Appendix D

Additional Information for Resource Areas

Appendix D

Appendix D1

Water Quality

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Table D1-01 303 (d) List of Impaired Waters along Mainstems and Major Tributaries of the TVA System

Waterbody ID	Affected Waterbody	State	County	Partially Impaired	Impaired	Cause	Pollutant Source
TN06010102 001-1000	South Fork Holston River	TN	Sullivan	5.5		Flow alterations Thermal modifications	Upstream impoundment
TN06010102 001-2000	South Fork Holston River	TN	Sullivan	2.4		Organic enrichment/ low DO Flow alterations Thermal modifications	Upstream impoundment
TN06010102 006-1000	Boone Reservoir	TN	Washington Sullivan	4,400 acres		PCBs Chlordane	Contaminated sediment
TN06010102 014-1000	South Fork Holston River	TN	Sullivan	4.4		Flow alterations Thermal modifications	Upstream impoundment
TN06010104 001-2000	Holston River	TN	Grainger Jefferson	26.9		Low DO Flow alteration	Upstream impoundment
TN06010107 006-2000	French Broad River	TN	Sevier	4.9		Low DO Thermal modifications Flow alteration	Upstream impoundment
TN06010201 1	Watts Bar Reservoir	TN	Rhea		3,900 acres	PCBs Mercury	Contaminated sediment
TN06010201 16	Tennessee River From Sweetwater Creek to Fort Loudoun Dam	TN	Loudon		10.8	Organic enrichment/ Low DO Flow alteration PCBs	Upstream impoundment Contaminated sediment
TN06010201 20	Fort Loudoun Reservoir	TN	Knox Loudoun		14,600 acres	PCBs	Contaminated sediment
TN06010201 026-1000	Little River	TN	Blount		7.1	PCBs	Contaminated sediment
TN06010204 001-1000	Tellico Reservoir	TN	Loudoun Monroe		16,500 acres	PCBs	Contaminated sediment

Table D1-01 303 (d) List of Impaired Waters along Mainstems and Major Tributaries of the TVA System (continued)

Waterbody ID	Affected Waterbody	State	County	Partially Impaired	Impaired	Cause	Pollutant Source
TN060102071	Clinch River and Tributaries	TN	Roane		42	PCBs Chlordane Metals	Industrial point source Contaminated sediment
TN060102070 06-1000	Melton Hill Reservoir	TN	Anderson		5,690 acres	PCBs Chlordane	Contaminated sediment
TN060102070 19-2000	Clinch River	TN	Anderson	7.4		Thermal modifications Flow alteration	Upstream impoundment
TN060200010 01-1000	Nickajack Reservoir	TN	Marion Hamilton	10,370.0 acres		PCBs Dioxins	Contaminated sediment
TN060200020 18-3000 & 4000	Hiwassee River	TN	Polk	11.4		Flow alteration	Upstream impoundment
TN060200030 04-1000 & 2000	Parksville-Reservoir Ocoee Dam #1 to Baker Creek is partial From Baker Creek to reservoir headwaters is not supporting	TN	Polk	704 acres	576 acres	Metals Siltation	Contaminated sediment
TN060200030 13-1000	Ocoee River-Parksville-Reservoir to Ocoee #2 Dam is not supporting	TN	Polk		4.7	Metals Flow alteration	Resource extraction Upstream impoundment
TN060200030 13.5-1000	Ocoee #2 Reservoir	TN	Polk		494 acres	Metals Siltation Flow alteration	Contaminated sediment Resource extraction Upstream impoundment
TN060200030 13.55-1000	Ocoee River From Reservoir #2 to Dam #3 is not supporting	TN	Polk		3.9	Metals Siltation Flow alteration	Contaminated sediment Resource extraction Upstream impoundment

Table D1-01 303 (d) List of Impaired Waters along Mainstems and Major Tributaries of the TVA System (continued)

