Summer Water Temperature Survey
Chattahoochee River
Below Morgan Falls Dam
1987 through 1989

submitted by
Georgia Department of Natural Resources
Game and Fish
26 June 1991

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Water temperatures in excess of 74°F have been recorded in the trout waters of the Chattahoochee River below Morgan Falls Dam since our monitoring began in 1987. A thermograph located at Paces Ferry Bridge (Chattahoochee River Mile 303) has documented the chronic problem (Table 1). Research has shown that temperatures above 74°F are particularly detrimental to trout fisheries (Cherry et al. 1977; [a]Elliot 1975; [b]Elliot 1975; [c]Elliot 1975; Hartzler et al. 1990).

The occurrence of these high water temperatures is related to the time of year, discharge patterns at Buford Dam, rainfall and air temperatures. The highest water temperatures typically occur early in the week because of the current practice of minimum flow releases from Buford Dam on Saturday and/or Sunday (Appendices 1,2 and 3).

The general features that produce chronically high water temperatures are: dates between May 20 and September 15; daily average air temperatures greater than 81°F at least one day prior to the event; mean daily discharges from Buford Dam of less than 800 cubic feet per second on both Saturday and Sunday; and weekend rainfall events that exceed 1 inch per day. In general, as runoff from heavy summer rains increases, more cold water is needed from Buford Dam to suppress daytime extremes in water temperature.

This occasional chronic water temperature problem became acute in June and July of 1989 near the end of a period of drought. No significant power generations occurred over a ten day period (Appendix 3). The maximum water temperature recorded on June 26, 1989 was 81.1°F (Appendix 3). The water temperature remained above 74°F for 74 hours over four consecutive days. On Tuesday, July 11, 1989, the water temperature climbed to 81.5°F following minimum flow releases on Saturday and Sunday and after receiving 2.5 inches of rain over the preceding Thursday, Friday and Saturday. It is our belief that, although the storm water runoff compounded the problem, minimum flow releases alone from Buford Dam are not sufficient to maintain water temperatures below 74°F at Peachtree Creek. This is demonstrated by the exceedance of 74°F on May 29 and 30, 1987 with 572 cfs minimum flow (Appendix 1).

The high temperature recorded on June 26, 1989 occurred two days after the stocking of 150,000 brown trout fingerlings. These brown trout were the State of Georgia's entire yearly allotment from the United States Fish and Wildlife Service. A three year study to determine the best stocking rate of brown trout in the section of the river below Morgan Falls Dam was being conducted during the time of the high water temperatures. The number of trout captured using electrofishing equipment declined from thirteen fish per hour of electrofishing in February 1989 to 1.5 fish per hour in August 1989. The February catch rate is represented by adult and juvenile trout while the August catch rate is comprised of adult trout only.

Table 1. Date and hours of water temperatures exceeding 74° at Paces Ferry Road in the Chattahoochee River for the years 1987, 1988, 1989 and 1990.

DATE	DAY OF WEEK	HOURS > 74°F	MAX. TEMPERATURE
Jun 02 1987	Tue	2.3	74.3
Jun 03 1987	Wed	0.3	74.1
Jun 30 1987	Tue	3.6	74.8
Jul 01 1987	Wed	1.3	74.1
Jul 03 1987	Fri	1.3	74.3
Jul 14 1987	Tue	10.3	76.6
Jul 15 1987	Wed	5.0	75.0
May 31 1988	Mon	7.0	76.3
Jun 14 1988	Tue	4.0	75.2
Jul 18 1988	Mon	1.0	74.3
Jul 26 1988	Tue	4.5	74.8
Aug 01 1988	Mon	3.0	74.7
Aug 02 1988	Tue	4.5	75.6
Aug 17 1988	Wed	2.0	74.3
Aug 20 1988	Sat	8.0	75.6
Aug 21 1988	Sun	18.0	75.6
Sep 15 1988	Thu	1.0	74.1
May 29 1989	Mon	2.0	74.1
May 30 1989	Tue	5.0	75.6
Jun 13 1989	Tue	4.0	75.0
Jun 24 1989	Sat	9.5	77.5
Jun 25 1989	Sun	16.5	79.7
Jun 26 1989	Mon	24.0	81.1(74.3 min)
Jun 27 1989	Tue	24.0	79.7(74.3 min)
Jul 10 1989	Mon	9.5	77.9
Jul 11 1989	Tue	24.0	81.5
Jul 12 1989	Wed	3.0	78.4
Jul 14 1989	Fri	4.0	74.7
Jul 24 1989	Mon	6.0	76.3
Jul 25 1989	Tue	6.0	76.3
Aug 07 1989	Mon	4.5	75.4
Aug 28 1989	Mon	5.5	76.3
Jun 11 1990	Mon	6.0	76.3
Jun 12 1990	Tue	3.0	75.6
Jun 18 1990	Mon	4.0	74.5
Jul 09 1990	Mon	5.5	75.2
Jul 29 1990	Sun	3.5	74.3

