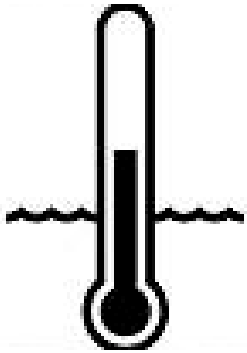




**Stream Temperature Monitoring on
Mendocino Redwood Company Timberlands 2001
(1989-2001 Summarized)**



Mendocino Redwood Company, LLC
Watershed and Fisheries Department
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Introduction

Stream temperature is a key water quality parameter that can be altered as a result of streamside forest management practices. Concern over abnormal warming of stream temperatures as a result of streamside vegetation removal has generally focused on the impacts to coldwater inland fisheries (see Literature Review). The California Forest Practice Rules addresses the effects of streamside timber harvesting activities on water temperatures and dictates the implementation of Best Management Practices to minimize impacts on water quality within forested watersheds. With recent attention to coho salmon and pressure to develop Total Maximum Daily Loads (TMDLs) for coastal watersheds, monitoring stream temperatures is becoming increasingly important. Tailoring land management to meet water quality requirements has come to the forefront.

This report summarizes the temperature data collected from Class I and Class II streams draining forested watersheds in Mendocino Redwood Company's (MRC) coastal timberlands in Mendocino and Sonoma counties during the summers of 1989-2001. The primary objectives of the stream temperature monitoring are to establish baseline temperature conditions and identify temperature limited stream segments. Changes in streamside and watershed management will eventually be reflected in stream temperatures. Stream temperature information presented in this report will be used to evaluate water quality limited stream segments, and develop and implement improved streamside management prescriptions in these problem areas.

Literature Review

Temperature Fluxes In Small Forested Streams

The factors affecting water temperature involve specific energy transfer processes, such as radiation, evaporation, convection, conduction, and advection. The sum of these factors represents the net gain or loss of heat in a stream (Brown 1983). Heat gain or loss from evaporation or convection depends on the vapor pressure and gradients respectively between the water surface and air (Beschta et al. 1987). Conduction of heat between the water and the streambed depends on substrate type, with bedrock being the most conductive substrate. Advection occurs as tributaries of differing temperatures enter a stream. Sedimentation of streams may also elevate stream temperatures due to an increased width-to-depth ratio, which can facilitate heat exchange (Poole and Berman, 2000). Large woody debris jams can also contribute to stream cooling by forcing stream flow into shallow groundwater where it is cooled before emerging downstream (Poole and Berman 2000).

Factors controlling stream water temperature include solar radiation inputs, air temperature, ground water inputs, inflow from tributaries, substrate type, and upslope soil

temperatures (Brosofske et al, 1997). Bartholow (1989) found that air temperature above the stream surface was the greatest factor in increasing water temperatures followed in importance by relative humidity and shade. Stream water temperature also responds to the input of solar radiation and is directly proportional to stream surface area and inversely proportional to discharge (Sullivan et al. 1990). Wide streams receive more radiation than narrow ones. For the same surface area and energy input, the temperature change expected of a high-discharge stream will be less than that of a low discharge stream.

Canopy cover is important in reducing the net gain of solar radiation in the summer, but less important in the winter. Several studies have shown that an intact streamside forest canopy will shade streams and minimize increases in summer water temperature. Brown and Krygier (1970), found diurnal variations in a well-shaded coastal Oregon stream to be less than 1°C. However, complete removal of a forest canopy has been shown to increase summer maximums 3-8°C (see review by Beschta et al. 1987). Hostetler (1991) found that streamside canopy cover was the trend variable most important to changes in stream temperature.

Thermal energy in streams is not easily lost through radiation, convection, advection and conduction (Beschta et al. 1987). Increases in stream water temperature are additive, and an alteration of shaded and unshaded reaches are not an effective strategy to minimize increased summer temperatures (Brown et al. 1971). Possible increases in stream temperature from streamside canopy removal can be predicted using formulas in Brown (1983).

Effects Of Stream Temperature On Aquatic Biota

Ectothermic organisms have limited physiological means to control and regulate body temperatures and thus are particularly dependent on the thermal environments in which they have evolved to persist. The optimal temperature range for Pacific salmonids in laboratory studies has been shown to range between 12 and 15°C (Brett 1952; Reiser and Bjornn 1979). Hicks (1999) suggests that the Maximum Weekly Maximum Temperature (MWMT) should not exceed 12°C while Sullivan et al. (2000) suggest threshold MWMT values of 16.5°C for coho and 20.5°C for steelhead. Brungs and Jones (1977) found that growth occurs in juvenile coho salmon from 5-17°C. Various studies have shown that growth stops at 18-20.3°C (Bell 1973; Armor 1990; Stein et al 1972). Temperatures lethal to salmonids have been determined in the laboratory and range from 23-29°C (Beschta et al. 1987). Sullivan et al. (2000) found that there was little risk of mortality to salmonids if stream temperatures remained below 26°C though site-specific factors may need to be considered. Though these temperatures are possible in some small, forested streams, they would generally only occur for short periods of time in the summer. In addition, cool water refugia may be found in deep pools and seeps (Matthews et al. 1994). Reiser and Bjornn (1979) defined optimum temperature for salmonid egg incubation as

4.4-14.4°C. In some spring-spawning salmonids, egg development may overlap with harmful high summer temperatures (Beschta et al. 1987).

Recent field studies to determine appropriate stream temperature regimes for coho salmon have focused on presence/absence of the species. Hines and Ambrose (1999) found that the number of days a site exceeded an MWMT of 17.6°C was one of the most influential variables predicting coho presence/absence. This indicates that stream temperature thresholds should incorporate a time-of-exposure limit within a significant range of temperatures rather than a single Maximum Weekly Average Temperature (MWAT) or MWMT limit. The authors also caution that persistence of fish under certain conditions does not necessarily imply health or success. Welsh et al. (2001) conducted a similar study in the Mattole River watershed. They found that coho salmon were not present in any streams which had a MWAT greater than 16.7°C or a MWMT greater than 18.0°C. Likewise, coho were present in all streams with a MWAT lower than 14.5°C and a MWMT less than 16.3°C. Other recent research suggests that risk assessment-based approaches can allow the effects of magnitude, duration and frequency of temperature on fish growth and survival to be quantified in an objective and repeatable manner (Sullivan et al. 2000).

Stream temperatures that are high but not lethal also affect stream biota. The metabolic energy requirements of fish must be met before they will grow (Warren and Davis 1967). A reduced growth rate may occur at higher temperatures. As metabolic rate increases with temperature, dietary intake must also increase for growth to occur (Beschta et al. 1987). Increased water temperatures can also be conducive to the growth and virulence of fish pathogens harmful to fish (Beschta et al. 1987). Research has shown that many fish diseases become more virulent over 15.6°C (McCullough, 1999).

Timing of development and certain life history stages of salmonids (Holtby et al. 1989) and invertebrates (Moore 1980) can be affected by changes in stream temperature. Holtby et al. (1989) found emigration timing for coho salmon and chum salmon (*O. keta*) fry was strongly temperature dependent. Some evidence shows that early emergence, due to increased water temperatures, is associated with higher fry to smolt survival (Holtby et al. 1989). However, early emergence might have risks associated with increases in mortality within the marine environment (Hartman et al. 1987).

The role of water temperature in the functioning of stream ecosystems is extremely complex. Trophic dynamics, behavior, growth, and development of stream biota are all affected by changes in water temperature. The effects of sub-lethal water temperatures on salmonids and invertebrates are difficult to distinguish, even with continuous stream temperature data. Increases in water temperature have been shown to increase algal production and invertebrate production (Phinney and McIntire 1965, Kevern and Ball 1965). Larger populations of invertebrate fauna may benefit salmonids although such changes in productivity come at the expense of lowered diversity and community stability (Gregory et al. 1987). Negative effects of increased temperatures on salmonids may be

partially offset by gains in primary and secondary production, but only if sufficient habitat and water quality exists to support this increased productivity. The importance of temperature in aquatic ecosystems suggests that sound streamside and upslope land management decisions should be based on appropriate long-term monitoring programs.

Regulatory Thresholds

Federal and State agencies are in charge of developing guidelines to ensure water quality and biotic integrity. As previously stated, research isn't conclusive but certain metrics are in place. The National Marine Fisheries Service (1996) characterize salmonid habitat "at risk" when spawning temperatures exceed 15.5°C and rearing temperatures exceed 17.8°C. Oregon Department of Forestry developed a standard in 1994 which states that in salmonid bearing streams, water temperatures must be maintained at or below 13°C. This standard is designed to minimize increases in water temperatures and is undergoing review and possible revision. Hicks (2000) recommends that MWAT values should not exceed 15°C and that maximum temperatures should not exceed 20°C in Washington State. MRC is currently developing an Habitat Conservation Plan and is using 15°C and below as "on target" for coho salmon and 17°C and below as "on target" for steelhead trout (CRWQCBNCR 2000).

Lewis et al. (2000) point out that 1) watersheds nearer the coast have cooler air temperatures and therefore cooler stream temperatures, 2) water temperatures tend to increase with increasing distance from watershed divide and with increasing drainage area, 3) headwater stream temperatures are similar to groundwater temperatures, and 4) at 70 km and further from their source, most streams in northwestern California were too wide to be affected by canopy cover. This suggests that setting one temperature threshold for large river basins may not be appropriate since higher order streams may warm naturally due to increased width and longer exposure to warm air temperatures. It may be more appropriate to set temperature standards in lower order streams where stream width and distance from the divide are not confounding. This study also suggests that MWMT may be more appropriate as a measure of temperature because MWAT values may not pick up transient water temperature peaks.

Materials and Methods

In summer 1989, Louisiana-Pacific initiated stream temperature monitoring within forestlands now owned by MRC. The number of sites has increased over the years and during summer 2001 a total of 150 sites were monitored. Stream temperatures were not monitored in 1998 as MRC was in the process of purchasing this timberland. Monitoring continued in 1999 and 2000 and was expanded in 2001. During summer 2001 additional monitoring occurred on all major streams on the property where coho salmon were

detected during aquatic species distribution studies. Also, a total of 67 Class II streams were monitored as part of a herpetological study.

Priority for stream temperature monitoring was based on the amount of MRC forestland within an individual watershed. Consideration was also given to baseline data needs for fish-bearing streams. Number of monitoring sites within a watershed was based on stream length and flow accumulation area. In longer streams (> 8 km), stream temperature monitoring sites were located in the lower, middle and upper reaches of the stream. On streams or tributaries that were shorter in length, lower and upper stream temperature monitoring sites were established. In certain cases, only one stream temperature recorder was placed on the lower part of the stream reach. Stream tributaries draining into the same sub-watersheds were monitored concurrently.

Stream water temperatures were monitored continuously (2-hour interval) during summer and early fall (May-October) each year using remote electronic temperature recorders. The stream temperature recorders were placed in shallow pools (< 1 m in depth) directly downstream of riffles and out of direct sunlight. Placement of temperature recorders in these areas ensured monitoring water that was adequately mixed and prevented de-watering of the monitoring devices. Each data recorder was held in place with a 45 cm piece of rebar that was driven into the streambed substrate with a sledge hammer and a post driver. Plastic coated 12-gauge wire was used to attach the data recorders to the rebar stakes.

Quality control procedures were developed and implemented to ensure accurate readings by the temperature data recorders and check for potential instrument errors. All temperature data recorders were calibrated pre- and post- data recording activities. Calibration of the temperature data recorders was accomplished by placing the equipment in five-gallon bucket of ice bath or sand for one hour. Temperature readings recorded by the data recorder were compared with the temperature readings of a certified reference thermometer (Cole-Parmer Instrument Company, Vernon Hills, Illinois) placed in the same medium in the bucket. We used the manufacturer suggested allowable error of +/- 0.7°C. Quality assurance goals were accomplished by training individuals for data recorder handling, calibration, deployment, in-stream placement of data recorders, and data synthesis.

Monitoring goals are to record stream temperatures in the same sites of the same streams every year. New sites may be added as the need arises. This will provide a record of yearly temperature variations in individual streams and will allow for long-term trend monitoring. There will also be a focus on increasing efforts to gather information in Class II perennial streams. This will allow MRC to understand more of the stream network as it relates to temperature concerns.

Data Analysis

Three different indices were used to characterize the water temperature regime in streams. We averaged daily maximum temperatures and daily mean temperatures for 7-day periods and then reported the highest average for the entire summer. These metrics are commonly called Maximum Weekly Maximum Temperature (MWMT) and Maximum Weekly Average Temperature (MWAT) and reflect 7-day moving averages. These weekly average temperatures are widely used as indicators of long-term exposure. We also reported the absolute maximum value for the entire summer. The absolute maximum temperatures are useful, however these values may only occur briefly. Long-term exposure to lower levels of temperature may do more physiological damage than short-term exposure to higher temperatures.

We looked at yearly variation in MWAT, MWMT, and maximum temperature at individual sites. To look at long-term trends, we calculated annual property-wide averages for these indices. This analysis was restricted to sites where we had at least two years of data. We compared these averages to those from 2001 to see if significant differences existed between any of the previous years and the most recent data (2001). We restricted the comparison to years in which we had at least 30 temperature sites on the property. Consequently, we compared the averages from 1994-2000 (except 1998) with the 2001 averages. We used a two-sample t-test for each of the three metrics to determine if significant differences exist.

We also looked at temperatures in any stream where coho salmon were determined to be present during property-wide distribution studies from 1994-96 and 2000-2001. For example, if coho were found in a stream in 1994 and temperature data was available from 1994 for that stream, we included it in the data set. In larger streams where we had multiple temperature sites, we used temperature data for the site closest to where coho were found. Because we did not account for other variables such as habitat quality, it is impossible to statistically derive any quantitative information from this comparison. However, it allowed us to look at what might be appropriate temperature regimes for coho salmon on MRC property. This can be compared to other recent studies in the area on this subject.

Results and Discussion

Table 1 provides a list of all sites monitored from 1989-2001. Maps 1-17 show locations of all sites that were monitored. Table 1.5 provides UTM coordinates and latitude and longitude of all sites. Temperature reports are separated by MRC management units. Tables 2-10 show maximum temperatures, MWAT, and MWMT for all sites. Figures 1-149 show daily fluctuation of maximum and mean temperatures for 2001 sites.

Some sites on the property exceed what are commonly considered appropriate temperature regimes for stream salmonids. Conversely, quite a few sites have favorable temperatures. For 2001 data, MWAT values are considered “on target” for coho salmon at 21% of the sites and “on target” for steelhead at 67% of the sites. In general, larger streams such as mainstem Navarro River are exceptionally warm while other smaller streams can be quite cold. It is in these smaller streams that we usually detect presence of coho salmon.

Individual sites show only small annual variations in stream temperature. Some streams have warmed slightly but even more seem to have cooled slightly. Temperature did drop for every year of record in a few streams: Bond Creek, Hardy Creek, Burbeck Creek, Hayworth Creek, East Branch North Fork Big River and Annapolis Falls Creek. It must be considered that the magnitude of change is small especially when compared to the allowable error of the instruments (+/- 0.7°C). Changes in stream temperature cannot necessarily be attributed to land management as many variables come into play. There is also an unknown “lag-time” between when more responsible land management results in improvements in water quality.

Comparing property-wide average maximum, MWAT, and MWMT for each year 1994-2000 with the 2001 data showed no significant difference between yearly means with the exception of 1995 ($p < .02$) and possibly 1996 ($p < .07$). 1995 was shown to be significantly warmer than the 2001 data. The absolute maximum value was 1.6°C higher, MWAT was 1.0°C higher and the MWMT 1.6°C higher in 1995. Because the temperature probe manufacturer states a +/- 0.7°C allowable error for the devices that were used, this may not be as significant as the t-test is indicating. Because these are property wide averages, significant changes could very well be due to climatic factors. Looking at 1995 data by management unit showed substantial increases in average temperatures in certain areas, especially Navarro River, South Coast, and Garcia River.

An interesting note is that 2001 values seem to be somewhat lower than many of the past years. Stream temperatures decreased at 86% of sites in 2001 compared to the first year of data available for each site. Rainfall was as low as 60% of normal for this year and streamflow was noticeably lower. Due to increased width/depth ratio, it seems that stream temperatures would be higher. This cooling of streams in 2001 may be due to decreased summertime air temperature. Also, lower flow may result in streams having more groundwater influence and therefore lower temperature.

For the available data on MRC property, the warmest stream sites where coho salmon were found had an MWAT of 20.6°C and an MWMT of 25.2°C. This comparison was not part of a study design but rather a compilation of previously collected data. Other variables were not accounted for and the distribution studies can only establish coho presence and not necessarily absence. Also, temperatures were not necessarily always monitored in streams where coho were found. Because of these factors, our comparison is qualitative in nature. The MWAT and MWMT values in streams where we found coho

are quite a bit higher than other studies have found (Welsh et al. 2000; Hines and Ambrose 1999). See Literature Review.

In summer 2001, we expanded stream temperature monitoring to include Class II streams. In total, 67 sites were monitored. These are obviously much smaller than many of the Class I streams that we usually monitor. While these are not fish bearing streams, they still affect other aquatic life and contribute to temperatures in Class I streams. For these Class II streams, property-wide average maximum temperature was 14.4°C, MWAT 13.5°C, and MWMT 14°C. These streams proved to be very cool but, more interestingly, very stable. Many of the Class II temperature graphs showed a “stairstep effect.” Temperatures stayed at one level for a period of days and then “jumped” to a different temperature and stayed there for a period of days. See Figures 17, 20, 26, 53, 126 for exceptional examples. We attribute this to very small streams that have very low flow and near 100% canopy cover. Daily and even weekly variation is low and groundwater influence may be quite strong in these places.

It is reasonable to conclude that stream temperatures have not increased on MRC’s timberlands from 1989-present. Hot and cold years do cause stream temperatures to vary but this variation is not statistically significant. At this point, no trends are evident. It also seems that the majority of streams on the property exhibit favorable temperature regimes for steelhead trout. Though this is true, specific problems do exist. Responsible land management is necessary to maintain or decrease stream temperatures. Because of recent emphasis on land management and increasing scrutiny by regulatory agencies, stream temperature monitoring should continue and this data should be used to tailor management needs to specific water quality issues.

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Table 1. Stream temperature monitoring sites on Mendocino Redwood Company's timberlands in Mendocino and Sonoma counties, 1989-2001.

CWPW No.	Stream Name	Monitoring Site No.	Monitoring Year (s)
113.32032	Hollow Tree Creek @ property line	41-1	1994, '95, 1999-2001
113.32031	Redwood Creek	41-2	1994, '95, 1999-2001
113.32031	Bond Creek	41-3	1996, '97, 1999-2001
113.32080	Hollow Tree @ Bond Creek	41-4	1999-2001
113.32030	Michaels Creek	41-5	1994, '96, 1999-2001
113.32030	Huckleberry Creek	41-6	1994, '95, 1999-2001
113.32030	Hollow Tree @ Huckleberry	41-7	1994, '95, 1999-2001
113.32080	Walters Creek	41-8	1997
113.32080	Waldron Creek	41-9	1997
113.32080	Tributary to Waldron Creek	41-20*	2001
113.32031	Tributary to Redwood Creek	41-21*	2001
113.32032	Middle Creek	41-22*	2001
113.12011	Cottoneva Creek @ Rockport	47-1	1995, '96, 1999-2001
113.12011	South Fork Cottoneva Creek	47-2	1994, '95, '00, 2001
113.12011	Cottoneva Creek @ MF	47-3	1994-1996, 1999-2001
113.12012	Hardy Creek	47-4	1992-1994, '00, 2001
113.12013	Juan Creek	47-5	1994, '95, 1999-2001
113.12020	Howard Creek	47-6	1996, '97, 1999-2001
113.12013	Little Juan Creek	47-20*	2001
113.12012	Tributary to Hardy Creek	47-21*	2001
113.12012	North Fork Hardy Creek	47-22*	2001
113.12011	Rockport Creek	47-23*	2001
113.12011	Kimball Gulch	47-24*	2001
113.12011	Slaughterhouse Gulch	47-25*	2001
113.12011	Tributary to Middle Fork Cottoneva Crk	47-26*	2001
113.12020	Rock Creek	47-27*	2001
113.12020	Tributary to Howard Creek	47-28*	2001
113.12020	Little Howard Creek	47-29*	2001
111.33041	Jack of Hearts Creek	55-1	2001
113.20015	North Fork Noyo River @ Northspur	70-1	1992-1996, 1999-2001
113.20015	Marble Creek	70-2	1994-1996, 1999-2001
113.20013	Hayworth Creek @ confl. w/ NF Noyo	70-3	1991-1996, 1999-2001
113.20013	North Fork Hayworth Creek	70-5	1994-1996, 1999-2001
113.20013	Hayworth Crk. @ confl. w/ NF Hayworth	70-6	1996, '97, 1999-2001
113.20013	North Fork Noyo River @ Hayworth	70-7	1991-1994, '96, 1999-2001

113.20014	Middle Fork NF Noyo River	70-8	1994-1996, 1999-2001
113.20014	North Fork Noyo River @ Middle Fork	70-10	1995, 1999-2001
113.20015	Noyo River@ Northspur	70-11	1992-1997, 1999-2001
113.20011	Redwood Creek	70-12	1994-1996, 1999-2001
113.20010	Burbeck Creek	70-13	1996, '97, '99, 2001
113.20010	Upper Noyo Mainstem @ Burbeck	70-14	2000
113.20015	Tributary to North Fork Noyo River	70-20*	2001
113.20015	Tributary to North Fork Noyo River	70-21*	2001
113.20015	Tributary to North Fork Noyo River	70-22*	2001
113.20013	Tributary to North Fork Hayworth Creek	70-23*	2001
113.20013	Tributary to North Fork Hayworth Creek	70-24*	2001
113.20013	Tributary to North Fork Hayworth Creek	70-25*	2001
113.30022	Big River @ WH Opening	74-1	1992-1994, '00, 2001
113.30022	Russel Brook	74-2	1994, '95, '00, 2001
113.30022	Big River @ PPN Gulch	74-3	1994, '95, '99, 2001
113.30022	Johnston Gulch	74-20*	2001
113.30022	Wildhorse Gulch	74-21*	2001
113.30033	East Branch NF Big River-Upper Site	75-1	1993, '95, '97, 1999-2001
113.30033	East Branch NF Big River-Lower Site	75-3	1997, 2001
113.30034	North Fork Big River	75-4	1993
113.30033	Quail Gulch	75-20*	2001
113.30033	Frykman Gulch	75-22*	2001
113.30034	Steam Donkey Gulch	75-23*	2001
113.30040	Big River @ Black Fly Opening	76-1	1993, '94, 1999
113.30040	Two Log Creek	76-2	2000, 2001
113.30040	Beaver Pond Gulch	76-20*	2001
113.73020	Jack Smith Creek	77-1	1996, '97, 1999-2001
113.40013	Albion River@ duckpond	78-1	1994, '95, '97, 1999-2001
113.40012	SF Albion River@ Mainstem Albion	78-3	1993, '94, '96, '97, 1999-2001
113.40012	SF Albion River@ Larmer Gulch	78-4	1992-1994, '96, 1999-2001
113.40013	Albion River @ SF Confl.	78-5	1992-1994, '96, '97, 1999-2001
113.40010	Albion River-Upper property line	78-6	1993, '94, '96, '97, 2000
113.40013	Deadman Gulch	78-7	2001
113.40012	Trib. to Albion-New Site	78-8	2000
113.40013	Railroad Gulch	78-9	2001
113.40013	Duckpond Gulch	78-10	2001
113.40013	Pleasant Valley Creek	78-11	2001
113.40011	East Railroad Gulch	78-12	1993

113.40013	Slaughterhouse Gulch	78-13	2001
113.40013	Deadman Gulch	78-20*	2001
113.40013	Slaughterhouse Gulch	78-21*	2001
113.40014	Tributary to Buckhorn Creek	78-22*	2001
113.40013	Tributary to Albion River	78-23*	2001
113.40012	Gunari Gulch	78-24*	2001
113.40012	Anderson Gulch	78-25*	2001
113.30013	South Fork Big River	79-1	1996, '97, 1999-2001
113.30013	Ramon Creek	79-2	1996, '97, 1999
113.30012	Daugherty Creek @ property line	79-4	1994, '95, '97, 1999-2001
113.30012	Daugherty Creek near Gates Crk.	79-5	1997
113.30013	North Fork Ramon Creek	79-8	2000
113.30012	Gates Creek	79-9	1997, 2001
113.30013	No Name Gulch	79-20*	2001
113.30013	Goddard Gulch	79-21*	2001
113.30013	Donkey House Gulch	79-22*	2001
113.50062	North Branch NF Navarro River	81-1	1992-1995, 1999-2001
113.50061	John Smith Creek	81-2	1989-1994, '97, '99, 2000
113.50060	North Branch NF Navarro River	81-3	1992-1995, 1999-2001
113.50061	John Smith Creek	81-4	1989, 1991
113.50061	Sheep Gulch	81-5	2001
113.50077	Marsh Gulch	82-1	1989, 1991-1994, 1999-2001
113.50075	Flynn Creek	82-2	1993, '94, '97, 1999-2001
113.50073	Navarro River	82-3	1989-1994, 1999-2001
113.50077	Marsh Gulch	82-4	1989
113.50073	Navarro River	82-5	1989-1992, 2001
113.50077	Murray Gulch	82-6	2001
113.50074	Deadhorse Gulch	82-7	2001
113.50075	Camp 16 Gulch	82-8	2001
113.50077	Flume Gulch	82-9	2001
113.50075	Tributary to Flynn Creek	82-21*	2001
113.50760	Mustard Gulch	82-22*	2001
113.50071	Black Rock Creek	82-23*	2001
113.50073	Berry Creek	82-24*	2001
113.50074	Tramway Gulch	82-25*	2001
113.50075	Tank 4 Gulch	82-26*	2001
113.50074	Coon Creek	82-27*	2001
113.50760	Ray Gulch	82-28*	2001

113.31015	Ackerman Creek-Upper Site	83-1	1996, '97, 2000
113.31014	Alder Creek	83-2	1999-2001
113.31015	Ackerman Creek-Lower Site	83-3	2000, 2001
113.61011	Greenwood Creek	84-1	1992, '93, '95, '97, '99, 2000
113.61010	Greenwood Creek	84-3	1994, '95, '97, 1999-2001
113.61010	Tributary to Greenwood Creek	84-20*	2001
113.61010	Tributary to Greenwood Creek	84-21*	2001
113.61010	Tributary to Greenwood Creek	84-22*	2001
113.61010	Tributary to Greenwood Creek	84-23*	2001
113.50052	South Branch NF Navarro River	85-1	1995, '96, 1999-2001
113.50051	South Branch NF Navarro River	85-2	1994-1996, 1999-2001
113.50050	North Fork Rose Creek	85-20*	2001
113.50050	South Fork Rose Creek	85-21*	2001
113.50041	North Fork Indian Creek	86-1	1993-1996, '00, 2001
113.50041	North Fork Indian Creek	86-2	1994-1996, 1999-2001
113.50041	West Branch Indian Creek	86-20*	2001
113.50041	Theron's Pond	86-21*	2001
113.62011	Elk Creek	87-1	1992-1994, '97, 1999-2001
113.62010	South Fork Elk Creek	87-2	1997, 1999-2001
113.62010	Elk Creek	87-3	1997, 2001
113.62010	Tributary to Elk Creek	87-20*	2001
113.62010	Tributary to Elk Creek	87-21*	2001
113.62010	Three Springs Creek	87-22*	2001
113.62010	Tributary to Soda Fork Elk Creek	87-23*	2001
113.62010	West Fork Tributary to Elk Creek	87-24*	2001
113.62010	East Fork Tributary to Elk Creek	87-25*	2001
113.50043	Navarro River	88-1	1990-1994, '99, 2000
113.63011	Alder Creek	89-1	1994-1996, '00, 2001
113.63011	Alder Creek	89-2	1995, '96, 1999-2001
113.63012	Mallo Pass Creek	89-3	1999-2001
113.63011	Mills Creek	89-20*	2001
113.63011	Owl Creek	89-21*	2001
113.63011	NE Fork of Bee Tree Creek	89-23*	2001
113.70024	Garcia River @ Rolling Brook	93-1	1994, '95, '97, 1999-2001
113.70024	Rolling Brook @ Mainstem	93-2	1995-1997, 1999-2001
113.70023	South Fork Garcia River @ Mainstem	93-4	1994, '95, '97, 1999-2001
113.70023	Garcia River@ SF confl.	93-5	1999-2001
113.70022	Garcia River @ upper prop. Line	93-6	1997, 1999

113.70023	Fleming Creek	93-7	1997, '00, 2001
113.70023	South Fork Garcia River-Upper Site	93-8	1999, 2001
113.70024	Rolling Brook	93-9	1997
113.70024	Rolling Brook	93-20*	2001
113.70024	Lee Creek	93-21*	2001
113.70030	Schooner Gulch	94-1	1996, '97, 1999-2001
113.70030	China Gulch	94-20*	2001
113.70030	Shinglemill Gulch	94-21*	2001
113.70030	Hall Gulch	94-22*	2001
113.84033	Annapolis Falls Creek	97-1	1995, '96, 1999
113.84032	Fuller Creek	97-2	1994, '95, 1999-2001
113.84033	Crocker Creek	97-4	1997, 2001
113.84031	Haupt Creek	97-5	2001
113.84030	Tobacco Creek	97-6	2001
113.84030	Tributary to Wheatfield Gualala River	97-20*	2001
114.11041	Willow Creek @ Hunter's Camp	98-1	1994-1996, '99, 2000
114.11041	Willow Creek Upper	98-3	1994-1996, 1999-2001
114.11040	Freezeout Creek	98-4	1996, '97, 1999-2001
114.11040	Freezeout Creek	98-20*	2001
114.11041	Tributary to Willow Creek	98-21*	2001

***Class II Streams**

Table 1.5. UTM Coordinates and Latitude/Longitude for MRC Stream Temperature Sites 1989-2001.

Stream Name	Site ID	X-Coordinate	Y-Coordinate	Latitude	Longitude
Hollow Tree Creek	41-1	437745	4408209	39.8235	-123.7274
Redwood Creek	41-2	435558	4403166	39.7779	-123.7525
Tributary to Waldron Creek	41-20	436729	4400261	39.7518	-123.7385
Tributary to Redwood Creek	41-21	434232	4401879	39.7662	-123.7678
Middle Creek	41-22	434650	4407149	39.8137	-123.7635
Bond Creek	41-3	437026	4402065	39.7681	-123.7352
Hollow Tree Creek	41-4	436877	4401880	39.7664	-123.7370
Michaels Creek	41-5	438264	4401471	39.7628	-123.7207
Huckleberry Creek	41-6	438332	4398726	39.7381	-123.7197
Hollow Tree Creek	41-7	438569	4398844	39.7392	-123.7169
Walters Creek	41-8	437679	4404471	39.7898	-123.7279
Waldron Creek	41-9	437921	4400730	39.7561	-123.7247
Cottoneva Creek	47-1	430046	4399081	39.7406	-123.8164
South Fork Cottoneva Creek	47-2	430144	4398851	39.7386	-123.8152
Little Juan Creek	47-20	435277	4394482	39.6996	-123.7549
Tributary to Hardy Creek	47-21	432076	4396518	39.7177	-123.7925
North Fork Hardy Creek	47-22	433165	4397372	39.7255	-123.7798
Rockport Creek	47-23	430876	4398303	39.7337	-123.8066
Kimball Gulch	47-24	432689	4399974	39.7489	-123.7857
Slaughterhouse Gulch	47-25	432018	4400805	39.7563	-123.7936
Tributary to Middle Fork Cottoneva Creek	47-26	430279	4403764	39.7829	-123.8142
Rock Creek	47-27	435295	4393155	39.6877	-123.7546
Tributary to Howard Creek	47-28	434516	4392779	39.6842	-123.7636
Little Howard Creek	47-29	433246	4393198	39.6879	-123.7785
Cottoneva Creek	47-3	429971	4403965	39.7846	-123.8178
Hardy Creek	47-4	432236	4396388	39.7166	-123.7906
Juan Creek	47-5	431541	4394840	39.7026	-123.7985
Howard Creek	47-6	434162	4392266	39.6796	-123.7677
Jack of Hearts Creek	55-1	442523	4397498	39.7273	-123.6707
North Fork Noyo River	70-1	452730	4363678	39.4232	-123.5492
North Fork Noyo River	70-10	453055	4369046	39.4716	-123.5458
Noyo River	70-11	452857	4363424	39.4209	-123.5477
Redwood Creek	70-12	457620	4364694	39.4326	-123.4924
Burbeck Creek	70-13	462340	4364355	39.4298	-123.4376
Upper Noyo Mainstem	70-14	462252	4364164	39.4281	-123.4386
Marble Gulch	70-2	453450	4364609	39.4316	-123.5409
Tributary to North Fork Noyo River	70-20	453090	4364186	39.4278	-123.5450
Tributary to North Fork Noyo River	70-21	455359	4365700	39.4416	-123.5188
Tributary to North Fork Noyo River	70-22	455406	4365871	39.4431	-123.5182
Tributary to North Fork Hayworth Creek	70-23	456540	4369329	39.4743	-123.5053
Tributary to North Fork Hayworth Creek	70-24	456519	4369710	39.4778	-123.5055

Tributary to North Fork Hayworth Creek	70-25	456584	4369985	39.4802	-123.5048
Hayworth Creek	70-3	454403	4367149	39.4546	-123.5300
North Fork Hayworth Creek	70-5	456746	4369127	39.4725	-123.5029
Hayworth Creek	70-6	457048	4368969	39.4711	-123.4993
North Fork Noyo River	70-7	454106	4367255	39.4555	-123.5334
Middle Fork NF Noyo River	70-8	453252	4368959	39.4708	-123.5435
Big River	74-1	454905	4350385	39.3036	-123.5230
Russel Brook	74-2	457177	4350964	39.3089	-123.4967
Johnston Gulch	74-20	455351	4350646	39.3059	-123.5179
Wildhorse Gulch	74-21	454558	4350430	39.3039	-123.5270
Big River	74-3	460199	4350968	39.3091	-123.4616
East Branch NF Big River	75-1	457011	4352541	39.3231	-123.4987
Quail Gulch	75-20	454530	4353209	39.3290	-123.5275
Frykman Gulch	75-22	456083	4352735	39.3248	-123.5095
Steam Donkey Gulch	75-23	451727	4351864	39.3167	-123.5600
East Branch NF Big River	75-3	452412	4352204	39.3198	-123.5520
North Fork Big River	75-4	452415	4350250	39.3022	-123.5519
Big River	76-1	452732	4350170	39.3015	-123.5482
Two Log Creek	76-2	447149	4352525	39.3224	-123.6131
Beaver Pond Gulch	76-20	448261	4353557	39.3318	-123.6003
Jack Smith Creek	77-1	473780	4346715	39.2713	-123.3040
Albion River	78-1	438372	4344166	39.2465	-123.7142
Duckpond Gulch	78-10	438540	4344141	39.2463	-123.7122
Pleasant Valley Creek	78-11	438144	4343537	39.2408	-123.7168
East Railroad Gulch	78-12	444245	4345982	39.2633	-123.6463
Deadman Gulch	78-20	437168	4344579	39.2501	-123.7282
Slaughterhouse Gulch	78-21	438016	4344405	39.2486	-123.7183
Tributary to Buckhorn Creek	78-22	434256	4345660	39.2597	-123.7620
Tributary to Albion River	78-23	438716	4344832	39.2525	-123.7102
Gunari Gulch	78-24	442650	4343801	39.2435	-123.6646
Anderson Gulch	78-25	442362	4343870	39.2441	-123.6679
South Fork Albion River	78-3	441804	4344891	39.2533	-123.6745
South Fork Albion River	78-4	446551	4342176	39.2291	-123.6192
Albion River	78-5	441852	4344959	39.2539	-123.6739
Albion River	78-6	447847	4346174	39.2652	-123.6045
Deadman Gulch	78-7	437558	4344014	39.2451	-123.7236
Railroad Gulch	78-9	438099	4343435	39.2399	-123.7173
South Fork Big River	79-1	454055	4349271	39.2935	-123.5328
Ramon Creek	79-2	456640	4346822	39.2715	-123.5027
No Name Gulch	79-20	455156	4347399	39.2767	-123.5199
Goddard Gulch	79-21	458485	4343271	39.2396	-123.4810
Donkey House Gulch	79-22	457052	4346717	39.2706	-123.4979
Daugherty Creek	79-4	460246	4341915	39.2275	-123.4606
Daugherty Creek	79-5	462768	4339193	39.2031	-123.4312

North Fork Ramon Creek	79-8	457875	4346547	39.2691	-123.4883
Gates Creek	79-9	462564	4339562	39.2064	-123.4336
North Branch NF Navarro River	81-1	451683	4335772	39.1717	-123.5593
John Smith Creek	81-2	453787	4339800	39.2081	-123.5352
North Branch NF Navarro River	81-3	453812	4339693	39.2072	-123.5350
John Smith Creek	81-4	454100	4341237	39.2211	-123.5317
Sheep Gulch	81-5	454174	4341445	39.2230	-123.5309
Marsh Gulch	82-1	438870	4336510	39.1776	-123.7077
Flynn Creek	82-2	449713	4334689	39.1618	-123.5820
Tributary to Flynn Creek	82-21	448129	4337408	39.1862	-123.6006
Mustard Gulch	82-22	445070	4335543	39.1693	-123.6359
Black Rock Creek	82-23	452688	4327576	39.0979	-123.5471
Berry Creek	82-24	450920	4328797	39.1088	-123.5677
Tramway Gulch	82-25	448232	4333377	39.1499	-123.5991
Tank 4 Gulch	82-26	446766	4340741	39.2162	-123.6166
Coon Creek	82-27	448259	4334663	39.1615	-123.5989
Ray Gulch	82-28	444559	4337452	39.1864	-123.6419
Navarro River	82-3	444860	4334088	39.1561	-123.6382
Marsh Gulch	82-4	439532	4335142	39.1653	-123.6999
Murray Gulch	82-6	439533	4336607	39.1785	-123.7000
Deadhorse Gulch	82-7	447281	4333951	39.1550	-123.6101
Camp 16 Gulch	82-8	447950	4337974	39.1913	-123.6027
Flume Gulch	82-9	441588	4336015	39.1733	-123.6762
Ackerman Creek	83-1	471760	4336696	39.1809	-123.3270
Alder Creek	83-2	474166	4336744	39.1814	-123.2991
Ackerman Creek	83-3	474619	4337204	39.1856	-123.2939
Greenwood Creek	84-1	439234	4331547	39.1329	-123.7030
Tributary to Greenwood Creek	84-20	439419	4331853	39.1356	-123.7009
Tributary to Greenwood Creek	84-21	447074	4327648	39.0982	-123.6120
Tributary to Greenwood Creek	84-22	447546	4327148	39.0938	-123.6065
Tributary to Greenwood Creek	84-23	446683	4328540	39.1062	-123.6166
Greenwood Creek	84-3	448775	4326283	39.0860	-123.5923
South Branch NF Navarro River	85-1	451738	4335707	39.1711	-123.5587
South Branch NF Navarro River	85-2	459608	4333947	39.1557	-123.4675
North Fork Rose Creek	85-20	468410	4331703	39.1358	-123.3655
South Fork Rose Creek	85-21	468361	4331670	39.1355	-123.3661
North Fork Indian Creek	86-1	467215	4327243	39.0956	-123.3791
North Fork Indian Creek	86-2	467328	4329143	39.1127	-123.3779
West Branch Indian Creek	86-20	467274	4329196	39.1132	-123.3785
Theron's Pond	86-21	465174	4331329	39.1323	-123.4029
Elk Creek	87-1	441647	4326878	39.0910	-123.6747
South Fork Elk Creek	87-2	441646	4326848	39.0907	-123.6747
Tributary to Elk Creek	87-20	444220	4326556	39.0882	-123.6450
Tributary to Elk Creek	87-21	446661	4324049	39.0658	-123.6165

Three Springs Creek	87-22	450860	4322686	39.0537	-123.5679
Tributary to Soda Fork Elk Creek	87-23	451828	4320062	39.0302	-123.5565
West Fork Tributary to Elk Creek	87-24	446436	4321740	39.0450	-123.6190
East Fork Tributary to Elk Creek	87-25	446517	4321766	39.0452	-123.6180
Elk Creek	87-3	448785	4322019	39.0476	-123.5918
Navarro River	88-1	458121	4326270	39.0864	-123.4842
Alder Creek	89-1	443399	4316317	38.9959	-123.6536
Alder Creek	89-2	449865	4317498	39.0069	-123.5790
Mills Creek	89-20	444759	4320988	39.0381	-123.6383
Owl Creek	89-21	442571	4316834	39.0005	-123.6632
NE Fork of Bee Tree Creek	89-23	447524	4318716	39.0178	-123.6061
Mallo Pass Creek	89-3	442420	4321085	39.0388	-123.6653
Garcia River	93-1	448961	4303877	38.8841	-123.5884
Rolling Brook	93-2	449156	4303875	38.8841	-123.5862
Rolling Brook	93-20	449981	4305113	38.8953	-123.5768
Lee Creek	93-21	449177	4306197	38.9051	-123.5861
South Fork Garcia River	93-4	451379	4300787	38.8564	-123.5603
Garcia River	93-5	451356	4300819	38.8567	-123.5606
Garcia River	93-6	453475	4301628	38.8641	-123.5363
Fleming Creek	93-7	452847	4298498	38.8359	-123.5433
South Fork Garcia River	93-8	452623	4298814	38.8387	-123.5459
Rolling Brook	93-9	449682	4304611	38.8908	-123.5802
Schooner Gulch	94-1	445864	4302100	38.8679	-123.6240
China Gulch	94-20	446649	4301983	38.8669	-123.6150
Shinglemill Gulch	94-21	445942	4301730	38.8646	-123.6231
Hall Gulch	94-22	446587	4302103	38.8680	-123.6157
Annapolis Falls Creek	97-1	468972	4282736	38.6946	-123.3568
Fuller Creek	97-2	470863	4280132	38.6712	-123.3349
Tributary to Wheatfield Gualala River	97-20	470931	4279993	38.6699	-123.3341
Crocker Creek	97-4	473881	4280758	38.6769	-123.3003
Haupt Creek	97-5	472106	4279058	38.6615	-123.3206
Tobacco Creek	97-6	474877	4279985	38.6700	-123.2888
Willow Creek	98-1	495423	4252561	38.4232	-123.0524
Freezeout Creek	98-20	496791	4254760	38.4430	-123.0368
Tributary to Willow Creek	98-21	498980	4251986	38.4180	-123.0117
Willow Creek	98-3	498892	4252016	38.4183	-123.0127
Freezeout Creek	98-4	496663	4255233	38.4472	-123.0382

Rockport Management Area

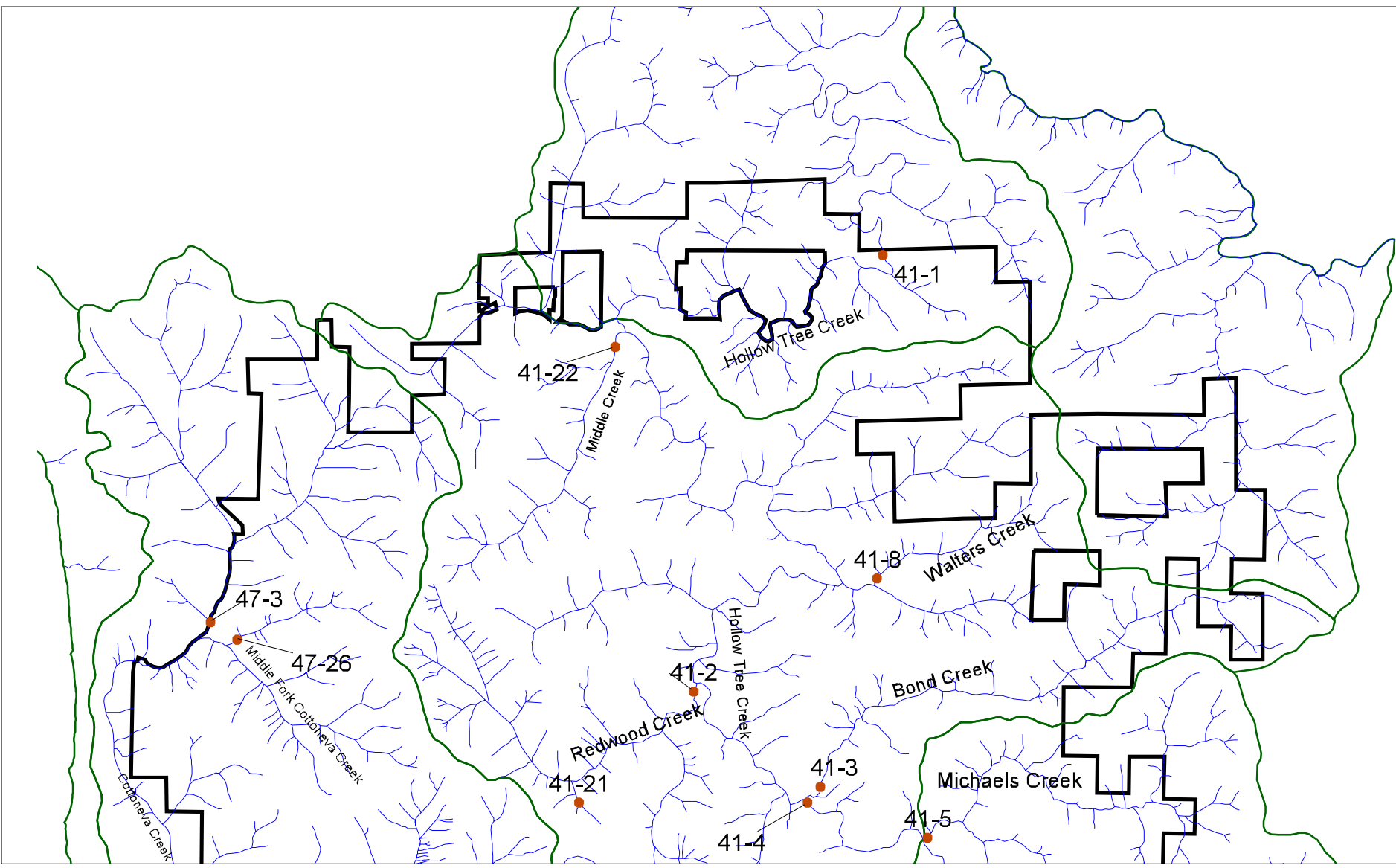
Table 2. Maximum, MWAT, and MWMT temperatures for sites in the Rockport Area (1992-2001).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Hollow Tree Creek	41-1	1994	22.2	19.9	21.9
Hollow Tree Creek	41-1	1995	21.9	19.2	21.4
Hollow Tree Creek	41-1	1999	22.7	19.1	21.3
Hollow Tree Creek	41-1	2000	23.4	19.9	22.3
Hollow Tree Creek	41-1	2001	21.6	18.8	20.7
Redwood Creek	41-2	1994	15.8	14.3	15.4
Redwood Creek	41-2	1995	15.8	14.3	15.3
Redwood Creek	41-2	1999	15.9	14.7	15.4
Redwood Creek	41-2	2000	16.4	15.0	15.5
Redwood Creek	41-2	2001	16.1	14.5	15.5
Bond Creek	41-3	1996	18.2	16.2	17.4
Bond Creek	41-3	1997	18.1	16.0	17.2
Bond Creek	41-3	1999	16.7	15.2	16.2
Bond Creek	41-3	2000	17.0	15.1	16.2
Bond Creek	41-3	2001	16.8	14.7	15.9
Hollow Tree Creek	41-4	1999	19.1	16.5	18.0
Hollow Tree Creek	41-4	2000	19.4	16.9	18.5
Hollow Tree Creek	41-4	2001	19.1	16.4	18.0
Michaels Creek	41-5	1994	20.6	16.5	20.2
Michaels Creek	41-5	1996	18.1	16.0	17.4
Michaels Creek	41-5	1999	19.8	17.1	18.6
Michaels Creek	41-5	2000	18.4	15.9	17.5
Michaels Creek	41-5	2001	16.6	14.4	15.9
Huckleberry Creek	41-6	1994	16.1	14.5	15.8
Huckleberry Creek	41-6	1995	15.9	14.4	15.4
Huckleberry Creek	41-6	1999	13.8	13.0	13.4
Huckleberry Creek	41-6	2000	16.8	14.6	15.6
Huckleberry Creek	41-6	2001	15.6	13.6	14.5
Hollow Tree Creek	41-7	1994	19.6	16.4	19.0
Hollow Tree Creek	41-7	1995	18.0	15.7	17.6
Hollow Tree Creek	41-7	1999	13.4	12.6	13.0
Hollow Tree Creek	41-7	2000	17.5	14.9	16.4
Hollow Tree Creek	41-7	2001	17.1	14.8	16.3
Walters Creek	41-8	1997	18.3	16.3	18.1

Waldron Creek	41-9	1997	17.6	15.4	16.3
Tributary to Waldron Creek	41-20*	2001	12.9	12.5	12.9
Tributary to Redwood Creek	41-21*	2001	14.1	13.4	13.7
Middle Creek	41-22*	2001	16.4	13.5	15.8
Cottoneva Creek	47-1	1995	17.0	15.2	16.0
Cottoneva Creek	47-1	1996	15.4	14.0	14.9
Cottoneva Creek	47-1	1999	14.5	13.6	14.3
Cottoneva Creek	47-1	2000	16.7	14.2	15.1
Cottoneva Creek	47-1	2001	15.5	14.1	14.7
South Fork Cottoneva Creek	47-2	1994	15.0	13.7	14.8
South Fork Cottoneva Creek	47-2	1995	16.2	14.2	15.3
South Fork Cottoneva Creek	47-2	2000	15.4	13.6	14.5
South Fork Cottoneva Creek	47-2	2001	14.5	13.4	13.9
Cottoneva Creek	47-3	1994	15.4	14.6	15.2
Cottoneva Creek	47-3	1995	16.1	14.3	15.3
Cottoneva Creek	47-3	1996	15.8	13.6	14.8
Cottoneva Creek	47-3	1999	15.8	13.8	14.7
Cottoneva Creek	47-3	2000	17.0	14.4	15.2
Cottoneva Creek	47-3	2001	15.3	13.6	14.6
Hardy Creek	47-4	1992	17.0	14.9	16.8
Hardy Creek	47-4	1993	17.0	14.7	16.4
Hardy Creek	47-4	1994	15.5	14.0	15.4
Hardy Creek	47-4	2000	16.4	13.8	15.2
Hardy Creek	47-4	2001	15.6	13.8	15.1
Juan Creek	47-5	1994	14.6	13.4	14.4
Juan Creek	47-5	1995	16.2	14.3	15.3
Juan Creek	47-5	1999	14.8	13.4	14.1
Juan Creek	47-5	2000	14.8	13.0	13.9
Juan Creek	47-5	2001	13.6	12.3	13.0
Howard Creek	47-6	1996	15.3	13.5	14.9
Howard Creek	47-6	1997	16.2	14.6	15.9
Howard Creek	47-6	1999	15.5	13.8	14.8
Howard Creek	47-6	2000	16.4	13.8	15.4
Howard Creek	47-6	2001	15.4	13.4	14.6
Little Juan Creek	47-20*	2001	12.2	12.2	12.2
Tributary to Hardy Creek	47-21*	2001	12.6	12.1	12.4
NF Hardy Creek	47-22*	2001	15.2	13.4	14.6
Tributary to Rockport Creek	47-23*	2001	11.8	11.8	11.8

Kimball Gulch	47-24*	2001	13.3	12.8	13.0
Slaughterhouse Gulch	47-25*	2001	13.3	12.9	13.1
Middle Fork Cottonева Creek	47-26*	2001	13.3	12.8	13.2
Rock Creek	47-27*	2001	15.2	14.0	14.7
Tributary to Howard Creek	47-28*	2001	12.9	12.1	12.8
Little Howard Creek	47-29*	2001	12.2	11.8	12.0
Jack O' Hearts Creek	55-1	2001	16.2	13.9	15.5
*Class II Streams					

Map 1. North Rockport Stream Temperature Sites



- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property

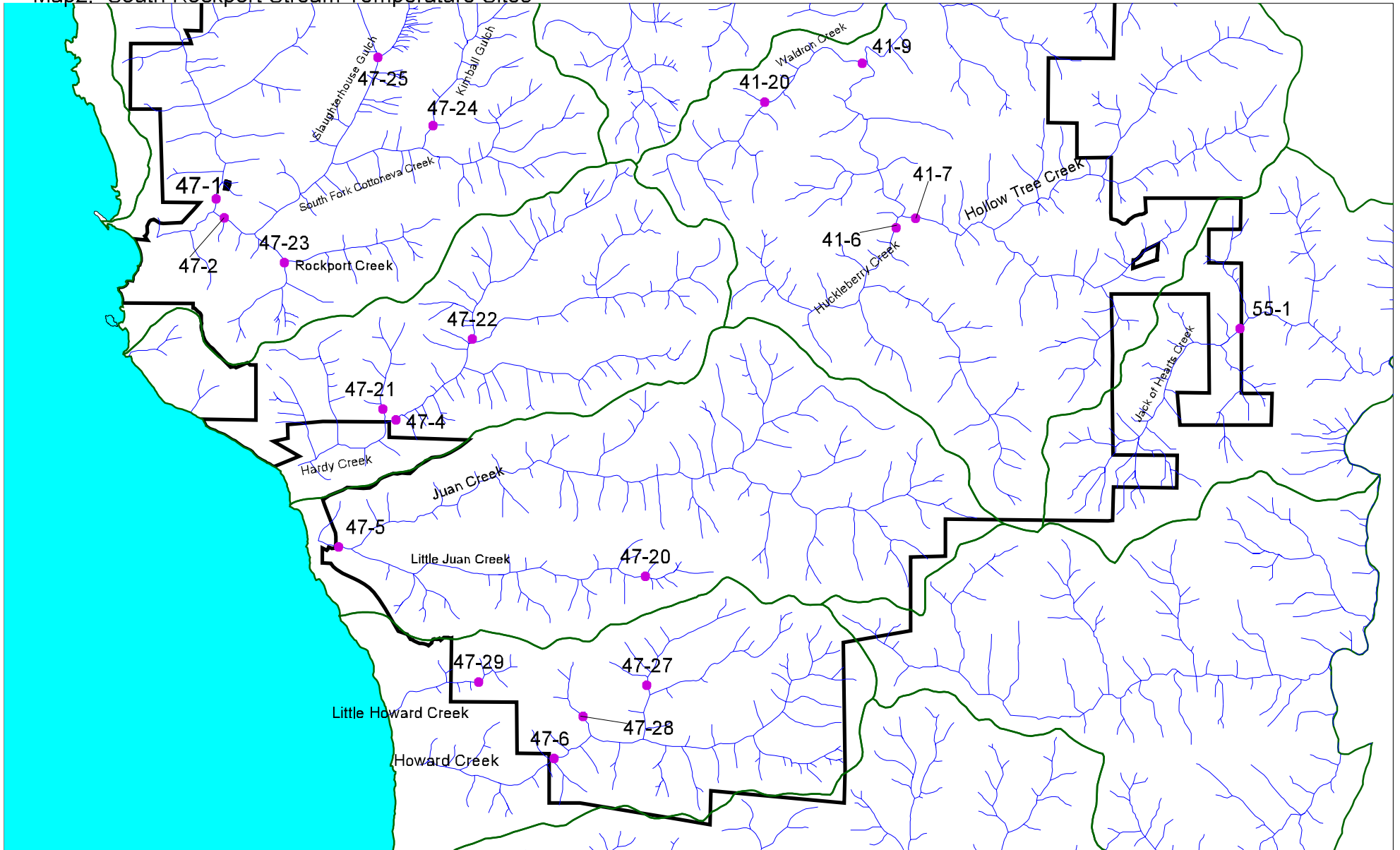
Mendocino Redwood Company, LLC

1 0 1 2 Miles

1:65000



Map2. South Rockport Stream Temperature Sites



- Temperature Sites
- └┬┘ Streams
- ▭ Planning Watershed
- ▭ Pacific Ocean
- ▭ MRC Property

Mendocino Redwood Company, LLC

1 0 1 2 Miles

1:65000



Figure 1. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hollow Tree Creek Site (41-1), Mendocino County, California.

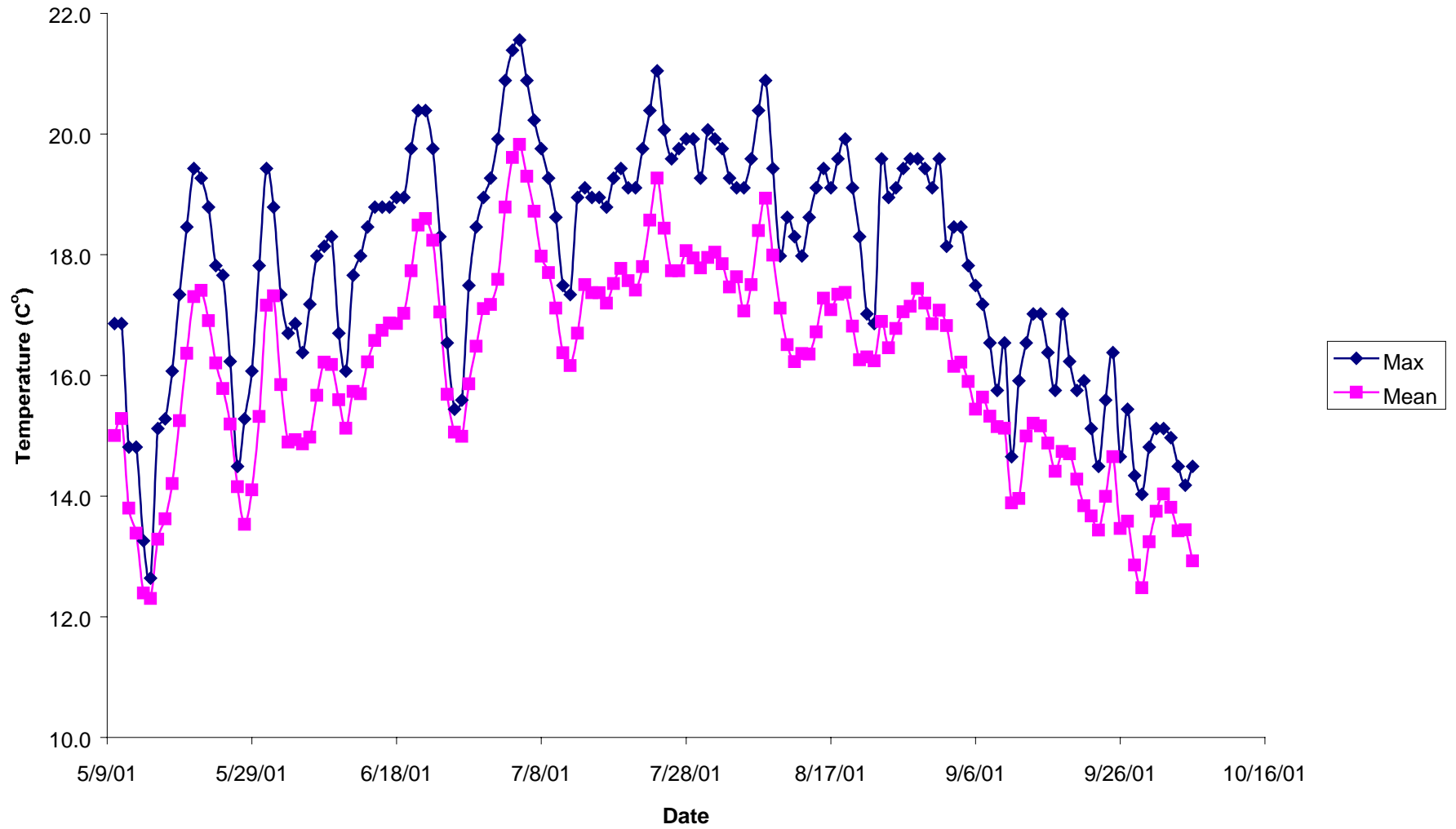


Figure 2. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Redwood Creek (Site 41-2), Mendocino County, California.

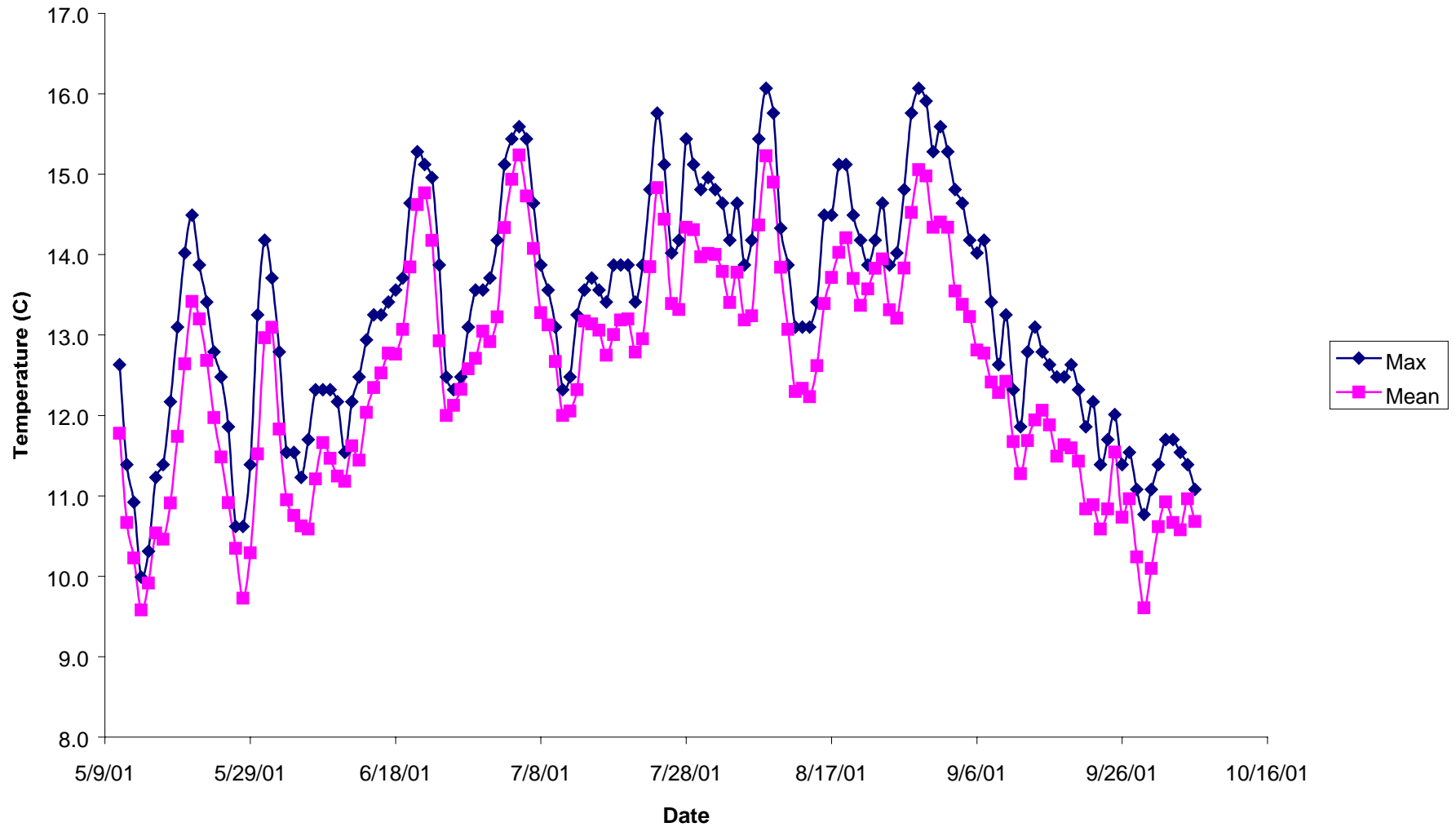


Figure 3. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Bond Creek (Site 41-3), Mendocino County, California.

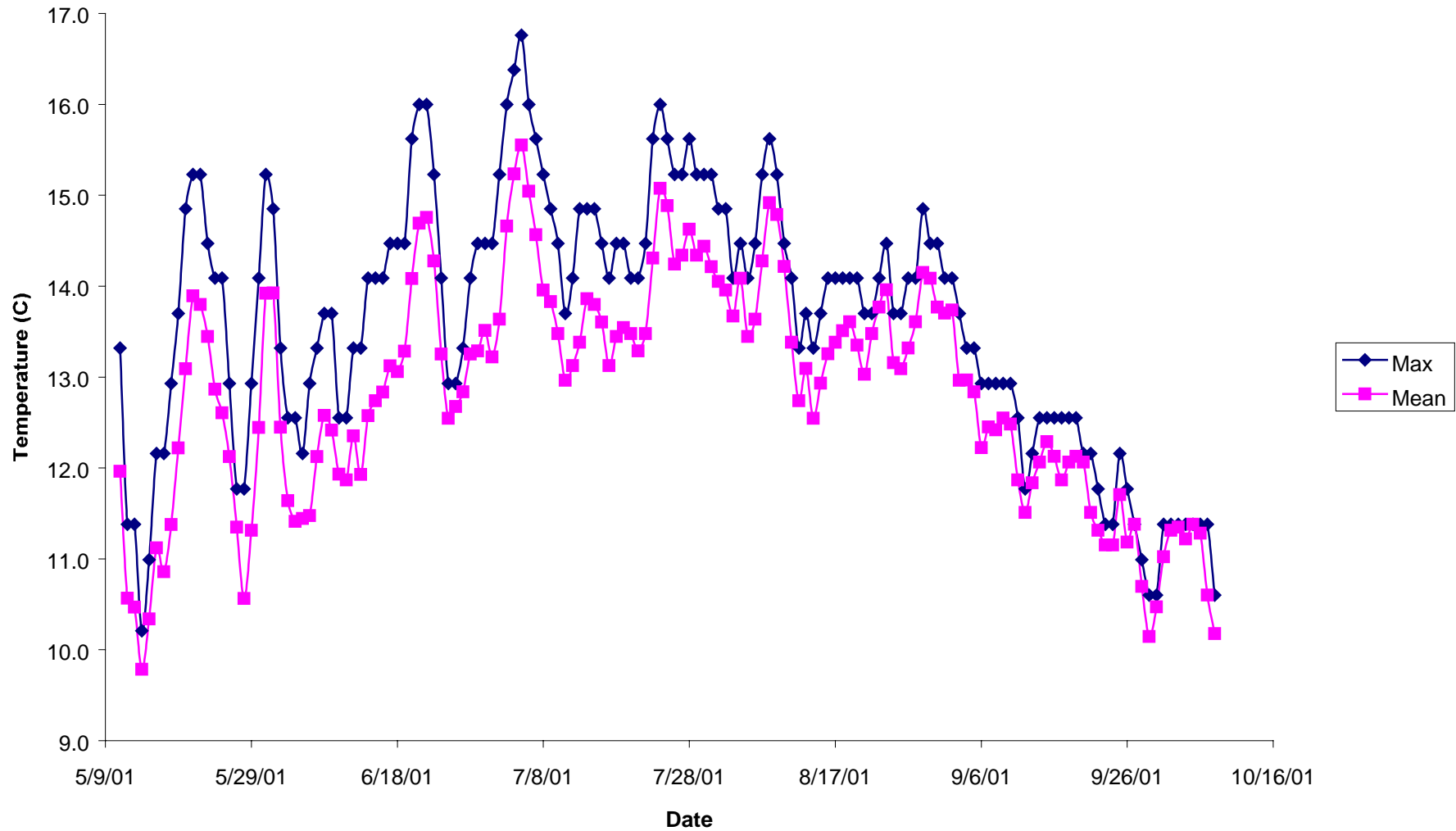


Figure 4. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hollow Tree Creek (Site 41-4), Mendocino County, California.

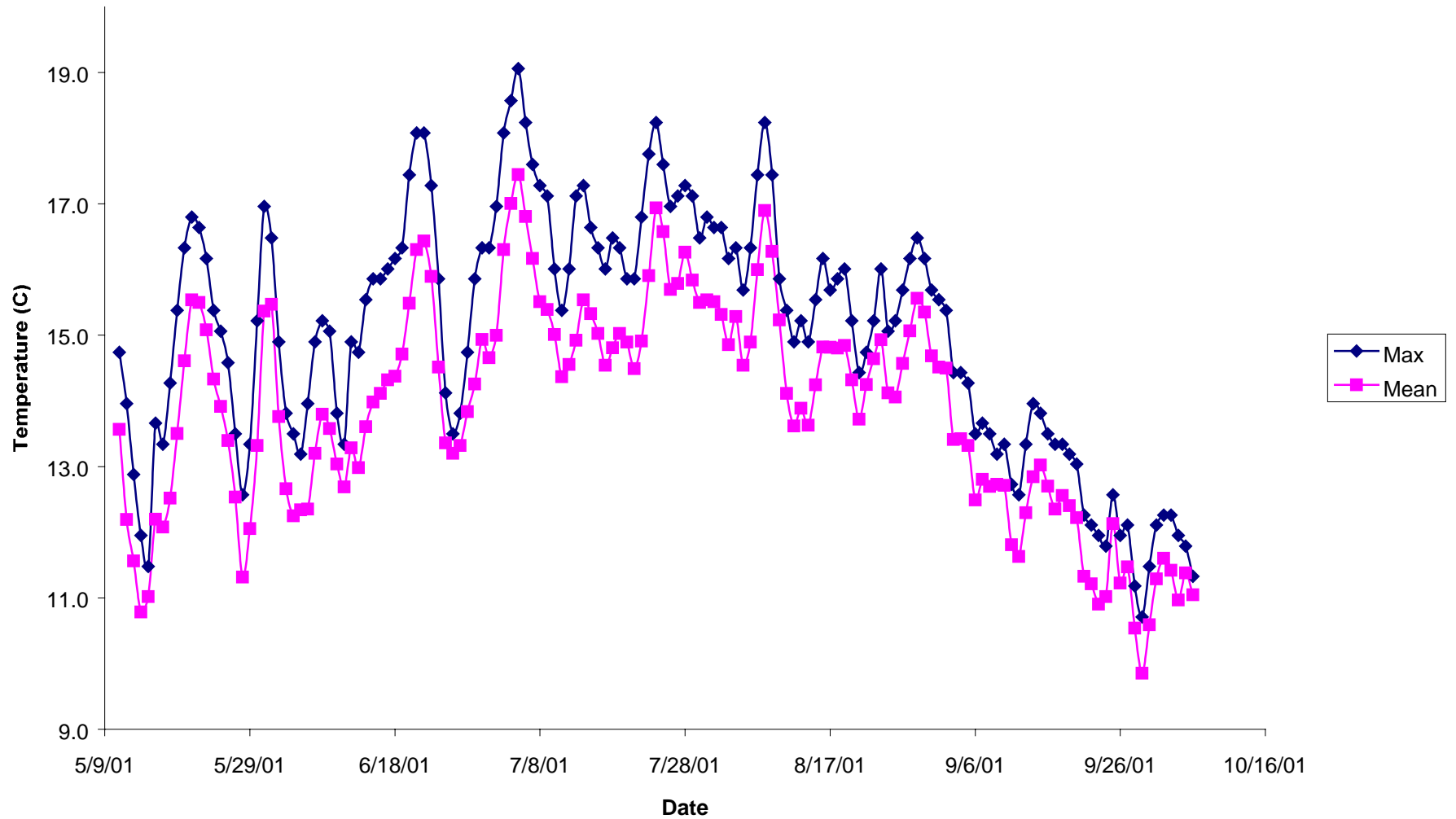


Figure 5. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Michaels Creek (Site 41-5), Mendocino County, California.

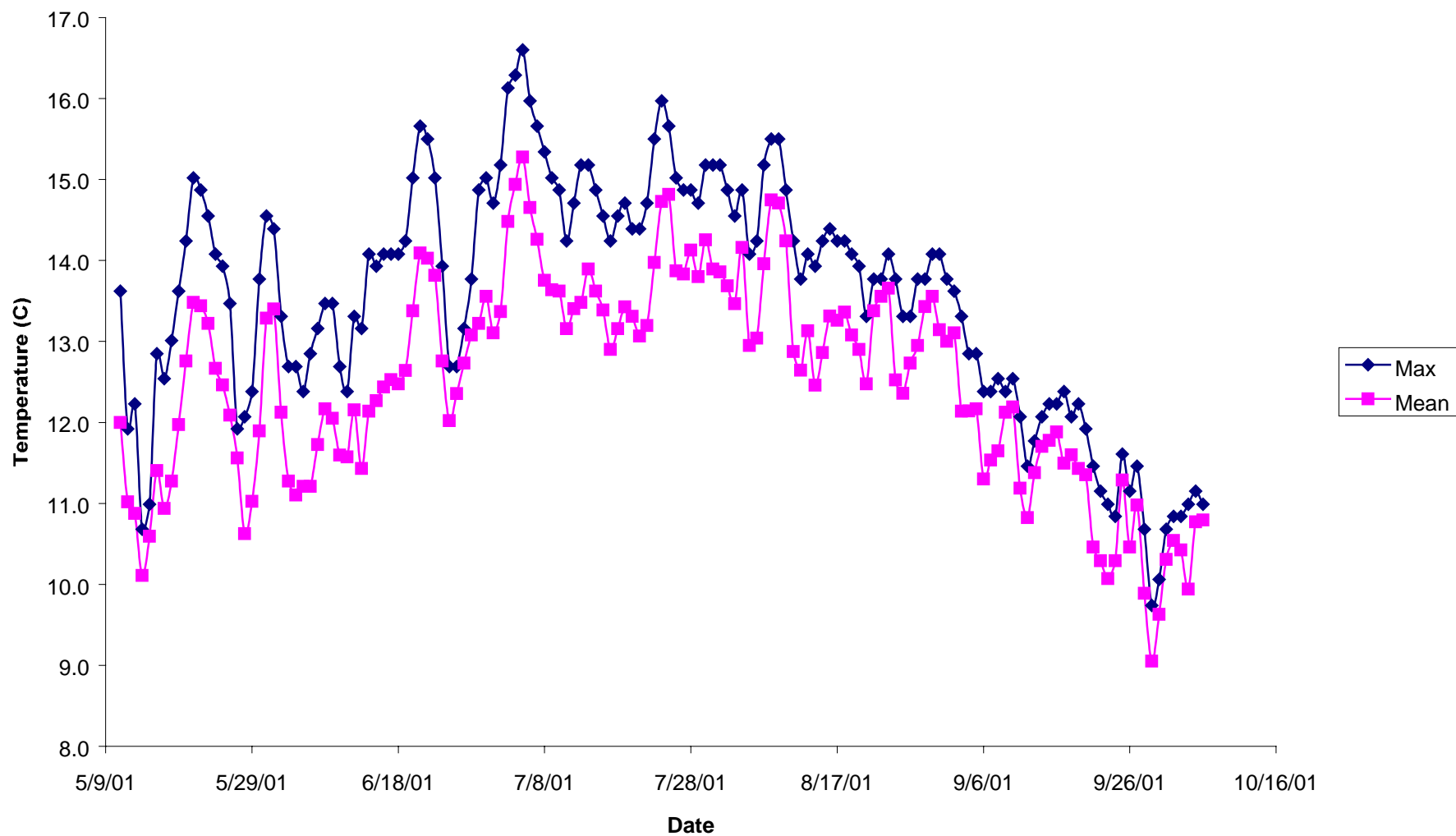


Figure 6. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Huckleberry Creek (Site 41-6), Mendocino County, California.

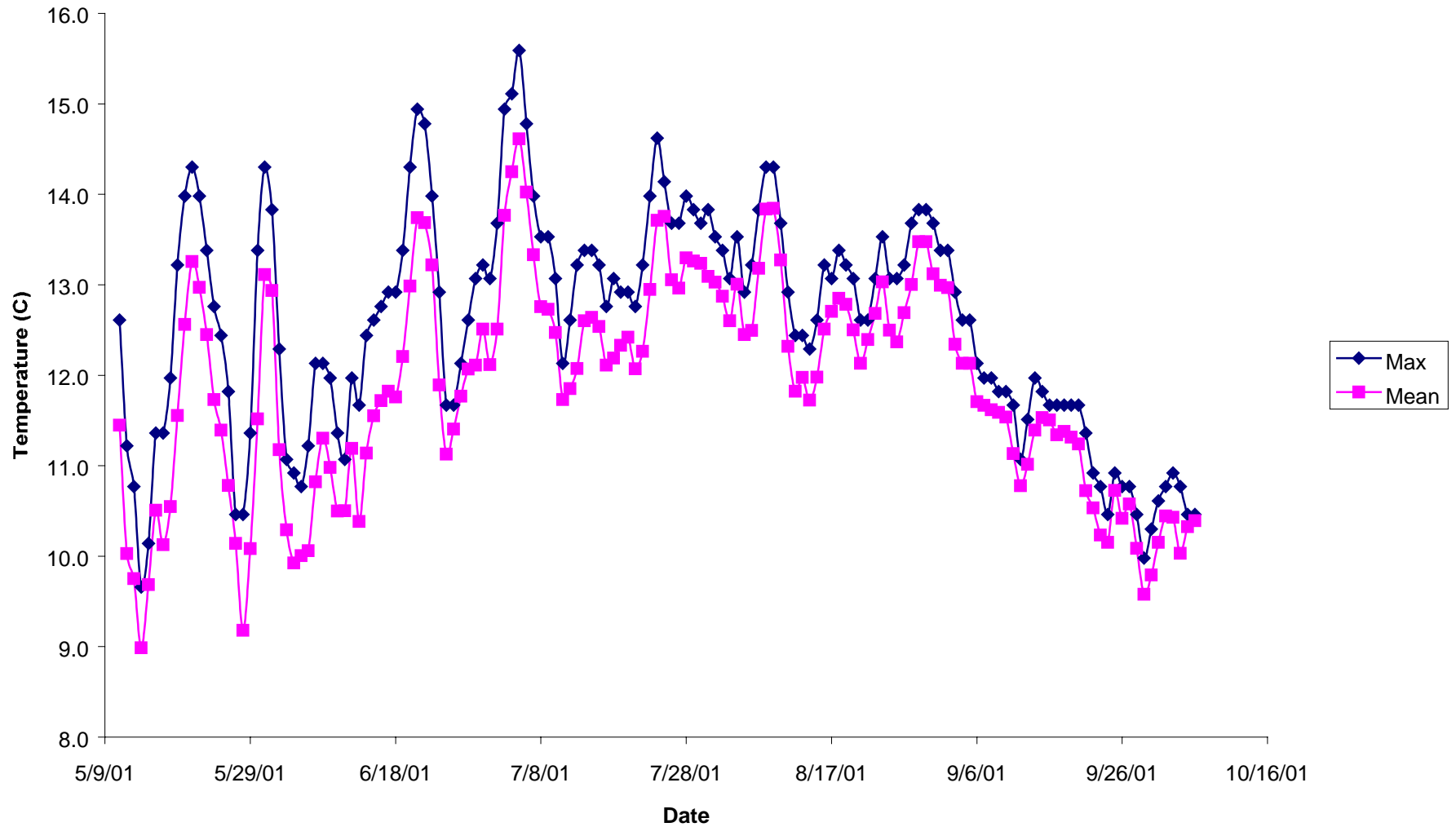


Figure 7. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hollow Tree Creek (Site 41-7), Mendocino County, California.

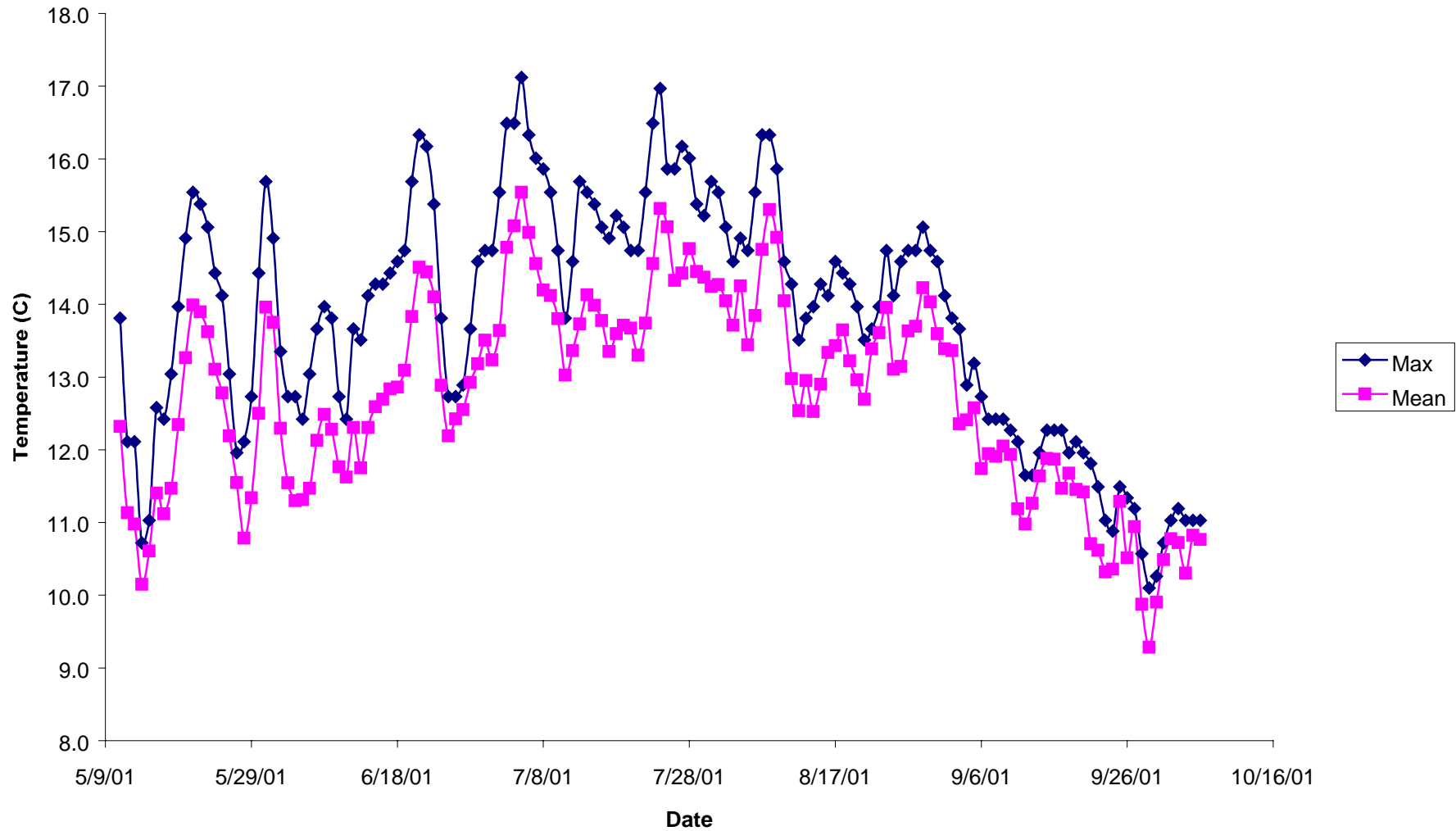


Figure 8. Mean and Maximum Daily Stream Temperatures for Unnamed tributary to Waldron Creek (41-20), Mendocino County, California.

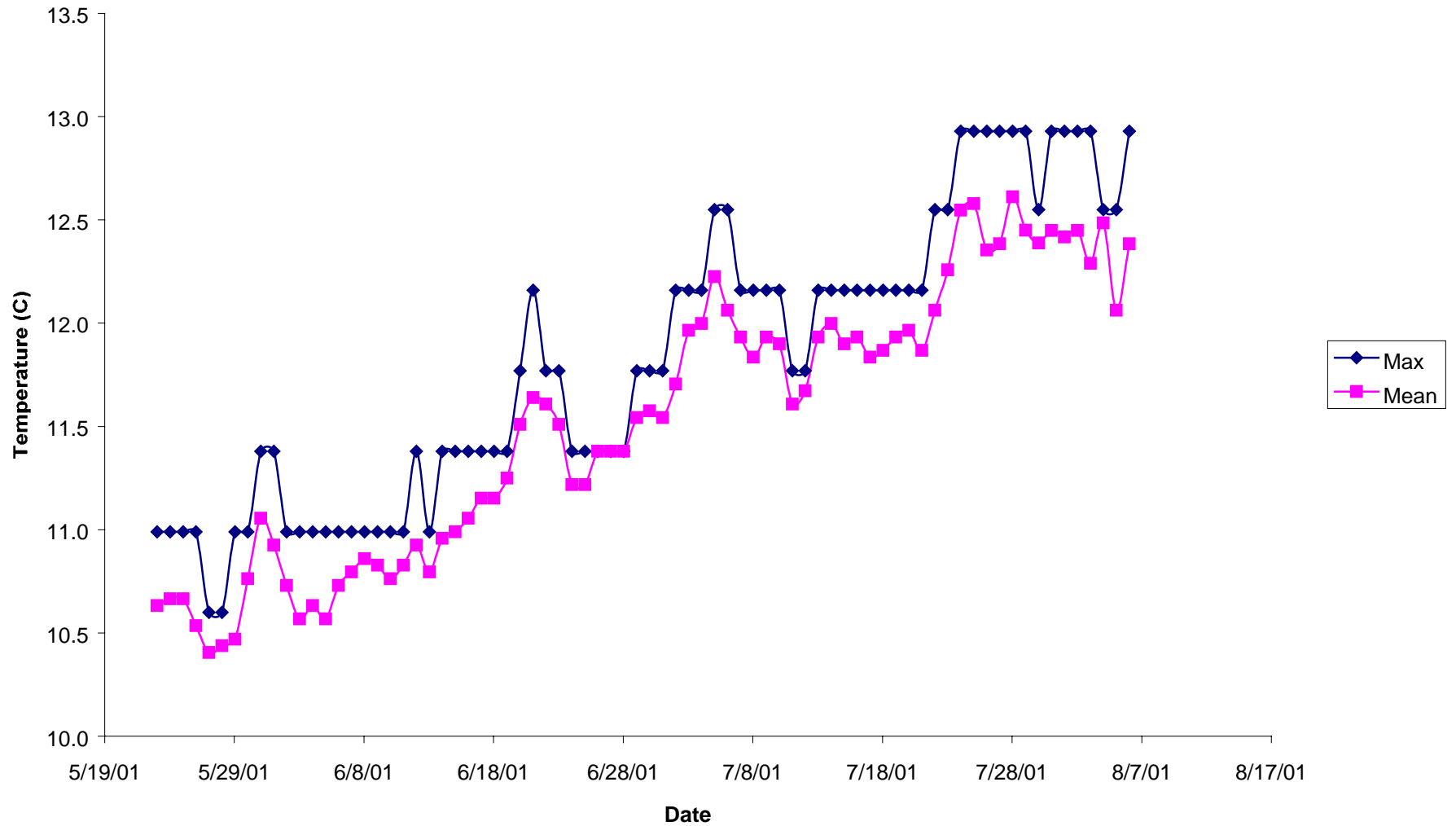


Figure 9. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Unnamed tributary to Redwood Creek (41-21), Mendocino County, California.

