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Madison River/Ennis Reservoir Fisheries

and

Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program

2000 Annual Report
to
PPL Montana
Environmental Division
Butte

and

Turner Enterprises, Inc.
Bozeman

by
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Montana Fish, Wildlife, & Parks
Ennis
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EXECUTIVE SUMMARY

The Federal Energy Regulatory Commission issued the operating license for PPL Montana's 2188 Project in 2000. No young-of-the-year Arctic grayling were captured in Ennis Reservoir in 2000. Populations of two year old & older rainbow trout in the Pine Butte and Varney monitoring sections increased markedly due to relatively high survival of the 1998 cohort, and yearling rainbow trout numbers in the Pine Butte and Varney sections were high for the second consecutive year. The two year old & older rainbow trout population decreased slightly in the Norris section. Two year old & older brown trout numbers remained high in the Pine Butte and Varney sections, but decreased in Norris. Whirling disease researchers believe that river discharge may be as critical as any other variable, including water temperature, in determining infection rate and severity. Water temperature was monitored at 14 sites throughout the Madison River, and air temperature at 7 sites. The New Zealand Mud Snail was detected in the upper Madison River below Quake Lake and in Darlinton Ditch, a spring creek along the lower Madison River. The appeal filed against the Montana Department of Environmental Quality permits for the Cherry Creek Native Fish Introduction Project was dismissed by the Montana Board of Environmental Review in September, but the appellants filed litigation in both state and federal district courts.

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INTRODUCTION

Montana Fish, Wildlife, & Parks (MFWP) has conducted fisheries studies in the Madison River Drainage since 1990 to assess and improve the status of the Arctic grayling (*Thymallus arcticus*) population of Ennis Reservoir, and to address effects of hydropower operations at Hebgen and Ennis dams on fisheries (Byorth and Shepard 1990, MFWP 1995, MFWP 1996, MFWP 1997a, MFWP 1998, MFWP 1999a, MFWP 2000). This work has been funded through an agreement, initially with Montana Power Company (MPC), now with PPL Montana, owner and operator of the dams. The original agreement between MFWP and MPC was designed to anticipate relicensing requirements for MPC's hydropower system on the Madison and Missouri Rivers, which includes Hebgen and Ennis dams, as well as seven dams on the Missouri River (Figure 1). PPL Montana has maintained the course set by MPC, and convened several committees to address fisheries, wildlife, water quality, and recreation issues related to the operation of the hydropower facilities on the Madison and Missouri rivers. These committees are composed of representatives of PPL Montana and several agencies. The Madison Fisheries Technical Advisory Committee (TAC) is composed of personnel of PPL Montana, MFWP, the U.S. Fish & Wildlife Service (USFWS), the U.S. Forest Service (USFS), and the U.S. Bureau of Reclamation (BLM). Each entity has equal authority in decision making within the TAC. Collectively, the nine dams on the Madison and Missouri rivers are called the 2188 Project, which refers to the Federal Energy Regulatory Commission (FERC) license number that authorizes their operation. The Federal Energy Regulatory Commission issued PPL Montana a license to operate the 2188 Project for 40 years (Federal Energy Regulatory Commission 2000). The license details the terms and conditions PPL Montana must meet during the license term, including fish, wildlife, and recreation protection, mitigation, and enhancement measures.

Late in 1996, MFWP initiated a ten-year program entitled "The Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program". The goal of this effort is to conserve and restore the native westslope cutthroat trout (*Oncorhynchus clarki lewisi*) in the Madison River drainage. Fieldwork for this effort began in 1997 in tributaries of the Madison River. The agreement between MFWP and PPL Montana includes provisions to address issues regarding species of special concern. In June 1997, the USFWS received a petition to list the westslope cutthroat trout as a Threatened species throughout its entire range, which includes parts of Montana, Idaho, Oregon, Washington, and Wyoming. Six conservation/environmental organizations and one individual filed the petition. The USFWS ruled in April 2000 that listing was not warranted, and the petitioners filed a lawsuit challenging that decision in October 2000.

In recognition of the severity of the situation faced by the westslope cutthroat trout, and in keeping with the philosophy of promoting native species on their lands, Turner Enterprises, Incorporated (TEI) offered access to the Cherry Creek drainage on the Flying D Ranch to assess its suitability for introducing westslope cutthroat. MFWP determined in 1997 that introducing westslope cutthroat to Cherry Creek is feasible, but would require the removal of all non-native trout presently in that portion of the drainage. MFWP, TEI, and the Gallatin National Forest (GNF) subsequently entered into an agreement to pursue this effort. The agreement outlines the roles and responsibilities of each party, including the GNF, which manages the public land at the upper end of the Cherry Creek drainage.

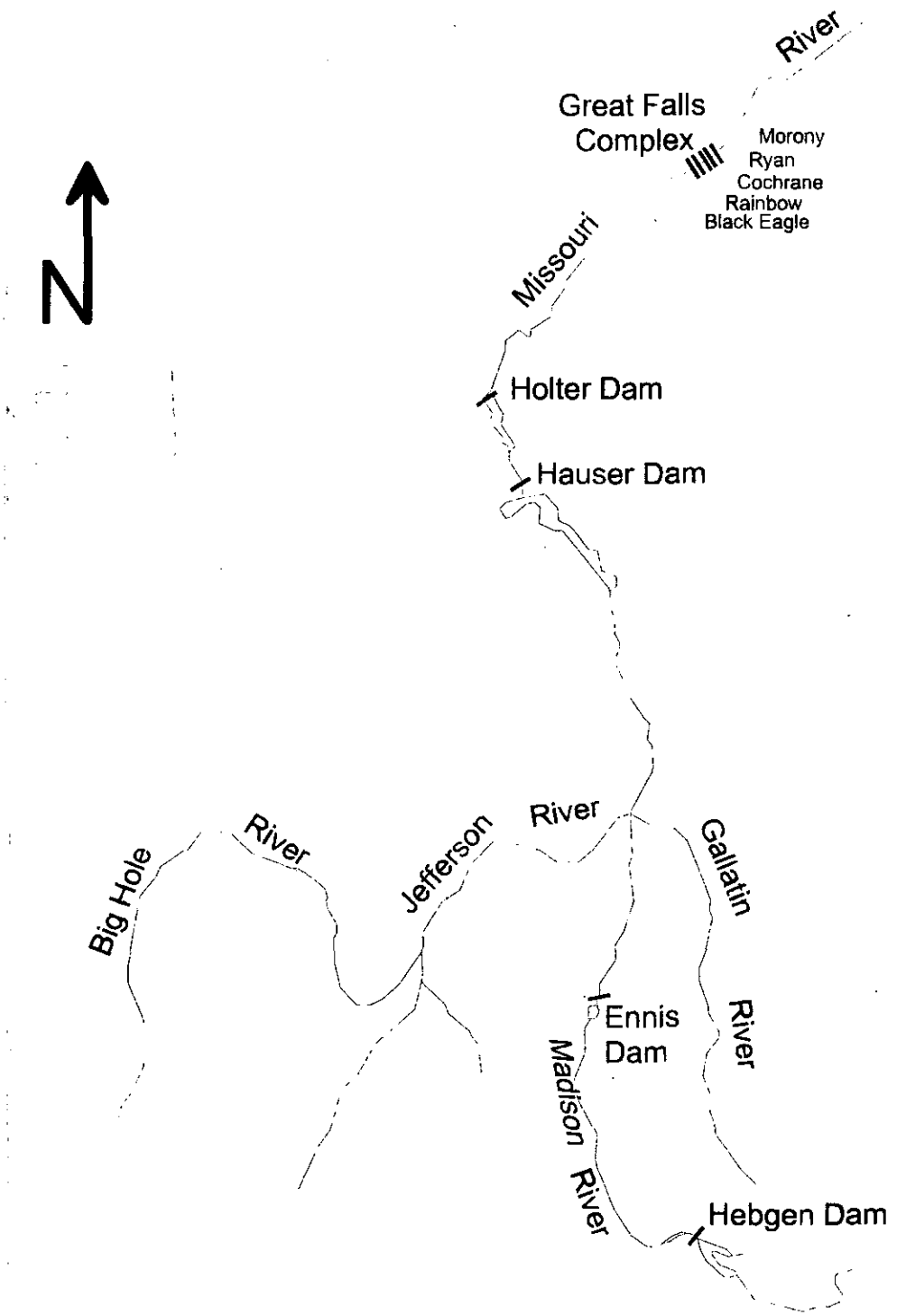


Figure 1. Locations of PPL Montana dams on the Madison and Missouri rivers.

METHODS

Madison Grayling

Index sites in Ennis Reservoir (Figure 2) are sampled for young-of-the-year grayling and other fish species using a beach seine. A 125'x 5'x ¼" mesh seine with a 5'x 5'x 5' bag is fed off a moving boat in water up to five feet deep, with a worker in the water at each end of the seine. The seine is pulled parallel to the shoreline for some distance, then onto the shoreline where captured fish are enumerated by species. If beds of macrophytes (aquatic plants) are present and accessible, the seine is pulled through them.

Population Estimates

Electrofishing from a driftboat mounted mobile anode system is the principle method used to capture Madison River trout for population estimates. Fish captured for population estimates are weighed and measured, marked with a fin clip, and released. A log-likelihood statistical analysis (MFWP 1997b) is used to estimate trout populations in several sections of the Madison River (Figure 3). Yearling fish are distinguished from two year old & older fish by taking a scale sample from up to ten of each species per half-inch group, making an impression of the scale in acetate, projecting the impression on a microfiche reader, and interpreting the age of the fish from the scale impression. Generally, the number of two year old & older fish is a better indicator of year class strength and subsequent reproductive potential. Yearling numbers serve as an after-the-fact measure of the impact of whirling disease on reproductive success the previous year. Because aging is not complete for 2000 estimates in the Pine Butte and Varney sections, fish from 5.0 to 9.9 inches are used to estimate yearling abundance, and fish larger than 9.9 inches are assumed to be two-year-old & older. The actual estimate may change after aging is completed.

Whirling Disease

Whirling disease (*Myxobolus cerebralis*) monitoring and research were continued in the Madison River in 2000. Sentinel fish live-cage studies were again conducted in the Madison River at established sites. Cages containing 60 young-of-the-year rainbow trout were placed at selected locations for multiple 10-day periods to conduct time-series. The time-series tests were conducted at the Kirby site from mid-April through mid-July.

Four 3000-foot sections of riverbank (Figure 4) were sampled in July, August, and October, 2000, in an effort to relate rearing habitat quality to infection severity and to monitor fry density in the period during which fry are most likely to succumb to whirling disease.

Figure 2. Locations of Ennis Reservoir seining sites.

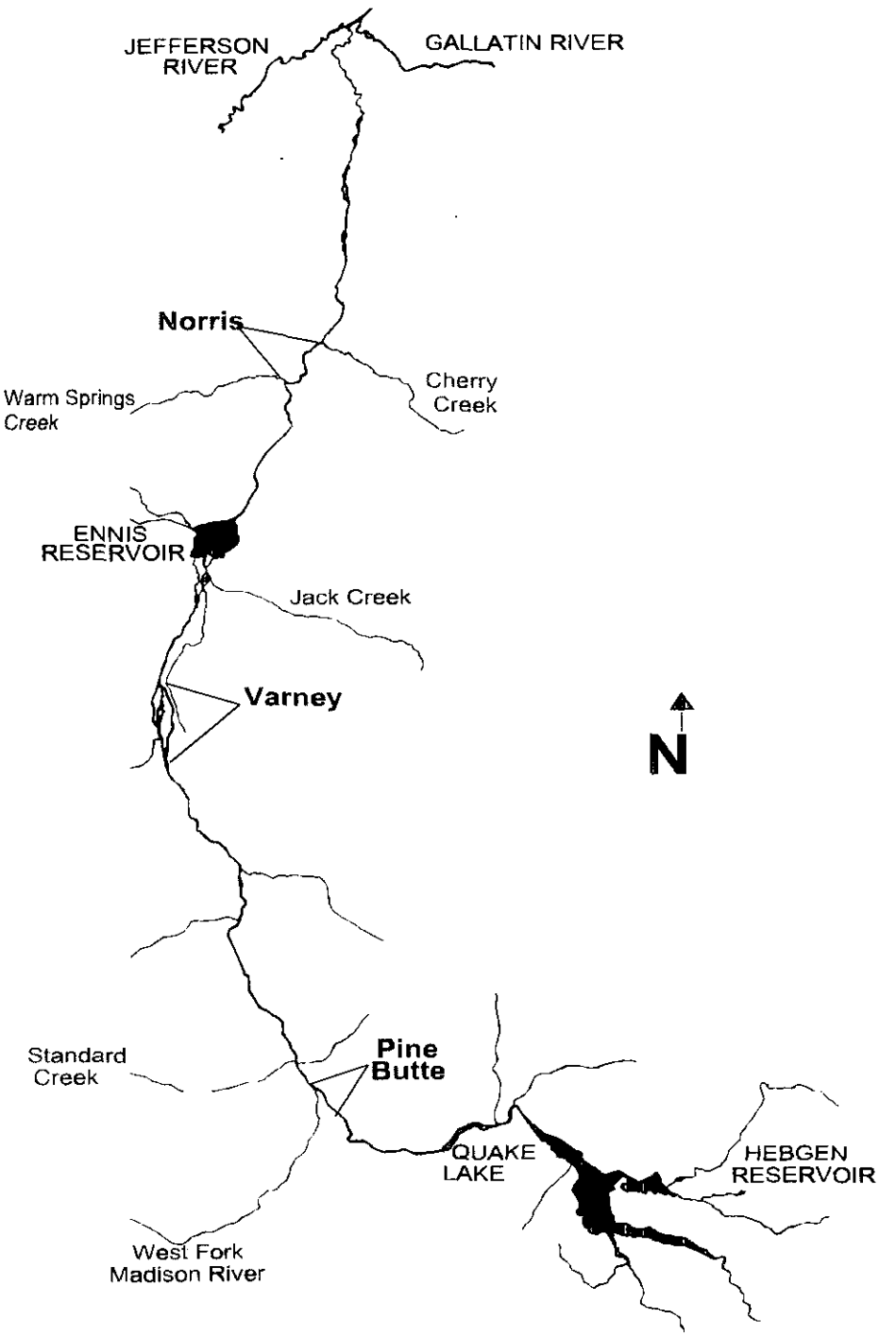


Figure 3. Locations of Montana Fish, Wildlife, & Parks 2000 Madison River population estimate sections.

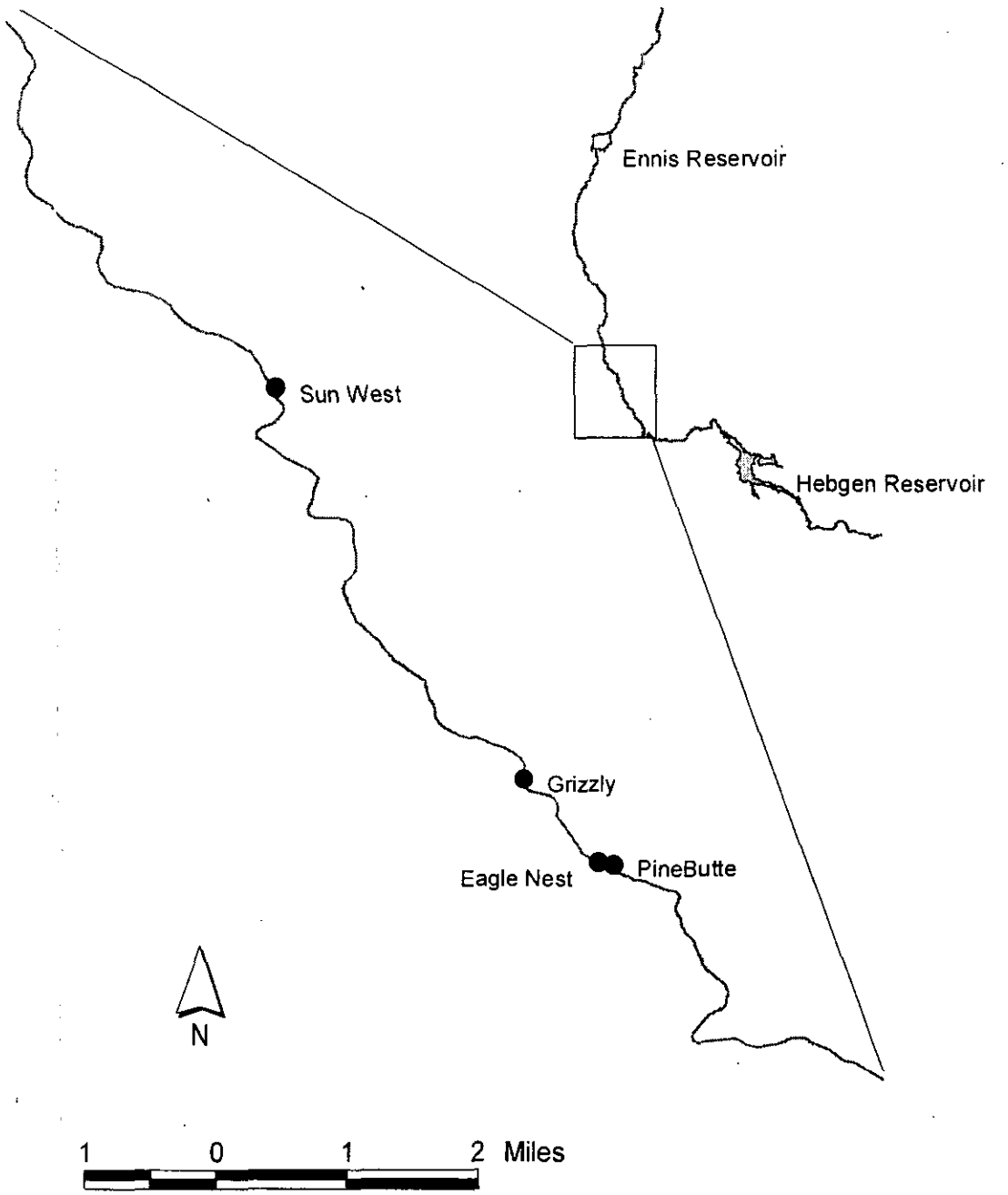


Figure 4. Locations of Madison River young-of-the-year monitoring sections, 2000.

These sections were selected to reflect "good", "moderate", and "poor" habitat based on characteristics known to provide preferred fry rearing habitat, such as inundated streamside grasses and sedges, slow current velocity, and mild gradient of the riverbank. Each 3000-foot section was sampled with a backpack shocker, captured fry were enumerated by species, and catch-per-unit-effort (CPUE) was determined. Additionally, within each 3000-foot section, a 150-foot section was selected for a 3-pass depletion estimate of young-of-the-year trout. Rainbow trout fry were collected during the August sampling in each section for whirling disease infection analyses.

To quantify fry rearing habitat quality, habitat characteristics were measured at 15 sampling transects established every 200 feet along the length of each section. Measurements were conducted in each section in August and October when discharge at the Kirby gauging station was 1320 and 1150 cfs, respectively. Dominant and subdominant substrate sizes were visually estimated and categorized according to Overton et al. (1997). Water depths were measured at the wetted edge, and one foot and two feet out from the wetted edge to obtain a depth profile of the stream margin. Mean current velocity was measured one foot from the wetted edge, and bank cover was characterized as grass/sedge, undercut, shrub, rock, or none. Additionally, the linear distance of side channel habitat within each section was also measured. Relative frequencies for these habitat characteristics were compared to reveal differences among sampling sections.

Beginning in late June, sentinel cages were used in a 10-day experiment to mimic migration of young-of-the-year rainbow trout. Five cages were placed at a site at the Slide that has shown low infection severity in previous years. One cage was left at this site over the course of the study to serve as a control. The other four cages were moved every two days by truck to downstream sites, with one cage being left at each site until only a single cage was moved to the downstream-most site near Pine Butte, where it was left for the final two days of the experiment. The intent of the 10-day study was to gather data to assess the potential for migrating young-of-the-year rainbows to be exposed to WD hot-spots.

Temperature Monitoring

Water temperature was recorded at 14 sites and air temperature at seven sites throughout the course of the Madison River from above Hebgen Reservoir to the mouth of the Madison River at Headwaters State Park (Figure 5). Optic StowAway temperature loggers recorded temperature every 30 minutes, in Fahrenheit. Air temperature recorders were placed in areas that were shaded 24 hours per day. Intensive monitoring is conducted to corroborate previous modeling, to continue building the data set for the model, and to monitor the effectiveness of measures designed to reduce high temperature impacts to aquatic life.

Biological and Biocontaminant Monitoring

As part of its relicensing effort, PPL Montana initiated a water-quality monitoring program in 1994. In this program, personnel of PPL Montana and several agencies, including MFWP, conducted biological and biocontaminant monitoring collections at locations within the

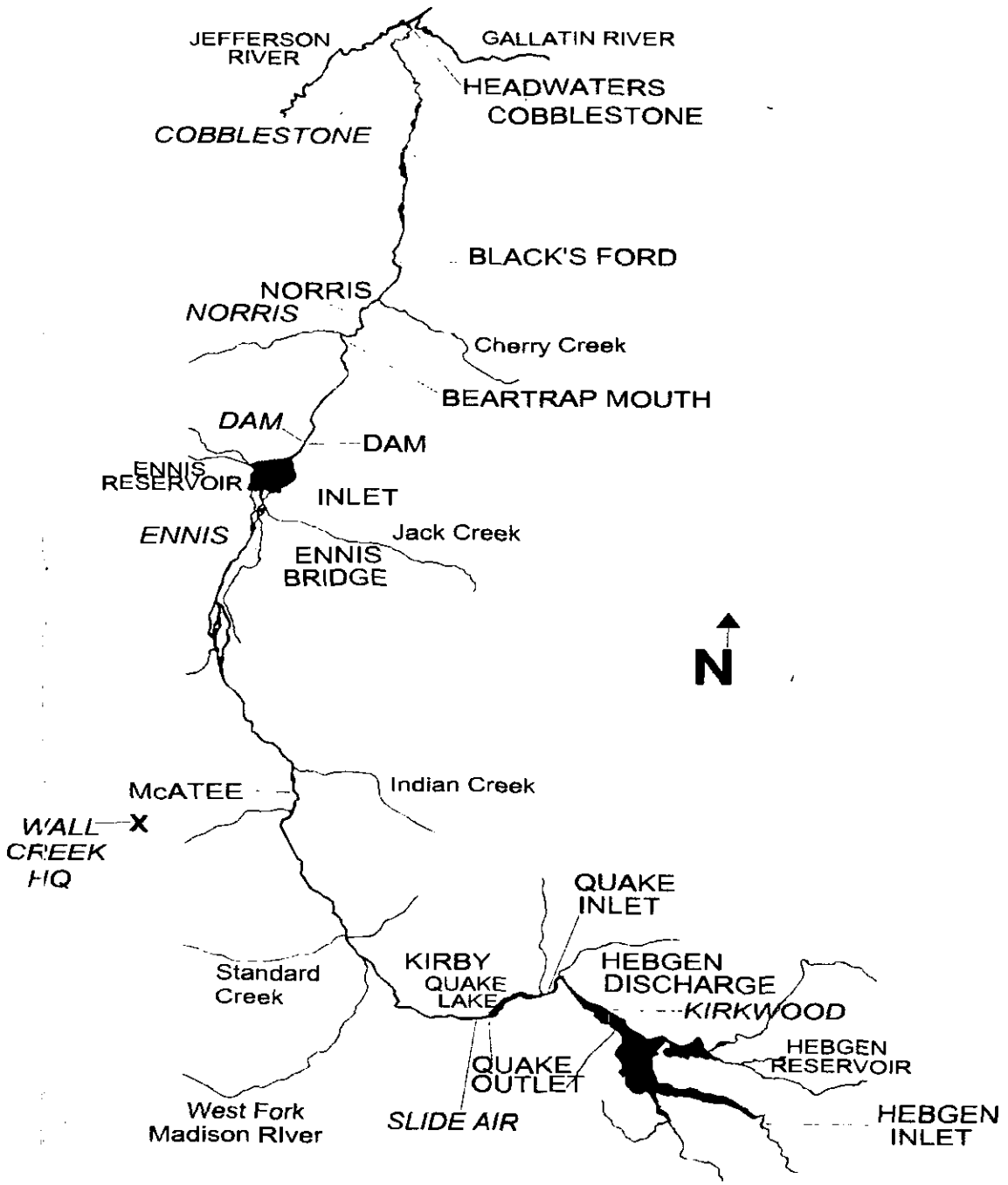


Figure 5. Locations of Montana Fish, Wildlife, & Parks 2000 temperature monitoring sites. Air temperature sites are italicized.

