

Marin Microclimates

- 1) What microclimates do we have?
- 2) Why do we have these microclimates?
- 3) How do we use them to our advantage?

1) What microclimates do we have?

- Sources:

A) www.usna.usda.gov/hardzone

Average annual minimum temperatures.

Zones 9a(20-25 o F) & zone 9b (25-30 o F)

B) www.AHS.org/publications

Zip code Heat zone finder

C) www.sunset.com/garden/climate-zone

B) Heat zones

- Average number of days >86 ° F / 30 ° C
- Marin is in zones 1-6
- Zone 1 = <1 day >86 ° F
- Zone 2 = 1-7 days > 86 ° F
- Zone 3 = 7-14 days > 86 ° F
- Zone 4 = 14-30 days > 86 ° F
- Zone 5 = 30-45 days > 86 ° F
- Zone 6 = 45-60 days > 86 ° F

Heat zones by zip code

Zone 1	< 1 day @ 86 o F	94937	Inverness
Zone 2	1 – 7 days @ 86 o F	94930, 94937 94941, 94956	Fairfax, Inverness, Point Reyes, Mill Valley
Zone 3	7- 14 days @ 86 o F	94904, 94930, 94937, 94939, 94941	Kentfield, Fairfax, Inverness, Larkspur, Mill Valley
Zone 4	14-30 days @ 86 o F	94901, 94904, 94920, 94930, 94933, 94941, 94960, 94973	San Rafael, San Anselmo, Fairfax, Kentfld Gr'brae, B'dere, Forest Knolls, MV,, Larkspur
Zone 5	30-45 days @ 86 o F	94901, 94903, 94925, 94930, 94945, 94947, 94949, 94960, 94973	Novato, San Rafael, San Anselmo,, Corte Madera,, Woodacre, Fair- fax, Terra Linda
Zone 6	45-60 days @ 86 o F	94945	Novato



Climate Zones



Marin microclimates-zones 15-17

	15	16	17
Average low temps	28 – 21 o F	32 – 19 o F	36 – 23 o F
Record low temps	26 – 16 o F	25 – 18 o F	30 – 20 o F
Average high temps	104 – 116 o F	104 - 116 o F	97 o F
Where?			

Marin Microclimates

- Zone 15: Occur in cold air basins & on hilltops. Chillest winters with greatest chance of frost. Warm dry summers but windy. Eg Novato
- Zone 16: Occur in thermal belt areas (slopes from which cold air drains). Winters are milder than in Zone 15. Eg parts of Larkspur, Mill Valley & San Anselmo
- Zone 17: The coastal location of this zone means it has the greatest marine influence of the 3 zones. Winters are cool, wet and usually frost free. Summers are also cool with frequent fog and wind. Eg Bolinas
- Source: Sunset Western Gardening

2) Why do we have these microclimates?

