CHAPTER 2
PLANNING AREA AND AIR BASIN DESCRIPTION

PHYSICAL DESCRIPTION OF PLANNING AREA

LAND USE AND POPULATION

LOCAL AND REGIONAL METEOROLOGY

2.1 PHYSICAL DESCRIPTION OF PLANNING AREA

San Luis Obispo County constitutes a land area of approximately 3,316 square miles with varied vegetation, topography and climate. The diversity of environmental conditions found in the county is greater than its size would suggest. It is bordered by Monterey County to the north, Santa Barbara County to the south, and Kern County to the east, with the Pacific Ocean as the western border. From a geographical and meteorological standpoint, the county can be divided into three general regions: the Coastal Plateau, the Upper Salinas River Valley, and the East County Plain (Figure 2-1). Air quality in each of these regions is characteristically different, although the physical features which divide them provide only limited barriers to transport of pollutants between regions. Predominant features of each region are discussed in the following section.

Geographical Regions in the County

About 75% of the county population and a corresponding portion of the commercial and industrial facilities are located within the coastal plateau. With higher population density and closer spacing of urban areas, emissions of air pollutants per unit area are generally higher here than in other regions of the county.

The coastal plateau is about five to ten miles wide and varies in elevation from sea level to about 500 feet. It is bounded on the northeast by the Santa Lucia Mountain Range, which extends almost the entire length of the county. Rising sharply to about 3,000 feet at its northern boundary, the Santa Lucia Range gradually winds southward away from the coast, finally merging into a mass of rugged features on the north side of Cuyama Canyon.

Point Buchon juts into the Pacific just south of Morro Bay to form the protective harbor of San Luis Obispo Bay. The Irish Hills are the dominant feature on this knob of land, rising abruptly from the shore to form steep cliffs and generally complex terrain from the Los Osos/Montana de Oro State Park area to Pismo Beach. These headlands have a pronounced influence on local windflow patterns. Winds on the lee side of the point often flow perpendicular to the prevailing winds and funnel back and forth through Price Canyon and the Highway 101 corridor. This effect is markedly reduced south of Grover Beach.

South of Point Buchon lies the Nipomo Dune system, which begins in the vicinity of Pismo Beach and extends to Mussel Rock, near Point Sal. This natural landmark plays host to a large number of endemic and rare plant species, as well as an unparalleled array of dune uplands, lakes and wetlands. The Nipomo Mesa is an old dune sheet that rises precipitously from the Santa Maria River floodplain on the south, and the Arroyo Grande Creek floodplain to the north.

Estuaries are also a notable feature of the coastal areas, occurring wherever flowing streams meet the ocean. Morro Bay contains the region's largest estuary, with a saltwater marsh located on the east side where Chorro and Los Osos creeks enter the bay. This is one of the most significant wetlands remaining on the California coast and has been designated part of the National Estuary Program. It provides nesting habitat for blue herons, cranes and other important types of woodland birds and wildlife. Smaller coastal lagoons and marshes are also scattered along the county's shoreline.

The Upper Salinas River Valley, located in the northern one-third of the county, houses 25% of the county's population. Historically, this region has experienced the highest ozone and particulate levels in the county. Transport of ozone precursors from the coastal plateau and from the San Joaquin Valley may contribute to this condition.

This area of plains and low rolling hills is bounded on the west by the Santa Lucia Range and to the east by the Cholame Hills, a northern extension of the Temblor Range. Southward, the La Panza Range gradually rises east of Santa Margarita and runs roughly parallel to the coast, merging with the Caliente Range near the southern border of the county. Caliente Mountain, the highest peak in the county at 5,104 feet, is found in this range.

The Upper Salinas River Valley is characterized by a variety of vegetation communities including riparian, oak woodlands, wetlands, native and nonnative grasslands, and chaparral. Coastal Live Oak and Blue Oak are dominant features of the landscape, with a wide variety of wildlife supported by the oak woodlands scattered throughout the area. Riparian trees such as cottonwoods and willows are common along drainage channels, streams, reservoirs, and marshes. Grassland vegetation is widespread on the rolling hills and flat areas that are either too dry to support oak woodland or have been cleared of oaks in the past.

