Madison River Drainage Fisheries

and

Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program

2006

Annual Report
to
PPL Montana
Environmental Division
Butte
www.pplmontana.com

and

Turner Enterprises, Inc.
Bozeman

by

Pat Clancey
Montana Fish, Wildlife, & Parks
Ennis
June 2007

Montana Fish, Wildlife & Parks

www.fwp.mt.gov

INTERNET WEB PAGES CITED IN THIS REPORT
(in alphabetical order)

Aquatic Nuisance Species Task Force……..www.anstaskforce.gov
Blue Ribbon Flies ……www.blueribbonflies.com
Ennis on the Madison Flyfishing Festival/Madison River Foundation…
www.ennisflyfishing.com
Lower Madison River Monitoring page….
www.madisondss.com/ppl-river.cfg/ppl-madison.php
Montana Fish, Wildlife, & Parks……..www.fwp.mt.gov
New Zealand Mudsnail in the Western USA……..
www.esg.montana.edu/aim/mollusca/nzms
Northwest Marine Technologies…….www.nmt.us
PPL Montana……...www.pplmontana.com
Protect Your Waters……www.protectyourwaters.net
Whirling Disease Foundation……..www.whirling-disease.org

MFWP personnel took all photos in this report unless otherwise credited.

FERC Articles addressed in this report

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EXECUTIVE SUMMARY

Beach seining for young-of-the-year Arctic grayling and mountain whitefish was not conducted in 2006 due to high winds throughout the Fall. Six Arctic grayling were captured in 108 worker hours of electrofishing. The US Fish & Wildlife Service committed to determining the T&E listing status of Arctic grayling by April 2007. In two sections of the upper Madison River, the estimated number of six inch and larger rainbow trout increased to their highest level since the impacts of whirling disease, and brown trout numbers remained high as well. In the lower river below Ennis Reservoir, rainbow trout numbers remain similar to numbers seen in the past two years, while brown trout numbers decreased to their lowest level in 10 years. An adequate water supply in 2006 allowed a flushing flow to be conducted in the river, the first such occurrence since FERC renewed the Project 2188 license in 2000. Water temperature was monitored at 14 sites and air temperature at 7 sites within the Madison Drainage. New Zealand mudsnails were found to be persistent throughout the river at low levels. Sentinel fish from captive stock are still severely infected by whirling disease in the river, but wild fish appear to be developing a resistance to the disease. The Sun Ranch hatchery was used to incubate eggs for the southwest Montana westslope cutthroat trout conservation and restoration program. In Spring 2006, the 2005 year class in the Sun Ranch Brood Pond was eliminated due to one hybrid fish used as a donor in parental crossings. The Cherry Creek Native Fish Introduction Project continued in 2006 with the second treatment of Phase 2. One hundred fifty 11-inch westslope cutthroat trout were stocked in Cherry Lake in September 2006, and eyed egg introductions began in Phase 1 of the project area. Concerned anglers and citizens conducted fish salvage in the West Madison Canal after the headgate was closed in the Fall.

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INTRODUCTION

Montana Fish, Wildlife, & Parks (MFWP) has conducted fisheries studies in the Madison River Drainage since 1990 to address effects of hydropower operations at Hebgen and Ennis dams on fisheries, and to assess the status of the Arctic grayling *Thymallus arcticus* population of Ennis Reservoir (Byorth and Shepard 1990, MFWP 1995, MFWP 1996, MFWP 1997, MFWP 1998a, MFWP 1999a, MFWP 2000, MFWP 2001, MFWP 2002, MFWP 2003, MFWP 2004a, MFWP 2005). This work has been funded through an agreement with the owner and operator of the dams, initially Montana Power Company (MPC), now PPL Montana. 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 direction 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. Each committee has an annual budget and authority to spend money that is provided to them by PPL Montana to address the requirements of PPL Montana's FERC license for operating the Madison & Missouri dams. The Madison Fisheries Technical Advisory Committee (MadTAC) 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.

During the late 1990's, numerous entities developed the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (MUCAWCTM). The MUCAWCTM, which was formalized in 1999 (MFWP 1999b), identifies Conservation & Restoration Goals and Objectives for westslope cutthroat trout (WCT) *Oncorhynchus clarki lewisi* in Montana. The Plan states "The management goal for westslope cutthroat trout in Montana is to ensure the long-term, self-sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana (Clark Fork, Kootenai, Flathead, upper Missouri, and Saskatchewan), and to maintain the genetic diversity and life history strategies represented by the remaining populations." Objectives are:

1. Protect all genetically pure WCT populations
2. Protect introgressed (less than 10% introgressed) populations
3. Ensure the long-term persistence of WCT within their native range
4. Providing technical information, administrative assistance, and financial resources to assure compliance with listed objectives and encourage conservation of WCT

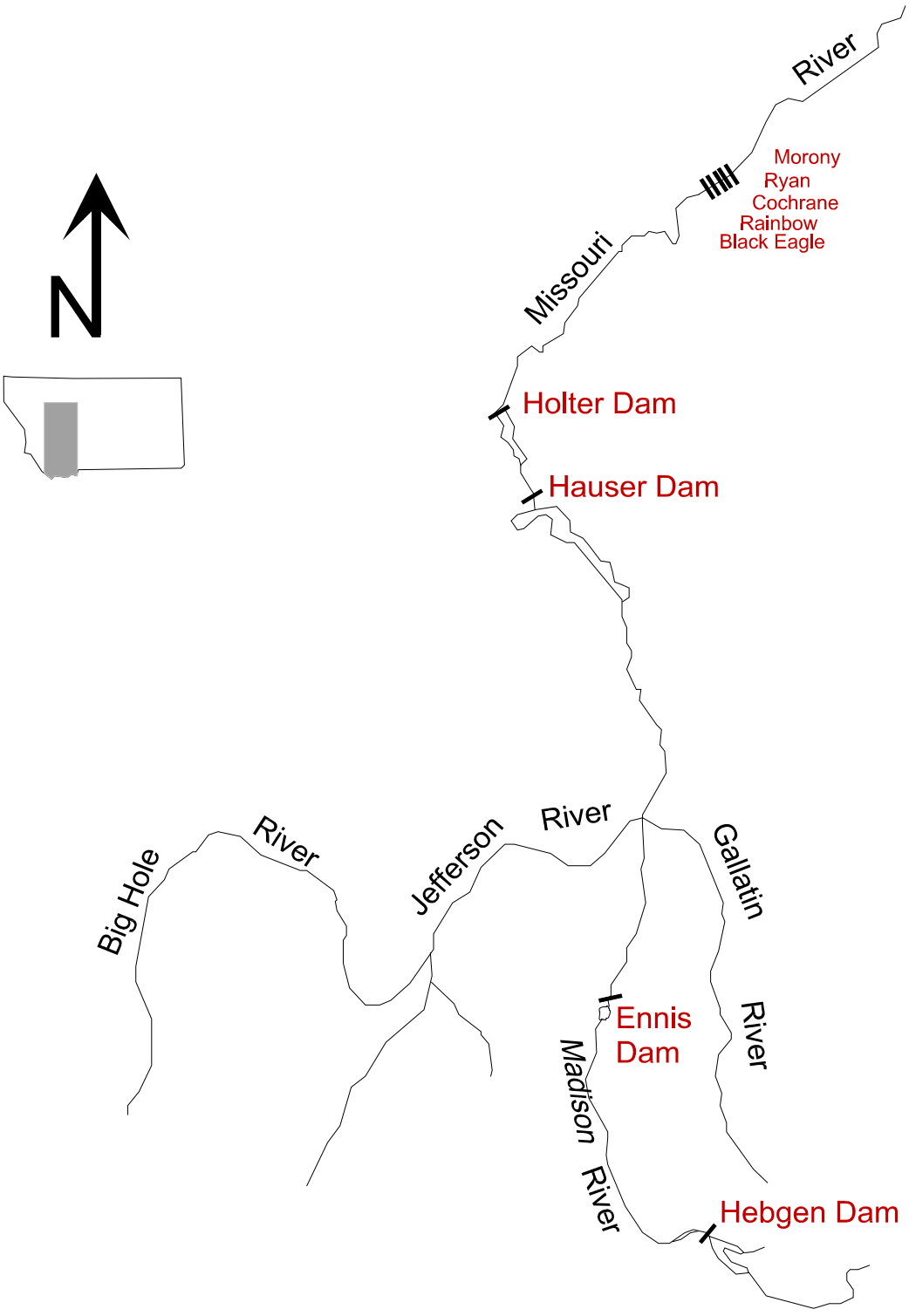


Figure 1. Locations of PPL Montana dams on the Madison and Missouri rivers (FERC Project 2188).

5. Design and implement an effective monitoring program by the year 2002 to document persistence and demonstrate progress towards goal

Objective 3 further states "The long-term persistence of westslope cutthroat trout within their native range will be ensured by maintaining at least ten population aggregates throughout the five major river drainages in which they occur, each occupying at least 50 miles of connected habitat…". Within the Missouri River Drainage, four geographic areas are identified, including the upper Missouri, which consists of the Big Hole, Gallatin, and Madison subdrainages.

Entities participating in the development of the MUCAWCTM were American Wildlands, Montana Chapter of the American Fisheries Society, Montana Department of Natural Resources and Conservation (MDNRC), Montana Farm Bureau, MFWP, Montana Stockgrowers Association, Montana Trout Unlimited, Montana Wildlife Federation, Natural Resource Conservation Service, BLM, USFS, USFWS, and private landowners.

In 2006, the MUCAWCTM was updated and combined with a similar document for Yellowstone Cutthroat Trout *Oncorhynchus clarki bouvieri*.

Late in 1996, MFWP initiated a 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 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 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 properties, Turner Enterprises, Incorporated (TEI) offered access to the Cherry Creek drainage on the Flying D Ranch to assess its suitability for introducing westslope cutthroat. Cherry Creek, a tributary to the Madison River, was identified as an opportune location to introduce genetically pure WCT, and it will provide an opportunity to meet or fulfill MUCAWCTM objectives 3, 4, & 5. 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 (Bramblett 1998, MFWP 1998b). 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. Administrative and legal challenges of the Cherry Creek Project delayed its implementation from 1999 - 2002. The project was successfully implemented in 2003.

In 2001, the Sun Ranch entered into an agreement to assist MFWP with westslope cutthroat trout conservation and recovery. The ranch built a small hatchery facility and a rearing pond to facilitate development of a westslope cutthroat trout broodstock for the Madison and Missouri river drainages, and provided personnel to assist with fieldwork and conduct hatchery operations.

METHODS

Madison Grayling

Most years a beach seine (Figure 2) is used to monitor index sites in Ennis Reservoir for young-of-the-year grayling and other fish species. Beach seining was not conducted in 2006 due to schedule conflicts, personnel conflicts, and frequent high waves caused by high winds that occurred throughout the Fall.

Figure 2. Beach seining in Ennis Reservoir.

In 2006, FWP crews conducted surveys for spawning grayling in the Madison River immediately upstream of Ennis Reservoir.

Population Estimates

Electrofishing from a driftboat mounted mobile anode system (Figure 3) is the principle method used to capture Madison River trout for population estimates in several sections of the Madison River (Figure 4). Fish captured for population estimates are weighed and measured, marked with a fin clip, and released. A log-likelihood statistical analysis (MFWP 2004b) is used to estimate trout populations.

Over the past two years, estimates for all sections and all years have been converted from age-based estimates to length-based estimates due partially to the major time requirement necessary to age fish, and to maximize the statistical probability that the estimates are accurate.

Figure 3. Electrofishing (shocking) in the Norris section of the Madison River.

Flushing Flow

Article 419 of the FERC license for the 2188 Project (PPL Montana dams on the Madison and Missouri rivers) requires the company to develop and implement a plan to coordinate and monitor flushing flows in the Madison River downstream of Hebgen Dam. A flushing flow is a flood stage of runoff that mobilizes streambed materials, resulting in scour in some locations and deposition in other locations. This is a natural and necessary occurrence in unregulated streams and rivers, and renews spawning, rearing, and food producing areas for fish, as well as providing fresh mineral soil for vegetation and other wildlife needs.

PPL Montana and consulting agencies, including FWP, have developed levels for runoff forecast and Hebgen storage volume that must be met to trigger a flushing flow. This group meets twice each spring to examine trigger conditions and determine if a flushing flow is possible. During these meetings, weather forecasts and other factors are examined to set the timing of the flushing flow in an attempt to coordinate releases from Hebgen Reservoir with peak runoff from Cabin and Beaver creeks and to set the duration and volume of the flushing flow. Implementation of a flushing flow in the river may delay filling Hebgen Reservoir.

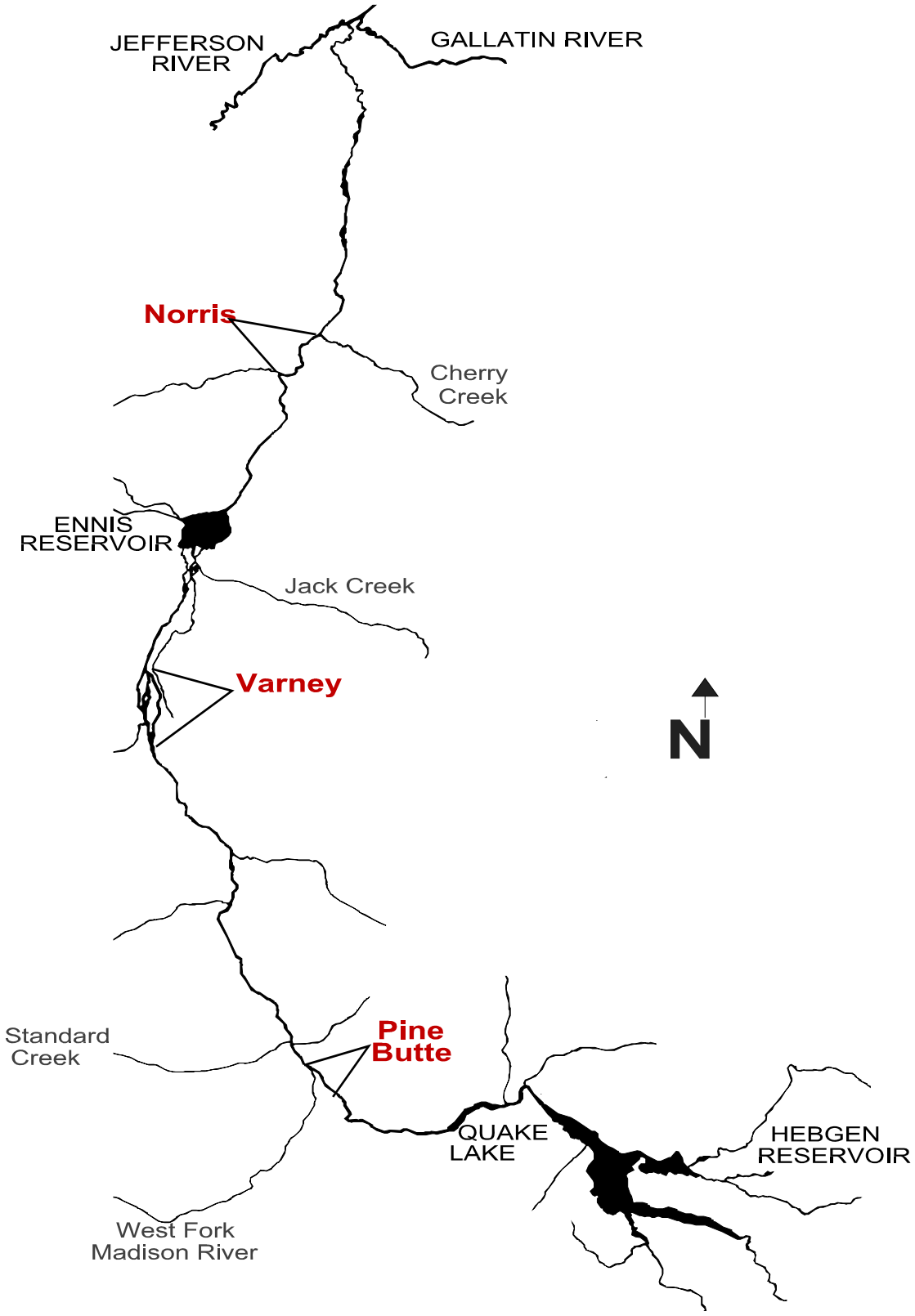


Figure 4. Locations of Montana Fish, Wildlife, & Parks 2006 Madison River population estimate sections.

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 in Fahrenheit every 30 minutes. 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 water temperature impacts to aquatic life.

PPL Montana has implemented a 'pulse flow' system in the Madison River below Ennis Reservoir to address high water temperature that could potentially cause fish kills. Real-time or near real-time meteorological and temperature monitoring is conducted at numerous sites. Data from these sites is used to predict water temperature the following day, which determines the volume of discharge that will occur. The increase in water volume in the lower river reduces the peak water temperature that would occur at the 1100 cfs base flow. Water is released from Ennis Reservoir in the early morning so that it is in the lower river during the warmest part of the day. Up to an additional 1300 cfs may be passed over the dam so that the lower river flows increase from 1100 cfs to 2400 cfs during the heat of the day, reducing the peak temperature. Discharge from Hebgen Dam typically does not fluctuate on a daily basis during pulse flows, but is occasionally adjusted to increase or decrease the volume of water going into Ennis Reservoir, where daily fluctuations in the lower river are controlled.

The meteorological and temperature data monitored in the lower river may be viewed in real-time or near-real time at http://www.madisondss.com/ppl-river.cfg/ppl-madison.php.

Aquatic Nuisance Species

Highway signs announce FWP's West Yellowstone Traveler Information System (TIS) (Figure 6). The five signs are located near major highway intersections in the West Yellowstone area, notifying drivers entering and leaving the area of the TIS system. The TIS notifies anglers and water recreationists of the presence of New Zealand mudsnails in the Madison River and Hebgen Reservoir, and instructs them on methods of reducing the likelihood of transporting New Zealand mudsnails and other ANS to other waters. Additional messages broadcast by the system include messages on whirling disease, zebra mussels, weed control, and TIPMont, the FWP hotline to report hunting & fishing violations. The system broadcasts at the AM frequency of 1600 KHz. Funding for the purchase, installation and signage of the system was provided by a $9,800 grant from the Pacific States Marine Fisheries Commission as part of an effort to prevent the westward spread of zebra mussels.

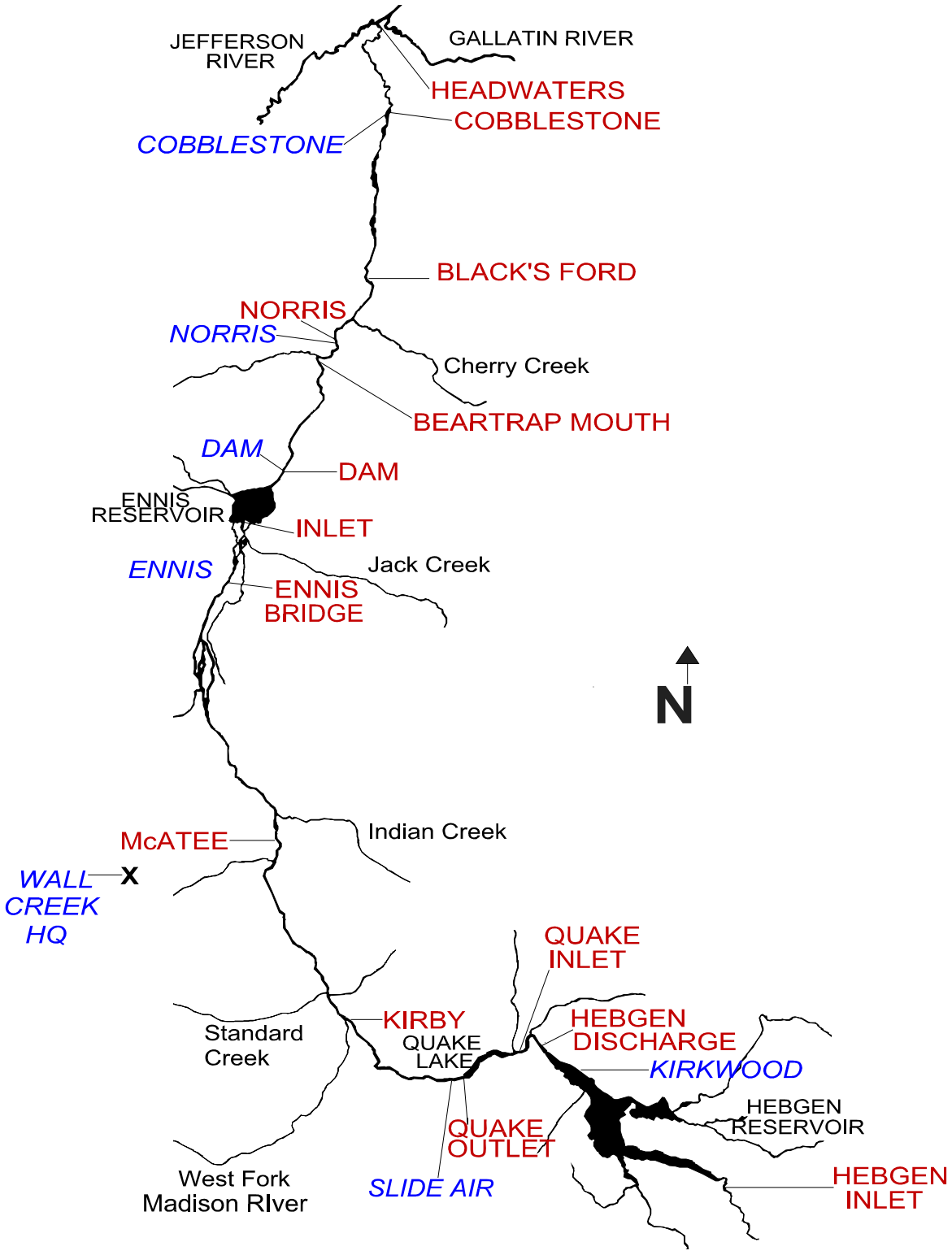


Figure 5 . Locations of Montana Fish, Wildlife, & Parks annual temperature monitoring sites. Air temperature sites are blue, water temperature sites are in red.

Figure 6. Roadside sign announcing the Traveler Information System at West Yellowstone.

The State of Montana hired an Aquatic Nuisance Species Coordinator in 2004. The position is responsible for developing and coordinating ANS control & management activities among state agencies as well as between state and non-state entities. The ANS Coordinator is responsible for developing and coordinating Hazard Analysis and Critical Control Point (HACCP) Training to State employees and other groups. The HACCP Program is a method to proactively plan and implement measures to prevent the inadvertent spread of ANS during work activities. The ANS Coordinator is an employee of FWP.

New Zealand Mudsnails

New Zealand Mudsnails have spread throughout the Madison River since first detected in 1994. PPL Montana and FWP each maintain monitoring sites at various locations within the Madison Drainage.

Whirling Disease

Whirling disease monitoring has been conducted in the Madison River since 1996 by using sentinel cage techniques. Each cage holds 50 young-of-the-year rainbow trout for 10 days. At the end of the 10 day period, fish are transferred to whirling disease free water in a laboratory where they are held until they are 90 days old, at which time they are euthanized and sent to the Washington Animal Disease Diagnostic Lab (WADDL) for analyses. Juvenile rainbow trout used in the studies are not offspring of Madison River fish, but are from the same captive stock used since studies began in 1996. This stock has been used continuously over the years to allow comparison over time and between various rivers.

Dave Kumlien, Executive Director of the Whirling Disease Foundation, presents two articles regarding whirling disease on the Blue Ribbon Flies webpage. These articles summarize some of the advances that have been made by whirling disease researchers and additional information that is needed. To view these and other articles, go to www.blueribbonflies.com, click on Journal, then on Articles and Essays.

Westslope Cutthroat Trout Conservation and Restoration

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

The Madison District of the U.S. Forest Service conducted two projects to benefit westslope cutthroat trout and to restore stream habitat in tributaries to the Madison River. Grant money from the PPL Montana relicensing agreement paid for materials and operations, and members of the Madison River Foundation, the Madison-Gallatin Chapter of Trout Unlimited, and the Montana Conservation Corps provided labor.

Sun Ranch Westslope Cutthroat Trout Brood

Gametes (eggs & sperm) for the Sun Ranch Westslope Cutthroat Trout program were collected from two streams and from the Sun Ranch Pond in 2006. All fertilized eggs were transported to the Sun Ranch Hatchery for incubation and hatching (Figure 7), and a portion of the resulting fry were introduced to the Sun Ranch Brood Pond (Figure 8) to contribute to the Sun Ranch brood development. Fry from the Sun Ranch Pond broodstock were used for introductions in Cherry Creek and stocked into the pond to facilitate development of the Sun Ranch brood.

The Sun Pond was drawn down in 2006 to facilitate elimination of the 2005 year class. A genetically pure population was used two successive years as donors to the Sun Ranch program. One donor male used in 2005 was found to be a hybrid, so the entire year class had to be eliminated because fry from different donor sources are indistinguishable from one another.

Occasionally, when project personnel are unavailable to do so, USFWS personnel from the Ennis National Fish Hatchery caretake the eggs or fry at the Sun Ranch Hatchery. Generally, this requires few days each year, but is an important contribution to the program.

Surplus fry from the Sun Pond brood were held in net cages under the ice to conduct disease tests in the pond. The intent was to hold the fish through the winter into the following spring until they were at least 4 inches, then to remove tissue samples for disease analysis. Three cages with 40 fry each were placed in the pond in early October and checked periodically to remove algal growth from the fine-mesh cages and to check fish survival.

Cherry Creek Native Fish Introduction Project

The Cherry Creek Native Fish Introduction Project was initiated in 2003. The project area is comprised of over 60 miles of stream habitat and the 7-acre, 105 acre-foot Cherry Lake, and includes all of the Cherry Creek Drainage upstream of a 25-foot waterfall approximately 8 miles upstream of the Madison River confluence (Figure 9). Species present in the project area are brook trout, rainbow trout, and Yellowstone

Figure 7. Sun Ranch Hatchery rearing troughs.

Figure 8. Sun Ranch Brood Pond.

Figure 9. Cherry Creek waterfall at stream mile 8.0. This falls is the downstream extent of the project area.

cutthroat trout (YCT) (Figure 10). The large size of the project area requires that the project be completed in phases. Each phase will be treated for at least two consecutive years. Phase 1 was treated in 2003 & 2004, Phase 2 in 2005 & 2006.

Preparatory fieldwork consisted of determining stream flow time, placing application station markers, posting sentinel fish, setting up the detoxification station, and some electrofishing to assess thoroughness of previous years treatments. Bioassay results from 2003 are available (MFWP 2004a). Fintrol was applied to streams in 2006 at 10 ppb, the same concentration used in all previous years. Treatments were initiated on August 1.

Stream discharge for stream treatments was measured following standard USGS protocols, and a staff gauge was temporarily put in place to determine if discharge changed appreciably during or prior to treating a given section of stream. Discharge was measured in a stream section the evening prior to treatment of that section, which allowed calculation and preparation of the piscicide that night or the next morning.

Stream treatments were made using trickle application systems (Figure 11). The system consists of a 3½ gallon plastic bucket & lid, garden hose, a gate valve, and a commercially available automatic dog watering bowl. A plastic elbow is fixed to a hole drilled in the bottom of the bucket, a short section of garden hose and the gate valve is clamped to the elbow (Figure 12), and a longer section of garden hose attached the assembly to the dog waterer. The bucket is partially filled with filtered stream water, the Fintrol is added, then the bucket is topped off with filtered stream water and stirred with a wooden dowel. At a predetermined time, the gate valve is opened, allowing the mixture

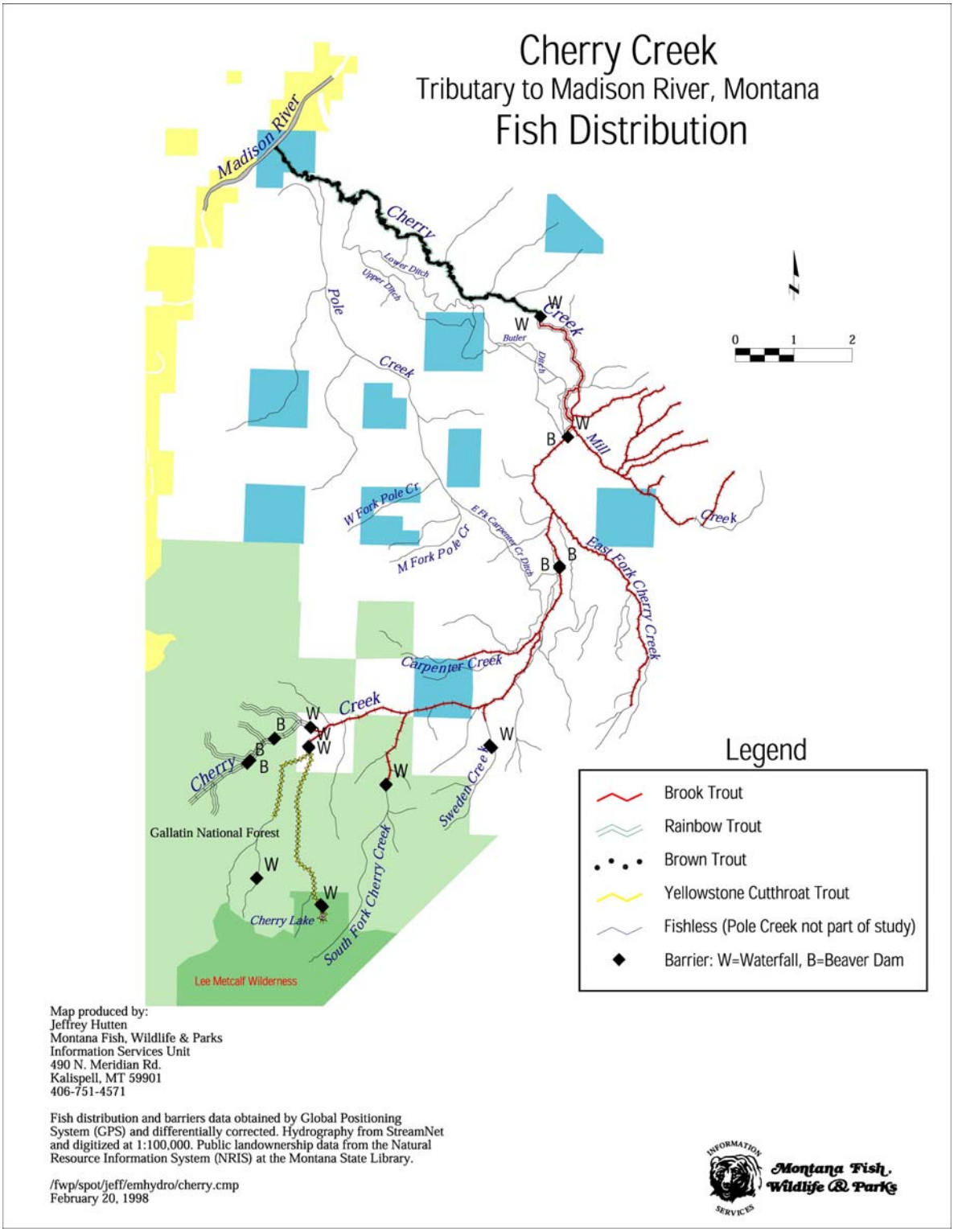


Figure 10. Cherry Creek Drainage. Landownership patterns have changed since this map was produced.