Waterbody ID	Affected Waterbody	State	County	Partially Impaired	Impaired	Cause	Pollutant Source
TN06020003 013.7-1000	Ocoee #3 Reservoir	TN	Polk		480 acres	Metals Siltation	Abandoned mining Contaminated sediment
AL/06030004 060_01	Shoal Creek	AL	Limestone		X	Pathogens	Pasture grazing
AL/06030004 080_01	Big Creek	AL	Limestone	X		OE/DO	Pasture grazing
AL/Wheeler Res_02	Elk River	AL	Limestone	X		pH/OE/DO	Pasture grazing Nonirrigated crop production
AL/06030005 010_01	Big Nance Creek	AL	Lawrence		X	Pesticides, ammonia, siltation, OE/DO, pathogens	Nonirrigated crop production Int. animal feeding operation Landfills, Pasture grazing
AL/06030005 040_01	Town Creek	AL	Lawrence		X	OE/DO	Nonirrigated crop production Pasture grazing
	Nottely River Toccoa River	GA GA	Union Fannin	X X		Fecal coliform DO, fecal coliform	Non-point source Dam release/non-point source

Notes:
DO = Dissolved oxygen.
PCBs = Polychlorinated biphenyls.
OE = Organic enrichment.

Sources:
State of Alabama. 2002. Federal 303(d) List of Impaired Waters for Alabama.
State of Georgia. 2002. Federal 305(b)/303(d) List of Impaired Waters for Georgia.
State of Tennessee. 2002. Federal 303(d) List of Impaired Waters for Tennessee.

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
South Holston	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	435	579	634	641	449	677	556	483
		Days forebay surface-bottom temp. ≥4 °C (# d)	220	220	220	219	220	219	220	221
		Maximum forebay surface-bottom temp. diff. (°C)	22	22	22	22	22	22	22	22
		Sum daily total reservoir vol. (million m3-d)	254,604	268,309	279,998	268,037	251,940	281,604	269,932	261,428
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	45,300	48,845	49,953	48,527	45,280	50,218	50,023	47,644
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	174	200	205	181	172	210	198	185
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	15,020	14,762	14,500	14,828	15,320	14,417	14,957	15,068
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	10,309	10,239	10,089	10,045	10,434	10,076	10,308	10,387
		Sum daily vol. DO ≤1 (million m3-d)	9,563	9,202	8,999	9,239	9,707	8,879	9,287	9,526
	Temperature	Sum daily vol. temp. >26 (million m3-d)	1,568	1,835	1,851	1,526	1,540	1,852	1,764	1,674
		Sum daily vol. temp. ≤10 (million m3-d)	143,722	153,099	162,086	151,514	141,460	162,702	153,766	146,823

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Boone	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	25	31	32	30	25	30	33	29
		Days forebay surface-bottom temp. ≥4 °C (# d)	219	219	212	215	221	216	220	221
		Maximum forebay surface-bottom temp. diff. (°C)	19	19	19	18	19	19	19	19
		Sum daily total reservoir vol. (million m3-d)	37,885	37,849	37,385	37,108	37,931	37,368	37,876	38,416
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	5,568	7,088	6,476	6,127	5,820	6,837	6,822	6,177
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	64	57	59	52	63	59	60	61
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	17	579	618	312	122	372	625	183
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	38	627	592	285	199	367	621	199
		Sum daily vol. DO ≤1 (million m3-d)	1	93	33	36	50	46	28	17
	Temperature	Sum daily vol. temp. >26 (million m3-d)	1,966	2,357	2,386	1,195	1,976	2,376	2,458	2,306
		Sum daily vol. temp. ≤10 (million m3-d)	10,791	10,937	11,218	11,958	10,790	11,232	10,969	11,285

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Douglas	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	72	83	99	85	74	98	120	75
		Days forebay surface-bottom temp. ≥4 °C (# d)	182	183	186	174	181	186	186	182
		Maximum forebay surface-bottom temp. diff. (°C)	18	18	18	16	17	18	18	18
		Sum daily total reservoir vol. (million m3-d)	242,040	268,404	290,573	194,840	238,533	288,649	297,091	251,913
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	69,139	75,454	82,175	46,525	68,803	81,829	88,573	70,137
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	180	258	268	187	178	262	273	257
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	23,836	26,780	30,296	13,426	23,856	30,151	33,127	24,088
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	28,419	31,385	34,793	18,220	28,367	34,633	37,024	28,666
		Sum daily vol. DO ≤1 (million m3-d)	22,393	24,869	27,825	14,852	22,337	27,679	30,090	22,835
	Temperature	Sum daily vol. temp. >26 (million m3-d)	15,466	16,675	17,339	14,787	15,321	17,383	17,132	14,273
		Sum daily vol. temp. ≤10 (million m3-d)	41,499	54,958	59,495	44,999	40,816	59,263	55,964	49,140

