Final report

Shasta River CRMP Coordinator, FY 1997

Cooperative Agreement #14-48-11333-97-J029
97-PC-05

Great Northern Corp.
December, 1999

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Abstract:

The Shasta CRMP has been engaged in fisheries habitat restoration work since 1991. 1997 included two major accomplishments--the complete revision and expansion of the Shasta Watershed Restoration Plan, and the preparation of a report to the KFMC describing apparent differential harvest impacts to the Shasta stock of Fall Chinook. Other work included community outreach, assessment and repair of flood damage, ongoing meetings with landowners, work with developers of the KRIS program, pulsed flows, fish screen fabrication and testing, and the preparation and oversight of restoration projects.

Background

The Shasta River Coordinated Resources Management and Planning group (CRMP) was started in mid-1991, through the combined efforts of several members of the ranching community, the Siskiyou RCD, and the Soil Conservation Service. At that time there was no similar organization in Siskiyou County, and the prospect of developing a good working relationship amongst the various landowners and agencies seemed unlikely.

Given the magnitude of the task undertaken—to restore the productivity of the Shasta, while maintaining a healthy local agricultural economy—it was clear that efforts beyond what a volunteer group was capable of were required. Recognizing this, the Klamath River Basin Fishery Task Force provided funding in FY 1992 for a part time Projects Coordinator to assist the CRMP in progressing from discussion, self-education and planning to project implementation, grant funding and community outreach.

That funding has been renewed at varying levels in FY 1993, 1995, 1996, 1997, 1998 and 1999.

Work completed in 1997:

Task 1—continue landowner contacts:

Throughout the 12-month period covered by this grant, contacts with landowners were maintained in a variety of ways, including newsletters and meeting agendas, which were mailed to all landowners bordering the Shasta or its tributaries, along with other interested parties, providing basic information on meetings, topics under discussion, and projects worked on.

We maintained operation of Shasta telephone accessible river monitoring station (530-459-0416) for use by landowners in Shasta Valley and other interested parties.

Most direct contact was concentrated on those individuals most interested in developing actual projects aimed at river improvements. Some of those projects will be discussed below.

Additional contacts with other landowners were made via telephone, individual letters and direct contact.

Task 2--Prepare work plans and secure funding for future restoration work:

Grant proposals were prepared for a variety of projects, including:

Klamath River Task Force:
- CRMP Coordinator
- Weirs and measuring devices to allow measurement of irrigation tailwater in order to design measures to eliminate it
- Reimbursement for direct costs of Pulsed Flows

Cal DFG
- Weather Station as part of a Flow/Temperature modeling effort for the Shasta
- CRMP Coordinator

Ecosystem Restoration Office
- Generic riparian exclusion fences
- Riparian vegetation inventory, part of Shasta flow/temp. model

319-H
- Omnibus proposal including fencing, bio-engineered bank protection, tailwater re-use, KRIS support, education

Siskiyou County Fish and Game Commission
- Tailwater measuring devices grant.

Cantara Trust
- Tailwater flow measuring devices

Of these, funding was secured for CRMP coordinator, measuring weirs, pulsed flows, and 319(h) water quality related work.

Task 3--Provide oversight of current year's work:

Project layout in the field, ongoing field inspections, final inspections and photo-point monitoring were all done via this funding. Projects included the Norm Fiock Livestock Exclusion Fence, the Himmel Livestock Exclusion Fence, the Bruce and Boyd Fiock Livestock Exclusion Fence #2, and do all paid work associated with two Pulsed Flows.

Task 4--Continue to support and use KRIS:

Many hours were dedicated to fine-tuning and troubleshooting the KRIS data, layouts and presentations with the KRIS developers. Beta versions were tested and written reports of findings produced. In preparation for the release of the first public version of KRIS, the KRIS computer was moved to the newly opened Resources Conservation District Office so the RCD employee could provide a KRIS public access site in addition to the one at USFWS.

Monitoring data from the CRMP, DFG, and the schools was assembled and forwarded to the KRIS developers, along with photos.

Task 5--Document projects and progress:

The bulk of this documentation came in the form of extensive photographic records of work in progress, and before and after shots of project sites. Other documentation came in the form of temperature data, and stream cross section profiles, and project related reports. See attachments 1-3. Photos are being provided to Kier and Assoc. on an ongoing basis for inclusion if KRIS and on the KRIS web site. Temperature data from the telephone accessible monitoring station has been provided to Kier and Assoc. directly. Other temperature data is being supplied to Kier and Assoc. directly by California DFG, which manages temperature data gathering sites for the Shasta CRMP.

Task 6--Provide notification of CRMP meetings, report to the CRMP working group at each meeting: this was done.

Task 7--Distribute sub-basin plan and update plan:

Much of 1997 was spent in revising, submitting for approval, re-revising and producing the current version of the Shasta Watershed Restoration Plan, released in 11/97. Once released, copies were made available to everyone requesting them, and a master distribution list kept for future updates.

The Plan was produced as a series of separate stand-alone elements held in separate sections in a three ring binder so they could be added to or changed without undue cost. Provision was included for future modification of the plan via a group review process.

Task 8--Integrate KRIS into the implementation of the sub-basin plan:

This task could not be met because KRIS was not released to the public until 2/98. Every effort was made to maximize the future utility of the KRIS prior to its release by working closely with the KRIS developers.

Full integration of KRIS is also limited by the fact that many landowners in the Shasta Valley do not own computers capable of running KRIS, and until that is substantially changed it will have to be an adjunct to the plan, rather than fully integrated into it.

The Shasta Watershed Restoration plan was provided to the KRIS developers and was included in its entirety into the final release version of KRIS.

Task 9--coordinate with other restoration efforts:

The Shasta CRMP Coordinator met, shared data and techniques, and engaged in planing with other sub-basin coordinators, agencies, tribes, the Task Force, Technical Work Group of the Task Force and the Klamath Fisheries Management Council. This occurred throughout the year.

Specific Work Products:

1. Arcview map showing restoration locations in the Shasta Valley--point coverages were produced, and small-scale sample maps are attached.

2. CRMP Newsletter: Six newsletters were produced in 1997.

3. Digital data for KRIS--described above, including temperature data and photographs.

4. Action Plans to prioritize proposals to implement the Shasta Plan--The revisions undertaken to expand the original Shasta Restoration Plan and transform it into the Shasta Watershed Restoration Plan addressed the intent of this section. Further work will be undertaken in the future to formalize the ranking process.

5. Proposals to various grant-funding agencies--see Task 2 above.

6. Quarterly and Final Reports: This report will be the final report produced under this grant.

This concludes the narrowly defined products of this grant. The more important results of this funding often cannot be predicted in advance, and sufficient flexibility was included in the funding request to allow responding to needs and opportunities as they arose. Some of the highlights of the year included:

1. Differential Harvest Impact Report:

Following the Fall Chinook return of 1995 (13,000+), 1996 was shockingly low (1300+). While this substantial drop was widely noted, fisheries managers had not discerned any pattern or explanation. Following release of the age composition data for the Klamath Basin in early February, the Shasta CRMP pointed out evidence of a run-timing shift in survival within the Klamath Basin between age 3 salmon in 1995 and other members of the cohort returning at age 4 in 1996. This pattern indicated the possibility of either an excessive harvest impact on early run salmon, or a major flaw in the model used by fisheries managers. This material was prepared and presented to the Klamath Fisheries Management Council and the Pacific Fisheries Management Council in March, 1997, and followed-up throughout the remainder of the year. Ultimately neither group made either modifications to their harvest recommendations, or re-examined their models. Neither did they propose further investigation to try to discern whether this was a recurring problem.

This failure to provide any substantive response was viewed as corroboration of the widely held opinion that harvest would continue to be an insurmountable obstacle to restoration.

That report is attached.

2. The winter of 1996-7 was severe, and substantial flood damage occurred throughout the Klamath Basin. Damage throughout the Shasta had to be assessed and emergency repairs made. While the damage was quite minimal, substantial labor was required to remove the tons of debris piled up on the livestock exclusion fences throughout the Shasta basin.

3. A major coordinated effort with the Scott CRMP finally resulted in the inclusion of fish screens in the list of conservation practices potentially funded by the Agricultural Stabilization and Conservation Service (ASCS). We thought that was the end of the battle, but it was just the beginning. Provision of ASCS funding was conditional upon developing screen designs approved by the Natural Resources Conservation Service. Normally the NRCS does design work for all ASCS projects. In this case, screen design became a political football in a turf battle between the Calif. DFG, NRCS, and NMFS, each of whom wanted authority for final design approval for fish screens. A prolonged process of foot-dragging, pointless meetings, and mis-information ensued, with fish screens held hostage to the process.

While that was going on, NRCS provided screen designs that did not fully meet the needs of the landowners or optimal fisheries protection as determined by the CRMP Coordinator and/or the landowners, so the designs were repeatedly rejected. Ultimately NRCS, feeling that the rejections were not warranted, chose not to invest further time, making it essentially impossible to meet ASCS funding requirements.

In order to proceed to more appropriate designs, a prototype tube screen was fabricated and installed on the Meamber irrigation diversion. Following several months of successful use, we took it to the UC Davis Hydraulics Lab for testing under controlled conditions to determine how closely it approached DFG criteria, prior to further modification and testing.

Based on the preliminary information gained at UC Davis, more extensive testing was provided by DFG in 1998 using a hatchery raceway at American Rivers Hatchery as the water source. Data from that series of tests was used to develop a prototype baffle for the screen. A baffle was fabricated and installed prior to the 1999 irrigation season, field tested, then the entire apparatus was removed to Iron Gate Hatchery for controlled condition testing in a raceway there with help from NMFS engineers, along with one other screen of similar design.

Final design modifications will be made in the winter of 1999, and a final screen will be constructed of corrosion resistant materials that will meet DFG and NMFS criteria. It will also meet the functional needs of the landowner who will thereafter use and maintain it. Cost share is not anticipated from ASCS, on the assumption that NRCS will be unwilling to approve the design despite the extensive test results.

This protracted process served no one's best interest. It could have been substantially shortened if testing equipment were available. As it was, proper flow measuring equipment could only be borrowed from either the DFG or NMFS once per year, making this trial and error effort very slow.

4. Other work included providing John Brown, Chairman of the Regional Water Quality Control Board with a personal tour of the Shasta Valley, preparing presentation materials for Supervisor Bill Hoy to present at a Bio-diversity Council, working with several schools in the county, including Weed High School, Discovery High School and Yreka High School to establish sites for the students to do field monitoring in the form of stream cross sections.

We also facilitated efforts by a local landowner to exchange land in the Shasta River Canyon with the BLM for non-critical land elsewhere. That exchange should assure that livestock grazing will not be a problem in the future in the Shasta Canyon.

Other efforts included:
Meeting with the Klamath Compact Commission in an effort to develop a comprehensive water supply initiative for the Klamath Basin.

Meeting and touring every restoration project with representatives of Kier and Assoc. as part of their mid-term review, along with assembling copies of all newsletters and agendas for review by other Kier associates.

Work with DFG to make modifications to the DFG counting weir on the Shasta to improve its efficiency while reducing adverse impacts to salmon.

Attachment 1:

Stream Cross Sections

Most of the stream cross section measurements are set up so that students can do the fieldwork. In most instances that means that the string line method will be used, rather than surveying instruments.

Setting up new cross sections is a multi-step process. It is begun by selecting several sites in the livestock exclusion zone that are typical of the area fenced, and/or will be likely to show measurable change. Heavy-duty T posts are driven upside down at the starting and ending point of each cross-section. By placing them upside down they stand out as unusual, reducing the likelihood that they will be inadvertently removed for use elsewhere. It is our standard practice to denote monitoring sites with upside down T posts.

Once the starting and ending points are marked, reference stakes are driven into the ground about 1.5 feet away from each end point stake and in line with the cross section to be measured. Those stakes are 2-3 foot long pieces of heavy-duty T posts that are driven nearly flush with the ground. In that position they are extremely unlikely to be removed, and even if lost can often be relocated with a metal detector.

A preliminary stringline height is selected at one end of the cross section, and marked on the upside down T post with a felt pen. An engineering autolevel is set up and used to establish an identical horizontal height on the upside down T post at the opposite end of the cross section. Once a reasonable height is established on both ends, a hacksaw is used to notch the upside down T posts at identical heights. Once cut, the heights are re-checked, and if necessary adjusted by additional driving of the posts.

At that point, a string line can be tied to one upside down T post, then pulled tightly across the river to the opposite T post. Braided nylon line works best for this purpose. It is attached at each end in the newly cut notch in the upside down T post, assuring that each end is on a perfectly level plane.

Next a fiberglass tape measure is stretched below the string line, and also tied off to the upside down T posts. Measurements are then made from the string to the top of the reference stake, and then periodically from the string to the ground. The horizontal distance (which can be read from the tape), and the height of the string above the ground are both recorded. In addition, notes are made of vegetation characteristics, stream substrate, and any other observations deemed important.

