FINAL REPORT FOR RESEARCH AGREEMENT
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"First Approximation of the Hydrologic and Geologic Characterization of the Tenderfoot Creek Experimental Forest"
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HYDROLOGIC AND GEOLOGIC CHARACTERIZATION

OF

TENDERFOOT CREEK EXPERIMENTAL FOREST

MONTANA

Final Report
RJVA-INT-92734

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UNITS

English units are used in this report to have data compatible to that being collected by lead Federal agencies and others for streamflow and water quality (US Geological Survey), snow pack (Soil Conservation Service), precipitation (National Weather Service), and land units and elevations (US Forest Service).

CONVERSION FACTORS		
Multiply	By	To obtain
acre	0.405	hectare
acre-foot (acre-ft)	0.001233	cubic hectometer
cubic foot per second (cfs)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
inch (in.)	2.54	centimeter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.59	square kilometer

Degree Fahrenheit (°F) may be converted to degree Celsius (°C) by using the following equation: °C - 5/9 (°F-32).

The following abbrevations also are used in this report:

microsiemens per centimeter at 25 degrees Celsius (μS/cm)
milligram per liter (mg/L)
National Turbidity Units (NTU)
tons per day (T/D)
tons per month (T/MO)

INTRODUCTION

Tenderfoot Creek Experimental Forest (TCEF) is located in Central Montana 24 miles north of White Sulphur Springs and 9 miles northwest of Highway 89 from Kings Hill via Forest Road #839 (figure 1). The experimental forest can also be accessed by Forest Road #586 via Sheep Creek. A general view of TCEF showing roads and drainages is shown in figure 2. The road down Tenderfoot Creek is open only to Administration Travel vehicles.

To monitor Tenderfoot Creek Experimental Forest, eight snow courses, eight precipitation storage gages, and nine stream gage locations were established in fall 1992. Sediment and water quality is measured at stream gages in addition to water quantity. One additional precipitation gage and one additional stream gage were installed in the fall of 1994. Seven of the stream gage sites have flumes with on-site recorders by the fall of 1994. A replacement snow course and precipitation gage were installed at Sun Creek in the fall of 1994. In the fall of 1993, two snow pillows were installed at the Onion Park site and attached to continuous recorders. One pillow is in the open and is comparable to a standard SNOTEL (SNOw Survey TELemetry) location. The other is under the tree canopy to compare accumulation and melt with the open pillow. Five canopy snow courses near regular snow courses are measured in winter to determine snow interception. The sixth canopy course was installed at Sun Creek in the fall of 1994. To evaluate interception of rain, two tipping bucket rain gages were installed under moderate and dense canopies and one gage was installed in the open without canopy. All sites will be upgraded from manual to automated as funds become available. An average annual precipitation map was developed for TCEF. Estimates of average annual runoff and peak flows were calculated for drainages in TCEF for sizing flumes and evaluating hydrologic conditions.

TEMPERATURE

A relationship was developed between elevation and temperatures at Spur Park (8,100 ft) and Deadman Creek (6,450 ft) SNOTEL sites, and White Sulphur Springs (5,200 ft) climatological station. The estimated mean monthly maximum and minimum temperatures for generalized elevation zones are shown in table 6. On an annual basis, the highest daily temperatures in the higher elevation of TCEF are about 7°F colder than those in the lower elevations of TCEF. The lowest daily temperature in the highest elevations is about 1°F warmer than it is in the lower elevations. This is caused by temperature inversons, particularly in the winter where lower elevations can be 10 to 20°F colder than those in the higher elevations.

FIRES

A fire history map was developed for Tenderfoot Creek Experimental Forest in 1992. The span of years since each burn for TCEF and subwatersheds is shown in table 7. The original report and maps showing the fire history is on file at the Forestry Sciences Laboratory in Bozeman, MT.

GEOLOGY OF TENDERFOOT CREEK EXPERIMENTAL FOREST

Little Belt Mountains, Meagher County, Montana

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Geographic Setting

The Tenderfoot Creek Experimental Forest in the west-central part of the Little Belt Mountains occupies a transition zone in the west-central part of the Mountains--a transition from rolling mountain parks with rounded peaks that rise about 500 ft above the upland of the range to deeply incised canyons that drain the west end of the mountains. The experimental forest is bisected by Tenderfoot Creek which is incised as deeply as 2,400 ft into the upland. The steep inner canyon of Tenderfoot Creek opens upward onto narrow parks which are rimmed on the north and south by rounded peaks that rise to elevations of about 7,200 to 7,600 ft. At the east end of the experimental forest, the divide of Onion Park separates drainage flowing east into Belt Creek from drainage flowing west into Tenderfoot Creek and the Smith River. Quartzite Ridge, Williams Mountain and Woods Mountain on the south, and the ridge of Iron Mountain north of Tenderfoot Creek enclose the Tenderfoot Creek drainage. Thus the experimental forest covers the upper end of a west-sloping basin that drains steeply into the Smith River, about 12 mi to the west. This geographic setting is controlled by the resistance to erosion of rock units that underlie the area and by young geologic uplift of the mountains. These controls are described in the following account of the geology of the experimental forest.

GEOLOGY OF THE TENDERFOOT CREEK EXPERIMENTAL FOREST

The geology of the Tenderfoot Creek Experimental Forest is simple in terms of the rock and sediment units present and the geologic structure of the area. By contrast, the geologic history records a complex series of events which has influenced both the succession of rock units and the erosion that has produced the present physiography of the area. In succession this report summarizes the rock units exposed in the area, the surficial sediments that mantle the forest, and the history of events that led to the present configuration. The accompanying reconnaissance bedrock geologic map (figure 7) shows the generalized distribution of rock units underlying the forest. Figure 8 shows the generalized distribution of surficial materials across the area. Both figures are generalized to show the geologic features at a scale of 1:50,000 (approximately) 1.2 inches per mile). The geologic units are described from oldest to youngest.

Early Proterozoic Gneiss--The oldest rocks are exposed in the canyon of Tenderfoot Creek from about 1,100 m east of Stringer Creek to near Lost Stove Creek on the west. The gneiss is more widely exposed east of the experimental forest in the vicinity of Neihart, Montana, and southwest of the area in the drainage of Moose Creek, south of the south-bounding divide of the experimental forest. The gneiss forms the basement rock of the Little Belt Mountains on which a thick succession of younger stratified rocks rests.

The oldest exposed rock is medium gray to medium-light gray, medium to coarsely crystalline hornblende biotite gneiss. Thin laminae of biotite schist coarse feldspathic biotite schist are present locally in the gneiss. Pegmatite dikes of pink orthoclase feldpar, with plagioclase feldspar and quartz, are scattered to common, generally parallel to the gneissic foliation.

The composition and textures of the gneiss suggest that it was derived by metamorphism from ancient feldspathic volcanic or foliated intrusive igneous rocks. Although no distinct evidence was seen that some of the gneiss could have been derived by metamorphism of sedimentary rocks, some schistose laminae might originally have been volcanic siltstone laminae or mafic tuff beds.

Generally foliation in the gneisses trends north-northeast to east-northeast. The crystalline rocks split blocky to support steep canyon walls; blocks of the gneiss form coarse talus cones built out from the steep exposures. Fractures and locally open vugs in quartz-rich laminae and foliation provide limited pathways for the movement of water through these crystalline rocks.

The age of the premetamorphic rocks from which the gneisses were derived is not known with certainty. Radiometric age determinations on zircon crystals from the gneiss are about 2.4 billion years (earliest Proterozoic), suggesting that age for the original rock. A metamorphic event that reset the age of other minerals in the rock has been dated as about 1.84 billion years before present. The surface on which younger stratified rocks of Cambrian age rest across the gneiss in the area of the experimental forest seems to be sharp, nearly flat surface. It represents early pronounced faulting, uplift, and erosion of the Earth's crystalline crust, likely between about 800 and 600 million years before present. However, stratified rocks younger than the gneiss, including the Neihart quartzite and other strata of the Middle Proterozoic Belt Supergroup, overlie the gneiss in the vicinity of Neihart and across areas west, south, and locally east of the Little Belt Mountains. The site of the experimental forest was likely on the faulted margin of the ancient uplift.

Cambrian Flathead Sandstone--Across the Tenderfoot Creek area, the Flathead Sandstone of Middle Cambrian age, rests unconformably on the Early Proterozoic gneiss. The Flathead Sandstone is fine- to coarse-grained sandstone cemented with quartz. Pebbles of red and white quartzite as large as 2 cm across are present locally in the sandstone. Beds of sandy siltstone, a few centimeters thick, are interbedded with the sandstone, and increase in abundance toward the top of the Flathead. Grains in the sandstone are quartz, polycrystalline quartz, microcline, orthoclase, scattered plagioclase, and common to abundant iron oxides, including hematite and magnetite. The grains of the sandstone, generally well rounded, are coated with hematite. The sandstone is trough cross-laminated to thinly crossbedded. The Flathead ranges in thickness from about 275 to 450 ft thick.

The Flathead Sandstone is generally firmly cemented and forms ledges or steep slopes. The Flathead underlies the steep slopes at the top of the inner canyon of Tenderfoot Creek. Because of the silica cement, the sandstone splits flaggy to blocky so that fragments form talus cones or remain in clayey soils as angular fragments. Cementation makes the sandstone tight, likely with low permeability. Fractures and weakly cemented laminae in the upper part are likely the principal sites of water storage and transmission in the unit. Water percolating downward through overlying shales emerges as seeps at or near the contact between the shales above the silica-cemented sandstone below.

About 7 mi east of the Tenderfoot Creek Experimental Forest, the Middle Proterozoic Neihart Quartzite, which has some characteristics similar to the Flathead, underlies the unconformity at the base of the Flathead Sandstone. Similarly, in Moose Creek drainage, south-southwest of the experimental forest, the Neihart Quartzite underlies the Flathead Sandstone, but is

truncated beneath the Flathead in that area. The truncated edge projects northeast to east-northeast under younger strata between those areas, and the Neihart Quartzite is considered absent in the area of the experimental forest. Both the apparent absence of a significant erosional break in the quartz-cemented sandstones present, and the upward gradation of the sandstone into siltstone, claystone, and sandy siltstones that locally contain fossils in the forest area demonstrate that the quartzitic sandstone overlying the Early Proterozoic gneiss is the Middle Cambrian Flathead Sandstone.

Middle Cambrian Wolsey Shale--The rolling park areas of the experimental forest, including Harley and Onion Parks, are underlain by dark to medium dark gray and dark greenish-gray clayey siltstone, claystone, and sandy siltstone assigned to the Wolsey Shale. The stratigraphic and Middle Cambrian age assignment are based on the superposition of the strata on the quartzite and on trilobite and small brachiopod fragments exposed in rock quarried on the edge of the forest area.

The Wolsey Shale is poorly exposed across the area. It consists of sandy siltstone, siltstone and silty claystone in exposures of the lower part. Based on the presence of silty limestone fragments higher in the section, the Wolsey also contains laminae and very thin beds of silty and sandy limestone. Wolsey strata are very thinly and thinly laminated and split shaly to platy. As much as 400 ft of Wolsey seems to be present north of Tenderfoot Creek, but the thickness may include thin, poorly exposed porphyritic rhyodacite sills of Eocene age (see below) and thin limestone beds of the lower part of the Middle Cambrian Meagher Formation.

The Wolsey Shale weathers to form clay-rich soils and subdued slopes. The slopes are mantled with colluvial fragments and fine alluvial sediment

derived from resistant rocks of the ridges bounding the basin on the south and north. Shaly rocks of the Wolsey have apparent low permeability, but are abundantly fractured. During wet times of the year, water saturates areas of low relief and emerges as seeps along the margins of colluvial and alluvial sediments in thin aprons on the Wolsey. Locally anomalous concentrations of calcium carbonate in water associated with the Wolsey, may be derived from dissolution of thin limestone beds and concretions in the Wolsey.

Sedimentary rocks younger than Middle Cambrian have been eroded from the area of upper Tenderfoot Creek. However, rocks ranging in age from Late Cambrian through Cretaceous are exposed west, north, east, and locally south of the Little Belt Mountains. Small outcrops of gravel containing pebbles and cobbles of the Paleozoic and Mesozoic strata are present on high ridges south of the Lost Fork of the Judith River, southeast of the Tenderfoot Creek Experimental Forest. Clasts of those gravels demonstrate that the younger strata were originally present across the site of the present Little Belt Mountains but were eroded from the range crest probably during middle and late Teriary time.

Eocene Porphyritic Rhyodacite--Capping the ridge bounding the north flank of the Tenderfoot Creek Experimental Forest from near Harley Park northwest is medium dark to medium gray porphrytic rhyodacite which weathers pale-grayish orange to light-gray. The rock intrudes shales of the Wolsey and Park (?) formations as sills 3 to 15 m thick. The rock consists of quartz and scattered plagioclase phenocrysts in a matrix of very finely crystalline alkalic and some sodic feldspar with scattered to common biotite and rare hornblende and scattered very fine quartz. The mafic minerals are commonly altered to iron oxides. The sills are within a nearly continuous northwest-

trending zone of sills that extends from Kings Hill and Porphyry Peak southeast of the Tenderfoot Creek area to the area of this report at the same approximate stratigraphic position.

Alteration precludes determination of the radiometric age of the sills in the Tenderfoot Creek area. However, sills from the same zone at Kings Hill have been dated by the U.S. Geological Survey as about 47.3 to 48.5 million years (Ma) old (Eocene)(H.H. Mehnert and M.S. Reynolds, 1983). The age coincides with the time of intrusion of laccoliths, stocks and sills on the north flank and in the center of the Little Belt Mountains (Weed, and Weed and Pirsson, 1900, and numerous authors since).

Tertiary Rocks Younger than Eocene--Tertiary rocks younger than about 47 Ma are not known in the central part of the Little Belt Mountains. South-southeast of the Tenderfoot Creek area basalt caps some ridges on the north and south flanks of Sheep Creek drainage. The basalt is considered equivalent to basalt farther south and southwest that have been dated as about 31 Ma (Oligocene). West-southwest down the west plunge of the Little Belt Mountains, deformed ash-flow and airfall tuffs with interbedded basalt breccia have been dated as about 26 Ma (U.S. Geological Survey, H.H. Mehnert and M.W. Reynolds, written communication, 1984). Deformation of those beds demonstrates tilting and uplift of at least the western part of the Little Belt Mountains as middle Miocene or younger. Normal faulting as young as Pliocene (5-3 Ma) has displaced rocks in valleys southwest of the Tenderfoot Creek area.

Quaternary Deposits--Three general units of Quaternary sediments are distinguished in the Tenderfoot Creek Experimental Forest: (1) Talus,

(2) thin mantles of colluvium derived from bounding ridges and mixed with alluvium; and (3) clay-rich soil developed on the Wolsey Shale.

Talus derived from ledges and rocky faces of Proterozoic gneiss and Flathead Sandstone is banked against walls of the canyon of Tenderfoot Creek and locally clogs the creek. Talus blocks in the stream channel trap sand and silt transported during internals of high water flow.

Thin braided and fan-shaped deposits of colluvium and alluvium cover slope of ridges and the parks in the forest area. Sediment clasts range from silt and sand size to angular fragments several centimeters across and, adjacent to the ridges, angular clasts as large as 10 to 20 cm across. The coarse sediment is reworked by sheet wash into braided patterns of coarse debris in low ridges with finer debris in channels. Porosity and permeability of the mixed colluvial and alluvial deposits is high. During wet intervals, water flowing through these coarse sediments emerges along contacts with the clay soils or onto clayey flat areas. The contrasting sediment grain size between the units seems to control the distribution of grasses and broad-leafed plants in the park areas. However, trees grow on both the colluvial/alluvial sediment and the clay-rich soils.

Clay soil and silty clay soil is deveoped on the Wolsey Shale across rolling park areas. The thickness of the soils ranges from 0 to about 2 m.

Geologic Structure--Rocks of the experimental forest area have been uplifted and faulted, but retain a relatively simple geologic structure. Strata of the Flathead Sandstone and Wolsey Shale are nearly flat lying or dip 1 to 2 degrees south on the south side of Tenderfoot Creek. These rocks unconformably overlie the Early Proterozoic gneisses which were strongly deformed and eroded before deposition of Middle Proterozoic strata of the

overlying Belt Supergroup, which were originally deposited across the gneiss. Uplift and erosion during the time interval about 0.8 to 0.65 billion years ago caused strata of the Belt Supergroup to be eroded from the Tenderfoot Creek area before subsequent deposition of the Middle Cambrian rocks.

During Eocene (Tertiary) time, sills of porphyritic rhyodacite were intruded into the Wolsey and overlying shales of the Cambrian succession. Remnants of those sills cap ridges on the north border of the experimental forest, and there are nearly flat-lying.

On the west end of the forest area, Cambrian and younger beds dip westward on a broad plunging anticline toward Smith River. Rocks of Upper Cambrian, Devonian, and Mississippian age crop out successively in the canyon of Tenderfoot Creek west toward the river.

Cambrian strata along the southeast and south flank of the experimental forest are faulted downward to the north (Tenderfoot Creek block) approximately 500 to 600 ft with respect to rocks of Quartzite Ridge. Strata on that ridge are broken by north and northwest-trending fractures, some with fault displacements as much as 100 ft. The north-trending small faults cannot be traced through the Wolsey Shale of the park bench. Those faults may be conduits for the movement of groundwater from the southern rim of the Tenderfoot Creek basin toward the creek.

The geologic cross section of Tenderfoot Creek Experimental Forest (figure 9 and 9a) represents the area from the westerly edge of Quartzite Ridge northward to the junction of Tenderfoot Creek and Bubbling Creek and then northeasterly to highest part of the Tenderfoot Creek Experimental Forest on the Stringer Creek-Spring Park Creek divide. The percentage of TCEF and each subwatershed within each generalized geologic formation is shown in table 9.

DATA COLLECTION AND ANALYSIS

Stream Gaging Stations

Streamflow has been monitored at nine locations within TCEF since 1992. The tenth location was added in the fall of 1994. In the fall of 1992, three Parshall flumes with continuous water level recorders were installed in Sun Creek (4-foot), Tenderfoot Creek above Sun Creek (4-foot), and Tenderfoot Creek below Stringer Creek (10-foot). The 10-foot Parshall flume is shown in figure 10. Installation was contracted through the Forestry Sciences Laboratory . During early summer of 1993, staff gages were installed near the mouth of Spring Park Creek, Bubbling Creek, Stringer Creek, Pack Creek and Passionate Creek and in Lonesome Creek near the TCEF boundary. In late summer of 1993, a 2-1/2-foot Parshall flume was installed in Spring Park Creek and a 3-1/2-foot H-flume installed in Bubbling Creek (figure 11). Both have continuous water level recorders. A staff gage was installed in Stringer Creek above East Fork in fall of 1994. In the fall of 1994, a 3-foot H-flume was installed in Lonesome Creek and a 4-foot H-flume was installed in Stringer Creek near its mouth. Pack Creek and Passionate Creek are accessible by trail that fords Tenderfoot Creek. Consequently, they cannot be observed until flows drop sufficiently that Tenderfoot Creek can be waded. A new access trail was constructed in summer of 1994 that will allow these two stations to be visited during high water. Ratings have been developed for all staff gage locations. The locations of stream gaging stations on TCEF are shown in figure 12. Legal locations and other specific information for these stations are shown in table 10. Detailed sketch maps of each stream gage location is shown in Appendix I. Current rating tables for flumes and for staff gages are shown in Appendix II. Stations with staff gages are planned to be upgraded to flumes or stilling wells with continuous recorders as funds become available.

Hydrographs and daily flows for the three locations having flumes and recorders for the 1993 runoff and seven flumes with recorders for 1994 runoff are shown in Appendix III (two of the 1994 records are for part of September only). Monthly runoff for 1993 and 1994 are shown in table 11. Instantaneous and peak daily flows and minimum daily flows for 1993 and 1994 are shown in table 12. Recorder charts are on file at Forestry Sciences Laboratory in Bozeman. Streamflows observed at visits to all sites are shown in Appendix IV.

Suspended Sediment

In 1992, 1993, and 1994, depth integrated water samples were obtained using handheld DH-48 sampler during higher flows and grab samples when depth was too little to use the DH-48. The U.S. Forest Service Laboratory in Helena, Montana, analyzed the samples to determine the concentration of suspended sediment. These data are presented in Appendix V.

Flow versus suspended sediment graphs for all locations are shown in Appendix VI. The last graph in this appendix shows a composite of all data collected on TCEF. Suspended sediment in tons/day is calculated by multiplying flow in cfs times sediment concentration in mg/l times 0.0027. In 1994, four ISCO automatic sediment samplers were installed on sites with Parshall flumes (figure 13). The variable depth intake used for the ISCO samplers is shown in figure 14 and the drawing showing details is described in figure 15.

Specific Conductance

Specific conductance (SC) or electrical conductivity is a general measure of various chemical compounds in the water. SC readings obtained during visits to the gaging stations are shown in Appendix V. Plots of flow versus specific conductance are shown in Appendix VII. Streams that drain open meadows underlain with Wolsey shale have much higher SC than other water courses in TCEF. This is due to much greater levels of calcium. On 8/10-12/1993, SC samples were taken on many waterways in TCEF to document sources of the higher SC water. Highest readings were obtained in Onion Park area. Locations and SC readings on 8/10-12/1993 are shown in figure 16.

Water Chemistry and Nutrients

Periodically, water samples were collected on field visits and taken to Montana Department of Health and Environmental Sciences in Helena, Montana for analysis of chemical and nutrients levels. Complete results are on file at FSL in Bozeman. Stiff diagrams, which indicate patterns of specific chemical constituents for different streams are shown in Appendix VIII.

Turbidity

Turbidity measurements were started in 1994 and data is presented in Appendix V.

Water Temperature and pH

Data collected on temperatures and pH is shown in Appendix V.

Snow and Precipitation Stations

Eight locations for snow and precipitation measurements were selected in the fall of 1992 (figure 17). A relocation of one of the original sites (Sun Creek) and additional precipitation gage (Passionate Creek) were installed in 1994. Table 13 shows the legal location and specific information for each of the sites. Sketch maps of individual sites are shown in Appendix IX. All snow courses have five sample locations where depth and snow water equivalent (SWE) is measured on winter visits (figure 18). The sites are in small meadows protected from wind but open enough so the snow fall is not influenced by tree canopy. Snow density is calculated by dividing the SWE by depth. Manual snow measurements are shown in Appendix X. Estimates of monthly values of SWE for 1993 and 1994 are obtained by pro-rating measured values with snow pillows (table 14). Melt-out is estimated from spring measurements, snow pillows and daily melt rates. In the fall of 1993 a snow pillow was installed at Onion Park (figure 19). Onion Park open pillow graph is shown in figure 20. Daily SWE for Onion Park open pillow for the 1994 water year is shown in table 15.

Precipitation storage gages are located at or near snow courses. A diagram of these storage gages is shown in figure 21 and photograph of a storage gage is shown in figure 22. The precipitation gages are read when snow courses are measured and periodically in spring, summer and fall. Data collected through 1994 is shown in Appendix X. Gages are recharged in late September or early October each year. An oil layer keeps precipitation from evaporating and the antifreeze recharge solution melts the snow and keeps the fluid in the gage from freezing. First of the month values for 1993 and 1994 are prorated from measured values and nearby SNOTEL sites (table 16). Estimated monthly precipitation is obtained from the monthly accumulated

values (table 17).

Canopy Interception

Overstory canopy of timber effects amount of rain and snow reaching the ground. Melt patterns are different under the canopy and in openings. These variations affect the volume and timing of the runoff. To be able to predict changes that might occur from timber removal through management, insect infestation or fire, it is necessary to understand the hydrologic changes that occur.

Five snow course locations have canopy snow courses where manual measurements are made during winter visits. The sixth canopy course was installed in fall of 1994. The Onion Park canopy pillow (figure 23) measures SWE continuously. From previous studies (Farnes 1978, 1989; Hardy 1990; Skidmore 1994) open areas accumulate more snow than under the timber canopy. The reduction of snow under canopies is proportional to the density of the canopy. Melt rates under the canopy is less than in the open so melt-out occurs in the open sites prior to melt-out under the canopy. Rain is also intercepted by the forest canopy. As rainfall amounts become greater, some may pass through the canopy. Three tipping bucket precipitation gages were installed at Onion Park in summer of 1994 to evaluate interception of rain. One gage is in the open (figure 19), one in moderate canopy, and one in dense canopy (figure 24). Codd (1959) developed the photocanopyometer (figure 25) to measure canopy on film. Farnes (1971) found the snowpack (SWE) is reduced when canopy encroaches in the 30° cone above the sample point. Other methods used to measure the canopy utilize the spherical densiometer, basal area, and habitat cover type (HCT). Canopy data for TCEF sites is shown in Appendix XI. Canopy snow course measurements are shown in Appendix XII. SWE for Onion Park

canopy snow pillow is shown in table 18. Figure 26 shows comparison between Onion Park open pillow SWE and Onion Park canopy pillow. Table 19 shows snow interception at canopy snow courses and snow pillows for 1993 and 1994.

Farnes (1971) compared canopy versus SWE reduction on Montana snow courses. Interception of SWE versus 0-30° photocanopyometer density for TCEF for 17 observations have a standard error of estimate (SE) 5.0 percent and R^2 of 0.317. The 17 observations for the relationship between SWE interception and spherical densiometer values have SE of 5.8 percent and R^2 of 0.067. The 17 observations for the relationship between SWE interception and basal area have SE of 6.0 percent and R^2 of 0.005. All of the canopy snow measurements on TCEF are quite dense. To better define the entire curve for thin, moderate, and dense canopies, additional work was considered. Additional data was collected by Farnes (1989) after the 1988 Yellowstone fires, and by Hardy (1990) and Skidmore (1994). Incorporating data from TCEF, Hardy, Skidmore and Farnes fire data for 35 observations yields correlations of R^2=0.770 and SE of 5.0 percent for photocanopyometer, R^2=0.623 and SE of 6.4 percent for densiometer and R^2=0.145 and SE of 9.6 percent for basal area. Best correlations are with photocanopyometer 0-30° density and this data for the 35 observations is shown in figure 27. The spherical densiometer probably represents too wide of an angle to correlate well with interception. It appears basal area is a poor indicator of snow interception. Figure 28 shows comparison of canopy cover and lodgepole pine habitat cover type (Despain 1990). In future studies on TCEF, it might be advantageous to establish additional canopy snow courses in thin and moderate canopies near existing snow courses. Data on interception of rain is inadequate to analyze at this time.

Stream Gages

Recorders should be started on last snow survey of the season. A propane burner can be used to heat water in 5 gallon metal bucket and then the hot water dumped into the stilling well to accelerate melting of ice. Experiments using solar power and resistor wire are being tried in winter of 1994-95 to see if freezing can be retarded and/or thawing accelerated. On each visit or about once each month, remove chart and take to Forestry Sciences Lab in Bozeman (Ward McCaughey). Rewind clock weight or spring. Record date, staff gage reading to nearest 1/100th foot, tape reading, and time on prepared datasheets. At each visit, mark location of pen on chart and write data, time, site name, staff gage reading, and tape reading on chart and initial. If chart is changed, write same information on beginning of new chart. Set pen at correct time. Most recorders travel 1.2 inches/day with midnight being at solid and heavy dashed lines. Blue line on chart indicates chart is getting low. Each square left between the blue line and edge of chart indicates 2 days of chart left. Check ink supply in pen. Make sure pen is loose on chart and ink is flowing. Make sure clock is working before closing lid. On flumes, make sure there are no rocks or debris in flume. If moss is present, sweep flume floor and check recorder after removal. Install 1/2 Vapona pest strip in shelter once each year to control flies and insects. If a clock stops, replace it and have the clock cleaned and lubricated. Spare charts and ink should be carried or kept in stream gage shelters.

For stream gages without flumes, check zero on staff gage against the bench mark on first visit in spring to make sure ice did not raise the staff gage. Use Abney or level with stadia rod to check elevation of zero as shown on data sheets. If zero is too high, pound post in or lower staff to correct

elevation. Record readings showing date, time, initial zero elevation, final zero elevation, initial water level, find water level for each gage location and file at Forestry Sciences Lab. On visits to gages without flumes, use current (velocity) meter to measure flow. Plot flow versus staff gage reading on rating curve to make sure channel or staff has not changed. Record date, time, staff gage (to nearest 1/100th foot) on prepared forms and take all data to Forestry Sciences Lab in Bozeman (Ward McCaughey).

Water Quality

On each visit to stream gage, take sediment sample, temperature, pH, and specific conductance (electrical conductivity). Record information on prepared forms. Record station, date, time, water temperature, flow (from flume rating and staff gage, or rating curve and staff gage), staff gage height and specific conductance on wire-tie tags and attach to sediment sample bottle. Use DH-48 depth integrated sampler for flows with more than 4-inch depth. Rinse bottles and DH-48 well before taking sample. Move DH-48 down and up at uniform rate. Fill bottle 3/4 to 7/8 full. If bottle is full, empty and retake sample as full bottle may indicate more sediment in bottle than actually in stream. Take data and sediment sample bottles to Forestry Sciences Lab in Bozeman (Ward McCaughey). Check calibration of specific conductance meter in spring and once in summer. Check calibration of pH meter at start of each day. Compare flow versus specific conductance curves and if point is outside of boundary, take one sample for chemical and one for nutrients (fix one with acid - keep all samples in cooler and get samples to Water Quality Lab in Helena, Montana within 24 hours). Use plastic bottles for these samples and use depth integrated method to collect samples. For flows deeper than 4 inches, use DH-48 and transfer water to plastic bottles.

For new stations, obtain 3-4 chemical and nutrient samples per year, one at high flow, one at low flow and one after snow melt. Develop flow versus specific conductance curves for new stations. For stations with good flow versus SC curves, take chemical and nutrient samples only when SC is outside of the range of previous values for specific flows. Plot data on stiff diagrams when chemical analysis are returned.

Isco Samplers

Inlets for ISCO samplers utilize galvanized pipe suspended on cable in the center of flumes so samples are taken at a higher depth as flows increase (see figures 14 and 15). Inlets should be about 1/2 inch above the flume floor when pipe is hanging vertically. Set ISCO Sampler to pull four samples per day at 1/4 pint each for total of 1 pint sample per day. Observe times of maximum daily gage height, minimum daily gage height, rising mean daily gage height and falling mean daily gage height during snow melt and set Isco to pull sample at these times. ISCO samplers hold 24 to 28 bottles so it needs to be visited at least once every 24 to 28 days. Samplers should be initiated before peak snow melt runoff but not before danger of bottles freezing has past and sampling should continue until about October 1. At each visit, take a manual depth integrated sediment sample and a full sample through the ISCO to verify ISCO samples. If flow versus sediment curve is different for Isco as compared to manual, the ISCO samples need to be adjusted to the manual depth integrated samples. At each visit, check battery voltage and make sure suction tube is OK. It is best to have suction tube so all water drains out between samples so it does not freeze in low places.

Storage Precipitation Gages

Read manometer near to first of every month when possible and with snow surveys. Record time, date and manometer reading to nearest 1/10th cm at top of oil layer on prepared data sheets. Take data sheets to Forestry Sciences Lab in Bozeman (Ward McCaughey). Correlate accumulated precipitation with daily data stations (SNOTEL at Spur Park or Deadman Creek, or Onion Park Omni Data Pod Station) to adjust readings to first of each month. Calculate monthly values for each location from estimated first of month values.

Near October 1 of each year, drain all fluid and oil from gage and recharge with 2 gallons glyco-meth (40% ethelene glycal-60% methonal which has a specific near 1.0) and 2/3 quart transformer oil. Replace gage in stand and put in 1 gallon of recharge, then oil, then last gallon to get a thin layer of oil in the manometer tube. Determine manometer reading for October 1 (start of water-year) and September 30 (end of water-year). Calculate and report monthly and water-year precipitation. Note any snow on ground at time of reading precipitation gages and record on forms.

Snow Courses

Read all snow courses between January 15 and March 1 and between April 1 and May 1 each winter. Also measure canopy snow course at Bubbling Creek, Lonesome Creek, and Sun Creek on first snow survey and County Line, Farnes Meadow, and Onion Park on the later snow survey. Use federal snow sampler with a standard cutter. Take snow survey notes to Forestry Sciences Lab in Bozeman (Ward McCaughey). Prorate snow survey readings at snow courses with SNOTEL pillows (Spur Park, Deadman Creek, or Onion Park Open Pillow) to determine estimated SWE on January 1, February 1, March 1, April 1, May 1, May 15, June 1, and date of melt-out. Each fall at October 1 visit to

precipitation gages, make sure all snow course and canopy snow course signs are up and painted and sampling areas are clear of all logs, limbs and brush.

Snow Pillows

Read manometer on each visit and complete data sheets. During summer, the readings should be zero. If below zero, check pillow or plumbing for probable leak. Reset tape, recorder and manometer to zero prior to snow in the fall. During October visit, make sure clock is wound and that chart will last until next visit. Blue line on chart indicates chart is getting low. Each square left between the blue line and edge of chart indicates 2 days of chart left. During winter and spring visits, change chart. On end of chart, mark location of pen, and write on chart, date, time, site name, manometer reading and tape reading and initial. Put same information on beginning of new chart. Check ink supply in pen and make sure pen is loose on chart. Set pen on correct time on chart. Most recorders travel 1.2 inches/day with midnight being at solid and heavy dashed line. Make sure clock is working before closing lid. Take data sheets and charts to Forestry Sciences Lab in Bozeman (Ward McCaughey). On summer visits, check pillow to see that screen is intact and backfill is smooth and level. Place 1/2 Vapona pest strip in shelter each year to control flies and insects.

MODELING

It will be possible to model the hydrology of TCEF using existing models calibrated to data being collected on the watershed. A water quality model can be developed using the hydrologic model as the driver and incorporating water quality parameters now being measured. Prior to any management activities, correlations can be developed between watersheds having similar geology, precipitation, elevation, aspect and vegetation. Anticipated changes for various management activities can be obtained from the models and verification can be obtained by observing changes in various data being collected on streamflow and water quality prior to and after initiation of any significant management activity. Paired watersheds that appear to be best suited for evaluating hydrologic changes associated with vegetative manipulation are Spring Park Creek and Stringer Creek above East Fork; Sun Creek and Bubbling Creek; and possibly Bubbling Creek and Pack Creek. Lonesome Creek is ideally suited for monitoring on-site management activities. Tenderfoot Creek above Sun Creek is within the Onion Park Natural Resource Area and ideally suited for observation of vegetative adaptation and variation. Runoff from this watershed can also be used for some hydrologic evaluation since it has the highest percentage of non-forested area of all the TCEF watersheds.

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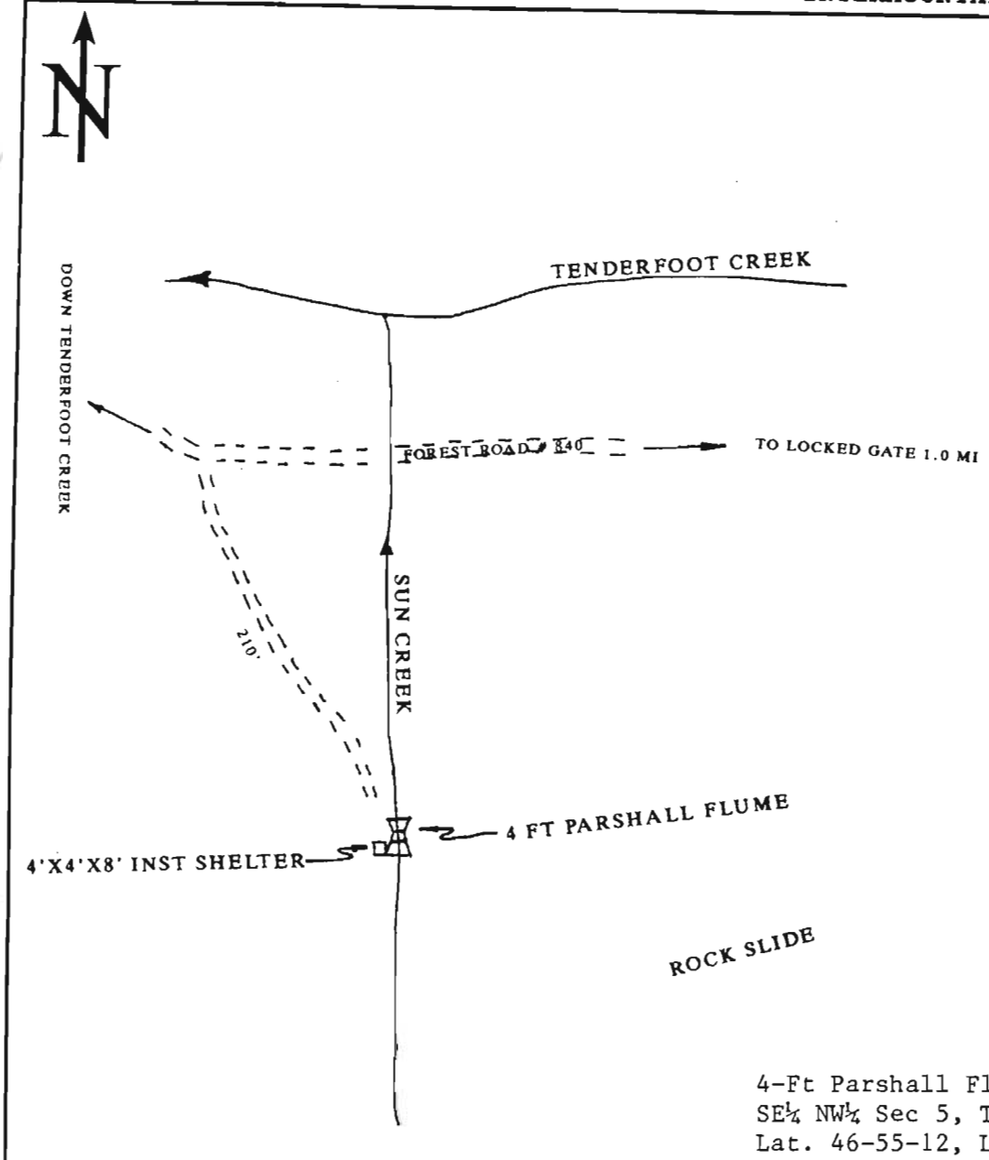
Appendix I. Stream gaging station sketch maps.

No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek
LC7015	Stringer Creek Above East Fork



4-Ft Parshall Flume Installed 10/92
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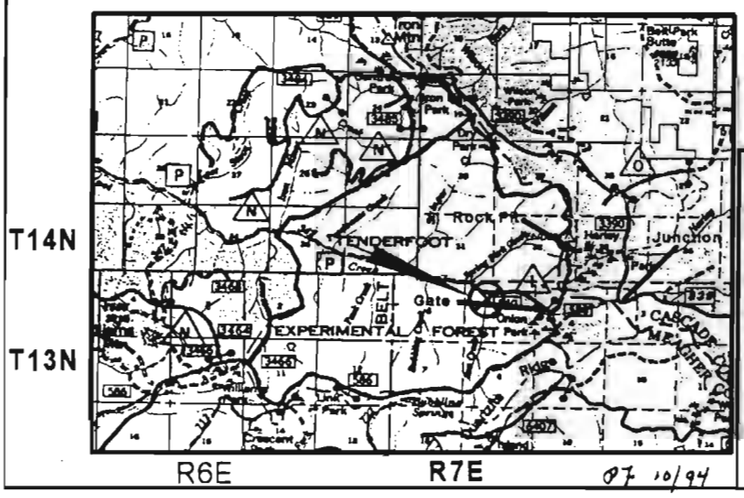
Lat. 46-55-12, Long. 110-52-42
Elev. 7020 ft



07 10/94

Stream Gaging Station
Tenderfoot Creek Experimental Forest

SUN CREEK NEAR MOUTH
Stream Gage No. LC7006

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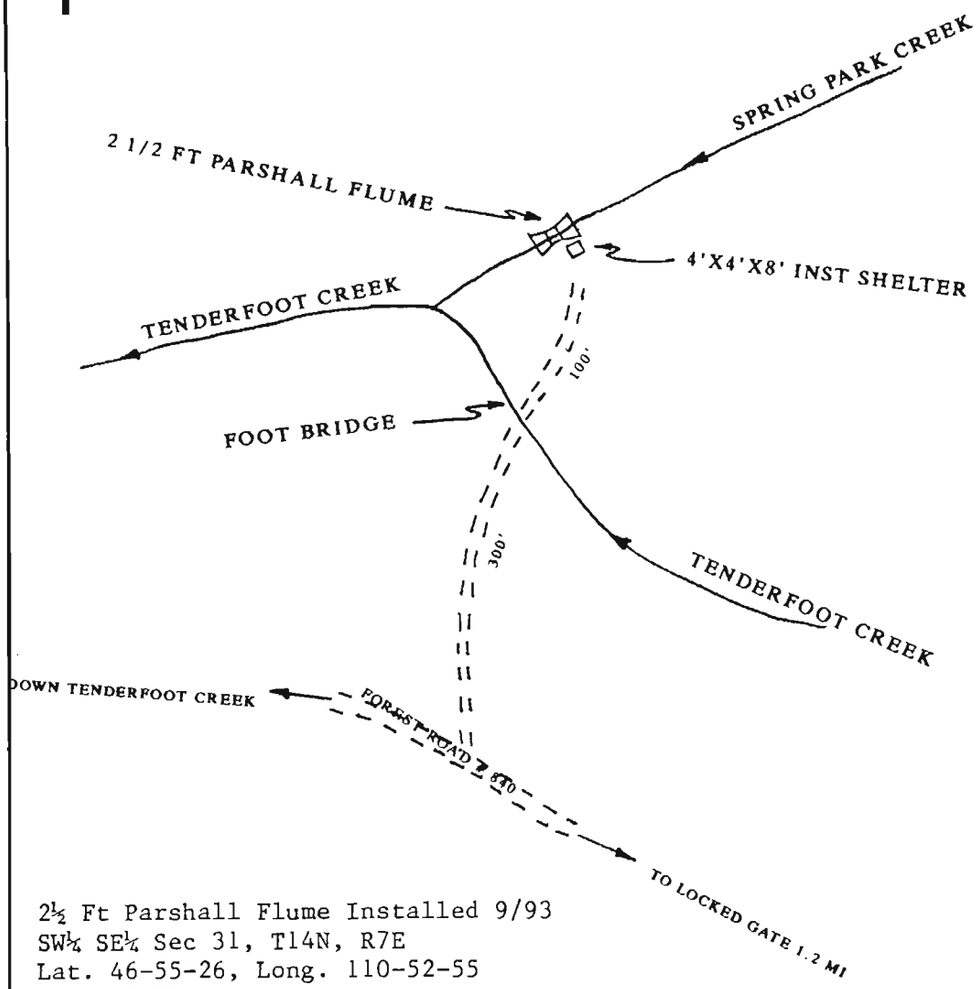

2½ Ft Parshall Flume Installed 9/93
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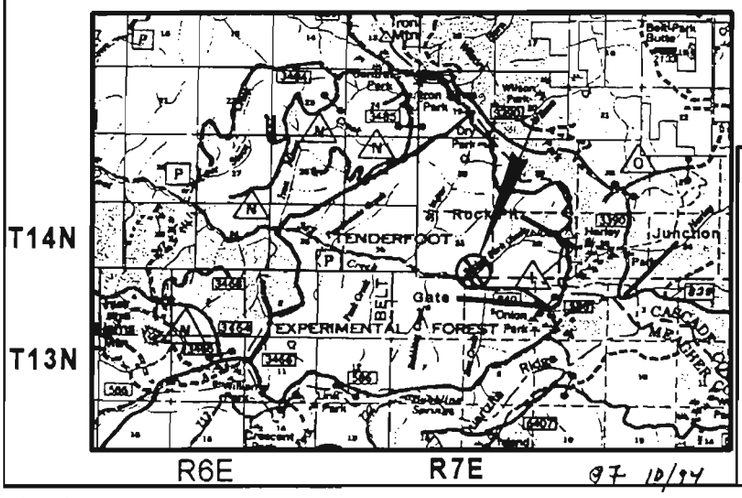
Lat. 46-55-26, Long. 110-52-55
Elev. 6910 ft



97 10/94

Stream Gaging Station
Tenderfoot Creek Experimental Forest

SPRING PARK CREEK NEAR MOUTH
Stream Gage No. LC7007

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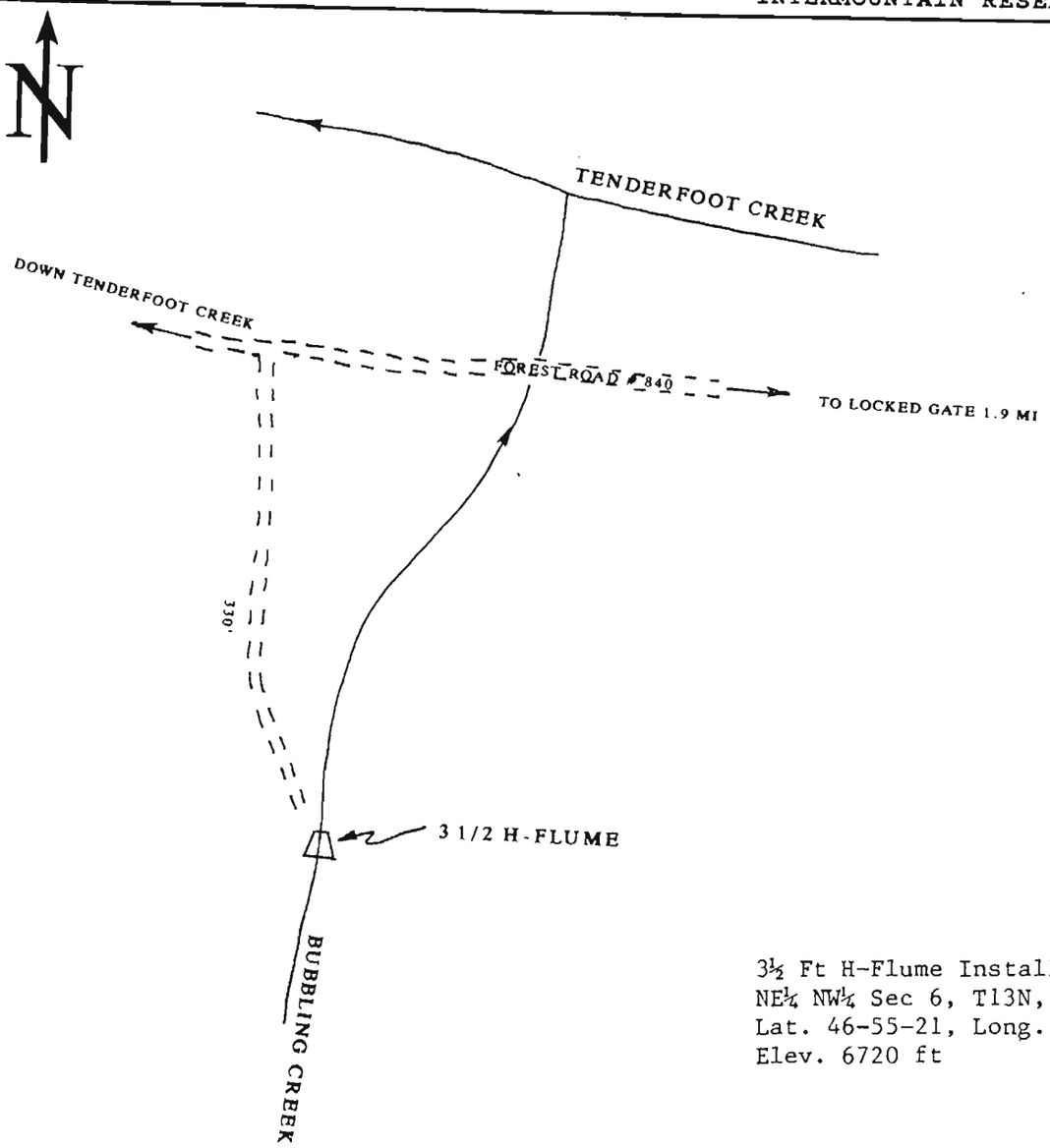

3½ Ft H-Flume Installed 9/93
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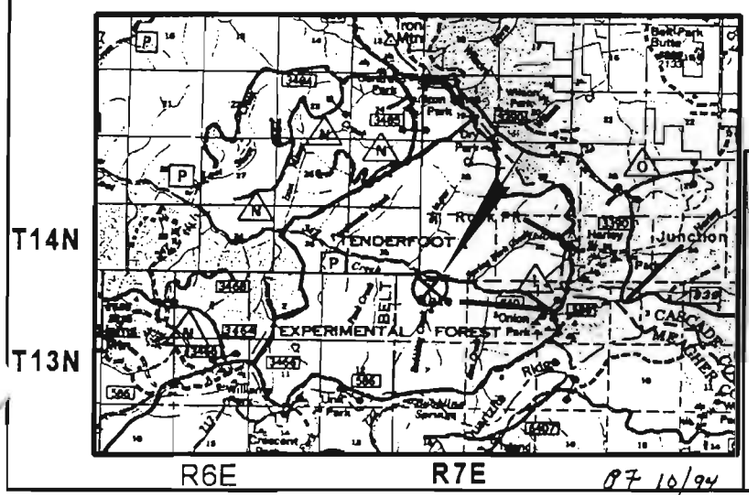
Lat. 46-55-21, Long. 110-53-44
Elev. 6720 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

BUBBLING CREEK NEAR MOUTH
Stream Gage No. LC7008

07 10/94

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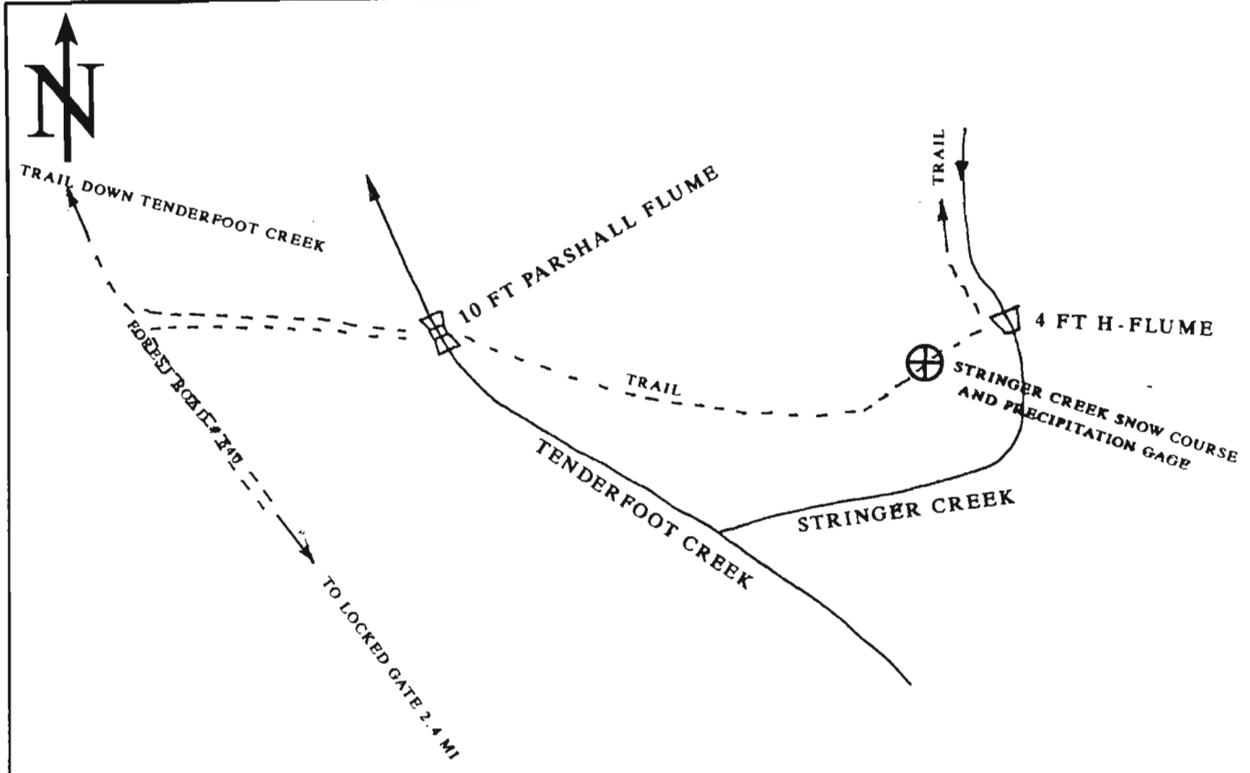

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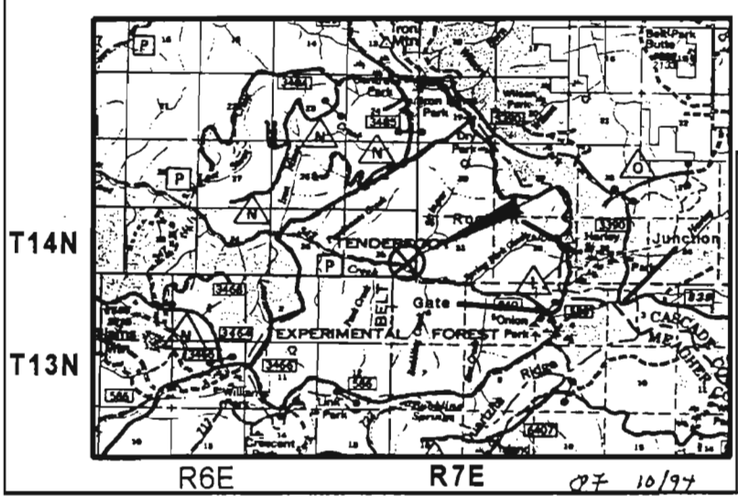
Lat. 46-55-38, Long. 110-54-03
Elev. 6560 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

STRINGER CREEK NEAR MOUTH
Stream Gage No. LC7009

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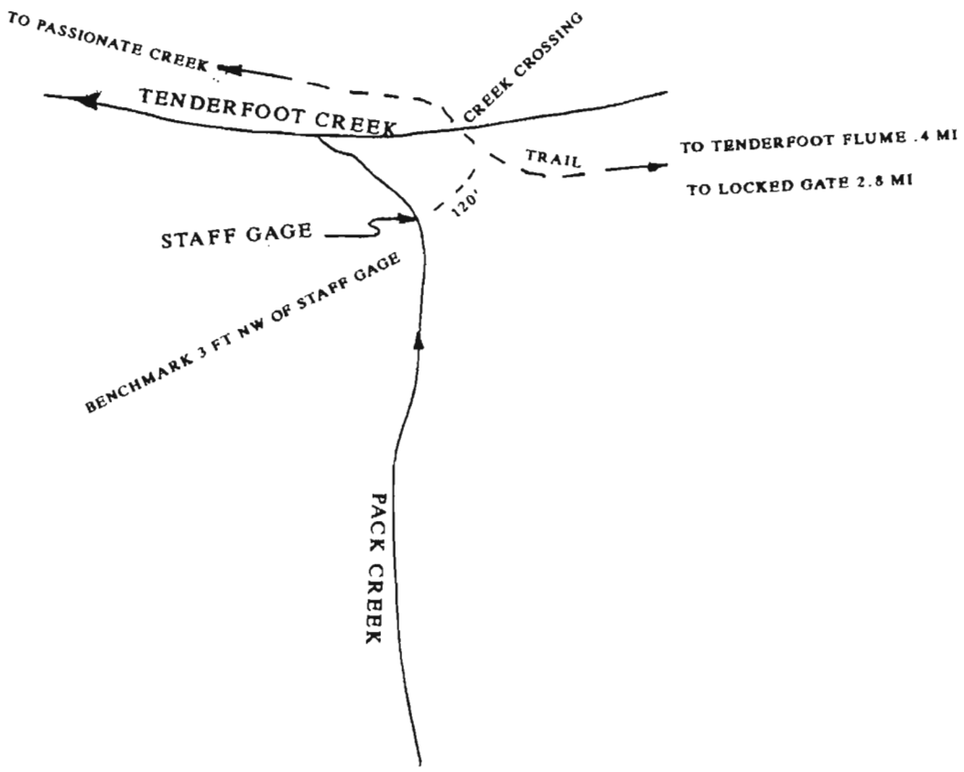
DEPARTMENT OF AGRICULTURE

INTERMOUNTAIN RESEARCH STATION



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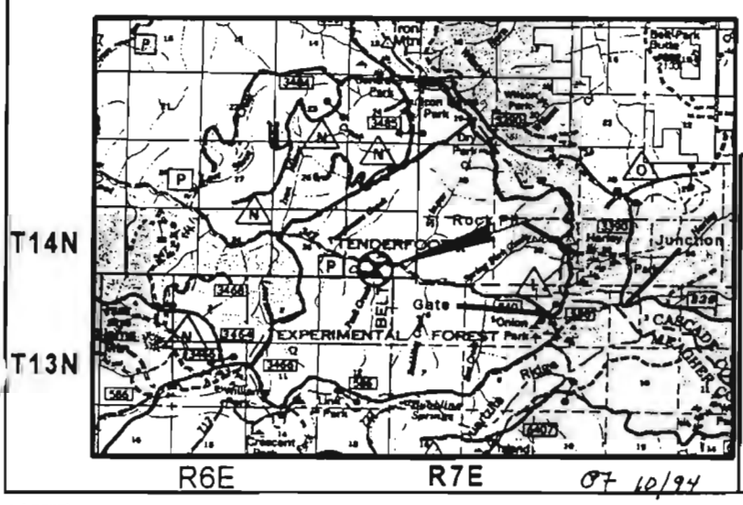
Elev. 6440 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

PACK CREEK
Stream Gage No. LC7010

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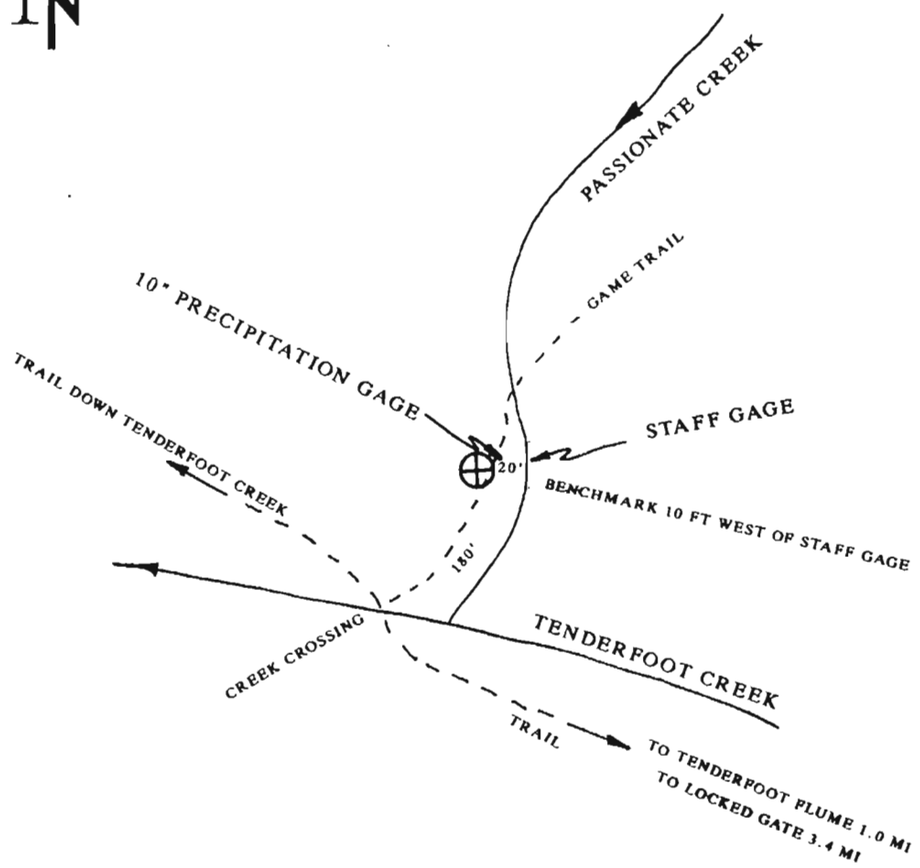

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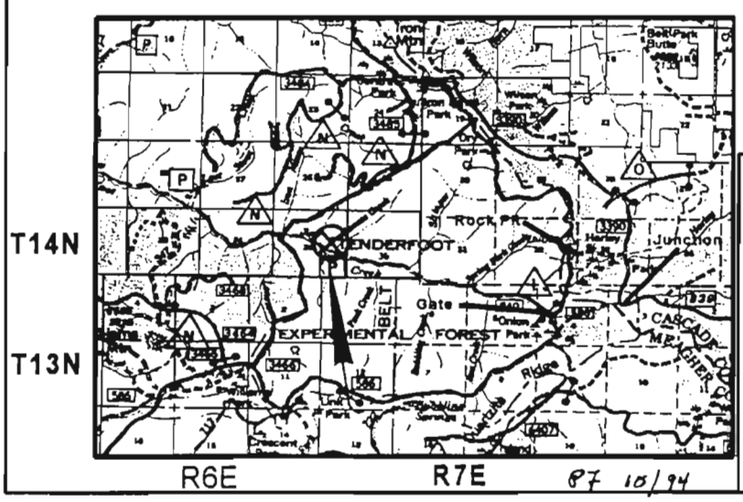
Elev. 6250 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

PASSIONATE CREEK NEAR MOUTH
Stream Gage No. LC7011

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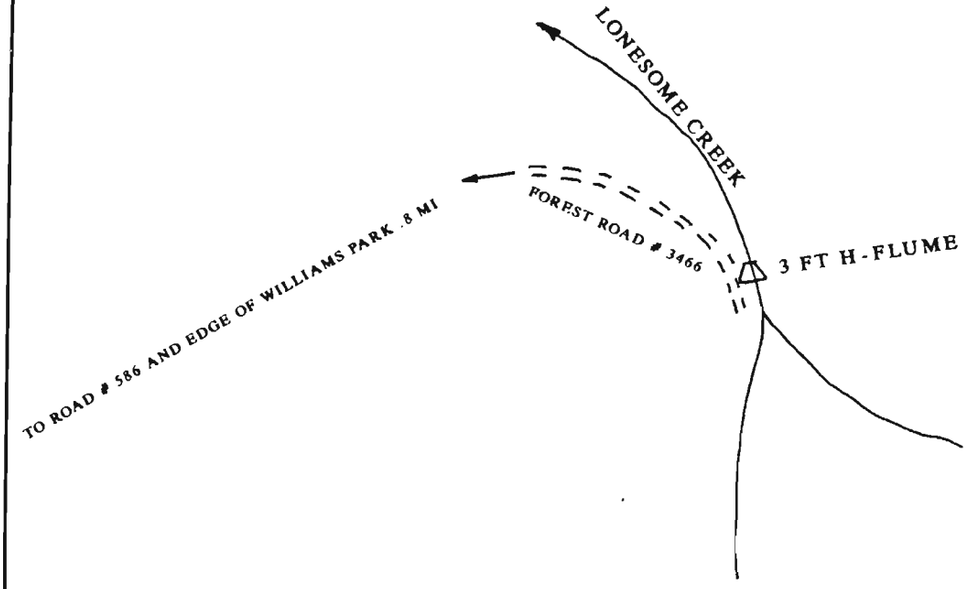

3 Ft H-Flume Installed 9/94
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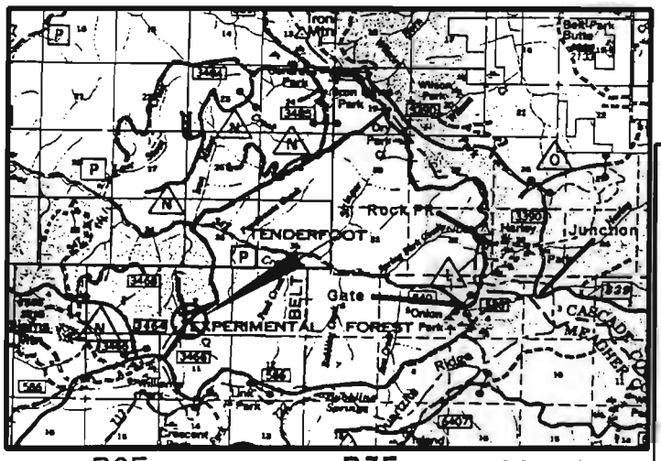
Lat. 46-54-51, Long. 110-56-20
Elev. 6810 ft



07 10/94

Stream Gaging Station
Tenderfoot Creek Experimental Forest

LONESOME CREEK NEAR WILLIAMS PARK
Stream Gage No. LC7012

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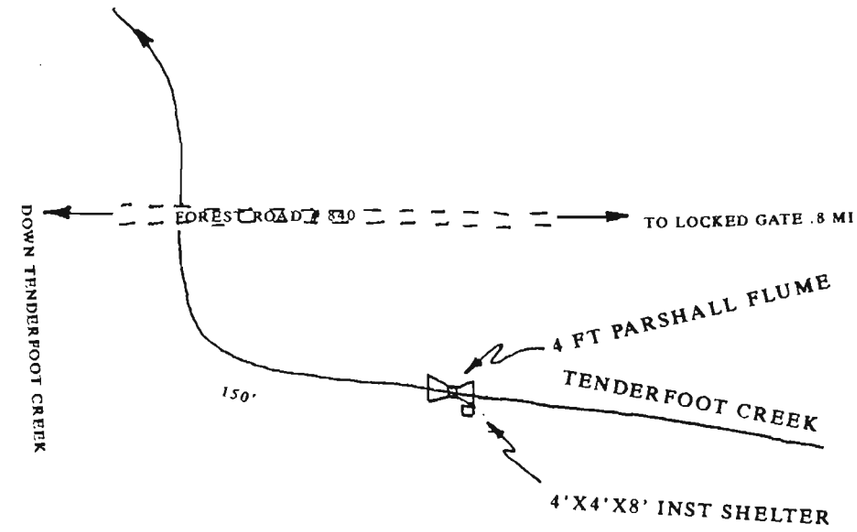

4-Ft Parshall Flume Installed 10/92
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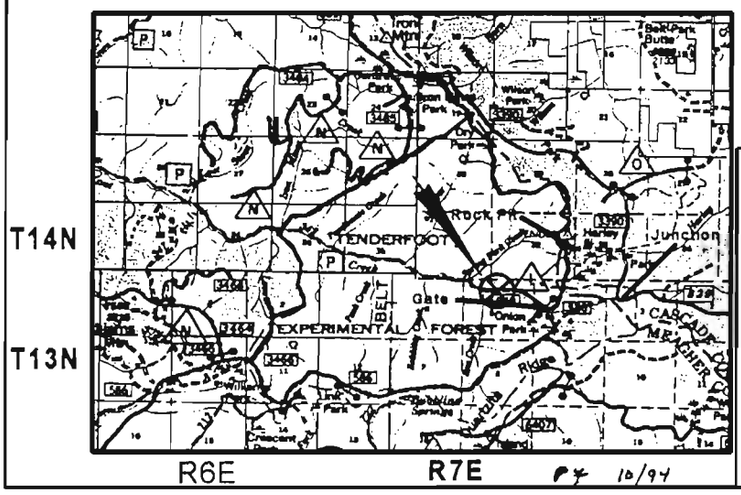
Lat. 46-55-12, Long. 110-52-25
Elev. 7060 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

TENDERFOOT CREEK ABOVE SUN CREEK
Stream Gage No. LC7013

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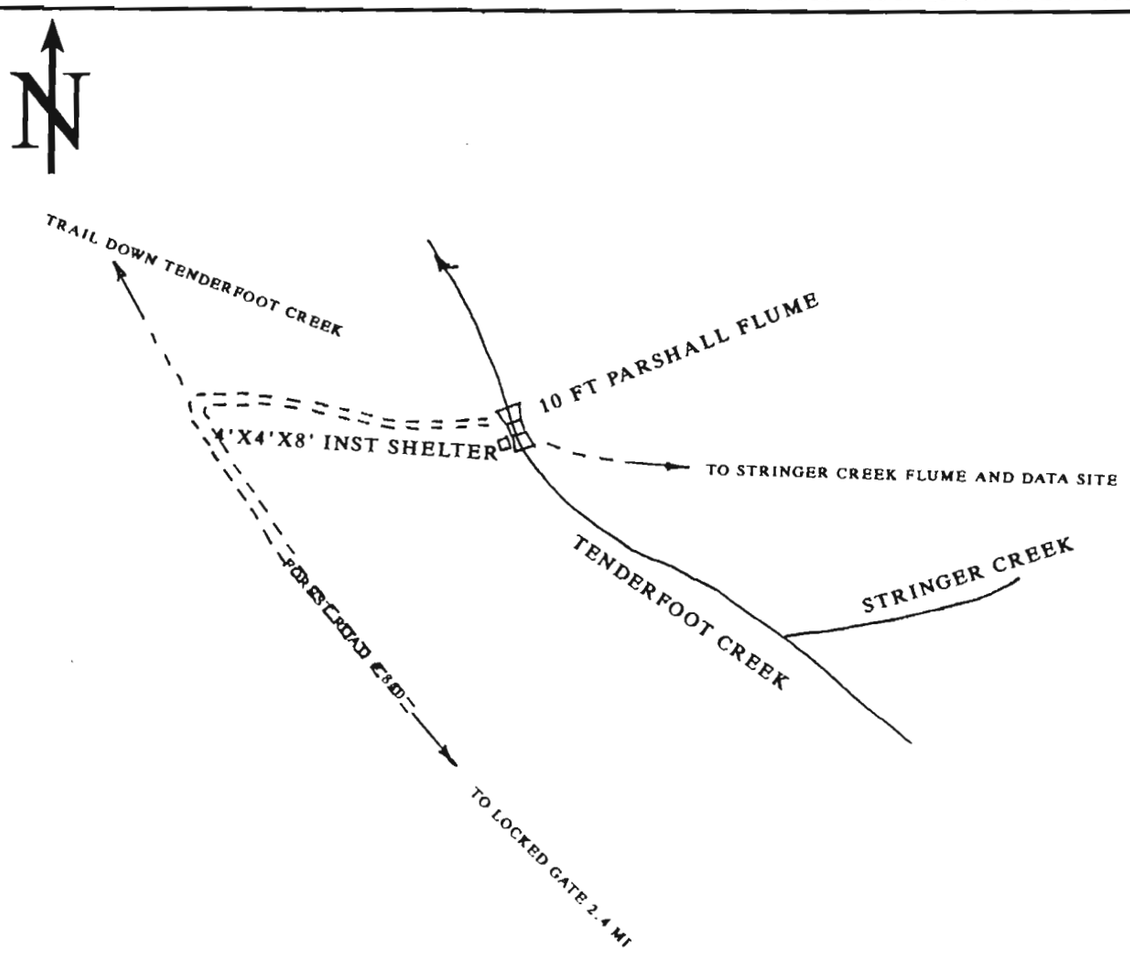

10 Ft Parshall Flume Installed 10/92
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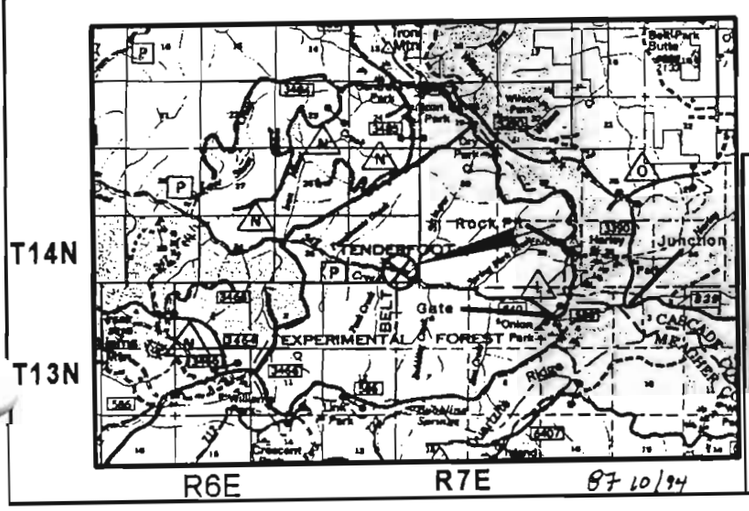
Lat. 46-55-37, Long. 110-54-09
Elev. 6510 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

TENDERFOOT CREEK BELOW
STRINGER CREEK
Stream Gage No. LC7014

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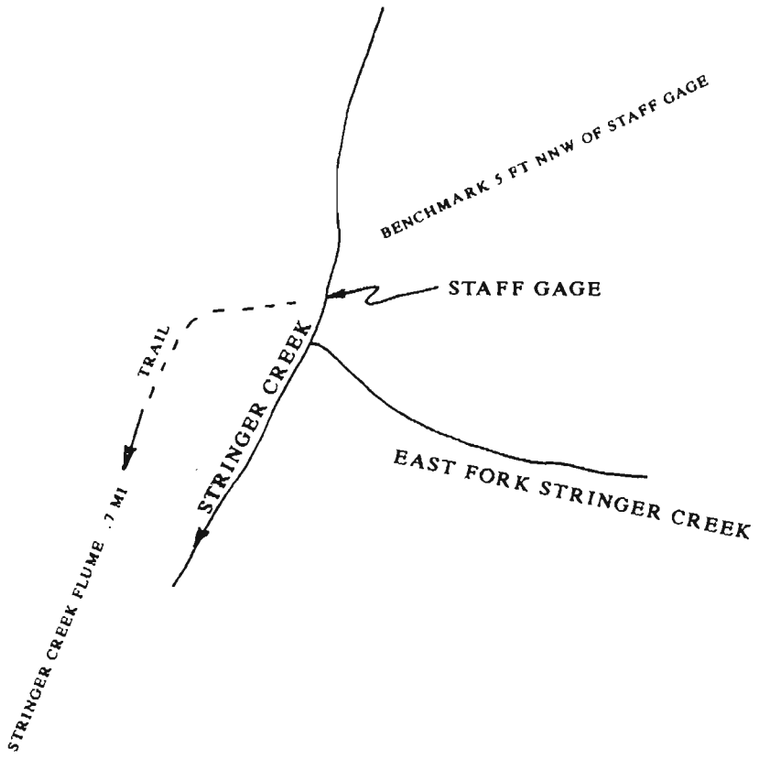

Staff Gage Installed 7/94
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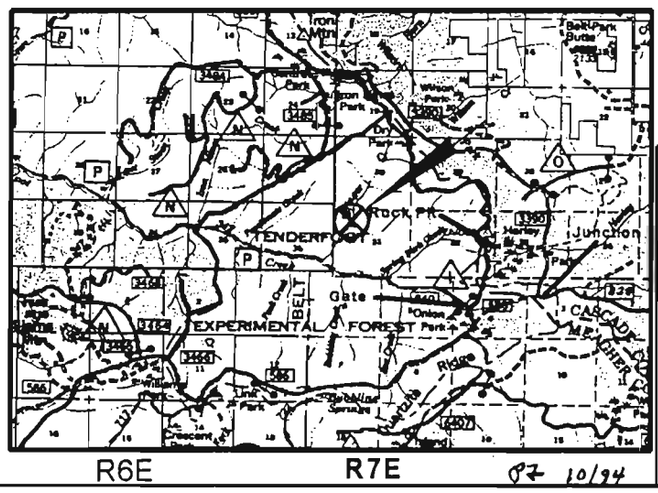
Lat. 46-56-05, Long. 110-53-33
Elev. 6870 ft



Stream Gaging Station
Tenderfoot Creek Experimental Forest

STRINGER CREEK ABOVE EAST FORK
Stream Gage No. LC7015

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Appendix II. Stream gaging station rating tables.

