



From Conservation to Climate Change: *Planning for an Uncertain Future*

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December 3, 2019



About Austin Water

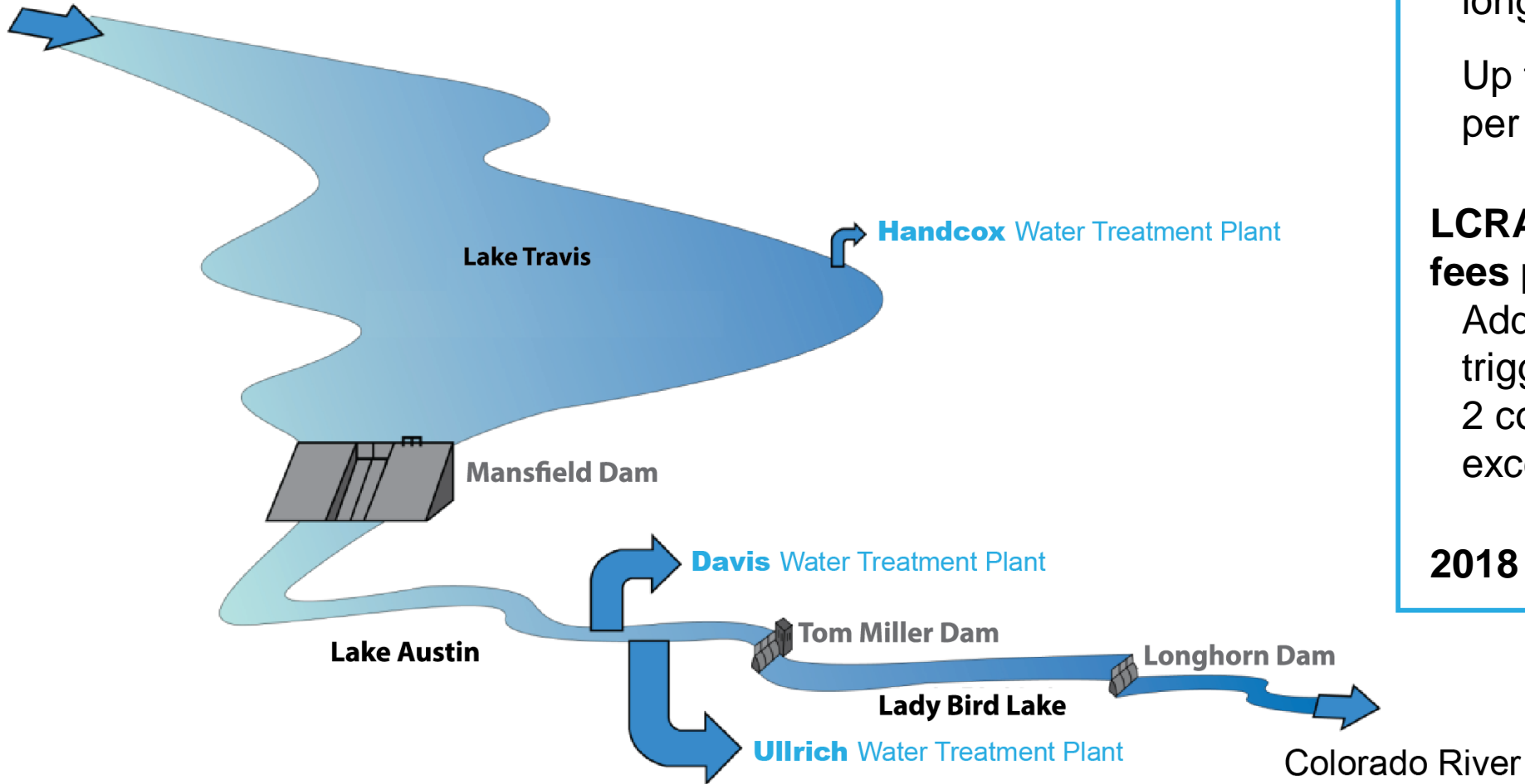
Large City-Owned Metropolitan Utility

- Drinking water, wastewater, & reclaimed water
- 335 MGD water treatment capacity
- 1,000,000+ customers
- 225,000+ connections
- 3,900+ miles of water mains



Water Supply

Lake Buchanan



Colorado River:

Combination of State-granted water rights & long-term LCRA contract

Up to 325,000 acre-feet per year (af/y)

LCRA reservation & use fees pre-paid in 1999

Additional use payments trigger when average for 2 consecutive years exceeds 201,000 af/y

2018 Use: 149,000 acre-feet



Environmental Stewardship As Community Value



Water Quality Protection Lands

Optimizes quantity and quality of water recharging the Barton Spring segment of the Edwards Aquifer (26,000+ acres)

Hornsby Bend

No-discharge biosolids plant that produces DilloDirt™, is powered by methane cogeneration, and serves as an internationally recognized bird habitat



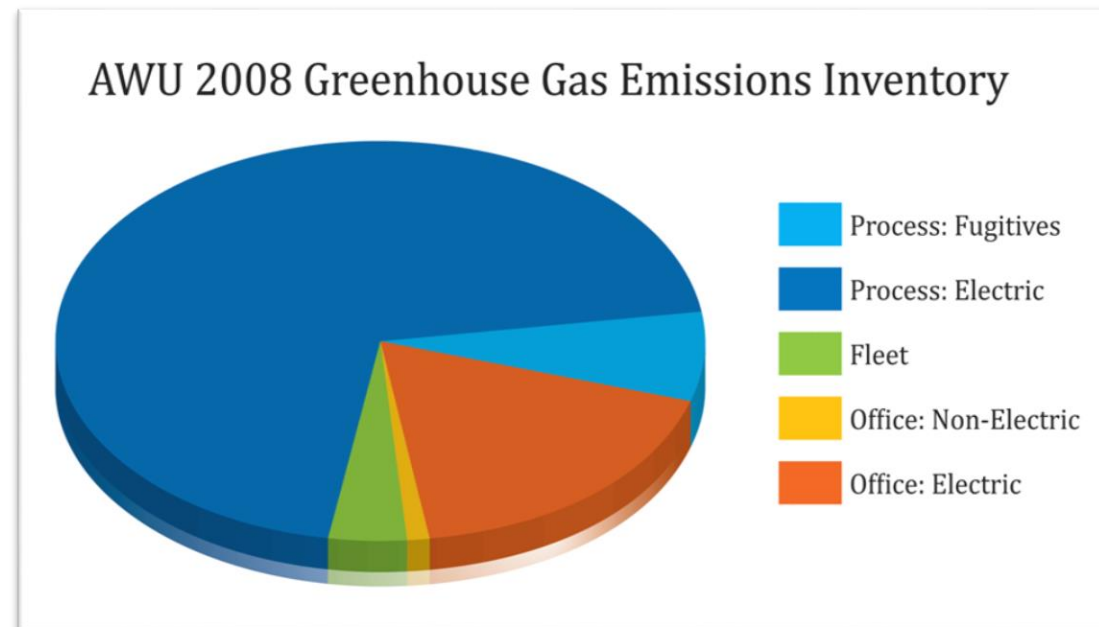
Balcones Canyonlands Preserve

Conserves habitat for eight endangered species and 27 species of concern (13,608 acres)



Initial Climate Planning Focused on Energy Efficiency & Greenhouse Gas Emissions

- **Water conservation**
 - A very direct way to reduce greenhouse gas emissions
- **Energy efficiency**
 - Improving operations and design of treatment plants and pumps
- **Generating renewable energy onsite**
 - Solar array and use of methane from wastewater sludge treatment
- **Reducing vehicle and equipment fuel use**
 - Improving fuel mix & using more efficient vehicles and equipment