Figure 11. Trickle system and sentinel fish bag on Cherry Lake Creek. The sentinel fish bag is upstream of the Fintrol application point to monitor the effectiveness of the station above the one shown here.

Figure 12. Elbow & gate valve assembly.

to flow into the bowl, where it then trickles into the stream through a small hole drilled in the bottom of the bowl (Figure 13). Typically, one bucket empties in 3 to 3½ hours. Applications are designed using a 7-hour application period, so the bucket must be refilled and the process repeated once at each application point each day.

Figure 13. Close-up view of the dog waterer trickling Fintrol mixture into the stream during the Cherry Creek Project.

Stations were placed at selected points along the stream and started at predetermined times to coordinate application of the mixture with the other stations along the stream. Backpack sprayers were used each day to treat off-channel water and larger pools. The 5 gallon sprayers were filled with water and Fintrol mixture in the same manner as the stationary trickle systems, with 10 ml Fintrol per 5 gallons (18,927 ml) water, so the Fintrol concentration in the spray tank was 528,346 ppb, necessitating only small amounts of spray from the backpack sprayer to treat standing water areas.

Westslope cutthroat eggs from one wild donor stream, the Sun Ranch brood, and the Washoe Park Hatchery were reared to the eyed stage then placed in remote streamside incubators (RSI) (Figure 14) in both forks of Phase 1. Eggs completed incubation in the RSI, hatched, and fry departed the RSI into the stream under their own power. The RSI is plumbed to allow stream water to flow into the bottom of a bucket, flow up through an artificial substrate where the eggs are placed, and out of the RSI near the top of the bucket. When ready to enter the stream, fry follow the water out the hole near the top of the bucket.

In 2006, a capture bucket was placed on the outflow of the RSI to capture and enumerate departing fry to allow estimates of survival in the RSI.

Figure 14. Remote streamside incubator (round bucket) and capture bucket (square bucket) in Cherry Creek

Fish Entrainment

Efforts have been initiated to evaluate fish entrainment into irrigation ditches along the Madison River. Ditches are observed from public roads or where they traverse across public land, or with permission of the water right holders. Surveys are conducted in the fall to determine if significant numbers of fish enter into ditches and become stranded after the headgate is closed, thus lost to the river population. Surveys are conducted annually for at least several years, and will also be conducted as drought diminishes and normal and high water years occur.

RESULTS AND DISCUSSION

Madison Grayling

Beach seining in Ennis Reservoir for young-of-the-year Arctic grayling was not conducted in 2006 due to schedule conflicts, personnel conflicts, and frequent high waves caused by high winds that occurred throughout the Fall. A summary of previous years seining is presented in Appendix A.

Electrofishing surveys for spawning grayling in the Madison River in April 2006 yielded six grayling in 108 worker-hours of effort. A similar effort in 2004 yielded 19 grayling in approximately 120 worker-hours.

Arctic grayling require loose, recently scoured gravels and cobbles to broadcast their eggs over during spawning each spring (Byorth and Shepard 1990). Generally, normal spring runoff creates these conditions, but it is possible that winter and spring ice scour also make such conditions available. The duration and severity of the Madison River ice gorge (Figure 15) may affect the spawning success of the Ennis Reservoir grayling.

Figure 15. The Madison River at the U.S. Highway 287 Bridge at Ennis, illustrating ice-gorged and ungorged conditions.

The USFWS is re-evaluating the petition to list fluvial Arctic grayling as a Threatened species in light of a lawsuit filed in 2003 by the Center for Biological Diversity (CDB). The USFWS has proposed to CBD that they will complete a listing review by April 2007. A listing would likely include all grayling populations construed to be fluvial (river-dwelling), either through behavioral traits or genetic similarity to Big Hole River fluvial grayling. Madison grayling are genetically very similar to Big Hole fish, but exhibit adfluvial behavior. They reside in Ennis Reservoir all year except when they enter the Channels area of the Madison River in April to spawn.

Genetic differences between organisms are measured on a scale ranging from 0 (alleles at all loci are identical) to infinity (alleles at all loci are different). An allele is a variable form of a gene. Arctic grayling populations across Montana and Wyoming exhibit very little genetic variation from one another (Leary 1990). The maximum distance between all grayling populations examined (fluvial and adfluvial) is 0.0132.

MFWP has developed a Candidate Conservation Agreement with Assurance (CCAA) for fluvial Arctic grayling in the Big Hole Drainage. Landowners who sign onto the CCAA must develop and implement pro-active site-specific land management conservation measures in cooperation with agencies that will reduce or eliminate detrimental habitat conditions for the grayling. If the grayling subsequently becomes listed as a Threatened or Endangered species, participating landowners will not be required to take additional measures on their property beyond those identified in their plan.

Population Estimates

Population estimates were conducted in the Norris section in March and in the Pine Butte and Varney sections in September (Figure 4).

Figures 16-18 illustrate population levels of six inch and larger rainbow trout per mile from 1995 – 2006 for the three estimate sections, and Figures 19-21 illustrate numbers six inch and larger of brown trout during the same time period. In 2006, the population of six-inch and larger rainbow trout in the Pine Butte and Varney sections of the upper river attained their highest levels since the impacts of whirling disease. Brown trout numbers also remained high in Pine Butte and Varney. In the Norris section, rainbow trout numbers increased slightly while brown trout numbers decreased to their lowest level in ten years.

In 2005, FWP Regional Management personnel began reporting population numbers greater than six inches rather than using fish length to assign fish as yearling or two year old & older. Appendix B1 contains charts illustrating fish numbers as yearling and two year old & older fish per mile as reported in previous years of this report (MFWP 1995 – 2005). Appendix B2 contains historic total population levels of two year old & older rainbow and brown trout (+ 80% C.I.) for each section.

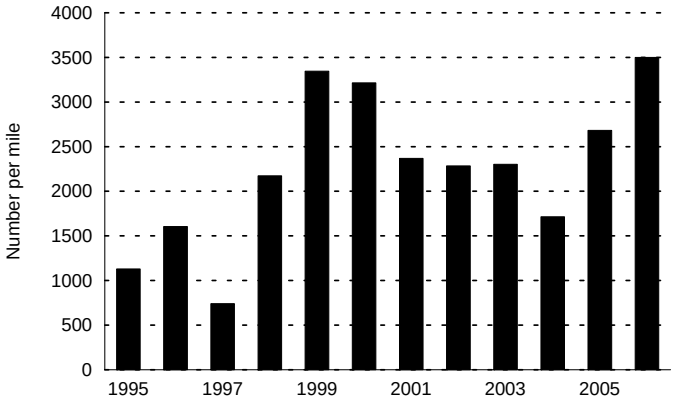


Figure 16. Rainbow trout (≥ 6") estimates in the Pine Butte section of the Madison River, 1995–2006, fall estimates.

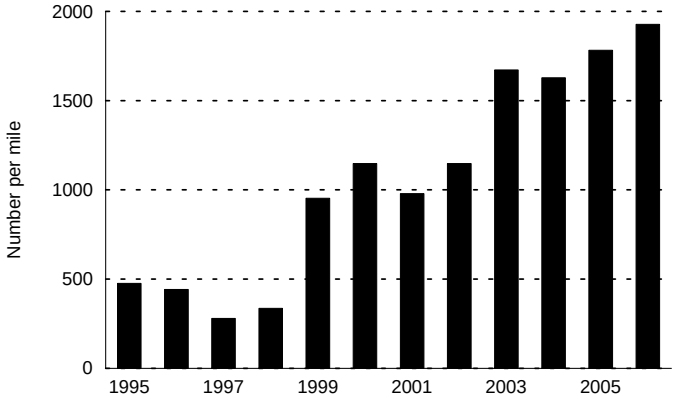


Figure 17. Rainbow trout (≥ 6") estimates in the Varney section of the Madison River, 1995–2006, fall estimates.

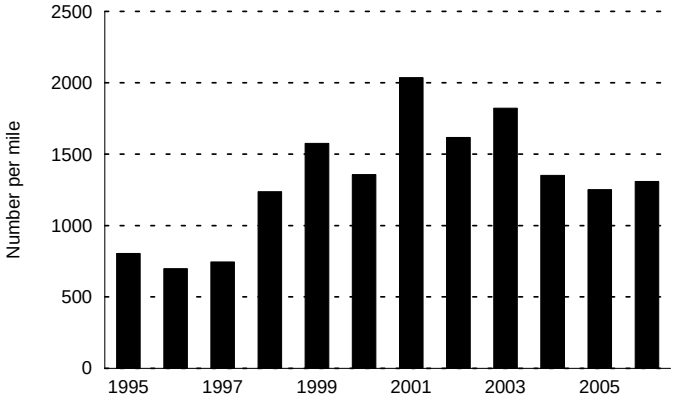


Figure 18. Rainbow trout (≥ 6") estimates in the Norris section of the Madison River, 1995–2006, spring estimates.

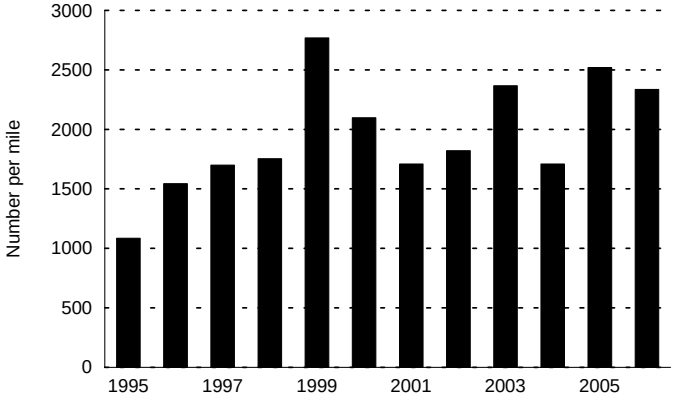


Figure 19. Brown trout (≥ 6") estimates in the Pine Butte section of the Madison River, 1995–2006, fall estimates.

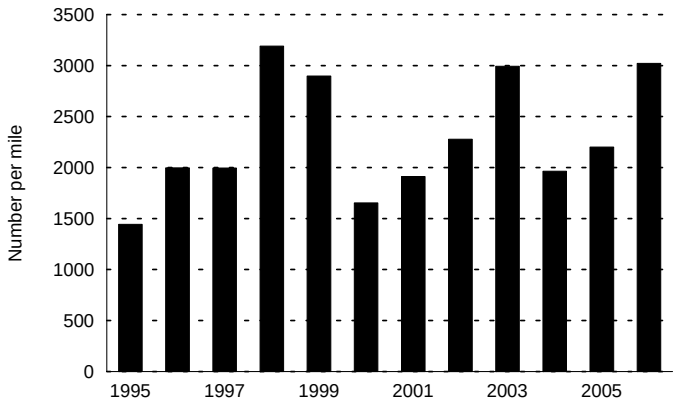


Figure 20. Brown trout (≥ 6") estimates in the Varney section of the Madison River, 1995–2006, fall estimates.

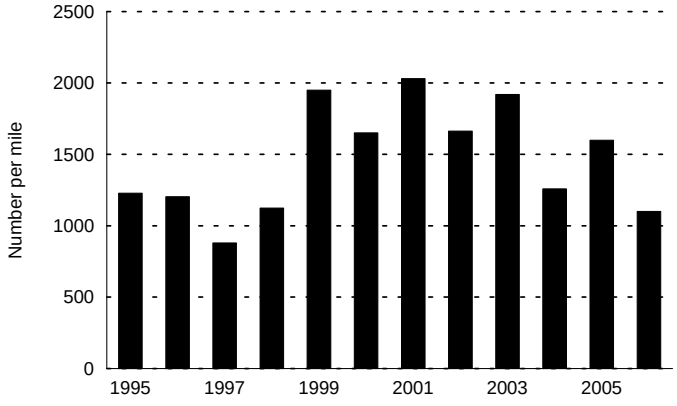


Figure 21. Brown trout (≥ 6") estimates in the Norris section of the Madison River, 1995–2006, spring estimates.

Flushing Flow

A flushing flow was conducted in the Madison River May 22-25, 2006. This was the first flushing flow conducted as ordered in the FERC license. Releases from Hebgen Reservoir were increased from a daily average of 1100 cfs on May 21 to a daily average of 2,400 cfs on May 25 (Figure 22). The releases from Hebgen resulted in peak discharge in the upper river at Kirby (Figure 5), just upstream of the West Fork, of 3360 cfs on May 26, and in the lower river just below Ennis Reservoir of 5,230 cfs on May 27. Releases from Hebgen were limited to avoid exceeding a 3,500 cfs discharge at Kirby. The FERC license mandates that river discharge not exceed 3,500 cfs at Kirby out of concern for stability of the Quake Lake Dam. The Gallatin National Forest, managers of the Quake Lake Dam, along with PPL Montana, FWP and other agencies, have contracted with the U.S. Geological Survey to re-survey Quake Lake dam to determine it's stability and gather information to re-assess the 3,500 cfs limit at Kirby.

During the flushing flow, Hebgen Reservoir elevation increased slightly more than one foot, while Ennis Reservoir elevation decreased about ½ foot.

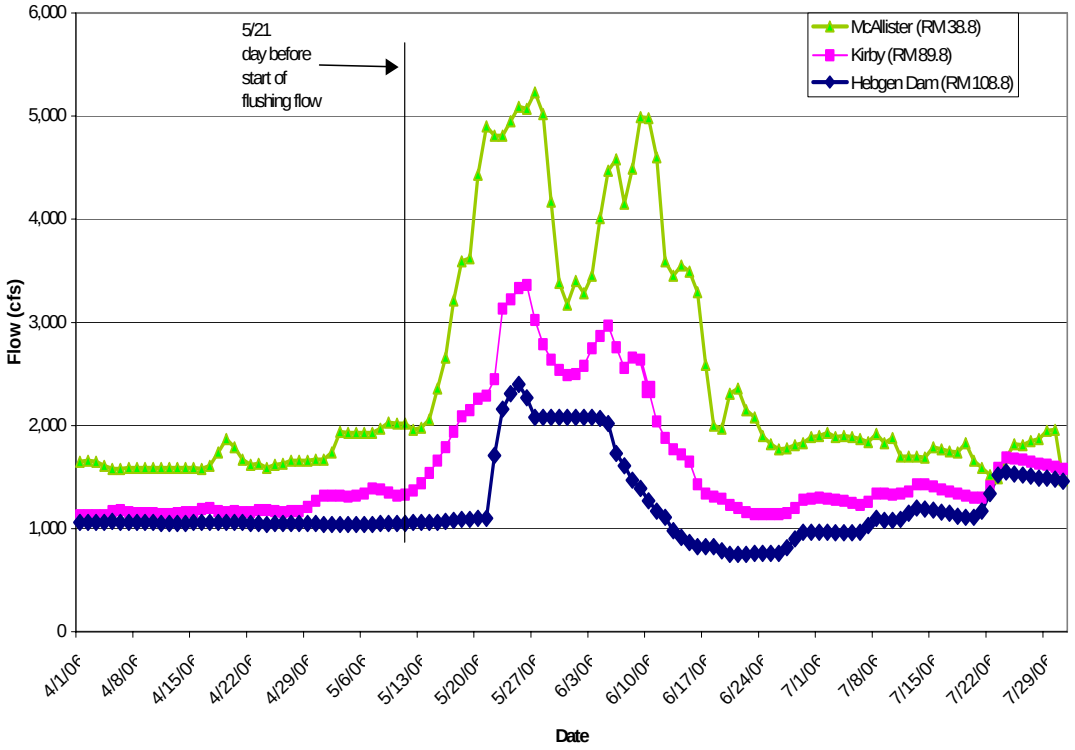


Figure 22. Discharge (cubic feet per second (cfs)) at three stations on the Madison River during the May 22-25, 2006 flushing flow. In the legend, RM = river miles upstream from the river mouth. Figure from PPL Montana.

Temperature Monitoring

Optic StowAway temperature recorders were deployed throughout the Madison River to document air and water temperatures (Figure 5). Table 1 summarizes the data collected at each location in 2006. Appendix C1 contains thermographs for each location, Appendix C2 contains thermographs at selected locations showing the 24-hour diurnal temperature fluctuation of each site around the warmest date of the year.

Aquatic Nuisance Species

The annual economic cost of invasive species in the United States is estimated to be nearly $120 billion (Pimentel et al 2005). It is estimated that about 42% of the species on the Threatened or Endangered species lists are at risk primarily because of alien-invasive species.

In 1994, two invasive species were detected in the Madison Drainage – New Zealand mudsnails (*Potamopyrgus antipodarum*) and whirling disease (*Myxobolus cerebralis*). Montana has an active multi-agency ANS program coordinated through FWP (Appendix D).

FWP ANS personnel conducted a broad survey throughout the Madison River primarily focusing on zebra mussels and Eurasian milfoil, but also for other ANS. None were found.

<u>New Zealand Mudsnails</u>

Montana's ANS Coordinator sampled for NZMS at numerous sites on the Madison River between Varney and Greycliff FASs. All sites were positive, but densities remained extremely low.

The Montana Aquatic Species Coordinator has developed a plan to address New Zealand mudsnails. Specifically, these actions include:

1) Listing New Zealand mudsnails as a Prohibited species in Montana.
2) Assisting in development of a regional management plan for New Zealand mudsnails, an important portion of which will describe actions to be undertaken when New Zealand mudsnails are found in or near a hatchery.
3) Establishing statewide monitoring efforts.
4) Conducting boat inspections at popular FAS, many of which are on the Madison River. This effort assists with public education/outreach and also ensures boats are not spreading New Zealand mudsnails or other ANS.
5) Purchasing portable power washing systems for cleaning boats and trailers at fishing access sites.

The MFWP Fisheries office in Ennis uses a power washer to clean project equipment to reduce the chance of spreading ANS through work activities.

NZMS have been detected in one private hatchery, but have not been found in any state or federal hatcheries. Strategies have been implemented to prevent the spread of NZMS from the private hatchery. The spread of New Zealand mudsnails has slowed and appears to be confined to east of the Continental Divide.

Table 1. Maximum and minimum temperatures (^{o}F) at selected locations in the Madison River Drainage, 2006. Air and water temperature data were recorded every 30 minutes from April 28 –October 10 (7944 readings). Thermographs for each location are in Appendix C1.

	Site	Max	Min
Water	Hebgen inlet	79.79	44.21
	Hebgen discharge	64.24	37.21
	Quake Lake inlet	64.57	36.46
	Quake Lake outlet[1/]	NA	NA
	Kirby Bridge	68.41	36.49
	McAtee Bridge	71.55	36.14
	Ennis Bridge	72.51	39.28
	Ennis Reservoir Inlet	75.98	38.00
	Ennis Dam	76.20	46.85
	Bear Trap Mouth	78.46	45.20
	Norris	79.35	44.91
	Blacks Ford	80.31	44.06
	Cobblestone	81.26	44.06
	Headwaters S.P.[2/] (Madison mouth)	80.16	43.97
Air	Kirkwood Store	100.56	25.88
	Slide	100.72	29.24
	Wall Creek HQ	94.98	26.56
	Ennis[3/]	NA	NA
	Ennis Dam[4/]	81.54	31.52
	Norris	100.79	28.37
	Cobblestone	93.16	26.56

[1/] Quake outlet data recorder was stolen between July 6 and October 10.
[2/] Headwaters State Park data recorder was dewatered from August 22 through September 14. These data are omitted from the table and appendix figures.
[3/] Ennis air temperature recorder ceased operating after four days, despite a properly functioning indicator light
[4/] Ennis Dam air temperature recorder ceased operating on July 13, yielding 3660 data points.

Additional information on Aquatic Nuisance Species is on the web at www.anstaskforce.gov and www.protectyourwaters.net, and for New Zealand mudsnails specifically, is available at www.esg.montana.edu/aim/mollusca/nzms.

Whirling Disease

Caged young-of-the-year rainbow trout in the Madison River continue to exhibit high infection rates & severity, with average spring and early summer histology scores exceeding 4.0 according to the MacConnell- Baldwin Scale (Appendix E). However, the juvenile rainbow trout used in the sentinel cage studies are not offspring of Madison River rainbow trout, but are from the captive stock that has been used in sentinel cages since studies began in 1996. The high infection rate exhibited by this captive stock shows that whirling disease is still at high levels in the Madison River, but offspring of Madison River rainbow trout appear to be developing a resistance to whirling disease. In 1998, and again in 2004, eggs were collected from spawning rainbow trout near the Slide Inn below Quake Lake and the resulting fry exposed to a controlled number of TAMs in the Wild Trout Laboratory in Bozeman. Fry from the 2004 spawners exhibited a lower proportion of fish in the highly infective categories compared to those from 1998 (Figure 23). For rainbow trout, average histology scores above 2.5 are associated with high mortality of young-of-the-year and significant decreases in population. In Figure 23, the average histology score of the 1998 test fish is 4.13, while that of the 2004 test fish is 2.42.

Vincent (2007) speculates that high levels of whirling disease spores persist in the Madison River because some rainbow trout produced in the late 90's through early 2000's still survive in the river, and their offspring are not resistant. He further speculates that as those older fish fall out of the spawning population, only fish that have developed resistance to whirling disease will remain, and the number of whirling disease spores in the river will diminish.

Information on whirling disease, including numerous links, is available online at www.whirling-disease.org.

Westslope Cutthroat Trout Conservation and Restoration

Habitat projects conducted by the Madison Ranger District of the Beaverhead-Deerlodge National Forest are summarized in Appendix F.

Sun Ranch Westslope Cutthroat Trout Program

Survival of the sentinel fish in the Sun Ranch Brood Pond was high until late December 2005, when 25 fish were found dead. Subsequent checks of the cages revealed higher than expected mortality through January and into February. Mortalities collected in early February were analyzed by a U.S. Fish & Wildlife pathologist who reported the fish were dying of gas-bubble disease. Measurements of the pond water under the ice revealed nitrogen levels as high as 116%, and after ice-off as high as 106%. Staigmiller (2007) states that chronic nitrogen levels as high as 102% are generally not problematic, but chronic levels of 104% will be. Levels higher than 104% will likely result in acute problems and mortality.

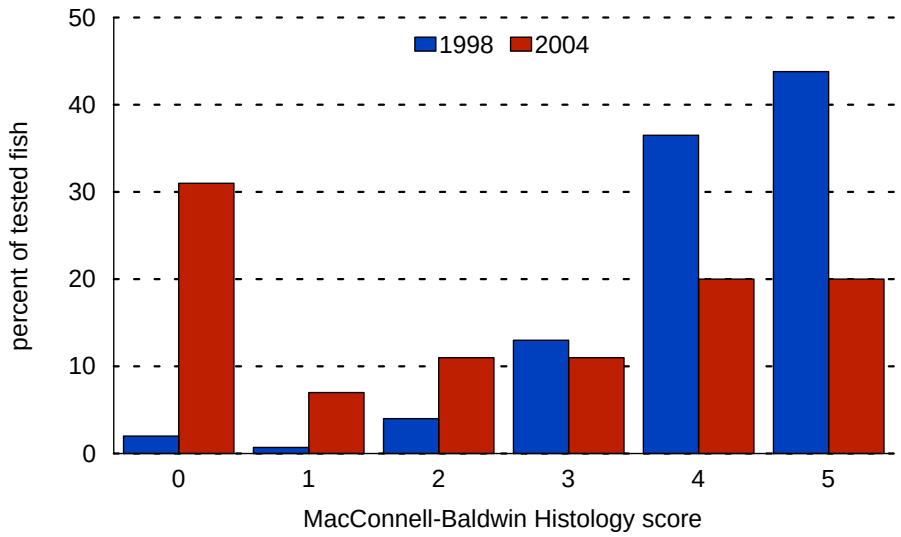


Figure 23. Percentage of young-of-the-year Madison River rainbow trout within MacConnell-Baldwin histology ratings in 1998 and 2004. See Appendix E for MacConnell-Baldwin definitions.

The Sun Ranch Pond was drawn down in 2006 to eliminate the 2005 year-class, which probably included hybridized fry produced from one wild crossing. Over 200 adult fish were captured prior to Sun Pond drawdown in May and placed in a temporary holding pond. High water temperatures developed in the small holding pond, which exacerbated the effect of the gas bubble disease. Upon refilling of the brood pond and return of the fish to the pond, only 60 fish survived in the temporary holding pond and were reintroduced into the brood pond.

Nearly 500 fry produced from eggs taken at two streams in 2006 were introduced into the Sun Pond in Fall 2006. Fry from one of these streams were also used in introductions in the Elkhorn Mountains.

Cherry Creek Native Fish Introduction Program

Ten gillnets were placed in Cherry Lake on August1, 2004, and four additional gillnets were placed in the lake in July 2005, and fished continuously. Fifty-seven fish were captured in the gillnets prior to ice-up of the lake in 2004. Six fish in an advanced state of decay were found in the nets upon ice-off in July 2005, but none since. All nets were removed on September 22, 2006 and the lake was stocked with 150 male WCT on September 25, 2006 (Figure 24). The average length of the fish stocked was 11.2 inches. Only a single gender was stocked to eliminate the possibility of spawning prior to seeding the lake with wild WCT eggs in 2007 or 2008.

Figure 24. Helicopter and bucket used to stock 150 westslope cutthroat trout in Cherry Lake in September 2006.

Eyed WCT eggs collected through the Sun Ranch Westslope Cutthroat Trout Program were used in 2006 to begin seeding Phase 1 streams (Figure 25). Seeding with eggs will continue for 3 – 4 additional years. Egg sources used in Cherry Creek introductions in 2006 were from one wild donor stream, the Sun Ranch Brood Pond, and the Washoe State Park Hatchery.

Personnel from MFWP, Montana State University, Gallatin National Forest, and Turner Enterprises spent approximately 256 worker-days completing the project in 2006, including all preparatory and support activities and treatments. A total of 5.90 gallons of Fintrol were required to complete treatments in 2006, all in Cherry Creek and tributaries. Montana Department of Environmental Quality personnel were on-site in 2006, and found full compliance of all aspects of the piscicide permit (Appendix G).

The producers of Fintrol notified project personnel that they had discovered improperly stored antimycin at their suppliers facility, and requested that we perform bioassays to test the most recently purchased Fintrol. Results of the bioassays documented that Fintrol purchased in 2005 and 2006 was only about 5 percent of full strength, so plans to conduct the first treatment of Phase 3 in 2006 were cancelled, and 19 Fintrol units had to be borrowed from biologists in Colorado and New Mexico to secure an adequate supply for the second treatment of Phase 2.

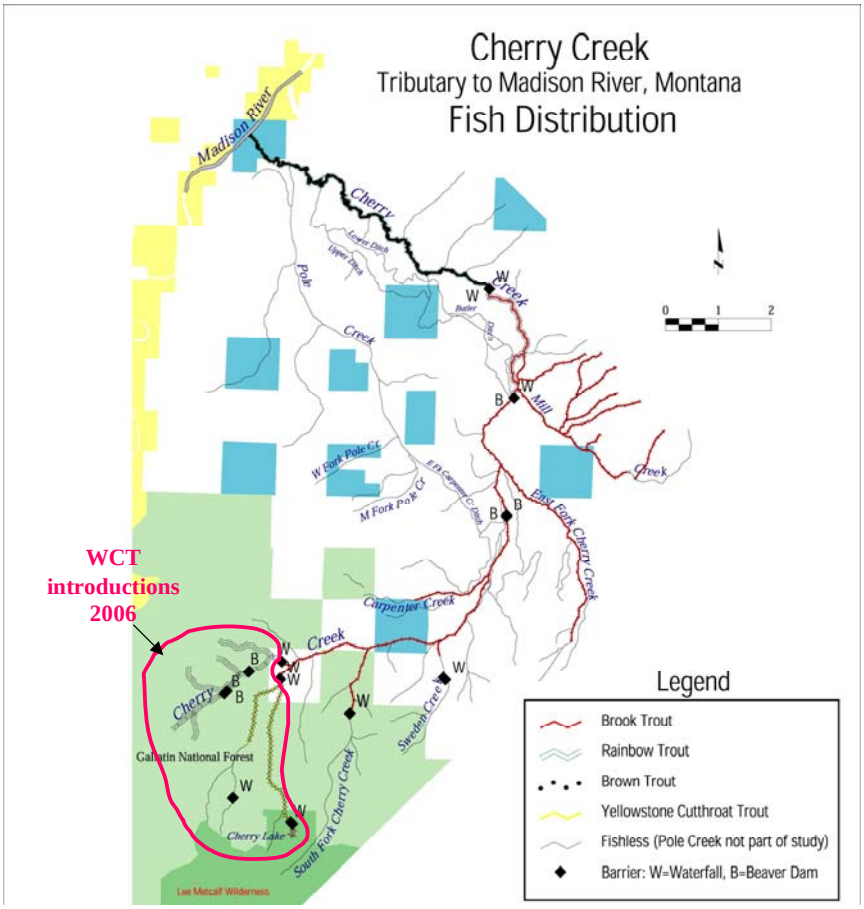


Figure 25. Phase 1 of Cherry Creek Native Fish Introduction Project where westslope cutthroat trout were introduced in 2006 following eradication of non-native Yellowstone cutthroat trout in 2003 – 2005.

Fish Entrainment

Several large irrigation ditches on the Madison River were observed in 2006 for fish entrainment (the Granger (Storey) Ditch & West Madison Canal (WMC) on the upper river, the Hutchison & Sloan on the lower river). As in previous years, few fish were found stranded after the headgates were closed, except in the WMC. The WMC draws water from the river on the west bank of the western river channel approximately one mile upstream of the Eight-mile Fishing Access Site, and has been surveyed since 2001. Surveys were limited in 2002 & 2003 as ice-up occurred prior to the ditch being shut down for the year, so ice cover concealed stranded fish. In years when the WMC headgate was closed prior to ice-up, several hundred or more fish, primarily trout, were observed stranded in the ditch and were lost to the population. It is unlikely that preventing those trout from becoming entrained in the ditch would increase the river population by that same number of fish due to competition, predation, and angling harvest that would occur in the river. The trout population below Varney is dominated by brown trout, and most fish observed in the ditch are brown trout. In recent years local anglers, interested citizens, and the Madison River Foundation (ennisflyfishing.com) were granted permission by the WMC water users and FWP to conduct a fish salvage effort. In 2005, approximately 2,000 fish were captured in hand held nets or other

devices and returned to the river after the headgate was closed and the ditch water receded. In 2006, a similar effort salvaged fewer fish, approximately 1,200, due mainly to thick ice cover that formed and lead to a quick shutdown of the ditch. The thick ice cover made locating and capturing fish difficult. Species captured both years include brown and rainbow trout, mottled sculpin, longnose dace, and juvenile whitefish and white suckers (Figure 26).