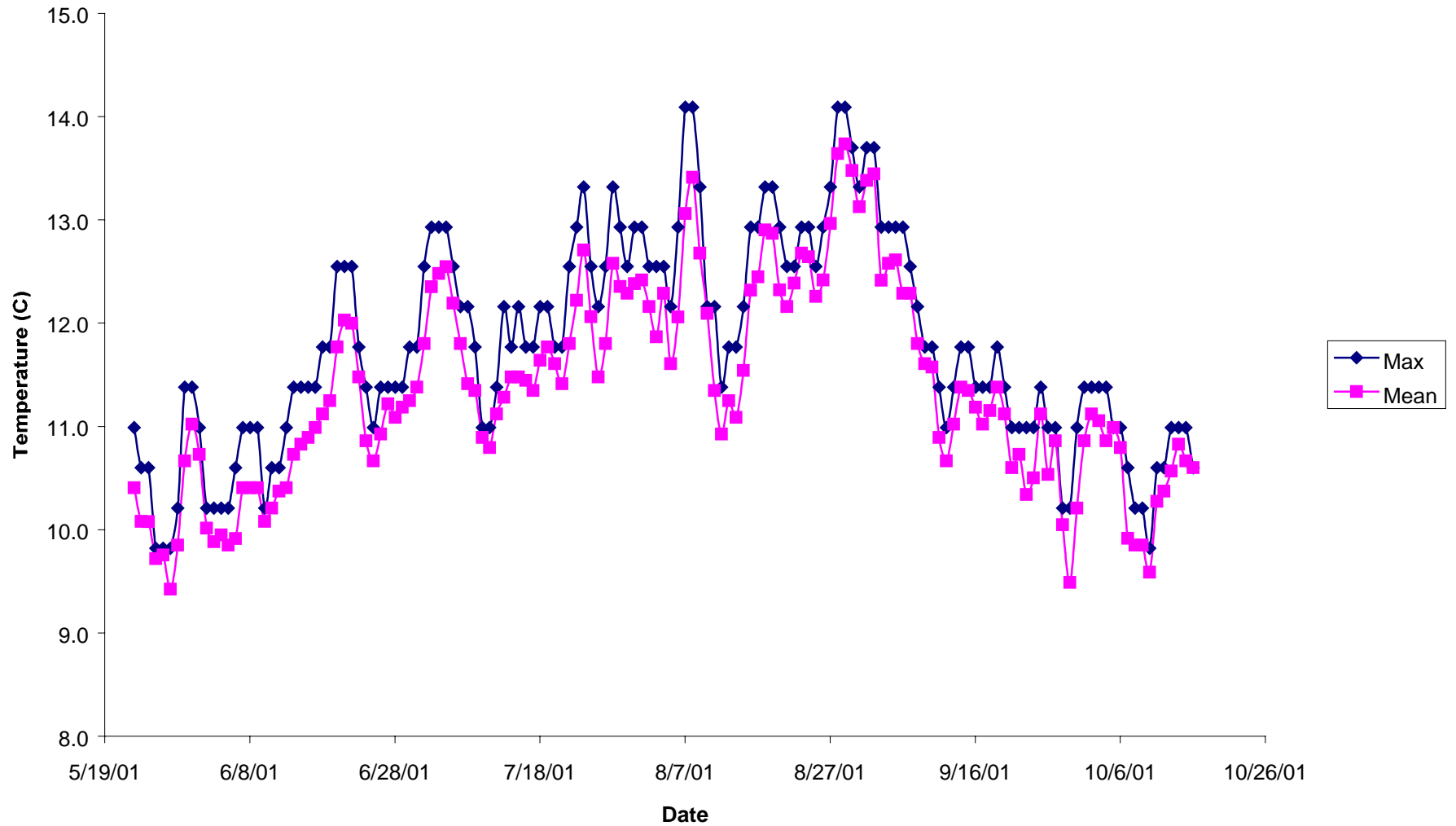


Figure 10. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Middle Creek (41-22), Mendocino County, California.

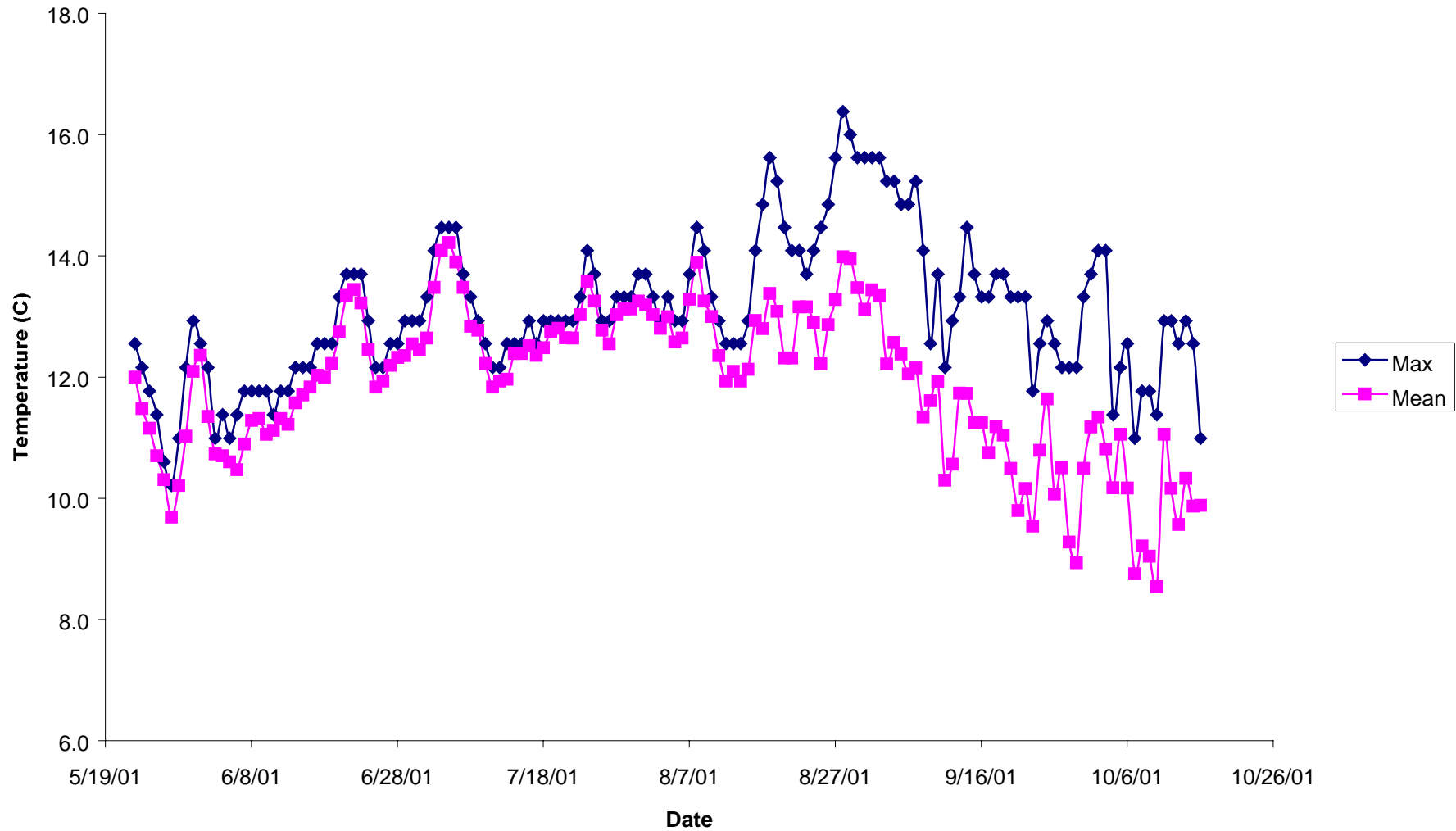


Figure 11. Mean and Maximum Daily Temperatures During Summer 2001 at Cottoneva Creek (Site 47-1), Mendocino County, California.

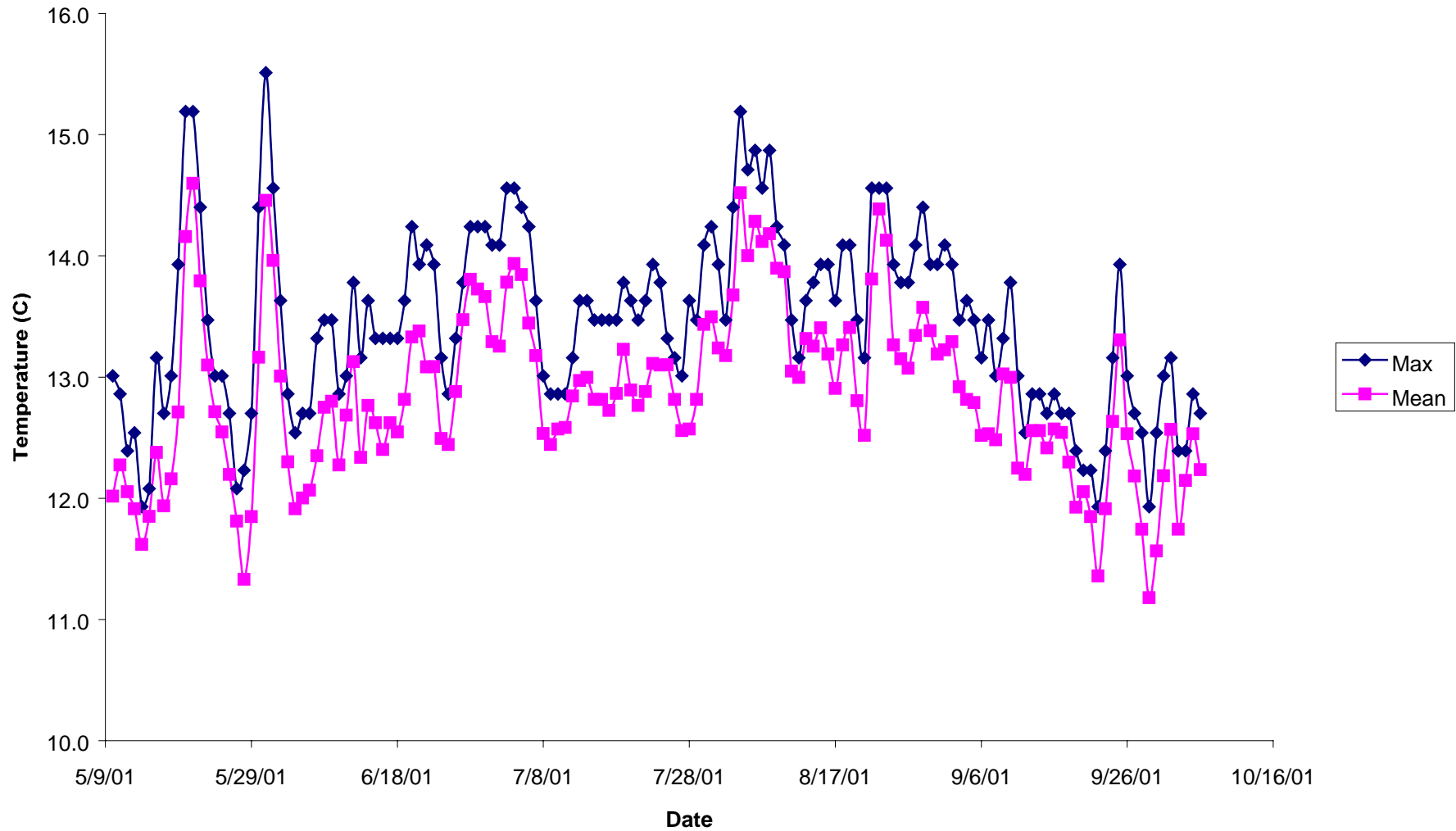


Figure 12. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Cottonева Creek (Site 47-2), Mendocino County, California.

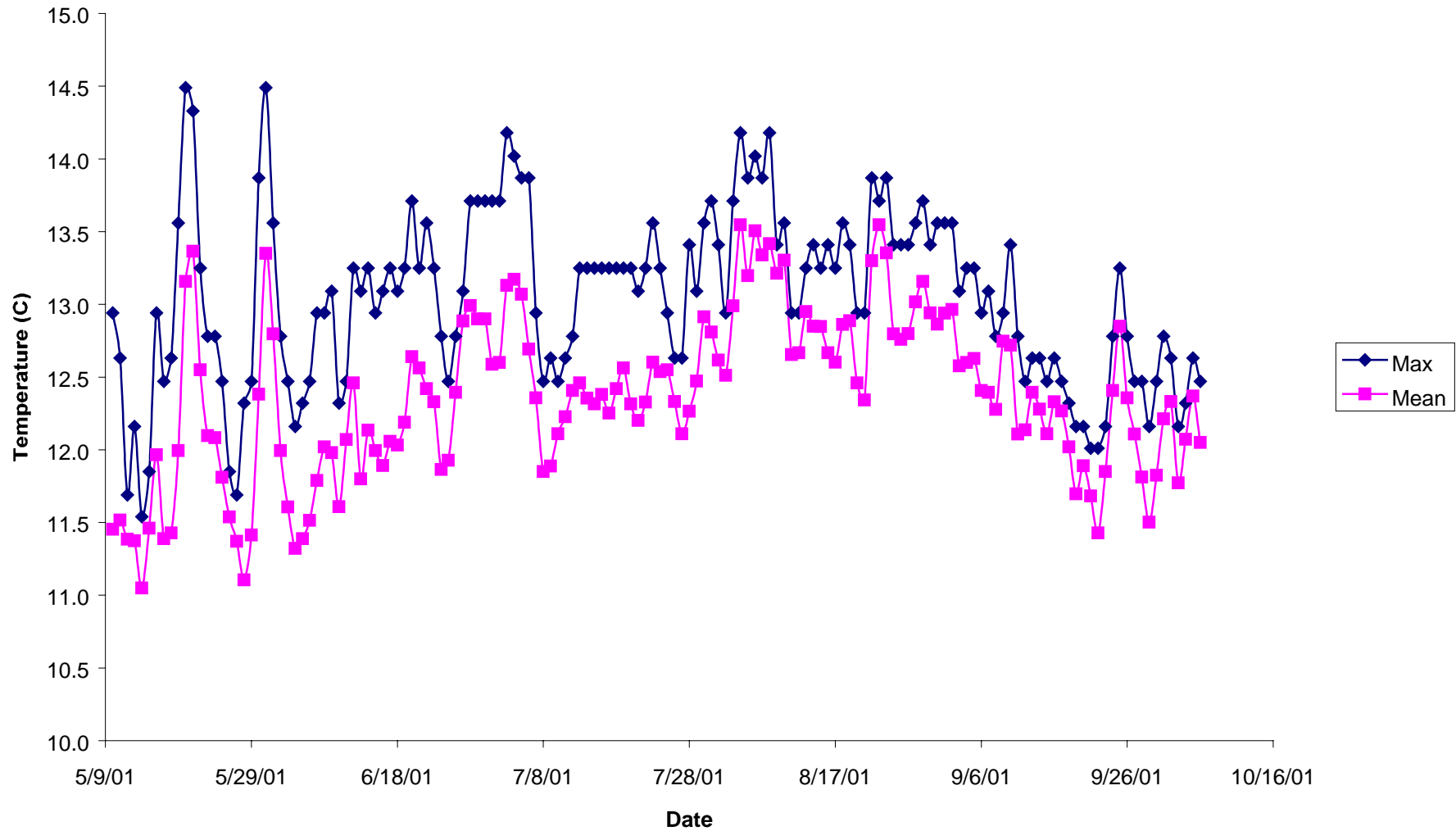


Figure 13. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Cottonева Creek (Site 47-3), Mendocino County, California.

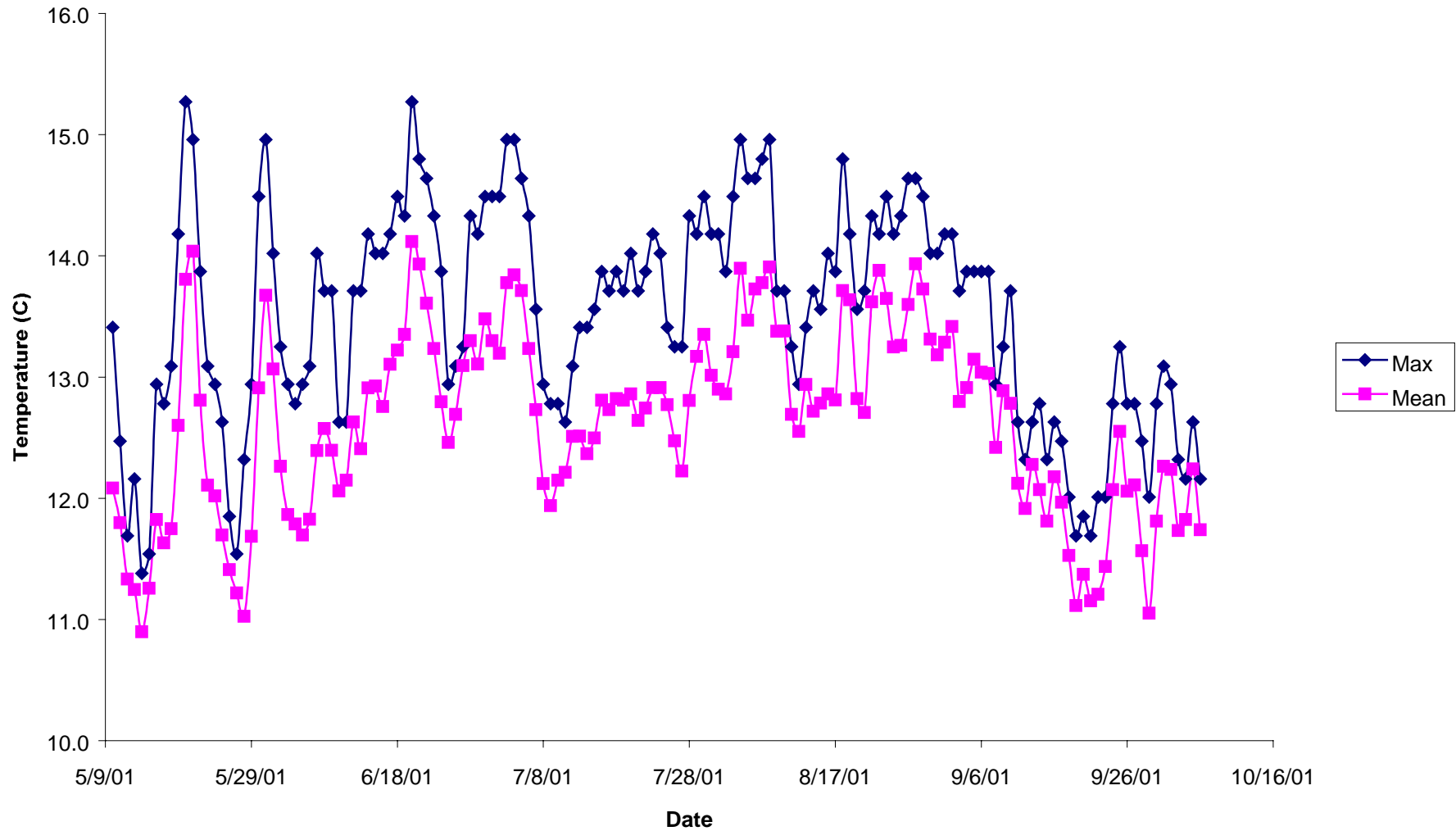


Figure 14. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hardy Creek (Site 47-4), Mendocino County, California.

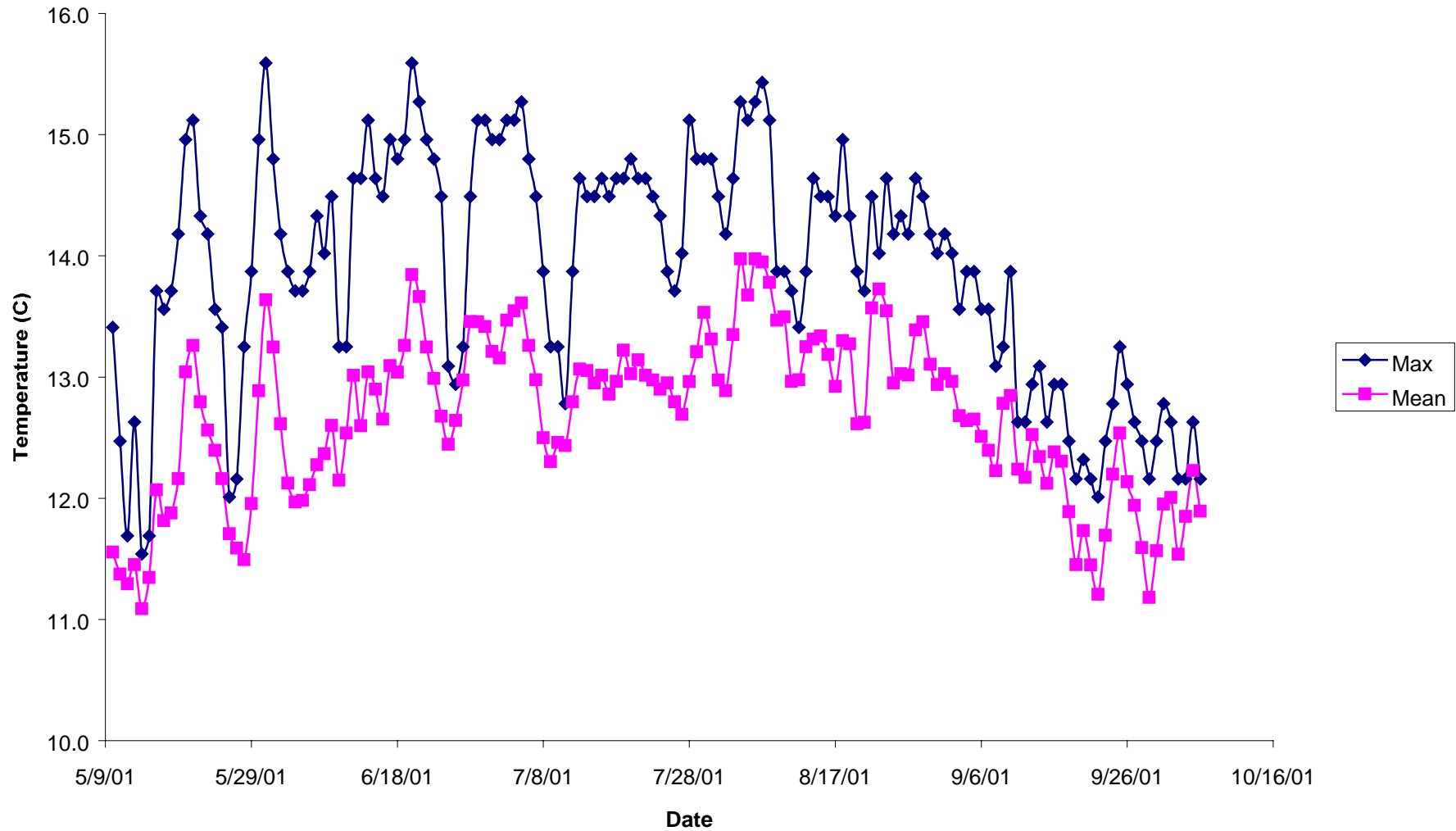


Figure 15. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Juan Creek (Site 47-5), Mendocino County, California.

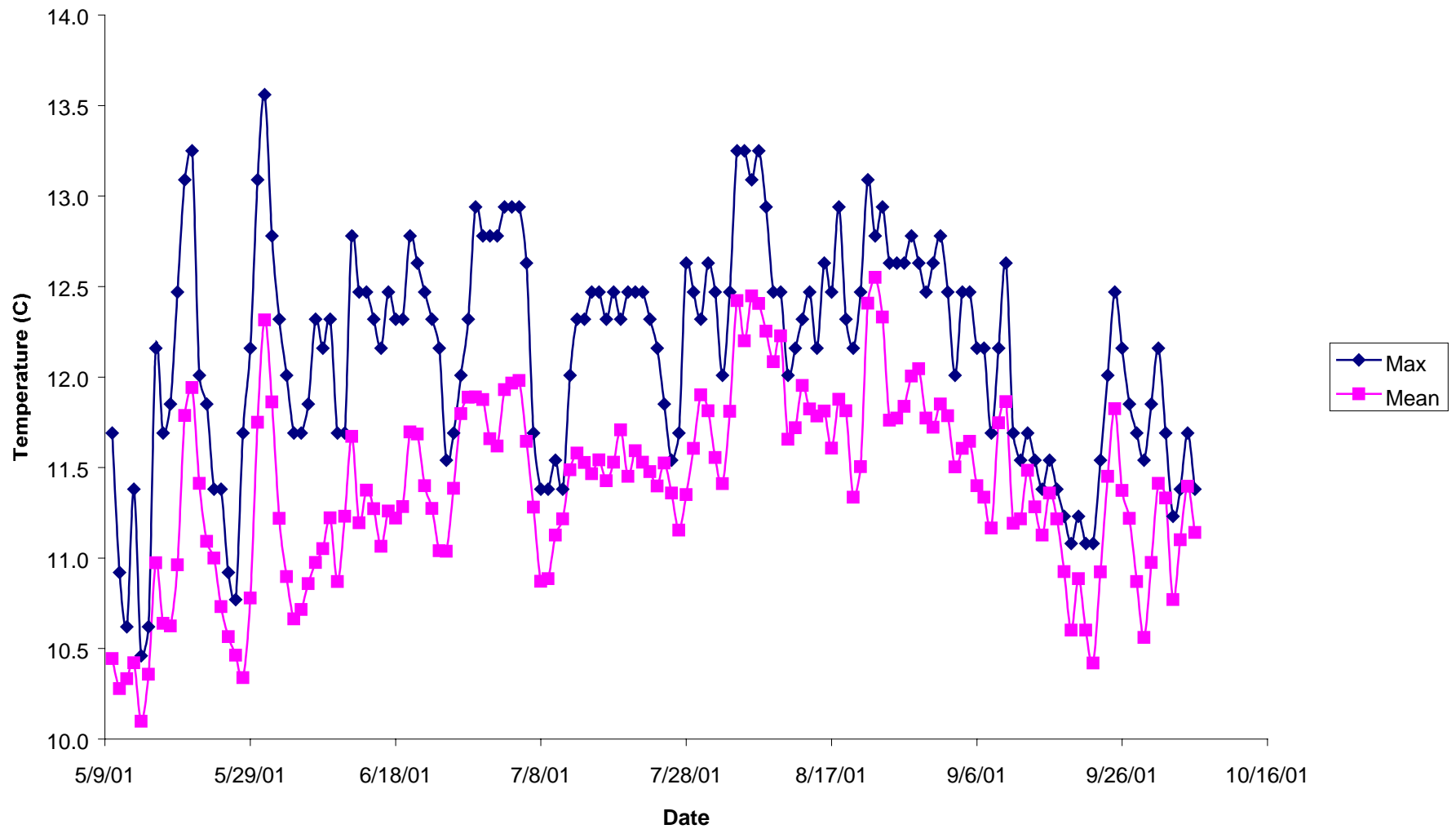


Figure 16. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Howard Creek (Site 47-6), Mendocino County, California.

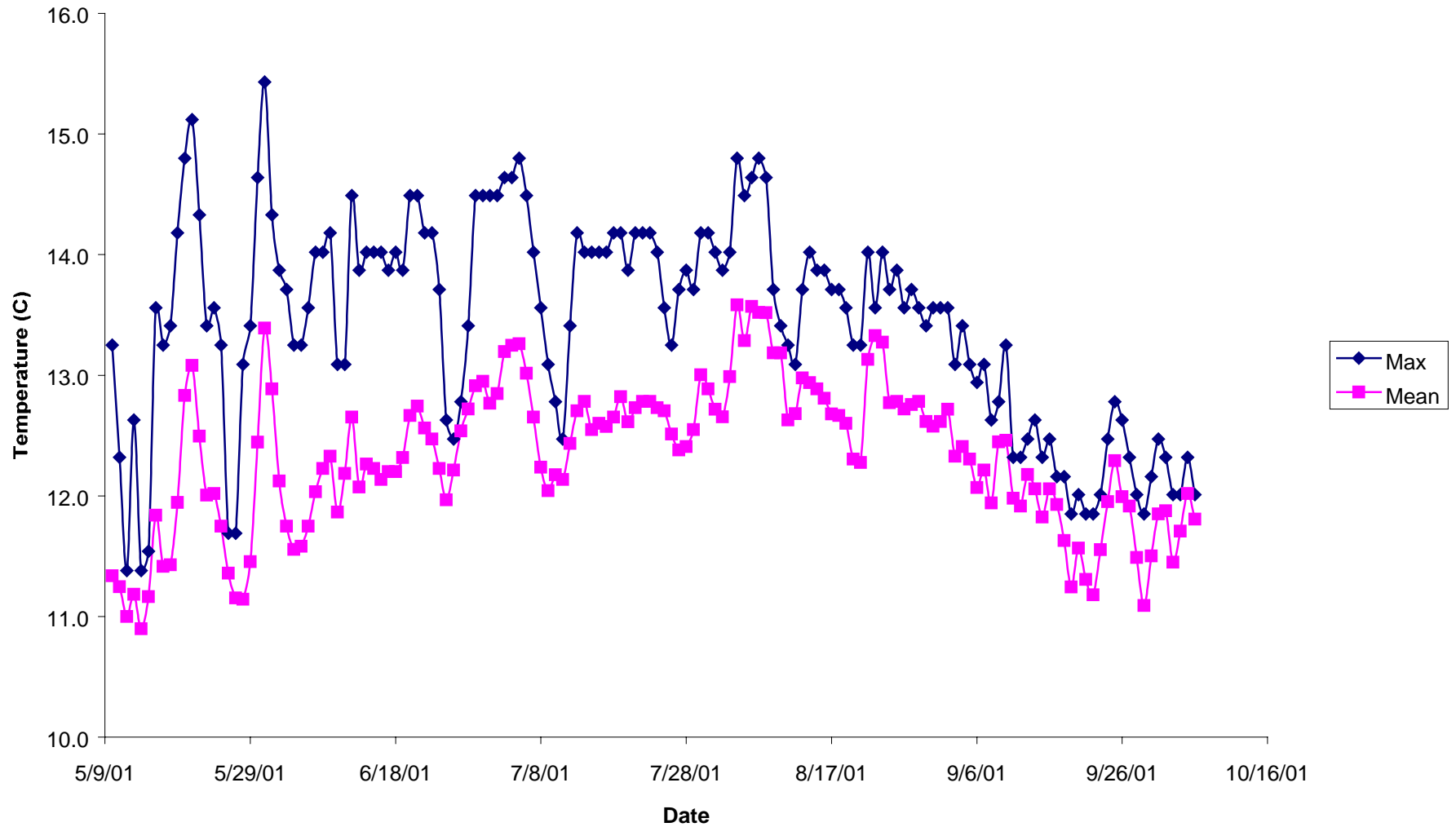


Figure 17. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Little Juan Creek (Site 47-20), Mendocino County, California.

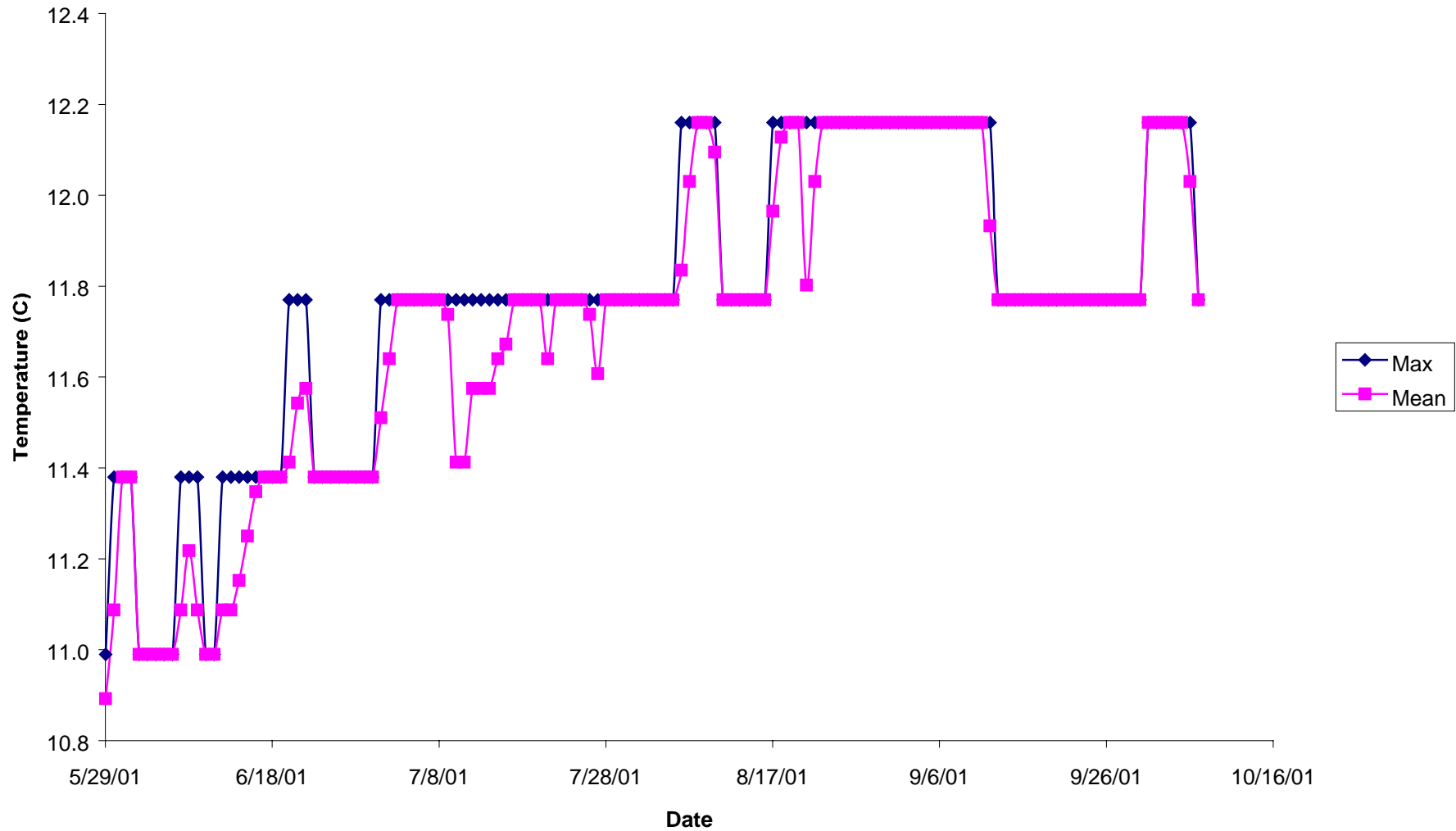


Figure 18. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Hardy Creek (Site 47-21), Mendocino County, California.

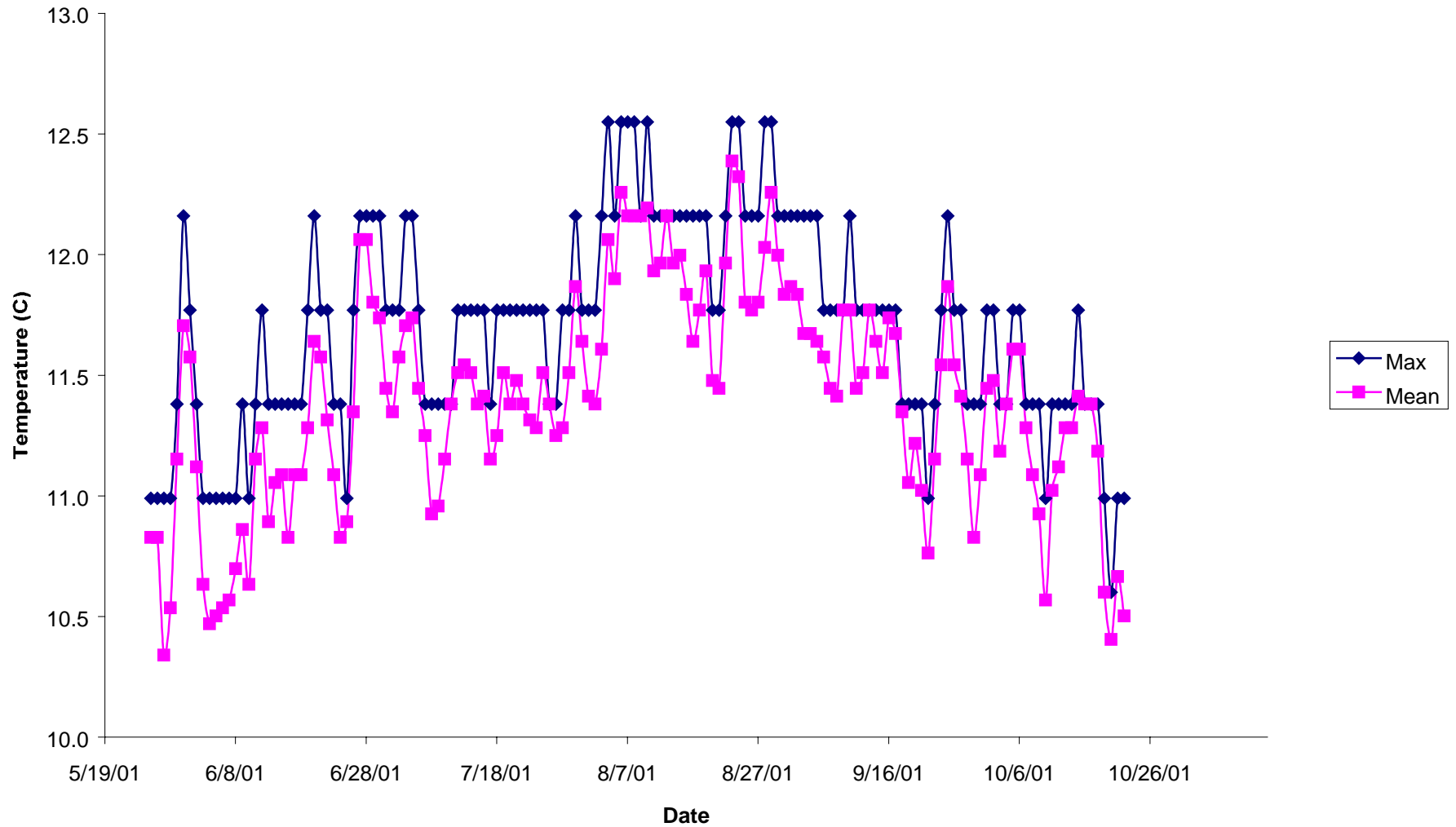


Figure 19. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Fork Hardy Creek (Site 47-22), Mendocino County, California.

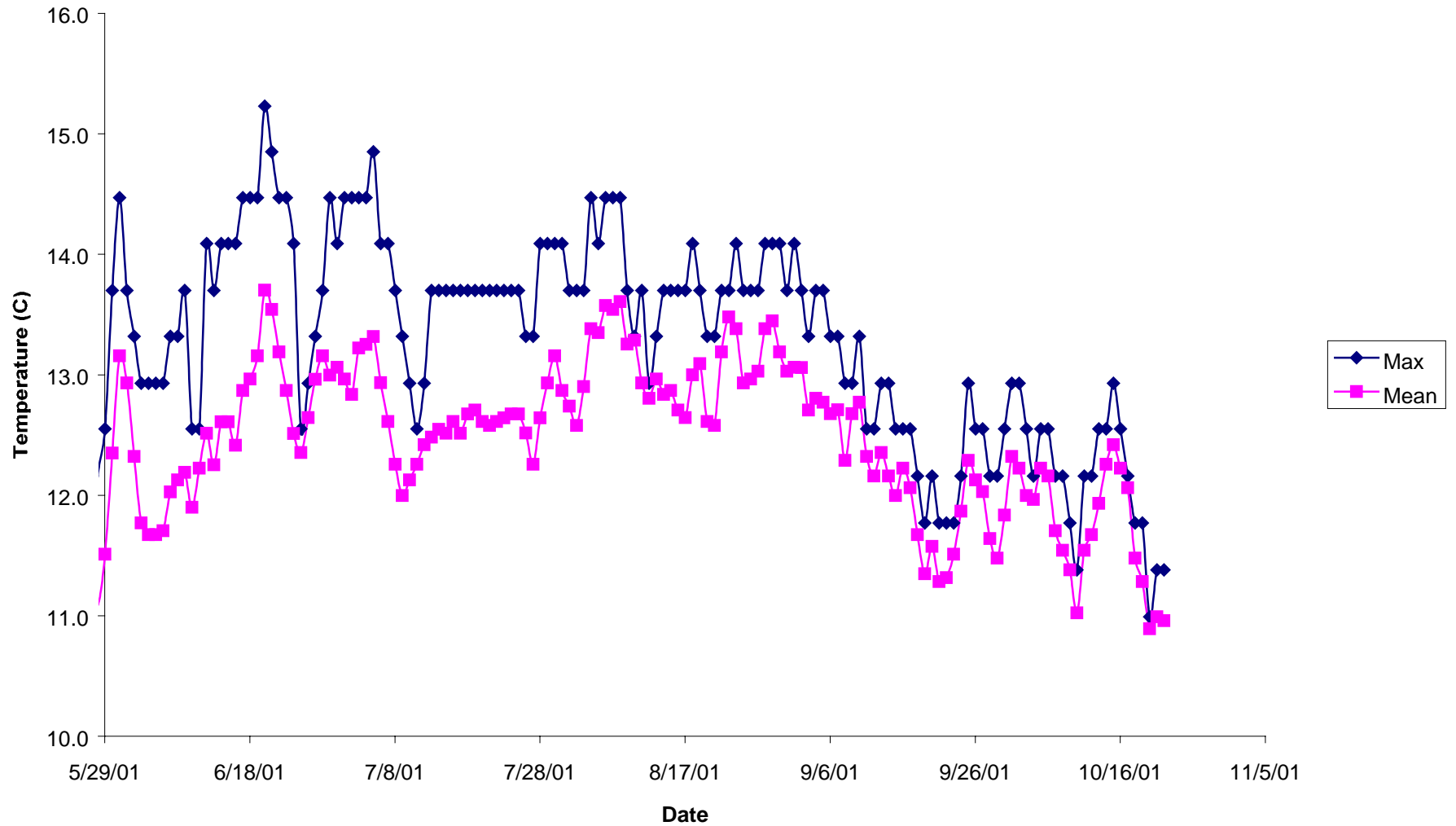


Figure 20. Mean and Maximum Daily Stream Temperature During Summer 2001 at Tributary to Rockport Creek (Site 47-23), Mendocino County, California.

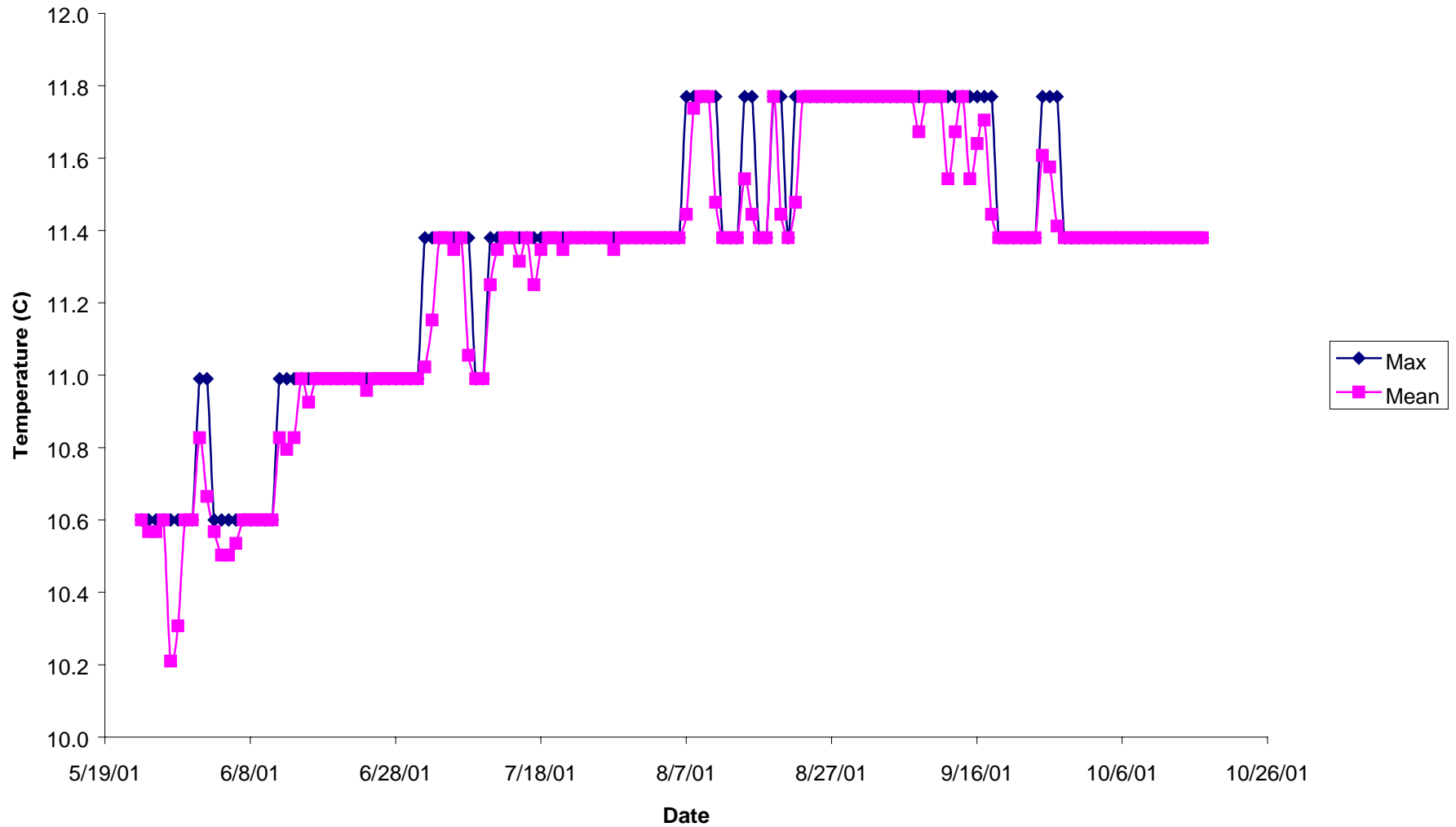


Figure 21. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Kimball Gulch (Site 47-24), Mendocino County, California.

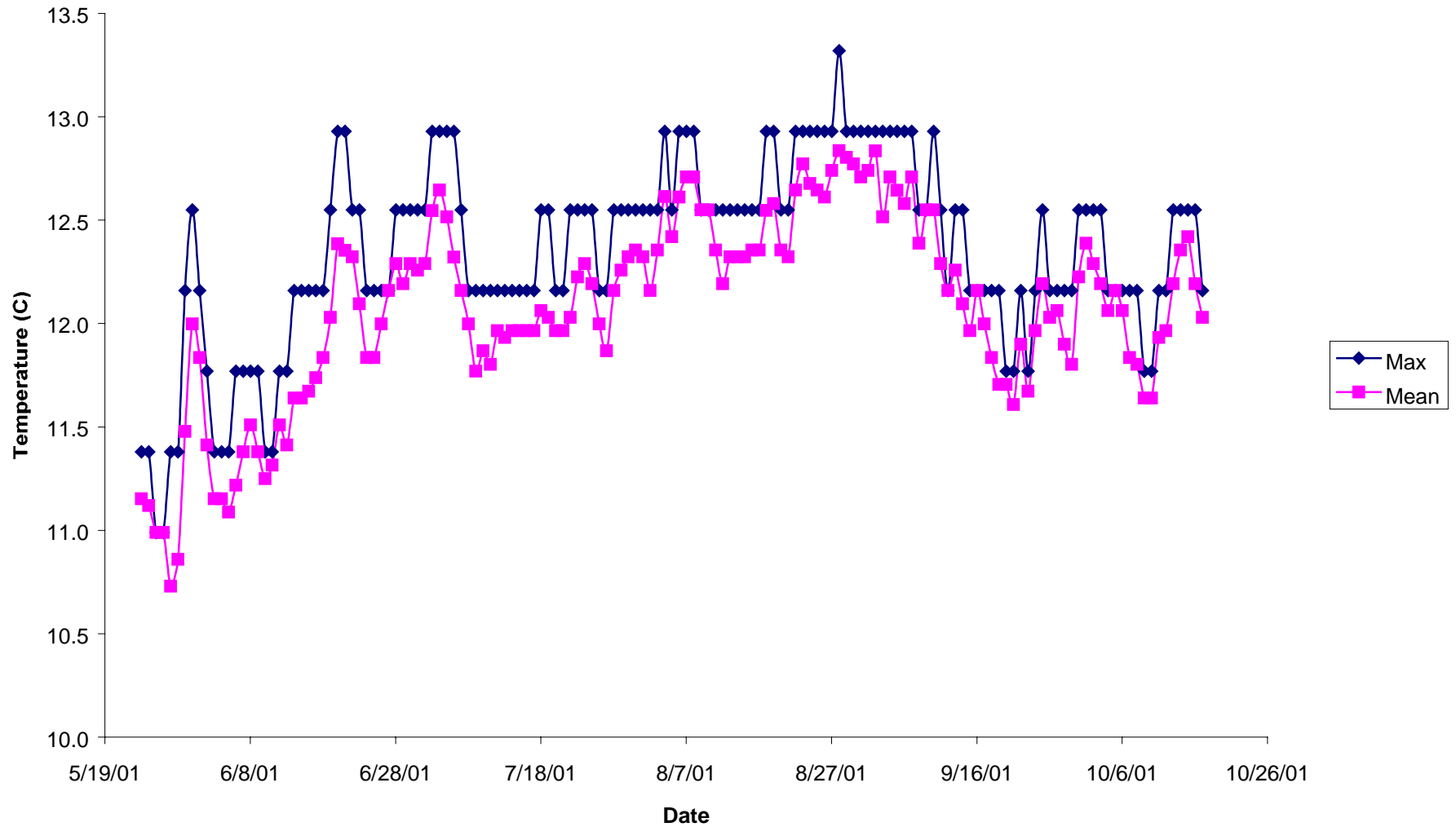


Figure 22. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Slaughterhouse Gulch (Site 47-25), Mendocino County, California.

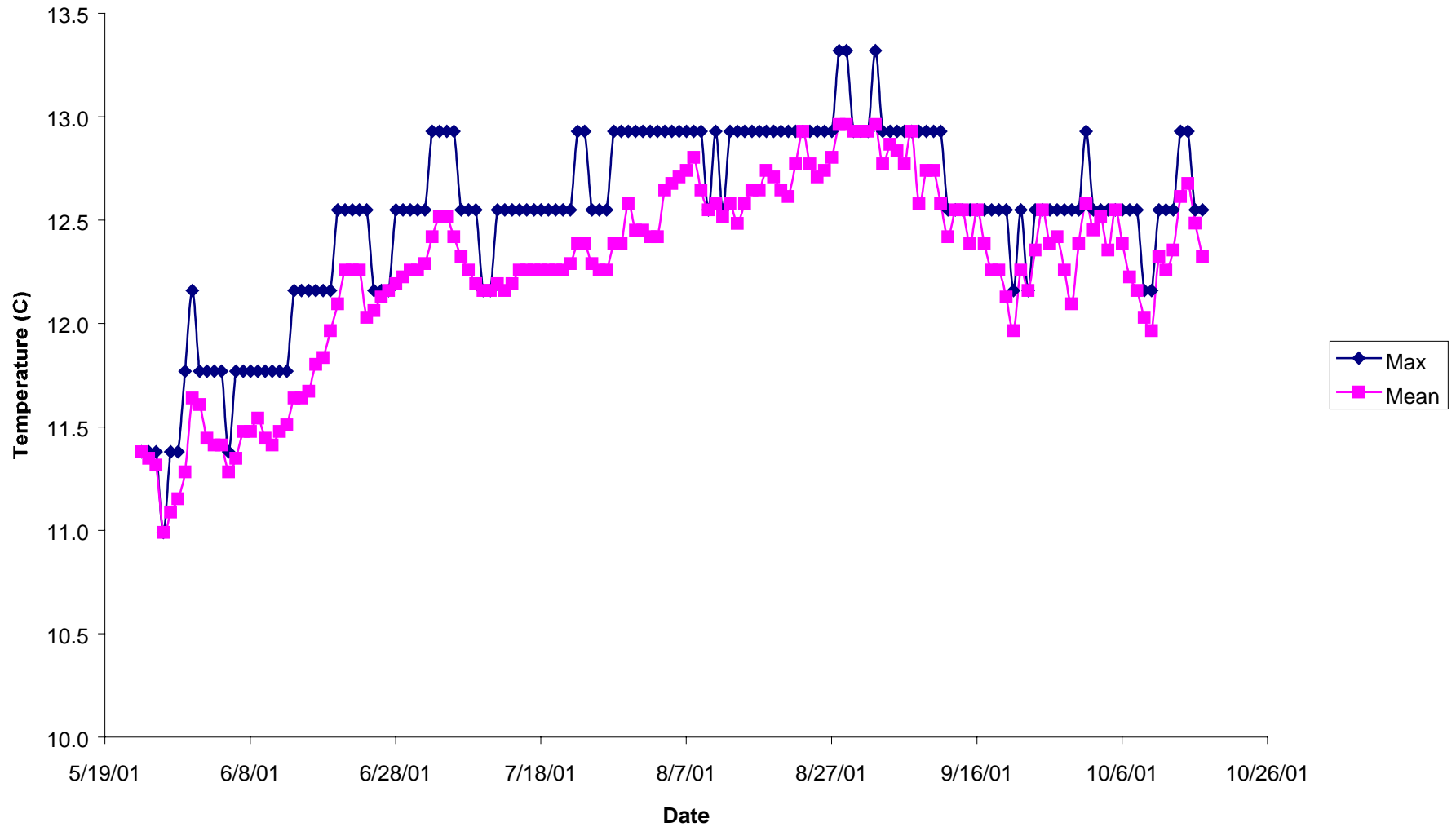


Figure 23. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Middle Fork Cottoneneva Creek (Site 47-26), Mendocino County, California.

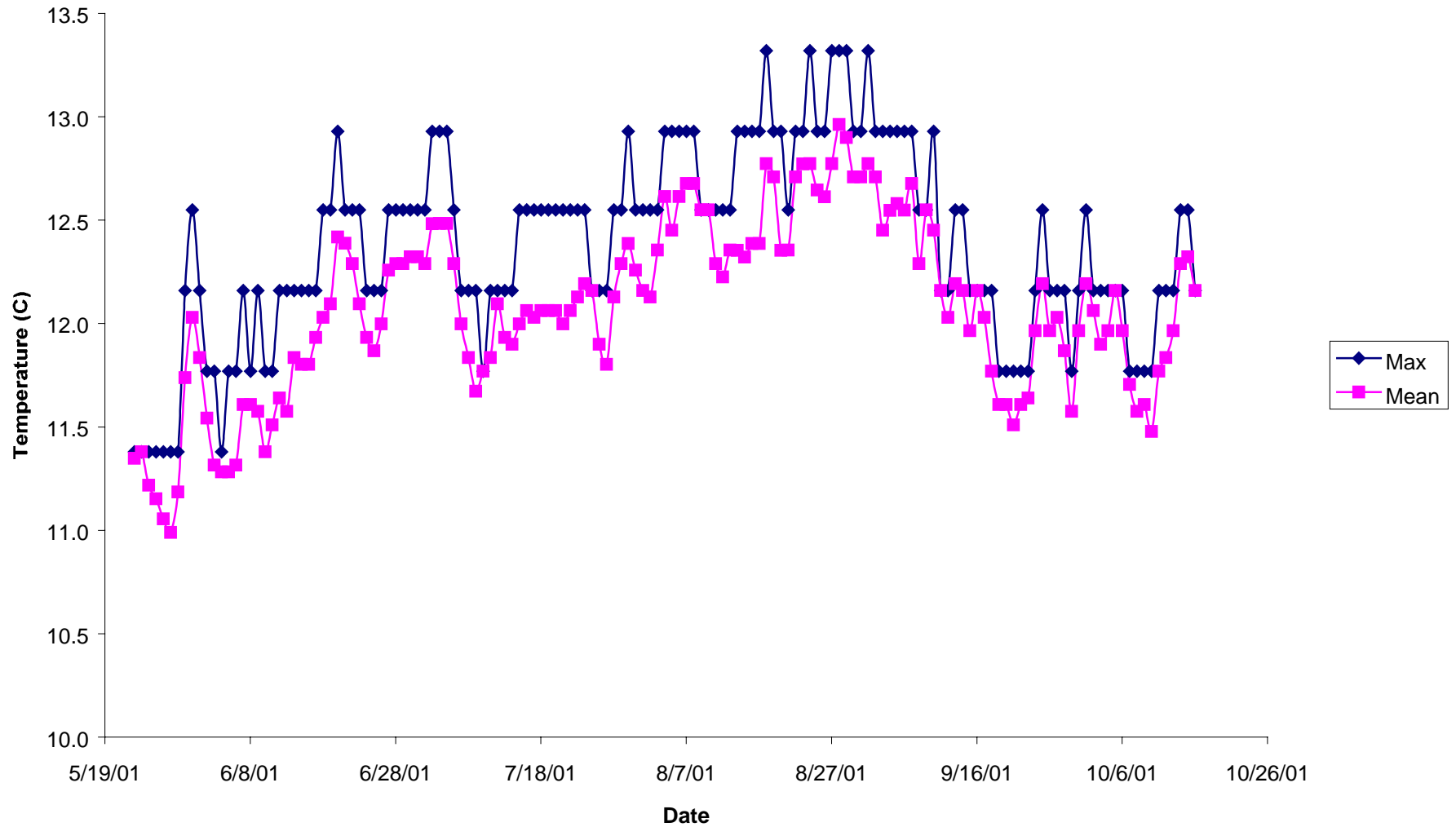


Figure 24. Mean and Maximum Daily Stream Temperature During Summer 2001 at Rock Creek (Site 47-27), Mendocino County, California.

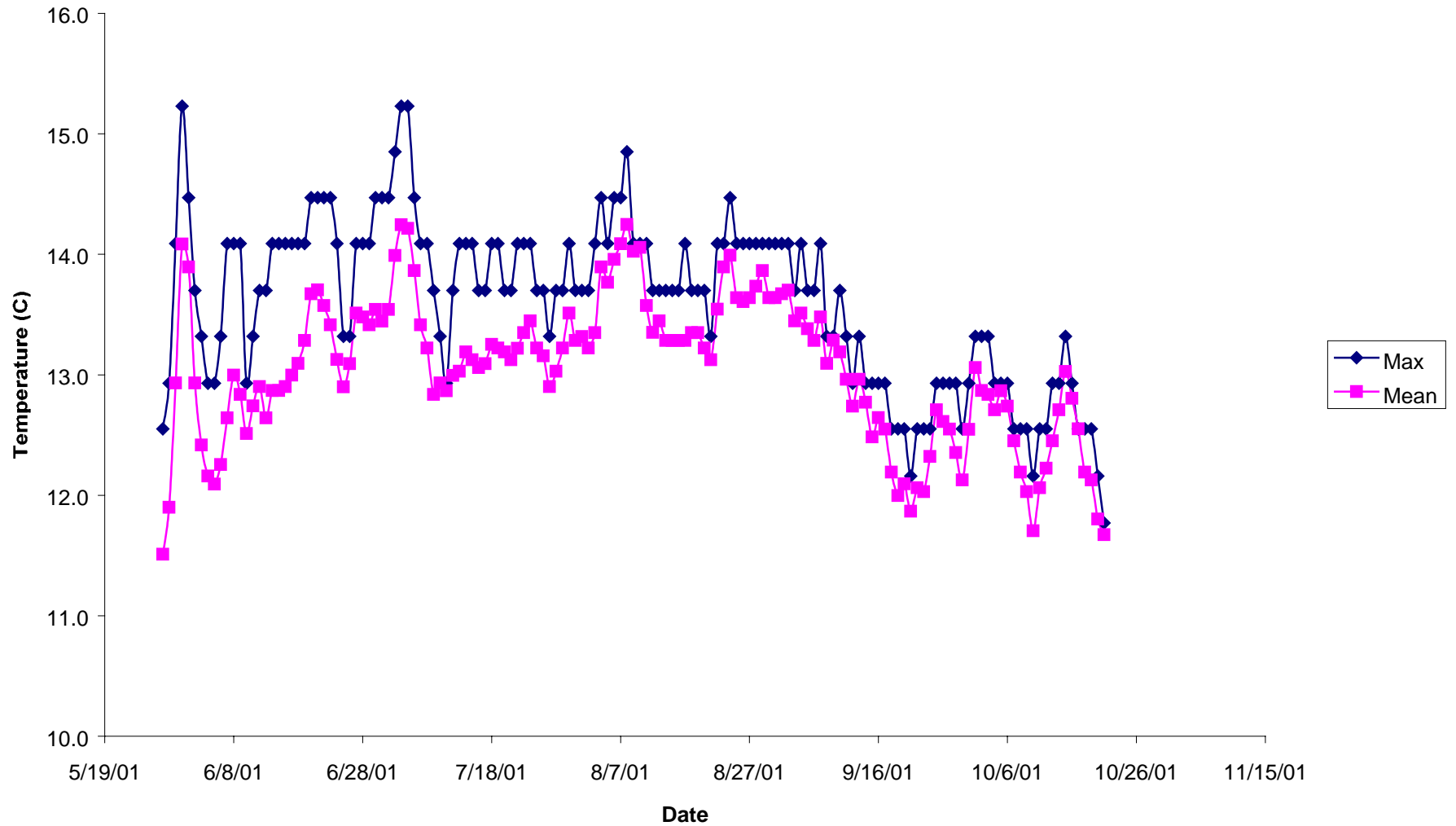


Figure 25. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Howard Creek (Site 47-28), Mendocino County, California.

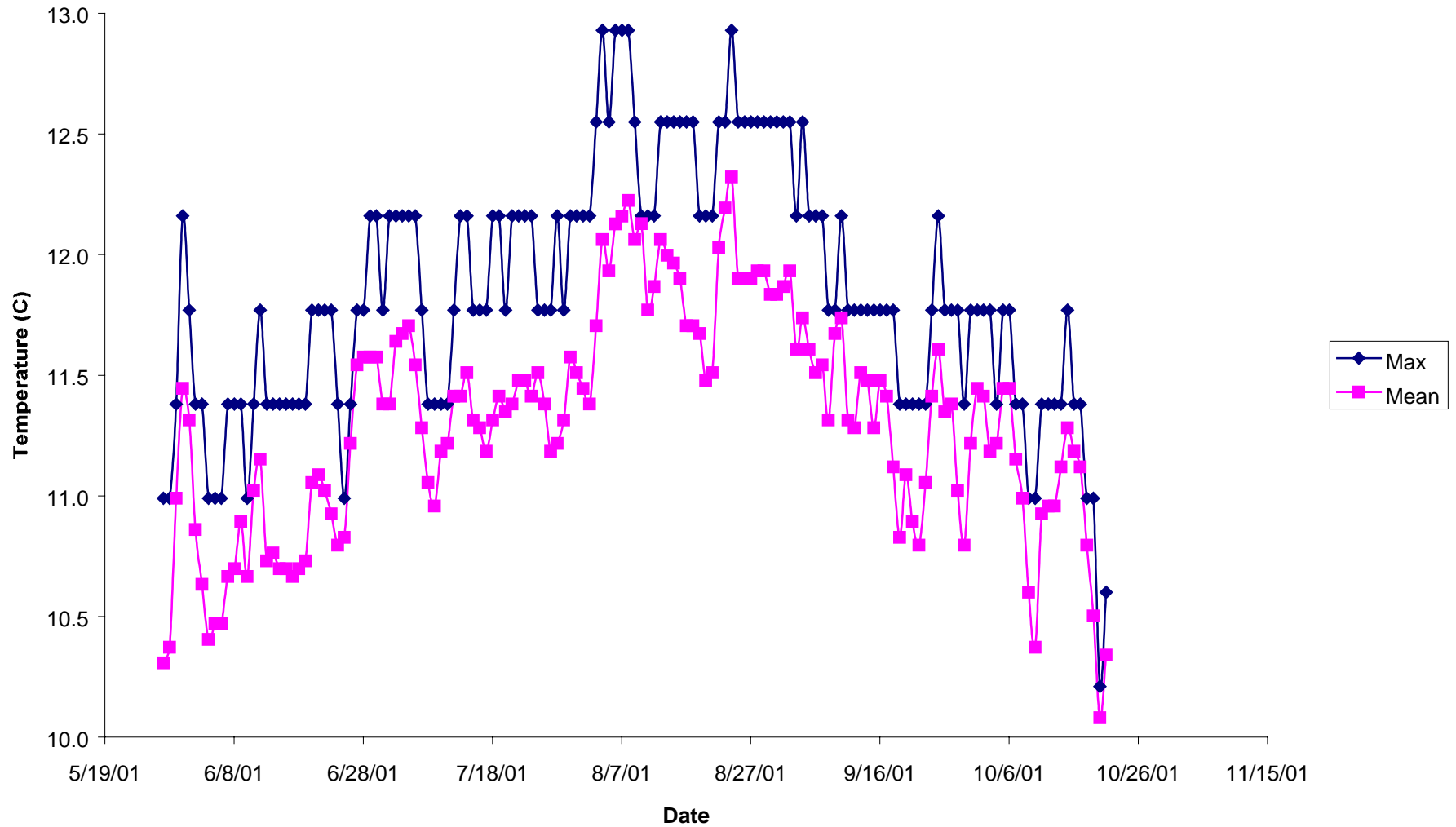


Figure 26. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Little Howard Creek (Site 47-29), Mendocino County, California.

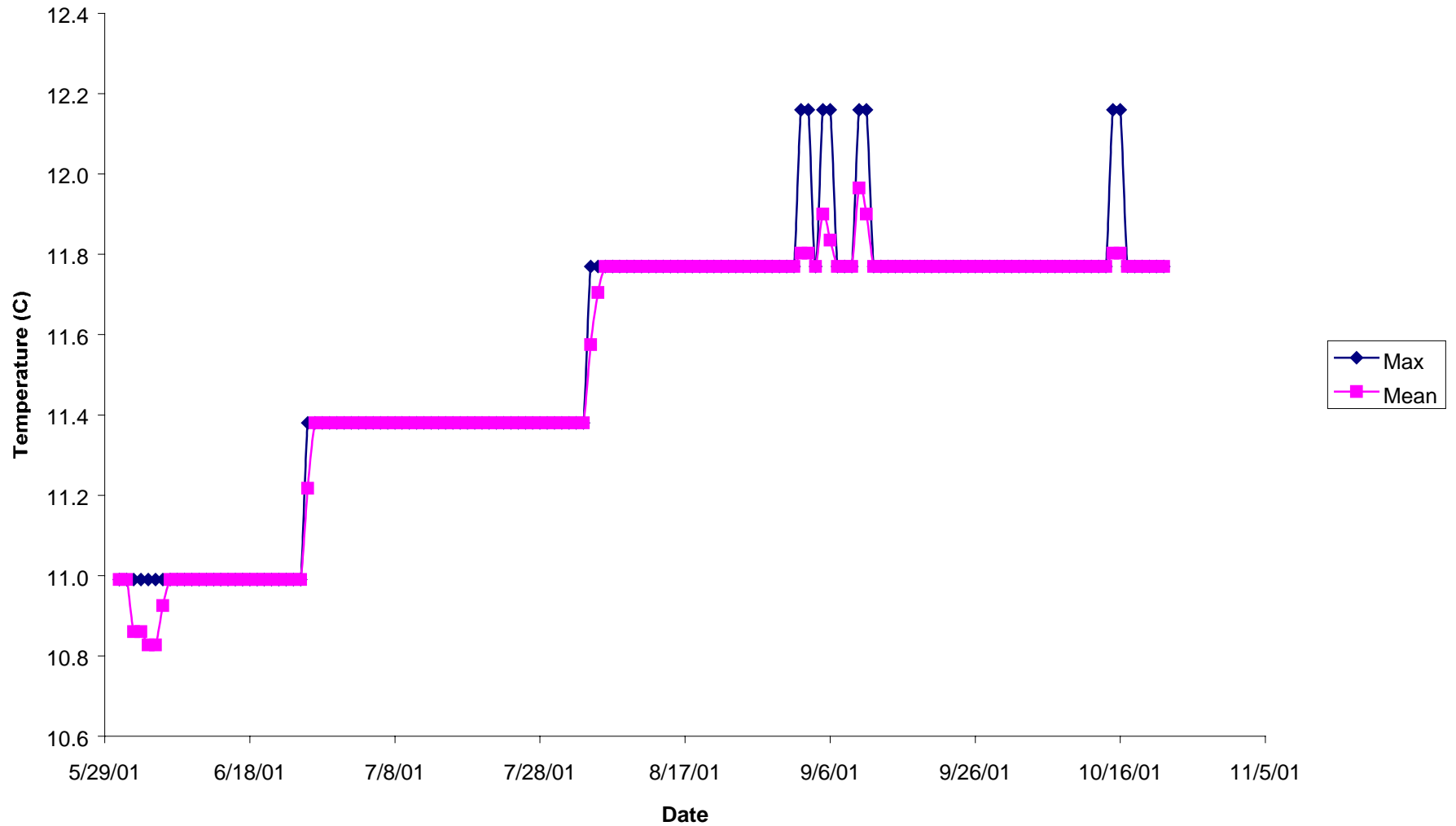
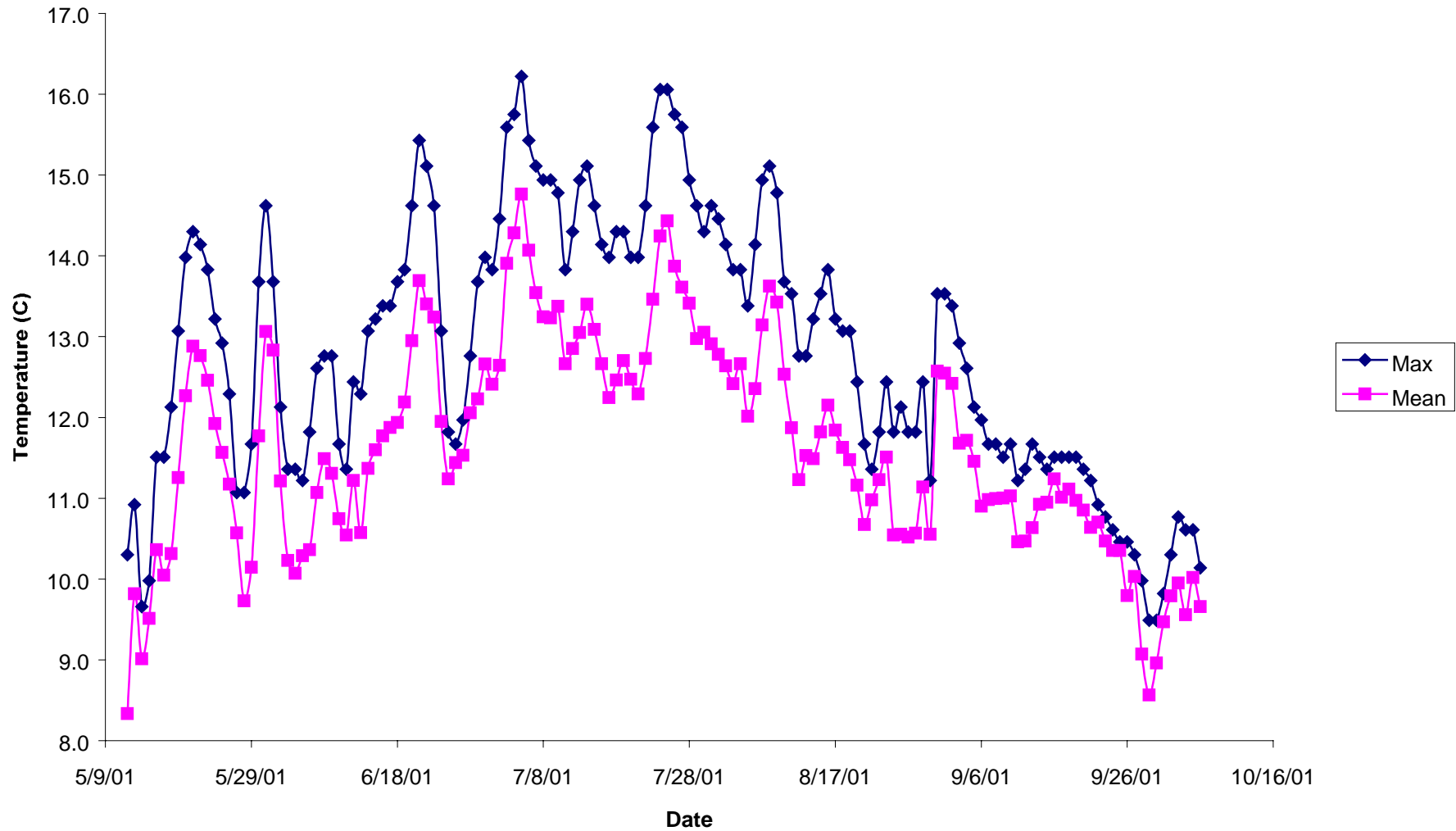


Figure 27. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Jack Of Hearts Creek (Site 55-1), Mendocino County, California.



Noyo River Management Area

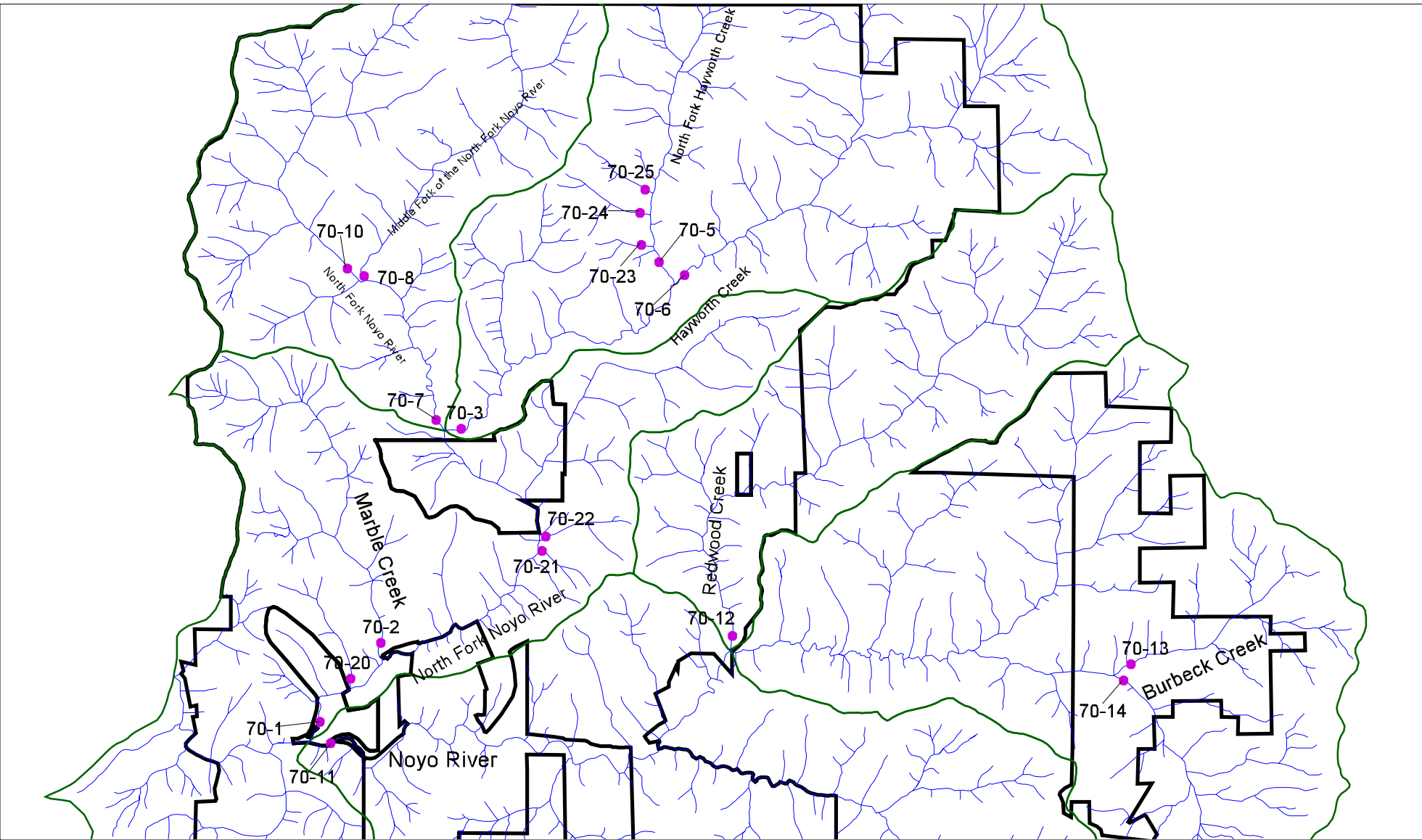
Table 3. Maximum, MWAT, and MWMT temperatures for sites in the Noyo Area (1991-2000).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
North Fork Noyo River	70-1	1992	21.0	18.5	20.3
North Fork Noyo River	70-1	1993	20.0	17.8	19.2
North Fork Noyo River	70-1	1994	19.5	17.1	19.1
North Fork Noyo River	70-1	1995	20.0	17.7	19.1
North Fork Noyo River	70-1	1996	20.6	18.0	19.5
North Fork Noyo River	70-1	1999	20.2	17.3	18.9
North Fork Noyo River	70-1	2000	20.1	17.3	19.0
North Fork Noyo River	70-1	2001	20.6	17.5	19.4
MarbleCreek	70-2	1994	16.7	15.0	16.2
MarbleCreek	70-2	1995	17.2	15.7	16.8
MarbleCreek	70-2	1996	18.0	15.6	17.1
MarbleCreek	70-2	1999	15.3	13.2	14.2
MarbleCreek	70-2	2000	17.5	15.3	16.5
MarbleCreek	70-2	2001	17.3	15.3	16.2
Hayworth Creek	70-3	1991	22.5	19.1	21.0
Hayworth Creek	70-3	1992	22.0	19.8	21.1
Hayworth Creek	70-3	1993	21.5	18.9	20.6
Hayworth Creek	70-3	1994	21.0	18.3	20.3
Hayworth Creek	70-3	1995	20.5	18.1	19.6
Hayworth Creek	70-3	1996	20.7	18.2	19.7
Hayworth Creek	70-3	1999	19.4	16.8	18.3
Hayworth Creek	70-3	2000	20.7	17.8	19.4
Hayworth Creek	70-3	2001	19.4	17.2	18.4
North Fork Hayworth Creek	70-5	1994	20.6	17.5	20.1
North Fork Hayworth Creek	70-5	1995	20.9	17.6	20.1
North Fork Hayworth Creek	70-5	1996	20.5	17.9	19.9
North Fork Hayworth Creek	70-5	1999	20.2	16.8	19.1
North Fork Hayworth Creek	70-5	2000	19.4	17.2	18.6
North Fork Hayworth Creek	70-5	2001	19.4	17.2	18.6
Hayworth Creek	70-6	1996	21.5	18.9	20.7
Hayworth Creek	70-6	1997	20.4	18.2	19.7
Hayworth Creek	70-6	1999	19.8	17.1	18.6
Hayworth Creek	70-6	2000	19.4	17.5	18.7
Hayworth Creek	70-6	2001	19.8	17.4	18.7
North Fork Noyo River	70-7	1991	21.0	17.9	19.6

North Fork Noyo River	70-7	1992	24.5	18.0	22.9
North Fork Noyo River	70-7	1993	19.0	17.3	18.4
North Fork Noyo River	70-7	1994	19.5	18.4	19.3
North Fork Noyo River	70-7	1996	19.7	17.4	18.7
North Fork Noyo River	70-7	1999	19.0	16.5	17.5
North Fork Noyo River	70-7	2000	18.8	16.8	18.0
North Fork Noyo River	70-7	2001	18.7	16.3	17.7
Middle Fork NF Noyo River	70-8	1994	17.8	15.6	17.3
Middle Fork NF Noyo River	70-8	1995	18.1	16.3	17.6
Middle Fork NF Noyo River	70-8	1996	19.0	16.7	18.3
Middle Fork NF Noyo River	70-8	1999	16.1	13.9	15.5
Middle Fork NF Noyo River	70-8	2000	18.0	15.9	17.1
Middle Fork NF Noyo River	70-8	2001	18.0	15.9	17.1
North Fork Noyo River	70-10	1995	17.9	16.1	17.6
North Fork Noyo River	70-10	1999	17.5	15.7	16.6
North Fork Noyo River	70-10	2000	18.4	16.0	17.5
North Fork Noyo River	70-10	2001	17.5	15.2	16.7
Noyo River	70-11	1992	20.0	18.3	19.8
Noyo River	70-11	1993	20.0	17.9	19.1
Noyo River	70-11	1994	19.5	17.1	19.0
Noyo River	70-11	1995	27.5	17.9	25.2
Noyo River	70-11	1996	20.6	18.1	19.6
Noyo River	70-11	1997	18.1	15.6	17.1
Noyo River	70-11	1999	20.8	17.9	19.5
Noyo River	70-11	2000	20.4	17.6	19.2
Noyo River	70-11	2001	20.6	17.9	19.5
Redwood Creek	70-12	1994	19.1	16.4	18.5
Redwood Creek	70-12	1995	19.6	17.4	19.1
Redwood Creek	70-12	1996	20.1	17.7	19.0
Redwood Creek	70-12	1999	18.8	16.6	17.6
Redwood Creek	70-12	2000	19.3	17.3	18.3
Redwood Creek	70-12	2001	17.8	15.8	16.9
Burbeck Creek	70-13	1996	20.1	17.5	19.3
Burbeck Creek	70-13	1997	19.3	16.6	18.4
Burbeck Creek	70-13	1999	19.0	16.5	17.9
Burbeck Creek	70-13	2001	19.0	16.2	18.1
Upper Noyo Mainstem	70-14	2000	19.6	17.2	18.6
Tributary to NF Noyo	70-20*	2001	22.1	19.7	21.5

Tributary to NF Noyo	70-21*	2001	15.2	14.0	14.9
Tributary to NF Noyo	70-22*	2001	14.1	13.3	13.8
Tributary to NF Hayworth Creek	70-23*	2001	14.1	13.5	13.7
Tributary to NF Hayworth Creek	70-24*	2001	14.5	13.8	14.0
Tributary to NF Hayworth Creek	70-25*	2001	14.1	13.5	13.8
*Class II Streams					

Map 3. Noyo River Stream Temperature Sites



- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property

Mendocino Redwood Company, LLC
1 0 1 Miles
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Figure 28. Mean and Maximum Daily Stream Temperature During Summer 2001 at North Fork Noyo River (Site 70-1), Mendocino County, California.

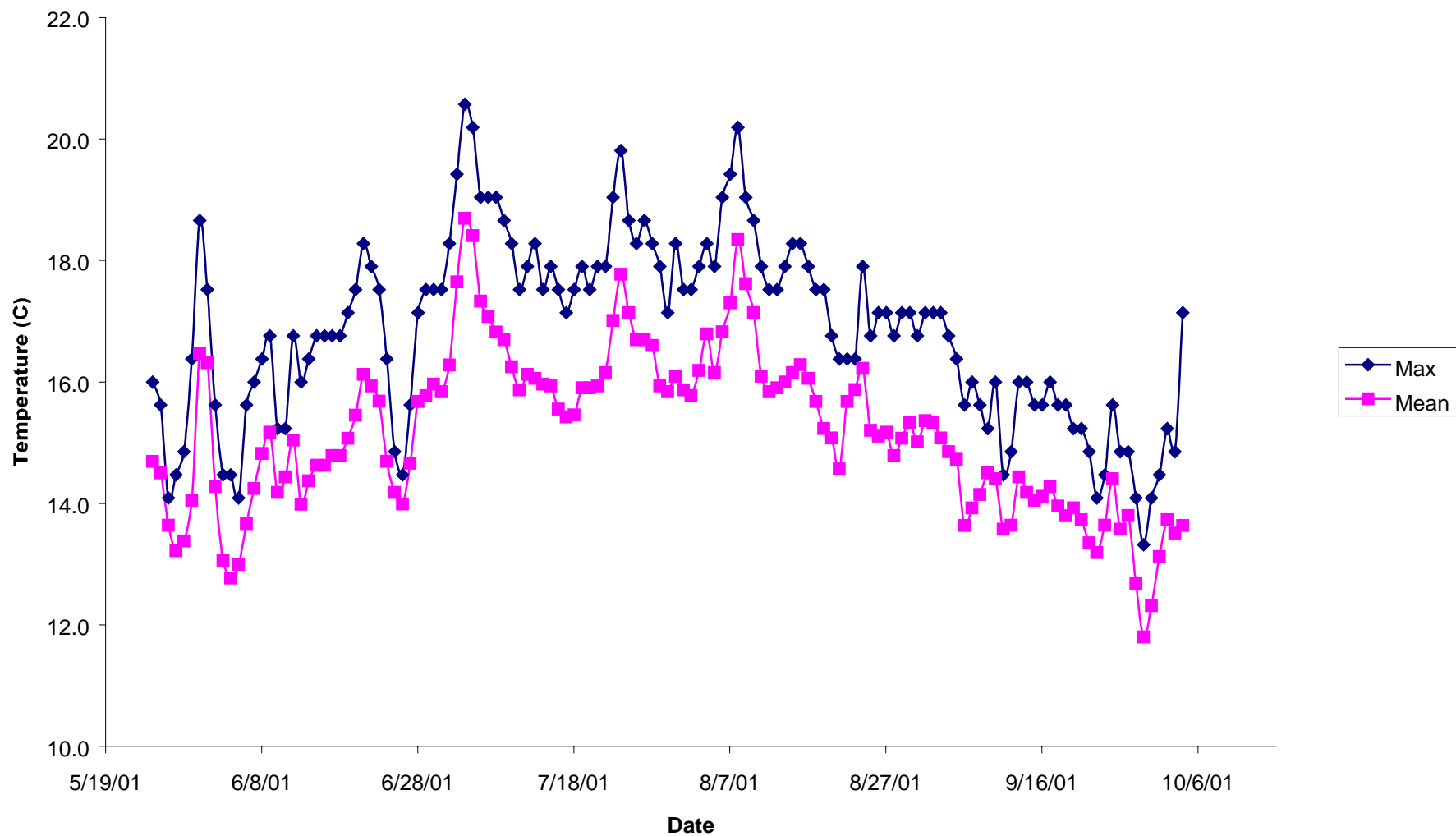


Figure 29. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Marble Creek (Site 70-2), Mendocino County, California.

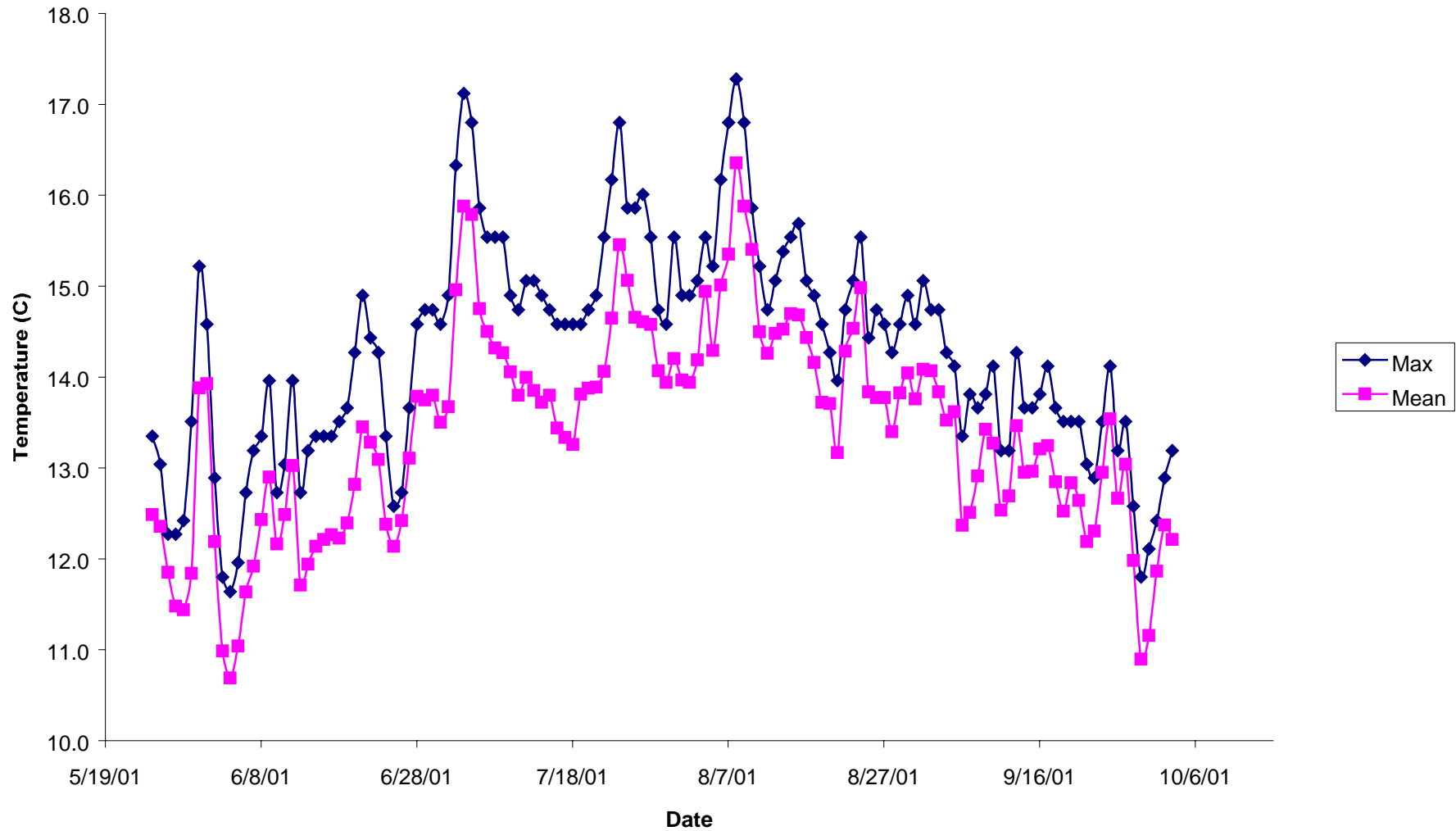


Figure 30. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hayworth Creek (Site 70-3), Mendocino County, California.

