

**Volumetric Survey
of
RED BLUFF
RESERVOIR**

November 2011 Survey

Texas Water 
Development Board

February 2013

Texas Water Development Board

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Red Bluff Water Power Control District

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Executive summary

In December, 2011, the Texas Water Development Board entered into agreement with Red Bluff Water Power Control District to perform a volumetric survey of Red Bluff Reservoir. Surveying was performed using a multi-frequency (200 kHz, 50 kHz, and 24 kHz), sub-bottom profiling depth sounder. However, only the 200 kHz frequency was used for data collection.

Red Bluff Dam and Red Bluff Reservoir are located on the Pecos River, a tributary of the Rio Grande, five miles north of Orla, Texas. The current operating level of Red Bluff Reservoir is 2,827.4 feet above mean sea level, the elevation of the crest of the service spillway. TWDB collected bathymetric data for Red Bluff Reservoir on November 29, 2011, and November 30, 2011. The daily average water surface elevations during that time ranged between 2,795.43 and 2,795.46 feet above mean sea level, respectively.

TWDB did not compute an elevation-area-capacity table for the section of lake surveyed. A complete elevation-area-capacity table up to elevation 2,879.72 feet above mean sea level was completed by HDR Engineering, Inc.

TWDB recommends that a similar methodology be used to resurvey Red Bluff Reservoir in 10 years or after a major flood event. To further improve estimates of capacity loss, TWDB recommends a volumetric and sedimentation survey. Sedimentation surveys include additional analysis of the multi-frequency data for post-impoundment sediment by correlation with sediment core samples and a map identifying the spatial distribution of sediment throughout the lake.

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Note: References to brand names throughout this report do not imply endorsement by the Texas Water Development Board

Introduction

The Hydrographic Survey Program of the Texas Water Development Board (TWDB) was authorized by the 72nd Texas State Legislature in 1991. The Texas Water Code authorizes TWDB to perform surveys to determine reservoir storage capacity, sedimentation levels, rates of sedimentation, and projected water supply availability.

In December, 2011, TWDB entered into agreement with Red Bluff Water Power Control District to perform a volumetric survey of Red Bluff Reservoir (TWDB, 2011). This report describes the methods used to conduct the volumetric survey, including data collection and processing techniques. This report serves as the final contract deliverable from TWDB to the Red Bluff Water Power Control District and contains as deliverables: (1) an elevation-area-capacity table of the lake acceptable to the Texas Commission on Environmental Quality [Appendix A, B], (2) a bottom contour map [Figure 5], and (3) a shaded relief plot of the lake bottom [Figure 3].

Red Bluff Reservoir general information

Red Bluff Dam and Red Bluff Reservoir are located on the Pecos River (Rio Grande River Basin), in Reeves and Loving Counties, five miles north of Orla, Texas and approximately 45 miles north of Pecos, Texas. The upper reaches of the reservoir extend into Eddy County, New Mexico (Freese and Nichols, Inc. et al, 2010) (Figure 1). Red Bluff Dam and Red Bluff Reservoir are owned and operated by the Red Bluff Water Power Control District. Red Bluff Reservoir was built primarily to supply irrigation water to Reeves, Loving, Pecos, and Ward Counties (COA, 1988).

Red Bluff Dam, under the TCEQ Dam Safety Program, is classified as a large high-hazard dam and was found to be hydraulically inadequate in a 1979 hydrologic and hydraulic analysis. HDR Engineering, Inc. performed a new hydrologic and hydraulic analysis of Red Bluff Dam in 2010, and concluded the dam is hydraulically inadequate under the new 2009 dam safety rules (HDR, 2010). As a result, for safety reasons, the reservoir is operated at elevation 2,827.4 feet, the crest of the service spillway. Many other factors also affect the current availability of water from Red Bluff Reservoir including drought, high evaporation rates, and high infiltration rates of the bed and banks of the Pecos River and canal systems used to deliver water for irrigation (Freese and Nichols, Inc. et al, 2010). Inflows to the reservoir from New Mexico are governed by the Pecos River

Compact (Freese and Nichols, Inc. et al, 2010, NM WRRI, 2012, TCEQ, 2012). During dry years, high evaporation and naturally occurring salt springs above the reservoir contribute to total dissolved solids and chlorides in concentrations too great for agricultural use (Freese and Nichols, Inc. et al, 2010).

Construction on Red Bluff Dam began in November, 1934, and was completed in September, 1936. Deliberate impoundment began in September, 1936 (TWDB, 1971). Additional pertinent data about Red Bluff Dam and Red Bluff Reservoir can be found in Table 1.

Water rights for Red Bluff Reservoir have been appropriated to Red Bluff Water Power Control District through Certificate of Adjudication No. 23-5438. The complete certificate is on file in the Information Resources Division of the Texas Commission on Environmental Quality.

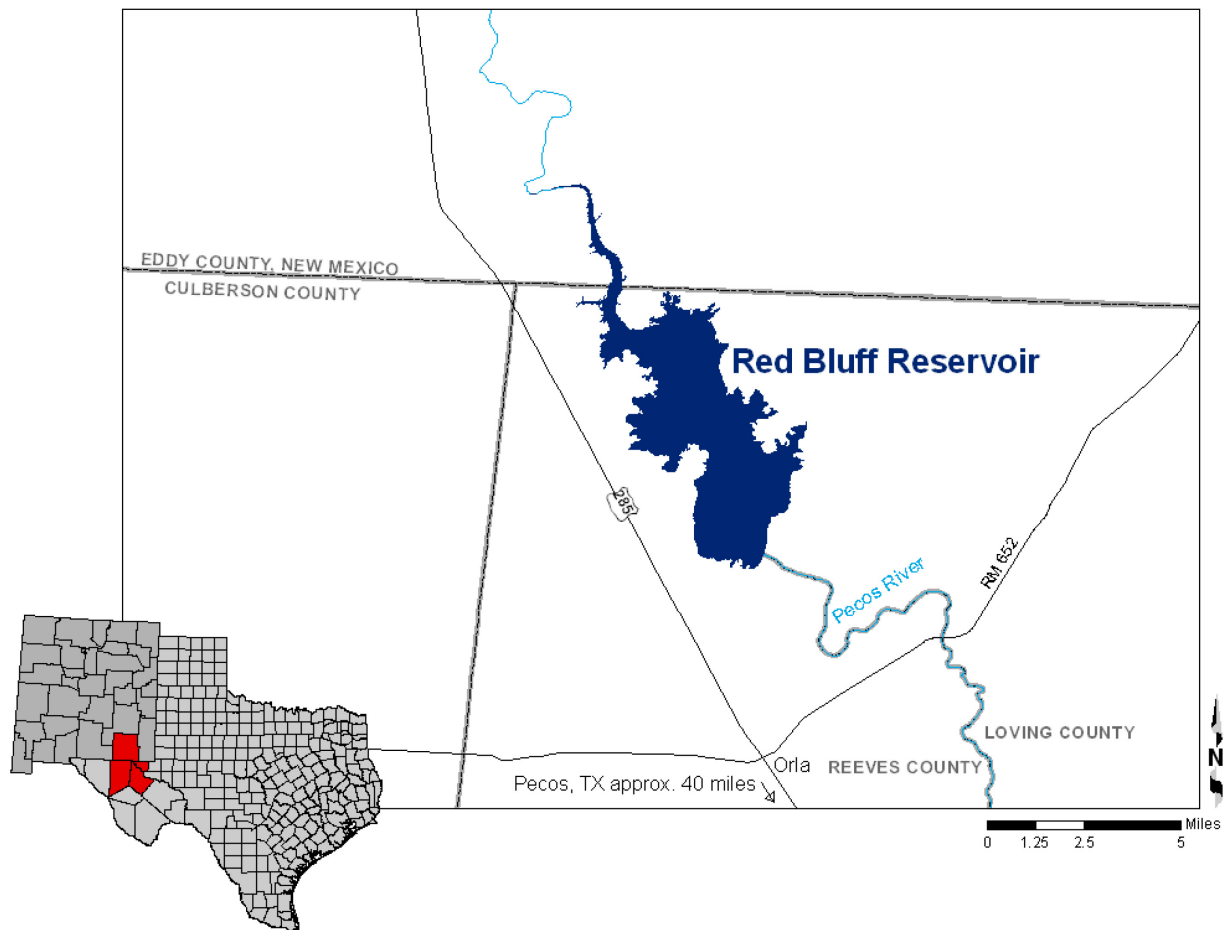


Figure 1. Location Map – Red Bluff Reservoir

Table 1. Pertinent data for Red Bluff Dam and Red Bluff Reservoir

Owner	Red Bluff Water Power Control District	
Engineer (design)	Vernon L. Sullivan	
Location of dam	On the Pecos River in Reeves and Loving Counties, five miles north of Orla, TX and approximately 45 miles north of Pecos, TX	
Drainage area	20,720 square miles	
Dam	Type	Earthfill
	Length	9,200 feet
	Maximum height	102 feet
	Top width	25 feet
Spillway (emergency)	Location	Right of dam
	Crest length	790 feet
	Crest elevation	2,845.4 feet above mean sea level
Spillway (service)	Type	Concrete ogee
	Control	12 tainter gates, each 25 by 15 feet
	Crest elevation	2,827.4 feet above mean sea level
Outlet works	Type	Tower supplied by 2 conduits, each 7.5 by 9.0 feet
	Irrigation use	2 outlets controlled by 4-foot gate valves
	Power	2 penstocks controlled by butterfly valves
Power generation features*	2 generating units with combined capacity of 2,300 kw	

*In September 1995, Red Bluff Water Power Control District requested, and TCEQ approved, authorizations for mining and hydroelectric power generation deleted from Certificate of Adjudication 23-5438 (Order, 1995).

Volumetric survey of Red Bluff Reservoir

Datum

The vertical datum used during this survey is that used by the United States Geological Survey (USGS) for the reservoir elevation gage *USGS 08410000 Red Bluff Res nr Orla, TX* (USGS, 2012). The USGS reports that this gage is referenced to Mean Sea Level (MSL). MSL elevations are 0.43 feet higher than Red Bluff Water Power Control District's gage datum. Elevations herein are reported in feet above mean sea level. Volume and area calculations in this report are referenced to water levels provided by the USGS gage. The horizontal datum used for this report is North American Datum 1983 (NAD83), and the horizontal coordinate system is State Plane Texas Central Zone (feet).

TWDB bathymetric data collection

TWDB collected bathymetric data for Red Bluff Reservoir on November 29, 2011, and November 30, 2011. The daily average water surface elevations during that time ranged

between 2,795.43 and 2,795.46 feet above mean sea level, respectively. For data collection, TWDB used a Specialty Devices, Inc., single-beam, multi-frequency (200 kHz, 50 kHz, and 24 kHz) sub-bottom profiling depth sounder integrated with differential global positioning system (DGPS) equipment. Data collection occurred while navigating along pre-planned survey lines oriented perpendicular to the assumed location of the original river channels and spaced approximately 500 feet apart. The depth sounder was calibrated daily using a velocity profiler to measure the speed of sound in the water column and a weighted tape or stadia rod for depth reading verification. Figure 2 shows where data collection occurred during the 2011 TWDB survey.

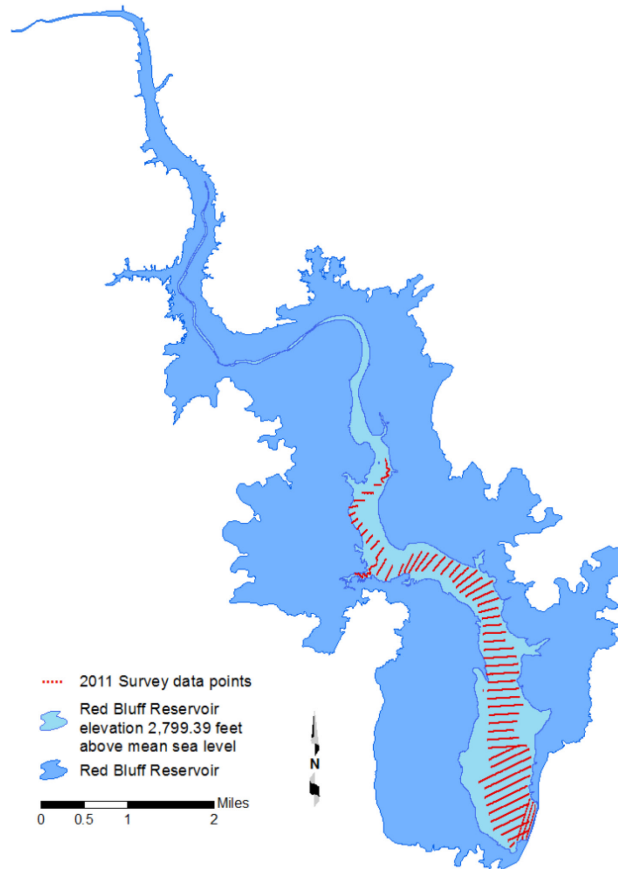


Figure 2. Data collected during 2011 TWDB Red Bluff Reservoir survey

Data processing

Model boundaries

The reservoir boundary was digitized from aerial photographs, also known as digital orthophoto quarter-quadrangle images (DOQQs), obtained from the Texas Natural Resources Information System (TNIRIS, 2012a) using Environmental Systems Research Institute's ArcGIS 10.0 software. The quarter-quadrangles that cover Red Bluff Reservoir are Red Bluff (NW, NE, SW, SE), Ross Ranch (SW, New Mexico), and Red Bluff (SE,

New Mexico). The DOQQs were photographed on August 11, 2012, and August 14, 2012, while the daily average water surface elevation measured 2,799.39 and 2,799.32 feet above mean sea level, respectively. The majority of the lake area was photographed at elevation 2,799.39; therefore, the boundary was digitized at the land-water interface and assigned an elevation 2,799.39 feet. According to the associated metadata, the 2012 DOQQS have a resolution of 1.0-meters and a horizontal accuracy within + / - 6 meters to absolute ground control (USDA, 2012, TNRIIS, 2012b).

Triangulated Irregular Network model

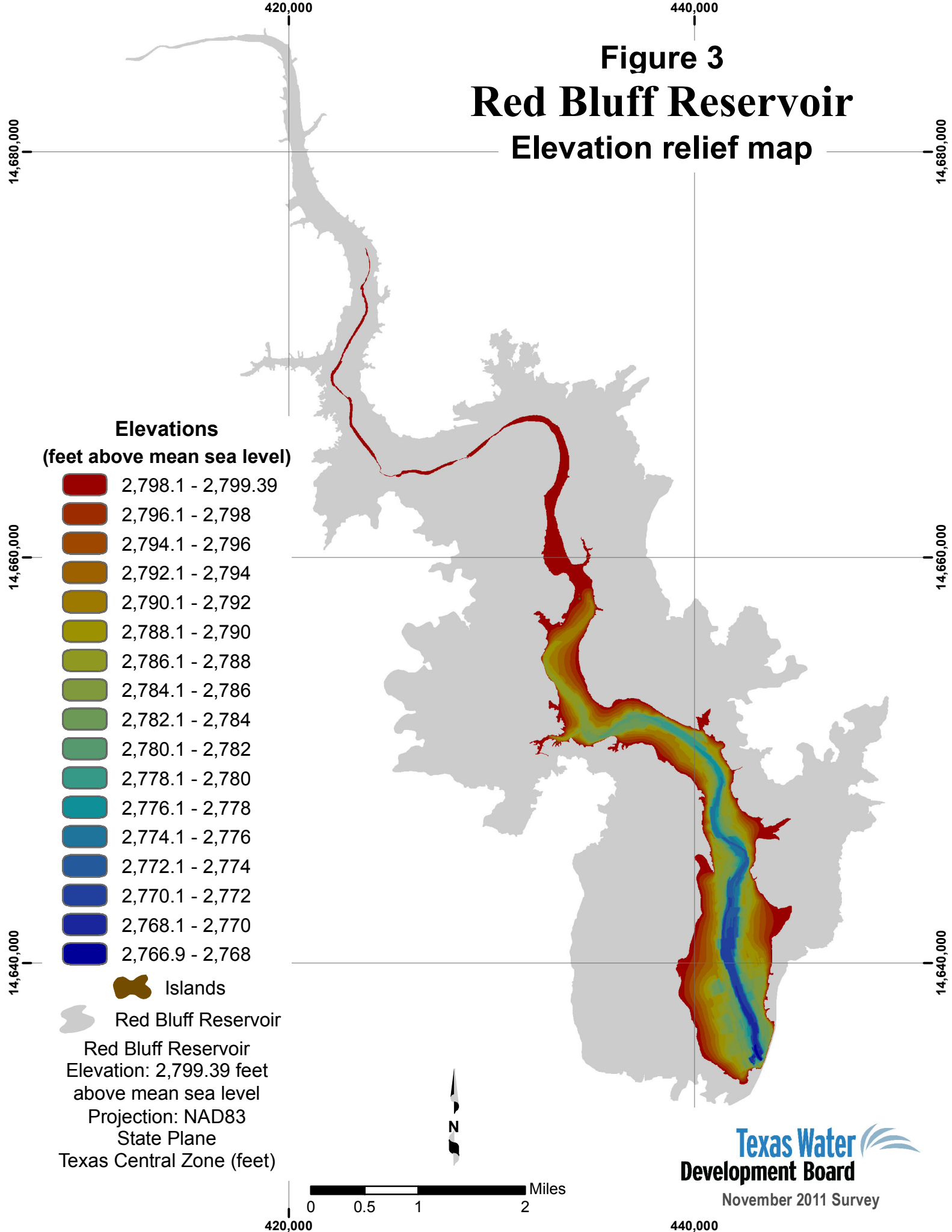
Following completion of data collection, the raw data was edited using DepthPic. DepthPic is used to display, interpret, and edit the multi-frequency data and to manually identify the current reservoir-bottom surface from the 200 kHz signal returns. Following the identification of this surface, an in-house TWDB software package called HydroTools is used for further processing (McEwen, 2011). The software is used to calculate the current reservoir-bottom surface, and output the data into a single file (McEwen, 2011a). The water surface elevation at the time of each sounding is used to convert each sounding depth to a corresponding reservoir-bottom elevation. This survey point dataset is then preconditioned by inserting a uniform grid of artificial survey points between the actual survey lines. Bathymetric elevations at these artificial points are determined using an anisotropic spatial interpolation algorithm described in the spatial interpolation of reservoir bathymetry section below. This technique creates a high resolution, uniform grid of interpolated bathymetric elevation points throughout a majority of the lake (McEwen et al., 2011). Finally, the point file resulting from spatial interpolation is used in conjunction with sounding and boundary data to create a Triangulated Irregular Network (TIN) model utilizing the 3D Analyst Extension of ArcGIS. The 3D Analyst algorithm uses Delaunay's criteria for triangulation to create a grid composed of triangles from non-uniformly spaced points, including the boundary vertices (ESRI, 1995).

The TIN model was converted to a raster representation using a cell size of 2 feet by 2 feet. The raster data was then used to produce an elevation relief map (Figure 3), representing the topography of the reservoir bottom, a depth range map (Figure 4), showing shaded depth ranges for Red Bluff Reservoir, and a 2-foot contour map (Figure 5 - attached).

Figure 3

Red Bluff Reservoir

Elevation relief map



Elevations
(feet above mean sea level)

- 2,798.1 - 2,799.39
- 2,796.1 - 2,798
- 2,794.1 - 2,796
- 2,792.1 - 2,794
- 2,790.1 - 2,792
- 2,788.1 - 2,790
- 2,786.1 - 2,788
- 2,784.1 - 2,786
- 2,782.1 - 2,784
- 2,780.1 - 2,782
- 2,778.1 - 2,780
- 2,776.1 - 2,778
- 2,774.1 - 2,776
- 2,772.1 - 2,774
- 2,770.1 - 2,772
- 2,768.1 - 2,770
- 2,766.9 - 2,768

Islands

Red Bluff Reservoir

Red Bluff Reservoir
 Elevation: 2,799.39 feet
 above mean sea level
 Projection: NAD83
 State Plane
 Texas Central Zone (feet)

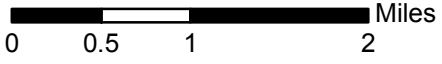
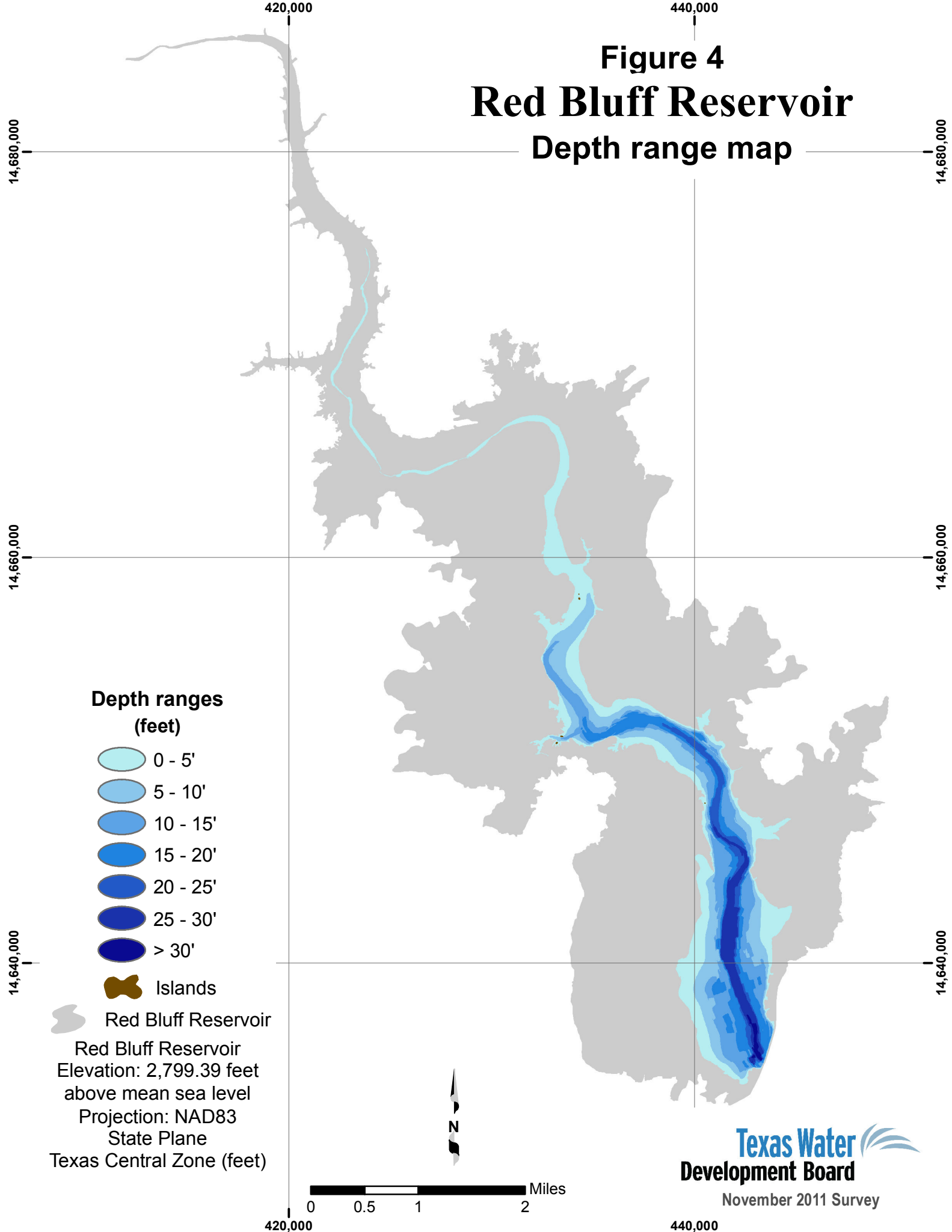


Figure 4

Red Bluff Reservoir

Depth range map



**Depth ranges
(feet)**

- 0 - 5'
- 5 - 10'
- 10 - 15'
- 15 - 20'
- 20 - 25'
- 25 - 30'
- > 30'

Islands

Red Bluff Reservoir

Red Bluff Reservoir
 Elevation: 2,799.39 feet
 above mean sea level
 Projection: NAD83
 State Plane
 Texas Central Zone (feet)



0 0.5 1 2 Miles

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Spatial interpolation of reservoir bathymetry

Isotropic spatial interpolation techniques such as the Delaunay triangulation used by the 3D Analyst extension of ArcGIS are in many instances unable to suitably interpolate bathymetries between survey lines common to lake surveys. Reservoirs and stream channels are anisotropic morphological features where bathymetry at any particular location is similar more to upstream and downstream locations than to transverse locations. Interpolation schemes that do not consider this anisotropy lead to the creation of several types of artifacts in the final representation of the reservoir bottom surface and hence to errors in volume. These include: artificially-curved contour lines extending into the reservoir where the reservoir walls are steep or the reservoir is relatively narrow; intermittent representation of submerged stream channel connectivity; oscillations of contour lines in between survey lines. These artifacts reduce the accuracy of the resulting TIN model in areas between actual survey data.

To improve the accuracy of bathymetric representation between survey lines, TWDB developed various anisotropic spatial interpolation techniques. Generally, the directionality of interpolation at different locations of a reservoir can be determined from external data sources. A basic assumption is that the reservoir profile in the vicinity of a particular location has upstream and downstream similarity. To determine the sinuosity of the submerged Pecos River channel, the boundary between Reeves and Loving Counties was used.

Using the survey data, polygons are created to partition the lake into segments with centerlines defining directionality of interpolation within each segment. These interpolation definition files are independent of survey data and can be applied to past and future data of the same reservoir. Using the interpolation definition files and survey data the current lake-bottom elevation is calculated for each point in the high resolution uniform grid of artificial survey points. The reservoir boundary, artificial survey points grid and survey data points are used to create a volumetric TIN model representing the reservoir bathymetry throughout the reservoir. Specific details of this interpolation technique can be found in the HydroTools manual (McEwen et al, 2011a) and in McEwen et al, 2011b.

In areas inaccessible to survey data collection such as small coves and shallow upstream areas of the reservoir, linear extrapolation is used for volumetric estimations. The linear extrapolation follows a linear definition file linking the survey points file to the lake

boundary file (McEwen et al, 2011a). Figure 6 illustrates typical results from application of the anisotropic interpolation techniques to Red Bluff Reservoir.

In Figure 6A, deeper channels indicated by surveyed cross sections are not continuously represented in areas between survey cross sections. This is an artifact of the TIN generation routine, rather than an accurate representation of the physical bathymetric surface. Inclusion of interpolation points, represented in Figure 6B, in creation of the volumetric TIN model directs Delaunay triangulation to better represent the lake bathymetry between survey cross-sections.

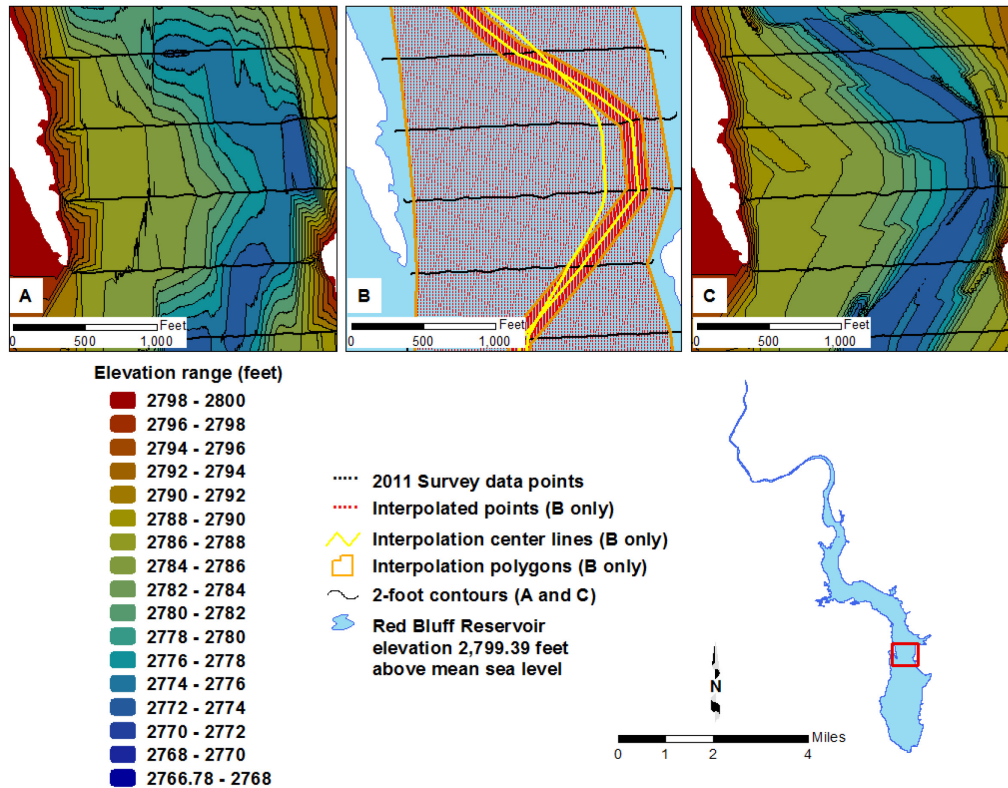


Figure 6. Anisotropic spatial interpolation of Red Bluff Reservoir sounding data – A) bathymetric contours without interpolated points, B) sounding points (black) and interpolated points (red), C) bathymetric contours with the interpolated points

Survey results

Volumetric survey

TWDB did not compute an elevation-area-capacity table for the section of lake surveyed. A complete elevation-area-capacity table was completed by HDR Engineering, Inc (Appendix A).

Previous capacity estimates include a 1925 total reservoir capacity estimate of 310,000 acre-feet below the top of service spillway gates, elevation 2,842.4 feet, and a total

capacity of 166,500 acre-feet below the crest of the service spillway, elevation 2,827.4 feet. For safety reasons the reservoir is currently operated at 2,827.4 feet. In 1986, Reed and Associates of Midland, Texas prepared a capacity curve for Red Bluff Water Power Control District that indicated the reservoir capacity was 153,670 acre-feet below the crest of the service spillway. In 2012, HDR Engineering, Inc. estimated Red Bluff Reservoir has a capacity of 151,110 acre-feet at elevation 2,827.4 feet (Table 2) using survey data collected in this study below elevation 2795.46 feet. Differences in past and present survey methodologies make direct comparison of volumetric surveys difficult and potentially unreliable.

Table 2. Current and previous survey capacity and surface area data

Elevation (feet above mean sea level)	Survey	Surface area (acres)	Capacity (acre-feet)
Top of service spillway gates 2,842.4	1925 ^a	11,700	310,000
	1986 ^b	N/A	289,670
	2012 ^c	11,811	294,305
Crest of service spillway 2,827.4	1925 ^a	N/A	166,500
	1986 ^b	N/A	153,670
	2012 ^c	7,495	151,110

^a Source: (TWDB, 1971), Note: Capacities reported at elevations 2,841.7 feet and 2,826.7 feet, local datum

^b Source: (RBWPCD, 2011), Note: Capacities reported at elevations 2,841.7 feet and 2,826.7 feet, local datum

^c Source: (HDR, 2012), Note: The elevations in the table created by HDR, Inc. are reported in feet North American Vertical Datum 1988 (NAVD88). NAVD88 elevations are 1.51 feet higher than the USGS gage elevations in feet above mean sea level. Capacities reported at elevations 2,843.91 feet and 2,828.91 feet NAVD88.

In principle, comparing lake volumes from multiple lake surveys allows for calculation of capacity loss rates. If all lost capacity is due to sediment accumulation, then comparisons of lake volumetric surveys would yield sediment accumulation rates. In practice, however, the differences in methodologies used in each lake survey may yield greater differences in computed lake volumes than the true volume differences. In addition, because volumetric surveys are not exact, small losses or gains in sediment may be masked by the imprecision of the computed volumes. For this reason, TWDB prefers to estimate sediment accumulation rates through sedimentation surveys, which directly measure the sediment layer thicknesses throughout the reservoir. The sediment accumulation rates derived from such surveys reflect the average rate of sediment accrual since the time of impoundment.

For informational purposes, a capacity loss rate, i.e. sedimentation rate, was calculated for the difference between the 2012 capacity estimate and the 1925 estimate; the

2012 capacity estimate and the 1986 estimate; and the 1986 capacity estimate and the 1925 estimate at elevation 2,827.4 feet (Table 3).

Table 3. Capacity loss comparisons for Red Bluff Reservoir

Survey	Volume comparisons @ 2,827.4 feet (acre-feet)		
1925 ^a	166,500	166,500	<
1986 ^b	153,670	<	153,670
2012 ^c	<	151,110	151,110
Volume difference (acre-feet)	12,830 (7.7%)	15,390 (9.2%)	2,560 (1.7%)
Number of years	61	87	26
Capacity loss rate (acre-feet/year)	210	177	98

^a Source: (TWDB, 1971)

^b Source: (RBWPCD, 2011)

^c Source: (HDR, 2012)

Recommendations

To improve estimates of capacity loss rates, TWDB recommends resurveying Red Bluff Reservoir in approximately 10 years or after a major flood event. To further improve estimates of capacity loss, TWDB recommends a volumetric and sedimentation survey. Sedimentation surveys include additional analysis of the multi-frequency data for post-impoundment sediment by correlation with sediment core samples and a map identifying the spatial distribution of sediment throughout the lake.

TWDB contact information

More information about the Hydrographic Survey Program can be found at:
<http://www.twdb.texas.gov/surfacewater/surveys/index.asp>

Any questions regarding the TWDB Hydrographic Survey Program may be addressed to:

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Appendix A

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2769.00										
2769.10										
2769.20				7	8	8	8	9	9	9
2769.30	9	10	10	10	11	11	11	11	12	12
2769.40	12	13	13	13	13	14	14	14	15	15
2769.50	15	15	16	16	16	16	17	17	17	18
2769.60	18	18	18	19	19	19	20	20	20	20
2769.70	21	21	21	22	22	22	22	23	23	23
2769.80	24	24	24	24	25	25	25	26	26	26
2769.90	26	27	27	27	28	28	28	28	29	29
2770.00	29	30	30	30	30	31	31	31	32	32
2770.10	32	32	33	33	33	34	34	34	34	35
2770.20	35	35	35	36	36	36	37	37	37	37
2770.30	38	38	38	39	39	39	39	40	40	40
2770.40	41	41	41	41	42	42	42	43	43	43
2770.50	43	44	44	44	45	45	45	45	46	46
2770.60	46	47	47	47	47	48	48	48	49	49
2770.70	49	49	50	50	50	51	51	51	51	52
2770.80	52	52	53	53	53	53	54	54	54	55
2770.90	55	55	55	56	56	56	56	57	57	57
2771.00	58	58	58	58	59	59	59	60	60	60
2771.10	60	61	61	61	62	62	62	62	63	63
2771.20	63	64	64	64	65	66	67	67	68	69
2771.30	70	70	71	72	73	74	74	75	76	77
2771.40	78	78	79	80	81	82	82	83	84	85
2771.50	85	86	87	88	89	89	90	91	92	93
2771.60	93	94	95	96	97	97	98	99	100	100
2771.70	101	102	103	104	104	105	106	107	108	108
2771.80	109	110	111	112	112	113	114	115	115	116
2771.90	117	118	119	119	120	121	122	123	123	124
2772.00	125	126	126	127	128	129	130	130	131	132
2772.10	133	134	134	135	136	137	138	138	139	140
2772.20	141	141	142	143	144	145	145	146	147	148
2772.30	149	149	150	151	152	153	153	154	155	156
2772.40	156	157	158	159	160	160	161	162	163	164
2772.50	164	165	166	167	168	168	169	170	171	171
2772.60	172	173	174	175	175	176	177	178	179	179
2772.70	180	181	182	183	183	184	185	186	186	187
2772.80	188	189	190	190	191	192	193	194	194	195
2772.90	196	197	198	198	199	200	201	201	202	203
2773.00	204	205	205	206	207	208	209	209	210	211
2773.10	212	213	213	214	215	216	216	217	218	219
2773.20	220	220	221	222	223	224	226	227	228	229
2773.30	231	232	233	234	236	237	238	239	241	242
2773.40	243	244	245	247	248	249	250	252	253	254
2773.50	255	257	258	259	260	262	263	264	265	266
2773.60	268	269	270	271	273	274	275	276	278	279
2773.70	280	281	283	284	285	286	287	289	290	291
2773.80	292	294	295	296	297	299	300	301	302	304
2773.90	305	306	307	308	310	311	312	313	315	316

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2774.00	317	318	320	321	322	323	325	326	327	328
2774.10	329	331	332	333	334	336	337	338	339	341
2774.20	342	343	344	346	347	348	349	350	352	353
2774.30	354	355	357	358	359	360	362	363	364	365
2774.40	366	368	369	370	371	373	374	375	376	378
2774.50	379	380	381	383	384	385	386	387	389	390
2774.60	391	392	394	395	396	397	399	400	401	402
2774.70	404	405	406	407	408	410	411	412	413	415
2774.80	416	417	418	420	421	422	423	425	426	427
2774.90	428	429	431	432	433	434	436	437	438	439
2775.00	441	442	443	444	446	447	448	449	450	452
2775.10	453	454	455	457	458	459	460	462	463	464
2775.20	465	467	468	469	471	472	474	476	477	479
2775.30	481	482	484	486	487	489	491	492	494	495
2775.40	497	499	500	502	504	505	507	509	510	512
2775.50	514	515	517	519	520	522	524	525	527	529
2775.60	530	532	534	535	537	539	540	542	543	545
2775.70	547	548	550	552	553	555	557	558	560	562
2775.80	563	565	567	568	570	572	573	575	577	578
2775.90	580	582	583	585	587	588	590	591	593	595
2776.00	596	598	600	601	603	605	606	608	610	611
2776.10	613	615	616	618	620	621	623	625	626	628
2776.20	630	631	633	635	636	638	639	641	643	644
2776.30	646	648	649	651	653	654	656	658	659	661
2776.40	663	664	666	668	669	671	673	674	676	678
2776.50	679	681	682	684	686	687	689	691	692	694
2776.60	696	697	699	701	702	704	706	707	709	711
2776.70	712	714	716	717	719	721	722	724	726	727
2776.80	729	730	732	734	735	737	739	740	742	744
2776.90	745	747	749	750	752	754	755	757	759	760
2777.00	762	764	765	767	769	770	772	774	775	777
2777.10	778	780	782	783	785	787	788	790	792	793
2777.20	795	797	798	800	802	804	806	808	810	813
2777.30	815	817	819	821	823	825	827	829	831	833
2777.40	835	838	840	842	844	846	848	850	852	854
2777.50	856	858	860	863	865	867	869	871	873	875
2777.60	877	879	881	883	885	888	890	892	894	896
2777.70	898	900	902	904	906	908	911	913	915	917
2777.80	919	921	923	925	927	929	931	933	936	938
2777.90	940	942	944	946	948	950	952	954	956	958
2778.00	961	963	965	967	969	971	973	975	977	979
2778.10	981	983	986	988	990	992	994	996	998	1000
2778.20	1002	1004	1006	1009	1011	1013	1015	1017	1019	1021
2778.30	1023	1025	1027	1029	1031	1034	1036	1038	1040	1042
2778.40	1044	1046	1048	1050	1052	1054	1056	1059	1061	1063
2778.50	1065	1067	1069	1071	1073	1075	1077	1079	1081	1084
2778.60	1086	1088	1090	1092	1094	1096	1098	1100	1102	1104
2778.70	1106	1109	1111	1113	1115	1117	1119	1121	1123	1125
2778.80	1127	1129	1132	1134	1136	1138	1140	1142	1144	1146
2778.90	1148	1150	1152	1154	1157	1159	1161	1163	1165	1167

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2779.00	1169	1171	1173	1175	1177	1179	1182	1184	1186	1188
2779.10	1190	1192	1194	1196	1198	1200	1202	1204	1207	1209
2779.20	1211	1213	1215	1217	1220	1222	1225	1228	1230	1233
2779.30	1235	1238	1241	1243	1246	1249	1251	1254	1257	1259
2779.40	1262	1264	1267	1270	1272	1275	1278	1280	1283	1286
2779.50	1288	1291	1293	1296	1299	1301	1304	1307	1309	1312
2779.60	1314	1317	1320	1322	1325	1328	1330	1333	1336	1338
2779.70	1341	1343	1346	1349	1351	1354	1357	1359	1362	1365
2779.80	1367	1370	1372	1375	1378	1380	1383	1386	1388	1391
2779.90	1394	1396	1399	1401	1404	1407	1409	1412	1415	1417
2780.00	1420	1423	1425	1428	1430	1433	1436	1438	1441	1444
2780.10	1446	1449	1452	1454	1457	1459	1462	1465	1467	1470
2780.20	1473	1475	1478	1481	1483	1486	1488	1491	1494	1496
2780.30	1499	1502	1504	1507	1509	1512	1515	1517	1520	1523
2780.40	1525	1528	1531	1533	1536	1538	1541	1544	1546	1549
2780.50	1552	1554	1557	1560	1562	1565	1567	1570	1573	1575
2780.60	1578	1581	1583	1586	1589	1591	1594	1596	1599	1602
2780.70	1604	1607	1610	1612	1615	1618	1620	1623	1625	1628
2780.80	1631	1633	1636	1639	1641	1644	1647	1649	1652	1654
2780.90	1657	1660	1662	1665	1668	1670	1673	1675	1678	1681
2781.00	1683	1686	1689	1691	1694	1697	1699	1702	1704	1707
2781.10	1710	1712	1715	1718	1720	1723	1726	1728	1731	1733
2781.20	1736	1739	1741	1744	1747	1751	1754	1758	1761	1764
2781.30	1768	1771	1775	1778	1781	1785	1788	1792	1795	1798
2781.40	1802	1805	1809	1812	1816	1819	1822	1826	1829	1833
2781.50	1836	1839	1843	1846	1850	1853	1856	1860	1863	1867
2781.60	1870	1873	1877	1880	1884	1887	1890	1894	1897	1901
2781.70	1904	1907	1911	1914	1918	1921	1924	1928	1931	1935
2781.80	1938	1941	1945	1948	1952	1955	1959	1962	1965	1969
2781.90	1972	1976	1979	1982	1986	1989	1993	1996	1999	2003
2782.00	2006	2010	2013	2016	2020	2023	2027	2030	2033	2037
2782.10	2040	2044	2047	2050	2054	2057	2061	2064	2067	2071
2782.20	2074	2078	2081	2085	2088	2091	2095	2098	2102	2105
2782.30	2108	2112	2115	2119	2122	2125	2129	2132	2136	2139
2782.40	2142	2146	2149	2153	2156	2159	2163	2166	2170	2173
2782.50	2176	2180	2183	2187	2190	2193	2197	2200	2204	2207
2782.60	2210	2214	2217	2221	2224	2228	2231	2234	2238	2241
2782.70	2245	2248	2251	2255	2258	2262	2265	2268	2272	2275
2782.80	2279	2282	2285	2289	2292	2296	2299	2302	2306	2309
2782.90	2313	2316	2319	2323	2326	2330	2333	2336	2340	2343
2783.00	2347	2350	2353	2357	2360	2364	2367	2371	2374	2377
2783.10	2381	2384	2388	2391	2394	2398	2401	2405	2408	2411
2783.20	2415	2418	2422	2425	2430	2434	2439	2444	2448	2453
2783.30	2458	2462	2467	2472	2476	2481	2486	2490	2495	2500
2783.40	2504	2509	2514	2518	2523	2528	2532	2537	2541	2546
2783.50	2551	2555	2560	2565	2569	2574	2579	2583	2588	2593
2783.60	2597	2602	2607	2611	2616	2621	2625	2630	2635	2639
2783.70	2644	2649	2653	2658	2663	2667	2672	2677	2681	2686
2783.80	2691	2695	2700	2705	2709	2714	2719	2723	2728	2733
2783.90	2737	2742	2747	2751	2756	2761	2765	2770	2774	2779

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2784.00	2784	2788	2793	2798	2802	2807	2812	2816	2821	2826
2784.10	2830	2835	2840	2844	2849	2854	2858	2863	2868	2872
2784.20	2877	2882	2886	2891	2896	2900	2905	2910	2914	2919
2784.30	2924	2928	2933	2938	2942	2947	2952	2956	2961	2966
2784.40	2970	2975	2980	2984	2989	2994	2998	3003	3007	3012
2784.50	3017	3021	3026	3031	3035	3040	3045	3049	3054	3059
2784.60	3063	3068	3073	3077	3082	3087	3091	3096	3101	3105
2784.70	3110	3115	3119	3124	3129	3133	3138	3143	3147	3152
2784.80	3157	3161	3166	3171	3175	3180	3185	3189	3194	3199
2784.90	3203	3208	3213	3217	3222	3227	3231	3236	3240	3245
2785.00	3250	3254	3259	3264	3268	3273	3278	3282	3287	3292
2785.10	3296	3301	3306	3310	3315	3320	3324	3329	3334	3338
2785.20	3343	3348	3352	3357	3363	3369	3375	3381	3387	3393
2785.30	3399	3405	3411	3417	3423	3429	3436	3442	3448	3454
2785.40	3460	3466	3472	3478	3484	3490	3496	3502	3508	3514
2785.50	3520	3526	3532	3538	3544	3550	3556	3562	3568	3574
2785.60	3580	3587	3593	3599	3605	3611	3617	3623	3629	3635
2785.70	3641	3647	3653	3659	3665	3671	3677	3683	3689	3695
2785.80	3701	3707	3713	3719	3725	3731	3738	3744	3750	3756
2785.90	3762	3768	3774	3780	3786	3792	3798	3804	3810	3816
2786.00	3822	3828	3834	3840	3846	3852	3858	3864	3870	3876
2786.10	3882	3889	3895	3901	3907	3913	3919	3925	3931	3937
2786.20	3943	3949	3955	3961	3967	3973	3979	3985	3991	3997
2786.30	4003	4009	4015	4021	4027	4033	4040	4046	4052	4058
2786.40	4064	4070	4076	4082	4088	4094	4100	4106	4112	4118
2786.50	4124	4130	4136	4142	4148	4154	4160	4166	4172	4178
2786.60	4184	4191	4197	4203	4209	4215	4221	4227	4233	4239
2786.70	4245	4251	4257	4263	4269	4275	4281	4287	4293	4299
2786.80	4305	4311	4317	4323	4329	4335	4342	4348	4354	4360
2786.90	4366	4372	4378	4384	4390	4396	4402	4408	4414	4420
2787.00	4426	4432	4438	4444	4450	4456	4462	4468	4474	4480
2787.10	4486	4493	4499	4505	4511	4517	4523	4529	4535	4541
2787.20	4547	4553	4559	4565	4572	4580	4587	4595	4602	4610
2787.30	4617	4625	4632	4640	4647	4654	4662	4669	4677	4684
2787.40	4692	4699	4707	4714	4722	4729	4736	4744	4751	4759
2787.50	4766	4774	4781	4789	4796	4804	4811	4818	4826	4833
2787.60	4841	4848	4856	4863	4871	4878	4886	4893	4900	4908
2787.70	4915	4923	4930	4938	4945	4953	4960	4968	4975	4982
2787.80	4990	4997	5005	5012	5020	5027	5035	5042	5050	5057
2787.90	5064	5072	5079	5087	5094	5102	5109	5117	5124	5132
2788.00	5139	5146	5154	5161	5169	5176	5184	5191	5199	5206
2788.10	5214	5221	5228	5236	5243	5251	5258	5266	5273	5281
2788.20	5288	5296	5303	5311	5318	5325	5333	5340	5348	5355
2788.30	5363	5370	5378	5385	5393	5400	5407	5415	5422	5430
2788.40	5437	5445	5452	5460	5467	5475	5482	5489	5497	5504
2788.50	5512	5519	5527	5534	5542	5549	5557	5564	5571	5579
2788.60	5586	5594	5601	5609	5616	5624	5631	5639	5646	5653
2788.70	5661	5668	5676	5683	5691	5698	5706	5713	5721	5728
2788.80	5735	5743	5750	5758	5765	5773	5780	5788	5795	5803
2788.90	5810	5817	5825	5832	5840	5847	5855	5862	5870	5877

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2789.00	5885	5892	5899	5907	5914	5922	5929	5937	5944	5952
2789.10	5959	5967	5974	5981	5989	5996	6004	6011	6019	6026
2789.20	6034	6041	6049	6056	6062	6068	6074	6080	6086	6092
2789.30	6099	6105	6111	6117	6123	6129	6135	6141	6147	6153
2789.40	6159	6165	6172	6178	6184	6190	6196	6202	6208	6214
2789.50	6220	6226	6232	6238	6244	6251	6257	6263	6269	6275
2789.60	6281	6287	6293	6299	6305	6311	6317	6324	6330	6336
2789.70	6342	6348	6354	6360	6366	6372	6378	6384	6390	6396
2789.80	6403	6409	6415	6421	6427	6433	6439	6445	6451	6457
2789.90	6463	6469	6476	6482	6488	6494	6500	6506	6512	6518
2790.00	6524	6530	6536	6542	6548	6555	6561	6567	6573	6579
2790.10	6585	6591	6597	6603	6609	6615	6621	6628	6634	6640
2790.20	6646	6652	6658	6664	6670	6676	6682	6688	6694	6700
2790.30	6707	6713	6719	6725	6731	6737	6743	6749	6755	6761
2790.40	6767	6773	6780	6786	6792	6798	6804	6810	6816	6822
2790.50	6828	6834	6840	6846	6852	6859	6865	6871	6877	6883
2790.60	6889	6895	6901	6907	6913	6919	6925	6932	6938	6944
2790.70	6950	6956	6962	6968	6974	6980	6986	6992	6998	7004
2790.80	7011	7017	7023	7029	7035	7041	7047	7053	7059	7065
2790.90	7071	7077	7084	7090	7096	7102	7108	7114	7120	7126
2791.00	7132	7138	7144	7150	7156	7163	7169	7175	7181	7187
2791.10	7193	7199	7205	7211	7217	7223	7229	7236	7242	7248
2791.20	7254	7260	7266	7272	7284	7297	7309	7321	7334	7346
2791.30	7358	7371	7383	7395	7408	7420	7432	7445	7457	7469
2791.40	7482	7494	7506	7519	7531	7543	7556	7568	7580	7593
2791.50	7605	7618	7630	7642	7655	7667	7679	7692	7704	7716
2791.60	7729	7741	7753	7766	7778	7790	7803	7815	7827	7840
2791.70	7852	7864	7877	7889	7901	7914	7926	7938	7951	7963
2791.80	7975	7988	8000	8012	8025	8037	8049	8062	8074	8086
2791.90	8099	8111	8123	8136	8148	8160	8173	8185	8197	8210
2792.00	8222	8235	8247	8259	8272	8284	8296	8309	8321	8333
2792.10	8346	8358	8370	8383	8395	8407	8420	8432	8444	8457
2792.20	8469	8481	8494	8506	8518	8531	8543	8555	8568	8580
2792.30	8592	8605	8617	8629	8642	8654	8666	8679	8691	8703
2792.40	8716	8728	8740	8753	8765	8777	8790	8802	8814	8827
2792.50	8839	8852	8864	8876	8889	8901	8913	8926	8938	8950
2792.60	8963	8975	8987	9000	9012	9024	9037	9049	9061	9074
2792.70	9086	9098	9111	9123	9135	9148	9160	9172	9185	9197
2792.80	9209	9222	9234	9246	9259	9271	9283	9296	9308	9320
2792.90	9333	9345	9357	9370	9382	9394	9407	9419	9431	9444
2793.00	9456	9469	9481	9493	9506	9518	9530	9543	9555	9567
2793.10	9580	9592	9604	9617	9629	9641	9654	9666	9678	9691
2793.20	9703	9715	9728	9740	9752	9763	9775	9786	9798	9809
2793.30	9821	9833	9844	9856	9867	9879	9891	9902	9914	9925
2793.40	9937	9948	9960	9972	9983	9995	10006	10018	10029	10041
2793.50	10053	10064	10076	10087	10099	10111	10122	10134	10145	10157
2793.60	10168	10180	10192	10203	10215	10226	10238	10250	10261	10273
2793.70	10284	10296	10307	10319	10331	10342	10354	10365	10377	10388
2793.80	10400	10412	10423	10435	10446	10458	10470	10481	10493	10504
2793.90	10516	10527	10539	10551	10562	10574	10585	10597	10608	10620

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2794.00	10632	10643	10655	10666	10678	10690	10701	10713	10724	10736
2794.10	10747	10759	10771	10782	10794	10805	10817	10829	10840	10852
2794.20	10863	10875	10886	10898	10910	10921	10933	10944	10956	10967
2794.30	10979	10991	11002	11014	11025	11037	11049	11060	11072	11083
2794.40	11095	11106	11118	11130	11141	11153	11164	11176	11187	11199
2794.50	11211	11222	11234	11245	11257	11269	11280	11292	11303	11315
2794.60	11326	11338	11350	11361	11373	11384	11396	11408	11419	11431
2794.70	11442	11454	11465	11477	11489	11500	11512	11523	11535	11546
2794.80	11558	11570	11581	11593	11604	11616	11628	11639	11651	11662
2794.90	11674	11685	11697	11709	11720	11732	11743	11755	11766	11778
2795.00	11790	11801	11813	11824	11836	11848	11859	11871	11882	11894
2795.10	11905	11917	11929	11940	11952	11963	11975	11987	11998	12010
2795.20	12021	12033	12044	12056	12071	12085	12100	12115	12129	12144
2795.30	12159	12173	12188	12203	12217	12232	12247	12262	12276	12291
2795.40	12306	12320	12335	12350	12364	12379	12394	12408	12423	12438
2795.50	12452	12467	12482	12496	12511	12526	12540	12555	12570	12584
2795.60	12599	12614	12629	12643	12658	12673	12687	12702	12717	12731
2795.70	12746	12761	12775	12790	12805	12819	12834	12849	12863	12878
2795.80	12893	12907	12922	12937	12951	12966	12981	12996	13010	13025
2795.90	13040	13054	13069	13084	13098	13113	13128	13142	13157	13172
2796.00	13186	13201	13216	13230	13245	13260	13274	13289	13304	13318
2796.10	13333	13348	13363	13377	13392	13407	13421	13436	13451	13465
2796.20	13480	13495	13509	13524	13539	13553	13568	13583	13597	13612
2796.30	13627	13641	13656	13671	13685	13700	13715	13730	13744	13759
2796.40	13774	13788	13803	13818	13832	13847	13862	13876	13891	13906
2796.50	13920	13935	13950	13964	13979	13994	14008	14023	14038	14052
2796.60	14067	14082	14097	14111	14126	14141	14155	14170	14185	14199
2796.70	14214	14229	14243	14258	14273	14287	14302	14317	14331	14346
2796.80	14361	14375	14390	14405	14419	14434	14449	14464	14478	14493
2796.90	14508	14522	14537	14552	14566	14581	14596	14610	14625	14640
2797.00	14654	14669	14684	14698	14713	14728	14742	14757	14772	14786
2797.10	14801	14816	14831	14845	14860	14875	14889	14904	14919	14933
2797.20	14948	14963	14977	14992	15009	15026	15043	15060	15077	15094
2797.30	15111	15127	15144	15161	15178	15195	15212	15229	15246	15263
2797.40	15280	15297	15314	15331	15348	15364	15381	15398	15415	15432
2797.50	15449	15466	15483	15500	15517	15534	15551	15568	15585	15601
2797.60	15618	15635	15652	15669	15686	15703	15720	15737	15754	15771
2797.70	15788	15805	15822	15839	15855	15872	15889	15906	15923	15940
2797.80	15957	15974	15991	16008	16025	16042	16059	16076	16092	16109
2797.90	16126	16143	16160	16177	16194	16211	16228	16245	16262	16279
2798.00	16296	16313	16329	16346	16363	16380	16397	16414	16431	16448
2798.10	16465	16482	16499	16516	16533	16550	16566	16583	16600	16617
2798.20	16634	16651	16668	16685	16702	16719	16736	16753	16770	16787
2798.30	16804	16820	16837	16854	16871	16888	16905	16922	16939	16956
2798.40	16973	16990	17007	17024	17041	17057	17074	17091	17108	17125
2798.50	17142	17159	17176	17193	17210	17227	17244	17261	17278	17294
2798.60	17311	17328	17345	17362	17379	17396	17413	17430	17447	17464
2798.70	17481	17498	17515	17532	17548	17565	17582	17599	17616	17633
2798.80	17650	17667	17684	17701	17718	17735	17752	17769	17785	17802
2798.90	17819	17836	17853	17870	17887	17904	17921	17938	17955	17972

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2799.00	17989	18006	18022	18039	18056	18073	18090	18107	18124	18141
2799.10	18158	18175	18192	18209	18226	18243	18259	18276	18293	18310
2799.20	18327	18344	18361	18378	18398	18417	18437	18456	18476	18495
2799.30	18515	18535	18554	18574	18593	18613	18632	18652	18671	18691
2799.40	18711	18730	18750	18769	18789	18808	18828	18848	18867	18887
2799.50	18906	18926	18945	18965	18985	19004	19024	19043	19063	19082
2799.60	19102	19121	19141	19161	19180	19200	19219	19239	19258	19278
2799.70	19298	19317	19337	19356	19376	19395	19415	19435	19454	19474
2799.80	19493	19513	19532	19552	19571	19591	19611	19630	19650	19669
2799.90	19689	19708	19728	19748	19767	19787	19806	19826	19845	19865
2800.00	19885	19904	19924	19943	19963	19982	20002	20021	20041	20061
2800.10	20080	20100	20119	20139	20158	20178	20198	20217	20237	20256
2800.20	20276	20295	20315	20335	20354	20374	20393	20413	20432	20452
2800.30	20471	20491	20511	20530	20550	20569	20589	20608	20628	20648
2800.40	20667	20687	20706	20726	20745	20765	20784	20804	20824	20843
2800.50	20863	20882	20902	20921	20941	20961	20980	21000	21019	21039
2800.60	21058	21078	21098	21117	21137	21156	21176	21195	21215	21234
2800.70	21254	21274	21293	21313	21332	21352	21371	21391	21411	21430
2800.80	21450	21469	21489	21508	21528	21548	21567	21587	21606	21626
2800.90	21645	21665	21684	21704	21724	21743	21763	21782	21802	21821
2801.00	21841	21861	21880	21900	21919	21939	21958	21978	21998	22017
2801.10	22037	22056	22076	22095	22115	22134	22154	22174	22193	22213
2801.20	22232	22252	22271	22291	22314	22336	22359	22381	22404	22426
2801.30	22449	22471	22494	22517	22539	22562	22584	22607	22629	22652
2801.40	22675	22697	22720	22742	22765	22787	22810	22832	22855	22878
2801.50	22900	22923	22945	22968	22990	23013	23035	23058	23081	23103
2801.60	23126	23148	23171	23193	23216	23239	23261	23284	23306	23329
2801.70	23351	23374	23396	23419	23442	23464	23487	23509	23532	23554
2801.80	23577	23599	23622	23645	23667	23690	23712	23735	23757	23780
2801.90	23803	23825	23848	23870	23893	23915	23938	23960	23983	24006
2802.00	24028	24051	24073	24096	24118	24141	24163	24186	24209	24231
2802.10	24254	24276	24299	24321	24344	24367	24389	24412	24434	24457
2802.20	24479	24502	24524	24547	24570	24592	24615	24637	24660	24682
2802.30	24705	24727	24750	24773	24795	24818	24840	24863	24885	24908
2802.40	24931	24953	24976	24998	25021	25043	25066	25088	25111	25134
2802.50	25156	25179	25201	25224	25246	25269	25291	25314	25337	25359
2802.60	25382	25404	25427	25449	25472	25495	25517	25540	25562	25585
2802.70	25607	25630	25652	25675	25698	25720	25743	25765	25788	25810
2802.80	25833	25855	25878	25901	25923	25946	25968	25991	26013	26036
2802.90	26059	26081	26104	26126	26149	26171	26194	26216	26239	26262
2803.00	26284	26307	26329	26352	26374	26397	26419	26442	26465	26487
2803.10	26510	26532	26555	26577	26600	26623	26645	26668	26690	26713
2803.20	26735	26758	26780	26803	26828	26854	26879	26905	26930	26956
2803.30	26981	27007	27032	27058	27083	27109	27134	27160	27185	27211
2803.40	27236	27261	27287	27312	27338	27363	27389	27414	27440	27465
2803.50	27491	27516	27542	27567	27593	27618	27644	27669	27694	27720
2803.60	27745	27771	27796	27822	27847	27873	27898	27924	27949	27975
2803.70	28000	28026	28051	28077	28102	28127	28153	28178	28204	28229
2803.80	28255	28280	28306	28331	28357	28382	28408	28433	28459	28484
2803.90	28509	28535	28560	28586	28611	28637	28662	28688	28713	28739

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2804.00	28764	28790	28815	28841	28866	28892	28917	28942	28968	28993
2804.10	29019	29044	29070	29095	29121	29146	29172	29197	29223	29248
2804.20	29274	29299	29325	29350	29375	29401	29426	29452	29477	29503
2804.30	29528	29554	29579	29605	29630	29656	29681	29707	29732	29758
2804.40	29783	29808	29834	29859	29885	29910	29936	29961	29987	30012
2804.50	30038	30063	30089	30114	30140	30165	30191	30216	30241	30267
2804.60	30292	30318	30343	30369	30394	30420	30445	30471	30496	30522
2804.70	30547	30573	30598	30624	30649	30674	30700	30725	30751	30776
2804.80	30802	30827	30853	30878	30904	30929	30955	30980	31006	31031
2804.90	31056	31082	31107	31133	31158	31184	31209	31235	31260	31286
2805.00	31311	31337	31362	31388	31413	31439	31464	31489	31515	31540
2805.10	31566	31591	31617	31642	31668	31693	31719	31744	31770	31795
2805.20	31821	31846	31872	31897	31926	31955	31984	32013	32042	32071
2805.30	32100	32129	32158	32187	32216	32245	32274	32303	32332	32361
2805.40	32390	32419	32448	32477	32506	32535	32564	32593	32621	32650
2805.50	32679	32708	32737	32766	32795	32824	32853	32882	32911	32940
2805.60	32969	32998	33027	33056	33085	33114	33143	33172	33201	33230
2805.70	33259	33288	33317	33346	33375	33404	33433	33462	33491	33520
2805.80	33549	33578	33607	33636	33665	33694	33723	33752	33781	33810
2805.90	33839	33868	33897	33926	33955	33984	34013	34042	34070	34099
2806.00	34128	34157	34186	34215	34244	34273	34302	34331	34360	34389
2806.10	34418	34447	34476	34505	34534	34563	34592	34621	34650	34679
2806.20	34708	34737	34766	34795	34824	34853	34882	34911	34940	34969
2806.30	34998	35027	35056	35085	35114	35143	35172	35201	35230	35259
2806.40	35288	35317	35346	35375	35404	35433	35462	35491	35519	35548
2806.50	35577	35606	35635	35664	35693	35722	35751	35780	35809	35838
2806.60	35867	35896	35925	35954	35983	36012	36041	36070	36099	36128
2806.70	36157	36186	36215	36244	36273	36302	36331	36360	36389	36418
2806.80	36447	36476	36505	36534	36563	36592	36621	36650	36679	36708
2806.90	36737	36766	36795	36824	36853	36882	36911	36940	36968	36997
2807.00	37026	37055	37084	37113	37142	37171	37200	37229	37258	37287
2807.10	37316	37345	37374	37403	37432	37461	37490	37519	37548	37577
2807.20	37606	37635	37664	37693	37726	37759	37792	37824	37857	37890
2807.30	37923	37956	37989	38022	38054	38087	38120	38153	38186	38219
2807.40	38252	38284	38317	38350	38383	38416	38449	38482	38514	38547
2807.50	38580	38613	38646	38679	38712	38744	38777	38810	38843	38876
2807.60	38909	38941	38974	39007	39040	39073	39106	39139	39171	39204
2807.70	39237	39270	39303	39336	39369	39401	39434	39467	39500	39533
2807.80	39566	39599	39631	39664	39697	39730	39763	39796	39829	39861
2807.90	39894	39927	39960	39993	40026	40059	40091	40124	40157	40190
2808.00	40223	40256	40289	40321	40354	40387	40420	40453	40486	40519
2808.10	40551	40584	40617	40650	40683	40716	40749	40781	40814	40847
2808.20	40880	40913	40946	40979	41011	41044	41077	41110	41143	41176
2808.30	41208	41241	41274	41307	41340	41373	41406	41438	41471	41504
2808.40	41537	41570	41603	41636	41668	41701	41734	41767	41800	41833
2808.50	41866	41898	41931	41964	41997	42030	42063	42096	42128	42161
2808.60	42194	42227	42260	42293	42326	42358	42391	42424	42457	42490
2808.70	42523	42556	42588	42621	42654	42687	42720	42753	42786	42818
2808.80	42851	42884	42917	42950	42983	43016	43048	43081	43114	43147
2808.90	43180	43213	43245	43278	43311	43344	43377	43410	43443	43475

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2809.00	43508	43541	43574	43607	43640	43673	43705	43738	43771	43804
2809.10	43837	43870	43903	43935	43968	44001	44034	44067	44100	44133
2809.20	44165	44198	44231	44264	44301	44337	44374	44410	44447	44483
2809.30	44520	44557	44593	44630	44666	44703	44740	44776	44813	44849
2809.40	44886	44922	44959	44996	45032	45069	45105	45142	45178	45215
2809.50	45252	45288	45325	45361	45398	45435	45471	45508	45544	45581
2809.60	45617	45654	45691	45727	45764	45800	45837	45874	45910	45947
2809.70	45983	46020	46056	46093	46130	46166	46203	46239	46276	46312
2809.80	46349	46386	46422	46459	46495	46532	46569	46605	46642	46678
2809.90	46715	46751	46788	46825	46861	46898	46934	46971	47007	47044
2810.00	47081	47117	47154	47190	47227	47264	47300	47337	47373	47410
2810.10	47446	47483	47520	47556	47593	47629	47666	47703	47739	47776
2810.20	47812	47849	47885	47922	47959	47995	48032	48068	48105	48141
2810.30	48178	48215	48251	48288	48324	48361	48398	48434	48471	48507
2810.40	48544	48580	48617	48654	48690	48727	48763	48800	48836	48873
2810.50	48910	48946	48983	49019	49056	49093	49129	49166	49202	49239
2810.60	49275	49312	49349	49385	49422	49458	49495	49532	49568	49605
2810.70	49641	49678	49714	49751	49788	49824	49861	49897	49934	49970
2810.80	50007	50044	50080	50117	50153	50190	50227	50263	50300	50336
2810.90	50373	50409	50446	50483	50519	50556	50592	50629	50665	50702
2811.00	50739	50775	50812	50848	50885	50922	50958	50995	51031	51068
2811.10	51104	51141	51178	51214	51251	51287	51324	51361	51397	51434
2811.20	51470	51507	51543	51580	51620	51661	51701	51742	51782	51823
2811.30	51863	51904	51944	51984	52025	52065	52106	52146	52187	52227
2811.40	52267	52308	52348	52389	52429	52470	52510	52551	52591	52631
2811.50	52672	52712	52753	52793	52834	52874	52915	52955	52995	53036
2811.60	53076	53117	53157	53198	53238	53278	53319	53359	53400	53440
2811.70	53481	53521	53562	53602	53642	53683	53723	53764	53804	53845
2811.80	53885	53926	53966	54006	54047	54087	54128	54168	54209	54249
2811.90	54289	54330	54370	54411	54451	54492	54532	54573	54613	54653
2812.00	54694	54734	54775	54815	54856	54896	54937	54977	55017	55058
2812.10	55098	55139	55179	55220	55260	55300	55341	55381	55422	55462
2812.20	55503	55543	55584	55624	55664	55705	55745	55786	55826	55867
2812.30	55907	55948	55988	56028	56069	56109	56150	56190	56231	56271
2812.40	56311	56352	56392	56433	56473	56514	56554	56595	56635	56675
2812.50	56716	56756	56797	56837	56878	56918	56959	56999	57039	57080
2812.60	57120	57161	57201	57242	57282	57322	57363	57403	57444	57484
2812.70	57525	57565	57606	57646	57686	57727	57767	57808	57848	57889
2812.80	57929	57970	58010	58050	58091	58131	58172	58212	58253	58293
2812.90	58333	58374	58414	58455	58495	58536	58576	58617	58657	58697
2813.00	58738	58778	58819	58859	58900	58940	58981	59021	59061	59102
2813.10	59142	59183	59223	59264	59304	59344	59385	59425	59466	59506
2813.20	59547	59587	59628	59668	59712	59756	59801	59845	59889	59933
2813.30	59977	60022	60066	60110	60154	60199	60243	60287	60331	60375
2813.40	60420	60464	60508	60552	60596	60641	60685	60729	60773	60817
2813.50	60862	60906	60950	60994	61039	61083	61127	61171	61215	61260
2813.60	61304	61348	61392	61436	61481	61525	61569	61613	61657	61702
2813.70	61746	61790	61834	61879	61923	61967	62011	62055	62100	62144
2813.80	62188	62232	62276	62321	62365	62409	62453	62497	62542	62586
2813.90	62630	62674	62718	62763	62807	62851	62895	62940	62984	63028

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2814.00	63072	63116	63161	63205	63249	63293	63337	63382	63426	63470
2814.10	63514	63558	63603	63647	63691	63735	63780	63824	63868	63912
2814.20	63956	64001	64045	64089	64133	64177	64222	64266	64310	64354
2814.30	64398	64443	64487	64531	64575	64620	64664	64708	64752	64796
2814.40	64841	64885	64929	64973	65017	65062	65106	65150	65194	65238
2814.50	65283	65327	65371	65415	65460	65504	65548	65592	65636	65681
2814.60	65725	65769	65813	65857	65902	65946	65990	66034	66078	66123
2814.70	66167	66211	66255	66300	66344	66388	66432	66476	66521	66565
2814.80	66609	66653	66697	66742	66786	66830	66874	66918	66963	67007
2814.90	67051	67095	67139	67184	67228	67272	67316	67361	67405	67449
2815.00	67493	67537	67582	67626	67670	67714	67758	67803	67847	67891
2815.10	67935	67979	68024	68068	68112	68156	68201	68245	68289	68333
2815.20	68377	68422	68466	68510	68558	68607	68655	68703	68751	68800
2815.30	68848	68896	68945	68993	69041	69089	69138	69186	69234	69283
2815.40	69331	69379	69427	69476	69524	69572	69621	69669	69717	69765
2815.50	69814	69862	69910	69959	70007	70055	70103	70152	70200	70248
2815.60	70297	70345	70393	70441	70490	70538	70586	70635	70683	70731
2815.70	70779	70828	70876	70924	70973	71021	71069	71117	71166	71214
2815.80	71262	71311	71359	71407	71455	71504	71552	71600	71649	71697
2815.90	71745	71793	71842	71890	71938	71987	72035	72083	72131	72180
2816.00	72228	72276	72325	72373	72421	72469	72518	72566	72614	72663
2816.10	72711	72759	72807	72856	72904	72952	73001	73049	73097	73145
2816.20	73194	73242	73290	73339	73387	73435	73483	73532	73580	73628
2816.30	73676	73725	73773	73821	73870	73918	73966	74014	74063	74111
2816.40	74159	74208	74256	74304	74352	74401	74449	74497	74546	74594
2816.50	74642	74690	74739	74787	74835	74884	74932	74980	75028	75077
2816.60	75125	75173	75222	75270	75318	75366	75415	75463	75511	75560
2816.70	75608	75656	75704	75753	75801	75849	75898	75946	75994	76042
2816.80	76091	76139	76187	76236	76284	76332	76380	76429	76477	76525
2816.90	76574	76622	76670	76718	76767	76815	76863	76912	76960	77008
2817.00	77056	77105	77153	77201	77250	77298	77346	77394	77443	77491
2817.10	77539	77588	77636	77684	77732	77781	77829	77877	77926	77974
2817.20	78022	78070	78119	78167	78219	78271	78323	78376	78428	78480
2817.30	78532	78584	78636	78688	78741	78793	78845	78897	78949	79001
2817.40	79053	79106	79158	79210	79262	79314	79366	79418	79470	79523
2817.50	79575	79627	79679	79731	79783	79835	79888	79940	79992	80044
2817.60	80096	80148	80200	80253	80305	80357	80409	80461	80513	80565
2817.70	80618	80670	80722	80774	80826	80878	80930	80983	81035	81087
2817.80	81139	81191	81243	81295	81348	81400	81452	81504	81556	81608
2817.90	81660	81713	81765	81817	81869	81921	81973	82025	82077	82130
2818.00	82182	82234	82286	82338	82390	82442	82495	82547	82599	82651
2818.10	82703	82755	82807	82860	82912	82964	83016	83068	83120	83172
2818.20	83225	83277	83329	83381	83433	83485	83537	83590	83642	83694
2818.30	83746	83798	83850	83902	83955	84007	84059	84111	84163	84215
2818.40	84267	84320	84372	84424	84476	84528	84580	84632	84684	84737
2818.50	84789	84841	84893	84945	84997	85049	85102	85154	85206	85258
2818.60	85310	85362	85414	85467	85519	85571	85623	85675	85727	85779
2818.70	85832	85884	85936	85988	86040	86092	86144	86197	86249	86301
2818.80	86353	86405	86457	86509	86562	86614	86666	86718	86770	86822
2818.90	86874	86927	86979	87031	87083	87135	87187	87239	87291	87344

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2819.00	87396	87448	87500	87552	87604	87656	87709	87761	87813	87865
2819.10	87917	87969	88021	88074	88126	88178	88230	88282	88334	88386
2819.20	88439	88491	88543	88595	88651	88707	88764	88820	88876	88932
2819.30	88989	89045	89101	89157	89213	89270	89326	89382	89438	89494
2819.40	89551	89607	89663	89719	89776	89832	89888	89944	90000	90057
2819.50	90113	90169	90225	90281	90338	90394	90450	90506	90563	90619
2819.60	90675	90731	90787	90844	90900	90956	91012	91068	91125	91181
2819.70	91237	91293	91350	91406	91462	91518	91574	91631	91687	91743
2819.80	91799	91855	91912	91968	92024	92080	92137	92193	92249	92305
2819.90	92361	92418	92474	92530	92586	92642	92699	92755	92811	92867
2820.00	92924	92980	93036	93092	93148	93205	93261	93317	93373	93429
2820.10	93486	93542	93598	93654	93711	93767	93823	93879	93935	93992
2820.20	94048	94104	94160	94217	94273	94329	94385	94441	94498	94554
2820.30	94610	94666	94722	94779	94835	94891	94947	95004	95060	95116
2820.40	95172	95228	95285	95341	95397	95453	95509	95566	95622	95678
2820.50	95734	95791	95847	95903	95959	96015	96072	96128	96184	96240
2820.60	96296	96353	96409	96465	96521	96578	96634	96690	96746	96802
2820.70	96859	96915	96971	97027	97083	97140	97196	97252	97308	97365
2820.80	97421	97477	97533	97589	97646	97702	97758	97814	97870	97927
2820.90	97983	98039	98095	98152	98208	98264	98320	98376	98433	98489
2821.00	98545	98601	98657	98714	98770	98826	98882	98939	98995	99051
2821.10	99107	99163	99220	99276	99332	99388	99444	99501	99557	99613
2821.20	99669	99726	99782	99838	99899	99959	100020	100081	100141	100202
2821.30	100262	100323	100384	100444	100505	100566	100626	100687	100747	100808
2821.40	100869	100929	100990	101051	101111	101172	101232	101293	101354	101414
2821.50	101475	101536	101596	101657	101718	101778	101839	101899	101960	102021
2821.60	102081	102142	102203	102263	102324	102384	102445	102506	102566	102627
2821.70	102688	102748	102809	102870	102930	102991	103051	103112	103173	103233
2821.80	103294	103355	103415	103476	103536	103597	103658	103718	103779	103840
2821.90	103900	103961	104021	104082	104143	104203	104264	104325	104385	104446
2822.00	104507	104567	104628	104688	104749	104810	104870	104931	104992	105052
2822.10	105113	105173	105234	105295	105355	105416	105477	105537	105598	105658
2822.20	105719	105780	105840	105901	105962	106022	106083	106144	106204	106265
2822.30	106325	106386	106447	106507	106568	106629	106689	106750	106810	106871
2822.40	106932	106992	107053	107114	107174	107235	107295	107356	107417	107477
2822.50	107538	107599	107659	107720	107781	107841	107902	107962	108023	108084
2822.60	108144	108205	108266	108326	108387	108447	108508	108569	108629	108690
2822.70	108751	108811	108872	108933	108993	109054	109114	109175	109236	109296
2822.80	109357	109418	109478	109539	109599	109660	109721	109781	109842	109903
2822.90	109963	110024	110084	110145	110206	110266	110327	110388	110448	110509
2823.00	110570	110630	110691	110751	110812	110873	110933	110994	111055	111115
2823.10	111176	111236	111297	111358	111418	111479	111540	111600	111661	111721
2823.20	111782	111843	111903	111964	112029	112094	112159	112224	112289	112354
2823.30	112419	112483	112548	112613	112678	112743	112808	112873	112938	113003
2823.40	113068	113133	113198	113263	113328	113392	113457	113522	113587	113652
2823.50	113717	113782	113847	113912	113977	114042	114107	114172	114237	114301
2823.60	114366	114431	114496	114561	114626	114691	114756	114821	114886	114951
2823.70	115016	115081	115146	115211	115275	115340	115405	115470	115535	115600
2823.80	115665	115730	115795	115860	115925	115990	116055	116120	116184	116249
2823.90	116314	116379	116444	116509	116574	116639	116704	116769	116834	116899

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2824.00	116964	117029	117093	117158	117223	117288	117353	117418	117483	117548
2824.10	117613	117678	117743	117808	117873	117938	118002	118067	118132	118197
2824.20	118262	118327	118392	118457	118522	118587	118652	118717	118782	118847
2824.30	118912	118976	119041	119106	119171	119236	119301	119366	119431	119496
2824.40	119561	119626	119691	119756	119821	119885	119950	120015	120080	120145
2824.50	120210	120275	120340	120405	120470	120535	120600	120665	120730	120794
2824.60	120859	120924	120989	121054	121119	121184	121249	121314	121379	121444
2824.70	121509	121574	121639	121704	121768	121833	121898	121963	122028	122093
2824.80	122158	122223	122288	122353	122418	122483	122548	122613	122677	122742
2824.90	122807	122872	122937	123002	123067	123132	123197	123262	123327	123392
2825.00	123457	123522	123586	123651	123716	123781	123846	123911	123976	124041
2825.10	124106	124171	124236	124301	124366	124431	124495	124560	124625	124690
2825.20	124755	124820	124885	124950	125019	125088	125157	125227	125296	125365
2825.30	125434	125503	125572	125642	125711	125780	125849	125918	125987	126056
2825.40	126126	126195	126264	126333	126402	126471	126540	126610	126679	126748
2825.50	126817	126886	126955	127025	127094	127163	127232	127301	127370	127439
2825.60	127509	127578	127647	127716	127785	127854	127923	127993	128062	128131
2825.70	128200	128269	128338	128408	128477	128546	128615	128684	128753	128822
2825.80	128892	128961	129030	129099	129168	129237	129306	129376	129445	129514
2825.90	129583	129652	129721	129791	129860	129929	129998	130067	130136	130205
2826.00	130275	130344	130413	130482	130551	130620	130689	130759	130828	130897
2826.10	130966	131035	131104	131174	131243	131312	131381	131450	131519	131588
2826.20	131658	131727	131796	131865	131934	132003	132072	132142	132211	132280
2826.30	132349	132418	132487	132557	132626	132695	132764	132833	132902	132971
2826.40	133041	133110	133179	133248	133317	133386	133455	133525	133594	133663
2826.50	133732	133801	133870	133940	134009	134078	134147	134216	134285	134354
2826.60	134424	134493	134562	134631	134700	134769	134838	134908	134977	135046
2826.70	135115	135184	135253	135323	135392	135461	135530	135599	135668	135737
2826.80	135807	135876	135945	136014	136083	136152	136221	136291	136360	136429
2826.90	136498	136567	136636	136706	136775	136844	136913	136982	137051	137120
2827.00	137190	137259	137328	137397	137466	137535	137604	137674	137743	137812
2827.10	137881	137950	138019	138089	138158	138227	138296	138365	138434	138503
2827.20	138573	138642	138711	138780	138853	138927	139000	139074	139147	139220
2827.30	139294	139367	139441	139514	139587	139661	139734	139807	139881	139954
2827.40	140028	140101	140174	140248	140321	140395	140468	140541	140615	140688
2827.50	140762	140835	140908	140982	141055	141128	141202	141275	141349	141422
2827.60	141495	141569	141642	141716	141789	141862	141936	142009	142083	142156
2827.70	142229	142303	142376	142450	142523	142596	142670	142743	142816	142890
2827.80	142963	143037	143110	143183	143257	143330	143404	143477	143550	143624
2827.90	143697	143771	143844	143917	143991	144064	144137	144211	144284	144358
2828.00	144431	144504	144578	144651	144725	144798	144871	144945	145018	145092
2828.10	145165	145238	145312	145385	145458	145532	145605	145679	145752	145825
2828.20	145899	145972	146046	146119	146192	146266	146339	146413	146486	146559
2828.30	146633	146706	146780	146853	146926	147000	147073	147146	147220	147293
2828.40	147367	147440	147513	147587	147660	147734	147807	147880	147954	148027
2828.50	148101	148174	148247	148321	148394	148467	148541	148614	148688	148761
2828.60	148834	148908	148981	149055	149128	149201	149275	149348	149422	149495
2828.70	149568	149642	149715	149789	149862	149935	150009	150082	150155	150229
2828.80	150302	150376	150449	150522	150596	150669	150743	150816	150889	150963
2828.90	151036	151110	151183	151256	151330	151403	151476	151550	151623	151697

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2829.00	151770	151843	151917	151990	152064	152137	152210	152284	152357	152431
2829.10	152504	152577	152651	152724	152797	152871	152944	153018	153091	153164
2829.20	153238	153311	153385	153458	153536	153615	153693	153771	153849	153928
2829.30	154006	154084	154163	154241	154319	154397	154476	154554	154632	154710
2829.40	154789	154867	154945	155024	155102	155180	155258	155337	155415	155493
2829.50	155572	155650	155728	155806	155885	155963	156041	156120	156198	156276
2829.60	156354	156433	156511	156589	156667	156746	156824	156902	156981	157059
2829.70	157137	157215	157294	157372	157450	157529	157607	157685	157763	157842
2829.80	157920	157998	158077	158155	158233	158311	158390	158468	158546	158624
2829.90	158703	158781	158859	158938	159016	159094	159172	159251	159329	159407
2830.00	159486	159564	159642	159720	159799	159877	159955	160034	160112	160190
2830.10	160268	160347	160425	160503	160581	160660	160738	160816	160895	160973
2830.20	161051	161129	161208	161286	161364	161443	161521	161599	161677	161756
2830.30	161834	161912	161991	162069	162147	162225	162304	162382	162460	162538
2830.40	162617	162695	162773	162852	162930	163008	163086	163165	163243	163321
2830.50	163400	163478	163556	163634	163713	163791	163869	163948	164026	164104
2830.60	164182	164261	164339	164417	164495	164574	164652	164730	164809	164887
2830.70	164965	165043	165122	165200	165278	165357	165435	165513	165591	165670
2830.80	165748	165826	165905	165983	166061	166139	166218	166296	166374	166452
2830.90	166531	166609	166687	166766	166844	166922	167000	167079	167157	167235
2831.00	167314	167392	167470	167548	167627	167705	167783	167862	167940	168018
2831.10	168096	168175	168253	168331	168409	168488	168566	168644	168723	168801
2831.20	168879	168957	169036	169114	169197	169281	169364	169447	169530	169614
2831.30	169697	169780	169864	169947	170030	170113	170197	170280	170363	170447
2831.40	170530	170613	170697	170780	170863	170946	171030	171113	171196	171280
2831.50	171363	171446	171529	171613	171696	171779	171863	171946	172029	172112
2831.60	172196	172279	172362	172446	172529	172612	172695	172779	172862	172945
2831.70	173029	173112	173195	173279	173362	173445	173528	173612	173695	173778
2831.80	173862	173945	174028	174111	174195	174278	174361	174445	174528	174611
2831.90	174694	174778	174861	174944	175028	175111	175194	175277	175361	175444
2832.00	175527	175611	175694	175777	175860	175944	176027	176110	176194	176277
2832.10	176360	176444	176527	176610	176693	176777	176860	176943	177027	177110
2832.20	177193	177276	177360	177443	177526	177610	177693	177776	177859	177943
2832.30	178026	178109	178193	178276	178359	178442	178526	178609	178692	178776
2832.40	178859	178942	179026	179109	179192	179275	179359	179442	179525	179609
2832.50	179692	179775	179858	179942	180025	180108	180192	180275	180358	180441
2832.60	180525	180608	180691	180775	180858	180941	181024	181108	181191	181274
2832.70	181358	181441	181524	181608	181691	181774	181857	181941	182024	182107
2832.80	182191	182274	182357	182440	182524	182607	182690	182774	182857	182940
2832.90	183023	183107	183190	183273	183357	183440	183523	183606	183690	183773
2833.00	183856	183940	184023	184106	184189	184273	184356	184439	184523	184606
2833.10	184689	184773	184856	184939	185022	185106	185189	185272	185356	185439
2833.20	185522	185605	185689	185772	185861	185950	186039	186127	186216	186305
2833.30	186394	186483	186572	186661	186750	186838	186927	187016	187105	187194
2833.40	187283	187372	187461	187549	187638	187727	187816	187905	187994	188083
2833.50	188171	188260	188349	188438	188527	188616	188705	188794	188882	188971
2833.60	189060	189149	189238	189327	189416	189505	189593	189682	189771	189860
2833.70	189949	190038	190127	190216	190304	190393	190482	190571	190660	190749
2833.80	190838	190926	191015	191104	191193	191282	191371	191460	191549	191637
2833.90	191726	191815	191904	191993	192082	192171	192260	192348	192437	192526

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2834.00	192615	192704	192793	192882	192970	193059	193148	193237	193326	193415
2834.10	193504	193593	193681	193770	193859	193948	194037	194126	194215	194304
2834.20	194392	194481	194570	194659	194748	194837	194926	195014	195103	195192
2834.30	195281	195370	195459	195548	195637	195725	195814	195903	195992	196081
2834.40	196170	196259	196348	196436	196525	196614	196703	196792	196881	196970
2834.50	197058	197147	197236	197325	197414	197503	197592	197681	197769	197858
2834.60	197947	198036	198125	198214	198303	198392	198480	198569	198658	198747
2834.70	198836	198925	199014	199103	199191	199280	199369	199458	199547	199636
2834.80	199725	199813	199902	199991	200080	200169	200258	200347	200436	200524
2834.90	200613	200702	200791	200880	200969	201058	201147	201235	201324	201413
2835.00	201502	201591	201680	201769	201857	201946	202035	202124	202213	202302
2835.10	202391	202480	202568	202657	202746	202835	202924	203013	203102	203191
2835.20	203279	203368	203457	203546	203634	203723	203812	203901	204019	204113
2835.30	204208	204302	204397	204491	204586	204680	204775	204869	204964	205058
2835.40	205153	205247	205342	205436	205531	205625	205720	205814	205909	206003
2835.50	206098	206192	206287	206381	206476	206570	206665	206759	206854	206948
2835.60	207043	207137	207232	207326	207421	207515	207610	207704	207799	207893
2835.70	207988	208082	208177	208272	208366	208461	208555	208650	208744	208839
2835.80	208933	209028	209122	209217	209311	209406	209500	209595	209689	209784
2835.90	209878	209973	210067	210162	210256	210351	210445	210540	210634	210729
2836.00	210823	210918	211012	211107	211201	211296	211390	211485	211579	211674
2836.10	211768	211863	211957	212052	212146	212241	212335	212430	212524	212619
2836.20	212713	212808	212902	212997	213092	213186	213281	213375	213470	213564
2836.30	213659	213753	213848	213942	214037	214131	214226	214320	214415	214509
2836.40	214604	214698	214793	214887	214982	215076	215171	215265	215360	215454
2836.50	215549	215643	215738	215832	215927	216021	216116	216210	216305	216399
2836.60	216494	216588	216683	216777	216872	216966	217061	217155	217250	217344
2836.70	217439	217533	217628	217723	217817	217912	218006	218101	218195	218290
2836.80	218384	218479	218573	218668	218762	218857	218951	219046	219140	219235
2836.90	219329	219424	219518	219613	219707	219802	219896	219991	220085	220180
2837.00	220274	220369	220463	220558	220652	220747	220841	220936	221030	221125
2837.10	221219	221314	221408	221503	221597	221692	221786	221881	221975	222070
2837.20	222164	222259	222353	222448	222542	222637	222731	222826	222920	223015
2837.30	223160	223255	223350	223445	223540	223635	223730	223825	223920	224015
2837.40	224152	224252	224352	224452	224553	224653	224753	224853	224953	225054
2837.50	225154	225254	225354	225454	225555	225655	225755	225855	225956	226056
2837.60	226156	226256	226356	226457	226557	226657	226757	226857	226958	227058
2837.70	227158	227258	227359	227459	227559	227659	227759	227860	227960	228060
2837.80	228160	228260	228361	228461	228561	228661	228762	228862	228962	229062
2837.90	229162	229263	229363	229463	229563	229663	229764	229864	229964	230064
2838.00	230165	230265	230365	230465	230565	230666	230766	230866	230966	231066
2838.10	231167	231267	231367	231467	231568	231668	231768	231868	231968	232069
2838.20	232169	232269	232369	232470	232570	232670	232770	232870	232971	233071
2838.30	233171	233271	233371	233472	233572	233672	233772	233873	233973	234073
2838.40	234173	234273	234374	234474	234574	234674	234774	234875	234975	235075
2838.50	235175	235276	235376	235476	235576	235676	235777	235877	235977	236077
2838.60	236177	236278	236378	236478	236578	236679	236779	236879	236979	237079
2838.70	237180	237280	237380	237480	237580	237681	237781	237881	237981	238082
2838.80	238182	238282	238382	238482	238583	238683	238783	238883	238983	239084
2838.90	239184	239284	239384	239485	239585	239685	239785	239885	239986	240086

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2839.00	240186	240286	240386	240487	240587	240687	240787	240888	240988	241088
2839.10	241188	241288	241389	241489	241589	241689	241789	241890	241990	242090
2839.20	242190	242291	242391	242491	242597	242703	242809	242915	243021	243127
2839.30	243234	243340	243446	243552	243658	243764	243870	243976	244082	244188
2839.40	244294	244400	244507	244613	244719	244825	244931	245037	245143	245249
2839.50	245355	245461	245567	245673	245779	245886	245992	246098	246204	246310
2839.60	246416	246522	246628	246734	246840	246946	247052	247159	247265	247371
2839.70	247477	247583	247689	247795	247901	248007	248113	248219	248325	248431
2839.80	248538	248644	248750	248856	248962	249068	249174	249280	249386	249492
2839.90	249598	249704	249811	249917	250023	250129	250235	250341	250447	250553
2840.00	250659	250765	250871	250977	251083	251190	251296	251402	251508	251614
2840.10	251720	251826	251932	252038	252144	252250	252356	252463	252569	252675
2840.20	252781	252887	252993	253099	253205	253311	253417	253523	253629	253735
2840.30	253842	253948	254054	254160	254266	254372	254478	254584	254690	254796
2840.40	254902	255008	255115	255221	255327	255433	255539	255645	255751	255857
2840.50	255963	256069	256175	256281	256387	256494	256600	256706	256812	256918
2840.60	257024	257130	257236	257342	257448	257554	257660	257767	257873	257979
2840.70	258085	258191	258297	258403	258509	258615	258721	258827	258933	259039
2840.80	259146	259252	259358	259464	259570	259676	259782	259888	259994	260100
2840.90	260206	260312	260419	260525	260631	260737	260843	260949	261055	261161
2841.00	261267	261373	261479	261585	261691	261798	261904	262010	262116	262222
2841.10	262328	262434	262540	262646	262752	262858	262964	263071	263177	263283
2841.20	263389	263495	263601	263707	263819	263932	264044	264157	264269	264382
2841.30	264494	264607	264719	264832	264944	265057	265169	265282	265394	265507
2841.40	265619	265731	265844	265956	266069	266181	266294	266406	266519	266631
2841.50	266744	266856	266969	267081	267194	267306	267419	267531	267643	267756
2841.60	267868	267981	268093	268206	268318	268431	268543	268656	268768	268881
2841.70	268993	269106	269218	269331	269443	269555	269668	269780	269893	270005
2841.80	270118	270230	270343	270455	270568	270680	270793	270905	271018	271130
2841.90	271242	271355	271467	271580	271692	271805	271917	272030	272142	272255
2842.00	272367	272480	272592	272705	272817	272930	273042	273154	273267	273379
2842.10	273492	273604	273717	273829	273942	274054	274167	274279	274392	274504
2842.20	274617	274729	274842	274954	275066	275179	275291	275404	275516	275629
2842.30	275741	275854	275966	276079	276191	276304	276416	276529	276641	276754
2842.40	276866	276978	277091	277203	277316	277428	277541	277653	277766	277878
2842.50	277991	278103	278216	278328	278441	278553	278666	278778	278890	279003
2842.60	279115	279228	279340	279453	279565	279678	279790	279903	280015	280128
2842.70	280240	280353	280465	280578	280690	280802	280915	281027	281140	281252
2842.80	281365	281477	281590	281702	281815	281927	282040	282152	282265	282377
2842.90	282489	282602	282714	282827	282939	283052	283164	283277	283389	283502
2843.00	283614	283727	283839	283952	284064	284177	284289	284401	284514	284626
2843.10	284739	284851	284964	285076	285189	285301	285414	285526	285639	285751
2843.20	285864	285976	286089	286201	286320	286439	286559	286678	286797	286916
2843.30	287035	287154	287274	287393	287512	287631	287750	287869	287989	288108
2843.40	288227	288346	288465	288585	288704	288823	288942	289061	289180	289300
2843.50	289419	289538	289657	289776	289895	290015	290134	290253	290372	290491
2843.60	290610	290730	290849	290968	291087	291206	291326	291445	291564	291683
2843.70	291802	291921	292041	292160	292279	292398	292517	292636	292756	292875
2843.80	292994	293113	293232	293352	293471	293590	293709	293828	293947	294067
2843.90	294186	294305	294424	294543	294662	294782	294901	295020	295139	295258

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2844.00	295377	295497	295616	295735	295854	295973	296093	296212	296331	296450
2844.10	296569	296688	296808	296927	297046	297165	297284	297403	297523	297642
2844.20	297761	297880	297999	298119	298238	298357	298476	298595	298714	298834
2844.30	298953	299072	299191	299310	299429	299549	299668	299787	299906	300025
2844.40	300144	300264	300383	300502	300621	300740	300860	300979	301098	301217
2844.50	301336	301455	301575	301694	301813	301932	302051	302170	302290	302409
2844.60	302528	302647	302766	302886	303005	303124	303243	303362	303481	303601
2844.70	303720	303839	303958	304077	304196	304316	304435	304554	304673	304792
2844.80	304911	305031	305150	305269	305388	305507	305627	305746	305865	305984
2844.90	306103	306222	306342	306461	306580	306699	306818	306937	307057	307176
2845.00	307295	307414	307533	307653	307772	307891	308010	308129	308248	308368
2845.10	308487	308606	308725	308844	308963	309083	309202	309321	309440	309559
2845.20	309678	309798	309917	310036	310162	310288	310414	310540	310666	310792
2845.30	310918	311044	311170	311296	311422	311548	311674	311800	311926	312052
2845.40	312178	312304	312430	312556	312682	312808	312934	313060	313186	313312
2845.50	313438	313564	313690	313816	313942	314068	314194	314320	314446	314572
2845.60	314698	314824	314950	315076	315202	315328	315454	315580	315706	315832
2845.70	315958	316084	316210	316336	316461	316587	316713	316839	316965	317091
2845.80	317217	317343	317469	317595	317721	317847	317973	318099	318225	318351
2845.90	318477	318603	318729	318855	318981	319107	319233	319359	319485	319611
2846.00	319737	319863	319989	320115	320241	320367	320493	320619	320745	320871
2846.10	320997	321123	321249	321375	321501	321627	321753	321879	322005	322131
2846.20	322257	322383	322509	322635	322761	322887	323013	323139	323265	323391
2846.30	323517	323643	323769	323895	324021	324147	324273	324399	324525	324651
2846.40	324777	324903	325029	325155	325281	325407	325533	325659	325785	325911
2846.50	326037	326163	326289	326415	326541	326667	326793	326919	327045	327171
2846.60	327297	327423	327549	327675	327801	327927	328053	328179	328305	328431
2846.70	328557	328683	328809	328935	329060	329186	329312	329438	329564	329690
2846.80	329816	329942	330068	330194	330320	330446	330572	330698	330824	330950
2846.90	331076	331202	331328	331454	331580	331706	331832	331958	332084	332210
2847.00	332336	332462	332588	332714	332840	332966	333092	333218	333344	333470
2847.10	333596	333722	333848	333974	334100	334226	334352	334478	334604	334730
2847.20	334856	334982	335108	335234	335367	335499	335632	335764	335897	336029
2847.30	336162	336294	336427	336559	336692	336824	336957	337089	337222	337354
2847.40	337487	337619	337752	337884	338017	338149	338282	338414	338547	338679
2847.50	338812	338944	339077	339209	339342	339474	339607	339739	339872	340004
2847.60	340137	340269	340402	340534	340667	340799	340932	341064	341197	341329
2847.70	341462	341594	341727	341860	341992	342125	342257	342390	342522	342655
2847.80	342787	342920	343052	343185	343317	343450	343582	343715	343847	343980
2847.90	344112	344245	344377	344510	344642	344775	344907	345040	345172	345305
2848.00	345437	345570	345702	345835	345967	346100	346232	346365	346497	346630
2848.10	346762	346895	347027	347160	347292	347425	347557	347690	347822	347955
2848.20	348087	348220	348352	348485	348618	348750	348883	349015	349148	349280
2848.30	349413	349545	349678	349810	349943	350075	350208	350340	350473	350605
2848.40	350738	350870	351003	351135	351268	351400	351533	351665	351798	351930
2848.50	352063	352195	352328	352460	352593	352725	352858	352990	353123	353255
2848.60	353388	353520	353653	353785	353918	354050	354183	354315	354448	354580
2848.70	354713	354845	354978	355111	355243	355376	355508	355641	355773	355906
2848.80	356038	356171	356303	356436	356568	356701	356833	356966	357098	357231
2848.90	357363	357496	357628	357761	357893	358026	358158	358291	358423	358556

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2849.00	358688	358821	358953	359086	359218	359351	359483	359616	359748	359881
2849.10	360013	360146	360278	360411	360543	360676	360808	360941	361073	361206
2849.20	361338	361471	361603	361736	361875	362014	362153	362292	362432	362571
2849.30	362710	362849	362988	363127	363266	363405	363544	363684	363823	363962
2849.40	364101	364240	364379	364518	364657	364797	364936	365075	365214	365353
2849.50	365492	365631	365770	365909	366049	366188	366327	366466	366605	366744
2849.60	366883	367022	367161	367301	367440	367579	367718	367857	367996	368135
2849.70	368274	368414	368553	368692	368831	368970	369109	369248	369387	369526
2849.80	369666	369805	369944	370083	370222	370361	370500	370639	370778	370918
2849.90	371057	371196	371335	371474	371613	371752	371891	372031	372170	372309
2850.00	372448	372587	372726	372865	373004	373143	373283	373422	373561	373700
2850.10	373839	373978	374117	374256	374395	374535	374674	374813	374952	375091
2850.20	375230	375369	375508	375648	375787	375926	376065	376204	376343	376482
2850.30	376621	376760	376900	377039	377178	377317	377456	377595	377734	377873
2850.40	378012	378152	378291	378430	378569	378708	378847	378986	379125	379264
2850.50	379404	379543	379682	379821	379960	380099	380238	380377	380517	380656
2850.60	380795	380934	381073	381212	381351	381490	381629	381769	381908	382047
2850.70	382186	382325	382464	382603	382742	382881	383021	383160	383299	383438
2850.80	383577	383716	383855	383994	384134	384273	384412	384551	384690	384829
2850.90	384968	385107	385246	385386	385525	385664	385803	385942	386081	386220
2851.00	386359	386498	386638	386777	386916	387055	387194	387333	387472	387611
2851.10	387751	387890	388029	388168	388307	388446	388585	388724	388863	389003
2851.20	389142	389281	389420	389559	389705	389851	389998	390144	390290	390436
2851.30	390582	390728	390875	391021	391167	391313	391459	391605	391752	391898
2851.40	392044	392190	392336	392482	392629	392775	392921	393067	393213	393359
2851.50	393506	393652	393798	393944	394090	394236	394383	394529	394675	394821
2851.60	394967	395113	395260	395406	395552	395698	395844	395990	396137	396283
2851.70	396429	396575	396721	396868	397014	397160	397306	397452	397598	397745
2851.80	397891	398037	398183	398329	398475	398622	398768	398914	399060	399206
2851.90	399352	399499	399645	399791	399937	400083	400229	400376	400522	400668
2852.00	400814	400960	401106	401253	401399	401545	401691	401837	401983	402130
2852.10	402276	402422	402568	402714	402860	403007	403153	403299	403445	403591
2852.20	403737	403884	404030	404176	404322	404468	404615	404761	404907	405053
2852.30	405199	405345	405492	405638	405784	405930	406076	406222	406369	406515
2852.40	406661	406807	406953	407099	407246	407392	407538	407684	407830	407976
2852.50	408123	408269	408415	408561	408707	408853	409000	409146	409292	409438
2852.60	409584	409730	409877	410023	410169	410315	410461	410607	410754	410900
2852.70	411046	411192	411338	411485	411631	411777	411923	412069	412215	412362
2852.80	412508	412654	412800	412946	413092	413239	413385	413531	413677	413823
2852.90	413969	414116	414262	414408	414554	414700	414846	414993	415139	415285
2853.00	415431	415577	415723	415870	416016	416162	416308	416454	416600	416747
2853.10	416893	417039	417185	417331	417477	417624	417770	417916	418062	418208
2853.20	418354	418501	418647	418793	418947	419101	419255	419408	419562	419716
2853.30	419870	420024	420178	420331	420485	420639	420793	420947	421101	421255
2853.40	421408	421562	421716	421870	422024	422178	422331	422485	422639	422793
2853.50	422947	423101	423255	423408	423562	423716	423870	424024	424178	424331
2853.60	424485	424639	424793	424947	425101	425254	425408	425562	425716	425870
2853.70	426024	426178	426331	426485	426639	426793	426947	427101	427254	427408
2853.80	427562	427716	427870	428024	428178	428331	428485	428639	428793	428947
2853.90	429101	429254	429408	429562	429716	429870	430024	430178	430331	430485

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2854.00	430639	430793	430947	431101	431254	431408	431562	431716	431870	432024
2854.10	432178	432331	432485	432639	432793	432947	433101	433254	433408	433562
2854.20	433716	433870	434024	434178	434331	434485	434639	434793	434947	435101
2854.30	435254	435408	435562	435716	435870	436024	436177	436331	436485	436639
2854.40	436793	436947	437101	437254	437408	437562	437716	437870	438024	438177
2854.50	438331	438485	438639	438793	438947	439101	439254	439408	439562	439716
2854.60	439870	440024	440177	440331	440485	440639	440793	440947	441101	441254
2854.70	441408	441562	441716	441870	442024	442177	442331	442485	442639	442793
2854.80	442947	443101	443254	443408	443562	443716	443870	444024	444177	444331
2854.90	444485	444639	444793	444947	445100	445254	445408	445562	445716	445870
2855.00	446024	446177	446331	446485	446639	446793	446947	447100	447254	447408
2855.10	447562	447716	447870	448024	448177	448331	448485	448639	448793	448947
2855.20	449100	449254	449408	449562	449724	449885	450047	450209	450371	450532
2855.30	450694	450856	451018	451179	451341	451503	451665	451826	451988	452150
2855.40	452312	452473	452635	452797	452959	453120	453282	453444	453606	453767
2855.50	453929	454091	454253	454414	454576	454738	454900	455061	455223	455385
2855.60	455547	455708	455870	456032	456194	456355	456517	456679	456841	457002
2855.70	457164	457326	457488	457649	457811	457973	458134	458296	458458	458620
2855.80	458781	458943	459105	459267	459428	459590	459752	459914	460075	460237
2855.90	460399	460561	460722	460884	461046	461208	461369	461531	461693	461855
2856.00	462016	462178	462340	462502	462663	462825	462987	463149	463310	463472
2856.10	463634	463796	463957	464119	464281	464443	464604	464766	464928	465090
2856.20	465251	465413	465575	465737	465898	466060	466222	466383	466545	466707
2856.30	466869	467030	467192	467354	467516	467677	467839	468001	468163	468324
2856.40	468486	468648	468810	468971	469133	469295	469457	469618	469780	469942
2856.50	470104	470265	470427	470589	470751	470912	471074	471236	471398	471559
2856.60	471721	471883	472045	472206	472368	472530	472692	472853	473015	473177
2856.70	473339	473500	473662	473824	473985	474147	474309	474471	474632	474794
2856.80	474956	475118	475279	475441	475603	475765	475926	476088	476250	476412
2856.90	476573	476735	476897	477059	477220	477382	477544	477706	477867	478029
2857.00	478191	478353	478514	478676	478838	479000	479161	479323	479485	479647
2857.10	479808	479970	480132	480294	480455	480617	480779	480941	481102	481264
2857.20	481426	481588	481749	481911	482079	482248	482416	482585	482753	482922
2857.30	483090	483258	483427	483595	483764	483932	484101	484269	484438	484606
2857.40	484774	484943	485111	485280	485448	485617	485785	485953	486122	486290
2857.50	486459	486627	486796	486964	487132	487301	487469	487638	487806	487975
2857.60	488143	488312	488480	488648	488817	488985	489154	489322	489491	489659
2857.70	489827	489996	490164	490333	490501	490670	490838	491006	491175	491343
2857.80	491512	491680	491849	492017	492186	492354	492522	492691	492859	493028
2857.90	493196	493365	493533	493701	493870	494038	494207	494375	494544	494712
2858.00	494880	495049	495217	495386	495554	495723	495891	496060	496228	496396
2858.10	496565	496733	496902	497070	497239	497407	497575	497744	497912	498081
2858.20	498249	498418	498586	498755	498923	499091	499260	499428	499597	499765
2858.30	499934	500102	500270	500439	500607	500776	500944	501113	501281	501449
2858.40	501618	501786	501955	502123	502292	502460	502629	502797	502965	503134
2858.50	503302	503471	503639	503808	503976	504144	504313	504481	504650	504818
2858.60	504987	505155	505323	505492	505660	505829	505997	506166	506334	506503
2858.70	506671	506839	507008	507176	507345	507513	507682	507850	508018	508187
2858.80	508355	508524	508692	508861	509029	509197	509366	509534	509703	509871
2858.90	510040	510208	510377	510545	510713	510882	511050	511219	511387	511556

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2859.00	511724	511892	512061	512229	512398	512566	512735	512903	513071	513240
2859.10	513408	513577	513745	513914	514082	514251	514419	514587	514756	514924
2859.20	515093	515261	515430	515598	515768	515937	516107	516277	516446	516616
2859.30	516785	516955	517125	517294	517464	517634	517803	517973	518142	518312
2859.40	518482	518651	518821	518991	519160	519330	519499	519669	519839	520008
2859.50	520178	520348	520517	520687	520856	521026	521196	521365	521535	521705
2859.60	521874	522044	522213	522383	522553	522722	522892	523062	523231	523401
2859.70	523570	523740	523910	524079	524249	524419	524588	524758	524927	525097
2859.80	525267	525436	525606	525776	525945	526115	526284	526454	526624	526793
2859.90	526963	527133	527302	527472	527641	527811	527981	528150	528320	528490
2860.00	528659	528829	528998	529168	529338	529507	529677	529847	530016	530186
2860.10	530355	530525	530695	530864	531034	531204	531373	531543	531712	531882
2860.20	532052	532221	532391	532561	532730	532900	533069	533239	533409	533578
2860.30	533748	533918	534087	534257	534426	534596	534766	534935	535105	535275
2860.40	535444	535614	535783	535953	536123	536292	536462	536632	536801	536971
2860.50	537140	537310	537480	537649	537819	537989	538158	538328	538497	538667
2860.60	538837	539006	539176	539346	539515	539685	539854	540024	540194	540363
2860.70	540533	540703	540872	541042	541211	541381	541551	541720	541890	542060
2860.80	542229	542399	542568	542738	542908	543077	543247	543417	543586	543756
2860.90	543925	544095	544265	544434	544604	544774	544943	545113	545282	545452
2861.00	545622	545791	545961	546131	546300	546470	546639	546809	546979	547148
2861.10	547318	547488	547657	547827	547996	548166	548336	548505	548675	548845
2861.20	549014	549184	549353	549523	549693	549863	550033	550203	550373	550543
2861.30	550713	550883	551053	551223	551393	551563	551733	551903	552073	552243
2861.40	552413	552583	552753	552923	553093	553263	553433	553603	553773	553943
2861.50	554113	554283	554453	554623	554793	554963	555133	555302	555472	555642
2861.60	555812	555982	556152	556322	556492	556662	556832	557002	557172	557342
2861.70	557512	557682	557852	558022	558192	558362	558532	558702	558872	559042
2861.80	559212	559382	559552	559722	559892	560062	560232	560402	560572	560742
2861.90	560912	561082	561252	561422	561592	561762	561932	562102	562272	562442
2862.00	562612	562782	562952	563122	563292	563462	563632	563802	563972	564142
2862.10	564312	564482	564652	564822	564992	565162	565332	565502	565672	565842
2862.20	566012	566182	566352	566522	566691	566861	567031	567201	567371	567541
2862.30	567711	567881	568051	568221	568391	568561	568731	568901	569071	569241
2862.40	569411	569581	569751	569921	570091	570261	570431	570601	570771	570941
2862.50	571111	571281	571451	571621	571791	571961	572131	572301	572471	572641
2862.60	572811	572981	573151	573321	573491	573661	573831	574001	574171	574341
2862.70	574511	574681	574851	575021	575191	575361	575531	575701	575871	576041
2862.80	576211	576381	576551	576721	576891	577061	577231	577401	577571	577741
2862.90	577910	578080	578250	578420	578590	578760	578930	579100	579270	579440
2863.00	579610	579780	579950	580120	580290	580460	580630	580800	580970	581140
2863.10	581310	581480	581650	581820	581990	582160	582330	582500	582670	582840
2863.20	583010	583180	583350	583520	583690	583860	584031	584201	584371	584541
2863.30	584712	584882	585052	585222	585393	585563	585733	585903	586074	586244
2863.40	586414	586584	586755	586925	587095	587265	587436	587606	587776	587946
2863.50	588117	588287	588457	588627	588798	588968	589138	589308	589479	589649
2863.60	589819	589989	590160	590330	590500	590670	590841	591011	591181	591351
2863.70	591522	591692	591862	592032	592202	592373	592543	592713	592883	593054
2863.80	593224	593394	593564	593735	593905	594075	594245	594416	594586	594756
2863.90	594926	595097	595267	595437	595607	595778	595948	596118	596288	596459

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2864.00	596629	596799	596969	597140	597310	597480	597650	597821	597991	598161
2864.10	598331	598502	598672	598842	599012	599183	599353	599523	599693	599864
2864.20	600034	600204	600374	600545	600715	600885	601055	601225	601396	601566
2864.30	601736	601906	602077	602247	602417	602587	602758	602928	603098	603268
2864.40	603439	603609	603779	603949	604120	604290	604460	604630	604801	604971
2864.50	605141	605311	605482	605652	605822	605992	606163	606333	606503	606673
2864.60	606844	607014	607184	607354	607525	607695	607865	608035	608206	608376
2864.70	608546	608716	608887	609057	609227	609397	609567	609738	609908	610078
2864.80	610248	610419	610589	610759	610929	611100	611270	611440	611610	611781
2864.90	611951	612121	612291	612462	612632	612802	612972	613143	613313	613483
2865.00	613653	613824	613994	614164	614334	614505	614675	614845	615015	615186
2865.10	615356	615526	615696	615867	616037	616207	616377	616548	616718	616888
2865.20	617058	617229	617399	617569	617739	617910	618080	618251	618421	618592
2865.30	618762	618932	619103	619273	619444	619614	619784	619955	620125	620296
2865.40	620466	620637	620807	620977	621148	621318	621489	621659	621829	622000
2865.50	622170	622341	622511	622682	622852	623022	623193	623363	623534	623704
2865.60	623875	624045	624215	624386	624556	624727	624897	625067	625238	625408
2865.70	625579	625749	625920	626090	626260	626431	626601	626772	626942	627113
2865.80	627283	627453	627624	627794	627965	628135	628305	628476	628646	628817
2865.90	628987	629158	629328	629498	629669	629839	630010	630180	630350	630521
2866.00	630691	630862	631032	631203	631373	631543	631714	631884	632055	632225
2866.10	632396	632566	632736	632907	633077	633248	633418	633588	633759	633929
2866.20	634100	634270	634441	634611	634781	634952	635122	635293	635463	635634
2866.30	635804	635974	636145	636315	636486	636656	636826	636997	637167	637338
2866.40	637508	637679	637849	638019	638190	638360	638531	638701	638871	639042
2866.50	639212	639383	639553	639724	639894	640064	640235	640405	640576	640746
2866.60	640917	641087	641257	641428	641598	641769	641939	642109	642280	642450
2866.70	642621	642791	642962	643132	643302	643473	643643	643814	643984	644155
2866.80	644325	644495	644666	644836	645007	645177	645347	645518	645688	645859
2866.90	646029	646200	646370	646540	646711	646881	647052	647222	647392	647563
2867.00	647733	647904	648074	648245	648415	648585	648756	648926	649097	649267
2867.10	649438	649608	649778	649949	650119	650290	650460	650630	650801	650971
2867.20	651142	651312	651483	651653	651824	651994	652165	652335	652506	652676
2867.30	652847	653017	653188	653359	653529	653700	653870	654041	654211	654382
2867.40	654552	654723	654894	655064	655235	655405	655576	655746	655917	656087
2867.50	656258	656429	656599	656770	656940	657111	657281	657452	657622	657793
2867.60	657964	658134	658305	658475	658646	658816	658987	659157	659328	659499
2867.70	659669	659840	660010	660181	660351	660522	660692	660863	661034	661204
2867.80	661375	661545	661716	661886	662057	662227	662398	662569	662739	662910
2867.90	663080	663251	663421	663592	663762	663933	664104	664274	664445	664615
2868.00	664786	664956	665127	665297	665468	665639	665809	665980	666150	666321
2868.10	666491	666662	666832	667003	667174	667344	667515	667685	667856	668026
2868.20	668197	668367	668538	668709	668879	669050	669220	669391	669561	669732
2868.30	669902	670073	670243	670414	670585	670755	670926	671096	671267	671437
2868.40	671608	671778	671949	672120	672290	672461	672631	672802	672972	673143
2868.50	673313	673484	673655	673825	673996	674166	674337	674507	674678	674848
2868.60	675019	675190	675360	675531	675701	675872	676042	676213	676383	676554
2868.70	676725	676895	677066	677236	677407	677577	677748	677918	678089	678260
2868.80	678430	678601	678771	678942	679112	679283	679453	679624	679795	679965
2868.90	680136	680306	680477	680647	680818	680988	681159	681330	681500	681671

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2869.00	681841	682012	682182	682353	682523	682694	682865	683035	683206	683376
2869.10	683547	683717	683888	684058	684229	684400	684570	684741	684911	685082
2869.20	685252	685423	685593	685764	685935	686105	686276	686447	686617	686788
2869.30	686959	687129	687300	687471	687641	687812	687983	688153	688324	688495
2869.40	688665	688836	689007	689177	689348	689519	689689	689860	690030	690201
2869.50	690372	690542	690713	690884	691054	691225	691396	691566	691737	691908
2869.60	692078	692249	692420	692590	692761	692932	693102	693273	693444	693614
2869.70	693785	693956	694126	694297	694468	694638	694809	694980	695150	695321
2869.80	695492	695662	695833	696004	696174	696345	696516	696686	696857	697028
2869.90	697198	697369	697540	697710	697881	698052	698222	698393	698563	698734
2870.00	698905	699075	699246	699417	699587	699758	699929	700099	700270	700441
2870.10	700611	700782	700953	701123	701294	701465	701635	701806	701977	702147
2870.20	702318	702489	702659	702830	703001	703171	703342	703513	703683	703854
2870.30	704025	704195	704366	704537	704707	704878	705049	705219	705390	705561
2870.40	705731	705902	706073	706243	706414	706585	706755	706926	707096	707267
2870.50	707438	707608	707779	707950	708120	708291	708462	708632	708803	708974
2870.60	709144	709315	709486	709656	709827	709998	710168	710339	710510	710680
2870.70	710851	711022	711192	711363	711534	711704	711875	712046	712216	712387
2870.80	712558	712728	712899	713070	713240	713411	713582	713752	713923	714094
2870.90	714264	714435	714606	714776	714947	715118	715288	715459	715629	715800
2871.00	715971	716141	716312	716483	716653	716824	716995	717165	717336	717507
2871.10	717677	717848	718019	718189	718360	718531	718701	718872	719043	719213
2871.20	719384	719555	719725	719896	720067	720237	720408	720579	720750	720920
2871.30	721091	721262	721433	721603	721774	721945	722116	722286	722457	722628
2871.40	722799	722969	723140	723311	723482	723652	723823	723994	724164	724335
2871.50	724506	724677	724847	725018	725189	725360	725530	725701	725872	726043
2871.60	726213	726384	726555	726726	726896	727067	727238	727409	727579	727750
2871.70	727921	728092	728262	728433	728604	728774	728945	729116	729287	729457
2871.80	729628	729799	729970	730140	730311	730482	730653	730823	730994	731165
2871.90	731336	731506	731677	731848	732019	732189	732360	732531	732701	732872
2872.00	733043	733214	733384	733555	733726	733897	734067	734238	734409	734580
2872.10	734750	734921	735092	735263	735433	735604	735775	735946	736116	736287
2872.20	736458	736629	736799	736970	737141	737311	737482	737653	737824	737994
2872.30	738165	738336	738507	738677	738848	739019	739190	739360	739531	739702
2872.40	739873	740043	740214	740385	740556	740726	740897	741068	741238	741409
2872.50	741580	741751	741921	742092	742263	742434	742604	742775	742946	743117
2872.60	743287	743458	743629	743800	743970	744141	744312	744483	744653	744824
2872.70	744995	745166	745336	745507	745678	745848	746019	746190	746361	746531
2872.80	746702	746873	747044	747214	747385	747556	747727	747897	748068	748239
2872.90	748410	748580	748751	748922	749093	749263	749434	749605	749775	749946
2873.00	750117	750288	750458	750629	750800	750971	751141	751312	751483	751654
2873.10	751824	751995	752166	752337	752507	752678	752849	753020	753190	753361
2873.20	753532	753703	753873	754044	754215	754386	754556	754727	754898	755069
2873.30	755239	755410	755581	755752	755923	756093	756264	756435	756606	756776
2873.40	756947	757118	757289	757460	757630	757801	757972	758143	758313	758484
2873.50	758655	758826	758997	759167	759338	759509	759680	759851	760021	760192
2873.60	760363	760534	760704	760875	761046	761217	761388	761558	761729	761900
2873.70	762071	762241	762412	762583	762754	762925	763095	763266	763437	763608
2873.80	763778	763949	764120	764291	764462	764632	764803	764974	765145	765315
2873.90	765486	765657	765828	765999	766169	766340	766511	766682	766852	767023

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.

(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2874.00	767194	767365	767536	767706	767877	768048	768219	768390	768560	768731
2874.10	768902	769073	769243	769414	769585	769756	769927	770097	770268	770439
2874.20	770610	770780	770951	771122	771293	771464	771634	771805	771976	772147
2874.30	772317	772488	772659	772830	773001	773171	773342	773513	773684	773854
2874.40	774025	774196	774367	774538	774708	774879	775050	775221	775391	775562
2874.50	775733	775904	776075	776245	776416	776587	776758	776929	777099	777270
2874.60	777441	777612	777782	777953	778124	778295	778466	778636	778807	778978
2874.70	779149	779319	779490	779661	779832	780003	780173	780344	780515	780686
2874.80	780856	781027	781198	781369	781540	781710	781881	782052	782223	782393
2874.90	782564	782735	782906	783077	783247	783418	783589	783760	783930	784101
2875.00	784272	784443	784614	784784	784955	785126	785297	785468	785638	785809
2875.10	785980	786151	786321	786492	786663	786834	787005	787175	787346	787517
2875.20	787688	787858	788029	788200	788371	788542	788712	788883	789054	789225
2875.30	789396	789566	789737	789908	790079	790250	790420	790591	790762	790933
2875.40	791104	791274	791445	791616	791787	791958	792128	792299	792470	792641
2875.50	792812	792982	793153	793324	793495	793666	793836	794007	794178	794349
2875.60	794520	794690	794861	795032	795203	795374	795544	795715	795886	796057
2875.70	796228	796398	796569	796740	796911	797082	797252	797423	797594	797765
2875.80	797936	798106	798277	798448	798619	798790	798960	799131	799302	799473
2875.90	799644	799814	799985	800156	800327	800498	800668	800839	801010	801181
2876.00	801352	801522	801693	801864	802035	802206	802376	802547	802718	802889
2876.10	803060	803230	803401	803572	803743	803914	804084	804255	804426	804597
2876.20	804768	804938	805109	805280	805451	805622	805792	805963	806134	806305
2876.30	806476	806646	806817	806988	807159	807330	807500	807671	807842	808013
2876.40	808184	808354	808525	808696	808867	809038	809208	809379	809550	809721
2876.50	809892	810062	810233	810404	810575	810746	810916	811087	811258	811429
2876.60	811600	811770	811941	812112	812283	812454	812624	812795	812966	813137
2876.70	813308	813478	813649	813820	813991	814162	814332	814503	814674	814845
2876.80	815016	815186	815357	815528	815699	815870	816040	816211	816382	816553
2876.90	816724	816894	817065	817236	817407	817578	817748	817919	818090	818261
2877.00	818432	818602	818773	818944	819115	819286	819456	819627	819798	819969
2877.10	820140	820310	820481	820652	820823	820994	821164	821335	821506	821677
2877.20	821848	822018	822189	822360	822531	822702	822872	823043	823214	823385
2877.30	823556	823726	823897	824068	824239	824410	824581	824751	824922	825093
2877.40	825264	825435	825605	825776	825947	826118	826289	826459	826630	826801
2877.50	826972	827143	827313	827484	827655	827826	827997	828168	828338	828509
2877.60	828680	828851	829022	829192	829363	829534	829705	829876	830046	830217
2877.70	830388	830559	830730	830901	831071	831242	831413	831584	831755	831925
2877.80	832096	832267	832438	832609	832779	832950	833121	833292	833463	833633
2877.90	833804	833975	834146	834317	834488	834658	834829	835000	835171	835342
2878.00	835512	835683	835854	836025	836196	836366	836537	836708	836879	837050
2878.10	837220	837391	837562	837733	837904	838075	838245	838416	838587	838758
2878.20	838929	839099	839270	839441	839612	839783	839953	840124	840295	840466
2878.30	840637	840807	840978	841149	841320	841491	841662	841832	842003	842174
2878.40	842345	842516	842686	842857	843028	843199	843370	843540	843711	843882
2878.50	844053	844224	844394	844565	844736	844907	845078	845249	845419	845590
2878.60	845761	845932	846103	846273	846444	846615	846786	846957	847127	847298
2878.70	847469	847640	847811	847982	848152	848323	848494	848665	848836	849006
2878.80	849177	849348	849519	849690	849860	850031	850202	850373	850544	850714
2878.90	850885	851056	851227	851398	851569	851739	851910	852081	852252	852423

Appendix A (continued)

Red Bluff Reservoir Expanded Rating Table
 Elevation (ft-msl NAVD88) vs. Capacity (acre-ft)

Type: Linear
 Date Processed: 7/10/2012
 Prepared by: HDR Engineering, Inc.

Note: Add 1.51 feet to USGS gage elevation prior to referencing values in table. This will convert NGVD29 gage elevation readings to NAVD88.


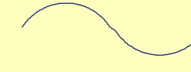






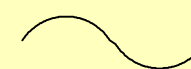




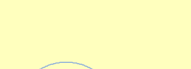


(Expanded Precision)										
Elevation	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2879.00	852593	852764	852935	853106	853277	853447	853618	853789	853960	854131
2879.10	854301	854472	854643	854814	854985	855156	855326	855497	855668	855839
2879.20	856010	856180	856351	856522	856705	856887	857070	857253	857435	857618
2879.30	857801	857984	858166	858349	858532	858714	858897	859080	859262	859445
2879.40	859628	859810	859993	860176	860358	860541	860724	860907	861089	861272
2879.50	861455	861637	861820	862003	862185	862368	862551	862733	862916	863099
2879.60	863282	863464	863647	863830	864012	864195	864378	864560	864743	864926
2879.70	865108	865291	865474	865657	865839	866022	866205	866387	866570	866753
2879.80	866935	867118	867301	867483	867666	867849	868031	868214	868397	868580
2879.90	868762	868945	869128	869310	869493	869676	869858	870041	870224	870406
2880.00	870589	870772	870955	871137	871320	871503	871685	871868	872051	872233
2880.10	872416	872599	872781	872964	873147	873329	873512	873695	873878	874060
2880.20	874243	874426	874608	874791	874974	875156	875339	875522	875704	875887
2880.30	876070	876253	876435	876618	876801	876983	877166	877349	877531	877714
2880.40	877897	878079	878262	878445	878627	878810	878993	879176	879358	879541
2880.50	879724	879906	880089	880272	880454	880637	880820	881002	881185	881368
2880.60	881551	881733	881916	882099	882281	882464	882647	882829	883012	883195
2880.70	883377	883560	883743	883926	884108	884291	884474	884656	884839	885022
2880.80	885204	885387	885570	885752	885935	886118	886300	886483	886666	886849
2880.90	887031	887214	887397	887579	887762	887945	888127	888310	888493	888675
2881.00	888858	889041	889224	889406	889589	889772	889954	890137	890320	890502
2881.10	890685	890868	891050	891233	891416	891598	891781	891964	892147	892329
2881.20	892512	892695	892877	893060						

Figure 5

Red Bluff Reservoir


2' - contour map

CONTOURS (feet above mean sea level)

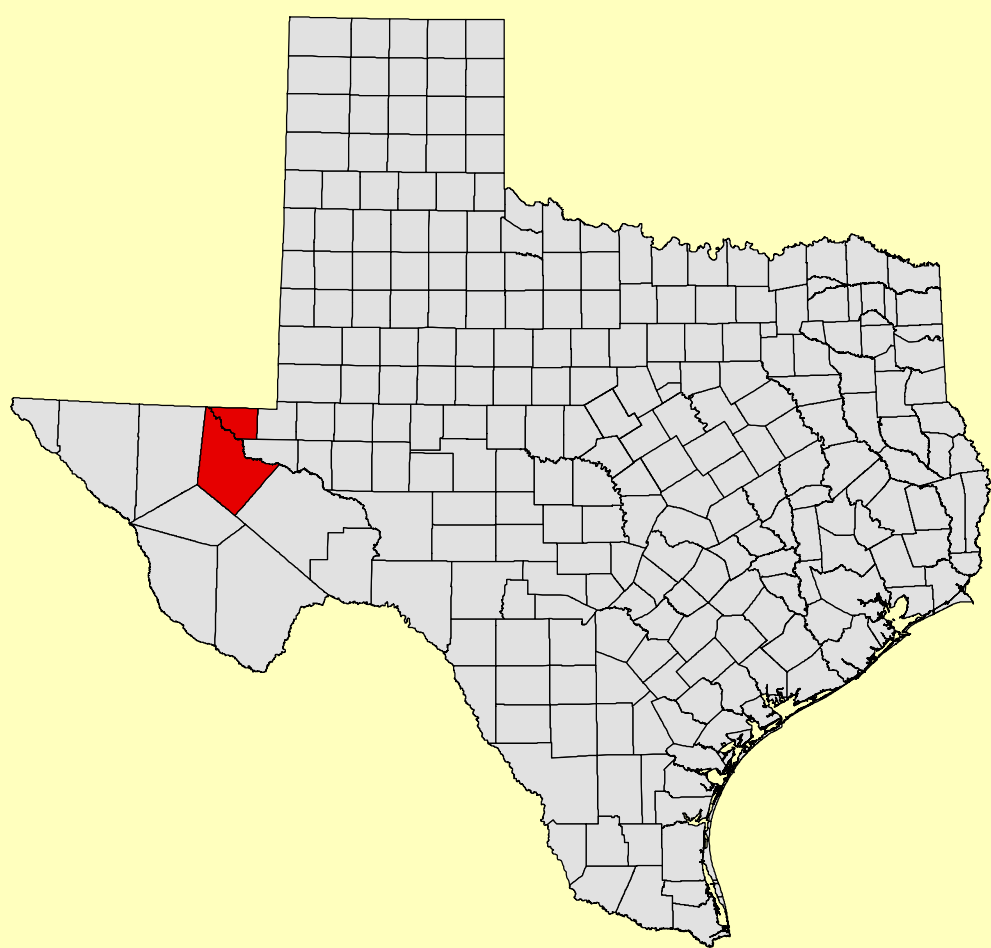
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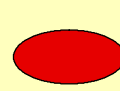
 Islands

 Red Bluff Reservoir

 Red Bluff Reservoir
Elevation: 2,799.39 feet
above mean sea level

Projection: NAD83
State Plane
Texas Central Zone (feet)



 Reeves and Loving Counties

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



428,000

440,000

14,680,000

14,685,000

14,690,000

14,695,000

14,700,000