Figure 26. A sample of fish salvaged from the West Madison Canal and released into the Madison River.

Several methods that reduce or eliminate stranding are available. Screening is one option, but it is very expensive and in some locations has not worked as well as anticipated. Another method is to incrementally close the headgate over several days, which slowly reduces the volume of water in the ditch, prompting many fish to move upstream, exiting the ditch and returning to the river prior to complete closure of the headgate. This method has been used successfully on the Granger (Storey) Ditch for several years (Mel McKittrick, 2004, pers.comm.).

CONCLUSIONS AND FUTURE PLANS

The Madison (Ennis) Reservoir grayling population continues to persist at low levels. While the Madison population is very similar genetically to the Big Hole population, the different life history characteristics (fluvial vs. adfluvial) will also be considered when the USFWS reviews population status for its April 2007 determination if listing as a Threatened species is warranted.

Population estimates will continue to be conducted annually in the Madison River. These data are necessary for setting angling regulations, and to monitor environmental and biological impacts on the populations.

A flushing flow was conducted in the Madison River in 2006. The annual review of snow-pack and water yield information will be conducted to determine the feasibility of conducting a flushing flow in 2007.

New Zealand Mudsnail populations will continue to be monitored through the 2188 Biological and Biocontaminant monitoring program and through the FWP Aquatic Nuisance Species Program.

Sentinel cage rainbow trout deployed in the Madison River have continued to show high infection rates and severity, and since 2002 sites previously known to have low infection severity have shown increasing severity. In laboratory studies, progeny of Madison River rainbow trout are exhibiting resistance to whirling disease. Additionally, genetic analyses of Madison rainbows is planned to ascertain any changes between the pre-whirling disease population and the present population.

FWP has implemented a program and provided equipment to clean sampling gear to reduce the chance of moving ANS between waters.

In 2006, adult WCT from the Sun Pond were spawned and resulting fry stocked back into the pond. Wild donor populations will continue to be tapped for the next several years as well for replicating existing wild, genetically pure WCT populations into fishless streams to expand the range and numbers of WCT, thereby diminishing their extinction risk.

The Cherry Creek Native Fish Introduction Project will continue in 2007. A portion of Phase 2 will need to be treated a third time and the first treatment of Phase 3 will occur. Introductions of WCT will continue in Phase 1 of the project area where treatments were conducted in 2003 and 2004.

Surveys of fish entrainment in irrigation ditches will continue in 2007. Additionally, West Madison Canal water-right holders have granted permission and access to FWP to electrofish the canal. Surveys will be conducted several times through the irrigation season to assess the timing of entrainment, the extent of distribution in the ditch, and the ability of fish to ascend the canal at shut-down and return to the river.

LITERATURE CITED

Bramblett, R.G. 1998. Environmental Assessment. Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program: Cherry Creek Native Fish Introduction. Prepared for Montana Fish, Wildlife, & Parks, April 15, 1998. 70 pages.

Byorth, P. 2004. Hebgen Reservoir Creel Survey and Contribution of Stocked Rainbow Trout to the Recreational Fishery: June 2000 to June 2001. 25 pages.

Byorth, P. and B. Shepard. 1990. Ennis Reservoir/Madison River Fisheries Investigations. Montana Fish, Wildlife, & Parks Final Report to Montana Power Company. 90 pages.

Federal Energy Regulatory Commission. 2000. Order Issuing New License, Project No. 2188-030. Issued September 27, 2000.

Hetrick, N. J. 1993. Cooperative Study on Fish Migration and Spawning in the Upper Madison River Drainage *Annual Report*: April 1993. 20 pages.

Jeanes, E. D. 1996. Behavioral Responses to Water Current of Age 0 Arctic Grayling from the Madison River, and Their Use of Stream Habitat. MS Thesis, Montana State University-Bozeman, August 1996. 60 pages.

Leary, R. 1990. Letter to MFWP Biologist Pat Byorth. University of Montana Wild Trout & Salmon Genetics Laboratory, Division of Biological Sciences, Missoula, MT. September 1990.

McKittrick, M. 2004. Personal communication.

Montana Department of Natural Resources and Conservation. 1979. River Mile Index of the Missouri River. Water Resources Division.

Montana Fish, Wildlife, & Parks. 1995. Madison River/Ennis Reservoir Fisheries. 1994 Annual Report to Montana Power Company, Environmental Division, Butte, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. May 1995.

Montana Fish, Wildlife, & Parks. 1996. Madison River/Ennis Reservoir Fisheries. 1995 Annual Report to Montana Power Company, Environmental Division, Butte, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. February 1996.

Montana Fish, Wildlife, & Parks. 1997. Madison River/Ennis Reservoir Fisheries. 1996 Annual Report to Montana Power Company, Environmental Division, Butte, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. March 1997.

Montana Fish, Wildlife, & Parks. 1998a. Madison River/Ennis Reservoir Fisheries. 1997 Annual Report to Montana Power Company, Environmental Division, Butte, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. June 1998.

Montana Fish, Wildlife, & Parks. 1998b. Decision Notice: Cherry Creek Native Fish Introduction Project. Region 3, July 6, 1998. Pat Clancey. 30 pages.

Montana Fish, Wildlife, & Parks. 1999a. Madison River/Ennis Reservoir Fisheries and Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program. 1998 Annual Report to Montana Power Company, Environmental Division, Butte, and Turner Enterprises, Inc., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. April 1999.

Montana Fish, Wildlife, & Parks. 1999b. Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana. May 1999.

Montana Fish, Wildlife, & Parks. 2000. Madison River/Ennis Reservoir Fisheries and Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program. 1999 Annual Report to PPL Montana (formerly Montana Power Company), Environmental Division, Butte, and Turner Enterprises, Inc., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. April 2000.

Montana Fish, Wildlife, & Parks. 2001. 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., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey and Dan Downing, Ennis. April 2001.

Montana Fish, Wildlife, & Parks. 2002. Madison River/Ennis Reservoir Fisheries and Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program. 2001 Annual Report to PPL Montana, Environmental Division, Butte, and Turner Enterprises, Inc., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. June 2002.

Montana Fish, Wildlife, & Parks. 2003. Madison River/Ennis Reservoir Fisheries and Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program. 2002 Annual Report to PPL Montana, Environmental Division, Butte, and Turner Enterprises, Inc., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. March 2003.

Montana Fish, Wildlife, & Parks. 2004a. Madison River/Ennis Reservoir Fisheries and Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program. 2003 Annual Report to PPL Montana, Environmental Division, Butte, and Turner Enterprises, Inc., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey, Ennis. May 2004.

Montana Fish, Wildlife, & Parks. 2004b. FA+. Montana Fish, Wildlife, & Parks, Information Services Unit, Bozeman.

Montana Fish, Wildlife, & Parks. 2005. Madison River/Ennis Reservoir Fisheries and Madison River Drainage Westslope Cutthroat Trout Conservation and Restoration Program. 2004 Annual Report to PPL Montana, Environmental Division, Butte, and Turner Enterprises, Inc., Gallatin Gateway, from Montana Fish, Wildlife, & Parks, Pat Clancey & Travis Lohrenz, Ennis. April 2005.

Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-species in the United States. Ecological Economics, 2005 (Vol. 52) (No. 3) 273-288

Sloat, M.R., B.B. Shepard, and P. Clancey. 2000. Survey of tributaries to the Madison River from Hebgen Dam to Ennis, Montana with an emphasis on distribution and status of westslope cutthroat trout. Report to Montana Fish, Wildlife, & Parks, Helena, Montana. 165 pages.

Staigmiller, Ken. 2007. Personal Communication.

Vincent, Dick. 2007. Personal Communication.

Watschke, Darin. 2006. Assessment of Tributary Potential for Wild Rainbow Trout Recruitment in Hebgen Reservoir, Montana. Master of Science Thesis, Montana State University, Bozeman, MT. 139 pages.

Appendix A

Summary of Ennis Reservoir beach seining for young-of-the-year Arctic grayling, 1993 – 2005.

Note: Effort was not equal in all years

Species abbreviations:

AG Arctic grayling
MWF mountain whitefish
LL brown trout
Rb rainbow trout

Date	AG	MWF	LL	Rb
7/27/95	12	177	4	0
9/1/95	23	89	4	0
6/18/96	0	6	1	2
7/22/96	0	0	0	0
8/22/96	0	0	1	0
8/20/97	1	0	3	0
10/27/97	0	5	0	0
9/4/98	0	0	0	0
9/22/99	2	34	0	0
11/2/00	0	14	3	0
8/29/01	0	0	0	0
10/2/02	1	2	4	0
10/6/03	0	2	3	1
9/28/04	1	9	96	0
9/27/05	0	11	19	5

Appendix B1

Historic population estimates of aged rainbow and brown trout per mile in the Pine Butte, Varney, and Norris sections of the Madison River

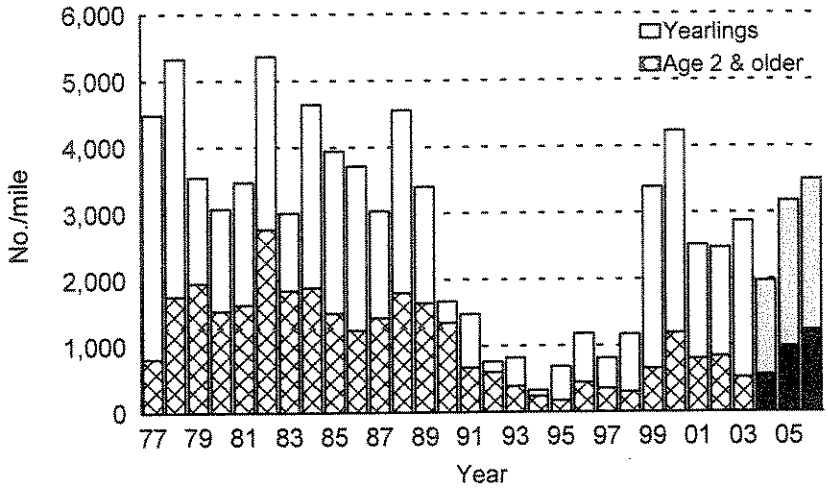


Figure B1 - 1. Rainbow trout populations in the Pine Butte section of the Madison River, 1977-2006, fall estimates. Data for 2004 - 2006 are provisional pending completion of age samples.

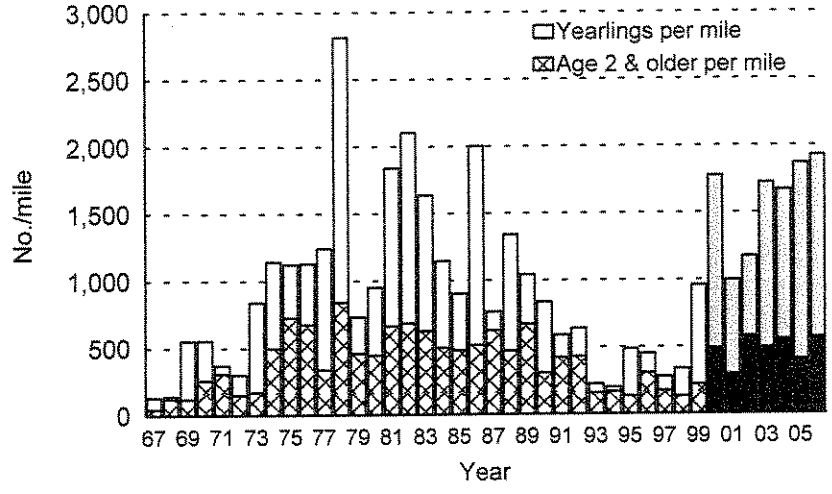


Figure B1 – 2. Rainbow trout populations in the Varney section of the Madison River, 1967-2006, fall estimates. Data for 2000 - 2006 are provisional pending completion of age samples.

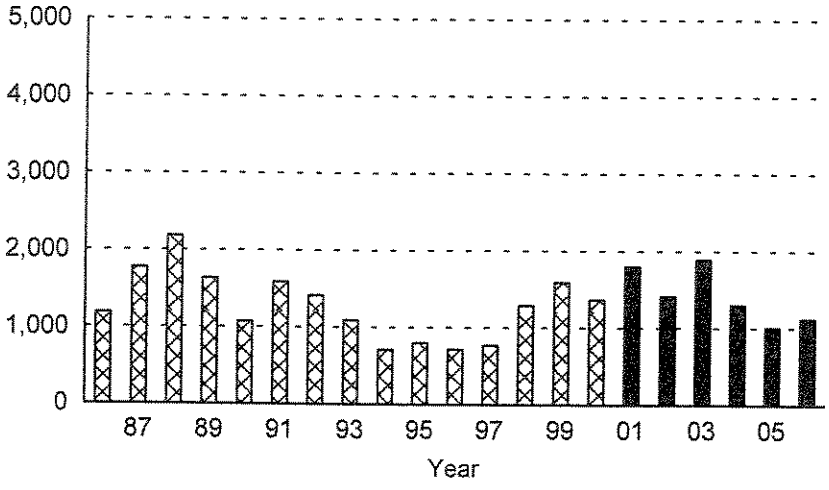


Figure B1 – 3. Rainbow trout populations in the Norris section of the Madison River, 1986-2006, spring estimates. Data for 2001 - 2006 are provisional pending completion of age samples.

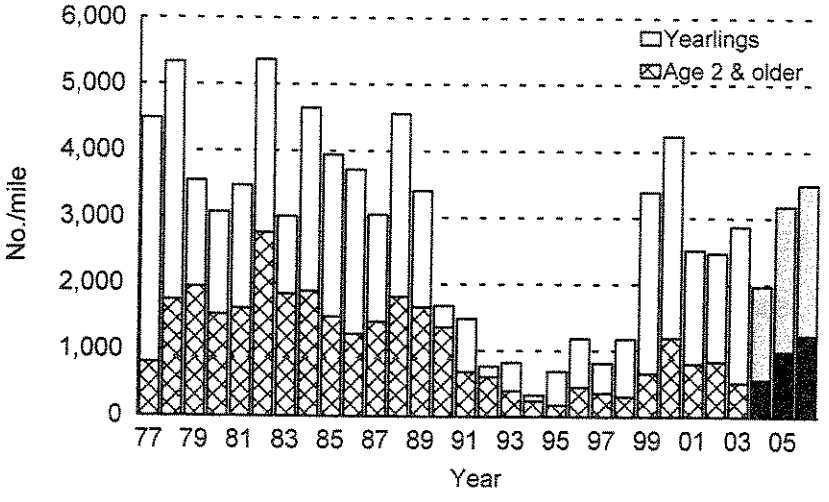


Figure B1 - 4. Brown trout populations in the Pine Butte section of the Madison River, 1977-2006, fall estimates. Data for 2004 - 2006 are provisional pending completion of age samples.

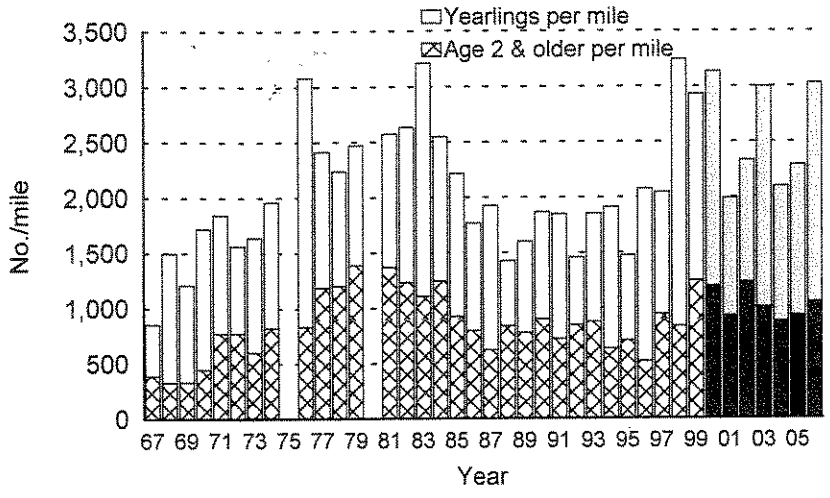


Figure B1 - 5. Brown trout populations in the Varney section of the Madison River, 1967-2006, fall estimates. Data for 2000 - 2006 are provisional pending completion of age samples.

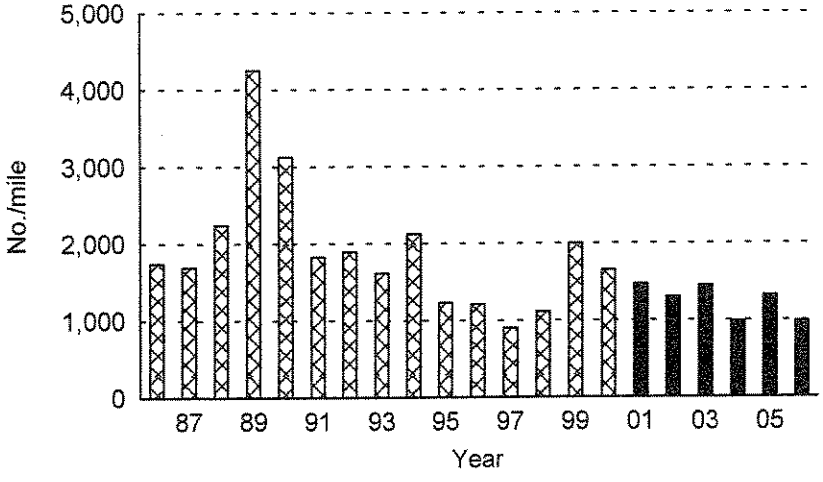


Figure B1 - 6. Brown trout populations in the Norris section of the Madison River, 1986-2006, spring estimates. Data for 2001 - 2006 are provisional pending completion of age samples.

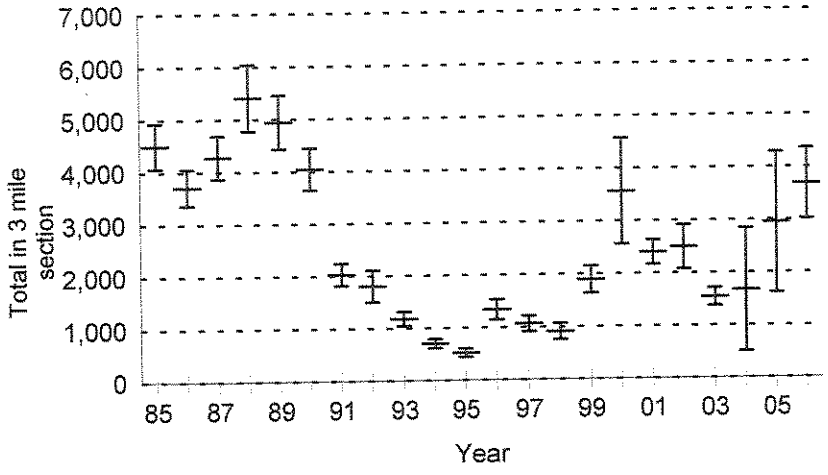
Appendix B2

Population estimates (total number in section± 80 percent Confidence Intervals)
of age 2 & older rainbow and brown trout in the Madison River
See Figure 4 for section locations