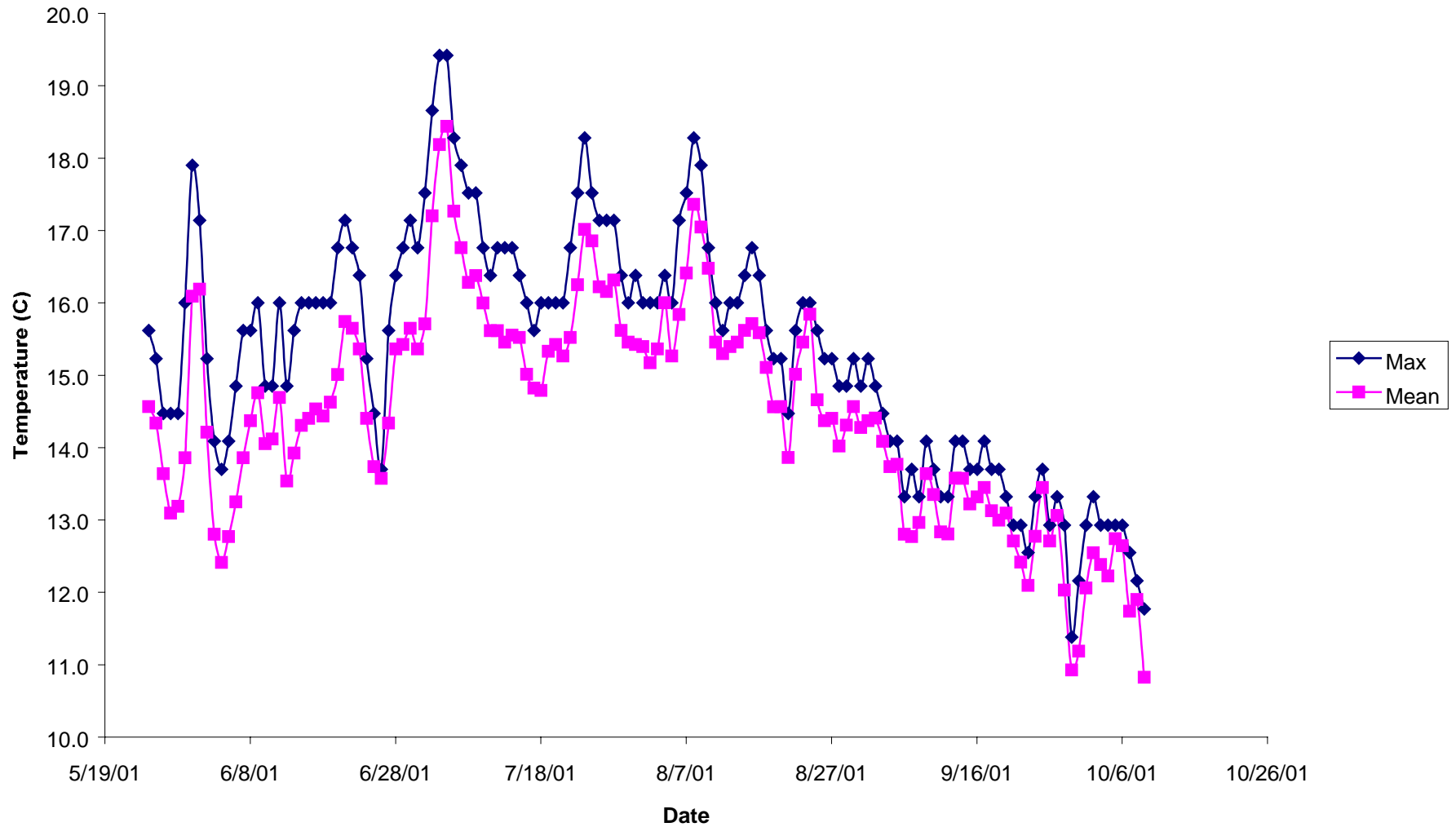


Figure 31. Mean and Maximum Daily Stream Temperature During Summer 2001 at North Fork Hayworth Creek (Site 70-5), Mendocino County, California.

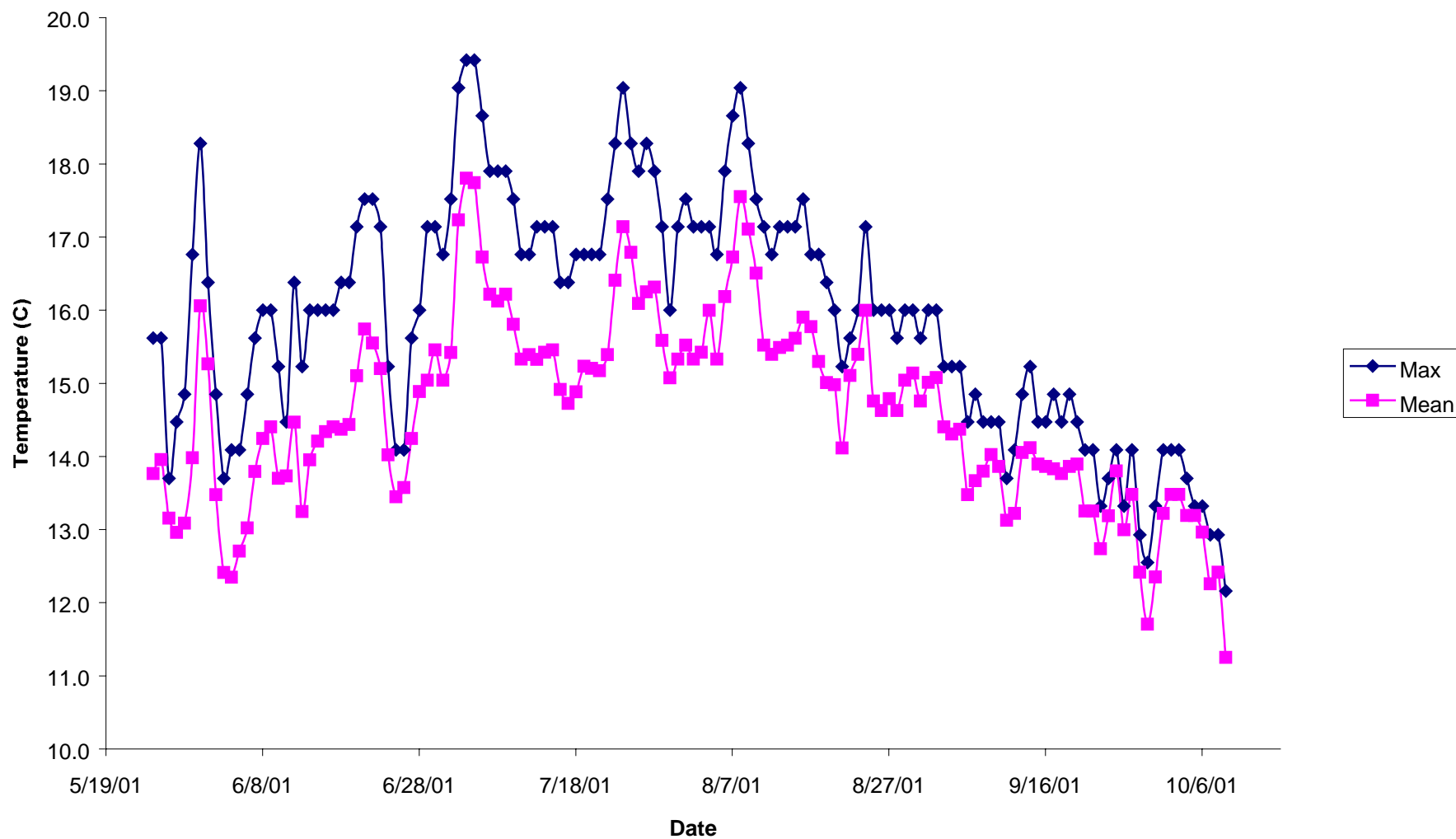


Figure 32. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hayworth Creek (Site 70-6), Mendocino County, California.

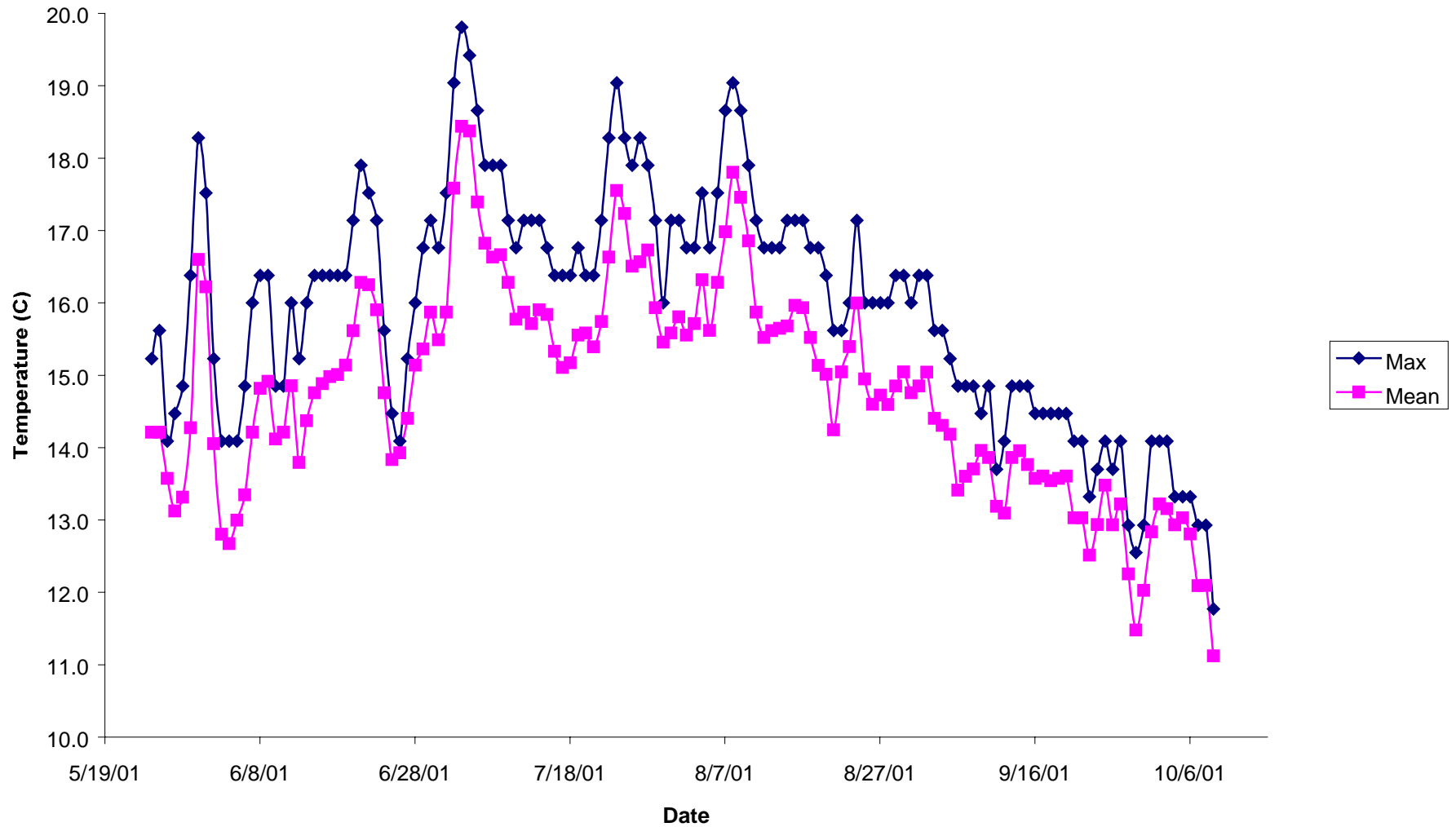


Figure 33. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Fork Noyo River (Site 70-7), Mendocino County, California.

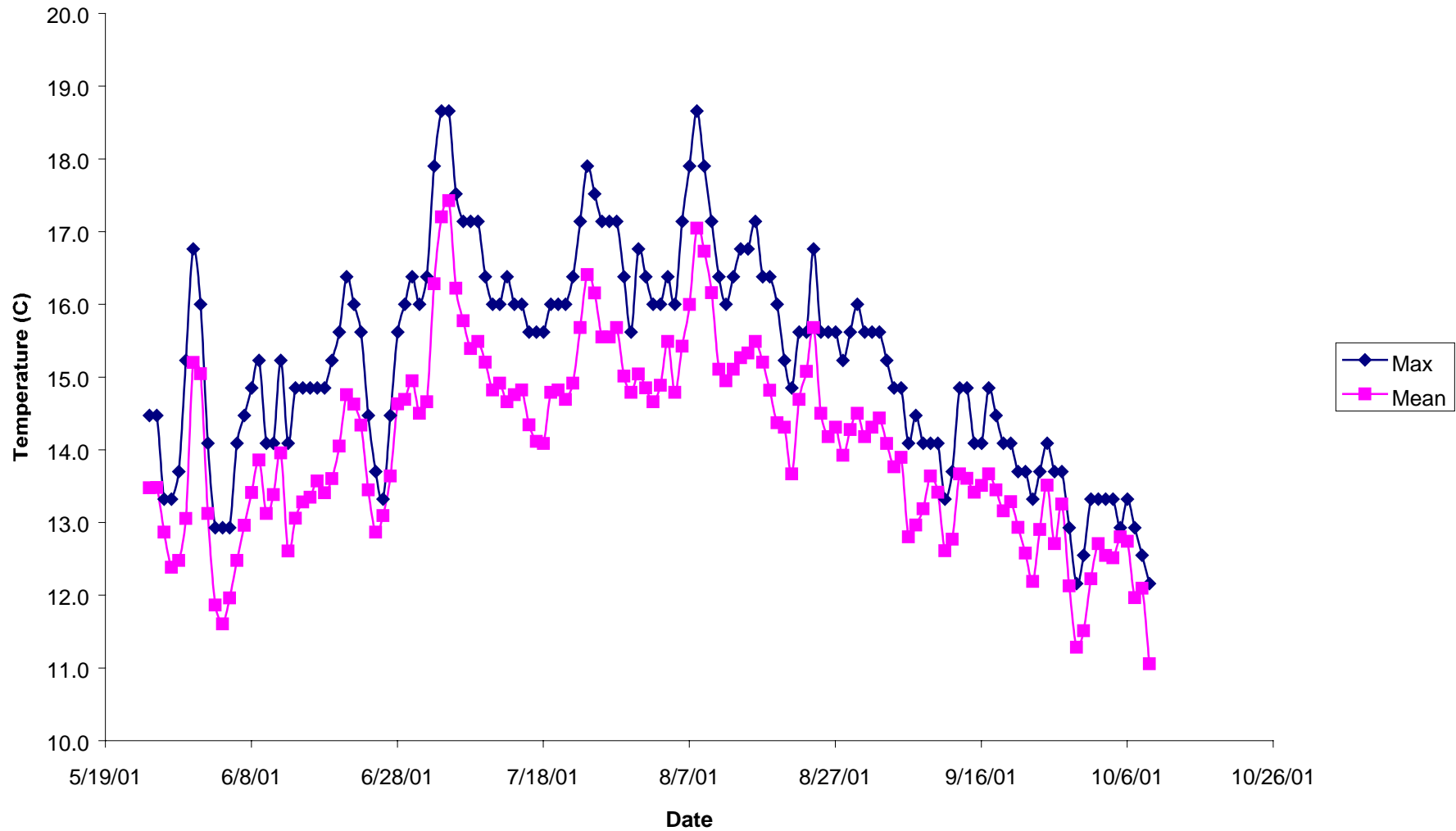


Figure 34. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Middle Fork North Fork Noyo River (Site 70-8), Mendocino County, California.

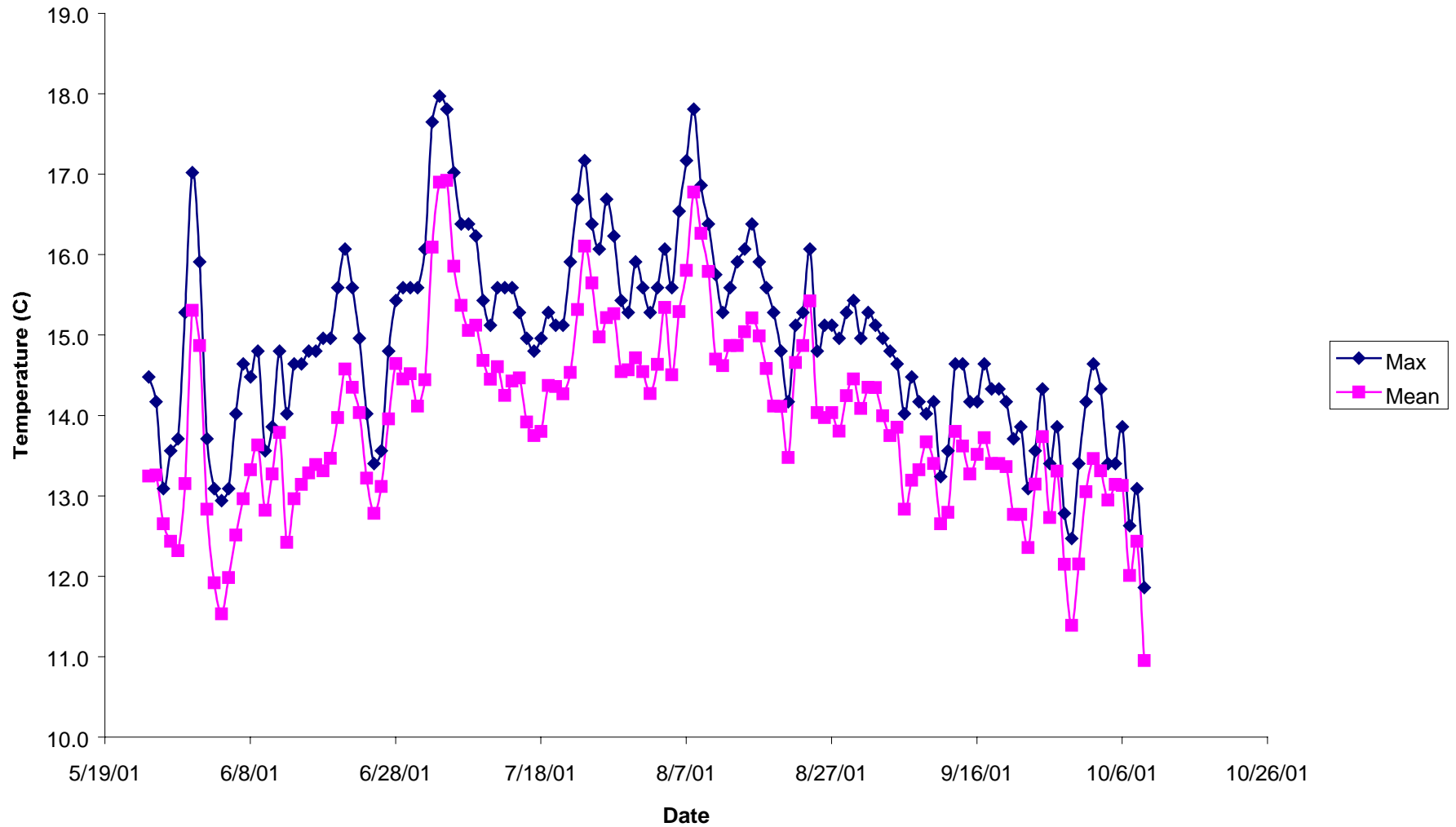


Figure 35. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Fork Noyo River (Site 70-10), Mendocino County, California.

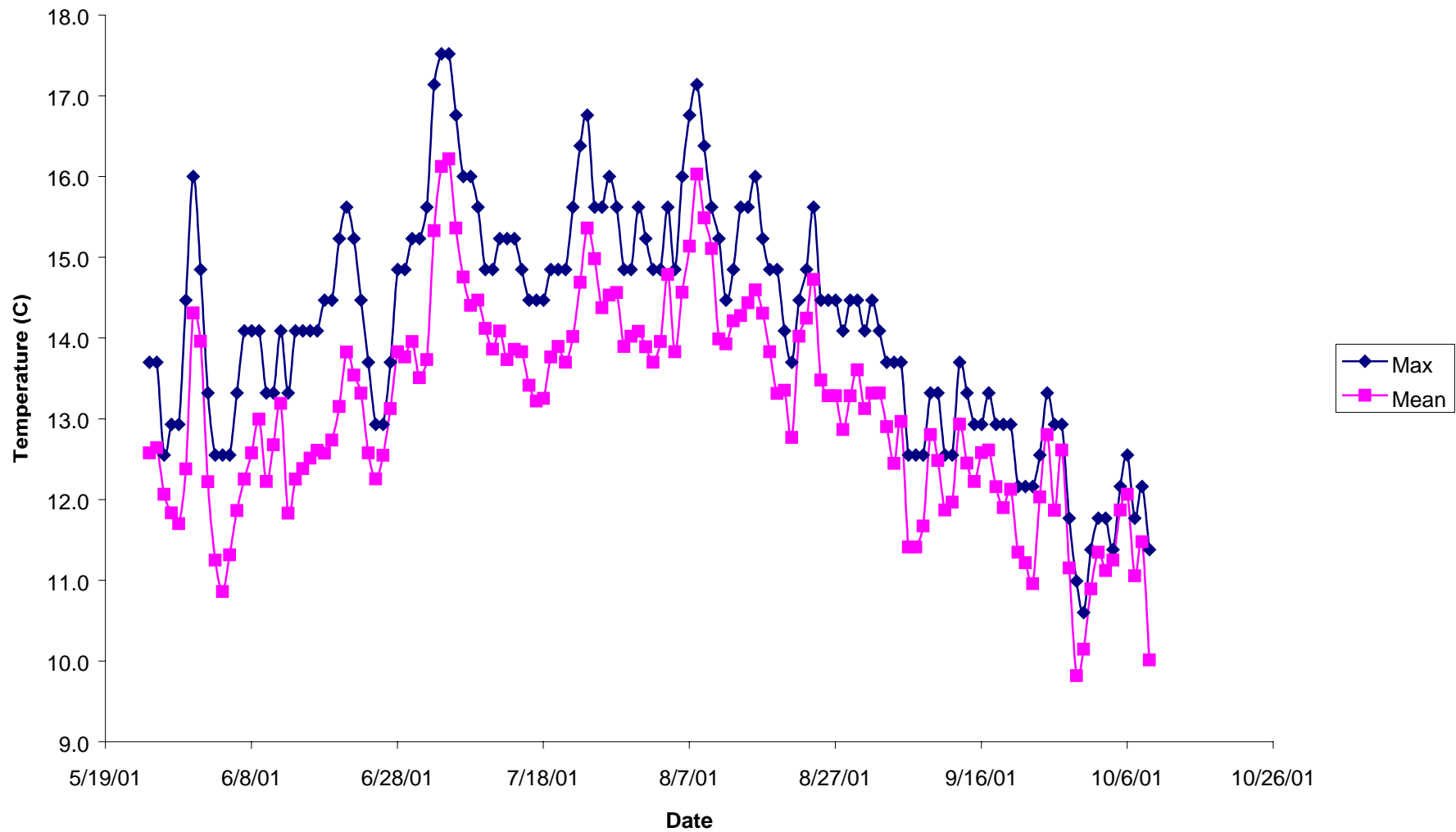


Figure 36. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Noyo River (Site 70-11), Mendocino County, California.

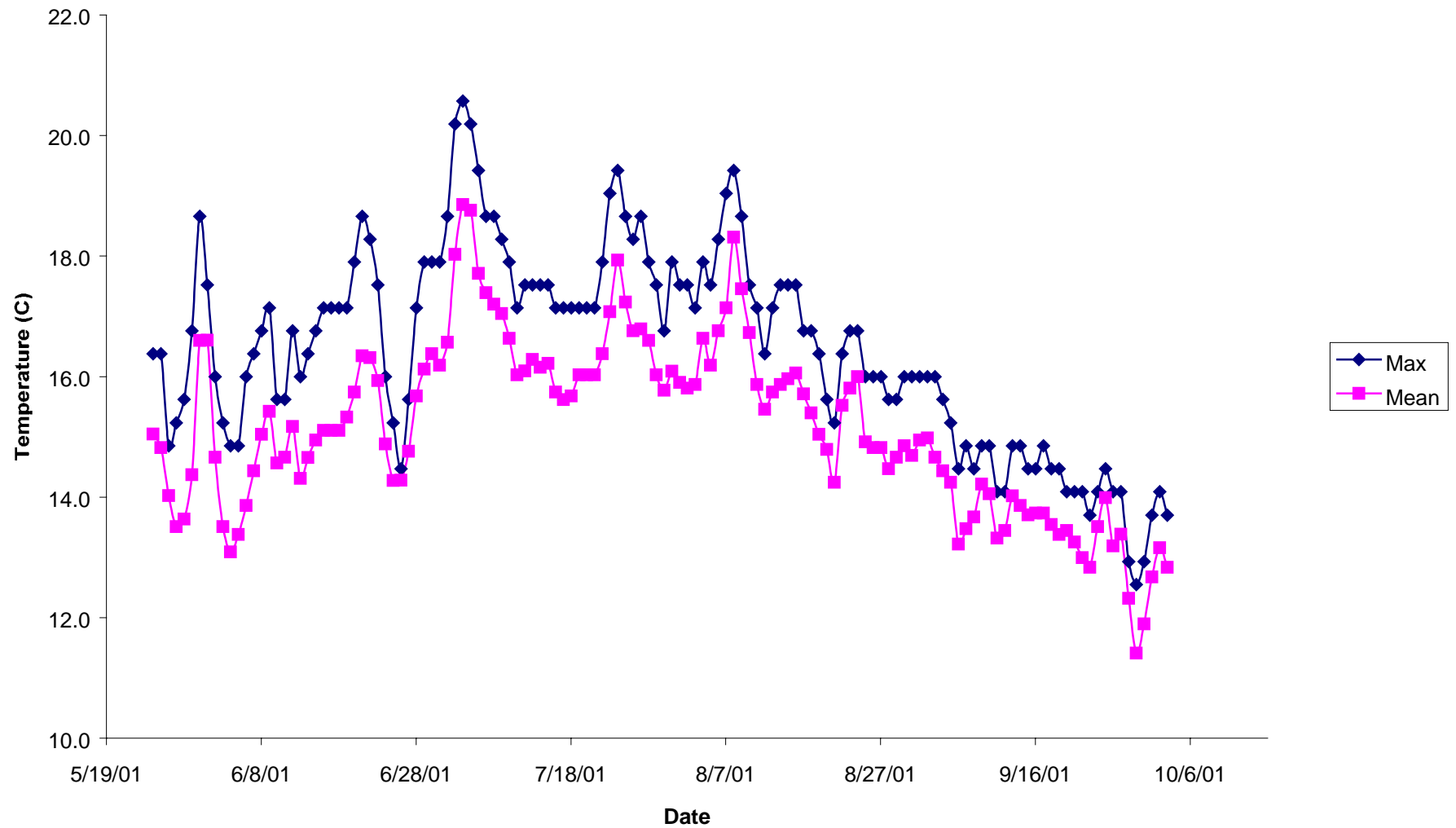


Figure 37. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Redwood Creek (Site 70-12), Mendocino County, California.

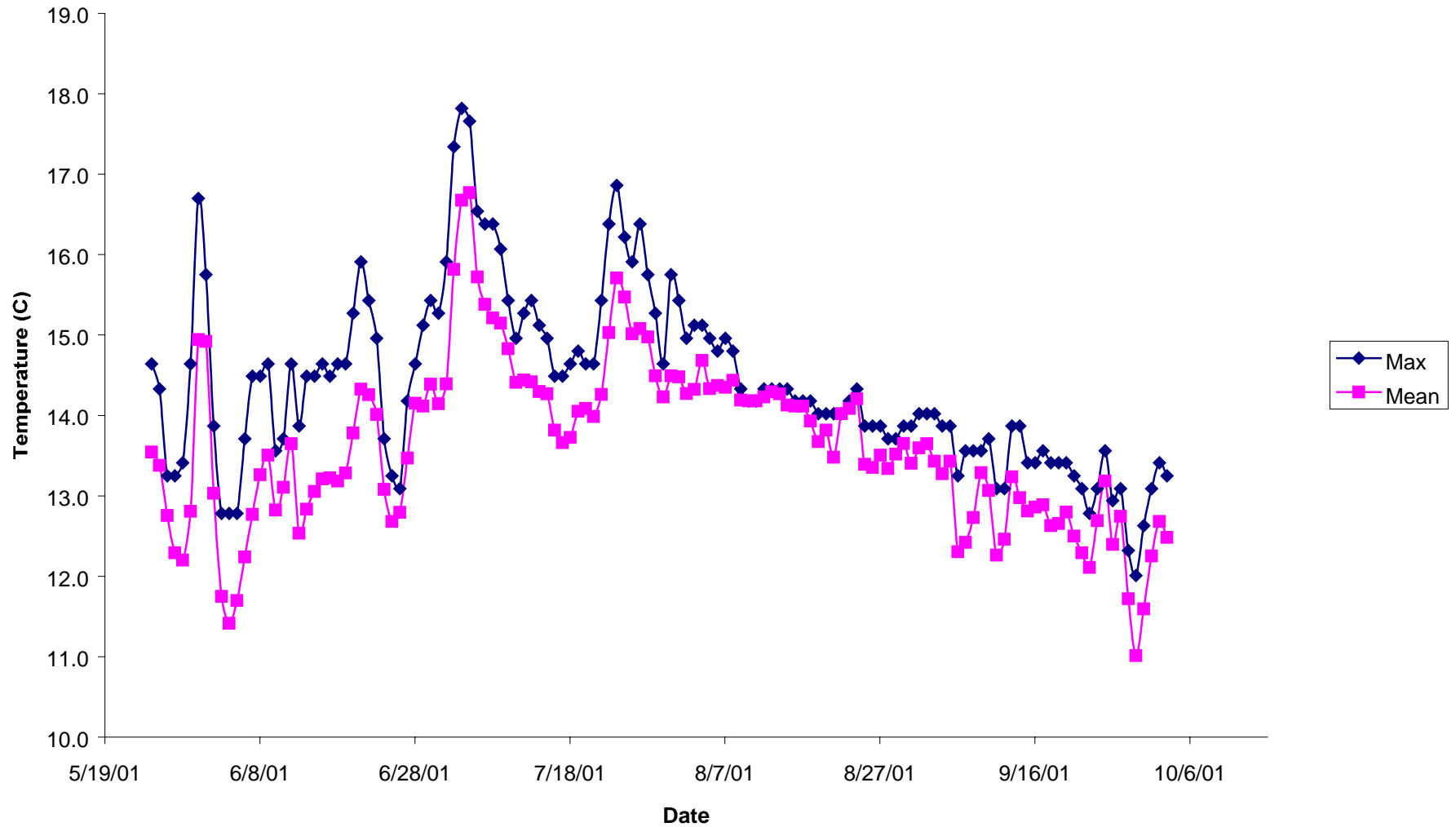


Figure 38. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Burbeck Creek (Site 70-13), Mendocino County, California.

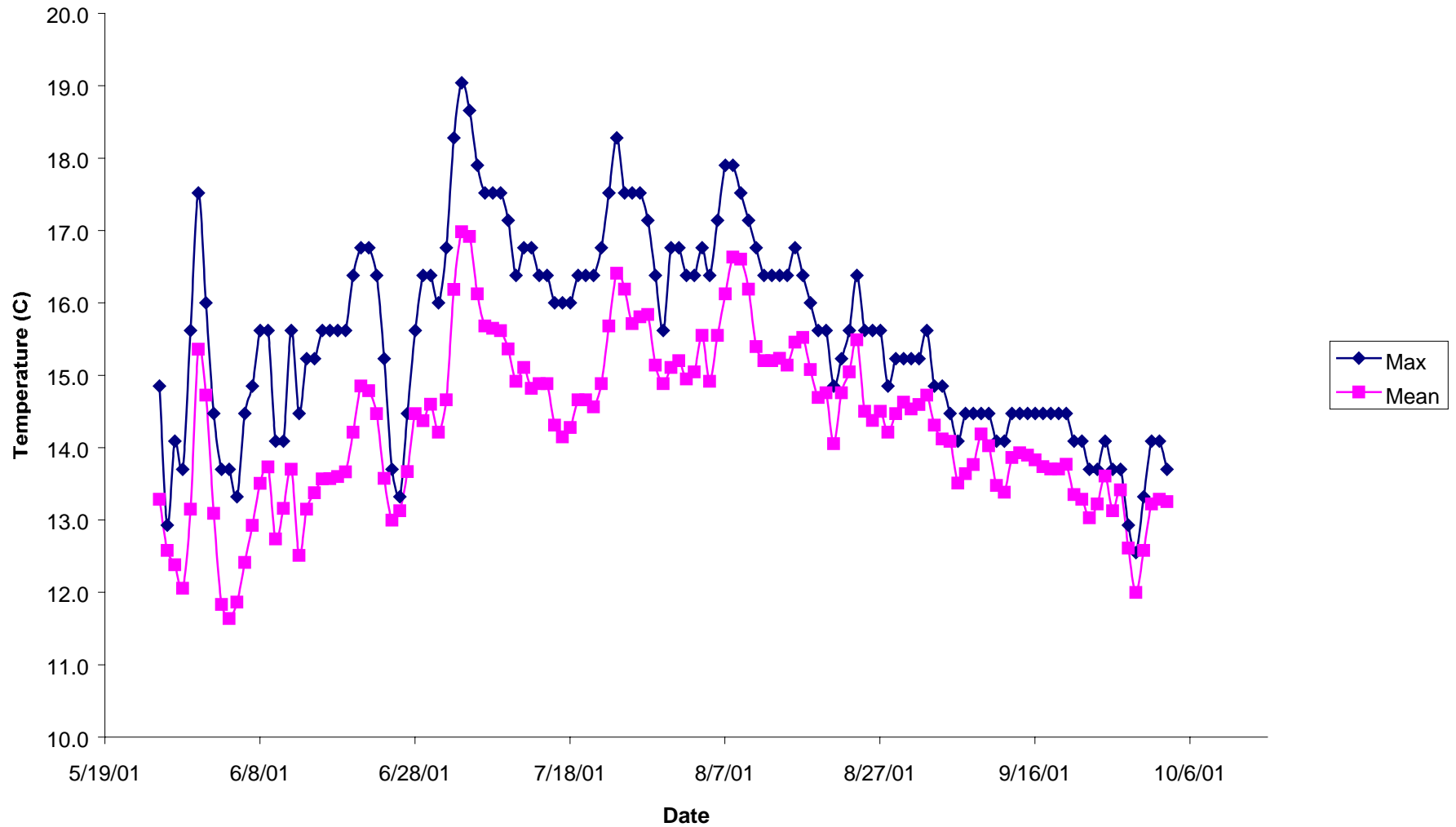


Figure 40. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to North Fork Noyo River (Site 70-20), Mendocino County, California.

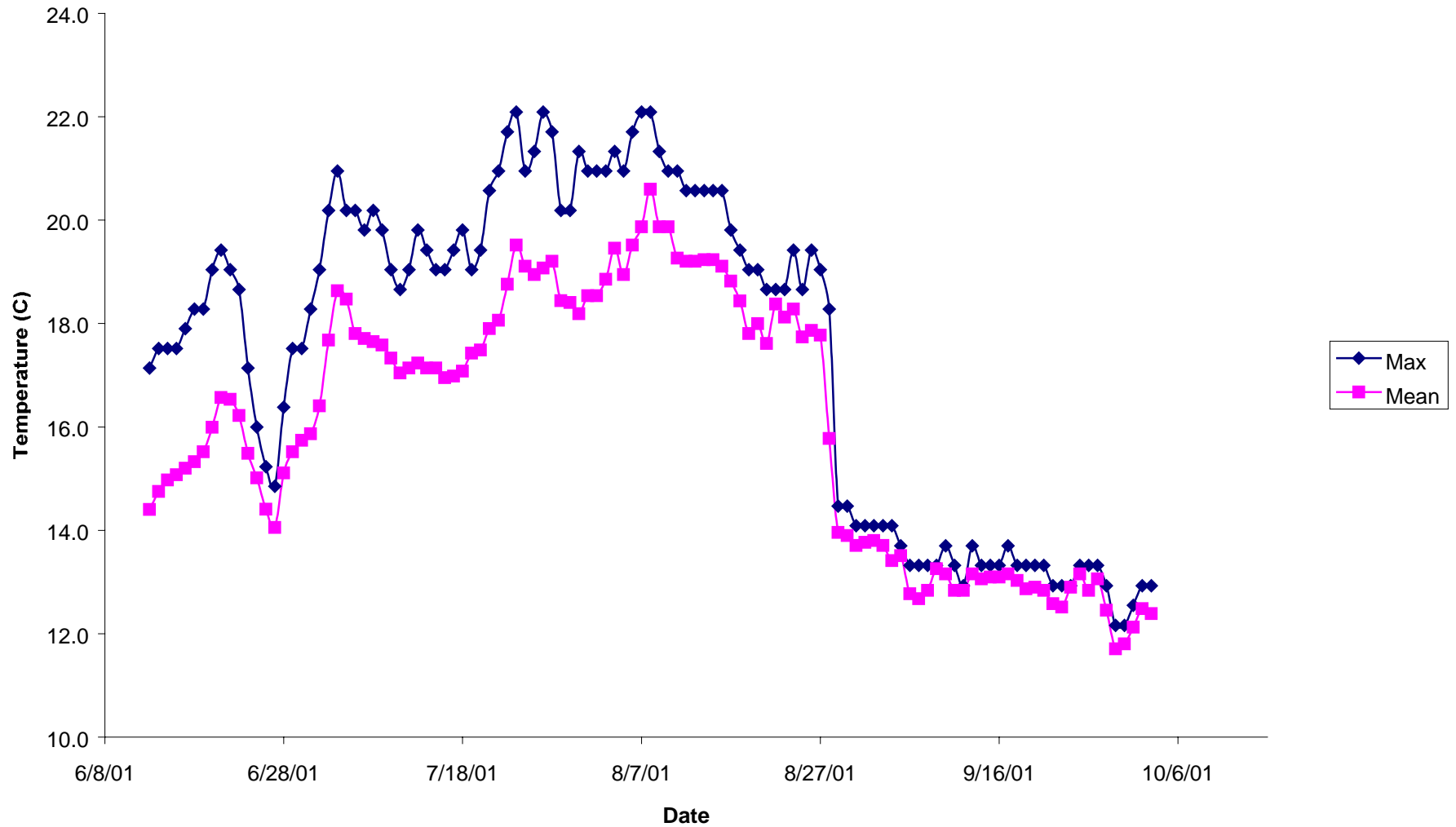


Figure 41. Mean and Maximum Daily Stream Temperatures at Tributary to North Fork Noyo River (Site 70-21), Mendocino County, California.

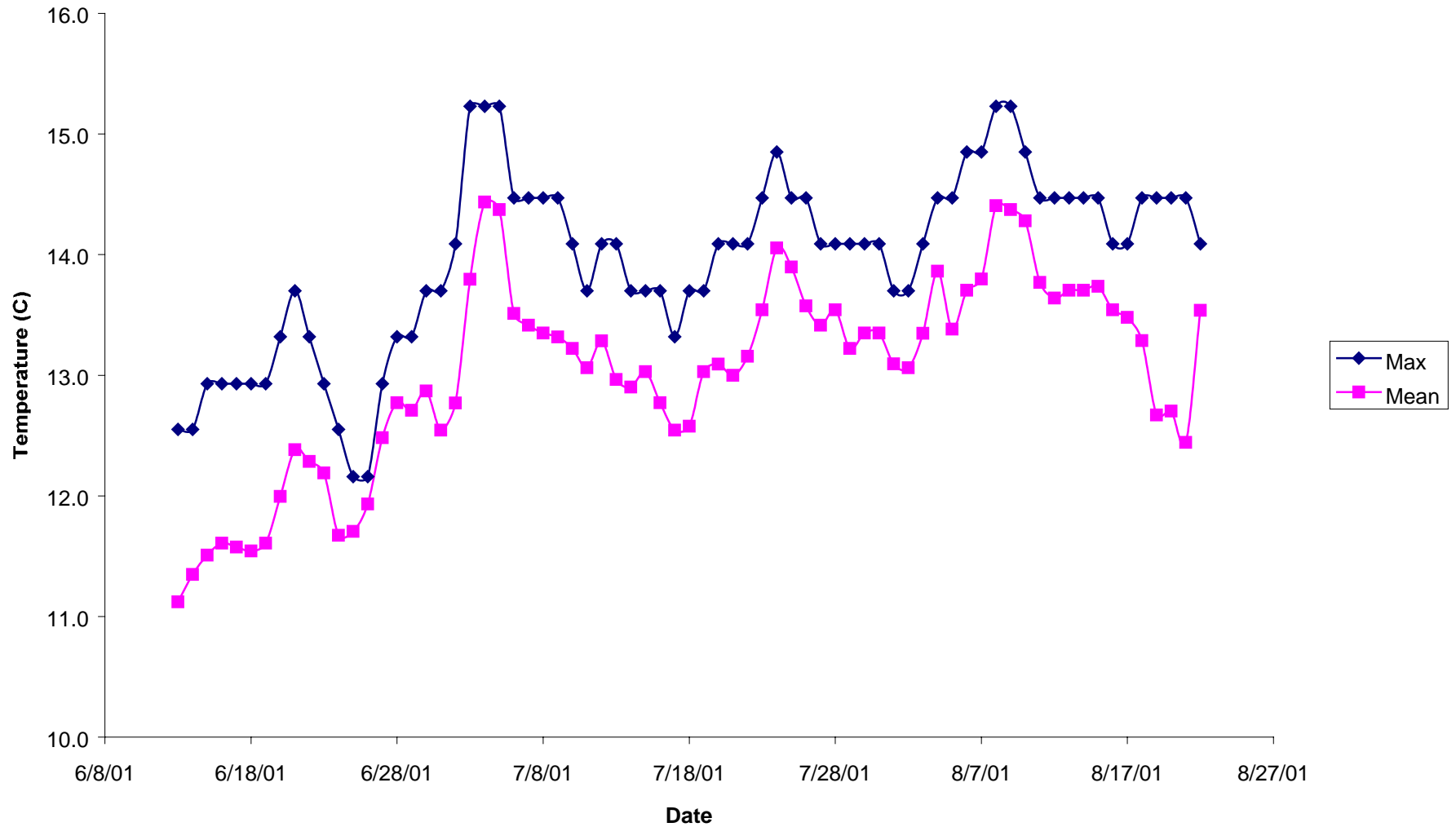


Figure 42. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to North Fork Noyo River (Site70-22), Mendocino County, California.

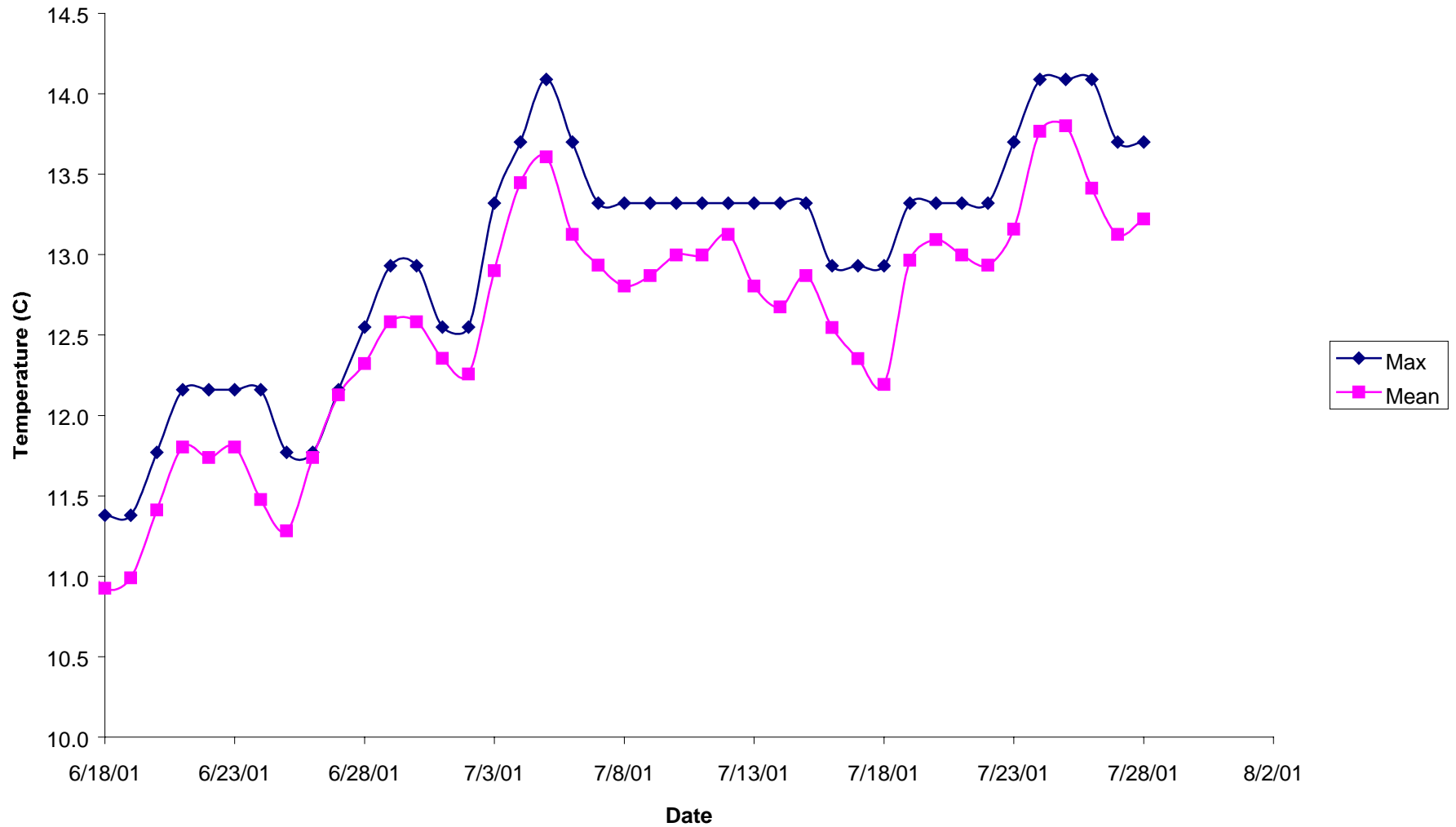


Figure 43. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to North Fork Hayworth Creek (Site 70-23), Mendocino County, California.

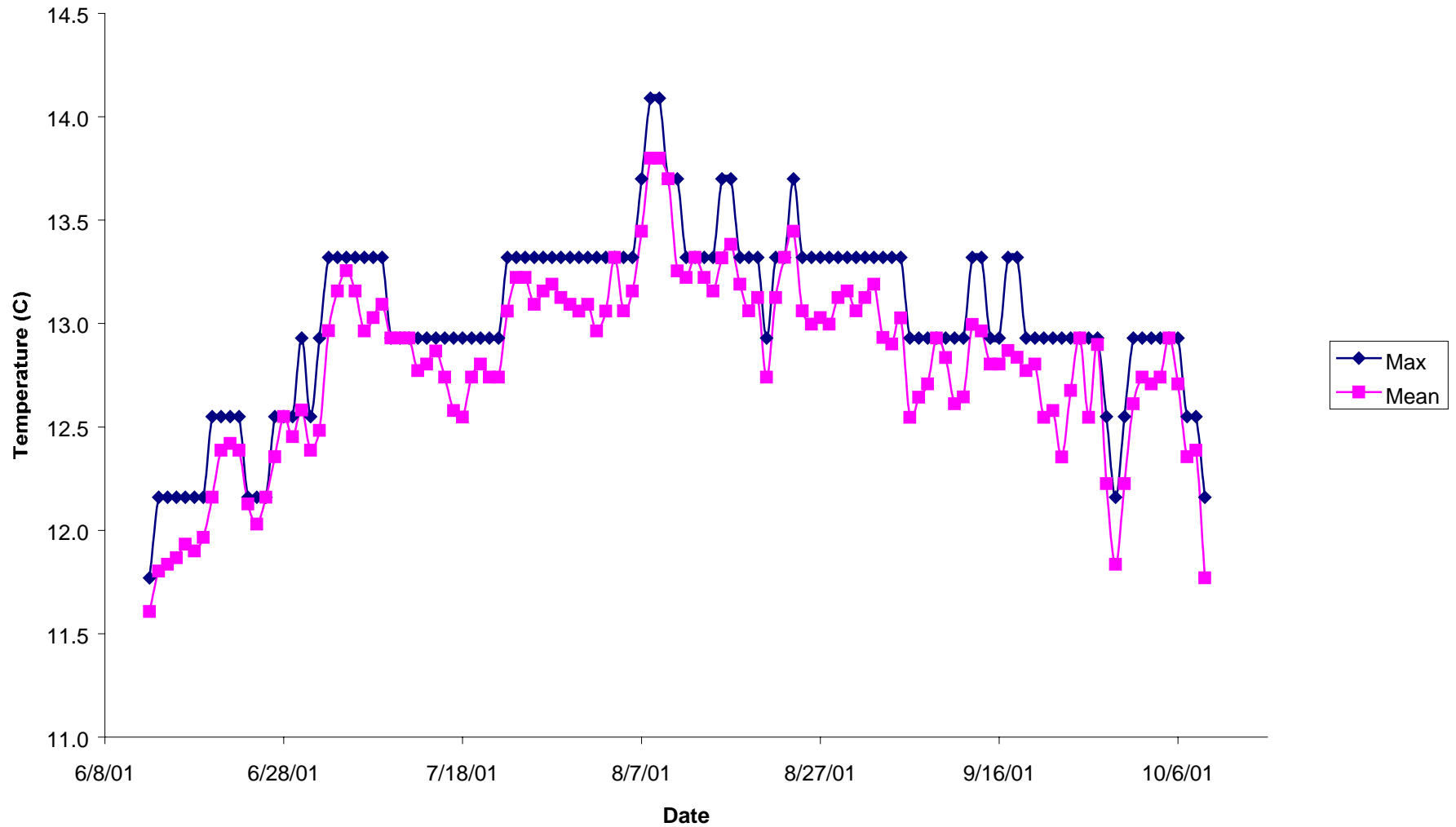


Figure 44. Mean and Maximum Daily Stream Temperatures at Tributary to North Fork Hayworth Creek (Site 70-24), Mendocino County, California.

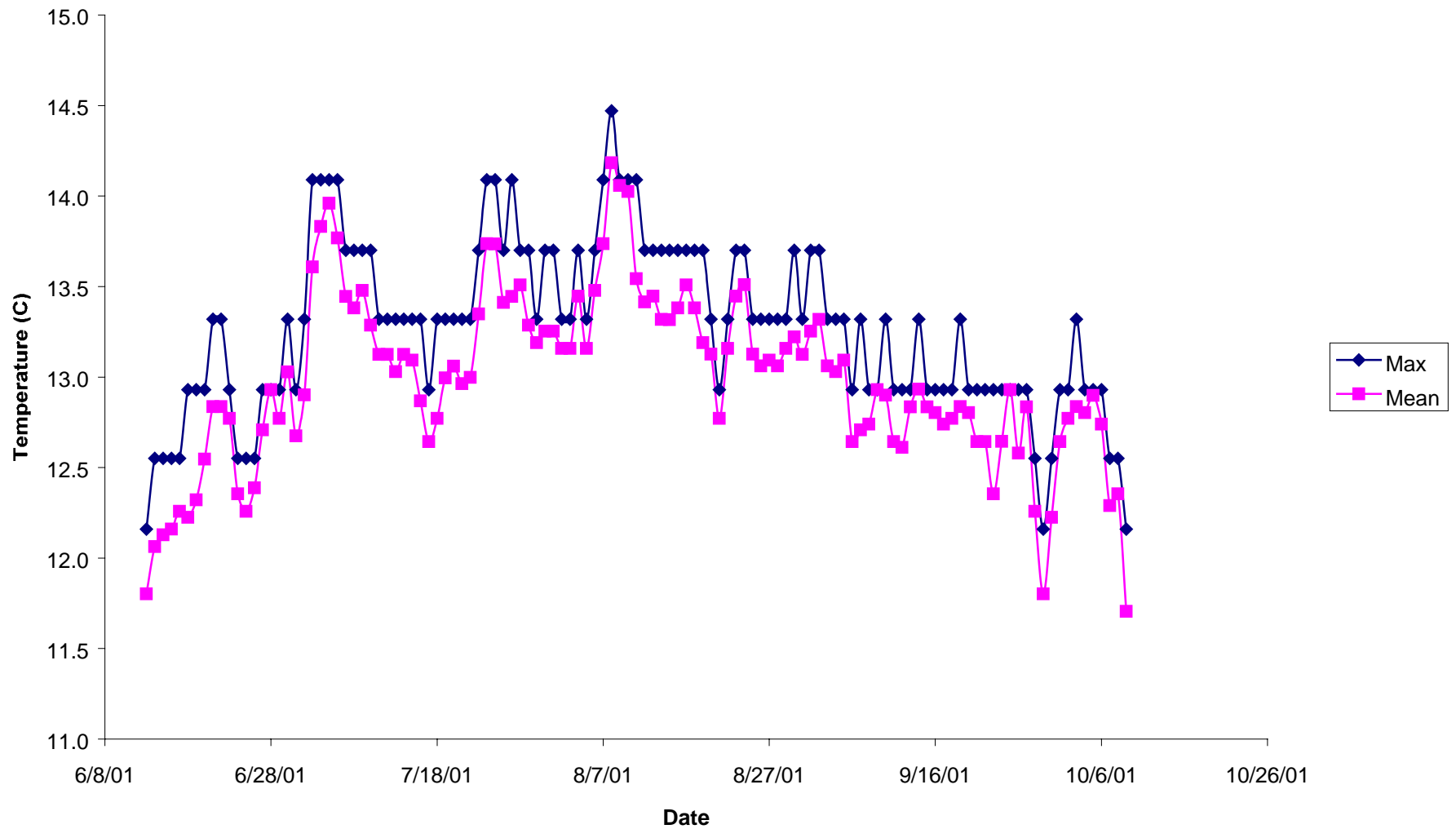
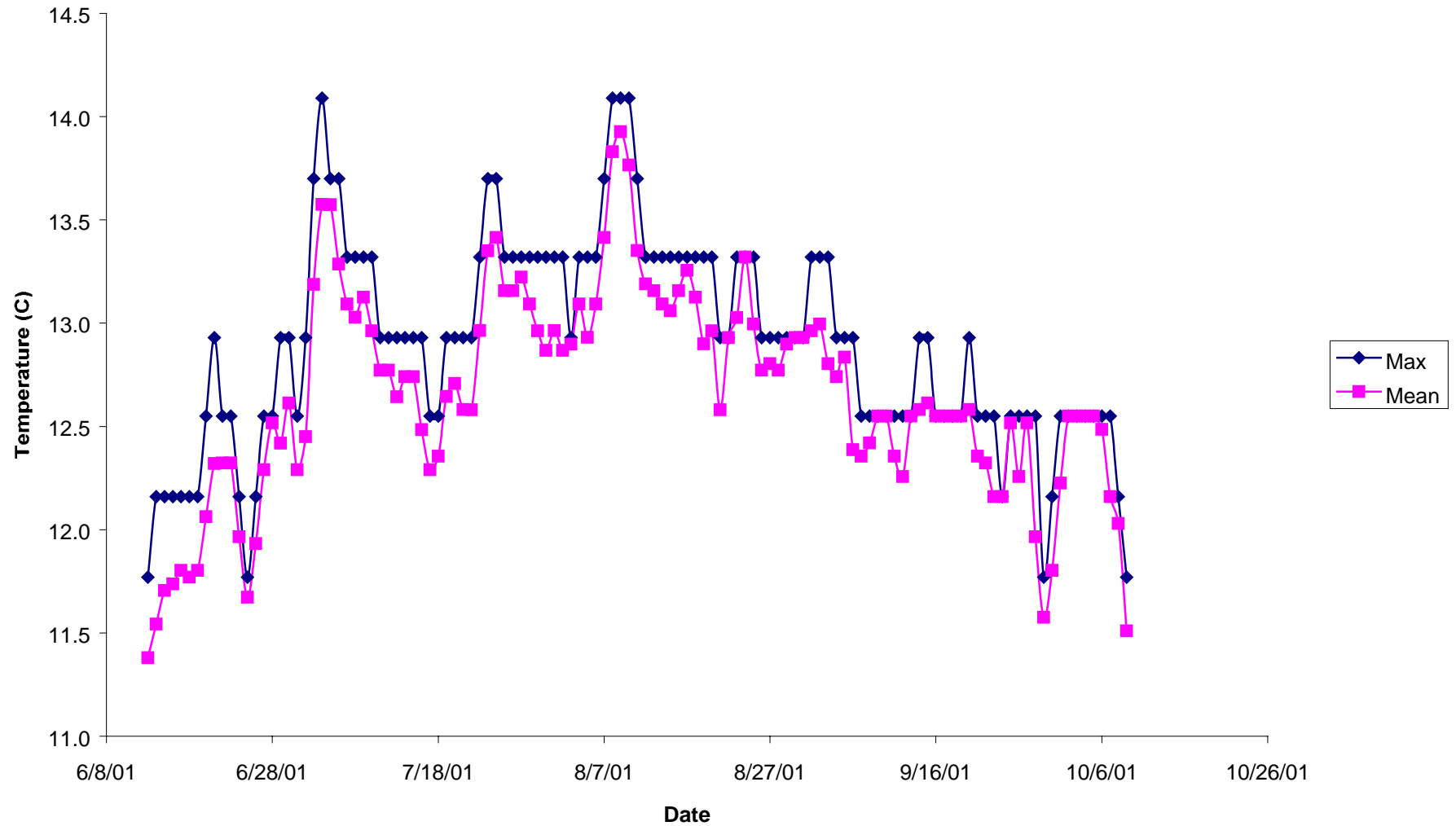


Figure 45. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to North Fork Hayworth Creek (Site 70-25), Mendocino County, California.



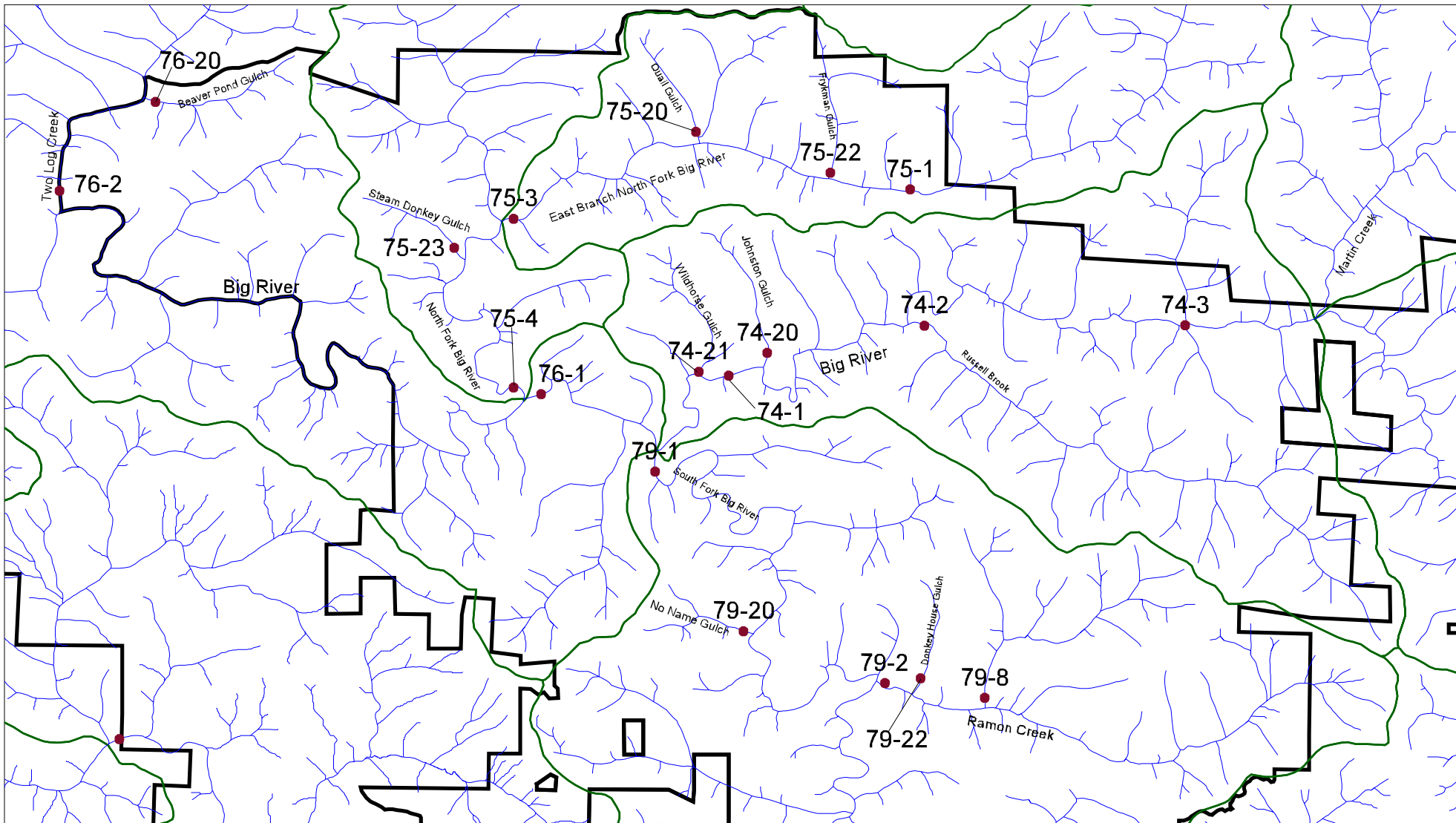
Big River Management Area

Table 4. Maximum, MWAT, and MWMT temperatures for sites in the Big River Area (1992-2001).

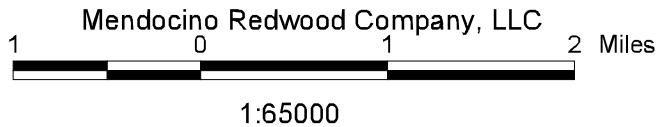
Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Big River	74-1	1992	23.5	20.1	22.9
Big River	74-1	1993	22.5	19.0	21.9
Big River	74-1	1994	21.5	19.0	21.1
Big River	74-1	2000	22.9	19.3	21.8
Big River	74-1	2001	23.8	19.9	22.8
Russel Brook	74-2	1994	17.0	15.2	16.9
Russel Brook	74-2	1995	19.0	16.6	17.9
Russel Brook	74-2	2000	18.1	16.0	17.3
Russel Brook	74-2	2001	17.5	14.9	16.8
Big River	74-3	1994	22.6	18.8	21.1
Big River	74-3	1995	21.4	16.0	20.4
Big River	74-3	1999	22.1	18.8	21.1
Big River	74-3	2001	22.1	18.8	20.9
Johnston Gulch	74-20*	2001	14.9	14.2	14.6
Wildhorse Gulch	74-21*	2001	15.6	14.7	15.1
East Branch NF Big River	75-1	1993	22.4	18.4	21.3
East Branch NF Big River	75-1	1995	21.4	18.1	20.2
East Branch NF Big River	75-1	1997	21.4	17.9	20.7
East Branch NF Big River	75-1	1999	20.1	17.1	19.2
East Branch NF Big River	75-1	2000	19.5	17.1	18.8
East Branch NF Big River	75-1	2001	19.0	16.4	18.1
East Branch NF Big River	75-3	1997	20.5	17.9	20.1
East Branch NF Big River	75-3	2001	19.4	16.3	18.5
North Fork Big River	75-4	1993	21.0	19.2	20.6
Quail Gulch	75-20*	2001	12.9	12.1	12.5
Frykman Gulch	75-22*	2001	14.1	13.6	13.8
Steam Donkey Gulch	75-23*	2001	14.5	13.2	13.8
Big River	76-1	1993	23.0	19.7	21.9
Big River	76-1	1994	23.0	19.3	22.6
Big River	76-1	1999	22.7	19.4	21.8
Two Log Creek	76-2	2000	17.8	15.8	17.3
Two Log Creek	76-2	2001	17.1	14.8	16.4
Beaver Pond Gulch	76-20*	2001	14.1	13.4	13.8
South Fork Big River	79-1	1996	23.6	20.6	22.5

South Fork Big River	79-1	1997	23.0	20.5	22.4
South Fork Big River	79-1	1999	22.8	20.0	21.8
South Fork Big River	79-1	2000	23.2	20.4	22.4
South Fork Big River	79-1	2001	22.5	19.5	21.7
Ramon Creek	79-2	1996	22.6	18.7	21.8
Ramon Creek	79-2	1997	21.7	18.4	21.2
Ramon Creek	79-2	1999	22.0	18.7	20.7
Daugherty Creek	79-4	1994	21.9	18.7	21.5
Daugherty Creek	79-4	1995	22.8	19.3	21.7
Daugherty Creek	79-4	1997	21.9	18.4	20.9
Daugherty Creek	79-4	1999	21.6	18.2	20.4
Daugherty Creek	79-4	2000	21.8	19.0	20.7
Daugherty Creek	79-4	2001	21.5	18.4	20.4
Daugherty Creek	79-5	1997	20.9	18.7	20.6
North Fork Ramon Creek	79-8	2000	17.2	15.1	16.4
Gates Creek	79-9	1997	21.6	18.2	20.2
Gates Creek	79-9	2001	19.6	16.5	18.1
No Name Gulch	79-20*	2001	16.0	14.0	15.4
Goddard Gulch	79-21*	2001	14.5	13.8	14.0
Donkey House Gulch	79-22*	2001	12.9	12.9	12.9
*Class II Streams					

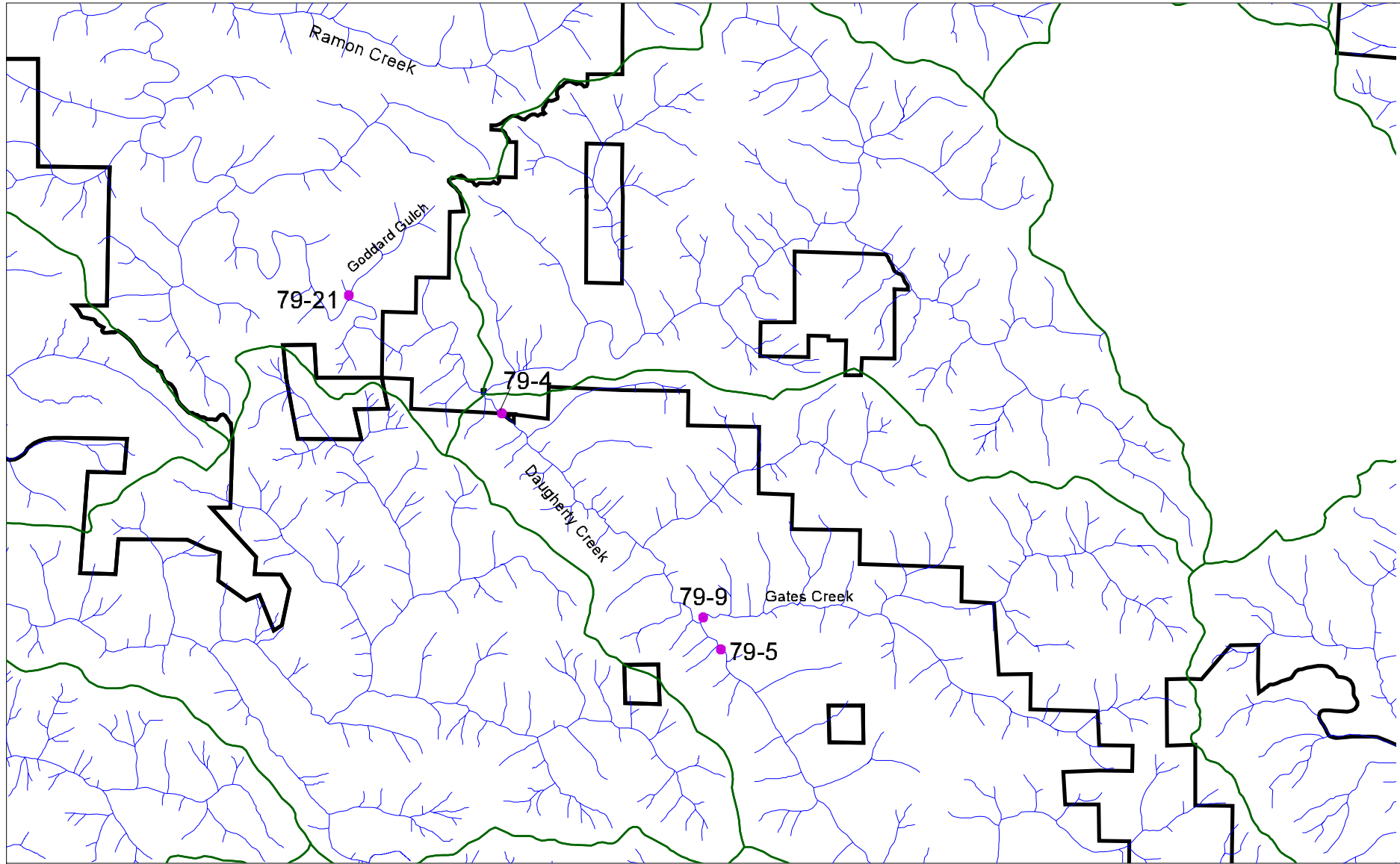
Map 4. Big River Stream Temperature Sites



- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property



Map 5. Daugherty Creek Temperature Sites



- Temperature Sites
- Streams
- ▭ Planning Watershed
- ▭ MRC Property

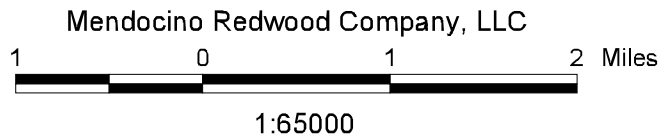


Figure 46. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Big River (Site 74-1), Mendocino County, California

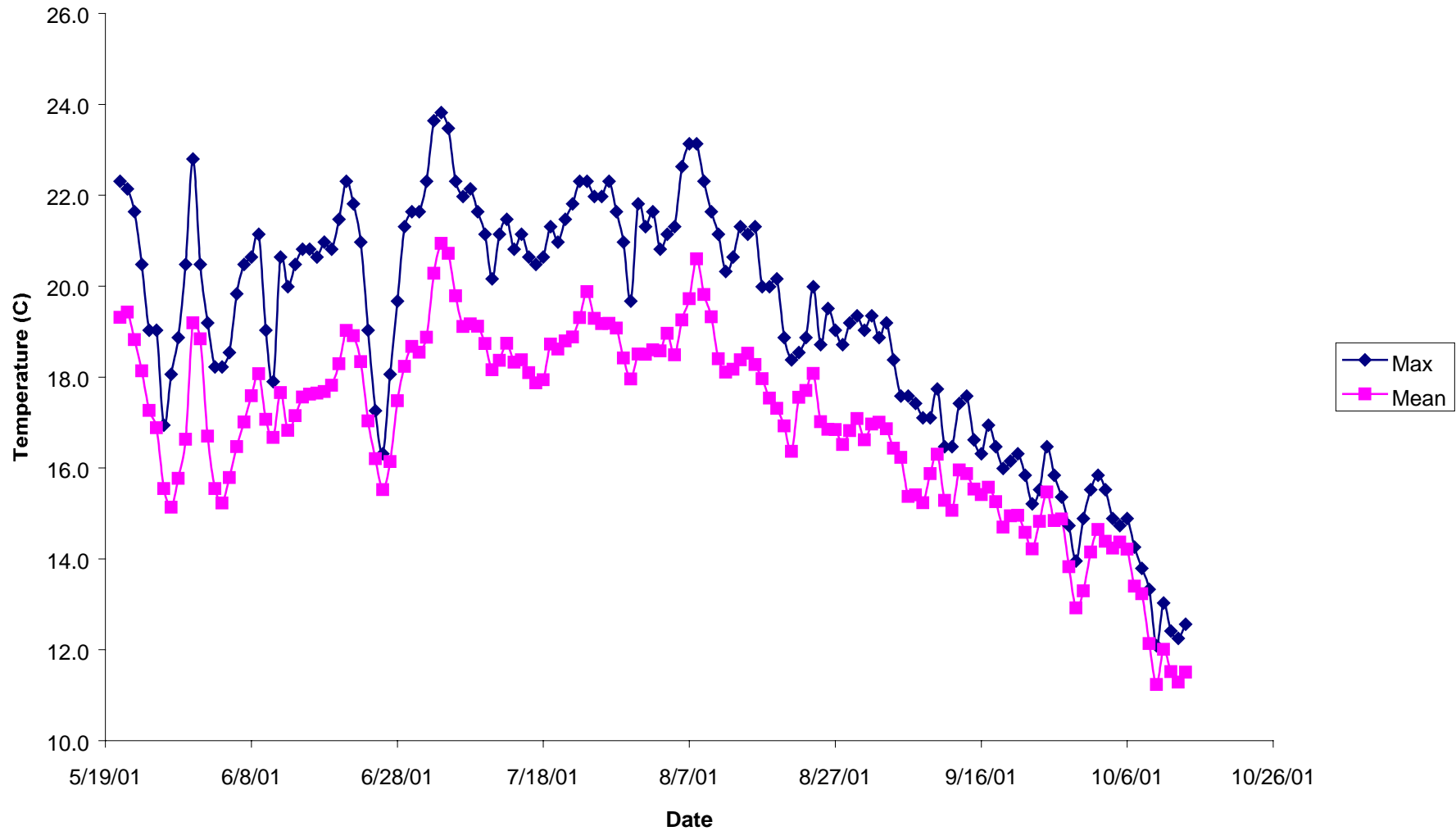


Figure 47. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Russel Brook (Site 74-2), Mendocino County, California.

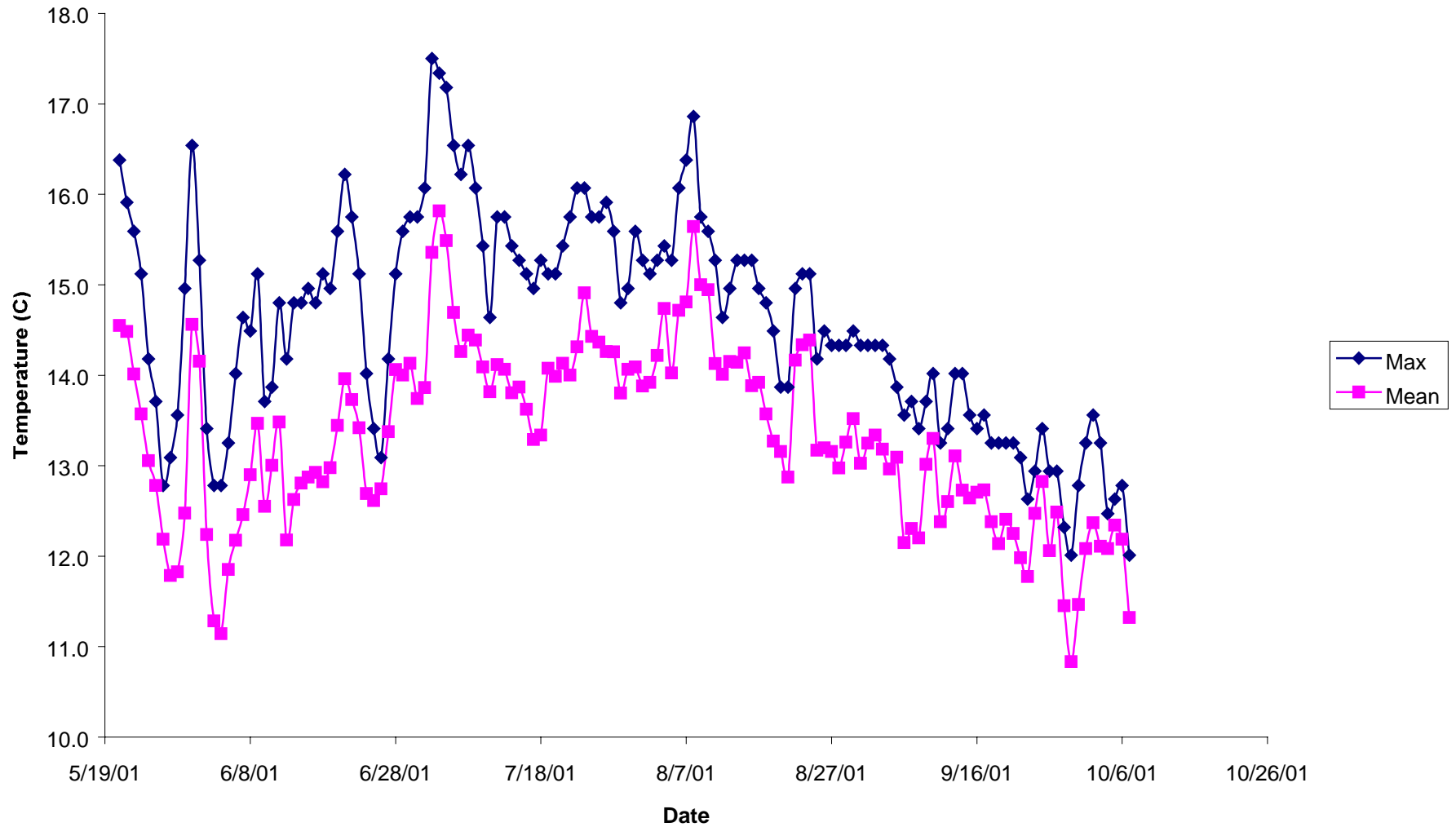


Figure 48. Mean and Maximum Daily Stream Temperature During Summer 2001 at Big River (Site 74-3), Mendocino County, California.

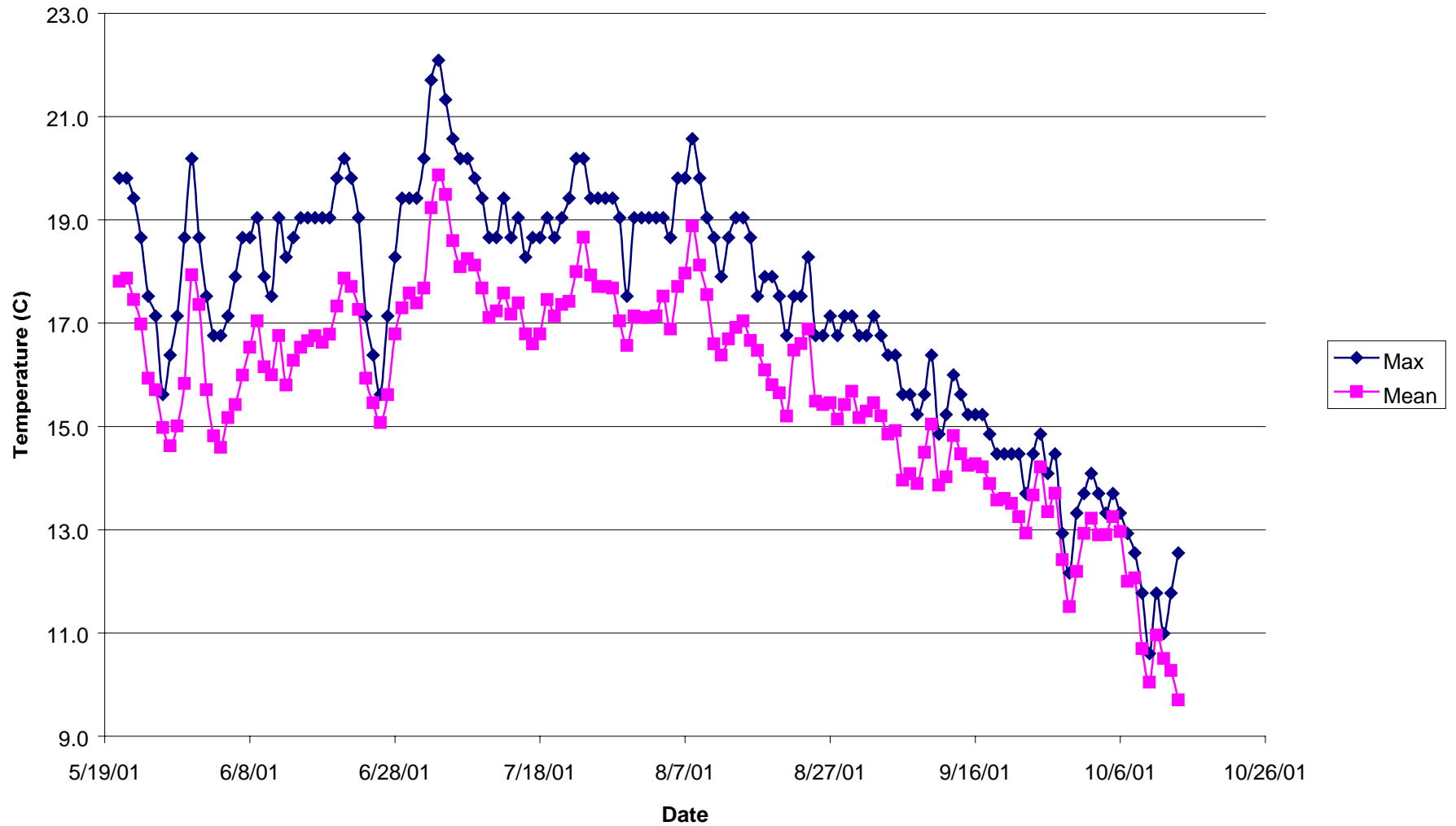


Figure 49. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Johnston Gulch (74-20), Mendocino County, California.

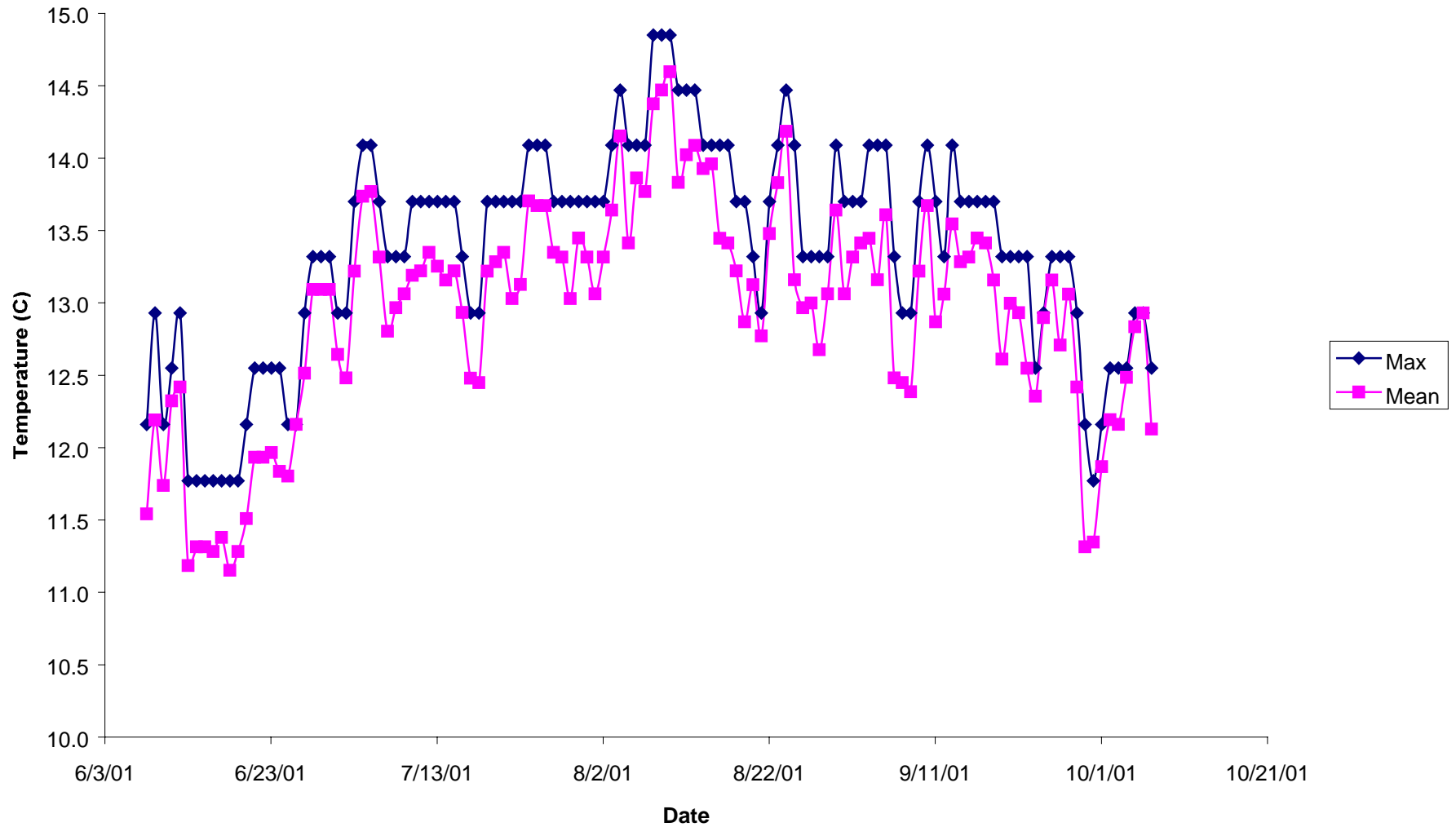


Figure 50. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Wildhorse Gulch (74-21), Mendocino County, California.

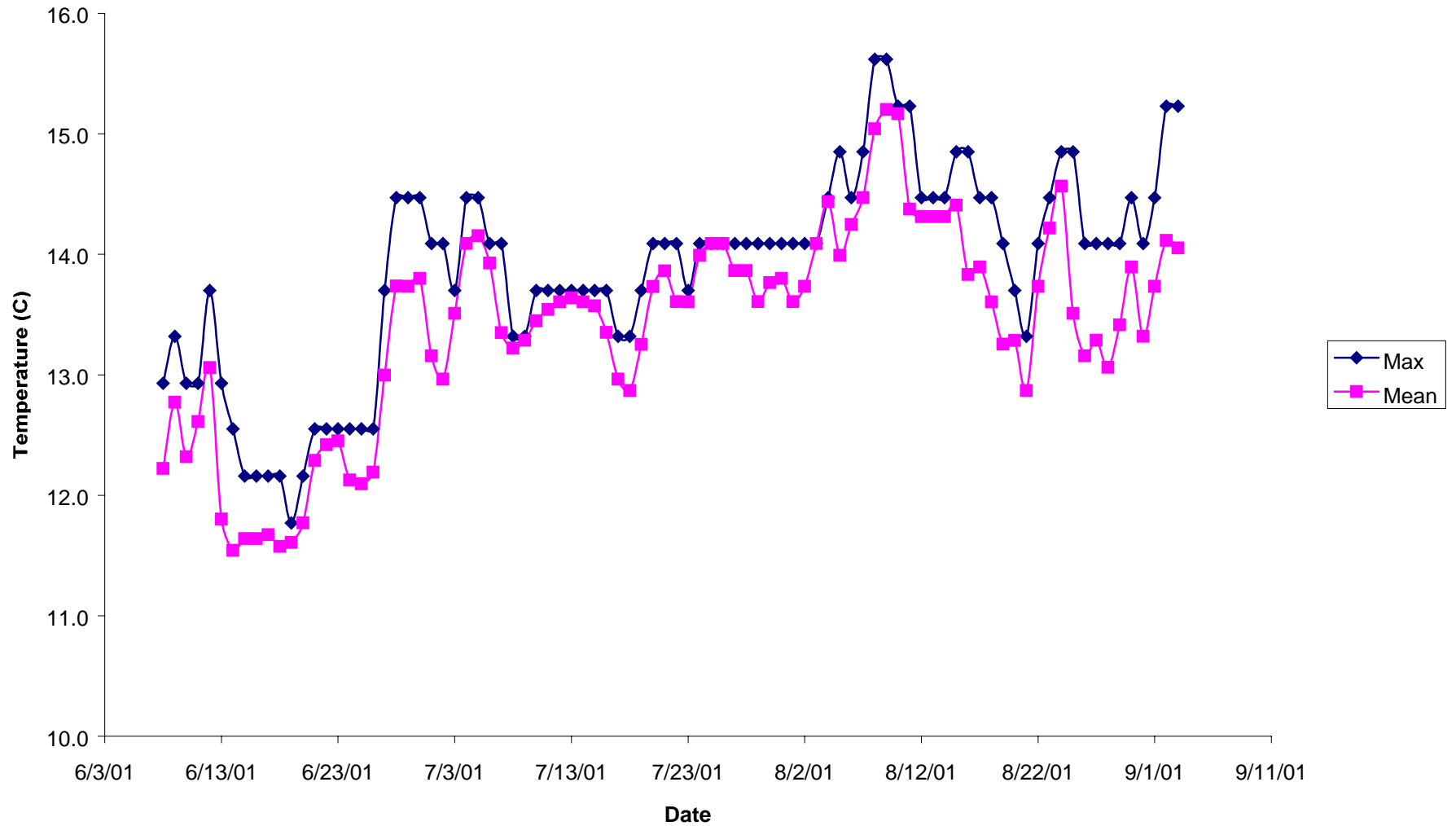


Figure 51. Mean and Maximum Daily Stream Temperatures During Summer 2001 at East Branch North Fork Big River (Site 75-1), Mendocino County, California.