Madison/Missouri System. Aquatic invertebrate and periphyton samples are collected for biological trend monitoring and contaminant analyses at eight sites from the Madison River within Yellowstone National Park (YNP) to the Missouri River below Morony Dam at Great Falls. Samples are analyzed by a variety of consultants, and results reported to the PPL Montana Environmental Division.

Westslope Cutthroat Trout Conservation and Restoration

Efforts to conserve and restore genetically pure westslope cutthroat trout in the Madison Drainage center on maintaining high quality stream habitat in Madison River tributaries, adequate instream flow, and removal of competing or hybridizing non-native trout where necessary. Stream habitat surveys were conducted throughout much of the Madison Drainage from 1997 – 1999 (MFWP 1998, Sloat et al. 2000) using techniques modified from Overton et al. (1997). Backpack electrofishing was used to survey fish species. Removal of non-native species will require use of the pesticides rotenone or antimycin.

The Cherry Creek Native Fish Introduction Project (MFWP 1999a), originally scheduled to begin in 1998, was delayed for the third time in 2000 due to continuing legal challenges. All required permits and approvals were renewed or newly applied for in 2000.

RESULTS AND DISCUSSION

Madison Grayling

Beach seining in Ennis Reservoir was conducted in November. No young-of-the-year Arctic grayling and 14 young-of-the-year whitefish (*Prosopium williamsoni*) were captured. Young-of-the-year of white sucker (*Catostomus commersoni*), brown trout (*Salmo trutta*), longnose dace (*Rhinichthys cataractae*), and Utah chub (*Gila atraria*) were also captured. Site descriptions, dates, and catches are listed in Appendix A.

MFWP conducted and Environmental Assessment (MFWP 1999b) and issued a Decision Notice (MFWP 1999c) approving the introduction of fluvial grayling at three sites – the lower Beaverhead River, the Missouri River Headwaters area, and the upper Madison River. This Decision Notice modified the original proposal to delay upper Madison River introductions until 2001 or later to allow on-going whirling disease, wild trout, and native species management options to be analyzed. A final decision on the upper Madison introduction will be predicated upon synthesis of these efforts.

In 2000, MFWP initiated a four-year program to restore fluvial Arctic grayling in the Missouri Headwaters area, including the lower Madison River from Greycliff to the Jefferson River confluence. Twenty-five thousand yearling fluvial Arctic grayling were introduced into the Headwaters area. Other locations presently being stocked are the lower Beaverhead River, the upper Ruby River, and the North and South forks of the Sun River.

Population Estimates

Population estimates were conducted in the Norris section in March and in the Pine Butte and Varney sections in September (Figure 3). Estimates in the Pine Butte and Varney sections in 2000 are provisional until age samples are completed.

In the charts illustrating annual population trends, stacked bars represent yearling and age 2 & older classes, with the top of the combined bars depicting the total population. Because Norris estimates are conducted in March each year, yearling fish are too small to capture in adequate numbers to derive an estimate of their abundance.

Figures 6-8 illustrate historic population levels of rainbow trout per mile. Preliminarily, rainbow trout numbers in the upper river appear high in 2000. This is due to a strong yearling cohort in 2000 as well as carryover from the strong 1999 yearling cohort. Rainbow trout in the Norris section below Ennis Reservoir remained similar to levels seen the previous two years.

Brown trout numbers per mile are illustrated in Figures 9-11. In the upper river in 2000, two-year-old and older brown trout remain abundant, and yearling numbers are strong. Brown trout in the Norris section below Ennis Reservoir remained similar to the 1999 level.

Appendix B contains historic population levels of two year old & older rainbow and brown trout (+ 80% C.I.) for each section.

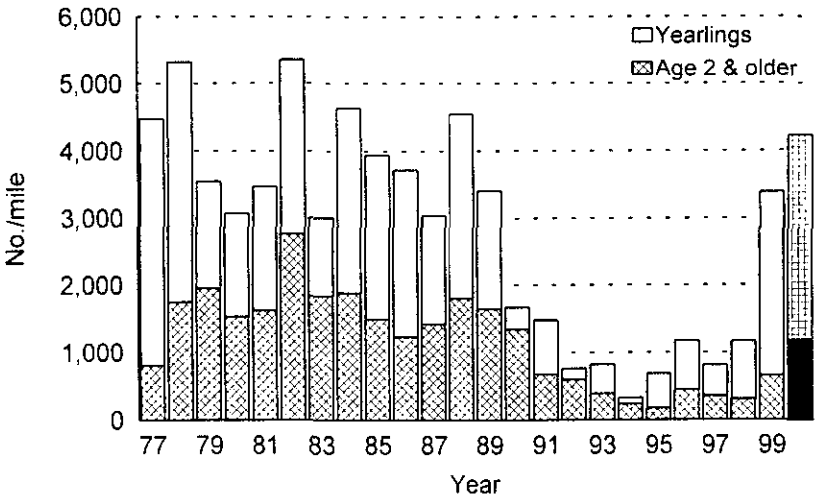


Figure 6. Rainbow trout populations in the Pine Butte section of the Madison River, 1977-2000, fall estimates. Data for 2000 are provisional pending completion of age samples.

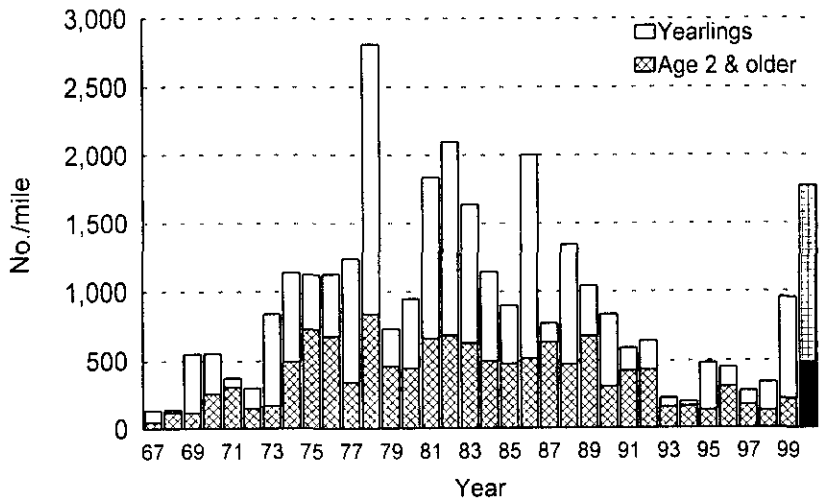


Figure 7. Rainbow trout populations in the Varney section of the Madison River, 1967-2000, fall estimates. Data for 2000 are provisional pending completion of age samples.

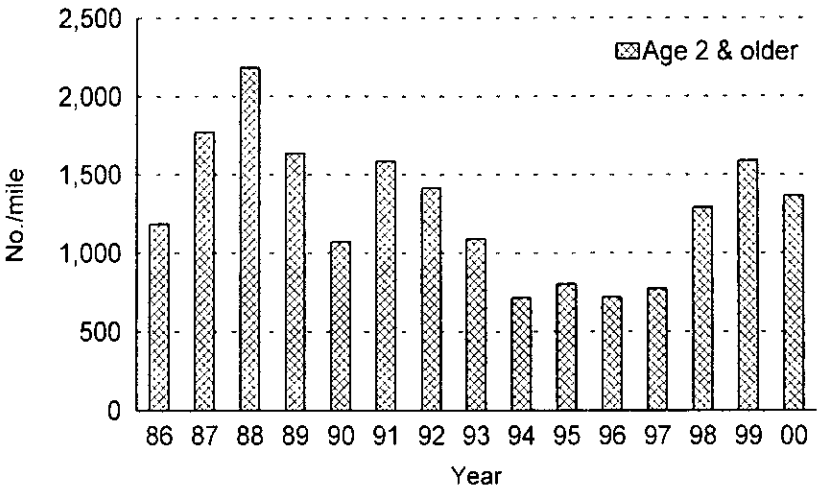


Figure 8. Rainbow trout populations in the Norris section of the Madison River, 1986-2000, spring estimates.

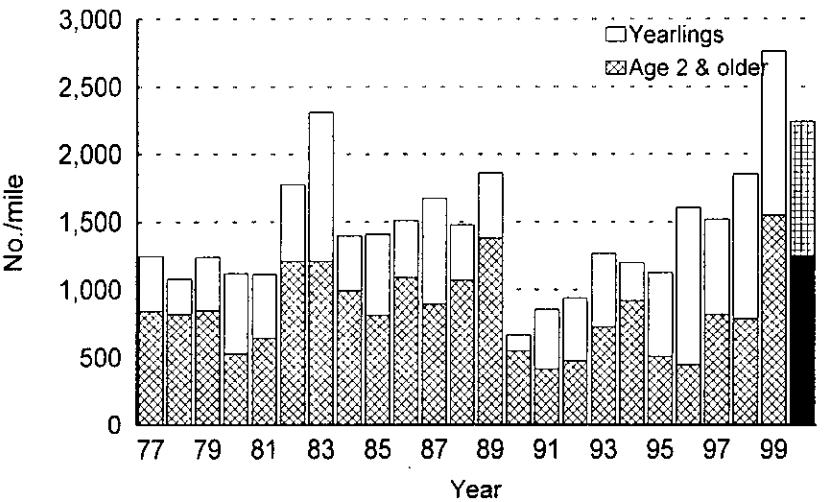


Figure 9. Brown trout populations in the Pine Butte section of the Madison River, 1977-2000, fall estimates. Data for 2000 are provisional pending completion of age samples.

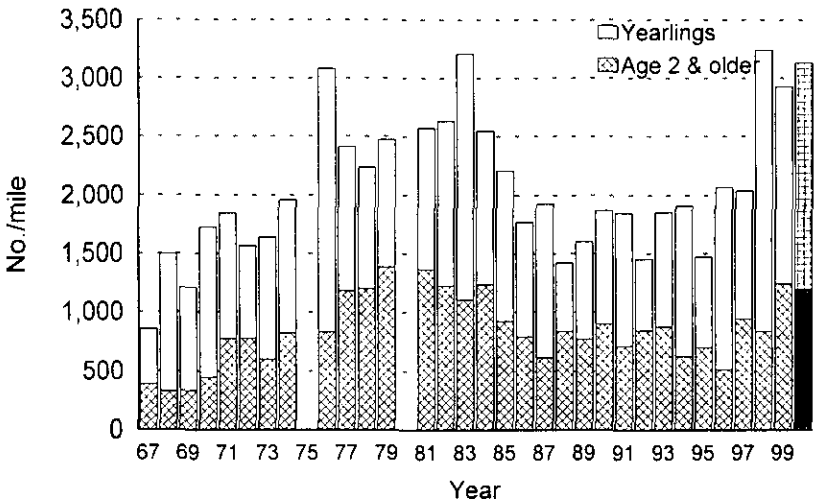


Figure10. Brown trout populations in the Varney section of the Madison River, 1967-2000, fall estimates. Data for 2000 are provisional pending completion of age samples.

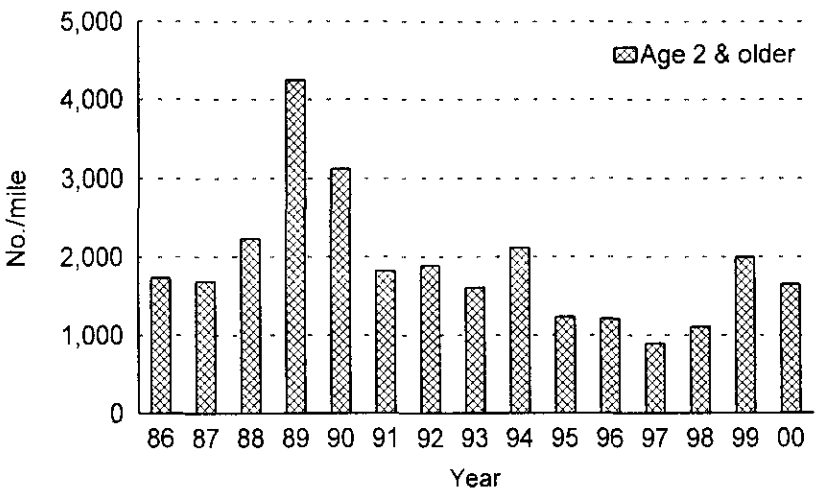


Figure 11. Brown trout populations in the Norris section of the Madison River, 1986-2000, spring estimates.

Whirling Disease

Infection rates and severity-of-infection data for 2000 studies are not yet available due to delays at the Washington Animal Disease Diagnostic Laboratory (WADDL), which underwent re-certification in 2000, and therefore was unable to process samples as quickly as in previous years. To increase the processing of samples at WADDL, the Whirling Disease Foundation has entered into an agreement with WADDL to fund a technician who will process samples exclusively from Montana. Anecdotally, 35 percent of sentinel rainbow trout fry from 2000 cage studies in the Madison River showed whirling behavior. Previously, the highest incidence was 17 percent.

Sentinel fish data collected over several years seems to indicate that water temperature may be less of a factor influencing WD infection severity than volume of runoff from approximately mid-June through mid-July (Vincent, pers.comm. 2000) (Table 1). Regardless of discharge, which ranged from 1095 to 4300 cfs for the 10-day periods examined, average water temperatures ranged from 52°-60° F, which are within or near the optimal range of 52°-56° F for WD production. During those same 10-day periods, when average runoff was 3100 cfs or greater and water temperatures were within the optimal range, the highest average infection severity was 2.40. When average runoff was less than 3100 cfs, average infection severity ranged between 2.74 – 4.16. Severity of 2.50 and higher has been determined to be the approximate point at which growth of individual fish is interrupted and population impacts occur (MFWP 1999a).

Table 1. Average discharge in cfs (Q), average water temperature (F), and average infection rate (I) of sentinel young-of-the-year rainbow trout at Kirby during three 10-day periods, 1997-2000. Data are from Vincent, pers.comm. 2000.

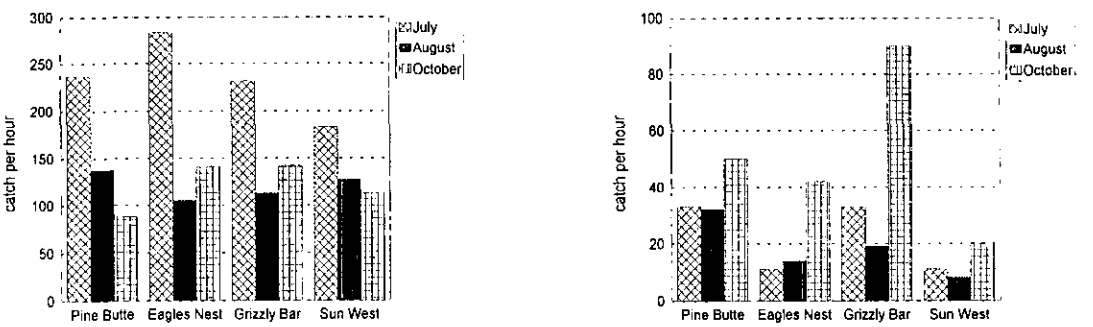
	1997			1998			1999			2000		
Date	Q	F	I	Q	F	I	Q	F	I	Q	F	I
6/15-6/25	4300	54.9	2.40	2851	51.9	3.06	3130	52.6	1.96	1547	53.8	3.60
6/25-7/5	2450	57.7	3.41	3378	55.4	2.00	2631	54.4	3.02	1224	57.9	4.16
7/5–7/15	1751	59.5	3.02	2504	57.5	2.74	1984	58.9	2.18	1095	60.3	4.16

Young-of-the-year trout rearing habitat was sampled in July, August, and October for population density (Figure 4). Catch-per-unit-effort for rainbow and brown trout fry in each section is illustrated in Figure 12, and catch-per-unit-effort, ratio of rainbow trout to brown trout, and 3-pass estimates for each section are in Appendix Table C. For the 3000-foot sections, there was not a distinct relationship between the density of rainbow trout fry and season – The Eagles Nest and Grizzly Bar sites showed mid-summer declines followed by early fall increases, while the Pine Butte and Sun West sites exhibited slight-to-moderate declines over the course of the season. Density of brown trout fry did show a consistent pattern – all four sections increased

noticeably from July to October. The results of this sampling suggest fry are mobile, undertaking late season movements into areas of higher habitat quality or complexity. Fry that are readily mobile may be exposing themselves to higher risk of WD infection by increasing the likelihood they will pass through a WD hotspot if they make those movements during a susceptible stage of their development.

Results of the 10-day migration study may provide information helpful for determining increased susceptibility during migration. One shortfall of the 10-day study is that the sentinel fish were not exposed to river conditions during the movement from one site to another, as wild fish would be. Migrating wild fish would move at their own behest, select their holding sites, and hold at those sites for a period of time determined by them. During the 10-day migration study, the researchers decided those factors for the sentinel fish.

A relationship between rearing habitat quality and effects of WD on fry survival was not evident. Few significant differences in rearing habitat were revealed among sections largely due to wide variation in habitat characteristics within sections. For example, the Sun West section, subjectively rated overall as "poor" habitat, included several isolated sites of complex habitat such as decadent streamside shrubs that had fallen at least partially into the river. These isolated sites produced the great majority of the fry captured in the Sun West section during all sampling periods.



Rainbow trout

Brown trout

Figure 12. Catch-per-unit-effort for rainbow and brown trout fry in four sections of Madison River streambank, 2000.

Temperature Monitoring

Optic StowAway temperature recorders were deployed throughout the Madison River to document air and water temperatures (Figure 5). Table 2 summarizes the data collected at each location in 2000, and Appendix D1 contains thermographs for each location. Appendix D2 contains thermographs at selected locations showing the 24-hour diurnal temperature fluctuation of each site around the warmest date of the year.

Table 2. Maximum and minimum temperatures (°F) and dates of occurrence at selected locations in the Madison River Drainage, 2000. Air and water temperature data were recorded 4/24-10/6 (7944 readings) unless otherwise indicated. Thermographs for each location are in Appendix D.

	Site	Max	Date(s)	Min	Date(s)
Water	Hebgen inlet	75.72	7/16	43.09	9/23
	Hebgen discharge[1]	NA	NA	NA	NA
	Hebgen-Quake river section	66.32	8/12	37.88	4/24
	Quake Lake outlet	64.36	7/30, 31	38.81	4/24
	Kirby Bridge	69.59	7/29	38.20	4/24
	McAtee Bridge	70.05	7/29, 8/1	36.99	4/24
	Ennis Bridge[2]	72.41	8/1	40.09	4/24
	Ennis Reservoir Inlet	75.36	7/28-31, 8/10	34.29	9/22
	Ennis Dam	73.71	8/1-3	39.31	9/24
	Bear Trap Mouth	77.45	8/2	39.00	9/24
	Norris	77.77	8/2	38.76	9/24
	Blacks Ford	78.18	7/28,8/2	39.92	9/24
	Cobblestone	79.68	7/31	39.30	9/24
	Headwaters S.P.[3] (Madison mouth)	79.36	7/16	40.17	8/28
Air[4]	Kirkwood Store	96.74	7/29, 30	23.43	4/30, 9/23-25, 10/5, 6
	Slide	95.01	7/29	23.83	9/24
	Wall Creek HQ	97.99	8/9	23.51	9/22-24, 10/5, 6
	Ennis Fisheries Office	100.43	7/13, 14	23.40	9/22, 24, 10/6
	Ennis Dam	96.85	7/31	23.46	9/24
	Norris	92.52	8/10	27.48	10/6
	Cobblestone	94.25	7/13	23.52	9/24, 10/6

[1] Data logger was lost during recovery, no data available.
[2] Data logger ceased collecting data at 3:30 a.m. on 9/19 registering only 7112 readings
[3] Data logger timer malfunctioned - resulted in incorrect date and time and 7484 readings
[4] The minimum temperature detectible by the recorders is approximately 23.4°F

Biological and Biocontaminant Monitoring

Biological and biocontaminant monitoring was conducted at seven index sites established in 1996 (3 Madison River sites & 4 Missouri River sites) (MFWP 1997a), and at an eighth site established in 1999 at the Ennis Fishing Access Site. New Zealand Mud Snail (NZMS) density has decreased markedly at the Yellowstone National Park (YNP) site near USGS gauge 6-375, but NZMS still comprise over 20 percent of all organisms sampled (Table 3). In 2000, NZMS were detected below Hebgen Reservoir and Quake Lake, as far downstream as Raynolds Pass Bridge, and in Darlinton Ditch at the Cobblestone Fishing Access Site (FAS) on the lower Madison River (Figure 5). The Cobblestone FAS was closed to all public use in an effort to eliminate the inadvertent spread of the NZMS from that location. Preliminary studies at Darlinton Ditch indicate a marked reduction in periphyton (microscopic plants) and mayfly densities in areas occupied by NZMS, as opposed to areas in Darlinton Ditch that are free of NZMS (B. Kerans, Wild Trout Lab, pers.comm. 2001). NZMS have been sampled in Darlinton Ditch at densities as high as 100,000/m^2 (Richards pers.comm. 2000). An Environmental Assessment discussing alternatives designed to control the NZMS in Darlinton Ditch is in preparation.

Montana State University (MSU) researchers sample numerous sites in the Madison River in YNP for NZMS (*Potomopyrgus antipodarum*) (B. Kerans, Wild Trout Lab, pers.comm. 2000). They use a 153-micron mesh sampling screen (1 micron = $1/1000^{th}$ millimeter) allowing them to collect smaller NZMS than collected in the PPL Montana monitoring program. They calculate NZMS densities ranged between 46,000 and 299,000/m^2 in 1997, decreased over winter to 20,000/m^2 in March 1998, but then increased to as high as 300,000/m^2 by July 1998 (Kerans et al. 2000). Corresponding reductions in other invertebrate fauna, particularly mayfly species, is likely due to the overwhelming density of NZMS. National Park Service personnel have confirmed the presence of NZMS in the Firehole, Gardner, and Snake rivers in YNP (D. Mahoney, NPS, pers.comm. 1999).

Westslope Cutthroat Trout Conservation and Restoration

Permits issued in 1999 by the Montana Department of Environmental Quality for the Cherry Creek Native Fish Introduction Project were appealed on the day of their issuance. The Montana Board of Environmental Review (BER), the hearing body, assigned an Assistant Attorney General from the Montana Department of Justice to review the legality of the permits. Legal documents were filed with the BER throughout much of 2000, and a decision was issued by the BER in September.

The decision of DEQ to issue permits for the Cherry Creek Native Fish Introduction Project was appealed to the BER on the following five points:

1) A Montana Pollution Elimination System Discharge (MPDES) permit is required to apply the fish toxicants (piscicides) to the water.
2) Statute MCA 75-5-317(2)(g), which provides an exemption from non-degradation review requirements, is unconstitutional.
3) DEQ's decision to issue a series of short-term exemptions for the project is unlawful.

Table 3. Density (#/m^2), relative abundance (percent of all organisms collected) of New Zealand Mud Snails, and mesh size (microns) of sampling screen used during biological monitoring to collect samples in the Madison River in Yellowstone National Park, September 1994 and August 1995-2000.

	Density	relative abundance	mesh size
Near USGS gauge 6-375			
1994	19	7	1700
1995	156	8	800
1996	2187	52	800
1997	7345	62	560
1998	7268	59	560
1999	6166	41	560
2000	1414	22	560
Near U.S. Highway 191			
1997	5668	58	560
1998	17196	70	560
1999	3972	51	560
2000	4976	50	560

4) DEQ is required by MCA 75-5-308(1) to make a determination that the project is necessary, but failed to do so.
5) DEQ is required by MCA 75-5-308(1)(b) to make a determination that the trout to be killed during the project are "undesirable and non-native aquatic species", but failed to do so.

The Notice of Appeal was filed on October 14, 1999, and the Motion for Summary Judgment (the appeal) was filed on January 27, 2000. MFWP filed a motion to intervene as an indispensable party, which was granted. DEQ and MFWP both responded to the appeal, and the Hearing Officer issued a Memorandum Recommending Granting of Summary Judgment to the Department of Environmental Quality (DEQ) on July 11, 2000 (Montana Board of Environmental Review 2000a). The memorandum recommended dismissal of all points of the appeal (Appendix E). The appellant and DEQ submitted Exceptions to the Hearing Examiners Recommendation, while MFWP submitted a brief in support of the recommendation. The issue was discussed by the BER at their September 15, 2000 meeting, and the Hearing Officers recommendation was adopted on September 28, 2000, with minor clarifications that do not affect the scope or procedures of the Cherry Creek Project (Montana Board of Environmental Review 2000b). However, with their dismissal of the appeal, and at the request of the appellants, the BER issued a stay that provided 33 days for the appellants to file litigation against the project. The appellants filed litigation against the BER, DEQ, and MFWP in Montana's First Judicial District Court, and against the EPA in

United States District Court for the District of Montana. Both of these actions were filed on October 31, 2000.