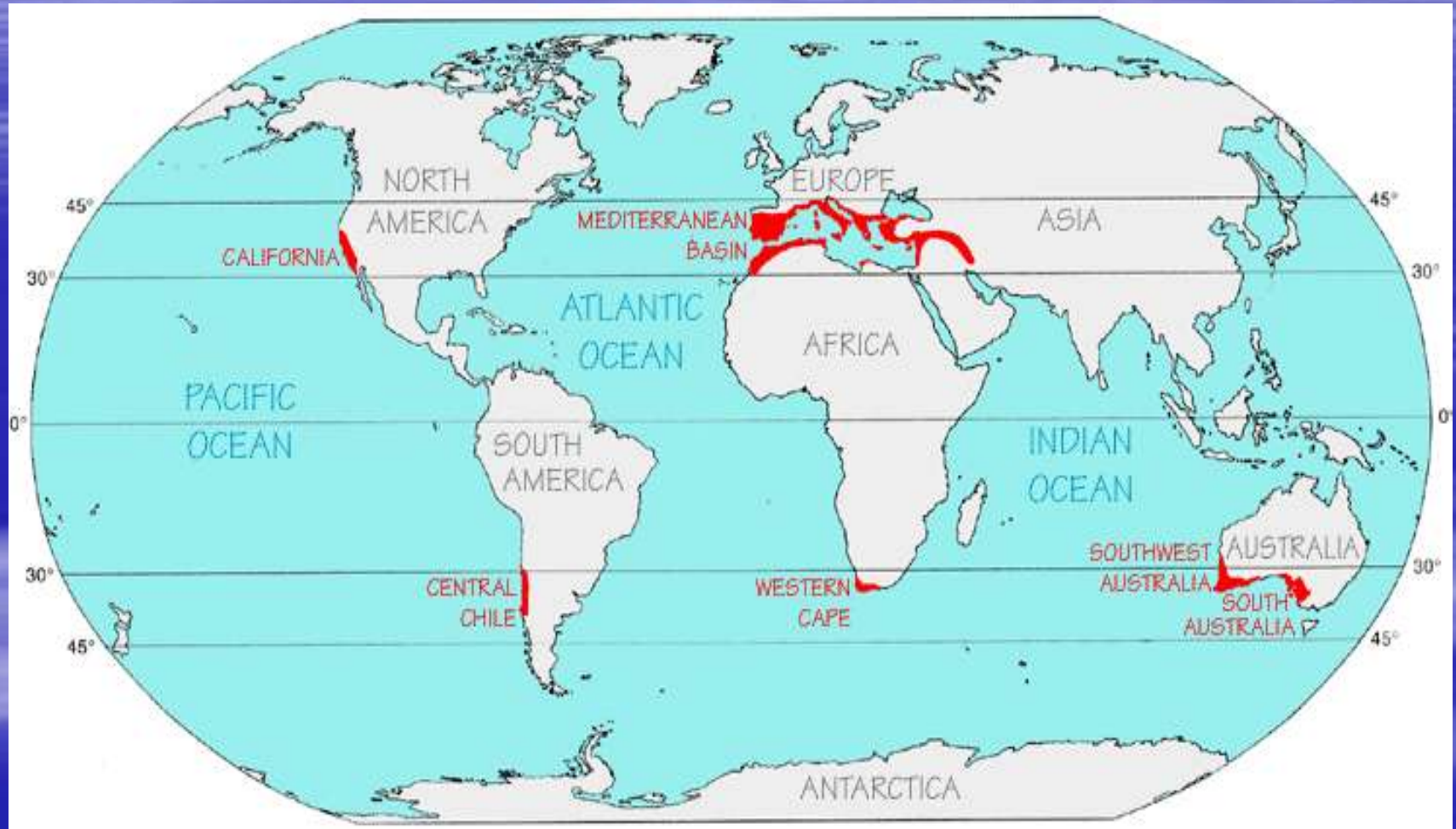
There are times when the microclimates are overwhelmed by large- scale weather phenomena and the differences are eliminated.