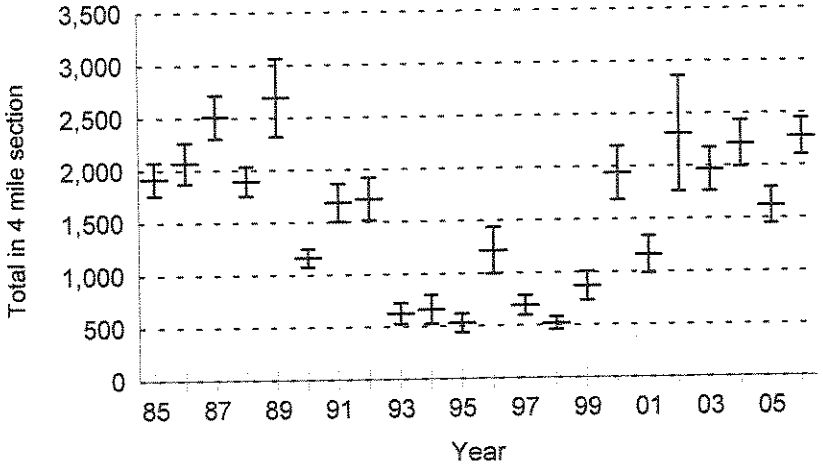
section lengths

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

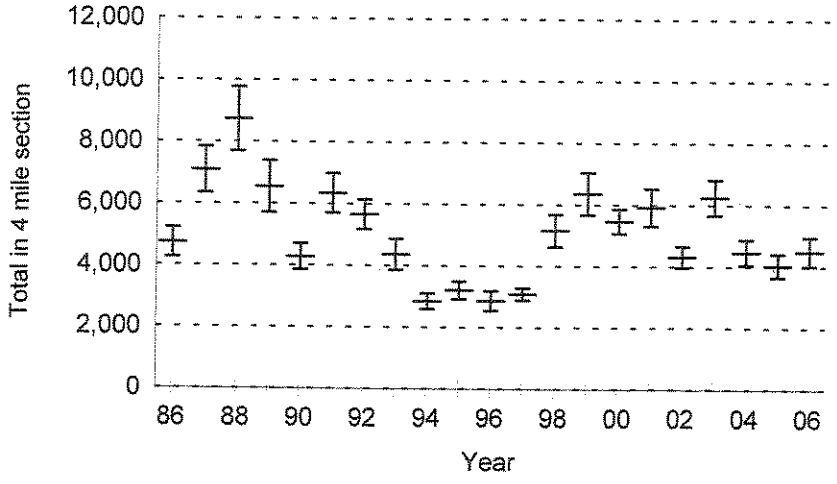
Pine Butte
Rainbow Trout
Age 2 & older



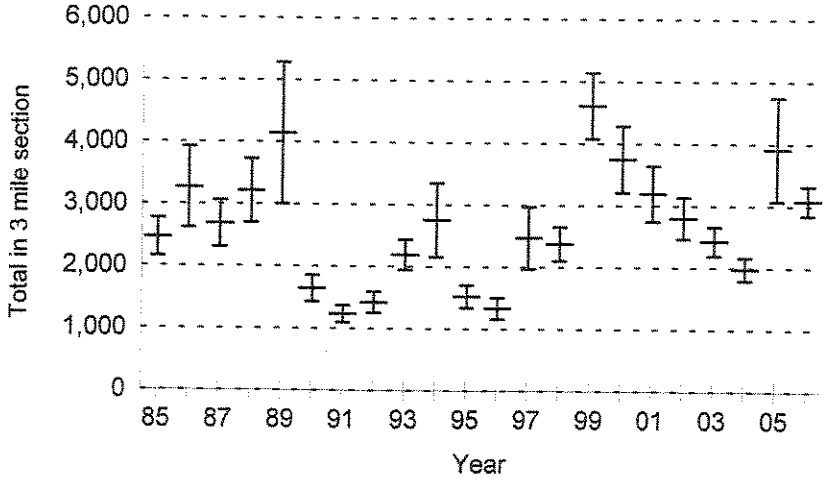
Varney
Rainbow Trout
Age 2 & Older



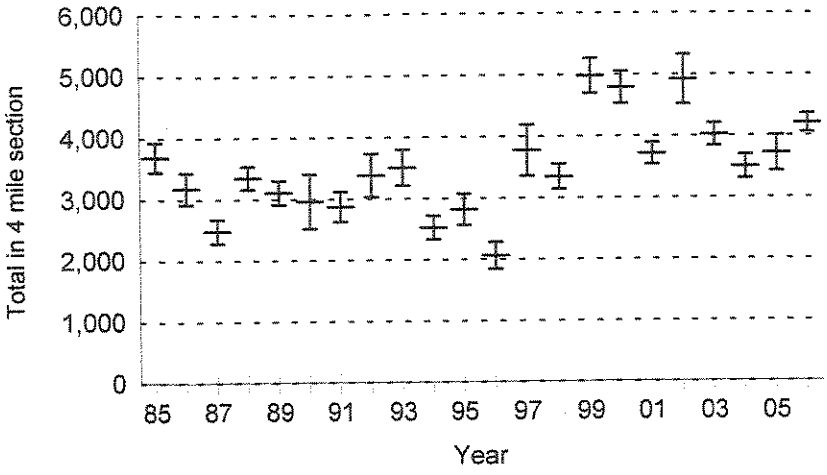
Norris
Rainbow Trout
Age 2 & Older



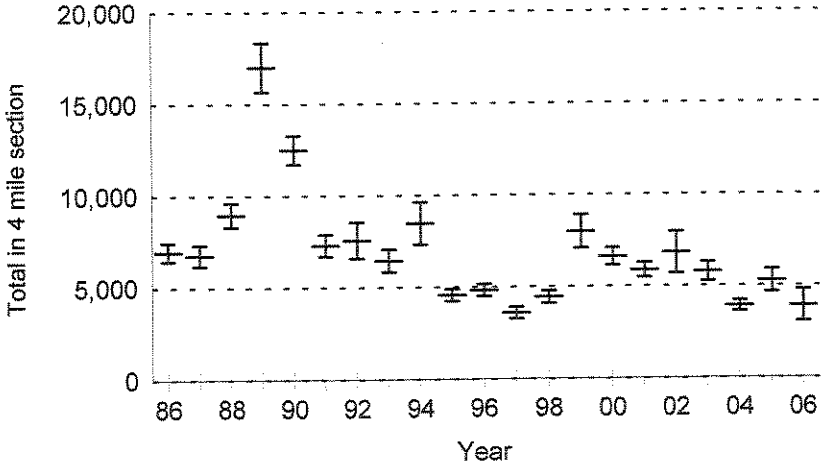
Pine Butte
Brown Trout
Age 2 & older



Varney
Brown Trout
Age 2 & Older



Norris
Brown Trout
Age 2 & Older

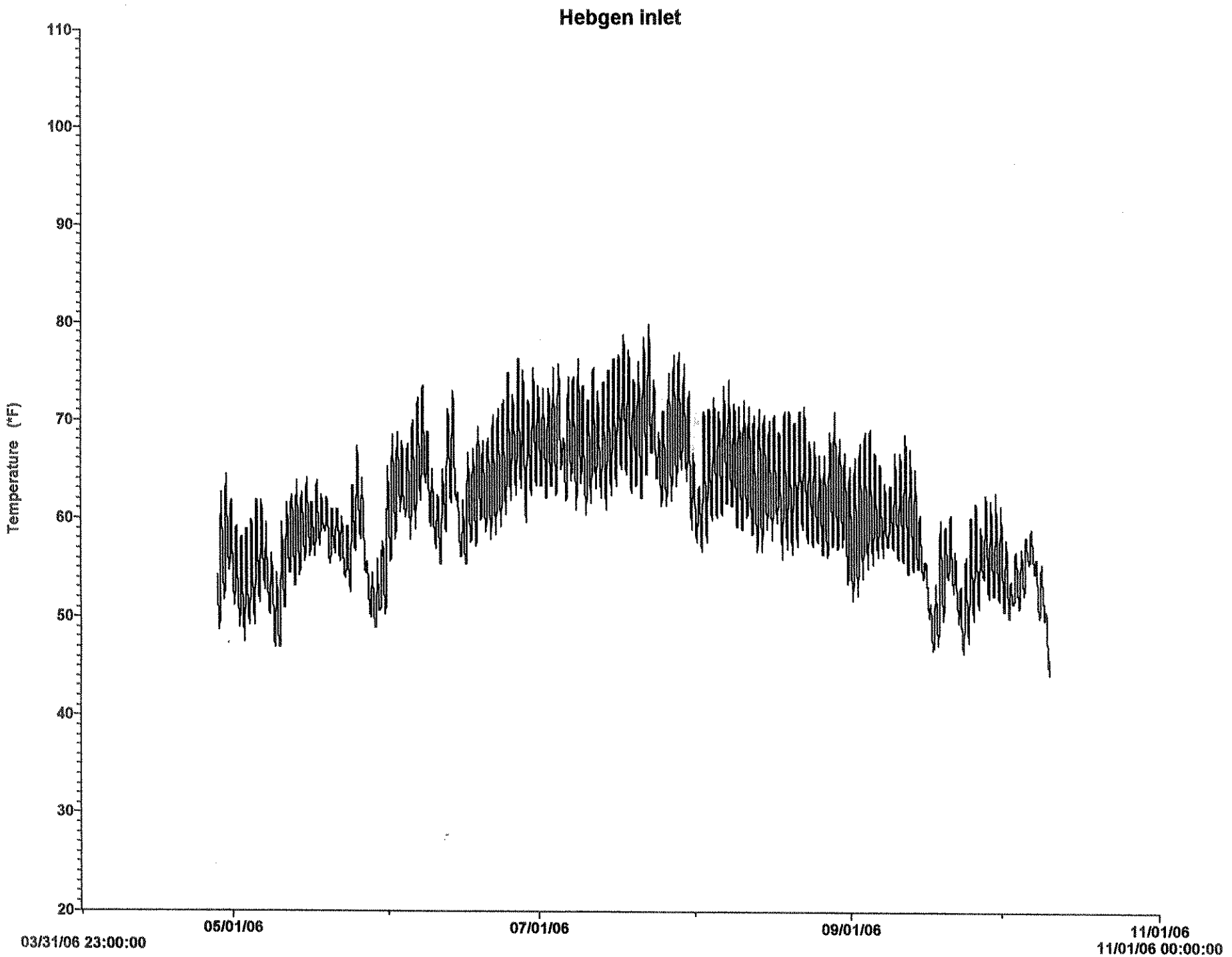


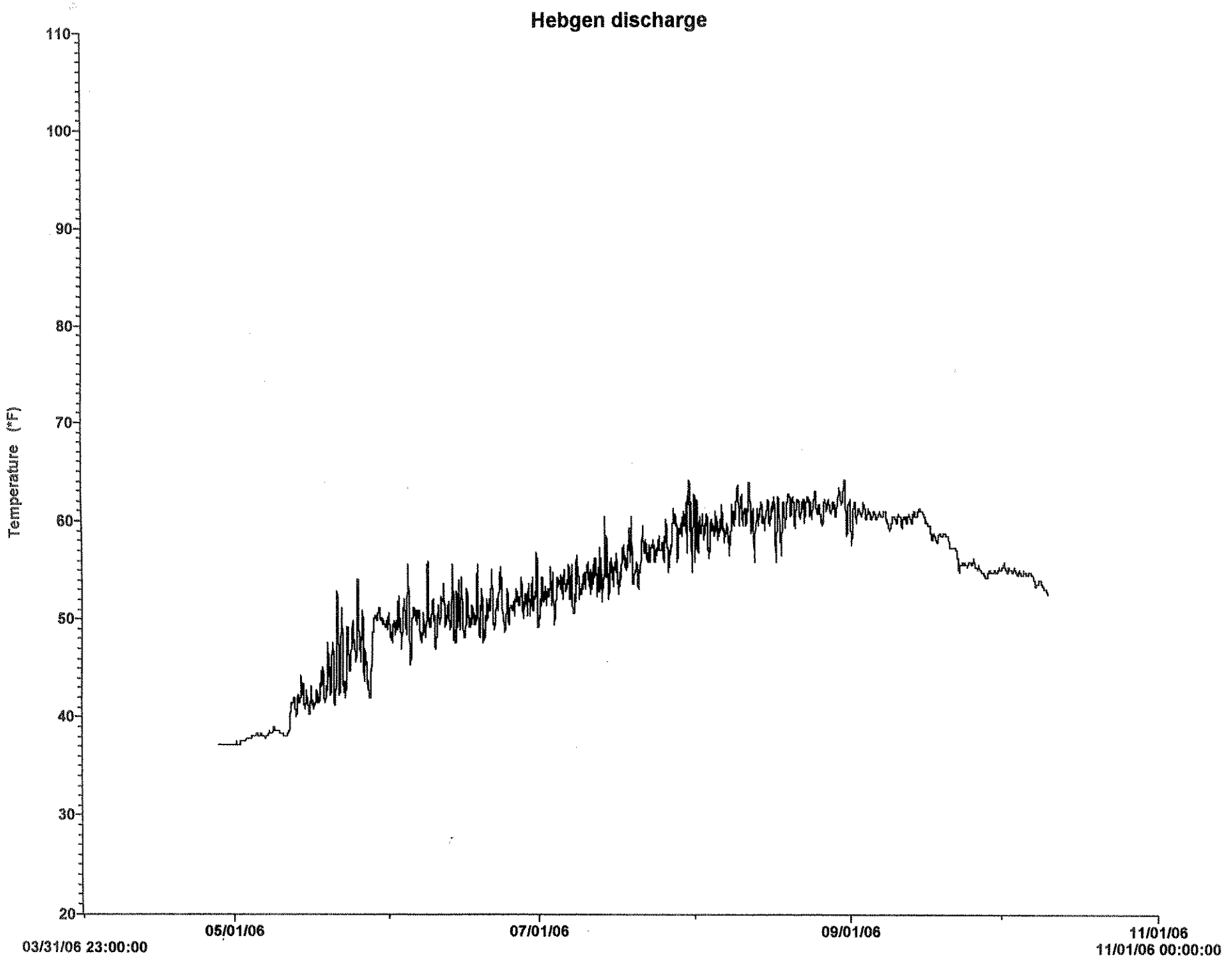
Appendix C1

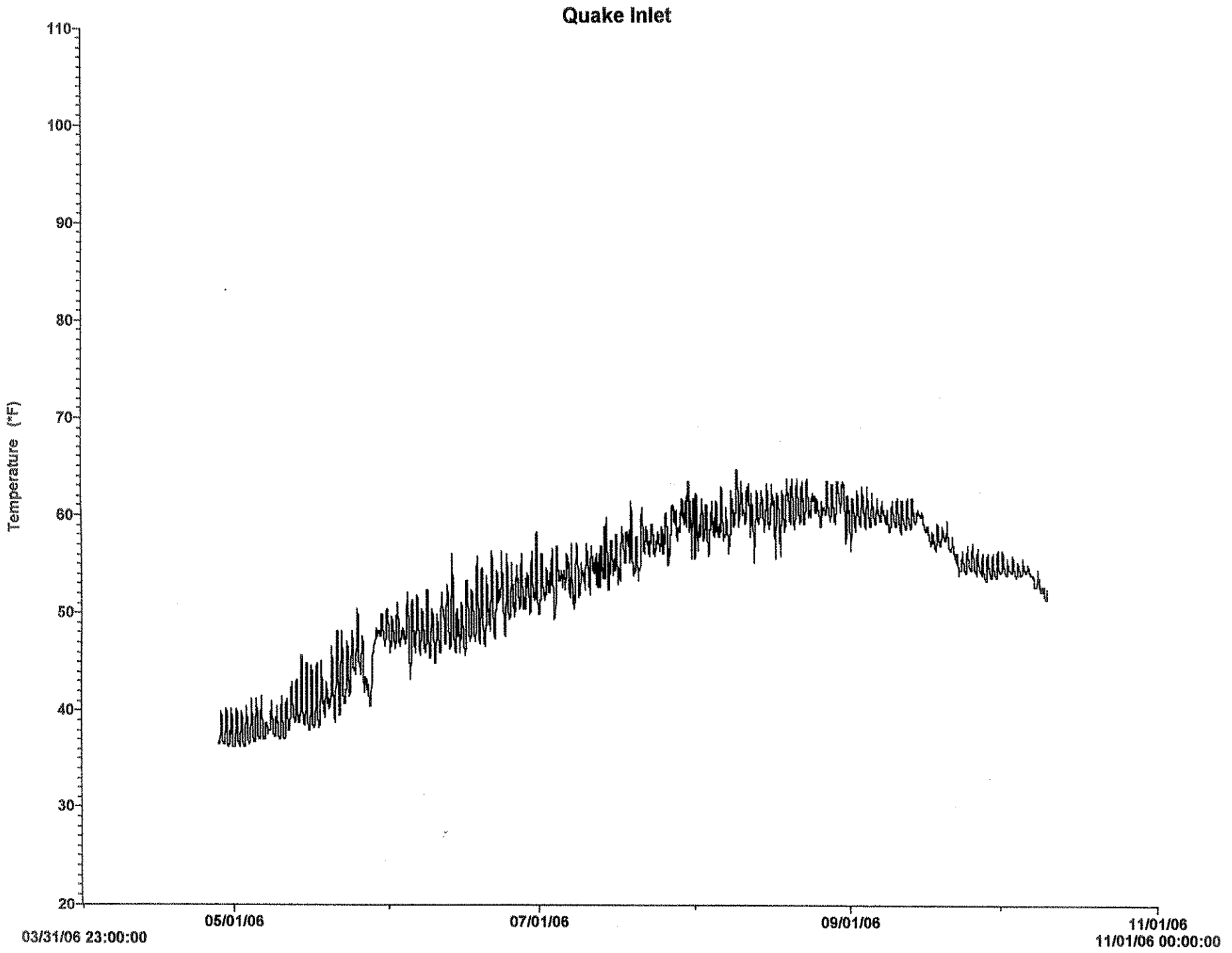
Temperature recordings from monitoring sites on the Madison River
See Figure 5 for locations

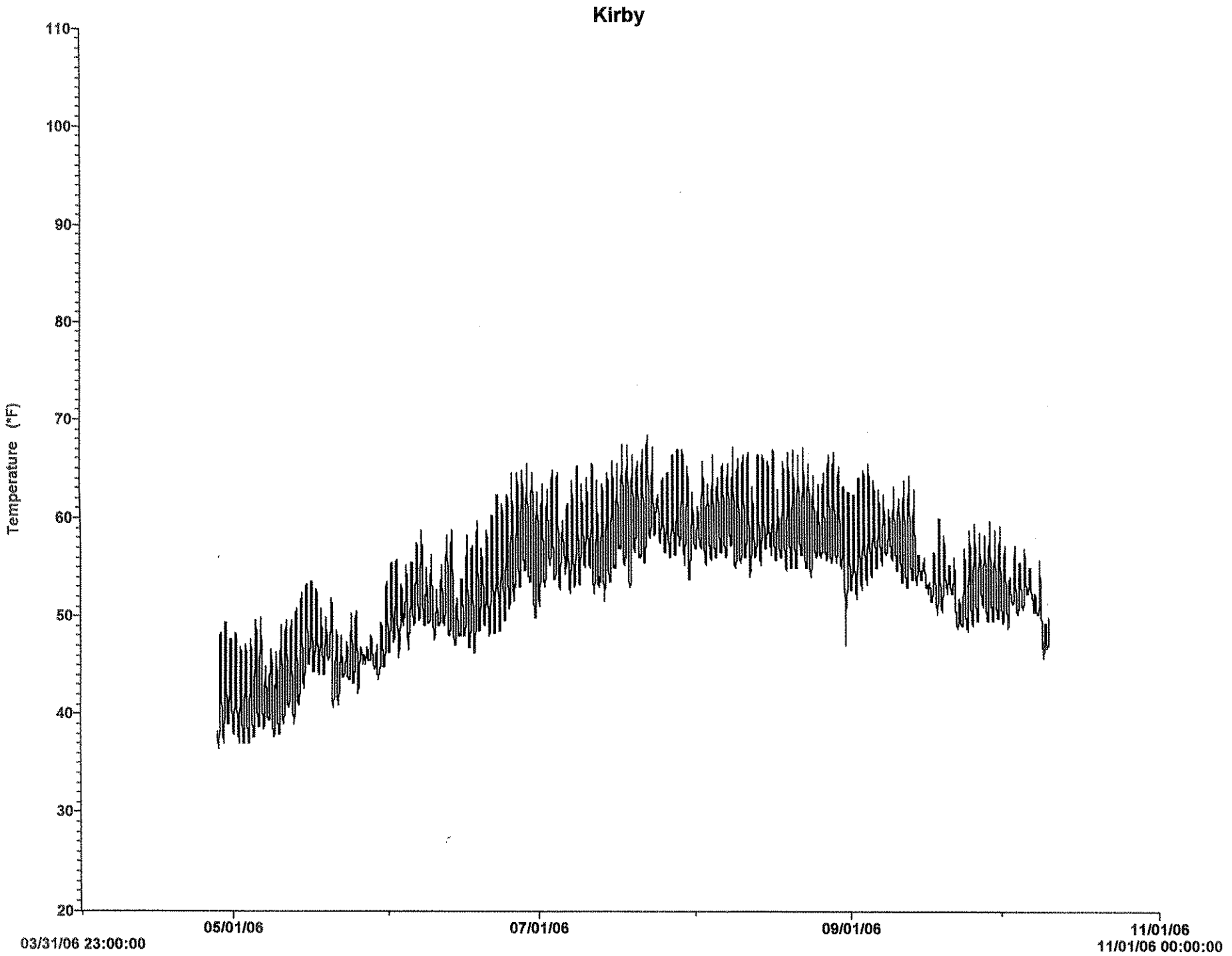
NOTES:

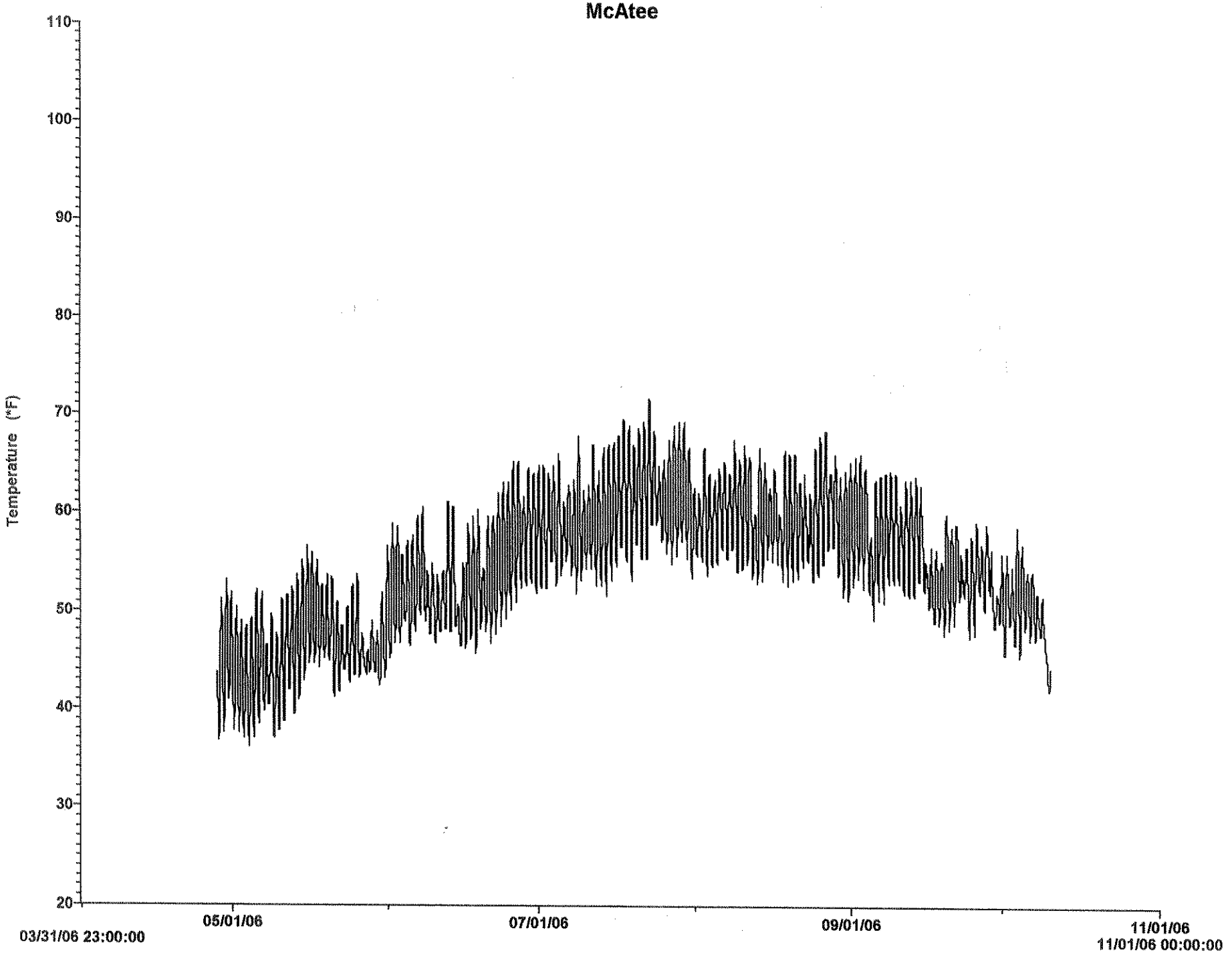
- Quake Lake outlet recorder was stolen sometime between July 6 & October 10
- Headwaters State Park recorder was dewatered from August 22 through September 14. These data are omitted from chart.
- Ennis Dam air temperature recorder ceased operating on July 13.
- Ennis air temperature recorder ceased operating after four days, despite a properly functioning indicator light

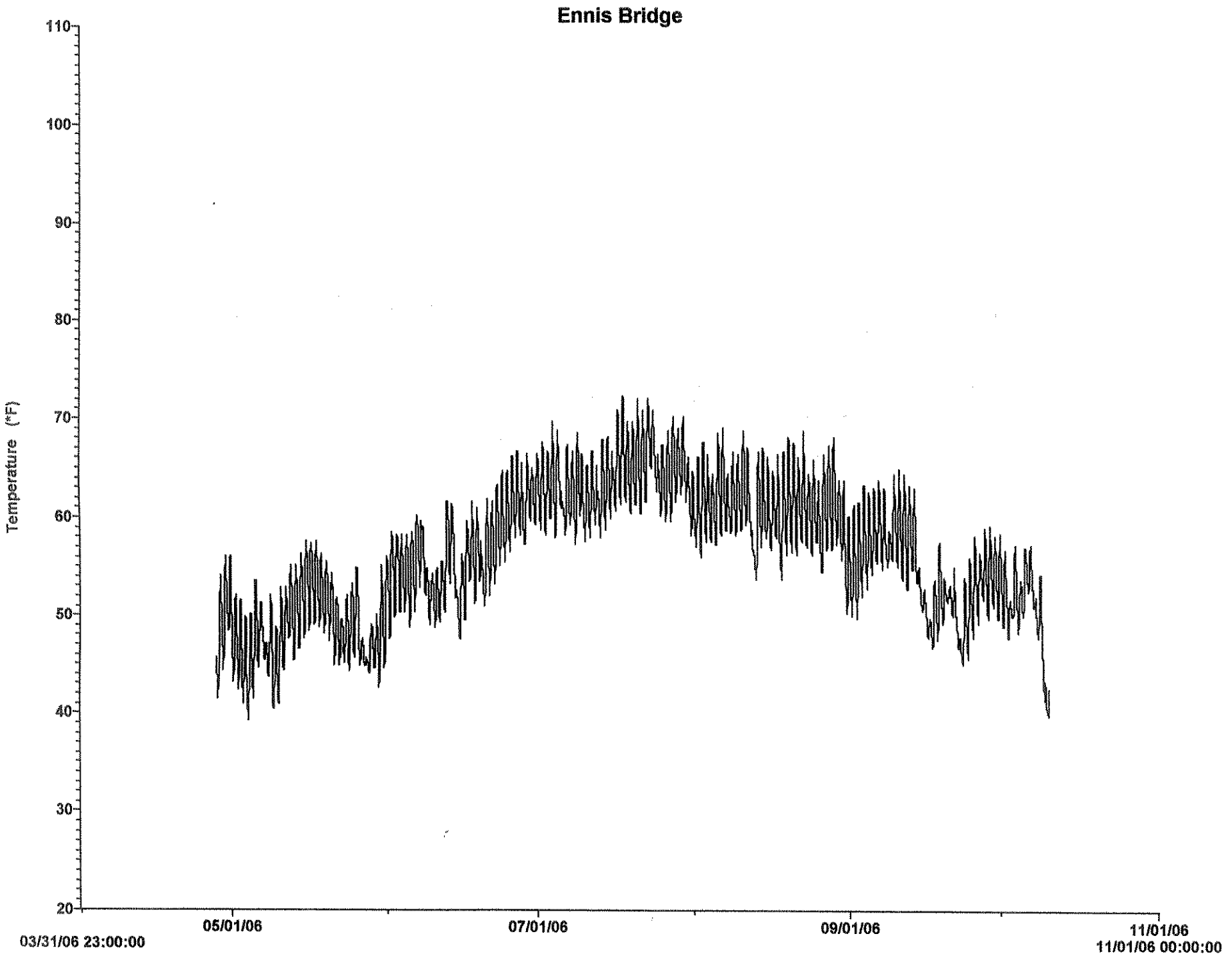

Hebgen inlet
Temperature (*F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

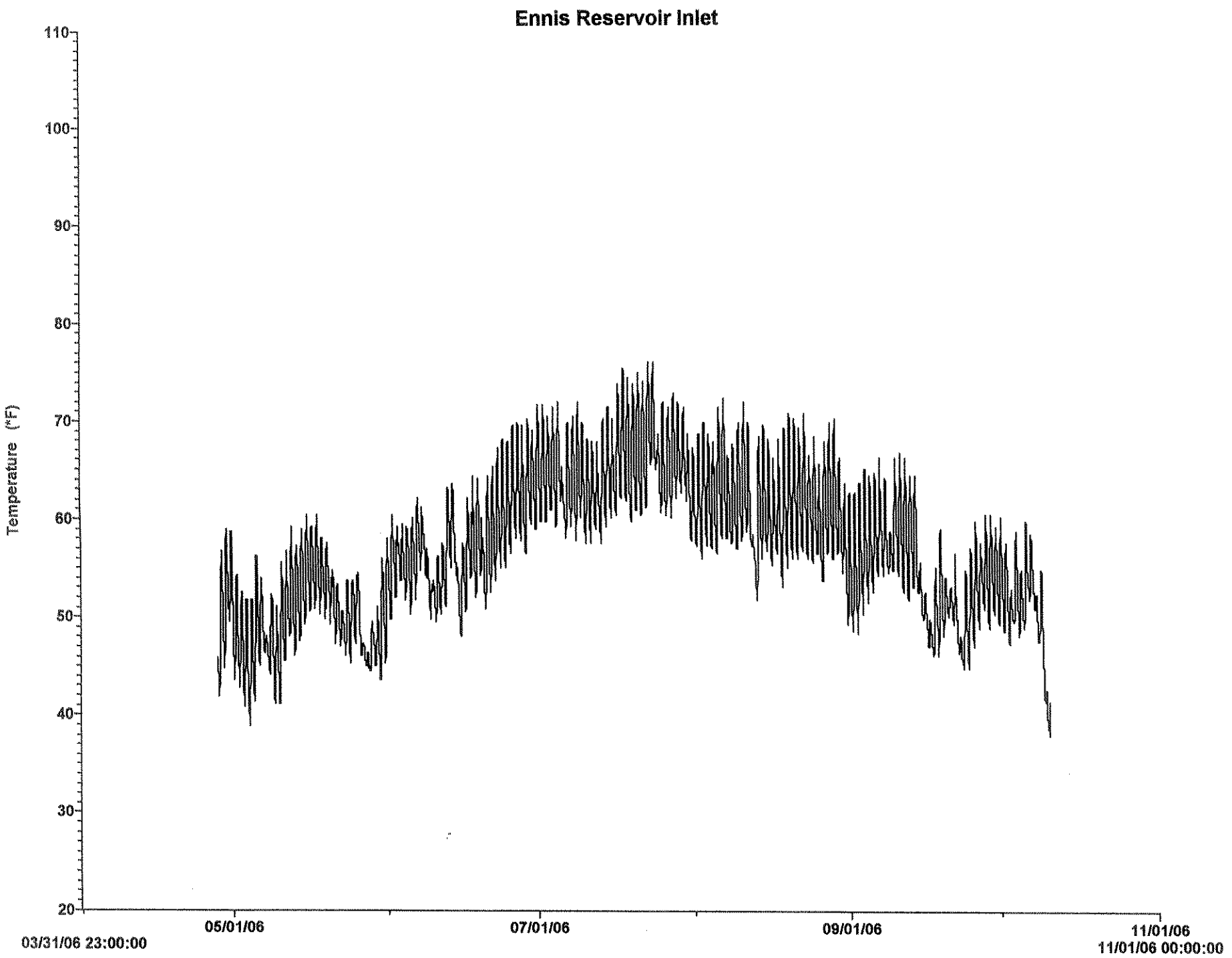

Hebgen discharge
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

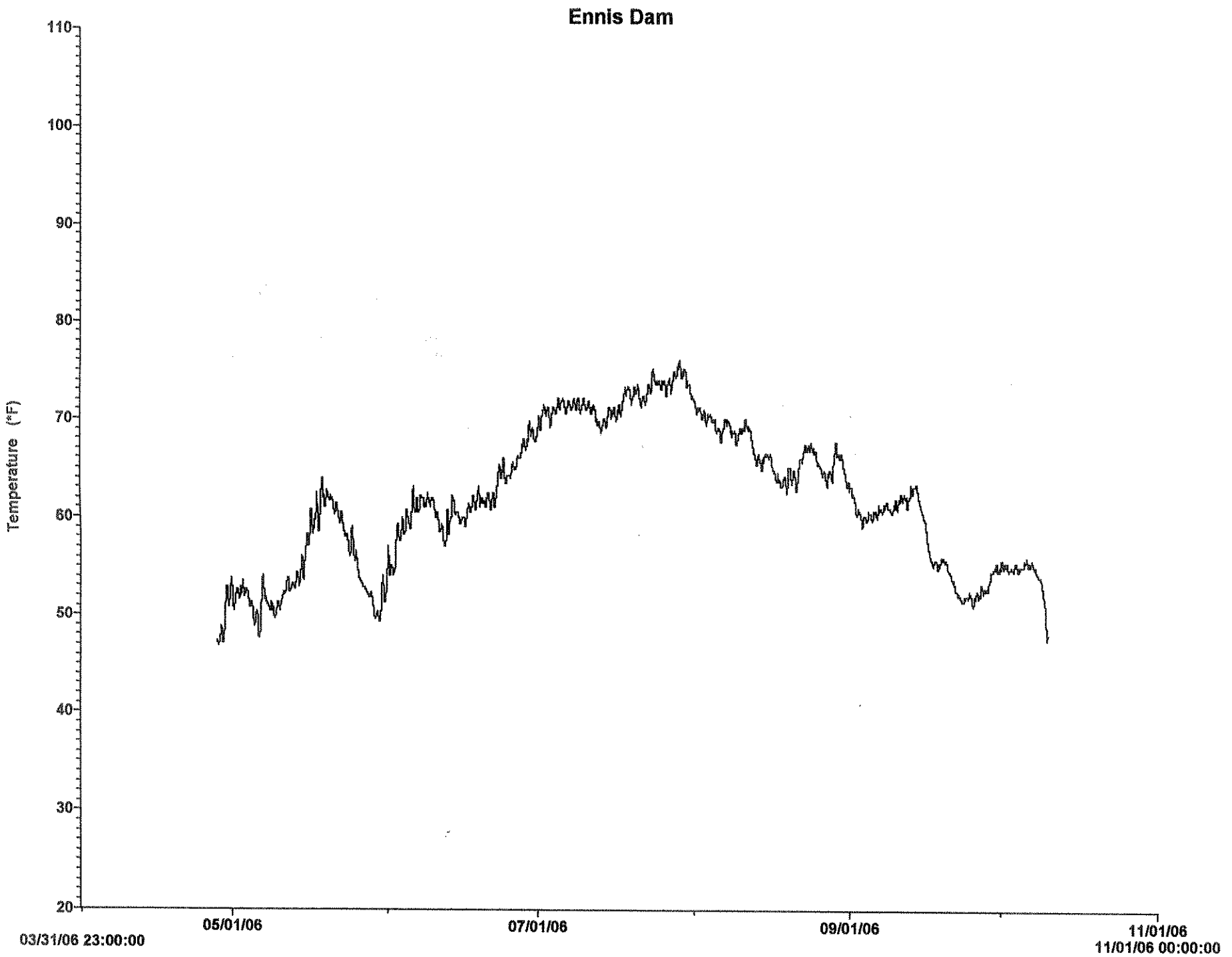

Quake Inlet
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

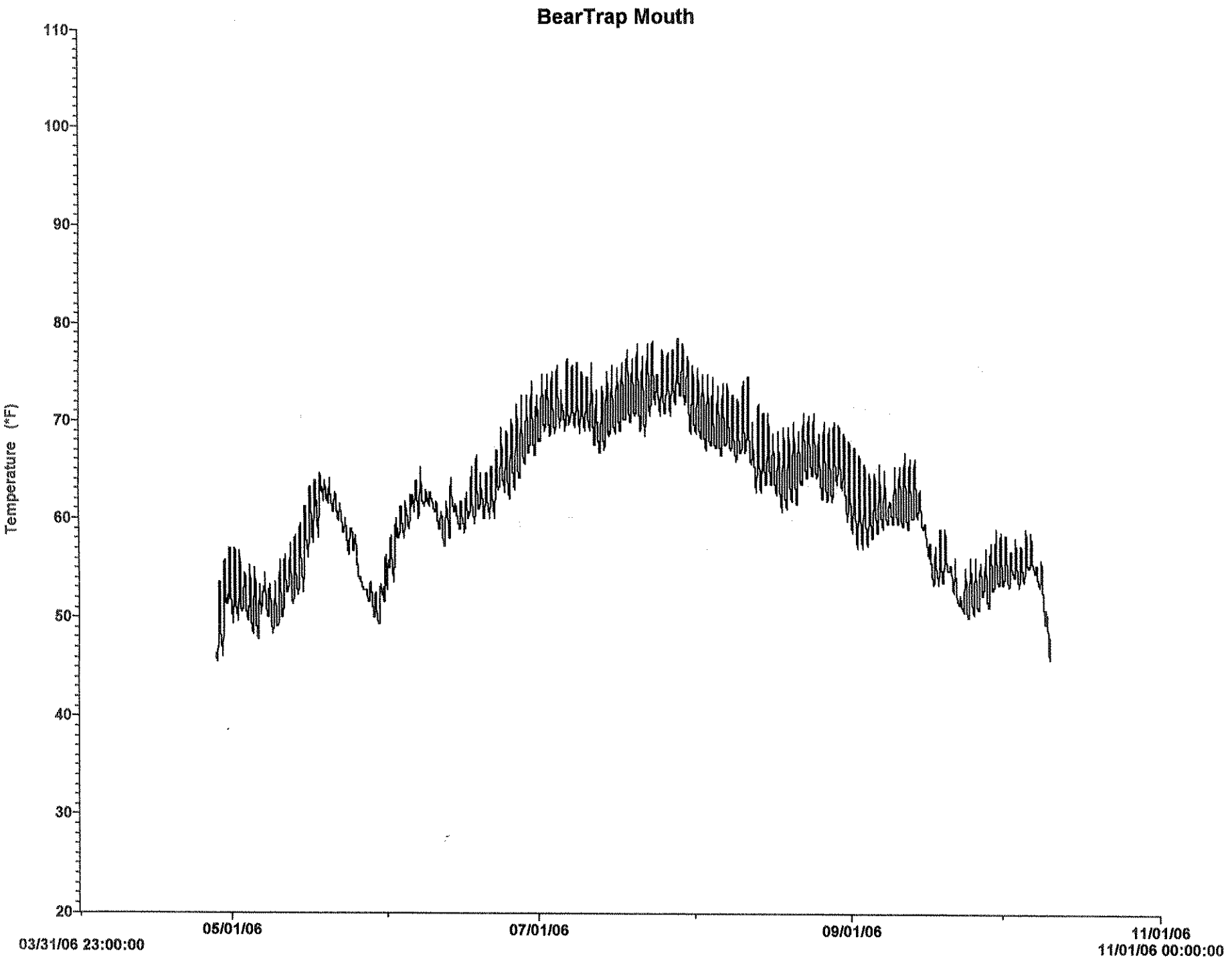

Kirby
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

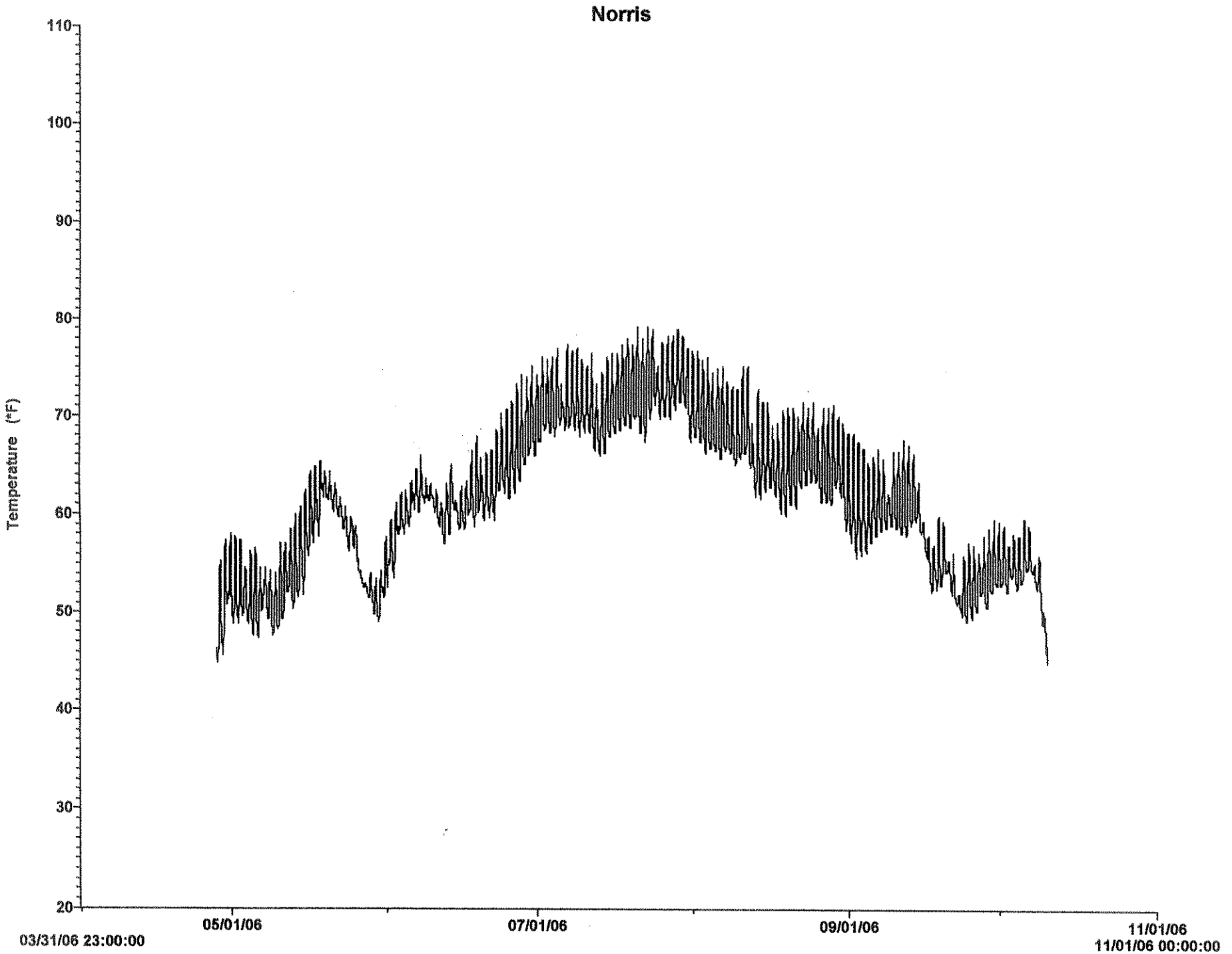

McAtee
110
100
90
80
70
60
50
40
30
20
Temperature (°F)
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