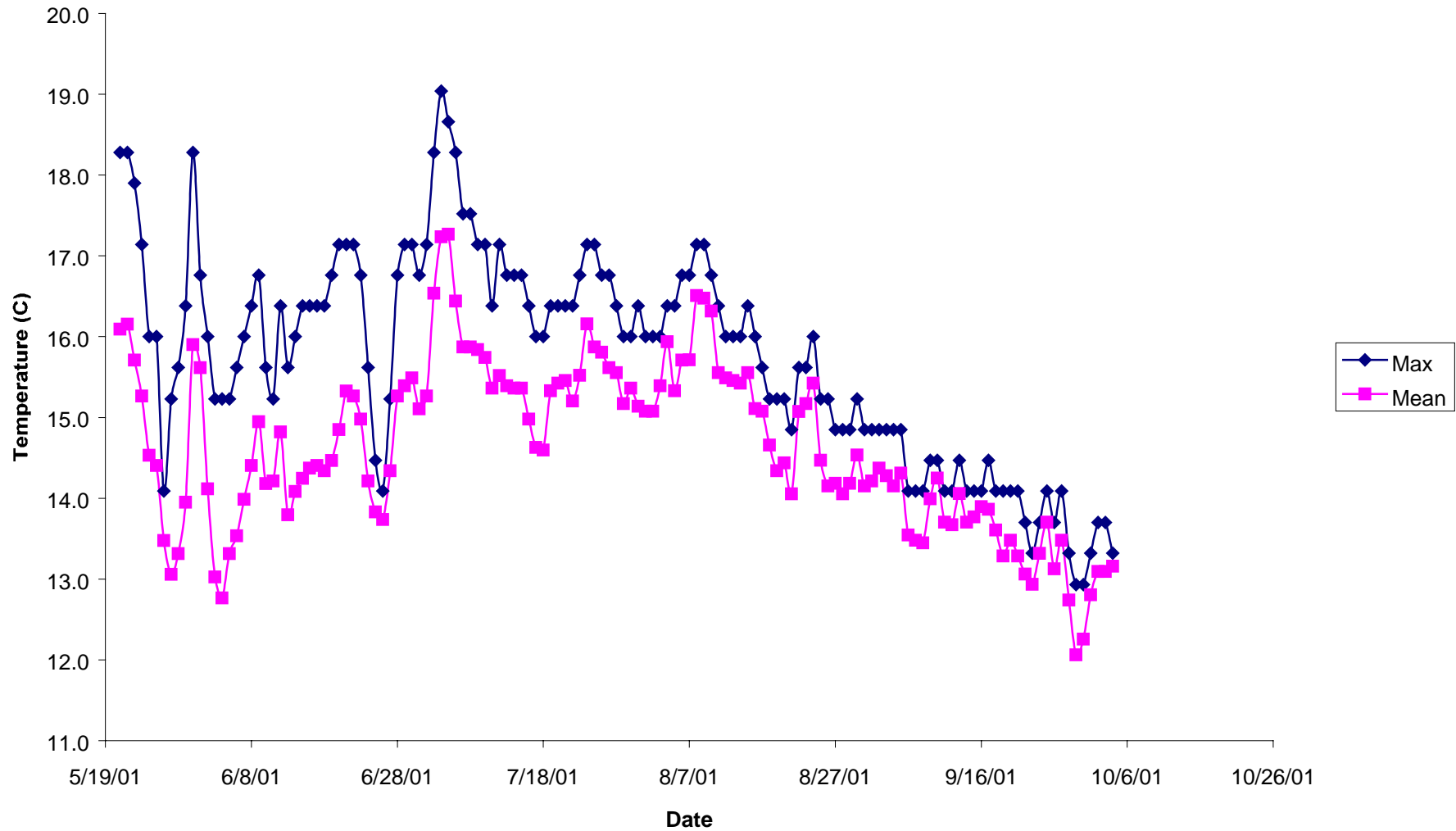


Figure 52. Mean and Maximum Daily Stream Temperatures During Summer 2001 at East Branch North Fork Big River (Site75-3), Mendocino County, California.

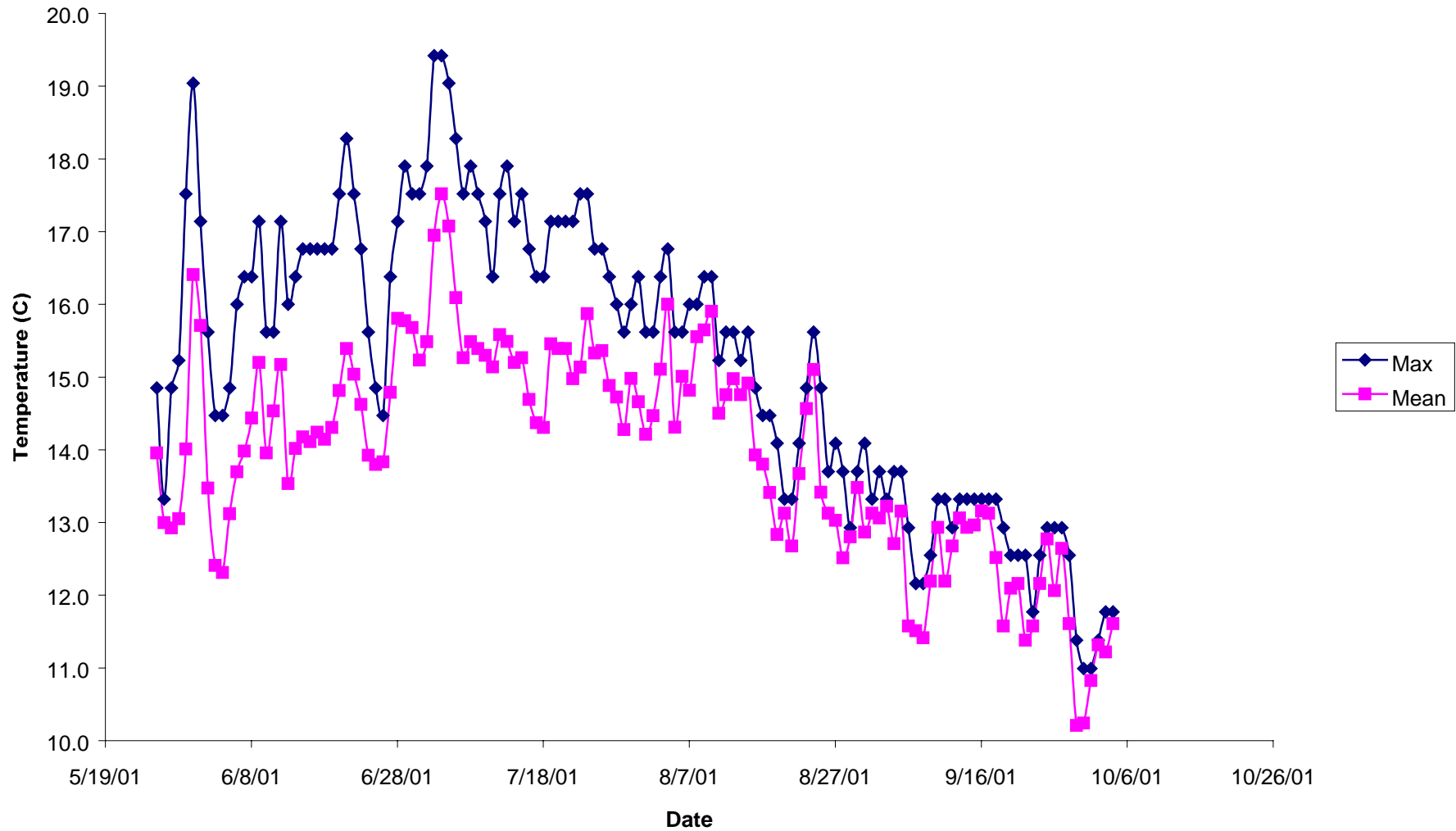


Figure 53. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Quail Gulch (75-20), Mendocino County, California.

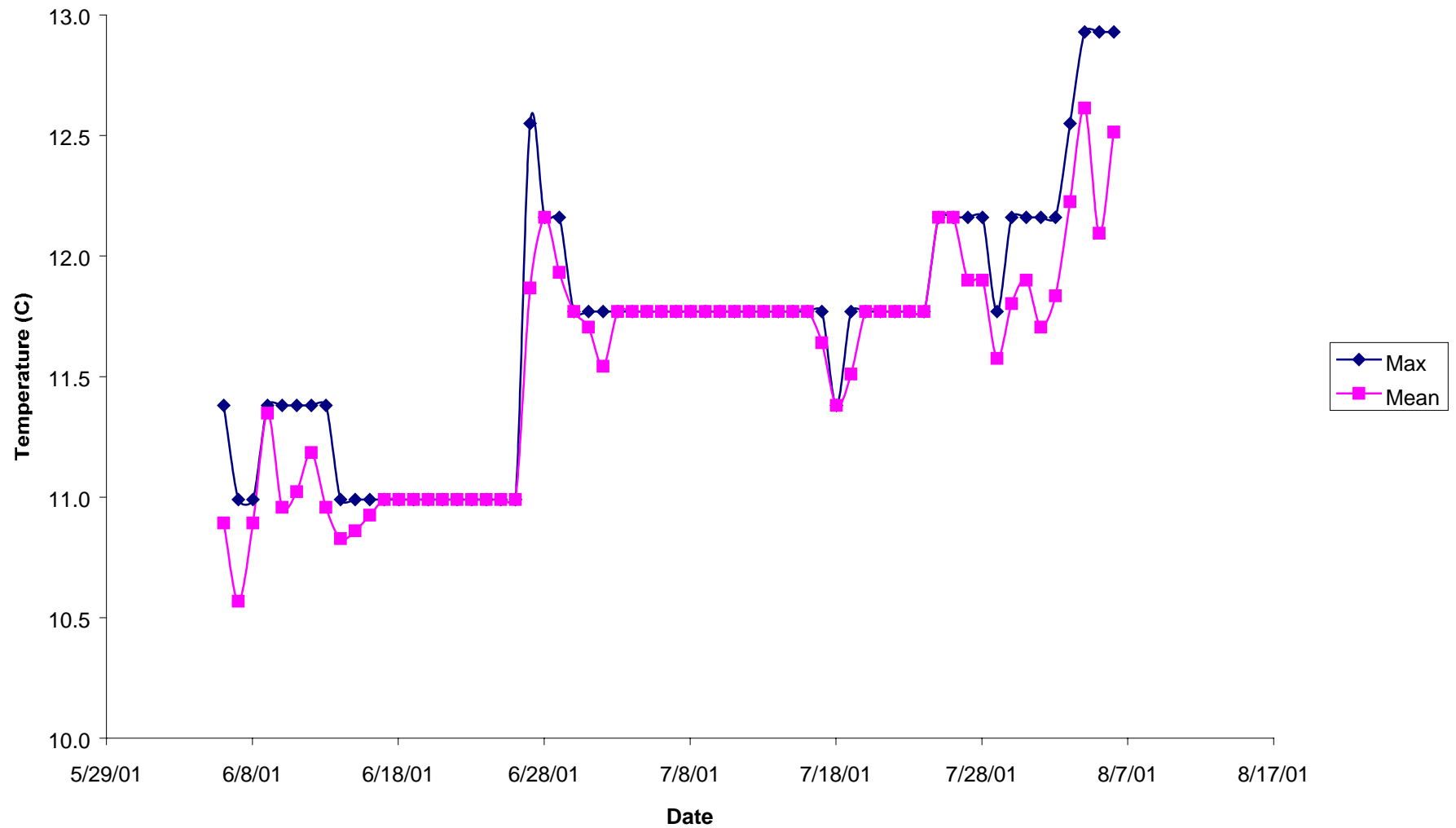


Figure 54. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Frykman Gulch (75-22), Mendocino County, California.

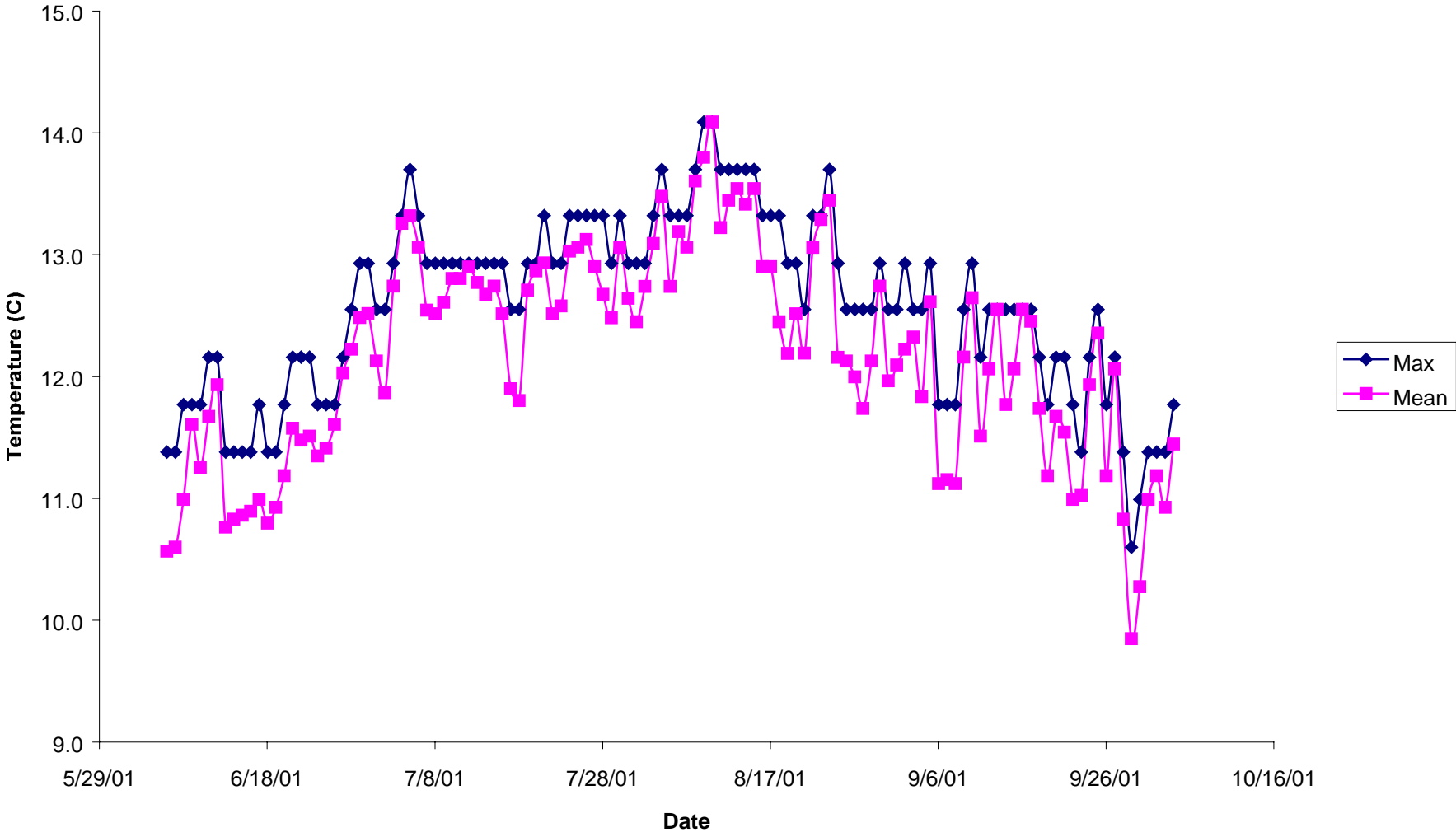


Figure 55. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Steam Donkey Gulch (75-23), Mendocino County, California.

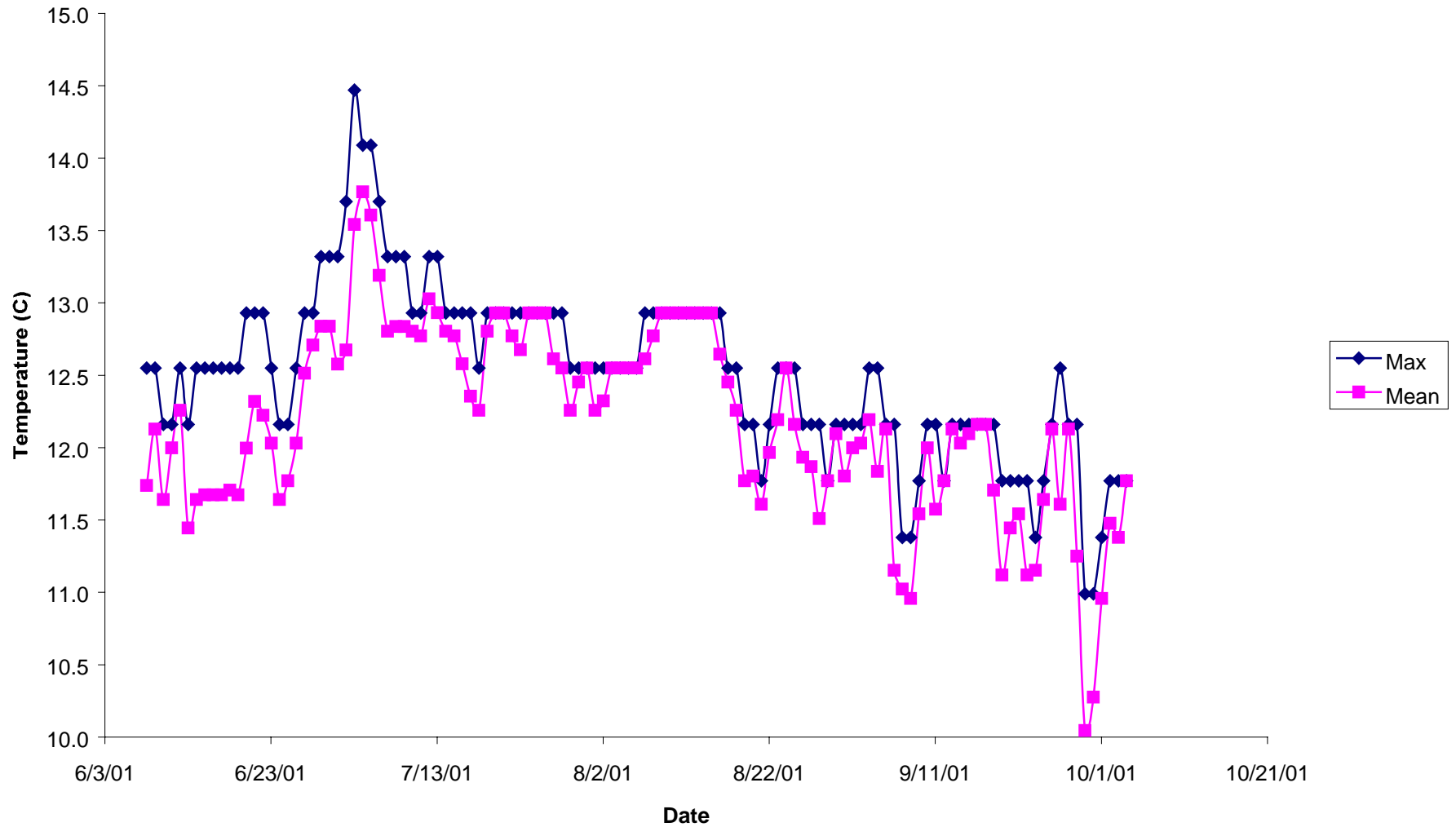


Figure 56. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Two Log Creek Site (76-2), Mendocino County, California.

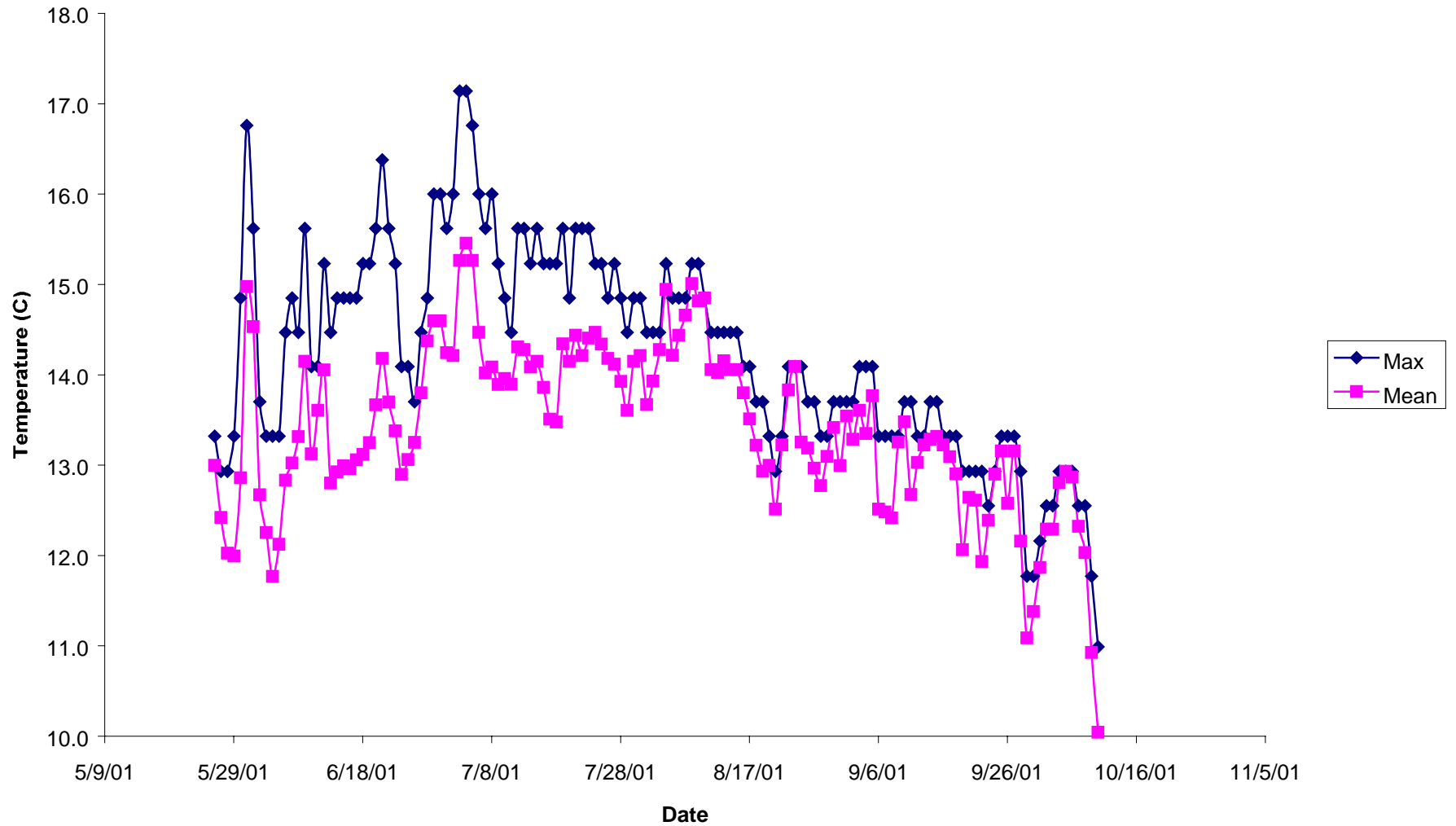


Figure 57. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Beaver Pond Gulch (76-20), Mendocino County, California.

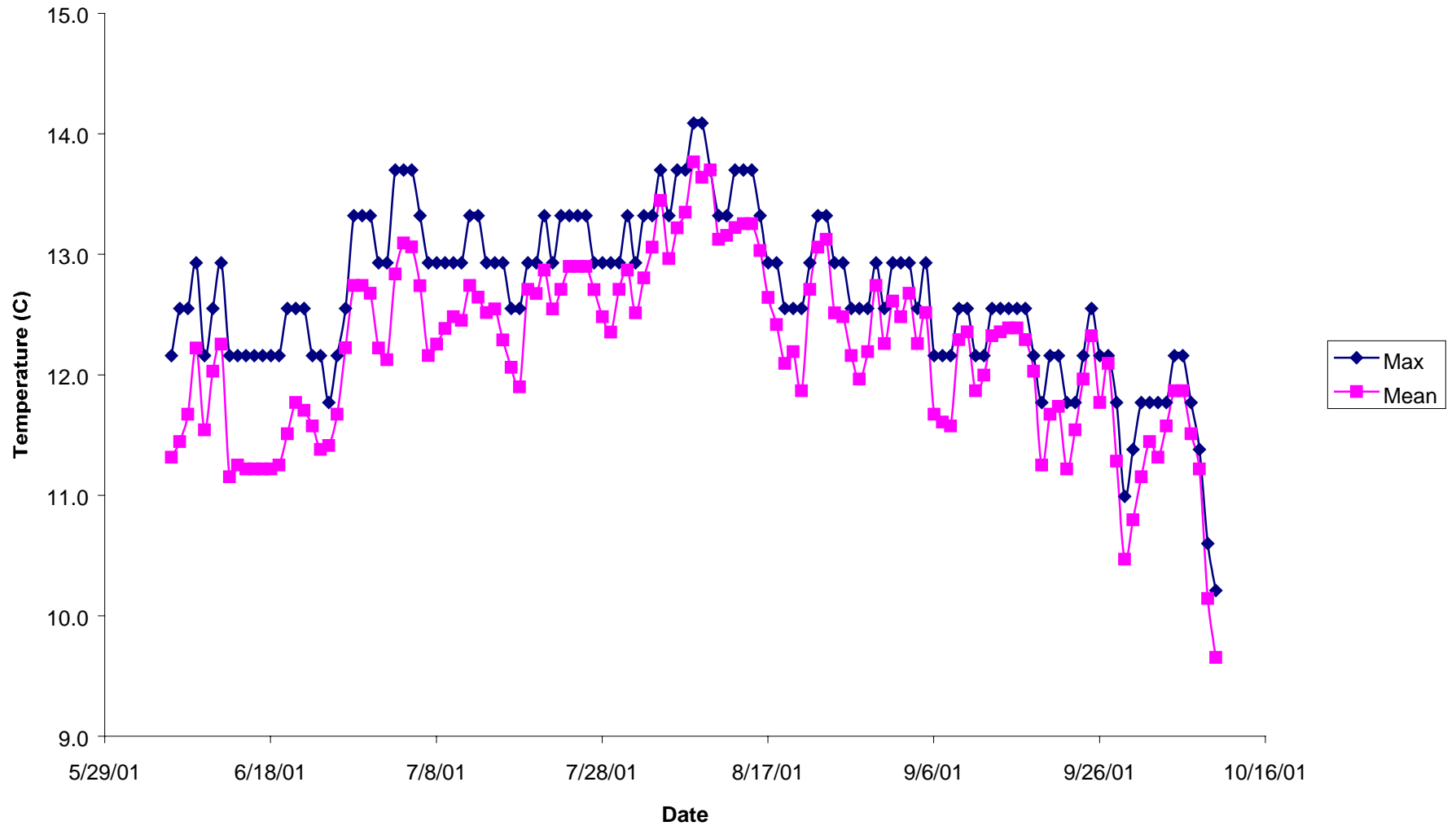


Figure 58. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Big River (Site79-1), Mendocino County, California.

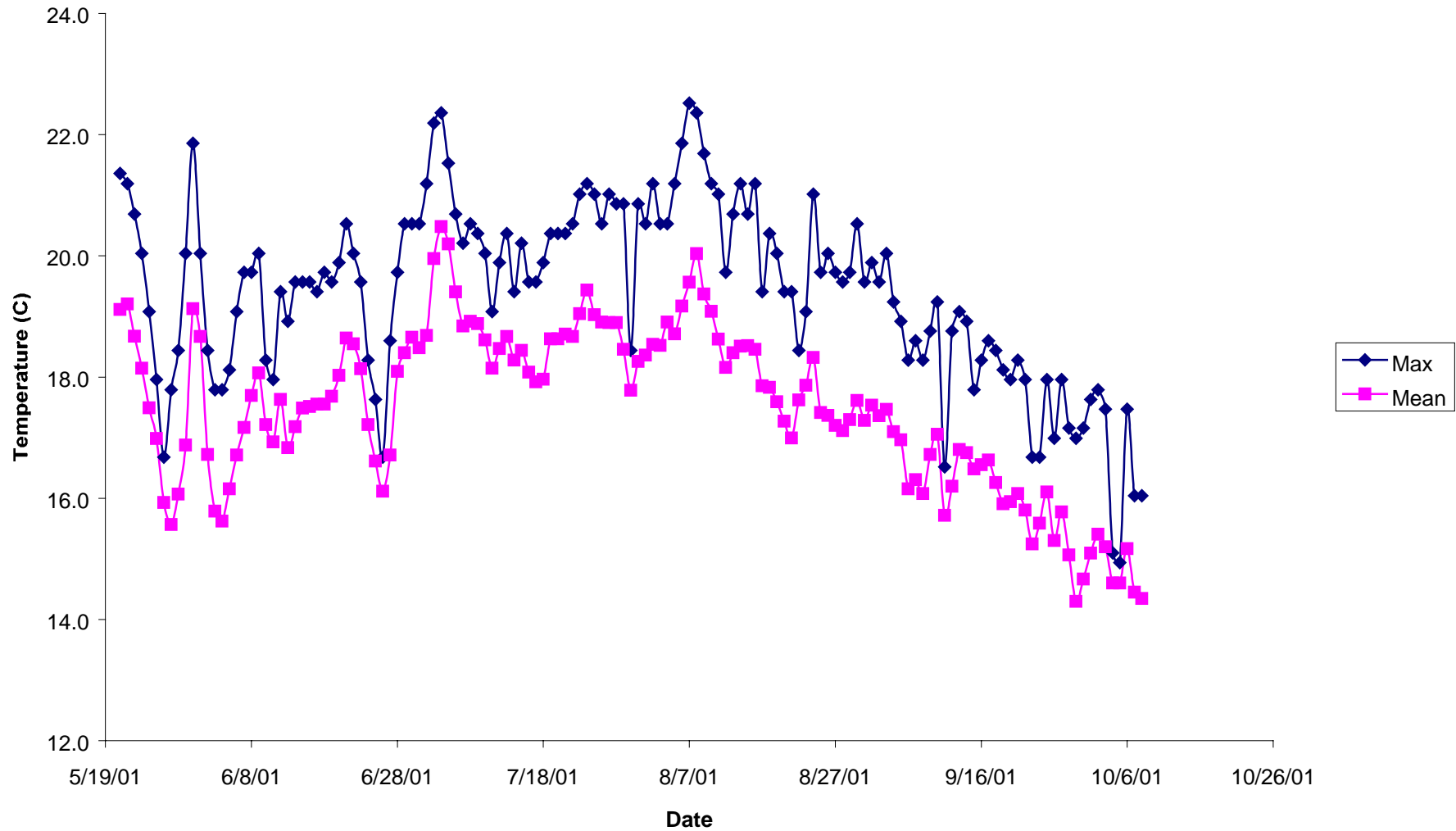


Figure 59. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Daugherty Creek (Site 79-4), Mendocino County, California.

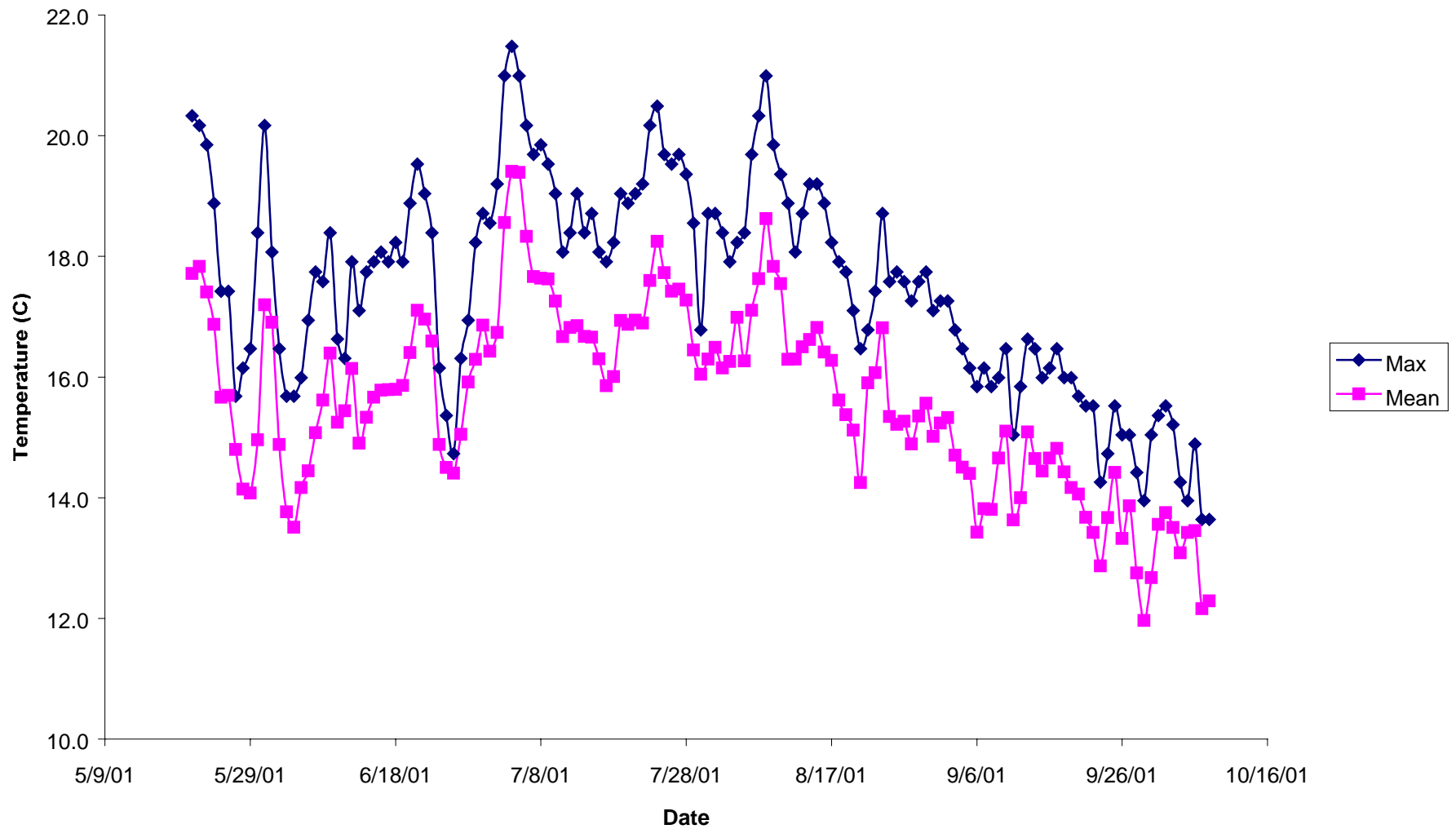


Figure 60. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Gates Creek (Site 79-9), Mendocino County, California.

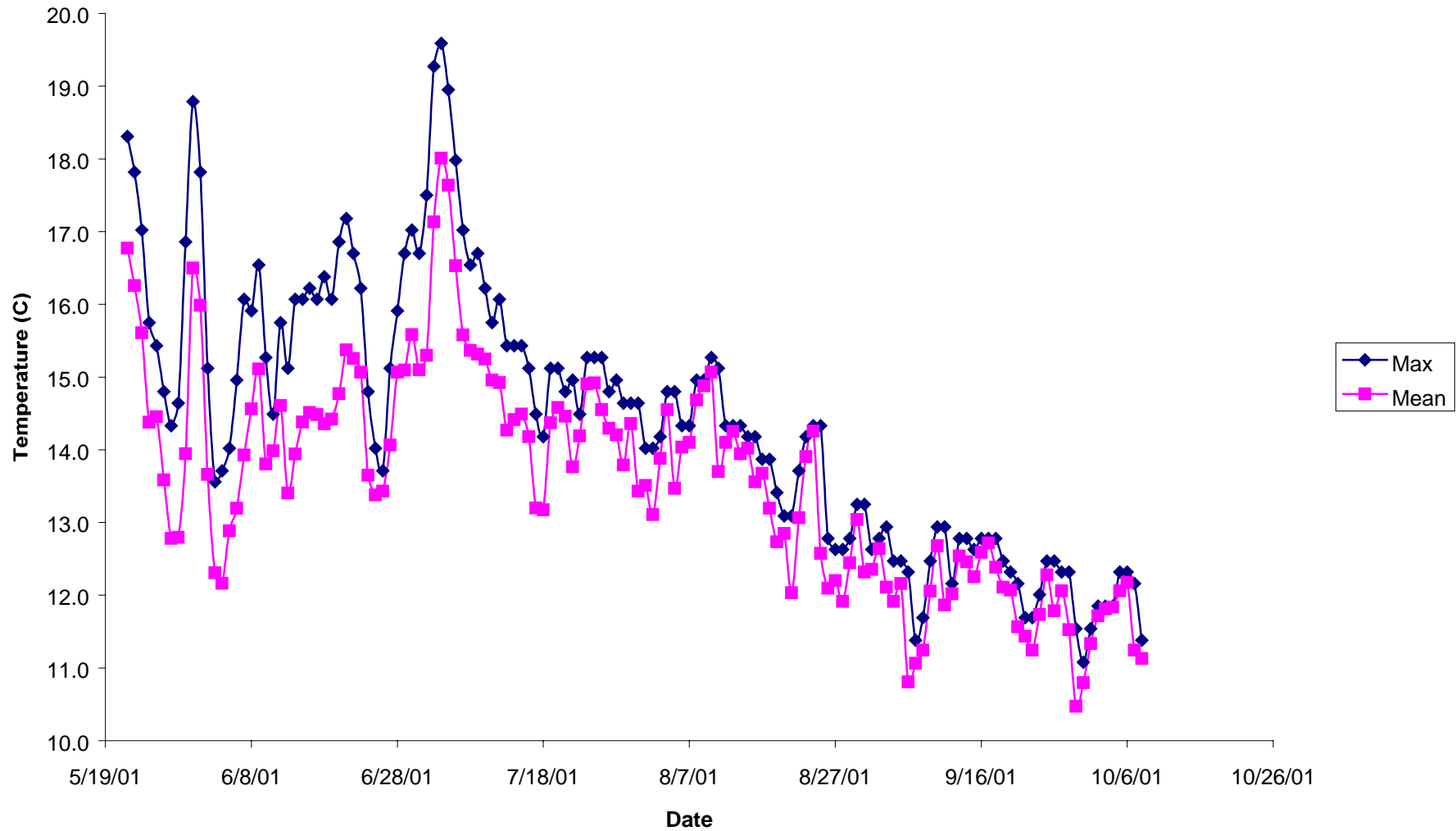


Figure 61. Mean and Maximum Daily Stream Temperatures During Summer 2001 at No Name Gulch (79-20), Mendocino County, California.

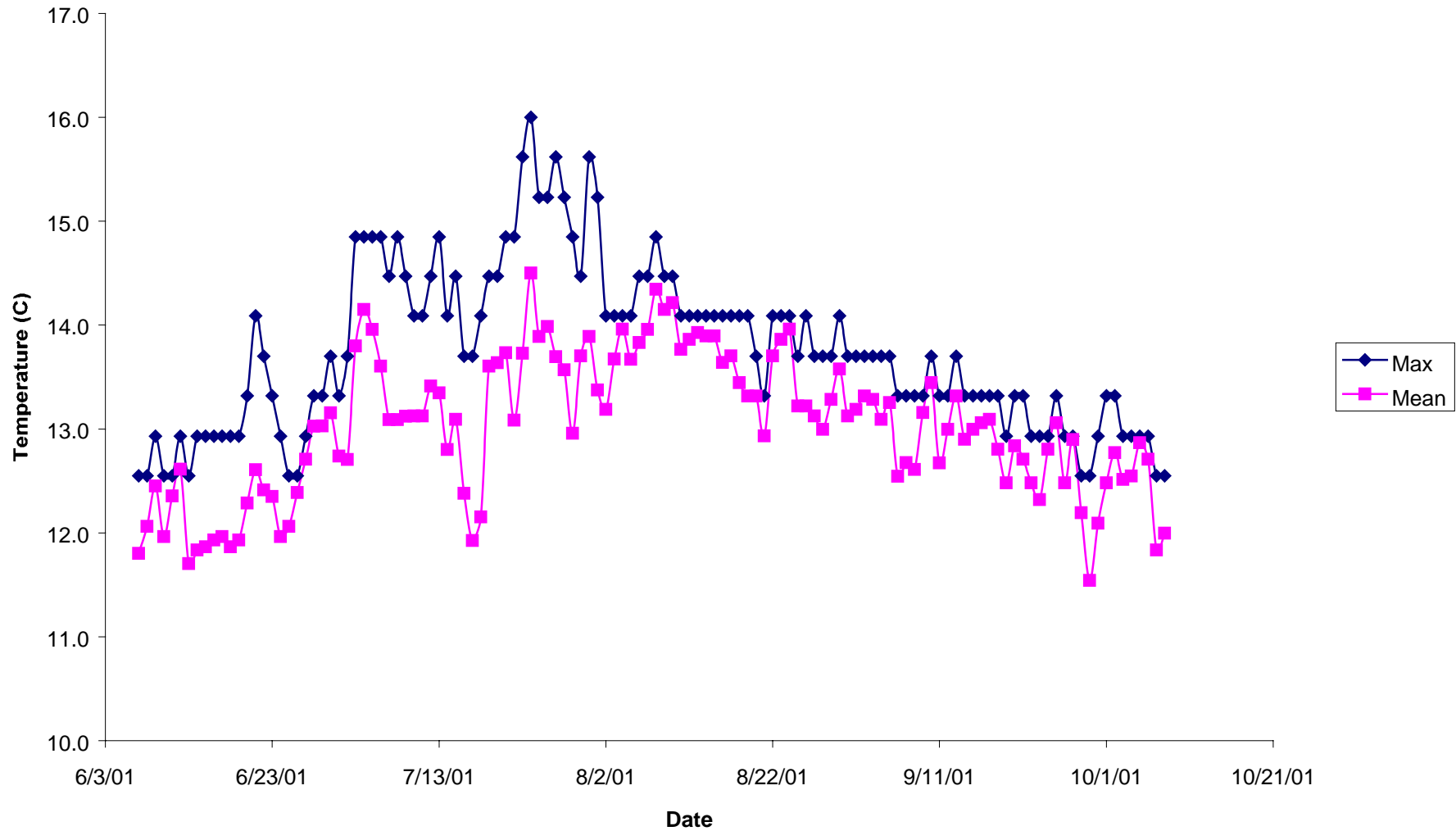


Figure 62. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Goddard Gulch (79-21), Mendocino County, California.

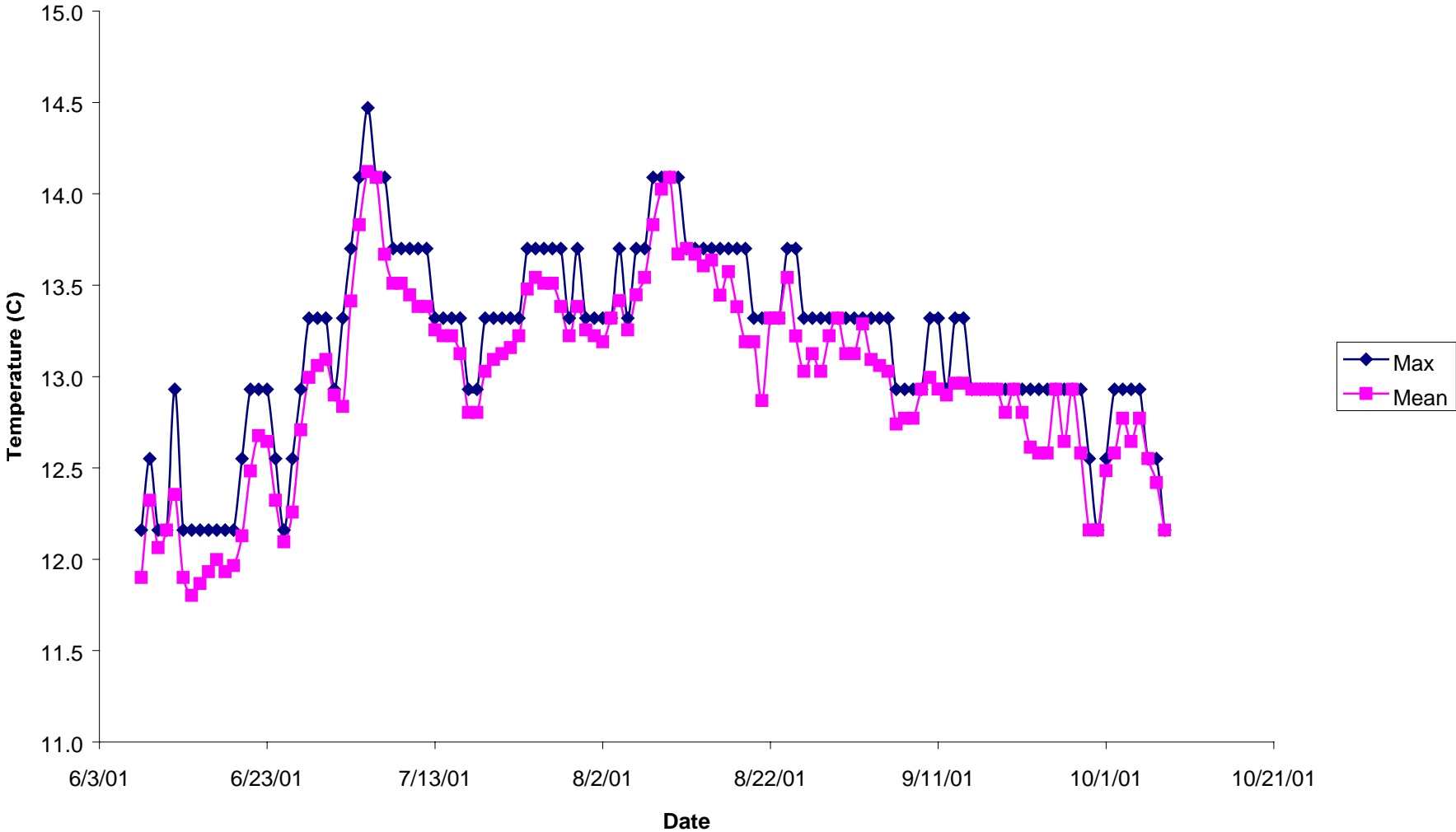
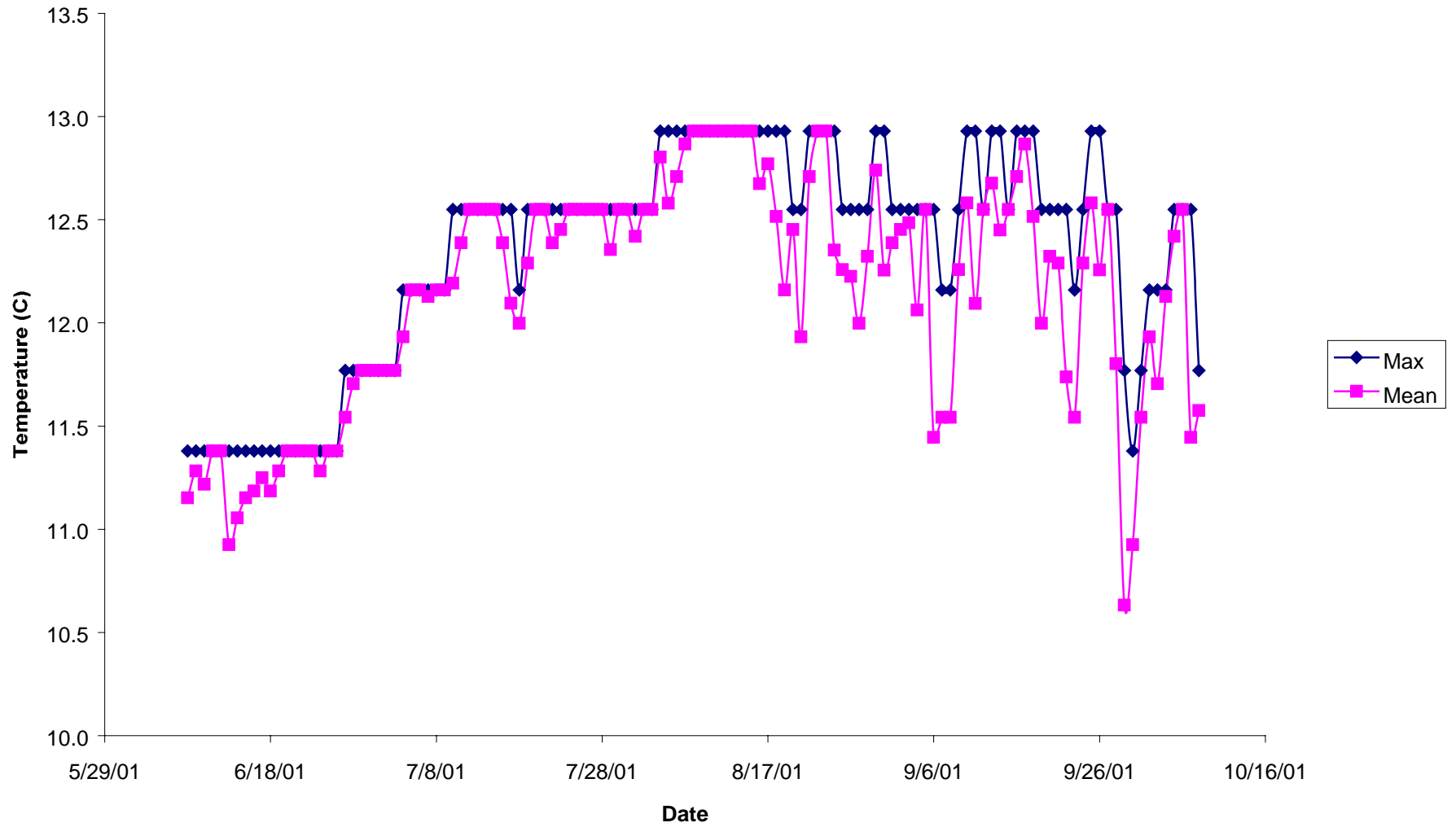


Figure 63. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Donkey House Gulch (79-22), Mendocino County, California.



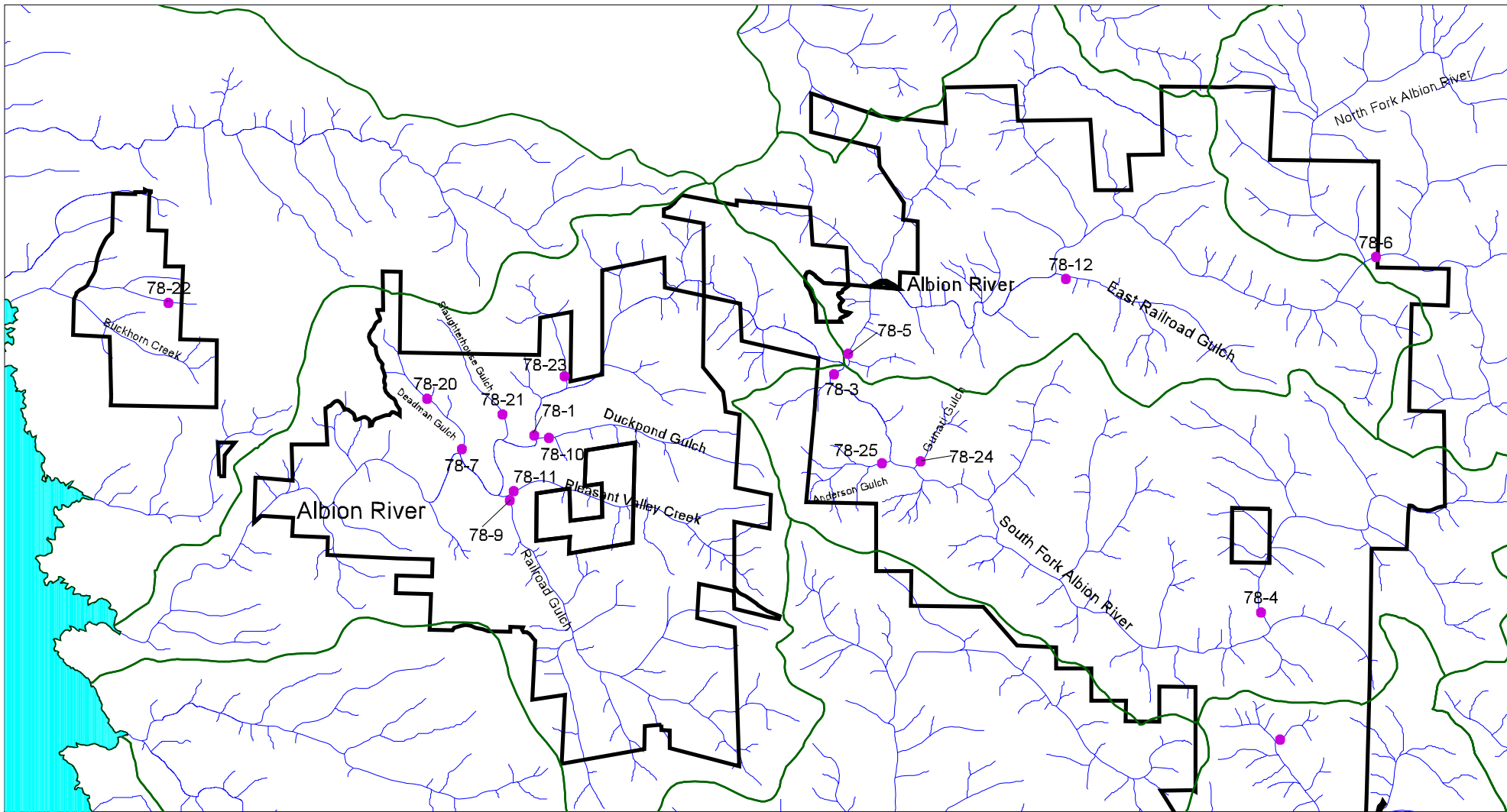
Albion River Management Area

Table 5. Maximum, MWAT, and MWMT temperatures for sites in the Albion Area (1992-2001).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Albion River	78-1	1994	20.2	15.5	19.8
Albion River	78-1	1995	17.0	16.6	16.9
Albion River	78-1	1997	19.9	16.8	19.2
Albion River	78-1	1999	19.5	16.4	18.7
Albion River	78-1	2000	20.6	16.2	19.4
Albion River	78-1	2001	21.7	20.3	21.1
SF Albion River	78-3	1993	17.3	16.0	16.6
SF Albion River	78-3	1994	19.6	16.3	16.6
SF Albion River	78-3	1996	17.9	15.8	17.2
SF Albion River	78-3	1997	16.7	15.5	16.2
SF Albion River	78-3	1999	18.0	15.6	17.1
SF Albion River	78-3	2000	18.5	15.8	17.0
SF Albion River	78-3	2001	17.1	14.9	16.4
SF Albion River	78-4	1992	16.2	15.4	15.9
SF Albion River	78-4	1993	17.6	15.5	16.6
SF Albion River	78-4	1994	15.3	14.1	14.9
SF Albion River	78-4	1996	17.4	15.4	16.5
SF Albion River	78-4	1999	17.0	15.1	16.3
SF Albion River	78-4	2000	17.8	14.6	16.9
SF Albion River	78-4	2001	15.2	13.8	14.7
Albion River	78-5	1992	18.0	16.3	17.7
Albion River	78-5	1993	18.0	16.4	17.3
Albion River	78-5	1994	17.5	15.3	16.9
Albion River	78-5	1996	18.0	16.1	17.6
Albion River	78-5	1997	17.9	16.7	17.5
Albion River	78-5	1999	24.1	17.2	23.3
Albion River	78-5	2000	19.1	16.0	17.5
Albion River	78-5	2001	18.0	16.1	17.2
Albion River	78-6	1993	18.0	16.1	17.2
Albion River	78-6	1994	17.0	15.2	16.9
Albion River	78-6	1996	18.2	16.0	17.3
Albion River	78-6	1997	16.8	16.0	16.4
Albion River	78-6	2000	18.2	16.1	17.1
Deadman Gulch	78-7	2001	14.2	13.3	13.8
Trib. to Albion	78-8	2000	15.6	14.0	15.1

Railroad Gulch	78-9	2001	15.6	14.1	15.1
Duckpond Gulch	78-10	2001	21.7	16.7	20.5
Pleasant Valley Creek	78-11	2001	14.8	13.8	14.4
East Railroad Gulch	78-12	1993	15.7	14.5	15.3
Deadman Gulch	78-20*	2001	13.7	12.8	13.3
Slaughterhouse Gulch	78-21*	2001	13.7	13.0	13.5
Trib. To Buckhorn Creek	78-22*	2001	13.3	12.5	12.8
Trib. To Albion River	78-23*	2001	14.5	13.4	14.1
Gunari Gulch	78-24*	2001	14.5	13.7	14.2
Anderson Gulch	78-25*	2001	13.7	13.2	13.4
*Class II Streams					

Map 6. Albion River Stream Temperature Sites



Mendocino Redwood Company, LLC



1:65000

- Temperature Sites
- Pacific Ocean
- Planning Watershed
- MRC Property
- ▲ Streams



Figure 64. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Albion River (Site 78-1), Mendocino County, California.

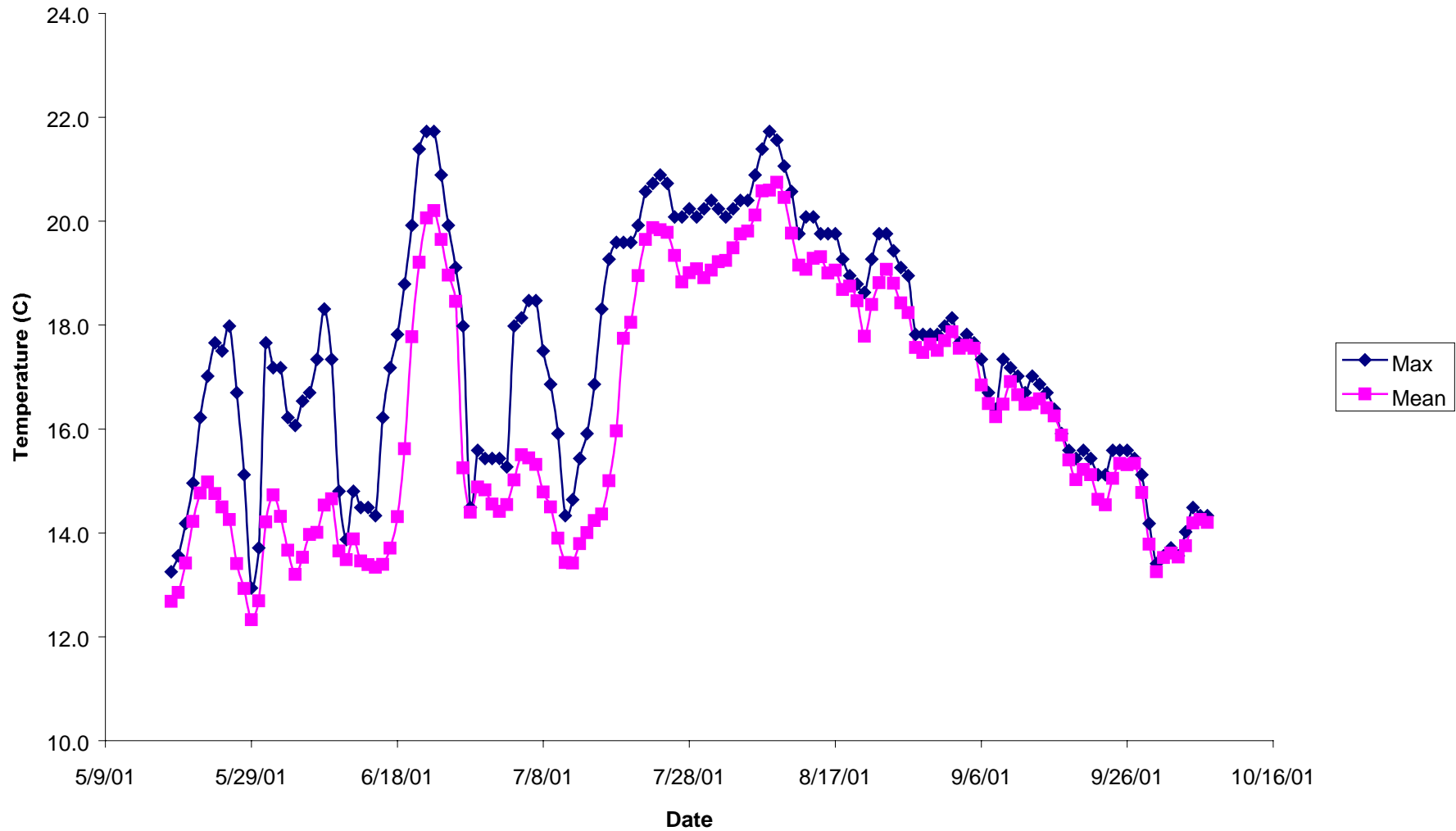


Figure 65. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Albion River (78-3), Mendocino County, California.

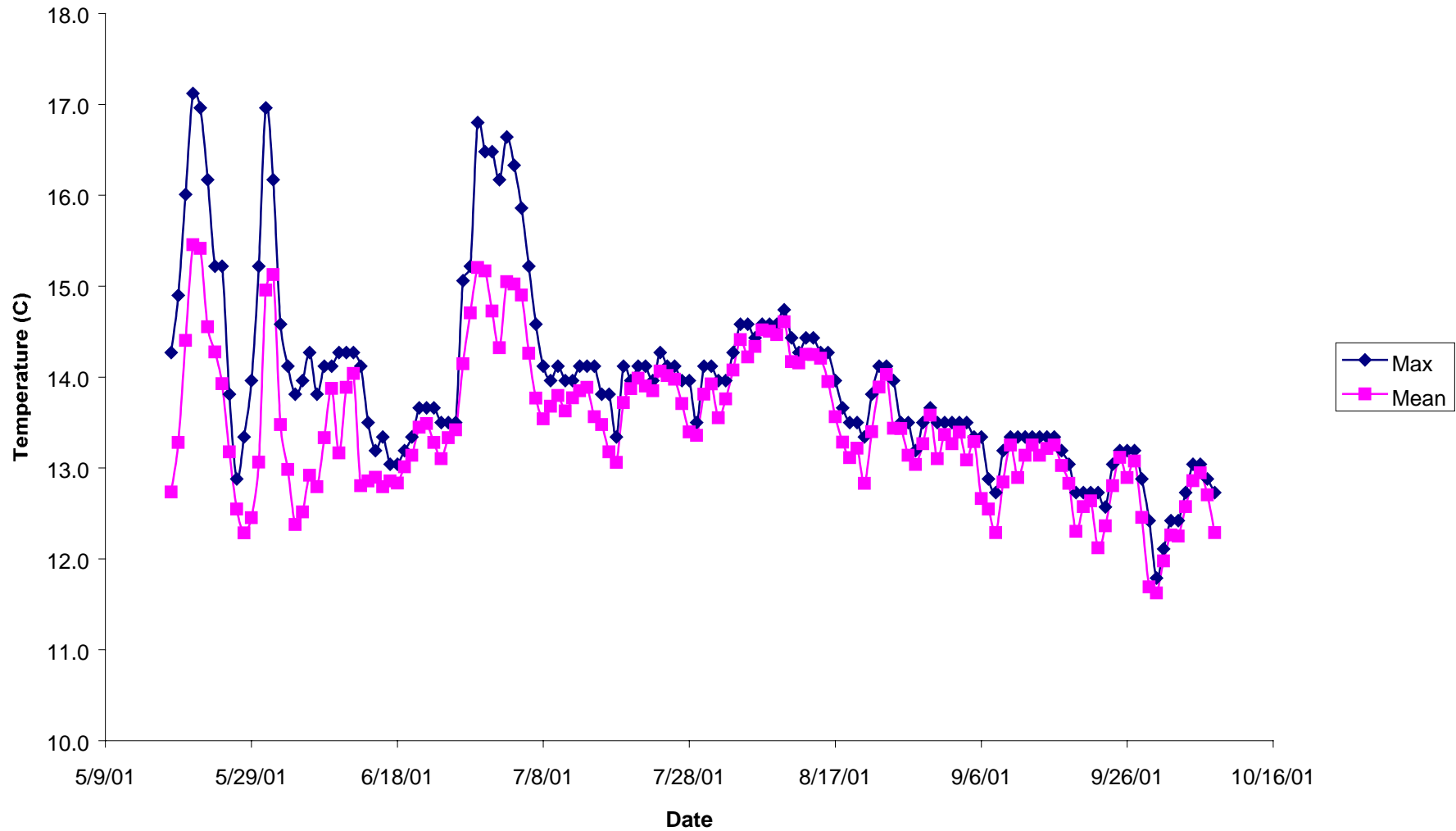


Figure 66. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Albion River (Site 78-4), Mendocino County, California.

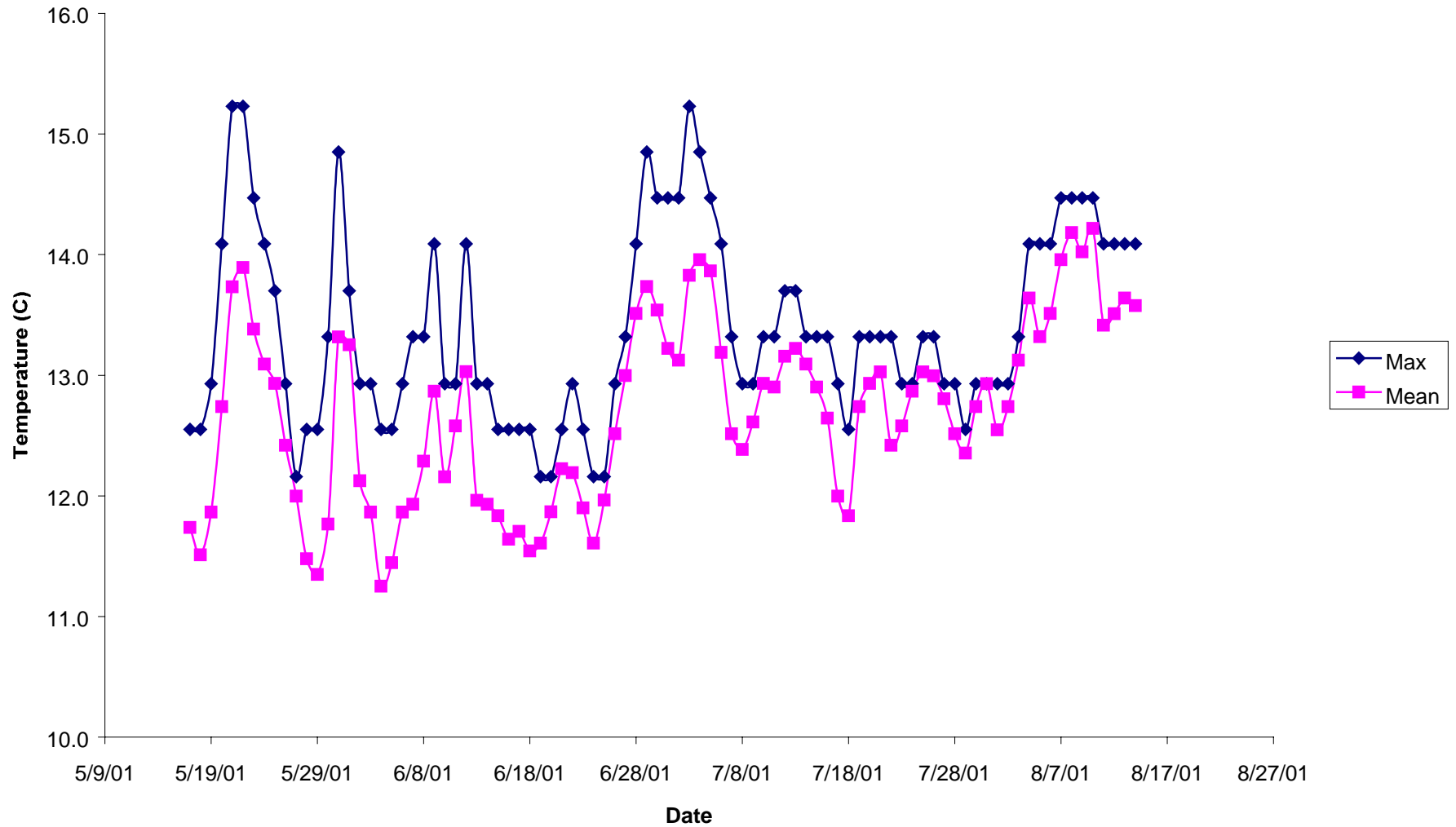


Figure 67. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Albion River (Site 78-5), Mendocino County, California.

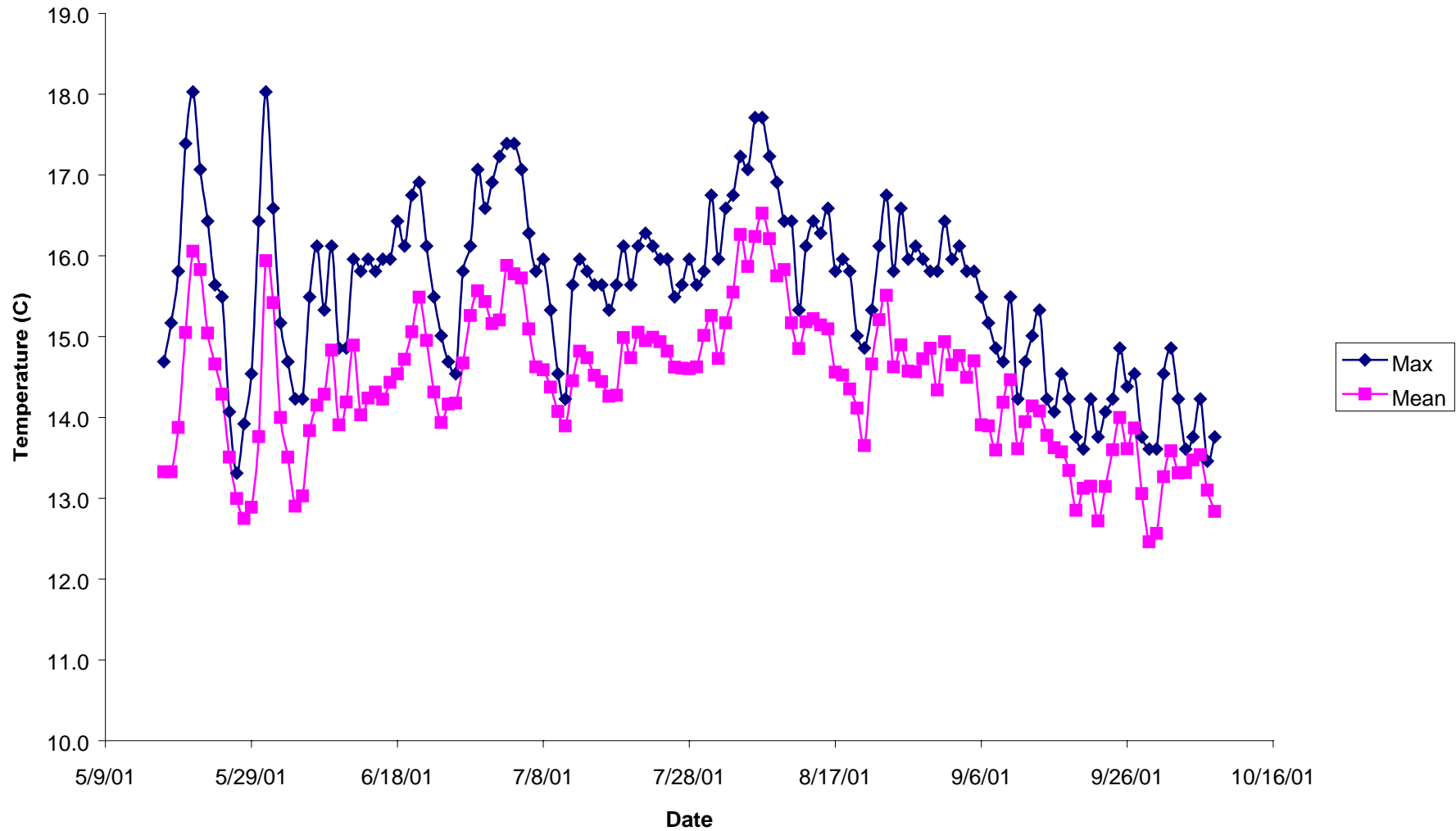


Figure 68. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Deadman Gulch (Site 78-7), Mendocino County, California.

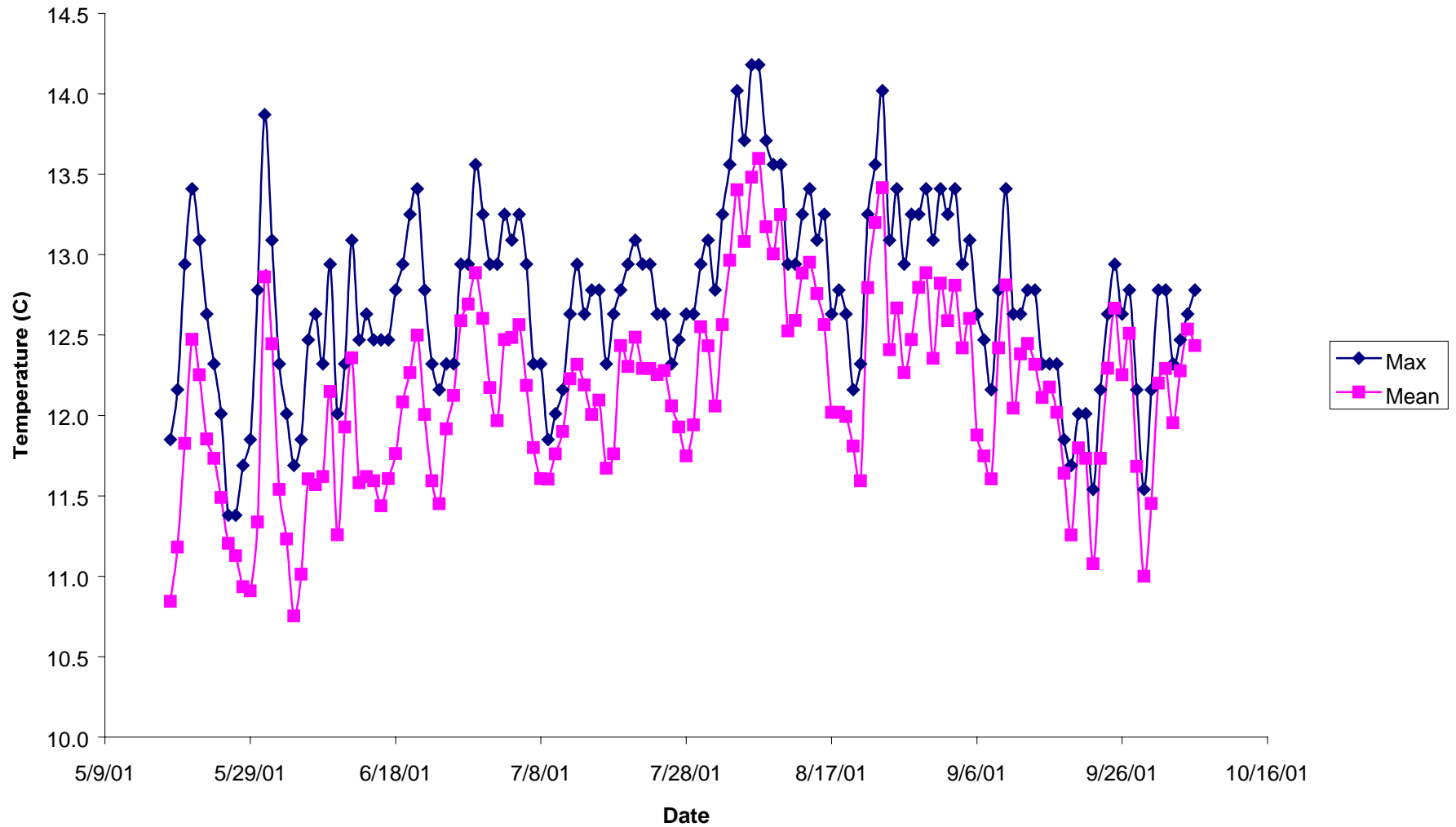


Figure 69. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Railroad Gulch (Site 78-9), Mendocino County, California.

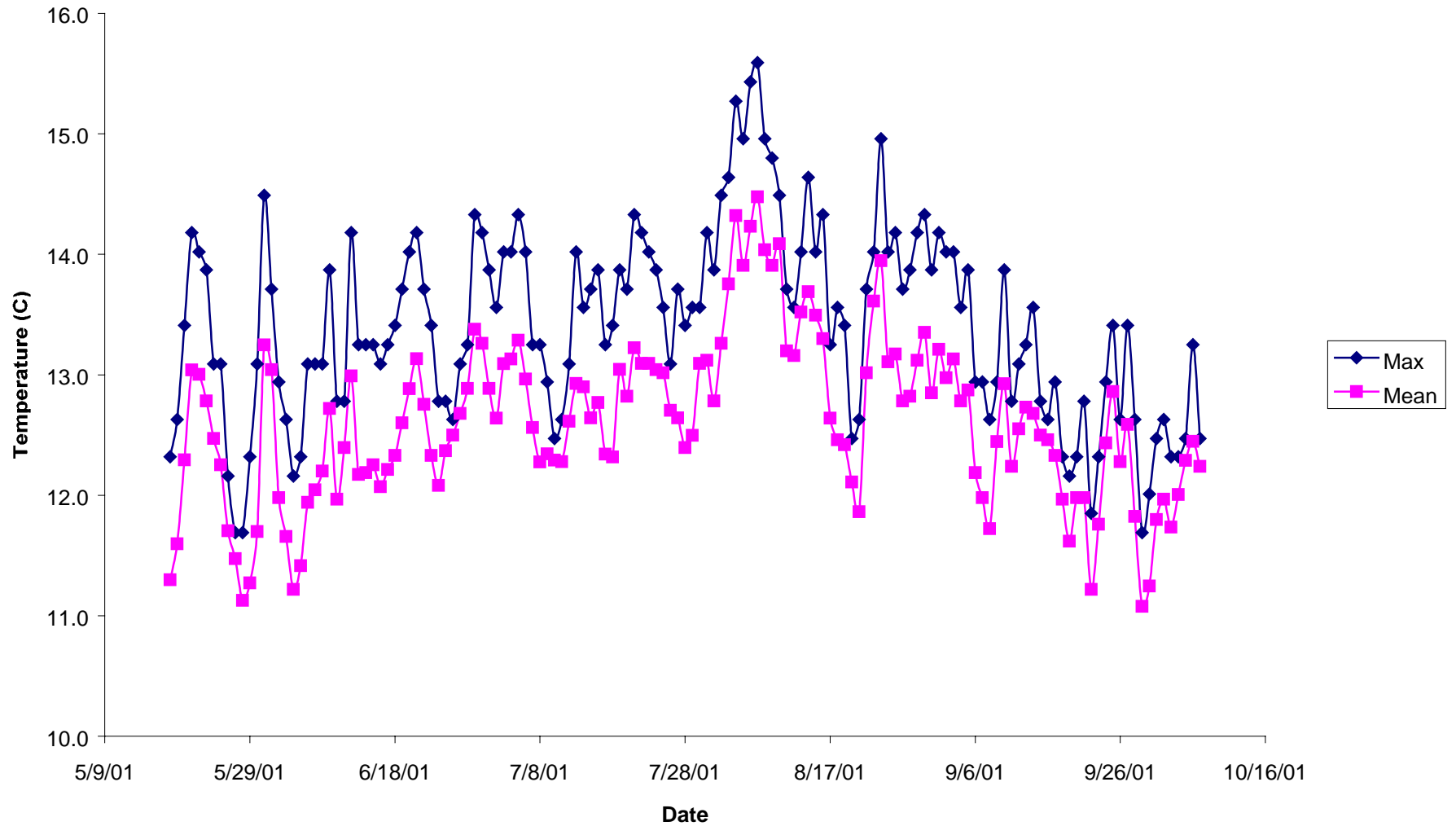


Figure 70. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Duckpond Gulch (78-10), Mendocino County, California.

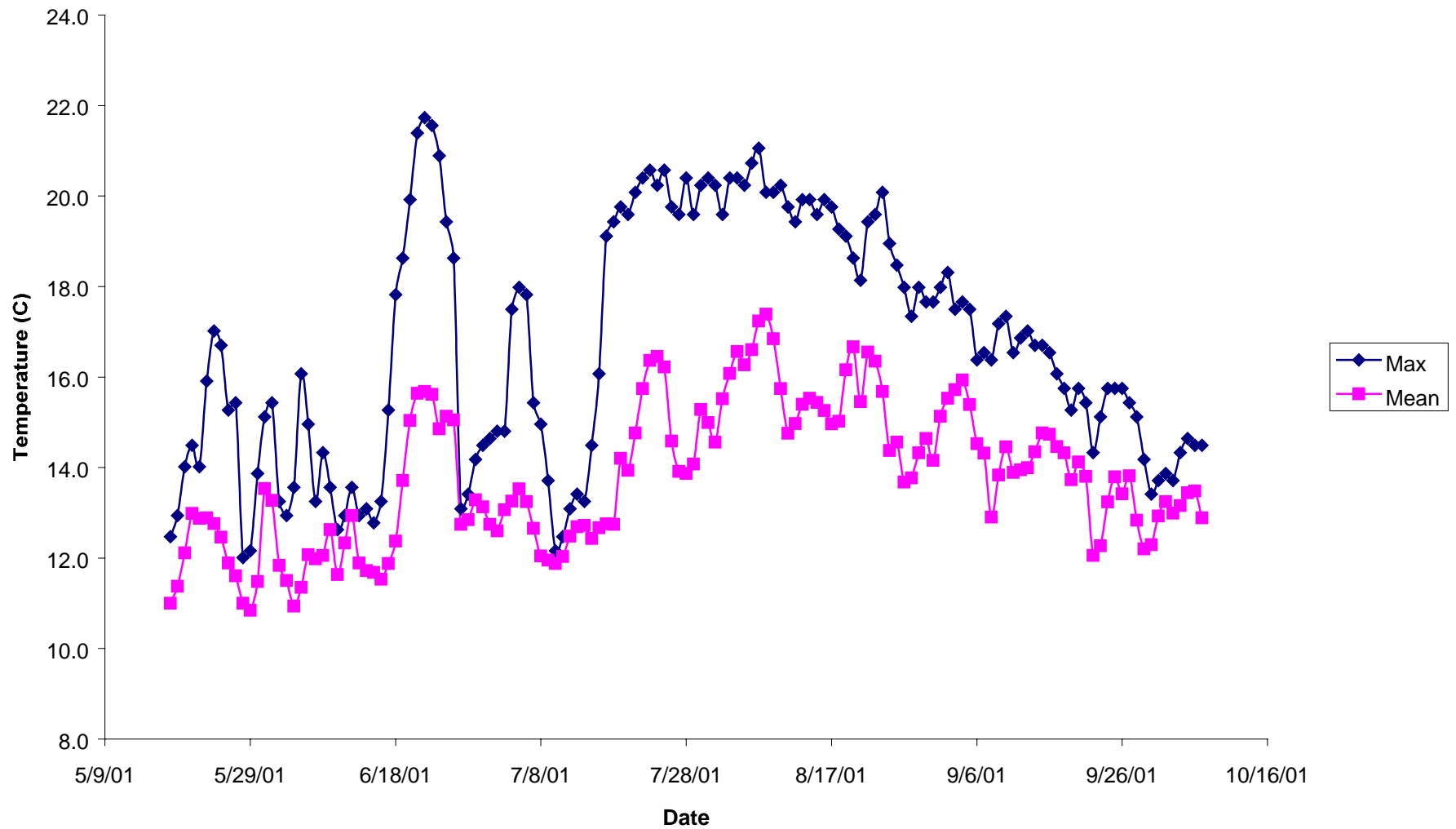


Figure 71. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Pleasant Valley Creek (Site 78-11), Mendocino County, California.

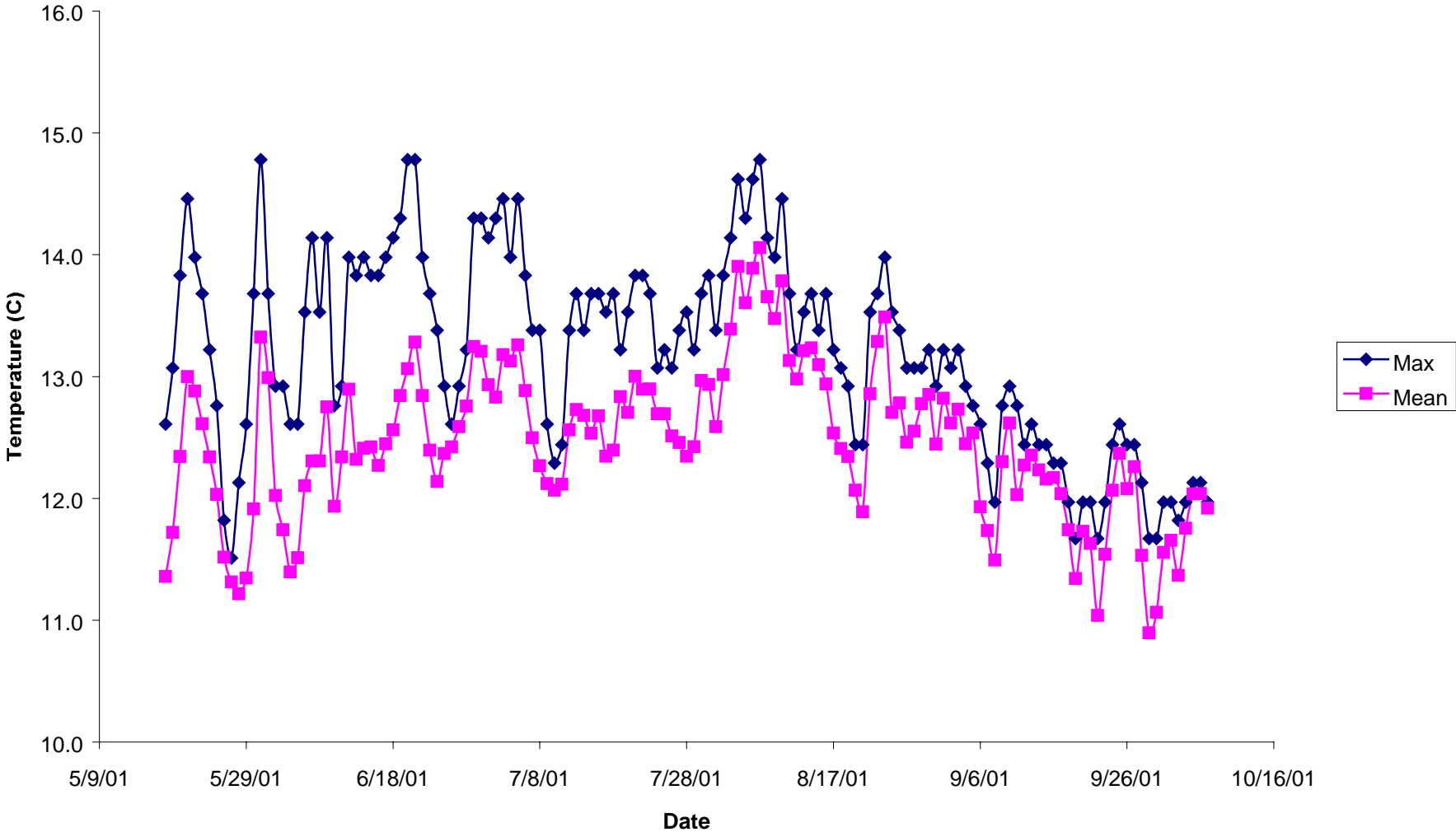


Figure 72. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Deadman Gulch (Site 78-20), Mendocino County, California.

