

# LCRA WATER MANAGEMENT PLAN

Participant Meeting

July 12, 2018



FOR DISCUSSION PURPOSES ONLY

# Agenda

- Timeline
- Updates to WMP model input
  - Water demands
  - Comments received
  - Arbuckle Reservoir
  - Amended Garwood water right
- WMP overview
- Model results
- Discussion

# Timeline

- May 21 – First participant meeting
- **July 12 – Second participant meeting**
- Aug. 10 – Third participant meeting
- Sept. 6 – Fourth participant meeting
- October/November – Draft WMP discussed with LCRA Board
- December – WMP before LCRA Board for approval
- Early 2019 – Plan submitted to TCEQ

# LCRA's Water Management Plan

- Governs LCRA's operation of lakes Buchanan and Travis to supply water to users throughout the lower Colorado River basin
- Allows for supply of interruptible water provided we continue to meet the needs of our firm customers
- Helps meet the environmental needs of the river and bay
- The basic objectives:
  - Meet firm demands
  - Maintain minimum combined storage

# WMP MODEL INPUT

- Hydrology
- Water demands
- Arbuckle Reservoir
- Amended Garwood water right

# Water Demands – Methodology Recap

- Based on Region K projections and recent use
- Expand use of weather variation
- Use highest projected demands through 2025

# Comments Received

- Eight entities submitted comments
- About 45 total comments and questions
- 15 comments on water demands

# Response to Comments

- Preparing written response for all comments
  - Will post on [lcra.org](http://lcra.org)
- Will discuss comments on water demands today
- Will continue to consider participant input throughout the update process

# Comments Received

## *Regarding level of firm demands*

	Comment	Response
1	Use 2030 demands reflecting a 10-year horizon	WMP is updated as conditions change, including demands; 2025 demands are protective
2	Adjust demand volumes for City of Austin	Proposed demands are reasonable and protective
3	Municipal and industrial demands may be over-estimated; need to account for conservation savings	Proposed 2025 demands are reasonable and protective

# Comments Received

## *Regarding level of firm demands*

	Comment	Response
4	Use “most protective” approach to estimate firm demands	Proposed approach is protective of firm demands
5	Demands for Cedar Park and domestic use on the Highland Lakes appear understated	Projected demands are consistent with methods and sources
6	Revise Leander’s demands to Region K 2021 projections	Demands revised to match Region K

# Comments Received

## *Regarding water conservation*

	Comment	Response
7	Provide how conservation efforts affect water suppliers and WMP model	Projections include plumbing-fixture conservation

# Comments Received

## *Information requests and other comments*

	Comment	Response
8	Change weather variables used to categorize high-demand years	Proposed method is reasonable and protective
9	Explain objective for using weather-varied demands	Objective is an accurate and reasonable model using conservative and protective water demands
10	Provide table comparing demands from 2015 WMP, proposed updated demands, and Region K demands	Comparison table has been prepared
11	Where are potential emergency hydro releases accounted for	Same as 2015 WMP; will be listed in summary demands

# Comments Received

## *Information requests and other comments*

	Comment	Response
12	Provide information on Domestic Use contracts and use around the Highland Lakes	Projected domestic use demand is 5,100 a-f/yr; 4,574 a-f/yr currently contracted
13	Why was 2012 to 2016 chosen for municipal demand projections?	2011 to 2017 data used; draft technical paper is being corrected
14	Explain why year 2011 use is included at some power plants and excluded at others	Actual high-use years are used for projecting high-use years at all plants
15	Where is the discussion on environmental flow demands? Where are these demands acknowledged as firm commitments?	Instream flow and bay criteria result in a varying water needs; stored water needed is reported in model results

## Preliminary Projected 2025 Demands (acre-feet/year)

	Normal/Average	High/Max
<b>Municipal/Manufacturing</b>		
City of Austin <sup>1</sup>	167,300*	215,900
Other <sup>2</sup>	109,000*	130,200*
<b>Steam-electric<sup>3</sup></b>		
LCRA power plants	13,100*	19,700
COA power plants	11,900*	18,600
STP	39,400	39,400
Bastrop Energy Partners	2,300	2,300
<b>Agriculture<sup>4</sup></b>		
Lakeside	114,000	135,300
Garwood	88,000	100,000
Pierce Ranch	27,000	30,000
Gulf Coast	139,000	156,700

<sup>1</sup> Average-use year projections estimated by City of Austin Water Forward Task Force. High-use year projections estimated by Region K.

