

Appendix C

Hydrologic Report

Banks Lake Flow Augmentation

Hydrologic Study Results

December 22, 2003

Background

The Reasonable and Prudent Alternative (RPA) Action No.31 of the National Marine Fisheries Service December 2000 Federal Columbia River Power System Biological Opinion¹ (FCRPS BiOp) states that Reclamation should perform an evaluation of the effects of drafting Banks Lake to elevation 1560 feet during the month of August. This action is to provide additional water downstream to meet flow objectives in the Columbia River during the out-migration of ESA listed juvenile salmonid stocks.

The current operation of Banks Lake is to restrict pumping from Lake Roosevelt and allow the lake to be drafted to elevation 1565 feet. This measure is described in RPA Action No. 23 of the FCRPS BiOp.

General

This document provides the hydrologic comparison of the current operation and the proposed operation. The current operation allows Banks Lake to be drafted to elevation 1565 feet. The proposed operation would allow Banks Lake to be drafted an additional five feet to elevation 1560 feet. Full Pool at Banks Lake is at elevation 1570 feet. The Lake typically operates during most of the year within 1 foot of elevation 1568 feet.

Banks Lake has a twofold function; providing pumped storage for peaking power operations associated with the Grand Coulee Project and as a re-regulation reservoir for the Columbia Basin Project. The water in Banks Lake must be pumped from Franklin Delano Roosevelt Lake (FDR) behind Grand Coulee Dam through pumps and pump/generators on the west side of the FDR.

The volume of storage above elevation 1565 is 133,600 acre-feet. The volume of storage between the elevations of 1565 feet and 1560 feet is 127,200 acre-feet, which is equivalent to approximately 1.8 feet of depth in FDR Lake (at elevation 1278 feet). The storage/elevation curve for Banks Lake is shown in Figure 1 in this Appendix.

¹ National Marine Fisheries Service – Northwest Region, “Endangered Species Act – Section 7 Consultation, Biological Opinion – Re-initiation of Consultation on Operation of the Federal Columbia River power System including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin” December 21, 2000 pg. 9-71

Hydrologic Modeling

The primary focus of the modeling was to quantify the potential contribution of the volume of the proposed draft of Banks Lake at McNary Dam downstream. Hydro-simulation data, provided by the Bonneville Power Administration, were used to model the alternatives.

The Hydro-simulation model is a semi-monthly model with August and April divided into two periods for a total of fourteen periods. The alternatives presented in the EIS report are based on real-time operations and do not align precisely with the modeled periods. Therefore, modeling the effect of the alternatives on the flows in the Columbia River requires that the daily flow contributions from the alternatives be averaged over the Hydro-Simulation modeling periods.

The modeling periods in August are Aug1 and Aug2. Aug1 is the period August 1 -15. Aug2 is the period August 16 – 31. An example: During the first half of August Banks Lake is drafted 5 feet in 10 days for a real-time daily flow contribution of 6,736 cfs. However, the 10 day “real time” period does not align precisely with the modeled period. Therefore, same volume of draft must be spread over the modeled period of 15 days at a daily flow contribution of 4,490 cfs.

The 2000 BiOp studies include drafting Banks Lake to elevation 1565 feet, so resulting flows at McNary were used as the base flow for this study. The additional flows resulting from the various draft alternatives at Banks Lake are added to the modeled flows at McNary Dam.

The hydro-simulation data is the output from the FCRPS studies that reflect operations in compliance with the 2000 Biological Opinion (BiOp). The hydro-simulation uses the historical hydrologic and meteorologic data sets over the period 1929-1978, current system configuration and operating requirements to compute the flows that would have occurred if the system and its constraints existed in those years.

This analysis focused on increasing the draft of Banks Lake during the month of August. The draft of Banks Lake was modeled by reducing the pumping from FDR Lake and allowing the irrigation demand to draft Banks Lake. Once the target elevation for Banks Lake is met pumping is resumed to hold that elevation through the end of August. Downstream flows are increased by the reduction in pumping rate.

The study is based on the assumption that Banks Lake is full on August 1; therefore the results are conservative. The actual August 1 starting elevation at Banks Lake is typically within 1 foot of 1568.

The flow target at McNary for salmon is 200,000 cfs for the entire month of August. For this simplified analysis, the value of 195,000 cfs is used in lieu of the actual flow objective of 200,000 cfs to compensate for modeling uncertainty. This produces results that more realistically represent the number of years that the flow objective would be met.

No Action Alternative

The No Action alternative drafts Banks Lake a total of five feet. Four different operating scenarios were modeled. This alternative assumes that beginning August 1st the pool elevation is at 1570 feet. The volume of water between elevation 1570 feet and 1565 feet is equivalent to 133,600 acre-feet. The four operating scenarios include:

Low Water – Assumes that Banks Lake was drafted five feet prior to August 1 and held at elevation 1565 feet throughout August.

Uniform Draft - Draft Banks Lake to elevation 1565 feet evenly through August. The modeled equivalent is a daily flow rate of 2,173 cfs over the periods Aug1 and Aug2.

Early Draft - Draft Banks Lake to elevation 1565 feet over 10 days in the first half of August. The modeled equivalent is a daily flow rate of 4,490 cfs over the period Aug1.

Late Draft - Draft Banks Lake to elevation 1565 feet over 10 days in the last half of August to elevation 1565 feet. The modeled equivalent is a daily flow rate of 4,209 cfs over the period Aug2.

Action Alternative

The Action alternative evaluates the impacts of drafting Banks Lake up to 10 feet. Four different operating scenarios were modeled. These scenarios assume different starting elevations on August 1 and different draft rates, but all draft Banks Lake to elevation 1560 feet by the end of the month.

