STATUS AND TRENDS REPORT

ON

LAND USE AND POPULATION

THE GEOMORPHOLOGY, CLIMATE, LAND USE AND POPULATION PATTERNS IN THE SAN FRANCISCO BAY, DELTA AND CENTRAL VALLEY DRAINAGE BASINS

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Final Report

Status and Trends Report on

LAND USE AND POPULATION

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PREFACE

In recognition of the special need to protect the water quality and natural resources of our nation's estuaries, Congress passed the Water Quality Act of 1987. This act amended the Clean Water Act and established the National Estuary Program. The Program, administered by the U.S. Environmental Protection Agency, requires the development of Comprehensive Conservation and Management Plans (CCMP) for the nation's most significant estuaries.

As enabled by the Water Quality Act, the Governor of California nominated the San Francisco Bay/Sacramento-San Joaquin Delta for inclusion into the National Estuary Program. In response, the Administrator of EPA formally established the San Francisco Estuary Project (the Project) in April 1988. The Project is a planning effort with broad-based involvement of the public and local, state and federal agencies. The Project's goals adopted by its participants are:

1. Develop a comprehensive understanding of environmental and public health values attributable to the Bay and Delta and how these values interact with social and economic factors.
2. Achieve effective, united and ongoing management of the Bay and Delta.
3. Develop a Comprehensive, Conservation and Management plan to restore and maintain the chemical, physical and biological integrity of the Bay and Delta, including restoration and maintenance of water quality, a balanced indigenous population of shellfish, fish and wildlife, and recreation activities in the Bay and Delta, and assure that the beneficial uses of the Bay and Delta are protected.
4. Recommend priority corrective actions and compliance schedules addressing point and non-point sources of pollution. These recommendations will include short and long-term components based on the best scientific information available.

Under authority of the Water Quality Act, the Project has five years in which to convene a Management Conference, identify and characterize the Estuary's priority problems, and develop a CCMP. The Project is scheduled to complete the CCMP by November 1992. After adoption by the Management Conference, the CCMP must be approved by the Governor of California and the Administrator of the EPA. Once approved, the Plan will guide local, state and federal agencies in efforts to improve protection of the Estuary.

The Project's Management Conference, with over 100 participants representing environmental, business and government interests has identified five management issues of concern; 1) Decline of Biological Resources, 2) Increased Pollutants, 3) Freshwater Diversion and Altered Flow Regime, 4) Increased Waterway Modification, and 5) Intensified Land Use.

To characterize and better define the management issues, the Project is preparing a series of Status and Trends Reports (STRs). These technical reports seek to develop a scientific consensus on the major aspects of the issues and identify important gaps in information and knowledge. In this characterization phase of the Project, individual Project subcommittees oversee the development of these reports. STRs are being prepared on: 1) Dredging and Waterway Modification, 2) Wetlands and Other Habitats, 3) Land Use and Population, 4) Pollutants, 5) Aquatic Resources, and 6) Wildlife.

Several other technical reports are also being prepared during the characterization phase of the Project. A report on land use impacts and regulation is being prepared on the relationship between land use and estuarine conditions. A report on quality assurance and quality control of

pollutants analysis will assess the changes needed to improve technical procedures of pollutant analysis. A report evaluating the regulatory, institutional and management programs will develop an understanding of the relevant regulatory responsibilities and lay the groundwork for improving protection of the Estuary. In addition, an analysis of freshwater flow and altered flow regimes will be undertaken.

The characterization effort will culminate in the completion of a "State of the Estuary" report. This report will summarize the information in the individual technical reports and provide an objective assessment of current conditions in the Estuary. This assessment will form the basis for the Project to develop actions for inclusion in the CCMP.

This STR deals with one of the five Project management issues -- Intensified Land Use. It presents historic data and projections of land use and population for the Bay Area, Delta and Central Valley through the year 2005. It is the product of more than a year's effort by members of the Land Use Subcommittee, the consultants and Project Staff. It is based on the review of two drafts by more than fifty individuals. In total, sixteen sets of written comments were received on the draft reports.

Unlike the other STRs that the Project is preparing, this report does not contain goals, short-term management actions or long-term management options. Rather, the land use goals and management options will be contained in a subsequent report on the Regulation and Impacts of Land Use. The objective of the report on land use and regulation is to characterize the extent and nature of impacts of land use change and management on the health and natural resources of the Estuary, and to recommend measures that would improve estuary land use controls and management with the goal of reducing adverse impacts on the Estuary.

To solicit additional input on the intensified land use management issue, the Project will present this report, and the land use impacts and regulation report together at public workshops. The land use workshops are schedule to be held in 1991, following completion of the impacts and regulation report. Comments on the short-term actions and long-term options for land use will be sought at that time. Subsequently, Project participants will re-assess the short-term actions and begin to implement them. Project participants will discuss the public input on the long-term options, and begin to select the most promising for evaluation and eventual inclusion into the CCMP. Using this approach, the Project will be able to develop a CCMP that is responsive to the public, elected officials and government agencies.

INTRODUCTION

Land use as it affects the Estuary is one of five major management issues being addressed as part of the San Francisco Estuary Project (SFEP). The reasons for the concern about how land is used resulted in a decision by the SFEP Management Committee to make land use a major management issue. To summarize:

> Intensified land use within the Estuary's drainage area affects its water quality, biological resources and uses. Agriculture, urbanization of rural land, and intensification of existing urban uses are the major land use issues that directly influence the Estuary. Management actions must be developed and implemented to lessen the effects of these land uses.

The purpose of this document is to quantify the historic, current and projected future land use patterns in the watershed area draining into the San Francisco Estuary, including both the Bay and Delta. The main product of this effort is the detailed existing and projected land use data contained in the appendices. The objectives of this document are to answer the following questions.

- How has land use within the Estuary drainage changed since California's missions were established? What have been the effects of the Gold Rush, two world wars and other major events?
- What recent (1975-1985) trends can be identified which have and will influence population growth and urbanization? What is the current distribution of land use types?
- How are those uses likely to change in the future? What assumptions are needed to develop future estimates of population and amount of urban land?
- What are some examples of how the land use data might be used in assessing the impacts of land use changes on the San Francisco Estuary?

Geomorphology and climate issues are two necessary elements provided as background to establish a comprehensive picture of the Estuary. Therefore, these two topics also are summarized.

Certain management questions are not being addressed as part of this report. These types of questions will be addressed in a subsequent SFEP report on the regulation and impacts of land use.

- What are the impacts of particular uses of land on the Estuary's water quality, biological resources, and uses? Are these impacts significant? If so, how can they be reduced or eliminated?
- What programs and management activities by local, regional, state and federal government agencies affect land use patterns in the Estuary drainage?
- As urban expansion continues, what land use management policies can regulators implement to minimize adverse impacts on the Estuary's water quality, biological resources and uses? What would be other environmental, economic and social implications of these policies?

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- What agricultural practices can be adopted to minimize impacts on the Estuary's water quality, biological resources and uses? What would be the costs and benefits to farmers and the public of such practices?

This Land Use Status and Trends Report (STR) focuses on the entire land area draining into the Estuary. The Land Use STR study area has been divided into three major regions as shown on Figure 1: the nine-county Bay Area, the three-county Delta, and the Central Valley watershed. This area is larger than the legal definition of the San Francisco Bay and Delta Estuary because land uses within this entire watershed influence the water quality in the Estuary.

This document has eight parts. Geomorphology and climate issues are two topics of too limited a scope to deserve separate STRs, yet are needed to establish a comprehensive picture of the Estuary. Therefore, these two topics have been included as Parts I and II of this report.

Parts III through V cover the three major topics essential to this report: the historic, current and projected future land uses in the Estuary drainage area. Data are provided for each of the three major regions shown in Figure 1 (the Bay Area, the Delta, and the Central Valley watershed). Increased urbanization has been and will be one of the major sources of land use change in these areas. This trend includes both a growth in size of urbanized areas and a continuing increase in density of existing urbanized areas. It is directly related to the increases in population. Hence, a discussion of historic, current and projected future population patterns is included in Parts III through V, as well.

Although land use management issues are being addressed in a separate report, Part VI provides several types of additional information that are essential in quantifying the impacts of land use change on the Estuary. These topics include:

- land coverage characteristics of the urban land use categories selected;
- productivity information for forests;
- crop information for agricultural land;
- erosion implications for the land use categories; and
- quantifying the amount of development pressure on wetlands.

The final section, Part VII, focuses on data limitations and information gaps. An assessment of relative importance of these limitations and gaps is also included.

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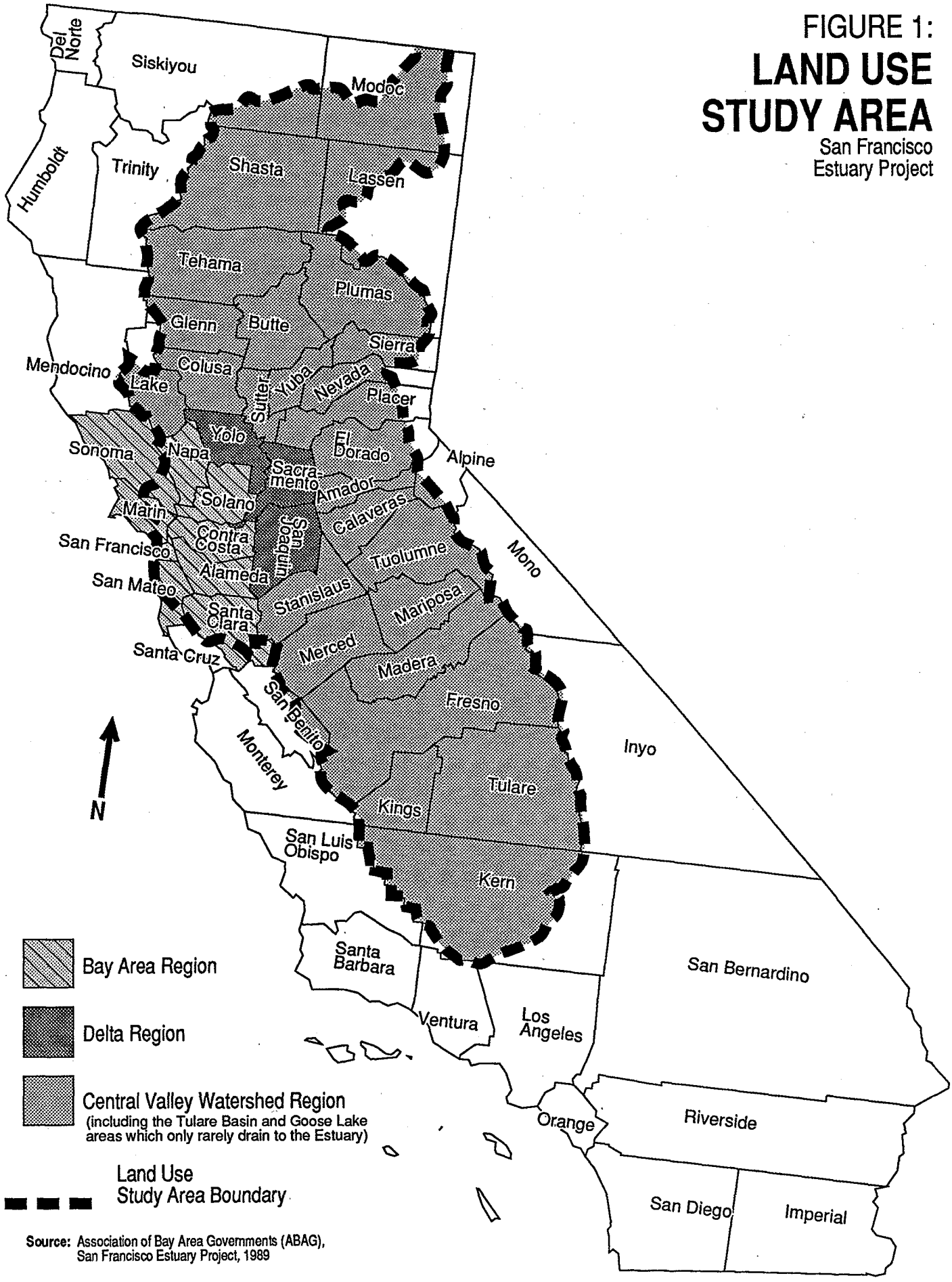
FIGURE 1:
LAND USE STUDY AREA

San Francisco Estuary Project



Source: Association of Bay Area Governments (ABAG), San Francisco Estuary Project, 1989

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SUMMARY

A. GEOMORPHOLOGY

The geomorphology (or physiography) of that portion of California draining into the San Francisco Estuary is spectacular in its diversity and scenic beauty. The landscape of the area is shaped most directly by geology. However, it is also strongly influenced by climate, vegetation, and global setting. Of the eleven major physiographic provinces present in California, six occur in the land use study area: Coast Ranges, Central Valley, Klamath Mountains, Cascade Range, Modoc Plateau, and Sierra Nevada.

The main inflows to the Estuary are contributed by the Sacramento and San Joaquin Rivers which drain approximately 40% of the land area of California. San Francisco Bay itself is a ***drowned valley*** which is about 50 miles (80 kilometers) long and varies from about one to ten miles (1.5 to 16 kilometers) in width. The entire San Francisco-San Pablo-Suisun Bay complex covers approximately 435 square miles (1100 square kilometers), with a shoreline of about 275 miles (440 kilometers) at mean sea level.

This Bay complex formed toward the end of the last glacial period, about 10,000 years ago, as sea levels slowly rose. The rate of marine incursion slowed about 6,000 years ago, but flooding of the Estuary by sea water continues today. The the average rate for the last 100 years has been lower than the average for the last 6,000 years. However, the rate for the last 19 years has been higher than the 6,000-year average. This trend has led some scientists to speculate that the more rapid rise may be due to the greenhouse effect.

B. CLIMATE

The climate of the land area draining into the San Francisco Estuary is based on California's position on the western coast of the country. The predominantly westerly winds of the mid-latitudes bring moist air over the Pacific Ocean to California. The amount and spatial distribution of moisture is controlled by the position of the Pacific high pressure zone. The principal reason for 85% of the total annual precipitation in California falling during the months from November through April is this high pressure zone.

The year-to-year variability in precipitation is so great that the State rarely has a "normal" year. Precipitation records show successions of years when precipitation is below the long-term average, perhaps interrupted by a year or two of above average values, followed by a series of years when precipitation was generally above average.

California's climate, including that portion in the land use study area, is also quite diverse geographically. This diversity is controlled by proximity to the ocean, topography, latitude, altitude and, to a small degree, land use. Most precipitation is intercepted by the northwest-trending mountain ranges that roughly parallel the coastline and by the high Sierra Nevada in the State's interior. As a result of this rain-shadow effect, precipitation is greatest near the coast and at higher elevations.

An important consideration is the proliferation of rainfall microclimates where one storm can drop over 4 inches (10 cm.) in one area and 1/4 inch (2/3 cm.) in another. This characteristic has profound implications for nonpoint pollutant modeling. Microclimates are also responsible for temperature ranges of 30°F or more for a single day within the 12-county Bay Area and Delta regions.

C. HISTORIC POPULATION AND LAND USE PATTERNS

Approximately 300,000 Native Americans were living in California in the late 1760s at the time of the first European contact. Most lived in villages which seldom exceeded 1000 people. All tribes were food gatherers, principally of acorns. In 1769, the Spanish missionaries began to establish a network of missions along the south and central coastal areas. By the year 1800, there were 18 missions along the coast. The exploration of the Central Valley did not begin until 1806 and the Spanish never settled the interior of California. During this Spanish era, the primary land use consisted of cattle and sheep grazing. The missions engaged in subsistence cultivation of dry-farmed wheat and barley.

The seeds of an American population in California were planted in the 1790s. Because of its sheltered nature and access to the source areas of the Santa Clara and Sonoma Valleys, San Francisco became the major port for the export of hides to New England. The revolt of Mexico from Spain in 1821 signaled the decline of the Spanish missions in California and marked an increase in American immigration and trade.

The gold rush of 1848 to 1860 had two huge impacts on the area draining into the San Francisco Estuary. First, it resulted in rapid growth through immigration, as well as a dramatic shift in the population centers from Spanish settlements of the southern coastal regions to San Francisco and the gold mining districts of the western Sierra Nevada Mountains and adjacent areas of the Central Valley. At this point, half of the state's population lived in the Sierra foothills and Sacramento Valley. An additional quarter lived in the Bay Area. The second impact related to the hydraulic mining of gold, which became widespread in the mid 1850s. This practice introduced huge quantities of rock, sand and mud into the mountain waterways. These same sediments are still contributing to the filling of San Pablo and San Francisco Bays.

Coinciding with the decline of gold mining in the 1860s was the rise of agriculture. First, much of the natural grasslands in the Central Valley were plowed and planted in wheat. Then, with a greater availability of water and falling wheat prices, these lands were converted to fruits and vegetables. This agricultural boom, in conjunction with federal and state reclamation acts, spurred the construction of a vast network of levees in the Sacramento/San Joaquin Delta and resulted in almost 60% of the Delta's wetlands being converted to field crops and orchards.

The period of 1900 to 1950 brought diversification as the area broadened its economic base and a rise in manufacturing. Agriculture changed as farming became more mechanized requiring greater capital investment. In addition, small farms were quickly engulfed by large agriculture conglomerates. While only 52% of the state's population lived in urban areas, by 1950, 90% lived in those areas. The urban areas grew in size and in number. Competition for limited water and demands for flood control led the federal government to finance the Central Valley Project beginning in the 1930s.

Following World War II, major population growth continued in suburban areas. Economic development was highlighted by growth in high-technology manufacturing, service and office sector employment, and tourism. As the state continued to grow and water demand increased, the federal Central Valley Project was supplemented by the State Water Project. The California Aqueduct was completed in 1972.

D. SIGNIFICANT TRENDS IN POPULATION AND LAND USE PATTERNS

The period from 1975 to 1985 has seen several changes in the development patterns.

In the Central Valley watershed region, existing urban areas have continued to grow by converting agricultural land to urban uses. In addition, there has been an explosion of growth in the Sierra's foothills. Urban land increased by over 40% in the ten year period. However, urban land was only slightly over 2% of the total land in the Central Valley watershed even in 1985. The predominant land uses in that region are non-urban, including forest (51%), agriculture (23%) and range (21%) uses.

During the 1975-1985 period in the Bay Area and Delta regions, Solano and San Joaquin Counties were the ***fastest*** growing (in terms of percent growth), while Santa Clara and Sacramento counties experienced the greatest ***absolute*** population growth (in terms of number of new residents). Although this 12-county area accounts for only 6.6% of California's total land area, about 28% of the state's people lived in the area in 1975 and 27% in 1985. The Bay Area and Delta regions are much more urban than the Central Valley watershed region (15% versus 2% for the watershed). Even so, agriculture (37%), forests (28%) and rangeland (17%) each account for a larger percent of the total land in that 12-county area than urban. By analyzing the changes in the land area attributed to the non-urban uses, it is possible to determine types of land converted to urban use. Overall, approximately three-fifths of the increase in urban land was due to the conversion of agricultural land.

The period until 2005 will continue to see an increase in urbanization. The urban growth in the 12-county Bay Area and Delta regions will be larger than the Central Valley watershed in ***absolute*** terms, although the rate of increase will be smaller.

In the Central Valley watershed region, urban land is expected to increase from approximately 2.2% in 1985 to 3.4% in 2005. The absolute amount of land will increase substantially, from 1,180 sq. miles (3,070 sq. km.) in 1985 to 1,800 sq. miles (4,660 sq. km.) in 2005. The largest amount of land will remain in forest, but will decrease from 51.1% in 1985 to 50.7% in 2005. Agricultural use will decrease from 22.8% in 1985 to 22.3% in 2005, while rangeland will decrease from 21.4% in 1985 to 21.1% in 2005. The most significant impact on the Estuary from the Central Valley in the next twenty years may come from changes in agriculture, including changes in water use, particular crops grown, and pesticides used -- not from urbanization.

In the twelve-county Bay and Delta area, the overall percentage of land in urban use is expected to increase from 15.1% (1,560 sq. miles/4,050 sq. km.) in 1985 to 19.0% (1,960 sq. miles/5,080 sq. km.) in 2005. This growth amounts to a 25% increase (compared to the 52% increase expected for the Central Valley watershed region).

Changes in non-urban land are much less dramatic. The largest amount of land will continue to be in agriculture, although the percentage of land in this type of use is expected to decrease from 36.8% in 1985 to 34.6% in 2005. The percentage of land in forests is expected to decrease form 27.8% in 1985 to 27.4% in 2005, a very small drop. The percentage of land in range is expected to decrease from 17.2% in 1985 to 16.4% in 2005. The area in sparsely vegetated land is expected to drop from 0.8% in 1985 to 0.5% in 2005. The majority of new urban land (57%) is expected to be obtained from the conversion of agricultural land. This percentage is disproportionate to the percentage of non-urban land used for agriculture in the Bay/Delta area in 1985 (43%). This projection is consistent with the trend in the 1975-1985 period, when 62% of new urban land was obtained from the conversion of agricultural land. Thus, the new urban growth is tending to occur disproportionately in agricultural counties and census tracts.

