

**CITY OF CORPUS CHRISTI
OFFICE OF THE CITY MANAGER**

TO: Peter Zaroni, City Manager
FROM: Drew Molly, Chief Operating Officer
COPY: Mayor and City Council
SUBJECT: **Combined Reservoir Level Forecast**
DATE: February 14, 2025



Corpus Christi Water (CCW) is utilizing the expertise of Carollo Engineers (Carollo) to perform modeling and forecasting activities to predict future water levels in our combined reservoir system (i.e., Lake Corpus Christi & Choke Canyon).

Given the critical levels of our combined reservoir and the ongoing drought in our region, Carollo's analysis will augment CCW's existing modeling capabilities and will be updated approximately every two weeks on the 15th and 31st of each month.

Please see the attached Combined Reservoir Level Forecast updated Friday, February 14, provided by Carollo. The current forecast shows no major change or shift in projections from the January 24 forecast, which was sent to the Mayor and City Council on January 26.

Attachment:

1. Reservoir Storage Forecast (February 14, 2025)

CITY OF CORPUS CHRISTI

Nueces River Reservoir System Modeling

Project No.: 203219

Date: February 14, 2025

Prepared By: Jeff Stovall, PhD, PE; Michael Pinckney, PE

Reviewed By: David Harkins, PhD, PE

Subject: Reservoir Storage Forecast

Carollo Engineers was engaged to develop a reservoir model for the City of Corpus Christi (City) to forecast storage in the City's Nueces River Basin water supply reservoirs. This Memo was developed to explain and define the broad details of the modeling exercise and to provide a concise summary of results. The following items define how the model was developed and utilized to provide the City with forecasts on the storage of the City's water supply reservoirs. Listed below are the steps in developing the model and explanations of the results. This Memo will be updated on or around the 15th and 31st of each month to provide the most recent forecast results based on current reservoir conditions.

The reservoir model provides a forecast of storage in Choke Canyon Reservoir and Lake Corpus Christi based on a monthly hydrologic mass balance calculation. This model provides an alternate forecast to supplement the City's existing Multi-Source Water Supply Model. The current forecast period runs through December 2026. The model accounts for net evaporation¹, stream inflows, and downstream releases based on the following assumptions:

- Historical hydrologic data through February 13, 2025, is based on recorded observations as noted below.
 - » Historical lake net evaporation data is estimated using the [TWDB Reservoir Evaporation Web Application](#).
 - » Historical inflows are based on observed streamflow at USGS gages upstream of the reservoirs. Inflows to Lake Corpus Christi are calculated as observed streamflow at USGS 08210000 Nueces Rv nr Three Rivers less 12% channel losses. The channel loss factor was determined as the value that minimizes the total error for calculated monthly reservoir storage for the period from January 2022 through October 2024.
- Hydrologic input for future months is based on the following assumptions.
 - » Evaporation for future months is based on monthly lake evaporation data from 2011, the year in the period of record with the highest net evaporation, estimated using the [TWDB Reservoir Evaporation Web Application](#).
 - » Inflows for future months assume a minimum value of 3 acre-feet/month to Choke Canyon Reservoir. Inflows to Lake Corpus Christi are assumed equal to the release from Choke Canyon less 12% channel losses.

¹ Net evaporation is the total water loss due to evaporation minus the water gained from precipitation.

- » Monthly releases from Lake Corpus Christi are assumed equal to 2022-2024 observed monthly averages (5,200 to 11,700 acre-feet/month).

The model can be used to provide short-term or long-term forecasts based on assumed hydrologic conditions (inflows and evaporation) and demand scenarios.

Mary Rhodes Pipeline

In addition to the two Nueces River system reservoirs, the City of Corpus Christi also receives water from Lake Texana and the Colorado River through the Mary Rhodes Pipeline. From January 2022 through July 2024, the pipeline was operated under Schedule 2 with deliveries through the pipeline ranging from 35 to 45 million gallons per day (mgd). The Mary Rhodes Pipeline can provide additional water when operated under Schedules 3 and 4, as shown in Table 1. The additional water from the Mary Rhodes Pipeline directly offsets demand from the Nueces River reservoirs.

Table 1 Lake Texana Pumping Schedules

Pumping Schedule	Pumping Range (mgd)	Average Daily Delivery (mgd)
Schedule 1	11.5 – 32.4	--
Schedule 2	34 – 46	42.3
Schedule 3	55 – 58	56.5
Schedule 4	72 – 79	75.5

Scenarios

Reservoir model scenarios have been developed to evaluate the impacts of alternative operations on the availability of supplies from Choke Canyon and Lake Corpus Christi reservoirs. The scenarios include Schedules 2, 3, and 4 along with a worst-case scenario that assumes the Mary Rhodes Pipeline is offline with no deliveries.

For these scenarios, monthly releases from Lake Corpus Christi were reduced or increased by an amount equal to the difference between the scheduled pipeline delivery and the amount delivered under Schedule 2. For example, pipeline deliveries under Schedule 3 reduce the daily demand from Lake Corpus Christi by an average of 14.2 mgd from the amount released when the Mary Rhodes Pipeline is operated under Schedule 2. Similarly, under Schedule 4, the reduction is 33.2 mgd. On a monthly basis, Schedule 3 reduces the required release from Lake Corpus Christi by an average of 1,330 acre-feet; under Schedule 4 the release from Lake Corpus Christi is reduced by an average of 3,100 acre-feet. With no deliveries through the Mary Rhodes Pipeline, the required release from Lake Corpus Christi increases by an average of 3,950 acre-feet per month.

Results

Table 2 shows the projected dates when conservation storage in Lake Corpus Christi will be fully depleted based on model input data and assumptions as of February 14, 2025. These calculations assume the Mary Rhodes Pipeline begins operating under the indicated scenario in March 2025.

Table 2 Reservoir Storage Forecast

Operations Scenario	Threshold Dates		
	15%	10%	Depletion of Conservation Storage
No MRP	4/19/2025	6/20/2025	End of October, 2025
Schedule 2	5/1/2025	7/11/2025	End of March, 2026
Schedule 3	5/10/2025	8/1/2025	End of April, 2026
Schedule 4	5/13/2025	8/4/2025	End of June, 2026

- The reservoir storage forecasts are displayed graphically in the figures below showing forecast end-of-month storage by volume and by percentage of combined conservation storage capacity.



