



TRANS-TEXAS WATER PROGRAM

SOUTHEAST AREA

System Operation of Surface Water Supply Sources in the Houston Area

April 1998

**Sabine River Authority of Texas
Lower Neches Valley Authority
San Jacinto River Authority
City of Houston
Brazos River Authority
Texas Water Development Board**

This document is a product of the Trans-Texas Water Program: Southeast Area. The program's mission is to propose economically and environmentally beneficial methods to meet water needs in Texas for the long term. The program's four planning areas are the Southeast Area, which includes the Houston-Galveston metropolitan area, the South-Central Area (including Corpus Christi), the West-Central Area (including San Antonio), and the North-Central Area (including Austin).

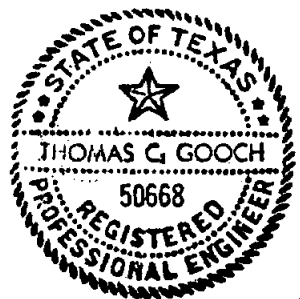
The Southeast Area of the Trans-Texas Water Program draws perspectives from many organizations and citizens. The Policy Management Committee and its Southeast Area subcommittee guide the program; the Southeast Area Technical Advisory Committee serves as program advisor. Local sponsors are the Sabine River Authority of Texas, the Lower Neches Valley Authority, the San Jacinto River Authority, the City of Houston and the Brazos River Authority.

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1. Introduction



In cases where a surface water system has more than one source of supply, it is often possible to coordinate operation of the overall system in a way that will produce more yield than could be obtained if the various sources were each operated independently. One of the tasks of Phase 2 of the Trans-Texas Water Program investigations is to analyze the potential gain from coordinated system operation of Lake Houston, Lake Conroe, Lake Livingston and the Wallisville salt water barrier.

System operation is basically a familiar concept in the Houston area. Lake Houston and Lake Conroe have now been functioning to some degree as a system for more than 20 years, and the value of that mode of operation is well established. It has also been generally understood that Lake Livingston and the Wallisville barrier will function as a system when construction of the barrier is finished.

The goals of this study are (a) to review the system operation methods that are applicable in this instance, (b) to explain briefly why they lead to increased yields, and (c) to evaluate how much yield can potentially be gained by their effective use.

One common feature of system operation is that it often involves alternately taking larger amounts of water from each source than would normally be taken if they were operating individually. This sometimes leads to greater capital costs for diversion, transmission and treatment facilities, and it can also cause greater fluctuations in lake levels. In some cases, there may be practical limits to the amounts of increased use that can be

obtained without encountering unacceptable secondary impacts. To an extent, that is true in the San Jacinto River Basin, where part of the theoretically available yield could only be obtained by drawing Lake Houston down to undesirable levels and keeping it that way for extended periods of time.

In this study, the potential yields and system operation gains will be examined in two ways. First, they will be evaluated assuming that maximum system yield is the primary goal and that all other considerations are secondary. Then, they will be analyzed a second time, based on a set of assumptions reflecting some of the more important practical limitations on factors such as rates of withdrawal and minimum lake levels.

2. Existing Facilities



The existing surface water supply reservoirs involved in this study consist of Lake Houston, Lake Conroe and Lake Livingston. Although it will contribute no additional conservation storage as such, the Wallisville salt water barrier will also be an important element when it is placed in operation. Figure 2-1 is a map showing the locations of the system components. Table 2.1 is a summary of key characteristics of the three storage reservoirs and the barrier.

Lake Houston was built in 1954. Lake Livingston was completed in 1969, and Lake Conroe in 1973. The Wallisville barrier is expected to begin operation in 1997. The City of Houston owns and operates Lake Houston. Lake Livingston was developed by Houston in cooperation with the Trinity River Authority, which operates that facility. The San Jacinto River Authority operates Lake Conroe. The Wallisville structure will be operated by the U. S. Army Corps of Engineers.

The area and capacity information in Table 2.1 for Lake Houston and Lake Conroe reflects the reservoir characteristics expected to exist as of the year 2000. These areas and volumes were projected based on volumetric surveys made by the Texas Water Development Board in 1994⁽¹⁾ and 1996⁽²⁾, respectively. The information shown for Lake Livingston is also for the year 2000 and is based on a study made in 1991 by the Bureau of Reclamation⁽³⁾. The capacity and area values shown for the Wallisville project are based on the Corps' design studies⁽⁴⁾. More detailed area and capacity tables and graphs are in Appendix B.

The water rights for these projects are summarized in Table 2.2. The combined sum of the rights is 1,668,600 acre-feet per year. Approximately 70.4 percent of the total appropriations belong to the City of Houston, which has the right to divert 1,175,467 acre-feet per year and holds some of the rights at each of the impoundments. The Trinity River Authority owns rights amounting to 403,200 acre-feet per year, or 24.2 percent of the total. The San Jacinto River Authority owns run-of-the-river rights to 88,333 acre-feet per year, or 5.3 percent. Riceland Properties and Roy A. Seabers own a small senior run-of-the-river right (1,600 acre-feet per year, or 0.1 percent).

⁽¹⁾ numbers in parentheses indicate references listed in Appendix A.

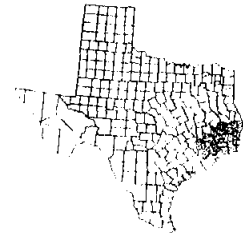
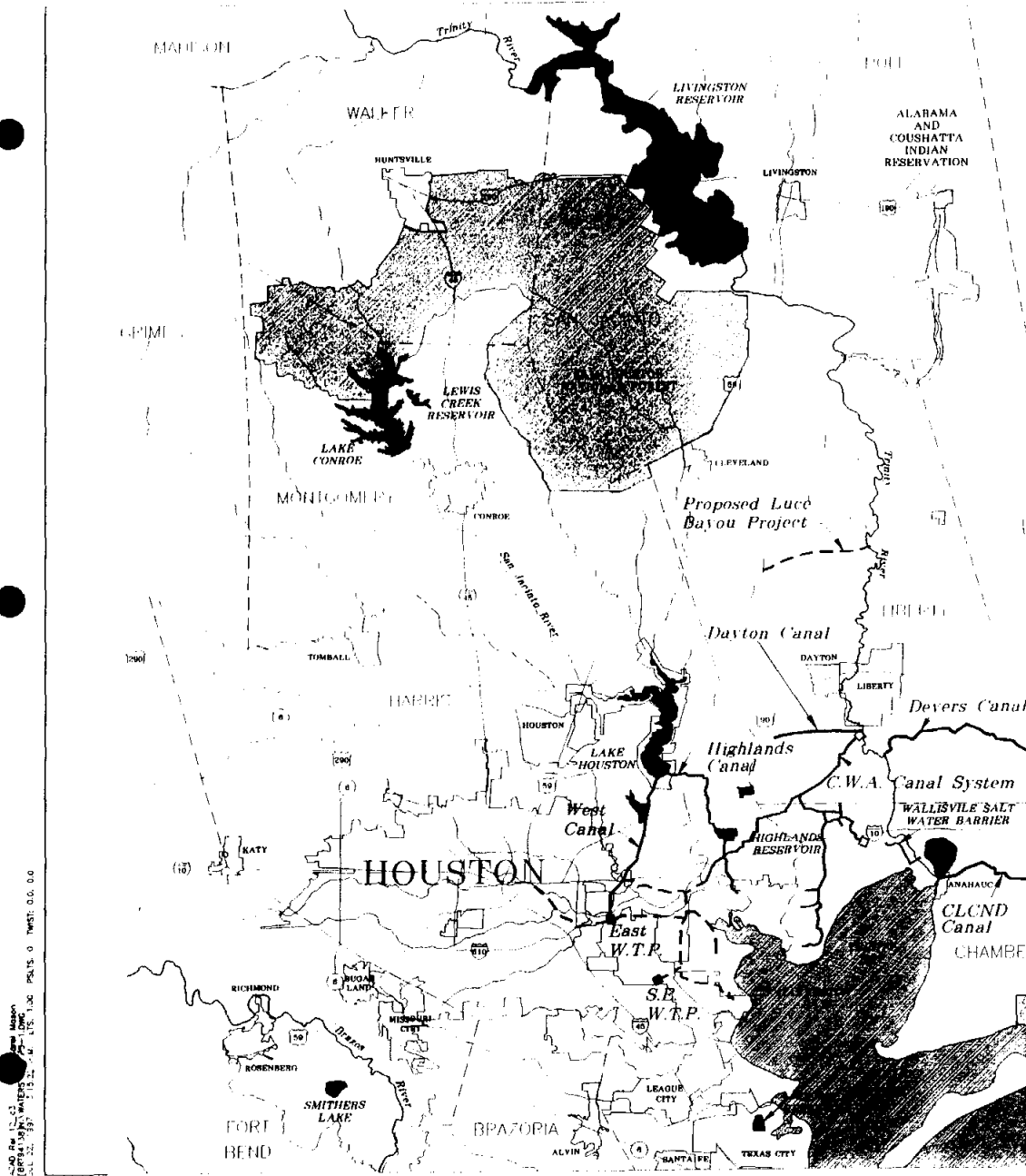
Table 2.1: Key Data for the Dams and Reservoirs

	<i>Lake Houston</i>	<i>Lake Livingston</i>	<i>Lake Conroe</i>	<i>Wallisville Salt Barrier</i>
Owner/operator	Houston	TRA	SJRA	USACOE
Year Started operation	1954	1969	1973	1997 (Est.)
Capacity (Acre-Feet)	131,540	1,718,778	413,941	-
Surface area (Acres)	11,817	82,950	20,074	3,800
Drainage area (Sq. Mi.)	2,828	16,583	445	17,845
Elev. at top of conservation storage	44.5	131.0	201.0	-

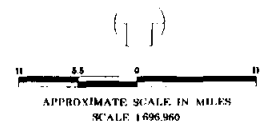
Note: The Wallisville salt water barrier will normally be operated at or slightly above normal water levels without the project. It will not have any conservation storage as such.

Table 2.2: Summary of Water Rights Associated with the Four Reservoirs (Acre-Feet/Year)

	<i>Houston</i>	<i>SJRA</i>	<i>TRA</i>	<i>Other</i>	<i>Total</i>
Run-of-the-River		55,000		1,600	56,600
Lake Houston	168,000				168,000
Lake Conroe	66,667	33,333			100,000
Lake Livingston	902,800		351,600		1,254,400
Wallisville SWB	38,000		51,600		89,600
Total	1,175,467	88,333	403,200	1,600	1,668,600



LOCATION MAP



LEGEND

- CITY
- MAJOR RIVER
- STREAM
- RESERVOIR
- COUNTY OR PARISH LINE
- STATE LINE
- FEDERAL LANDS
- BIG THICKET NATIONAL PRESERVE
- CITY OF HOUSTON CANAL SYSTEM
- CITY OF HOUSTON PIPELINES
- SAN JACINTO RIVER AND CANAL SYSTEM
- OTHER CANAL SYSTEMS
- CWA PUMP STATIONS

FIGURE 2-1
LAKE CONROE, LAKE HOUSTON AND
LAKE LIVINGSTON SYSTEM OPERATION

U.S. GEOLOGICAL SURVEY
 WATER RESOURCES DIVISION
 1:50,000 SCALE
 1975



3. Hydrologic Data

In the Houston area, as in many other parts of Texas, the critical drought periods of record for major reservoirs occurred in the 1950s. The length of the critical drought is not the same for all of the reservoirs considered here, but their drought periods overlap. The long span of below-normal rainfall that began in July of 1950 and extended through February of 1957 represents the limiting historical conditions so far experienced on those watersheds. The runoff and net evaporation data used for this investigation cover the 25 years from 1946 through 1970 and include the critical droughts in all cases.

The primary source of runoff data for this study was a report prepared for the City of Houston by Black and Veatch in 1978 ⁽⁵⁾. Freese and Nichols participated in that investigation as an observer and offered suggestions regarding the computational methods as they were developed. The result was a set of analyses on which Black and Veatch and Freese and Nichols were basically in agreement.

Monthly runoff estimates for Lake Conroe, for the Lake Houston watershed exclusive of the area above Lake Conroe, and for Lake Livingston were taken from the Black and Veatch report ⁽⁵⁾. Adjustments were made in the Lake Livingston inflows to allow for construction of the proposed Tehuacana Reservoir. (The Lake Livingston water rights provide for future construction of several upstream reservoirs, of which Tehuacana is the one most likely to be built in the foreseeable future.) In the Black and Veatch work, runoff downstream from Lake Livingston was derived only for the area between Livingston Dam and Capers Ridge. For this study, those

values were extended to include the remaining drainage area down to the Wallisville barrier site, assuming equal runoff rates per square mile of contributing area for all the Trinity watershed below Lake Livingston. The runoff data are summarized in Appendix C.

The evaporation data were also taken from the Black and Veatch work. The monthly depths of net evaporation loss from lake surfaces, as used in that study, were in turn based on data published by the Texas Water Development Board ⁽⁶⁾. Tables of the net evaporation estimates are in Appendix D.

4. Prior Rights Downstream From Lake Livingston



There are several large water rights on the Trinity River downstream from Lake Livingston that are senior to the Lake Livingston rights. When the Livingston project was being developed, contractual agreements were signed by Houston and the TRA and three of the owners of such prior rights, defining obligations to release water from Lake Livingston in recognition of the downstream priorities. These were referred to as the "fixed right" obligations associated with Lake Livingston. Basically, they set the annual downstream withdrawal amounts for each of the older rights that are to be supported by releases from Lake Livingston.

The fixed rights are summarized in Table 4.1. Under the terms of the agreements, the users of Lake Livingston consented to release water as required to make reliable 88,820 acre-feet per year of diversions by the Chambers-Liberty Counties Navigation District, 33,000 acre-feet per year by the Dayton Canal Company, and 86,000 acre-feet per year by the Devers Canal Company. All of these uses were for irrigation. Their diversion point locations are shown on the map in Figure 2-1. The Chambers-Liberty Counties Navigation District's diversion point is just upstream from the Wallisville barrier site, and the other two are near the CWA diversion station.

Since these settlements were in recognition of senior certified filings and permits, for the most part they do not constitute part of the Lake Livingston yield and must be satisfied in preference to that yield. The one exception is the Devers right, of which 27,500 acre-feet per year were earmarked as being part of the project yield, to be charged against the Lake Livingston permit.

In addition to the three "fixed right" agreements, a fourth senior right of 45,000 acre-feet, belonging to the Southern Canal Company, was purchased outright by Houston and is still owned by the city. That right is also shown in Table 4.1, since its effect on Lake Livingston will be similar to that of the three fixed right agreements.

The downstream water rights situation has also been affected by a recent purchase by the San Jacinto River Authority of 56,000 acre-feet per year that were formerly part of the Devers rights. For purposes of this study, it will be assumed that the downstream water right obligations at Lake Livingston were not altered by that purchase.

In all, there are 252,820 acre-feet per year of prior rights downstream from Lake Livingston that involve obligations for pass-throughs or releases from the lake. Of that amount, only 27,500 acre-feet per year would count as new yield developed by Lake Livingston.

Table 4.1: Lake Livingston "Fixed Right" Obligations

Chambers & Liberty Counties Navigation District	88,820 ac-ft/yr
Dayton Canal Company	33,000 ac-ft/yr
Devers Canal Company	86,000 ac-ft/yr
Southern Canal Company	45,000 ac-ft/yr
Total	252,820 ac-ft/yr

- Notes:
- a. The San Jacinto River Authority now owns 56,000 acre-feet per year of the Devers rights.
 - b. The City of Houston now owns the former Southern Canal Company rights.
 - c. Although the 45,000 acre-feet per year of rights purchased by Houston from the Southern Canal Company is not entirely the same kind of obligation as the three "fixed rights," it has a similar effect on Lake Livingston and is included for that reason.



5. Return Flows

In general, the runoff data discussed in Chapter 3 do not include reclaimed wastewater that is returned to the streams after use by municipalities and industries. The amount of such return flow in the San Jacinto River Basin above Lake Houston was relatively small in the 1950s. The sources used for the Black and Veatch derivations of Trinity River flows reflected the natural runoff of the watershed, not including the return flows^(5,7). In both the Trinity River Basin and the San Jacinto River Basin, there are now significant discharges from wastewater treatment plants, and these discharges are increasing steadily. Lake Houston and Lake Livingston now intercept enough return flow to make noticeable differences in their yields.

Because most return flows have only small seasonal variations and are nearly constant throughout the year, they tend to have very little influence on system operation considerations. The yield gains available from system coordination are essentially independent of the amounts of return flow. In that sense, this study could be completed without including the return flow at all. However, the volumes of reclaimed wastewater are of such magnitude that they should not be altogether ignored. For purposes of showing the benefits of system operation, our studies have therefore been based on the hydrologic conditions as they would be during the critical drought without the return flows. Then, the potential impact of the increasing return flows will also be noted in the final results.

Figure 5-1 is a graph of return flows above Lake Houston, plotted as a moving 5-year average for the period from 1978 through 1996, with the resulting best-fit curve extrapolated through 2000.

The basic information on actual historical flows was obtained from the Regulatory Compliance System database of the Texas Natural Resource Conservation Commission⁽⁸⁾. Use of the moving 5-year average makes it easier to see the historical trends and is consistent with the fact that the critical drought lasted for several years. When evaluating reservoir yields, the average return flow over a period of years is more meaningful than the flow in a single extreme year. Based on Figure 5-1, it is estimated that approximately 54,000 acre-feet per year of return flows which were not present in the 1950s will be added to the Lake Houston inflows by the year 2000.

Figures 5-2 and 5-3 give similar information for Lake Livingston, showing the historical return flows released to flow downstream to the reservoir, a graph of 5-year moving averages, and a best-fit projection extending through 2000. The total return flow going into Lake Livingston is now approximately 600,000 acre-feet per year. By 2000, it is projected to reach 635,000 acre-feet per year.

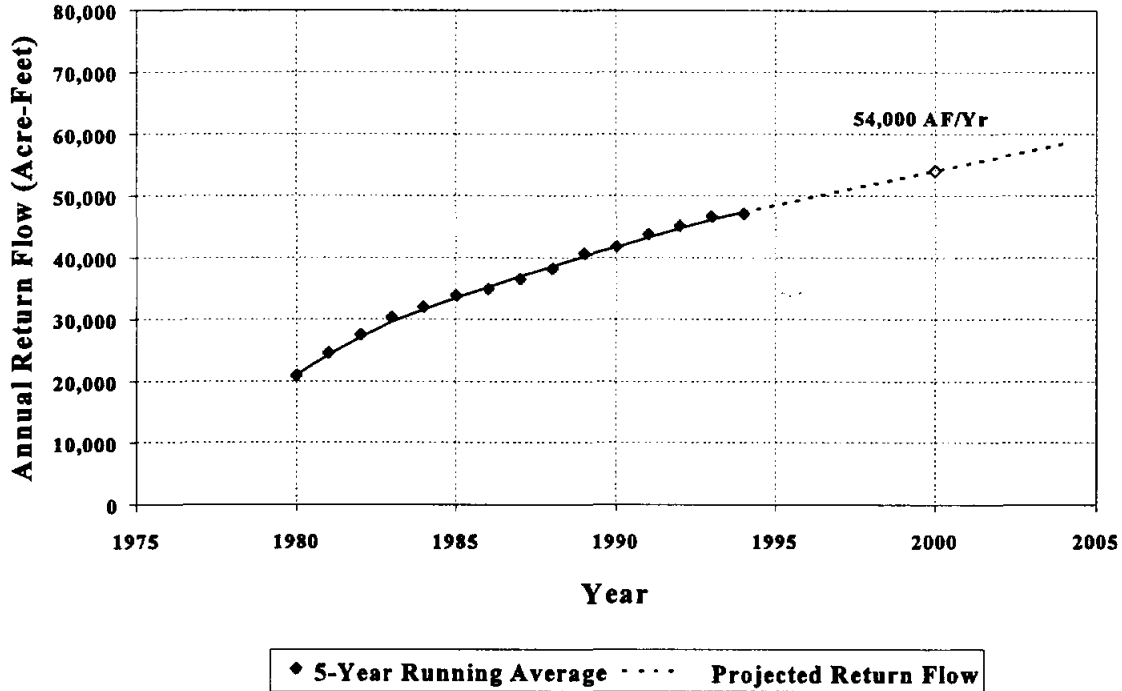


Figure 5-1: Lake Houston Annual Return Flow (Five-Year Running Average)

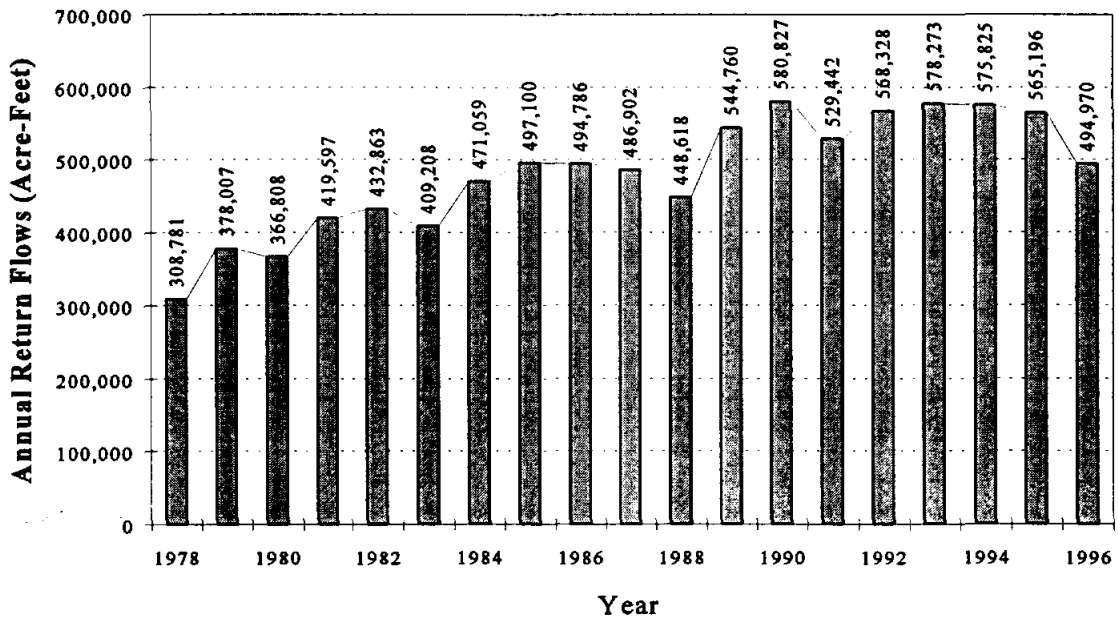


Figure 5-2: Upper Trinity Annual Return Flows

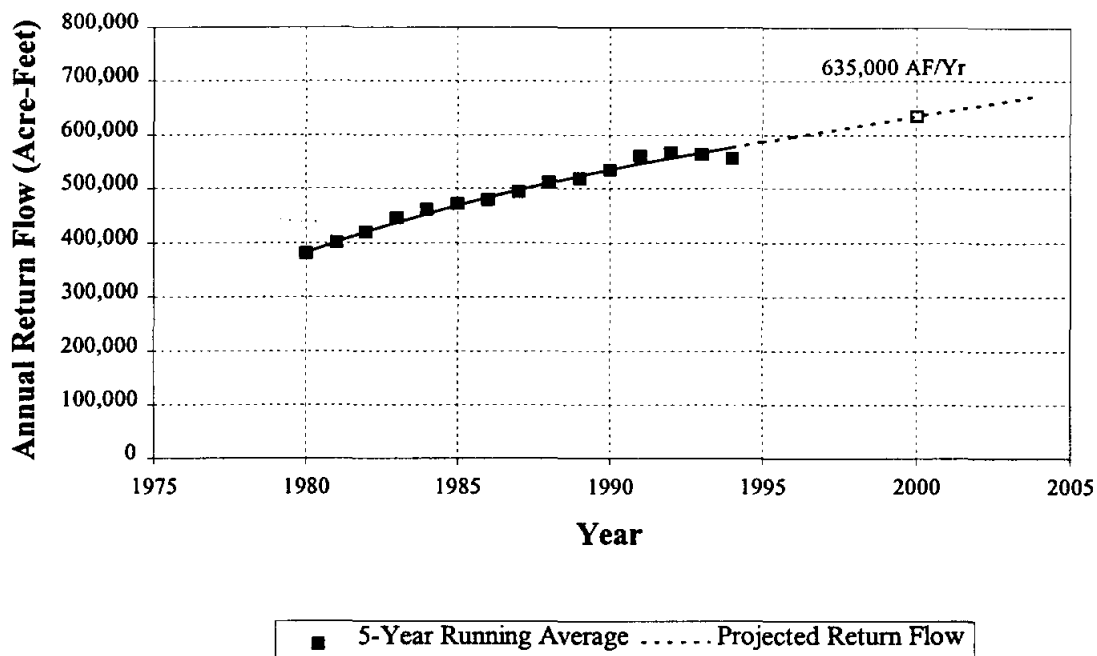


Figure 5-3: Upper Basin Annual Return Flow
(Five-Year Running Average)

Table 5.1 lists the minimum flow rates observed in the Trinity River at the U. S. Geological Survey gaging station near Crockett during the last five years⁽⁷⁾. These minimum flows can be thought of as consisting almost entirely of reclaimed wastewater, and they reflect approximately the present levels of wastewater return flows after conveyance losses in the stream. The lowest value observed in water years 1990 through 1996 was 784 cfs, on August 23, 1996, and the next-lowest was 851 cfs, on September 10, 1994. These minimum daily rates are equivalent to annual total flows of 567,616 acre-feet and 616,124 acre-feet and tend to support the conclusion that the current average return flows reaching Lake Livingston are on the order of 600,000 acre-feet per year.

Special conditions contained in the Lake Livingston certificates of water rights adjudication subordinate the rights of Houston and the Trinity River Authority to a general right of water supply entities in the upper Trinity Basin to reuse local return flows. When the original permits for Lake Livingston and the salt water barrier were granted, it was concluded by the then Texas Board of Water Engineers that the Lake Livingston project should not preempt the anticipated reuse of return flows in the upper Trinity. Realistically, it is to be expected that a significant portion of the return flow will continue to reach Lake Livingston in the future and will contribute to the Livingston yield, but Houston and the TRA do not have priority rights to it under the terms of their existing certificates of adjudication.

Table 5.1: Minimum Recorded Daily Average Flows in the Trinity River near Crockett, Water Years 1990 through 1996

<i>Water Year</i>	<i>Minimum Daily Flow Rates</i>		<i>Date</i>
	<i>cfs</i>	<i>Ac-Ft/Yr</i>	
1990	928	671,872	October 28, 29
1991	1,050	760,200	August 9
1992	808	584,992	September 23
1993	881	637,884	October 11
1994	851	616,124	September 30
1995	1,180	854,320	October 24, 26, 29, 30
1996	784	567,616	August 23



6. The Computer Model

A computer model was created to simulate the performance of the four reservoirs. The model was based on the program OPERATE, a general purpose routine developed previously by Freese and Nichols for simulation of surface reservoir operation. The program used in the present study is structured to allow analysis of one or all of the four main reservoirs in the Houston area under a variety of load conditions. It provides wide flexibility in the location and seasonal pattern of demands, to make possible the examination of various alternative system operation methods. Figure 6-1 is a schematic of the modeled system, showing the various components and their relative locations.

Basically, the model reflects conditions as they would be if the hydrologic events of the years 1946-1970 were to occur with present watershed development plus construction of the proposed Tehuacana Reservoir in the Trinity Basin. It also includes the options to assume that water can be transferred (a) from the Trinity River to Lake Houston via the proposed Luce Bayou project and (b) from the Trinity to the SJRA's Highlands Reservoir through a linkage from the CWA canal.

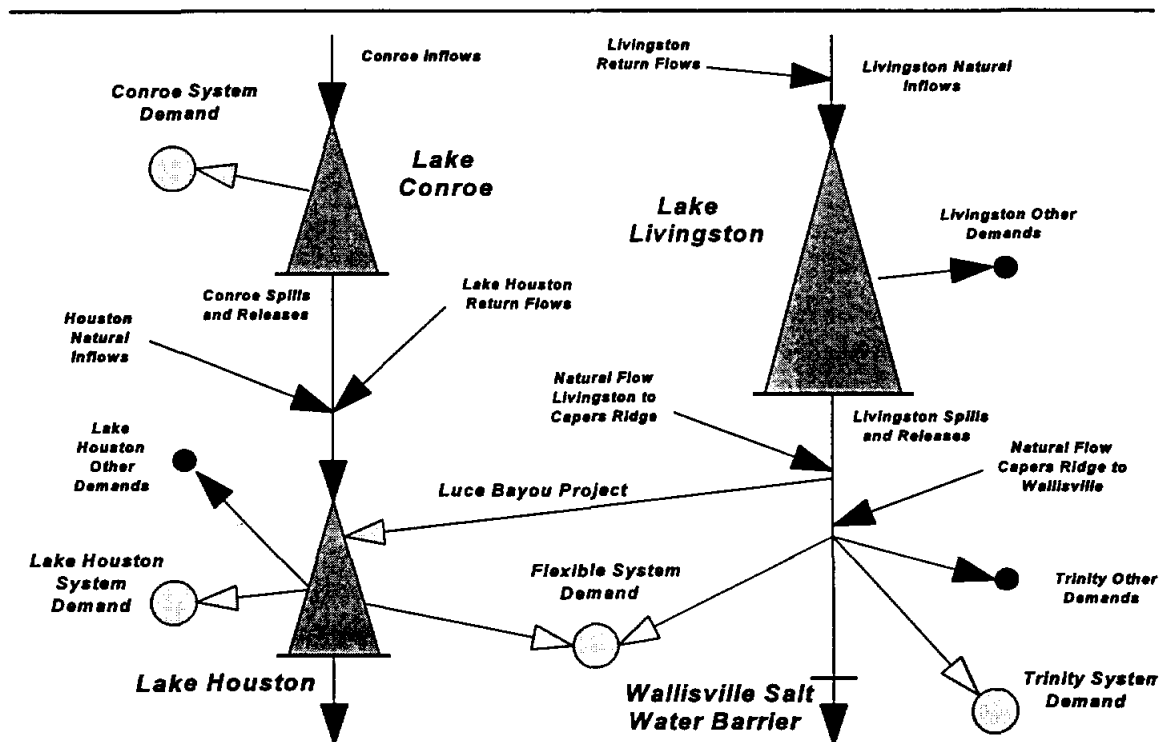


Figure 6-1: Operation Model Schematic



7. Lake Houston and Lake Conroe

Lake Houston and Lake Conroe represent a classic example of an opportunity for gains in yield due to system operation. These two reservoirs are in tandem and are significantly different in their ability to control the runoff that they would receive during a critical drought. Lake Conroe, which has approximately 935 acre-feet of storage per square mile of contributing drainage area, would be able to control and use all its inflows throughout the drought, without spilling, if operating at a demand equal to the firm yield. Lake Houston, on the other hand, has only about 56 acre-feet of storage per square mile of net contributing drainage area and would tend to spill often, even during drought conditions.

Another way to understand a lake's ability to control the runoff it receives during a drought is in terms of the ratio of the reservoir storage capacity to the total runoff experienced in the drought period. From July 1950 through February 1957, there was slightly more than enough runoff from the Lake Conroe watershed to fill that lake once. In that same period, however, Lake Houston experienced enough inflow (not counting return flows) to fill and refill it 18 times.

Table 7.1 contains yearly summaries of inflows and spills at Lake Conroe and Lake Houston during the 80-month dry period from July 1950 through February 1957, assuming that (a) the two lakes are operating independently, (b) no water is released to flow downstream from Lake Conroe and be stored in Lake Houston during the drought, and (c) both Lake Houston and Lake Conroe make use of all their conservation storage and have no water remaining at the end of the critical period. Under those conditions, the firm yield of Lake

Conroe would be 101,655 acre-feet per year, and the firm yield of Lake Houston would be 157,538 acre-feet per year, for a combined total of 259,193 acre-feet per year. A printout of the key years of the operation study is reproduced in Appendix E as Table E-1.

With the lakes operating independently, the spills at Lake Houston would total 1,382,442 acre-feet, or 48 percent of its natural inflows during the drought. Any water spilled from Lake Houston, of course, is no longer available for beneficial use and represents a loss of water that might otherwise be part of the firm yield.

The combined yield of the two reservoirs can be increased significantly by varying the withdrawals at the lakes and taking more water from Lake Houston whenever it is above a certain level. This will increase the amount of empty storage space at Lake Houston, in which to capture inflows when they occur. The basic approach is that the water level in Lake Houston would be intentionally pulled down first, and the water in Lake Conroe would be held in reserve for use as needed when Lake Houston reaches a selected minimum elevation. If full potential use were made of this technique, the firm combined yield of the two-lake system could be increased to 360,710 acre-feet per year. That is a gain in yield of 101,517 acre-feet per year, or approximately 39 percent. It results from being able to capture and use a considerable portion of the water that would otherwise spill from Lake Houston if the lakes were operating independently. A copy of the computer output for the system operation condition is included in Appendix E as Table E-2.

It should be noted that the study described above for the independent operation case (Table E-1 in Appendix E) is not strictly in accord with the water rights priorities, since it assumes that Lake Conroe would capture and use some water that would actually be covered by the prior rights associated with Lake Houston. In other words, the independent operation study takes advantage of the benefits of holding as much water as possible in the upstream lake, even when a strict application of Lake Houston's priority rights would mean that Lake Conroe would have to bypass any current inflows that would not cause spills at Lake Houston. Keeping the maximum possible amount of water upstream results in a simpler set of operating conditions and also a somewhat higher independent firm yield total for the lakes. Inasmuch as the same two users (SJRA and the City of Houston) hold the rights in both reservoirs, this approach is considered reasonable.

The estimated combined firm yield of 360,710 acre-feet per year from system operation (represented by Table E-2 in Appendix E) is a limiting theoretical amount, assuming complete use of both conservation storage pools during the drought. In actual operation, there are significant problems associated with emptying a major water supply impoundment. If the lakes are not drawn down completely, the yields will be less, both with and without system operation. Table 7.2 and Figure 7-1 show, for example, the range of system yields if the Lake Houston minimum level is set at various elevations (assuming that all other aspects of the system study shown in Table E-2 remain unchanged). It can be seen from Table 7.2 and Figure 7-1 that there is a noticeable drop in system yield as the minimum level in Lake Houston is raised.

Another factor that influences the operational results will be the amount of Lake Conroe yield needed for local demands in the vicinity of that reservoir. The operation studies for Lake Conroe

discussed in this chapter have up to this point all assumed that the local demand for water consists only of Entergy's use of 6,450 acre-feet per year for power plant cooling at its Lewis Creek facility. Table 7.3 and Figure 7-2 show the impact on system yield due to changes in the local requirements at Lake Conroe (again assuming that all other factors remain unchanged). As the local demand at Lake Conroe increases, the amount of Lake Conroe water available for coordination with Lake Houston decreases, and the total system yield is diminished.

Chapter 10 will discuss the practical limitations of actual operation in more detail.

System operation of Lake Houston and Lake Conroe would require no additional facilities, so there would be no costs for physical facilities.

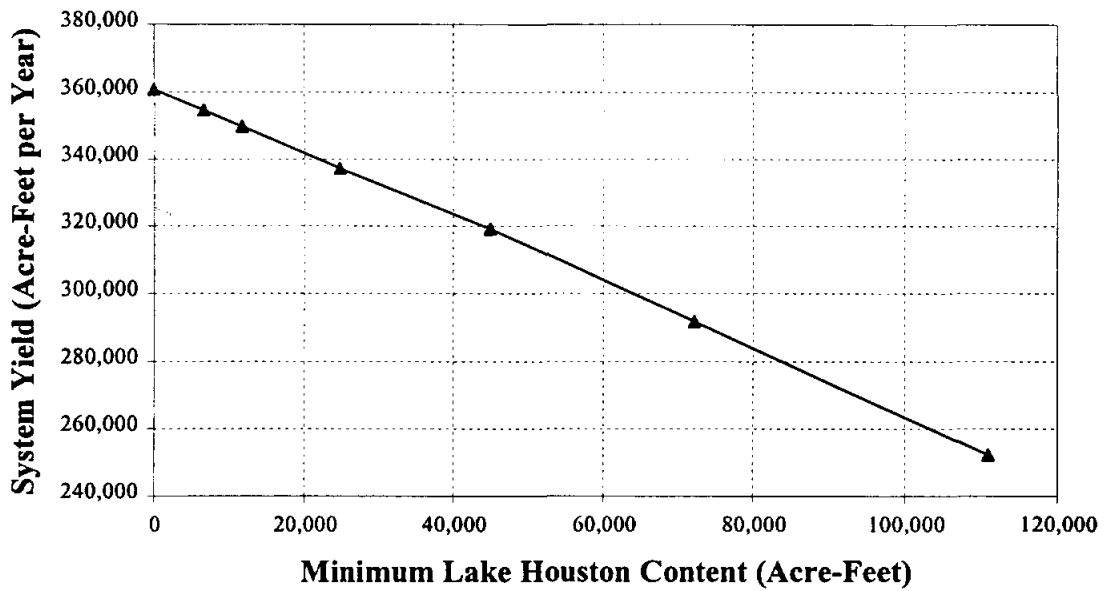


Figure 7-1: Effect of Minimum Lake Houston Content on System Yield for Lake Conroe and Lake Houston

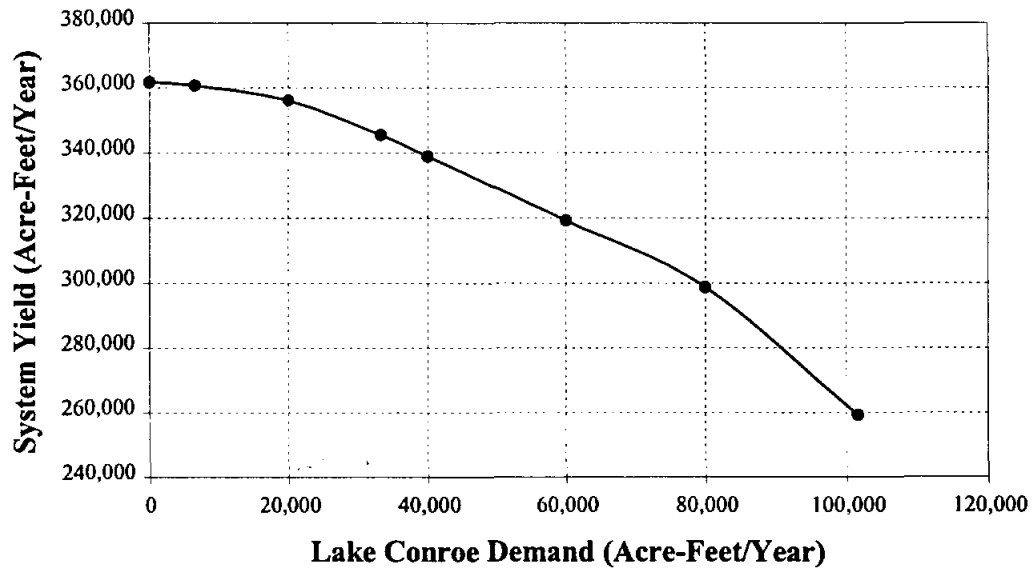


Figure 7-2: Effect of Local Demand at Lake Conroe on System Yield for Lake Conroe and Lake Houston

Table 7.1: San Jacinto River Basin Runoff and Spills During the Critical Drought with Independent Lake Operation (Amounts in Acre-Feet)

		<i>Lake Conroe Runoff</i>	<i>Lake Houston Runoff</i>	<i>Total Runoff</i>	<i>Lake Houston Spills</i>
Jul-Dec	1950	9,560	78,100	87,660	17,576
	1951	22,870	148,630	171,500	0
	1952	90,230	495,950	586,180	301,229
	1953	181,310	950,920	1,132,230	797,977
	1954	41,760	255,940	297,700	70,541
	1955	72,430	347,190	419,620	245,159
	1956	27,330	127,230	154,560	0
Jan-Feb	1957	2,490	13,170	15,600	0
Total		447,980	2,417,130	2,865,110	1,382,442

- Notes:
- a. Lake Conroe and Lake Houston are assumed to be operating independently.
 - b. There are assumed to be no releases flowing downstream from Lake Conroe during the drought.
 - c. Lake Houston is assumed to use all its conservation storage during the critical drought.

Table 7.2: Effect of the Minimum Lake Houston Water Level on System Yield for Lake Conroe and Lake Houston

<i>Lake Houston Target Elevation (msl)</i>	<i>Maximum Lake Houston Drawdown (Feet)</i>	<i>Minimum Lake Houston Content (Ac-Ft)</i>	<i>System Yield (Ac-Ft/Yr)</i>	<i>Lake Houston Spills in Drought (Ac-Ft)</i>
42.5	2.0	111,032	252,350	1,278,085
38.0	6.5	72,186	291,845	1,061,584
34.0	10.5	44,853	319,244	914,825
30.0	14.5	24,806	337,330	823,090
26.0	18.5	11,678	349,770	763,018
23.3	21.2	6,573	354,550	742,148
9.0	35.5	0	360,710	716,815

Note: The local demand at Lake Conroe is set at 6,450 acre-feet per year in the studies summarized in this table.

Table 7.3: Impact of the Local Demand at Lake Conroe on the System Yield for Lake Conroe and Lake Houston

<i>Local Demand at Lake Conroe (Ac-Ft/Yr)</i>	<i>System Yield (Ac-Ft/Yr)</i>
0	361,827
6,450	360,710
20,000	356,090
33,333	345,473
40,000	338,940
60,000	319,204
80,000	298,745
100,000	262,000



8. Lake Livingston and the Wallisville Salt Water Barrier

Lake Livingston would have a stand-alone yield of 898,390 acre-feet per year with present conditions of upstream development plus the addition of the proposed Tehuacana project and not counting the return flows from the upper Trinity Basin that were discussed in Chapter 5. The operation study for this case is shown by Table E-3 in Appendix E. In that study, water was assumed to be released or passed through the reservoir on a priority basis to firm up the "fixed rights" that were explained in Chapter 4. The remaining water resources available at Lake Livingston were then used to provide a firm yield, independent of any water originating farther downstream. The yield was divided so that it supplied assumed local requirements of 40,000 acre-feet per year at Lake Livingston, 200,000 acre-feet per year for diversion to Lake Houston through the Luce Bayou connection, and the remainder - 658,390 acre-feet per year - through the CWA canal. This is a basically reasonable distribution of the yield among various users but not the only possibility by any means. Within reason, the firm yield amount should not be influenced significantly by where the water is used.