Once all field data is collected, the horizontal and vertical dimensions can be entered into a spreadsheet, then depicted in a standard Cartesian graph. Similar data from this site for multiple years can be entered on one graph, showing change over time.

In 1997 we collected cross section data at the Fiock, Meamber and Ekstrom ranches working with Yreka High School, Discovery High School and Weed High School. This material was presented in the Final 319(h) report from the Siskiyou County Schools titled : School-Based Klamath River Restoration Project Phase IV Final Report, January 30, 1998.

Attachment 2:

Temperature Data

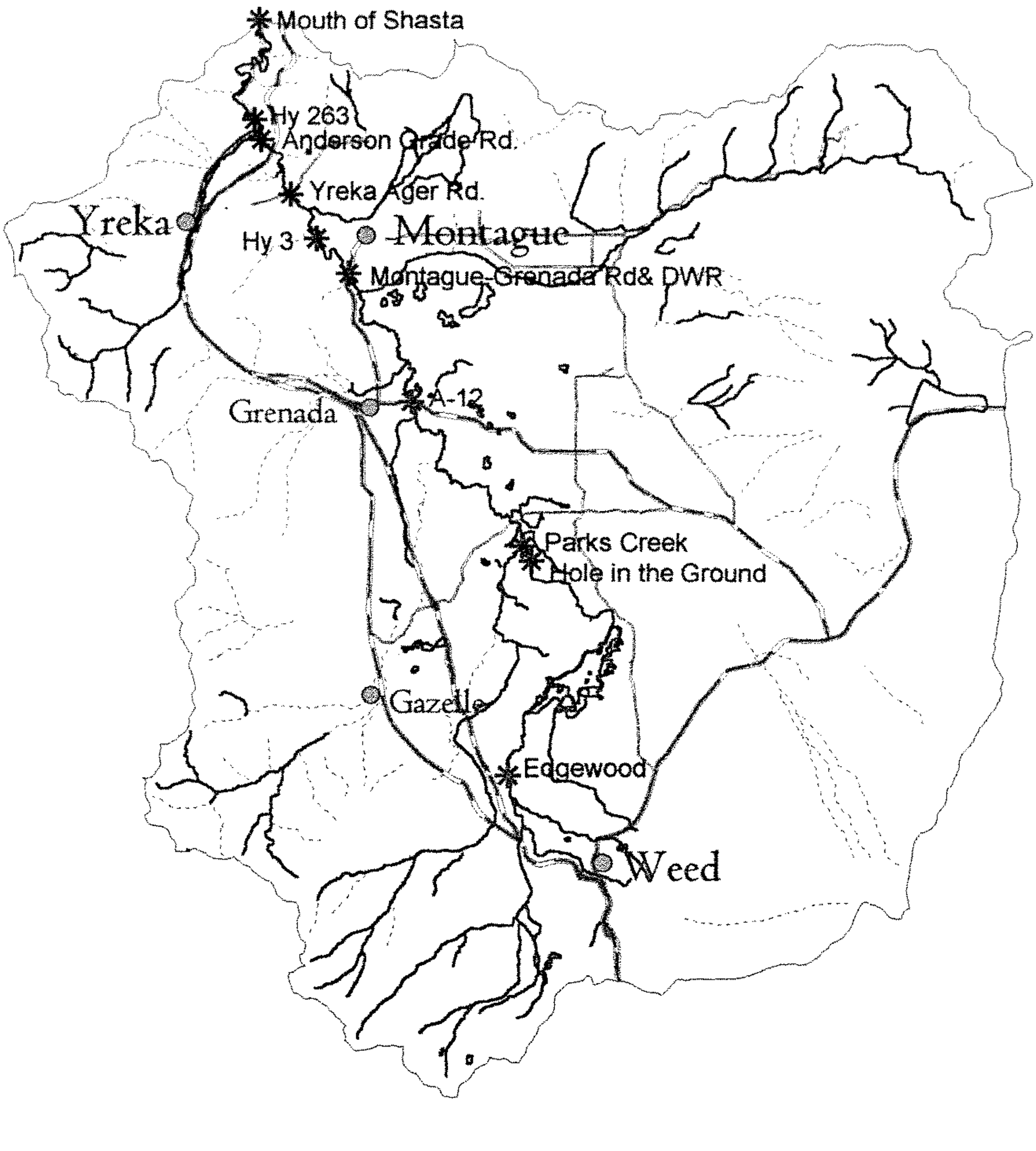
Most of the temperature data available for the Shasta River for 1997 was collected using Onset brand "Hobo Temp" data loggers.

As an active and voting CRMP member, the Calif. DFG has managed this effort for several years.

Temperatures are provided for August for the range of sites sampled in 1997 (see map), along with typical informational files associated with the data loggers and typical raw data for one site.

The DFG is working directly with Kier and Associates to incorporate this data into the KRIS.

1997 Shasta River
Temperature Monitoring Sites



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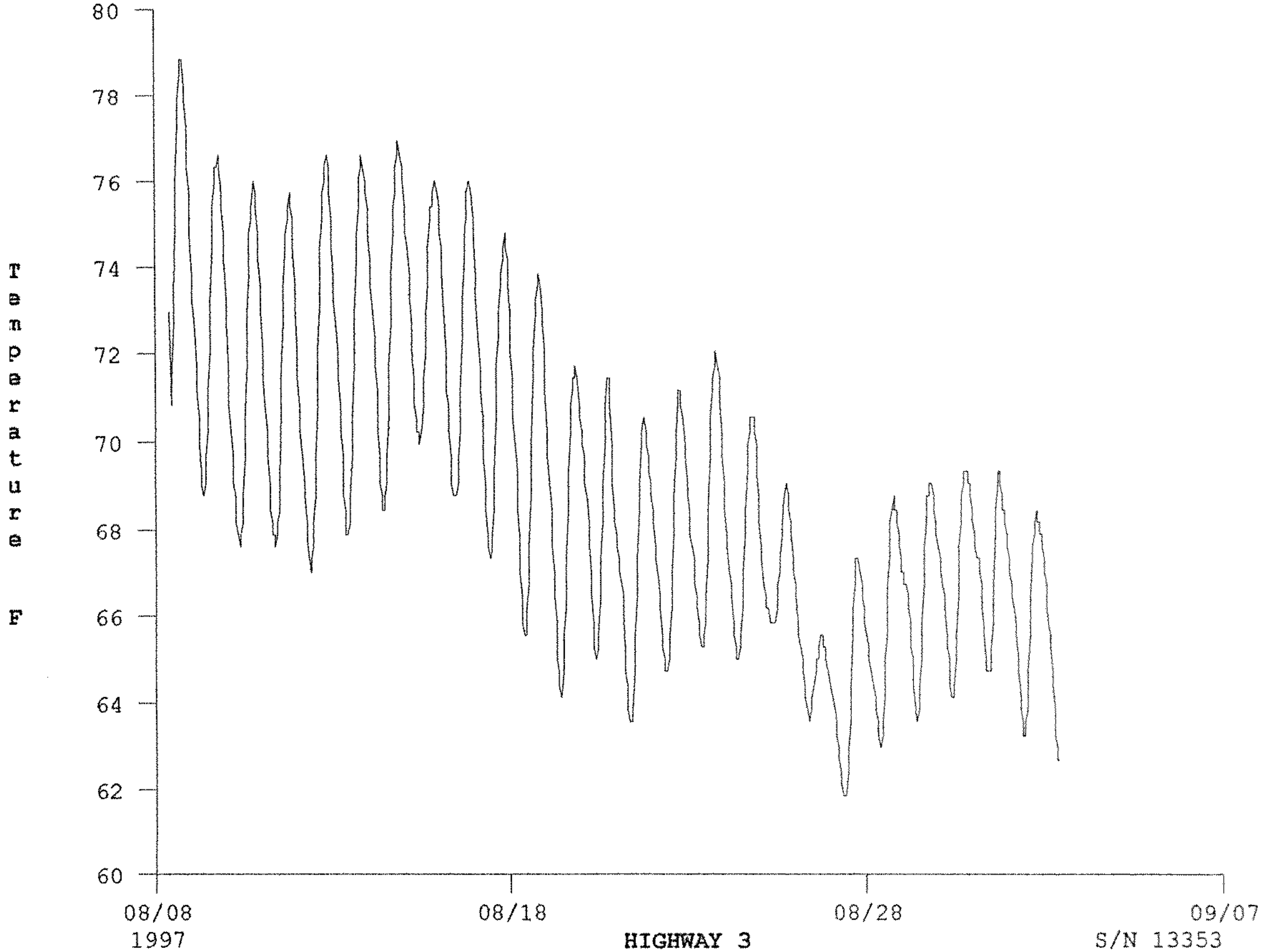

Temperature F
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HIGHWAY 3
S/N 13353