No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek
LC7015	Stringer Creek Above East Fork

RATING TABLE

SUN CREEK NEAR MOUTH
4 FOOT PARSHALL FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.0	0.0	0.1	0.10	0.10	0.2	0.2	0.3	0.3	0.4
0.1	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.1	1.2
0.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3
0.3	2.4	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5	3.6
0.4	3.8	3.9	4.1	4.2	4.4	4.5	4.7	4.9	5.0	5.2
0.5	5.4	5.5	5.7	5.9	6.0	6.2	6.4	6.6	6.9	7.0
0.6	7.2	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.7	8.9
0.7	9.1	9.3	9.5	9.7	10.0	10.2	10.4	10.6	10.8	11.0
0.8	11.2	11.5	11.7	11.9	12.2	12.4	12.6	12.8	13.1	13.3
0.9	13.6	13.8	14.0	14.3	14.5	14.8	15.0	15.2	15.5	15.8
1.0	16.0	16.2	16.5	16.8	17.0	17.3	17.5	17.8	18.1	18.3
1.1	18.6	18.9	19.1	19.4	19.7	20.0	20.2	20.5	20.8	21.0
1.2	21.3	21.6	21.9	22.2	22.5	22.8	23.0	23.3	23.6	23.9
1.3	24.2	24.5	24.8	25.1	25.4	25.7	26.0	26.3	26.6	26.9
1.4	27.2	27.5	27.8	28.1	28.4	28.8	29.1	29.4	29.7	30.0
1.5	30.3	30.7	31.0	31.3	31.6	32.0	32.3	32.6	32.9	33.3
1.6	33.6	33.9	34.2	34.6	34.9	35.3	35.6	35.9	36.3	36.6
1.7	37.0	37.3	37.6	38.0	38.3	38.7	39.0	39.4	39.7	40.1
1.8	40.4	40.8	41.2	41.5	41.9	42.2	42.6	43.0	43.3	43.7
1.9	44.0	44.4	44.8	45.2	45.5	45.9	46.3	46.6	47.0	47.4
2.0	47.8	48.1	48.5	48.9	49.3	49.7	50.0	50.4	50.8	51.2
2.1	51.6	52.0	52.4	52.8	53.1	53.5	53.9	54.3	54.7	55.1
2.2	55.5	55.9	56.3	56.7	57.1	57.5	57.9	58.3	58.7	59.1
2.3	59.6	60.0	60.4	60.8	61.2	61.6	62.0	62.4	62.8	63.3
2.4	63.7	64.1	64.5	64.9	65.4	65.8	66.2	66.6	67.1	67.5
2.5	67.9	68.4	68.8	69.2	69.7	70.1	70.5	71.0	71.4	71.8
2.6	72.2	72.7	73.1	73.6	74.0	74.5	74.9	75.4	75.8	76.2
2.7	76.7	77.1	77.6	78.0	78.5	79.0	79.4	79.9	80.3	80.8
2.8	81.2	81.7	82.1	82.6	83.1	83.5	84.0	84.4	84.9	85.4
2.9	85.8	86.3	86.8	87.3	87.7	88.2	88.7	89.1	89.6	90.1
3.0	90.6	91.0	91.5	92.0	92.5	93.0	93.4	93.9	94.4	94.9

FILE = SUN_CREK.TBL

RATING TABLE

SPRING PARK CREEK NEAR MOUTH
2.5 FOOT PARSHALL FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
0.1	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8
0.2	0.8	0.9	0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.4
0.3	1.5	1.6	1.7	1.8	1.9	2.0	2.0	2.1	2.2	2.3
0.4	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3
0.5	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.4
0.6	4.5	4.6	4.8	4.9	5.0	5.1	5.2	5.4	5.5	5.6
0.7	5.7	5.9	6.0	6.1	6.2	6.4	6.5	6.6	6.8	6.9
0.8	7.1	7.2	7.3	7.5	7.6	7.8	7.9	8.0	8.2	8.3
0.9	8.5	8.6	8.8	8.9	9.1	9.2	9.4	9.5	9.7	9.8
1.0	10.0	10.2	10.3	10.5	10.6	10.8	11.0	11.1	11.3	11.4
1.1	11.6	11.8	11.9	12.1	12.3	12.4	12.6	12.8	12.9	13.1
1.2	13.3	13.5	13.6	13.8	14.0	14.2	14.3	14.5	14.7	14.9
1.3	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.3	16.5	16.7
1.4	16.9	17.1	17.3	17.5	17.6	17.8	18.0	18.2	18.4	18.6
.5	18.8	19.0	19.2	19.4	19.6	19.8	20.0	20.2	20.4	20.6
1.6	20.8	21.0	21.2	21.4	21.6	21.8	22.0	22.2	22.4	22.7
1.7	22.9	23.1	23.3	23.5	23.7	23.9	24.1	24.4	24.6	24.8
1.8	25.0	25.2	25.4	25.6	25.9	26.1	26.3	26.5	26.8	27.0
1.9	27.2	27.4	27.6	27.9	28.1	28.3	28.5	28.8	29.0	29.2
2.0	29.5	29.7	29.9	30.2	30.4	30.6	30.8	31.1	31.3	31.5
2.1	31.8	32.0	32.3	32.5	32.7	33.0	33.2	33.4	33.7	33.9
2.2	34.2	34.4	34.7	34.9	35.2	35.4	35.6	35.9	36.1	36.4
2.3	36.6	36.9	37.1	37.4	37.6	37.9	38.1	38.4	38.6	38.9
2.4	39.1	39.4	39.6	39.9	40.2	40.4	40.7	40.9	41.2	41.4
2.5	41.7	42.0	42.2	42.5	42.8	43.0	43.3	43.6	43.8	44.1

FILE = SPRING.TBL

RATING TABLE

BUBBLING CREEK NEAR MOUTH
3.5 FOOT H-FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
0.5	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9
0.6	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3
0.7	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7
0.8	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1
0.9	2.2	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.6
1.0	2.7	2.8	2.8	2.9	2.9	3.0	3.0	3.1	3.2	3.2
1.1	3.3	3.4	3.4	3.5	3.6	3.6	3.7	3.8	3.8	3.9
1.2	4.0	4.0	4.1	4.2	4.2	4.3	4.4	4.5	4.6	4.6
1.3	4.7	4.8	4.9	4.9	5.0	5.1	5.2	5.3	5.4	5.4
1.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.2	6.3
1.5	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3
1.6	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.4
1.7	8.5	8.6	8.7	8.8	8.9	9.0	9.2	9.3	9.4	9.5
1.8	9.6	9.8	9.9	10.0	10.1	10.2	10.4	10.5	10.6	10.
1.9	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	11.9	12.1
2.0	12.2	12.4	12.5	12.6	12.8	12.9	13.1	13.2	13.4	13.5
2.1	13.6	13.8	14.0	14.1	14.2	14.4	14.6	14.7	14.9	15.0
2.2	15.2	15.3	15.5	15.7	15.8	16.0	16.2	16.3	16.5	16.6
2.3	16.8	17.0	17.2	17.3	17.5	17.7	17.8	18.0	18.2	18.4
2.4	18.6	18.7	18.9	19.1	19.3	19.5	19.7	19.8	20.0	20.2
2.5	20.4	20.6	20.8	21.0	21.2	21.4	21.6	21.8	22.0	22.2
2.6	22.4	22.6	22.8	23.0	23.2	23.4	23.6	23.8	24.0	24.2
2.7	24.5	24.7	24.9	25.1	25.3	25.5	25.8	26.0	26.2	26.4
2.8	26.6	26.9	27.1	27.3	27.6	27.8	28.0	28.3	28.5	28.7
2.9	29.0	29.2	29.4	29.7	29.9	30.2	30.4	30.7	30.9	31.2
3.0	31.4	31.7	31.9	32.2	32.4	32.7	32.9	33.2	33.5	33.7
3.1	34.0	34.2	34.5	34.8	35.1	35.3	35.6	35.9	36.1	36.4
3.2	36.7	37.0	37.2	37.5	37.8	38.1	38.4	38.7	39.0	39.2
3.3	39.5	39.8	40.1	40.4	40.7	41.0	41.3	41.6	41.9	42.2
3.4	42.5	42.8	43.1	43.4	43.7	44.0	44.3	44.6	44.9	45.2

FILE = BUBBLING.TBL

RATING TABLE

STRINGER CREEK NEAR MOUTH
4 FOOT H-FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5
0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7
0.5	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0
0.6	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4
0.7	1.4	1.4	1.5	1.5	1.6	1.7	1.6	1.7	1.7	1.8
0.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3
0.9	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.8
1.0	2.9	2.9	3.0	3.0	3.1	3.2	3.2	3.3	3.4	3.4
1.1	3.5	3.5	3.6	3.7	3.8	3.8	3.9	4.0	4.03	4.10
1.2	4.2	4.2	4.3	4.4	4.5	4.6	4.6	4.7	4.8	4.9
1.3	4.9	5.0	5.1	5.2	5.3	5.4	5.4	5.5	5.6	5.7
1.4	5.8	5.9	6.0	6.0	6.1	6.2	6.3	6.4	6.5	6.6
1.5	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6
1.6	7.7	7.8	7.9	8.0	8.1	8.2	8.4	8.5	8.6	8.7
1.7	8.8	8.9	9.0	9.2	9.3	9.4	9.5	9.6	9.7	9.8
1.8	10.0	10.1	10.2	10.4	10.5	10.6	10.7	10.9	11.0	11.1
1.9	11.3	11.4	11.5	11.7	11.8	11.9	12.1	12.2	12.3	12.5
2.0	12.6	12.8	12.9	13.0	13.2	13.3	13.5	13.6	13.8	13.9
2.1	14.18	14.2	14.4	14.5	14.7	14.8	15.0	15.2	15.3	15.5
2.2	15.6	15.8	16.0	16.1	16.3	16.4	16.6	16.8	17.0	17.1
2.3	17.3	17.5	17.6	17.8	18.0	18.2	18.3	18.5	18.7	18.9
2.4	19.1	19.2	19.4	19.6	19.8	20.0	20.2	20.4	20.5	20.7
2.5	20.9	21.1	21.3	21.5	21.7	21.9	22.1	22.3	22.5	22.7
2.6	22.9	23.1	23.3	23.5	23.7	23.9	24.1	24.4	24.6	24.8
2.7	25.0	25.2	25.4	25.6	25.9	26.1	26.3	26.5	26.7	27.0
2.8	27.2	27.4	27.6	27.9	28.1	28.3	28.6	28.8	29.0	29.3
2.9	29.5	29.8	30.0	30.2	30.5	30.7	31.0	31.2	31.5	31.7
3.0	32.0	32.2	32.5	32.7	33.0	33.2	33.5	33.7	34.0	34.3
.1	34.5	34.8	35.0	35.3	35.6	35.8	36.1	36.4	36.7	36.9
3.2	37.2	37.5	37.8	38.0	38.3	38.6	38.9	39.2	39.5	39.8
3.3	40.0	40.3	40.6	40.9	41.2	41.5	41.8	42.1	42.4	42.7

RATING TABLE

STRINGER CREEK RATING TABLE (continued)

DISCHARGE OF A 4-FT H-FLUME, CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
3.4	43.0	43.3	43.6	43.9	44.2	44.5	44.8	45.2	45.5	45.8
3.5	46.1	46.4	46.7	47.0	47.4	47.7	48.0	48.3	48.7	49.0
3.6	49.3	49.7	50.0	50.3	50.7	51.0	51.3	51.7	52.0	52.4
3.7	52.7	53.0	53.4	53.7	54.1	54.4	54.8	55.2	55.5	55.9
3.8	56.2	56.6	57.0	57.3	57.7	58.0	58.4	58.8	59.2	59.5
3.9	59.9	60.3	60.7	61.0	61.4	61.8	62.2	62.6	63.0	63.4
4.0	63.7									

FILE = STRINGER.TBL

RATING TABLE

PACK CREEK NEAR MOUTH (FILE = PACK.TBL)
STAFF GAGE IN FEET, DISCHARGE IN CFS

aff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	Zero Flow at .15 Staff									
0.1						0.00	0.00	0.00	0.00	0.00
0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.10
0.3	0.10	0.15	0.20	0.20	0.25	0.30	0.40	0.50	0.60	0.70
0.4	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.55	1.65	1.80
0.5	1.90	2.00	2.15	2.25	2.40	2.50	2.65	2.80	2.90	3.05
0.6	3.20	3.35	3.50	3.60	3.75	3.90	4.05	4.20	4.30	4.45
0.7	4.60	4.75	4.90	5.00	5.15	5.30	5.45	5.60	5.80	5.95
0.8	6.10									
0.9										

NOTE: Preliminary Data Based on 1992-94 Measurements

RATING TABLE

PASSIONATE CREEK NEAR MOUTH (FILE = PASSION.TBL)
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.0
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.0
0.1	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03
0.2	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.14	0.16
0.3	0.18	0.20	0.23	0.25	0.28	0.30	0.34	0.38	0.42	0.46
0.4	0.50	0.54	0.58	0.62	0.66	0.70	0.74	0.78	0.82	0.86
0.5	0.90	0.95	1.00	1.05	1.10	1.15	1.21	1.27	1.33	1.39
0.6	1.45	1.52	1.59	1.66	1.73	1.80	1.88	1.92	2.00	2.08
0.7	2.20	2.30	2.40	2.50	2.60	2.70	2.84	2.98	3.12	3.26
0.8	3.40	3.56	3.72	3.88	4.04	4.20	4.38	4.56	4.74	4.92
0.9	5.10									

NOTE: Preliminary Data Based on 1992-94 Measurements

RATING TABLE

LONESOME CREEK NEAR WILLIAMS PARK
3 FOOT H-FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03
0.1	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.09	0.10
0.2	0.11	0.12	0.13	0.14	0.16	0.17	0.18	0.19	0.21	0.22
0.3	0.23	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.36	0.38
0.4	0.40	0.42	0.44	0.46	0.48	0.50	0.53	0.55	0.57	0.60
0.5	0.62	0.64	0.67	0.70	0.72	0.75	0.78	0.80	0.83	0.86
0.6	0.89	0.92	0.95	0.98	1.01	1.05	1.08	1.11	1.15	1.18
0.7	1.22	1.25	1.29	1.33	1.36	1.40	1.44	1.48	1.52	1.56
0.8	1.60	1.65	1.69	1.73	1.78	1.82	1.86	1.91	1.96	2.00
0.9	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.41	2.46	2.51
1.0	2.57	2.62	2.68	2.73	2.79	2.85	2.91	2.97	3.03	3.09
1.1	3.15	3.21	3.27	3.34	3.40	3.46	3.53	3.60	3.66	3.73
1.2	3.80	3.87	3.94	4.01	4.08	4.15	4.23	4.30	4.37	4.45
1.3	4.53	4.60	4.68	4.76	4.84	4.92	5.00	5.08	5.16	5.24
1.4	5.33	5.41	5.50	5.58	5.67	5.76	5.84	5.93	6.02	6.11
..5	6.20	6.30	6.39	6.48	6.58	6.67	6.77	6.87	6.96	7.06
1.6	7.16	7.26	7.36	7.47	7.57	7.67	7.78	7.88	7.99	8.10
1.7	8.20	8.31	8.42	8.53	8.64	8.75	8.87	8.98	9.10	9.21
1.8	9.33	9.45	9.56	9.68	9.80	9.92	10.05	10.17	10.29	10.41
1.9	10.50	10.64	10.78	10.92	11.06	11.20	11.34	11.48	11.62	11.76
2.0	11.90	12.04	12.18	12.32	12.46	12.60	12.74	12.88	13.02	13.16
2.1	13.30	13.45	13.60	13.75	13.90	14.05	14.20	14.35	14.50	14.65
2.2	14.80	14.96	15.12	15.28	15.44	15.60	15.76	15.92	16.08	16.24
2.3	16.40	16.57	16.74	16.91	17.08	17.25	17.42	17.59	17.76	17.93
2.4	18.10	18.28	18.46	18.64	18.82	19.00	19.18	19.36	19.54	19.72
2.5	19.90	20.10	20.30	20.50	20.70	20.90	21.10	21.30	21.50	21.70
2.6	21.90	22.10	22.30	22.50	22.70	22.90	23.10	23.30	23.50	23.70
2.7	23.90	24.11	24.32	24.53	24.74	24.95	25.16	25.37	25.58	25.79
2.8	26.00	26.23	26.46	26.69	26.92	27.15	27.38	27.61	27.84	28.07
2.9	28.30	28.54	28.78	29.02	29.26	29.50	29.74	29.98	30.22	30.46
3.0	30.70									

F = LONESOME.TBL

RATING TABLE

TENDERFOOT CREEK ABOVE SUN CREEK
4 FOOT PARSHALL FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4
0.1	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.1	1.2
0.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3
0.3	2.4	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5	3.6
0.4	3.8	3.9	4.1	4.2	4.4	4.5	4.7	4.9	5.0	5.2
0.5	5.4	5.5	5.7	5.9	6.0	6.2	6.4	6.6	6.8	7.0
0.6	7.2	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.7	8.9
0.7	9.1	9.3	9.5	9.7	10.0	10.2	10.4	10.6	10.8	11.0
0.8	11.2	11.5	11.7	11.9	12.2	12.4	12.6	12.8	13.1	13.3
0.9	13.6	13.8	14.0	14.3	14.5	14.8	15.0	15.2	15.5	15.8
1.0	16.0	16.2	16.5	16.8	17.0	17.3	17.5	17.8	18.1	18.3
1.1	18.6	18.9	19.1	19.4	19.7	20.0	20.2	20.5	20.8	21.0
1.2	21.3	21.6	21.9	22.2	22.5	22.8	23.0	23.3	23.6	23.9
1.3	24.2	24.5	24.8	25.1	25.4	25.7	26.0	26.3	26.6	26.9
1.4	27.2	27.5	27.8	28.1	28.4	28.8	29.1	29.4	29.7	30.0
1.5	30.3	30.7	31.0	31.3	31.6	32.0	32.3	32.6	32.9	33.3
1.6	33.6	33.9	34.2	34.6	34.9	35.3	35.6	35.9	36.3	36.6
1.7	37.0	37.3	37.6	38.0	38.3	38.7	39.0	39.4	39.7	40.1
1.8	40.4	40.8	41.2	41.5	41.9	42.2	42.6	43.0	43.3	43.7
1.9	44.0	44.4	44.8	45.2	45.5	45.9	46.3	46.6	47.0	47.4
2.0	47.8	48.1	48.5	48.9	49.3	49.7	50.0	50.4	50.8	51.2
2.1	51.6	52.0	52.4	52.8	53.1	53.5	53.9	54.3	54.7	55.1
2.2	55.5	55.9	56.3	56.7	57.1	57.5	57.9	58.3	58.7	59.1
2.3	59.6	60.0	60.4	60.8	61.2	61.6	62.0	62.4	62.8	63.3
2.4	63.7	64.1	64.5	64.9	65.4	65.8	66.2	66.6	67.1	67.5
2.5	67.9	68.4	68.8	69.2	69.7	70.1	70.5	71.0	71.4	71.8
2.6	72.2	72.7	73.1	73.6	74.0	74.5	74.9	75.4	75.8	76.2
2.7	76.7	77.1	77.6	78.0	78.5	79.0	79.4	79.9	80.3	80.8
2.8	81.2	81.7	82.1	82.6	83.1	83.5	84.0	84.4	84.9	85.4
2.9	85.8	86.3	86.8	87.3	87.7	88.2	88.7	89.1	89.6	90.1
3.0	90.6	91.0	91.5	92.0	92.5	93.0	93.4	93.9	94.4	94.9

FILE = UPPERTC.TBL

RATING TABLE

TENDERFOOT CREEK BELOW STRINGER CREEK
10-FOOT PARSHALL FLUME
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
0.1	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6
0.2	2.8	3.0	3.3	3.6	3.8	4.1	4.4	4.7	5.0	5.3
0.3	5.6	6.0	6.3	6.7	7.0	7.4	7.7	8.0	8.3	8.7
0.4	9.1	9.5	9.8	10.2	10.6	11.0	11.4	11.8	12.2	12.6
0.5	13.0	13.4	13.8	14.3	14.7	15.1	15.6	16.0	16.5	16.9
0.6	17.4	17.8	18.3	18.8	19.3	19.8	20.2	20.8	21.2	21.8
0.7	22.2	22.8	23.3	23.8	24.3	24.8	25.4	25.9	26.5	27.0
0.8	27.6	28.1	28.7	29.2	29.8	30.4	30.9	31.5	32.1	32.7
0.9	33.3	33.9	34.5	35.1	35.7	36.3	36.9	37.5	38.1	38.8
1.0	39.4	40.0	40.6	41.3	41.9	42.6	43.2	43.9	44.5	45.2
1.1	45.9	46.5	47.2	47.9	48.6	49.3	49.9	50.6	51.3	52.0
1.2	52.7	53.4	54.1	54.8	55.9	56.3	57.0	57.7	58.4	59.2
1.3	59.9	60.6	61.4	62.1	62.9	63.6	64.4	65.2	65.9	66.7
1.4	67.4	68.2	69.0	69.8	70.6	71.4	72.1	72.9	73.7	74.5
1.5	75.3	76.2	76.9	77.8	78.6	79.4	80.2	81.0	81.9	82.7
1.6	83.5	84.4	85.2	86.0	86.9	87.7	88.6	89.5	90.3	91.2
1.7	92.0	92.9	93.8	94.7	95.5	96.4	97.3	98.2	99.1	99.9
1.8	100.8	101.8	102.6	103.6	104.5	105.4	106.3	107.2	108.1	109.0
1.9	110.	110.9	111.8	112.8	113.7	114.6	115.6	116.5	117.5	118.4
2.0	119.4	120.3	121.3	122.3	123.2	124.2	125.2	126.1	127.1	128.1
2.1	129.1	130.1	131.0	132.0	133.0	134.0	135.0	136.0	137.0	138.0
2.2	139.0	140.0	141.1	142.1	143.1	144.1	145.2	146.2	147.2	148.2
2.3	149.3	150.3	151.4	152.4	153.5	154.5	155.6	156.6	157.7	158.7
2.4	159.8	160.8	161.9	163.0	164.1	165.2	166.2	167.3	168.4	169.5
2.5	170.6	171.7	172.8	173.9	175.0	176.1	177.2	178.3	179.4	180.5
2.6	181.6	182.8	183.9	185.0	186.2	187.3	188.4	189.6	190.7	191.8
2.7	192.9	194.1	195.2	196.4	197.6	198.7	199.9	201.0	202.2	203.4
2.8	204.5	205.7	206.8	208.0	209.2	210.4	211.6	212.8	213.9	215.1
2.9	216.3	217.5	218.7	219.9	221.1	222.3	223.5	224.8	226.0	227.2

RATING TABLE

TENDERFOOT CREEK BELOW STRINGER CREEK (continued)

DISCHARGE OF A 10 FT PARSHALL FLUME, CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	
3.0	228.4	229.6	230.8	232.0	233.3	234.5	235.7	237.0	238.2	239.4
3.1	240.7	241.9	243.2	244.4	245.7	246.9	248.2	249.4	250.7	251.9
3.2	253.2	254.5	255.7	257.0	258.3	259.6	260.9	262.1	263.4	264.7
3.3	266.0	267.3	268.6	269.9	271.2	272.5	273.8	275.1	276.4	277.7
3.4	279.0	280.3	281.6	283.0	284.3	285.6	286.9	288.2	289.6	290.9
3.5	292.2	293.6	294.9	296.3	297.6	299.0	300.3	301.7	303.0	304.4
3.6	305.7	307.1	308.4	309.8	311.2	312.6	313.9	315.3	316.7	318.0
3.7	319.4	320.8	322.2	323.6	325.0	326.4	327.8	329.1	330.5	331.9
3.8	333.3	334.7	336.1	337.5	339.0	340.4	341.8	343.2	344.6	346.1
3.9	347.5	348.9	350.3	351.8	353.2	354.7	356.1	357.5	359.0	360.4
4.0	361.9	363.3	364.8	366.2	367.7	369.2	370.6	372.1	373.5	375.0
4.1	376.5	377.9	379.4	380.9	382.4	383.8	385.3	386.8	388.3	389.8
4.2	391.2	392.7	394.2	395.8	397.3	398.8	400.3	401.8	403.3	404.8
4.3	406.3	407.8	409.4	410.9	412.4	413.9	415.4	416.9	418.4	419.9
4.4	421.4	423.0	424.5	426.1	427.6	429.2	430.7	432.3	433.8	435.4
4.5	436.9	438.4	440.0	441.6	443.1	444.7	446.2	447.8	449.4	450.
4.6	452.5	454.1	455.7	457.2	458.8	460.4	462.0	463.6	465.2	466.7
4.7	468.3	469.9	471.5	473.2	474.8	476.4	478.0	479.6	481.2	482.8
4.8	484.4	486.0	487.6	489.3	490.9	492.5	494.1	495.8	497.4	499.0
4.9	500.6	502.3	503.9	505.6	507.2	508.9	510.5	512.1	513.8	515.4
5.0	517.1	518.7	520.4	522.1	523.7	525.4	527.1	528.7	530.4	532.1

FILE = LOWERTC.TBL

RATING TABLE

STRINGER CREEK ABOVE EAST FORK (FILE = UPSTRING.TBL)
STAFF GAGE IN FEET, DISCHARGE IN CFS

Staff	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0										
0.1										
0.2										
0.3	Zero Flow at .5 Staff									
0.4										
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
0.6	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
0.7	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5
0.8	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9
0.9	0.9									
1.0										

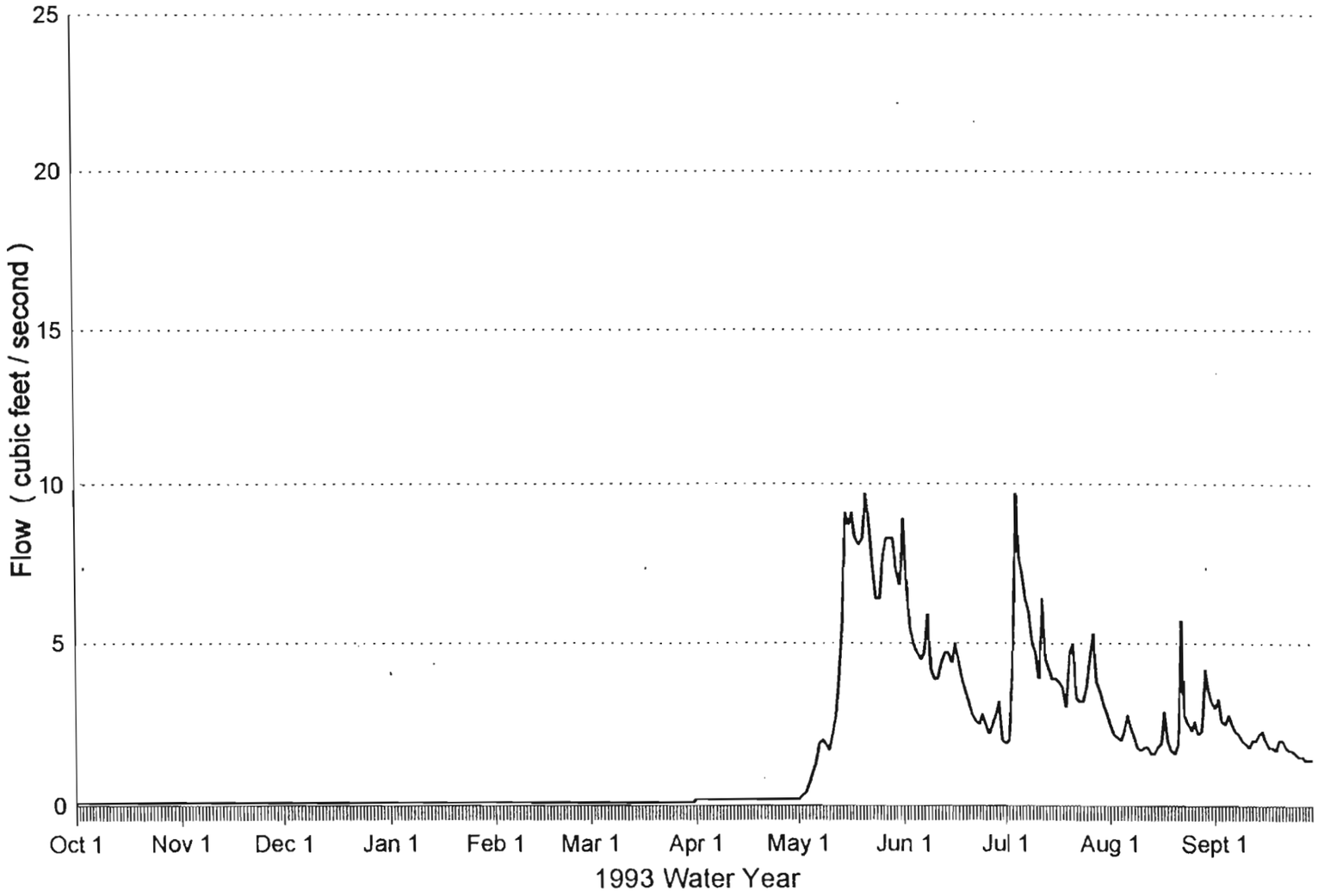
NOTE: Preliminary Data Based on 1994 Measurements

Appendix III. Hydrographs for 1993 and 1994.

No.	Station
LC7006	Sun Creek Near Mouth, 1993
LC7006	Sun Creek Near Mouth, 1994
LC7007	Spring Park Creek Near Mouth, 1994
LC7008	Bubbling Creek Near Mouth, 1994
LC7009	Stringer Creek Near Mouth, partial 1994
LC7012	Lonesome Creek Near Williams Park, partial 1994
LC7013	Tenderfoot Creek Above Sun Creek, 1993
LC7013	Tenderfoot Creek Above Sun Creek, 1994
LC7014	Tenderfoot Creek Below Stringer Creek, 1993
LC7014	Tenderfoot Creek Below Stringer Creek, 1994

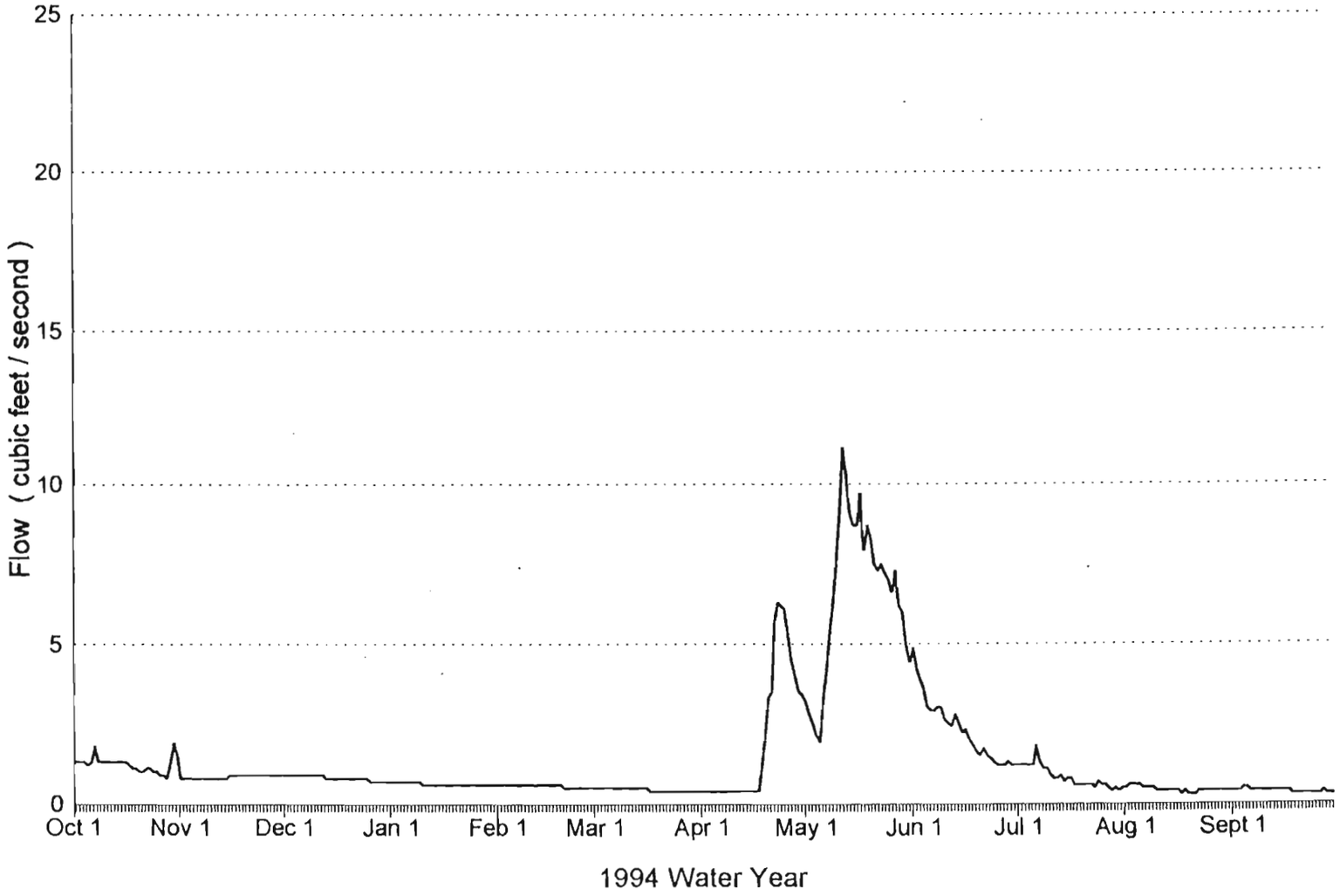
Sun Creek Near Mouth

LC7006



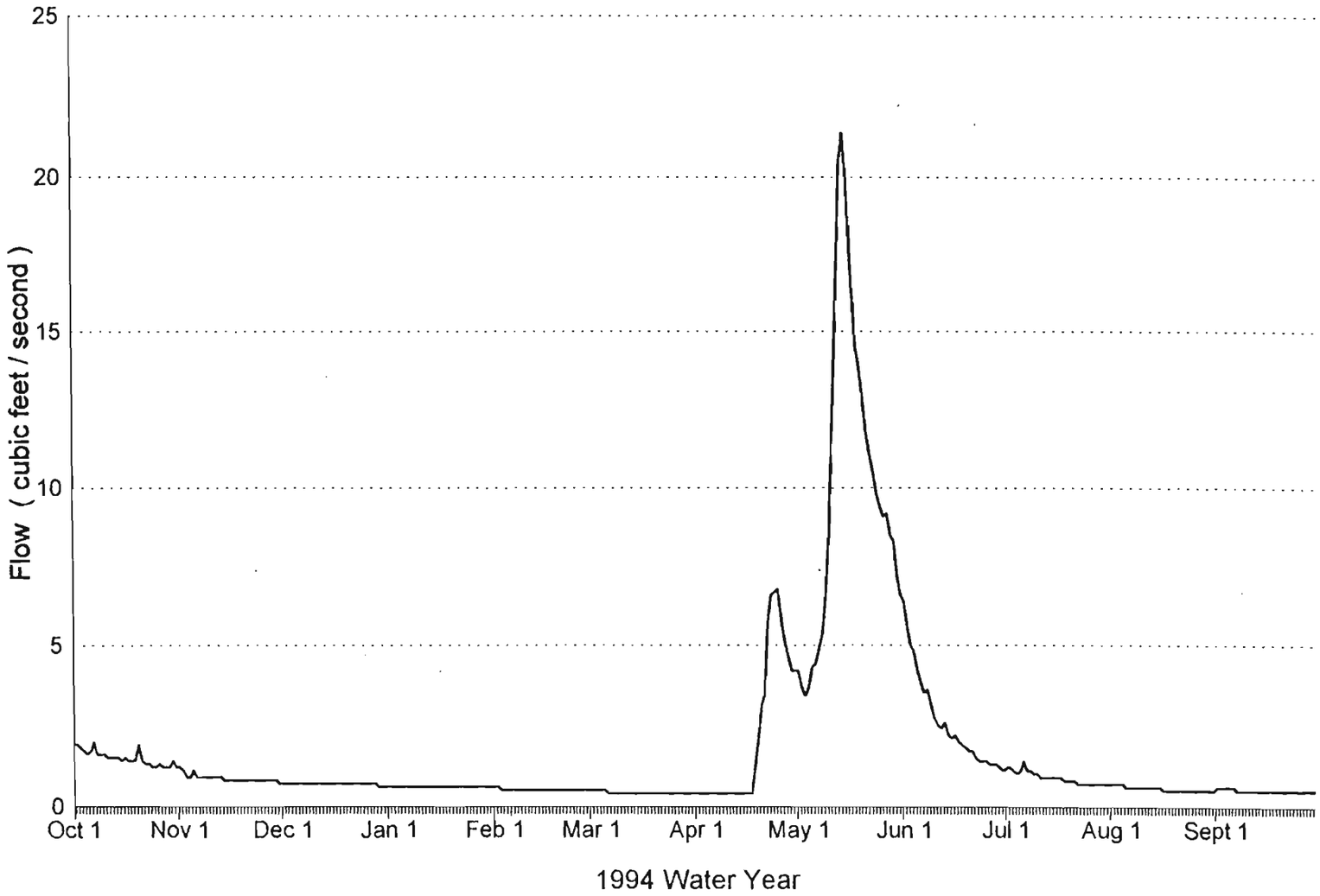
Sun Creek Near Mouth

LC7006



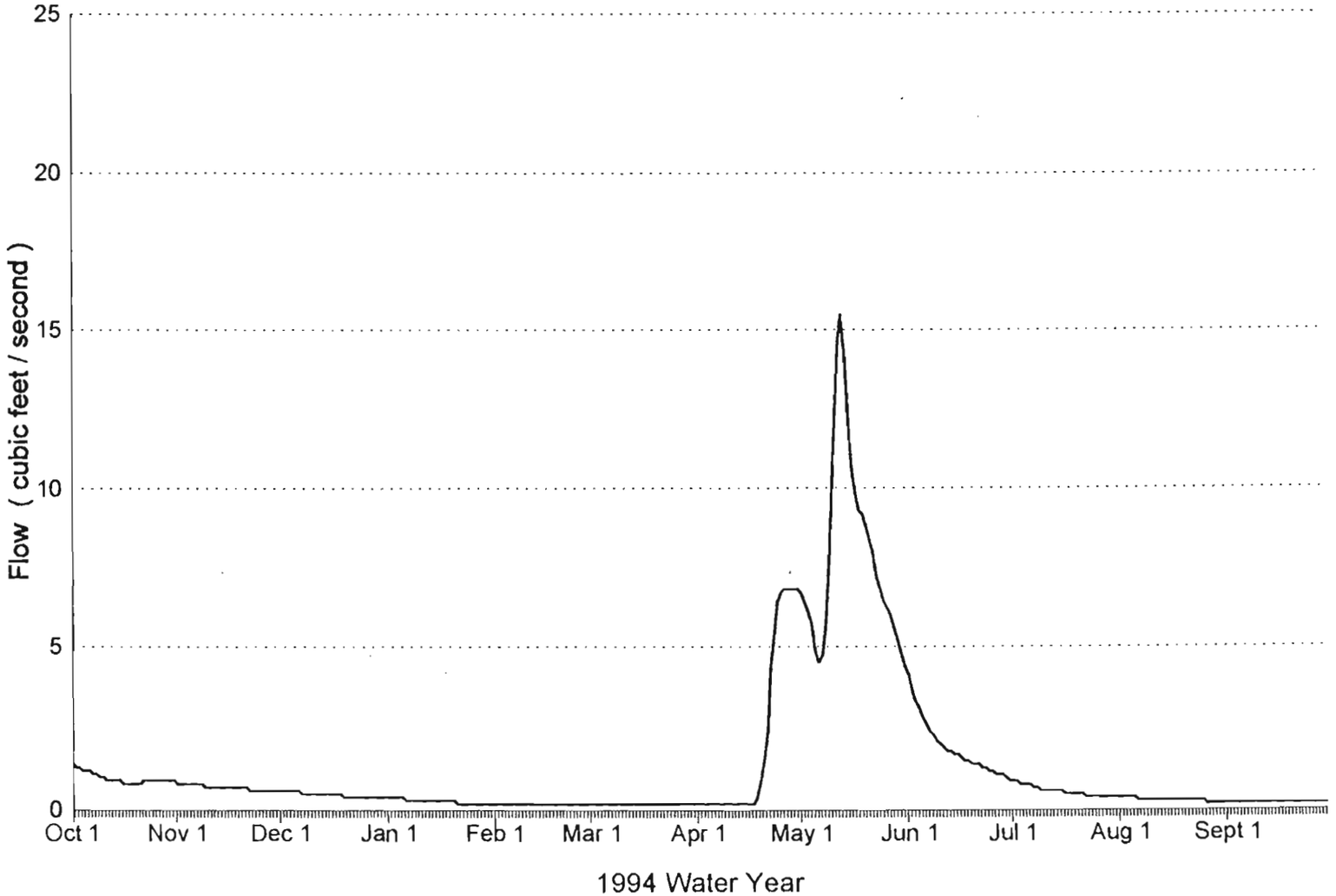
Spring Park Creek Near Mouth

LC7007



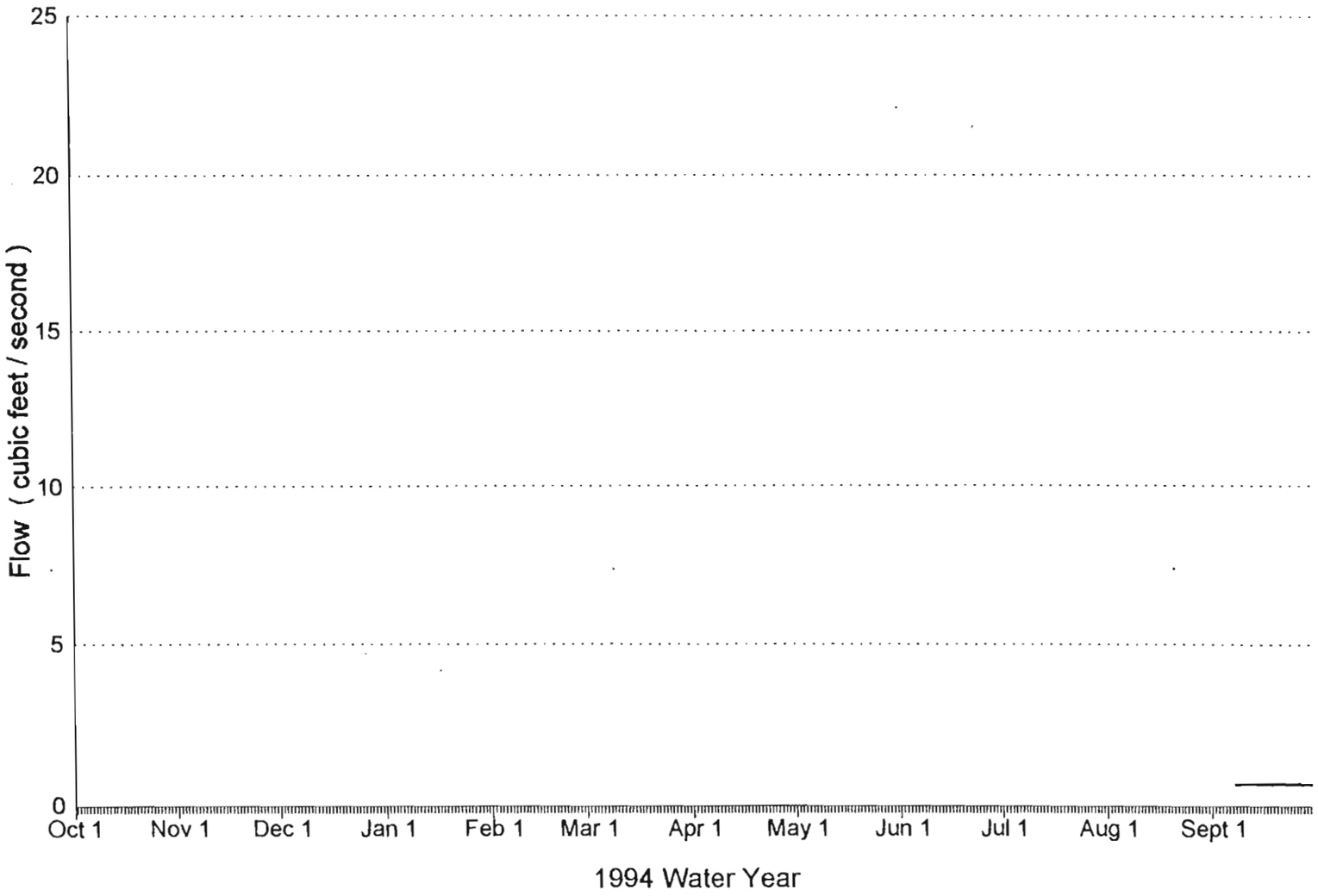
Bubbling Creek Near Mouth

LC7008



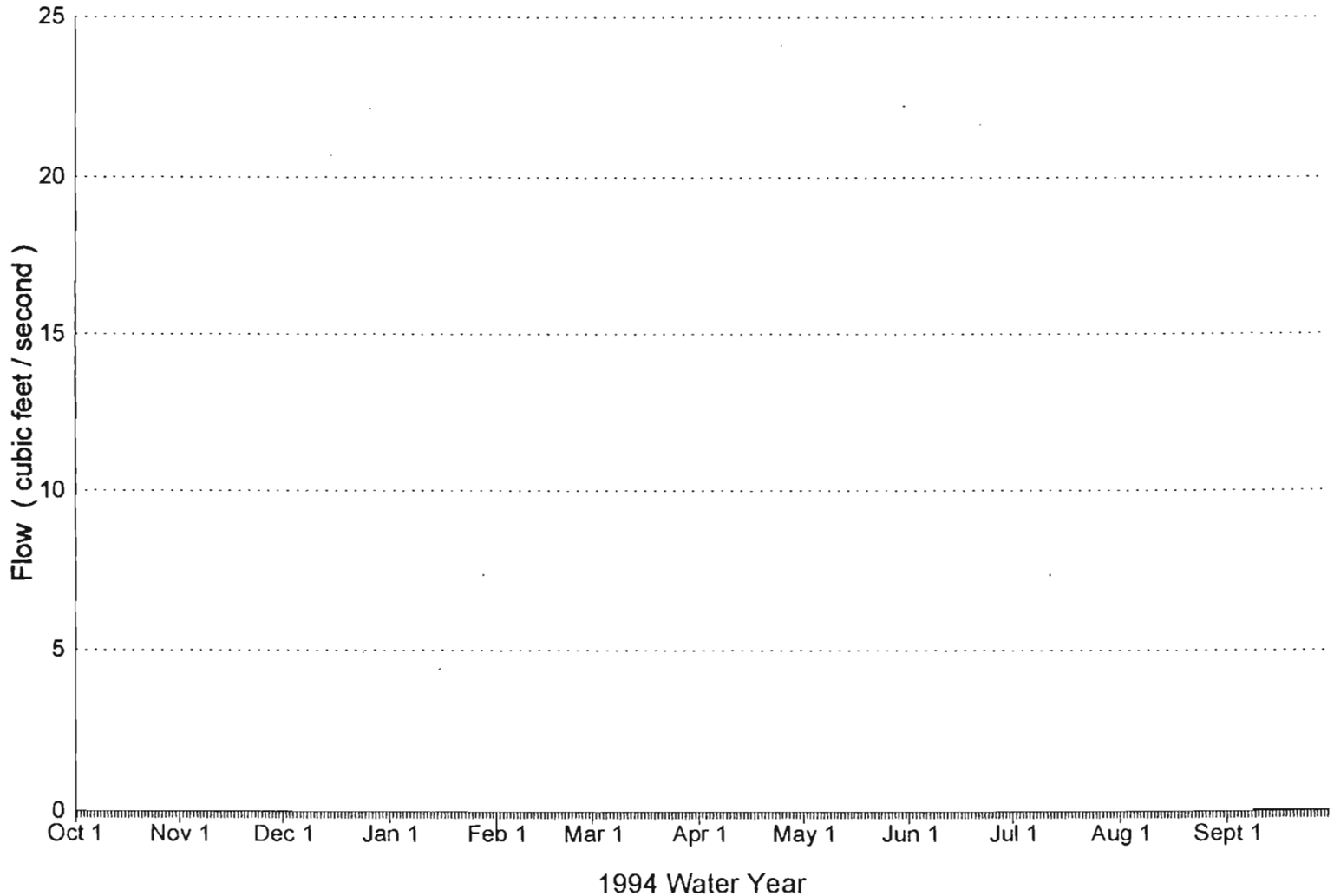
Stringer Creek Near Mouth

LC7009



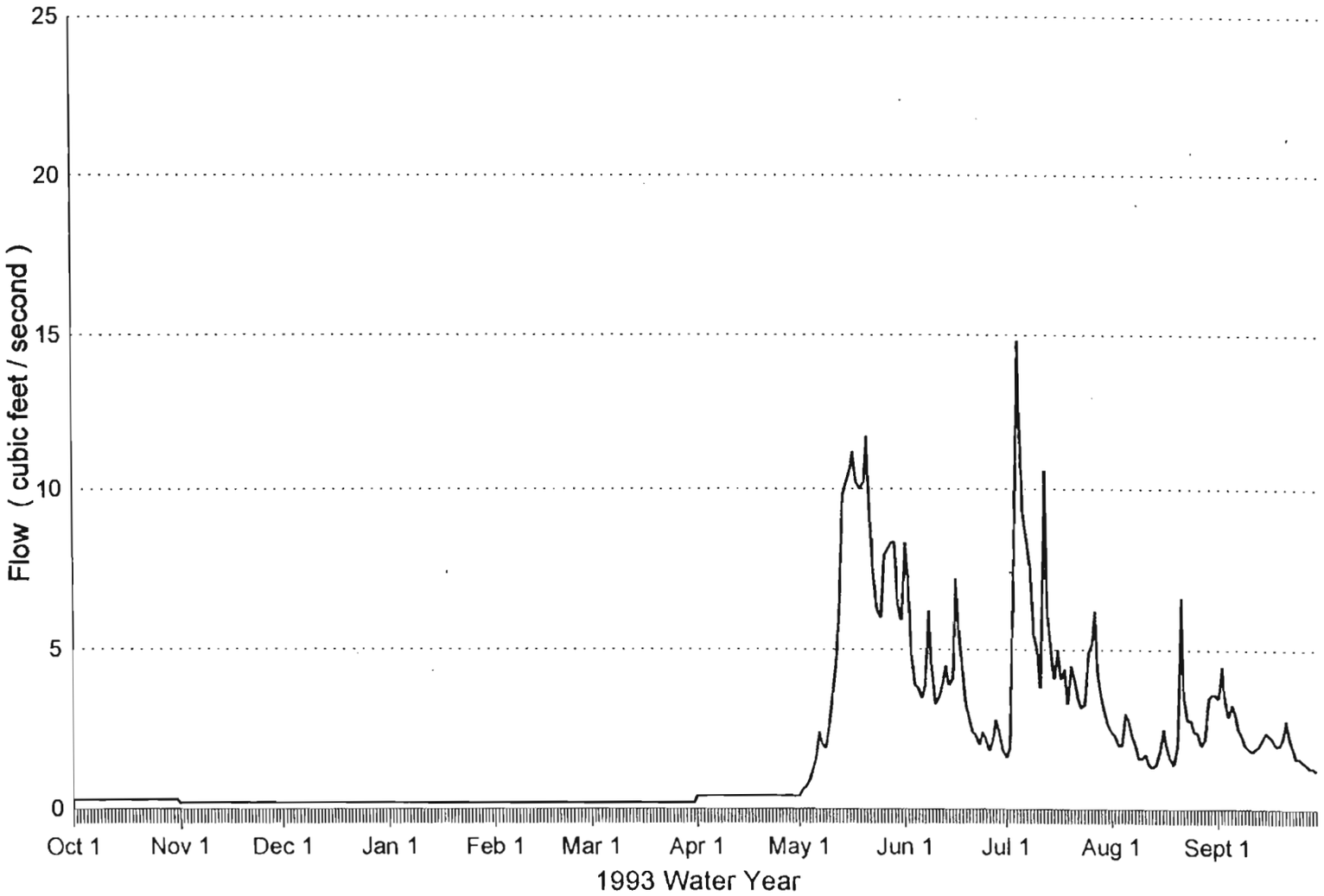
Lonesome Creek Near Williams Park

LC7012



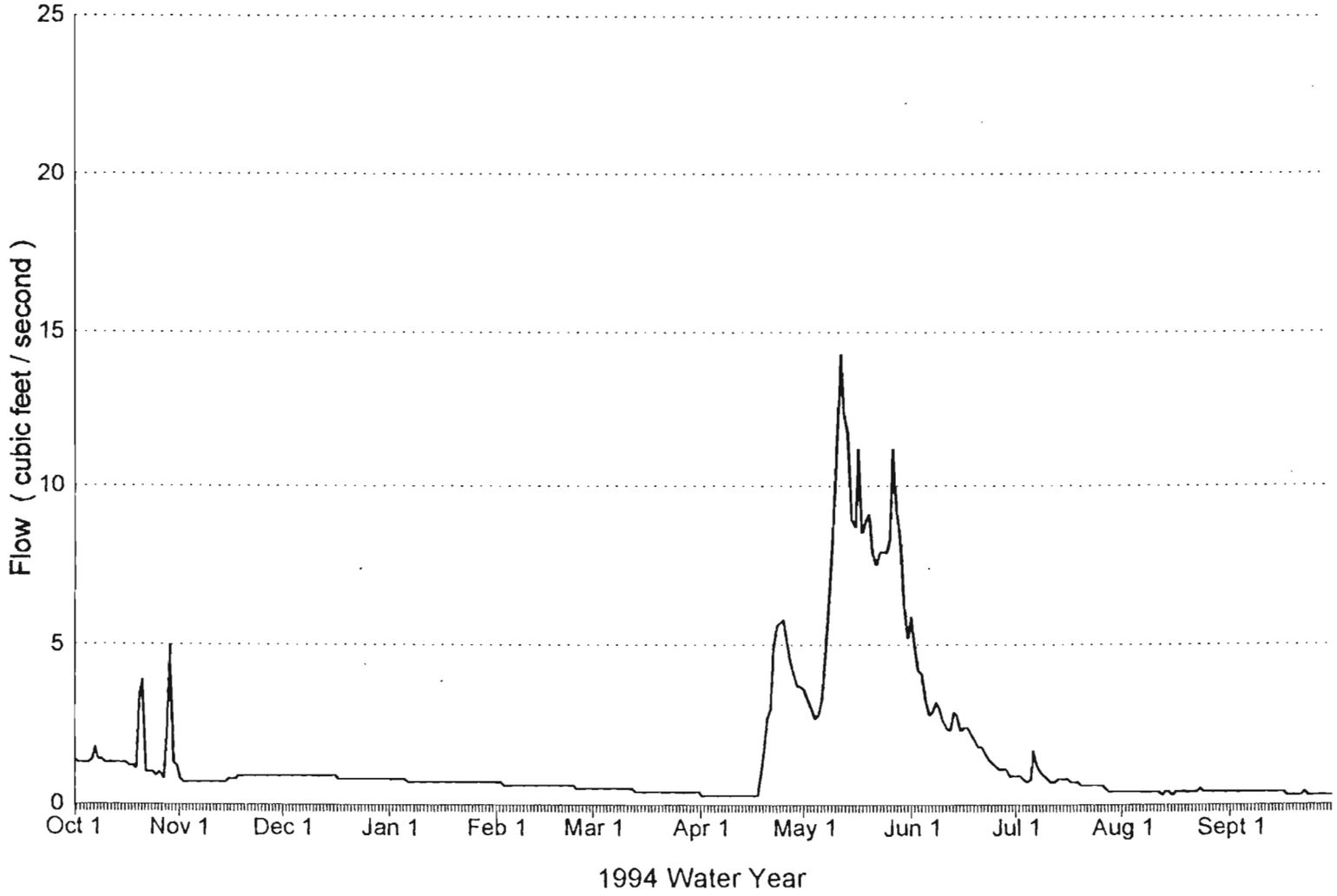
Tenderfoot Creek Above Sun Creek

LC7013



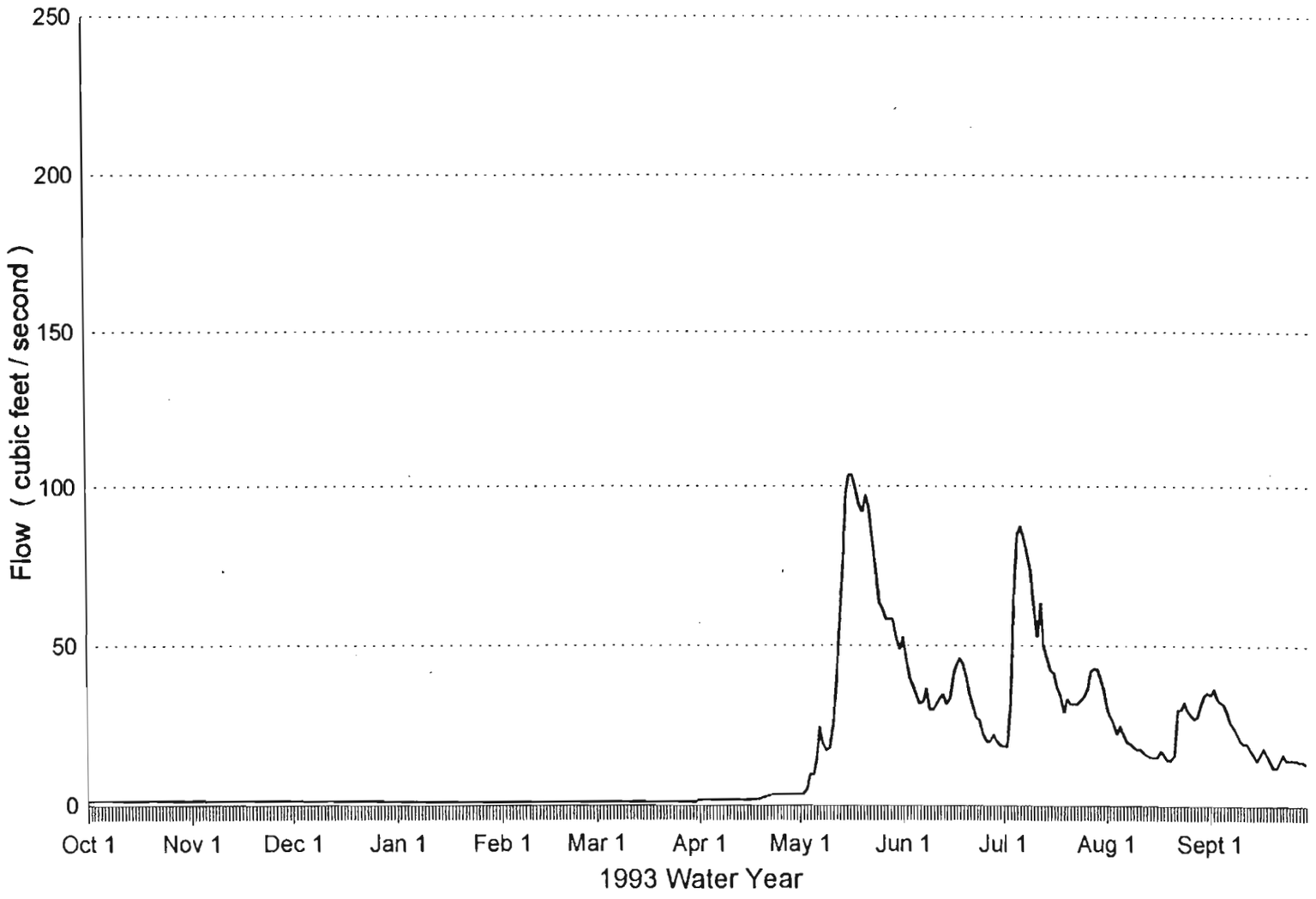
Tenderfoot Creek Above Sun Creek

LC7013



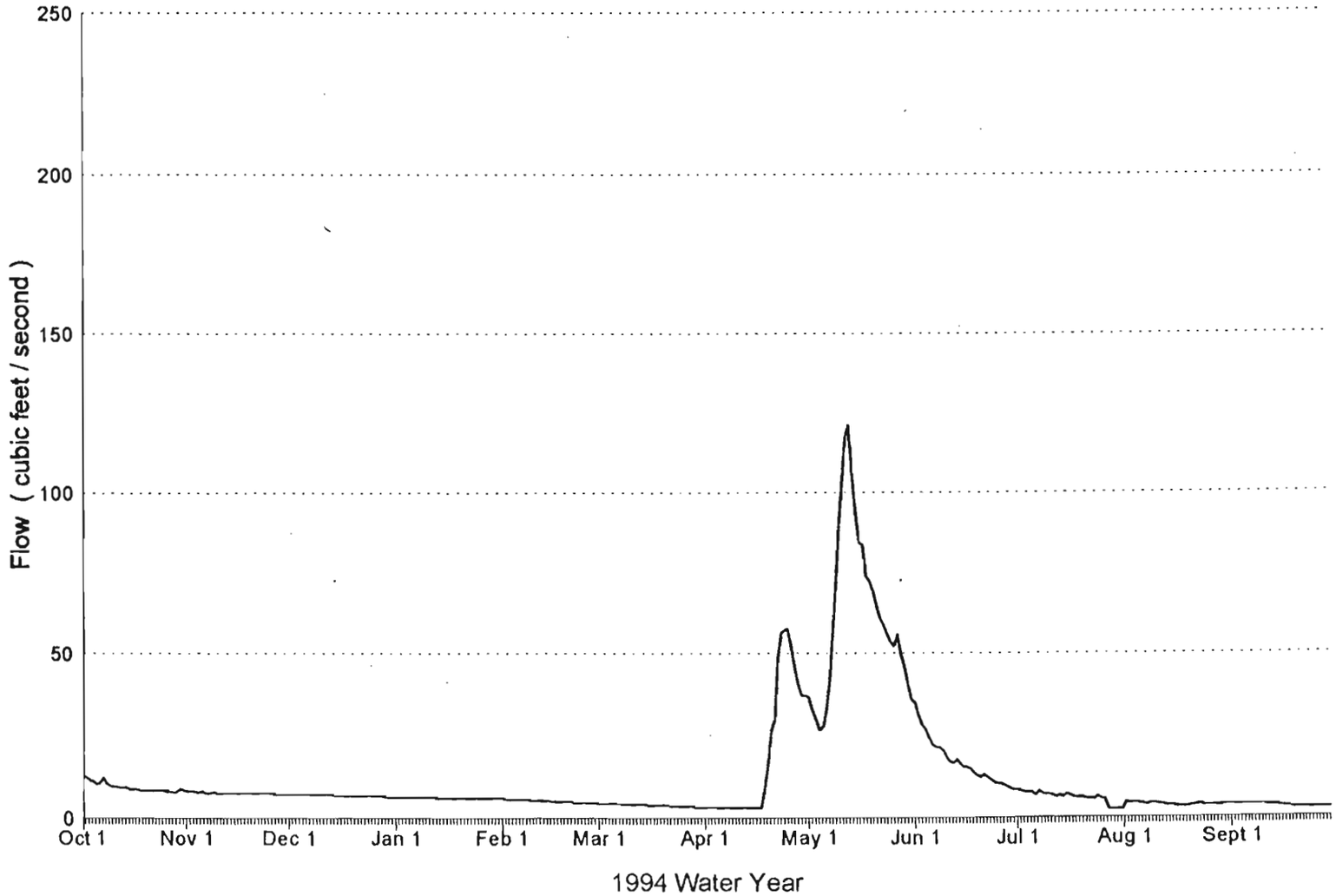
Tenderfoot Creek Below Stringer Creek

LC7014



Tenderfoot Creek Below Stringer Creek

LC7014



Appendix IV. Daily streamflow data for 1993 and 1994.

