Fog

The fog comes
on little cat feet.
It sits looking
over the harbor
and city
on silent haunches
and then
moves on.

— *Carl Sandburg*

Bill Lovejoy/Sentinel

When mists reduce a fisherman's horizontal visibility, as above, he's caught in a fog; if the horizon were clear, he'd be under a low cloud deck.

Lifting the shroud off the bay's mysterious mists

By RICHARD EMANUEL
Sentinel staff writer

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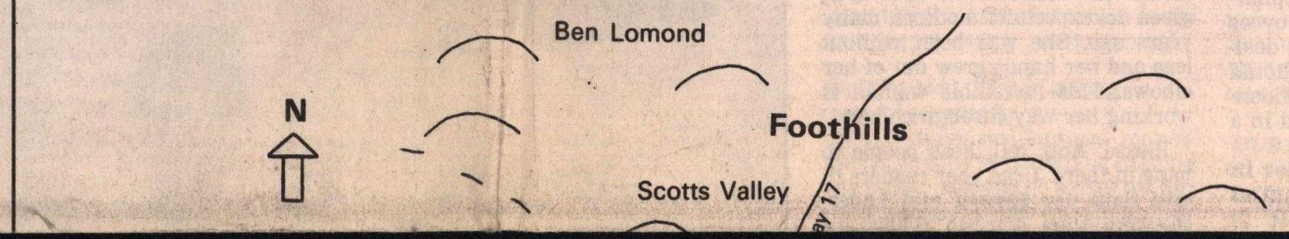
"The cold marine air is our natural air conditioner," Balogh says. "That's why so many people from San Jose come here to escape the heat."

Land heats and cools five times faster than water, he explains. Sunshine rapidly heats the land on a clear day, but seawater

Health/science

The county's microclimates



THERE IS NO DENYING the element of poetry, romance and mystery in fog, which steals on cat feet, often where land meets sea.

But the romance of fog thins in a place like Santa Cruz, a county wrapped around miles of beachfront and humming with a summer tourist trade.

A summer fog bank that outlasts the morning here provokes more grumbled complaints than sonnets. But all the muttering may mask an important aspect of local weather: It varies dramatically from place to place.

"They say in New England, if you don't like the weather, wait a few minutes," quotes Dave Balogh, a Cabrillo College climatologist. "In Northern California, if you don't like the weather, walk a few blocks."

There is no such thing as a single "Santa Cruz climate," Balogh says, only a complex pattern of microclimates that vary over short distances. Climate is simply average weather, and DeLaveaga Park's weather typically differs from the weather at Lighthouse Point.

What is more, these variations in microclimate affect more than beach volleyball games. They affect heating bills, real estate sales and even land development in Santa Cruz County.

MONTEREY BAY plays a dominant role in the weather of the coastal lands that ring it. The ocean off Northern California is cold and teeming with life because nutrient-rich water wells from chilly depths along the coast. Cold seawater chills the overlying air.

San Jose come here to escape the heat."

Land heats and cools five times faster than water, he explains. Sunshine rapidly heats the land on a clear day, but seawater temperature is little affected.

"Hot air is lighter than cold air," he says. Heated air rises, lowering the barometric pressure. Wind moves from areas of high pressure to low pressure, so it typically blows at the surface from the cold sea to the hot land during the day.

After dark, the land cools quickly. When it is cooler than the sea, the surface wind pattern reverses, blowing from land to sea.

This daily pattern of daytime sea winds followed by nighttime land breezes holds more than 70 percent of the time, according to weather observations at Cabrillo College, Balogh states.