FIGURE 2:
12-COUNTY BAY AND DELTA AREA POPULATION

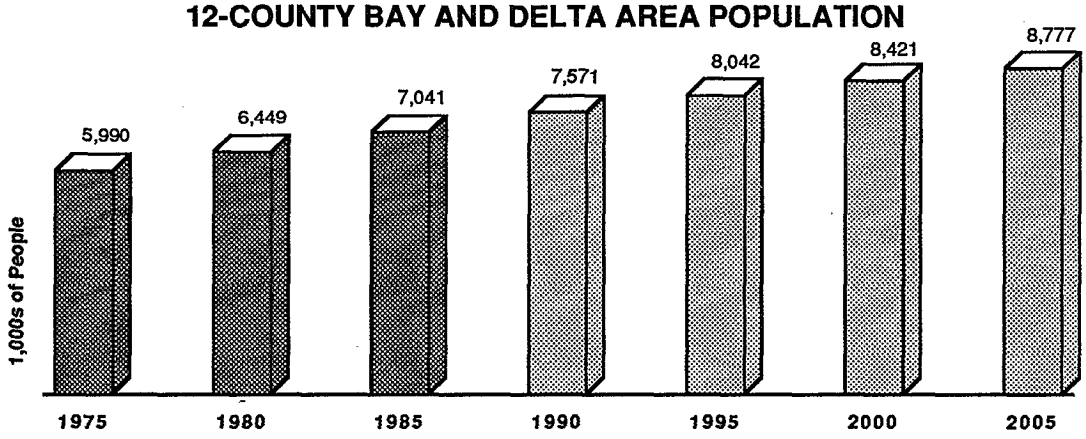


FIGURE 3:
12-COUNTY BAY AND DELTA AREA URBAN LAND

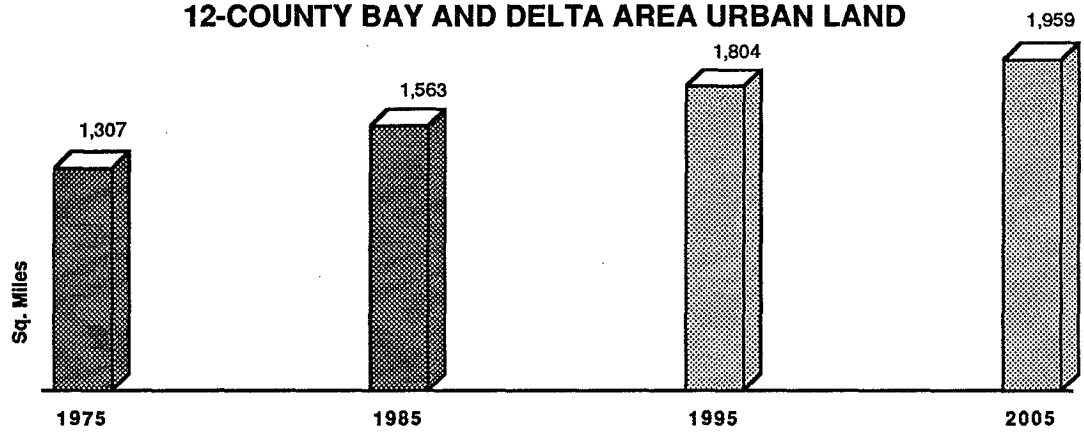
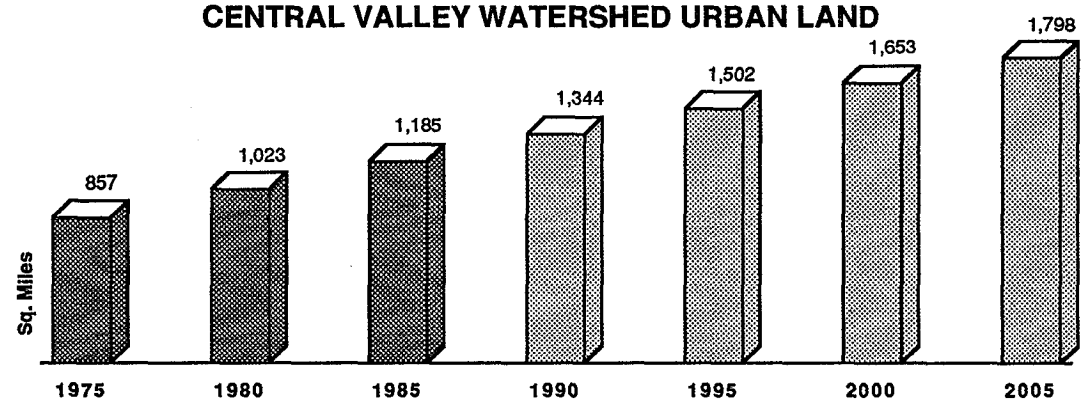


FIGURE 4:
CENTRAL VALLEY WATERSHED URBAN LAND



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E. IMPORTANT ASSUMPTIONS AFFECTING POPULATION, EMPLOYMENT AND LAND USE TRENDS

Population projections are readily available and useful in predicting future urban land use patterns in the Central Valley watershed. Projected employment data is much more difficult to obtain, but also are a less direct means of forecasting land use change. The data provided in this report are based on work by two different agencies -- the Association of Bay Area Governments and the California Department of Finance. ABAG uses demographic, economic and local government policy data to project population, employment and urban land use patterns in the nine-county Bay Area for individual census tracts. DOF uses only demographic data to project population and does not provide the data for geographic areas smaller than counties.

Variations in forecasting methodologies can substantially affect the results. Appendix IV explains how some of these variations can affect population projections. One of the principal conclusions of that discussion is that model statistics should be viewed with caution. Simple statistics as a high correlation coefficient or a small SE may not be sufficient to suggest that a model is a "good predictor of the future."

The method used to predict changes in the non-urban land was relatively simple. Basically, the increase in urban land was taken out of the agriculture, forest, range and sparsely vegetated land categories ***in proportion*** to their relative size in a given area. The area for analysis varied from Hydrologic Units/County areas (HUCOs) in the Central Valley watershed and Delta areas, to Hydrologic Units/Census Tract areas (HUCTs) in the nine Bay Area counties. The analysis also assumed that the amount of tundra, perennial snow and ice, and wetlands would remain unchanged.

Finally, it also was assumed that the proportion of various agricultural crops would remain unchanged through 2005. Changes to water policy in the state, precipitation patterns, public dietary preferences, and emerging international markets may change the proportions of various crops in the state, but in an unknown manner.

One should not interpret these assumptions as a finding or an endorsement by the San Francisco Estuary Project of some specific policy. Rather, they have been made and are clearly stated to enable the projections work to be accomplished.

F. USING LAND USE DATA

Several additional types of information beyond the land use database are needed to aid in using that land use data.

One principal use of the land use data is in modeling nonpoint contaminants. The land coverage information (including percentage paved and landscaped) provided in Part VI can supplement the traditional residential/commercial/industrial breakdown of urban uses.

Erosion, one source of nonpoint contaminants, illustrates the complexity of the type of analysis needed. Developed urban land is far less subject to erosion than agricultural land except in the construction period. Erosion control practices instituted by local governments can reduce the sediment yield from construction. Thus, one result of conversion of agricultural land to urban use (following the construction period) should be a reduction of sediment in creeks, provided that appropriate erosion control practices are ***implemented*** during construction. (Other related impacts of urbanization on water quality are more negative, including increased runoff, changes in contaminant levels, flooding and stream erosion.)

The data on erosion for each major land use category provided in Part VI can aid in this type of analysis. Data on land use changes, especially conversion of land from agriculture to urban use, are particularly useful due to the impacts on water quality, including sediment levels from erosion. In addition, information on forest productivity can help predict where most logging is likely to occur and therefore help predict where erosion from heavily logged areas is likely to become the greatest problem.

Pesticides on various crops are another source of nonpoint contaminants. The information provided in Part VI from the County Agricultural Commissioners' crop reports can be used to quantify the extent of this type of contaminant.

The land use data was used in two ways to quantify development pressure on wetlands. First, data on land use change from 1985 to 2005 has been used to create a development pressure index. Second, the land use database has been overlaid with the map of wetland areas from the U.S. Fish and Wildlife Service. The analysis process involved the comparison of the amount of wetlands in areas designated as urban with that in non-urban areas. Such a comparison helped gauge whether future development pressure is more likely to be due to development pressure from urban densification, or from conversion of non-urban land to urban uses. The conclusions of both of these analyses are presented in the Wetlands Status and Trends Report.

Finally, population and land use data can be used to quantify the current and future water usage patterns in the Estuary drainage area.

Continued population growth and urbanization in the Bay Area, and development pressure in the Central Valley and Delta regions, will place increased environmental pressures on the Estuary's resources, including the water, air and land. If ***low density*** development continues in the fringes of the nine-county Bay Area and extends into the Central Valley and Delta regions, it will exacerbate these environmental impacts. Such growth is occurring even though it is in conflict with the city-centered concept contained in the Regional Plan 1980--San Francisco Bay Area (ABAG, 1980). A much more complete analysis of the potential impacts of the projected land use changes and population growth will be contained in a subsequent report on land use impacts and regulations being prepared for the San Francisco Estuary Project.

PART I: GEOMORPHOLOGY

The physiography, or geomorphology, of the portion of California in this report's study area is spectacular in its diversity and scenic beauty. The landscape of the area is shaped most directly by geology, but is also influenced by climate, vegetation, and global setting.

Of the eleven major physiographic provinces present in California, six occur in the study area: Coast Ranges, Central Valley, Klamath Mountains, Cascade Range, Modoc Plateau, and Sierra Nevada (Fig. 5). Although only the Coast Ranges and Central Valley are included in either the Bay Area region or the Delta region of the study area, portions of six are included in the Central Valley watershed; streams and rivers draining the Sierra Nevada, Cascade Range, Modoc Plateau, Klamath Mountains and Coast Ranges eventually find their way into the Central Valley and from there into the San Francisco Estuary.

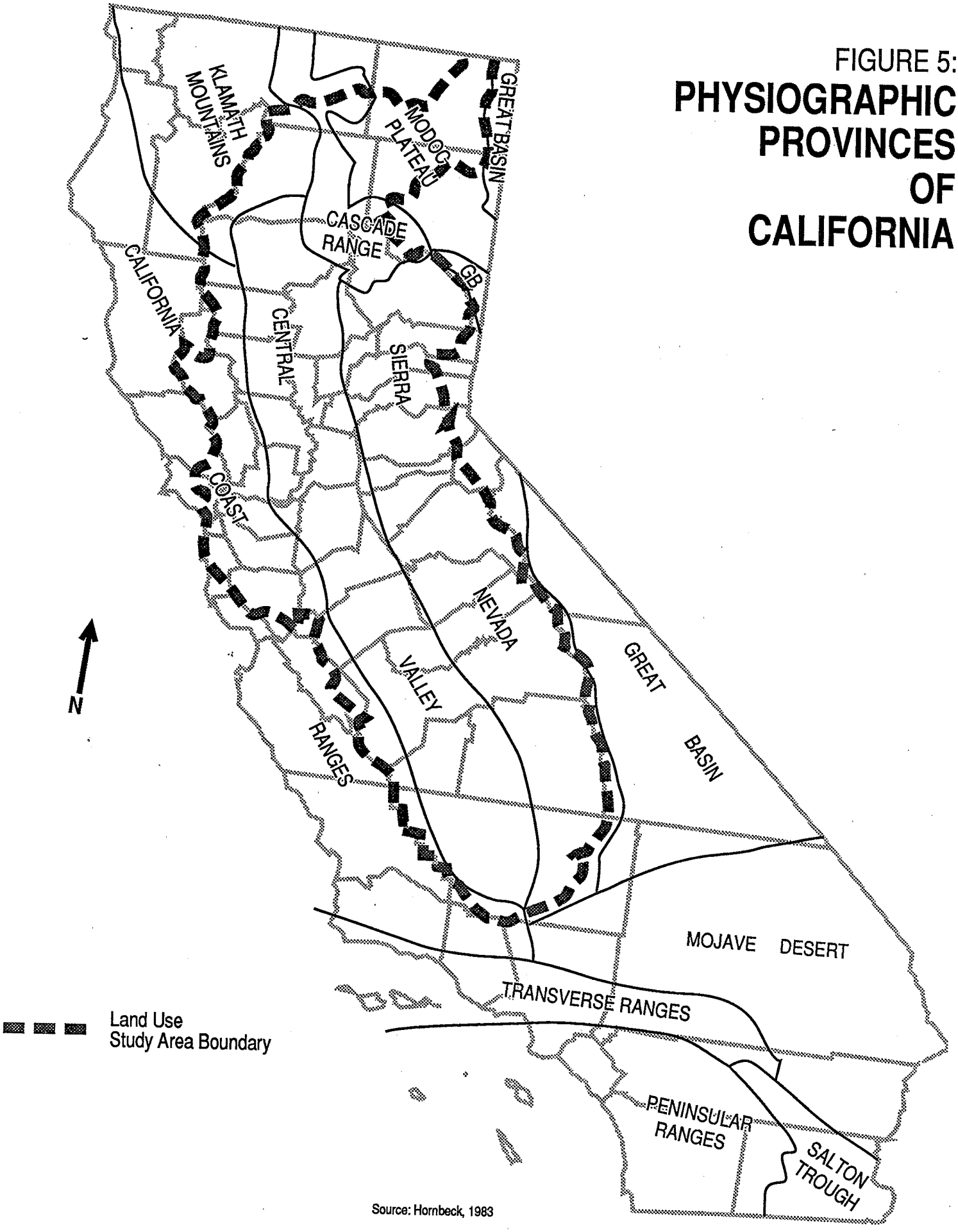
The main inflows to the Estuary are contributed by the Sacramento and San Joaquin Rivers, which drain approximately 40% of the land area of the State.

The geology of western California is dominated by movements of three major crustal plates; the North American, the Pacific, and the Juan de Fuca. The San Andreas fault system is the most obvious on-land expression of these plates. Current plate motion or tectonic regime has been operating for the past 25-30 million years, and is responsible for the young features (steep slopes and linear drainage) that typify the California landscape.

The geology of eastern California, although influenced by plate boundary dynamics, is further removed from these forces, and geomorphic relationships are more indirect. To complicate matters, the poorly understood tectonics of the Great Basin strongly influences the physiography of eastern California. The climate of the area tends to be more arid than further west, and desert features and processes dominate the landscape.

FIGURE 5:

PHYSIOGRAPHIC PROVINCES OF CALIFORNIA



Source: Hornbeck, 1983

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A. THE BAY AREA REGION

The nine-county Bay Area region lies between latitudes 36° 50' and 39° 55' north and between 121° 40' and 123° 35' west (Fig. 5). The nine counties cover about 6970 square miles (18,040 square kilometers) of ***land***. The area is bounded on the west by the Pacific Ocean.

The largest single feature in the Bay Area region is San Francisco Bay, a ***drowned valley*** which is about 50 miles (80 kilometers) long and varies from one to ten miles (one to sixteen kilometers) wide. The Bay joins the Pacific Ocean at the Golden Gate, a strait about three miles (five kilometers) long, one mile (one and a half kilometers) wide and nearly 400 feet (120 meters) in maximum depth. At the northeast end of the Bay (often referred to as San Pablo Bay), the Carquinez Strait, a narrow channel one-half to one and a half miles (one to two and a half kilometers) wide and eight miles (thirteen kilometers) long, joins San Pablo Bay to Suisun Bay, a smaller body of water about six miles (ten kilometers) long and twelve miles (nineteen) kilometers wide. The San Francisco-San Pablo-Suisun Bay complex covers approximately 435 square miles (1100 square kilometers), with a shoreline of about 275 miles (440 kilometers) at mean sea level.

The San Francisco Bay formed when melting ice from the last glaciation caused a worldwide rise in sea level. Toward the end of the glacial period, about 15,000 years ago, sea level off the Golden Gate was more than 300 feet lower than today. As sea level rose the shoreline moved landward. It reached the Golden Gate about 10,000 years ago, and sea water than invaded the branching valleys to form the San Francisco, San Pablo and Suisun Bays. The rate of marine incursion slowed about 6,000 years ago, but flooding by sea water continues today. More information is included in the section on "Sea Level" in Part II.

Surveys in 1852 showed that San Francisco Bay was a complex comprised of vast areas of tidal marshes. These tidal marsh areas totaled approximately 310 square miles (800 square kilometers) (Atwater and others, 1979). The Bay has been radically altered from this natural state and presently is comprised of large areas of diked lowlands, including wetlands, that no longer are effected by tidal fluctuations. In addition, mudflats, salt ponds and agricultural marshlands comprise a significant portion of the present Bay complex. The Wetlands Status and Trends Report estimates that there are currently approximately 200 square miles (320 square kilometers) of wetlands (excluding open water, lakes, rivers and streams and Bay flats) in the nine Bay Area counties.

The land portion of the Bay Area region contains a variety of topographic features, but the overall pattern of the landscape is dominated by northwest-southeast trending mountain ranges and valleys that roughly parallel the coastline and the San Andreas fault system. This group of ranges is referred to as the Coast Ranges. Because the Coast Ranges are geologically young and are continually uplifting, they are dominated by rugged terrain and linear stream courses. The hills support mixed conifer and deciduous forests as well as chaparral and grasslands. The west side of the Coast Ranges join the sea forming high cliffs, rugged shorelines and, in places, marine terraces. The east side of the range blends, in gentler slopes, with the nearly flat Central Valley. The Coast Ranges make up much of the nine counties, except for parts of Contra Costa and Solano counties. The remainder of these two counties are part of the Central Valley--the wide, flat northwest-southeast elongated basin that contains the Sacramento and San Joaquin rivers. A portion of the Central Valley contains the slough-island landforms characteristic of the Delta. In fact, a portion of both Solano and Contra Costa counties lies within the legal boundaries of the Delta established by statute. (For more information, see the Wetlands Status and Trends Report).

B. THE DELTA REGION

The three-county Delta region is east of the central portion of the Bay Area, lying between latitudes 37° 25' and 38° 45' north and between 120° 55' and 122° 30' west (Fig. 5). The three counties cover about 3890 square miles (8,775 square kilometers) of ***land.***

The Delta region contains two physiographic provinces: the eastern portion of the Coast Ranges described above and the Central Valley. The principal feature of the Central Valley physiographic province is the Delta of the San Joaquin and Sacramento rivers. This area consists of a network of minor, braided channels that define low-lying islands. The portion of the legally defined Delta that is not in either Solano or Contra Costa counties lies within this three county area.

Although the Delta formed along with San Francisco Bay itself, there are some differences in formation worth noting. First, although rivers were largely responsible for the formation of the island-slough landforms in the Delta area, tidal action was largely responsible for these landforms in the Bay area (Atwater and others, 1979). Second, according to Atwater and others (1979), "in the western Delta, peat as thick as 20 m [22 yards] indicates that vertical accretion in marshes has kept pace with submergence during the past 4,000-6,000 years." This time-frame is earlier than for the marshes in southern San Francisco Bay.

The 1852 survey of tidal marshes described in the previous section estimated that approximately 540 square miles (1400 square kilometers) of tidal marshes existed in the Delta at that time (Atwater and others, 1979). Because the distinction between Bay Area and Delta regions used in this report is based on political rather than physiographic boundaries, some of these marshes lie within the nine-county Bay Region. As with those tidal marshes adjacent to the Bay, this area has been greatly modified and presently contains of large areas of diked lowlands, including wetlands, that no longer are effected by tidal fluctuations. For more information, see the Wetlands Status and Trends Report.

C. CENTRAL VALLEY WATERSHED

The principal feature of the Central Valley ***watershed*** is the Central Valley itself. This valley is largely a depositional plain underlain by many feet of sediments; this material has been washed down from the surrounding highlands over eons of time. The valley is drained by the Sacramento and San Joaquin Rivers. These rivers join east of Suisun Bay in the vicinity of the Delta, flow through the San Francisco Bay complex, and reach the Pacific Ocean via the Golden Gate.

Although that Central Valley may seem at first glance to be featureless, in fact four natural landform subdivisions have been recognized in the watershed area: the red lands, the low plains, the river lands, and the flood basins. The red lands form a zone of subdued hills between the higher ridges of the Coast Range and the Central Valley. The low plains are alluvial fans that have grown and coalesced to form alluvial plains that lie between range fronts and river lands. River lands are natural levees that form low lying ridges that gently slope toward flood plains and low plains. Flood plains are broad shallow troughs filled during floods by overflow water. A fifth landform subdivision, the Delta, is confined to the Bay Area region and Delta region described above and is not found in this region.

Although much of the Sacramento-San Joaquin river system is within the Central Valley, water is contributed from other areas. Much of the spring snowmelt and other precipitation that flows into the Central Valley comes from mountain streams on the west side of the Sierra Nevada.

The headwater streams of the Sacramento River, in the Klamath Mountain Province of northern California, are another source of Central Valley water. Water also flows from the Pit River, which drains the volcanic highlands of the Modoc Plateau, and joins the Sacramento River in the Central Valley.

Many waterways in the Central Valley watershed have been significantly altered from their natural state. Before emptying into the Delta, these rivers flow through a series of dams and vast areas of agricultural land. Water extraction for irrigation and drinking water supply has greatly altered the natural drainage patterns, flow rates and water quality of these rivers and the hydrologic system of the Estuary.

PART II: CLIMATE

The climate of the entire land use study area is based on California's position on the western coast of the country. The predominant westerly winds of the mid-latitudes bring moist air over the Pacific Ocean to California. The amount and spatial distribution of moisture is controlled by the position of the Pacific high pressure zone, usually located approximately 1,000 miles (1,600 kilometers) offshore. This high pressure is strongest during the summer and prevents cyclonic storms from reaching California. However, during the winter, the Pacific high moves south and becomes weaker, allowing many storms to bring moisture to the west coast. Thus, 85% of total annual precipitation in California falls during the months from November to April.

In spite of these controlling conditions, the climate of California varies from year to year. California's climate is a product of extremes and can not be easily described by average annual figures.

Annual variations in precipitation are so great that the State rarely enjoys a "normal" year. Precipitation records show several years when precipitation is below the long-term average, perhaps interrupted by a year or two of above average values, followed several years when precipitation was generally above average. As stated in the California Water Atlas, "the pattern of precipitation throughout California is irregularly cyclic: 'cyclic' enough to be recognized in history and 'irregular' enough to defy predication" (Kahrl, 1979). Exceptionally wet or dry periods occur when there is a disruption of the large scale atmospheric circulation over the northern Pacific Ocean.

The first historic record of an extreme wet period affecting the west coast of the United States was in the winter of 1861-1862. Although flow was not measured in the Sacramento and San Joaquin Rivers, Young (1929) noted that "[a]t the Golden Gate, for nearly a fortnight, the stream on the surface was continuously flowing toward the Pacific, composed entirely of fresh water, the tide not affecting the surface flow, and the water was brackish at the Farallon Islands." Historical records refer to a 17-year drought in the early 1800s. More recent extremes are represented by the drought of 1976-77 and the current drought that began in 1987. Between those two drought periods was the extreme wet winter of 1982-83. The variation in riverine streamflow produced by such extremes in precipitation effects salt-water intrusion, sedimentation, aeration, the riverine chemistry and biologic productivity of the San Francisco Estuary.

California's climate is also quite diverse geographically. These variations form the basis for the sections which follow.

Global climatic changes resulting in an expected rise in sea level are the subject of the final section.

A. GEOGRAPHIC DIVERSITY OF CLIMATE

The state contains at least four climatic zones, the temperate humid northern coast, the semi-arid 'Mediterranean' southern coast, the arid southeastern desert and the continental interior. Boundaries between these zones are inexact, and many areas of California share features of several zones.

Geographic variations in climate are controlled by proximity to the ocean, topography (both local and regional), latitude, altitude and, to a small degree, land use. (Typically cities have higher average temperatures than the surrounding countryside.)

Most precipitation is intercepted by northwest-trending mountain ranges that roughly parallel the coastline and by the high Sierra Nevada in the state's interior. As a result of this rain-shadow effect, precipitation is greatest near the coast and at higher elevations. Precipitation also decreases with decreased latitude, as the moderating effects of the Pacific High pressure is greatest in the southern part of the state during the winter months. This effect is enhanced by the natural tendency for wetter, cooler climates to dominate away from the equator, especially in the temperate zone between 40 - 55° N latitude. Finally, wet and dry periods are variable in length and are not coincident statewide.

Average temperatures also vary considerably from place to place. Temperatures in southern California are mild throughout the year, although inland deserts typically experience cold winter nights. The north coastal region is mild and humid, with temperatures ranging from 40° to 70°, but generally 55-65°. Inland areas experience more extreme temperatures, with frequent frost and higher daytime temperatures in the summer.

1. San Francisco Bay Region

The climate of the nine-county Bay Area region is essentially maritime in nature. Temperatures are moderate throughout the year, with the majority of precipitation falling during the winter months.

As with much of the state, the climate of this region is controlled chiefly by the Pacific high pressure zone. During the summer the normal position of the high pressure is such that few rain-bearing storms reach the coast. Winds are generally from the west or northwest and strongest in the afternoon. Relative humidity is moderate to high and the air mass is characterized by low temperatures at the surface and by an inversion layer starting near the surface and extending up to about 1,700 feet (520 meters). The Bay Area has locations of regionally and locally varied climates that are influenced by their distance from the ocean, elevation and proximity to topographic gaps in the coastal mountains. The daily and annual temperature range in this nine-county region can vary more than 30°F for the same day depending on distance from the moderating influence of the ocean.

In general, precipitation decreases to the east. Heaviest rainfall occurs on the southern and southwestern slopes of mountains and increases with increased elevation, as shown on the average annual precipitation map in the Precipitation Data Appendix (Rantz, 1971). An important consideration is the proliferation of rainfall microclimates where one storm can drop over 4 inches (10 cm) in one area and 1/4 inch (2/3 cm) in another. This characteristic has profound implications for nonpoint pollutant modeling. See the Precipitation Data Appendix for further information.