No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek
LC7015	Stringer Creek Above East Fork

DAILY STREAMFLOW, CFS
SUN CREEK NEAR MOUTH
LC7006
1993 WATER YEAR

DAY	92 OCT	NOV	DEC	93 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	8.9	1.9	2.5	3.0	
2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	6.8	2.0	2.2	3.3	
3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	5.5	4.4	2.1	2.6	
4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.7	5.0	9.7	2.0	2.5	
5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.0	4.7	7.7	2.3	2.8	
6	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.3	4.5	7.2	2.8	2.5	
7	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.9	4.7	6.4	2.4	2.3	
8	0.1	0.1	0.1	0.1	0.1	0.1	0.2	2.0	5.9	6.0	2.1	2.2	
9	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.9	4.2	5.0	1.8	2.0	
10	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.7	3.9	4.7	1.7	1.9	
11	0.1	0.1	0.1	0.1	0.1	0.1	0.2	2.2	3.9	3.9	1.8	1.8	
12	0.1	0.1	0.1	0.1	0.1	0.1	0.2	2.8	4.4	6.4	1.8	2.0	
13	0.1	0.1	0.1	0.1	0.1	0.1	0.2	3.9	4.7	4.5	1.6	2.0	
14	0.1	0.1	0.1	0.1	0.1	0.1	0.2	5.7	4.7	4.2	1.6	2.2	
15	0.1	0.1	0.1	0.1	0.1	0.1	0.2	9.1	4.4	3.9	1.8	2.3	
16	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.7	5.0	3.9	1.9	2.0	
17	0.1	0.1	0.1	0.1	0.1	0.1	0.2	9.1	4.5	3.8	2.9	1.8	
18	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.3	3.9	3.6	2.0	1.8	
19	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.1	3.5	3.0	1.7	1.7	
20	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.3	3.2	4.7	1.6	2.0	
21	0.1	0.1	0.1	0.1	0.1	0.1	0.2	9.7	2.8	5.0	1.9	2.0	
22	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.9	2.6	3.3	5.7	1.8	
23	0.1	0.1	0.1	0.1	0.1	0.1	0.2	7.5	2.5	3.2	2.8	1.7	
24	0.1	0.1	0.1	0.1	0.1	0.1	0.2	6.4	2.8	3.2	2.5	1.7	
25	0.1	0.1	0.1	0.1	0.1	0.1	0.2	6.4	2.5	3.7	2.3	1.6	
26	0.1	0.1	0.1	0.1	0.1	0.1	0.2	7.7	2.2	4.7	2.6	1.5	
27	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.3	2.5	5.3	2.2	1.5	
28	0.1	0.1	0.1	0.1	0.1	0.1	0.2	8.3	2.8	3.8	2.3	1.4	
29	0.1	0.1	0.1	0.1	--	0.1	0.2	8.3	3.2	3.5	4.2	1.4	
30	0.1	0.1	0.1	0.1	--	0.1	0.2	7.3	2.0	3.1	3.6	1.4	
31	0.1	--	0.1	0.1	--	0.1	--	6.8	--	2.8	3.2	--	
TOTAL	3.1	3.0	3.1	3.1	2.8	3.1	6.0	163.2	122.2	138.5	73.9	60.7	CFS
AC.FT.	6.1	6.0	6.1	6.1	5.6	6.1	11.9	323.7	242.4	274.7	146.6	120.4	AC.FT.
MEAN DAILY	0.1	0.1	0.1	0.1	0.1	0.1	0.2	5.3	3.9	4.5	2.4	2.0	CFS

DAILY STREAMFLOW, CFS
SUN CREEK NEAR MOUTH
LC7006
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	1.3	0.8	0.9	0.7	0.6	0.5	0.4	3.2	4.9	1.2	0.5	0.4	
2	1.3	0.8	0.9	0.7	0.6	0.5	0.4	2.8	4.2	1.2	0.6	0.4	
3	1.3	0.8	0.9	0.7	0.6	0.5	0.4	2.5	3.9	1.2	0.6	0.4	
4	1.3	0.8	0.9	0.7	0.6	0.5	0.4	2.1	3.6	1.2	0.6	0.5	
5	1.2	0.8	0.9	0.7	0.6	0.5	0.4	1.9	3.0	1.2	0.6	0.5	
6	1.3	0.8	0.9	0.7	0.6	0.5	0.4	3.3	2.9	1.8	0.5	0.4	
7	1.8	0.8	0.9	0.7	0.6	0.5	0.4	4.2	2.9	1.3	0.5	0.4	
8	1.3	0.8	0.9	0.7	0.6	0.5	0.4	5.4	3.0	1.1	0.5	0.4	
9	1.3	0.8	0.9	0.7	0.6	0.5	0.4	6.2	3.0	1.1	0.5	0.4	
10	1.3	0.8	0.9	0.6	0.6	0.5	0.4	7.5	2.6	0.9	0.4	0.4	
11	1.3	0.8	0.9	0.6	0.6	0.5	0.4	9.1	2.5	0.8	0.4	0.4	
12	1.3	0.8	0.9	0.6	0.6	0.5	0.4	11.2	2.4	0.8	0.4	0.4	
13	1.3	0.8	0.8	0.6	0.6	0.5	0.4	10.4	2.8	0.9	0.4	0.4	
14	1.3	0.8	0.8	0.6	0.6	0.5	0.4	9.1	2.5	0.7	0.4	0.4	
15	1.3	0.9	0.8	0.6	0.6	0.5	0.4	8.7	2.2	0.8	0.4	0.4	
16	1.3	0.9	0.8	0.6	0.6	0.5	0.4	8.7	2.3	0.8	0.4	0.4	
17	1.2	0.9	0.8	0.6	0.6	0.4	0.4	9.7	2.0	0.6	0.3	0.4	
18	1.1	0.9	0.8	0.6	0.6	0.4	1.1	7.9	1.8	0.6	0.4	0.3	
19	1.1	0.9	0.8	0.6	0.6	0.4	2.1	8.7	1.6	0.6	0.3	0.3	
20	1.0	0.9	0.8	0.6	0.5	0.4	3.3	8.3	1.5	0.6	0.3	0.3	
21	1.0	0.9	0.8	0.6	0.5	0.4	3.5	7.5	1.7	0.6	0.3	0.3	
22	1.1	0.9	0.8	0.6	0.5	0.4	5.6	7.3	1.5	0.6	0.4	0.3	
23	1.1	0.9	0.8	0.6	0.5	0.4	6.3	7.5	1.4	0.5	0.4	0.3	
24	1.0	0.9	0.8	0.6	0.5	0.4	6.2	7.2	1.3	0.7	0.4	0.3	
25	1.0	0.9	0.8	0.6	0.5	0.4	6.1	7.0	1.2	0.6	0.4	0.3	
26	0.9	0.9	0.7	0.6	0.5	0.4	5.4	6.6	1.2	0.6	0.4	0.3	
27	0.9	0.9	0.7	0.6	0.5	0.4	4.5	7.3	1.2	0.5	0.4	0.4	
28	0.8	0.9	0.7	0.6	0.5	0.4	4.0	6.2	1.3	0.4	0.4	0.3	
29	1.3	0.9	0.7	0.6	--	0.4	3.5	6.0	1.2	0.5	0.4	0.3	
30	1.9	0.9	0.7	0.6	--	0.4	3.4	5.0	1.2	0.4	0.4	0.3	
31	1.5	--	0.7	0.6	--	0.4	--	4.4	--	0.5	0.4	--	
TOTA	38.1	25.6	25.4	19.5	15.9	14.0	61.8	202.9	68.8	25.3	13.3	11.0	CFS
AC.FT	75.6	50.8	50.4	38.7	31.5	27.8	122.6	402.4	136.5	50.2	26.4	21.8	AC.FT.
MEAN DAILY	1.2	0.8	0.8	0.6	0.5	0.5	2.0	6.5	2.2	0.8	0.4	0.4	CFS

DAILY STREAMFLOW, CFS
SPRING PARK CREEK NEAR MOUTH
LC7007
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	1.9	1.2	0.7	0.6	0.6	0.5	0.4	4.2	6.4	1.2	0.7	0.6	
2	1.9	1.1	0.7	0.6	0.6	0.5	0.4	3.7	5.6	1.2	0.7	0.6	
3	1.8	0.9	0.7	0.6	0.5	0.5	0.4	3.4	5.0	1.1	0.7	0.6	
4	1.7	0.9	0.7	0.6	0.5	0.5	0.4	3.7	4.8	1.0	0.7	0.6	
5	1.6	1.1	0.7	0.6	0.5	0.5	0.4	4.3	4.2	1.1	0.6	0.6	
6	1.7	0.9	0.7	0.6	0.5	0.4	0.4	4.4	3.8	1.4	0.6	0.6	
7	2.0	0.9	0.7	0.6	0.5	0.4	0.4	4.9	3.5	1.1	0.6	0.5	
8	1.6	0.9	0.7	0.6	0.5	0.4	0.4	5.4	3.6	1.1	0.6	0.5	
9	1.6	0.9	0.7	0.6	0.5	0.4	0.4	6.5	3.1	1.0	0.6	0.5	
10	1.6	0.9	0.7	0.6	0.5	0.4	0.4	8.6	2.7	1.0	0.6	0.5	
11	1.5	0.9	0.7	0.6	0.5	0.4	0.4	12.3	2.5	0.9	0.6	0.5	
12	1.5	0.9	0.7	0.6	0.5	0.4	0.4	16.3	2.4	0.9	0.6	0.5	
13	1.5	0.9	0.7	0.6	0.5	0.4	0.4	20.4	2.6	0.9	0.6	0.5	
14	1.5	0.8	0.7	0.6	0.5	0.4	0.4	21.4	2.2	0.9	0.6	0.5	
15	1.4	0.8	0.7	0.6	0.5	0.4	0.4	20.2	2.1	0.9	0.6	0.5	
16	1.5	0.8	0.7	0.6	0.5	0.4	0.4	18.0	2.2	0.9	0.5	0.5	
17	1.4	0.8	0.7	0.6	0.5	0.4	0.4	16.3	2.0	0.9	0.5	0.5	
18	1.4	0.8	0.7	0.6	0.5	0.4	1.1	14.5	1.9	0.8	0.5	0.5	
19	1.4	0.8	0.7	0.6	0.5	0.4	2.0	13.8	1.8	0.8	0.5	0.5	
20	1.9	0.8	0.7	0.6	0.5	0.4	3.1	12.8	1.7	0.8	0.5	0.5	
21	1.4	0.8	0.7	0.6	0.5	0.4	3.5	11.8	1.7	0.8	0.5	0.5	
22	1.3	0.8	0.7	0.6	0.5	0.4	5.7	11.1	1.5	0.7	0.5	0.5	
23	1.3	0.8	0.7	0.6	0.5	0.4	6.6	10.5	1.4	0.7	0.5	0.5	
24	1.2	0.8	0.7	0.6	0.5	0.4	6.7	9.8	1.4	0.7	0.5	0.5	
25	1.2	0.8	0.7	0.6	0.5	0.4	6.8	9.4	1.4	0.7	0.5	0.5	
26	1.3	0.8	0.7	0.6	0.5	0.4	6.0	9.1	1.3	0.7	0.5	0.5	
27	1.2	0.8	0.7	0.6	0.5	0.4	5.2	9.2	1.3	0.7	0.5	0.5	
28	1.2	0.8	0.7	0.6	0.5	0.4	4.7	8.5	1.3	0.7	0.5	0.5	
29	1.2	0.8	0.6	0.6	–	0.4	4.2	8.3	1.2	0.7	0.5	0.5	
30	1.4	0.7	0.6	0.6	–	0.4	4.2	7.3	1.1	0.7	0.5	0.5	
31	1.2	–	0.6	0.6	–	0.4	–	6.6	–	0.7	0.5	–	
TOTA	46.3	25.9	21.4	18.6	14.2	12.9	66.6	316.7	77.7	27.7	17.4	15.6	CFS
AC.FT	91.8	51.4	42.4	36.9	28.2	25.6	132.1	628.2	154.1	54.9	34.5	30.9	AC.FT.
MEAN DAILY	1.5	0.8	0.7	0.6	0.5	0.4	2.1	10.2	2.5	0.9	0.6	0.5	CFS

DAILY STREAMFLOW, CFS
BUBBLING CREEK NEAR MOUTH
LC7008
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	1.4	0.8	0.6	0.4	0.2	0.2	0.2	6.7	4.1	0.9	0.4	0.2	
2	1.3	0.8	0.6	0.4	0.2	0.2	0.2	6.4	3.6	0.9	0.4	0.2	
3	1.3	0.8	0.6	0.4	0.2	0.2	0.2	6.1	3.3	0.8	0.4	0.2	
4	1.2	0.8	0.6	0.4	0.2	0.2	0.2	5.7	3.1	0.8	0.4	0.2	
5	1.2	0.8	0.6	0.4	0.2	0.2	0.2	4.9	2.8	0.8	0.4	0.2	
6	1.2	0.8	0.6	0.3	0.2	0.2	0.2	4.5	2.6	0.8	0.3	0.2	
7	1.1	0.8	0.5	0.3	0.2	0.2	0.2	4.7	2.4	0.7	0.3	0.2	
8	1.1	0.8	0.5	0.3	0.2	0.2	0.2	5.7	2.3	0.7	0.3	0.2	
9	1.0	0.7	0.5	0.3	0.2	0.2	0.2	7.4	2.1	0.6	0.3	0.2	
10	1.0	0.7	0.5	0.3	0.2	0.2	0.2	9.8	2.0	0.6	0.3	0.2	
11	0.9	0.7	0.5	0.3	0.2	0.2	0.2	12.5	1.9	0.6	0.3	0.2	
12	0.9	0.7	0.5	0.3	0.2	0.2	0.2	14.7	1.8	0.6	0.3	0.2	
13	0.9	0.7	0.5	0.3	0.2	0.2	0.2	15.5	1.8	0.6	0.3	0.2	
14	0.9	0.7	0.5	0.3	0.2	0.2	0.2	14.3	1.7	0.6	0.3	0.2	
15	0.9	0.7	0.5	0.3	0.2	0.2	0.2	12.2	1.7	0.6	0.3	0.2	
16	0.8	0.7	0.5	0.3	0.2	0.2	0.2	10.6	1.6	0.5	0.3	0.2	
17	0.8	0.7	0.5	0.3	0.2	0.2	0.2	9.9	1.5	0.5	0.3	0.2	
18	0.8	0.7	0.5	0.3	0.2	0.2	0.4	9.3	1.5	0.5	0.3	0.2	
19	0.8	0.7	0.4	0.3	0.2	0.2	0.9	9.2	1.4	0.5	0.3	0.2	
20	0.8	0.7	0.4	0.3	0.2	0.2	1.5	8.8	1.4	0.5	0.3	0.2	
21	0.8	0.7	0.4	0.2	0.2	0.2	2.4	8.4	1.4	0.5	0.3	0.2	
22	0.9	0.6	0.4	0.2	0.2	0.2	4.4	8.0	1.3	0.4	0.3	0.2	
23	0.9	0.6	0.4	0.2	0.2	0.2	5.3	7.2	1.3	0.4	0.3	0.2	
24	0.9	0.6	0.4	0.2	0.2	0.2	6.4	6.8	1.2	0.4	0.3	0.2	
25	0.9	0.6	0.4	0.2	0.2	0.2	6.7	6.4	1.2	0.4	0.3	0.2	
26	0.9	0.6	0.4	0.2	0.2	0.2	6.8	6.2	1.1	0.4	0.2	0.2	
27	0.9	0.6	0.4	0.2	0.2	0.2	6.8	6.0	1.1	0.4	0.2	0.2	
28	0.9	0.6	0.4	0.2	0.2	0.2	6.8	5.6	1.1	0.4	0.2	0.2	
29	0.9	0.6	0.4	0.2	–	0.2	6.8	5.2	1.0	0.4	0.2	0.2	
30	0.9	0.6	0.4	0.2	–	0.2	6.8	4.8	0.9	0.4	0.2	0.2	
31	0.9	–	0.4	0.2	–	0.2	–	4.4	–	0.4	0.2	–	
TOTA	30.1	20.9	14.8	8.7	5.6	6.2	65.4	247.9	56.2	17.6	9.2	6.0	CFS
AC.FT	59.7	41.5	29.4	17.3	11.1	12.3	129.7	491.7	111.5	34.9	18.2	11.9	AC.FT.
MEAN DAILY	1.0	0.7	0.5	0.3	0.2	0.2	2.1	8.0	1.8	0.6	0.3	0.2	CFS

DAILY STREAMFLOW, CFS
STRINGER CREEK NEAR MOUTH
LC7009
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	--	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	0.7
8	--	--	--	--	--	--	--	--	--	--	--	0.7
9	--	--	--	--	--	--	--	--	--	--	--	0.7
10	--	--	--	--	--	--	--	--	--	--	--	0.7
11	--	--	--	--	--	--	--	--	--	--	--	0.7
12	--	--	--	--	--	--	--	--	--	--	--	0.7
13	--	--	--	--	--	--	--	--	--	--	--	0.7
14	--	--	--	--	--	--	--	--	--	--	--	0.7
15	--	--	--	--	--	--	--	--	--	--	--	0.7
16	--	--	--	--	--	--	--	--	--	--	--	0.7
17	--	--	--	--	--	--	--	--	--	--	--	0.7
18	--	--	--	--	--	--	--	--	--	--	--	0.7
19	--	--	--	--	--	--	--	--	--	--	--	0.7
20	--	--	--	--	--	--	--	--	--	--	--	0.7
21	--	--	--	--	--	--	--	--	--	--	--	0.7
22	--	--	--	--	--	--	--	--	--	--	--	0.7
23	--	--	--	--	--	--	--	--	--	--	--	0.7
24	--	--	--	--	--	--	--	--	--	--	--	0.7
25	--	--	--	--	--	--	--	--	--	--	--	0.7
26	--	--	--	--	--	--	--	--	--	--	--	0.7
27	--	--	--	--	--	--	--	--	--	--	--	0.7
28	--	--	--	--	--	--	--	--	--	--	--	0.7
29	--	--	--	--	--	--	--	--	--	--	--	0.7
30	--	--	--	--	--	--	--	--	--	--	--	0.7
31	--	--	--	--	--	--	--	--	--	--	--	--
TOTA	--	--	--	--	--	--	--	--	--	--	--	--
AC.FT	--	--	--	--	--	--	--	--	--	--	--	--
MEAN DAILY	--	--	--	--	--	--	--	--	--	--	--	--

DAILY STREAMFLOW, CFS
LONESOME CREEK NEAR WILLIAMS PARK
LC7012
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	–	–	–	–	–	–	–	–	–	–	–	–
2	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–
4	–	–	–	–	–	–	–	–	–	–	–	–
5	–	–	–	–	–	–	–	–	–	–	–	–
6	–	–	–	–	–	–	–	–	–	–	–	–
7	–	–	–	–	–	–	–	–	–	–	–	–
8	–	–	–	–	–	–	–	–	–	–	–	0.03
9	–	–	–	–	–	–	–	–	–	–	–	0.03
10	–	–	–	–	–	–	–	–	–	–	–	0.03
11	–	–	–	–	–	–	–	–	–	–	–	0.03
12	–	–	–	–	–	–	–	–	–	–	–	0.03
13	–	–	–	–	–	–	–	–	–	–	–	0.03
14	–	–	–	–	–	–	–	–	–	–	–	0.03
15	–	–	–	–	–	–	–	–	–	–	–	0.03
16	–	–	–	–	–	–	–	–	–	–	–	0.03
17	–	–	–	–	–	–	–	–	–	–	–	0.03
18	–	–	–	–	–	–	–	–	–	–	–	0.03
19	–	–	–	–	–	–	–	–	–	–	–	0.03
20	–	–	–	–	–	–	–	–	–	–	–	0.03
21	–	–	–	–	–	–	–	–	–	–	–	0.03
22	–	–	–	–	–	–	–	–	–	–	–	0.03
23	–	–	–	–	–	–	–	–	–	–	–	0.03
24	–	–	–	–	–	–	–	–	–	–	–	0.03
25	–	–	–	–	–	–	–	–	–	–	–	0.03
26	–	–	–	–	–	–	–	–	–	–	–	0.03
27	–	–	–	–	–	–	–	–	–	–	–	0.03
28	–	–	–	–	–	–	–	–	–	–	–	0.03
29	–	–	–	–	–	–	–	–	–	–	–	0.03
30	–	–	–	–	–	–	–	–	–	–	–	0.03
31	–	–	–	–	–	–	–	–	–	–	–	–
TOTA	–	–	–	–	–	–	–	–	–	–	–	–
AC.FT	–	–	–	–	–	–	–	–	–	–	–	–
MEAN DAILY	–	–	–	–	–	–	–	–	–	–	–	–

DAILY STREAMFLOW, CFS
TENDERFOOT CREEK ABOVE SUN CREEK
LC7013
1993 WATER YEAR

DAY	92 OCT	NOV	DEC	93 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.4	8.3	1.6	2.4	3.5	
2	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.6	7.0	1.9	2.3	4.5	
3	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.7	4.9	7.3	2.0	3.5	
4	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.9	3.9	14.8	2.0	2.9	
5	0.3	0.2	0.2	0.2	0.2	0.2	0.4	1.2	3.8	11.2	3.0	3.3	
6	0.3	0.2	0.2	0.2	0.2	0.2	0.4	1.6	3.5	9.1	2.8	3.0	
7	0.3	0.2	0.2	0.2	0.2	0.2	0.4	2.4	3.9	8.3	2.3	2.5	
8	0.3	0.2	0.2	0.2	0.2	0.2	0.4	2.0	6.2	7.5	2.0	2.3	
9	0.3	0.2	0.2	0.2	0.2	0.2	0.4	1.9	4.4	5.5	1.8	2.0	
10	0.3	0.2	0.2	0.2	0.2	0.2	0.4	2.6	3.3	5.0	1.6	1.9	
11	0.3	0.2	0.2	0.2	0.2	0.2	0.4	3.6	3.5	3.8	1.7	1.8	
12	0.3	0.2	0.2	0.2	0.2	0.2	0.4	4.6	3.9	10.6	1.4	1.9	
13	0.3	0.2	0.2	0.2	0.2	0.2	0.4	6.2	4.5	6.2	1.3	2.0	
14	0.3	0.2	0.2	0.2	0.2	0.2	0.4	9.8	3.9	5.0	1.4	2.2	
15	0.3	0.2	0.2	0.2	0.2	0.2	0.4	10.2	4.1	4.1	1.8	2.4	
16	0.3	0.2	0.2	0.2	0.2	0.2	0.4	10.6	7.2	5.0	2.5	2.3	
17	0.3	0.2	0.2	0.2	0.2	0.2	0.4	11.2	5.5	4.1	2.0	2.2	
18	0.3	0.2	0.2	0.2	0.2	0.2	0.4	10.2	4.4	4.4	1.8	2.0	
19	0.3	0.2	0.2	0.2	0.2	0.2	0.4	10.0	3.3	3.3	1.4	2.0	
20	0.3	0.2	0.2	0.2	0.2	0.2	0.4	10.2	2.9	4.5	2.0	2.2	
21	0.3	0.2	0.2	0.2	0.2	0.2	0.4	11.7	2.4	4.1	6.6	2.8	
22	0.3	0.2	0.2	0.2	0.2	0.2	0.4	9.1	2.3	3.5	3.5	2.2	
23	0.3	0.2	0.2	0.2	0.2	0.2	0.4	7.2	2.0	3.2	2.8	1.9	
24	0.3	0.2	0.2	0.2	0.2	0.2	0.4	6.2	2.4	3.3	2.8	1.6	
25	0.3	0.2	0.2	0.2	0.2	0.2	0.4	6.0	2.2	4.9	2.4	1.6	
26	0.3	0.2	0.2	0.2	0.2	0.2	0.4	7.9	1.8	5.2	2.4	1.5	
27	0.3	0.2	0.2	0.2	0.2	0.2	0.4	8.1	2.2	6.2	2.0	1.4	
28	0.3	0.2	0.2	0.2	0.2	0.2	0.4	8.3	2.8	4.2	2.2	1.3	
29	0.3	0.2	0.2	0.2	--	0.2	0.4	8.3	2.4	3.5	3.5	1.3	
30	0.3	0.2	0.2	0.2	--	0.2	0.4	6.4	1.8	3.0	3.6	1.2	
31	0.3	--	0.2	0.2	--	0.2	--	5.9	--	2.6	3.6	--	
TOTAL	9.3	6.0	6.2	6.2	5.6	6.2	12.0	186.0	114.7	166.9	74.5	67.2	CFS
AC.FT.	18.4	11.9	12.3	12.3	11.1	12.3	23.8	368.9	227.5	331.0	147.8	133.3	AC.FT.
MEAN DAILY	0.3	0.2	0.2	0.2	0.2	0.2	0.4	6.0	3.7	5.4	2.4	2.2	CFS

DAILY STREAMFLOW, CFS
TENDERFOOT CREEK ABOVE SUN CREEK
LC7013
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	1.4	0.8	0.9	0.8	0.7	0.5	0.3	3.6	5.9	0.9	0.4	0.4	
2	1.3	0.7	0.9	0.8	0.7	0.5	0.3	3.3	4.9	0.9	0.4	0.4	
3	1.3	0.7	0.9	0.8	0.6	0.5	0.3	3.0	4.2	0.8	0.4	0.4	
4	1.3	0.7	0.9	0.8	0.6	0.5	0.3	2.7	4.1	0.7	0.4	0.4	
5	1.3	0.7	0.9	0.8	0.6	0.5	0.3	2.8	3.3	0.8	0.4	0.4	
6	1.4	0.7	0.9	0.7	0.6	0.5	0.3	3.3	2.8	1.7	0.4	0.4	
7	1.8	0.7	0.9	0.7	0.6	0.5	0.3	4.7	2.9	1.2	0.4	0.4	
8	1.4	0.7	0.9	0.7	0.6	0.5	0.3	6.2	3.2	1.0	0.4	0.4	
9	1.4	0.7	0.9	0.7	0.6	0.5	0.3	7.7	3.0	0.9	0.4	0.4	
10	1.3	0.7	0.9	0.7	0.6	0.5	0.3	9.7	2.6	0.8	0.4	0.4	
11	1.3	0.7	0.9	0.7	0.6	0.5	0.3	12.2	2.4	0.7	0.4	0.4	
12	1.3	0.7	0.9	0.7	0.6	0.5	0.3	14.3	2.3	0.7	0.3	0.4	
13	1.3	0.7	0.9	0.7	0.6	0.4	0.3	12.4	2.9	0.8	0.4	0.4	
14	1.3	0.7	0.9	0.7	0.6	0.4	0.3	11.7	2.8	0.8	0.4	0.4	
15	1.3	0.8	0.9	0.7	0.6	0.4	0.3	8.9	2.3	0.8	0.3	0.4	
16	1.3	0.8	0.9	0.7	0.6	0.4	0.3	8.7	2.4	0.8	0.4	0.4	
17	1.2	0.8	0.8	0.7	0.6	0.4	0.3	11.2	2.4	0.7	0.4	0.3	
18	1.2	0.9	0.8	0.7	0.6	0.4	0.9	8.5	2.2	0.7	0.4	0.3	
19	1.1	0.9	0.8	0.7	0.6	0.4	1.7	8.9	2.0	0.7	0.4	0.3	
20	3.5	0.9	0.8	0.7	0.6	0.4	2.7	9.1	1.8	0.6	0.4	0.3	
21	3.9	0.9	0.8	0.7	0.6	0.4	3.0	7.9	1.8	0.6	0.4	0.3	
22	1.0	0.9	0.8	0.7	0.6	0.4	4.9	7.5	1.6	0.6	0.4	0.4	
23	1.0	0.9	0.8	0.7	0.6	0.4	5.6	7.9	1.4	0.6	0.5	0.3	
24	1.0	0.9	0.8	0.7	0.5	0.4	5.7	7.9	1.3	0.6	0.4	0.3	
25	0.9	0.9	0.8	0.7	0.5	0.4	5.8	7.9	1.2	0.6	0.4	0.3	
26	1.0	0.9	0.8	0.7	0.5	0.4	5.2	8.3	1.1	0.6	0.4	0.3	
27	0.8	0.9	0.8	0.7	0.5	0.4	4.5	11.2	1.1	0.5	0.4	0.3	
28	2.2	0.9	0.8	0.7	0.5	0.4	4.1	9.3	1.1	0.4	0.4	0.3	
29	5.0	0.9	0.8	0.7	--	0.4	3.7	8.3	0.9	0.4	0.4	0.3	
30	1.3	0.9	0.8	0.7	--	0.4	3.7	6.4	0.9	0.4	0.4	0.3	
31	1.2	--	0.8	0.7	--	0.4	--	5.2	--	0.4	0.4	--	
TOTA	48.0	24.0	26.4	22.2	16.5	13.6	56.6	240.7	72.8	22.7	12.3	10.7	CFS
AC.FT	95.2	47.6	52.4	44.0	32.7	27.0	112.3	477.4	144.4	45.0	24.4	21.2	AC.FT.
MEAN DAILY	1.5	0.8	0.9	0.7	0.5	0.4	1.8	7.8	2.3	0.7	0.4	0.3	CFS

DAILY STREAMFLOW, CFS
TENDERFOOT CREEK BELOW STRINGER CREEK
LC7014
1993 WATER YEAR

DAY	92 OCT	NOV	DEC	93 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	1.5	1.4	1.3	1.2	1.1	1.2	1.8	3.6	3.6	18.3	30.4	34.5	
2	1.5	1.4	1.3	1.2	1.1	1.2	1.8	3.8	3.8	18.3	27.6	36.3	
3	1.5	1.4	1.3	1.2	1.1	1.2	1.8	5.0	5.0	32.1	25.4	33.3	
4	1.5	1.4	1.3	1.2	1.1	1.2	1.8	9.8	9.8	63.6	22.2	32.1	
5	1.5	1.4	1.3	1.2	1.1	1.2	1.8	9.5	9.5	85.2	24.8	31.5	
6	1.5	1.4	1.3	1.2	1.1	1.2	1.8	14.3	14.3	87.7	22.2	28.7	
7	1.5	1.4	1.3	1.2	1.1	1.2	1.8	24.3	24.3	84.4	19.8	25.9	
8	1.5	1.4	1.3	1.2	1.1	1.2	1.8	18.8	18.8	79.4	19.3	24.3	
9	1.5	1.4	1.3	1.2	1.1	1.2	1.8	16.9	16.9	73.7	18.3	22.2	
10	1.5	1.4	1.3	1.2	1.1	1.2	1.8	17.8	17.8	63.6	17.4	20.2	
11	1.5	1.4	1.3	1.2	1.1	1.2	1.8	25.4	25.4	52.7	17.4	19.3	
12	1.5	1.4	1.3	1.2	1.1	1.2	1.9	39.4	39.4	63.6	16.5	19.3	
13	1.5	1.4	1.3	1.2	1.1	1.2	2.0	56.3	56.3	49.3	15.6	17.4	
14	1.5	1.4	1.3	1.2	1.1	1.2	1.8	73.7	73.7	45.9	15.1	16.0	
15	1.5	1.4	1.3	1.2	1.1	1.2	1.8	98.2	98.2	41.9	15.1	14.0	
16	1.5	1.4	1.3	1.2	1.1	1.2	1.9	103.6	103.6	41.3	15.1	16.0	
17	1.5	1.4	1.3	1.2	1.1	1.2	1.9	103.6	103.6	36.9	16.9	18.0	
18	1.5	1.4	1.3	1.2	1.1	1.2	2.0	99.1	99.1	33.9	16.0	16.0	
19	1.5	1.4	1.3	1.2	1.1	1.2	2.2	94.7	94.7	28.7	14.3	14.0	
20	1.5	1.4	1.3	1.2	1.1	1.2	2.6	92.0	92.0	33.3	14.3	12.0	
21	1.5	1.4	1.3	1.2	1.1	1.2	2.9	97.3	97.3	31.5	15.6	12.0	
22	1.5	1.4	1.3	1.2	1.1	1.2	3.2	93.8	93.8	31.5	29.8	14.0	
23	1.5	1.4	1.3	1.2	1.1	1.2	3.6	83.5	83.5	31.5	29.8	16.0	
24	1.5	1.4	1.3	1.2	1.1	1.2	3.6	73.7	73.7	32.7	32.1	14.3	
25	1.5	1.4	1.3	1.2	1.1	1.2	3.6	63.6	63.6	33.9	29.8	14.3	
26	1.5	1.4	1.3	1.2	1.1	1.2	3.6	61.4	61.4	36.3	28.1	14.3	
27	1.5	1.4	1.3	1.2	1.1	1.2	3.6	58.4	58.4	41.9	27.0	14.3	
28	1.5	1.4	1.3	1.2	1.1	1.2	3.6	58.4	58.4	42.6	27.6	13.8	
29	1.5	1.4	1.3	1.2	--	1.2	3.6	58.4	58.4	42.6	31.5	13.8	
30	1.5	1.4	1.3	1.2	--	1.2	3.6	52.7	52.7	40.0	34.5	13.0	
31	1.5	--	1.3	1.2	--	1.2	--	48.6	48.6	36.3	35.1	--	
TOTAL	46.5	42.0	40.3	37.2	30.8	37.2	72.8	1659.6	1659.6	1434.6	704.6	590.8	CFS
AC.FT.	92.2	83.3	79.9	73.8	61.1	73.8	144.4	3291.8	3291.8	2845.5	1397.6	1171.8	AC.FT.
MEAN DAILY	1.5	1.4	1.3	1.2	1.0	1.2	2.3	53.5	53.5	46.3	22.7	19.1	CFS

DAILY STREAMFLOW, CFS
TENDERFOOT CREEK BELOW STRINGER CREEK
LC7014
1994 WATER YEAR

DAY	93 OCT	NOV	DEC	94 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	12.6	8.0	7.0	6.3	6.0	4.4	3.3	36.3	34.5	8.3	4.7	3.8	
2	12.2	8.0	7.0	6.3	5.6	4.4	3.3	32.7	30.9	8.0	4.4	3.8	
3	11.4	8.0	7.0	6.3	5.6	4.4	3.3	29.8	28.1	7.7	4.4	3.8	
4	11.0	7.7	7.0	6.3	5.6	4.4	3.0	26.5	26.5	7.7	4.4	3.8	
5	10.2	8.0	7.0	6.3	5.6	4.4	3.0	27.6	23.8	7.7	4.4	3.8	
6	10.6	7.7	7.0	6.3	5.6	4.4	3.0	32.7	21.8	6.7	4.1	3.8	
7	12.2	7.4	7.0	6.3	5.6	4.4	3.0	41.9	21.2	8.0	3.8	3.8	
8	10.2	7.7	7.0	6.3	5.6	4.1	3.0	57.0	21.2	7.4	4.1	3.8	
9	9.8	7.7	7.0	6.3	5.3	4.1	3.0	72.9	20.2	7.0	4.1	3.8	
10	9.5	7.4	7.0	6.3	5.3	4.1	3.0	89.5	18.3	7.0	4.1	3.8	
11	9.5	7.4	7.0	6.3	5.3	4.1	3.0	102.6	16.9	6.7	3.8	3.6	
12	9.1	7.4	7.0	6.3	5.3	4.1	3.0	117.5	16.5	6.3	3.8	3.6	
13	9.1	7.4	7.0	6.0	5.3	4.1	3.0	121.3	17.4	6.7	3.6	3.6	
14	9.1	7.4	6.7	6.0	5.3	4.1	3.0	109.0	16.5	6.3	3.6	3.6	
15	8.7	7.4	6.7	6.0	5.0	3.8	3.0	94.7	15.1	7.0	3.6	3.3	
16	8.7	7.4	6.7	6.0	5.0	3.8	3.0	84.4	15.1	6.7	3.3	3.3	
17	8.7	7.4	6.7	6.0	5.0	3.8	3.0	83.5	14.7	6.3	3.3	3.0	
18	8.3	7.4	6.7	6.0	5.0	3.8	9.1	73.7	13.4	6.0	3.3	3.0	
19	8.3	7.4	6.7	6.0	5.0	3.8	16.9	72.1	12.6	6.3	3.3	2.8	
20	8.3	7.4	6.7	6.0	5.0	3.8	26.5	69.0	12.2	6.0	3.6	2.8	
21	8.3	7.4	6.7	6.0	5.0	3.8	29.8	64.4	13.0	5.6	3.6	2.8	
22	8.3	7.4	6.7	6.0	4.7	3.6	48.6	60.6	12.2	5.6	3.8	2.8	
23	8.3	7.4	6.7	6.0	4.7	3.6	56.3	58.4	11.4	5.6	3.8	2.8	
24	8.3	7.4	6.7	6.0	4.7	3.6	57.0	55.9	10.6	6.3	3.6	2.8	
25	8.3	7.4	6.7	6.0	4.7	3.6	57.7	53.4	10.2	5.6	3.6	2.8	
26	8.0	7.4	6.7	6.0	4.7	3.6	52.0	52.0	10.2	5.6	3.6	2.8	
27	8.0	7.0	6.7	6.0	4.7	3.6	45.2	55.9	9.8	5.3	3.6	2.8	
28	7.7	7.0	6.7	6.0	4.7	3.6	40.6	49.3	9.1	5.0	3.6	2.8	
29	8.0	7.0	6.3	6.0	–	3.3	36.9	45.9	8.7	5.0	3.6	2.8	
30	8.7	7.0	6.3	6.0	–	3.3	36.9	40.6	8.3	5.0	3.8	2.8	
31	8.3	–	6.3	6.0	–	3.3	–	35.7	–	5.0	3.8	–	
TOTA	287.7	224.0	210.4	189.6	144.9	121.2	565.4	1946.8	500.4	199.4	118.1	98.6	CFS
AC.FT	570.6	444.3	417.3	376.1	287.4	240.4	1121.5	3861.4	992.5	395.5	234.2	195.6	AC.FT.
MEAN DAILY	9.3	7.2	6.8	6.1	4.7	3.9	18.2	62.8	16.1	6.4	3.8	3.2	CFS

Appendix V. Water quality data for 1992 - 1994.

No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek
LC7015	Stringer Creek Above East Fork

SUN CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7006
SE1/4, NW1/4, S5, T13N, R7E, LAT. 46-55-12, LONG. 110-52-42
4 - FOOT PARSHALL FLUME INSTALLED 10/92
ELEVATION (FEET) = 7020
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1740	0.2	0.24	0.00013	78.0		7.0	7.8
SEPT 30	92273	1400	0.2	1.97	0.001064			7.5	
OCT 15	92288	1550	0.1	1.26	0.00034			0.5	
FEB 17	93048	1310	0.1			104.0		0.0	8.0
APR 14	93104	1440	0.2			101.0		0.5	7.9
MAY 30	93150	1115	6.6	3.24	0.057737			5.0	
JULY 9	93190	1300	5	6.06	0.08181			7.0	
AUG 10	93220	845	1.8	0.81	0.003937	51.0		8.0	
AUG 24	93236	1545	2.4	1.92	0.012442			7.0	
AUG 27	93239	1310	2	0.48	0.002592	43.0		8.0	7.6
SEPT 1	93244	1600	2.9	1.79	0.014016	47.0		5.0	
SEPT 24	93267	1230	1.8	1.62	0.007873	44.0		4.0	7.5
NOV 2	93306	1300	0.8	0.23	0.000497	53.0		1.0	
JAN 25	94025	1125	0.6			82.0		1.0	
APR 7	94097	1640	0.4			80.5		1.0	
MAY 26	94146	1200	6.2	3.00	0.05022	24.2	1.70	7.0	
JUNE 15	94166	1415	2.2	1.95	0.011583	35.0	0.70	8.0	7.8
JUNE 21	94172	1005	1.7	2.63	0.012072	42.5		11.0	7.9
JULY 14	94195	750	0.8	0.44	0.00095	58.4		6.0	7.1
AUG 9	94221	1040	0.5	1.39	0.001877	77.2	0.34	10.0	8.0
AUG 31	94243	905	0.4	4.62	0.00499	86.8		6.0	7.8
SEPT 20	94263	755	0.3	0.58	0.00047	97.2		5.0	8.0
SEPT 29	94272	1815	0.3	0.27	0.000219	94.8	0.29	7.5	8.1

SUN CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - ISCO F:\TCEF\SEDIMENT\ISCO94.WB2

STREAM GAGING STATION NO. LC7006
SE1/4, NW1/4, S5, T13N, R7E, LAT. 46-55-12, LONG. 110-52-42
4 - FOOT PARSHALL FLUME INSTALLED 10/92
ELEVATION (FEET) = 7020
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	TNS/MO
JUNE 21	94172		1.7	9.61	0.04411	
JUNE 22	94173		1.5	10.51	0.04257	
JUNE 23	94174		1.4	22.02	0.08324	
JUNE 24	94175		1.3	22.54	0.07912	
JUNE 25	94176		1.2	9.69	0.03140	
JUNE 26	94177		1.2	1.91	0.00619	
JUNE 27	94178		1.2	20.37	0.06600	
JUNE 28	94179		1.3	2.13	0.00748	
JUNE 29	94180		1.2	2.17	0.00703	
JUNE 30	94181		1.2	12.10	0.03920	
JULY 1	94182		1.2	11.08	0.03590	
JULY 2	94183		1.2	13.71	0.04442	
JULY 3	94184		1.2	11.71	0.03794	
JULY 4	94185		1.2	2.78	0.00901	
JULY 5	94186		1.2	2.87	0.00930	
JULY 6	94187		1.8	2.23	0.01084	
JULY 7	94188		1.3	1.86	0.00653	
JULY 8	94189		1.1	1.60	0.00475	
JULY 9	94190		1.1	2.33	0.00692	
JULY 10	94191		0.9	1.47	0.00357	
JULY 11	94192		0.8	1.59	0.00343	
JULY 12	94193		0.8	e	0.00400	
JULY 13	94194		0.9	e	0.00900	
JULY 14	94195		0.7	e	0.00700	
JULY 15	94196		0.8	7.55	0.01631	
JULY 16	94197		0.8	3.62	0.00782	
JULY 17	94198		0.6	4.11	0.00666	
JULY 18	94199		0.6	7.94	0.01286	
JULY 19	94200		0.6	3.57	0.00578	
JULY 20	94201		0.6	1.14	0.00185	
JULY 21	94202		0.6	5.63	0.00912	
JULY 22	94203		0.6	10.06	0.01630	
JULY 23	94204		0.5	2.93	0.00396	
JULY 24	94205		0.7	1.95	0.00369	
JULY 25	94206		0.6	1.53	0.00248	
JULY 26	94207		0.6	3.21	0.00520	
JULY 27	94208		0.5	3.44	0.00464	
JULY 28	94209		0.4	6.11	0.00660	
JULY 29	94210		0.5	14.96	0.02020	
JULY 30	94211		0.4	3.91	0.00422	
JULY 31	94212		0.5	3.19	0.00431	
JULY						0.32460
AUG 1	94213		0.5	8.68	0.01172	

AUG 2	94214	0.6	10.54	0.01707	
AUG 3	94215	0.6	4.24	0.00687	
AUG 4	94216	0.6	2.72	0.00441	
AUG 5	94217	0.6	11.36	0.01840	
AUG 6	94218	0.5	27.53	0.03717	
AUG 7	94219	0.5	0.68	0.00092	
AUG 8	94220	0.5	e	0.00500	
AUG 9	94221	0.5	2.80	0.00378	
AUG 10	94222	0.4	1.71	0.00185	
AUG 11	94223	0.4	4.77	0.00515	
AUG 12	94224	0.4	3.23	0.00349	
AUG 13	94225	0.4	1.46	0.00158	
AUG 14	94226	0.4	3.20	0.00346	
AUG 15	94227	0.4	1.59	0.00172	
AUG 16	94228	0.4	1.13	0.00122	
AUG 17	94229	0.3	0.79	0.00064	
AUG 18	94230	0.4	1.13	0.00122	
AUG 19	94231	0.3	1.14	0.00092	
AUG 20	94232	0.3	1.25	0.00101	
AUG 21	94233	0.3	1.58	0.00128	
AUG 22	94234	0.4	1.95	0.00211	
AUG 23	94235	0.4	1.80	0.00194	
AUG 24	94236	0.4	0.89	0.00096	
AUG 25	94237	0.4	0.80	0.00086	
AUG 26	94238	0.4	1.47	0.00159	
AUG 27	94239	0.4	1.25	0.00135	
AUG 28	94240	0.4	0.90	0.00097	
AUG 29	94241	0.4	0.67	0.00072	
AUG 30	94242	0.4	1.45	0.00157	
AUG 31	94243	0.4	1.53	0.00165	
AUGUST					0.14259
SEPT 1	94244	0.4	1.59	0.00172	
SEPT 2	94245	0.4	1.07	0.00116	
SEPT 3	94246	0.4	0.95	0.00103	
SEPT 4	94247	0.5	1.88	0.00254	
SEPT 5	94248	0.5	1.05	0.00142	
SEPT 6	94249	0.4	0.46	0.00050	
SEPT 7	94250	0.4	0.93	0.00100	
SEPT 8	94251	0.4	0.91	0.00098	
SEPT 9	94252	0.4	1.71	0.00185	
SEPT 10	94253	0.4	1.62	0.00175	
SEPT 11	94254	0.4	2.51	0.00271	
SEPT 12	94255	0.4	1.38	0.00149	
SEPT 13	94256	0.4	0.45	0.00049	
SEPT 14	94257	0.4	1.07	0.00116	
SEPT 15	94258	0.4	1.04	0.00112	
SEPT 16	94259	0.4	0.58	0.00063	
SEPT 17	94260	0.4	0.80	0.00086	
SEPT 18	94261	0.3	0.46	0.00037	
SEPT 19	94262	0.3	0.45	0.00036	
SEPT 20	94263	0.3	0.80	0.00065	
SEPT 21	94264	0.3	1.88	0.00152	
SEPT 22	94265	0.3	0.23	0.00019	
SEPT 23	94266	0.3	1.11	0.00090	
SEPT 24	94267	0.3	0.69	0.00056	
SEPT 25	94268	0.3	0.38	0.00031	
SEPT 26	94269	0.3	0.70	0.00057	
SEPT 27	94270	0.4	0.78	0.00084	

SEPT 28	94271	0.3	0.55	0.00045	
SEPT 29	94272	0.3	0.85	0.00069	
SEPT 30	94273	0.3	0.76	0.00062	
SEPTEMBER					0.03041

SPRING PARK CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7007
SW1/4, SE1/4, S31, T14N, R7E, LAT. 46-55-26, LONG. 110-52-55
STAFF GAGE PRIOR TO 9/93; 2 1/2-FOOT PARSHALL FLUME INSTALLED 9/30/9
ELEVATION (FEET) = 6910
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1715	0.2	2.82	0.00152	96.0		9.0	8.0
OCT 15	92288	1540	0.1	1.23	0.00033			1.0	
JULY 9	93190	1315	5.4	2.36	0.03441			6.0	
AUG 11	93221	1150	2.4	2.30	0.01490	71.0		8.0	
AUG 24	93236	1200	2.2	2.46	0.01461			7.0	
SEPT 1	93244	1525	2.9	1.12	0.00877	65.0		5.0	
SEPT 24	93267	1155	1.7	1.39	0.00638	73.0		4.0	7.8
NOV 2	93306	1315	1.0	0.27	0.00073	78.0		2.0	
JAN 25	94025	1130	0.6			93.0		2.0	
APR 7	94097	1630	0.4			82.0		1.0	
MAY 26	94146	1225	8.9	2.65	0.06389	51.6		8.0	
JUNE 15	94166	1440	2.0	2.16	0.01166	64.3		7.0	8.0
JUNE 21	94172	1235	1.6	1.31	0.00569	70.2		12.0	8.0
JULY 14	94195	1530	0.9	0.96	0.00244	79.8		9.0	7.8
AUG 9	94221	1105	0.6	0.44	0.00074	76.9		9.0	8.0
AUG 31	94243	955	0.5			91.0		6.0	7.0
SEPT 20	94263	830	0.5			90.9		4.0	8.0
SEPT 30	94273	1030	0.5	0.98	0.00132	97.0	0.2	5.0	8.1

SPRING PARK CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - ISCO F:\TCEF\SEDIMENT\ISCO94.WB2

STREAM GAGING STATION NO. LC7007
SW1/4, SE1/4, S31, T14N, R7E, LAT. 46-55-26, LONG. 110-52-55
STAFF GAGE PRIOR TO 9/93; 2 1/2-FOOT PARSHALL FLUME INSTAL
ELEVATION (FEET) = 6910
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	TNS/MO
JULY 14	94195		0.9	3.94	0.00957	
JULY 15	94196		0.9	3.22	0.00781	
JULY 16	94197		0.9	3.52	0.00855	
JULY 17	94198		0.9	2.74	0.00665	
JULY 18	94199		0.8	4.06	0.00876	
JULY 19	94200		0.8	4.66	0.01005	
JULY 20	94201		0.8	4.35	0.00940	
JULY 21	94202		0.8	4.60	0.00994	
JULY 22	94203		0.7	4.78	0.00903	
JULY 23	94204		0.7	3.44	0.00650	
JULY 24	94205		0.7	5.65	0.01068	
JULY 25	94206		0.7	5.17	0.00977	
JULY 26	94207		0.7	2.45	0.00463	
JULY 27	94208		0.7	5.47	0.01034	
JULY 28	94209		0.7	e	0.00500	
JULY 29	94210		0.7	e	0.00500	
JULY 30	94211		0.7	e	0.00500	
JULY 31	94212		0.7	e	0.00500	
AUG 1	94213		0.7	e	0.00500	
AUG 2	94214		0.7	e	0.00500	
AUG 3	94215		0.7	e	0.00500	
AUG 4	94216		0.7	e	0.00500	
AUG 5	94217		0.6	e	0.00300	
AUG 6	94218		0.6	e	0.00300	
AUG 7	94219		0.6	e	0.00300	
AUG 8	94220		0.6	e	0.00300	
AUG 9	94221		0.6	e	0.00300	
AUG 10	94222		0.6	e	0.00300	
AUG 11	94223		0.6	e	0.00300	
AUG 12	94224		0.6	e	0.00300	
AUG 13	94225		0.6	e	0.00300	
AUG 14	94226		0.6	e	0.00300	
AUG 15	94227		0.6	e	0.00300	
AUG 16	94228		0.5	e	0.00200	
AUG 17	94229		0.5	e	0.00200	
AUG 18	94230		0.5	e	0.00200	
AUG 19	94231		0.5	e	0.00200	
AUG 20	94232		0.5	e	0.00200	
AUG 21	94233		0.5	e	0.00200	
AUG 22	94234		0.5	e	0.00200	
AUG 23	94235		0.5	e	0.00200	
AUG 24	94236		0.5	e	0.00200	
AUG 25	94237		0.5	e	0.00200	

AUG 26	94238	0.5	e	0.00200	
AUG 27	94239	0.5	e	0.00200	
AUG 28	94240	0.5	e	0.00200	
AUG 29	94241	0.5	e	0.00200	
AUG 30	94242	0.5	e	0.00200	
AUG 31	94243	0.5		0.00200	
AUGUST					0.08500
SEPT 1	94244	0.6	1.30	0.00211	
SEPT 2	94245	0.6	1.40	0.00227	
SEPT 3	94246	0.6	1.42	0.00230	
SEPT 4	94247	0.6	1.42	0.00230	
SEPT 5	94248	0.6	1.42	0.00230	
SEPT 6	94249	0.6	0.71	0.00115	
SEPT 7	94250	0.5	1.86	0.00251	
SEPT 8	94251	0.5	0.76	0.00103	
SEPT 9	94252	0.5	0.74	0.00100	
SEPT 10	94253	0.5	1.18	0.00159	
SEPT 11	94254	0.5	0.74	0.00100	
SEPT 12	94255	0.5	1.14	0.00154	
SEPT 13	94256	0.5	e	0.00200	
SEPT 14	94257	0.5	e	0.00200	
SEPT 15	94258	0.5	e	0.00200	
SEPT 16	94259	0.5	e	0.00200	
SEPT 17	94260	0.5	e	0.00200	
SEPT 18	94261	0.5	e	0.00200	
SEPT 19	94262	0.5	e	0.00200	
SEPT 20	94263	0.5	2.18	0.00294	
SEPT 21	94264	0.5	3.78	0.00510	
SEPT 22	94265	0.5	2.24	0.00302	
SEPT 23	94266	0.5	6.35	0.00857	
SEPT 24	94267	0.5	1.20	0.00162	
SEPT 25	94268	0.5	1.69	0.00228	
SEPT 26	94269	0.5	1.18	0.00159	
SEPT 27	94270	0.5	1.86	0.00250	
SEPT 28	94271	0.5	1.46	0.00196	
SEPT 29	94272	0.5	0.66	0.00089	
SEPT 30	94273	0.5	1.33	0.00180	
SEPTEMBER					0.06738

BUBBLING CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7008
NE1/4, NW1/4, S06, T13N, R7E, LAT. 46-55-21, LONG. 110-53-44
STAFF GAGE PRIOR TO 9/93, 3 1/2-FOOT H-FLUME INSTALLED 9/30/93
ELEVATION (FEET) = 6720
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92258	1630	0.3	2.32	0.00188	72.0		7.0	7.9
OCT 15	92288	1525	0.2	2.46	0.00133			1.5	
MAY 30	93150	1055	8.0	4.00	0.08640			5.0	
JULY 9	93190	1340	7.1	2.66	0.05099			5.5	
AUG 10	93220	1130	1.8	0.81	0.00394	41.0		7.0	
AUG 24	93236	1030	6.0	0.96	0.01555			6.0	
SEPT 1	93244	1440	5.0	1.88	0.02538	38.0		5.0	
SEPT 24	93267	1130	1.4	1.14	0.00431	42.0		4.0	7.6
NOV 2	93306	1335	0.8	0.22	0.00048	45.0		1.0	
JAN 25	94025	1205	0.2			66.0		1.0	
MAY 26	94146	1255	6.0	2.16	0.03476	27.7	1.85	7.0	
JUNE 15	94166	1500	1.6	1.83	0.00800	35.0		6.0	7.8
JUNE 21	94172	1210	1.3	1.37	0.00496	37.6	1.52	10.0	7.7
JULY 14	94195	1505	0.6	0.75	0.00113	45.9		8.0	7.9
AUG 9	94221	1205	0.3	0.45	0.00038	57.2	0.68	9.0	7.9
AUG 31	94243	1020	0.2	0.70	0.00038	65.5		6.0	7.7
SEPT 20	94263	915	0.2	1.31	0.00071	71.8	6.00	5.0	8.1
SEPT 30	94273	1105	0.2	0.26	0.00014	75.8	0.42	5.5	7.9

STRINGER CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7009
SE1/4, SE1/4, S36, T14N, R6E, LAT. 46-55-38, LONG 110-54-03
STAFF GAGE PRIOR TO 9/94, 4 - FOOT H-FLUME INSTALLED 9/07/94
ELEVATION (FEET) = 6560
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1615	0.8	0.25	0.00054	98.0		5.5	8.0
OCT 15	92288	1505	0.6	1.79	0.00290			1.5	
MAY 30	93150	1020	26.0	4.21	0.29550			4.0	
JULY 9	93190	1405	20.0	9.29	0.50170			6.0	
AUG 10	93220	1300	5.0	0.91	0.01230	52.0		7.0	
AUG 24	93236	1105	10.6	2.24	0.06410			7.0	
SEPT 1	93244	1150	11.4	2.22	0.06710	46.0		5.0	
SEPT 24	93267	1110	4.0	1.11	0.01200	69.0		4.0	7.7
NOV 2	93306	1410	2.3	0.53	0.00330	66.0		3.0	
JAN 25	94025	1220	0.9			99.0		1.0	
APR 7	94097	1500	0.6			82.5			
MAY 26	94146	1315	9.4	0.96	0.02436	43.5	1.73	8.0	
JUNE 15	94166	1520	2.7	1.70	0.01239	58.0		6.0	8.0
JUNE 21	94172	1045	2.5	1.70	0.01148	60.6	0.96	9.0	7.7
JULY 14	94195	1150	1.6	0.47	0.00203	75.1		7.0	8.2
AUG 9	94221	1310	1.0	0.74	0.00200	90.3	0.35	9.0	8.0
AUG 31	94243	1100	0.8	1.89	0.00408	103.0		6.0	8.0
SEPT 20	94263	945	0.7	0.22	0.00039	110.2	2.2	4.0	7.9
SEPT 30	94273	1250	0.7	0.22	0.00042	109.7	0.2	6.0	8.2

PACK CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7010
SE1/4, SW1/4, S36, T14N, R6E, LAT. 46-55-38, LONG. 110-54-32
STAFF GAGE INSTALLED 8/11/93
ELEVATION (FEET) = 6440
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1100	0.40	0.76	0.00082	87.0		5.0	7.8
OCT 15	92288	1350	0.30	0.78	0.00063			0.5	
AUG 11	93221	1445	2.90	1.59	0.01245	42.0		9.0	
SEPT 1	93244	1055	5.80	1.75	0.02741	36.0		5.0	
SEPT 24	93267	1020	2.40	0.94	0.00609	45.0		4.0	7.7
JUNE 15	94166	1635	1.90	2.53	0.01298	40.7		6.0	7.7
JUNE 30	94181	1008	1.00	1.91	0.00516	44.7		6.0	7.0
JULY 14	94195	1430	0.25	1.46	0.00099	52.4		10.0	7.7
AUG 9	94221	1400	0.10	1.02	0.00028	68.6	0.78	12.0	7.7
AUG 31	94243	1140	0.05	0.69	0.00009	77.9		8.0	7.7
SEPT 20	94263	1045	0.05	1.09	0.00015	83.8	1.10	5.0	7.8
SEPT 30	94273	1315	0.05	0.25	0.00003	88.0	0.36	7.0	7.9

PASSIONATE CREEK NEAR MOUTH

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7011
NE1/4, SE1/4, S35, T14N, R6E, LAT. 46-55-48, LONG. 110-55-20
STAFF GAGE INSTALLED 8/11/93
ELEVATION (FEET) = 6240
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	TURBIDI NTU	SPEC COND	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1020	0.30	0.53	0.00043		76.0	5.0	7.8
OCT 15	92288	1415	0.20	0.25	0.00014			3.0	
AUG 11	93221	1410	1.39	0.98	0.00368		39.0	9.0	
SEPT 1	93244	1005	4.20	1.23	0.01395		40.0	5.0	
SEPT 24	93267	920	1.33	0.54	0.00194		44.0	4.0	7.6
JUNE 15	94166	1610	0.58	0.74	0.00116		39.8	5.5	7.7
JUNE 30	94181	1043	0.28	1.48	0.00112		46.9	8.0	7.6
JULY 14	94195	1440	0.12	1.05	0.00034		52.2	9.0	7.6
AUG 9	94221	1420	0.02	0.25	0.00001	0.88	63.2	12.0	7.4
AUG 31	94243	1230	0.01	0.24	0.00001		68.8	9.0	7.3
SEPT 20	94263	1130	0.01	0.2	0.00001	6.5	73.7	8.0	7.6
SEPT 30	94273	1345	0.01	0.27	0.00001	0.6	75.7	8.0	7.7

LONESOME CREEK NEAR WILLIAMS PARK

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7012
SE1/4, SW1/4, S2, T13N, R6E, LAT. 46-54-51, LONG. 110-56-20
STAFF GAGE PRIOR TO 9/94, 3 - FOOT H-FLUME INSTALLED 9/08/94
ELEVATION (FEET) = 6810
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 14	92257	1200	0.05	0.26	0.00004	98.0		7.0	8.0
OCT 15	92288	1010	0.03	2.37	0.00019			0.5	
JULY 9	93190	1020	1.50	0.68	0.00275			4.5	
AUG 11	93221	1810	0.40	1.29	0.00139	54.0		7.0	
AUG 23	93235	1645	0.70	1.71	0.00323			7.0	
AUG 31	93243	830	2.00	1.57	0.00848	42.0		4.0	
SEPT 24	93267	745	0.40	0.48	0.00052	52.0		4.0	7.6
NOV 2	93306	1030	0.20	0.70	0.00038	69.0		2.0	
JAN 25	94025	815	0.10			103.0		1.0	
APRIL 7	94097	1100	0.05			96.0			
MAY 26	94146	1600	3.50	0.68	0.00643	41.9		7.0	
JUNE 15	94166	1130	0.30	2.05	0.00166	60.2		5.0	8.0
JUNE 21	94172	805	0.20	0.71	0.00038	61.1		7.0	7.2
JULY 13	94195	1310	0.02	0.54	0.00003	70.6		10.0	7.6
AUG 8	94220	1330	0.03	0.71	0.00006	93.5	0.45	11.0	8.0
AUG 31	94243	800	0.03	0.66	0.00005	97.9		6.0	8.0
SEPT 19	94262	1600	0.03	0.68	0.00006	102.7	3.6	8.5	8.5
SEPT 29	94272	1300	0.03	0.45	0.00004	103.4	0.24	7.0	8.3

TENDERFOOT CREEK ABOVE SUN CREEK

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7013
NE1/4, NW1/4, S5, T13N, R7E, LAT. 46-55-12, LONG. 110-52-25
4 - FOOT PARSHALL FLUME INSTALLED 10/92
ELEVATION (FEET) = 7060
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1750	0.3	0.49	0.00040	176.0		7.0	8.2
SEPT 30	92273	1415	0.2	5.06	0.00273			6.5	
OCT 15	92288	1610	0.4	3.09	0.00334			0.0	
FEB 17	93048	1240	0.2	1.00	0.00054	177.0		0.0	8.2
APR 14	93104	1500	0.3			164.0		0.5	8.1
MAY 30	93150	1140	6.2	3.90	0.06529			6.0	
JULY 9	93190	1145	5.4	5.50	0.08019			7.0	
AUG 10	93220	940	1.6	3.21	0.01387	103.0		9.0	
AUG 24	93236	1550	2.8	2.75	0.02079			8.0	
AUG 27	93239	1345	2.2	1.60	0.00950	94.0		7.0	7.9
SEPT 1	93244	1610	3.8	3.18	0.03263	74.0		7.0	
SEPT 24	93267	1230	1.8	1.79	0.00870	93.0		4.0	7.9
NOV 2	93306	1225	0.7	0.83	0.00157	126.0		1.0	
JAN 25	94025	1100	0.7			128.0		2.0	
APR 7	94097	1200	0.3			83.5		1.0	
MAY 26	94146	1045	7.2	3.68	0.07154	39.7		5.0	
MAY 26	94146	1045	7.2	5.88	0.11431	39.7	2.90	5.0	
JUNE 15	94166	1400	2.3	1.55	0.00963	74.8		8.0	8.2
JUNE 20	94171	1635	1.7	2.44	0.01120	92.3	1.80	17.0	8.1
JULY 14	94195	1510	0.7	2.16	0.00408	131.3		10.0	8.2
AUG 9	94221	1025	0.4	0.23	0.00025	165.7	0.46	10.0	8.1
AUG 31	94243	840	0.4	0.57	0.00062	177.6		6.0	8.1
SEPT 20	94263	745	0.3	0.76	0.00062	170.3		4.0	8.3
SEPT 30	94273	1800	0.3	0.26	0.00021	175.6	0.24	7.5	8.5

TENDERFOOT CREEK ABOVE SUN CREEK

TCEF WATER SEDIMENT DATA - ISCO F:\TCEF\SEDIMENT\ISCO94.WB2

STREAM GAGING STATION NO. LC7013
NE1/4, NW1/4, S5, T13N, R7E, LAT. 46-55-12, LONG. 110-52-25
4 - FOOT PARSHALL FLUME INSTALLED 10/92
ELEVATION (FEET) = 7060
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	TNS/DY	TNS/MO
APR 1	94091		0.3	e	0.00700	
APR 2	94092		0.3	e	0.00700	
APR 3	94093		0.3	e	0.00700	
APR 4	94094		0.3	e	0.00700	
APR 5	94095		0.3	e	0.00700	
APR 6	94096		0.3	e	0.00700	
APR 7	94097		0.3	e	0.00700	
APR 8	94098		0.3	e	0.00700	
APR 9	94099		0.3	e	0.00700	
APR 10	94100		0.3	e	0.00700	
APR 11	94101		0.3	e	0.00700	
APR 12	94102		0.3	e	0.00700	
APR 13	94103		0.3	e	0.00700	
APR 14	94104		0.3	11.57	0.00937	
APR 15	94105		0.3	11.46	0.00928	
APR 16	94106		0.3	7.22	0.00585	
APR 17	94107		0.3	20.88	0.01691	
APR 18	94108		0.9	16.86	0.04097	
APR 19	94109		1.7	18.98	0.08712	
APR 20	94110		2.7	24.87	0.18130	
APR 21	94111		3.0	26.89	0.21781	
APR 22	94112		4.9	32.50	0.42998	
APR 23	94113		5.6	18.33	0.27715	
APR 24	94114		5.7	8.57	0.13189	
APR 25	94115		5.8	16.00	0.25056	
APR 26	94116		5.2	e	0.12000	
APR 27	94117		4.5	e	0.10000	
APR 28	94118		4.1	e	0.09000	
APR 29	94119		3.7	e	0.08000	
APR 30	94120		3.7	8.68	0.08671	
APRIL						2.22590
MAY 1	94121		3.6	4.61	0.04481	
MAY 2	94122		3.3	5.12	0.04562	
MAY 3	94123		3.0	4.15	0.03362	
MAY 4	94124		2.7	5.40	0.03937	
MAY 5	94125		2.8	10.64	0.08044	
MAY 6	94126		3.3	4.29	0.03822	
MAY 7	94127		4.7	5.71	0.07246	
MAY 8	94128		6.2	8.67	0.14514	
MAY 9	94129		7.7	7.25	0.15073	
MAY 10	94130		9.7	10.24	0.26819	
MAY 11	94131		12.2	8.58	0.28263	
MAY 12	94132		14.3	9.34	0.36062	
MAY 13	94133		12.4	8.62	0.28860	

MAY 14	94134	11.7	3.44	0.10867	
MAY 15	94135	8.9	3.31	0.07954	
MAY 16	94136	8.7	3.69	0.08668	
MAY 17	94137	11.2	4.25	0.12852	
MAY 18	94138	8.5	2.89	0.06633	
MAY 19	94139	8.9	2.72	0.06536	
MAY 20	94140	9.1	3.02	0.07420	
MAY 21	94141	7.9	2.74	0.05844	
MAY 22	94142	7.5	2.29	0.04637	
MAY 23	94143	7.9	2.87	0.06122	
MAY 24	94144	7.9	1.73	0.03690	
MAY 25	94145	7.9	2.42	0.05162	
MAY 26	94146	8.3	2.24	0.05020	
MAY 27	94147	11.2	12.36	0.37377	
MAY 28	94148	9.3	7.74	0.19435	
MAY 29	94149	8.3	32.81	0.73527	
MAY 30	94150	6.4	4.57	0.07897	
MAY 31	94151	5.2	4.43	0.06220	
MAY					4.20902
JUNE 1	94152	5.9	4.61	0.07344	
JUNE 2	94153	4.9	5.98	0.07912	
JUNE 3	94154	4.2	4.72	0.05352	
JUNE 4	94155	4.1	5.26	0.05823	
JUNE 5	94156	3.3	4.45	0.03965	
JUNE 6	94157	2.8	3.90	0.02948	
JUNE 7	94158	2.9	4.28	0.03351	
JUNE 8	94159	3.2	4.57	0.03948	
JUNE 9	94160	3.0	4.48	0.03629	
JUNE 10	94161	2.6	3.39	0.02380	
JUNE 11	94162	2.4	2.70	0.01750	
JUNE 12	94163	2.3	3.10	0.01925	
JUNE 13	94164	2.9	3.81	0.02983	
JUNE 14	94165	2.8	2.84	0.02147	
JUNE 15	94166	2.3	5.85	0.03633	
JUNE 16	94167	2.4	2.98	0.01931	
JUNE 17	94168	2.4	3.33	0.02158	
JUNE 18	94169	2.2	3.73	0.02216	
JUNE 19	94170	2.0	3.68	0.01987	
JUNE 20	94171	1.8	4.19	0.02036	
JUNE 21	94172	1.8	4.48	0.02177	
JUNE 22	94173	1.6	3.25	0.01404	
JUNE 23	94174	1.4	3.41	0.01289	
JUNE 24	94175	1.3	3.83	0.01344	
JUNE 25	94176	1.2	3.58	0.01160	
JUNE 26	94177	1.1	3.81	0.01132	
JUNE 27	94178	1.1	3.25	0.00965	
JUNE 28	94179	1.1	3.37	0.01001	
JUNE 29	94180	0.9	2.67	0.00649	
JUNE 30	94181	0.9	3.10	0.00753	
JUNE					0.81292
JULY 1	94182	0.9	2.52	0.00612	
JULY 2	94183	0.9	2.54	0.00617	
JULY 3	94184	0.8	2.57	0.00555	
JULY 4	94185	0.7	2.10	0.00397	
JULY 5	94186	0.8	3.12	0.00674	
JULY 6	94187	1.7	6.12	0.02809	
JULY 7	94188	1.2	3.50	0.01134	
JULY 8	94189	1.0	3.10	0.00837	

JULY 9	94190	0.9	2.40	0.00583	
JULY 10	94191	0.8	5.28	0.01140	
JULY 11	94192	0.7	2.31	0.00437	
JULY 12	94193	0.7	2.42	0.00457	
JULY 13	94194	0.8	2.31	0.00499	
JULY 14	94195	0.8	1.83	0.00395	
JULY 15	94196	0.8	2.32	0.00501	
JULY 16	94197	0.8	2.79	0.00603	
JULY 17	94198	0.7	2.55	0.00482	
JULY 18	94199	0.7	1.73	0.00327	
JULY 19	94200	0.7	2.42	0.00457	
JULY 20	94201	0.6	1.96	0.00318	
JULY 21	94202	0.6	1.83	0.00296	
JULY 22	94203	0.6	1.94	0.00314	
JULY 23	94204	0.6	2.05	0.00332	
JULY 24	94205	0.6	3.65	0.00591	
JULY 25	94206	0.6	1.94	0.00314	
JULY 26	94207	0.6	1.47	0.00238	
JULY 27	94208	0.5	1.59	0.00215	
JULY 28	94209	0.4	1.71	0.00185	
JULY 29	94210	0.4	1.02	0.00110	
JULY 30	94211	0.4	1.13	0.00122	
JULY 31	94212	0.4	1.59	0.00172	
JULY					0.16725
AUG 1	94213	0.4	1.46	0.00158	
AUG 2	94214	0.4	1.70	0.00184	
AUG 3	94215	0.4	1.01	0.00109	
AUG 4	94216	0.4	1.46	0.00158	
AUG 5	94217	0.4	1.36	0.00147	
AUG 6	94218	0.4	1.60	0.00173	
AUG 7	94219	0.4	1.60	0.00173	
AUG 8	94220	0.4	e	0.00180	
AUG 9	94221	0.4	1.78	0.00192	
AUG 10	94222	0.4	1.43	0.00154	
AUG 11	94223	0.4	1.31	0.00141	
AUG 12	94224	0.3	1.55	0.00126	
AUG 13	94225	0.4	1.41	0.00152	
AUG 14	94226	0.4	2.11	0.00228	
AUG 15	94227	0.3	1.31	0.00106	
AUG 16	94228	0.4	1.19	0.00129	
AUG 17	94229	0.4	1.05	0.00113	
AUG 18	94230	0.4	1.04	0.00112	
AUG 19	94231	0.4	0.93	0.00100	
AUG 20	94232	0.4	0.95	0.00103	
AUG 21	94233	0.4	1.38	0.00149	
AUG 22	94234	0.4	1.15	0.00124	
AUG 23	94235	0.5	0.81	0.00109	
AUG 24	94236	0.4	1.27	0.00137	
AUG 25	94237	0.4	1.27	0.00137	
AUG 26	94238	0.4	1.15	0.00124	
AUG 27	94239	0.4	1.39	0.00150	
AUG 28	94240	0.4	1.05	0.00113	
AUG 29	94241	0.4	1.16	0.00125	
AUG 30	94242	0.4	1.14	0.00123	
AUG 31	94243	0.4	0.88	0.00095	
AUGUST					0.04326
SEPT 1	94244	0.4	1.45	0.00157	
SEPT 2	94245	0.4	1.69	0.00183	

SEPT 3	94246	0.4	2.31	0.00249	
SEPT 4	94247	0.4	8.57	0.00926	
SEPT 5	94248	0.4	3.55	0.00383	
SEPT 6	94249	0.4	2.85	0.00308	
SEPT 7	94250	0.4	2.03	0.00219	
SEPT 8	94251	0.4	0.88	0.00095	
SEPT 9	94252	0.4	1.45	0.00157	
SEPT 10	94253	0.4	1.48	0.00160	
SEPT 11	94254	0.4	0.66	0.00071	
SEPT 12	94255	0.4	1.07	0.00116	
SEPT 13	94256	0.4	1.03	0.00111	
SEPT 14	94257	0.4	0.58	0.00063	
SEPT 15	94258	0.4	0.72	0.00078	
SEPT 16	94259	0.4	1.13	0.00122	
SEPT 17	94260	0.3	1.07	0.00087	
SEPT 18	94261	0.3	0.91	0.00074	
SEPT 19	94262	0.3	1.01	0.00082	
SEPT 20	94263	0.3	1.52	0.00123	
SEPT 21	94264	0.3	0.88	0.00071	
SEPT 22	94265	0.4	1.22	0.00132	
SEPT 23	94266	0.3	0.24	0.00019	
SEPT 24	94267	0.3	0.78	0.00063	
SEPT 25	94268	0.3	0.65	0.00053	
SEPT 26	94269	0.3	0.56	0.00045	
SEPT 27	94270	0.3	0.39	0.00032	
SEPT 28	94271	0.3	0.15	0.00012	
SEPT 29	94272	0.3	0.77	0.00062	
SEPT 30	94273	0.3	0.83	0.00067	
SEPTEMBER					0.04319

TENDERFOOT CREEK BELOW STRINGER CREEK

TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7014
SE1/4, SE1/4, S31, T14N, R6E, LAT. 46-55-37, LONG. 110-54-09
10 - FOOT PARSHALL FLUME INSTALLED 10/92
ELEVATION (FEET) = 6510
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
SEPT 15	92257	1530	2.8	0.27	0.00200	99.0		6.0	8.0
SEPT 30	92273	1230	2.0	1.29	0.00700			5.0	
OCT 15	92288	1320	1.4	2.71	0.01020			0.5	
FEB 17	93048	1340	1.1			116.0		0.0	8.1
APR 14	93104	1410	1.8			100.0		0.5	8.0
MAY 30	93150	1030	99.1	3.09	0.82680			4.0	
JULY 9	93190	1350	73.7	2.00	0.39800			6.0	
AUG 10	93220	1325	16.9	0.76	0.03470	58.0		9.0	
AUG 24	93236	1110	32.1	1.36	0.11790			7.0	
AUG 27	93239	1215	28.7	1.19	0.09220	50.0		6.0	7.6
SEPT 1	93244	1235	36.3	1.21	0.11860	46.0		5.0	
SEPT 24	93267	1100	14.7	0.89	0.03530	58.0		4.0	7.6
NOV 2	93306	1400	8.0	0.94	0.02030	56.0		2.0	
JAN 25	94025	1230	6.0			92.0		1.0	
APR 7	94097	1400	3.0			76.5		1.0	
MAY 26	94146	1300	50.6	2.02	0.27597	37.4	1.83	8.0	
JUN 15	94166	1530	15.1	0.81	0.03302	53.1		6.0	7.9
JUN 20	94171	720	11.8	1.57	0.05002	60.2	1.30	13.0	8.1
JUL 14	94195	1200	6.7	0.25	0.00452	75.8		9.0	7.0
AUG 9	94221	1320	4.1	0.74	0.00819	92.6	0.46	11.0	8.1
AUG 31	94243	1040	3.8	1.11	0.01139	102.6		6.0	8.0
SEPT 20	94263	935	2.8	0.57	0.00431	102.5		5.0	8.0
SEPT 30	94273	1220	2.8	0.28	0.00212	108.6	0.32	6.5	8.2

TENDERFOOT CREEK BELOW STRINGER CREEK

TCEF WATER SEDIMENT DATA - ISCO F:\TCEF\SEDIMENT\ISCO94.WB2

STREAM GAGING STATION NO. LC7014
SE1/4, SE1/4, S31, T14N, R6E, LAT. 46-55-37, LONG. 110-54-09
10 - FOOT PARSHALL FLUME INSTALLED 10/92
ELEVATION (FEET) = 6510
Tons/Day = Flow X MG/L X 0.0027

