

Introduction

Blue Mountain Lake dam is located at river mile 74.4 on the Petit Jean River in Logan and Yell Counties in west-central Arkansas (fig. 1). Drainage area above the dam is 488 square miles. Blue Mountain Lake is located between two national forests—the Ozark National Forest and the Ouachita National Forest. The primary purpose for Blue Mountain Lake is flood control, but the lake is used for a variety of recreational purposes.

The U.S. Geological Survey (USGS) in cooperation with the U.S. Army Corps of Engineers, Little Rock District, conducted a bacterial and turbidity study of the Blue Mountain Lake Basin during the spring and summer 1994. Samples were collected weekly at 11 locations within the lake basin from May through September 1994. Eight sampling sites were located on tributaries to the lake and three sampling sites were located on the lake with one of the sites located at a swim beach (fig. 2; table 1).

Collection and Analysis

Water samples were collected by two methods depending on the site type. The swim beach samples were collected by wading into the lake to approximately knee deep and dipping a sterile bottle below the water surface. These samples were collected weekly at the center of the swim beach. Eight tributary samples and three lake samples were collected weekly depending on site conditions by either hand dipping or lowering a sample bottle into the water using a rope and a weighted bottle holder. The total number of samples collected at these sites during this period ranged from 10 to 19. Samples were chilled and analyzed for bacteria within 6 hours after collection.

The samples were analyzed for fecal coliform bacteria and fecal streptococci bacteria following methods described in Britton and Greeson (1987). Fecal coliform bacteria and fecal streptococci bacteria were analyzed following methods B-0050-85 and B-0055-85, respectively. Sample analysis for fecal coliform bacteria and fecal streptococci bacteria was conducted by the USGS. The results for both are reported in tables 2-12. The samples were analyzed for nephelometric turbidity units (NTU's) following methods described by Fishman and Friedman (1989). NTU's were analyzed following method 1-3860-85 with the results reported in tables 2-12. Sample analysis for NTU's was conducted by the USGS, Quality Water Service Unit, Ocala, Florida.

Surface-Water Quality

Water-quality samples were collected at 11 surface-water sites within Blue Mountain Lake Basin during the study. Quality assurance blanks were included with the bacterial analysis to ensure that cross-contamination did not occur between the buffered dilution water and the bacterial water samples taken at each site. The results are reported in tables 2-12. Bacteriological analyses indicate that fecal coliform bacteria counts for surface-water sites ranged from a nonideal count of 1 to greater than 10,000 colonies per 100 milliliters (col/100 mL) with a median of 110 col/100 mL. Fecal streptococci bacteria counts for surface-water sites ranged from a nonideal count of 1 to 31,000 col/100 mL with a median of 230 col/100 mL. Turbidity values ranged from less than 1 to 17,000 NTU's.

During this sampling period, the maximum value for fecal coliform bacteria was found to be greater than 10,000 col/100 mL at site 7, Mixon Creek near Booneville, Arkansas; the minimum value was found to be a nonideal count of 1 col/100 mL at two locations—site 8, Blue Mountain Lake at Sugar Grove, Arkansas and site 10, Blue Mountain Lake near Sugar Grove, Arkansas. The maximum value for fecal streptococci bacteria was found to be 31,000 col/100 mL at site 2, Revlon Creek at Magazine, Arkansas; the minimum value was found to be a nonideal count of 1 col/100 mL at swim beach site 1, Blue Mountain Lake at Waveland Park near Waveland, Arkansas. The maximum value for turbidity was found to be 17,000 NTU's at site 7, Mixon Creek near Booneville, Arkansas; the minimum value was found to be less than 1 NTU at site 9, Lick Creek near Sugar Grove, Arkansas.

References Cited

Britton, L.J., and Greeson, P.E., eds., 1987, Methods for collection and analysis of aquatic biological and microbiological samples: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A4, p. 37-50.
Fishman, M.J., and Friedman, L.C., eds., 1989, Methods for determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A1, p. 497-498.