2. The Delta Region

The climate of the three-county Delta region is quite similar to neighboring portions of the Bay Area region, particularly eastern Solano and Contra Costa counties. The Pacific Ocean moderates the temperature. Most of the rainfall occurs during the winter months. In addition, wind tends to funnel through Carquinez Straits and across the Delta, particularly in the summer, as the warm air in the Central Valley rises and is replaced by cooler coastal air.

Temperature and precipitation data for Davis, Lodi, Stockton, Tracy and Los Banos is provided in the Precipitation Data Appendix.

3. The Central Valley Watershed Region

In general, precipitation is greatest in the mountainous areas, ranging from 30 to 90 inches/year (75 to 225 cm/year) and less on the valley floor (from less than 6 inches to more than 30 inches per year (15 to 75 cm/year). More precipitation also occurs as one moves north. For example, the California Water Atlas (Kahrl, 1979) provides mean annual precipitation values for five valley cities:

TABLE 1: MEAN ANNUAL PRECIPITATION IN THE CENTRAL VALLEY

	Mean Annual Precipitation (inches/year)	(cm/year)
Red Bluff	22.05	56.01
Sacramento	18.02	45.77
Stockton	13.37	33.96
Fresno	11.14	28.30
Bakersfield	6.36	16.15

B. SEA LEVEL

Immediately following the last glacial period 10,000 years ago, melting glacial and polar ice sheets caused a period of rapid sea-level rise at a rate of 0.06 feet/year (1.8 cm/year). At this rate, wetlands were inundated and converted into mudflats or subtidal areas. Approximately 6,000 years ago that rate slowed and has remained constant at 0.006 feet/year (0.18 cm/year). At this rate of sea-level rise, sedimentation has kept pace with inundation, creating extensive marsh areas over the former mudflats. Tide gauge measurements indicate the rate over that last 100 years has been 0.0039 feet/year (0.12 cm/year).

However, during the most recent 19-year period (1967 through 1985) both the global rate and the rate measured in the San Francisco Bay is estimated to be 0.0072 feet/year (0.22 cm/year). Some scientists speculate that the rate of sea-level rise may have increased recently because of climatic warming caused by the "greenhouse effect" as more carbon dioxide, methane, chlorofluorocarbons and other gases are introduced into the atmosphere.

Although most scientists agree that we are entering a period of accelerated sea level rise, the complexity of the contributing factors cause estimates to vary widely. The U.S. Environmental Protection Agency estimates the magnitude of the sea-level rise to range from 2 to 11 feet (0.6 to 3.4 meters) by the year 2100. Sea level is expected to increase geometrically rather than linearly, resulting in higher rates of rise with time (Fig. 6).

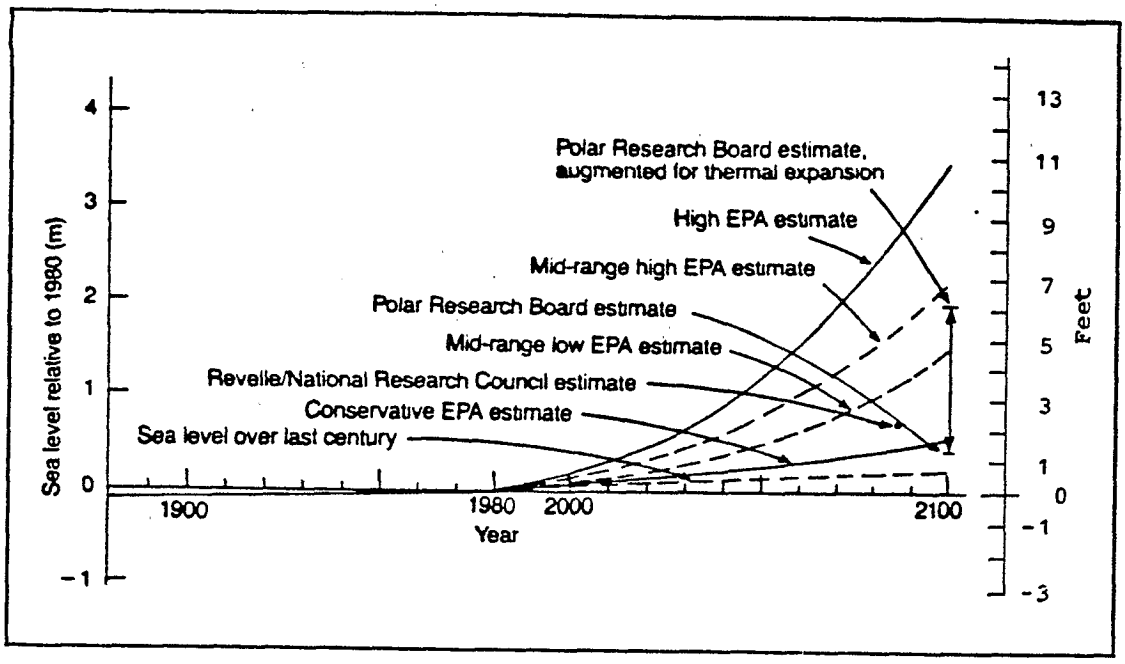


FIGURE 6: **GLOBAL SEA LEVEL RISE PREDICTIONS** SOURCE: Dean, 1986

The San Francisco Bay Conservation and Development Commission (BCDC, 1987) states that such a rise "[c]ould cause tidal inundation of unprotected low-lying areas, increased periodic flooding of previously protected low-lying areas, disruption of storm water drainage systems, increase shoreline and beach erosion, and salt water intrusion into estuaries, fresh water tributaries and groundwater." Areas vulnerable to sea-level rise occur in both the Bay Area region and the Delta region.

Tectonic movement and ground subsidence cause the Bay Area to be subject to differential vertical movement. Consequently, relative sea level rise will probably vary in different regions of the bay. Projecting the current 19-year rate to the year 2007, BCDC predicts a minimum mean sea-level rise at Sausalito of 0.37 feet (11 cm) and a maximum rise of 2.78 feet (84 cm) at the Alviso Slough. At the Presidio, which mirrors global sea level change, a rise of 0.43 feet (13 cm) is expected. Pittsburg, near the western boundary of the Delta, is expected to see a rise of 1.32 feet (40 cm).

PART III: HISTORIC LAND USE AND POPULATION PATTERNS

A. 1760s TO 1790 -- THE MISSIONS

Estimates of the native population in California in the late 1760s at the time of the first European contact range from 133,000 to 700,000, but the most frequently cited figure is 300,000. The distribution of native American Indians at that time is shown in Fig. 7. Most Indians lived in villages which seldom exceeded 1000 people. All tribes were food gatherers, principally of acorns. An exception were the Yuman Indians of the Colorado River Valley who used irrigation to cultivate corn. After European contact the native American Indian population declined steadily to a population of approximately 80,000 today.

In 1769, the Spanish missionaries began to establish a network of missions along the south and central coastal areas. By 1775 there were six missions ranging from San Diego to Monterey which was also the site of a military presidio. The total population of approximately 200 consisted of military personnel, friars and their neophytes, a few mechanics, servants, and slaves. There were no colonists or settlers. In the Bay Area, the San Francisco mission and presidio were established in 1776 and the missions in Santa Clara, San Jose, San Rafael and Solano were founded a few years later. The establishment of a pueblo in San Jose in 1777 made that city the oldest civil town in California. By the year 1800, there were 18 missions with a total population of 13,500 and the three pueblos at Los Angeles, Santa Cruz (Branciforte) and San Jose had a combined population of 550. Exploration of the Central Valley did not begin until 1806 and the Spanish never settled the interior of the state.

During the Spanish era the primary land use consisted of cattle and sheep grazing. The missions engaged in subsistence cultivation of dry farmed wheat and barley, and small plots of irrigated fruits and vegetables. On the whole, the natural conditions of California were essentially unmodified during the Spanish missionary period. Distribution of native vegetation in California is shown in Fig. 8.

B. 1790s TO 1847 -- EARLY AMERICAN SETTLEMENT

The seeds of an American population in California were planted in the 1790s. New England traders who secured furs from coastal areas of the state and transported them to China ensured that the emerging United States had an impact on California's development. After the turn of the century, hides were transported directly to New England to meet the needs of the newly industrialized shoe factories. Because of its sheltered nature and access to the source areas of the Santa Clara Valley and Sonoma, San Francisco became the major port for this trade. Some of the Boston traders ultimately settled in this region. The revolt of Mexico from Spain in 1821 signaled the decline of the Spanish missions in California and marked an increase in American immigration and trade.

FIGURE 7:

NATIVE AMERICAN POPULATION DENSITY AT TIME OF EUROPEAN CONTACT

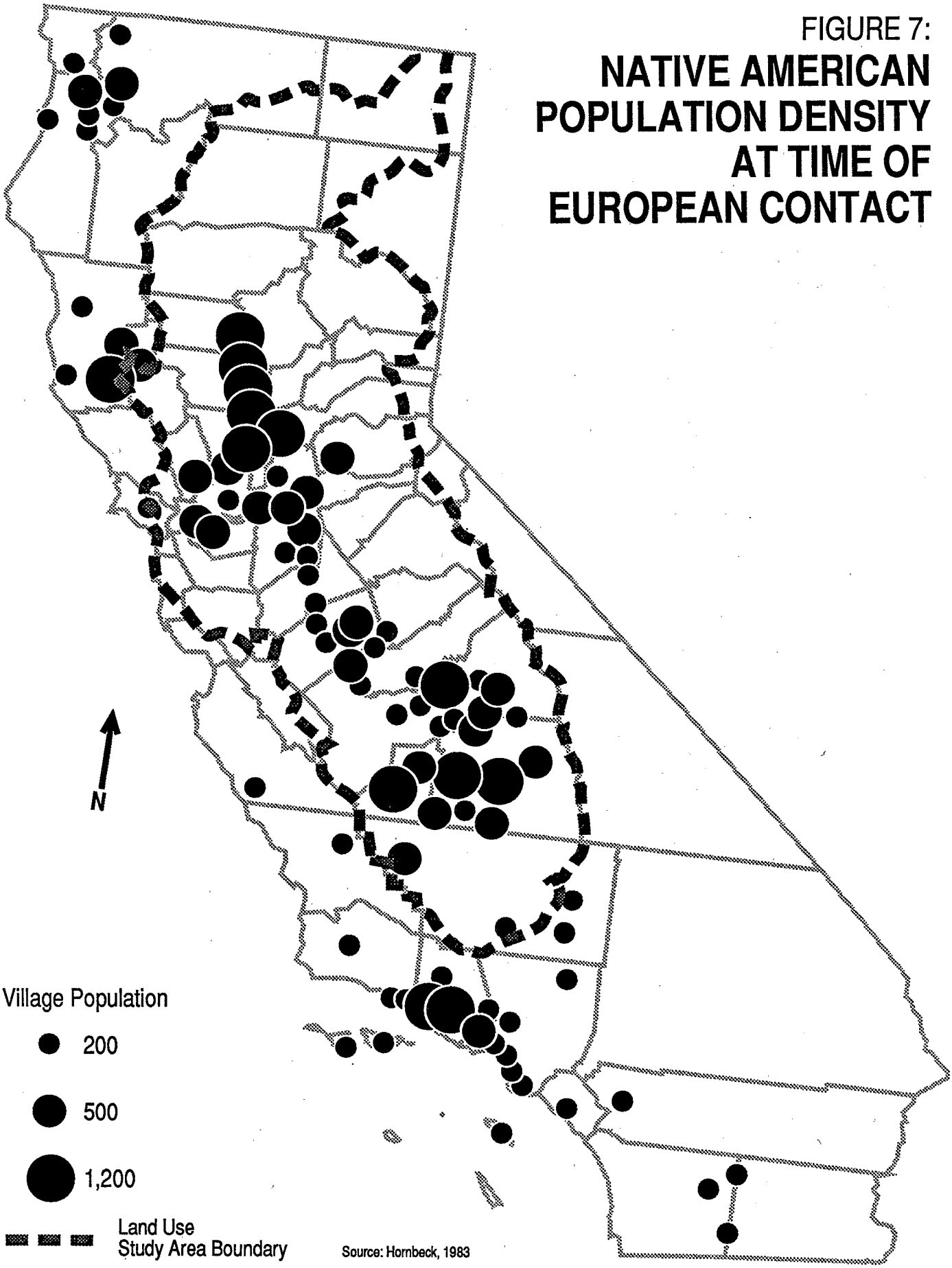
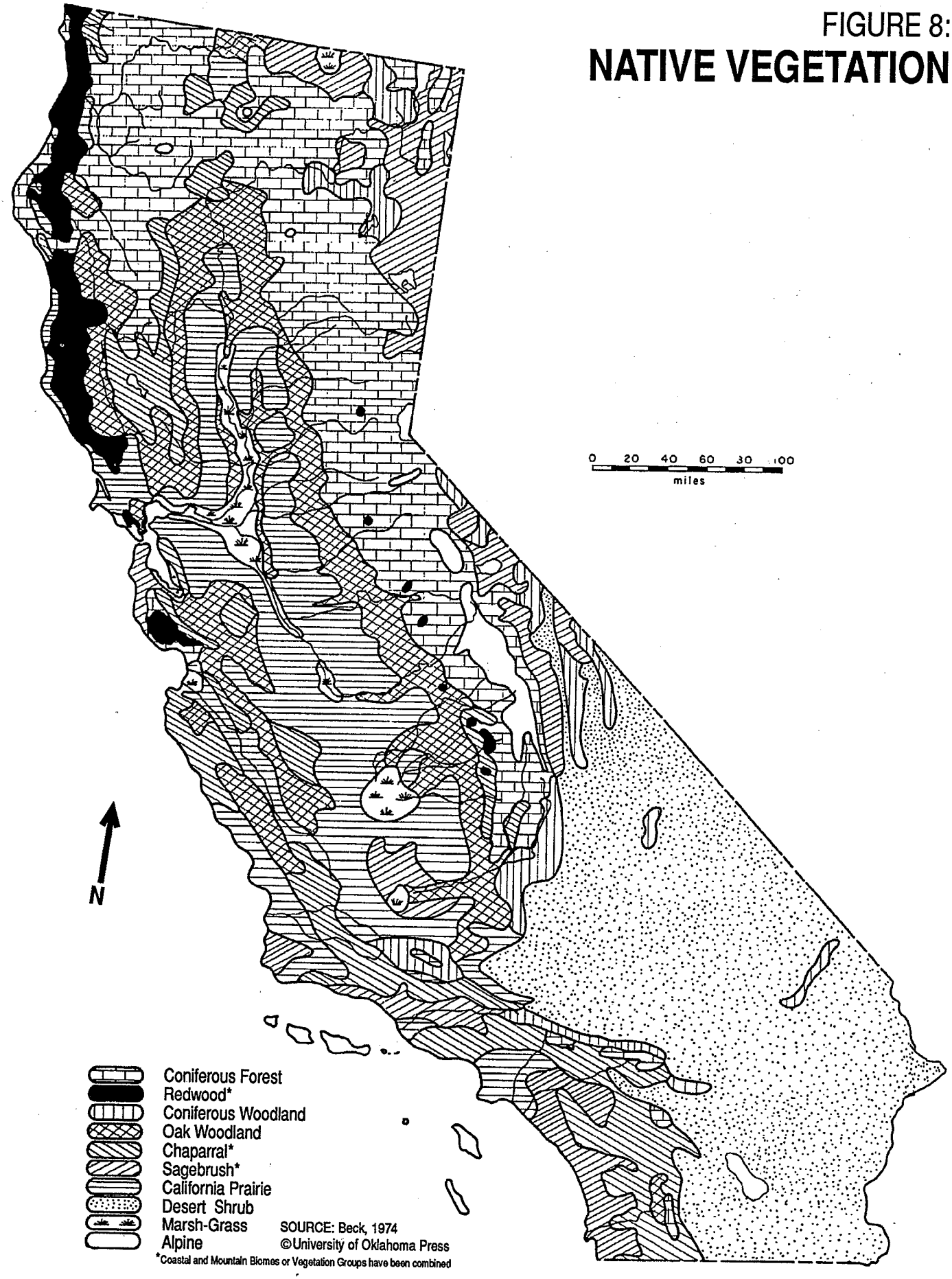


FIGURE 8:
NATIVE VEGETATION



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C. 1848 TO 1860 -- THE GOLD RUSH

The discovery of gold in 1848 resulted in rapid growth through immigration, as well as a dramatic shift in the population centers from Spanish settlements of the southern coastal regions, to San Francisco and the gold mining districts of the western Sierra Nevada Mountains and adjacent areas of the Central Valley. The population of California at the end of 1848 was 15,000. By 1850 when California became a state, the population had reached 93,000 and was concentrated in the gold districts and San Francisco. By 1860, the year of the first census, the state population was 380,000. At that time over 1/2 of the state's population lived in the Mother Lode of the Sierra Nevada Mountains and in the nearby Sacramento Valley. Nearly 1/4 of the population lived in the Bay Area which served as a warehouse and trade center for the gold districts. Almost 59,000 people lived in the Bay Area communities of San Francisco, Oakland, Berkeley and Alameda. San Francisco was the major port and largest city of the state and continued to dominate the state both as a population and cultural center through the early 1900s.

Hydraulic mining of gold became widespread in the mid 1850s. This practice introduced huge quantities of rock, sand and mud into the mountain waterways. Grove (1917, p. 43) estimated that over 1.6 billion cubic yards (1.2 billion cubic meters) were introduced. The rivers transported these sediments into the lower gradient channels of the Central Valley. Valley waterways were soon choked with sediments, interfering with the navigation of the rivers and causing increased flooding and sedimentation on adjacent farmland. These same sediments have and are still slowly contributing to the filling of San Pablo and San Francisco Bays. The build-up of the shoals outside of the Golden Gate has been accelerated, as well. For more detailed information, see Gilbert (1917). It was not until the 1884 Sawyer Federal Court Decision that this mining practice was finally stopped.

However, most 49ers gave up their quest for gold several decades prior to that decision. Mining districts began losing population in the early 1860s. Towns as large as 10,000 became ghost towns. The majority of these disillusioned people relocated in the Bay Area.

D. 1860s TO 1900 -- THE RISE OF AGRICULTURE

Coinciding with the decline of gold mining in the 1860s was the rise of agriculture as the natural grasslands of the Central Valley (some of which were wetlands) were plowed and planted in wheat. The completion of the first transcontinental railroad in 1869 linked California to the east coast and Europe, creating a market for California's agricultural products. By 1870, agriculture was firmly established as the economic base of the state. This railroad link to the east also encouraged the development of some non-agricultural pursuits, such as retailing and wholesaling which in turn increase immigration to California's urban centers.

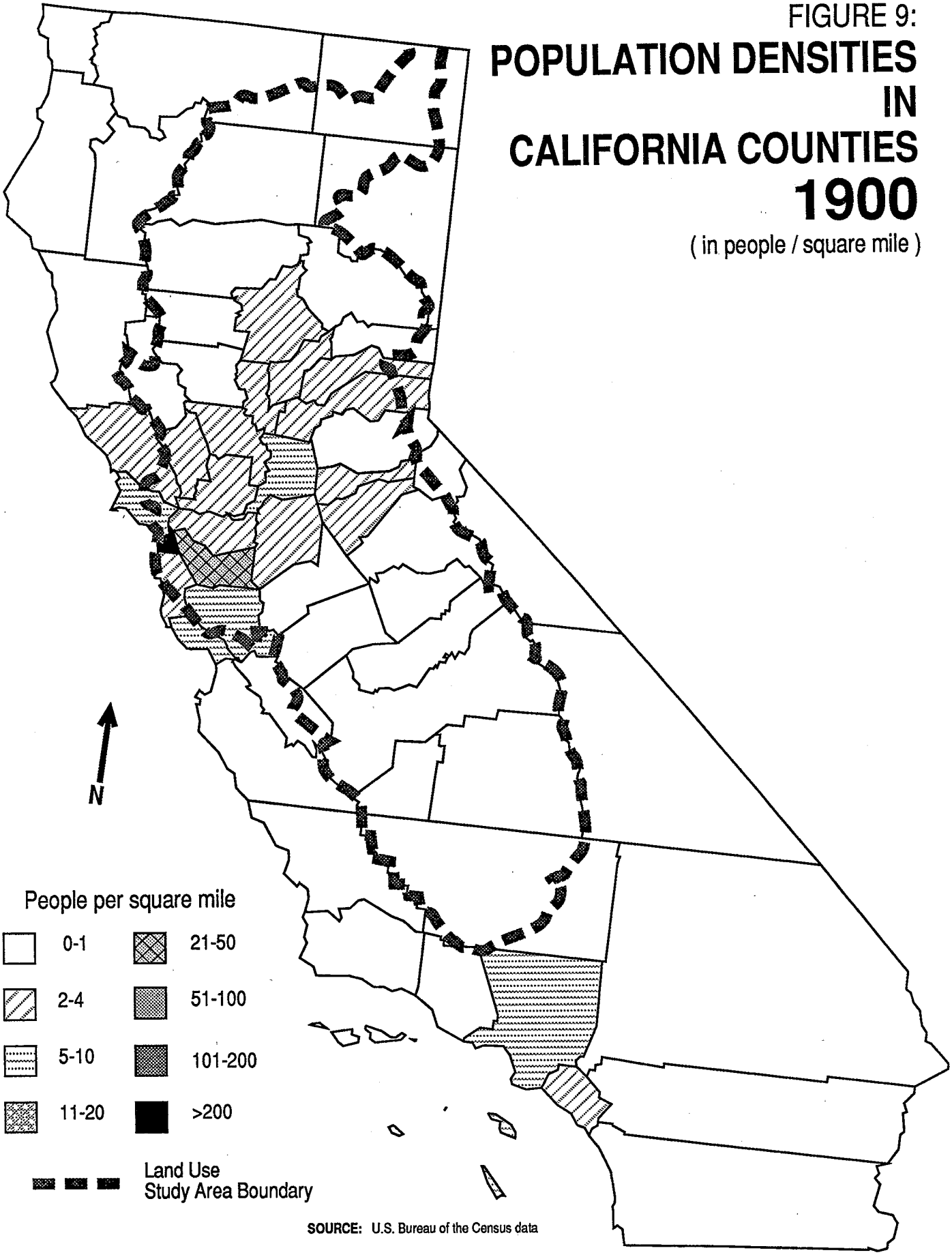
In the late 1880s, lower freight fares, falling wheat prices, increased population and greater availability of water lead to the diversification of farm products from primarily wheat to fruits and vegetables, crops that required irrigation. Much of the inhabitable land of the Central Valley was settled and cultivated by 1890 and one-quarter of the land was irrigated. By the end of the century non-grain (or truck) crops were the major cash crop and California led the nation in the production of many varieties of fruit.

The agricultural boom, in conjunction with federal and state reclamation acts, spurred the construction of a vast network of levees in the Sacramento/San Joaquin Delta and resulted in almost 60% of the Delta's wetlands being converted to field crops and orchards.

FIGURE 9:

POPULATION DENSITIES IN CALIFORNIA COUNTIES 1900

(in people / square mile)



SOURCE: U.S. Bureau of the Census data

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Throughout this period, most transportation was water-based. Most urban development was restricted to waterfront cities, particularly San Francisco, Oakland, Berkeley, Alameda and Sacramento.

E. 1900s TO 1950 -- THE RISE OF MANUFACTURING

The 1900s were a period of diversification as California broadened its economic base (Fig. 9). In the early 1900s, the petroleum industry grew rapidly while the gold mining industry continued to decline. The two decades from 1900 to 1920 brought rail transportation to the Bay and Delta areas, and with them towns along the peninsula and the east Bay lines. Increases in car ownership and "commuting" from the "bungalow tracts" led to towns such as Albany, Daly City, El Cerrito, Hayward, Piedmont, Redwood City, San Leandro and San Mateo doubling in size from 1920 to 1939 (Vance, 1964).