DATE	YEAR/ JUL DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	TNS/DY	TNS/MO
APR 1	94091		3.3	e	0.00600	
APR 2	94092		3.3	e	0.00600	
APR 3	94093		3.3	e	0.00600	
APR 4	94094		3.0	e	0.00500	
APR 5	94095		3.0	e	0.00500	
APR 6	94096		3.0	e	0.00500	
APR 7	94097		3.0	e	0.00500	
APR 8	94098		3.0	e	0.00500	
APR 9	94099		3.0	e	0.00500	
APR 10	94100		3.0	e	0.00500	
APR 11	94101		3.0	e	0.00500	
APR 12	94102		3.0	e	0.00500	
APR 13	94103		3.0	e	0.00500	
APR 14	94104		3.0	e	0.00500	
APR 15	94105		3.0	e	0.00500	
APR 16	94106		3.0	e	0.00500	
APR 17	94107		3.0	e	0.00500	
APR 18	94108		9.1	e	0.05500	
APR 19	94109		16.9	e	0.20000	
APR 20	94110		26.5	e	0.50000	
APR 21	94111		29.8	e	0.65000	
APR 22	94112		48.6	e	2.00000	
APR 23	94113		56.3	e	2.50000	
APR 24	94114		57.0	e	2.80000	
APR 25	94115		57.7	e	2.80000	
APR 26	94116		52.0	e	2.00000	
APR 27	94117		45.2	e	1.50000	
APR 28	94118		40.6	e	1.10000	
APR 29	94119		36.9	e	0.90000	
APR 30	94120		36.9	e	0.90000	
APRIL						17.99300
MAY 1	94121		36.3	e	0.90000	
MAY 2	94122		32.7	e	0.70000	
MAY 3	94123		29.8	e	0.55000	
MAY 4	94124		26.5	e	0.40000	
MAY 5	94125		27.6	e	0.45000	
MAY 6	94126		32.7	9.32	0.82286	
MAY 7	94127		41.9	53.62	6.06603	
MAY 8	94128		57.0	19.24	2.96104	
MAY 9	94129		72.9	27.69	5.45022	
MAY 10	94130		89.5	18.02	4.35453	
MAY 11	94131		102.6	14.87	4.11929	
MAY 12	94132		117.5	11.41	3.61982	
MAY 13	94133		121.3	5.24	1.71615	

MAY 14	94134	109.0	e	1.20000	
MAY 15	94135	94.7	4.50	1.15061	
MAY 16	94136	84.4	3.89	0.88645	
MAY 17	94137	83.5	4.48	1.01002	
MAY 18	94138	73.7	3.61	0.71835	
MAY 19	94139	72.1	3.08	0.59958	
MAY 20	94140	69.0	2.89	0.53841	
MAY 21	94141	64.4	2.71	0.47121	
MAY 22	94142	60.6	3.23	0.52849	
MAY 23	94143	58.4	4.49	0.70798	
MAY 24	94144	55.9	1.89	0.28526	
MAY 25	94145	53.4	e	0.44000	
MAY 26	94146	52.0	e	0.44000	
MAY 27	94147	55.9	e	0.50000	
MAY 28	94148	49.3	e	0.41000	
MAY 29	94149	45.9	e	0.35000	
MAY 30	94150	40.6	e	0.32000	
MAY 31	94151	35.7	e	0.26000	
MAY					42.02631
JUNE 1	94152	34.5	e	0.25000	
JUNE 2	94153	30.9	e	0.21000	
JUNE 3	94154	28.1	e	0.18000	
JUNE 4	94155	26.5	e	0.16000	
JUNE 5	94156	23.8	e	0.14000	
JUNE 6	94157	21.8	e	0.12000	
JUNE 7	94158	21.2	e	0.12000	
JUNE 8	94159	21.2	e	0.12000	
JUNE 9	94160	20.2	e	0.11000	
JUNE 10	94161	18.3	e	0.09000	
JUNE 11	94162	16.9	e	0.08000	
JUNE 12	94163	16.5	e	0.08000	
JUNE 13	94164	17.4	e	0.09000	
JUNE 14	94165	16.5	e	0.08000	
JUNE 15	94166	15.1	e	0.07000	
JUNE 16	94167	15.1	e	0.07000	
JUNE 17	94168	14.7	e	0.07000	
JUNE 18	94169	13.4	e	0.06000	
JUNE 19	94170	12.6	e	0.05400	
JUNE 20	94171	12.2	e	0.05200	
JUNE 21	94172	13.0	1.87	0.06564	
JUNE 22	94173	12.2	1.62	0.05336	
JUNE 23	94174	11.4	1.53	0.04709	
JUNE 24	94175	10.6	1.27	0.03635	
JUNE 25	94176	10.2	1.25	0.03443	
JUNE 26	94177	10.2	1.17	0.03222	
JUNE 27	94178	9.8	1.20	0.03175	
JUNE 28	94179	9.1	1.25	0.03071	
JUNE 29	94180	8.7	0.82	0.01926	
JUNE 30	94181	8.3	1.10	0.02465	
JUNE					2.58146
JULY 1	94182	8.3	1.11	0.02488	
JULY 2	94183	8.0	0.83	0.01793	
JULY 3	94184	7.7	0.83	0.01726	
JULY 4	94185	7.7	0.64	0.01331	
JULY 5	94186	7.7	1.19	0.02474	
JULY 6	94187	6.7	5.18	0.09371	
JULY 7	94188	8.0	1.01	0.02182	
JULY 8	94189	7.4	1.00	0.01998	

JULY 9	94190	7.0	1.28	0.02419	
JULY 10	94191	7.0	0.92	0.01739	
JULY 11	94192	6.7	1.08	0.01954	
JULY 12	94193	6.3	1.09	0.01854	
JULY 13	94194	6.7	0.94	0.01700	
JULY 14	94195	6.3	0.61	0.01038	
JULY 15	94196	7.0	2.51	0.04744	
JULY 16	94197	6.7	2.46	0.04450	
JULY 17	94198	6.3	4.26	0.07246	
JULY 18	94199	6.0	1.71	0.02770	
JULY 19	94200	6.3	2.23	0.03793	
JULY 20	94201	6.0	1.96	0.03175	
JULY 21	94202	5.6	1.55	0.02344	
JULY 22	94203	5.6	2.89	0.04370	
JULY 23	94204	5.6	1.60	0.02419	
JULY 24	94205	6.3	1.89	0.03215	
JULY 25	94206	5.6	2.09	0.03160	
JULY 26	94207	5.6	1.69	0.02555	
JULY 27	94208	5.3	1.69	0.02418	
JULY 28	94209	5.0	1.24	0.01674	
JULY 29	94210	5.0	1.46	0.01971	
JULY 30	94211	5.0	1.89	0.02552	
JULY 31	94212	5.0	1.02	0.01377	
JULY					0.88298
AUG 1	94213	4.7	2.22	0.02817	
AUG 2	94214	4.4	1.87	0.02222	
AUG 3	94215	4.4	1.78	0.02115	
AUG 4	94216	4.4	1.42	0.01687	
AUG 5	94217	4.4	2.02	0.02400	
AUG 6	94218	4.1	1.82	0.02015	
AUG 7	94219	3.8	1.79	0.01837	
AUG 8	94220	4.1	e	0.02000	
AUG 9	94221	4.1	1.38	0.01528	
AUG 10	94222	4.1	1.59	0.01760	
AUG 11	94223	3.8	1.58	0.01621	
AUG 12	94224	3.8	1.11	0.01139	
AUG 13	94225	3.6	1.70	0.01652	
AUG 14	94226	3.6	3.25	0.03159	
AUG 15	94227	3.6	1.33	0.01293	
AUG 16	94228	3.3	1.09	0.00971	
AUG 17	94229	3.3	1.11	0.00989	
AUG 18	94230	3.3	3.62	0.03225	
AUG 19	94231	3.3	1.41	0.01256	
AUG 20	94232	3.6	1.02	0.00991	
AUG 21	94233	3.6	14.60	0.14191	
AUG 22	94234	3.8	1.62	0.01662	
AUG 23	94235	3.8	3.42	0.03509	
AUG 24	94236	3.6	1.49	0.01448	
AUG 25	94237	3.6	1.69	0.01643	
AUG 26	94238	3.6	1.11	0.01079	
AUG 27	94239	3.6	4.31	0.04189	
AUG 28	94240	3.6	2.46	0.02391	
AUG 29	94241	3.6	8.36	0.08126	
AUG 30	94242	3.8	2.35	0.02411	
AUG 31	94243	3.8	5.11	0.05243	
AUGUST					0.82569
SEPT 1	94244	3.8	12.94	0.13276	
SEPT 2	94245	3.8	9.40	0.09644	

SEPT 3	94246	3.8	1.94	0.01990	
SEPT 4	94247	3.8	1.56	0.01601	
SEPT 5	94248	3.8	3.30	0.03386	
SEPT 6	94249	3.8	22.37	0.22952	
SEPT 7	94250	3.8	22.00	0.22572	
SEPT 8	94251	3.8	18.00	0.18468	
SEPT 9	94252	3.8	1.66	0.01703	
SEPT 10	94253	3.8	14.45	0.14826	
SEPT 11	94254	3.6	2.05	0.01993	
SEPT 12	94255	3.6	26.07	0.25340	
SEPT 13	94256	3.6	1.26	0.01225	
SEPT 14	94257	3.6	5.53	0.05375	
SEPT 15	94258	3.3	59.88	0.53353	
SEPT 16	94259	3.3	40.80	0.36353	
SEPT 17	94260	3.0	16.98	0.13754	
SEPT 18	94261	3.0	1.91	0.01547	
SEPT 19	94262	2.8	14.93	0.11287	
SEPT 20	94263	2.8	0.72	0.00541	
SEPT 21	94264	2.8	0.62	0.00469	
SEPT 22	94265	2.8	0.57	0.00431	
SEPT 23	94266	2.8	0.44	0.00329	
SEPT 24	94267	2.8	0.62	0.00469	
SEPT 25	94268	2.8	0.89	0.00673	
SEPT 26	94269	2.8	0.50	0.00378	
SEPT 27	94270	2.8	0.73	0.00552	
SEPT 28	94271	2.8	0.37	0.00280	
SEPT 29	94272	2.8	0.62	0.00465	
SEPT 30	94273	2.8	0.65	0.00491	
SEPTEMBER					2.65721

STRINGER CREEK ABOVE EAST FORK

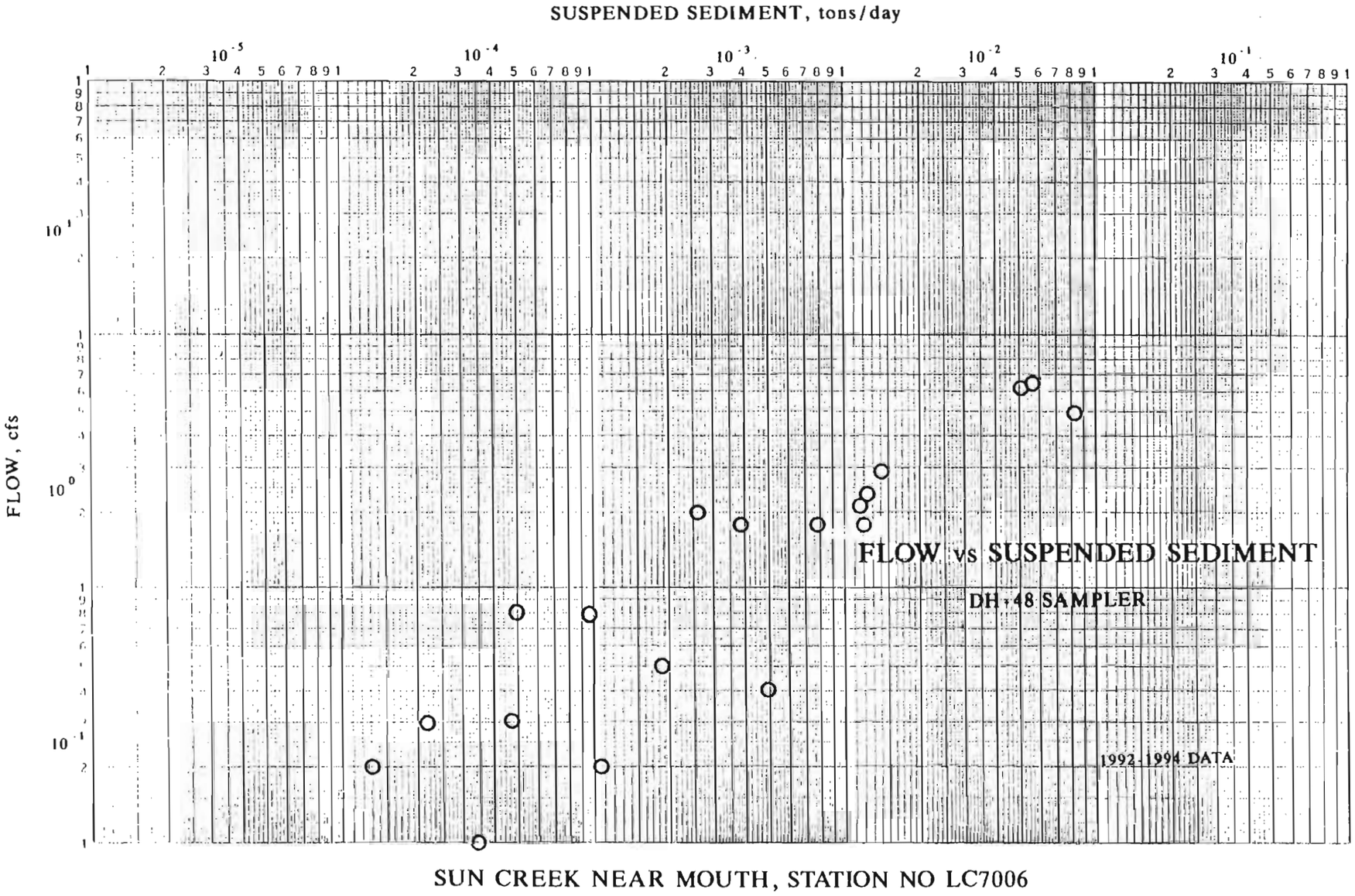
TCEF WATER SEDIMENT DATA - MANUAL F:\TCEF\SEDIMENT\MAN_GRAB.WB2

STREAM GAGING STATION NO. LC7015
NW1/4, NW1/4, S31, T14N, R7E, LAT. 46-5-06, LONG. 110-53-32
STAFF GAGE INSTALLED 7/25/94
ELEVATION (FEET) = 6880
Specific Conductance in Microsiemens/cm
Tons/Day = Flow X MG/L X 0.0027

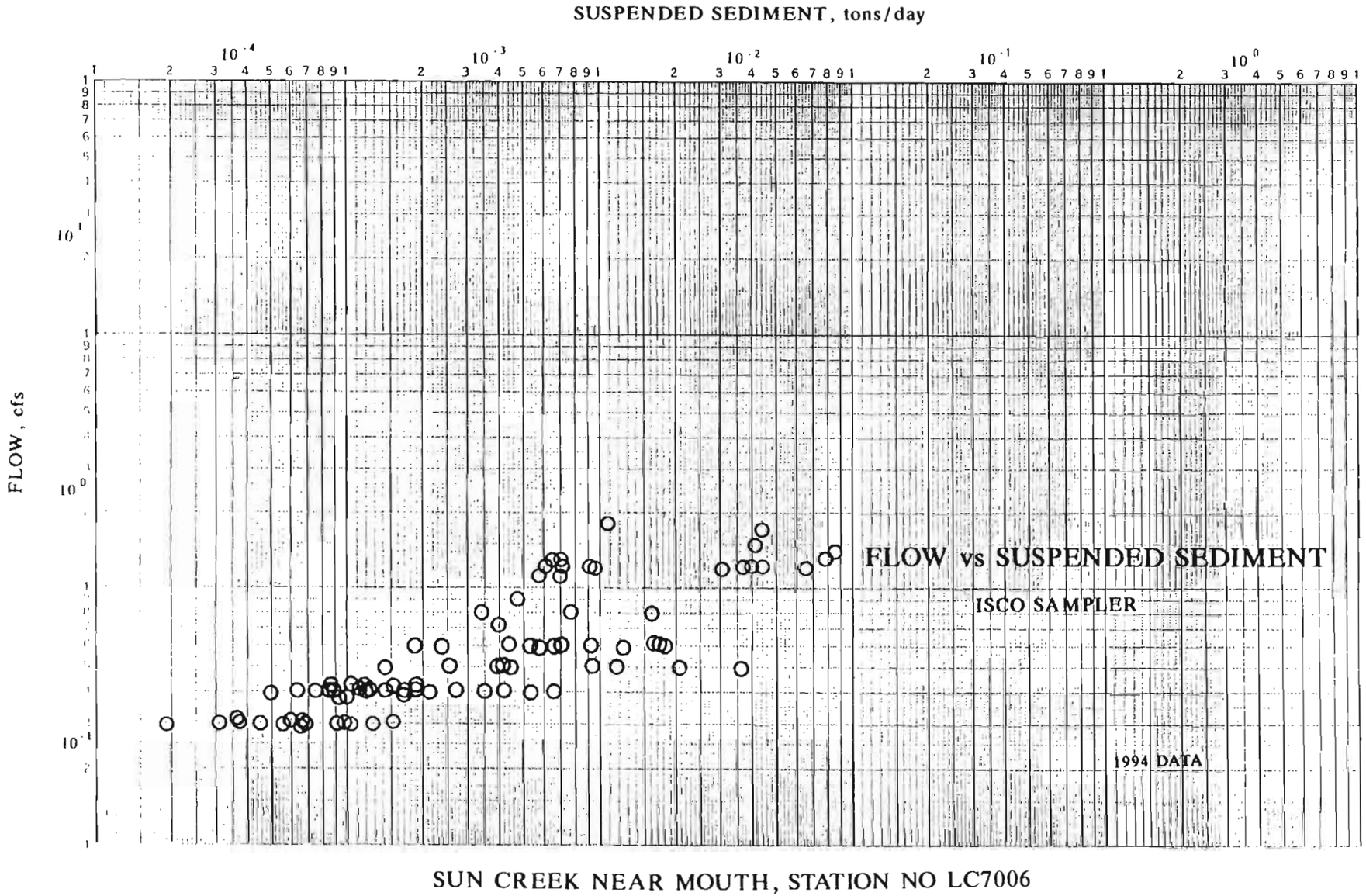
DATE	YEAR/ JUL. DATE	TIME	FLOW CFS	SUSPENDED SEDIMENT MG/L	SUSPENDED SEDIMENT TNS/DY	SPEC COND	TURBIDI NTU	WATER TEMP DEG C	WATER pH
AUG 31	94243	1445	0.20	0.26	0.00014	106.5		6.0	7.3
SEPT 20	94263	1010	0.20	7.19	0.00388	118.5	1.80	4.0	7.3
SEPT 30	94273	1430	0.20	0.25	0.00014	121.6	0.20	5.5	7.5

Appendix VI. Flow versus suspended sediment.

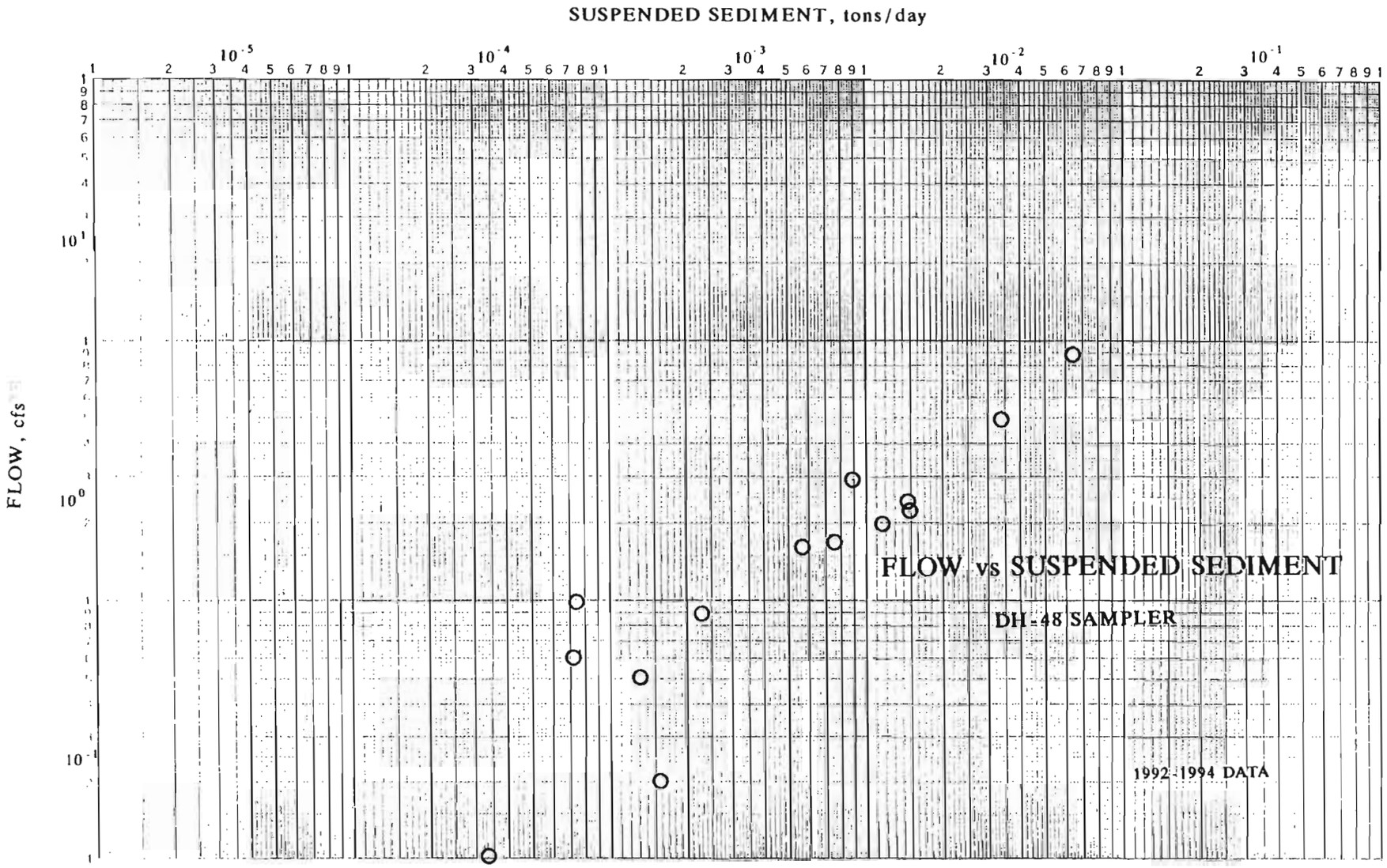
No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek
LC7015	Stringer Creek Above East Fork
--	Composite for TCEF



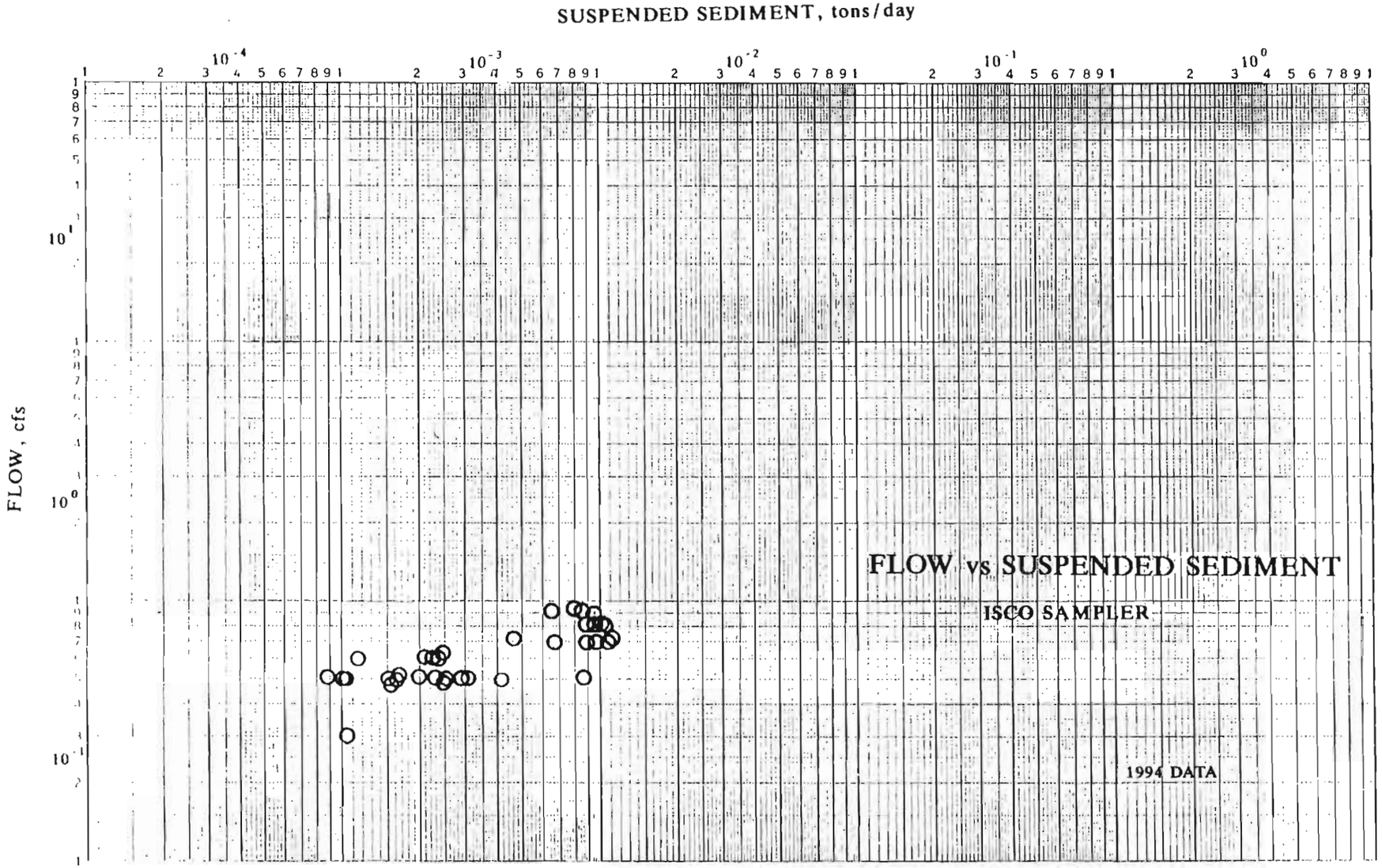
SUN CREEK NEAR MOUTH, STATION NO LC7006



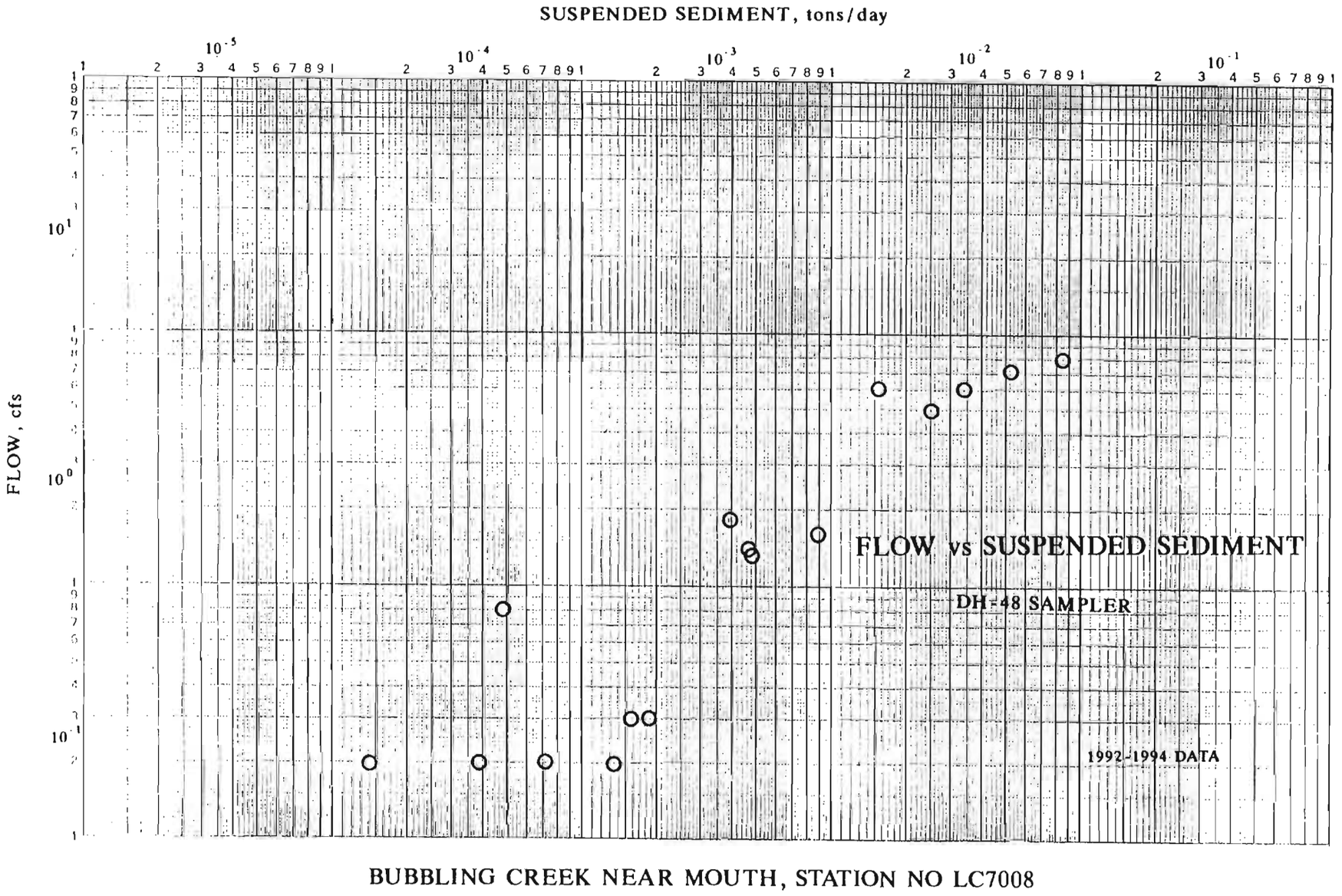
SUN CREEK NEAR MOUTH, STATION NO LC7006



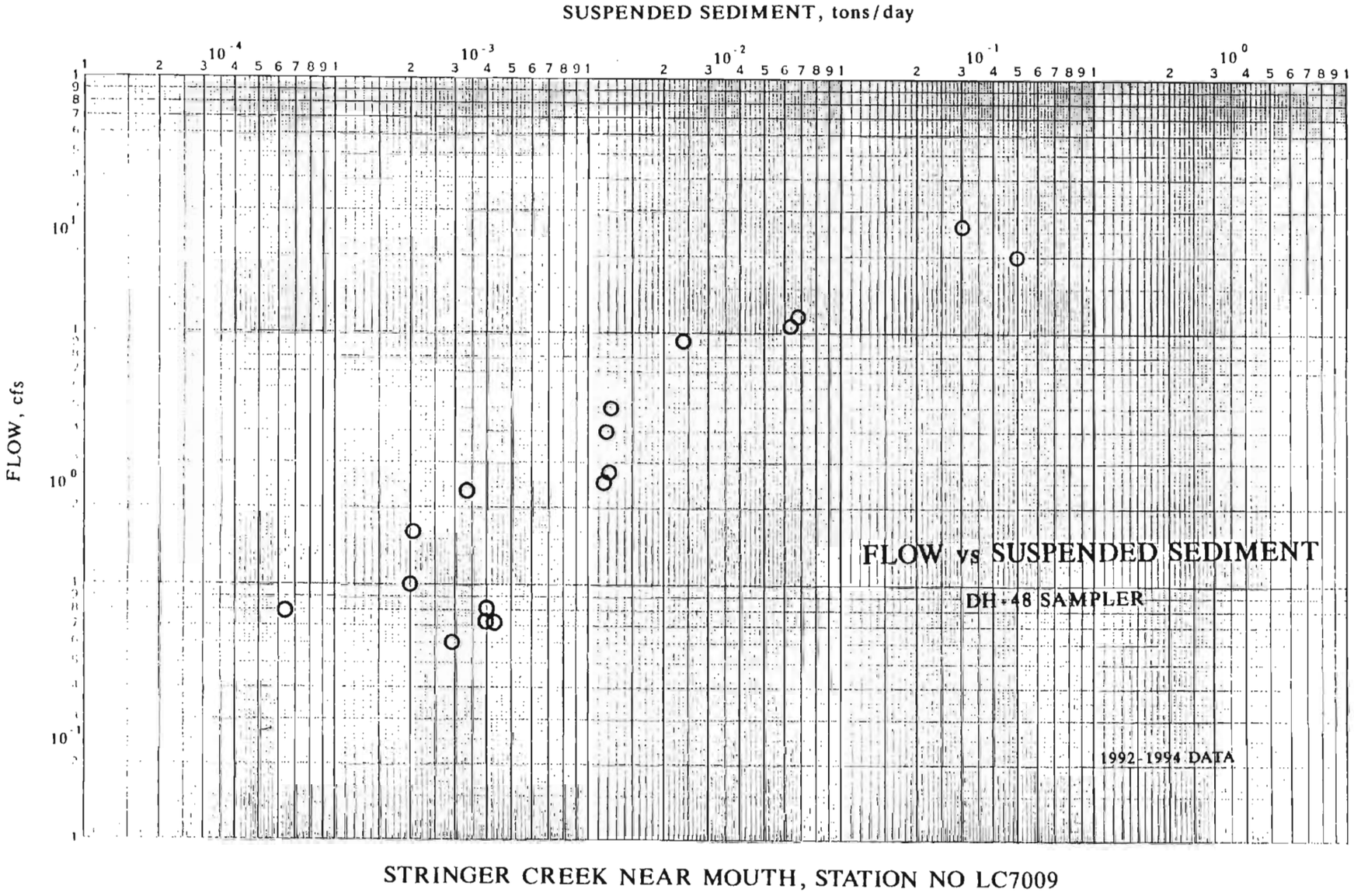
SPRING PARK CREEK NEAR MOUTH, STATION NO LC7007



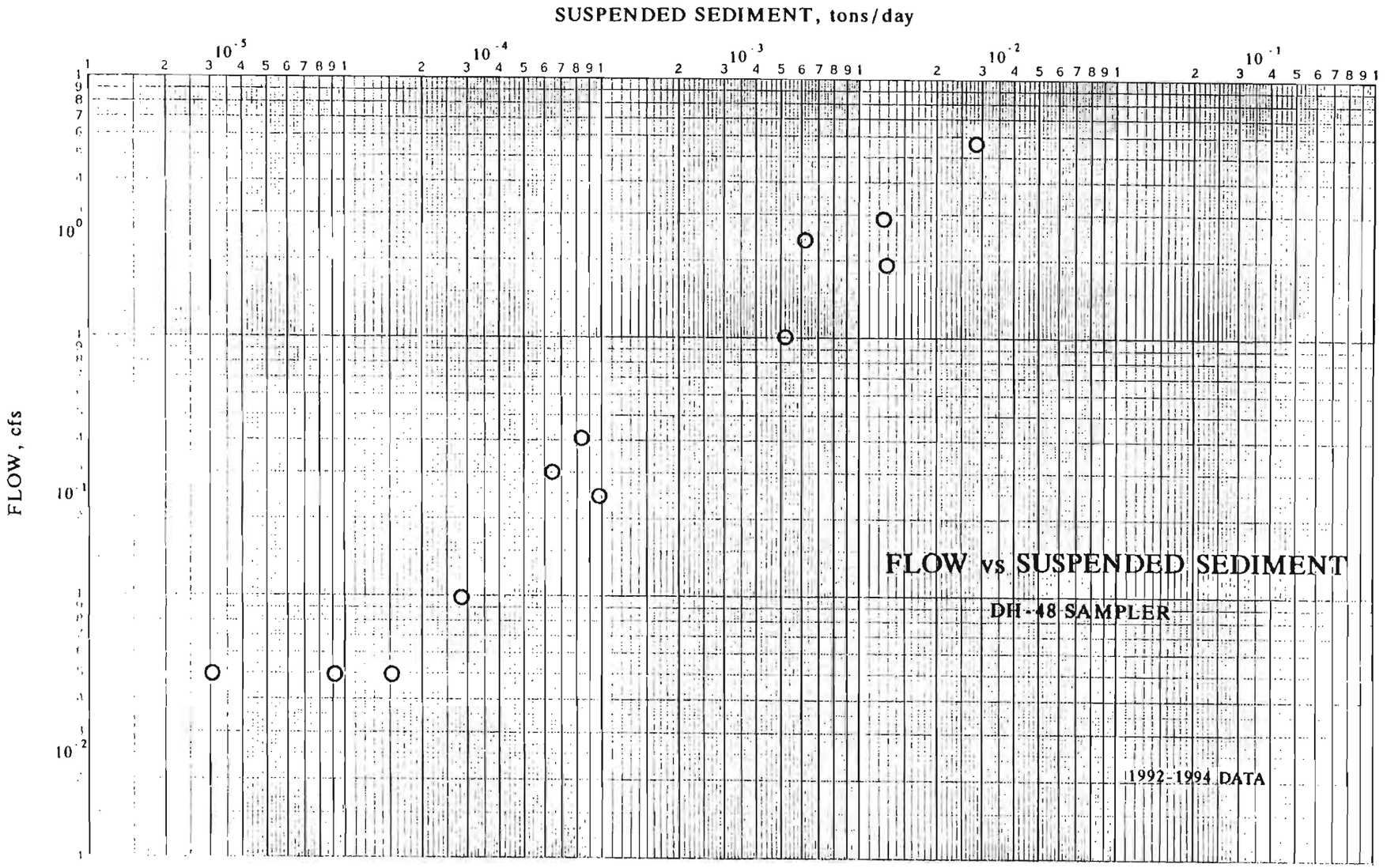
SPRING PARK CREEK NEAR MOUTH, STATION NO LC7007



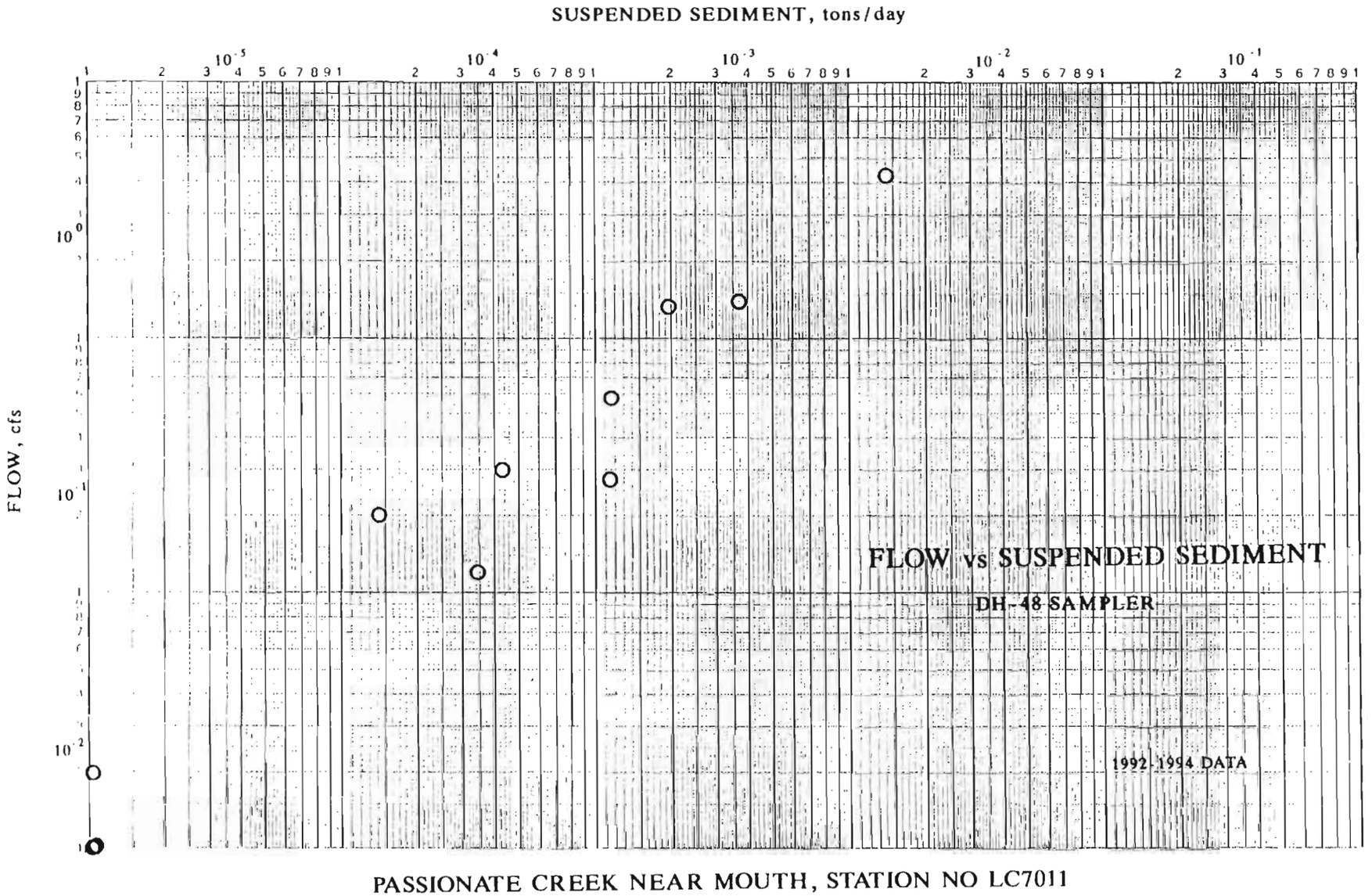
BUBBLING CREEK NEAR MOUTH, STATION NO LC7008

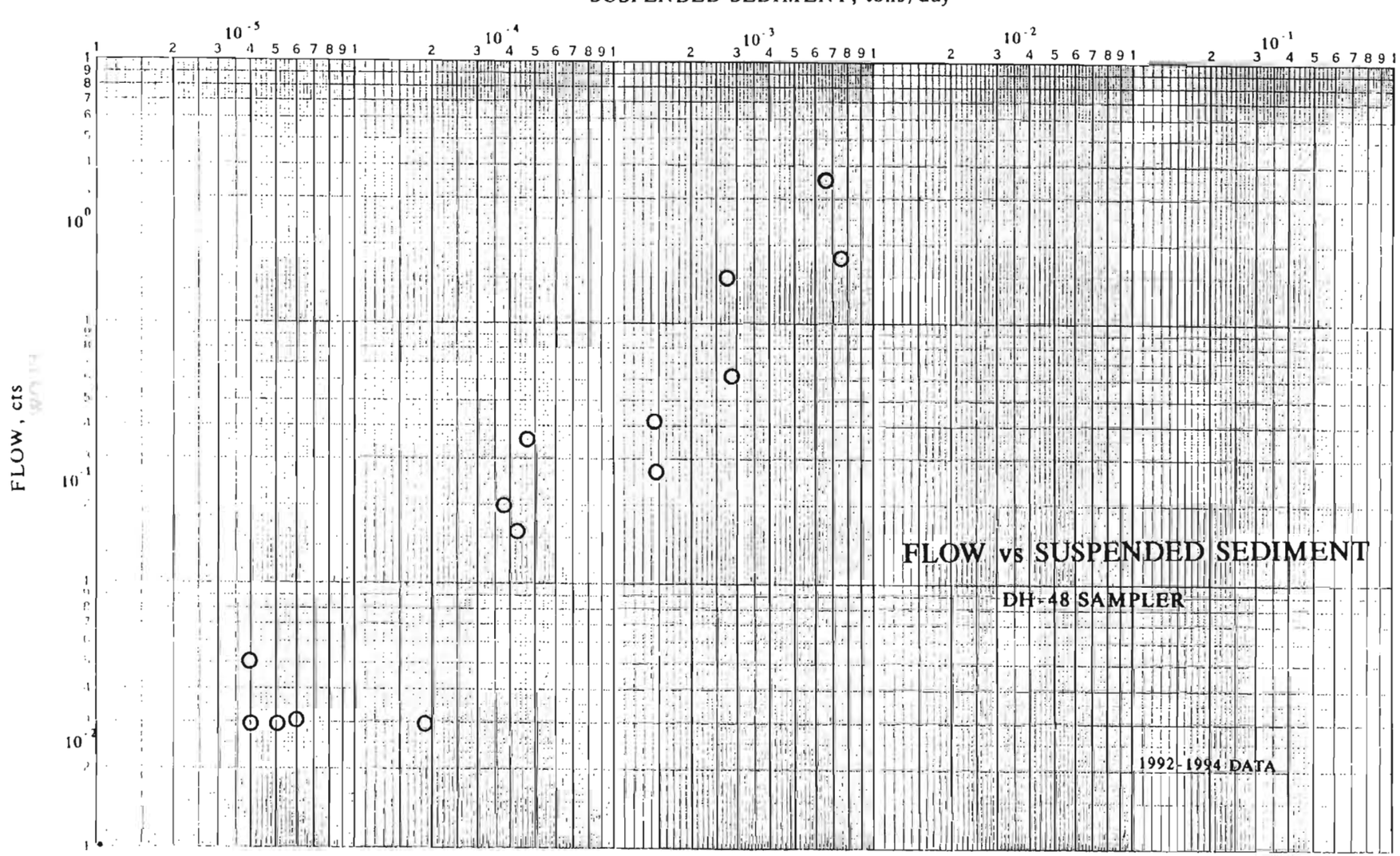


STRINGER CREEK NEAR MOUTH, STATION NO LC7009

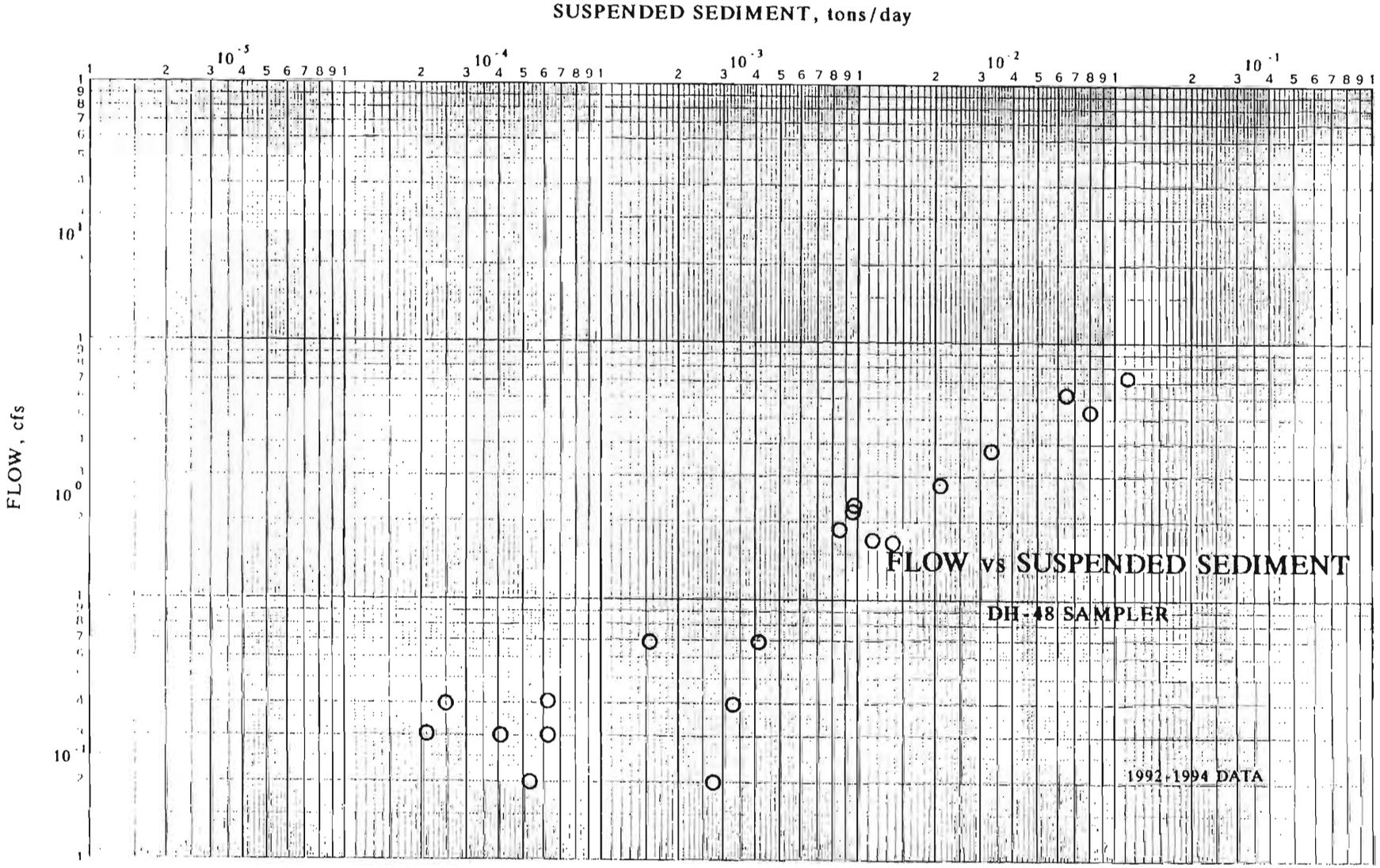


PACK CREEK NEAR MOUTH, STATION NO LC7010

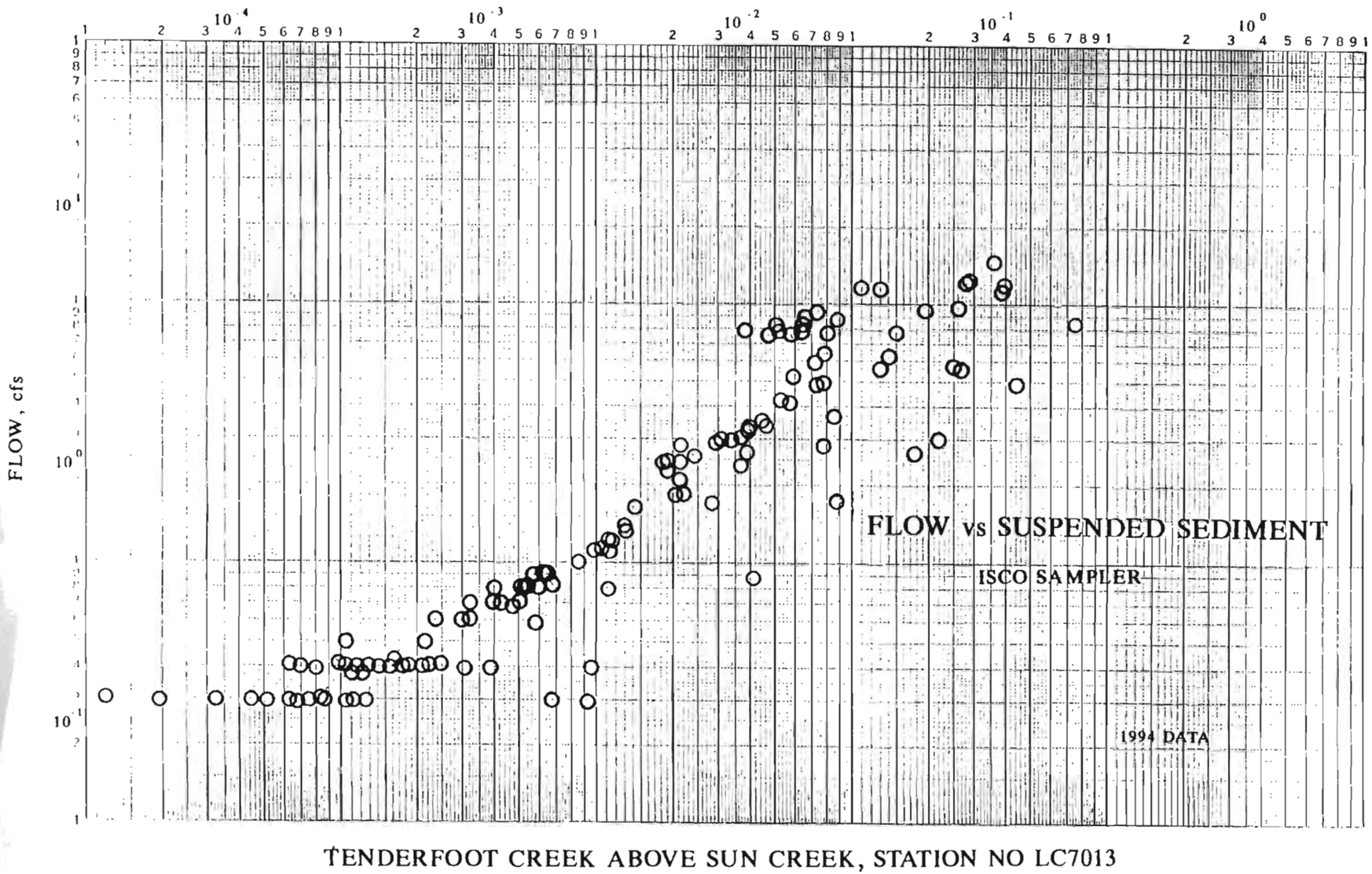

SUSPENDED SEDIMENT, tons/day
FLOW, cfs
FLOW vs SUSPENDED SEDIMENT
DH-48 SAMPLER
1992-1994 DATA
PASSIONATE CREEK NEAR MOUTH, STATION NO LC7011

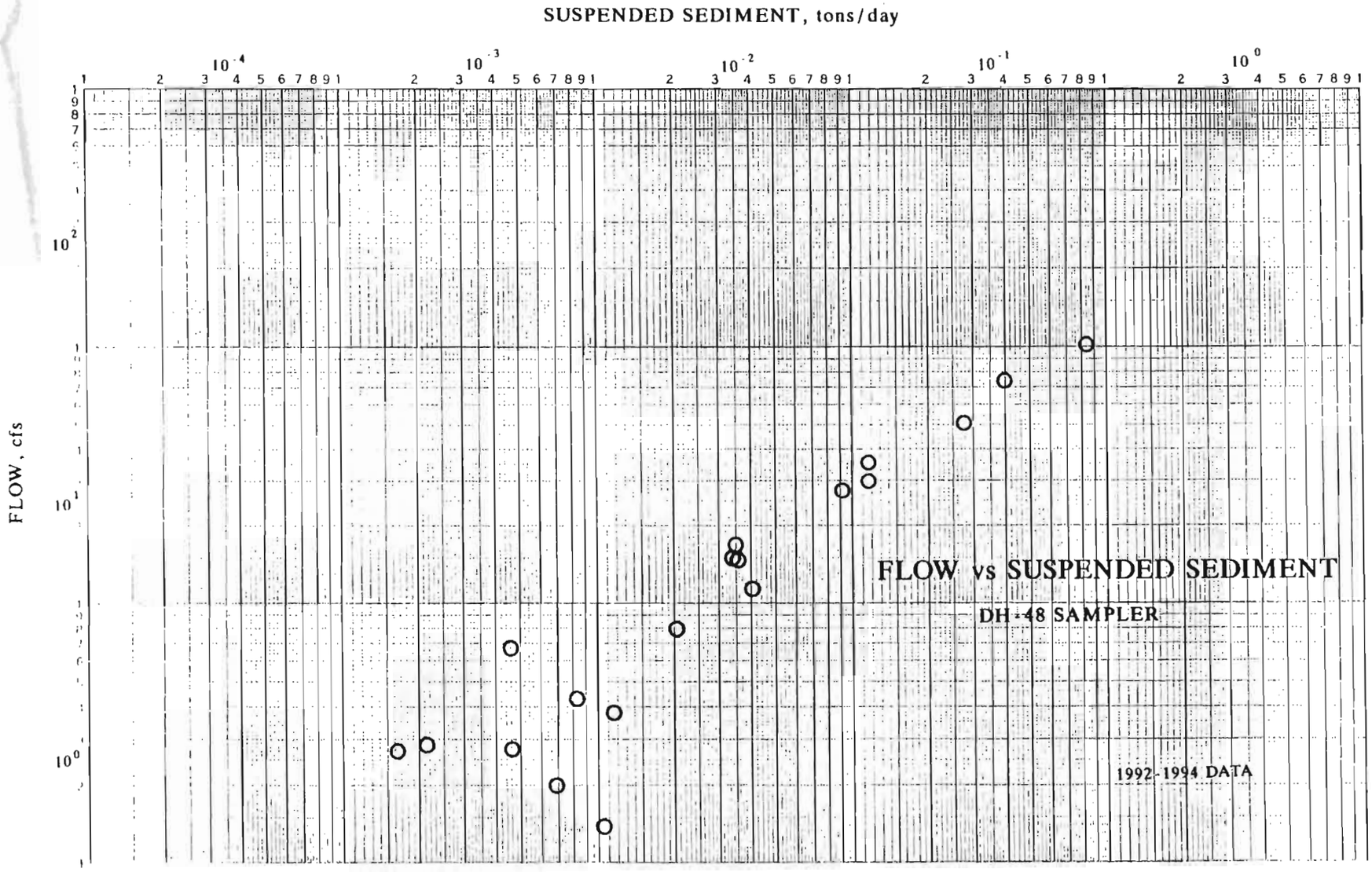


LONESOME CREEK NEAR WILLIAMS PARK, STATION NO LC7012

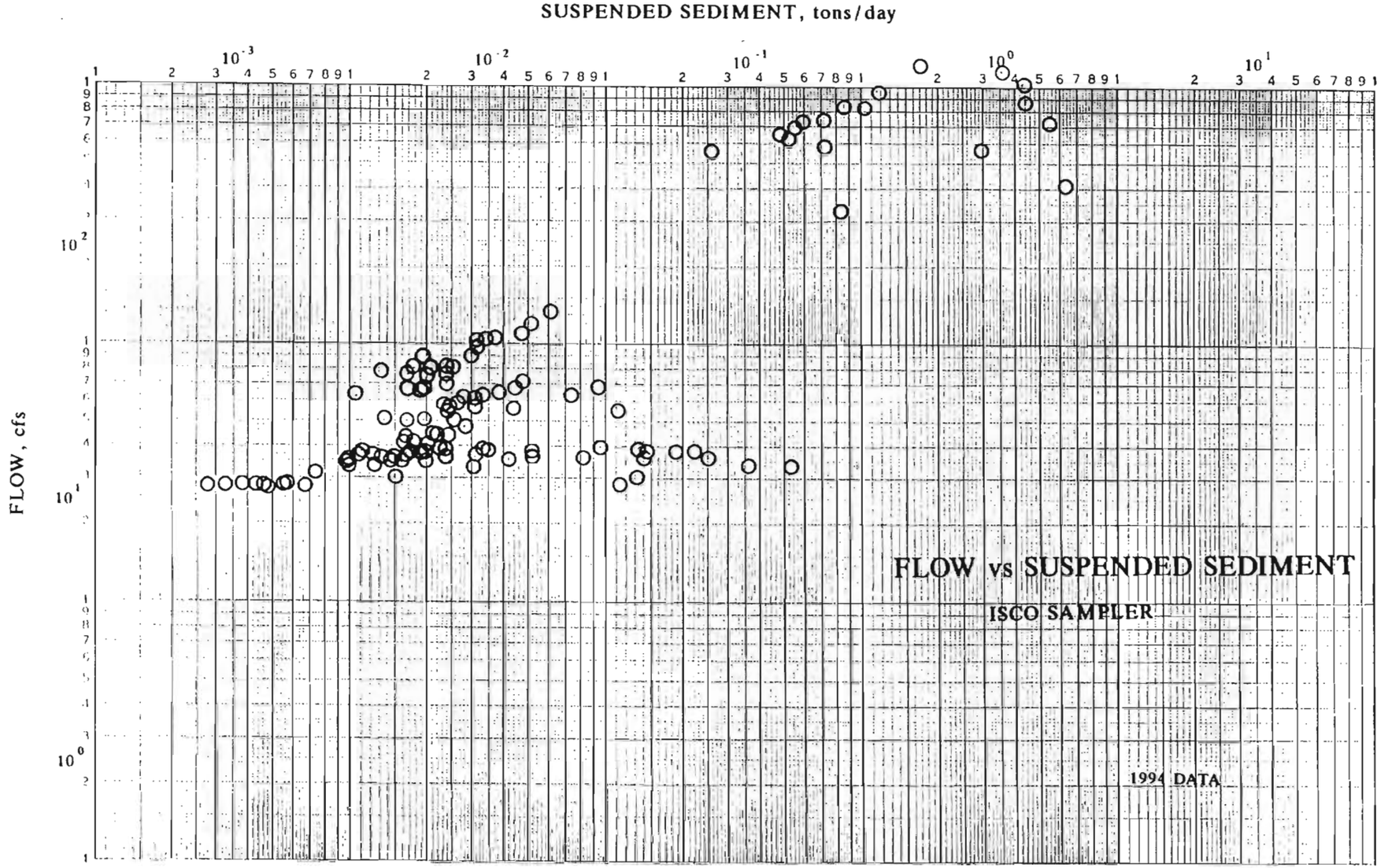


TENDERFOOT CREEK ABOVE SUN CREEK, STATION NO LC7013

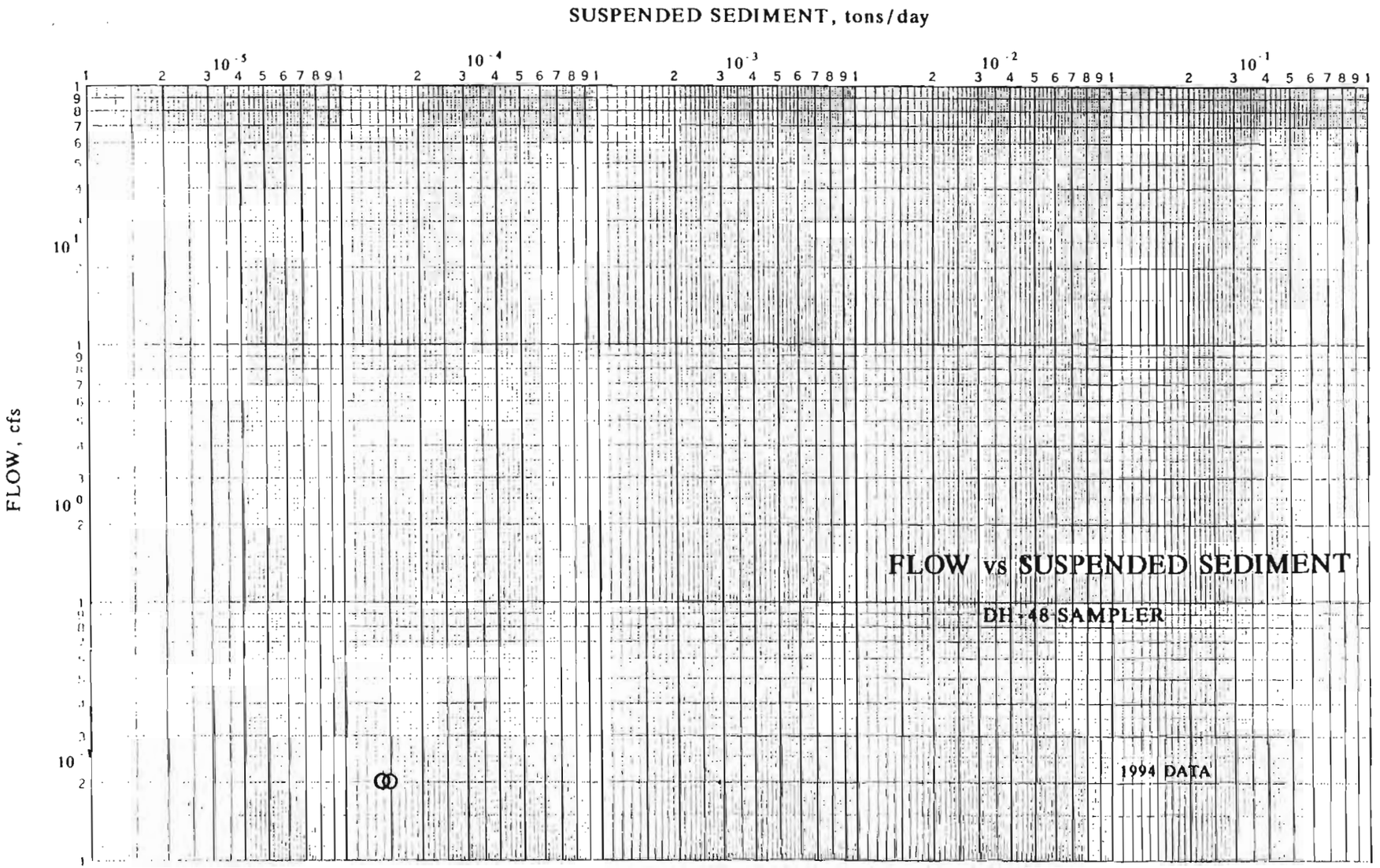

SUSPENDED SEDIMENT, tons/day
FLOW, cfs
FLOW vs SUSPENDED SEDIMENT
ISCO SAMPLER
1994 DATA
TENDERFOOT CREEK ABOVE SUN CREEK, STATION NO LC7013



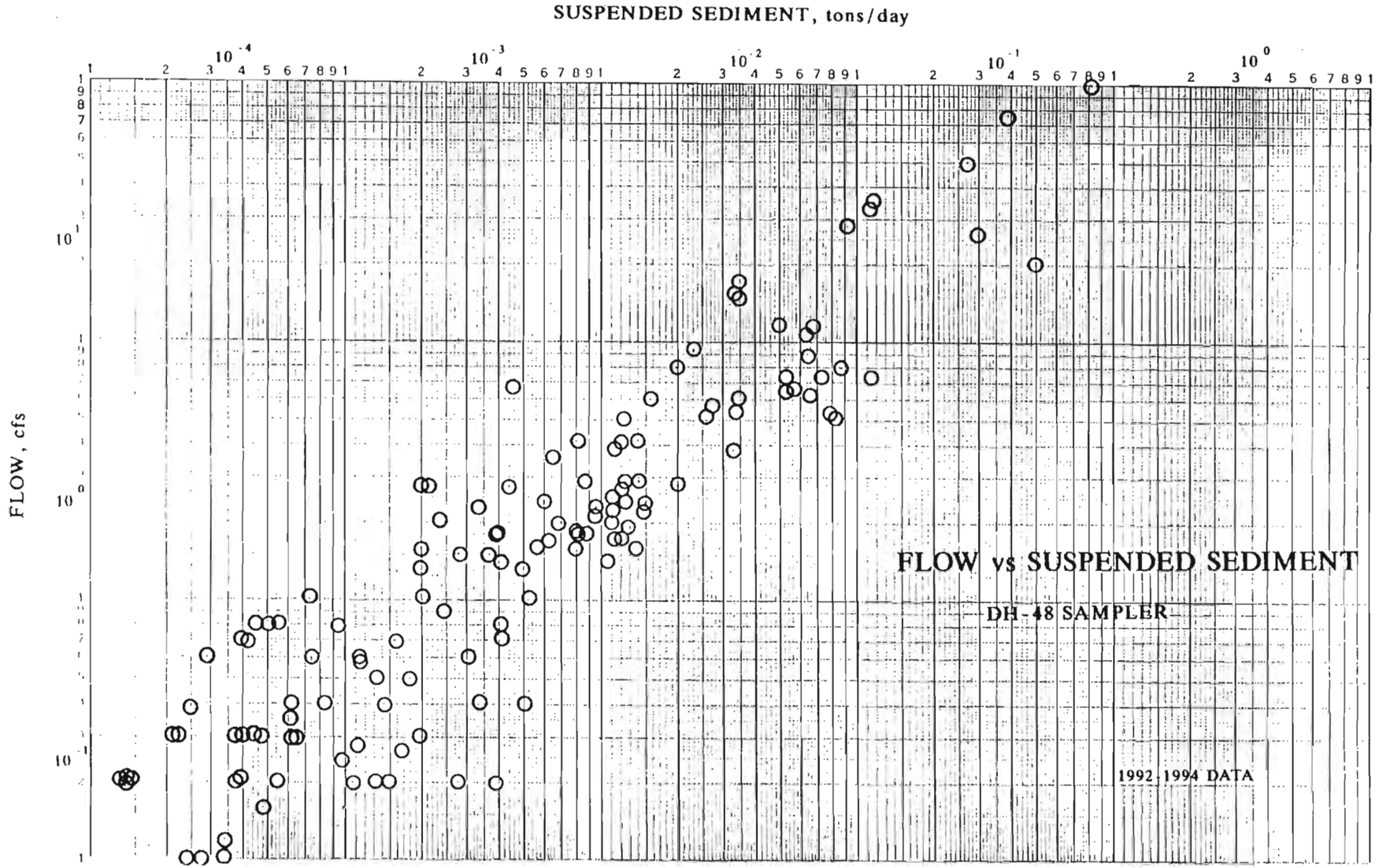
TENDERFOOT CREEK BELOW STRINGER CREEK, STATION NO LC7014



TENDERFOOT CREEK BELOW STRINGER CREEK, STATION NO LC7014



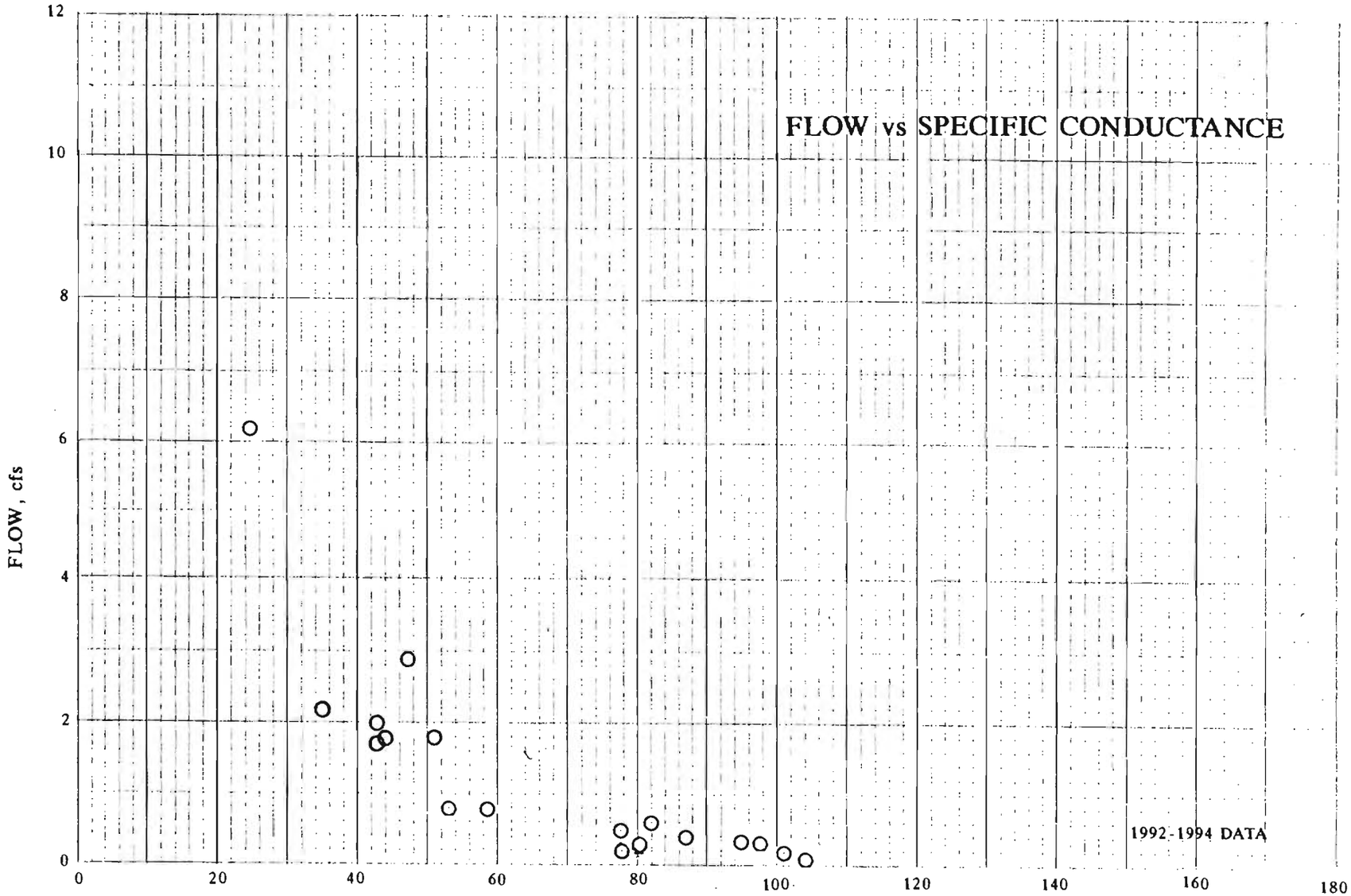
STRINGER CREEK ABOVE EAST FORK, STATION NO LC7015



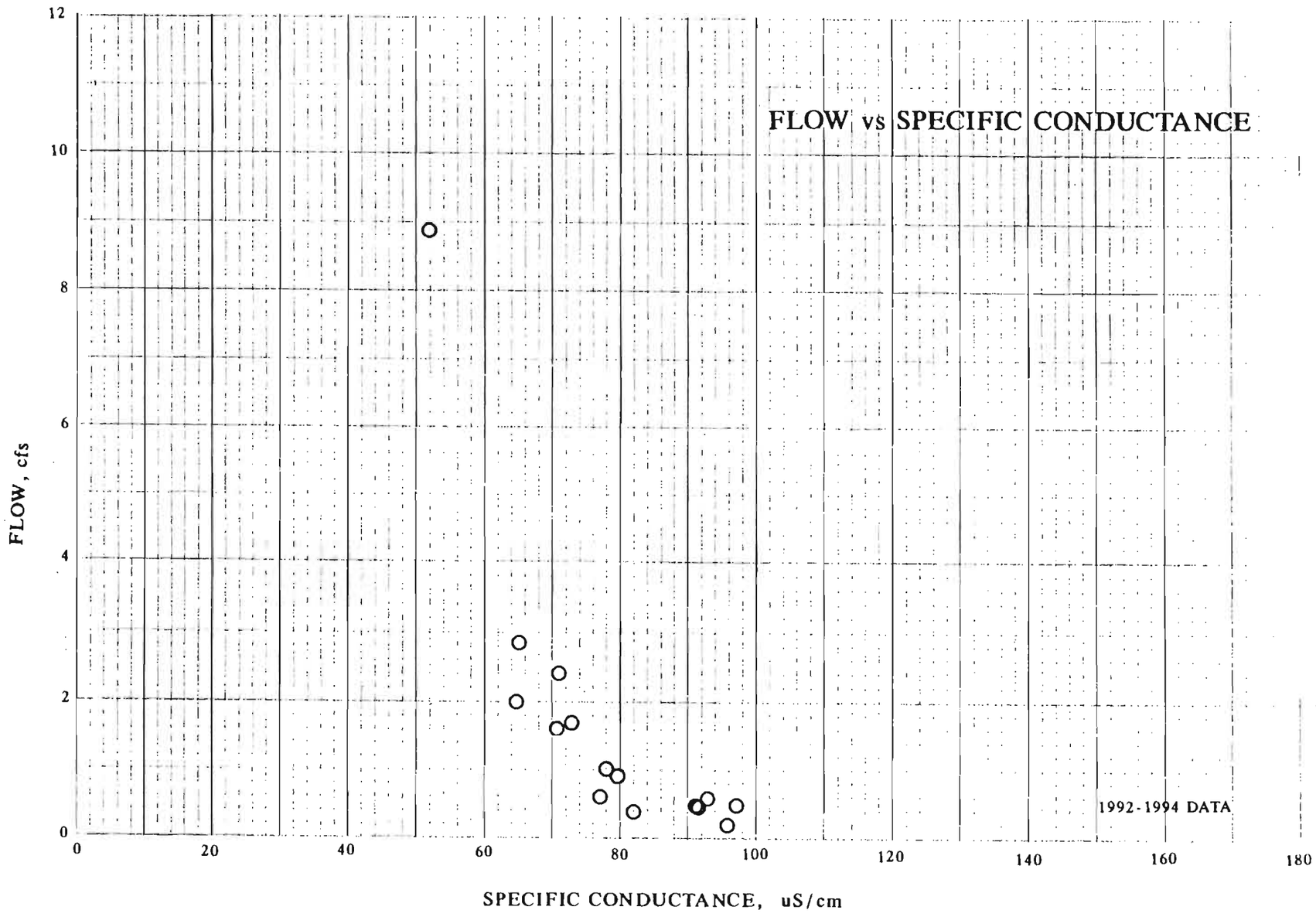
TENDERFOOT CREEK EXPERIMENTAL FOREST, COMPOSITE FROM 10 GAGING STATIONS

Appendix VII. Flow versus specific conductance.

