

# **VOLUMETRIC SURVEY REPORT**

**OF**

# **BELTON LAKE**

**MAY 2003 SURVEY**

**Prepared by the:**

**TEXAS WATER DEVELOPMENT BOARD**



**September 2005**

**Texas Water Development Board**

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Prepared for:

**Brazos River Authority**

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## **EXECUTIVE OVERVIEW**

The Texas Water Development Board entered into a contract with the Brazos River Authority to perform a volumetric survey of Belton Lake. The goal of the study was to produce updated elevation-area and elevation-volume tables using current GPS, acoustical depth sounder and GIS technology.

Records indicate the top of the conservation pool for Belton Lake is at elevation 594.0 feet above mean seal level. A lake boundary was digitized from digital orthophoto quadrangle images (DOQ's). Depth and positional data were collected along a layout of transects or pre-plotted navigation lines spaced approximately 500 feet apart using commercially available software.

Data were collected at Belton Lake during the period of May 13 through May 21, 2003. The water levels varied between 594.0 ft and 594.2 ft. Approximately 120,500 data points were collected over 290 miles.

Post-processing the data included removing any depth spikes and erroneous depths caused by vegetation interference. All the edited files were combined into an X, Y, and Z (latitude, longitude and elevation) file and imported into a popular GIS software package. The digitized boundary file and point file were then used to create a Digital Terrain Model (DTM) of the lake's bottom surface using a Triangulated Irregular Network (TIN) software module. Volumes and areas were calculated from the TIN for the entire lake at one-tenth of a foot interval from the lowest elevation to the contour used for the lake boundary.

The result of the current survey indicates the lake encompasses 12,135 surface acres and contains a total of 435,225 ac-ft at the top of conservation pool elevation 594.0 ft. When compared to the TWDB 1994 survey, which found 12,385 surface acres and a total volume of 434,500 ac-ft; there is a 2% reduction in surface area and a 2% increase in total volume at the top of conservation pool.

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# **VOLUMETRIC SURVEY REPORT**

## **ON BELTON LAKE**

### **SURVEY OF MAY 2003**

#### **INTRODUCTION**

Staff of the Surface Water Resources Division of the Texas Water Development Board (TWDB) conducted a volumetric survey of Belton Lake during the period of May 13 and May 21, 2003. The primary purpose of the survey was to determine the total volume when the lake is at conservation pool elevation (CPE) 594.0 feet above mean sea level<sup>1</sup>. See references on page 13. For the purpose of this report, the term “top of conservation (TOC) pool” will be used to mean the conservation pool elevation (594.0 feet) for Belton Lake. The results of the current survey will be compared to the baseline survey performed by TWDB in September of 1994. Survey results are presented in the following pages in both graphical and tabular form.

The vertical datum used during this survey is that used by the United States Geological Survey (USGS) for the lake elevation gage at Belton Lake. The station number and name is 08102000 Belton Lk nr Belton, TX<sup>2</sup>. The datum for this gage is reported as mean sea level (msl) NGVD29 (USGS, 2002). Thus, elevations are reported here in feet (ft) above mean sea level (msl) NGVD29. Volume and area calculations in this report are referenced to water levels provided by the USGS gage.

Original design information for Belton Lake is based on information furnished by the U.S. Army Corps of Engineers<sup>3</sup>. The equipment and methodology used in the current survey is similar to that used in the September 1994 TWDB survey. Please refer to the Volumetric Survey of Belton Lake (TWDB 1994) for more information<sup>4</sup>.

## **PERTINENT DATA**

**Table 1. Belton Dam and Belton Lake Pertinent Data**

Owner of Dam and Facilities:

U. S. Army Corps of Engineers

Operator of Dam and Facilities:

U. S. Army Corps of Engineers, Fort Worth District

Engineer and General Contractor

U. S. Army Corps of Engineers (Design)

J. W. Morgan & Son of Snyder (General Contractor)

Location:

Belton Lake is located in Bell County on the Leon River, tributary of the Brazos River (Figure 1).

Purpose:

Multi-purpose reservoir for flood control, water supply and recreation<sup>5</sup>.

Authorization:

Federal: Federal Flood Control Act of July 24, 1946, modified by the Federal Flood Control Act 1954<sup>6</sup>.

State: Certificate of Adjudication 12-2936 was issued by the Texas Water Commission on April 30, 1984, to the United States Army Corps of Engineers to divert 12,000 ac-ft of water for use at Fort Hood<sup>7</sup>.

Certificate of Adjudication 12-5160 was issued by the Texas Water Commission<sup>8</sup> on December 14, 1987 to the Brazos River Authority (BRA) to impound 457,600 ac-ft of water in Belton Lake between elevations 540.0 ft. and 594.0 ft. The BRA was authorized a priority right to divert and use not to exceed 95,000 ac-ft of water per annum for municipal purposes, 150,000 ac-ft of water for industrial, 100,000 ac-ft of water for irrigation purposes and 50,000 ac-ft of water for mining. For detailed information about the water rights permits and the System Operation Order, refer to Volumetric Survey of Belton Lake (TWDB, 1994). The following information was obtained from the U. S. Army Corps of Engineers' website<sup>9</sup>.

#### Drainage area

3,560 square miles

#### Dam

Type:	Rolled earth fill
Length:	5,524 ft (including spillway and 418-ft dike)
Maximum height:	192 ft (above natural streambed)
Top width:	30 ft

#### Spillway

Type:	Broad-crested weir
Control:	Uncontrolled
Length:	1,300 ft
Crest elevation:	631.0 ft

#### Outlet works

Type:	1 conduit, 22 ft diameter with 3 inlets
Dimensions:	Tower- 22 ft diameter
Invert elevation (lowest gate):	483.0 ft
Control:	3 broome-type gates, each 7 ft by 22 ft

Low-Flow Outlets

Type: 1 – 3 ft by 3 ft gated outlet discharging into flood control conduit.

Invert Elevation: 540.0 ft msl (at intake to wet well)

Reservoir Data

FEATURE	ELEVATION (Feet)	CAPACITY (Acre-Feet)	AREA (Acres)
Top of Dam	662.0	-----	-----
Maximum Design Water Surface	656.9	1,876,700	37,340
Top of Flood control and Spillway Crest	631.0	1,097,600	23,620

The following information was obtained from the TWDB 1994 Volumetric Survey of Belton Lake<sup>4</sup>:

FEATURE	ELEVATION (Feet)	CAPACITY (Acre-feet)	AREA (Acres)
Top of Conservation Storage Space	594.0	434,500	12,385
Service outlet (invert)	540.0	52,401	2,961
Lowest gated outlet (invert)	483.0	0	0

The following information was obtained from the TWDB 2003 Volumetric Survey of Belton Lake:

FEATURE	ELEVATION (Feet)	CAPACITY (Acre-feet)	AREA (Acres)
Top of Conservation Storage Space	594.0	435,225	12,154
Service outlet (invert)	540.0	52,618	2,987
Lowest gated outlet (invert)	483.0	0	0



## **VOLUMETRIC SURVEYING TECHNOLOGY**

The equipment used to perform the latest volumetric survey consisted of a 23-foot aluminum tri-hull SeaArk craft with cabin, equipped with twin 90-Horsepower Honda outboard motors. (Reference to brand names throughout this report does not imply endorsement by TWDB). Installed within the enclosed cabin are a Coastal Oceanographics' Helmsman Display (for navigation), an Innerspace Technology Model 449 Depth Sounder and Model 443 Velocity Profiler, Trimble Navigation, Inc. AG132 GPS receiver with Omnistar differential GPS correction signal and PC. A water-cooled 4.5 kW generator provides electrical power through an in-line uninterruptible power supply.

In shallow areas and where navigational hazards such as stumps were present, a 20-foot aluminum shallow-draft flat bottom SeaArk craft with cabin and equipped with one 100-horsepower Yamaha outboard motor was used. The portable data collection equipment on-board the boat included a Knudsen 320 B/P Echosounder (depth sounder), a Trimble Navigation, Inc. AG132 GPS receiver with Omnistar differential GPS correction signal and a laptop computer.

The GPS equipment, survey vessel, and depth sounder in combination provide an efficient hydrographic survey system. As the boat travels across the pre-plotted transect lines, the depth sounder takes approximately ten readings of the lake bottom each second. The depth readings are stored on the computer along with the positional data generated by the boat's GPS receiver. The data files collected are downloaded and transferred to the office for editing after the survey is completed. During editing, poor-quality data is removed or corrected, multiple data points are averaged to one data point per second, and the average depths are converted to elevation readings based on the water-level elevation recorded on the day the survey was performed. Accurate estimates of the lake volume can then be determined by standard Geographic Information System (GIS) analysis using the collected data.

## **PRESURVEY PROCEDURES**

The lake's boundary was digitized using Environmental Systems Research Institute's (ESRI) ArcGIS from digital orthophoto quadrangles (DOQ's). VARGIS of Texas LLC produced the DOQ's for the Texas Orthoimagery Program (TOP). The DOQ's produced for the Department of Information Resources and the GIS Planning Council under the TOP reside in the public domain. More information can be obtained on the Internet at <http://www.tnris.state.tx.us/DigitalData/doqs.htm>. The lake elevations at the time the DOQ's were photographed (January 19, 1995, January 23, 1995 and January 31, 1995) were 594.2 ft, 594.18 ft, and 594.18 ft., respectively. The lake and island boundaries were given an elevation of 594.2 ft and TWDB Staff utilized these updated boundary conditions in modeling Belton Lake for this report. The lake elevations varied between elevation 594.28 ft and 594.36 ft during the survey (May 13, 2003 through May 21, 2003).

The survey layout was designed by placing survey track lines at 500-foot intervals within the digitized lake boundary using the HYPACK software. The survey design required the use of approximately 600 survey lines placed perpendicular to the original river channel and tributaries along the length of the lake. The survey track lines (transects) are similar to those track lines designed for the 1994 TWDB survey.

## **SURVEY PROCEDURES**

The following procedures were followed during the volumetric survey of Belton Lake performed by the TWDB. Information regarding equipment calibration and operation, the field survey, and data processing is also presented.

## **Equipment Calibration and Operation**

Prior to collecting data onboard the Hydro-survey boat, the depth sounder was calibrated with the Innerspace 443 Velocity Profiler, an instrument used to measure the variation in the speed of sound at different depths in the water column. The average speed of sound through the entire water column below the boat was determined by averaging local speed-of-sound measurements collected through the water column. The velocity profiler probe was first placed in the water to acclimate it. The probe was next raised to the water surface where the depth was considered zero. The probe was then gradually lowered on a cable to a depth just above the lake bottom, and then raised again to the surface. During this lowering and raising procedure, local speed-of-sound measurements were collected, from which the average speed was computed by the velocity profiler. This average speed of sound was entered into the ITI449 depth sounder, which then provided the depth of the lake bottom. The depth was then checked manually with a weighted measuring tape to ensure that the depth sounder was properly calibrated and operating correctly.

While collecting data onboard the River Runner (shallow draft) boat, the Knudsen depth sounder was calibrated using the DIGIBAR-Pro Profiling Sound Velocimeter by Odem Hydrographic Systems. The steps to determine the speed of sound are similar to those used for the Innerspace 443 Velocity Profiler. The probe was first placed in the water to acclimate it, then raised to the water surface where the depth was considered zero. The probe was then gradually lowered on a cable to a depth just above the lake bottom, and then raised again to the surface. During this lowering and raising procedure, local speed-of-sound measurements were collected, from which the average speed was computed by the velocimeter. The speed of sound was then entered into the bar check feature in the Knudsen software program. The depth was then checked manually with a stadia (survey) rod or weighted measuring tape to ensure that the depth sounder was properly calibrated and operating correctly.

The speed of sound in the water column varied from 4,883 feet per second to 4,910 feet per second during the Belton Lake survey. Based on the measured speed of sound for various depths and the average speed of sound calculated for the entire water column, the depth sounder is accurate to within  $\pm 0.2$  ft. An additional estimated error of  $\pm 0.3$  ft arises from variation in boat inclination. These two factors combine to give an overall accuracy of  $\pm 0.5$  ft for any instantaneous reading. These errors tend to be fairly minimal over the entire survey, since some errors are positive and some are negative, canceling each other out.

During the survey, the horizontal mask setting on the onboard GPS receiver was set to 10 degrees and the PDOP (Position Dilution of Precision) limit was set to seven to maximize the accuracy of the horizontal positioning. An internal alarm sounds if PDOP rises above seven to advise the field crew that the horizontal position has degraded to an unacceptable level. Further positional accuracy is obtained through differential corrections from the Omnistar receiver. The lake's initialization file used by the HYPACK data collection program was set up to convert the collected Differential GPS positions to NAD 83, State Plane, Texas Central Zone coordinates on the fly.

## **Data Collection**

TWDB staff collected data at Belton Lake for approximately 7 days during the period of May 13 through May 21, 2003. The USACE were able to maintain the lake levels above TOC pool during the survey. The lake level elevations varied between 594.26 ft and 594.00 ft, thus allowing the survey crew to collect data in most areas of the lake that would be inundated at TOC pool.

The design layout for collecting data at Belton Lake required pre-plotting transects (range lines) that were perpendicular to the old river and creek channels. These transects had an average spacing of 500 ft. While collecting data, the boat operator would steer the boat on course (with GPS navigation) starting from one shore and

heading to the opposite shore. The data collector would monitor the data display and depth sounder to make sure the latitude, longitude and depth (x,y,z) values were being logged; adjustments can be made if the instruments start receiving bad data. The depth sounder and GPS equipment records 10 data points every second. These points are averaged to one data point per second for generating the model; the distance between data points depends on the speed of the boat. The maximum distance between averaged data points during the resurvey of Belton Lake was approximately 30 ft.

Over 120,000 data points were collected over the 290 miles traveled during the data collection phase of Belton Lake. These points were stored digitally on the boat's computer in 577 data files. Data were still collected in those areas where the crew was not able to stay on course due to obstructions. Data were not collected in areas with significant obstructions or where the water was too shallow. Figure 2 shows the actual location of all data points collected.

## **Data Processing**

The collected data were downloaded from diskettes onto TWDB's network computers. CD backups were made for future reference as needed. To process the data, the EDIT routine in the HYPACK Program was run on each raw data file. Data points such as depth spikes or data with missing depth or positional information were deleted from the files. A correction for the lake elevation at the time of data collection was also applied to each file during the EDIT routine. After all adjustments had been made to the raw data files, the edited files were saved. The edited files were then combined into a single X, Y, Z data file, to be used with the GIS software to develop a model of the lake bottom elevation.

The resulting data file was imported into Environmental System Research Institute's (ESRI) Arc/Info Workstation GIS software. This software was used to convert the data to a MASS points file. The MASS points and the boundary file were then used

to create a Digital Terrain Model (DTM) of the lake's bottom surface using Arc/Info's TIN software module. The module generates a triangulated irregular network (TIN) from the data points and the boundary file using a method known as Delauney's criteria for triangulation. A triangle is formed between three non-uniformly spaced points, including all points along the boundary. If there is another point within the triangle, additional triangles are created until all points lie on the vertex of a triangle. All of the data points are used in this method. The generated network of three-dimensional triangular planes represents the bottom surface. With this representation of the bottom, the software then calculates elevations along the triangle surface plane by determining the elevation along each leg of the triangle. The lake area and volume can be determined from the triangulated irregular network created using this method of interpolation.

Volumes and areas were calculated from the TIN for the entire lake at one-tenth of a foot interval from the lowest elevation to the contour used for the lake boundary during the current survey. The surface areas and volumes of the lake were computed from elevation 481.1 ft to 594.2 ft using Arc/Info Workstation software. The computed lake volume and area tables are presented in Appendix A and Appendix C, respectively for the 2003 Belton Lake Survey. The 1994 lake volume and area tables are presented in Appendix B and Appendix D. An elevation-volume graph and an elevation-area graph including both surveys are presented in Appendix E and Appendix F, respectively.

Figures 3, 4, and 5 were developed by converting the TIN model to a lattice using the TINLATTICE command and then to a polygon coverage using the LATTICEPOLY command. Ranges of elevation were assigned to the polygons for Figure 3 (Elevation Relief Map) and associated depth ranges assigned for Figure 4 (Shaded Depth Ranges Map). Linear filtration algorithms were then applied to the DTM to produce smooth cartographic contours. The resulting contour map of the bottom surface at 5-ft intervals is presented in Figure 5. Finally, endpoint coordinates for 35 range lines can be found in Appendix G. These range lines were used in comparing the current TWDB TIN model (2003) and a TIN model based on the 1994 data using the current boundary conditions. Differences between cross-sections are partially due to the fact that the 2003 range lines do not exactly match the range lines driven in the 1994 survey and in the way Arc/Info

interpolates between points in developing the TIN model. The range line plots are presented in Appendix H.

## **RESULTS**

Results from the 2003 TWDB Survey indicate Belton Lake encompasses 12,135 surface acres and contains a total volume of 435,225 ac-ft at TOC pool. The length of the shoreline at the digitized elevation of 594.2 ft was calculated to be approximately 153 miles. The deepest point physically measured during the survey was at elevation 481.0 ft corresponding to a depth of 113 ft from TOC pool and was located approximately 1900 ft upstream of Belton Dam.

## **SUMMARY AND COMPARISONS**

The Federal Flood Control Act of July 24, 1946 (modified September 3, 1954) authorized the construction of Belton Dam and creation of Belton Lake. Construction commenced in July 1949. Deliberate impoundment began March 8, 1954. Original design information, based on 1936, 1937 and 1948 surveys estimated the volume of the lake at TOC pool to be 457,600 ac-ft with surface area of 12,300 acres. Prior to this report, the most recent volumetric survey report on Belton Lake was published by the TWDB in December 1994.

At TOC pool, the 2003 TWDB survey calculated 12,135 surface acres and reports a volume of 435,225 ac-ft. The capacity of the active pool (conservation storage) between elevations 594.0 ft and 483.0 ft is 435,225 ac-ft. The dead pool storage or that capacity of water below the invert of the lowest outlet (elevation 483.0 ft) was negligible.

The 1994 elevation-area-capacity table indicates that Belton Lake had a volume of 434,500 ac-ft and a surface area of 12,385 acres at TOC pool.

Despite the similarity in total capacity of the lake as estimated by the 1994 and 2003 surveys, there are some rather large differences in the surveys when comparing the bathymetry at the range lines. A good example is SR18, where the navigational difficulties caused different boat paths in the vicinity and resulted in drastically different software extrapolations to the cross-section (see Figure 6).

A comparative summary of the historical data and the results of the TWDB 2003 resurvey are presented in Table 2. Comparisons between initial volume calculations and the TWDB volumetric surveys are difficult and some apparent changes might simply be due to methodological differences. The 1994 and 2003 volumetric survey results are within the margin of error and are essentially identical. In fact the methodology and experience of the staff have improved since 1994 and so it is recommended that more reliance be placed on the current survey. It is recommended that a similar survey be performed in five to ten years or after major flood events to monitor changes to the lake's capacity.

**Table 2. Area and Volume Comparisons of Belton Lake**

FEATURE	USACE Original Design	USACE Re-Survey	USACE Re-Survey	TWDB Volumetric	TWDB Current Survey
Year	1948	1961	1966	1994	2003
Area (acres)	12,300	12,420	12,423	12,385	12,135
Volume (ac-ft)	457,600	447,500	441,984	434,500	435,225

Notes:

1. All pre-1994 data provided by the U. S. Army Corps of Engineers, Fort Worth District
2. All results from top of conservation pool elevation 594.0 ft



## REFERENCES

1. Texas Water Development Board. 1966. Report 48. "Dams and Lakes in Texas, Historical and Descriptive Information"
2. United States Geological Survey, 2002, Water Data Report TX-02-3. "Water Resources Data Texas Water Year 2002"
3. <http://www.swf-wc.usace.army.mil/>
4. Texas Water Development Board, 1994, "Volumetric Survey of Belton Lake"
5. <http://www.texasoutside.com/centraltexas/lakebelton.htm>
6. Texas Water Development Board. 1973. Report 126 Part II. "Engineering Data on Dams and Lakes in Texas"
7. Texas Water Commission, 1984, Certificate of Adjudication 12-2936
8. Texas Water Commission, 1987, Certificate of Adjudication 12-5160
9. <http://www1.swf-wc.usace.army.mil/pertrdata/blnt2>.