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Melton Hill	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	16	20	24	26	15	23	23	19
		Days forebay surface-bottom temp. ≥4 °C (# d)	176	179	176	170	174	178	175	179
		Maximum forebay surface-bottom temp. diff. (°C)	17	17	17	17	17	18	17	17
		Sum daily total reservoir vol. (million m3-d)	43,418	43,308	43,103	43,142	43,179	46,531	43,029	45,513
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	314	771	987	1,442	291	743	1,196	529
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	105	101	98	94	106	104	93	110
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	11	85	80	117	14	25	179	9
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	28	108	98	145	25	26	193	27
		Sum daily vol. DO ≤1 (million m3-d)	8	41	31	54	7	5	81	7
	Temperature	Sum daily vol. temp. >26 (million m3-d)	1,870	2,769	3,131	3,537	1,816	2,806	2,980	2,045
		Sum daily vol. temp. ≤10 (million m3-d)	12,058	12,882	13,374	13,381	11,977	14,793	12,519	13,270

Table D1-02 Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Guntersville	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	17	19	22	24	17	22	23	19
		Days forebay surface-bottom temp. ≥4 °C (# d)	55	57	58	56	52	56	62	57
		Maximum forebay surface-bottom temp. diff. (°C)	9	9	9	9	8	9	9	9
		Sum daily total reservoir vol. (million m3-d)	400,001	401,851	404,928	402,555	400,053	404,946	401,636	404,875
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	11,231	13,076	14,446	12,948	10,639	14,217	15,577	11,541
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	896	887	875	898	902	892	870	929
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	1,290	1,939	2,455	1,652	1,361	2,436	2,750	1,102
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	2,279	3,080	3,612	3,041	2,264	3,529	3,806	1,913
		Sum daily vol. DO ≤1 (million m3-d)	1,767	2,329	2,721	2,015	1,441	2,587	2,400	1,342
	Temperature	Sum daily vol. temp. >26 (million m3-d)	105,019	107,543	110,937	111,577	105,043	110,923	107,693	109,153
		Sum daily vol. temp. ≤10 (million m3-d)	87,475	88,429	88,366	88,582	87,579	88,473	88,384	88,150

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Pickwick	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	16	18	21	23	15	21	22	18
		Days forebay surface-bottom temp. ≥4 °C (# d)	72	76	77	77	70	76	78	77
		Maximum forebay surface-bottom temp. diff. (°C)	10	10	10	10	10	10	10	10
		Sum daily total reservoir vol. (million m3-d)	368,754	383,813	386,237	368,547	376,538	386,268	382,471	375,957
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	21,309	24,122	25,515	25,042	20,893	25,396	26,298	22,442
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	717	703	692	723	712	698	670	757
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	3,342	4,937	6,069	5,351	3,246	6,018	5,971	4,268
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	5,304	7,124	8,285	7,834	5,127	8,187	8,172	6,212
		Sum daily vol. DO ≤1 (million m3-d)	3,447	4,583	5,492	4,965	3,247	5,454	5,107	3,983
	Temperature	Sum daily vol. temp. >26 (million m3-d)	99,407	101,415	102,172	102,402	98,953	102,392	98,233	103,794
		Sum daily vol. temp. ≤10 (million m3-d)	74,937	80,507	80,517	74,900	80,421	80,586	80,726	74,888

Table D1-02 Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Kentucky	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	39	45	51	48	36	51	50	41
		Days forebay surface-bottom temp. ≥4 °C (# d)	46	48	49	49	40	48	52	49
		Maximum forebay surface-bottom temp. diff. (°C)	8	8	8	8	8	8	9	9
		Sum daily total reservoir vol. (million m3-d)	989,951	1,013,106	1,071,116	993,578	1,037,845	1,071,091	1,014,296	988,419
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	34,388	39,615	43,010	41,858	31,333	42,918	53,955	38,445
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	2,194	2,284	2,324	2,203	2,215	2,335	2,068	2,204
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	2,824	3,416	5,205	4,727	1,723	5,252	8,079	3,180
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	3,504	4,216	5,974	5,420	1,916	6,027	10,395	4,229
		Sum daily vol. DO ≤1 (million m3-d)	954	918	1,881	1,721	492	1,941	4,753	1,028
	Temperature	Sum daily vol. temp. >26 (million m3-d)	267,947	278,028	281,759	278,123	268,687	282,336	273,752	264,727
		Sum daily vol. temp. ≤10 (million m3-d)	219,849	220,728	243,234	220,197	243,591	243,268	219,779	219,345

