The
R.H. PHILLIPS
Vineyard

Thomas Busey
Chief
Wine and Beer Division
Bureau of Alcohol, Tobacco and Firearms
Department of the Treasury
Washington, D.C. 20226

February 13, 1992

Dear Mr. Busey:

Enclosed is a petition for the creation of an American Viticultural Area. The R. H. Phillips Vineyards of Esparto, California is submitting this petition, for the creation of "The Dunnigan Hills " viticultural area as described in 27 CFR 4.25a(e)(2).

It is my understanding that your office had been contacted about this petition in 1989 but the actual petition was not submitted. At that time the project was given the number 89F-276P.

Enclosed with our petition is also a copy of the Soil Conservation Service Soil Survey of Yolo County, California which shows the distinctive soil types of the Dunnigan Hills, copies of the four 15 minute topographic maps showing the boundaries of the proposed area, and a copy of the letter, sent by us, to all wine grape growers within the proposed area, requesting that they review a draft of the petition and provide us with their comments. One grower did contact seeking clarification of the process and what it would mean to him.

Thank you for the assistance we have received from your Branch to date and we look forward to working with you and your staff on this project.

Sincerely,

Ron McClendon
Winemaker

26836 COUNTY ROAD 12A, ESPARTO, CALIFORNIA 95627 (916) 662-3215

AMERICAN VITICULTURAL AREA PETITION

DUNNIGAN HILLS, CALIFORNIA

The R. H. Phillips Vineyards of Esparto, California is submitting this petition, for the creation of "The Dunnigan Hills" viticultural area as described in 27 CFR 4.25a(e)(2). In this petition we will show that the area described has long been known as "The Dunnigan Hills" and that geographical features exist which distinguish the viticultural features of the proposed area from surrounding areas.

The United States Department of Agriculture places the Dunnigan Hills within the Great Valley Province. This province includes the Sacramento Valley, the San Joaquin Valley and portions of the Coast Ranges, which is a series of mountain ranges adjacent to the California coast. The Coast Ranges parallel the Great Valley on the west.

The Dunnigan Hills rise out of the flat plains of the west Sacramento Valley and adjoin the plateau land bordering the Blue Ridge Coast Ranges, east of Napa and Lake Counties. Running north from Cache Creek, approximately nineteen miles to Little Buckeye

Creek and approximately ten miles across, the Dunnigan Hills total area is approximately one hundred and forty square miles.

NAME

The name "Dunnigan Hills" refers to an area in northwestern Yolo County, California where low rolling hills suddenly appear out of the otherwise flat Sacramento Valley.

The name "Dunnigan Hills" appears on the following U.S.G.S. maps: Dunnigan Quadrangle (15 minute Series-1953), Woodland Quadrangle (15 Minute Series-1953) and the Guinda Quadrangle (15 Minute Series-1959). The name "Dunnigan Hills" also appears in the United States Department of Agriculture Soil Survey of Yolo County California (1972), the Northern California Atlas and Gazetteer, a guide to outdoor recreation published by the DeLorme Mapping Company, 1988 and on the " Solano & Yolo Counties" road map published by the California State Automobile Association. The term "Dunnigan Hills" was used to describe this area as early as 1913 by Tom Gregory, in his book A History of Yolo County and as recently as 1987, by another Historian, Joann Larkey, in her book Yolo County, Land of Changing Patterns, published in 1987.

HISTORY

The area's native population was nearly extinct by the 1860's. The Spanish missions did not settle in this part of the State, nor

did Spanish settlers. The first non-native settlers of the area were western Europeans. According to Larkey, the Dunnigan Hills was settled in the 1850's and 1860's by German families who raised grain and livestock. In 1856 a post office was established in the town of Antelope, which was located three miles south of the Colusa County line, just east of the Dunnigan Hills. In 1853, A.W. Dunnigan settled in Antelope and opened a hotel which was known as Dunnigan's. In 1876 the Northern Railway was extended to Dunnigan's hotel and a town plat was recorded for the town of Dunnigan and a Dunnigan post office was opened. The near-by hills soon were known as the Dunnigan Hills.

Grape growing began in the Dunnigan Hills in 1861 when the 450 acre Orleans Hills vineyards was planted by Jacob Knauth. Today there are two wineries and six vineyards, totaling 1118 acres in the Dunnigan Hills.

GEOGRAPHY

The Dunnigan Hills are a group of low, rolling hills running in a ~~northeast~~ northwest to ~~southwesterly~~ southeast direction for about 19.5 miles. At its widest point the hills are about 10 miles wide. At the south end of the proposed Viticultural Area the hills begin at an elevation of 60 feet above sea level and go to an elevation of 400 feet. On the east side the hills begin at an elevation of about 130 feet and to the north they begin at an elevation of 100 ft. To the west, where the Dunnigan Hills meet the Coast Range, the soil types change and the slope and elevation increase rapidly.

DISTINGUISHING CHARACTERISTICS

In addition to history and name, the Dunnigan Hills are distinguished from adjoining areas by topography, elevation, climate and soils.

Topography and Elevation. The Sacramento Valley, out of which the Dunnigan Hills rise, is nearly flat. The Valley in this area is between 60 and 130 feet above sea level. The Dunnigan Hills are low, rolling hills, that rise to an elevation of about 400 feet above sea level. The hills are crossed by several streams, such as Oat Creek and Buckeye Creek, that flow west to east out of the Coast Range. On the West side the hills gradually drop to an elevation of about 250 feet in Hungry Hollow before increasing in elevation as one starts up the eastern slope of the Coast Range.

Climate. The Dunnigan Hills, like the nearby surrounding areas, has a Mediterranean climate, with warm, dry summers and cool moist winters. The annual mean temperature ranges from 50 to 62 degrees F. The maximum temperatures are from 95 to 98 degrees F with extreme temperatures from 110 to 117 degrees F.

Annual rainfall is 16 to 24 inches. Rainstorms move eastward from the Pacific Coast in winter and early spring, but rain is rare in the summer months.

The wind blows from the south two-thirds of the time and from the northeast much of the remaining time. The winds from the south are usually light, but those from the northeast can be much stronger. Strong dry winds can persist for several days in the fall. Strong north winds that follow a winter storm frequently

cause a sudden drop in temperature.

The Dunnigan Hills are warmer in the summer and winter than the Coast Range highlands to the west. The Dunnigan Hills are also less prone to frost damage in the spring because the hills and streams provide better air drainage than that found on the valley floor to the north, east and south of the Dunnigan Hills. During the summer months, these same air drainage features create microclimates in the Dunnigan Hills that tend to be cooler than the surrounding valley floor.

Soil. The soils of the Dunnigan Hills can be broadly defined as somewhat excessively drained to well-drained soils on uplands and high terraces. The two most prominent soil types are the Corning-Hillgate association and the Sehorn-Balcom association. The Corning-Hillgate association is well-drained, gently sloping to moderately steep gravelly loams or loams on terraces. The Sehorn-Balcom association is well-drained, gently sloping to steep silty clay loams and clays over sandstone.

To the west of the Dunnigan Hills, as one enters the foothills of the Coast range, the soils change to the Dibble-Millsholm association, which is a well-drained, steep to very steep loam to silty clay loam over sandstone and to the Positas association, a well-drained, moderately steep to steep gravelly loam on old alluvium.

To the north, east and south of the Dunnigan Hills, the soils are well drained to poorly drained soils on alluvial fans, basin rims and terraces. Five soil types are found boardering the Dunnigan Hills on these three sides: The Yolo-Brentwood

association, the Rincon-Marvin-Tehama association, the Capay-Clear Lake association and the Willows-Pescadero association. The Yolo-Brentwood association is well drained, nearly level silt loams to silty clay loams on alluvial fans. The Rincon-Marvin-Tehama association is well drained to somewhat poorly drained, nearly level silty clay loams or loams on alluvial fans and basin rims. The Capay-Clear Lake association is moderately well drained to poorly drained, nearly level silty clays and clays on basin rims and in basins. The Willows-Pescadero association is poorly drained, nearly level, saline-alkali silty clay loams to clays in basins.

Agricultural Land Use

Historically, the Dunnigan Hills were used for grazing sheep and for dry land farming of wheat and barley. The highlands to the west of the Dunnigan Hills were used as range lands. The flat valley floor to the north, east and west of the Dunnigan Hills was used for row crops because of its suitability for irrigation.

Today, because of drip irrigation, the Dunnigan Hills are very well suited to grape growing. The U.S. Department of Agriculture Soil Conservation Services has stated that grape vineyards are a preferred crop over wheat and barley because they are more effective in controlling erosion than the cereal crops.

BOUNDARY

The following three U.S.G.S maps are used to describe the boundary of the proposed "Dunnigan Hills Viticultural Area":

1. Dunnigan,Calif., 15 Minute Series-1953
2. Woodland, Calif. , 15 Minute Series-1953
3. Guinda, Calif, 15 Minute Series-1959

The proposed "Dunnigan Hills Viticultural Area" is located in Yolo County in the State of California. The boundary is as follows:

On the Dunnigan, Calif. Quadrangle begin where Buckeye Creek crosses Interstate Highway 5(Shown as Highway 99 on the map).

1. Then southeast along Interstate Highway 5 for approximately 16.5 miles to Yolo County Road 17.

2. Then west on Yolo County Road 17 for approximately 2 miles to Yolo County Road 95A.

3. Then south on Yolo County Road 95A for 0.5 miles to Yolo County Road 17A.

4. Then west on Yolo County Road 17A for approximately 3/8 of a mile to Yolo County Road 95.

5. Then south on Yolo County Road 95 for approximately 1 mile to Yolo County Road 19.

6. Then southwest on Yolo County Road 19 for approximately 1/4 of a mile to Yolo County Road 94B.

7. Then southwest on Yolo County Road 94B approximately 1 1/4 miles to Cache Creek.

8. Then west along Cache Creek approximately 5.5 miles to Yolo County Road 89.

9. Then north on County Road 89 approximately 1.5 miles to Yolo County Road 19.

10. Then northeast on Yolo County Road 89 (Now Interstate Highway 505) two miles to Yolo County Road 16.

11. Then west on Yolo County Road 16 two miles to Yolo County Road 87.

12. Then north on Yolo County Road 87 two miles to Yolo County Road 14.

13. Then west on Yolo County Road 14 for three miles to the the intersection of sections 22, 23, 26 and 27 of township R2w T11N

14. Then due north for approximately 8 1/4 miles to Little Buckeye Creek.

15. Then east along Little Buckeye Creek for approximately 4 1/4 miles until it joins Buckeye Creek.

16. Then east along Buckeye Creek approximately 1/4 mile, until it intersects Interstate Highway 5 (Shown as Highway 99 on the map).

KERRY JO

TTB Note: Due to its size, the entire Soil Survey of Yolo County was not scanned.
Contact TTB for more information.

SOIL SURVEY OF
Yolo County, California

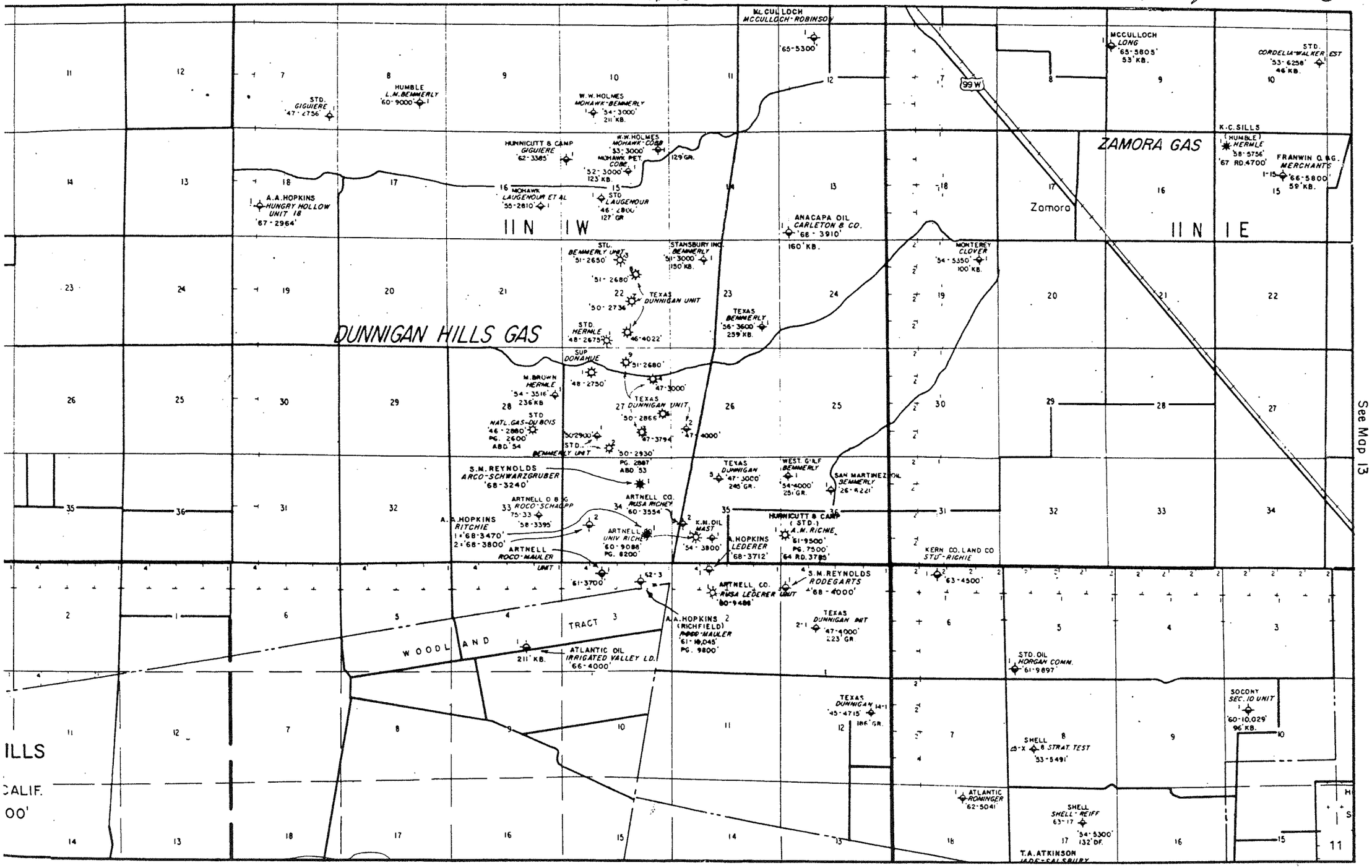
United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of California
Agricultural Experiment Station

Issued June 1972

(1)

Vineyard # 1	Hucke Vineyard Muller Farms II [redacted] Woodland, CA 95695
Vineyard # 2	Arion Vineyards Arion Farms [redacted] Woodland, CA 95695
Vineyard # 3	Storz Vineyard Walter/Jean Storz [redacted] Woodland, CA 95695
Vineyard # 4	Bisalle Vineyards William Roggeveen [redacted] Woodland, CA 95695
Vineyard # 5	Pheasant Glen/Reiff Vineyard Randy Reiff [redacted] Woodland, CA 95695
Vineyard # 6	Stan Barth [redacted] Esparto, CA 95627 Table Grapes
Vineyard # 7	Bill Hays, Jr. [redacted] Esparto, CA 95627
Vineyard # 8	Eaton Ranch Vineyard Kohnan Inc. [redacted] Napa, CA 94558

See Map 10



See Map 13

CALIFORNIA DIVISION OF MINES AND GEOLOGY
IAN CAMPBELL, STATE GEOLOGIST

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION

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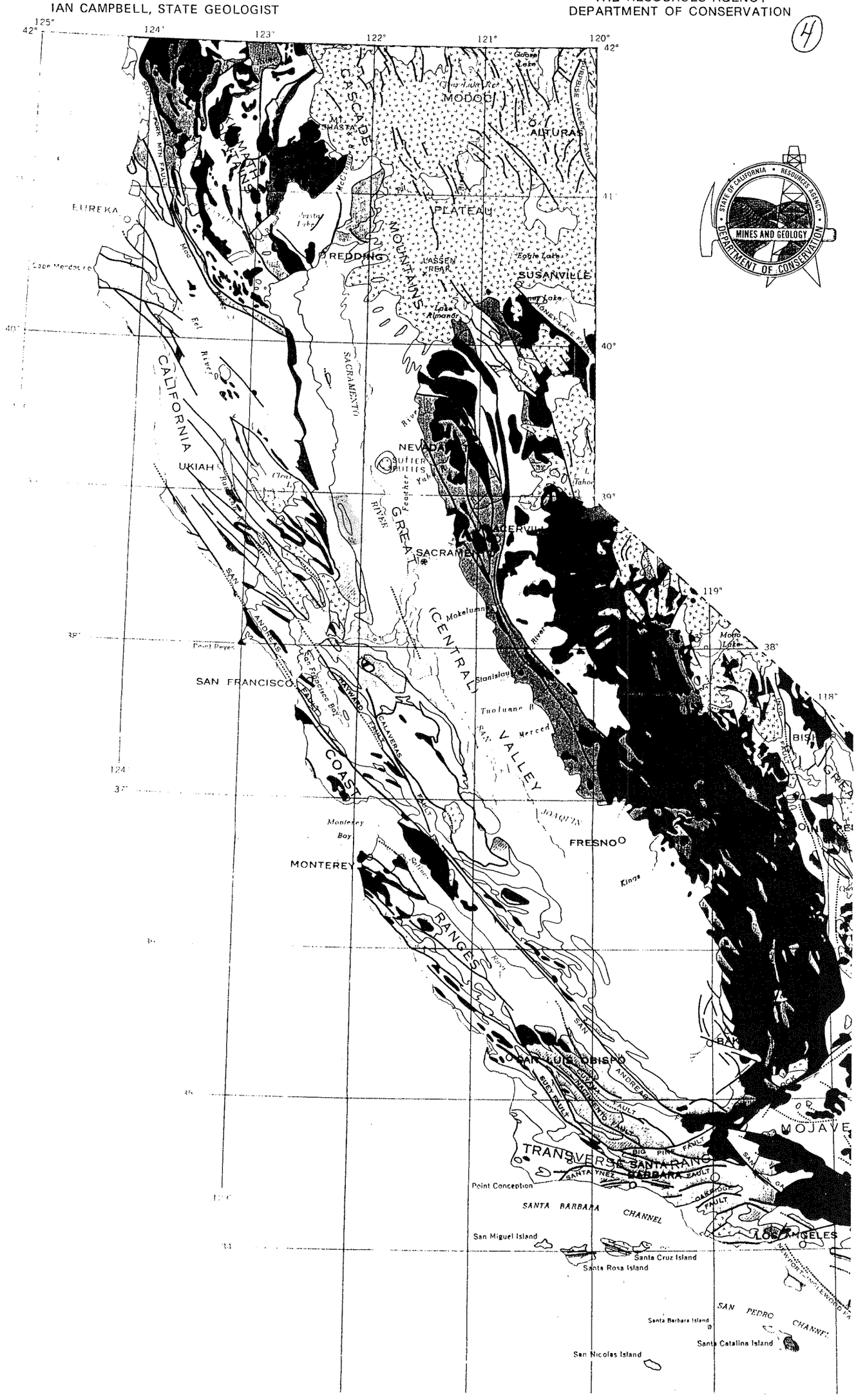
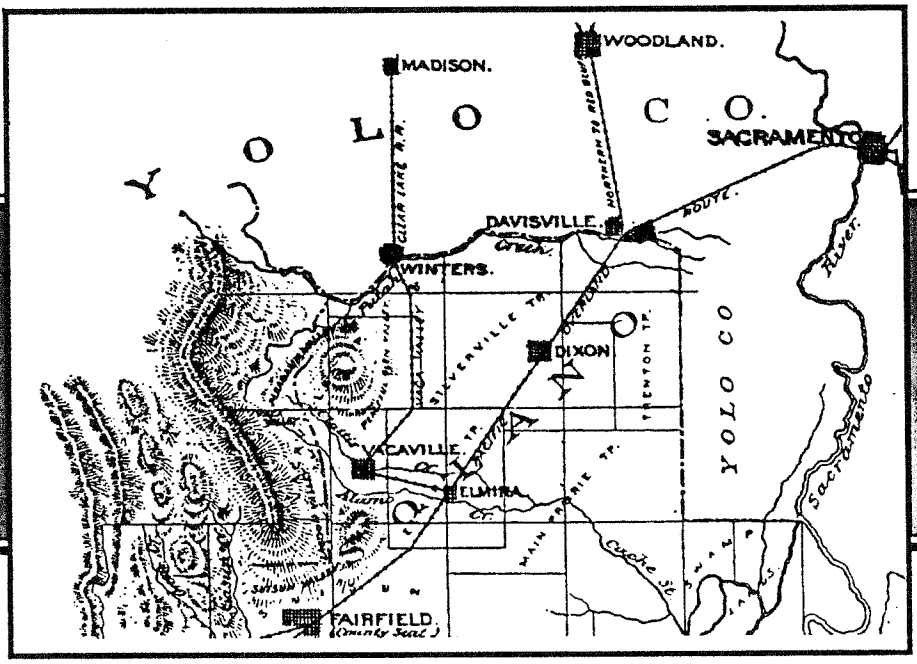


The Quakes of '92

The History and Geological Background of the Vacaville–Winters Earthquakes of 1892

Richard Cowen, Janice Cooper,
and Richard Cooper



History Geology

Guided Tour

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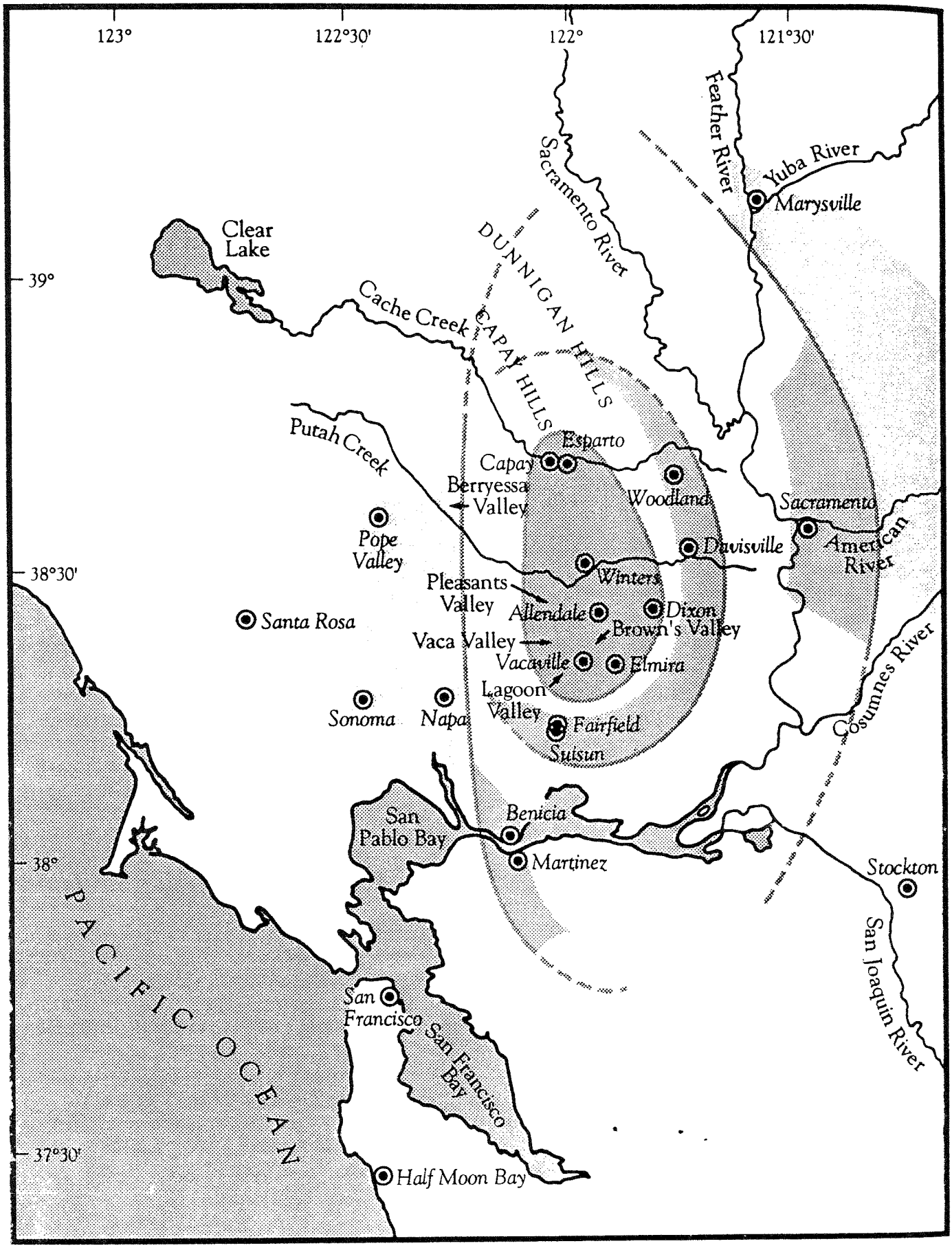
About the authors: Richard Cowen and Janice Cooper are geologists at the University of California, Davis. Richard Cooper is a historian at the California State University, Sacramento.


123°
122°30'
122°
121°30'
39°
38°30'
38°
37°30'
Clear Lake
Cache Creek
Putah Creek
Sacramento River
Feather River
Yuba River
Marysville
DUNNIGAN HILLS
CAPAY HILLS
Esparto
Capay
Woodland
Berryessa Valley
Pope Valley
Davisville
Winters
Sacramento
American River
Pleasants Valley
Allendale
Dixon
Brown's Valley
Vaca Valley
Vacaville
Elmira
Lagoon Valley
Fairfield
Suisun
Santa Rosa
Sonoma
Napa
Cosumnes River
San Pablo Bay
Benicia
Martinez
Stockton
San Joaquin River
PACIFIC OCEAN
San Francisco
San Francisco Bay
Half Moon Bay

In the "tectonic wedging" explanation for the Coalinga earthquake (p. 48), compression from the west causes faulting along "blind thrusts" whose leading edges never reach the earth's surface. Higher up in the stack of sedimentary rock, above the point of rupture, compression forces weaken and faulting is replaced by folding. For us, this means that, if the 1892 quakes were Coalinga-like, we should not be looking for surface fault traces, but rather for evidence of folding, uplift, or downdrop, either directly from seismographic evidence of continuing activity under the Valley floor, or, failing that, indirectly from the landforms of the western side of the Valley.

Unfortunately, seismological information for Yolo and Solano Counties east and south of the Coast Ranges is quite unsatisfactory. The US Geological Survey has been building a seismographic network to cover Northern California since 1970, but their stations are concentrated in the Coast Ranges and the Sierra Nevada (especially near Oroville, where filling of Lake Oroville set off a damaging earthquake in 1975) and there are conspicuous gaps in the net. The area of the 1892 earthquakes falls squarely into one of those gaps. To all but the most sensitive instruments, the area has been seismically quiet for a hundred years (several portable seismographs set up in the area by geologists from the University of California at Davis in 1986 recorded no activity).

But there is some information, and it is useful. A 1986 informal report by Jerry Eaton of the US Geological Survey contains an analysis of seismic activity in Northern California from 1972 to 1985. Hundreds of earthquakes were recorded, and although most of them were very small (Richter magnitude < M2) and most were far to the west of the Central Valley margin, enough of them originated close to the Coast Ranges to suggest a zone of increased seismicity there.

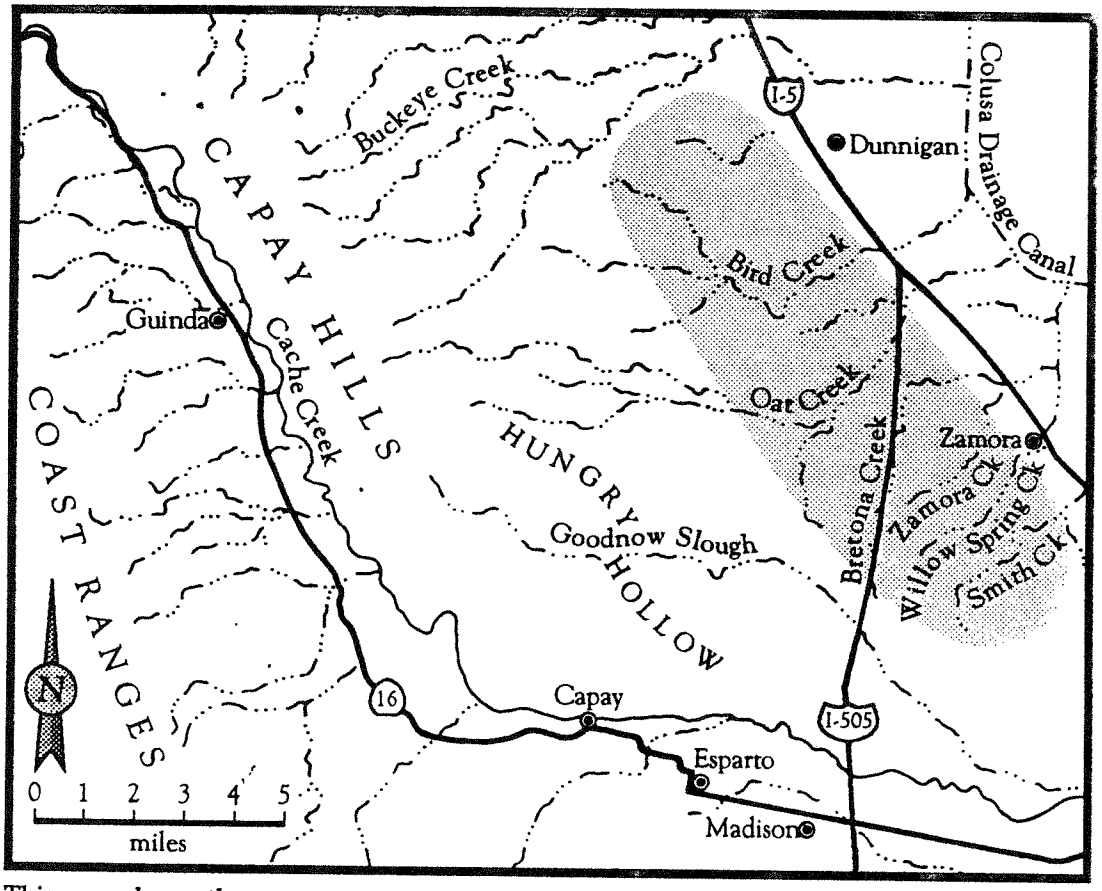
The largest earthquake in the foothills between 1972 and 1985 was a magnitude 4.3 shock along a 7-mile-deep thrust fault southwest of Woodland. So we know that there is low-level seismic activity in our area today, and that at least one quake was Coalinga-like, produced by a thrust fault which acted at depth and produced no surface expression — a blind thrust, in fact.

But that, of course, is just one earthquake in one twenty-year period. To find evidence of actual uplift and folding, we have to rely on classic geological techniques, mapping and map reading. The western Valley margin in Yolo and Solano counties is superficially flat and monotonous country, perfectly adapted to the uses to which it has been put for the past 150 years — first range land, then orchards, then irrigated farmland, and now urbanized development — but not particularly interesting to California geologists more accustomed to looking for gold, oil, and gas to exploit or dramatic faults to map. (There are oil and gas fields in the area, but they are deep, and they were discovered by geophysical techniques that did not require close study of the ground surface.) Overall, study of the rock structures and land forms of this region has lagged behind that in other parts of California.

Happily, this situation began to change after the 1983 Coalinga earthquake. Eaton's 1986 report pointed specifically to the seismic activity and uplifted areas along the Valley margin in North California as possible analogs to the situation farther south at Coalinga. More recently, geologists at UC Davis have been doing preliminary research on the geology of western Yolo County in order to establish its earthquake history and to make comparisons with the Coalinga region. There seems to be general agreement that the hilly areas along the Valley margin are important to an understanding of its geologic past (and our futures). We discuss each of those areas below, paying particular attention to their geomorphology — their shapes and their relationship to streams flowing around or through them — and what it might be telling us about the forces that produced them.

Dunnigan Hills. — To a traveller on Interstate 5 in northern Yolo County, the Dunnigan Hills can be seen rising just to the west of a 20-mile stretch of the freeway running from near the community of Yolo northwestward toward Dunnigan. The hills are higher toward the north, reaching more than 400 feet on their northwestern side; farther south, maximum elevations are closer to 200 feet. The hills slope away gently to the Central Valley on the northeast, falling about 300 feet from the crest of the range. The boundary between hills and Valley is sharply defined and very straight. On the southwestern side, the boundary with Hungry Hollow is much less well defined and the difference in elevation between hills and valley is relatively smaller, rarely as much as 100 feet.

In fact, Hungry Hollow has a great deal to tell us about the history of the Dunnigan Hills. Geographically, the valley opens to the south, but its floor dips gently to the southeast, and although the total relief



This map shows the strange stream courses in Hungry Hollow and the Dunnigan Hills (shaded). Bird and Oat Creeks flow across, not down, Hungry Hollow, and then turn sharply northeast to flow through the Dunnigan Hills. Buckeye Creek and Goodnow Slough follow courses around the hills.

from the head of the valley to its mouth is well over 150 feet, there is no creek flowing directly downslope to Cache Creek (Goodnow Slough, at the southern end of the valley, flows southeast, but its path has been so altered by canal-building that it's hard to map out its original course.) Instead, Bird Creek and Oat Creek flow *across* Hungry Hollow from the Capay Hills in the west, *through* the Dunnigan Hills, and then out to the Central Valley floor. All this suggests that the Dunnigan Hills have risen recently: there hasn't been time for a stream system to develop for draining Hungry Hollow southward since the hills rose to define the valley.