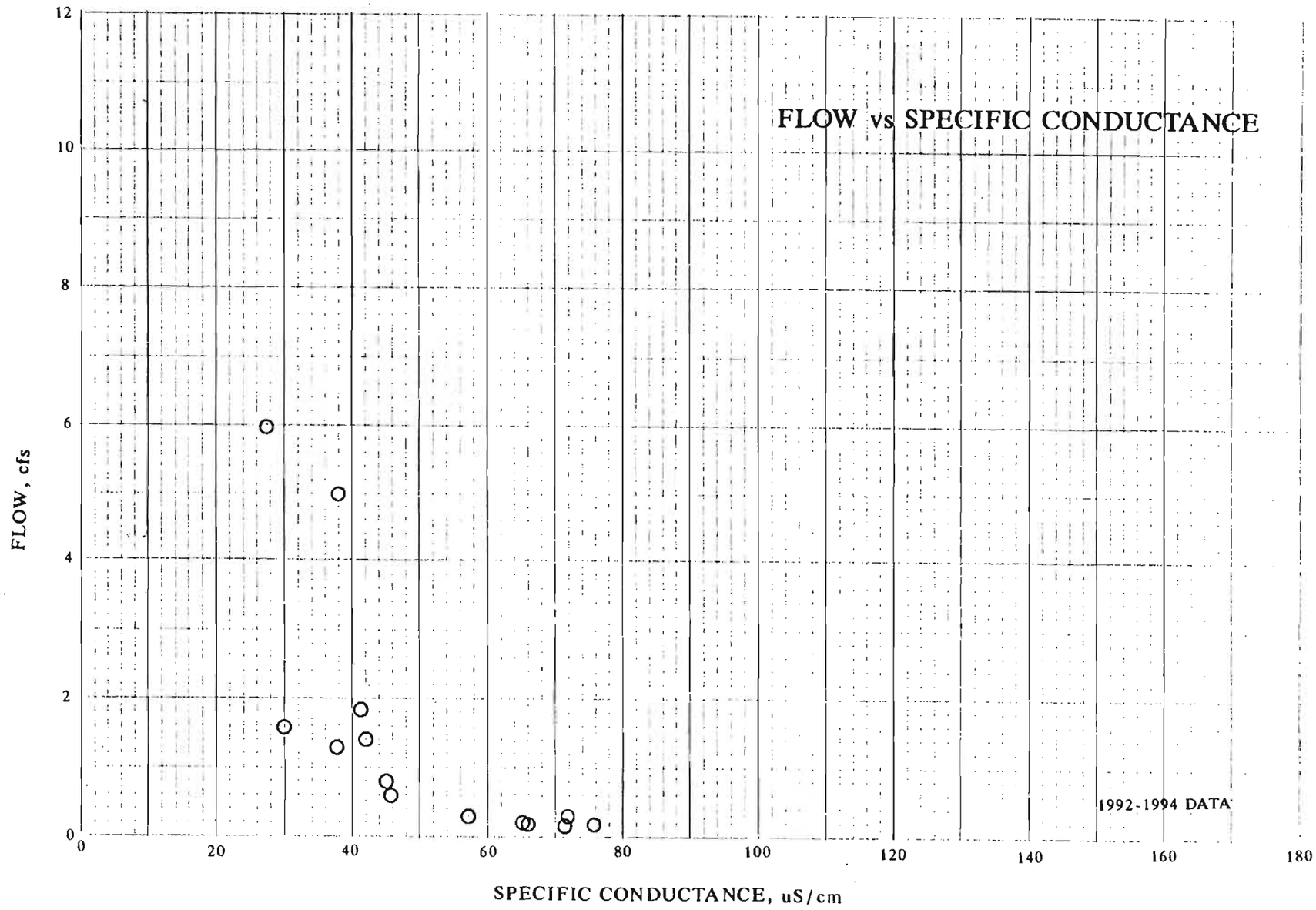
No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek
LC7015	Stringer Creek Above East Fork



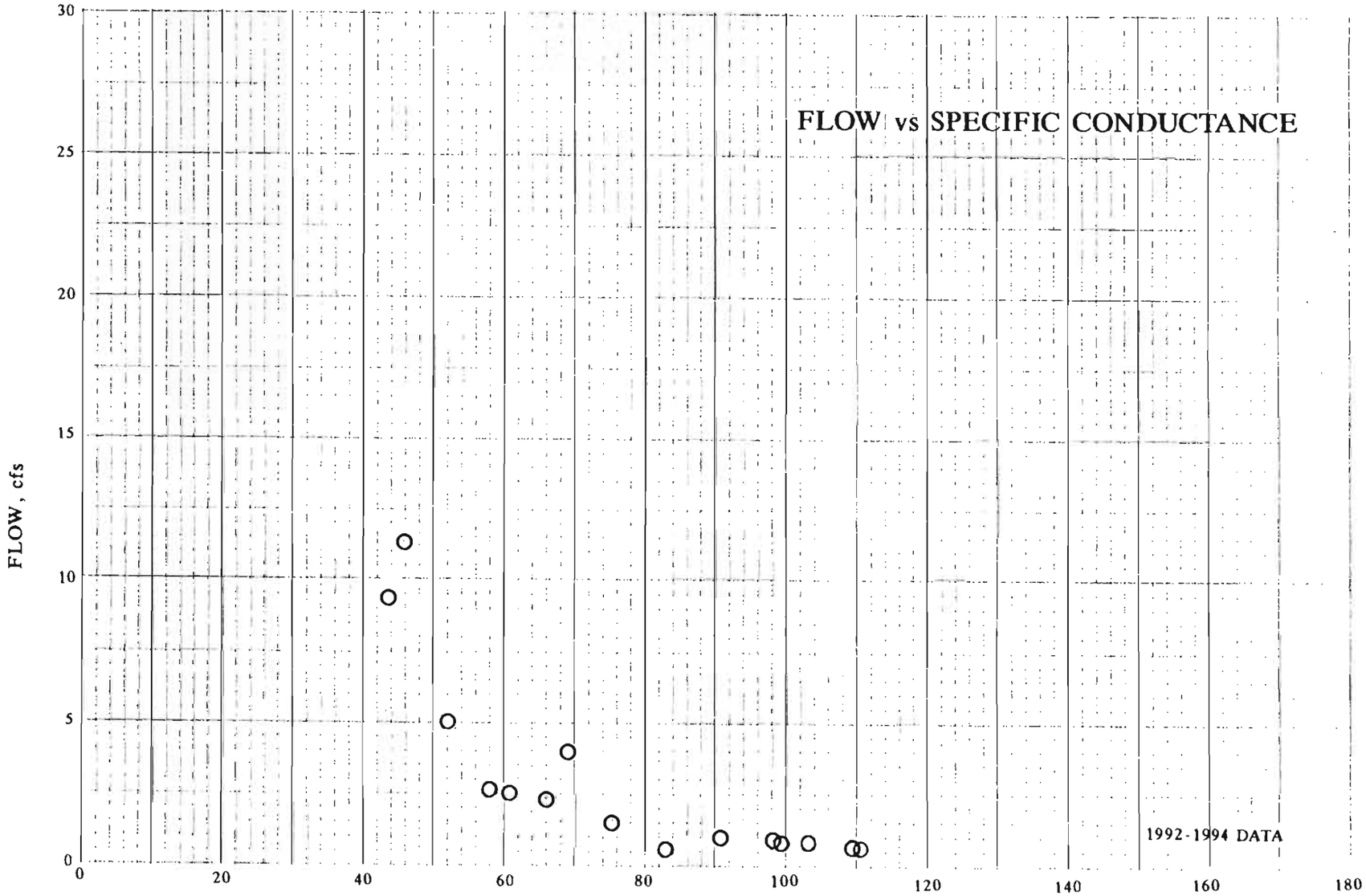
SUN CREEK NEAR MOUTH, STATION NO LC7006



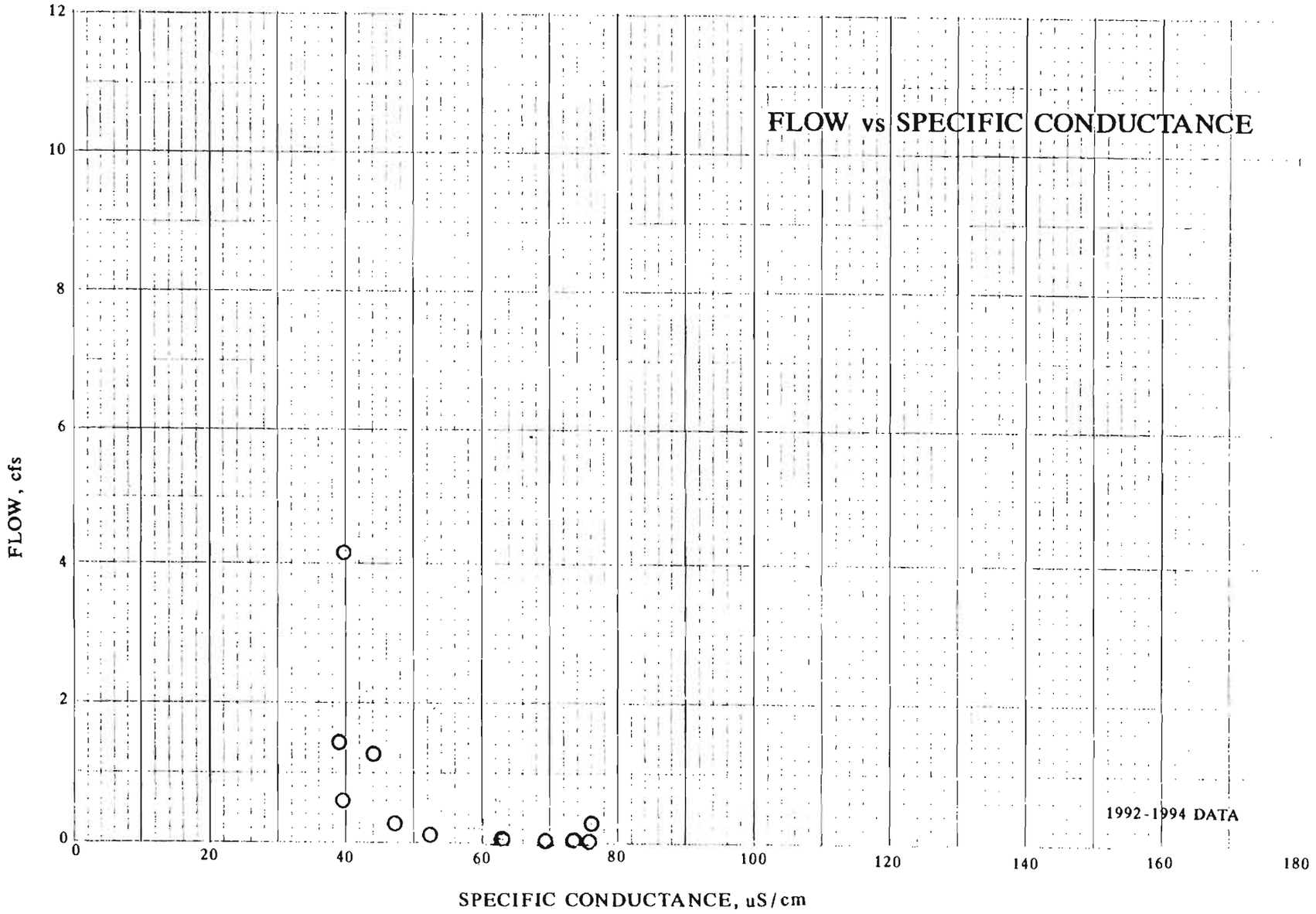
SPRING PARK CREEK NEAR MOUTH, STATION NO LC7007



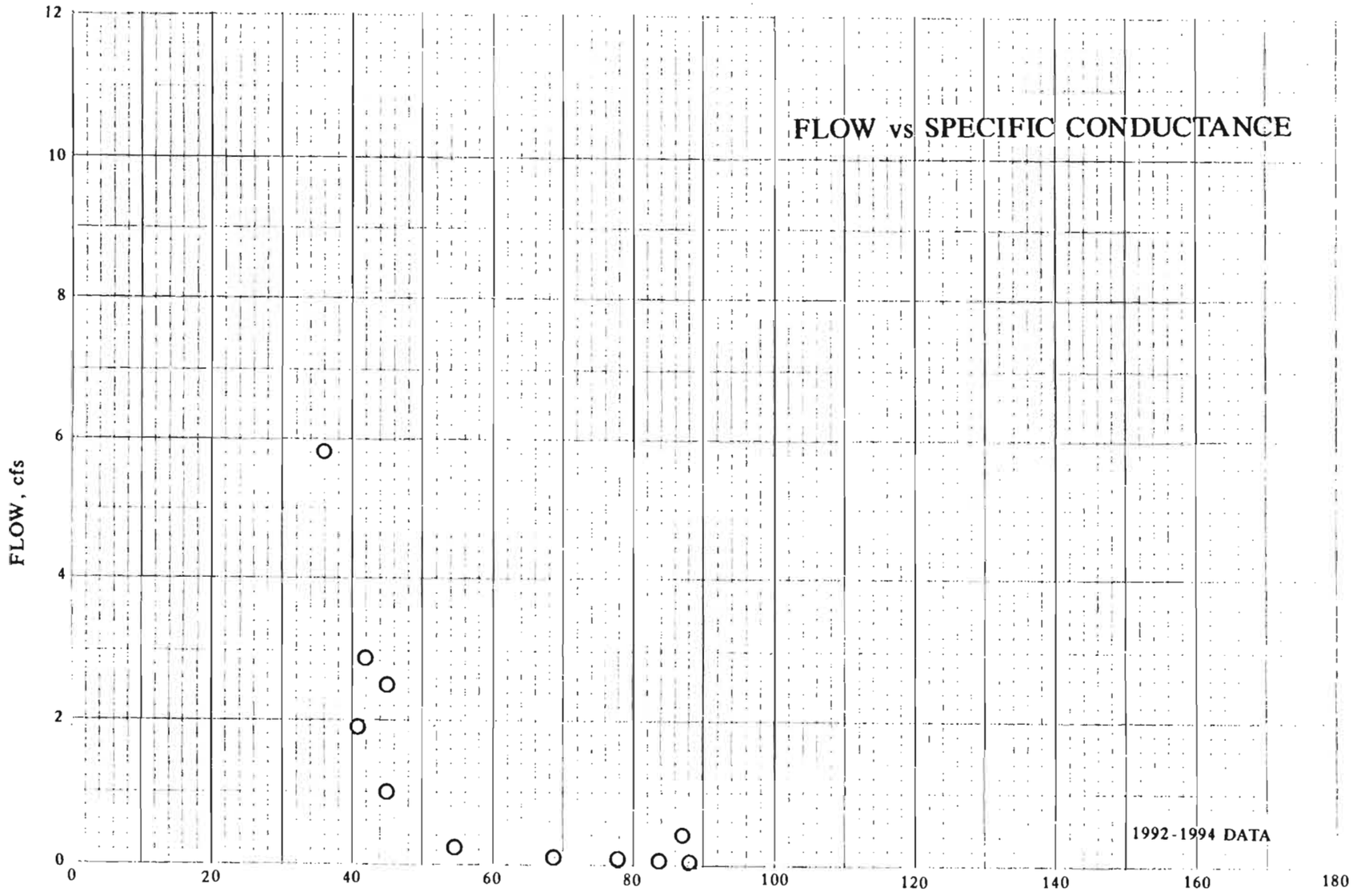
BUBBLING CREEK NEAR MOUTH, STATION NO LC7008



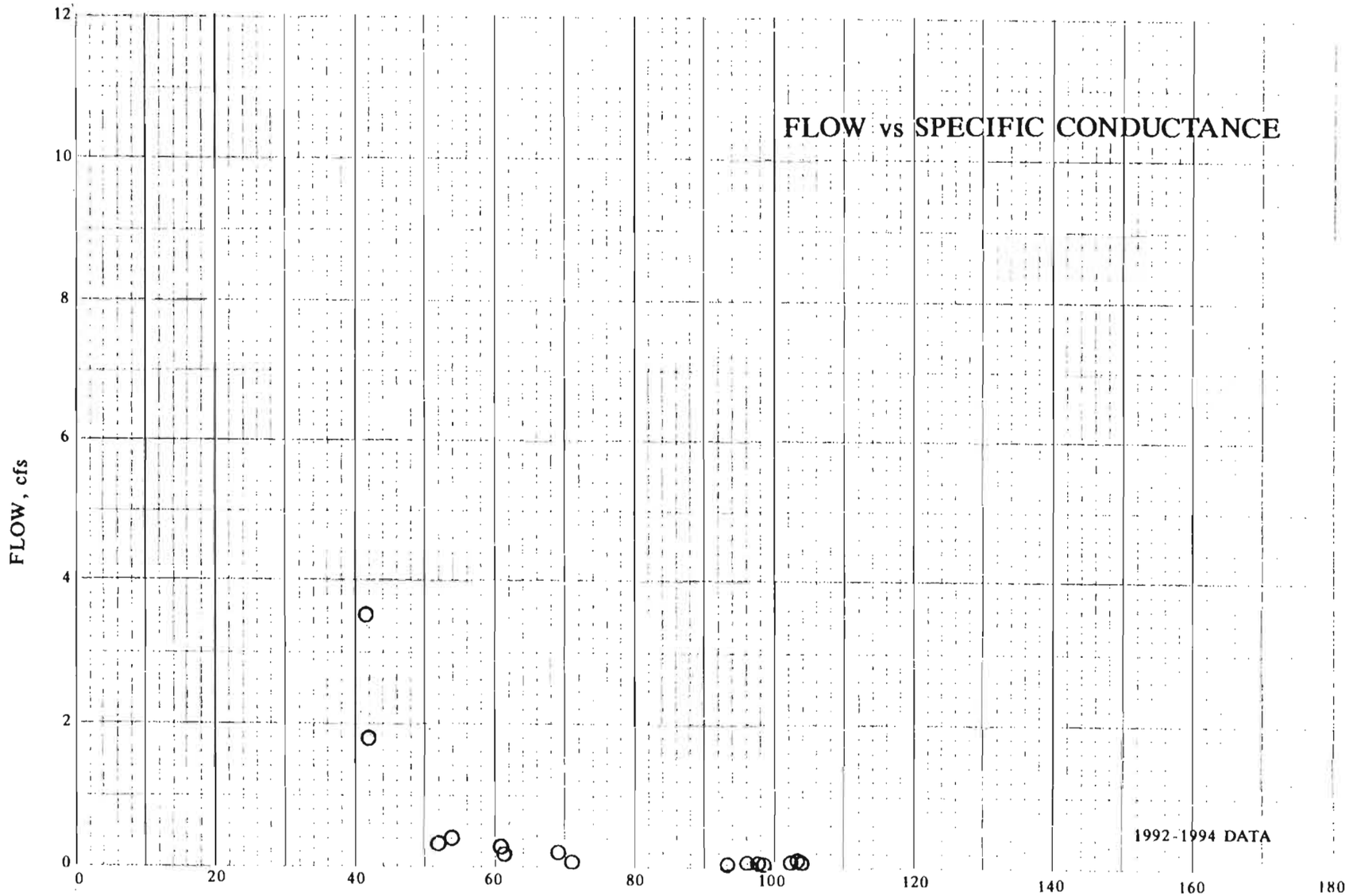
STRINGER CREEK NEAR MOUTH, STATION NO LC7009



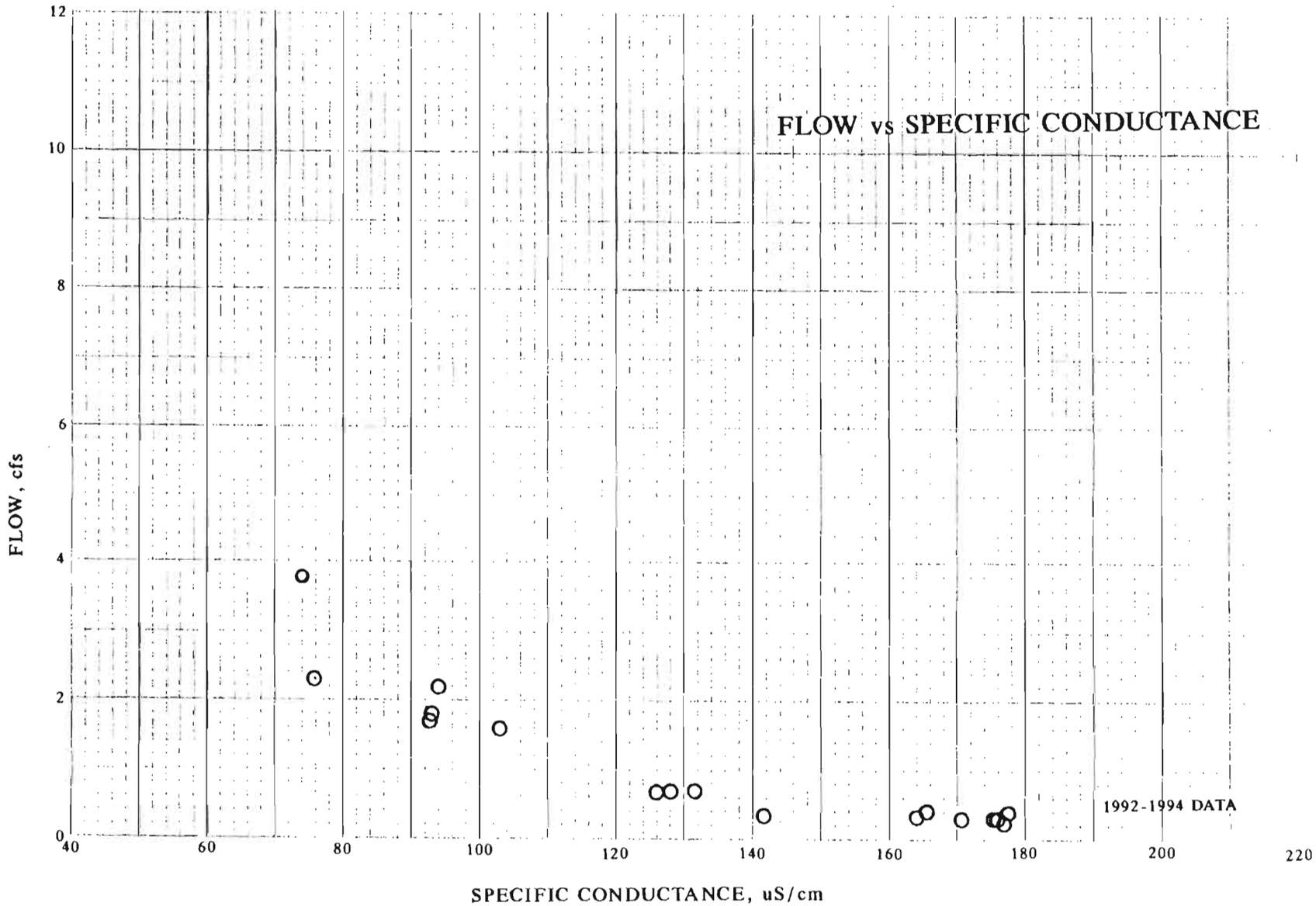
PASSIONATE CREEK NEAR MOUTH, STATION NO LC7011



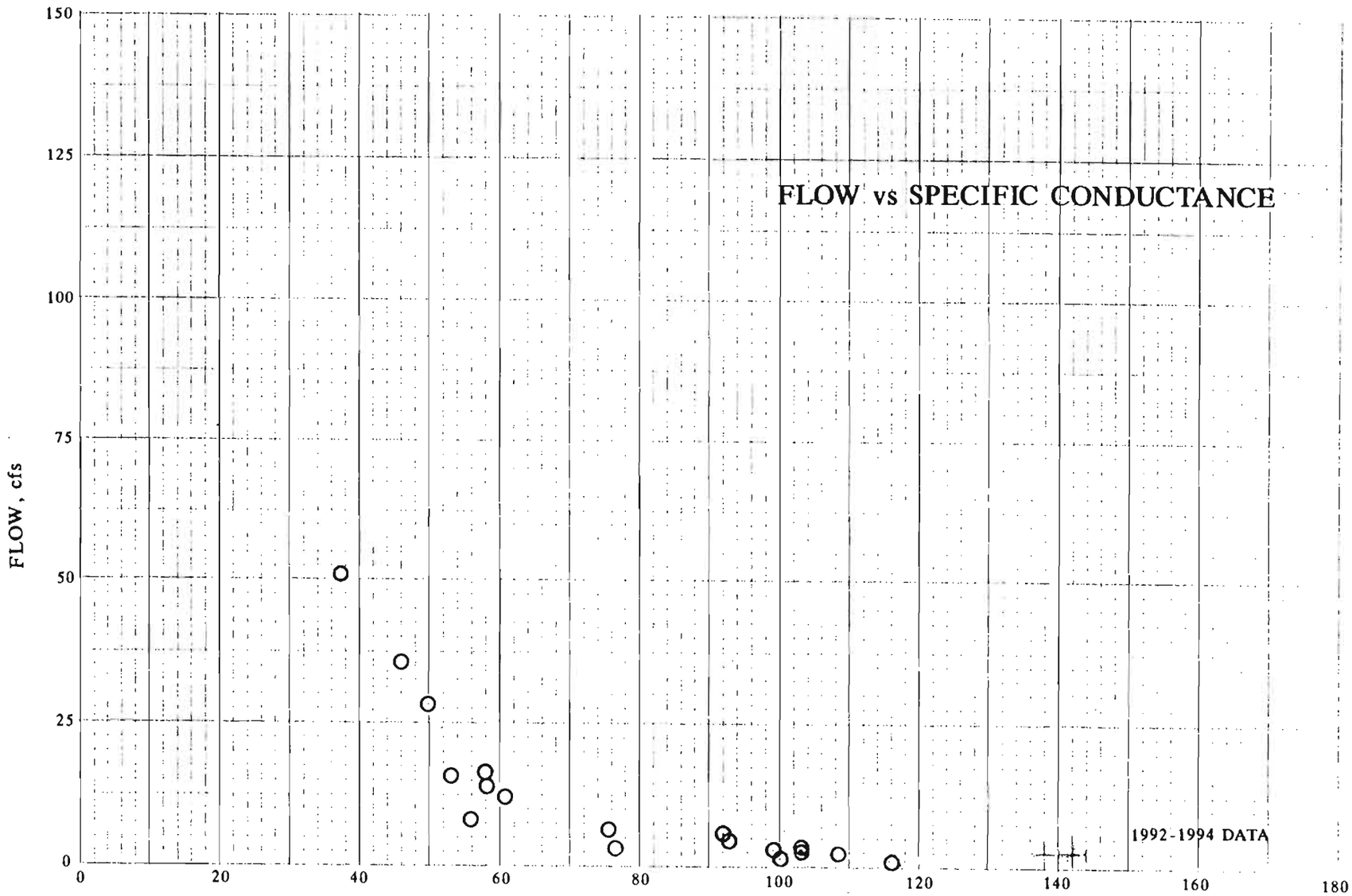
PACK CREEK NEAR MOUTH, STATION NO LC7010



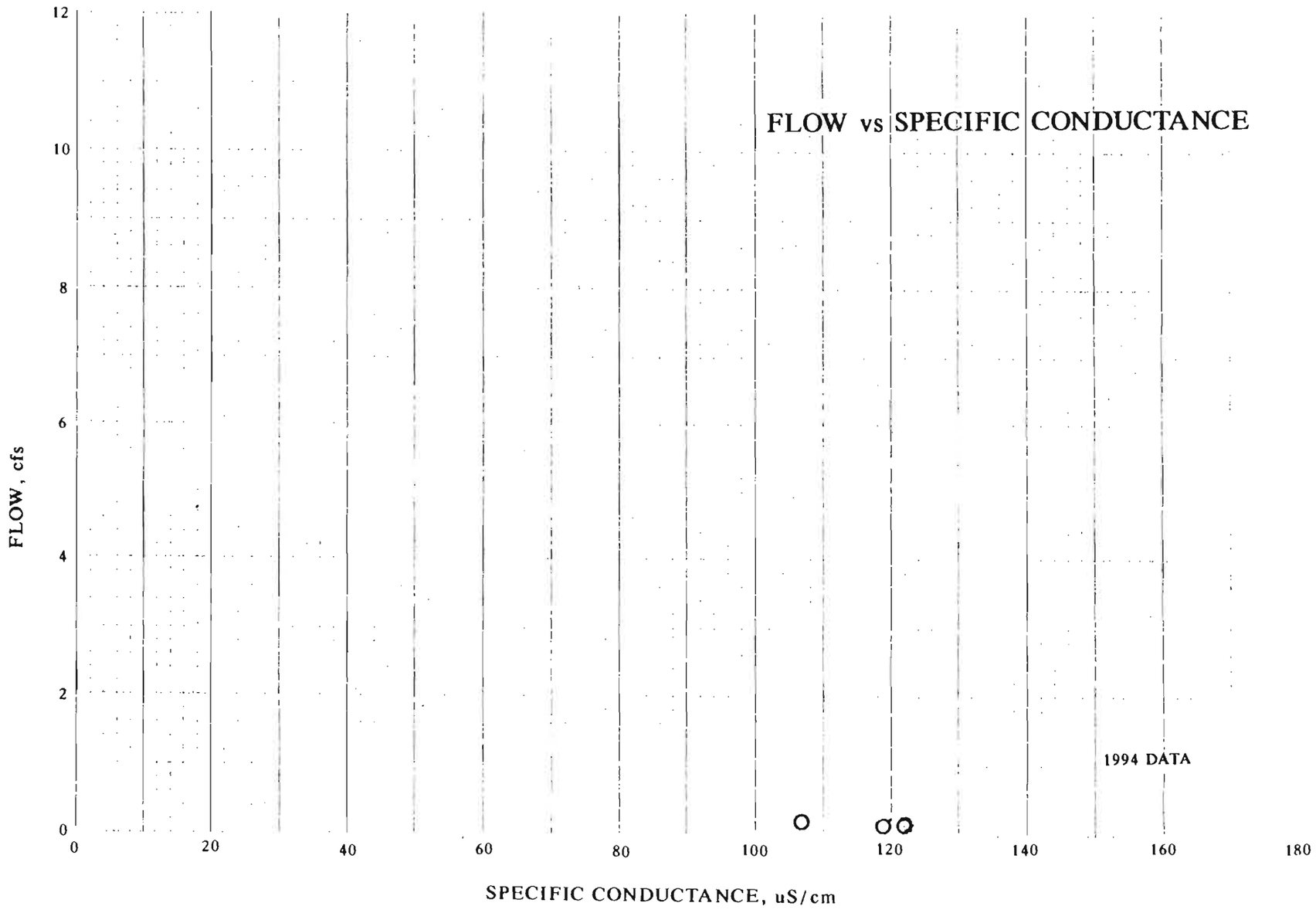
LONESOME CREEK NEAR WILLIAMS PARK, STATION NO LC7012



TENDERFOOT CREEK ABOVE SUN CREEK, STATION NO LC7013



TENDERFOOT CREEK BELOW STRINGER CREEK, STATION NO LC7014



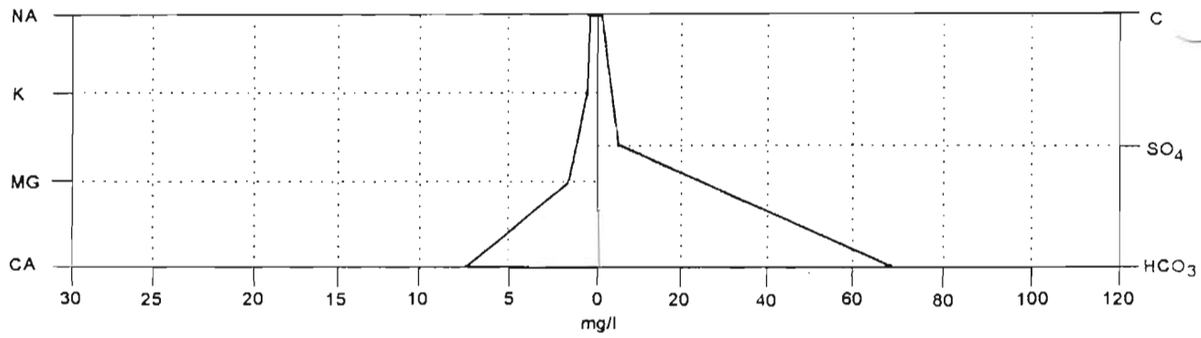
STRINGER CREEK ABOVE EAST FORK, STATION NO LC7015

Appendix VIII. Stiff diagrams.

No.	Station
LC7006	Sun Creek Near Mouth
LC7007	Spring Park Creek Near Mouth
LC7008	Bubbling Creek Near Mouth
LC7009	Stringer Creek Near Mouth
LC7010	Pack Creek Near Mouth
LC7011	Passionate Creek Near Mouth
LC7012	Lonesome Creek Near Williams Park
LC7013	Tenderfoot Creek Above Sun Creek
LC7014	Tenderfoot Creek Below Stringer Creek

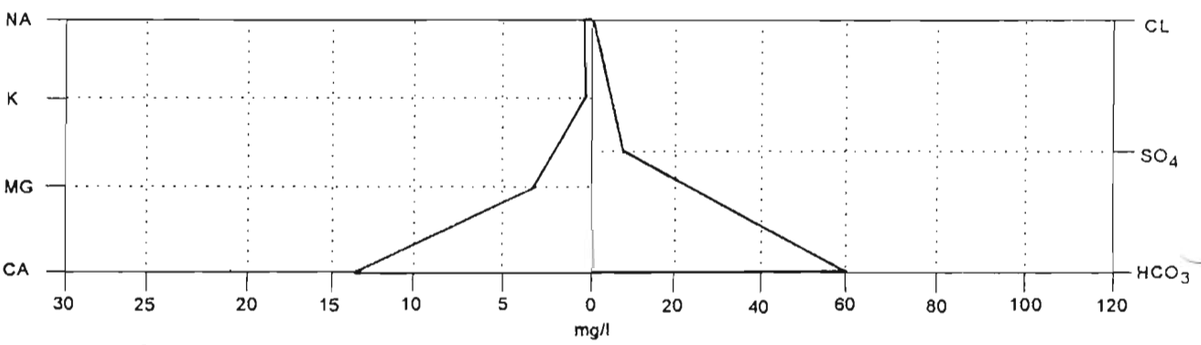
STIFF DIAGRAMS

STATION: SUN CREEK NEAR MOUTH; LC7006



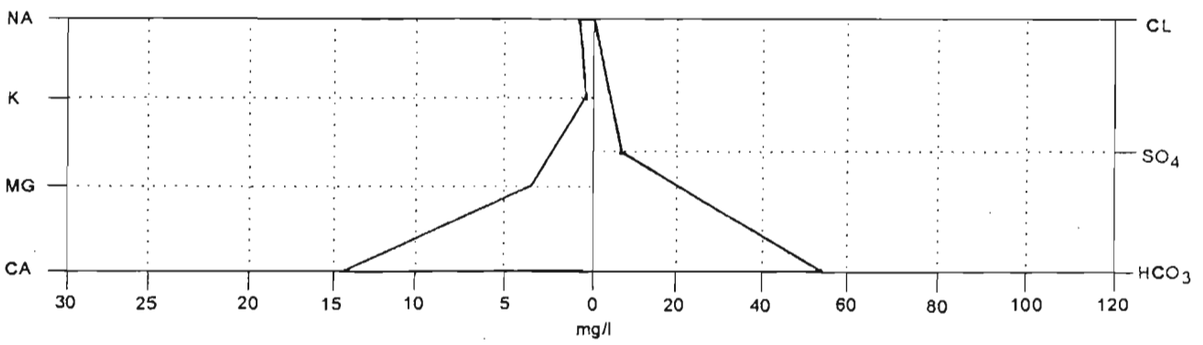
Date: 09/15/92 Flow: 0.2 cfs SC: 78 pH: 7.8

STATION: SUN CREEK NEAR MOUTH; LC7006



Date: 02/17/93 Flow: 0.1 cfs SC: 104 pH: 8.0

STATION: SUN CREEK NEAR MOUTH; LC7006



Date: 04/14/93 Flow: 0.2 cfs SC: 101 pH: 7.9

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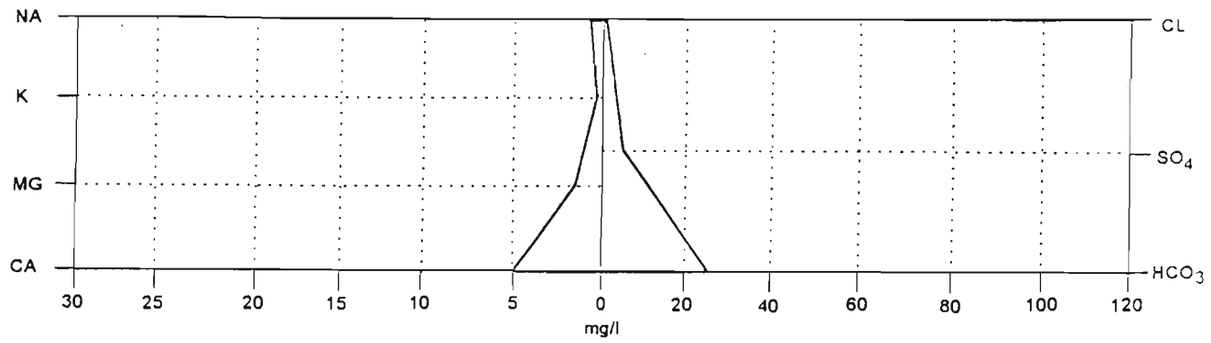
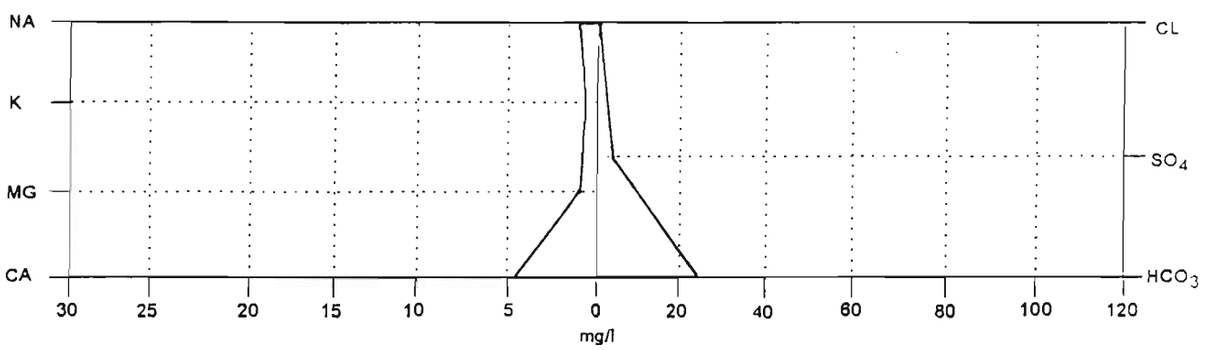
STIFF DIAGRAMS

STATION: SUN CREEK NEAR MOUTH; LC7006



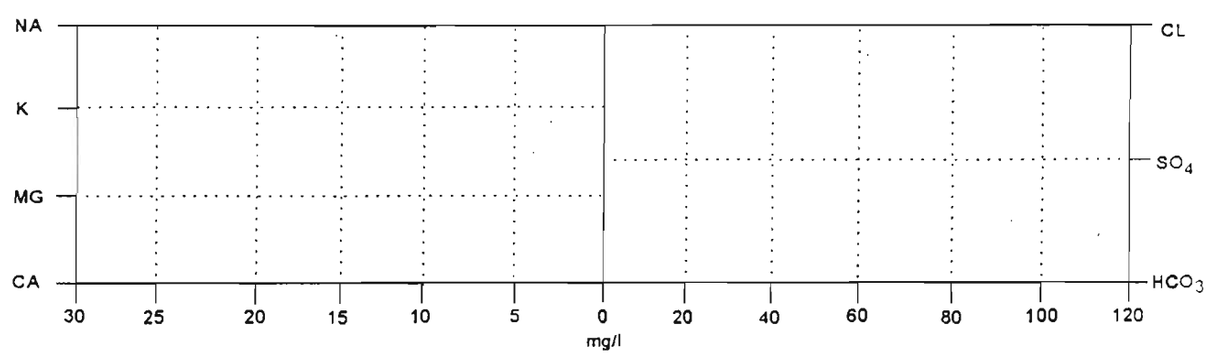
Date: 08/27/93 Flow: 2.0 cfs SC: 43 pH: 7.6

STATION: SUN CREEK NEAR MOUTH; LC7006



Date: 09/24/93 Flow: 1.8 cfs SC: 44 pH: 7.5

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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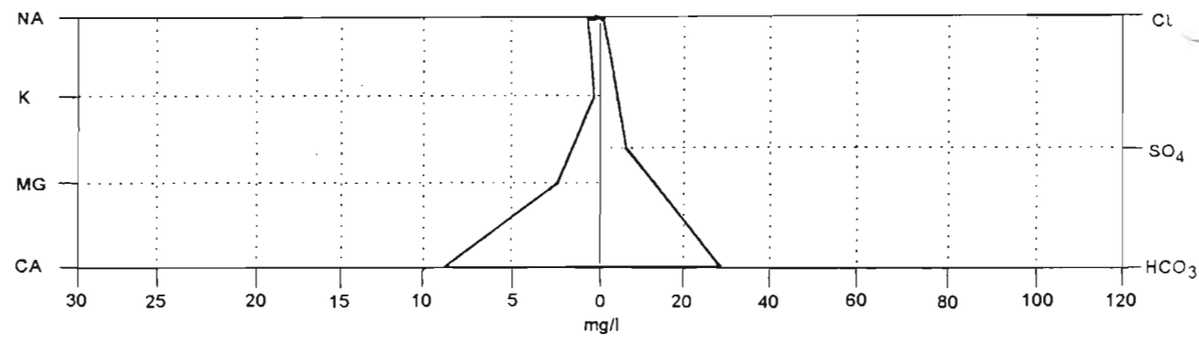
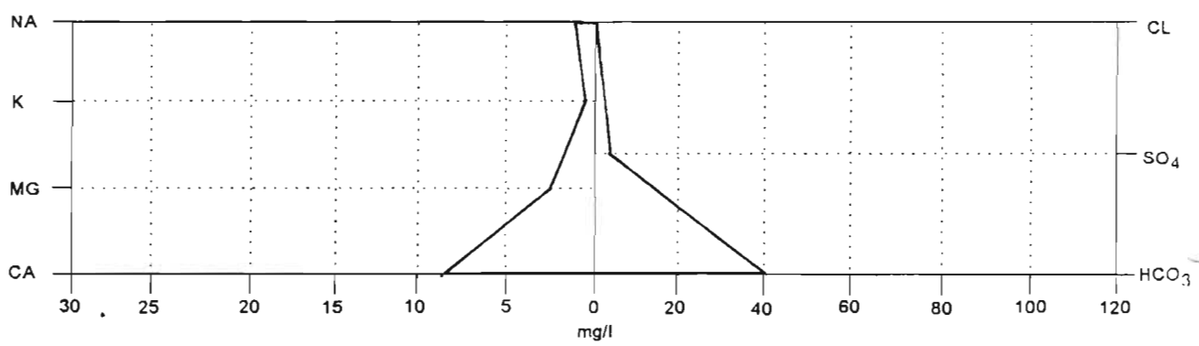
STIFF DIAGRAMS

STATION: SPRING PARK CREEK NEAR MOUTH; LC7007



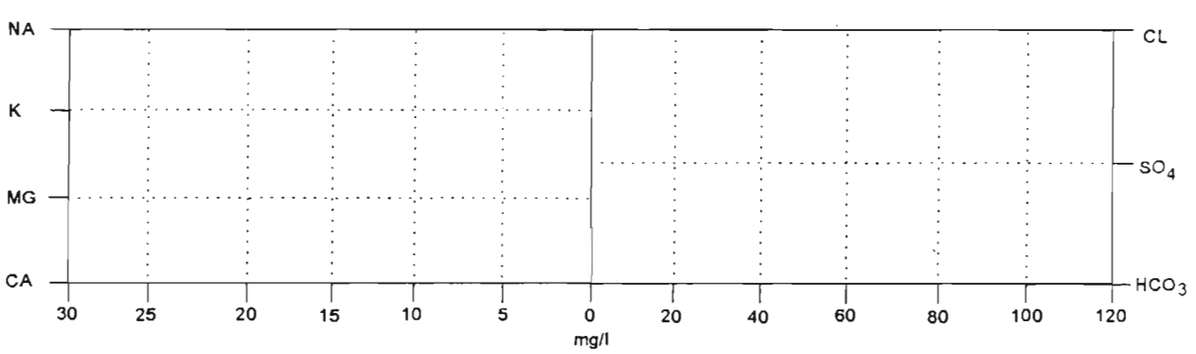
Date: 09/15/92 Flow: 0.2 cfs SC: 96 pH: 8.0

STATION: SPRING PARK CREEK NEAR MOUTH; LC7007



Date: 09/24/93 Flow: 1.7 cfs SC: 73 pH: 7.8

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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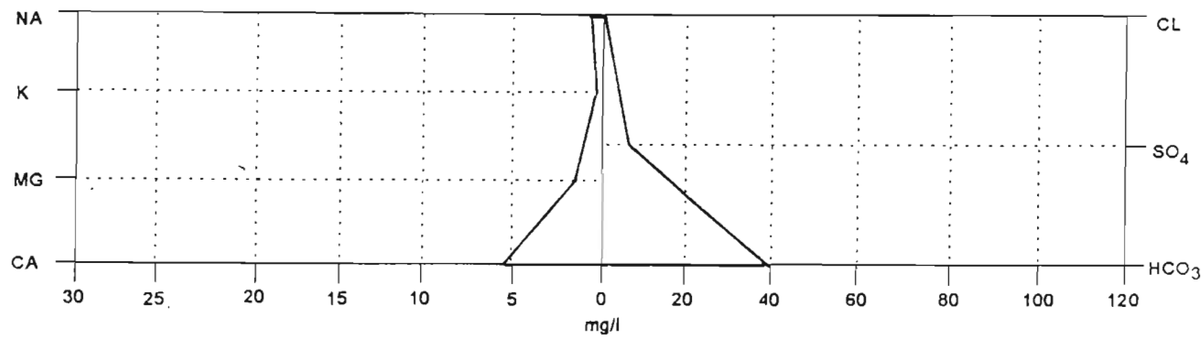
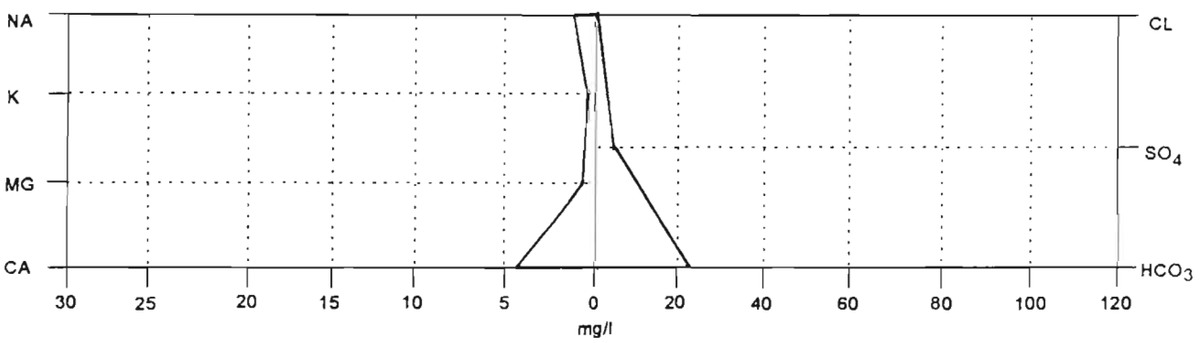
STIFF DIAGRAMS

STATION: BUBBLING CREEK NEAR MOUTH; LC7008



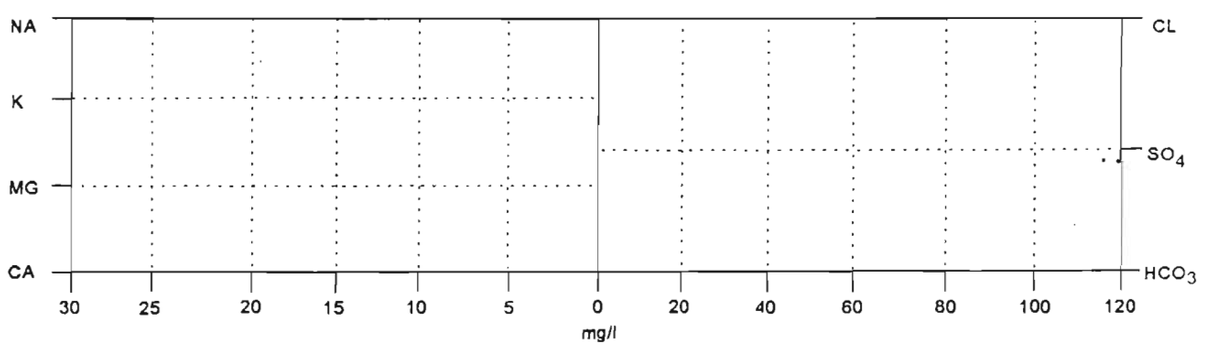
Date: 09/15/92 Flow: 0.3 cfs SC: 72 pH: 7.9

STATION: BUBBLING CREEK NEAR MOUTH; LC7008



Date: 09/24/93 Flow: 1.4 cfs SC: 42 pH: 7.6

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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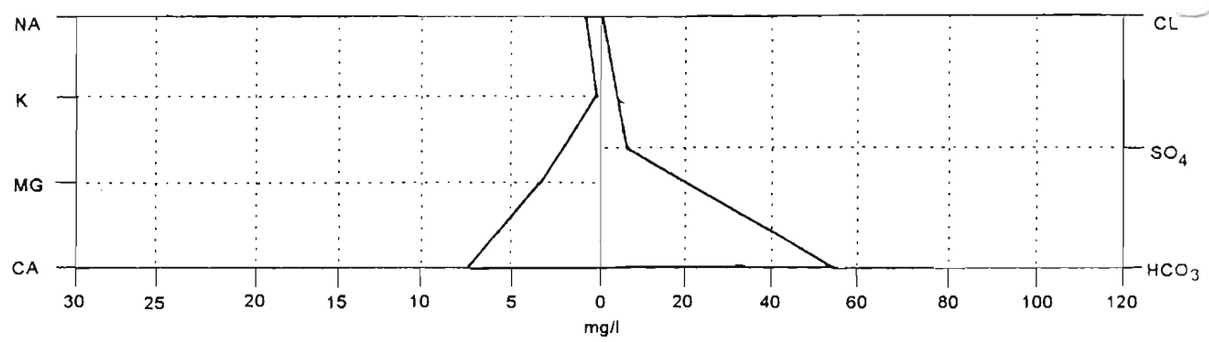
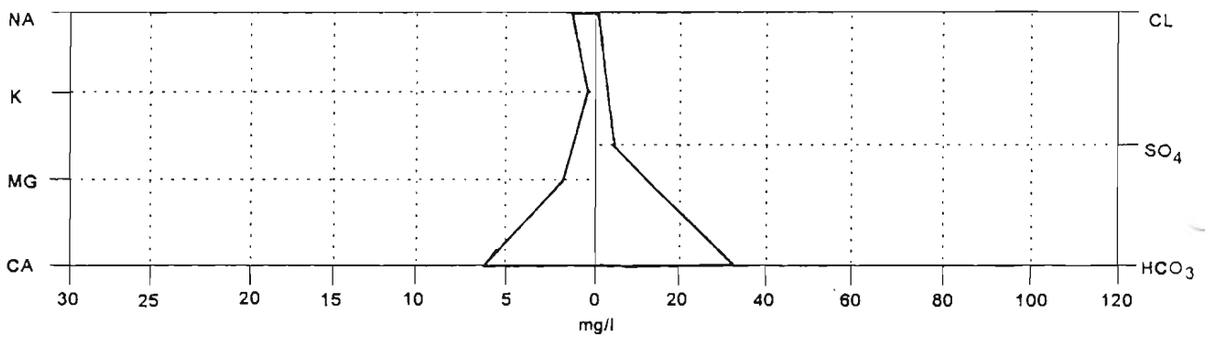
STIFF DIAGRAMS

STATION: STRINGER CREEK NEAR MOUTH; LC7009



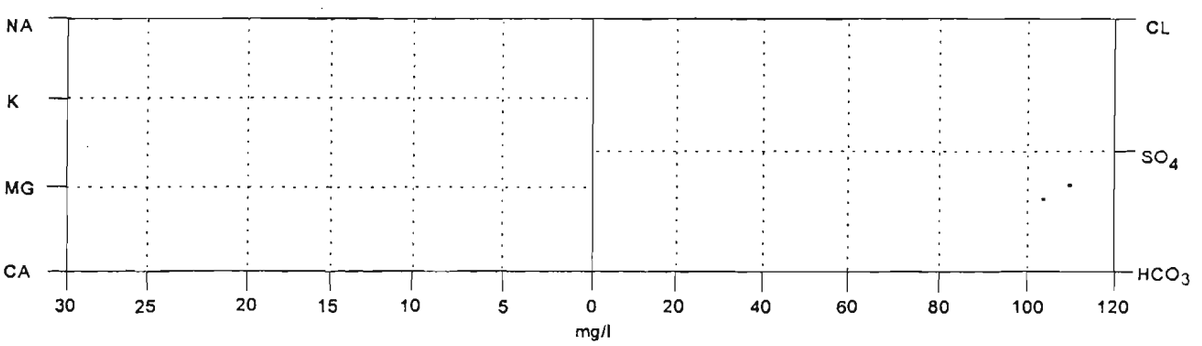
Date: 09/15/92 Flow: 0.8 cfs SC: 98 pH: 8.0

STATION: STRINGER CREEK NEAR MOUTH; LC7009



Date: 09/24/93 Flow: 4.0 cfs SC: 69 pH: 7.7

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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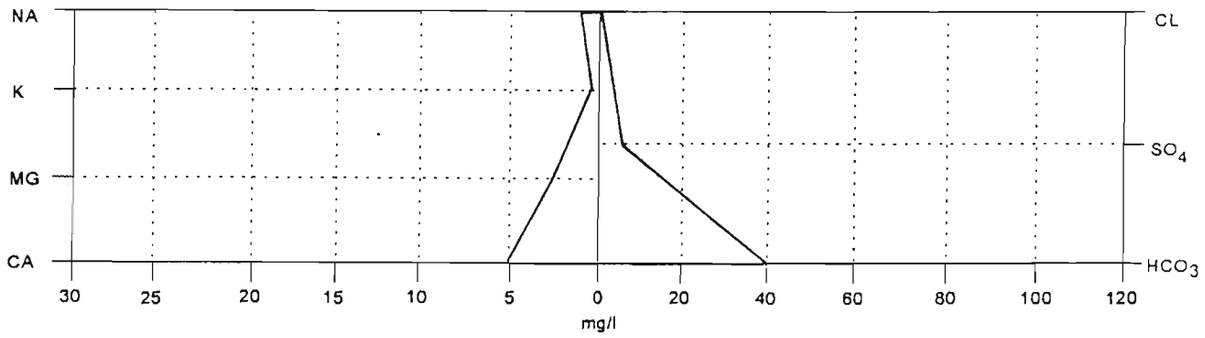
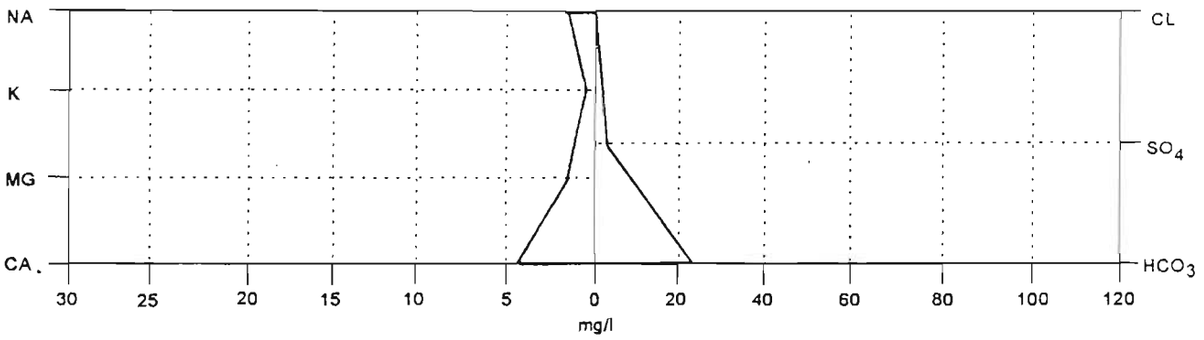
STIFF DIAGRAMS

STATION: PACK CREEK NEAR MOUTH; LC7010



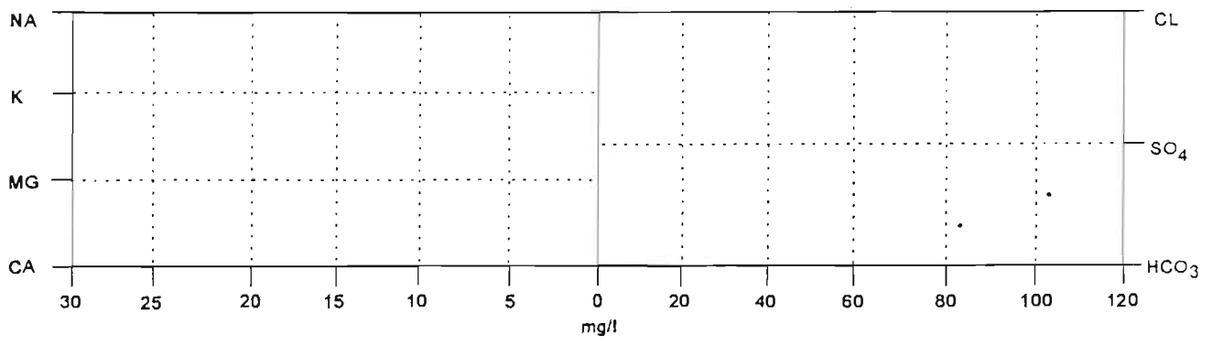
Date: 09/15/92 Flow: 0.4 cfs SC: 87 pH: 7.8

STATION: PACK CREEK NEAR MOUTH; LC7010



Date: 09/24/93 Flow: 2.4 cfs SC: 45 pH: 7.7

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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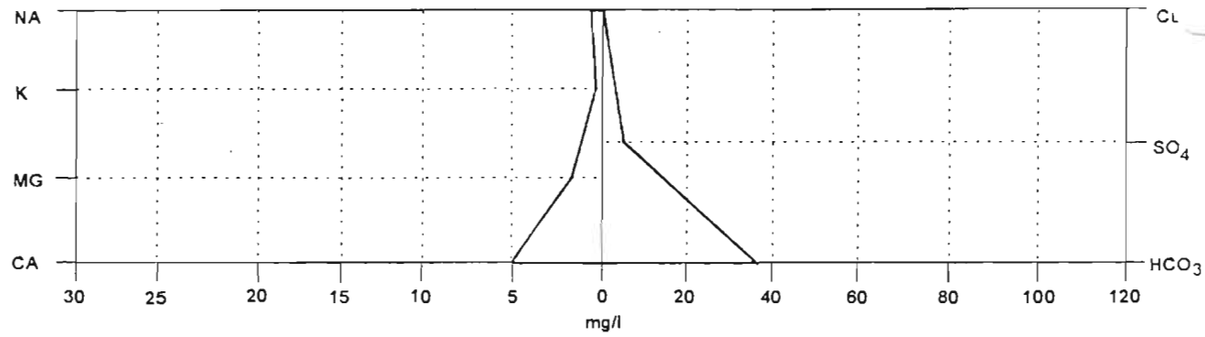
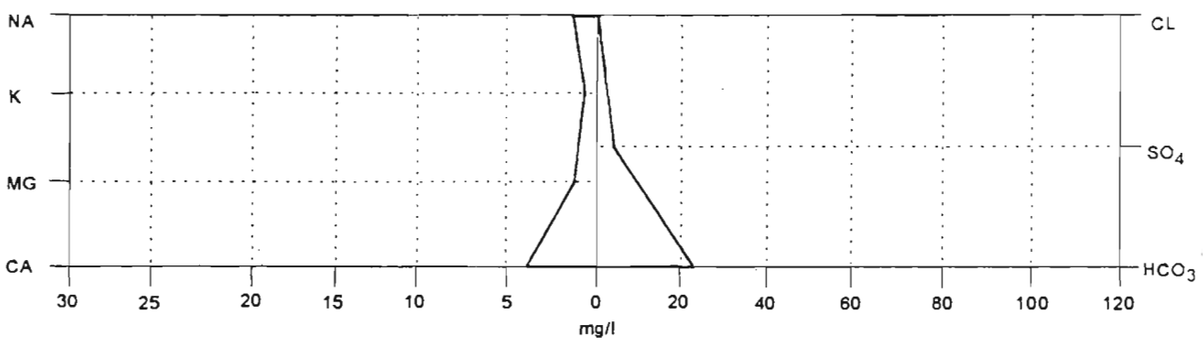
STIFF DIAGRAMS

STATION: PASSIONATE CREEK NEAR MOUTH; LC7011



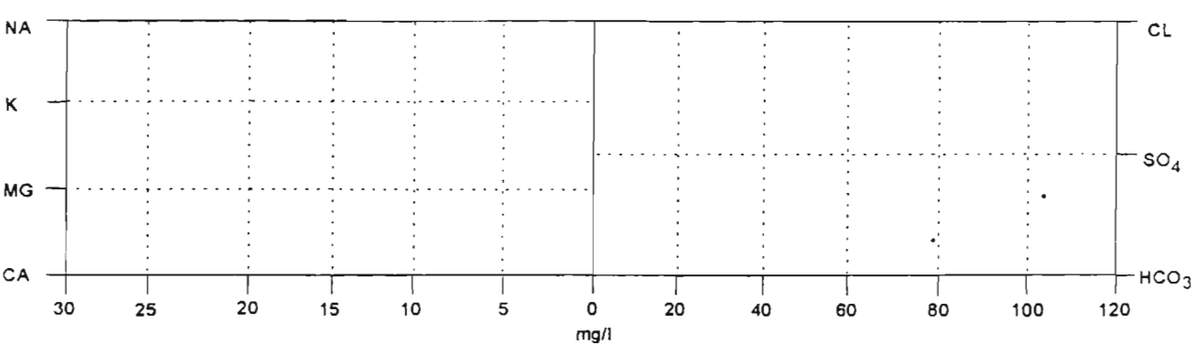
Date: 09/15/92 Flow: 0.30 cfs SC: 76 pH: 7.8

STATION: PASSIONATE CREEK NEAR MOUTH; LC7011



Date: 09/24/93 Flow: 1.33 cfs SC: 44 pH: 7.6

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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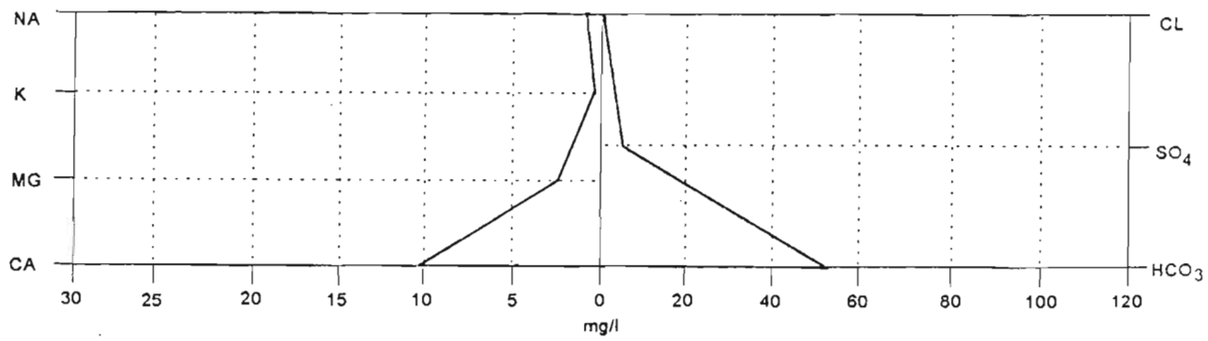
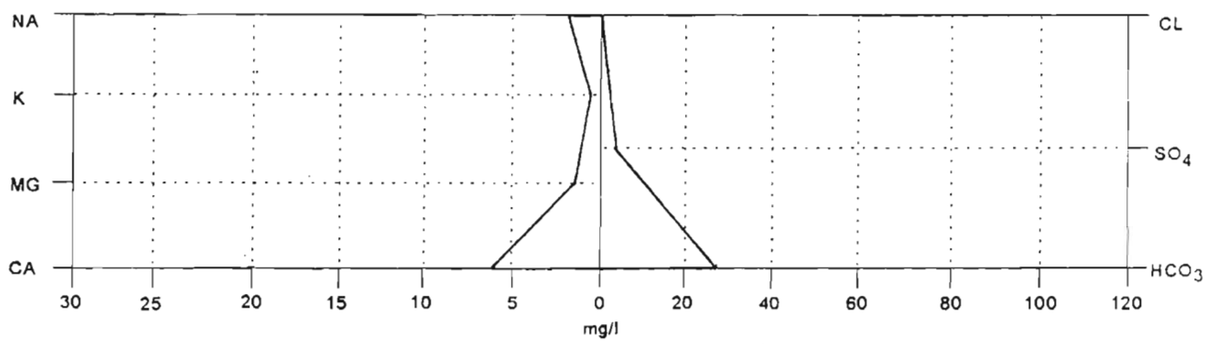
STIFF DIAGRAMS

STATION: LONESOME CREEK NEAR WILLIAMS PARK; LC7012



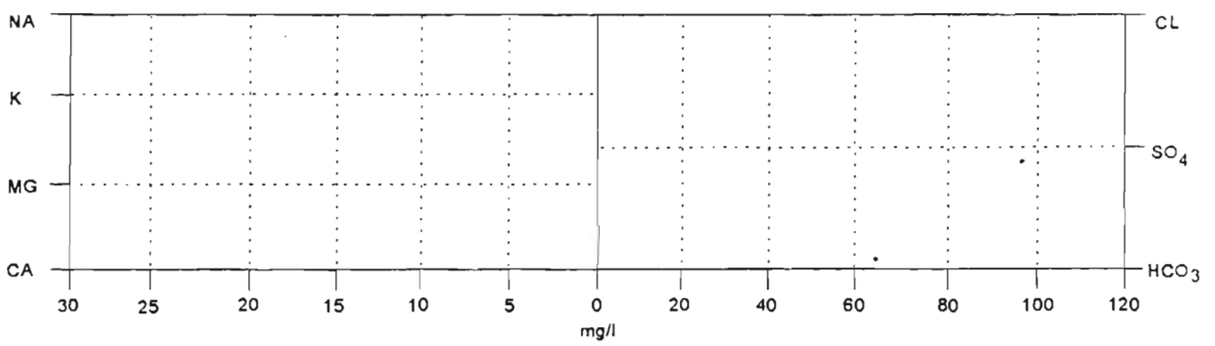
Date: 09/15/92 Flow: 0.05 cfs SC: 98 pH: 8.0