The critical drought period for Lake Livingston with those conditions is shorter than the critical drought for Lake Conroe. Spills totaling 846,499 acre-feet are indicated to occur in May and June of 1953, nearly three years after the start of the overall period of unusually dry weather in July of 1950. The true critical period for Lake Livingston in this mode of operation is from July of 1953 through February of 1957. (See Table E-3.)

The Wallisville salt water barrier will have no usable conservation storage and thus no stand-

alone firm yield. However, it potentially will save an estimated 1,000 cfs (724,000 acre-feet per year) that otherwise would have to remain flowing in the lower reaches of the river and go on into Trinity Bay in order to keep salt water from moving upstream and contaminating the water at the diversion points.

In the case of Lake Livingston and the Wallisville barrier, the basic feature of system operation will consist of coordinating the releases at Lake Livingston with the runoff originating in the sub-basin between Livingston and Wallisville so as to maximize the use of local inflows that could not otherwise be counted as a source of firm supply because they would not be dependable. Using the storage of Lake Livingston to supplement the lower Trinity inflows, a firm system yield of 970,537 acre-feet per year could be developed. Thus, in this case the system approach could increase the firm yield by as much as 72,147 acre-feet per year, or 8 percent. The printout for this run is in Table E-4 of Appendix E.

System operation of Lake Livingston and the Wallisville Salt Water Barrier would require completion of the link between the CWA system and the SJRA canal system and may require expansion of the CWA pump station. Plans to link the CWA and SJRA systems are underway and the costs associated with the link will be minimal. The CWA pump station expansion is currently under design and the estimated cost of the expansion is included in the Trans-Texas Water Program Southeast Area report, *Engineering Analysis of the Interbasin Transfer Strategy*.



9. Four-Reservoir System Operation

During the dry period from July of 1950 through February of 1957, when Lake Conroe would have received enough inflow to fill its conservation storage only once, Lake Livingston would have had enough natural runoff to fill and refill approximately four times. Thus, Lake Livingston is inherently more likely to spill than Lake Conroe. Since those two impoundments are the largest lakes in the group, the primary key to overall system operation should be to use Lake Livingston first, so as to provide more empty storage space to hold its greater amounts of inflow. Tables E-5a and E-5b show the performance of all four lakes when operating as an overall system.

For coordinated operation of the four-reservoir system, as with the two-reservoir San Jacinto system, Lake Houston is drawn on heavily in order to conserve water that would otherwise spill. Unlike the run in Table E-2, however, the preferred source once Lake Houston is drawn down is Lake Livingston, rather than Lake Conroe. When Lake Livingston is drawn down to about half full, then releases are made from Lake Conroe to help supply the demands at Lake Houston. As in Table E-4, releases from Lake Livingston are coordinated closely with the Trinity River runoff downstream from Livingston Dam.

The gain in firm yield in comparison to the sum of the firm yields of the two-lake systems (Tables E-2 and E-4) is found to be some 5,420 acre-feet per year. This is shown by Table 9.1. The yield of the coordinated four-reservoir system is thus very little more than can be obtained from the two separate two-reservoir systems. For practical purposes, there is little benefit from extending the

coordination to take in all four lakes, and independent operation of the separate two-lake systems is all that is warranted.

System operation of all four water supply sources would require completion of the link between the CWA system and the SJRA canal system, completion of the Luce Bayou Project, and may require expansion of the CWA pump station. Plans to link the CWA and SJRA systems are underway and the cost associated with this link will be minimal. The CWA pump station expansion is currently under design. Estimated costs of constructing the Luce Bayou Project and expanding the CWA pump station are included in the Trans-Texas Water Program Southeast Area report, *Engineering Analysis of the Interbasin Transfer Strategy*.

Table 9.1: Comparative Yields of the Four-Reservoir System and the Combined Two-Reservoir Systems

Yield of the coordinated four-reservoir system	1,336,667 Ac-Ft/Yr
Yield of the coordinated two-reservoir San Jacinto system operating independently	360,710 Ac-Ft/Yr
Yield of the coordinated two-reservoir Trinity system operating independently	970,537 Ac-Ft/Yr
Sum of the yields of the combined San Jacinto and Trinity two-reservoir systems	1,331,247 Ac-Ft/Yr
Gain in firm yield due to coordinated operation of all four reservoirs	5,420 Ac-Ft/Yr



10. Realistic Operating Conditions

The previous three chapters have dealt with the theoretical firm yields available from the reservoirs under critical drought conditions, with and without system operation. Chapter 7 indicated that Lake Conroe and Lake Houston could be expected to gain as much as 101,500 acre-feet per year of added yield due to system coordination. Chapter 8 showed a potential gain of approximately 72,150 acre-feet per year from operating Lake Livingston and the Wallisville barrier as a system.

The analyses described in those sections of the report represent the maximum yields that the lakes could produce (not counting reuse of return flows) if the entire volume of conservation storage could be used during the drought, leaving no reserve at the end of the critical period. Likewise, the system studies assumed that maximum yield was the only consideration and that there would be no limitations on the amounts of drawdown of the lakes at any given time. In actual operation, it is likely that a moderate amount of storage would remain in each of the reservoirs at the end of the drought, and an effort would be made to avoid holding any of them at minimum levels for extended periods of time.

In order to define the range of possible gains more realistically, a second group of studies was also prepared, with assumed minimum storage levels and other reasonable limits on the degree of efficiency that might be expected in the coordination efforts. First, for Lake Conroe and Lake Houston standing alone, the following limits were introduced:

- Lake Conroe minimum content = 2,000 acre-feet
- Lake Houston minimum content = 15,800 acre-feet

Based on the projected area/capacity evaluation relationships as of the year 2000, the selected minimum storage in Lake Conroe would be about four feet above the bottom of the lake, and the minimum for Lake Houston would be approximately 17 feet below the top of conservation storage.

With those guidelines, the stand-alone yields were found to be 101,189 acre-feet per year for Lake Conroe and 147,706 acre-feet per year for Lake Houston. The combined total of these yields is 248,706 acre-feet per year. The printout of the study is Table E-6 in Appendix E.

Next, a system operation study was made for Lake Conroe and Lake Houston, with the following assumptions added:

- The system demand (other than the local demand at Lake Conroe) is met entirely from Lake Houston as long as Lake Houston is within 2 feet of full.
- If Lake Houston drops to 2 feet or more below full, a steady release of 100 cfs is begun at Lake Conroe. If Lake Houston still tends to drop, added releases are made from Lake Conroe to hold Lake Houston at the 2-foot-down level.

- However, if Lake Conroe falls more than 4 feet below the top of its conservation pool, the releases are cut back to the steady 100 cfs rate once again.
- When Lake Houston reaches its specified minimum content, releases are made from Lake Conroe sufficient to keep Lake Houston at that level.

operation studies.

The total firm yield with these guidelines was calculated to be 313,926 acre-feet per year, exclusive of reuse of return flows. That represents a gain of 65,220 acre-feet per year due to system operation. (See Table E-7.) If the projected increased return flow (up to 54,000 acre-feet per year in the year 2000) is also counted, the total system yield would reach and exceed the 324,000 acre-feet per year of combined existing water rights at Lake Houston and Lake Conroe.

For Lake Livingston, it was assumed that the minimum content would be 20,000 acre-feet, or about 22 feet above the bottom of the lake. In recognition of the difficulty of matching releases perfectly with the available runoff downstream from the Livingston Dam, it was also assumed that at least 10 percent of the local inflows from the drainage area between the dam and the Wallisville barrier in any given month would bypass each diversion point and flow into Trinity Bay.

Operating with those assumptions, it was found that the firm yield of Lake Livingston by itself would be 883,060 acre-feet per year and that the system yield of Lake Livingston combined with the natural runoff originating between Livingston and the barrier would be 952,900 acre-feet per year. If reuse of part of the return flows is also assumed, the combined system yield could equal the existing water rights of 1,344,000 acre-feet per year from the Livingston/Wallisville system. Tables E-8 and E-9, in Appendix E, show these



11. Water Rights for System Operation

The existing water rights for the four reservoirs do not provide for full use of system operation. In order to operate in the manner envisioned in this report and gain the added yield benefits that system operations can provide, it would be necessary to amend the certificates of adjudication.

Specifically, the rights should be changed to allow the total demand to be distributed unevenly among the various sources in any given year, with the basic limitation that the total use from each system is not to exceed the sum of the original rights granted for the projects. In other words, the certificates for Lake Houston and Lake Conroe should allow their individual annual withdrawal rates to be greater than now permitted, as long as their combined use in any given year does not exceed their present total permitted use rate of 324,600 acre-feet per year.

Similarly, the allowable yearly use from Lake Livingston and the Wallisville salt water barrier should afford the same flexibility, with the overall provision that the total annual use could not exceed 1,344,000 acre-feet per year.

Because there are two major users at each reservoir, there would also be a need for specific limits applicable to each of them, similar to the overall limits mentioned above. Such limits would protect against over-use by either Houston or the TRA or the SJRA.

Amending the water rights permits to allow system operation is likely to require an environmental review. Under current environmental review requirements, a detailed

study of the impact of system operation of Lake Houston and Lake Conroe would cost approximately \$500,000.



12. Environmental Review of Proposed System Operations

This section provides an overview of potential hydrological, biological, and recreational/socioeconomic impacts associated with proposed San Jacinto reservoir system operation scenarios. The review is based on existing data for Lake Conroe, Lake Houston, the San Jacinto River, and Harris and Montgomery Counties. It also is based on the data generated in the reservoir operations models. Both non-limited system operation of Lakes Conroe and Houston and system operation of the two reservoirs with realistic limitations are addressed.

The reservoir system operation scenario which includes Lake Livingston is not discussed in this section since it has been determined to provide little additional yield. However, the same types of issues associated with the San Jacinto reservoirs could be applied to Lake Livingston if its inclusion in the system operation becomes feasible in the future. In addition, the issues associated with interbasin water transfers would need to be addressed.

12.1 Current Conditions

According to the operation model's 25-year study period, the water surface elevation in Lake Conroe, if operated independently, would reach the conservation elevation of 201 feet msl 29 times. The water surface would reach the conservation elevation in the month of June during eight of the 25 years. The conservation elevation would be reached during six years from January through May during the same 25-year period. The conservation elevation would be reached fewer times for all other months during the study period.

The water surface elevation in Lake Conroe also would be at elevations less than 190 feet 72 times during the 25-year period. The water surface in the months of November and December would be below this level 8 times each during the study period. In the months from April through July, the reservoir would be below the 190 foot level 4 or 5 times during the study period.

Spills and releases from Lake Conroe if it were operated independently would average 49,225 acre-feet per year. Greater quantities of spills and releases would occur from January through March than other months.

The water surface in Lake Houston, if operated independently, would reach the conservation elevation (44.5 feet msl) 158 times during the 25-year reservoir operation study period. The water surface in the reservoir would reach the conservation elevation 24 times each in April and May during the 25-year period. The water surface would reach the conservation elevation 18 to 22 times from January through March. That level would only be reached 9 times during the month of October during the study period. Water surface elevations would be below 34.5 feet once each in the months of January, February, October, November, and December.

Spills and releases from Lake Houston, if it were operated independently, would average 797,679 acre-feet per year. Larger spills and releases would occur in January, February, and May than any other time of year.

Bays and estuaries are unique ecosystems that provide a variety of valuable water quality and

aquatic life functions. Fresh water inflows into bays and estuaries are responsible for maintaining their operational integrity, including the dilution of seawater to brackish conditions, dilution and transport of harmful materials and contaminants, creation and maintenance of low salinity nursery habitats for fish, shrimp, crabs, and other biota, moderation of bay water temperatures, reduction of metabolic stress, provision of a medium for the transport of beneficial sediments and nutrients, creation of a cutting and filling mechanism that affects both erosion and deposition within bays and estuaries, and creation of a salt-wedge and mixing zone ⁽¹⁹⁾. Total freshwater inflows into the Trinity-San Jacinto estuary averaged approximately 879,000 acre-feet per month from 1941 to 1987 ⁽⁹⁾. The spills from Lake Houston represent approximately 7.6 percent of the total freshwater inflows into the estuary.

Mammalian species typical of Montgomery and Harris Counties include the opossum (Didelphis virginiana), eastern pipistrelle (Pipistrellus subflavis), eastern red bat (Lasiurus borealis), seminole bat (Lasiurus seminolus), evening bat (Nycticeius humeralis), Brazilian free-tailed bat (Tadarida brasiliensis), eastern cottontail (Sylvilagus floridanus), eastern fox squirrel (Sciurus niger), cotton mouse (Peromyscus leucopus), northern pigmy mouse (Baiomys taylori), nutria (Myocastor coypus), coyote (Canis latrans), red fox (Vulpes vulpes), gray fox (Urocyon cinereoargenteus), ringtail (Bassariscus astutus), raccoon (Procyon lotor), mink (Mustela vison), striped skunk (Mephitis mephitis), hog-nosed skunk (Conepatus mesoleucus), and the bobcat (Lynx rufus)⁽¹⁰⁾.

Numerous birds representing various families occur within the two-county area including the anhinga (Anhinga anhinga), great blue heron (Ardea herodias), Canada goose (Branta canadensis), mallard (Anas platyrhynchos), turkey vulture (Cathartes aura), red-tailed hawk (Buteo

jamaicensis), American kestrel (Falco sparverius), woodpeckers, flycatchers, wrens, mockingbird (Mimus polyglottos), warblers, northern cardinal (Cardinalis cardinalis), and sparrows⁽¹¹⁾.

Numerous species of amphibians and reptiles occupy the two-county area including the common snapping turtle (Chelydra serpentina serpentina), three-toed box turtle (Terrapene carolina), ornate box turtle (Terrapene ornata ornata), Mississippi map turtle (Graptemys pseudogeographica kohnii), red-eared slider (Trachemys scripta elegans), pallid spiny softshell (Trionyx spineferus pallidus), green anole (Anolis carolinensis), northern fence lizard (Sceloporus undulatus hyacinthinus), five-lined skink (Eumeces fasciatus), gulf coast toad (Bufo valliceps valliceps), green treefrog (Hyla cinerea), gray treefrog (Hyla versicolor), bullfrog (Rana catesbeiana), diamond-backed water snake (Nerodia rhombifera rhombifera), southern copperhead (Agkistrodon contortrix), and the Texas rat snake (Elaphe obsoleta lindeimeri)⁽¹²⁾.

According to information provided in publications of the Texas Parks and Wildlife Department (TPWD) and the United States Fish and Wildlife Service (USFWS) ⁽¹³⁾, three endangered species, the red-cockaded woodpecker (Picoides borealis), Texas prairie dawn (Hymenoxys texana), and the paddlefish (Polyodon spathula) could occur in Montgomery and Harris Counties. One threatened species, the bald eagle (Haliaeetus leucocephalus) also could occur in these counties.

Tremendous population growth in the area has led to high demand for recreational opportunities. Many types of recreation occur in the area and freshwater swimming and freshwater fishing rank among the highest. Besides being ranked high relative to other recreational activities in the area, these activities also are ranked highest in resource needs. However, access to these areas is limited. Participation in freshwater swimming is projected

to increase by 15 percent in this area by the year 2000 ⁽¹⁴⁾.

12.2 Potential Impacts

Under the no-limitations system operations scenario, the number of times that the water surface elevation in Lake Conroe would reach the conservation elevation would increase from 29 months, if operated independently, per 25 years to 87 months per 25-years when operated as a part of a system without limitations on withdrawals. The water surface would be at the conservation elevation more often during all months, except August and September. Also, the water surface elevation would be at levels below 190 feet less often under this scenario when compared to independent operation of the reservoir, 36 times versus 72 times. Figure 12-1 shows a comparison of the median, 10th percentile and 90th percentile water surface elevations for the stand alone and system operation, realistic limitations, scenarios.

Under the no limitations system operation scenario, the water surface in Lake Houston would reach the conservation elevation 99 months in the 25-year study period, with the lowered elevations occurring in all months nearly equally. The number of times that the water surface in Lake Houston would be lower than 34.5 feet (10 feet low) is expected to increase significantly from 5 times to 103 times in the 25-year study period. The months most affected by lowered levels are January and August through December. Figure 12-2 shows a comparison of the median, 10th percentile and 90th percentile water surface elevations for the stand alone and system operation, realistic limitations, scenarios.

Differences in spills and releases from Lake Conroe under the no-limitations system operation would include marked increases. The spills/releases would increase by an average amount of 87,105 acre-feet per year from 49,225

acre-feet per year to 136,330 acre-feet per year. Spills and releases would increase during all months with greatest changes occurring during April through August, October, and December.

Spills and releases from Lake Houston are projected to decrease by 111,595 acre-feet from 797,679 acre-feet per year to 686,084 acre-feet per year. All months would be affected, with January through May experiencing the greatest changes.

Under system operation with realistic limitations, the water surface in Lake Conroe would reach the conservation elevation in 64 months versus 29 months during the 25-year study period. The water surface elevation from January through May would be most affected. The water surface in the reservoir would fall below 190 feet only 37 times rather than 72 times.

Spills and releases from Lake Conroe under system operation with realistic limitations would increase over those experienced under independent operation. An average increase of 91,404 acre-feet per year, from 49,225 acre-feet per year to 140,629 acre-feet per year is projected to result. Increased spills and releases would occur in all months, with largest changes occurring from July through September.

The water surface in Lake Houston would be at the conservation elevation under this scenario 118 months during the 25-year study period, down from 158 months. All months would be affected, with greatest changes occurring from June through October. The number of times that the water surface in Lake Houston would be lower than 34.5 feet is projected to be 29 times versus the 5 times expected under independent operations. All months would be affected, with greater changes occurring from September through November.

Spills and releases from Lake Houston would be less than under independent operation, but more than the unlimited operation scenario. The average expected spills would total 732,157 acre-feet per year, a decrease of 65,522 acre-feet per year from those expected under the independent operation. All months would be affected with largest changes occurring during February through April.

The San Jacinto River contributes relatively small amounts of freshwater into downstream estuaries. Minor alterations in that flow regime would occur under either of the proposed system operation scenarios. The decrease in the outflows from Lake Houston would be represent approximately one percent of the total monthly inflows into the Trinity-San Jacinto Estuary in the no limitations operation scenario and roughly 0.6 percent of the 879,000 acre-feet per month under the reservoir system operation with realistic limitations.

The spawning season for most fish species within the area of investigation occurs from March through June. The increased surface area of Lake Conroe due to increased conservation elevations during spring is likely to create additional shallows that could create additional spawning grounds for fishes. Either of the proposed system operation scenarios would create more shallows than would independent operation. Also, increasing the area of shallows would be expected to provide more habitat for important shellfish.

Although greater elevations would be encountered in Lake Houston during spring than during other times of the year in both system operation scenarios, the water surface elevations are projected to decrease over those under independent operation. Decreases in surface area of the lake would occur which could cause loss of some spawning ground for fishes and fewer shallows for shellfish production. However, under the system operation with realistic limitations, the

reservoir would be within 2 feet of the conservation elevation in most years during the spawning season.

Projected increased spills and releases into the San Jacinto River from Lake Conroe would significantly change habitat conditions for aquatic species within the river. Increases in flow, especially during spring months would be beneficial to most species. Many species within the river require moderate to high flow for successful spawning. However, rapid fluctuations in flow could negatively impact species associated with the river. Increased sedimentation may be experienced by Lake Houston as a result of those increased flows, which could constitute a negative impact.

Under either of the proposed scenarios, impacts to terrestrial species in the area of Lake Conroe and Lake Houston should be insignificant.

Few endangered or threatened species occur in the two-county area under inspection. The paddlefish could occur in either of Lake Conroe or Lake Houston and within the San Jacinto River. This species only spawns in rivers and increased flows are expected to benefit that species. Wide fluctuations in water surface elevations and a potential reduction of fisheries in Lake Houston could impact the feeding patterns of any bald eagles nesting near the reservoir.

Under either of the proposed scenarios, freshwater recreation and recreation within the area of Lake Conroe should not be negatively impacted. Additional water surface would be available for recreation. The decrease in surface area under either of the proposed scenarios for Lake Houston could mean a decrease in available space for recreational opportunity. Considering population trends within the area and current high demand for freshwater recreational opportunity, a decrease in these opportunities also would be expected to

Figure 12-1
Lake Conroe Elevations

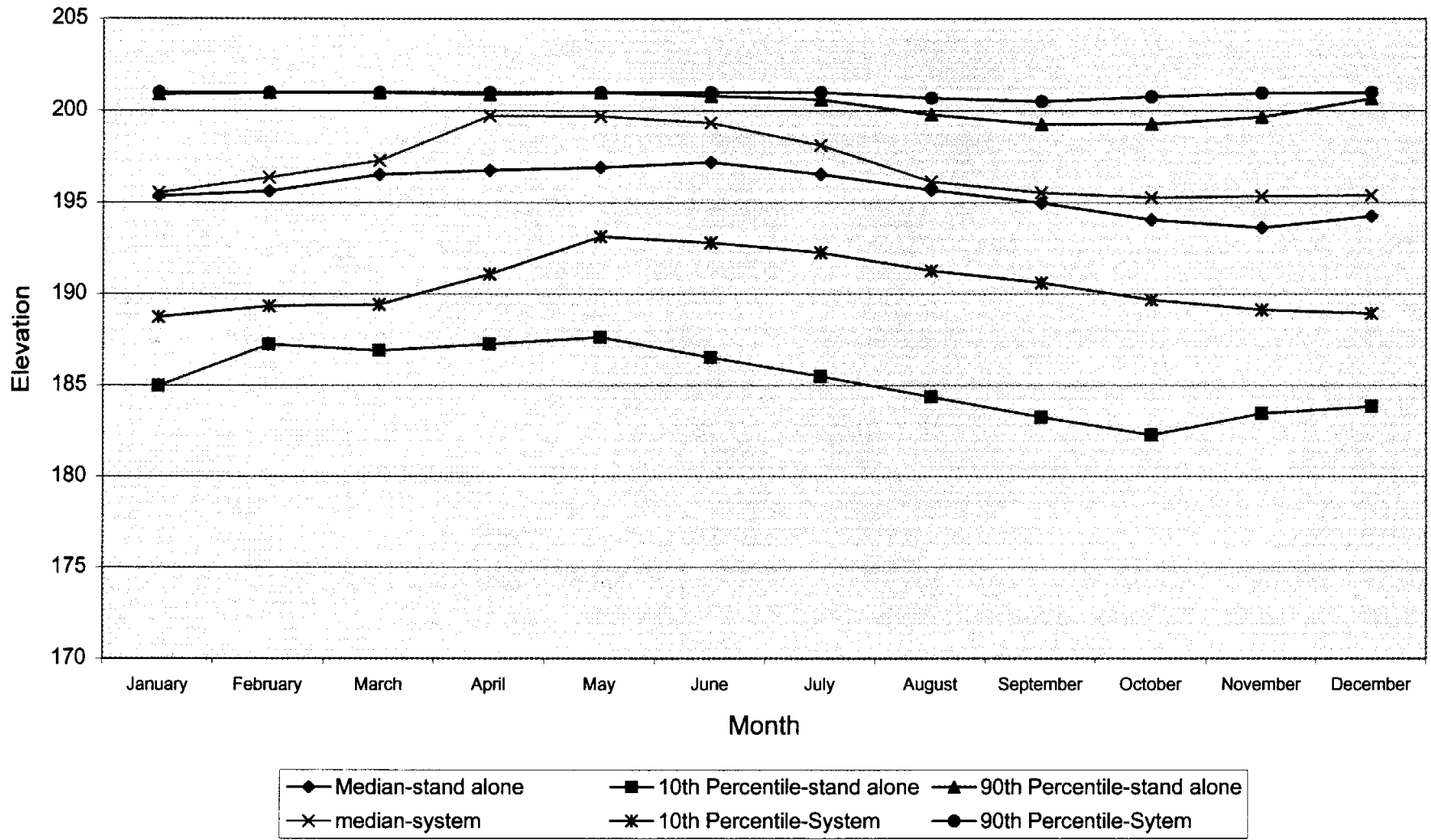
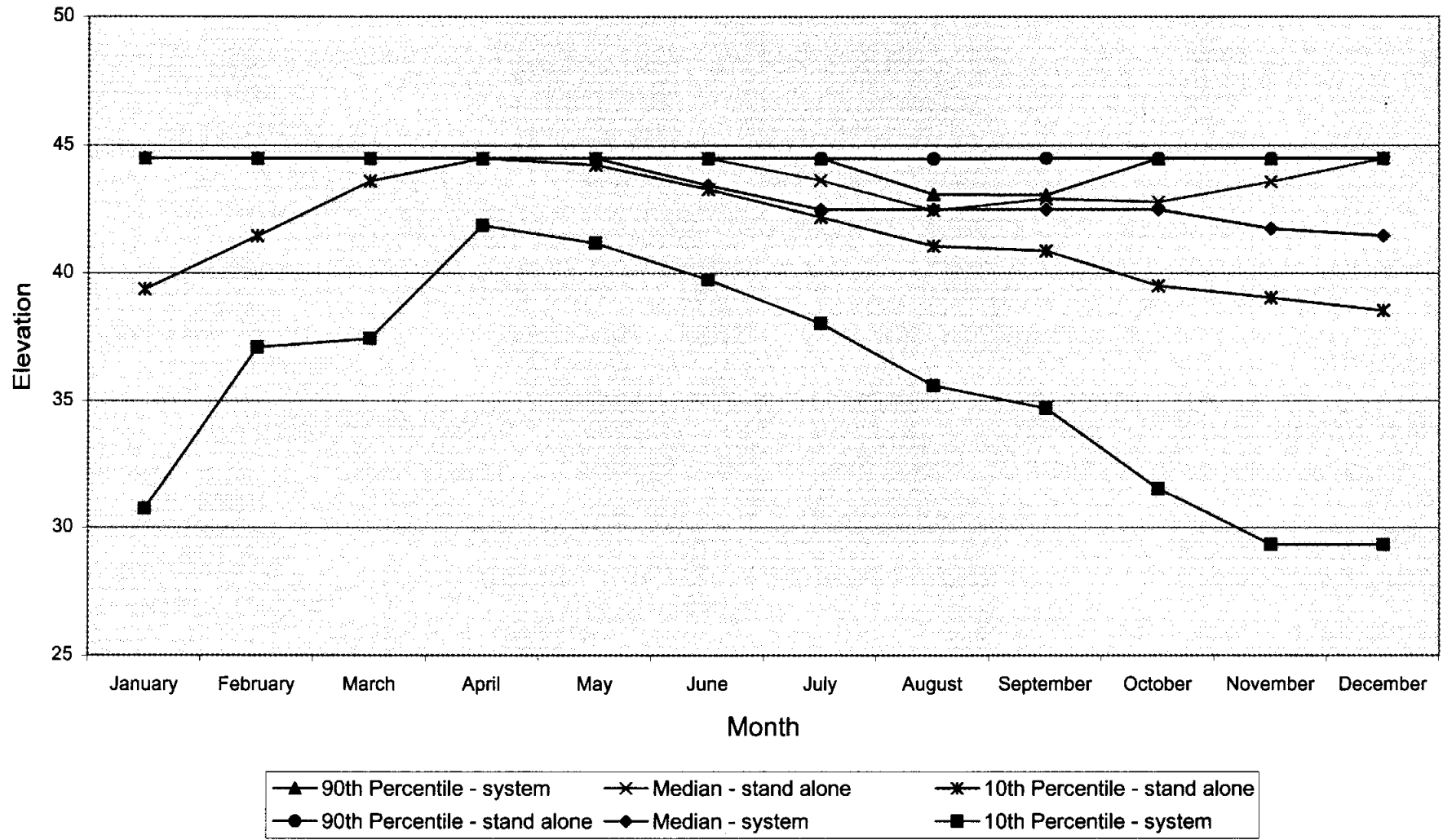


Figure 12-2
Lake Houston Elevations



impact this area economically. Little recreational activity has been associated with the San Jacinto River under its historic low flow regime. Projected increases in spills and releases from Lake Conroe could provide additional opportunities for water related activities.



13. Dredging to Control Loss of Yield Due to Siltation

Almost all surface water reservoirs in Texas undergo a gradual loss of storage capacity and a consequent loss of yield due to siltation. The scope of work for this study includes a task that calls for examination of the siltation and yield loss outlook for Lake Houston and Lake Livingston. The basic approach is to (a) calculate how much sediment would have to be removed from the lakes each year to avoid the yield losses and (b) make a preliminary estimate of the economic feasibility of a sediment removal program.

The key results are summarized in Table 13.1. The recent volumetric surveys in References (1) and (3) show average annual siltation rates of 401 acre-feet per year for Lake Houston and 2,854 acre-feet per year for Lake Livingston. In the 30 years from 2000 to 2030, the firm yield lost at Lake Houston due to the sedimentation would be 6,213 acre-feet per year. Similarly, Lake Livingston is predicted to lose 22,723 acre-feet per year of firm yield between 2000 and 2030.

A dredging operation beginning in the year 2000 and removing 401 acre-feet (646,947 cubic yards) of silt from Lake Houston each year would preserve a total of 6,213 acre-feet per year of usable supply by the year 2030. Similarly, taking 2,854 acre-feet (4,604,453 cubic yards) of sediment out of Lake Livingston each year would prevent a total yield loss of 22,723 acre-feet per year at that reservoir by 2030.

The cost of dredging varies considerably from one location to another, depending on the characteristics of the sites. A current project involving removal of approximately 3 million cubic yards of sediment from White Rock Lake in

Dallas was bid at approximately \$17.2 million, which represents a unit cost of about \$5.73 per cubic yard⁽¹⁵⁾. It is unlikely that the average unit costs to remove sediment from Lake Houston or Lake Livingston and dispose of the dredged material in an environmentally acceptable manner would be less than \$5.00 per cubic yard. At that rate, the yearly costs to keep up with the natural sedimentation would be approximately \$3.2 million at Lake Houston and \$23.0 million at Lake Livingston.

In terms of the unit costs of those operations per acre-foot per year of yield gained, the Lake Houston dredging would cost approximately $\$3,200,000 \times 30 / 6,213 = \$15,450$ per acre-foot per year at 1997 price levels, and the dredging at Lake Livingston would cost $\$23,000,000 \times 30 / 22,723 = \$30,365$ per acre-foot per year.

These unit costs are much higher than the cost per acre-foot per year of dependable supply would be from a new reservoir. For example, the proposed Allens Creek project in the Brazos Basin west of Houston is estimated to cost approximately \$2,415 per acre-foot per year at 1996 price levels⁽¹⁶⁾. The cost of dredging is so much greater than the cost of providing replacement storage by building a new reservoir that in almost all cases the dredging alternative is not truly a feasible choice.

Table 13.1: Key Parameters of Siltation Rates and Related Decreases in Firm Yield at Lake Houston and Lake Livingston

	<i>Lake Houston</i>	<i>Lake Livingston</i>
Average siltation rate (Ac-Ft/Yr)	401	2,854
(CY/Yr)	646,947	4,604,453
Expected silt accumulation 2000-2030 (Ac-Ft)	12,030	85,620
Estimated yield loss 2000-2030 (Ac-Ft/Yr)	6,213	22,723
Average annual yield loss (Ac-Ft/Yr)	207	757

Removal of sediment from a reservoir can also involve some relatively serious environmental difficulties. The sediment deposits often contain significant concentrations of heavy metals and organic contaminants such as polychlorinated biphenyls. During removal, some of these are re-suspended in the water column, so that they are available for uptake by aquatic organisms and enter the food chain. The dredged material must be drained, and the ultimate disposal must be in an approved landfill. A Federal Section 404 permit is required in all cases. If the nature and concentrations of toxic compounds are severe enough, the material may be classified as a Class I industrial waste or even a hazardous waste.



14. Summary of Findings

- a. The stand-alone firm yields of the three currently existing major reservoirs in the Houston area, with storage capacities projected as of the year 2000, are estimated to be as follows:

Lake Houston:	157,538 Ac-Ft/Yr
Lake Conroe:	<u>101,655 Ac-Ft/Yr</u>
Sub-total:	259,193 Ac-Ft/Yr

Lake Livingston:	<u>898,390 Ac-Ft/Yr</u>
Total:	1,169,583 Ac-Ft/Yr

These yields are based on complete use of each reservoir's conservation storage during the critical drought. In the case of Lake Livingston, the runoff assumed in the operation study is based on existing conditions of basin development upstream plus the effect of adding the proposed Tehuacana Reservoir.

- b. The above yields do not include the return flows of treated wastewater that contribute to these impoundments. It is estimated that, as of 2000, there will be approximately 54,000 acre-feet per year of such return flow coming into Lake Houston and 635,000 acre-feet per year coming into Lake Livingston.
- c. The Wallisville salt water barrier is expected to be completed and begin operation later this year. It will have no conservation storage and thus no firm yield. Its main benefit will consist of preventing salt water from moving upstream during times of low flow.

Without the barrier, a continual flow of 1,000 cfs or more is needed to keep the salt water away from the diversion intakes on the lower river. When the barrier goes into service, that 1,000 cfs of fresh water flow into Trinity Bay, which is now made reliable by extra releases from Lake Livingston when necessary, will no longer be required to protect the intakes from contamination.

- d. If Lake Houston and Lake Conroe are operated as two independent lakes, their combined firm yield is 259,193 acre-feet per year. If they are operated as a coordinated system, their total yield can be increased to as much as 360,710 acre-feet per year. This gain in firm yield of 101,517 acre-feet per year would be due primarily to increased efficiency of operation and minimizing of spills at Lake Houston.
- e. If releases from Lake Livingston are coordinated closely with the natural runoff originating from the lower Trinity River Basin downstream from Livingston Dam, the available supply could be increased from 898,390 acre-feet per year to 970,537 acre-feet per year. This is a gain of 72,147 acre-feet per year.
- f. Thus, by using coordinated system operation concepts, the total firm yield made available by the four major surface water supply projects in the Houston area can be increased by 173,664 acre-feet per year.

- g. Further refinement of the system approach, mainly involving timely transfers from Lake Livingston to Lake Houston, could gain an additional 5,420 acre-feet per year. This is a relatively small increase and probably is not enough to justify the added complexity of operation.
 - h. The above yields all assume that no water would be left in the lakes at the end of the drought. A second set of computer runs was made, assuming that moderate volumes would still be in storage at that point and imposing less severe drawdown conditions on Lake Houston. The studies with these somewhat more realistic assumptions showed a gain of 135,060 acre-feet per year.
 - i. The existing water rights for these projects would need to be amended in order to make proper use of system operation. In their present form, they do not allow the system demand to be distributed in a coordinated way.
 - j. With suitable modification of the water rights and with reuse of part of the current return flows, these projects could produce firm yields equal to their total permitted diversion and use rates, as summarized in Table 14.1.
 - k. The system operation of Lakes Conroe and Houston should have minimal impact on Lake Conroe. Any impacts associated with the changed operation of the reservoir should be positive.
 - l. Increased instream flows in the San Jacinto River between Lake Conroe and Lake Houston should have a positive impact on most aquatic species.
- However, a detailed analysis should be performed once a plan for the proposed releases is developed.
- m. The reduction in the freshwater flows to the Trinity-San Jacinto Estuary due to decreased releases from Lake Houston should result in minimal impacts. The reduced flows under either of the proposed system operation scenarios account for one percent of the total monthly inflows or less.
 - n. The impacts associated with the system operation would be negative for Lake Houston under either of the proposed system operation scenarios, especially for fisheries and recreational opportunities. Once a well defined operation plan is developed, a comprehensive analysis of the impacts to Lake Houston should be conducted.

**Table 14.1: Summary of Firm Yields with Operation at Permitted Diversion Rates
(Acre-Feet/Year)**

	<i>Lake Houston & Lake Conroe</i>	<i>Lake Livingston & the Barrier</i>	<i>Combined Total</i>
Stand-alone yield	248,706	883,060	1,131,766
System operation gain	65,220	69,840	135,060
Reuse of return flows	10,674	391,100	401,774
Total Permitted use	324,600	1,344,000	1,668,600

Note: The above yields are based on leaving moderate amounts of water in storage at the end of the drought (see Chapter 10).

APPENDIX A

REFERENCES



References

- (1) Texas Water Development Board: *Volumetric Survey of Lake Houston*, Austin, May 1994
- (2) Texas Water Development Board: *Volumetric Survey of Lake Conroe*, Austin, July 1996.
- (3) United States Department of Interior Bureau of Reclamation: *Lake Livingston Project Area and Capacity Tables*, Denver, December 1991.
- (4) U.S. Army Corps of Engineers, Galveston District: *Wallisville Lake Feature Design Memorandum, Appendix A, Hydrology and Hydraulics*, 1996.
- (5) Black and Veatch: *Review of Alternative Surface Water Supplies for the City of Houston, Texas*, Dallas, March 1978.
- (6) Texas Water Development Board: *Texas Water Oriented Data Bank Net-Evaporation Quadrangles*
- (7) U.S. Geological Survey: *Water Supply Papers and Water Resources Data - Texas*, published annually.
- (8) Texas Natural Resource Conservation Commission: *Wastewater Permit Self-Report Loading Reports*.
- (9) Longley, W. L., ed.: *Freshwater Inflows to Texas Bays and Estuaries: Ecological Relationships and Methods for Determining Needs*, Texas Water Development Board and Texas Parks and Wildlife Department, Austin, 1994.
- (10) Davis, W. B., and D. J. Schmidly: *The Mammals of Texas*, Texas Parks and Wildlife Department, Austin, 1994.
- (11) C.S. Robbins, B. Brunn, and H.S. Zim: *Birds of North America*, Western Publishing Company, Inc. Racine, Wisconsin, 1996.
- (12) Tennant, A.: *A Field Guide to Texas Snakes*, Gulf Publishing Company, Houston, Texas, 1990.
- (13) United States Fish and Wildlife Service: *County-by-County Listings of Threatened and Endangered Species and Candidate Species*, Houston, Texas, 1997.

- (14) Texas Parks and Wildlife Department: *Texas Outdoor Recreation Plan*, Austin, Texas, 1990.
- (15) Information on White Rock Lake dredging project from Dallas Water Utilities, September 1997.
- (16) Freese and Nichols, Inc: *Operation Studies and Opinions of Cost for Allens Creek Reservoir*, prepared for the Trans-Texas Water program, September 1996.