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Hiwassee	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	70	80	89	82	74	93	112	79
		Days forebay surface-bottom temp. ≥4 °C (# d)	232	222	221	225	220	221	226	220
		Maximum forebay surface-bottom temp. diff. (°C)	20	19	19	19	19	19	19	19
		Sum daily total reservoir vol. (million m3-d)	93,821	98,452	100,767	88,119	92,850	99,357	101,640	98,340
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	10,217	11,200	12,565	9,309	10,242	12,799	14,055	10,669
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	155	151	143	131	148	138	134	154
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	1,533	1,754	2,130	1,551	1,426	2,425	3,014	1,606
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	1,387	1,626	1,899	1,421	1,317	2,202	2,383	1,468
		Sum daily vol. DO ≤1 (million m3-d)	790	884	1,045	914	759	1,196	1,521	833
	Temperature	Sum daily vol. temp. >26 (million m3-d)	836	818	830	755	784	865	703	781
		Sum daily vol. temp. ≤10 (million m3-d)	27,005	30,540	30,100	26,403	28,027	29,505	31,419	40,376

Table D1-02 **Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs for Alternatives Other Than the Summer Hydropower Alternative (see Table D1-03) (continued)**

Reservoir	Water Quality Category	Data (Average Condition)	Alternative[1]							
			Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Watts Bar	Reservoir hydrodynamics	Summer residence time 6/1 - 9/30 (d)	21	24	27	29	21	27	30	23
		Days forebay surface-bottom temp. ≥4 °C (# d)	160	164	169	165	160	169	181	162
		Maximum forebay surface-bottom temp. diff. (°C)	16	16	16	15	15	16	16	16
		Sum daily total reservoir vol. (million m3-d)	340,084	349,162	350,967	330,958	348,132	350,960	348,422	341,731
	Dissolved oxygen	Sum daily vol. DO ≤5 (million m3-d)	67,675	70,125	71,312	68,096	67,647	71,283	64,592	81,841
		Minimum reservoir vol. DO ≥5 (mil. m3-d) on "worst-case"	370	364	362	345	367	365	393	312
		Sum daily vol. DO ≤2 (million m3-d) 7/1 – 10/31	12,590	17,418	21,576	20,969	12,169	21,308	17,002	21,580
		Sum daily vol. DO ≤2 (million m3-d) 6/1 – 9/30	16,816	22,115	25,093	23,928	16,331	25,001	20,069	27,665
		Sum daily vol. DO ≤1 (million m3-d)	6,557	9,953	13,097	12,776	6,174	12,886	9,029	14,604
	Temperature	Sum daily vol. temp. >26 (million m3-d)	40,633	43,911	48,667	51,454	39,894	48,104	57,879	41,602
		Sum daily vol. temp. ≤10 (million m3-d)	77,861	84,572	83,869	78,284	82,559	84,158	83,719	79,053

Note: DO = Dissolved oxygen.

Table D1-03 Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs under the Summer Hydropower Alternative (Based on Rainfall and Flows in 1990–1994, the Only Consecutive Years That Allowed Successful Model Runs)