Harold Gilliam: *Weather of the San Francisco Bay Region.*

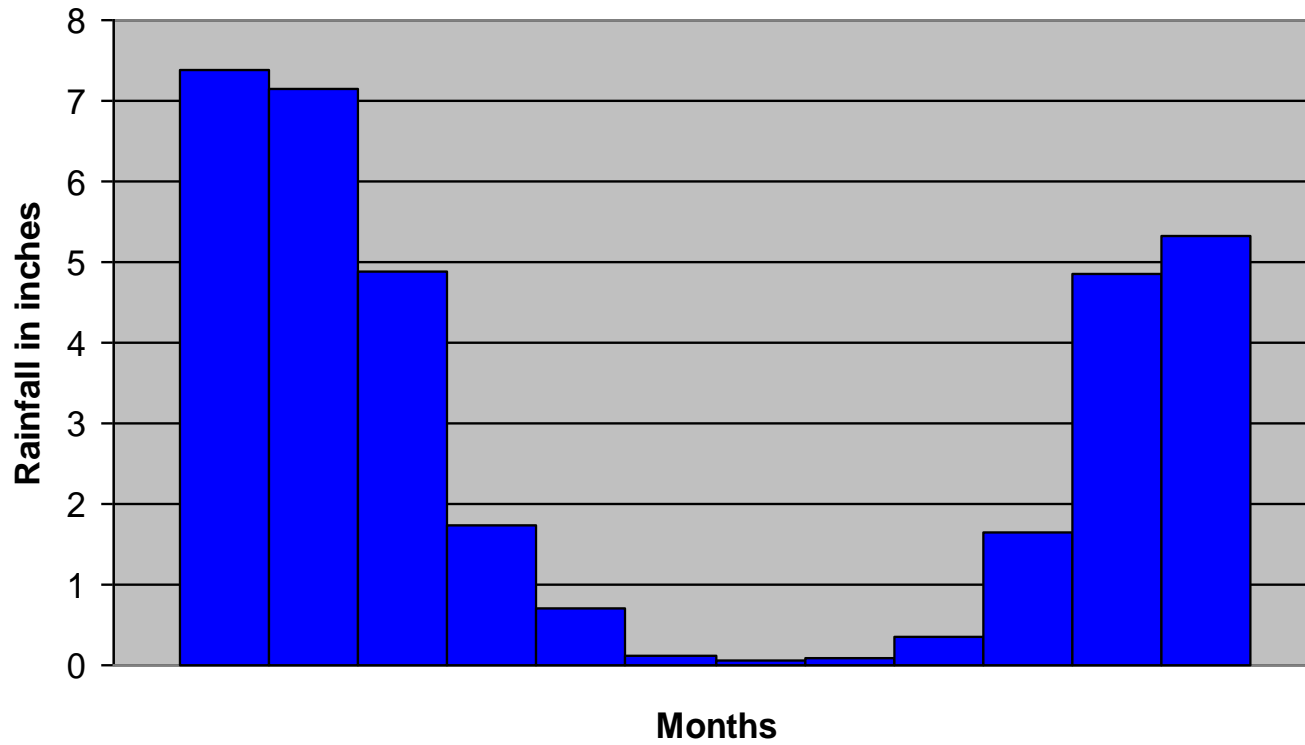
“Nearly any weather I could want is just minutes away”