SUMMARY BY YEAR

YEAR	NO. OF DAYS OF EXCEEDANCE	AVG. TIME (HRS)
1987	8	3.0
1988	10	5.3
1989	15	9.8
1990	5	4.4

Creel survey data indicate that the fisherman success rate declined from one trout harvested for every twelve hours of effort in 1988 to one trout harvested for every 53 hours of effort in 1990. The results of the study indicate that none of the 150,000 brown trout fingerlings survived since none of the fish in that yearclass have been recaptured by anglers or by the Game and Fish Division.

Adherence to the normally practiced generation schedule should prevent the recurrence of the high water temperature events of June and July 1989. These events were caused by deviation from the "normal" generation schedule of minimum flow releases on weekend days and high flow generation releases every weekday throughout the summer.

RECOMMENDATIONS:

1. The United States Army Corps of Engineers should develop and incorporate a discharge schedule that minimizes water temperatures greater than 74°F in the Chattahoochee River between Buford Dam and Peachtree Creek.

2. Weekday power generations late May through mid September are critical to maintain water temperatures in the Chattahoochee River above the confluence of Peachtree Creek within a range that will allow the protection of this valuable trout habitat resource.

3. Saturday and Sunday minimum flows of 448 cfs may not prevent excessively high water temperatures following "normal" summer weekday generation schedules. Higher minimum flows may be necessary on weekends during which heavy rainfall events occur or on weekends when high volume hydropower discharges are not planned for Sunday night or Monday morning.

4. If higher minimum flows are not sufficient to prevent acute water temperatures, then alternative discharge schedules should be investigated.

Literature Cited

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[a]Elliot, J. M. 1975. The growth rate of brown trout (Salmo trutta L.) fed on maximum rations. Journal of Animal Ecology. 44:805-821.

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Appendix 1

Maximum water temperatures recorded in the Chattahoochee River at Paces Ferry Road, maximum air temperatures and rain fall measured at the Alpharetta 5 SSW station in 1987. Total discharge and minimum cfs reported from Buford Dam.