Time	Temperature (*F)
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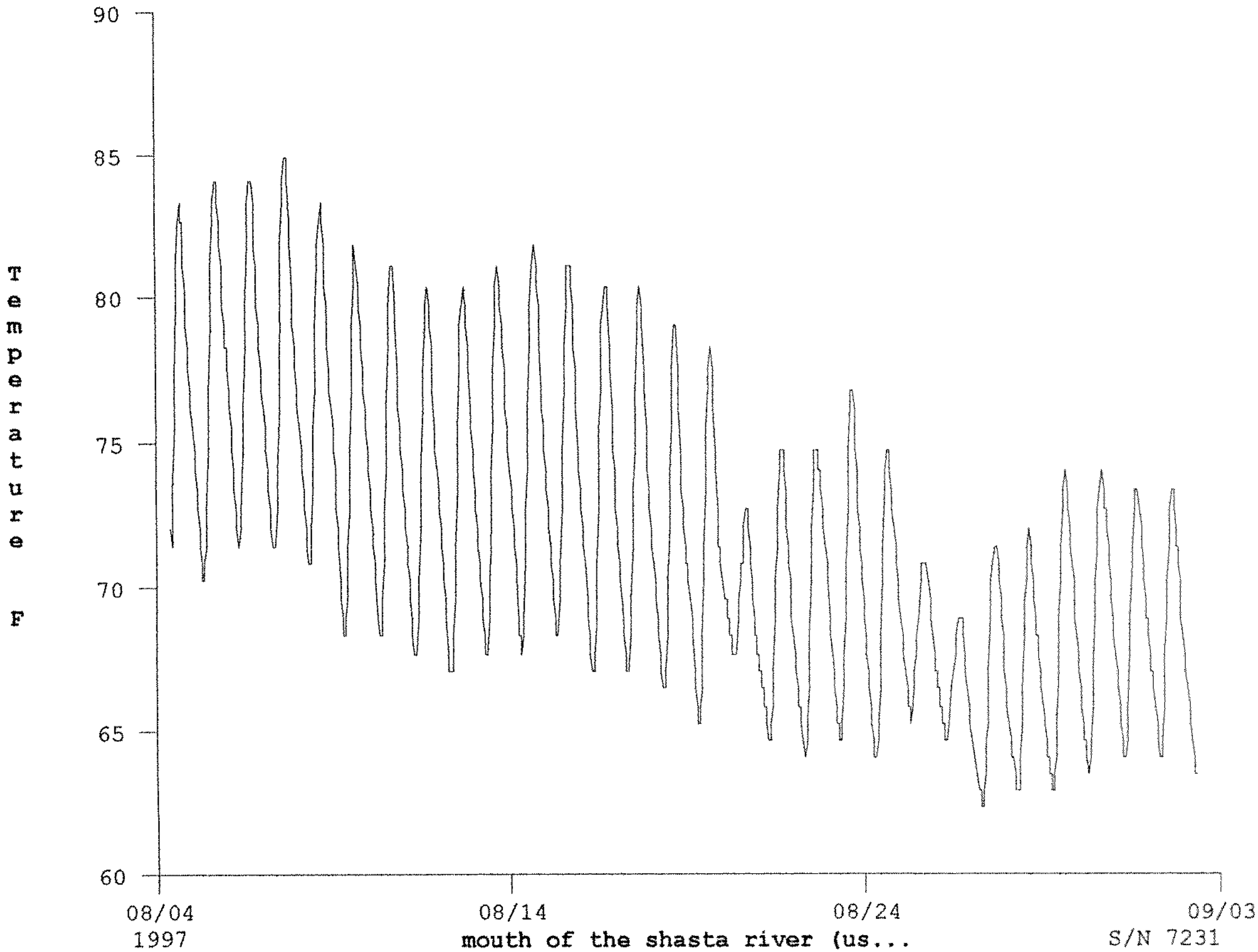
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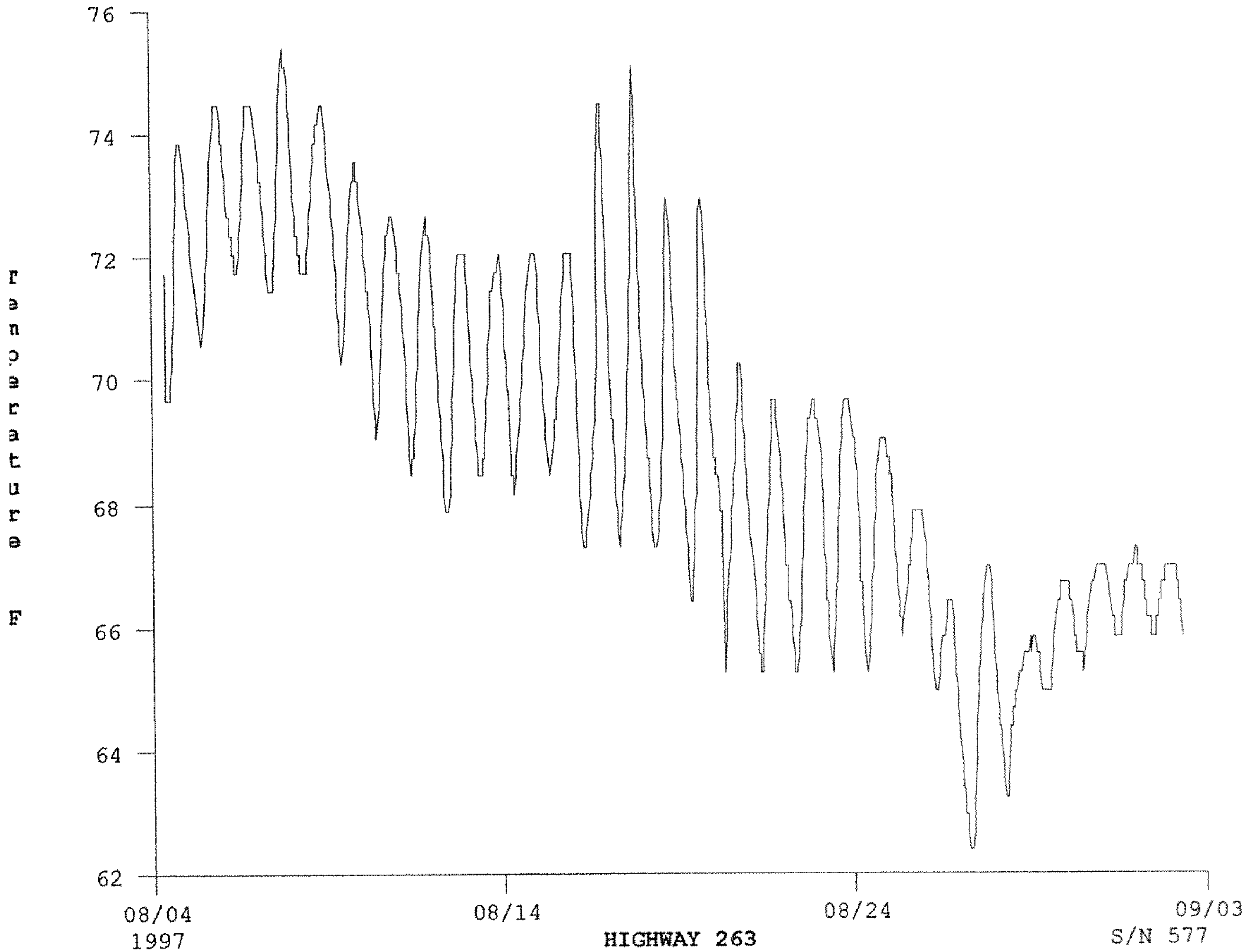
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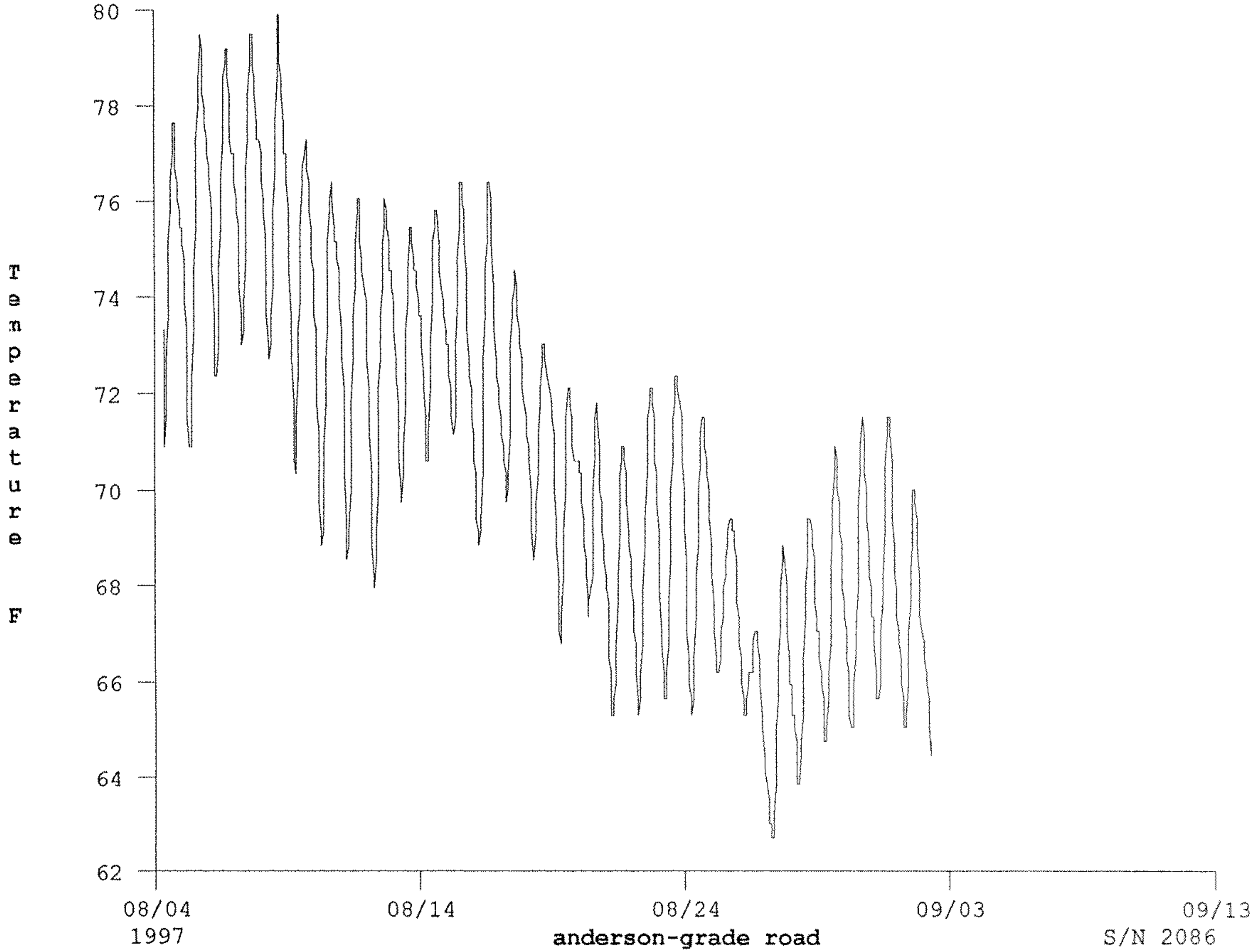
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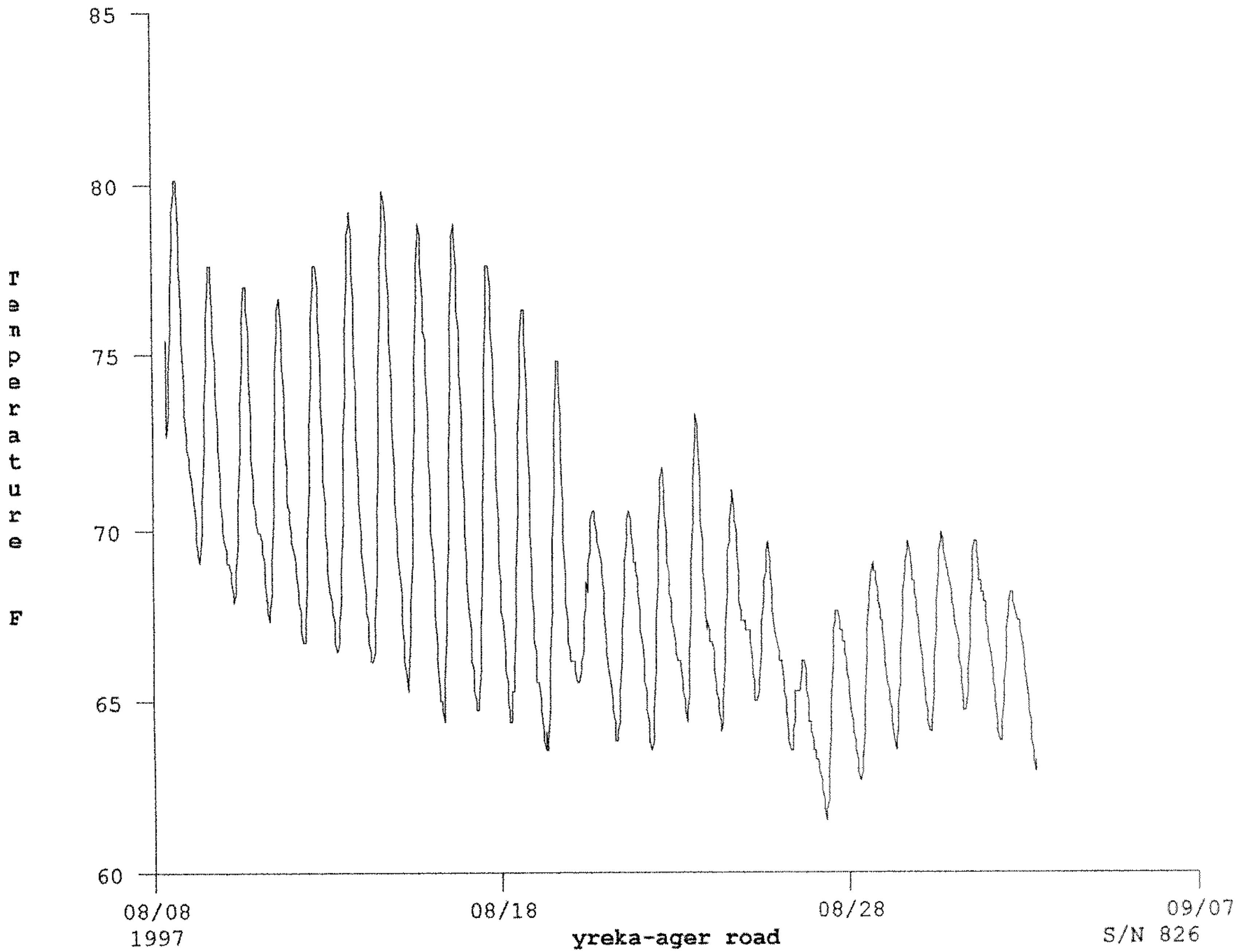
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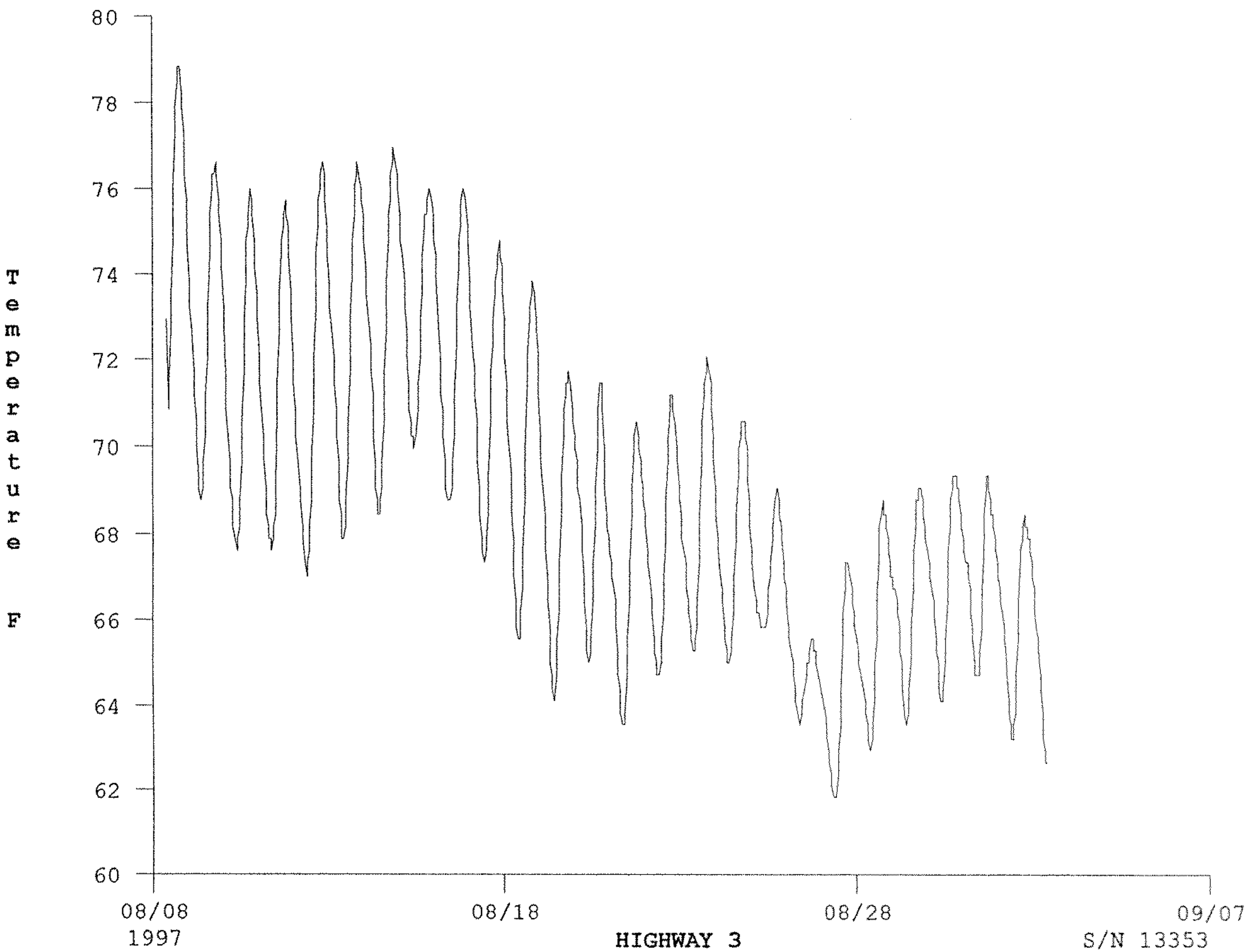

