in zero return flows for January 1940.

Average Annual Diversion from the River is the summation of all water diverted by Austin to meet municipal demand that is derived from the City's water rights and LCRA supplies. The summation includes the river diversions to refill the ASR and OCR (if present in the portfolio). The ASR has a small loss rate associated with it, and the OCR has evaporative losses. Therefore, it is possible for the Averge Annual Diversion from the River to be slightly higher than the Average Annual Total Demand when diversions to offset ASR losses and OCR evaporation are considered.

The Average Annual Total Demands are the average of derived from simulated monthly demands. The monthly demand change according to Austin's implementaiton of drought contingency plan (DCP) measures in response to combined storage in lakes Buchanan and Travis. Simulations with lower lake levels will have lower monthly and annual averge demands.

For example, for demand projections in 2115 with climate adjustment are 6% higher than for demand projections in 2115 with a stationary climate. However, simulated lake levels are lower with climate trend adjustments to the stationary hydrologic condtions. Therefore, average annual total demands are lower in the climate adjusted simulation.

The Geometric Mean is calculated for 2020 Stationary, 2040 RCP 8.5, 2070 RCP 8.5, and 2115 RCP 8.5. Results for 2040 Stationary, 2070 Stationary, and 2115 Stationary are provided for informational purposes only.

Max Reliability

Hydrologic Condition	Demand Projection	Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
Stationary	2020	143,547	104,723	143,547	38,824	0.270	0.730
Stationary	2040	166,329	116,682	167,437	49,646	0.297	0.702
RCP 8.5	2040	165,655	116,026	167,667	49,629	0.296	0.700
Stationary	2070	212,727	141,662	215,204	71,065	0.330	0.666
RCP 8.5	2070	206,877	139,185	215,430	67,693	0.314	0.673
Stationary	2115	291,113	186,456	303,398	104,657	0.345	0.640
RCP 8.5	2115	259,670	173,796	301,031	85,875	0.285	0.669
			Geometric Mean		57,851	0.291	0.693

Min Implementation

Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
143,523	104,120	143,523	39,404	0.275	0.725
167,184	114,694	166,463	52,489	0.315	0.686
167,245	114,694	166,539	52,551	0.316	0.686
221,607	139,327	217,964	82,280	0.377	0.629
221,426	139,121	217,994	82,305	0.378	0.628
315,164	183,047	311,985	132,117	0.423	0.581
308,496	181,053	308,106	127,442	0.414	0.587
	Geometric Mean		68,268	0.341	0.654

Max Local Control

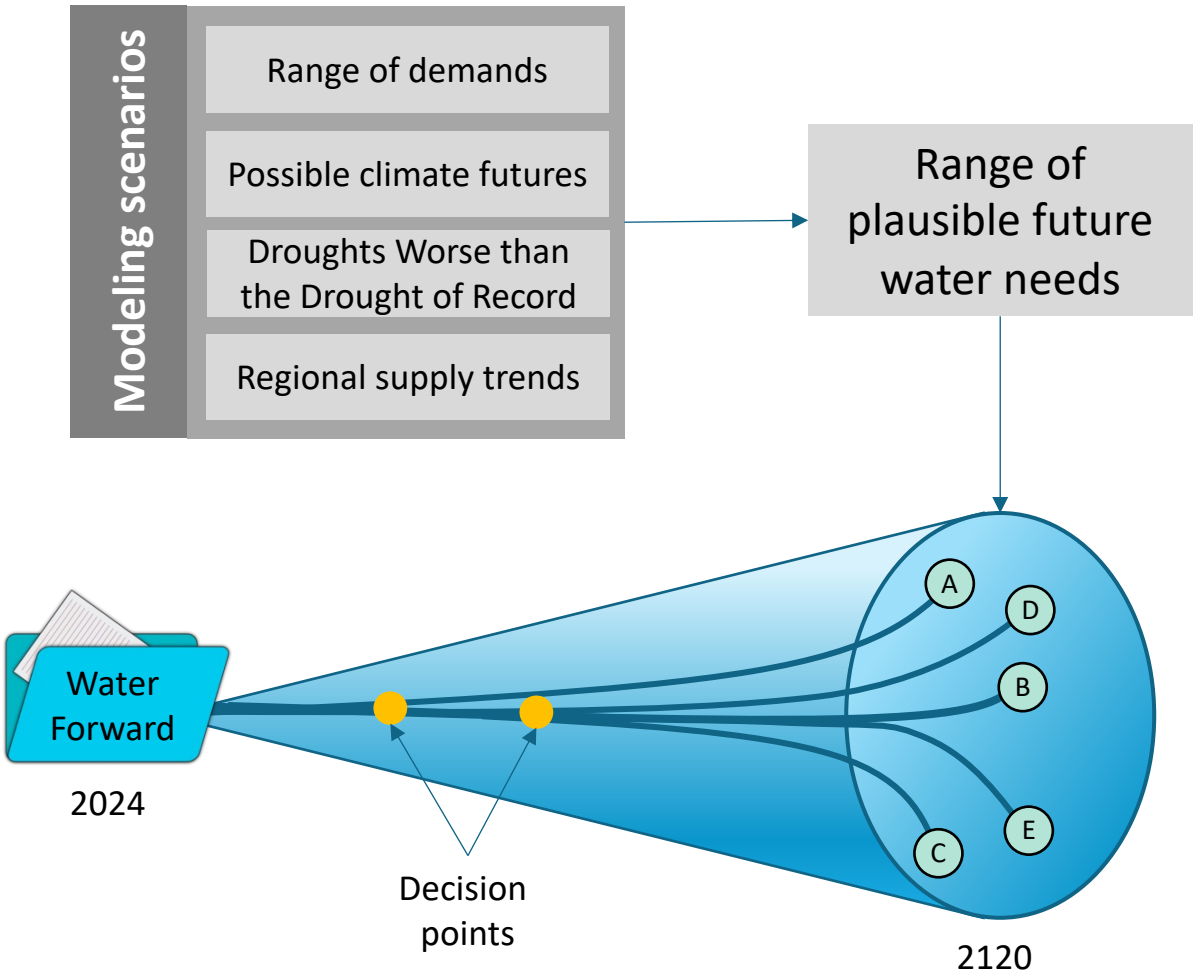
Hydrologic Condition	Demand Projection	Average Annual Diversion from River, ac-ft	Average Annual Return Flow to River, ac-ft	Average Annual River Demand, ac-ft	Net Diversion (Diversion minus Return Flow), ac-ft	Net Diversion divided by Avg. Annual Demand	Return Flow divided by Avg. Annual Diversion
Stationary	2020	143,560	104,876	143,560	38,684	0.269	0.731
Stationary	2040	162,870	113,613	162,150	49,258	0.304	0.698
RCP 8.5	2040	163,062	113,613	162,354	49,449	0.305	0.697
Stationary	2070	210,173	136,364	206,529	73,809	0.357	0.649
RCP 8.5	2070	210,431	136,198	206,932	74,234	0.359	0.647
Stationary	2115	286,764	173,638	282,859	113,126	0.400	0.606
RCP 8.5	2115	281,582	171,746	280,722	109,836	0.391	0.610
			Geometric Mean		62,843	0.328	0.670

The tables above show the modeled estimates based on various scenarios for planning, each of which have assumptions about effluent production and reuse.

Actual future diversions and return flows will depend on future conditions and strategy implementation.

Planning for Uncertainty in Water Forward 24

- Develop range of futures
- Find common near-term strategies that work for a broad range of futures
- Develop adaptive management plan with key decision points
- Re-evaluate at key decision points



THANKS!

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