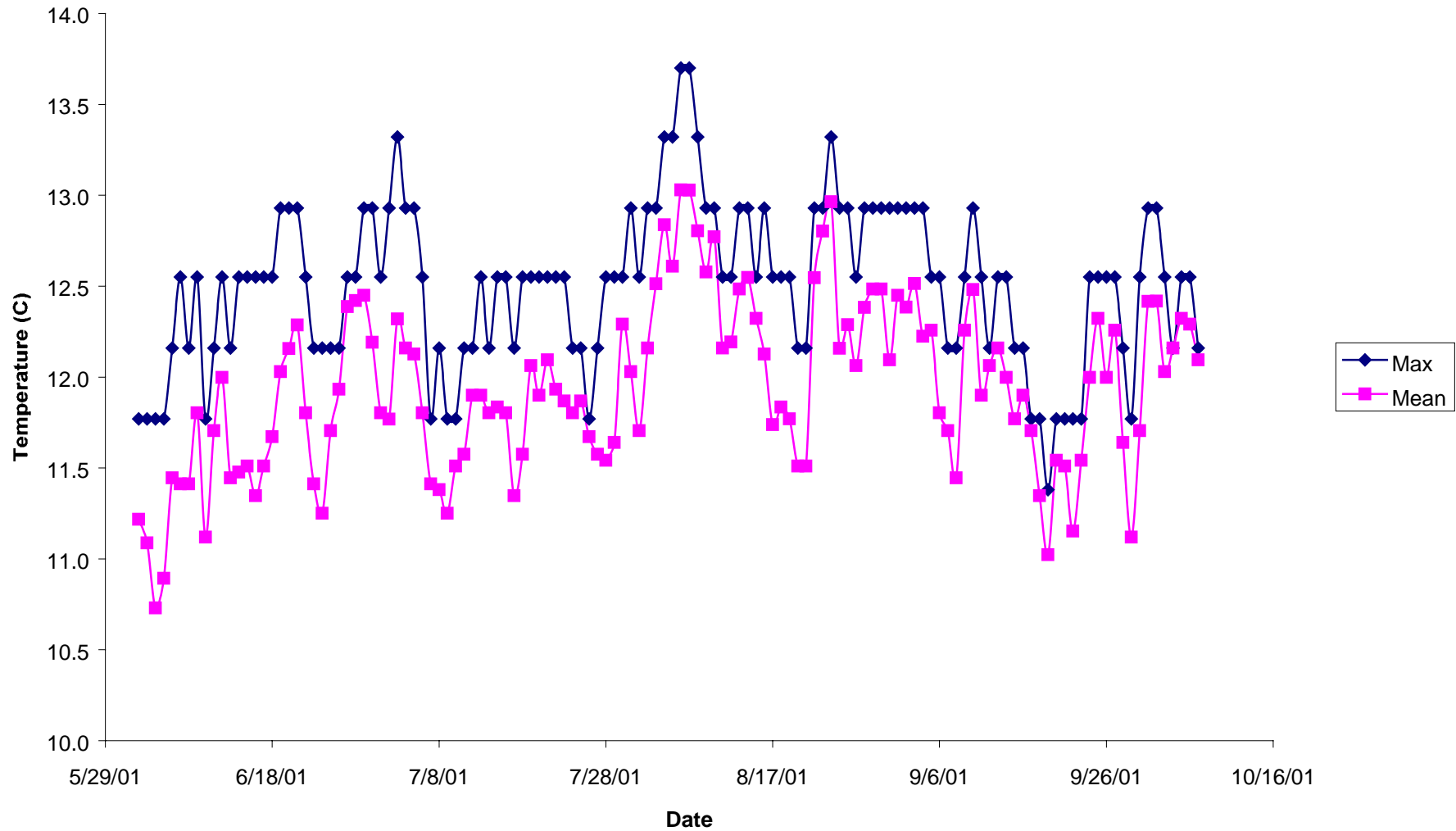


Figure 73. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Slaughterhouse Gulch (Site 78-21), Mendocino County, California.

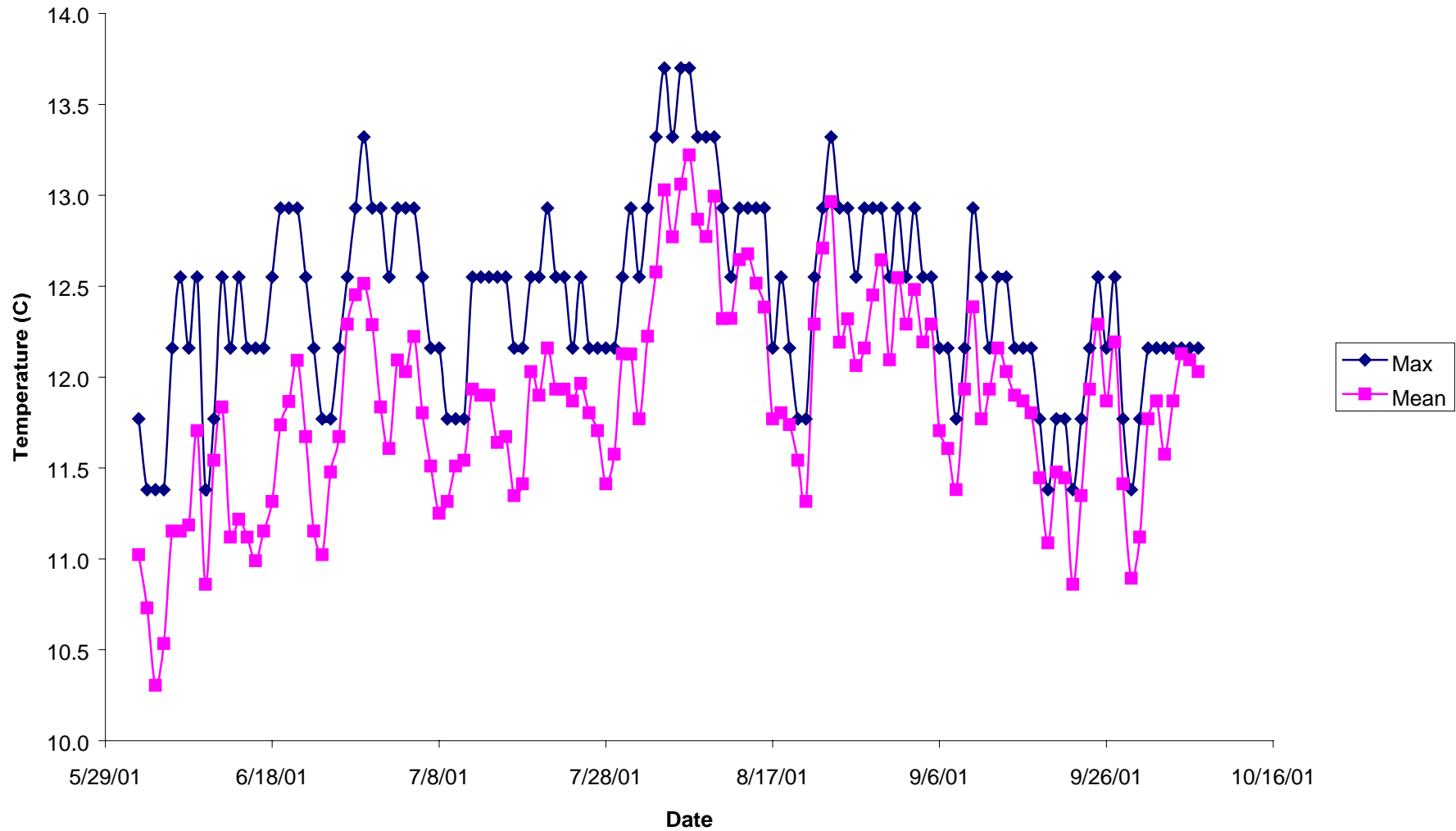


Figure 74. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Buckhorn Creek (Site 78-22), Mendocino County, California.

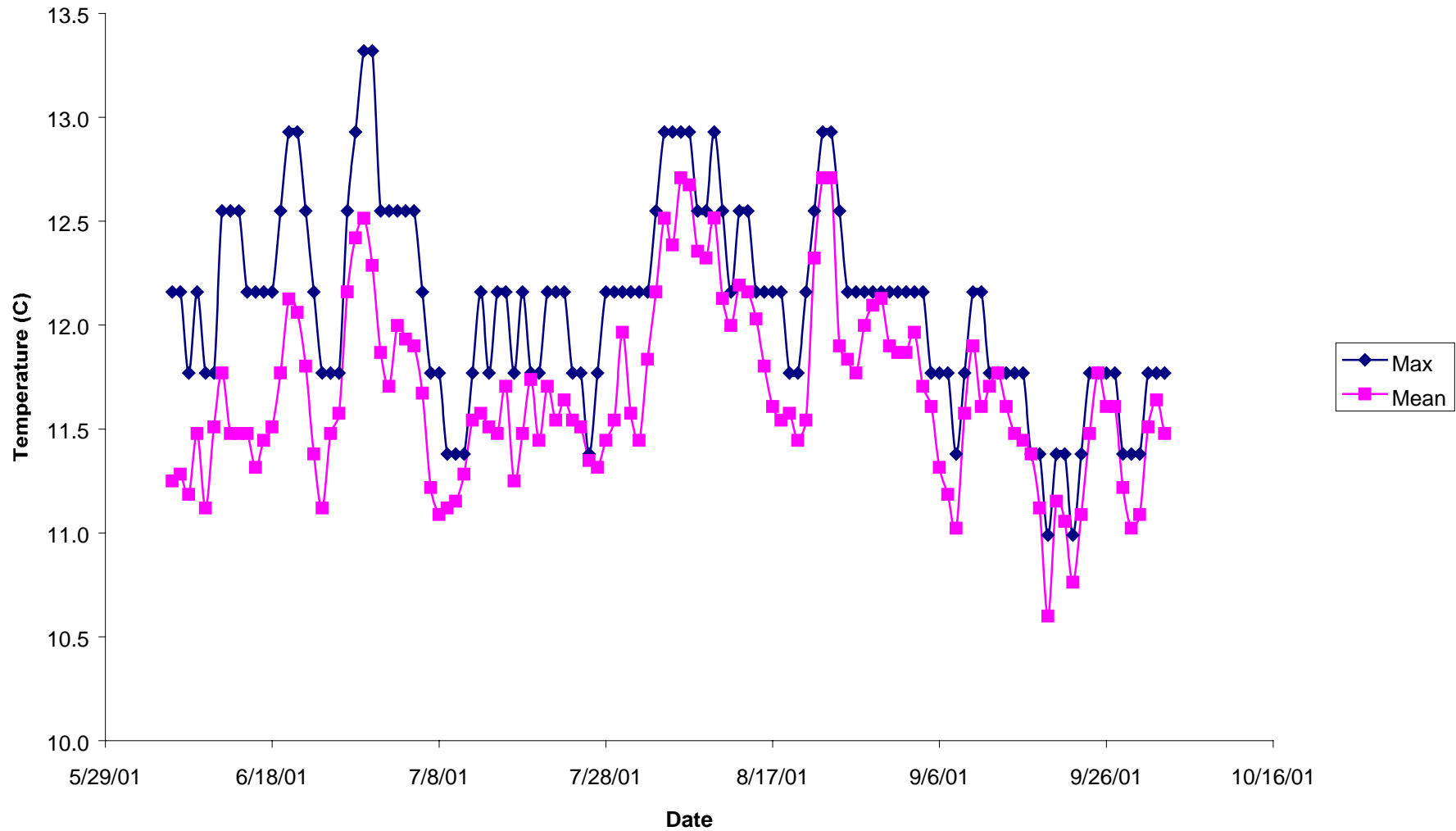


Figure 75. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Unnamed Tributary to Albion River (Site 78-23), Mendocino County, California.

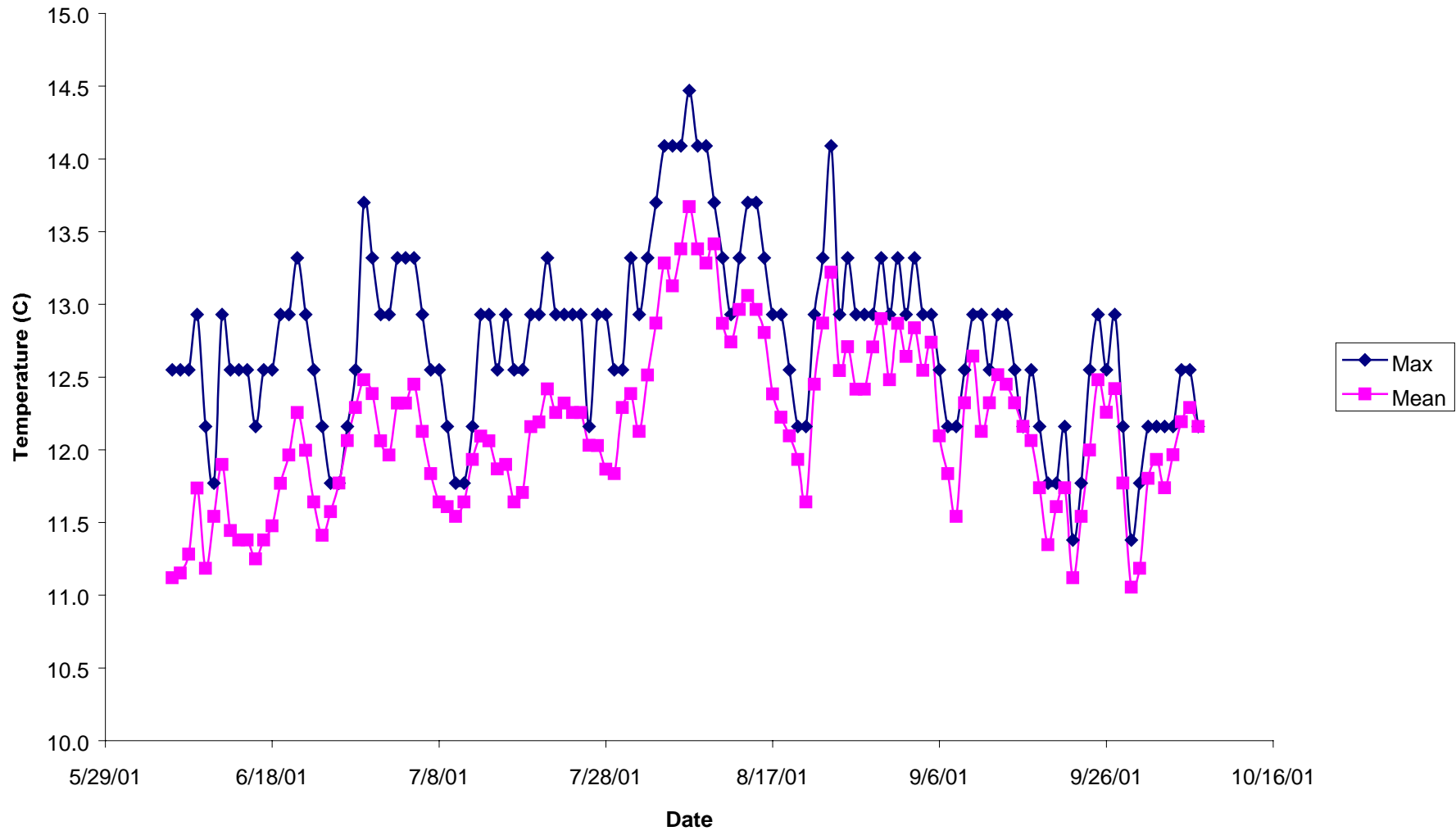


Figure 76. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Gunari Gulch (Site 78-24), Mendocino County, California.

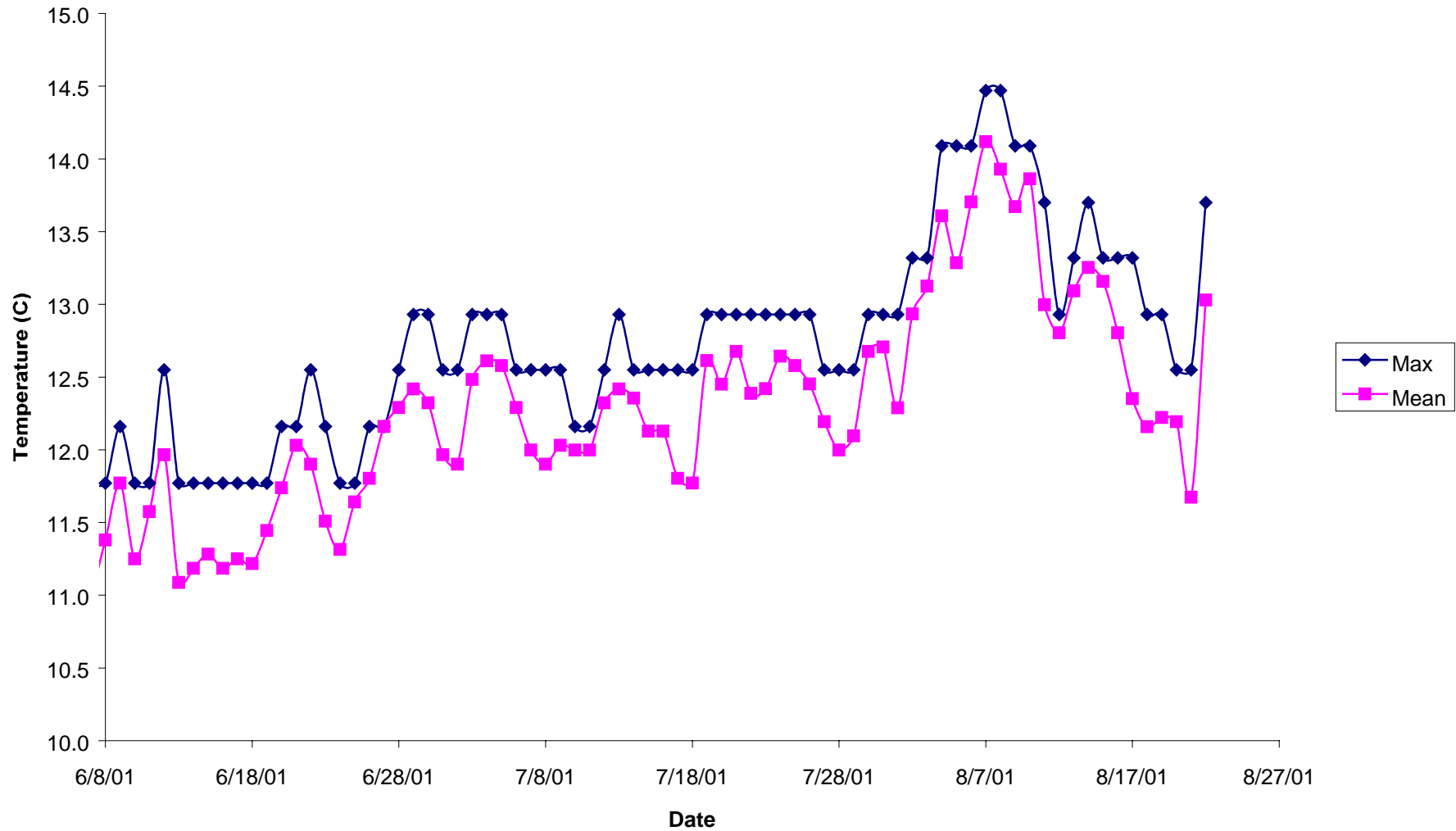
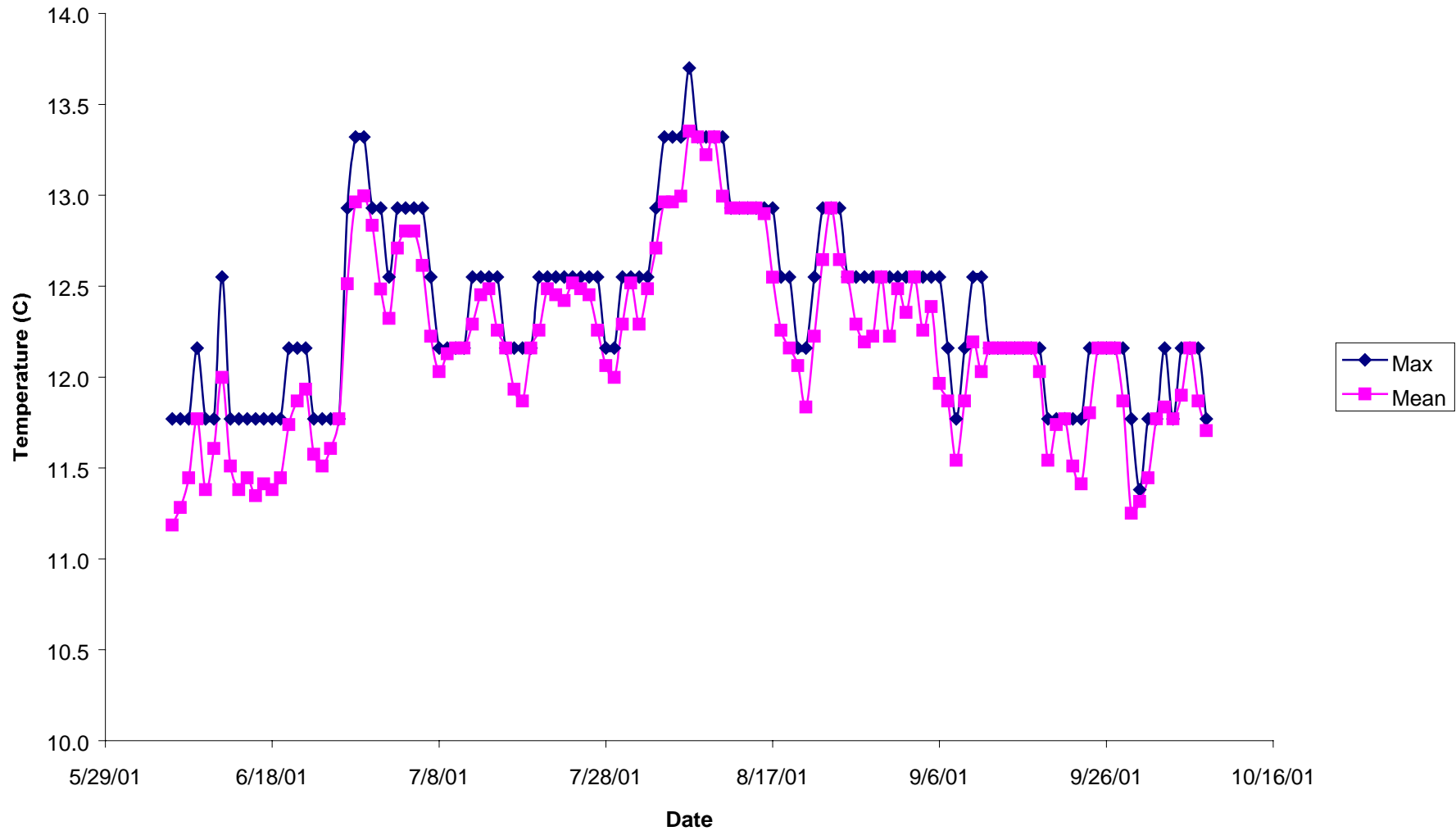


Figure 77. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Anderson Gulch (Site 78-25), Mendocino County, California.



Navarro River Management Area

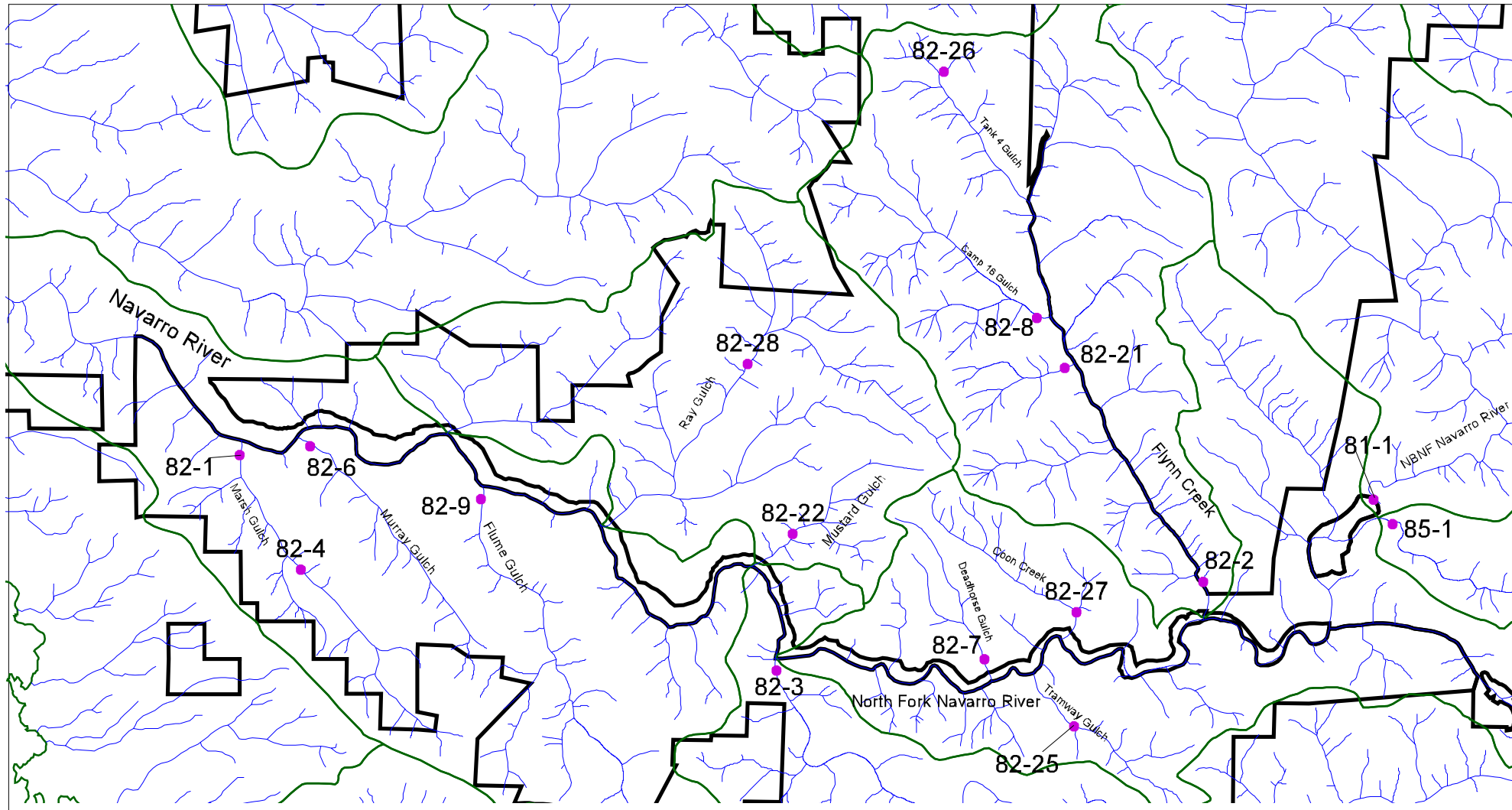
Table 6. Maximum, MWAT, and MWMT temperatures for sites in the Navarro Area (1997-2000).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
North Branch NF Navarro River	81-1	1992	21.5	18.7	20.8
North Branch NF Navarro River	81-1	1993	22.5	18.7	21.1
North Branch NF Navarro River	81-1	1994	19.1	17.6	18.8
North Branch NF Navarro River	81-1	1995	21.2	19.4	20.9
North Branch NF Navarro River	81-1	1999	20.6	18.6	20.2
North Branch NF Navarro River	81-1	2000	21.8	19.0	21.4
North Branch NF Navarro River	81-1	2001	20.7	18.1	20.1
John Smith Creek	81-2	1989	19.5	17.0	18.9
John Smith Creek	81-2	1990	22.5	18.9	21.2
John Smith Creek	81-2	1991	19.0	16.8	18.3
John Smith Creek	81-2	1992	19.0	16.2	18.4
John Smith Creek	81-2	1993	18.5	16.7	17.9
John Smith Creek	81-2	1994	17.5	15.2	17.1
John Smith Creek	81-2	1997	20.0	16.8	19.4
John Smith Creek	81-2	1999	17.8	15.7	17.0
John Smith Creek	81-2	2000	18.0	16.3	17.8
North Branch NF Navarro River	81-3	1992	21.5	18.7	20.8
North Branch NF Navarro River	81-3	1993	22.5	18.7	21.1
North Branch NF Navarro River	81-3	1994	20.5	17.5	20.2
North Branch NF Navarro River	81-3	1995	22.3	18.6	21.5
North Branch NF Navarro River	81-3	1999	20.9	17.1	19.9
North Branch NF Navarro River	81-3	2000	21.5	18.0	20.6
North Branch NF Navarro River	81-3	2001	19.7	16.6	19.2
John Smith Creek	81-4	1989	22.5	19.3	21.8
John Smith Creek	81-4	1991	21.5	17.4	20.4
Sheep Gulch	81-5	2001	13.9	12.8	13.2
Marsh Gulch	82-1	1989	18.0	15.8	17.5
Marsh Gulch	82-1	1991	15.5	13.8	14.7
Marsh Gulch	82-1	1992	16.0	14.5	15.7
Marsh Gulch	82-1	1993	15.5	14.1	14.9
Marsh Gulch	82-1	1994	15.0	13.0	14.5
Marsh Gulch	82-1	1999	15.0	13.6	14.6
Marsh Gulch	82-1	2000	15.9	13.7	14.6
Marsh Gulch	82-1	2001	15.1	13.8	14.8
Flynn Creek	82-2	1993	18.0	16.5	17.4

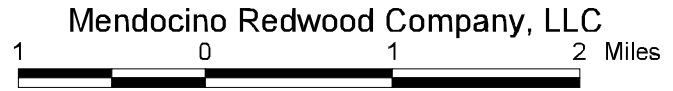
Flynn Creek	82-2	1994	16.5	14.5	15.9
Flynn Creek	82-2	1997	18.1	16.1	17.7
Flynn Creek	82-2	1999	21.4	18.3	20.5
Flynn Creek	82-2	2000	19.1	16.6	18.4
Flynn Creek	82-2	2001	16.7	14.9	16.0
Navarro River	82-3	1989	26.5	22.6	25.8
Navarro River	82-3	1990	27.5	22.6	25.9
Navarro River	82-3	1991	25.0	21.2	24.1
Navarro River	82-3	1992	24.0	21.2	23.4
Navarro River	82-3	1993	24.5	21.4	23.0
Navarro River	82-3	1994	23.5	19.7	22.7
Navarro River	82-3	1999	24.2	21.1	23.1
Navarro River	82-3	2000	25.4	21.8	24.1
Navarro River	82-3	2001	23.7	20.4	23.1
Marsh Gulch	82-4	1989	15.0	14.4	14.6
Navarro River	82-5	1989	28.0	20.9	27.4
Navarro River	82-5	1990	29.5	23.8	28.4
Navarro River	82-5	1991	28.5	22.3	27.3
Navarro River	82-5	1992	26.5	21.8	25.6
Navarro River	82-5	2001	25.7	21.8	23.8
Murray Gulch	82-6	2001	14.3	13.4	14.0
Deadhorse Gulch	82-7	2001	13.3	12.9	13.1
Camp16 Gulch	82-8	2001	15.4	14.8	15.0
Flume Gulch	82-9	2001	14.9	13.6	14.6
Unnamed Tributary to Flynn Creek	82-21*	2001	14.1	13.4	13.8
Mustard Gulch	82-22*	2001	14.5	13.8	14.3
Black Rock Creek	82-23*	2001	16.0	14.9	15.8
Berry Creek	82-24*	2001	14.5	13.5	14.1
Tramway Gulch	82-25*	2001	14.5	13.6	14.1
Tank 4 Gulch	82-26*	2001	12.6	12.3	12.4
Coon Creek	82-27*	2001	14.1	13.7	14.0
Ray Gulch	82-28*	2001	13.7	13.3	13.5
South Branch NF Navarro River	85-1	1995	23.1	19.5	21.7
South Branch NF Navarro River	85-1	1996	22.1	19.0	21.1
South Branch NF Navarro River	85-1	1999	20.1	17.8	19.0
South Branch NF Navarro River	85-1	2000	21.2	18.9	20.3
South Branch NF Navarro River	85-1	2001	19.6	17.3	19.0
South Branch NF Navarro River	85-2	1994	24.6	19.8	23.9

South Branch NF Navarro River	85-2	1995	24.4	20.3	22.8
South Branch NF Navarro River	85-2	1996	23.7	20.2	22.6
South Branch NF Navarro River	85-2	1999	21.4	18.3	20.5
South Branch NF Navarro River	85-2	2000	21.9	19.0	21.0
South Branch NF Navarro River	85-2	2001	20.4	17.5	19.5
NF Rose Creek	85-20*	2001	16.8	14.9	15.9
SF Rose Creek	85-21*	2001	14.9	13.8	14.3
North Fork Indian Creek	86-1	1993	26.6	20.5	25.8
North Fork Indian Creek	86-1	1994	27.4	20.1	27.1
North Fork Indian Creek	86-1	1995	25.7	20.3	25.5
North Fork Indian Creek	86-1	1996	27.2	20.8	26.4
North Fork Indian Creek	86-1	2000	24.4	19.5	23.8
North Fork Indian Creek	86-1	2001	26.4	19.6	25.9
North Fork Indian Creek	86-2	1994	26.2	21.4	25.8
North Fork Indian Creek	86-2	1995	24.4	20.4	24.1
North Fork Indian Creek	86-2	1996	24.3	20.6	23.6
North Fork Indian Creek	86-2	1999	20.0	16.7	19.1
North Fork Indian Creek	86-2	2000	24.7	20.2	24.0
North Fork Indian Creek	86-2	2001	23.4	19.6	22.8
West Branch NF Indian Creek	86-20*	2001	16.8	15.0	15.8
Theron's Pond (Class IV)	86-21*	2001	20.2	18.2	19.6
Navarro River	88-1	1990	28.0	23.5	27.5
Navarro River	88-1	1991	26.5	22.3	25.5
Navarro River	88-1	1992	26.0	22.1	25.1
Navarro River	88-1	1993	27.0	21.8	25.9
Navarro River	88-1	1994	25.0	21.2	22.8
Navarro River	88-1	1999	27.1	21.4	25.8
Navarro River	88-1	2000	27.2	22.2	26.5
*Class II Streams					

Map 7. Navarro West Stream Temperature Sites



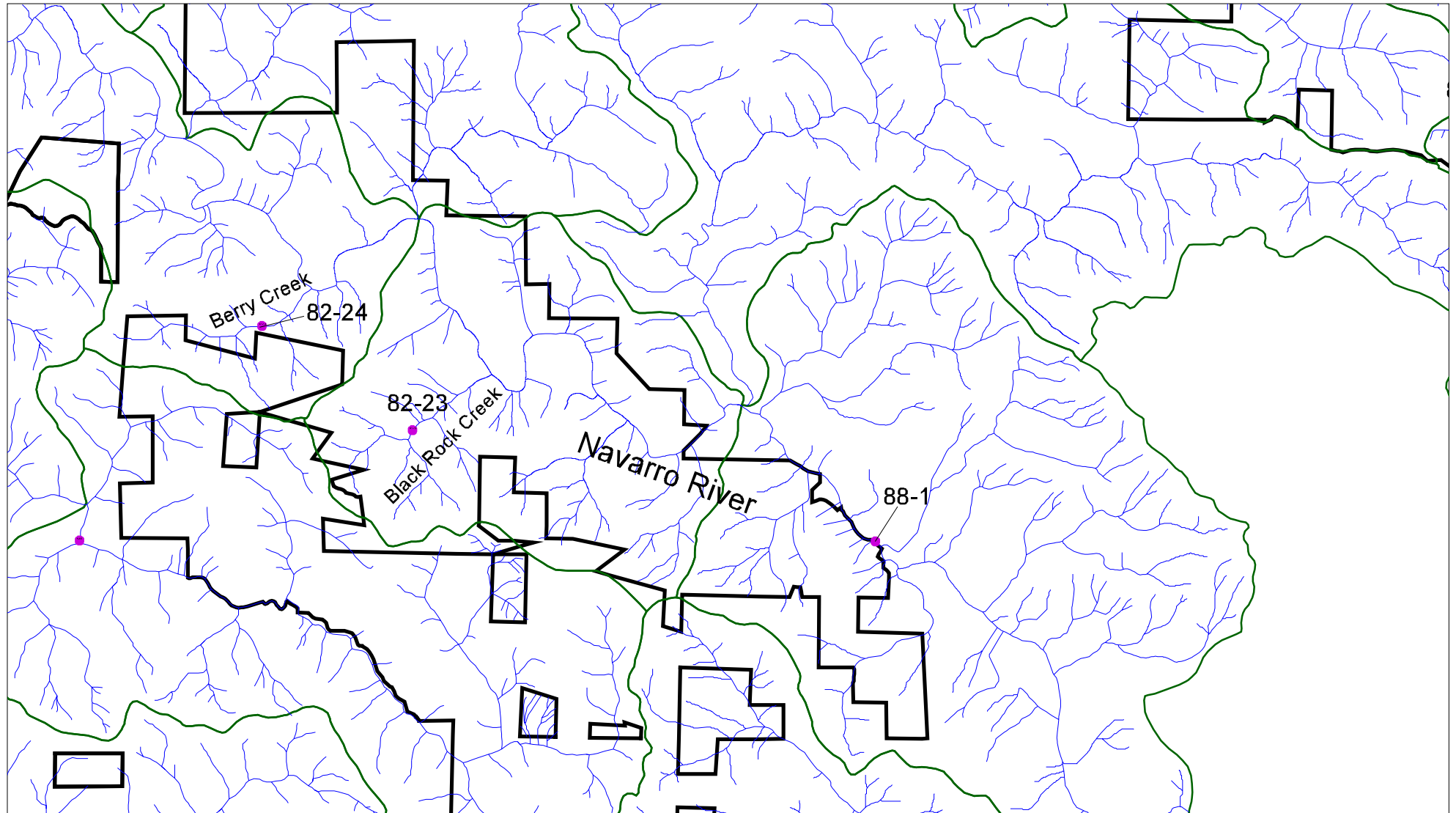
- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property



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Map 10. Upper Navarro West Stream Temperature Sites



Mendocino Redwood Company, LLC

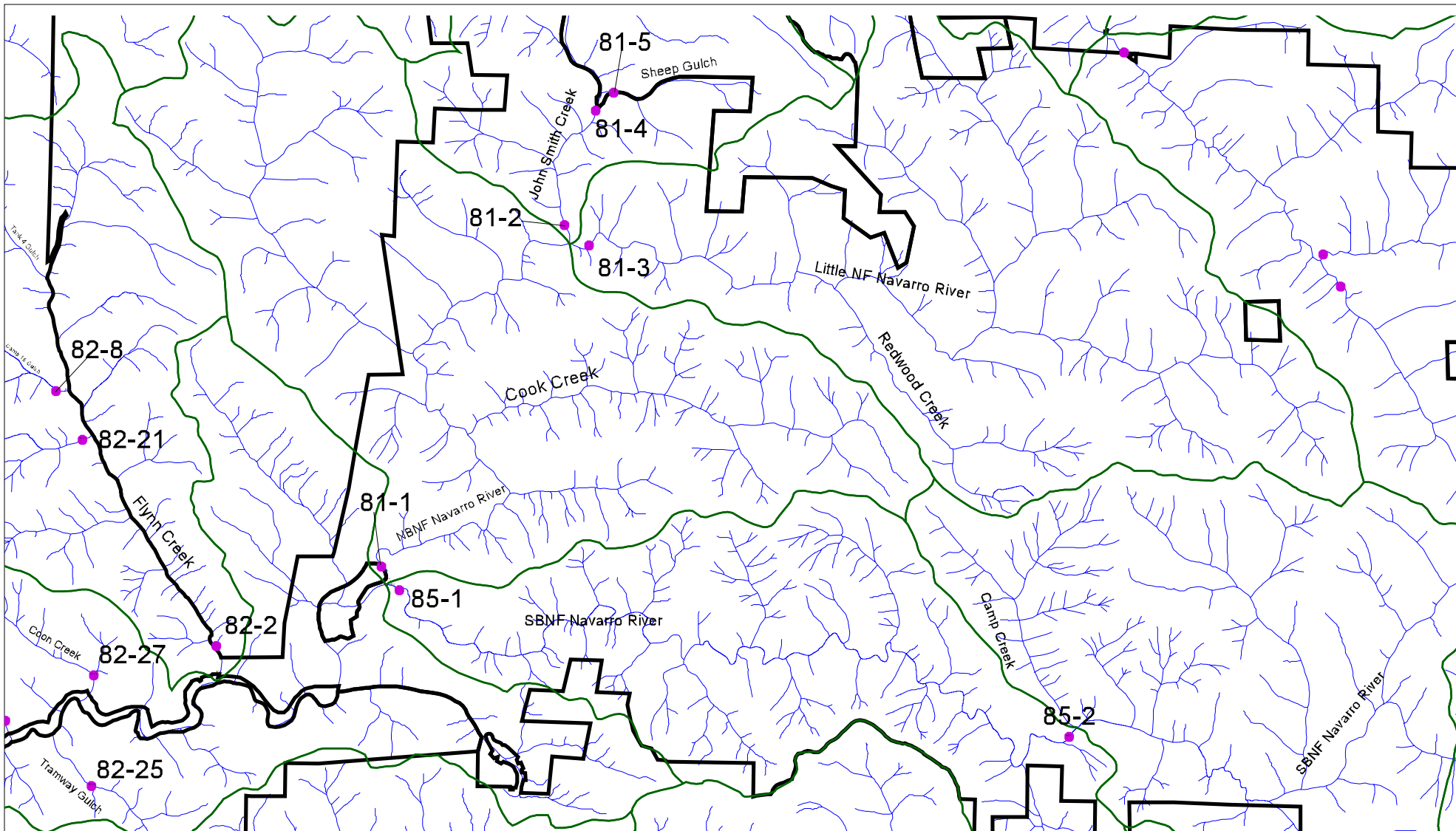
- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property



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Map 8. North Branch North Fork Navarro River Temperature Sites



- Temperature Sites
- ▭ Planning Watershed
- ▭ MRC Property
- ▭ Streams

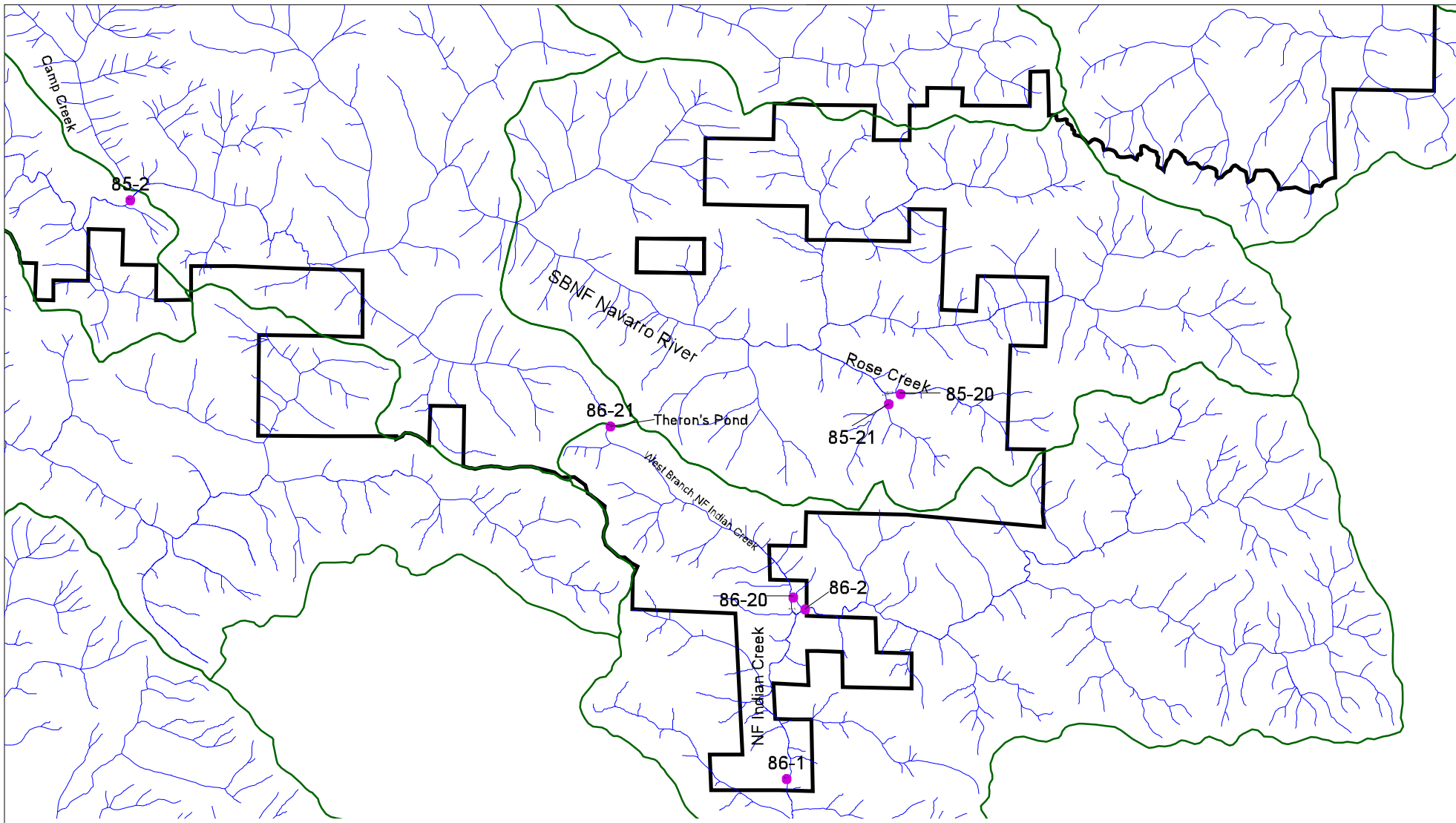
Mendocino Redwood Company, LLC

1 0 1 2 Miles

1:65000



Map 9. Upper South Branch North Fork Navarro Stream Temperature Sites



- Stream Temperatures
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property

Mendocino Redwood Company, LLC
1 0 1 2 Miles

1:65000



Figure 78. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Branch North Fork Navarro River (Site 81-1), Mendocino County, California.

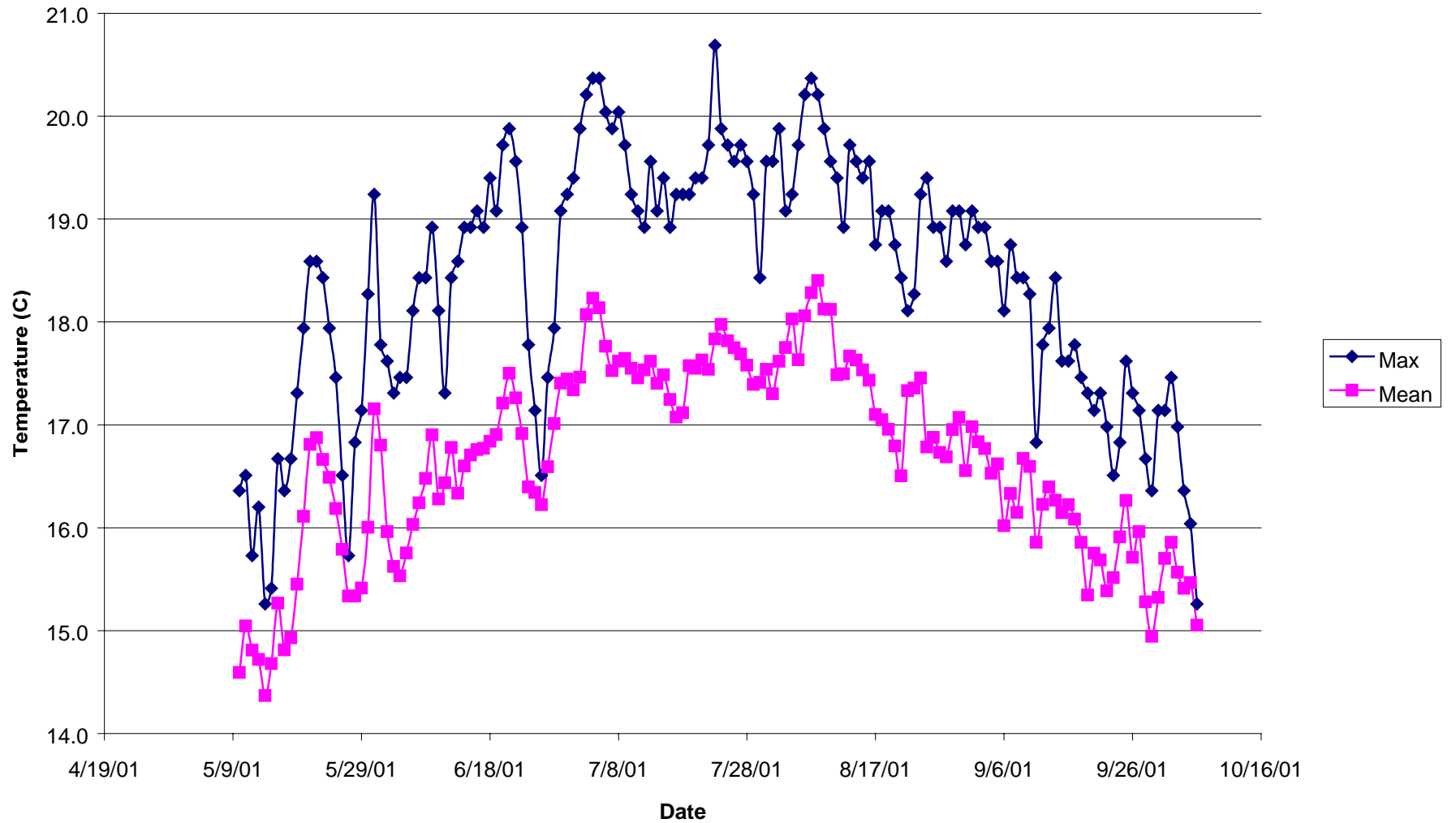


Figure 79. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Branch North Fork Navarro River (Site 81-3), Mendocino County, California.

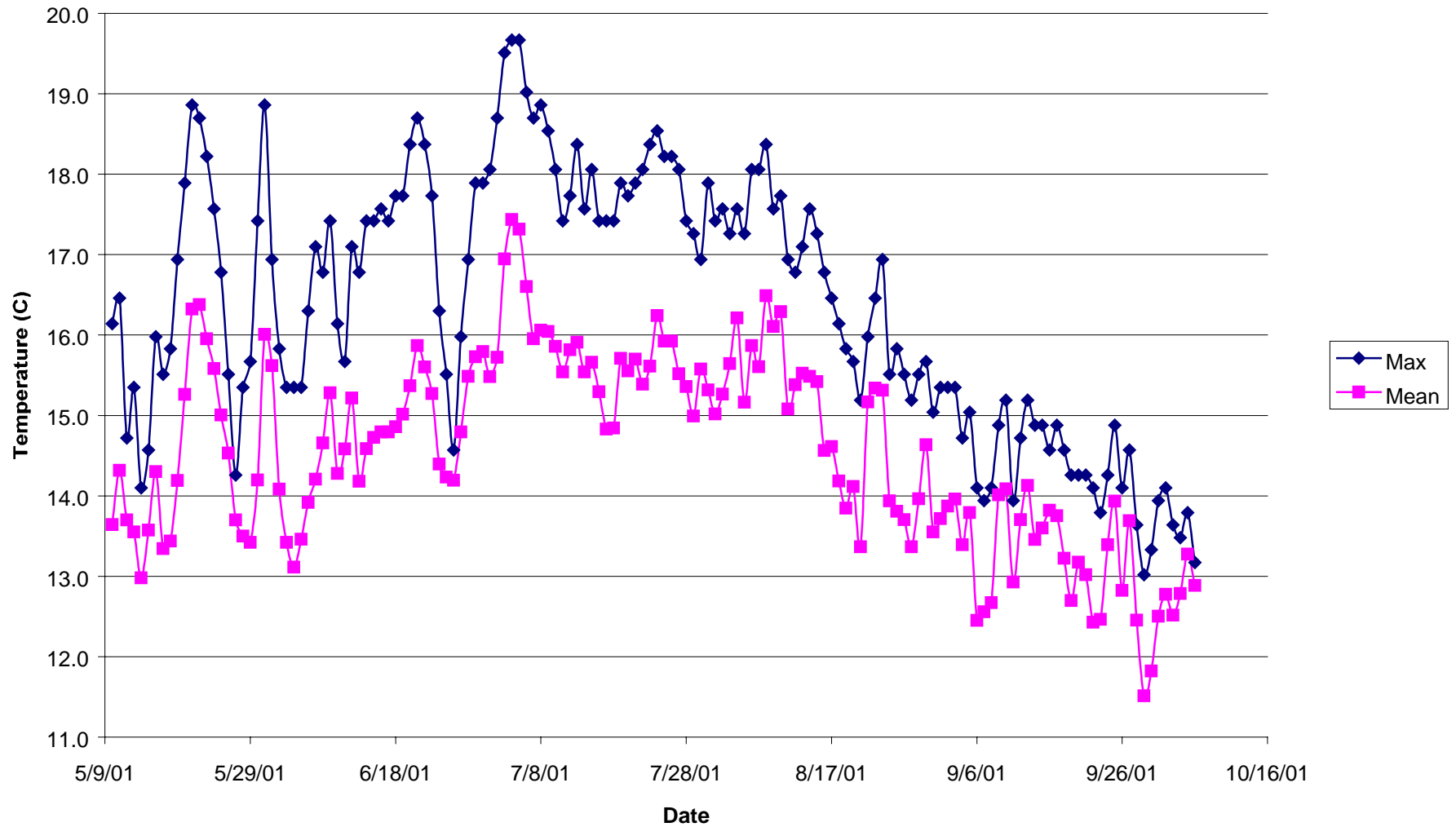


Figure 80. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Sheep Gulch (Site 81-5), Mendocino County, California.

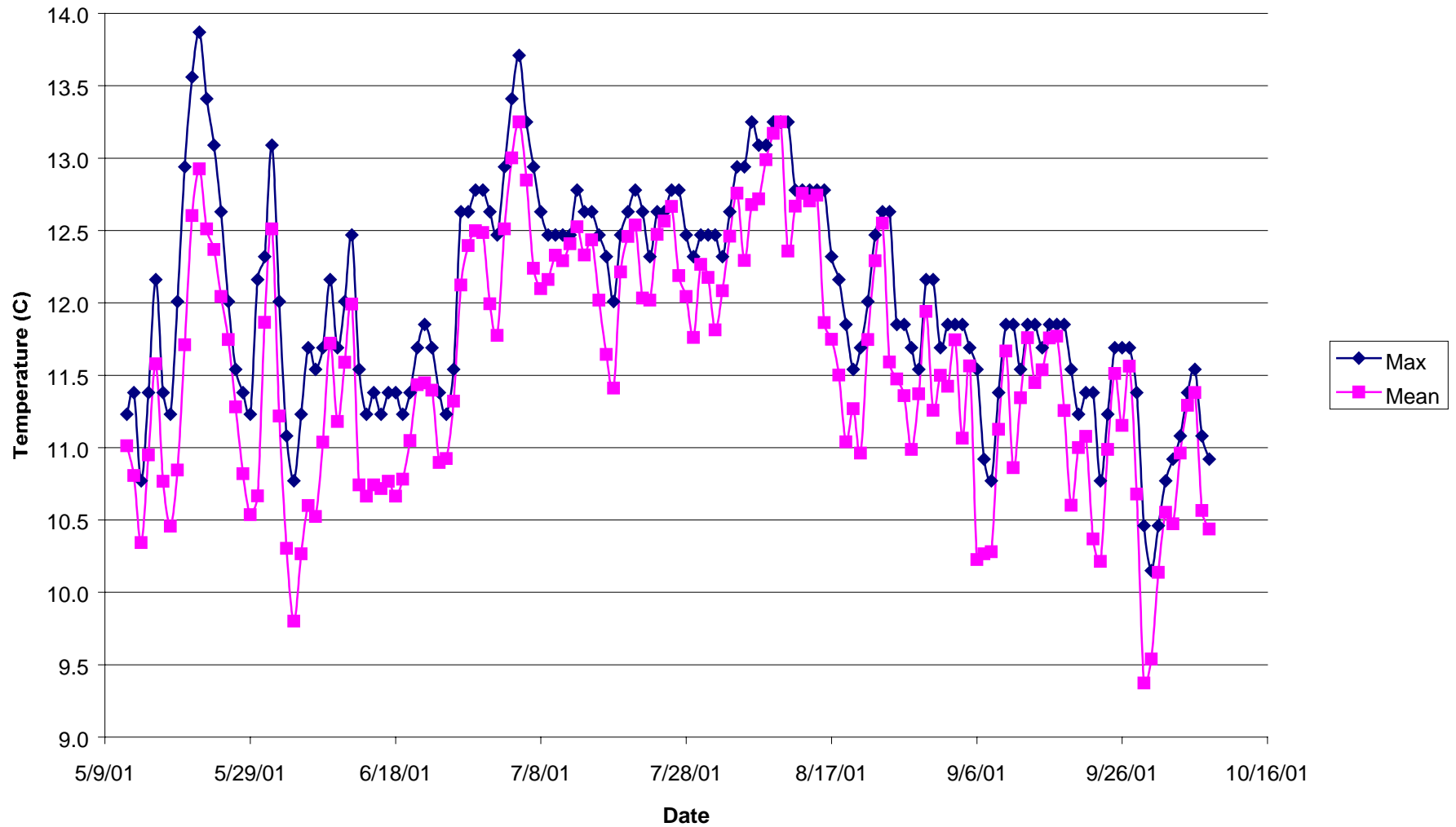


Figure 81. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Marsh Gulch (Site 82-1), Mendocino County, California.

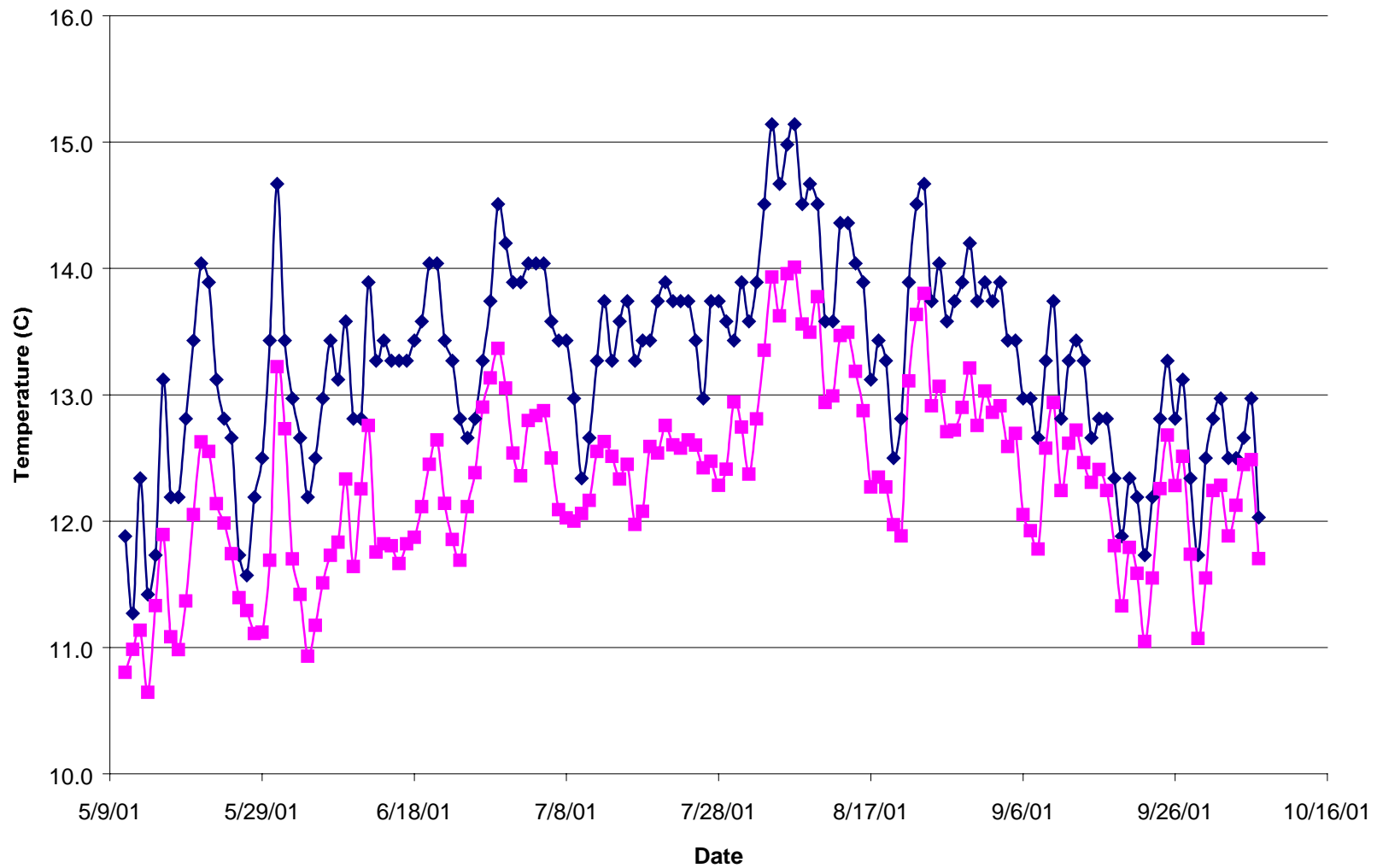


Figure 82. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Flynn Creek (Site 82-2), Mendocino County, California.

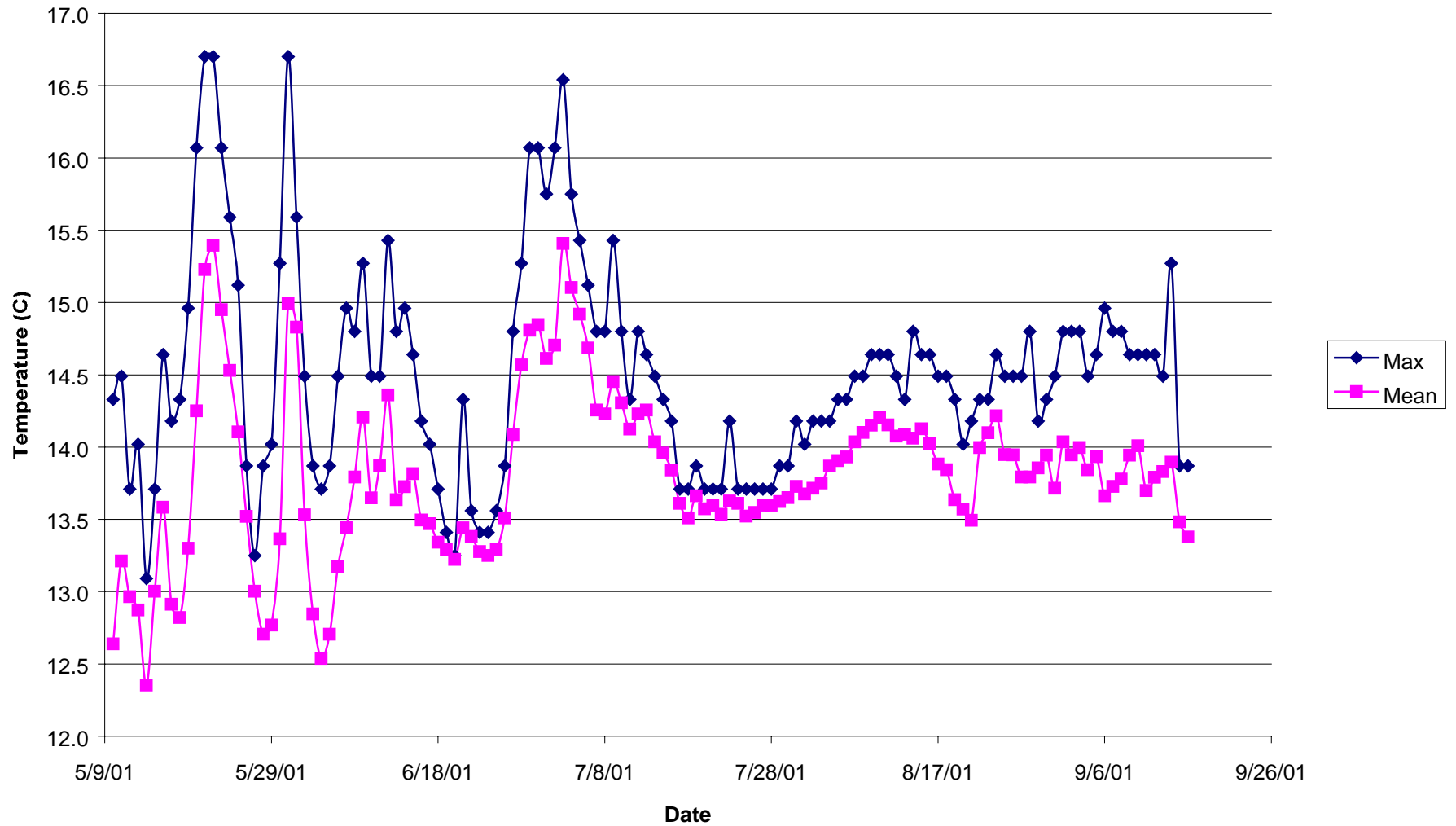


Figure 83. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Navarro River (Site 82-3), Mendocino County, California.

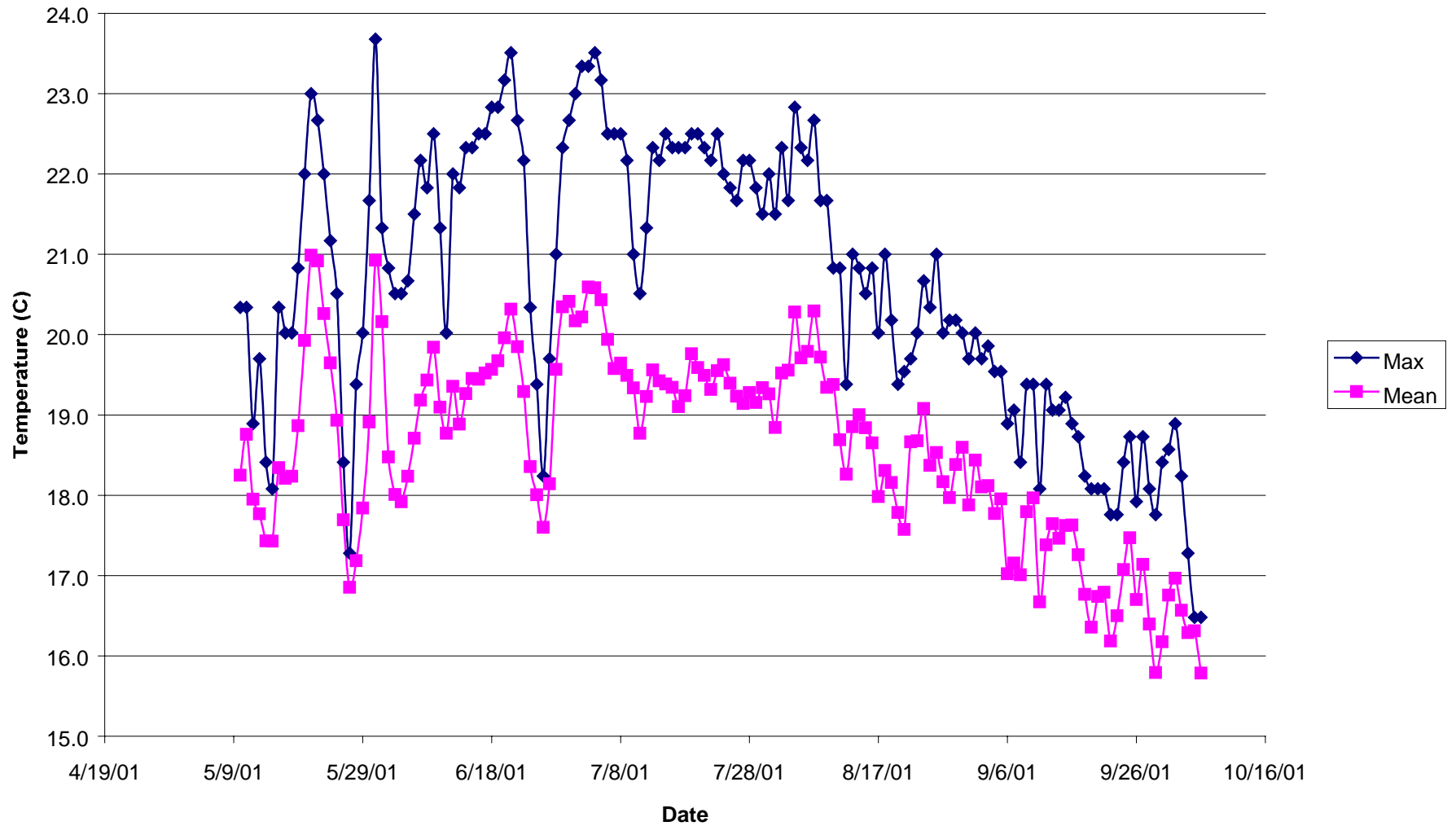


Figure 84. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Navarro River (Site 82-5), Mendocino County, California.

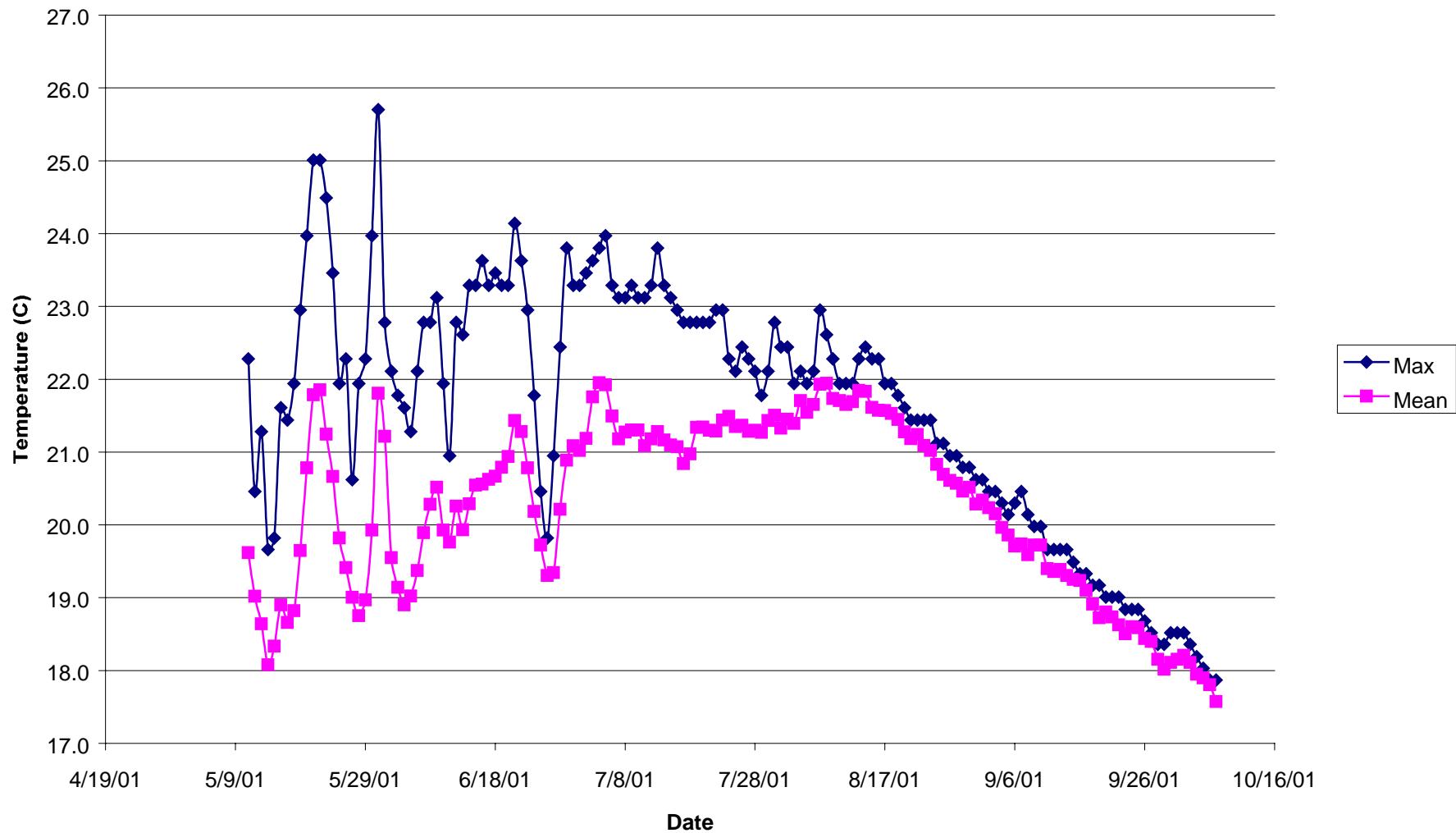


Figure 85. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Murray Gulch (Site 82-6), Mendocino County, California.

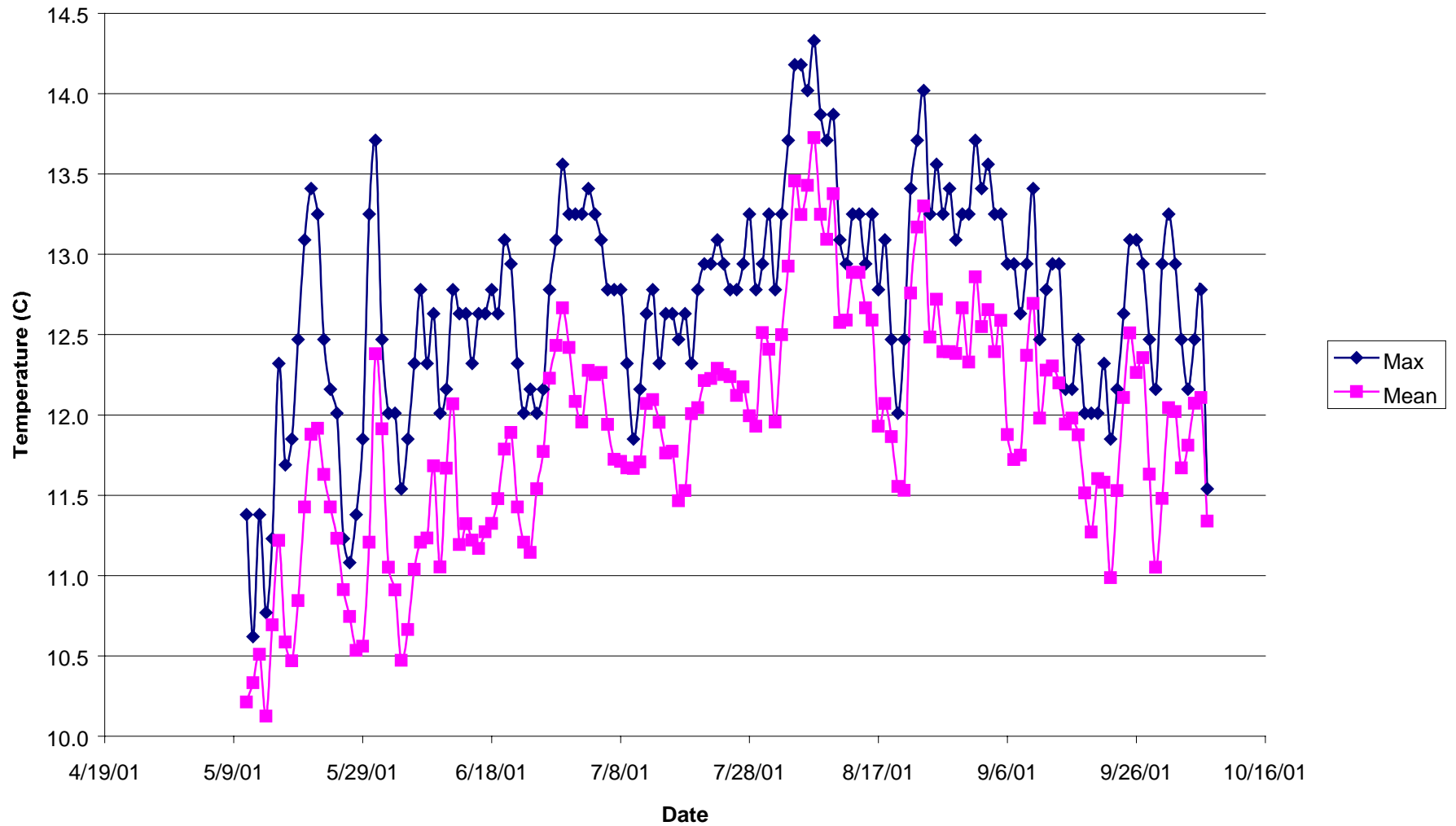


Figure 86. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Deadhorse Gulch (Site 82-7), Mendocino County, California.

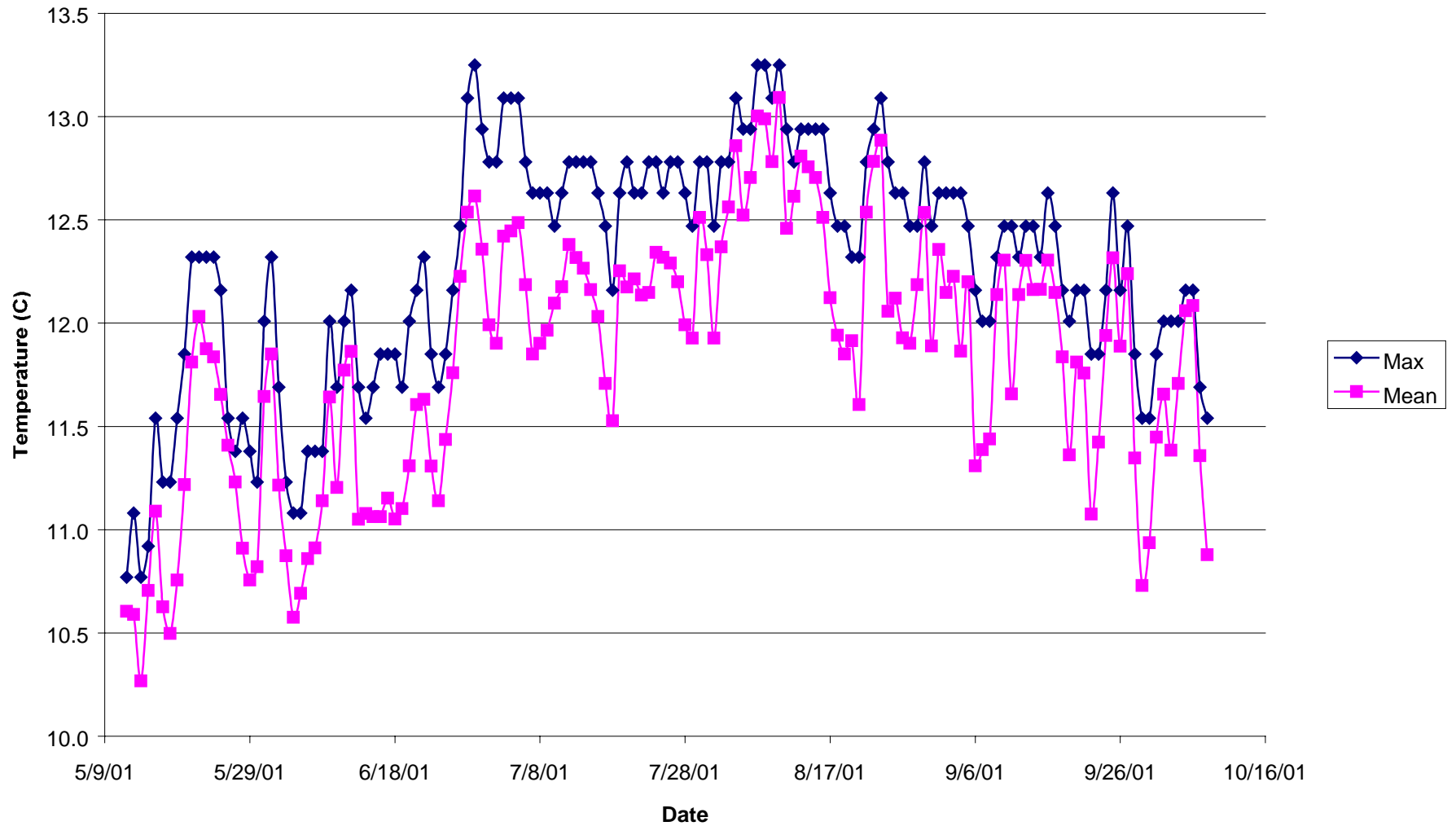


Figure 87. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Camp 16 Gulch (Site 82-8), Mendocino County, California.

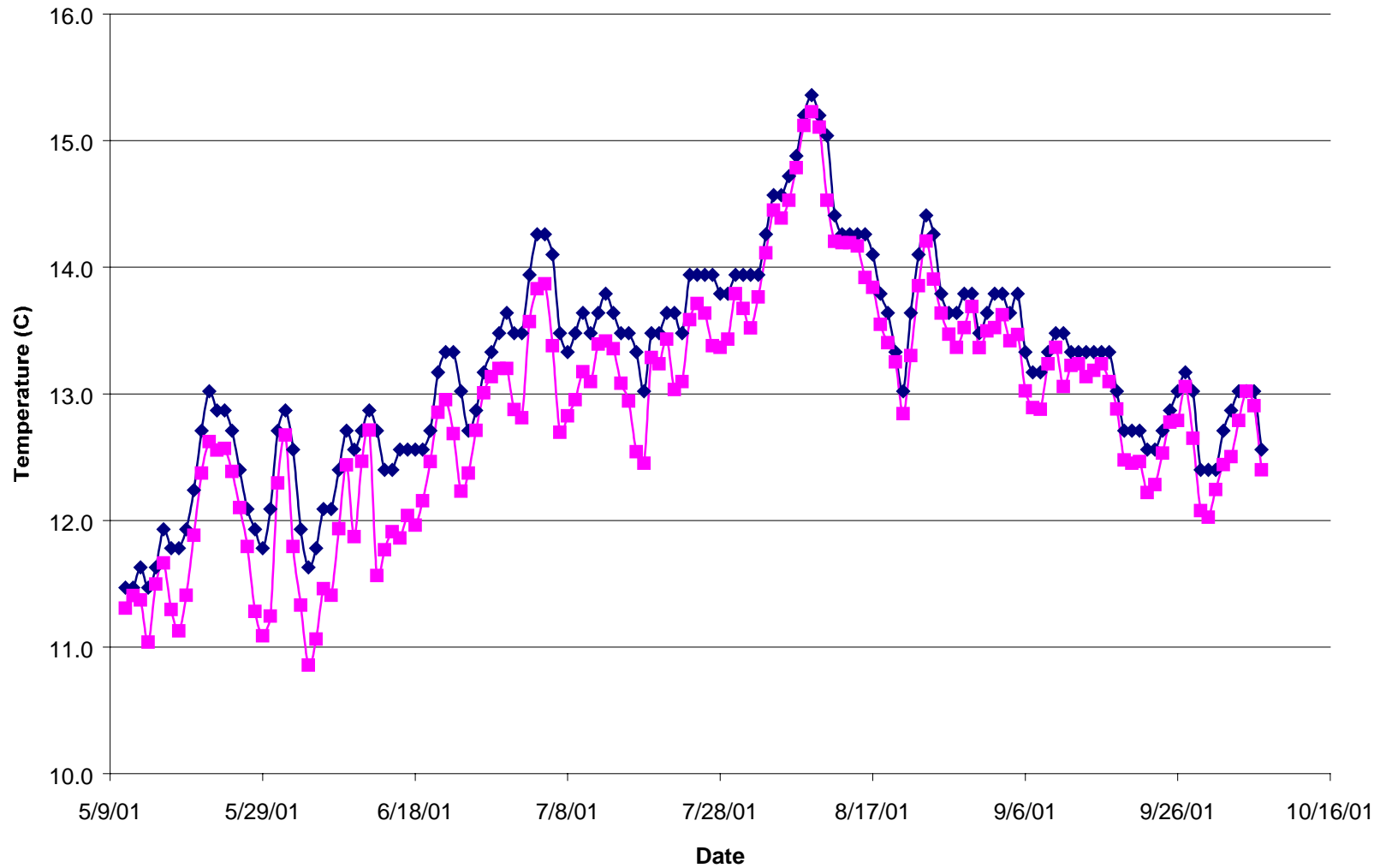


Figure 88. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Flume Gulch (Site 82-9), Mendocino County, California.

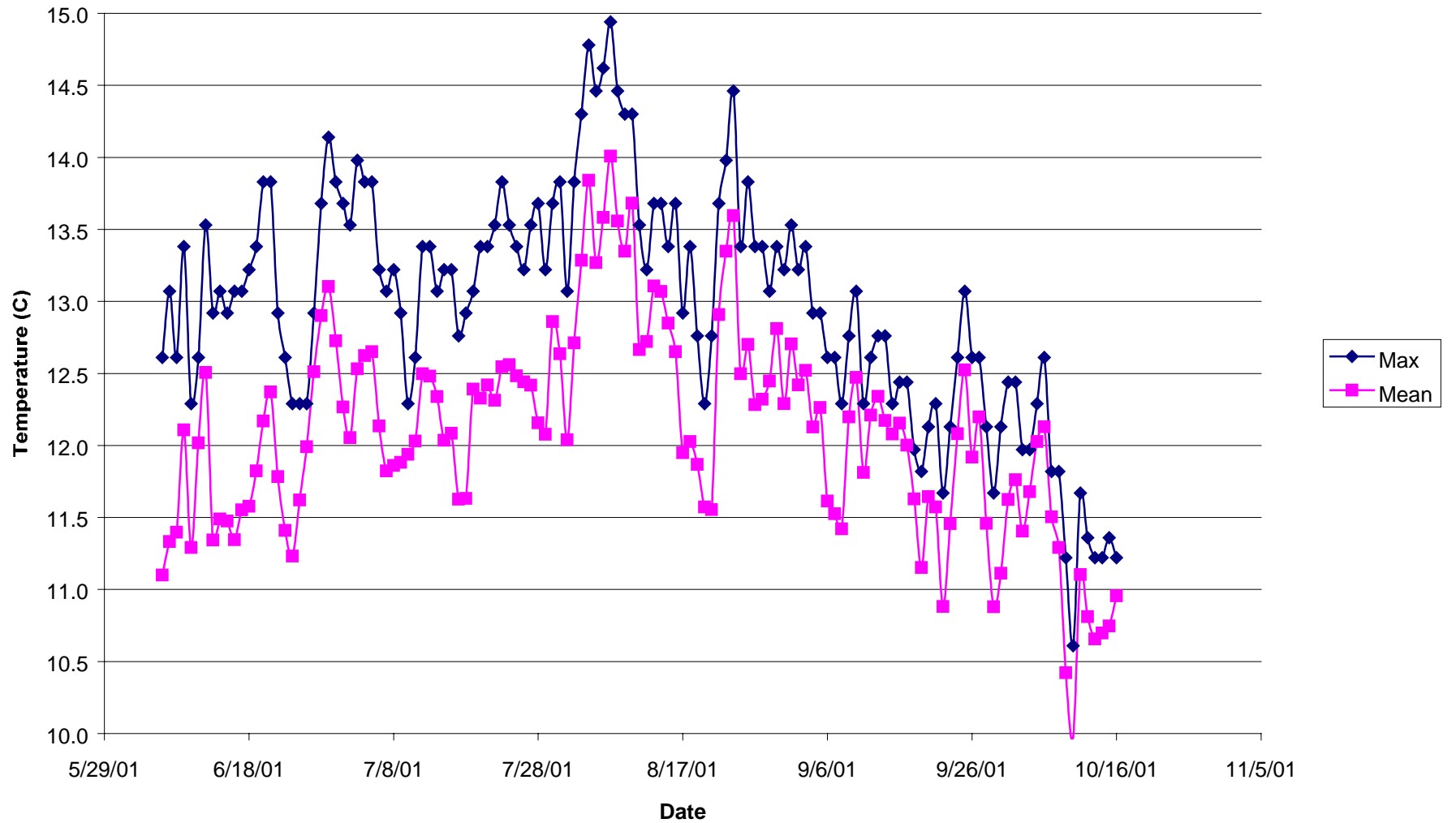


Figure 89. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Unnamed tributary to Flynn Creek (82-21), Mendocino County, California.