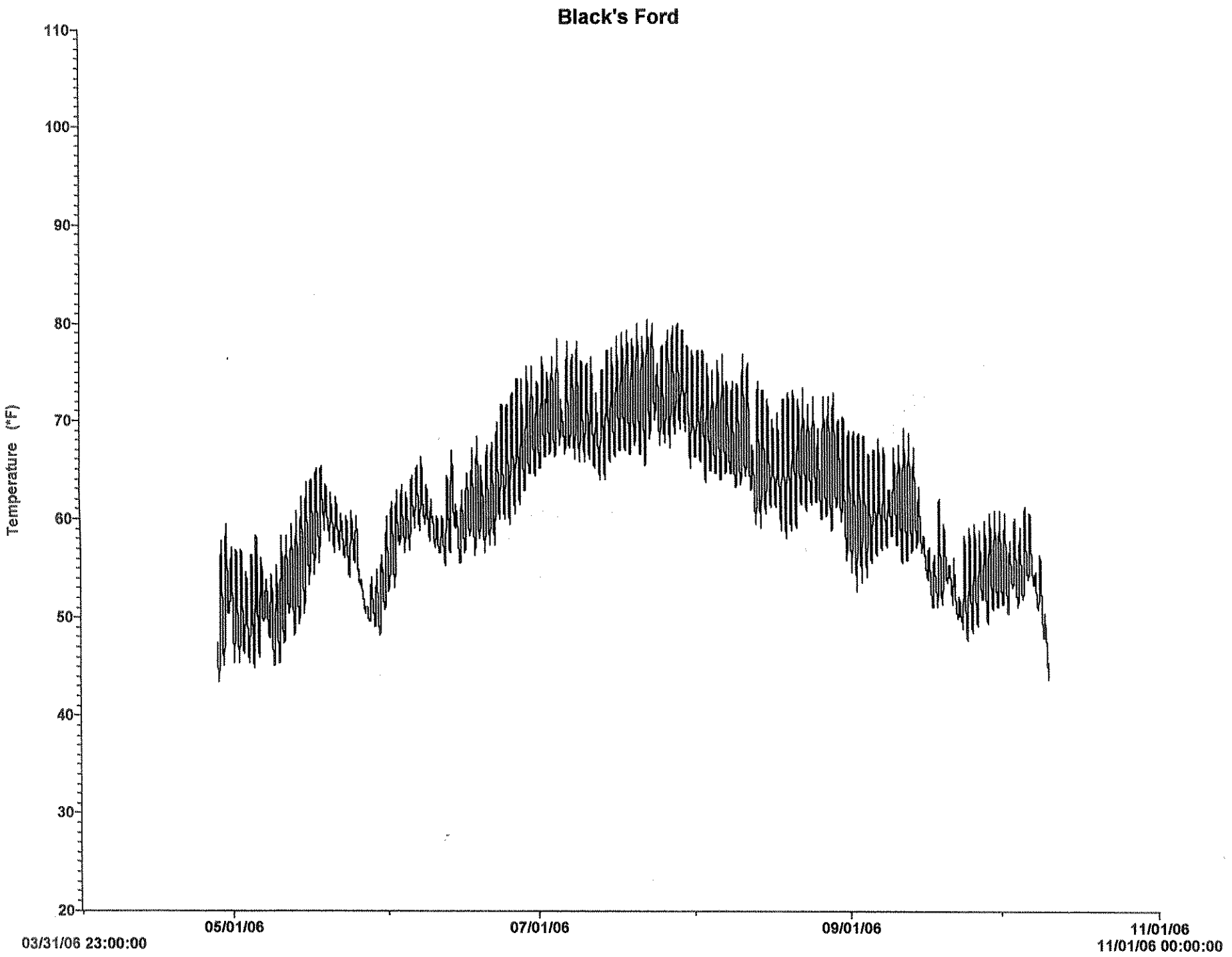

Ennis Bridge
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

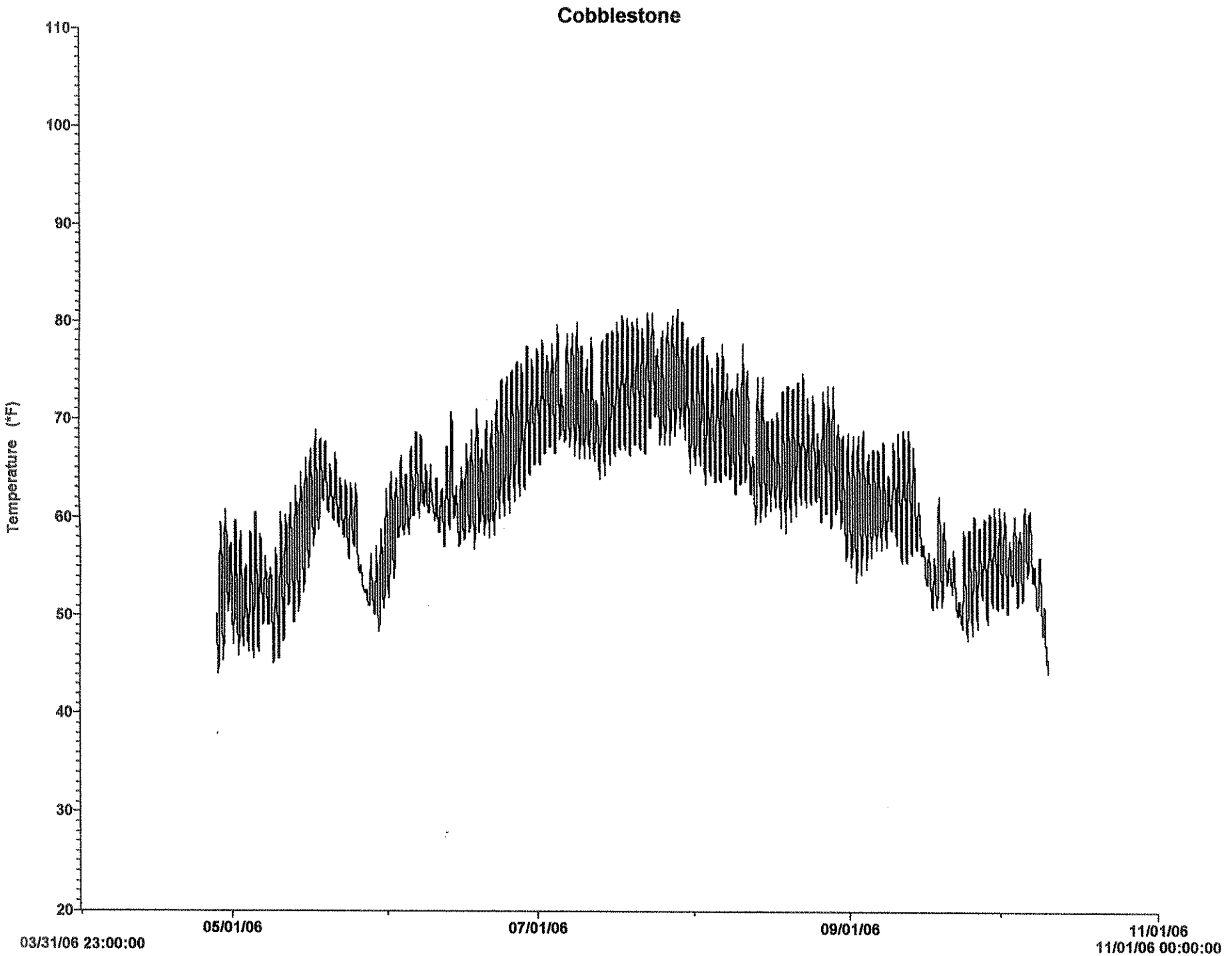

Ennis Reservoir Inlet
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

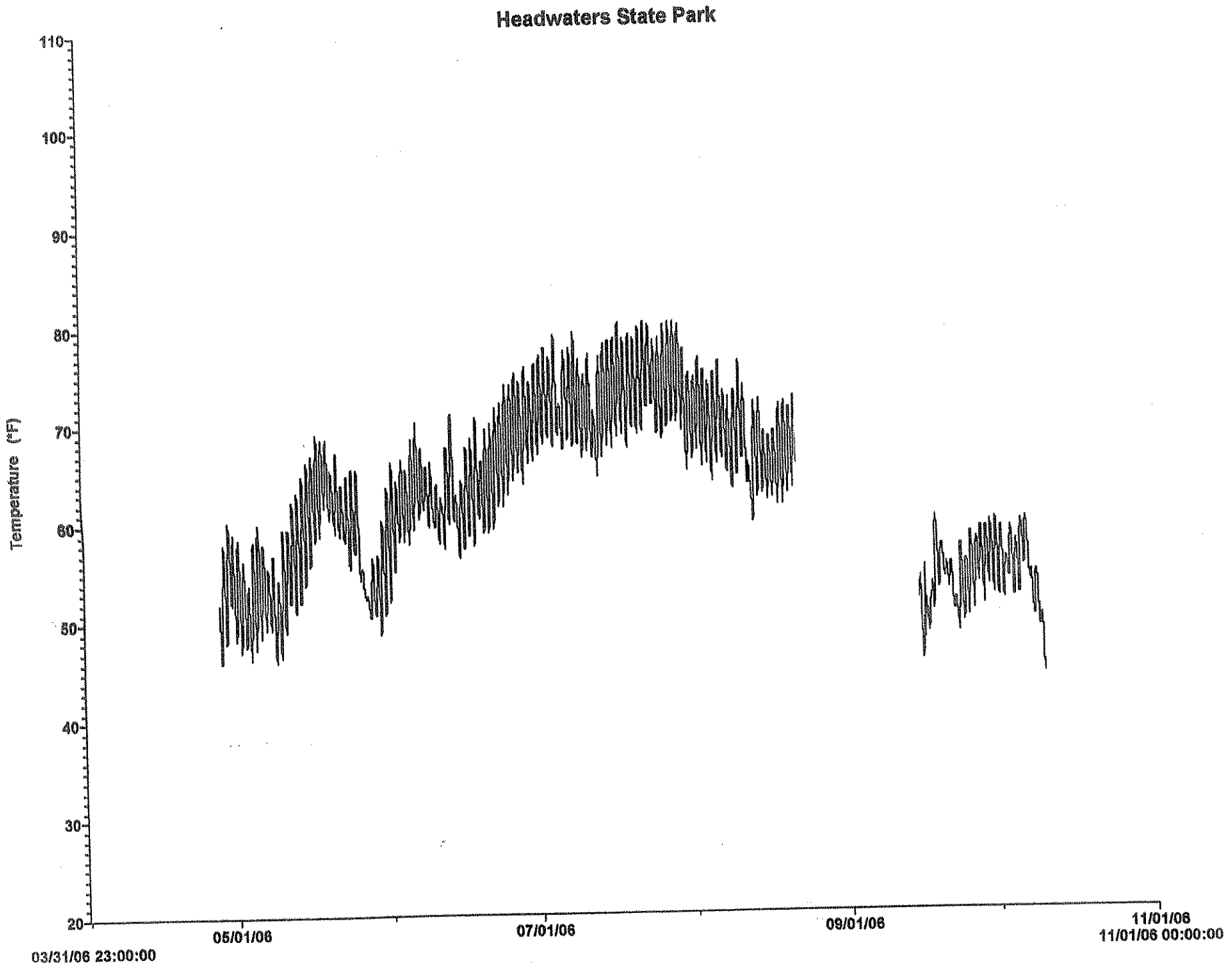

Ennis Dam
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

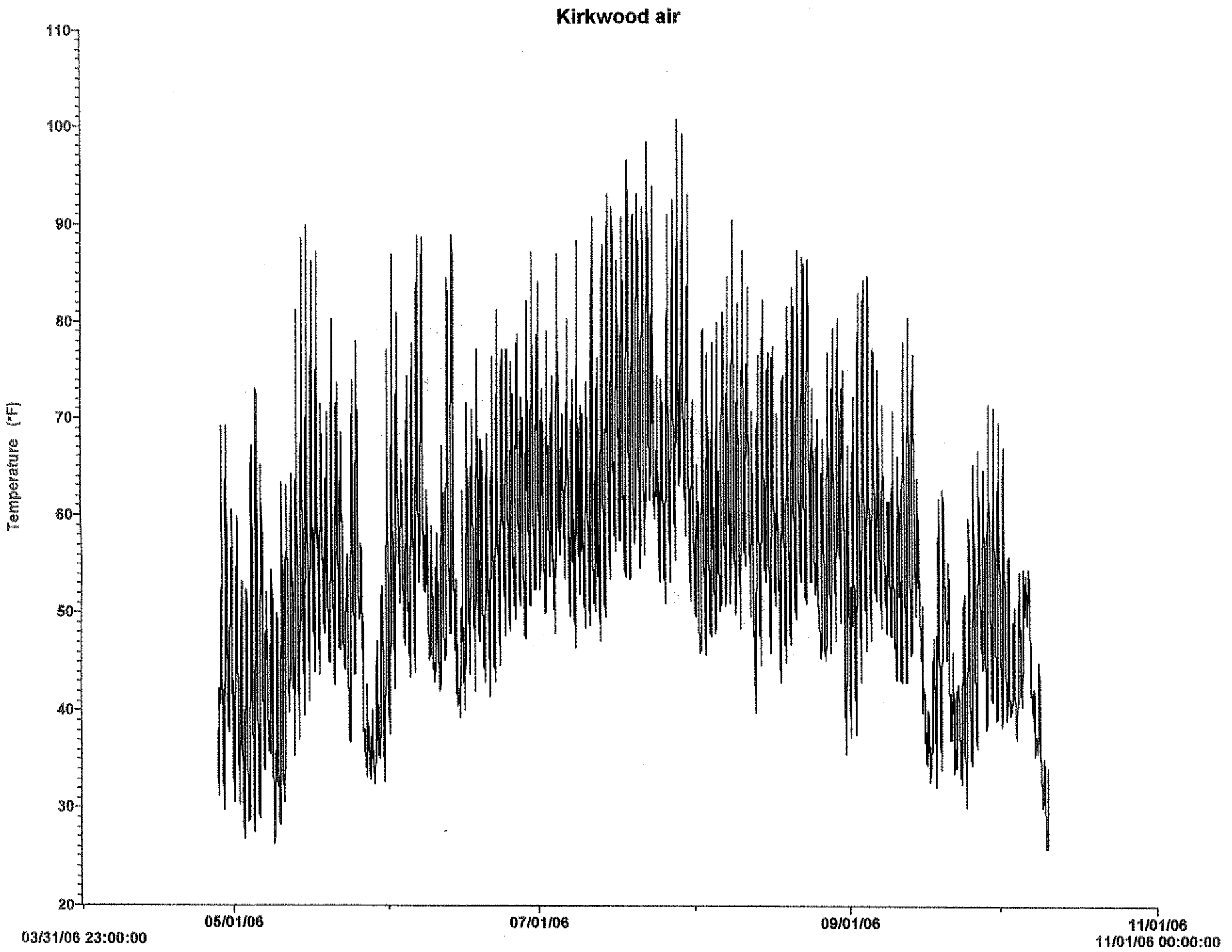

BearTrap Mouth
Temperature (*F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

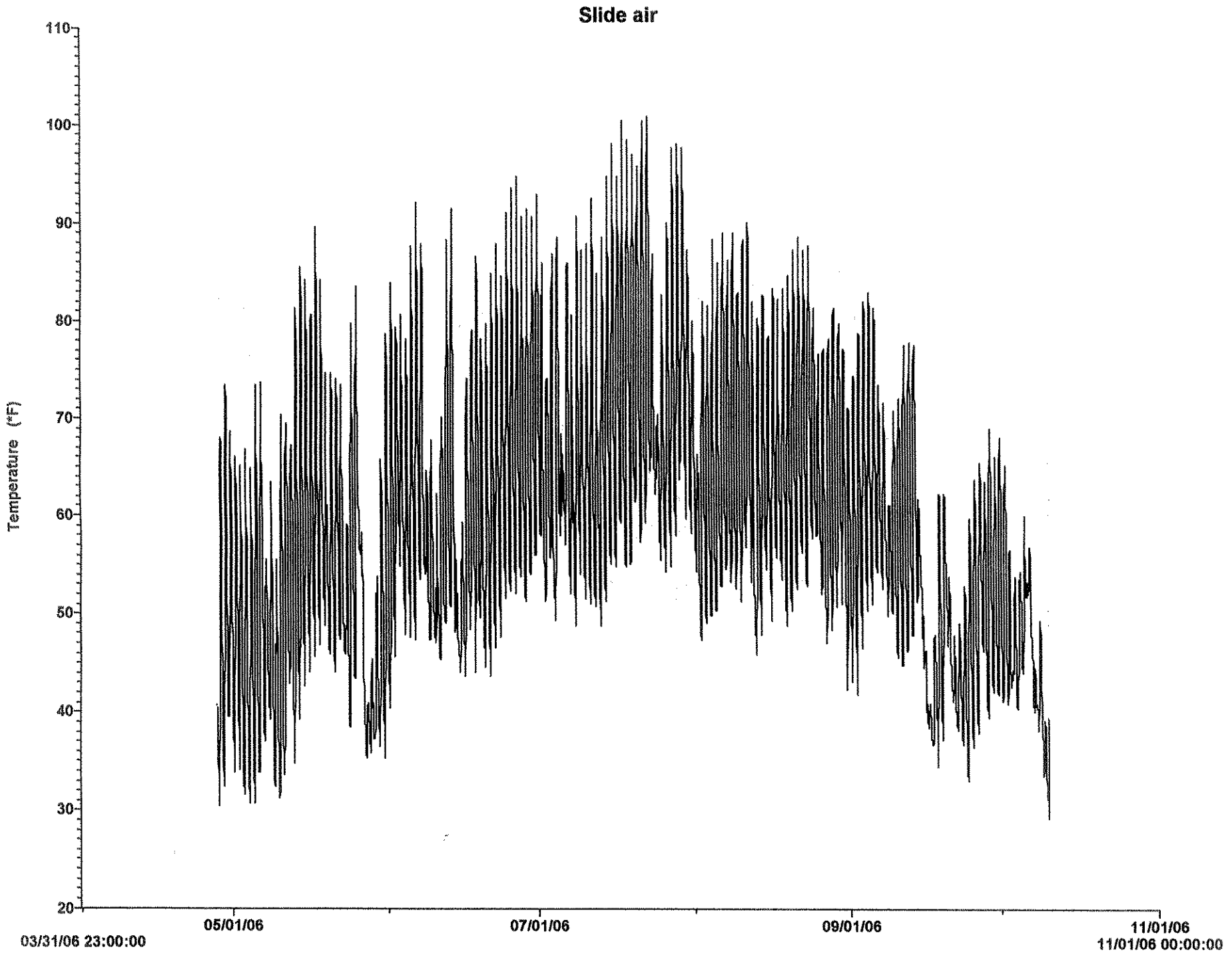

Norris
110
100
90
80
70
60
50
40
30
20
Temperature (°F)
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

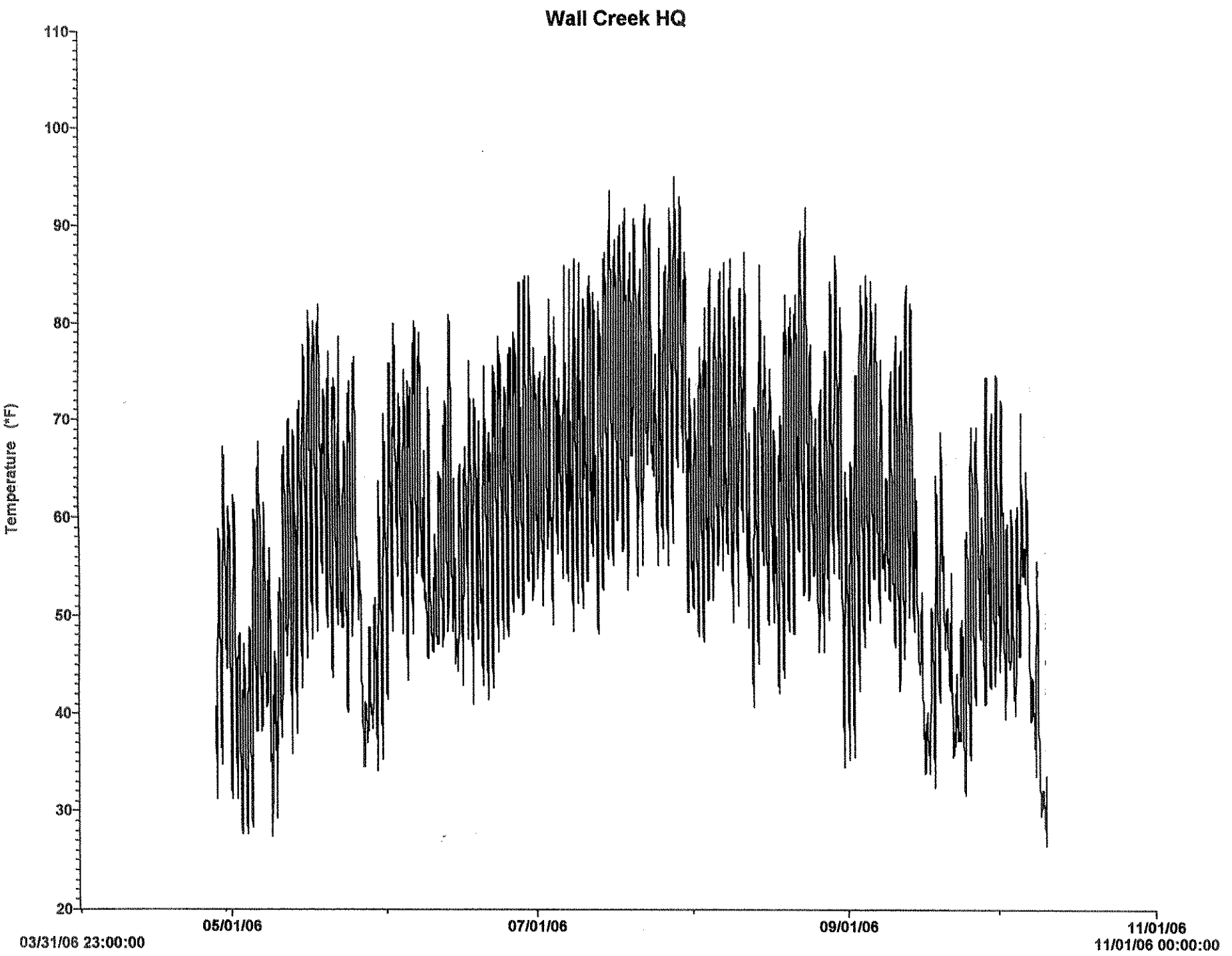

Black's Ford
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

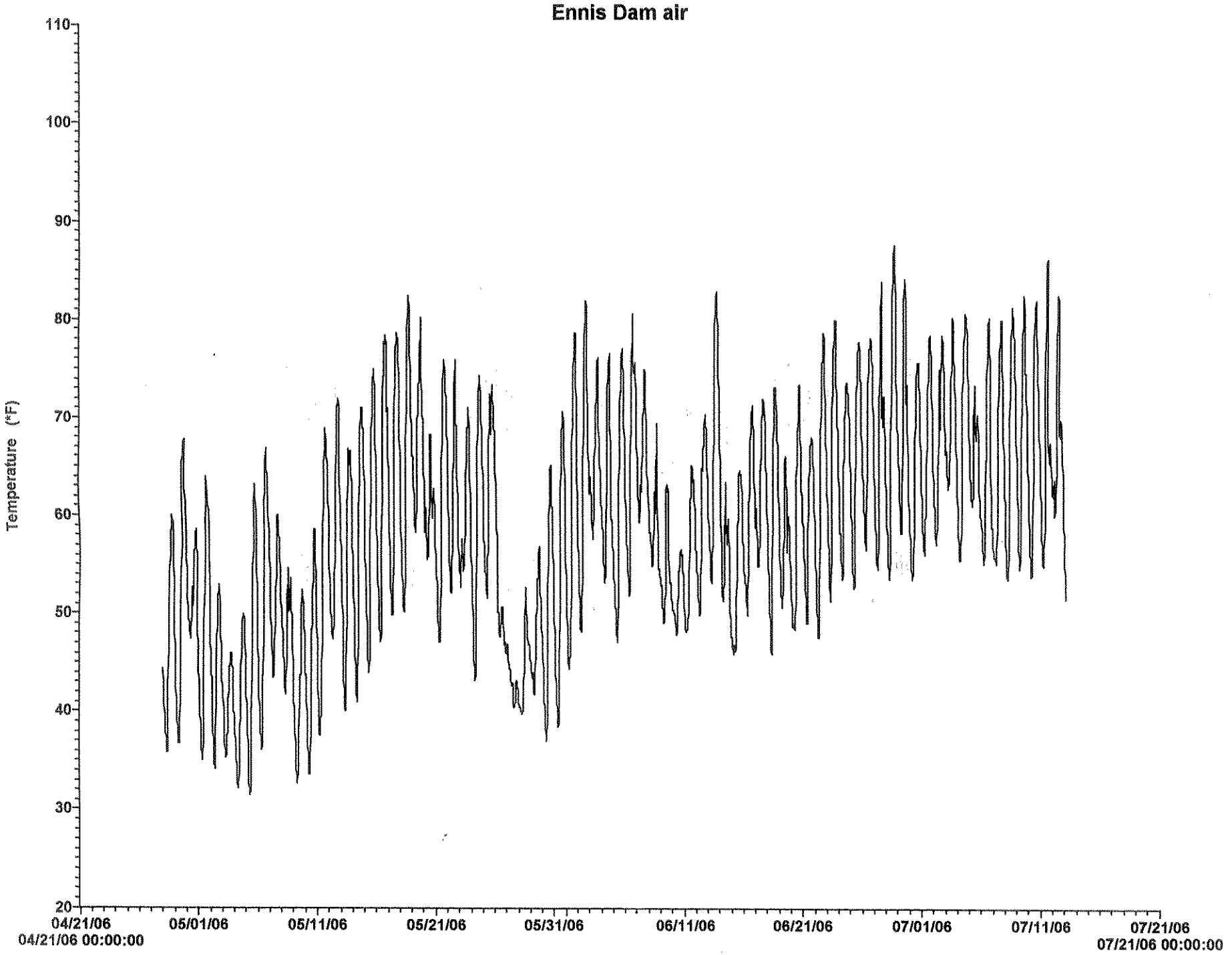

Cobblestone
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

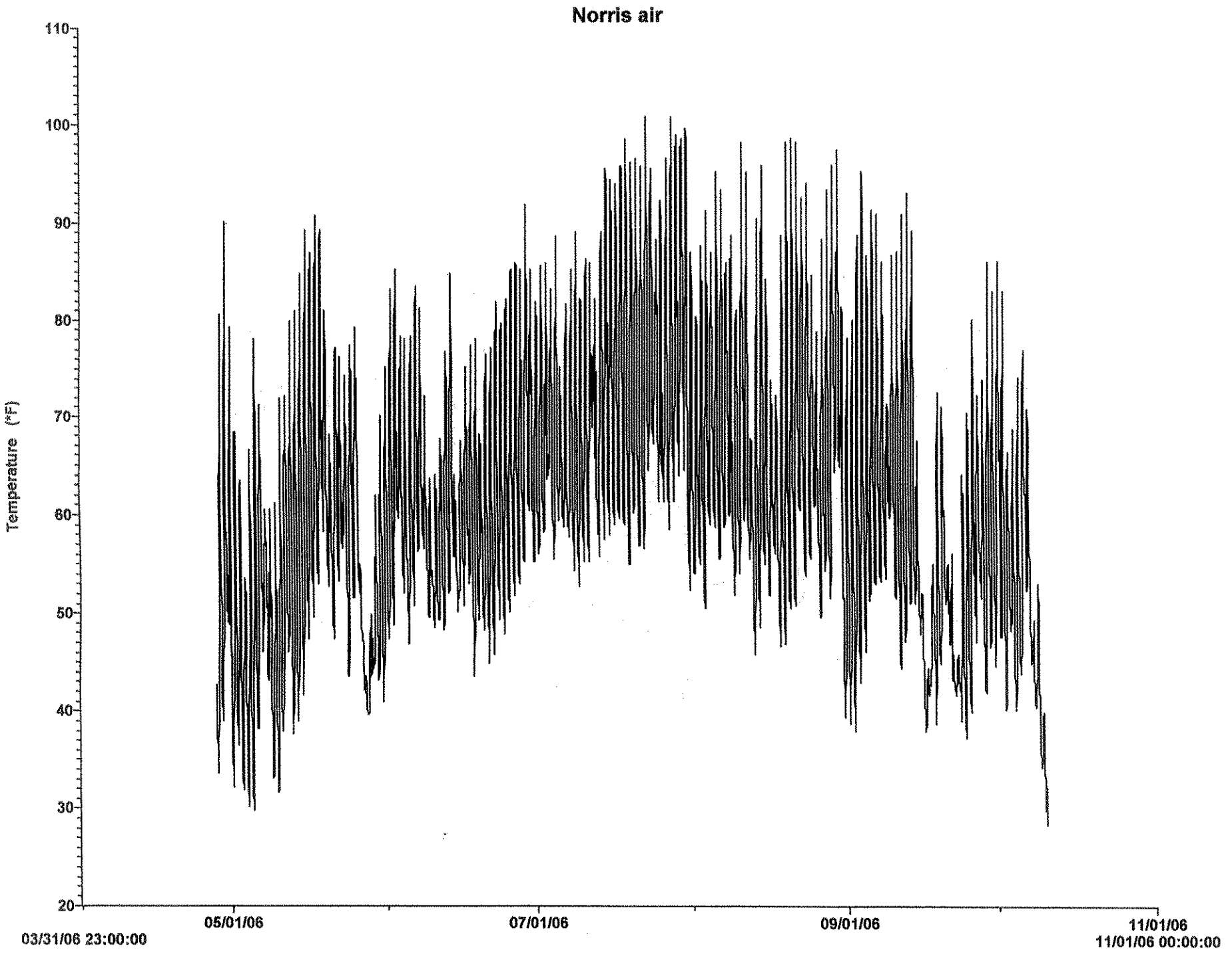

Headwaters State Park
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00
03/31/06 23:00:00