Joe Kissell, www.itotd.com

Mediterranean regions



Monthly rainfall in Novato



World ocean currents

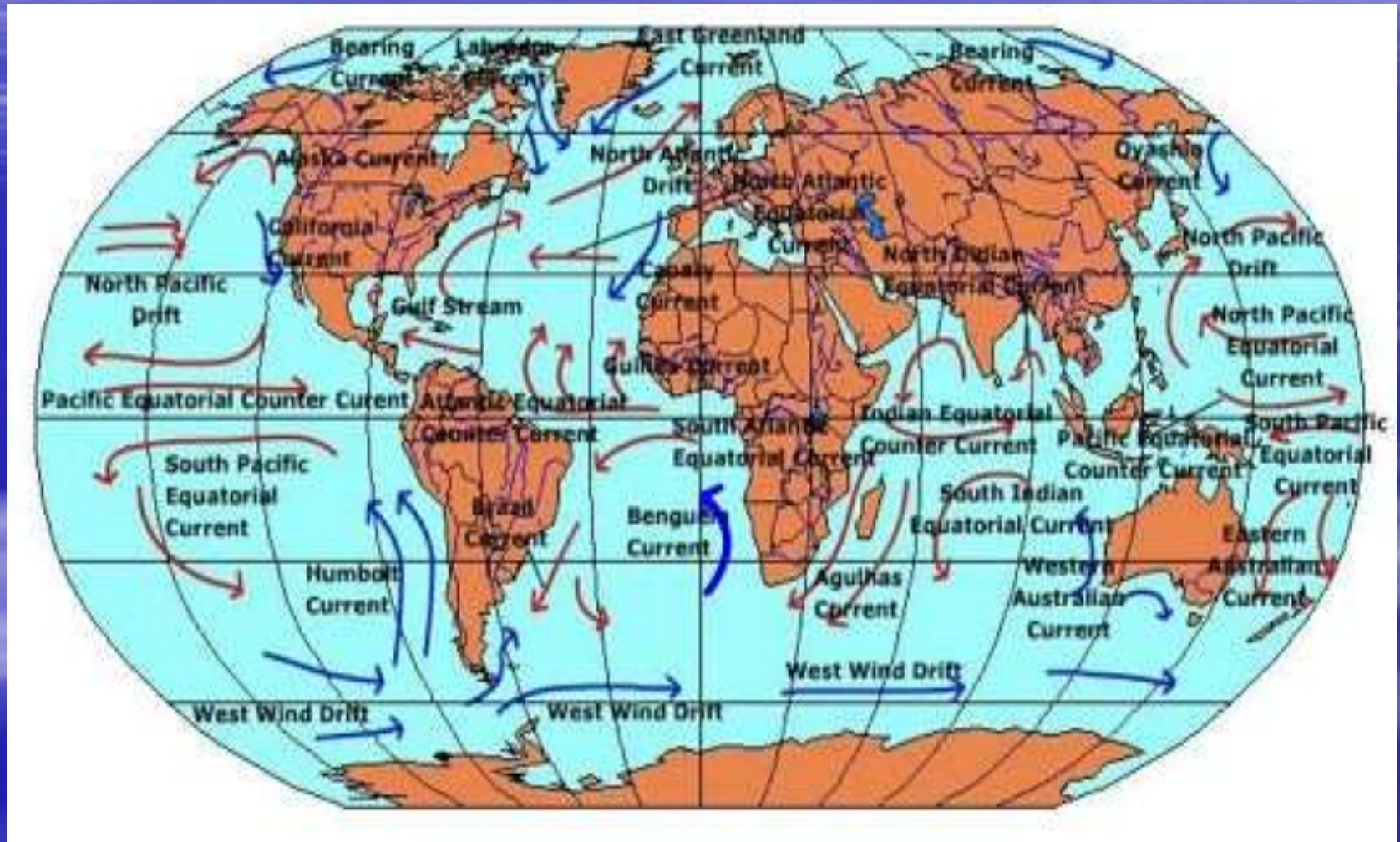
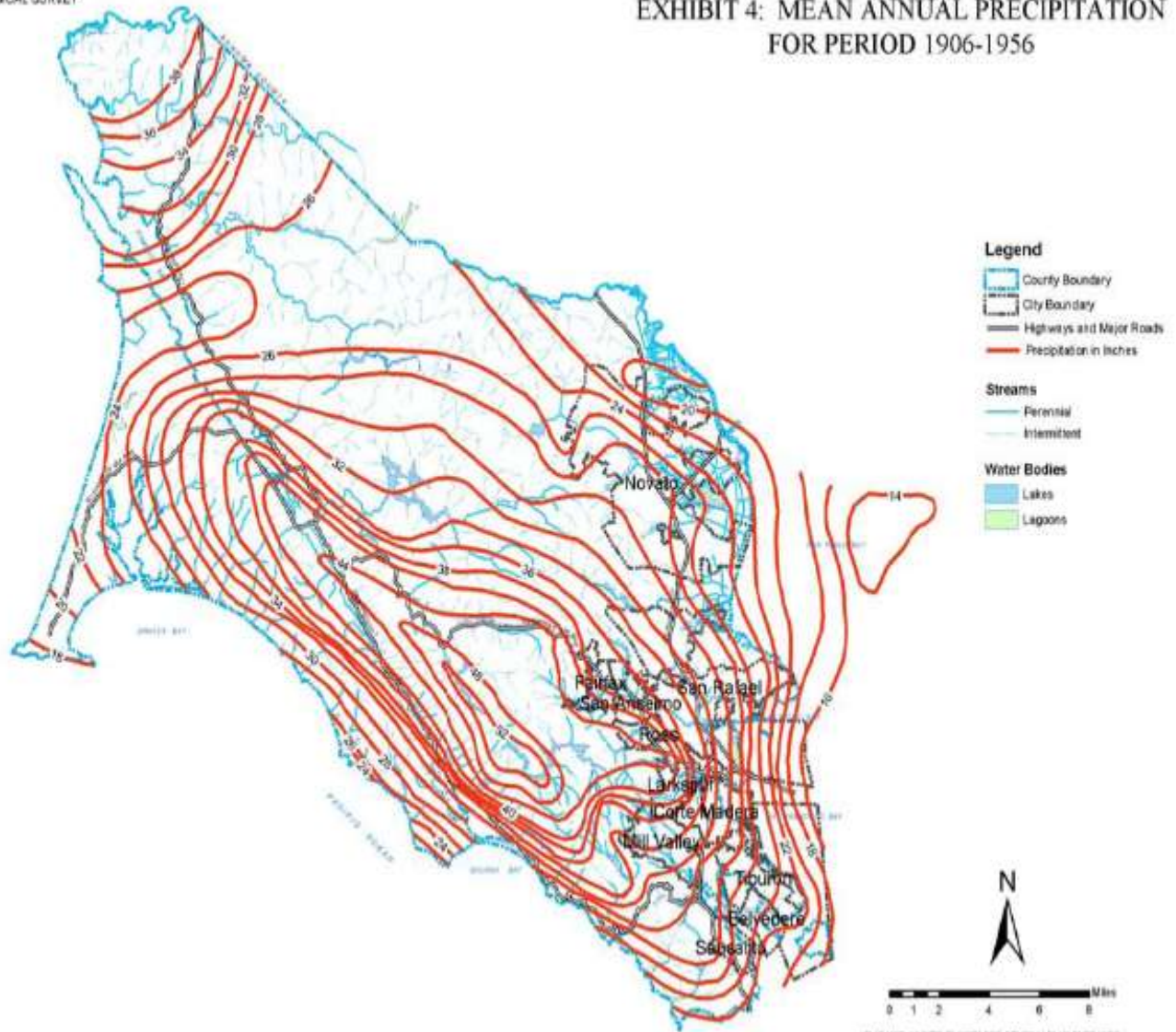