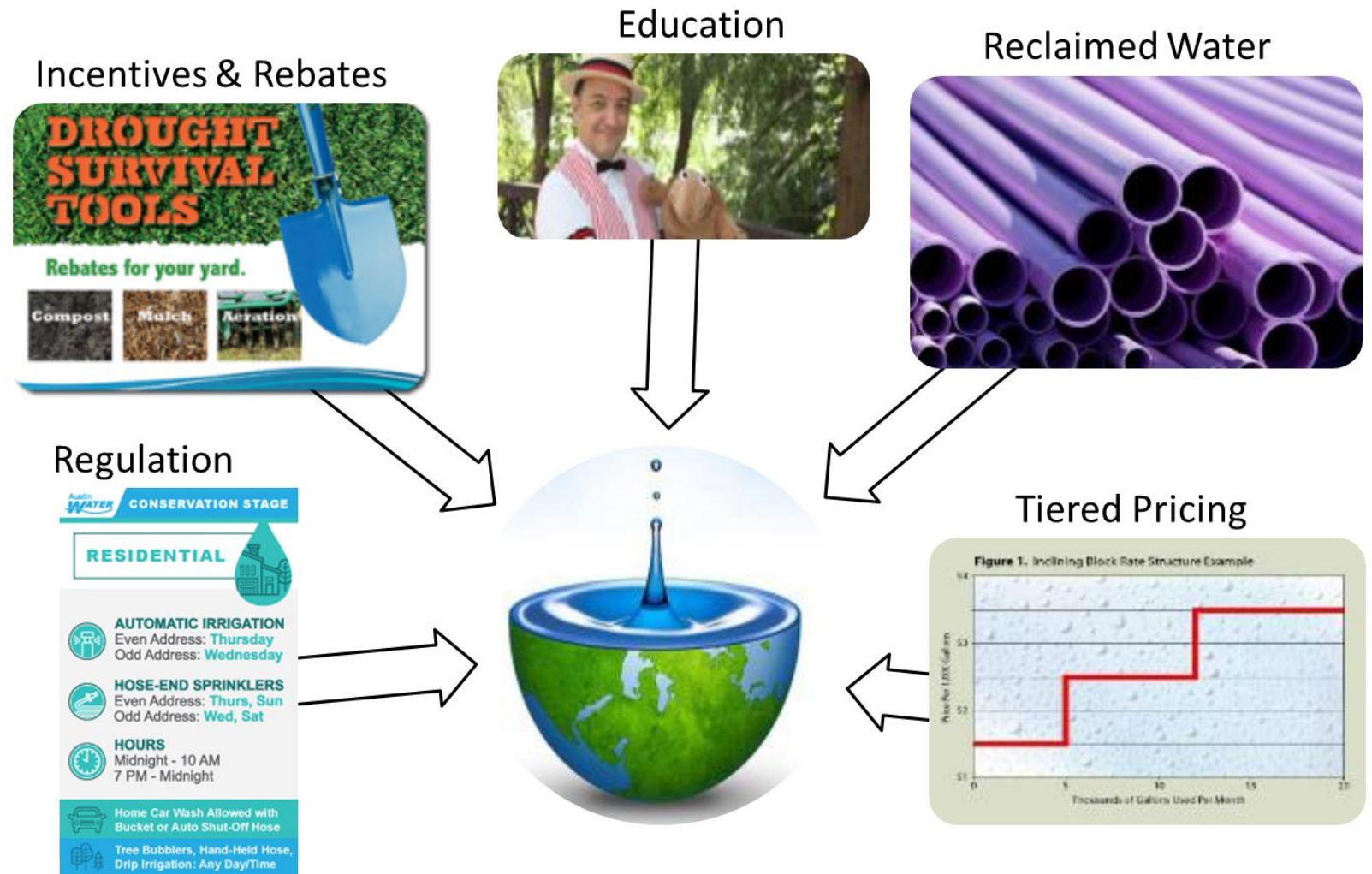


Traditional Approach to Water Use Management & Conservation

1983: Conservation program began with ordinance allowing water use restrictions

1990s: Conservation focus expanded to include consumer incentives & education

2006: Council directs strengthening of conservation programs



City Council Dual Directives Would Prove Prescient

- In 2006, Council directed AW to build a new water treatment plant (Handcox) & also strengthen its conservation program
 - Some residents opposed construction of Handcox saying conservation could prevent need for it
- Ultimately, investing in both infrastructure and programs proved wise in weathering climate impacts
 - Conservation would be key to surviving both drought & flood events
 - Handcox's treatment capacity would be essential to water service provision during flood



Texas Gets More Like It Is..... But More Intense

Drought



Fire



Heat



Flood



Source: Austin American Statesman, Photo Credit: Jay Janner

★ THE TEXAS TRIBUNE

Texas Tree Ring Study Warns of Long Droughts By Kate Galbraith | Dec. 21, 2011

A new study of tree rings adds to evidence that Texas has experienced **at least one 10-year drought every 100 years**, as well as, several **"mega-droughts" lasting 15 to 30 years** over the centuries.

TEXAS WATER JOURNAL

Extended droughts have been a **consistent feature** of southwestern climate since the 800s, **decadal-scale droughts** have occurred in Texas at least once a century since the 1500s.



Exceptional Drought & Unrelenting Heat

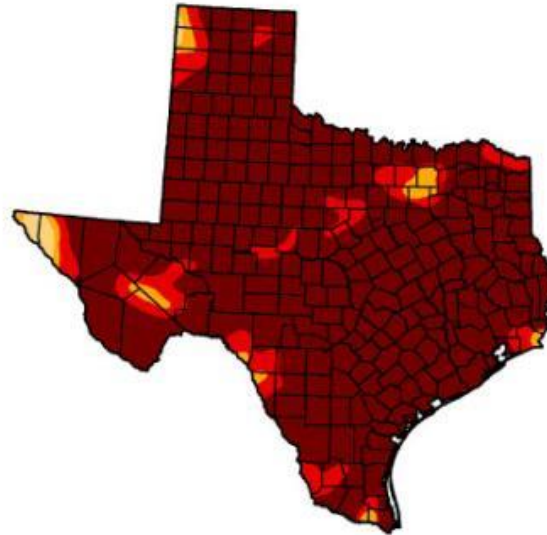
U.S. Drought Monitor Texas

October 4, 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 (09/27/2011 map)	0.00	100.00	100.00	99.16	96.65	85.75
3 Months Ago (07/05/2011 map)	2.41	97.59	95.73	94.39	90.21	71.30
Start of Calendar Year (12/28/2010 map)	7.89	92.11	69.43	37.46	9.59	0.00
Start of Water Year (09/27/2011 map)	0.00	100.00	100.00	99.16	96.65	85.75
One Year Ago (09/28/2010 map)	75.57	24.43	2.43	0.99	0.00	0.00

Intensity:

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



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

<http://droughtmonitor.unl.edu>



Released Thursday, October 6, 2011

Lowest Annual Inflows on Record

Rank	Year	Annual Total in Acre-Feet
1	2011	127,802
2	2014	207,642
3	2013	215,138
4	2008	284,462
5	2006	285,229
6	1963	392,589
7	2012	393,163
8	2017	429,959
9	1983	433,312
10	1999	448,162
11	2009	499,732
12	1950	501,926