Figure 1  
**LAKE BELTON**  
 Location Map

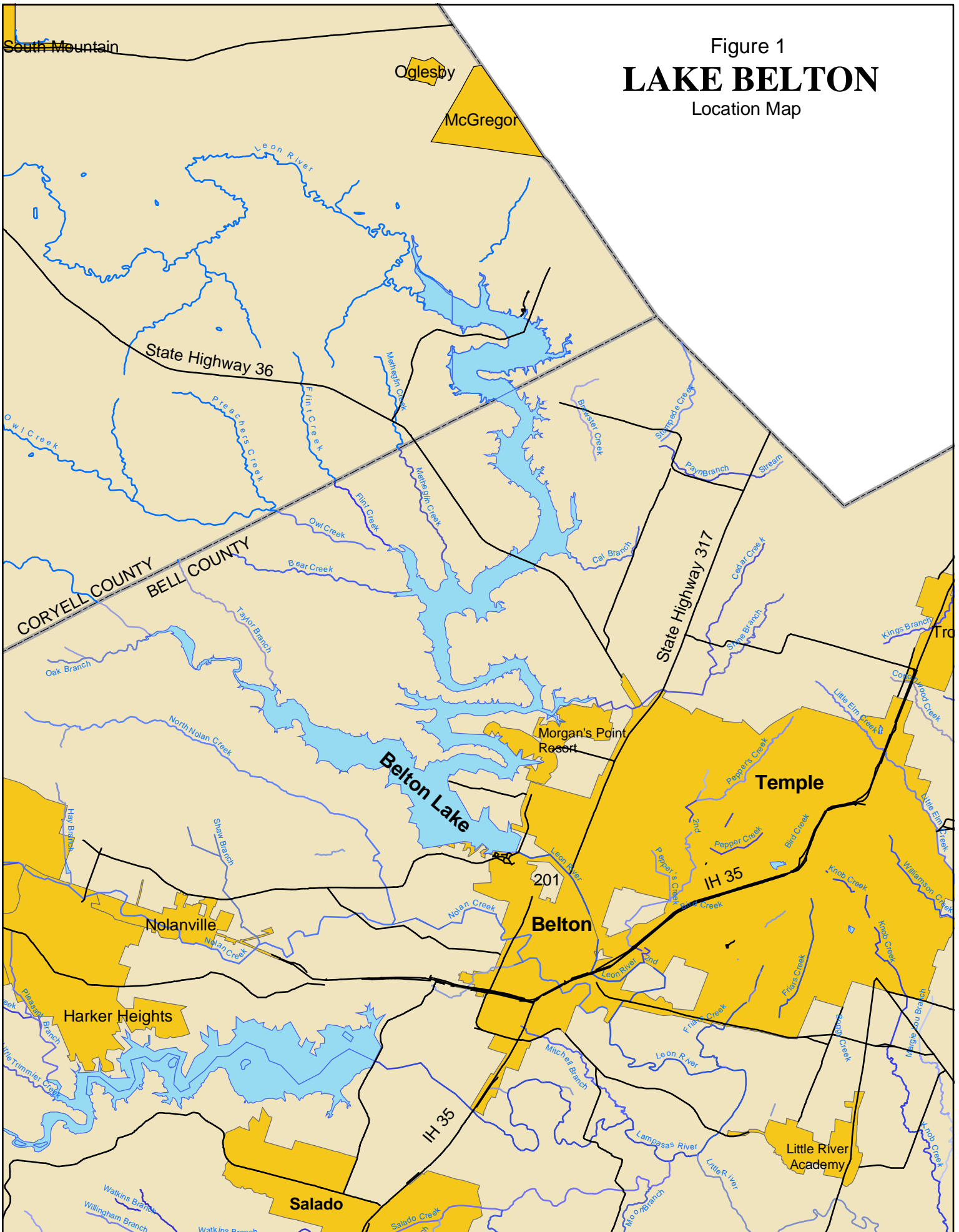


Figure 2  
**LAKE BELTON**  
Location of Survey Data

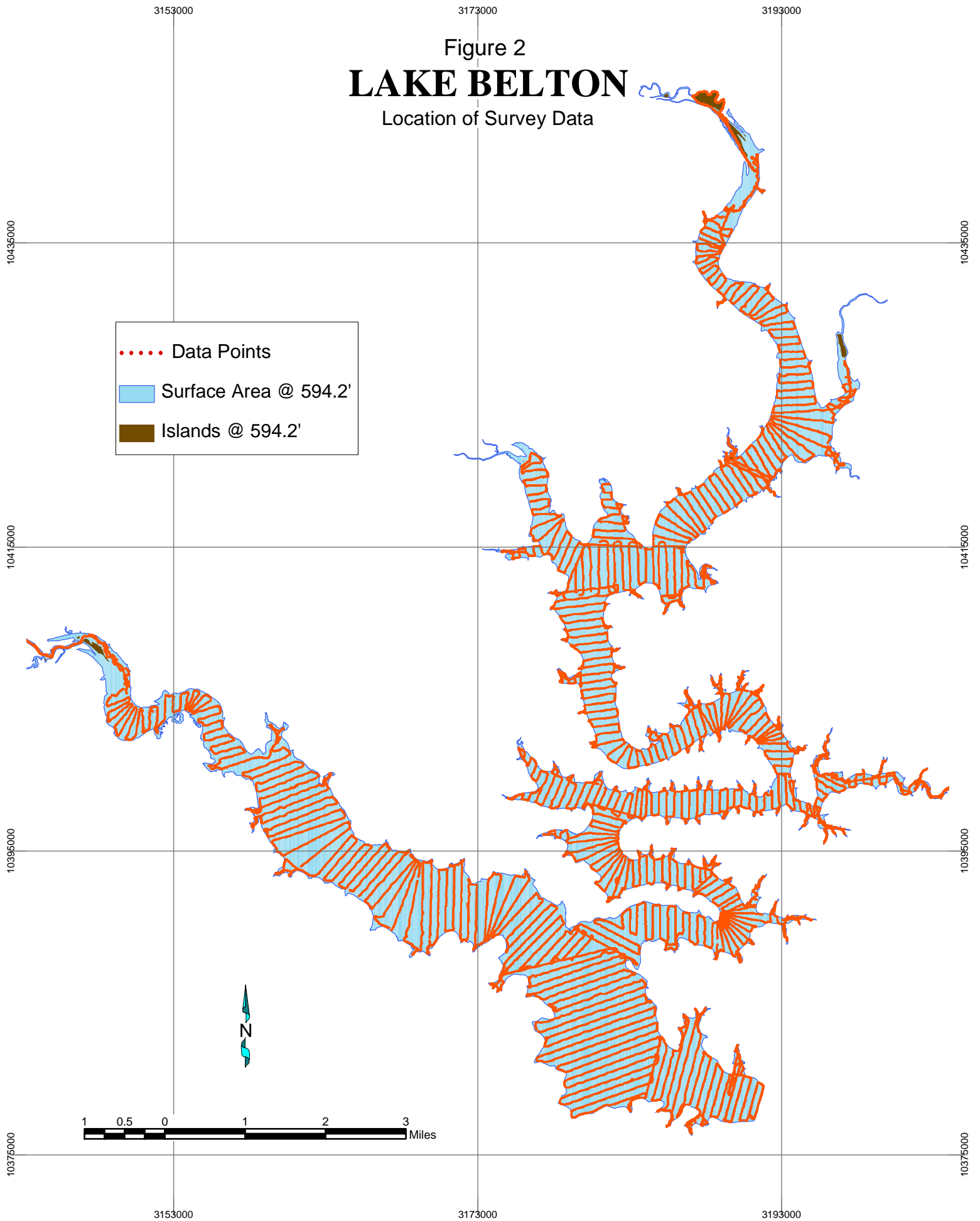
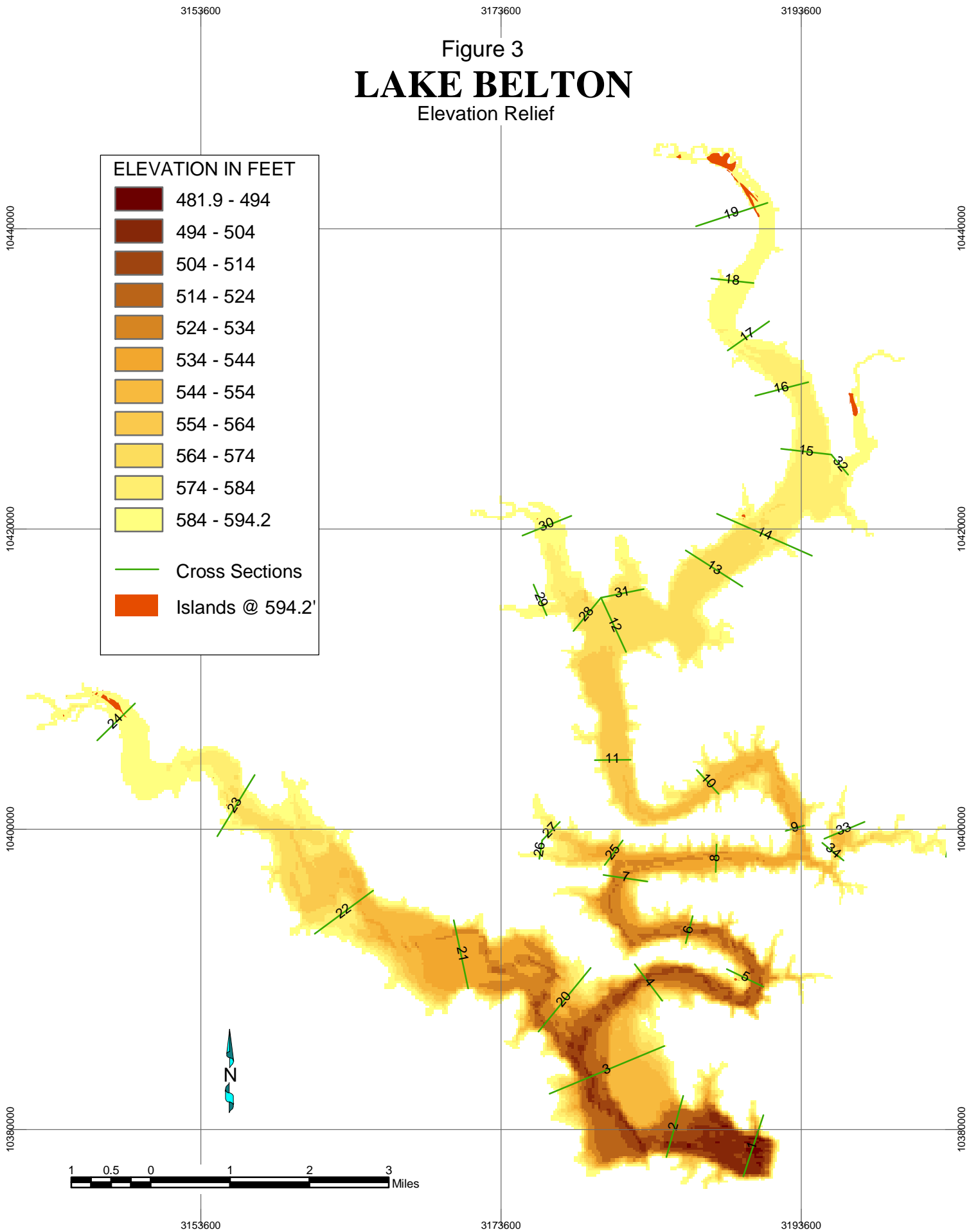


Figure 3  
**LAKE BELTON**  
 Elevation Relief



TWDB Survey May 2003

Figure 4  
**LAKE BELTON**  
Shaded Depth Ranges

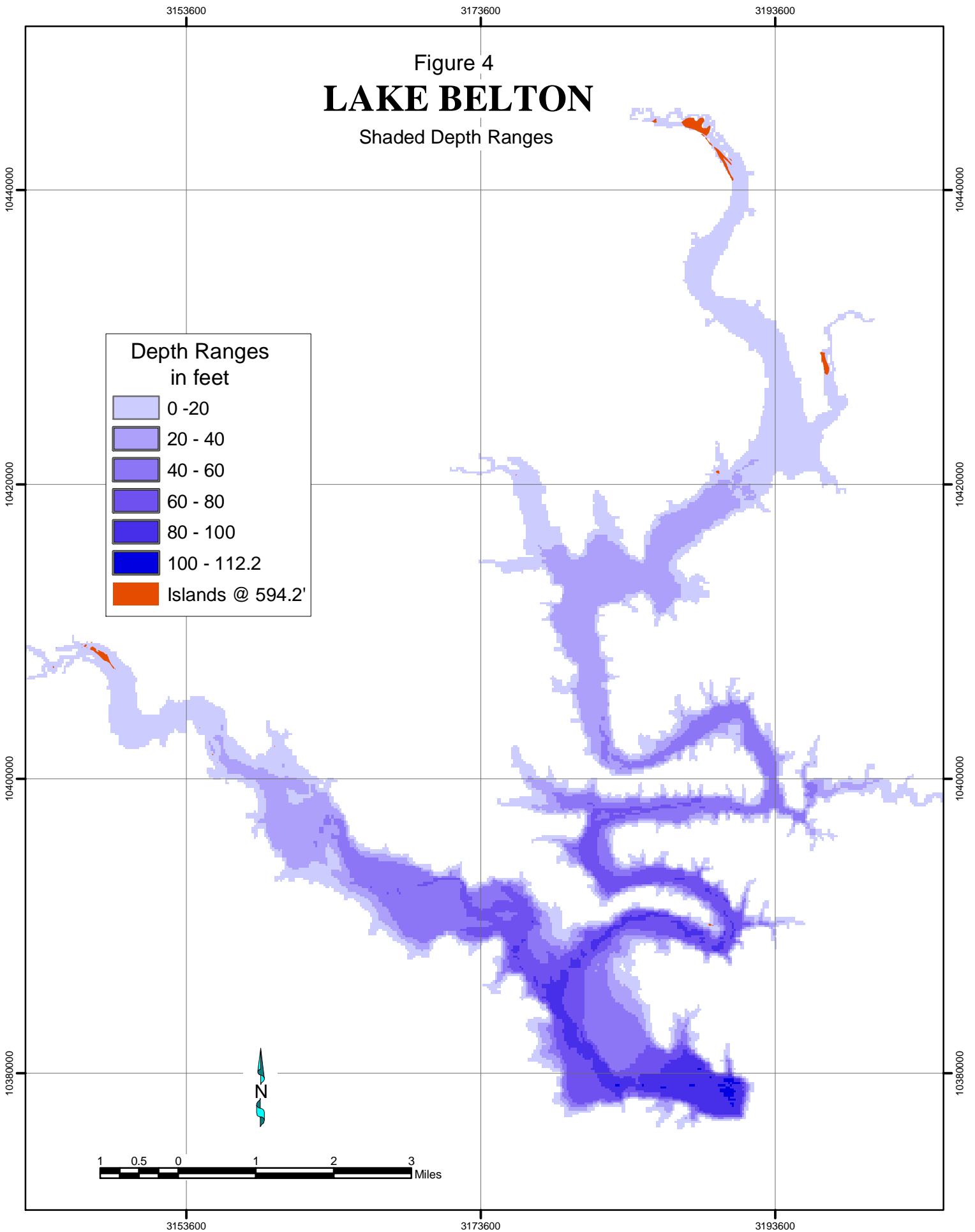
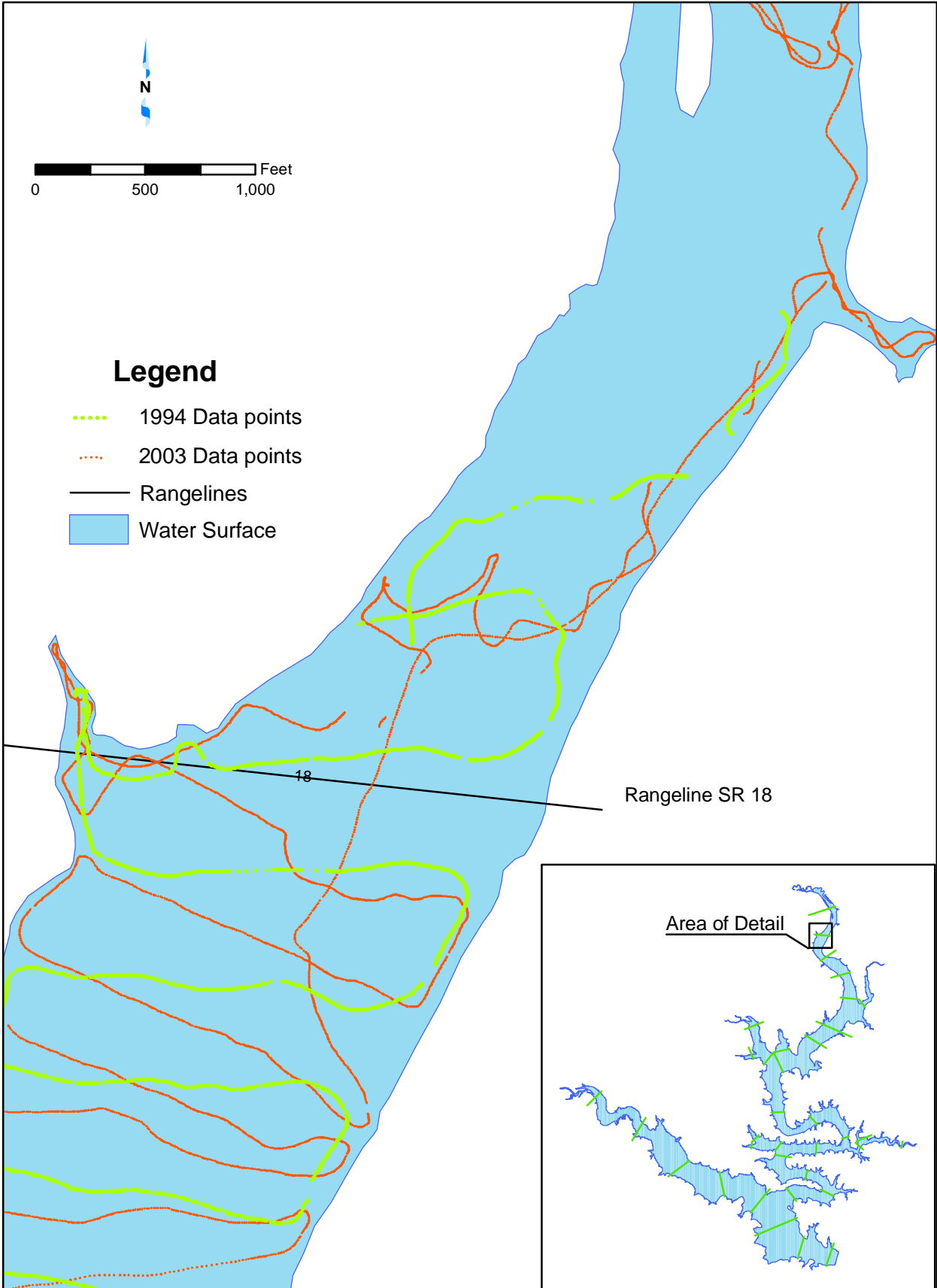


Figure 6  
**LAKE BELTON**  
Deltaic Activity



Appendix A  
**Belton Lake**  
**RESERVOIR VOLUME TABLE**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

Conservation Pool Elevation 594.0

VOLUME IN ACRE-FEET

ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
481		0	0	0	0	0	0	0	0	0
482	0	0	0	0	0	0	0	0	0	0
483	0	0	0	0	0	0	0	0	0	0
484	0	0	0	0	0	0	0	0	0	0
485	0	0	0	0	0	1	1	1	1	1
486	1	1	1	1	1	1	2	2	2	2
487	3	3	3	3	4	4	4	5	5	6
488	6	7	7	8	8	9	9	10	11	11
489	12	13	13	14	15	16	17	18	19	20
490	21	23	24	25	26	28	29	31	32	34
491	36	37	39	41	43	45	47	49	51	53
492	55	58	60	63	65	68	71	73	76	79
493	82	85	89	92	95	99	103	106	110	114
494	118	122	127	131	136	141	146	151	157	162
495	168	174	180	186	193	199	206	213	220	227
496	235	243	251	259	268	276	285	294	304	313
497	323	333	343	354	364	375	386	397	408	420
498	432	444	456	468	481	494	507	520	534	548
499	562	576	590	605	620	635	650	666	682	698
500	714	730	747	764	782	799	817	835	854	872
501	891	911	930	950	971	991	1012	1034	1055	1077
502	1099	1122	1145	1168	1192	1216	1241	1266	1291	1317
503	1344	1371	1398	1426	1455	1484	1514	1544	1574	1605
504	1637	1669	1701	1733	1766	1799	1833	1867	1901	1935
505	1970	2006	2041	2077	2114	2151	2188	2225	2263	2301
506	2339	2378	2417	2456	2496	2536	2577	2617	2659	2700
507	2742	2784	2827	2869	2913	2956	3000	3044	3089	3134
508	3179	3224	3270	3317	3363	3411	3458	3506	3554	3603
509	3652	3702	3752	3802	3853	3904	3956	4007	4059	4112
510	4165	4218	4272	4325	4380	4434	4490	4545	4601	4657
511	4714	4771	4829	4887	4945	5004	5063	5123	5183	5244
512	5305	5366	5428	5491	5554	5617	5681	5745	5810	5876
513	5941	6008	6075	6142	6210	6278	6347	6416	6486	6556
514	6627	6698	6770	6843	6916	6989	7063	7138	7213	7289
515	7366	7443	7521	7600	7679	7759	7840	7922	8004	8087
516	8171	8256	8342	8428	8515	8604	8693	8784	8875	8968
517	9061	9156	9251	9347	9445	9543	9642	9742	9843	9946
518	10049	10153	10258	10364	10471	10578	10687	10797	10907	11019
519	11131	11244	11358	11472	11588	11704	11821	11939	12057	12177
520	12297	12417	12539	12661	12784	12908	13032	13158	13284	13410
521	13538	13666	13795	13925	14056	14187	14319	14452	14586	14721
522	14856	14992	15128	15265	15403	15542	15682	15822	15962	16104
523	16246	16389	16533	16677	16822	16968	17114	17262	17410	17559
524	17709	17859	18011	18163	18316	18470	18625	18780	18937	19095
525	19253	19412	19573	19734	19896	20059	20222	20387	20551	20717
526	20884	21051	21219	21388	21557	21727	21898	22070	22242	22416
527	22590	22764	22939	23115	23292	23469	23648	23826	24006	24186
528	24367	24549	24731	24915	25099	25283	25468	25654	25841	26029
529	26217	26406	26595	26786	26977	27169	27361	27555	27749	27944
530	28140	28336	28534	28732	28931	29130	29331	29532	29734	29937
531	30141	30346	30551	30757	30965	31173	31382	31592	31802	32014
532	32226	32440	32654	32869	33085	33302	33520	33739	33959	34179
533	34401	34624	34847	35072	35297	35524	35751	35980	36210	36440
534	36672	36905	37139	37374	37610	37847	38085	38325	38565	38807
535	39050	39294	39539	39785	40032	40281	40531	40782	41034	41287
536	41542	41798	42055	42313	42572	42833	43094	43357	43621	43886
537	44152	44419	44687	44956	45227	45498	45770	46043	46317	46592

## Appendix A (continued)

**Belton Lake****RESERVOIR VOLUME TABLE**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

VOLUME IN ACRE-FEET

ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
538	46869	47146	47424	47704	47984	48266	48548	48832	49116	49402
539	49689	49976	50266	50556	50847	51139	51432	51727	52023	52320
540	52618	52917	53217	53519	53822	54125	54430	54736	55043	55352
541	55661	55972	56284	56597	56911	57227	57543	57862	58181	58501
542	58823	59145	59470	59795	60122	60450	60779	61110	61442	61775
543	62109	62444	62781	63118	63457	63796	64137	64479	64822	65166
544	65511	65857	66204	66552	66902	67252	67604	67957	68311	68666
545	69023	69381	69741	70101	70463	70827	71191	71558	71925	72294
546	72665	73036	73410	73785	74161	74539	74918	75298	75680	76064
547	76448	76834	77222	77612	78003	78395	78789	79184	79581	79979
548	80379	80781	81184	81588	81994	82402	82811	83222	83634	84048
549	84464	84881	85299	85719	86140	86563	86987	87413	87840	88268
550	88698	89129	89562	89996	90432	90869	91307	91747	92188	92631
551	93075	93520	93967	94415	94865	95315	95767	96221	96676	97132
552	97589	98048	98509	98970	99434	99898	100364	100831	101299	101769
553	102239	102711	103184	103657	104133	104609	105086	105565	106044	106525
554	107007	107490	107974	108459	108945	109432	109920	110409	110899	111391
555	111883	112377	112872	113368	113865	114363	114862	115362	115864	116366
556	116869	117374	117880	118386	118894	119403	119912	120423	120935	121447
557	121961	122475	122991	123508	124026	124545	125065	125587	126110	126635
558	127161	127687	128216	128745	129276	129807	130340	130874	131410	131946
559	132484	133023	133563	134104	134647	135191	135735	136282	136829	137379
560	137929	138480	139033	139587	140143	140700	141258	141819	142380	142944
561	143508	144074	144642	145211	145782	146354	146928	147503	148080	148658
562	149238	149819	150402	150987	151573	152160	152749	153340	153933	154528
563	155124	155723	156324	156926	157530	158135	158743	159352	159962	160574
564	161187	161802	162418	163035	163653	164273	164894	165517	166140	166765
565	167391	168018	168647	169277	169908	170541	171174	171809	172445	173083
566	173722	174362	175005	175648	176293	176939	177588	178238	178889	179544
567	180200	180858	181518	182179	182843	183509	184177	184847	185520	186196
568	186874	187553	188236	188920	189606	190295	190985	191678	192374	193072
569	193772	194474	195180	195888	196600	197314	198030	198750	199473	200198
570	200925	201655	202387	203121	203858	204597	205339	206083	206830	207579
571	208330	209082	209838	210596	211356	212119	212885	213653	214422	215194
572	215968	216743	437656	218301	219083	219868	220654	221443	222233	223025
573	223819	224615	437656	226212	227014	227818	228624	229432	230242	231054
574	231868	232684	437656	234322	235144	235967	236792	237619	238448	239278
575	240110	240943	437656	242615	243453	244293	245135	245979	246824	247671
576	248520	249372	437656	251082	251941	252801	253664	254530	255397	256267
577	257139	258015	437656	259774	260657	261543	262430	263321	264214	265109
578	266007	266907	437656	268714	269621	270530	271440	272354	273269	274187
579	275107	276029	437656	277881	278811	279742	280676	281611	282549	283488
580	284429	285372	437656	287263	288212	289163	290115	291070	292027	292986
581	293947	294911	437656	296845	297815	298786	299759	300735	301711	302691
582	303671	304653	437656	306623	307612	308601	309593	310586	311581	312579
583	313577	314578	437656	316585	317591	318599	319608	320620	321633	322648
584	323665	324683	437656	326727	327752	328778	329806	330837	331869	332903
585	333939	334977	437656	337058	338102	339147	340194	341244	342294	343347
586	344401	345458	437656	347576	348638	349702	350768	351836	352906	353978
587	355052	356127	437656	358284	359366	360449	361535	362623	363712	364805
588	365898	366995	437656	369194	370298	371403	372510	373620	374731	375845
589	376960	378077	437656	380317	381440	382565	383691	384820	385951	387084
590	388218	389354	437656	391634	392777	393921	395067	396215	397365	398517
591	399670	400825	437656	403142	404304	405467	406633	407802	408973	410147
592	411322	412499	437656	414860	416043	417228	418415	419604	420794	421987
593	423181	424377	437656	426775	427977	429180	430385	431592	432801	434012
594	435225	436439	437656							