STATION: LONESOME CREEK NEAR WILLIAMS PARK; LC7012



Date: 09/24/93 Flow: 0.36 cfs SC: 52 pH: 7.6

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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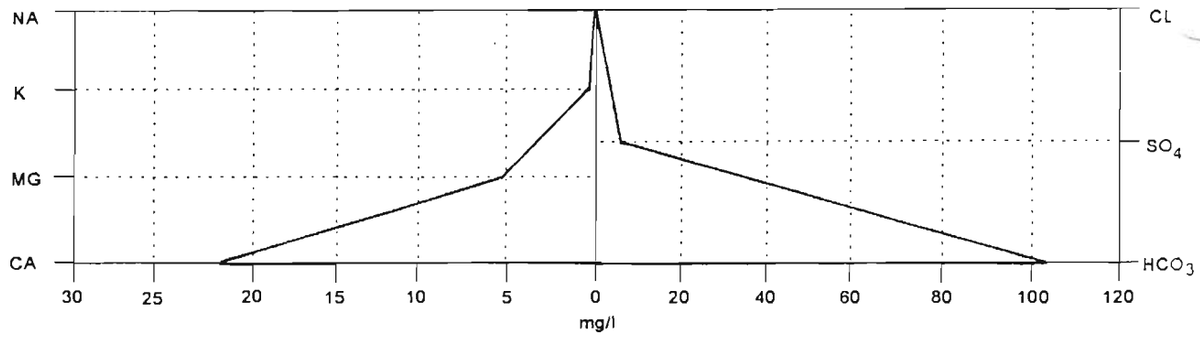
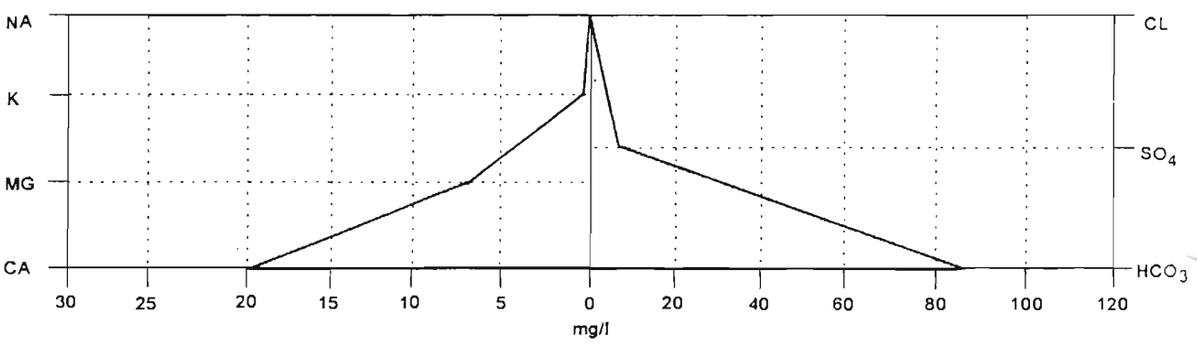
STIFF DIAGRAMS

STATION: TENDERFOOT CREEK ABOVE SUN CREEK; LC7013



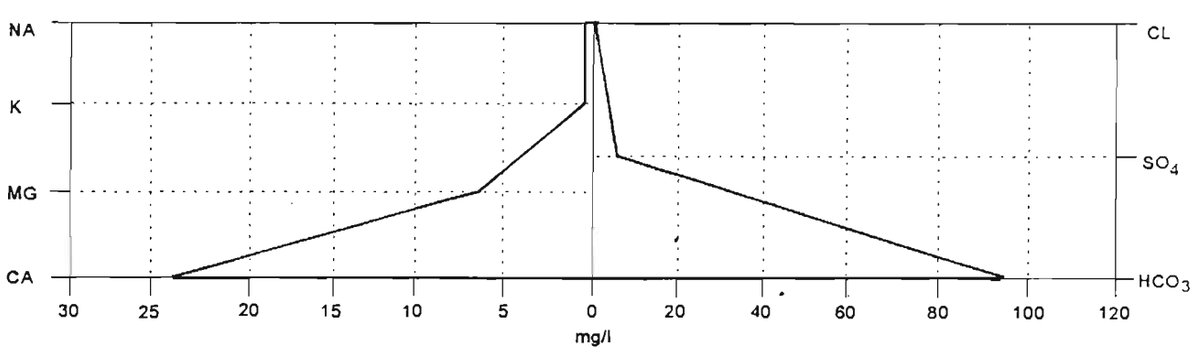
Date: 09/15/92 Flow: 0.3 cfs SC: 176 pH: 8.2

STATION: TENDERFOOT CREEK ABOVE SUN CREEK; LC7013



Date: 02/17/93 Flow: 0.2 cfs SC: 177 pH: 8.2

STATION: TENDERFOOT CREEK ABOVE SUN CREEK; LC7013



Date: 04/14/93 Flow: 0.3 cfs SC: 164 pH: 8.1

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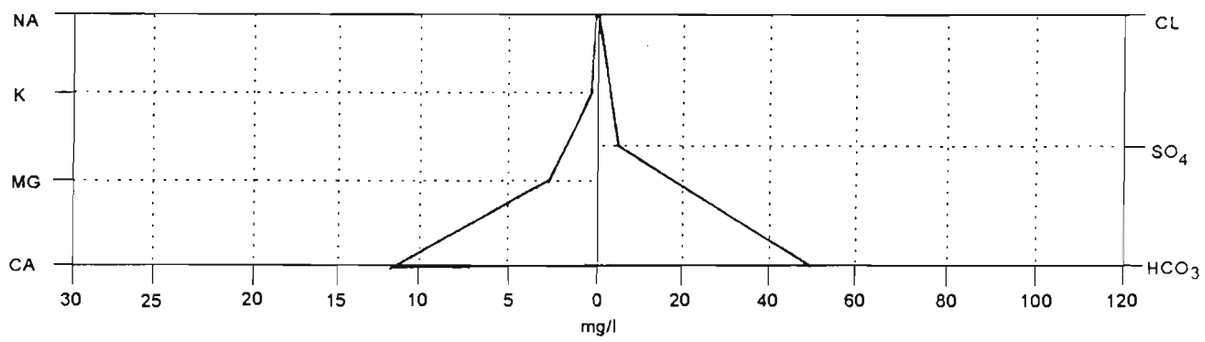
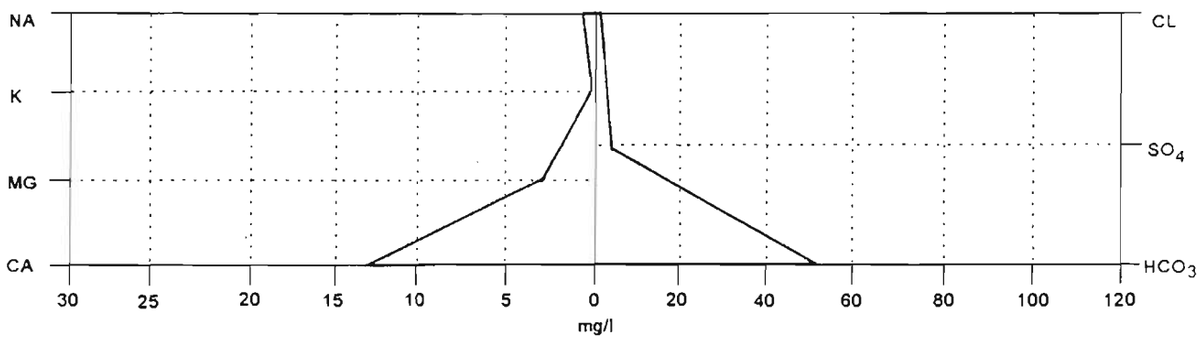
STIFF DIAGRAMS

STATION: TENDERFOOT CREEK ABOVE SUN CREEK; LC7013



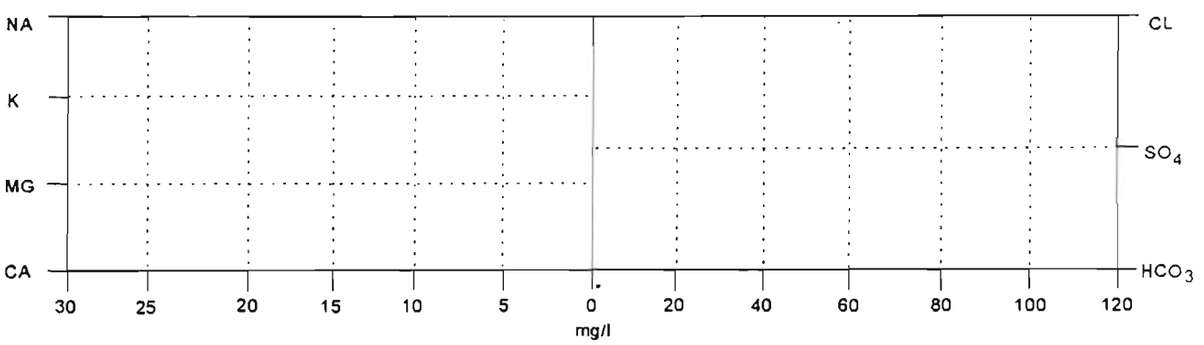
Date: 08/27/93 Flow: 2.2 cfs SC: 94 pH: 7.9

STATION: TENDERFOOT CREEK ABOVE SUN CREEK; LC7013



Date: 09/24/93 Flow: 1.8 cfs SC: 93 pH: 7.9

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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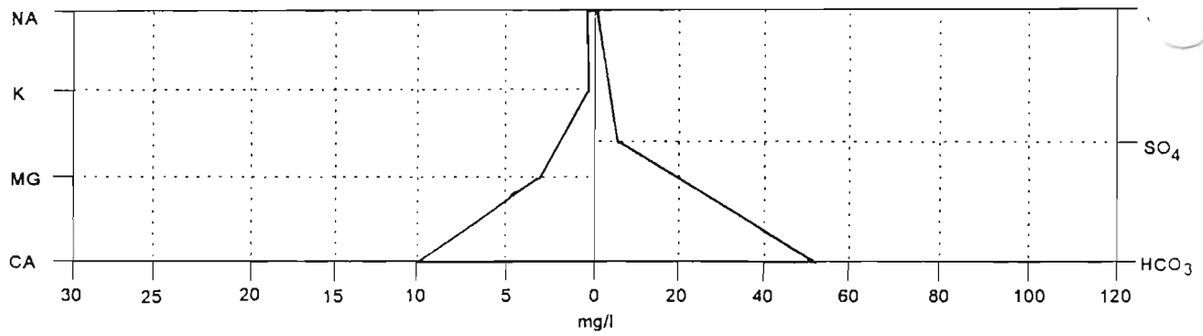
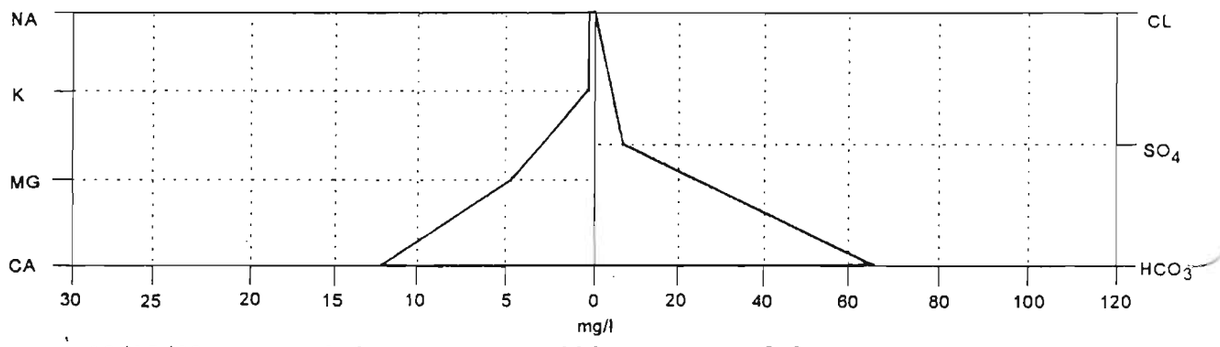
STIFF DIAGRAMS

STATION: TENDERFOOT CREEK BELOW STRINGER CREEK; LC7014



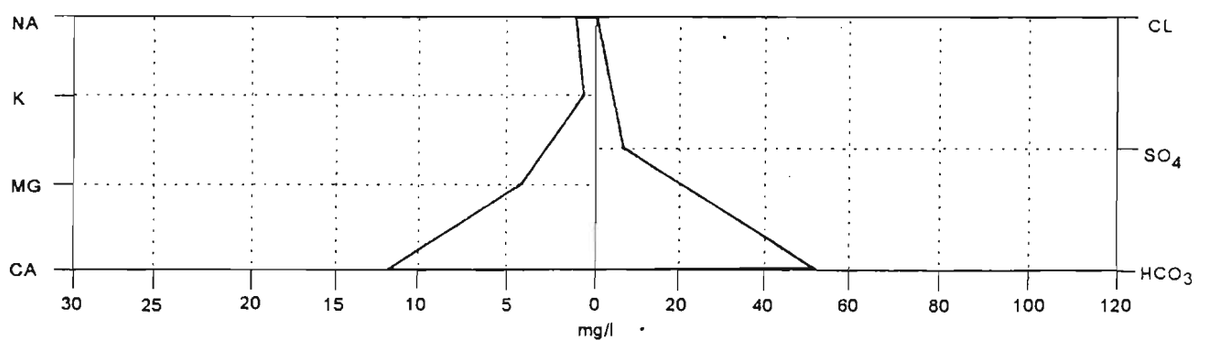
Date: 09/15/92 Flow: 2.8 cfs SC: 99 pH: 8.0

STATION: TENDERFOOT CREEK BELOW STRINGER CREEK; LC7014



Date: 02/17/93 Flow: 1.1 cfs SC: 116 pH: 8.1

STATION: TENDERFOOT CREEK BELOW STRINGER CREEK; LC7014



Date: 04/14/93 Flow: 1.8 cfs SC: 100 pH: 8.0

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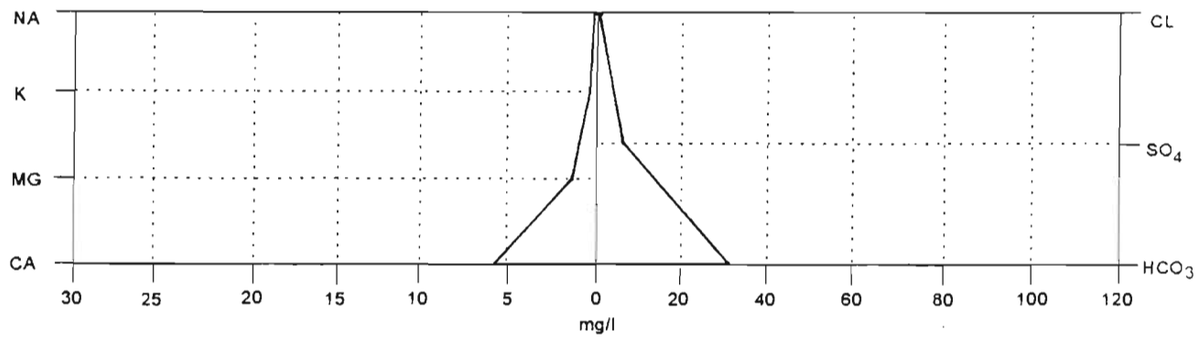
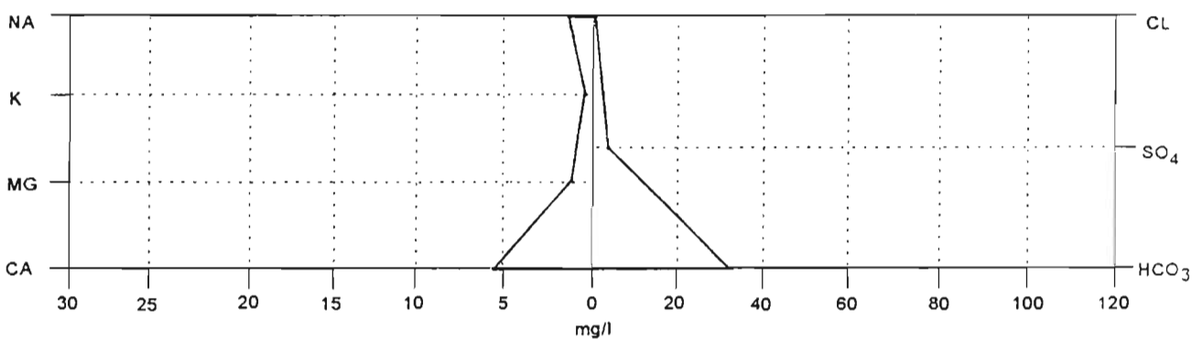
STIFF DIAGRAMS

STATION: TENDERFOOT CREEK BELOW STRINGER CREEK; LC7014



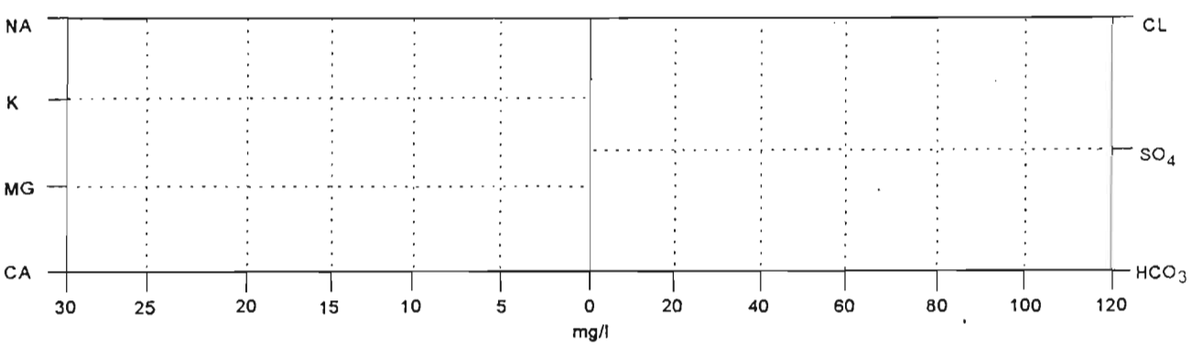
Date: 08/27/93 Flow: 28.7 cfs SC: 50 pH: 7.6

STATION: TENDERFOOT CREEK BELOW STRINGER CREEK; LC7014



Date: 09/24/93 Flow: 14.7 cfs SC: 58 pH: 7.6

STATION: _____



Date: _____ Flow: _____ cfs SC: _____ pH: _____

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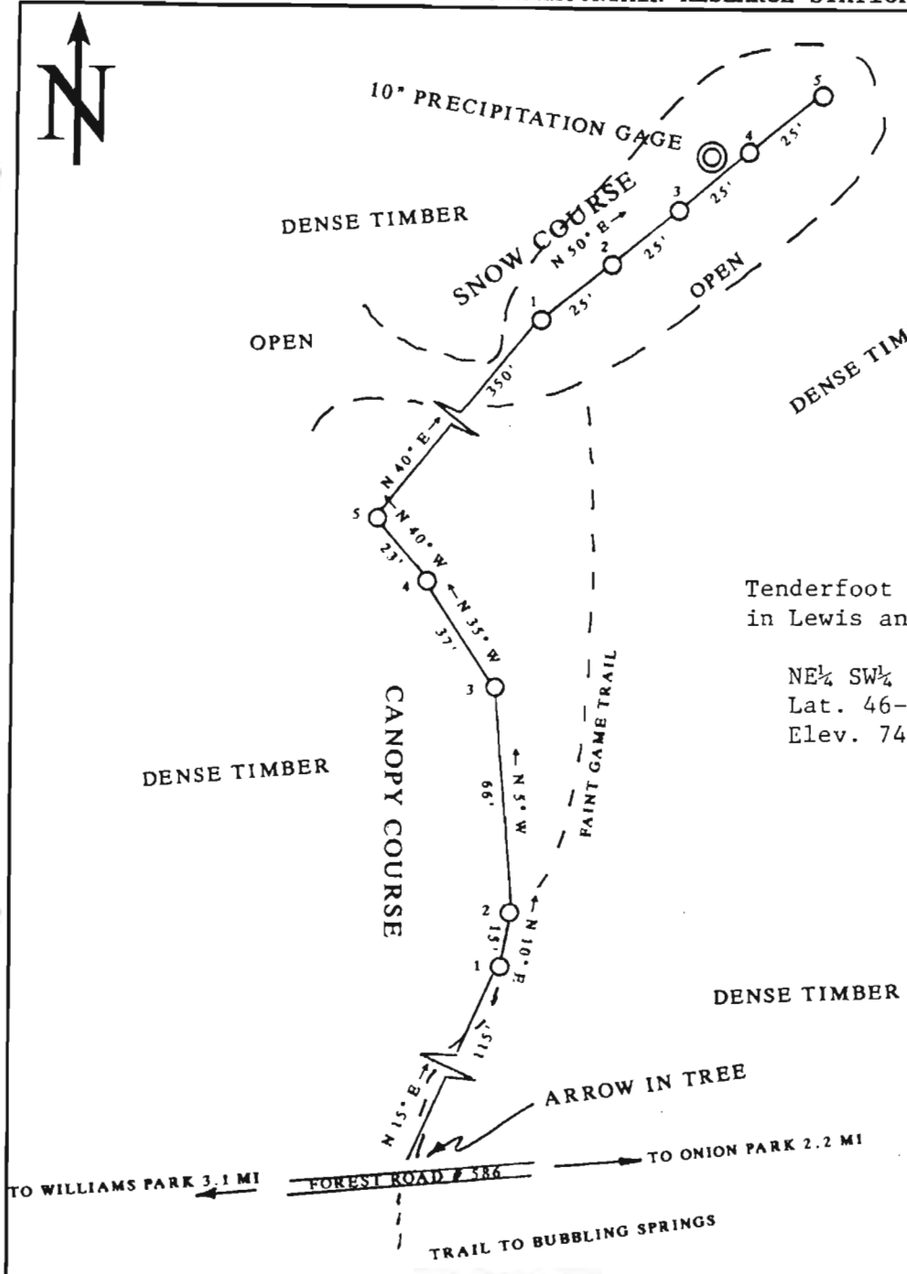
Appendix IX. Sketch maps of snow and precipitation sites.

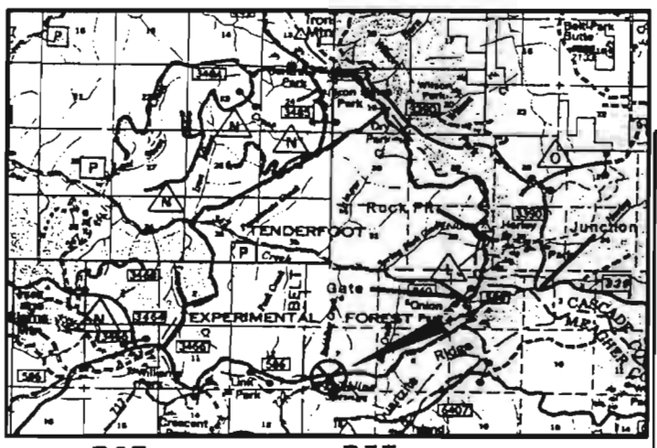
No.	Site
10C17/MC17	Bubbling Springs
10C18/MC18	County Line
10C19/MC19	Dry Park
10C20/MC20	Farnes Meadow
10C21/MC21	Lonesome Creek
10C22/MC22	Onion Park
10C25/MC25	Passionate Creek
10C23/MC23	Stringer Creek
10C24/MC24	Sun Creek
10C240/MC240	Sun Creek (Old)

DEPARTMENT OF AGRICULTURE INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

NE¼ SW¼ Sec 7, T13N, R7E
Lat. 46-54-04, Long. 110-53-50
Elev. 7430 ft Scale 1" = 50 ft

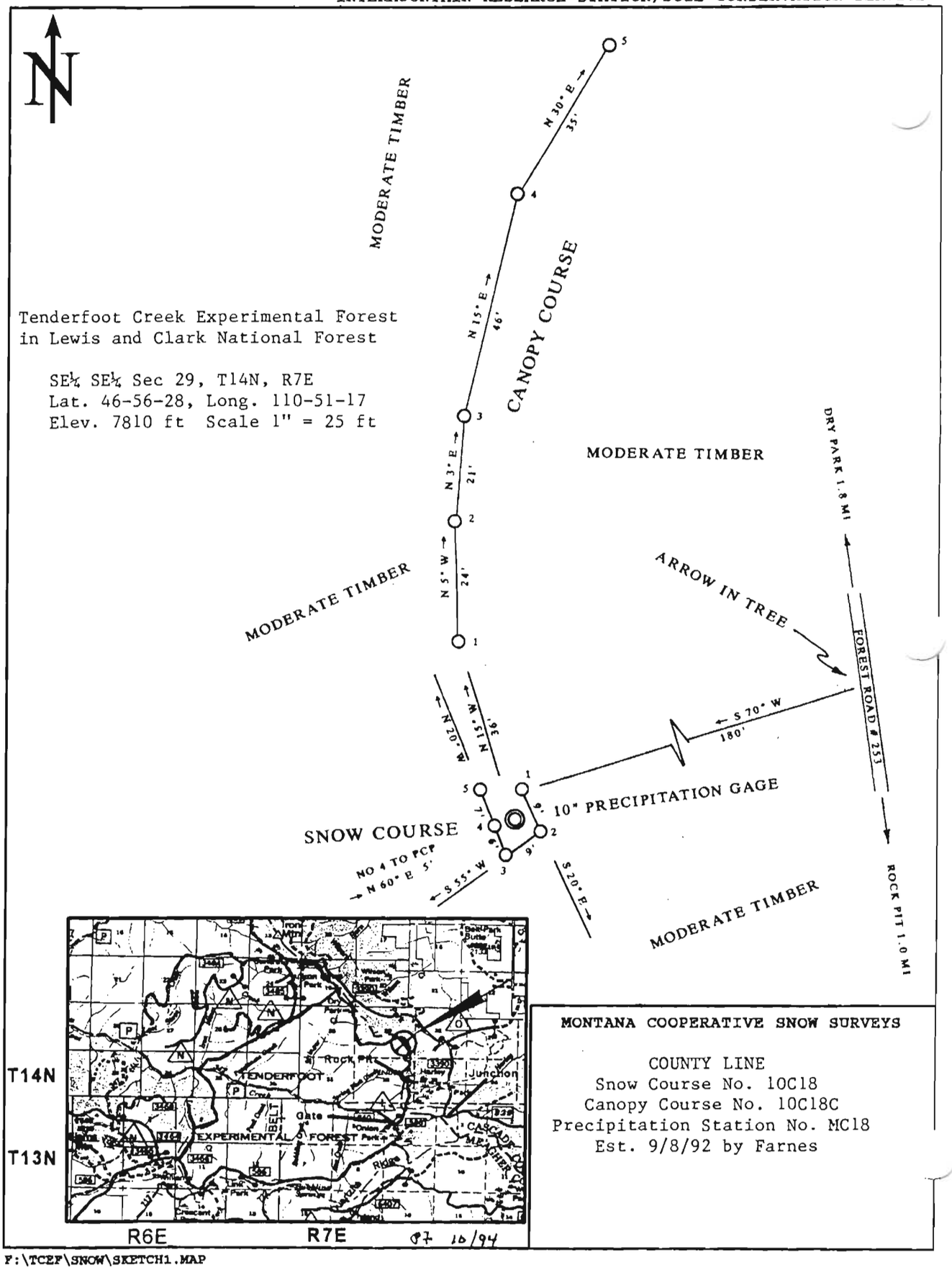


MONTANA COOPERATIVE SNOW SURVEYS

BUBBLING SPRINGS
Snow Course No. 10C17
Canopy Course No. 10C17C
Precipitation Station No. MC17
Est. 9/9/92 by Farnes

F:\TCEF\SNOW\SKETCH1.MAP

DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

SE¼ SE¼ Sec 29, T14N, R7E
Lat. 46-56-28, Long. 110-51-17
Elev. 7810 ft Scale 1" = 25 ft

MONTANA COOPERATIVE SNOW SURVEYS

COUNTY LINE
Snow Course No. 10C18
Canopy Course No. 10C18C
Precipitation Station No. MC18
Est. 9/8/92 by Farnes

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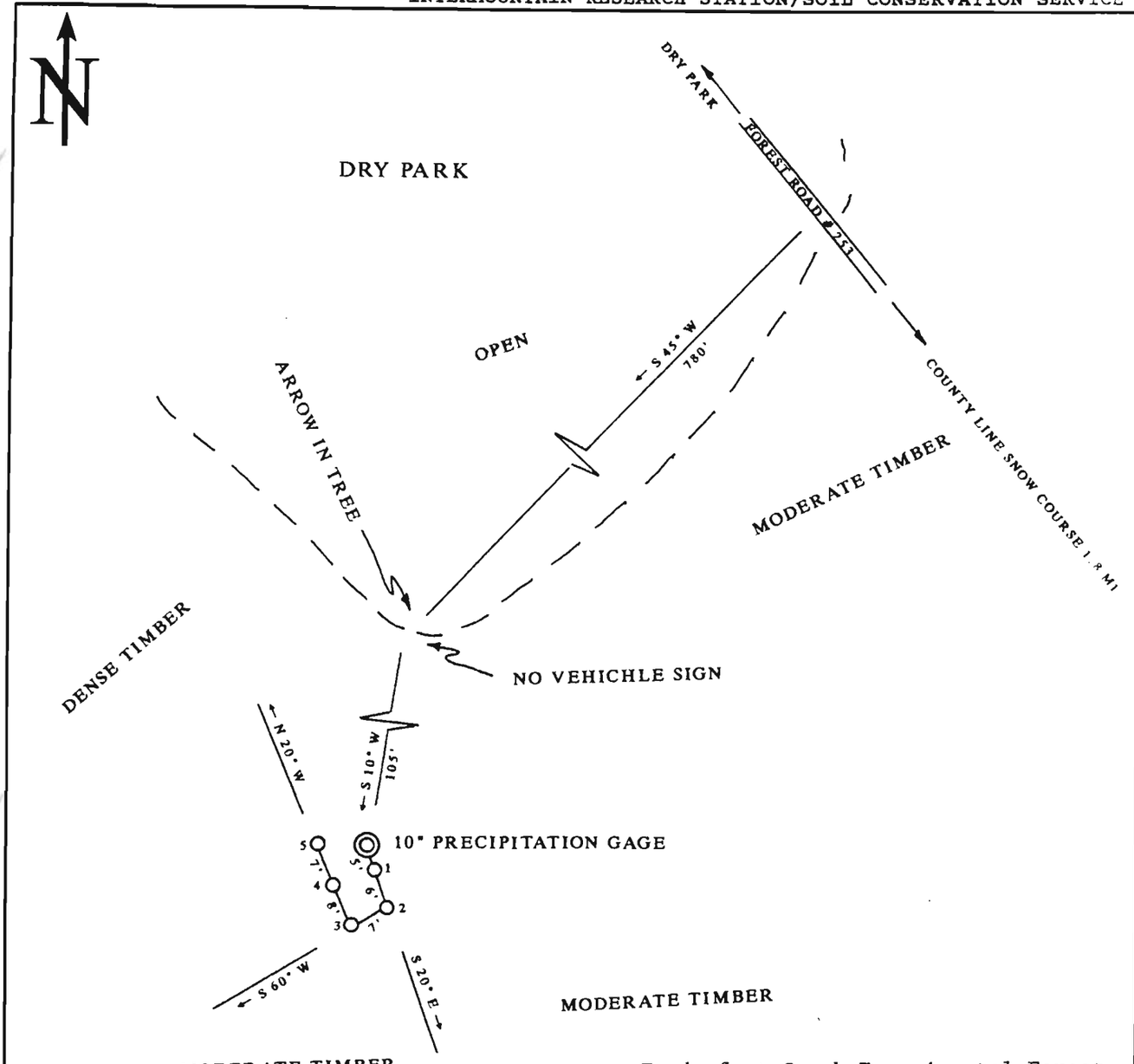
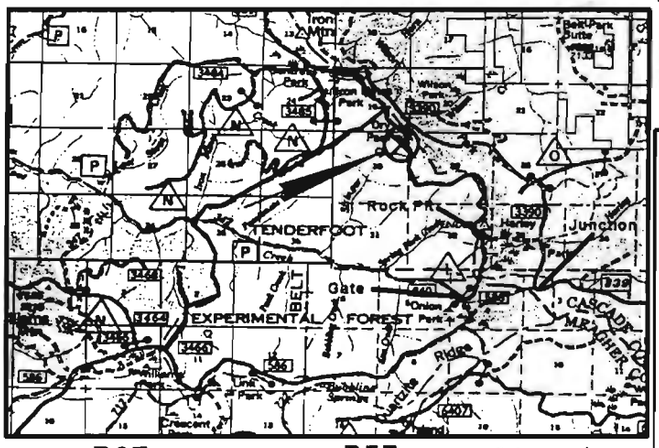
DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

NE¼ NE¼ Sec 30, T14N, R7E
Lat. 46-57-03, Long. 110-52-47
Elev. 7420 ft Scale 1" = 25 ft



MONTANA COOPERATIVE SNOW SURVEYS

DRY PARK
Snow Course No. 10C19
Precipitation Station No. MC19
Est. 9/8/92 by Farnes

97 10/94

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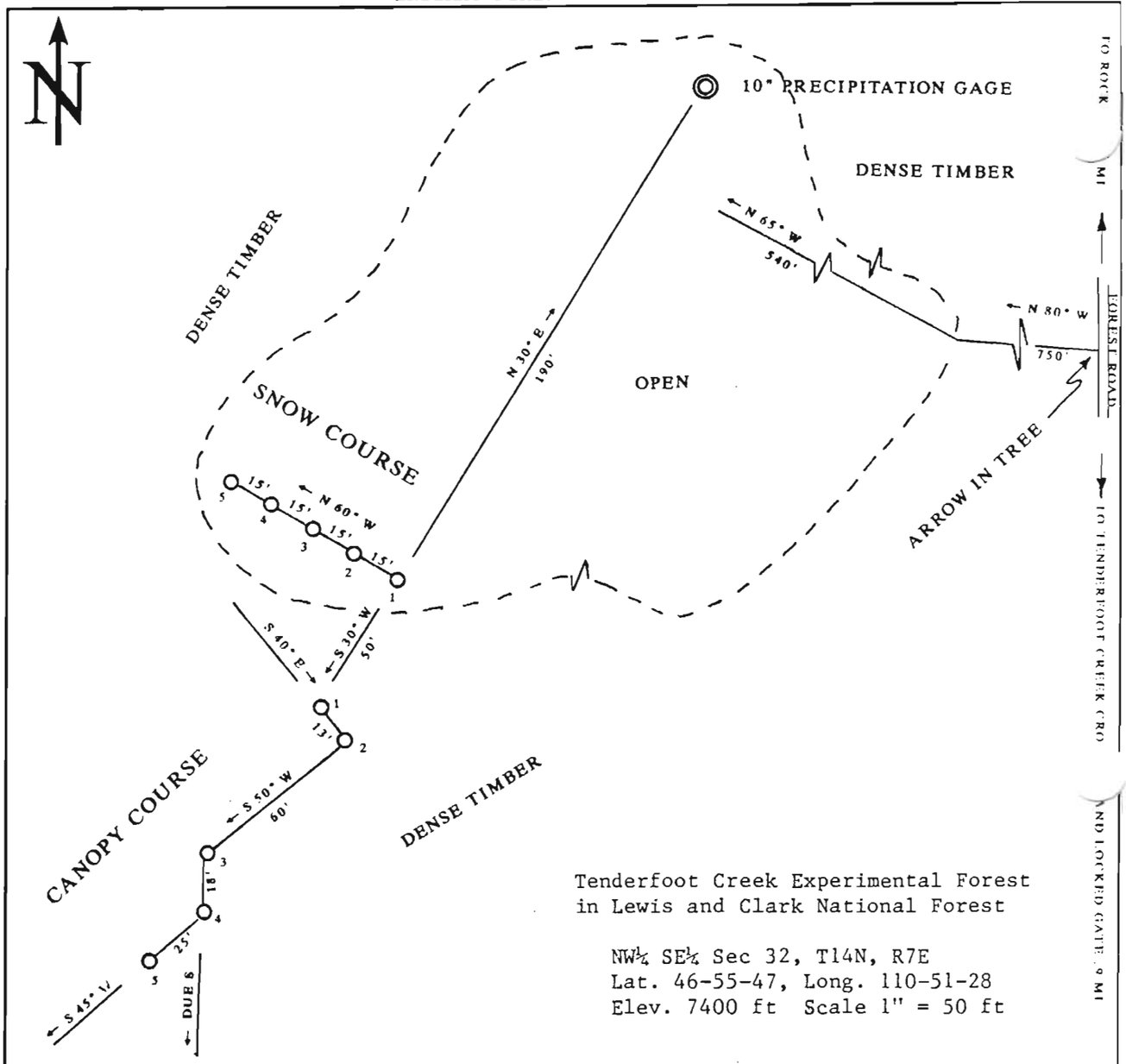
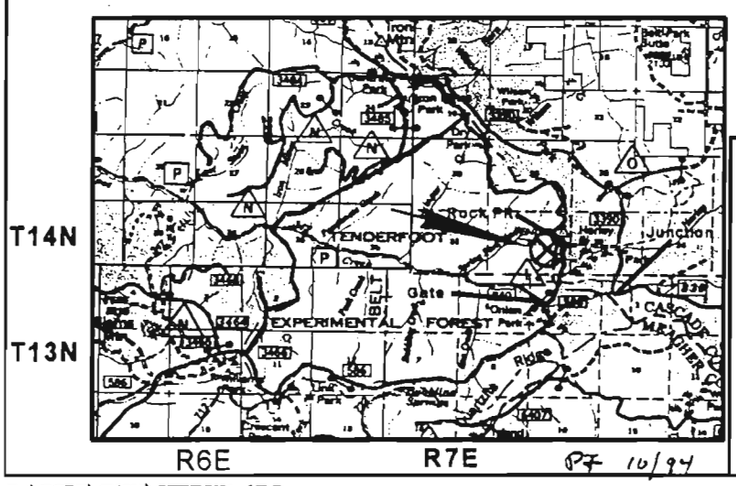
DEPARTMENT OF AGRICULTURE INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

NW¼ SE¼ Sec 32, T14N, R7E
Lat. 46-55-47, Long. 110-51-28
Elev. 7400 ft Scale 1" = 50 ft

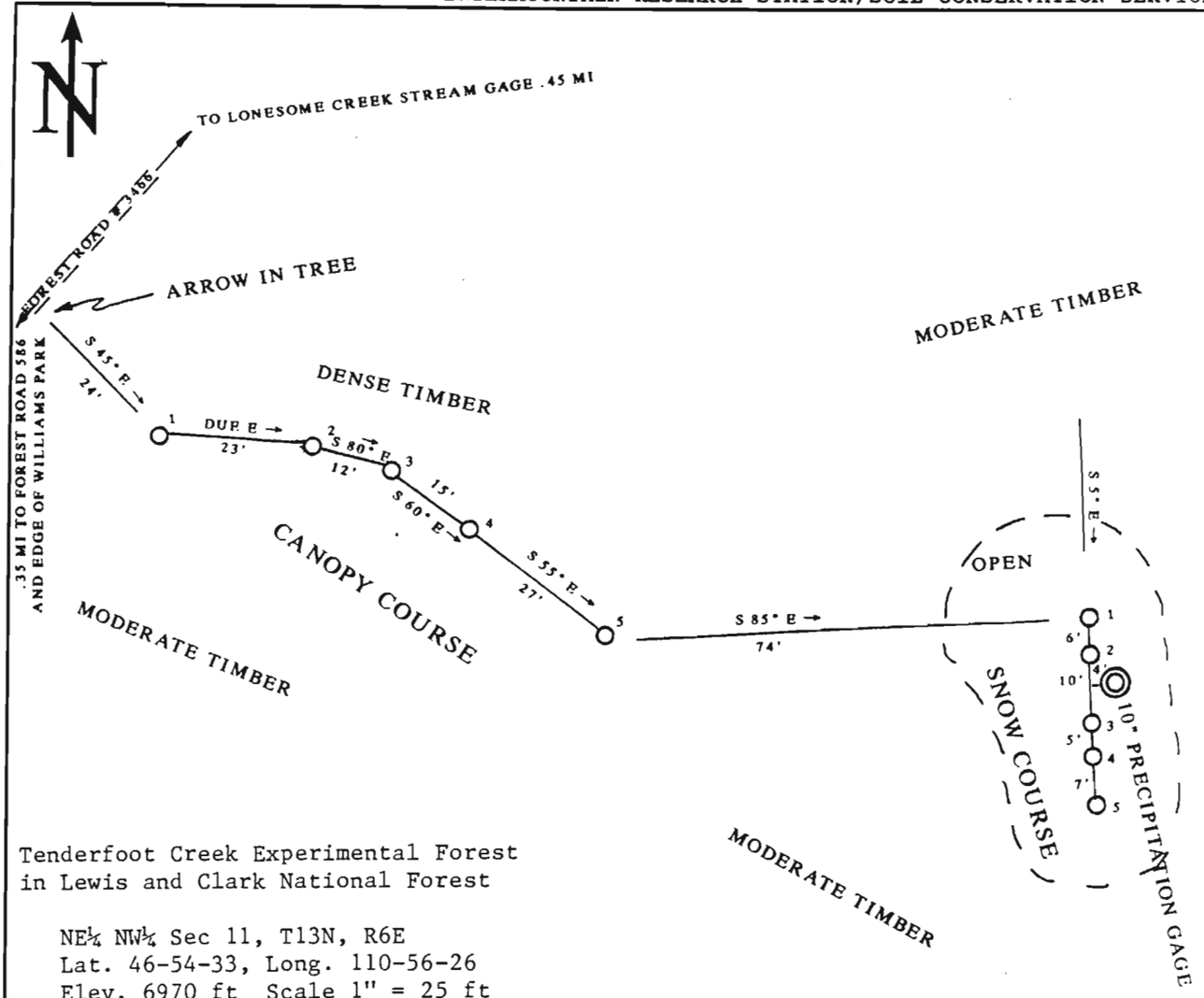


MONTANA COOPERATIVE SNOW SURVEYS

FARNES MEADOW
Snow Course No. 10C20
Canopy Course No. 10C20C
Precipitation Station No. MC20
Est. 9/16/92 by Farnes
Revised 4/14/93 by PF, WM

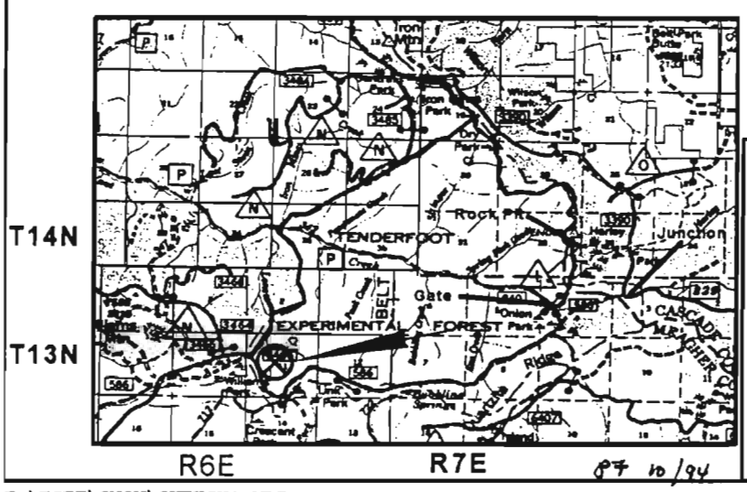
F:\TCEF\SNOW\SKETCH1.MAP

DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

NE¼ NW¼ Sec 11, T13N, R6E
Lat. 46-54-33, Long. 110-56-26
Elev. 6970 ft Scale 1" = 25 ft



MONTANA COOPERATIVE SNOW SURVEYS

LONESOME CREEK
Snow Course No. 10C21
Canopy Course No. 10C21C
Precipitation Station No. MC21
Est. 9/14/92 by Farnes

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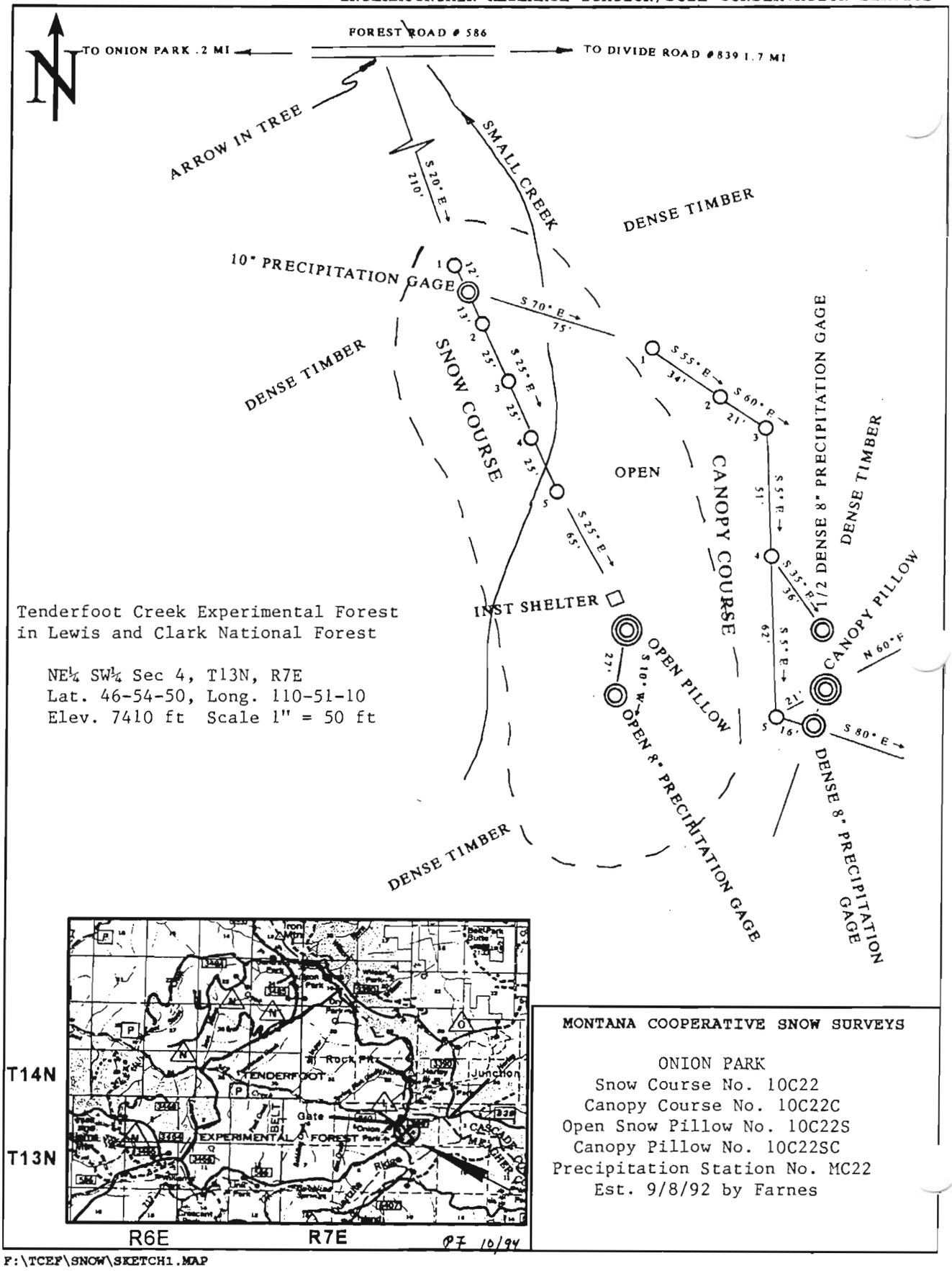
DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

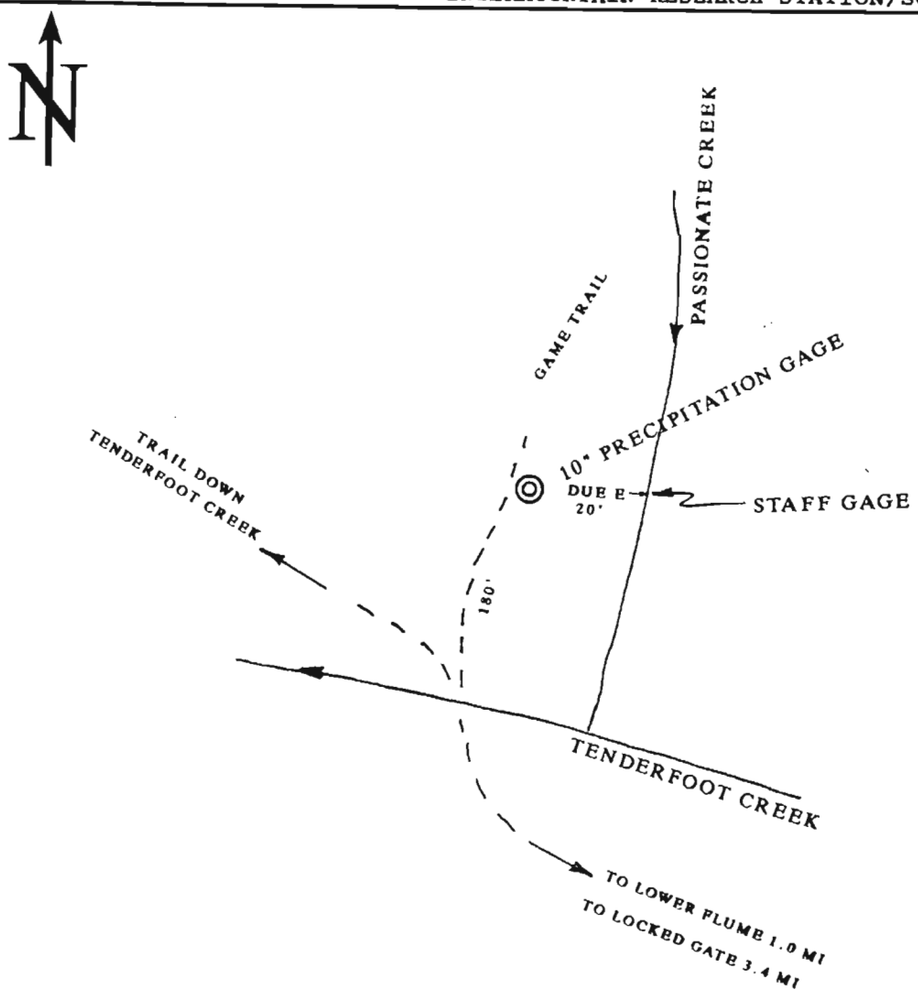
NE¼ SW¼ Sec 4, T13N, R7E
Lat. 46-54-50, Long. 110-51-10
Elev. 7410 ft Scale 1" = 50 ft

MONTANA COOPERATIVE SNOW SURVEYS

ONION PARK
Snow Course No. 10C22
Canopy Course No. 10C22C
Open Snow Pillow No. 10C22S
Canopy Pillow No. 10C22SC
Precipitation Station No. MC22
Est. 9/8/92 by Farnes

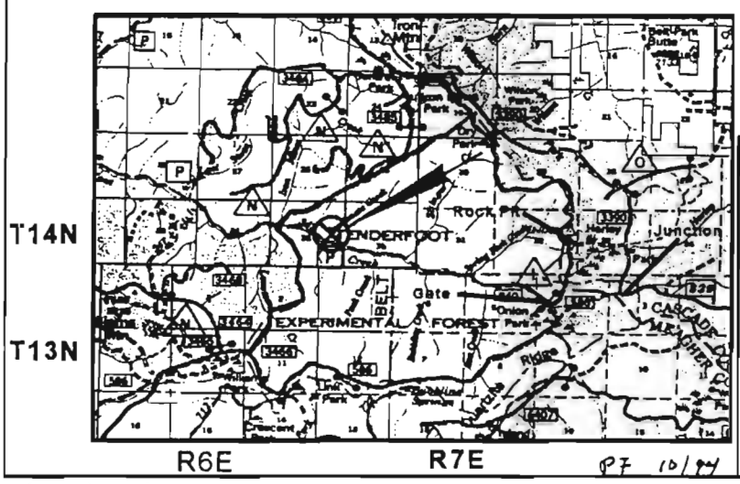
F:\TCEF\SNOW\SKETCH1.MAP

DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

SE¼ SE¼ Sec 35, T14N, R6E
Lat. 46-55-48, Long. 110-55-20
Elev. 6250 ft Scale 1" = 100 ft



MONTANA COOPERATIVE SNOW SURVEYS

PASSIONATE CREEK
Precipitation Station No. MC25
Est. 7/14/94 by Farnes & Phelps

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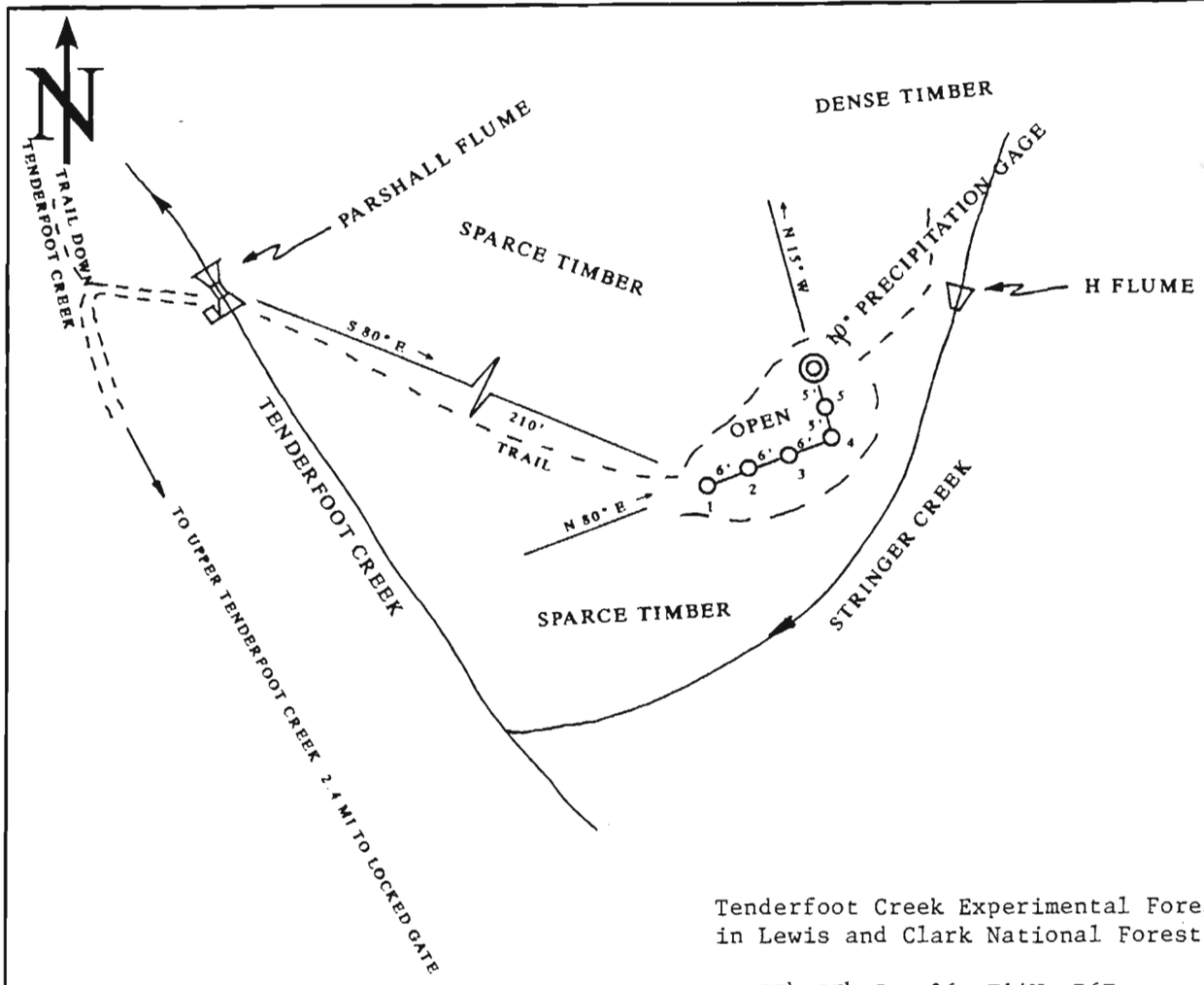
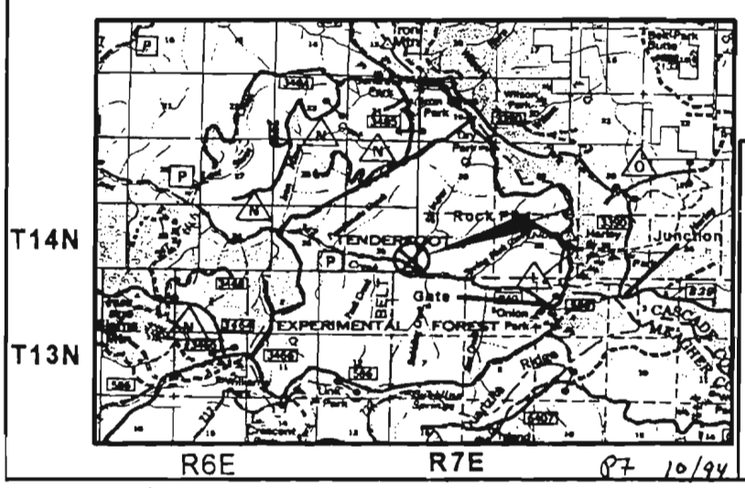
DEPARTMENT OF AGRICULTURE INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

SE¼ SE¼ Sec 36, T14N, R6E
Lat. 46-55-38, Long. 110-54-03
Elev. 6550 ft Scale 1" = 25 ft



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MONTANA COOPERATIVE SNOW SURVEYS

STRINGER CREEK
Snow Course No. 10C23
Precipitation Station No. MC23
Est. 9/16/92 by Farnes

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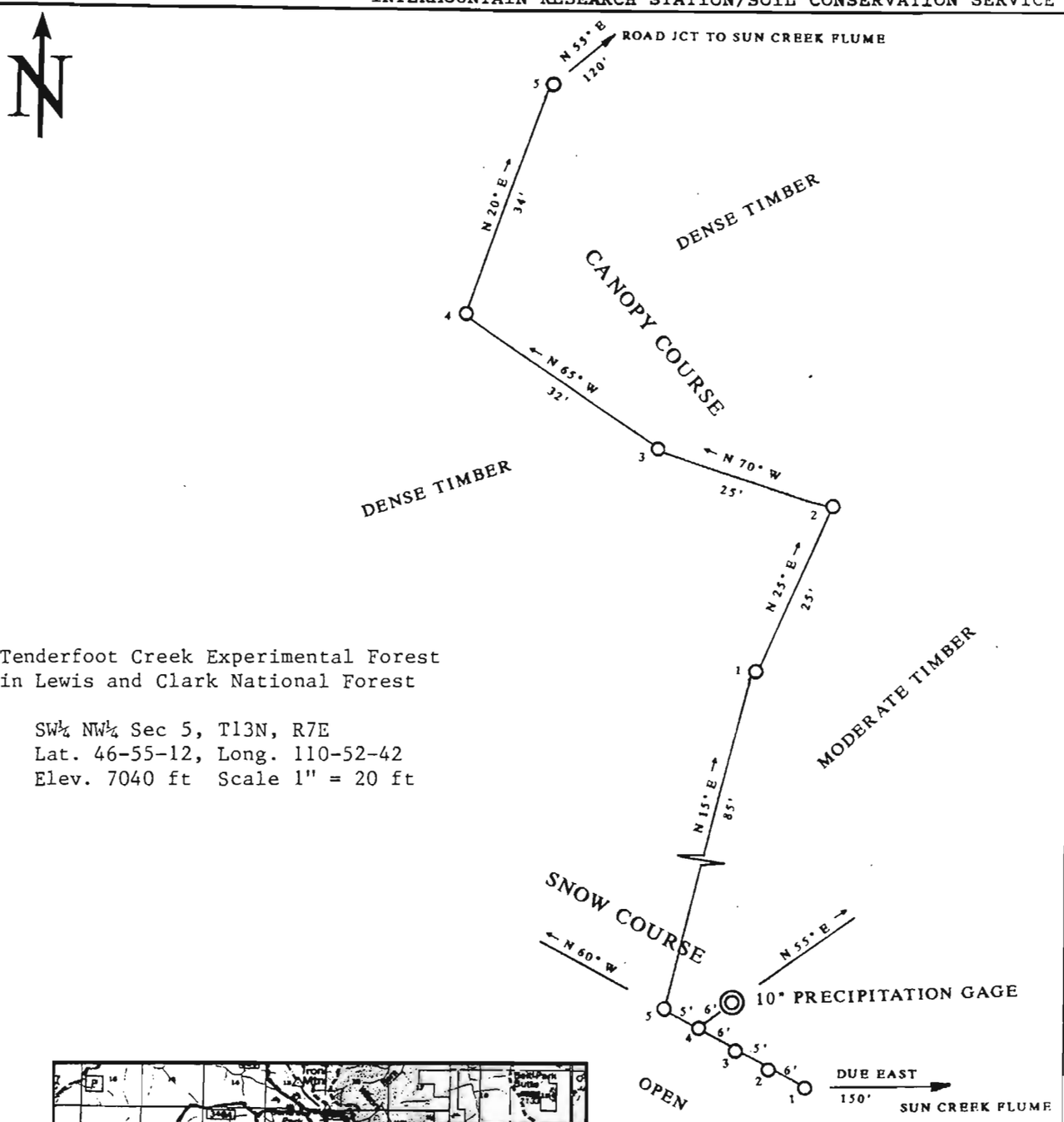
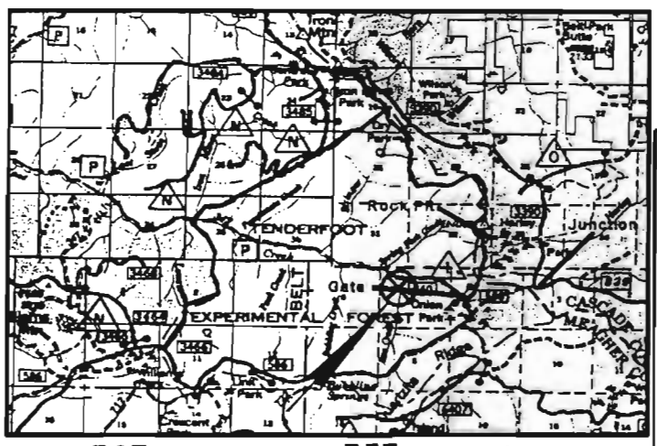
DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

SW¼ NW¼ Sec 5, T13N, R7E
Lat. 46-55-12, Long. 110-52-42
Elev. 7040 ft Scale 1" = 20 ft



87 10/94

MONTANA COOPERATIVE SNOW SURVEYS

SUN CREEK
Snow Course No. 10C24
Canopy Course No. 10C24C
Precipitation Station No. MC24
Est. 9/7/94 by
Farnes, McCaughey, Phelps

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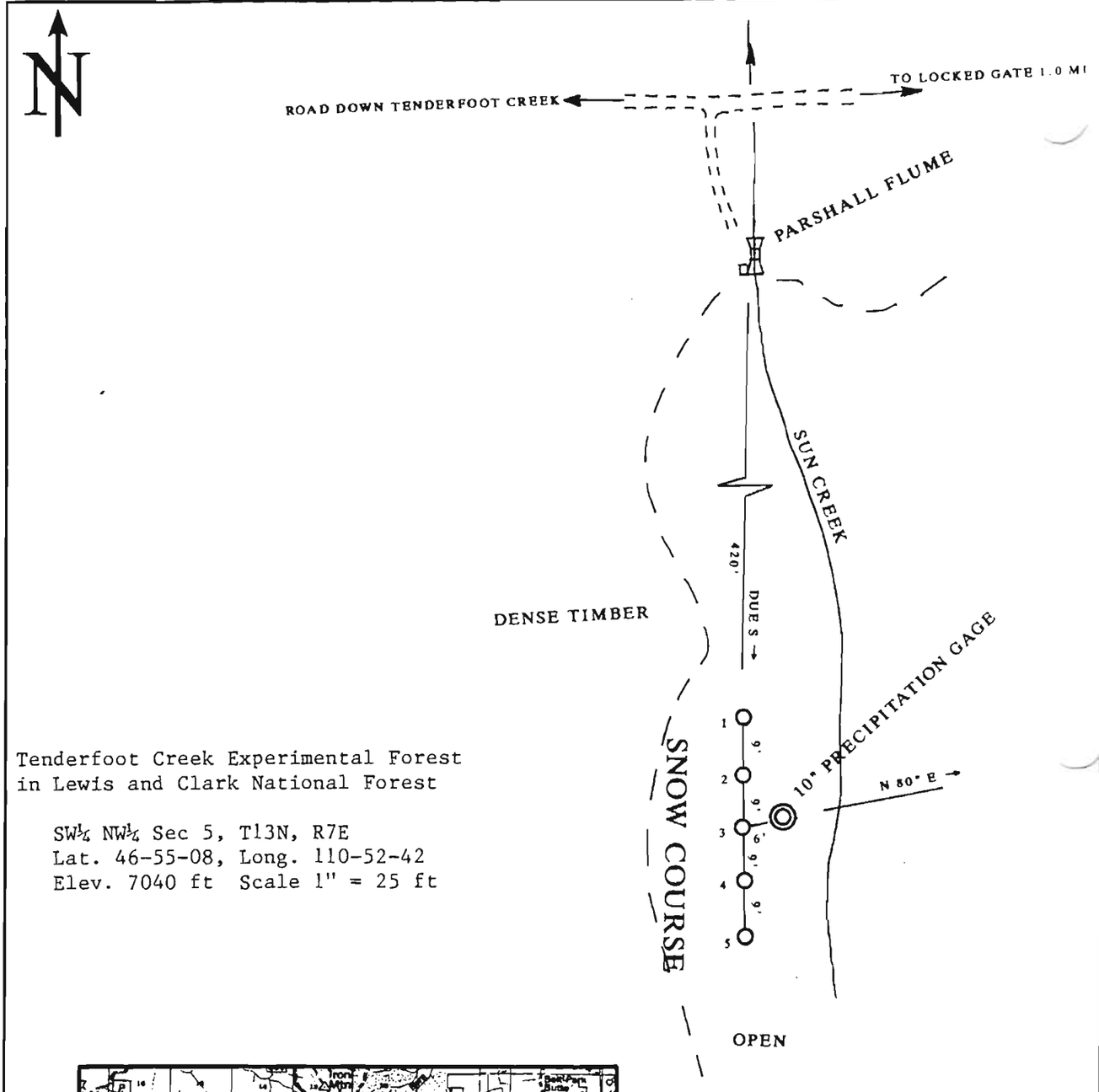
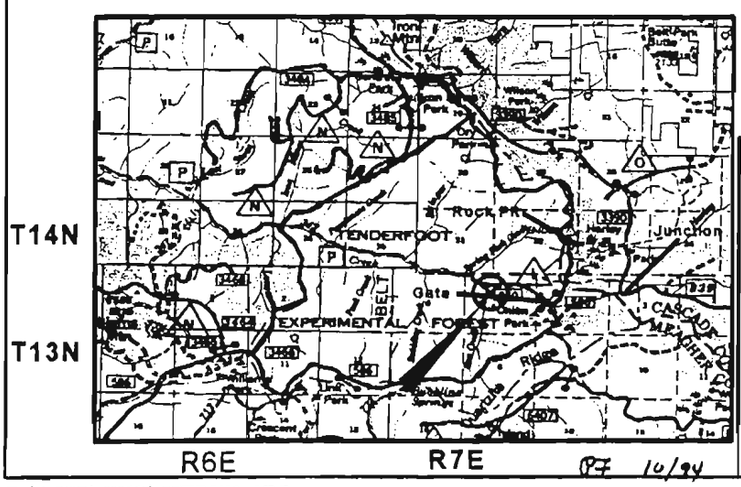
DEPARTMENT OF AGRICULTURE — INTERMOUNTAIN RESEARCH STATION/SOIL CONSERVATION SERVICE



Tenderfoot Creek Experimental Forest
in Lewis and Clark National Forest

SW¼ NW¼ Sec 5, T13N, R7E
Lat. 46-55-08, Long. 110-52-42
Elev. 7040 ft Scale 1" = 25 ft



PF 10/94

MONTANA COOPERATIVE SNOW SURVEYS

SUN CREEK (OLD)
Snow Course No. 10C24Ø
Precipitation Station No. MC24Ø
Est. 9/16/92 by Farnes

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Appendix X. Manual snow survey and precipitation data.