The East County Plain is the largest region by land area, but only one percent of the county population resides there. Dryland farming and unpaved roads in this region contribute to county totals for particulate emissions, but these emissions rarely affect other regions of the county.

A significant portion of this area is a landlocked drainage basin called the Carrizo Plain, which lies between the La Panza and Caliente Ranges on the west and the Temblor Range to the east. These mountains join together to close the basin at the southeastern tip of the county. The Diablo Range occupies the extreme northeastern portion of this region and, like the Temblors, lies adjacent to the San Joaquin Valley.

The basin of the Plain is a dry, salt lake with alkali flats and saltbush-scrub as the principal vegetation. The upland areas are characteristic of an arid prairie, with little vegetation except dry grass. This region is best described as a steppe, a dry grass covered area with wide temperature fluctuations.

2.2 LAND USE AND POPULATION

Land Use

The predominant land use in San Luis Obispo County is agriculture, with the production and processing of vegetable crops, wine grapes, dryland grains and livestock as the major components. The southern and coastal areas of the county are primarily devoted to the production of row crops (lettuce, broccoli, peas and other vegetables), although cattle ranching prevails along the north coast. Vineyards, grain production, livestock grazing, and show and thoroughbred horse ranching are the dominant land uses in the Upper Salinas River Valley; the East County Plain supports some cattle ranches and dryland grain farms. Much of the county's agricultural land is property committed to agricultural use for periods of up to 20 years under the Williamson Act. In 1999, agricultural acreage totaled approximately 1,198,771 acres, with a gross crop value of $393,023,000. Production in the animal industry was valued at $36,031,000 for the same period. The largest change in agricultural uses in recent years has been a substantial increase in vineyard plantings for wine grapes. In 1998 there were 11,897 bearing acres; this increased to 16,272 bearing acres in 1999, with an additional 24,660 acres planted that year.

As the income from agricultural production is dispersed through other sectors of the local economy, its value to the region multiplies two to four times. Thus, the involvement of related businesses such as production equipment and products, agricultural financing, energy usage, packaging and marketing is estimated to have contributed between $786 million and $1.6 billion dollars in local agribusiness-related commerce in 1999.

The county's urban areas exist as separate and uniquely distinct clusters of development. San Miguel, Templeton, Atascadero, Cambria, Cayucos, Los Osos, Oceano and Nipomo are primarily residential communities; of these Atascadero is the only incorporated city. In contrast, San Luis Obispo, Morro Bay, the Five Cities area and Paso Robles have a much broader mix of commercial and residential uses. Residential development has been limited in some areas of the county as a result of moratoriums, growth management issues, and resource constraints.

The City of San Luis Obispo is the county seat and commercial center of the region, with 21.6% of the employment opportunities and a commercial airport located there. Commercial and industrial development has been growing steadily in the northern areas of the county, particularly in Atascadero which now boasts 11.9% of the employment opportunities and Paso Robles which follows with 8%. Industrial and commercial activities important to the region include agriculture, tourism, trade and services, government agencies, power generation, petroleum production, construction, and commercial fishing.

Institutional uses occupy significant portions of the regional land area and are important to the economic well-being of the county. Higher education facilities include California Polytechnic State University and Cuesta Community College. The County Office of Education provides special education for handicapped children as well as an Environmental Education Center for use by various groups to foster better understanding of the environment. Major institutional facilities include Atascadero State Hospital, California Mens Colony, Paso Robles Boys School, and National Guard facilities at Camp San Luis and Camp Roberts. Industrial land uses include a 1,000 megawatt fossil-fuel fired power plant in Morro Bay, a 2,000 megawatt nuclear power plant at Diablo Canyon, a petroleum refinery and coke calcining complex on the Nipomo Mesa, several large oil fields and tank farms, and many smaller industrial operations described in further detail in Chapter 5.

A substantial amount of land in San Luis Obispo County is dedicated to open space and recreational uses. The county boasts several state and regional parks, the Morro Bay Wildlife Refuge, the Nipomo Dunes, the Los Padres National Forest, and many coastal and inland recreation areas. The Hearst San Simeon State Historical Monument contains a large portion of open space land in addition to Hearst Castle, and is a significant generator of revenue for the state and local economies.