Low Water–Assume that Banks Lake was drafted to pool elevation 1565 prior to August 1, and is then drafted over 10 days to elevation 1560 feet in the first half of August. The modeled equivalent is a daily flow rate of 4,275 cfs over the period Aug1.

Early Draft - Assume that on August 1 the pool elevation is 1570 feet and is drafted to elevation 1560 feet over 20 days in August. The modeled equivalent is a draft of 195,600 acre-feet at a rate of 6,574 cfs from August 1-15 and a draft of 65,200 acre-feet at a daily flow rate of 2,054 cfs over the Aug2 period.

Uniform Draft - Assume that on August 1 the pool elevation is 1570 feet and is drafted evenly to elevation 1560 feet at the end of August. The modeled equivalent is a daily flow rate of 4,242 cfs over the periods Aug1 and Aug2.

Late Draft – Assume the pool would be drafted over the last 20 days of to elevation 1560 feet. The modeled equivalent is a draft of 52,160 acre-feet at a rate of 1,753 cfs from August 1-15 and a draft of 208,640 acre-feet at a daily flow rate of 6,754 cfs over the Aug2 period.

Table 1 Flow Contributions at McNary Dam.

Alternatives as Modeled with The Hydro-Simulation Model Aug1 = August 1-15 = 15 days Aug2 = August 16-31 = 16 days	<u>Potential Flow Contribution at McNary Dam</u> (cfs per day)		Number of Years the Flow at McNary Dam Met or Exceeded 195 kcfs (within 1 kcfs)	
	Aug1	Aug2	Aug1	Aug2
No Action Alternative.				
Low Water – Banks Lake drafted to 1565 prior to August 1 and held at elevation 1565 feet through August	0	0	20	5
Early Draft - 5 feet of Draft at Banks from 1570 to 1565 in Aug1.	4490	0	21	5
Uniform Draft - 5 feet of Draft at Banks from Elevation 1570 to 1565 spread evenly through August.	2173	2173	21	6
Late Draft - 5 feet of Draft at Banks from 1570 to 1565 in Aug2.	0	4209	20	6
Action Alternative.				
Low Water – Banks Lake drafted to 1565 prior to August 1, then 5 feet of draft at Banks from Elevation 1565 to 1560 in Aug1.	4275	0	21	5
Early Draft - Draft 195,600 acre-feet at a rate of 6,574 cfs in Aug1 and a draft of 65,200 acre-feet at a daily flow rate of 2,054 cfs in Aug2.	6754	2054	21	6
Uniform Draft - 10 feet of Draft at Banks from Elevation 1570 to 1560 spread evenly through August.	4242	4242	21	6
Late Draft - Draft 52,160 acre-feet at a rate of 1,753 cfs in Aug1 and a draft of 208,640 acre-feet at a daily flow rate of 6,754 cfs in Aug2.	1753	6754	21	7

Results

A. Effects of the Draft of Banks Lake on Columbia River Flows

Drafting Banks Lake during the month of August will increase streamflow in the Columbia River at McNary. During the month of August Grand Coulee is being drafted to the BiOp summer draft limits of either 1280 feet or 1278. During the month of August the inflows into Grand Coulee are highly regulated. The primary sources of inflow are the headwater projects of Libby Dam and Hungry Horse Dam and releases from storage in Canada. Libby and Hungry Horse are also being drafted during the month of August to their respective summer draft limits. The releases from Canada are controlled by Treaty and Non-Treaty agreements.

Results of the evaluation show that a contribution of five feet of water from Banks Lake makes a small difference to the McNary flows during the August time periods. By drafting an additional five feet of water from Banks Lake, flow targets at McNary Dam can be met one more time in the second half of August. The number of years the flow at McNary Dam met or exceeded 195,000 cfs, within 1 kcfs, with this additional volume is presented in Table 1.

It should be noted that the only time the flows at McNary Dam are close to the BiOp objective in August the water supply in the basin is very high. Therefore, measuring the hydrologic effect of the Banks Lake operation on meeting flow objectives in August is not the best method. The flow augmentation provided from Banks Lake is more significant to the flow in the Columbia River in low runoff years.

B. Effect of Banks Lake Refill

The refill of Banks Lake occurs during periods where smaller loads on the power system are typically experienced. The rate of refill of Banks Lake will be variable and unique each year.

The water removed from FDR to refill Banks Lake is a small increment of the flow in the Columbia River. Labor Day and Thanksgiving Day weekends commonly provide good conditions for pumping into Banks Lake when there is low power demand elsewhere on the system so power costs are low. The refill operations typically avoid periods where flow minimums for fish migration are in effect.

The project has the capability to refill from elevation 1565 to 1570 in less than four days; however, the higher cost of peaking power makes this a less desirable operation. System conditions will dictate the rate of refill.

Irrigation demands on Banks Lake diminish in September and can disappear completely in October. A reasonable assumption for the refill would be no net gain on weekdays and pumping in small increments over each weekend. This will refill Banks Lake gradually while taking advantage of holiday or other periods of smaller system loads. It is also reasonable to assume that the pool will reach 1568 by the end of Thanksgiving weekend.