Table 1. Sampling site descriptions

[Station number corresponds to national downstream order number assigned by the U.S. Geological Survey]

Site number	Station number	Station name	Latitude	Longitude
SB-1	07258998	Blue Mountain Lake at Waveland Park near Waveland, Arkansas	350627	0933936
B-1	07258898	Ashley Creek near Blue Mountain, Arkansas	350650	0934238
B-2	07258891	Revlon Creek at Magazine, Arkansas	350857	0934737
B-3	07258889	Prairie Branch at Magazine, Arkansas	350859	0934742
B-4	07258880	Scots Creek at Magazine, Arkansas	350901	0934948
B-5	07258820	Booneville Creek at Booneville, Arkansas	350903	0935439
B-6	07258800	Petit Jean River near Booneville, Arkansas	350925	0935525
B-7	07258690	Mixon Creek near Booneville, Arkansas	350506	0935246
B-8	07258699	Blue Mountain Lake at Sugar Grove, Arkansas	350428	0934908
B-9	07258610	Lick Creek near Sugar Grove, Arkansas	350631	0935035
B-10	07258705	Blue Mountain Lake near Sugar Grove, Arkansas	350548	0934803

Table 2. Water-quality data for Ashley Creek near Blue Mountain, Arkansas (Site B-1)

[col/100 mL, number of colonies per 100 milliliters of sample; NTU, nephelometric turbidity unit; K, nonideal count; >, greater than; --, no data; five digit numbers in parentheses are STORET parameter codes used for computer storage of data]

Date of sample	Time of sample	Coliform, fecal (col/100 mL) (31625)	Quality assurance coliform, (fecal blank) (31673)	Streptococci, fecal (col/100 mL) (31673)	Quality assurance streptococci, (fecal blank) (00076)	Turbidity (NTU) (00076)	Weather conditions	Remarks
05-03-94	1315	490	0	1,600	0	29	Cloudy	Medium low flow
05-10-94	1145	83	0	210	0	12	Sunny	Low flow, brown water
05-16-94	1525	69	0	84	0	10	Sunny	Low flow, floating algae
05-25-94	1140	66	0	K35	0	7.7	Sunny	Low flow, blue-gray water
06-01-94	1125	120	0	43	0	7.6	Sunny	Low flow
06-08-94	1245	--	--	--	--	--	Cloudy	No flow
06-14-94	1130	66	0	1,100	0	9.5	Sunny	Low flow, blue-gray water
06-21-94	1125	210	0	31	0	10	Sunny	Low flow, blue-gray water
06-28-94	1200	--	--	--	--	--	Sunny	No flow, floating algae
07-05-94	1305	--	--	--	--	--	Partly cloudy	No flow
07-11-94	1255	110	0	87	0	24	Sunny	Low flow, brown water
07-20-94	1155	350	0	460	0	23	Sunny	Low flow, brown water
07-27-94	1345	>400	0	1,200	0	30	Partly cloudy	Low flow, floating debris
08-02-94	1330	K31	0	K300	0	6.3	Partly cloudy	Low flow, detergent suds
08-11-94	1215	82	0	120	0	4.8	Sunny	Low flow, brown water
08-16-94	1110	--	--	--	--	--	Sunny	Low flow, floating algae
08-25-94	1100	110	0	140	0	8.2	Sunny	Low flow, blue-gray water
08-31-94	1340	K2	0	K8	0	4.7	Partly cloudy	Low flow
09-07-94	0930	K240	0	1,700	0	36	Sunny	Medium flow, brown water
Minimum		K2		K8		4.7		
Maximum		490		1,700		38		
Median		110		140		10		

Table 3. Water-quality data for Revlon Creek at Magazine, Arkansas (Site B-2)

[col/100 mL, number of colonies per 100 milliliters of sample; NTU, nephelometric turbidity unit; K, nonideal count; >, greater than; --, no data; five digit numbers in parentheses are STORET parameter codes used for computer storage of data]

Date of sample	Time of sample	Coliform, fecal (col/100 mL) (31625)	Quality assurance coliform, (fecal blank) (31673)	Streptococci, fecal (col/100 mL) (31673)	Quality assurance streptococci, (fecal blank) (00076)	Turbidity (NTU) (00076)	Weather conditions	Remarks
05-03-94	1000	4,300	0	31,000	0	49	Cloudy	Medium low flow
05-10-94	0930	1,000	0	370	0	16	Sunny	Low flow, brown water
05-16-94	1315	K410	0	K61	0	14	Sunny	Low flow, muddy water
05-25-94	0935	65	0	160	0	53	Sunny	Low flow, brown water
06-01-94	0915	86	0	210	0	15	Sunny	Low flow
06-08-94	1045	171	0	230	0	8.4	Cloudy	Low flow, floating debris
06-14-94	0920	90	0	330	0	26	Sunny	Low flow, brown water
06-21-94	0930	--	--	--	--	--	Sunny	No flow, oil sheen on water
06-28-94	0940	--	--	--	--	--	Sunny	No flow, oil sheen on water
07-05-94	1100	33	0	82	0	10	Partly cloudy	Low flow, floating debris
07-11-94	1045	91	0	160	0	13	Partly cloudy	Low flow, brown water
07-20-94	0940	>400	0	740	0	27	Sunny	Low flow, oil sheen on water
07-27-94	1050	>400	0	>2,000	0	130	Sunny	Low flow, muddy water
08-02-94	1100	K76	0	480	0	33	Partly cloudy	Low flow, floating debris
08-11-94	1010	47	0	81	0	12	Sunny	Low flow, brown water
08-16-94	0915	21	0	200	0	7.3	Sunny	Low flow, oil sheen on water
08-25-94	0905	--	--	--	--	--	Sunny	No flow, floating debris
08-31-94	1000	K5	0	K2	0	16	Partly cloudy	Low flow, oil sheen on water
09-07-94	0945	3,000	0	4,300	0	87	Sunny	Low flow, muddy water
Minimum		K5		K2		7.3		
Maximum		4,300		31,000		130		
Median		91		220		16		

Table 4. Water-quality data for Booneville Creek at Booneville, Arkansas (Site B-3)

[col/100 mL, number of colonies per 100 milliliters of sample; NTU, nephelometric turbidity unit; K, nonideal count; >, greater than; --, no data; five digit numbers in parentheses are STORET parameter codes used for computer storage of data]

Date of sample	Time of sample	Coliform, fecal (col/100 mL) (31625)	Quality assurance coliform, (fecal blank) (31673)	Streptococci, fecal (col/100 mL) (31673)	Quality assurance streptococci, (fecal blank) (00076)	Turbidity (NTU) (00076)	Weather conditions	Remarks
05-03-94	1020	K290	0	K480	0	20	Cloudy	Medium low flow
05-10-94	0950	K270	0	520	0	6.6	Sunny	Low flow, brown water
05-16-94	1335	K330	0	K74	0	6.8	Sunny	Low flow
05-25-94	0955	K390	0	350	0	3.8	Sunny	Low flow
06-01-94	0935	300	0	300	0	6.3	Sunny	Low flow
06-08-94	1110	>400	0	380	0	5.3	Cloudy	Low flow
06-14-94	0945	310	0	540	0	6.0	Sunny	Low flow, blue-gray water
06-21-94	0945	380	0	1,000	0	4.4	Sunny	Low flow
06-28-94	1000	96	0	1,100	0	2.8	Sunny	Low flow
07-05-94	1130	>400	0	760	0	3.5	Partly cloudy	Low flow, floating debris
07-11-94	1100	>400	0	1,700	0	12	Sunny	Low flow
07-20-94	1000	>400	0	980	0	5.8	Sunny	Low flow, blue-gray water
07-27-94	1120	>400	0	1,300	0	12	Partly cloudy	Low flow
08-02-94	1125	1,100	0	620	0	4.2	Sunny	Medium flow, floating debris
08-11-94	1025	330	0	380	0	3.7	Sunny	Low flow, oil sheen on water
08-16-94	0930	--	--	--	--	--	Sunny	No flow
08-25-94	0920	--	--	--	--	--	Sunny	No flow, blue-gray water
08-31-94	1030	--	--	--	--	--	Partly cloudy	No flow, oil sheen on water
09-07-94	1000	1,200	0	2,900	0	33	Sunny	Low flow, muddy water
Minimum		96		K74		2.8		
Maximum		1,200		2,900		33		
Median		385		580		5.9		

Table 5. Water-quality data for Booneville Creek at Booneville, Arkansas (Site B-5)

[col/100 mL, number of colonies per 100 milliliters of sample; NTU, nephelometric turbidity unit; K, nonideal count; >, greater than; five digit numbers in parentheses are STORET parameter codes used for computer storage of data]