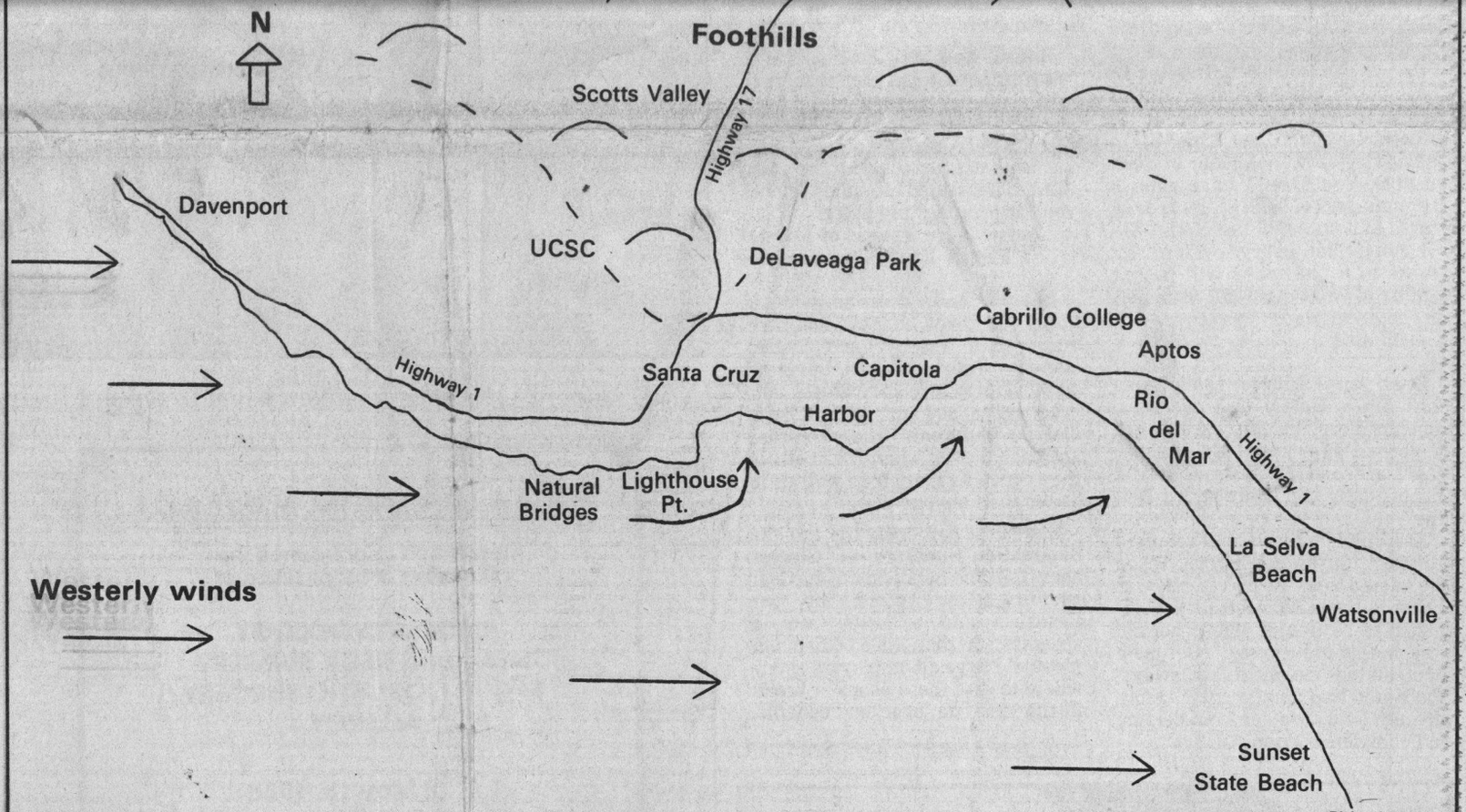
BUT MONTEREY Bay does more than dominate local surface wind patterns, it is the fountainhead of Santa Cruz' summer fog and low clouds.

"Fog is a cloud on the ground," Balogh says simply. Technically, fog is a mist of condensed water droplets that reduces visibility to less than ¼ mile at ground level.

By this definition, fog is really somewhat exceptional here. "What we *do* get are low stratus clouds," Balogh explains. "People often call it fog, but unless it actually reduces horizontal visibility, it's just a low cloud deck."

Air always contains some water vapor, or humidity, but there is a limit to the amount of water that it can hold. Hot air can hold more water vapor, cold air cannot hold

Please see FOG — **E3**



Richard Emanuel

Weather in the Santa Cruz area is dominated by a multiplicity of microclimates — climates that can vary dramatically over a short distance. The coast from Davenport through Natural Bridges and from La Selva Beach south is directly exposed to prevailing westerly winds. Fog banks may blow ashore in those areas first, although strong winds may also dissipate fog.

East Santa Cruz through Soquel lies in a wind shadow, partially protected from westerly winds. Fog usually sets in last in the wind shadow and burns off there first.

Scotts Valley, Corralitos and Watsonville are far enough inland to escape some of the coastal influence. The elevation rise up the San Lorenzo Valley creates upslope fog and increases rainfall, which may be twice as heavy in Boulder Creek compared with Santa Cruz.