Furthermore, Bird Creek and Oat Creek follow puzzling paths as they enter the Dunnigan Hills: they turn sharply northeast, almost at right angles to their original courses. The new direction is perpendicular to the overall trend of the hills and follows exactly the pattern that streams would have cut into the rising slopes of the new foothill range. This suggests that rapid uplift of the Dunnigan Hills caused fast-growing streams to develop on their flanks (parallel to the present-day Zamora, Willow Springs, and Smith Creeks at the southern end of the range) and that these steams cut their courses back and down into the hills, finally tapping into or capturing the older streams which had flowed from the Coast Ranges down to the Valley.

The Dunnigan Hills are earthquake-prone, with fairly frequent, very small earthquakes centered right under their straight-line northeast edge. Perhaps that edge marks a fault line, and perhaps it is significant that the hills themselves lie along a line roughly parallel to the San Andreas Fault System to the west.

In any event, it is clear that the Dunnigan Hills are the site of current seismic activity and that uplift in the area has been relatively recent. In fact, the Dunnigan Hills were probably formed by uplift more

recently than the Capay Hills immediately to the west, since the creeks which flow through the Dunnigan Hills originate on the eastern slopes of the Capay Hills.

Capay Hills. — The Capay Hills are a much more dramatic feature than the Dunnigan Hills. Rising to over 1800 feet in the north along their crest, they stretch some 15 miles to the southeast, blocking the flow of Cache Creek as it emerges from the Coast Ranges, diverting the creek to follow their trend, until it escapes at the southern end and flows more easterly across the Central Valley floor toward the Sacramento River. The Capay Hills are by far the highest of the foothill ranges along the Central Valley margin and they are further distinguished in having Cretaceous Great Valley sequence rocks exposed along their ridge line, the same rocks that form the crest of the Coast Ranges to the west. This fact, and the fact that exposed faults can be mapped along the Cretaceous rocks, suggest that their tectonic history has been longer or more dramatic than that of the Dunnigan Hills to the east. Nevertheless, the 1972-85 seismic survey indicates that, at present, both the Capay Hills and the Capay Valley are relatively quiet.

South of Cache Creek. — Several miles beyond the southern end of the Dunnigan Hills, and across Cache Creek, Plainfield Ridge rises no more than 30 feet above the valley floor west of Davis. It forms a slight rise in the road surface along Russell Boulevard, near its intersection with County Road 96 at Fairfield School. From that point, it extends about 6 miles to the northwest, just south of the Yolo County airport. Plainfield Ridge is a slight fold which also has an interesting drainage pattern. Dry Slough cuts through the ridge as if it were not there, implying that the ridge is very new, geologically speaking. There was a small earthquake (Richter M = 4.3) close to the northwest end of the ridge in September 1978, and it was a Coalinga-type earthquake with maximum compression along an axis running almost exactly parallel with the San Andreas System. Geologists at UC Davis have studied seismic data which was generated for oil and gas exploration in this area, and it suggests to them that Coalinga-type blind thrusting is taking place under this ridge. Indeed, they feel that this ridge may have been the site of the Friday, April 29, aftershock to the 1892 earthquakes.

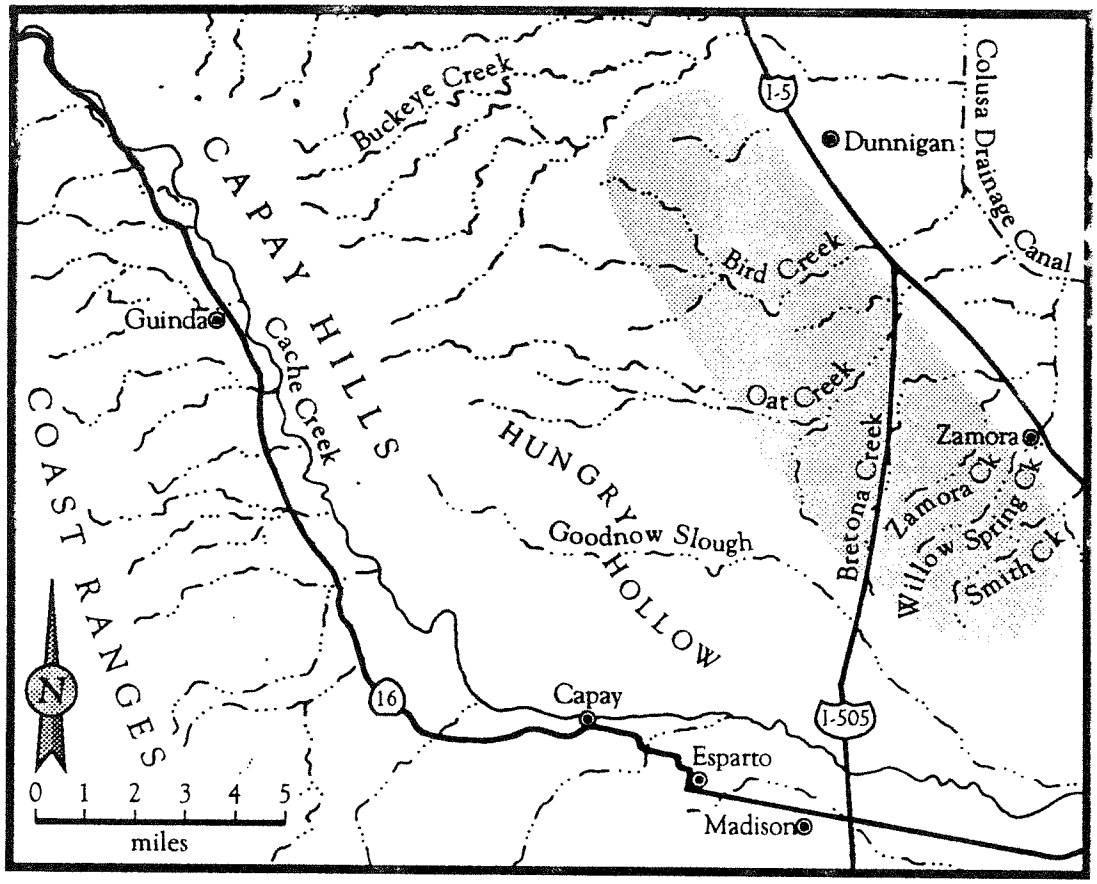
English Hills. — We suspect, of course, that the English Hills were right at the center of the 1892 earthquake activity. Is there anything we can learn about their uplift history from their geomorphology? Certainly, their trend is roughly parallel to that of the Dunnigan Hills, the Capay Hills, and Plainfield Ridge west of Davis. Like the Dunnigan Hills and the Capay Hills, the English Hills are higher to the north, and like the Capay Hills, they have had profound effects on the courses of streams flowing out of the Coast Ranges.

Pleasants Creek apparently has been diverted north to flow around the hills to Putah Creek. In the same way, Ulatis and Alamo Creeks have been diverted south before they can turn east through gaps in the southern end of the range to reach the Central Valley. As Ulatis Creek reaches Vacaville, moreover, it leaves the broadening Vaca Valley and turns eastward to cut through the southern end of the English Hills in a narrow ravine that leads it into Browns Valley. Even then, it does not flow in a direction that would take it along Browns Valley southward to join Alamo Creek. Instead, it continues eastward, to cut through another 100-foot ridge and flow across the valley floor. Alamo Creek, once it reaches the Vaca Valley, flows eastward across it to cut through the southernmost ridge of the English Hills a mile south of Ulatis Creek, and only then flows out to Elmira and the east. South of the California Medical Facility, Union Creek flows down a broad flat valley to the southeast, then it turns south and cuts through a low ridge.

On the eastern side of the English Hills, Dry Arroyo and Sweany Creeks line up reasonably well with Miller (Pleasants Creek) and Mix (Ulatis Creek) Canyons, suggesting an older drainage pattern which has been interrupted by the uplift of the hills.

All these strange courses make sense only if they were made at some time in the past by normal streams heading generally southeastward across a gentle slope toward the Sacramento River. The ridges that they now cut through have been uplifted in geologically more recent time. They are not small insignificant ridges: some of them are several hundred feet high now. They represent large-scale vertical movement of the earth's surface in the relatively recent geological past. It would be too optimistic to think that such movement has stopped, and so we must assume that uplift or folding is still continuing.

Lagoon Valley. — There is also evidence of recent uplift west of the English Hills. Lagoon Valley is a striking oddity in the landscape of Solano County. The valley floor has been lowered to the point that a lake



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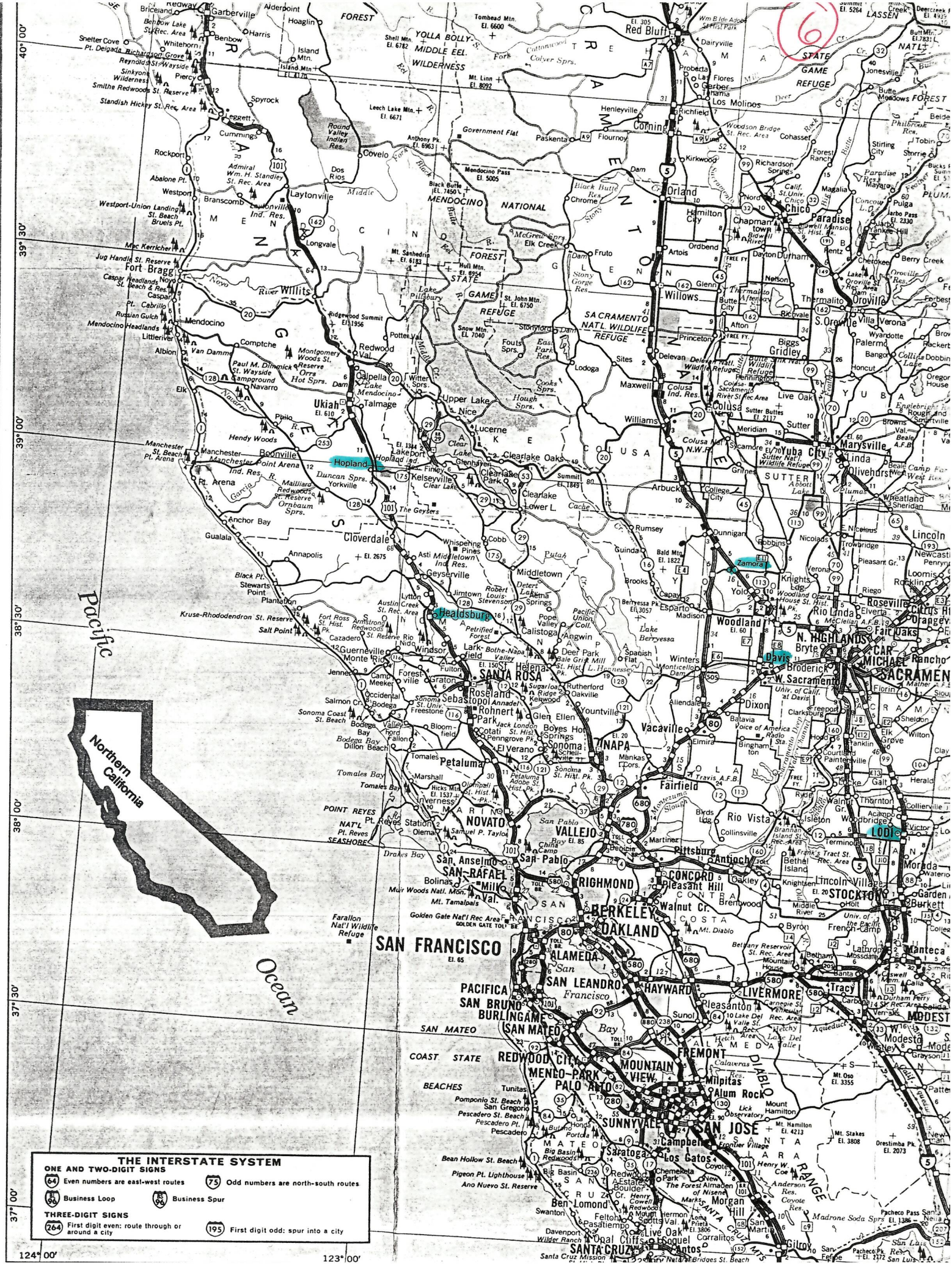
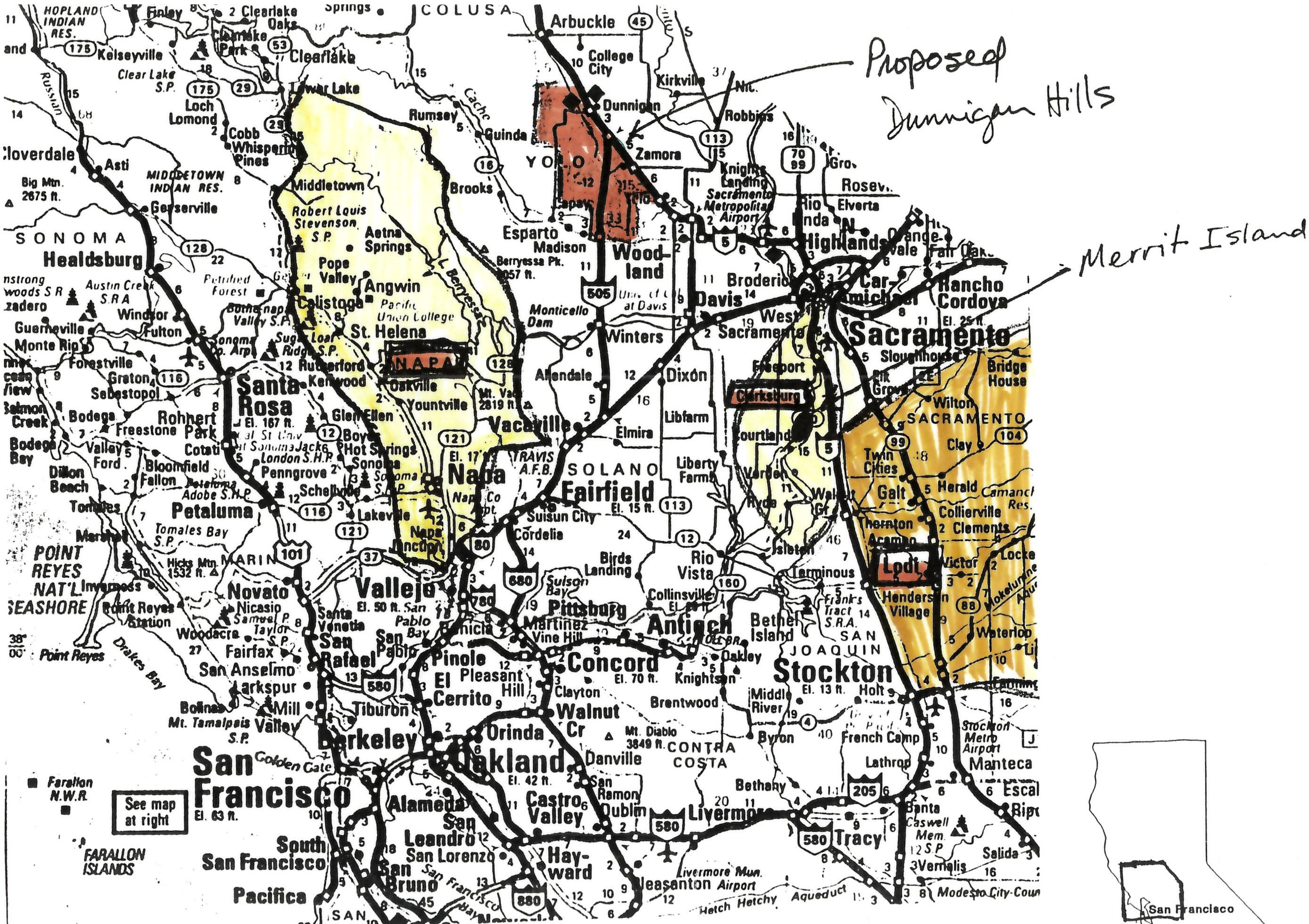
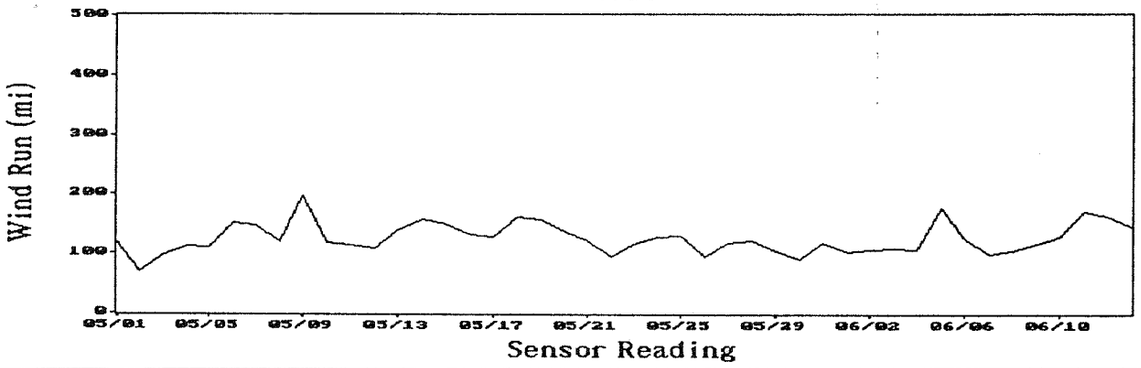

Pacific Ocean
Northern California
THE INTERSTATE SYSTEM
ONE AND TWO-DIGIT SIGNS
64 Even numbers are east-west routes
75 Odd numbers are north-south routes
80 Business Loop
580 Business Spur
THREE-DIGIT SIGNS
264 First digit even: route through or around a city
195 First digit odd: spur into a city
124° 00'
123° 00'
40° 00'
39° 30'
39° 00'
38° 30'
38° 00'
37° 30'
37° 00'
SAN FRANCISCO
OAKLAND
BERKELEY
SAN JOSE
SANTA ROSA
VALLEJO
NAPA
FAIRFIELD
VACAVILLE
PETALUMA
NOVATO
SAN RAFAEL
RICHMOND
CONCORD
ANTIOCH
HAYWARD
SAN LEANDRO
ALAMEDA
SAN MATEO
REDWOOD CITY
MENLO PARK
PALO ALTO
MOUNTAIN VIEW
SUNNYVALE
CAMPBELL
LOS GATOS
SANTA CRUZ
MONTEREY
SALINAS
WATSONVILLE
HOLLISTER
GILROY
MORGAN HILL
MILPITAS
FREMONT
LIVERMORE
PLEASANTON
DUBLIN
TRACY
MANTECA
STOCKTON
LODI
MODESTO
TURLOCK
MERCED
SACRAMENTO
DAVIS
WOODLAND
WEST SACRAMENTO
ARCADE
CARMICHAEL
ROSEVILLE
ROCKLIN
AUBURN
LINCOLN
YUBA CITY
MARYSVILLE
OROVILLE
CHICO
PARADISE
REDDING
RED BLUFF
WILLOWS
ORLAND
GLENN
COLUSA
WILLIAMS
WOODLAND
DAVIS
VACAVILLE
FAIRFIELD
VALLEJO
NAPA
SONOMA
PETALUMA
NOVATO
SAN RAFAEL
RICHMOND
CONCORD
ANTIOCH
HAYWARD
SAN LEANDRO
ALAMEDA
SAN MATEO
REDWOOD CITY
MENLO PARK
PALO ALTO
MOUNTAIN VIEW
SUNNYVALE
CAMPBELL
LOS GATOS
SANTA CRUZ
MONTEREY
SALINAS
WATSONVILLE
HOLLISTER
GILROY
MORGAN HILL
MILPITAS
FREMONT
LIVERMORE
PLEASANTON
DUBLIN
TRACY
MANTECA
STOCKTON
LODI
MODESTO
TURLOCK
MERCED
SACRAMENTO
DAVIS
WOODLAND
WEST SACRAMENTO
ARCADE
CARMICHAEL
ROSEVILLE
ROCKLIN
AUBURN
LINCOLN
YUBA CITY
MARYSVILLE
OROVILLE
CHICO
PARADISE
REDDING
RED BLUFF
WILLOWS
ORLAND
GLENN
COLUSA
WILLIAMS

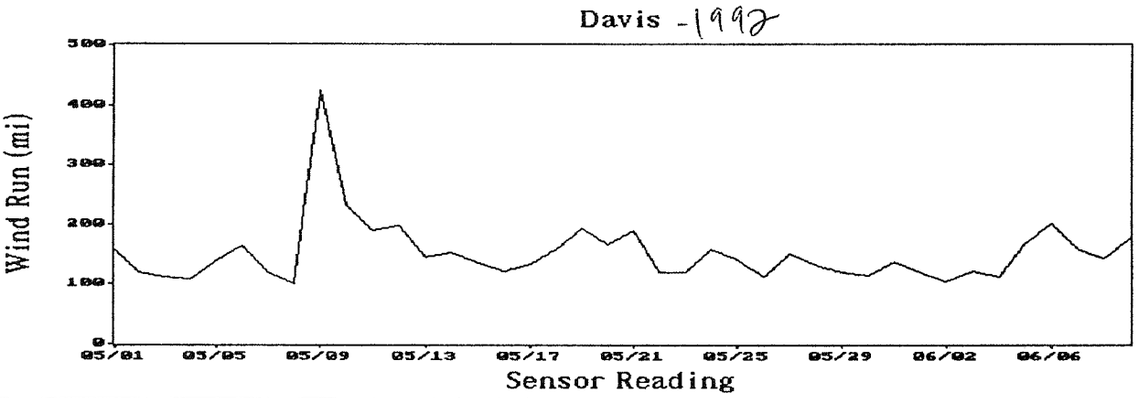

Proposed Dunnigan Hills
Merrit Island
COLUSA
Arbuckle
College City
Dunnigan
Zamora
YOLO
Kirkville
Robbins
Knights Landing
Sacramento Metropolitan Airport
Esparto
Madison
Woodland
Davis
Winters
Dixon
Vacaville
Rumsey
Guinda
Brooks
Middletown
Lower Lake
Clearlake
Kelseyville
Loch Lomond
Cobb
Whispering Pines
Robert Louis Stevenson S.P.
Aetna Springs
Pope Valley
Angwin
Pacific Union College
Calistoga
St. Helena
NAPA
Rutherford
Oakville
Yountville
Napa
Napa Junction
Glen Ellen
Sonoma
Kenwood
Lake Berryessa
Monticello Dam
Allendale
SONOMA
Healdsburg
Cloverdale
Asti
Geyserville
Windsor
Fulton
Santa Rosa
Sebastopol
Forestville
Guerneville
Monte Rio
Graton
Rohnert Park
Cotati
Bodega
Bodega Bay
Valley Ford
Bloomfield
Petaluma
Penngrove
Tomales
Dillon Beach
POINT REYES NAT'L SEASHORE
Point Reyes Station
Inverness
MARIN
Novato
Nicasio
Woodacre
Fairfax
San Anselmo
Larkspur
Mill Valley
San Rafael
Tiburon
Bolinas
Vallejo
Benicia
Martinez
Pittsburg
Antioch
Concord
Pleasant Hill
Walnut Cr
Clayton
Orinda
Berkeley
Oakland
Alameda
San Leandro
Hayward
Castro Valley
San Ramon
Danville
Dublin
Livermore
Pleasanton
Tracy
Brentwood
Byron
Oakley
Knightsen
Bethel Island
CONTRA COSTA
Mt. Diablo 3849 ft.
SOLANO
Fairfield
Suisun City
Cordelia
Travis A.F.B.
Elmira
Birds Landing
Rio Vista
Collinsville
Liberty Farms
Clarksburg
Freeport
Courtland
Hood
Walnut Grove
Isleton
Ryde
Terminous
Sacramento
West Sacramento
Broderick
Highlands
Carmichael
Rancho Cordova
Elk Grove
Wilton
SACRAMENTO
Bridge House
Clay
Twin Cities
Galt
Herald
Thornton
Acampo
Lodi
Victor
Lockeford
Clements
Collierville
Henderson Village
Waterloo
SAN JOAQUIN
Stockton
Holt
Middle River
French Camp
Lathrop
Manteca
Stockton Metro Airport
Bethany
Vernalis
San Francisco
Golden Gate
South San Francisco
San Bruno
Pacifica
Farallon N.W.R.
FARALLON ISLANDS
See map at right
Drakes Bay
Point Reyes
Hetch Hetchy Aqueduct
Livermore Mun. Airport
Roseville
Elverta
Rio Linda
Orange Vale
Fair Oaks