Appendix B  
**Belton Lake**  
**RESERVOIR VOLUME TABLE**

TEXAS WATER DEVELOPMENT BOARD  
 VOLUME IN ACRE-FEET

SEPTEMBER 1994 SURVEY  
 ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION IN FEET	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
481	0	0	0	0	0	0	0	0	0	0
482	0	0	0	0	0	0	0	0	0	0
483	0	0	0	0	0	0	0	0	0	1
484	1	1	1	1	1	1	1	1	1	1
485	2	2	2	2	2	2	3	3	3	3
486	3	4	4	4	5	5	5	6	6	7
487	7	8	9	10	10	11	12	13	14	15
488	16	17	18	19	20	22	23	24	26	27
489	29	31	32	34	36	38	40	42	44	47
490	49	51	54	56	59	61	64	66	69	72
491	75	78	81	84	87	90	93	97	100	104
492	107	111	114	118	122	126	130	134	138	142
493	147	151	156	161	166	171	176	181	186	192
494	197	203	209	215	221	228	234	241	248	255
495	262	269	276	284	291	299	307	315	324	332
496	341	350	359	369	378	388	397	407	417	428
497	438	448	459	470	481	492	503	514	526	538
498	549	561	573	586	598	611	624	637	650	663
499	676	690	704	718	732	747	761	776	791	807
500	822	838	854	870	887	904	921	938	955	973
501	991	1010	1028	1048	1067	1087	1107	1128	1149	1170
502	1192	1214	1237	1260	1283	1307	1331	1355	1380	1405
503	1431	1457	1483	1510	1537	1564	1591	1619	1648	1676
504	1705	1735	1764	1794	1824	1855	1886	1917	1949	1981
505	2013	2045	2078	2112	2145	2179	2214	2249	2284	2319
506	2355	2391	2427	2464	2501	2539	2577	2615	2654	2693
507	2733	2772	2813	2853	2894	2936	2977	3020	3062	3105
508	3148	3192	3236	3281	3325	3371	3416	3462	3509	3555
509	3603	3650	3698	3747	3795	3845	3894	3944	3995	4046
510	4097	4149	4201	4254	4307	4361	4415	4469	4524	4580
511	4636	4692	4749	4807	4865	4924	4983	5043	5103	5164
512	5226	5288	5350	5414	5477	5542	5606	5672	5738	5804
513	5871	5939	6007	6075	6145	6214	6285	6356	6427	6499
514	6572	6645	6719	6794	6869	6944	7021	7097	7175	7253
515	7332	7411	7491	7572	7653	7735	7817	7901	7985	8070
516	8156	8242	8330	8419	8508	8598	8690	8782	8875	8969
517	9064	9160	9256	9354	9452	9551	9652	9753	9855	9957
518	10061	10166	10271	10377	10484	10592	10701	10811	10922	11033
519	11145	11258	11372	11486	11602	11718	11835	11953	12072	12192
520	12312	12433	12555	12678	12802	12926	13052	13178	13305	13433
521	13562	13691	13822	13953	14085	14218	14352	14486	14622	14758
522	14895	15033	15172	15311	15451	15592	15734	15876	16019	16163
523	16307	16452	16598	16745	16892	17040	17188	17338	17488	17638
524	17790	17942	18095	18248	18403	18558	18713	18870	19027	19185
525	19343	19502	19662	19822	19983	20145	20307	20470	20633	20797
526	20962	21128	21294	21461	21628	21796	21965	22135	22306	22477
527	22649	22821	22994	23168	23342	23517	23693	23870	24047	24224
528	24403	24582	24762	24943	25124	25306	25488	25672	25856	26041
529	26227	26414	26601	26789	26978	27168	27358	27550	27742	27935
530	28128	28323	28518	28714	28911	29109	29307	29506	29706	29907
531	30109	30311	30515	30719	30924	31130	31337	31545	31754	31964
532	32174	32385	32598	32811	33026	33241	33457	33674	33892	34111
533	34332	34553	34775	34999	35223	35448	35675	35902	36131	36360
534	36591	36823	37056	37290	37525	37761	37999	38238	38478	38719
535	38961	39204	39449	39694	39941	40189	40437	40687	40938	41189
536	41442	41696	41951	42207	42464	42722	42981	43241	43502	43765
537	44028	44292	44557	44823	45090	45358	45627	45897	46168	46440



Appendix C  
**Belton Lake**  
**RESERVOIR AREA TABLE**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

Conservation Pool Elevation 594.0

AREA IN ACRES

ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
481		0	0	0	0	0	0	0	0	0
482	0	0	0	0	0	0	0	0	0	0
483	0	0	0	0	0	0	0	0	0	0
484	0	0	0	0	0	0	0	0	0	0
485	0	0	0	0	0	0	0	1	1	1
486	1	1	1	1	2	2	2	2	2	2
487	3	3	3	3	3	3	4	4	4	5
488	5	5	5	5	6	6	6	6	7	7
489	7	7	8	8	9	9	10	10	11	11
490	12	12	13	13	14	14	15	15	16	16
491	17	17	18	19	19	20	20	21	22	22
492	23	24	25	25	26	27	28	28	29	30
493	31	32	33	34	35	36	37	38	39	40
494	41	43	45	47	48	50	52	53	55	57
495	58	60	61	63	65	67	69	71	73	75
496	77	79	81	84	86	88	90	93	95	97
497	99	101	103	105	107	109	111	113	115	117
498	119	121	123	125	128	130	132	134	136	139
499	141	143	145	148	150	152	154	157	159	162
500	164	167	169	172	175	177	180	183	186	189
501	192	195	198	201	205	208	211	215	218	221
502	225	228	232	236	239	244	248	253	257	262
503	267	272	278	283	289	294	299	304	308	312
504	316	319	323	327	330	334	337	341	344	348
505	351	355	358	362	365	369	372	376	379	382
506	386	389	392	396	399	403	406	410	413	417
507	420	423	427	430	433	437	440	444	447	451
508	454	458	461	465	469	473	477	482	486	490
509	494	498	502	505	509	512	516	519	523	527
510	530	534	537	541	545	549	553	557	561	565
511	569	574	578	582	586	590	595	599	604	608
512	613	617	622	627	632	637	642	646	651	656
513	660	665	670	675	680	685	690	696	701	706
514	711	717	722	727	733	738	744	750	756	763
515	770	777	783	790	797	804	812	819	827	835
516	843	852	861	870	879	888	899	910	921	930
517	940	949	959	969	978	987	997	1006	1016	1026
518	1036	1045	1055	1064	1073	1083	1092	1101	1109	1118
519	1126	1134	1143	1150	1158	1166	1174	1181	1189	1196
520	1204	1211	1219	1226	1234	1241	1249	1256	1264	1271
521	1279	1287	1295	1303	1310	1318	1326	1333	1341	1348
522	1355	1362	1369	1376	1384	1390	1397	1404	1411	1418
523	1425	1433	1440	1447	1455	1462	1470	1478	1486	1494
524	1501	1509	1518	1526	1535	1544	1553	1562	1571	1580
525	1589	1599	1607	1616	1624	1632	1639	1646	1653	1661
526	1668	1676	1683	1691	1698	1706	1714	1721	1728	1736
527	1743	1750	1756	1763	1770	1777	1785	1792	1799	1806
528	1814	1821	1828	1835	1842	1849	1856	1863	1871	1878
529	1885	1893	1901	1908	1916	1923	1930	1938	1946	1954
530	1961	1969	1977	1985	1993	2001	2009	2017	2025	2034
531	2042	2051	2060	2068	2077	2085	2094	2103	2112	2120
532	2129	2138	2147	2156	2165	2174	2184	2193	2202	2212
533	2221	2231	2241	2250	2260	2270	2280	2291	2301	2312
534	2323	2334	2344	2355	2366	2377	2388	2400	2412	2423
535	2434	2445	2456	2468	2480	2492	2505	2517	2528	2540
536	2552	2563	2576	2588	2599	2611	2622	2633	2644	2655
537	2666	2676	2687	2697	2707	2717	2727	2736	2746	2757

## Appendix C (continued)

**Belton Lake****RESERVOIR AREA TABLE**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

AREA IN ACRES

ELEVATION INCREMENT IS ONE TENTH FOOT

ELEVATION in Feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
538	2768	2778	2789	2799	2809	2819	2830	2841	2852	2862
539	2873	2884	2895	2906	2917	2929	2940	2951	2962	2975
540	2987	2998	3010	3021	3032	3043	3054	3065	3077	3089
541	3101	3114	3127	3138	3149	3161	3174	3186	3197	3210
542	3222	3235	3248	3261	3274	3288	3300	3312	3325	3337
543	3348	3359	3369	3380	3390	3401	3412	3424	3434	3445
544	3455	3466	3477	3489	3500	3511	3523	3536	3549	3561
545	3574	3587	3601	3614	3627	3640	3654	3668	3683	3697
546	3711	3726	3741	3756	3770	3784	3798	3812	3826	3841
547	3855	3871	3886	3901	3916	3931	3946	3961	3976	3992
548	4007	4022	4038	4053	4068	4085	4101	4116	4132	4146
549	4161	4176	4191	4205	4220	4235	4249	4263	4278	4293
550	4307	4321	4335	4349	4363	4377	4390	4405	4418	4432
551	4446	4461	4475	4489	4501	4514	4527	4541	4555	4569
552	4583	4597	4611	4625	4639	4652	4664	4676	4688	4699
553	4710	4722	4733	4744	4756	4768	4780	4791	4802	4813
554	4824	4834	4844	4855	4865	4875	4886	4897	4909	4920
555	4931	4943	4954	4965	4976	4987	4997	5007	5018	5029
556	5040	5051	5062	5072	5082	5092	5102	5112	5121	5131
557	5141	5151	5161	5173	5185	5198	5212	5225	5238	5251
558	5265	5276	5288	5299	5310	5323	5335	5347	5359	5371
559	5383	5396	5408	5419	5431	5443	5457	5470	5483	5496
560	5509	5522	5535	5548	5562	5577	5594	5610	5625	5640
561	5655	5670	5685	5700	5714	5729	5744	5759	5775	5790
562	5806	5822	5837	5853	5868	5883	5900	5918	5937	5956
563	5977	5996	6014	6030	6047	6065	6082	6097	6112	6125
564	6138	6152	6165	6179	6192	6204	6217	6229	6242	6255
565	6267	6280	6293	6305	6318	6331	6343	6356	6370	6383
566	6397	6411	6426	6442	6458	6474	6492	6512	6530	6549
567	6571	6589	6607	6627	6647	6667	6693	6718	6744	6766
568	6788	6810	6831	6852	6874	6896	6919	6942	6966	6990
569	7015	7041	7068	7098	7126	7155	7183	7212	7238	7262
570	7285	7308	7332	7356	7381	7406	7429	7452	7477	7499
571	7520	7542	7565	7591	7619	7643	7666	7688	7708	7727
572	7746	7766	7788	7811	7834	7855	7874	7894	7912	7931
573	7949	7968	7987	8007	8028	8050	8071	8091	8111	8131
574	8150	8170	8188	8207	8225	8243	8261	8278	8295	8311
575	8327	8343	8358	8374	8391	8408	8426	8445	8463	8482
576	8503	8528	8552	8574	8597	8618	8640	8662	8687	8712
577	8740	8768	8795	8820	8845	8869	8893	8917	8940	8964
578	8989	9012	9035	9057	9079	9100	9121	9144	9166	9188
579	9211	9236	9260	9283	9305	9325	9345	9365	9383	9401
580	9420	9439	9458	9478	9497	9516	9536	9557	9579	9602
581	9626	9647	9668	9688	9707	9725	9743	9761	9779	9797
582	9815	9833	9851	9870	9888	9907	9924	9943	9961	9980
583	9998	10016	10034	10052	10070	10088	10105	10123	10141	10159
584	10178	10196	10216	10236	10255	10274	10294	10314	10332	10351
585	10370	10388	10407	10425	10444	10462	10481	10499	10518	10536
586	10554	10573	10591	10610	10630	10650	10670	10690	10709	10728
587	10747	10766	10786	10805	10824	10845	10866	10888	10909	10931
588	10952	10976	10998	11020	11043	11064	11084	11105	11124	11143
589	11163	11182	11201	11220	11239	11258	11277	11296	11315	11335
590	11355	11378	11397	11416	11435	11454	11472	11489	11507	11526
591	11544	11563	11583	11604	11626	11648	11671	11697	11726	11746
592	11765	11784	11803	11822	11840	11859	11878	11896	11915	11933
593	11952	11970	11989	12007	12026	12044	12062	12081	12099	12117
594	12135	12154	12404							

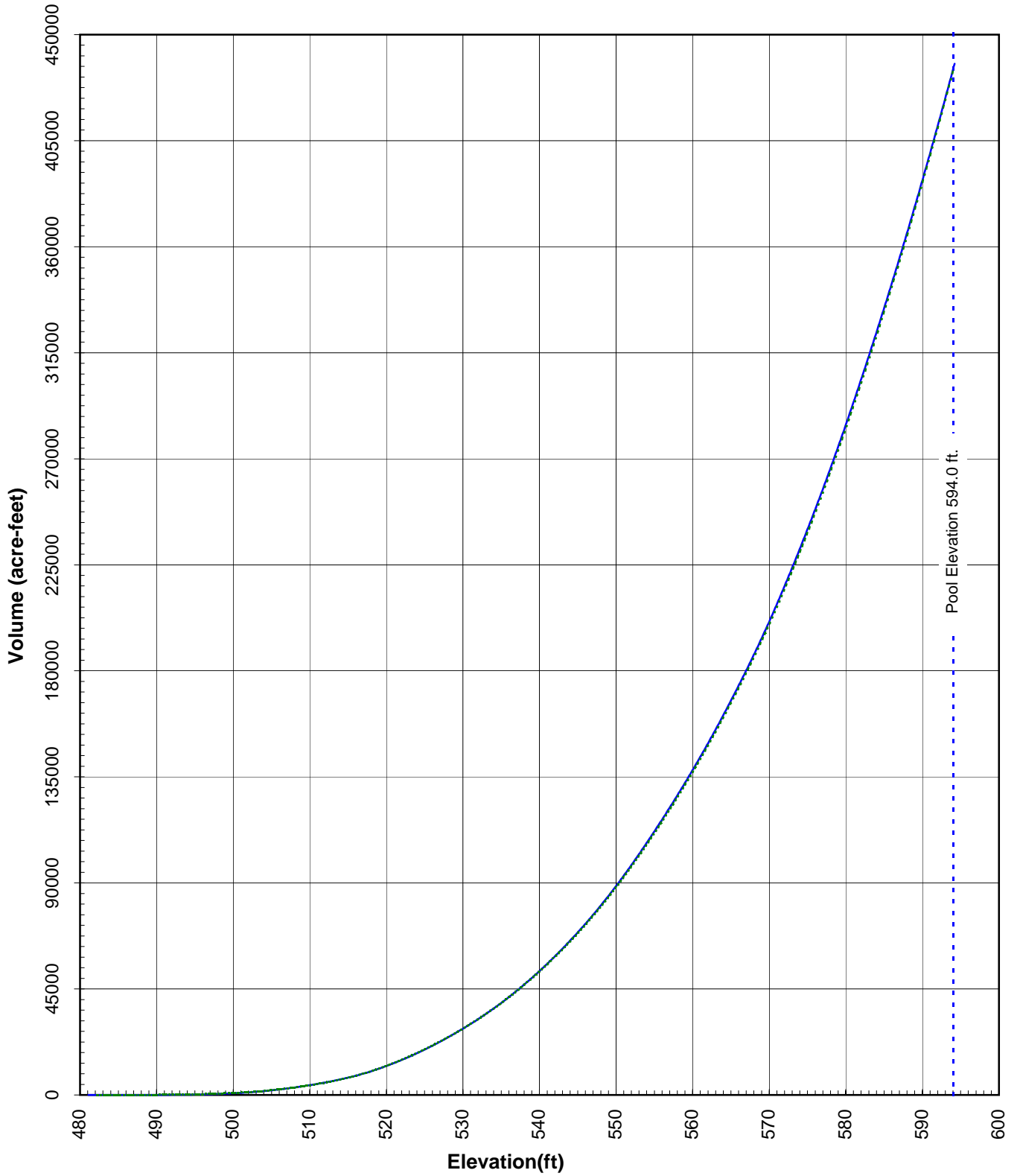
Appendix D  
**Belton Lake**  
**RESERVOIR AREA TABLE**

TEXAS WATER DEVELOPMENT BOARD  
 AREA IN ACRES

SEPTEMBER 1994 SURVEY  
 ELEVATION INCREMENT IS ONE TENTH FOOT

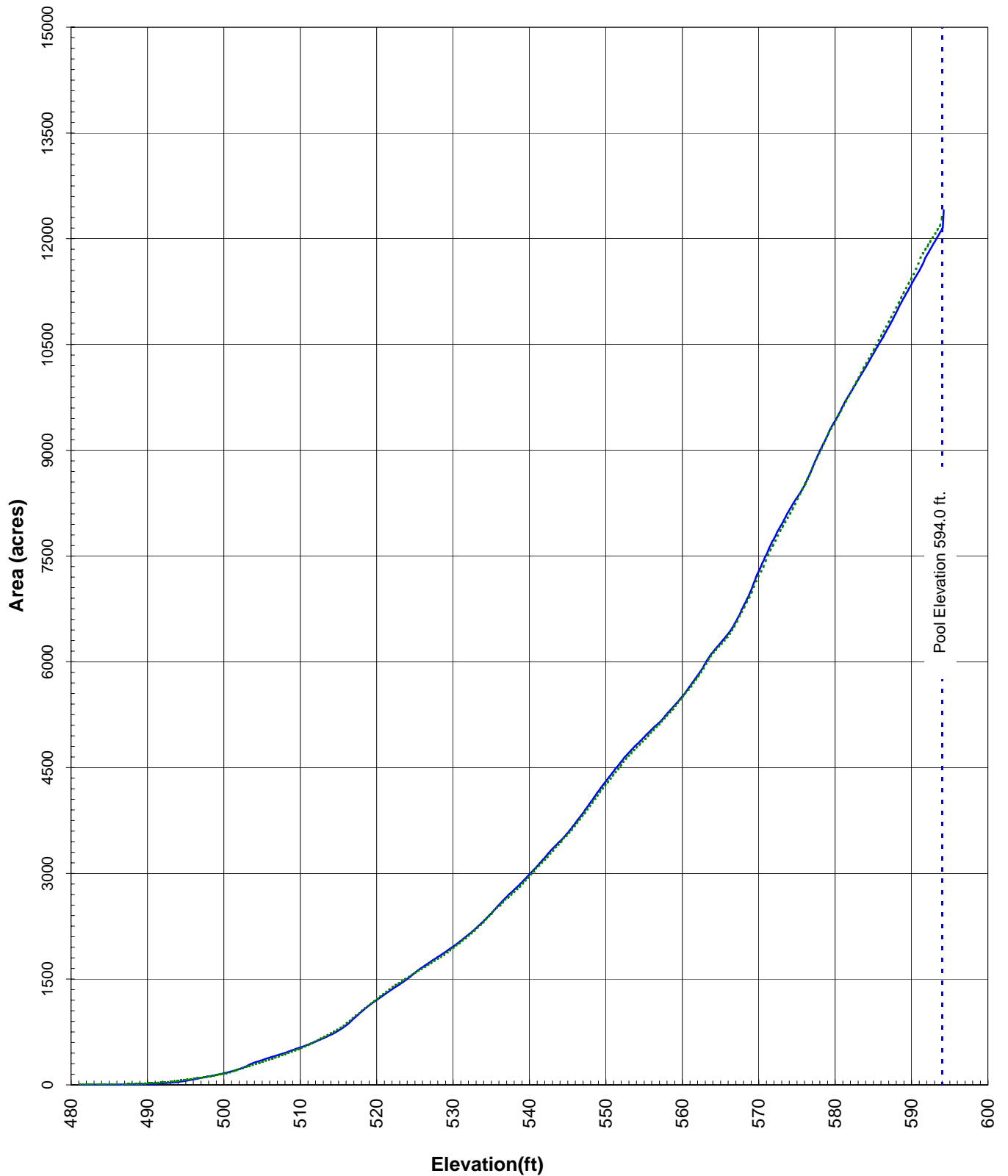
ELEVATION IN FEET	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
481	0	0	0	0	0	0	0	0	0	0
482	0	0	0	0	0	0	0	0	0	0
483	0	0	0	0	0	0	0	1	1	1
484	1	1	1	1	1	1	1	1	1	1
485	1	1	2	2	2	2	2	2	2	2
486	3	3	3	3	4	4	4	5	5	6
487	6	7	7	8	8	8	9	9	10	10
488	10	11	11	12	12	13	14	14	15	15
489	16	17	18	19	19	20	21	21	22	22
490	23	24	24	25	25	26	27	27	28	28
491	29	30	30	31	32	32	33	34	34	35
492	36	36	37	38	39	40	41	41	42	43
493	44	46	47	48	49	50	52	53	55	56
494	57	59	60	61	63	64	66	67	68	70
495	71	73	74	76	78	79	81	83	85	86
496	88	90	92	94	95	97	98	100	101	103
497	104	106	107	109	110	111	113	114	116	117
498	119	120	122	124	125	127	129	130	132	134
499	136	138	140	142	144	146	148	150	152	154
500	157	159	161	164	166	169	171	174	177	180
501	182	186	189	192	196	201	205	209	213	216
502	220	223	227	231	235	238	242	246	250	254
503	257	261	265	268	271	275	278	281	285	288
504	291	294	298	301	304	307	311	314	318	321
505	325	328	332	335	338	342	345	349	352	356
506	359	363	367	370	374	378	381	385	389	393
507	397	401	404	408	412	416	420	423	427	431
508	435	439	443	446	450	454	458	462	466	470
509	474	478	482	486	490	495	499	503	508	512
510	516	520	525	529	533	538	543	547	552	557
511	562	568	573	578	584	590	596	601	607	612
512	618	624	629	635	640	646	651	656	662	667
513	673	678	684	689	695	700	706	712	718	724
514	731	737	742	748	753	759	765	771	778	784
515	790	797	803	810	816	823	830	837	844	853
516	863	873	881	890	900	908	917	926	935	944
517	953	962	971	980	988	997	1006	1015	1024	1033
518	1041	1050	1059	1067	1076	1084	1093	1101	1109	1118
519	1126	1134	1142	1150	1159	1167	1175	1183	1192	1200
520	1208	1216	1224	1233	1241	1249	1258	1267	1275	1284
521	1292	1300	1308	1317	1325	1334	1342	1350	1358	1366
522	1374	1383	1391	1398	1406	1413	1420	1427	1434	1441
523	1448	1455	1462	1469	1475	1482	1489	1496	1503	1510
524	1517	1525	1532	1539	1546	1554	1561	1568	1575	1581
525	1588	1594	1600	1607	1613	1619	1625	1631	1638	1644
526	1651	1658	1665	1672	1679	1687	1694	1701	1708	1715
527	1721	1728	1734	1741	1748	1754	1761	1768	1775	1782
528	1789	1796	1802	1809	1816	1823	1830	1838	1846	1854
529	1862	1870	1878	1886	1894	1901	1909	1917	1925	1933
530	1941	1949	1956	1964	1972	1980	1988	1996	2005	2013
531	2021	2030	2038	2047	2056	2065	2074	2083	2092	2101
532	2110	2119	2129	2138	2148	2157	2167	2176	2186	2197
533	2207	2218	2228	2239	2249	2259	2270	2280	2291	2301
534	2312	2324	2335	2347	2358	2370	2381	2393	2404	2417
535	2428	2439	2450	2461	2471	2482	2491	2501	2512	2522
536	2533	2543	2554	2566	2576	2586	2597	2607	2617	2627
537	2637	2646	2656	2665	2675	2685	2694	2704	2714	2724