DATE	Day of Week	Water Temp(F)	Air Temp(F)	Rainfall (inch)	Average Discharge (cfs)	Minimum cfs
May/22/87	F	65.8	77	0	1,078	442
May/23	S	68.7	78	0	572	572
May/24	S	69.6	84	0	728	572
May/25	M	69.8	85	0	1,128	442
May/26	T	72.9	85	0	1,096	442
May/27	W		87	0	1,096	442
May/28	T	72	85	0	1,089	442
May/29	F	71.8	86	0	1,097	442
May/30	S	69.8	86		572	572
May/31	S	70.7	85	1	728	572
June/1/87	M	71.4	87	0.07	1,067	442
June/2	T	74.3 *	86	0	1,064	442
June/3	W	74.1 *	89	0	1,063	442
June/4	T	72.3	90	0.06	1,064	442
June/5	F	72.7	81	0	1,067	442
June/6	S	72.7	84	0	572	557
June/7	S	72.3	86	0	725	557
June/8	M	73.4	87	0	1,737	442
June/9	T	73.8	88	0	1,733	442
June/10	W	72.5	90	0	1,731	442
June/11	T	68.5	90	0	1,740	442
June/12	F	68.4	87	0.04	1,747	442
June/13	S	68.4	89	0.1	722	574
June/14	S	65.5	77	0.72	733	574
June/15	M	66	85	0.01	1,376	443
June/16	T	67.5	82	0.12	1,367	442
June/17	W	68	78	0.5	1,126	442
June/18	T	68	84	0.04	1,115	442
June/19	F	68	86		1,115	442
June/20	S	69.6	82	1.8	574	572
June/21	S	70	84	0.86	878	442
June/22	M	70.5	85	0.54	1,094	442
June/23	T	73.4	85	0	1,097	442
June/24	W	72.3	85		1,093	442
June/25	T	72.5	90	1.08	1,094	442
June/26	F	72.9	85		1,094	442
June/27	S	73.2	86	0	572	572
June/28	S	72.7	81	0	874	572
June/29	M	72.7	84	0	759	442
June/30	T	74.8 *	86	0	759	442
July/1/87	W	74.1 *	88	0.12	1,101	442
July/2	T	73.6	87	1.52	1,106	442
July/3	F	74.3 *	86	2.37	1,091	442
July/4	S	71.4	84	0	572	572
July/5	S	72.9	84	0.19	875	572
July/6	M	72.9	87	0	1,770	442
July/7	T	73.2	89	0.7	1,770	442

July/8	W	71.8	88	0	1,770	442
July/9	T	70.7	91	0	1,764	442
July/10	F	69.4	91	0	1,764	442
July/11	S	70.3	86	0	572	572
July/12	S	70.7	89	0	872	572
July/13	M	71.2	91	0	1,097	442
July/14	T	76.6 *	91	0	1,090	442
July/15	W	75 *	84		1,100	442
July/16	T	72.7	84	0	1,087	442
July/17	F	71.2	86	0	1,094	442
July/18	S	71.1	88	0	832	574
July/19	S	72.3	87	0	832	574
July/20	M	72.7	90	0	2,454	443
July/21	T	72.9	88	0	2,459	443
July/22	W	67.6	90	0	2,474	443
July/23	T	62.1	92	0	2,471	443
July/24	F	63	96	0	2,426	443
July/25	S	62.4	96	0	824	574
July/26	S	64	96	0	827	574
July/27	M	66.7	94	0.05	2,459	443
July/28	T	72.5	96	0	2,479	443
July/29	W	68.5	94	0	2,493	443
July/30	T	63.9	94	0	2,502	444
July/31	F	64.8	88	0	2,503	444
Aug/1/87	S	62.6	95	0	887	578
Aug/2	S	62.1	96	0	814	578
Aug/3	M	66.2	95	0.05	3,494	444
Aug/4	T	70.5	93	0.33	3,498	444
Aug/5	W	67.3	94	1.25	3,497	444
Aug/6	T	64.9	94	0	3,499	444
Aug/7	F	62.8	89	1.7	3,494	444
Aug/8	S	61.3	88	0	884	582
Aug/9	S	62.6	89	0.15	819	582
Aug/10	M	66.7	91	0	3,502	445
Aug/11	T	71.1	93	0.04	3,511	445
Aug/12	W	70	89	0	3,469	445
Aug/13	T	61.2	84	0	3,526	445
Aug/14	F	60.4	84		3,515	445
Aug/15	S	60.3	84	0	896	586
Aug/16	S	60.1	81	0	824	586
Aug/17	M	64.2	87	0	3,881	446
Aug/21	F	59.0	88.0	0	3,562	446
Aug/22	S	59.5	84.0	0	834	590
Aug/23	S	60.3	68.0	0.05	744	590
Aug/24	M	66.4	78.0	0.08	3,214	447
Aug/25	T	65.1	86.0	1.28	3,219	447
Aug/26	W	64.4	86.0	0.2	3,216	447
Aug/27	T	60.3	85.0	0	3,212	447
Aug/28	F	59.0	89.0	0	3,224	447
Aug/29	S	59.0	86.0	0.16	909	594
Aug/30	S	61.5	79.0	0.02	861	594
Aug/31	M	67.3	81.0	0.06	3,239	447
Sept/1/87	T	63.7	86.0	0	3,241	448
Sept/2	W	59.2	85.0	0	3,236	448
Sept/3	T	59.2	85.0	0.06	3,234	448
Sept/4	F	58.6	82.0	0	3,238	448
Sept/5	S	59.9	85.0	0	841	598
Sept/6	S	63.1	79.0	0.57	760	598