<sup>2</sup> High-use year projected demands based on Region K. For entities not reported in Region K, high-use projected demands are based on use since 2010. Average-use year projections estimated from ratio of average to high use in recent years.

<sup>3</sup> Max-use year based on 2011. Weather variation applied to FPP and Decker power plant, and evaporation from STP cooling reservoir.

<sup>4</sup> Based on Region K projected demands. Weather variation applied to all operations.

*\*Updated since May 21 meeting presentation.*

# Additional WMP Model Input

- Arbuckle Reservoir
  - Expected to begin operating in early 2019
- Amended Garwood water right
  - Issued in 2018

# Modeled Operation of Arbuckle Reservoir

- Filled from river diversions under Gulf Coast water right
- Used before Highland Lakes stored water
- Supplies water for firm and interruptible customers
- Stores “ordered-not-diverted” water
- Helps meet bay inflow obligation
- In curtailment years, 25 percent of stored water available only for agricultural irrigation

# Modeled Use of Amended Garwood Water Right

- Adds diversion locations upstream
- Run-of-river water can be used for some firm customers; reduces use of stored water from Highland Lakes
- Contract commitments to Garwood farmers remain

# 2015 WATER MANAGEMENT PLAN



# Water Management Plan Overview

- The basic WMP framework:
  - Three water supply conditions – Normal, Less Severe Drought and Extraordinary Drought
  - Two evaluation dates for interruptible water availability for agriculture
  - Look-ahead tests
  - Environmental flow criteria

# Normal Water Supply Condition

- Default water supply condition: Normal
- Interruptible stored water available:
  - Up to 202,000 acre-feet in first irrigation season
  - Up to 76,500 acre-feet in second irrigation season

# Less Severe Drought Water Supply Condition

- Criteria for entering Less Severe Drought Water Supply Condition:
  - Combined storage  $\leq$  1.6 million acre-feet on evaluation date and three-month inflow  $\leq$  50,000 acre-feet
  - Combined storage  $\leq$  1.4 million acre-feet on evaluation date and three-month inflow total  $\leq$  33rd percentile
- Interruptible stored water available:
  - Up to 155,000 acre-feet in first irrigation season.
  - Up to 55,000 acre-feet in second irrigation season

# Extraordinary Drought Water Supply Condition

- Criteria for entering:
  - Combined storage below 1.3 million acre-feet on evaluation date
  - Been 24 months since lakes were last full
  - Long-term inflows equal or worse than 1950s drought
- No interruptible stored water available to Gulf Coast, Lakeside and Pierce Ranch irrigation operations

# Look-ahead Test

- If on March 1 or July 1 projections indicate:
  - Storage could drop below 900,000 acre-feet in upcoming crop season
- OR
- Storage could drop below 600,000 acre-feet within 12 months
- Then no interruptible stored water available to Gulf Coast, Lakeside and Pierce Ranch irrigation operations

# Environmental Flows

- Two evaluation dates for environmental flows
- Instream flows levels:
  - Base Average, Base Dry and Subsistence
- Matagorda Bay inflows:
  - Monthly Threshold value
  - OP 1-4

# Instream Flows

<b>Combined Storage on Evaluation Date</b>	<b>Instream Flow Level</b>
Above 1.96 million acre-feet	Base Average
Between 1.90 and 1.96 million acre-feet	Base Dry
Less than 1.90 million acre-feet	Subsistence

# Freshwater Inflows to Matagorda Bay

Combined Storage on Evaluation Date	Freshwater Inflow Criteria
Greater than 1.95 million acre-feet	OP-4
1.5 to 1.95 million acre-feet	OP-3
1.3 to 1.5 million acre-feet	OP-2
1.0 to 1.3 million acre-feet	OP-1
At all times	Threshold

# PRELIMINARY APPROACH TO THE NEXT WATER MANAGEMENT PLAN

# Preliminary Extraordinary Drought Criteria Change

- Reduce drought duration requirement to at least 18 months since lakes last full

# Preliminary Ag Supply Changes

- Reduce the amount of interruptible stored water available
- Maximum first season interruptible stored water: about 175,000 acre-feet
- Maximum second season interruptible stored water: about 60,000 acre-feet
- Corresponding changes to curtailment curves

# Preliminary Environmental Flow Changes

- Balance large releases of storable inflows
- Limit Wharton obligation when storage is below 900,000 acre-feet
- Adjust Base-Dry to Subsistence trigger from 1.9 MAF to 1.8 MAF
- Add a third evaluation date (Nov. 1)

# Preliminary Environmental Flow Changes

- Use Arbuckle Reservoir to meet bay inflow obligation
- Include a bypass at Arbuckle Reservoir to help meet bay Threshold
- Help meet Threshold with releases from Arbuckle Reservoir

# REVIEW OF WAM MODEL

# Water Availability Model (WAM)

What is a WAM?