- - - Pool Elevation 594.0'     
 — Volume 2003     
 - - - Volume 1995

**Belton Lake**  
 May 2003  
 Prepared by: TWDB



**Belton Lake**  
 May 2003  
 Prepared by: TWDB



Appendix G  
**Belton Lake**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

**Range Line Endpoints**  
 State Plane NAD83 Units-feet

L-Left endpoint  
 R-right endpoint

<u>Range Line</u>	<u>X</u>	<u>Y</u>
SR 01-L	3190992.8	10381091.0
SR 01-R	3189664.8	10377024.0
SR 02-L	3185681.5	10382355.0
SR 02-R	3184554.8	10378301.0
SR 03-L	3184438.8	10385658.0
SR 03-R	3176822.3	10382496.0
SR 04-L	3184301.5	10388674.0
SR 04-R	3182472.3	10391093.0
SR 05-L	3190989.5	10389586.0
SR 05-R	3188566.5	10390776.0
SR 06-L	3186307.8	10394289.0
SR 06-R	3185846.5	10392503.0
SR 07-L	3183296.3	10396599.0
SR 07-R	3180392.3	10397010.0
SR 08-L	3187833.0	10397225.0
SR 08-R	3187893.0	10399054.0
SR 09-L	3193702.8	10400289.0
SR 09-R	3192485.8	10399940.0
SR 10-L	3186572.0	10403992.0
SR 10-R	3188040.8	10402412.0
SR 11-L	3182180.8	10404673.0
SR 11-R	3179809.0	10404635.0
SR 12-L	3181898.0	10411807.0
SR 12-R	3180221.3	10415411.0
SR-13-L	3189612.8	10416155.0
SR-13-R	3185839.8	10418547.0
SR 14-L	3194213.0	10418194.0
SR 14-R	3187929.5	10420983.0
SR 15-L	3195503.3	10424903.0
SR 15-R	3192176.5	10425297.0
SR 16-L	3193981.5	10429725.0
SR 16-R	3190456.8	10428825.0

## Appendix G (continued)

**Belton Lake**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

**Range Line Endpoints**  
State Plane NAD83 Units-feet

L-Left endpoint

R-right endpoint

<u>Range Line</u>	<u>X</u>	<u>Y</u>
SR 17-L	3191389.5	10433750.0
SR 17-R	3188619.3	10431829.0
SR 18-L	3190335.5	10436292.0
SR 18-R	3187535.5	10436594.0
SR 19-L	3191263.8	10441624.0
SR 19-R	3186528.8	10440066.0
SR 31-L	3179545.8	10390859.0
SR 31-R	3176061.0	10386615.0
SR 32-L	3170459.0	10394028.0
SR 32-R	3171413.5	10389490.0
SR 33-L	3165113.3	10395986.0
SR 34-R	3161241.5	10393117.0
SR 34-L	3157247.0	10403664.0
SR 34-R	3154755.8	10399575.0
SR 35-L	3149304.3	10408401.0
SR 35-R	3146796.8	10405943.0
SR 44-L	3181678.5	10399317.0
SR 44-R	3180456.5	10397672.0
SR 45-L	3176325.8	10399323.0
SR 45-R	3176123.8	10398098.0
SR 46-L	3177484.8	10400538.0
SR 46-R	3176325.8	10399323.0
SR 47-L	3180221.3	10415411.0
SR 47-R	3178384.5	10413206.0
SR 48-L	3175750.0	10416287.0
SR 48-R	3176614.8	10414239.0
SR 50-L	3178271.3	10420859.0
SR 50-R	3175021.0	10419528.0
SR 55-L	3183063.8	10415990.0
SR 55-R	3180221.3	10415411.0
SR 59-L	3196615.8	10423573.0
SR 59-R	3195503.3	10424903.0

Appendix G (continued)  
**Belton Lake**

TEXAS WATER DEVELOPMENT BOARD

MAY 2003 SURVEY

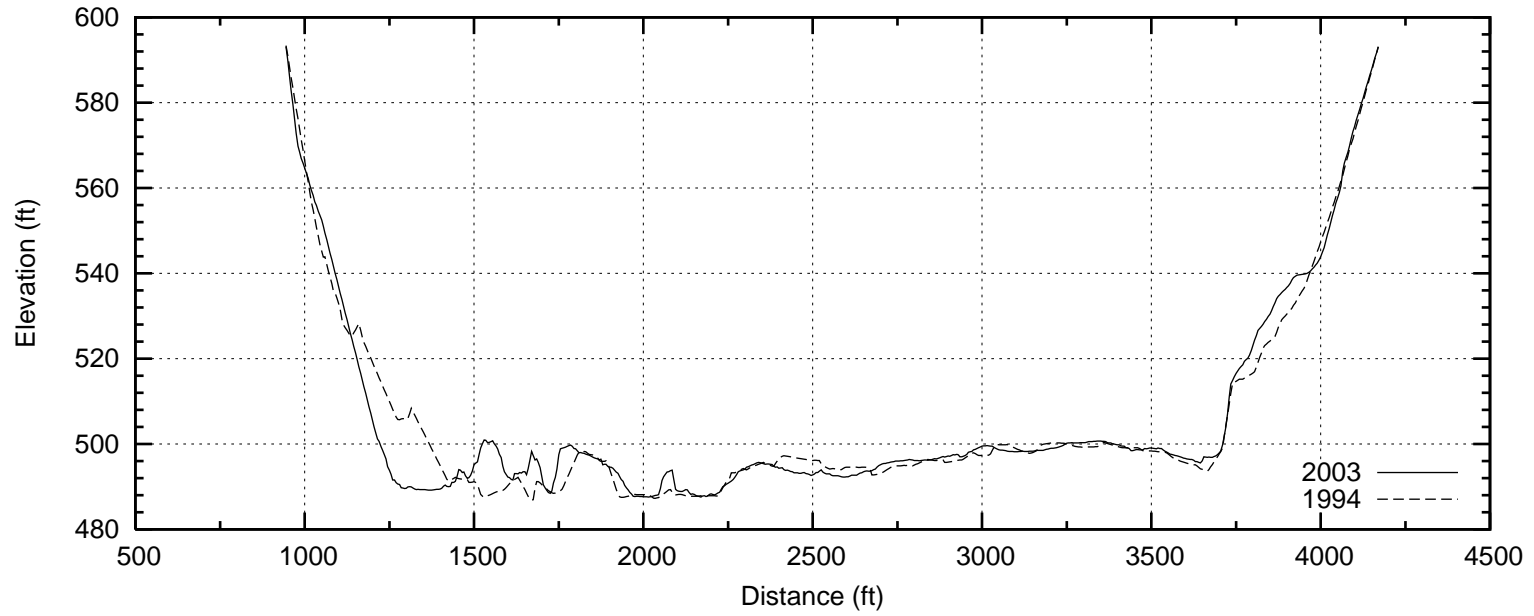
**Range Line Endpoints**  
State Plane NAD83 Units-feet

L-Left endpoint  
R-right endpoint

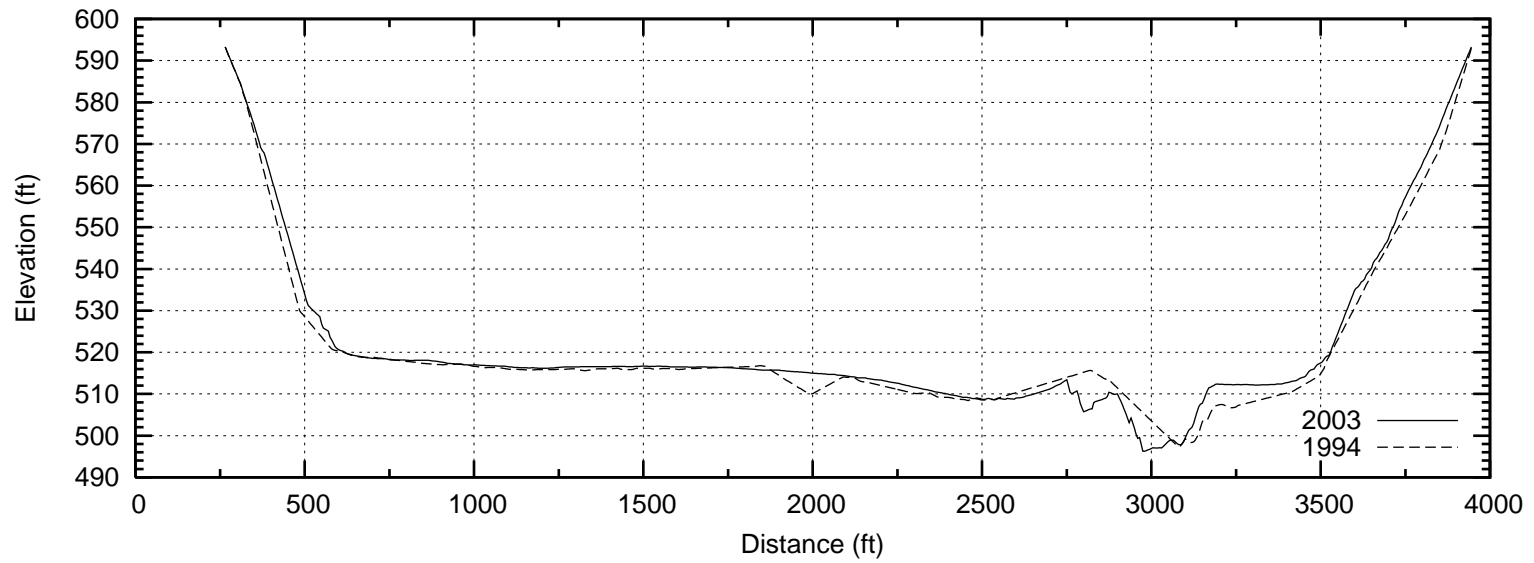
<u>Range Line</u>	<u>X</u>	<u>Y</u>
SR 63-L	3197710.8	10400556.0
SR 63-R	3195037.0	10399430.0
SR 64-L	3196313.5	10397986.0
SR 64-R	3194902.3	10399148.0
SR 65-L	3203106.5	10398231.0
SR 65-R	3203374.5	10399432.0