Sites	Data	Modeled Metric Results for Base Case and Summer Hydropower Alternative	
		Base Case	Summer Hydropower
South Holston	Summer residence time 6/1 - 9/30 (days)	462	394
	Days forebay surface-bottom temp>=4 ºC (d)	227	225
	Max. forebay surface-bottom temp. (ºC)	22	22
	Sum daily res. vol. (million m3-d)	258,936	270,147
	Sum daily vol. DO<=5 (million m3-d)	50,030	51,161
	Min. res. vol. DO>=5 (mil. M3) on "worst-case" d	161	143
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	17,410	17,459
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	11,992	11,891
	Sum daily vol. DO<=1 (million m3-d)	9,563	11476
	Sum daily vol. temp. >26 (million m3-d)	1,648	1,644
	Sum daily vol. temp. <=10 (million m3-d)	141,907	147,451
Boone	Summer residence time 6/1 - 9/30 (days)	23	16
	Days forebay surface-bottom temp>=4ºC (d)	223	209
	Max. forebay surface-bottom temp. (ºC)	19	18
	Sum daily res. vol. (million m3-d)	37,907	31,886
	Sum daily vol. DO<=5 (million m3-d)	5,544	3,328
	Min. res. vol. DO>=5 (mil. M3) on "worst-case" d	65	46
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	14	22
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	12	22
	Sum daily vol. DO<=1 (million m3-d)	1	4
	Sum daily vol. temp. >26 (million m3-d)	2,088	1,299
	Sum daily vol. temp. <=10 (million m3-d)	10,207	10,416
Douglas	Summer residence time 6/1-9/30 (days)	78	57
	Days forebay surface-bottom temp>=4 ºC (d)	195	192
	Max. forebay surface-bottom temp. (ºC)	18	18
	Sum daily res. vol. (million m3-d)	256,182	253,705
	Sum daily vol. DO<=5 (million m3-d)	82,743	65,985

Table D1-03 Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs under the Summer Hydropower Alternative (Based on Rainfall and Flows in 1990–1994, the Only Consecutive Years That Allowed Successful Model Runs) (continued)

Sites	Data	Modeled Metric Results for Base Case and Summer Hydropower Alternative	
		Base Case	Summer Hydropower
Douglas (continued)	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	185	245
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	28,774	19,046
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	33,956	23,944
	Sum daily vol. DO<=1 (million m3-d)	22,393	18,765
	Sum daily vol. temp. >26 (million m3-d)	17,037	16,465
	Sum daily vol. temp. <=10 (million m3-d)	40,173	55,925
Hiwassee	Summer residence time 6/1-9/30 (days)	65	67
	Days forebay surface-bottom temp>=4 ºC (d)	234	219
	Max. forebay surface-bottom temp. (ºC)	20	18
	Sum daily res. vol. (million m3-d)	97,701	92,640
	Sum daily vol. DO<=5 (million m3-d)	11,410	8,463
	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	165	144
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	1,672	1,212
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	1,530	1,169
	Sum daily vol. DO<=1 (million m3-d)	832	708
	Sum daily vol. temp. >26 (million m3-d)	919	650
	Sum daily vol. temp. <=10 (million m3-d)	25,658	28,140
Melton Hill	Summer residence time 6/1 - 9/30 (days)	16	17
	Days forebay surface-bottom temp>=4 ºC (d)	179	175
	Max. forebay surface-bottom temp. (ºC)	17	17
	Sum daily res. vol. (million m3-d)	43,456	43,239
	Sum daily vol. DO<=5 (million m3-d)	457	420
	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	100	101
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	18	26
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	44	41
	Sum daily vol. DO<=1 (million m3-d)	8	13
	Sum daily vol. temp. >26 (million m3-d)	2,015	1,745
	Sum daily vol. temp. <=10 (million m3-d)	11,199	12,747

Table D1-03 Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs under the Summer Hydropower Alternative (Based on Rainfall and Flows in 1990–1994, the Only Consecutive Years That Allowed Successful Model Runs) (continued)

Sites	Data	Modeled Metric Results for Base Case and Summer Hydropower Alternative	
		Base Case	Summer Hydropower
Watts Bar	Summer residence time 6/1 - 9/30 (days)	19	16
	Days forebay surface-bottom temp>=4 ºC (d)	165	164
	Max. forebay surface-bottom temp. (ºC)	16	15
	Sum daily res. vol. (million m3-d)	340,184	324,583
	Sum daily vol. DO<=5 (million m3-d)	76,332	83,988
	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	338	238
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	12,334	9,697
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	16,706	13,707
	Sum daily vol. DO<=1 (million m3-d)	5,240	3,318
	Sum daily vol. temp. >26 (million m3-d)	42,298	38,316
	Sum daily vol. temp. <=10 (million m3-d)	72,490	75,557
Guntersville	Summer residence time 6/1-9/30 (days)	16	14
	Days forebay surface-bottom temp>=4 ºC (d)	49	43
	Max. forebay surface-bottom temp. (ºC)	8	8
	Sum daily res. vol. (million m3-d)	399,955	395,888
	Sum daily vol. DO<=5 (million m3-d)	8,694	4,933
	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	918	975
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	744	83
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	1,297	224
	Sum daily vol. DO<=1 (million m3-d)	1,767	135
	Sum daily vol. temp. >26 (million m3-d)	110,594	107,461
	Sum daily vol. temp. <=10 (million m3-d)	77,307	77,943
Pickwick	Summer residence time 6/1 - 9/30 (days)	14	12
	Days forebay surface-bottom temp>=4 ºC (d)	61	49
	Max. forebay surface-bottom temp. (ºC)	9	8
	Sum daily res. vol. (million m3-d)	369,048	357,611
	Sum daily vol. DO<=5 (million m3-d)	19,328	11,423
	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	730	756