- Computer-based mathematical model of the river system that incorporates:
  - Hydrologic elements (river flows, evaporation)
  - Diversions and return flows
  - Water rights (prior appropriation system)
  - Reservoirs
- Uses a monthly time step
- Based on the TCEQ WAM for the Colorado River basin

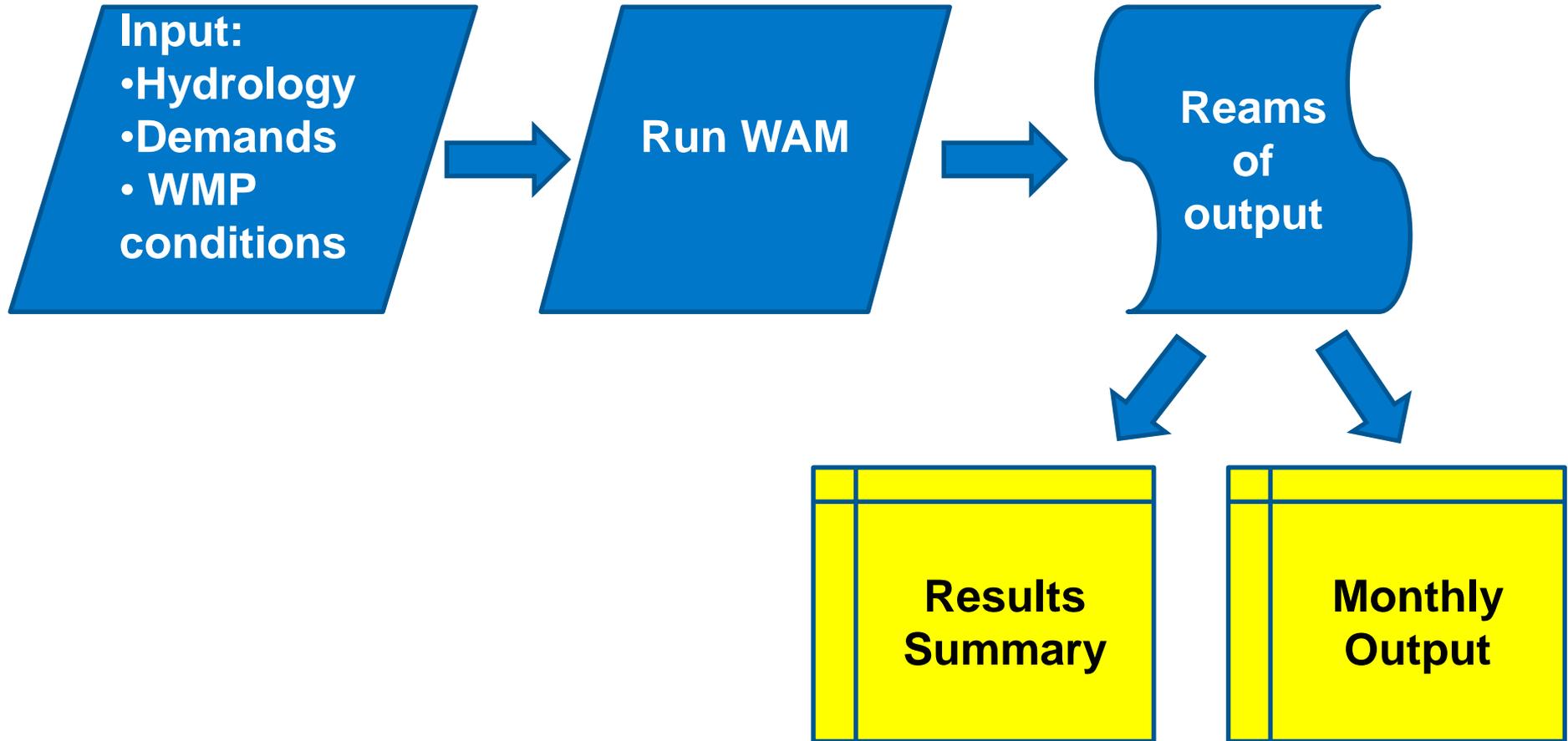
# What the WAM does

Provides estimates of the amount of water that would be in the river and lakes for a specified set of physical and management conditions had those conditions been in place throughout the period of record.