Date of sample	Time of sample	Coliform, fecal (col/100 mL) (31625)	Quality assurance coliform, (fecal blank) (31673)	Streptococci, fecal (col/100 mL) (31673)	Quality assurance streptococci, (fecal blank) (00076)	Turbidity (NTU) (00076)	Weather conditions	Remarks
05-03-94	1110	3,300	0	3,500	0	19	Cloudy	Medium low flow
05-10-94	1040	K190	0	400	0	6.6	Sunny	Low flow
05-16-94	1410	K720	0	210	0	7.9	Sunny	Low flow, floating garbage
05-25-94	1020	310	0	170	0	3.6	Sunny	Low flow, blue-gray water
06-01-94	1000	70	0	220	0	4.5	Sunny	Low flow
06-08-94	1215	59	0	310	0	3.0	Cloudy	Low flow, floating debris
06-14-94	1000	>400	0	>2,000	0	6.4	Sunny	Low flow, blue-gray water
06-21-94	1055	170	0	440	0	5.2	Sunny	Low flow, brown water
06-28-94	1050	130	0	>2,000	0	4.6	Sunny	Low flow, floating garbage
07-05-94	1150	>400	0	200	0	6.6	Partly cloudy	Low flow, floating debris
07-11-94	1130	>400	0	110	0	5.9	Sunny	Low flow, brown water
07-20-94	1025	>400	0	300	0	5.9	Sunny	Low flow, brown water
07-27-94	1200	>400	0	720	0	8.2	Partly cloudy	Low flow, green water
08-02-94	1200	K61	0	600	0	3.8	Partly cloudy	Low flow, floating garbage
08-11-94	1045	K120	0	250	0	6.2	Sunny	Low flow, brown water
08-16-94	0950	140	0	K170	0	3.8	Sunny	Low flow
08-25-94	0935	170	0	260	0	5.6	Sunny	Low flow, blue-gray water
08-31-94	1110	K10	0	K2	0	7.3	Partly cloudy	Low flow
09-07-94	1045	4,300	0	>3,300	0	62	Sunny	Medium flow, muddy water
Minimum		K10		K2		3.0		
Maximum		4,300		3,500		62		
Median		340		305		6.1		

Table 6. Water-quality data for Mixon Creek near Booneville, Arkansas (Site B-7)

[col/100 mL, number of colonies per 100 milliliters of sample; NTU, nephelometric turbidity unit; K, nonideal count; >, greater than; --, no data; five digit numbers in parentheses are STORET parameter codes used for computer storage of data]

Date of sample	Time of sample	Coliform, fecal (col/100 mL) (31625)	Quality assurance coliform, (fecal blank) (31673)	Streptococci, fecal (col/100 mL) (31673)	Quality assurance streptococci, (fecal blank) (00076)	Turbidity (NTU) (00076)	Weather conditions	Remarks
05-03-94	1230	K360	0	K530	0	22	Cloudy	Medium low flow
05-10-94	1100	770	0	270	0	13	Sunny	Low flow, brown water
05-16-94	1430	350	0	140	0	12	Sunny	Low flow
05-25-94	1045	110	0	960	0	5.8	Sunny	Low flow, oil sheen on water
06-01-94	1025	53	0	340	0	7.9	Sunny	Low flow
06-08-94	1150	--	--	--	--	--	Partly cloudy	No flow
06-14-94	1030	400	0	1,300	0	32	Sunny	Low flow, brown water
06-21-94	1030	>400	0	1,200	0	8.6	Sunny	Low flow, brown water
06-28-94	1100	--	--	--	--	--	Sunny	No flow, oil sheen on water
07-05-94	1215	--	--	--	--	--	Partly cloudy	No flow
07-11-94	1200	--	--	--	--	--	Sunny	Low flow, oil sheen on water
07-20-94	1055	>400	0	>2,000	0	61	Sunny	Low flow, oil sheen on water
07-27-94	1230	>10,000	0	>2,000	0	17,000	Partly cloudy	Low flow, floating debris
08-02-94	1230	K120	0	680	0	32	Partly cloudy	Low flow, floating debris
08-11-94	1120	--	--	--	--	--	Sunny	No flow
08-16-94	1020	--	--	--	--	--	Sunny	No flow, floating debris
08-25-94	1005	--	--	--	--	--	Sunny	No flow, floating debris
08-31-94	1							