APPENDIX

Figure 1. Storage/Elevation Curve

Banks Lake Storage - Elevation Curve

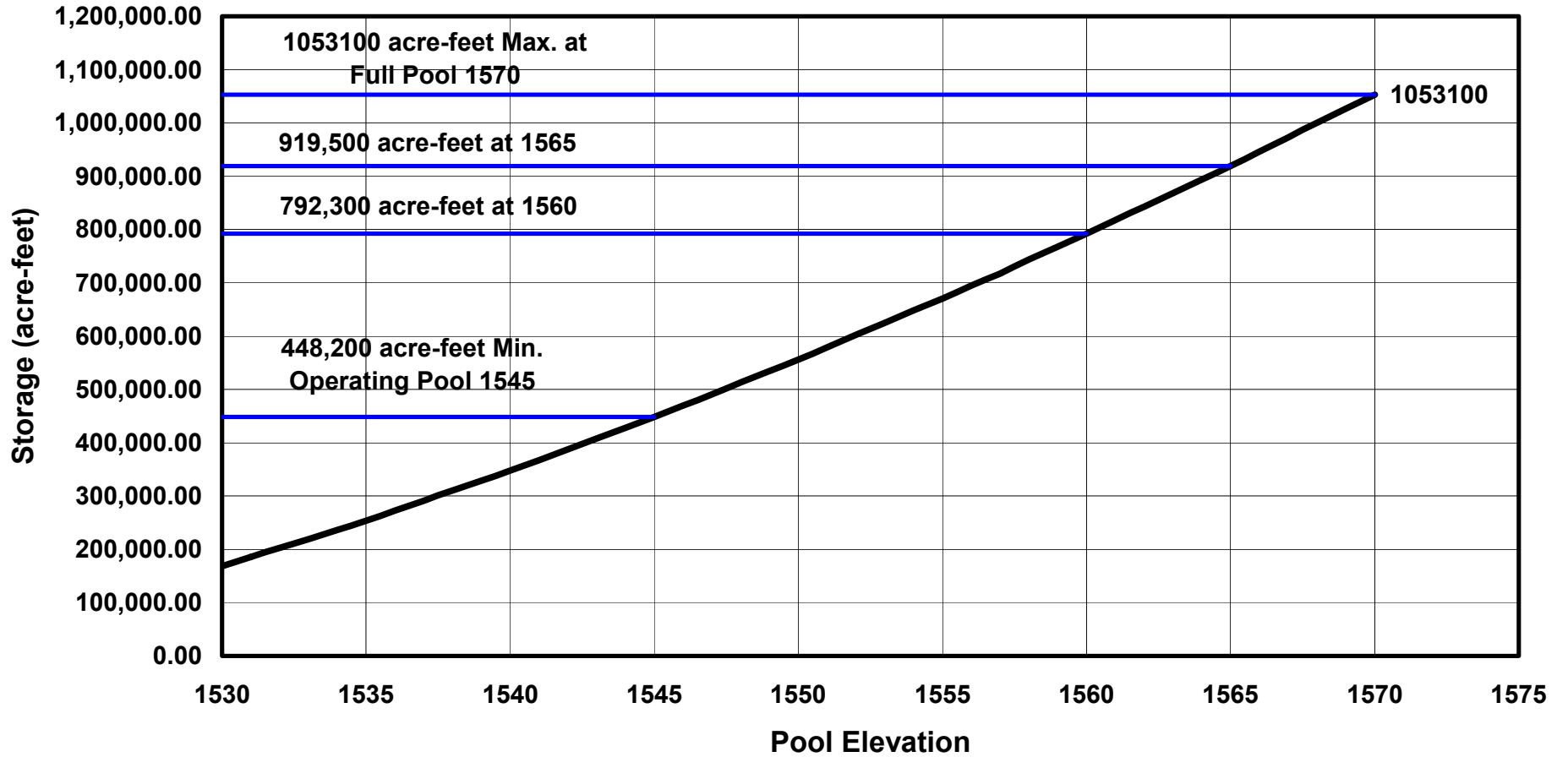


Figure 2. Banks Lake Forebay Exceedance Curve.