# Model Implementation

- On monthly time step, model calculates:
  - River flows
  - Diversions to meet water rights and contracts
  - Highland Lakes combined storage
  - Environmental flows
- On evaluation dates, model assesses:
  - Combined storage
  - Highland Lakes inflows
  - Look-ahead test
  - Environmental flow conditions
- Interruptible water allocated
  - First irrigation season: March through July
  - Second irrigation season: August through October

# WAM Process



# PRELIMINARY MODEL RESULTS



FOR DISCUSSION PURPOSES ONLY

# Results Summary – Preliminary Results

WORKING DOCUMENT

Information presented in the Results Summary:

- Water demands
- Reports summary metrics
  - Firm customer demands met
  - Lake levels
  - Interruptible water cutoffs
  - Bay and estuary (B&E) inflows
- Period of Record (POR) results
- Drought of Record (DOR) results
- Additional details (same categories)
- Instream flows
- Information specific to each irrigation operation

WATER MANAGEMENT PLAN - SCENARIO RUNS  
 PERIOD-OF-RECORD RESULTS SUMMARY  
 Prepared for WMP Update

PERIOD-OF-RECORD RESULTS (1940 - 2016)		7/12/2018 Run Period-of-Record Average	7/12/2018 Run Maximum Demand (2011)	UNITS
DEMAND CATEGORY / PARAMETER				
<b>REF</b>	<b>Firm Demands</b>			
[1]	City of Austin - Municipal Demand	189,391	215,900	ac-ft
[2]	Annual <b>run-of-river water</b> diverted by City of Austin - Municipal	132,377	94,615	ac-ft
[3]	Annual <b>stored water</b> diverted by City of Austin - Municipal	43,273	107,543	ac-ft
[4]	Annual <b>direct reuse</b> by City of Austin	13,742	13,742	ac-ft
	<b>Average Total Supply:</b>	<b>189,391</b>	<b>215,900</b>	ac-ft
[5]	LCRA - Power Plant Demand	13,167	19,700	ac-ft
[6]	Annual <b>run-of-river water</b> diverted by LCRA - Power (Garwood)	3,006	4,300	ac-ft
[7]	Annual <b>stored water</b> diverted by LCRA - Power	10,161	15,400	ac-ft
	<b>Average Total Supply:</b>	<b>13,167</b>	<b>19,700</b>	ac-ft
[8]	City of Austin - Power Plant Demand	11,799	18,600	ac-ft
[9]	Annual <b>run-of-river water</b> diverted by City of Austin - Power	5,511	1,900	ac-ft
[10]	Annual <b>stored water</b> diverted by City of Austin - Power	6,288	16,700	ac-ft
	<b>Average Total Supply:</b>	<b>11,799</b>	<b>18,600</b>	ac-ft
[11]	Other Municipal and Industrial Demands	118,583	130,000	ac-ft
[12]	Annual <b>run-of-river water</b> diverted by Other M&I	6,711	4,200	ac-ft
[13]	Annual <b>run-of-river water</b> diverted by Other M&I (Garwood)	29,737	28,700	ac-ft
[14]	Annual <b>stored water</b> diverted by Other M&I	101,623	90,500	ac-ft
[15]	Annual <b>Arbuckle Reservoir water</b> diverted by Other M&I	512	6,600	ac-ft
	<b>Average Total Supply:</b>	<b>118,583</b>	<b>130,000</b>	ac-ft
	<b>Average Firm Demand:</b>	<b>332,941</b>	<b>384,200</b>	ac-ft
	<b>Average Firm Supply:</b>	<b>352,941</b>	<b>384,200</b>	ac-ft
[16]	Annual <b>net evaporation</b> from lakes Buchanan and Travis	82,683	137,800	ac-ft
[17]	% of months combined storage below 900,000 ac-ft	3%	0%	
[18]	% of months combined storage below 600,000 ac-ft	0%	0%	
[19]	Annual <b>run-of-river water</b> diverted by STPNOC	49,727	6,500	ac-ft
[20]	Annual <b>stored water</b> diverted by STPNOC	0	0	ac-ft
[21]	Annual <b>Arbuckle Reservoir water</b> diverted by STPNOC	62	0	ac-ft
[22]	Annual flow at Bay City	1,617,491	190,100	ac-ft
[23]	% of months average Bay City flow below 300 cfs	15%	6.7%	
	<b>Lake Level</b>			
[24]	Total combined storage in lakes Buchanan and Travis	1,964,429	1,964,429	ac-ft
[25]	Average combined storage in lakes Buchanan and Travis	1,686,209	1,373,261	ac-ft
[26]	Minimum combined storage in lakes Buchanan and Travis	624,573	1,042,597	ac-ft