San Francisco

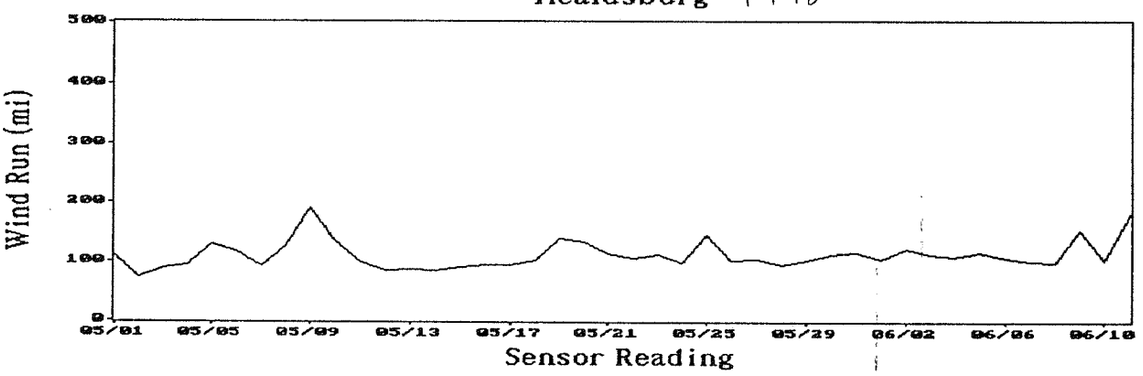
Lodi - 1992



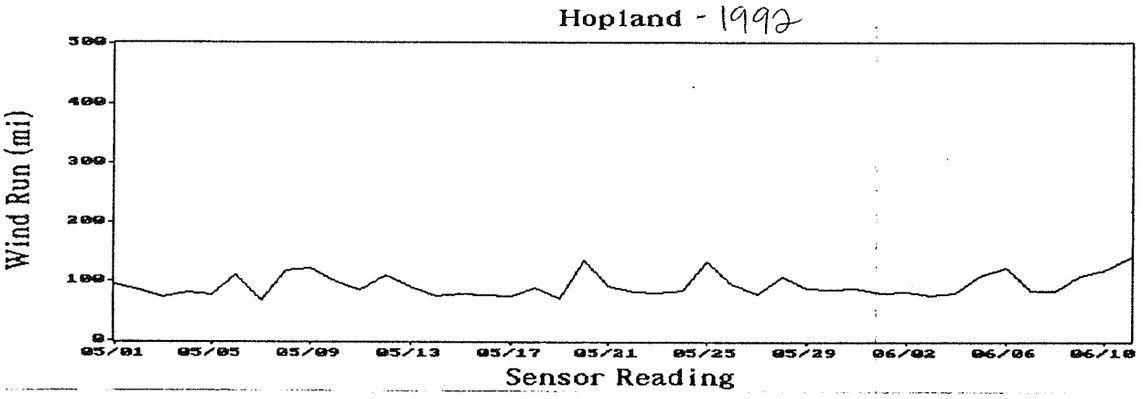
Davis - 1992



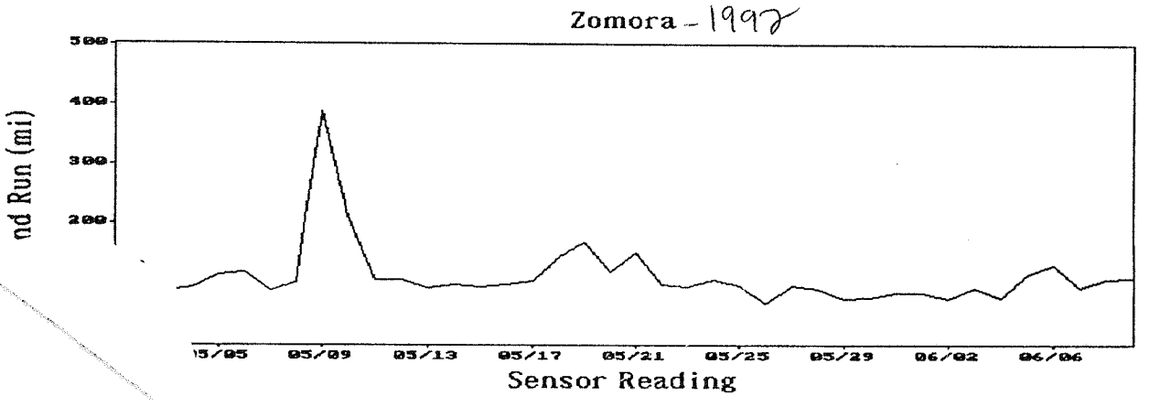
Healdsburg - 1992



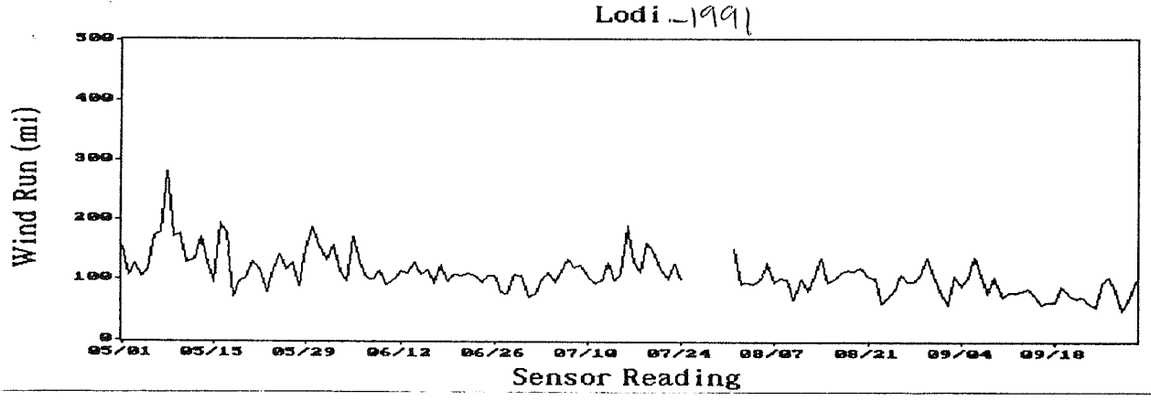
Hopland - 1992



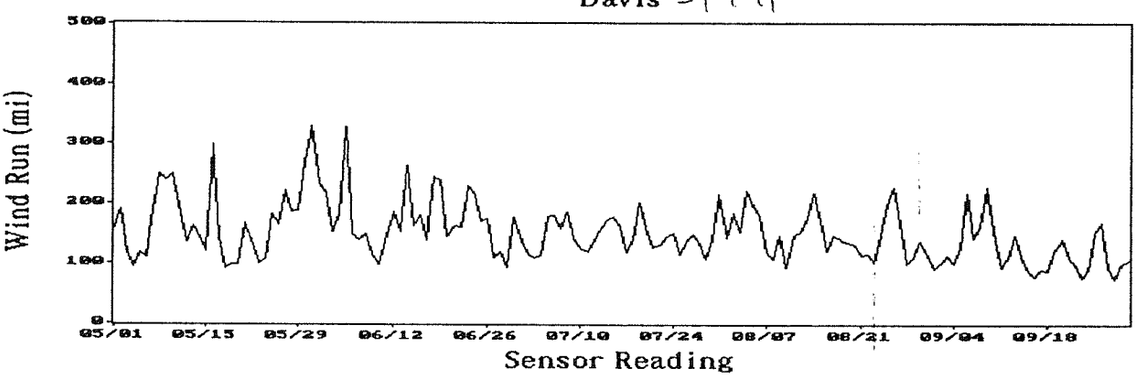
Zomora - 1992



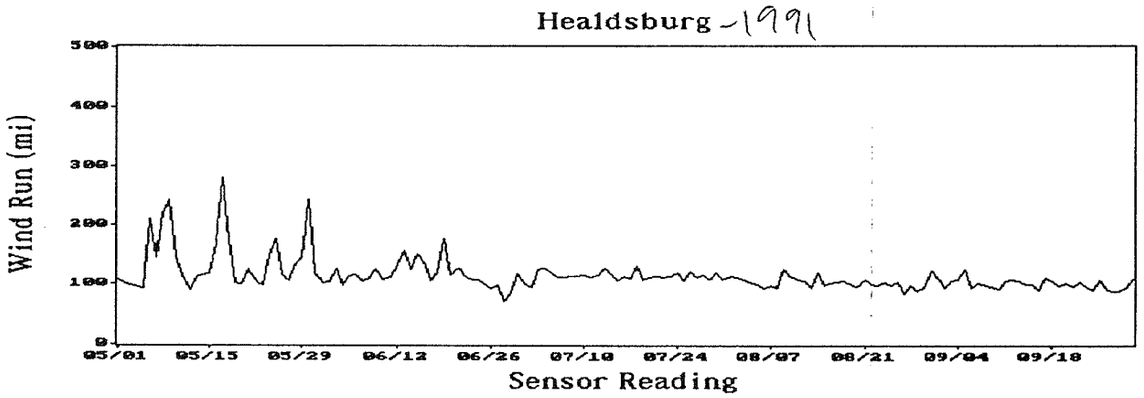
Lodi -1991



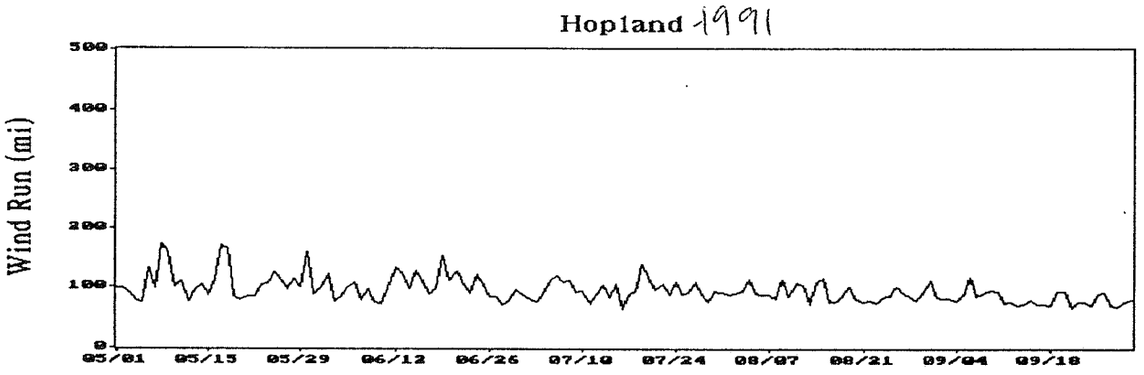
Davis -1991



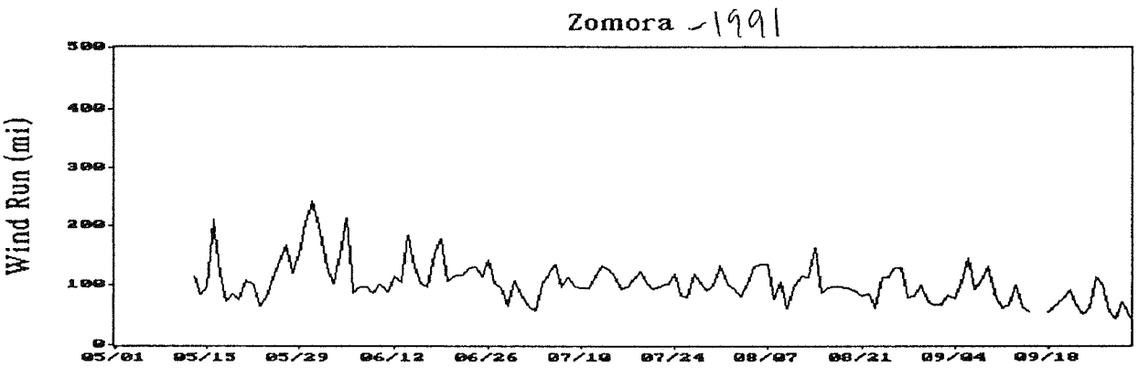
Healdsburg -1991



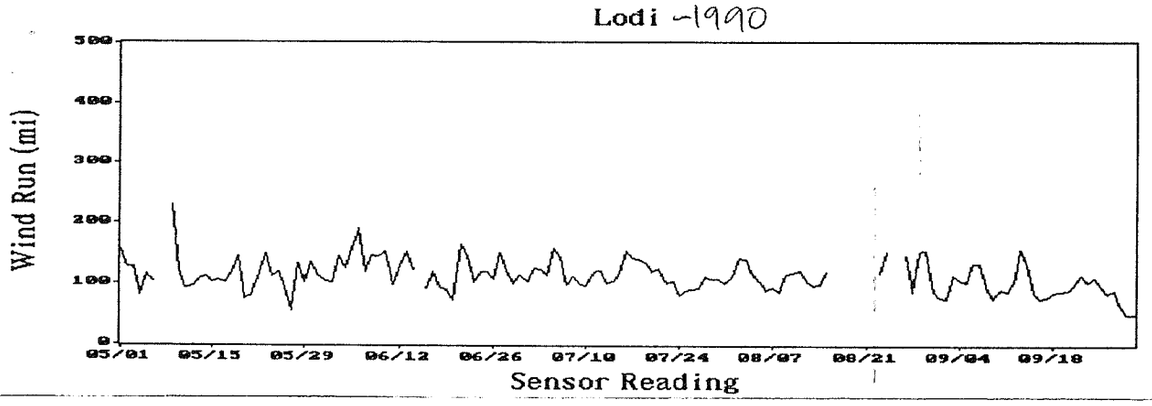
Hopland 1991



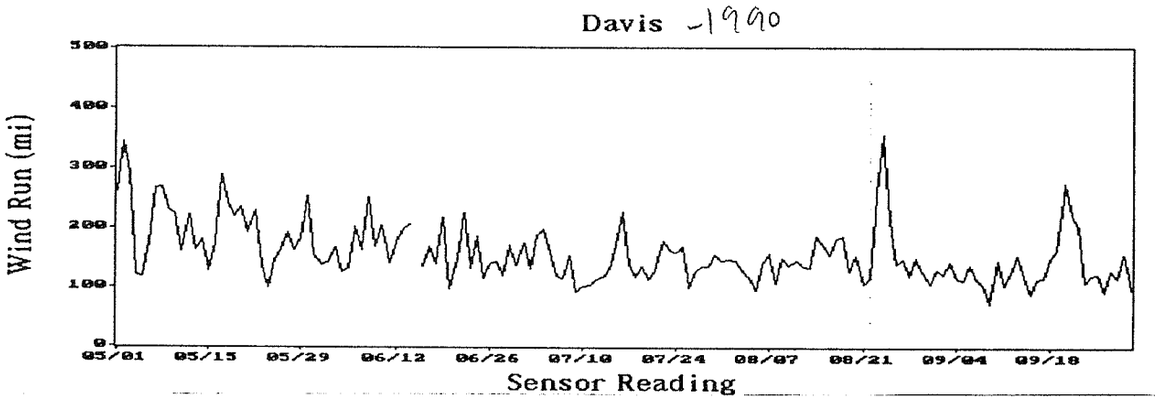
Zomora -1991



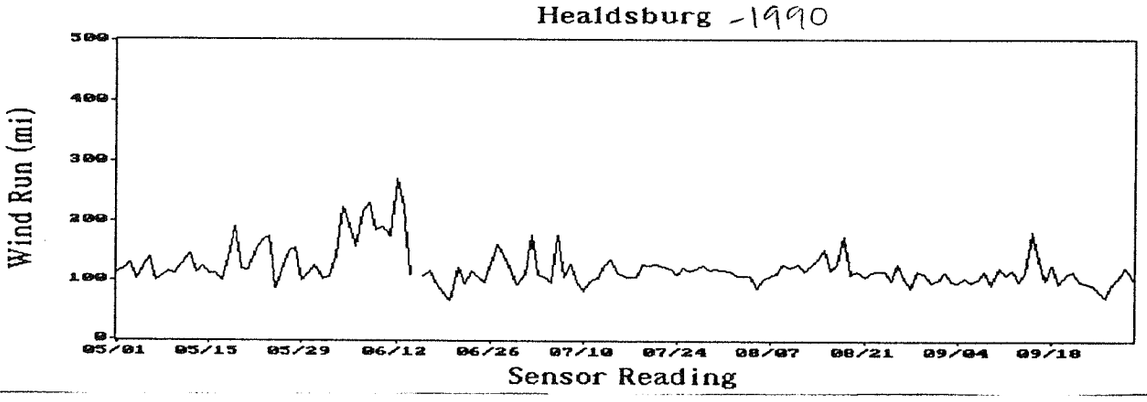
Lodi -1990



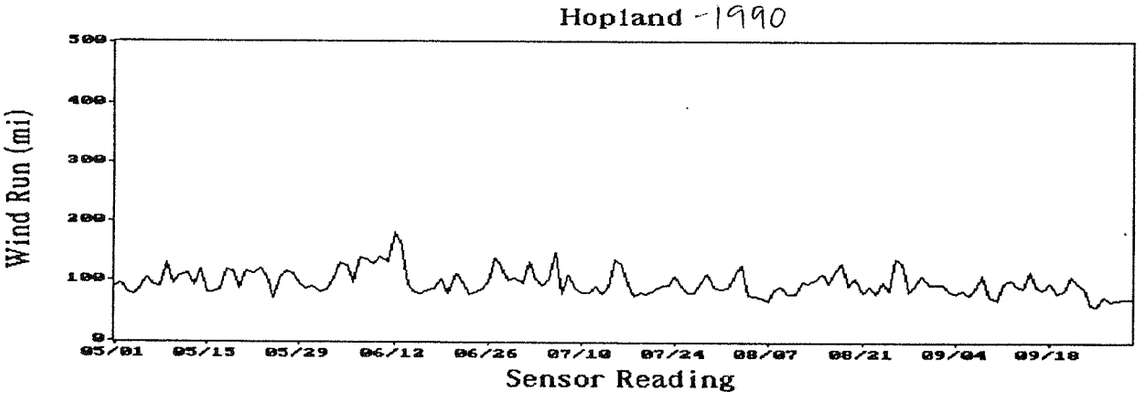
Davis -1990



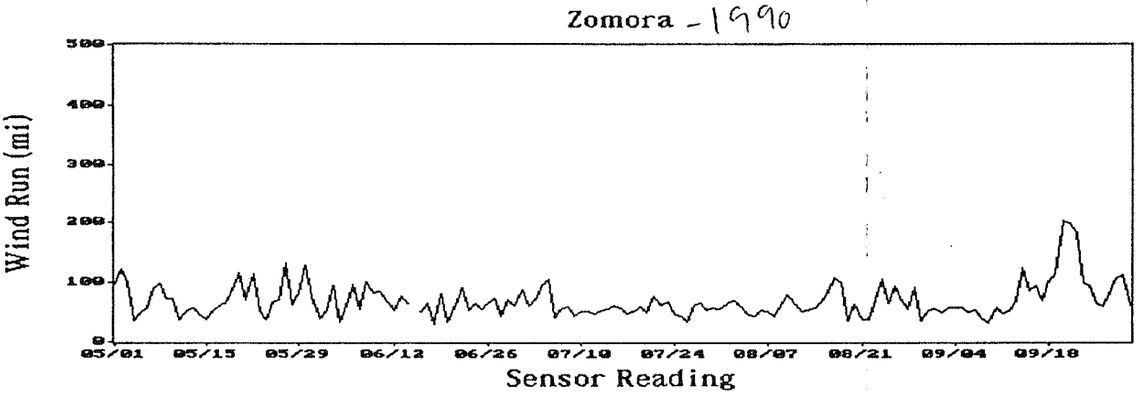
Healdsburg -1990



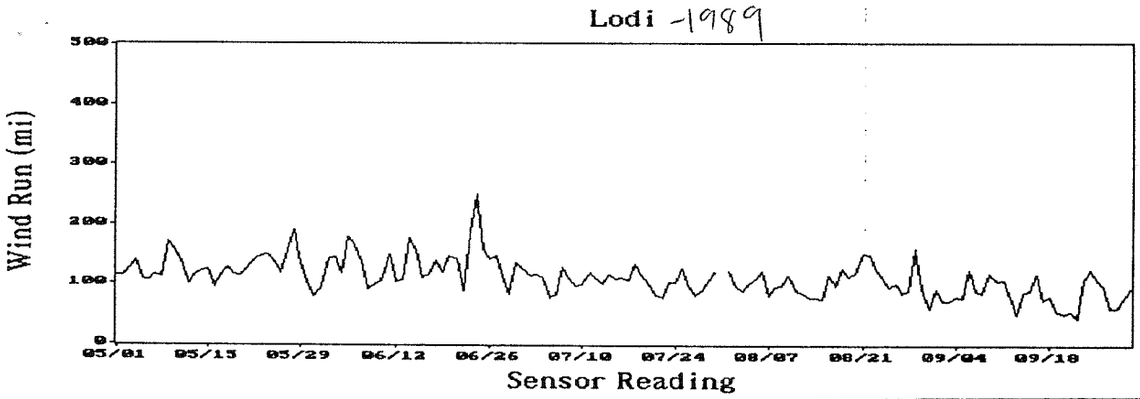
Hopland -1990



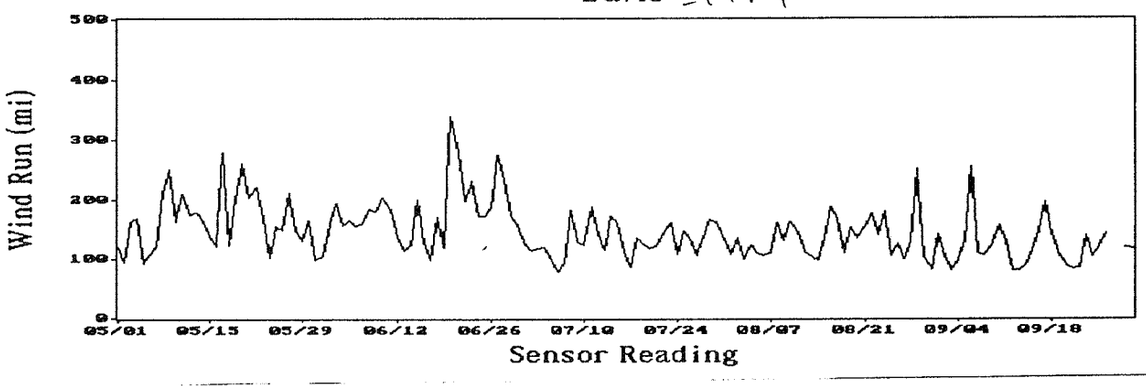
Zomora -1990



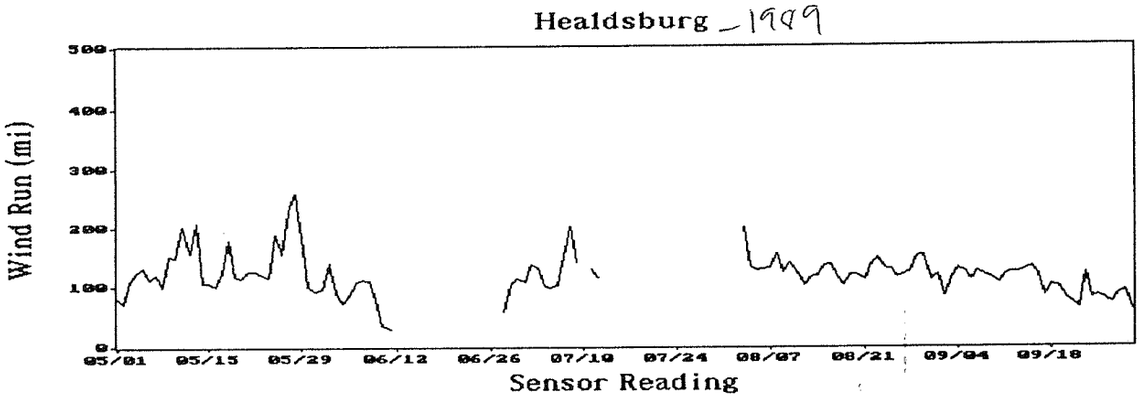
Lodi -1989



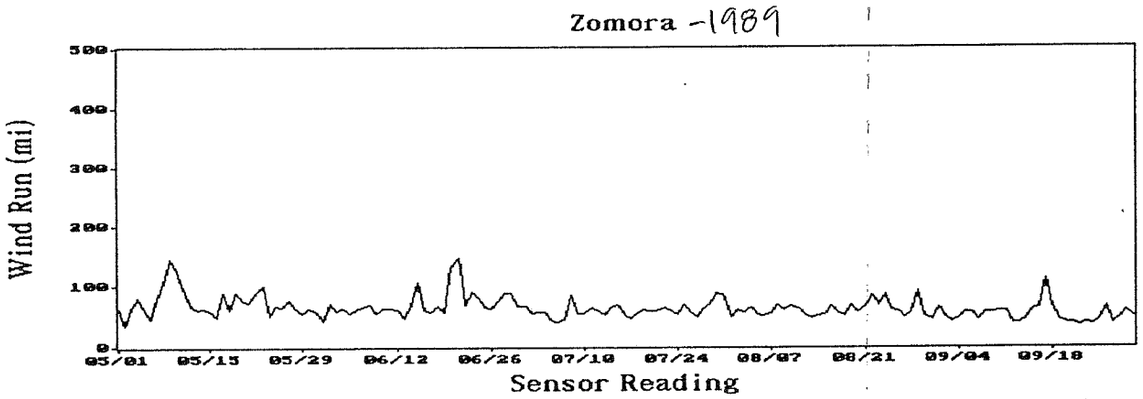
Davis -1989



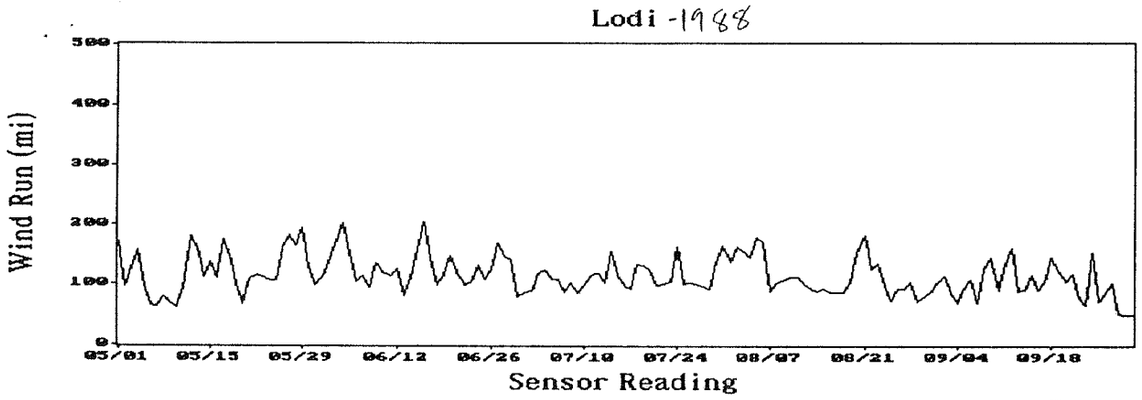
Healdsburg -1989



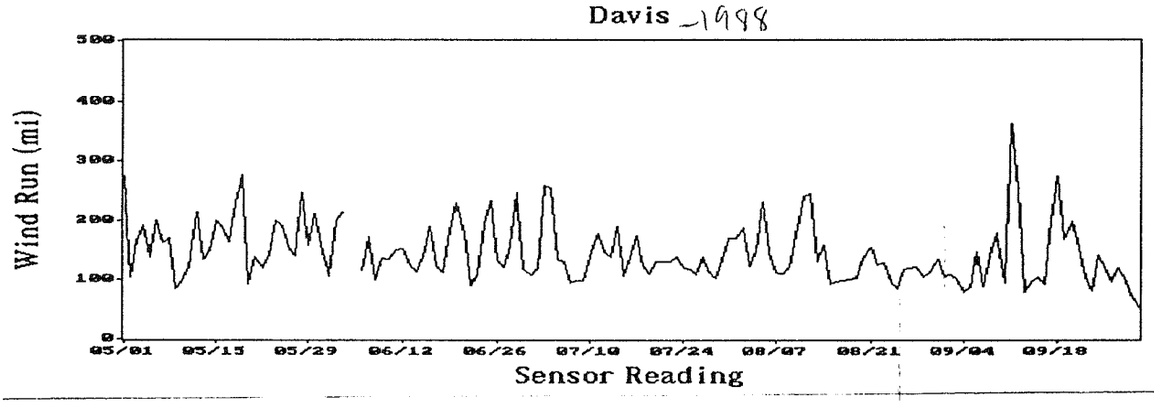
Zomora -1989



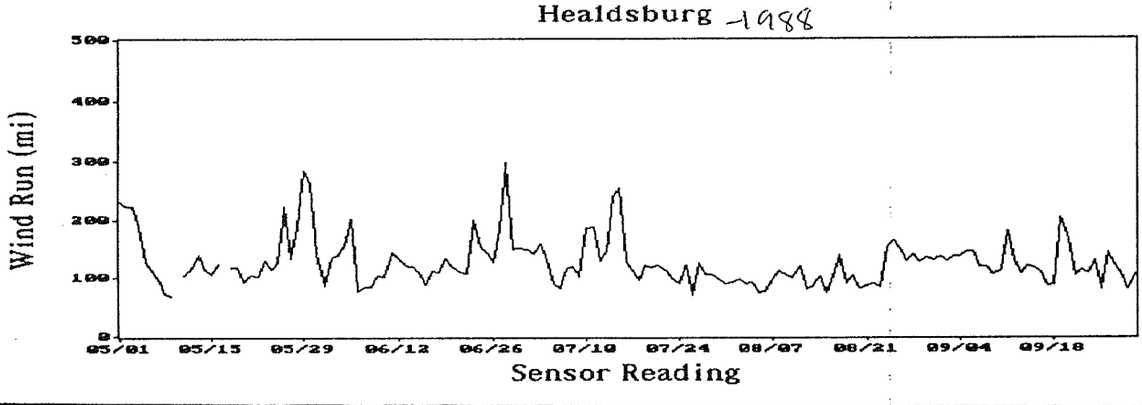
Lodi -1988



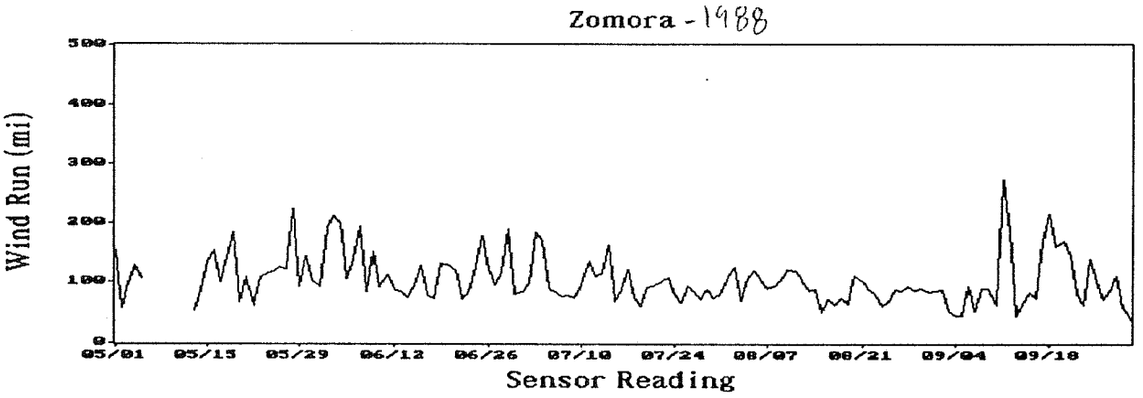
Davis -1988



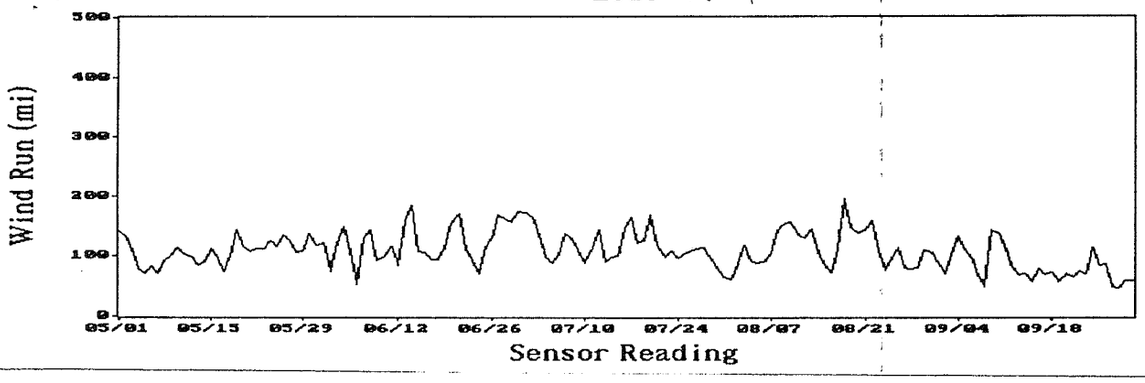
Healdsburg -1988



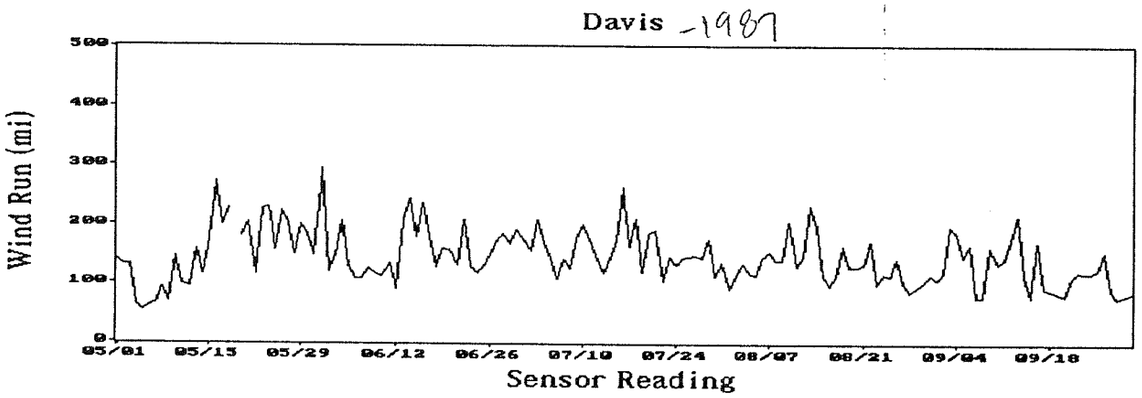
Zomora - 1988



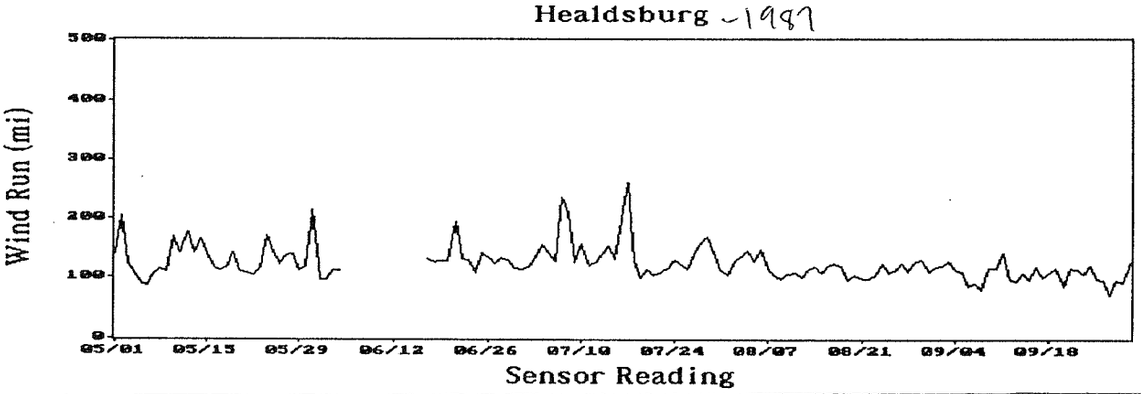
Lodi -1987



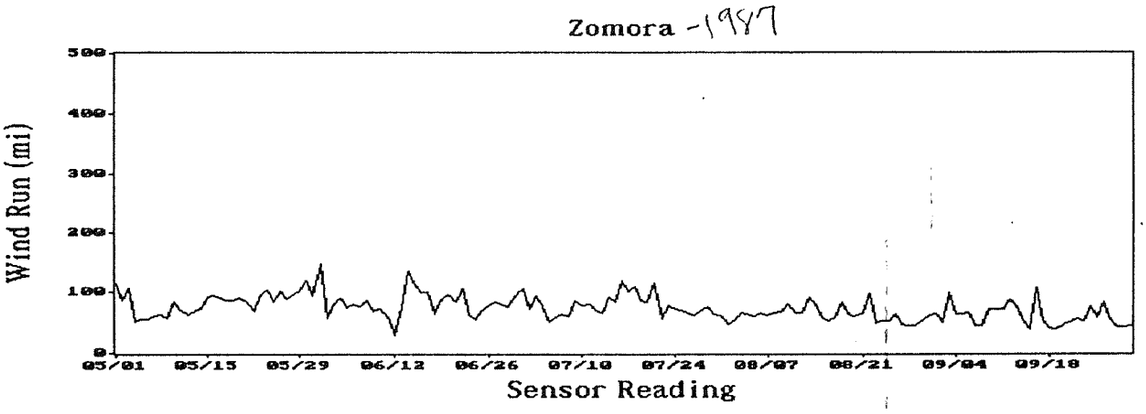
