

EXECUTIVE SUMMARY

This feasibility level study began in response to comments received during the 2002 LCRA Water Management Plan revision process. Lake Travis interests requested that LCRA consider changing its reservoir operations so that water would be withdrawn equally throughout the year from Lake Travis and Lake Buchanan to meet downstream demands. The study included the following tasks:

- Develop a daily time step HEC-ResSim reservoir operations model for Lakes Buchanan and Travis using the recently developed Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) data set from the Water Rights Analysis Package (WRAP) program.
- Identify trigger point pool elevations that are reasonable estimates of the range of lake levels that could signal changes to Lake Buchanan and Lake Travis recreation related businesses.
- Simulate the following reservoir operation plans under Ultimate and Year 2010 water demand conditions, and assess the effects on pool elevations (trigger points), system yield (firm yield), and system losses (spills and evaporation):

1. *Water Management Plan (WMP)* – The WMP seeks to optimize storage by minimizing spills and evaporation, and calls on more water from Buchanan as Travis drops, then less water from Buchanan as Travis rises.

2. *Current Operating Plan (COP)* - The COP is based on the WMP, but includes seasonal constraints for even distribution of releases from Lakes Travis and Buchanan in proportion to their percentages full to benefit recreational interests, maximize hydro-generation, and minimize spills.

3. *50/50 Operating Plan* - The 50/50 operating plan is supported by Lake Travis interests and seeks to maintain proportionately equal storage levels in lakes Travis and Buchanan.

4. *Travis 1st Operating Plan* – The Travis 1st operating plan draws Lake Travis down to zero storage before drawing on Lake Buchanan for required releases.

5. *Buchanan 1st Operating Plan* - The Buchanan 1st operating plan draws Lake Buchanan down to zero storage before drawing on Lake Travis for required releases.

6. *WAMOpsZone Operating Plan* - The *WAMOpsZone* operating plan was used in the WAM model for water rights simulation in the lower Colorado River basin. This plan was used primarily for HEC-ResSim model verification and comparison purposes in the current study. The *WAMOpsZone* plan divides Lakes Buchanan and Travis into two zones and makes releases relative to each zone and the percent storage in each zone.

7. *Lake Lowering Plan (LLP)* – The LLP operating plan was developed as part of this study and combines the aspects of the 50/50 plan in an attempt to increase yield, decrease losses, and maintain lake levels.

8. *Mason Reservoir Study* – The Mason Reservoir Study evaluates the feasibility of whether a flood detention basin could be used to expand the Highland Lakes system to include water supply for a multi-purpose reservoir on the Llano River.

Following is a summary of study findings:

- **Pool Elevations** - As expected, the proposed 50/50 operating plan does generally increase pool elevations in Lake Travis. Trigger point results indicate the 50/50 plan increases the number of days Lake Travis is above its elevation 660 trigger point by reducing lake levels in Lake Buchanan; however, it also dramatically increases the number of days Lake Buchanan is below its elevation 1012 trigger point. The Lake Lowering Plan was an attempt to mitigate this impact, but showed only modest improvements to water supply and lake elevations at levels where significant recreational impacts have already occurred.
- **System Yield** – The differences in system yield for the various operating plans are relatively small (less than 1% difference). Simulation results indicate the Current Operating Plan reduces system yield from the previous Water Management Plan operation, and if the 50/50 operating plan was adopted, system yield would be further reduced. Adoption of the Lake Lowering Plan would produce only modest increases to system yield, and construction of a multi-purpose reservoir on the Llano River near Mason could significantly increase system yield.
- **System Losses** - The differences in system losses for the various operating plans are relatively small (less than 1%). Study results do indicate that operating plans that leave water high in the system may not always be best for Lake Travis and Lake Buchanan due to significant increases in evaporative losses. The results also indicate that the 50/50 plan increased the frequency of flood spills from Lake Travis for both 2010 and ultimate demands compared to the Current Operating Plan.

Summary of Plan Simulation Results

| Operating Plan | 2010 Demand Period (1940-1998) | | | | Ultimate Demands Period (1940-1959) | | |
|--------------------------|--------------------------------|-----------------------|---------------------|------------------------|-------------------------------------|-------------------|-----------------------|
| | Spills (ac-ft) | Total Evap (ac-ft) | Days Below Trigger | | System Yield (ac-ft) | Spills (ac-ft) | Total Evap (ac-ft) |
| | | | Travis (660 ft.) | Buchanan (1012 ft.) | | | |
| WMP | 35,313,458 | 5,286,762 | 1,091 | 310 | 427,000 | 8,234,104 | 1,652,216 |
| COP | 35,330,261 | 5,285,180 | 792 | 530 | 426,750 | 8,237,882 | 1,653,547 |
| 50/50 | 35,378,468 | 5,269,910 | 331 | 1,465 | 423,500 | 8,280,735 | 1,672,334 |
| Travis 1 st | - | - | - | - | 422,750 | 8,283,570 | 1,699,630 |
| Buchanan 1 st | - | - | - | - | 427,500 | 8,436,780 | 1,434,360 |
| WAMOpsZone | - | - | - | - | 429,000 | 8,275,657 | 1,567,182 |
| LLP | 35,389,259 | 5,250,678 | 572 | 1,323 | 430,000 | 8,239,121 | 1,582,772 |
| Mason | 34,438,779 | 5,689,024 | 1,032 | 505 | 439,500 | 7,706,450 | 1,954,723 |

The overall study conclusion is that the Current Operating Plan is a relatively balanced plan when comparing recreational interests for Lakes Travis and Buchanan, and Lake Buchanan recreational interests would be unfairly impacted by implementation of the proposed 50/50 plan. Water supply and flood control would also be adversely impacted by moving from the Current Operating Plan to the 50/50 plan.