Population

San Luis Obispo County had a 1999 population of approximately 241,600 people, an increase of about 14,375, or 6%, since 1995. Over 75% of the residents live along the Highway 101 corridor, which services six of the county's seven incorporated cities and five unincorporated communities. Most of the remaining populace lives to the west of that corridor. The estimated median age in San Luis Obispo County has increased from about 29.9 years in 1980, to 33.3 years in 1990, to 37.3 years in 2000. Cambria, Cayucos, Morro Bay and Pismo Beach have the highest percentage of residents aged 65 and above; Oceano, Nipomo and most north county communities have the highest percentage of residents less than 17 years old. The City of San Luis Obispo has the lowest median age in the county, primarily due to a large resident population of college students attending Cal Poly and Cuesta College.

Table 2-1 shows the distribution of county population between incorporated cities and unincorporated county areas, together with projections of their growth. Growth projections are based on the SLO County Planning Department and San Luis Obispo Council of Governments population estimates for January 1, 1999; local evaluation of historical growth rates; national, state, and local economic forecasts; and the availability of resources to support additional growth. Estimates for incorporated cities are based on growth projections and policies provided by the cities. Figure 2-2 shows the location of the planning

areas listed in the population tables. These geographic boundaries are used by the County for land use planning purposes and for monitoring population and demographic trends.

Between 1990 and 1999, the county's population grew 11% or at an average rate of 1.3% per year. Current estimates project the number of county residents to increase 25% by the year 2015, with rate of growth in the unincorporated rural areas out pacing incorporated cities. Table 2-2 ranks the cities, unincorporated communities and planning areas by the projected percent increase in population from 1995 to the year 2015. As shown in the table, Nipomo, Cambria, Paso Robles, Nacimiento and Templeton are projected to experience the highest percent increase in population. The cities of Pismo Beach and Atascadero are also expected to show significant growth during this period.

The region's top three employment sectors - retail trade, government, and services - account for 25%, 25% and 24% of total employment, respectively. Employment growth is expected to continue in most sectors of the local economy, with most new jobs occurring in retail trade, education and health services. Employment in the farming industry has also been on the rise over the past several years due to the ongoing expansion of the wine grape and production industry. Although the recession in the early 1990s had significant impacts throughout the region, our overall unemployment rate remains among the lowest in the state.

2.3 LOCAL AND REGIONAL METEOROLOGY

The climate of the county can be generally characterized as Mediterranean, with warm, dry summers and cooler, relatively damp winters. Along the coast, mild temperatures are the rule throughout the year due to the moderating influence of the Pacific Ocean. This effect is diminished inland in proportion to distance from the ocean or by major intervening terrain features, such as the coastal mountain ranges. As a result, inland areas are characterized by a considerably wider range of temperature conditions. Maximum summer temperatures average about 70 degrees Fahrenheit near the coast, while inland valleys are often in the high 90s. Minimum winter temperatures average from the low 30s along the coast to the low 20s inland.

Regional meteorology is largely dominated by a persistent high pressure area which commonly resides over the eastern Pacific Ocean. Seasonal variations in the strength and position of this pressure cell cause seasonal changes in the weather patterns of the area. The Pacific High remains generally fixed several hundred miles offshore from May through September, enhancing onshore winds and opposing offshore winds. During spring and early summer, as the onshore breezes pass over the cool water of the ocean, fog and low clouds often form in the marine air layer along the coast. Surface heating in the interior valleys dissipates the marine layer as it moves inland.

From November through April the Pacific High tends to migrate southward, allowing northern storms to move across the county. About 90% of the total annual rainfall is received during this period. Winter conditions are usually mild, with intermittent periods of precipitation followed by mostly clear days. Rainfall amounts can vary considerably among different regions in the county. In the Coastal Plain, annual rainfall averages 16 to 28 inches, while the Upper Salinas River Valley generally receives about 12 to 20 inches of rain. The Carrizo Plain is the driest area of the county with less than 12 inches of rain in a typical year.