# Belton Lake

## Rangeline SR01

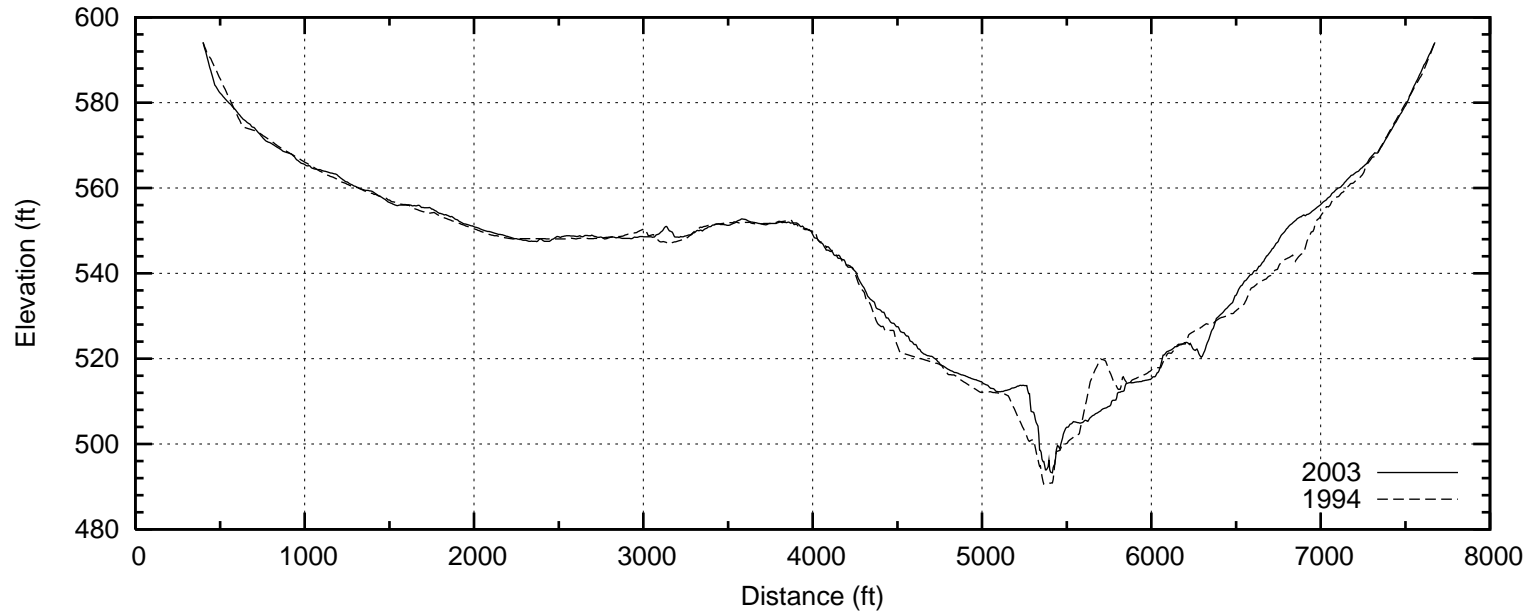


## Rangeline SR02

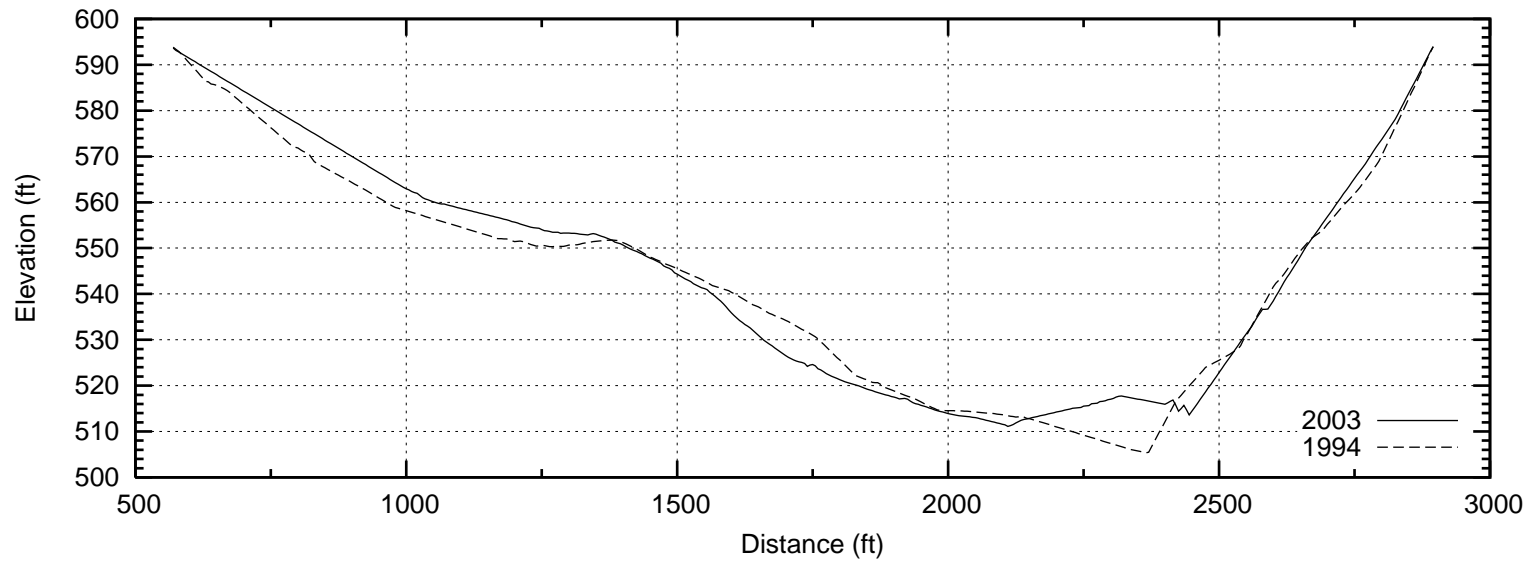


# Belton Lake

## Rangeline SR03

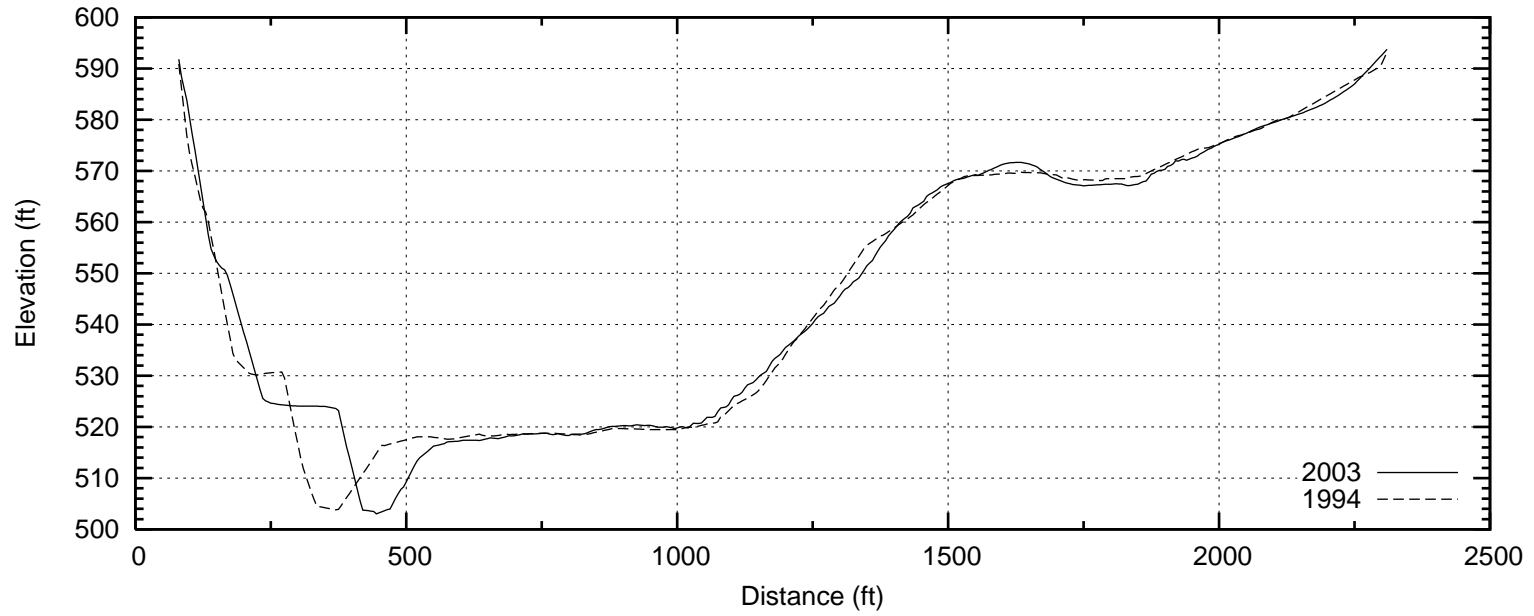


## Rangeline SR04

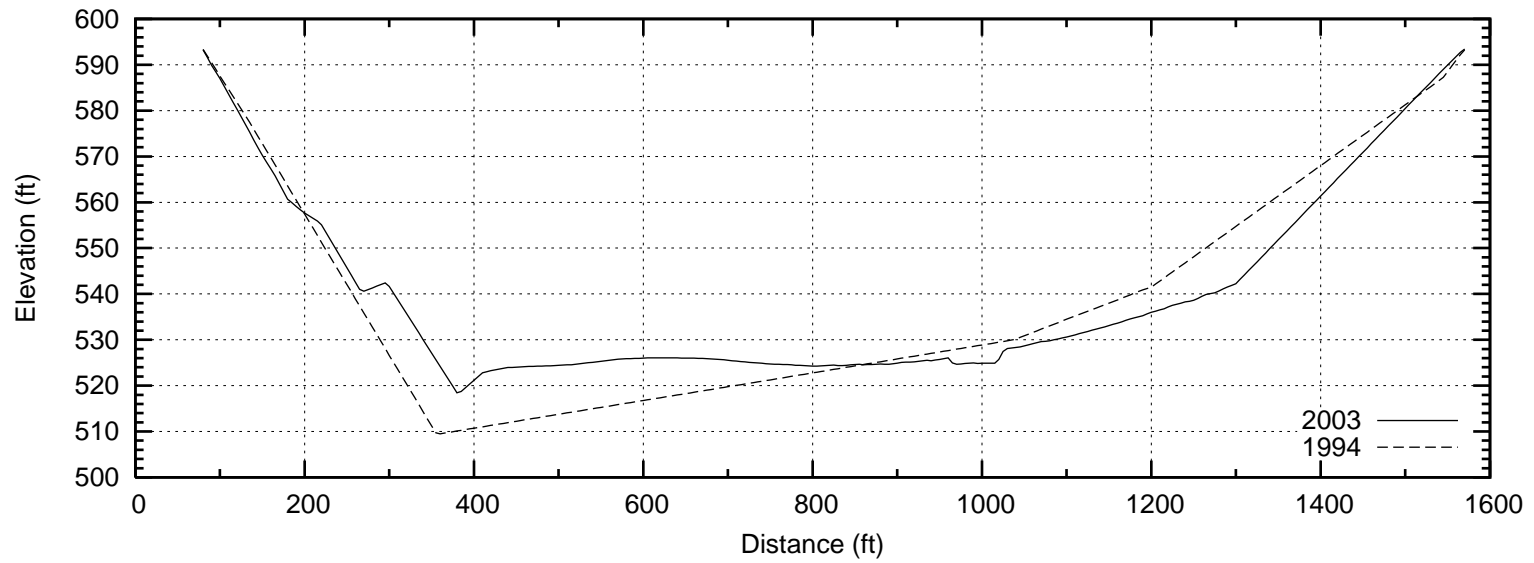


# Belton Lake

## Rangeline SR05

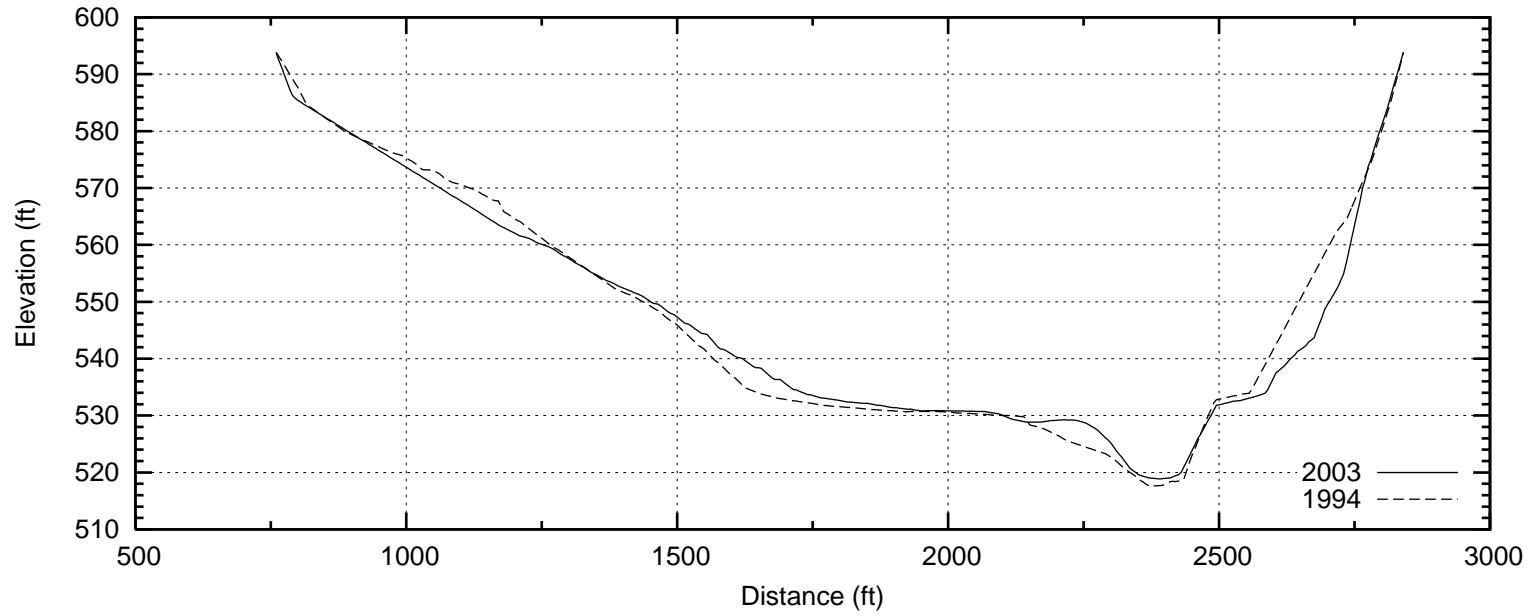


## Rangeline SR06

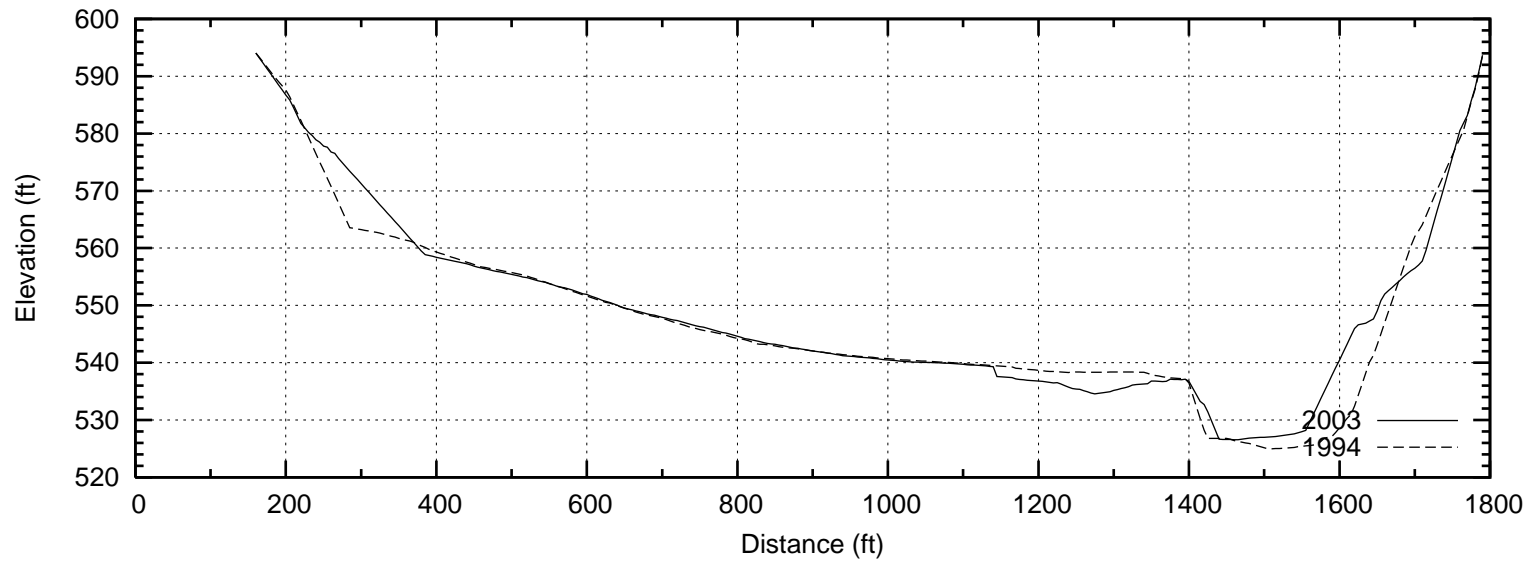


# Belton Lake

## Rangeline SR07

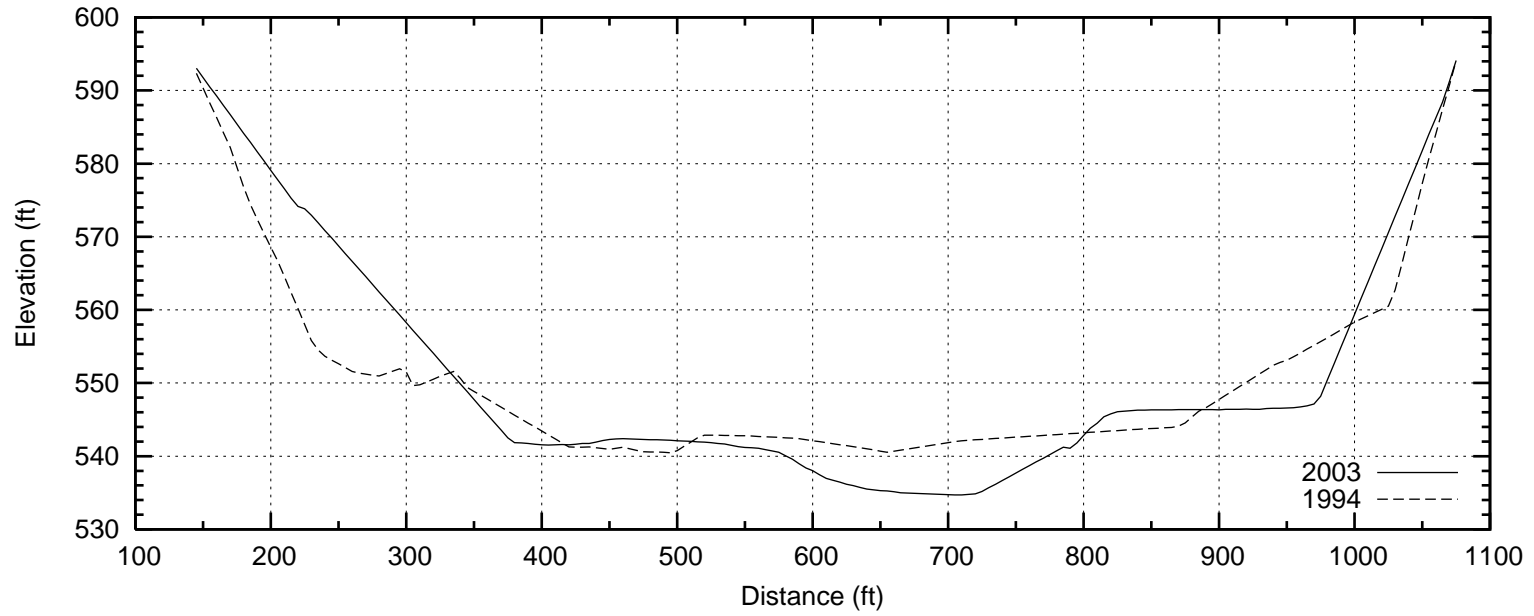


## Rangeline SR08

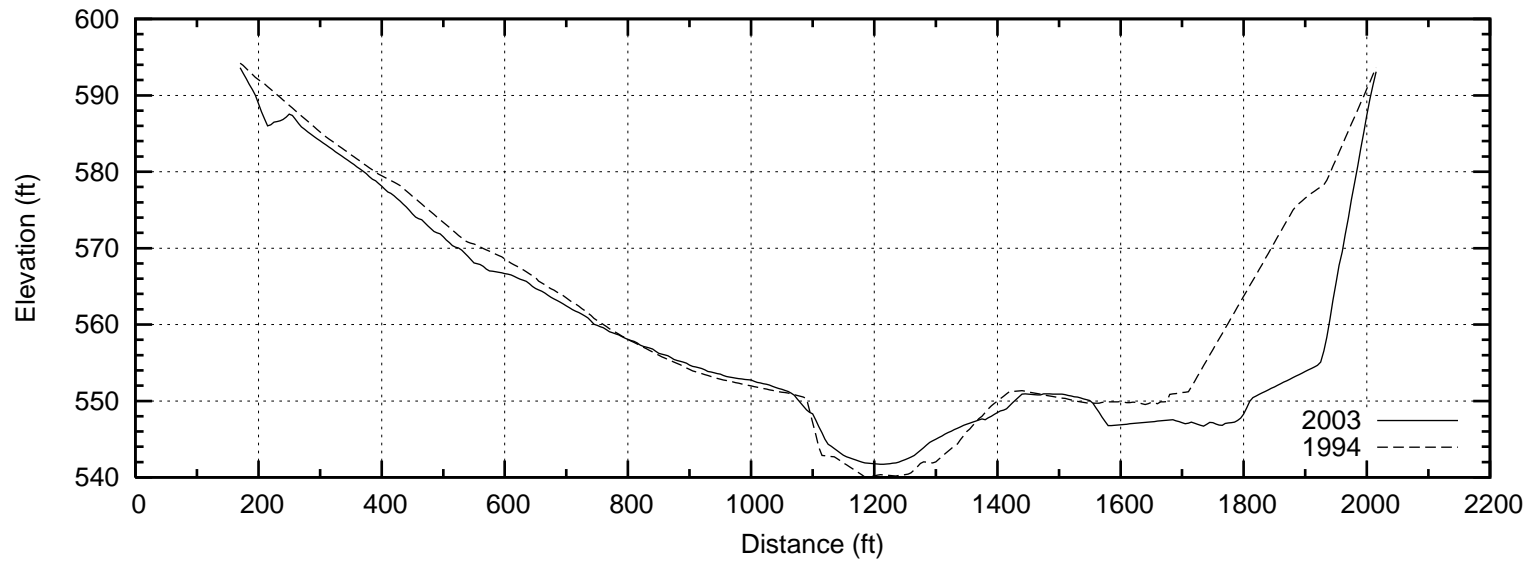


# Belton Lake

## Rangeline SR09



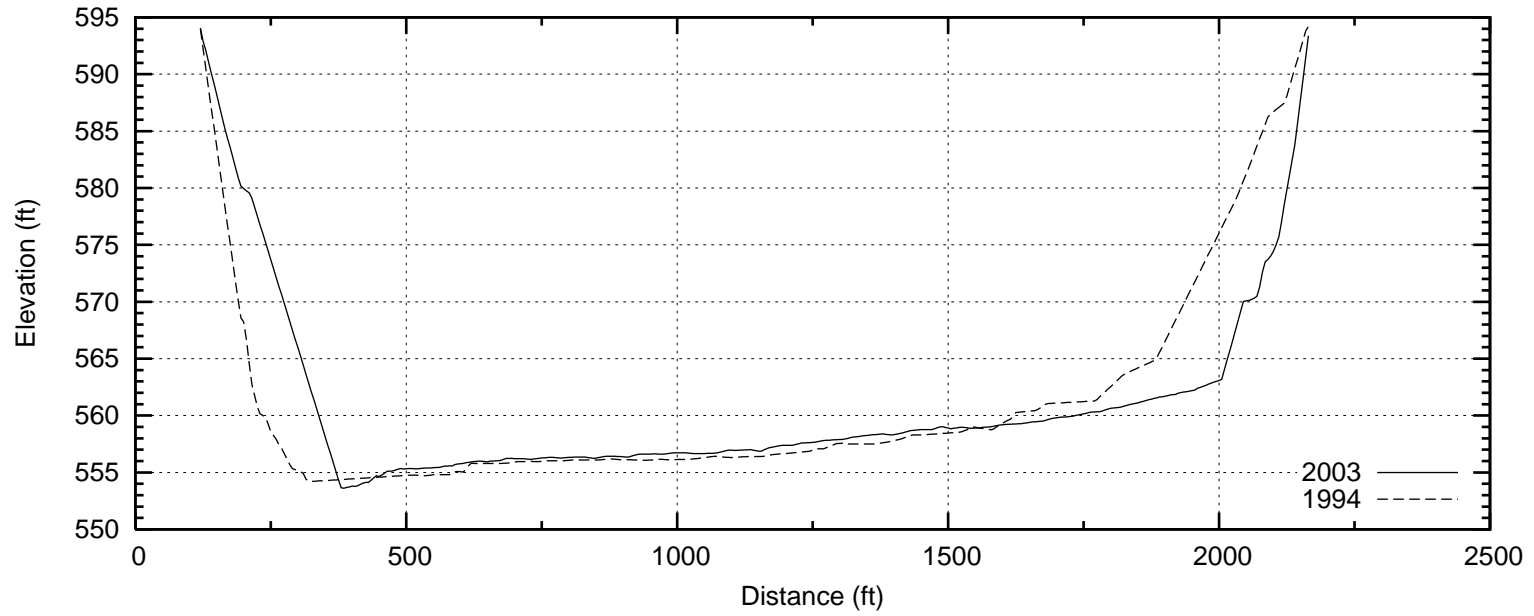
## Rangeline SR10



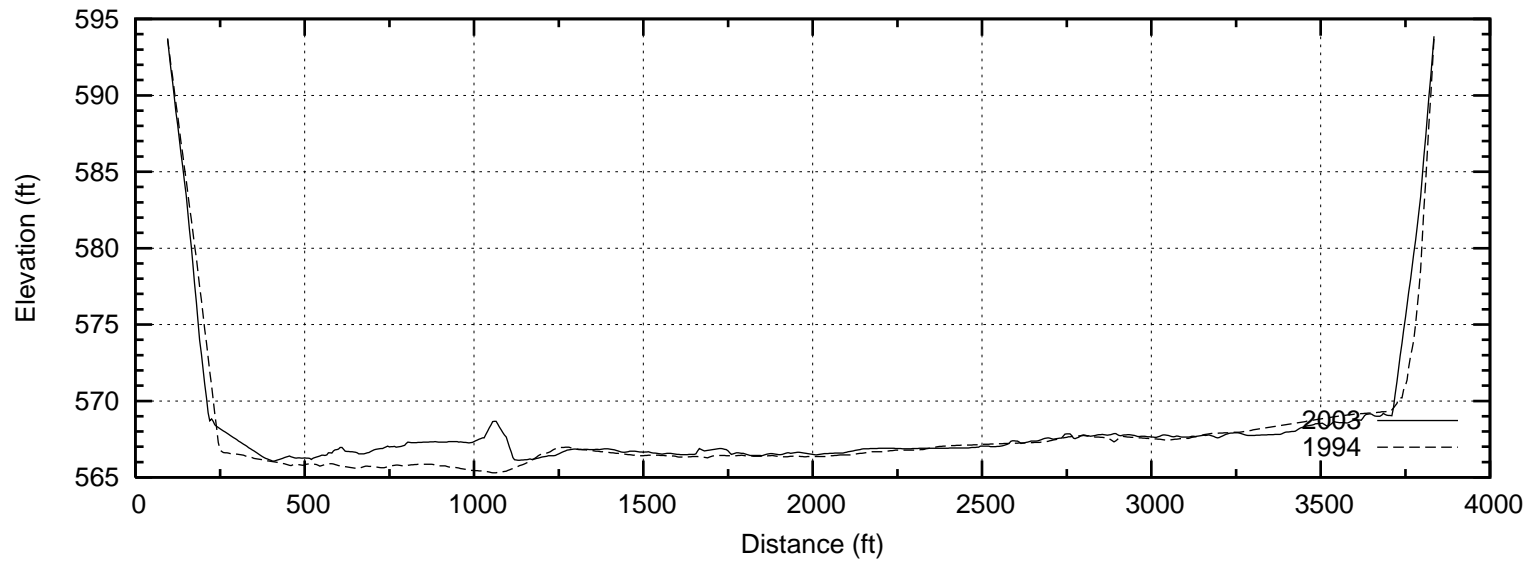