CONCLUSIONS AND FUTURE PLANS

Four tasks will be conducted in 2001: 1) complete the year long creel census on Hebgen Reservoir; 2) determine the feasibility of re-watering selected eastside tributaries of the Madison River by improving irrigation efficiency; 3) conduct field trials of a water management action that potentially may reduce the WD infection severity of young-of-the-year rainbow trout, and 4) determine the importance of the Bypass Reach between Ennis Dam and Powerhouse for spawning trout using radio telemetry.

The Hebgen creel will help determine the contribution of stocked rainbow trout to the angler creel, as well as other characteristics of the fishery. The goal is to determine the need for increased production from wild fish, and then, if necessary, to implement measures to increase spawning in tributaries of the reservoir.

Stream discharges will be monitored in eastside tributaries of the Madison River to determine the feasibility of working with irrigators to improve streamflows for fisheries purposes. On streams where improvements seem feasible, irrigators will be contacted to determine the potential for entering into agreements using TAC and other grant money to improve the efficiency of irrigation systems to reduce ditch loss of irrigation water. If such measures can be implemented, excess water remaining in the streams will provide an opportunity to enhance or initiate spawning runs in those tributaries, and diversify spawning and rearing sources for the Madison River fishery.

In 2001, we will attempt to modify streamflow in selected side channels of the Madison River to assess whether the volume of water transporting the WD TAMS is a critical factor in determining the severity of infection of young-of-the-year rainbow trout (Table 1). Flow deflectors will be used to augment or divert the volume of water in portions of selected side channels. If sentinel fish held in those areas which have water augmentation show significantly lower infection rates than those with flow diversion, it may be possible to reach an agreement with PPL Montana to supplement Hebgen discharge at critical times in some years to decrease WD infection of young-of-the-year rainbow trout. If 2001 is an extremely low water year, a high density of TAMS throughout the river could overwhelm the efforts of this study.

In the Bypass reach of the Madison River between Ennis Dam and powerhouse, radio telemetry will be used to monitor movements of trout to determine their use of the Bypass and how flow fluctuations in the Bypass affect their behavior. Additionally, surveys will be conducted in the Beartrap Canyon to determine the availability and use of spawning gravel. The intent of this work is to determine whether gravel should be added to the Bypass Reach to enhance its suitability for spawning.

Pending the outcome of the Cherry Creek litigation, that project is set to go forth in 2001. Several other streams in the Madison Drainage are candidates for westslope cutthroat restoration

projects, but, due to the legal action brought against the Cherry Creek Project, are presently on hold. This includes streams for which the landowner has solicited MFWP to assess the feasibility of conducting such projects, and to implement them if feasible.

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Appendix A

Description of young-of-the-year Arctic grayling beach seining locations in Ennis Reservoir, and catch at each site. See Figure 2 for sites.

Species abbreviations:
AG arctic grayling
MWF mountain whitefish
WSu white sucker
LND longnose dace
UC Utah chub

November 2, 2000

Site and time seined	AG	MWF	Note
parallel to shore east of small main channel east of Moore's Creek mouth (Fig 2, site 3) 1040 hrs	0	0	some WSu; some LND up to 3"
parallel to shore west of river mouth, near Fletchers channel (Fig 2, site 2) 1130 hrs	0	0	few WSu
Meadow Cr. Bay Parallel to shore south of Meadow Cr. Mouth (Fig 2, site 1) 1200 hrs	0	0	few WSu; few UC
parallel to shore along willows at Meadow Lake FAS (Fig 2, site 1) 1230 hrs	0	9	two brown trout yoy; few WSu; few UC
parallel to shore along Willows at edge of Peterson property (Fig 2, site 1) 1245 hrs	0	5	one brown trout yoy; few WSu; few UC

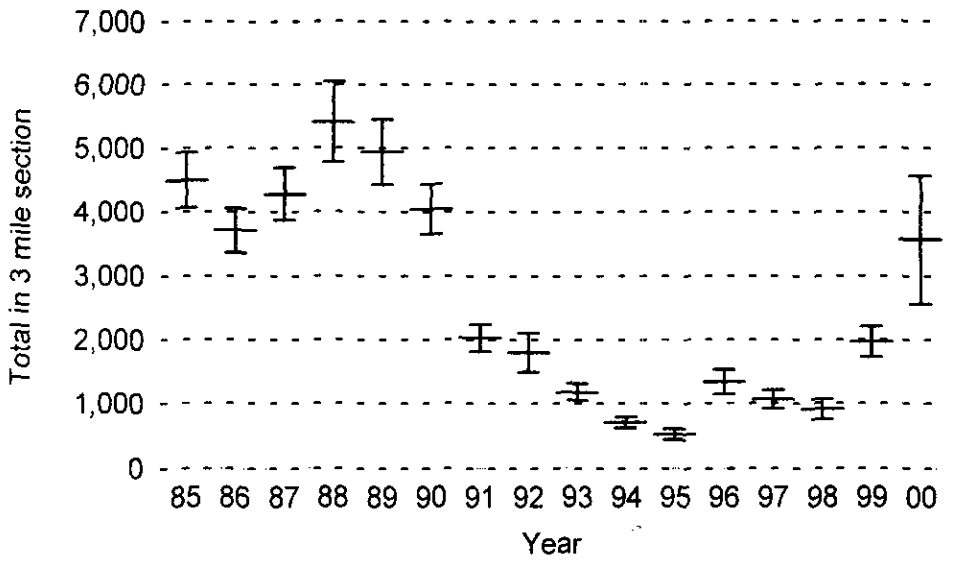
Appendix B

Population estimates (number for total section) of age 2 & older rainbow and brown trout in the Madison River ± 80 percent Confidence Intervals

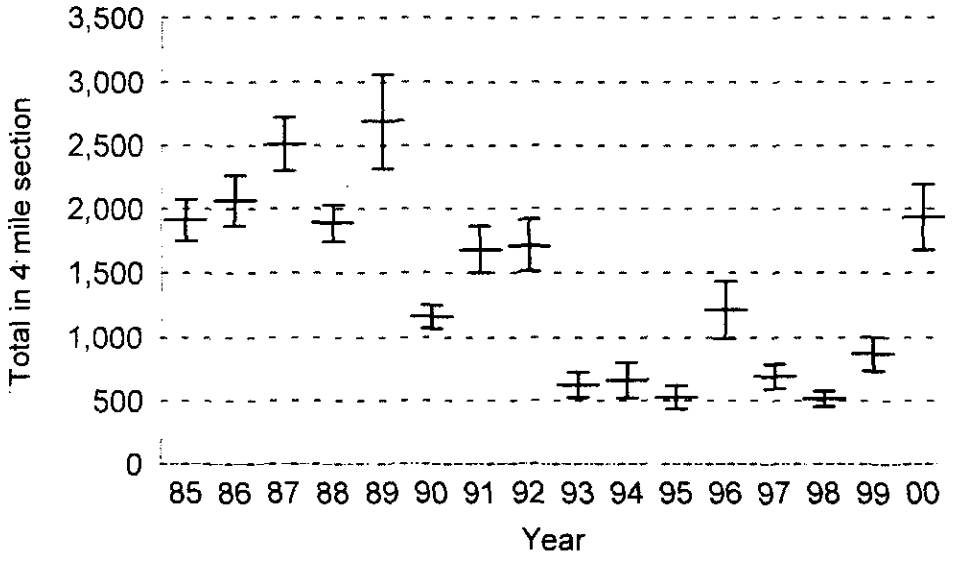
section lengths

Pine Butte – 3 miles
Varney – 4 miles
Norris – 4 miles

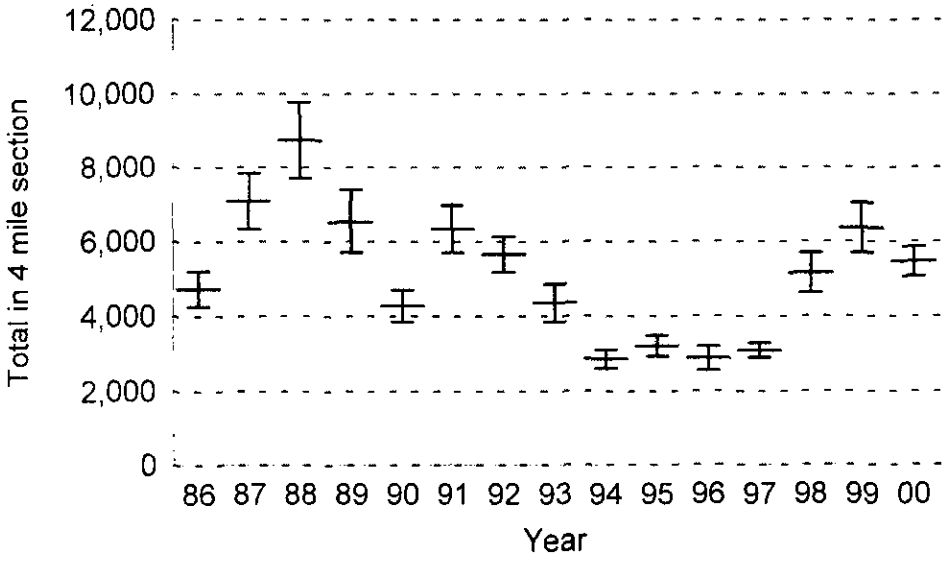
Pine Butte
Rainbow Trout
Age 2 & older



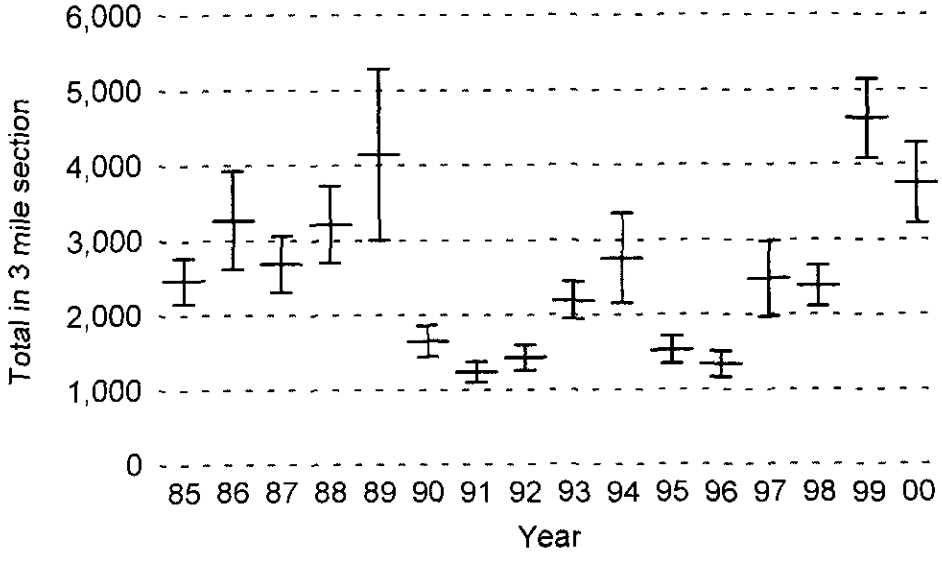
Varney
Rainbow Trout
Age 2 & Older



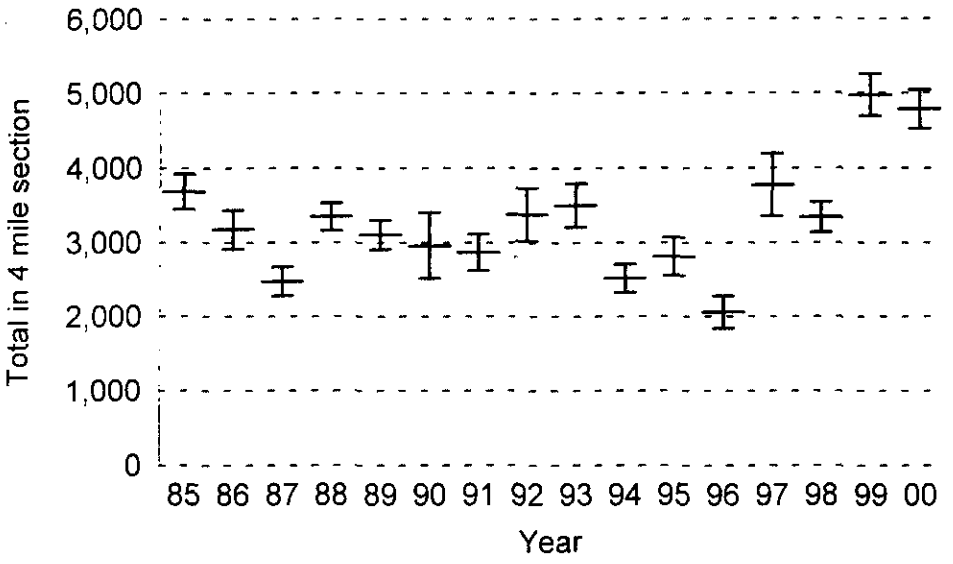
Norris
Rainbow Trout
Age 2 & Older



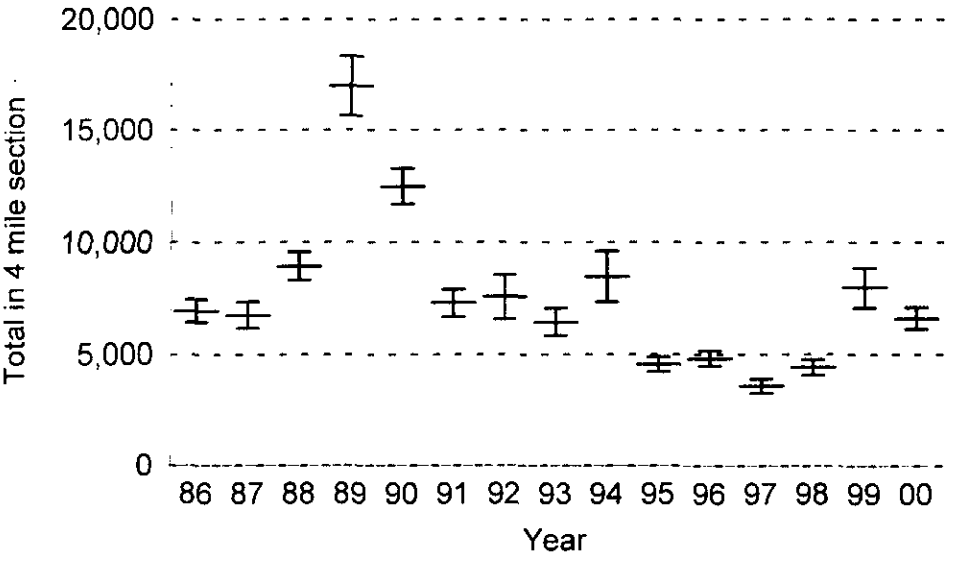
Pine Butte
Brown Trout
Age 2 & older



Varney
Brown Trout
Age 2 & Older



Norris
Brown Trout
Age 2 & Older



Appendix C

Catch per unit effort, rainbow trout:brown trout ratios, and 3 pass depletion estimates for young of the year rainbow and brown trout for each sampling period in each sampling section.

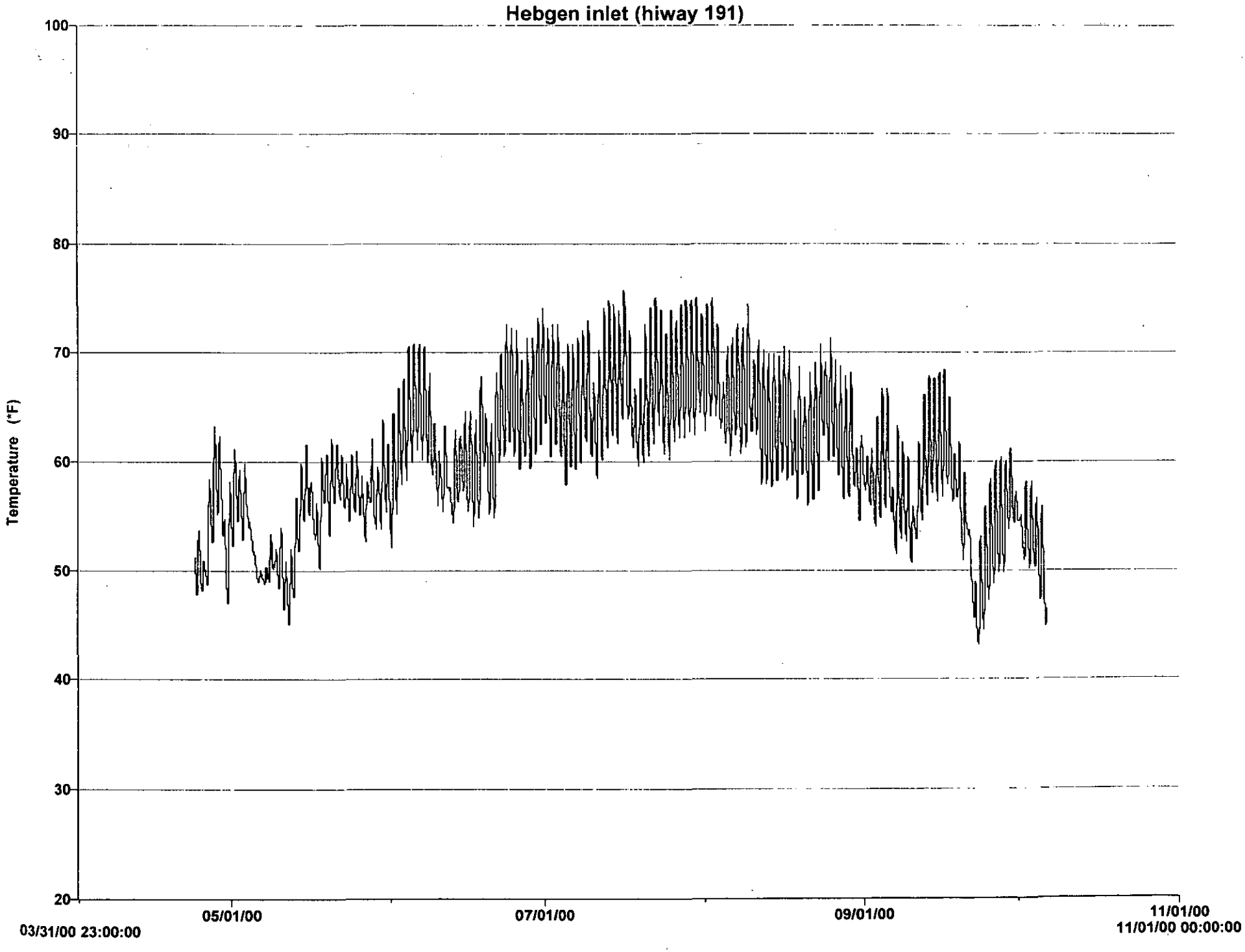
Appendix Table C. Catch-per-unit-effort (CPUE – number of fish caught per hour of shocking time), ratio of rainbow trout to brown trout (RB/LL – number of rainbow trout caught for each brown trout caught), and 3-pass population estimates in four sections of riverbank in the Madison River. CPUE and RB/LL are from 3000-foot sections, 3-pass estimates are from 150-foot sections within the 3000-foot section. Rb = rainbow trout, LL = brown trout.

Section	CPUE		RB/LL	3-pass	
	Rb	LL		Rb	LL
Pine Butte					
July	237	33	7.0	26	[1]
August	137	32	4.3	33	6.5
October	88	50	1.8	7	[1]
Eagles Nest					
July	284	11	24.9	81	[1]
August	105	14	7.6	10	[1]
October	144	42	3.4	23	8
Grizzly Bar					
July	232	33	7.0	71	10
August	113	19	5.8	38	7
October	142	90	1.6	15	7
Sun West					
July	183	11	16.5	36	[1]
August	127	8	15.4	31	6
October	113	20	5.7	29	4

[1] Too few captured in 150-foot section to conduct an estimate.

Appendix D1

Temperature recordings from monitoring sites on the Madison River
(See Figure 5 for locations)


Hebgen inlet (hiway 191)
Temperature (°F)
100
90
80
70
60
50
40
30
20
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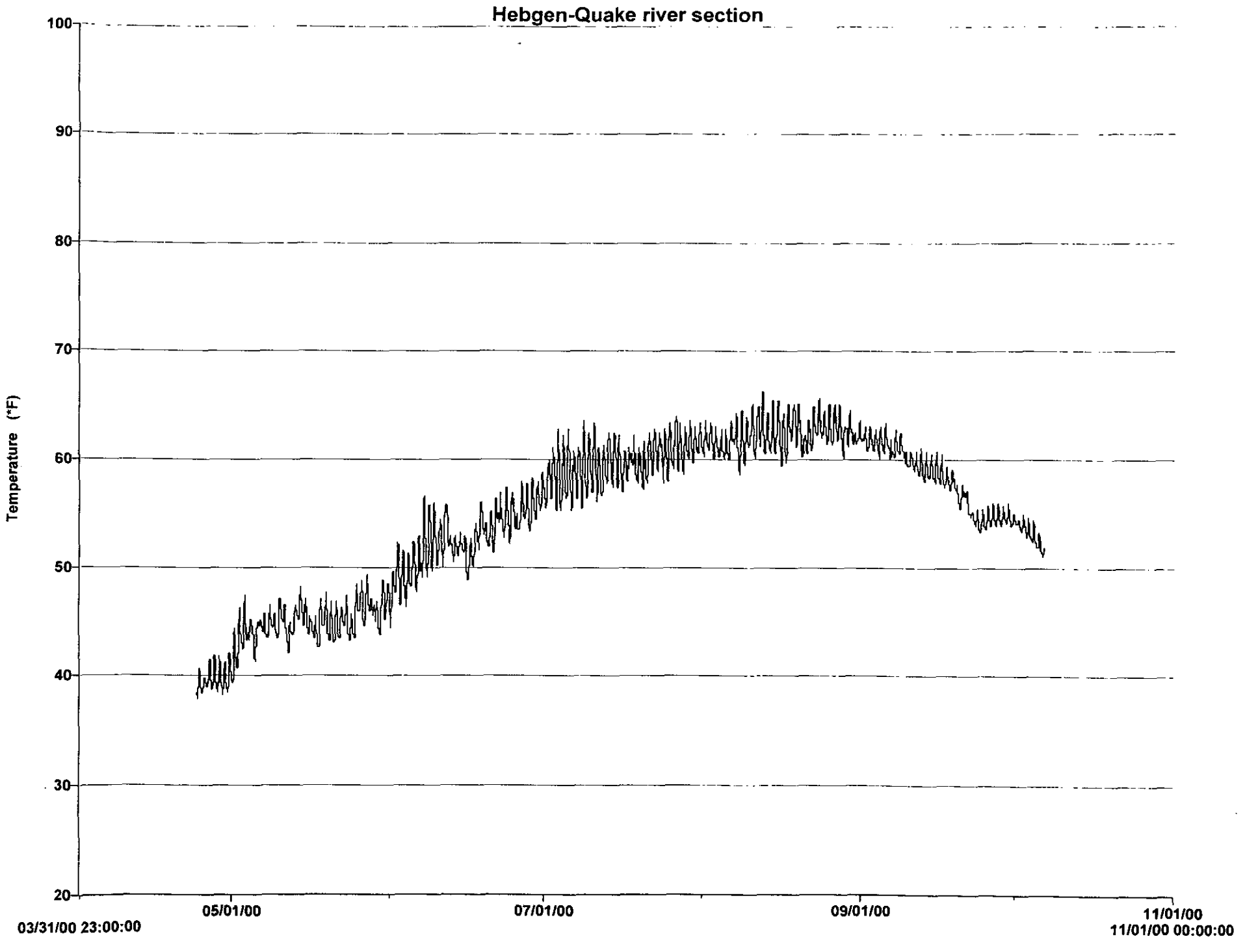
05/01/00
07/01/00
09/01/00
11/01/00
11/01/00 00:00:00