After WWI, motion picture, auto and aircraft industries were established in the state. WWII stimulated manufacturing and industry to the degree that they usurped agriculture from its forefront position. Employment in manufacturing was 165,000 in 1914, 445,000 in 1941, and 722,000 in 1947. State-wide, defense spending helped establish scientific labs and the aerospace industry. California's population growth was marked by large-scale immigration, which reached its peak during World War II.

Two trends led to a change in agricultural land use from 1900 to 1950. First, agriculture itself changed as farming became more mechanized requiring greater capital investment. Small family farms gave way to large agriculture conglomerates. The second trend relates to urbanization. Throughout California's history there has been a pattern of population concentrated in urban centers with the vast majority of the land consisting of sparsely settled rural areas. In 1900, 52% of population resided in urban areas with 49% in San Francisco and Los Angeles alone. Because of an increase in the size of existing urban areas and an increase in the number of urban centers, over 90% of the population lived in urban areas at the end of this period. The pattern of growth was in conversion of flat valley land from agricultural to urban uses (Fig. 10).

Competition for limited water and demands for flood control led the federal government to finance the Central Valley Project beginning in the 1930s. Shasta Dam on the Sacramento River, Friant Dam on the San Joaquin River, and other stream diversions were constructed which altered natural run-off and drainage patterns to the Central Valley, the Delta and San Francisco Bay.

F. 1950s TO 1975 -- POST-WAR URBANIZATION AND WATER DEMAND

Following World War II, major population growth accelerated in suburban areas. The "baby boom" peaked in the 1950s. Returning servicemen and their families sought new affordable homes and settled in the suburbs. Immigration to California was quite high in the early 1950s, but had declined and then leveled off by 1975.

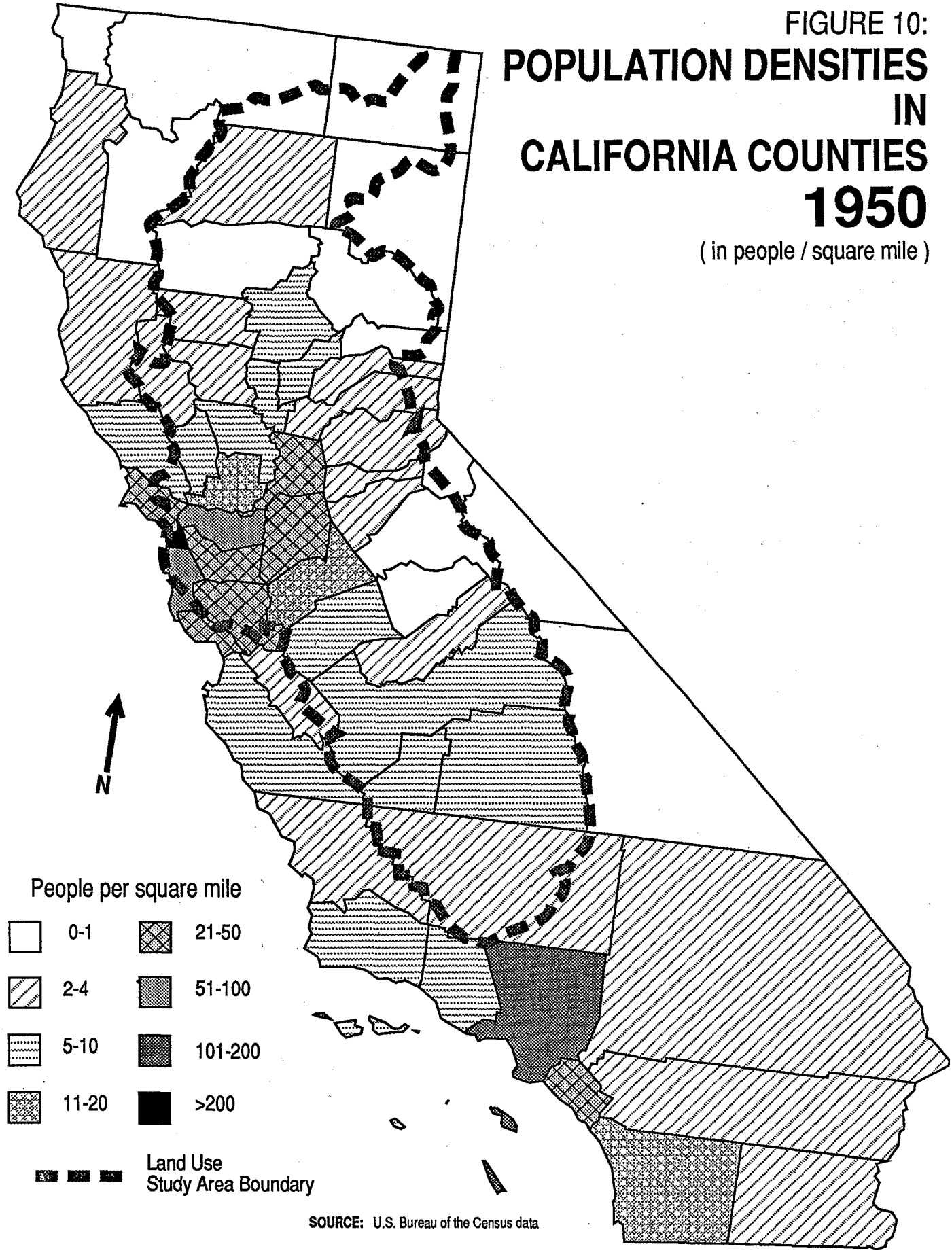
Economic development was highlighted by growth in high-technology manufacturing, service and office sector employment, and tourism.

Major cities outside of the older urban centers established strong job growth, leading to commute patterns from one suburban area to another, rather than from the suburbs to the central cities. Four-lane arterials replaced two-lane roads and freeways replaced four-lane arterials as a growth in population and jobs led to more cars. San Francisco's need to import workers and the workers' need for affordable housing in the suburbs led to the planning and construction of BART, linking the east Bay with San Francisco.

FIGURE 10:

POPULATION DENSITIES IN CALIFORNIA COUNTIES 1950

(in people / square mile)



SOURCE: U.S. Bureau of the Census data

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In 1951, the key structures in the federal Central Valley Project were completed and water flowed through canals to serve urban, industrial and agricultural customers. Other projects control flows, provide irrigation water and flood protection to downstream lands and Delta islands, and protect Delta waterways against the intrusion of saline water.

As the state continued to grow and water demand increased, additional water diversions were discussed. The first phase of planning for the State Water Project was completed in 1951. Sixteen years later, in 1967, construction was completed on two major components of that project, Oroville Dam and San Luis Dam. The California Aqueduct was completed in 1972. By 1973, the first phase of construction on the State Water Project was completed.

PART IV: CURRENT STATUS OF POPULATION AND LAND USE PATTERNS

The period from 1975 to 1985 has seen several changes in the development patterns in the land use study area. In the Central Valley watershed region, existing urban areas have continued to grow by converting agricultural land to urban uses. In addition, there has been an explosion of growth in the Sierra's foothills. However, the predominate land uses in that region are non-urban, including forest, agricultural and range uses. In the Bay Area and Delta regions, Solano and San Joaquin counties were the fastest growing, while Santa Clara and Sacramento counties experienced the greatest absolute population growth. The Bay Area and Delta regions are much more urban than the Central Valley watershed. Even so, currently, agriculture, forests and rangeland each account for a larger percent of the total land in the 12-county area than urban.

One of the major purposes of this status and trends report is to identify the current distribution of population and land uses in the land use study area. The population and land use data provide quantitative data for the years 1975 and 1985, as well as information on the changes that have occurred in that time period. The results of this work are summarized in Figures 12 - 17, which follow.

Population data from two government agencies have been used in this identification process -- the Association of Bay Area Governments (ABAG) and the California Department of Finance. Land use data were obtained from three sources: ABAG's geographic information system (BASIS), ABAG's Local Policy Survey (part of its projections work), and the U.S. Geological Survey LUDA (Land Use DAta) maps and data. These data sources and their strengths and weaknesses are the subject of the first section which follows, "Potential Data Sources." The procedures and assumptions needed to develop the land use numbers contained in the Appendix are described in the second section of this chapter, "Procedures." Finally, the results of this work are summarized in the third and fourth sections, "Current Population Patterns," and "Current Land Use Patterns."

Two principal assumptions have driven the processes of collecting and selecting appropriate population and land use data. (1) The categories of land use identified in Appendix II are more useful than other systems developed that may produce different subdivisions of, in particular, urban land. (2) Accurate population and urban land use information is most critical for the nine-county Bay Area region, less critical for the three-county Delta region, and least critical for the Central Valley watershed.

The data sources used to create the land use information vary by area. However, by using the "nested" classification system described in Appendix II, the data for the three project areas (the Central Valley watershed, the Delta region, and the Bay Area region) are able to be compared.

A. POTENTIAL DATA SOURCES

1. Potential Sources of Population Data

The obvious and principal source of population data is the U.S. Bureau of the Census. This federal agency is responsible for counting the people in the country, and for collecting other data on the characteristics of that population. Because of the need by the San Francisco Estuary Project to have data for every five years, while the census is taken every ten years, it has been necessary to use data from the California Department of Finance Population Research Unit. This State agency uses administrative records such as drivers licenses and federal income tax returns to estimate the population of counties and cities in California. The data produced are more general than produced in the census, however, and do not include information by census tract.

The three councils of governments (COGs) in the twelve-county Bay Area and Delta regions have developed estimates of population by census tracts for non-census years. The three COGs are the Association of Bay Area Governments (ABAG), the Sacramento Area Council of Governments (SACOG, for Sacramento and Yolo counties) and the San Joaquin Council of Governments (serving only San Joaquin County).

2. Potential Sources of Land Use Data

There are a number of sources of reasonably current land use data for the Bay Area, Delta and Central Valley watershed. Some data consist of tables, others of maps, and others of maps that have been converted to a digital format for use in geographic information systems. These data often do not measure exactly the same physical characteristics of the land because they were prepared for different purposes. The data are also available for different dates. Several major sources of land use data were examined for possible use, including the five described in the following paragraphs. The first three sources were used extensively in the preparation of this report. The fourth source, zoning maps, were used only to the extent that they influenced the first source, ABAG's Local Policy Survey. The final source was used only as a check of some of the urban totals in the Central Valley watershed and Delta regions.

(1) ABAG has land use data by census tract, in tabular form only, for use in its population projections work. These data, commonly referred to as the "Local Policy Survey Database," focuses on "defin[ing] development opportunities in the nine-county San Francisco Bay Area by quantifying land available for development according to local policies" (Hootkins, 1986). The latest version of the database, completed in April 1989 for internal use, will be used in ABAG's 1989 projections document. It includes data on existing (1985) development for each census tract for ***net*** acres of land in five categories: (a) residential, (b) local serving (including most of those items listed under Category 12 in Appendix II), (c) basic (including land devoted to industrial uses, but also long-distance transportation, finance and insurance, colleges and universities, military, and federal and state government offices, (d) land in mixed use (whether residential/local serving or local serving/basic), and (e) streets and highways. Because the principal use of this database is in ABAG's population and employment projections work, the non-urban acres are subdivided not by current use, but by whether or not they are ***available*** for future urban development according to local government policies.

(2) ABAG also has extensive mapped data and a 1985 land use database in its own geographic information system, called the Bay Area Spatial Information System (BASIS). At the time of this project's effort in late 1988 to identify possible land use data sources, the ABAG database consisted of extensive Level II and Level III information for ***urban*** uses in the nine

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Bay Area counties only. (For a discussion of the land use categorization scheme and definitions of Levels I, II, III, and IV, see Appendix II.) The maps were based on mapping prepared by the U.S. Geological Survey as part of its nationwide LUDA (Land Use DAta) map series, largely from aerial photography. The Bay Area map sheets, ranging in scale from 1:100,000 to 1:250,000, were based on photography from the mid-1970s (Fig. 11). In addition, a joint U.S. Geological Survey/San Mateo County project produced a series of compatible land use maps for the mid-1970s at a scale of 1:24,000. ABAG staff drafted the ***urban*** data from all of these land use maps onto mylar overlays registered to 1:24,000-scale U.S. Geological Survey 7.5' quadrangle base maps. The maps were updated to a consistent date of March 1985 based on (a) data from ABAG's population and employment projections staff, particularly the "Local Policy Survey", (b) interviews with local government planning and building department staff members, and (c) selected field checking, particularly in the areas of strip commercial development. One important distinction between this database and the projections database is that the areas of existing urban use are calculated based on ***gross***, NOT ***net***, acres (or hectares). Therefore, the area for streets is included within the total amounts.

(3) The U.S. Geological Survey, as part of the national mapping effort described above, has developed land use maps for the entire area of concern to this project, including the Central Valley watershed. In addition, much of the area is available in digital form suitable for inclusion in a computer-based geographic information system (GIS). The data have two major disadvantages. First, the maps are based on aerial photography from the mid-1970s (Fig. 11) and are therefore relatively old. Second, ABAG staff experience from working with these maps in the Bay Area showed two common errors which resulted from the techniques used to compile the data: (a) multi-story residential development was often mapped as commercial, and (b) commercial strip development occurring in one-story buildings was often mistaken for residential development.

(4) Local governments have zoning maps. However, because these maps often depict how land could be developed, not its current use, they overestimate developed land.

(5) The California Department of Conservation (Yoha, 1988) has developed an impressive program for depicting the conversion of potential agricultural land to urban use. The urban/non-urban boundaries are checked biannually using aerial photography. The latest maps available are based on 1986 aerial photos. The subdivisions of agriculture have some of the same problems as local government zoning maps, however, for they depict how agricultural land might be used, not how it is actually used. A second problem is that maps are only available for parts of 41 counties; all of Sacramento County and the western portion of San Joaquin County are not available.

B. PROCEDURES

1. Central Valley Watershed

The principal source of data used for the Central Valley watershed was the LUDA (Land Use DAta) maps developed by the U.S. Geological Survey in the mid-1970s. Much of the data were obtained from USGS as grid cell data with a cell size (or resolution) of four hectares (approximately 10 acres). As shown on Fig. 11, some of these data needed to be entered manually. When this occurred, the hard copies of the LUDA maps were used to tabulate the land uses occurring in the corner points of a one-kilometer (0.39 square mile) grid. This "point count" data was then added to the results of the tabulations from the digital grid cells.

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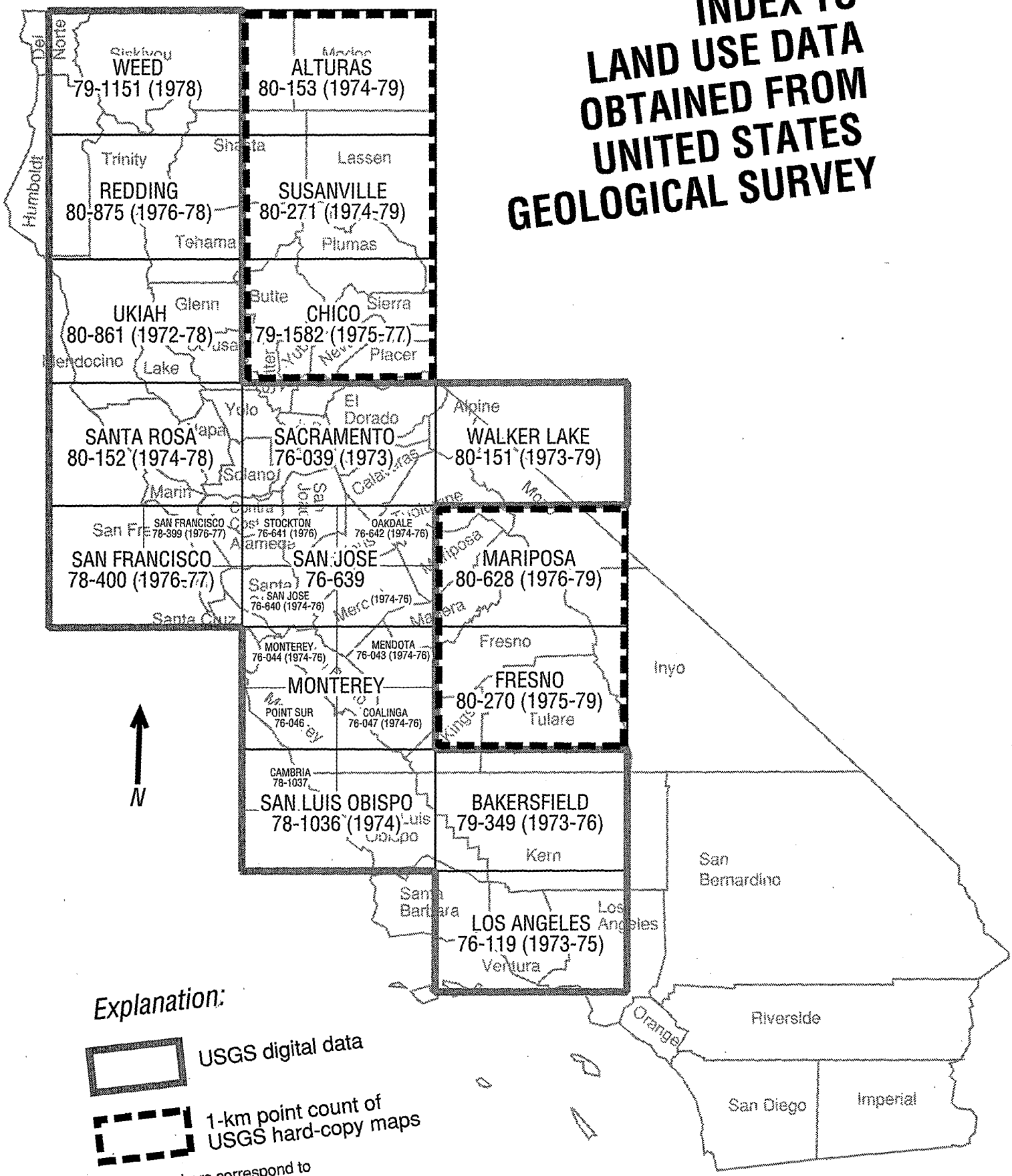
FIGURE 11:

INDEX TO LAND USE DATA OBTAINED FROM UNITED STATES GEOLOGICAL SURVEY



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The data then needed to be ***projected*** to 1985 data for use in this project. This was accomplished by first assuming that the mapping in the valley was based on, as a rough average, 1975 aerial photography. The area in urban land use was then increased by the same ratio as the change in population from 1975 to 1985. Because of the potential for problems, both in the original USGS urban data and in this simple model, this model was also run for USGS data in the nine-county San Francisco Bay Area where ABAG has accurate urban land use data for 1985 in its BASIS database. The results were quite similar. Any differences appeared to result from the way in which rural residential (Category 111) and low density residential (112) were depicted. In addition, it was confirmed that the USGS LUDA mapping in the Bay Area tended to mistake high density multi-family residential for commercial use, thus overestimating commercial and underestimating residential. One could, therefore, conclude that these same systematic errors are present in the Central Valley land use database. Attempts to use measures for growth other than population, including employment and households, resulted in much higher urban land use areas that did not predict the 1985 data in the Bay Area. One possible explanation for these high values is that there is some degree of densification with growth, resulting in higher numbers of jobs and households per acre (or hectare) of land.

The resulting increase in urban area was then subtracted from land in those non-urban categories considered to be available for conversion to urban. These categories were agriculture, range, forest, and sparse vegetation. The categories of water, wetlands, tundra and snow or ice were not considered available for development. There were two reasons for not including wetlands in the group available for conversion. (1) These areas are subject to significant development constraints and will not be urbanized at the same rate as the other non-urban uses. (2) The wetlands areas are not mapped accurately enough to warrant being used in ***projected*** data. Thus, the resulting land use files cannot be used to measure the number of acres of wetland converted to urban use in the 1975-1985 period. Much more accurate information is contained in the Wetlands Status and Trends Report.

The amount of land subtracted from each available category was based on the percent of total available land that category represented. Checks of the resulting agriculture land area against figures available from the County Agricultural Commissioners Offices showed this assumption to be reasonable. For a more complete description of these agricultural data and their uses, see Part VI.

2. The Delta Region

In general, the data sources used for the Delta are the same as for the Central Valley watershed. However, both the 4-hectare (approximately 10-acre) grid cell database of the USGS LUDA (Land Use DAta) files and the digitized polygons representing those areas were obtained from USGS. The polygons were then used in the BASIS geographic information system and converted to 1-hectare (2.47 acre) grid cells. The principal advantage of this technique was not so much the higher resolution of the land use file as the ability of BASIS to map the data. In addition, census tract boundaries were obtained from the USGS LUDA files. These could have been used to produce accurate tabulations of the data by census tract, rather than merely by county. However, both the grid cell and polygon versions of the census tract file proved to be unusable. The U.S. Bureau of the Census has computer files of 1980 census tract boundaries in its TIGER files, but the time and the cost involved in obtaining and manipulating them to produce census tract tabulations seems too great given the relatively small marginal increase in data reliability that could be gained.

This process of projecting land use is quite simplified. The process also resulted in negative numbers for two land use categories in one HUCO (Hydrologic Unit/County area). The decision

was made to preserve the negative number because most forms of analysis will use the SuperHUCO (aggregated HUCO) data. The appearance of negative numbers could be eliminated if the analysis had been conducted at the census tract level. This did not occur for the reasons just specified.

3. The Bay Area Region

The principal source of urban land use data used for the nine-county Bay Area was the 1985 land use file available in BASIS. Because of the desire to use the ABAG Local Policy Survey Database in the land use projections process, these two databases were systematically compared. The databases are remarkably similar, given the two ways in which they were developed. In general, the BASIS file tends to identify more low density residential and the Local Policy Survey Database tends to identify more available land, often in small "infill" parcels within developed areas. This comparison also pointed out inaccuracies in both databases, which were subsequently corrected in April 1989.

The USGS LUDA (Land Use DAta) polygon files were converted to one-hectare (2.47 acre) grid cells in the BASIS database. The resulting file was used to assign land use codes to the non-urban portions of the Bay Area. Discrepancies in the urban-non-urban definitions and in the land-water definitions of the two files were resolved by creating three new land use categories: 175, 64, and 56. Descriptions of these categories are contained in Appendix II.

4. Use of HUCO and SuperHUCO Areas

From a geographic standpoint, the polygons formed from the intersections of the hydrologic unit boundaries and the county boundaries make convenient areas for tabulating the land use data. These areas are called Hydrologic Unit/Counties, or HUCOs. The HUCO boundaries and definitions are depicted on Figure 26 in the Appendix. From an analysis standpoint, it is quite useful to group these 234 HUCOs into more general areas, termed "SuperHUCOs." The SuperHUCO boundaries are depicted on Figure 27 in the Appendix.

The same USGS LUDA files that contained the land use data from the mid-1970s also contains a map set of hydrologic units. The map file is based on the Hydrologic Unit Maps published by the USGS Office of Water Data Coordination (USGS, 1986). The availability of this file enabled the relatively easy tabulation of the land use data for all three subareas by hydrologic unit. It also enabled the area outside of the project area and watershed to be eliminated from consideration. As with the land use data, the hydrologic unit information has 4 or 100 hectare resolution in the Central Valley watershed and one-hectare resolution in the Bay Area and Delta.

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C. CURRENT POPULATION PATTERNS

1. Central Valley Watershed Region

As stated in Part III, the major pattern of growth in the Central Valley watershed from 1900 to 1950 was the conversion of flat agricultural lands to suburban and urban uses. The period from 1975 to 1985 has seen a change from this pattern; improvements in transportation away from water and rail-based systems and the increased number of household of retirement age have allowed for the growth of communities in the Sierra foothills. This trend is responsible for Amador, Calaveras, El Dorado, Madera, Mariposa, Nevada, Placer and Tuolumne counties all experiencing over 50% growth in population from 1975 to 1985. The only other California counties experiencing such rapid growth were Lake, Riverside and San Bernadino.