Airflow around the county plays an important role in the movement and dispersion of pollutants. The speed and direction of local winds are controlled by the location and strength of the Pacific High pressure system and other global patterns, by topographical factors, and by circulation patterns resulting from temperature differences between the land and sea. In spring and summer months, when the Pacific High

attains its greatest strength, onshore winds from the northwest generally prevail during the day. At night, as the sea breeze dies, weak drainage winds flow down the coastal mountains and valleys to form a light, easterly land breeze.

In the Fall, onshore surface winds decline and the marine layer grows shallow, allowing an occasional reversal to a weak offshore flow. This, along with the diurnal alternation of land-sea breeze circulation, can sometimes produce a "sloshing" effect. Under these conditions, pollutants may accumulate over the ocean for a period of one or more days and are subsequently carried back onshore with the return of the sea breeze. Strong inversions can form at this time, "trapping" pollutants near the surface.

This effect is intensified when the Pacific High weakens or moves inland to the east. This may produce a "Santa Ana" condition in which air, often pollutant-laden, is transported into the county from the east and southeast. This can occur over a period of several days until the high pressure system returns to its normal location, breaking the pattern. The breakup of a Santa Ana condition may result in relatively stagnant conditions and a buildup of pollutants offshore. The onset of the typical daytime seabreeze can bring these pollutants back onshore, where they combine with local emissions to cause high pollutant concentrations. Not all occurrences of the "post Santa Ana" condition lead to high ambient pollutant levels, but it does play an important role in the air pollution meteorology of the county.

Atmospheric Stability and Dispersion

Air pollutant concentrations are primarily determined by the amount of pollutant emissions in an area and the degree to which these pollutants are dispersed into the atmosphere. The stability of the atmosphere is one of the key factors affecting pollutant dispersion. Atmospheric stability regulates the amount of vertical and horizontal air exchange, or mixing, that can occur within a given air basin. Restricted mixing and low wind speeds are generally associated with a high degree of stability in the atmosphere. These conditions are characteristic of temperature inversions.

In the atmosphere, air temperatures normally decrease as altitude increases. At varying distances above the earth's surface, however, a reversal of this gradient can occur. This condition, termed an inversion, is simply a warm layer of air above a layer of cooler air, and it has the effect of limiting the vertical dispersion of pollutants. The height of the inversion determines the size of the mixing volume trapped below. Inversion strength or intensity is measured by the thickness of the layer and the difference in temperature between the base and the top of the inversion. The strength of the inversion determines how easily it can be broken by winds or solar heating.

Several types of inversions are common to this area. Weak, surface inversions are caused by radiational cooling of air in contact with the cold surface of the earth at night. In valleys and low lying areas this condition is intensified by the addition of cold air flowing downslope from the hills and pooling on the valley floor. Surface inversions are a common occurrence throughout the county during the winter, particularly on cold mornings when the inversion is strongest. As the morning sun warms the earth and the air near the ground, the inversion lifts, gradually dissipating as the day progresses.

During the late spring and early summer months, cool air over the ocean can intrude under the relatively warmer air over land, causing a marine inversion. These inversions can restrict dispersion along the coast, but they are typically shallow and will dissipate with surface heating.

In contrast, in the summertime the presence of the Pacific high pressure cell can cause the air mass aloft to sink. As the air descends, compressional heating warms it to a temperature higher than the air below. This highly stable atmospheric condition, termed a subsidence inversion, is common to all of coastal California and can act as a nearly impenetrable lid to the vertical mixing of pollutants. The base of the

inversion typically ranges from 1000 to 2500 feet above sea level; however, levels as low as 250 feet, among the lowest anywhere in the state, have been recorded on the coastal plateau in San Luis Obispo county. The strength of these inversions makes them difficult to disrupt. Consequently, they can persist for one or more days, causing air stagnation and the buildup of pollutants. Highest or worst-case ozone levels are often associated with the presence of this type of inversion.

Figure 2-3 provides a visual representation of inversions at the surface and aloft.