Sept/7	M	66.0	78.0	0	3,411	448
Sept/8	T	64.2	80.0	0	3,411	449
Sept/9	W	62.6	76.0	0	3,402	449
Sept/10	T	58.8	76.0	0	3,427	449
Sept/11	F	58.3	77.0	0	3,425	449
Sept/12	S	58.6	81.0	0	600	598
Sept/13	S	61.5	83.0	0	761	598
Sept/14	M	64.4	80.0	0	3,075	449

Appendix 2

Maximum water temperatures recorded in the Chattahoochee River at Paces Ferry Road, maximum air temperatures and rainfall measured at the Alpharetta 5 SSW station in 1988. Total discharge and minimum cfs reported from Buford Dam.

Date	Day of Week	Water Temp(F)	Air Temp(F)	Rainfall (inch)	Average Discharge (cfs)	Minimum cfs
May/14/88	S	68.2	79	T	558	602/450
May/15	S	68	82	0	602	602
May/16	M	68.9	85	0.36	1,219	602/305
May/17	T	72.1	84	T	1,032	303
May/18	W	69.1	80	0	1,032	303
May/19	T	69.6	79	0	1,032	303
May/20	F	70	78	0	1,052	303
May/21	S	68.9	82	0	450	450
May/22	S	69.3	84	0	450	450
May/23	M	70.9	85	0.07	1,117	450/303
May/24	T	68.9	81	T	1,031	303
May/25	W	67.8	71	0.39	1,044	303
May/26	T	67.8	75	0	1,028	303
May/27	F	69.3	76	0	1,044	303
May/28	S	69.6	78	0	476	303
May/29	S	71.8	84	0	481	303
May/30	M	72.9	87	0	1,035	303
May/31	T	76.3 *	89	0	1,103	303
June/1/88	W	72.5	88	0	1,039	303
June/2	T	72	90	0	991	303
June/3	F	72.5	89	0	1,013	303
June/4	S	70.5	75	0	713	451
June/5	S	70.9	77	0	717	451
June/6	M	72.5	80	0	1,112	451
June/7	T	73.9	88	0	1,039	304
June/8	W	72.1	90	0	1,033	304
June/9	T	69.6	92	0	1,040	304
June/10	F	68.9	89	0.21	1,040	304
June/11	S	68.9	75	0	582	304
June/12	S	70.5	79	0	582	304
June/13	M	72.1	83	0	1,188	304
June/14	T	75.2 *	86	0	1,188	304
June/15	W	71.8	88	0	1,187	304
June/16	T	69.4	90	0	1,172	304
June/17	F	69.6	93	0.17	1,176	304
June/18	S	67.8	90	0	950	452
June/19	S	67.3	89	0	943	452
June/20	M	71.4	86	0.25	1,283	452/305
June/21	T	71.6	91	0	1,224	305
June/22	W	71.1	92	0.05	1,213	305
June/23	T	71.4	94	0	1,211	305
June/24	F	71.8	95	0	1,221	305
June/25	S	71.2	98	0	988	452
June/26	S	71.4	92	0	935	452
June/27	M	72.7	94	0	1,308	452/305