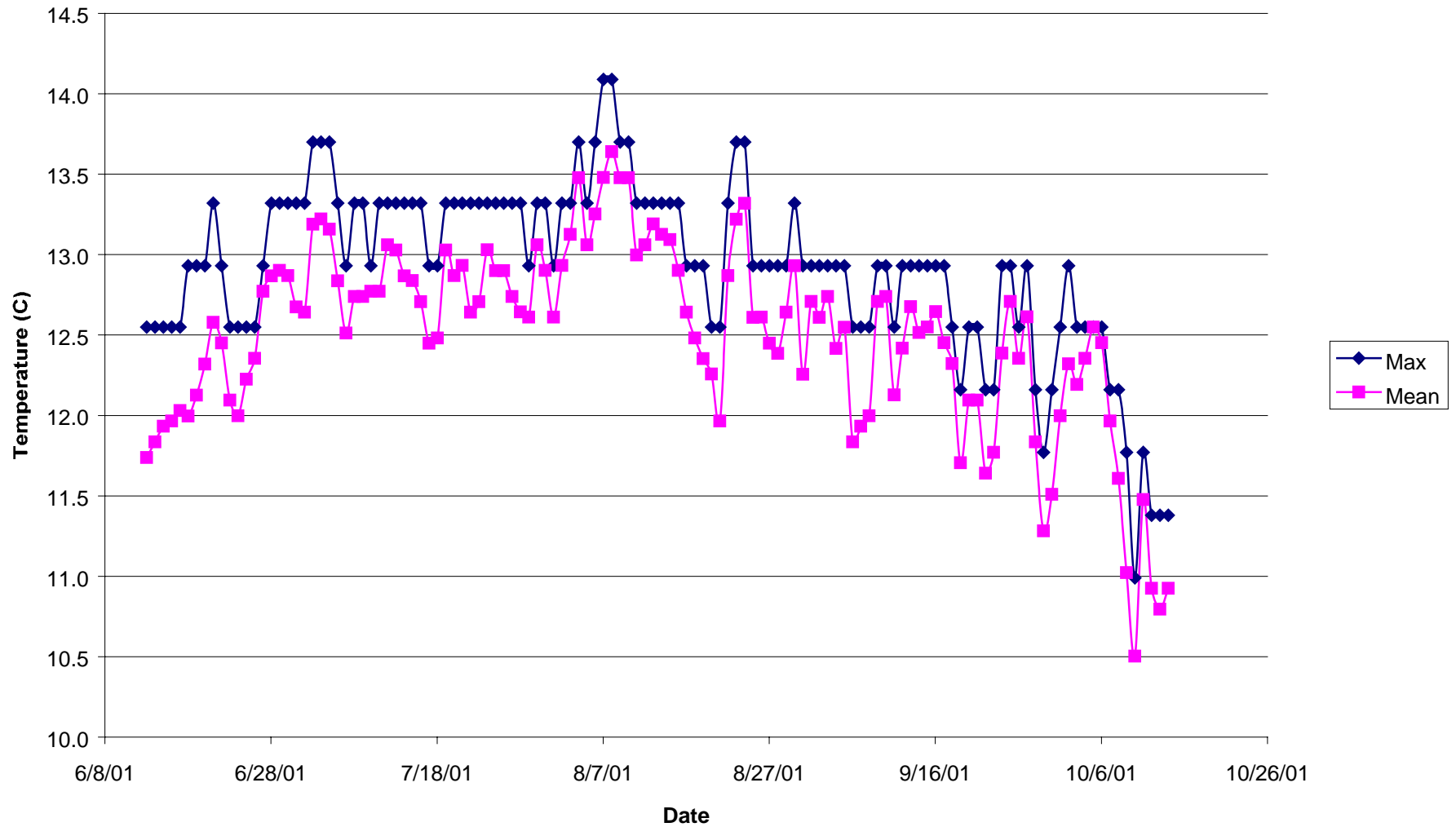


Figure 90. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Mustard Gulch (82-22), Mendocino County, California.

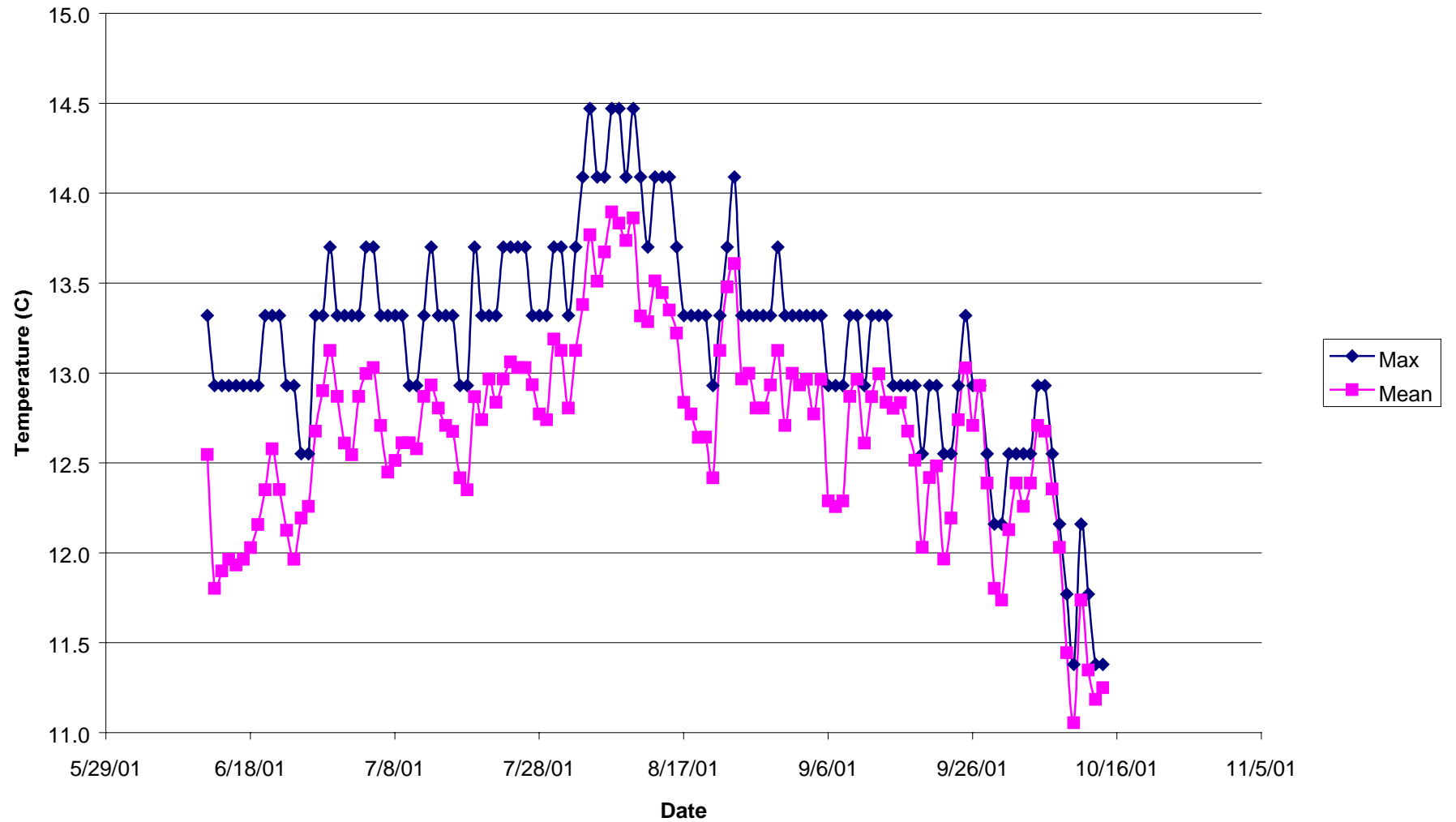


Figure 91. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Black Rock Creek (Site 82-23), Mendocino County, California.

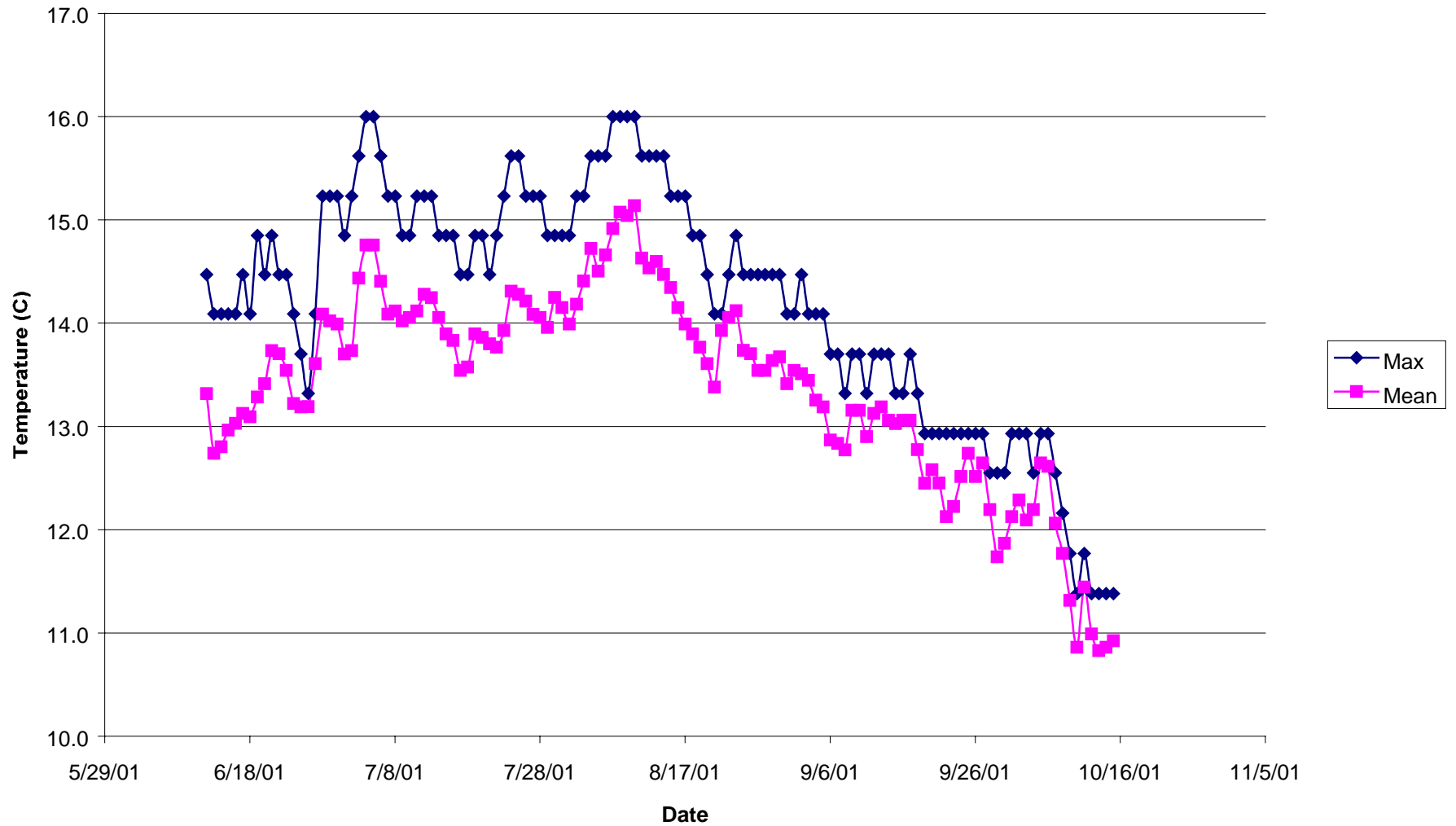


Figure 92. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Berry Creek (82-24), Mendocino County, California.

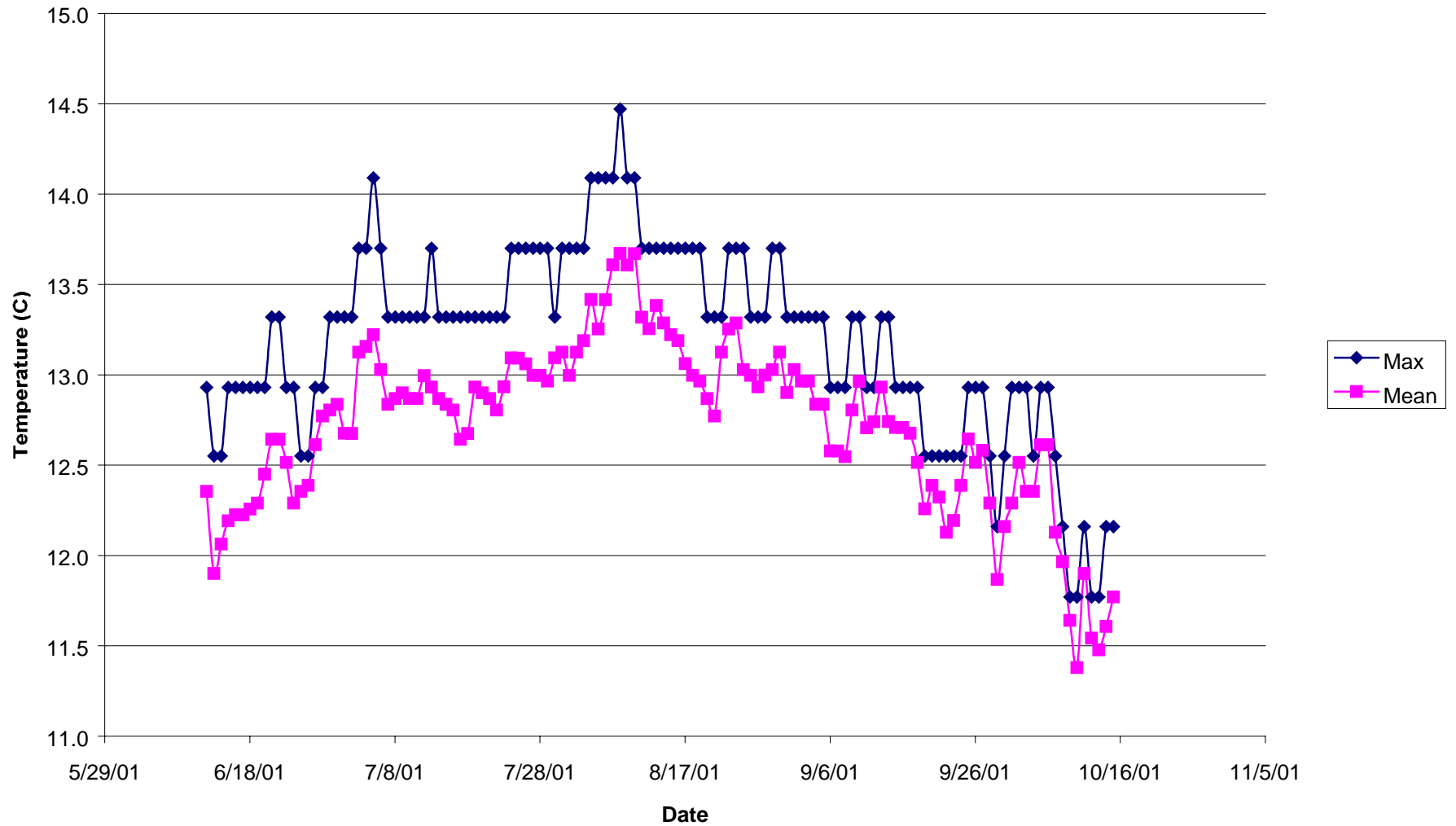


Figure 93. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tramway Gulch (82-25), Mendocino County, California.

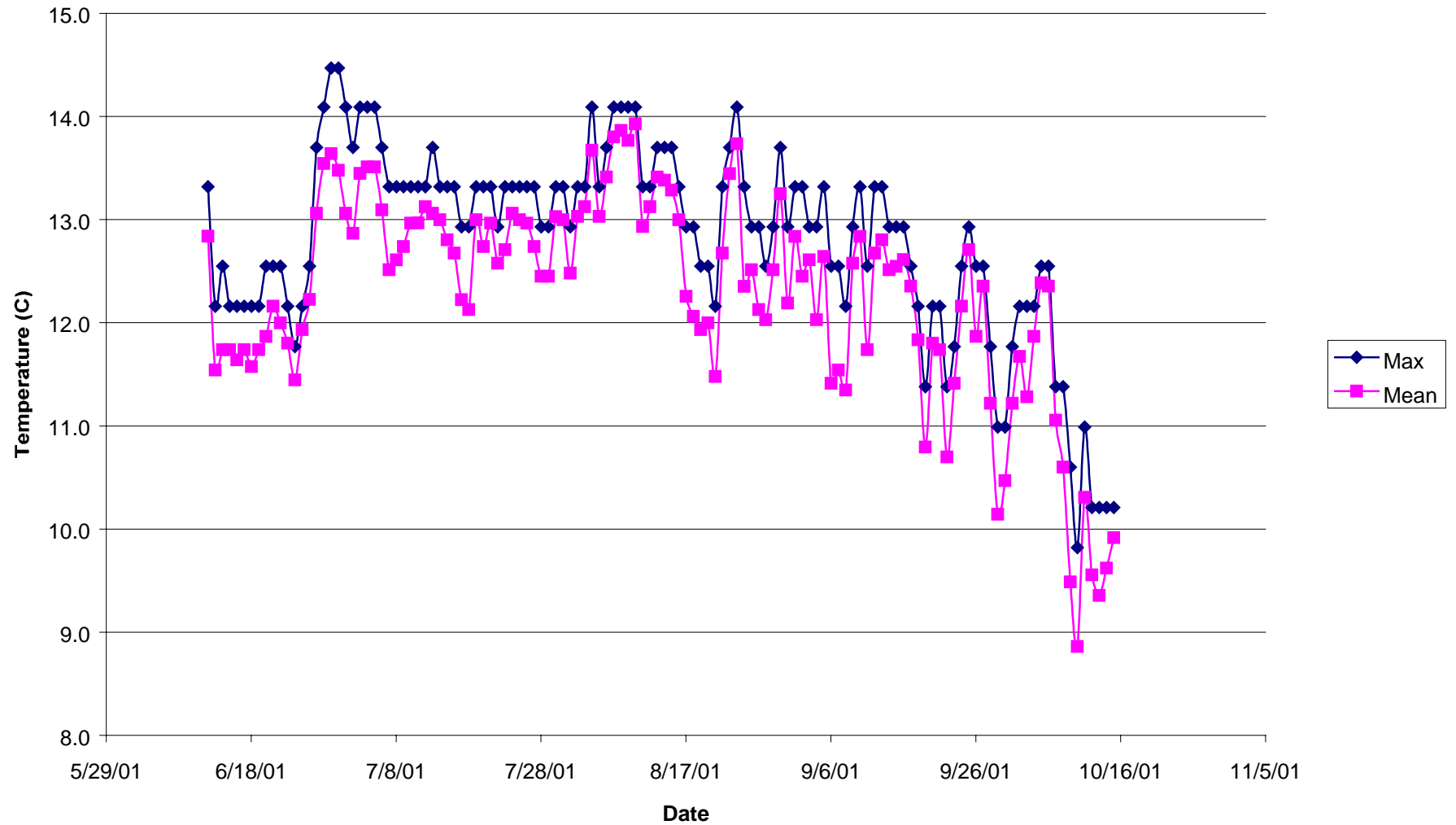


Figure 94. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tank 4 Gulch (82-26), Mendocino County, California.

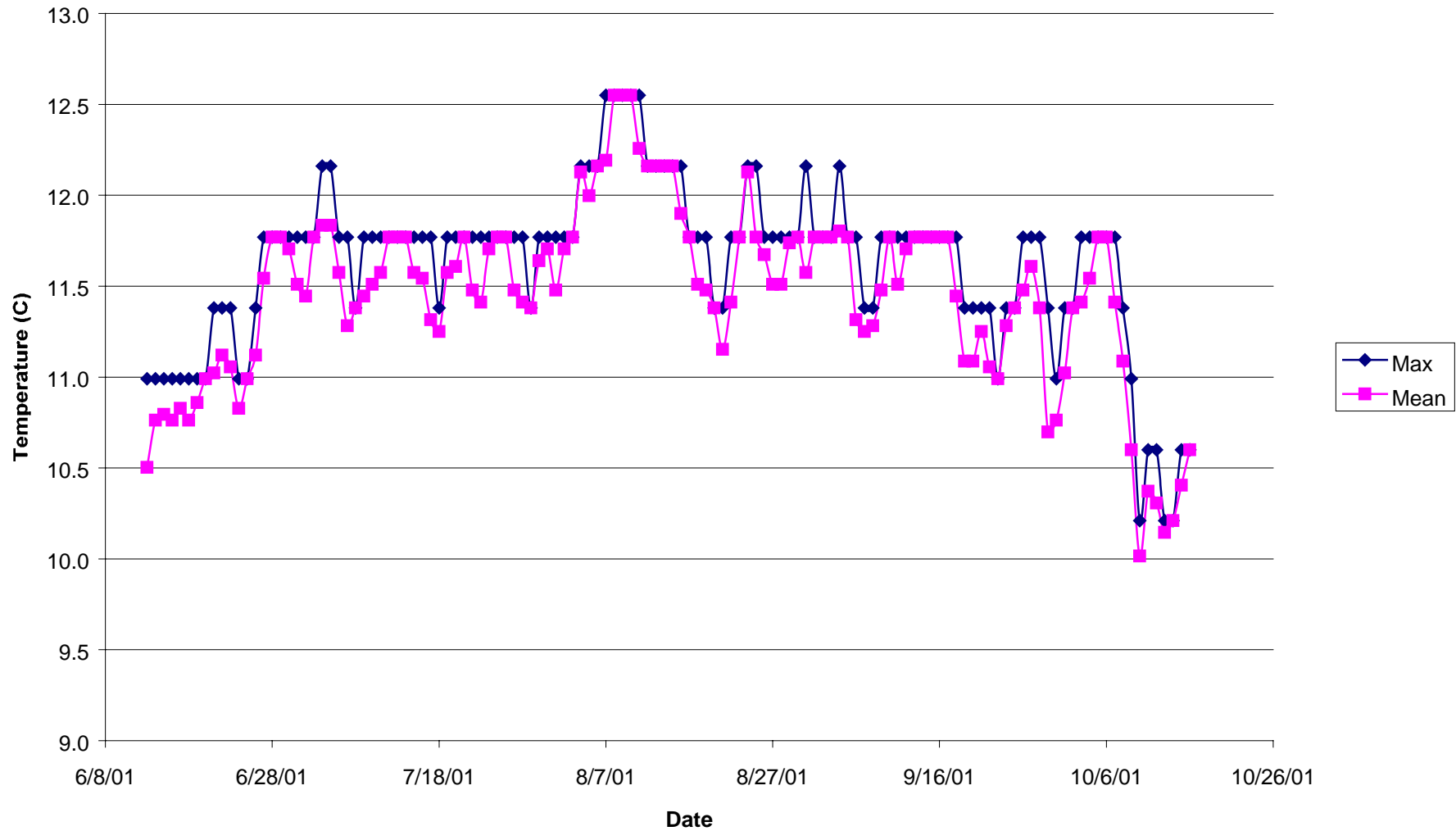


Figure 95. Mean and Maximum Stream Temperatures During Summer 2001 at Coon Creek(Site 82-27), Mendocino County, California.

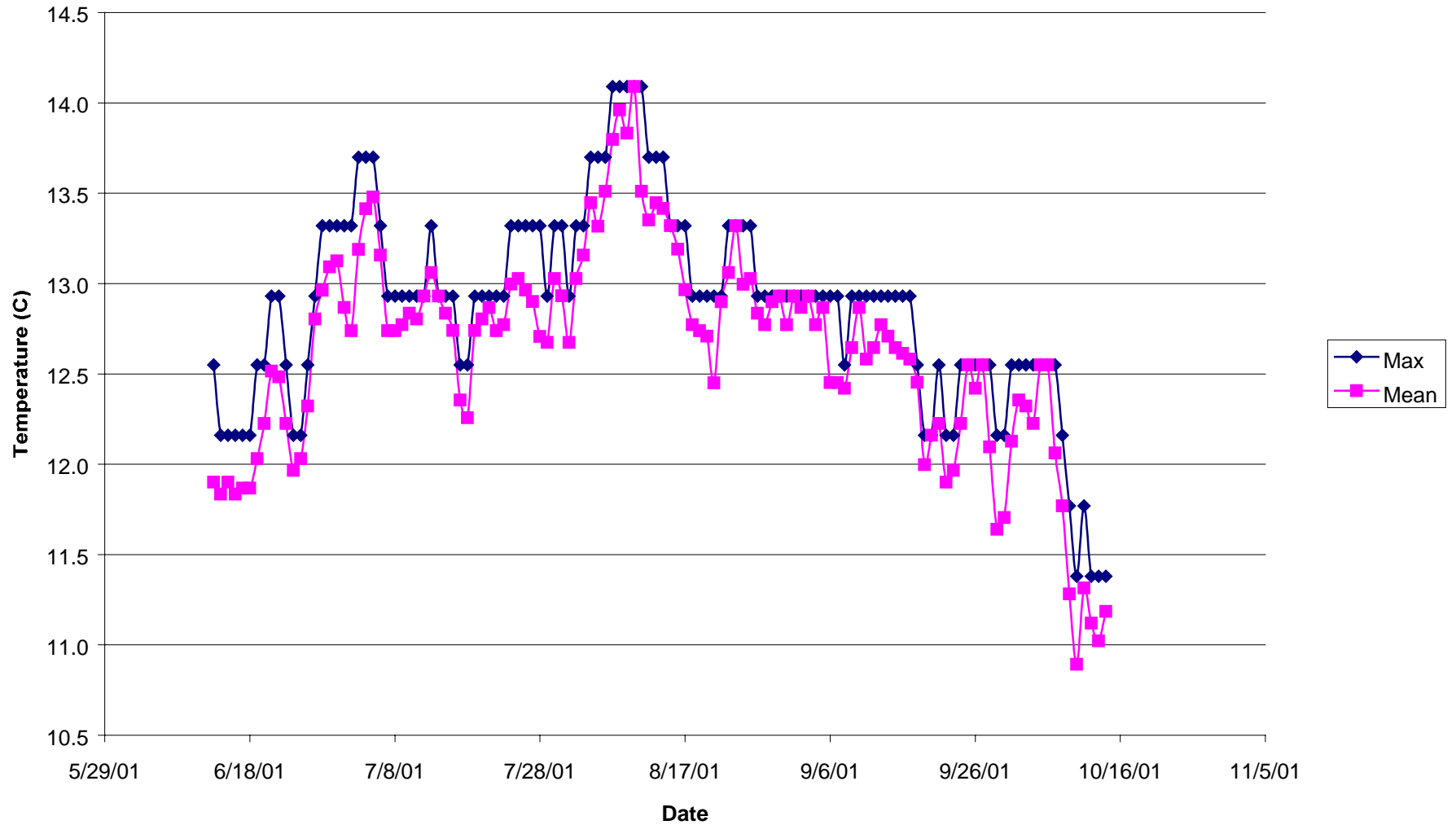


Figure 96. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Ray Gulch (Site 82-28), Mendocino County, California.

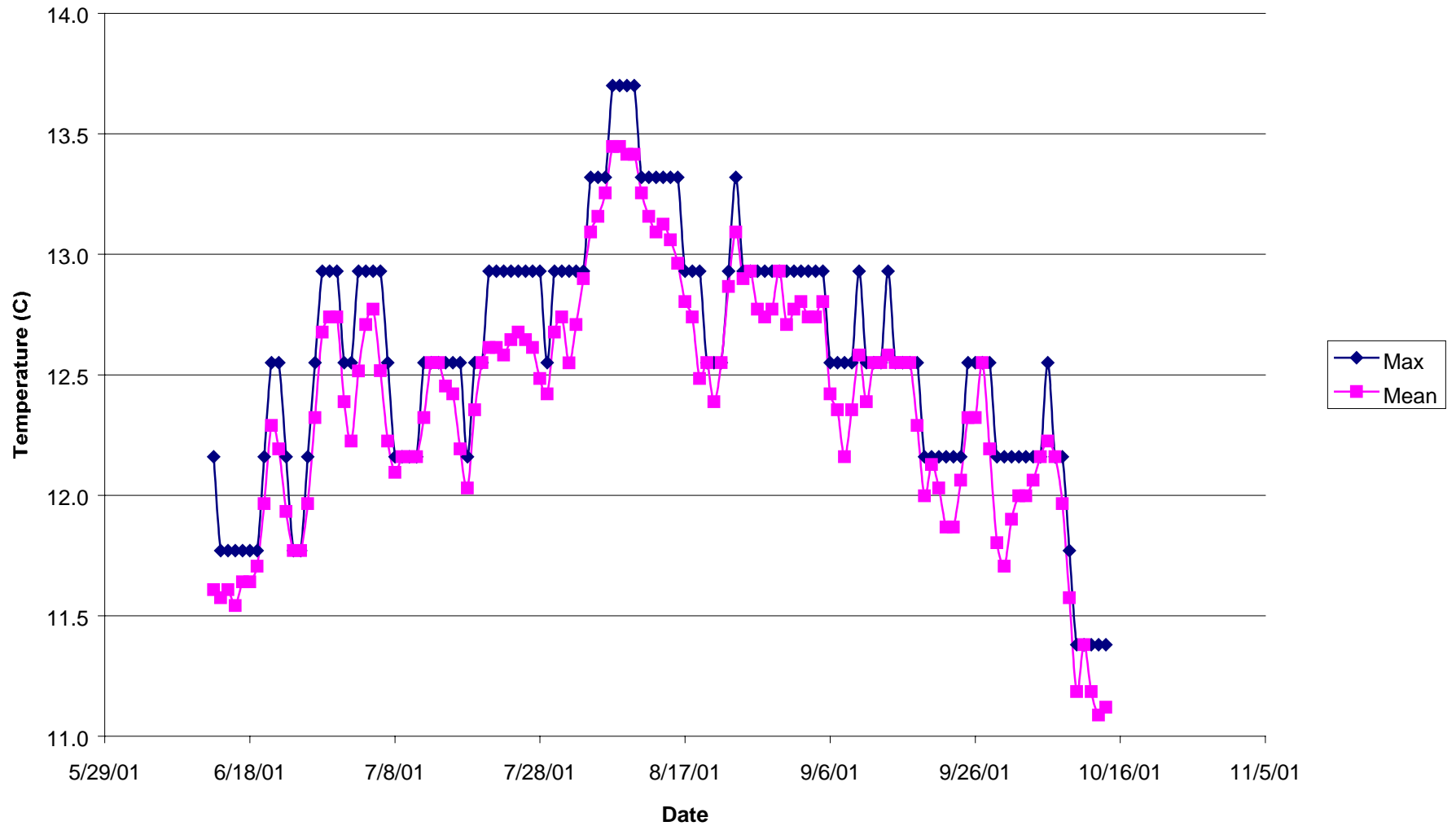


Figure 97. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Branch North Fork Navarro River (Site 85-1), Mendocino County, California.

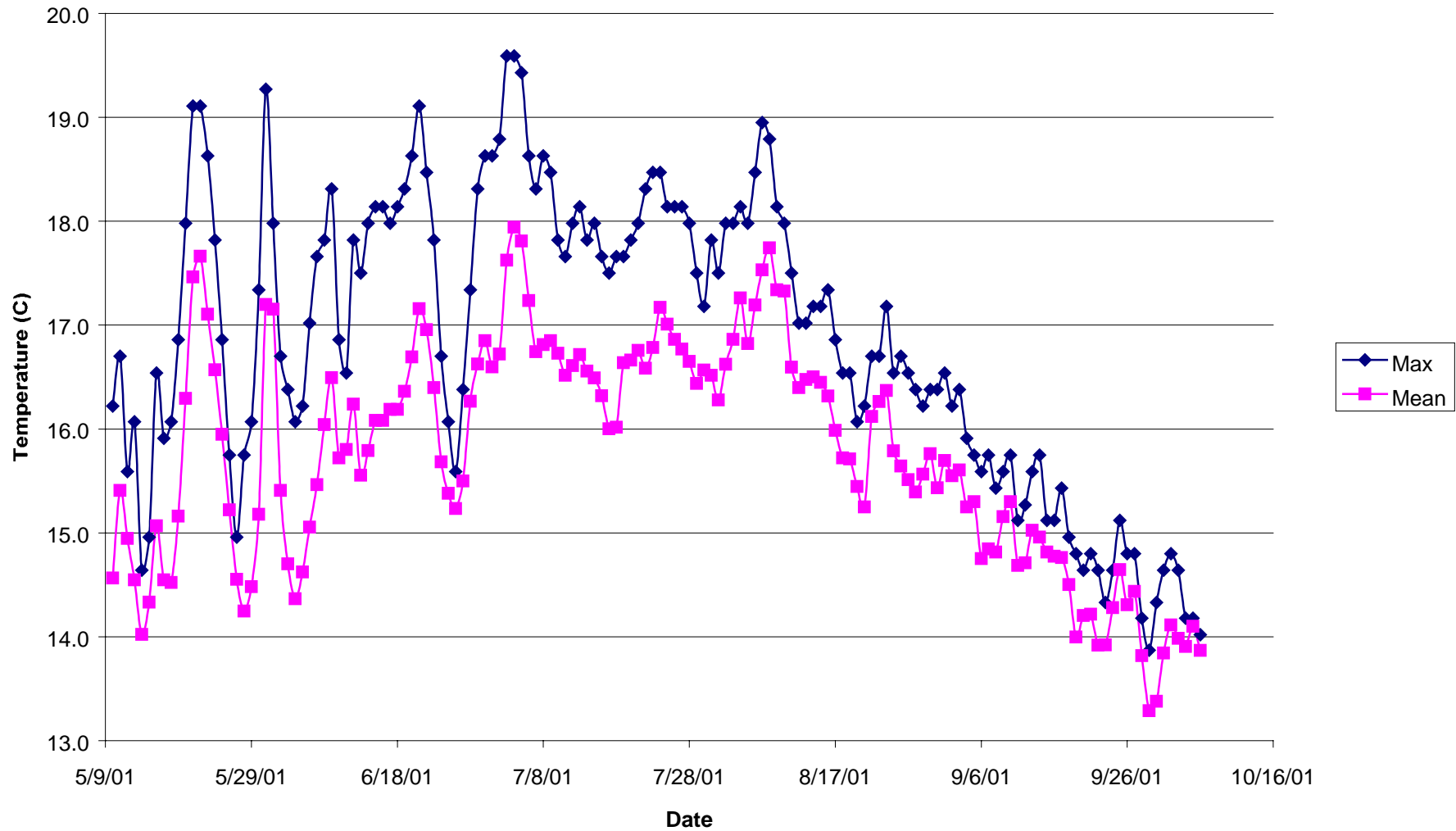


Figure 98. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Branch North Fork Navarro River Site (85-2), Mendocino County, California.

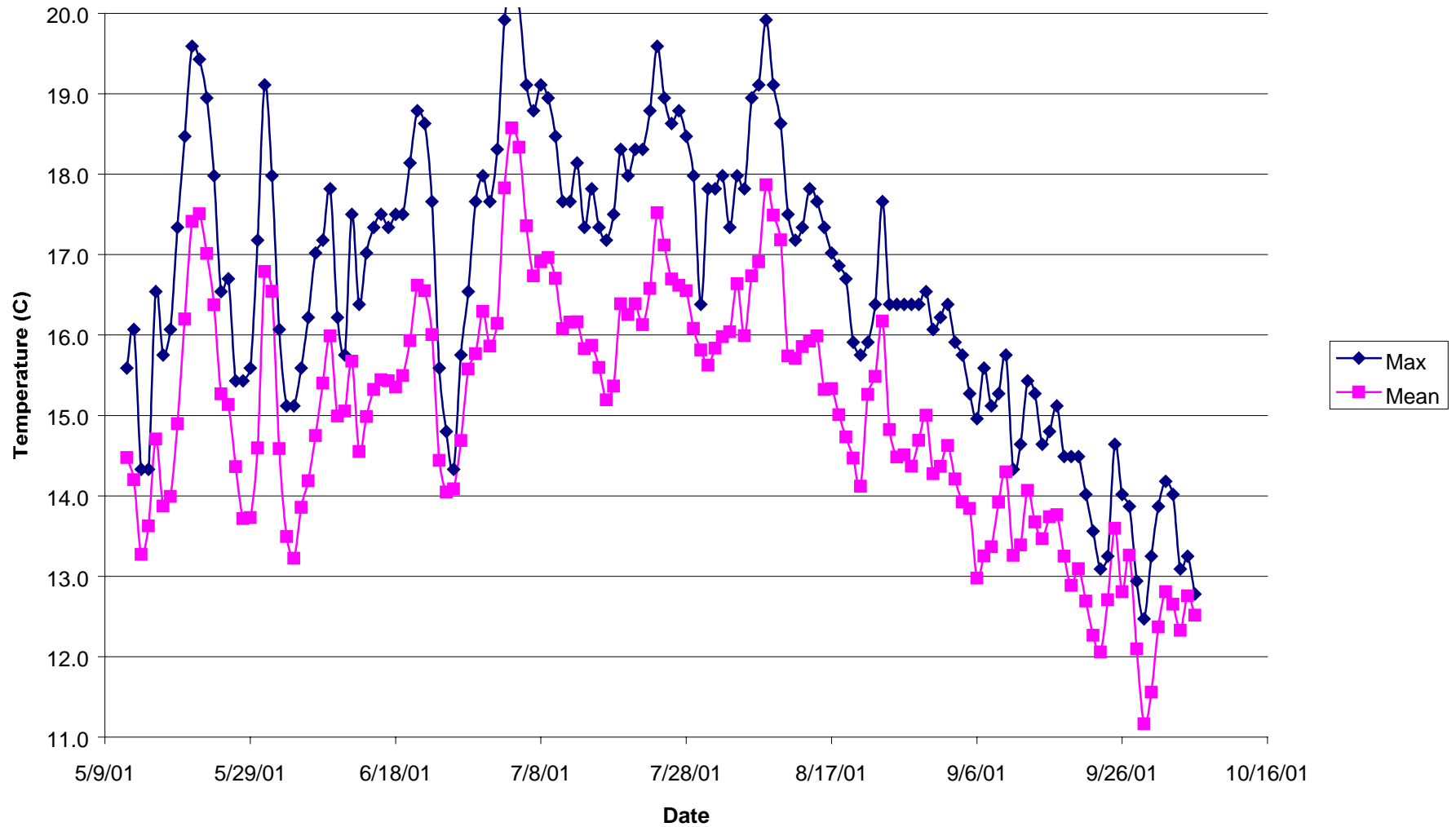


Figure 99. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Fork Rose Creek (Site 85-20), Mendocino County, California.

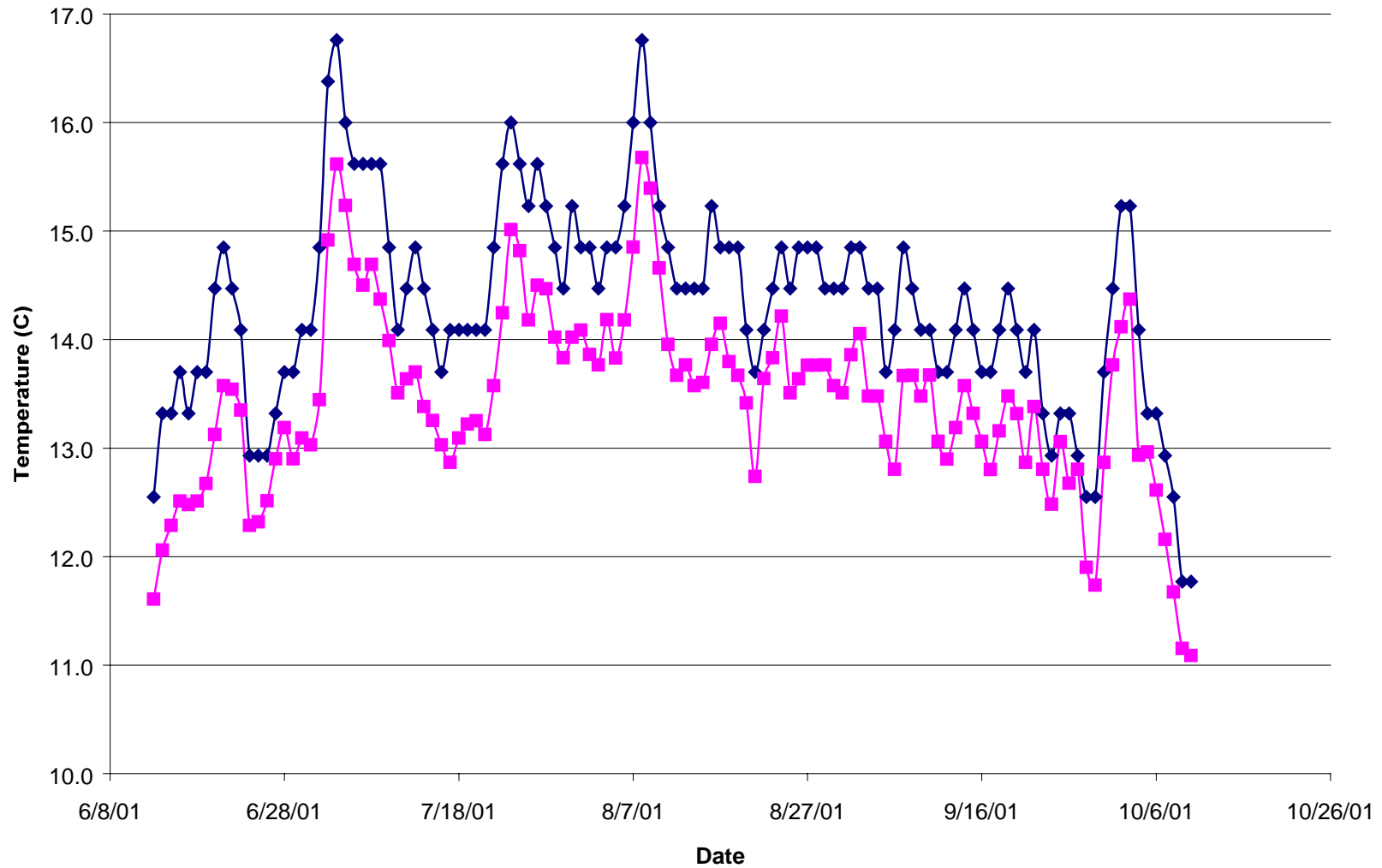


Figure 100. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Rose Creek (Site 85-21), Mendocino County, California.

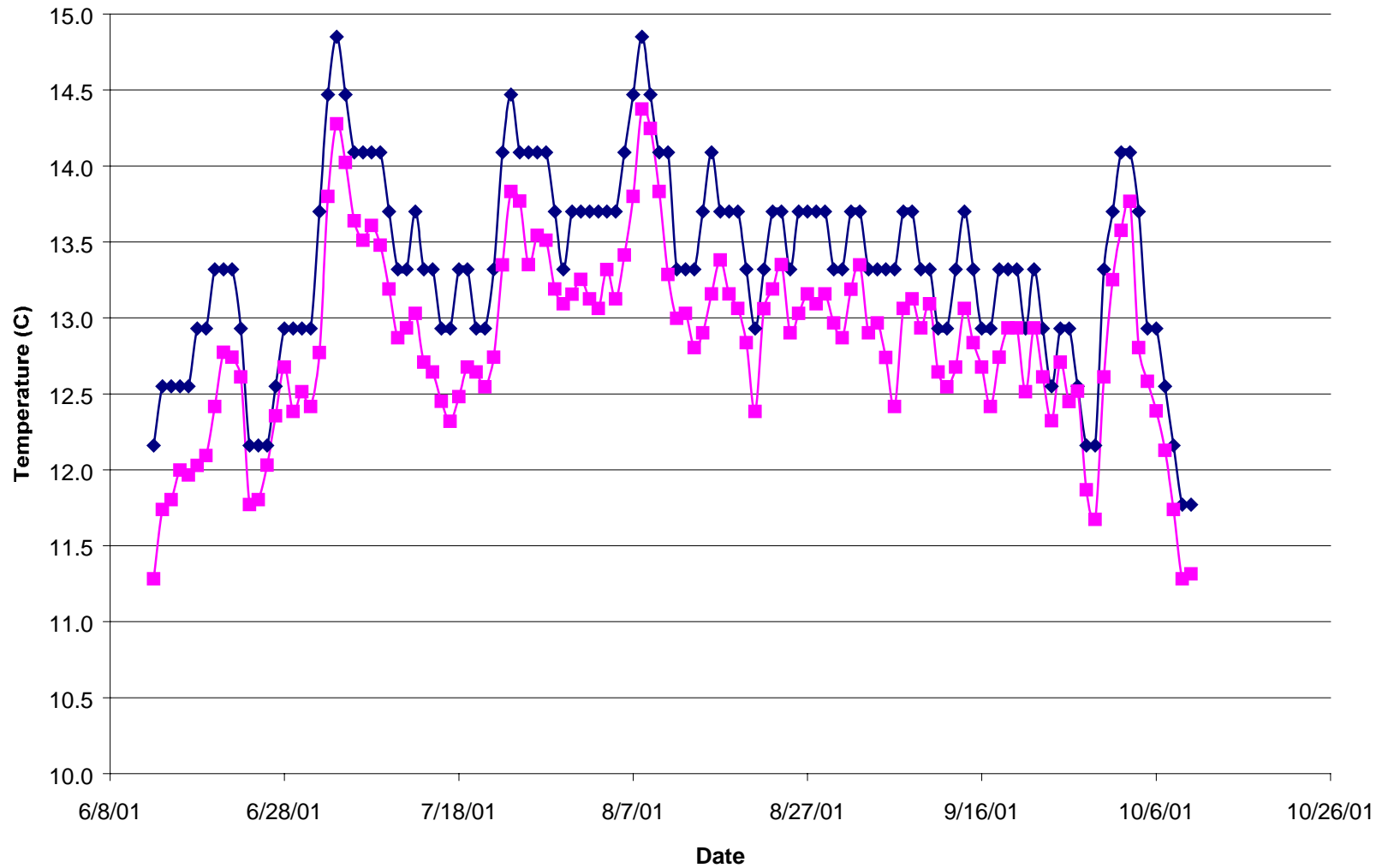


Figure 101. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Fork Indian Creek (Site 86-1), Mendocino County, California.

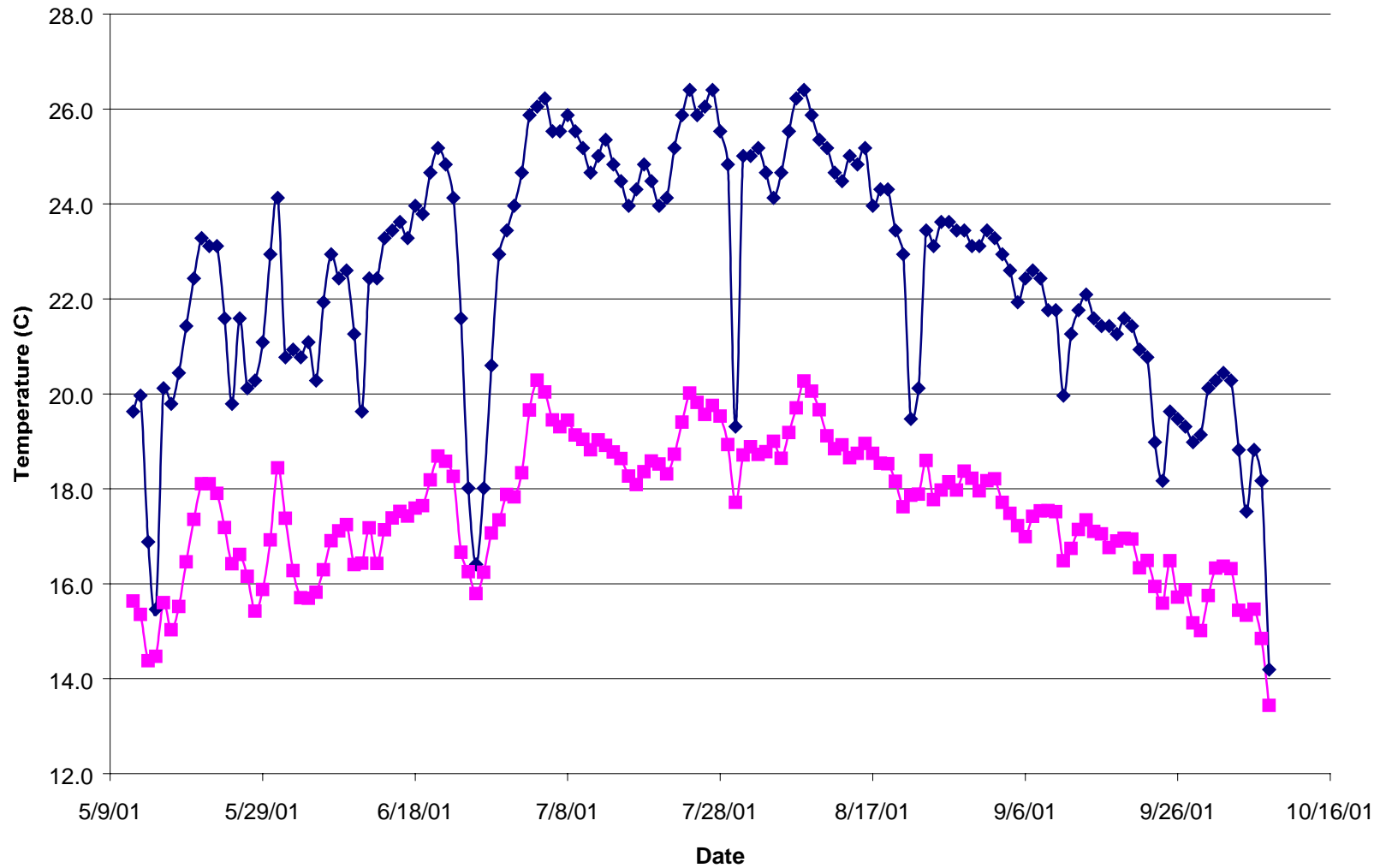


Figure 102. Mean and Maximum Daily Stream Temperatures During Summer 2001 at North Fork Indian Creek (Site 86-2), Mendocino County, California.

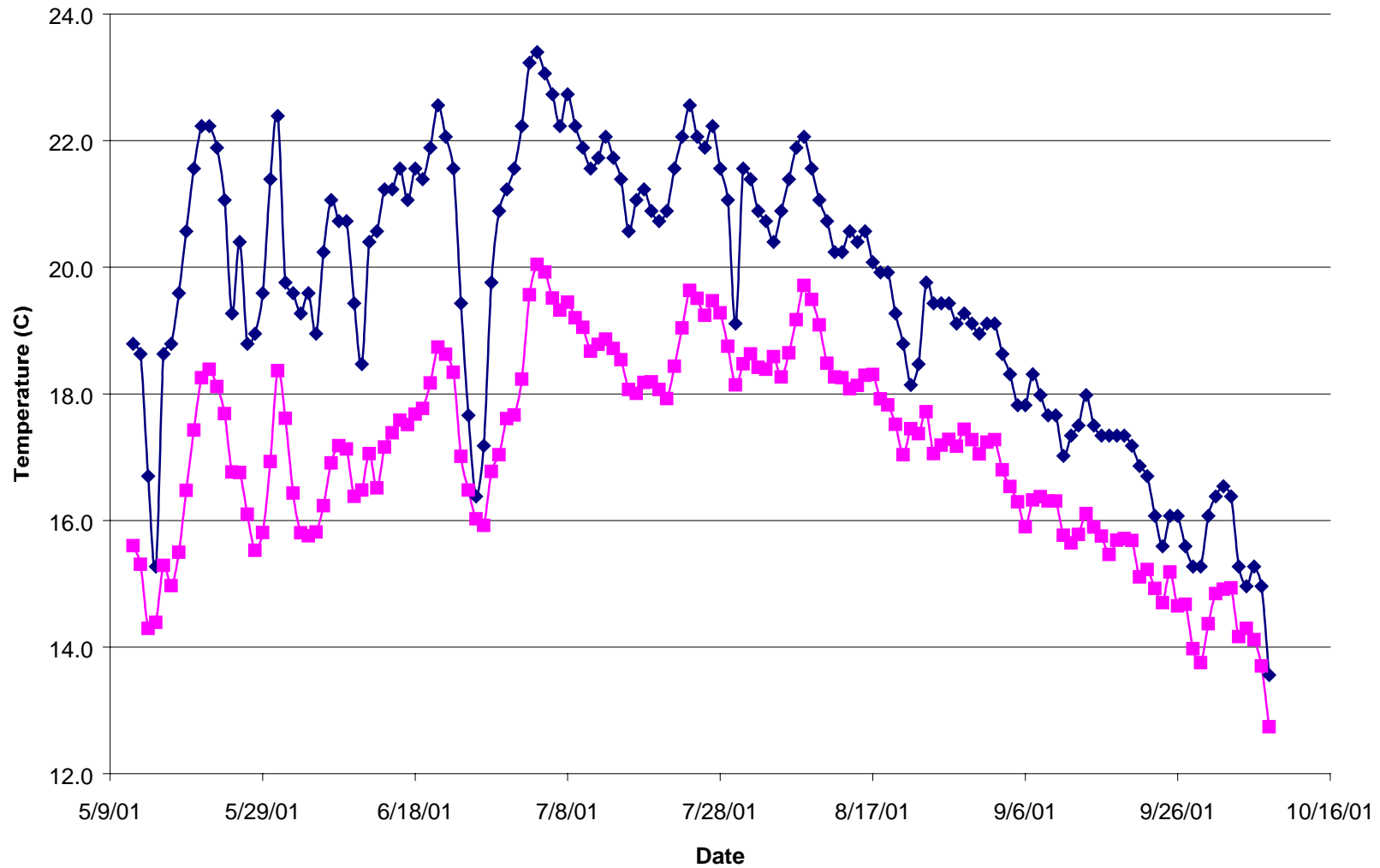


Figure 103. Mean and Maximum Daily Stream Temperatures During Summer 2001 at West Branch Indian Creek (Site 86-20), Mendocino County, California.

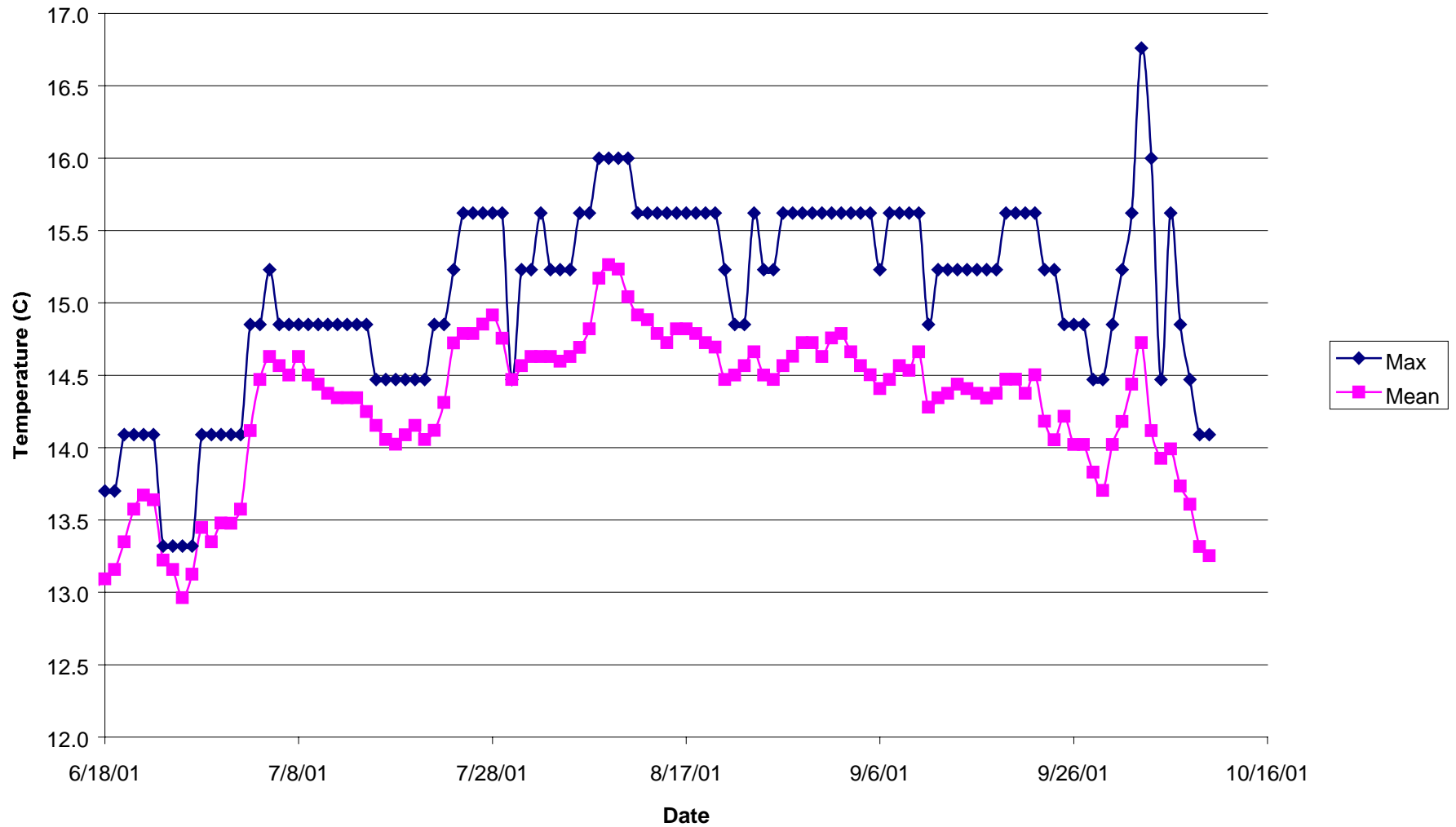
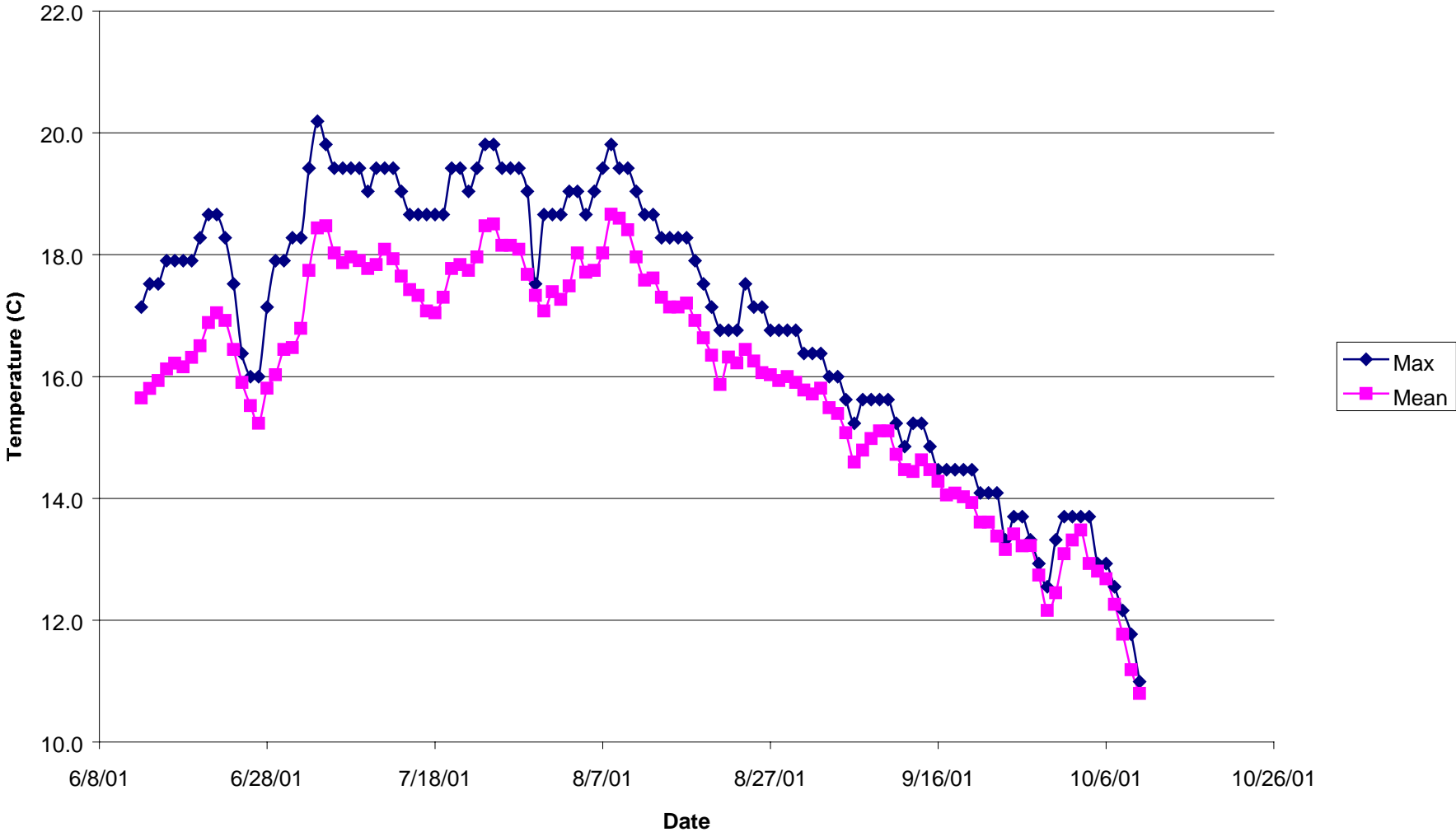


Figure 104. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Theron's Pond (Site 86-21), Mendocino County, California.

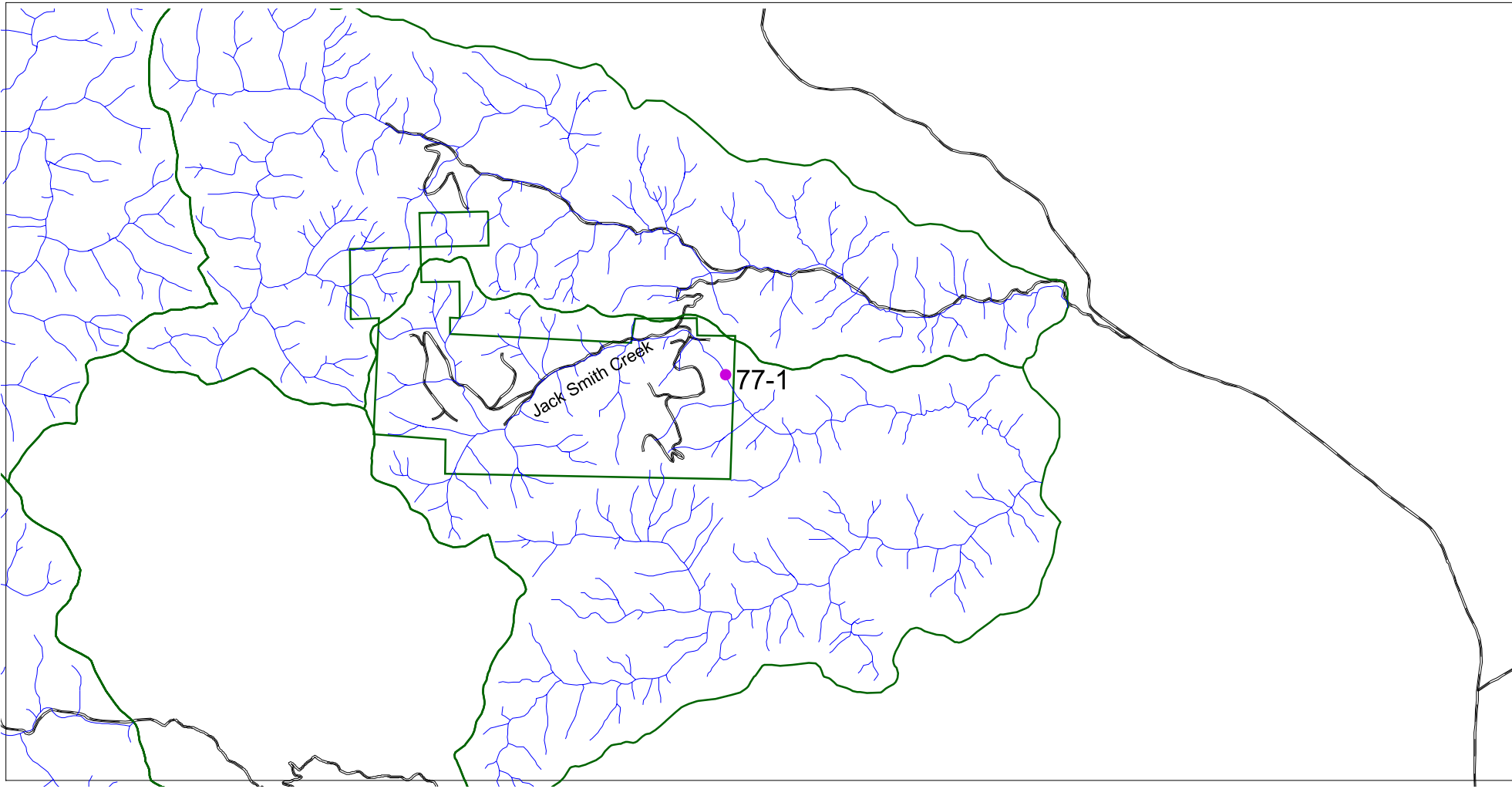


Ukiah Management Area

Table 7. Maximum, MWAT, and MWMT temperatures for sites in the Ukiah Area (1996-2001).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Jack Smith Creek	77-1	1996	22.1	18.9	21.3
Jack Smith Creek	77-1	1997	22.5	18.2	21.4
Jack Smith Creek	77-1	1999	20.5	17.4	19.8
Jack Smith Creek	77-1	2000	20.3	18.3	19.7
Jack Smith Creek	77-1	2001	19.3	16.7	18.5
Ackerman Creek	83-1	1996	30.9	22.9	29.8
Ackerman Creek	83-1	1997	26.0	20.8	25.1
Ackerman Creek	83-1	2000	26.0	21.0	25.1
Alder Creek	83-2	1999	23.7	18.6	22.2
Alder Creek	83-2	2000	31.7	19.5	26.6
Alder Creek	83-2	2001	23.4	18.6	21.8
Ackerman Creek	83-3	2000	33.6	22.3	30.1
Ackerman Creek	83-3	2001	23.4	19.2	22.2

Map 11. Reeves Canyon Stream Temperature Site



- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▬ Roads
- ▭ MRC Property

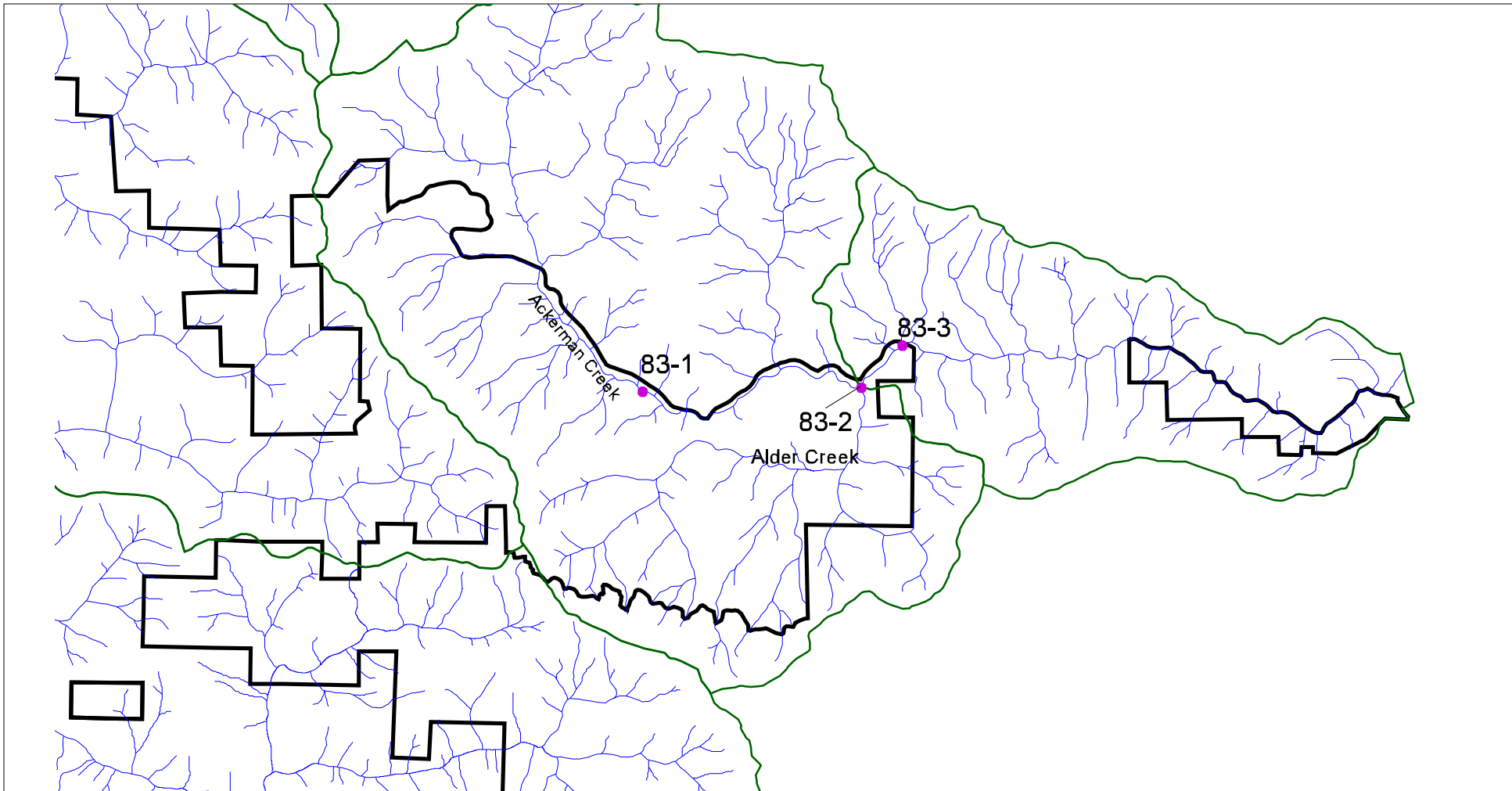
Mendocino Redwood Company, LLC



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Map 12. Ackerman Creek Stream Temperature Sites



Mendocino Redwood Company, LLC

- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property



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Figure 105. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Jack Smith Creek (Site77-1), Mendocino County, California.

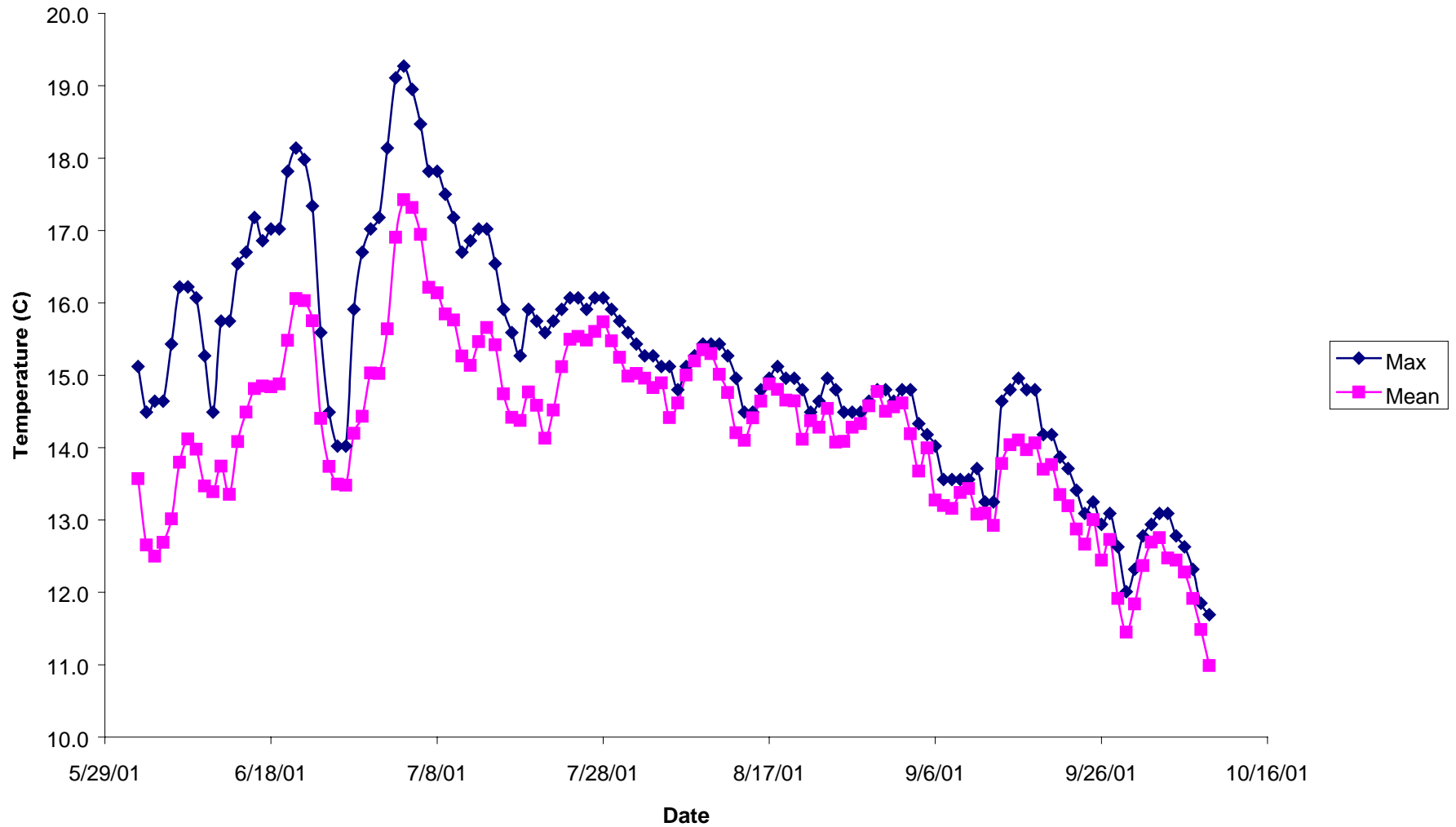


Figure 106. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Alder Creek (Site 83-2), Mendocino County, California.

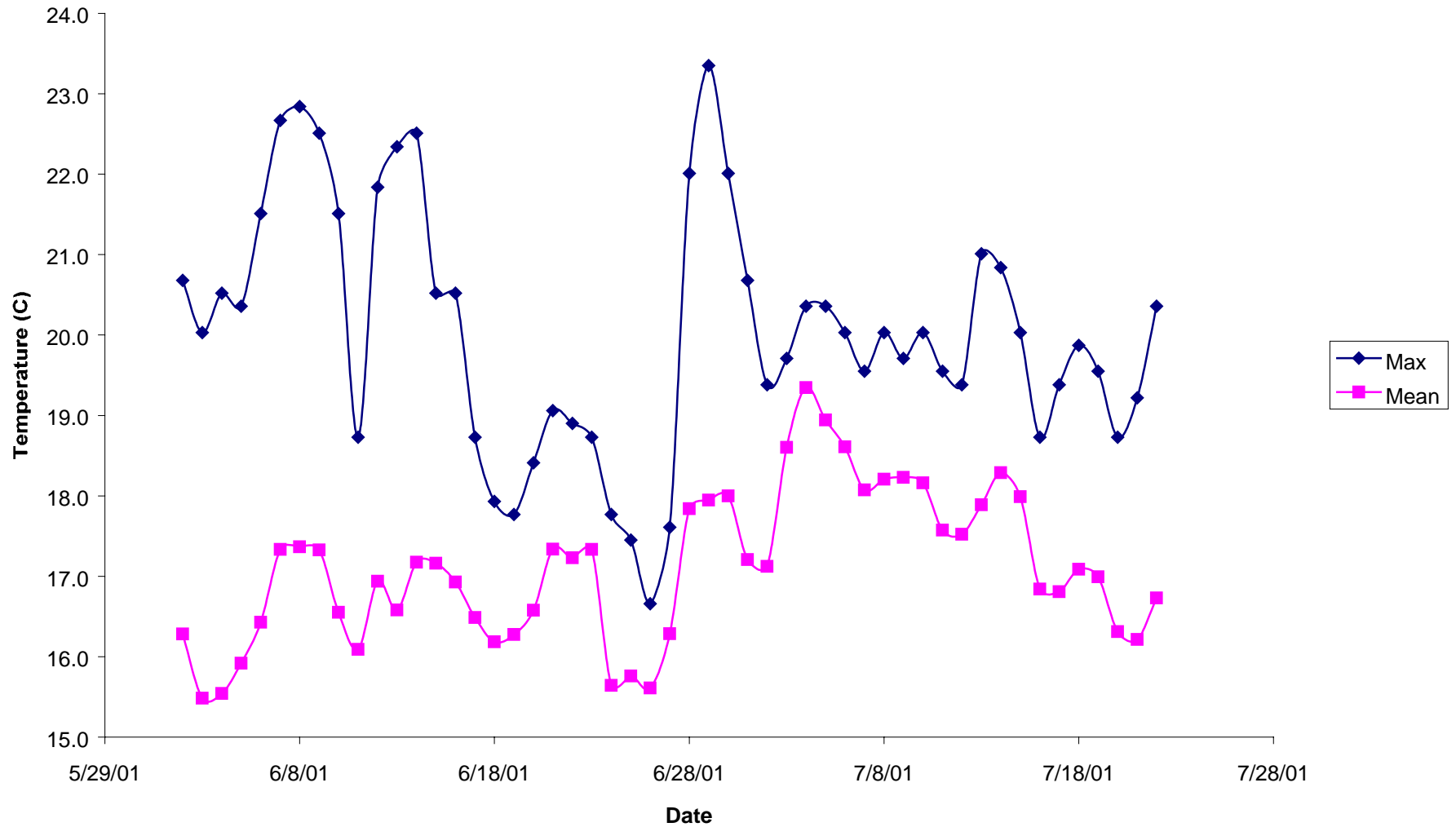
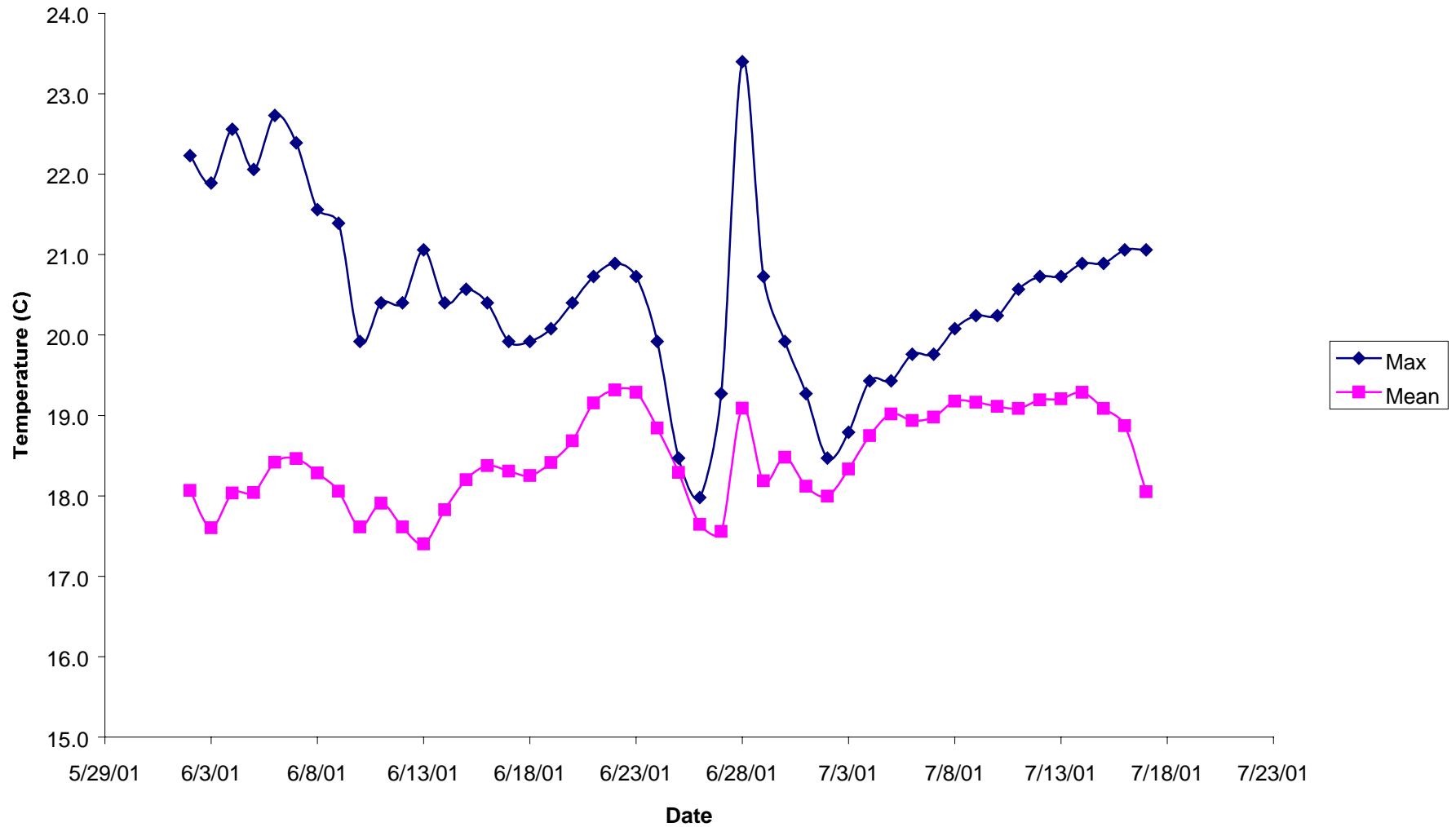


Figure 107. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Ackerman Creek (Site 83-3), Mendocino County, California.



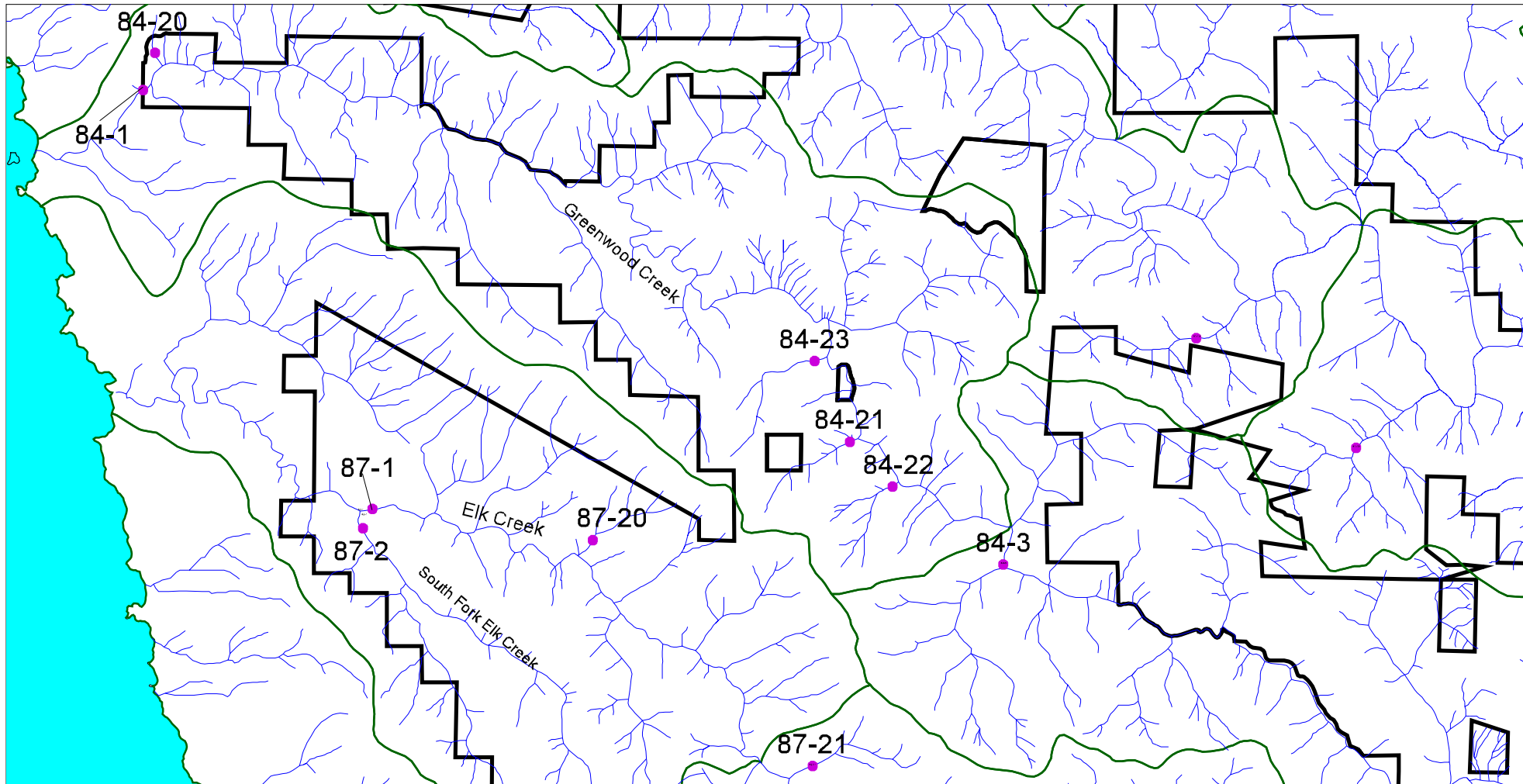
South Coast Management Area

Table 9. Maximum, MWAT, and MWMT temperatures for sites in the South Coast Area (1992-2001).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Greenwood Creek	84-1	1992	20.0	17.0	19.1
Greenwood Creek	84-1	1993	20.0	17.0	18.7
Greenwood Creek	84-1	1995	20.8	17.1	19.4
Greenwood Creek	84-1	1997	21.2	17.7	20.4
Greenwood Creek	84-1	1999	19.8	15.7	18.7
Greenwood Creek	84-1	2000	17.8	14.6	16.9
Greenwood Creek	84-3	1994	18.5	16.4	18.2
Greenwood Creek	84-3	1995	20.6	17.7	19.3
Greenwood Creek	84-3	1997	19.1	17.2	18.3
Greenwood Creek	84-3	1999	20.4	16.7	19.0
Greenwood Creek	84-3	2000	20.3	17.4	19.7
Greenwood Creek	84-3	2001	18.6	16.2	17.7
Tributary to Greenwood	84-20*	2001	12.9	12.6	12.9
Tributary to Greenwood	84-21*	2001	14.5	13.6	14.0
Tributary to Greenwood	84-22*	2001	14.1	13.2	13.8
Tributary to Greenwood	84-23*	2001	14.1	13.2	13.6
Elk Creek	87-1	1992	18.0	16.5	17.8
Elk Creek	87-1	1993	18.0	16.3	17.3
Elk Creek	87-1	1994	16.5	14.8	16.3
Elk Creek	87-1	1997	18.4	16.4	17.5
Elk Creek	87-1	1999	15.9	14.4	15.1
Elk Creek	87-1	2000	17.7	15.3	16.6
Elk Creek	87-1	2001	15.8	14.3	15.2
South Fork Elk Creek	87-2	1997	14.3	13.3	14.3
South Fork Elk Creek	87-2	1999	13.4	12.5	13.4
South Fork Elk Creek	87-2	2000	13.1	12.0	12.7
South Fork Elk Creek	87-2	2001	13.2	12.2	13.0
Elk Creek	87-3	1997	19.1	16.3	18.4
Elk Creek	87-3	2001	17.7	15.4	16.6
Tributary to Elk Creek	87-20*	2001	14.5	13.4	14.0
Tributary to Elk Creek	87-21*	2001	14.5	13.6	14.1
Three Springs Creek	87-22*	2001	13.3	12.7	13.0
Tributary to Soda Fork	87-23*	2001	14.1	13.4	13.6
West Fork Trib. To Elk	87-24*	2001	13.3	12.9	13.0

Creek					
East Fork Trib. To Elk Creek	87-25*	2001	12.9	12.6	12.7
Alder Creek	89-1	1994	18.5	16.4	17.9
Alder Creek	89-1	1995	21.1	17.8	19.9
Alder Creek	89-1	1996	19.3	16.5	18.7
Alder Creek	89-1	2000	19.4	16.7	18.5
Alder Creek	89-1	2001	18.4	16.1	16.9
Alder Creek	89-2	1995	22.0	18.4	20.9
Alder Creek	89-2	1996	22.6	18.7	21.4
Alder Creek	89-2	1999	19.6	16.8	18.3
Alder Creek	89-2	2000	19.8	17.3	19.0
Alder Creek	89-2	2001	18.7	16.2	17.8
Mallo Pass Creek	89-3	1999	13.3	12.7	13.0
Mallo Pass Creek	89-3	2000	13.9	13.3	13.6
Mallo Pass Creek	89-3	2001	13.1	12.6	12.9
Mills Creek	89-20*	2001	12.9	12.8	12.9
Owl Creek	89-21*	2001	12.9	12.5	12.8
NE Fork of Bee Tree	89-23*	2001	14.1	13.6	13.9
*Class II Streams					

Map 13. Northern South Coast Stream Temperature Sites



Mendocino Redwood Company, LLC

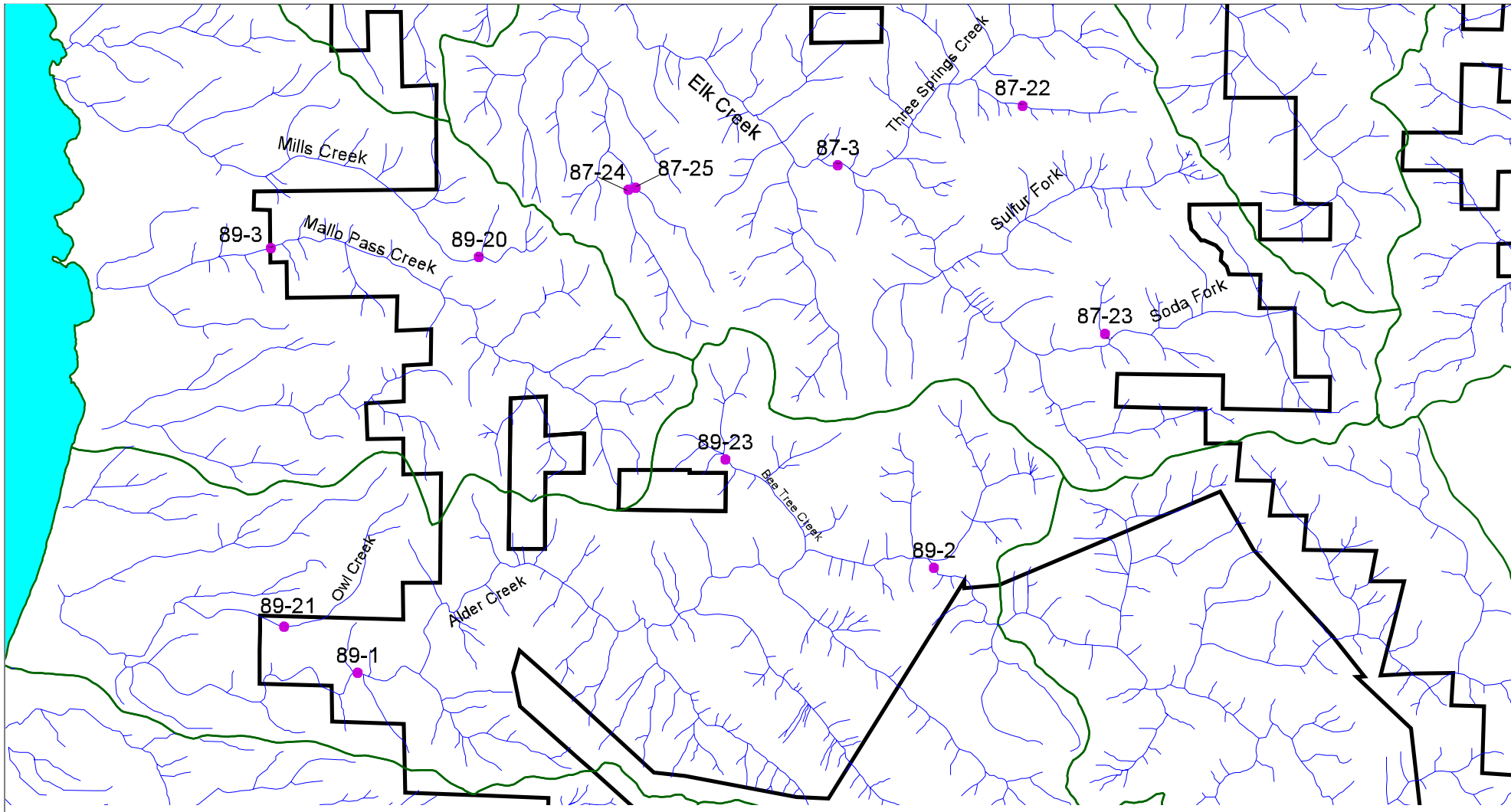
- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ Pacific Ocean
- ▭ MRC Property



1:65000



Map 14. Southern South Coast Stream Temperature Sites



Mendocino Redwood Company, LLC



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- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ Pacific Ocean
- ▭ MRC Property



Figure 109. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Greenwood Creek (Site 84-3), Mendocino County, California.