2. The Bay Area and Delta Regions

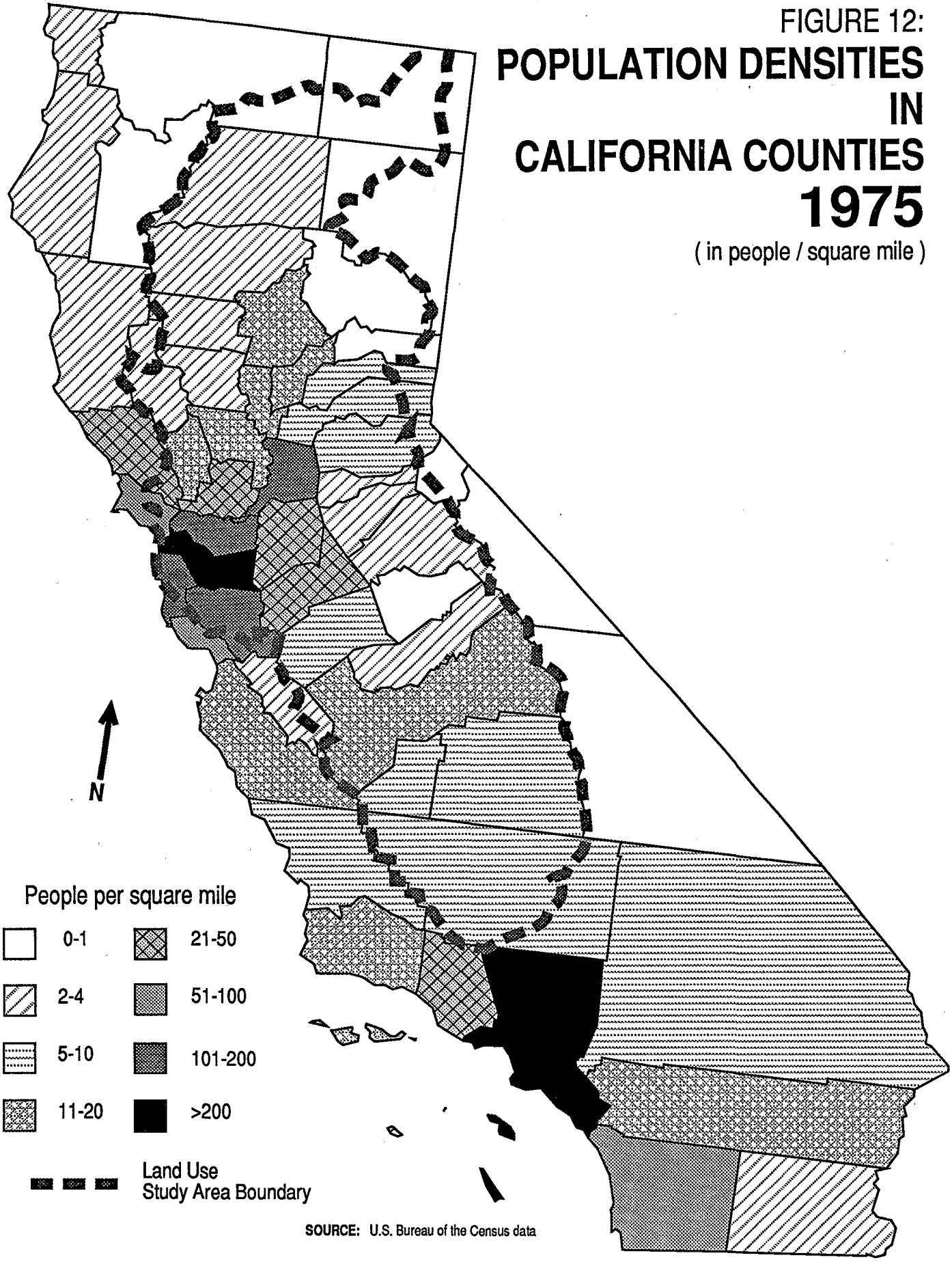
The 12-county Bay and Delta area is one of the most urban in California. From 1975 to 1985, eight of California's 58 counties had a population density in excess of 100 people per square mile. Six of those are in the 12-county Bay Area and Delta regions: Alameda, Contra Costa, Sacramento, San Francisco, San Mateo and Santa Clara (Figures 12 and 13). Although this 12-county area accounts for only 6.6% of California's total land area, about 28% of the state's people lived in the area in 1975 and 27% in 1985.

A large amount of recent growth has also occurred in this 12-county area. In terms of percent increase in population, Solano County has been the fastest growing, with a 46% increase from 1975 to 1985, followed by San Joaquin County with a 39% increase. The greatest absolute growth has occurred in Santa Clara County, where the population increased by about 219,800 from 1975 to 1985, and in Sacramento County, where the population increased by about 202,200 in that period.

FIGURE 12:

POPULATION DENSITIES IN CALIFORNIA COUNTIES 1975

(in people / square mile)



SOURCE: U.S. Bureau of the Census data

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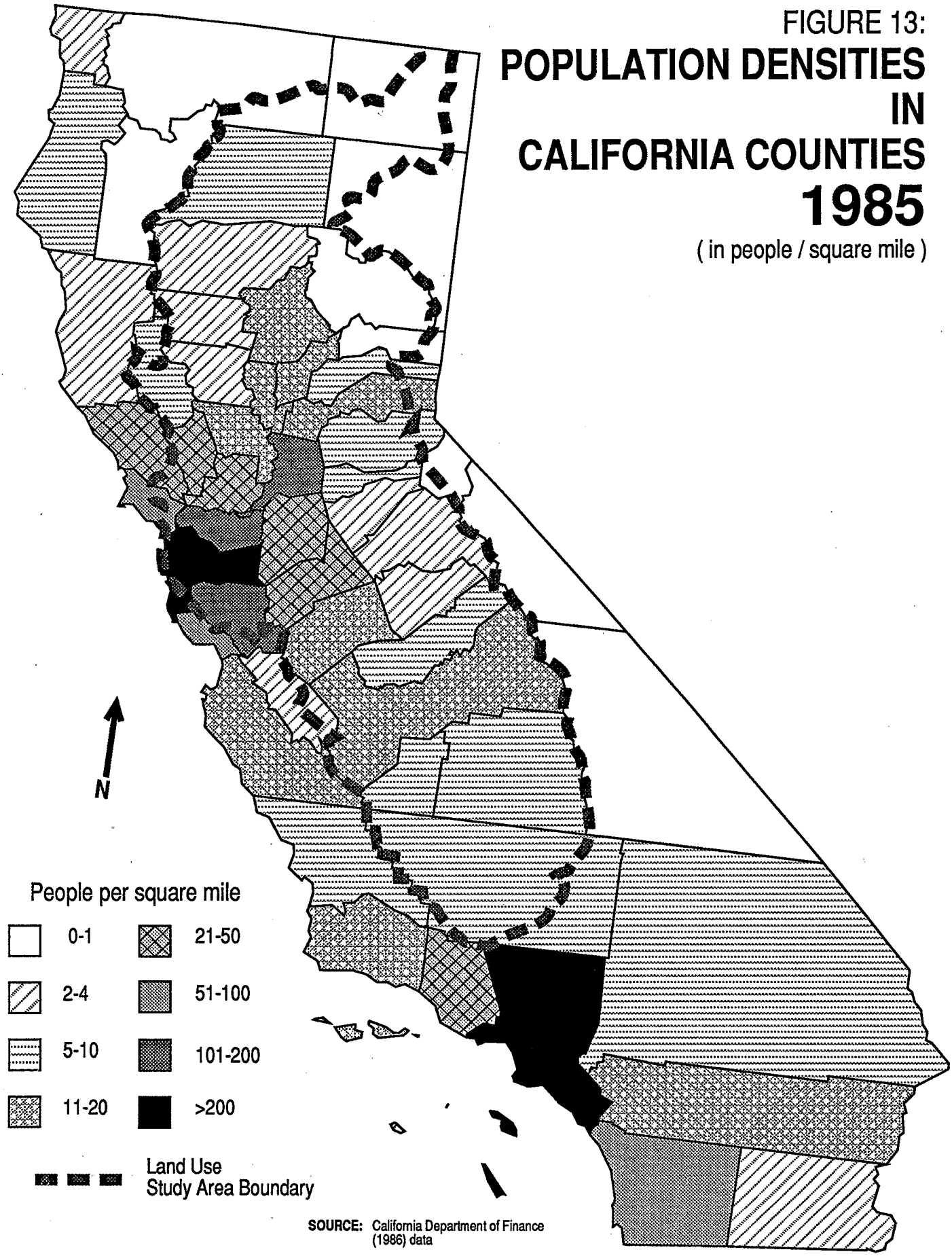
FIGURE 13:

POPULATION DENSITIES IN CALIFORNIA COUNTIES 1985

(in people / square mile)



SOURCE: California Department of Finance (1986) data

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D. CURRENT LAND USE PATTERNS

1. Central Valley Watershed Region

Although the amount of urban land in the Central Valley increased from 860 square miles (2,220 sq. km.) in 1975 to approximately 1,180 square miles (3,070 sq. km.) in 1985, the percentage of land in urban use in that area is still quite small--increasing from 1.54% in 1975 to 2.22% in 1985.

The largest amount of land is forest. In 1975, there were 27,340 square miles (70,810 sq. km. or 51.31%) of forest. Due to urbanization, this amount had decreased to approximately 27,220 square miles (70,500 or 51.08%) in 1985.

Rangeland and agriculture account for approximately the same percentages of land. In 1975, there were about 11,460 square miles (29,670 sq. km.) in rangeland, or 21.50% of the Central Valley watershed. The percentage in rangeland decreased due to urbanization to approximately 21.36%, or 11,380 square miles (29,480 sq. km.) in 1985. In 1975, there were about 12,280 square miles (31,810 sq. km.) of land in agricultural use, or 23.05% of the Central Valley watershed area. The percentage in agriculture had decreased due to urbanization to 22.80%, or 12,150 square miles (31,470 sq. km.) in 1985.

Other categories of use are quite small.

- Approximately 360 square miles (920 sq. km.) are sparsely vegetated land (or 0.67% of the watershed area).
- Approximately 390 square miles (1,000 sq. km.) are wetlands (or 0.73% of the watershed area).
- Approximately 610 square miles (1,570 sq. km.) are tundra, snow and ice (or 1.14% of the watershed area).

Two important points should be clear from examining these data and the charts that follow (Figures 14 and 15). ***(1) Urbanization is a relatively minor portion of the Central Valley watershed. (2) Agricultural land use is significant.*** Agricultural land use data for the Central Valley watershed are critical because water and chemical usage, as well as agricultural management practices, have potentially significant impacts on the water quality and beneficial uses of the San Francisco Estuary. Additional agricultural data for this area is included in Part VI.

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FIGURE 14:
1975 CENTRAL VALLEY WATERSHED LAND USE PATTERNS

Total Area of 53,284 sq. mi. / 138,004 sq. km.

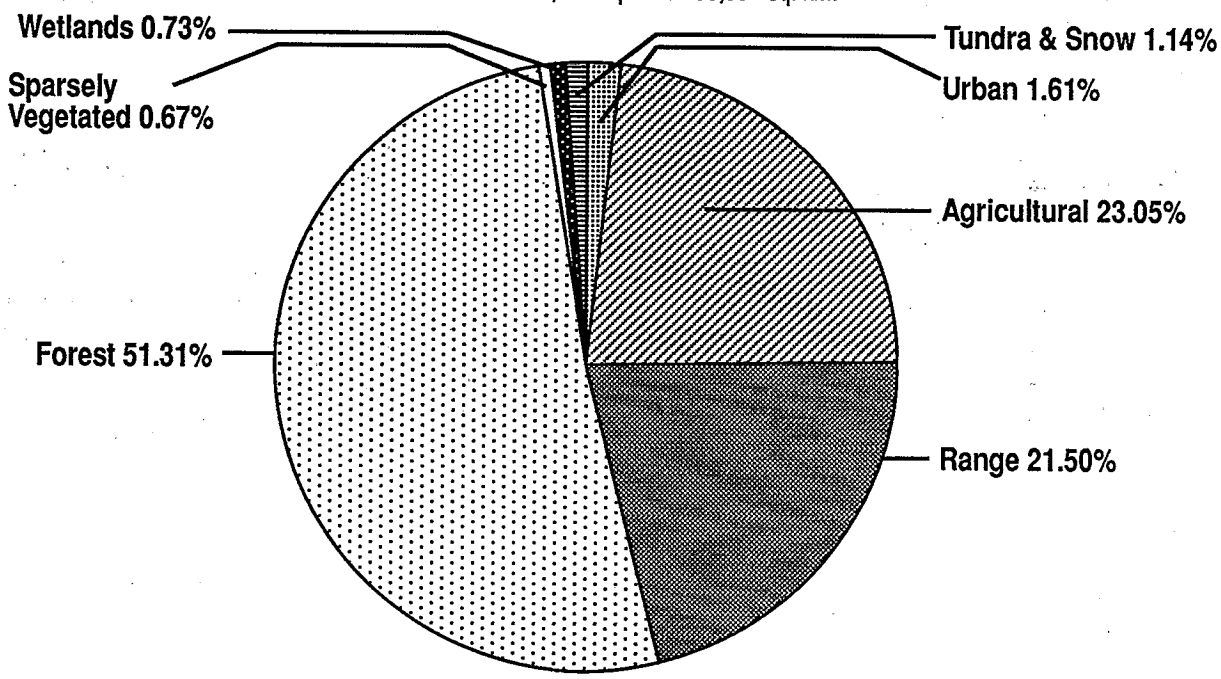


FIGURE 15:
1985 CENTRAL VALLEY WATERSHED LAND USE PATTERNS

Total Area of 53,284 sq. mi. / 138,004 sq. km.

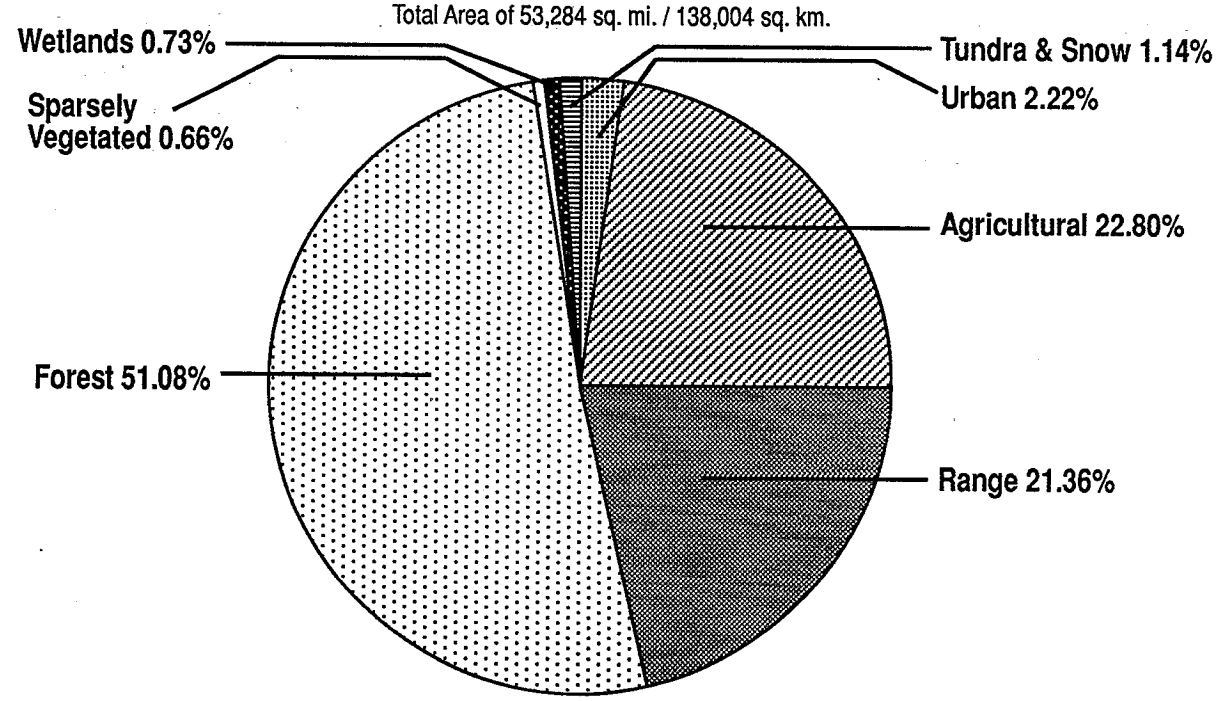
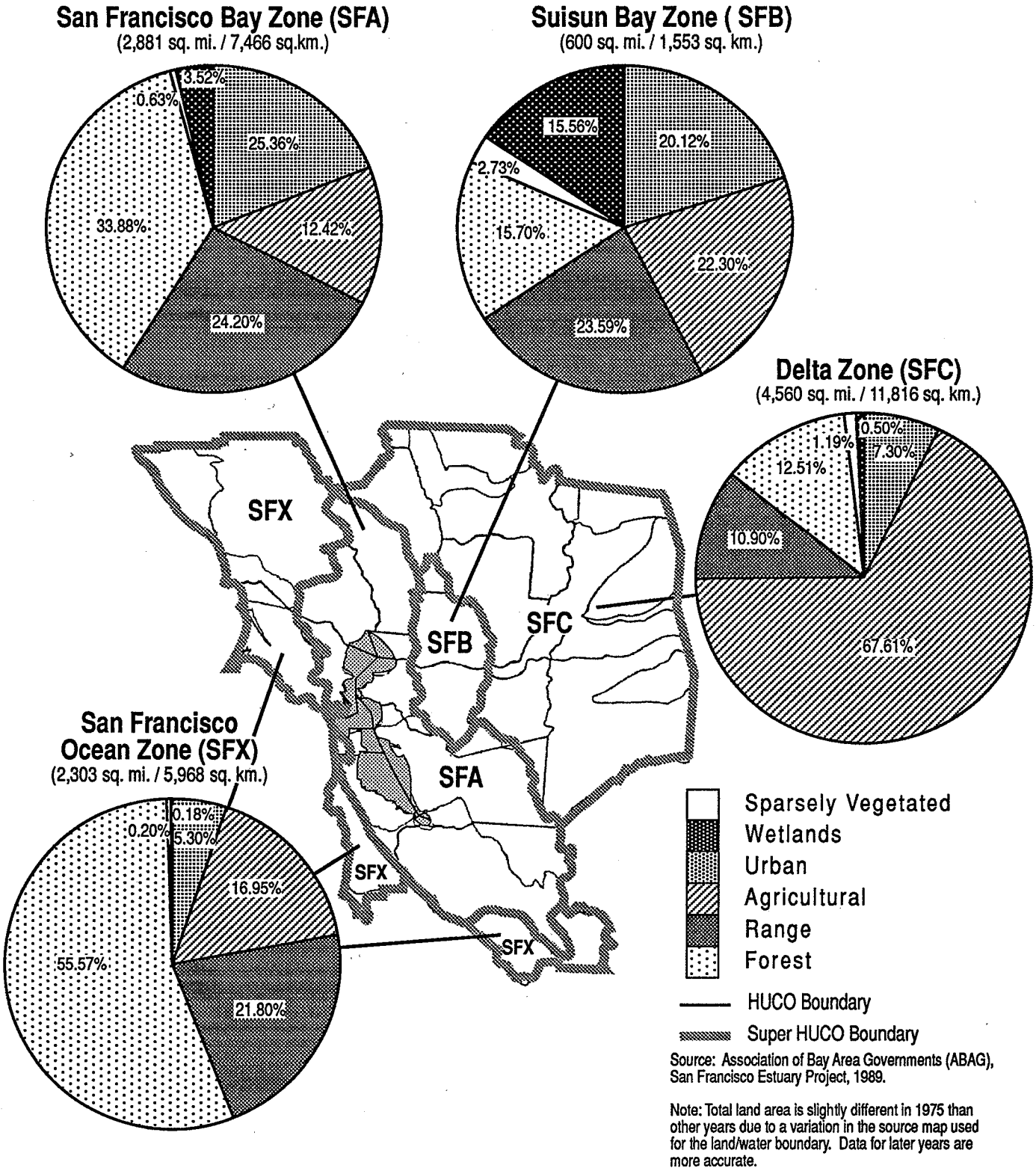


FIGURE 16:

1975 BAY AND DELTA AREA LAND USE PATTERNS

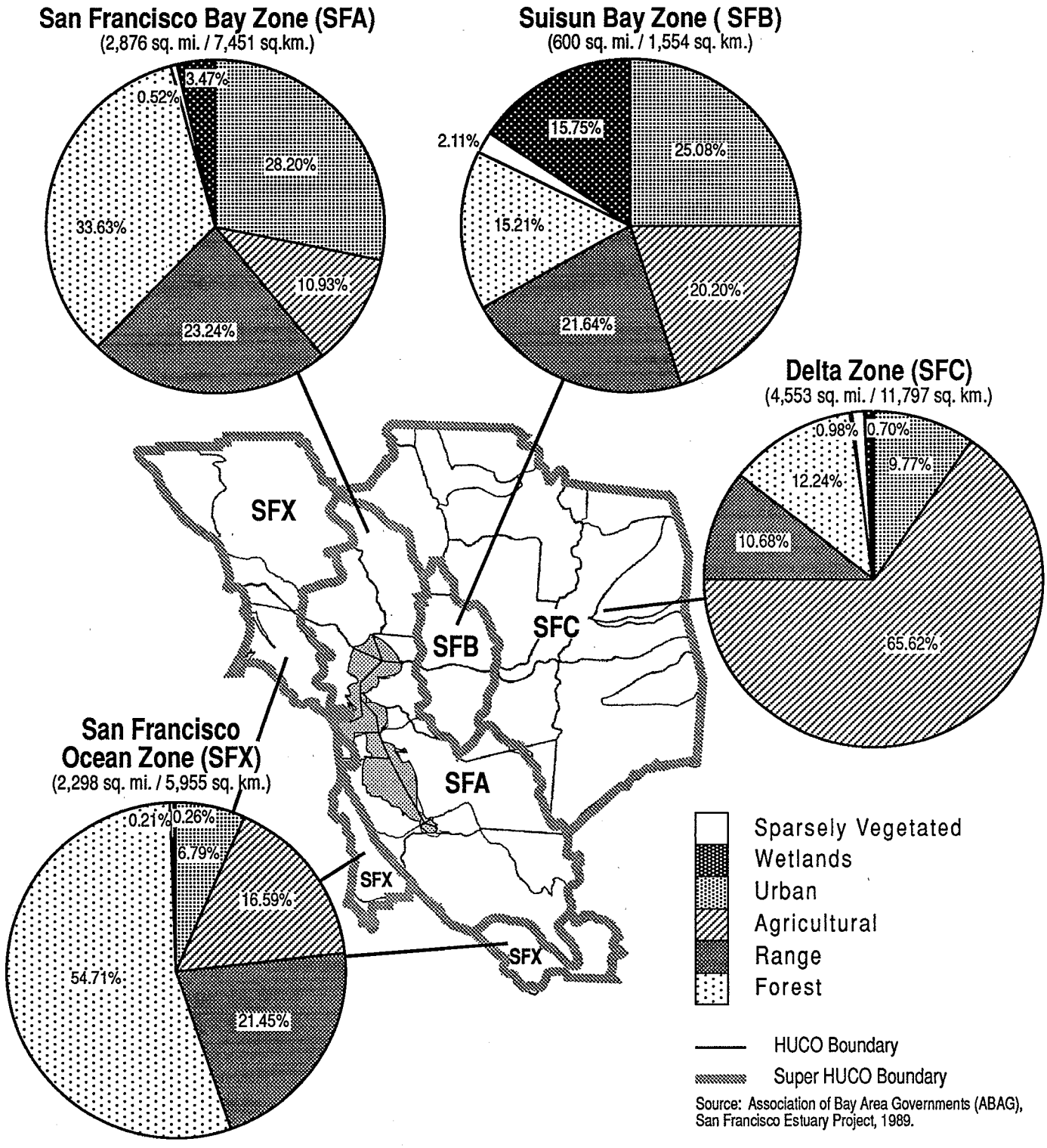


Source: Association of Bay Area Governments (ABAG), San Francisco Estuary Project, 1989.