June/28	T	73.9	85	0.22	1,266	305
June/29	W	72	83	0	1,279	305
June/30	T	68.7	89	0	1,283	305
July/1/88	F	69.6	82	T	1,285	305
July/2	S	64.4	84	0	963	452
July/3	S	62.6	72	0.03	956	452
July/4	M	61.9	72	0.02	1,361	452/305
July/5	T	63.1	68	T	1,289	305
July/6	W	66.9	80	0	1,267	305
July/7	T	70.2	82	0	1,272	305
July/8	F	70	88	0	1,302	305
July/9	S	70.2	96	0	961	454
July/10	S	72.1	96	0	962	454
July/11	M	71.8	92	0	1,372	454/305
July/12	T	71.8	84	0	1,279	307
July/13	W	70	90	0	1,294	307
July/14	T	70.9	85	0.03	1,287	307
July/15	F	72.1	91	0.05	1,281	307
July/16	S	71.1	95	0.29	958	454
July/17	S	72.7	89	0.06	979	454
July/18	M	74.3 *	90	0	1,366	454/304
July/19	T	73.6	89	0	1,318	307
July/20	W	74.1 *	90	0	1,288	307
July/21	T	72.9	90	0	1,289	307
July/22	F	70.5	87	0.51	1,293	307
July/23	S	70.7	84	2.94	961	454
July/24	S	70.5	78	0	356	454/307
July/25	M	72.3	82	0	1,293	307
July/26	T	74.8 *	83	0	1,271	307
July/27	W	72.5	80	0.23	1,295	307
July/28	T	70.2	77	0.17	1,296	307
July/29	F	68.5	84	0.02	1,286	307
July/30	S	70	78	0.31	968	456
July/31	S	72.7	87	0	961	456
Aug/1/88	M	74.7 *	88	0	1,373	456/307
Aug/2	T	75.6 *	90	0	1,296	307
Aug/3	W	71.8	91	0.09	1,298	309
Aug/4	T	71.1	88	1.49	1,289	309
Aug/5	F	70.5	93	1.65	1,307	309
Aug/6	S	70.2	81	0.12	968	456
Aug/7	S	69.4	92	0	881	456/309
Aug/8	M	72.7	90	0.05	1,288	309
Aug/9	T	72.7	93	0	1,291	309
Aug/10	W	71.1	94	0	1,291	309
Aug/11	T	70.2	91	0	1,291	309
Aug/12	F	70.5	89	0	1,298	309
Aug/13	S	71.1	89	0	797	456
Aug/14	S	71.1	91	0	833	456
Aug/15	M	73.6	89	0	1,302	456/309
Aug/16	T	73.8	92	0	1,239	309
Aug/17	W	74.3 *	94	0	1,249	309
Aug/18	T	73.8	97	0	1,231	309
Aug/19	F	73.4	97	0	1,239	309
Aug/20	S	75.6 *	96	0.06	713	458/309

Aug/21	S	75.6 *	89	1.18	309	309
Aug/22	M		89	0	1,233	309
Aug/23	T		89	0.04	1,236	309
Aug/24	W		76	1.32	1,236	309
Aug/25	T		86	0	1,234	310
Aug/26	F		88	0	1,238	311
Aug/27	S		91	0	705	458/311
Aug/28	S		90	0	662	311
Aug/29	M		87	0	1,232	311
Aug/30	T		91	0	1,235	311
Aug/31	W		86	0	1,247	311
Sept/1/88	T		77	0	1,238	311
Sept/2	F		83	0	1,241	311
Sept/3	S		81	0	805	458
Sept/4	S		83	1.2	458	458
Sept/5	M		74	1.25	458	458
Sept/6	T		78	0	1,311	458/311
Sept/7	W		79	0	1,241	311
Sept/8	T		77	0	1,238	311
Sept/9	F	63.7	76	0.21	1,238	311
Sept/10	S	61.2	72	0.1	718	458/311
Sept/11	S	63.3	77	0.18	673	311
Sept/12	M	68	85	0.01	1,235	311
Sept/13	T	68.5	85	T	766	311
Sept/14	W	73.4	88	0	1,228	311
Sept/15	T	74.1	91	0	1,241	311
Sept/16	F	69.3	86	T	1,235	311
Sept/17	S	64.9	71	0.9	785	458
Sept/18	S	64.2	70	0.17	806	458
Sept/19	M	67.8	77	T	1,321	458/311
Sept/20	T	68.4	83	0.07	1,232	311
Sept/21	W	68.4	88	0	1,238	311
Sept/22	T	68.9	85	0	1,241	311
Sept/23	F	68.7	87	0	1,244	311
Sept/24	S	68.9	89	0	633	458
Sept/25	S	69.1	88	0	633	458
Sept/26	M	69.4	86	T	1,082	458/311
Sept/27	T	67.8	78	0	1,031	311
Sept/28	W	67.1	77	0	1,433	540/311
Sept/29	T	66.9	81	0	1,036	311
Sept/30	F	64.9	83	0	1,019	311