Table 2-1

SAN LUIS OBISPO COUNTY
POPULATION PROJECTIONS - JULY 1999

PLANNING AREA	1995	2000	2005	2010	2015
ADELAIDA	3060	3226	3441	3634	3801
EL POMAR/ESTRELLA	6832	7555	8341	9119	9872
ESTERO	27764	28996	30796	32535	34105
Morro Bay	9221	9662	10145	10552	10959
Cayucos	2876	3312	3657	3959	4202
Los Osos	14444	14768	15676	16639	17488
Estero (Rural)	1223	1254	1318	1385	1456
HUASNA-LOPEZ	773	850	871	889	902
LAS PILITAS	1355	1398	1491	1575	1647
LOS PADRES	322	330	345	359	372
NACIMIENTO	2700	2955	3426	3895	4385
NORTH COAST	6265	7497	8400	9411	10545
Cambria	5401	6599	7394	8284	9282
North Coast (Rural)	864	898	1006	1127	1263
SALINAS RIVER	55544	60462	68142	75219	79499
Atascadero[1]	23982	25516	28588	31150	31150
Paso Robles	20020	22170	25701	29220	32579
San Miguel	1200	1252	1389	1526	1660
Santa Margarita	1208	1291	1343	1391	1433
Templeton	3173	3992	4364	4724	5064
Salinas River (Rural)	5961	6241	6757	7208	7613
SAN LUIS BAY	45583	49077	53249	57301	59970
Arroyo Grande[1]	14719	16122	17626	18988	18988
Avila Beach	379	385	415	443	470
Grover Beach	11905	12781	13426	14104	14816
Oceano	6300	6741	7262	7785	8304
Pismo Beach	7922	8567	9693	10807	11873
San Luis Bay (Rural)	4358	4481	4827	5174	5519
SAN LUIS OBISPO	43252	45420	47718	50093	52567
San Luis Obispo (City)	39814	41774	43905	46145	48499
San Luis Obispo (Rural)	3438	3646	3813	3948	4068
SHANDON-CARRIZO	2470	2565	2804	3036	3255
SOUTH COUNTY	16786	19243	22097	25020	27907
Nipomo	8416	10074	12023	14006	15924
Nipomo (Rural)	8370	9169	10074	11014	11983
COUNTY TOTAL (Households Only)	213375	229574	251121	272086	288827
Incorporated Cities	128185	136592	149084	160966	168864
Unincorporated Areas	85190	92982	102037	111120	119963
GROUP QUARTERS[2]	14519	15109	15723	16362	17027
Incorporated Cities	3174	3303	3437	3577	3722
Unincorporated Cities	11345	11806	12286	12785	13305
COUNTY TOTAL (Hsehds + Grp Qtrs)	227894	244683	266844	288448	305854

Source: San Luis Obispo County Department of Planning and Building - July 1999

[1] No increase indicated beyond 2010 for Atascadero and Arroyo Grande in recognition of city buildout policies.
[2] Group Quarters includes nursing homes, school dormitories, military barracks, prisons, jails, hospitals, etc.