Note: Total land area is slightly different in 1975 than other years due to a variation in the source map used for the land/water boundary. Data for later years are more accurate.

FIGURE 17:

1985 BAY AND DELTA AREA LAND USE PATTERNS



2. The Bay and Delta Area

The amount of urban land in the 12-county Bay Area and Delta region increased from 1,310 square miles (3,380 sq. km.) in 1975 to 1,560 square miles (4,050 sq. km.) in 1985. The percentage of total land in urban use is currently quite large when compared to the Central Valley watershed region (12.63% vs. 1.54% for 1975 and 15.13% vs. 2.22% for 1985). Even in absolute numbers, the 1,560 square miles (3,380 sq. km.) in this 12-county region is larger than the 1180 square miles (3,070 sq. km.) in the Central Valley watershed region.

By analyzing the changes in the land area attributed to the non-urban uses, it is possible to determine types of land converted to urban use. Overall, approximately three-fifths of the increase in urban land was due to the conversion of agricultural land. The largest amount of land in the twelve-county area remains in agriculture, although the percentage of land in this type of use decreased from 38.33% in 1975 to 36.84% in 1985. Amounts in range and forest were reduced much less. Forest dropped from 28.23% in 1975 to 27.82% in 1985. Rangeland dropped only 0.56% (from 17.77% in 1975 to 17.21% in 1985). The area of sparsely vegetated land was reduced from 0.90% to 0.75%.

Any analysis of the change in area in the wetlands category is not meaningful for two major reasons. First, the data in the central nine-county Bay Area region was from a slightly different source in 1975 than in 1985. Second, one subdivision of the wetlands category of land use (coded "64") which served as a means of reconciling land-water boundary discrepancies in the two data sources accounts for over 15% of the total 1985 wetlands in the nine-county Bay Area region. However, because the total amount of wetlands in the 1985 land use database for the Bay Area region is 137,100 acres, versus 138,600 acres in the Wetlands Status and Trends Report, these discrepancies should not significantly affect the percentages of land assigned to various urban and other non-urban categories.

The highest percentage of urban land exists in the San Francisco Bay Zone SuperHUCO (SFA), followed by the Suisun Bay SuperHUCO (SFB). In both cases, the amount of urban land is over 1 1/2 times the average for the 12-county area. Urban land increased in SFA from 25.36% in 1975 to 28.20% in 1985. Urban land increased in SFB even more rapidly, rising from 20.12% in 1975 to 25.08% in 1985.

Agricultural land is most predominant in the Delta SuperHUCO (SFC), accounting for 67.61% in 1975, although that percentage was reduced to 65.62% in 1985. The agricultural land in this SuperHUCO is almost double the average for the 12-county area.

The dominant land use in the San Francisco Ocean Zone SuperHUCO (SFX) is forest. At 55.57% in 1975 and 54.71% in 1985, the forest percentage is also almost double the average for the 12-county area.

PART V: FUTURE PROJECTIONS OF POPULATION AND RESULTING LAND USE PATTERNS

The period until 2005 will continue to see an increase in urbanization of the land use study area. In the Central Valley watershed region, the percent of land in urban use will continue to be quite small when compared to that for agricultural uses. The urban growth in the 12-county Bay Area and Delta regions will be larger in absolute terms, although the rate of increase will be smaller.

As with the analysis of the current status of population and employment, one of the principal purposes of this section is to quantify the magnitude of these trends. The results of this work are summarized in Figures 18 - 23, which follow.

To accomplish this projections effort, population projections of the California Department of Finance have been used. In addition, these population data, together with land use projections prepared by the Association of Bay Area Governments (ABAG), have been used to produce land use projections. The techniques used to develop both the population and land use projections are contained in the first section, "Procedures." Note that no attempt to quantify potential loss of wetlands is contained in this report. That analysis is contained in the Wetlands Status and Trends Report.

The assumptions underlying the projections relating to demographics, economics, and local government policies are contained in the second section, "Assumptions."

Finally, the results of this work are summarized in the third and fourth sections, "Projected Population Patterns," and "Projected Land Use Patterns."

A. PROCEDURES

In order to predict the extent of increased urbanization in the Estuary drainage area, it is essential to use estimates of future population.

1. Sources of Population Projections

The State Department of Finance has developed projections of population for each of California's counties for 1990, 1995, 2000, and 2020 (DOF, 1986). Several councils of governments in the state, have developed projections for smaller geographic areas, including census tracts. In the 12-county Bay and Delta areas, these agencies include ABAG for the nine-county Bay Area (ABAG, 1987), the Sacramento Area Council of Governments for Sacramento and Yolo counties (SACOG), and the San Joaquin Council of Governments for San Joaquin County (SJCOG). Although the ABAG population data were used to create the land use projections within the nine Bay Area counties, the population data used to create the population density maps (Figures 18 and 19) are from the California Department of Finance. Plans to use census tract data in the three Delta counties were abandoned when ABAG was unable to obtain land use data by census tract for this area due to the difficulties explained in Part IV. These projections, whether from ABAG or the California Department of Finance, "should not be interpreted as either a floor or a ceiling on growth" (ABAG, 1987).

2. Development of Land Use Projections

As with the collection of current land use information, the development of land use projections has been made using the assumption that this information is less critical for the Central Valley watershed than for the three-county Delta area, which, in turn, is less critical than for the nine-county Bay Area.

Projections of land use changes due to urbanization for the Delta and Central Valley watershed have been developed using the same simple population-based model used to track urbanization from 1975 to 1985. This model is described in Part IV.

On the other hand, the estimates of increased urbanization in the nine-county Bay Area are based on the estimates for each census tract of land conversion contained in Projections '87 (ABAG, 1987).

> [These projections] reflect estimates of an area's **development potential** based upon current zoning, general plans and other local development policies, **in conjunction with** regional employment and population forecasts over the period 1980-2005.

Thus, several of the possible shortcomings of the model used in the Delta and Central Valley watershed, including redevelopment and densification, are avoided.

Note, however, that variations in forecasting methodologies can substantially affect the results. Appendix IV explains how some of these variations can affect population projections. One of the principal conclusions of that discussion is that model statistics should be viewed with caution. Simple statistics as a high correlation coefficient or a small SE may not be sufficient to suggest that a model is a "good predictor of the future."

As with the Delta and Central Valley, the increased urban area in the Bay Area was subtracted from land in categories considered to be "available." These categories were agriculture, range,

forest, sparse vegetation and urban vacant (a subcategory of urban open). As stressed in Part IV, ***water and wetlands areas were not considered available for development.*** There were two reasons for not including wetlands in the group available for conversion. (1) These areas are subject to significant development constraints and will not be urbanized at the same rate as the other non-urban uses. (2) The wetlands areas are not mapped accurately enough in the land use database to warrant being used in ***projected*** data. The resulting land use files cannot be used to quantify the amount of wetlands that might be converted to urban use. In individual census tracts, however, it is possible to measure the development pressure. A discussion of this potential application appears in Part VI, and is used in the Wetlands Status and Trends Report.

In the Bay Area, the amount of land subtracted from each "available" category was based on the percent of total available land that category represented in each census tract area. (This model is more detailed than that used in the Delta and Valley areas.) For cases where census tracts were split among multiple hydrologic units, the residential land conversion has been prorated based on the percent of existing residential land in each portion of the tract. Similarly, new local serving land is prorated based on the occurrence of existing commercial land and new land for basic employment is prorated based on the occurrence of existing industrial land. Any new mixed residential/commercial or commercial/industrial development are split into residential, commercial, and industrial use. ***No significant increases in lifeline use (highways, airports, sewage treatment plants, etc.) are included for the Bay Area region because the sites of these facilities are not expected to increase in size (even though the amount of paving or structures on those sites will increase).***

B. ASSUMPTIONS

The key demographic and economic assumptions, as well as any use of local government development policy constraints, are summarized here to aid in interpretation of the data. A more detailed discussion of these assumptions are covered in the source documents for the projections data used.

1. Demographic Assumptions

The Bay Area -

The fertility rate in the Bay Area has historically been lower than that of the rest of the state. "ABAG staff assumed a fixed period fertility rate of 1.76 between 1985 and 1990, and 1.80 for the period 1990-2005. ...In 1980, 49 percent of the female population was in the 15-44 age group. By 1985, this fraction decreased to 48 percent of the total female population. By 1995, ABAG forecasts that the percentage of women aged 15-44 will be down to 46. By 2005, this proportion is expected to decline even further to 43 percent of the total female population" (ABAG, 1987, p. 13).

Although mortality rates are expected to continue to decline, the number of deaths in the Bay Area will increase from 48,020 per year from 1986-1990 to 66,050 per year from 2001-2005 because of the aging population (ABAG, 1987, pp. 13-14).

"Net regional migration ... will represent about 30 percent of gross population growth (births plus migration) in the nine-county region" (ABAG, 1987, p. 14).

"Over the 20 year projection period from 1985-2005, regional household size is expected to decline from an average of 2.57 persons per household in 1985 to 2.43 persons by 2005" (ABAG, 1987, pp. 14, 17).

"Regional labor force participation for persons 15 years or older is expected to rise from 67.4 percent in 1985 to about 71.0" in 1995, remaining there until 2005 (ABAG, 1987, p. 17).

The Delta and the Central Valley Watershed -

The California Department of Finance has assumed an overall fertility rate of 1.96 between 1985 and 1990, dropping to 1.95 between 1995 and 2000, and again dropping to 1.93 in 2005 (DOF, 1986, p. 10).

The Department of Finance handles mortality by using the standard assumption that current county mortality rates will be more similar to the national rates in 200 years (one-half the current difference) (DOF, 1986, p. 12).

That Department also assumes a net in-migration to California of 215,000 over the next 35 years (DOF, 1986, p. 14). The assumptions regarding the distribution of these people rely heavily on data from local governments and regional councils of governments.

2. Economic Assumptions

The Bay Area -

ABAG discusses its use of economic assumptions in developing population projections in Projections '87.

> [T]he region's gross regional product (GRP) is assumed to grow an average of 3.0 percent annually in real terms. ...The region's exports to the rest-of-the-world are expected to increase about 3.9 percent annually in real terms between 1985-2005. ...Major economic growth will continue to be focused around: 1) High tech and related activity; 2) Research and development; 3) Office and information services; 4) Business services; 5) Finance, insurance and real estate; and 6) Retail trade.
>
> ...Housing and infrastructure costs will slow growth in the 1990s. Water supply could be a major problem by the year 2000.
>
> ...A single improved and regional transit and highway system was assumed to be operational by 1995 [based on data] from the Metropolitan Transportation Commission (MTC). ...[P]rograms which improve the efficiency of the existing system [are assumed to]...have a better chance of being realized than extensive system expansion. ...The highway and transit system assumptions are translated to estimates of peak period service levels [which are] in turn translated into estimates of travel time from location to location. Such measures of accessibility become key assumptions to the location of housing vis-a-vis job locations" (ABAG, 1987, pp. 17-19).

The Delta and Central Valley Watershed -

The California Department of Finance does not incorporate economic information into its population projections.

3. Local Government Development Policy Assumptions

The Bay Area -

As stated in Projections '87 (ABAG, 1987, p. 19):

> The development policies of the cities and counties are assumed to have a major effect on the type and extent of growth within the region. Local governments are responsible for regulating land use and for providing public services to support development.
>
> ...Local development policies include communities' general and specific plans and other programs to either encourage or discourage development activity in a geographic area. Local zoning regulations, capital improvements schedules, and building permit allocation measures are examples of the methods used by local governments to manage the type, extent, and rate of growth.
>
> ABAG staff collected information on the current land use and service policies of local governments in the nine-county region in 1981 and 1982. The survey results were updated in 1984 and 1986 [and again in 1988] for jurisdictions with significant changes. These Local Policy Survey data were used to define the supply of land available to accommodate future households and employment activity. ...In short, the available land supply is used to direct the allocation of household and employment growth to small geographic areas within each county.

The system for allocating the available land supply, as discussed in Projections '87 (ABAG, 1987, p. 20), "did assume employment density increases would cause greater commercial/industrial site utilization."

Projections '87 does, however, note some limitations in relying totally on the Local Policy Survey data. As noted in that document (ABAG, 1987, p. 23):

> ...[C]urrent local policies concerning housing growth, land use and service capabilities are assumed to remain in effect until the 1990s.
>
> ...In several communities, however, the potential housing supply appears to be insufficient to accommodate household growth during the 1995-2005 period. In several subregional study areas that are projected to undergo significant job growth, the projections assume that local policies will change to accommodate a sufficient resident labor force [emphasis removed]. Since many local general plans do not yet address a planning horizon beyond the year 2000, it is reasonable to assume policy changes in the long term.

Although the policies are essentially those of local government, state and federal moneys may become involved. More specially, Projections '87 (ABAG, 1987, p. 25) notes that:

> The projections in the long term, 1995 to 2005, assume that essential public services and infrastructure will be available to accommodate new development... The supporting roads, water, and sewerage systems will need to be provided if the levels of growth projected for the region during the 1990s and beyond are to be realized. The projections offer two additional caveats (ABAG, 1987,

p. 25): While local development policies were used in the ABAG projections system, the projections are not a recommendation for a specific pattern of growth within the region....

ABAG's household forecast represents the minimum needed housing supply. Based upon the results of...our latest labor force projections, housing production below that level will have serious economic consequences on the region's growth [emphasis removed].

The Delta and Central Valley Watershed -

The California Department of Finance does not incorporate local government development policies into its population projections.

C. PROJECTED POPULATION PATTERNS

1. Central Valley Watershed

Based on data from the California Department of Finance (1986), the period to 2005 should see a continuation of the rapid growth in the foothill counties, particularly Amador, Calaveras and Nevada, along with Lake and San Benito counties.

Population densities are expected to remain higher in the flatter areas of the Central Valley than in the foothills, however.

2. The Bay and Delta Area

The 12-county Bay and Delta area will remain one of the most urban in California through 2005 (Figures 18 and 19). Of the ten counties in the state projected to have a population density exceeding 100 people per square mile, six are expected to be in the 12-county area: Alameda, Contra Costa, Sacramento, San Francisco, San Mateo, and Santa Clara. Of the four additional counties projected to have a population density exceeding 50 people per square mile, three are expected to be in the 12-county area: Marin, San Joaquin and Solano.

Even though this 12-county area accounts for only 6.6% of California's total land area, about 25% of the state's people are expected to live in the area in 2005. This percentage is a drop from 1985, however, when 27% of the state's population lived in the area.

In terms of ***percent increase*** in population, the California Department of Finance (1986) projects San Joaquin County to grow the fastest, with a 61% increase in population from 1985 to 2005, followed by Solano County with 55%. This represents a reversal of the one-two positions for 1975-85 growth, where Solano County had the leading growth rate in the 12-county area. Note, however, that Projections '87 (ABAG, 1987) projects a 61% growth for Solano County in the 1985-2005 period.

The California Department of Finance (1986) projects the greatest ***absolute growth*** in Sacramento County, with a projected increase of 378,600 people, followed by Santa Clara County, with a projected increase of 305,600. Projections '87 (ABAG, 1987) foresees a much smaller growth for Santa Clara County of 232,250.

D. PROJECTED LAND USE PATTERNS

1. Central Valley Watershed Region

The period through 2005 will continue to experience an increase in urbanization of the Central Valley watershed region. However, urban land will remain a relatively minor portion of the region, increasing from 2.22% in 1985 to 2.82% in 1995 and to 3.38% in 2005. The absolute amount of land will increase substantially from 1,180 sq. miles (3,070 sq. km.) in 1985 to 1,800 sq. miles (4,660 sq. km.) in 2005.

The largest amount of land will remain in forest. In 1985, there were approximately 27,220 square miles (70,500 sq. km. or 51.08%) of forest. This amount is expected to decrease to about 27,000 square miles (69,940 sq. km. or 50.68%) in 2005.

Rangeland and agricultural will continue to account for approximately the same percentages of land. In 1985, there were about and 12,150 square miles (31,470 sq. km. or 22.80%) of agriculture and 11,380 square miles (29,480 sq. km. or 21.36%) of rangeland. Agricultural use decreased at a slightly higher rate than rangeland, dropping to 11,900 square miles (30,820 sq. km. or 22.33%) in 2005, while rangeland dropped to 11,240 square miles (29,110 sq. km. or 21.09%) in 2005.

Other categories of use will remain quite small.

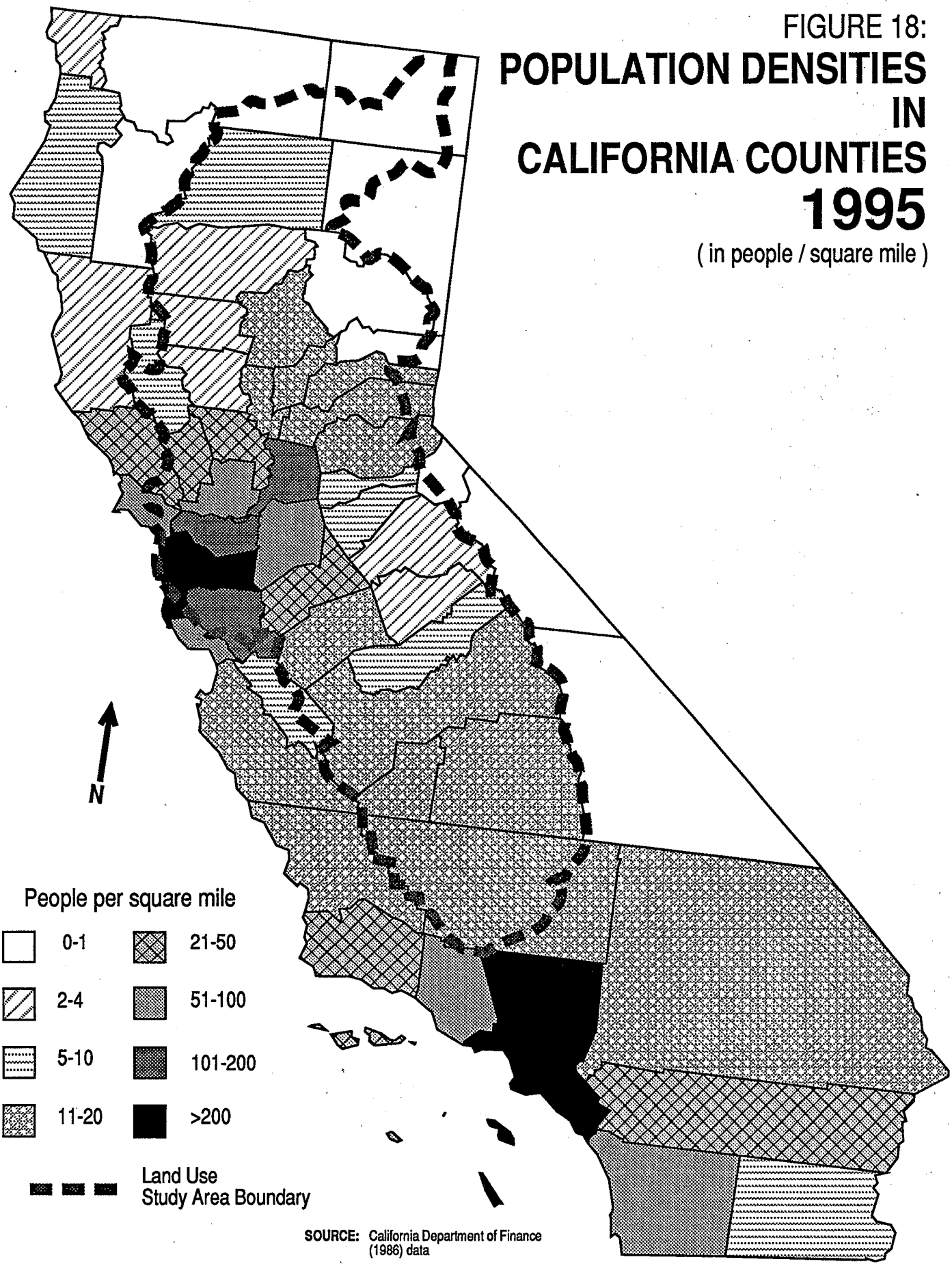
- Approximately 350 square miles (900 sq. km.) will remain as sparsely vegetated land (or 0.65% of the watershed area).
- Approximately 390 square miles (1,000 sq. km.) will remain in wetlands (or 0.73% of the watershed area).
- Approximately 610 square miles (1,570 sq. km.) will remain as tundra, snow and ice (or 1.14% of the watershed area).

It should be clear after examining these data that agricultural land use is more significant in the Central Valley watershed region than urbanization. Thus, the potential changes to agricultural land use due to changes in crop production or agricultural practices and the potential changes to forest land due to changes in logging practices are of great concern. These issues are discussed in greater detail in Part VI.

FIGURE 18:

POPULATION DENSITIES IN CALIFORNIA COUNTIES 1995

(in people / square mile)



SOURCE: California Department of Finance (1986) data

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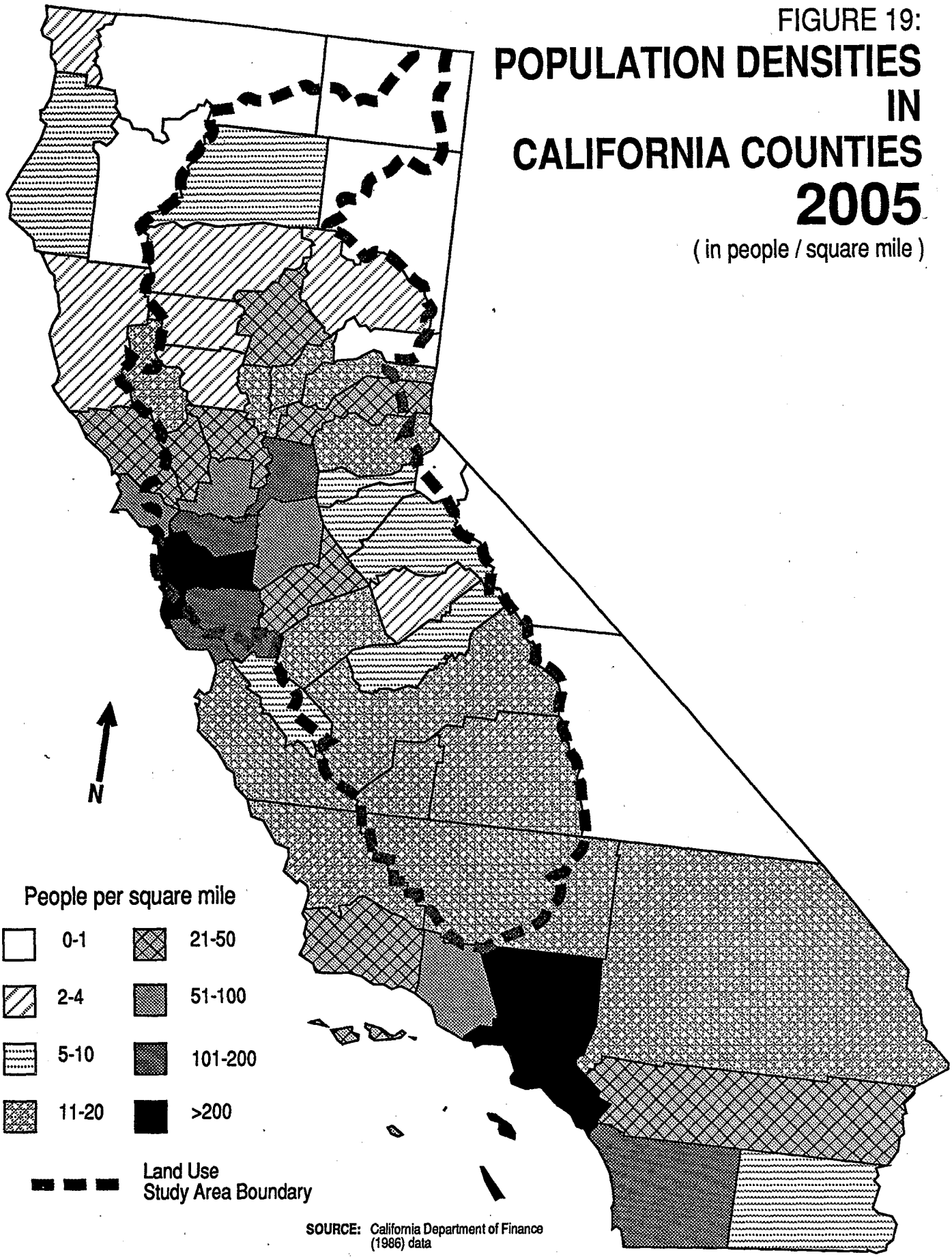
FIGURE 19:

POPULATION DENSITIES IN CALIFORNIA COUNTIES 2005

(in people / square mile)



SOURCE: California Department of Finance (1986) data

FIGURE 20:
1995 CENTRAL VALLEY WATERSHED LAND USE PATTERNS

Total Area of 53,284 sq. mi. / 138,004 sq. km.