Table D1-03 Summary of Modeling Results for Reservoir Dynamics and Water Quality Characteristics on Representative Reservoirs under the Summer Hydropower Alternative (Based on Rainfall and Flows in 1990–1994, the Only Consecutive Years That Allowed Successful Model Runs) (continued)

Sites	Data	Modeled Metric Results for Base Case and Summer Hydropower Alternative	
		Base Case	Summer Hydropower
Pickwick (continued)	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	2,757	609
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	4,308	1,149
	Sum daily vol. DO<=1 (million m3-d)	3,447	577
	Sum daily vol. temp. >26 (million m3-d)	106,642	100,700
	Sum daily vol. temp. <=10 (million m3-d)	65,992	65,913
Kentucky	Summer residence time 6/1 - 9/30 (days)	36	32
	Days forebay surface-bottom temp>=4 ºC (d)	36	29
	Max. forebay surface-bottom temp. (ºC)	7	7
	Sum daily res. vol. (million m3-d)	989,985	965,189
	Sum daily vol. DO<=5 (million m3-d)	30,132	21,289
	Min. res. vol. DO>=5 (mil. m3) on "worst-case" d	2,239	2,137
	Sum daily vol. DO<=2 (million m3-d) 7/1 - 10/31	1,838	616
	Sum daily vol. DO<=2 (million m3-d) 6/1 - 9/30	2,118	691
	Sum daily vol. DO<=1 (million m3-d)	954	169
	Sum daily vol. temp. >26 (million m3-d)	272,324	260,420
	Sum daily vol. temp. <=10 (million m3-d)	199,719	199,681

Note:
DO = Dissolved oxygen.

Table D1-04 **Summary of Modeling Results Providing Water Quality Characteristics in Representative Dam Releases under Alternatives Other Than the Summer Hydropower Alternative (Based on Rainfall and Flows during 1987–1994)**

Sites	Data	Alternative							
		Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
South Holston	Annual average minimum (dissolved oxygen (DO) (mg/L)	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/year temp >10 °C	91	70	65	80	95	62	65	82
	Annual average maximum temp	13.6	12.6	12.2	12.8	13.7	12.1	12.3	13.2
Boone	Annual average minimum DO (mg/L)	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/year temp >10 °C	228	228	226	236	228	227	229	229
	Annual average maximum temp	17.4	18.6	19.1	18.3	17.5	18.6	18.7	18.3
Douglas	Annual average minimum DO (mg/L)	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/year temp >10 °C	237	239	244	246	237	244	242	239
	Annual average maximum temp	24.3	24.2	23.6	25.2	24.3	23.6	22.9	24.2
Hiwassee	Annual average minimum DO (mg/L)	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/year temp >10 °C	226	221	221	230	221	226	216	223
	Annual average maximum temp	20.6	20.7	20.3	21.5	21.1	20.4	19.8	20.9

Table D1-04 **Summary of Modeling Results Providing Water Quality Characteristics in Representative Dam Releases under Alternatives Other Than the Summer Hydropower Alternative (Based on Rainfall and Flows during 1987–1994) (continued)**