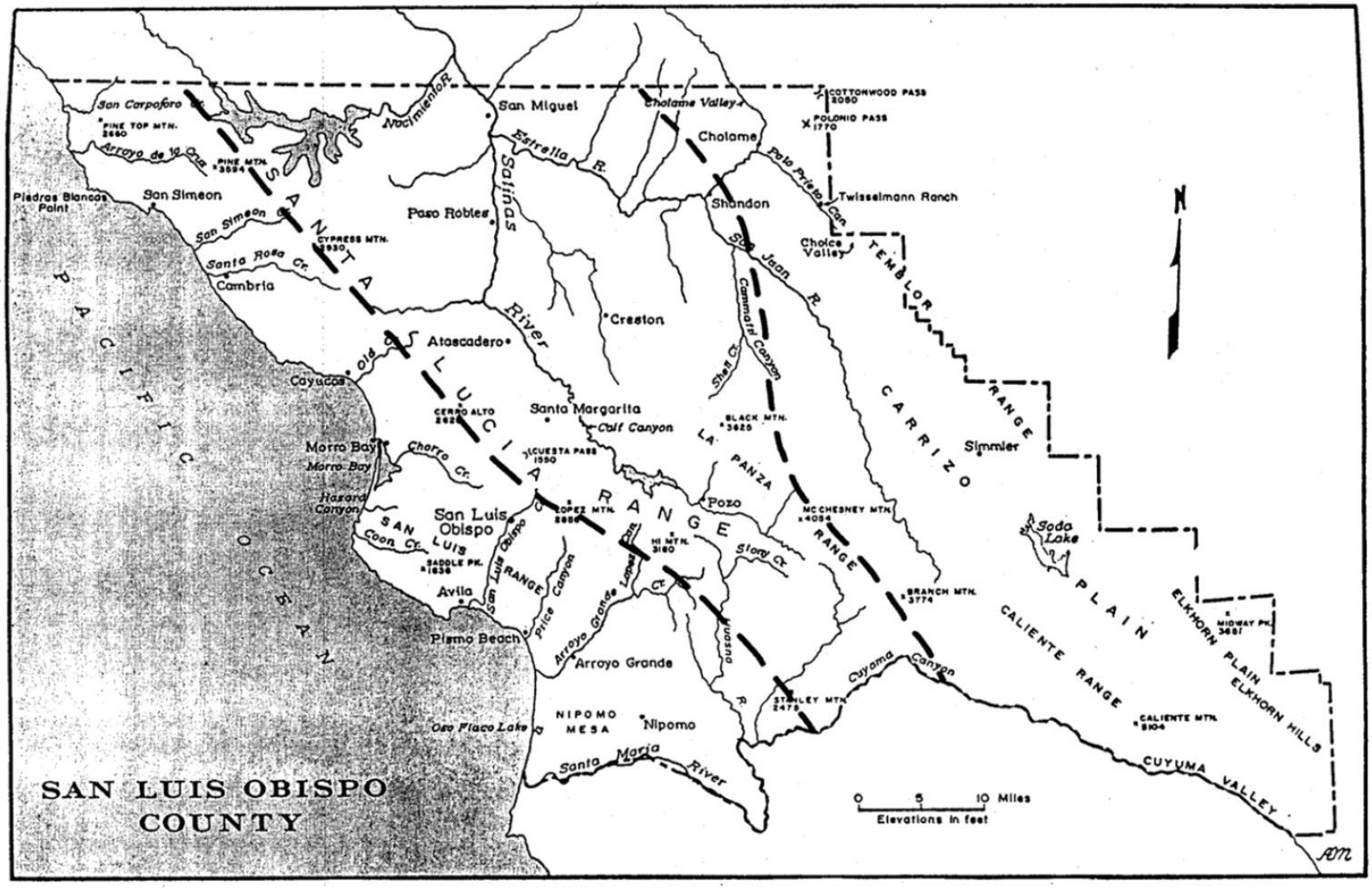
Table 2-2

SAN LUIS OBISPO COUNTY
PROJECTED POPULATION RATE OF GROWTH

PLANNING AREA/COMMUNITY	1995	2015	GROWTH
Nipomo	8416	15924	89%
Cambria	5401	9282	72%
Paso Robles	20020	32579	63%
Nacimiento	2700	4385	62%
Templeton	3173	5064	60%
Pismo Beach	7922	11873	50%
North Coast (Rural)	864	1263	46%
Cayucos	2876	4202	46%
El Pomar/Estrella Planning Area	6832	9872	44%
Nipomo (Rural)	8370	11983	43%
San Miguel	1200	1660	38%
Shandon – Carrizo Planning Area	2470	3255	32%
Oceano	6300	8304	32%
Atascadero	23982	31350	31%
Arroyo Grande	14719	18988	29%
Salinas River (Rural)	5961	7613	28%
San Luis Bay (Rural)	4358	5519	27%
Adelaida Planning Area	3060	3801	24%
Grover Beach	11905	14816	24%
Avila Beach	379	470	24%
Las Pilitas Planning Area	1355	1647	22%
San Luis Obispo	39814	48499	22%
Los Osos	14444	17488	21%
Estero (Rural)	1223	1456	19%
Santa Margarita	1208	1433	19%
Morro Bay	9221	10959	19%
San Luis Obispo (Rural)	3438	4068	18%
Huasna – Lopez Planning Area	773	902	17%
Group Quarters	14519	17027	17%
Los Padres Planning Area	322	372	16%

Note: "(Rural)" indicates the rural portion of the planning area, not including incorporated cities or unincorporated communities recognized by the U.S. Census.