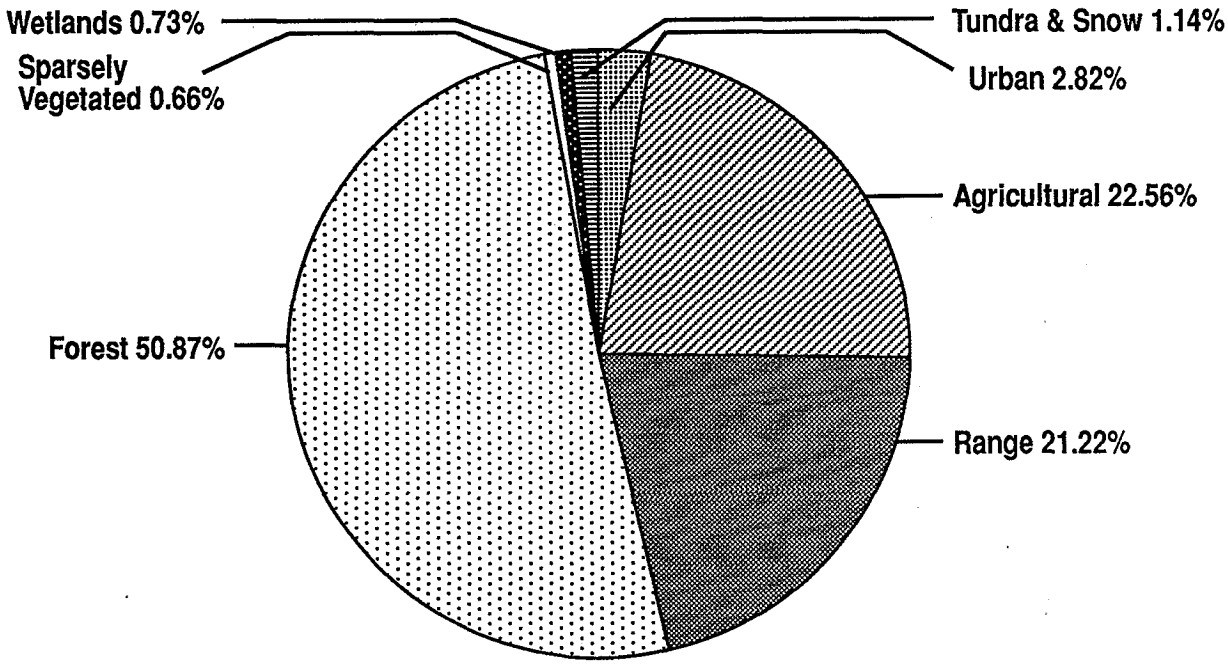
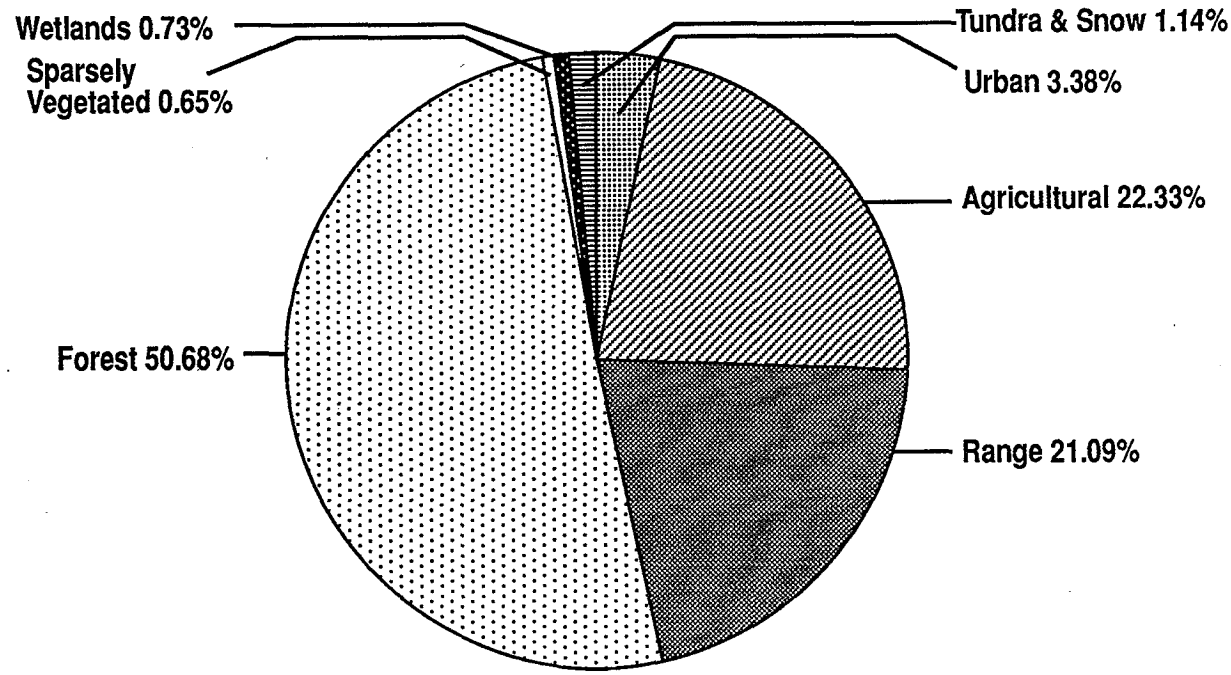


FIGURE 21:
2005 CENTRAL VALLEY WATERSHED LAND USE PATTERNS

Total Area of 53,284 sq. mi. / 138,004 sq. km.



2. The Bay Area and Delta Regions

The area of urban growth in the 12-county Bay Area and Delta regions will be larger in absolute terms than the Central Valley watershed region, although the rate of increase will be smaller. The amount of land in urban use in that 12-county region will increase from 1,560 square miles (4,050 sq. km. or 15.13%) in 1985 to 1,960 square miles (5,080 sq. km. or 18.97%) in 2005. This growth amounts to a 25% increase (compared to the 52% increase expected for the Central Valley watershed region).

Changes in non-urban land are much less dramatic. These changes are more apparent when examining the percent of total land in each non-urban category, than when examining the absolute area numbers. The largest amount of land will continue to be in agriculture, although the percentage of land in this type of use is expected to decrease from 36.84% in 1985 to 35.59% in 1995 and to 34.64% in 2005. The percentage of land in forests is expected to decrease from 27.82% in 1985 to 27.44% in 1995 and to 27.24% in 2005, a very small drop. The percentage of land in range is expected to decrease from 17.21% in 1985 to 16.64% in 1995 and to 16.36 in 2005. The area in sparsely vegetated land is expected to drop from 0.75% of the total land in the Bay/Delta area in 1985 to 0.63% in 1995 and to 0.54% in 2005.

By analyzing these changes in the land area attributed to the non-urban uses, it is possible to determine types of land converted to urban use. The majority of new urban land (57%) is expected to be obtained from the conversion of agricultural land. This percentage is disproportionate to its percentage of the non-urban land in the 12-county Bay/Delta area in 1985 (43%). This projection is consistent with, but less dramatic than, the trend in the 1975-1985 period, when 63% of new urban land was obtained from the conversion of agricultural land.

Because each of the four SuperHUCO drain into different portions of the Estuary or into the Pacific Ocean, it is also essential that the changes in urban and agricultural land for each of these areas be examined. The percentage of urban land in the San Francisco Bay Zone SuperHUCO (SFA) is expected to continue to be higher than for the other three SuperHUCOs in the Bay/Delta area. However, the percentage of urban land in the Suisun Bay Zone SuperHUCO (SFB) is expected to be almost as great (31.87% for SFA versus 31.11% for SFB). Agricultural land is expected to continue to be most predominant in the Delta Zone SuperHUCO, although the percentage of agricultural land in that area is expected to decrease from 65.62% in 1985 to 62.01% in 2005.

In three of the four SuperHUCOs, the increase in urban land is obtained through the conversion of agricultural land in amounts disproportionate to the percentage of agricultural land in those areas:

- In the San Francisco Bay Zone (SFA), conversion of agricultural land is expected to account for 31% of the new urban land, even though it currently accounts for only 15% of the non-urban land in that area.

- In the Delta Zone (SFC), conversion of agricultural land is expected to account for 80% of the new urban land, even though it currently accounts for only 73% of the non-urban land in that area.

- In the San Francisco Ocean Zone (SFX), conversion of agricultural land is expected to account for 41% of the new urban land, even though it currently accounts for only 18% of the non-urban land in that area.

FIGURE 22:

1995 BAY AND DELTA AREA LAND USE PATTERNS

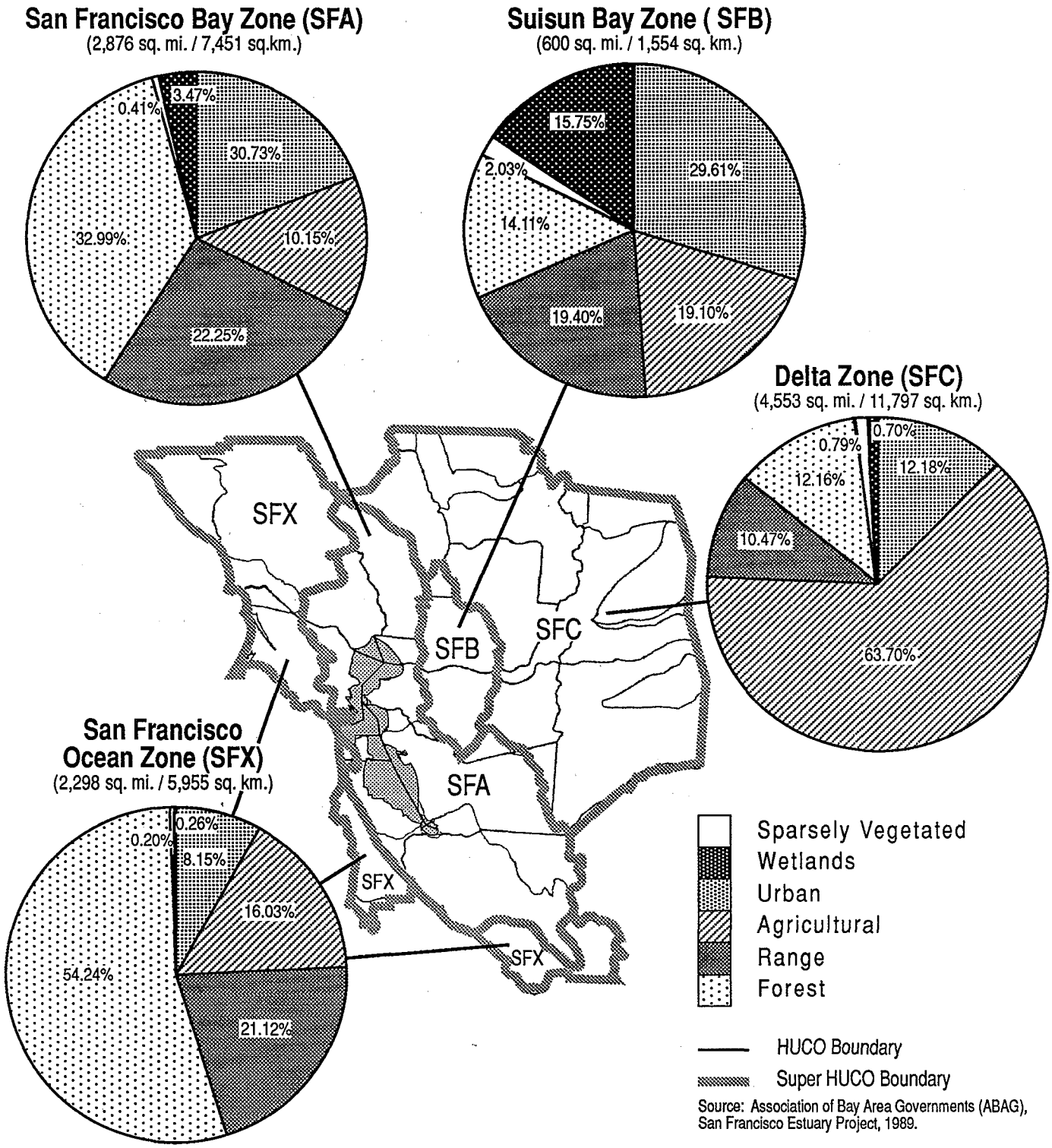
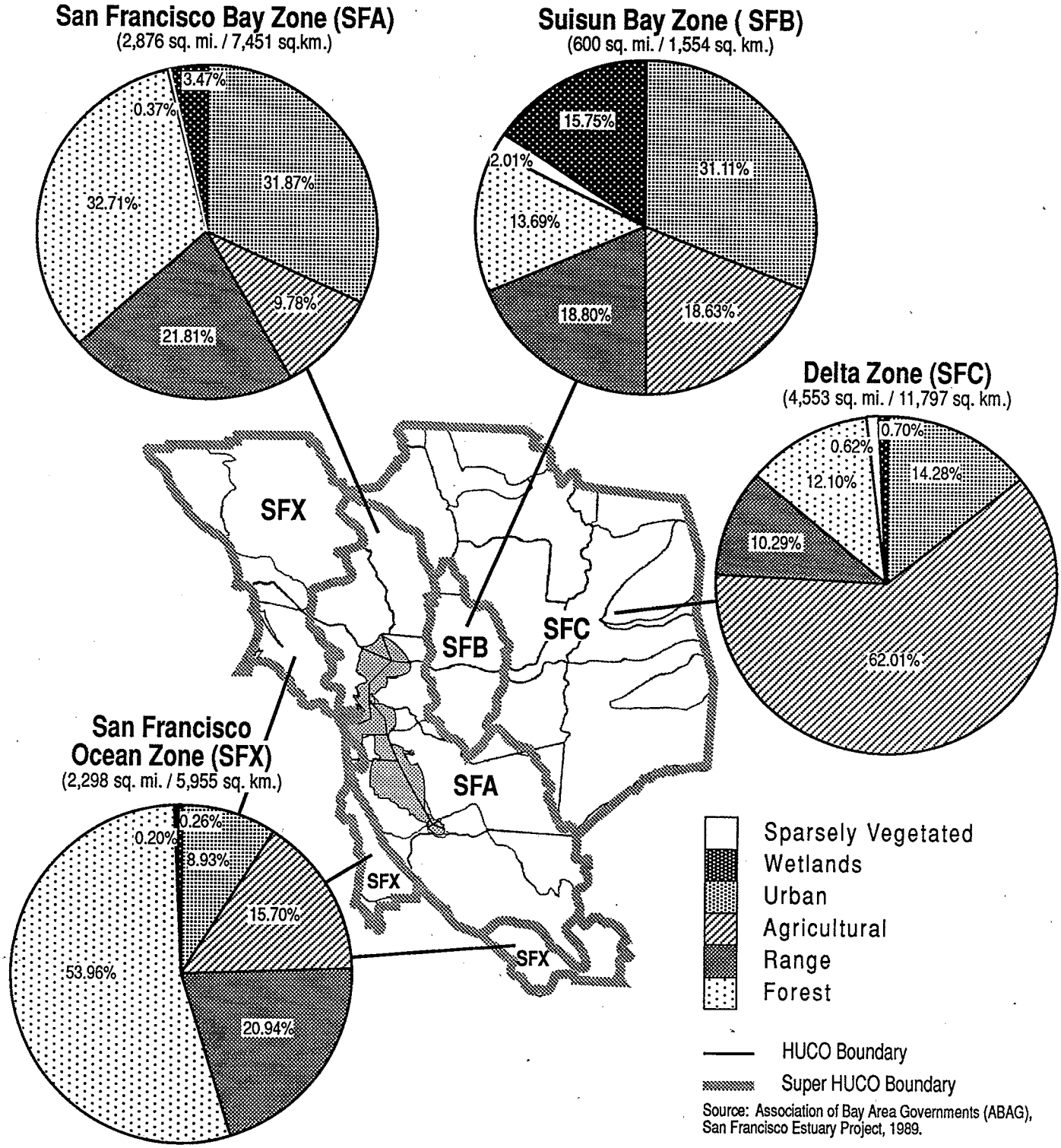


FIGURE 23:

2005 BAY AND DELTA AREA LAND USE PATTERNS



Source: Association of Bay Area Governments (ABAG), San Francisco Estuary Project, 1989.

On the other hand, in the Suisun Bay Zone (SFB), conversion of agricultural land is expected to account for 26% of the new urban land, even though it currently accounts for more (27%) of the non-urban land in that area. In this SuperHUCO, the conversion of rangeland to urban should be most significant, accounting for 47% of the new urban land even though only it is only 29% of the non-urban land in that area.

PART VI: INFORMATION FOR APPLYING LAND USE DATA

The potential impacts of land use and land use changes on the San Francisco Estuary are being addressed in a subsequent report. However, this section provides several types of additional information essential in quantifying the impacts of land use change on the Estuary, including:

- land coverage characteristics of urban land;
- productivity information for forests;
- current crop information for agricultural land;
- erosion implications for various land uses; and
- information on how to use the data to quantify the amount of development pressure on wetlands.

A. LAND COVERAGE CHARACTERISTICS OF URBAN LAND

When assessing the impacts of urbanization on nonpoint surface runoff characteristics, it can be as valuable to know something about the how much of the land is covered with paving and buildings as it is to know the precise nature of the use of the structures on the site. Therefore, based on some information gained from field checks of the land use data, from interviews with local government staff, and from ABAG staff experience, the following estimates of land coverage are being provided. It must be stressed that these percentages will vary from one community to another and within individual communities.

TABLE 2: LAND COVERAGE DATA FOR URBAN LAND USE TYPES

URBAN LAND USE	Percent Streets and Highways	Percent Buildings	Percent Paved	Percent Landscaped or Graded	Percent Unaltered
CATEGORY 11 -- RESIDENTIAL	20	35	20	25	0
CATEGORY 12 -- COMMERCIAL/ SERVICES	20	35	40	5	0
CATEGORY 13 -- INDUSTRIAL	10	35	35	15	5
CATEGORY 14 -- INFRASTRUCTURE	<-	70	->	30	0
CATEGORY 15 -- COMMERCIAL/ INDUSTRIAL COMPLEXES	15	30	40	15	0
CATEGORY 16 -- MIXED RESIDENTIAL AND COMMERCIAL	20	35	30	15	0
CATEGORY 17 -- URBAN OPEN	<-	5	->	80	15

B. PRODUCTIVITY INFORMATION FOR FOREST LANDS

Changes in the amount and location of logging could have an impact on land cover and water runoff characteristics. Although there is no direct way to measure the likelihood of such changes, data on the relative productivity of forest land (U.S. Department of Agriculture Forest Service, under various authors, 1986) can be used to gauge the likelihood of logging in various counties in the future. Table 3 contains this information for January 1, 1985.

When an entire county is located in the Estuary drainage area, the most accurate method to obtain the area of productive forest in an individual HUCO is to prorate the area of productive forest based on comparing the area of forest land in the land use database with the total forest column. If only a portion of the county is located in the Estuary drainage area, the percent productive forest value can be applied to the area of forest land in the land use database.

TABLE 3: FOREST LAND IN CALIFORNIA COUNTIES
SIGNIFICANTLY WITHIN THE ESTUARY DRAINAGE AREA
[data from U.S. Forest Services, 1986)
(in acres - for Jan. 1985)

COUNTY	COUNTY CODE	PRODUCTIVE FOREST	UNPRODUCTIVE FOREST	TOTAL FOREST	PERCENT PRODUCTIVE FOREST
ALAMEDA	6001	1000	91000	92000	1.1
ALPINE	6003	85000	207000	292000	29.0
AMADOR	6005	85000	147000	232000	37.0
BUTTE	6007	363000	185000	548000	66.0
CALAVERAS	6009	214000	258000	472000	45.0
COLUSA	6011	34000	198000	232000	15.0
CONTRA COSTA	6013	2000	62000	64000	3.1
EL DORADO	6017	590000	307000	897000	66.0
FRESNO	6019	400000	739000	1139000	35.0
GLENN	6021	108000	183000	291000	37.0
KERN	6029	117000	782000	899000	13.0
KINGS	6031	0	15000	15000	0.0
LAKE	6033	190000	465000	655000	29.0
LASSEN	6035	753000	531000	1284000	59.0
MADERA	6039	311000	460000	771000	40.0
MARIN	6041	53000	58000	111000	48.0
MARIPOSA	6043	318000	340000	658000	48.0
MERCED	6047	1000	58000	59000	1.7
MODOC	6049	582000	834000	1416000	41.0
NAPA	6055	29000	279000	308000	9.4
NEVADA	6057	344000	129000	473000	73.0
PLACER	6061	446000	169000	615000	73.0
PLUMAS	6063	1298000	123000	1421000	91.0
SACRAMENTO	6067	0	20000	20000	0.0
SAN BENITO	6069	7000	379000	386000	1.8
SAN FRANCISCO	6075	0	0	0	0.0
SAN JOAQUIN	6077	500	24000	24500	2.0
SAN MATEO	6081	78000	70000	148000	53.0
SANTA CLARA	6085	36000	327000	363000	9.9
SHASTA	6089	1283000	727000	2010000	64.0
SIERRA	6091	444000	46000	490000	91.0
SISKIYOU	6093	2431000	781000	3212000	76.0
SOLANO	6095	0	39000	39000	0.0
SONOMA	6097	327000	207000	534000	61.0
STANISLAUS	6099	2000	158000	160000	1.2
SUTTER	6101	4000	18000	22000	18.0
TEHAMA	6103	475000	737000	1212000	39.0
TULARE	6107	592000	898000	1490000	40.0
TUOLUMNE	6109	795000	309000	1104000	72.0
YOLO	6113	6000	121000	127000	4.7
YUBA	6115	92000	77000	169000	54.0

C. CROP INFORMATION FOR AGRICULTURAL LANDS

Annually, each of the County Agricultural Commissioners' offices compiles a report on the crops and livestock produced in their county. These reports can be a valuable source of information on the type and amount of various crops grown in each county. The data from the 1987 crop reports is reproduced in Table 4.