Davis -1987



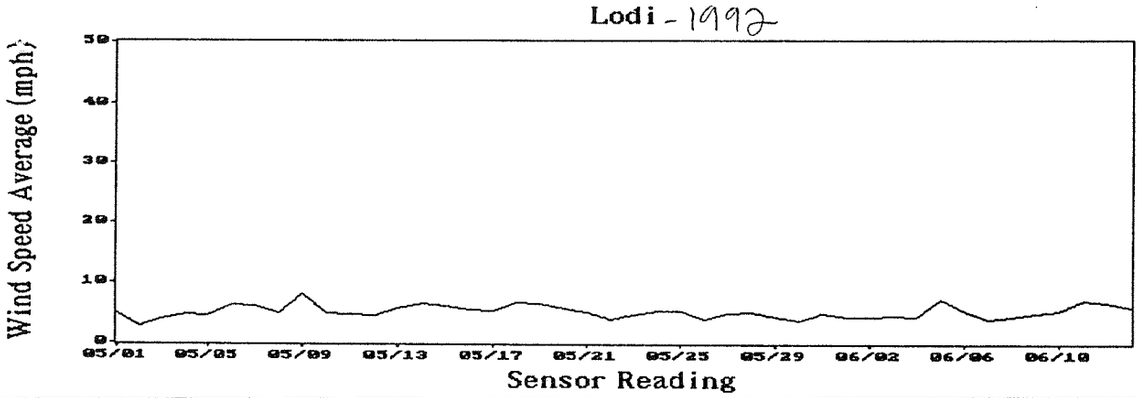
Healdsburg -1987



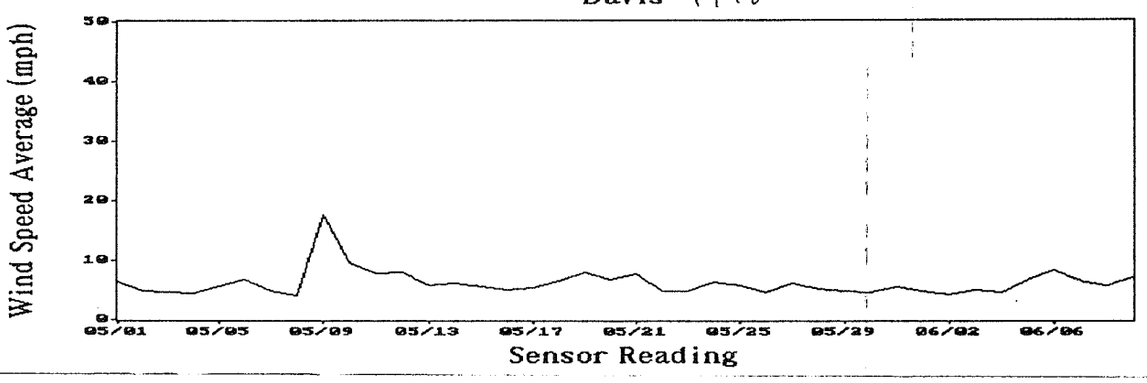
Zomora -1987



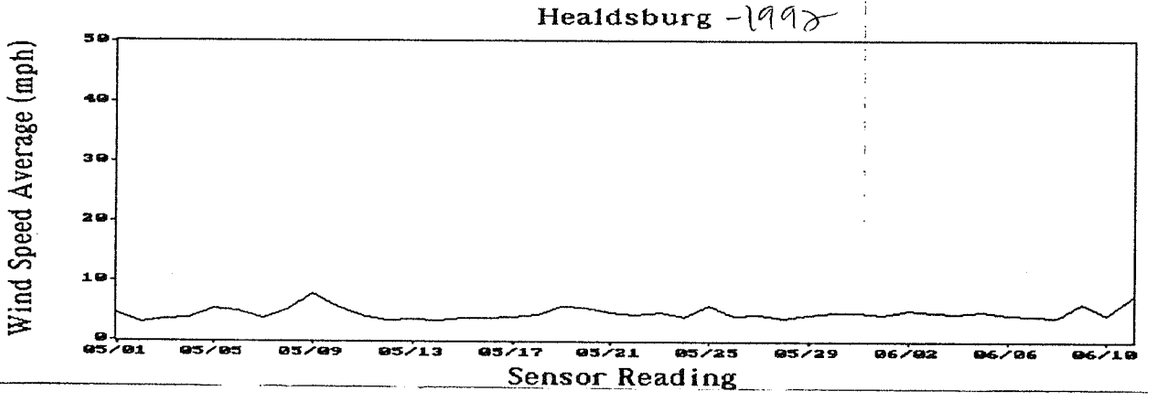
Lodi - 1992



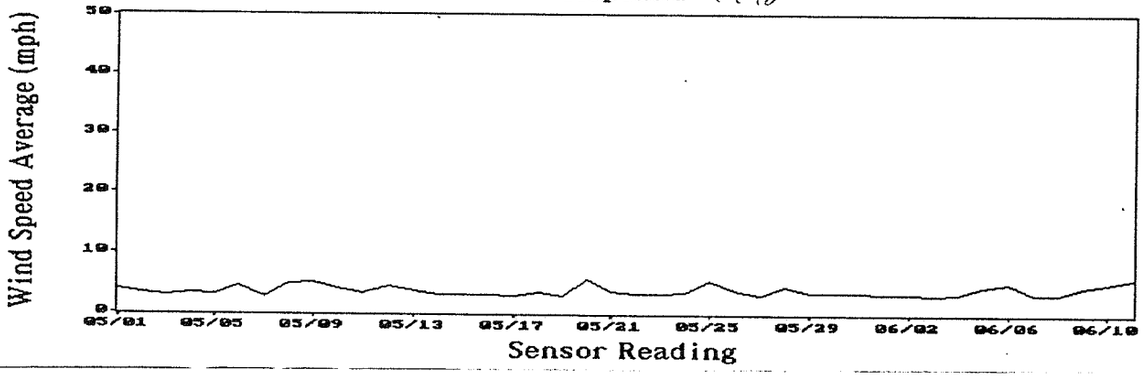
Davis - 1992



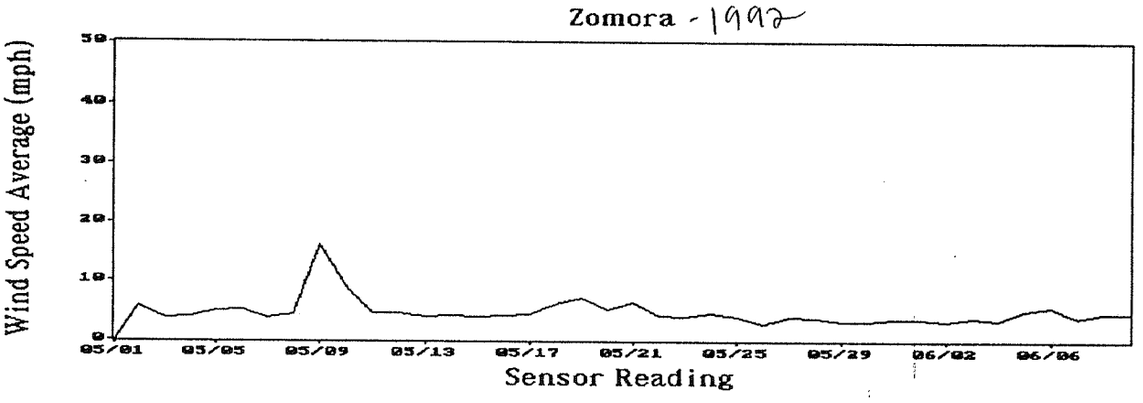
Healdsburg - 1992

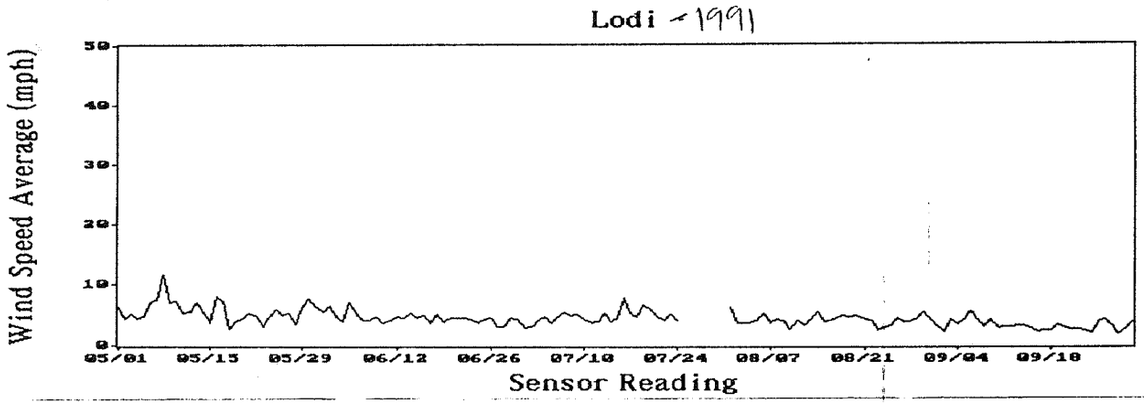


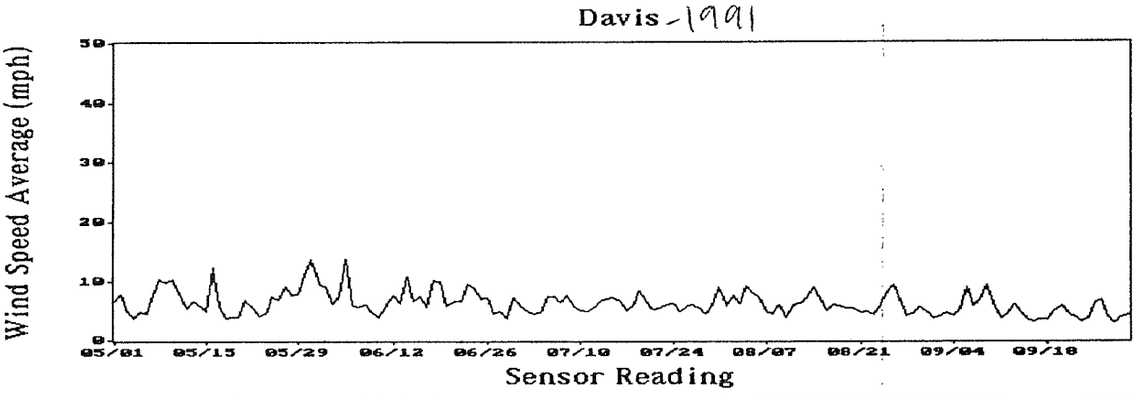
Hopland - 1992



Zomora - 1992




Lodi - 1991
Wind Speed Average (mph)
50
40
30
20
10
0
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
Sensor Reading


Davis - 1991
Wind Speed Average (mph)
50
40
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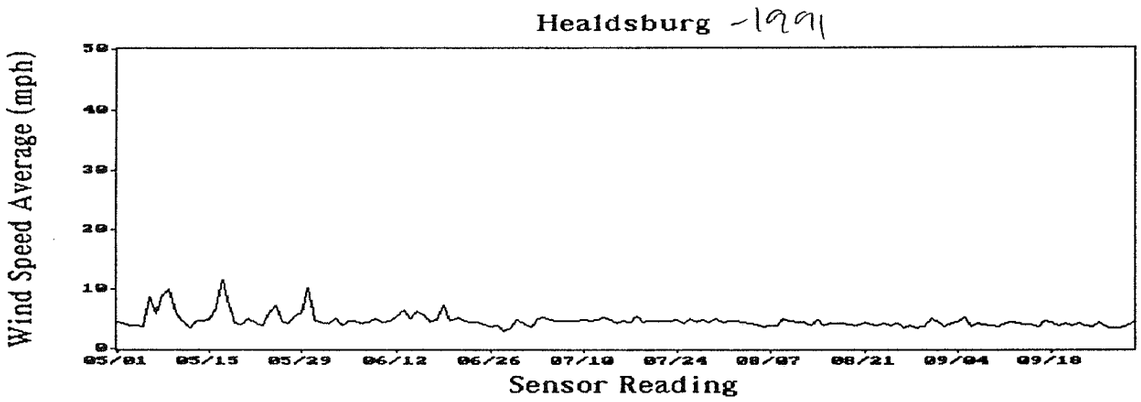
06/26
07/10
07/24
08/07
08/21
09/04
09/18
Sensor Reading


Healdsburg - 1991
Wind Speed Average (mph)
50
40
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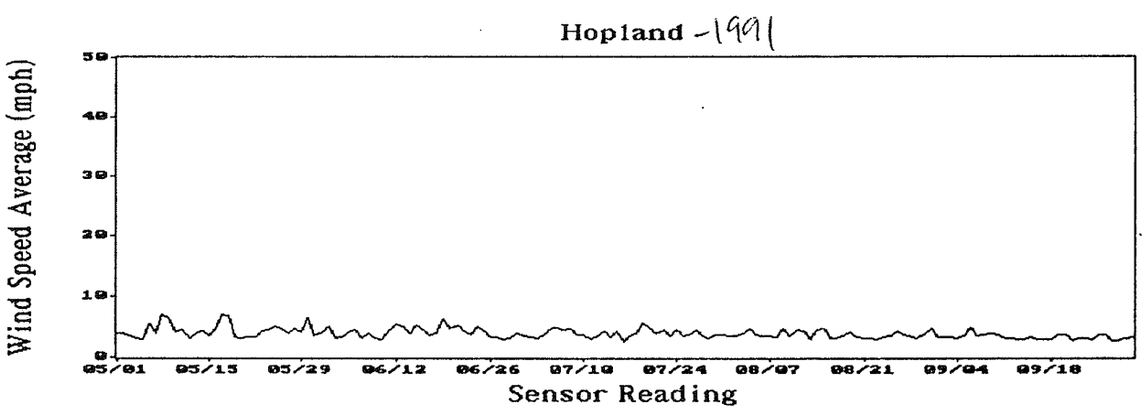
20
10
0
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
Sensor Reading


Hopland - 1991
Wind Speed Average (mph)
50
40
30
20
10
0
05/01
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05/29
06/12
06/26
07/10
07/24
08/07
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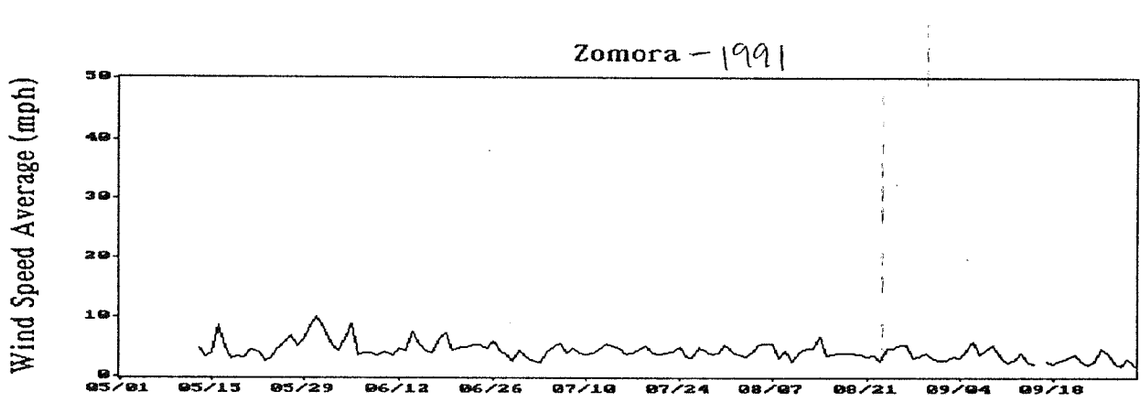
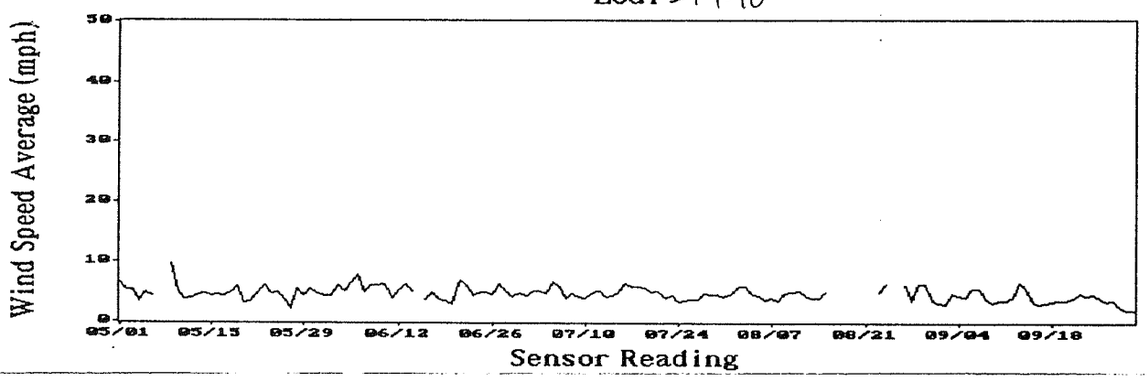
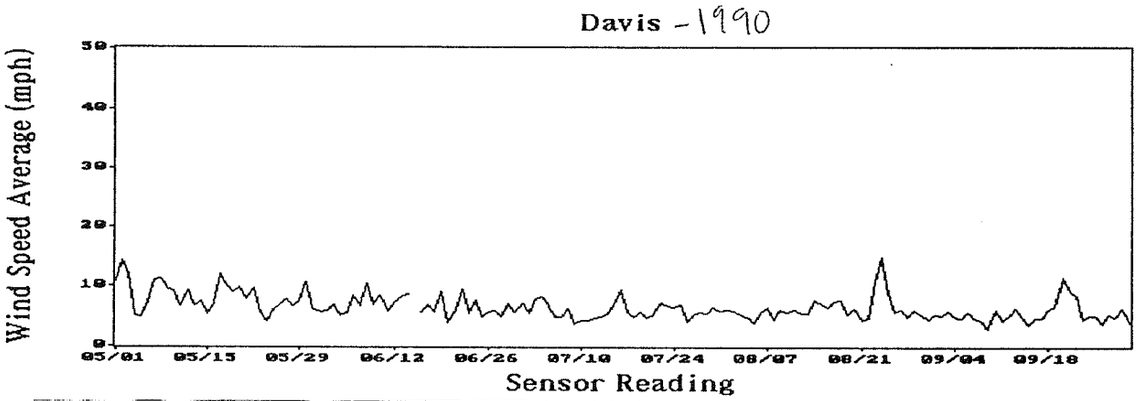
09/18
Sensor Reading


Zomora - 1991
Wind Speed Average (mph)
50
40
30
20
10
0
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
Sensor Reading