APPENDIX B

AREA AND CAPACITY DATA

Table B-1
 Lake Houston
 Area, Capacity and Elevation Relationships as of the Year 2000

<i>Elevation (Feet)</i>	<i>Area (Acres)</i>	<i>Capacity (Acre-Feet)</i>
9	0	0
10	15	5
11	50	35
12	91	104
13	138	218
14	193	382
15	258	606
16	329	899
17	409	1,266
18	502	1,721
19	615	2,278
20	752	2,960
21	942	3,805
22	1,159	4,853
23	1,376	6,118
24	1,661	7,634
25	2,015	9,469
26	2,411	11,678
27	2,831	14,296
28	3,279	17,348
29	3,745	20,857
30	4,158	24,806
31	4,585	29,176
32	5,002	33,967
33	5,442	39,187
34	5,893	44,853
35	6,383	50,989
36	6,859	57,608
37	7,302	64,687
38	7,698	72,186
39	8,085	80,076
40	8,494	88,364
41	8,914	97,067
42	9,381	106,213
43	9,900	115,852
44	10,386	125,993
44.5	11,817	131,540

Table B-2
 Lake Conroe
 Area, Capacity and Elevation Relationships as of the Year 2000

<i>Elevation (Feet)</i>	<i>Area (Acres)</i>	<i>Capacity (Acre-Feet)</i>
145	0	0
147	33	16
149	177	202
151	415	785
153	732	1,921
155	1,037	3,698
157	1,486	6,200
159	1,960	9,616
160	2,212	11,701
161	2,427	14,020
162	2,661	16,564
163	2,963	19,375
164	3,282	22,497
165	3,572	25,923
166	3,907	29,662
167	4,229	33,729
168	4,508	38,097
169	4,826	42,764
170	5,226	47,789
171	5,566	53,184
172	5,904	58,919
173	6,226	64,983
174	6,582	71,387
175	7,007	78,181
176	7,608	85,487
177	8,081	93,330
178	8,523	101,632
179	8,999	110,392
180	9,397	119,590
181	9,818	129,197
182	10,226	139,219
183	10,580	149,622
184	10,936	160,380
185	11,333	171,514
186	11,752	183,056
187	12,182	195,023
188	12,638	207,433
189	13,038	220,271
190	13,445	233,512
191	13,882	247,175
192	14,389	261,310
193	14,912	275,961
194	15,457	291,145
195	16,030	306,888
196	16,611	323,208
197	17,177	340,101
198	17,857	357,618
199	18,317	375,705
200	19,043	394,384
201	20,074	413,941

Table B-3
 Lake Livingston
 Area, Capacity and Elevation Relationships

<i>Elevation (Feet)</i>	<i>Area (Acres)</i>	<i>Capacity (Acre-Feet)</i>
63	0	0
65	149	131
67	306	583
69	463	1,352
71	579	2,415
73	653	3,647
75	727	5,027
77	800	6,555
79	874	8,230
81	1,281	10,213
83	2,020	13,507
85	2,759	18,281
87	3,498	24,536
89	4,237	32,269
91	5,920	41,940
93	8,547	56,387
95	11,173	76,092
97	13,800	101,055
99	16,426	131,272
101	20,003	167,211
102	22,266	188,336
103	24,529	211,725
104	26,793	237,377
105	29,056	265,295
106	31,319	295,475
107	33,582	327,919
108	35,845	362,627
109	38,109	399,598
110	40,372	438,834
111	42,294	480,163
112	44,216	523,415
113	46,138	568,589
114	48,061	615,685
115	49,983	664,704
116	51,905	715,646
117	53,827	768,509
118	55,749	823,294
119	57,671	880,002
120	59,594	938,632
121	61,648	999,250
122	63,701	1,061,922
123	65,755	1,126,648
124	67,809	1,193,427
125	69,863	1,262,261
126	71,917	1,333,149
127	73,971	1,406,091
128	76,025	1,481,086
129	78,079	1,558,136
130	80,133	1,637,240
131	82,950	1,718,778

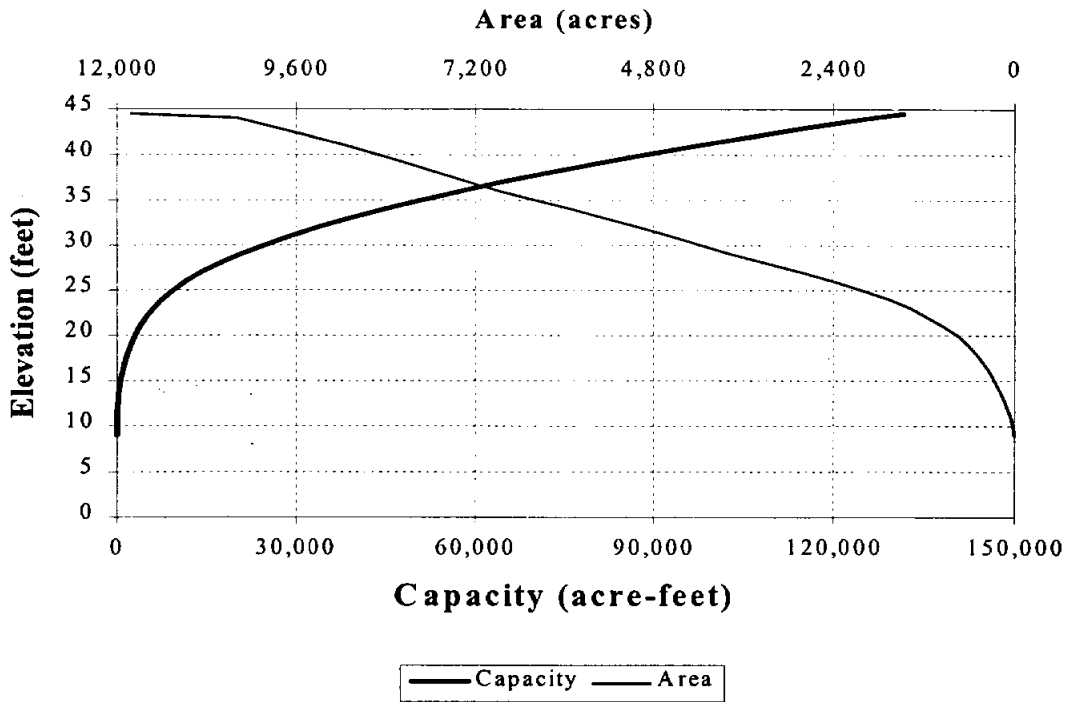


Figure B-1: Lake Houston Area/Capacity/Elevation as of the Year 2000

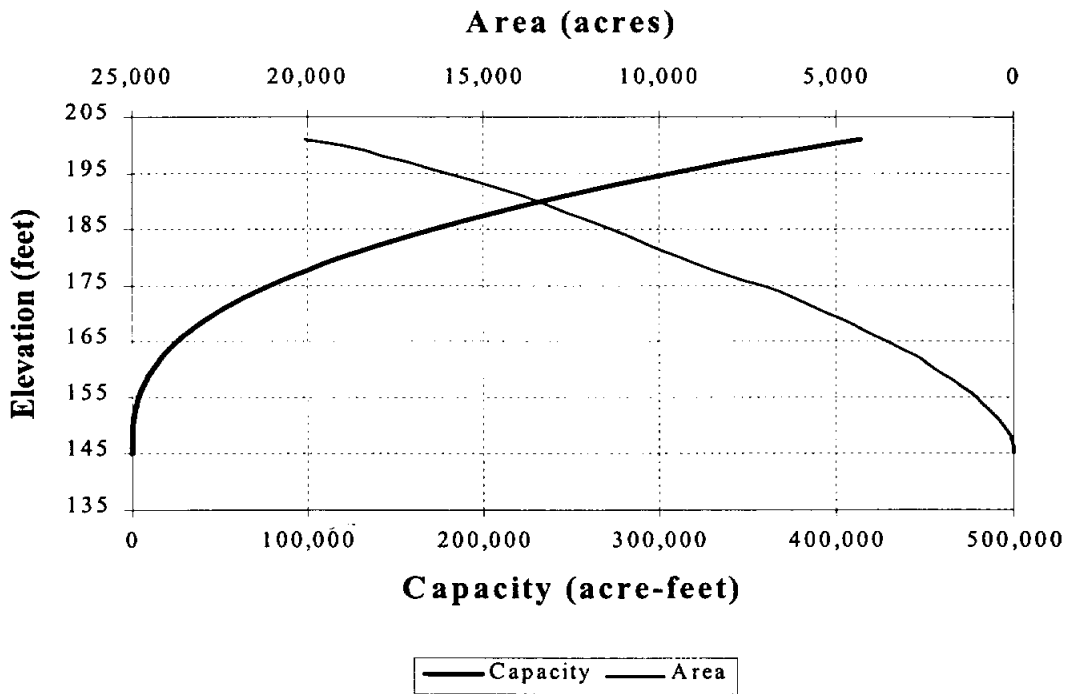


Figure B-2: Lake Conroe Area/Capacity/Elevation as of the Year 2000

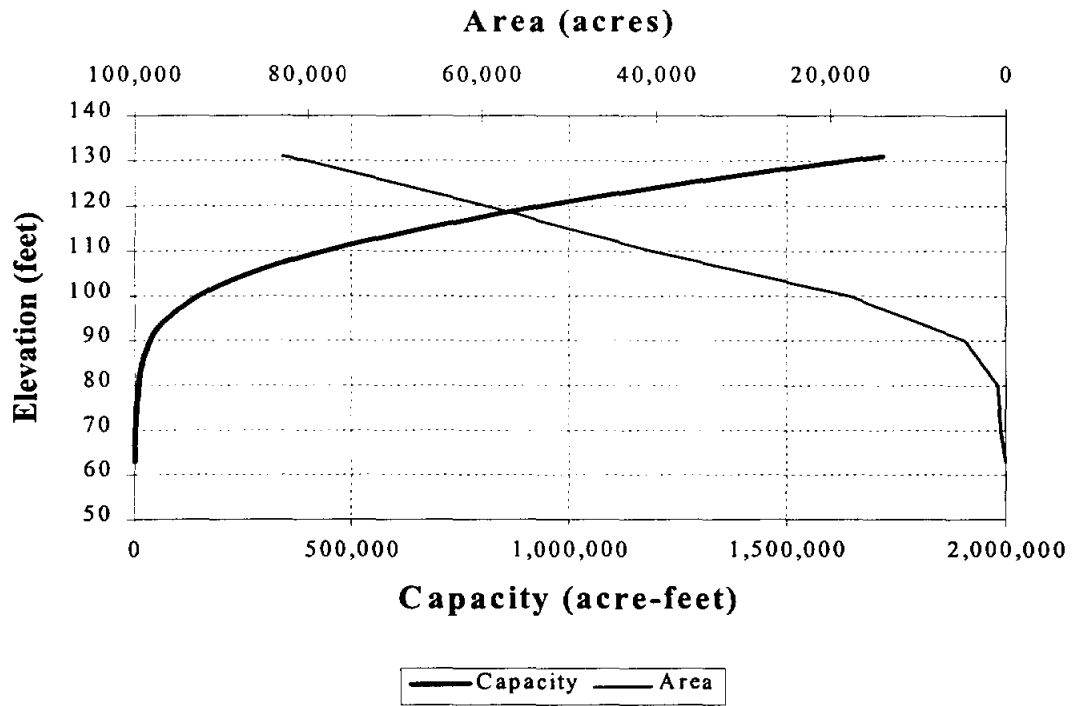


Figure B-3: Lake Livingston Area/Capacity/Elevation as of the Year 2000

APPENDIX C

RUNOFF DATA

Table C-1
 Lake Houston Runoff
 (Values in Acre-Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	306,300	346,600	213,400	40,400	368,900	229,700	207,000	14,600	20,100	73,200	1,047,200	108,000	2,975,400
1947	487,430	40,950	152,550	29,680	146,740	26,590	13,370	11,180	8,800	7,390	11,870	64,950	1,001,500
1948	36,740	96,540	95,610	54,820	27,260	7,910	8,750	4,860	5,880	4,550	7,080	6,950	356,950
1949	27,260	130,710	293,830	246,720	38,050	18,090	27,320	16,320	11,520	657,410	21,640	290,320	1,779,190
1950	355,540	318,030	85,150	89,740	151,080	365,680	34,770	9,900	9,660	8,510	7,050	8,210	1,443,320
1951	11,930	12,860	33,640	21,640	8,910	9,210	5,120	3,710	18,590	6,070	6,530	10,420	148,630
1952	8,640	53,790	21,210	216,990	113,760	23,600	10,600	4,620	5,040	3,080	8,270	26,350	495,950
1953	31,760	78,090	33,210	52,290	565,990	20,070	10,910	9,290	14,470	9,240	23,550	102,050	950,920
1954	53,830	21,070	11,220	14,590	22,510	4,660	45,610	16,040	2,950	23,680	22,850	16,930	255,940
1955	38,520	202,650	14,680	37,900	12,720	6,160	5,940	8,590	6,740	4,200	3,330	5,760	347,190
1956	14,240	39,400	16,100	25,660	6,640	7,020	3,130	1,960	1,880	1,960	2,960	6,280	127,230
1957	4,590	8,580	60,560	152,430	174,200	52,860	6,340	4,570	13,830	188,410	337,320	95,580	1,099,270
1958	365,060	144,970	34,460	35,240	112,240	6,200	3,980	3,590	43,500	31,010	12,340	10,070	802,660
1959	11,890	92,040	21,720	549,900	117,380	48,020	34,880	29,010	9,520	28,750	40,020	105,840	1,088,970
1960	146,080	210,410	43,370	30,630	71,460	392,470	165,550	90,320	28,590	229,540	351,880	330,100	2,090,400
1961	421,650	487,110	55,960	53,910	15,030	142,200	159,740	17,250	386,270	18,920	29,120	42,720	1,829,880
1962	58,960	35,600	27,430	42,740	25,100	19,780	10,310	5,690	13,140	7,710	31,010	142,170	419,640
1963	89,710	91,630	32,310	30,320	12,970	9,960	14,800	5,320	5,430	4,260	17,290	40,630	354,630
1964	43,000	66,200	158,040	115,040	41,970	28,440	5,830	5,260	9,350	8,390	33,720	27,830	543,070
1965	78,380	165,310	30,490	21,430	48,490	37,320	5,780	5,470	7,250	7,480	19,140	79,870	506,410
1966	75,440	201,120	44,630	162,740	245,920	18,340	6,320	15,000	18,420	19,200	6,230	9,440	822,800
1967	12,620	11,160	10,550	27,520	12,090	35,020	4,590	4,260	30,700	9,050	5,290	16,850	179,700
1968	169,310	14,300	50,150	111,850	457,690	525,340	39,950	7,980	25,860	44,860	46,050	179,220	1,672,560
1969	28,320	303,910	240,780	130,250	241,630	11,510	6,330	4,620	7,800	5,450	11,330	15,000	1,006,930
1970	16,670	16,730	103,230	72,370	52,830	16,560	5,800	3,970	9,410	79,210	12,740	7,060	396,580
Average	115,755	127,590	75,371	94,672	123,662	82,508	33,709	12,135	28,588	59,261	84,632	69,944	907,829

Table C-2
 Lake Conroe Runoff
 (Values in Acre-Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	61,490	53,600	78,430	6,490	57,090	33,500	8,990	1,170	2,010	12,780	150,800	13,730	480,080
1947	71,780	6,130	58,250	4,250	22,100	2,440	1,580	920	860	750	1,770	7,890	178,720
1948	5,370	19,310	27,510	11,540	4,830	1,160	930	520	580	510	870	1,130	74,260
1949	4,310	26,950	39,170	34,880	4,140	1,520	1,710	1,330	1,350	33,010	2,730	33,890	184,990
1950	46,010	54,550	14,090	19,750	30,330	95,920	2,720	910	2,340	1,460	950	1,180	270,210
1951	1,930	3,750	6,960	3,820	1,180	760	520	400	690	530	670	1,660	22,870
1952	1,500	9,240	8,620	44,120	16,420	4,030	990	430	320	290	700	3,570	90,230
1953	7,030	14,690	7,200	12,700	95,810	1,890	1,560	1,110	3,030	1,010	4,550	30,730	181,310
1954	9,920	4,190	2,130	2,260	6,200	600	1,350	1,410	290	3,760	7,100	2,550	41,760
1955	8,220	43,800	2,730	10,060	2,220	950	730	1,510	600	470	410	730	72,430
1956	1,500	8,480	3,370	8,850	1,230	1,090	430	270	270	280	430	1,130	27,330
1957	740	1,750	10,510	54,700	42,670	10,480	870	340	850	29,450	76,510	20,000	248,870
1958	61,550	28,650	6,170	10,300	33,620	800	460	310	5,110	7,370	2,150	1,580	158,070
1959	2,820	20,910	4,810	115,500	16,290	6,350	1,920	2,000	920	5,320	8,930	25,070	210,840
1960	23,240	36,610	8,280	5,470	16,540	66,940	33,060	21,660	4,170	42,200	77,220	63,750	399,140
1961	86,350	79,700	9,090	11,070	2,550	10,220	28,790	1,780	51,050	1,890	3,930	9,360	295,780
1962	16,260	8,100	4,740	6,620	5,240	3,050	970	620	1,560	950	2,960	32,370	83,440
1963	22,370	16,450	5,890	10,770	2,610	1,010	2,670	780	500	450	2,270	7,510	73,280
1964	9,710	14,170	26,710	19,760	7,030	6,640	820	610	1,660	2,180	14,650	9,500	113,440
1965	38,340	56,430	8,110	6,050	8,490	9,740	710	510	210	910	1,960	19,730	151,190
1966	15,120	36,010	10,910	43,710	38,030	1,770	680	820	1,740	1,790	830	1,270	152,680
1967	1,630	1,630	1,570	6,340	2,040	4,900	450	520	7,550	800	830	4,180	32,440
1968	45,050	3,120	10,790	35,780	61,710	101,000	7,050	910	1,940	8,970	9,170	47,870	333,360
1969	4,820	50,860	57,420	39,270	50,000	1,740	630	360	1,000	460	700	1,230	208,490
1970	1,770	1,840	20,440	14,150	2,810	1,250	500	370	770	3,500	860	780	49,040
Average	21,953	24,037	17,356	21,528	21,247	14,790	4,044	1,663	3,655	6,444	14,958	13,696	165,370

Table C-3
 Lake Livingston Runoff
 (Values in Acre-Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	640,400	1,204,300	1,064,300	256,100	1,670,400	1,186,000	143,000	0	91,900	39,400	931,700	667,300	7,894,800
1947	941,000	163,600	826,100	496,000	684,000	110,500	160,400	12,100	63,300	26,700	58,400	249,400	3,791,500
1948	208,900	599,200	449,200	264,700	538,300	77,300	56,000	12,300	10,300	13,300	17,800	26,200	2,273,500
1949	60,800	237,500	617,600	425,000	322,900	533,500	86,100	27,400	27,100	517,400	116,900	320,700	3,292,900
1950	532,200	867,500	540,500	322,000	847,700	590,200	262,300	88,700	304,200	86,800	10,300	20,300	4,472,700
1951	30,800	21,700	105,800	54,200	44,700	163,300	63,800	9,600	21,300	8,200	17,900	31,800	573,100
1952	38,400	102,500	109,100	119,500	262,700	236,800	17,200	8,100	4,100	5,600	6,000	134,000	1,044,000
1953	265,600	171,800	290,300	112,400	985,700	246,600	20,800	16,200	14,000	19,400	47,400	189,300	2,379,500
1954	63,700	42,200	28,700	32,300	214,100	22,500	12,000	16,200	3,900	32,400	141,900	44,000	653,900
1955	100,200	318,700	71,800	441,300	85,900	47,600	14,900	8,500	0	17,800	6,800	14,000	1,127,500
1956	20,600	100,800	41,000	102,400	124,200	21,500	3,700	1,500	3,400	3,900	6,900	10,800	440,700
1957	8,500	43,100	133,700	260,400	1,903,300	1,611,900	151,400	238,600	74,900	805,600	765,100	316,700	6,313,200
1958	472,300	258,200	202,500	632,000	2,041,200	116,100	74,300	15,500	301,700	101,200	36,100	41,500	4,292,600
1959	39,900	239,900	90,300	609,700	696,100	434,600	257,900	66,300	19,100	254,900	129,500	409,700	3,247,900
1960	923,000	455,800	307,200	91,800	132,400	168,300	84,400	54,700	35,100	124,100	458,500	903,200	3,738,500
1961	1,699,200	1,037,800	491,700	272,600	54,400	304,200	270,200	35,800	253,600	48,200	40,100	348,900	4,856,700
1962	275,800	142,500	146,400	89,400	310,700	103,900	57,300	120,800	139,700	149,900	42,500	229,900	1,808,800
1963	119,000	131,200	65,900	125,400	119,600	62,600	22,600	9,100	8,100	5,100	12,700	37,700	719,000
1964	48,500	57,800	164,900	146,100	118,300	48,200	7,400	11,000	85,900	50,600	147,200	104,900	990,800
1965	172,100	441,700	236,300	272,200	916,200	412,600	46,400	21,500	25,000	13,900	26,900	154,600	2,739,400
1966	177,500	294,700	104,700	501,100	2,195,000	239,500	129,100	108,700	81,600	61,500	25,100	33,300	3,951,800
1967	34,400	31,300	33,400	130,600	70,200	25,500	34,000	75,800	21,600	27,600	92,800	131,800	709,000
1968	518,200	411,300	701,600	1,384,000	1,908,500	1,002,100	260,700	62,600	42,700	58,300	152,100	370,600	6,872,700
1969	124,900	455,100	1,162,000	1,399,900	2,923,700	399,600	82,200	15,400	20,400	16,200	43,100	119,400	6,761,900
1970	116,600	63,500	787,900	742,600	231,900	57,400	15,700	29,300	43,500	248,000	92,600	53,500	2,482,500
Average	305,300	315,748	350,916	371,348	776,084	328,892	93,352	42,628	67,856	109,440	137,052	198,540	3,097,156

Table C-4
Runoff Between Livingston Dam and Capers Ridge
(Values in Acre-Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	65,830	90,760	62,070	9,780	70,070	54,550	39,740	0	9,100	7,310	140,100	39,970	589,280
1947	182,200	34,370	67,340	0	45,270	0	22,450	2,410	0	630	0	1,060	355,730
1948	13,640	65,600	48,810	71,850	23,510	15,430	0	2,400	1,880	1,970	3,270	580	248,940
1949	1,780	43,640	88,270	61,700	0	29,550	13,870	7,620	8,380	161,000	22,860	106,900	545,570
1950	153,700	96,400	119,200	21,630	60,200	163,300	37,850	8,370	1,410	21,250	1,050	2,240	686,600
1951	4,170	760	20,690	11,420	6,350	13,450	15,850	2,020	2,660	1,700	2,510	4,710	86,290
1952	3,250	10,630	19,050	33,910	26,620	27,610	4,230	1,290	380	1,140	0	8,890	137,000
1953	20,030	35,930	15,990	16,170	155,200	56,190	7,580	5,090	3,190	0	2,500	18,960	336,830
1954	11,140	3,590	4,880	2,800	29,110	8,570	8,600	9,240	1,900	0	22,970	9,980	112,780
1955	18,340	47,310	9,450	77,830	12,270	9,810	4,380	2,180	170	6,150	2,350	2,820	193,060
1956	4,460	18,340	11,480	19,690	0	2,250	1,530	490	50	420	150	2,970	61,830
1957	0	3,700	24,550	7,060	122,700	107,700	22,620	60,240	12,140	67,240	123,700	87,560	639,210
1958	144,000	69,080	21,540	1,930	0	34,160	50	0	13,500	13,030	0	0	297,290
1959	0	5,000	9,220	56,810	29,250	0	58,760	16,370	4,240	0	25,760	27,080	232,490
1960	38,560	63,870	46,650	9,830	32,540	40,300	12,430	5,920	12,950	4,090	45,710	37,150	350,000
1961	85,580	87,470	64,800	28,920	7,150	0	37,210	10,360	80,510	11,310	0	52,160	465,470
1962	45,000	23,230	15,240	90	47,680	4,800	4,330	0	0	1,750	12,370	39,970	194,460
1963	32,640	32,730	16,410	24,130	3,200	7,290	8,310	3,150	2,210	1,080	3,900	10,420	145,470
1964	11,330	10,270	42,650	27,840	33,720	1,410	3,510	0	0	460	0	0	131,190
1965	2,330	17,810	31,750	34,330	0	0	0	0	0	16,650	54,840	227,400	385,110
1966	32,110	63,020	15,420	15,140	102,000	16,600	17,160	21,580	6,960	9,250	2,650	3,050	304,940
1967	3,040	4,760	5,140	20,080	11,620	0	0	750	0	0	0	0	45,390
1968	0	0	0	87,100	48,440	129,300	43,450	12,280	5,750	1,700	3,300	33,590	364,910
1969	13,400	5,910	13,010	0	35,160	0	0	1,520	10,800	16,840	0	820	97,460
1970	12,320	0	0	39,780	19,290	0	0	0	0	19,790	8,260	6,390	105,830
Average	35,954	33,367	30,944	27,193	36,854	28,891	14,556	6,931	7,127	14,590	19,130	28,987	284,525

Table C-5
Runoff Between Capers Ridge and Wallisville
(Values in Acre-Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	44,790	61,760	42,230	6,650	47,680	37,120	27,040	0	6,190	4,970	95,330	27,200	400,960
1947	123,970	23,390	45,820	0	30,800	0	15,280	1,640	0	430	0	720	242,050
1948	9,280	44,640	33,210	48,890	16,000	10,500	0	1,630	1,280	1,340	2,220	390	169,380
1949	1,210	29,690	60,060	41,980	0	20,110	9,440	5,180	5,700	109,550	15,550	72,740	371,210
1950	104,580	65,590	81,110	14,720	40,960	111,110	25,750	5,700	960	14,460	710	1,520	467,170
1951	2,840	520	14,080	7,770	4,320	9,150	10,780	1,370	1,810	1,160	1,710	3,200	58,710
1952	2,210	7,230	12,960	23,070	18,110	18,790	2,880	880	260	780	0	6,050	93,220
1953	13,630	24,450	10,880	11,000	105,600	38,230	5,160	3,460	2,170	0	1,700	12,900	229,180
1954	7,580	2,440	3,320	1,910	19,810	5,830	5,850	6,290	1,290	0	15,630	6,790	76,740
1955	12,480	32,190	6,430	52,960	8,350	6,670	2,980	1,480	120	4,180	1,600	1,920	131,360
1956	3,030	12,480	7,810	13,400	0	1,530	1,040	330	30	290	100	2,020	42,060
1957	0	2,520	16,700	4,800	83,490	73,280	15,390	40,990	8,260	45,750	84,170	59,580	434,930
1958	97,980	47,000	14,660	1,310	0	23,240	30	0	9,190	8,870	0	0	202,280
1959	0	3,400	6,270	38,660	19,900	0	39,980	11,140	2,890	0	17,530	18,430	158,200
1960	26,240	43,460	31,740	6,690	22,140	27,420	8,460	4,030	8,810	2,780	31,100	25,280	238,150
1961	58,230	59,520	44,090	19,680	4,870	0	25,320	7,050	54,780	7,700	0	35,490	316,730
1962	30,620	15,810	10,370	60	32,440	3,270	2,950	0	0	1,190	8,420	27,200	132,330
1963	22,210	22,270	11,170	16,420	2,180	4,960	5,650	2,140	1,500	730	2,650	7,090	98,970
1964	7,710	6,990	29,020	18,940	22,940	960	2,390	0	0	310	0	0	89,260
1965	1,590	12,120	21,600	23,360	0	0	0	0	0	11,330	37,310	154,730	262,040
1966	21,850	42,880	10,490	10,300	69,400	11,300	11,680	14,680	4,740	6,290	1,800	2,080	207,490
1967	2,070	3,240	3,500	13,660	7,910	0	0	510	0	0	0	0	30,890
1968	0	0	0	59,270	32,960	87,980	29,560	8,360	3,910	1,160	2,250	22,860	248,310
1969	9,120	4,020	8,850	0	23,920	0	0	1,030	7,350	11,460	0	560	66,310
1970	8,380	0	0	27,070	13,130	0	0	0	0	13,470	5,620	4,350	72,020
Average	24,464	22,704	21,055	18,503	25,076	19,658	9,904	4,716	4,850	9,928	13,016	19,724	193,598

APPENDIX D

NET EVAPORATION DATA

Table D-1
 Lake Houston Net Evaporation Rates
 (Values in Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	-0.25	-0.08	-0.01	0.11	-0.31	-0.03	0.14	0.25	-0.04	0.10	-0.58	0.06	-0.64
1947	-0.18	0.12	-0.04	0.15	-0.18	0.23	0.37	0.07	0.40	0.26	-0.08	-0.13	0.99
1948	-0.11	-0.15	0.06	0.12	0.08	0.39	0.32	0.34	0.25	0.31	-0.06	0.11	1.66
1949	-0.18	-0.23	-0.14	-0.04	0.24	0.19	0.01	0.29	0.16	-0.70	0.25	-0.38	-0.53
1950	-0.04	-0.27	0.15	-0.12	0.14	-0.01	0.19	0.48	0.22	0.37	0.27	0.15	1.53
1951	-0.11	0.02	-0.04	0.21	0.11	0.30	0.34	0.51	-0.21	0.34	0.17	0.05	1.69
1952	0.07	-0.34	0.07	-0.26	-0.08	0.33	0.10	0.49	0.40	0.58	-0.13	0.04	1.27
1953	0.12	-0.12	0.12	0.06	-0.31	0.18	0.28	-0.18	0.51	0.23	0.01	-0.10	0.80
1954	-0.01	0.25	0.20	0.03	0.11	0.42	0.31	0.45	0.39	0.01	0.17	0.22	2.55
1955	-0.05	-0.19	0.25	0.02	0.16	0.36	0.22	0.11	0.11	0.54	0.32	0.08	1.93
1956	-0.04	-0.01	0.14	0.04	0.17	0.27	0.50	0.46	0.53	0.31	0.26	-0.06	2.57
1957	0.12	0.04	-0.19	-0.24	0.17	-0.07	0.31	0.39	-0.08	0.04	-0.13	0.13	0.49
1958	-0.13	-0.04	0.13	0.06	0.18	0.31	0.31	0.32	-0.46	0.18	0.14	0.12	1.12
1959	0.10	-0.33	0.19	-0.11	0.00	0.35	-0.04	0.08	0.30	0.09	0.22	-0.03	0.82
1960	0.02	-0.07	0.13	0.11	0.31	-0.16	0.29	-0.01	0.36	-0.04	-0.04	-0.24	0.66
1961	-0.10	-0.10	0.12	0.14	0.26	-0.19	-0.05	0.29	-0.12	0.45	-0.07	0.10	0.73
1962	0.04	0.09	0.19	-0.05	0.24	-0.04	0.51	0.41	0.19	0.23	-0.01	-0.18	1.62
1963	0.00	-0.02	0.17	0.13	0.30	0.00	0.23	0.43	0.04	0.40	-0.01	0.00	1.67
1964	-0.09	-0.07	0.04	0.09	0.18	0.33	0.22	0.27	0.01	0.34	0.06	-0.16	1.22
1965	0.11	-0.03	0.09	0.21	0.06	0.30	0.36	0.28	0.18	0.27	-0.13	-0.32	1.38
1966	-0.02	-0.01	0.04	-0.03	-0.11	0.19	0.17	0.21	0.16	0.23	0.10	0.06	0.99
1967	-0.01	0.04	0.08	0.03	-0.02	0.34	0.34	0.31	0.17	0.17	0.17	0.01	1.63
1968	-0.01	0.02	0.00	-0.03	0.00	-0.03	0.28	0.37	0.02	0.15	0.14	0.07	0.98
1969	0.01	-0.07	0.04	-0.05	-0.06	0.22	0.38	0.26	0.24	0.19	0.24	0.02	1.42
1970	-0.01	0.00	0.04	0.01	-0.04	0.32	0.32	0.32	0.09	0.02	0.26	0.06	1.39
Average	-0.03	-0.06	0.07	0.02	0.06	0.18	0.26	0.29	0.15	0.20	0.06	-0.01	1.20

Table D-2
 Lake Conroe Net Evaporation Rates
 (Values in Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	-0.28	-0.14	-0.14	0.10	-0.25	0.07	0.28	0.39	0.22	0.08	-0.52	-0.02	-0.21
1947	-0.27	0.10	-0.10	0.19	-0.19	0.29	0.40	0.30	0.45	0.35	-0.06	-0.15	1.31
1948	-0.04	-0.14	0.03	0.01	0.14	0.42	0.37	0.39	0.43	0.41	-0.03	0.13	2.12
1949	-0.28	-0.18	-0.14	-0.13	0.23	0.14	0.20	0.34	0.18	-0.51	0.36	-0.24	-0.03
1950	-0.04	-0.29	0.14	-0.12	0.07	0.08	0.28	0.56	0.05	0.38	0.29	0.14	1.54
1951	-0.04	-0.10	-0.03	0.21	0.23	0.25	0.46	0.56	0.00	0.43	0.20	0.06	2.23
1952	0.05	-0.20	0.10	-0.28	-0.04	0.43	0.30	0.62	0.52	0.62	-0.09	0.02	2.05
1953	0.11	-0.18	0.03	-0.21	-0.33	0.31	0.29	0.19	0.59	0.19	0.23	-0.08	1.14
1954	0.02	0.23	0.23	0.04	0.03	0.42	0.27	0.54	0.49	-0.04	0.14	0.17	2.54
1955	-0.02	-0.21	0.21	-0.04	0.20	0.45	0.30	0.38	0.23	0.55	0.32	0.04	2.41
1956	0.03	-0.07	0.05	-0.02	0.24	0.29	0.61	0.59	0.75	0.40	0.14	0.00	3.01
1957	0.11	0.02	-0.14	-0.51	0.21	0.06	0.40	0.40	0.21	-0.01	-0.18	0.02	0.59
1958	-0.15	-0.03	0.13	-0.01	0.13	0.30	0.34	0.28	-0.39	0.03	0.10	0.03	0.76
1959	0.13	-0.22	0.20	-0.23	-0.01	0.19	0.06	0.17	0.32	0.06	0.19	-0.12	0.74
1960	-0.03	-0.08	0.15	0.10	0.36	-0.14	0.27	0.03	0.32	-0.22	-0.14	-0.24	0.38
1961	-0.17	-0.23	0.08	0.19	0.24	-0.06	0.07	0.32	-0.19	0.30	0.01	-0.01	0.55
1962	-0.08	0.08	0.19	-0.06	0.34	0.01	0.43	0.46	0.03	0.22	-0.03	-0.19	1.40
1963	-0.03	-0.04	0.18	0.03	0.19	0.18	0.39	0.43	0.23	0.40	-0.05	-0.08	1.83
1964	-0.02	0.01	-0.03	-0.05	0.13	0.35	0.45	0.39	0.10	0.33	0.01	-0.03	1.64
1965	0.08	-0.21	0.07	0.23	-0.02	0.26	0.54	0.43	0.18	0.28	-0.06	-0.31	1.47
1966	0.02	0.00	0.05	-0.01	0.02	0.29	0.31	0.23	0.19	0.38	0.13	0.16	1.77
1967	0.05	0.12	0.07	0.07	0.06	0.43	0.48	0.45	0.24	0.24	0.20	0.06	2.47
1968	0.00	0.00	0.00	-0.02	-0.08	0.05	0.37	0.37	0.10	0.18	0.18	0.07	1.22
1969	0.05	-0.13	0.02	-0.06	0.01	0.33	0.45	0.22	0.13	0.27	0.22	0.05	1.56
1970	0.00	-0.06	0.06	-0.07	-0.04	0.35	0.49	0.41	0.10	0.28	0.29	0.03	1.84
Average	-0.03	-0.08	0.06	-0.03	0.07	0.23	0.35	0.38	0.22	0.22	0.07	-0.02	1.45

Table D-3
 Lake Livingston Net Evaporation Rates
 (Values in Feet)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
1946	-0.28	-0.16	-0.09	0.07	-0.33	-0.02	0.10	0.23	0.16	0.07	-0.47	0.01	-0.71
1947	-0.23	0.10	-0.10	0.17	-0.21	0.20	0.37	0.20	0.40	0.29	-0.12	-0.12	0.95
1948	-0.08	-0.14	0.06	0.03	0.05	0.37	0.25	0.34	0.31	0.34	-0.16	0.09	1.46
1949	-0.26	-0.18	-0.14	-0.09	0.21	0.07	0.13	0.27	0.16	-0.59	0.28	-0.35	-0.49
1950	-0.02	-0.28	0.15	-0.13	0.07	0.06	0.25	0.46	0.10	0.35	0.24	0.13	1.38
1951	-0.12	-0.08	-0.04	0.18	0.20	0.24	0.35	0.52	-0.04	0.38	0.18	0.00	1.77
1952	0.04	-0.24	0.08	-0.27	-0.07	0.36	0.21	0.52	0.47	0.58	-0.11	0.10	1.67
1953	0.10	-0.18	0.02	-0.19	-0.32	0.18	0.20	0.13	0.45	0.24	0.20	-0.01	0.82
1954	0.01	0.25	0.20	0.06	0.02	0.37	0.25	0.48	0.44	0.04	0.14	0.18	2.44
1955	-0.05	-0.20	0.22	-0.04	0.17	0.35	0.23	0.34	0.18	0.48	0.29	0.03	2.00
1956	0.00	-0.08	0.05	0.01	0.22	0.25	0.52	0.54	0.67	0.33	0.17	-0.06	2.62
1957	0.07	0.05	-0.16	-0.40	0.21	-0.02	0.32	0.28	0.03	0.03	-0.14	0.03	0.30
1958	-0.14	-0.06	0.13	0.01	0.13	0.20	0.31	0.36	-0.40	0.15	0.13	0.10	0.92
1959	0.05	-0.27	0.16	-0.21	0.07	0.25	-0.08	0.28	0.33	0.12	0.18	-0.08	0.80
1960	-0.03	-0.10	0.14	0.09	0.33	-0.12	0.31	0.15	0.34	-0.13	-0.05	-0.24	0.69
1961	-0.19	-0.19	0.05	0.15	0.24	-0.04	-0.01	0.26	-0.09	0.39	0.02	-0.02	0.57
1962	-0.07	0.05	0.19	-0.05	0.27	0.00	0.48	0.36	0.27	0.23	-0.03	-0.17	1.53
1963	0.00	-0.07	0.08	0.04	0.31	0.17	0.17	0.48	-0.06	0.49	0.05	0.03	1.69
1964	-0.10	-0.02	-0.03	-0.11	0.09	0.31	0.27	0.26	0.11	0.41	0.11	-0.07	1.23
1965	0.09	-0.08	-0.03	0.17	0.03	0.26	0.35	0.29	0.12	0.37	0.02	-0.31	1.28
1966	0.05	0.01	0.06	0.01	0.03	0.24	0.20	0.29	0.14	0.15	0.07	0.05	1.30
1967	0.04	0.06	0.03	-0.04	-0.03	0.34	0.31	0.35	0.32	0.23	0.20	0.02	1.83
1968	0.05	0.00	0.01	-0.08	0.00	0.02	0.32	0.32	-0.01	0.16	0.17	0.06	1.02
1969	0.05	-0.15	0.02	-0.07	-0.06	0.30	0.34	0.27	0.26	0.29	0.21	0.02	1.48
1970	0.01	-0.04	0.03	0.03	-0.03	0.32	0.48	0.34	0.13	-0.05	0.26	0.04	1.52
Average	-0.04	-0.08	0.04	-0.03	0.06	0.19	0.27	0.33	0.19	0.21	0.07	-0.02	1.20

APPENDIX E
OPERATION STUDIES

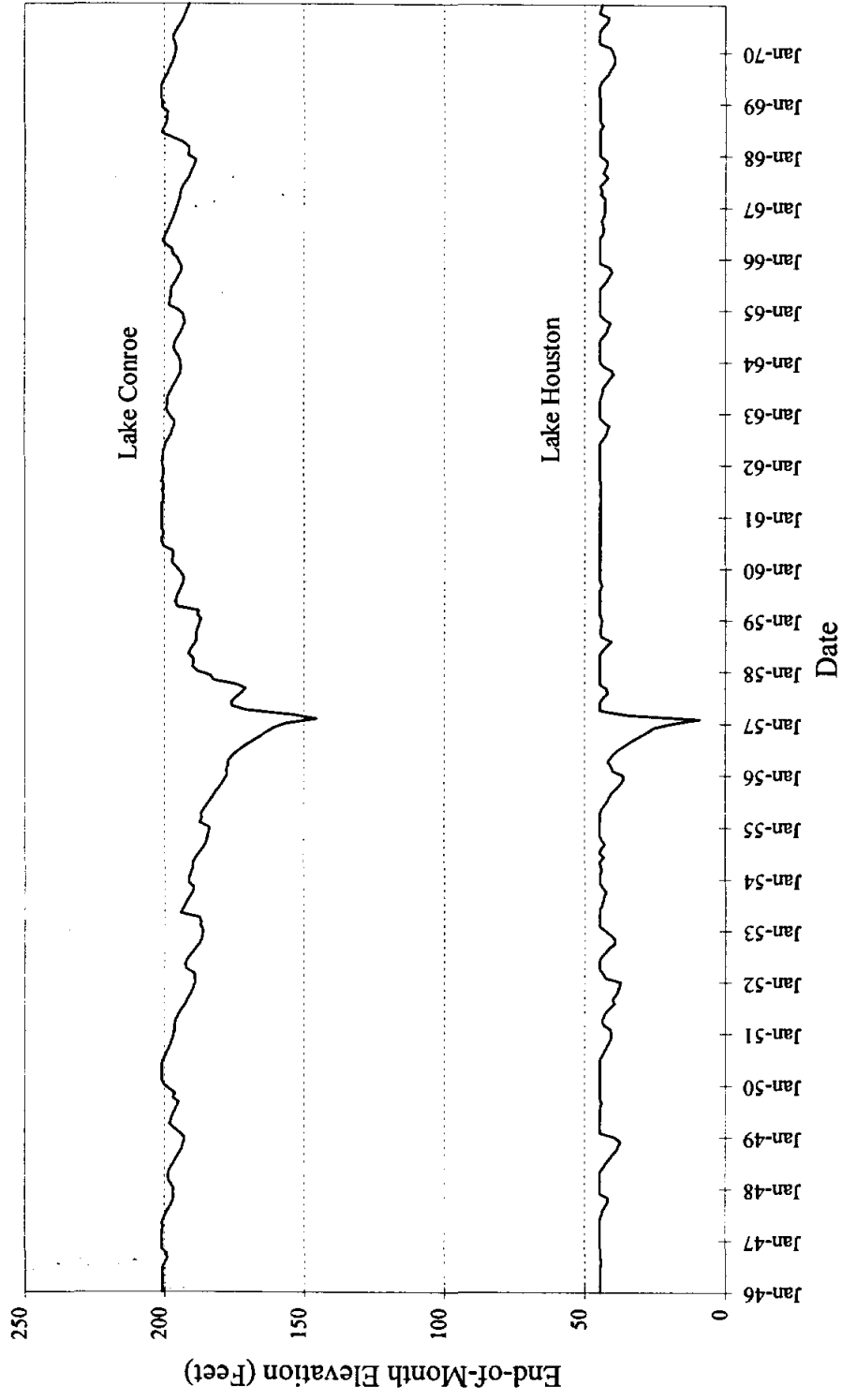


Figure E-1: Lake Houston and Lake Conroe Stand-Alone Operation

Table E-1
Lake Conroe and Lake Houston Stand-Alone Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1949																		
1	-4179.	8010.	4310.	0.	0.	276530.	193.0	-1408.	0.	12288.	27260.	0.	0.	0.	0.	82911.	39.3	
2	-2761.	7177.	26950.	0.	0.	299064.	194.5	-2170.	1.	11009.	130710.	0.	0.	73241.	0.	131540.	44.5	
3	-2289.	7868.	39170.	0.	0.	332655.	196.6	-1654.	80.	12070.	293830.	0.	0.	283334.	0.	131540.	44.5	
4	-2268.	8193.	34880.	0.	0.	361610.	198.2	-473.	234.	12569.	246720.	0.	0.	234390.	0.	131540.	44.5	
5	4104.	8824.	4140.	0.	0.	352822.	197.7	2836.	309.	13535.	38050.	0.	0.	21370.	0.	131540.	44.5	
6	2447.	9047.	1520.	0.	0.	342848.	197.2	2245.	346.	13878.	18090.	0.	0.	1621.	0.	131540.	44.5	
7	3416.	9576.	1710.	0.	0.	331566.	196.5	118.	300.	14689.	27320.	0.	0.	12213.	0.	131540.	44.5	
8	5665.	9291.	1330.	0.	0.	317940.	195.7	3371.	203.	14253.	16320.	0.	0.	0.	0.	130033.	44.4	
9	2923.	8813.	1350.	0.	0.	307554.	195.0	1749.	100.	13520.	11520.	0.	0.	0.	0.	126184.	44.0	
10	-8485.	8671.	33010.	0.	0.	340378.	197.0	-7788.	14.	13302.	657410.	0.	0.	646526.	0.	131540.	44.5	
11	6119.	7970.	2730.	0.	0.	329019.	196.3	2954.	9.	12226.	21640.	0.	0.	6451.	0.	131540.	44.5	
12	-4158.	8215.	33890.	0.	0.	358852.	198.1	-4490.	4.	12599.	290320.	0.	0.	282207.	0.	131540.	44.5	
	534.	101655.	184990.	0.	0.			-4710.	1600.	155938.	1779190.	0.	0.	1561353.	0.			
1950																		
1	-737.	8010.	46010.	0.	0.	397589.	200.2	-473.	0.	12288.	355540.	0.	0.	343725.	0.	131540.	44.5	
2	-5696.	7177.	54550.	36717.	0.	413941.	201.0	-3191.	1.	11009.	318030.	0.	36717.	346928.	0.	131540.	44.5	
3	2810.	7868.	14090.	3412.	0.	413941.	201.0	1773.	80.	12070.	85150.	0.	3412.	74639.	0.	131540.	44.5	
4	-2409.	8193.	19750.	13966.	0.	413941.	201.0	-1418.	234.	12569.	89740.	0.	13966.	92321.	0.	131540.	44.5	
5	1405.	8824.	30330.	20101.	0.	413941.	201.0	1654.	309.	13535.	151080.	0.	20101.	155683.	0.	131540.	44.5	
6	1606.	9047.	95920.	85267.	0.	413941.	201.0	-118.	346.	13878.	365680.	0.	85267.	436841.	0.	131540.	44.5	
7	5529.	9576.	2720.	0.	0.	401556.	200.4	2245.	300.	14689.	34770.	0.	0.	17536.	0.	131540.	44.5	
8	10613.	9291.	910.	0.	0.	382562.	199.4	5076.	203.	14253.	9900.	0.	0.	0.	0.	121908.	43.6	
9	922.	8813.	2340.	0.	0.	375167.	199.0	2209.	100.	13520.	9660.	0.	0.	0.	0.	115739.	43.0	
10	6887.	8671.	1460.	0.	0.	361069.	198.2	3577.	14.	13302.	8510.	0.	0.	0.	0.	107356.	42.1	
11	5149.	7970.	950.	0.	0.	348900.	197.5	2496.	9.	12226.	7050.	0.	0.	0.	0.	99675.	41.3	
12	2427.	8215.	1180.	0.	0.	339438.	197.0	1335.	4.	12599.	8210.	0.	0.	0.	0.	93947.	40.6	
	28506.	101655.	270210.	159463.	0.			15165.	1600.	155938.	1443320.	0.	159463.	1467673.	0.			
1951																		
1	-683.	8010.	1930.	0.	0.	334041.	196.6	-966.	0.	12288.	11930.	0.	0.	0.	0.	94555.	40.7	
2	-1694.	7177.	3750.	0.	0.	332308.	196.5	177.	1.	11009.	12860.	0.	0.	0.	0.	96228.	40.9	
3	-507.	7868.	6960.	0.	0.	331907.	196.5	-377.	80.	12070.	33640.	0.	0.	0.	0.	118095.	43.2	
4	3522.	8193.	3820.	0.	0.	324012.	196.0	2135.	234.	12569.	21640.	0.	0.	0.	0.	124797.	43.9	
5	3780.	8824.	1180.	0.	0.	312588.	195.3	1120.	309.	13535.	8910.	0.	0.	0.	0.	118743.	43.3	
6	4003.	9047.	760.	0.	0.	300298.	194.6	2952.	346.	13878.	9210.	0.	0.	0.	0.	110777.	42.5	
7	7128.	9576.	520.	0.	0.	284114.	193.5	3156.	300.	14689.	5120.	0.	0.	0.	0.	97752.	41.1	
8	8341.	9291.	400.	0.	0.	266882.	192.4	4377.	203.	14253.	3710.	0.	0.	0.	0.	82629.	39.3	
9	0.	8813.	690.	0.	0.	258759.	191.8	-1759.	100.	13520.	18590.	0.	0.	0.	0.	89358.	40.1	
10	6039.	8671.	530.	0.	0.	244579.	190.8	2820.	14.	13302.	6070.	0.	0.	0.	0.	79292.	38.9	
11	2728.	7970.	670.	0.	0.	234551.	190.1	1339.	9.	12226.	6530.	0.	0.	0.	0.	72248.	38.0	
12	802.	8215.	1660.	0.	0.	227194.	189.5	382.	4.	12599.	10420.	0.	0.	0.	0.	69683.	37.7	
	33459.	101655.	22870.	0.	0.			15356.	1600.	155938.	148630.	0.	0.	0.	0.			