9 of the 12 lowest inflow years have occurred since 1999

Top 5 all-time lowest reservoir inflows have occurred since 2006

90 days at or above 100 degrees in 2011



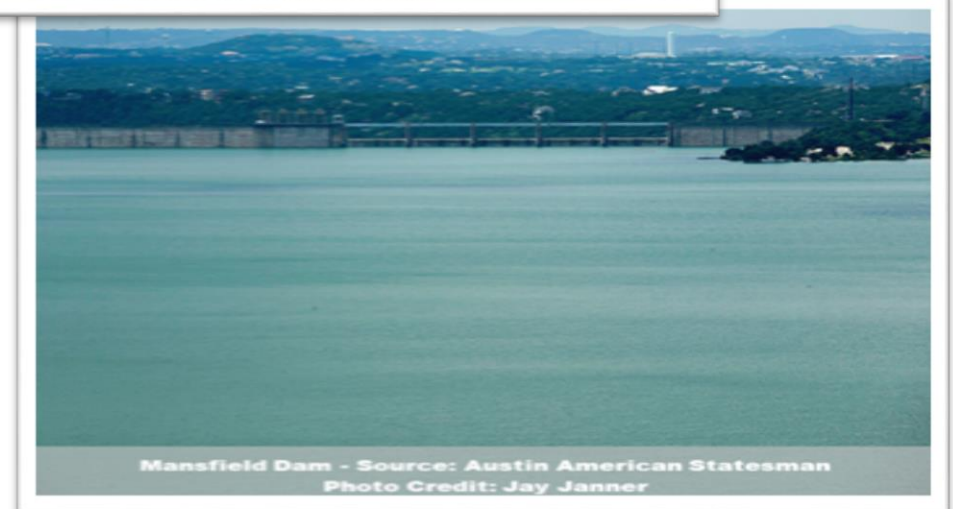
Drought Contingency Planning

July 2011

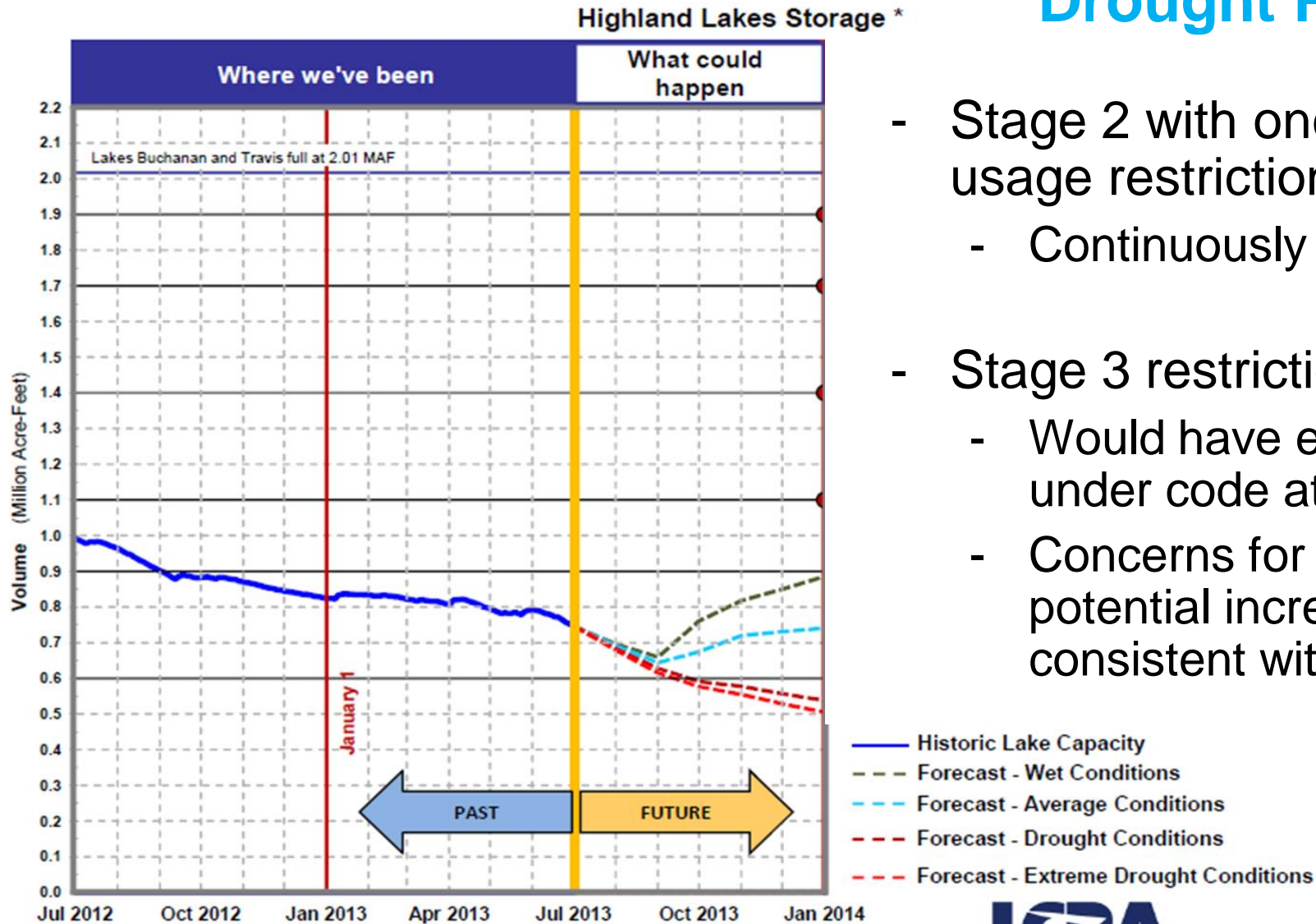
- State-required plan updated every five years
- Triggers for mandatory water use reductions set by LCRA based on Highland Lakes combined storage:
 - **900,000 acre-feet (Stage 2):**
 - Reduce by 15-20%
 - **600,000 acre-feet (Stage 3):**
 - Reduce to levels deemed necessary
 - May include state-mandated 20% reduction in water use (*pro rata* curtailment)



June 2016



Drought Plan Implementation



Note: MAF equals One Million Acre-Feet
One Acre-Foot (AF) equals 325,851 gallons.