Hebgen-Quake river section
100
90
80
70
60
50
40
30
20
Temperature (°F)
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07/01/00
09/01/00
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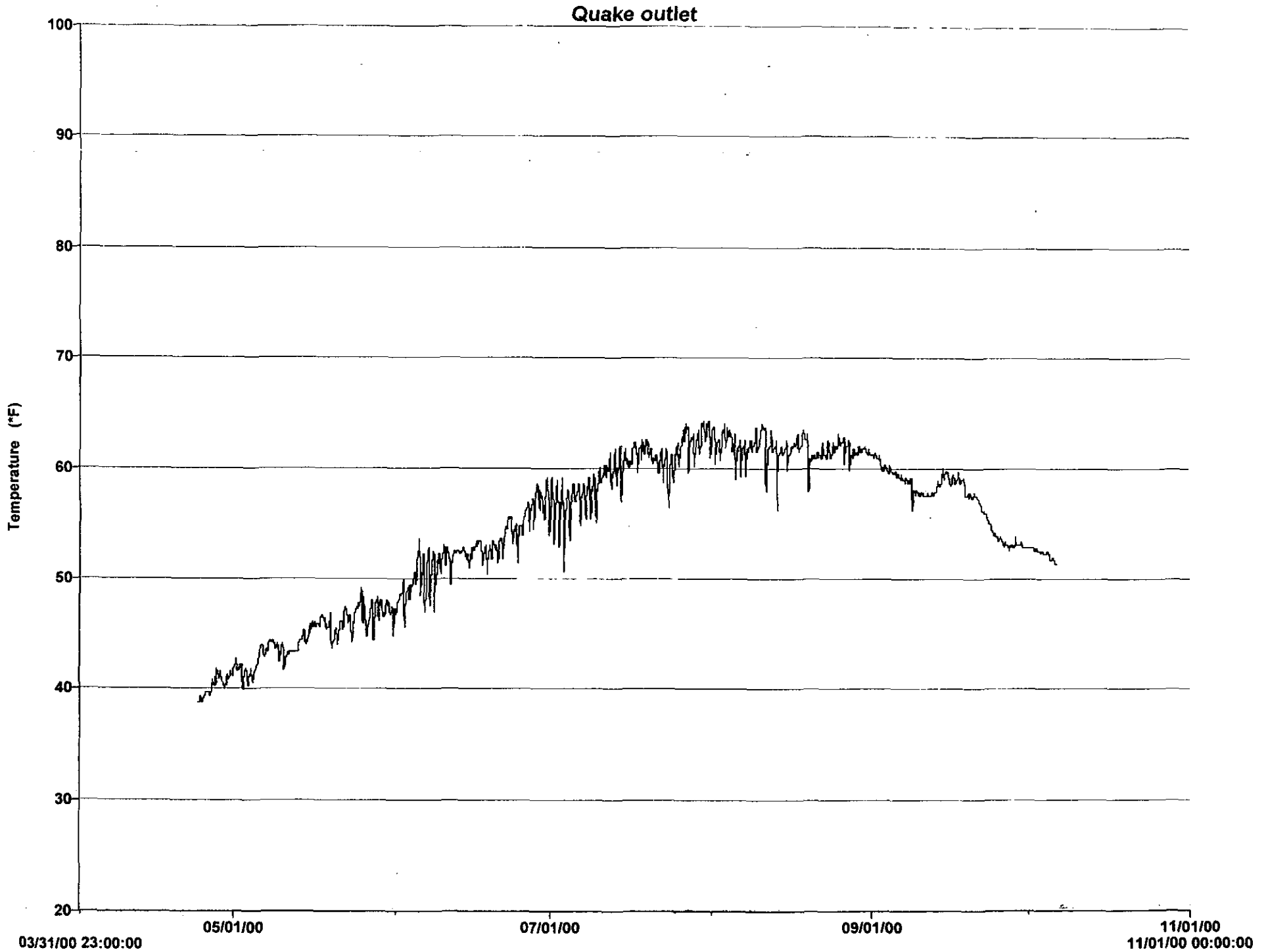
Quake outlet
100
90
80
70
60
50
40
30
20
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09/01/00
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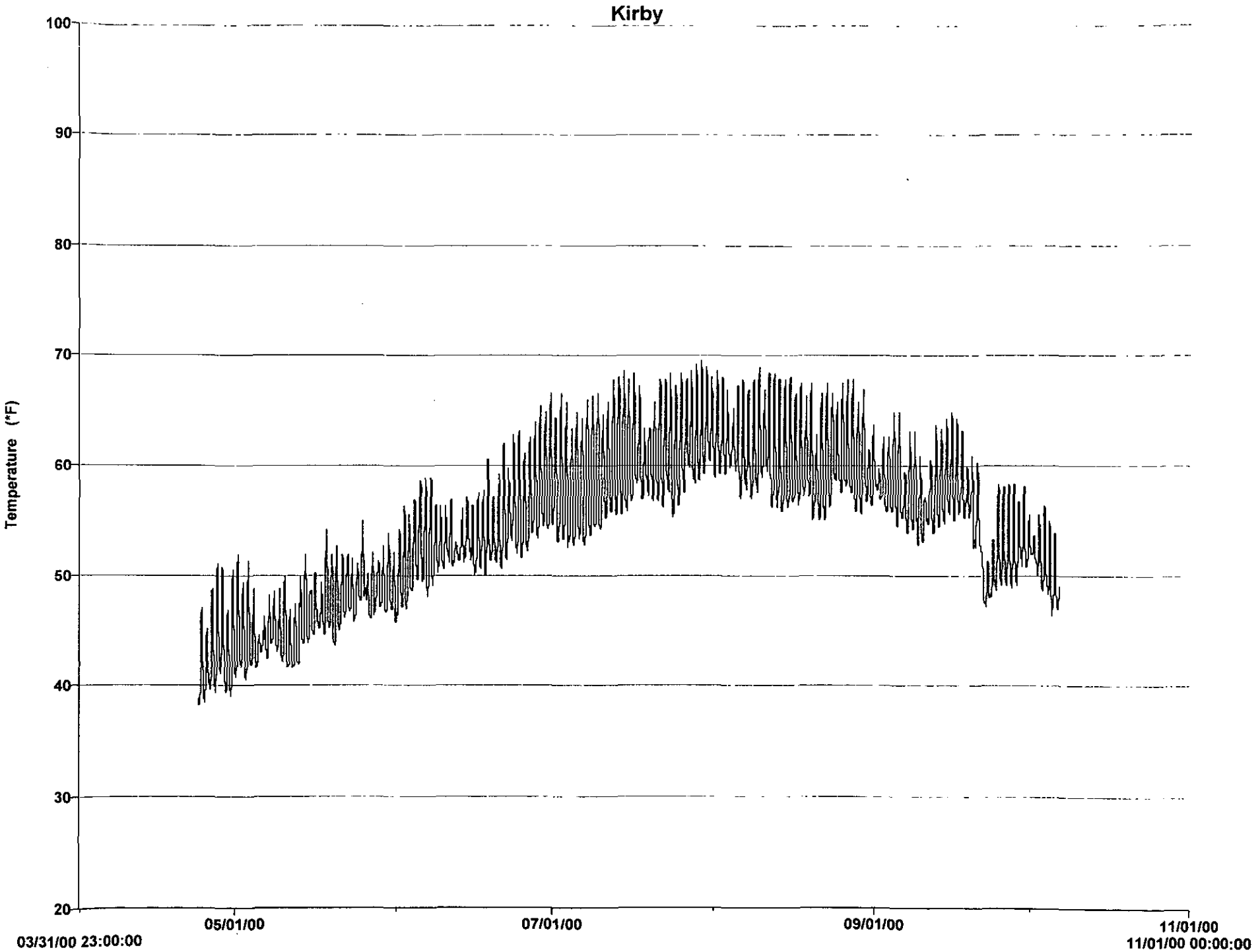
11/01/00 00:00:00