Table E-1 (cont.)
Lake Conroe and Lake Houston Stand-Alone Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1952																		
1	657.	8010.	1500.	0.	0.	220027.	189.0	522.	0.	12288.	8640.	0.	0.	0.	0.	0.	65513.	37.1
2	-2620.	7177.	9240.	0.	0.	224710.	189.3	-2888.	1.	11009.	53790.	0.	0.	0.	0.	0.	111181.	42.5
3	1317.	7868.	8620.	0.	0.	224145.	189.3	691.	80.	12070.	21210.	0.	0.	0.	0.	0.	119550.	43.4
4	-3859.	8193.	44120.	0.	0.	263931.	192.2	-2695.	234.	12569.	216990.	0.	0.	0.	194892.	0.	131540.	44.5
5	-585.	8824.	16420.	0.	0.	272112.	192.7	-945.	309.	13535.	113760.	0.	0.	0.	100861.	0.	131540.	44.5
6	6266.	9047.	4030.	0.	0.	260829.	192.0	3900.	346.	13878.	23600.	0.	0.	0.	5476.	0.	131540.	44.5
7	4243.	9576.	990.	0.	0.	248000.	191.1	1111.	300.	14689.	10600.	0.	0.	0.	0.	0.	126040.	44.0
8	8452.	9291.	430.	0.	0.	230687.	189.8	4917.	203.	14253.	4620.	0.	0.	0.	0.	0.	111287.	42.5
9	6824.	8813.	320.	0.	0.	215370.	188.6	3730.	100.	13520.	5040.	0.	0.	0.	0.	0.	98977.	41.2
10	7832.	8671.	290.	0.	0.	199157.	187.3	5010.	14.	13302.	3080.	0.	0.	0.	0.	0.	83731.	39.4
11	-1100.	7970.	700.	0.	0.	192987.	186.8	-1065.	9.	12226.	8270.	0.	0.	0.	0.	0.	80831.	39.1
12	240.	8215.	3570.	0.	0.	188102.	186.4	338.	4.	12599.	26350.	0.	0.	0.	0.	0.	94240.	40.7
	27667.	101655.	90230.	0.	0.			12626.	1600.	155938.	495950.	0.	0.	0.	301229.	0.		
1953																		
1	1308.	8010.	7030.	0.	0.	185814.	186.2	1109.	0.	12288.	31760.	0.	0.	0.	0.	0.	112603.	42.7
2	-2164.	7177.	14690.	0.	0.	195491.	187.0	-1224.	1.	11009.	78090.	0.	0.	0.	49367.	0.	131540.	44.5
3	365.	7868.	7200.	0.	0.	194458.	187.0	1418.	80.	12070.	33210.	0.	0.	0.	19642.	0.	131540.	44.5
4	-2581.	8193.	12700.	0.	0.	201546.	187.5	709.	234.	12569.	52290.	0.	0.	0.	38778.	0.	131540.	44.5
5	-4583.	8824.	95810.	0.	0.	293115.	194.1	-3663.	309.	13535.	565990.	0.	0.	0.	555809.	0.	131540.	44.5
6	4747.	9047.	1890.	0.	0.	281211.	193.3	2127.	346.	13878.	20070.	0.	0.	0.	3719.	0.	131540.	44.5
7	4315.	9576.	1560.	0.	0.	268880.	192.5	3051.	300.	14689.	10910.	0.	0.	0.	0.	0.	124410.	43.8
8	2748.	9291.	1110.	0.	0.	257951.	191.8	-1841.	203.	14253.	9290.	0.	0.	0.	0.	0.	121085.	43.5
9	8270.	8813.	3030.	0.	0.	243898.	190.8	5125.	100.	13520.	14470.	0.	0.	0.	0.	0.	116810.	43.1
10	2587.	8671.	1010.	0.	0.	233650.	190.0	2250.	14.	13302.	9240.	0.	0.	0.	0.	0.	110484.	42.4
11	3070.	7970.	4550.	0.	0.	227160.	189.5	99.	9.	12226.	23550.	0.	0.	0.	0.	0.	121700.	43.6
12	-1090.	8215.	30730.	0.	0.	250765.	191.3	-1055.	4.	12599.	102050.	0.	0.	0.	80662.	0.	131540.	44.5
	16992.	101655.	181310.	0.	0.			8105.	1600.	155938.	950920.	0.	0.	0.	747977.	0.		
1954																		
1	281.	8010.	9920.	0.	0.	252394.	191.4	-118.	0.	12288.	53830.	0.	0.	0.	41660.	0.	131540.	44.5
2	3210.	7177.	4190.	0.	0.	246197.	190.9	2954.	1.	11009.	21070.	0.	0.	0.	7106.	0.	131540.	44.5
3	3153.	7868.	2130.	0.	0.	237306.	190.3	2281.	80.	12070.	11220.	0.	0.	0.	0.	0.	128329.	44.2
4	539.	8193.	2260.	0.	0.	230834.	189.8	335.	234.	12569.	14590.	0.	0.	0.	0.	0.	129781.	44.3
5	399.	8824.	6200.	0.	0.	227811.	189.6	1275.	309.	13535.	22510.	0.	0.	0.	5632.	0.	131540.	44.5
6	5483.	9047.	600.	0.	0.	213881.	188.5	4334.	346.	13878.	4660.	0.	0.	0.	0.	0.	117642.	43.2
7	3418.	9576.	1350.	0.	0.	202237.	187.6	3199.	300.	14689.	45610.	0.	0.	0.	13524.	0.	131540.	44.5
8	6578.	9291.	1410.	0.	0.	187778.	186.4	5113.	203.	14253.	16040.	0.	0.	0.	0.	0.	128011.	44.2
9	5716.	8813.	290.	0.	0.	173539.	185.2	3952.	100.	13520.	2950.	0.	0.	0.	0.	0.	113389.	42.7
10	-453.	8671.	3760.	0.	0.	169081.	184.8	100.	14.	13302.	23680.	0.	0.	0.	0.	0.	123653.	43.8
11	1568.	7970.	7100.	0.	0.	166643.	184.6	1836.	9.	12226.	22850.	0.	0.	0.	892.	0.	131540.	44.5
12	1874.	8215.	2550.	0.	0.	159104.	183.9	2600.	4.	12599.	16930.	0.	0.	0.	1727.	0.	131540.	44.5
	31766.	101655.	41760.	0.	0.			27861.	1600.	155938.	255940.	0.	0.	0.	70541.	0.		

Table E-1 (cont.)
Lake Conroe and Lake Houston Stand-Alone Operation

Date	LAKE CONROE								LAKE HOUSTON									
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1955																		
1	-218.	8010.	8220.	0.	0.	159532.	183.9	-591.	0.	12288.	38520.	0.	0.	0.	26823.	0.	131540.	44.5
2	-2437.	7177.	43800.	0.	0.	198592.	187.3	-2245.	1.	11009.	202650.	0.	0.	0.	193885.	0.	131540.	44.5
3	2556.	7868.	2730.	0.	0.	190898.	186.7	2941.	80.	12070.	14680.	0.	0.	0.	0.	0.	131129.	44.5
4	-483.	8193.	10060.	0.	0.	193248.	186.9	235.	234.	12569.	37900.	0.	0.	0.	24451.	0.	131540.	44.5
5	2391.	8824.	2220.	0.	0.	184253.	186.1	1830.	309.	13535.	12720.	0.	0.	0.	0.	0.	128586.	44.2
6	5199.	9047.	950.	0.	0.	170957.	184.9	3682.	346.	13878.	6160.	0.	0.	0.	0.	0.	116840.	43.1
7	3329.	9576.	730.	0.	0.	158782.	183.9	2124.	300.	14689.	5940.	0.	0.	0.	0.	0.	105667.	41.9
8	4061.	9291.	1510.	0.	0.	146940.	182.7	1010.	203.	14253.	8590.	0.	0.	0.	0.	0.	98791.	41.2
9	2371.	8813.	600.	0.	0.	136356.	181.7	969.	100.	13520.	6740.	0.	0.	0.	0.	0.	90942.	40.3
10	5408.	8671.	470.	0.	0.	122747.	180.3	4474.	14.	13302.	4200.	0.	0.	0.	0.	0.	77352.	38.7
11	2978.	7970.	410.	0.	0.	112209.	179.2	2455.	9.	12226.	3330.	0.	0.	0.	0.	0.	65992.	37.2
12	355.	8215.	730.	0.	0.	104369.	178.3	572.	4.	12599.	5760.	0.	0.	0.	0.	0.	58577.	36.1
	25510.	101655.	72430.	0.	0.			17456.	1600.	155938.	347190.	0.	0.	0.	245159.	0.		
1956																		
1	255.	8010.	1500.	0.	0.	97604.	177.5	-280.	0.	12288.	14240.	0.	0.	0.	0.	0.	60809.	36.5
2	-585.	7177.	8480.	0.	0.	99492.	177.7	-78.	1.	11009.	39400.	0.	0.	0.	0.	0.	89277.	40.1
3	414.	7868.	3370.	0.	0.	94580.	177.2	1205.	80.	12070.	16100.	0.	0.	0.	0.	0.	92022.	40.4
4	-163.	8193.	8850.	0.	0.	95400.	177.2	359.	234.	12569.	25660.	0.	0.	0.	0.	0.	104520.	41.8
5	1901.	8824.	1230.	0.	0.	85905.	176.1	1542.	309.	13535.	6640.	0.	0.	0.	0.	0.	95774.	40.9
6	2096.	9047.	1090.	0.	0.	75852.	174.7	2328.	346.	13878.	7020.	0.	0.	0.	0.	0.	86242.	39.7
7	3944.	9576.	430.	0.	0.	62762.	172.6	3999.	300.	14689.	3130.	0.	0.	0.	0.	0.	70384.	37.8
8	3401.	9291.	270.	0.	0.	50340.	170.5	3296.	203.	14253.	1960.	0.	0.	0.	0.	0.	54592.	35.5
9	3706.	8813.	270.	0.	0.	38091.	168.0	3219.	100.	13520.	1880.	0.	0.	0.	0.	0.	39633.	33.1
10	1670.	8671.	280.	0.	0.	28030.	165.6	1530.	14.	13302.	1960.	0.	0.	0.	0.	0.	26747.	30.4
11	478.	7970.	430.	0.	0.	20012.	163.2	994.	9.	12226.	2960.	0.	0.	0.	0.	0.	16478.	27.7
12	0.	8215.	1130.	0.	0.	12927.	160.5	-161.	4.	12599.	6280.	0.	0.	0.	0.	0.	10316.	25.4
	17117.	101655.	27330.	0.	0.			17953.	1600.	155938.	127230.	0.	0.	0.	0.	0.		
1957																		
1	209.	8010.	740.	0.	0.	5448.	156.4	171.	0.	12288.	4590.	0.	0.	0.	0.	0.	2447.	19.2
2	17.	7177.	1750.	0.	0.	4.	145.5	16.	1.	11009.	8580.	0.	0.	0.	0.	0.	1.	9.2
3	-81.	7868.	10510.	0.	0.	2727.	153.9	-786.	80.	12070.	60560.	0.	0.	0.	0.	0.	49197.	34.7
4	-1867.	8193.	54700.	0.	0.	51101.	170.6	-2062.	234.	12569.	152430.	0.	0.	0.	59346.	0.	131540.	44.5
5	1335.	8824.	42670.	0.	0.	83612.	175.7	2009.	309.	13535.	174200.	0.	0.	0.	158347.	0.	131540.	44.5
6	450.	9047.	10480.	0.	0.	84595.	175.9	-827.	346.	13878.	52860.	0.	0.	0.	39463.	0.	131540.	44.5
7	2824.	9576.	870.	0.	0.	73065.	174.2	3214.	300.	14689.	6340.	0.	0.	0.	0.	0.	119677.	43.4
8	2542.	9291.	340.	0.	0.	61572.	172.4	3798.	203.	14253.	4570.	0.	0.	0.	0.	0.	105993.	42.0
9	1216.	8813.	850.	0.	0.	52393.	170.9	-752.	100.	13520.	13830.	0.	0.	0.	0.	0.	106955.	42.1
10	-61.	8671.	29450.	0.	0.	73233.	174.3	403.	14.	13302.	188410.	0.	0.	0.	150106.	0.	131540.	44.5
11	-1599.	7970.	76510.	0.	0.	143372.	182.4	-1536.	9.	12226.	337320.	0.	0.	0.	326621.	0.	131540.	44.5
12	211.	8215.	20000.	0.	0.	154946.	183.5	1536.	4.	12599.	95580.	0.	0.	0.	81441.	0.	131540.	44.5
	5196.	101655.	248870.	0.	0.			5184.	1600.	155938.	1099270.	0.	0.	0.	815324.	0.		

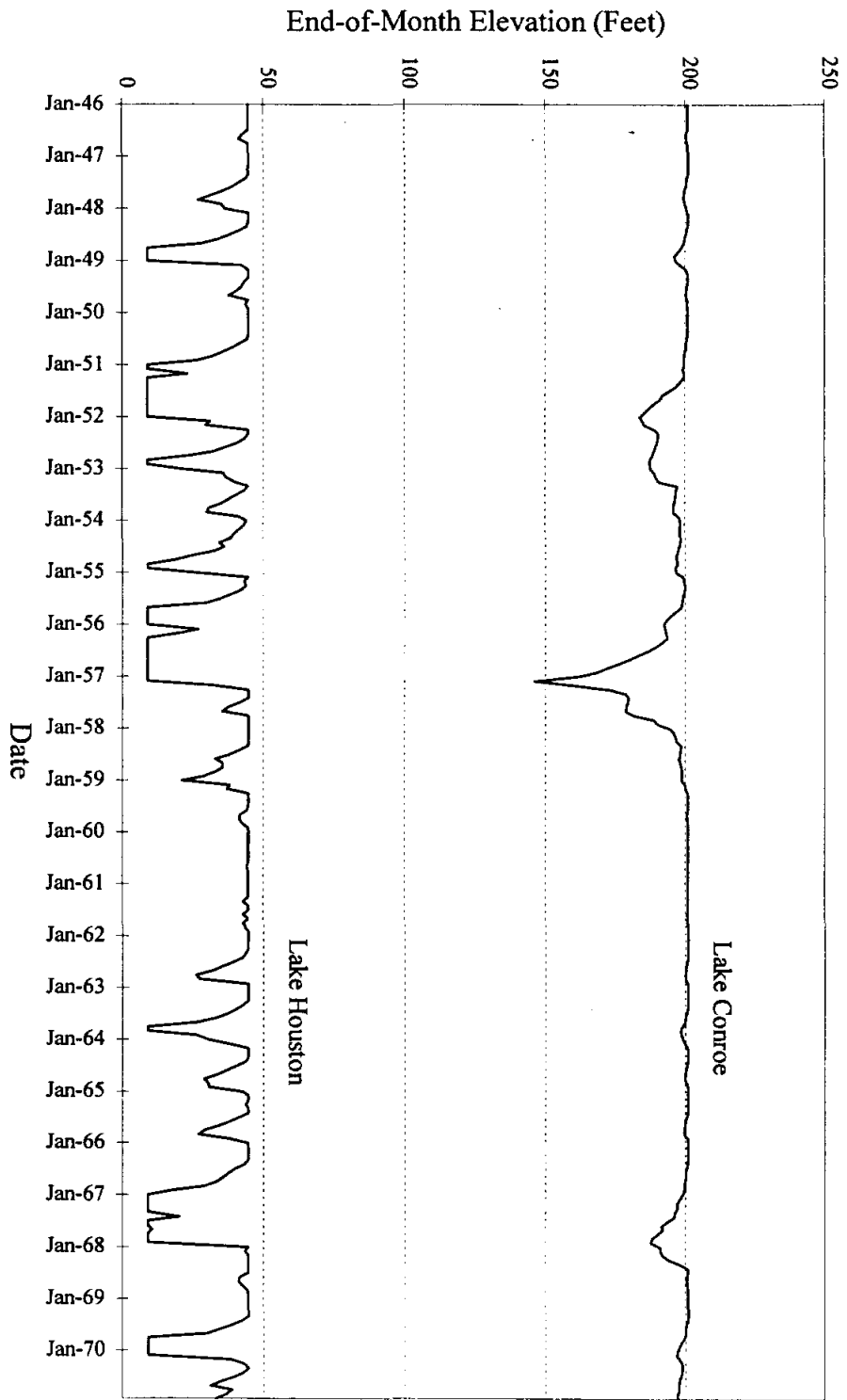


Figure E-2: Lake Houston and Lake Conroe System Operation

Table E-2
Lake Conroe and Lake Houston System Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1949																		
1	-4701.	588.	4310.	0.	530.	332438.	196.5	0.	0.	27790.	27260.	0.	530.	0.	0.	0.	0.	9.0
2	-3142.	480.	26950.	0.	0.	362050.	198.2	-1512.	1.	24898.	130710.	0.	0.	0.	0.	0.	107323.	42.1
3	-2603.	392.	39170.	0.	0.	403431.	200.5	-1410.	80.	27296.	293830.	0.	0.	0.	243647.	0.	131540.	44.5
4	-2574.	442.	34880.	26502.	0.	413941.	201.0	-473.	234.	28424.	246720.	0.	26502.	0.	245037.	0.	131540.	44.5
5	4611.	502.	4140.	0.	0.	412968.	201.0	2836.	309.	30611.	38050.	0.	0.	0.	4294.	0.	131540.	44.5
6	2796.	631.	1520.	0.	0.	411061.	200.9	1953.	346.	31387.	18090.	0.	0.	0.	0.	0.	115944.	43.0
7	3969.	679.	1710.	0.	0.	408123.	200.7	97.	300.	33221.	27320.	0.	0.	0.	0.	0.	109646.	42.4
8	6667.	679.	1330.	0.	0.	402107.	200.4	2633.	203.	32233.	16320.	0.	0.	0.	0.	0.	90897.	40.3
9	3488.	566.	1350.	0.	0.	399403.	200.3	1298.	100.	30576.	11520.	0.	0.	0.	0.	0.	70443.	37.8
10	-10042.	556.	33010.	27958.	0.	413941.	201.0	-6380.	14.	30082.	657410.	0.	27958.	0.	600555.	0.	131540.	44.5
11	7180.	474.	2730.	0.	0.	409017.	200.7	2674.	9.	27649.	21640.	0.	0.	0.	0.	0.	122848.	43.7
12	-4787.	461.	33890.	33292.	0.	413941.	201.0	-4064.	4.	28493.	290320.	0.	33292.	0.	290487.	0.	131540.	44.5
	862.	6450.	184990.	87752.	530.			-2348.	1600.	352660.	1779190.	0.	88282.	0.	1384020.	0.		
1950																		
1	-803.	588.	46010.	46225.	0.	413941.	201.0	-473.	0.	27790.	355540.	0.	46225.	0.	374448.	0.	131540.	44.5
2	-5821.	480.	54550.	59891.	0.	413941.	201.0	-3191.	1.	24898.	318030.	0.	59891.	0.	356213.	0.	131540.	44.5
3	2810.	392.	14090.	10888.	0.	413941.	201.0	1773.	80.	27296.	85150.	0.	10888.	0.	66889.	0.	131540.	44.5
4	-2409.	442.	19750.	21717.	0.	413941.	201.0	-1418.	234.	28424.	89740.	0.	21717.	0.	84217.	0.	131540.	44.5
5	1405.	502.	30330.	28423.	0.	413941.	201.0	1654.	309.	30611.	151080.	0.	28423.	0.	146929.	0.	131540.	44.5
6	1606.	631.	95920.	93683.	0.	413941.	201.0	-118.	346.	31387.	365680.	0.	93683.	0.	427748.	0.	131540.	44.5
7	5594.	679.	2720.	0.	0.	410388.	200.8	2221.	300.	33221.	34770.	0.	0.	0.	0.	0.	130568.	44.4
8	10978.	679.	910.	0.	0.	399641.	200.3	4776.	203.	32233.	9900.	0.	0.	0.	0.	0.	103256.	41.7
9	967.	566.	2340.	0.	0.	400448.	200.3	1905.	100.	30576.	9660.	0.	0.	0.	0.	0.	80335.	39.0
10	7294.	556.	1460.	0.	0.	394058.	200.0	2770.	14.	30082.	8510.	0.	0.	0.	0.	0.	55979.	35.8
11	5491.	474.	950.	0.	0.	389043.	199.7	1592.	9.	27649.	7050.	0.	0.	0.	0.	0.	33779.	32.0
12	2632.	461.	1180.	0.	0.	387130.	199.6	601.	4.	28493.	8210.	0.	0.	0.	0.	0.	12891.	26.5
	29744.	6450.	270210.	260827.	0.			12092.	1600.	352660.	1443320.	0.	260827.	0.	1456444.	0.		
1951																		
1	-750.	588.	1930.	0.	2811.	386411.	199.6	-158.	0.	27790.	11930.	0.	2811.	0.	0.	0.	0.	9.0
2	-1860.	480.	3750.	0.	12039.	379502.	199.2	0.	1.	24898.	12860.	0.	12039.	0.	0.	0.	0.	9.0
3	-558.	392.	6960.	0.	0.	386628.	199.6	-32.	80.	27296.	33640.	0.	0.	0.	0.	0.	6296.	23.1
4	3930.	442.	3820.	0.	889.	385187.	199.5	167.	234.	28424.	21640.	0.	889.	0.	0.	0.	0.	9.0
5	4194.	502.	1180.	0.	22010.	359661.	198.1	0.	309.	30611.	8910.	0.	22010.	0.	0.	0.	0.	9.0
6	4354.	631.	760.	0.	22523.	332913.	196.6	0.	346.	31387.	9210.	0.	22523.	0.	0.	0.	0.	9.0
7	7505.	679.	520.	0.	28401.	296848.	194.4	0.	300.	33221.	5120.	0.	28401.	0.	0.	0.	0.	9.0
8	8395.	679.	400.	0.	28726.	259448.	191.9	0.	203.	32233.	3710.	0.	28726.	0.	0.	0.	0.	9.0
9	0.	566.	690.	0.	12086.	247486.	191.0	0.	100.	30576.	18590.	0.	12086.	0.	0.	0.	0.	9.0
10	5769.	556.	530.	0.	24026.	217665.	188.8	0.	14.	30082.	6070.	0.	24026.	0.	0.	0.	0.	9.0
11	2517.	474.	670.	0.	21128.	194216.	186.9	0.	9.	27649.	6530.	0.	21128.	0.	0.	0.	0.	9.0
12	710.	461.	1660.	0.	18077.	176628.	185.4	0.	4.	28493.	10420.	0.	18077.	0.	0.	0.	0.	9.0
	34206.	6450.	22870.	0.	192716.			-23.	1600.	352660.	148630.	0.	192716.	0.	0.	0.		

Table E-2 (cont.)
Lake Conroe and Lake Houston System Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1952																		
1	559.	588.	1500.	0.	19150.	157831.	183.8	0.	0.	27790.	8640.	0.	19150.	0.	0.	0.	0.	9.0
2	-2208.	480.	9240.	0.	0.	168799.	184.8	-995.	1.	24898.	53790.	0.	0.	0.	0.	0.	29886.	31.1
3	1136.	392.	8620.	0.	0.	175891.	185.4	304.	80.	27296.	21210.	0.	0.	0.	0.	0.	23416.	29.6
4	-3457.	442.	44120.	0.	0.	223026.	189.2	-2069.	234.	28424.	216990.	0.	0.	0.	82277.	0.	131540.	44.5
5	-535.	502.	16420.	0.	0.	239479.	190.4	-945.	309.	30611.	113760.	0.	0.	0.	83785.	0.	131540.	44.5
6	5847.	631.	4030.	0.	0.	237031.	190.3	3424.	346.	31387.	23600.	0.	0.	0.	0.	0.	119983.	43.4
7	4049.	679.	990.	0.	0.	233293.	190.0	948.	300.	33221.	10600.	0.	0.	0.	0.	0.	96114.	40.9
8	8251.	679.	430.	0.	0.	224793.	189.3	3965.	203.	32233.	4620.	0.	0.	0.	0.	0.	64333.	36.9
9	6796.	566.	320.	0.	0.	217751.	188.8	2530.	100.	30576.	5040.	0.	0.	0.	0.	0.	36167.	32.4
10	7955.	556.	290.	0.	0.	209530.	188.2	2214.	14.	30082.	3080.	0.	0.	0.	0.	0.	6937.	23.5
11	-1126.	474.	700.	0.	12338.	198544.	187.3	-113.	9.	27649.	8270.	0.	12338.	0.	0.	0.	0.	9.0
12	246.	461.	3570.	0.	2147.	199260.	187.3	0.	4.	28493.	26350.	0.	2147.	0.	0.	0.	0.	9.0
	27513.	6450.	90230.	0.	33635.			9263.	1600.	352660.	495950.	0.	33635.	0.	166062.	0.		
1953																		
1	1367.	588.	7030.	0.	0.	204335.	187.8	66.	0.	27790.	31760.	0.	0.	0.	0.	0.	3904.	21.1
2	-2304.	480.	14690.	0.	0.	220849.	189.0	-567.	1.	24898.	78090.	0.	0.	0.	0.	0.	57662.	36.0
3	395.	392.	7200.	0.	0.	227262.	189.5	842.	80.	27296.	33210.	0.	0.	0.	0.	0.	62654.	36.7
4	-2832.	442.	12700.	0.	0.	242352.	190.6	468.	234.	28424.	52290.	0.	0.	0.	0.	0.	85818.	39.7
5	-5118.	502.	95810.	0.	0.	342778.	197.2	-2949.	309.	30611.	565990.	0.	0.	0.	492297.	0.	131540.	44.5
6	5333.	631.	1890.	0.	0.	338704.	196.9	1859.	346.	31387.	20070.	0.	0.	0.	0.	0.	118018.	43.2
7	4948.	679.	1560.	0.	0.	334637.	196.7	2615.	300.	33221.	10910.	0.	0.	0.	0.	0.	92792.	40.5
8	3220.	679.	1110.	0.	0.	331848.	196.5	-1472.	203.	32233.	9290.	0.	0.	0.	0.	0.	71118.	37.9
9	9898.	566.	3030.	0.	0.	324414.	196.1	3613.	100.	30576.	14470.	0.	0.	0.	0.	0.	51299.	35.0
10	3155.	556.	1010.	0.	0.	321713.	195.9	1271.	14.	30082.	9240.	0.	0.	0.	0.	0.	29172.	31.0
11	3809.	474.	4550.	0.	0.	321980.	195.9	44.	9.	27649.	23550.	0.	0.	0.	0.	0.	25020.	30.0
12	-1368.	461.	30730.	0.	0.	353617.	197.8	-714.	4.	28493.	102050.	0.	0.	0.	0.	0.	99287.	41.2
	20503.	6450.	181310.	0.	0.			5076.	1600.	352660.	950920.	0.	0.	0.	492297.	0.		
1954																		
1	357.	588.	9920.	0.	0.	362592.	198.3	-97.	0.	27790.	53830.	0.	0.	0.	0.	0.	125424.	43.9
2	4135.	480.	4190.	0.	0.	362167.	198.3	2551.	1.	24898.	21070.	0.	0.	0.	0.	0.	119044.	43.3
3	4127.	392.	2130.	0.	0.	359778.	198.1	1917.	80.	27296.	11220.	0.	0.	0.	0.	0.	100971.	41.4
4	717.	442.	2260.	0.	0.	360879.	198.2	263.	234.	28424.	14590.	0.	0.	0.	0.	0.	86640.	39.8
5	540.	502.	6200.	0.	0.	366037.	198.5	900.	309.	30611.	22510.	0.	0.	0.	0.	0.	77330.	38.7
6	7549.	631.	600.	0.	0.	358457.	198.0	3004.	346.	31387.	4660.	0.	0.	0.	0.	0.	47253.	34.4
7	4808.	679.	1350.	0.	0.	354320.	197.8	2008.	300.	33221.	45610.	0.	0.	0.	0.	0.	57334.	36.0
8	9482.	679.	1410.	0.	0.	345569.	197.3	2756.	203.	32233.	16040.	0.	0.	0.	0.	0.	38182.	32.8
9	8438.	566.	290.	0.	0.	336855.	196.8	1570.	100.	30576.	2950.	0.	0.	0.	0.	0.	8886.	24.7
10	-685.	556.	3760.	0.	0.	340744.	197.0	13.	14.	30082.	23680.	0.	0.	0.	0.	0.	2457.	19.3
11	2413.	474.	7100.	0.	2419.	342538.	197.1	68.	9.	27649.	22850.	0.	2419.	0.	0.	0.	0.	9.0
12	2899.	461.	2550.	0.	11567.	330161.	196.4	0.	4.	28493.	16930.	0.	11567.	0.	0.	0.	0.	9.0
	44780.	6450.	41760.	0.	13986.			14953.	1600.	352660.	255940.	0.	13986.	0.	0.	0.		

Table E-2 (cont.)
Lake Conroe and Lake Houston System Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1955																		
1	-340.	588.	8220.	0.	0.	338133.	196.9	-63.	0.	27790.	38520.	0.	0.	0.	0.	0.	10793.	25.6
2	-3772.	480.	43800.	0.	0.	385225.	199.5	-1452.	1.	24898.	202650.	0.	0.	0.	58456.	0.	131540.	44.5
3	3918.	392.	2730.	0.	0.	383645.	199.4	2571.	80.	27296.	14680.	0.	0.	0.	0.	0.	116273.	43.0
4	-753.	442.	10060.	0.	0.	394016.	200.0	203.	234.	28424.	37900.	0.	0.	0.	0.	0.	125312.	43.9
5	3798.	502.	2220.	0.	0.	391936.	199.9	1580.	309.	30611.	12720.	0.	0.	0.	0.	0.	105532.	41.9
6	8455.	631.	950.	0.	0.	383800.	199.4	3107.	346.	31387.	6160.	0.	0.	0.	0.	0.	76852.	38.6
7	5557.	679.	730.	0.	0.	378294.	199.1	1573.	300.	33221.	5940.	0.	0.	0.	0.	0.	47698.	34.5
8	6956.	679.	1510.	0.	0.	372169.	198.8	564.	203.	32233.	8590.	0.	0.	0.	0.	0.	23288.	29.6
9	4177.	566.	600.	0.	913.	367113.	198.5	265.	100.	30576.	6740.	0.	913.	0.	0.	0.	0.	9.0
10	9644.	556.	470.	0.	25896.	331487.	196.5	0.	14.	30082.	4200.	0.	25896.	0.	0.	0.	0.	9.0
11	5241.	474.	410.	0.	24328.	301854.	194.7	0.	9.	27649.	3330.	0.	24328.	0.	0.	0.	0.	9.0
12	617.	461.	730.	0.	22737.	278769.	193.2	0.	4.	28493.	5760.	0.	22737.	0.	0.	0.	0.	9.0
	43498.	6450.	72430.	0.	73874.			8348.	1600.	352660.	347190.	0.	73874.	0.	58456.	0.		
1956																		
1	443.	588.	1500.	0.	13550.	265688.	192.3	0.	0.	27790.	14240.	0.	13550.	0.	0.	0.	0.	9.0
2	-1029.	480.	8480.	0.	0.	274717.	192.9	-16.	1.	24898.	39400.	0.	0.	0.	0.	0.	14517.	27.1
3	745.	392.	3370.	0.	0.	276950.	193.1	263.	80.	27296.	16100.	0.	0.	0.	0.	0.	2978.	20.0
4	-302.	442.	8850.	0.	38.	285622.	193.6	18.	234.	28424.	25660.	0.	38.	0.	0.	0.	0.	9.0
5	3546.	502.	1230.	0.	24280.	258524.	191.8	0.	309.	30611.	6640.	0.	24280.	0.	0.	0.	0.	9.0
6	4000.	631.	1090.	0.	24713.	230270.	189.8	0.	346.	31387.	7020.	0.	24713.	0.	0.	0.	0.	9.0
7	7778.	679.	430.	0.	30391.	191852.	186.7	0.	300.	33221.	3130.	0.	30391.	0.	0.	0.	0.	9.0
8	6719.	679.	270.	0.	30476.	154248.	183.4	0.	203.	32233.	1960.	0.	30476.	0.	0.	0.	0.	9.0
9	7569.	566.	270.	0.	28796.	117587.	179.8	0.	100.	30576.	1880.	0.	28796.	0.	0.	0.	0.	9.0
10	3410.	556.	280.	0.	28136.	85765.	176.0	0.	14.	30082.	1960.	0.	28136.	0.	0.	0.	0.	9.0
11	935.	474.	430.	0.	24698.	60088.	172.2	0.	9.	27649.	2960.	0.	24698.	0.	0.	0.	0.	9.0
12	0.	461.	1130.	0.	22217.	38540.	168.1	0.	4.	28493.	6280.	0.	22217.	0.	0.	0.	0.	9.0
	33814.	6450.	27330.	0.	227295.			265.	1600.	352660.	127230.	0.	227295.	0.	0.	0.		
1957																		
1	402.	588.	740.	0.	23200.	15090.	161.4	0.	0.	27790.	4590.	0.	23200.	0.	0.	0.	0.	9.0
2	33.	480.	1750.	0.	16319.	8.	146.0	0.	1.	24898.	8580.	0.	16319.	0.	0.	0.	0.	9.0
3	-182.	392.	10510.	0.	0.	10308.	159.3	-610.	80.	27296.	60560.	0.	0.	0.	0.	0.	33794.	32.0
4	-2316.	442.	54700.	0.	0.	66882.	173.3	-1971.	234.	28424.	152430.	0.	0.	0.	27997.	0.	131540.	44.5
5	1619.	502.	42670.	0.	0.	107431.	178.7	2009.	309.	30611.	174200.	0.	0.	0.	141271.	0.	131540.	44.5
6	544.	631.	10480.	0.	0.	116736.	179.7	-827.	346.	31387.	52860.	0.	0.	0.	21954.	0.	131540.	44.5
7	3679.	679.	870.	0.	0.	113248.	179.3	3077.	300.	33221.	6340.	0.	0.	0.	0.	0.	101282.	41.5
8	3615.	679.	340.	0.	0.	109294.	178.9	3262.	203.	32233.	4570.	0.	0.	0.	0.	0.	70154.	37.7
9	1868.	566.	850.	0.	0.	107710.	178.7	-571.	100.	30576.	13830.	0.	0.	0.	0.	0.	53879.	35.4
10	-95.	556.	29450.	0.	0.	136699.	181.7	348.	14.	30082.	188410.	0.	0.	0.	80305.	0.	131540.	44.5
11	-2068.	474.	76510.	0.	0.	214803.	188.6	-1536.	9.	27649.	337320.	0.	0.	0.	311198.	0.	131540.	44.5
12	263.	461.	20000.	0.	0.	234079.	190.0	1536.	4.	28493.	95580.	0.	0.	0.	65547.	0.	131540.	44.5
	7362.	6450.	248870.	0.	39519.			4717.	1600.	352660.	1099270.	0.	39519.	0.	648272.	0.		

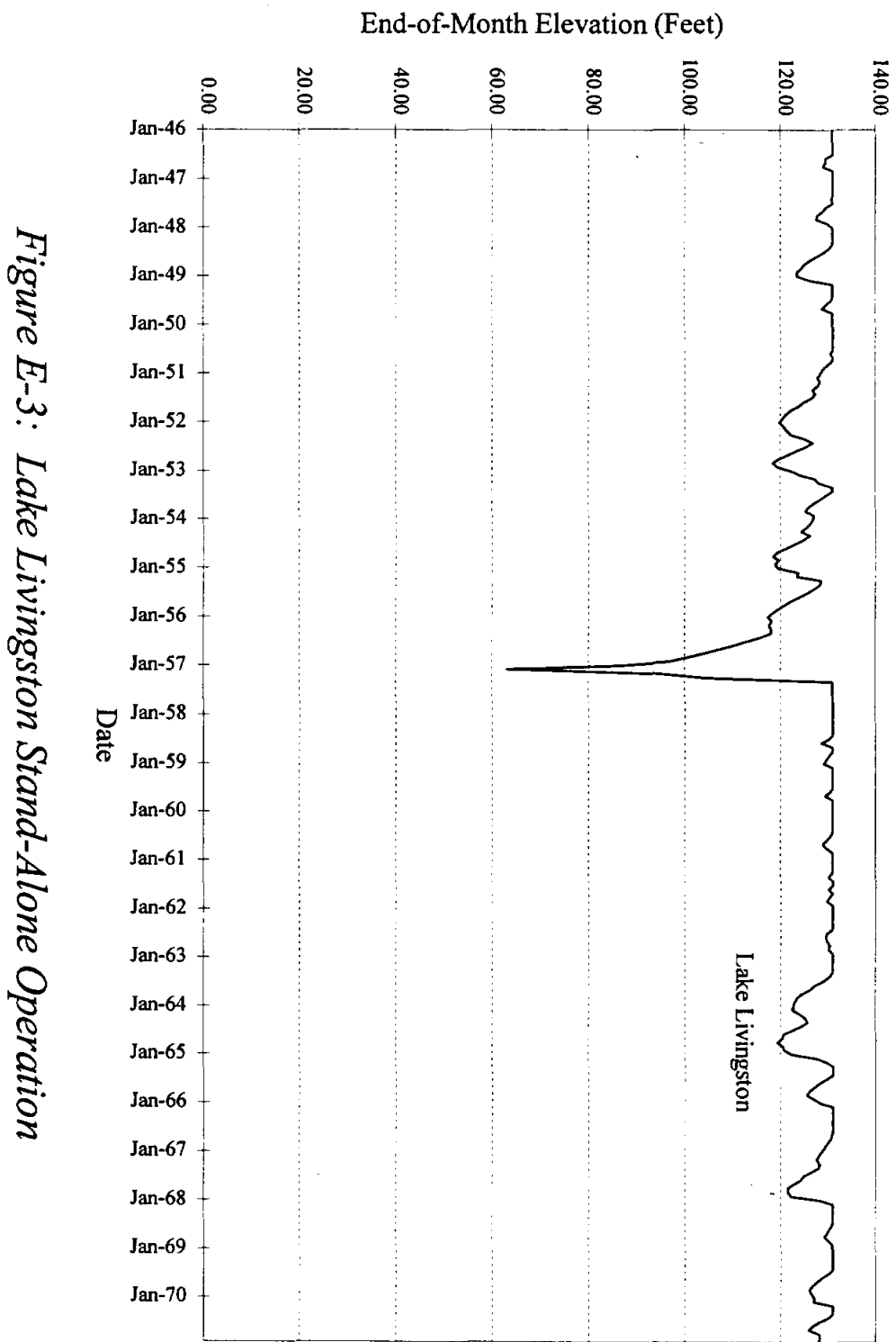


Figure E-3: Lake Livingston Stand-Alone Operation

Table E-3
Lake Livingston Stand-Alone Operation

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON											Total *A-F*
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*			
1949																	
1	-17380.	2216.	60800.	0.	0.	75448.	1162429.	123.5	77228.	16975.	61463.	51881.	9582.	0.	80654.		
2	-12539.	1996.	237500.	0.	0.	61951.	1348521.	126.2	105591.	15469.	119812.	46482.	8672.	64658.	72619.		
3	-10840.	2772.	617600.	0.	187477.	67934.	1718778.	131.0	343681.	16975.	386766.	50959.	15978.	319829.	86684.		
4	-7466.	4004.	425000.	0.	358969.	69493.	1718778.	131.0	490162.	16427.	515715.	53066.	29024.	433625.	102521.		
5	17419.	4736.	322900.	0.	226622.	74123.	1718778.	131.0	300745.	16975.	283770.	57148.	35900.	190722.	114759.		
6	5807.	5068.	533500.	0.	447601.	75024.	1718778.	131.0	552175.	16427.	555858.	58597.	39162.	458099.	119254.		
7	10736.	4876.	86100.	0.	0.	91762.	1697504.	130.7	105632.	16975.	98097.	62020.	36077.	0.	119948.		
8	21776.	4080.	27400.	0.	0.	92137.	1606911.	129.6	99757.	16975.	87962.	60177.	27785.	0.	109017.		
9	12557.	3176.	27100.	0.	0.	78138.	1540140.	128.8	86518.	16427.	75791.	57082.	18709.	0.	95394.		
10	-47159.	2504.	517400.	0.	310281.	73136.	1718778.	131.0	544417.	16975.	636992.	56161.	11529.	569302.	87169.		
11	23226.	2272.	116900.	0.	23357.	68045.	1718778.	131.0	114262.	16427.	113385.	51618.	10290.	51477.	80607.		
12	-29032.	2300.	320700.	0.	277258.	70174.	1718778.	131.0	454332.	16975.	510097.	53199.	10112.	446786.	82586.		
	-32895.	40000.	3292900.	0.	1831565.	897365.			3274500.	200002.	3445708.	658390.	252820.	2534498.	1151212.		
1950																	
1	-1659.	2216.	532200.	0.	462787.	68856.	1718778.	131.0	685343.	16975.	772948.	51881.	9582.	711485.	80654.		
2	-23226.	1996.	867500.	0.	826779.	61951.	1718778.	131.0	985130.	15469.	1035251.	46482.	8672.	980097.	72619.		
3	12443.	2772.	540500.	0.	457351.	67934.	1718778.	131.0	644485.	16975.	708620.	50959.	15978.	641683.	86684.		
4	-10783.	4004.	322000.	0.	259286.	69493.	1718778.	131.0	350409.	16427.	348702.	53066.	29024.	266612.	102521.		
5	5807.	4736.	847700.	0.	763034.	74123.	1718778.	131.0	897357.	16975.	921342.	57148.	35900.	828294.	114759.		
6	4977.	5068.	590200.	0.	505131.	75024.	1718778.	131.0	743455.	16427.	838138.	58597.	39162.	740379.	119254.		
7	20738.	4876.	262300.	0.	157691.	78995.	1718778.	131.0	274536.	16975.	283311.	62020.	36077.	185214.	119948.		
8	37807.	4080.	88700.	0.	0.	90867.	1674724.	130.5	99237.	16975.	87962.	60177.	27785.	0.	109017.		
9	8219.	3176.	304200.	0.	175242.	73509.	1718778.	131.0	250161.	16427.	234694.	57082.	18709.	158903.	95394.		
10	28925.	2504.	86800.	0.	0.	73136.	1701013.	130.8	94386.	16975.	91871.	56161.	11529.	24181.	87169.		
11	19396.	2272.	10300.	0.	0.	76575.	1613070.	129.7	77625.	16427.	61908.	51618.	10290.	0.	80607.		
12	10220.	2300.	20300.	0.	0.	76526.	1544324.	128.8	78766.	16975.	63311.	53199.	10112.	0.	82586.		
	112864.	40000.	4472700.	0.	3607301.	886989.			5180890.	200002.	5448058.	658390.	252820.	4536848.	1151212.		
1951																	
1	-9272.	2216.	30800.	0.	0.	71428.	1510752.	128.4	75598.	16975.	61463.	51881.	9582.	0.	80654.		
2	-6099.	1996.	21700.	0.	0.	69343.	1467212.	127.8	70103.	15469.	55154.	46482.	8672.	0.	72619.		
3	-3047.	2772.	105800.	0.	0.	67934.	1505353.	128.3	88624.	16975.	85729.	50959.	15978.	18792.	86684.		
4	13698.	4004.	54200.	0.	0.	79327.	1462524.	127.8	90747.	16427.	82090.	53066.	29024.	0.	102521.		
5	14900.	4736.	44700.	0.	0.	99353.	1388235.	126.8	105703.	16975.	93048.	57148.	35900.	0.	114759.		
6	17796.	5068.	163300.	0.	0.	91586.	1437085.	127.4	105036.	16427.	97759.	58597.	39162.	0.	119254.		
7	25921.	4876.	63800.	0.	0.	88442.	1381646.	126.7	104292.	16975.	98097.	62020.	36077.	0.	119948.		
8	37124.	4080.	9600.	0.	0.	101547.	1248495.	124.8	103567.	16975.	87962.	60177.	27785.	0.	109017.		
9	-2738.	3176.	21300.	0.	0.	87748.	1181609.	123.8	90408.	16427.	75791.	57082.	18709.	0.	95394.		
10	25038.	2504.	8200.	0.	0.	81805.	1080462.	122.3	83505.	16975.	67690.	56161.	11529.	0.	87169.		
11	11370.	2272.	17900.	0.	0.	74115.	1010605.	121.2	76625.	16427.	61908.	51618.	10290.	0.	80607.		
12	0.	2300.	31800.	0.	0.	72376.	967729.	120.5	77086.	16975.	63311.	53199.	10112.	0.	82586.		
	124691.	40000.	573100.	0.	0.	985004.			1071294.	200002.	930002.	658390.	252820.	18792.	1151212.		