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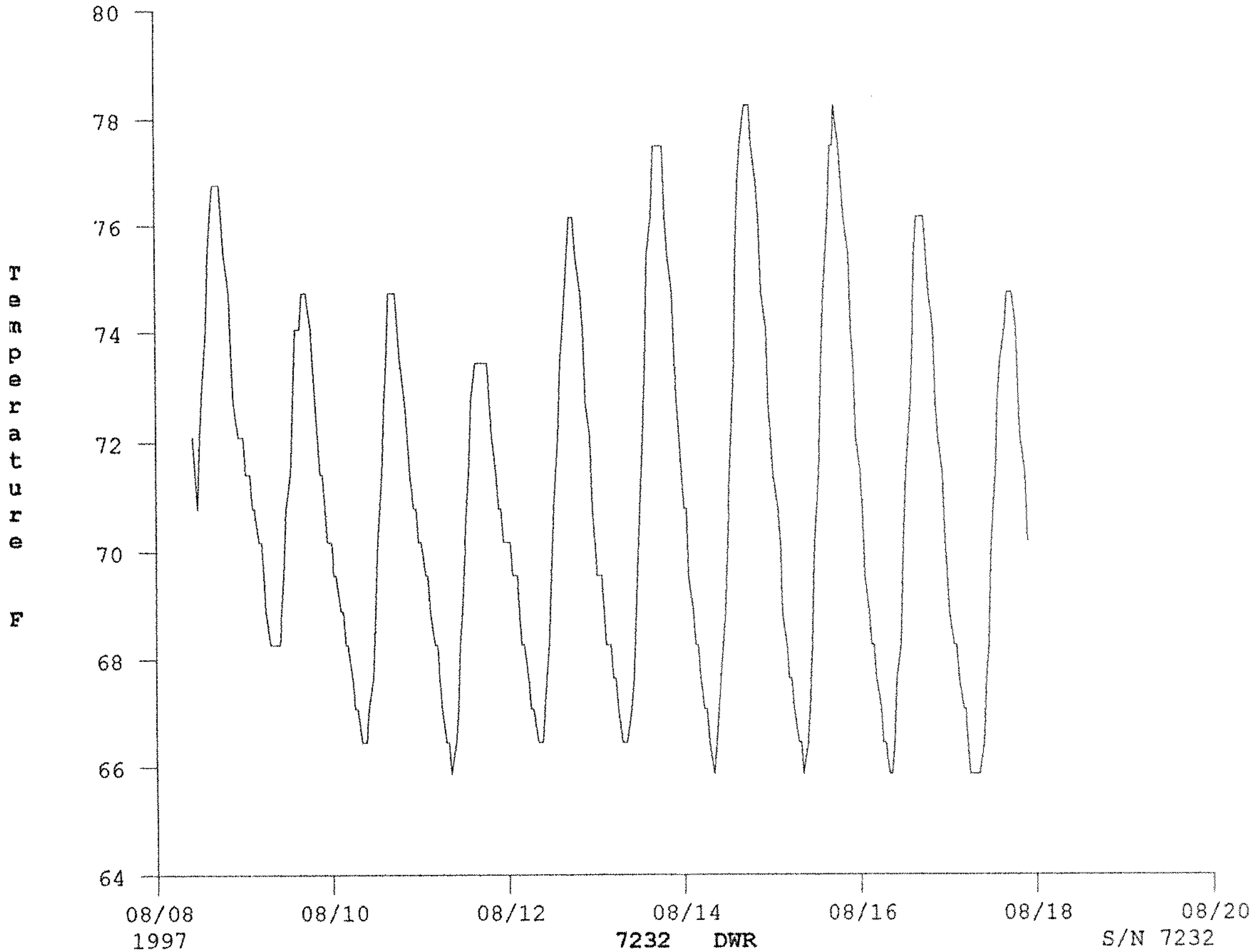