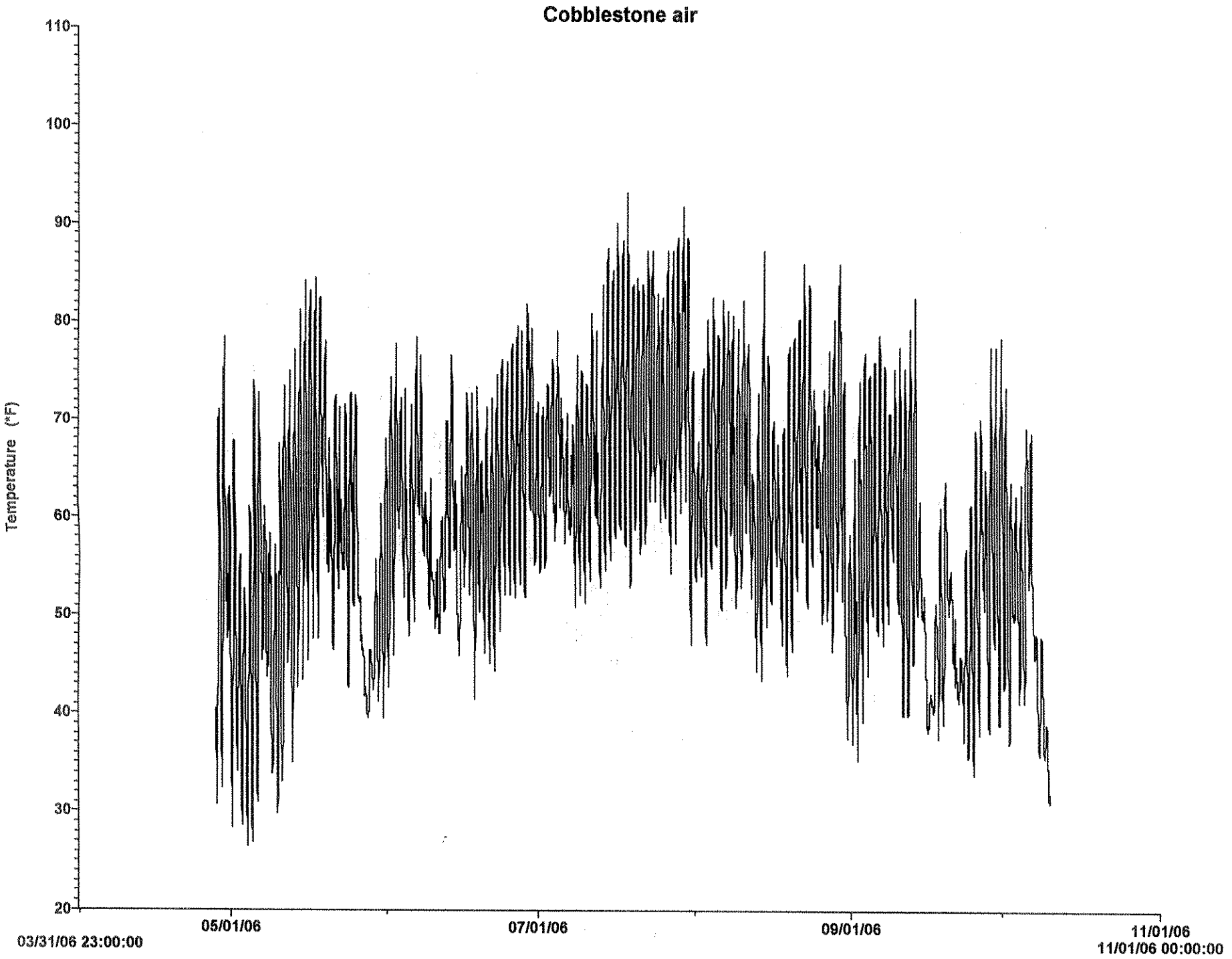

Kirkwood air
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00


Slide air
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00


Wall Creek HQ
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00


Ennis Dam air
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
04/21/06
04/21/06 00:00:00
05/01/06
05/11/06
05/21/06
05/31/06
06/11/06
06/21/06
07/01/06
07/11/06
07/21/06
07/21/06 00:00:00

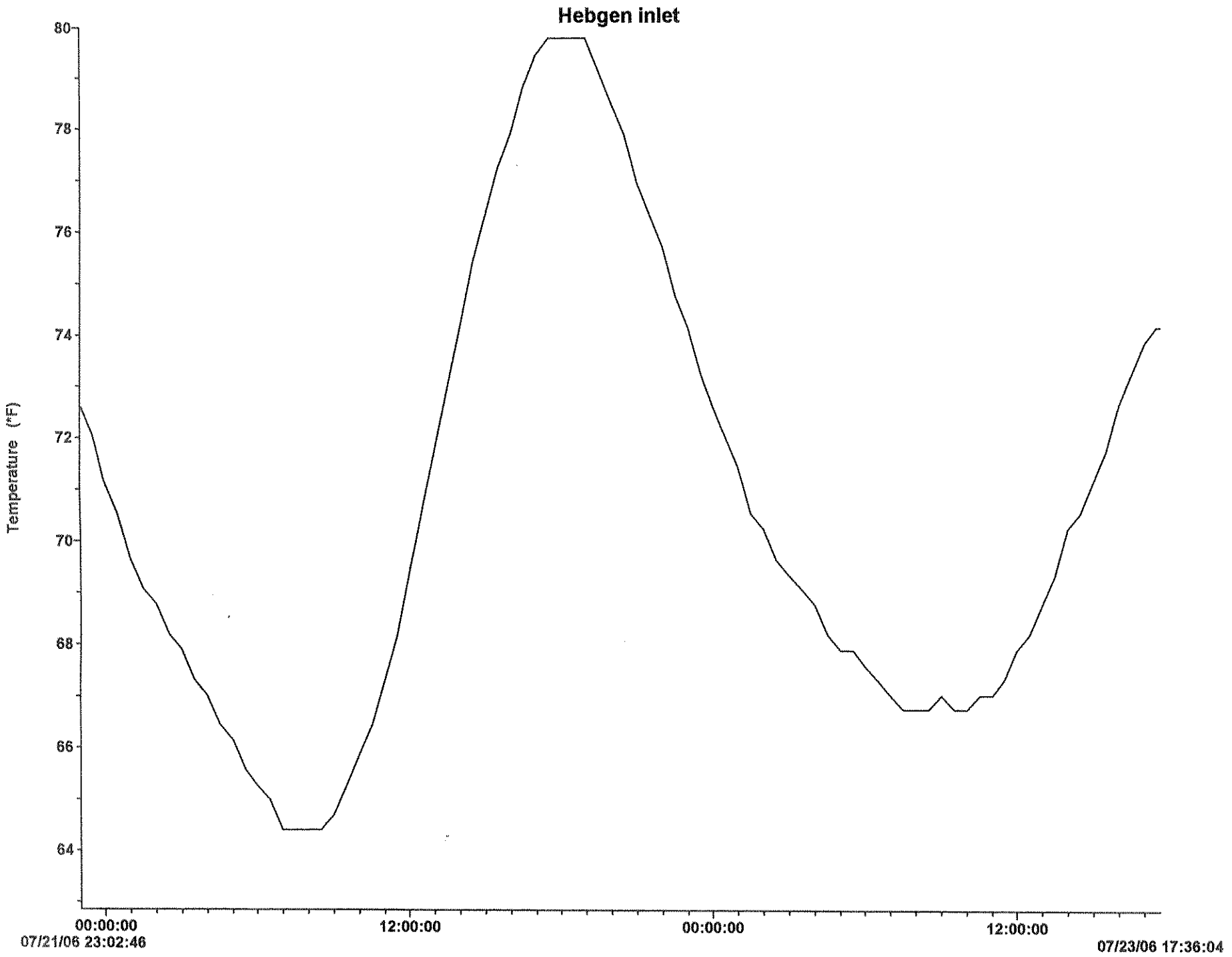

Norris air
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

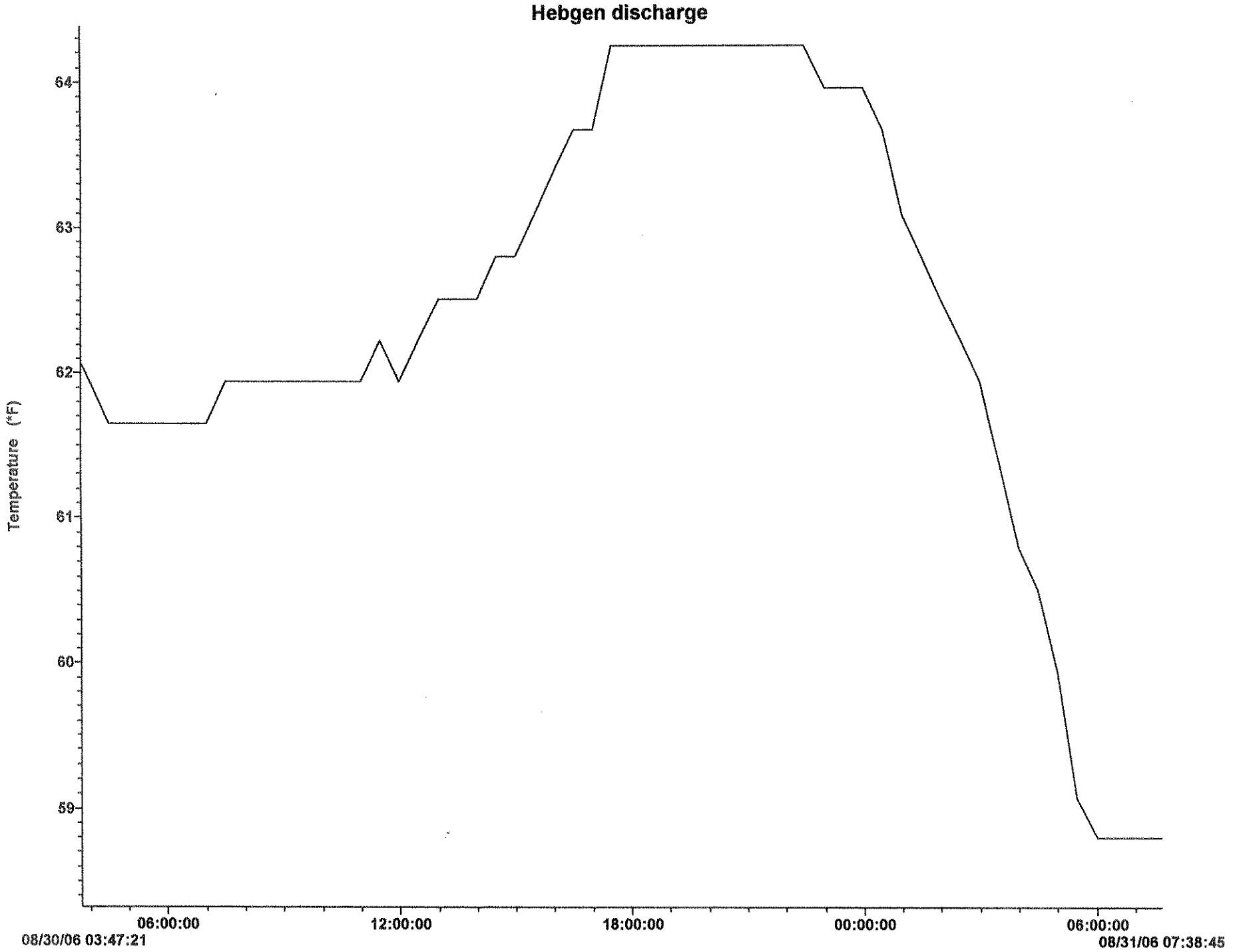

Cobblestone air
Temperature (°F)
110
100
90
80
70
60
50
40
30
20
03/31/06 23:00:00
05/01/06
07/01/06
09/01/06
11/01/06
11/01/06 00:00:00

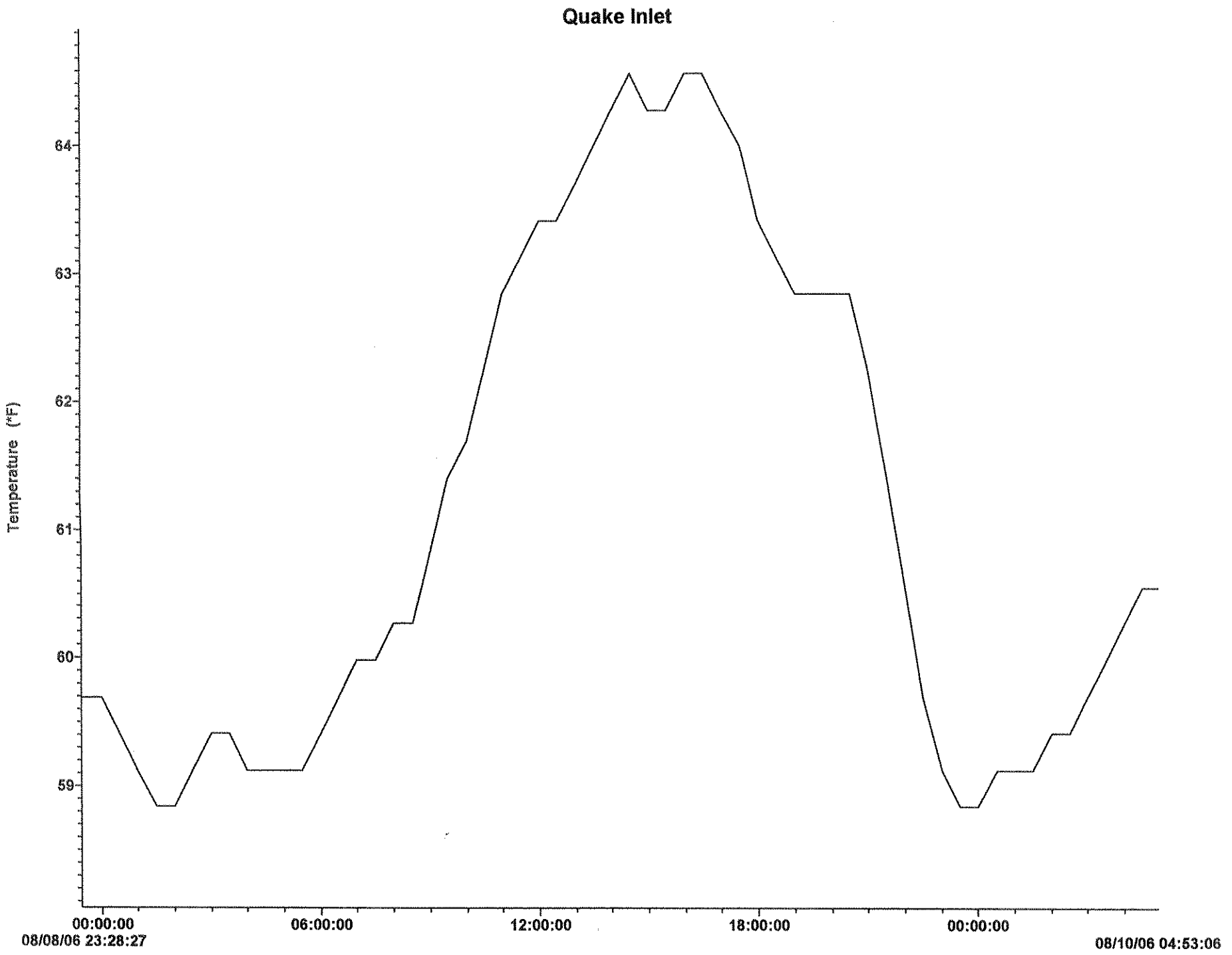
Appendix C2

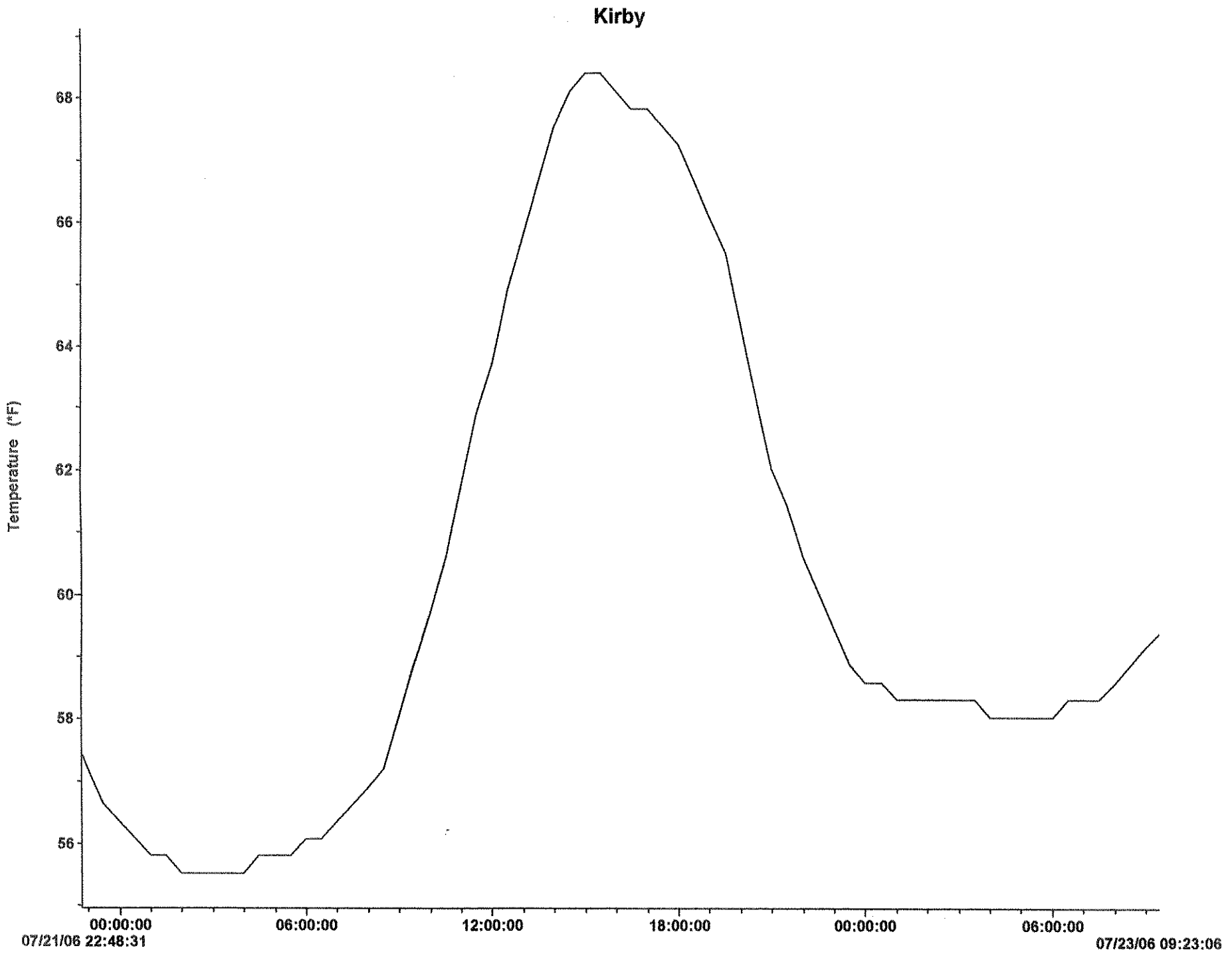
Diel water temperature fluctuations during the warmest 24 hours at river monitoring sites

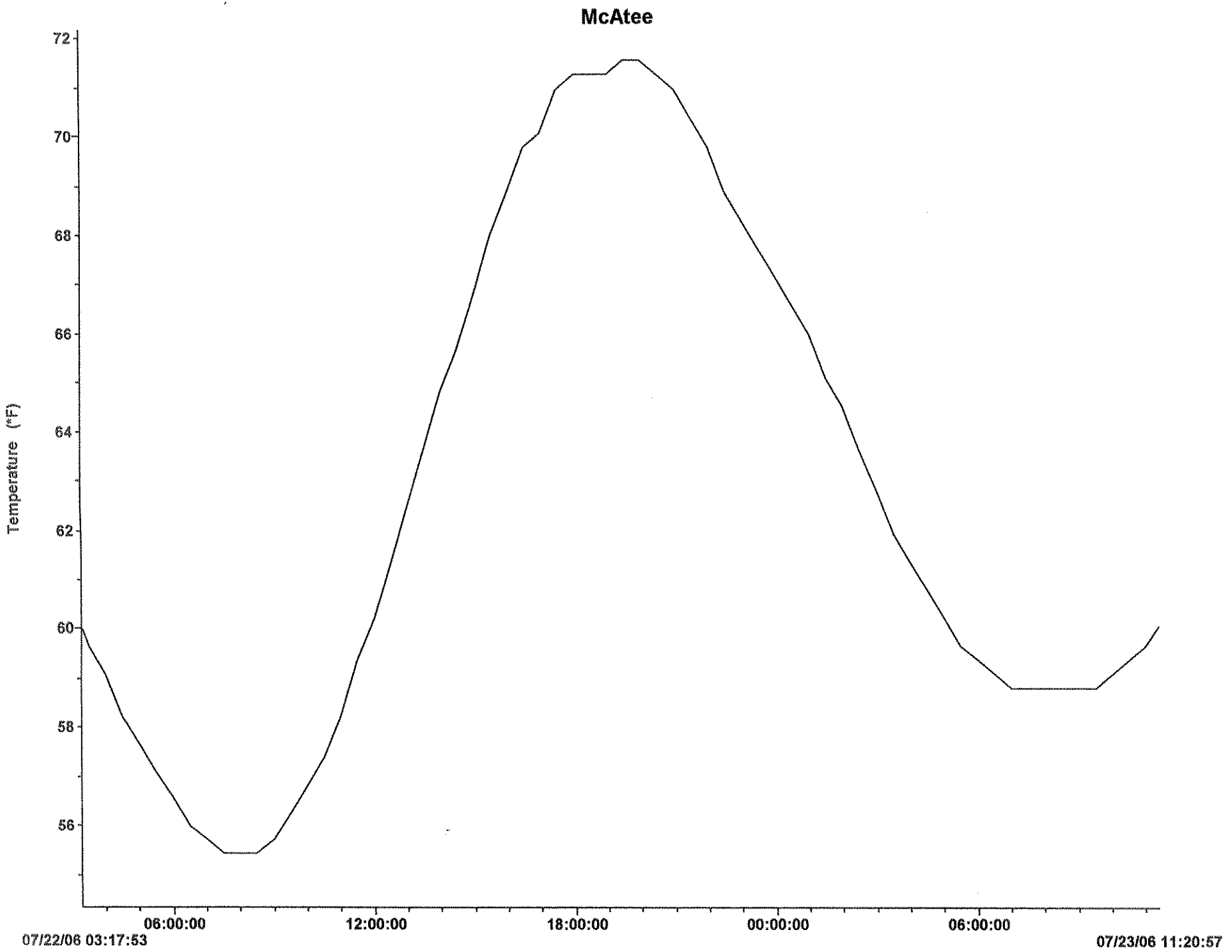
Site	Date	Maximum temperature
Hebgen inlet	July 22	79.79
Hebgen discharge	July 30 & Aug 30	64.24
Quake inlet	August 8	64.57
Quake outlet	NA	NA
Kirby	July 22	68.41
McAtee	July 22	71.55
Ennis Bridge	July 17	72.51
Ennis Reservoir Inlet	July 21 & 22	75.98
Ennis Dam	July 28 & 29	76.20
Beartrap mouth	July 28	78.46
Norris	July 20 & 22	79.35
Black's Ford	July 22	80.31
Cobblestone	July 28	81.26
Headwaters State Park	July 17, 22, 27, 28	80.16

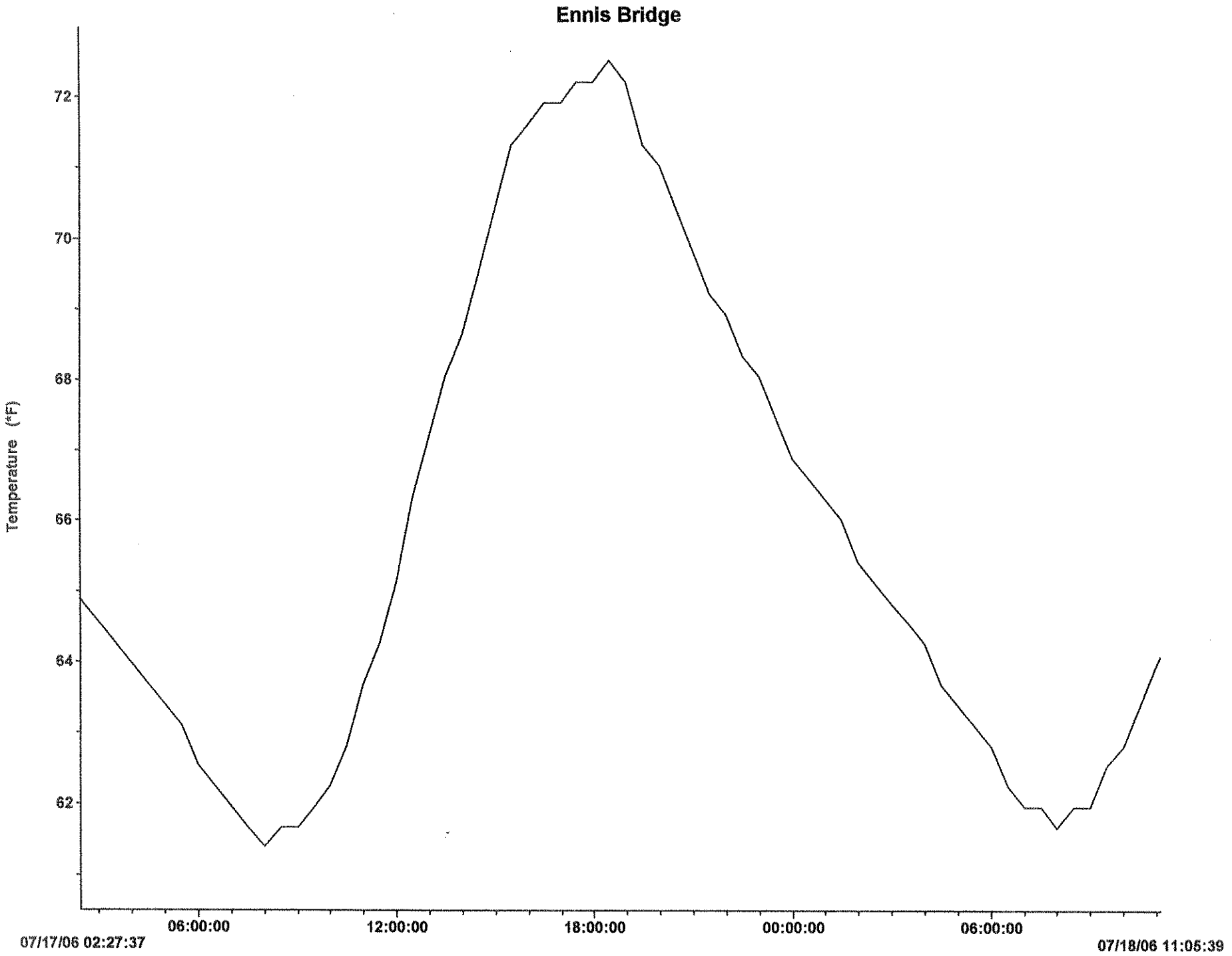

Hebgen inlet
Temperature (°F)
80
78
76
74
72
70
68
66
64
00:00:00
07/21/06 23:02:46
12:00:00
00:00:00
12:00:00
07/23/06 17:36:04

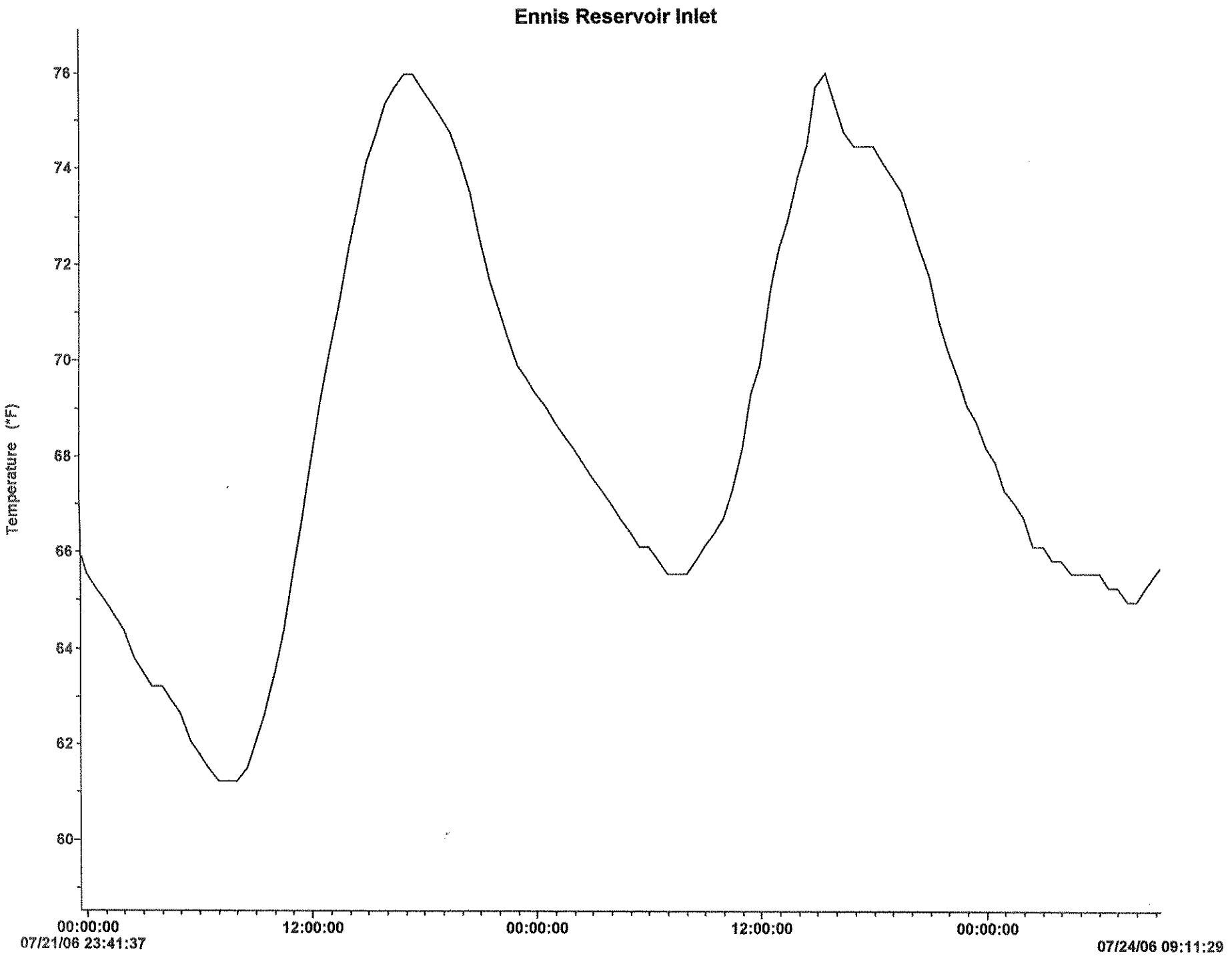

Hebgen discharge
Temperature (°F)
64
63
62
61
60
59
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
08/30/06 03:47:21
08/31/06 07:38:45

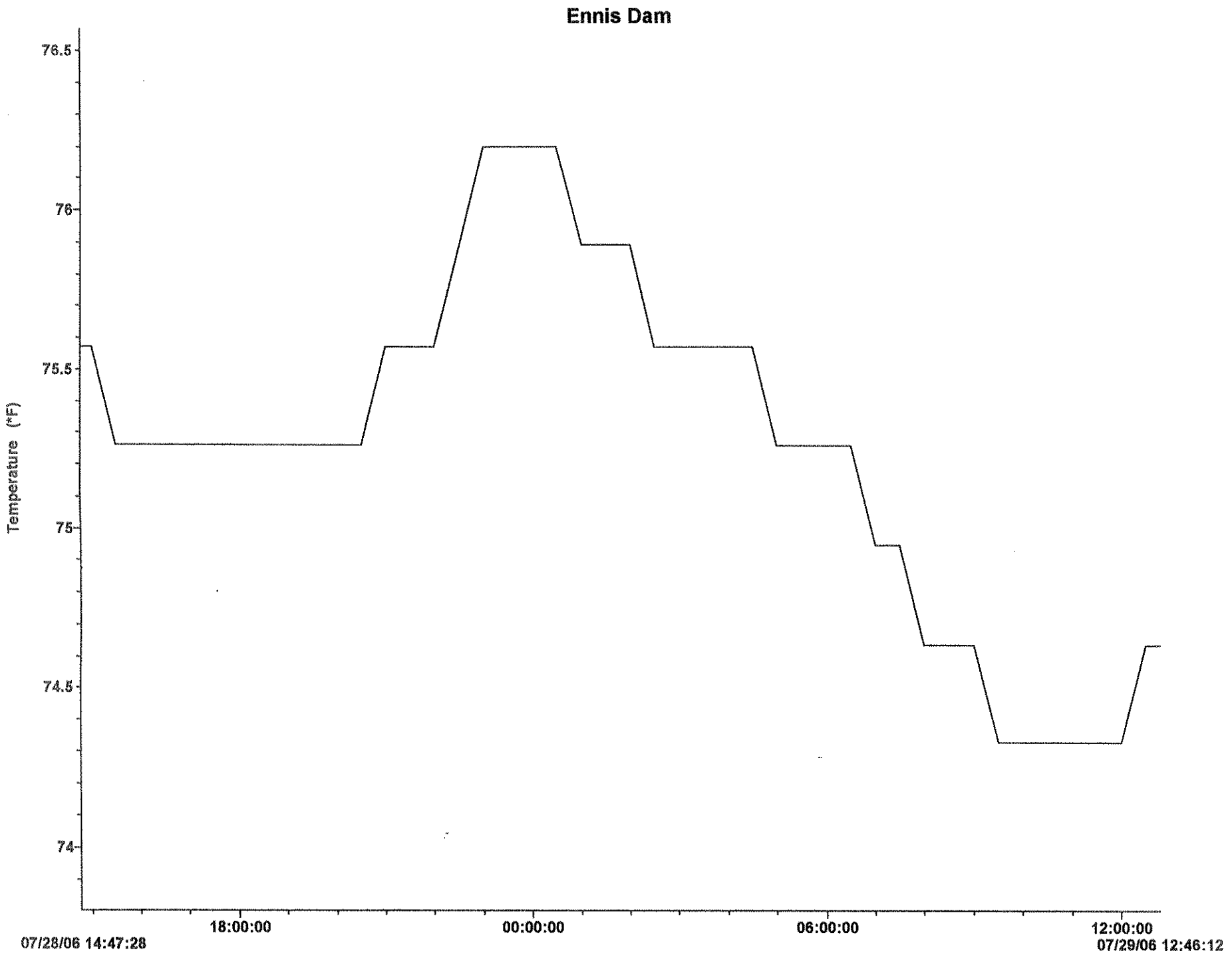

Quake Inlet
Temperature (°F)
64
63
62
61
60
59
00:00:00
08/08/06 23:28:27
06:00:00
12:00:00
18:00:00
00:00:00
08/10/06 04:53:06

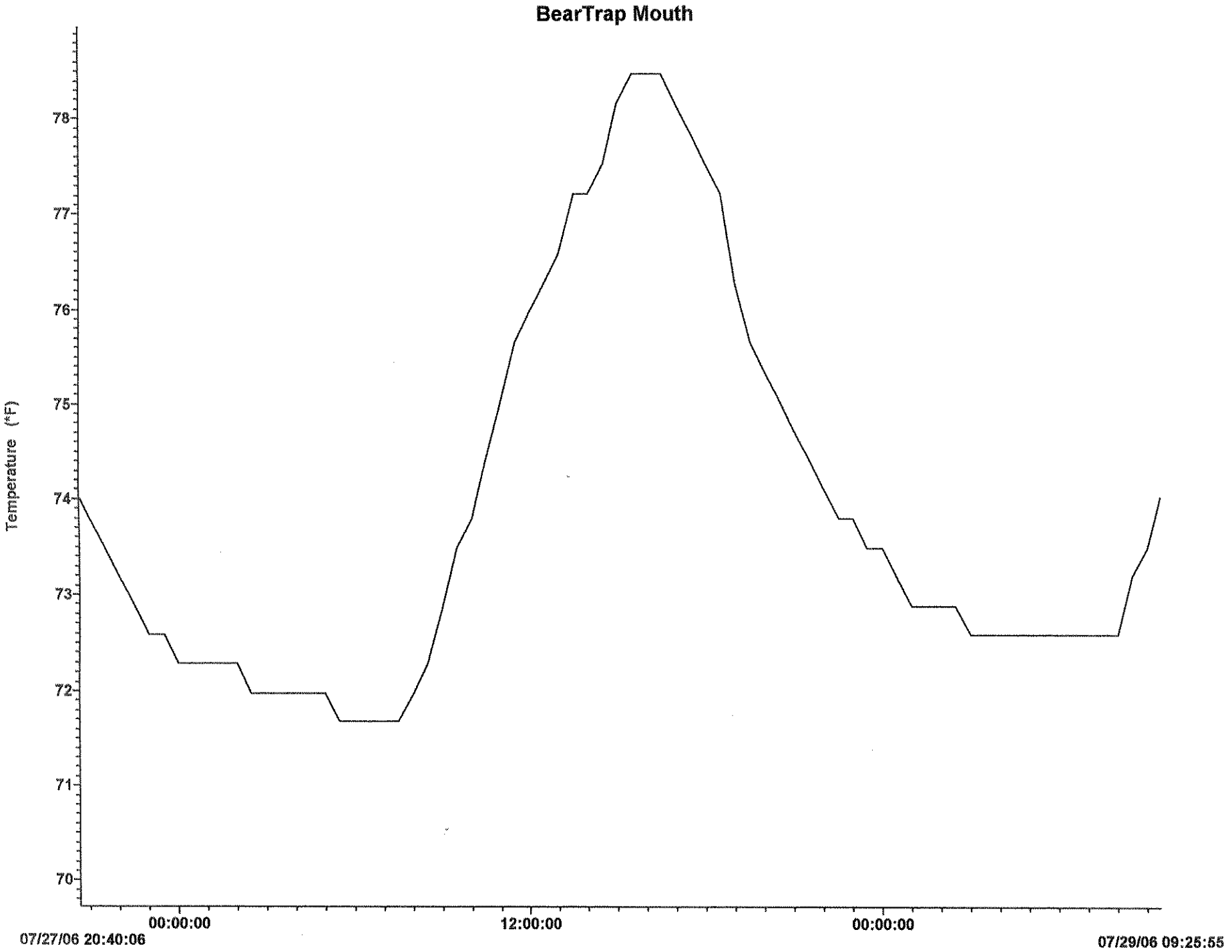

Kirby
Temperature (°F)
68
66
64
62
60
58
56
00:00:00
07/21/06 22:48:31
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/23/06 09:23:06

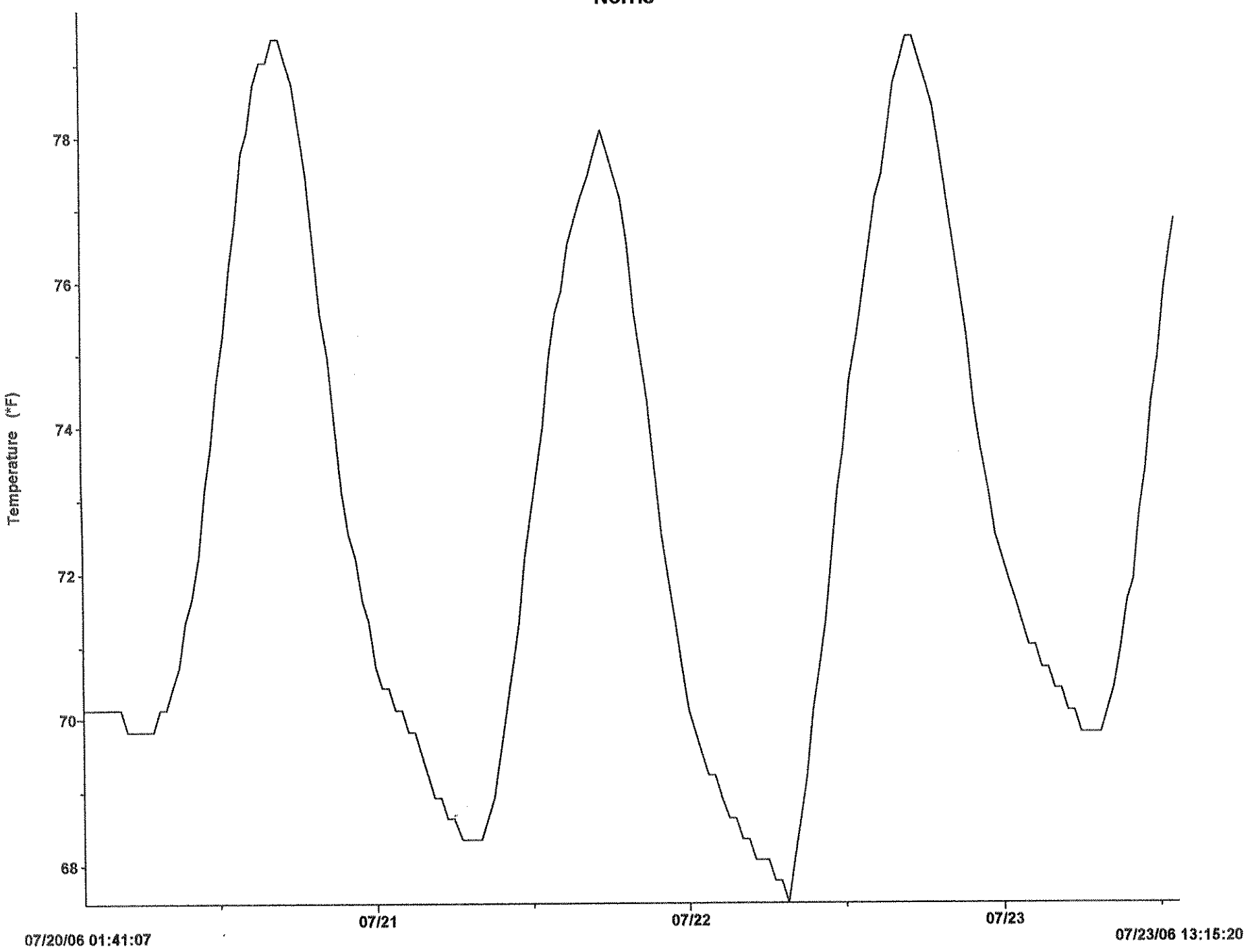

McAtee
72
70
68
66
64
62
60
58
56
Temperature (*F)
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/22/06 03:17:53
07/23/06 11:20:57

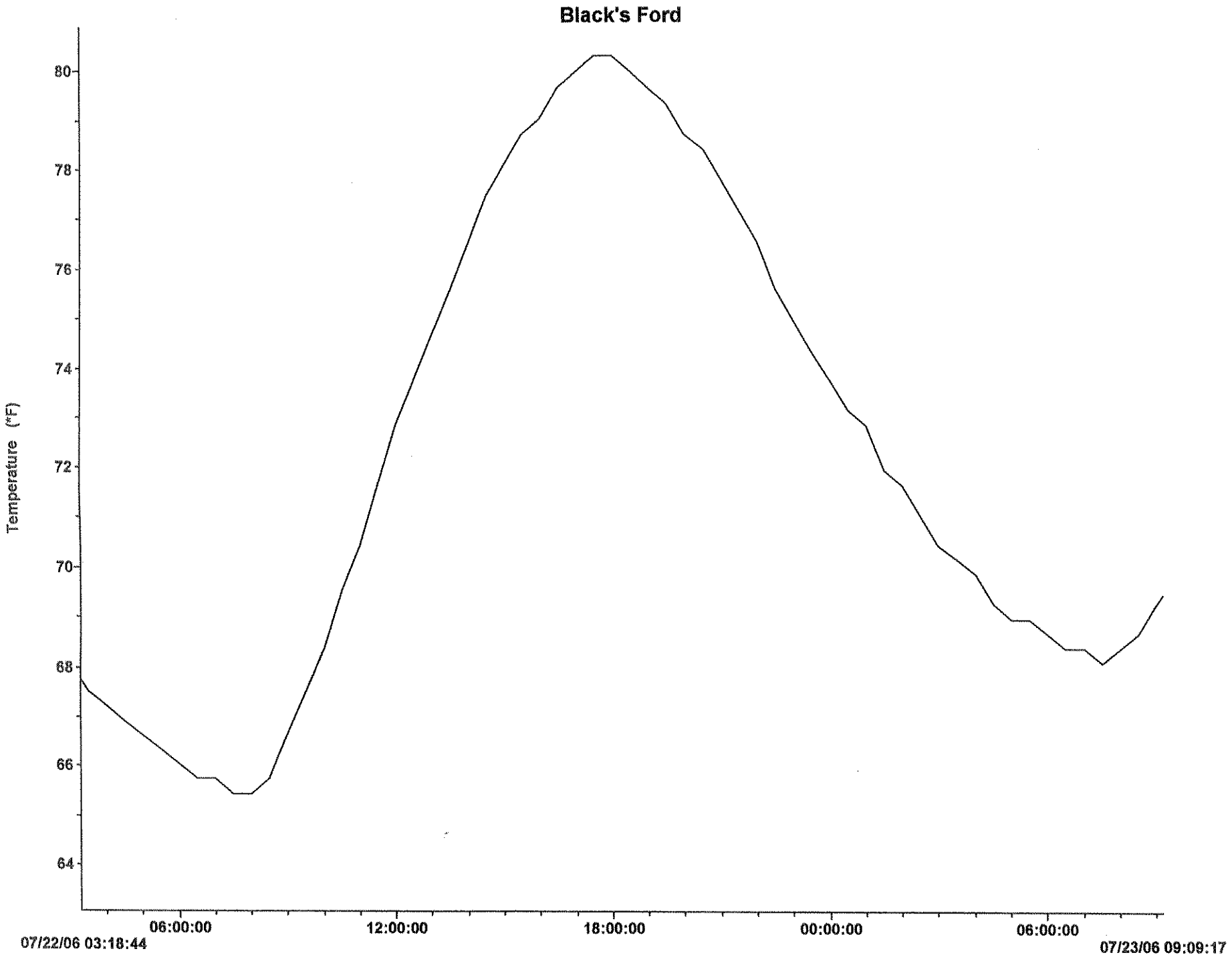

Ennis Bridge
Temperature (°F)
72
70
68
66
64
62
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/17/06 02:27:37
07/18/06 11:05:39

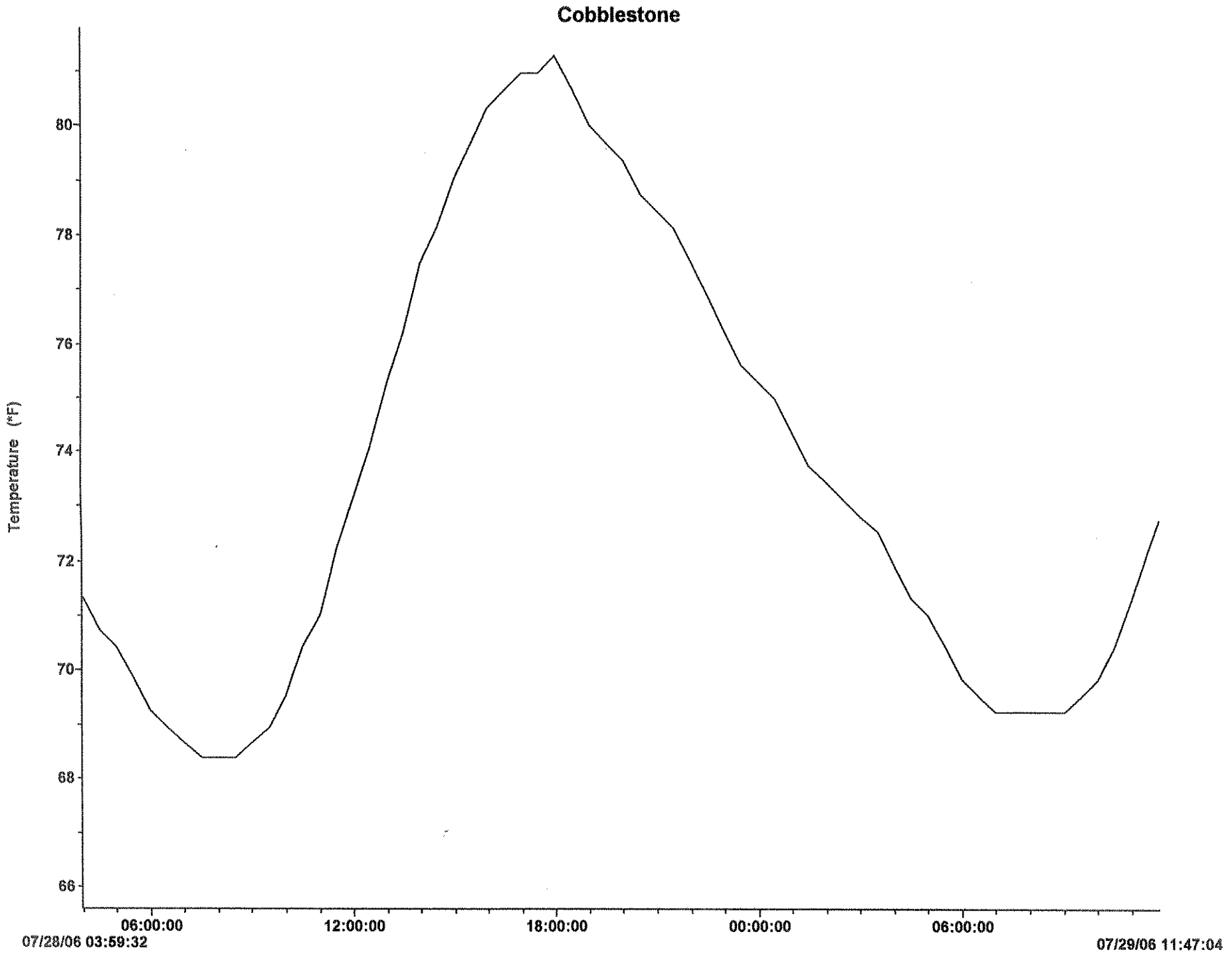

Ennis Reservoir Inlet
Temperature (*F)
76
74
72
70
68
66
64
62
60
00:00:00
07/21/06 23:41:37
12:00:00
00:00:00
12:00:00
00:00:00
07/24/06 09:11:29

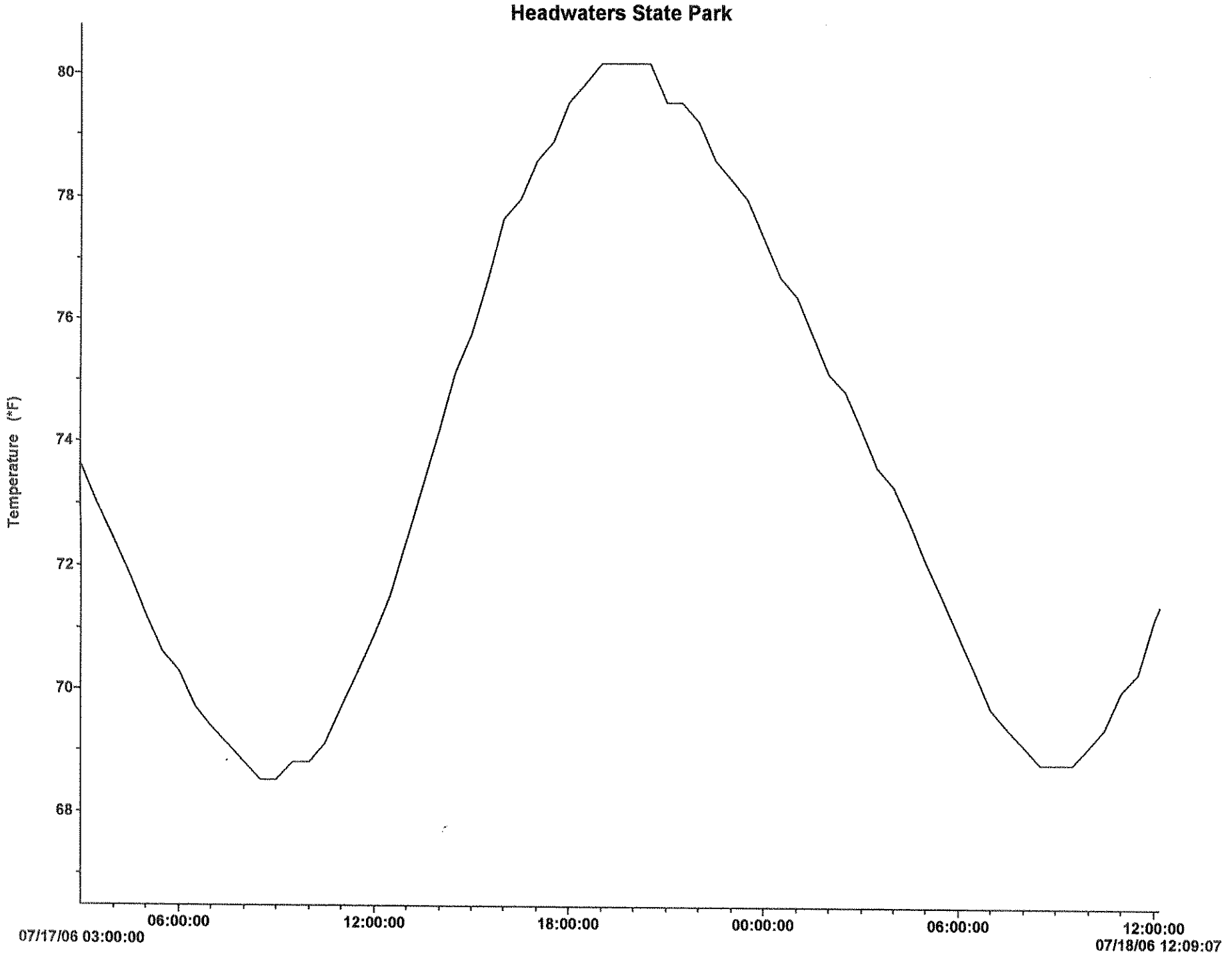

Ennis Dam
76.5
76
75.5
75
74.5
74
Temperature (*F)
18:00:00
00:00:00
06:00:00
12:00:00
07/28/06 14:47:28
07/29/06 12:46:12

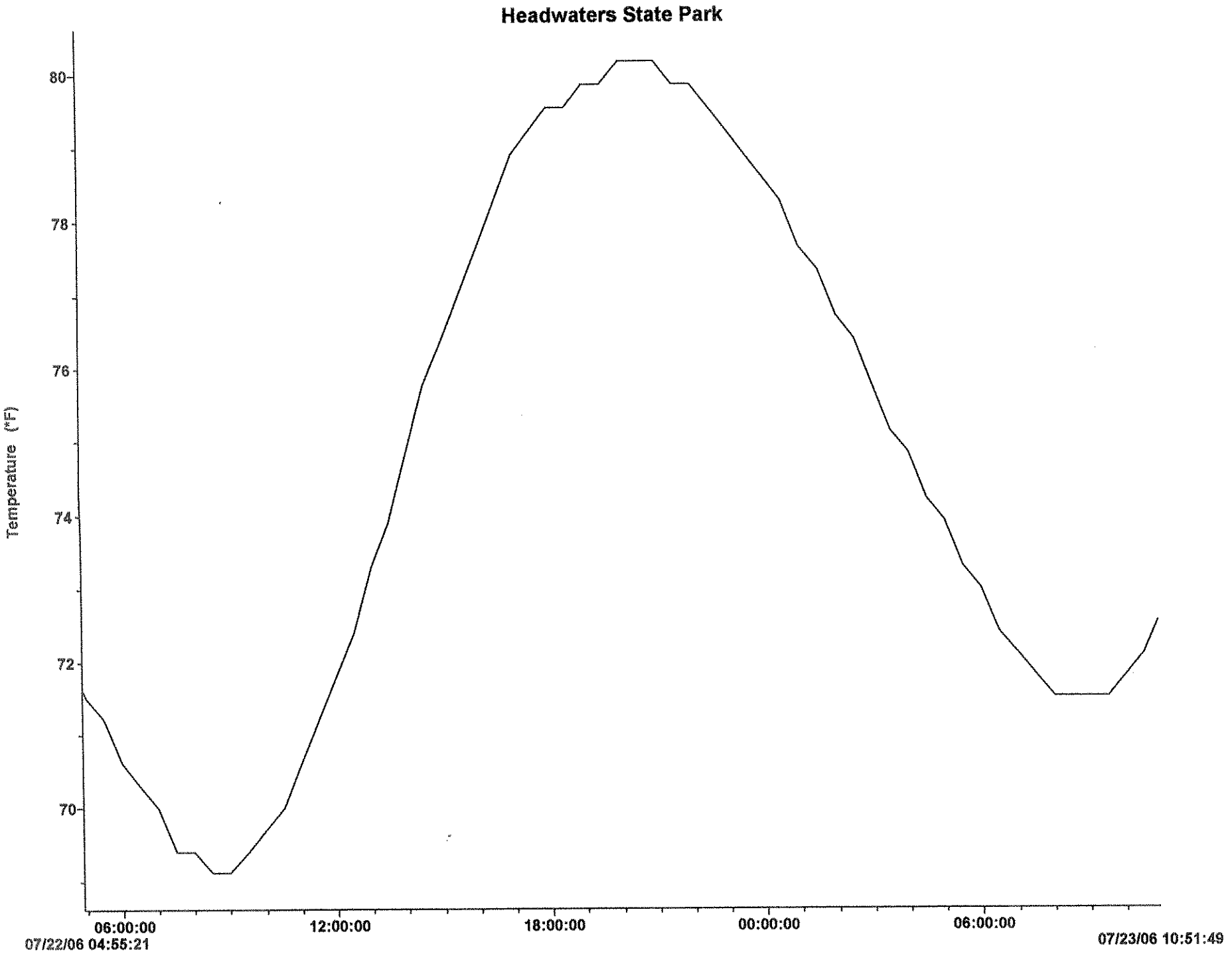

BearTrap Mouth
Temperature (°F)
78
77
76
75
74
73
72
71
70
00:00:00
12:00:00
00:00:00
07/27/06 20:40:06
07/29/06 09:25:55

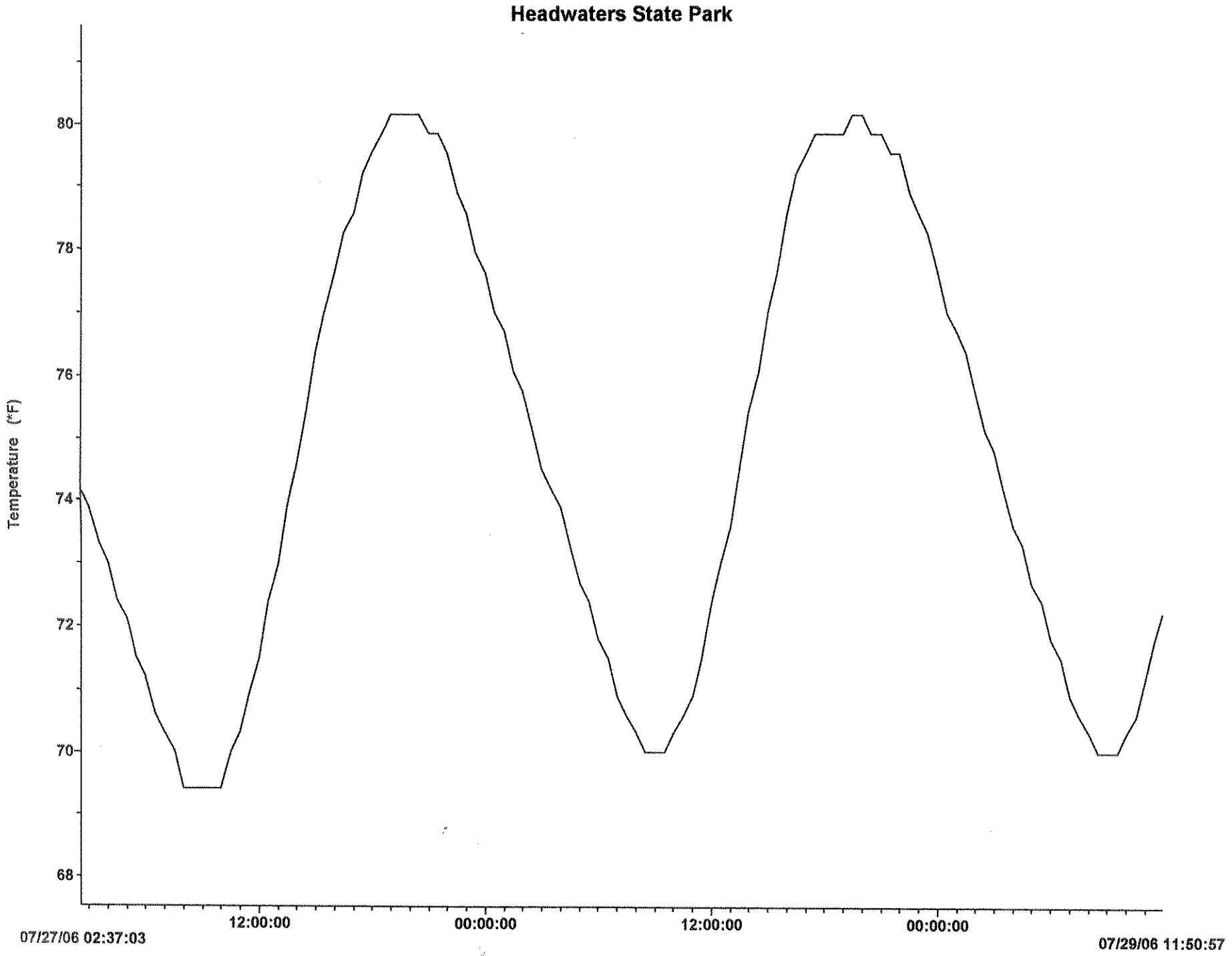

Norris
Temperature (°F)
78
76
74
72
70
68
07/21
07/22
07/23
07/20/06 01:41:07
07/23/06 13:15:20


Black's Ford
Temperature (°F)
80
78
76
74
72
70
68
66
64
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/22/06 03:18:44
07/23/06 09:09:17


Cobblestone
Temperature (°F)
80
78
76
74
72
70
68
66
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/28/06 03:59:32
07/29/06 11:47:04


Headwaters State Park
Temperature (°F)
80
78
76
74
72
70
68
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
12:00:00
07/17/06 03:00:00
07/18/06 12:09:07


Headwaters State Park
Temperature (°F)
80
78
76
74
72
70
06:00:00
12:00:00
18:00:00
00:00:00
06:00:00
07/22/06 04:55:21
07/23/06 10:51:49


Headwaters State Park
Temperature (°F)
80
78
76
74
72
70
68
12:00:00
00:00:00
12:00:00
00:00:00
07/27/06 02:37:03
07/29/06 11:50:57

Appendix D

The Montana Aquatic Nuisance Species Management Plan was finalized in October of 2002 and a full time Aquatic Nuisance Species (ANS) Program Coordinator was hired by Montana Fish, Wildlife and Parks in February of 2004. The emphasis of the Montana ANS Program is on coordination, education, control and prevention of spread, monitoring and detection, and rapid response. The species of emphasis are New Zealand mudsnails, whirling disease (both of which are established in Montana), zebra mussels and Eurasian milfoil (both of which are yet to be documented in the state). Strategies to prevent the further spread and introduction of these species are outlined below.