Even within a general climatic zone, weather and climate, which is average weather, can vary depending on southern exposure and local topography.

"The heating bill for a properly designed and sited house can be half the heating bill of the house across the street," says Cabrillo College climatologist Dave Balogh.

Fog/ The bay gives us microclimates

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as much. If an air mass is cooled enough — to its dew point — water will condense into tiny droplets and form fog or a cloud, and possibly rain.

Fog or low-level stratus clouds are produced in one of three ways, Balogh says.

• Advection fog is produced in one place and moved somewhere else. "Most of our Santa Cruz fog is produced in this way," he notes. "It's produced at sea and blown in with the wind."

• Upslope fog results when air cools as it rises to pass over a mountain. Moist air climbing up the San Lorenzo Valley, for instance, may condense into fog or clouds. "That's why Boulder Creek gets twice as much rain as Santa Cruz," he observes.

• Radiation fog, or tule fog, forms when the ground cools by radiating heat into a clear, usually nighttime, sky. Moist overlying air is chilled by the ground and fog results. "Tule fog is common in the winter in the Central Valley, but we don't get it much around here," he says.

The cool, moist air over Monterey Bay is often close to the dew point, ready to condense into fog or stratus clouds with a slight drop in temperature. Salt-spray adds to the readiness by throwing salt crystals into the air; the crystals act as nuclei around which moisture condenses.

"It's a sort of pre-fog," Balogh says. "You can see it sitting offshore lots of days. It's the reason you can't see Monterey from here most of the time."

When the temperature drops, as it does at night, the pre-fog over the bay may condense into the real thing. Banks of fog or stratus clouds form near the coast or sit offshore until wind blows the stuff ashore.

Dan Coyro/Sentinel

Dave Balogh has studied Santa Cruz' varied climate

This is easily accomplished by the nighttime surface land-to-sea breeze, which sets up a return airflow from sea to land about 300 feet above the surface. To this movement is added the influence of the prevailing winds.

"The prevailing wind here is westerly," Balogh points out. "Fog and stratus clouds blow ashore first in places exposed to the westerly wind," like Rio Del Mar and La Selva Beach.

Other parts of the Santa Cruz area open on the bay to the south. "The wind has to curve around to blow fog or clouds ashore there," he says. "The last place to get it is the so-called Banana Belt, roughly from Lighthouse Point through Soquel."

Advection fog and stratus clouds build up most where they first come ashore. With daytime heating, the stuff burns off or dispells from those areas last.

"When it's really hot, we have a lot of onshore airflow," Balogh says. As the heat builds, daytime breezes from the sea grow strong, pushing more "pre-fog" haze, fog and clouds ashore at the coast.

The heavier haze and overcast at the shore persists longer the next day and shields the land from the sun. Daytime heating is reduced, the shoreward breeze is weakened and less sea-air blows ashore. The fog buildup is less.

"That's why a few days of late burning fog and clouds are followed by a few days of early burning fog," Balogh explains. "It's a fairly predictable cycle."

But Balogh is quick to point out that there is more to human comfort than fog. Temperature, humidity, wind and solar radiation together determine comfort — and where people are most likely to live.

A house with extensive south-facing exposure can pick up considerable solar heat, he says, but the heat thus gained can be drained away if the house is exposed to a cooling wind.

"In general, the people who settled here first were pretty smart," Balogh says. "They located on the San Lorenzo River for water, but you'll notice both the mission and Villa Branciforte were located on the east side of the present town, in the lee of the wind.

"If you look at a map of land development, those places settled first generally have the best climate," he continues. "Unless there is some other reason why it was locked up, there is probably a good reason why land that's still undeveloped wasn't built on before now. Often that reason is climate."

Vegetation patterns provide another clue to microclimates. Redwood trees need fog to thrive, Balogh notes. Study has shown that redwoods scavenge as much moisture from summer fog as they would get from 10 inches of rain. And the cool, moist ground beneath the towering trees is shielded by mist from the hot, drying sun.

"You can make general statements about the climate of an area," Balogh says, "but there are always local exceptions. There is more variability in climate in Santa Cruz County than in the entire distance from Boston to South Dakota. There's no ocean (between Boston and South Dakota) and there's not much topographic change.

"Here, if you want to know the climate in your own backyard, you're going to have to measure it yourself."