Figure 2-1
GEOGRAPHICAL REGIONS OF SAN LUIS OBISPO COUNTY



Source: Hoover, Robert.
Vascular Plants of San Luis Obispo County, California
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Figure 2-2
San Luis Obispo County Planning Area Maps

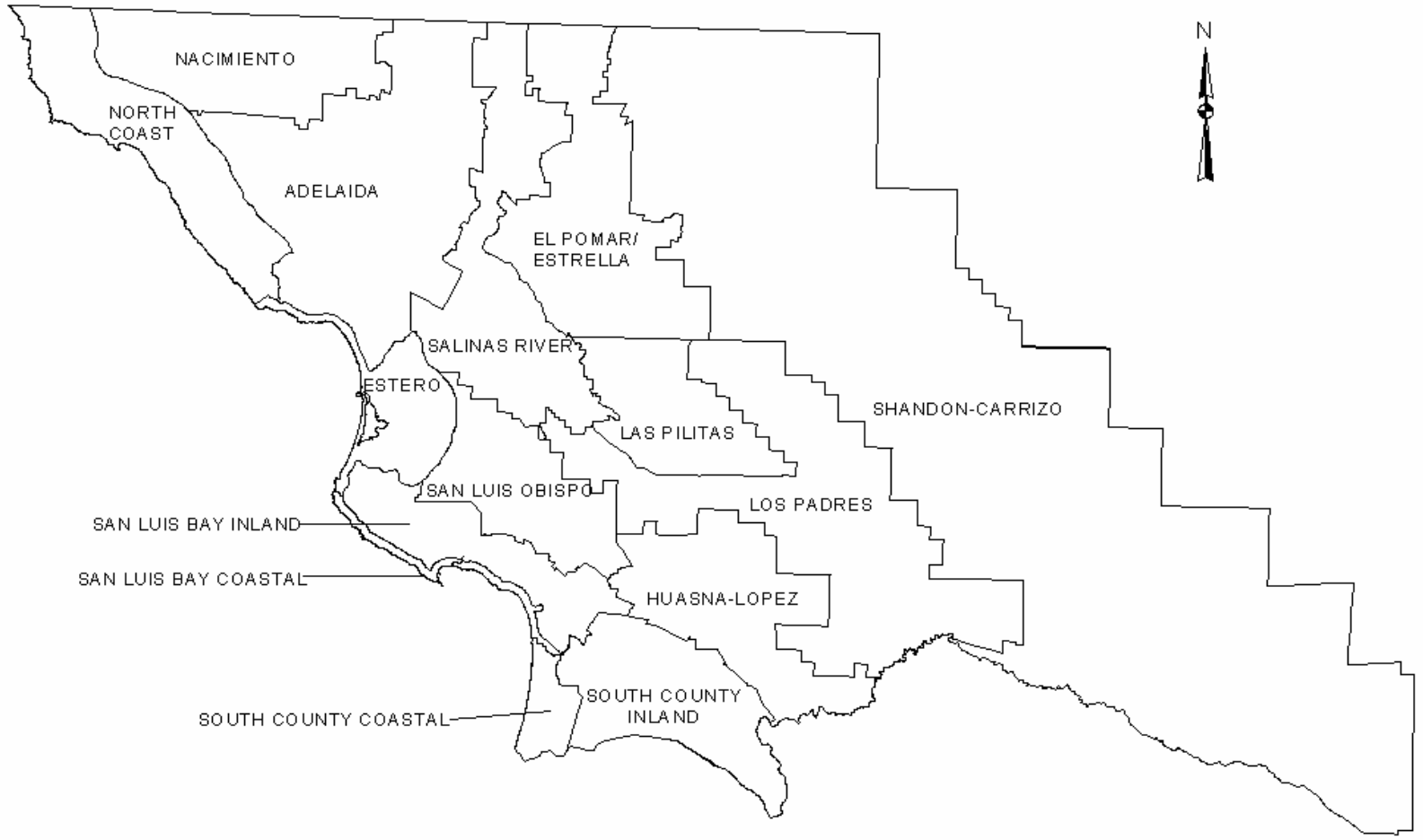

Figure 2-3

INVERSION CHARACTERISTICS