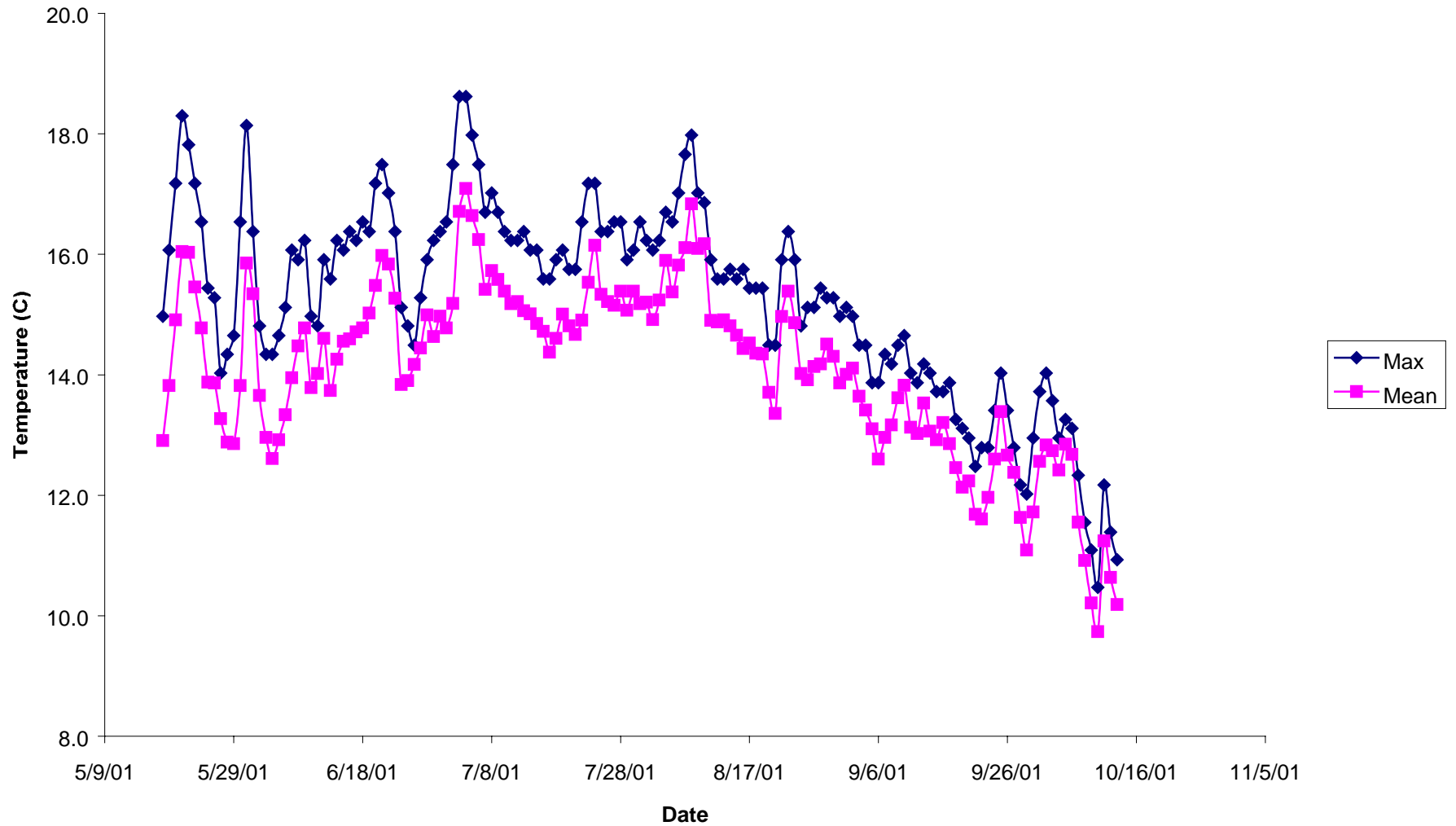


Figure 110. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Greenwood Creek (Site 84-20), Mendocino County, California.

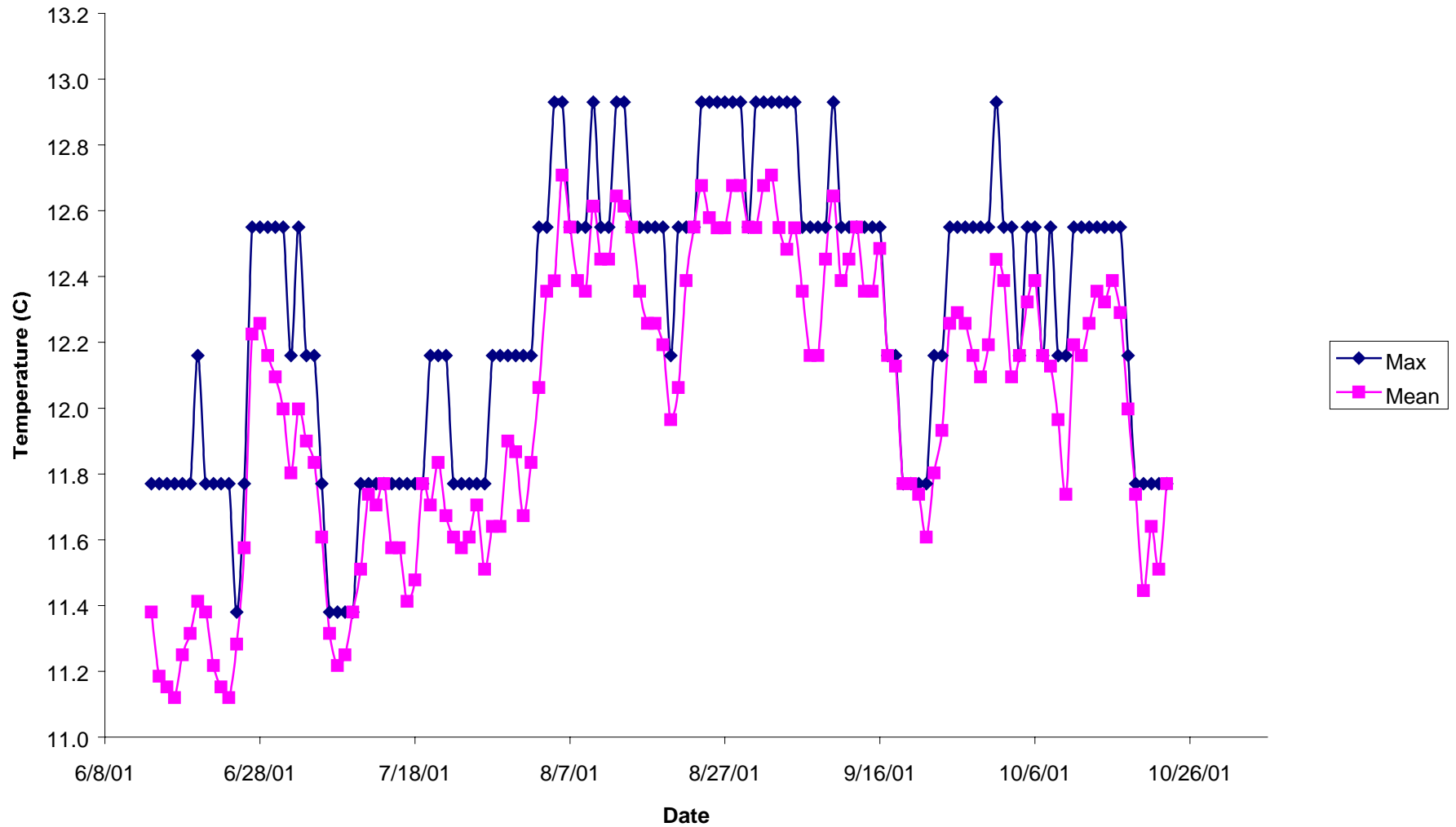


Figure 111. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Greenwood Creek (Site 84-21), Mendocino County, California.

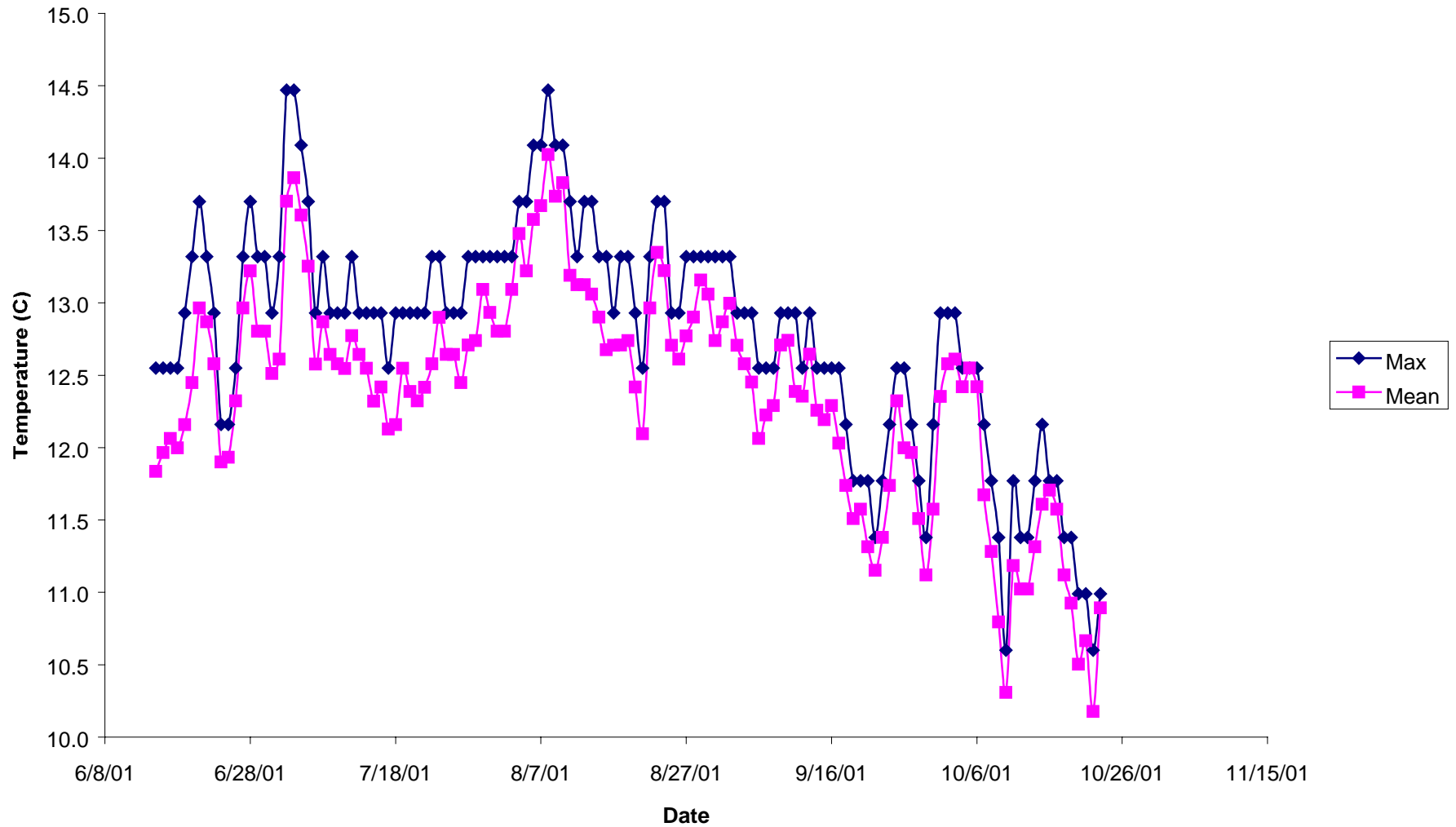


Figure 112. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Greenwood Creek (Site 84-22), Mendocino County, California.

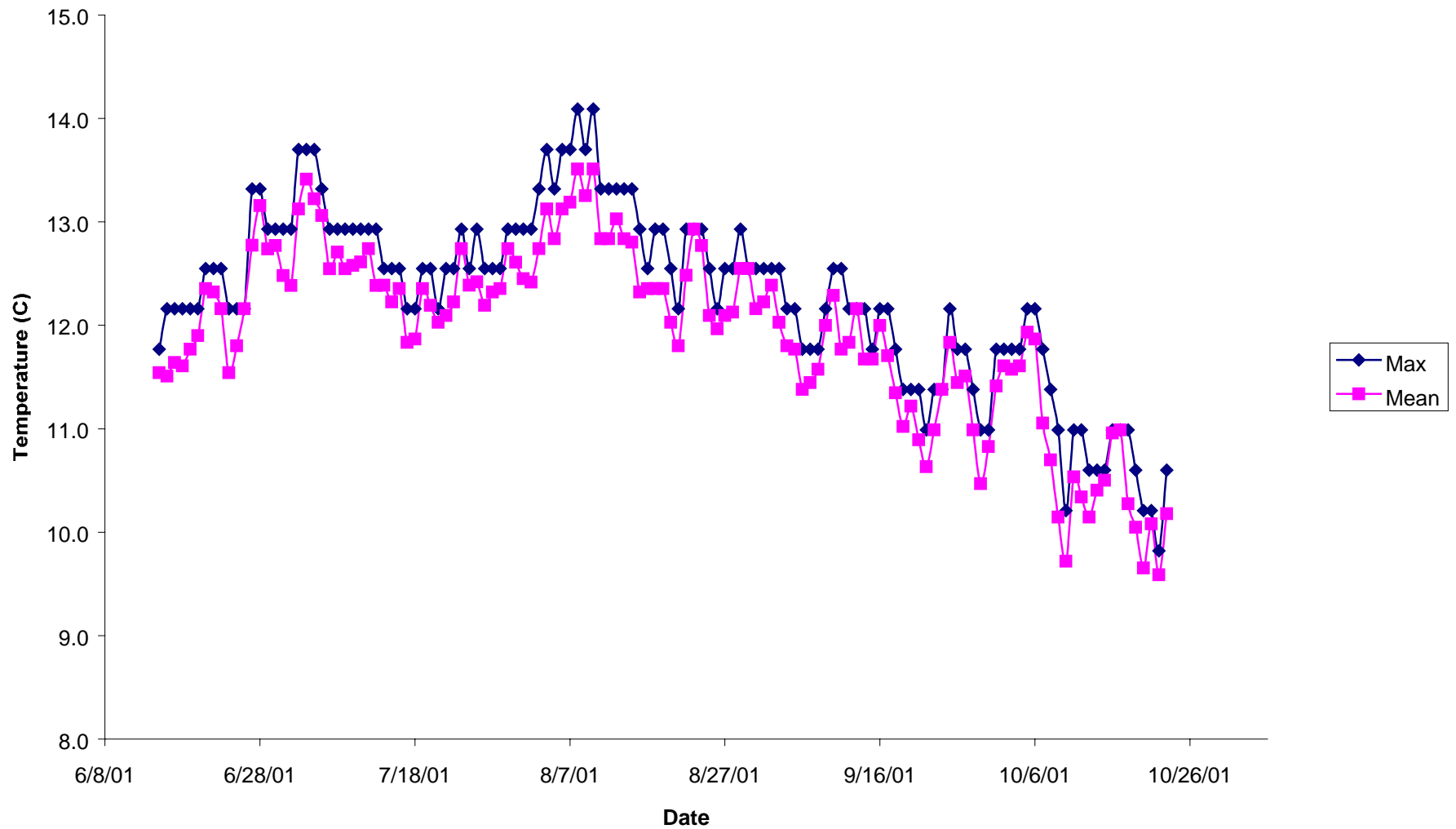


Figure 113. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Greenwood Creek (Site 84-23), Mendocino County, California.

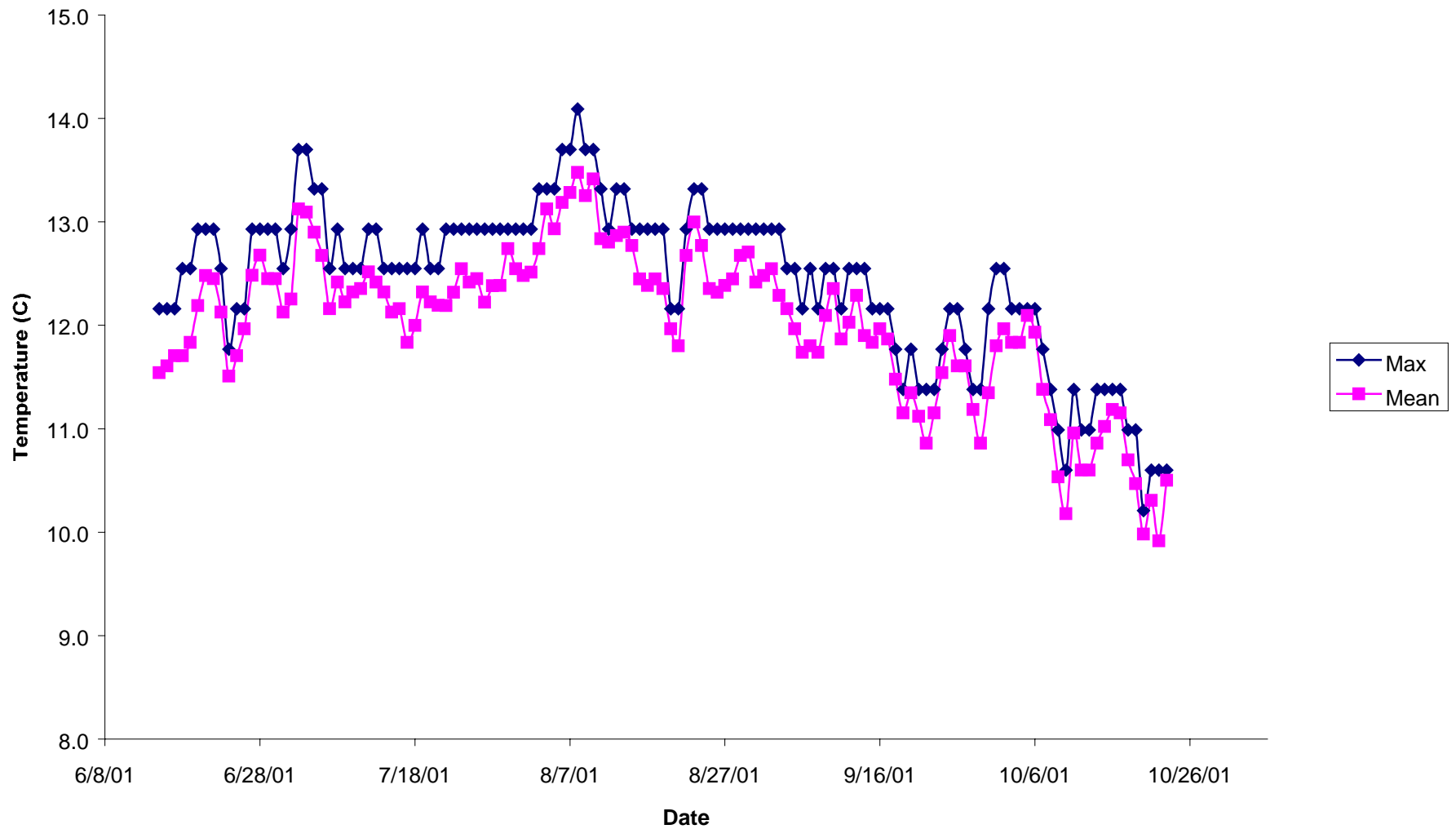


Figure 114, Mean and Maximum Daily Stream Temperatures During Summer 2001 at Elk Creek (87-1), Mendocino County, California.

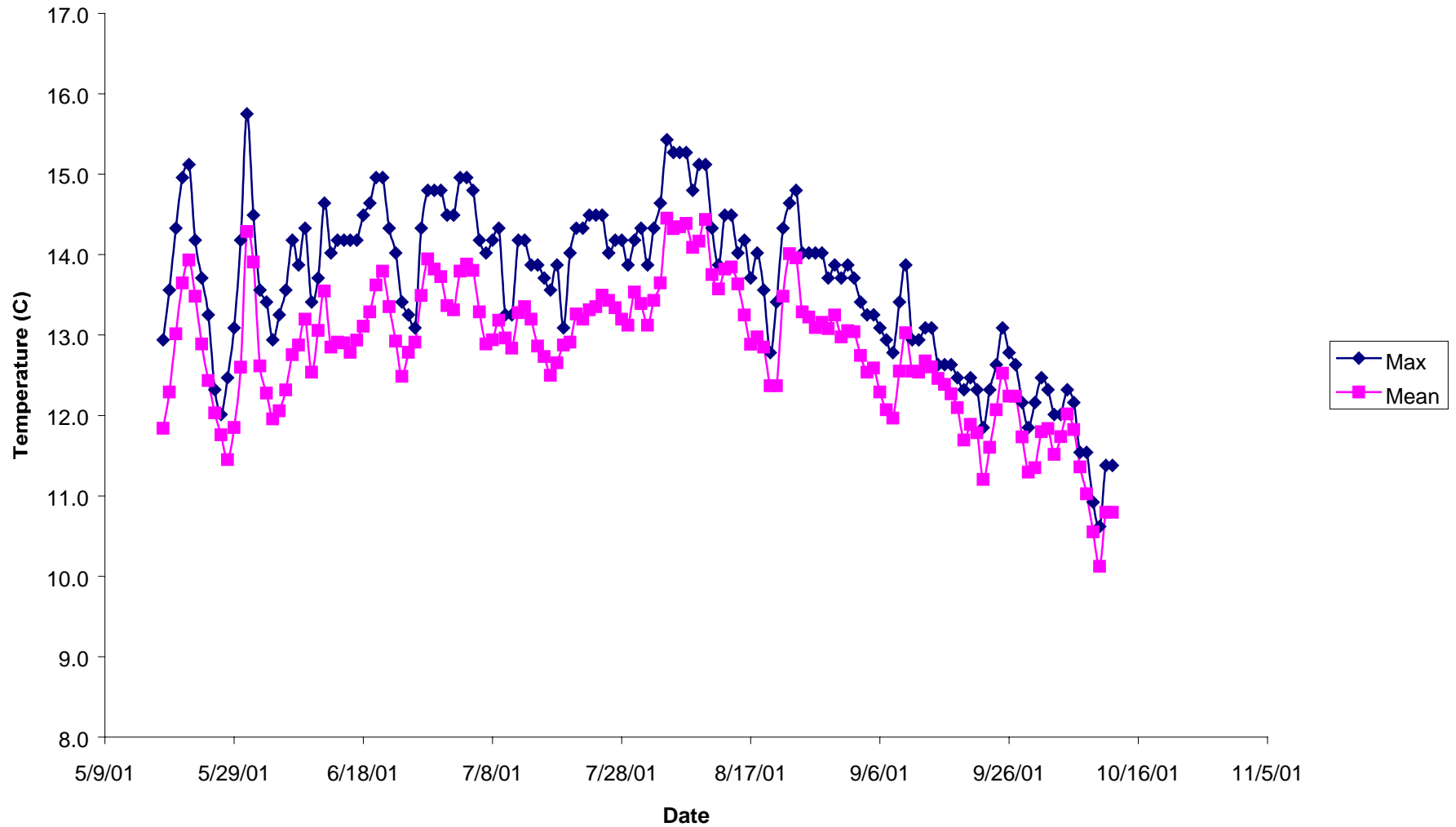


Figure 115. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Elk Creek (Site 87-2), Mendocino County, California.

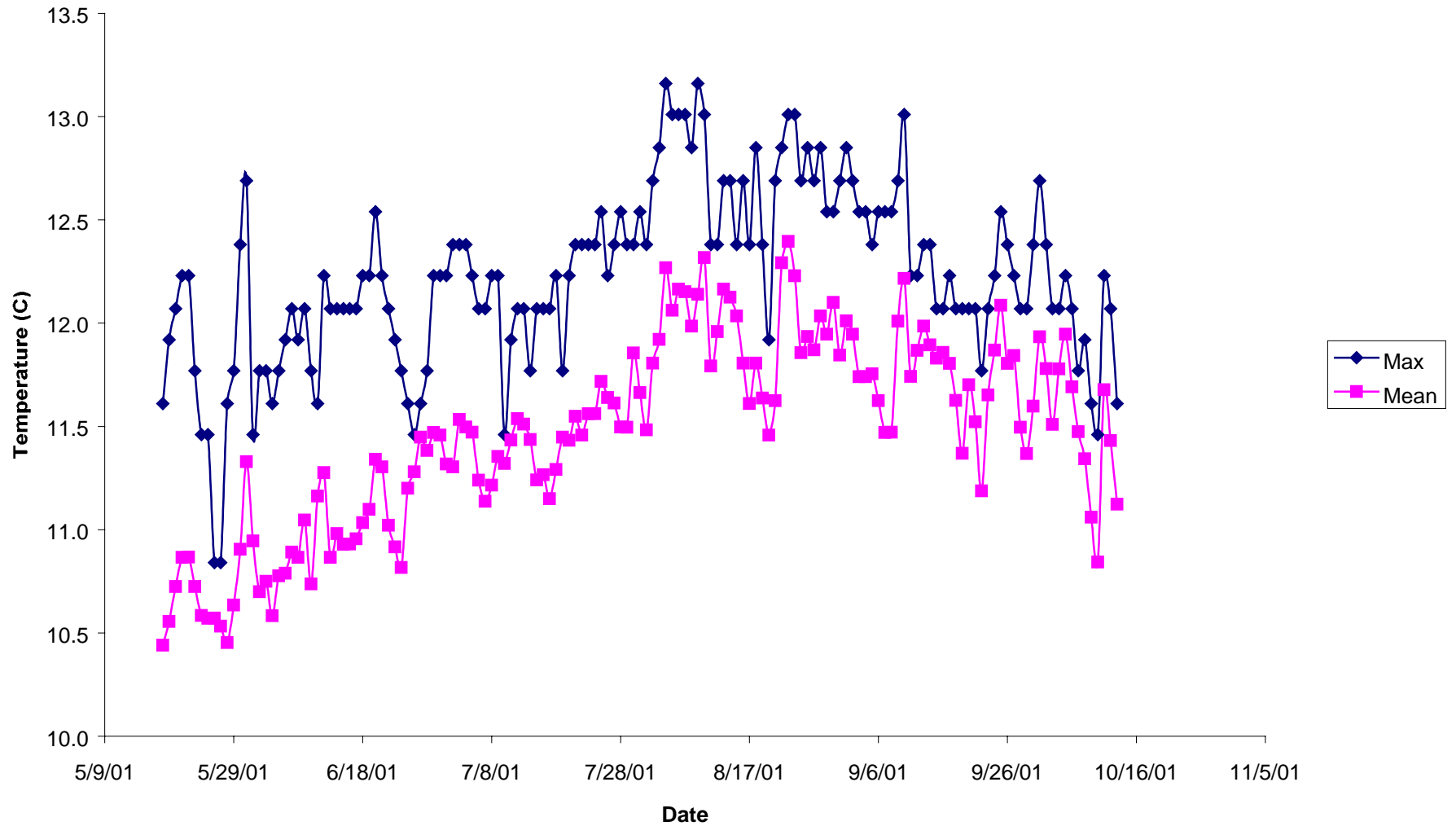


Figure 116. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Elk Creek (87-3), Mendocino County, California.

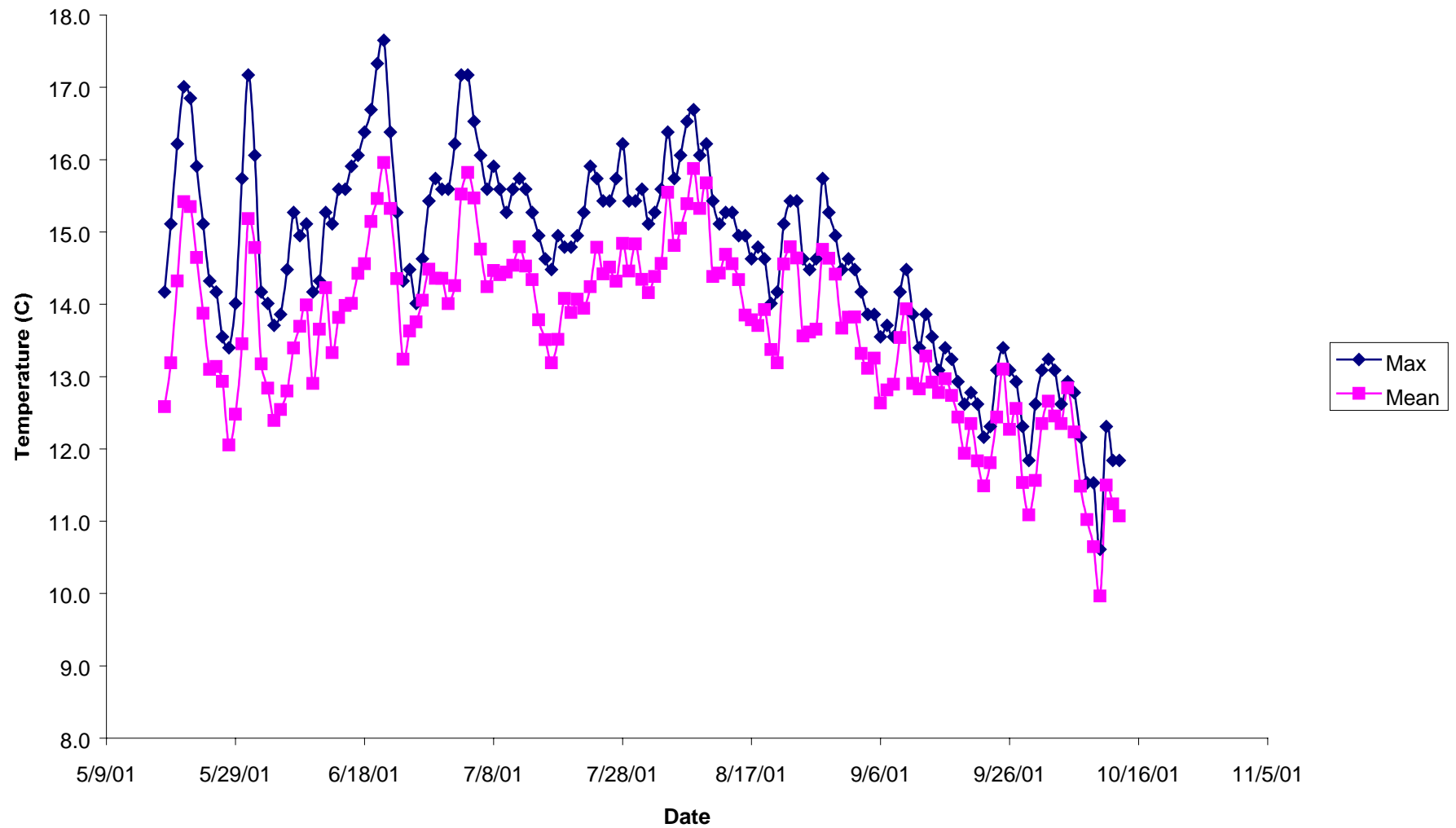


Figure 117. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Elk Creek (87-20), Mendocino County, California.

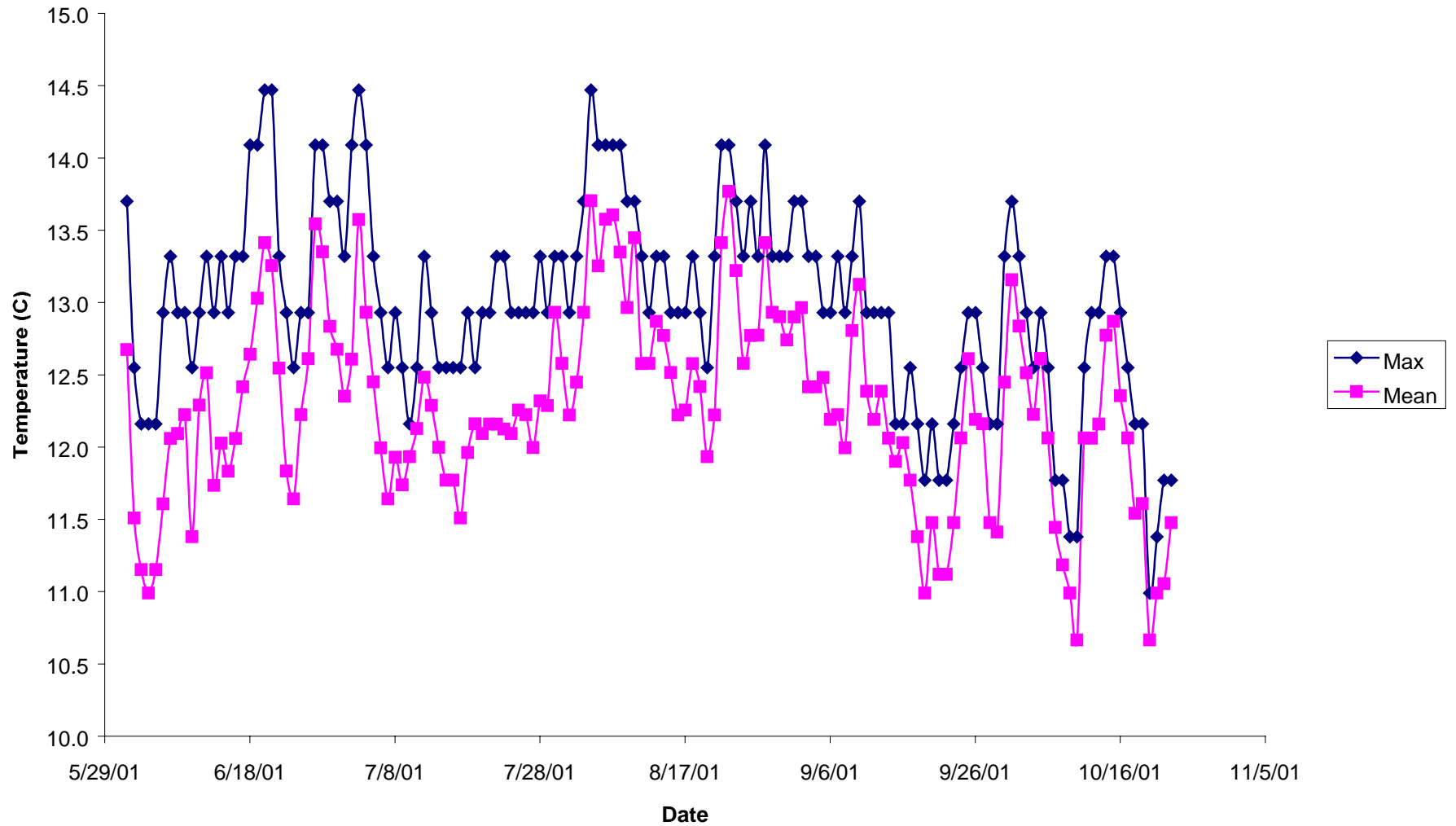


Figure 118. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Elk Creek (Site 87-21), Mendocino County, California.

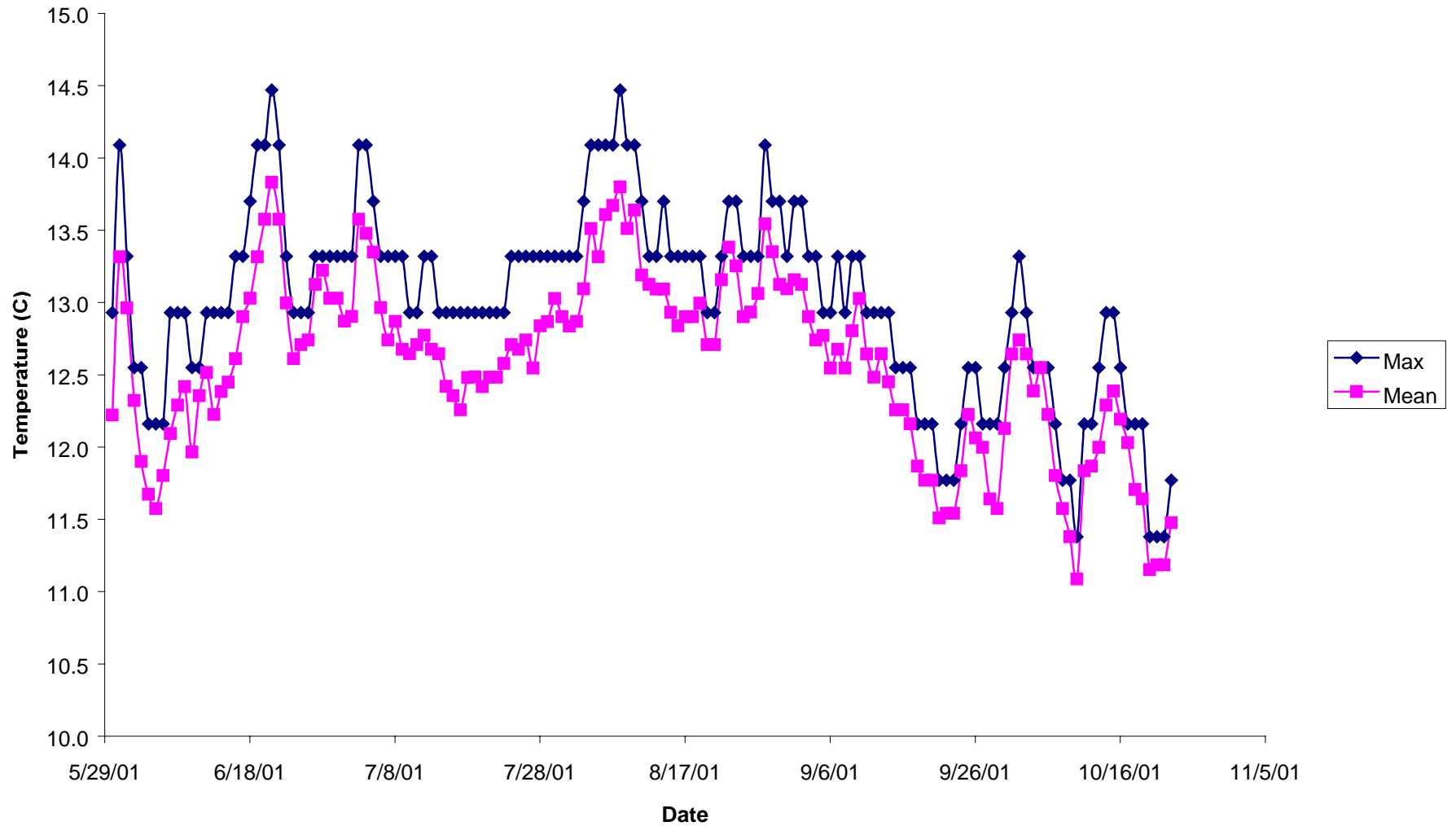


Figure 119. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Three Springs Creek (Site 87-22), Mendocino County, California.

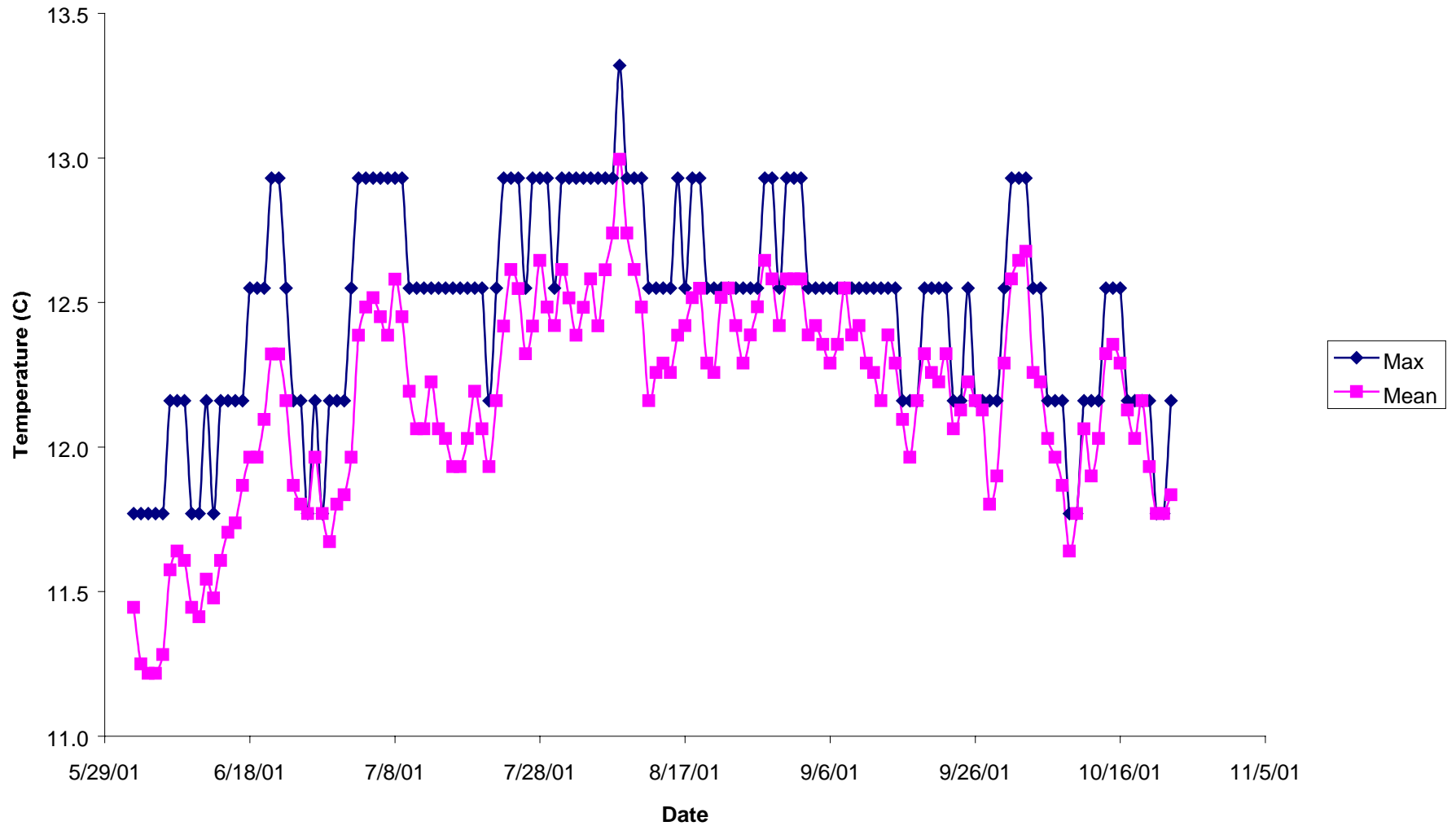


Figure 120. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tributary to Soda Fork Elk Creek (Site 87-23), Mendocino County, California.

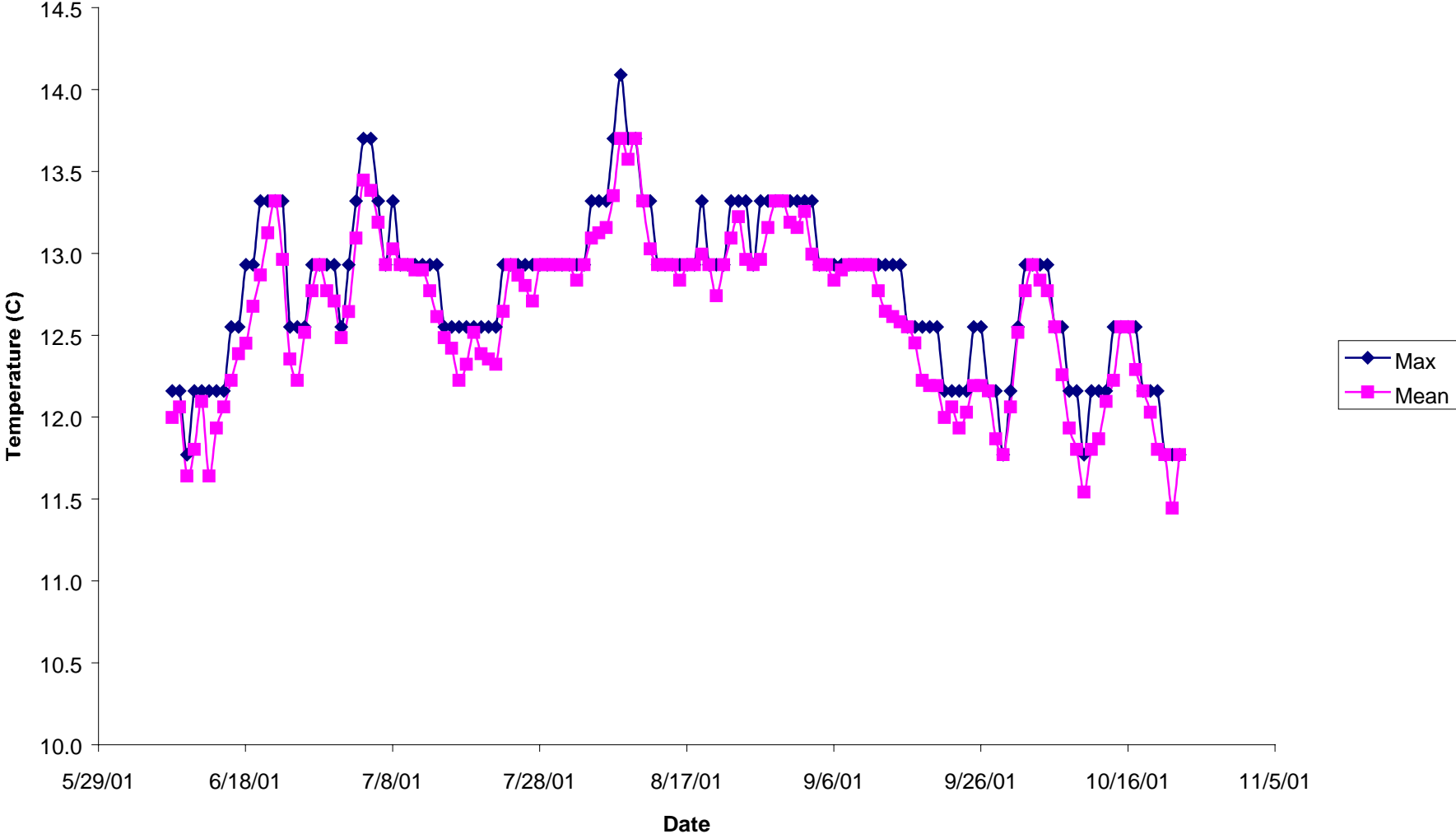


Figure 121. Mean and Maximum Daily Stream Temperatures During Summer 2001 at West Fork Unnamed Tributary to Elk Creek (Site 87-24), Mendocino County, California.

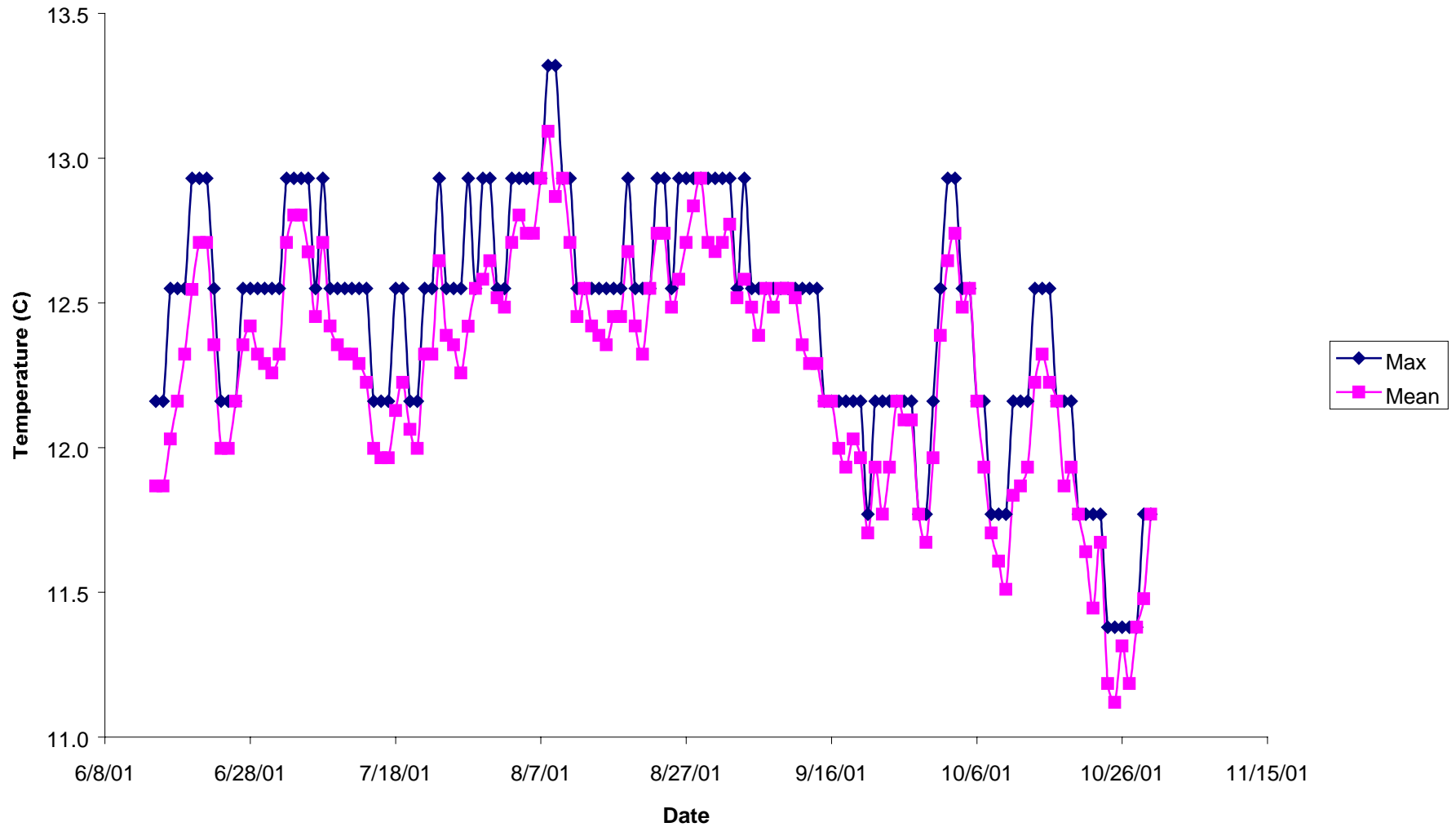


Figure 122. Mean and Maximum Daily Stream Temperatures During Summer 2001 at East Fork of Unnamed Tributary to Elk Creek (Site 87-25), Mendocino County, California.

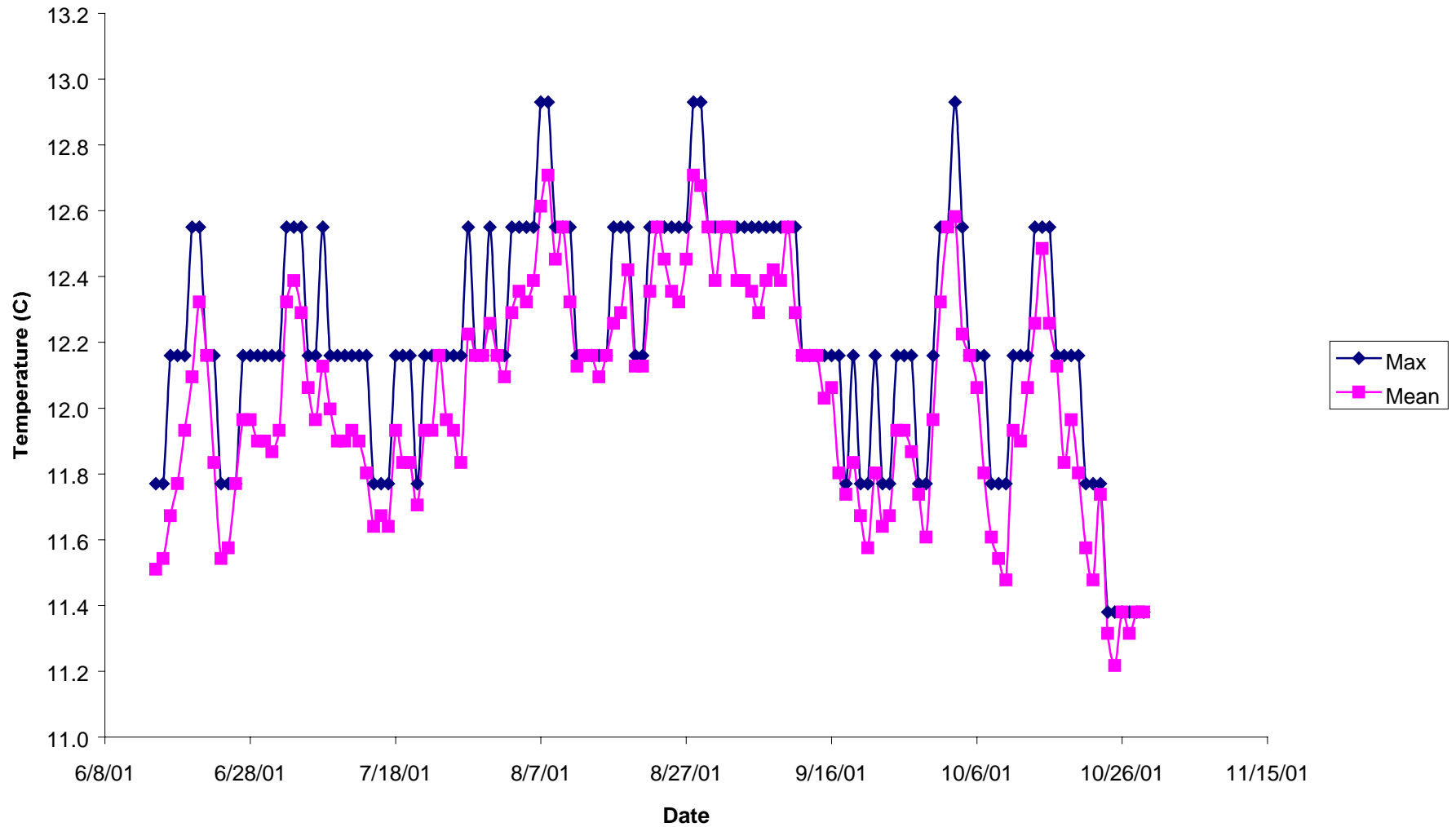


Figure 123. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Alder Creek (Site 89-1), Mendocino County, California.

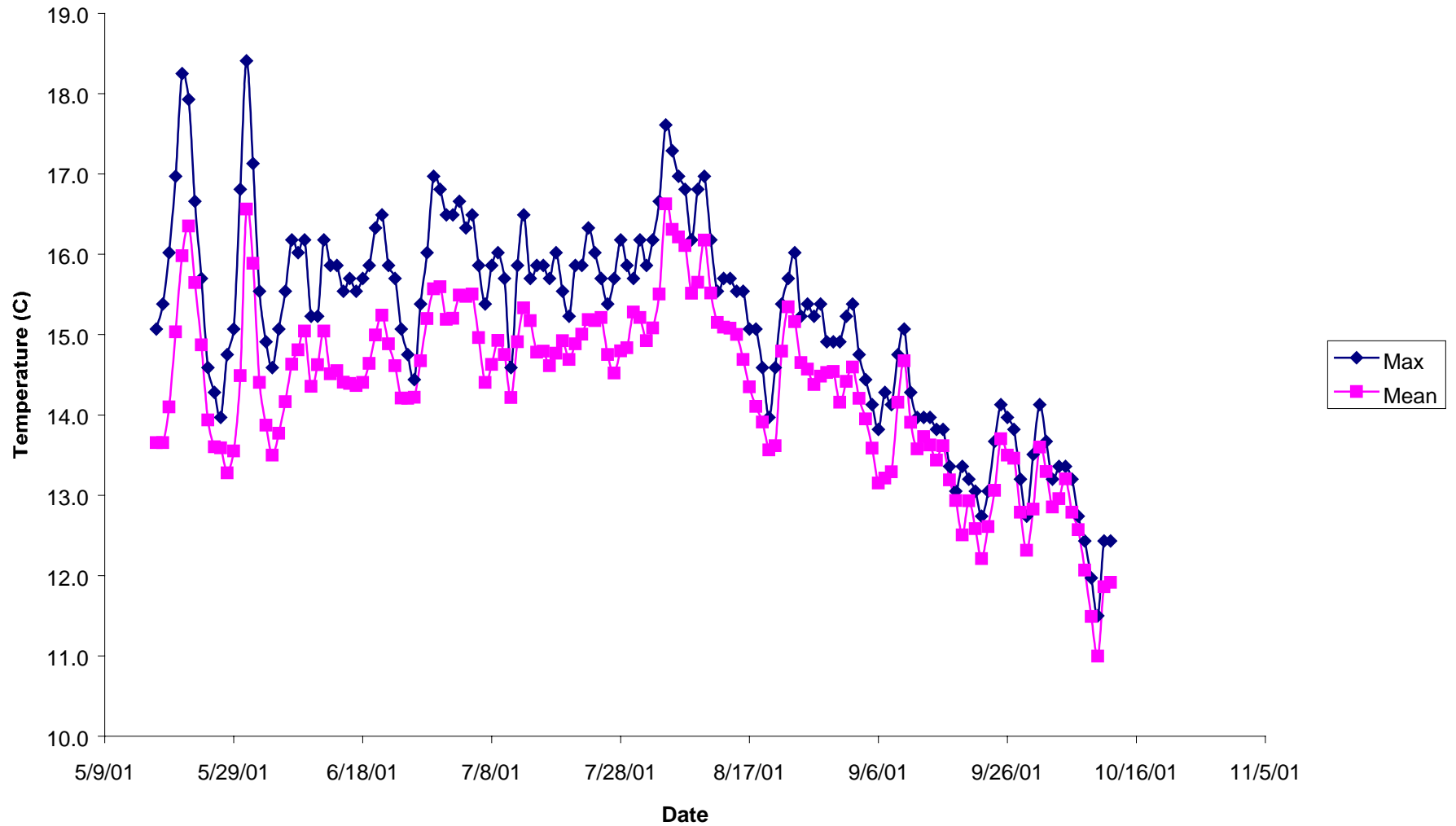


Figure 124. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Alder Creek (Site 89-2), Mendocino County, California.

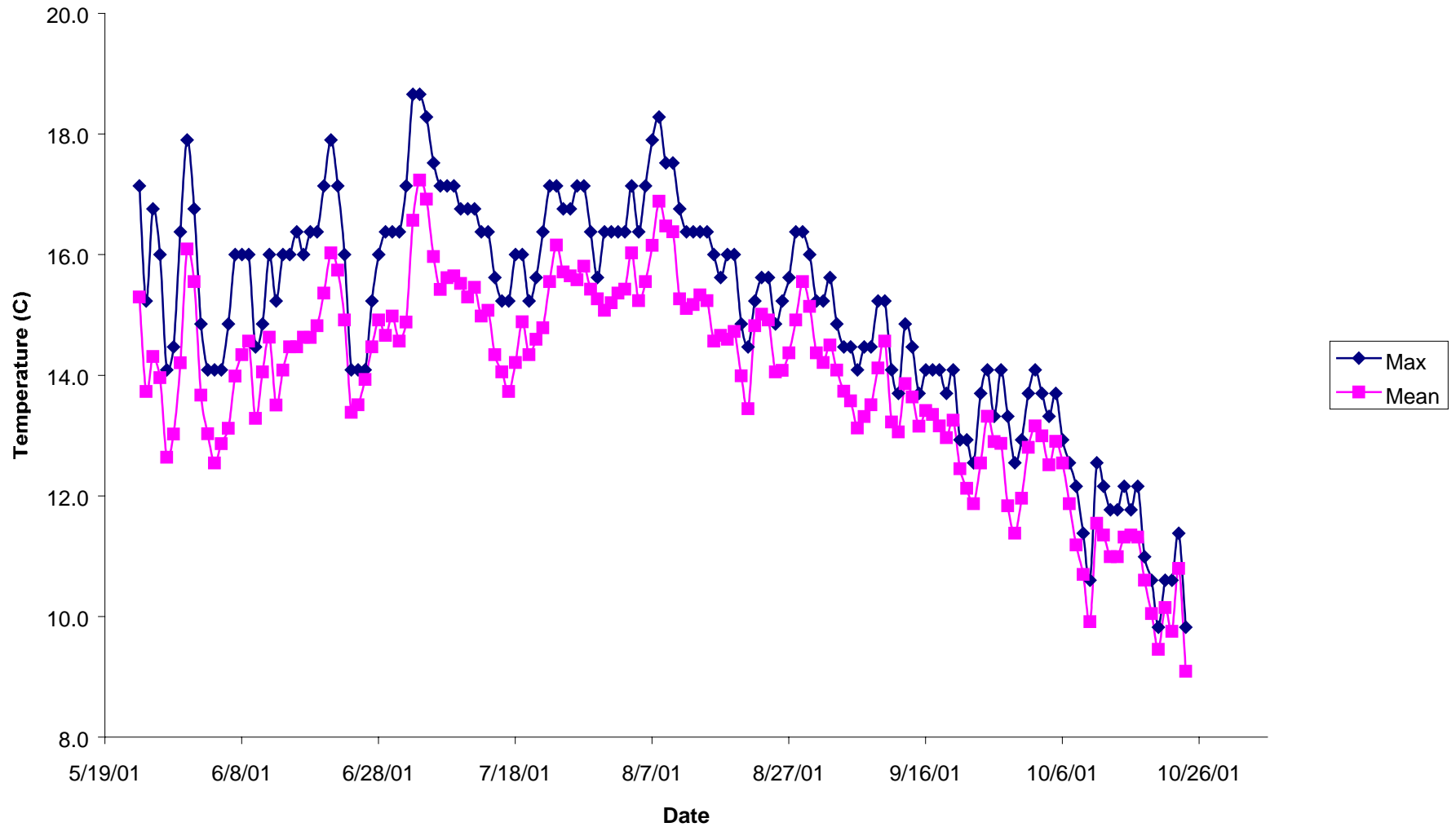


Figure 125. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Mallo Pass Creek (Site 89-3), Mendocino County, California.

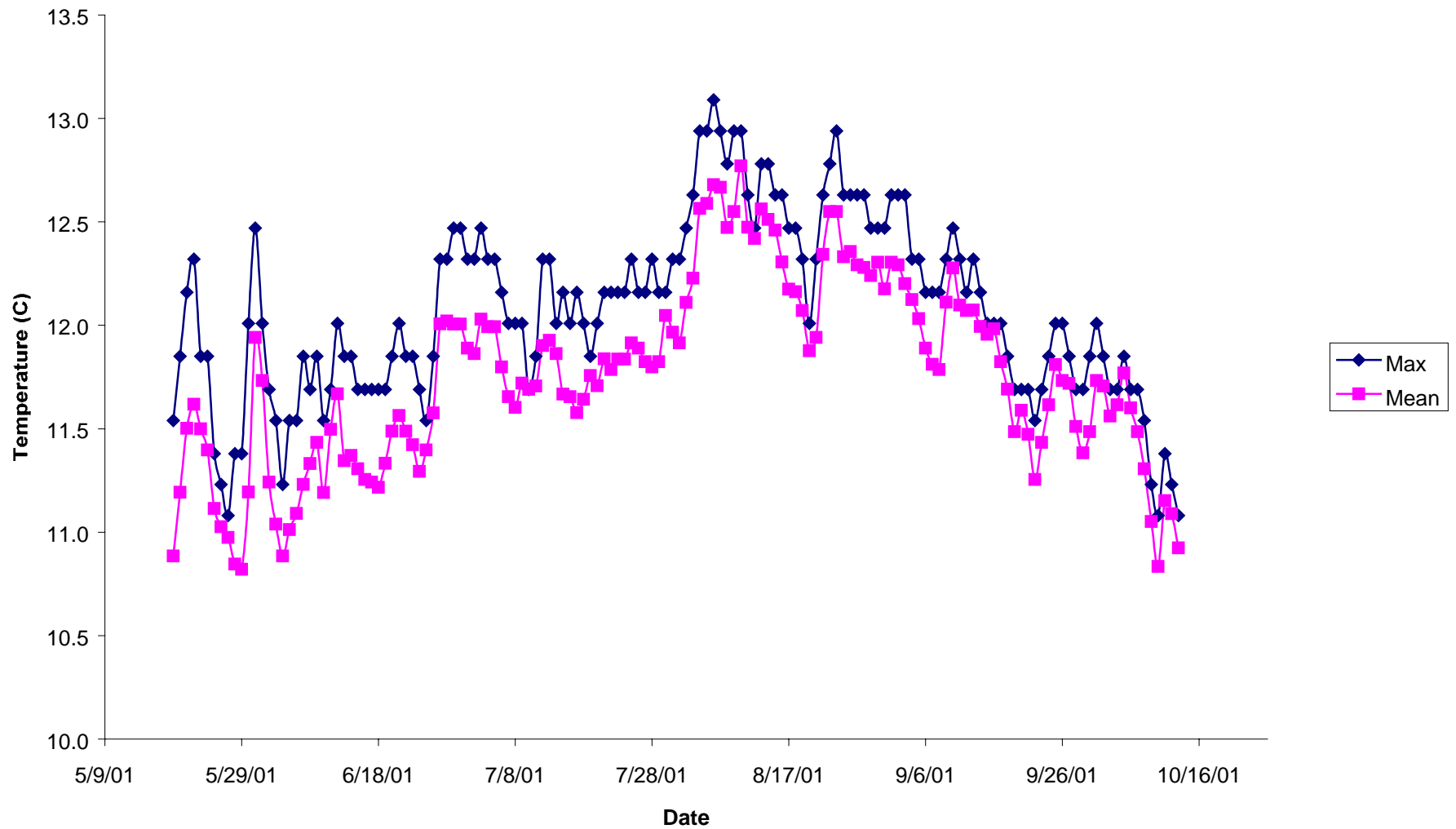


Figure 126. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Mills Creek (Site 89-20), Mendocino County, California.

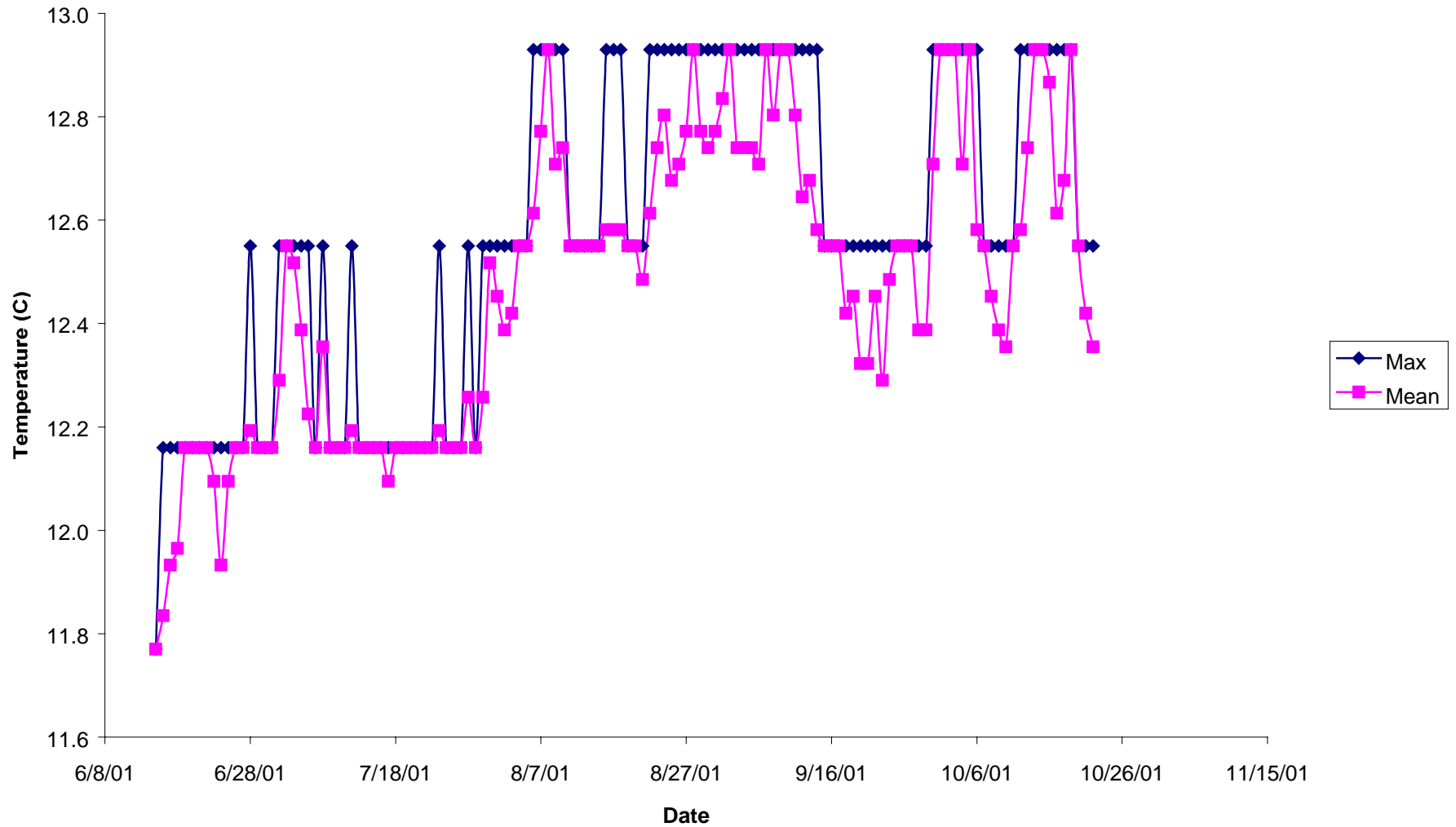


Figure 127. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Owl Creek (Site 89-21), Mendocino County, California.

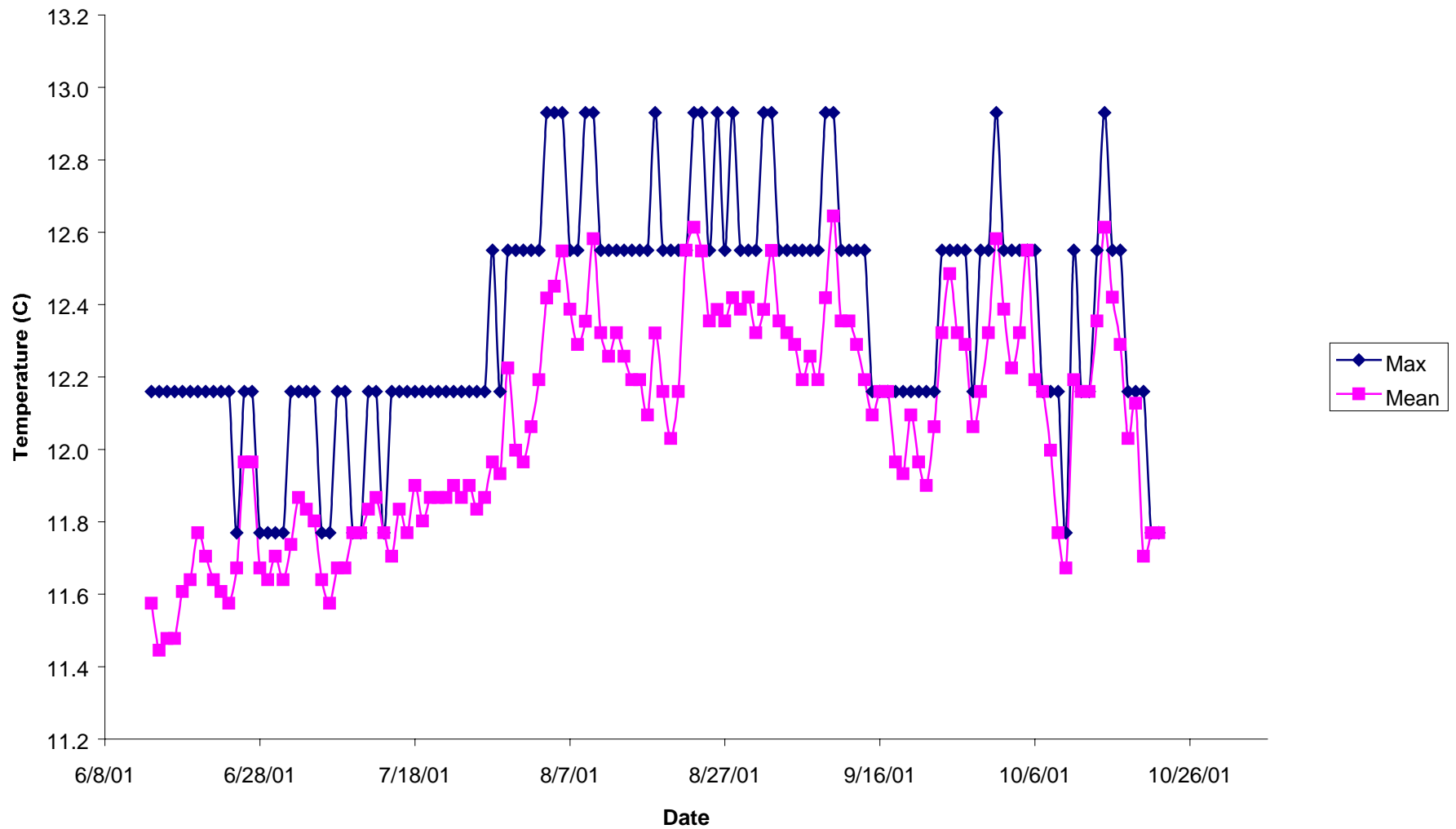
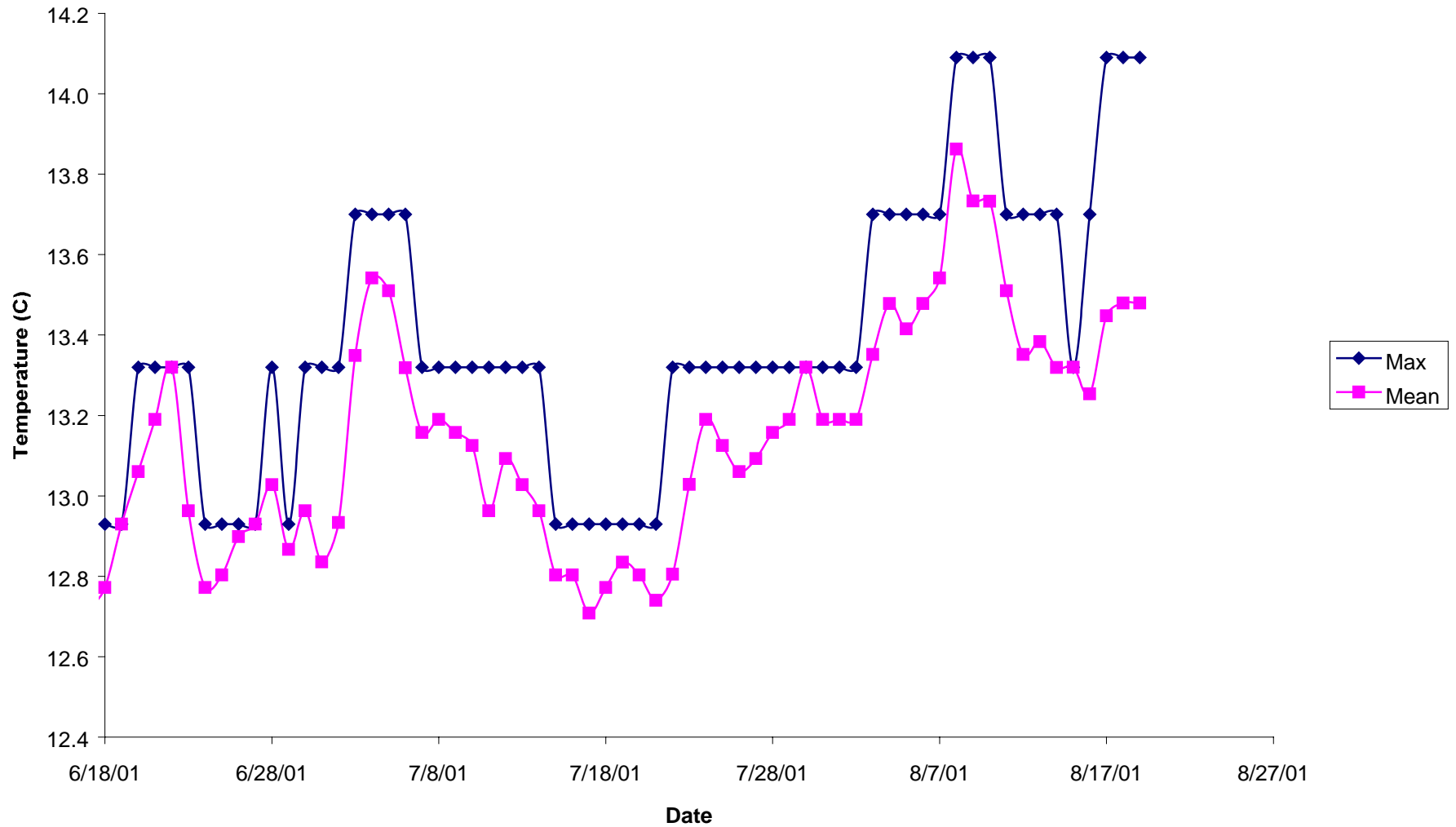


Figure 128. Mean and Maximum Daily Stream Temperatures During Summer 2001 at NE Fork Bee Tree Gulch (Site 89-23), Mendocino County, California.



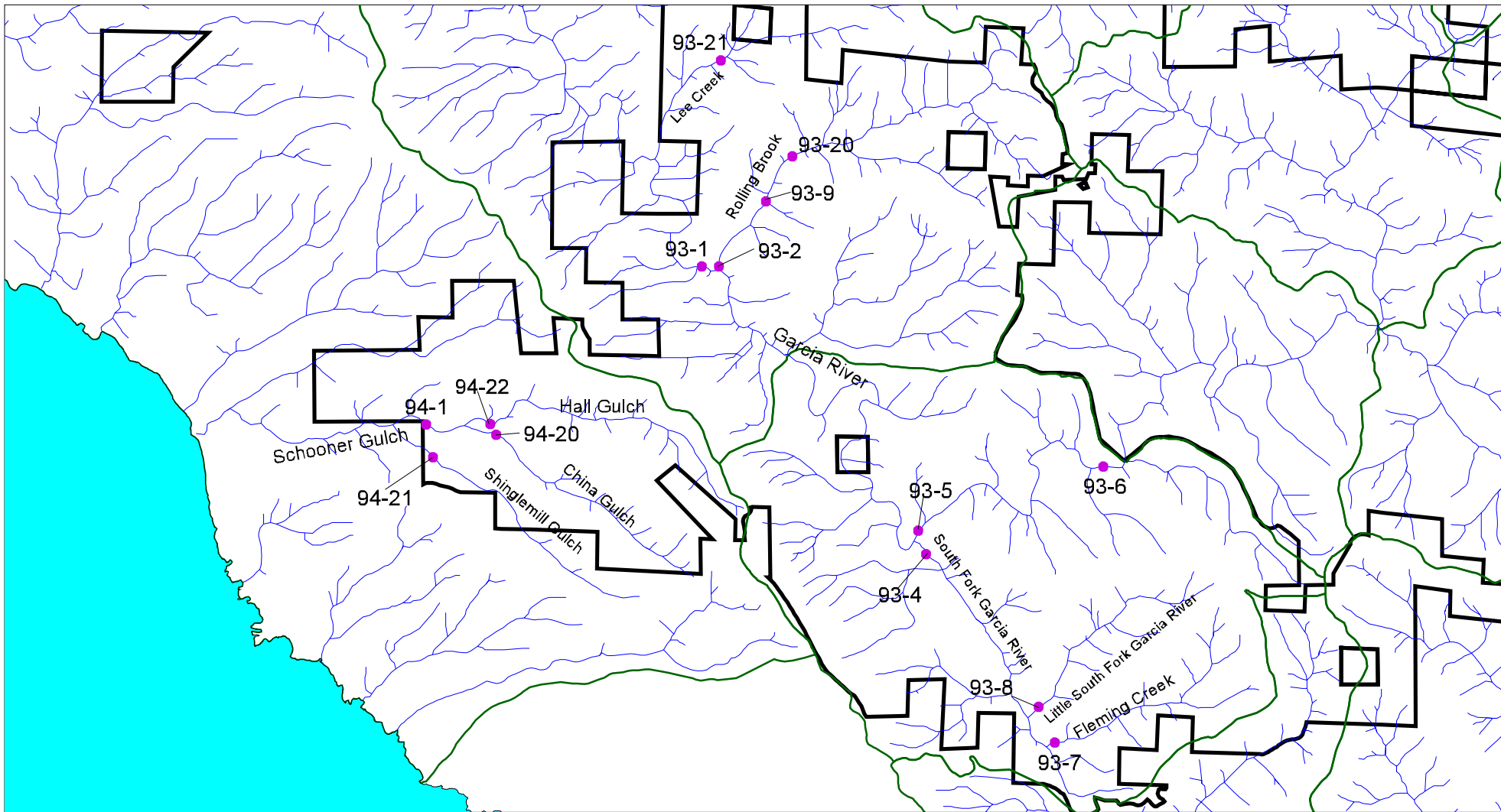
Garcia River Management Area

Table 8. Maximum, MWAT, and MWMT temperatures for sites in the Garcia Area (1994-2000).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Garcia River	93-1	1994	20.2	17.9	20.0
Garcia River	93-1	1995	23.0	19.7	22.3
Garcia River	93-1	1997	21.7	19.2	21.3
Garcia River	93-1	1999	18.3	15.8	17.8
Garcia River	93-1	2000	21.1	18.3	20.7
Garcia River	93-1	2001	19.8	18.2	19.5
Rolling Brook	93-2	1995	16.7	15.1	16.3
Rolling Brook	93-2	1996	15.3	13.9	14.9
Rolling Brook	93-2	1997	15.8	14.7	15.6
Rolling Brook	93-2	1999	16.1	14.5	15.5
Rolling Brook	93-2	2000	16.0	14.4	15.4
Rolling Brook	93-2	2001	15.7	14.2	15.5
Rolling Brook	93-9	1997	15.1	14.4	14.9
South Fork Garcia River	93-4	1994	15.0	14.0	14.8
South Fork Garcia River	93-4	1995	17.1	15.3	16.7
South Fork Garcia River	93-4	1997	15.1	14.2	14.8
South Fork Garcia River	93-4	1999	17.8	15.8	16.8
South Fork Garcia River	93-4	2000	16.4	14.4	16.1
South Fork Garcia River	93-4	2001	16.0	14.7	15.9
Garcia River	93-5	1999	22.2	19.1	21.5
Garcia River	93-5	2000	22.5	20.2	21.9
Garcia River	93-5	2001	24.0	19.0	22.4
Garcia River	93-6	1997	22.6	19.5	22.1
Garcia River	93-6	1999	22.8	20.2	22.4
Fleming Creek	93-7	1997	14.7	14.1	14.7
Fleming Creek	93-7	2000	13.7	13.1	13.5
Fleming Creek	93-7	2001	14.1	13.2	13.8
South Fork Garcia River	93-8	1999	14.6	13.8	14.3
South Fork Garcia River	93-8	2001	13.3	12.9	13.2
Rolling Brook	93-20*	2001	14.5	13.6	14.3
Lee Creek	93-21*	2001	12.9	12.8	12.9
Schooner Gulch	94-1	1996	15.2	13.8	14.8
Schooner Gulch	94-1	1997	16.5	14.8	16.0
Schooner Gulch	94-1	1999	15.6	14.2	15.1
Schooner Gulch	94-1	2000	15.7	13.9	14.8
Schooner Gulch	94-1	2001	12.9	12.2	12.6
China Gulch	94-20*	2001	15.2	13.6	14.7

Shinglemill Gulch	94-21*	2001	16.8	13.8	16.3
Hall Gulch	94-22*	2001	14.5	13.6	14.3
*Class II Streams					

Map 15. Garcia River Stream Temperature Sites



- Temperature Sites
- ▬ Streams
- ▭ Pacific Ocean
- ▭ Planning Watershed
- ▭ MRC Property

Mendocino Redwood Company, LLC
1 0 1 2 Miles

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Figure 129. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Garcia River (Site 93-1), Mendocino County, California.