August Pool Elevation Exceedance Curve

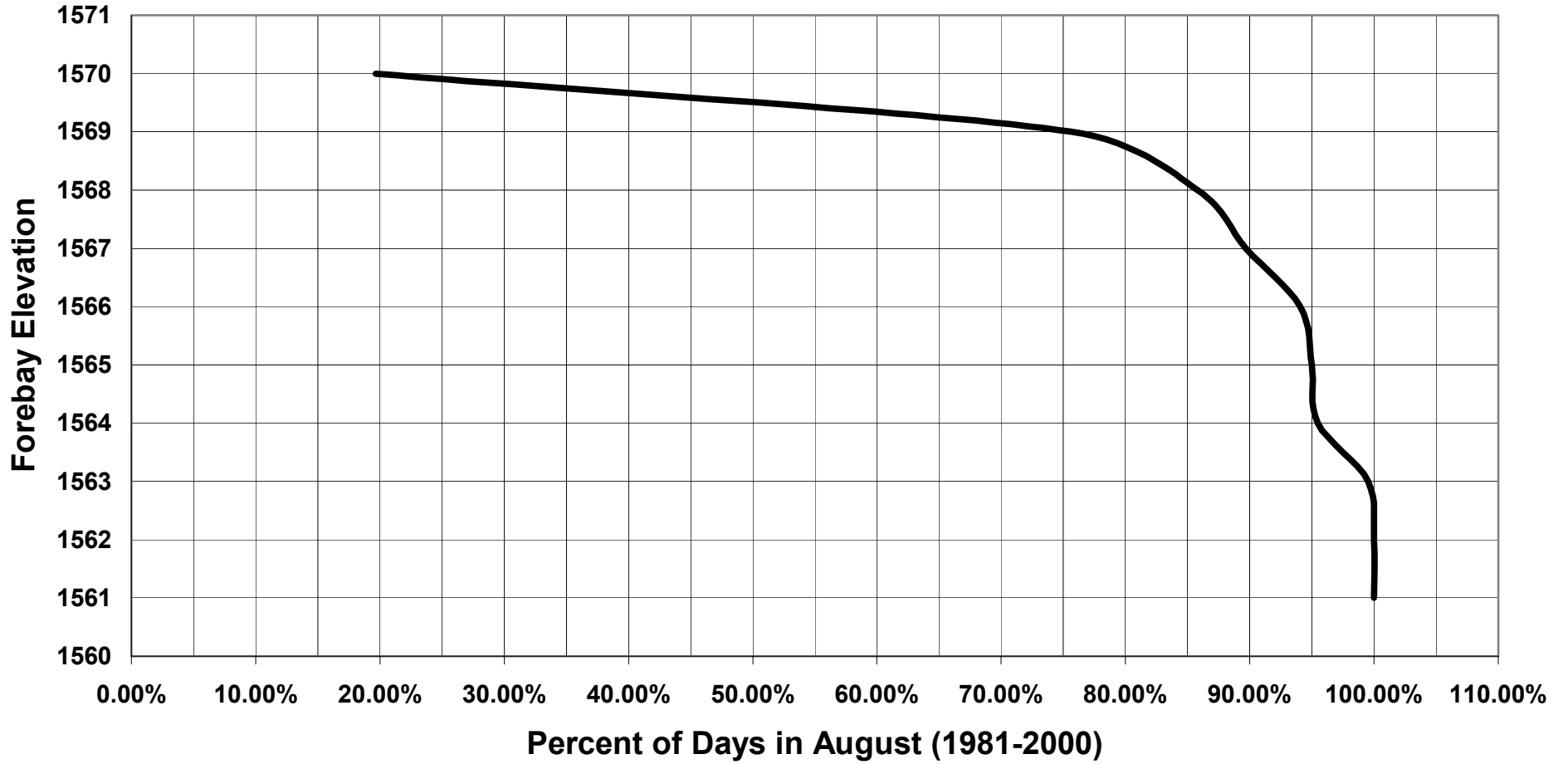


Figure 3. 1980-1989 Historical Banks Lake Pool Elevations.

1980-1989 Historical Banks Lake Pool Elevations

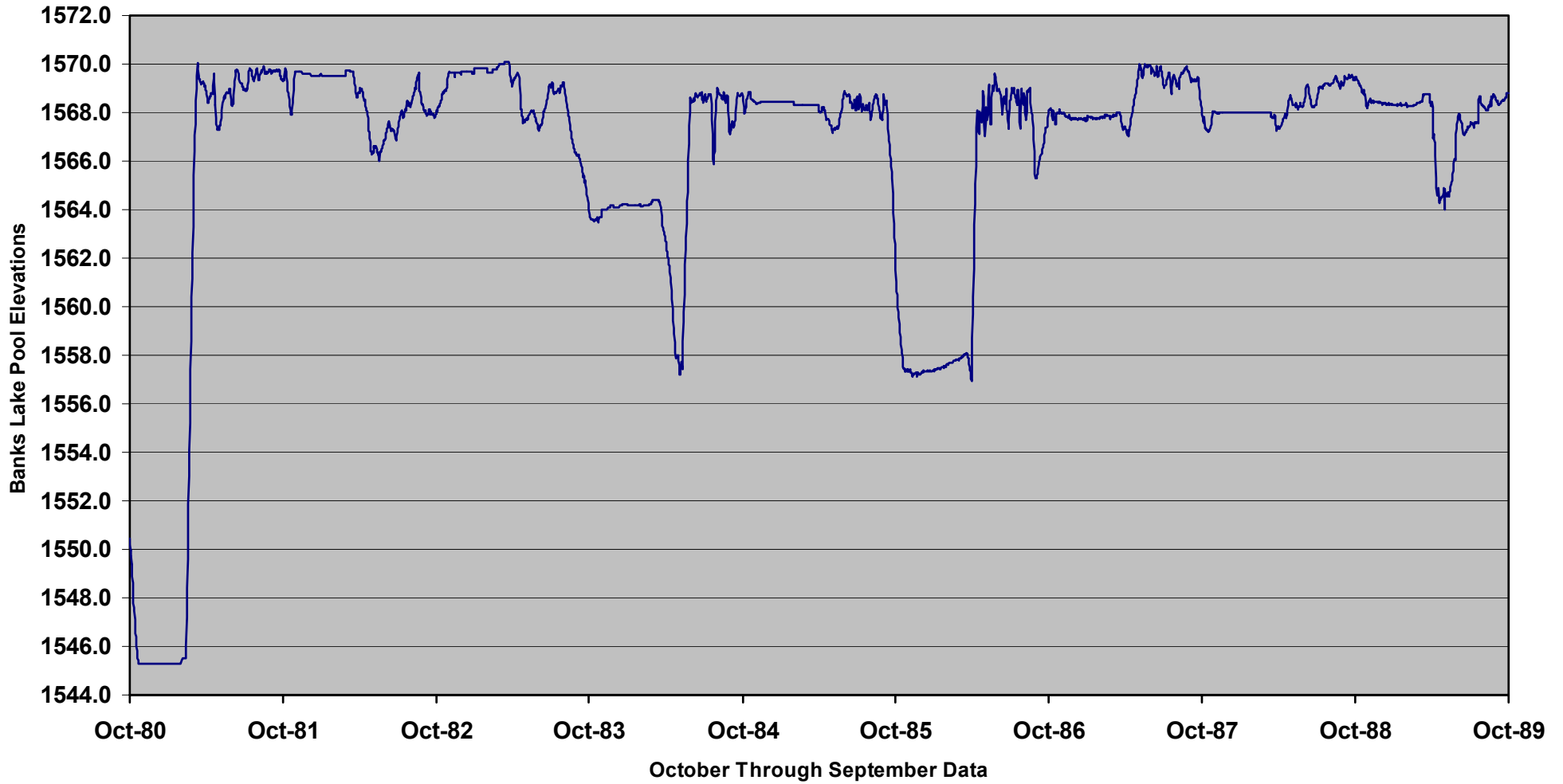


Figure 4. Historical Banks Lake Pool Elevations 1990-1999

1990-1999 Historical Banks Lake Pool Elevations

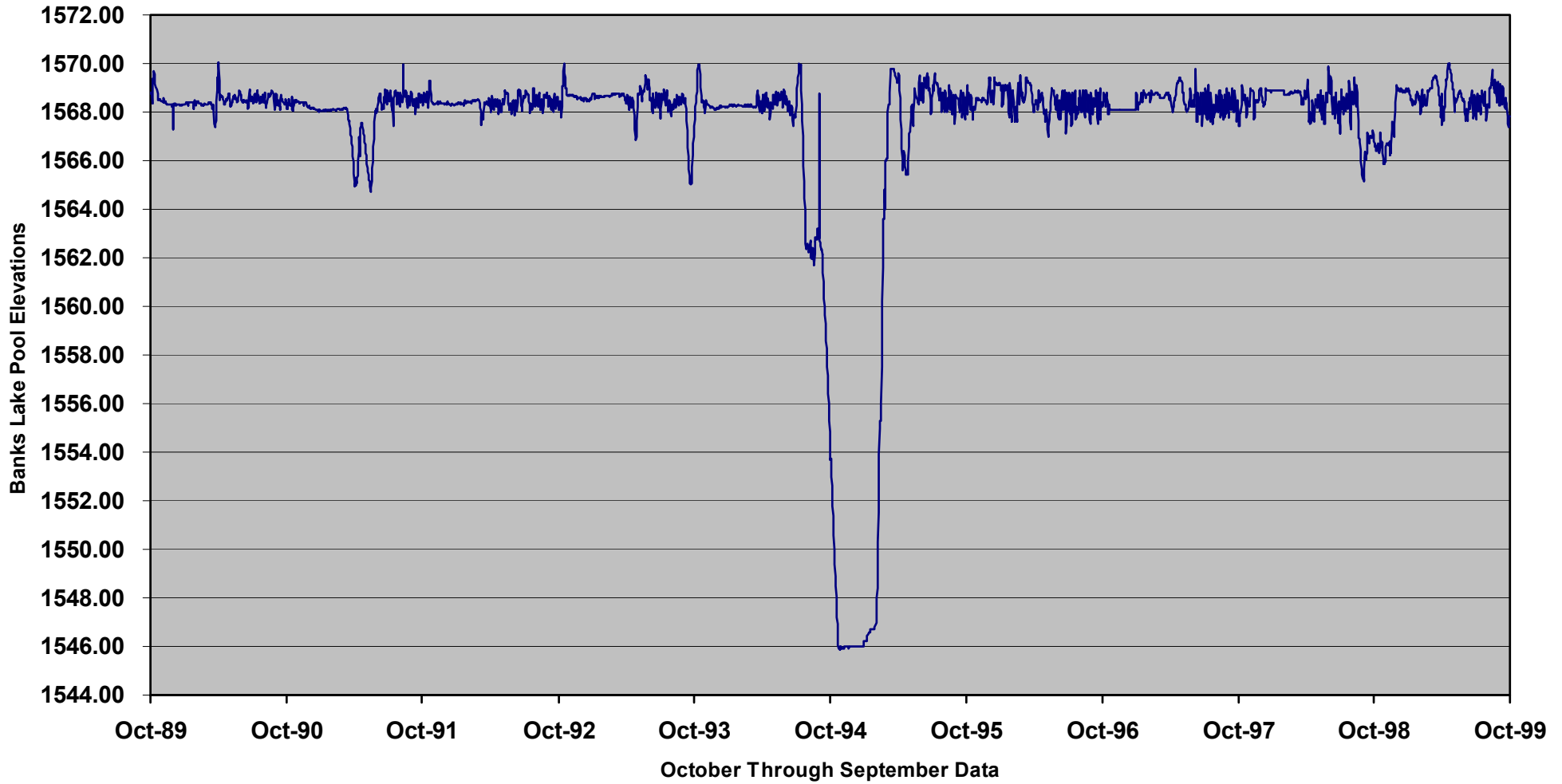


Figure 5. Historical Banks Lake Pool Elevation for Year 2000

Historical Banks Lake Pool Elevations October 1999 Through September 2000

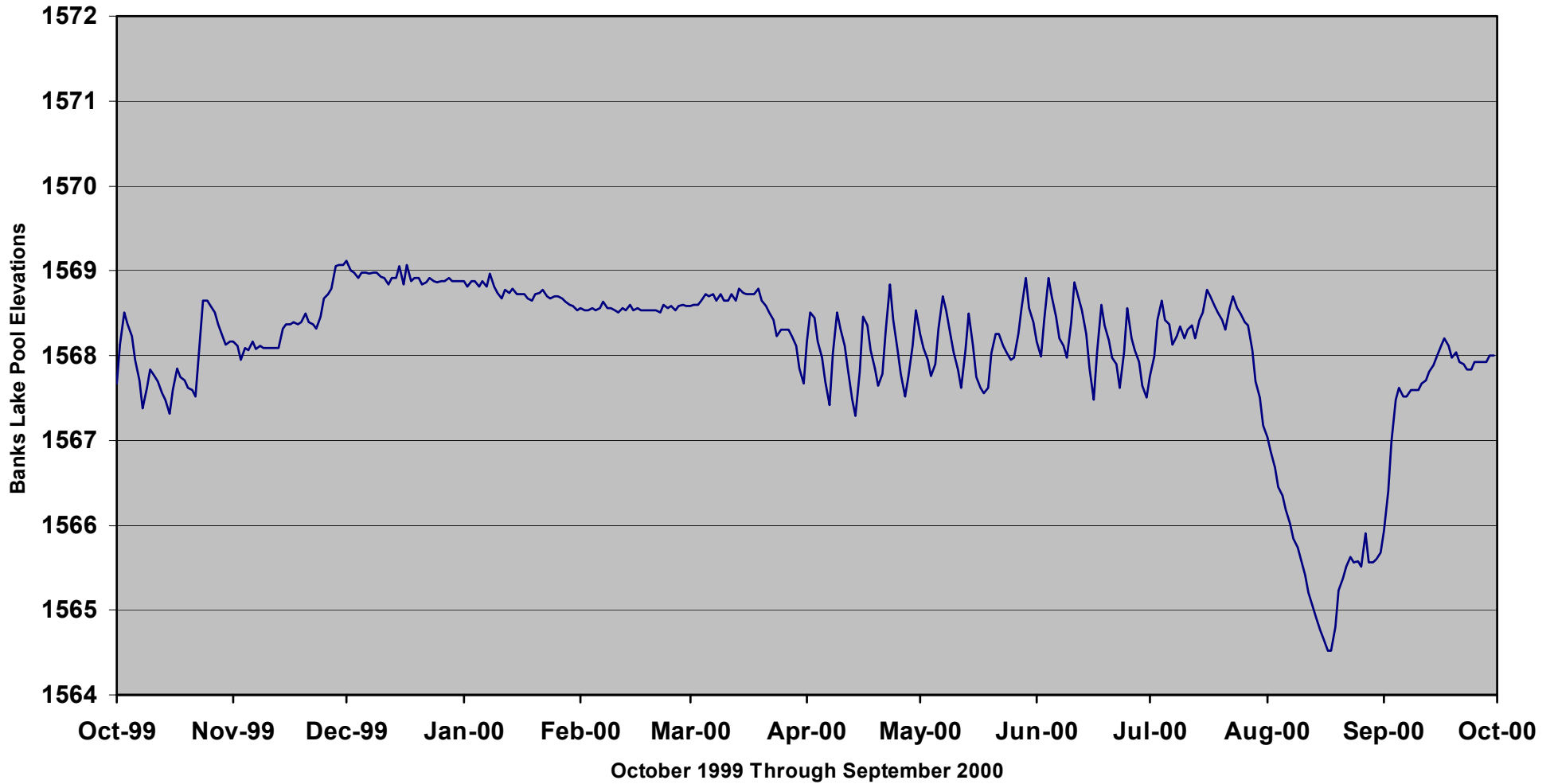


Table 2. Modeled Flow Data (cfs) for Each Scenario of the No-Action Alternative.

Year	Volume (Maf)	Low Water		Uniform Draft		Early Draft		Late Draft	
		August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31
28		179152	126113	181325	128286	183642	126113	179152	130322
29	68.4	126905	117733	129078	119906	131395	117733	126905	121942
30	70.0	137671	105937	139844	108110	142161	105937	137671	110146
31	64.4	146631	115927	148804	118100	151121	115927	146631	120136
32	106.1	170308	158833	172481	161006	174798	158833	170308	163042
33	108.1	197827	197827	200000	200000	202317	197827	197827	202036
34	110.6	130423	106216	132596	108389	134913	106216	130423	110425
35	90.9	195662	132116	197835	134289	200152	132116	195662	136325
36	88.6	166093	123764	168266	125937	170583	123764	166093	127973
37	69.2	152669	108696	154842	110869	157159	108696	152669	112905
38	106.1	158151	125364	160324	127537	162641	125364	158151	129573
39	81.0	145772	124212	147945	126385	150262	124212	145772	128421
40	80.8	141361	110541	143534	112714	145851	110541	141361	114750
41	69.5	149056	120971	151229	123144	153546	120971	149056	125180
42	90.6	163090	143423	165263	145596	167580	143423	163090	147632
43	117.4	195259	160436	197432	162609	199749	160436	195259	164645
44	60.1	124323	99729	126496	101902	128813	99729	124323	103938
45	82.3	142390	135444	144563	137617	146880	135444	142390	139653
46	111.4	195675	146466	197848	148639	200165	146466	195675	150675
47	106.2	178493	136618	180666	138791	182983	136618	178493	140827
48	130.8	197827	193031	200000	195204	202317	193031	197827	197240
49	101.9	136325	102008	138498	104181	140815	102008	136325	106217
50	123.8	197827	190448	200000	192621	202317	190448	197827	194657
51	124.5	197827	169002	200000	171175	202317	169002	197827	173211
52	112.6	183827	136929	186000	139102	188317	136929	183827	141138
53	105.8	194835	158080	197008	160253	199325	158080	194835	162289
54	117.9	226582	197827	228755	200000	231072	197827	226582	202036
55	96.4	197827	177641	200000	179814	202317	177641	197827	181850
56	139.9	196773	163183	198946	165356	201263	163183	196773	167392
57	112.3	158584	119459	160757	121632	163074	119459	158584	123668
58	107.1	154773	130359	156946	132532	159263	130359	154773	134568
59	117.8	197827	157165	200000	159338	202317	157165	197827	161374
60	101.8	197827	123642	200000	125815	202317	123642	197827	127851
61	111.2	158871	135685	161044	137858	163361	135685	158871	139894
62	96.9	179023	143462	181196	145635	183513	143462	179023	147671
63	94.1	184356	150653	186529	152826	188846	150653	184356	154862
64	106.6	197827	167981	200000	170154	202317	167981	197827	172190
65	125.6	197827	166401	200000	168574	202317	166401	197827	170610
66	89.5	186923	131612	189096	133785	191413	131612	186923	135821
67	112.6	197827	156440	200000	158613	202317	156440	197827	160649

68	95.3	197827	162286	200000	164459	202317	162286	197827	166495
69	122.1	157976	123274	160149	125447	162466	123274	157976	127483
70	96.1	151906	127135	154079	129308	156396	127135	151906	131344
71	138.5	200328	183699	202501	185872	204818	183699	200328	187908
72	151.6	214805	197827	216978	200000	219295	197827	214805	202036
73	70.9	128872	99477	131045	101650	133362	99477	128872	103686
74	156.1	203064	197827	205237	200000	207554	197827	203064	202036
75	111.4	159212	146834	161385	149007	163702	146834	159212	151043
76	121.8	242829	227148	245002	229321	247319	227148	242829	231357
77	53.5	138417	108049	140590	110222	142907	108049	138417	112258

Table 3. Modeled Flow Data (cfs) for Each Scenario of the Action Alternative.

Year	Volume (Maf)	Low Water Early Draft		Uniform Draft		Early Draft		Late Draft	
		August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31	August 1-15	August 16-31
28		183427	126113	183394	130355	185906	128167	180905	132867
29	68.4	131180	117733	131147	121975	133659	119787	128658	124487
30	70.0	141946	105937	141913	110179	144425	107991	139424	112691
31	64.4	150906	115927	150873	120169	153385	117981	148384	122681
32	106.1	174583	158833	174550	163075	177062	160887	172061	165587
33	108.1	202102	197827	202069	202069	204581	199881	199580	204581
34	110.6	134698	106216	134665	110458	137177	108270	132176	112970
35	90.9	199937	132116	199904	136358	202416	134170	197415	138870
36	88.6	170368	123764	170335	128006	172847	125818	167846	130518
37	69.2	156944	108696	156911	112938	159423	110750	154422	115450
38	106.1	162426	125364	162393	129606	164905	127418	159904	132118
39	81.0	150047	124212	150014	128454	152526	126266	147525	130966
40	80.8	145636	110541	145603	114783	148115	112595	143114	117295
41	69.5	153331	120971	153298	125213	155810	123025	150809	127725
42	90.6	167365	143423	167332	147665	169844	145477	164843	150177
43	117.4	199534	160436	199501	164678	202013	162490	197012	167190
44	60.1	128598	99729	128565	103971	131077	101783	126076	106483
45	82.3	146665	135444	146632	139686	149144	137498	144143	142198
46	111.4	199950	146466	199917	150708	202429	148520	197428	153220
47	106.2	182768	136618	182735	140860	185247	138672	180246	143372
48	130.8	202102	193031	202069	197273	204581	195085	199580	199785
49	101.9	140600	102008	140567	106250	143079	104062	138078	108762
50	123.8	202102	190448	202069	194690	204581	192502	199580	197202
51	124.5	202102	169002	202069	173244	204581	171056	199580	175756
52	112.6	188102	136929	188069	141171	190581	138983	185580	143683
53	105.8	199110	158080	199077	162322	201589	160134	196588	164834
54	117.9	230857	197827	230824	202069	233336	199881	228335	204581
55	96.4	202102	177641	202069	181883	204581	179695	199580	184395
56	139.9	201048	163183	201015	167425	203527	165237	198526	169937
57	112.3	162859	119459	162826	123701	165338	121513	160337	126213
58	107.1	159048	130359	159015	134601	161527	132413	156526	137113
59	117.8	202102	157165	202069	161407	204581	159219	199580	163919
60	101.8	202102	123642	202069	127884	204581	125696	199580	130396
61	111.2	163146	135685	163113	139927	165625	137739	160624	142439
62	96.9	183298	143462	183265	147704	185777	145516	180776	150216
63	94.1	188631	150653	188598	154895	191110	152707	186109	157407
64	106.6	202102	167981	202069	172223	204581	170035	199580	174735
65	125.6	202102	166401	202069	170643	204581	168455	199580	173155
66	89.5	191198	131612	191165	135854	193677	133666	188676	138366
67	112.6	202102	156440	202069	160682	204581	158494	199580	163194
68	95.3	202102	162286	202069	166528	204581	164340	199580	169040
69	122.1	162251	123274	162218	127516	164730	125328	159729	130028
70	96.1	156181	127135	156148	131377	158660	129189	153659	133889
71	138.5	204603	183699	204570	187941	207082	185753	202081	190453
72	151.6	219080	197827	219047	202069	221559	199881	216558	204581

73	70.9	133147	99477	133114	103719	135626	101531	130625	106231
74	156.1	207339	197827	207306	202069	209818	199881	204817	204581
75	111.4	163487	146834	163454	151076	165966	148888	160965	153588
76	121.8	247104	227148	247071	231390	249583	229202	244582	233902
77	53.5	142692	108049	142659	112291	145171	110103	140170	114803

Table 4. First of Month Banks Lake Pool Elevation (feet) 1980-2000.

Date	Elevation	Date	Elevation	Date	Elevation
10/01/80	1550.5	10/01/87	1568.0	10/01/94	1553.7
11/01/80	1545.3	11/01/87	1568.0	11/01/94	1546.0
12/01/80	1545.3	12/01/87	1568.0	12/01/94	1546.0
01/01/81	1545.3	01/01/88	1568.0	01/01/95	1546.2
02/01/81	1545.4	02/01/88	1568.0	02/01/95	1546.9
03/01/81	1563.3	03/01/88	1568.0	03/01/95	1566.1
04/01/81	1568.9	04/01/88	1567.4	04/01/95	1569.4
05/01/81	1567.3	05/01/88	1568.6	05/01/95	1567.0
06/01/81	1568.3	06/01/88	1568.5	06/01/95	1568.7
07/01/81	1569.0	07/01/88	1568.5	07/01/95	1568.3
08/01/81	1569.8	08/01/88	1569.1	08/01/95	1568.5
09/01/81	1569.7	09/01/88	1569.1	09/01/95	1567.5
10/01/81	1569.3	10/01/88	1569.5	10/01/95	1568.6
11/01/81	1569.7	11/01/88	1568.4	11/01/95	1568.5
12/01/81	1569.6	12/01/88	1568.4	12/01/95	1569.1
01/01/82	1569.5	01/01/89	1568.3	01/01/96	1569.1
02/01/82	1569.5	02/01/89	1568.3	02/01/96	1567.6
03/01/82	1569.7	03/01/89	1568.4	03/01/96	1568.8
04/01/82	1568.8	04/01/89	1568.3	04/01/96	1568.0
05/01/82	1566.3	05/01/89	1564.0	05/01/96	1567.8
06/01/82	1566.9	06/01/89	1567.7	06/01/96	1568.7
07/01/82	1567.2	07/01/89	1567.4	07/01/96	1568.0
08/01/82	1568.3	08/01/89	1568.3	08/01/96	1568.1
09/01/82	1568.2	09/01/89	1568.6	09/01/96	1568.8
10/01/82	1568.0	10/01/89	1568.8	10/01/96	1568.4
11/01/82	1569.7	11/01/89	1568.5	11/01/96	1568.1
12/01/82	1569.7	12/01/89	1567.3	12/01/96	1568.1
01/01/83	1569.8	01/01/90	1568.3	01/01/97	1568.8
02/01/83	1569.7	02/01/90	1568.3	02/01/97	1568.7
03/01/83	1570.0	03/01/90	1568.3	03/01/97	1568.7
04/01/83	1569.1	04/01/90	1570.0	04/01/97	1568.6
05/01/83	1567.7	05/01/90	1568.8	05/01/97	1569.3
06/01/83	1567.4	06/01/90	1568.7	06/01/97	1568.5
07/01/83	1569.2	07/01/90	1568.6	07/01/97	1568.3
08/01/83	1569.2	08/01/90	1568.5	08/01/97	1568.0
09/01/83	1566.2	09/01/90	1568.1	09/01/97	1569.0
10/01/83	1564.0	10/01/90	1568.4	10/01/97	1568.0
11/01/83	1564.0	11/01/90	1568.4	11/01/97	1568.2
12/01/83	1564.1	12/01/90	1568.3	12/01/97	1569.0
01/01/84	1564.2	01/01/91	1568.1	01/01/98	1568.9
02/01/84	1564.1	02/01/91	1568.1	02/01/98	1568.7
03/01/84	1564.4	03/01/91	1568.1	03/01/98	1568.8
04/01/84	1562.7	04/01/91	1565.5	04/01/98	1568.5
05/01/84	1557.8	05/01/91	1566.7	05/01/98	1568.3
06/01/84	1568.4	06/01/91	1567.9	06/01/98	1569.7
07/01/84	1568.6	07/01/91	1568.8	07/01/98	1567.4

08/01/84	1568.9	08/01/91	1568.4	08/01/98	1568.3
09/01/84	1567.1	09/01/91	1568.7	09/01/98	1565.3
10/01/84	1568.7	10/01/91	1568.6	10/01/98	1566.8
11/01/84	1568.4	11/01/91	1568.4	11/01/98	1566.3
12/01/84	1568.5	12/01/91	1568.3	12/01/98	1569.1
01/01/85	1568.5	01/01/92	1568.3	01/01/99	1568.9
02/01/85	1568.3	02/01/92	1568.5	02/01/99	1568.3
03/01/85	1568.3	03/01/92	1568.5	03/01/99	1569.0
04/01/85	1568.0	04/01/92	1568.1	04/01/99	1568.8
05/01/85	1567.4	05/01/92	1568.0	05/01/99	1568.9
06/01/85	1568.8	06/01/92	1568.5	06/01/99	1568.3
07/01/85	1568.7	07/01/92	1568.6	07/01/99	1568.1
08/01/85	1567.9	08/01/92	1568.4	08/01/99	1568.3
09/01/85	1568.1	09/01/92	1568.7	09/01/99	1568.5
10/01/85	1561.5	10/01/92	1568.2	10/01/99	1567.7
11/01/85	1557.4	11/01/92	1568.7	11/01/99	1568.2
12/01/85	1557.3	12/01/92	1568.6	12/01/99	1569.1
01/01/86	1557.4	01/01/93	1568.8	01/01/00	1568.9
02/01/86	1557.6	02/01/93	1568.7	02/01/00	1568.6
03/01/86	1557.9	03/01/93	1568.7	03/01/00	1568.6
04/01/86	1557.7	04/01/93	1568.4	04/01/00	1568.2
05/01/86	1567.0	05/01/93	1568.2	05/01/00	1568.3
06/01/86	1569.0	06/01/93	1569.2	06/01/00	1568.2
07/01/86	1568.5	07/01/93	1568.0	07/01/00	1567.8
08/01/86	1568.3	08/01/93	1568.3	08/01/00	1567.0
09/01/86	1565.4	09/01/93	1568.6	09/01/00	1565.9
10/01/86	1568.1	10/01/93	1567.4		
11/01/86	1568.0	11/01/93	1568.4		
12/01/86	1567.8	12/01/93	1568.2		
01/01/87	1567.9	01/01/94	1568.2		
02/01/87	1567.8	02/01/94	1568.3		
03/01/87	1567.8	03/01/94	1568.3		
04/01/87	1567.4	04/01/94	1568.0		
05/01/87	1569.4	05/01/94	1568.7		
06/01/87	1569.9	06/01/94	1568.7		
07/01/87	1569.2	07/01/94	1568.0		
08/01/87	1569.2	08/01/94	1562.6		
09/01/87	1569.6	09/01/94	1562.8		