Appendix 3

Maximum water temperatures recorded in the Chattahoochee River at Paces Ferry Road, maximum air temperatures and rainfall measured at the Alpharetta 5 SSW station in 1989. Total discharge and minimum cfs reported from Buford Dam.

DATE	Day of Week	Water Temp(F)	Air Temp(F)	Rainfall (inch)	Average Discharge (cfs)	Minimum (cfs)
May/24/89	W	72.7	88	0	1,102	462
May/25	T	72.7	88	0	1,098	360
May/26	F	71.6	88	0	1,086	390
May/27	S	73.2	85	0	360	360
May/28	S	73.8	85	0	445	360
May/29	M	74.1 *	86	0	1,571	360
May/30	T	75.6 *	87	0	1,106	360
May/31	W	71.2	91	0	1,106	360
June/1/89	T	71.2	92	0	1,074	325
June/2	F	72.7	93	0	1,062	325
June/3	S	71.6	90	0	884	325
June/4	S	71.2	90	0.2	519	325
June/5	M	72	87	0.3	507	325
June/6	T	71.1	88	0.98	1,086	325
June/7	W	72.3	79	0.18	325	325
June/8	T	69.8	84	0.38	455	325
June/9	F	71.1	84	0	697	325
June/10	S	71.6	84	0	1,090	325
June/11	S	71.4	86	0	515	325
June/12	M	73	87	0	511	325
June/13	T	75 *	87	0	1,094	325
June/14	W	72.1	88	0	1,128	325
June/15	T	69.6	89	0.69	1,090	325
June/16	F	65.5	73	0.2	1,098	325
June/17	S	69.6	72	0.57	324	324
June/18	S	73.6	81	0	505	324
June/19	M	72.1	85	0.13	324	324
June/20	T	71.6	81	0.7	324	324
June/21	W	68.9	72	1.39	323	324
June/22	T	69.4	82	0.5	322	323
June/23	F	72.7	79	0	321	321
June/24	S	77.5 *	87	0	321	321
June/25	S	79.7 *	90	0	500	321
June/26	M	81.1 *	91	0	321	320
June/27	T	79.7 *	90	0	1,075	320
June/28	W			0	1,090	320
June/29	T	71.1	90	0.99	936	320
June/30	F	68.5	86	0	1,505	320
July/1/89	S	67.3	82	0	510	320
July/2	S	65.8	83	0	320	320
July/3	M	69.4	81	0.3	1,063	320
July/4	T	71.1	82	0.67	1,067	320
July/5	W	68.4	85	0	1,063	320
July/6	T	71.6	80	0.42	1,070	319
July/7	F	73.6	86	0.03	1,713	319
July/8	S	70.5	89	0	319	319
July/9	S	72.9	89	0	319	319
July/10	M	77.9 *	93	0.25	1,066	319
July/11	T	81.5 *	93	0	2,025	319
July/12	W	78.4 *	91	0	1,058	319
July/13	T	71.6	78	0	1,058	319
July/14	F	74.7 *	88	0	1,065	319
July/15	S	72.7	89	0	381	319
July/16	S	72.1	86	2.8	567	567