No.	Site
10C17/MC17	Bubbling Springs
10C18/MC18	County Line
10C19/MC19	Dry Park
10C20/MC20	Farnes Meadow
10C21/MC21	Lonesome Creek
10C22/MC22	Onion Park
10C25/MC25	Passionate Creek
10C23/MC23	Stringer Creek
10C24/MC24	Sun Creek
10C24O/MC24O	Sun Creek (Old)

BUBBLING SPRINGS

SNOW COURSE NUMBER (SCS) 10C1 PRECIPITATION STATION NUMBER (SCS) MC17
DRAINAGE BASIN = Missouri STATE= Montana
ELEV = 7430ft NE1/4,SW1/4 Sec 7 T13N R7E LAT 46-54-04 LONG 110-53-50

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
PF	09/09/92	253	1300	0			9.8	0.0	
PF	09/15/92	258	1330	0			10.4	0.6	
PF	09/30/92	274	1105	0			12.6	2.2	
1993 WATER YEAR									
PF	10/01/92	275	0	0			12.6		
WM	10/15/92	289	1040	3	0.3	10	14.9	2.3	2.3
PF	02/17/93	48	1420	40	10.9	27	37.5	22.6	24.9
OO	04/14/93	104	1320	53	15.9	30	50.4	12.9	37.8
PF	05/30/93	150	1450	3	1.2	40	67.0	16.6	54.4
CH	07/09/93	190	1043	0			91.9	24.9	79.3
PF	08/11/93	223	1840	0			105.3	13.4	92.7
PF	08/23/93	235	1600	0			115.1	9.8	102.5
PF	08/31/93	243	1745	T	T		120.1	5.0	107.5
PF&WM	09/30/93	273	730	0			126.2	6.1	113.6
							1993 WATER YEAR TOTAL (cm) ==		113.6
							(inches) =		44.7
1994 WATER YEAR									
PF&WM	10/01/93	274		0			7.7	0.0	0.0
WM	11/02/93	306	1045	5	0.5	10	13.5	5.8	5.8
WM	01/25/94	25	840	37	10.8	29	32.2	18.7	24.5
JB,OO	04/07/94	97	1010	58	15.2	26	48.5	16.3	40.8
PF	05/26/94	145	1535	T	T		59.4	10.9	51.7
PF	06/15/94	166	1200	0			64.8	5.4	57.1
CH,WM	06/21/94	172	835	0			66.0	1.2	58.3
PF	07/13/94	194	1400	0			68.9	2.9	61.2
PF,HP	07/26/94	207	1610	0			70.4	1.5	62.7
WM	08/09/94	221	740	0			70.8	0.4	63.1
PF,HP	09/01/94	244	1050	0			70.8	0.0	63.1
WM	09/30/94	273	725	0			72.7	1.9	65.0
							1994 WATER YEAR TOTAL (cm) ==		65.0
							(inches) =		25.6

COUNTY LINE

SNOW COURSE NUMBER (SCS) 10C1 PRECIPITATION STATION NUMBER (SCS) MC18
DRAINAGE BASIN = Missouri STATE= Montana
ELEV 7810ft SE1/4 SE1/4 SEC 29 T14N R7E LAT 46-56-28 LONG 110-51-17

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
WM	09/08/92	253	1700	T			8.1		
PF	09/15/92	258	1500	0			8.5		
PF	09/30/92	274	1145	T			11.1		
1993 WATER YEAR									
PF	10/01/92	275	0	0			11.1		
WM	10/15/92	289	1140	7	0.7	10	14.7	3.6	3.6
OO	02/17/93	48	1100	43	11.6	27	37.3	22.6	26.2
OO	04/14/93	104	950	62	16.8	27	50.7	13.4	39.6
PF	05/30/93	150	1300	15	5.7	38	65.5	14.8	54.4
CH	07/09/93	190	1505	0			91.5	26.0	80.4
PF	08/11/93	223	1655	0			108.1	16.6	97.0
PF	08/23/93	235	1120	0			115.2	7.1	104.1
PF	08/31/93	243	1700	5	1.0	20	120.0	4.8	108.9
PF&WM	09/29/93	272	1120	1	0.2	20	127.5	7.5	116.4
							1993 WATER YEAR TOTAL (cm) ==		116.4
							(inches) =		45.8
1994 WATER YEAR									
PF&WM	10/01/93	274		1	0.2	20	9.0	0.0	0.0
WM	11/02/93	306	1435	11	1.1	10	14.3	5.3	5.3
WM	01/25/94	25	1430	43	13.1	30	34.9	20.6	25.9
JB,OO	04/07/94	97	1300	64	20.6	32	50.7	15.8	41.7
PF	05/26/94	145	1105	11	4.2	38	63.3	12.6	54.3
PF	06/15/94	166	1305	0			69.3	6.0	60.3
CH,WM	06/21/94	172	930	0			70.4	1.2	61.4
PF	07/13/94	194	1520	0			73.8	3.4	64.8
PF,HP	07/26/94	207	845	0			75.3	1.5	66.3
WM	08/09/94	221	935	0			75.4	0.1	66.4
PF,HP	09/01/94	244	930	0			76.6	1.2	67.6
WM	09/30/94	273	805	0			77.6	2.0	69.6
							1994 WATER YEAR TOTAL (cm) ==		69.6
							(inches) =		27.4

DRY PARK

SNOW COURSE NUMBER (SCS) 10C1 PRECIPITATION STATION NUMBER (SCS) MC19
DRAINAGE BASIN = Missouri STATE= Montana
ELEV = 7420 ft NE1/4 NE1/4 SEC 30 T14N R7E LAT=46-57-03 LONG= 110-52-47

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
PF	09/08/92	253	1500	0			7.0	0.0	
PF	09/14/92	258	1600	0			7.2	0.2	
PF	09/30/92	274	1205	0			9.4	2.2	
1993 WATER YEAR									
PF	10/01/92	275	0	0			9.4		
WM	10/15/92	289	1210	5	0.5	10	12.2	2.8	2.8
OO	02/17/93	48	1015	41	10.2	25	31.2	19.0	21.8
KM	04/14/93	104	1040	52	15.5	29	44.2	13.0	34.8
PF	05/30/93	150	1350	0			59.2	15.0	49.8
CH	07/09/93	190	1515	0			87.4	28.2	78.0
PF	08/11/93	223	1710	0			105.4	18.0	96.0
PF	08/23/93	235	1035	0			113.0	7.6	103.6
PF	08/31/93	243	1645	1	0.2	20	118.3	5.3	108.9
PF&WM	09/29/93	272	1255	0			126.4	8.1	117.0
							1993 WATER YEAR TOTAL (cm) ==		117.0
							(inches) =		46.1
1994 WATER YEAR									
PF&WM	10/01/93	275		0			7.1	0.0	0.0
WM	11/02/93	306	1450	8	0.8	10	13.6	6.5	6.5
WM	01/25/94	25	1430	39	11.4	29	31.1	17.5	24.0
JB,OO	04/07/94	97	1230	59	17.9	30	44.0	12.9	36.9
PF	05/26/94	145	1205	0			57.1	13.1	50.0
PF	06/15/94	166	1315	0			62.9	5.8	55.8
CH,WM	06/21/94	172	900	0			64.0	1.1	56.9
PF	07/13/94	194	1500	0			67.4	3.4	60.3
PF,HP	07/26/94	207	905	0			69.1	1.7	62.0
WM	08/09/94	221	920	0			69.5	0.4	62.4
PF,HP	09/01/94	244	955	0			70.3	0.8	63.2
WM	09/30/94	273	755	0			71.5	1.2	64.4
							1994 WATER YEAR TOTAL (cm) ==		64.4
							(inches) =		25.4

FARNES MEADOW

SNOW COURSE NUMBER (SCS) 10C2 PRECIPITATION STATION NUMBER (SCS) MC20
DRAINAGE BASIN = Missouri STATE= Montana
ELEV = 7400 ft NW1/4 SE1/4 SEC 32 T14N R7E LAT= 46-55-47 LONG=110-51-28

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
PF	09/16/92	261	1330	0			9.3	0.0	
PF	09/30/92	274	1235	0			11.0	1.7	
1993 WATER YEAR									
PF	10/01/92	275	0	0			11.0		
WM	10/15/92	289	1240	4	0.4	10	14.3	3.3	3.3
PF	02/17/93	48	1140	42	10.9	26	35.1	20.8	24.1
OO	04/14/93	104	915	58	15.5	27	47.6	12.5	36.6
PF	05/30/93	150	1415	0			62.1	14.5	51.1
CH	07/09/93	190	1045	0			91.4	29.3	80.4
PF	08/11/93	223	1635	0			108.1	16.7	97.1
PF	08/23/93	235	1330	0			116.6	8.5	105.6
PF	08/31/93	243	1720	T			121.7	5.1	110.7
PF&WM	09/29/93	272	1255	0			129.4	7.7	118.4
					1993 WATER YEAR TOTAL (cm) ==				118.4
					(inches) =				46.6
1994 WATER YEAR									
PF&WM	10/01/93	275	0	0			8.8	0.0	0.0
WM	11/02/93	306	1200	9	0.9	10	15.2	6.4	6.4
WM	01/25/94	25	1400	42	12.2	29	35.4	20.2	26.6
JB,00	04/07/94	97	1400	61	19.8	32	50.9	15.5	42.1
PF	05/26/94	145	1305	3	1.0	33	64.3	13.4	55.5
PF	06/15/94	166	1240	0			70.6	6.3	61.8
CH,WM	06/21/94	172	945	0			71.6	1.0	62.8
PF	07/13/94	194	1600	0			75.1	3.5	66.3
PF,HP	07/26/94	207	830	0			76.3	1.2	67.5
WM	08/09/94	221	950	0			76.6	0.3	67.8
PF,HP	09/01/94	244	845	0			77.7	1.1	68.9
WM	09/30/94	273	820	0			78.8	1.1	70.0
					1994 WATER YEAR TOTAL (cm) ==				70.0
					(inches) =				27.6

LONESOME CREEK

SNOW COURSE NUMBER (SCS) 10C2 PRECIPITATION STATION NUMBER (SCS) MC21
DRAINAGE BASIN = Missouri STATE= Montana
ELEV= 6970 ft NE1/4 NW1/4 SEC11 T13N R6E LAT= 46-54-33 LONG= 110-56-26

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
PF	09/14/92	258	1300	0			10.6	0.0	
PF	09/30/92	274	1035	0			12.2	1.6	
1993 WATER YEAR									
PF	10/01/92	275	0	0			12.2		
WM	10/15/92	289	1020	2	0.2	10	14.3	2.1	2.1
JB	02/17/93	48	1445	38	9.6	25	37.0	22.7	24.8
OO	04/14/93	104	1220	49	13.9	28	49.8	12.8	37.6
PF	05/30/93	150	1510	0			65.5	15.7	53.3
CH	07/09/93	190	1045	0			90.6	25.1	78.4
PF	08/11/93	223	1755	0			104.1	13.5	91.9
PF	08/23/93	235	1700	0			112.1	8.0	99.9
PF	08/31/93	243	800	0			117.2	5.1	105.0
PF&WM	09/30/93	273	1545	0			123.3	6.1	111.1
					1993 WATER YEAR TOTAL (cm) ==				111.1
					(inches) =				43.7
1994 WATER YEAR									
PF&WM	10/01/93	274	0	0			8.1	0.0	0.0
WM	11/02/93	306	1015	4	0.4	10	13.4	5.3	5.3
WM	01/25/94	25	800	32	9.0	28	30.6	17.2	22.5
JB,OO	04/07/94	97	1045	53	14.6	28	44.0	13.4	35.9
PF	05/26/94	145	1610	0			56.0	12.0	47.9
PF	06/15/94	166	1145	0			60.6	4.6	52.5
CH,WM	06/21/94	172	820	0			61.6	1.0	53.5
PF	07/13/94	194	1330	0			64.8	3.2	56.7
PF,HP	07/26/94	207	1700	0			65.5	0.7	57.4
WM	08/08/94	220	1405	0			65.9	0.4	57.8
PF,HP	08/31/94	243	1730	0			67.0	1.1	58.9
WM	09/30/94	273	720	0			67.6	0.6	59.5
					1994 WATER YEAR TOTAL (cm) ==				59.5
					(inches) =				23.4

ONION PARK

SNOW COURSE NUMBER (SCS) 10C2 PRECIPITATION STATION NUMBER (SCS) MC22
DRAINAGE BASIN = Missouri STATE= Montana
ELEV = 7410 ft NE1/4 SW1/4 SEC 04 T13N R7E LAT= 46-54-50 LONG= 110-51-10

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW COURSE READINGS: SNOW WATER EQUIV. (IN)	SNOW COURSE READINGS: SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	STORAGE GAGE READINGS: PPT INCREASE (CM)	STORAGE GAGE READINGS: CUM. PPT (CM)
PF	09/08/92	251	1200	0			9.1	0.0	
PF	09/14/92	257	1400	0			9.5	0.4	
PF	09/16/92	259	1450	0			10.4	0.9	
PF	09/30/92	274	1120	0			12.4	2.0	
1993 WATER YEAR									
PF	10/01/92	275	0	0			12.4		
WM	10/15/92	289	1100	4	0.4	10	15.7	3.3	3.3
JB	02/17/93	48	1530	40	10.8	27	37.4	21.7	25.0
OO	04/14/93	104	1120	50	14.3	29	49.6	12.2	37.2
PF	05/30/93	150	1430	0			65.4	15.8	53.0
CH	07/09/93	190	1045	0			91.6	26.2	79.2
PF	08/09/93	221	1400	0			106.0	14.4	93.6
PF	08/23/93	235	1430	0			114.6	8.6	102.2
PF	08/31/93	243	950	4	0.6	15	119.9	5.3	107.5
PF&WM	09/29/93	272	1025	0			126.6	6.7	114.2
								1993 WATER YEAR TOTAL (cm) ==	114.2
								(inches) =	45.0
1994 WATER YEAR									
PF&WM	10/01/93	274	0	0			8.1	0.0	0.0
WM	11/02/93	306	1130	6	0.6	10	13.8	5.7	5.7
WM	01/25/94	25	930	42	12.3	29	34.3	20.5	26.2
JB,OO	04/07/94	97	900	61	17.7	29	50.2	15.9	42.1
PF	05/26/94	145	1000	0.4	0.1	25	63.6	13.4	55.5
PF	06/15/94	166	1210	0			70.2	6.6	62.1
CH,WM	06/21/94	172	845	0			71.3	1.1	63.2
PF	07/13/94	194	1425	0			74.3	3.0	66.2
PF,HP	07/26/94	207	930	0			76.0	1.7	67.9
WM	08/09/94	221	900	0			76.1	0.1	68.0
PF,HP	09/01/94	244	1030	0			77.0	0.9	68.9
WM	09/30/94	273	735	0			78.0	1.0	69.9
								1994 WATER YEAR TOTAL (cm) ==	69.9
								(inches) =	27.5

STRINGER CREEK

SNOW COURSE NUMBER (SCS) 10C2 PRECIPITATION STATION NUMBER (SCS) MC23
DRAINAGE BASIN = Missouri STATE= Montana
ELEV = 6550 ft SE1/4 SE1/4 SEC 36 T14N R6E LAT= 46-55-38 LONG= 110-54-03

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
PF	09/16/92	260	1000	0			10.0		
PF	09/30/92	274	1230	0			11.3	1.3	
1993 WATER YEAR									
PF	10/01/92	275	0	0			11.3		
WM	10/15/92	289	1320	2	0.2	10	13.5	2.2	2.2
JB	02/17/93	48	1330	34	9.4	28	33.1	19.6	21.8
OO	04/13/93	103	1030	38	10.8	28	44.6	11.5	33.3
PF	05/30/93	150	1020	0			58.1	13.5	46.8
CH	07/09/93	190	1045	0			85.0	26.9	73.7
PF	08/11/93	223	1310	0			99.6	14.6	88.3
PF	08/23/93	235	1100	0			109.0	9.4	97.7
PF	08/31/93	243	1430	0			114.1	5.1	102.8
PF&WM	09/30/93	273	1110	0			120.3	6.2	109.0
							1993 WATER YEAR TOTAL (cm) ==		109.0
							(inches) =		42.9
1994 WATER YEAR									
PF&WM	10/01/93	274					8.7	0.0	0.0
WM	11/02/93	306	1410	4	0.4	10	14.3	5.6	5.6
WM	01/25/94	25	1215	33	9.4	28	32.0	17.7	23.3
JB,OO	04/07/94	97	1450	45	13.5	30	45.6	13.6	36.9
PF	05/26/94	145	1320	0			57.6	12.0	48.9
PF	06/15/94	166	1520	0			62.8	5.2	54.1
CH,WM	06/21/94	172	1035	0			63.8	1.0	55.1
PF	07/14/94	195	1145	0			66.8	3.0	58.1
PF,HP	07/25/94	206	1605	0			68.1	1.3	59.4
WM	08/09/94	221	1315	0			68.5	0.4	59.8
PF,HP	08/31/94	243	1420	0			69.4	0.9	60.7
WM	09/30/94	273	1145	0			70.4	1.0	61.7
							1994 WATER YEAR TOTAL (cm) ==		61.7
							(inches) =		24.3

SUN CREEK (OLD)

SNOW COURSE NUMBER (SCS) 10C2 PRECIPITATION STATION NUMBER (SCS) MC24
DRAINAGE BASIN = Missouri STATE= Montana
ELEV = 7040 ft SW1/4 NW1/4 SEC 05 T13N R7E LAT= 46-55-08 LONG= 110-52-42

SAMPLER	DATE	JUL DATE	TIME	SNOW COURSE READINGS: DEPTH OF SNOW (IN)	SNOW WATER EQUIV. (IN)	SNOW DENSITY %	STORAGE GAGE READINGS: PPT READING (CM)	PPT INCREASE (CM)	CUM. PPT (CM)
PF	09/16/92	260	1200	0			9.1	0.0	
PF	09/30/92	274	1310	0			10.7	1.6	
1993 WATER YEAR									
PF	10/01/92	275	0	0			10.7		
WM	10/15/92	289	1555	2	0.2	10	13.1	2.4	2.4
OO	02/17/93	48	1245	40	11.6	29	31.2	18.1	20.5
KM	04/13/93	103	1400	49	13.5	28	42.6	11.4	31.9
PF	05/30/93	150	1125	0			57.5	14.9	46.8
CH	07/09/93	190	1215	0			84.4	26.9	73.7
PF	08/10/93	222	900	0			99.2	14.8	88.5
PF	08/24/93	236	1000	0			108.4	9.2	97.7
PF	08/31/93	243	1230	0			113.6	5.2	102.9
PF&WM	09/29/93	272	1345	0			119.0	5.4	108.3
					1993 WATER YEAR TOTAL (cm) ==				108.3
					(inches) =				42.6
1994 WATER YEAR									
PF&WM	10/01/93	274	0	0			9.6	0.0	0.0
WM	11/02/93	306	1300	5	0.5	10	14.8	5.2	5.2
WM	01/25/94	25	1100	37	10.8	29	30.3	15.5	20.7
JB,OO	04/07/94	97	1610	57	17.8	31	41.1	10.8	31.5
PF	05/26/94	145	1440	0			53.7	12.6	44.1
PF	06/15/94	166	1425	0			59.2	5.5	49.6
CH,WM	06/21/94	172	1005	0			60.5	1.3	50.9
PF	07/14/94	195	800	0			63.3	2.8	53.7
PF,HP	07/25/94	206	1700	0			65.0	1.7	55.4
WM	08/09/94	221	1035	0			65.4	0.4	55.8
PF,HP	09/01/94	244	1145	0			66.2	0.8	56.6
WM	09/30/94	273	1020	0			67.0	0.8	57.4
					1994 WATER YEAR TOTAL (cm) ==				57.4
					(inches) =				22.6

Appendix XI. Canopy density, basal area, and HCT for TCEF data sites.

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

CANOPY, BASAL AREA AND HABITAT COVER TYPE

Date surveyed	Location[1]	HCT[2]	Canopy[3]	Densiometer overstory[4]	Basal area[5]
			(0-30°%)	(%)	(ft^2/acre)
5/26/94	Bubbling Springs S.C.	SF	2	1	46
8/12/93	Bubbling Springs Canopy	SF	63	67	189
5/26/94	Bubbling Springs Precipitation	SF	0	1	55
8/23/93	County Line S.C.	SF	4	11	109
8/23/93	County Line Canopy	SF	59	55	139
8/23/93	County Line Precipitation	SF	2	6	115
8/23/93	Dry Park S.C.	LP3	2	5	55
8/23/93	Dry Park Precipitation	LP3	0	3	45
8/12/93	Farnes Meadow S.C.	SF	3	8	41
8/12/93	Farnes Meadow 1993 Canopy	LP2	74	74	233
8/12/93	Farnes Meadow 1994 Canopy	SF	76	78	219
5/26/94	Farnes Meadow Precipitation	LP2	4	17	65
8/09/93	Lonesome Creek S.C.	LP2	7	15	70
8/09/93	Lonesome Creek Canopy	LP2	71	63	233
8/09/93	Lonesome Creek Precipitation	LP2	2	15	85
7/13/94	Onion Park S.C.	SF	0	1	33
8/09/93	Onion Park 1993 Canopy	SF	60	62	209
8/27/93	Onion Park 1994 Canopy	SF	57	60	196
7/13/94	Onion Park Precipitation	SF	1	6	35
7/13/94	Onion Park Open Pillow	SF	0	8	35
8/27/94	Onion Park Canopy Pillow	SF	63	74	155
7/13/94	Onion Park Open Pcp.	SF	0	1	40
8/27/93	Onion Park Dense Pcp.	SF	84	85	100
8/27/93	Onion Park 1/2 Dense Pcp.	SF	64	70	135

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

CANOPY, BASAL AREA AND HABITAT COVER TYPE

(continued)

Date surveyed	Location[1]	HCT[2]	Canopy[3]	Densiometer overstory[4]	Basal area[5]
			(0-30°%)	(%)	(ft^2/acre)
7/14/94	Passionate Creek Precipitation	SF	0	26	50
7/14/94	Stringer Creek S.C.	SF	2	6	35
7/14/94	Stringer Creek Precipitation	SF	3	6	25
10/12/94	Sun Creek S.C.	LP2	4	25	59
8/24/93	Sun Creek (Old) S.C.	LP2	11	19	27
10/12/94	Sun Creek Canopy	LP2	59	70	128
10/12/94	Sun Creek Precipitation	LP2	0	23	55
8/24/93	Sun Creek (Old) Precipitation	LP2	8	12	15

[1]S.C. = Snow Course; Canopy = Canopy Snow Course; Precipitation = Storage Precipitation Gauge; Pcp. = Tipping Bucket Precipitation Gauges

[2]From Habitat Cover Type in Yellowstone Vegetation by Don Despain

[3]From Photo Canopyomoeter, 0 to 30° Cone

[4]From Spherical Densiometer, Forest Overstory Density

[5]From CRUZ-ALL, 5 BAF Scale

Appendix XII. Canopy snow survey data.

No.	Site
10C17C	Bubbling Springs
10C18C	County Line
10C20C	Farnes Meadow
10C21C	Lonesome Creek
10C22C	Onion Park
10C24C	Sun Creek

FILE = CANOPYSC. WB2

CANOPY SNOW COURSE DATA
SITE NAME = BUBBLING SPRINGS CANOPY
SNOW COURSE NUMBER = 10C17C
DRAINAGE BASIN = MISSOURI STATE = MT
ELEVATION: 7430 ft NE 1/4 SW 1/4 SEC 7 T13N R7E
LAT = 46-54-04 LONG = 110-53-50

SAMPLER	DATE	JULIAN DATE	TIME	SNOW COURSE READINGS DEPTH OF SNOW (IN)	SNOW WATER EQUIV (IN)	SNOW DENSITY %
	04/14/93	104	1320	46	12.1	26
WM	11/02/93	306	1045	2	0.2	10
WM	01/25/94	25	0840	29	8.1	28
	04/07/94	97	1010	46	12.8	28

FILE = CANOPYSC. WB2

`NOPY SNOW COURSE DATA
E NAME = COUNTY LINE CANOPY
SNOW COURSE NUMBER = 10C18C
DRAINAGE BASIN = MISSOURI STATE = MT
ELEVATION: 7810 ft SE 1/4 SE 1/4 SEC 29 T14N R7E
LAT = 46-56-28 LONG = 110-51-17

SAMPLER	DATE	JULIAN DATE	TIME	SNOW COURSE READINGS DEPTH OF SNOW (IN)	SNOW WATER EQUIV (IN)	SNOW DENSITY %
	04/14/93	104	0950	47	12.4	26
	04/07/94	97	1300	52	15.4	30

FILE = CANOPYSC. WB2

CANOPY SNOW COURSE DATA
SITE NAME = FARNES MEADOW CANOPY
SNOW COURSE NUMBER = 10C20C
DRAINAGE BASIN = MISSOURI STATE = MT
ELEVATION: 7400 ft NW 1/4 SE 1/4 SEC 32 T14N R7E
LAT = 46-55-47 LONG = 110-51-28

SAMPLER	DATE	JULIAN DATE	TIME	SNOW COURSE READINGS DEPTH OF SNOW (IN)	SNOW WATER EQUIV (IN)	SNOW DENSITY %
	02/17/93	48	1140	29	7.3	25
CANOPY COURSE MOVED SUMMER 1993						
WM	11/02/93	306	1200	3	0.3	10
	04/07/94	97	1400	41	12.5	30

FILE = CANOPYSC. WB2

NOPY SNOW COURSE DATA
E NAME = LONESOME CREEK CANOPY
SNOW COURSE NUMBER = 10C21C
DRAINAGE BASIN = MISSOURI STATE = MT
ELEVATION: 6970 ft NE 1/4 NW 1/4 SEC 11 T13N R6E
LAT = 46-54-33 LONG = 110-56-26

SAMPLER	DATE	JULIAN DATE	TIME	SNOW COURSE READINGS DEPTH OF SNOW (IN)	SNOW WATER EQUIV (IN)	SNOW DENSITY %
	02/17/93	48	1450	30	7.0	23
	11/02/93	306	1015	3	0.3	10
	01/25/94	25	0800	25	7.0	28
	04/07/94	97	1045	41	10.7	26

FILE = CANOPYSC. WB2

CANOPY SNOW COURSE DATA
SITE NAME = ONION PARK CANOPY
SNOW COURSE NUMBER = 10C22C
DRAINAGE BASIN = MISSOURI STATE = MT
ELEVATION: 7410 ft NE 1/4 SW 1/4 SEC 04 T13N R7E
LAT = 46-54-50 LONG = 110-51-10

SAMPLER	DATE	JULIAN DATE	TIME	SNOW COURSE READINGS DEPTH OF SNOW (IN)	SNOW WATER EQUIV (IN)	SNOW DENSITY %
	04/14/93	104	1130	43	11.9	28
SAMPLE #5 MOVED FOR CANOPY PILLOW						
WM	11/02/93	306	1130	4	0.4	10
WM	01/25/94	25	930	30	8.7	29
	04/07/94	97	0900	50	14.3	29

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Figure 28--Relationship between SWE interception and lodgepole pine habitat cover type.

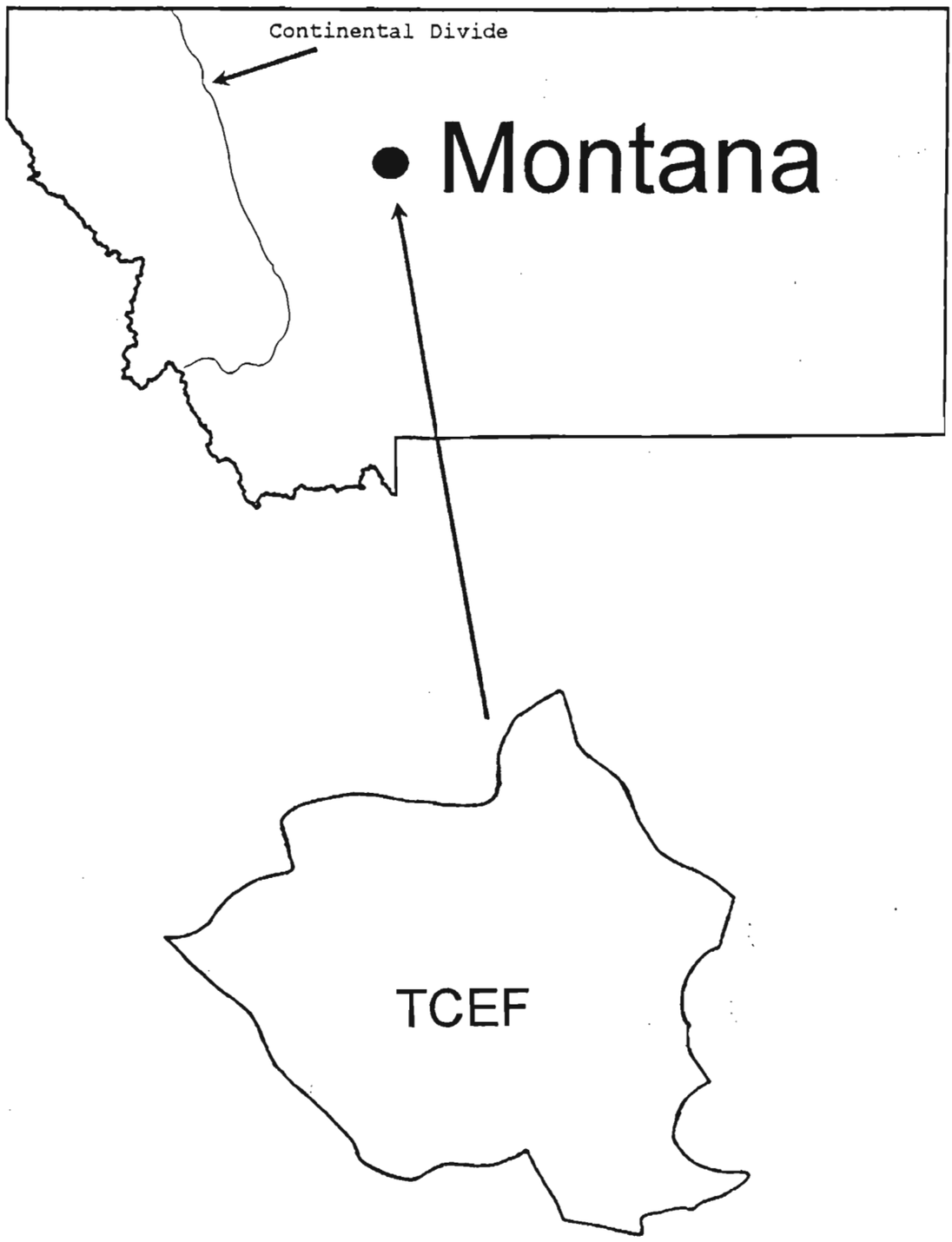

Figure 1 . Location of Tenderfoot Creek Experimental Forest (TCEF).

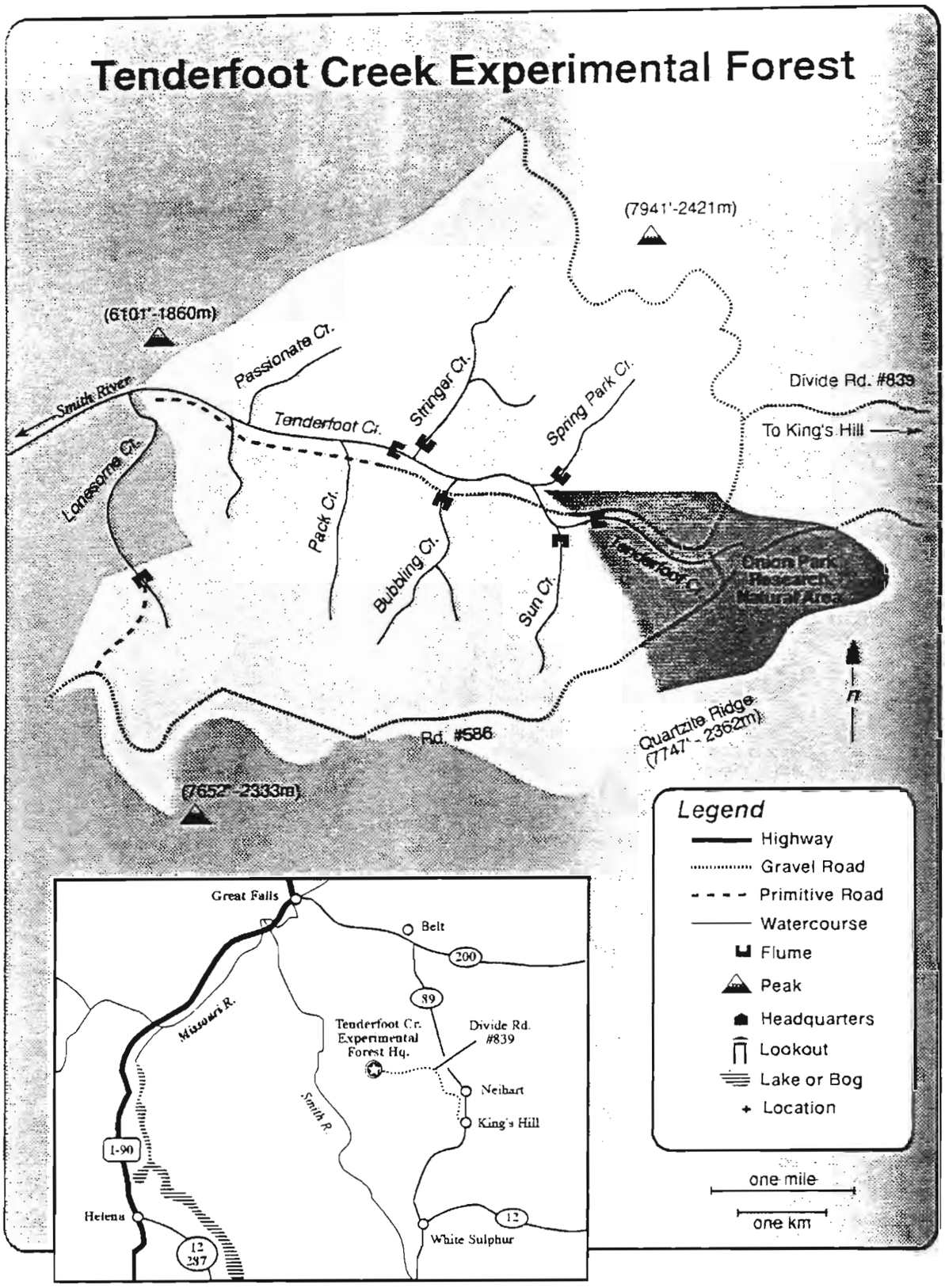

Figure 2--Orientation of Tenderfoot Creek Experimental Forest.

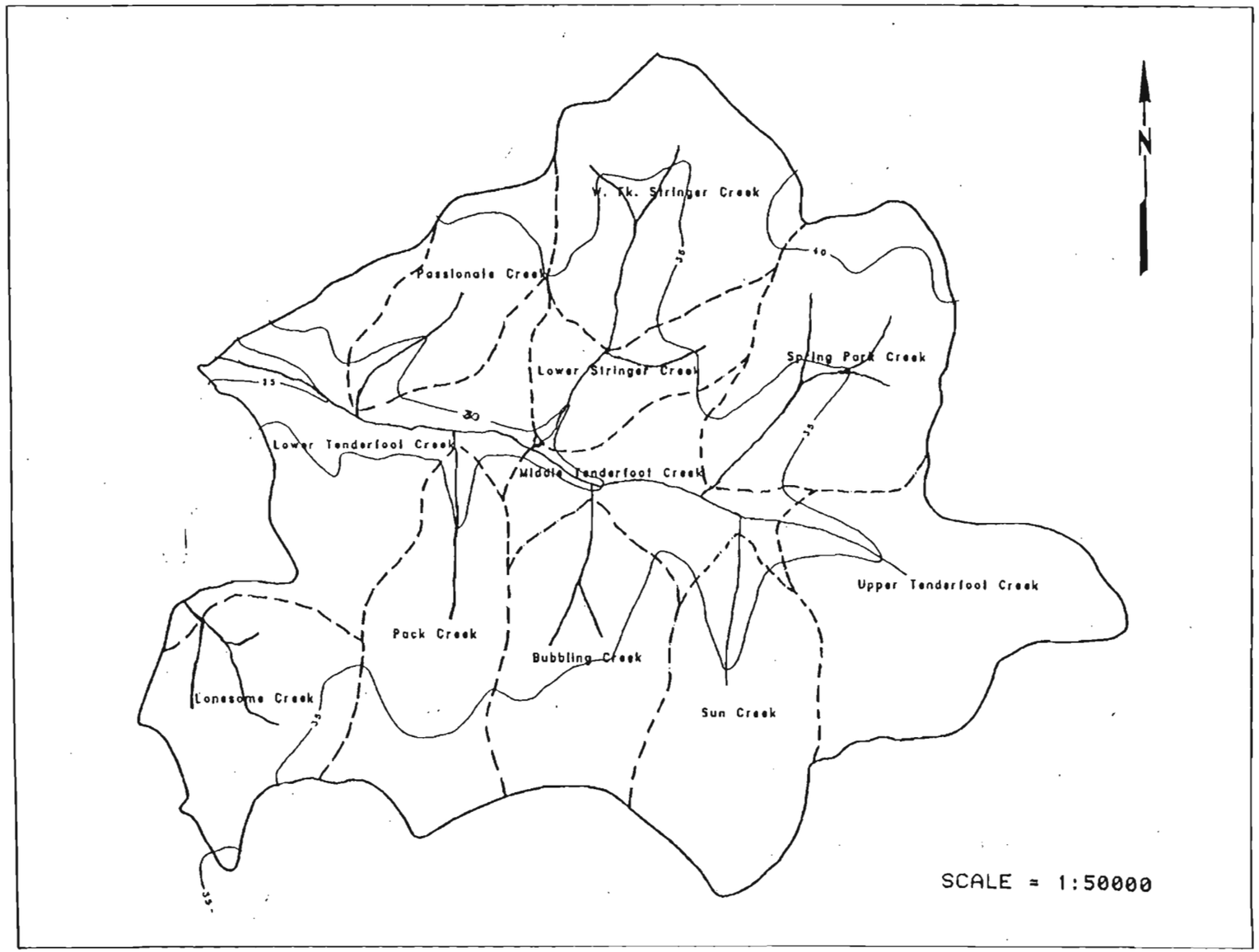

Figure 3--Map of 1961-90 average annual precipitation for Tenderfoot Creek Experimental Forest and subwatersheds.

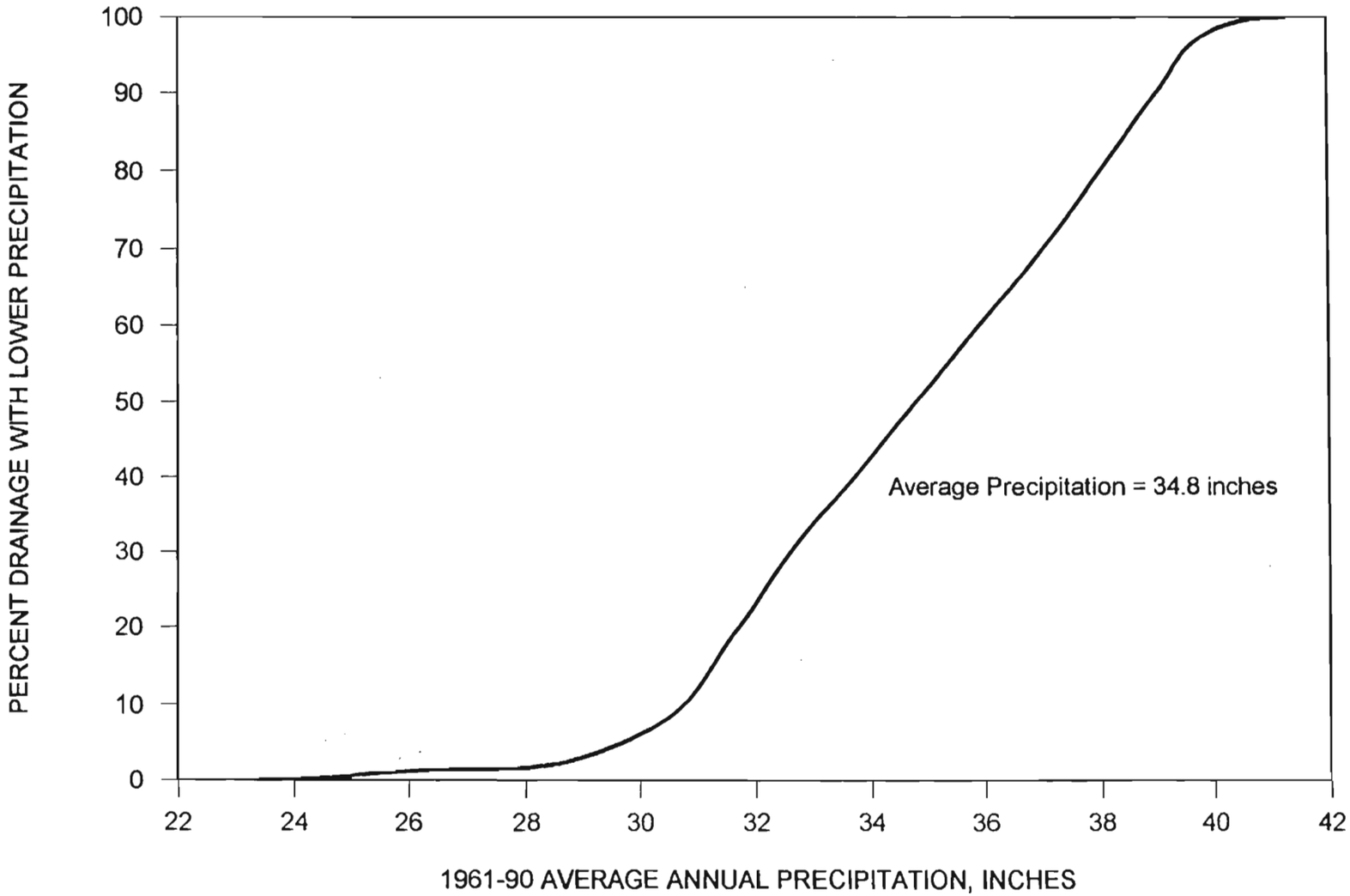

Figure 4--Area/precipitation curve for Tenderfoot Creek Experimental Forest.

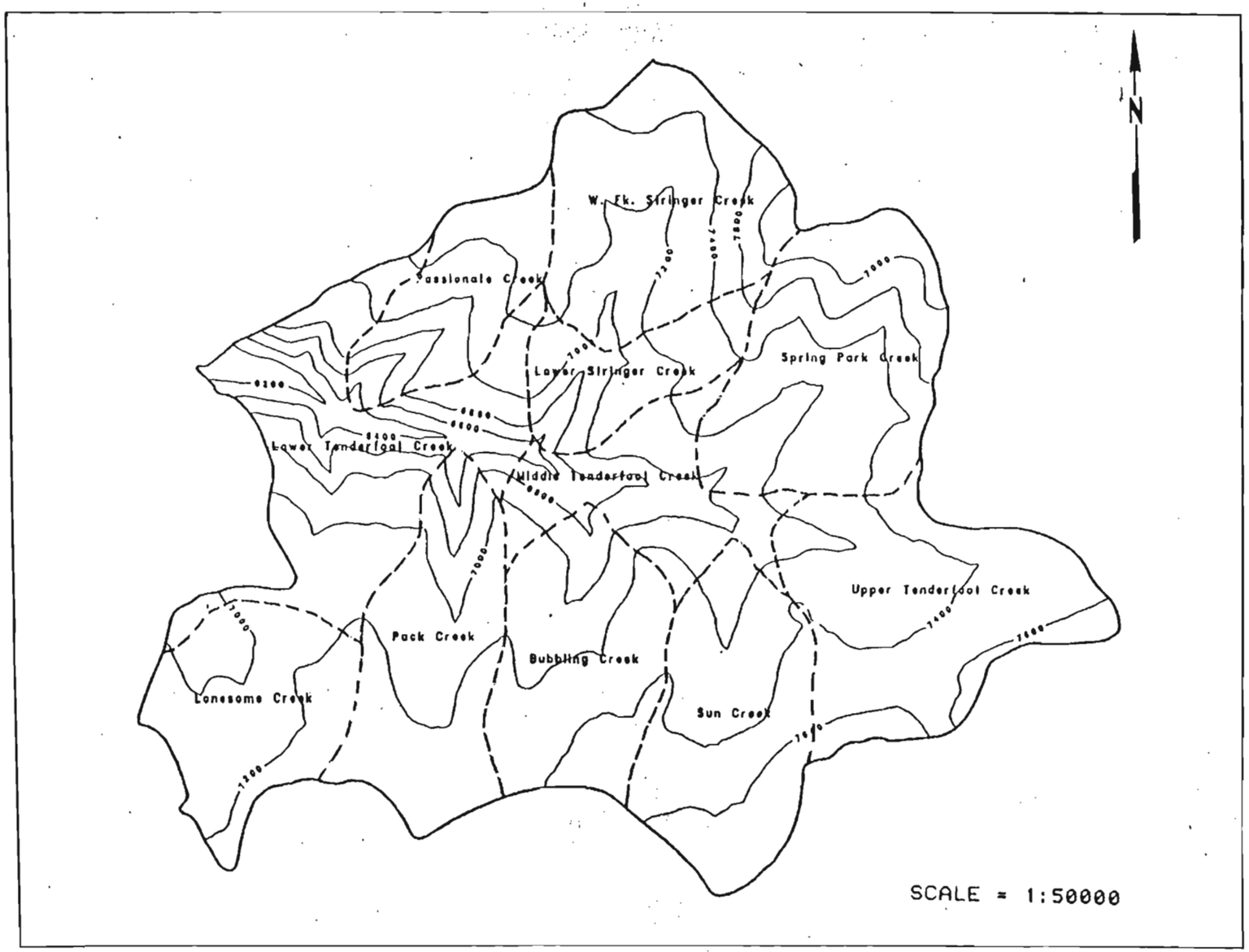

Figure 5--Map of elevations for Tenderfoot Creek Experimental Forest and subwatersheds.

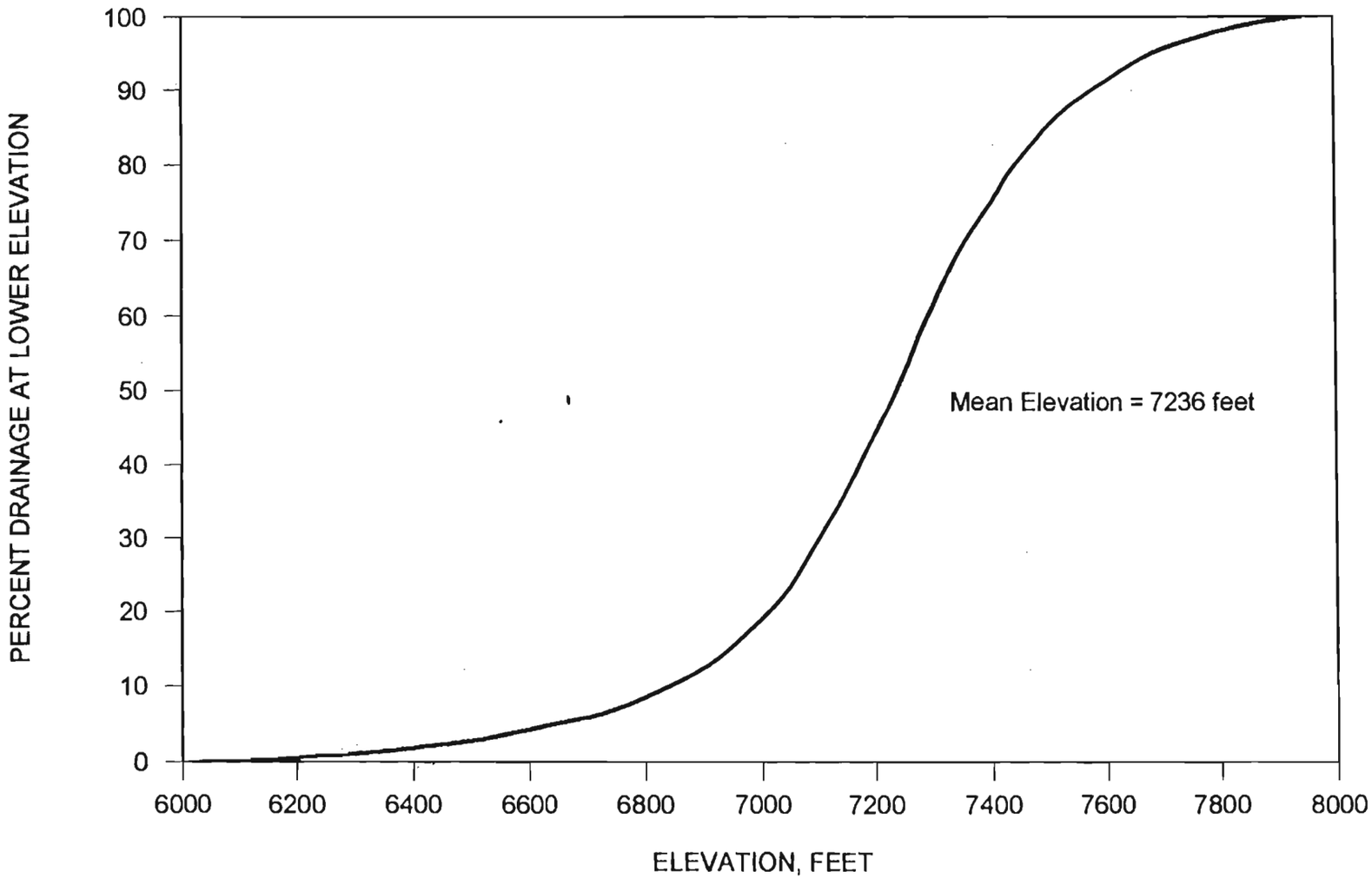

Figure 6--Area/elevation curve for Tenderfoot Creek Experimental Forest.

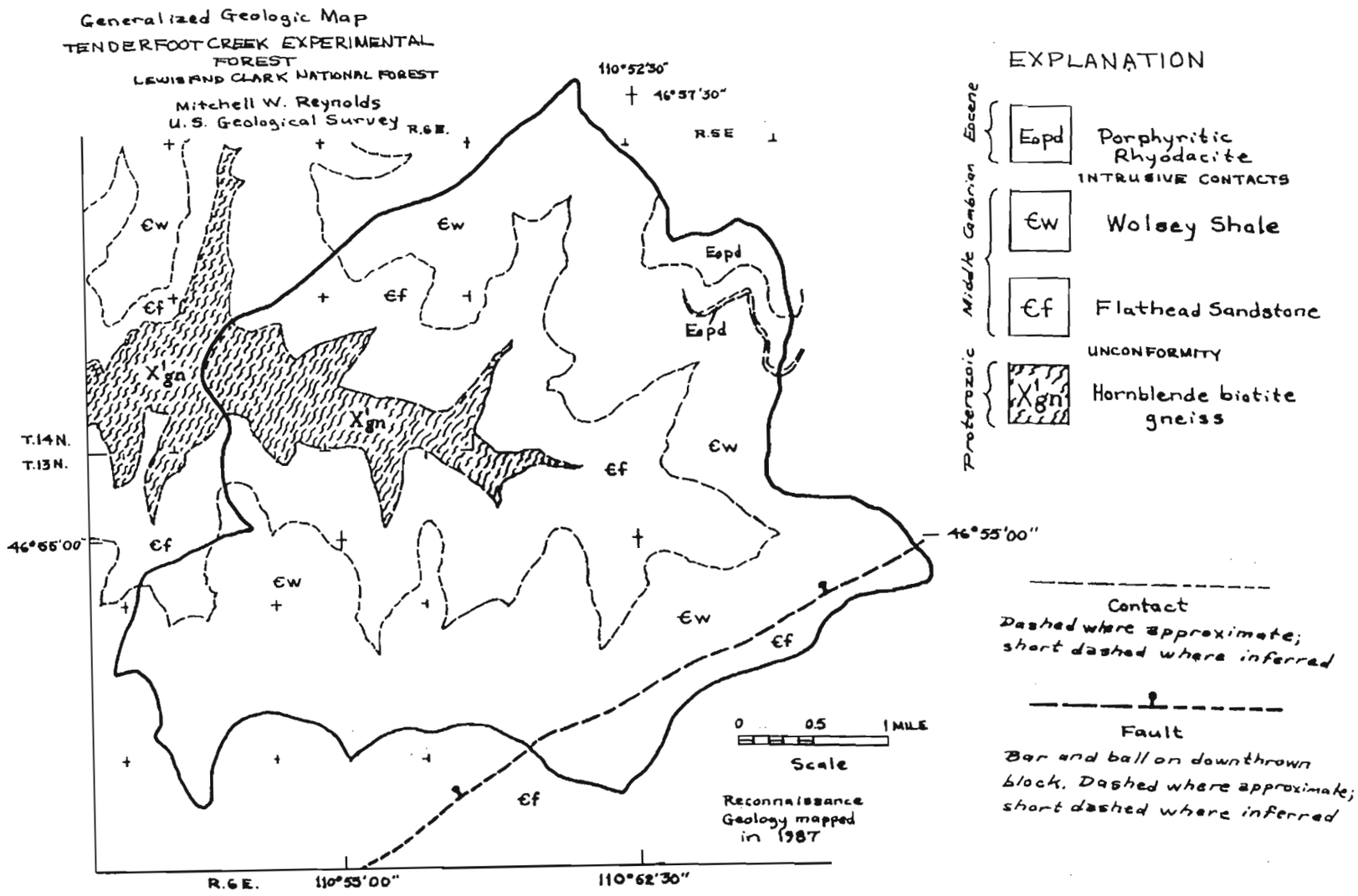

Figure 7--Reconnaissance bedrock geologic map of Tenderfoot Creek Experimental Forest.

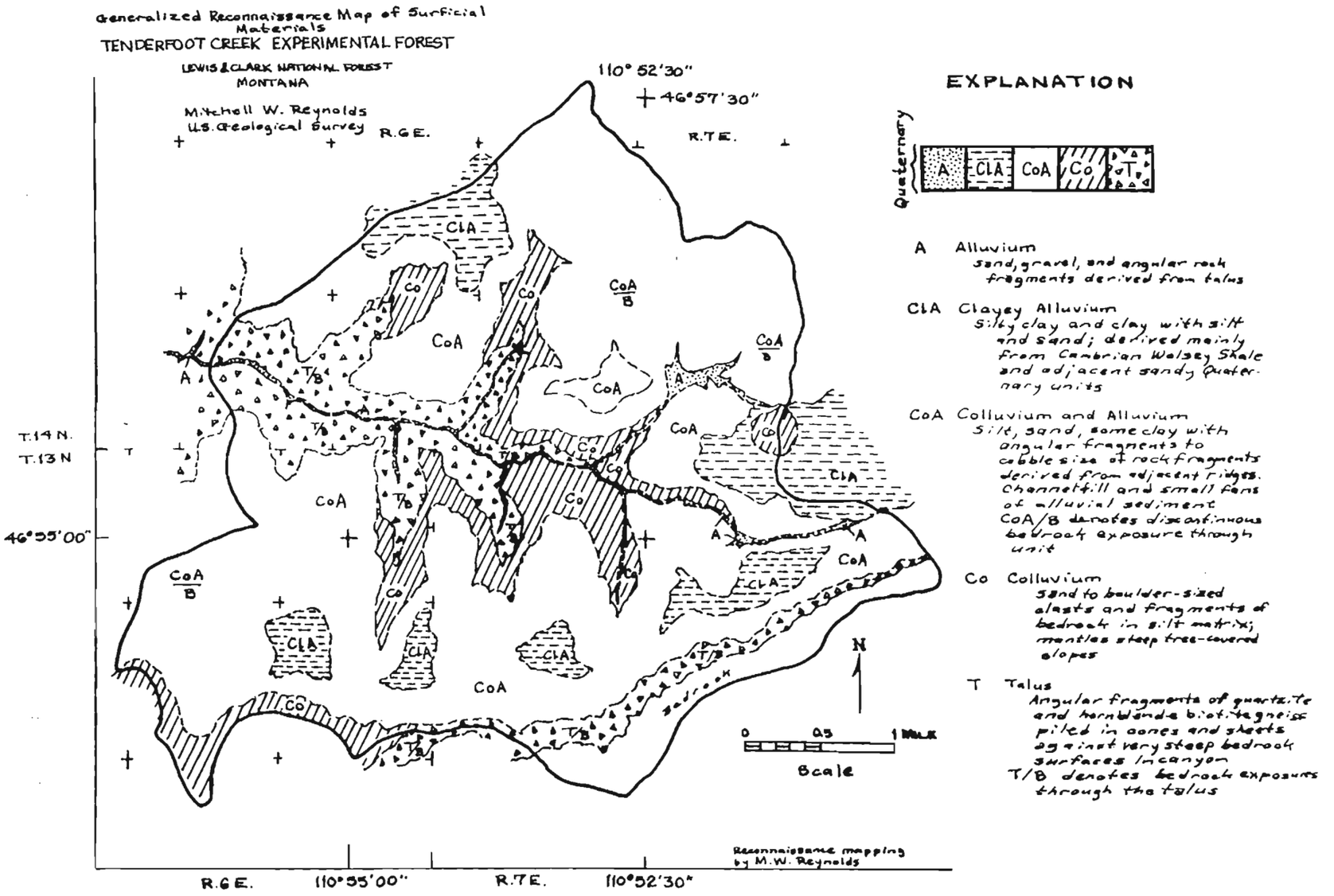

Figure 8--Generalized distribution of surface materials across Tenderfoot Creek Experimental Forest.

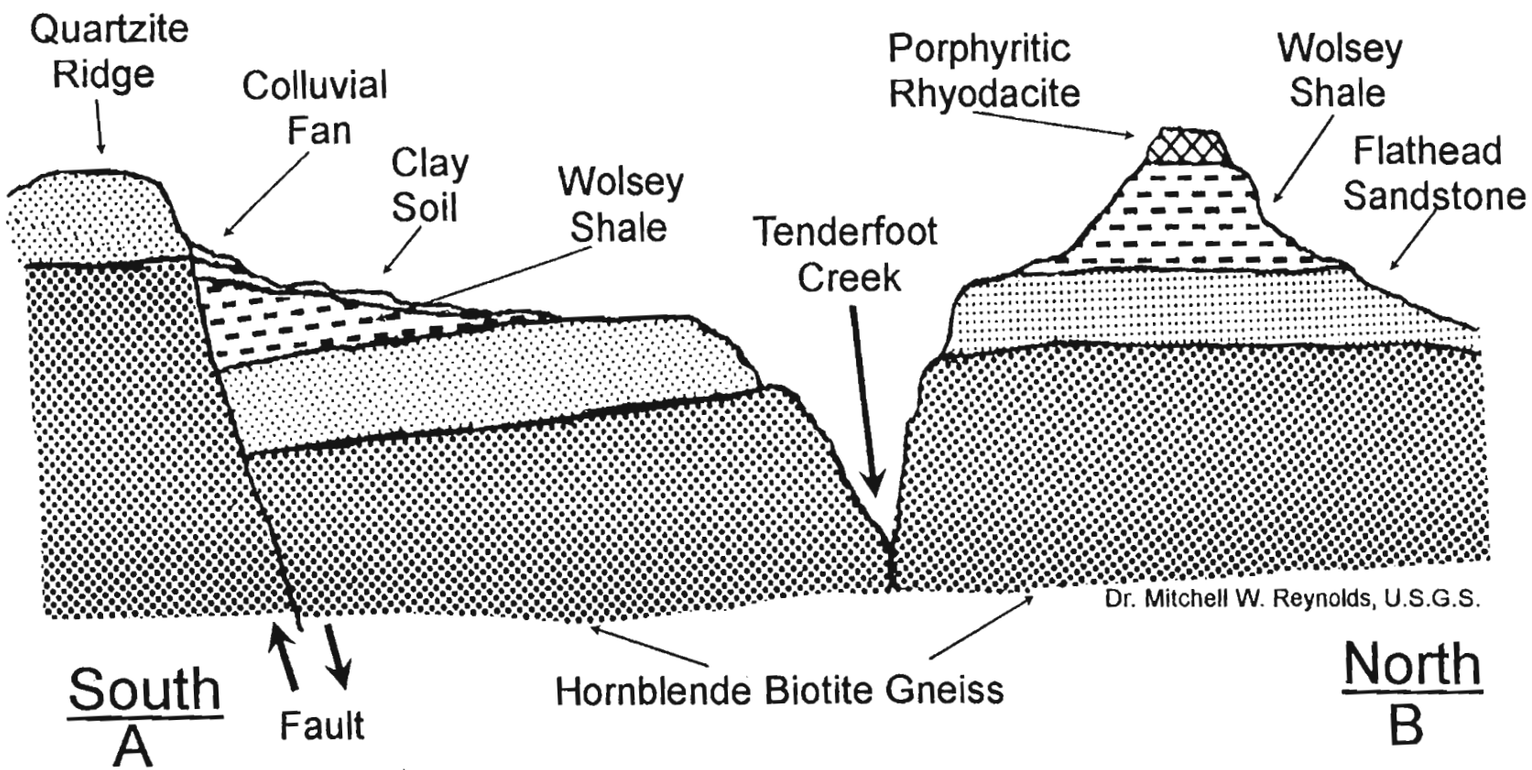

Figure 9. Expanded geologic cross-section of Tenderfoot Creek Experimental Forest along cross-section A/B in figure 9a.

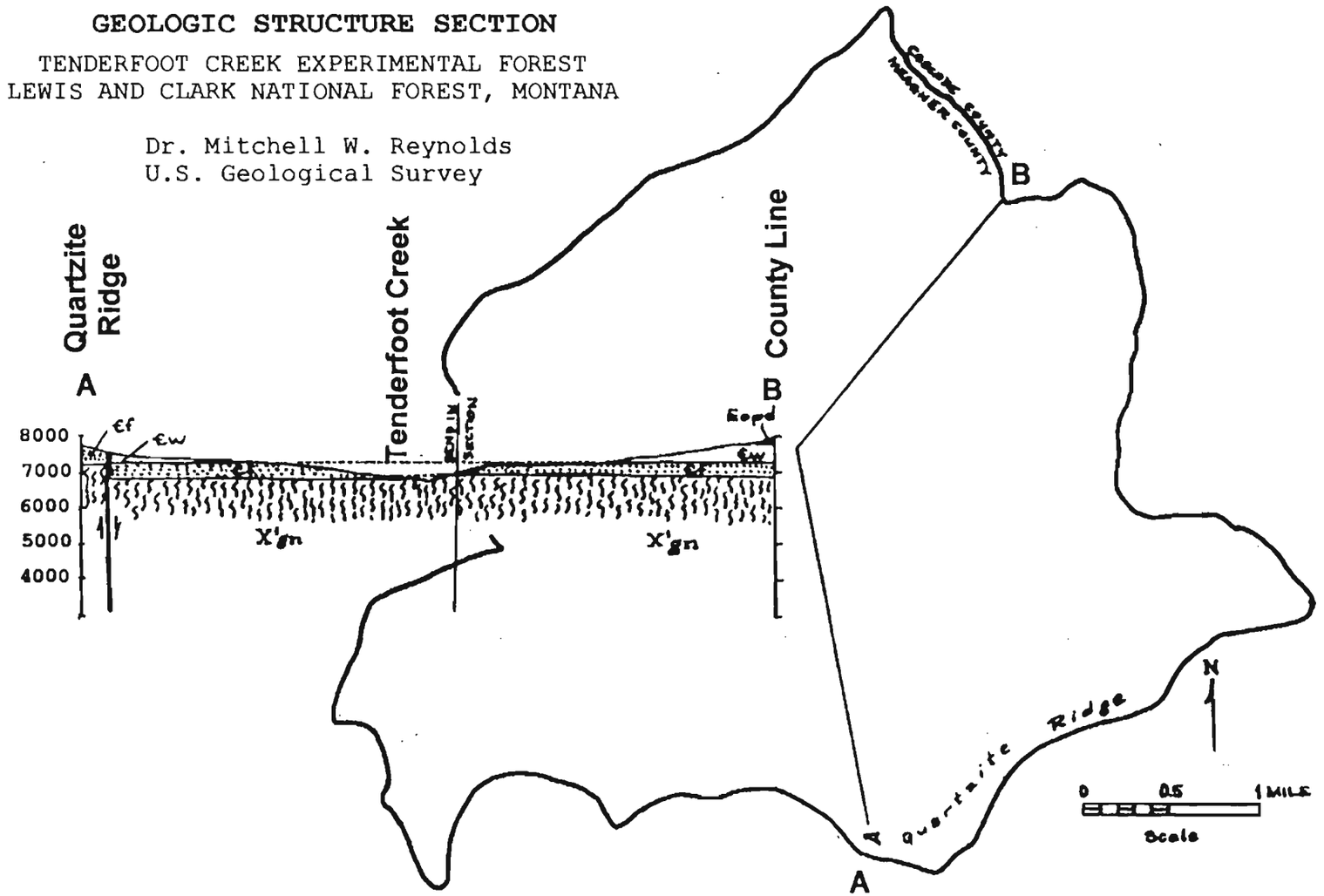

Figure 9a. Expanded geologic cross-section of Tenderfoot Creek Experimental Forest.

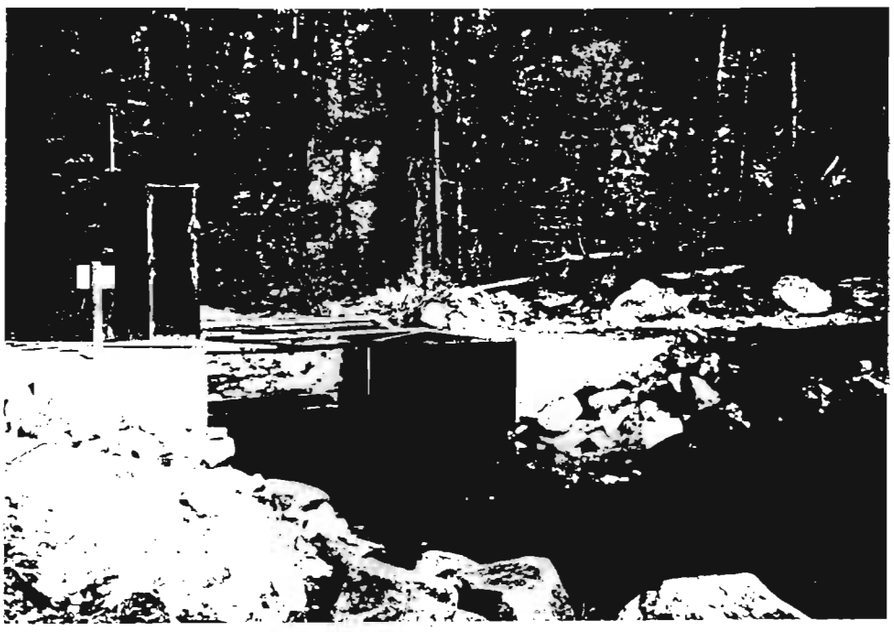

Figure 10--Photograph of 10-foot Parshall flume on Tenderfoot Creek below Stringer Creek.

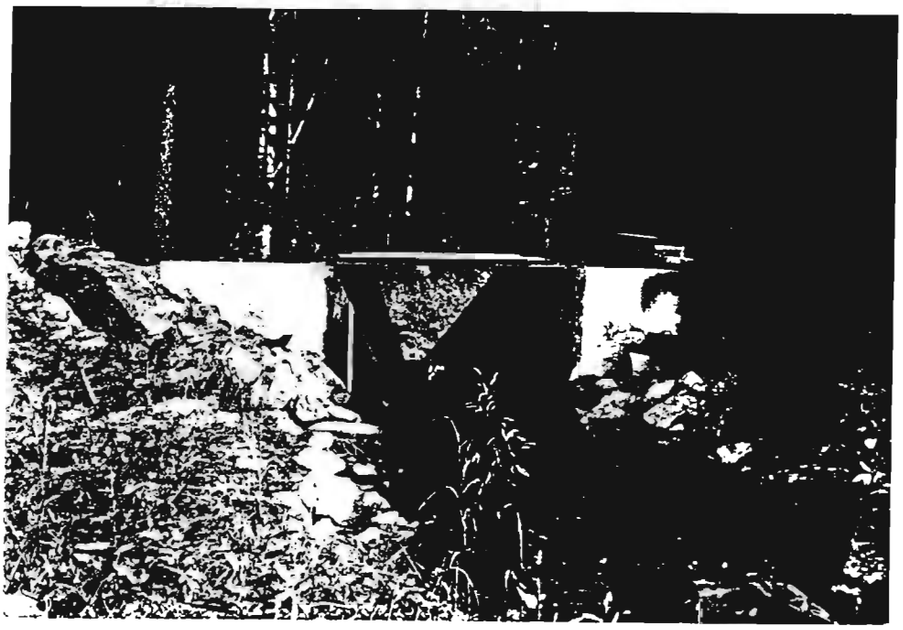

Figure 11--Photograph of 3-1/2-foot H-flume on Bubbling Creek near mouth.

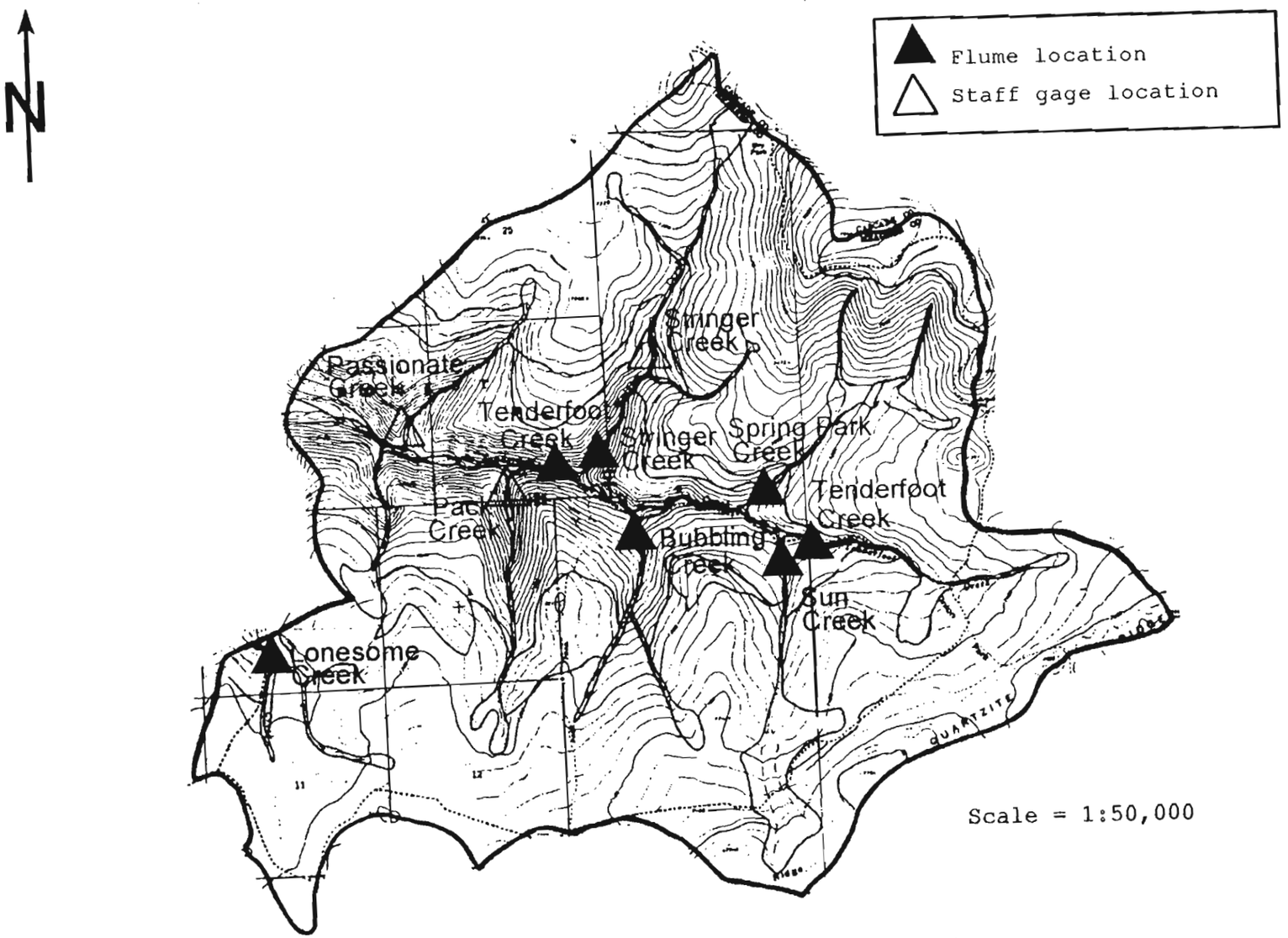

Figure 12--Map of stream gaging station locations on Tenderfoot Creek Experimental Forest.

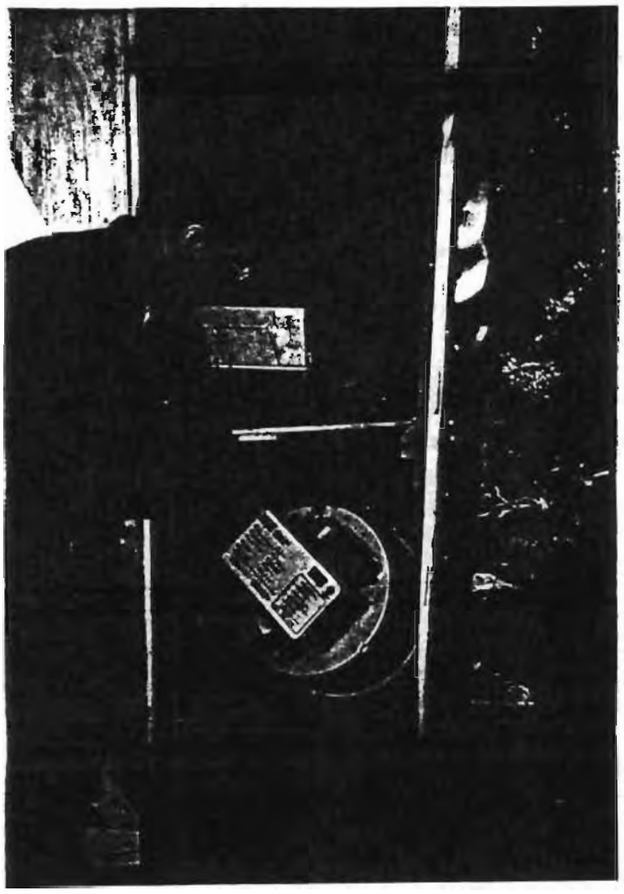

Figure 13--Photograph of ISCO sediment sampler at Sun Creek.