# Belton Lake

## Rangeline SR11

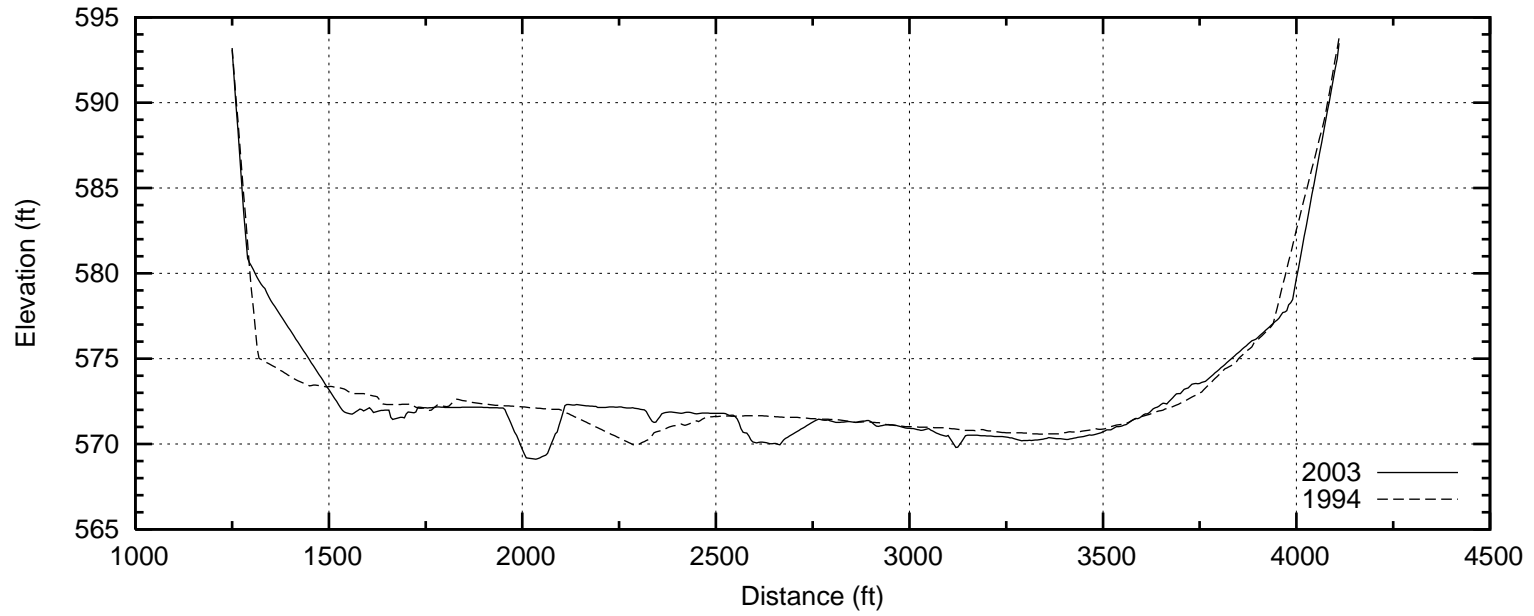


## Rangeline SR12

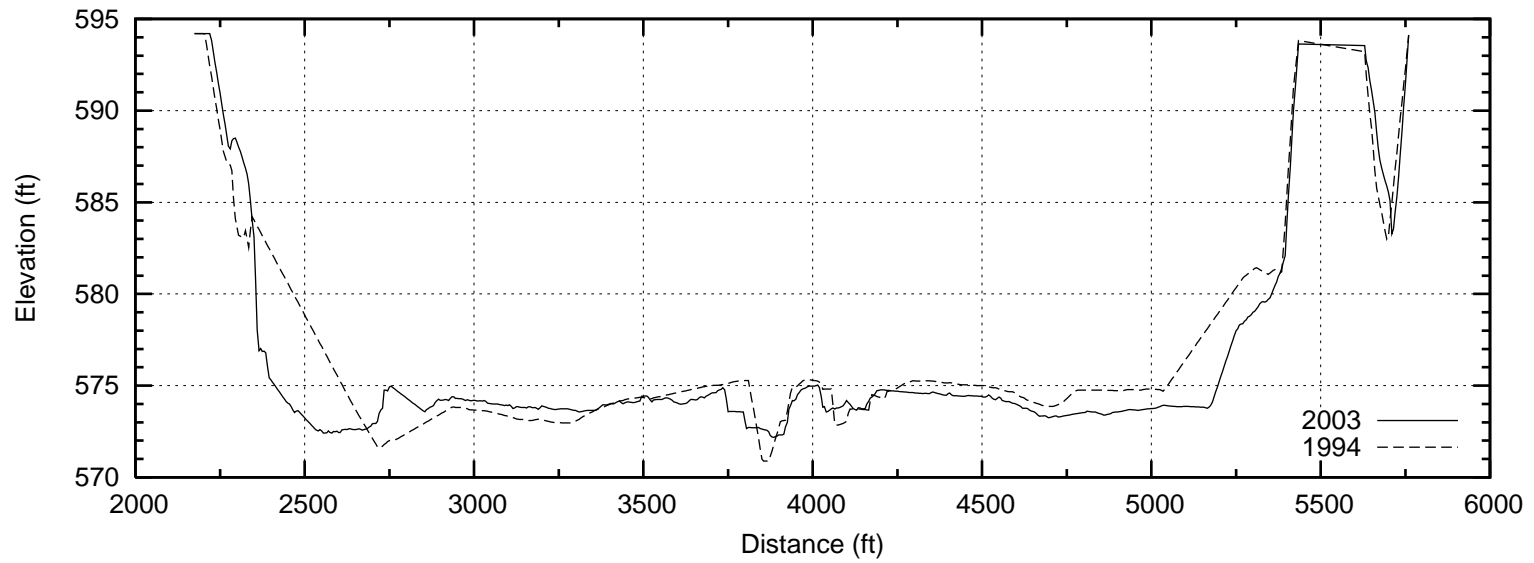


# Belton Lake

## Rangeline SR13

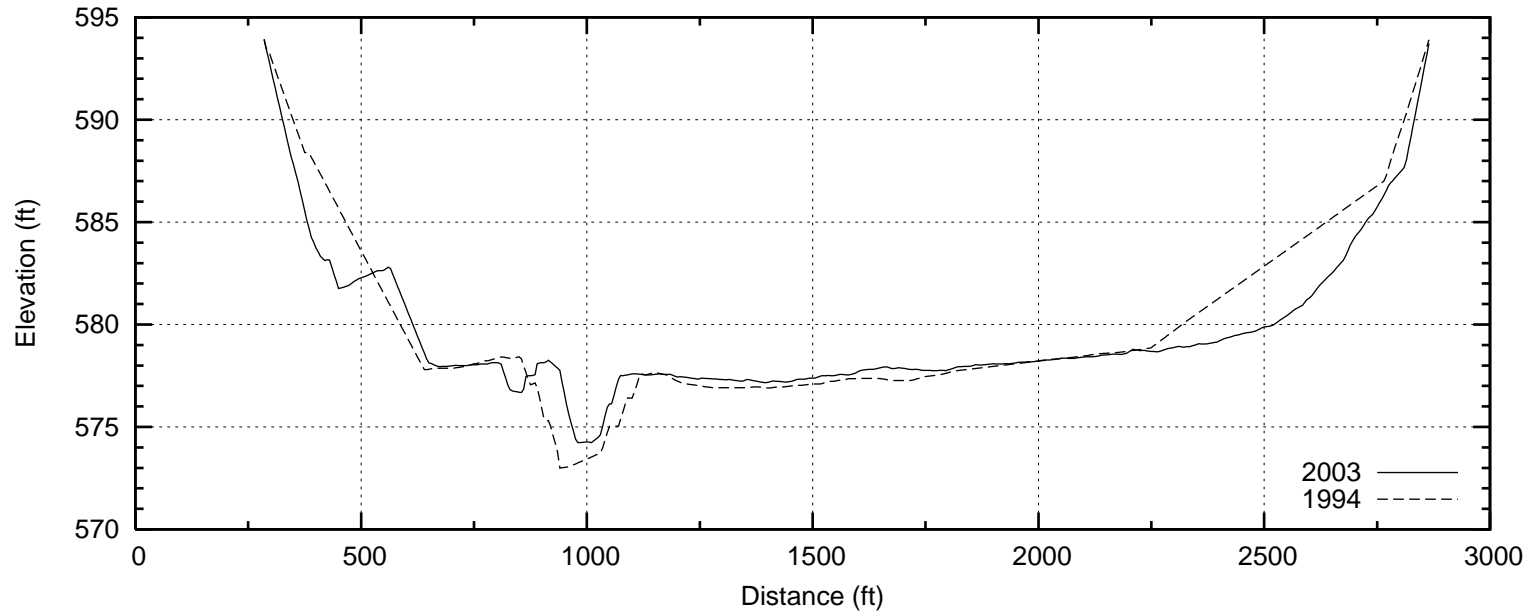


## Rangeline SR14

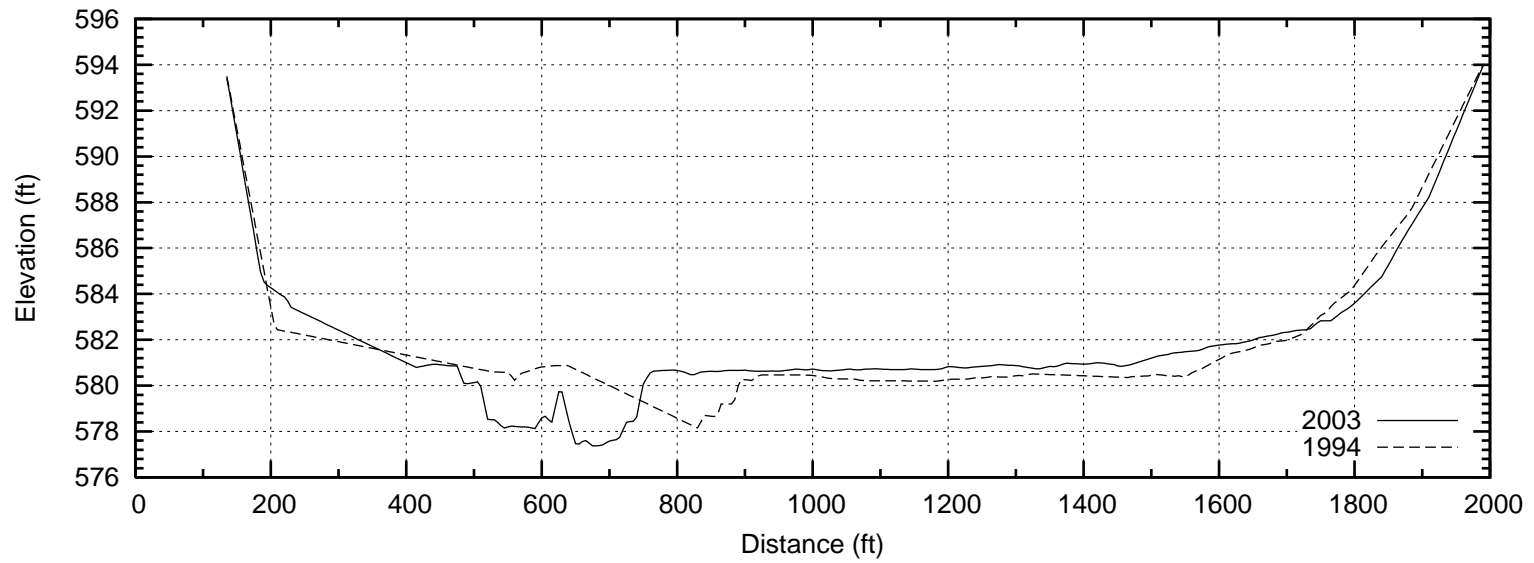


# Belton Lake

## Rangeline SR15

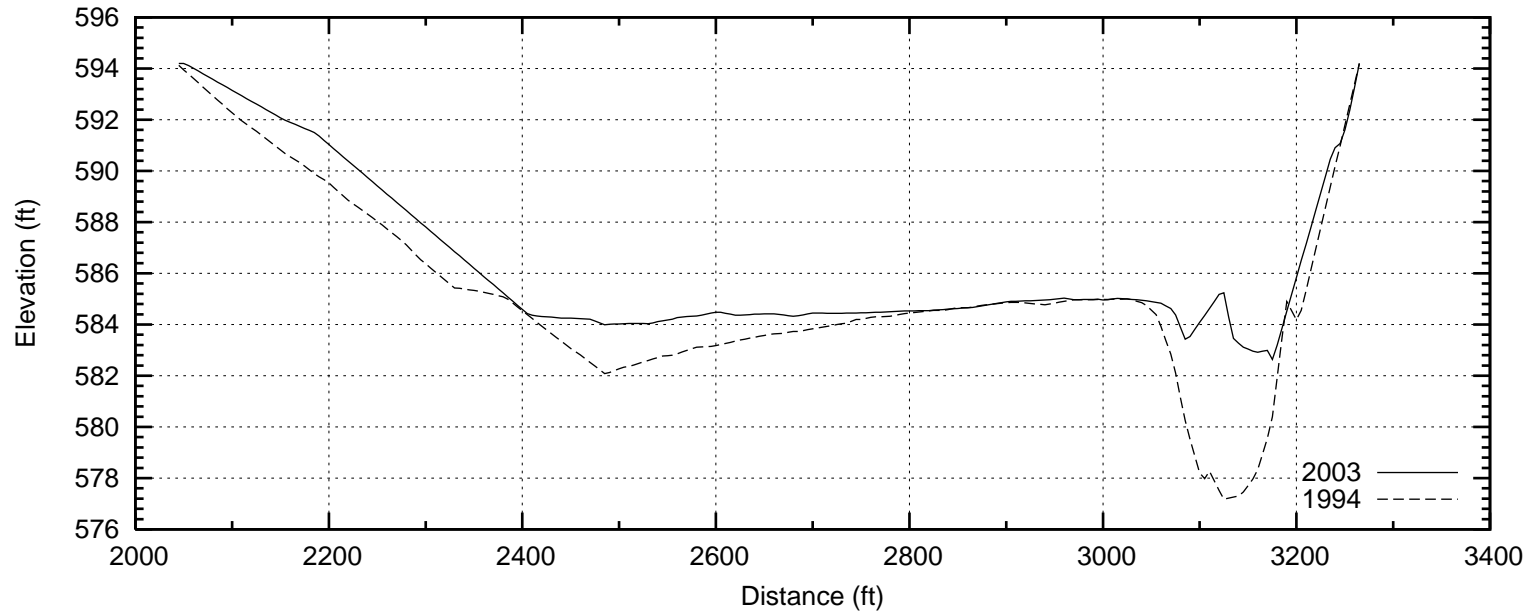


## Rangeline SR16

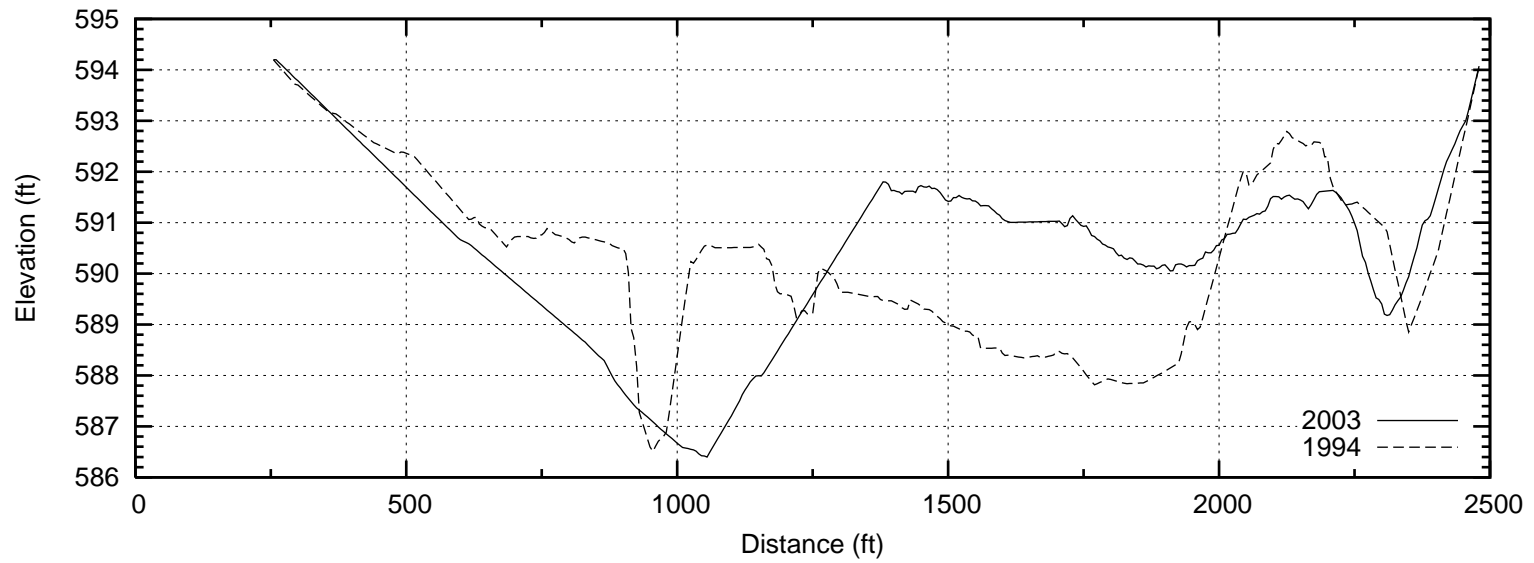


# Belton Lake

## Rangeline SR17

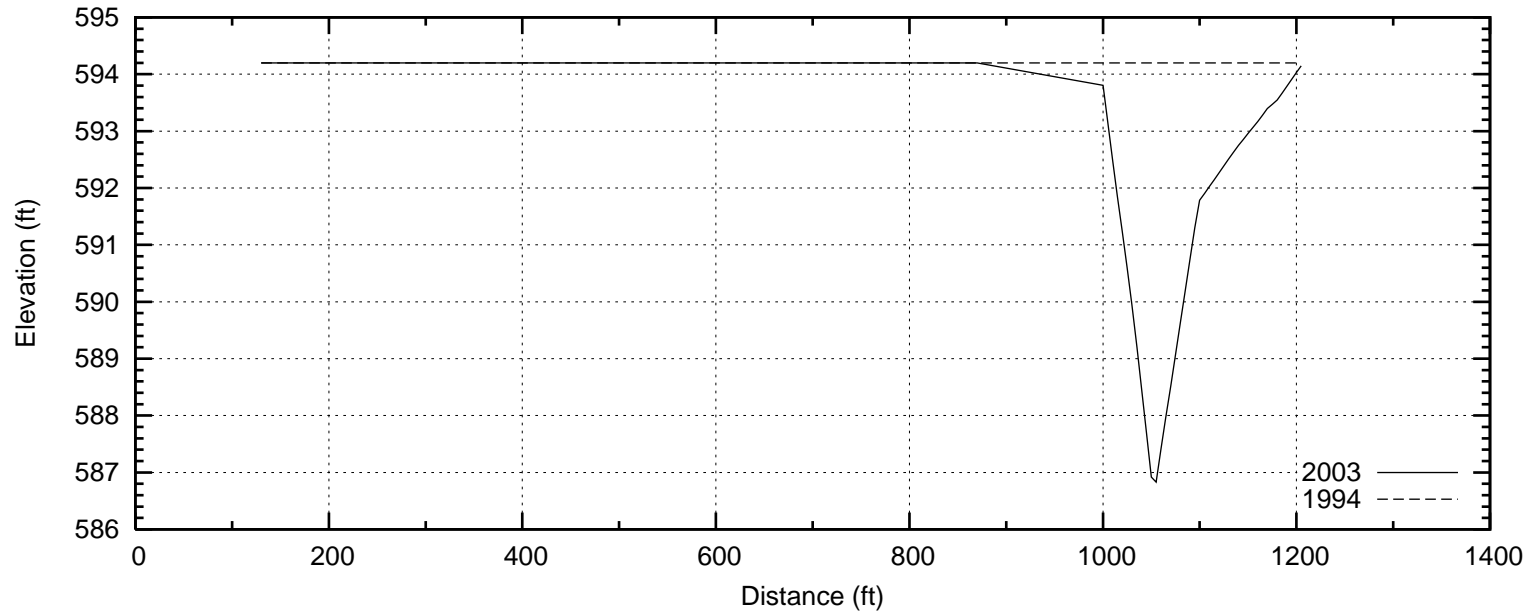


## Rangeline SR18

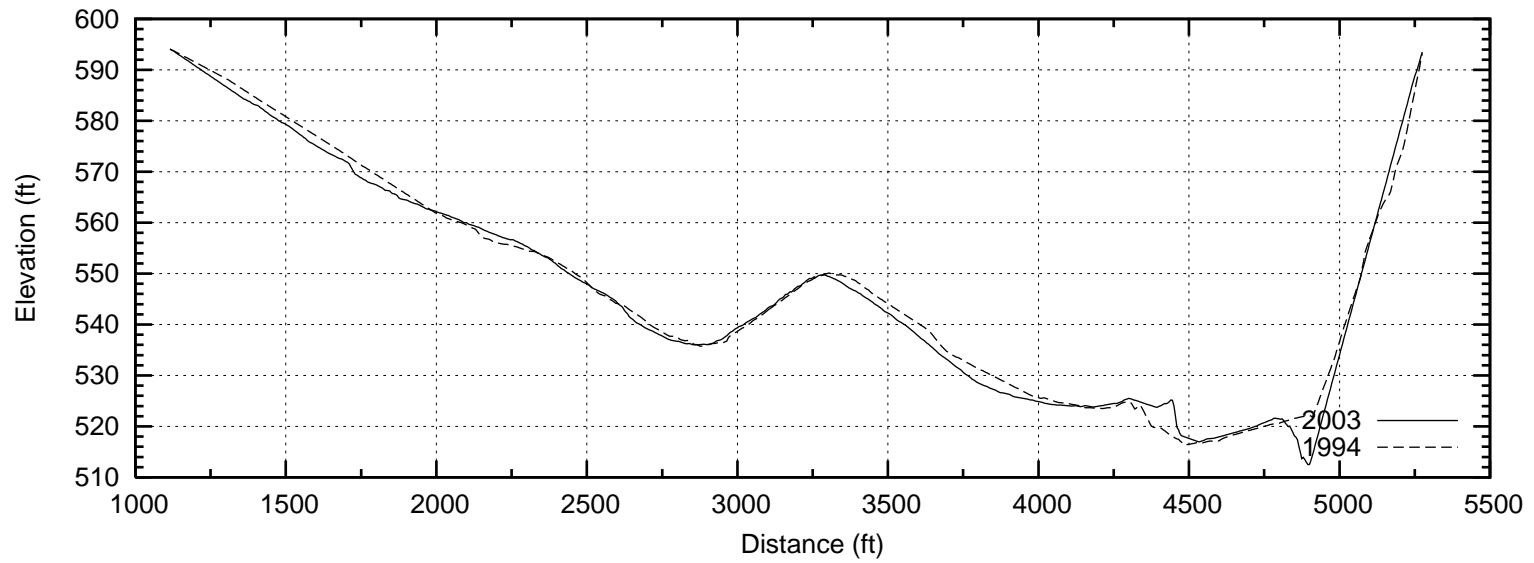


# Belton Lake

## Rangeline SR19

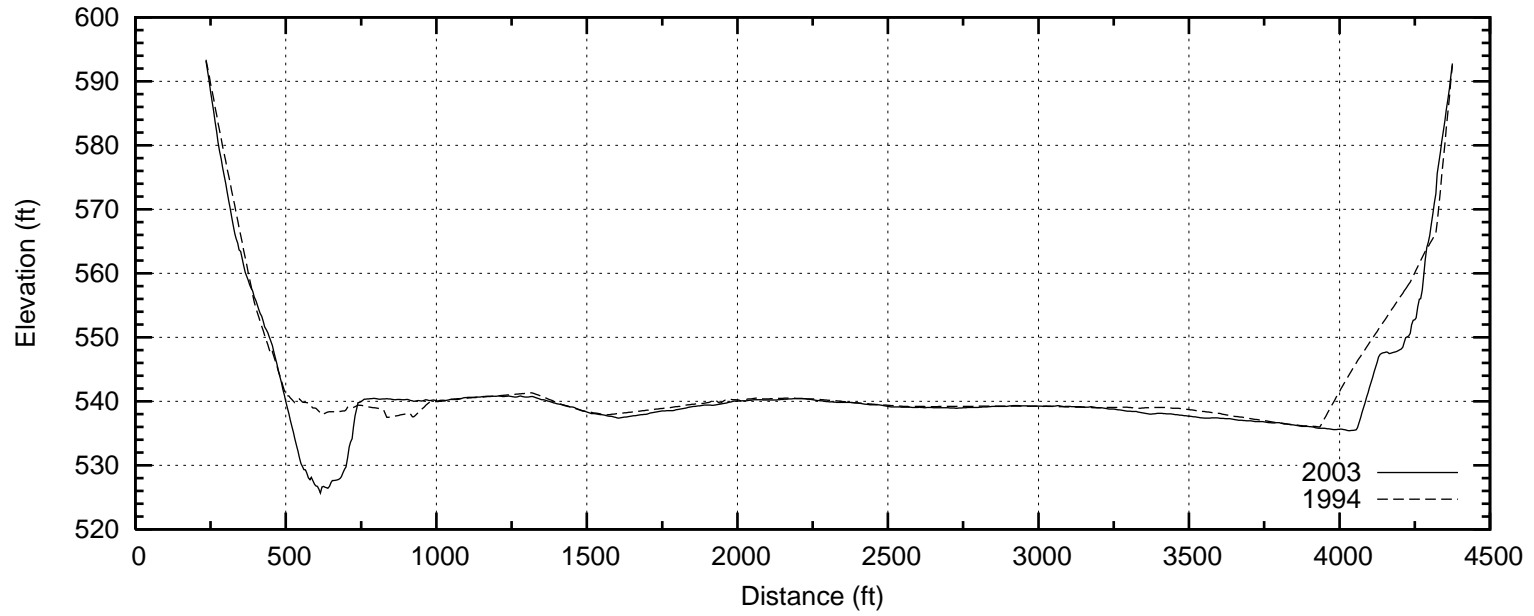


## Rangeline SR31

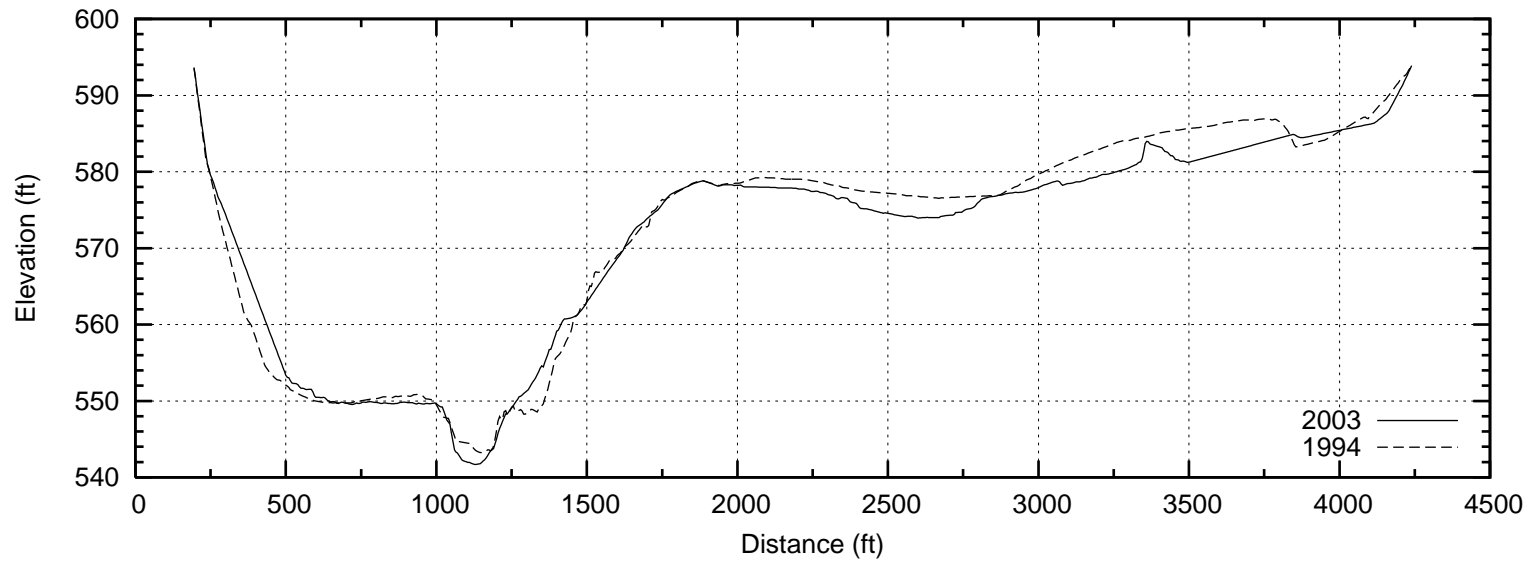


# Belton Lake

## Rangeline SR32

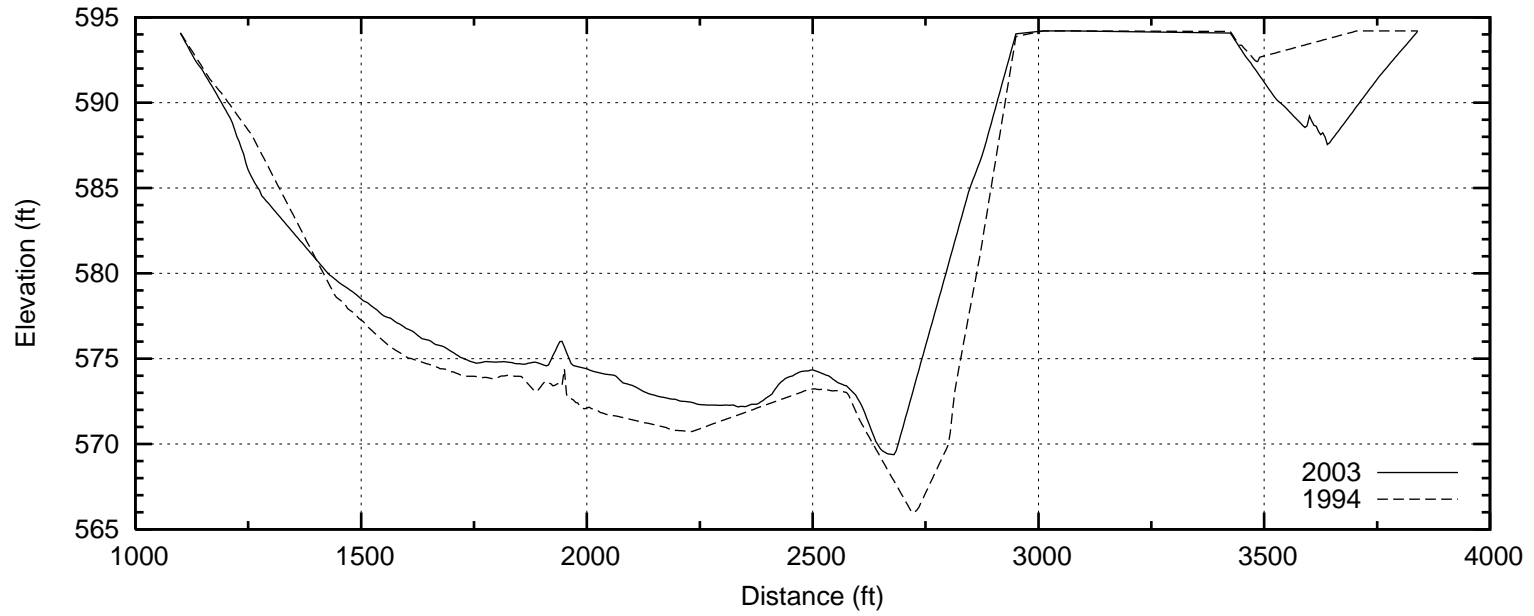