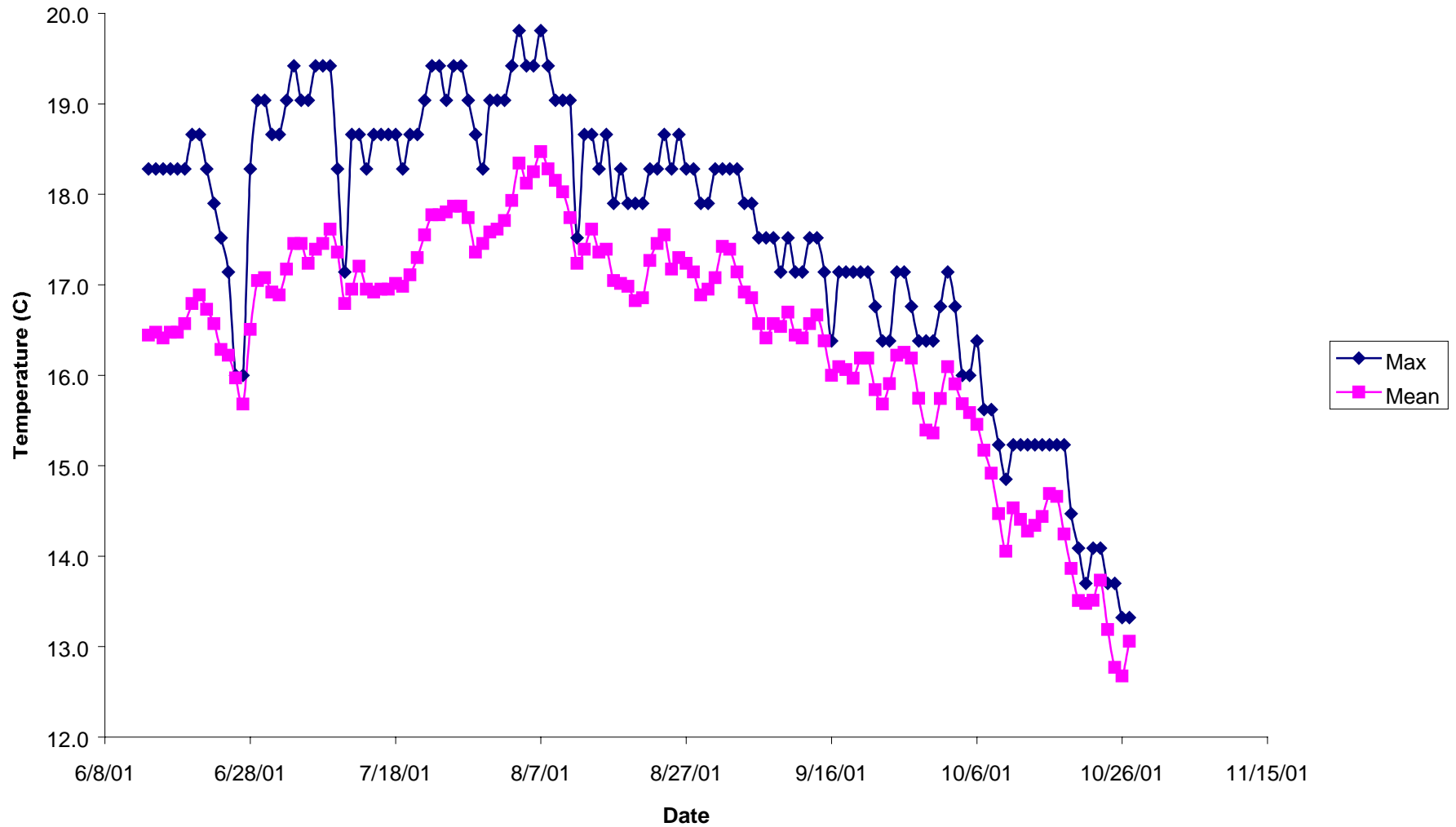


Figure 130. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Rolling Brook (Site 93-2), Mendocino County, California.

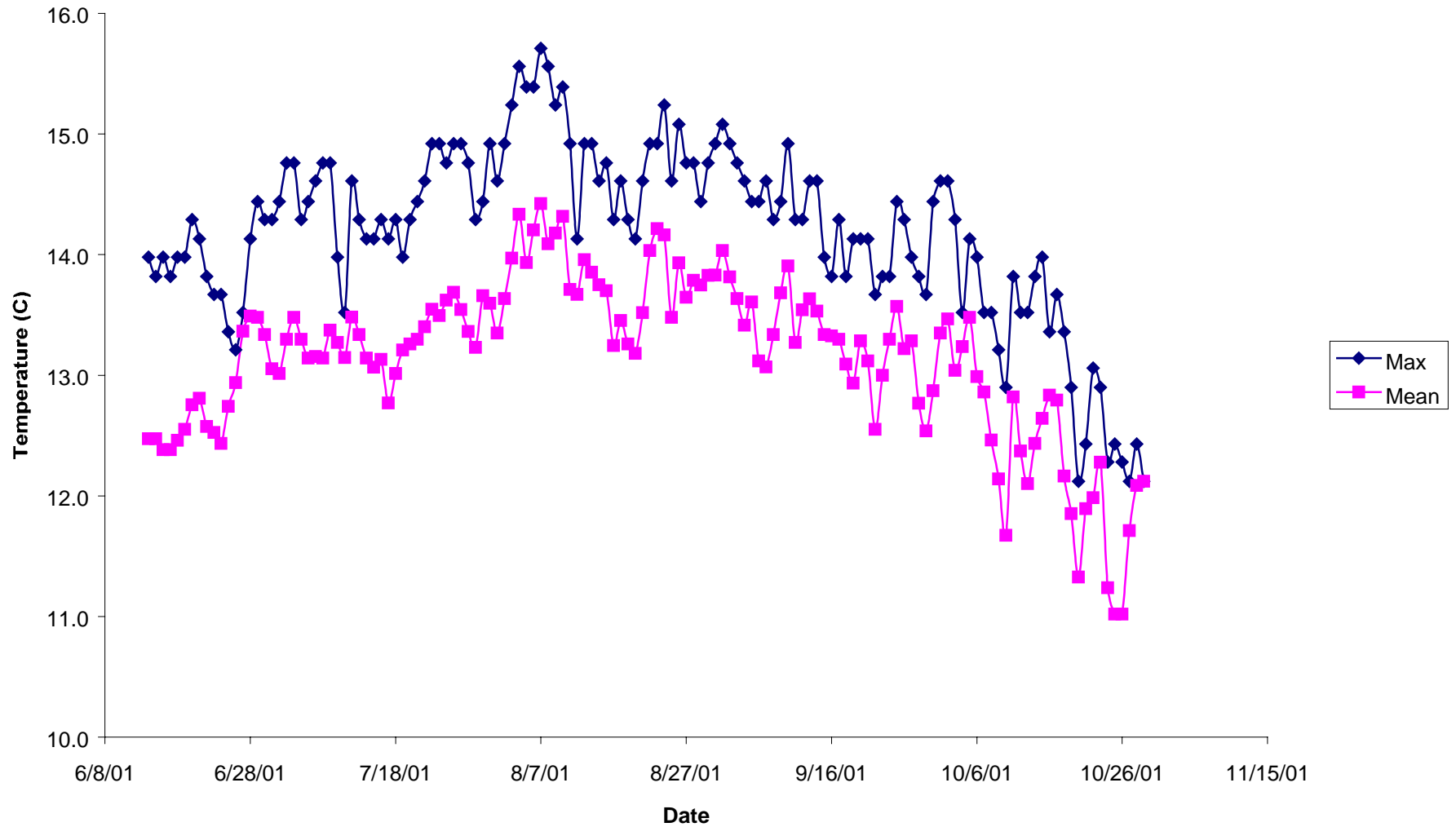


Figure 131. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Garcia River (Site 93-4), Mendocino County, California.

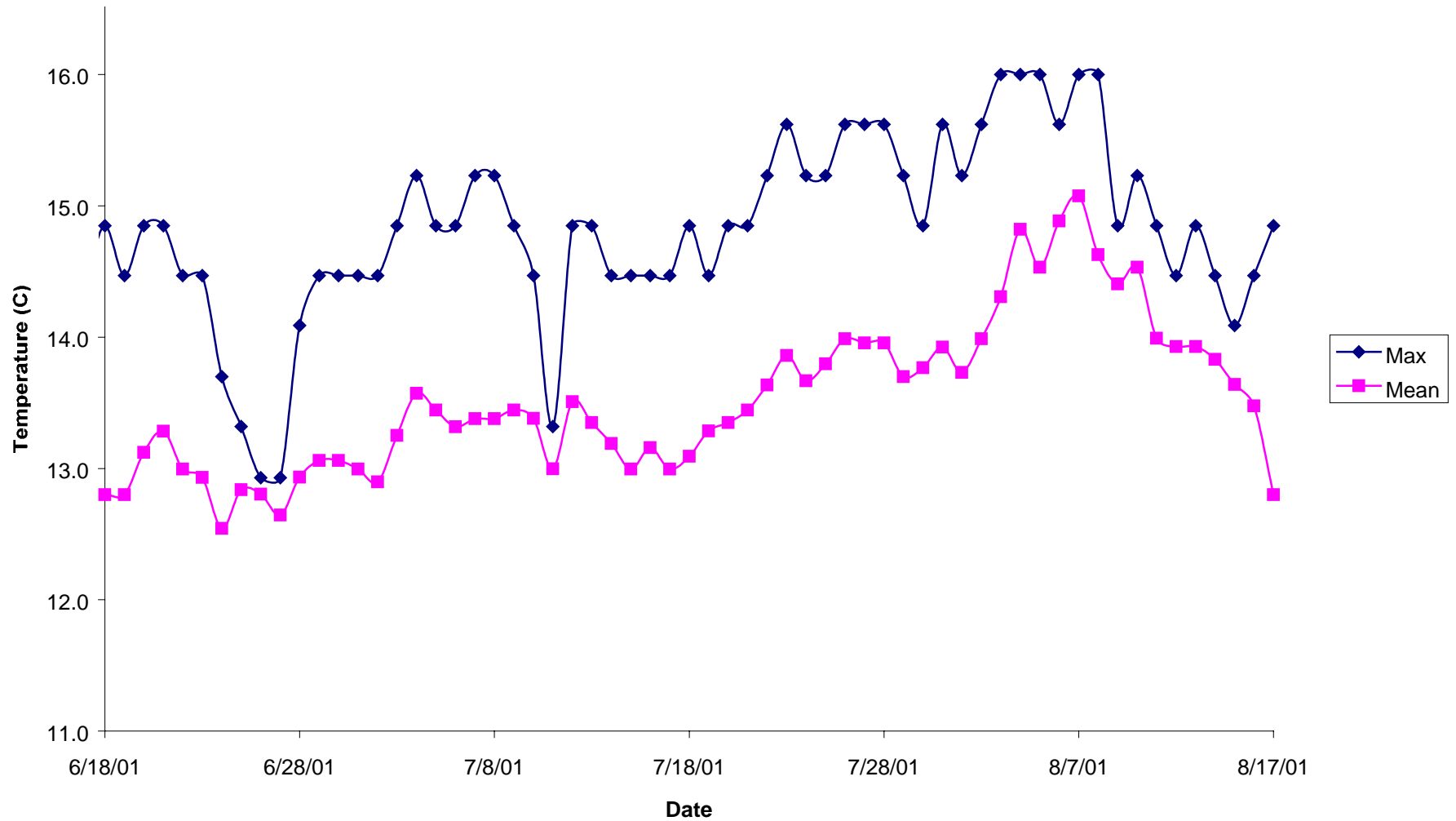


Figure 132. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Garcia River (Site 93-5), Mendocino County, California.

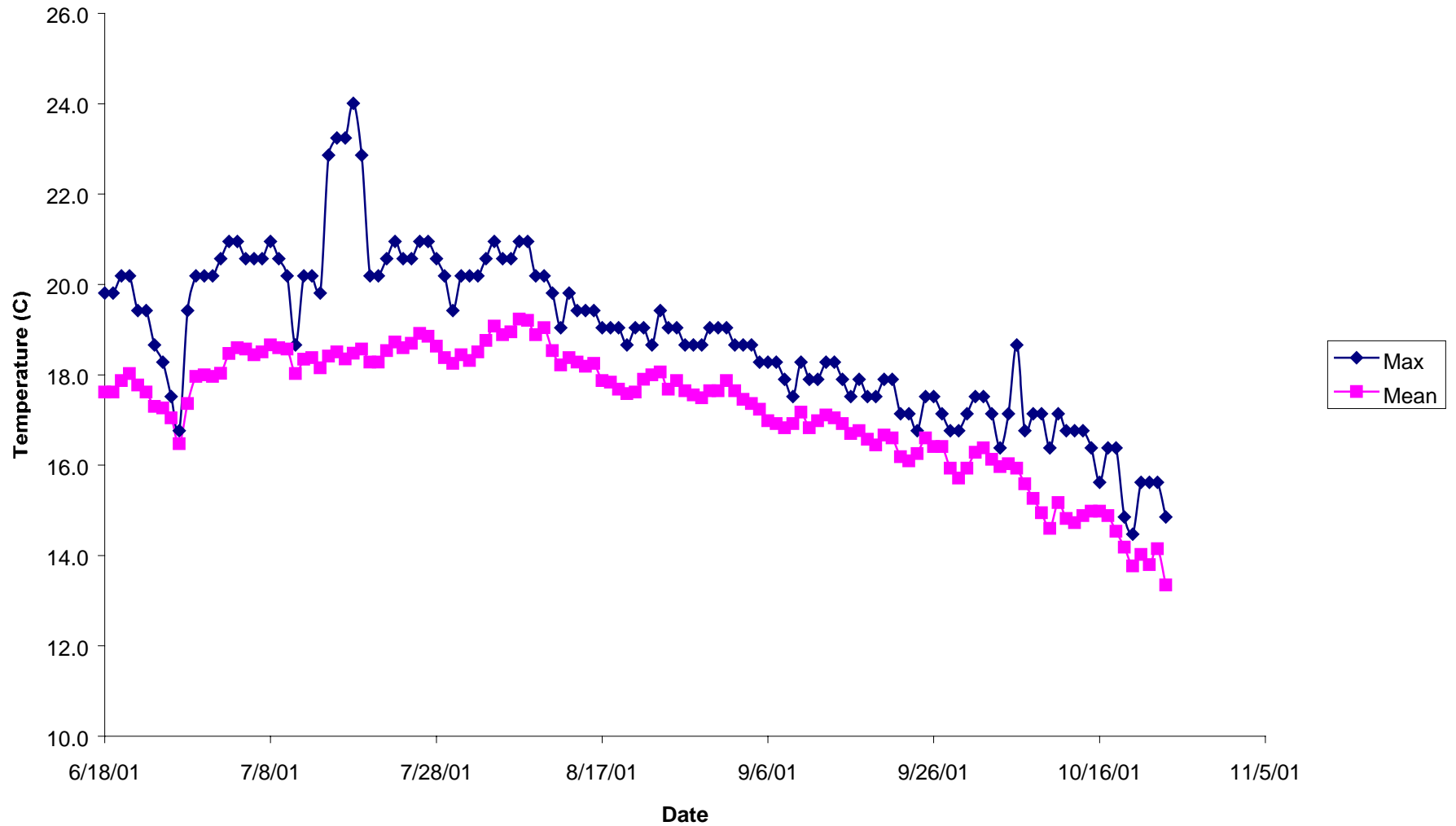


Figure 133. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Fleming Creek (Site 93-7), Mendocino County, California.

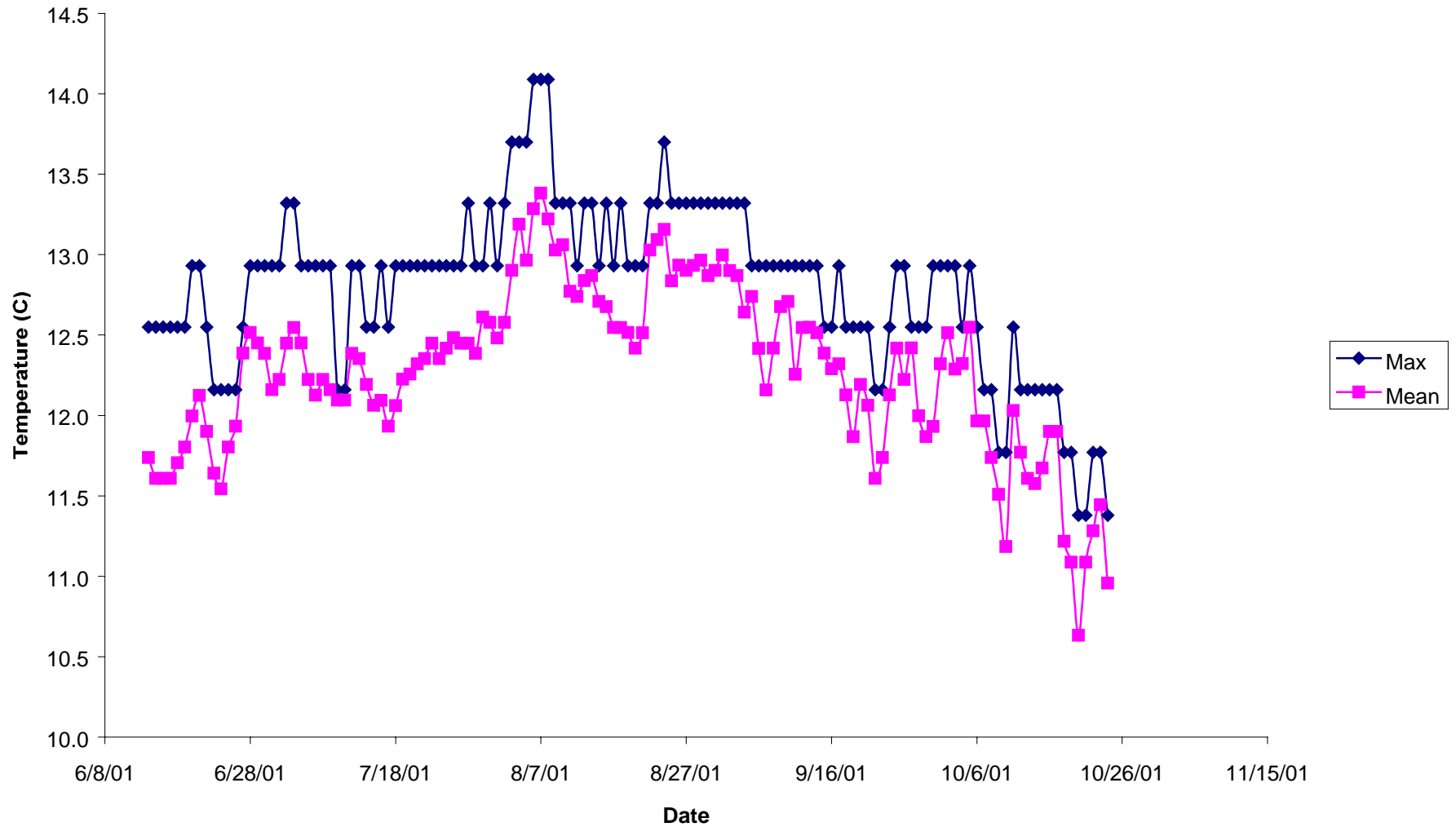


Figure 134. Mean and Maximum Daily Stream Temperatures During Summer 2001 at South Fork Garcia River (Site 93-8), Mendocino County, California.

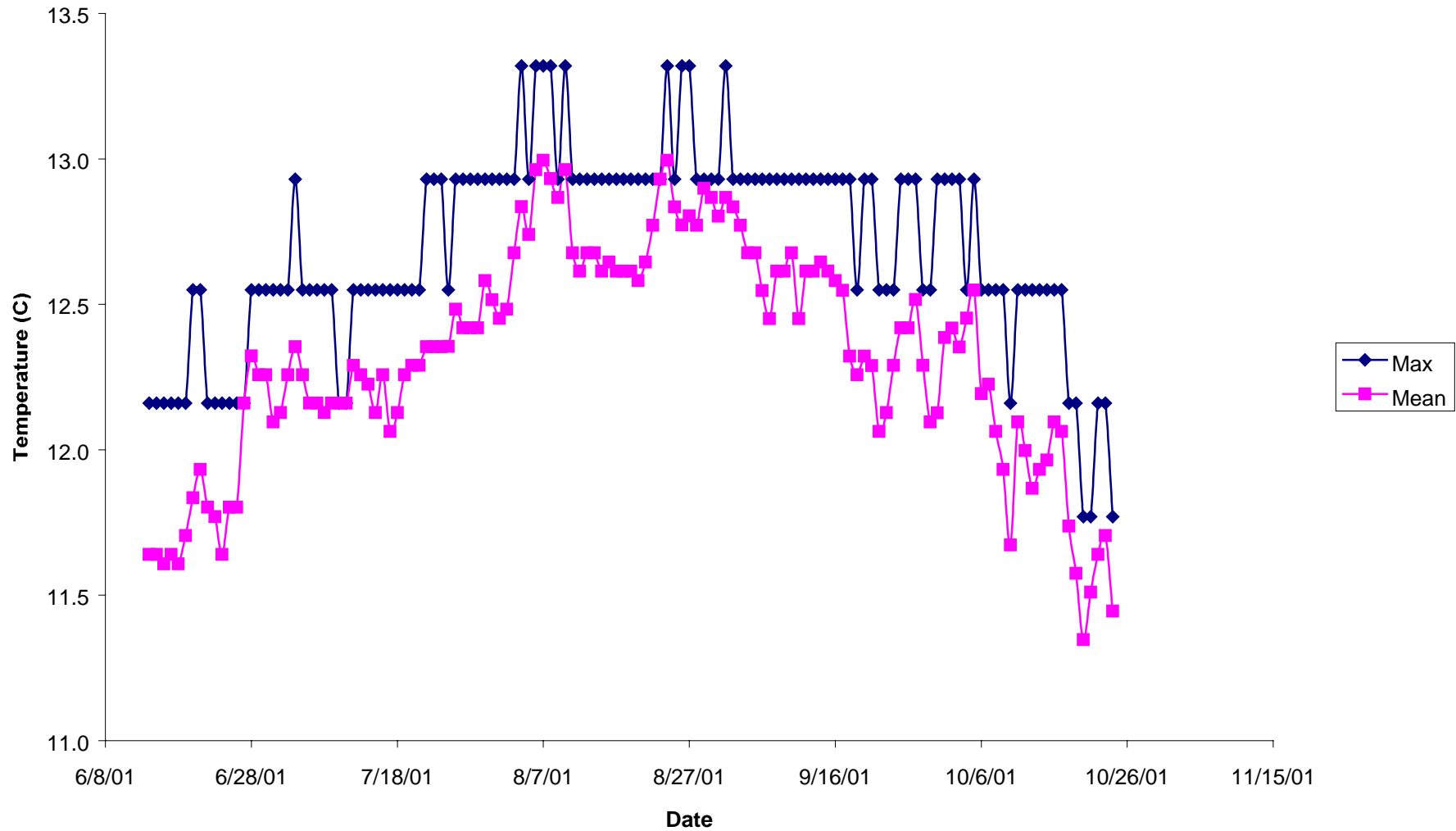


Figure 135. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Rolling Brook (Site 93-20), Mendocino County, California.

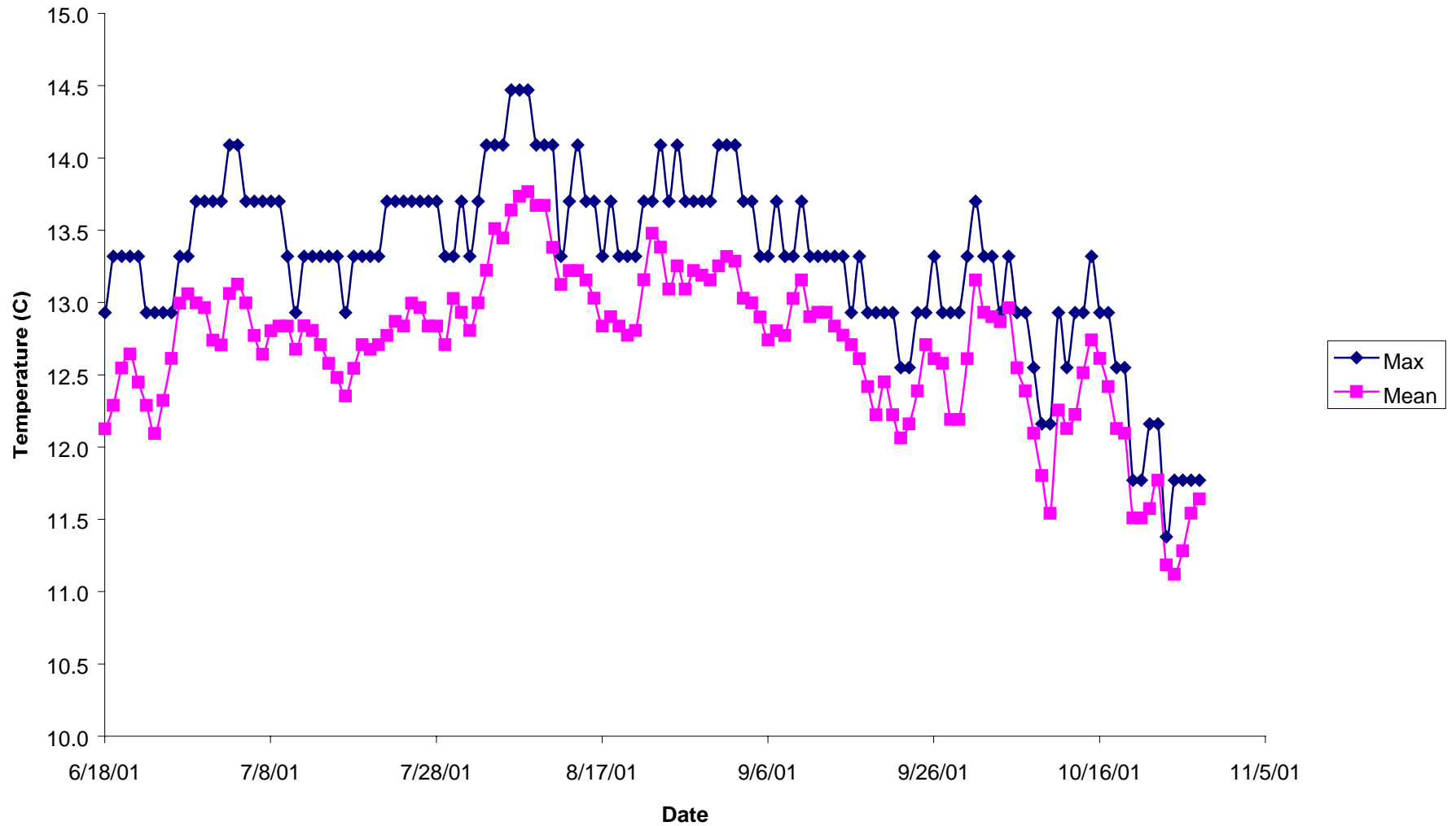


Figure 136. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Lee Creek (Site 93-21), Mendocino County, California.

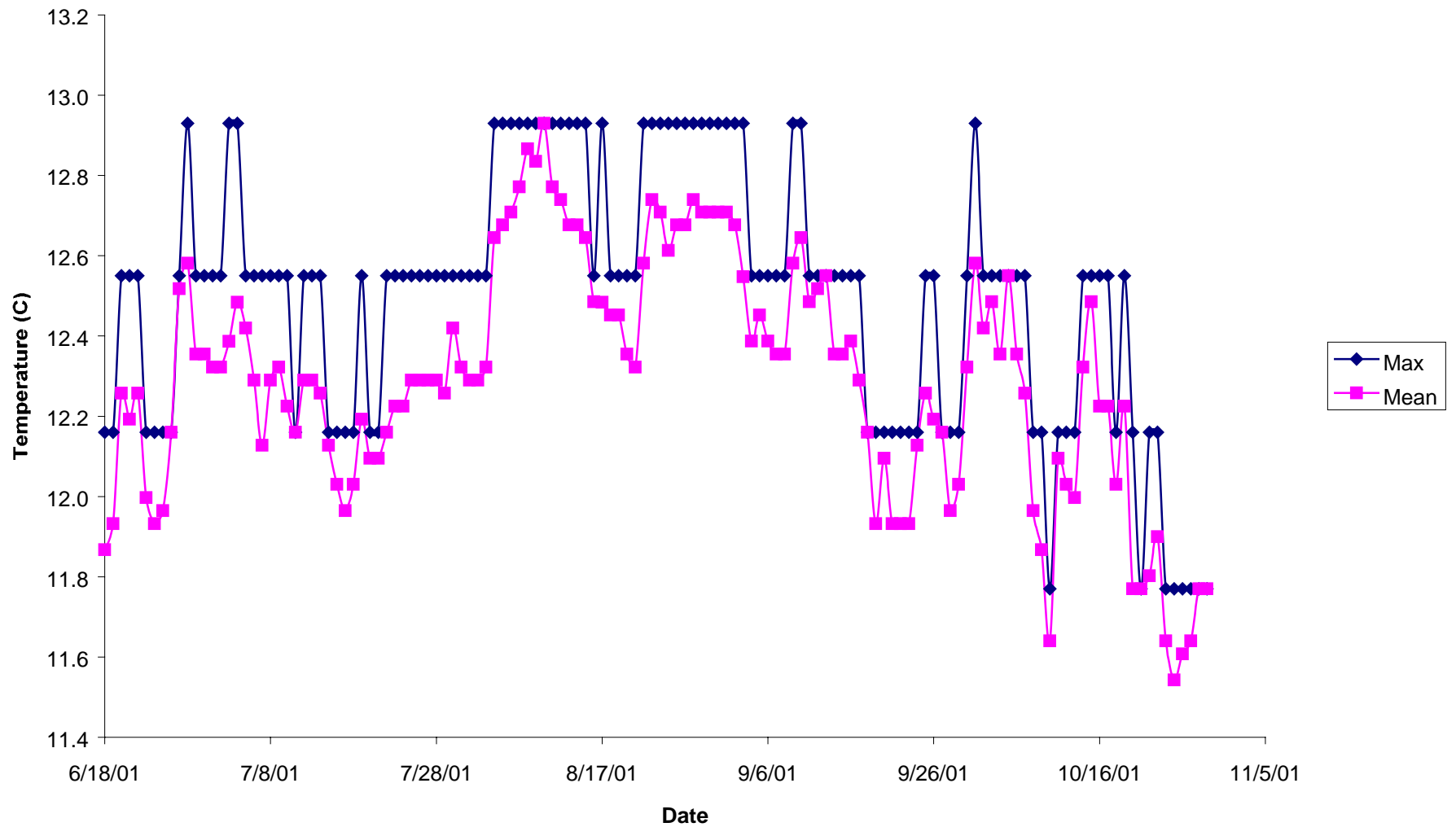


Figure 137. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Schooner Gulch (Site 94-1), Mendocino County, California.

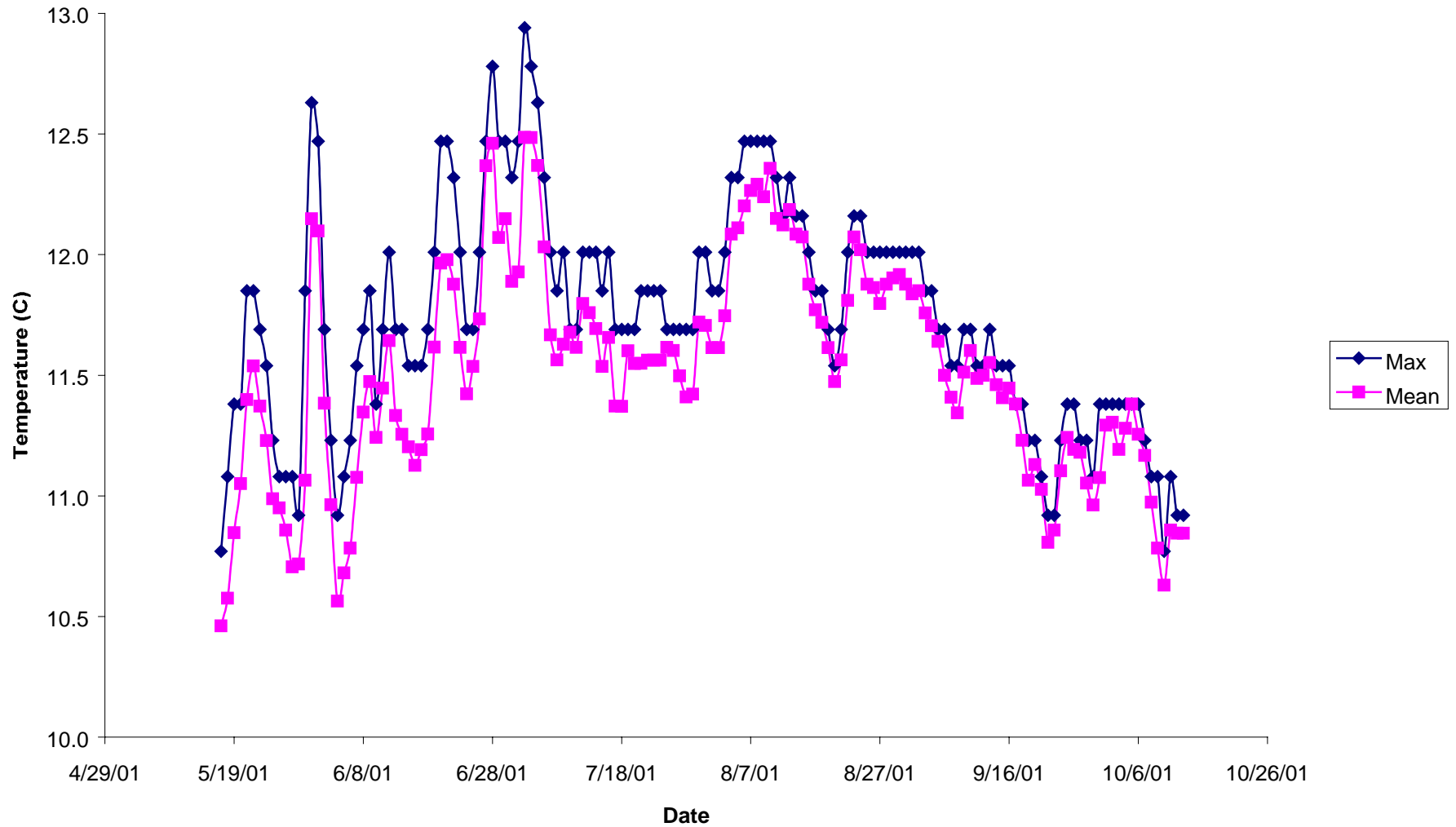


Figure 138. Mean and Maximum Daily Stream Temperatures During Summer 2001 at China Gulch (Site 94-20), Mendocino County, California.

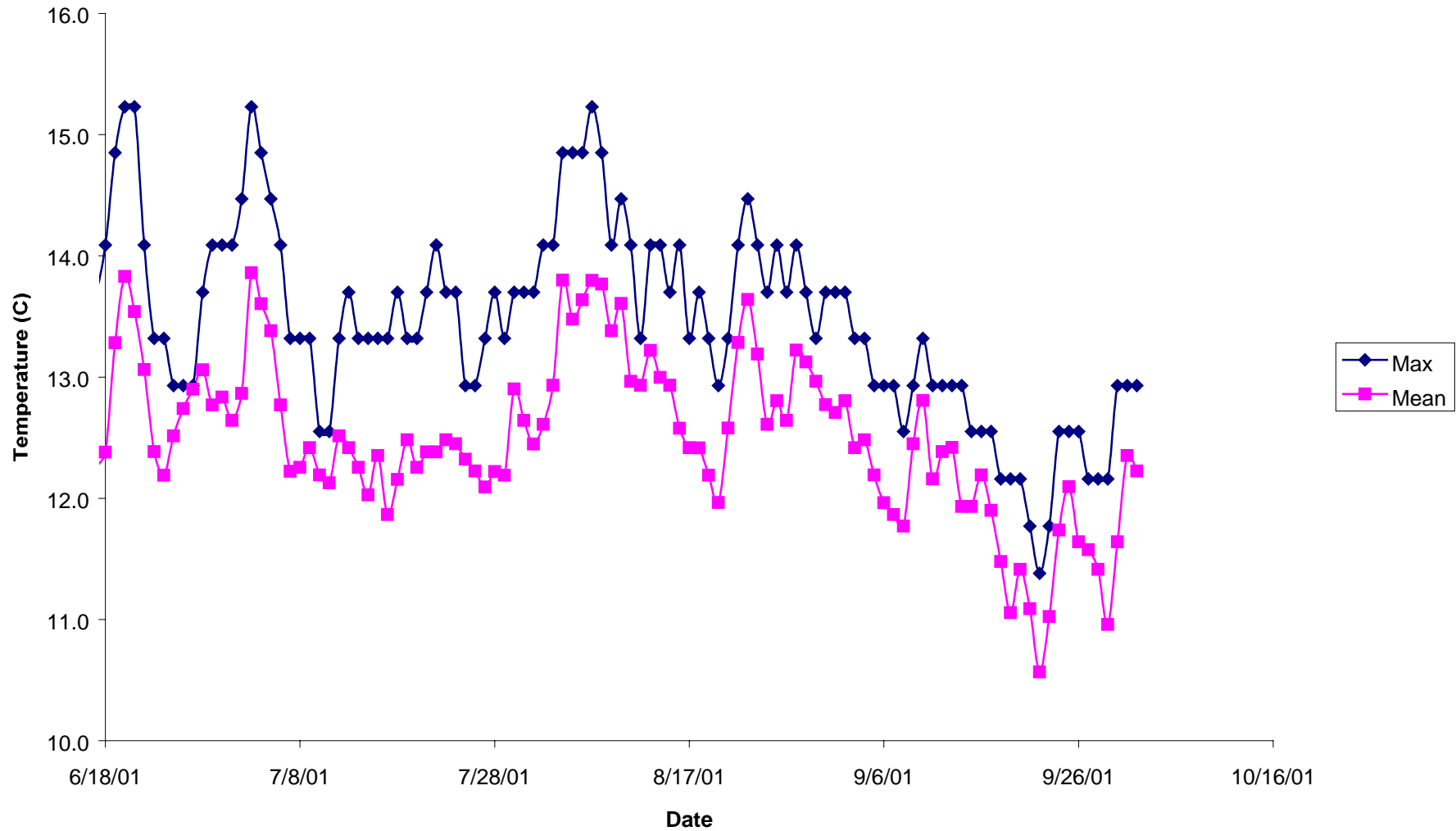


Figure 139. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Shinglemill Gulch (Site 94-21), Mendocino County, California.

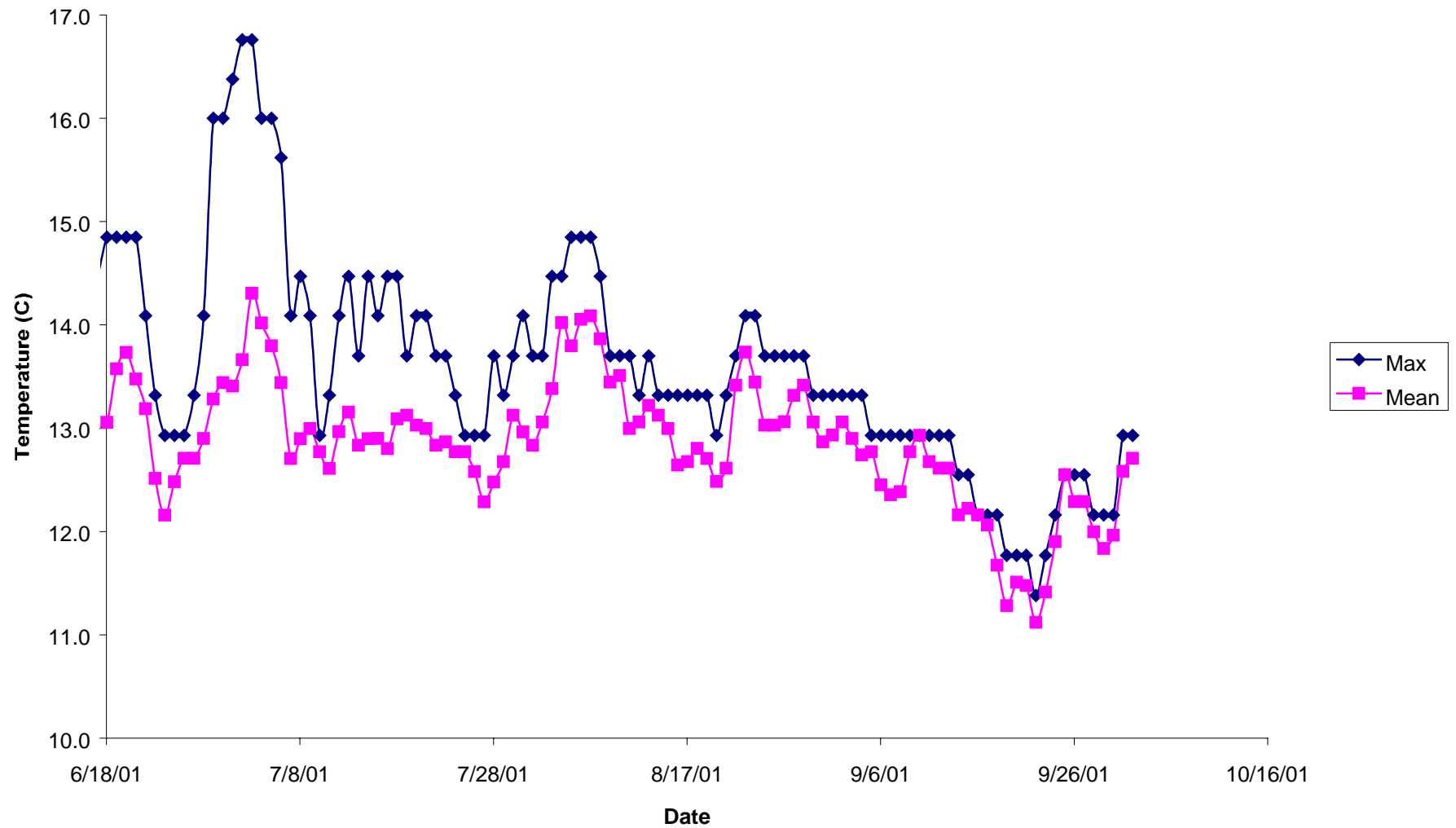
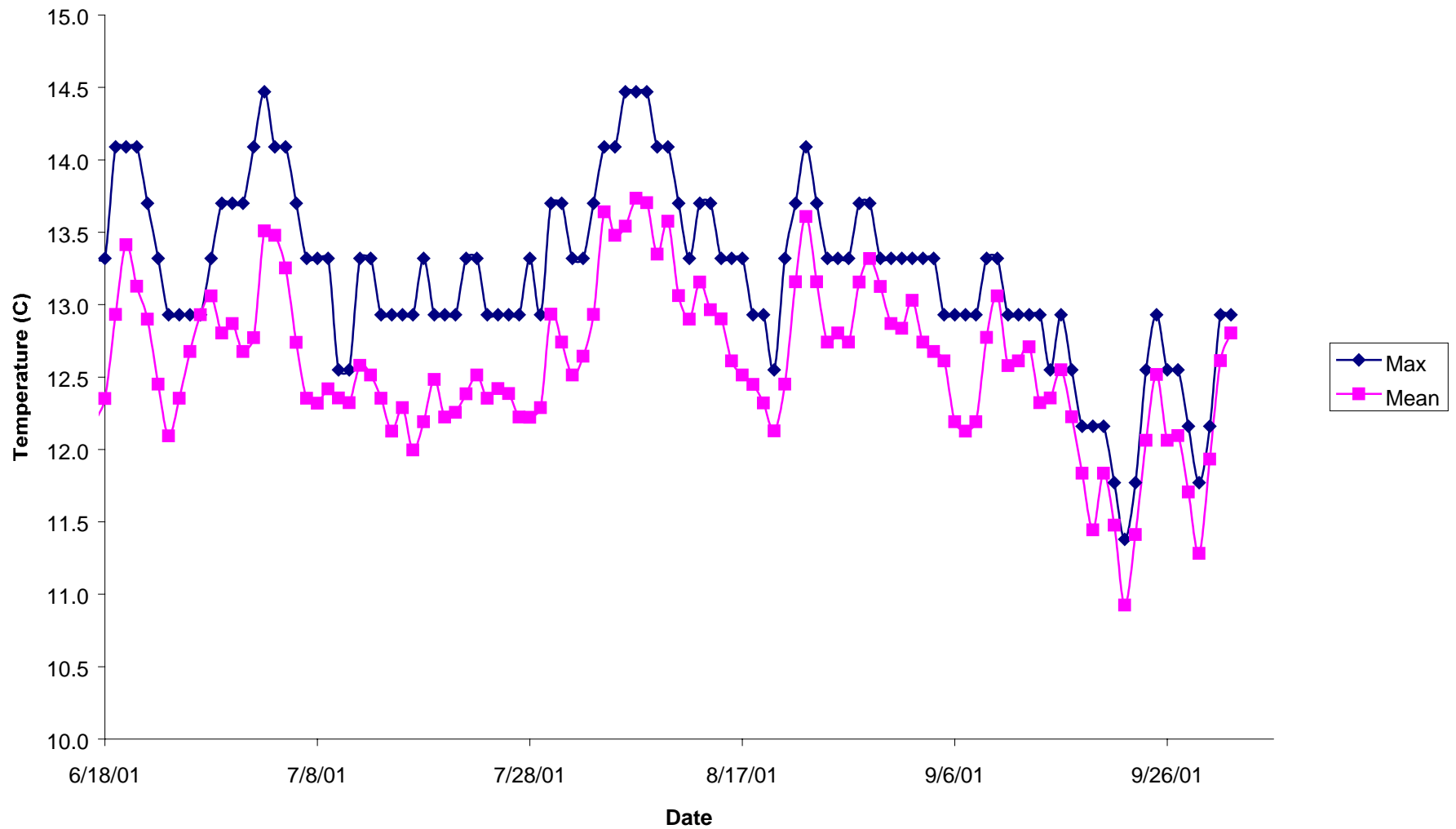


Figure 140. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Hall Gulch (Site 94-22), Mendocino County, California.

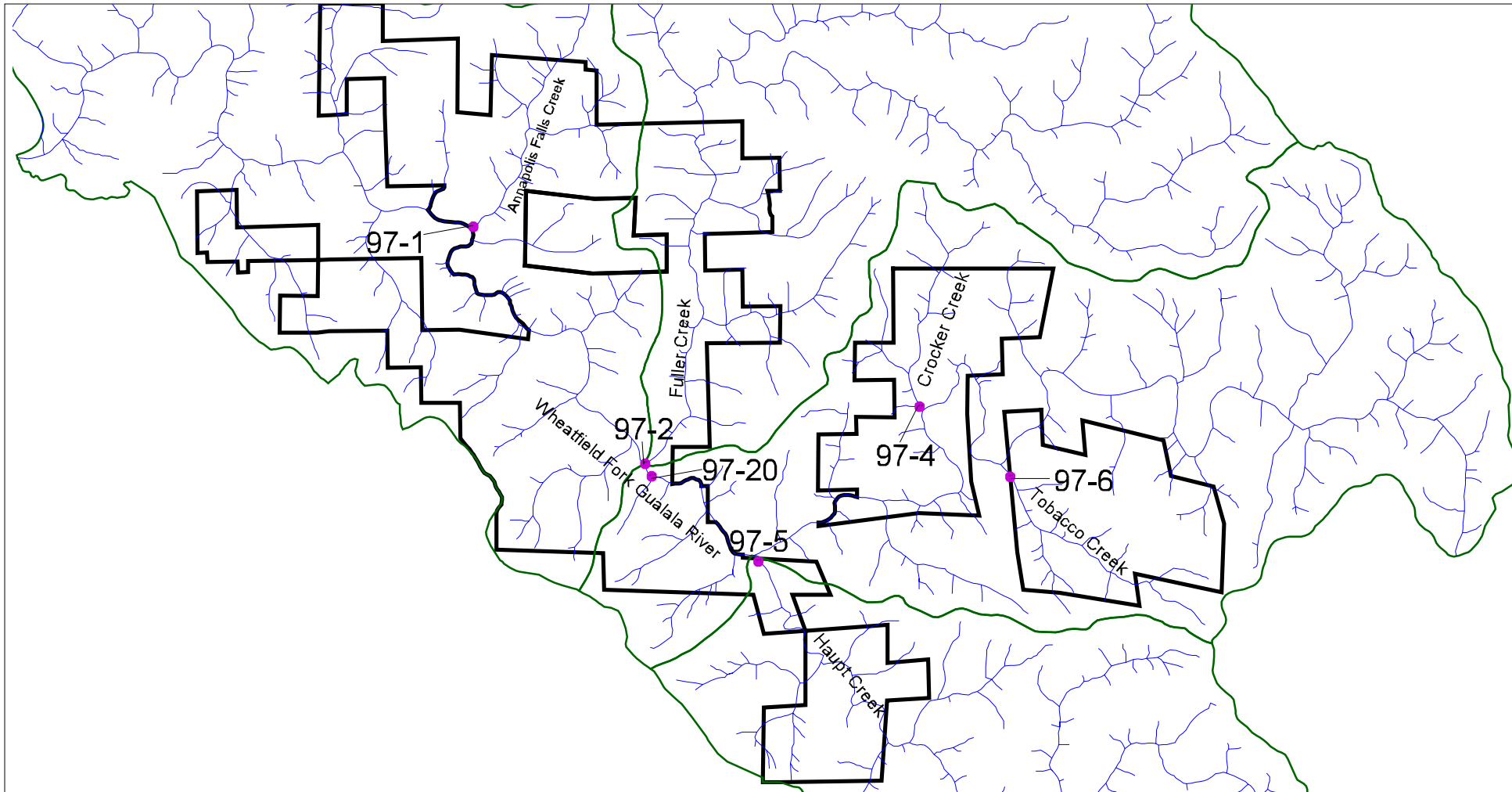


Sonoma Management Area

Table 10. Maximum, MWAT, and MWMT temperatures for sites in the Sonoma Area (1994-2001).

Stream	Site ID	Year	Temperature (C°)		
			Maximum	MWAT	MWMT
Annapolis Falls Creek	97-1	1995	19.3	16.8	18.7
Annapolis Falls Creek	97-1	1996	18.2	15.7	17.6
Annapolis Falls Creek	97-1	1999	15.7	14.5	15.1
Fuller Creek	97-2	1994	24.1	19.1	23.4
Fuller Creek	97-2	1995	25.0	19.5	23.7
Fuller Creek	97-2	1999	24.0	18.8	22.5
Fuller Creek	97-2	2000	23.2	19.1	21.3
Fuller Creek	97-2	2001	22.1	18.7	21.2
Crocker Creek	97-4	1997	18.1	16.2	17.2
Crocker Creek	97-4	2001	16.4	15.0	16.1
Haupt Creek	97-5	2001	22.5	17.8	21.4
Tobacco Creek	97-6	2001	17.5	15.7	16.8
Trib. To Wheatfield Gualala	97-20*	2001	15.6	14.5	15.1
Willow Creek	98-1	1994	13.7	13.0	13.2
Willow Creek	98-1	1995	16.8	15.3	16.2
Willow Creek	98-1	1996	15.1	13.9	14.6
Willow Creek	98-1	1999	14.5	13.9	14.1
Willow Creek	98-1	2000	16.3	14.5	15.2
Willow Creek	98-3	1994	17.2	13.9	16.4
Willow Creek	98-3	1995	16.9	15.1	16.0
Willow Creek	98-3	1996	15.9	13.9	15.2
Willow Creek	98-3	1999	16.2	13.6	15.2
Willow Creek	98-3	2000	17.6	14.6	15.9
Willow Creek	98-3	2001	15.1	14.0	14.8
Freezeout Creek	98-4	1996	14.8	13.4	14.3
Freezeout Creek	98-4	1997	16.4	15.1	16.3
Freezeout Creek	98-4	1999	15.8	14.1	14.8
Freezeout Creek	98-4	2000	15.1	13.6	14.6
Freezeout Creek	98-4	2001	14.1	13.6	13.9
Freezeout Creek	98-20*	2001	15.8	14.4	14.9
Tributary to Willow Creek	98-21*	2001	14.2	13.1	13.6
*Class II Streams					

Map 16. Gualala River Stream Temperature Sites



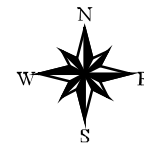
- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property

Mendocino Redwood Company, LLC

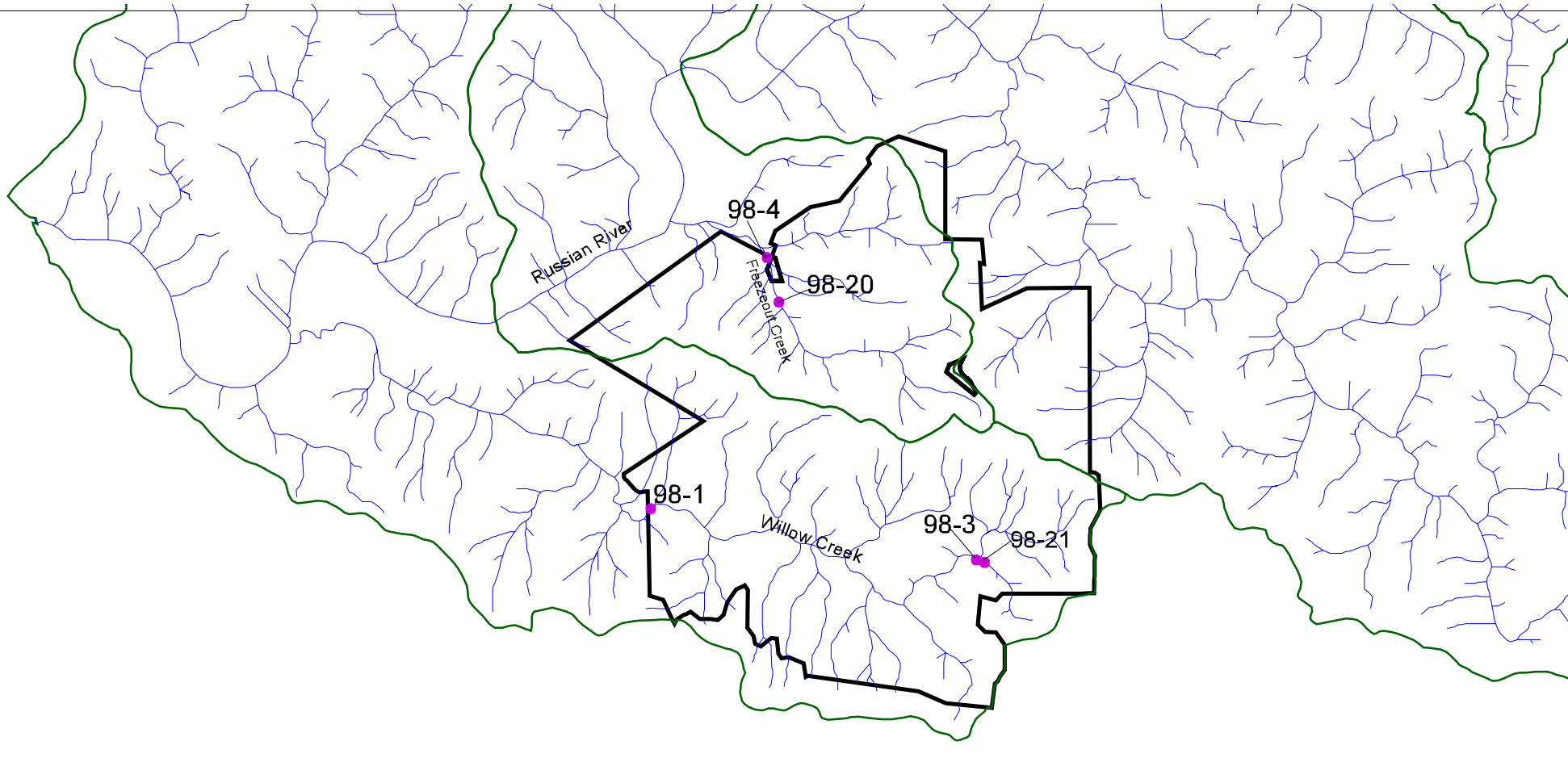
1 0 1 Miles



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Map 17. Willow Creek Stream Temperature Monitoring Sites



Mendocino Redwood Company, LLC

- Temperature Sites
- ▬ Streams
- ▭ Planning Watershed
- ▭ MRC Property Line



1:65000



Figure 141. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Fuller Creek (Site 97-2), Sonoma County, California.

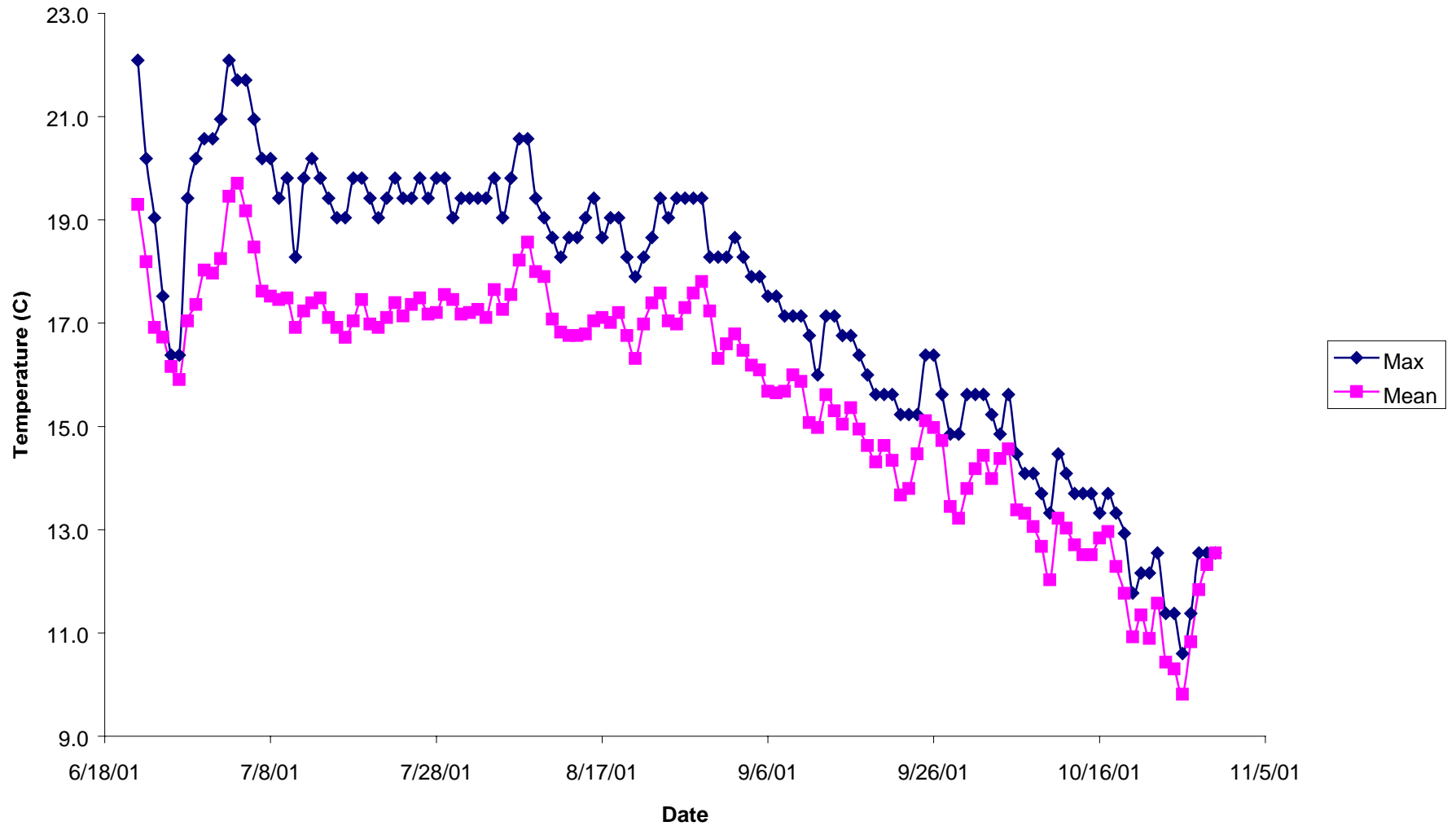


Figure 142. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Crocker Creek (Site 97-4), Sonoma County, California.

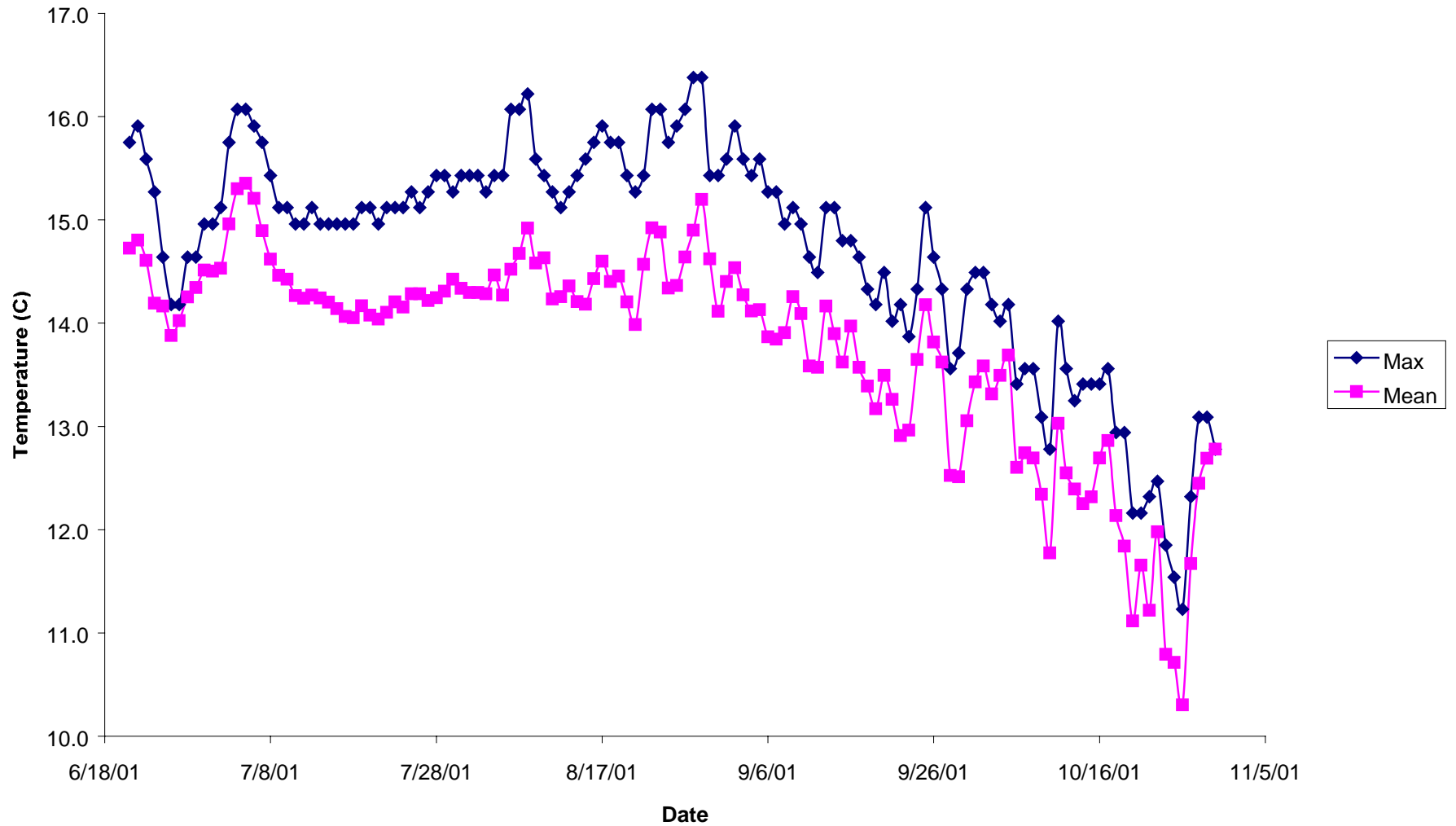


Figure 143. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Haupt Creek (Site 97-5), Sonoma County, California.

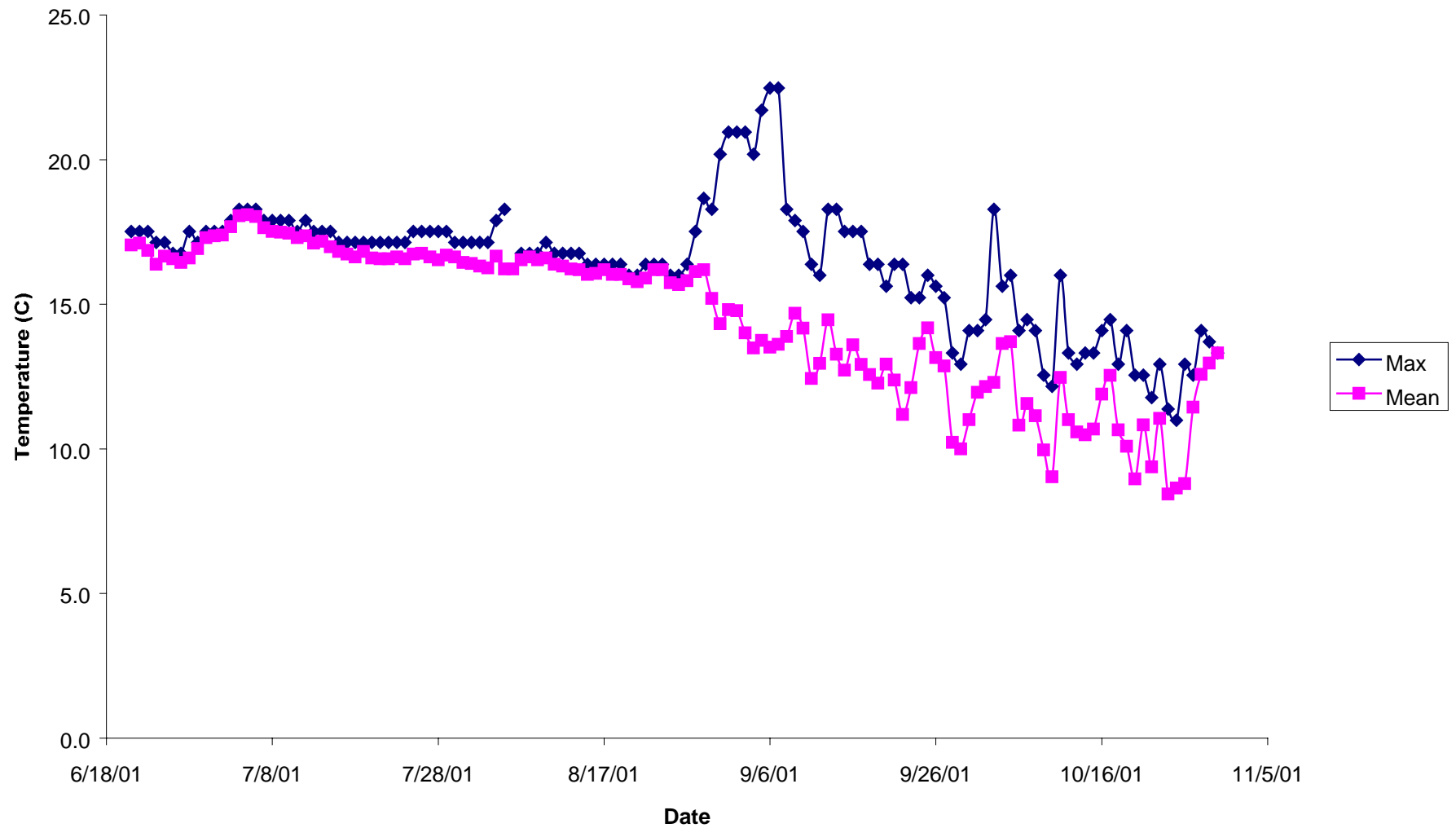


Figure 144. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Tobacco Creek (Site 97-6), Sonoma County, California.

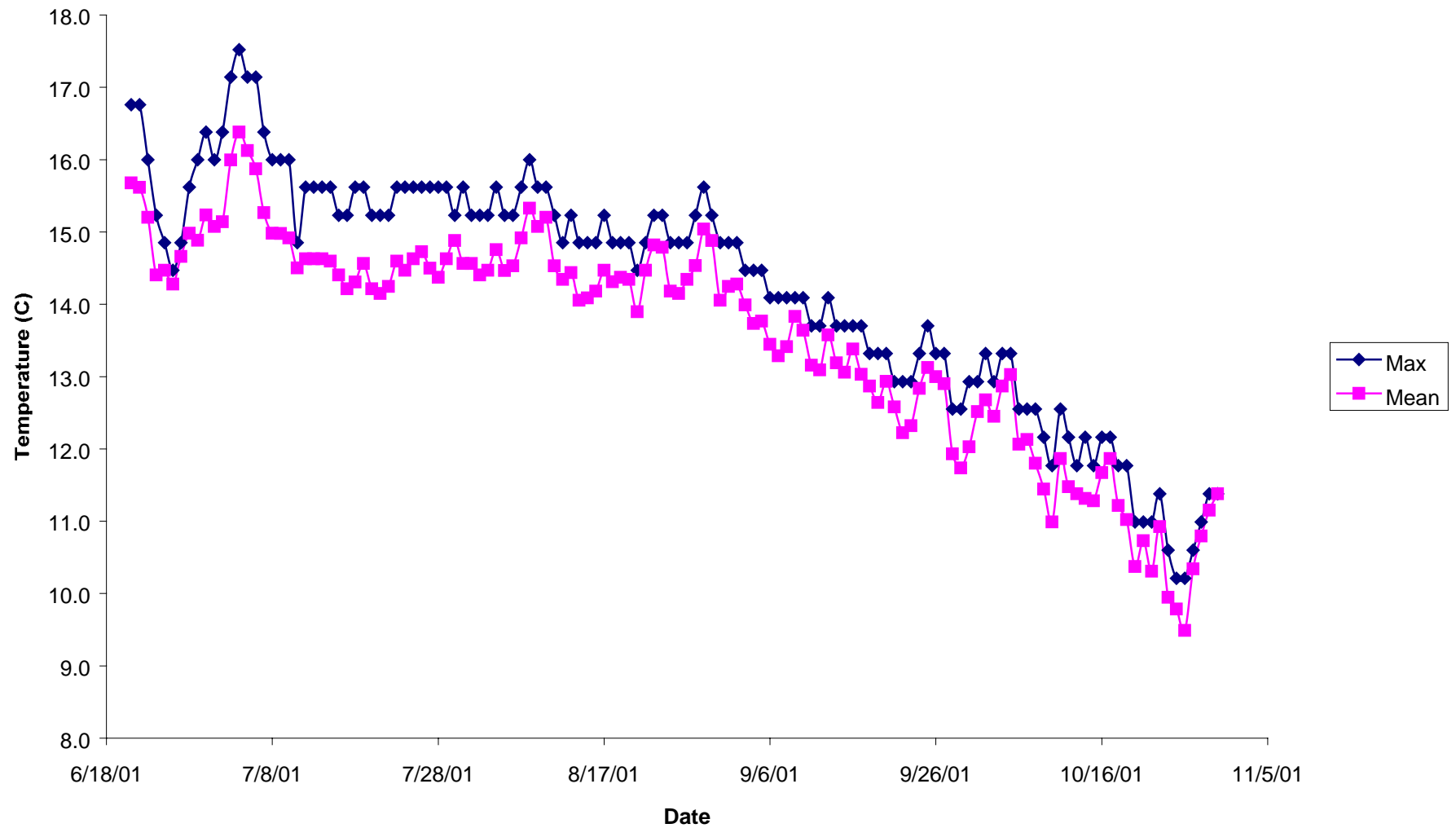


Figure 145. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Unnamed tributary to Wheatfield Fork Gualala (97-20), Sonoma County, California.

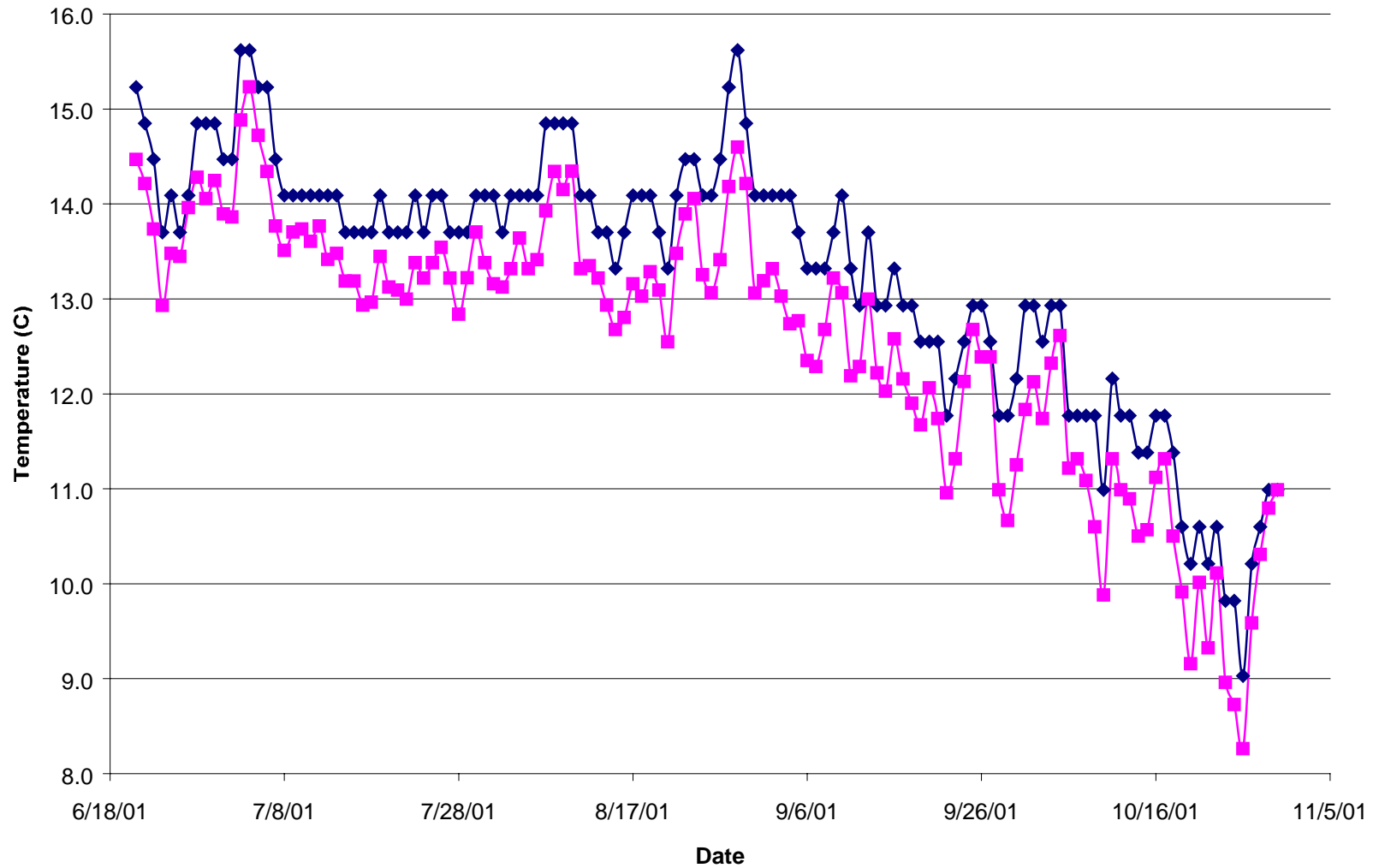


Figure 146. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Willow Creek (Site 98-3), Sonoma County, California.

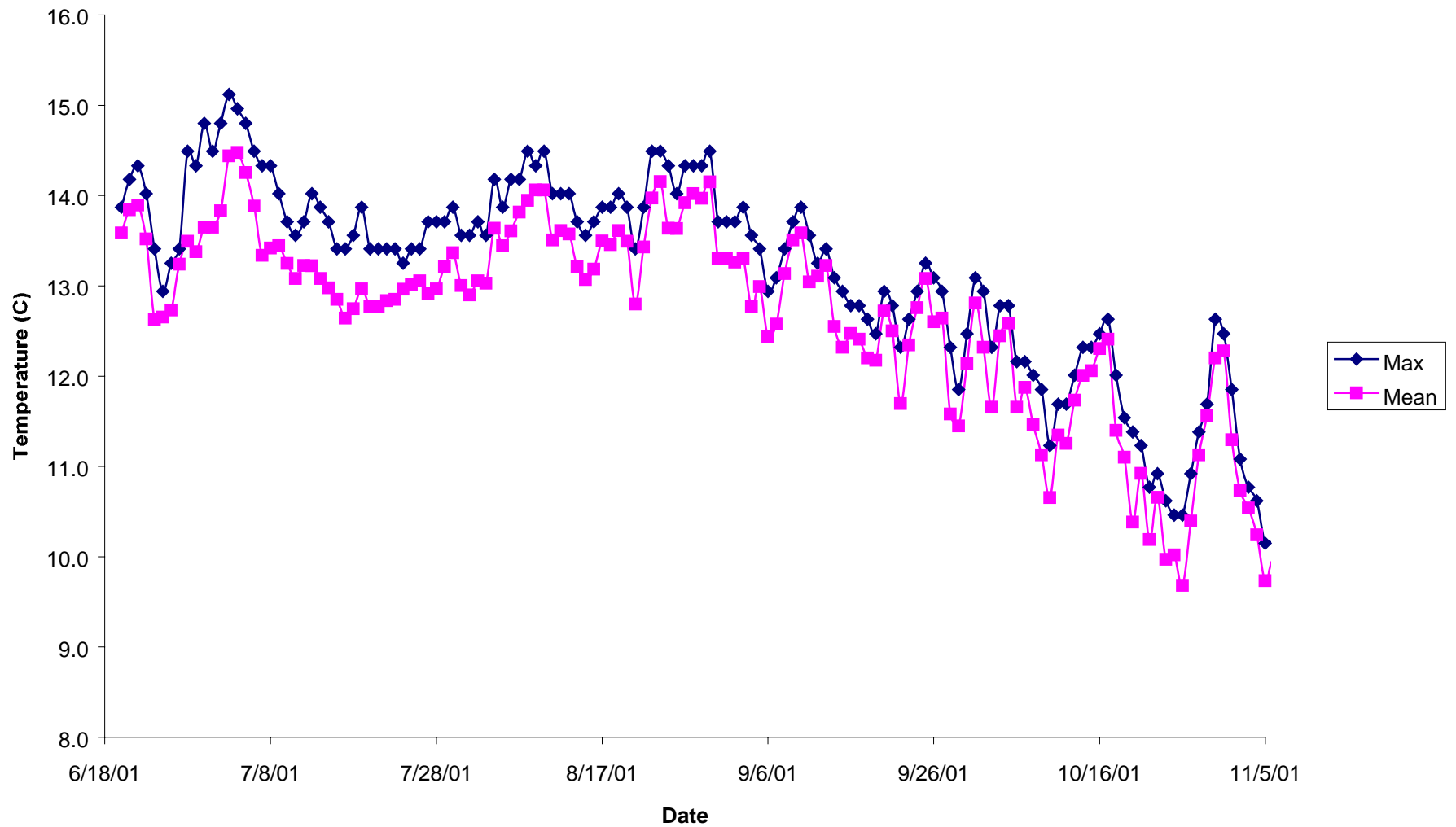


Figure 147. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Freezeout Creek (Site 98-4), Sonoma County, California.

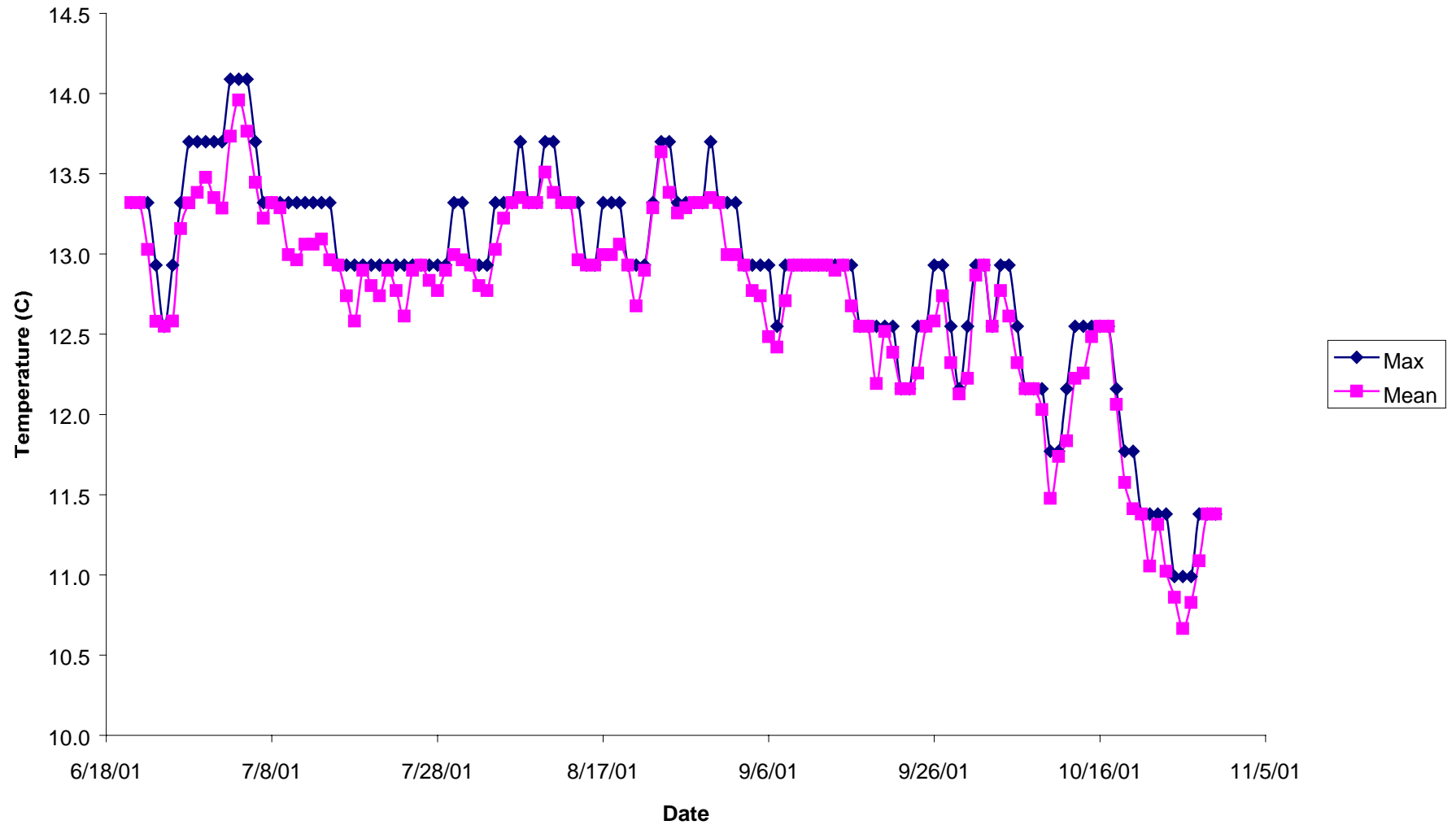


Figure 148. Mean and Maximum Daily Stream Temperatures During Summer 2001 at Freezeout Creek (Site 98-20), Sonoma County, California.

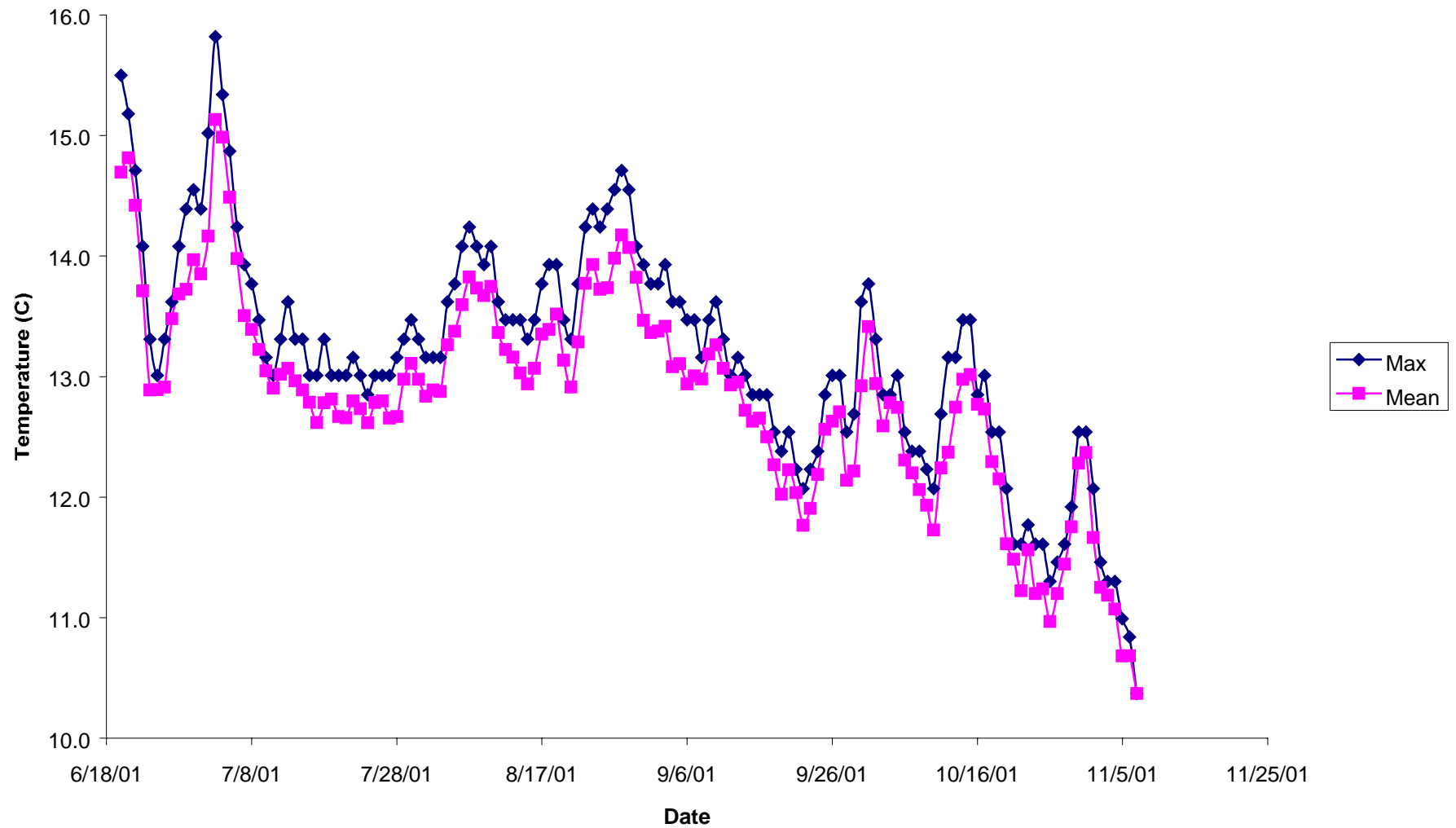


Figure 149. Mean and Maximum Stream Temperatures During Summer 2001 at Unnamed Tributary to Willow Creek (Site 98-21), Sonoma County, California.