July/17	M	73.8	84	0.3	1,442	319
July/18	T	73.6	86	0	1,453	319
July/19	W	68.7	84	0	1,449	319
July/20	T	67.8	86	1.6	1,453	319
July/21	F	68.5	84	0.45	1,453	319
July/22	S	69.4	83	0.4	318	318
July/23	S	72.7	83	0	318	318
July/24	M	76.3 *	85	0	1,862	318
July/25	T	76.3 *	86	0.75	1,842	318
July/26	W	70.5	92	0	1,852	318
July/27	T	70.7	92	0	1,846	318
July/28	F	71.1	92	0	1,847	318
July/29	S	71.4	92	0	400	318
July/30	S	70.9	91	0	567	567
July/31	M	73.2	91	0	4,289	564/318
Aug/1/89	T	71.6	88	T	4,178	318
Aug/2	W	62.8	86	0.19	4,093	318
Aug/3	T	63.5	92	0	4,186	318
Aug/4	F	62.2	93	0	4,186	318
Aug/5	S	62.2	93	0	319	319
Aug/6	S	70.5	94	0	484	319
Aug/7	M	75.4 *	87	0	4,310	567/319
Aug/8	T	72.3	75	0	4,198	319
Aug/9	W	59	80	0	319	319
Aug/10	T	67.1	81	0	3,032	319
Aug/11	F	65.1	86	0	3,043	319
Aug/12	S	60.4	84	0	500	319
Aug/13	S	65.3	84	0	422	567/319
Aug/14	M	71.1	88	0.81	3,640	567/319
Aug/15	T	69.4	84	0.31	1,099	319
Aug/16	W	68.7	87	0	2,267	319
Aug/17	T	65.8	87	0.38	1,482	319
Aug/18	F	67.3	87	0	1,492	319
Aug/19	S	69.4	90	0	392	570/319
Aug/20	S	69.4	90	0	591	654/570
Aug/21	M	73.9	90	0	3,628	654/319
Aug/22	T	72.1	92	0	3,511	319
Aug/23	W	62.2	94	0	3,121	319
Aug/24	T	62.2	94	0	4,298	319
Aug/25	F	62.6	93	0	4,283	320
Aug/26	S	62.6	92	0.27	445	570/320
Aug/27	S	73.2	91	0	497	570/320
Aug/28	M	76.3 *	91	0	2,664	320
Aug/29	T	72.5	91	0.08	2,668	320
Aug/30	W	63.7	91	0.09	2,660	320
Aug/31	T	62.1	89	T	2,668	320
Sept/1/89	F	61.9	88	0	2,669	320
Sept/2	S	63.3	93	0	497	570/320
Sept/3	S	67.6	86	0	570	570
Sept/4	M	72.5	83	0	3,192	570/320
Sept/5	T	70	79	0.03	3,073	320
Sept/6	W	60.8	74	0.15	3,076	320
Sept/7	T	60.1	86	0.01	3,084	320
Sept/8	F	60.1	89	0	3,077	321
Sept/9	S	60.8	92	0	321	321
Sept/10	S	65.7	91	0	321	321
Sept/11	M	68.9	88	0	2,672	321
Sept/12	T	68.5	89	0	2,671	321
Sept/13	W	61.3	86	0	2,688	321
Sept/14	T	61	90	0	2,680	321
Sept/15	F	61.5	86	0.18	2,676	321
Sept/16	S	61	81	T	500	321
Sept/17	S	65.3	83	0	585	572/321
Sept/18	M	68.7	81	0	2,813	572/321

Sept/19	T	67.1	80	0	3,092	321
Sept/20	W	59.9	84	0	3,080	321
Sept/21	T	60.1	80	0.02	3,090	321
Sept/22	F	61.5	82	0.55	3,161	576/321
Sept/23	S	62.2	81	0.14	576	576
Sept/24	S	60.1	63	T	576	576
Sept/25	M	60.1	57	4.9	3,214	576/321
Sept/26	T	59.9	76	T	3,073	321