Date: July 1, 2013



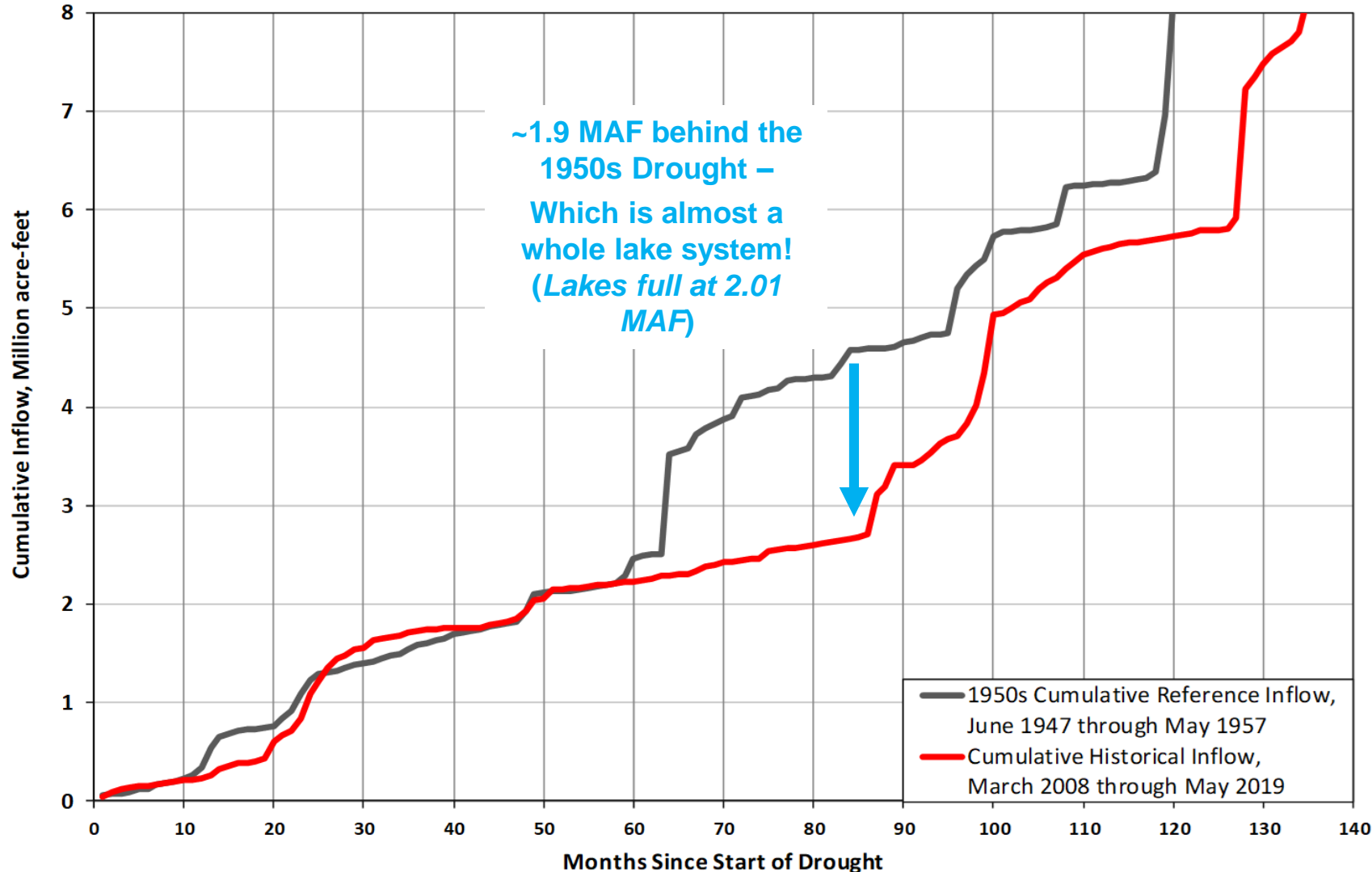
* Projections take into account emergency drought relief measures affirmed by TCEQ on February 13, 2013.

- Stage 2 with once a week watering & other usage restrictions in place
 - Continuously for over 3 years 8 months
- Stage 3 restrictions looked likely
 - Would have eliminated outdoor watering under code at that time
 - Concerns for impacts to tree canopy and potential increase in urban heat island consistent with climate change projections



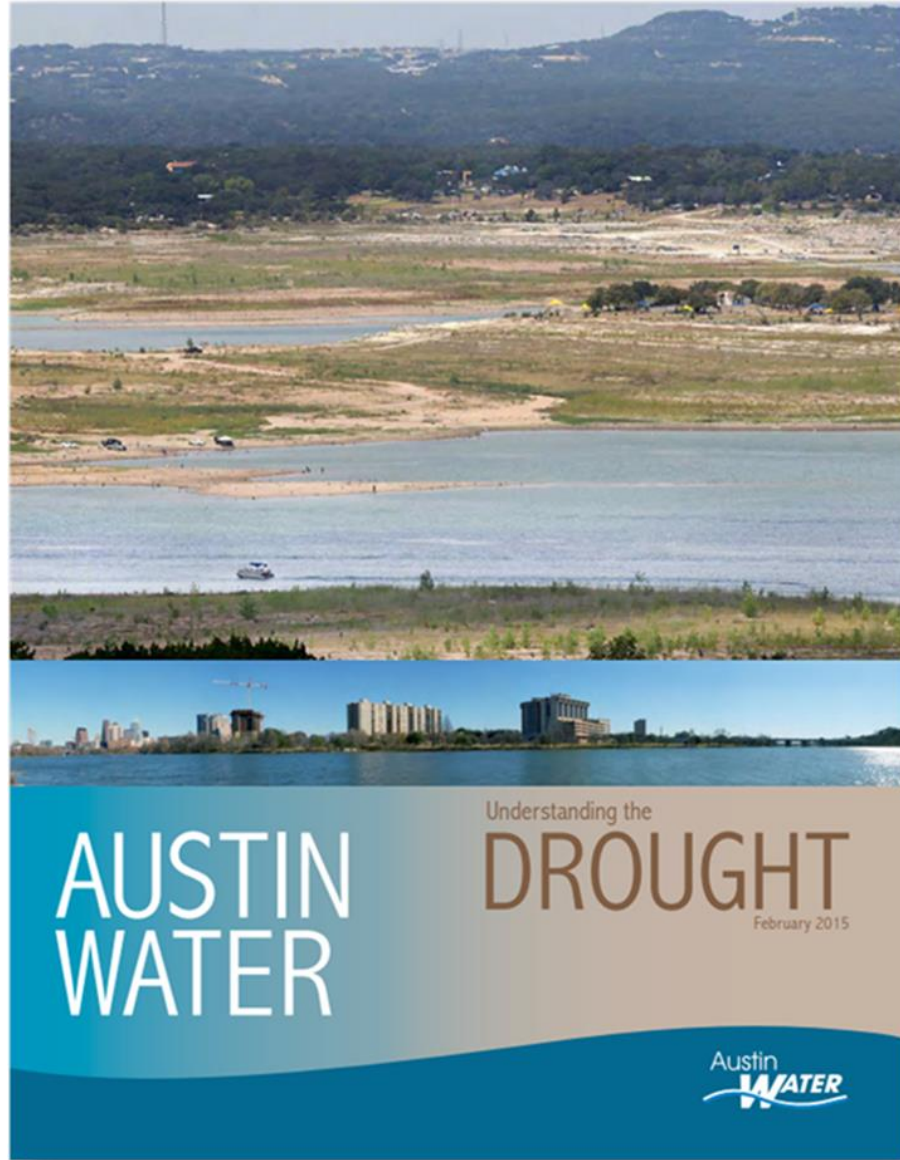
Moving into Uncharted Territory

Cumulative Inflows to Lakes Buchanan and Travis
1950's Drought vs Recent Drought



This drought – with record low inflows - was the truest period of uncertainty in AW's experience





“This Is Not Your Grandfather’s Drought”

It would **ultimately become the new drought of record** although it was uncertain at the time that this was what AW was facing

AW made planning & operations changes in response:

- Increased customer education and outreach
- Greater emphasis on water restriction enforcement
- Revised rate structure to accommodate conservation
- Revised water use ordinances in 2012 and 2016
 - Public called for initiating restrictions sooner in drought
 - New trigger added when combined storage falls below 1.4 million acre-feet
 - Automatic irrigation limited to once a week year-round



When It Finally Rains It Pours

- Record drought begins to break with Memorial Day flood in 2015
- Multiple rain events in 2016 fill the Highland Lakes
- One and a half relatively stable years follow
- Return to drought and record low inflows in 2018
- Massive flood event in October 2018 results in new challenges for AW