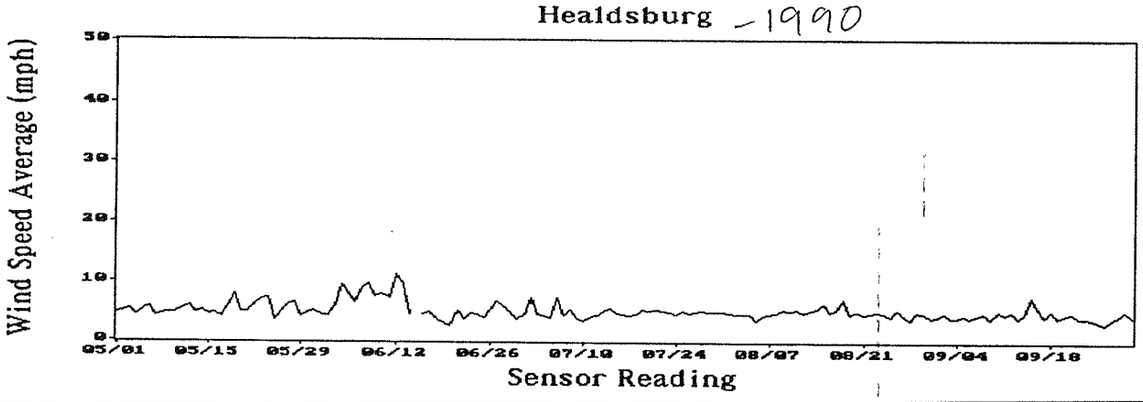
Lodi -1990



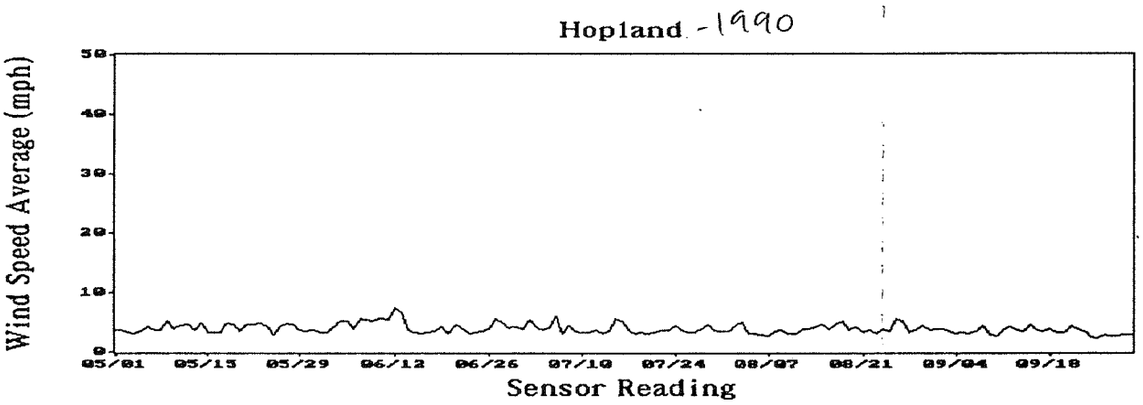
Davis -1990



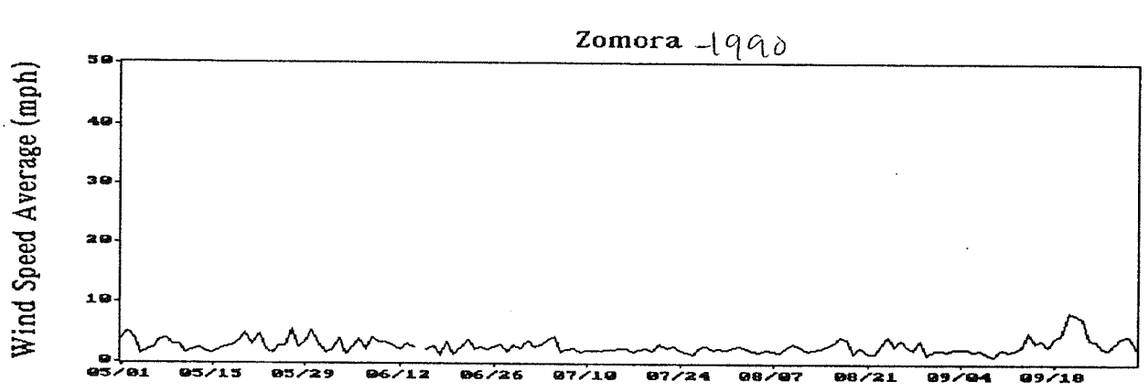
Healdsburg -1990



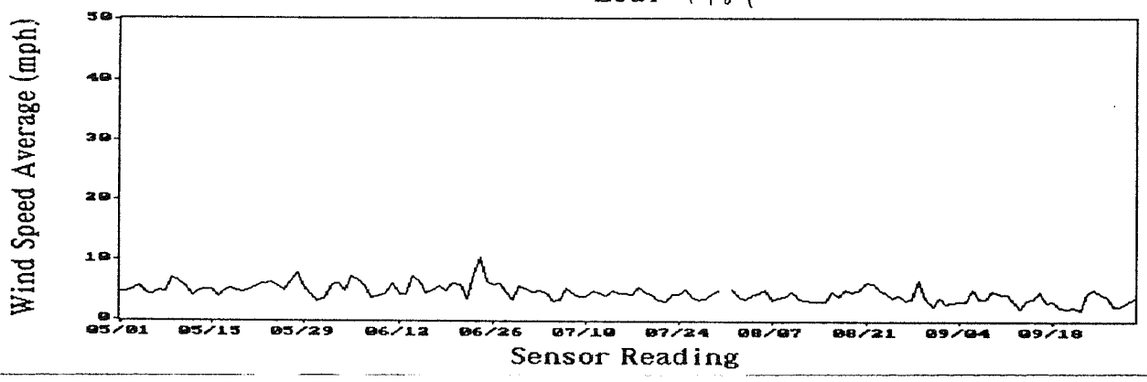
Hopland -1990



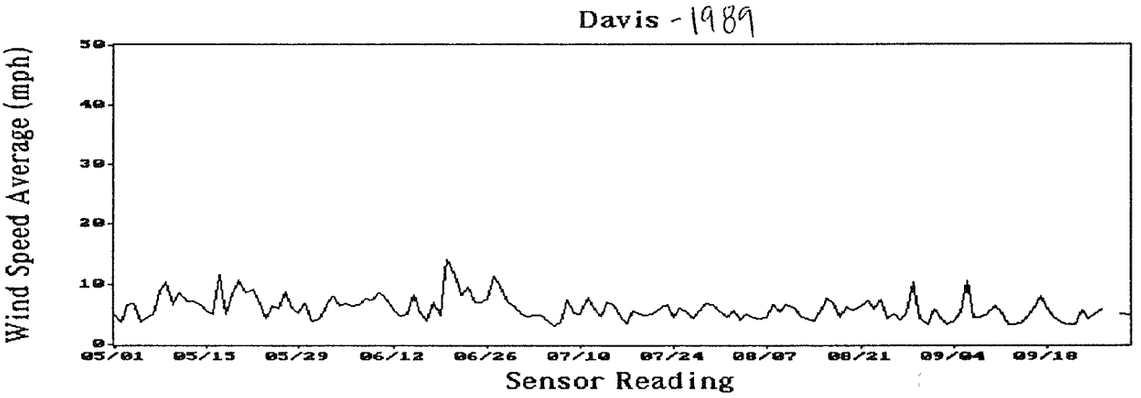
Zomora -1990



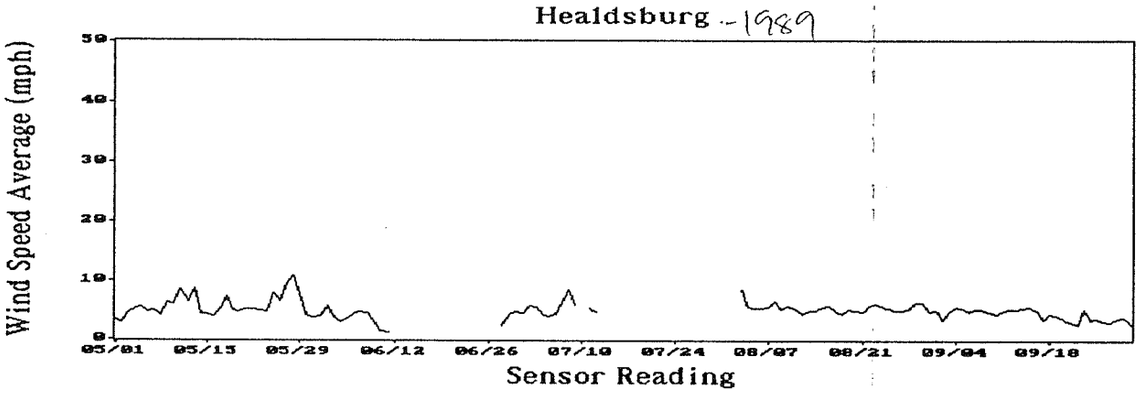
Lodi-1989



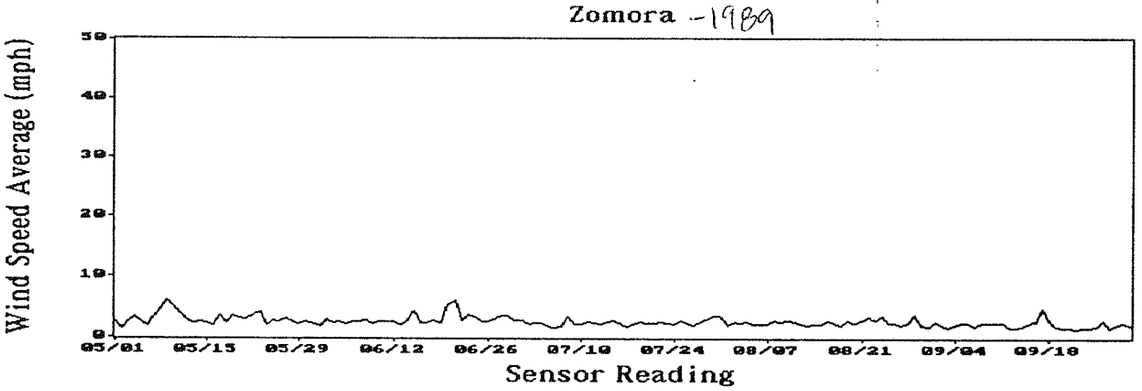
Davis - 1989



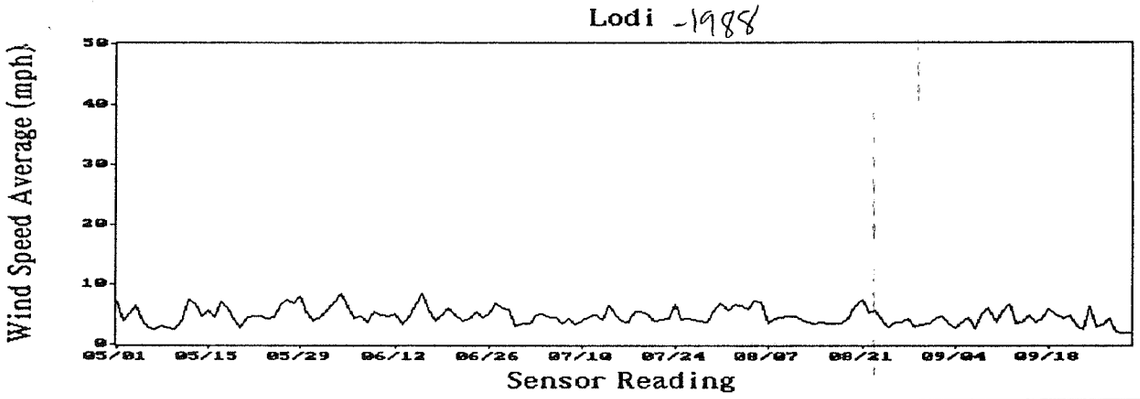
Healdsburg - 1989



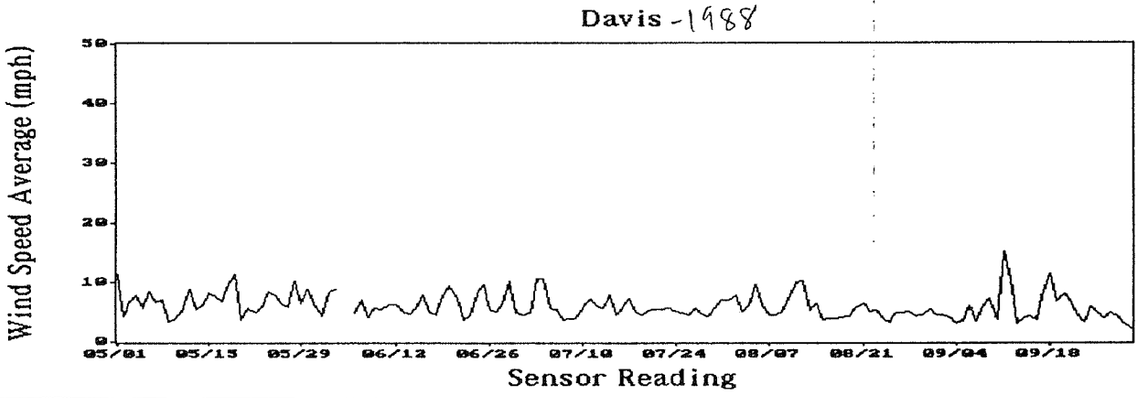
Zomora - 1989



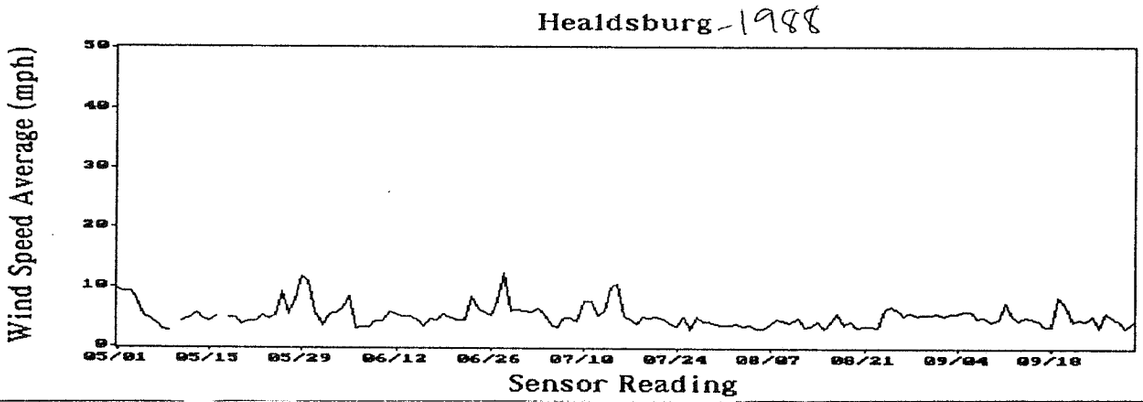
Lodi -1988



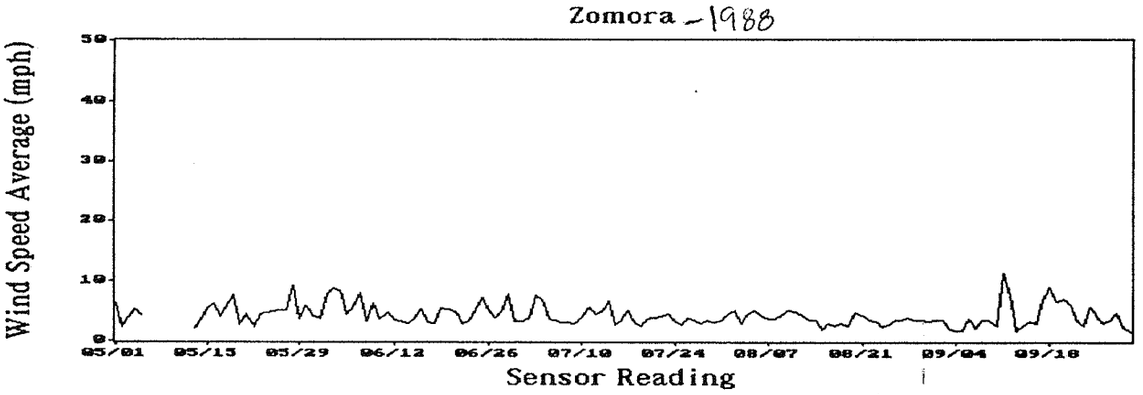
Davis -1988



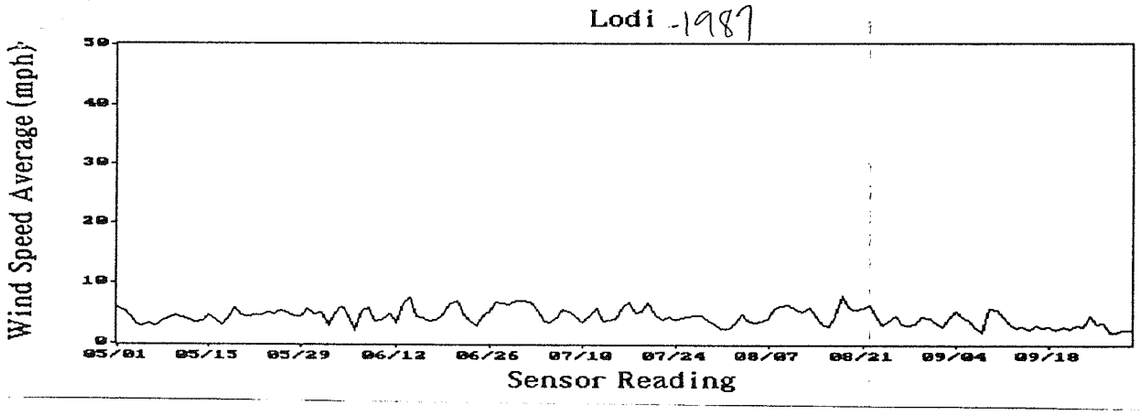
Healdsburg -1988



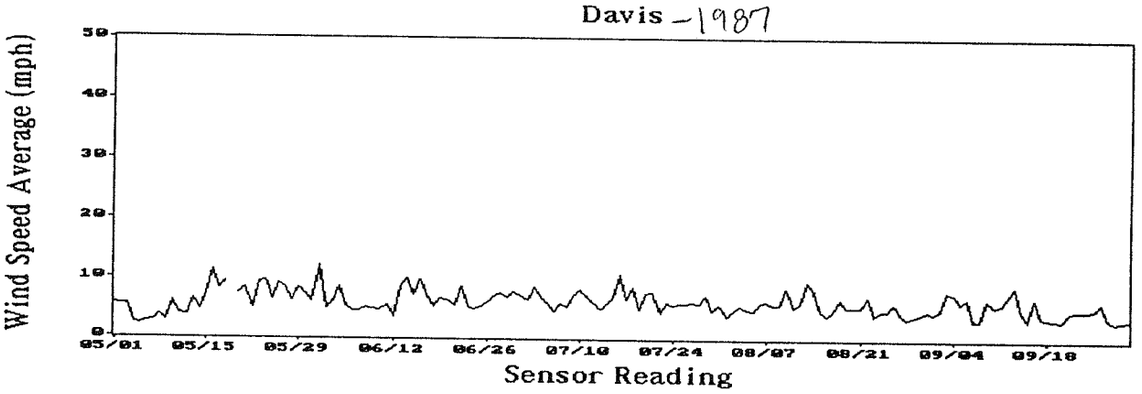
Zomora -1988



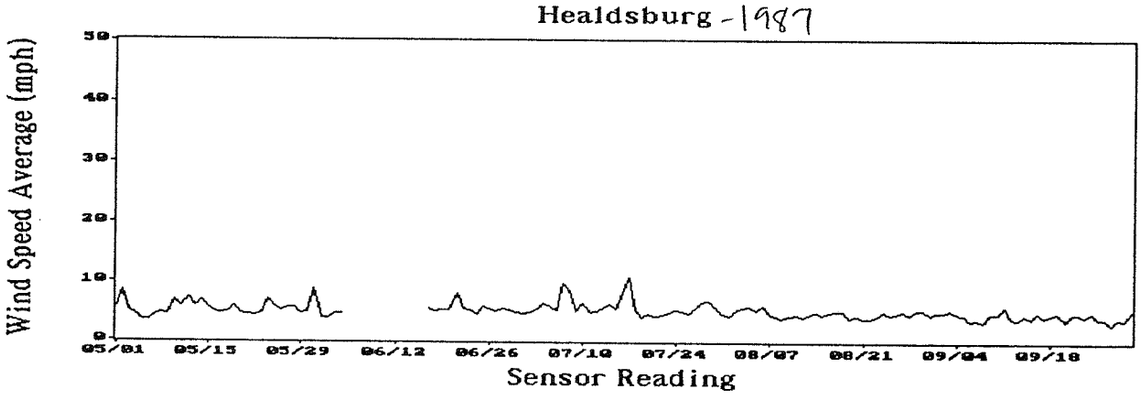
Lodi -1987



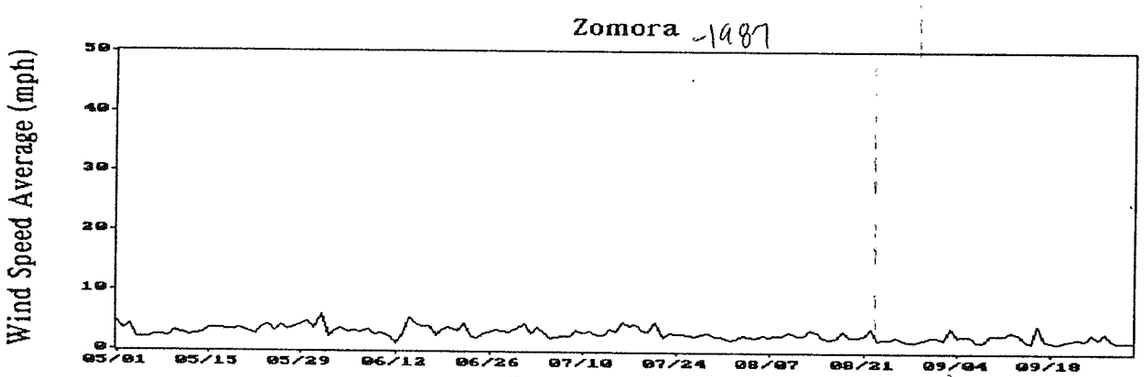
Davis -1987



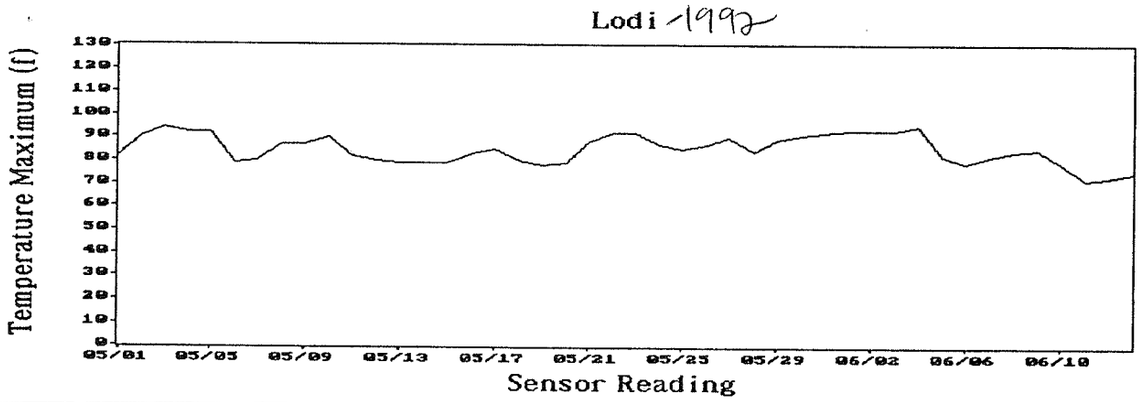
Healdsburg -1987



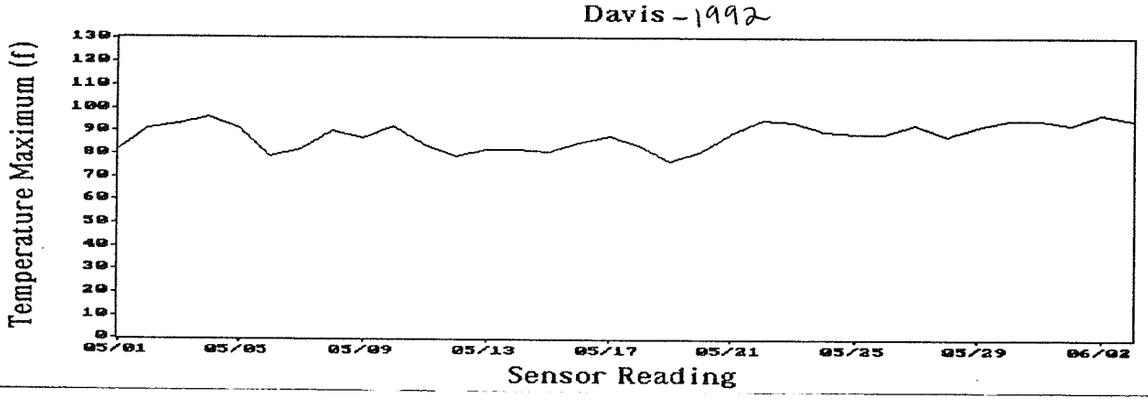
Zomora -1987



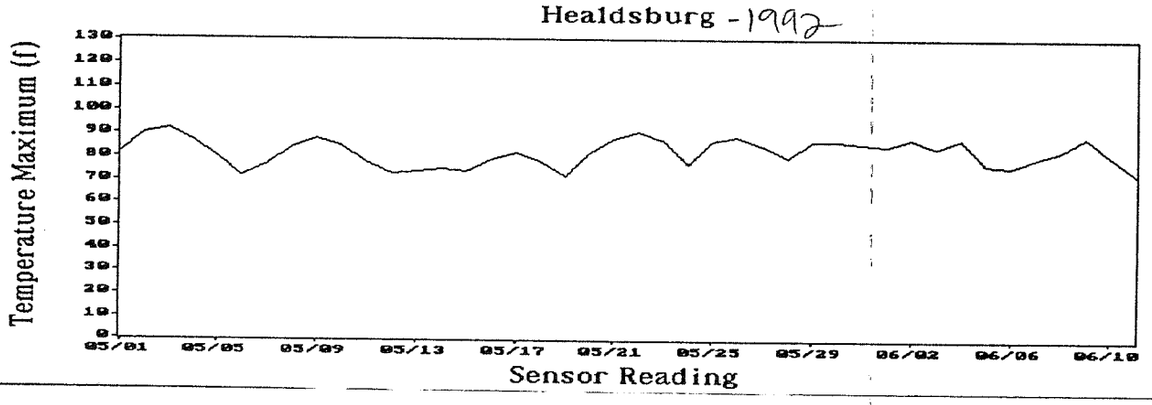
Lodi - 1992



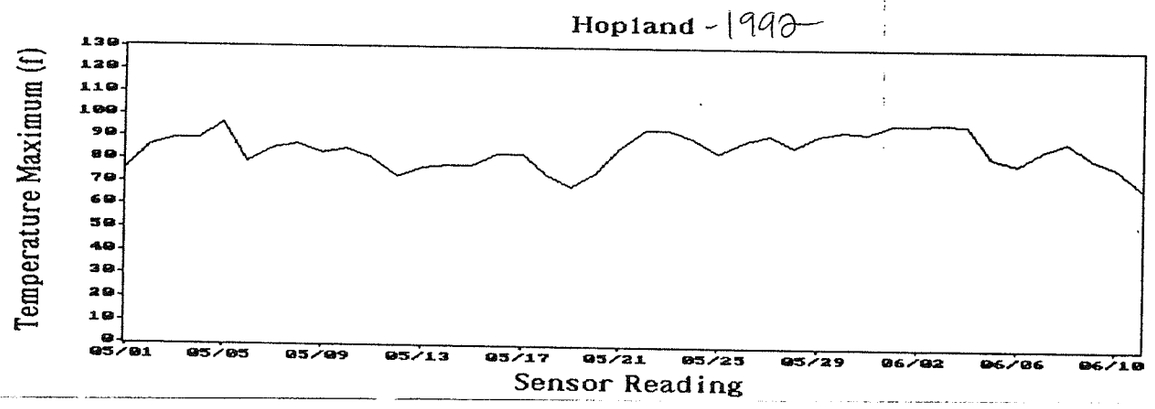
Davis - 1992



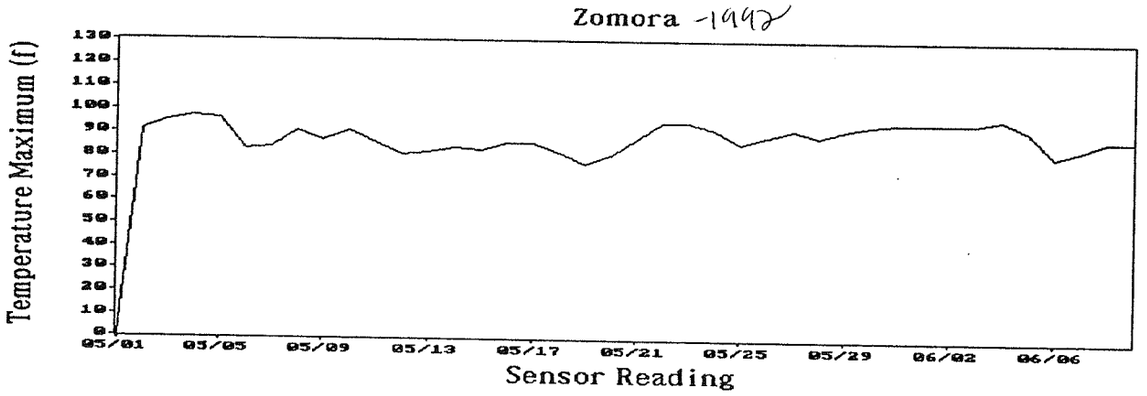
Healdsburg - 1992

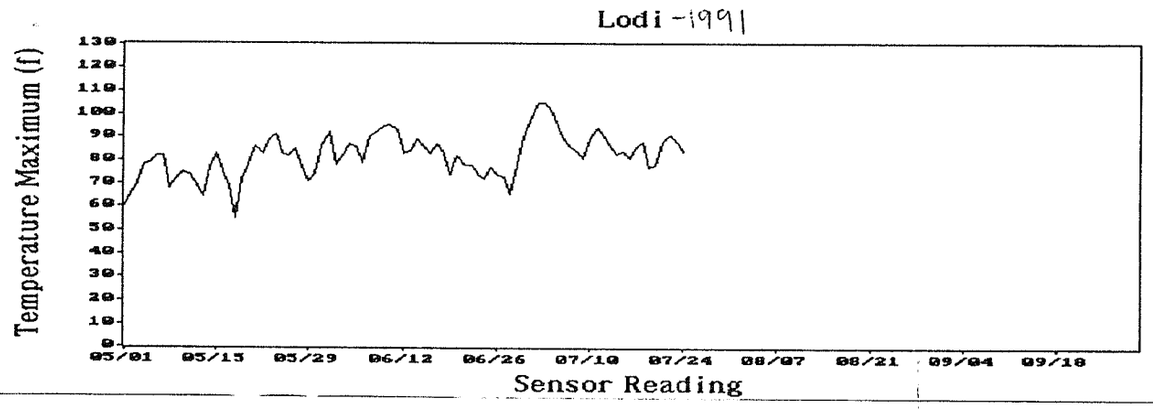


Hopland - 1992



Zomora - 1992




Lodi -1991
Temperature Maximum (f)
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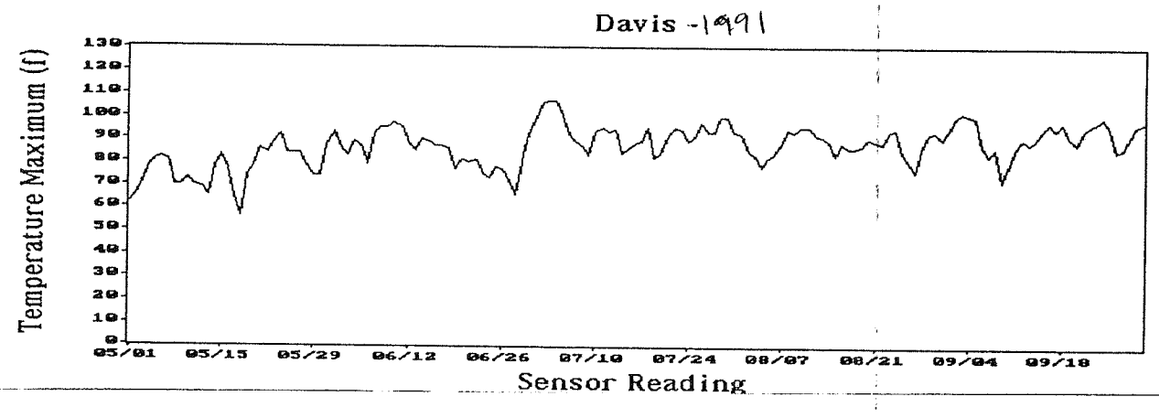
Sensor Reading


Davis -1991
Temperature Maximum (f)
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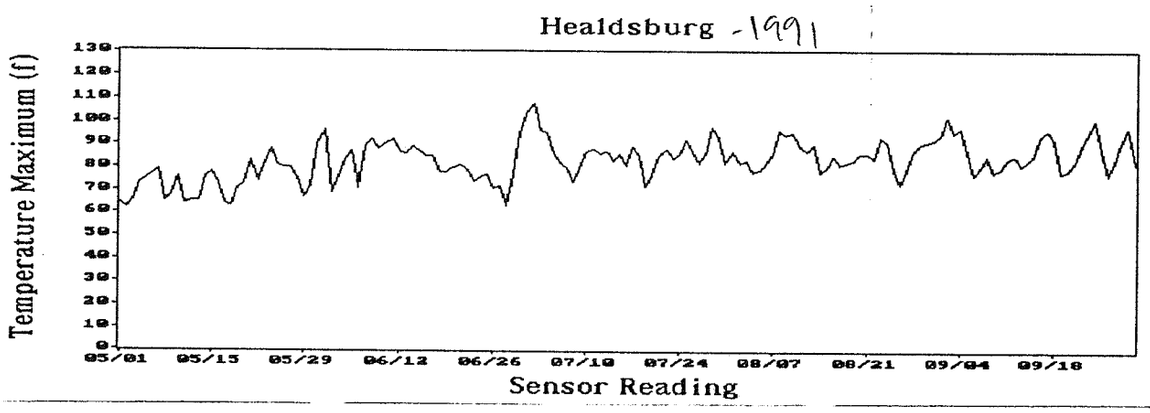
Sensor Reading


Healdsburg -1991
Temperature Maximum (f)
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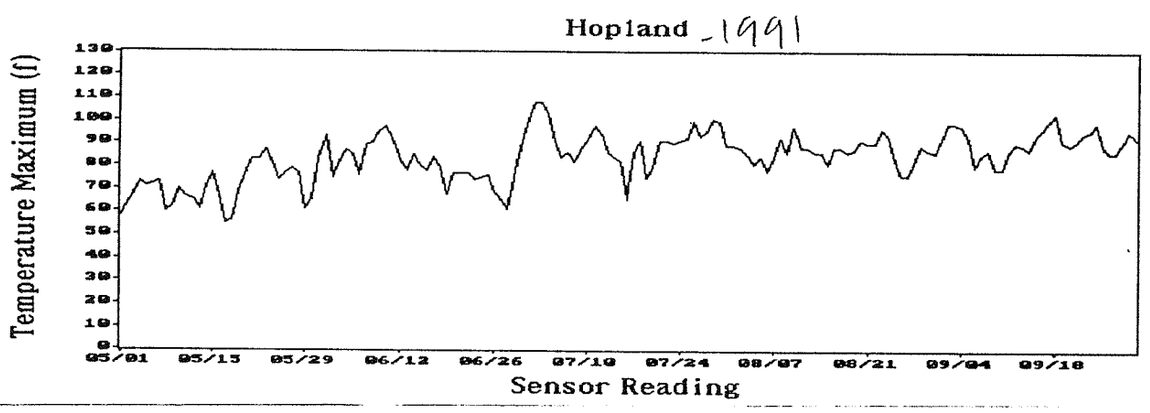
Sensor Reading


Hopland -1991
Temperature Maximum (f)
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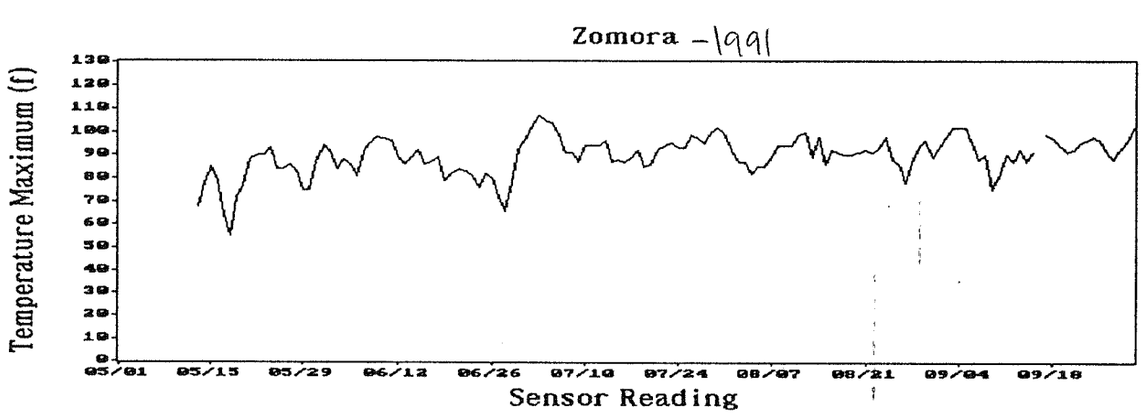
Sensor Reading


Zomora -1991
Temperature Maximum (f)
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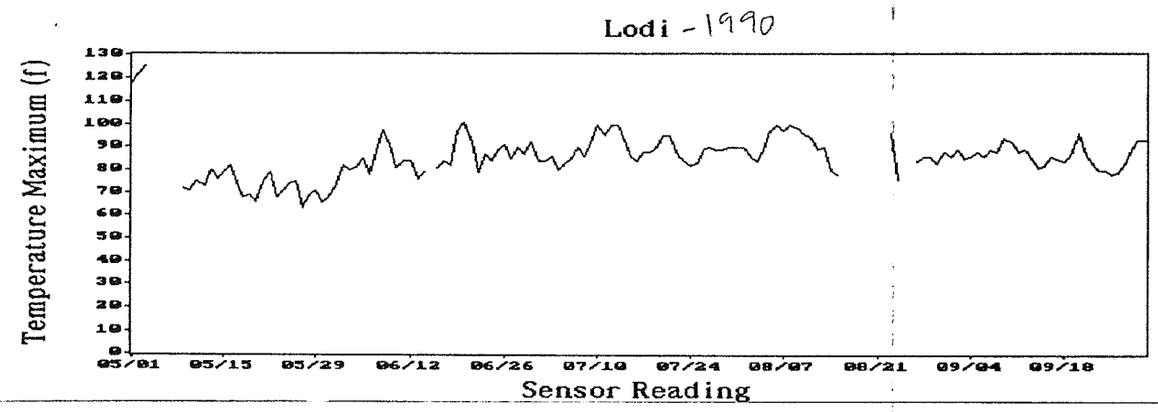
Sensor Reading


Lodi - 1990
Temperature Maximum (f)
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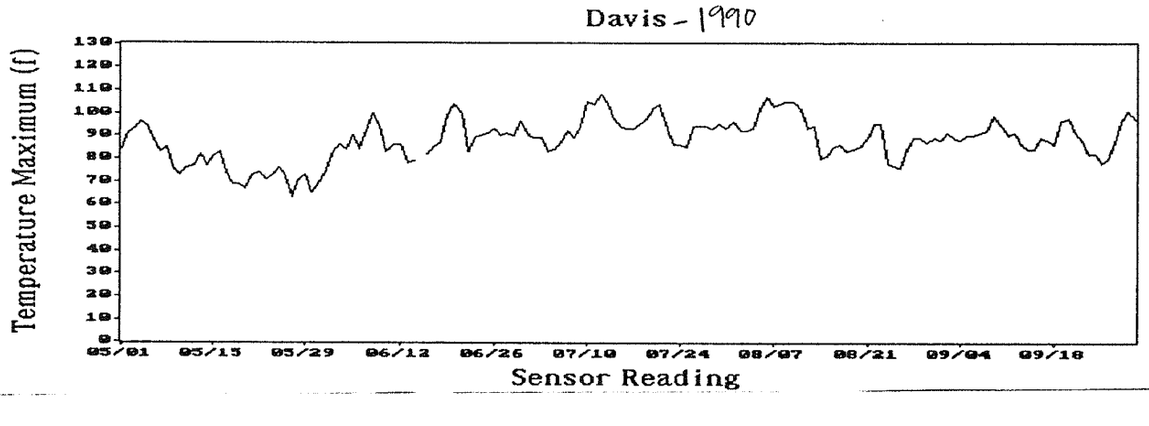
Sensor Reading


Davis - 1990
Temperature Maximum (f)
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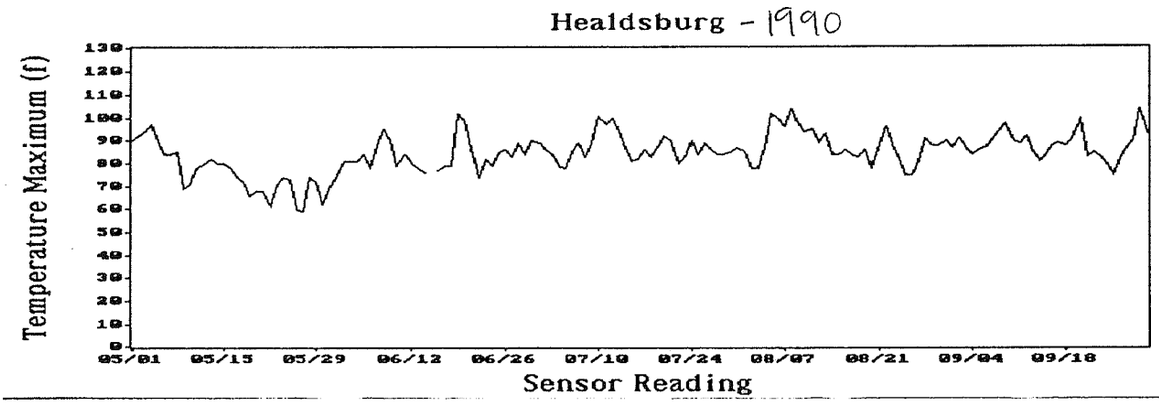
Sensor Reading


Healdsburg - 1990
Temperature Maximum (f)
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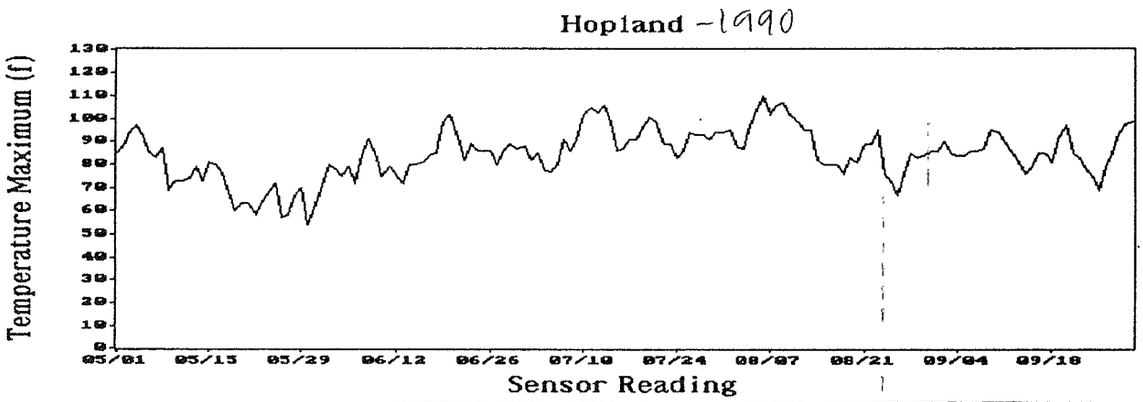
Sensor Reading


Hopland - 1990
Temperature Maximum (f)
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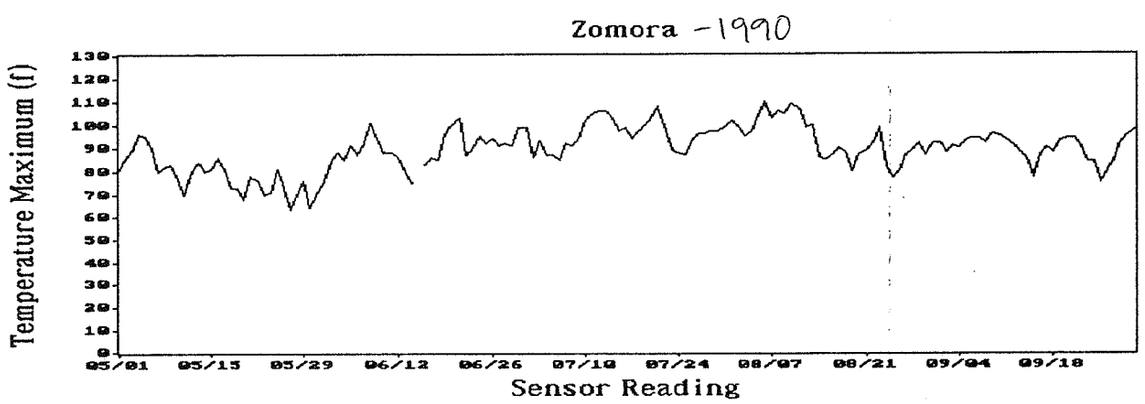
Sensor Reading


Zomora - 1990
Temperature Maximum (f)
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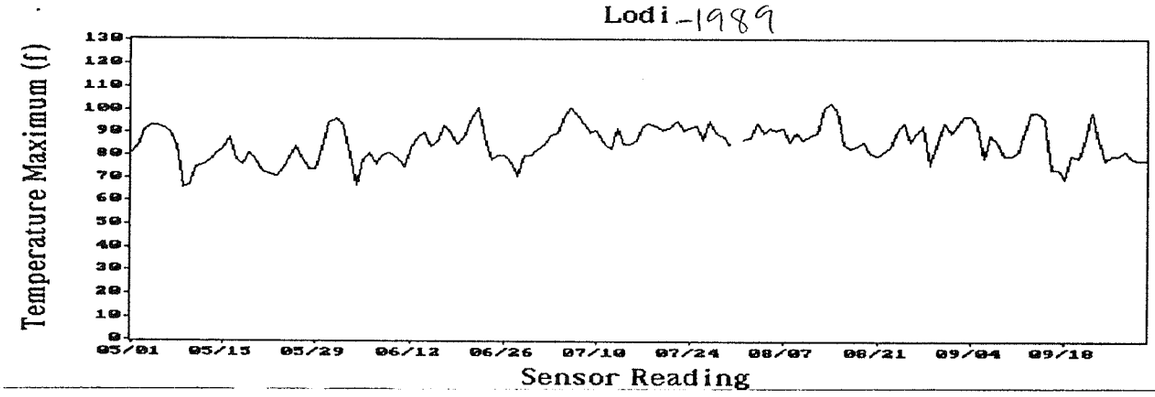
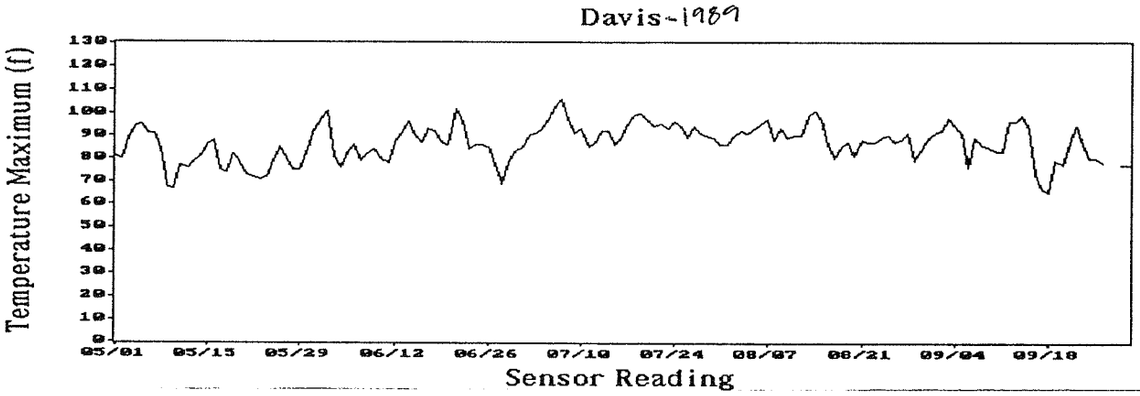
Sensor Reading