## Rangeline SR33

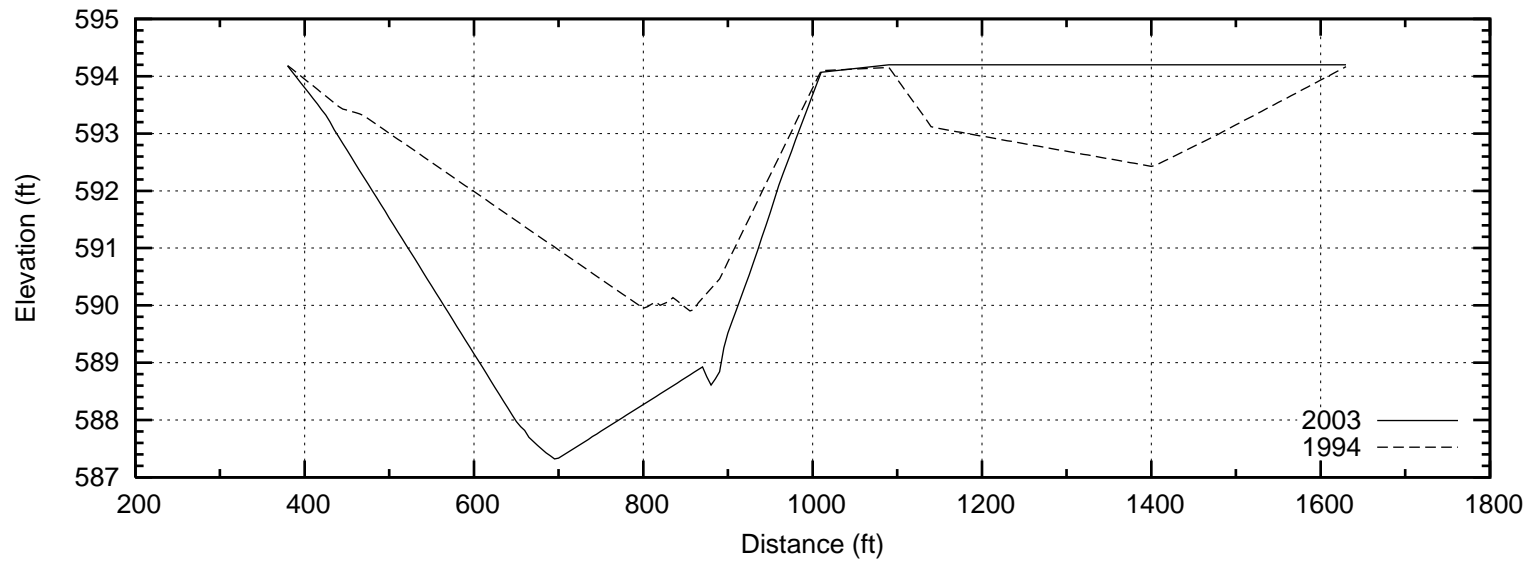


# Belton Lake

## Rangeline SR34

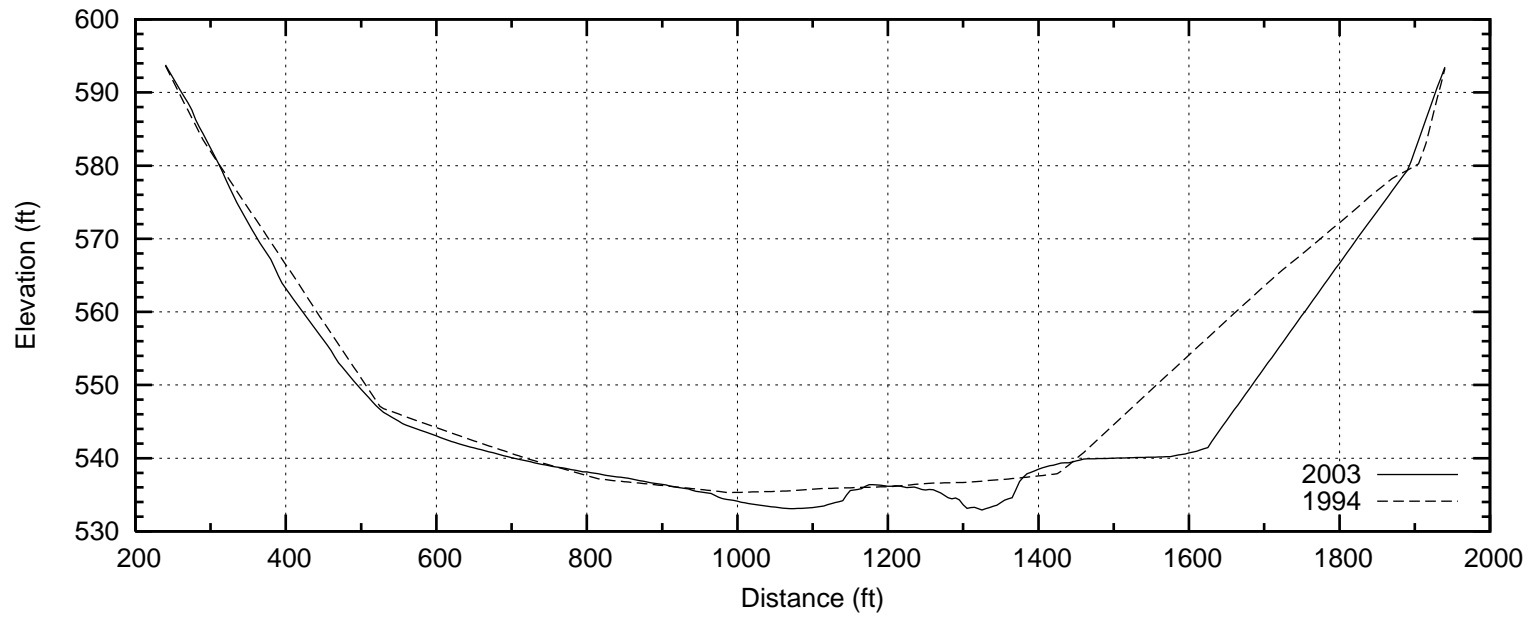


## Rangeline SR35

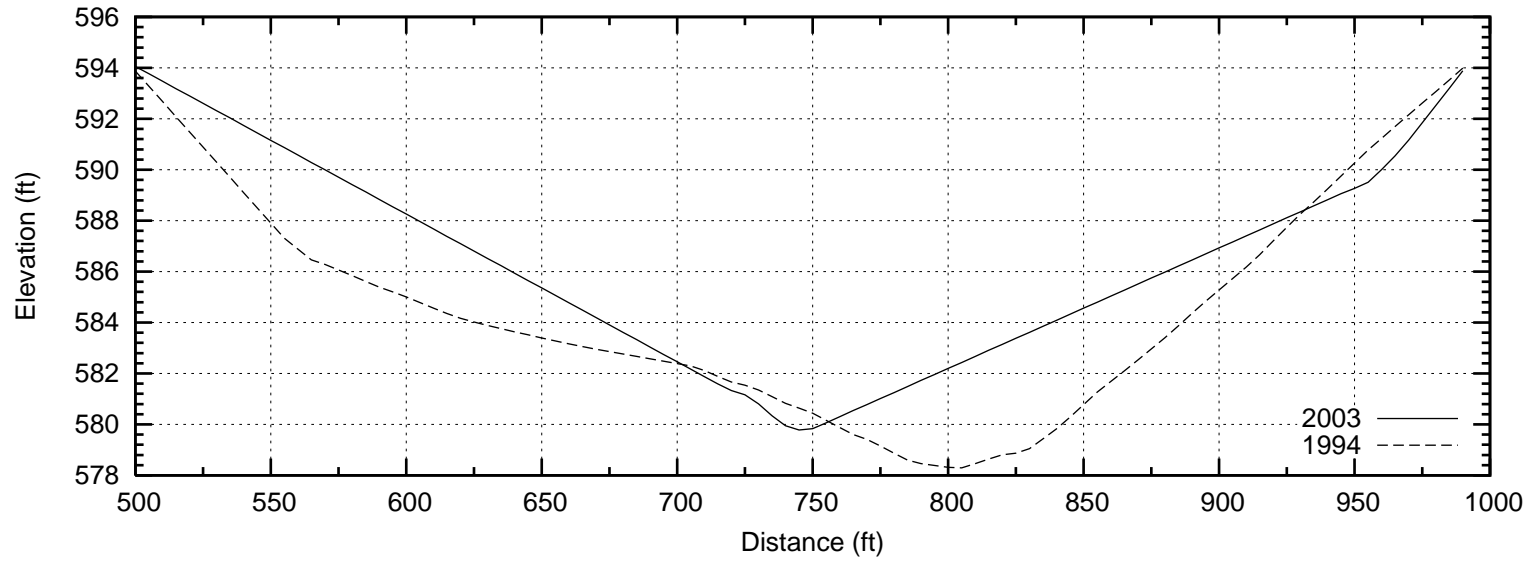


# Belton Lake

## Rangeline SR44



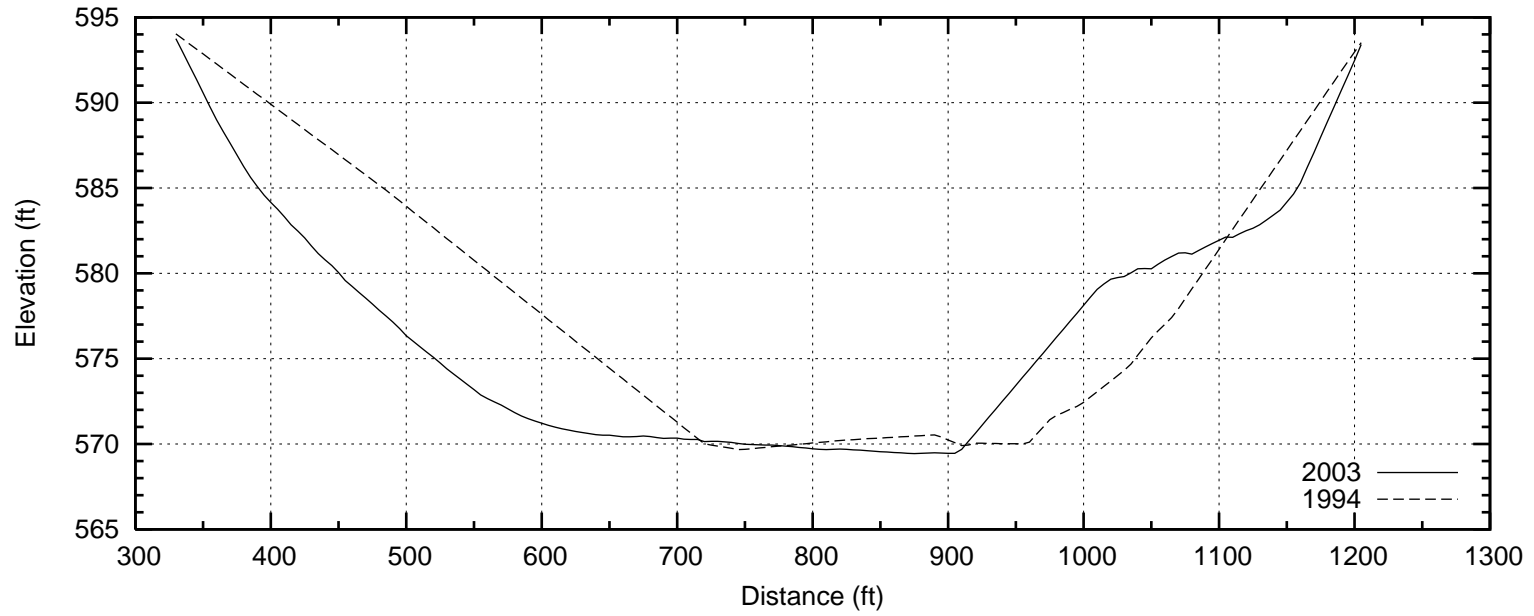
## Rangeline SR45



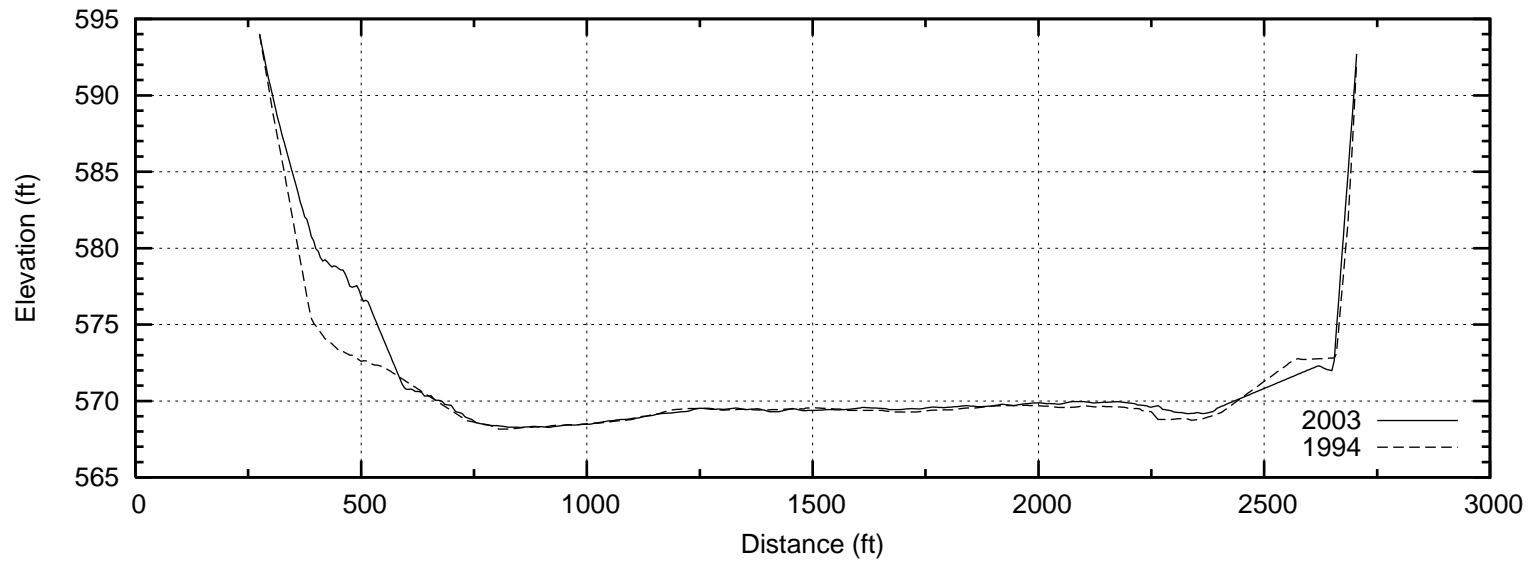


# Belton Lake

## Rangeline SR46

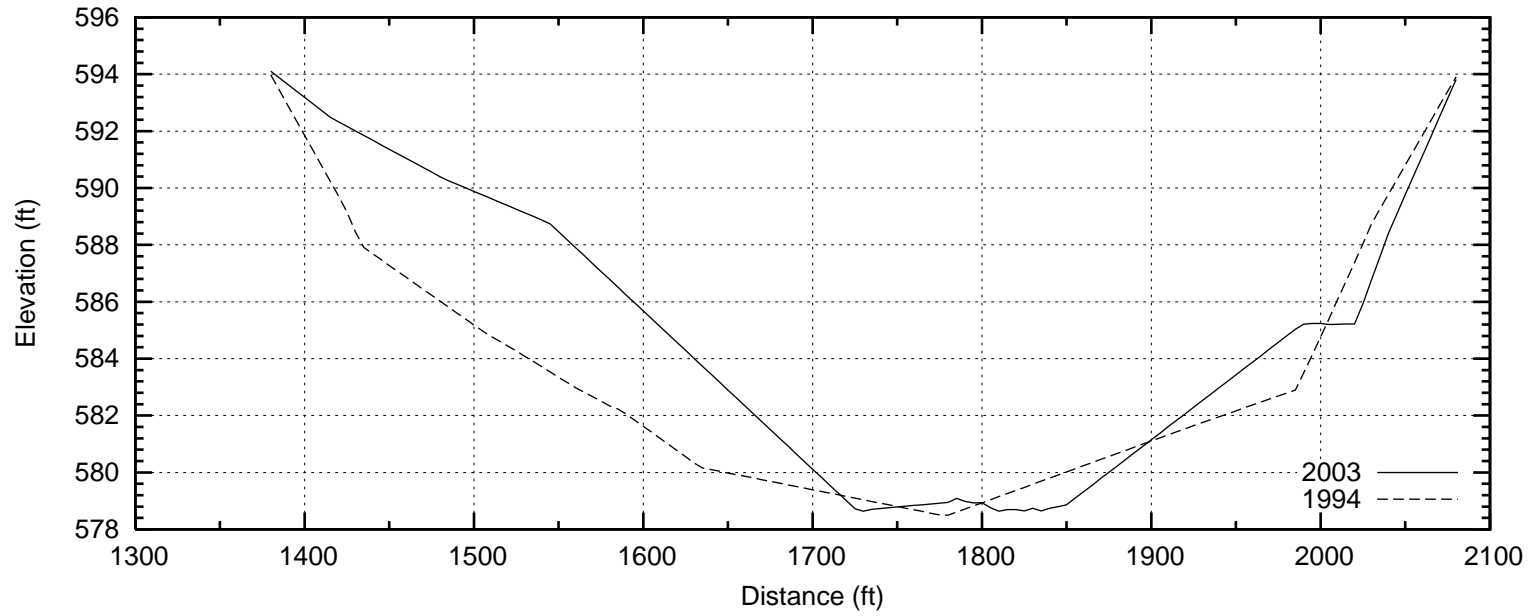


## Rangeline SR47

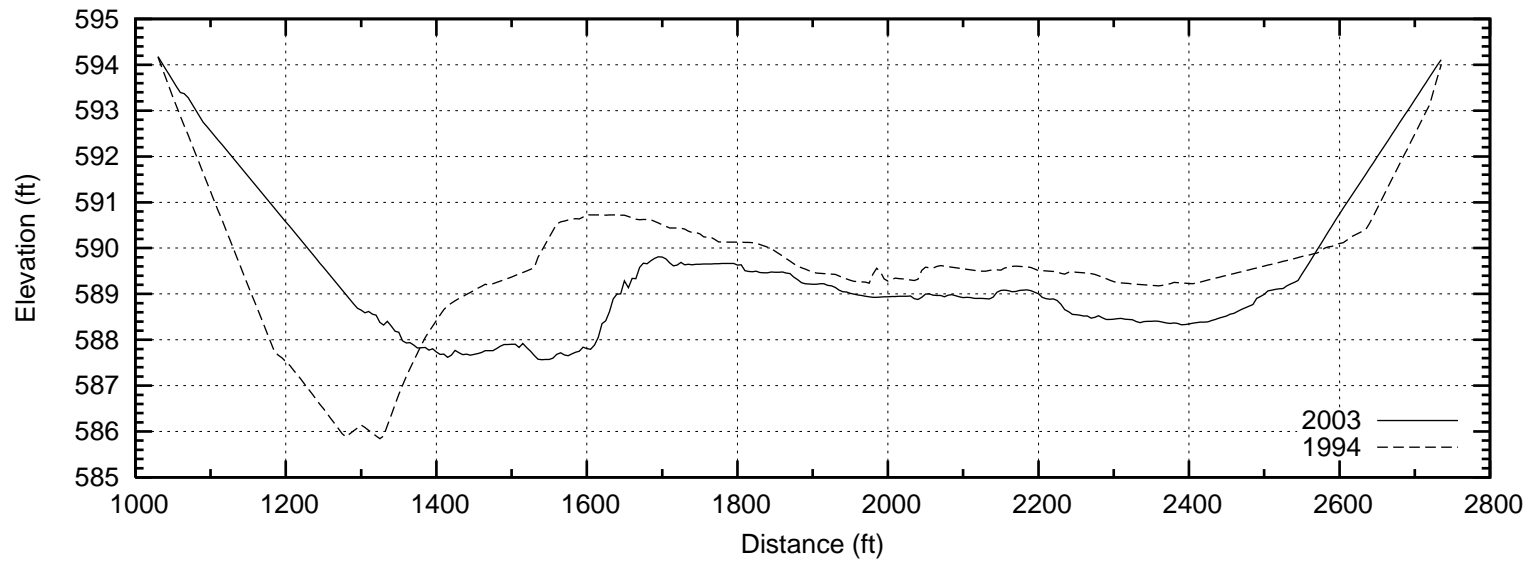


# Belton Lake

## Rangeline SR48

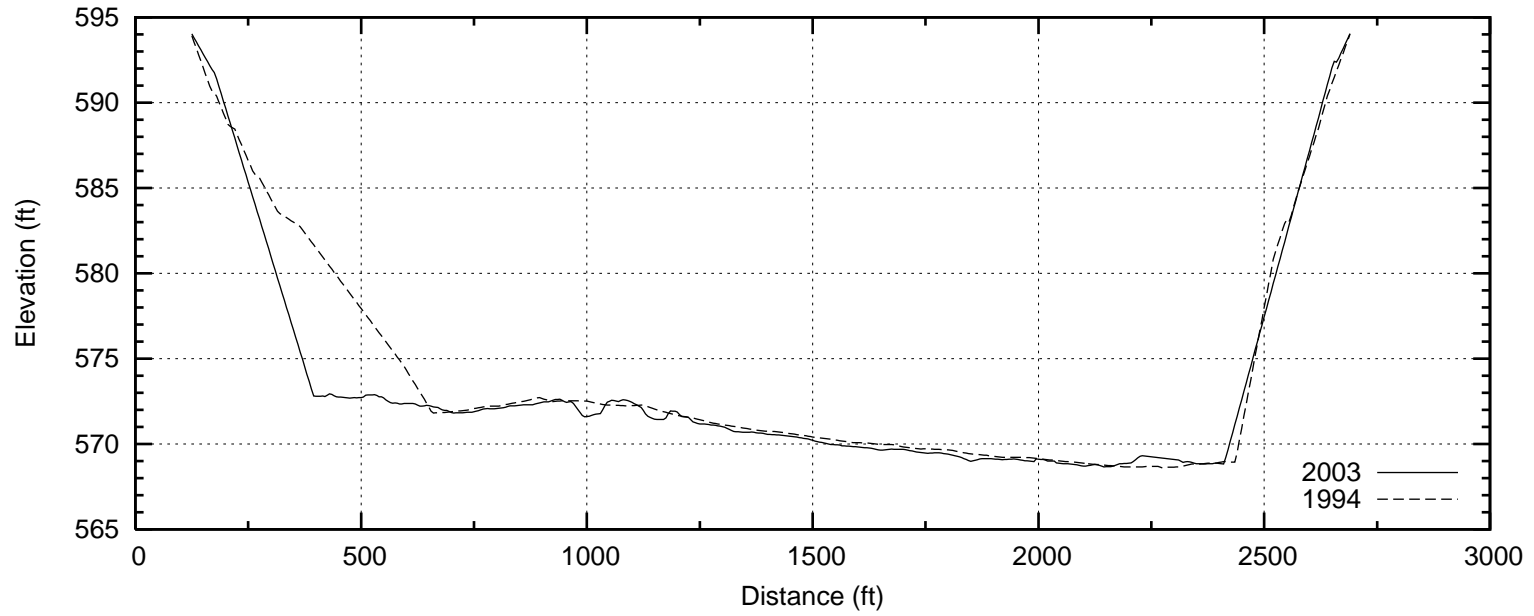


## Rangeline SR50

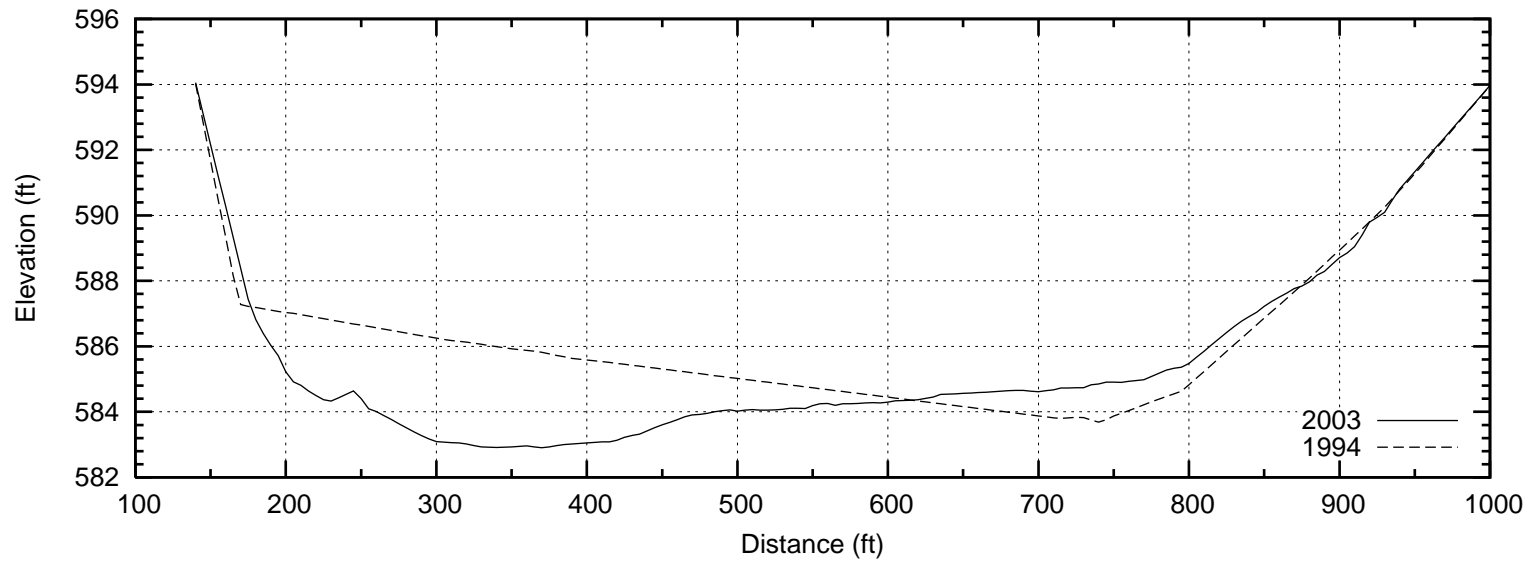


# Belton Lake

## Rangeline SR55

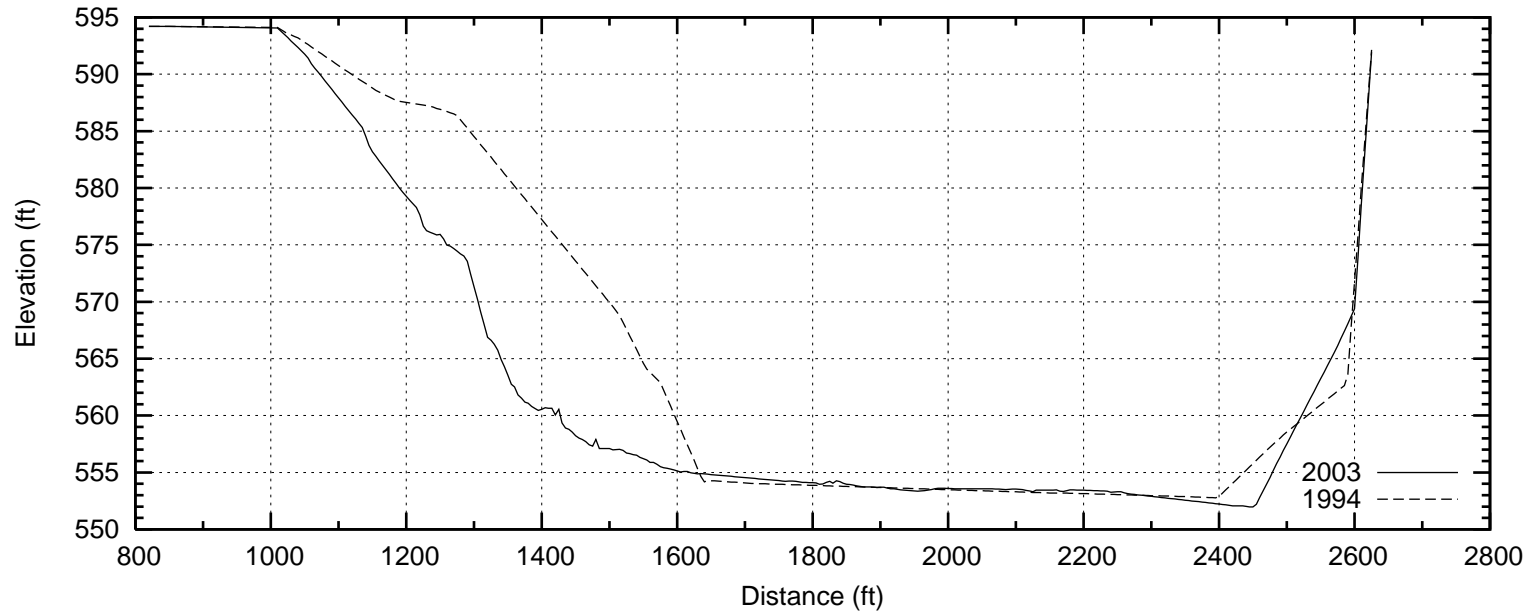