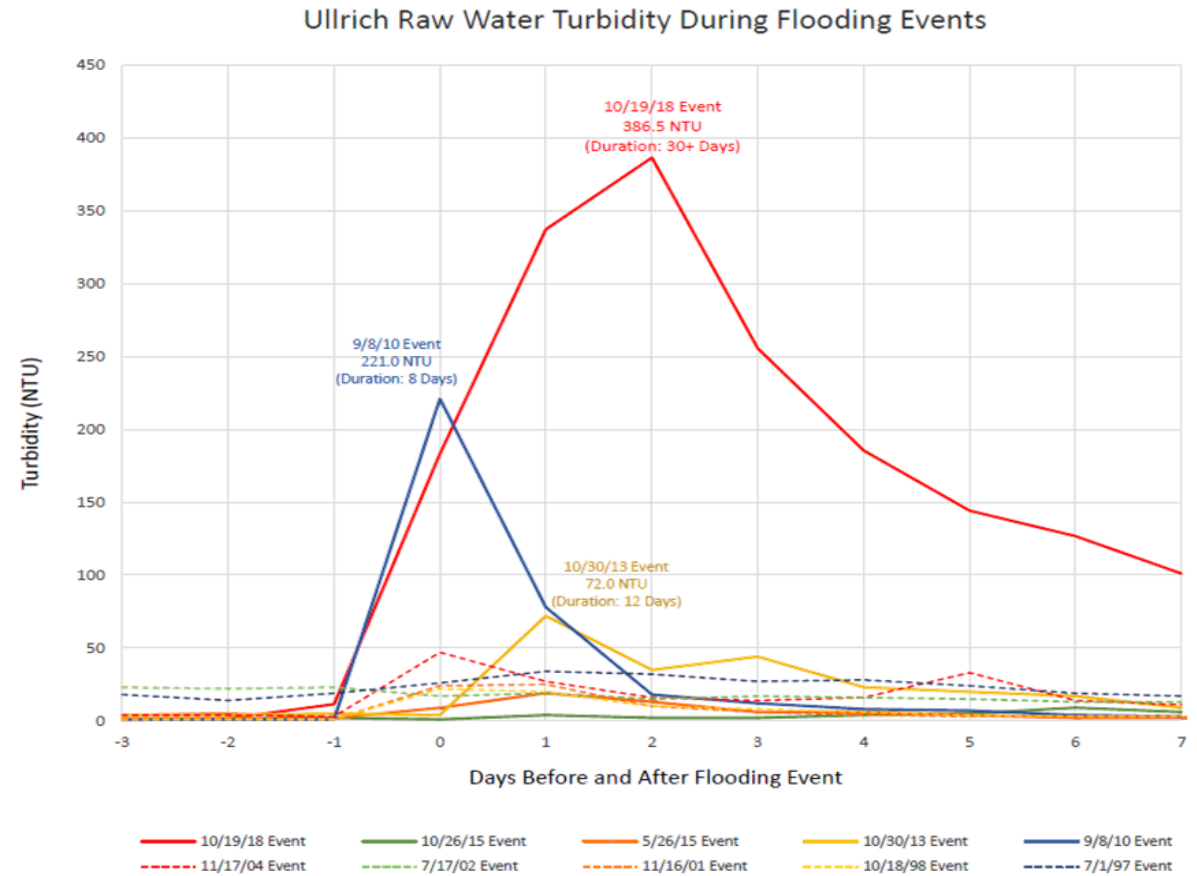
Colorado River Flood Event – October 2018



Barton Creek meets the turbid waters of the rain-swollen Lady Bird Lake [JAY JANNER/AMERICAN-STATESMAN]

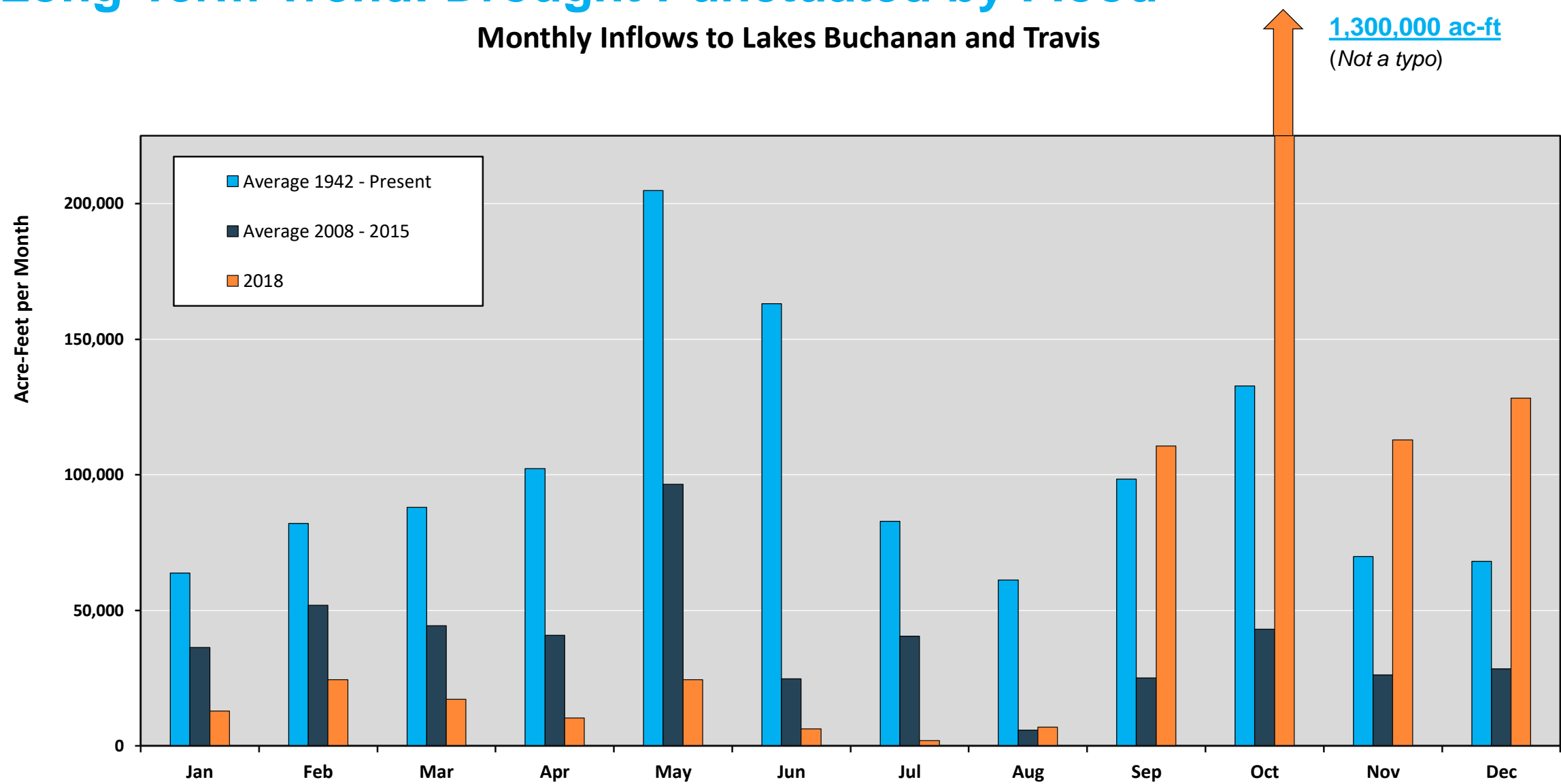
- AW had planned for climate change, including modeling that showed more intense droughts broken by more intense floods
- This was not sufficient to predict all the ways such historically intense flooding could affect operations

Off the charts turbidity led to first city-wide boil water notice in AW's more than 100 year history