EXHIBIT 4: MEAN ANNUAL PRECIPITATION FOR PERIOD 1906-1956



THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES.
THE COUNTY OF MARIETTA IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

Relief Rainfall in Marin County

When it rains, it pours – and here's why

In the shadow of Mount Tamalpais, the Kentfield area receives more precipitation than many other parts of the Bay Area because of a phenomenon called "orographic uplift." Mount Tamalpais shows this process clearly because of its singular ridge lining up against incoming winter storms.

❶ Winter storms from the Pacific rotate in a southwesterly counterclockwise motion as they reach the Bay Area.

❷ The storm wind is warmed as it flows over land.

❸ Warm wind is forced over Mount Tamalpais.

❹ Wind cools down and condenses into clouds as it crests the ridge.

❺ The cooler clouds don't hold water as well as warmer air, so the vapor sinks, producing copious amounts of rain over the mountain and Kentfield area.

❻ Proceeding eastward, the wind warms up again.



Predicted 24-hour rainfall amounts for 4 a.m., Saturday

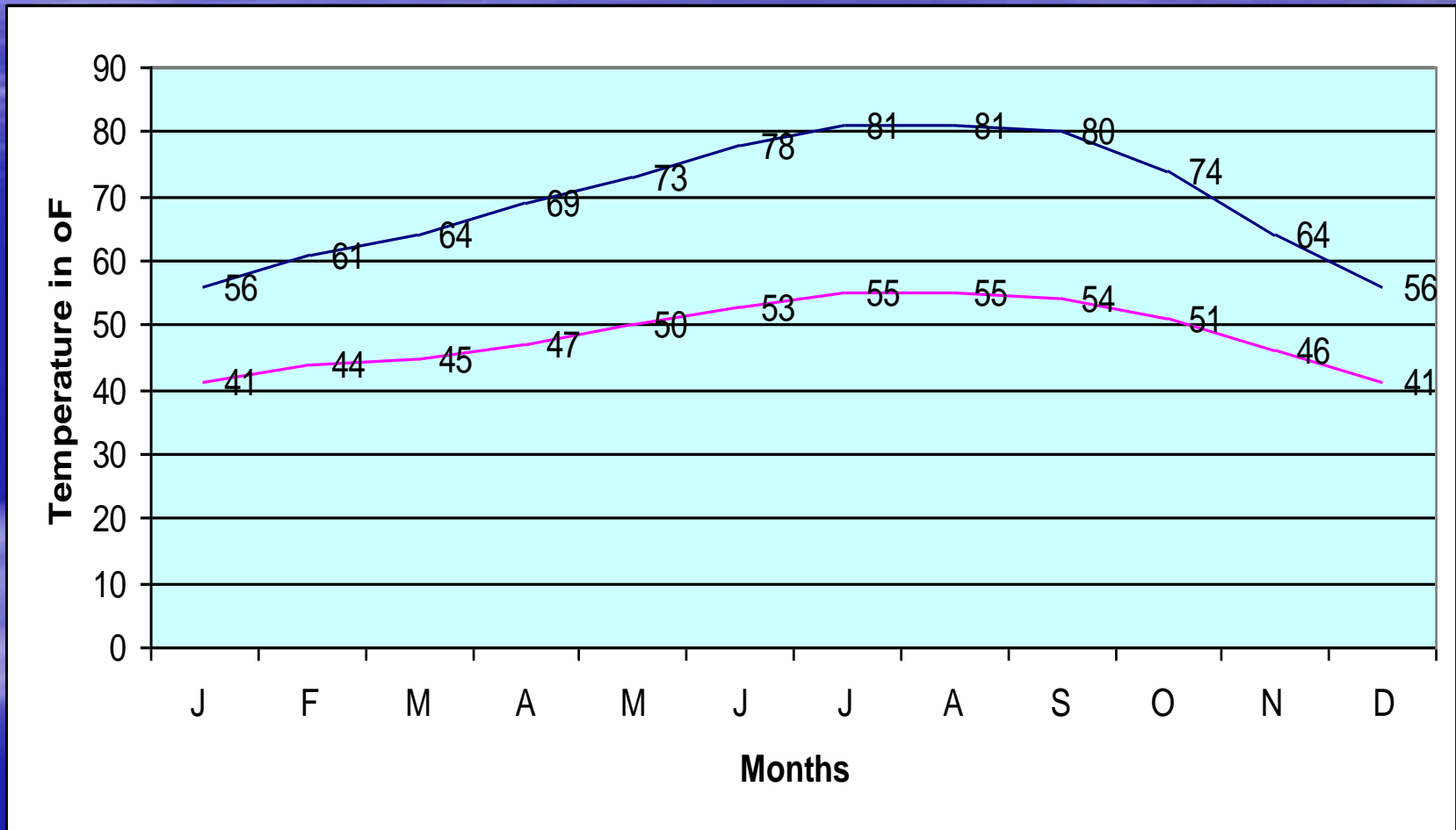


Sources: Geographic Data Technology, NOAA, map image by Google Earth, rainfall image by NOAA

JOHN BLANCHARD / The Chronicle

SF Chronicle, Jan 4, 08

Maximum & minimum temperatures in Novato



Other influences on climate

- Fog gaps
- Aspect
- Shade from natural features
- Cooling influence of water
- Man made features providing shade

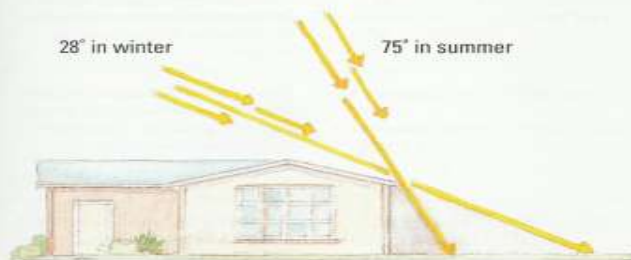
MICROCLIMATES

Sun and shade

In summer, the morning sun rises in the northeast, arcs high across the southern sky, and sets in the evening to the northwest. This long passage means extra hours of daylight—by the time of the summer solstice in June, approximately 16 hours in Seattle and 14½ hours in San Diego. By contrast, the winter sun rises in the southeast, passes low across the southern sky, and sets to the southwest. Days are much shorter at winter solstice in December, approximately 8½ hours in Seattle and 10 hours in San Diego.