1. Statewide distribution survey for New Zealand Mudsnails has been completed. All state, federal and private hatcheries have been inspected for New Zealand Mudsnails. One private hatchery contains New Zealand mudsnails, strategies have been implemented to prevent the spread of this invasive through hatchery operations. The spread of New Zealand mudsnails has slowed and appears to be confined to east of the divide.

2. Zebra Mussel veliger sampling has been completed for all major reservoirs on the Missouri River, and on other high priority lakes and reservoirs. To date no zebra mussels have been found within the state.

3. Legislation and Rule making: In 2005 a rule making system was developed to classify exotic wildlife (terrestrial and aquatic) as either non controlled, controlled or prohibited. The following ANS have been since added to the prohibited list: snakehead fish (29 species), grass carp, silver carp, black carp, bighead carp, zebra mussels, rusty crayfish, nutria, African clawed frogs, North American bullfrogs, and New Zealand mudsnails. Legislation was also passed during the 2005 session to provide exceptions for the possession of prohibited species, primarily for the purposes of research, in addition to providing for tougher enforcement authority including the ability to confiscate illegally possessed exotic wildlife.

4. Montana continues to actively participate in the 100th Meridian angler survey program and during 2005 submitted more than 1,700 entries to the angler survey database. The angler surveys are conducted as part of the Montana boat inspection program, which was greatly expanded in 2005. Boat inspections have occurred on all major lakes, reservoirs and popular cold-water trout rivers. The first boat with zebra mussels was found in Montana in March 2005.

5. Training: a one day workshop was provided during the Annual Meeting of the Montana Chapter of the American Fisheries Society on ANS identification, 2 day HACCP workshops have been provided for Montana hatchery personnel and field workers, a half day training was provided for Montana Firefighters on the prevention of spread of ANS, and a half day training was provided on ANS identification and prevention of spread as part of fish health training for fisheries and hatchery personnel within FWS Region 6.

6. Public outreach: presentations on ANS have been made to several special interest groups including Walleyes Unlimited, Fishing Outfitters Association of Montana and Lake Associations. ANS informational booths were present at five Montana outdoor shows: Billings, Bozeman, Great Falls, Missoula and Kalispell. Informational packets have been developed and are being distributed for private pond owners to encourage responsible pond ownership.

7. Illegal introductions: to date over 500 illegal fish introductions have been recorded in Montana. Illegal introductions have been identified as a major source of ANS introductions into Montana waters. An aggressive public outreach campaign was launched during summer of 2005 with an increase in law enforcement to discourage the activity of "bucket biology".

Appendix E

The MacConnell-Baldwin whirling disease grade-of-severity scale and definitions.

Grade 0: No abnormalities noted. *Myxobolus cerebralis* is not seen.

Grade 1: Small, discrete focus or foci of cartilage degeneration. No or few associated leukocytes.

Grade 2: Single, locally extensive focus or several smaller foci of cartilage degeneration and necrosis. Inflammation is localized, few to moderate numbers of leukocytes infiltrate or border lytic cartilage.

Grade 3: Multiple foci (usually 3 –4[1/]) of cartilage degeneration and necrosis. Moderate number of leukocytes are associated with lytic cartilage. Inflammatory cells extend minimally into surrounding tissue.

Grade 4: Multifocal (usually 4 or more sites[1/]) to coalescing areas of cartilage necrosis. Moderate to large numbers of leukocytes border and/or infiltrate lytic cartilage. Locally extensive leukocyte infiltrates extend into surrounding tissue.

Grade 5: Multifocal (usually 6 or more[1/]) to coalescing areas of cartilage necrosis. Moderate to large numbers of leukocytes border and/or infiltrate necrotic cartilage. The inflammatory response is extensive and leukocytes infiltrate deeply into surrounding tissue. This classification is characterized by loss of normal architecture and is reserved for the most severely infected fish.

[1/] lesion numbers typical for head, not whole body sections.

Appendix F

Madison Ranger District – Aquatic Restoration Partnerships
2007 Monitoring Report

This document reports the accomplishments and effectiveness of partnership projects with PPL-Montana conducted by Aquatic Resources staff on the Madison Ranger District during the 2006 field season. Additional partners include the Madison-Gallatin Chapter of Trout Unlimited, the Madison River Foundation, MT Dept. of Fish, Wildlife and Parks, Montana Conservation Corps, and the National Forest Foundation. Stream restoration projects described here include Tepee Creek, Wigwam Creek, Gazelle Creek, Arasta Creek, and Elk River, all supporting Article 409 parts (3) and (9) of the PPL's Madison River FERC license. Replacement of a 48" culvert at Soap Creek with a stream simulation 14 foot arch pipe is also reported and meets parts (3) and (5) of Article 409.

Tepee Creek

Since 2004, about 40 in-channel structures have been installed in a 1 km meadow reach of Tepee Creek, a headwater tributary of Horse Creek in the Madison River basin. Initial effectiveness monitoring from 2005 indicate these low-head structures were trapping considerable amounts of fine sediments, however data collected in 2006 relate the structures installed had trapped no greater quantities of sediment, i.e., they had reached their maximum potential and any additional sediments would be transported downstream (see Figure 1). As an adaptive management strategy, we decided in 2006 to begin installing channel-spanning weirs using long willow cuttings woven between wood

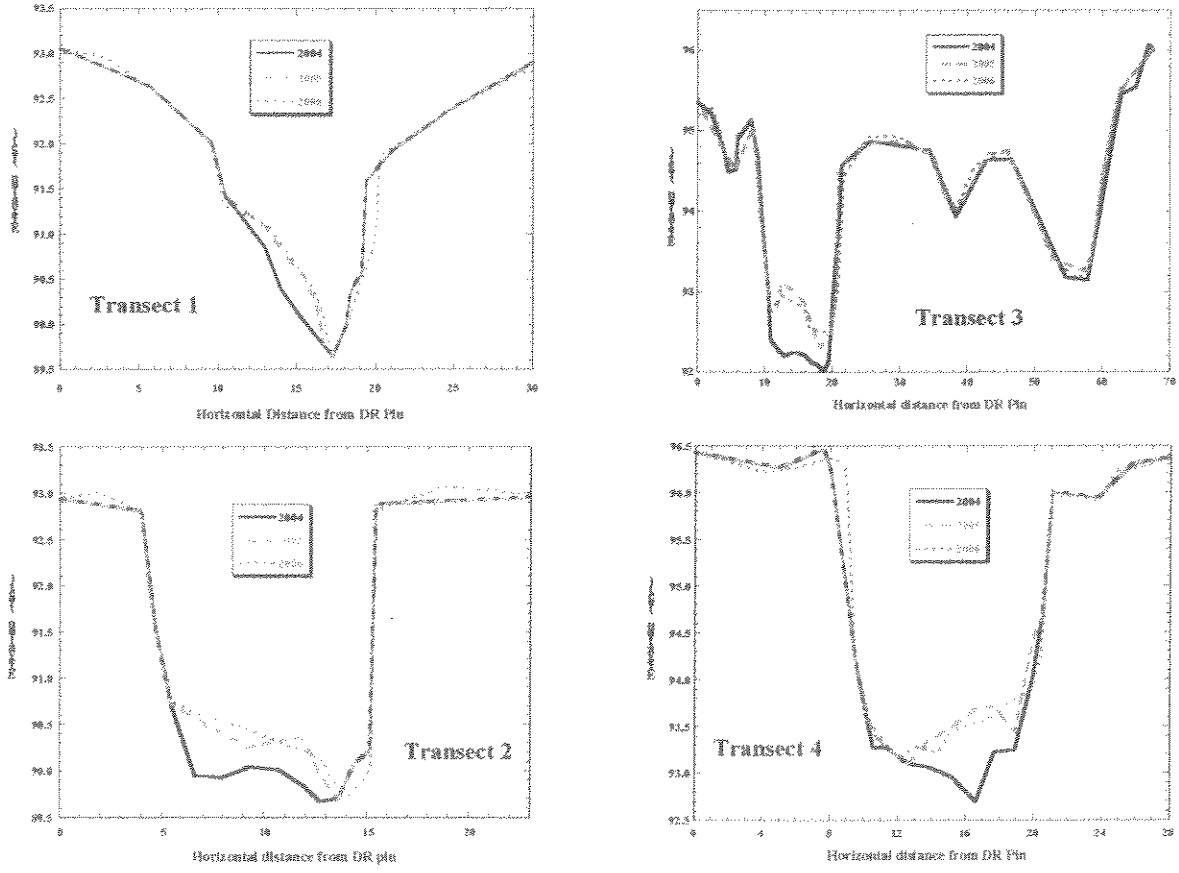


Figure 1. Channel cross-sections at four locations of Tepee Creek, 2004-2006. Note how each site relates considerable sediment deposition in 2005, with relatively no change in 2006.

stakes with the objective of creating stilling ponds to enhance the deposition of fine sediments, raising streambed elevations, and associated unconfined water tables (Figure 2). Initial observation is that these structures are effective at raising water surface elevation, however their effectiveness at increasing sediment deposition will have to await judgment until new data is collected and analyzed in the summer of 2007.

Figure 2. Willow wicker weir, Tepee Creek, 2006.

Wigwam Creek

The restoration work Wigwam Creek has employed the installation of baffle structures that influence sediment deposition without spanning the entire channel. Monitoring of morphological parameters indicate that we have been successful in reducing bankfull width and bed gradient, while increasing channel length and sinuosity, with lesser improvements in pool characteristics (Table 1).

Table 1. Channel characteristics, Wigwam Creek, 2004-2006

Channel characteristic	2004	2005	2006
Channel length (m)	388.3	397.9	421.2
Stream bed gradient (%)	2.73	2.65	2.51
Sinuosity	1.20	1.24	1.31
Mean bankfull width (m)	2.73	2.48	2.28
Pool frequency (pools / km)	27.1	34.1	34.3
Pool spacing	13.4	11.7	12.7
Mean residual pool depth (m)	0.23	0.21	0.22

Baffles installed in Wigwam Creek have been very successful influencing sediment deposition, particularly in their downstream eddy areas. In 2006, we purchased sedge plugs using funds provided by the Madison River Foundation and planted them in these areas of deposition to help stabilize these unconsolidated sediments. By fall, sedges appeared to thrive in these environments, and continued monitoring will be needed to determine how effective they are in sediment stabilization (Figures 3 and 4).

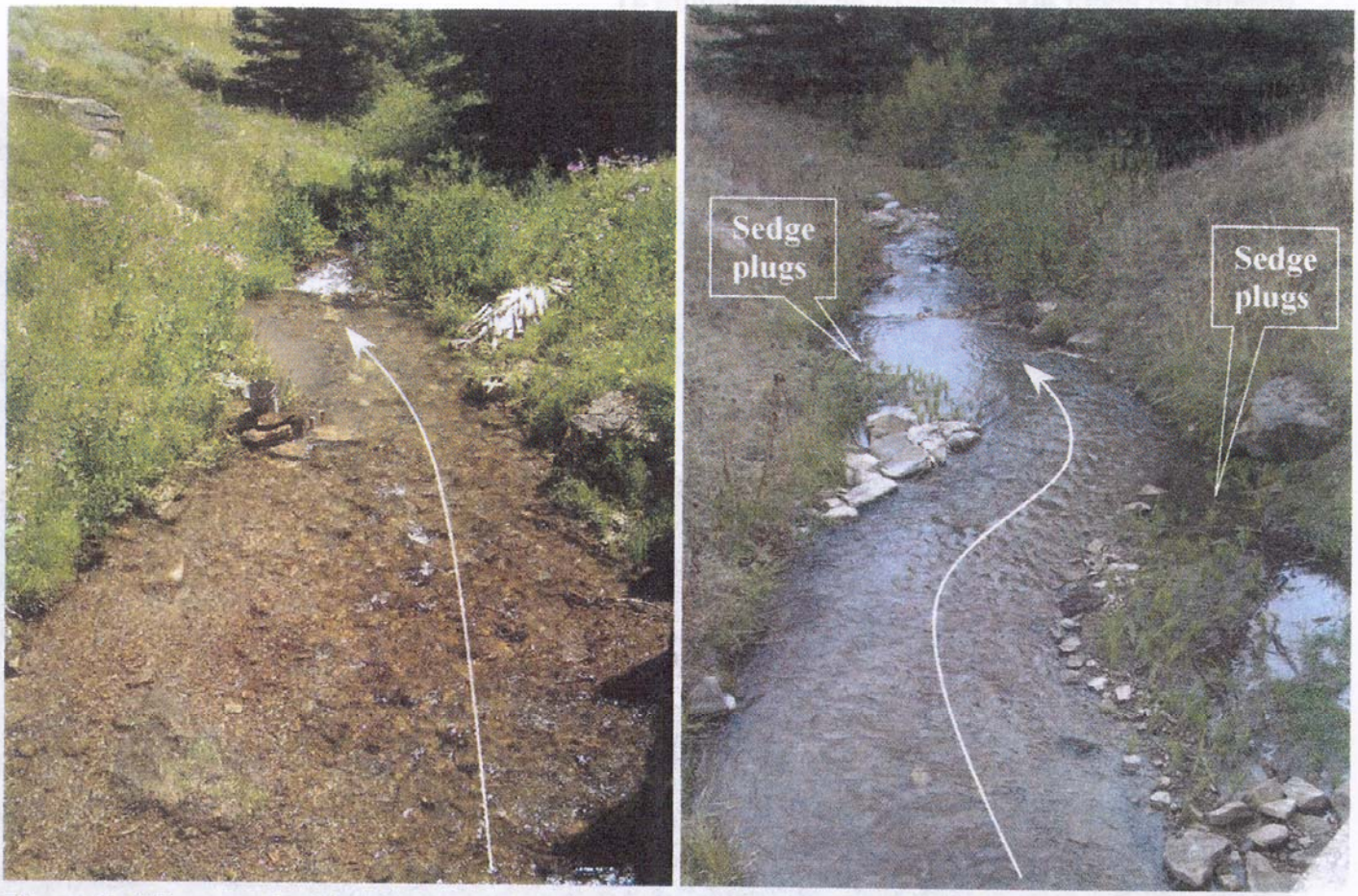


Figure 3. Wigwam Creek immediately downstream of the FS Road 290 bridge; previous to baffle installation (July 2005) at left, and after baffle installation (September 2006) at right.

Figure 4. Sedge plugs in fine sediment deposited behind a baffle.

Gazelle Creek, Arasta Creek, Elk River

After completing environmental analysis and obtaining necessary permits from the state and the US Army Corps of Engineers, Madison District Aquatics staff began implementing stream restoration in these three drainages during the summer of 2006. In Gazelle Creek, about eight structures were installed in about 400 meters of channel (Figure 4).

Figure 4. Gazelle Creek willow wicker weir structure. Note the fish passage ramp design.

In Arasta Creek, about 10 structures were installed in a 300 meter channel segment, and in Elk River meadow, a fairly remote location, only one structure was installed, due to time and weather constraints (Figure 5). This structure is an experimental attempt to evaluate how a simple line of wood stakes pounded into the streambed will act to influence sediment deposition on its downstream face, reducing the channel's bankfull width locally and improving its overall channel function.

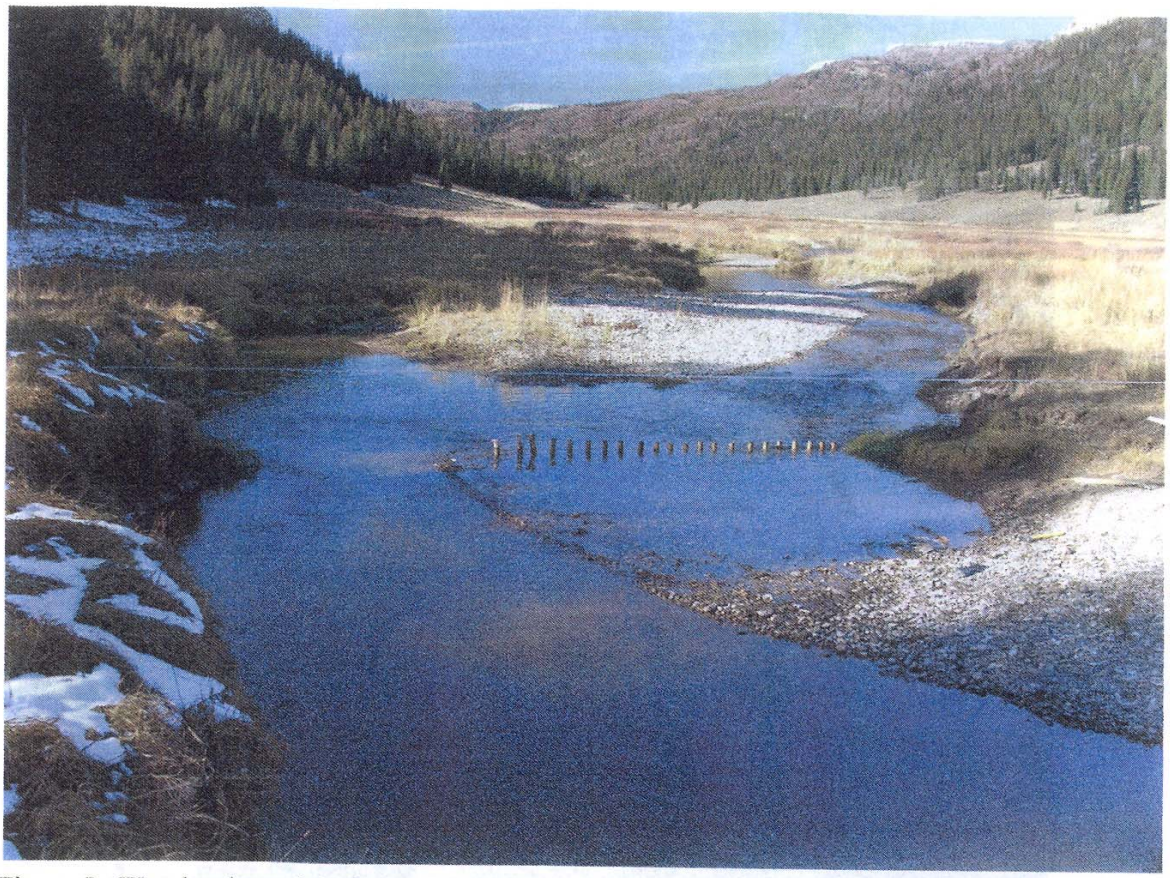


Figure 5. Wood stake weir in Elk River, October 2006.

Soap Creek Culvert Replacement

District Aquatics staff, working with Forest Engineering and Contracting staff, planned and installed a new stream crossing structure in Soap Creek where FSR 8373 in 2006. The old structure, a 48" round metal culvert, was undersized and perched, and functioned as a barrier to juvenile westslope cutthroat trout, in addition to creating problems related to channel function. The new structure, a 14 foot arch pipe, was designed to be countersunk into the streambed and back-filled with stream substrate to simulate natural stream function within the structure. This installation was completed in mid-September of 2006 with excellent results. Before and after data describing the structure (Table 2) and installation photos (Figure 6) provide a comparison of relative change in both the crossing structure, fish passage capability, and channel function associated with the structure.

Table 2. Before and after comparison of crossing structure, FSR 8373, Soap Creek, Madison RD.

	Stream simulation design?	Outlet perched?	Bankfull flow constricted?	Substrate roughness	Maintenance risk
48" culvert	No	6"	60%	None	Moderate
14' arch pipe	Yes	None	None	High	Very low

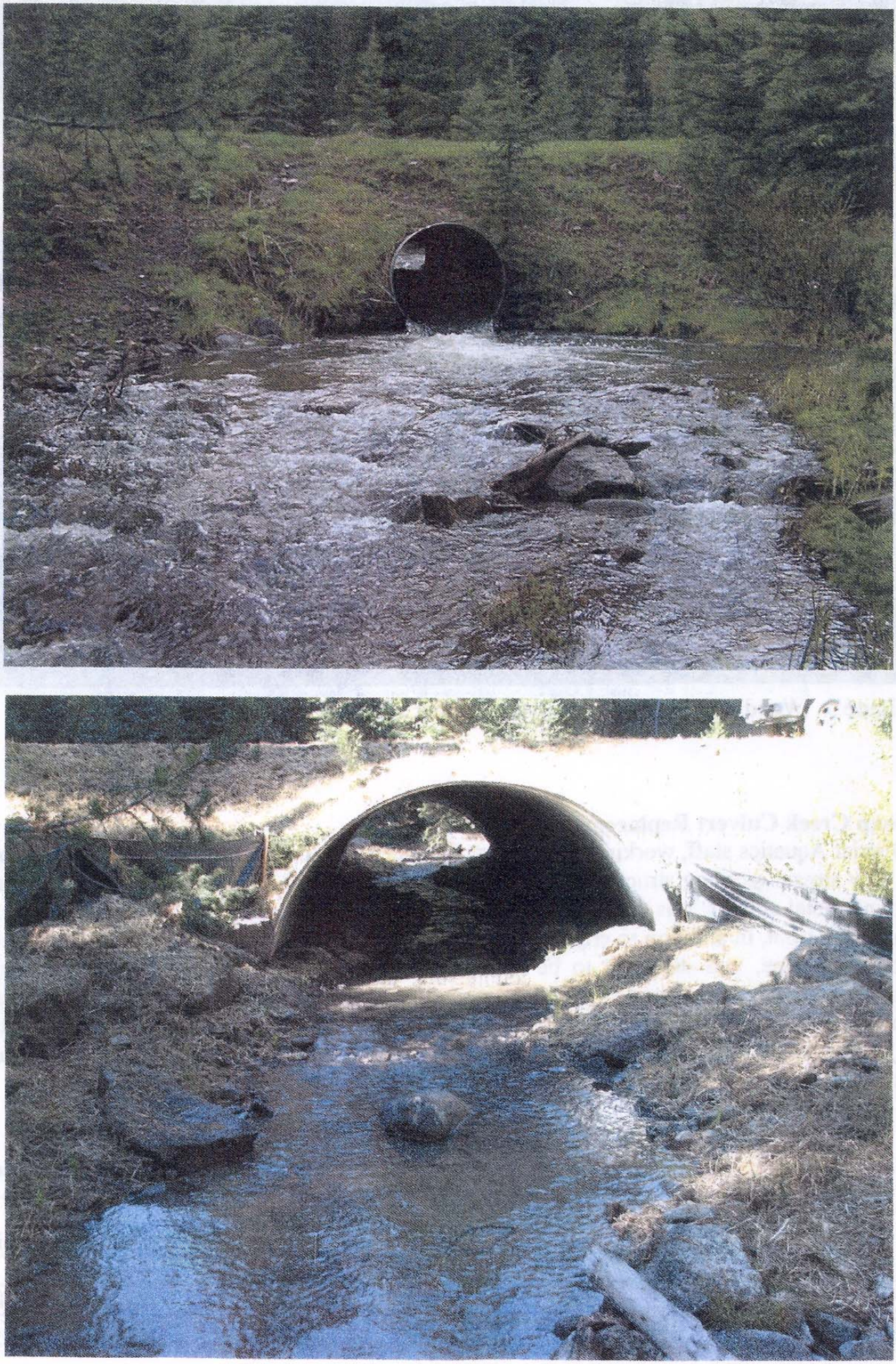


Figure 6. FSR 8373 stream crossing of Soap Creek, 2005 (top) and 2006 (bottom).

Appendix G

Montana Department of Environmental Quality Compliance Evaluation Inspection Report

for

The Cherry Creek Native Fish Introduction Project

Montana Department of
ENVIRONMENTAL QUALITY
Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

August 17, 2006

Pat Clancey, Fisheries Biologist
Montana Department of Fish, Wildlife and Parks
P.O. Box 1336
Ennis, MT 59729

RE: Compliance Evaluation Inspection Report for Authorization No. MTE000906
Short-Term Exemption from Surface Water Quality Standards for Pesticide Application, 75-5-308, MCA.

Dear Mr. Clancey:

The Department of Environmental Quality (Department) conducts compliance evaluation inspections as part of the responsibilities under the 308 Authorization for Emergency Remediation & Pesticide Application program. As a condition of your temporary authorization under the Short-Term Exemption from Surface Water Quality Standards for Pesticide Application, 75-5-308, MCA, the activity is subject to compliance inspections. As a representative of the Department, I conducted an inspection of your treatment action, located on Tributary 20.1, tributary of Cherry Creek in Townships 3, 4 and 5 South, Range 1, 2 and 3 East August 1st of 2006.

Enclosed is the compliance inspection report. Based on observation and information obtained during the inspection the Department has determined that the 2006 treatment Cherry Creek and its associated tributaries was preformed in compliance with the conditions of their 308 Authorization letter. I look forward to reviewing the project report summary.

I would like to thank you and your staff for your cooperation and willingness to assist me during my visit. If you have any questions or would like additional information, please do not hesitate to call me at (406) 444-6778.

Sincerely,

Banning Starr
Water Quality Specialist
Water Protection Bureau
Montana Department of Environmental Quality
Enclosures: Inspection Report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C. 20460

NPDES Compliance Inspection Report

Form Approved
OMB No. 2040-0003
Approval Expires 7-31-85

Section A: National Data System Coding

1 Transaction Code	2	3 NPDES	11	12 yr/mo/day	17	18 Inspec. Type	19 Inspector	20 Fac Type
N	5	MTE000906		080106		C	S	

Remarks: Cherry Creek 308

Inspection Work Days (67–69)	Facility Evaluation Rating (70)	BI (71)	QA (72)	Reserved (73–80)
1	5	N	N	

Section B: Facility Data

Name and Location of Facility Inspected *(For industrial users discharging to POTW, also include POTW name and NPDES permit number)*
Cherry Creek 308 Authorization
Upper Cherry Creek Flying D Ranch
Madison County

Entry Time/Date: 09:00 / 8-1-06
Exit Time/Date: 16:00 / 8-1-06
Permit Effective Date: August 1, 06 – ~~July 31, 06~~
Permit Expiration Date: July 31, 06

Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number(s)
Pat Clancey, MTFWP, 406-682-7807
Fisheries Biologist

Other Facility Data
Observed thru treatment of tributary 20.1.

Name, Address of Responsible Official/Title/Phone and Fax Number
Pat Clancey, Fisheries Biologist
Montana Fish, Wildl. & Parks
PO Box 1336, Ennis, MT 59729

Contacted: Yes ☐ No ☐

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

S	Permit	S	Flow Measurement	S	Operations & Maintenance	N	CSO/SSO
N	Records/Reports	S	Self-Monitoring Program	N	Sludge Handling/Disposal	N	Pollution Prevention
N	Facility Site Review	N	Compliance Schedules	N	Pretreatment	N	Multimedia
S	Effluent/Receiving Waters	N	Laboratory	N	Storm Water	S	Other: Debris/Vandalism

Section D: Summary of Findings/Comments (Attach additional sheets if necessary)

See attached Section D sheet

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Telephone/Fax	Date
Brandon Starr	MDEQ / 406-444-6778	8/11/06
Signature of Management QA Reviewer	Agency/Office/Phone and Fax Numbers	Date

EPA Form 3560-3 (Rev. 9-94) Previous editions are obsolete.

Section D:

On 8/1/06 I observed the application of antimycin to a tributary of upper Cheery Creek, Tributary # 20.1. The treatment area covered approximately 0.50 river miles and consisted of 12 antimycin drip stations and 4 backpack sprayers. Flows were measured at station 26 on 7/31/06 as 0.08 cfs allowing for a target concentration of antimycin of 11 ppb. The evening of 7/31/06 rain increased flows on 8/1/06 to 0.16 cfs at station 26 and hence further diluting the concentration of antimycin. The Potassium Permanganate detoxification station was appropriately place downstream days treatment area. Over the course of the inspection I found the treatment action to be in compliance with their March 2, 2006 authorization.