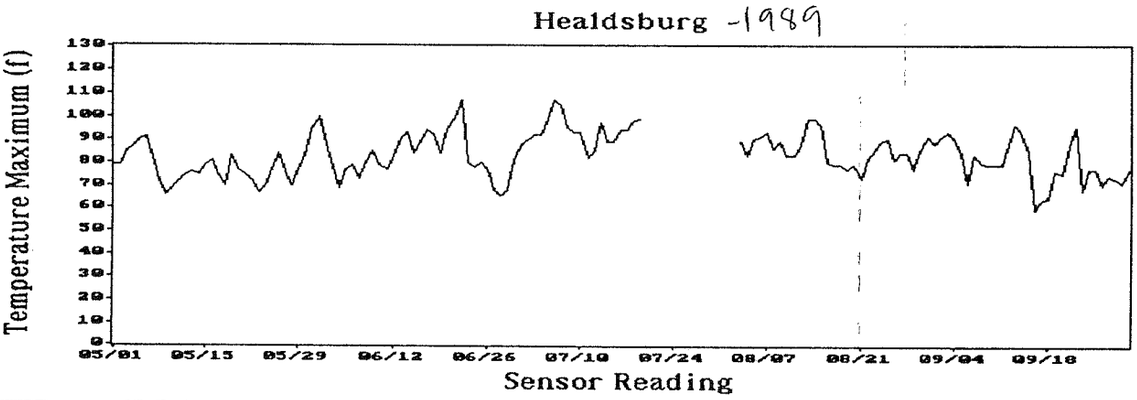
Lodi - 1989



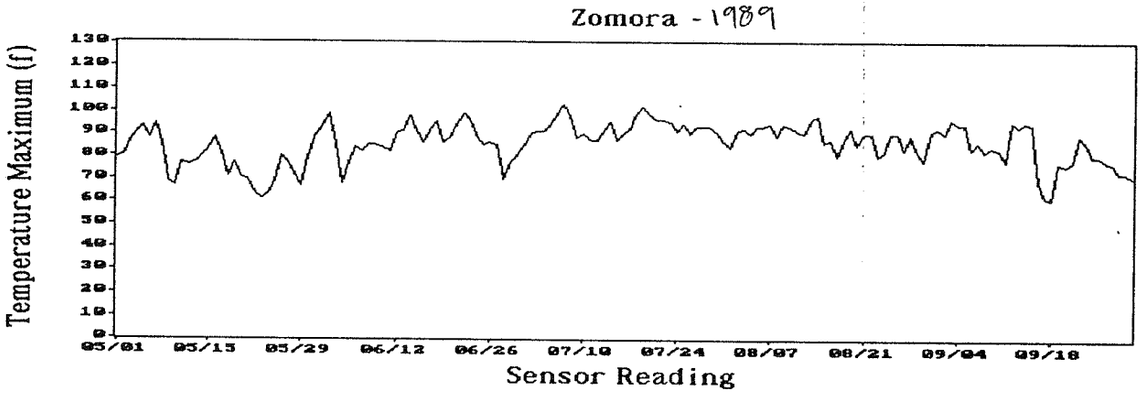
Davis - 1989



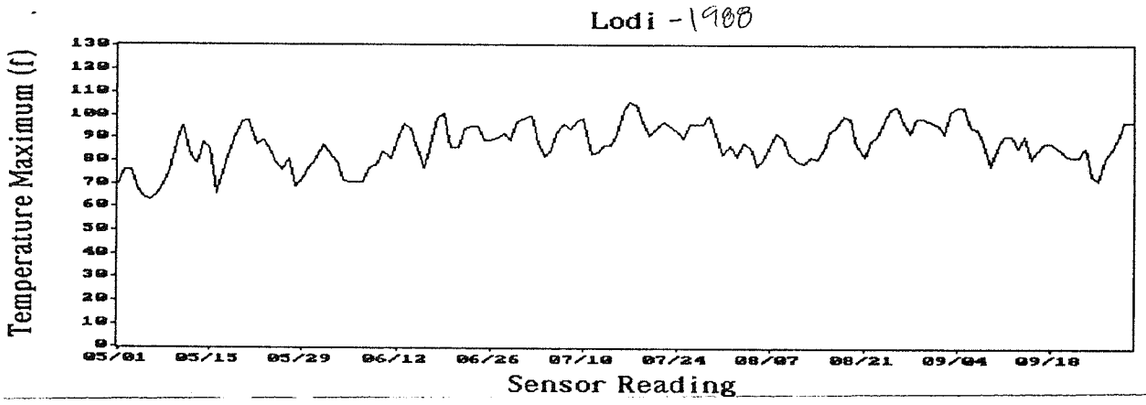
Healdsburg - 1989



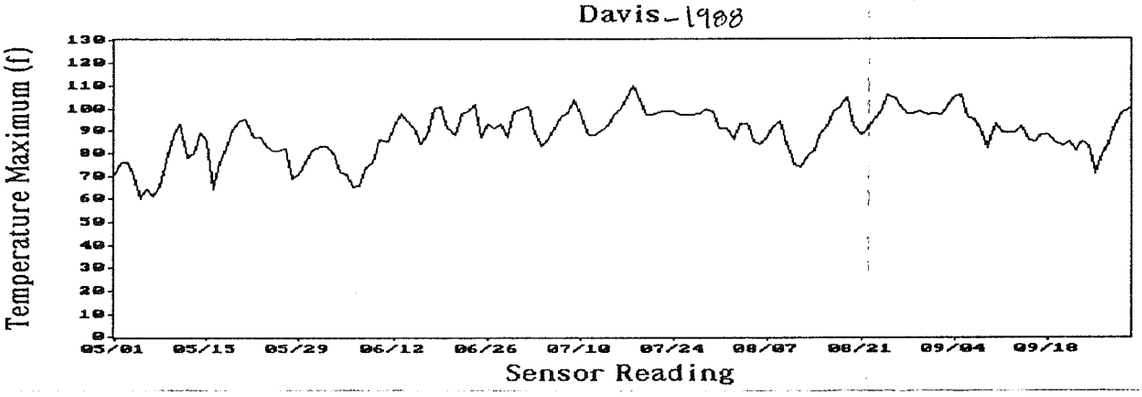
Zomora - 1989



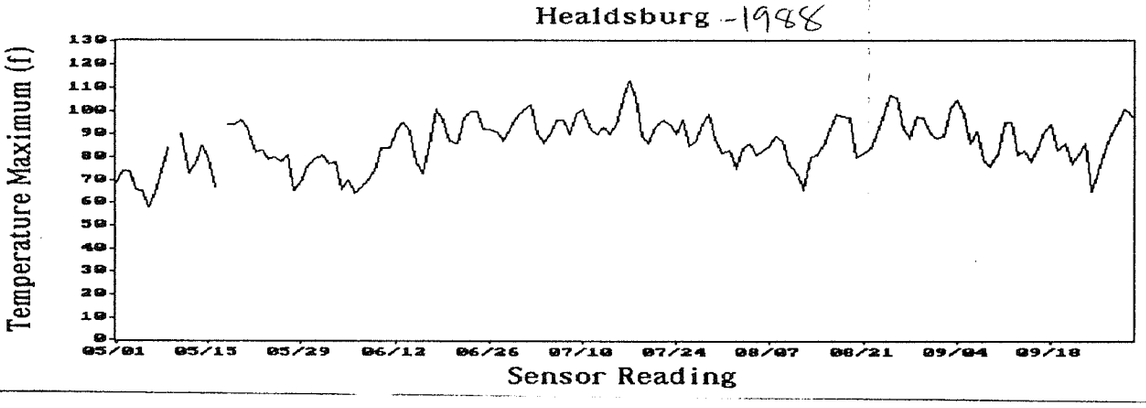
Lodi - 1988



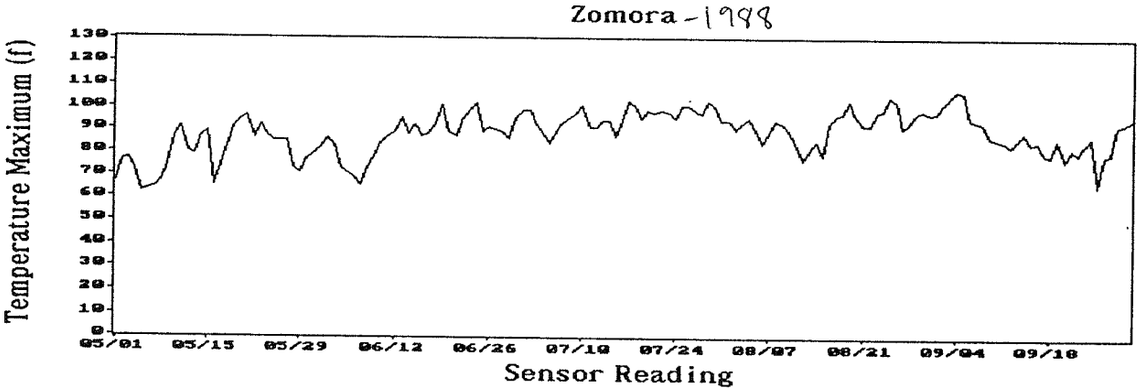
Davis - 1988



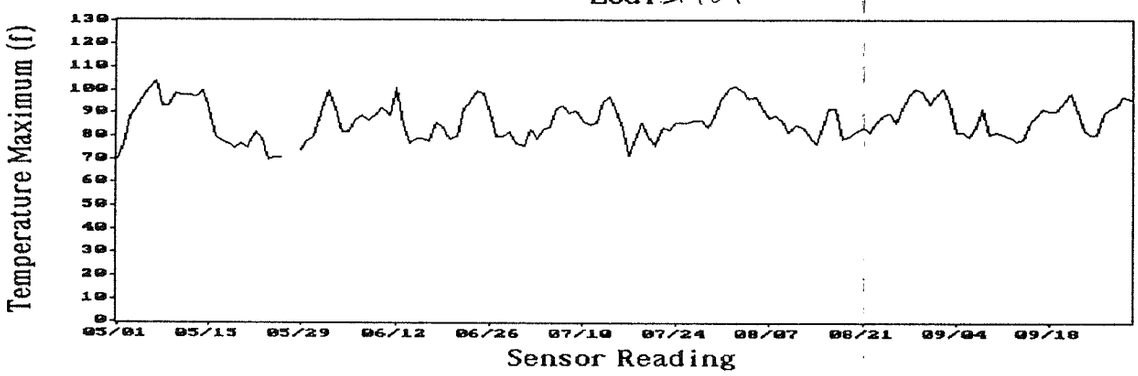
Healdsburg - 1988



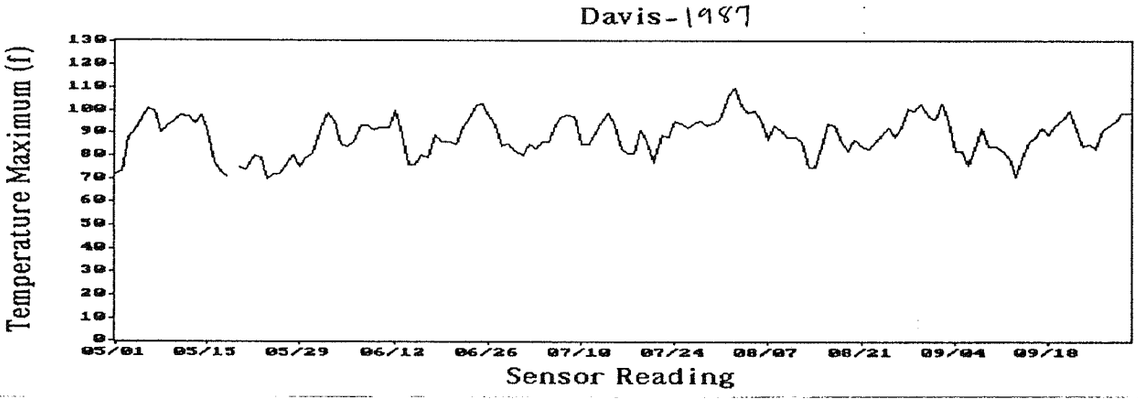
Zomora - 1988



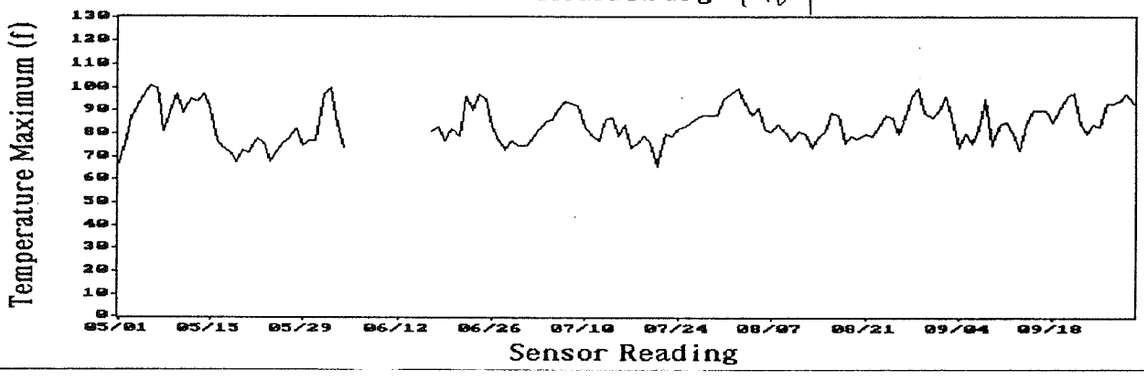
Lodi-1987



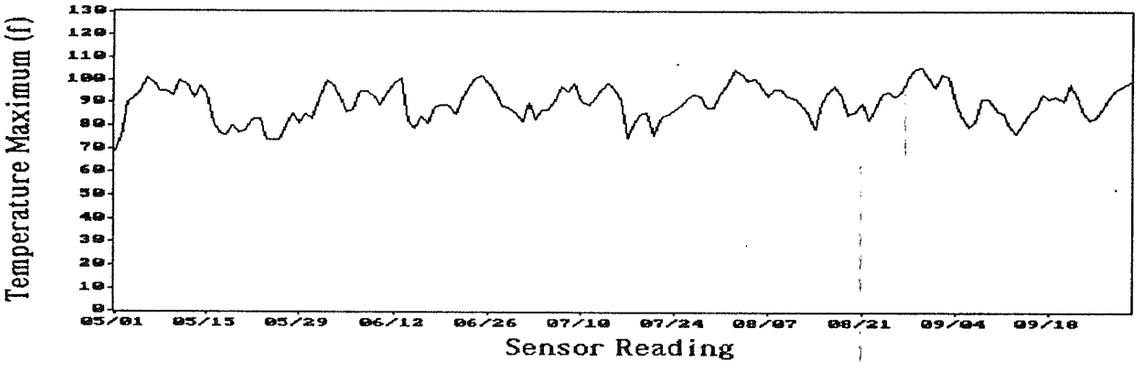
Davis-1987



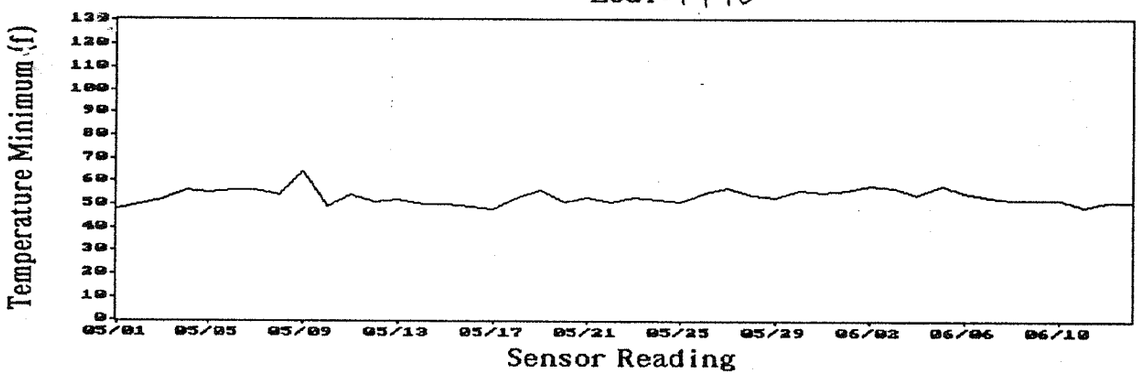
Healdsburg-1987



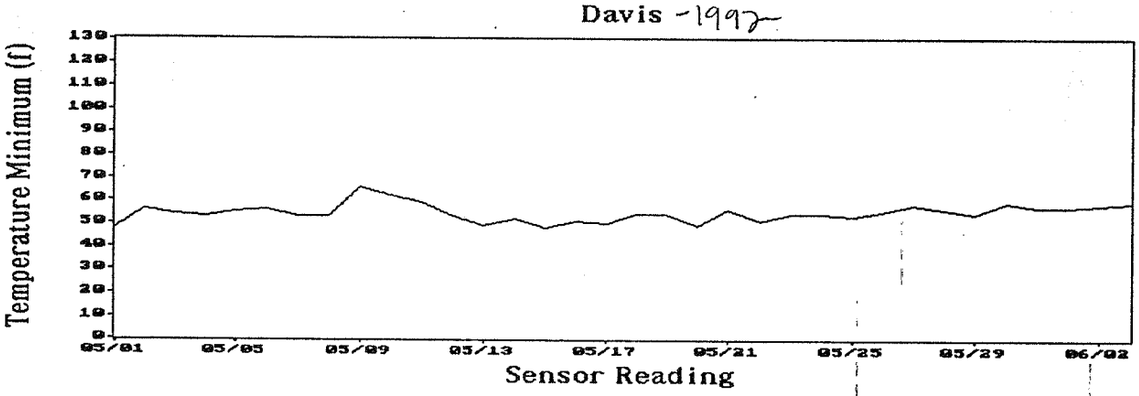
Zomora-1987



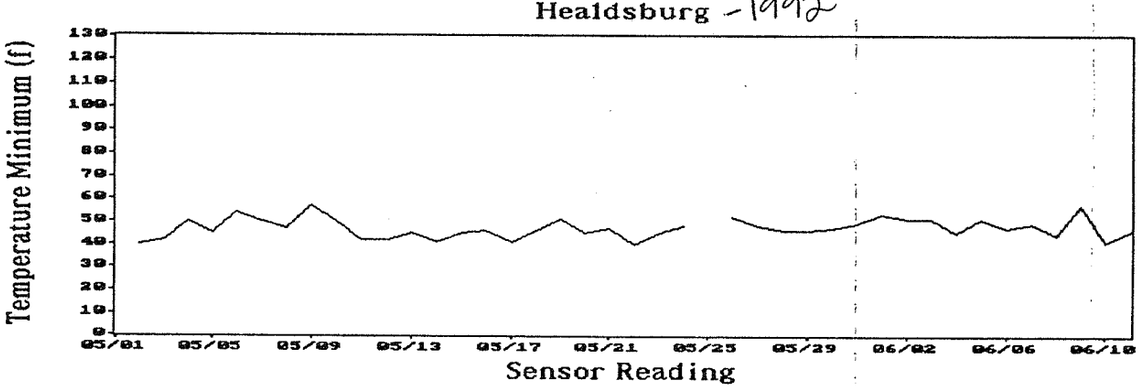
Lodi - 1992



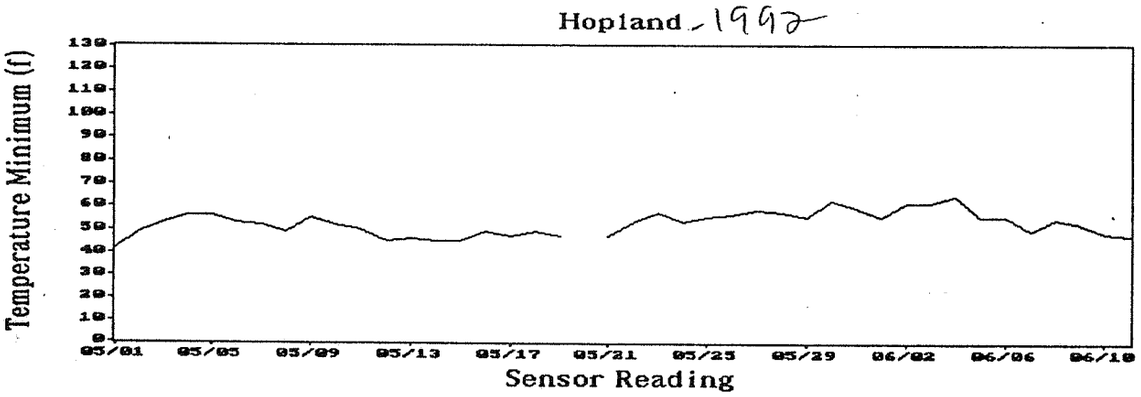
Davis - 1992



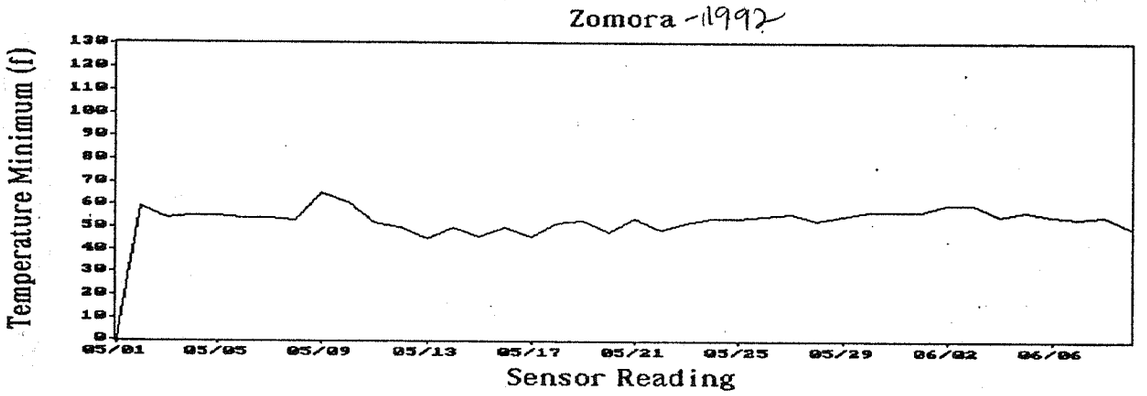
Healdsburg - 1992



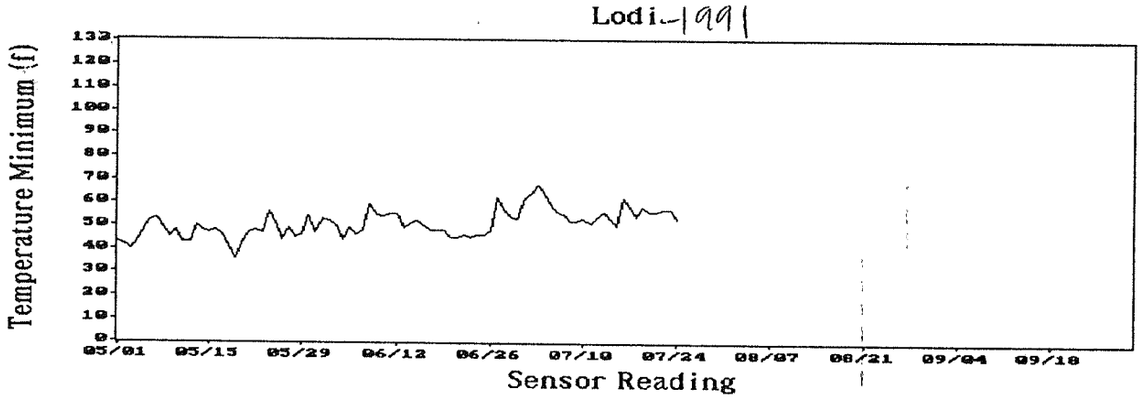
Hopland - 1992



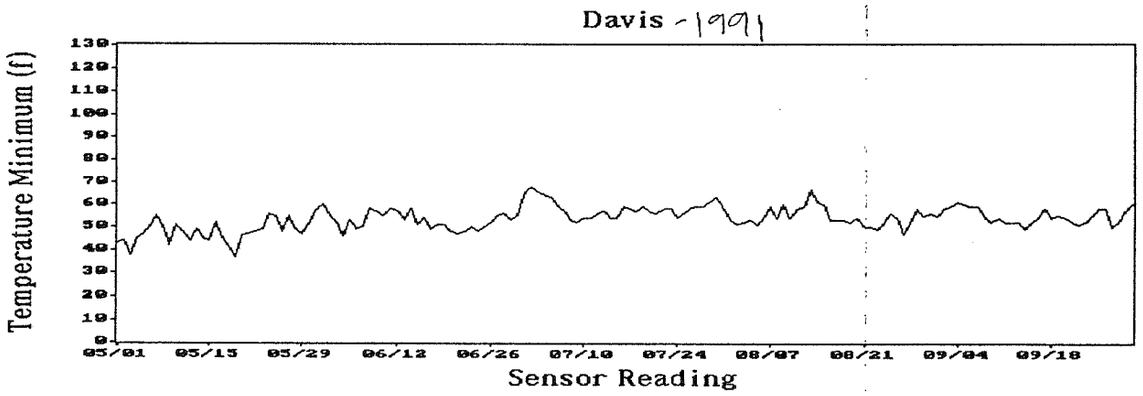
Zomora - 1992



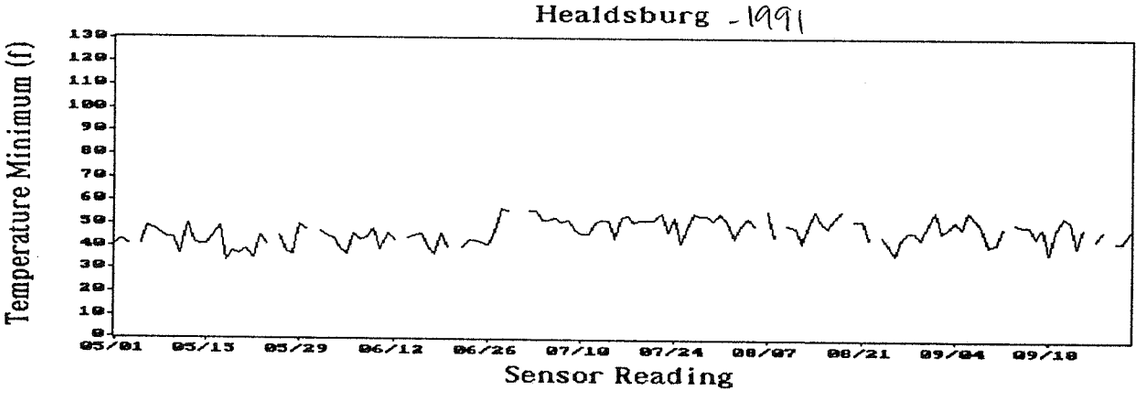
Lodi - 1991



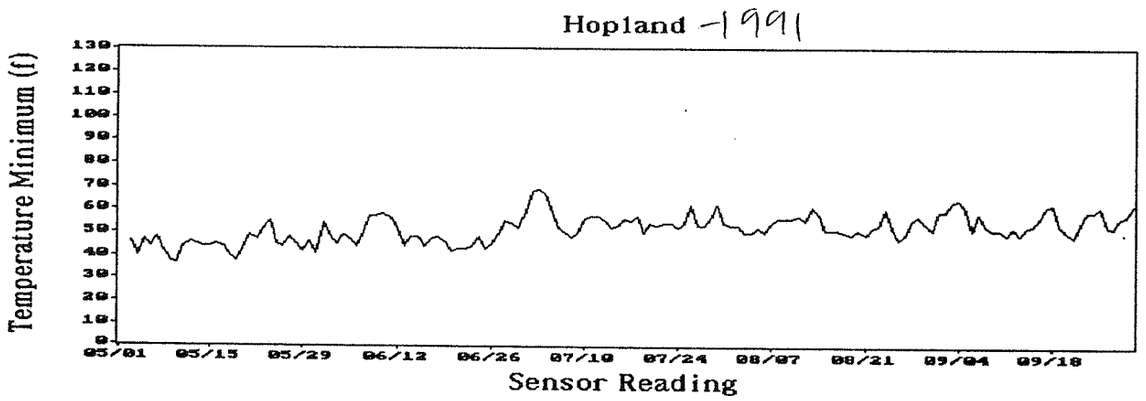
Davis - 1991



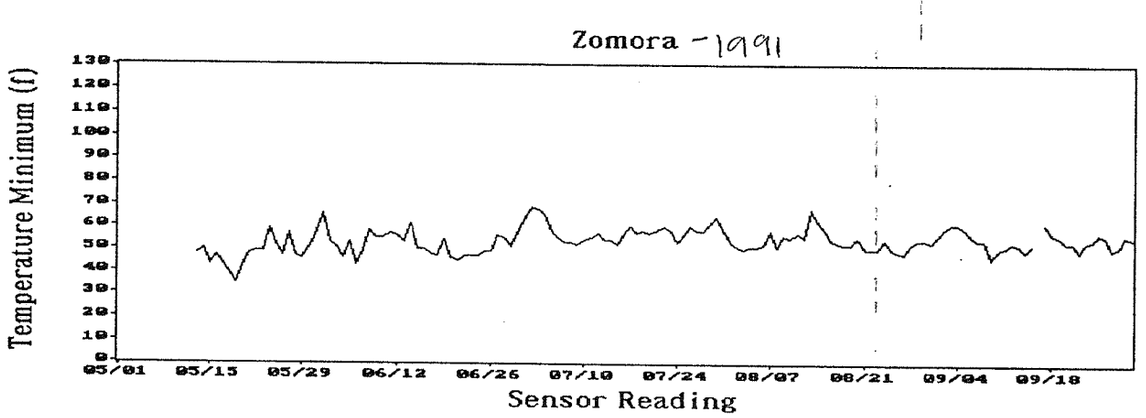
Healdsburg - 1991



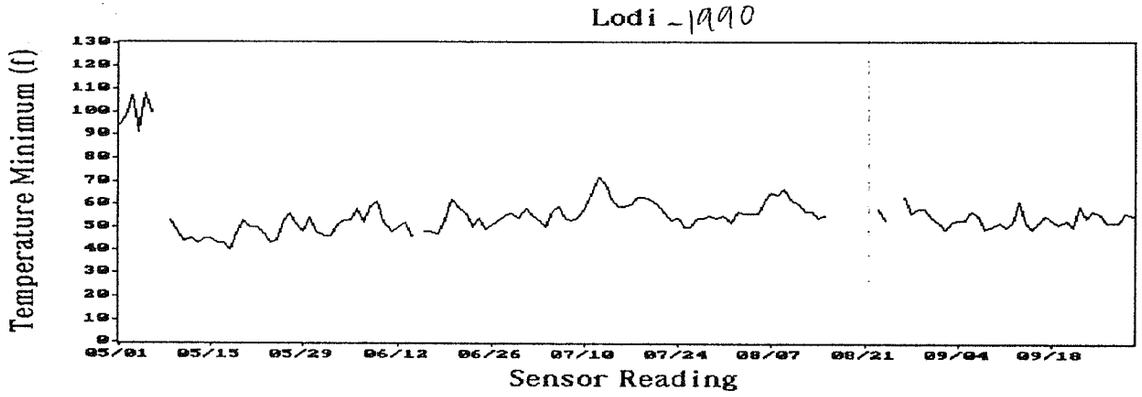
Hopland - 1991



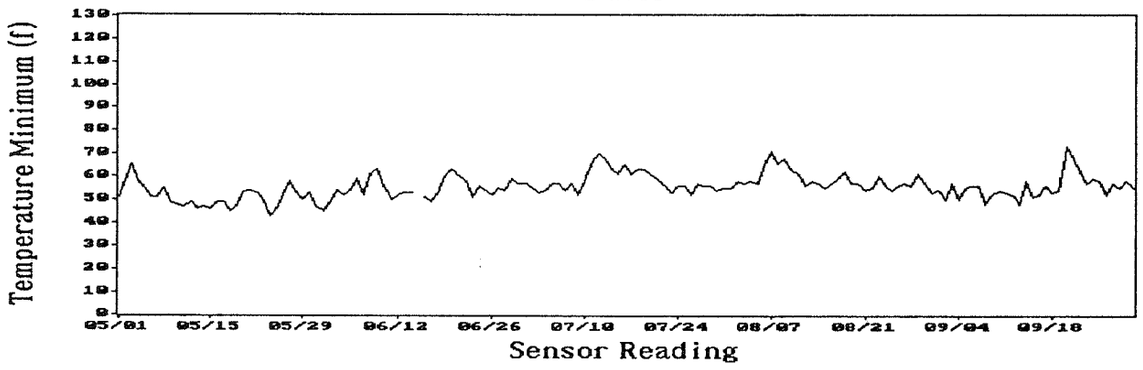
Zomora - 1991



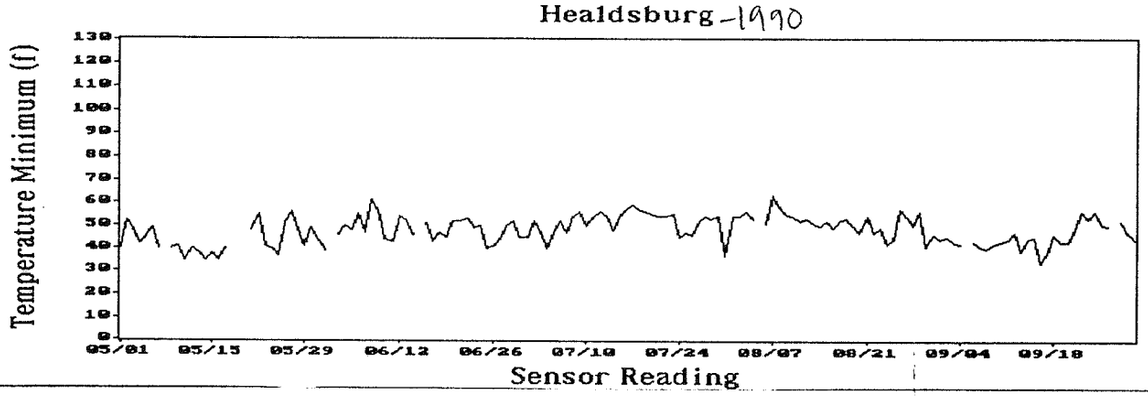
Lodi -1990



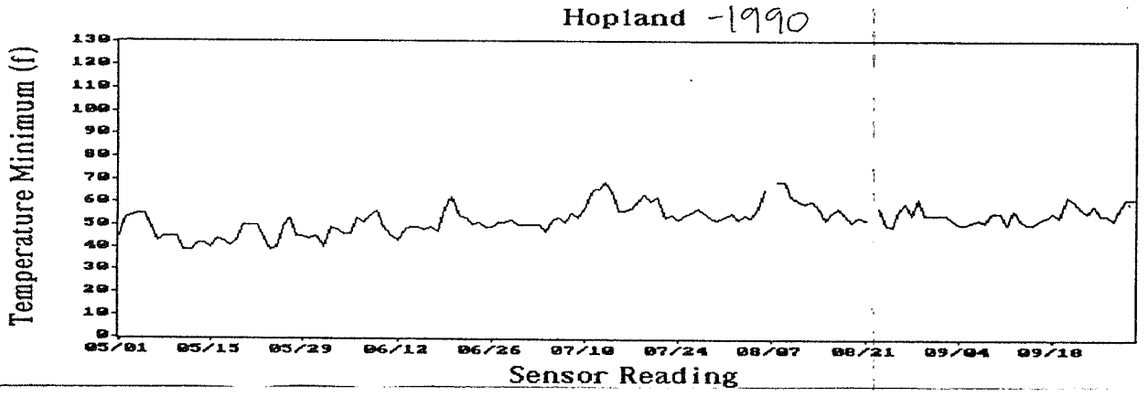
Davis -1990



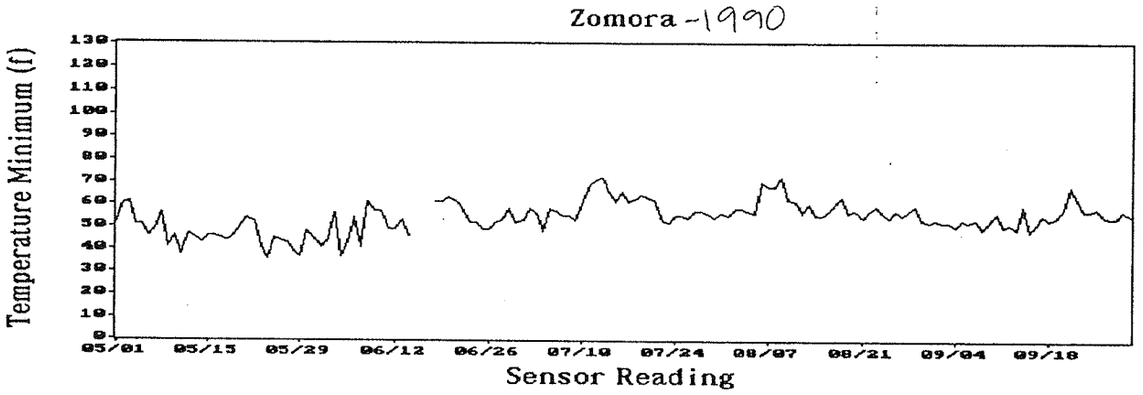
Healdsburg -1990



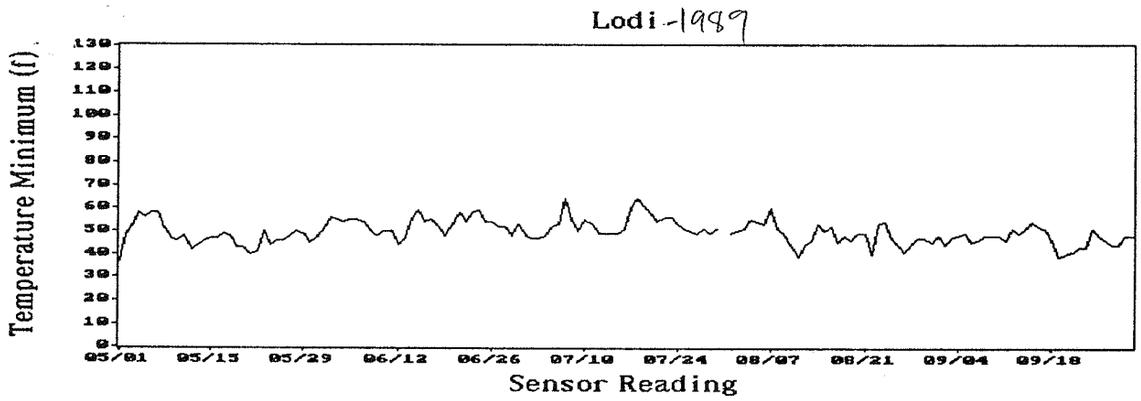
Hopland -1990



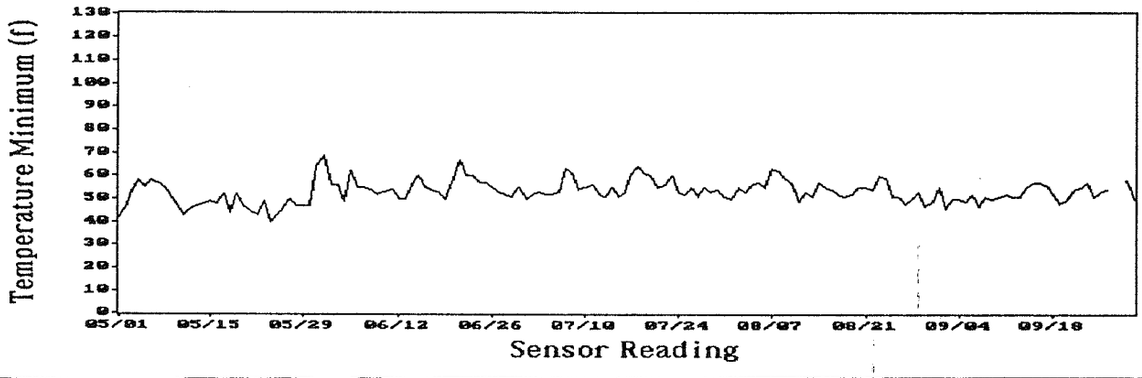
Zomora -1990



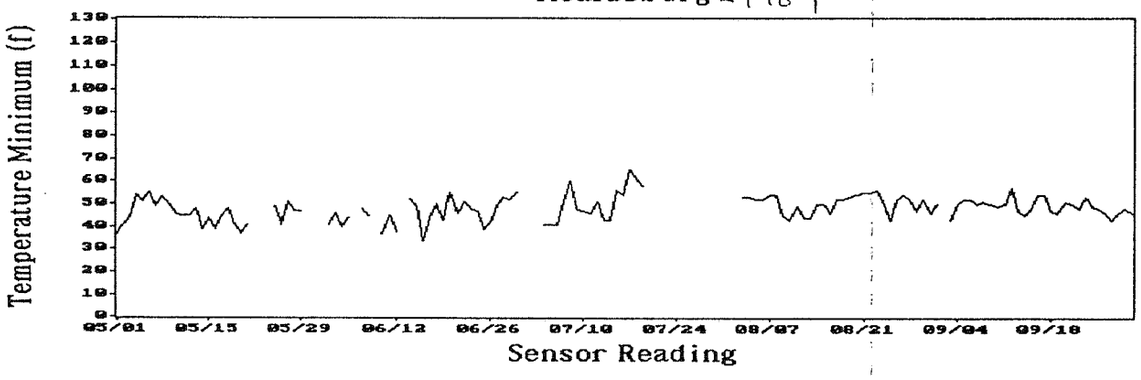
Lodi -1989



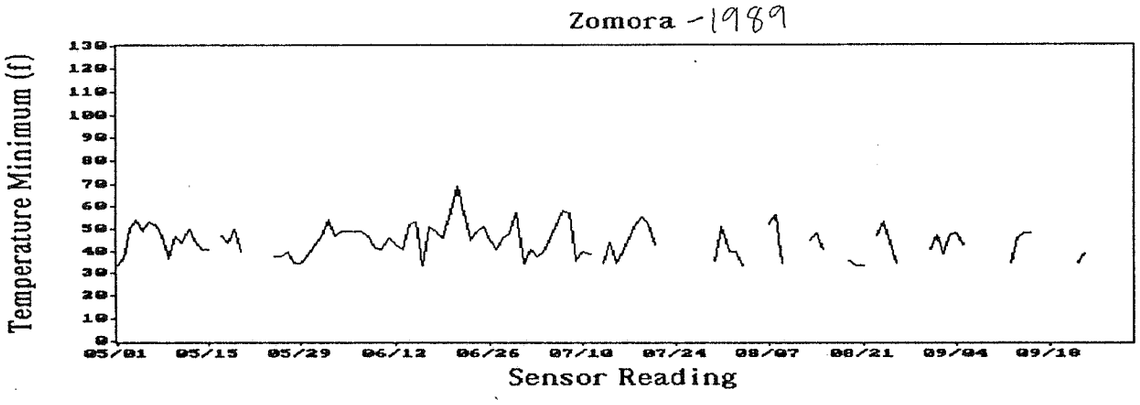
Davis -1989



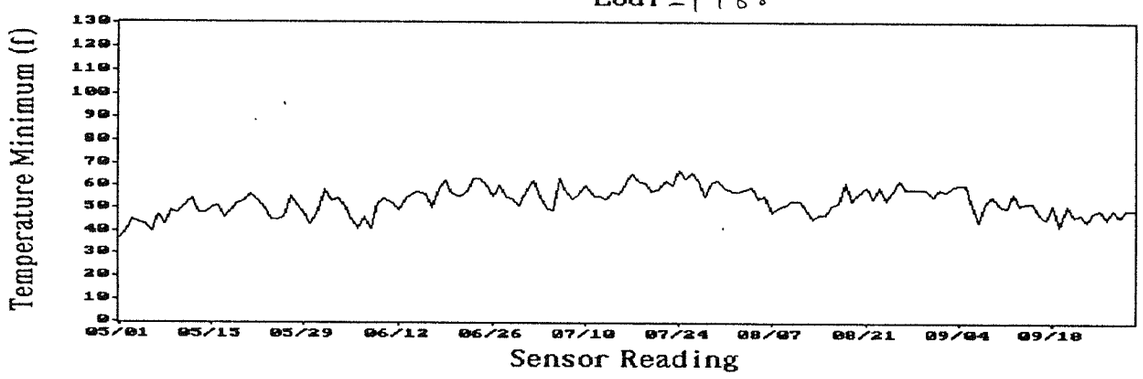
Healdsburg -1989



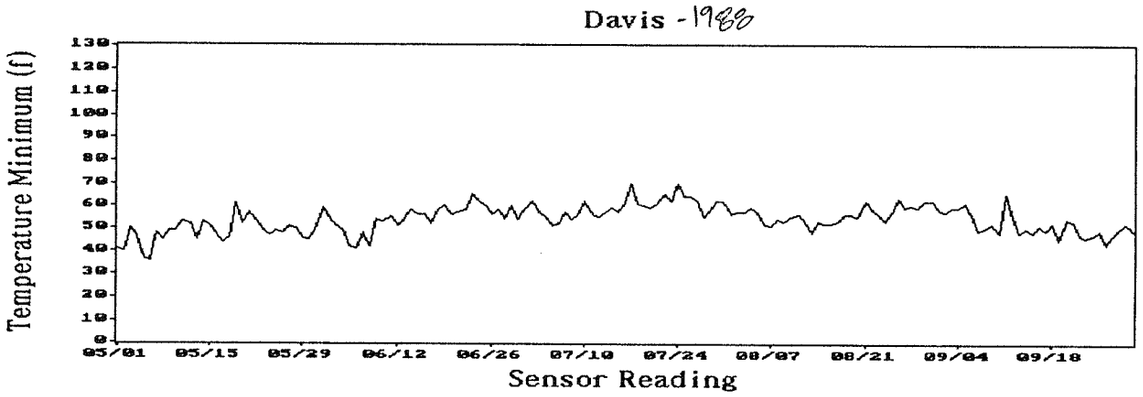
Zomora -1989



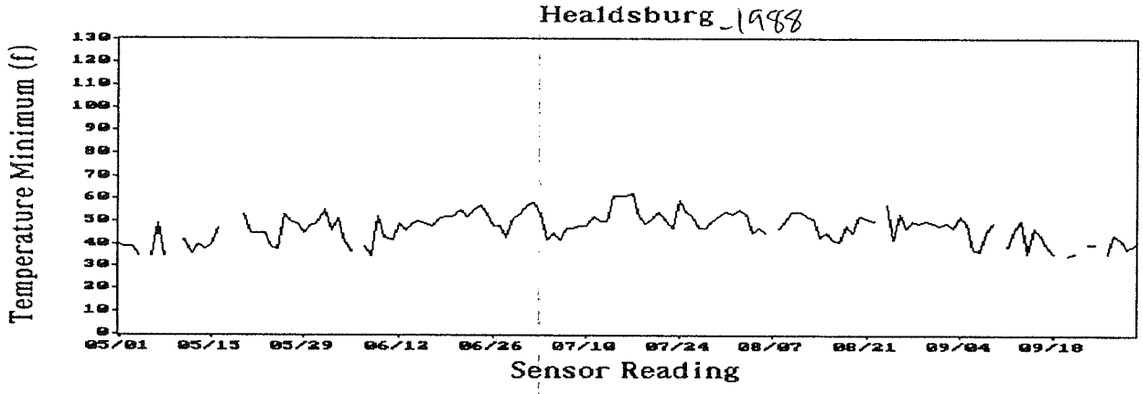
Lodi - 1988



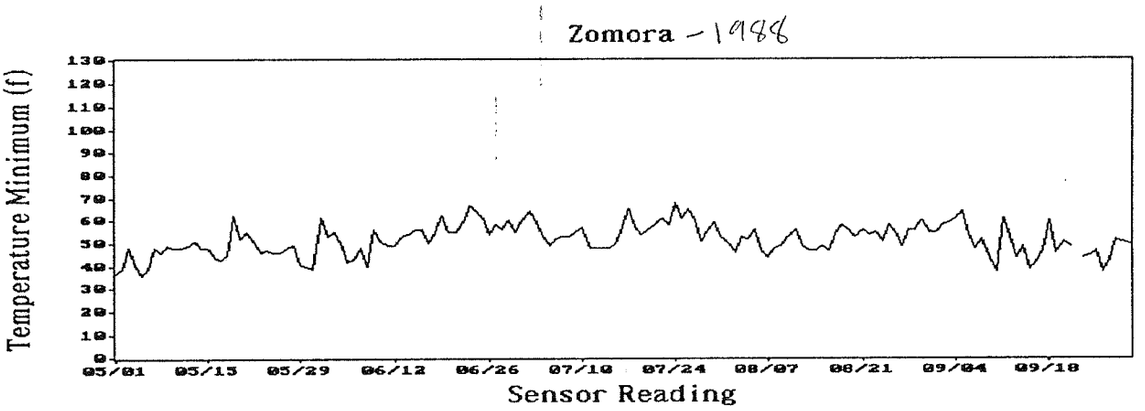
Davis - 1988



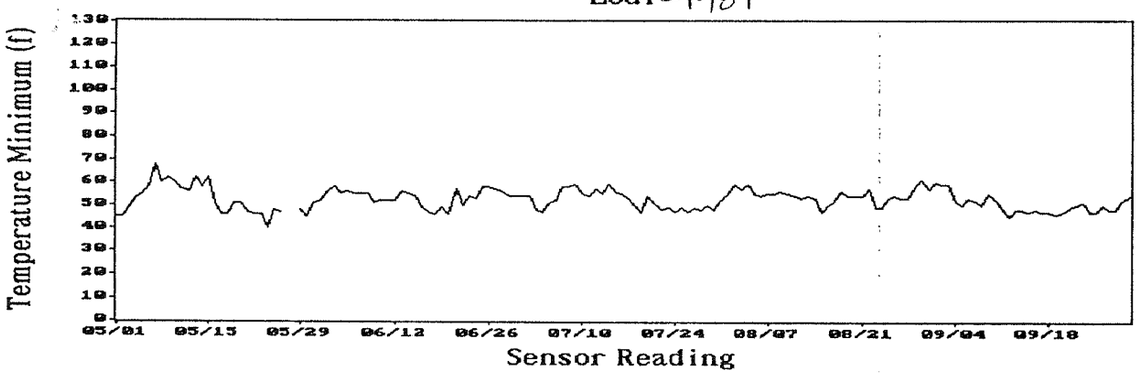
Healdsburg - 1988



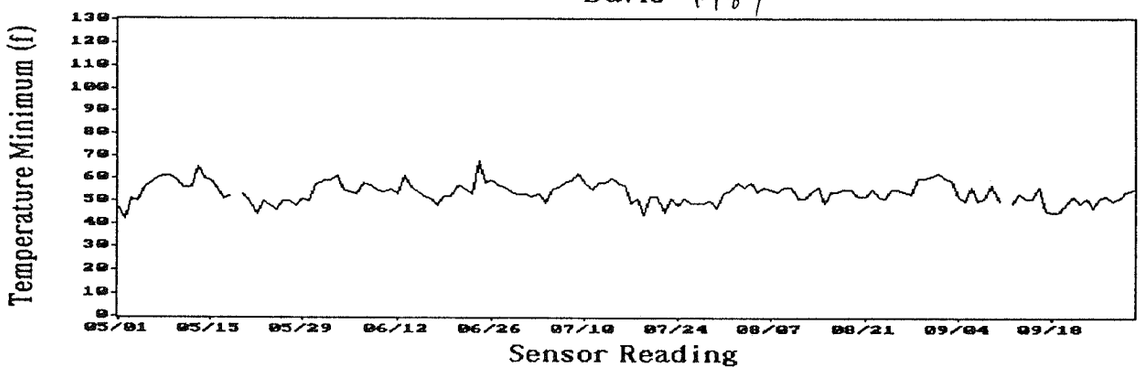
Zomora - 1988



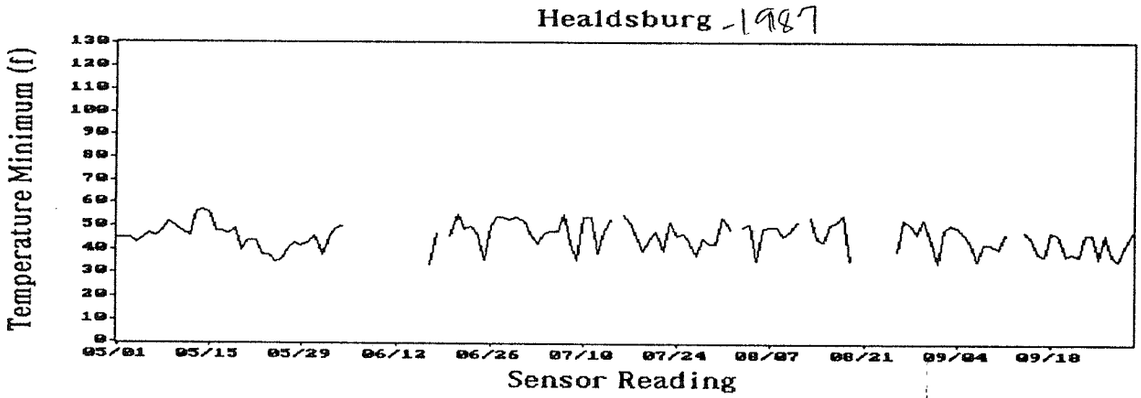
Lodi -1987



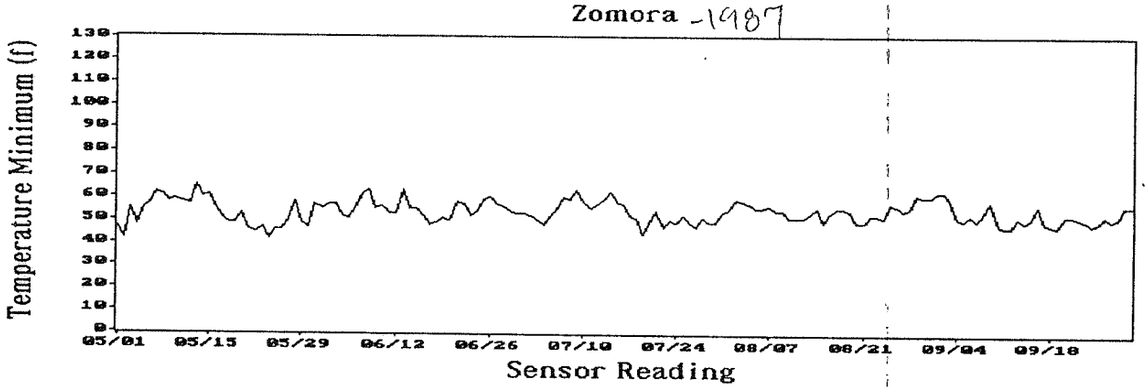
Davis -1987



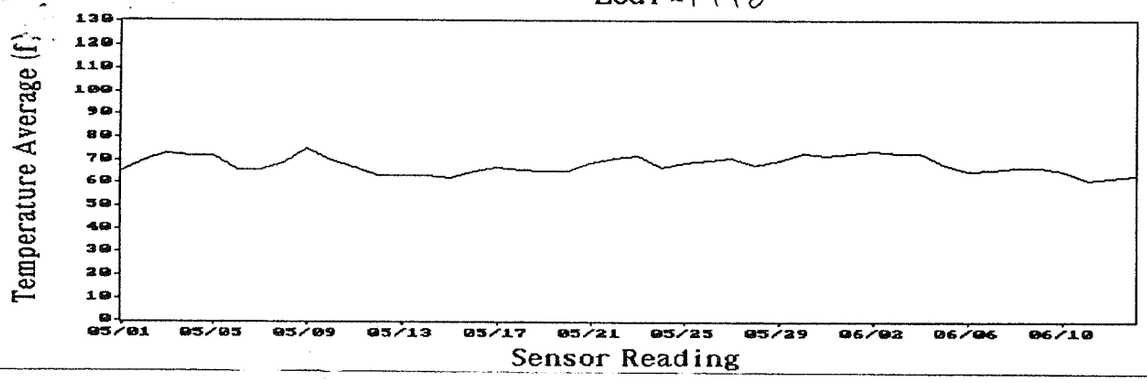
Healdsburg -1987



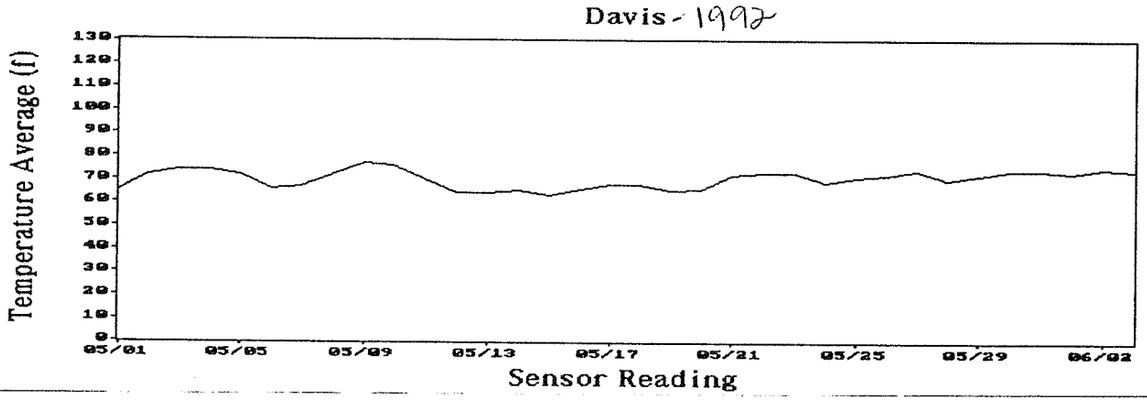
Zomora -1987



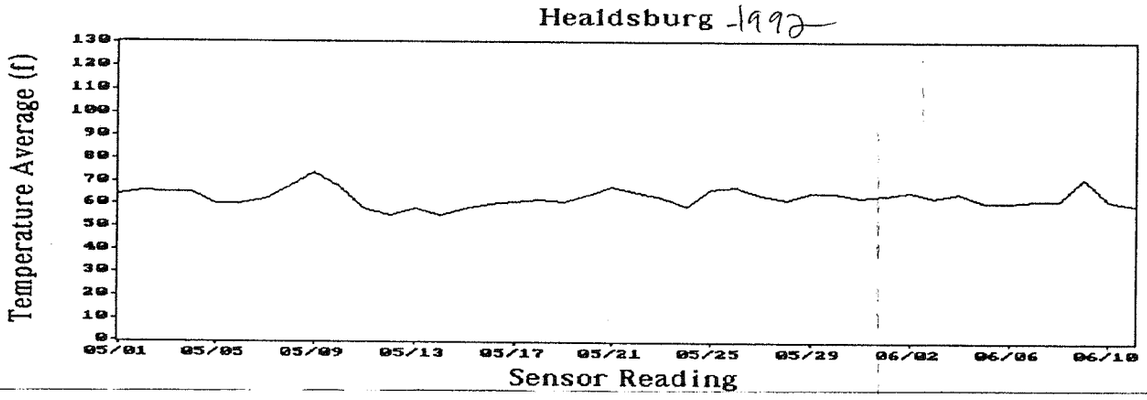
Lodi - 1992



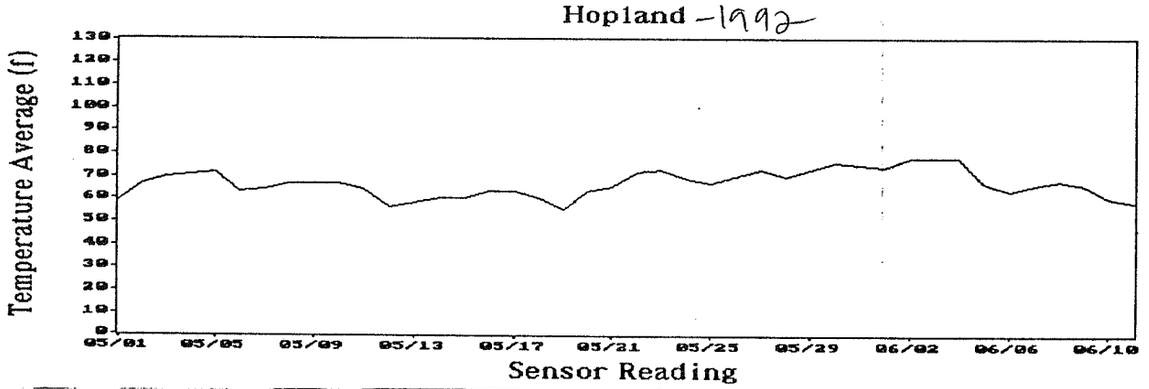
Davis - 1992



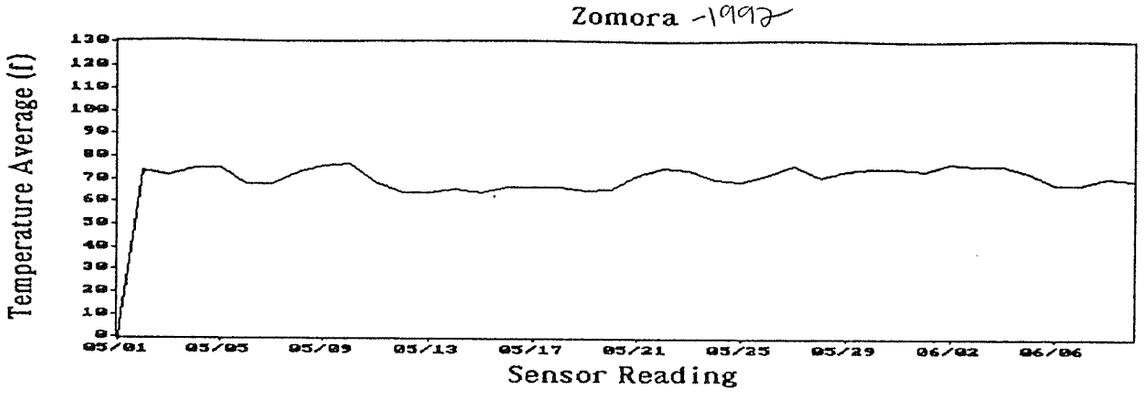
Healdsburg - 1992



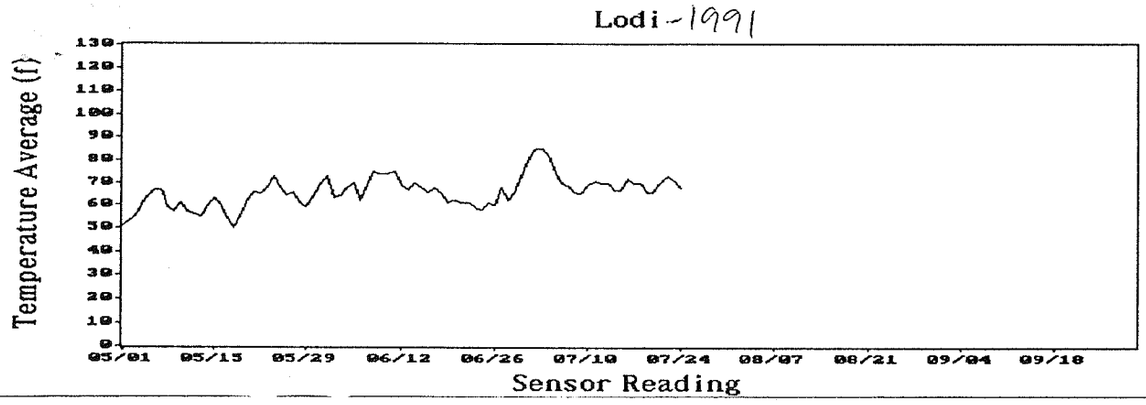
Hopland - 1992



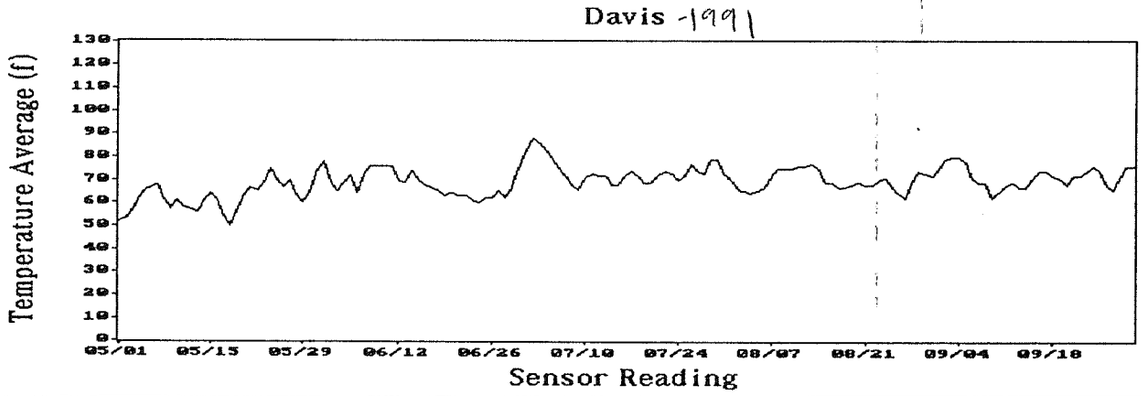
Zomora - 1992



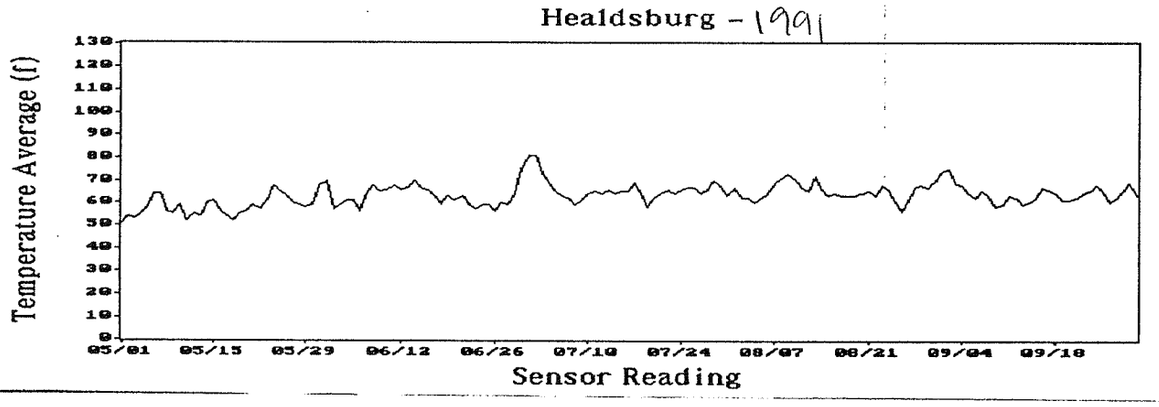
Lodi - 1991



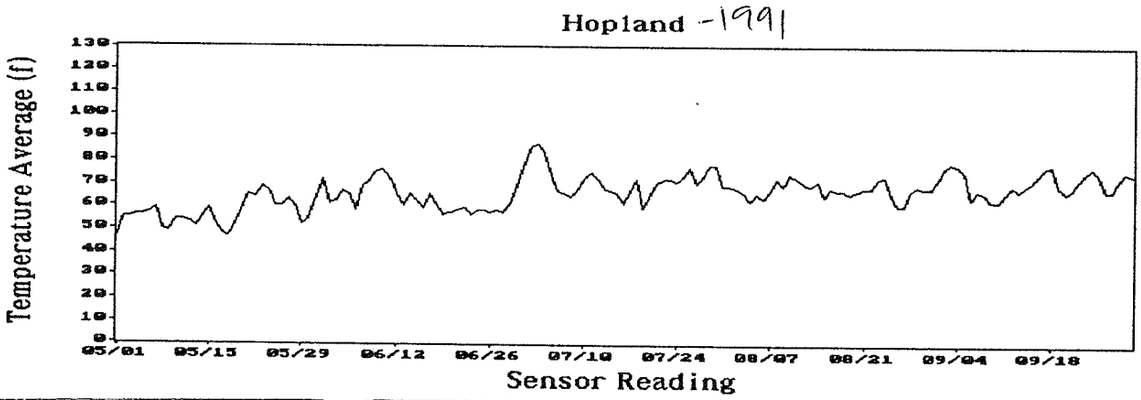
Davis - 1991



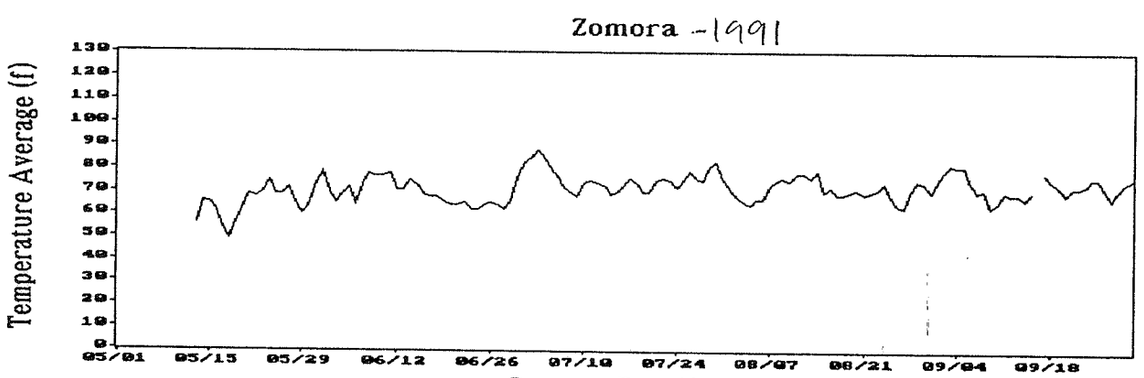
Healdsburg - 1991



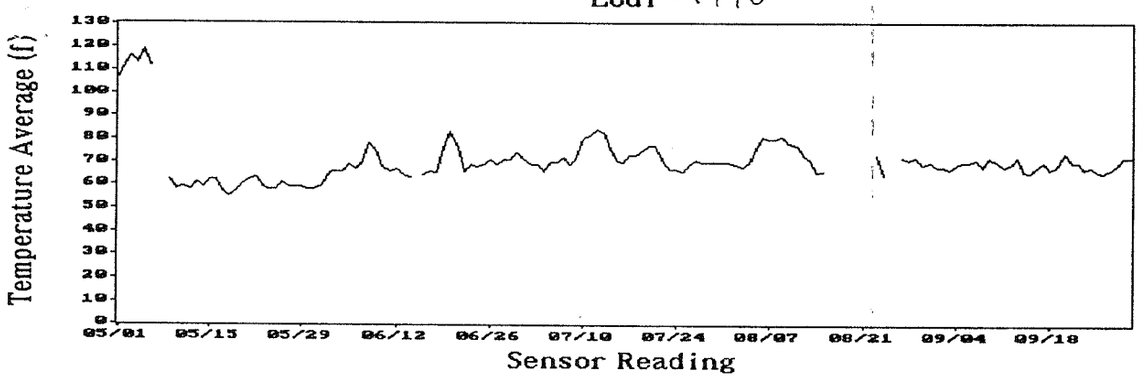
Hopland - 1991



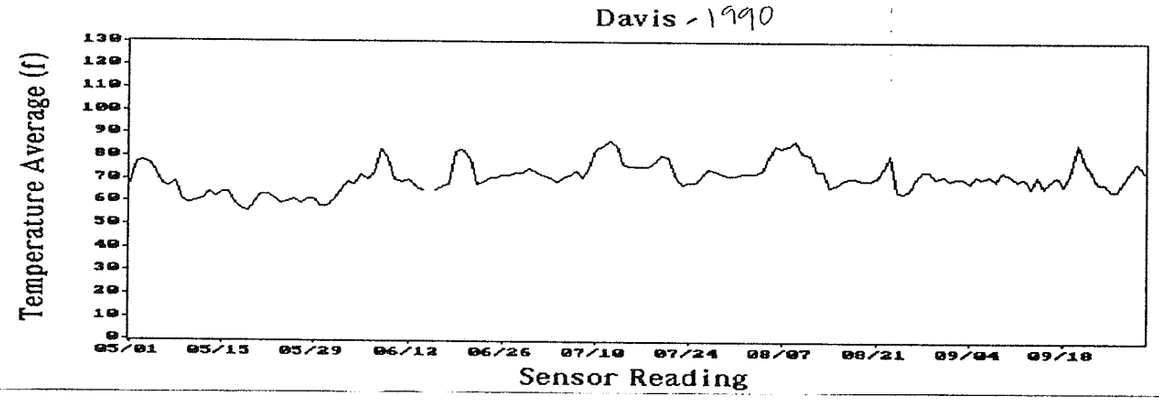
Zomora - 1991



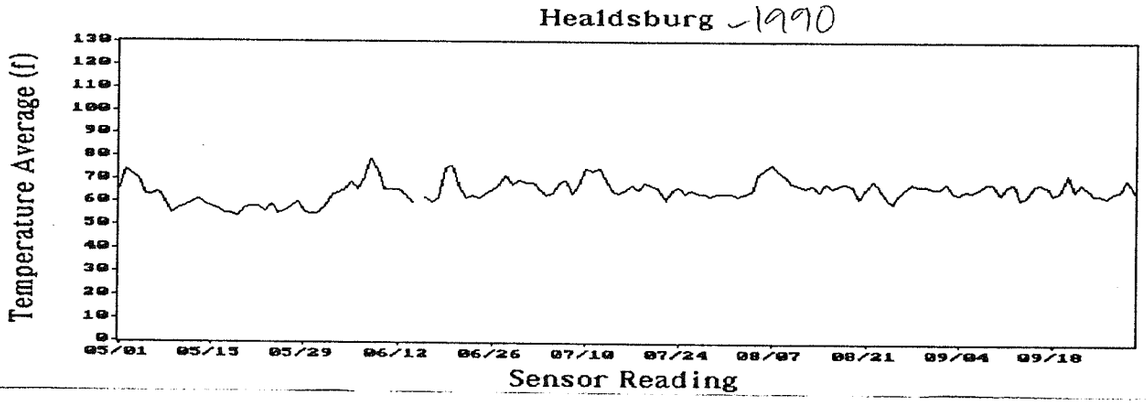
Lodi -1990



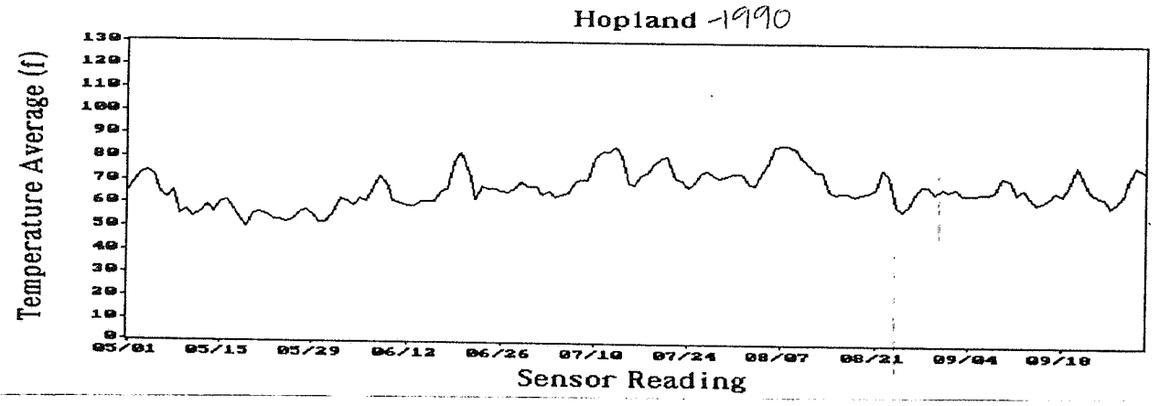
Davis - 1990



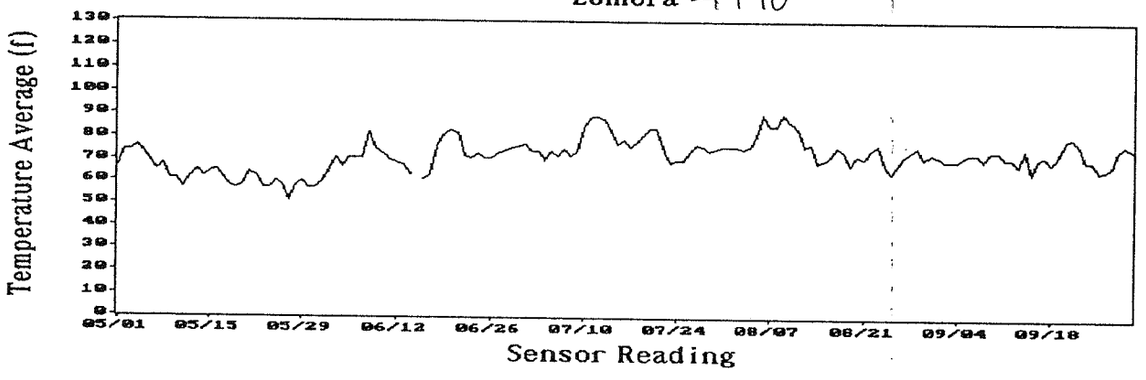
Healdsburg - 1990



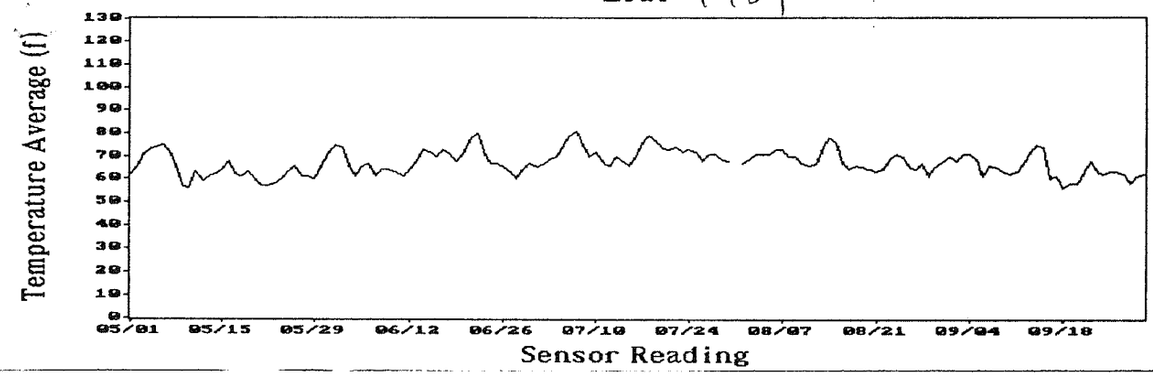
Hopland -1990



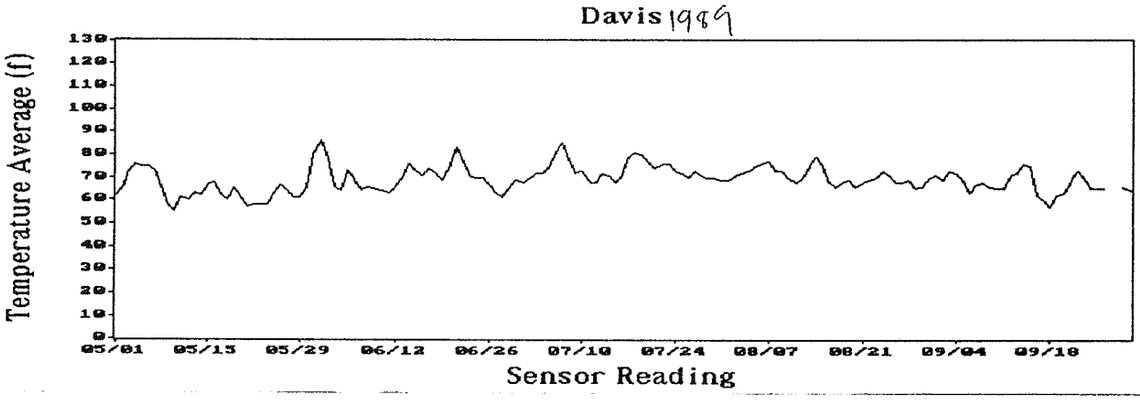
Zomora -1990



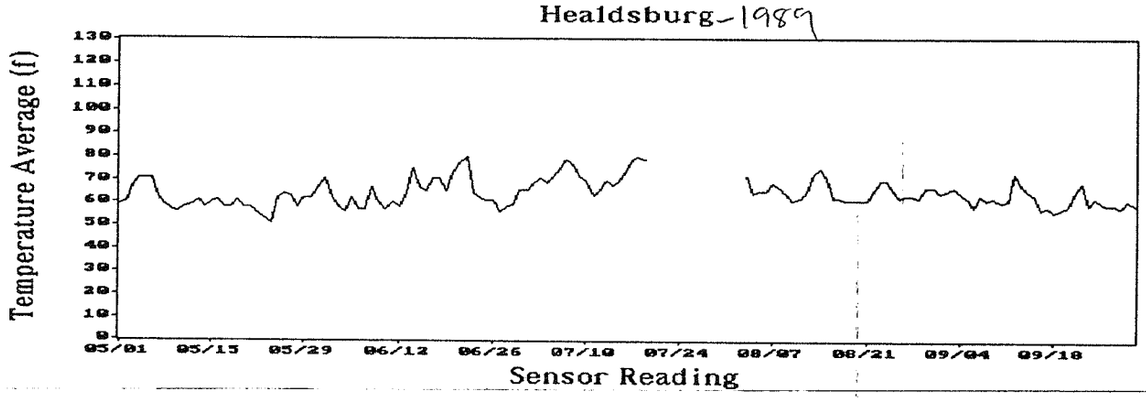
Lodi -1989



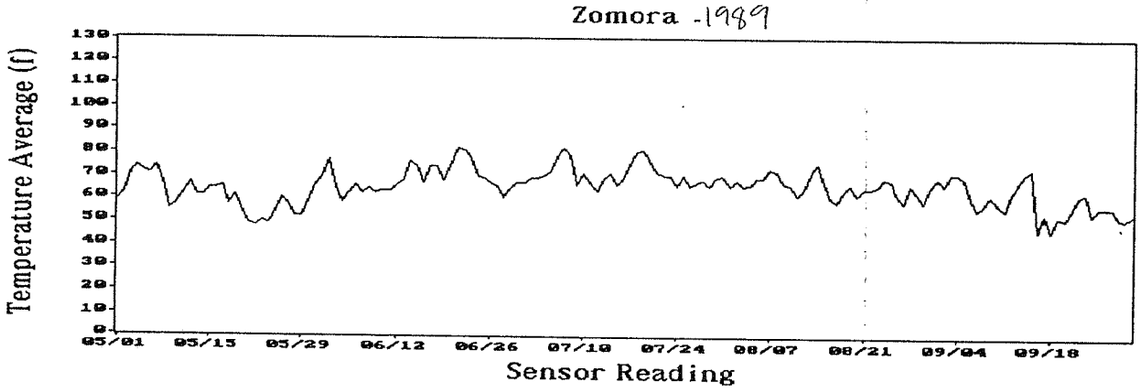
Davis 1989



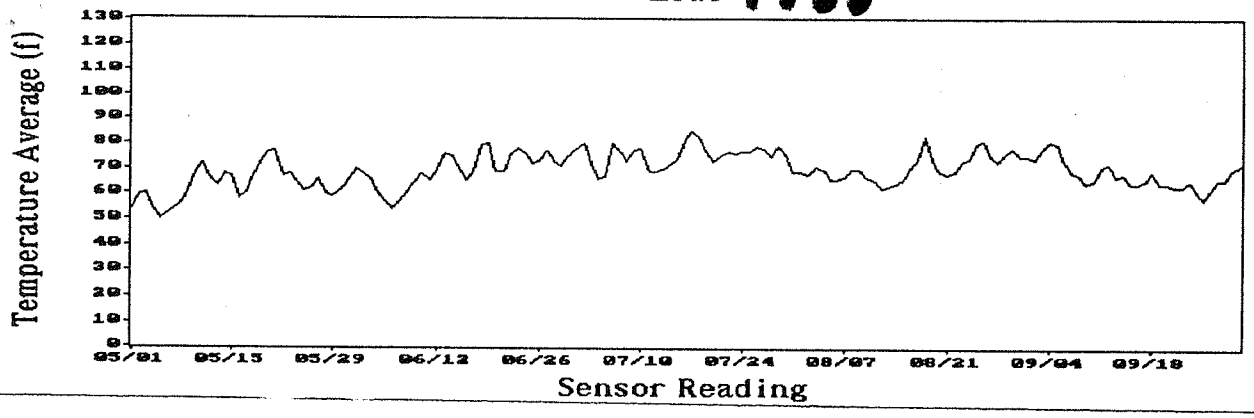
Healdsburg-1989



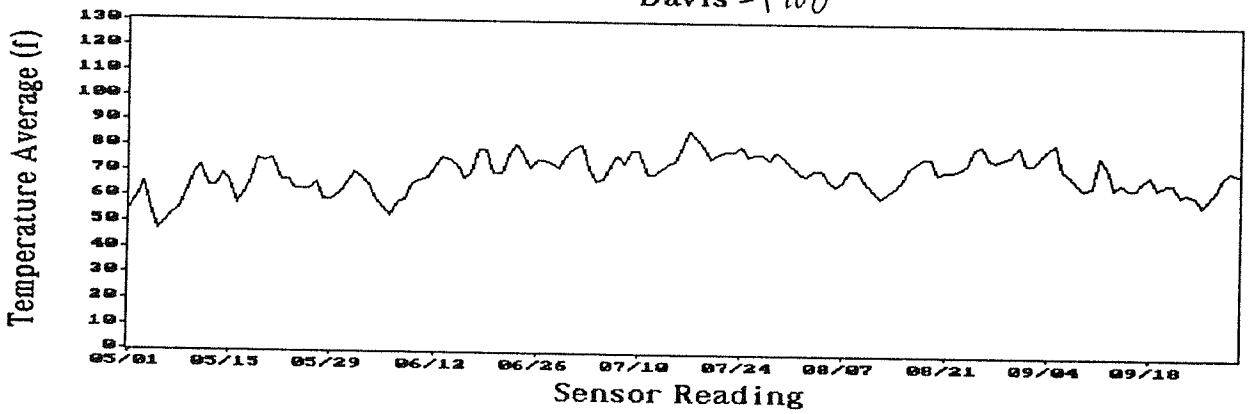