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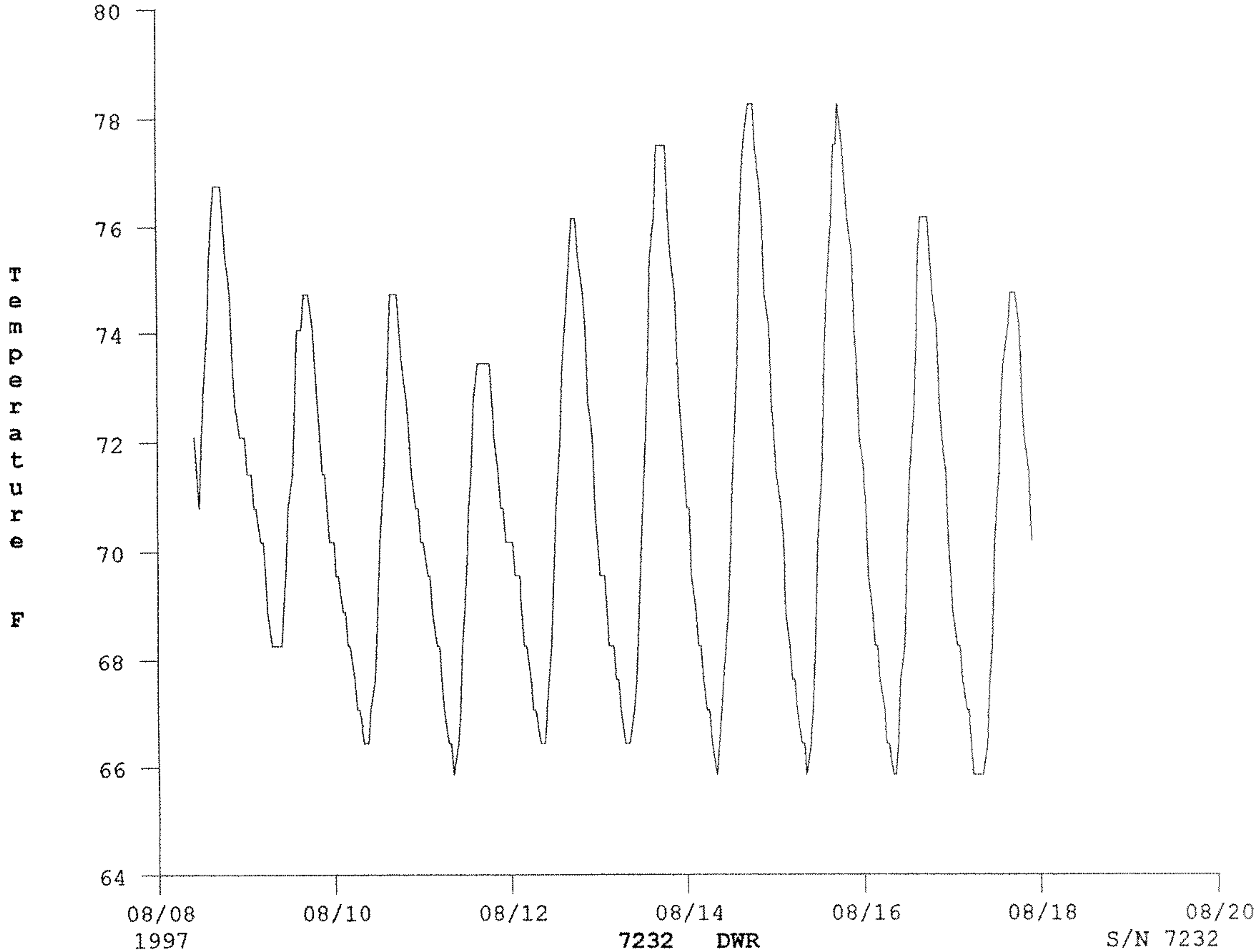
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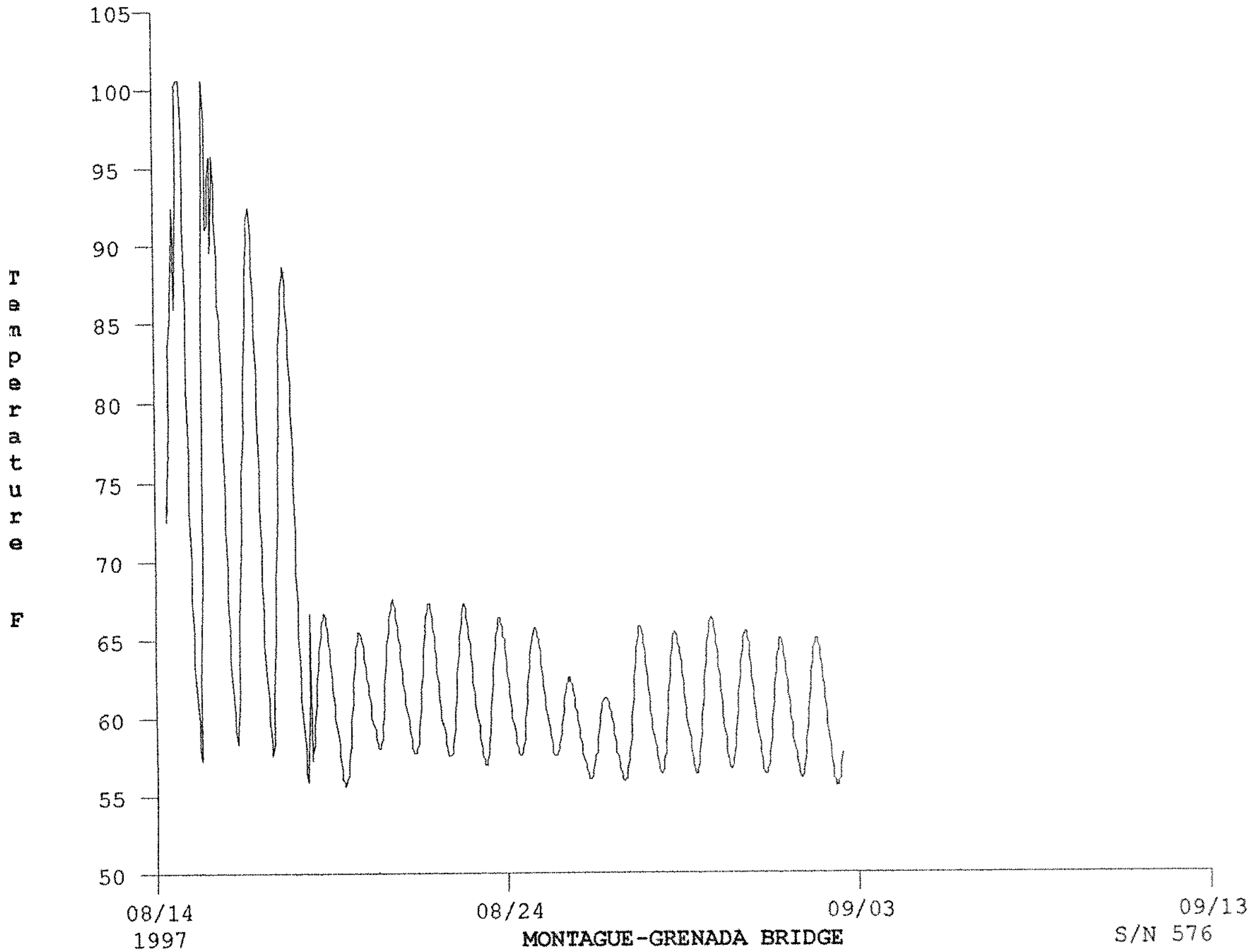
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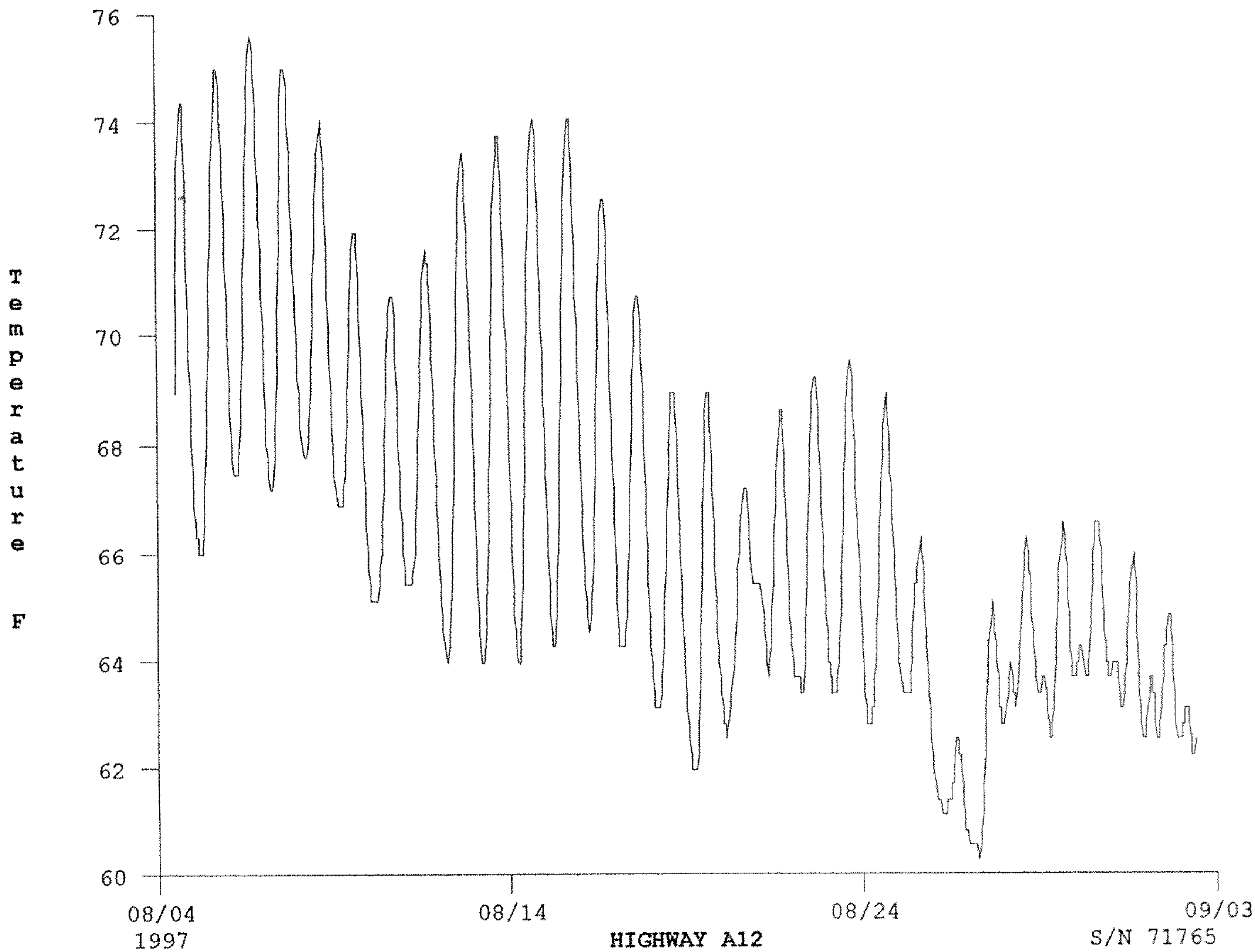
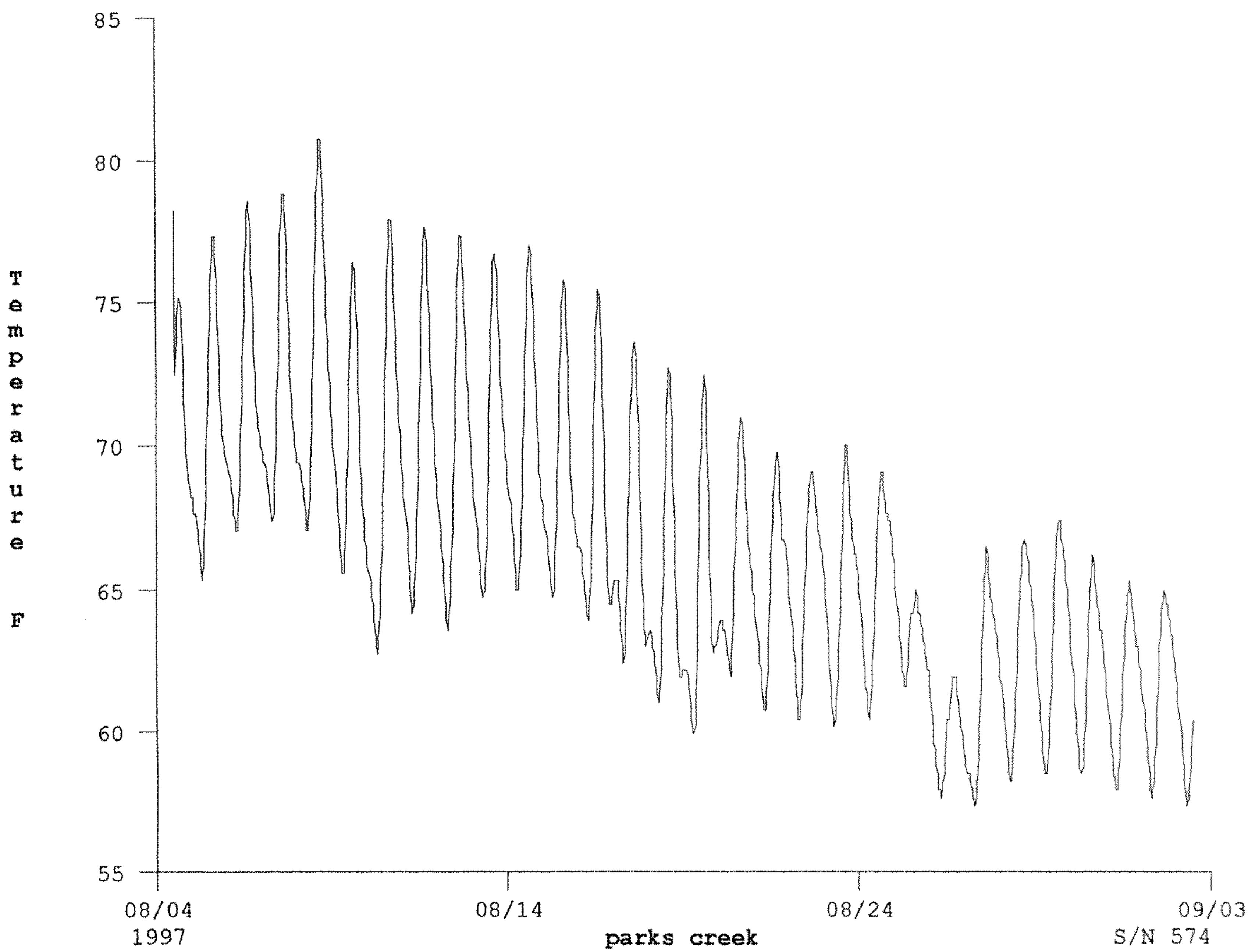
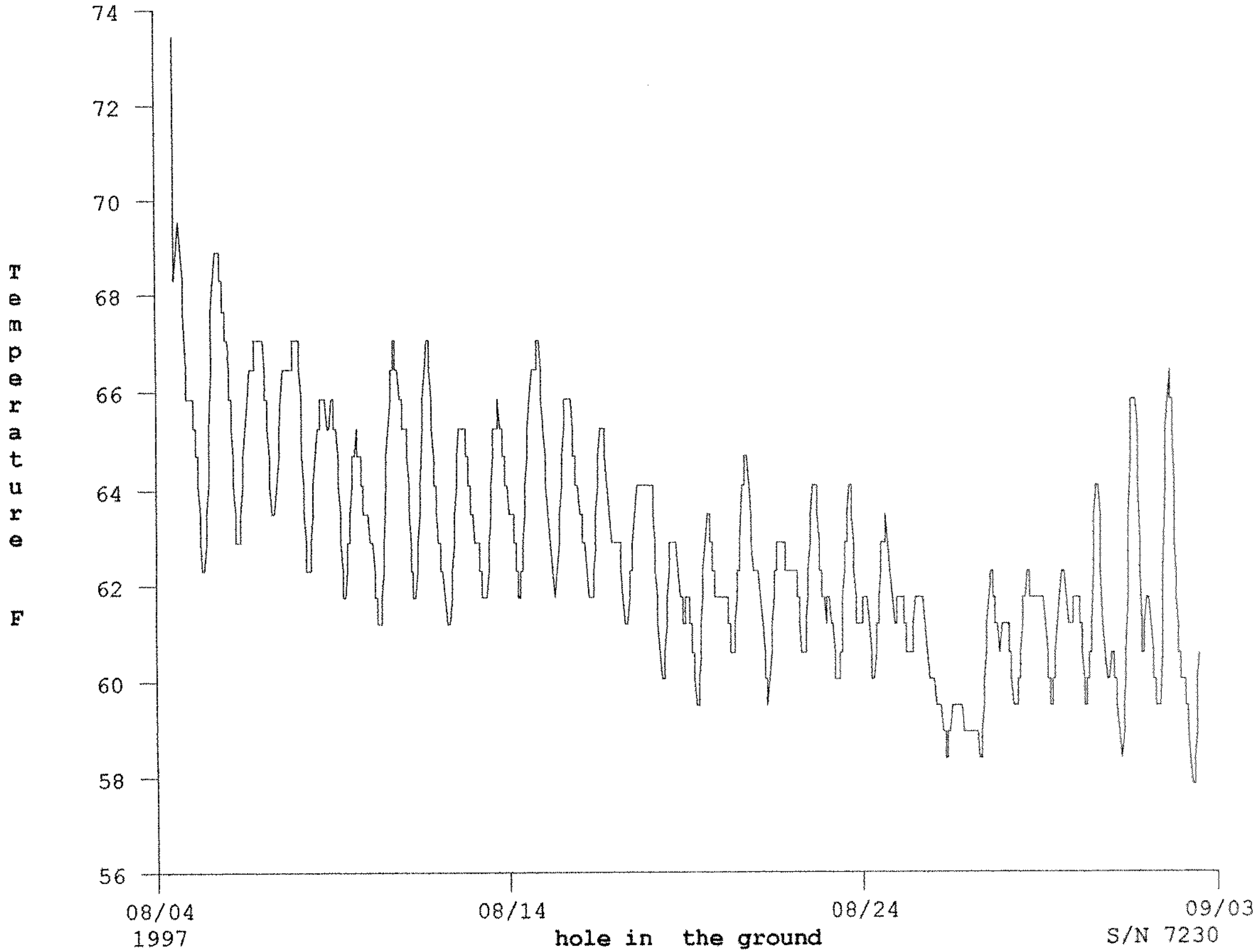
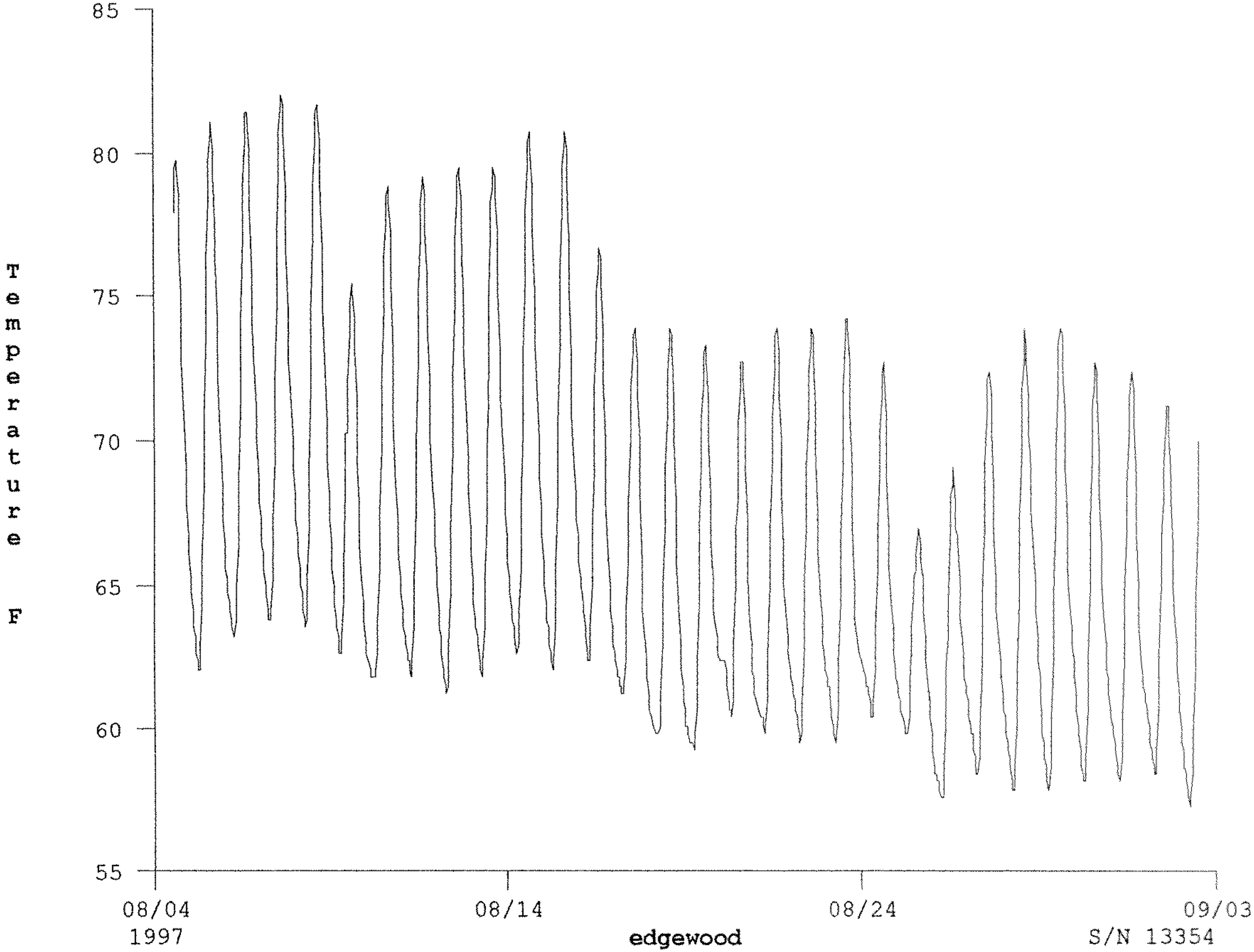
MONTAGUE-GRENADA BRIDGE
S/N 576


Temperature F
76
74
72
70
68
66
64
62
60
08/04
1997
08/14
08/24
09/03
HIGHWAY A12
S/N 71765


Temperature F
85
80
75
70
65
60
55
08/04
1997
08/14
08/24
09/03
parks creek
S/N 574


Temperature F
74
72
70
68
66
64
62
60
58
56
08/04
1997
08/14
08/24
09/03
hole in the ground
S/N 7230



Temperature F
85
80
75
70
65
60
55
08/04
1997
08/14
08/24
09/03
edgewood
S/N 13354

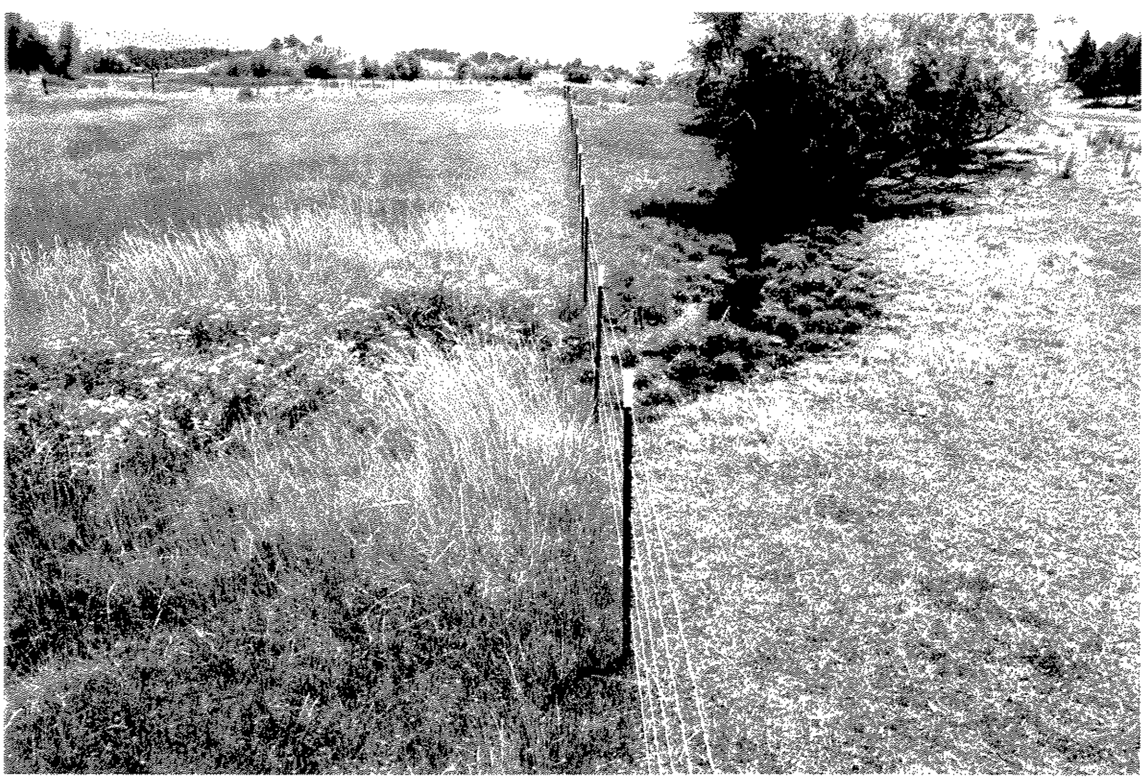
Attachment 3

Photos of selected activities and events from 1997

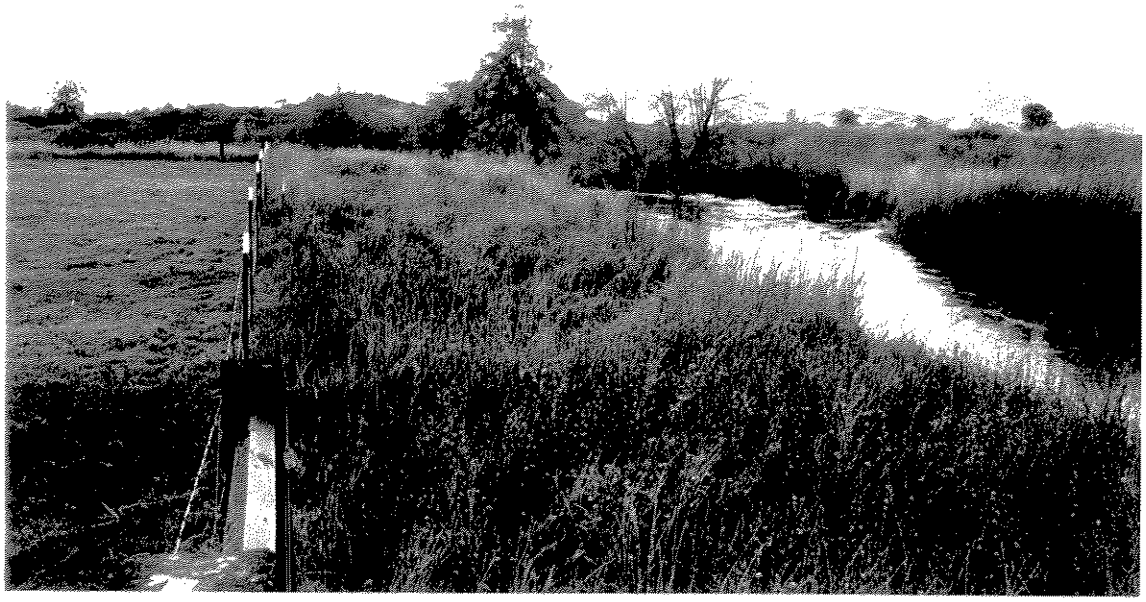
Yreka High School Students preparing to make profile measurement of Shasta River on Fiock Ranch upstream of the Yreka Ager Road, May, 1997. Note remnant '97 flood debris in field next to fence.

Discovery High School Students measuring cross section profile of Shasta River on Meamber Ranch downstream of the Montague-Grenada Road Bridge about 2 miles south of Montague, May, 1997.

Inside and outside the riparian grazing exclusion fence on Peters Ranch about one mile upstream of the I-5 bridge over the Shasta River north of Yreka. Spring, 1997.



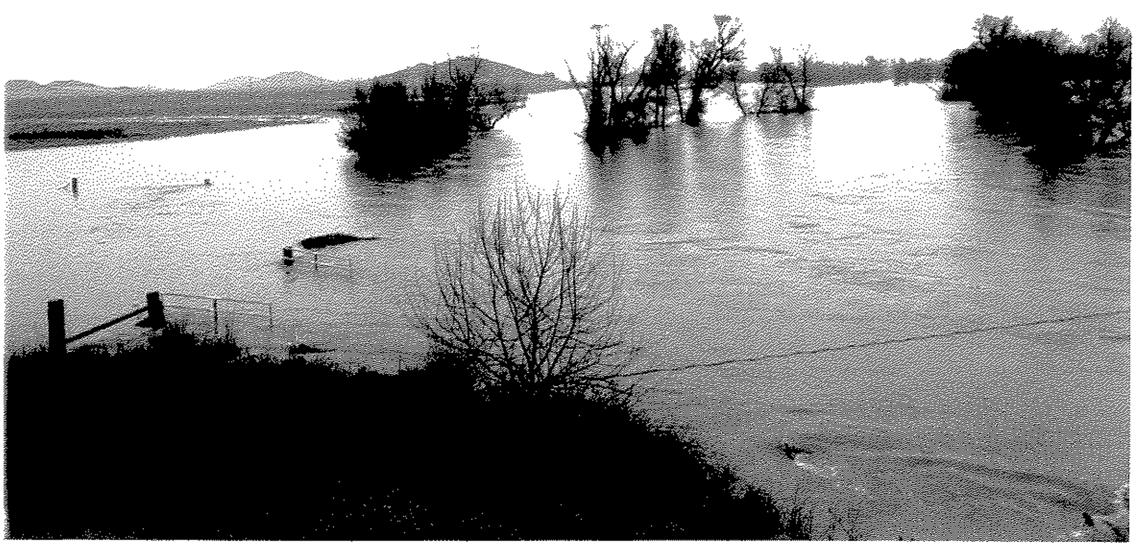
Grazed and ungrazed, Freeman ranch between Montague and Grenada, Summer 1997.



Ekstrom Ranch, Fall, 1997. Pasture properly grazed to allow light to reach ground and stimulate early plant growth in spring. Riparian zone properly ungrazed to maintain bank stability and capture soil from the water column during high water events.

Preparing to remove the flash boards from the Fiock dam on the Shasta River downstream of Highway 3 for Pulsed Flow; summer 1997. L to R: Mike Deas, Dave Webb, Bruce Fiock

Shasta River looking upstream at the Montague-Grenada Road bridge, on the Meamber ranch, October, 1996.



Same location as above, January 1, 1997. Flood plain fully utilized by high water that year; riparian fencing completely under water.

After the flood--well constructed fencing and streambanks with well established vegetation withstood second highest flows on record since 1912 in the Shasta River. Same view as previous two, looking upstream from the Montague Grenada Road Bridge, June, 1997.

Attachment 4

Report to the Klamath Fishery Management Council and Pacific Fisheries Management Council, Portland Oregon. March, 1997

Shasta River CRMP
PO Box 459
Montague, CA 96064

February 26, 1997

Klamath Fisheries Management Council
c/o USFWS
PO Box 1006
Yreka, CA 96097

Greetings:

We understand that the KFMC and the PFMC will be beginning their discussion of harvest levels for the upcoming Salmon season next week. We have recently received scale analysis data that spotlights an issue that is of utmost concern to us regarding Fall Chinook Salmon in the Shasta River, and which we feel should concern you equally:

As all of you know, brood year 1992 was an exceptional year for Klamath stocks. In-river survival of juveniles was at least adequate, and apparently ocean survival was exceptional. The results were obvious over the last two spawning seasons -- large numbers of three-year-old salmon returning to spawn in 1995, and large numbers of four-year-old salmon either caught or returning to spawn in 1996.

Two other events greatly affected brood year 1992 -- the substantial underestimate of ocean populations for the 1995 season, leading to a relatively light harvest of that brood year in the 1995 fishery, and the very heavy harvest of four-year-olds from brood year 1992 (along with 3's from BY 1993) in the 1996 fishery.

That combination is extremely important:

1. A large ocean population of one brood year (1992), coupled with:
2. Light harvest on that population as 3 year olds (in 1995), then followed by:
3. Heavy harvest of 4 year olds from that brood year (in 1996).

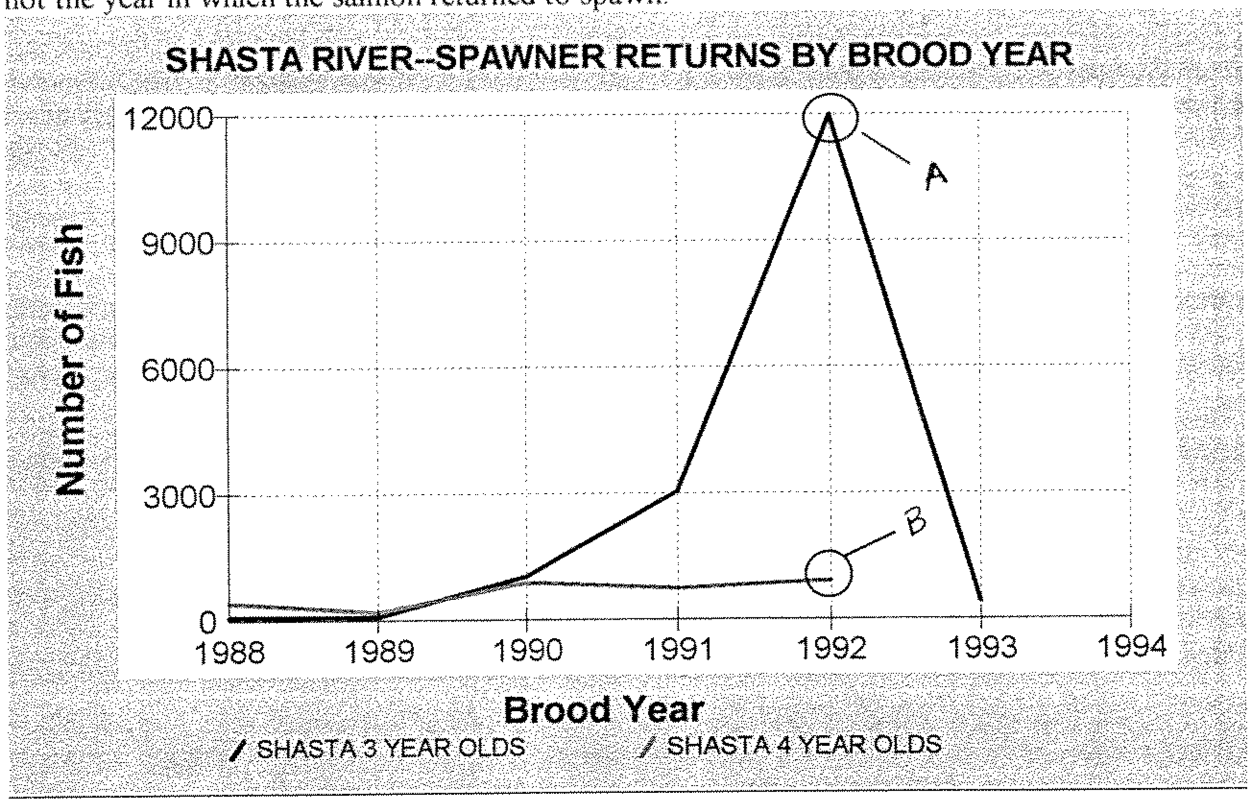
The three-year-old return in 1995 documented the size of the population from brood year 1992 from the Shasta River. The harvest of 1996 with its nearly complete elimination of the four-year-old component of the 1992 brood year in the Shasta demonstrated a problem we have long suspected but until now could not demonstrate:

Shasta River salmon are being harvested at a much higher rate than other natural stocks throughout the Klamath Basin.

We believe that the following graphs showing spawner returns by brood year to the Shasta and other rivers throughout the Klamath Basin will document this. If our reading of the scale analysis data is correct, there is a disproportionate impact on early returning spawners. The Shasta is recognized as one of the earliest spawning runs in the Klamath. What we believe the data shows is that the Shasta, and to a slightly lesser extent Bogus Creek and Iron Gate Hatchery, fish were caught in relatively much larger numbers than were salmon from elsewhere in the Klamath Basin.

The graph below shows spawner returns by brood year, not spawner year as is commonly done. It allows us to compare the numbers of salmon returning from a single brood year, whether they return at age three or four.

Please remember that the years shown at the bottom of the graph are the years in which the eggs were laid, not the year in which the salmon returned to spawn.



Thus, the graph above shows the very large return of three-year-old fall chinook to the Shasta River in 1995. That large **three-year-old return in 1995 (see point A)** should have presaged a similarly large return of four-year-olds in 1996, since they were from the same brood year. Instead, as the graph shows, virtually none survived to enter the Shasta River as **four-year-olds in 1996 (see point B)**, in spite of the documented high survival in the ocean of age three to age four salmon from elsewhere throughout the Klamath Basin that year (see following graphs).

Those numbers raise several obvious questions:

1. What became of the remainder of Brood Year 1992 from the Shasta River between the spawner run of 1995 and the spawner run of 1996?
2. Did the same thing happen elsewhere in the Klamath Basin?
3. How often has this occurred?

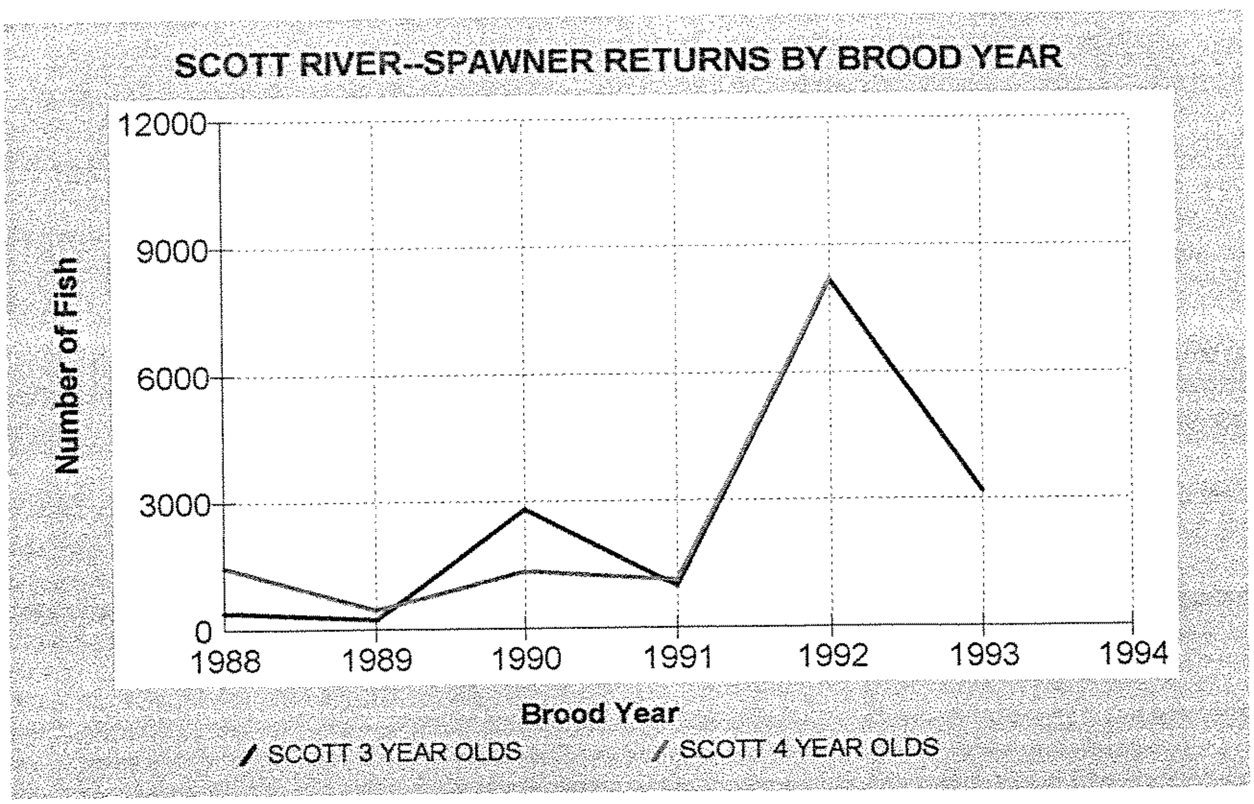
The most plausible answer we can arrive at to question #1 is that there was a disproportionate harvest impact on Shasta River Fall Chinook Salmon.

If this occurred in the ocean, then it raises serious questions about the wisdom of using hatchery salmon and CWTs to estimate ocean distribution and basin-wide harvest impacts. It likewise suggests a need to exercise much greater restraint in setting harvest levels until true ocean distribution of the various stocks can be determined and harvest impacts distributed in a sustainable fashion.

If it occurred in the river, then it suggests that tribal efforts to spread harvest impacts proportionately throughout the run are not working. If so, then this will also have profound impacts on harvest levels, since the allocation percentages are fixed.

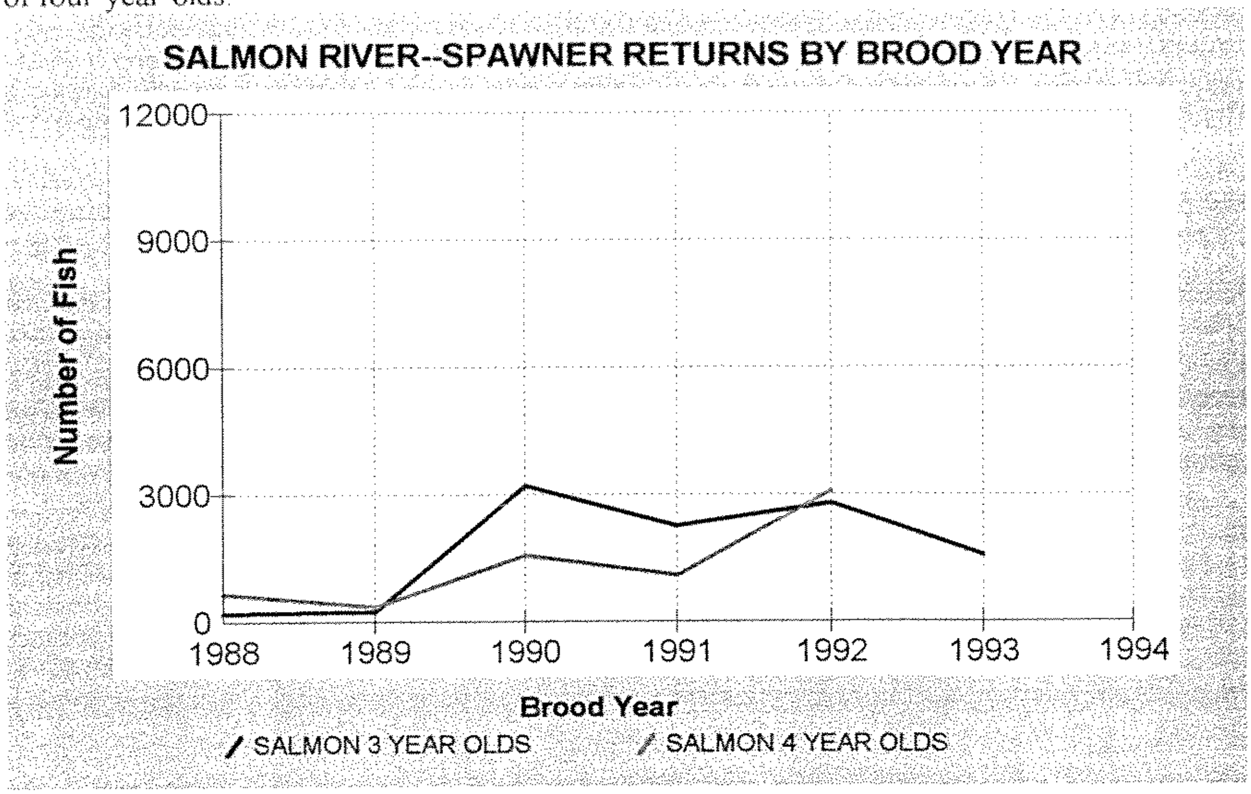
In either case, it indicates the very real possibility that the Shasta River stock of salmon is inadvertently being managed to extinction.

On the second question -- is this occurring elsewhere in the basin?--we need only look at similar graphs of other streams in the Klamath River, such as the Scott, below:

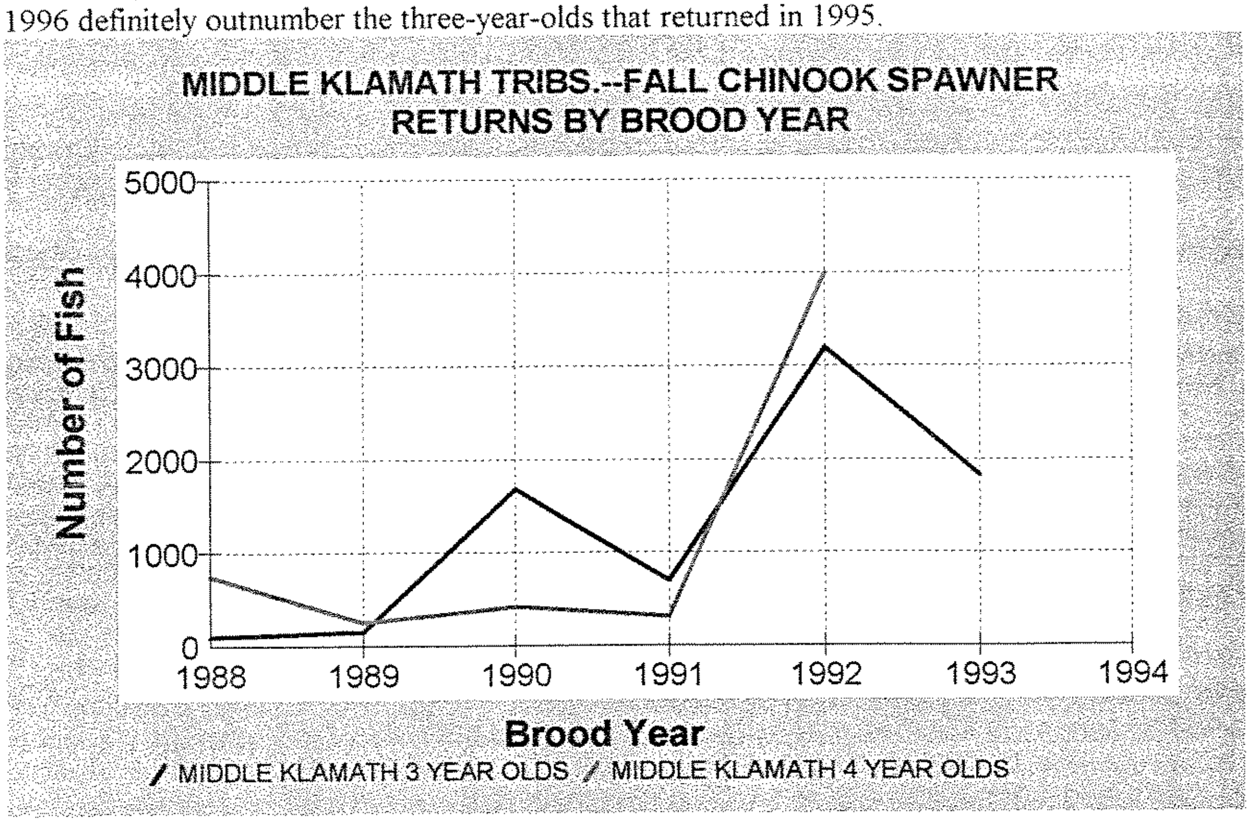


Here on the Scott River (above) the pattern is much more what would be expected with strong returns from the 1992 brood year at both age three and four despite substantial harvest in 1996.

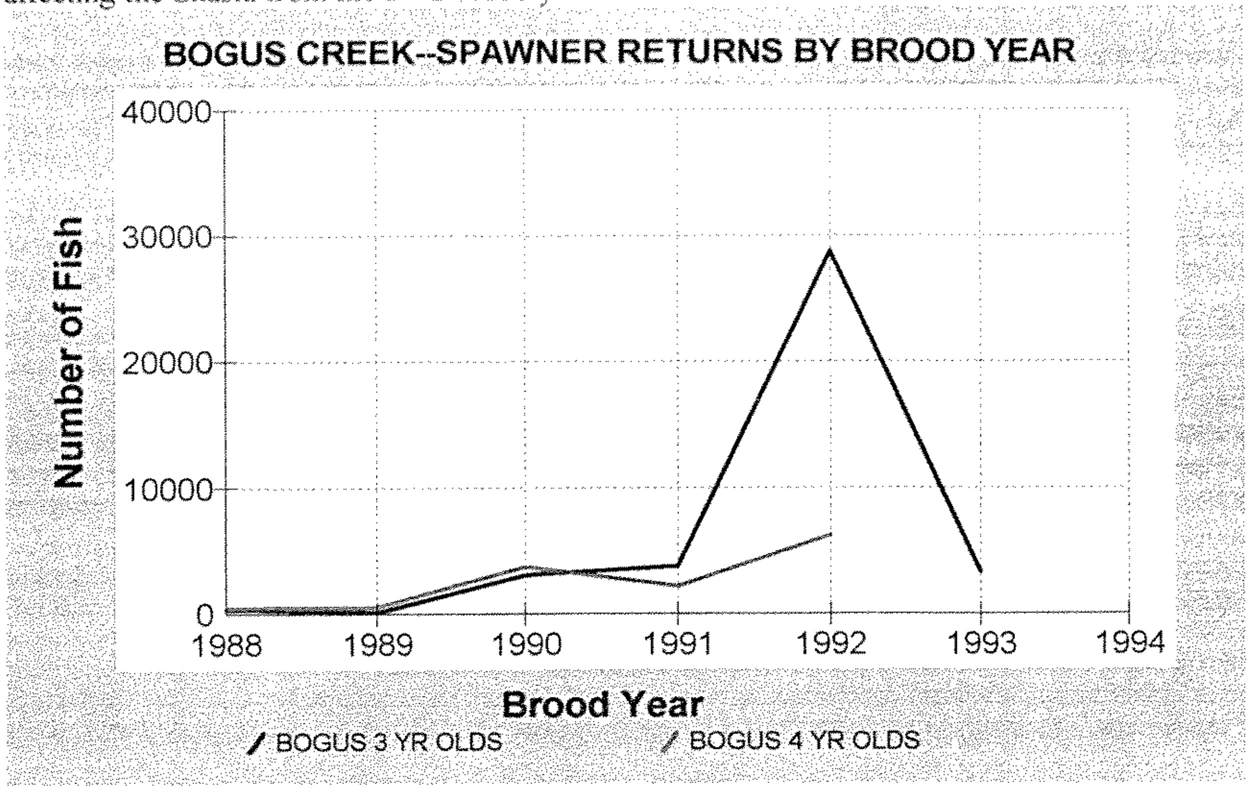
Likewise, when we look at the Salmon River the picture is very similar, with even a slight preponderance of four-year-olds:



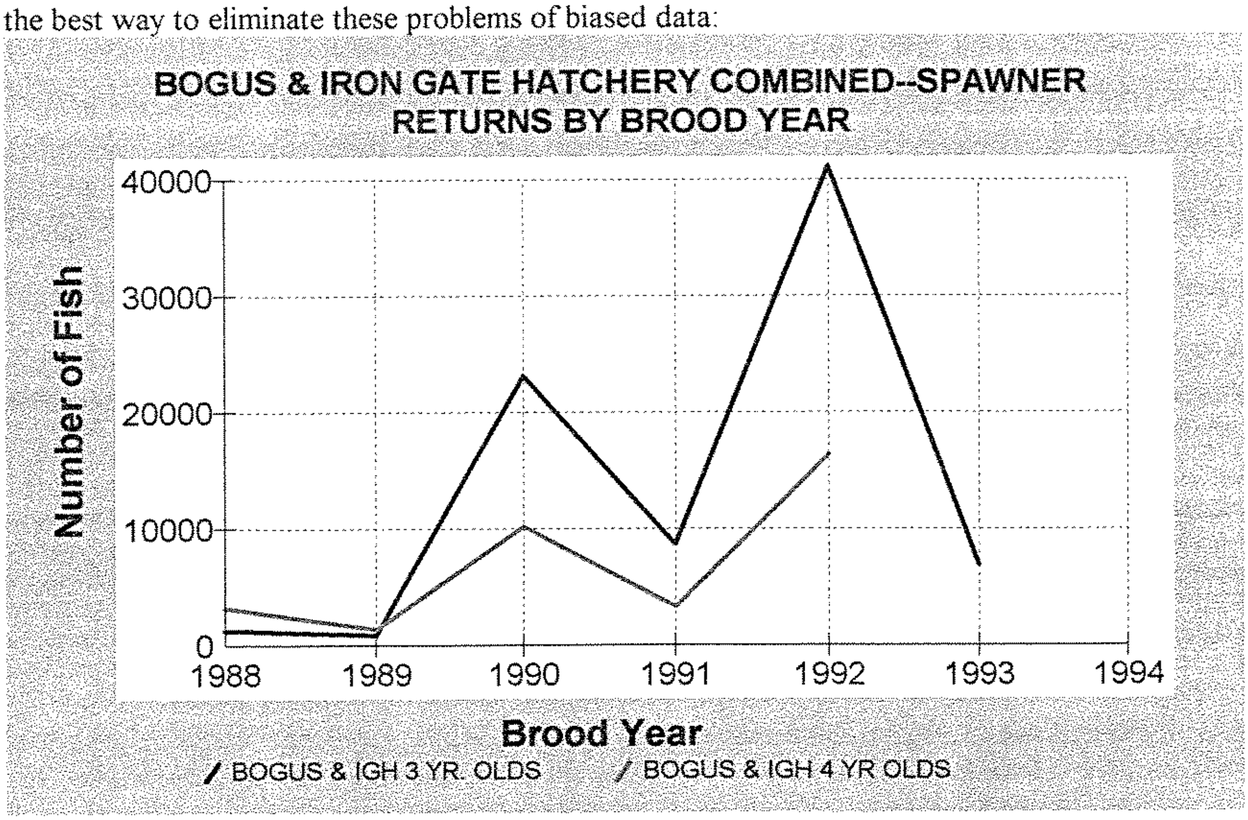
As we move even further downstream, the trend of diminishing impact continues, as the graph below shows. By the time we have gotten down to the middle Klamath tributaries, the four-year-olds returning in 1996 definitely outnumber the three-year-olds that returned in 1995.



Only when we look upstream at Bogus Creek and Iron Gate Hatchery do we see losses similar to those affecting the Shasta from the 1992 brood year:



Most of us are well aware that the numbers reported for Bogus Creek are badly skewed to an unknown degree by voluntary and forced straying from Iron Gate Hatchery. Likewise Iron Gate hatchery numbers will be badly skewed when the hatchery ladder is closed to exclude fish. Combining the two seems to be the best way to eliminate these problems of biased data:



What seems to be apparent from all of these graphs is that those salmon from the 1992 brood year experienced excessive mortality when returning as four-year-olds in 1996, if they were returning to the upper end of the watershed.

That mortality might also be described as being tied to run timing-- the earlier the run, the greater the mortality.

Has this occurred in the past? It is significant to realize that this is not just a four-year-old age class problem.

Presumably whatever factors were able to remove nearly all of the remaining Shasta River adults from brood year 1992 between September 1995 and October 1996 were equally effective at reducing the numbers of adults from brood year 1993, with the result that the Shasta River " inexplicably" experienced another disastrous decline in the spawning run of 1996.

The proof of the size of the 1992 brood year from the Shasta River as presented by the 1995 return of three-year-olds is key to recognizing this problem. It clearly demonstrates that previous declines could likewise have resulted from similar disproportionate mortality either in the ocean or in the Klamath River as returning adults.

Assuming the number of salmon from the Shasta waiting in the ocean to return as four-year olds in 1996 was only equal to the number of three-year-olds that came back in 1995 (ignoring both historic data and even 1996 run data that the Klamath run that year was predominantly four-year-olds), then:

- the Shasta suffered a reduction of more than 92% in four-year-old spawners from Brood Year 1992
- presumably the three-year-old spawners from brood year 1993 were likewise impacted
- and it all occurred without anyone knowing it.

Not even a hatchery can withstand continued harvest rates at this level.

As fisheries managers you are faced with an extremely difficult task. If effective measures cannot be devised to appropriately distribute harvest impacts, then we have to assume that the Shasta will be lost as a producer of salmon. Well before that happens, far more onerous restrictions are likely to be imposed.

We feel that the information we have presented here is so compelling that it should be reflected immediately in structuring this year's harvest and its quotas. We would ask that you reply to us in writing within the next month on your analysis of the information we have presented, and what actions you propose to take. Perhaps there are other ways to interpret the data -- we are currently trying to assemble Klamath flow and temperature data for that period, although we don't expect them to provide any new insights.

Thank you very much,

Blair Hart

President, Shasta River CRMP
Rancher
Chairman, Shasta Valley Resources Conservation District
Sport Fishing Representative to the KRBFTF Technical Working Group

cc: interested parties

Attachment 5

Restoration Sites in Shasta Valley

Shasta Valley Restoration Projects