## Rangeline SR59

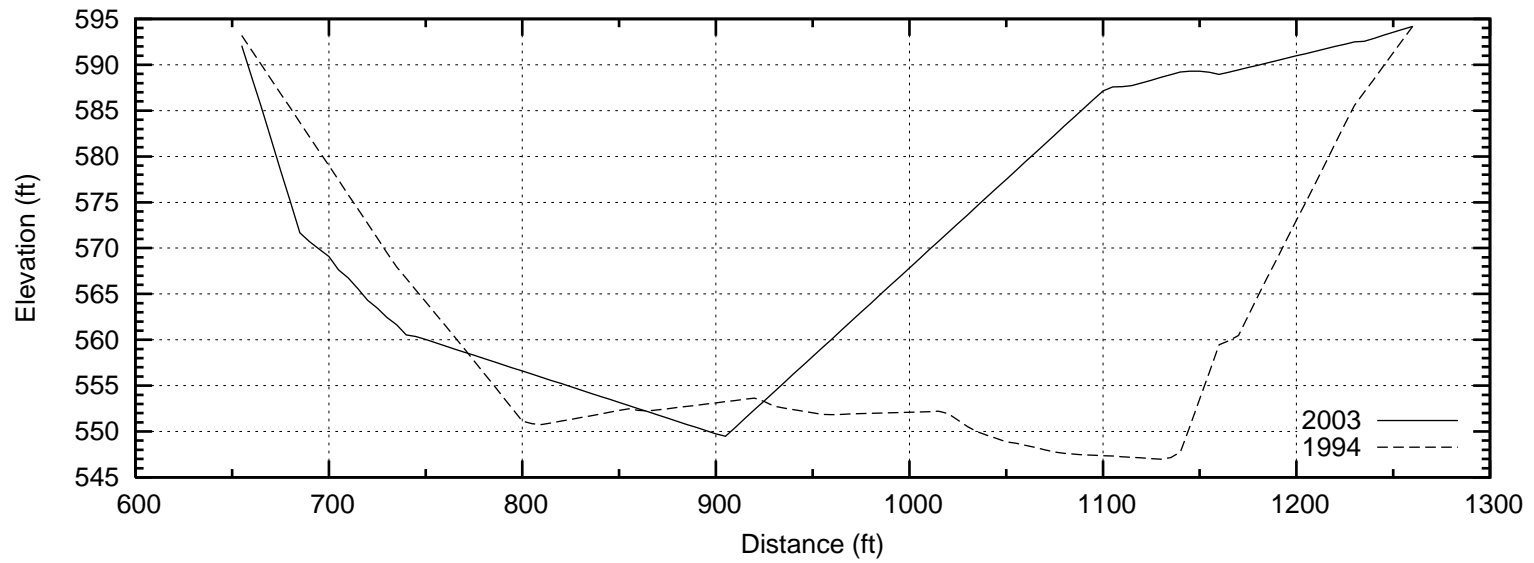


# Belton Lake

## Rangeline SR63

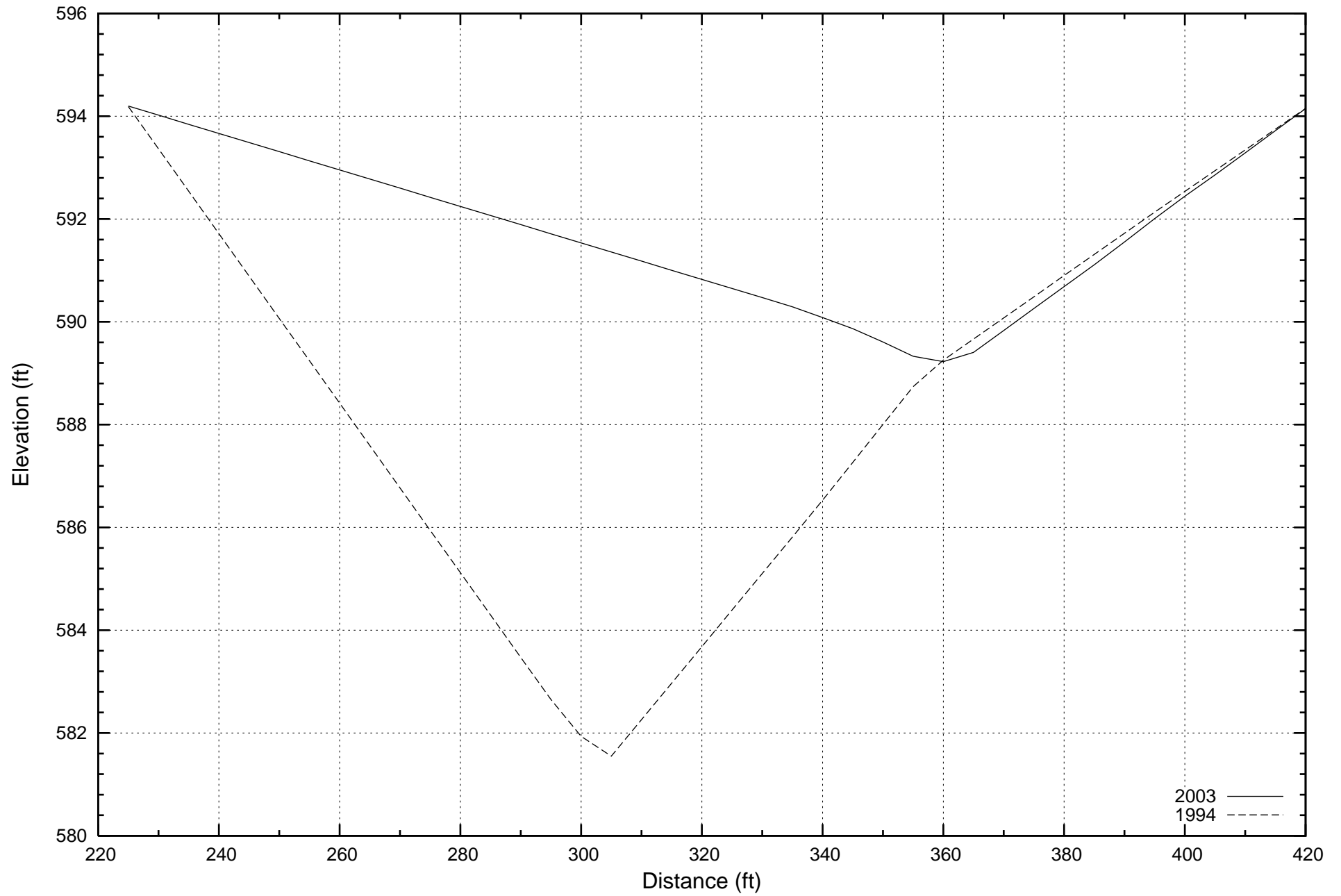


## Rangeline SR64



# Belton Lake

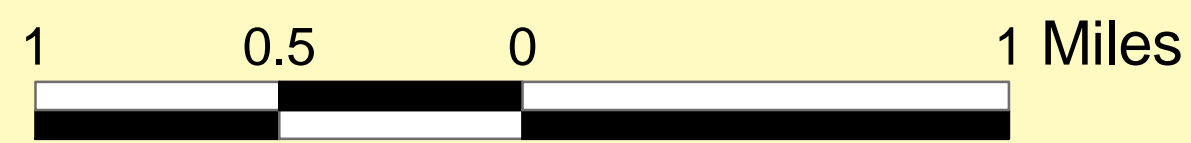
Rangeline SR65



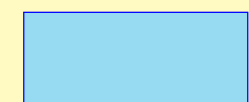
# Figure 5

# LAKE BELTON

## 5' Contours



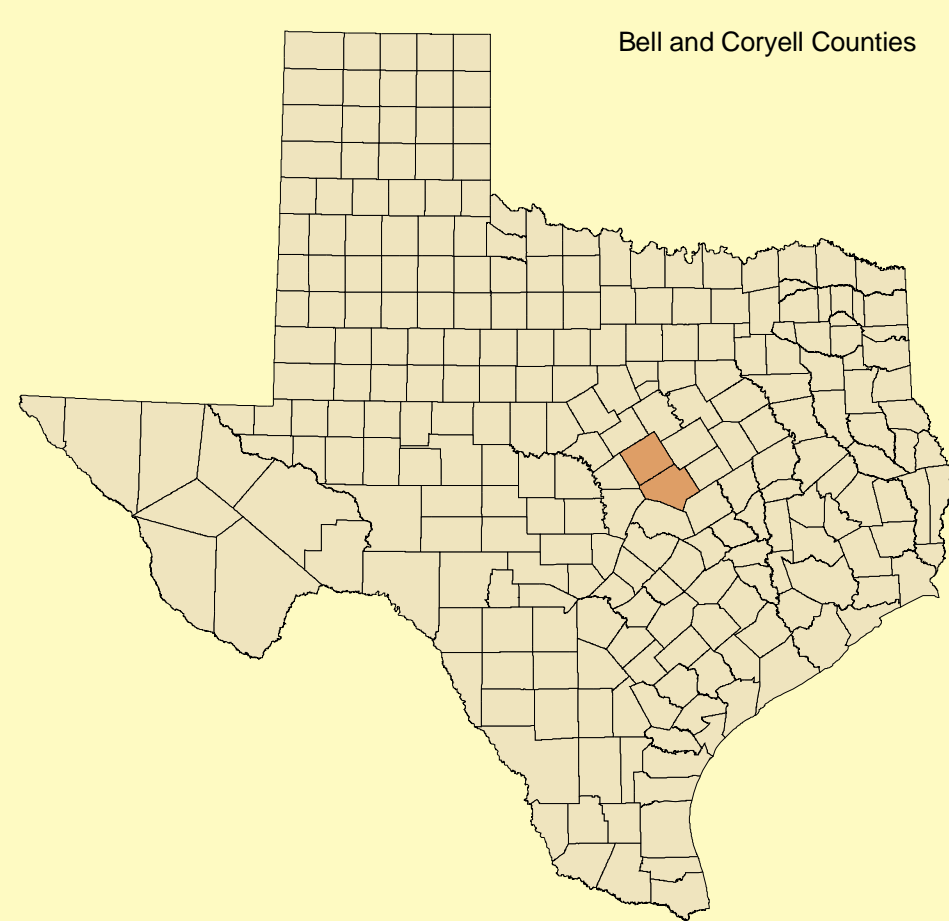
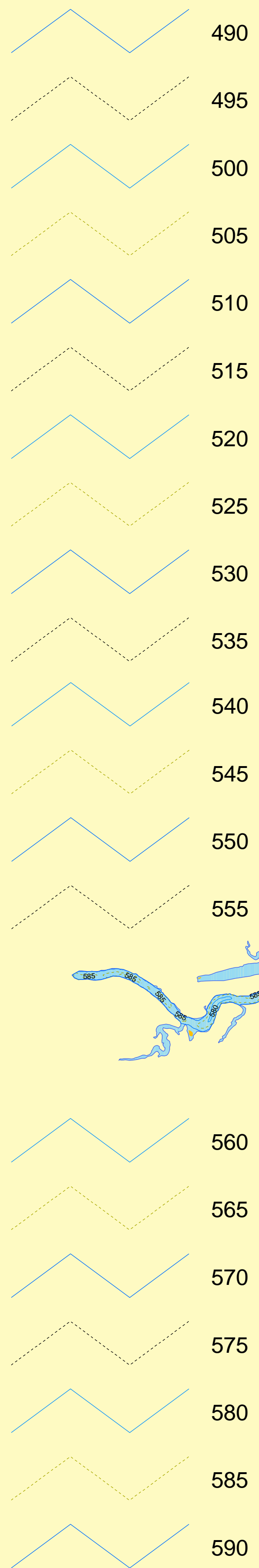
Conservation Pool Elevation 594'

 Water Surface @ 594.2'

 Islands @ 594.2'

 Range Lines

### Contours



This map is the product of a survey conducted by the Texas Water Development Board's Hydrographic Survey Program to determine the capacity of Lake Belton. The Texas Water Development Board makes no representations nor assumes any liability.