Zomora -1989



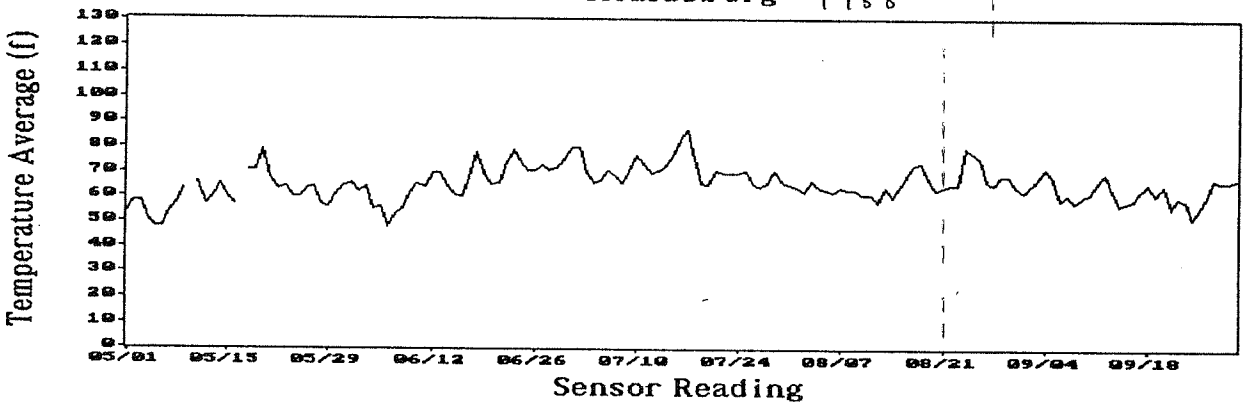
Lodi 1988



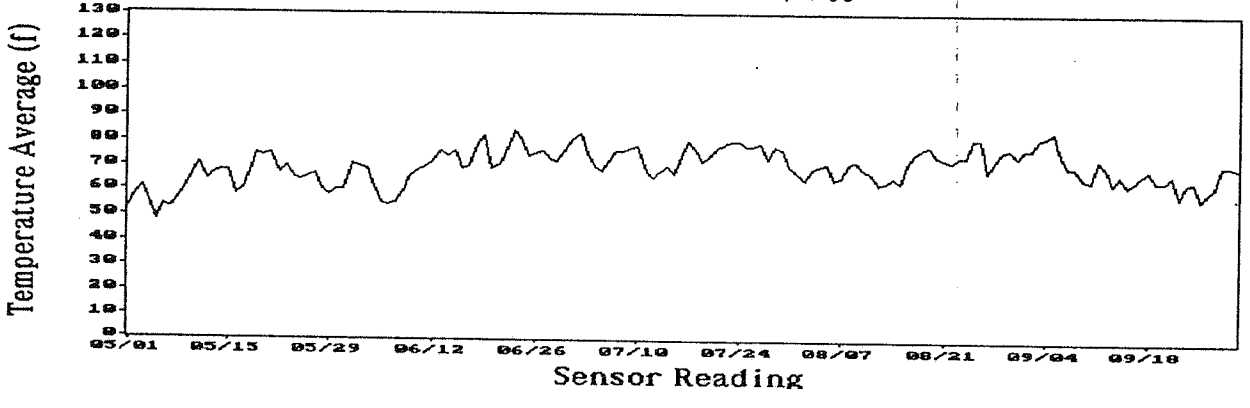
Davis - 1988



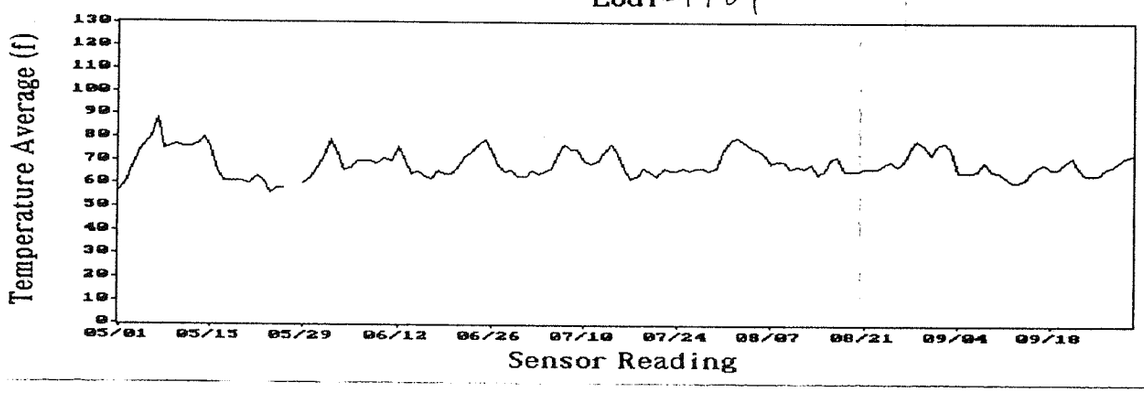
Healdsburg - 1988



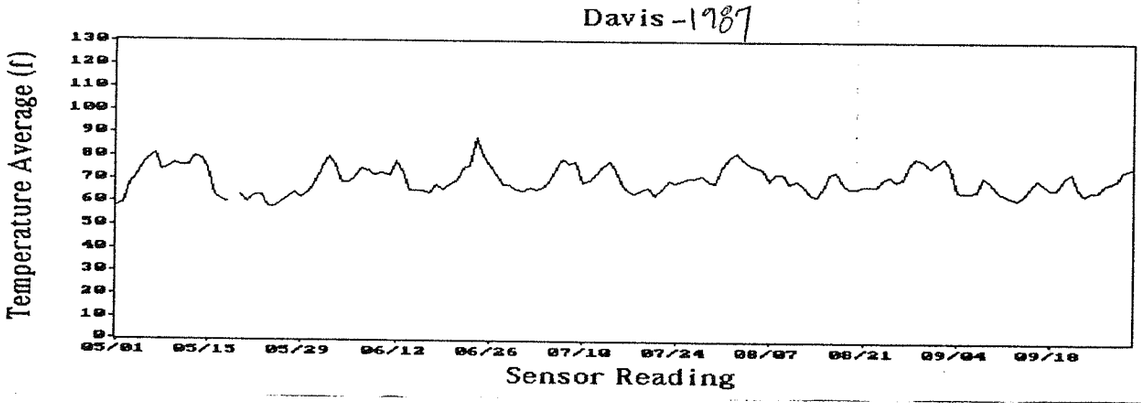
Zomora - 1988



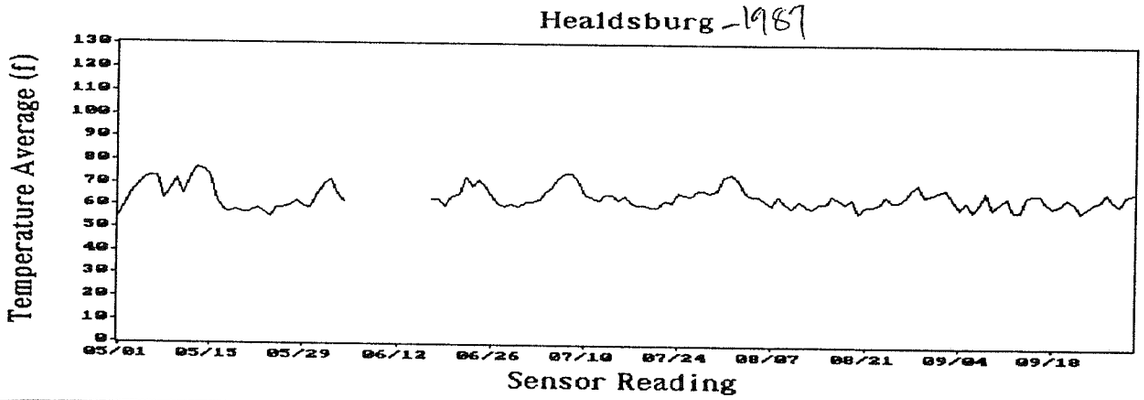
Lodi - 1987



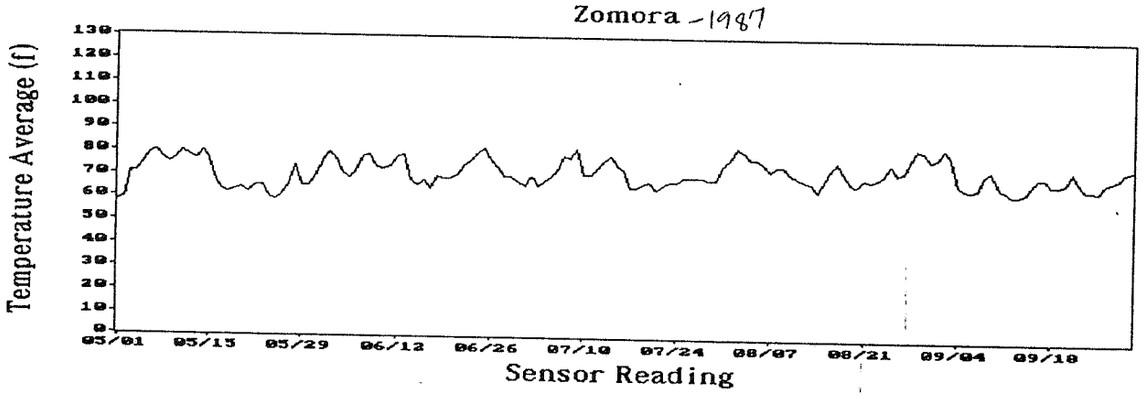
Davis - 1987

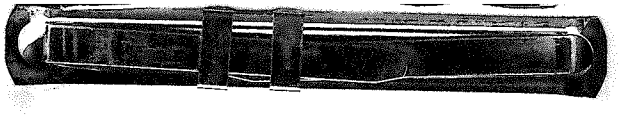


Healdsburg - 1987



Zomora - 1987





> O R A N G E S O F T W A R E
> J U D I
> T H E W E A T H E R R E Q U E S T O R

WEATHER DATA

42 Lodi

Starting Date : 10/16/83 End Date : 06/13/92

Date....	ETo (in)..	Prec (in)..	Solar Rad (Ly/dy)..	Vapor Avg (mBars).	Temperature..... Min (f)...	Max (f)...	Avg (f)...	Humidity..... Min (%)...	Max (%)...	Avg (%)...	Dew Point (f)...	Wind Avg (mph)..	Wind Run... (mi)...	Soil Temp (f)....
06/09/92	0.25	0.00	681	14.99	52	85	67	54	75	65	55	4.9	117	70
06/10/92	0.23	0.00	646	13.55	52	79	65	55	71	64	53	5.3	127	70
06/11/92	0.24	0.00	668	11.79	49	72	61	57	70	63	49	7.1	170	69
06/12/92	0.21	0.00	587	11.95	51	73	62	56	70	63	49	6.8	163	69
06/13/92	0.24	0.00	676	12.30	51	75	63	56	70	63	50	6.0	145	69

TTB Note: Due to the size of the documents, the raw climate data for Lodi, Hopland, Zomora, Davis, and Healdsburg was not scanned in its entirety. Contact TTB for more information.

SEVERE FLAGS..... INFORMATIVE FLAGS.....
C-not collected Y-out of range H-hourly flagged severe
L-limit exceeded Q-all QC not done F-estimated U-user
Ly/day*.484=W/sq.m in.*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa

> O R A N G E S O F T W A R E
> J U D I
> T H E W E A T H E R R E Q U E S T O R

WEATHER DATA

85 Hopland

Starting Date : 09/23/89 End Date : 06/11/92

Date....	ETo (in)..	Prec (in)..	Solar Rad (Ly/dy)..	Vapor Avg (mBars).	Temperature..... Min (f)...	Max (f)...	Avg (f)...	Humidity..... Min (%)...	Max (%)...	Avg (%)...	Dew Point (f)...	Wind Avg (mph)..	Wind Run... (mi)...	Soil Temp (f)....
05/26/92	0.25	0.05Y	692	15.27	56	89	70	44	80	60	56	4.0	96	74
05/27/92	0.24	0.00	656	16.50	58	92	73	38	85	59	58	3.3	80	75
05/28/92	0.26	0.12Y	708	14.79	57	87	70	42	84	58	55	4.5	108	76
05/29/92	0.25	0.00	700	16.07	55	92	73	40	84	59	57	3.7	89	77
05/30/92	0.27	0.00	716	17.13	62	94	76	34	80	55	59	3.6	86	78
05/31/92	0.26	0.00	705	18.04	59	93	75	43	84	61	61	3.7	88	79
06/01/92	0.26	0.00	706	17.38	55	97	74	38	93	60	60	3.4	81	80
06/02/92	0.27	0.00	699	18.87	61	97	78	43	80	58	62	3.5	83	81
06/03/92	0.28	0.00	739	17.02	61	98	78	31	77	53	59	3.3	78	81
06/04/92	0.27	0.00	717	18.73	64	97	78	43	67	57	62	3.4	82	82
06/05/92	0.23	0.00	670	16.14	55	83	67	55	94	71	57	4.6	110	82
06/06/92	0.19	0.00	598	14.74	55	80	63	53	95	75	55	5.2	124	80
06/07/92	0.25	0.00	733	12.52	49	86	66	37	99	57	51	3.5	85	80
06/08/92	0.26	0.00	716	13.64	54	90	68	41	77	57	53	3.5	85	80
06/09/92	0.26	0.00	740	12.82	52	83	66	40	88	59	51	4.6	110	80
06/10/92	0.22	0.00	674	12.14	48	79	60	44	97	68	50	5.1	121	79
06/11/92	0.19	0.00	578	10.36	47	70	58	45	83	63	45	5.9	142	78

SEVERE FLAGS..... INFORMATIVE FLAGS.....
C-not collected Y-out of range H-hourly flagged severe
L-limit exceeded Q-all QC not done F-estimated U-user
Ly/day*.484=W/sq.m in.*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa

> O R A N G E S O F T W A R E
> J U D I
> T H E W E A T H E R R E Q U E S T O R

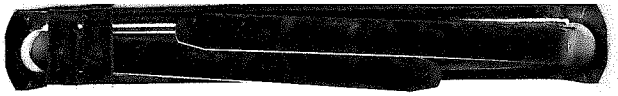
WEATHER DATA

27 Zomora