Sites	Data	Alternative							
		Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Melton Hill	Annual average minimum DO (mg/L)	5.6	4.9	4.3	4.3	6.0	4.8	3.9	5.6
	Average # days/years DO <5 mg/L	7	18	21	32	7	12	30	12
	Average # days/year temp >10°C	263	255	250	252	263	246	255	255
	Annual average maximum temp	23.9	24.9	25.0	25.7	23.9	23.9	24.7	23.4
Watts Bar	Annual average minimum DO (mg/L)	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target	LIP target
	Average # days/year temp >10°C	274	272	272	274	273	272	273	272
	Annual average maximum temp	26.8	27.3	27.3	27.9	26.8	27.2	26.5	26.8
Guntersville	Annual average minimum DO (mg/L)	4.7	4.4	4.3	4.5	4.7	4.4	4.3	5.0
	Average # days/years DO <5 mg/L	19	24	28	23	18	26	31	12
	Average # days/year temp >10°C	282	281	281	281	281	281	281	281
	Annual average maximum temp	30.3	30.4	30.4	30.5	30.4	30.4	30.2	30.4
Pickwick	Annual average minimum DO (mg/L)	4.3	4.1	4.0	4.0	4.3	4.0	3.8	4.3
	Average # days/years DO <5 mg/L	30	39	43	42	29	44	48	36
	Average # days/year temp >10°C	281	281	281	282	281	281	281	281
	Annual average maximum temp	29.9	29.7	29.6	29.7	29.9	29.6	29.5	29.8
Kentucky	Annual average minimum DO (mg/L)	3.4	3.0	2.8	2.9	3.8	2.8	2.5	3.1
	Average # days/years DO <5 mg/L	47	54	57	60	39	57	60	56
	Average # days/year temp >10°C	272	272	272	272	271	272	272	272
	Annual average maximum temp	29.1	28.9	28.6	28.8	29.3	28.6	28.6	29.0

Note: LIP = Lake Improvement Plan.

Table D1-05 Summary of Modeled Water Quality Characteristics in Representative Dams under the Summer Hydropower Alternative (Based on Rainfall and Flows in 1990–1994, the Only Consecutive Years That Allowed Successful Model Runs)

Sites	Data	Alternative	
		Base Case	Summer Hydropower
South Holston	Annual average minimum DO (mg/L)	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target
	Average # days/year temp >10°C	96	105
	Annual average maximum temp	13.8	13.6
Boone	Annual average minimum DO (mg/L)	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target
	Average # days/year temp >10 °C	237	234
	Annual average maximum temp	17.5	19.3
Douglas	Annual average minimum DO (mg/L)	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target
	Average # days/year temp >10 °C	241	239
	Annual average maximum temp	24.0	24.8
Hiwassee	Annual average minimum DO (mg/L)	LIP target	LIP target
	Average # days/years DO <5 mg/L	LIP target	LIP target
	Average # days/year temp >10 °C	235	232
	Annual average maximum temp	20.9	22.0
Melton Hill	Annual average minimum DO (mg/L)	5.2	4.9
	Average # days/years DO <5 mg/L	11.0	10.2
	Average # days/year temp >10 °C	270.2	256.2
	Annual average maximum temp	23.9	23.7
Watts Bar	Annual average minimum DO (mg/L)	2.5	2.7
	Average # days/years DO <5 mg/L	127	134
	Average # days/year temp >10 °C	LIP target	LIP target
	Annual average maximum temp	LIP target	LIP target
Guntersville	Annual average minimum DO (mg/L)	4.9	5.7
	Average # days/years DO <5 mg/L	10	0
	Average # days/year temp >10 °C	292	291
	Annual average maximum temp	30.5	30.3

Table D1-05 Summary of Modeled Water Quality Characteristics in Representative Dams under the Summer Hydropower Alternative (Based on Rainfall and Flows in 1990–1994, the Only Consecutive Years That Allowed Successful Model Runs) (continued)

Sites	Data	Alternative	
		Base Case	Summer Hydropower
Pickwick	Annual average minimum DO (mg/L)	4.4	5.0
	Average # days/years DO <5 mg/L	22	2
	Average # days/year temp >10 °C	291	292
	Annual average maximum temp	30.1	30.4
Kentucky	Annual average minimum DO (mg/L)	3.7	4.3
	Average # days/years DO <5 mg/L	40	26
	Average # days/year temp >10 °C	279	279
	Annual average maximum temp	29.0	29.3

Notes:
DO = Dissolved oxygen.
LIP = Lake Improvement Plan.
mg/L = Milligrams per liter.