Kirby
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20
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09/01/00
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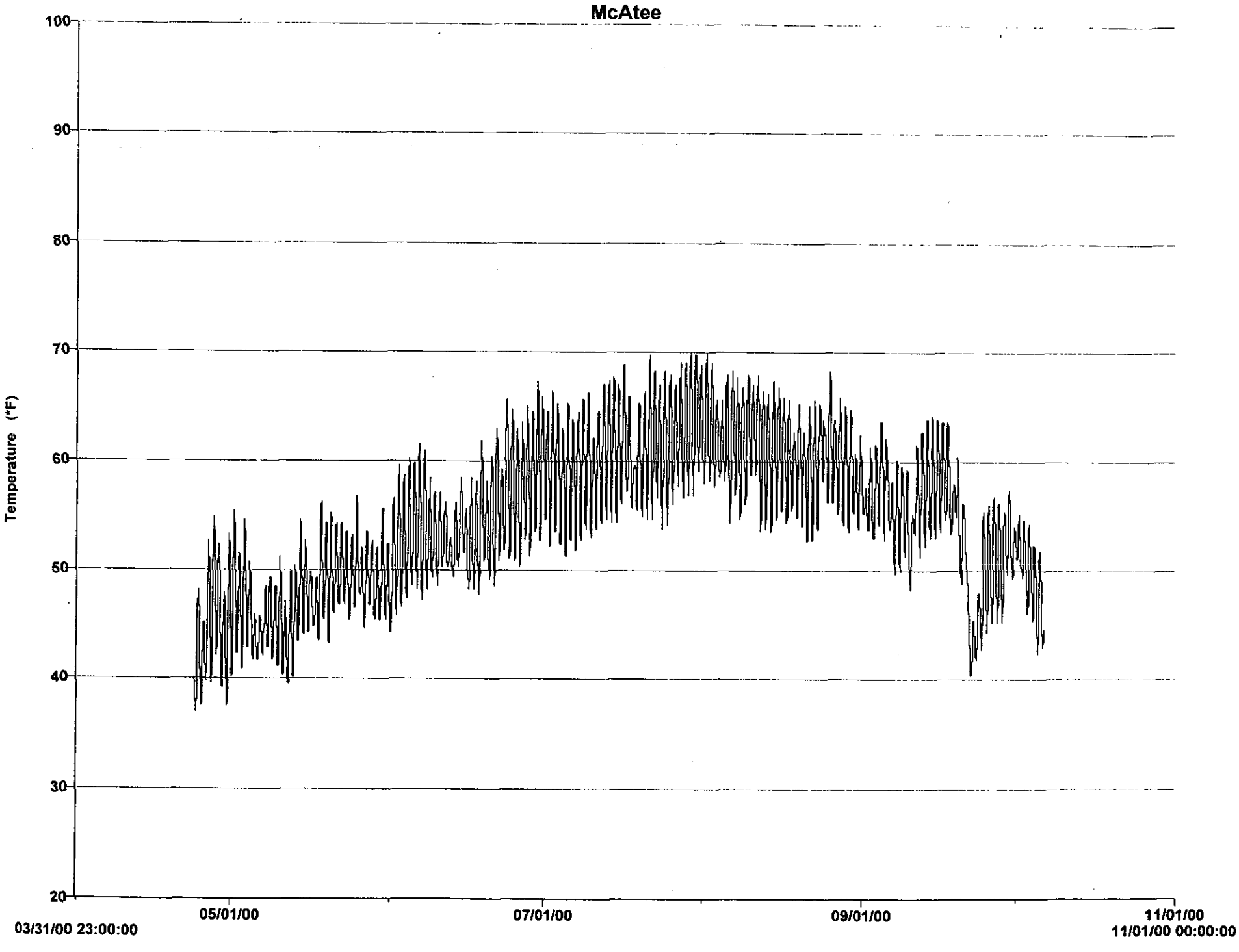
McAtee
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30
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Temperature (°F)
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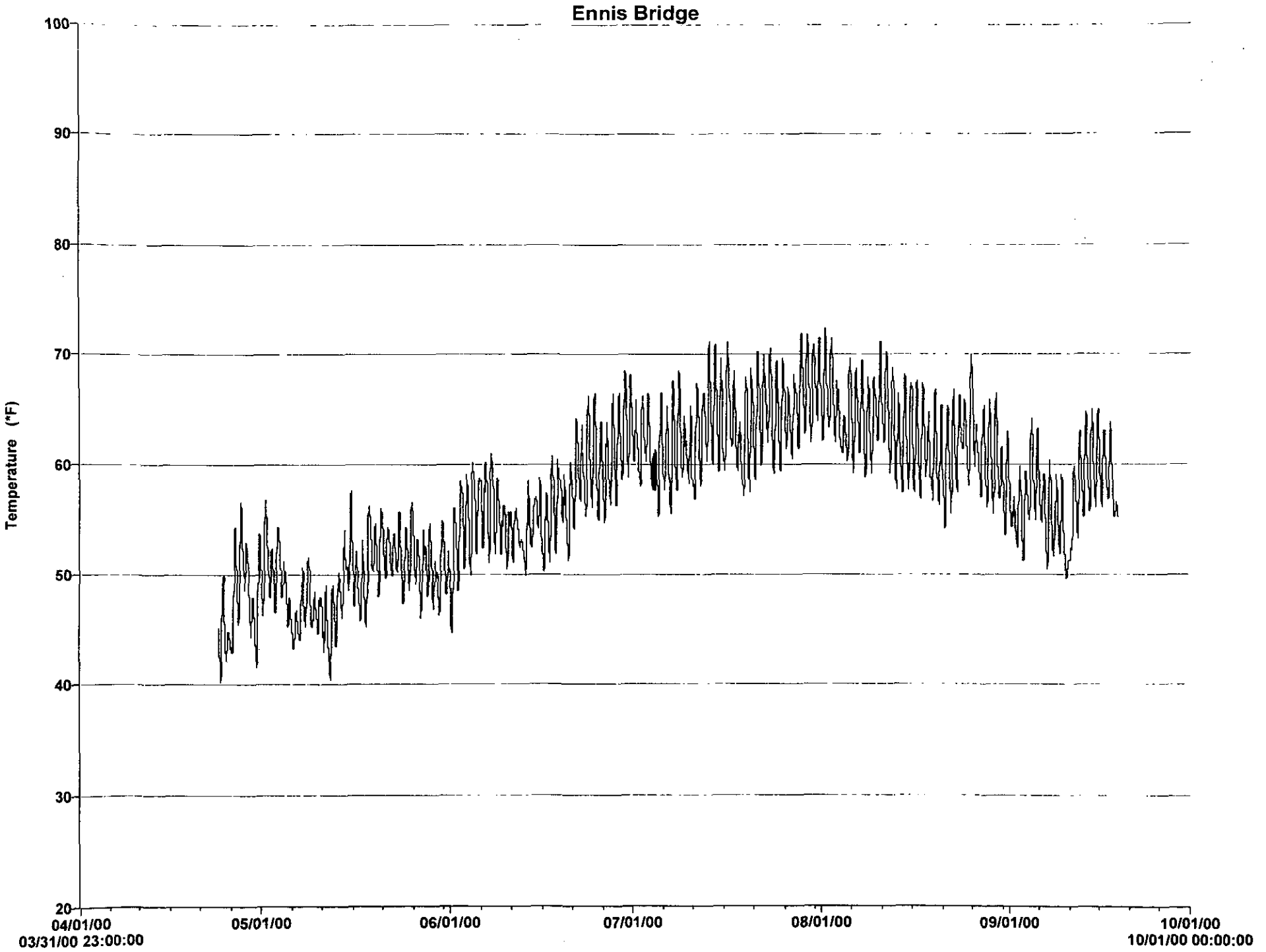
Ennis Bridge
Temperature (°F)
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80
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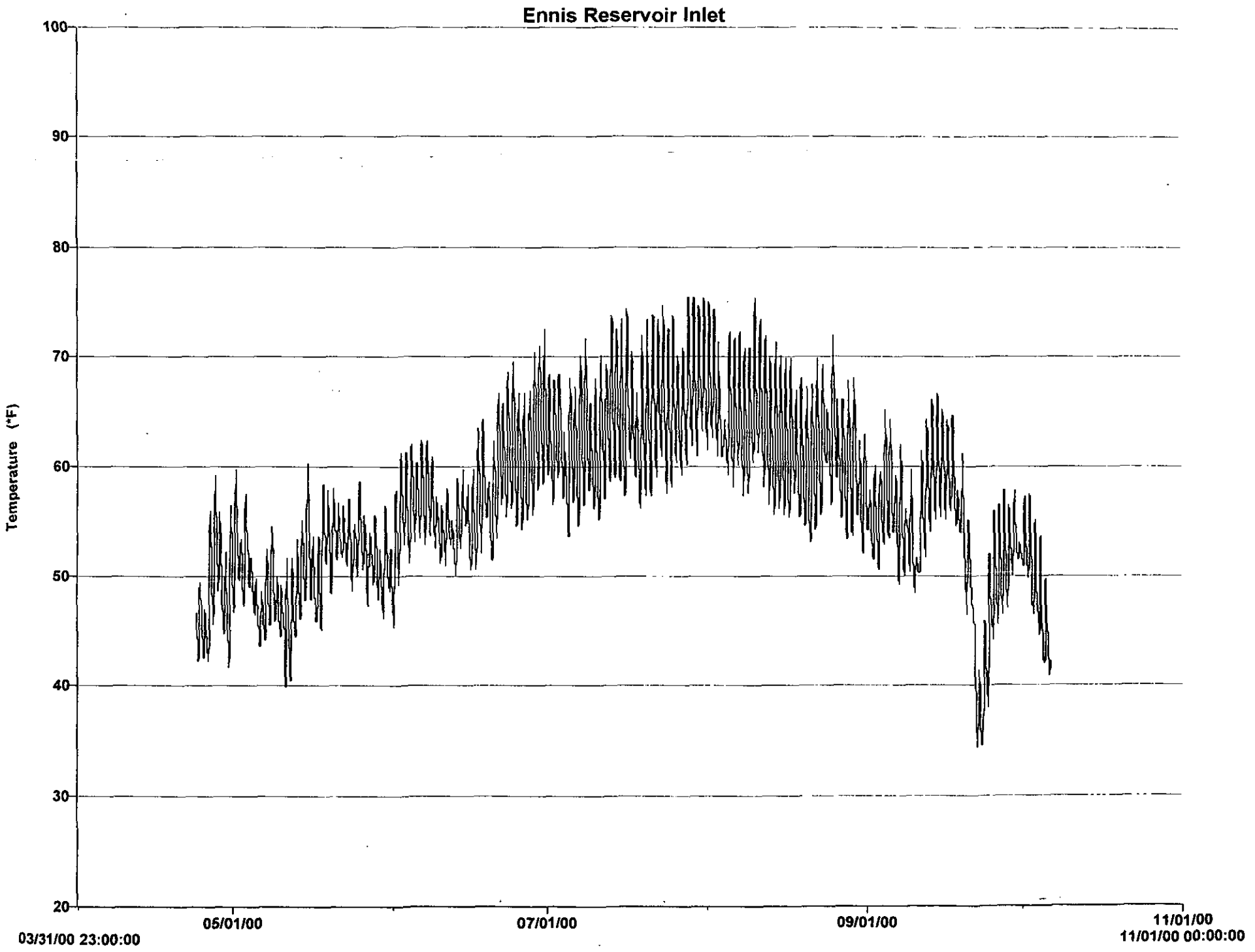
Ennis Reservoir Inlet
Temperature (°F)
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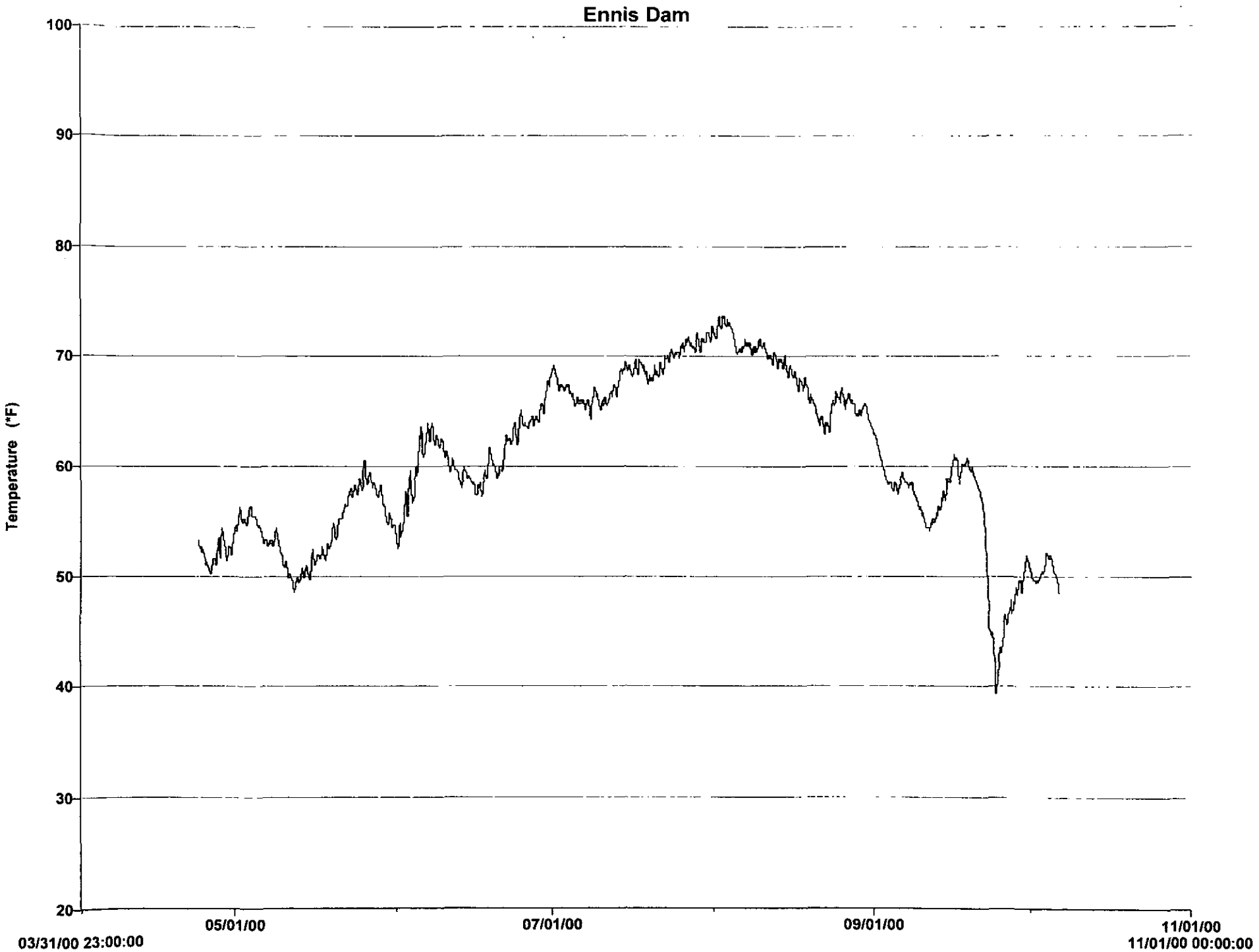
Ennis Dam
Temperature (°F)
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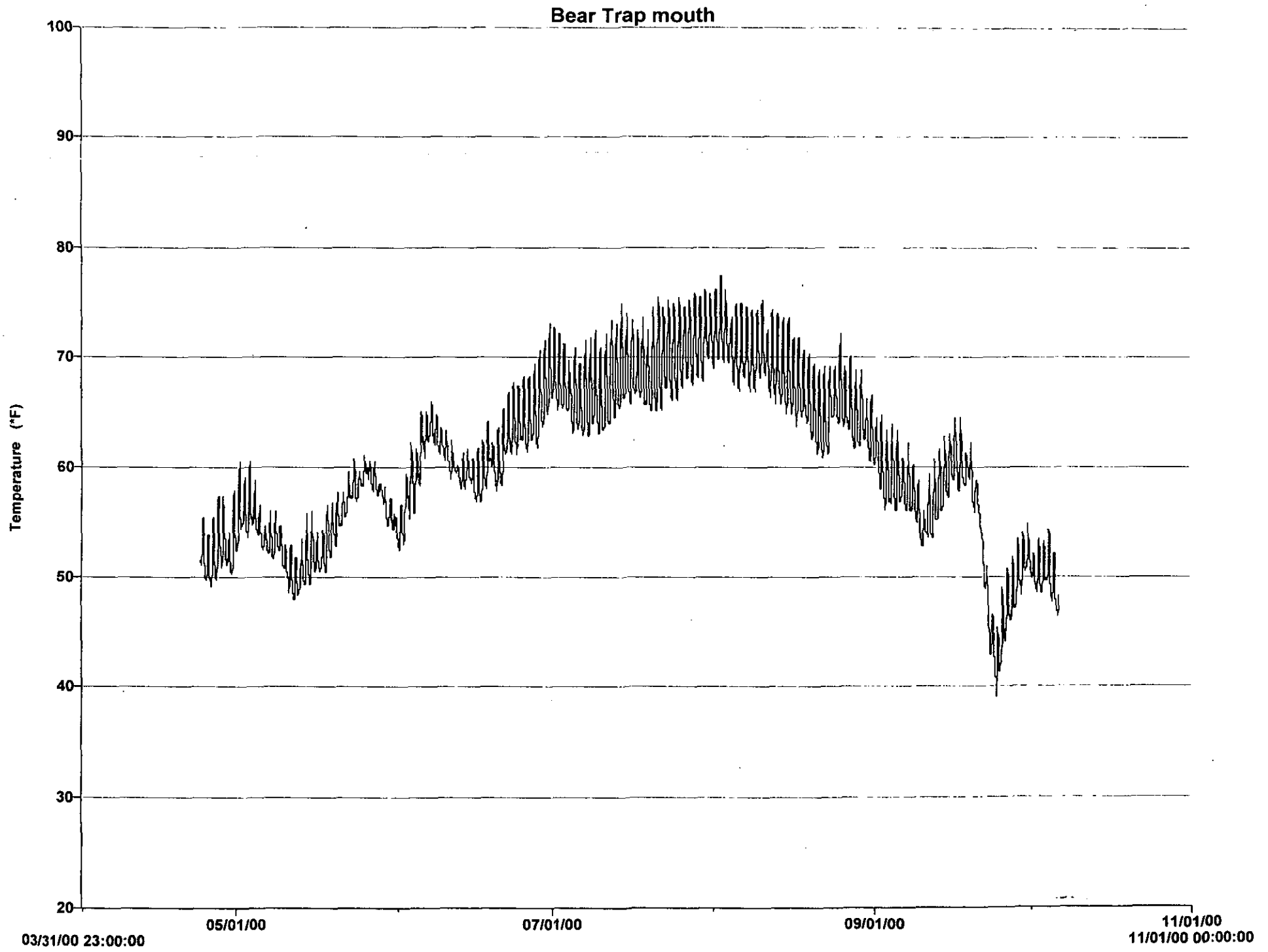
Bear Trap mouth
Temperature (°F)
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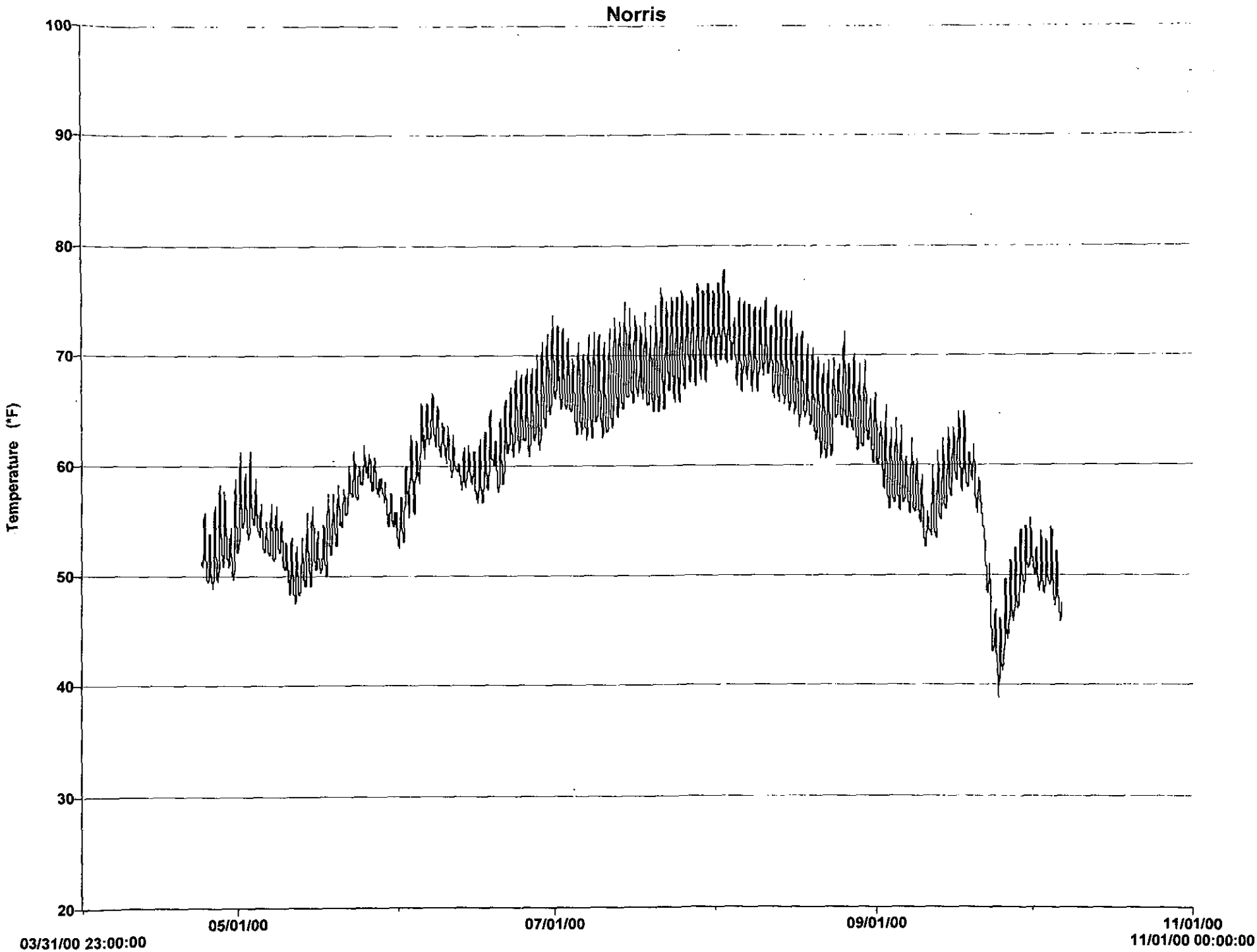
Norris
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Temperature (°F)
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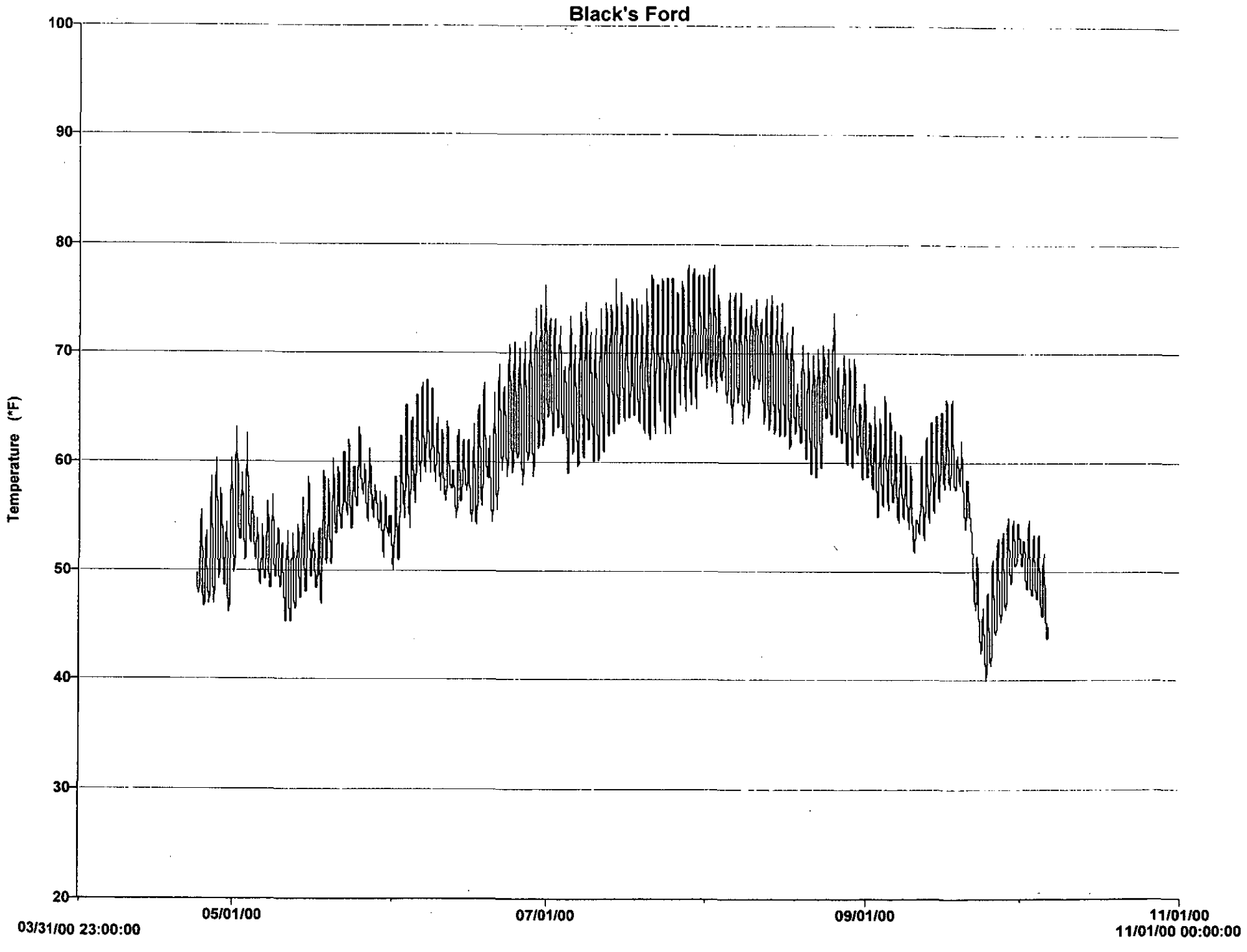
Black's Ford
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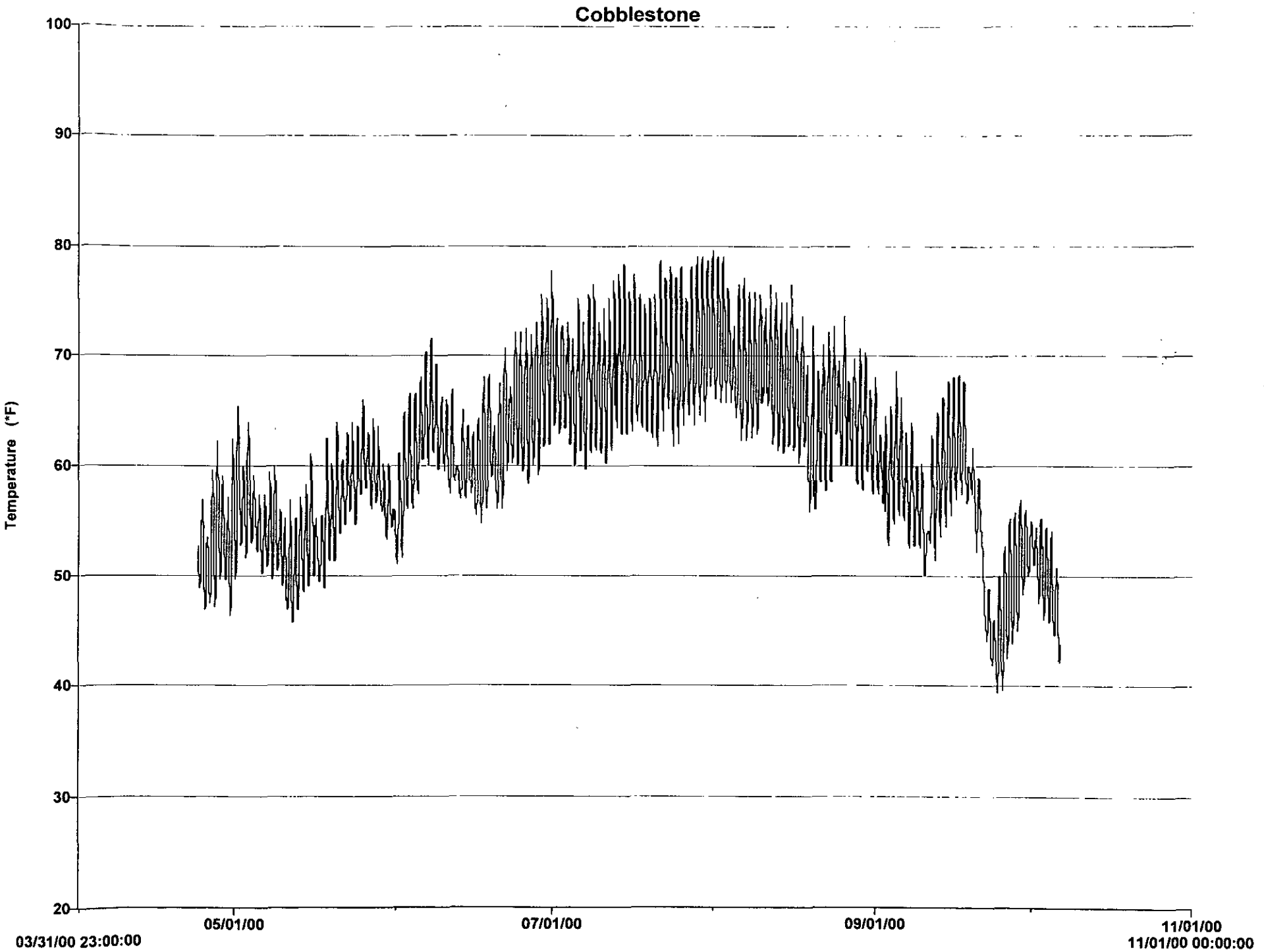
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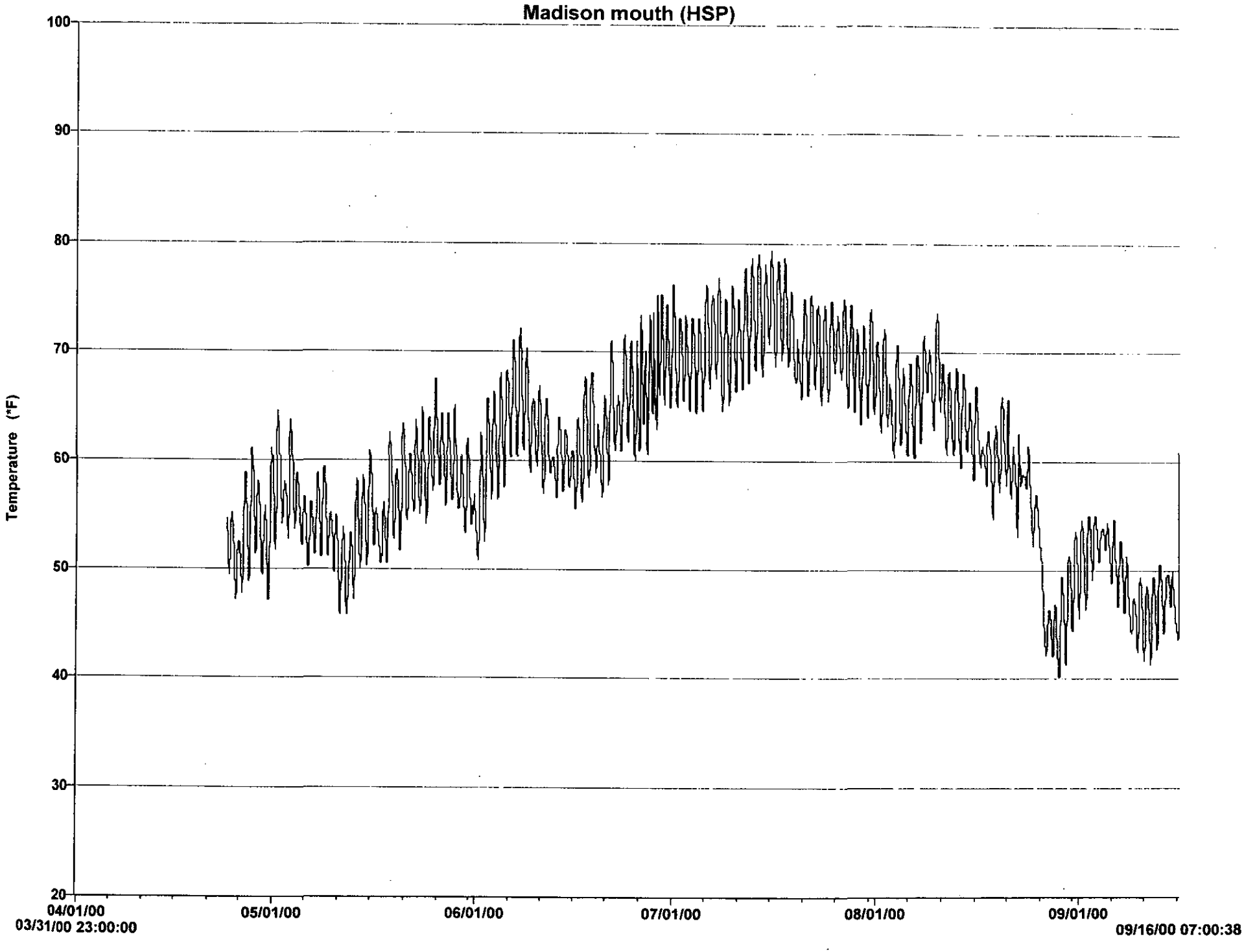
Madison mouth (HSP)
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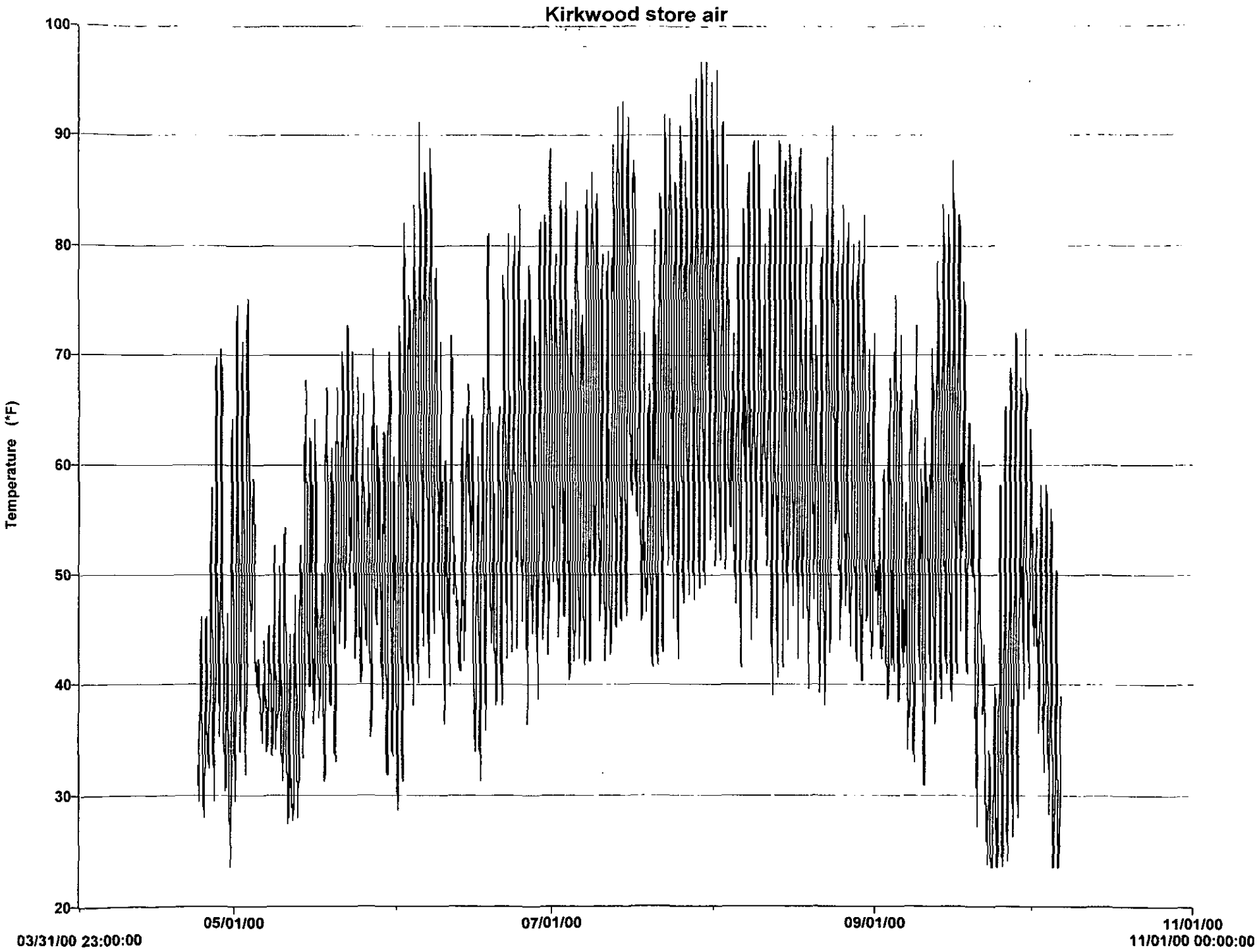
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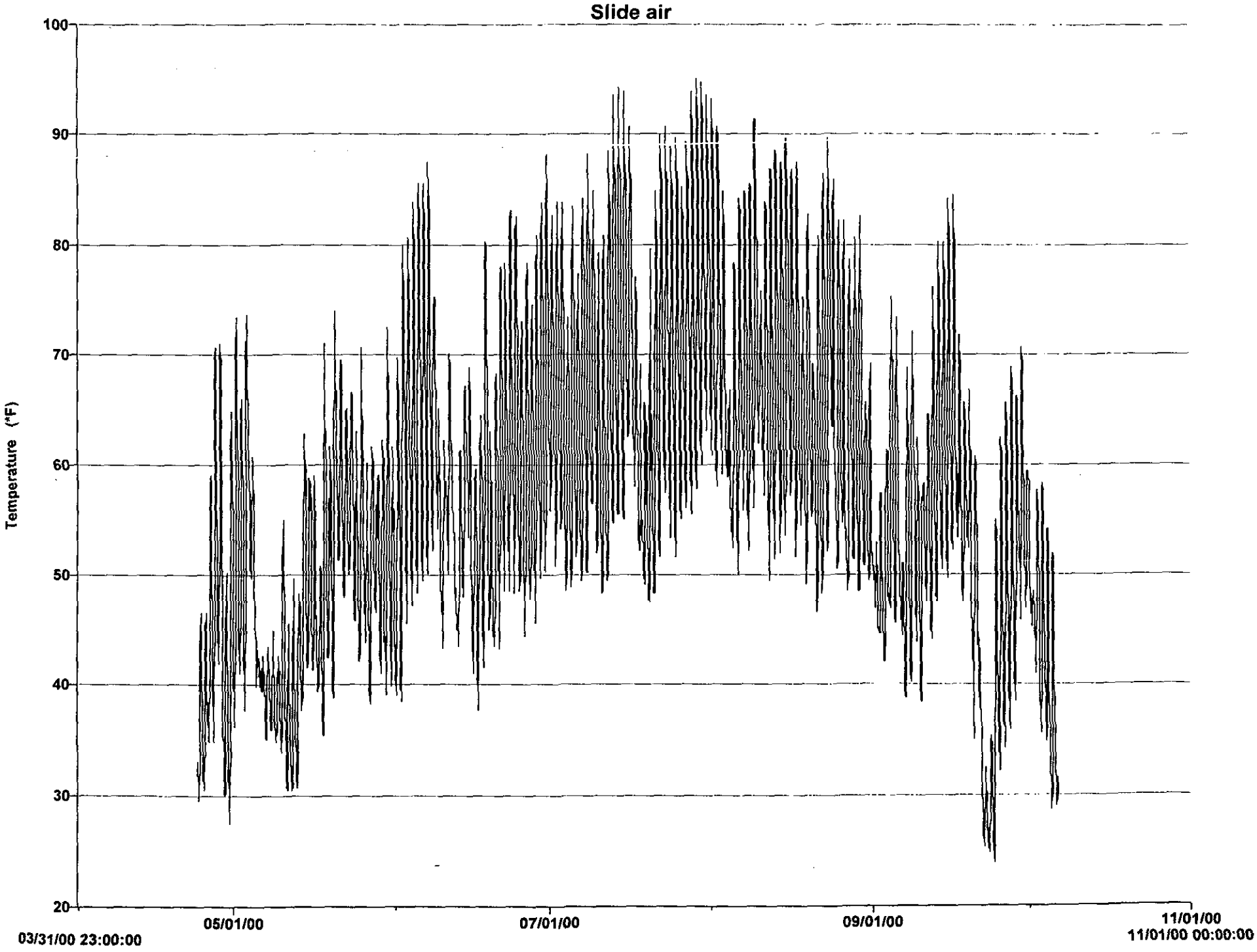
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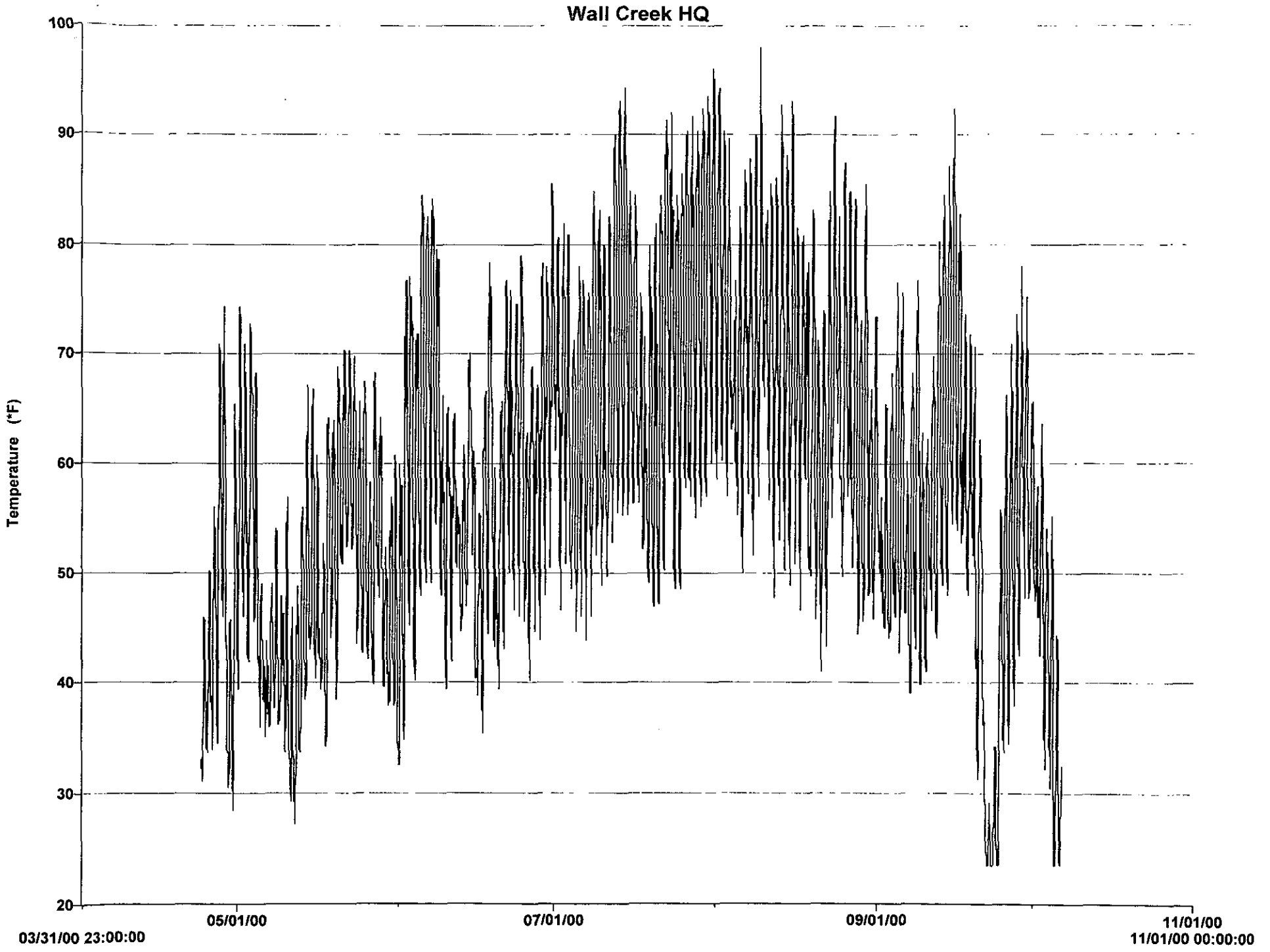
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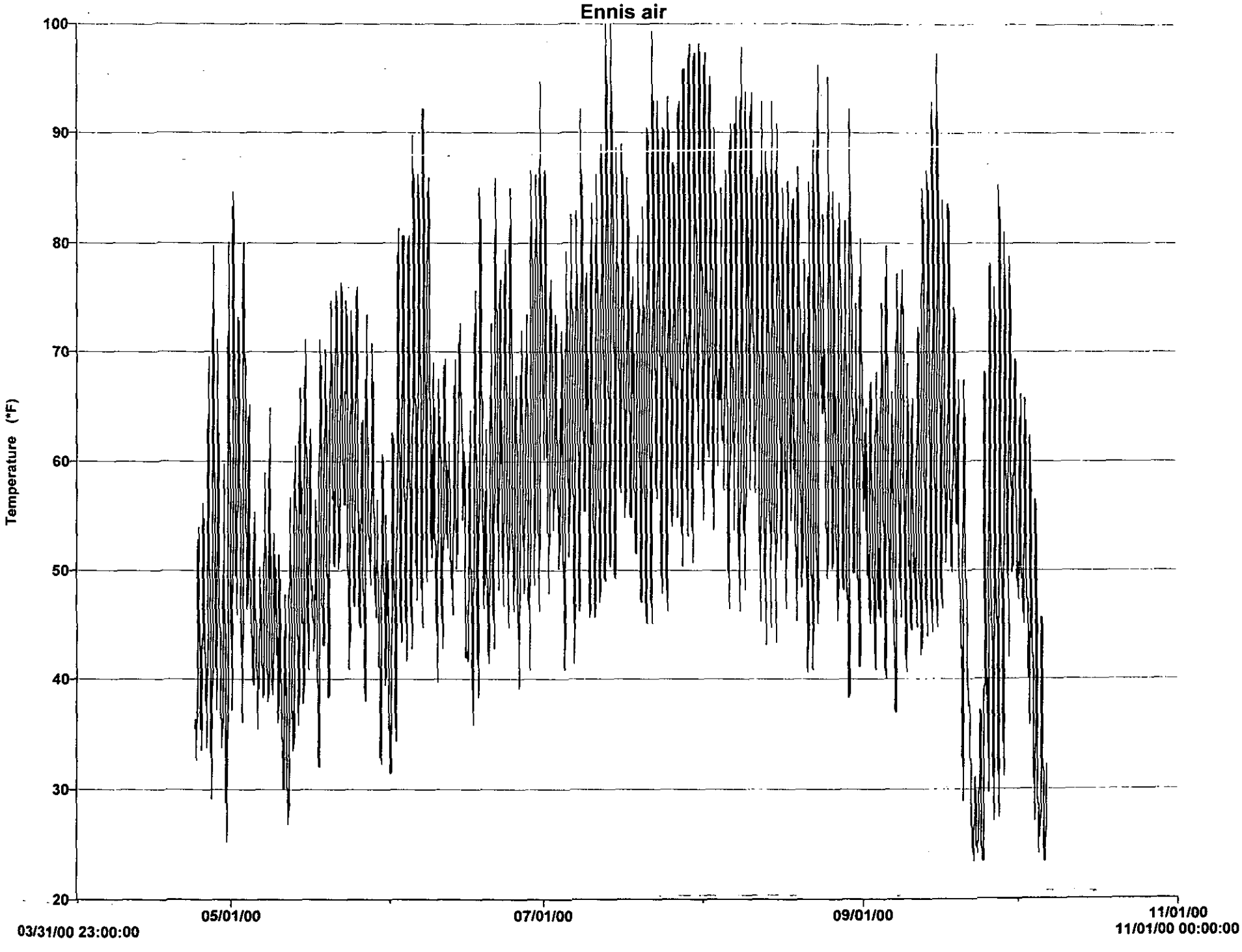
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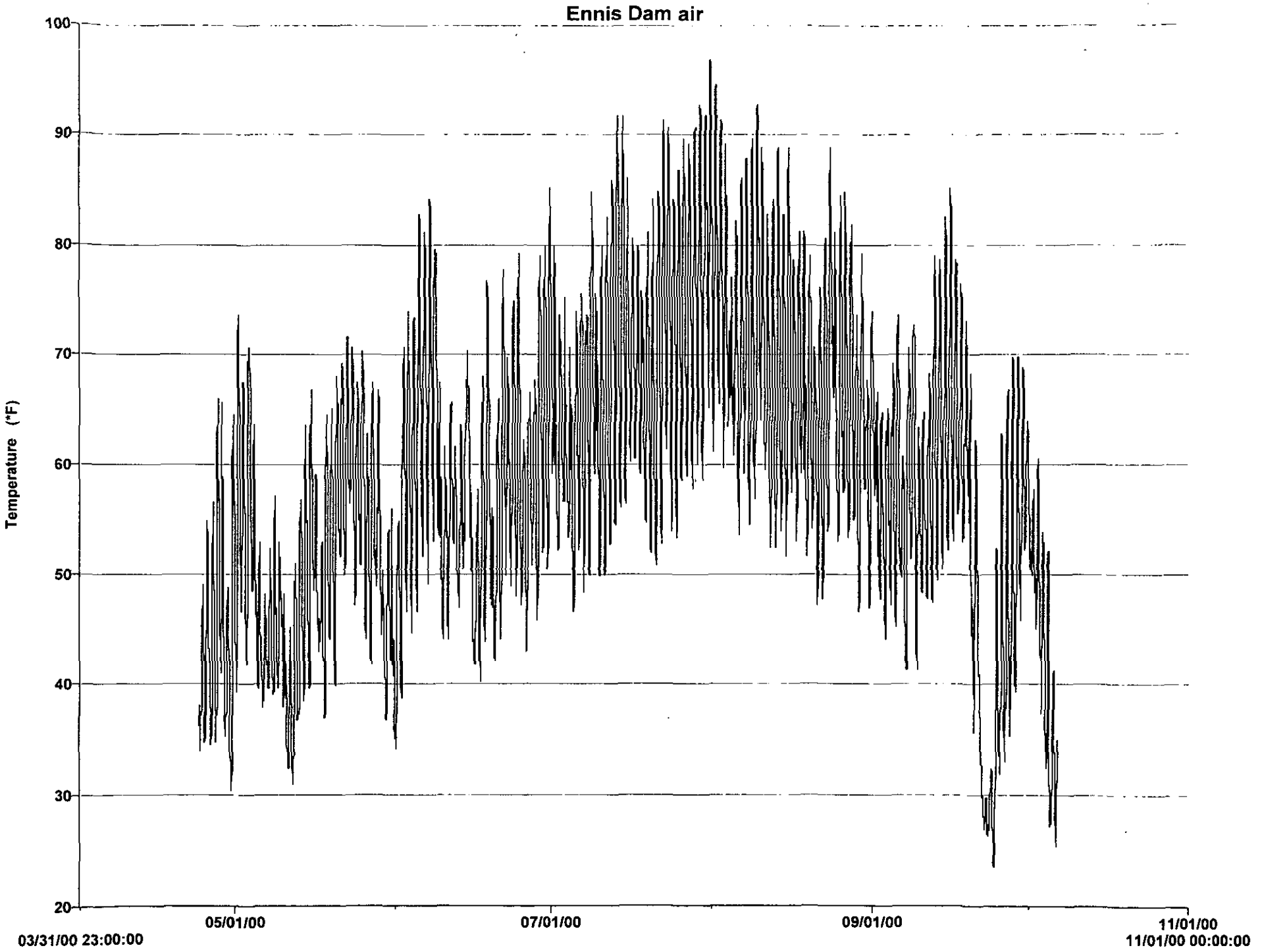
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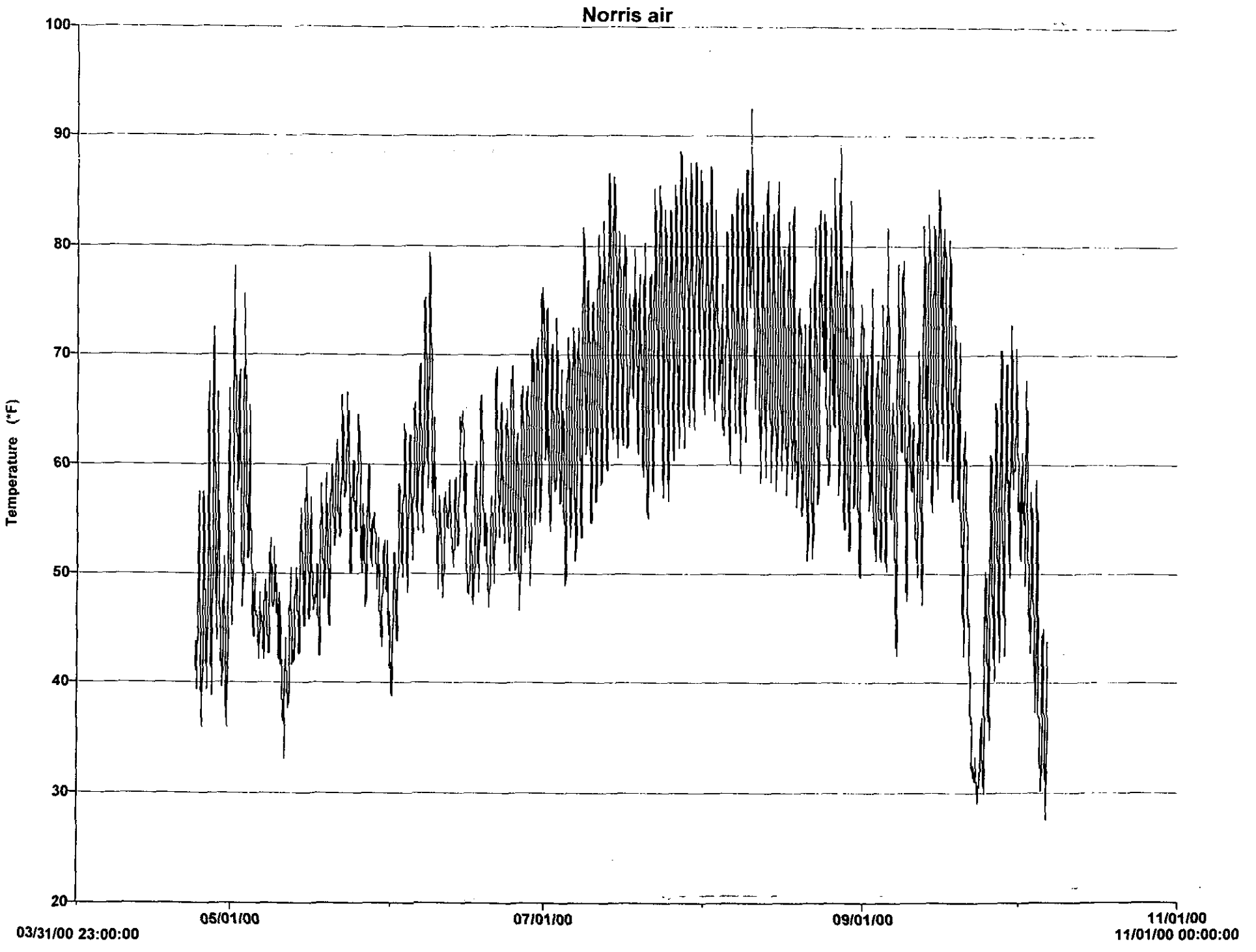
Norris air
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70
60
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40
30
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09/01/00
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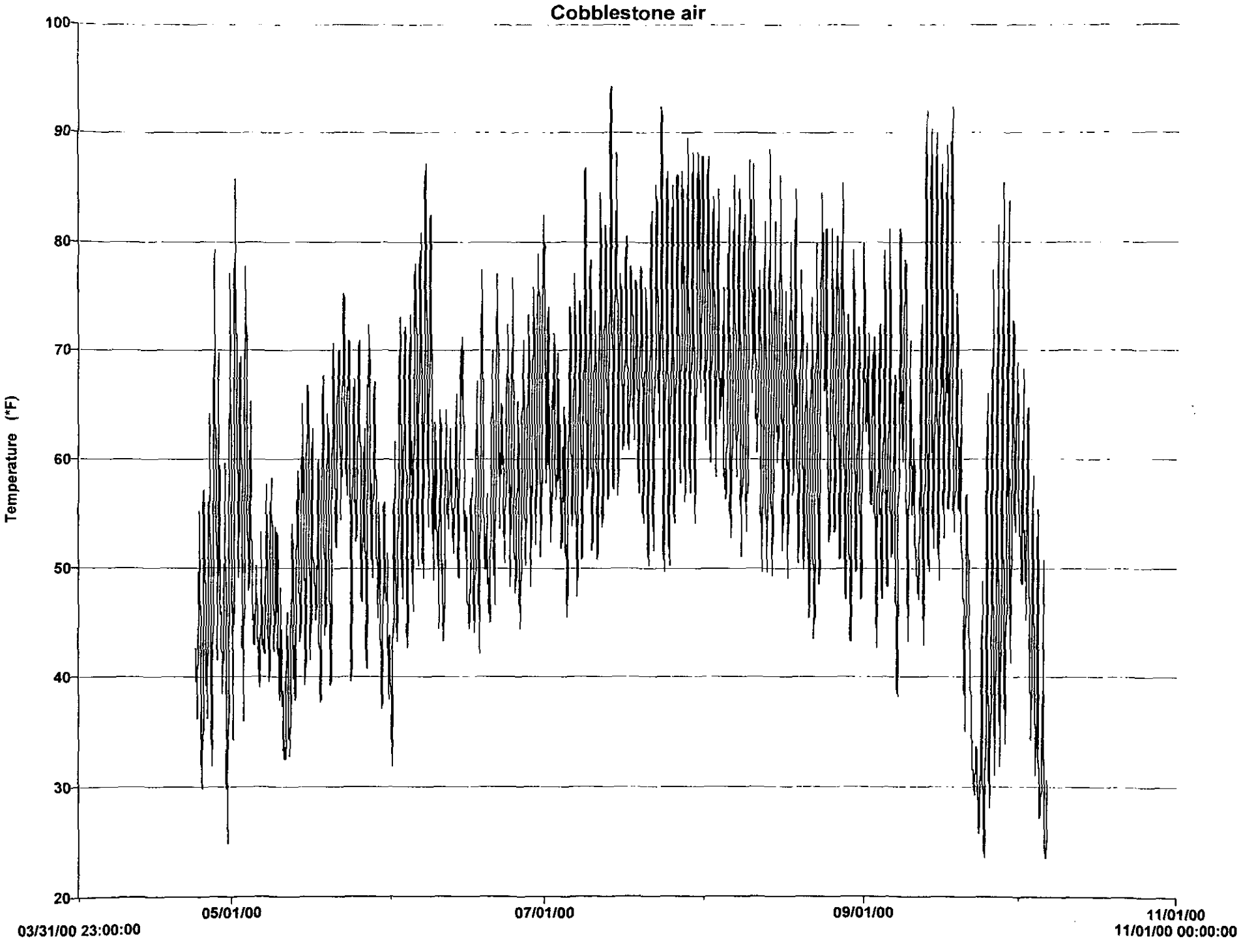
Cobblestone air
Temperature (°F)
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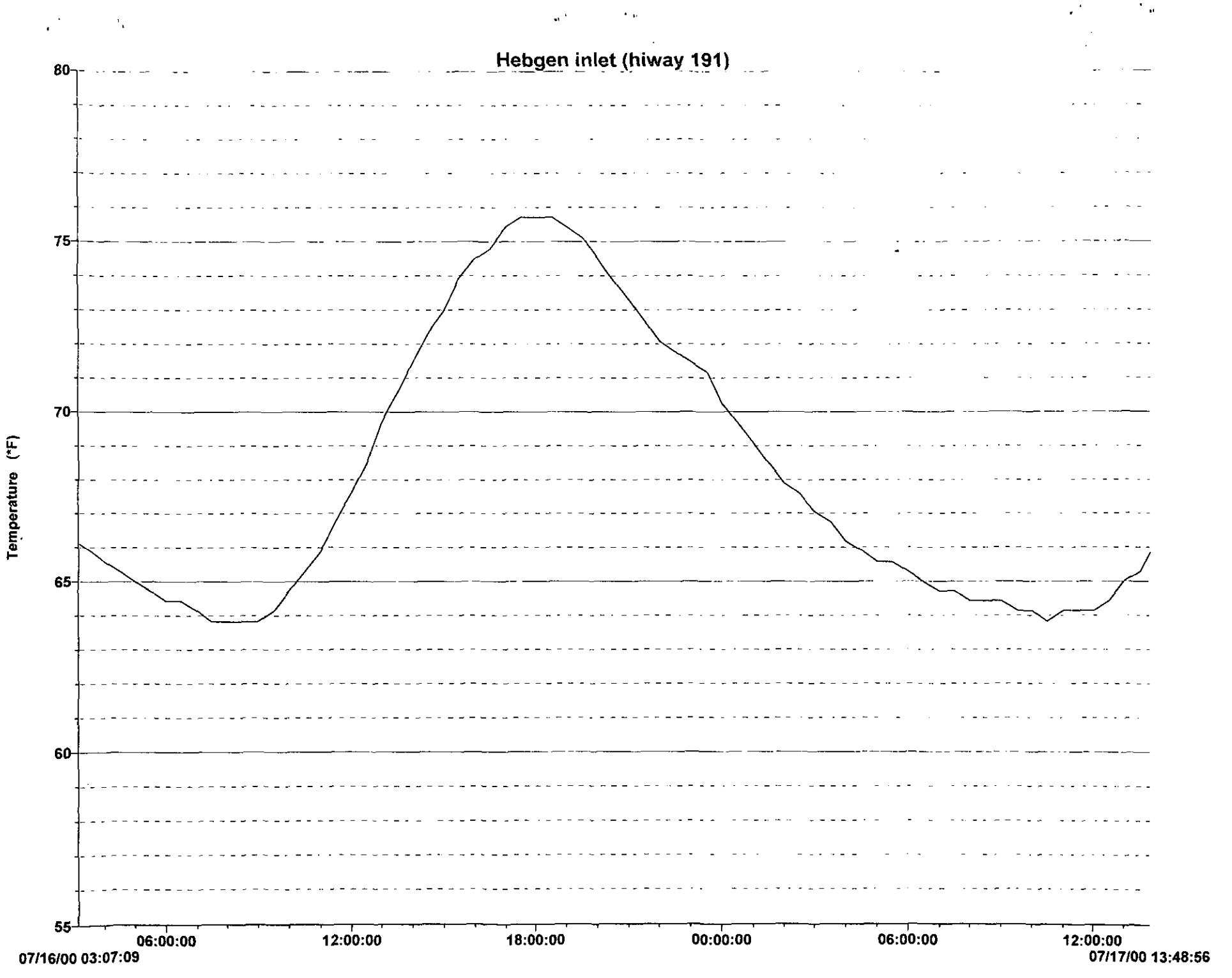
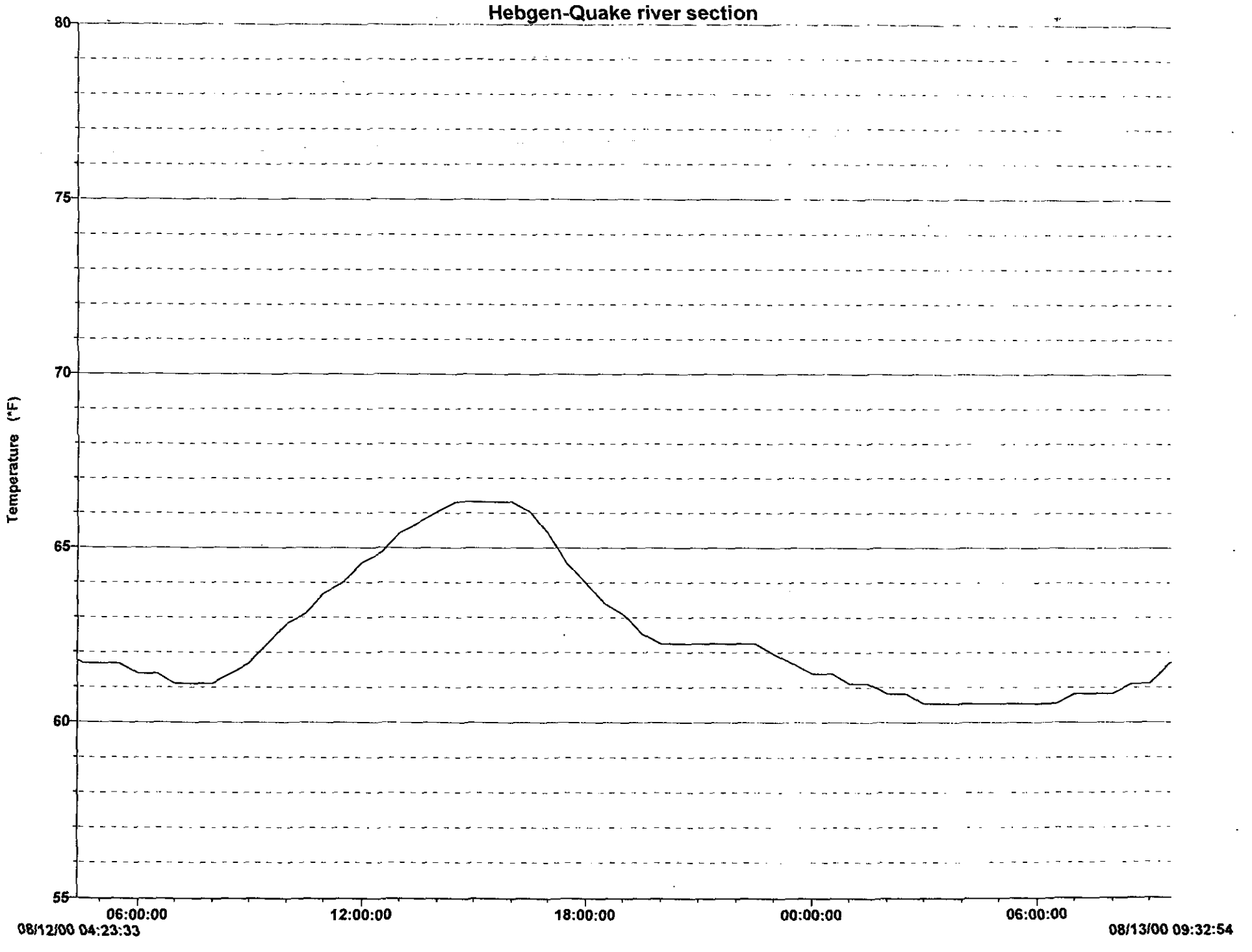
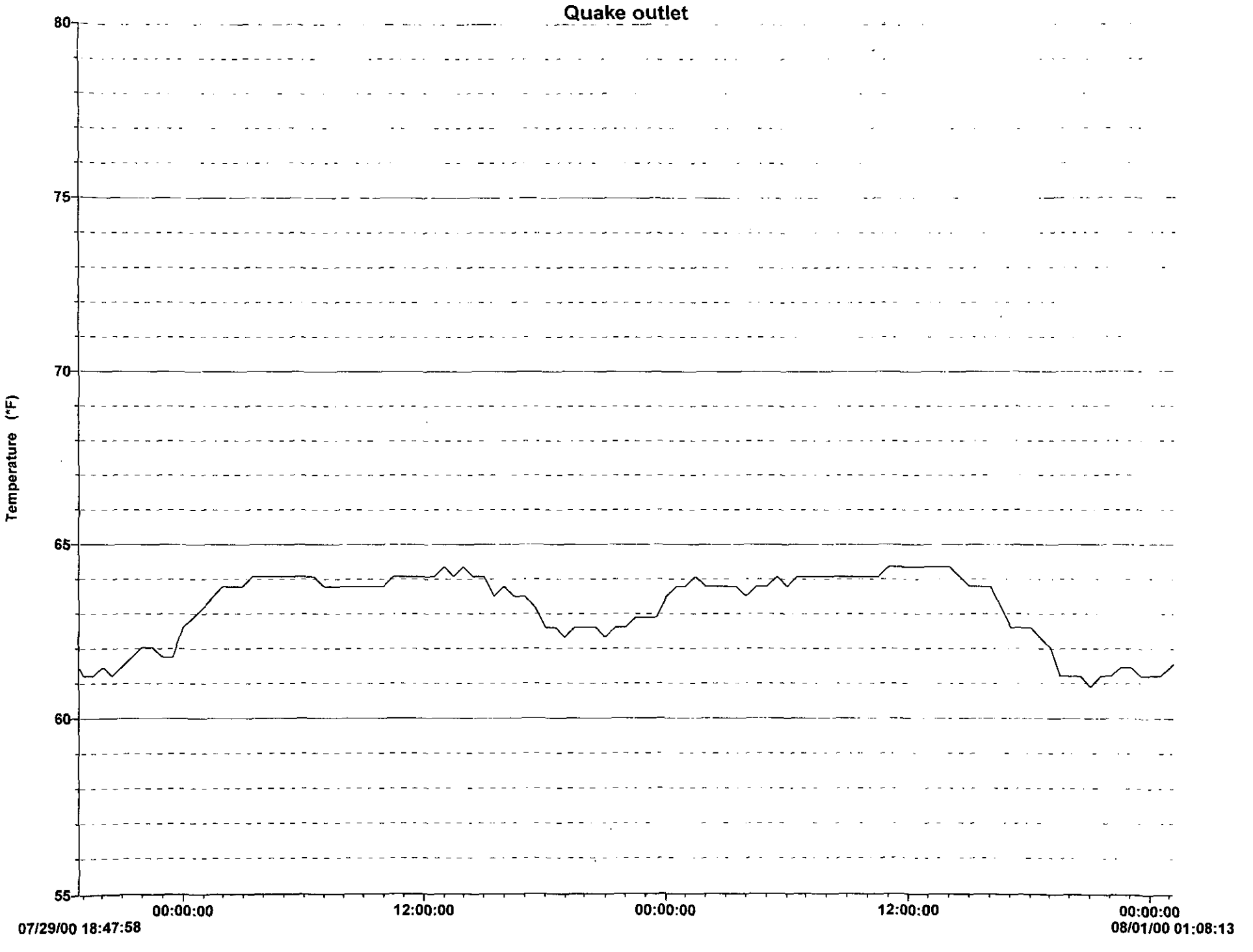
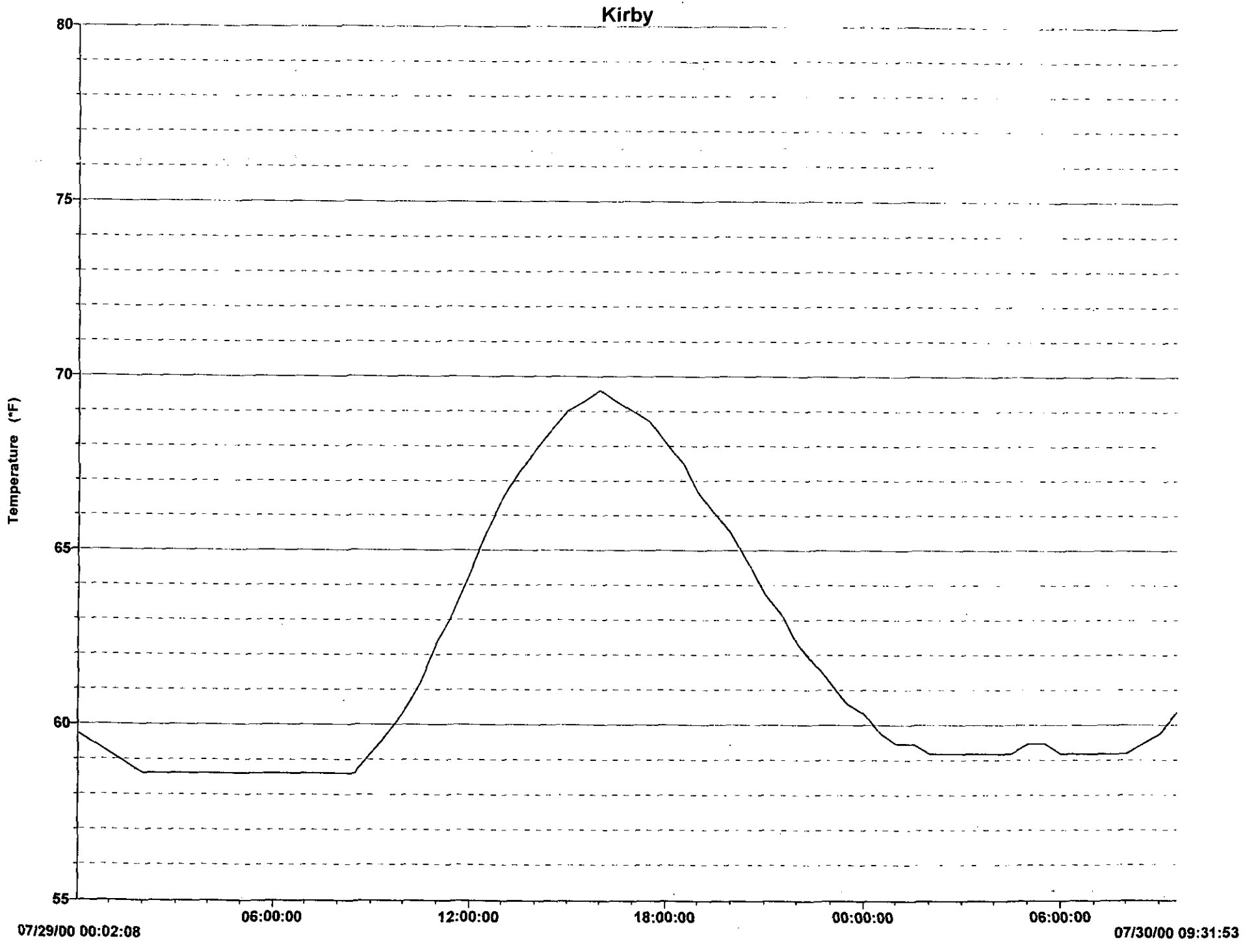
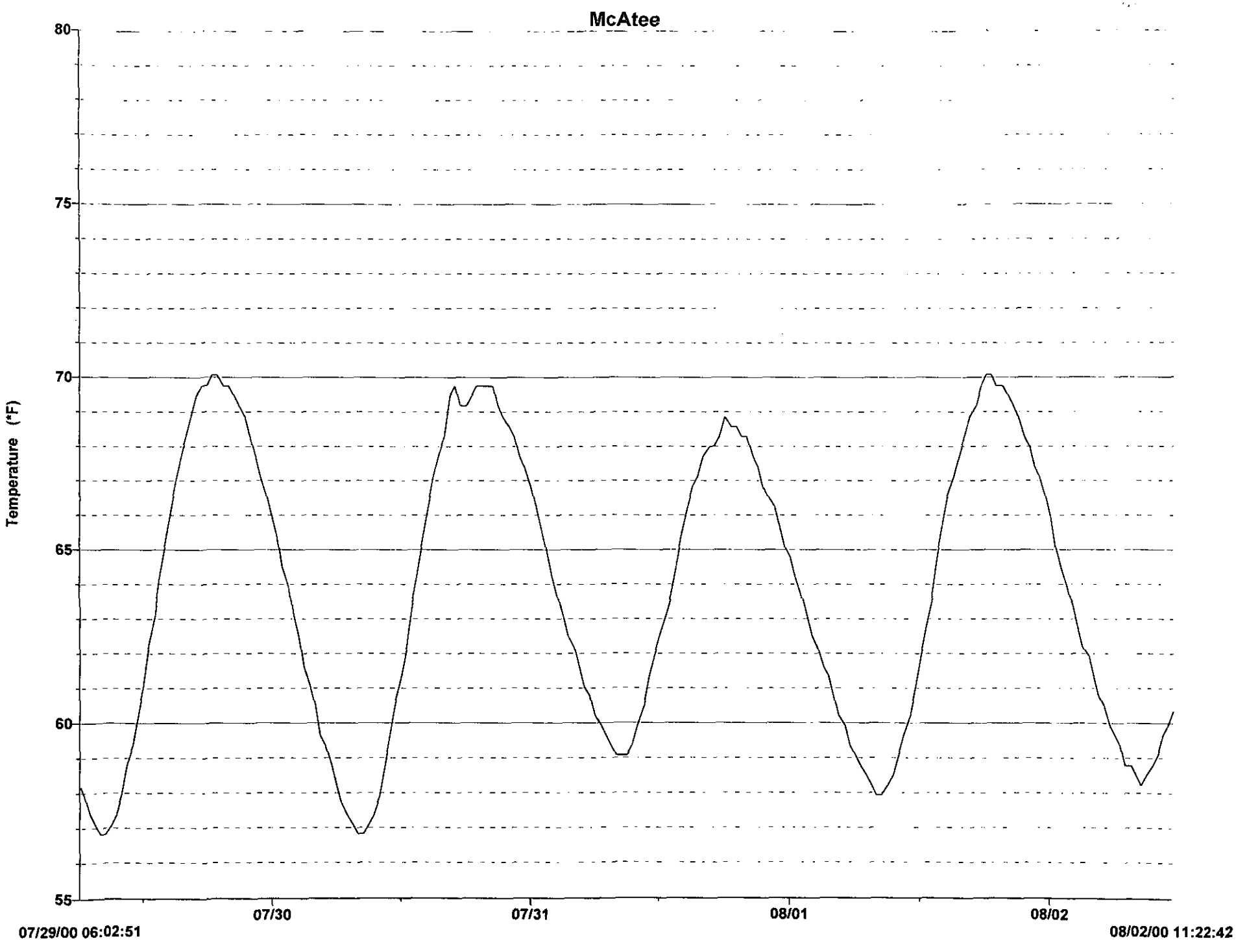
50
40
30
20
03/31/00 23:00:00
05/01/00
07/01/00
09/01/00
11/01/00
11/01/00 00:00:00

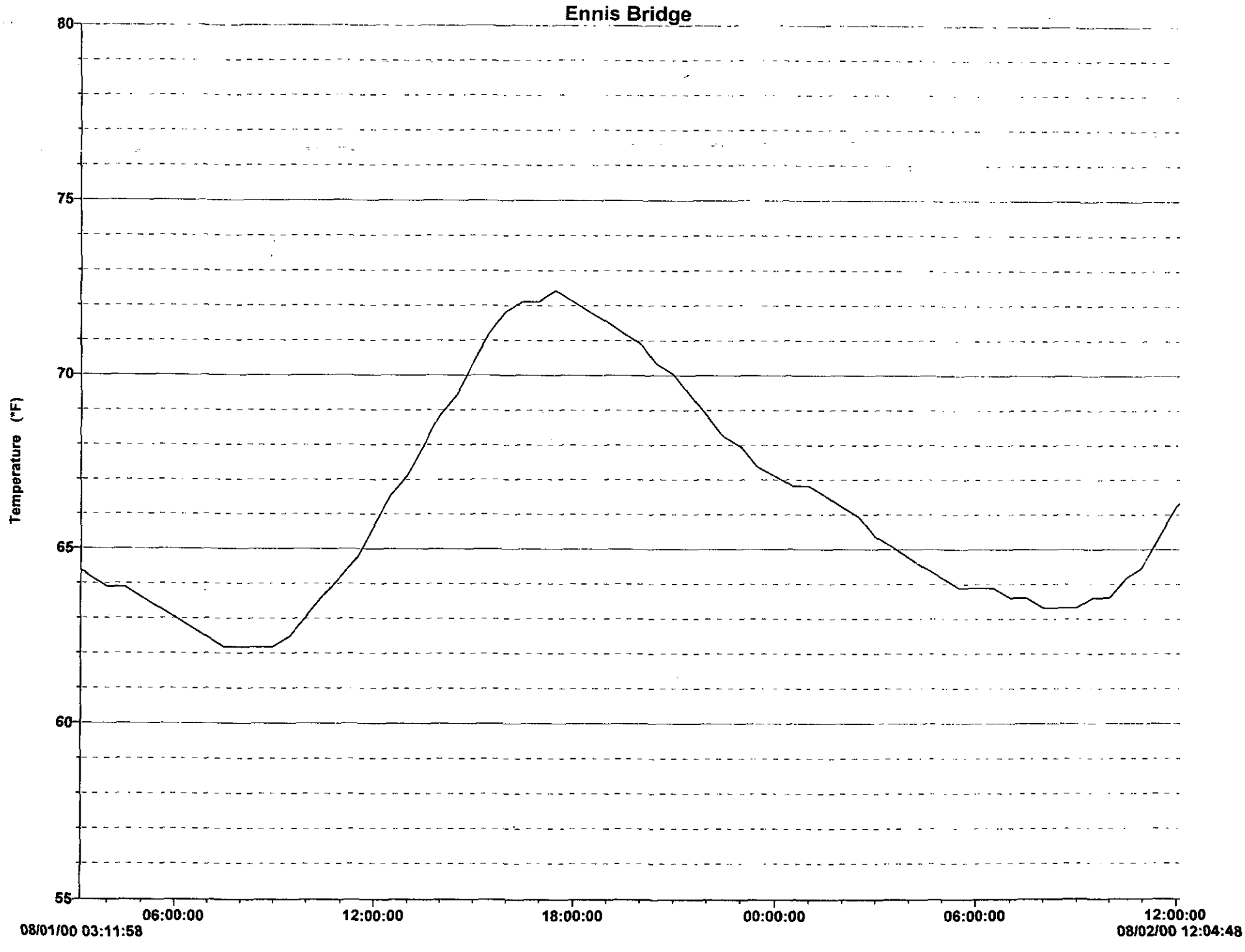

Hebgen inlet (hiway 191)
80
75
70
65
60
55
Temperature (*F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
12:00:00
07/16/00 03:07:09
07/17/00 13:48:56

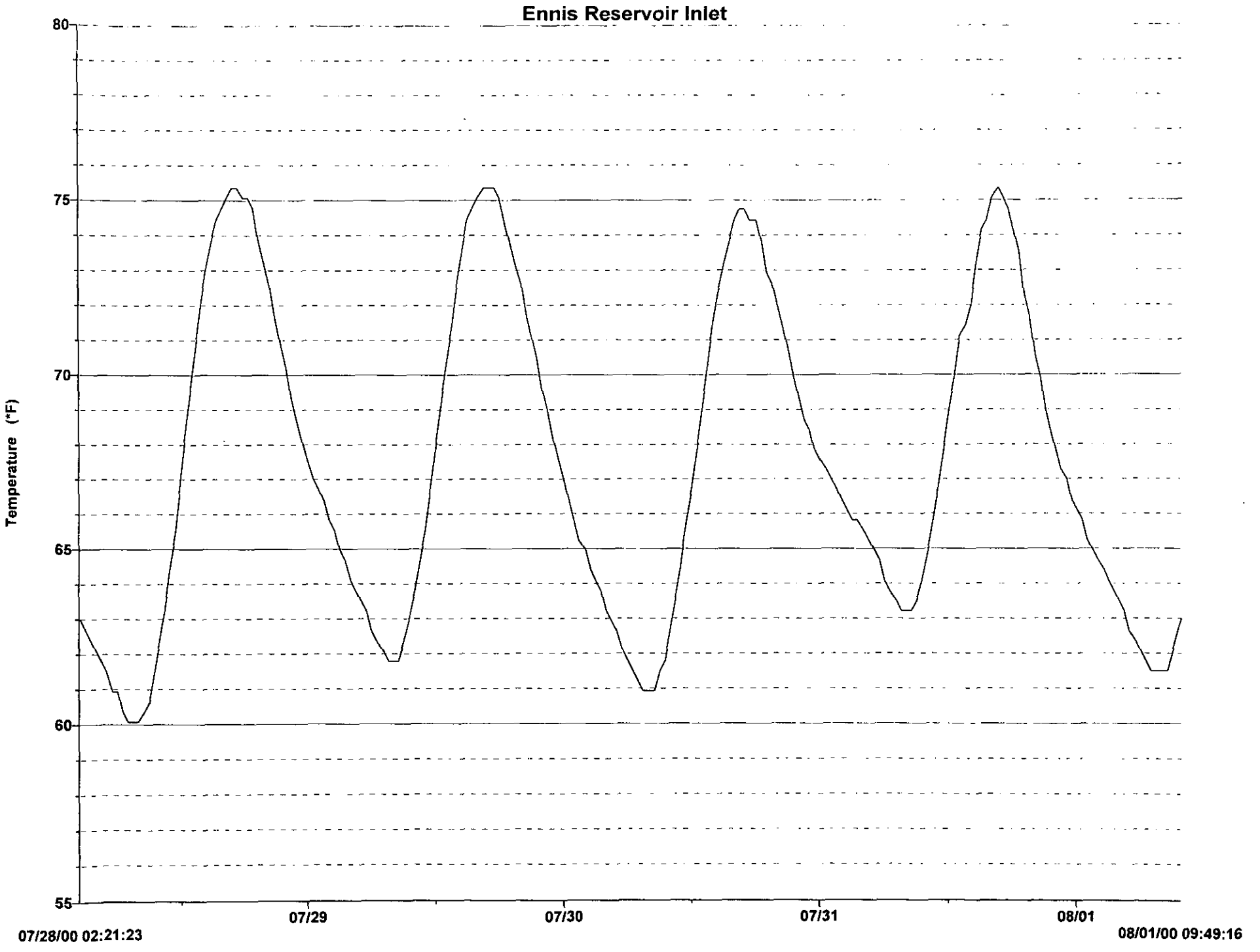

Hebgen-Quake river section
80
75
70
65
60
55
Temperature (°F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
08/12/00 04:23:33
08/13/00 09:32:54

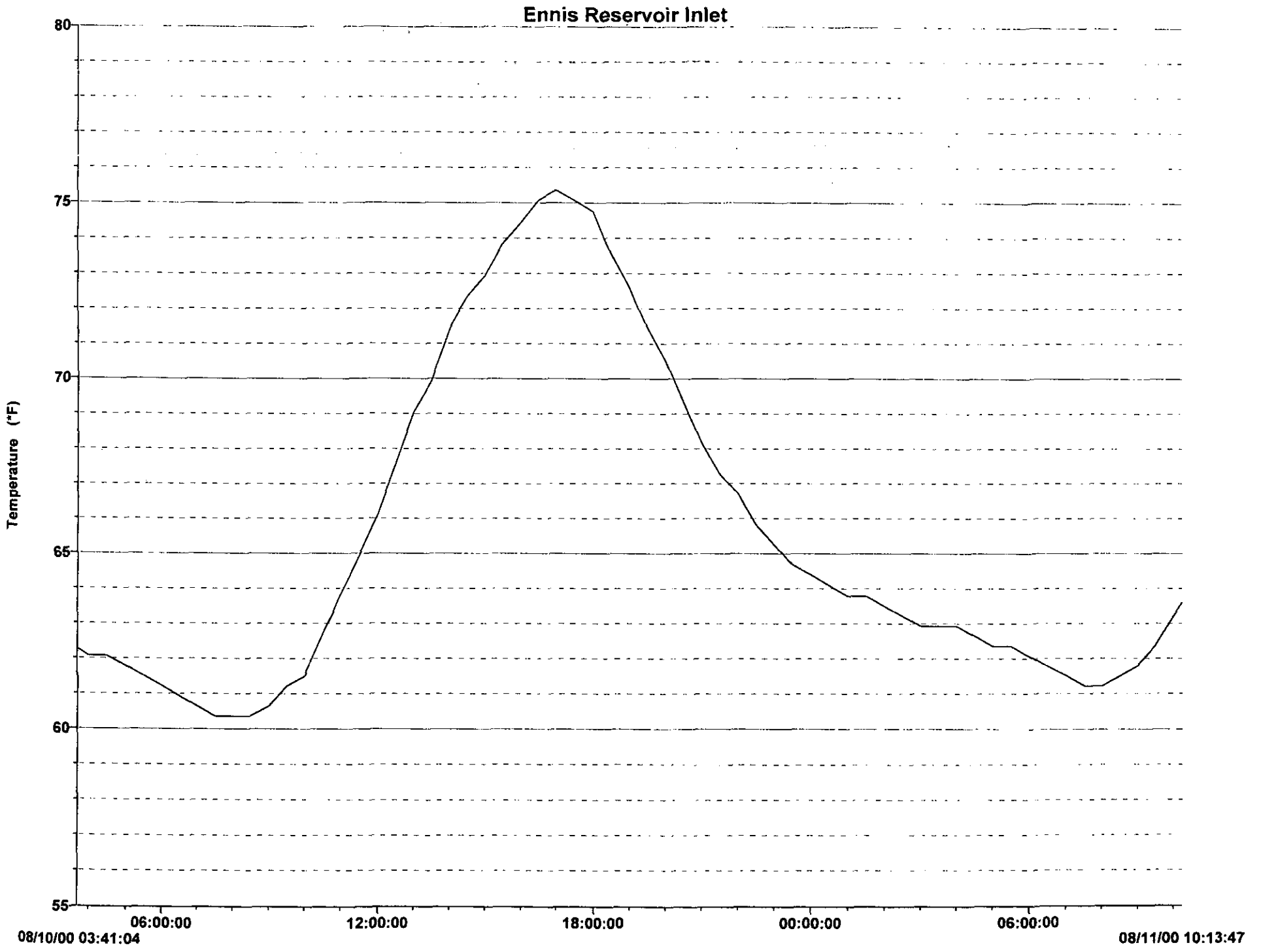

Quake outlet
80
75
70
65
60
55
Temperature (°F)
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
07/29/00 18:47:58
08/01/00 01:08:13

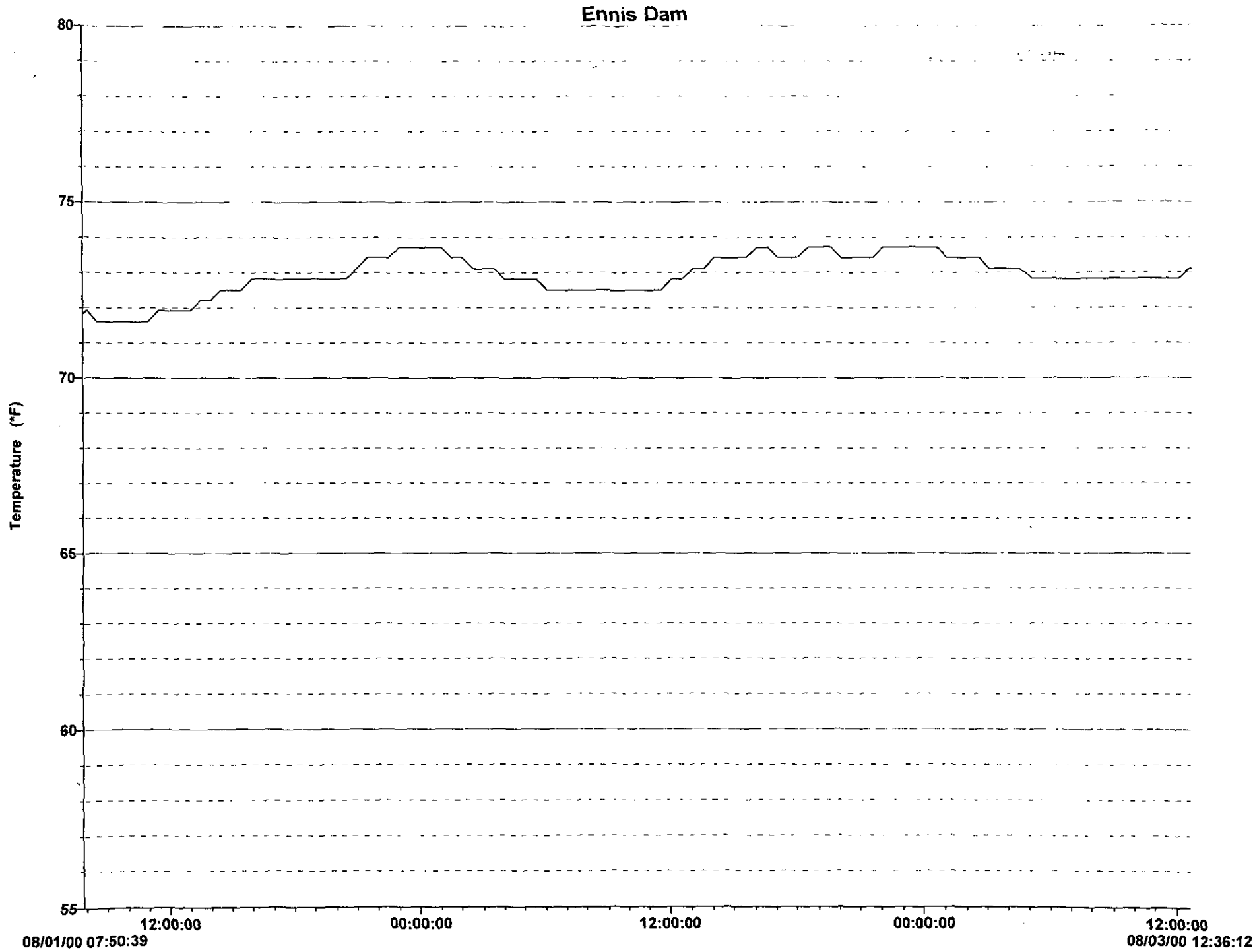

Kirby
80
75
70
65
60
55
Temperature (°F)
07/29/00 00:02:08
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/30/00 09:31:53

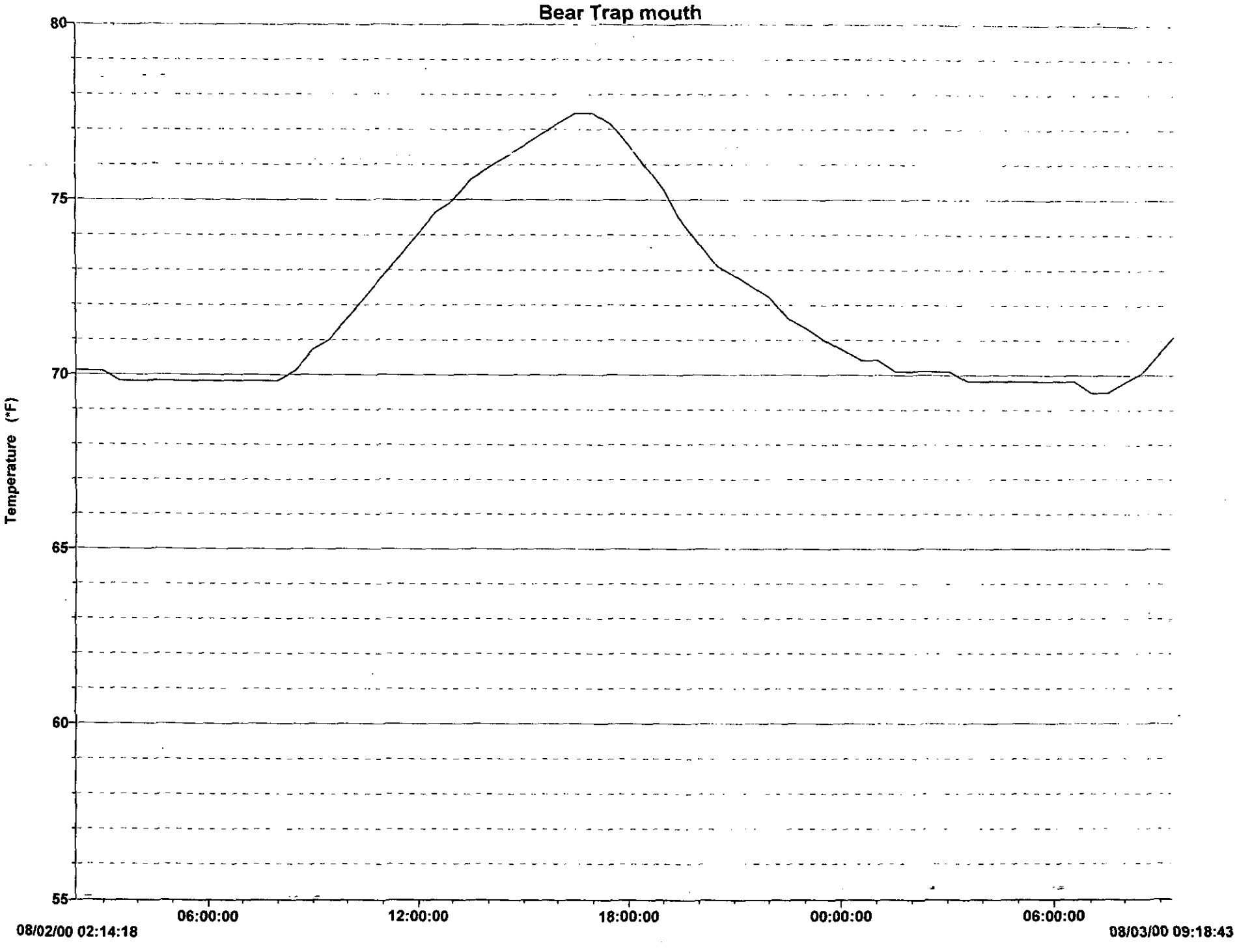

McAtee
80
75
70
65
60
55
Temperature (°F)
07/30
07/31
08/01
08/02
07/29/00 06:02:51
08/02/00 11:22:42

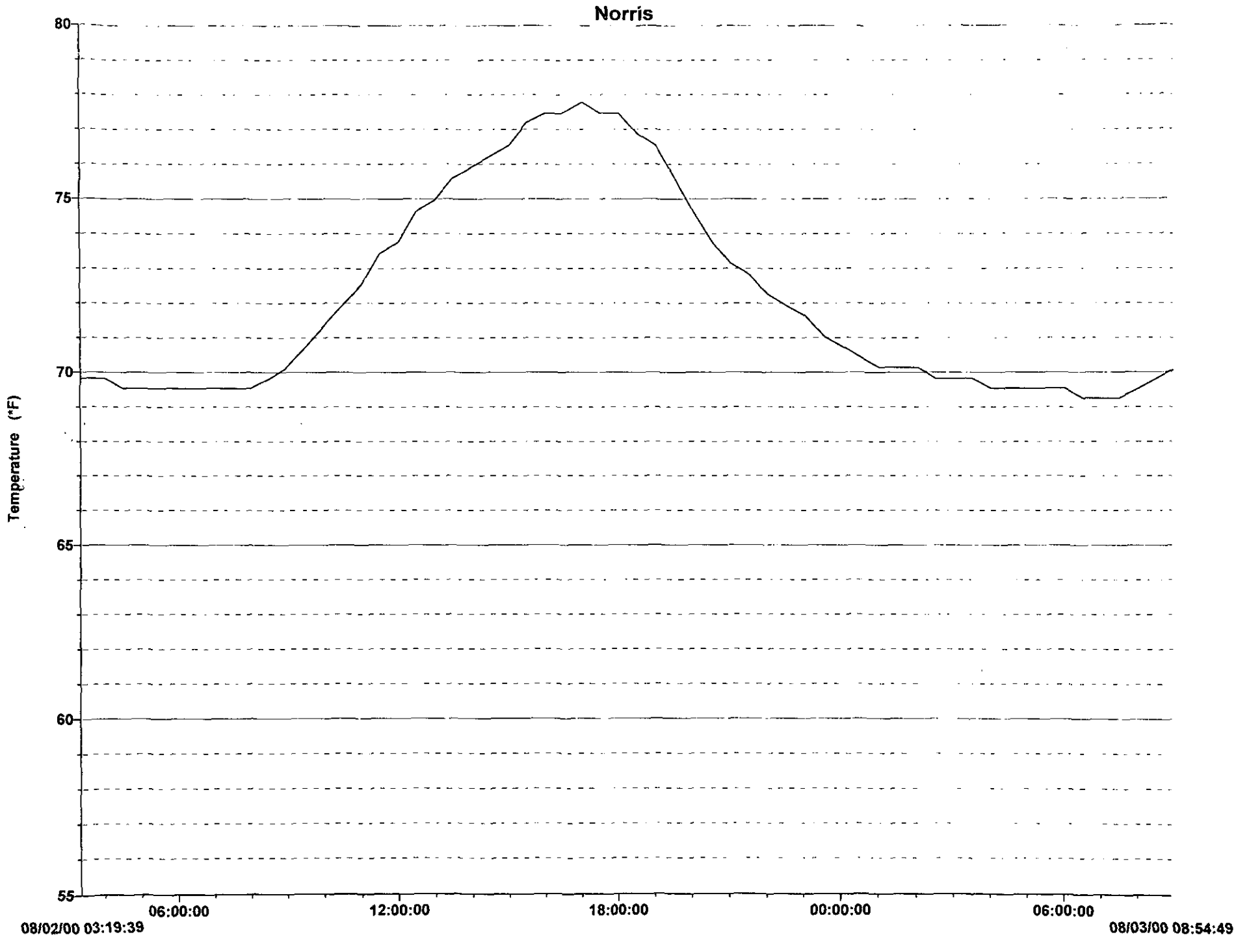

Ennis Bridge
80
75
70
65
60
55
Temperature (°F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
12:00:00
08/01/00 03:11:58
08/02/00 12:04:48

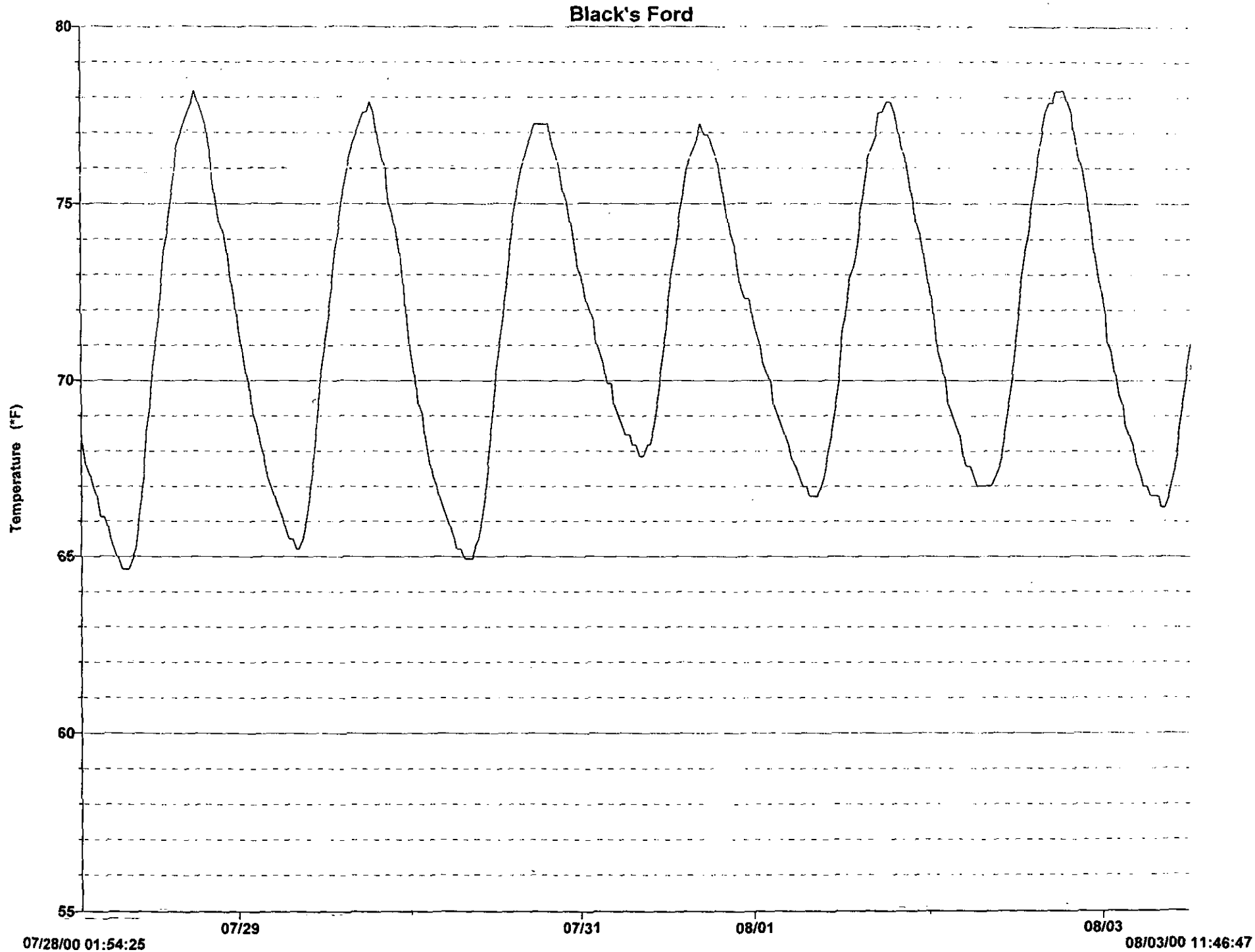

Ennis Reservoir Inlet
80
75
70
65
60
55
Temperature (°F)
07/29
07/30
07/31
08/01
07/28/00 02:21:23
08/01/00 09:49:16

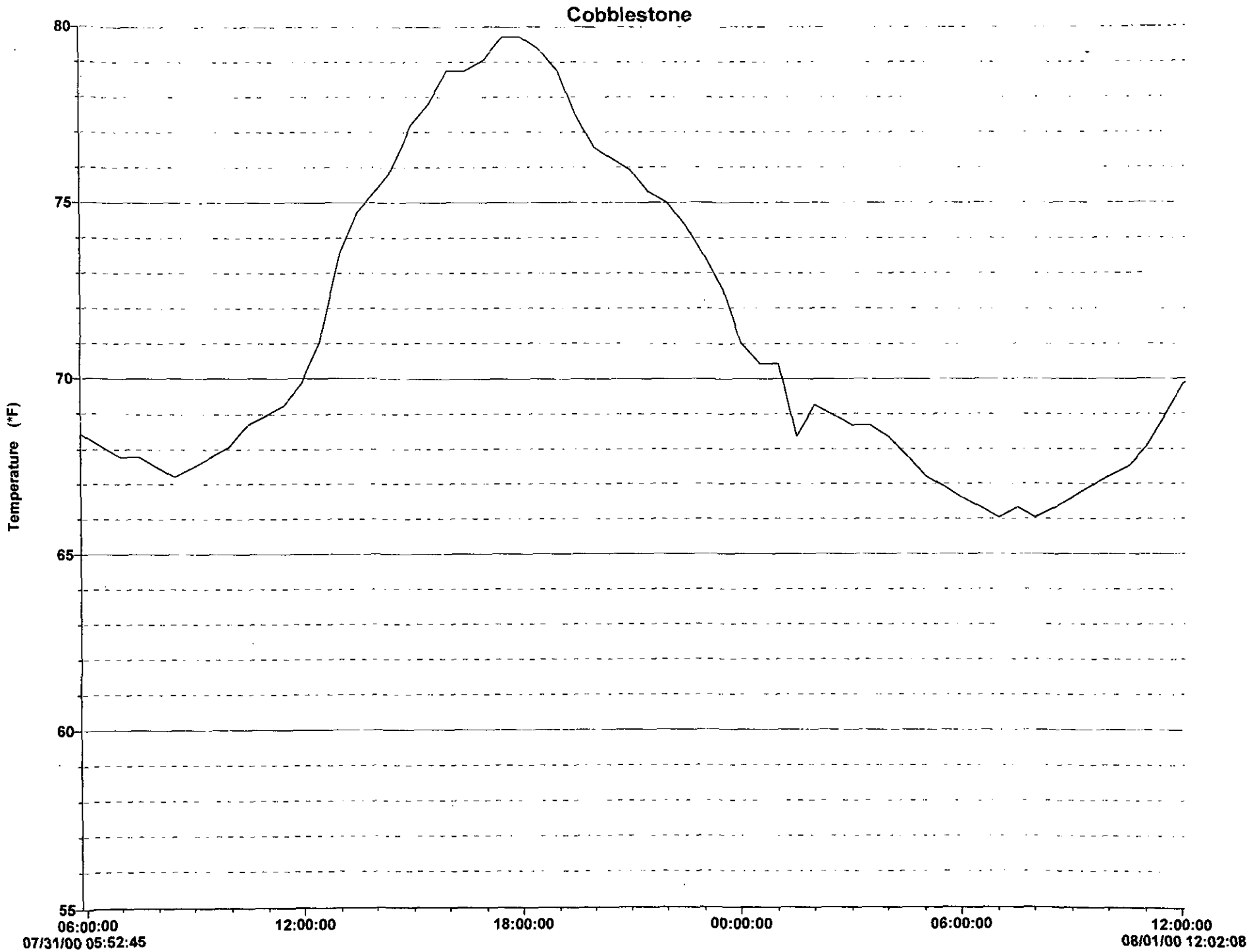

Ennis Reservoir Inlet
80
75
70
65
60
55
Temperature (°F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
08/10/00 03:41:04
08/11/00 10:13:47

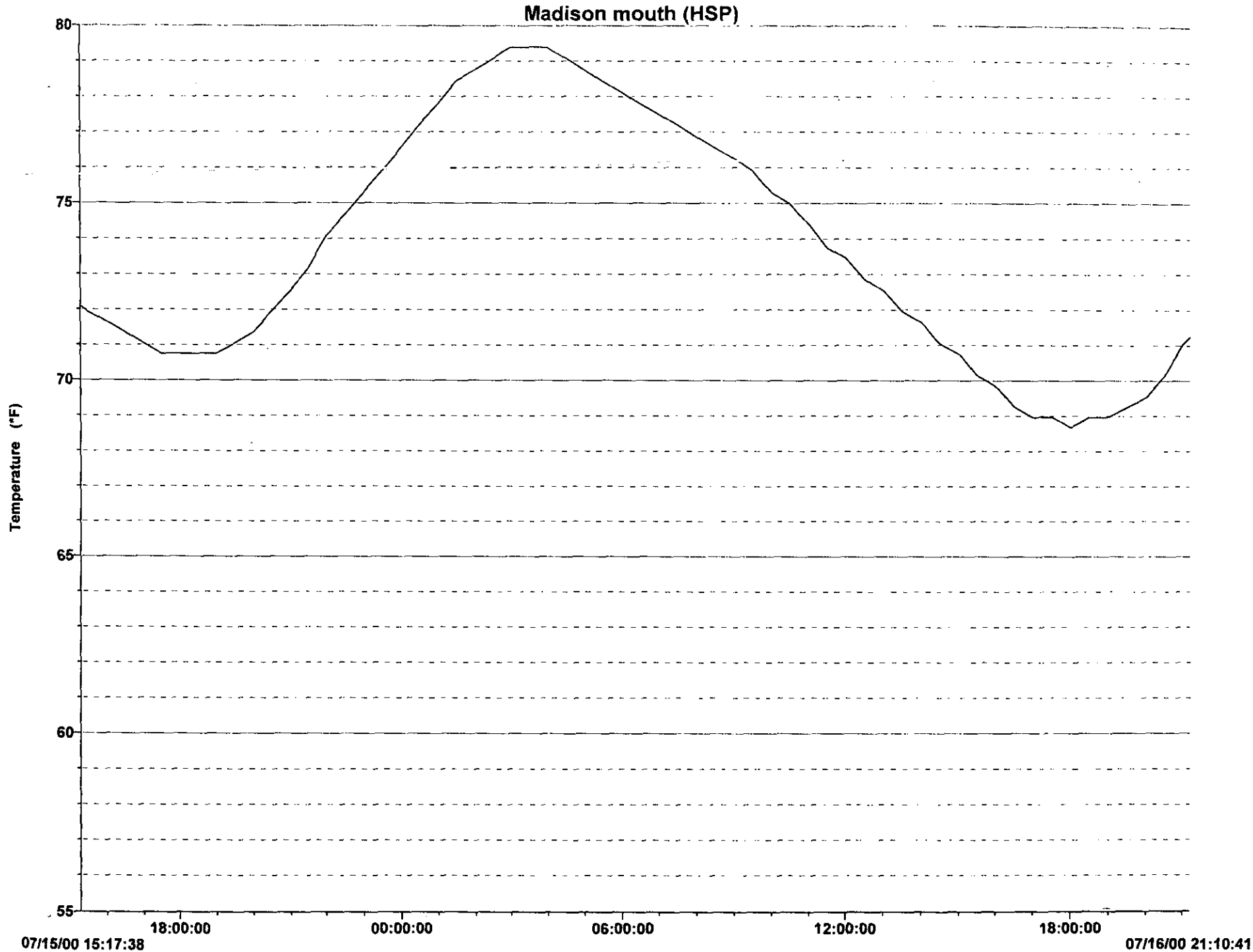

Ennis Dam
80
75
70
65
60
55
Temperature (°F)
12:00:00
00:00:00
12:00:00
00:00:00
12:00:00
08/01/00 07:50:39
08/03/00 12:36:12


Bear Trap mouth
80
75
70
65
60
55
Temperature (°F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
08/02/00 02:14:18
08/03/00 09:18:43


Norris
80
75
70
65
60
55
Temperature (°F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
08/02/00 03:19:39
08/03/00 08:54:49


Black's Ford
80
75
70
65
60
55
Temperature (°F)
07/29
07/31
08/01
08/03
07/28/00 01:54:25
08/03/00 11:46:47


Cobblestone
80
75
70
65
60
55
Temperature (°F)
06:00:00
07/31/00 05:52:45
12:00:00
18:00:00
00:00:00
06:00:00
12:00:00
08/01/00 12:02:08


Madison mouth (HSP)
80
75
70
65
60
55
Temperature (°F)
18:00:00
00:00:00
06:00:00
12:00:00
18:00:00
07/15/00 15:17:38
07/16/00 21:10:41

Appendix E

Summary of the Montana Board of Environmental Review Hearing Officer Recommendation of the Order Granting Summary Judgment to the Montana Department of Environmental Quality

1) A Montana Pollution Elimination System Discharge Permit is required to apply the fish toxicants to the water.

Pesticides are not a "pollutant" within the meaning of the Clean Water Act when they are used according to their safety label provided by the EPA. Therefore, their application, when in compliance with their label, does not require an MPDES permit or nondegredation hearing.

2) Statute MCA 75-5-317(2)(g), which provides an exemption from non-degradation review requirements, is unconstitutional.

The concern about outstanding resource waters, or "wholly within the wilderness area," is not an issue in this matter. With the statutory exemption from water quality statutes, there is an exemption from issues involving the nondegredation statute; one of which is the outstanding resource water designation. BER deleted from the Memorandum all discussion of the constitutional issues except the conclusion that BER cannot decide the constitutionality of a statute.

3) DEQ's decision to issue a series of short-term exemptions for the project is unlawful.

The project, as designed, is a series of independent annual events, each of which require separate permitting. The Final Order will include more language clarifying that each year of the project stands alone as a separate event and that FWP must obtain the necessary permits each year for the exemption from water quality standards. Additionally, DEQ is required to make a yearly report to BER for the progress of the project.

4) DEQ is required by MCA 75-5-308(1) to make a determination that the project is necessary, but failed to do so.

The term "if necessary" in statute 75-5-308 refers to the requirement of DEQ to decide whether the project needs an exemption from water quality standards, not whether there is a need for the project. BER found that DEQ made that determination in this case.

5) DEQ is required by MCA 75-5-308(1)(b) to make a determination that the trout to be killed during the project are "undesirable and non-native aquatic species", but failed to do so.

The authority to determine whether the trout presently in the project area are "undesirable and non-native aquatic species" rests with FWP, not DEQ or BER.