Starting Date : 05/01/92 End Date : 06/16/92

Date....	ETo (in)..	Prec (in)..	Solar Rad (Ly/dy)..	Vapor Avg (mBars).	Temperature..... Min (f)...	Max (f)...	Avg (f)...	Humidity..... Min (%)...	Max (%)...	Avg (%)...	Dew Point (f)...	Wind Avg (mph)..	Wind Run... (mi)...	Soil Temp (f)....
06/09/92	0.27	0.00	729	12.54	50	88	70	29	83	51	51	4.6	111	65
06/10/92	0.23	1.06H	590	10.69	49	83	64	27	83	52	46	4.8	116	65
06/11/92	0.27	0.00	727	9.30	48	76	62	34	78	48	43	7.6	181	64
06/12/92	0.20	0.00	567	8.46	48	74	62	31	58	45	40	5.0	121	63
06/13/92	0.23	0.00	667	9.30	52	75	62	34	63	50	43	5.0	120	62
06/14/92	0.25	0.00	708	9.48	47	78	64	29	79	46	43	4.4	105	62
06/15/92	0.14	0.00	437	11.15	54	72	61	42	75	61	47	4.1	99	62
06/16/92	0.24	0.00	716	11.82	50	81	67	33	80	53	49	2.9	70	61

SEVERE FLAGS..... INFORMATIVE FLAGS.....
C-not collected Y-out of range H-hourly flagged severe
L-limit exceeded Q-all QC not done F-estimated U-user
Ly/day*.484=W/sq.m in.*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa



> O R A N G E S O F T W A R E
> J U D I
> T H E W E A T H E R R E Q U E S T O R

WEATHER DATA

6 Davis

Starting Date : 07/17/82 End Date : 06/03/92

Date....	ETo (in)..	Prec (in)..	Solar Rad (Ly/dy)..	Vapor Avg (mBars).	Temperature..... Min (f)...	Max (f)...	Avg (f)...	Humidity..... Min (%)...	Max (%)...	Avg (%)...	Dew Point (f)...	Wind Avg (mph)..	Wind Run... (mi)...	Soil Temp (f)....
05/30/92	0.26	0.00	650	16.70	59	95	74	39	83	58	58	4.7	114	80
05/31/92	0.27	0.00	653	16.16	57	95	74	31	83	56	58	5.7	138	79
06/01/92	0.26	0.00	649	16.60	57	93	73	40	81	59	58	5.0	121	78
06/02/92	0.25	0.00	644	17.47	58	98	75	36	84	60	60	4.3	104	78
06/03/92	0.26	0.00	657	17.35	59	95	74	39	81	60	59	5.1	123	79

SEVERE FLAGS..... INFORMATIVE FLAGS.....
C-not collected Y-out of range H-hourly flagged severe
L-limit exceeded Q-all QC not done F-estimated U-user
Ly/day*.484=W/sq.m in.*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa

> O R A N G E S O F T W A R E
> J U D I
> T H E W E A T H E R R E Q U E S T O R

WEATHER DATA

51 Healdsburg

Starting Date : 08/24/86 End Date : 06/11/92

Date....	ETo (in)..	Prec (in)..	Solar Rad (Ly/dy)..	Vapor Avg (mBars).	Temperature..... Min (f)...	Max (f)...	Avg (f)...	Humidity..... Min (%)...	Max (%)...	Avg (%)...	Dew Point (f)...	Wind Avg (mph)..	Wind Run... (mi)...	Soil Temp (f)....
05/30/92	0.25	0.00	705	13.41	47	87	65	47	81	64	52	4.7	113	61
05/31/92	0.22	0.00	622	13.15	49	86	63	46	82	67	52	4.8	116	61
06/01/92	0.22	0.00	618	13.62	53	85	64	49	80	66	53	4.3	104	61
06/02/92	0.25	0.00	690	13.92	51	88	66	47	80	65	53	5.1	122	61
06/03/92	0.23	0.00	646	13.16	51	84	63	49	80	66	52	4.7	113	62
06/04/92	0.25	0.00	701	13.31	45	88	65	46	82	64	52	4.5	109	61
06/05/92	0.19	0.00	548	12.21	51	77	61	54	79	68	50	4.9	117	61
06/06/92	0.17	0.00	503	11.93	47	76	61	52	78	66	49	4.4	106	61
06/07/92	0.22	0.00	652	12.12	49	80	62	49	76	63	50	4.2	100	61
06/08/92	0.24	0.00	699	12.20	44	83	62	48	81	64	50	4.1	99	61
06/09/92	0.25	0.00Y	271	10.16	57	89	72	28	82	38	45	6.4	154	63
06/10/92	0.23	0.00	640	9.21	41	81	62	36	69	49	42	4.3	103	62
06/11/92	0.26	0.00	659	8.25	46	73	60	37	61	47	40	7.5	180	62

SEVERE FLAGS..... INFORMATIVE FLAGS.....
C-not collected Y-out of range H-hourly flagged severe
L-limit exceeded Q-all QC not done F-estimated U-user
Ly/day*.484=W/sq.m in.*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa