PETITION FOR THE SALADO CREEK AMERICAN VITICULTURAL AREA
Revised 19Nov02

Submitted by: Stan Grant
Vineyard Consultant
Progressive Viticulture
P. O. Box 2134
Turlock, California 95381
(209) 669-7656 (Office and Fax)
(209) 614-2565 (Mobile)
provit@earthlink.net

On behalf of: Fred Vogel
Sunflower Ranch Company
P. O. Box 666
17837 Ward Avenue
Patterson, California 95363-0666
(209) 892-8020 (Office)
(209) 892-6016 (Fax)

Location: Western Stanislaus County, California

Boundaries:

The appropriate maps depicting the boundaries of the Salado Creek viticultural area are two United States Geological Survey (U.S.G.S.) topographic maps (7.5 minute series, quadrangles). They are titled:

1. "Patterson, California", 1953 (photorevised 1971).
2. "Crows Landing, California", 1952 (photorevised 1980)

The boundaries are as follows

1. Beginning at the intersection of Fink Road and Interstate 5, the boundary follows Interstate 5 northward to where it intersects a light-duty road 1000 ft north of the border between township 5 south and township 6 south ("Patterson" Quadrangle)(figure 1).
2. The boundary continues north along the light-duty road to where it intersects another light-duty road on the north edge of the Delta-Mendota Canal ("Patterson" Quadrangle).
3. The boundary follows the light-duty road (adjacent to the canal) southeast for about 1250 feet to where it intersects an unimproved dirt road ("Patterson" Quadrangle).
4. The boundary then follows the unimproved dirt road first to the north and then to the east until it intersects Baldwin Road ("Patterson" Quadrangle).
5. The boundary follows Baldwin Road eastward to where it intersects Ward Avenue ("Patterson" Quadrangle).
6. The boundary then follows Ward Avenue a very short distance north to the where it intersects a small canal labeled "2D LIFT" ("Patterson" Quadrangle).

7. The boundary continues to the southeast along the "2D LIFT" to where it intersects Elfers Road ("Patterson" Quadrangle).
8. The boundary follows Elfers Road east to where it intersects an unimproved dirt road that is a northern extension of Davis Road ("Patterson" Quadrangle and "Crows Landing" Quadrangle).
9. The boundary continues south along the unimproved dirt road to where it intersects Marshall Road ("Crows Landing" Quadrangle).
10. The boundary then continues west along Marshall Road to where it intersects Ward Avenue ("Patterson" Quadrangle and "Crows Landing" Quadrangle).
11. The boundary then extends south along Ward Avenue to where it intersects the California Aqueduct ("Patterson" Quadrangle).
12. The boundary continues southward along the California Aqueduct to where it intersects Fink Road ("Patterson" Quadrangle).
13. The boundary extends along Fink Road westward from the California Aqueduct to Interstate 5 ("Patterson" Quadrangle).

Size: approximately 2940 acres or 4.6 square miles

Name Evidence:

Salado Creek and Little Salado Creek are the prominent hydrologic features in the area south of the city of Patterson, California that encompasses that proposed American Viticultural Area (U. S. G. S.). The Gabriel Moraga named Salado Creek during explorations of the area between 1806 and 1811 (Delphia).

The original Salado Creek course was altered after Patterson's founder, T. W. Patterson, and his engineers moved a section that flowed through town further to west (Delphia). This section lies downstream and to the north of the proposed AVA. The engineers who laid out the town of Patterson were apparently unaware of Salado Creek's flooding potential because they created a very small artificial channel for it. Their misjudgment is easy to understand because Salado Creek carries little water during many winters and is dry during a portion of most summers.

However, local inhabitants best know Salado Creek for flooding. The first written record of Salado Creek flooding appears in the March 4, 1938 edition of the Patterson Irrigator, the local newspaper (Delphia). The wording of the article suggested that this was not the first occurrence of the creek going over its banks and inundating State Highway 33 on the east side of Patterson. In the November of the same year the creek flooded after brush at the Ward Avenue Bridge choked the stream and backed up flow in the creek, damaging to a nursery, including greenhouses, and inconveniencing the neighborhood.

Floods became more frequent and severe after Salado Creek was further altered by farmers and construction of the Delta-Mendota Canal during the late 1950's (Delphia). Minor flooding occurred in 1951, but the most significant floods occurred during 1958. During peak flooding Salado Creek waters inundated nearly the entire town of Patterson with fourteen to twenty-four inches of water.

During this time most of the floodwaters stayed uphill of the Delta-Mendota Canal in the area of the proposed AVA.

Flooding occurred again in 1969 and impacted the proposed AVA (Delphia). A similar flood occurred in 1976. Other flood years include 1973, 1978, 1980, and 1995 (Anonymous, Delphia, Lane).

Concerns about flooding from Salado Creek posed an obstacle to the Creekside development of 2400 homes and a shopping center on 650 acres on the west side of Patterson and along Salado Creek (Swift). Patterson City Council and concerned citizens agreed that the flooding problem must be solved before further development of the city proceeded.

In 1997 Patterson was ready to implement a plan to control Salado Creek floodwaters. It involved moving voluminous, though infrequent, amounts of water through an enlarged channel and a new pipeline (Lane). Channel widening and deepening were to occur along two miles stream course within the city of Patterson, while the ninety-six inch diameter, three-mile long pipeline was to extend from Highway 33 on the east side of Patterson to the San Joaquin River. The pipe width, which is large enough for a car to drive through, was too large to be transported and had be built in place. It was designed as a supplement to existing thirty-six inch pipes. The combined new projects increased the flow capacity of Salado Creek from 100 to 500 cubic feet per second, the equivalent of an average twenty-year flood event. The combined cost is projected to be about five million dollars. City Manager George Lambert claimed the projects would end flooding problems with Salado Creek. The Salado Creek flood control project was christened late in October of 1998 (Houk).

In November of 1998, George Lambert, Patterson City Manager, was is very interested in controlling 100-year flooding caused by Salado Creek, supported construction of a proposed dam being considered by the U. S. Army Corps of Engineers and Stanislaus County (Scott, 1998). Other options, including further modification of the Salado Creek channel, were also considered (Scott, 1999). Flood control of Salado Creek has remained a part of the Stanislaus County strategic plan through recent times (Stanislaus County Website).

The Salado name occurs elsewhere in and near the proposed AVA. The Salado Creek Ranch, a farming operation dedicated to production of walnuts, occurs in the central portion of the proposed AVA. Also, the Del Puerto Irrigation District, which distributes irrigation water to the area comprising the proposed Salado Creek AVA, was formerly called the Salado Irrigation District (Harrison).

Salado Avenue is a major street within the city of Patterson. The Patterson Branch of the U. S. Post Office, Patterson Branch of the Stanislaus County Library, and the chambers of the Patterson City Council are located on Salado Avenue. A school currently under construction adjacent to the creek has been named Creekside Middle School.

A group of soils unique to the west side of the San Joaquin Valley in Stanislaus County was first identified within the proposed AVA (McElhiney). Originally named the Salado series, it was renamed the Ensalado series in a recent soil survey (McLaughlin and Huntington, Ferrari and McElhiney).

Historical Evidence

Salado Creek, and nearby Little Salado Creek, are among a few small, intermittent streams in western Stanislaus County that originate in the section of Coast Range that separates the San Joaquin Valley from the Livermore and Santa Clara valleys (the Diablo Range). During most winters little water flows through the creeks, but on rare occasions Salado Creek has swelled and flooded the city of Patterson, which lies on the flood plain downstream to the north of the proposed American Viticultural Area (Patterson Historical Society).

Waters from the creeks deposited sediments to form the alluvial fan that comprises the proposed American Viticultural Area. These sediments were the parent material for the deep, fertile Ensalado series (formerly Salado series) soils, which are unique to western Stanislaus County.

Little is known about the prehistory of the Salado and Little Salado Creek areas. Sediments deposited by the creeks may have been covered archeological evidence of habitation. Northern Valley Yokut and Costanoan people likely inhabited major tributaries to the San Joaquin River, including Salado Creek and Little Salado Creek, during different periods of time as their boundaries of habitation and activity fluctuated with the seasons and under external pressures from the Spanish (SCS Engineers).

Agriculture is fairly recent in the Salado Creek area. The earliest attempt occurred after Mariano Hernandez received the 13340-acre Rancho Del Puerto Land Grant in 1844 (Delphia, Ray, Gooch, Tinkham). After Indian raids destroyed his herds of cattle he returned to San Jose and, in 1847, he sold the property (Delphia, Ray).

After this false start, agriculture began in earnest in 1864 after John D. Patterson purchased the former land grant and began raising cattle and Spanish Merino sheep (Delphia, Gooch). Livestock thrived on the abundant native and naturalized non-native grasses (Delphia).

A rail line, developed in 1864 by the San Pueblo & Tulare Railroad, a subsidiary of the Central Pacific, facilitated export of agricultural products and precipitated the development of the city of Patterson (Delphia, SCS Engineers). A boom in dry land grain production followed the railroad (Delphia).

The original Rancho Del Puerto Land Grant remained nearly intact until 1909 when John D. Patterson's heirs subdivided their land. In 1910 they began an irrigation company, one of the first to successfully lift water from a body of water (the San Joaquin River) for irrigation purposes. (Bramhall, Delphia, Gooch, SCS Engineers, and Stanislaus County Blue Book).

Following these events the character of agriculture in the area changed. Agriculture became more diversified and intensive as production shifted away from dry land grain and livestock towards high value crops such as apricots, peaches, walnuts, almonds, prunes, and grapes. Recent technological advances in food processing and transportation (drying, canning, refrigerated rail cars) contributed to changes and growth in agriculture. Accompanying these changes in agriculture was the movement of people from communities centered on transportation links to farmland. (Bramhall, Delphia, Gooch, SCS Engineers, and Stanislaus County Blue Book).

In recent years, almonds, walnuts, sod, tomatoes and other row crops have been prominent in the Salado Creek-Little Salado Creek area. Wine grapes returned with a forty-four acre planting in 2000 that, as a testament to the suitability of the area, produced their first crop in 2001. Current varieties include Cabernet Sauvignon, Syrah, Sauvignon blanc, and Viognier. The 2001 Sauvignon blanc was submitted to the California State Fair in 2002 and won a bronze medal. Ground breaking for a winery within the proposed Salado Creek American Viticultural Area will occur within the next couple of months.

Boundary Evidence

The boundary of the proposed Salado Creek American Viticultural Area coincides with the extent of Ensalado series soils that developed in parent material deposited by Salado Creek and Little Salado Creek. They occur on the upper alluvial fan created by the creeks, and on the down slope portion of the alluvial fan to the north. The alluvial fan topographic position and the occurrence of Ensalado series soils are the defining factors for the proposed Salado Creek American Viticultural Area.

Geographical Features

- Topography:

The proposed Salado Creek American Viticultural Area (AVA) extends across the upper part of the alluvial fan of Salado Creek and Little Salado Creek southwest of the city of Patterson, California. The upper alluvial fan generally lies between 180 feet and 220 feet above mean sea level (MSL)(figure 1).

In addition, the proposed American Viticultural Area extends further north on to the backslope of the alluvial fan, to about 140 feet MSL, to capture all of the Ensalado soils, which are unique to the area. These backslope soils follow the downstream path and former paths of Salado Creek.

The alluvial fan was created on the west edge of Central Valley of California by the Salado and Little Salado creeks as they left the east side of the California Coast Range (McElhiney). The velocity of flow in the creeks diminished as they left the steeper slopes of mountains and entered the much gentler slopes of the valley. As velocity began to diminish, the heavier, coarser portion of the sediments settled from the flow to form the alluvial fan, while lighter, finer sediments continued downstream and settled on flood plains and basins on the valley floor. The coarse textured sediments that served as parent material for the Ensalado soils were among the most recently deposited.

- Soil:

Ensalado series soils are unique to western Stanislaus County, occurring nowhere else in the state of California (Grant (2001)). In addition, no other soils of the same taxonomic classification occur between the Coast Range and the San Joaquin River in Stanislaus, San Joaquin, or Merced counties (Ferrari and McElhiney, McElhiney (1992), Arkley). Ensalado soils cover only 0.17 % of the area within western Stanislaus County (Ferrari and McElhiney).

Ensalado soils occur along three stream courses: Salado Creek, Orestimba Creek, and Del Puerto Creek (Ferrari and McElhiney). The coarsest sediments deposited after these streams entered the Central Valley were the parent materials for the Ensalado Series soils.

In recent geologic time, because of their comparatively low flow velocity, Salado Creek and Little Salado creeks deposited large quantities of sediments immediately after leaving the Coast Ranges (McElhiney (2002)). The materials accumulated to form an alluvial fan. The parent material for Ensalado Series soils was among the most recent sediments deposited on the fan.

The flow velocities of Orestimba and Del Puerto creeks have been high compared to Salado and Little Salado creeks (McElhiney (2002)). As a result they produced much smaller alluvial fans and Ensalado soils developed further downstream and to east. They are present on levees on low terraces and flood plains adjacent to Orestimba and Del Puerto creeks.

Ensalado series soils are very deep (rooting depth > 60 in.) and well drained (table 1)(Ferrari and McElhiney). Their parent material is alluvium from mixed sources of sandstone and shale. Due to the prevailing dry, warm climate, Ensalado series soils have experienced minimum profile or layer development, contain little organic matter (< 0.5% to 1.0 % organic matter), and are highly calcareous, particularly in the subsoil (high free lime and pH 7.4 to 8.4).

The simple profiles of Ensalado soils consist of a thin layer of fine sandy loam or loam topsoil (6 in.) over deep loam subsoil (Ferrari and McElhiney). Minimum profile development means that soil properties are fairly consistent with depth, including hydraulic properties such as water permeability (moderate at 0.6 to 6.0 in./hr.) and available moisture (high at 0.13 to 0.16 in./in.). Ensalado series soils are classified as coarse-loamy, mixed, superactive, calcareous, thermic Fluventic Haploxerepts.

Other soils on the Salado Creek-Little Salado Creek alluvial fan are older than Ensalado soils and lie beyond the most recent stream courses. Prominent among other soils are the Vernalis, Zacharias, Capay, and Stomar series. These soils differ significantly from Ensalado soils. At a minimum they differ in texture and proximity to the creeks (Vernalis and Zacharias series), but they may also differ in topographic position, mineral composition of parent material, and degree of profile development (Capay and Stomar series).

OFFICE / FAX: 209-669-7656 CELL: 209-614-2565 P.O. BOX 2134 TURLOCK, CA 95381

- Climate:

The Salado Creek area lies within a "thermal belt" along the western rim of the San Joaquin Valley in Stanislaus County. The thermal belt lays mainly on alluvial fans that extend downhill from Interstate 5 on the west towards State Route 33 on the east (McElhiney (2001)). It is characterized by consistent breezes, mainly from the north, which cool the area during the summer (McElhiney (2001)). The average wind direction is north and occasionally winds from this direction are strong (Patterson Irrigation District).

In the winter, lands within the thermal belt experience fog less frequently than lands to east, which are nearer the San Joaquin River (McElhiney). Lands within the thermal belt also have warmer winter temperatures than lower lands to the east (McLaughlin and Huntington).

Climatic conditions within the thermal belt influence crop quality and the type of crops that can be grown. Apricots from the thermal belt have long been recognized for their outstanding color and quality. Also, citrus is successfully grown within the thermal belt, but nowhere else in the northern San Joaquin Valley (McElhiney (2001)).

Comparisons of recent information from a weather station within the Salado Creek area (Patterson #161) to stations to the north and south supports climatic anecdotes. (No long-term climate data is available for the Salado Creek area or the City of Patterson). Salado Creek has warmer minimum temperatures and cooler maximum temperatures than other locations (Table 2, Calif. Dept. Water Res.). It also has a comparatively low average minimum relative humidity, maximum relative humidity, dew point temperature, and vapor pressure, which are most likely the result of the high average wind speed. The values of these parameters, in combination with relatively high average solar radiation, create in high evapotranspiration or water loss due to evaporation from the soil and transpiration through plants (Goldhamer and Snyder, Williams, et. al.). Precipitation is moderate at the Salado Creek area. Average soil temperature is low.

The unique character of Salado Creek area weather was also apparent in the seasonal progression of weather. At first glance, relative average temperatures at the Salado Creek area were as expected – generally warmer than locations to the north and cooler than locations to the south (figure 2). However, the Salado Creek area deviates from expectations when minimum and maximum temperatures are considered. Average minimum temperatures at the Salado Creek area were warmer than other nearby areas during the periods of May through June and August through October (figure 3), while average maximum temperatures were cooler during the months of August through December (figure 4).

The period of comparatively mild temperatures (high minimum and low maximum temperature) corresponded with the period of wine grape ripening (August through October). These temperature factors favor the development of fruit acidity, aromas, flavors, and color important to wine quality (Jackson (1994), Kliewer (1970), Kliewer (1973), Oxford Companion (1994)).

Salado Creek is an area of relatively low air moisture, with average monthly relative humidity and average minimum relative humidity lower than neighboring areas early in the grape growing season (figures 5 and 6), and average maximum relative humidity lower than areas except Kesterson during the entire growing season (figure 7). Two other measures of air moisture, the vapor pressure and dew point temperature, were also low for the Salado Creek area, particularly early in the season (figures 8 and 9). Low air moisture contributes to accelerated water loss from vineyards (Gladstones, Goldhamer and Snyder).

Average wind speed was high for the Salado Creek area compared areas nearby (figure 10). Winds were the principal weather factor causing low air moisture.

Early in the year the solar radiation for the Salado Creek area was about average for the Northern San Joaquin Valley, but late in the season, between August and October, the Salado Creek area received less solar radiation than nearby areas (figure 11). With less solar radiation, grapevines in the Salado Creek area had lower rates of photosynthesis and, consequently, slower fruit ripening. Slower ripening has positive affects on fruit quality for wine making only when it is accompanied with lower maximum temperatures and humidity, which is the case for the Salado Creek area (Gladstones).

At the Salado Creek area reference evapotranspiration (ET) was high early in the growing season, mainly due to early season high temperatures, low air moisture, and high wind speeds (figure 12). These conditions make it possible for vineyards to experience water stress early in the growing season. Early season water stress in grapevines, sustained at a moderate level with careful irrigation scheduling, is known to have positive effects on wine grape quality (Grant (2000), Matthews, et. al. (1990), Prichard, et. al, (1995)).

References:

Anonymous. Twenty years in pictures. The Gateway: A Patterson Township Historical Society Bulletin. 1998. 11, 260-261.

Arkley, R. J. Soil Survey of Merced Area, California. U. S. D. A. Dept. of Agric. Soil Cons. Serv. Revised 1991.

Bramhall, J. T. The Story of Stanislaus. Modesto Hearld, Modesto, 1914

California Department of Water Resources. California Irrigation Management Information System (CIMIS). 2002.

Delphia, C. Salado Creek History. The Gateway: A Patterson Township Historical Society Bulletin. Dec. 1996. 9, 200-205.

Delphia, C. West side in perspective. Stanislaus stepping stones: the quarterly of the Stanislaus County Historical Society. 6, 327-329. 1982.

Ferrari, C. A. and M. A. McElhiney. Soil Survey of Western Stanislaus County, California, Western Part. U. S. D. A. Dept. of Agric. Nat. Res. Cons. Serv. 2002.

The Gateway. Patterson Township Historical Society Bulletin. Vol. 9, No. 2., Dec. 1986.

Gladstones, J. Viticulture and Environment. Winetitles, Adelaide, 1992.

Gooch, K. M. Stanislaus County: An Illustrated History. Windsor Publications, Northridge California, 1988.

Grant, R. S. Five-step irrigation schedule promoting fruit quality and vine health. Practical Winery and Vineyard. Pp 46-75. May/June 2000.

Grant, R. S. Soil Survey Database for California. Progressive Viticulture. 2001.

Harrison, B. Del Puerto Irrigation District. Personal Communication. 2002.

Houk, M. Salado Creek pipeline is 'open for business'. Patterson Irrigator. 27Oct98. p. 1.

Irrigation scheduling: a guide for efficient on-farm water management. Goldhamer, D. A. and R. L. Snyder (Ed.). University of California Division of Agriculture and Natural Sciences Publication 21454. 1989.

Jackson, R. S. Wine Science Principles and Applications. Academic Press, San Diego, 1994.

Kliewer, W. M. Effect of day temperature and light intensity on coloration of *Vitis vinifera* L. grapes. J. Am Soc. Hort. Sci. 95, 693-697 and 96, 372-377. 1970.

Kliewer, W. M. Berry composition of *Vitis vinifera* cultivars as influenced by photo- and nycto-temperatures during maturation. J. Am. Soc. Hort. Sci. 98, 153-159. 1973.

Lane, Libby. Patterson looks to tame Salado. Modesto Bee. 19Mar97. p. B-1.

Matthews, M. A., R. Ishii, M. M. Anderson, and M. O'Mahony. Dependence of wine sensory attributes on vine water status. J. Sci. Food. Agric. 51, 321-335. 1990.

McElhiney, M. A. U. S. D. A. Natural Resources Conservation Services. Personal Communication. 2001.

McElhiney, M. A. U. S. D. A. Dept. of Agric. Nat. Res. Cons. Serv. Personal communication. 2002.

McElhiney, M. A. Soil Survey of San Joaquin County, California. . U. S. D. A. Dept. of Agric. Nat. Res. Cons. Serv. 1992.

McLaughlin, J. C. and G. L. Huntington. Soils of Westside Stanislaus Area California. Dept. of Soils and Plant Nutrition, Univ. of Calif. 1968.

The Oxford Companion to Wine. Robinson, J. (Ed.) Oxford University Press, 1999.

Patterson Irrigation District Report. 2002.

Prichard, T., P. S. Verdegaal, and C. Rous. Modification of wine characteristics through irrigation management. Grape Grower. pp 8-13. May 1995.

Ray, H. C. Stanislaus County: A Century of Growth, 1854-1954. County Superintendent of Schools, Modesto, 1955.

Rhea, J. J. Stanislaus County California. Sunset Housekeepers Bureau, San Francisco, 1913.

SCS Engineers and EDAW. Draft Environmental Impact Report for the Fink Road Landfill Extension Project. 2001.

Scott, L. Dams new priority for City Manager George Lambert. Patterson Irrigator. 05Nov98. p. 1.

Scott, L. Dams on Salado Creek are one step closer to reality. Patterson Irrigator. 09Mar99. p. 1.

Stanislaus County Blue Book, 1936

Stanislaus County Website (2002): http://www.co.stanislaus.ca.us/budget/fy2000-2001

Swift, R. Salado Creek is major obstacle to Creekside. Patterson Irrigator. 31Jan95. p. 1.

Tinkham, G. H. History of Stanislaus County California with Biological Sketches. Historic Record Company, Los Angeles, 1921.

U. S. G. S. Patterson, California (topographic quadrangle). 1951. Photorevised 1971 and photoinspected 1978.

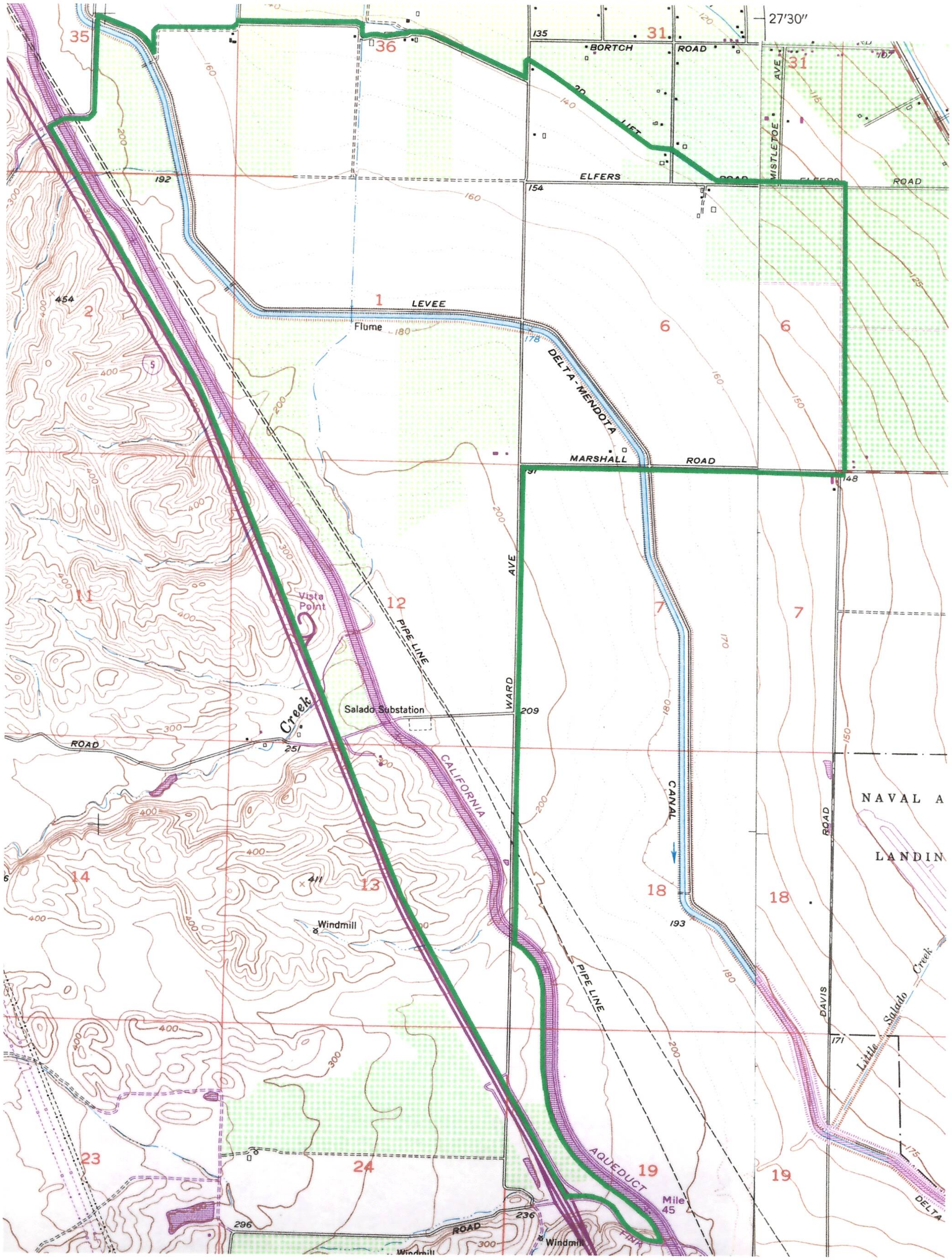
Williams, L. E., N. K. Dokoozlian, and R. Wample. Grape. In Handbook of Environmental Physiology of Fruit Crops. Vol. 1. Temperate Crops. Schaffer, B. and P. C. Anderson (Ed.). CRC Press. 1994.

Winkler, A. J., J. A. Cook, W. M. Kliewer, and L. A. Lider. General Viticulture. University of California Press, Berkeley, 1974.

VINEYARDS NEAREST THE PROPOSED SALADO CREEK AVA

Vineyard	Varieties	Area	Direction From Proposed AVA	Approximate Distance from Proposed AVA
		(acres)		(miles)
Sunflower Ranch Company	Cab. Sauv., Sauv. Blanc, Syrah, Viognier	44	*NA*	0.0
California Crop Management	Merlot	93	West	0.5
Diablo Grande	Barbera, Cab. Franc, Cab. Sauv., Chardonnay, Merlot, Sauv. Blanc, Syrah, others	36	West	4.3
Baldwin Road Vineyard	Cab. Sauv.	< 40	Northeast	4.5
Maring Cox Road	Burgers, Cab. Sauv., Chardonnay	137	Northeast	6.7
Maring Frank Cox Road	Cab. Sauv.	24	Northeast	7.5
Land Management, Inc.	Syrah, others	> 100	North	18.0

Fig. 1. Topographic Map of the Proposed Salado Creek American Viticultural Area



PROGRESSIVE VITICULTURE
OFFICE / FAX: 209-669-7656 CELL: 209-614-2565 P.O. BOX 2134 TURLOCK, CA 95381

TABLE 1. SELECTED CHARACTERISTICS OF ENSALADO SERIES SOILS

PARAMETER	UNITS					
Mapping Unit Number		270	271	272	273	274
Series		Ensalado	Ensalado	Ensalado	Ensalado	Ensalado
Surface Texture(s)		fine sandy loam, rarely flooded	loam, rarely flooded	loam, wet	fine sandy loam	loam
Slope	%	0 to 2	0 to 2	0 to 2	0 to 2	0 to 2
Depth Class		Very Deep	Very Deep	Very Deep	Very Deep	Very Deep
Surface Soil Depth	in.	6	6	6	6	6
Subsoil						
Texture, layer 1		loam	loam	loam	loam	loam
Thickness, layer 1	in.	20	20	20	20	20
Texture, layer 2		loam	loam	loam	loam	loam
Thickness, layer 2	in.	34	34	34	34	34
Landscape Position		Alluvial fans	Alluvial fans	Alluvial fans	Alluvial fans	Alluvial fans
Elevation	ft. MSL	40 to 275	40 to 275	40 to 300	40 to 300	40 to 300
Parent Material		Alluvium from sandstone and shale	Alluvium from sandstone and shale	Alluvium from sandstone and shale	Alluvium from sandstone and shale	Alluvium from sandstone and shale
Shrink-Swell Potential		Low	Low	Low	Low	Low
Infiltration Rate	in./hr	1.5	1.0	1.0	1.5	1.0
Permeability		Moderate	Moderate	Moderate	Moderate	Moderate
Surface Soil	in./hr	2.0 to 6.0	0.6 to 2.0	2.0 to 6.0	0.6 to 2.0	0.6 to 2.0
Subsoil layer 1	in./hr	0.6 to 2.0	0.6 to 2.0	0.6 to 2.0	0.6 to 2.0	0.6 to 2.0
Subsoil layer 2	in./hr	0.6 to 2.0	0.6 to 2.0	0.6 to 2.0	0.6 to 2.0	0.6 to 2.0
Available Water Capacity		High	High	High	High	High
Surface Soil	in./in.	0.13 to 0.15	0.14 to 0.16	0.14 to 0.16	0.13 to 0.15	0.14 to 0.16
Subsoil layer 1	in./in.	0.14 to 0.16	0.14 to 0.16	0.14 to 0.16	0.14 to 0.16	0.14 to 0.16
Subsoil layer 2	in./in.	0.14 to 0.16	0.14 to 0.16	0.14 to 0.16	0.14 to 0.16	0.14 to 0.16
Drainage Class		Well	Well	Well	Well	Well
Water Table Depth	ft.	> 6.0	> 6.0	4.0 to 6.0, Dec to Mar	> 6.0	> 6.0
Rooting Depth	in.	> 60	> 60	> 60	> 60	> 60
Surface soil pH		7.4 to 8.4	7.4 to 8.4	7.4 to 8.4	7.4 to 8.4	7.4 to 8.4
Organic Matter		0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	0.5 to 1.0
Prime Farm Land		Yes	Yes	Yes	Yes	Yes
Land Use Capability Unit		IVc-1	IVc-1	IVw-2	IVc-1	IVc-1
Storie Index		95	95	95	100	100
Limitation(s)		Flooding	Flooding	High Water Table	None	None

Progressive Viticulture
Office / Fax: 209-669-7656 Cell: 209-614-2565 P.O. Box 213 4 Turlock, CA 95381

TABLE 2. SELECTED CLIMATE PARAMETER FOR LOCATIONS FOR THE SALADO CREEK AREA AND NEARBY LOCATIONS

Station	Longitude	Latitude	Elevation	Average Minimum Air Temperature	Average Maximum Air Temperature	Average Air Temperature	Average Minimum Relative Humidity	Average Maximum Relative Humidity	Average Relative Humidity	Average Dew Point	Average Vapor Pressure	Average Wind Speed	Average Solar Radiation	Total Reference ET	Average Annual Precipitation	Average Soil Temperature
	degrees, mins	degrees, mins	(ft MSL)	(degrees F)	(degrees F)	(degrees F)	(%)	(%)	(%)	(degrees F)	(mBars)	(MPH)	(Ly/day)	(in)	(in)	(degrees F)
Lodi West - #161	38,13 N	121,38 W	25	46.5	74.1	59.9	46	91	69	48.7	12.0	2.5	432	49.49	10.96	61.3
Manteca - # 70	37,84 N	121,22 W	33	47.3	74.4	60.5	45	92	67	48.7	12.0	4.9	447	55.60	14.36	62.0
Modesto - #71	37,65 N	121,19 W	35	44.5	73.6	58.9	46	94	69	47.9	11.7	5.4	399	51.04	12.65	65.8
Patterson #161	**37,44 N**	**121,14 W**	**183**	**48.4**	**73.5**	**61.0**	**42**	**84**	**61**	**46.0**	**11.0**	**6.5**	**439**	**61.10**	**13.33**	**61.4**
Kesterson - # 92	37,03 N	120,88 W	75	44.6	77.6	60.9	44	63	55	42.4	10.0	4.8	469	*No data*	12.80	64.8
Los Banos - # 56	37,01 N	120,76 W	95	47.7	75.6	61.4	49	93	71	50.8	13.1	5.7	458	57.78	10.21	62.6
Merced - # 148	37,21 N	120,39 W	200	46.5	75.8	60.8	41	90	64	47.4	11.4	4.4	422	55.62	14.45	61.9

Source: California Irrigation Management Information System (CIMIS), California Department of Water Resources.

FIG. 2. AVERAGE MONTHLY TEMPERATURE

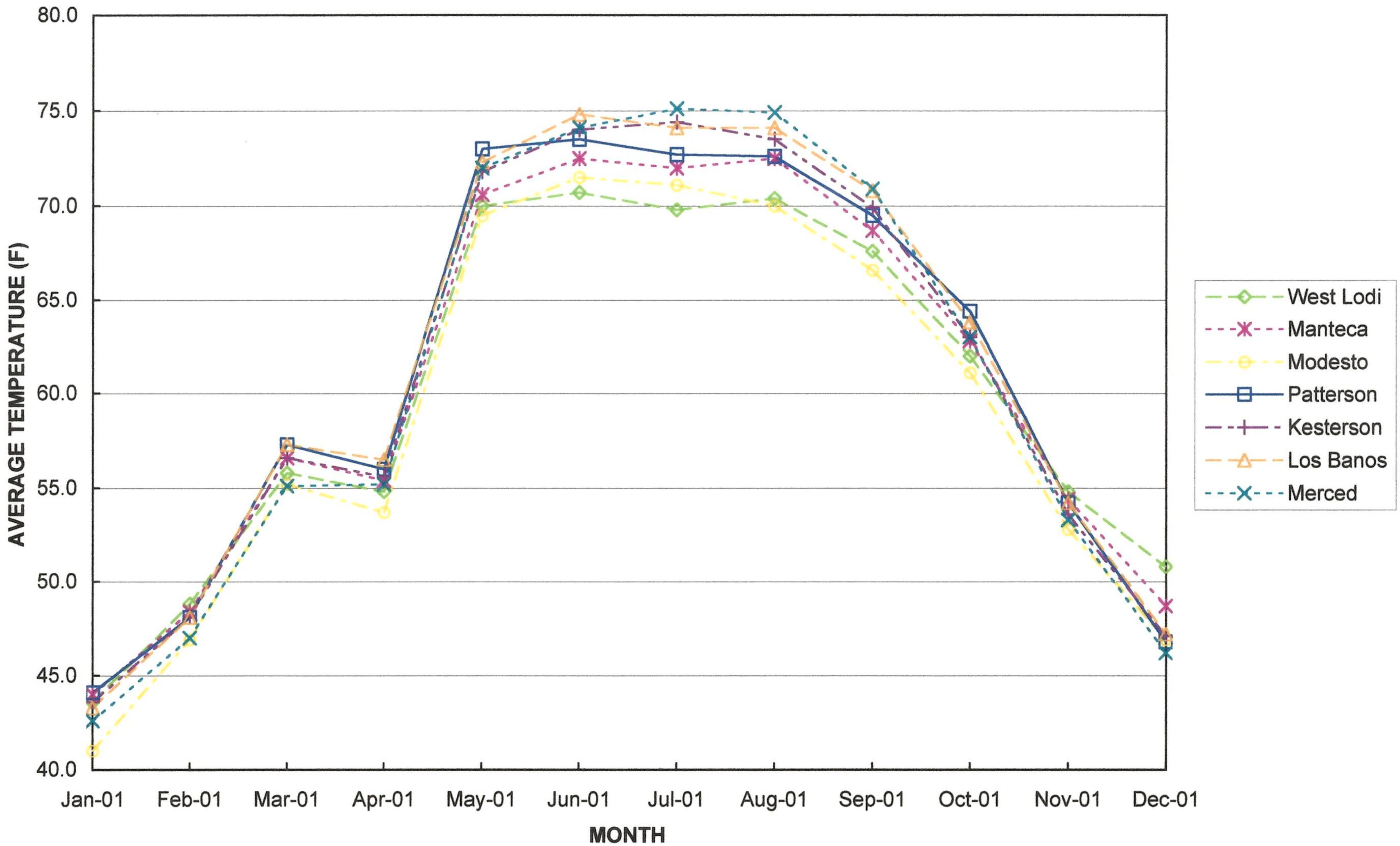


FIG. 3. AVERAGE MONTHLY MINIMUM TEMPERATURE

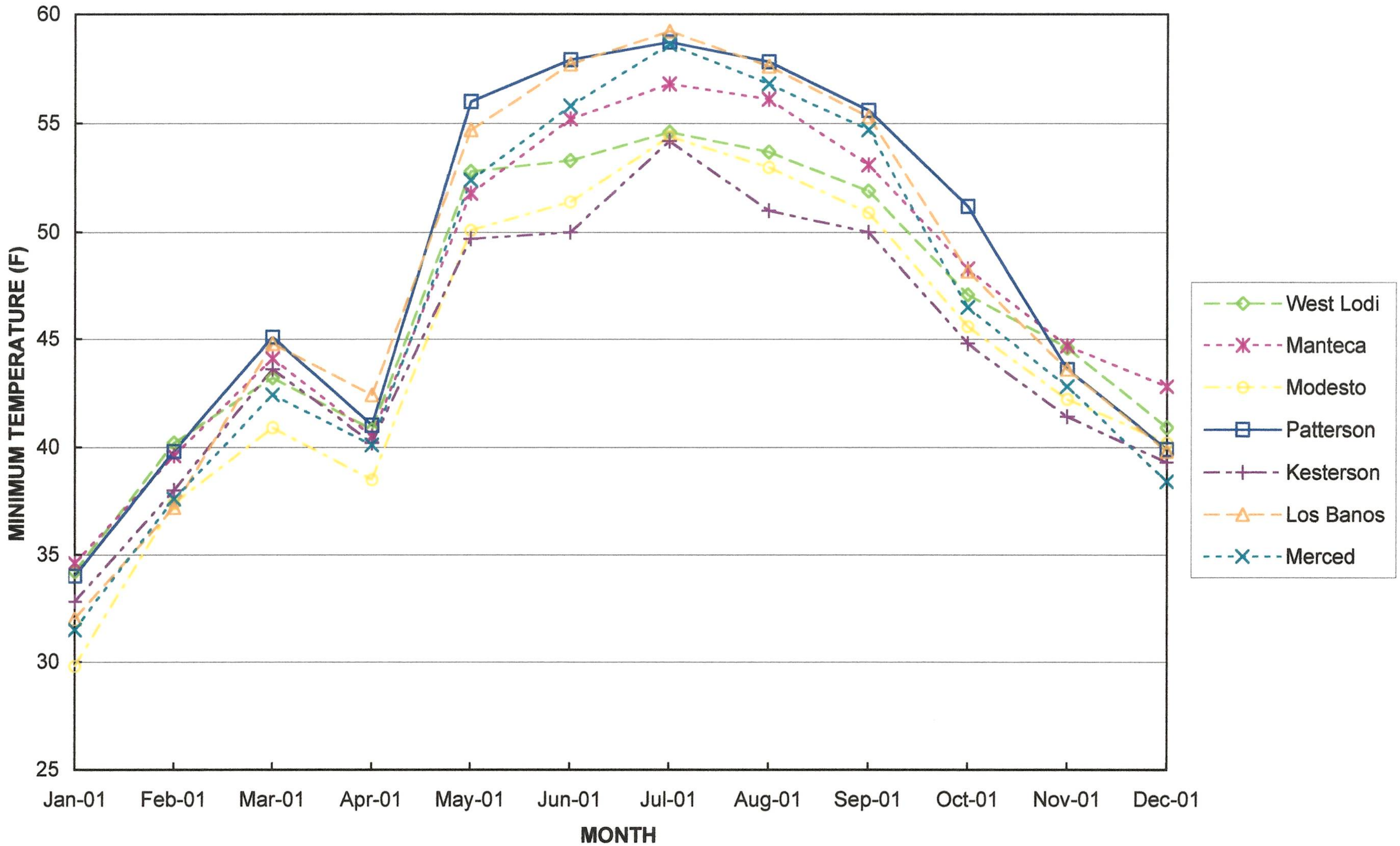


FIG. 4. AVERAGE MONTHLY MAXIMUM TEMPERATURE

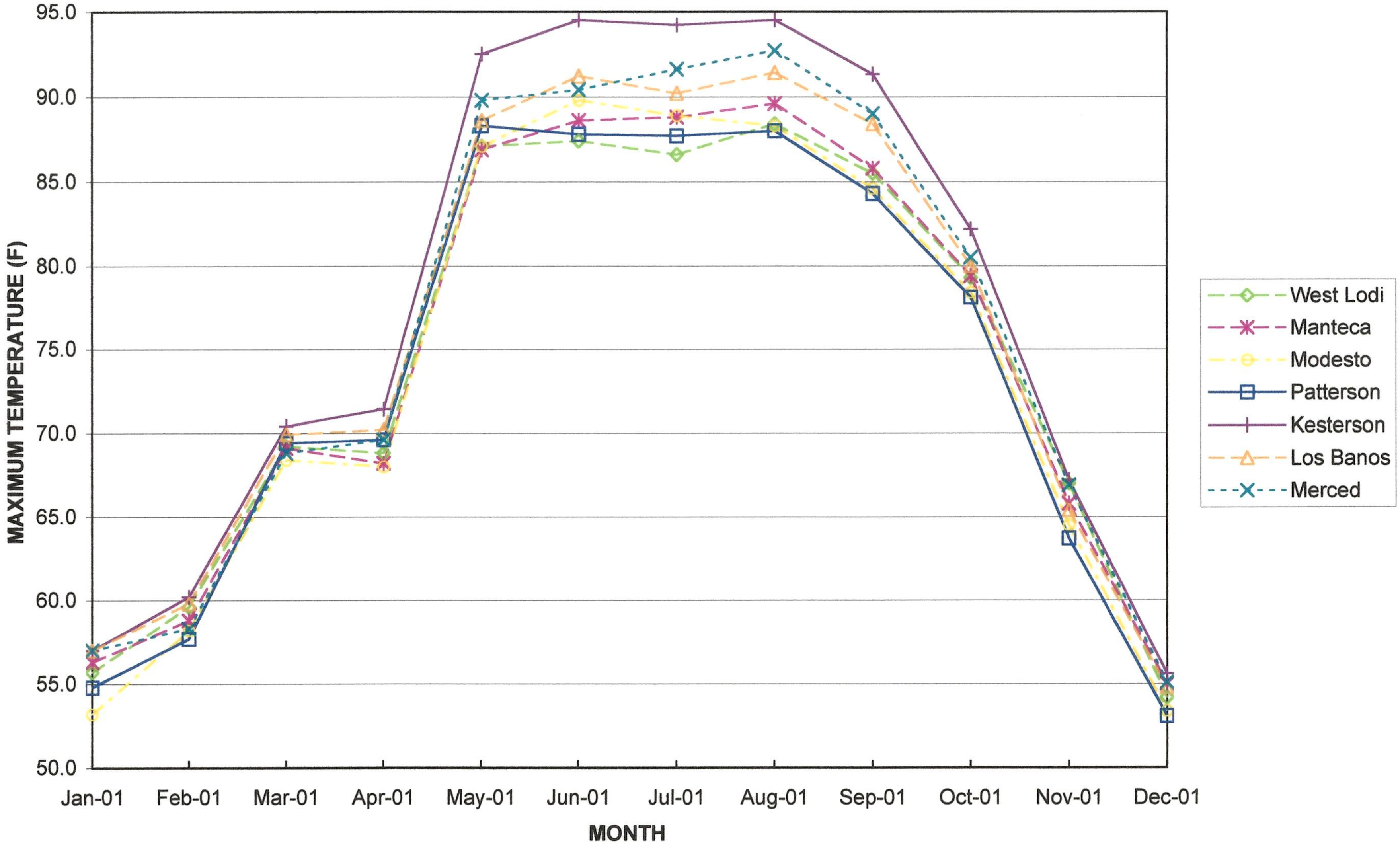


FIG. 5. AVERAGE MONTHLY RELATIVE HUMIDITY

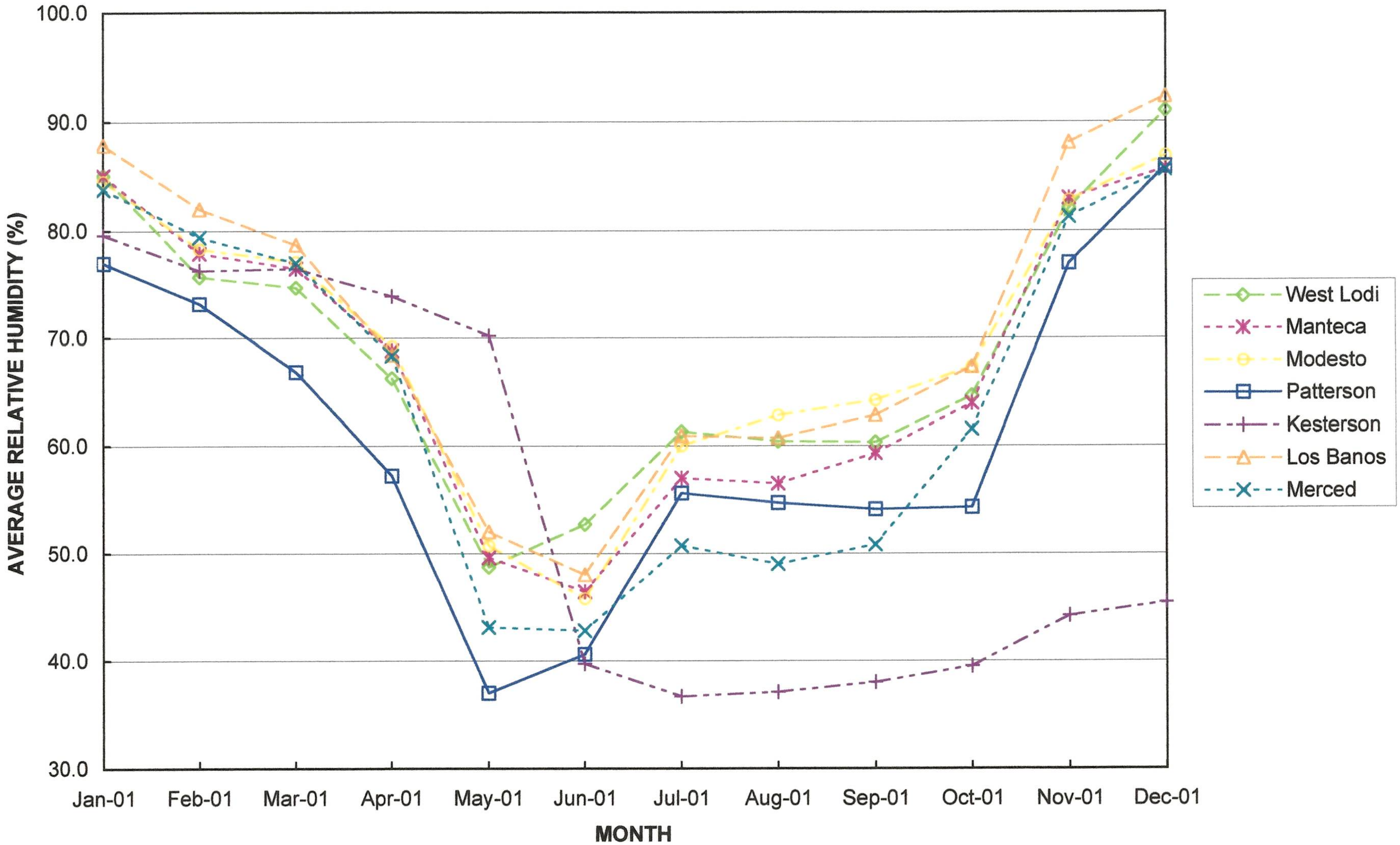
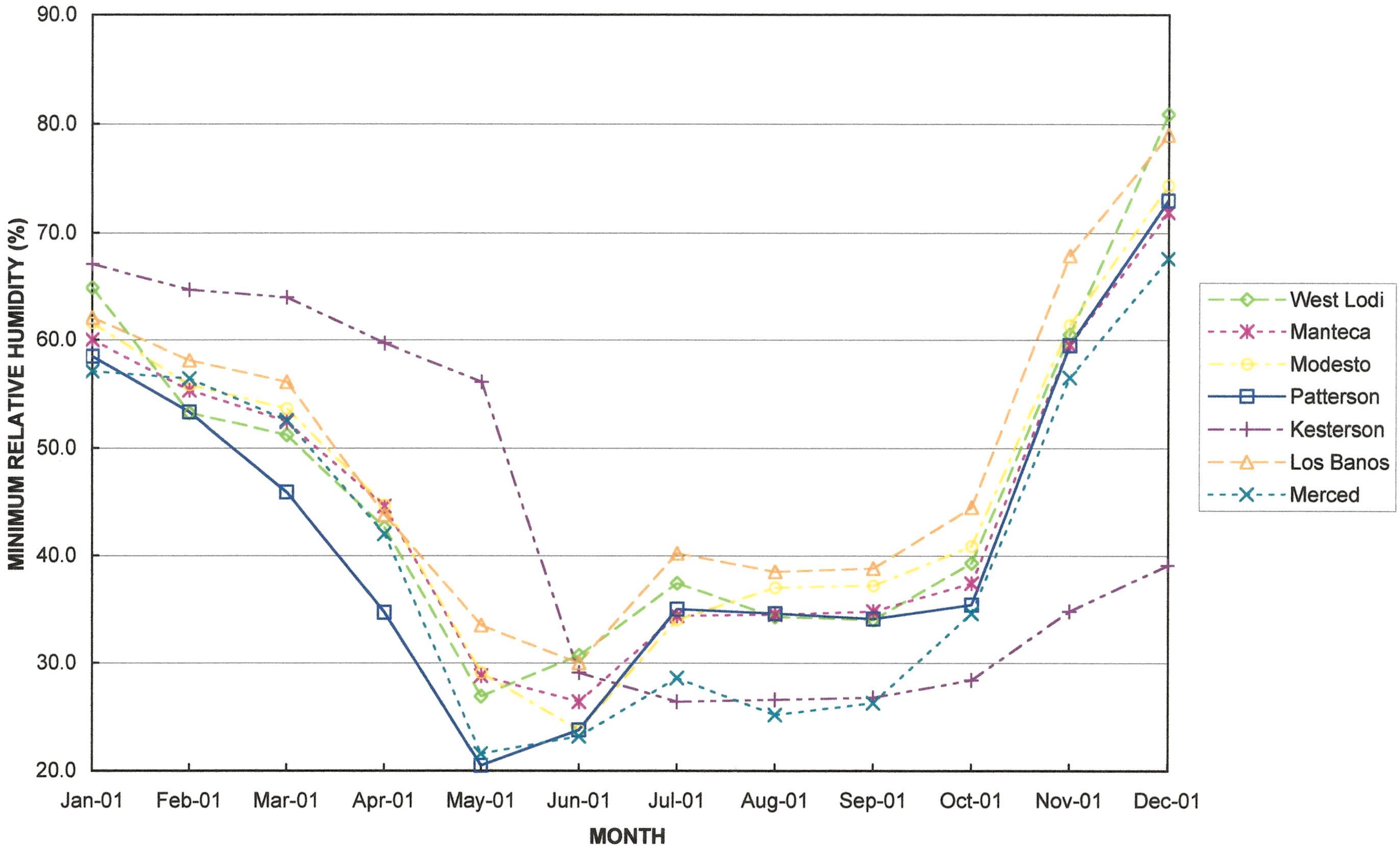
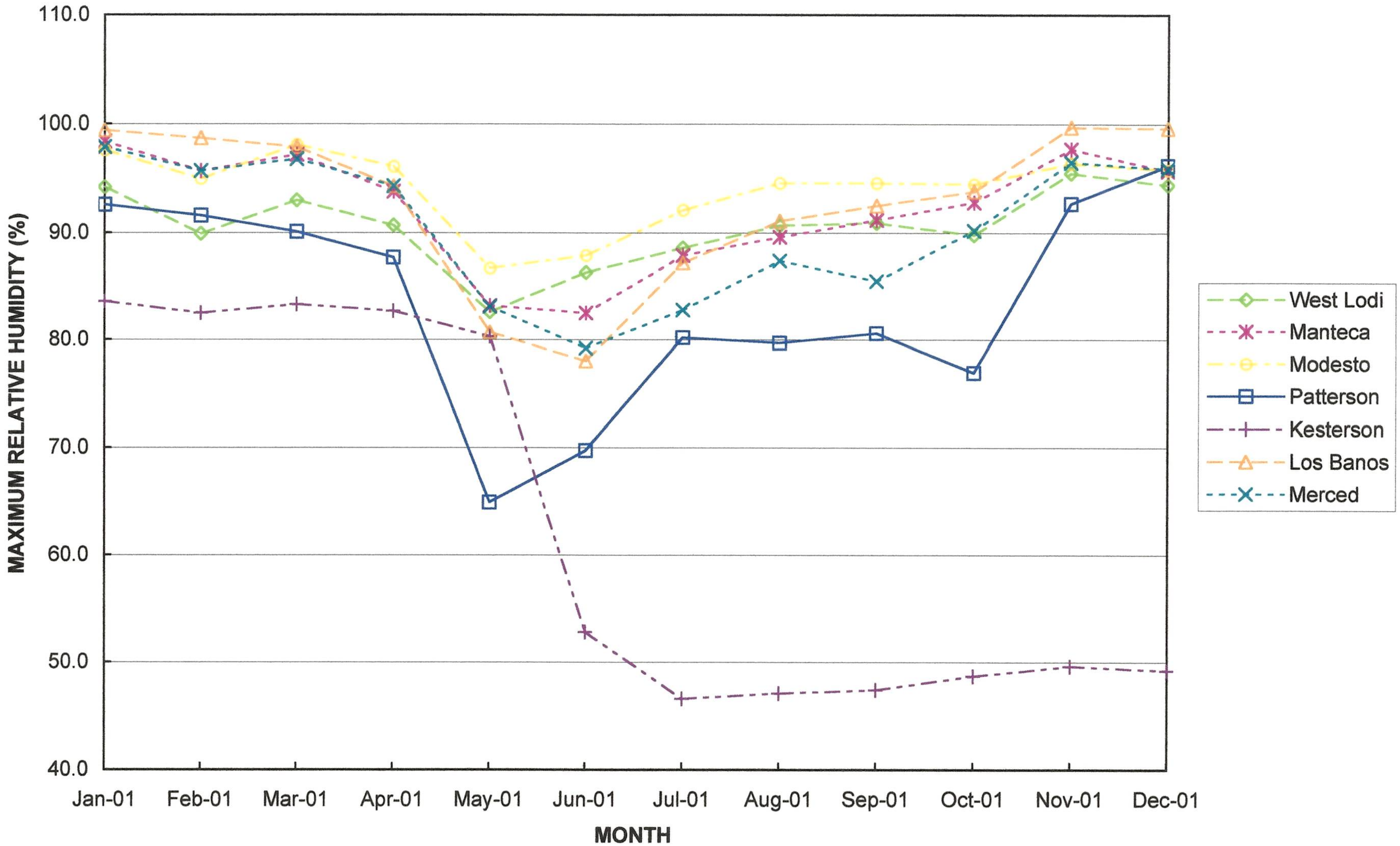


FIG. 6. AVERAGE MONTHLY MINIMUM RELATIVE HUMIDITY



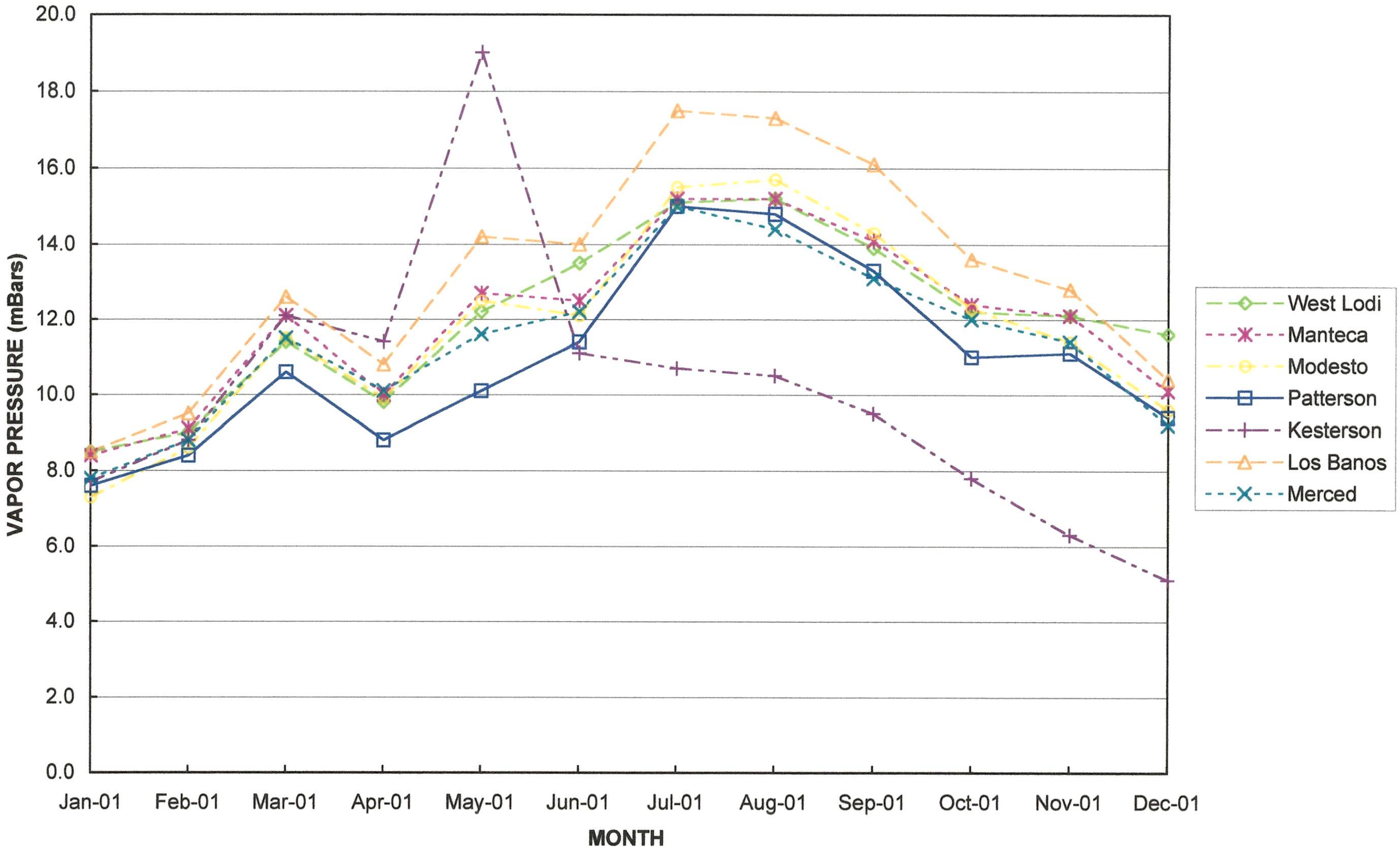
PROGRESSIVE VITICULTURE
OFFICE / FAX: 209-669-7656 CELL: 209-614-2565 P.O. BOX 2134 TURLOCK, CA 95381

FIG. 7. AVERAGE MONTHLY MAXIMUM RELATIVE HUMIDITY



Progressive Viticulture
Office / Fax: 209-669-7656 Cell: 209-614-2565 P.O. Box 2134 Turlock, CA 95381

FIG. 8. AVERAGE MONTHLY VAPOR PRESSURE



PROGRESSIVE VITICULTURE
OFFICE / FAX: 209-669-7656 CELL: 209-614-2565 P.O. BOX 2134 TURLOCK, CA 95381

FIG. 9. AVERAGE MONTHLY DEW POINT TEMPERATURE

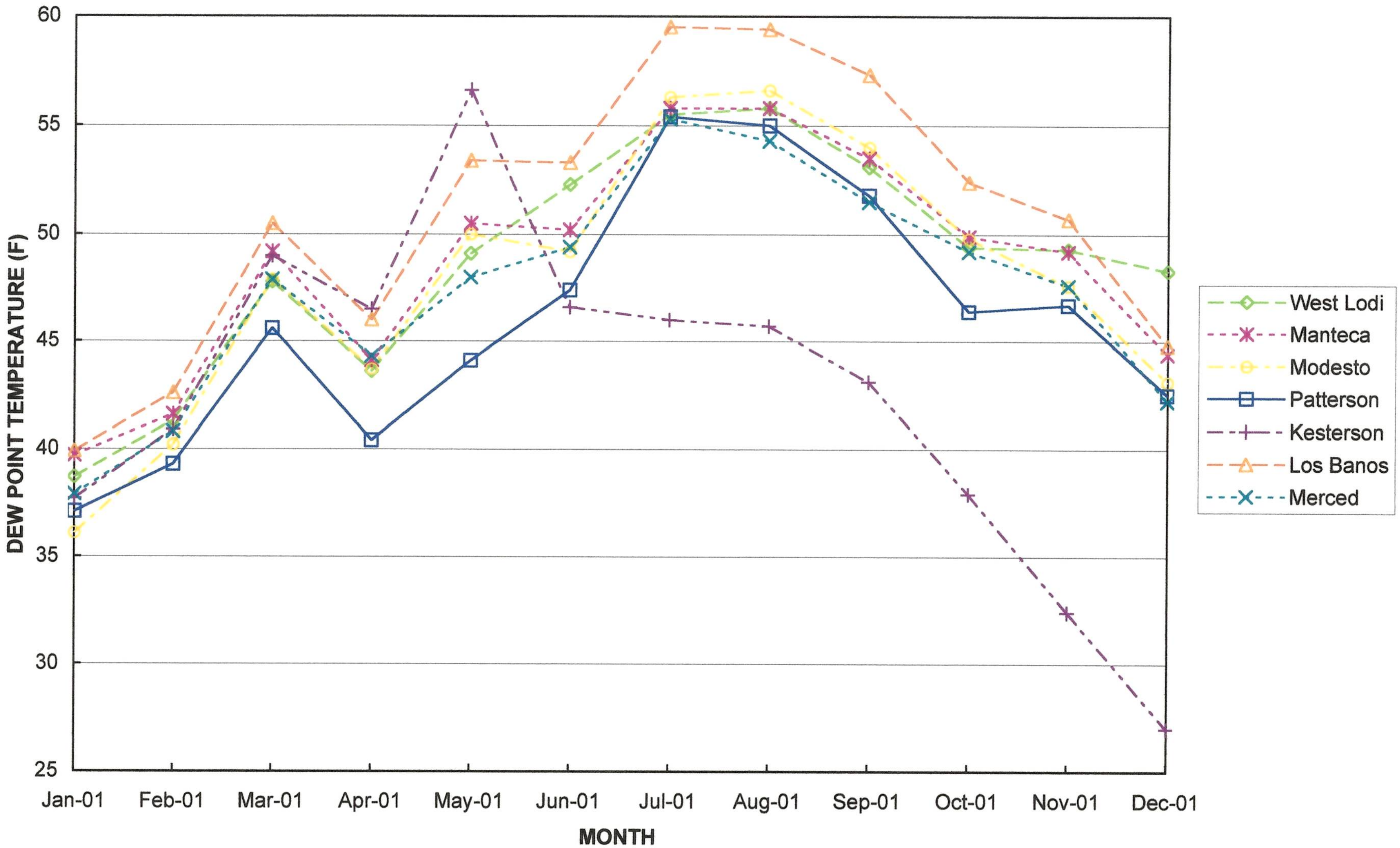
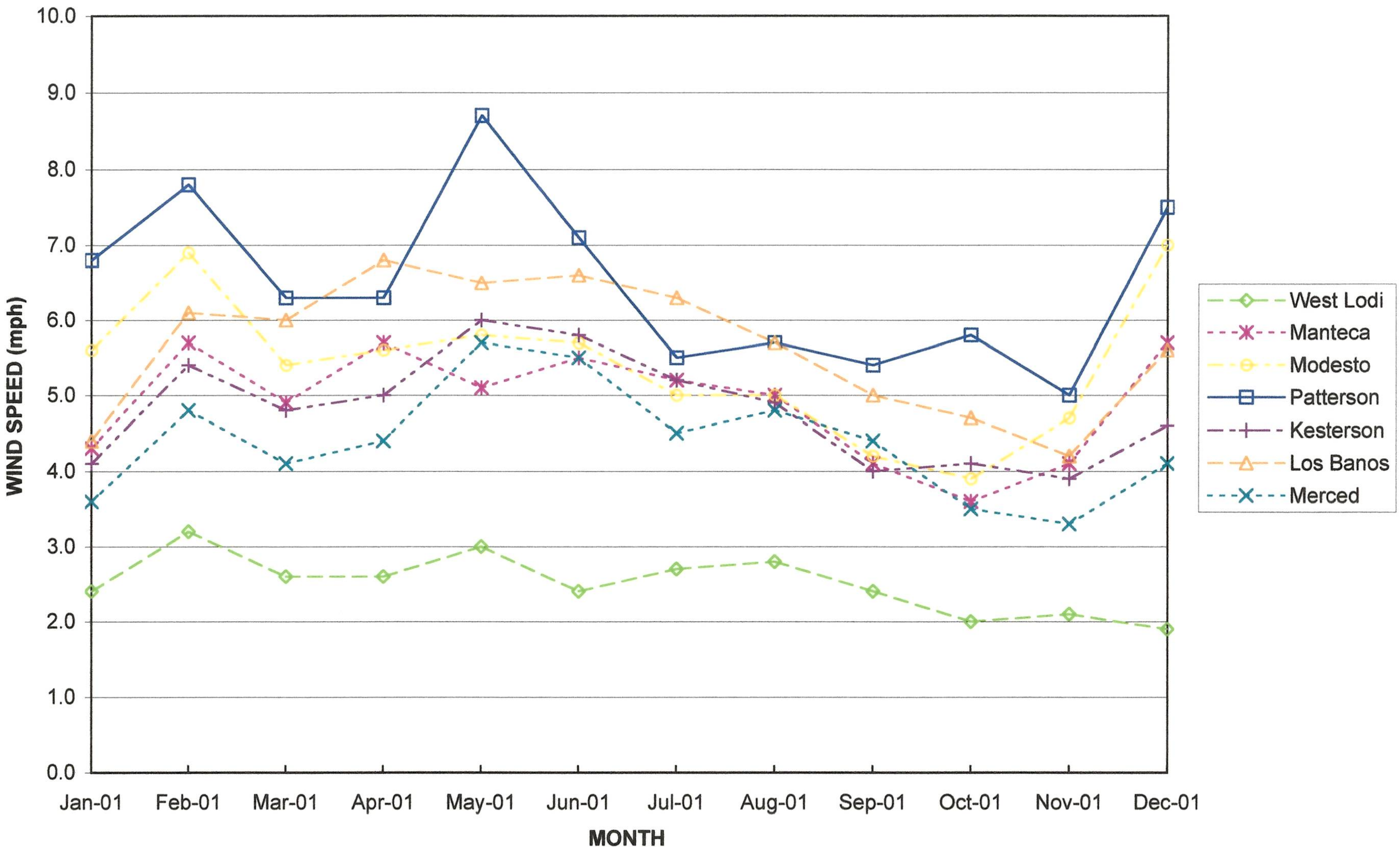


FIG. 10. AVERAGE MONTHLY WIND SPEED



PROGRESSIVE VITICULTURE
OFFICE / FAX: 209-669-7656 CELL: 209-614-2565 P.O. BOX 2134 TURLOCK, CA 95381

FIG. 11. AVERAGE MONTHLY SOLAR RADIATION

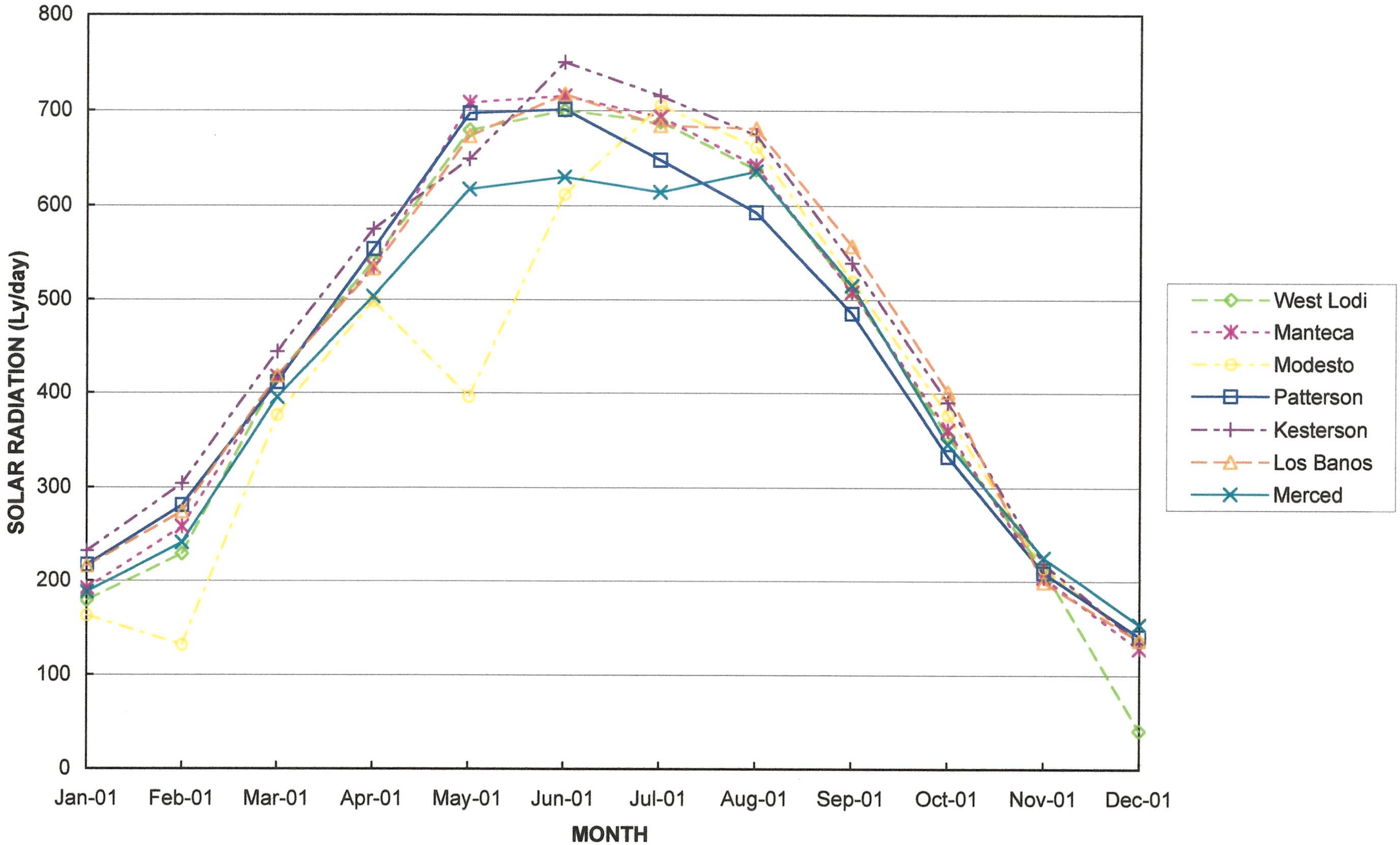


FIG. 12. TOTAL MONTHLY REFERENCE EVAPOTRANSPIRATION OR ET