Table E-3 (cont.)
Lake Livingston Stand-Alone Operation

Date	LAKE LIVINGSTON									TRINITY BELOW LIVINGSTON						Total *A-F*
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*		
1952																
1	2397.	2216.	38400.	0.	0.	72978.	928538.	119.8	76228.	16975.	61463.	51881.	9582.	0.	80654.	
2	-14436.	1996.	102500.	0.	0.	61951.	981527.	120.7	72581.	15469.	64342.	46482.	8672.	9188.	72619.	
3	4929.	2772.	109100.	0.	0.	67934.	1014992.	121.3	86984.	16975.	82969.	50959.	15978.	16032.	86684.	
4	-17063.	4004.	119500.	0.	0.	69493.	1078058.	122.2	103403.	16427.	110046.	53066.	29024.	27956.	102521.	
5	-4701.	4736.	262700.	0.	0.	74123.	1266600.	125.1	100743.	16975.	101878.	57148.	35900.	8830.	114759.	
6	25878.	5068.	236800.	0.	0.	75024.	1397430.	126.9	102634.	16427.	104997.	58597.	39162.	7238.	119254.	
7	15155.	4876.	17200.	0.	0.	107962.	1286637.	125.3	112192.	16975.	98097.	62020.	36077.	0.	119948.	
8	35664.	4080.	8100.	0.	0.	102767.	1152226.	123.4	104057.	16975.	87962.	60177.	27785.	0.	109017.	
9	30384.	3176.	4100.	0.	0.	91578.	1031188.	121.5	91958.	16427.	91958.	57082.	18709.	0.	95394.	
10	35254.	2504.	5600.	0.	0.	82745.	916285.	119.6	83885.	16975.	67690.	56161.	11529.	0.	87169.	
11	-6352.	2272.	6000.	0.	0.	78335.	848030.	118.4	78335.	16427.	61908.	51618.	10290.	0.	80607.	
12	5753.	2300.	134000.	0.	0.	70174.	903803.	119.4	79064.	16975.	68139.	53199.	10112.	4828.	82586.	
	112862.	40000.	1044000.	0.	0.	955064.			1092064.	200002.	985282.	658390.	252820.	74072.	1151212.	
1953																
1	6161.	2216.	265600.	0.	0.	68856.	1092170.	122.5	88886.	16975.	85541.	51881.	9582.	24078.	80654.	
2	-11977.	1996.	171800.	0.	0.	61951.	1212000.	124.3	97881.	15469.	106862.	46482.	8672.	51708.	72619.	
3	1431.	2772.	290300.	0.	0.	67934.	1430163.	127.3	83924.	16975.	77829.	50959.	15978.	10892.	86684.	
4	-14313.	4004.	112400.	0.	0.	71347.	1481525.	128.0	87517.	16427.	82090.	53066.	29024.	0.	102521.	
5	-25334.	4736.	985700.	0.	694922.	74123.	1718778.	131.0	924245.	16975.	1012870.	57148.	35900.	919822.	114759.	
6	14931.	5068.	246600.	0.	151577.	75024.	1718778.	131.0	282791.	16427.	304594.	58597.	39162.	206835.	119254.	
7	16235.	4876.	20800.	0.	0.	102332.	1616135.	129.7	109912.	16975.	98097.	62020.	36077.	0.	119948.	
8	10187.	4080.	16200.	0.	0.	96387.	1521681.	128.5	101477.	16975.	87962.	60177.	27785.	0.	109017.	
9	34033.	3176.	14000.	0.	0.	86858.	1411614.	127.1	90048.	16427.	75791.	57082.	18709.	0.	95394.	
10	17502.	2504.	19400.	0.	0.	84665.	1326343.	125.9	84665.	16975.	67690.	56161.	11529.	0.	87169.	
11	14219.	2272.	47400.	0.	0.	74135.	1283117.	125.3	76635.	16427.	61908.	51618.	10290.	0.	80607.	
12	-722.	2300.	189300.	0.	0.	70174.	1400665.	126.9	89134.	16975.	85059.	53199.	10112.	21748.	82586.	
	62353.	40000.	2379500.	0.	846499.	933786.			2117115.	200002.	2146293.	658390.	252820.	1235083.	1151212.	
1954																
1	737.	2216.	63700.	0.	0.	68856.	1392556.	126.8	79996.	16975.	70601.	51881.	9582.	9138.	80654.	
2	18247.	1996.	42200.	0.	0.	64593.	1349920.	126.2	68183.	15469.	55154.	46482.	8672.	0.	72619.	
3	14295.	2772.	28700.	0.	0.	75712.	1285841.	125.3	80592.	16975.	66937.	50959.	15978.	0.	86684.	
4	4172.	4004.	32300.	0.	0.	93807.	1216158.	124.3	96607.	16427.	82090.	53066.	29024.	0.	102521.	
5	1409.	4736.	214100.	0.	0.	74123.	1349990.	126.2	103233.	16975.	106068.	57148.	35900.	13020.	114759.	
6	26208.	5068.	22500.	0.	0.	99786.	1241428.	124.7	108356.	16427.	97759.	58597.	39162.	0.	119254.	
7	16897.	4876.	12000.	0.	0.	100622.	1131033.	123.1	109222.	16975.	98097.	62020.	36077.	0.	119948.	
8	30806.	4080.	16200.	0.	0.	89407.	1022940.	121.4	98647.	16975.	87962.	60177.	27785.	0.	109017.	
9	26622.	3176.	3900.	0.	0.	89028.	908014.	119.5	90928.	16427.	75791.	57082.	18709.	0.	95394.	
10	2306.	2504.	32400.	0.	0.	84665.	850939.	118.5	84665.	16975.	67690.	56161.	11529.	0.	87169.	
11	8086.	2272.	141900.	0.	0.	68045.	914436.	119.6	91015.	16427.	90218.	51618.	10290.	28310.	80607.	
12	10469.	2300.	44000.	0.	0.	70174.	875493.	118.9	80154.	16975.	69969.	53199.	10112.	6658.	82586.	
	160254.	40000.	653900.	0.	0.	978818.			1091598.	200002.	968336.	658390.	252820.	57126.	1151212.	

Table E-3 (cont.)
Lake Livingston Stand-Alone Operation

Date	LAKE LIVINGSTON						TRINITY BELOW LIVINGSTON									
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Total *A-F*	
1955																
1	-2902.	2216.	100200.	0.	0.	68856.	907523.	119.5	87196.	16975.	82701.	51881.	9582.	21238.	80654.	
2	-12604.	1996.	318700.	0.	0.	61951.	1174880.	123.7	109261.	15469.	125982.	46482.	8672.	70828.	72619.	
3	14746.	2772.	71800.	0.	0.	68032.	1161130.	123.5	77482.	16975.	66937.	50959.	15978.	0.	86684.	
4	-2892.	4004.	441300.	0.	0.	69493.	1531825.	128.7	147323.	16427.	183856.	53066.	29024.	101766.	102521.	
5	13106.	4736.	85900.	0.	0.	89403.	1510480.	128.4	101673.	16975.	93048.	57148.	35900.	0.	114759.	
6	26499.	5068.	47600.	0.	0.	97706.	1428807.	127.3	107516.	16427.	97759.	58597.	39162.	0.	119254.	
7	16790.	4876.	14900.	0.	0.	107712.	1314329.	125.7	112092.	16975.	98097.	62020.	36077.	0.	119948.	
8	23670.	4080.	8500.	0.	0.	101277.	1193802.	124.0	103457.	16975.	87962.	60177.	27785.	0.	109017.	
9	11911.	3176.	0.	0.	0.	91928.	1086787.	122.4	92098.	16427.	75791.	57082.	18709.	0.	95394.	
10	30265.	2504.	17800.	0.	0.	74335.	997483.	121.0	80485.	16975.	67690.	56161.	11529.	0.	87169.	
11	17432.	2272.	6800.	0.	0.	74385.	910194.	119.5	76735.	16427.	61908.	51618.	10290.	0.	80607.	
12	1727.	2300.	14000.	0.	0.	75546.	844621.	118.4	78366.	16975.	63311.	53199.	10112.	0.	82586.	
	137748.	40000.	1127500.	0.	0.	980624.			1173684.	200002.	1105042.	658390.	252820.	193832.	1151212.	
1956																
1	0.	2216.	20600.	0.	0.	70948.	792057.	117.4	75408.	16975.	61463.	51881.	9582.	0.	80654.	
2	-4430.	1996.	100800.	0.	0.	61951.	833340.	118.2	80291.	15469.	77302.	46482.	8672.	22148.	72619.	
3	2777.	2772.	41000.	0.	0.	67934.	800857.	117.6	79414.	16975.	70249.	50959.	15978.	3312.	86684.	
4	555.	4004.	102400.	0.	0.	69493.	829205.	118.1	89183.	16427.	86156.	53066.	29024.	4066.	102521.	
5	12298.	4736.	124200.	0.	0.	110023.	826348.	118.1	110023.	16975.	93048.	57148.	35900.	0.	114759.	
6	13493.	5068.	21500.	0.	0.	110406.	718881.	116.1	112656.	16427.	97759.	58597.	39162.	0.	119254.	
7	25675.	4876.	3700.	0.	0.	112502.	579528.	113.2	114032.	16975.	98097.	62020.	36077.	0.	119948.	
8	23659.	4080.	1500.	0.	0.	104117.	449172.	110.3	104607.	16975.	87962.	60177.	27785.	0.	109017.	
9	25165.	3176.	3400.	0.	0.	92138.	332093.	107.1	92188.	16427.	75791.	57082.	18709.	0.	95394.	
10	10095.	2504.	3900.	0.	0.	83955.	239439.	104.1	84375.	16975.	67690.	56161.	11529.	0.	87169.	
11	3989.	2272.	6900.	0.	0.	78085.	161993.	100.7	78235.	16427.	61908.	51618.	10290.	0.	80607.	
12	-974.	2300.	10800.	0.	0.	75296.	96171.	96.6	78266.	16975.	63311.	53199.	10112.	0.	82586.	
	112302.	40000.	440700.	0.	0.	1036848.			1098678.	200002.	940736.	658390.	252820.	29526.	1151212.	
1957																
1	630.	2216.	8500.	0.	0.	78438.	23387.	86.6	78438.	16975.	61463.	51881.	9582.	0.	80654.	
2	81.	1996.	43100.	0.	0.	64403.	7.	63.1	68103.	15469.	55154.	46482.	8672.	0.	72619.	
3	-671.	2772.	133700.	0.	0.	67934.	63672.	93.7	92484.	16975.	92209.	50959.	15978.	25272.	86684.	
4	-7405.	4004.	260400.	0.	0.	86657.	240816.	104.1	93717.	16427.	82090.	53066.	29024.	0.	102521.	
5	12808.	4736.	1903300.	0.	333671.	74123.	1718778.	131.0	530494.	16975.	597009.	57148.	35900.	503961.	114759.	
6	-1659.	5068.	1611900.	0.	1533467.	75024.	1718778.	131.0	1716191.	16427.	1773044.	58597.	39162.	1675285.	119254.	
7	26544.	4876.	151400.	0.	40985.	78995.	1718778.	131.0	142600.	16975.	141015.	62020.	36077.	42918.	119948.	
8	23226.	4080.	238600.	0.	134142.	77152.	1718778.	131.0	271534.	16975.	295549.	60177.	27785.	207587.	109017.	
9	2486.	3176.	74900.	0.	0.	73509.	1714507.	130.9	85649.	16427.	77482.	57082.	18709.	1691.	95394.	
10	2486.	2504.	805600.	0.	723203.	73136.	1718778.	131.0	863579.	16975.	892354.	56161.	11529.	824664.	87169.	
11	-11613.	2272.	765100.	0.	706396.	68045.	1718778.	131.0	898141.	16427.	965884.	51618.	10290.	903976.	80607.	
12	2488.	2300.	316700.	0.	241738.	70174.	1718778.	131.0	399472.	16975.	442077.	53199.	10112.	378766.	82586.	
	49401.	40000.	6313200.	0.	3713602.	887590.			5240402.	200002.	5475330.	658390.	252820.	4564120.	1151212.	

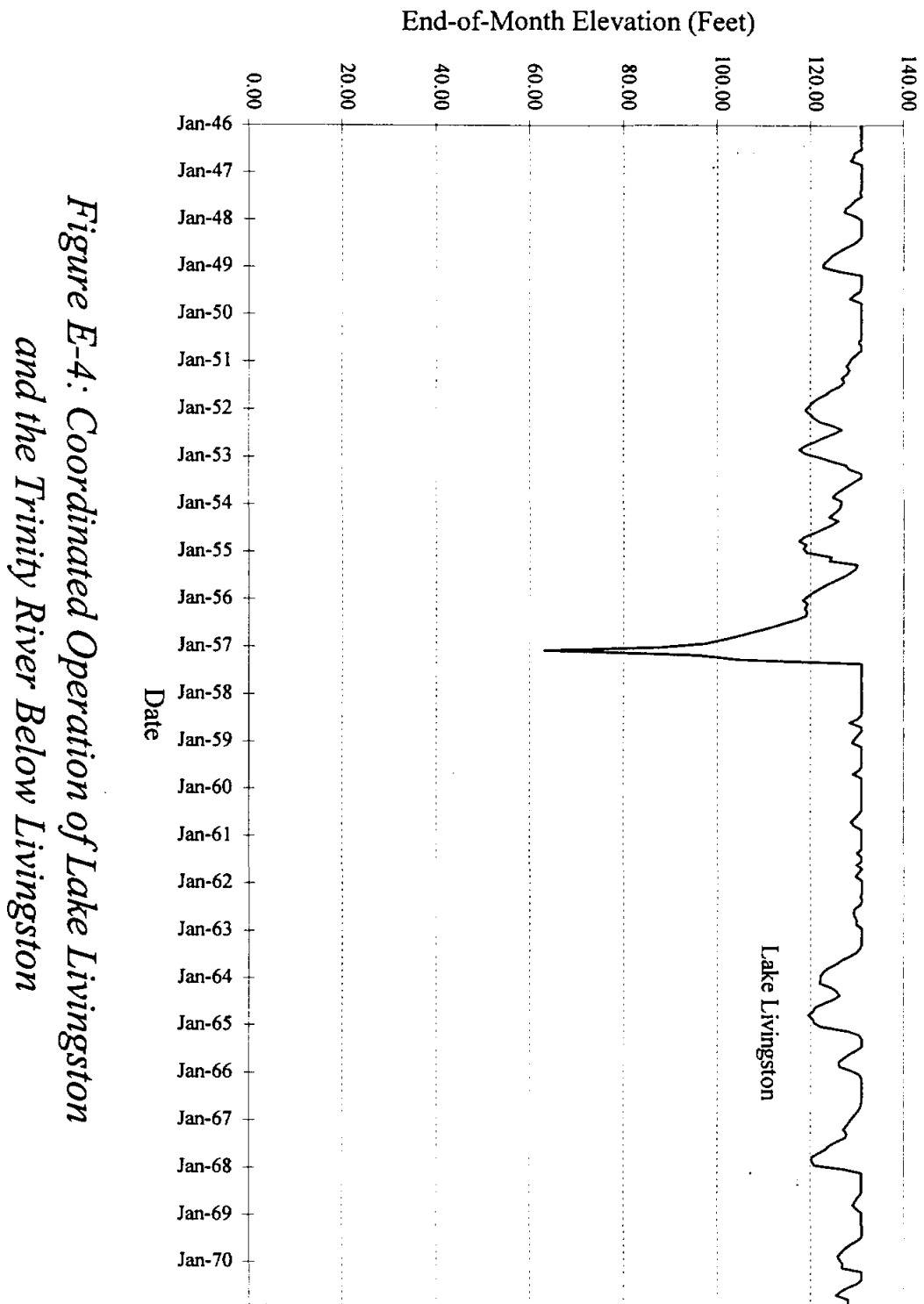


Figure E-4: Coordinated Operation of Lake Livingston and the Trinity River Below Livingston

Table E-4
Coordinated Operation of Lake Livingston and the Trinity River below Lake Livingston

Date	LAKE LIVINGSTON						TRINITY BELOW LIVINGSTON									
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Total *A-F*	
1949																
1	-17009.	2216.	60800.	0.	0.	81133.	1113342.	122.8	82913.	16975.	67148.	57566.	9582.	0.	86339.	
2	-12435.	1996.	237500.	0.	0.	2387.	1358894.	126.4	46027.	15469.	60248.	51576.	8672.	0.	77713.	
3	-10859.	2772.	617600.	0.	265803.	0.	1718778.	131.0	354073.	16975.	397158.	56543.	15978.	324637.	92268.	
4	-7466.	4004.	425000.	0.	428462.	0.	1718778.	131.0	490162.	16427.	515715.	58881.	29024.	427810.	108336.	
5	17419.	4736.	322900.	0.	300745.	0.	1718778.	131.0	300745.	16975.	283770.	63410.	35900.	184460.	121021.	
6	5807.	5068.	533500.	0.	522625.	0.	1718778.	131.0	552175.	16427.	555858.	65018.	39162.	451678.	125675.	
7	10720.	4876.	86100.	0.	0.	98558.	1690724.	130.7	112428.	16975.	104893.	68816.	36077.	0.	126744.	
8	21682.	4080.	27400.	0.	0.	98731.	1593631.	129.4	106351.	16975.	94556.	66771.	27785.	0.	115611.	
9	12488.	3176.	27100.	0.	0.	84393.	1520674.	128.5	92773.	16427.	82046.	63337.	18709.	0.	101649.	
10	-47010.	2504.	517400.	0.	363802.	0.	1718778.	131.0	524802.	16975.	617377.	62315.	11529.	543533.	93323.	
11	23226.	2272.	116900.	0.	91402.	0.	1718778.	131.0	114262.	16427.	113385.	57274.	10290.	45821.	86263.	
12	-29032.	2300.	320700.	0.	347432.	0.	1718778.	131.0	454332.	16975.	510097.	59028.	10112.	440957.	88415.	
	-32469.	40000.	3292900.	0.	2320271.	365202.			3231043.	200002.	3402251.	730535.	252820.	2418896.	1223357.	
1950																
1	-1659.	2216.	532200.	0.	531643.	0.	1718778.	131.0	685343.	16975.	772948.	57566.	9582.	705800.	86339.	
2	-23226.	1996.	867500.	0.	888730.	0.	1718778.	131.0	985130.	15469.	1035251.	51576.	8672.	975003.	77713.	
3	12443.	2772.	540500.	0.	525285.	0.	1718778.	131.0	644485.	16975.	708620.	56543.	15978.	636099.	92268.	
4	-10783.	4004.	322000.	0.	328779.	0.	1718778.	131.0	350409.	16427.	348702.	58881.	29024.	260797.	108336.	
5	5807.	4736.	847700.	0.	837157.	0.	1718778.	131.0	897357.	16975.	921342.	63410.	35900.	822032.	121021.	
6	4977.	5068.	590200.	0.	580155.	0.	1718778.	131.0	743455.	16427.	838138.	65018.	39162.	733958.	125675.	
7	20738.	4876.	262300.	0.	236686.	0.	1718778.	131.0	274536.	16975.	283311.	68816.	36077.	178418.	126744.	
8	37755.	4080.	88700.	0.	0.	97461.	1668182.	130.4	105831.	16975.	94556.	66771.	27785.	0.	115611.	
9	8208.	3176.	304200.	0.	242220.	0.	1718778.	131.0	243630.	16427.	228163.	63337.	18709.	146117.	101649.	
10	29032.	2504.	86800.	0.	55264.	0.	1718778.	131.0	76514.	16975.	73999.	62315.	11529.	155.	93323.	
11	19519.	2272.	10300.	0.	0.	82231.	1625056.	129.8	83281.	16427.	67564.	57274.	10290.	0.	86263.	
12	10250.	2300.	20300.	0.	0.	82355.	1550451.	128.9	84595.	16975.	69140.	59028.	10112.	0.	88415.	
	113061.	40000.	4472700.	0.	4225919.	262047.			5174566.	200002.	5441734.	730535.	252820.	4458379.	1223357.	
1951																
1	-9282.	2216.	30800.	0.	0.	77113.	1511204.	128.4	81283.	16975.	67148.	57566.	9582.	0.	86339.	
2	-6094.	1996.	21700.	0.	0.	74437.	1462565.	127.8	75197.	15469.	60248.	51576.	8672.	0.	77713.	
3	-3049.	2772.	105800.	0.	0.	54726.	1513916.	128.4	75416.	16975.	72521.	56543.	15978.	0.	92268.	
4	13725.	4004.	54200.	0.	0.	85142.	1465245.	127.8	96562.	16427.	87905.	58881.	29024.	0.	108336.	
5	14898.	4736.	44700.	0.	0.	105615.	1384696.	126.7	111965.	16975.	99310.	63410.	35900.	0.	121021.	
6	17752.	5068.	163300.	0.	0.	98007.	1427169.	127.3	111457.	16427.	104180.	65018.	39162.	0.	125675.	
7	25792.	4876.	63800.	0.	0.	95238.	1365063.	126.4	111088.	16975.	104893.	68816.	36077.	0.	126744.	
8	36827.	4080.	9600.	0.	0.	108141.	1225615.	124.5	110161.	16975.	94556.	66771.	27785.	0.	115611.	
9	-2707.	3176.	21300.	0.	0.	94003.	1152443.	123.4	96663.	16427.	82046.	63337.	18709.	0.	101649.	
10	24653.	2504.	8200.	0.	0.	87959.	1045527.	121.7	89659.	16975.	73844.	62315.	11529.	0.	93323.	
11	11148.	2272.	17900.	0.	0.	79771.	970236.	120.5	82281.	16427.	67564.	57274.	10290.	0.	86263.	
12	0.	2300.	31800.	0.	0.	78205.	921531.	119.7	82915.	16975.	69140.	59028.	10112.	0.	88415.	
	123663.	40000.	573100.	0.	0.	1038357.			1124647.	200002.	983355.	730535.	252820.	0.	1223357.	

Table E-4 (cont.)
Coordinated Operation of Lake Livingston and the Trinity River below Lake Livingston

Date	LAKE LIVINGSTON									TRINITY BELOW LIVINGSTON						Total *A-F*
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*		
1952																
1	2332.	2216.	38400.	0.	0.	78663.	876720.	118.9	81913.	16975.	67148.	57566.	9582.	0.	86339.	
2	-14038.	1996.	102500.	0.	0.	57857.	933405.	119.9	68487.	15469.	60248.	51576.	8672.	0.	77713.	
3	4813.	2772.	109100.	0.	0.	57486.	977434.	120.6	76536.	16975.	72521.	56543.	15978.	0.	92268.	
4	-16828.	4004.	119500.	0.	0.	47352.	1062406.	122.0	81262.	16427.	87905.	58881.	29024.	0.	108336.	
5	-4670.	4736.	262700.	0.	0.	71555.	1253485.	124.9	98175.	16975.	99310.	63410.	35900.	0.	121021.	
6	25746.	5068.	236800.	0.	0.	74207.	1385264.	126.7	101817.	16427.	104180.	65018.	39162.	0.	125675.	
7	15062.	4876.	17200.	0.	0.	114758.	1267768.	125.1	118988.	16975.	104893.	68816.	36077.	0.	126744.	
8	35323.	4080.	8100.	0.	0.	109361.	1127104.	123.0	110651.	16975.	94556.	66771.	27785.	0.	115611.	
9	29965.	3176.	4100.	0.	0.	97833.	1000230.	121.0	98213.	16427.	82046.	63337.	18709.	0.	101649.	
10	34592.	2504.	5600.	0.	0.	88899.	879835.	119.0	90039.	16975.	73844.	62315.	11529.	0.	93323.	
11	-6205.	2272.	6000.	0.	0.	83991.	805777.	117.7	83991.	16427.	67564.	57274.	10290.	0.	86263.	
12	5609.	2300.	134000.	0.	0.	71175.	860693.	118.7	80065.	16975.	69140.	59028.	10112.	0.	88415.	
	111701.	40000.	1044000.	0.	0.	953137.			1090137.	200002.	983355.	730535.	252820.	0.	1223357.	
1953																
1	6046.	2216.	265600.	0.	0.	50463.	1067568.	122.1	70493.	16975.	67148.	57566.	9582.	0.	86339.	
2	-11970.	1996.	171800.	0.	0.	15337.	1234005.	124.6	51267.	15469.	60248.	51576.	8672.	0.	77713.	
3	1445.	2772.	290300.	0.	0.	62626.	1457462.	127.7	78616.	16975.	72521.	56543.	15978.	0.	92268.	
4	-14441.	4004.	112400.	0.	0.	77162.	1503137.	128.3	93332.	16427.	87905.	58881.	29024.	0.	108336.	
5	-25424.	4736.	985700.	0.	790747.	0.	1718778.	131.0	945947.	16975.	1034572.	63410.	35900.	935262.	121021.	
6	14931.	5068.	246600.	0.	226601.	0.	1718778.	131.0	282791.	16427.	304594.	65018.	39162.	200414.	125675.	
7	16212.	4876.	20800.	0.	0.	109128.	1609362.	129.6	116708.	16975.	104893.	68816.	36077.	0.	126744.	
8	10153.	4080.	16200.	0.	0.	102981.	1508348.	128.4	108071.	16975.	94556.	66771.	27785.	0.	115611.	
9	33832.	3176.	14000.	0.	0.	93113.	1392227.	126.8	96303.	16427.	82046.	63337.	18709.	0.	101649.	
10	17351.	2504.	19400.	0.	0.	90819.	1300953.	125.5	90819.	16975.	73844.	62315.	11529.	0.	93323.	
11	14056.	2272.	47400.	0.	0.	79791.	1252234.	124.9	82291.	16427.	67564.	57274.	10290.	0.	86263.	
12	-715.	2300.	189300.	0.	0.	54255.	1385694.	126.7	73215.	16975.	69140.	59028.	10112.	0.	88415.	
	61476.	40000.	2379500.	0.	1017348.	735675.			2089853.	200002.	2119031.	730535.	252820.	1135676.	1223357.	
1954																
1	733.	2216.	63700.	0.	0.	65403.	1381042.	126.7	76543.	16975.	67148.	57566.	9582.	0.	86339.	
2	18149.	1996.	42200.	0.	0.	69687.	1333410.	126.0	73277.	15469.	60248.	51576.	8672.	0.	77713.	
3	14183.	2772.	28700.	0.	0.	81296.	1263859.	125.0	86176.	16975.	72521.	56543.	15978.	0.	92268.	
4	4127.	4004.	32300.	0.	0.	99622.	1188406.	123.9	102422.	16427.	87905.	58881.	29024.	0.	108336.	
5	1395.	4736.	214100.	0.	0.	67365.	1329010.	125.9	96475.	16975.	99310.	63410.	35900.	0.	121021.	
6	25950.	5068.	22500.	0.	0.	106207.	1214285.	124.3	114777.	16427.	104180.	65018.	39162.	0.	125675.	
7	16663.	4876.	12000.	0.	0.	107418.	1097328.	122.5	116018.	16975.	104893.	68816.	36077.	0.	126744.	
8	30236.	4080.	16200.	0.	0.	96001.	983211.	120.7	105241.	16975.	94556.	66771.	27785.	0.	115611.	
9	25995.	3176.	3900.	0.	0.	95283.	862657.	118.7	97183.	16427.	82046.	63337.	18709.	0.	101649.	
10	2241.	2504.	32400.	0.	0.	90819.	799493.	117.6	90819.	16975.	73844.	62315.	11529.	0.	93323.	
11	7897.	2272.	141900.	0.	0.	45391.	885833.	119.1	68361.	16427.	67564.	57274.	10290.	0.	86263.	
12	10301.	2300.	44000.	0.	0.	69345.	847887.	118.4	79325.	16975.	69140.	59028.	10112.	0.	88415.	
	157870.	40000.	653900.	0.	0.	993837.			1106617.	200002.	983355.	730535.	252820.	0.	1223357.	

Table E-4 (cont.)
Coordinated Operation of Lake Livingston and the Trinity River below Lake Livingston

Date	LAKE LIVINGSTON			LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON					Total *A-F*	
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*		Remaining Flow *A-F*
1955															
1	-2869.	2216.	100200.	0.	0.	53303.	895437.	119.3	71643.	16975.	67148.	57566.	9582.	0.	86339.
2	-12729.	1996.	318700.	0.	0.	0.	1224870.	124.5	47310.	15469.	64031.	51576.	8672.	3783.	77713.
3	15060.	2772.	71800.	0.	0.	73616.	1205222.	124.2	83066.	16975.	72521.	56543.	15978.	0.	92268.
4	-2980.	4004.	441300.	0.	0.	0.	1645498.	130.1	77830.	16427.	114363.	58881.	29024.	26458.	108336.
5	13597.	4736.	85900.	0.	0.	95665.	1617400.	129.7	107935.	16975.	99310.	63410.	35900.	0.	121021.
6	27462.	5068.	47600.	0.	0.	104127.	1528343.	128.6	113937.	16427.	104180.	65018.	39162.	0.	125675.
7	17400.	4876.	14900.	0.	0.	114508.	1406459.	127.0	118888.	16975.	104893.	68816.	36077.	0.	126744.
8	24541.	4080.	8500.	0.	0.	107871.	1278467.	125.2	110051.	16975.	94556.	66771.	27785.	0.	115611.
9	12357.	3176.	0.	0.	0.	98183.	1164751.	123.6	98353.	16427.	82046.	63337.	18709.	0.	101649.
10	31407.	2504.	17800.	0.	0.	80489.	1068151.	122.1	86639.	16975.	73844.	62315.	11529.	0.	93323.
11	18088.	2272.	6800.	0.	0.	80041.	974550.	120.6	82391.	16427.	67564.	57274.	10290.	0.	86263.
12	1788.	2300.	14000.	0.	0.	81375.	903087.	119.4	84195.	16975.	69140.	59028.	10112.	0.	88415.
	143122.	40000.	1127500.	0.	0.	889178.			1082238.	200002.	1013596.	730535.	252820.	30241.	1223357.
1956															
1	0.	2216.	20600.	0.	0.	76633.	844838.	118.4	81093.	16975.	67148.	57566.	9582.	0.	86339.
2	-4598.	1996.	100800.	0.	0.	44897.	903343.	119.4	63237.	15469.	60248.	51576.	8672.	0.	77713.
3	2893.	2772.	41000.	0.	0.	70206.	868472.	118.8	81686.	16975.	72521.	56543.	15978.	0.	92268.
4	577.	4004.	102400.	0.	0.	71242.	895049.	119.3	90932.	16427.	87905.	58881.	29024.	0.	108336.
5	12762.	4736.	124200.	0.	0.	116285.	885466.	119.1	116285.	16975.	99310.	63410.	35900.	0.	121021.
6	13979.	5068.	21500.	0.	0.	116827.	771092.	117.0	119077.	16427.	104180.	65018.	39162.	0.	125675.
7	26635.	4876.	3700.	0.	0.	119298.	623983.	114.2	120828.	16975.	104893.	68816.	36077.	0.	126744.
8	24603.	4080.	1500.	0.	0.	110711.	486089.	111.1	111201.	16975.	94556.	66771.	27785.	0.	115611.
9	26467.	3176.	3400.	0.	0.	98393.	361453.	108.0	98443.	16427.	82046.	63337.	18709.	0.	101649.
10	10710.	2504.	3900.	0.	0.	90109.	262030.	104.9	90529.	16975.	73844.	62315.	11529.	0.	93323.
11	4299.	2272.	6900.	0.	0.	83741.	178618.	101.5	83891.	16427.	67564.	57274.	10290.	0.	86263.
12	-1055.	2300.	10800.	0.	0.	81125.	107048.	97.4	84095.	16975.	69140.	59028.	10112.	0.	88415.
	117272.	40000.	440700.	0.	0.	1079467.			1141297.	200002.	983355.	730535.	252820.	0.	1223357.
1957															
1	705.	2216.	8500.	0.	0.	84123.	28504.	88.0	84123.	16975.	67148.	57566.	9582.	0.	86339.
2	107.	1996.	43100.	0.	0.	69497.	4.	63.1	73197.	15469.	60248.	51576.	8672.	0.	77713.
3	-944.	2772.	133700.	0.	0.	48246.	83630.	95.6	72796.	16975.	72521.	56543.	15978.	0.	92268.
4	-8105.	4004.	260400.	0.	0.	92472.	255659.	104.7	99532.	16427.	87905.	58881.	29024.	0.	108336.
5	12860.	4736.	1903300.	0.	422585.	0.	1718778.	131.0	545285.	16975.	611800.	63410.	35900.	512490.	121021.
6	-1659.	5068.	1611900.	0.	1608491.	0.	1718778.	131.0	1716191.	16427.	1773044.	65018.	39162.	1668864.	125675.
7	26544.	4876.	151400.	0.	119980.	0.	1718778.	131.0	142600.	16975.	141015.	68816.	36077.	36122.	126744.
8	23226.	4080.	238600.	0.	211294.	0.	1718778.	131.0	271534.	16975.	295549.	66771.	27785.	200993.	115611.
9	2484.	3176.	74900.	0.	0.	78073.	1709945.	130.9	90213.	16427.	82046.	63337.	18709.	0.	101649.
10	2484.	2504.	805600.	0.	791779.	0.	1718778.	131.0	859019.	16975.	887794.	62315.	11529.	813950.	93323.
11	-11613.	2272.	765100.	0.	774441.	0.	1718778.	131.0	898141.	16427.	965884.	57274.	10290.	898320.	86263.
12	2488.	2300.	316700.	0.	311912.	0.	1718778.	131.0	399472.	16975.	442077.	59028.	10112.	372937.	88415.
	48577.	40000.	6313200.	0.	4240482.	372411.			5252103.	200002.	5487031.	730535.	252820.	4503676.	1223357.

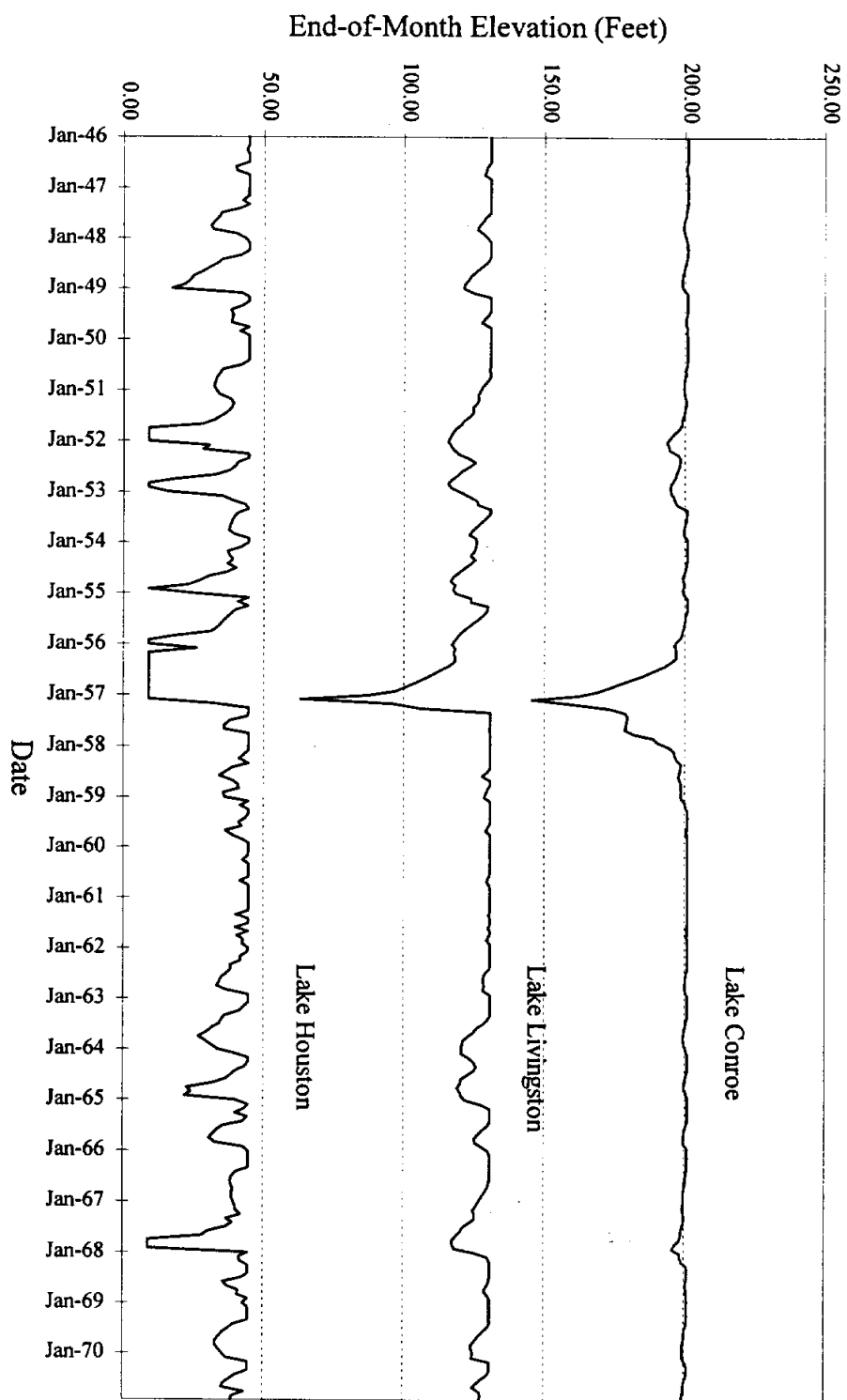


Figure E-5: Four Reservoir System Operation

Table E-5a
Four Reservoir System Operation

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON							DEMAND SUMMARY					
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Lake Conroe *A-F*	Lake Houston *A-F*	Trinity River *A-F*	Total *A-F*
1949																		
1	-16318.	2216.	60800.	0.	0.	77402.	1032016.	121.5	79182.	22847.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	-11997.	1996.	237500.	0.	0.	0.	1279517.	125.2	43640.	20820.	52510.	42972.	8672.	866.	480.	48005.	53640.	102125.
3	-10711.	2772.	617600.	0.	186278.	0.	1718778.	131.0	274548.	0.	334608.	47111.	15978.	271519.	392.	52707.	65861.	118960.
4	-7466.	4004.	425000.	0.	428462.	0.	1718778.	131.0	490162.	0.	532142.	49059.	29024.	454059.	442.	55037.	82087.	137566.
5	17419.	4736.	322900.	0.	300745.	0.	1718778.	131.0	300745.	4340.	296405.	52833.	35900.	207672.	502.	59328.	93469.	153299.
6	5807.	5068.	533500.	0.	522625.	0.	1718778.	131.0	552175.	4450.	567835.	54172.	39162.	474501.	631.	60861.	98402.	159894.
7	10682.	4876.	86100.	0.	0.	115798.	1673522.	130.4	129668.	45694.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	21489.	4080.	27400.	0.	0.	116312.	1559041.	129.0	123932.	45694.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	12305.	3176.	27100.	0.	0.	101621.	1469039.	127.8	110001.	44220.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	-46615.	2504.	517400.	0.	311772.	0.	1718778.	131.0	472772.	0.	582322.	51920.	11529.	518873.	556.	58013.	65953.	124522.
11	23226.	2272.	116900.	0.	91402.	0.	1718778.	131.0	114262.	3920.	125892.	47720.	10290.	67882.	474.	53316.	60282.	114072.
12	-29032.	2300.	320700.	0.	347432.	0.	1718778.	131.0	454332.	0.	527072.	49181.	10112.	467779.	461.	54943.	61593.	116997.
	-31211.	40000.	3292900.	0.	2188716.	411133.			3145419.	191985.	3324644.	608673.	252820.	2463151.	6450.	681540.	901493.	1589483.
1950																		
1	-1659.	2216.	532200.	0.	531643.	0.	1718778.	131.0	685343.	0.	789923.	47963.	9582.	732378.	588.	53579.	59761.	113928.
2	-23226.	1996.	867500.	0.	888730.	0.	1718778.	131.0	985130.	0.	1050720.	42972.	8672.	999076.	480.	48005.	53640.	102125.
3	12443.	2772.	540500.	0.	525285.	0.	1718778.	131.0	644485.	0.	725595.	47111.	15978.	662506.	392.	52707.	65861.	118960.
4	-10783.	4004.	322000.	0.	328779.	0.	1718778.	131.0	350409.	0.	365129.	49059.	29024.	287046.	442.	55037.	82087.	137566.
5	5807.	4736.	847700.	0.	837157.	0.	1718778.	131.0	897357.	0.	938317.	52833.	35900.	849584.	502.	59328.	93469.	153299.
6	4977.	5068.	590200.	0.	580155.	0.	1718778.	131.0	743455.	0.	854565.	54172.	39162.	761231.	631.	60861.	98402.	159894.
7	20738.	4876.	262300.	0.	236686.	0.	1718778.	131.0	274536.	4710.	295576.	57337.	36077.	202162.	679.	64350.	98290.	163319.
8	37941.	4080.	88700.	0.	0.	73918.	1691539.	130.7	82288.	4570.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	8248.	3176.	304200.	0.	265537.	0.	1718778.	131.0	266947.	44220.	223687.	52772.	18709.	152206.	566.	59051.	74657.	134274.
10	28923.	2504.	86800.	0.	0.	73433.	1700718.	130.8	94683.	45694.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	19295.	2272.	10300.	0.	0.	100470.	1588981.	129.4	101520.	44220.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	10095.	2300.	20300.	0.	0.	101227.	1495659.	128.2	103467.	45694.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	112799.	40000.	4472700.	0.	4193972.	349048.			5229620.	189108.	5507682.	608673.	252820.	4646189.	6450.	681540.	901493.	1589483.
1951																		
1	-9075.	2216.	30800.	0.	0.	96229.	1437089.	127.4	100399.	45694.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	-5913.	1996.	21700.	0.	0.	92005.	1370701.	126.5	92765.	41641.	51644.	42972.	8672.	0.	480.	48005.	53640.	102125.
3	-2937.	2772.	105800.	0.	0.	74013.	1402653.	127.0	94703.	45694.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	13130.	4004.	54200.	0.	0.	103113.	1336606.	126.0	114533.	44220.	78083.	49059.	29024.	0.	442.	55037.	82087.	137566.
5	14120.	4736.	44700.	0.	0.	123757.	1238693.	124.7	130107.	45694.	88733.	52833.	35900.	0.	502.	59328.	93469.	153299.
6	16694.	5068.	163300.	0.	0.	114954.	1265277.	125.0	128404.	44220.	93334.	54172.	39162.	0.	631.	60861.	98402.	159894.
7	24078.	4876.	63800.	0.	0.	112478.	1187645.	123.9	128328.	45694.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	33927.	4080.	9600.	0.	0.	125722.	1033516.	121.5	127742.	45694.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	-2466.	3176.	21300.	0.	0.	89121.	964985.	120.4	91781.	22110.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	22350.	2504.	8200.	0.	0.	83436.	864895.	118.7	85136.	22847.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	10074.	2272.	17900.	0.	0.	75900.	794549.	117.5	78410.	22110.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	0.	2300.	31800.	0.	0.	74230.	749819.	116.6	78940.	22847.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	113982.	40000.	573100.	0.	0.	1164958.			1251248.	448465.	861493.	608673.	252820.	0.	6450.	681540.	901493.	1589483.

Table E-5a (cont.)
Four Reservoir System Operation - Maximum Yield

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON							DEMAND SUMMARY					
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Lake Conroe *A-F*	Lake Houston *A-F*	Trinity River *A-F*	Total *A-F*
1952																		
1	2096.	2216.	38400.	0.	0.	74932.	708975.	115.9	78182.	22847.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	-12654.	1996.	102500.	0.	0.	54604.	767529.	117.0	65234.	20820.	51644.	42972.	8672.	0.	480.	48005.	53640.	102125.
3	4371.	2772.	109100.	0.	0.	53926.	815560.	117.9	72976.	22847.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	-15484.	4004.	119500.	0.	0.	21103.	925437.	119.8	55013.	0.	78083.	49059.	29024.	0.	442.	55037.	82087.	137566.
5	-4396.	4736.	262700.	0.	0.	44003.	1143794.	123.3	70623.	0.	88733.	52833.	35900.	0.	502.	59328.	93469.	153299.
6	24714.	5068.	236800.	0.	0.	51384.	1299428.	125.5	78994.	4450.	93334.	54172.	39162.	0.	631.	60861.	98402.	159894.
7	14484.	4876.	17200.	0.	0.	131998.	1165270.	123.6	136228.	45694.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	33539.	4080.	8100.	0.	0.	126942.	1008809.	121.2	128232.	45694.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	28170.	3176.	4100.	0.	0.	92951.	888612.	119.1	93331.	22110.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	32500.	2504.	5600.	0.	0.	84376.	774832.	117.1	85516.	22847.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	-5805.	2272.	6000.	0.	0.	80120.	704245.	115.8	80120.	22110.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	5257.	2300.	134000.	0.	0.	67200.	763488.	116.9	76090.	22847.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	106792.	40000.	1044000.	0.	0.	883539.			1020539.	252266.	861493.	608673.	252820.	0.	6450.	681540.	901493.	1589483.
1953																		
1	5730.	2216.	265600.	0.	0.	46732.	974410.	120.6	66762.	22847.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	-11449.	1996.	171800.	0.	0.	12084.	1143579.	123.3	48014.	20820.	51644.	42972.	8672.	0.	480.	48005.	53640.	102125.
3	1387.	2772.	290300.	0.	0.	81913.	1347807.	126.2	97903.	45694.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	-13815.	4004.	112400.	0.	0.	95133.	1374885.	126.6	111303.	44220.	78083.	49059.	29024.	0.	442.	55037.	82087.	137566.
5	-24889.	4736.	985700.	0.	661960.	0.	1718778.	131.0	817160.	0.	922760.	52833.	35900.	834027.	502.	59328.	93469.	153299.
6	14931.	5068.	246600.	0.	226601.	0.	1718778.	131.0	282791.	4450.	316571.	54172.	39162.	223237.	631.	60861.	98402.	159894.
7	16153.	4876.	20800.	0.	0.	126368.	1592181.	129.4	133948.	45694.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	10063.	4080.	16200.	0.	0.	120562.	1473676.	127.9	125652.	45694.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	33301.	3176.	14000.	0.	0.	110341.	1340858.	126.1	113531.	44220.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	16934.	2504.	19400.	0.	0.	109143.	1231677.	124.6	109143.	45694.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	13592.	2272.	47400.	0.	0.	98030.	1165183.	123.6	100530.	44220.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	-694.	2300.	189300.	0.	0.	27433.	1325444.	125.9	46393.	0.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	61244.	40000.	2379500.	0.	888561.	827739.			2053130.	363553.	1918757.	608673.	252820.	1057264.	6450.	681540.	901493.	1589483.
1954																		
1	720.	2216.	63700.	0.	0.	38825.	1347383.	126.2	49965.	0.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	17985.	1996.	42200.	0.	0.	49144.	1320458.	125.8	52734.	3530.	51644.	42972.	8672.	0.	480.	48005.	53640.	102125.
3	14174.	2772.	28700.	0.	0.	58759.	1273453.	125.2	63639.	3870.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	4128.	4004.	32300.	0.	0.	117593.	1180028.	123.8	120393.	44220.	78083.	49059.	29024.	0.	442.	55037.	82087.	137566.
5	1385.	4736.	214100.	0.	0.	85507.	1302500.	125.6	114617.	45694.	88733.	52833.	35900.	0.	502.	59328.	93469.	153299.
6	25569.	5068.	22500.	0.	0.	123154.	1171209.	123.7	131724.	44220.	93334.	54172.	39162.	0.	631.	60861.	98402.	159894.
7	16262.	4876.	12000.	0.	0.	124658.	1037413.	121.6	133258.	45694.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	29334.	4080.	16200.	0.	0.	90735.	929464.	119.8	99975.	22847.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	25256.	3176.	3900.	0.	0.	90401.	814531.	117.8	92301.	22110.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	2177.	2504.	32400.	0.	0.	86296.	755954.	116.8	86296.	22847.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	7696.	2272.	141900.	0.	0.	41520.	846366.	118.4	64490.	22110.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	10073.	2300.	44000.	0.	0.	65370.	812623.	117.8	75350.	22847.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	154759.	40000.	653900.	0.	0.	971962.			1084742.	299989.	861493.	608673.	252820.	0.	6450.	681540.	901493.	1589483.

Table E-5a (cont.)
Four Reservoir System Operation

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON							DEMAND SUMMARY					
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Lake Conroe *A-F*	Lake Houston *A-F*	Trinity River *A-F*	Total *A-F*
1955																		
1	-2813.	2216.	100200.	0.	0.	49572.	863848.	118.7	67912.	22847.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	-12521.	1996.	318700.	0.	0.	0.	1193073.	124.0	47310.	0.	79500.	42972.	8672.	27856.	480.	48005.	53640.	102125.
3	14926.	2772.	71800.	0.	0.	51079.	1196096.	124.0	60529.	3870.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	-2970.	4004.	441300.	0.	0.	0.	1636362.	130.0	77830.	44220.	86570.	49059.	29024.	8487.	442.	55037.	82087.	137566.
5	13608.	4736.	85900.	0.	0.	72453.	1631465.	129.9	84723.	4340.	88733.	52833.	35900.	0.	502.	59328.	93469.	153299.
6	27512.	5068.	47600.	0.	0.	121074.	1525411.	128.6	130884.	44220.	93334.	54172.	39162.	0.	631.	60861.	98402.	159894.
7	17327.	4876.	14900.	0.	0.	131748.	1386360.	126.7	136128.	45694.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	24260.	4080.	8500.	0.	0.	125452.	1241068.	124.7	127632.	45694.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	12108.	3176.	0.	0.	0.	115411.	1110373.	122.7	115581.	44220.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	30442.	2504.	17800.	0.	0.	98813.	996414.	121.0	104963.	45694.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	17413.	2272.	6800.	0.	0.	76170.	907359.	119.5	78520.	22110.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	1724.	2300.	14000.	0.	0.	77400.	839935.	118.3	80220.	22847.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	141016.	40000.	1127500.	0.	0.	919172.			1112232.	345756.	897836.	608673.	252820.	36343.	6450.	681540.	901493.	1589483.
1956																		
1	0.	2216.	20600.	0.	0.	72902.	785417.	117.3	77362.	22847.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	-4440.	1996.	100800.	0.	0.	41644.	847017.	118.4	59984.	20820.	51644.	42972.	8672.	0.	480.	48005.	53640.	102125.
3	2801.	2772.	41000.	0.	0.	66646.	815798.	117.9	78126.	22847.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	560.	4004.	102400.	0.	0.	67103.	846531.	118.4	86793.	22110.	78083.	49059.	29024.	0.	442.	55037.	82087.	137566.
5	12421.	4736.	124200.	0.	0.	111580.	841994.	118.3	111580.	22847.	88733.	52833.	35900.	0.	502.	59328.	93469.	153299.
6	13624.	5068.	21500.	0.	0.	111664.	733138.	116.3	113914.	22110.	93334.	54172.	39162.	0.	631.	60861.	98402.	159894.
7	25951.	4876.	3700.	0.	0.	113691.	592320.	113.5	115221.	22847.	93414.	57337.	36077.	0.	679.	64350.	98290.	163319.
8	23944.	4080.	1500.	0.	0.	105445.	460351.	110.5	105935.	22847.	83418.	55633.	27785.	0.	679.	62350.	87498.	150527.
9	25584.	3176.	3400.	0.	0.	93511.	341480.	107.4	93561.	22110.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	10305.	2504.	3900.	0.	0.	85586.	246985.	104.3	86006.	22847.	63449.	51920.	11529.	0.	556.	58013.	65953.	124522.
11	4097.	2272.	6900.	0.	0.	79870.	167646.	101.0	80020.	22110.	58010.	47720.	10290.	0.	474.	53316.	60282.	114072.
12	-1001.	2300.	10800.	0.	0.	77150.	99997.	96.9	80120.	22847.	59293.	49181.	10112.	0.	461.	54943.	61593.	116997.
	113846.	40000.	440700.	0.	0.	1026792.			1088622.	269189.	861493.	608673.	252820.	0.	6450.	681540.	901493.	1589483.
1957																		
1	656.	2216.	8500.	0.	0.	80392.	25233.	87.2	80392.	22847.	57545.	47963.	9582.	0.	588.	53579.	59761.	113928.
2	91.	1996.	43100.	0.	0.	66244.	2.	63.0	69944.	20820.	51644.	42972.	8672.	0.	480.	48005.	53640.	102125.
3	-996.	2772.	133700.	0.	0.	44686.	87240.	95.9	69236.	22847.	63089.	47111.	15978.	0.	392.	52707.	65861.	118960.
4	-8818.	4004.	260400.	0.	0.	67139.	285315.	105.7	74199.	916.	78083.	49059.	29024.	0.	442.	55037.	82087.	137566.
5	12965.	4736.	1903300.	0.	452136.	0.	1718778.	131.0	574836.	0.	658326.	52833.	35900.	569593.	502.	59328.	93469.	153299.
6	-1659.	5068.	1611900.	0.	1608491.	0.	1718778.	131.0	1716191.	4450.	1785021.	54172.	39162.	1691687.	631.	60861.	98402.	159894.
7	26544.	4876.	151400.	0.	119980.	0.	1718778.	131.0	142600.	4710.	153280.	57337.	36077.	59866.	679.	64350.	98290.	163319.
8	23226.	4080.	238600.	0.	211294.	0.	1718778.	131.0	271534.	45694.	266830.	55633.	27785.	183412.	679.	62350.	87498.	150527.
9	2475.	3176.	74900.	0.	0.	95301.	1692726.	130.7	107441.	44220.	71481.	52772.	18709.	0.	566.	59051.	74657.	134274.
10	2475.	2504.	805600.	0.	774569.	0.	1718778.	131.0	841809.	0.	887559.	51920.	11529.	824110.	556.	58013.	65953.	124522.
11	-11613.	2272.	765100.	0.	774441.	0.	1718778.	131.0	898141.	0.	982311.	47720.	10290.	924301.	474.	53316.	60282.	114072.
12	2488.	2300.	316700.	0.	311912.	0.	1718778.	131.0	399472.	0.	459052.	49181.	10112.	399759.	461.	54943.	61593.	116997.
	47834.	40000.	6313200.	0.	4252823.	353762.			5245795.	166504.	5514221.	608673.	252820.	4652728.	6450.	681540.	901493.	1589483.

Table E-5b
Four Reservoir System Operation

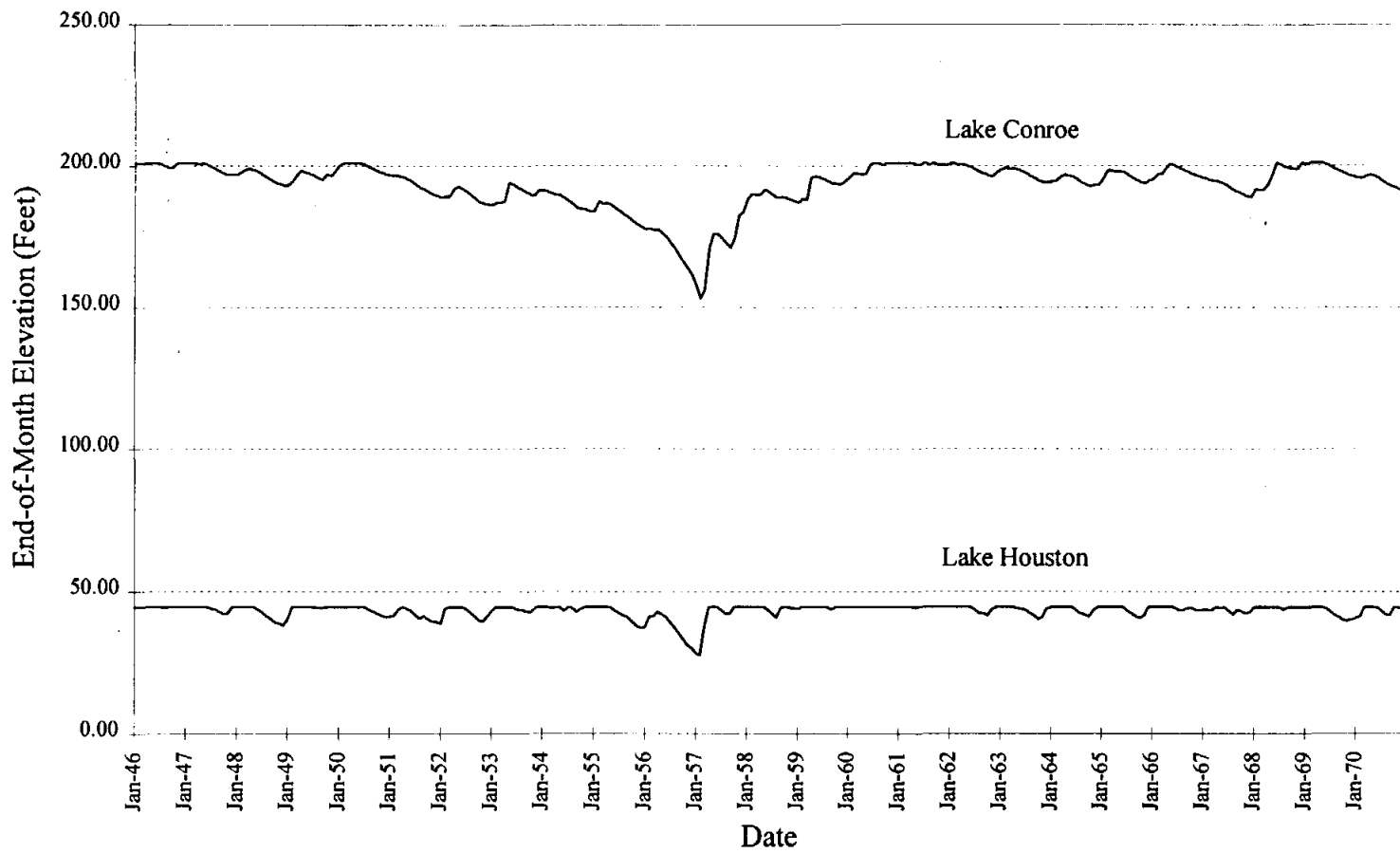
Date	LAKE CONROE							LAKE HOUSTON											
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	
1949																			
1	-5171.	588.	4310.	0.	0.	384008.	199.4	-137.	0.	53579.	27260.	0.	0.	22847.	0.	0.	1328.	17.1	
2	-3471.	480.	26950.	8.	0.	413941.	201.0	-1515.	1.	48004.	130710.	0.	8.	20820.	0.	0.	106376.	42.0	
3	-2810.	392.	39170.	41588.	0.	413941.	201.0	-1407.	80.	52627.	293830.	0.	41588.	0.	258954.	0.	131540.	44.5	
4	-2610.	442.	34880.	37048.	0.	413941.	201.0	-473.	234.	54803.	246720.	0.	37048.	0.	229204.	0.	131540.	44.5	
5	4611.	502.	4140.	0.	0.	412968.	201.0	2445.	309.	59019.	38050.	0.	0.	4340.	0.	0.	112157.	42.6	
6	2796.	631.	1520.	0.	0.	411061.	200.9	1649.	346.	60515.	18090.	0.	0.	4450.	0.	0.	72187.	38.0	
7	3969.	679.	1710.	0.	0.	408123.	200.7	79.	300.	64050.	27320.	0.	0.	45694.	0.	0.	80772.	39.1	
8	6667.	679.	1330.	0.	0.	402107.	200.4	2336.	203.	62147.	16320.	0.	0.	45694.	0.	0.	78100.	38.7	
9	3488.	566.	1350.	0.	0.	399403.	200.3	1260.	100.	58951.	11520.	0.	0.	44220.	0.	0.	73529.	38.2	
10	-10042.	556.	33010.	27958.	0.	413941.	201.0	-6435.	14.	57999.	657410.	0.	27958.	0.	575779.	0.	131540.	44.5	
11	7180.	474.	2730.	0.	0.	409017.	200.7	2482.	9.	53307.	21640.	0.	0.	3920.	0.	0.	101302.	41.5	
12	-4787.	461.	33890.	33292.	0.	413941.	201.0	-3772.	4.	54939.	290320.	0.	33292.	0.	242203.	0.	131540.	44.5	
	-180.	6450.	184990.	139894.	0.			-3488.	1600.	679940.	1779190.	0.	139894.	191985.	1306140.	0.			
1950																			
1	-803.	588.	46010.	46225.	0.	413941.	201.0	-473.	0.	53579.	355540.	0.	46225.	0.	348659.	0.	131540.	44.5	
2	-5821.	480.	54550.	59891.	0.	413941.	201.0	-3191.	1.	48004.	318030.	0.	59891.	0.	333107.	0.	131540.	44.5	
3	2810.	392.	14090.	10888.	0.	413941.	201.0	1773.	80.	52627.	85150.	0.	10888.	0.	41558.	0.	131540.	44.5	
4	-2409.	442.	19750.	21717.	0.	413941.	201.0	-1418.	234.	54803.	89740.	0.	21717.	0.	57838.	0.	131540.	44.5	
5	1405.	502.	30330.	28423.	0.	413941.	201.0	1654.	309.	59019.	151080.	0.	28423.	0.	118521.	0.	131540.	44.5	
6	1606.	631.	95920.	93683.	0.	413941.	201.0	-118.	346.	60515.	365680.	0.	93683.	0.	398620.	0.	131540.	44.5	
7	5594.	679.	2720.	0.	0.	410388.	200.8	1902.	300.	64050.	34770.	0.	0.	4710.	0.	0.	104768.	41.8	
8	10978.	679.	910.	0.	0.	399641.	200.3	3853.	203.	62147.	9900.	0.	0.	4570.	0.	0.	53035.	35.3	
9	967.	566.	2340.	0.	0.	400448.	200.3	1383.	100.	58951.	9660.	0.	0.	44220.	0.	0.	46481.	34.3	
10	7294.	556.	1460.	0.	0.	394058.	200.0	2141.	14.	57999.	8510.	0.	0.	45694.	0.	0.	40531.	33.2	
11	5491.	474.	950.	0.	0.	389043.	199.7	1460.	9.	53307.	7050.	0.	0.	44220.	0.	0.	37025.	32.6	
12	2632.	461.	1180.	0.	0.	387130.	199.6	777.	4.	54939.	8210.	0.	0.	45694.	0.	0.	35209.	32.2	
	29744.	6450.	270210.	260827.	0.			9743.	1600.	679940.	1443320.	0.	260827.	189108.	1298303.	0.			
1951																			
1	-752.	588.	1930.	0.	0.	389224.	199.7	-583.	0.	53579.	11930.	0.	0.	45694.	0.	0.	39837.	33.1	
2	-1894.	480.	3750.	0.	0.	394388.	200.0	115.	1.	48004.	12860.	0.	0.	41641.	0.	0.	46218.	34.2	
3	-577.	392.	6960.	0.	0.	401533.	200.4	-280.	80.	52627.	33640.	0.	0.	45694.	0.	0.	73125.	38.1	
4	4074.	442.	3820.	0.	0.	400837.	200.3	1673.	234.	54803.	21640.	0.	0.	44220.	0.	0.	82275.	39.3	
5	4435.	502.	1180.	0.	0.	397080.	200.1	886.	309.	59019.	8910.	0.	0.	45694.	0.	0.	76665.	38.6	
6	4766.	631.	760.	0.	0.	392443.	199.9	2303.	346.	60515.	9210.	0.	0.	44220.	0.	0.	66931.	37.3	
7	8646.	679.	520.	0.	0.	383638.	199.4	2361.	300.	64050.	5120.	0.	0.	45694.	0.	0.	51034.	35.0	
8	10315.	679.	400.	0.	0.	373044.	198.9	2934.	203.	62147.	3710.	0.	0.	45694.	0.	0.	35154.	32.2	
9	0.	566.	690.	0.	0.	373168.	198.9	-907.	100.	58951.	18590.	0.	0.	22110.	0.	0.	17710.	28.1	
10	7740.	556.	530.	0.	12031.	353371.	197.8	645.	14.	57999.	6070.	0.	12031.	22847.	0.	0.	0.	9.0	
11	3431.	474.	670.	0.	24676.	325460.	196.1	0.	9.	53307.	6530.	0.	24676.	22110.	0.	0.	0.	9.0	
12	979.	461.	1660.	0.	21676.	304004.	194.8	0.	4.	54939.	10420.	0.	21676.	22847.	0.	0.	0.	9.0	
	41163.	6450.	22870.	0.	58383.			9147.	1600.	679940.	148630.	0.	58383.	448465.	0.	0.			

Table E-5b (cont.)
Four Reservoir System Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1952																		
1	776.	588.	1500.	0.	22092.	282048.	193.4	0.	0.	53579.	8640.	0.	22092.	22847.	0.	0.	0.	9.0
2	-3069.	480.	9240.	0.	0.	293877.	194.2	-934.	1.	48004.	53790.	0.	0.	20820.	0.	0.	27539.	30.6
3	1568.	392.	8620.	0.	0.	300537.	194.6	278.	80.	52627.	21210.	0.	0.	22847.	0.	0.	18611.	28.4
4	-4665.	442.	44120.	0.	0.	348880.	197.5	-2038.	234.	54803.	216990.	0.	0.	0.	51062.	0.	131540.	44.5
5	-714.	502.	16420.	0.	0.	365512.	198.4	-945.	309.	59019.	113760.	0.	0.	0.	55377.	0.	131540.	44.5
6	7741.	631.	4030.	0.	0.	361170.	198.2	3226.	346.	60515.	23600.	0.	0.	4450.	0.	0.	95503.	40.8
7	5365.	679.	990.	0.	0.	356116.	197.9	862.	300.	64050.	10600.	0.	0.	45694.	0.	0.	86585.	39.8
8	10901.	679.	430.	0.	0.	344966.	197.3	3926.	203.	62147.	4620.	0.	0.	45694.	0.	0.	70623.	37.8
9	8938.	566.	320.	0.	0.	335782.	196.7	2621.	100.	58951.	5040.	0.	0.	22110.	0.	0.	36101.	32.4
10	10449.	556.	290.	0.	0.	325067.	196.1	2032.	14.	57999.	3080.	0.	0.	22847.	0.	0.	1983.	18.5
11	-1470.	474.	700.	0.	20908.	305855.	194.9	-45.	9.	53307.	8270.	0.	20908.	22110.	0.	0.	0.	9.0
12	319.	461.	3570.	0.	5746.	302899.	194.7	0.	4.	54939.	26350.	0.	5746.	22847.	0.	0.	0.	9.0
	36139.	6450.	90230.	0.	48746.			8983.	1600.	679940.	495950.	0.	48746.	252266.	106439.	0.		
1953																		
1	1757.	588.	7030.	0.	0.	307584.	195.0	27.	0.	53579.	31760.	0.	0.	22847.	0.	0.	1001.	16.3
2	-2945.	480.	14690.	0.	0.	324739.	196.1	-521.	1.	48004.	78090.	0.	0.	20820.	0.	0.	52427.	35.2
3	503.	392.	7200.	0.	0.	331044.	196.5	879.	80.	52627.	33210.	0.	0.	45694.	0.	0.	77745.	38.7
4	-3599.	442.	12700.	0.	0.	346901.	197.4	538.	234.	54803.	52290.	0.	0.	44220.	0.	0.	118680.	43.3
5	-6105.	502.	95810.	34373.	0.	413941.	201.0	-3207.	309.	59019.	565990.	0.	34373.	0.	531382.	0.	131540.	44.5
6	6183.	631.	1890.	0.	0.	409017.	200.7	1749.	346.	60515.	20070.	0.	0.	4450.	0.	0.	93450.	40.6
7	5709.	679.	1560.	0.	0.	404189.	200.5	2379.	300.	64050.	10910.	0.	0.	45694.	0.	0.	83325.	39.4
8	3700.	679.	1110.	0.	0.	400920.	200.3	-1458.	203.	62147.	9290.	0.	0.	45694.	0.	0.	77417.	38.7
9	11301.	566.	3030.	0.	0.	392083.	199.9	4002.	100.	58951.	14470.	0.	0.	44220.	0.	0.	73054.	38.1
10	3590.	556.	1010.	0.	0.	388947.	199.7	1752.	14.	57999.	9240.	0.	0.	45694.	0.	0.	68223.	37.5
11	4330.	474.	4550.	0.	0.	388693.	199.7	79.	9.	53307.	23550.	0.	0.	44220.	0.	0.	82598.	39.3
12	-1553.	461.	30730.	6574.	0.	413941.	201.0	-943.	4.	54939.	102050.	0.	6574.	0.	5682.	0.	131540.	44.5
	22871.	6450.	181310.	40947.	0.			5276.	1600.	679940.	950920.	0.	40947.	363553.	537064.	0.		
1954																		
1	401.	588.	9920.	8931.	0.	413941.	201.0	-118.	0.	53579.	53830.	0.	8931.	0.	9300.	0.	131540.	44.5
2	4612.	480.	4190.	0.	0.	413039.	201.0	2508.	1.	48004.	21070.	0.	0.	3530.	0.	0.	105627.	41.9
3	4589.	392.	2130.	0.	0.	410188.	200.8	1675.	80.	52627.	11220.	0.	0.	3870.	0.	0.	66335.	37.2
4	796.	442.	2260.	0.	0.	411210.	200.9	224.	234.	54803.	14590.	0.	0.	44220.	0.	0.	69884.	37.7
5	600.	502.	6200.	2367.	0.	413941.	201.0	862.	309.	59019.	22510.	0.	2367.	45694.	0.	0.	80265.	39.0
6	8338.	631.	600.	0.	0.	405572.	200.6	3243.	346.	60515.	4660.	0.	0.	44220.	0.	0.	65041.	37.0
7	5268.	679.	1350.	0.	0.	400975.	200.3	2464.	300.	64050.	45610.	0.	0.	45694.	0.	0.	89531.	40.1
8	10334.	679.	1410.	0.	0.	391372.	199.8	3549.	203.	62147.	16040.	0.	0.	22847.	0.	0.	62519.	36.7
9	9184.	566.	290.	0.	0.	381912.	199.3	2284.	100.	58951.	2950.	0.	0.	22110.	0.	0.	26244.	30.3
10	-745.	556.	3760.	0.	0.	385861.	199.5	37.	14.	57999.	23680.	0.	0.	22847.	0.	0.	14721.	27.1
11	2631.	474.	7100.	0.	0.	389856.	199.8	370.	9.	53307.	22850.	0.	0.	22110.	0.	0.	5995.	22.9
12	3173.	461.	2550.	0.	9338.	379434.	199.2	167.	4.	54939.	16930.	0.	9338.	22847.	0.	0.	0.	9.0
	49181.	6450.	41760.	11298.	9338.			17265.	1600.	679940.	255940.	0.	20636.	299989.	9300.	0.		

Table E-5b (cont.)
Four Reservoir System Operation

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1955																		
1	-372.	588.	8220.	0.	0.	387438.	199.6	-48.	0.	53579.	38520.	0.	0.	22847.	0.	0.	7836.	24.1
2	-4069.	480.	43800.	20886.	0.	413941.	201.0	-1438.	1.	48004.	202650.	0.	20886.	0.	53265.	0.	131540.	44.5
3	4205.	392.	2730.	0.	0.	412074.	200.9	2440.	80.	52627.	14680.	0.	0.	3870.	0.	0.	94943.	40.8
4	-801.	442.	10060.	8552.	0.	413941.	201.0	195.	234.	54803.	37900.	0.	8552.	44220.	0.	0.	130383.	44.4
5	4003.	502.	2220.	0.	0.	411656.	200.9	1521.	309.	59019.	12720.	0.	0.	4340.	0.	0.	86594.	39.8
6	8878.	631.	950.	0.	0.	403097.	200.4	2907.	346.	60515.	6160.	0.	0.	44220.	0.	0.	73206.	38.1
7	5805.	679.	730.	0.	0.	397343.	200.2	1622.	300.	64050.	5940.	0.	0.	45694.	0.	0.	58868.	36.2
8	7233.	679.	1510.	0.	0.	390941.	199.8	730.	203.	62147.	8590.	0.	0.	45694.	0.	0.	50072.	34.9
9	4330.	566.	600.	0.	0.	386645.	199.6	656.	100.	58951.	6740.	0.	0.	44220.	0.	0.	41325.	33.4
10	10198.	556.	470.	0.	0.	376361.	199.0	2788.	14.	57999.	4200.	0.	0.	45694.	0.	0.	30418.	31.3
11	5843.	474.	410.	0.	0.	370454.	198.7	985.	9.	53307.	3330.	0.	0.	22110.	0.	0.	1557.	17.6
12	714.	461.	730.	0.	24803.	345206.	197.3	24.	4.	54939.	5760.	0.	24803.	22847.	0.	0.	0.	9.0
	45967.	6450.	72430.	29438.	24803.			12382.	1600.	679940.	347190.	0.	54241.	345756.	53265.	0.		
1956																		
1	512.	588.	1500.	0.	16492.	329114.	196.3	0.	0.	53579.	14240.	0.	16492.	22847.	0.	0.	0.	9.0
2	-1187.	480.	8480.	0.	0.	338301.	196.9	-14.	1.	48004.	39400.	0.	0.	20820.	0.	0.	12229.	26.2
3	856.	392.	3370.	0.	1724.	338699.	196.9	193.	80.	52627.	16100.	0.	1724.	22847.	0.	0.	0.	9.0
4	-343.	442.	8850.	0.	7267.	340183.	197.0	0.	234.	54803.	25660.	0.	0.	7267.	22110.	0.	0.	9.0
5	3990.	502.	1230.	0.	29841.	307080.	195.0	0.	309.	59019.	6640.	0.	29841.	22847.	0.	0.	0.	9.0
6	4462.	631.	1090.	0.	31731.	271346.	192.7	0.	346.	60515.	7020.	0.	31731.	22110.	0.	0.	0.	9.0
7	8482.	679.	430.	0.	38373.	224242.	189.3	0.	300.	64050.	3130.	0.	38373.	22847.	0.	0.	0.	9.0
8	7330.	679.	270.	0.	37543.	178960.	185.6	0.	203.	62147.	1960.	0.	37543.	22847.	0.	0.	0.	9.0
9	8124.	566.	270.	0.	35061.	135479.	181.6	0.	100.	58951.	1880.	0.	35061.	22110.	0.	0.	0.	9.0
10	3712.	556.	280.	0.	33206.	98285.	177.6	0.	14.	57999.	1960.	0.	33206.	22847.	0.	0.	0.	9.0
11	1044.	474.	430.	0.	28246.	68951.	173.6	0.	9.	53307.	2960.	0.	28246.	22110.	0.	0.	0.	9.0
12	0.	461.	1130.	0.	25816.	43804.	169.2	0.	4.	54939.	6280.	0.	25816.	22847.	0.	0.	0.	9.0
	36982.	6450.	27330.	0.	285300.			179.	1600.	679940.	127230.	0.	285300.	269189.	0.	0.		
1957																		
1	438.	588.	740.	0.	26142.	17376.	162.3	0.	0.	53579.	4590.	0.	26142.	22847.	0.	0.	0.	9.0
2	37.	480.	1750.	0.	18605.	4.	145.5	0.	1.	48004.	8580.	0.	18605.	20820.	0.	0.	0.	9.0
3	-182.	392.	10510.	0.	0.	10304.	159.3	-575.	80.	52627.	60560.	0.	0.	22847.	0.	0.	31275.	31.4
4	-2316.	442.	54700.	0.	0.	66878.	173.3	-1956.	234.	54803.	152430.	0.	0.	916.	0.	0.	131540.	44.5
5	1619.	502.	42670.	0.	0.	107427.	178.7	2009.	309.	59019.	174200.	0.	0.	0.	112863.	0.	131540.	44.5
6	544.	631.	10480.	0.	0.	116732.	179.7	-802.	346.	60515.	52860.	0.	0.	4450.	0.	0.	128791.	44.3
7	3679.	679.	870.	0.	0.	113244.	179.3	2821.	300.	64050.	6340.	0.	0.	4710.	0.	0.	72670.	38.1
8	3615.	679.	340.	0.	0.	109290.	178.9	2858.	203.	62147.	4570.	0.	0.	45694.	0.	0.	57726.	36.0
9	1868.	566.	850.	0.	0.	107706.	178.7	-548.	100.	58951.	13830.	0.	0.	44220.	0.	0.	57273.	35.9
10	-95.	556.	29450.	0.	0.	136695.	181.7	351.	14.	57999.	188410.	0.	0.	0.	55779.	0.	131540.	44.5
11	-2068.	474.	76510.	0.	0.	214799.	188.6	-1536.	9.	53307.	337320.	0.	0.	0.	285540.	0.	131540.	44.5
12	263.	461.	20000.	0.	0.	234075.	190.0	1536.	4.	54939.	95580.	0.	0.	0.	39101.	0.	131540.	44.5
	7402.	6450.	248870.	0.	44747.			4158.	1600.	679940.	1099270.	0.	44747.	166504.	493283.	0.		



*Figure E-6: Lake Houston and Lake Conroe Stand-Alone Operation
2,000 AF Minimum Conroe Content, 15,800 AF Minimum Houston Content*

Table E-6
 Lake Conroe and Lake Houston Stand-Alone - 2,000 AF Minimum in Lake Conroe and 15,800 AF Minimum in Lake Houston

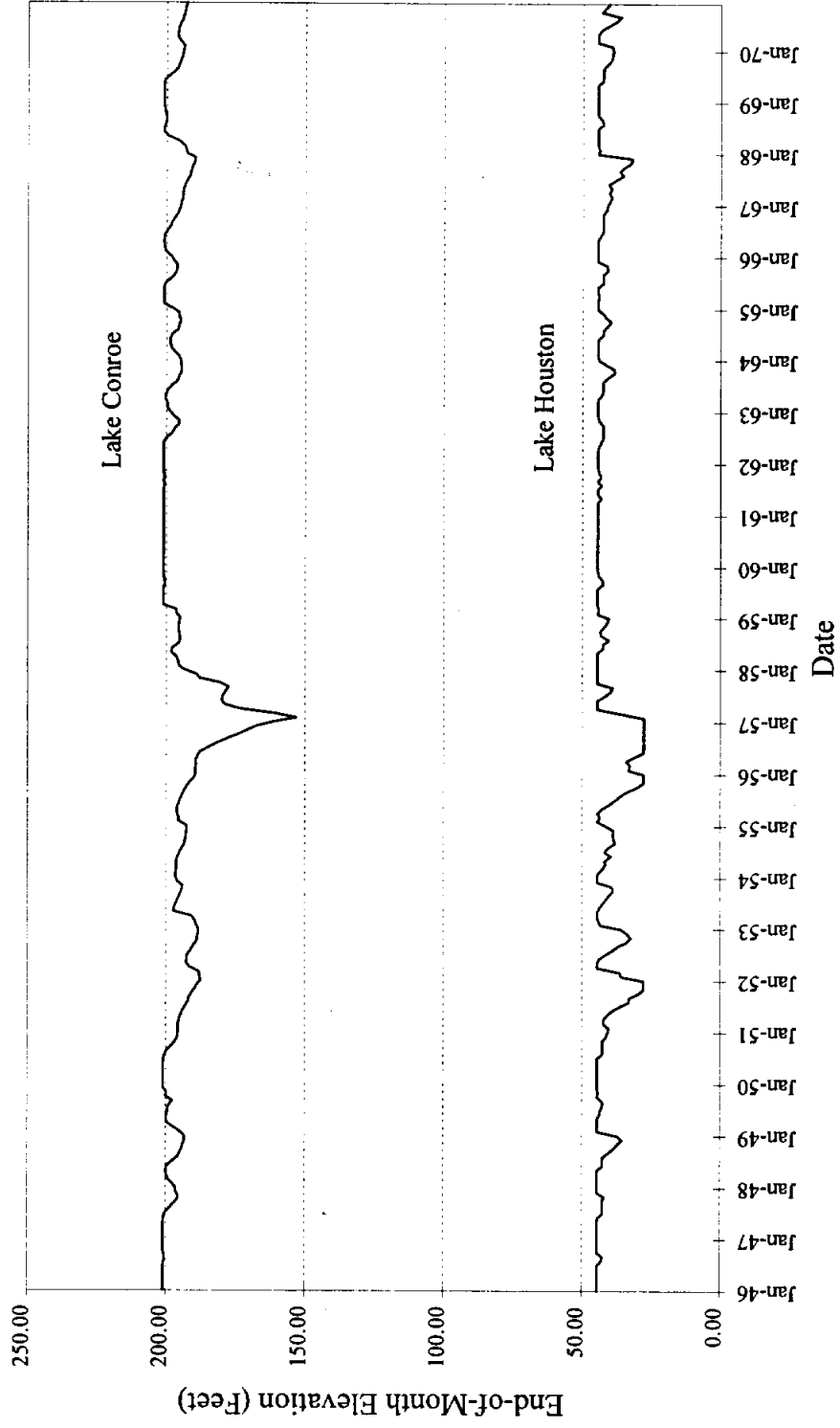
Date	LAKE CONROE							LAKE HOUSTON											
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	
1949																			
1	-4184.	8053.	4310.	0.	0.	277072.	193.1	-1464.	0.	11498.	27260.	0.	0.	0.	0.	0.	89613.	40.1	
2	-2764.	7169.	26950.	0.	0.	299617.	194.5	-2212.	1.	10302.	130710.	0.	0.	0.	80692.	0.	131540.	44.5	
3	-2292.	7725.	39170.	0.	0.	333354.	196.6	-1654.	80.	11294.	293830.	0.	0.	0.	284110.	0.	131540.	44.5	
4	-2272.	8078.	34880.	0.	0.	362428.	198.3	-473.	234.	11761.	246720.	0.	0.	0.	235198.	0.	131540.	44.5	
5	4110.	8725.	4140.	0.	0.	353733.	197.8	2836.	309.	12666.	38050.	0.	0.	0.	22239.	0.	131540.	44.5	
6	2452.	9063.	1520.	0.	0.	343738.	197.2	2245.	346.	12987.	18090.	0.	0.	0.	2512.	0.	131540.	44.5	
7	3422.	9603.	1710.	0.	0.	332423.	196.5	118.	300.	13745.	27320.	0.	0.	0.	13157.	0.	131540.	44.5	
8	5675.	9338.	1330.	0.	0.	318740.	195.7	3404.	203.	13337.	16320.	0.	0.	0.	0.	0.	130916.	44.4	
9	2928.	8780.	1350.	0.	0.	308382.	195.1	1802.	100.	12651.	11520.	0.	0.	0.	0.	0.	127883.	44.2	
10	-8499.	8637.	33010.	0.	0.	341254.	197.1	-7942.	14.	12447.	657410.	0.	0.	0.	649234.	0.	131540.	44.5	
11	6129.	7902.	2730.	0.	0.	329953.	196.4	2954.	9.	11440.	21640.	0.	0.	0.	7237.	0.	131540.	44.5	
12	-4167.	8116.	33890.	0.	0.	359894.	198.1	-4490.	4.	11789.	290320.	0.	0.	0.	283017.	0.	131540.	44.5	
	538.	101189.	184990.	0.	0.			-4876.	1600.	145917.	1779190.	0.	0.	0.	1577396.	0.			
1950																			
1	-738.	8053.	46010.	0.	0.	398589.	200.2	-473.	0.	11498.	355540.	0.	0.	0.	344515.	0.	131540.	44.5	
2	-5704.	7169.	54550.	37733.	0.	413941.	201.0	-3191.	1.	10302.	318030.	0.	37733.	0.	348651.	0.	131540.	44.5	
3	2810.	7725.	14090.	3555.	0.	413941.	201.0	1773.	80.	11294.	85150.	0.	3555.	0.	75558.	0.	131540.	44.5	
4	-2409.	8078.	19750.	14081.	0.	413941.	201.0	-1418.	234.	11761.	89740.	0.	14081.	0.	93244.	0.	131540.	44.5	
5	1405.	8725.	30330.	20200.	0.	413941.	201.0	1654.	309.	12666.	151080.	0.	20200.	0.	156651.	0.	131540.	44.5	
6	1606.	9063.	95920.	85251.	0.	413941.	201.0	-118.	346.	12987.	365680.	0.	85251.	0.	437716.	0.	131540.	44.5	
7	5529.	9603.	2720.	0.	0.	401529.	200.4	2245.	300.	13745.	34770.	0.	0.	0.	18480.	0.	131540.	44.5	
8	10612.	9338.	910.	0.	0.	382489.	199.4	5129.	203.	13337.	9900.	0.	0.	0.	0.	0.	122771.	43.7	
9	922.	8780.	2340.	0.	0.	375127.	199.0	2223.	100.	12651.	9660.	0.	0.	0.	0.	0.	117457.	43.2	
10	6887.	8637.	1460.	0.	0.	361063.	198.2	3620.	14.	12447.	8510.	0.	0.	0.	0.	0.	109886.	42.4	
11	5149.	7902.	950.	0.	0.	348962.	197.5	2536.	9.	11440.	7050.	0.	0.	0.	0.	0.	102951.	41.6	
12	2427.	8116.	1180.	0.	0.	339599.	197.0	1363.	4.	11789.	8210.	0.	0.	0.	0.	0.	98005.	41.1	
	28496.	101189.	270210.	160820.	0.			15343.	1600.	145917.	1443320.	0.	160820.	0.	1474815.	0.			
1951																			
1	-683.	8053.	1930.	0.	0.	334159.	196.6	-990.	0.	11498.	11930.	0.	0.	0.	0.	0.	99427.	41.3	
2	-1695.	7169.	3750.	0.	0.	332435.	196.5	182.	1.	10302.	12860.	0.	0.	0.	0.	0.	101802.	41.5	
3	-507.	7725.	6960.	0.	0.	332177.	196.5	-390.	80.	11294.	33640.	0.	0.	0.	0.	0.	124458.	43.8	
4	3524.	8078.	3820.	0.	0.	324395.	196.1	2290.	234.	11761.	21640.	0.	0.	0.	273.	0.	131540.	44.5	
5	3784.	8725.	1180.	0.	0.	313066.	195.4	1225.	309.	12666.	8910.	0.	0.	0.	0.	0.	126250.	44.0	
6	4008.	9063.	760.	0.	0.	300755.	194.6	3068.	346.	12987.	9210.	0.	0.	0.	0.	0.	119059.	43.3	
7	7135.	9603.	520.	0.	0.	284537.	193.6	3313.	300.	13745.	5120.	0.	0.	0.	0.	0.	106821.	42.1	
8	8349.	9338.	400.	0.	0.	267250.	192.4	4612.	203.	13337.	3710.	0.	0.	0.	0.	0.	92379.	40.5	
9	0.	8780.	690.	0.	0.	259160.	191.8	-1863.	100.	12651.	18590.	0.	0.	0.	0.	0.	100081.	41.3	
10	6045.	8637.	530.	0.	0.	245008.	190.8	3003.	14.	12447.	6070.	0.	0.	0.	0.	0.	90687.	40.3	
11	2731.	7902.	670.	0.	0.	235045.	190.1	1437.	9.	11440.	6530.	0.	0.	0.	0.	0.	84331.	39.5	
12	803.	8116.	1660.	0.	0.	227786.	189.6	413.	4.	11789.	10420.	0.	0.	0.	0.	0.	82545.	39.3	
	33494.	101189.	22870.	0.	0.			16300.	1600.	145917.	148630.	0.	0.	0.	273.	0.			

Table E-6 (cont.)
 Lake Conroe and Lake Houston Stand-Alone - 2,000 AF Minimum in Lake Conroe and 15,800 AF Minimum in Lake Houston

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1952																		
1	658.	8053.	1500.	0.	0.	220575.	189.0	569.	0.	11498.	8640.	0.	0.	0.	0.	0.	79118.	38.9
2	-2624.	7169.	9240.	0.	0.	225270.	189.4	-3124.	1.	10302.	53790.	0.	0.	0.	0.	0.	125729.	44.0
3	1319.	7725.	8620.	0.	0.	224846.	189.3	775.	80.	11294.	21210.	0.	0.	0.	3250.	0.	131540.	44.5
4	-3866.	8078.	44120.	0.	0.	264754.	192.2	-3072.	234.	11761.	216990.	0.	0.	0.	208067.	0.	131540.	44.5
5	-586.	8725.	16420.	0.	0.	273035.	192.8	-945.	309.	12666.	113760.	0.	0.	0.	101730.	0.	131540.	44.5
6	6280.	9063.	4030.	0.	0.	261722.	192.0	3900.	346.	12987.	23600.	0.	0.	0.	6367.	0.	131540.	44.5
7	4252.	9603.	990.	0.	0.	248857.	191.1	1123.	300.	13745.	10600.	0.	0.	0.	0.	0.	126972.	44.1
8	8468.	9338.	430.	0.	0.	231481.	189.8	4949.	203.	13337.	4620.	0.	0.	0.	0.	0.	113103.	42.7
9	6837.	8780.	320.	0.	0.	216184.	188.7	3777.	100.	12651.	5040.	0.	0.	0.	0.	0.	101615.	41.5
10	7848.	8637.	290.	0.	0.	199989.	187.4	5095.	14.	12447.	3080.	0.	0.	0.	0.	0.	87139.	39.9
11	-1103.	7902.	700.	0.	0.	193890.	186.9	-1090.	9.	11440.	8270.	0.	0.	0.	0.	0.	85050.	39.6
12	241.	8116.	3570.	0.	0.	189103.	186.5	347.	4.	11789.	26350.	0.	0.	0.	0.	0.	99260.	41.2
	27724.	101189.	90230.	0.	0.			12304.	1600.	145917.	495950.	0.	0.	0.	319414.	0.		
1953																		
1	1312.	8053.	7030.	0.	0.	186768.	186.3	1143.	0.	11498.	31760.	0.	0.	0.	0.	0.	118379.	43.2
2	-2171.	7169.	14690.	0.	0.	196460.	187.1	-1240.	1.	10302.	78090.	0.	0.	0.	55866.	0.	131540.	44.5
3	367.	7725.	7200.	0.	0.	195568.	187.0	1418.	80.	11294.	33210.	0.	0.	0.	20418.	0.	131540.	44.5
4	-2590.	8078.	12700.	0.	0.	202780.	187.6	709.	234.	11761.	52290.	0.	0.	0.	39586.	0.	131540.	44.5
5	-4598.	8725.	95810.	0.	0.	294463.	194.2	-3663.	309.	12666.	565990.	0.	0.	0.	556678.	0.	131540.	44.5
6	4762.	9063.	1890.	0.	0.	282528.	193.4	2127.	346.	12987.	20070.	0.	0.	0.	4610.	0.	131540.	44.5
7	4328.	9603.	1560.	0.	0.	270157.	192.6	3084.	300.	13745.	10910.	0.	0.	0.	0.	0.	125321.	43.9
8	2757.	9338.	1110.	0.	0.	259172.	191.8	-1853.	203.	13337.	9290.	0.	0.	0.	0.	0.	122924.	43.7
9	8296.	8780.	3030.	0.	0.	245126.	190.9	5180.	100.	12651.	14470.	0.	0.	0.	0.	0.	119463.	43.4
10	2594.	8637.	1010.	0.	0.	234905.	190.1	2286.	14.	12447.	9240.	0.	0.	0.	0.	0.	113956.	42.8
11	3079.	7902.	4550.	0.	0.	228474.	189.6	101.	9.	11440.	23550.	0.	0.	0.	0.	0.	125956.	44.0
12	-1093.	8116.	30730.	0.	0.	252181.	191.4	-1110.	4.	11789.	102050.	0.	0.	0.	85783.	0.	131540.	44.5
	17043.	101189.	181310.	0.	0.			8182.	1600.	145917.	950920.	0.	0.	0.	762941.	0.		
1954																		
1	282.	8053.	9920.	0.	0.	253766.	191.5	-118.	0.	11498.	53830.	0.	0.	0.	42450.	0.	131540.	44.5
2	3222.	7169.	4190.	0.	0.	247565.	191.0	2954.	1.	10302.	21070.	0.	0.	0.	7813.	0.	131540.	44.5
3	3164.	7725.	2130.	0.	0.	238806.	190.4	2300.	80.	11294.	11220.	0.	0.	0.	0.	0.	129086.	44.3
4	541.	8078.	2260.	0.	0.	232447.	189.9	344.	234.	11761.	14590.	0.	0.	0.	0.	0.	131337.	44.5
5	401.	8725.	6200.	0.	0.	229521.	189.7	1297.	309.	12666.	22510.	0.	0.	0.	8035.	0.	131540.	44.5
6	5505.	9063.	600.	0.	0.	215553.	188.6	4343.	346.	12987.	4660.	0.	0.	0.	0.	0.	118524.	43.3
7	3431.	9603.	1350.	0.	0.	203869.	187.7	3205.	300.	13745.	45610.	0.	0.	0.	15344.	0.	131540.	44.5
8	6610.	9338.	1410.	0.	0.	189331.	186.5	5163.	203.	13337.	16040.	0.	0.	0.	0.	0.	128877.	44.3
9	5744.	8780.	290.	0.	0.	175097.	185.3	3976.	100.	12651.	2950.	0.	0.	0.	0.	0.	115100.	42.9
10	-455.	8637.	3760.	0.	0.	170675.	184.9	101.	14.	12447.	23680.	0.	0.	0.	0.	0.	126218.	44.0
11	1576.	7902.	7100.	0.	0.	168297.	184.7	1892.	9.	11440.	22850.	0.	0.	0.	4187.	0.	131540.	44.5
12	1885.	8116.	2550.	0.	0.	160846.	184.0	2600.	4.	11789.	16930.	0.	0.	0.	2537.	0.	131540.	44.5
	31906.	101189.	41760.	0.	0.			28057.	1600.	145917.	255940.	0.	0.	0.	80366.	0.		

Table E-6 (cont.)
 Lake Conroe and Lake Houston Stand-Alone - 2,000 AF Minimum in Lake Conroe and 15,800 AF Minimum in Lake Houston

Date	LAKE CONROE								LAKE HOUSTON									
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1955																		
1	-219.	8053.	8220.	0.	0.	161232.	184.1	-591.	0.	11498.	38520.	0.	0.	0.	27613.	0.	131540.	44.5
2	-2451.	7169.	43800.	0.	0.	200314.	187.4	-2245.	1.	10302.	202650.	0.	0.	0.	194592.	0.	131540.	44.5
3	2570.	7725.	2730.	0.	0.	192749.	186.8	2954.	80.	11294.	14680.	0.	0.	0.	352.	0.	131540.	44.5
4	-486.	8078.	10060.	0.	0.	195217.	187.0	236.	234.	11761.	37900.	0.	0.	0.	25669.	0.	131540.	44.5
5	2406.	8725.	2220.	0.	0.	186306.	186.3	1847.	309.	12666.	12720.	0.	0.	0.	0.	0.	129438.	44.3
6	5232.	9063.	950.	0.	0.	172961.	185.1	3705.	346.	12987.	6160.	0.	0.	0.	0.	0.	118560.	43.3
7	3350.	9603.	730.	0.	0.	160738.	184.0	2149.	300.	13745.	5940.	0.	0.	0.	0.	0.	108306.	42.2
8	4085.	9338.	1510.	0.	0.	148825.	182.9	1027.	203.	13337.	8590.	0.	0.	0.	0.	0.	102329.	41.6
9	2386.	8780.	600.	0.	0.	138259.	181.9	990.	100.	12651.	6740.	0.	0.	0.	0.	0.	95328.	40.8
10	5450.	8637.	470.	0.	0.	124642.	180.5	4601.	14.	12447.	4200.	0.	0.	0.	0.	0.	82466.	39.3
11	3004.	7902.	410.	0.	0.	114146.	179.4	2541.	9.	11440.	3330.	0.	0.	0.	0.	0.	71806.	37.9
12	360.	8116.	730.	0.	0.	106400.	178.5	600.	4.	11789.	5760.	0.	0.	0.	0.	0.	65173.	37.1
	25687.	101189.	72430.	0.	0.			17814.	1600.	145917.	347190.	0.	0.	0.	248226.	0.		
1956																		
1	258.	8053.	1500.	0.	0.	99589.	177.8	-296.	0.	11498.	14240.	0.	0.	0.	0.	0.	68211.	37.5
2	-593.	7169.	8480.	0.	0.	101493.	178.0	-82.	1.	10302.	39400.	0.	0.	0.	0.	0.	97390.	41.0
3	419.	7725.	3370.	0.	0.	96719.	177.4	1263.	80.	11294.	16100.	0.	0.	0.	0.	0.	100853.	41.4
4	-166.	8078.	8850.	0.	0.	97657.	177.5	378.	234.	11761.	25660.	0.	0.	0.	0.	0.	114140.	42.8
5	1934.	8725.	1230.	0.	0.	88228.	176.3	1631.	309.	12666.	6640.	0.	0.	0.	0.	0.	106174.	42.0
6	2151.	9063.	1090.	0.	0.	78104.	175.0	2472.	346.	12987.	7020.	0.	0.	0.	0.	0.	97389.	41.0
7	4020.	9603.	430.	0.	0.	64911.	173.0	4281.	300.	13745.	3130.	0.	0.	0.	0.	0.	82193.	39.3
8	3474.	9338.	270.	0.	0.	52369.	170.8	3596.	203.	13337.	1960.	0.	0.	0.	0.	0.	67017.	37.3
9	3825.	8780.	270.	0.	0.	40034.	168.4	3706.	100.	12651.	1880.	0.	0.	0.	0.	0.	52440.	35.2
10	1724.	8637.	280.	0.	0.	29953.	166.1	1862.	14.	12447.	1960.	0.	0.	0.	0.	0.	40077.	33.2
11	501.	7902.	430.	0.	0.	21980.	163.8	1327.	9.	11440.	2960.	0.	0.	0.	0.	0.	30261.	31.2
12	0.	8116.	1130.	0.	0.	14994.	161.4	-266.	4.	11789.	6280.	0.	0.	0.	0.	0.	25014.	30.0
	17547.	101189.	27330.	0.	0.			19872.	1600.	145917.	127230.	0.	0.	0.	0.	0.		
1957																		
1	237.	8053.	740.	0.	0.	7444.	157.7	455.	0.	11498.	4590.	0.	0.	0.	0.	0.	17651.	28.1
2	24.	7169.	1750.	0.	0.	2001.	153.1	128.	1.	10302.	8580.	0.	0.	0.	0.	0.	15800.	27.5
3	-140.	7725.	10510.	0.	0.	4926.	156.0	-1060.	80.	11294.	60560.	0.	0.	0.	0.	0.	66046.	37.2
4	-1973.	8078.	54700.	0.	0.	53521.	171.1	-2161.	234.	11761.	152430.	0.	0.	0.	77102.	0.	131540.	44.5
5	1364.	8725.	42670.	0.	0.	86102.	176.1	2009.	309.	12666.	174200.	0.	0.	0.	159216.	0.	131540.	44.5
6	460.	9063.	10480.	0.	0.	87059.	176.2	-827.	346.	12987.	52860.	0.	0.	0.	40354.	0.	131540.	44.5
7	2903.	9603.	870.	0.	0.	75423.	174.6	3226.	300.	13745.	6340.	0.	0.	0.	0.	0.	120609.	43.5
8	2594.	9338.	340.	0.	0.	63831.	172.8	3827.	203.	13337.	4570.	0.	0.	0.	0.	0.	107812.	42.2
9	1243.	8780.	850.	0.	0.	54658.	171.3	-761.	100.	12651.	13830.	0.	0.	0.	0.	0.	109652.	42.4
10	-62.	8637.	29450.	0.	0.	75533.	174.6	405.	14.	12447.	188410.	0.	0.	0.	153656.	0.	131540.	44.5
11	-1622.	7902.	76510.	0.	0.	145763.	182.6	-1536.	9.	11440.	337320.	0.	0.	0.	327407.	0.	131540.	44.5
12	213.	8116.	20000.	0.	0.	157434.	183.7	1536.	4.	11789.	95580.	0.	0.	0.	82251.	0.	131540.	44.5
	5241.	101189.	248870.	0.	0.			5241.	1600.	145917.	1099270.	0.	0.	0.	839986.	0.		



*Figure E-7: Lake Houston and Lake Conroe System Operation
Realistic Operating Conditions*

Table E-7
Lake Conroe and Lake Houston System Operation - Realistic Operating Conditions

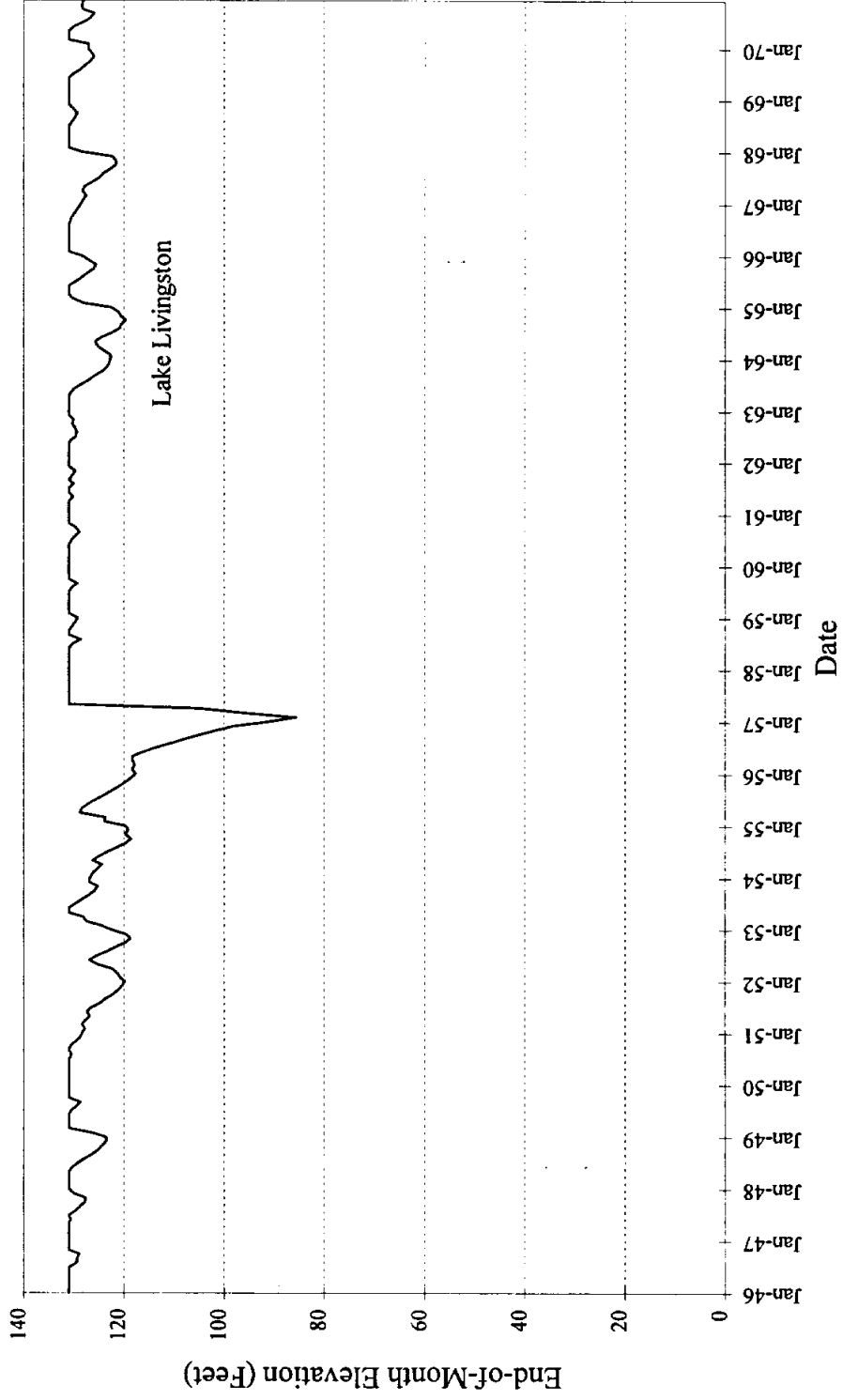
Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1949																		
1	-4229.	588.	4310.	0.	6200.	282176.	193.4	-1245.	0.	24103.	27260.	0.	6200.	0.	0.	0.	63873.	36.9
2	-2819.	480.	26950.	0.	0.	311465.	195.3	-2058.	1.	21595.	130710.	0.	0.	0.	43505.	0.	131540.	44.5
3	-2367.	392.	39170.	0.	0.	352610.	197.7	-1654.	80.	23675.	293830.	0.	0.	0.	271729.	0.	131540.	44.5
4	-2366.	442.	34880.	0.	0.	389414.	199.7	-473.	234.	24654.	246720.	0.	0.	0.	222305.	0.	131540.	44.5
5	4332.	502.	4140.	0.	0.	388720.	199.7	2836.	309.	26550.	38050.	0.	0.	0.	8355.	0.	131540.	44.5
6	2630.	631.	1520.	0.	0.	386979.	199.6	1972.	346.	27223.	18090.	0.	0.	0.	0.	0.	120089.	43.4
7	3741.	679.	1710.	0.	0.	384269.	199.5	101.	300.	28814.	27320.	0.	0.	0.	0.	0.	118194.	43.2
8	6254.	679.	1330.	0.	7530.	371136.	198.7	2852.	203.	27957.	16320.	0.	7530.	0.	0.	0.	111032.	42.5
9	3232.	566.	1350.	0.	16641.	352047.	197.7	1542.	100.	26519.	11520.	0.	16641.	0.	0.	0.	111032.	42.5
10	-9306.	556.	33010.	0.	0.	393807.	200.0	-7112.	14.	26091.	657410.	0.	0.	0.	617909.	0.	131540.	44.5
11	6816.	474.	2730.	0.	0.	389247.	199.7	2789.	9.	23981.	21640.	0.	0.	0.	0.	0.	126401.	44.0
12	-4662.	461.	33890.	13397.	0.	413941.	201.0	-4239.	4.	24714.	290320.	0.	13397.	0.	278099.	0.	131540.	44.5
	1256.	6450.	184990.	13397.	30371.			-4689.	1600.	305876.	1779190.	0.	43768.	0.	1441902.	0.		
1950																		
1	-803.	588.	46010.	46225.	0.	413941.	201.0	-473.	0.	24103.	355540.	0.	46225.	0.	378135.	0.	131540.	44.5
2	-5821.	480.	54550.	59891.	0.	413941.	201.0	-3191.	1.	21595.	318030.	0.	59891.	0.	359516.	0.	131540.	44.5
3	2810.	392.	14090.	10888.	0.	413941.	201.0	1773.	80.	23675.	85150.	0.	10888.	0.	70510.	0.	131540.	44.5
4	-2409.	442.	19750.	21717.	0.	413941.	201.0	-1418.	234.	24654.	89740.	0.	21717.	0.	87987.	0.	131540.	44.5
5	1405.	502.	30330.	28423.	0.	413941.	201.0	1654.	309.	26550.	151080.	0.	28423.	0.	150990.	0.	131540.	44.5
6	1606.	631.	95920.	93683.	0.	413941.	201.0	-118.	346.	27223.	365680.	0.	93683.	0.	431912.	0.	131540.	44.5
7	5594.	679.	2720.	0.	0.	410388.	200.8	2245.	300.	28814.	34770.	0.	0.	0.	3411.	0.	131540.	44.5
8	10940.	679.	910.	0.	2629.	397050.	200.1	4877.	203.	27957.	9900.	0.	2629.	0.	0.	0.	111032.	42.5
9	940.	566.	2340.	0.	19080.	378804.	199.2	2121.	100.	26519.	9660.	0.	19080.	0.	0.	0.	111032.	42.5
10	6859.	556.	1460.	0.	21162.	351687.	197.7	3567.	14.	26091.	8510.	0.	21162.	0.	0.	0.	111032.	42.5
11	4977.	474.	950.	0.	19543.	327643.	196.3	2603.	9.	23981.	7050.	0.	19543.	0.	0.	0.	111032.	42.5
12	2328.	461.	1180.	0.	6200.	319834.	195.8	1399.	4.	24714.	8210.	0.	6200.	0.	0.	0.	99325.	41.2
	28426.	6450.	270210.	260827.	68614.			15039.	1600.	305876.	1443320.	0.	329441.	0.	1482461.	0.		
1951																		
1	-657.	588.	1930.	0.	6200.	315633.	195.5	-979.	0.	24103.	11930.	0.	6200.	0.	0.	0.	94331.	40.7
2	-1633.	480.	3750.	0.	5650.	314886.	195.5	174.	1.	21595.	12860.	0.	5650.	0.	0.	0.	91071.	40.3
3	-490.	392.	6960.	0.	6200.	315744.	195.5	-361.	80.	23675.	33640.	0.	6200.	0.	0.	0.	107517.	42.1
4	3410.	442.	3820.	0.	6000.	309712.	195.2	1989.	234.	24654.	21640.	0.	6000.	0.	0.	0.	108280.	42.2
5	3672.	502.	1180.	0.	6200.	300518.	194.6	1008.	309.	26550.	8910.	0.	6200.	0.	0.	0.	95523.	40.8
6	3905.	631.	760.	0.	6000.	290742.	194.0	2544.	346.	27223.	9210.	0.	6000.	0.	0.	0.	80620.	39.1
7	6993.	679.	520.	0.	6200.	277390.	193.1	2586.	300.	28814.	5120.	0.	6200.	0.	0.	0.	60240.	36.4
8	8232.	679.	400.	0.	6200.	262679.	192.1	3195.	203.	27957.	3710.	0.	6200.	0.	0.	0.	38795.	32.9
9	0.	566.	690.	0.	6000.	256803.	191.7	-1128.	100.	26519.	18590.	0.	6000.	0.	0.	0.	37894.	32.8
10	6023.	556.	530.	0.	6200.	244554.	190.8	1589.	14.	26091.	6070.	0.	6200.	0.	0.	0.	22470.	29.4
11	2715.	474.	670.	0.	11388.	230647.	189.8	598.	9.	23981.	6530.	0.	11388.	0.	0.	0.	15800.	27.5
12	788.	461.	1660.	0.	14451.	216607.	188.7	153.	4.	24714.	10420.	0.	14451.	0.	0.	0.	15800.	27.5
	32958.	6450.	22870.	0.	86689.			11368.	1600.	305876.	148630.	0.	86689.	0.	0.	0.		

Table E-7 (cont.)
 Lake Conroe and Lake Houston System Operation - Realistic Operating Conditions

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1952																		
1	634.	588.	1500.	0.	15677.	201208.	187.5	214.	0.	24103.	8640.	0.	15677.	0.	0.	0.	15800.	27.5
2	-2502.	480.	9240.	0.	5650.	206820.	188.0	-1747.	1.	21595.	53790.	0.	5650.	0.	0.	0.	55391.	35.7
3	1263.	392.	8620.	0.	6200.	207585.	188.0	477.	80.	23675.	21210.	0.	6200.	0.	0.	0.	58569.	36.1
4	-3746.	442.	44120.	0.	0.	255009.	191.6	-2292.	234.	24654.	216990.	0.	0.	0.	121423.	0.	131540.	44.5
5	-578.	502.	16420.	0.	0.	271505.	192.7	-945.	309.	26550.	113760.	0.	0.	0.	87846.	0.	131540.	44.5
6	6321.	631.	4030.	0.	0.	268583.	192.5	3578.	346.	27223.	23600.	0.	0.	0.	0.	0.	123993.	43.8
7	4373.	679.	990.	0.	0.	264521.	192.2	981.	300.	28814.	10600.	0.	0.	0.	0.	0.	104498.	41.8
8	8823.	679.	430.	0.	6200.	249249.	191.1	4288.	203.	27957.	4620.	0.	6200.	0.	0.	0.	82870.	39.3
9	7142.	566.	320.	0.	6000.	235861.	190.2	3106.	100.	26519.	5040.	0.	6000.	0.	0.	0.	64185.	36.9
10	8241.	556.	290.	0.	6200.	221154.	189.1	3822.	14.	26091.	3080.	0.	6200.	0.	0.	0.	43538.	33.8
11	-1169.	474.	700.	0.	6000.	216549.	188.7	-706.	9.	23981.	8270.	0.	6000.	0.	0.	0.	34524.	32.1
12	257.	461.	3570.	0.	6200.	213201.	188.4	215.	4.	24714.	26350.	0.	6200.	0.	0.	0.	42141.	33.5
	29059.	6450.	90230.	0.	58127.			10991.	1600.	305876.	495950.	0.	58127.	0.	209269.	0.		
1953																		
1	1408.	588.	7030.	0.	6200.	212035.	188.4	744.	0.	24103.	31760.	0.	6200.	0.	0.	0.	55254.	35.6
2	-2331.	480.	14690.	0.	5650.	222926.	189.2	-1010.	1.	21595.	78090.	0.	5650.	0.	0.	0.	118408.	43.3
3	397.	392.	7200.	0.	0.	229337.	189.7	1226.	80.	23675.	33210.	0.	0.	0.	0.	0.	126637.	44.1
4	-2846.	442.	12700.	0.	0.	244441.	190.8	671.	234.	24654.	52290.	0.	0.	0.	21828.	0.	131540.	44.5
5	-5143.	502.	95810.	0.	0.	344892.	197.3	-3663.	309.	26550.	565990.	0.	0.	0.	542794.	0.	131540.	44.5
6	5358.	631.	1890.	0.	0.	340793.	197.0	1909.	346.	27223.	20070.	0.	0.	0.	0.	0.	122132.	43.6
7	4920.	679.	1560.	0.	9886.	326868.	196.2	2782.	300.	28814.	10910.	0.	9886.	0.	0.	0.	111032.	42.5
8	3151.	679.	1110.	0.	6200.	317948.	195.7	-1682.	203.	27957.	9290.	0.	6200.	0.	0.	0.	100044.	41.3
9	9553.	566.	3030.	0.	6000.	304859.	194.9	4488.	100.	26519.	14470.	0.	6000.	0.	0.	0.	89407.	40.1
10	3001.	556.	1010.	0.	6200.	296112.	194.3	1894.	14.	26091.	9240.	0.	6200.	0.	0.	0.	76848.	38.6
11	3574.	474.	4550.	0.	6000.	290614.	194.0	81.	9.	23981.	23550.	0.	6000.	0.	0.	0.	82327.	39.3
12	-1281.	461.	30730.	0.	0.	322164.	195.9	-942.	4.	24714.	102050.	0.	0.	0.	29061.	0.	131540.	44.5
	19761.	6450.	181310.	0.	46136.			6498.	1600.	305876.	950920.	0.	46136.	0.	593683.	0.		
1954																		
1	335.	588.	9920.	0.	0.	331161.	196.5	-118.	0.	24103.	53830.	0.	0.	0.	29845.	0.	131540.	44.5
2	3881.	480.	4190.	0.	0.	330990.	196.5	2846.	1.	21595.	21070.	0.	0.	0.	0.	0.	128168.	44.2
3	3872.	392.	2130.	0.	0.	328856.	196.3	2028.	80.	23675.	11220.	0.	0.	0.	0.	0.	113605.	42.8
4	673.	442.	2260.	0.	0.	330001.	196.4	285.	234.	24654.	14590.	0.	0.	0.	0.	0.	103022.	41.7
5	505.	502.	6200.	0.	6200.	328994.	196.3	1016.	309.	26550.	22510.	0.	6200.	0.	0.	0.	103857.	41.7
6	6966.	631.	600.	0.	6000.	315997.	195.6	3673.	346.	27223.	4660.	0.	6000.	0.	0.	0.	83275.	39.4
7	4368.	679.	1350.	0.	6200.	306100.	194.9	2707.	300.	28814.	45610.	0.	6200.	0.	0.	0.	103264.	41.7
8	8503.	679.	1410.	0.	6200.	292128.	194.1	4039.	203.	27957.	16040.	0.	6200.	0.	0.	0.	93305.	40.6
9	7470.	566.	290.	0.	6000.	278382.	193.2	3207.	100.	26519.	2950.	0.	6000.	0.	0.	0.	72429.	38.0
10	-598.	556.	3760.	0.	6200.	275984.	193.0	78.	14.	26091.	23680.	0.	6200.	0.	0.	0.	76126.	38.5
11	2084.	474.	7100.	0.	6000.	274526.	192.9	1356.	9.	23981.	22850.	0.	6000.	0.	0.	0.	79630.	38.9
12	2506.	461.	2550.	0.	6200.	267909.	192.5	1756.	4.	24714.	16930.	0.	6200.	0.	0.	0.	76286.	38.5
	40565.	6450.	41760.	0.	49000.			22873.	1600.	305876.	255940.	0.	49000.	0.	29845.	0.		

Table E-7 (cont.)
Lake Conroe and Lake Houston System Operation - Realistic Operating Conditions

Date	LAKE CONROE							LAKE HOUSTON										
	Evap Loss *A-F*	Total Demand *A-F*	Natural Runoff *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Evap Loss *A-F*	Local Demand *A-F*	System Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Conroe Spill&Rel *A-F*	Luce Bayou Transfer *A-F*	Spills *A-F*	Short- age *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*
1955																		
1	-293.	588.	8220.	0.	6200.	269634.	192.6	-421.	0.	24103.	38520.	0.	6200.	0.	0.	0.	97324.	41.0
2	-3260.	480.	43800.	0.	0.	316214.	195.6	-1866.	1.	21595.	202650.	0.	0.	0.	148704.	0.	131540.	44.5
3	3432.	392.	2730.	0.	0.	315120.	195.5	2593.	80.	23675.	14680.	0.	0.	0.	0.	0.	119872.	43.4
4	-660.	442.	10060.	0.	0.	325398.	196.1	207.	234.	24654.	37900.	0.	0.	0.	1137.	0.	131540.	44.5
5	3331.	502.	2220.	0.	0.	323785.	196.0	1644.	309.	26550.	12720.	0.	0.	0.	0.	0.	115757.	43.0
6	7427.	631.	950.	0.	0.	316677.	195.6	3325.	346.	27223.	6160.	0.	0.	0.	0.	0.	91023.	40.3
7	4855.	679.	730.	0.	6200.	305673.	194.9	1796.	300.	28814.	5940.	0.	6200.	0.	0.	0.	72253.	38.0
8	5996.	679.	1510.	0.	6200.	294308.	194.2	806.	203.	27957.	8590.	0.	6200.	0.	0.	0.	58077.	36.1
9	3542.	566.	600.	0.	6000.	284800.	193.6	700.	100.	26519.	6740.	0.	6000.	0.	0.	0.	43498.	33.8
10	8233.	556.	470.	0.	6200.	270281.	192.6	2716.	14.	26091.	4200.	0.	6200.	0.	0.	0.	25077.	30.1
11	4609.	474.	410.	0.	12564.	253044.	191.4	1181.	9.	23981.	3330.	0.	12564.	0.	0.	0.	15800.	27.5
12	550.	461.	730.	0.	19202.	233561.	190.0	244.	4.	24714.	5760.	0.	19202.	0.	0.	0.	15800.	27.5
	37762.	6450.	72430.	0.	62566.			12925.	1600.	305876.	347190.	0.	62566.	0.	149841.	0.		
1956																		
1	399.	588.	1500.	0.	9741.	224333.	189.3	-122.	0.	24103.	14240.	0.	9741.	0.	0.	0.	15800.	27.5
2	-925.	480.	8480.	0.	5650.	227608.	189.6	-44.	1.	21595.	39400.	0.	5650.	0.	0.	0.	39298.	33.0
3	660.	392.	3370.	0.	6200.	223726.	189.3	750.	80.	23675.	16100.	0.	6200.	0.	0.	0.	37093.	32.6
4	-264.	442.	8850.	0.	6000.	226398.	189.5	221.	234.	24654.	25660.	0.	6000.	0.	0.	0.	43644.	33.8
5	3143.	502.	1230.	0.	6200.	217783.	188.8	882.	309.	26550.	6640.	0.	6200.	0.	0.	0.	28743.	30.9
6	3705.	631.	1090.	0.	8657.	205880.	187.9	1051.	346.	27223.	7020.	0.	8657.	0.	0.	0.	15800.	27.5
7	7285.	679.	430.	0.	27510.	170836.	184.9	1526.	300.	28814.	3130.	0.	27510.	0.	0.	0.	15800.	27.5
8	6321.	679.	270.	0.	27604.	136502.	181.7	1404.	203.	27957.	1960.	0.	27604.	0.	0.	0.	15800.	27.5
9	7050.	566.	270.	0.	26356.	102800.	178.1	1617.	100.	26519.	1880.	0.	26356.	0.	0.	0.	15800.	27.5
10	3117.	556.	280.	0.	25091.	74316.	174.4	946.	14.	26091.	1960.	0.	25091.	0.	0.	0.	15800.	27.5
11	857.	474.	430.	0.	21823.	51592.	170.7	793.	9.	23981.	2960.	0.	21823.	0.	0.	0.	15800.	27.5
12	0.	461.	1130.	0.	18255.	34006.	167.1	-183.	4.	24714.	6280.	0.	18255.	0.	0.	0.	15800.	27.5
	31348.	6450.	27330.	0.	189087.			8841.	1600.	305876.	127230.	0.	189087.	0.	0.	0.		
1957																		
1	375.	588.	740.	0.	19879.	13904.	160.9	366.	0.	24103.	4590.	0.	19879.	0.	0.	0.	15800.	27.5
2	35.	480.	1750.	0.	13138.	2001.	153.1	122.	1.	21595.	8580.	0.	13138.	0.	0.	0.	15800.	27.5
3	-227.	392.	10510.	0.	1.	12345.	160.3	-962.	80.	23675.	60560.	0.	1.	0.	0.	0.	53568.	35.4
4	-2388.	442.	54700.	0.	0.	68991.	173.6	-2087.	234.	24654.	152430.	0.	0.	0.	51657.	0.	131540.	44.5
5	1645.	502.	42670.	0.	0.	109514.	178.9	2009.	309.	26550.	174200.	0.	0.	0.	145332.	0.	131540.	44.5
6	550.	631.	10480.	0.	0.	118813.	179.9	-827.	346.	27223.	52860.	0.	0.	0.	26118.	0.	131540.	44.5
7	3715.	679.	870.	0.	0.	115289.	179.5	3110.	300.	28814.	6340.	0.	0.	0.	0.	0.	105656.	41.9
8	3596.	679.	340.	0.	6200.	105154.	178.4	3442.	203.	27957.	4570.	0.	6200.	0.	0.	0.	84824.	39.6
9	1787.	566.	850.	0.	6000.	97651.	177.5	-653.	100.	26519.	13830.	0.	6000.	0.	0.	0.	78688.	38.8
10	-91.	556.	29450.	0.	0.	126636.	180.7	373.	14.	26091.	188410.	0.	0.	0.	109080.	0.	131540.	44.5
11	-2002.	474.	76510.	0.	0.	204674.	187.8	-1536.	9.	23981.	337320.	0.	0.	0.	314866.	0.	131540.	44.5
12	257.	461.	20000.	0.	0.	223956.	189.3	1536.	4.	24714.	95580.	0.	0.	0.	69326.	0.	131540.	44.5
	7252.	6450.	248870.	0.	45218.			4893.	1600.	305876.	1099270.	0.	45218.	0.	716379.	0.		



*Figure E-8: Lake Livingston Stand-Alone Operation
20,000 AF Minimum Livingston Content*

Table E-8
Lake Livingston Stand-Alone - 20,000 AF Minimum Content

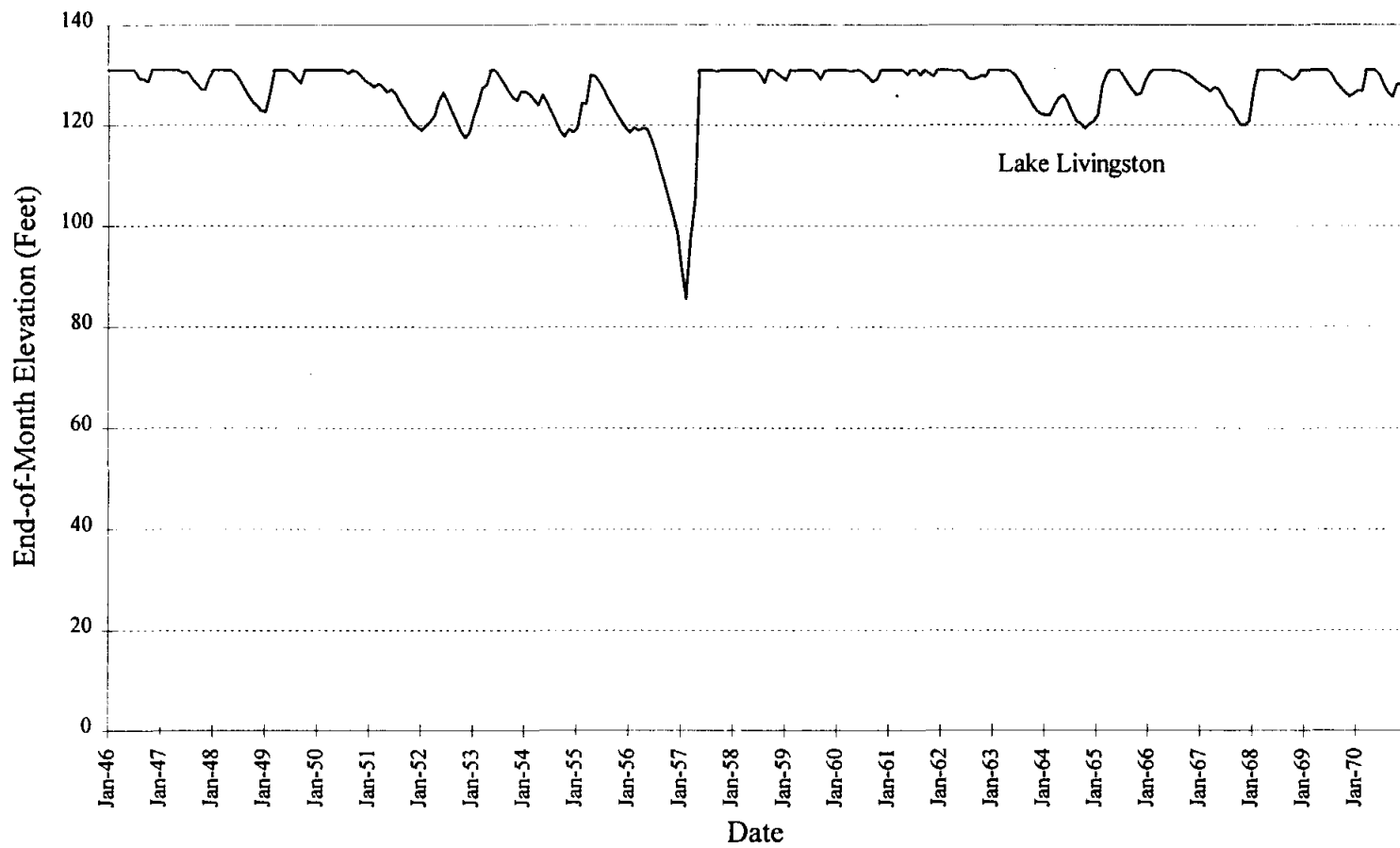
Date	LAKE LIVINGSTON							TRINITY BELOW LIVINGSTON							Total *A-F*
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	
1949															
1	-17405.	2216.	60800.	0.	0.	74699.	1165933.	123.6	76479.	16975.	60714.	50673.	9582.	459.	79446.
2	-12561.	1996.	237500.	0.	0.	60869.	1353129.	126.3	104509.	15469.	114366.	45400.	8672.	53397.	71537.
3	-10848.	2772.	617600.	0.	193279.	66748.	1718778.	131.0	348297.	16975.	363227.	49773.	15978.	266131.	85498.
4	-7466.	4004.	425000.	0.	360204.	68258.	1718778.	131.0	490162.	16427.	473525.	51831.	29024.	350501.	101286.
5	17419.	4736.	322900.	0.	227952.	72793.	1718778.	131.0	300745.	16975.	260975.	55818.	35900.	148741.	113429.
6	5807.	5068.	533500.	0.	448966.	73659.	1718778.	131.0	552175.	16427.	508006.	57232.	39162.	366535.	117889.
7	10731.	4876.	86100.	0.	0.	93897.	1695374.	130.7	107767.	16975.	100232.	60576.	36077.	3579.	118504.
8	21753.	4080.	27400.	0.	0.	92702.	1604239.	129.6	100322.	16975.	88527.	58776.	27785.	1966.	107616.
9	12544.	3176.	27100.	0.	0.	78971.	1536648.	128.7	87351.	16427.	76624.	55753.	18709.	2162.	94065.
10	-47133.	2504.	517400.	0.	308071.	71828.	1718778.	131.0	540899.	16975.	586567.	54853.	11529.	467014.	85861.
11	23226.	2272.	116900.	0.	24559.	66843.	1718778.	131.0	114262.	16427.	108643.	50416.	10290.	42114.	79405.
12	-29032.	2300.	320700.	0.	278498.	68934.	1718778.	131.0	454332.	16975.	471557.	51959.	10112.	367526.	81346.
	-32965.	40000.	3292900.	0.	1841529.	890201.			3277300.	200002.	3212963.	643060.	252820.	2070125.	1135882.
1950															
1	-1659.	2216.	532200.	0.	463995.	67648.	1718778.	131.0	685343.	16975.	711178.	50673.	9582.	584872.	79446.
2	-23226.	1996.	867500.	0.	827861.	60869.	1718778.	131.0	985130.	15469.	942825.	45400.	8672.	799010.	71537.
3	12443.	2772.	540500.	0.	458537.	66748.	1718778.	131.0	644485.	16975.	650846.	49773.	15978.	524988.	85498.
4	-10783.	4004.	322000.	0.	260521.	68258.	1718778.	131.0	350409.	16427.	320487.	51831.	29024.	212766.	101286.
5	5807.	4736.	847700.	0.	764364.	72793.	1718778.	131.0	897357.	16975.	838886.	55818.	35900.	668861.	113429.
6	4977.	5068.	590200.	0.	506496.	73659.	1718778.	131.0	743455.	16427.	771158.	57232.	39162.	603371.	117889.
7	20738.	4876.	262300.	0.	159135.	77551.	1718778.	131.0	274536.	16975.	263612.	60576.	36077.	146655.	118504.
8	37801.	4080.	88700.	0.	0.	91626.	1673971.	130.5	99996.	16975.	88721.	58776.	27785.	2160.	107616.
9	8218.	3176.	304200.	0.	175819.	72180.	1718778.	131.0	249409.	16427.	216219.	55753.	18709.	125710.	94065.
10	28933.	2504.	86800.	0.	0.	71828.	1702313.	130.8	93078.	16975.	88438.	54853.	11529.	18697.	85861.
11	19411.	2272.	10300.	0.	0.	75644.	1615286.	129.7	76694.	16427.	60977.	50416.	10290.	271.	79405.
12	10228.	2300.	20300.	0.	0.	75864.	1547194.	128.9	78104.	16975.	62649.	51959.	10112.	578.	81346.
	112888.	40000.	4472700.	0.	3616728.	874668.			5177996.	200002.	5015996.	643060.	252820.	3687939.	1135882.
1951															
1	-9281.	2216.	30800.	0.	0.	71296.	1513763.	128.4	75466.	16975.	61331.	50673.	9582.	1076.	79446.
2	-6106.	1996.	21700.	0.	0.	68457.	1471116.	127.9	69217.	15469.	54268.	45400.	8672.	196.	71537.
3	-3051.	2772.	105800.	0.	0.	66748.	1510447.	128.4	87438.	16975.	82474.	49773.	15978.	13453.	85498.
4	13718.	4004.	54200.	0.	0.	81039.	1465886.	127.8	92459.	16427.	83802.	51831.	29024.	2947.	101286.
5	-14917.	4736.	44700.	0.	0.	99662.	1391271.	126.8	106012.	16975.	93357.	55818.	35900.	1639.	113429.
6	17809.	5068.	163300.	0.	0.	93692.	1438002.	127.4	107142.	16427.	99865.	57232.	39162.	3471.	117889.
7	25917.	4876.	63800.	0.	0.	91088.	1379921.	126.6	106938.	16975.	100743.	60576.	36077.	4090.	118504.
8	37105.	4080.	9600.	0.	0.	100667.	1247669.	124.8	102687.	16975.	87082.	58776.	27785.	521.	107616.
9	-2738.	3176.	21300.	0.	0.	87105.	1181426.	123.8	89765.	16427.	75148.	55753.	18709.	686.	94065.
10	25041.	2504.	8200.	0.	0.	80936.	1081145.	122.3	82636.	16975.	66821.	54853.	11529.	439.	85861.
11	11375.	2272.	17900.	0.	0.	73561.	1011837.	121.2	76071.	16427.	61354.	50416.	10290.	648.	79405.
12	0.	2300.	31800.	0.	0.	72351.	968986.	120.5	77061.	16975.	63286.	51959.	10112.	1215.	81346.
	124706.	40000.	573100.	0.	0.	986602.			1072892.	200002.	929531.	643060.	252820.	30381.	1135882.

Table E-8 (cont.)
Lake Livingston Stand-Alone - 20,000 AF Minimum Content

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON										
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Total *A-F*	
1952																
1	2399.	2216.	38400.	0.	0.	72609.	930162.	119.9	75859.	16975.	61094.	50673.	9582.	839.	79446.	
2	-14454.	1996.	102500.	0.	0.	60869.	984251.	120.8	71499.	15469.	62197.	45400.	8672.	6445.	71537.	
3	4938.	2772.	109100.	0.	0.	66748.	1018893.	121.3	85798.	16975.	79878.	49773.	15978.	11116.	85498.	
4	-17103.	4004.	119500.	0.	0.	68258.	1083234.	122.3	102168.	16427.	105420.	51831.	29024.	19206.	101286.	
5	-4714.	4736.	262700.	0.	0.	72793.	1273119.	125.2	99413.	16975.	97886.	55818.	35900.	1961.	113429.	
6	25951.	5068.	236800.	0.	0.	73659.	1405241.	127.0	101269.	16427.	100871.	57232.	39162.	113.	117889.	
7	15202.	4876.	17200.	0.	0.	107610.	1294753.	125.5	111840.	16975.	97745.	60576.	36077.	1092.	118504.	
8	35797.	4080.	8100.	0.	0.	101699.	1161277.	123.5	102989.	16975.	86894.	58776.	27785.	333.	107616.	
9	30527.	3176.	4100.	0.	0.	90347.	1041327.	121.7	90727.	16427.	74560.	55753.	18709.	98.	94065.	
10	35462.	2504.	5600.	0.	0.	81732.	927229.	119.8	82872.	16975.	66677.	54853.	11529.	295.	85861.	
11	-6393.	2272.	6000.	0.	0.	77133.	860217.	118.7	77133.	16427.	60706.	50416.	10290.	0.	79405.	
12	5796.	2300.	134000.	0.	0.	68934.	917187.	119.6	77824.	16975.	66010.	51959.	10112.	2534.	81346.	
	113408.	40000.	1044000.	0.	0.	942391.			1079391.	200002.	959938.	643060.	252820.	44032.	1135882.	
1953																
1	6206.	2216.	265600.	0.	0.	67648.	1106717.	122.7	87678.	16975.	82330.	50673.	9582.	18909.	79446.	
2	-12060.	1996.	171800.	0.	0.	60869.	1227712.	124.5	96799.	15469.	102187.	45400.	8672.	42436.	71537.	
3	1441.	2772.	290300.	0.	0.	66748.	1447051.	127.5	82738.	16975.	75044.	49773.	15978.	6766.	85498.	
4	-14394.	4004.	112400.	0.	0.	74284.	1495557.	128.2	90454.	16427.	85027.	51831.	29024.	4172.	101286.	
5	-25393.	4736.	985700.	0.	710343.	72793.	1718778.	131.0	938336.	16975.	940407.	55818.	35900.	760230.	113429.	
6	14931.	5068.	246600.	0.	152942.	73659.	1718778.	131.0	282791.	16427.	283681.	57232.	39162.	164642.	117889.	
7	16234.	4876.	20800.	0.	0.	102844.	1615624.	129.7	110424.	16975.	98609.	60576.	36077.	1956.	118504.	
8	10185.	4080.	16200.	0.	0.	96299.	1521260.	128.5	101389.	16975.	87874.	58776.	27785.	1313.	107616.	
9	34031.	3176.	14000.	0.	0.	86352.	1411701.	127.1	89542.	16427.	75285.	55753.	18709.	823.	94065.	
10	17507.	2504.	19400.	0.	0.	83357.	1327733.	125.9	83357.	16975.	66382.	54853.	11529.	0.	85861.	
11	14228.	2272.	47400.	0.	0.	73578.	1285055.	125.3	76078.	16427.	61351.	50416.	10290.	645.	79405.	
12	-722.	2300.	189300.	0.	0.	68934.	1403843.	127.0	87894.	16975.	81923.	51959.	10112.	16856.	81346.	
	62194.	40000.	2379500.	0.	863285.	927365.			2127480.	200002.	2040100.	643060.	252820.	1018748.	1135882.	
1954																
1	738.	2216.	63700.	0.	0.	67648.	1396941.	126.9	78788.	16975.	68279.	50673.	9582.	6263.	79446.	
2	18279.	1996.	42200.	0.	0.	64437.	1354429.	126.3	68027.	15469.	54998.	45400.	8672.	926.	71537.	
3	14321.	2772.	28700.	0.	0.	75785.	1290251.	125.4	80665.	16975.	67010.	49773.	15978.	1259.	85498.	
4	4180.	4004.	32300.	0.	0.	93295.	1221072.	124.4	96095.	16427.	81578.	51831.	29024.	723.	101286.	
5	1413.	4736.	214100.	0.	0.	72793.	1356230.	126.3	101903.	16975.	101827.	55818.	35900.	5508.	113429.	
6	26270.	5068.	22500.	0.	0.	100632.	1246760.	124.8	109202.	16427.	98605.	57232.	39162.	2211.	117889.	
7	16935.	4876.	12000.	0.	0.	101397.	1135552.	123.1	109997.	16975.	98872.	60576.	36077.	2219.	118504.	
8	30867.	4080.	16200.	0.	0.	90391.	1026414.	121.4	99631.	16975.	88946.	58776.	27785.	2385.	107616.	
9	26679.	3176.	3900.	0.	0.	88189.	912270.	119.6	90089.	16427.	74952.	55753.	18709.	490.	94065.	
10	2313.	2504.	32400.	0.	0.	83357.	856496.	118.6	83357.	16975.	66382.	54853.	11529.	0.	85861.	
11	8114.	2272.	141900.	0.	0.	66843.	921167.	119.7	89813.	16427.	86719.	50416.	10290.	22383.	79405.	
12	10512.	2300.	44000.	0.	0.	68934.	883421.	119.1	78914.	16975.	67731.	51959.	10112.	4083.	81346.	
	160621.	40000.	653900.	0.	0.	973701.			1086481.	200002.	955899.	643060.	252820.	48450.	1135882.	

Table E-8 (cont.)
Lake Livingston Stand-Alone - 20,000 AF Minimum Content

Date	LAKE LIVINGSTON						TRINITY BELOW LIVINGSTON									
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Total *A-F*	
1955																
1	-2916.	2216.	100200.	0.	0.	67648.	916673.	119.6	85988.	16975.	79659.	50673.	9582.	16505.	79446.	
2	-12668.	1996.	318700.	0.	0.	60869.	1185176.	123.9	108179.	15469.	120169.	45400.	8672.	58620.	71537.	
3	14811.	2772.	71800.	0.	0.	69285.	1170108.	123.7	78735.	16975.	68190.	49773.	15978.	2439.	85498.	
4	-2903.	4004.	441300.	0.	0.	68258.	1542049.	128.8	146088.	16427.	174838.	51831.	29024.	81682.	101286.	
5	13148.	4736.	85900.	0.	0.	91239.	1518826.	128.5	103509.	16975.	94884.	55818.	35900.	3166.	113429.	
6	26573.	5068.	47600.	0.	0.	98872.	1435913.	127.4	108682.	16427.	98925.	57232.	39162.	2531.	117889.	
7	16837.	4876.	14900.	0.	0.	107398.	1321702.	125.8	111778.	16975.	97783.	60576.	36077.	1130.	118504.	
8	23749.	4080.	8500.	0.	0.	100438.	1201935.	124.1	102618.	16975.	87123.	58776.	27785.	562.	107616.	
9	11960.	3176.	0.	0.	0.	90643.	1096156.	122.5	90813.	16427.	74506.	55753.	18709.	44.	94065.	
10	30409.	2504.	17800.	0.	0.	74614.	1006429.	121.1	80764.	16975.	67969.	54853.	11529.	1587.	85861.	
11	17522.	2272.	6800.	0.	0.	73790.	919645.	119.7	76140.	16427.	61313.	50416.	10290.	607.	79405.	
12	1737.	2300.	14000.	0.	0.	75034.	854574.	118.6	77854.	16975.	62799.	51959.	10112.	728.	81346.	
	138259.	40000.	1127500.	0.	0.	978088.			1171148.	200002.	1088158.	643060.	252820.	169601.	1135882.	
1956																
1	0.	2216.	20600.	0.	0.	70890.	802068.	117.6	75350.	16975.	61405.	50673.	9582.	1150.	79446.	
2	-4460.	1996.	100800.	0.	0.	60869.	844463.	118.4	79209.	15469.	74386.	45400.	8672.	17415.	71537.	
3	2797.	2772.	41000.	0.	0.	66748.	813146.	117.8	78228.	16975.	67915.	49773.	15978.	350.	85498.	
4	559.	4004.	102400.	0.	0.	69273.	841710.	118.3	88963.	16427.	85936.	51831.	29024.	5081.	101286.	
5	12396.	4736.	124200.	0.	0.	108693.	840085.	118.3	108693.	16975.	91718.	55818.	35900.	0.	113429.	
6	13616.	5068.	21500.	0.	0.	109622.	733279.	116.3	111872.	16427.	96975.	57232.	39162.	581.	117889.	
7	25976.	4876.	3700.	0.	0.	111453.	594674.	113.6	112983.	16975.	97048.	60576.	36077.	395.	118504.	
8	24027.	4080.	1500.	0.	0.	102842.	465225.	110.6	103332.	16975.	86687.	58776.	27785.	126.	107616.	
9	25820.	3176.	3400.	0.	0.	90822.	348807.	107.6	90872.	16427.	74475.	55753.	18709.	13.	94065.	
10	10506.	2504.	3900.	0.	0.	82756.	256941.	104.7	83176.	16975.	66491.	54853.	11529.	109.	85861.	
11	4274.	2272.	6900.	0.	0.	76922.	180373.	101.6	77072.	16427.	60745.	50416.	10290.	39.	79405.	
12	-1084.	2300.	10800.	0.	0.	74822.	115135.	97.9	77792.	16975.	62837.	51959.	10112.	766.	81346.	
	114427.	40000.	440700.	0.	0.	1025712.			1087542.	200002.	926618.	643060.	252820.	26025.	1135882.	
1957																
1	805.	2216.	8500.	0.	0.	77230.	43384.	91.2	77230.	16975.	60255.	50673.	9582.	0.	79446.	
2	209.	1996.	43100.	0.	0.	64276.	20003.	85.6	67976.	15469.	55027.	45400.	8672.	955.	71537.	
3	-1261.	2772.	133700.	0.	0.	66748.	85444.	95.7	91298.	16975.	88568.	49773.	15978.	18937.	85498.	
4	-8299.	4004.	260400.	0.	0.	87243.	262896.	104.9	94303.	16427.	82676.	51831.	29024.	1821.	101286.	
5	12886.	4736.	1903300.	0.	357003.	72793.	1718778.	131.0	552496.	16975.	571041.	55818.	35900.	427801.	113429.	
6	-1659.	5068.	1611900.	0.	1534832.	73659.	1718778.	131.0	1716191.	16427.	1608791.	57232.	39162.	1357241.	117889.	
7	26544.	4876.	151400.	0.	42429.	77551.	1718778.	131.0	142600.	16975.	134510.	60576.	36077.	30464.	118504.	
8	23226.	4080.	238600.	0.	135543.	75751.	1718778.	131.0	271534.	16975.	275971.	58776.	27785.	167690.	107616.	
9	2486.	3176.	74900.	0.	0.	73622.	1714394.	130.9	85762.	16427.	77595.	55753.	18709.	3133.	94065.	
10	2486.	2504.	805600.	0.	724398.	71828.	1718778.	131.0	863466.	16975.	813077.	54853.	11529.	670873.	85861.	
11	-11613.	2272.	765100.	0.	707598.	66843.	1718778.	131.0	898141.	16427.	882754.	50416.	10290.	738814.	79405.	
12	2488.	2300.	316700.	0.	242978.	68934.	1718778.	131.0	399472.	16975.	409023.	51959.	10112.	311246.	81346.	
	48298.	40000.	6313200.	0.	3744781.	876478.			5260469.	200002.	5059288.	643060.	252820.	3728975.	1135882.	



*Figure E-9: Coordinated Operation of Lake Livingston
and the Trinity River below Livingston
20,000 AF Minimum Livingston Content*

Table E-9
Coordinated Operation of Lake Livingston and the Trinity River below Lake Livingston - 20,000 Livingston Minimum

Date	LAKE LIVINGSTON						TRINITY BELOW LIVINGSTON						Total *A-F*		
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*		Fixed Rights *A-F*	Remaining Flow *A-F*
1949															
1	-17014.	2216.	60800.	0.	0.	79883.	1114490.	122.8	81663.	16975.	65898.	56177.	9582.	139.	84950.
2	-12418.	1996.	237500.	0.	0.	10856.	1351556.	126.3	54496.	15469.	68717.	50331.	8672.	9714.	76468.
3	-10845.	2772.	617600.	0.	258451.	0.	1718778.	131.0	346721.	16975.	355134.	55178.	15978.	248465.	90903.
4	-7466.	4004.	425000.	0.	428462.	0.	1718778.	131.0	490162.	16427.	466699.	57460.	29024.	333545.	106915.
5	17419.	4736.	322900.	0.	300745.	0.	1718778.	131.0	300745.	16975.	253695.	61880.	35900.	130545.	119491.
6	5807.	5068.	533500.	0.	522625.	0.	1718778.	131.0	552175.	16427.	500640.	63448.	39162.	347966.	124105.
7	10690.	4876.	86100.	0.	0.	112163.	1677149.	130.5	126033.	16975.	118498.	67155.	36077.	15266.	125083.
8	21579.	4080.	27400.	0.	0.	97713.	1581177.	129.3	105333.	16975.	93538.	65159.	27785.	594.	113999.
9	12437.	3176.	27100.	0.	0.	83518.	1509146.	128.4	91898.	16427.	81171.	61808.	18709.	654.	100120.
10	-46922.	2504.	517400.	0.	352186.	0.	1718778.	131.0	513186.	16975.	554442.	60810.	11529.	426659.	91818.
11	23226.	2272.	116900.	0.	91402.	0.	1718778.	131.0	114262.	16427.	101959.	55891.	10290.	25582.	84880.
12	-29032.	2300.	320700.	0.	347432.	0.	1718778.	131.0	454332.	16975.	464664.	57603.	10112.	350483.	86990.
	-32539.	40000.	3292900.	0.	2301303.	384133.			3231006.	200002.	3125055.	712900.	252820.	1889612.	1205722.
1950															
1	-1659.	2216.	532200.	0.	531643.	0.	1718778.	131.0	685343.	16975.	704414.	56177.	9582.	568214.	84950.
2	-23226.	1996.	867500.	0.	888730.	0.	1718778.	131.0	985130.	15469.	936738.	50331.	8672.	784061.	76468.
3	12443.	2772.	540500.	0.	525285.	0.	1718778.	131.0	644485.	16975.	644171.	55178.	15978.	508598.	90903.
4	-10783.	4004.	322000.	0.	328779.	0.	1718778.	131.0	350409.	16427.	313661.	57460.	29024.	195811.	106915.
5	5807.	4736.	847700.	0.	837157.	0.	1718778.	131.0	897357.	16975.	831606.	61880.	35900.	650665.	119491.
6	4977.	5068.	590200.	0.	580155.	0.	1718778.	131.0	743455.	16427.	763792.	63448.	39162.	584803.	124105.
7	20738.	4876.	262300.	0.	236686.	0.	1718778.	131.0	274536.	16975.	255857.	67155.	36077.	127039.	125083.
8	37694.	4080.	88700.	0.	0.	105140.	1660564.	130.3	113510.	16975.	102235.	65159.	27785.	9291.	113999.
9	8194.	3176.	304200.	0.	234616.	0.	1718778.	131.0	236026.	16427.	196956.	61808.	18709.	96743.	100120.
10	28957.	2504.	86800.	0.	0.	67890.	1706227.	130.8	89140.	16975.	86625.	60810.	11529.	14286.	91818.
11	19421.	2272.	10300.	0.	0.	80930.	1613904.	129.7	81980.	16427.	66263.	55891.	10290.	82.	84880.
12	10215.	2300.	20300.	0.	0.	81104.	1540585.	128.8	83344.	16975.	67889.	57603.	10112.	174.	86990.
	112778.	40000.	4472700.	0.	4163051.	335064.			5184715.	200002.	4970207.	712900.	252820.	3539767.	1205722.
1951															
1	-9252.	2216.	30800.	0.	0.	76050.	1502371.	128.3	80220.	16975.	66085.	56177.	9582.	326.	84950.
2	-6077.	1996.	21700.	0.	0.	73252.	1454900.	127.7	74012.	15469.	59063.	50331.	8672.	60.	76468.
3	-3039.	2772.	105800.	0.	0.	57003.	1503964.	128.3	77693.	16975.	74798.	55178.	15978.	3642.	90903.
4	13679.	4004.	54200.	0.	0.	84612.	1455869.	127.7	96032.	16427.	87375.	57460.	29024.	891.	106915.
5	14849.	4736.	44700.	0.	0.	104581.	1376403.	126.6	110931.	16975.	98276.	61880.	35900.	496.	119491.
6	17698.	5068.	163300.	0.	0.	97487.	1419450.	127.2	110937.	16427.	103660.	63448.	39162.	1050.	124105.
7	25718.	4876.	63800.	0.	0.	94814.	1357842.	126.3	110664.	16975.	104469.	67155.	36077.	1237.	125083.
8	36730.	4080.	9600.	0.	0.	106686.	1219946.	124.4	108706.	16975.	93101.	65159.	27785.	157.	113999.
9	-2701.	3176.	21300.	0.	0.	92682.	1148089.	123.3	95342.	16427.	80725.	61808.	18709.	208.	100120.
10	24609.	2504.	8200.	0.	0.	86587.	1042589.	121.7	88287.	16975.	72472.	60810.	11529.	133.	91818.
11	11134.	2272.	17900.	0.	0.	78584.	968499.	120.5	81094.	16427.	66377.	55891.	10290.	196.	84880.
12	0.	2300.	31800.	0.	0.	77147.	920852.	119.7	81857.	16975.	68082.	57603.	10112.	367.	86990.
	123348.	40000.	573100.	0.	0.	1029485.			1115775.	200002.	974483.	712900.	252820.	8763.	1205722.

Table E-9 (cont.)
 Coordinated Operation of Lake Livingston and the Trinity River below Lake Livingston - 20,000 Livingston Minimum

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON										
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Total *A-F*	
1952																
1	2332.	2216.	38400.	0.	0.	77528.	877176.	119.0	80778.	16975.	66013.	56177.	9582.	254.	84950.	
2	-14044.	1996.	102500.	0.	0.	57441.	934283.	119.9	68071.	15469.	59832.	50331.	8672.	829.	76468.	
3	4813.	2772.	109100.	0.	0.	59339.	976459.	120.6	78389.	16975.	74374.	55178.	15978.	3218.	90903.	
4	-16794.	4004.	119500.	0.	0.	53038.	1055711.	121.9	86948.	16427.	93591.	57460.	29024.	7107.	106915.	
5	-4652.	4736.	262700.	0.	0.	75196.	1243131.	124.7	101816.	16975.	102951.	61880.	35900.	5171.	119491.	
6	25619.	5068.	236800.	0.	0.	78119.	1371125.	126.5	105729.	16427.	108092.	63448.	39162.	5482.	124105.	
7	14980.	4876.	17200.	0.	0.	113427.	1255042.	124.9	117657.	16975.	103562.	67155.	36077.	330.	125083.	
8	35135.	4080.	8100.	0.	0.	107850.	1116077.	122.8	109140.	16975.	93045.	65159.	27785.	101.	113999.	
9	29809.	3176.	4100.	0.	0.	96334.	990858.	120.9	96714.	16427.	80547.	61808.	18709.	30.	100120.	
10	34428.	2504.	5600.	0.	0.	87483.	872043.	118.9	88623.	16975.	72428.	60810.	11529.	89.	91818.	
11	-6179.	2272.	6000.	0.	0.	82608.	799342.	117.6	82608.	16427.	66181.	55891.	10290.	0.	84880.	
12	5588.	2300.	134000.	0.	0.	70444.	855010.	118.6	79334.	16975.	68409.	57603.	10112.	694.	86990.	
	111035.	40000.	1044000.	0.	0.	958807.			1095807.	200002.	989025.	712900.	252820.	23305.	1205722.	
1953																
1	6023.	2216.	265600.	0.	0.	52545.	1059826.	122.0	72575.	16975.	69230.	56177.	9582.	3471.	84950.	
2	-11909.	1996.	171800.	0.	0.	21817.	1219722.	124.4	57747.	15469.	66728.	50331.	8672.	7725.	76468.	
3	1437.	2772.	290300.	0.	0.	62509.	1443304.	127.5	78499.	16975.	72404.	55178.	15978.	1248.	90903.	
4	-14367.	4004.	112400.	0.	0.	77003.	1489064.	128.1	93173.	16427.	87746.	57460.	29024.	1262.	106915.	
5	-25366.	4736.	985700.	0.	776616.	0.	1718778.	131.0	931816.	16975.	927259.	61880.	35900.	736753.	119491.	
6	14931.	5068.	246600.	0.	226601.	0.	1718778.	131.0	282791.	16427.	276315.	63448.	39162.	146073.	124105.	
7	16216.	4876.	20800.	0.	0.	108059.	1610427.	129.7	115639.	16975.	103824.	67155.	36077.	592.	125083.	
8	10158.	4080.	16200.	0.	0.	101766.	1510623.	128.4	106856.	16975.	93341.	65159.	27785.	397.	113999.	
9	33867.	3176.	14000.	0.	0.	91833.	1395747.	126.9	95023.	16427.	80766.	61808.	18709.	249.	100120.	
10	17380.	2504.	19400.	0.	0.	89314.	1305949.	125.6	89314.	16975.	72339.	60810.	11529.	0.	91818.	
11	14088.	2272.	47400.	0.	0.	78603.	1258386.	124.9	81103.	16427.	66376.	55891.	10290.	195.	84880.	
12	-717.	2300.	189300.	0.	0.	56025.	1390078.	126.8	74985.	16975.	70910.	57603.	10112.	3195.	86990.	
	61741.	40000.	2379500.	0.	1003217.	739474.			2079521.	200002.	1987238.	712900.	252820.	901160.	1205722.	
1954																
1	735.	2216.	63700.	0.	0.	64883.	1385944.	126.7	76023.	16975.	66628.	56177.	9582.	869.	84950.	
2	18187.	1996.	42200.	0.	0.	68722.	1339239.	126.1	72312.	15469.	59283.	50331.	8672.	280.	76468.	
3	14220.	2772.	28700.	0.	0.	80312.	1270635.	125.1	85192.	16975.	71537.	55178.	15978.	381.	90903.	
4	4140.	4004.	32300.	0.	0.	98420.	1196371.	124.0	101220.	16427.	86703.	57460.	29024.	219.	106915.	
5	1399.	4736.	214100.	0.	0.	71649.	1332687.	126.0	100759.	16975.	103594.	61880.	35900.	5814.	119491.	
6	25994.	5068.	22500.	0.	0.	105306.	1218819.	124.4	113876.	16427.	103279.	63448.	39162.	669.	124105.	
7	16701.	4876.	12000.	0.	0.	106428.	1102814.	122.6	115028.	16975.	103903.	67155.	36077.	671.	125083.	
8	30329.	4080.	16200.	0.	0.	95110.	989495.	120.8	104350.	16975.	93665.	65159.	27785.	721.	113999.	
9	26095.	3176.	3900.	0.	0.	93902.	870222.	118.8	95802.	16427.	80665.	61808.	18709.	148.	100120.	
10	2252.	2504.	32400.	0.	0.	89314.	808552.	117.7	89314.	16975.	72339.	60810.	11529.	0.	91818.	
11	7933.	2272.	141900.	0.	0.	48293.	891954.	119.2	71263.	16427.	70466.	55891.	10290.	4285.	84880.	
12	10340.	2300.	44000.	0.	0.	68699.	854615.	118.6	78679.	16975.	68494.	57603.	10112.	779.	86990.	
	158325.	40000.	653900.	0.	0.	991038.			1103818.	200002.	980556.	712900.	252820.	14836.	1205722.	

Table E-9 (cont.)
Coordinated Operation of Lake Livingston and the Trinity River below Lake Livingston - 20,000 Livingston Minimum

Date	LAKE LIVINGSTON					TRINITY BELOW LIVINGSTON										
	Evap Loss *A-F*	Local Demand *A-F*	Natural Runoff *A-F*	Return Flow *A-F*	Spills *A-F*	Release *A-F*	E.O.M. Content *A-F*	E.O.M. Elev *Ft*	Flow at Capers *A-F*	Luce Bayou Diversion *A-F*	Flow at CWA PS *A-F*	CWA Diversion *A-F*	Fixed Rights *A-F*	Remaining Flow *A-F*	Total *A-F*	
1955																
1	-2881.	2216.	100200.	0.	0.	53345.	902135.	119.4	71685.	16975.	67190.	56177.	9582.	1431.	84950.	
2	-12754.	1996.	318700.	0.	0.	5633.	1225960.	124.5	52943.	15469.	69664.	50331.	8672.	10661.	76468.	
3	15069.	2772.	71800.	0.	0.	72989.	1206930.	124.2	82439.	16975.	71894.	55178.	15978.	738.	90903.	
4	-2982.	4004.	441300.	0.	0.	0.	1647208.	130.1	77830.	16427.	106580.	57460.	29024.	9438.	106915.	
5	13606.	4736.	85900.	0.	0.	95093.	1619673.	129.8	107363.	16975.	98738.	61880.	35900.	958.	119491.	
6	27486.	5068.	47600.	0.	0.	103322.	1531397.	128.7	113132.	16427.	103375.	63448.	39162.	765.	124105.	
7	17423.	4876.	14900.	0.	0.	113189.	1410809.	127.1	117569.	16975.	103574.	67155.	36077.	342.	125083.	
8	24589.	4080.	8500.	0.	0.	106429.	1284211.	125.3	108609.	16975.	93114.	65159.	27785.	170.	113999.	
9	12392.	3176.	0.	0.	0.	96668.	1171975.	123.7	96838.	16427.	80531.	61808.	18709.	14.	100120.	
10	31524.	2504.	17800.	0.	0.	79464.	1076283.	122.2	85614.	16975.	72819.	60810.	11529.	480.	91818.	
11	18170.	2272.	6800.	0.	0.	78842.	983799.	120.7	81192.	16427.	66365.	55891.	10290.	184.	84880.	
12	1798.	2300.	14000.	0.	0.	80170.	913531.	119.6	82990.	16975.	67935.	57603.	10112.	220.	86990.	
	143440.	40000.	1127500.	0.	0.	885144.			1078204.	200002.	1001779.	712900.	252820.	25401.	1205722.	
1956																
1	0.	2216.	20600.	0.	0.	75592.	856323.	118.6	80052.	16975.	66107.	56177.	9582.	348.	84950.	
2	-4626.	1996.	100800.	0.	0.	46838.	912915.	119.6	65178.	15469.	62189.	50331.	8672.	3186.	76468.	
3	2909.	2772.	41000.	0.	0.	69737.	878497.	119.0	81217.	16975.	72052.	55178.	15978.	896.	90903.	
4	580.	4004.	102400.	0.	0.	73259.	903054.	119.4	92949.	16427.	89922.	57460.	29024.	3438.	106915.	
5	12825.	4736.	124200.	0.	0.	114755.	894938.	119.3	114755.	16975.	97780.	61880.	35900.	0.	119491.	
6	14065.	5068.	21500.	0.	0.	115433.	781872.	117.2	117683.	16427.	102786.	63448.	39162.	176.	124105.	
7	26860.	4876.	3700.	0.	0.	117756.	636080.	114.4	119286.	16975.	103351.	67155.	36077.	119.	125083.	
8	24896.	4080.	1500.	0.	0.	109137.	499467.	111.4	109627.	16975.	92982.	65159.	27785.	38.	113999.	
9	27003.	3176.	3400.	0.	0.	96868.	375820.	108.4	96918.	16427.	80521.	61808.	18709.	4.	100120.	
10	11053.	2504.	3900.	0.	0.	88637.	277526.	105.4	89057.	16975.	72372.	60810.	11529.	33.	91818.	
11	4540.	2272.	6900.	0.	0.	82370.	195244.	102.3	82520.	16427.	66193.	55891.	10290.	12.	84880.	
12	-1158.	2300.	10800.	0.	0.	79932.	124970.	98.6	82902.	16975.	67947.	57603.	10112.	232.	86990.	
	118947.	40000.	440700.	0.	0.	1070314.			1132144.	200002.	974202.	712900.	252820.	8482.	1205722.	
1957																
1	857.	2216.	8500.	0.	0.	82734.	476663.	91.8	82734.	16975.	65759.	56177.	9582.	0.	84950.	
2	225.	1996.	43100.	0.	0.	68541.	20001.	85.5	72241.	15469.	59292.	50331.	8672.	289.	76468.	
3	-1454.	2772.	133700.	0.	0.	51518.	100865.	97.0	76068.	16975.	75793.	55178.	15978.	4637.	90903.	
4	-8879.	4004.	260400.	0.	0.	91602.	274538.	105.3	98662.	16427.	87035.	57460.	29024.	551.	106915.	
5	12928.	4736.	1903300.	0.	441396.	0.	1718778.	131.0	564096.	16975.	574201.	61880.	35900.	419001.	119491.	
6	-1659.	5068.	1611900.	0.	1608491.	0.	1718778.	131.0	1716191.	16427.	1601425.	63448.	39162.	1338672.	124105.	
7	26544.	4876.	151400.	0.	119980.	0.	1718778.	131.0	142600.	16975.	126755.	67155.	36077.	10847.	125083.	
8	23226.	4080.	238600.	0.	211294.	0.	1718778.	131.0	271534.	16975.	268396.	65159.	27785.	148612.	113999.	
9	2477.	3176.	74900.	0.	0.	91189.	1696836.	130.7	103329.	16427.	95162.	61808.	18709.	14645.	100120.	
10	2477.	2504.	805600.	0.	778677.	0.	1718778.	131.0	845917.	16975.	790100.	60810.	11529.	638751.	91818.	
11	-11613.	2272.	765100.	0.	774441.	0.	1718778.	131.0	898141.	16427.	876070.	55891.	10290.	722282.	84880.	
12	2488.	2300.	316700.	0.	311912.	0.	1718778.	131.0	399472.	16975.	402130.	57603.	10112.	294202.	86990.	
	47617.	40000.	6313200.	0.	4246191.	385584.			5270985.	200002.	5022118.	712900.	252820.	3592489.	1205722.	

APPENDIX F
COMMENTS



TEXAS WATER DEVELOPMENT BOARD

William B. Madden, *Chairman*
 Elaine M. Barrón, M.D., *Member*
 Charles L. Geren, *Member*

Craig D. Pedersen
Executive Administrator

Noé Fernández, *Vice-Chairman*
 Jack Hunt, *Member*
 Wales H. Madden, Jr., *Member*

March 6, 1998

Mr. Tom Gooch
 Freese & Nichols
 4055 International Plaza, Suite 200
 Fort Worth, Texas 76109

Re: Texas Water Development Board (Board staff) Comments on Trans-Texas Water Program "System Operation of Surface Water Supply Sources in the Houston Area", November 1997

Dear Mr. Gooch:

Board staff has reviewed the above-referenced report and offer the following comment:

Section 4.3.7 of the Scope of Services states that preliminary estimates of the cost of facilities and operation required for system operation would be developed. These cost estimates were not included in the report.

The Board looks forward to receiving one (1) unbound camera-ready original and nine (9) bound double-sided copies of the Final Report on this planning project. Please contact Mr. Gordon Thorn, Director, Research and Planning Funds Management Division, at (512) 463-7979, if you have any questions about the Board's comments.

Sincerely,

Tommy Knowles
 Deputy Executive Administrator
 for Planning

Our Mission

Exercise leadership in the conservation and responsible development of water resources for the benefit of the citizens, economy, and environment of Texas.

P.O. Box 13231 • 1700 N. Congress Avenue • Austin, Texas 78711-3231

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From: Wayne Tschirhart, Water Supplies Section
To: Tom Gooch
Date: January 27, 1998

Subject: Comments on draft Houston System Operations Report

The references on pages A-1, 5-1, 5-2, and 5-3 need to be checked. I found that some of the reference numbers did not correspond to the appropriate reports listed in Appendix A.

RESPONSE TO COMMENTS

Response to Comment #1 by TWDB:

Paragraphs were added to the end of Sections 7, 8, 9 and 11 that described the new facilities required and identified the cost of those facilities.

Response to Comment #2 by Wayne Tschirhart, Water Supplies Section of TNRCC:

All references were checked and if needed they were corrected.