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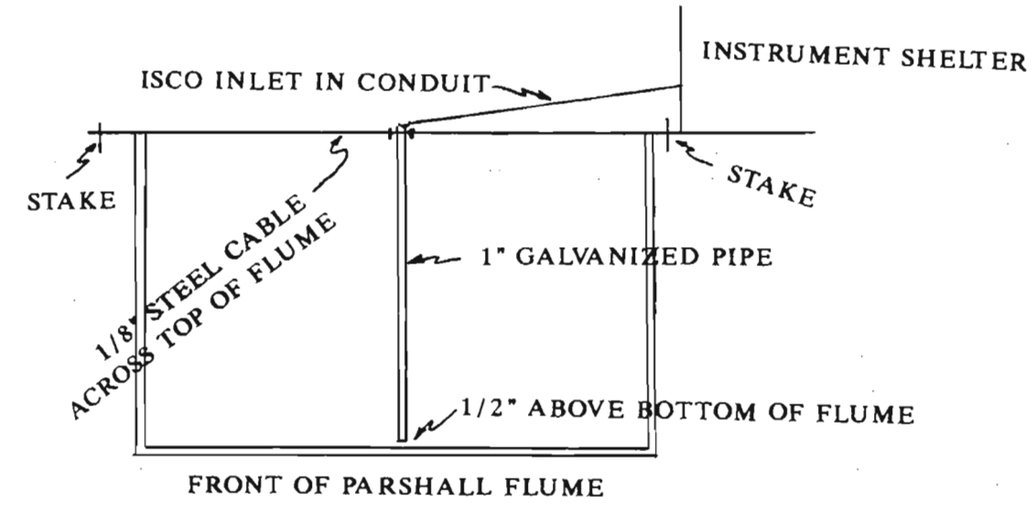

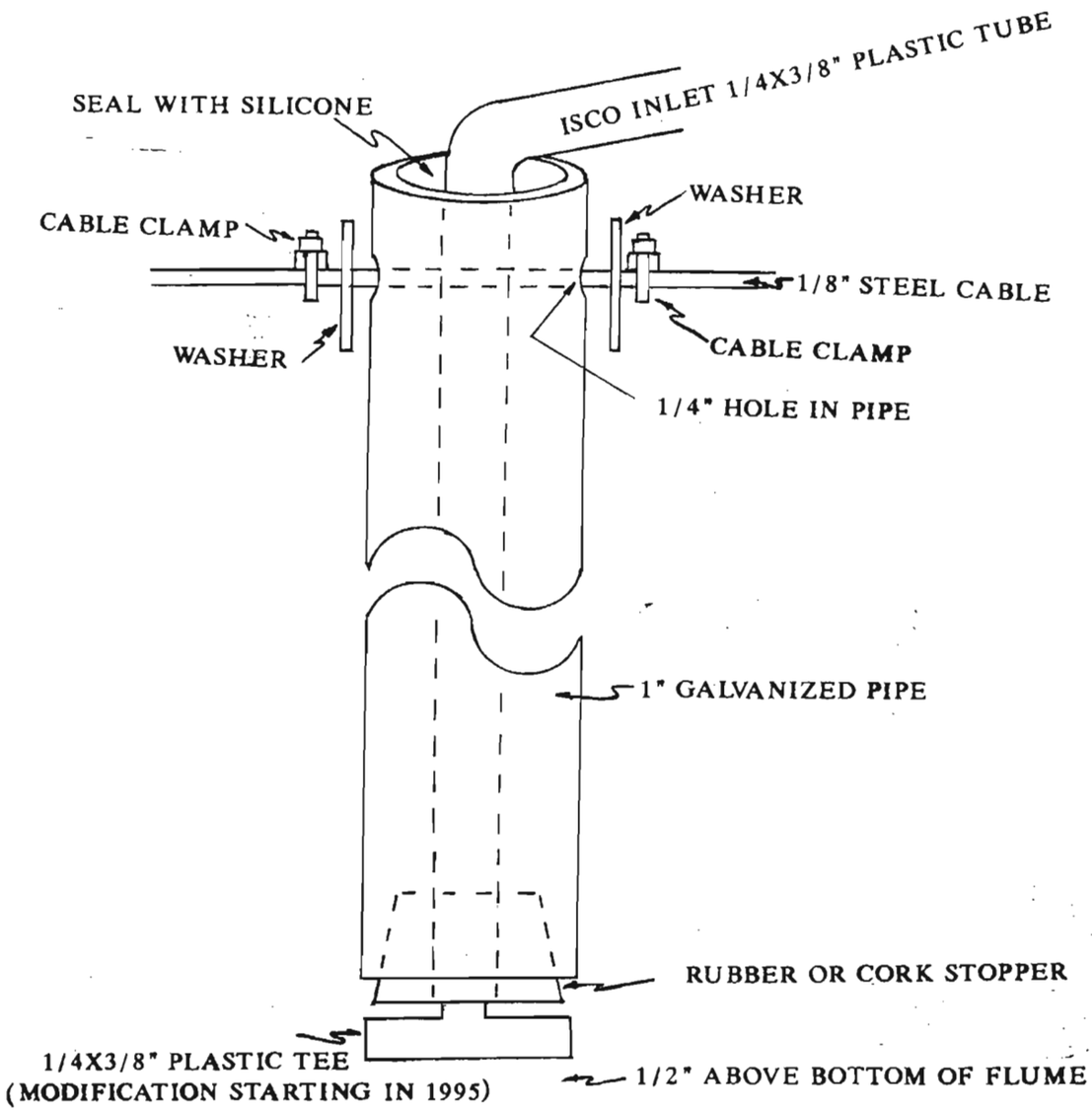

Figure 15--Sketch of variable depth intake for ISCO sampler.

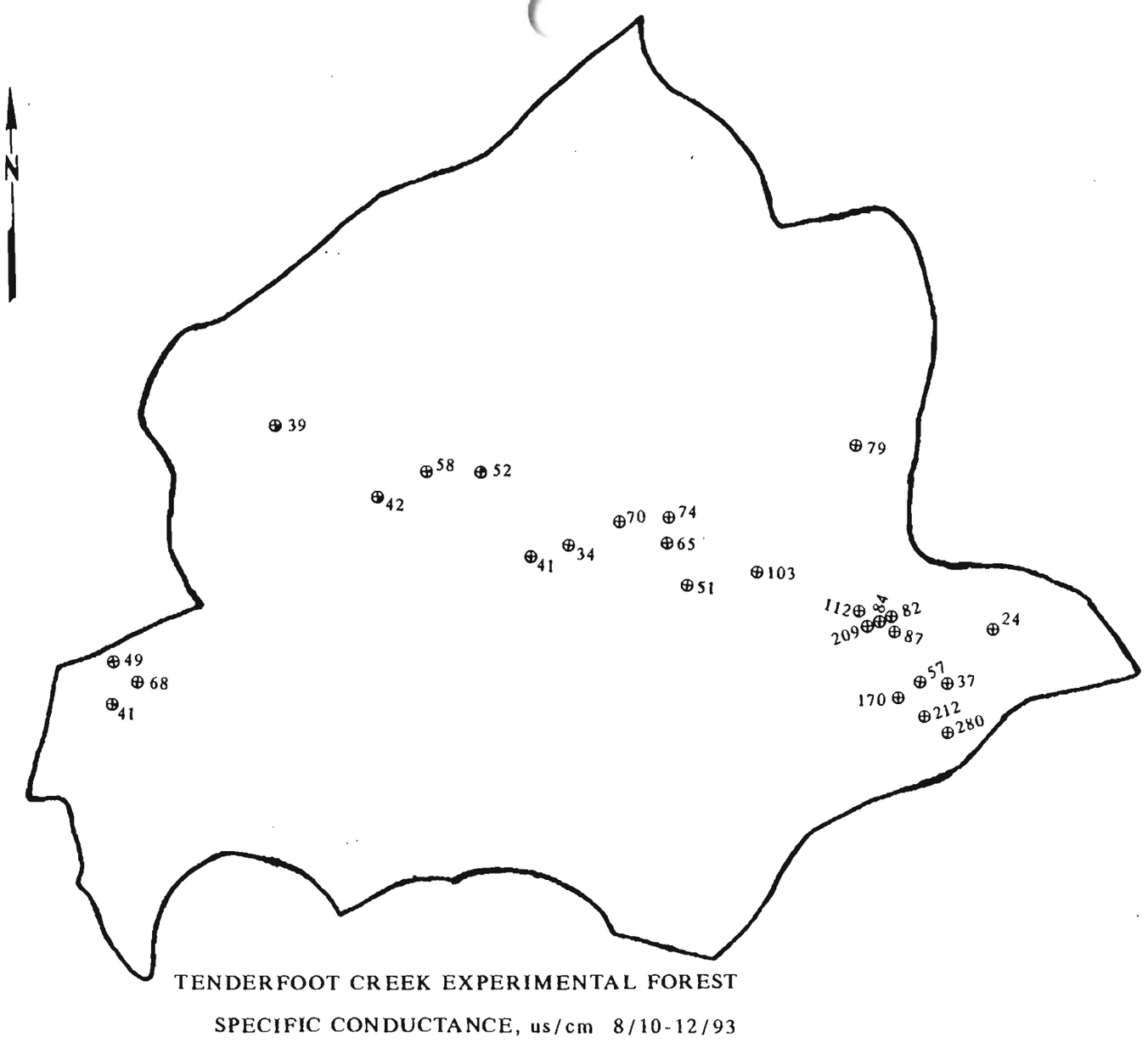

Figure 16--Map showing locations and specific conductance readings of 8/10-12/1993.

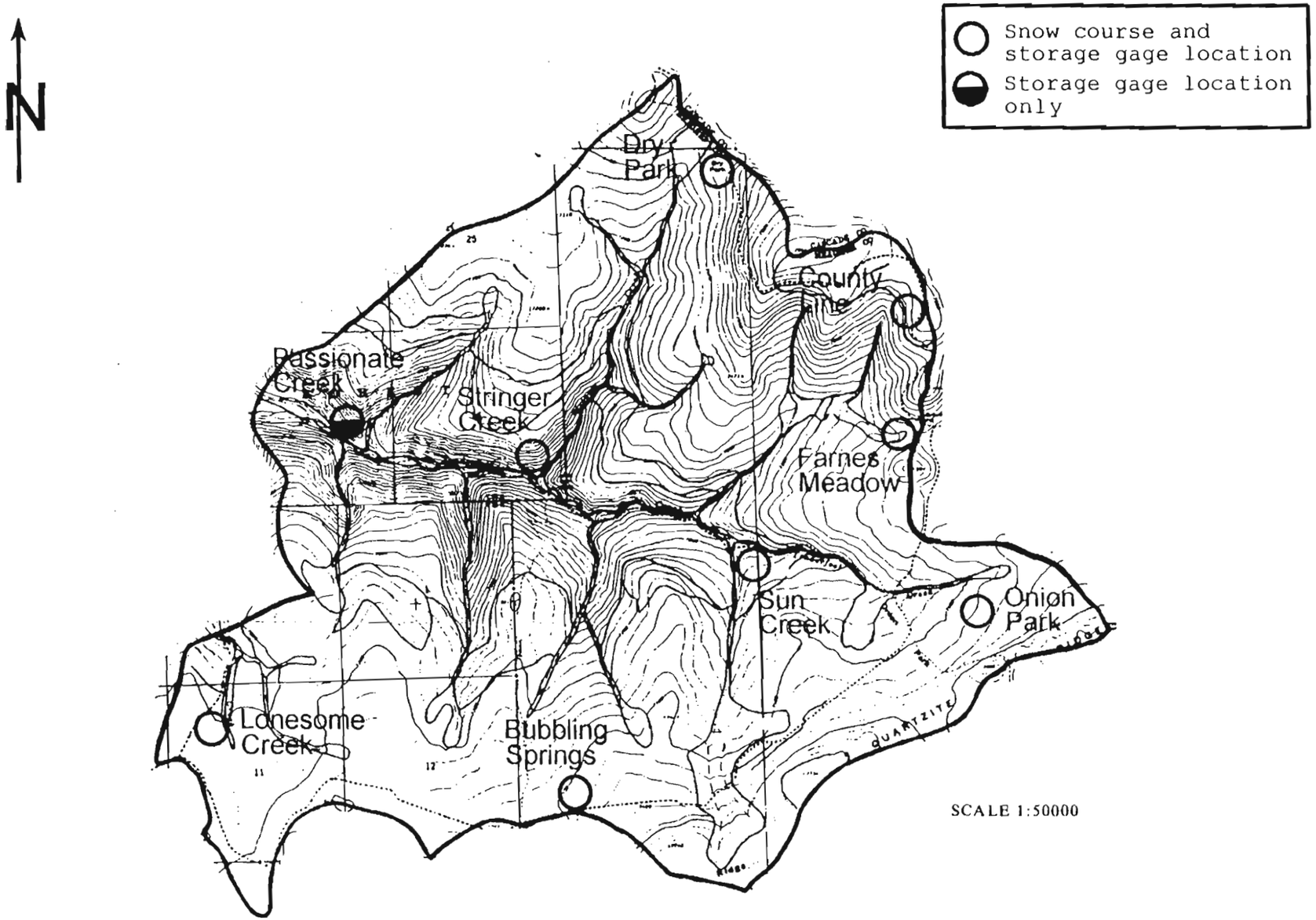

Figure 17--Map of snow and precipitation measuring sites on Tenderfoot Creek Experimental Forest.

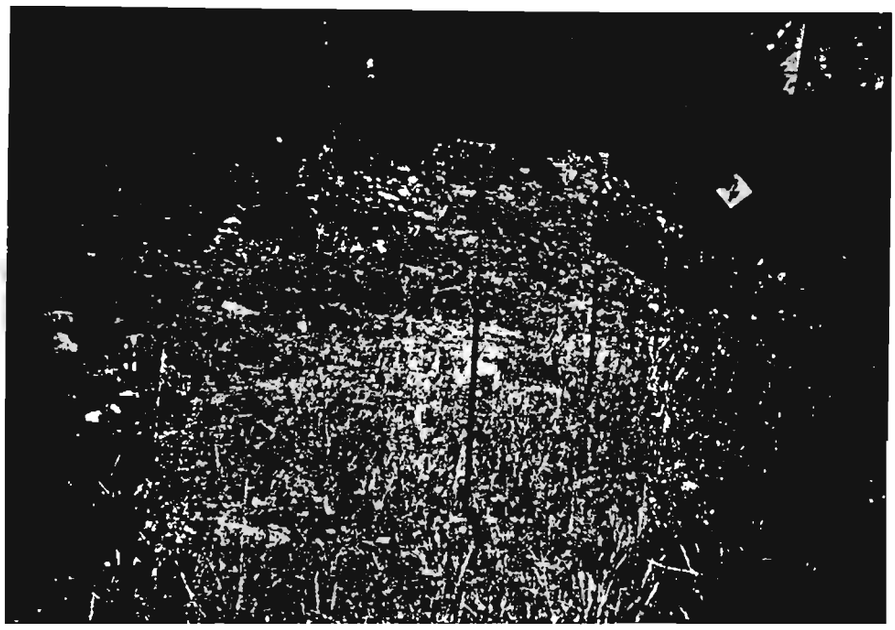

Figure 18--Photograph of Sun Creek (Old) snow course.

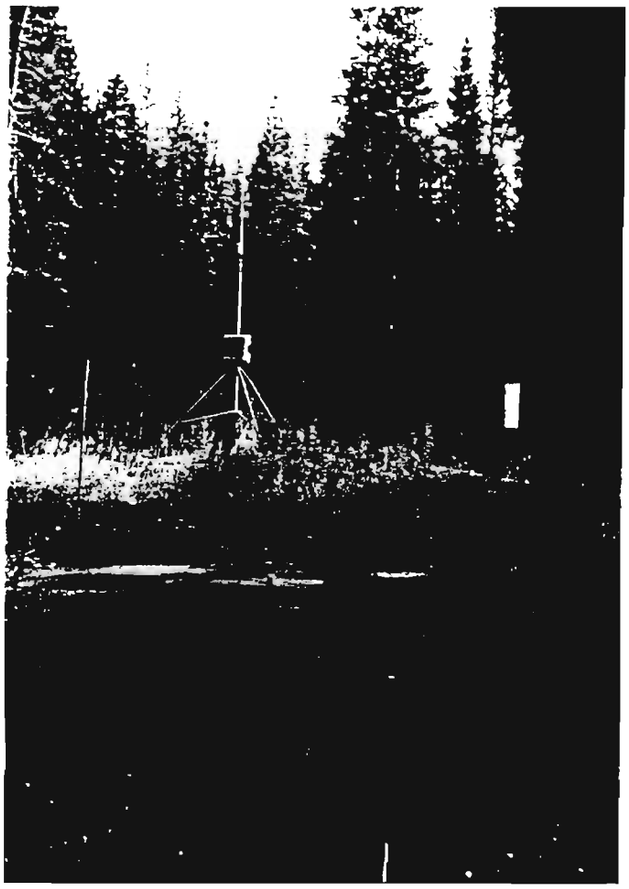

Figure 19--Photograph of Onion Park Snow Pillow (open) with Omni data pod and open tipping bucket precipitation gage in background.

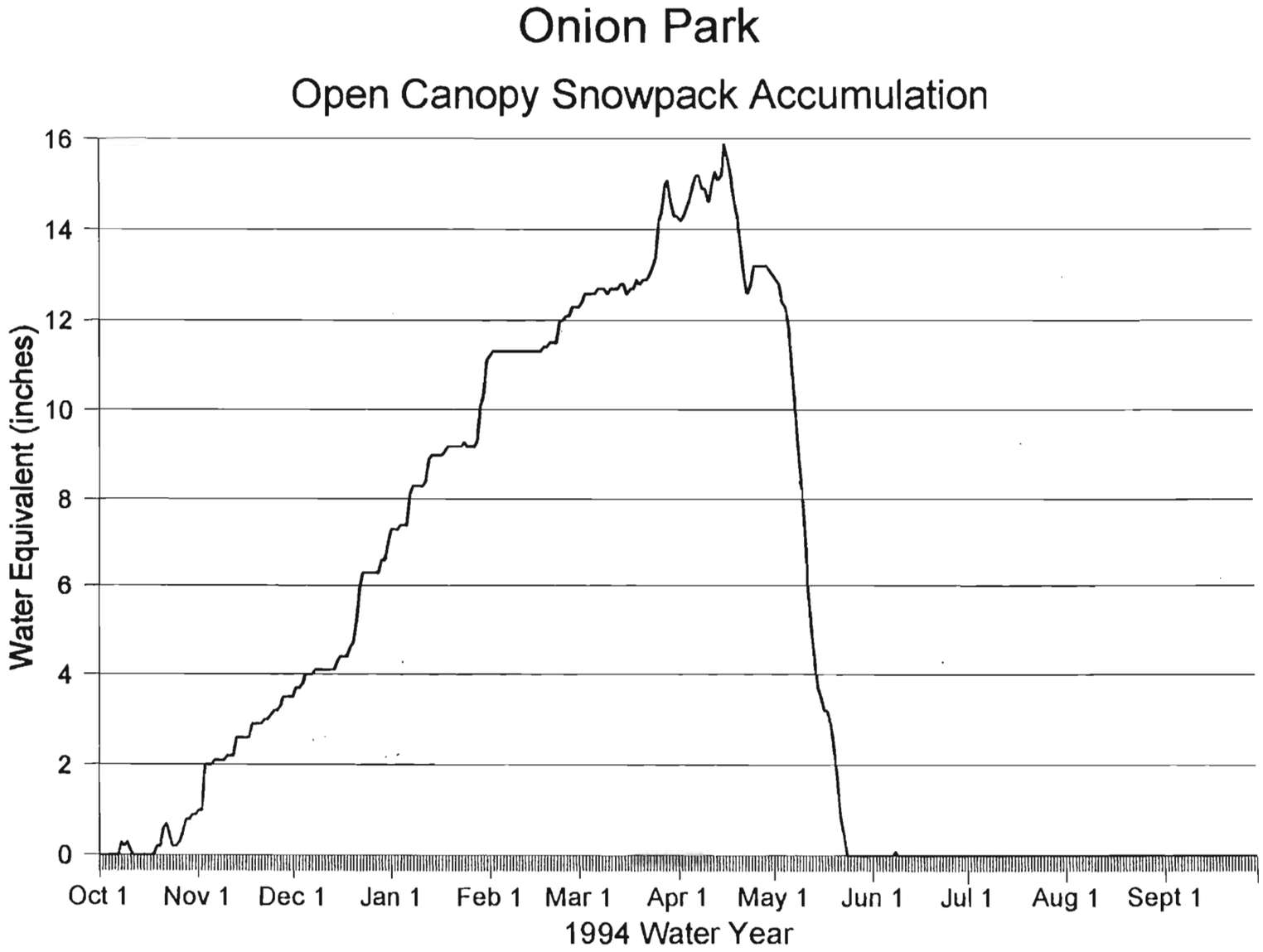

Figure 20--Daily SWE at Onion Park Open Pillow, 1994.

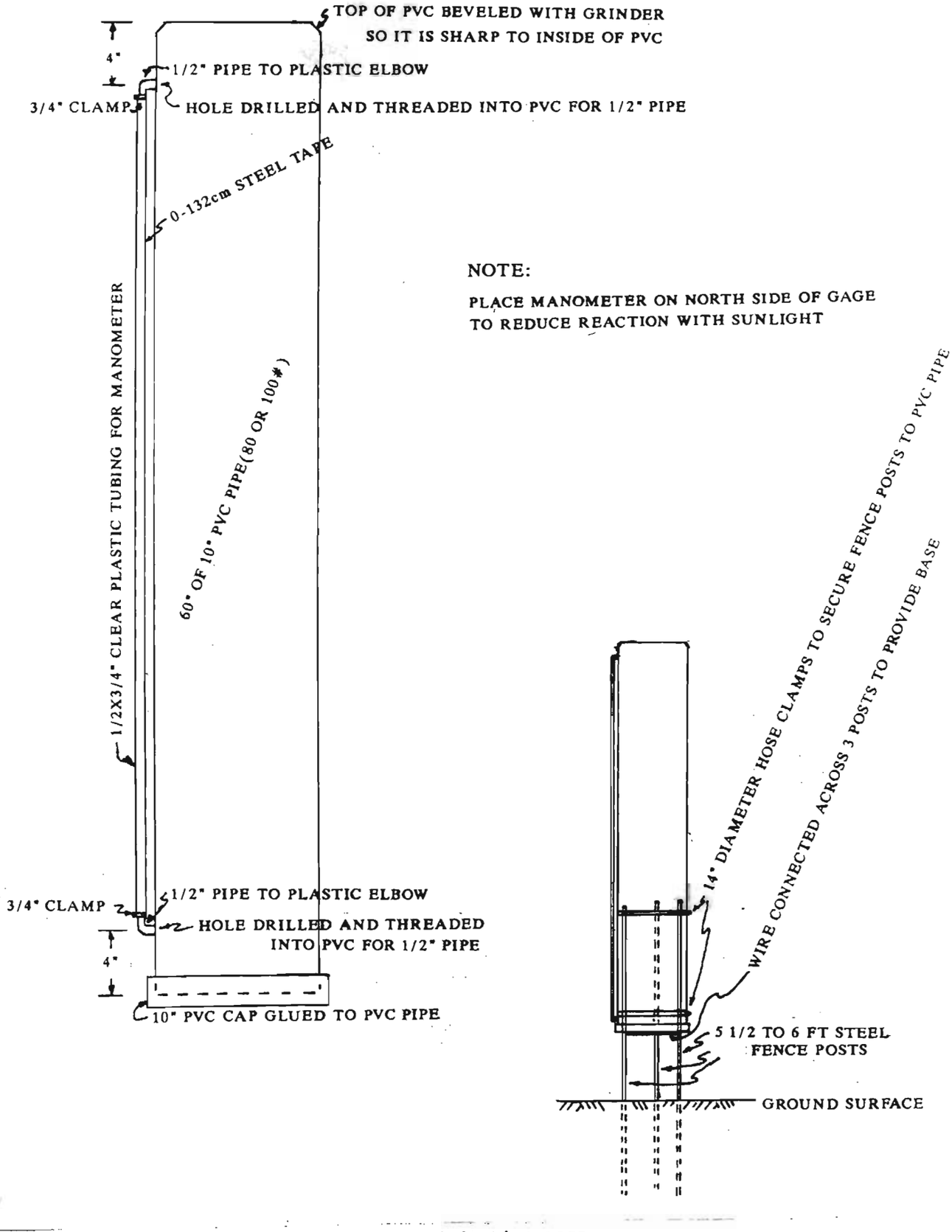

Figure 21--Diagram of 10" storage precipitation gage.

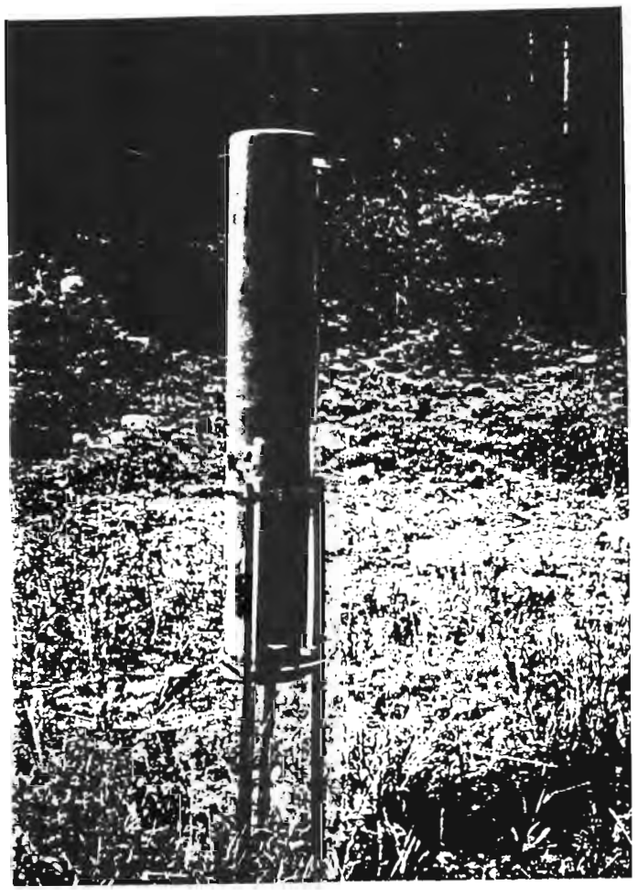

Figure 22--Photograph of 10" storage precipitation gage at Sun Creek (Old).

Figure 23--Photograph of Onion Park Canopy Snow Pillow.

Figure 24--Photograph of Onion Park Dense Canopy tipping bucket precipitation gage.

Figure 25--Photograph of Photocanopyometer.

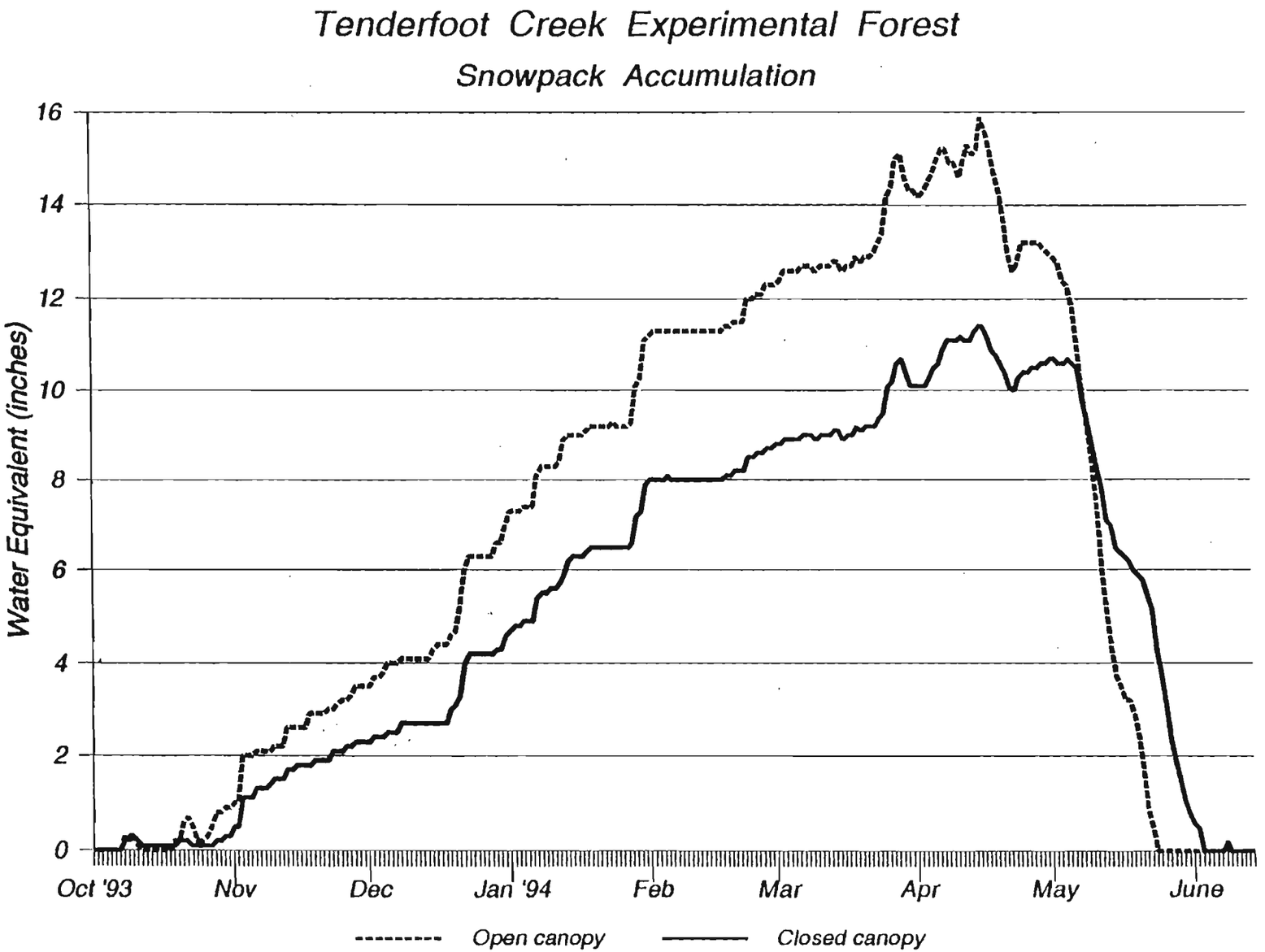

Figure 26--Daily SWE at Onion Park Open and Onion Park Canopy Snow Pillows, 1994.

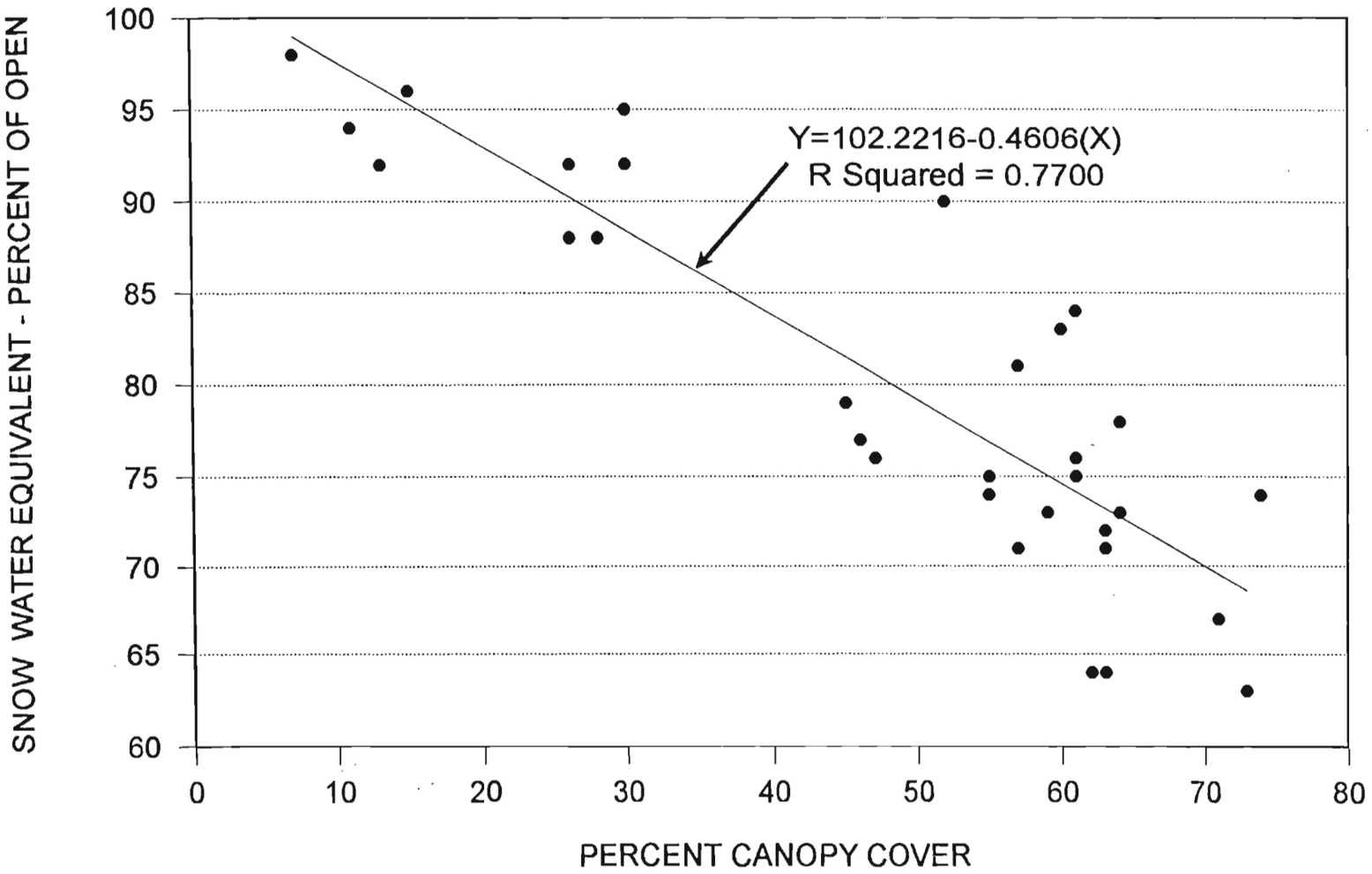

Figure 27. Relationship between snow water equivalent interception and photo-canopyometer measurements in percent canopy cover for canopy and open snow courses on the Tenderfoot Creek Experimental Forest.

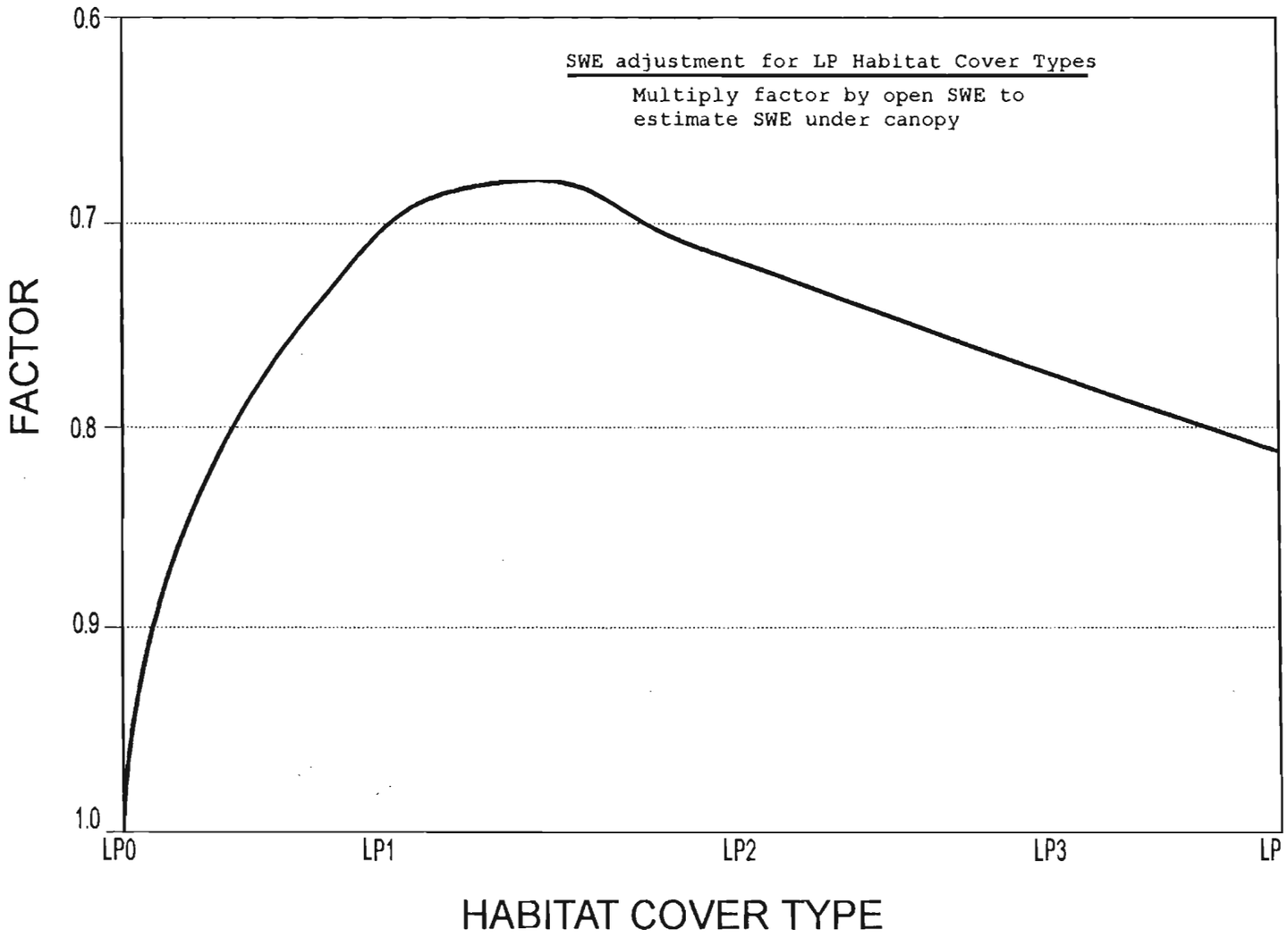

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Table 15--Daily SWE for Onion Park Open Pillow, 1994.

Table 16--Estimated first of month accumulation of precipitation for 1993 and 1994.

Table 17--Estimated monthly precipitation for 1993 and 1994.

Table 18--Daily SWE for Onion Park Canopy Pillow, 1994.

Table 19--Interception at Canopy Snow Courses and Snow Pillows for 1993 and 1994.

Table 1--Area in each precipitation zone for TCEF and subwatersheds.

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

ACRES IN 1961-90 AVERAGE ANNUAL PRECIPITATION ZONES

DRAINAGE	PRECIPITATION IN INCHES					DRAINAGE AREA ACRES
	23.4 - 25	25 - 30	30 - 35	35 - 40	40 - 41.3	
Sun Creek Near Mouth			100	756		856
Spring Park Creek Near Mouth			213	696	124	1033
Bubbling Springs Creek Near Mouth			367	418		785
Stringer Creek Above East Fork			301	630	34	965
Stringer Creek Near Mouth		11	585	742	34	1372
Tenderfoot Creek Above Sun Creek			75	1028		1103
Tenderfoot Creek Below Stringer Creek		40	1830	3686	158	5714
Pack Creek Near Mouth		34	520	268		822
Passionate Creek Near Mouth		62	353	82		497
Tenderfoot Creek @ TCEF Boundary	57	486	3454	4036	158	8191
Lonesome Creek Near Williams Park			593	90		683
Tenderfoot Creek Experimental Forest	57	486	4047	4126	158	8874

FILE = TEN.ACR

Table 2--Lowest, average, and highest precipitation for TCEF and subwatersheds.

PRECIPITATION MEANS AND EXTREMES FOR

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

Gaging Station No	Drainage	1961-90 Average Annual Precipitation, Inches			Drainage Area Acres
		Lowest	Highest	Average	
LC7006	Sun Creek	32.6	39.5	37.0	856
LC7007	Spring Park Creek	31.6	41.3	37.2	1033
LC7008	Bubbling Creek	29.8	37.1	35.1	785
LC7015	W.Fk.Springer Creek	31.3	41.2	36.5	965
LC7009	Stringer Creek @ Mouth	28.3	41.2	35.6	1372
LC7013	Tenderfoot Creek Above Sun Creek	33.0	39.7	37.2	1103
LC7014	Tenderfoot Creek Below Stringer Creek	27.9	41.3	36.3	5714
LC7010	Pack Creek	27.2	36.5	33.6	822
LC7011	Passionate Creek	25.3	35.6	32.6	497
	Tenderfoot Creek @ TCEF Boundary	23.4	41.3	35.1	8191
LC7012	Lonesome Creek Near Williams Park	30.7	36.5	33.2	683
	Tenderfoot Creek Experimental Forest	23.4	41.3	34.8	8874

FILE = TEN.196

Table 3--Monthly distribution of annual precipitation for high, mid and low elevations on Tenderfoot Creek Experimental Forest.

TENDERFOOT CREEK EXPERIMENTAL FOREST
ESTIMATED 1961-90 MONTHLY PRECIPITATION
AS PERCENTAGE OF ANNUAL PRECIPITATION

Month	High Elev. (7900')	Mid Elev. (7200')	Low Elev. (6200')
October	5.5	5.5	5.5
November	8.5	7.6	6.1
December	12.0	10.3	7.5
January	13.5	11.3	8.0
February	9.4	7.9	5.5
March	10.2	9.1	7.2
April	8.9	8.4	7.5
May	8.9	10.8	13.3
June	7.5	9.9	13.2
July	5.7	7.2	9.0
August	5.0	5.7	9.0
September	4.9	6.3	8.2

Based on relationship between monthly precipitation at Spur Park and Deadman Creek SNOTEL sites and White Sulphur Springs 10N and Fort Logan climatological stations.

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Table 4--Area in each elevation zone for and subwatersheds.

ACRES IN ELEVATION ZONES FOR

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

DRAINAGE	Elevation Zones in Feet										Drainage Area Acres
	6030-6200	6200-6400	6400-6600	6600-6800	6800-7000	7000-7200	7200-7400	7400-7600	7600-7800	7800-7944	
Sun Creek Near Mouth						67	293	279	217		856
Spring Park Creek Near Mouth					6	131	375	232	151	138	1033
Bubbling Creek Near Mouth				7	68	231	363	116			785
Stringer Creek Above East Fork					17	179	453	209	70	37	965
Stringer Creek at Mouth			1	32	103	329	550	242	78	37	1372
Tenderfoot Creek Above Sun Creek						41	354	563	145		1103
Tenderfoot Creek Below Stringer Creek			10	108	336	1047	2015	1432	591	175	5714
Pack Creek Near Mouth			14	47	95	311	355				822
Passionate Creek Near Mouth		5	30	53	102	156	151				497
Tenderfoot Creek @ TCEF Boundary	54	112	215	383	841	1838	2550	1432	591	175	8191
Lonesome Creek Near Williams Park					90	408	185				683
Tenderfoot Creek Experimental Forest	54	112	215	383	931	2246	2735	1432	591	175	8874

FILE = TEN.ZON

Table 5--Lowest, average, and highest elevation for TCEF and subwatersheds.

ELEVATION MEANS AND EXTREMES FOR

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

Stream Gaging Station No	Drainage	Lowest Elev Feet	Highest Elev Feet	Mean Elev Feet	Drainage Area Acres
LC7006	Sun Creek Near Mouth	7020	7754	7449	856
LC7007	Spring Park Creek Near Mouth	6910	7944	7404	1033
LC7008	Bubbling Creek Near Mouth	6720	7499	7248	785
LC7015	Stringer Creek Above East Fork	6880	7930	7327	965
LC7009	Stringer Creek Near Mouth	6560	7930	7280	1372
LC7013	Tenderfoot Creek Above Sun Creek	7060	7772	7456	1103
LC7014	Tenderfoot Creek Below Stringer Creek	6510	7944	7334	5714
LC7010	Pack Creek Near Mouth	6440	7431	7164	822
LC7011	Passionate Creek Near Mouth	6240	7339	7075	497
	Tenderfoot Creek @ TCEF Boundary	6030	7944	7251	8191
LC7012	Lonesome Creek Near Williams Park	6810	7431	7123	683
	Tenderfoot Creek Experimental Forest	6030	7944	7236	8874

FILE = TEN.DRA

Table 6--Estimated annual runoff and peak flows for Tenderfoot Creek Experimental Forest.

ESTIMATED PEAK DAY AND ANNUAL RUNOFF FOR

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA

Stream Gaging Station No.	Drainage	Mean Elevation FT	1961-90 Avg Ann Pcp IN	Drainage Area Acres	Est Ann 1961-90 Yield Ac-FT[1]	Zone 2 Est Peak Flow, Max Day 25 Yr Freq Cfs[2]	Zone 5 Est Peak Flow, Max Day 25 Yr Freq Cfs[3]
LC7006	Sun Creek Near Mouth	7449	37.0	865	965	60	140
LC7007	Spring Park Creek Near Mouth	7404	37.2	1033	1175	70	160
LC7008	Bubbling Creek Near Mouth	7248	35.1	785	800	50	120
LC7015	Stringer Creek Above East Fork	7327	36.5	965	1060	65	150
LC7009	Stringer Creek Near Mouth	7280	35.6	1372	1440	85	195
LC7013	Tenderfoot Creek Above Sun Creek	7456	37.2	1103	1255	75	175
LC7014	Tenderfoot Creek Below Stringer Creek	7334	36.3	5714	6215	265	615
LC7010	Pack Creek Near Mouth	7164	33.6	822	765	50	120
LC7011	Passionate Creek Near Mouth	7075	32.6	497	435	35	110
	Tenderfoot Creek @ TCEF Boundary	7251	35.1	8191	8360	335	785
LC7012	Lonesome Creek Near Williams Park	7123	33.2	683	620	45	105
	Tenderfoot Creek Experimental Forest	7236	34.8	8874	8875	--	--

FILE = TEN.PEA

[1] From Mountain Hydrology Adjusted to Central Montana Mountain Ranges (1978)

[2] Zone 2, Interior Mountains (Farnes 1973)

[3] Zone 5, Extreme Orographic (Farnes 1973)

Table 7--Estimated mean monthly maximum and minimum temperatures for different elevation zones within Tenderfoot Creek Experimental Forest.

TENDERFOOT CREEK EXPERIMENTAL FOREST
ESTIMATED 1961-90 AVERAGE TEMPERATURE °F

	High Elev. (7900')		Mid Elev. (7200')		Low Elev. (6200')	
Month	TMax	TMin	TMax	TMin	TMax	TMin
October	45	22	48	21	51	19
November	31	9	34	7	39	7
December	20	0	23	-3	27	-2
January	14	-1	18	-4	23	-5
February	20	3	23	0	28	-1
March	26	6	28	3	33	4
April	40	14	43	14	48	15
May	48	24	52	23	56	24
June	58	32	61	31	65	32
July	69	39	72	38	76	39
August	67	39	70	38	74	39
September	54	30	57	29	61	30
Annual	41	18	44	16	48	17
Average Annual Temp.	30		30		32	

Based on relationship between temperatures at Spur Park and Deadman Creek Snotel sites and White Sulphur Springs climalogical station and elevation.

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Table 8--Percentage of Tenderfoot Creek Experimental Forest and subwatersheds that have burned in past years.

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA
PERCENT OF DRAINAGE HAVING BURNED WITHIN PAST YEARS

Drainage	Meadow or Rock	Years							Drainage Area, acres
		Last 50	50-100	100-150	150-200	200-250	250-300	Over 300	
Sun Creek Near Mouth	10			79		11			856
Spring Creek Near Mouth	7			30			63		1,033
Bubbling Creek Near Mouth	5		2	72		9	5	7	785
Stringer Creek Above East Fork	9	2		10	14		65		965
Stringer Creek Near Mouth	8	1		15	10		66		1,372
Tenderfoot Creek Above Sun Creek	15			64		8	13		1,103
Tenderfoot Creek Below Stringer Creek	9	1	2	47	2	4	34	1	5,714
Pack Creek Near Mouth	3			83			14		822
Passionate Creek Near Mouth	2		11				87		497
Tenderfoot Creek at TCEF Boundary	8	>.5	6	46	2	3	34	1	8,191
Lonesome Creek Near Williams Park	2			94				4	683
Tenderfoot Creek Experimental Forest	8	>.5	5	50	2	3	31	1	8,874

Table 9--Percent of Tenderfoot Creek Experimental Forest and subwatersheds within each generalized geologic formation.

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA
PERCENT OF DRAINAGE WITHIN GENERALIZED GEOLOGIC FORMATION

Drainage	Porphyritic Rhyodacite	Wolsey Shale	Flathead Sandstone	Hornblende Biotite Gneiss	Drainage Area, Acres
Sun Creek Near Mouth		50	50		856
Spring Park Creek Near Mouth	17	66	17		1,033
Bubbling Creek Near Mouth		65	33	2	785
Stringer Creek Above East Fork	3	75	22		965
Stringer Creek Near Mouth	2	63	31	4	1,372
Tenderfoot Creek Above Sun Creek		57	43		1,103
Tenderfoot Creek Below Stringer Creek	4	56	37	3	5,714
Pack Creek Near Mouth		61	33	6	822
Passionate Creek Near Mouth		34	45	21	497
Tenderfoot Creek at TCEF Boundary	2	50	38	10	8,191
Lonesome Creek Near Williams Park		92	8		683
Tenderfoot Creek Experimental Forest	2	53	36	9	8,874

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Table 10--Legal locations and specific information on TCEF stream gaging station.

TENDERFOOT CREEK EXPERIMENTAL FOREST WATERSHEDS

Name/Watershed FS No.	Section	TWN	RG	Latitude	Longitude	Elev.
Bubbling Creek near mouth LC 7008	NE1/4 NW1/4 Sec 6	13N	7E	46-55-21	110-53-44	6720
Lonesome Creek near Williams Park LC 7012	SE1/4 SW1/4 Sec 2	13N	6E	46-54-51	110-56-20	6810
Pack Creek near mouth LC 7010	SE1/4 SW1/4 Sec 36	14N	6E	46-55-38	110-54-32	6440
Passionate Creek near mouth LC 7011	NE1/4 SE1/4 Sec 35	14N	6E	46-55-48	110-55-20	6250
Spring Park Creek near mouth LC 7007	SW1/4 SE 1/4 Sec 31	14N	7E	46-55-26	110-52-55	6910
Stringer Creek above East Fork LC 7015	NW1/4 NW1/4 Sec 31	14N	7E	46-56-05	110-53-33	6870
Stringer Creek near mouth LC 7009	SE1/4 SE1/4 Sec 36	14N	6E	46-55-38	110-54-03	6560
Sun Creek near mouth LC 7006	SE1/4 NW1/4 Sec 5	13N	7E	46-55-12	110-52-42	7020
Tenderfoot Creek above Sun Creek LC 7013	NE1/4 NW1/4 Sec 5	13N	7E	46-55-12	110-52-25	7060
Tenderfoot Creek below Stringer Creek LC 7014	SE1/4 SE1/4 Sec 36	14N	6E	46-55-37	110-54-09	6510

Montana Drainage Basin Code 41J

County 059
A=NE1/4
B=NW1/4
C=SW1/4
D=SE1/4

Table 11--Monthly runoff for TCEF for 1993 and 1994.

MONTHLY RUNOFF FOR TENDERFOOT CREEK EXPERIMENTAL FOREST AT STREAM GAGING STATIONS WITH FLUMES AND RECORDERS

Sun Creek Near Mouth; LC7006
Runoff in Acre Feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY
1993	6	6	6	6	6	6	12	324	240	275	147	120	1118
1994	76	51	50	39	32	28	128	402	136	50	26	22	1035

Spring Creek Near Mouth; LC7007
Runoff in Acre Feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY
1994	92	51	42	37	28	26	132	628	154	55	34	31	1310

Bubbling Creek Near Mouth; LC7008
Runoff in Acre Feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY
1994	60	42	29	17	11	12	130	492	112	35	18	12	970

Tenderfoot Creek Above Sun Creek; LC7013
Runoff in Acre Feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY
1993	18	12	12	12	11	12	24	369	228	331	148	133	1310
1994	95	48	52	44	33	27	112	477	144	45	24	21	1122

Tenderfoot Creek Below Stringer Creek; LC7014
Runoff in Acre Feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY
1993	92	83	80	74	61	74	144	3292	1962	2845	1398	1192	11297
1994	571	444	417	376	287	240	1121	3861	992	396	234	196	9133

Table 12--Instantaneous and peak daily and minimum flows for TCEF for 1993 and 1994.

INSTANTANEOUS, PEAK DAILY AND MINIMUM DAILY FLOW FOR TENDERFOOT CREEK EXPERIMENTAL FOREST AT GAGING STATION WITH FLUME AND RECORDERS

Sun Creek Near Mouth; LC7006
Flow in cfs

Water Year	Instantaneous Peak		Peak Day		Minimum Daily Flow
	Date	Flow	Date	Flow	
1993	7/29/93	17.5	5/21/93	9.7	0.1
			7/04/93	9.7	
1994	5/12/94	14.3	5/12/94	11.2	0.3

Spring Park Creek Near Mouth; LC7007
Flow in cfs

Water Year	Instantaneous Peak		Peak Day		Minimum Daily Flow
	Date	Flow	Date	Flow	
1994	5/14/94	21.6	5/14/94	21.4	0.4

Bubbling Creek Near Mouth; LC7008
Flow in cfs

Water Year	Instantaneous Peak		Peak Day		Minimum Daily Flow
	Date	Flow	Date	Flow	
1994	5/13/94	15.7	5/13/94	15.5	0.2

Tenderfoot Creek Above Sun Creek; LC7013
Flow in cfs

Water Year	Instantaneous Peak		Peak Day		Minimum Daily Flow
	Date	Flow	Date	Flow	
1993	7/12/93	25.4	7/04/93	14.8	0.2
1994	5/27/94	26.0	5/12/94	14.3	0.3

Tenderfoot Creek Below Stringer Creek; LC7014
Flow in cfs

Water Year	Instantaneous Peak		Peak Day		Minimum Daily Flow
	Date	Flow	Date	Flow	
1993	5/16/93	112.8	5/16/93	103.6	1.1
			5/17/93	103.6	
1994	5/12/94	131.0	5/13/94	121.3	2.4

Table 13--Legal location and specific information on TCEF snow and precipitation measuring sites.

SNOW COURSE AND PRECIPITATION GAGE DATA SITES ON THE TENDERFOOT CREEK EXPERIMENTAL FOREST

NAME Snow Course No./ Precipitation No.	Section	TWN	RNG	Latitude	Longitude	Elev
Bubbling Springs 10C17 / MC17	NE1/4 SW1/4 Sec 7	13N	7E	46-54-04	110-53-50	7430
County Line 10C18 / MC18	SE1/4 SE1/4 Sec 29	14N	7E	46-56-28	110-51-17	7810
Dry Park 10C19 / MC19	NE1/4 NE1/4 Sec 30	14N	7E	46-57-03	110-52-47	7420
Farnes Meadow 10C20 / MC20	NW1/4 SE1/4 Sec 32	14N	7E	46-55-47	110-51-28	7400
Lonesome Creek 10C21 / MC21	NE1/4 NW1/4 Sec 11	13N	6E	46-54-33	110-56-26	6970
Onion Park[1] 10C22 / MC22	NE1/4 SW1/4 Sec 4	13N	7E	46-54-50	110-51-10	7410
Passionate Creek 10C25 / MC25	SE1/4 SE1/4 Sec 35	14N	6E	46-55-48	110-55-20	6250
Stringer Creek 10C23 / MC23	SE1/4 SE1/4 Sec 36	14N	6E	46-55-38	110-54-03	6550
Sun Creek 10C24 / MC24	SW1/4 NW1/4 Sec 5	13N	7E	46-55-12	110-52-42	7040

[1] The name Onion Park refers to the Onion Park data site located in a small hidden meadow to the east of Onion Park within the Onion Park RNA.

Table 14--Estimates of monthly SWE and melt-out dates for 1993 and 1994.

Site	Oct. 1	Nov. 1	Dec. 1	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	May 15	June 1	Est. day melt-out
	Extrapolated Snow Water Equivalent - 1993 Water Year, Inches										
Bubbling Springs	0.0	1.8	4.2	7.2	10.6	12.0	14.0	17.3	13.4	0.0	6/01
County Line	0.0	1.9	4.5	7.7	11.2	12.8	14.9	20.1	17.0	3.1	6/05
Dry Park	0.0	1.7	4.1	7.0	10.2	11.5	13.5	15.6	10.1	0.0	5/26
Farnes Meadow	0.0	1.7	4.2	7.2	10.4	11.9	13.8	16.5	11.0	0.0	5/28
Lonesome Creek	0.0	1.5	3.7	6.4	9.3	10.6	12.4	12.4	9.4	0.0	5/24
Onion Park	0.0	1.7	4.1	7.0	10.2	11.5	13.5	14.6	9.8	0.0	5/29
Stringer Creek	0.0	0.5	3.5	5.7	9.4	10.6	10.5	11.8	6.1	0.0	5/21
Sun Creek (Old)	0.0	0.6	4.3	7.1	11.7	13.2	13.1	14.3	8.7	0.0	5/23
	Extrapolated Snow Water Equivalent - 1994 Water Year, Inches										
Bubbling Springs	0.0	0.5	3.7	8.4	12.2	13.0	14.5	11.3	3.5	0.0	5/26
County Line	0.2	1.1	4.8	10.3	15.6	17.0	19.4	19.2	11.8	0.0	5/31
Dry Park	0.0	0.8	4.1	9.0	13.5	14.7	16.9	15.3	7.7	0.0	5/22
Farnes Meadow	0.0	0.9	4.4	9.6	15.4	17.2	20.4	21.3	13.9	0.0	5/28
Lonesome Creek	0.0	0.4	3.1	7.1	10.8	11.8	13.7	10.5	2.1	0.0	5/19
Onion Park	0.0	0.6	4.2	9.6	14.1	15.1	16.9	15.0	7.3	0.0	5/26
Stringer Creek	0.0	0.4	3.2	7.3	10.8	11.5	12.8	8.8	0.0	0.0	5/13
Sun Creek (Old)	0.0	0.5	3.7	8.4	13.1	14.4	16.7	15.1	7.6	0.0	5/20
Onion Park Open Pillow	0.0	1.0	3.5	7.3	11.2	12.3	14.3	13.0	3.7	0.0	5/24
Onion Park Canopy Pillow	0.0	0.5	2.3	4.7	8.0	8.8	10.1	10.7	6.5	0.6	6/03

Table 15--Daily SWE for Onion Park Open Pillow, 1994.

WATER EQUIV. (IN.)

DAY	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	0.0	1.0	3.5	7.3	11.2	12.3	14.3	13.0	0.0	0.0	0.0	0.0
2	0.0	1.0	3.7	7.3	11.3	12.4	14.2	12.9	0.0	0.0	0.0	0.0
3	0.0	2.0	3.7	7.3	11.3	12.6	14.3	12.8	0.0	0.0	0.0	0.0
4	0.0	2.0	3.8	7.4	11.3	12.6	14.5	12.4	0.0	0.0	0.0	0.0
5	0.0	2.0	4.0	7.4	11.3	12.6	14.7	12.3	0.0	0.0	0.0	0.0
6	0.0	2.1	4.0	7.4	11.3	12.6	15.0	11.8	0.0	0.0	0.0	0.0
7	0.0	2.1	4.0	8.1	11.3	12.7	15.2	10.9	0.0	0.0	0.0	0.0
8	0.3	2.1	4.1	8.3	11.3	12.7	15.2	10.0	0.1	0.0	0.0	0.0
9	0.2	2.1	4.1	8.3	11.3	12.7	14.9	9.1	0.0	0.0	0.0	0.0
10	0.3	2.2	4.1	8.3	11.3	12.6	14.9	8.3	0.0	0.0	0.0	0.0
11	0.1	2.2	4.1	8.3	11.3	12.7	14.6	7.4	0.0	0.0	0.0	0.0
12	0.0	2.2	4.1	8.4	11.3	12.7	15.0	5.9	0.0	0.0	0.0	0.0
13	0.0	2.6	4.1	8.9	11.3	12.7	15.3	5.1	0.0	0.0	0.0	0.0
14	0.0	2.6	4.1	9.0	11.3	12.8	15.1	4.3	0.0	0.0	0.0	0.0
15	0.0	2.6	4.3	9.0	11.3	12.8	15.2	3.7	0.0	0.0	0.0	0.0
16	0.0	2.6	4.4	9.0	11.3	12.6	15.9	3.5	0.0	0.0	0.0	0.0
17	0.0	2.6	4.4	9.0	11.3	12.7	15.6	3.2	0.0	0.0	0.0	0.0
18	0.0	2.9	4.4	9.1	11.4	12.7	15.2	3.2	0.0	0.0	0.0	0.0
19	0.2	2.9	4.6	9.2	11.4	12.9	14.7	2.9	0.0	0.0	0.0	0.0
20	0.2	2.9	4.7	9.2	11.5	12.8	14.3	2.4	0.0	0.0	0.0	0.0
21	0.6	2.9	5.2	9.2	11.5	12.9	13.7	1.7	0.0	0.0	0.0	0.0
22	0.7	3.0	6.0	9.2	11.5	12.9	13.0	0.9	0.0	0.0	0.0	0.0
23	0.5	3.0	6.3	9.2	12.0	13.0	12.6	0.5	0.0	0.0	0.0	0.0
24	0.2	3.1	6.3	9.3	12.0	13.2	12.8	0.0	0.0	0.0	0.0	0.0
25	0.2	3.2	6.3	9.2	12.1	13.4	13.2	0.0	0.0	0.0	0.0	0.0
26	0.3	3.2	6.3	9.2	12.1	14.2	13.2	0.0	0.0	0.0	0.0	0.0
27	0.5	3.3	6.3	9.2	12.3	14.4	13.2	0.0	0.0	0.0	0.0	0.0
28	0.8	3.5	6.3	9.3	12.3	15.0	13.2	0.0	0.0	0.0	0.0	0.0
29	0.8	3.5	6.6	10.1	--	15.1	13.2	0.0	0.0	0.0	0.0	0.0
30	0.9	3.5	6.6	10.3	--	14.6	13.1	0.0	0.0	0.0	0.0	0.0
31	0.9	--	7.0	11.1	--	14.3	--	0.0	--	0.0	0.0	--

Table 16--Estimated first of month accumulation of precipitation for 1993 and 1994.

Site	Oct 1	Nov 1	Dec 1	Jan 1	Feb 1	Mar 1	Apr 1	May 1	Jun 1	Jul 1	Aug 1	Sep 1	Oct 1
	Extrapolated Accumulated Precipitation - 1993 Water Year, Inches												
Bubbling Springs	0.0	1.9	4.0	6.5	9.6	11.0	13.3	16.8	21.4	27.2	35.0	42.3	44.7
County Line	0.0	2.0	4.2	6.8	10.1	11.5	13.9	17.7	21.8	27.6	36.4	42.9	45.8
Dry Park	0.0	1.7	3.6	5.8	8.6	9.8	11.8	15.5	19.6	26.1	35.8	42.9	46.1
Farnes Meadow	0.0	1.9	3.9	6.3	9.3	10.6	12.8	16.1	20.1	26.9	36.4	43.6	46.6
Lonesome Creek	0.0	1.9	4.0	6.5	9.5	10.9	13.1	16.4	21.0	26.8	34.7	41.3	43.7
Onion Park	0.0	1.9	4.0	6.5	9.5	10.9	13.1	16.5	20.9	27.0	35.3	42.3	45.0
Stringer Creek	0.0	1.7	3.5	5.8	8.5	9.7	11.7	14.3	18.4	24.7	33.1	40.5	42.9
Sun Creek (Old)	0.0	1.6	3.3	5.5	8.0	9.2	11.1	14.1	18.4	24.7	33.2	40.5	42.6
	Extrapolated Accumulated Precipitation - 1994 Water Year, Inches												
Bubbling Springs	0.0	2.3	4.2	6.7	10.6	12.9	15.1	18.6	20.8	23.1	24.7	24.8	25.6
County Line	0.0	2.1	4.2	7.0	11.1	13.3	15.5	19.3	21.9	24.4	26.1	26.6	27.4
Dry Park	0.0	2.6	4.3	6.7	10.2	12.0	13.7	17.6	20.2	23.1	24.4	24.9	25.4
Farnes Meadow	0.0	2.5	4.6	7.3	11.4	13.6	15.7	19.7	22.4	25.0	26.6	27.1	27.6
Lonesome Creek	0.0	2.1	3.9	6.1	9.6	11.5	13.3	16.9	19.3	21.3	22.6	23.2	23.4
Onion Park	0.0	2.2	4.3	7.1	11.3	13.5	15.6	19.7	22.4	25.1	26.7	27.2	27.5
Stringer Creek	0.0	2.2	4.0	6.4	10.0	11.9	13.7	17.3	19.7	21.9	23.4	23.9	24.3
Sun Creek (Old)	0.0	2.0	3.6	5.7	8.8	10.3	11.8	15.3	17.9	20.3	21.8	22.3	22.6

Table 17--Estimated monthly precipitation - 1993 and 1994.

Site	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	W.Y. Total
	Extrapolated Monthly Precipitation - 1993 Water Year, Inches												
Bubbling Springs	1.9	2.1	2.5	3.1	1.4	2.3	3.5	4.6	5.8	7.8	7.3	2.4	44.7
County Line	2.0	2.2	2.6	3.3	1.4	2.4	3.8	4.1	5.8	8.8	6.5	2.9	45.8
Dry Park	1.7	1.9	2.2	2.8	1.2	2.0	3.7	4.1	6.5	9.7	7.1	3.2	46.1
Farnes Meadow	1.9	2.0	2.4	3.0	1.3	2.2	3.3	4.0	6.8	9.5	7.2	3.0	46.6
Lonesome Creek	1.9	2.1	2.5	3.0	1.4	2.2	3.3	4.6	5.8	7.9	6.6	2.4	43.7
Onion Park	1.9	2.1	2.5	3.0	1.4	2.2	3.4	4.4	6.1	8.3	7.0	2.7	45.0
Stringer Creek	1.7	1.8	2.3	2.7	1.2	2.0	2.6	4.1	6.3	8.4	7.4	2.4	42.9
Sun Creek (Old)	1.6	1.7	2.2	2.5	1.2	1.9	3.0	4.3	6.3	8.5	7.3	2.1	42.6
	Extrapolated Monthly Precipitation - 1994 Water Year, Inches												
Bubbling Springs	2.3	1.9	2.5	3.9	2.3	2.2	3.5	2.2	2.3	1.6	0.1	0.8	25.6
County Line	2.1	2.1	2.8	4.1	2.2	2.2	3.8	2.6	2.5	1.7	0.5	0.8	27.4
Dry Park	2.6	1.7	2.4	3.5	1.8	1.7	3.9	2.6	2.9	1.3	0.5	0.5	25.4
Farnes Meadow	2.5	2.1	2.7	4.1	2.2	2.1	4.0	2.7	2.6	1.6	0.5	0.5	27.6
Lonesome Creek	2.1	1.8	2.2	3.5	1.9	1.8	3.6	2.4	2.0	1.3	0.6	0.2	23.4
Onion Park	2.2	2.1	2.8	4.2	2.2	2.1	4.1	2.7	2.7	1.6	0.5	0.3	27.5
Stringer Creek	2.2	1.8	2.4	3.6	1.9	1.8	3.6	2.4	2.2	1.5	0.5	0.4	24.3
Sun Creek (Old)	2.0	1.6	2.1	3.1	1.5	1.5	3.5	2.6	2.4	1.5	0.5	0.3	22.6
	Tipping Bucket Daily Recording Gages												
Onion Park Open										1.58	0.27	0.36	
Onion Park Moderate Canopy										.98	0.13*	0.02*	
Onion Park Dense Canopy										.53	0.18	0.19	

*Possibly plugged inlet during portions of month

Table 18--Daily SWE for Onion Park Canopy Pillow, 1994.

WATER EQUIV. (IN.)

DAY	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	0.0	0.5	2.3	4.7	8.0	8.8	10.1	10.7	0.6	0.0	0.0	0.0
2	0.0	0.5	2.4	4.8	8.0	8.9	10.1	10.7	0.5	0.0	0.0	0.0
3	0.0	1.1	2.4	4.8	8.0	8.9	10.1	10.6	0.0	0.0	0.0	0.0
4	0.0	1.1	2.4	4.9	8.0	8.9	10.3	10.6	0.0	0.0	0.0	0.0
5	0.0	1.1	2.5	4.9	8.1	8.9	10.5	10.7	0.0	0.0	0.0	0.0
6	0.0	1.3	2.5	4.9	8.0	8.9	10.6	10.6	0.0	0.0	0.0	0.0
7	0.0	1.3	2.5	5.4	8.0	9.0	10.9	10.5	0.0	0.0	0.0	0.0
8	0.2	1.3	2.7	5.5	8.0	9.0	11.1	9.8	0.2	0.0	0.0	0.0
9	0.3	1.4	2.7	5.5	8.0	9.0	11.1	9.3	0.0	0.0	0.0	0.0
10	0.3	1.5	2.7	5.6	8.0	8.9	11.1	8.8	0.0	0.0	0.0	0.0
11	0.2	1.5	2.7	5.6	8.0	9.0	11.2	8.3	0.0	0.0	0.0	0.0
12	0.1	1.5	2.7	5.7	8.0	9.0	11.1	7.8	0.0	0.0	0.0	0.0
13	0.1	1.7	2.7	5.9	8.0	9.0	11.1	7.1	0.0	0.0	0.0	0.0
14	0.1	1.7	2.7	6.2	8.0	9.1	11.3	7.0	0.0	0.0	0.0	0.0
15	0.1	1.8	2.7	6.3	8.0	9.1	11.4	6.5	0.0	0.0	0.0	0.0
16	0.1	1.8	2.7	6.3	8.0	8.9	11.4	6.4	0.0	0.0	0.0	0.0
17	0.1	1.8	2.7	6.3	8.0	9.0	11.2	6.3	0.0	0.0	0.0	0.0
18	0.1	1.8	2.7	6.4	8.1	9.0	10.9	6.2	0.0	0.0	0.0	0.0
19	0.1	1.9	3.0	6.5	8.1	9.2	10.8	6.0	0.0	0.0	0.0	0.0
20	0.2	1.9	3.1	6.5	8.2	9.1	10.6	5.9	0.0	0.0	0.0	0.0
21	0.2	1.9	3.3	6.5	8.2	9.2	10.4	5.8	0.0	0.0	0.0	0.0
22	0.2	1.9	4.0	6.5	8.2	9.2	10.1	5.5	0.0	0.0	0.0	0.0
23	0.1	2.1	4.2	6.5	8.5	9.2	10.0	5.2	0.0	0.0	0.0	0.0
24	0.1	2.1	4.2	6.5	8.5	9.4	10.3	4.3	0.0	0.0	0.0	0.0
25	0.1	2.1	4.2	6.5	8.6	9.5	10.4	3.8	0.0	0.0	0.0	0.0
26	0.1	2.2	4.2	6.5	8.6	10.1	10.4	3.1	0.0	0.0	0.0	0.0
27	0.1	2.2	4.2	6.5	8.7	10.2	10.5	2.4	0.0	0.0	0.0	0.0
28	0.2	2.3	4.2	6.6	8.7	10.6	10.5	1.9	0.0	0.0	0.0	0.0
29	0.2	2.3	4.3	7.2	--	10.7	10.6	1.5	0.0	0.0	0.0	0.0
30	0.3	2.3	4.3	7.3	--	10.4	10.6	1.1	0.0	0.0	0.0	0.0
31	0.3	--	4.6	7.9	--	10.1	--	0.8	--	0.0	0.0	--

Table 19--Interception at Canopy Snow Co[illegible]s and Snow Pillows for 1993 and 1994.

TENDERFOOT CREEK EXPERIMENTAL FOREST, MONTANA
SNOW INTERCEPTION AT CANOPY COURSES

Date	Location	Open SWE Inches	Canopy SWE Inches	Canopy as % Open	Diff in % Canopy	Diff in % Densiometer	Diff in Basal Area
02/17/93	Farnes Meadow	10.9	7.3	67	71	66	192
02/17/93	Lonesome Creek	9.6	7.0	73	64	48	163
04/14/93	Bubbling Springs	15.9	12.1	76	61	66	143
04/14/93	County Line	16.8	12.4	74	55	44	30
04/14/93	Onion Park	14.3	11.9	83	60	61	176
01/01/94	Onion Park Pillows	7.3	4.7	64	63	66	120
01/25/94	Bubbling Springs	10.8	8.1	75	61	66	143
01/25/94	Lonesome Creek	9.0	7.0	78	64	48	163
01/25/94	Onion Park	12.3	8.7	71	57	59	163
02/01/94	Onion Park Pillows	11.2	8.0	71	63	66	120
03/01/94	Onion Park Pillows	12.3	8.8	72	63	66	120
04/01/94	Onion Park Pillows	14.3	10.1	71	63	66	120
04/07/94	Bubbling Springs	15.2	12.8	84	61	66	143
04/07/94	County Line	20.6	15.4	75	55	44	30
04/07/94	Farnes Meadow	19.8	12.5	63	73	70	178
04/07/94	Lonesome Creek	14.6	10.7	73	64	48	163
04/07/94	Onion Park	17.7	14.3	81	57	59	163