Long-Term Trend: Drought Punctuated by Flood

Monthly Inflows to Lakes Buchanan and Travis

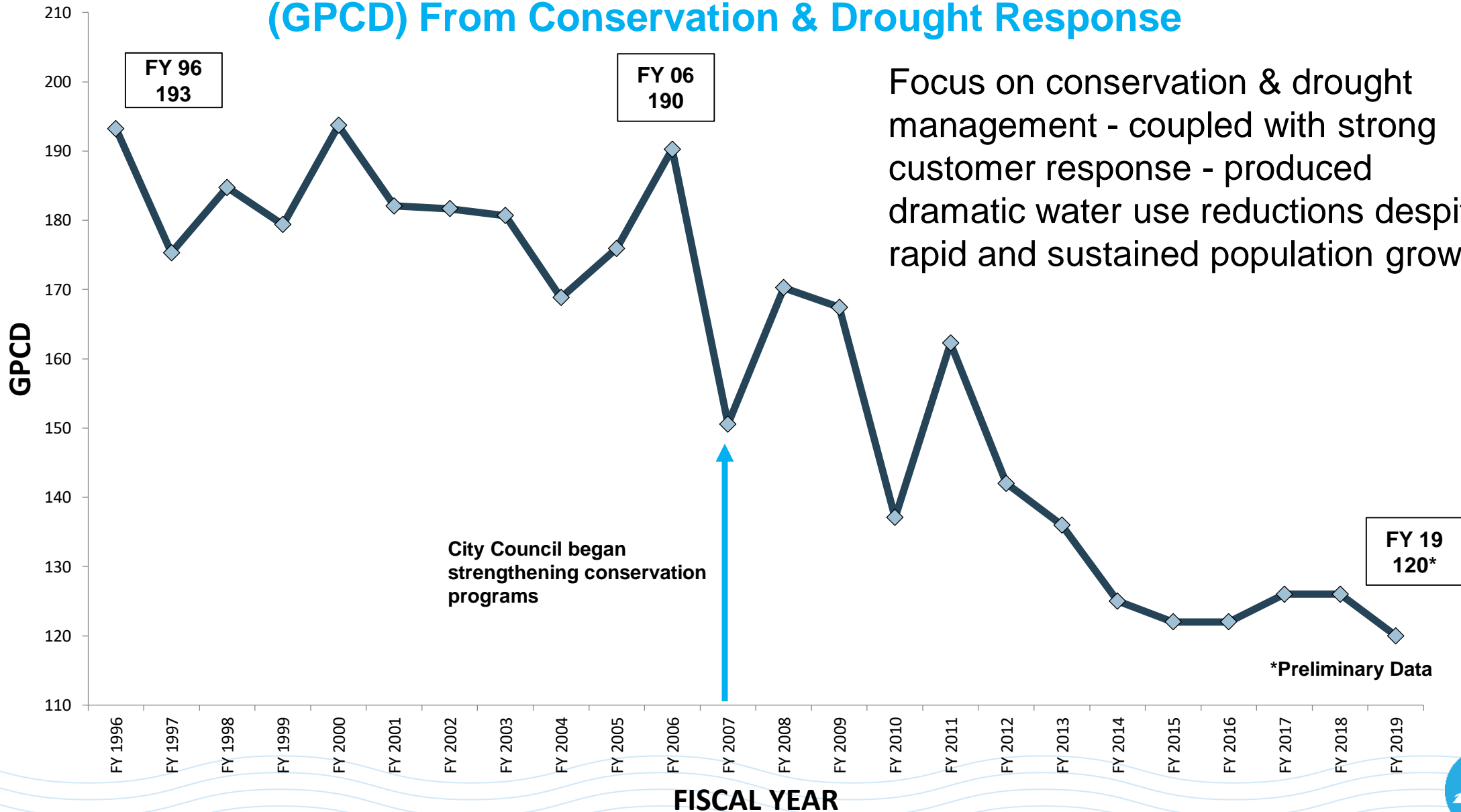


1,300,000 ac-ft
(Not a typo)

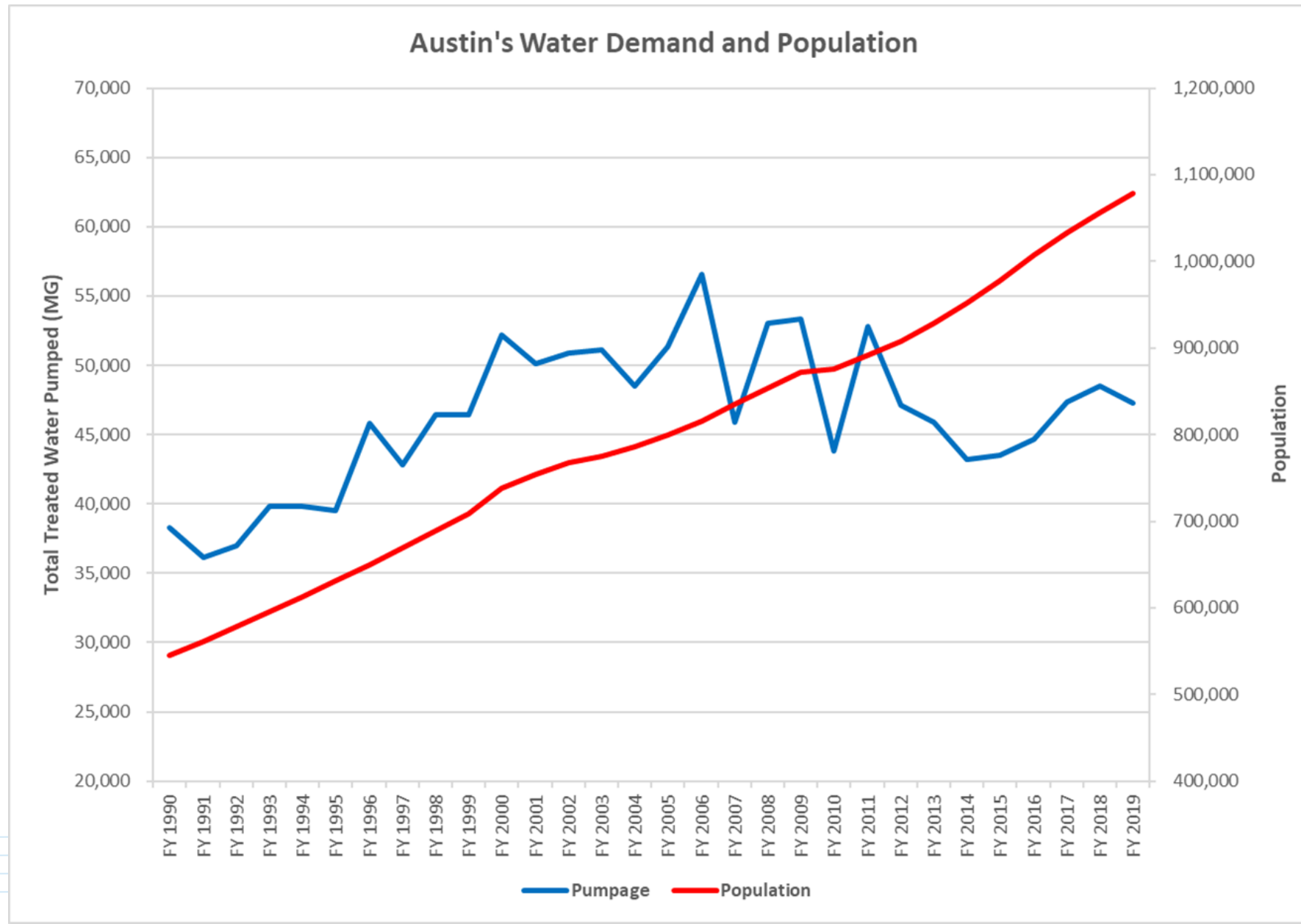


Significant Reductions in Total Gallons Per Capita Per Day (GPCD) From Conservation & Drought Response

Focus on conservation & drought management - coupled with strong customer response - produced dramatic water use reductions despite rapid and sustained population growth

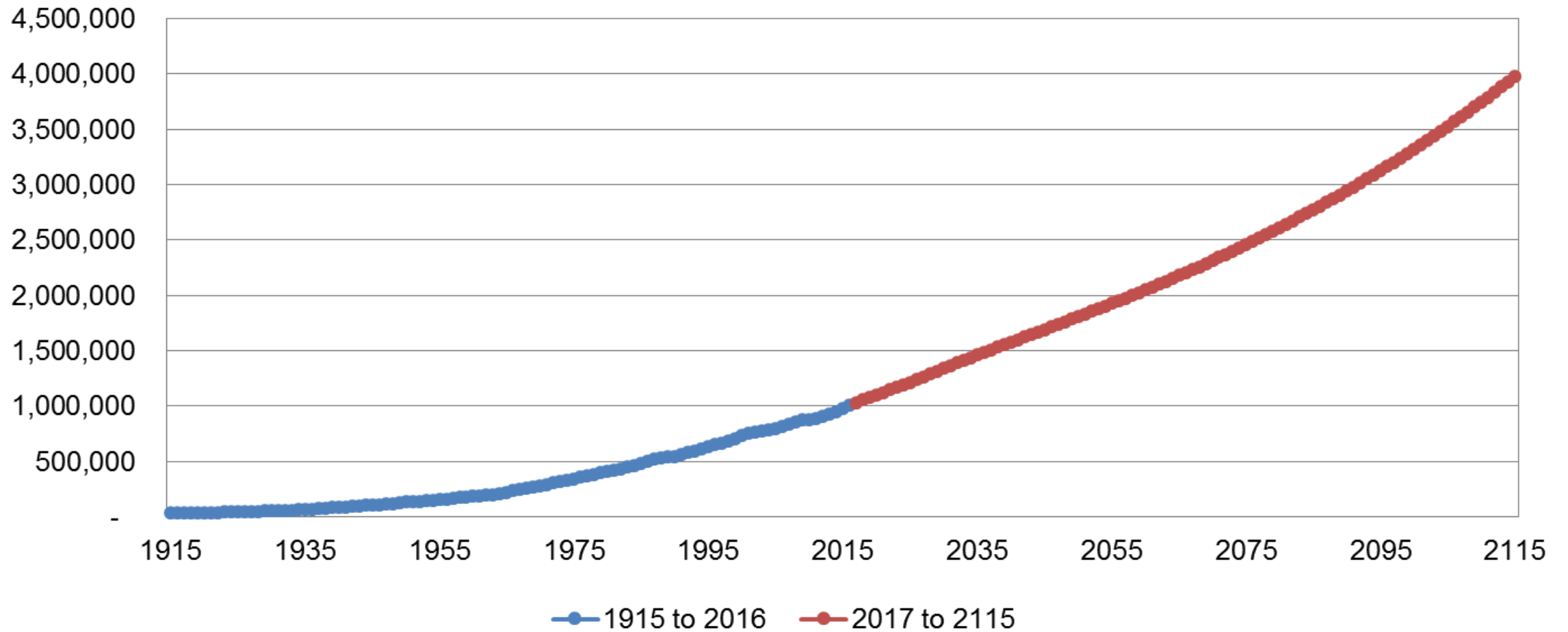


Continued Declines in Water Use Despite Intense & Sustained Population Growth

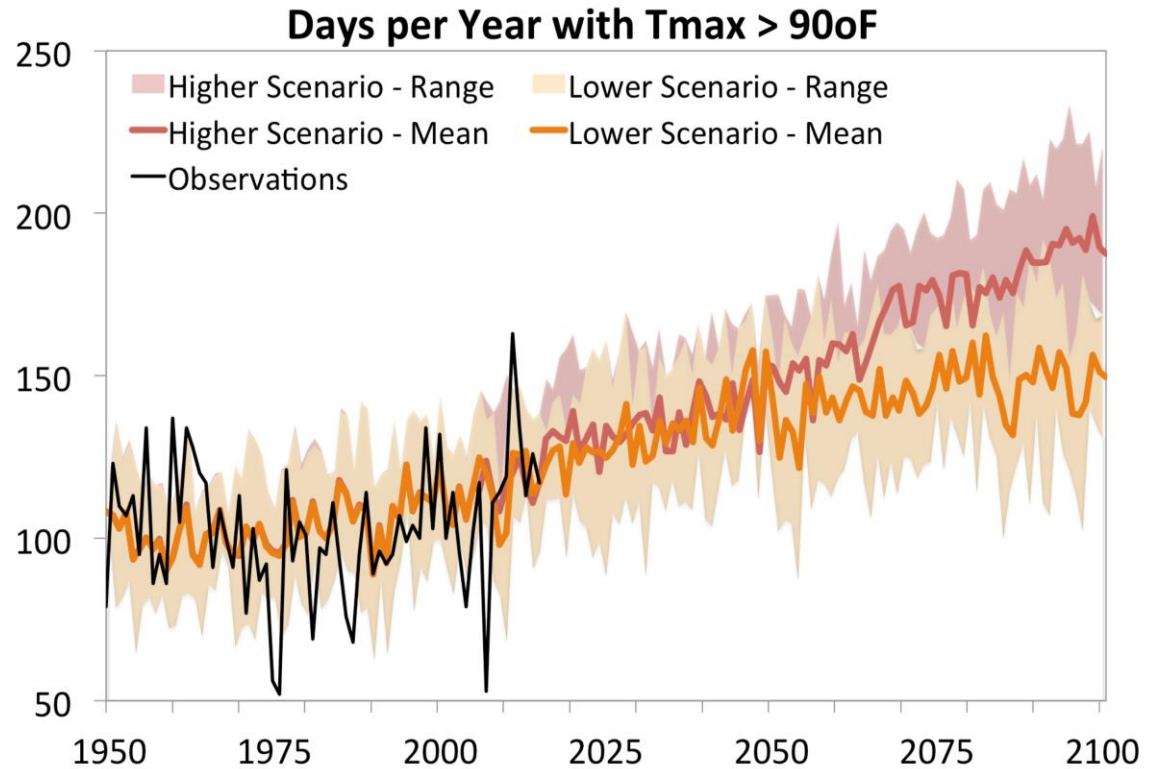
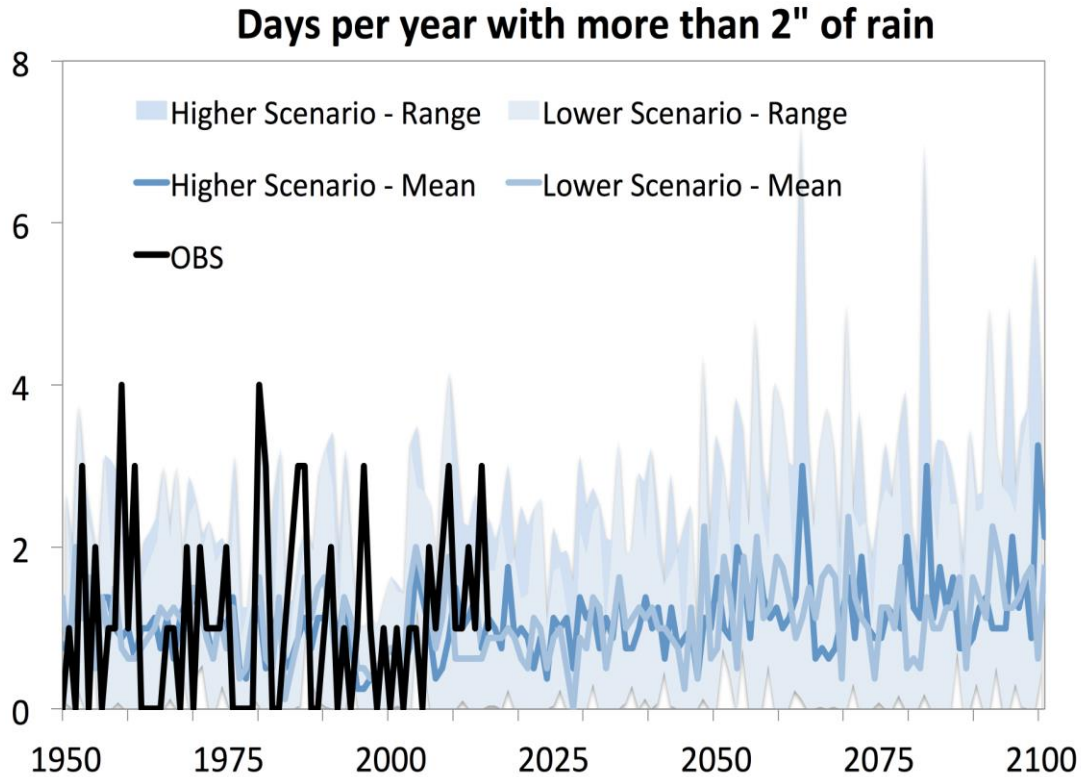