That shifting sun angle means longer shadows in winter when the sun is low in the sky—leaving a greater part of the garden in shade during the dormant season and more of it in the sun when plants are growing. The pattern of sun and shade also varies depending on the time of day; at noon, when the sun is highest, there is little shade to be found.

SUN ANGLES

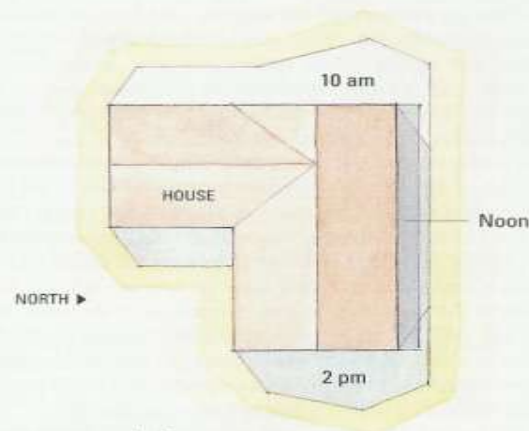


In winter, the sun crosses the sky at a lower angle than it does in summer. The effects can be pronounced, especially on north-facing exposures. The illustration above shows how the ground is shaded by the house at noon in summer and winter.

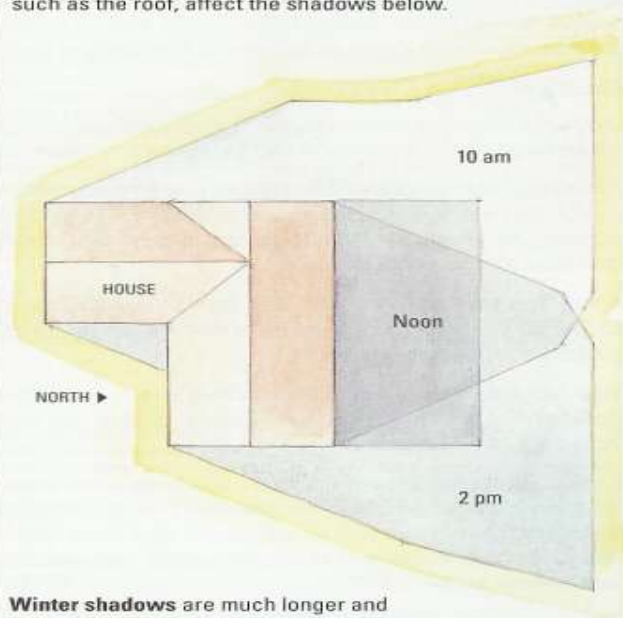
Exposure

Slopes that drop to the south or southwest get more heat during the day than those that drop to the north or northeast. Similarly, walls that run east and west reflect extra heat and sunlight onto plants on their south sides. Walls that run north and south reflect extra heat to plants growing on their west sides, but cooler microclimates are created on their east sides. Sunny locations are best for heat-loving plants, but the soil is also affected, drying out faster and requiring extra irrigation.

SUMMER AND WINTER SHADOWS



In summer, only those areas immediately beside the house are shaded. Note how features of the house, such as the roof, affect the shadows below.



Winter shadows are much longer and can shift dramatically within the space of a few hours. Compare the shadow cast at noon to that cast at 2 pm.

Microclimates in Marin

Zone 15	Zone 16	Zone 17
<p>Lows = 28-21 o F Record lows = 26-16 o F Average highs= 104-116 o F Cold winters Hot summers Windy on summer afternoon Winter chill Eg Novato 35 days to delay of maximum</p>	<p>Lows = 32-18 o F Record lows= 25-18 o F Average highs=104-116 o F Thermal belts provide benign climates Windy on summer afternoon Eg San Anselmo 40-45 days to delay of maximum</p>	<p>Lows = 36 - 23 o F Record lows = 30-20 o F Average highs = 97 o F Foggy in summer. Humid and cooler in summer but milder in winter. Eg Inverness 70-90 days to delay of maximum</p>

3)How can we use microclimates to our advantage?

- Seed and plant selection
- Improve the soil
- Protect crops from temperature fluctuations
- Informed use of irrigation

Bibliography

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