This information is for discussion only.  
 This is not a forecast of future conditions



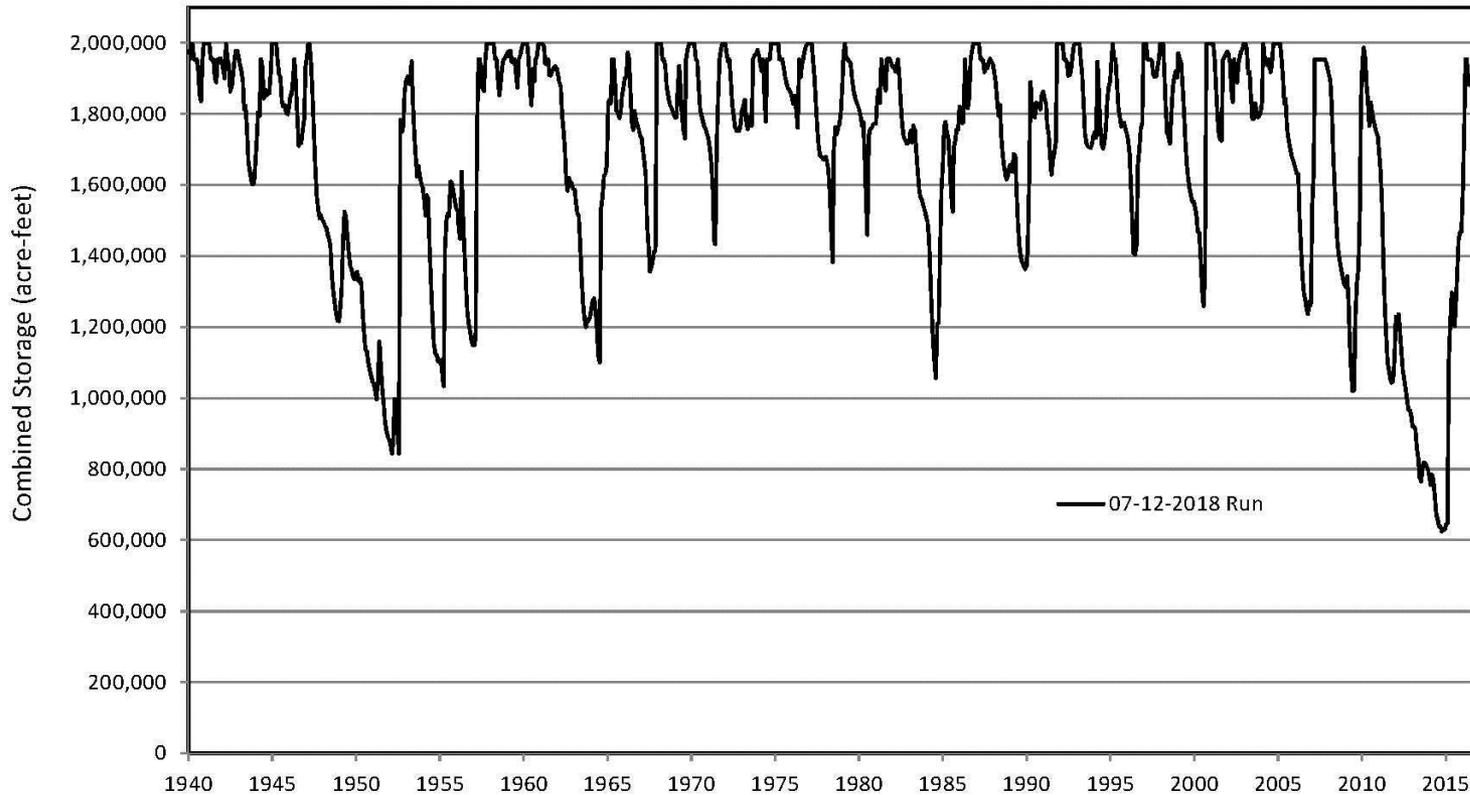
# Results Summary – Preliminary Results

Switch over to the .pdf of the summary output.

# Monthly Output – Preliminary Results

Switch back from output.

### WATER MANAGEMENT PLAN UPDATE LAKES BUCHANAN AND TRAVIS COMBINED STORAGE Prepared for WMP update meeting on 7/12/2018



This information is for discussion only.  
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# Next Steps

- Comment period open until July 31
  - Submit comments to **LCRAWMP@lcra.org**
- Aug. 10 – Third participant meeting
  - Discuss comments