And Intense Population Growth is Expected to Continue

Served Population



If Drought & Flood Aren't Enough, It's Projected to Get Hotter



A photograph of the Austin skyline across a body of water, with a construction crane visible on the left. The text 'A WATER PLAN FOR THE NEXT 100 YEARS' is overlaid in white.

A WATER PLAN FOR THE NEXT 100 YEARS

Water Forward: Taking a New Approach to Prepare for What the Future May Hold

An Austin Water-led effort, approved by Council in 2018, that included related city departments, consultants, and a Council-appointed citizen task force

Goals included:

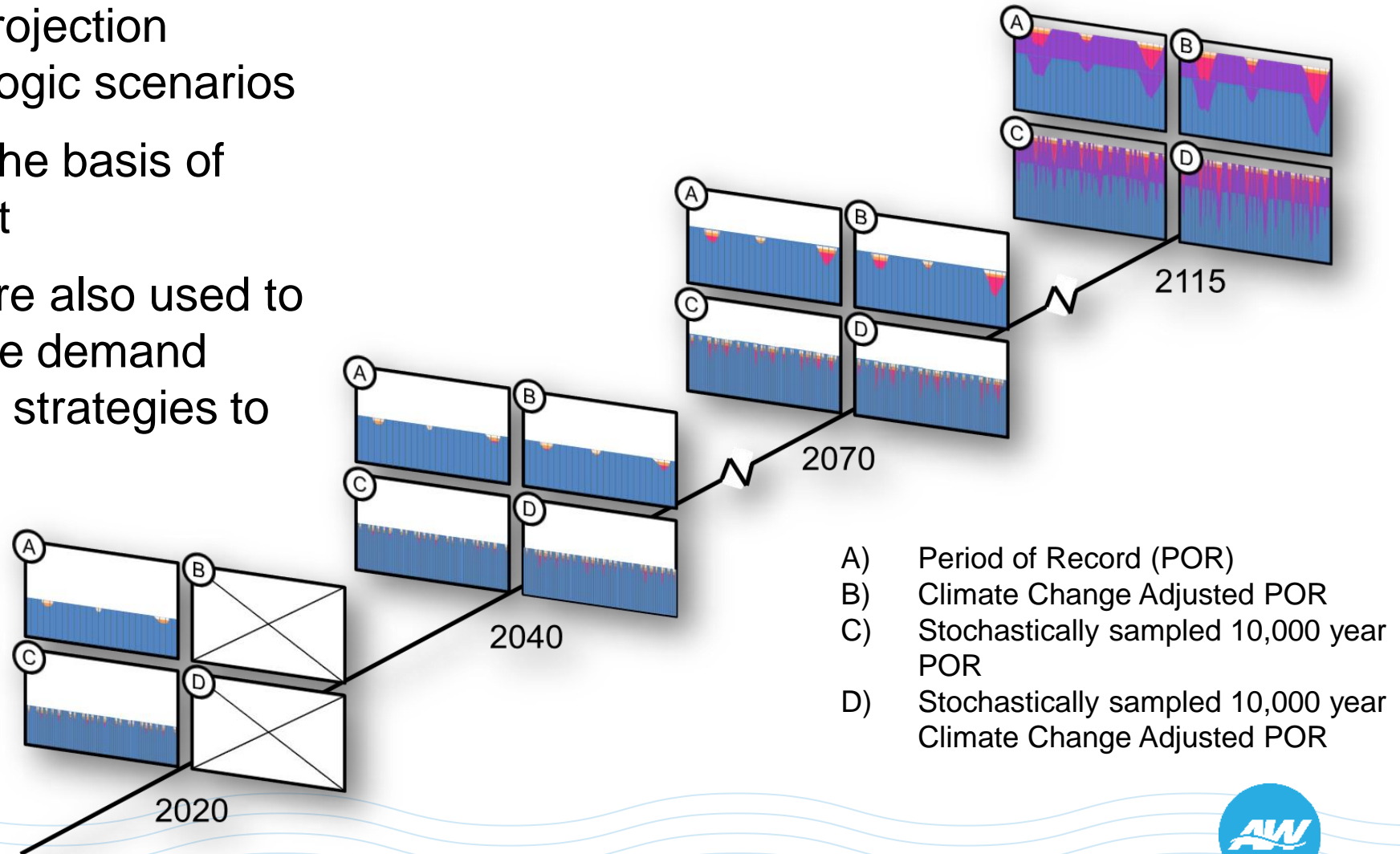
- Reflect community values
- Ensure a diversified, sustainable, and resilient water future
- Strong emphasis on conservation

Planning approach included:

- Climate change scenario planning to consider impacts on inflows to Highland Lakes
- Water availability modeling
- Disaggregated demand modeling to consider how water was being used in future scenarios
- Population growth estimating for shifting demographics and density

Water Forward: Planning for Uncertainty

- Performed water availability simulations for four future demand projection horizons with four hydrologic scenarios
- Analysis results formed the basis of future needs assessment
- Hydrologic scenarios were also used to evaluate and select future demand management and supply strategies to meet identified needs



Water Forward – Comprehensive Strategies

Demand Management

- Implement Advanced Metering Infrastructure (AMI)
- Enhance distribution system water loss control
- Provide customer water use benchmarking information and implement water budgets
- Transform to regionally appropriate landscapes
- Expand irrigation efficiency incentives

Water Supply

- Store water for drought via Aquifer Storage and Recovery and a new Off Channel Reservoir
- Bring on additional supplies via Brackish Groundwater Desalination
- Expand the Centralized Reclaimed Water System
- Use Indirect Potable Reuse as a deep drought strategy
- Capture local inflows to Lady Bird Lake

Use on-site and neighborhood scale alternative water sources for non-potable end uses
Rainwater, Stormwater, Wastewater, Graywater, and AC Condensate

Decentralized