Although data are provided on numerous individual crops in the county reports, the decision was made to only identify nine individual crops in this table. The crops were selected to provide needed information for the nonpoint-source portion of the Contaminants Status and Trends Report. Seven (alfalfa, almonds, corn, grapes, sugar beets, tomatoes and wheat) were selected because the Coefficient of Relative Toxicity (CRT) value provided in a recent NOAA report (Pait and others, 1989) exceeded 250.* The rice was selected because its CRT exceeded 150 ***and*** there is such a large area planted in rice in the Central Valley. Finally, cotton was added because it is so prevalent in the southern Central Valley (the San Joaquin Valley).

Some assumptions about the data in these reports were made in the process of developing that table. First, the report category of Seed Crops, if it appeared, was split into the field, fruit and vegetable crop categories, depending on whether the seeds were for field, fruit or vegetable crops. Second, any information on a particular crop of concern (such as tomatoes) that was contained in the report category of Miscellaneous had to be ignored. Thus, the totals for these crops tends to underestimate the actual amount of the crop. However, if individual crop data in the Miscellaneous category might be inferred from 1986 data, it is estimated and included. Third, if data on bearing versus non-bearing acres was provided, the data on total bearing plus non-bearing areas appears in the following table.

To obtain hectares for an individual crop or crop category in a HUCO, one needs to prorate the hectares of that category in the applicable county based on the ratio of agricultural land in the HUCO to agricultural data in the county from the land use database.

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* The Coefficient of Relative Toxicity (CRT) normalizes pesticide application to acute toxicity for that chemical. As stated by Pait and others (1989), "[t]he application of a CRT integrates toxicity with use, and provides an initial indication of the hazard posed to estuarine systems as a result of pesticide use patterns. ...A heavily used but less toxic compound would contribute less to the toxicity normalized load than would a little used but highly toxic pesticide.

TABLE 4: AGRICULTURAL LAND IN CALIFORNIA COUNTIES
LARGELY IN THE ESTUARY DRAINAGE AREA
[data from County Agricultural Commissioners Reports, 1987]
(in acres)

COUNTY	CODE	TOTAL AG LAND --NOT PASTURE	SUBTOT. FRUIT & NUTS	Grapes	Almonds	Other Fruit	SUBTOT. VEGET-ABLES	Tomatoes	Other Veget-ables	SUBTOT. FIELD CROPS	Alfalfa	Corn	Cotton	Rice	Sugar Beets	Wheat	Other Field Crops	SUBTOT. PASTURE	Irrig. Pasture	Rangeland (Non-Irrig Pasture)
ALAMEDA	6001	12124	1654	1458	0	196	1270	0	1270	9200	1600	0	0	0	0	700	6900	203800	400	203400
ALPINE	6003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100000	0	100000
AMADOR	6005	6179	2367	1650	0	717	45	0	45	3767	250	190	0	0	0	380	2947	197815	1715	196100
BUTTE	6007	191480	72012	175	38663	33174	1010	0	1010	118458	2900	1400	0	78220	2900	10000	23038	309700	19700	290000
CALAVERAS	6009	2340	1400	135	0	1265	0	0	0	940	0	0	0	0	0	0	940	414875	2000	412875
COLUSA	6011	222064	35265	0	16350	18915	19335	12800	6535	167464	7415	8000	0	97850	10200	20870	23129	202650	2650	200000
CONTRA COSTA	6013	31944	7372	879	1746	4747	10158	6050	4108	14414	2170	3240	0	0	350	3790	4864	177280	5280	172000
EL DORADO	6017	3007	3007	642	0	2365	0	0	0	0	0	0	0	0	0	0	0	249000	4000	245000
FRESNO	6019	1249506	316587	210632	30648	75307	192419	70480	121939	740500	129000	20000	385030	6300	33200	52900	114070	950000	50000	900000
GLENN	6021	187338	33116	2399	14368	16349	0	0	0	154222	1750	5500	0	61291	9515	27000	49166	256575	16575	240000
KERN	6029	840976	232526	79956	76582	75988	81984	2400	79584	526466	101363	4680	280800	596	10650	44973	83404	2089500	6500	2083000
KINGS	6031	485436	29620	3732	3203	22685	9621	2681	6940	446195	50431	19897	218000	0	1656	43119	113092	221000	13000	208000
LAKE	6033	25199	17408	3000	80	14328	76	0	76	7715	500	0	0	450	0	500	6265	129900	4900	125000
LASSEN	6035	75210	750	0	0	750	50	0	50	74410	31580	35	0	310	0	585	41900	453500	23500	430000
MADERA	6039	310821	146782	79741	32968	34073	2644	0	2644	161395	28000	17500	43550	0	3700	20000	48645	426500	19000	407500
MARIN	6041	3760	120	0	0	120	0	0	0	3640	0	0	0	0	0	0	3640	154560	560	154000
MARIPOSA	6043	1104	274	0	0	274	0	0	0	830	0	0	0	0	0	0	830	415706	706	415000
MERCED	6047	410015	107532	15521	64532	27479	34180	11780	22400	268303	61300	11300	58500	7100	19100	14100	96903	640000	83000	557000
MODOC	6049	88730	0	0	0	0	9380	0	9380	79350	21350	0	0	580	0	2420	55000	365700	65700	300000
NAPA	6055	36977	29677	28970	0	707	0	0	0	7300	0	0	0	0	0	0	7300	121200	1200	120000
NEVADA	6057	173	173	100	0	73	0	0	0	0	0	0	0	0	0	0	0	109500	14500	95000
PLACER	6061	24482	2382	125	0	2257	0	0	0	22100	0	0	0	12000	0	1800	8300	244800	26800	218000
PLUMAS	6063	22250	0	0	0	0	0	0	0	22250	5300	0	0	0	0	0	16950	146300	31300	115000
SACRAMENTO	6067	124180	11530	4530	0	7000	8200	5140	3060	104450	6350	26350	0	11800	4100	20900	34950	126000	29000	97000
SAN BENITO	6069	72456	9967	1700	0	8267	12921	4700	8221	52568	3200	1000	0	0	1019	4000	43349	508000	1000	507000
SAN FRANCISCO	6075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN JOAQUIN	6077	478290	134917	51990	38160	44767	61178	24770	36408	282195	54800	72900	0	4320	36800	41000	72375	170600	30600	140000

TABLE 4: AGRICULTURAL LAND IN CALIFORNIA COUNTIES
LARGELY IN THE ESTUARY DRAINAGE AREA
[data from County Agricultural Commissioners Reports, 1987]
(in acres)

COUNTY	CODE	TOTAL AG LAND --NOT PASTURE	SUBTOT. FRUIT & NUTS	Grapes	Almonds	Other Fruit	SUBTOT. VEGET-ABLES	Tomatoes	Other Veget-ables	SUBTOT. FIELD CROPS	Alfalfa	Corn	Cotton	Rice	Sugar Beets	Wheat	Other Field Crops	SUBTOT. PASTURE	Irrig. Pasture	Rangeland (Non-Irrig Pasture)
SAN MATEO	6081	6758	0	0	0	0	3110	0	3110	3648	0	0	0	0	0	0	3648	29300	300	29000
SANTA CLARA	6085	42599	6516	1570	0	4946	13055	2960	10095	23028	1475	0	0	0	1128	4900	15525	222000	2500	219500
SHASTA	6089	41860	2750	0	0	2750	0	0	0	39110	14310	0	0	1350	0	1300	22150	460000	34000	426000
SIERRA	6091	6440	0	0	0	0	0	0	0	6440	1050	0	0	0	0	0	5390	54600	10800	43800
SISKIYOU	6093	179623	79	0	0	79	8940	0	8940	170604	73820	500	0	0	0	14248	82036	695500	103000	592500
SOLANO	6095	198760	14221	1198	2325	10698	18328	16000	2328	166211	11500	37000	0	0	19211	59591	38909	165800	20500	145300
SONOMA	6097	74240	39372	31006	0	8366	580	0	580	34288	0	533	0	0	0	0	33755	396700	8700	388000
STANISLAUS	6099	420536	127844	17244	65417	45183	43894	13057	30837	248798	26830	43331	0	4575	3870	4590	165602	444500	75500	369000
SUTTER	6101	229177	47234	0	4550	42684	27226	17896	9330	154717	4120	6000	0	71707	4400	25302	43188	71500	21500	50000
TEHAMA	6103	55140	30349	0	6886	23463	31	0	31	24760	4100	1100	0	2300	1300	4800	11160	964300	29400	934900
TULARE	6107	673286	245177	71274	9735	164168	7157	430	6727	420952	100000	8200	151335	0	3610	49190	108617	740000	10000	730000
TUOLUMNE	6109	424	131	0	0	131	0	0	0	293	0	0	0	0	0	0	293	211620	1550	210070
YOLO	6113	304700	19214	1308	7700	10206	46800	41100	5700	238686	30300	18000	0	20313	18924	55294	95855	149200	13000	136200
YUBA	6115	63331	29941	410	1987	27544	0	0	0	33390	926	2792	0	24129	0	2110	3433	207500	7500	200000

D. EROSION IMPLICATIONS FOR VARIOUS LAND USES

The major effects of erosion and sedimentation include loss of agricultural soil, increased need for dredging, "loss of water quality, damage from increasing flood frequency due to reduced channel and storage capacity, [need for] engineering mitigation measures, and the loss of spawning grounds" (Laird and others, 1979).

The major sources of erosion are "agriculture, silviculture (logging), mining and construction. Although agriculture produces the largest percentage of the total sediment load, construction causes the most concentrated form of erosion" (Goldman and others, 1986, p. 1.2).

Sediment yield data for different land uses is uncommon. One source of such data is a study of Colma Creek in San Mateo County. The data developed by Knott (1973) appears in Table 5, below.

TABLE 5: AVERAGE ANNUAL SEDIMENT YIELD FOR COLMA CREEK
(in tons per square mile per year -- Knott, 1973)

LAND USE	YIELD	RATIO TO OPEN SPACE
Open Space	310	1.0
Agricultural	21000	67.7
Urban	760	2.5
Construction	26000	83.9

The sediment yield for a particular category of use (such as open space) will vary greatly among the various general physiographic provinces in the Estuary drainage area. Data for such provinces in the southern San Francisco Bay Area indicates a variation for the category "open space" of 140 to 2300 tons per square mile per year (Brown and Jackson, 1973). One can assume that the ***ratio*** of sediment yield for any developed land use to the sediment yield for open space is constant (Laird and others, 1979). However, there is a great deal of variation in the data. According to Goldman and others (1986, p. 1.2):

> When land is disturbed by construction activities, soil erosion increases from 2 to 40,000 times the preconstruction erosion rate. ...Erosion rates from construction sites are typically 10 to 20 times those from agricultural lands and they can be 100 times as high. ...In the San Francisco Bay Area the authors found the average rate of erosion in all land uses (grazing, agriculture, forests, etc.) was about 3.5 tons/(acre)(year) [7.8t/(ha)(yr)], whereas the erosion rate from construction sites was 52 to 70 tons/(acre)(year) [116 to 157 t/(ha)(yr)] and sometimes higher. Erosion rates from construction sites were typically 20 times the average rates. Although a wide variation in erosion rates is reported in the literature, it is clear that construction causes a large increase in erosion. One need only observe a bare graded slope before and after a single storm to verify that fact.

Erosion control practices instituted by most local governments can reduce the sediment yield from construction. In addition, the increases during the construction period appear to stabilize to background levels after about five years. Thus, one result of conversion of agricultural land to urban use (following the construction period) should be a reduction of sediment in creeks, provided that appropriate erosion control measures are ***implemented*** during construction. Other related impacts of urbanization on water quality are more negative, including increased runoff, changes in contaminant levels, flooding and stream erosion. These numerous impacts illustrate the complexity of the impact analysis needed. For more information on other issues associated with urban runoff and on the nonpoint portion of urban contaminants, see the Contaminants Status and Trends Report.

E. QUANTIFYING DEVELOPMENT PRESSURE ON WETLANDS

As mentioned in Appendix II and Part IV, it is inappropriate to use the land use data directly as a measure of the amount of wetlands in the Bay and Delta area or the Central Valley watershed for three major reasons. First, in many cases, areas of wetlands within areas that are predominately another use are not identified in the land use database. Second, in that database, areas of land-water discrepancies were categorized as wetlands in the process of reconciling the land-water boundary in the U.S. Geological Survey basemaps with that shown on the USGS land use maps. Third, no attempt was made to project future wetlands in this report. (See the descriptions of the wetlands categories in Appendix II.)

However, the land use data has been combined with wetlands data contained in the Wetlands Status and Trends Report to create two major products. First, the information on land use has been used to create a development pressure index. One of the most important components of such an index is the data on land use change from 1985 to 2005. Such data should be available at the census tract level of resolution to be most useful. Although census tract information is available for the nine counties in the Bay Area, it is not available for the three Delta counties due to the data difficulties described in Part IV. The development pressure index information is contained in the Wetlands Status and Trends Report.

Second, the land use database has been overlaid manually with the map of wetlands areas from the U.S. Fish and Wildlife Service by the staff of the Wetlands Status and Trends Report. Although that wetlands map data is in the process of being converted to a digital computer file, such a file was not made available to ABAG in time to do such an analysis using a computer. The amount of wetlands in areas designated as urban were compared with that in non-urban areas. Such a comparison enables one to gauge whether future development pressure is more likely to be due to development pressure from urban densification, or from conversion of non-urban land to urban uses. The conclusions of this analysis are presented in the "Future Habitat and Trends -- Chapter 13" of the Wetlands Status and Trends Report.

PART VII: GAPS IN KNOWLEDGE AND FUTURE WORK

This report is a summary of information pertaining to climate, geomorphology, population and land use trends for the lands draining into the San Francisco Estuary. Thus, this section focuses on two issues related to the future use of the data contained in this document: (1) data and information gaps; and (2) the relationship of this report to the report to be prepared on the regulation and impacts of land use.

A. DATA AND INFORMATION GAPS

1. Climate

Before the non-point portion of the contaminants research work is ever quantified, the cost and feasibility of updating the mean annual precipitation work by Rantz (1971) should be investigated.

2. Land Use Data

The primary difficulty in compiling a land use database and data on land use change is not the absence of information, but rather the existence of inconsistent data from numerous sources. Although there are many ways to improve the land use database compiled for this project, there are two types of tasks that would yield the greatest improvement in data for the least cost. First, the 1975 land use data for the area within the legal boundaries of the Delta could be mapped on USGS 7.5' quadrangles, field checked for accuracy and updated to 1985. Any changes needed in the data could then be entered into the database, enabling a reasonably accurate land use map to be produced for the central Estuary study area for 1985. The maps would be a more accurate representation of wetlands areas within urban land uses, indicating where development pressure is most likely to be the result of urban densification. Second, the census tract files described in Part IV could be obtained and used to produce census tract data in the three-county Delta area. These data could be used in conjunction with census tract population projections data to produce land use projections by census tract for that three-county area.

3. Forest Management Issues

Several counties in the Estuary drainage area have over 50% of their forest lands classified as productive by the U.S. Forest Service, including Butte, El Dorado, Lassen, Nevada, Placer, Plumas, San Mateo, Shasta, Sierra, Siskiyou, Sonoma, Tuolumne and Yuba. A review of the logging practices and forest management practices for these counties might identify how these practices are likely to change in the next twenty years. Significant changes should have a major impact on future runoff characteristics.

4. Agricultural Management Practices

One of the most significant impacts on the Estuary in the next twenty years may come from changes in agriculture, including changes in water use, particular crops grown, and pesticides used -- not from urbanization. A review of potential changes in agricultural practices in the next twenty years might point out those likely to have a major impact on future runoff characteristics.

5. Wetlands Issues

If computer files from the U.S. Fish and Wildlife Service of their wetlands inventory can be obtained, the type of analysis described in the section on "Using the Land Use Data" could be automated.

B. FUTURE WORK ON LAND USE MANAGEMENT ISSUES

Certain management questions have not been addressed as part of this report. These types of questions will be addressed in a subsequent report on the regulation and impacts of land use.

- What are the impacts on the Estuary's water quality, biological resources and uses associated with particular kinds of land use? Are these impacts significant? If so, how can they be reduced or eliminated?

- What programs and management activities by local, regional, state and federal government agencies affect land use patterns in the Estuary drainage?

- As urban expansion continues, what land use management policies can regulators implement to minimize adverse impacts on the Estuary's water quality, biological resources and uses? What would be the environmental, economic and social implications of these policies?

- What agricultural practices can be adopted to minimize impacts on the Estuary's water quality, biological resources and uses? What would be the costs and benefits to farmers and the public of such practices?

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GLOSSARY

Available Land -- Land identified by the local governments in the nine-county Bay Area as ***available*** for development according to current local government policies. These lands were identified in ABAG's Population/Employment Projections Program during its Local Policy Survey.

BASIS -- This abbreviation for Bay Area Spatial Information System is the name of ABAG's computer-based geographic information system.

Bay Area Region -- the nine-county San Francisco Bay Area consisting of the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma.

Central Valley Watershed Region -- a large area in central California consisting of the entire area draining into the San Francisco Estuary except for those areas in the twelve-county Bay Area and Delta regions.

Delta Region -- the three-county area consisting of Yolo, Sacramento and San Joaquin counties.

Development Pressure -- the increased interest by developers, builders and potential home buyers in land available for development or redevelopment.

DU -- Dwelling Unit, or housing unit.

HUCO -- Hydrologic Unit / COunty areas are formed from the intersections of the hydrologic unit boundaries and the county boundaries.

Land Use Study Area -- the entire area draining into the San Francisco Estuary, including the San Francisco Bay Area Region, the Delta Region, and the Central Valley Watershed Region.

Local Policy Survey -- This ABAG survey focused on defining ***development*** opportunities in the nine-county San Francisco Bay Area by quantifying land available for development according to local governments' land use policies. This survey gathered data on proposed land uses and policies affecting the timing and extent of development.

LUDA -- a series of Land Use DAta maps and data files available from the U.S. Geological Survey. The maps are published by USGS as "Land Use and Land Cover" maps. The data and maps are based on a national mapping program and contain a fixed explanation. Maps vary in scale from 1:125,000 to 1:250,000.

Non-Point Sources of Pollutants -- are sources which are diffuse or non-discrete, and generally episodic and seasonally variable. These sources include run-off from agricultural and urban lands.

Point Sources of Pollutants -- include municipal and industrial discharges or effluent.

STR -- one of several Status and Trend Reports being developed by the San Francisco Estuary Project.

SuperHUCO -- groupings of the 234 HUCOs useful for analysis purposes as mapped in Figure 27.

Urban Land -- includes residential, commercial and services, industrial, infrastructure, and developed park lands. (Non-urban lands include sparsely populated agricultural, range, forest, wetland, sparsely vegetated, snow-covered and tundra-covered uses.)

Urbanization -- the conversion of land from non-urban to urban uses.

USGS -- United States Department of the Interior Geological Survey.

Watershed -- the area drained by a river system.

APPENDIX I: PRECIPITATION DATA

The following pages provide compilations of average annual rainfall data compiled by the U.S. Geological Survey (Rantz, 1971). A much more generalized map for the entire state based on this information is found in the California Water Atlas (Kahrl, 1979). Although the publication date of the Atlas is more recent, it is based in large part on the Rantz (1971) work.

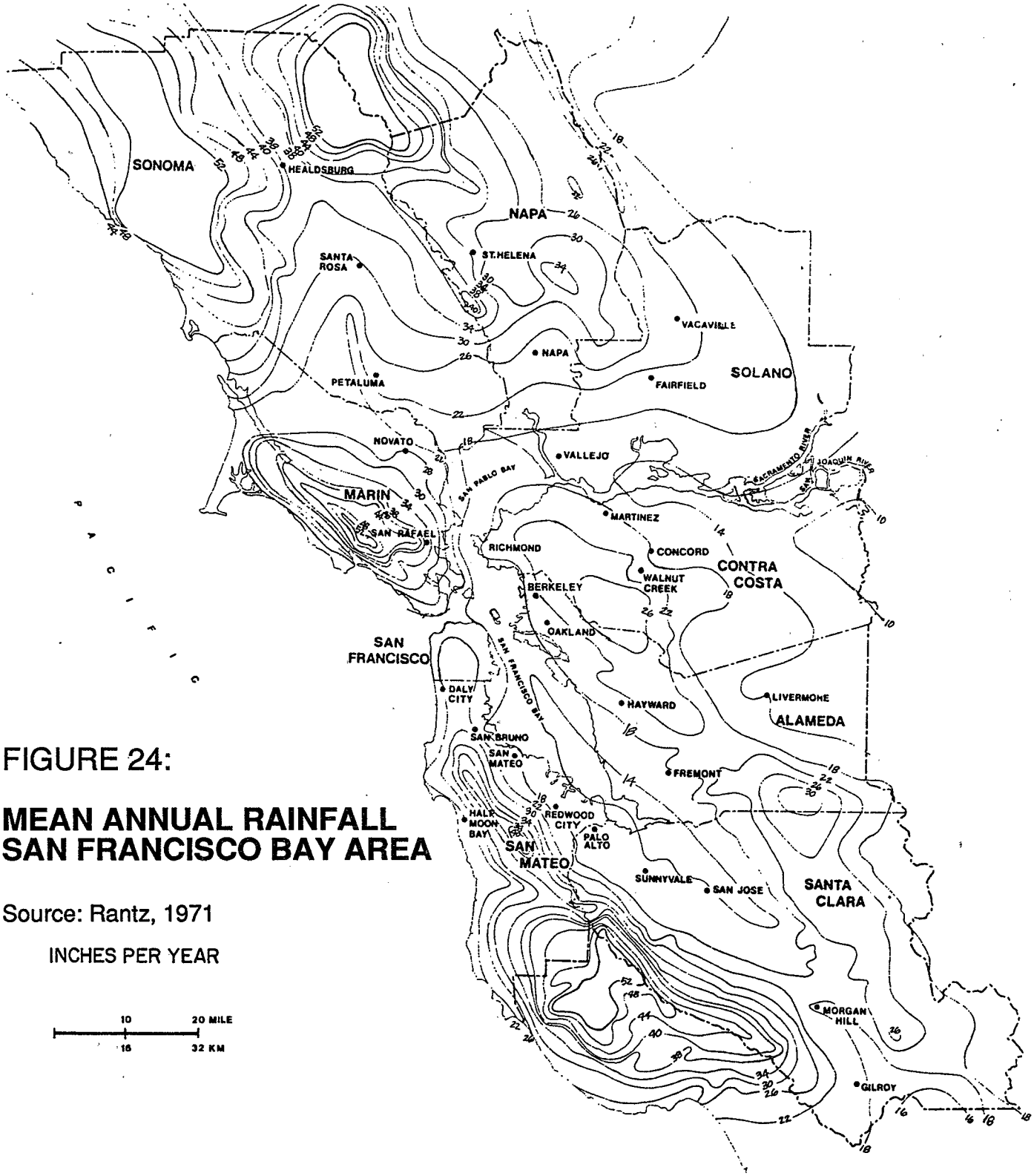


FIGURE 24:

MEAN ANNUAL RAINFALL SAN FRANCISCO BAY AREA

Source: Rantz, 1971

INCHES PER YEAR

C—095387

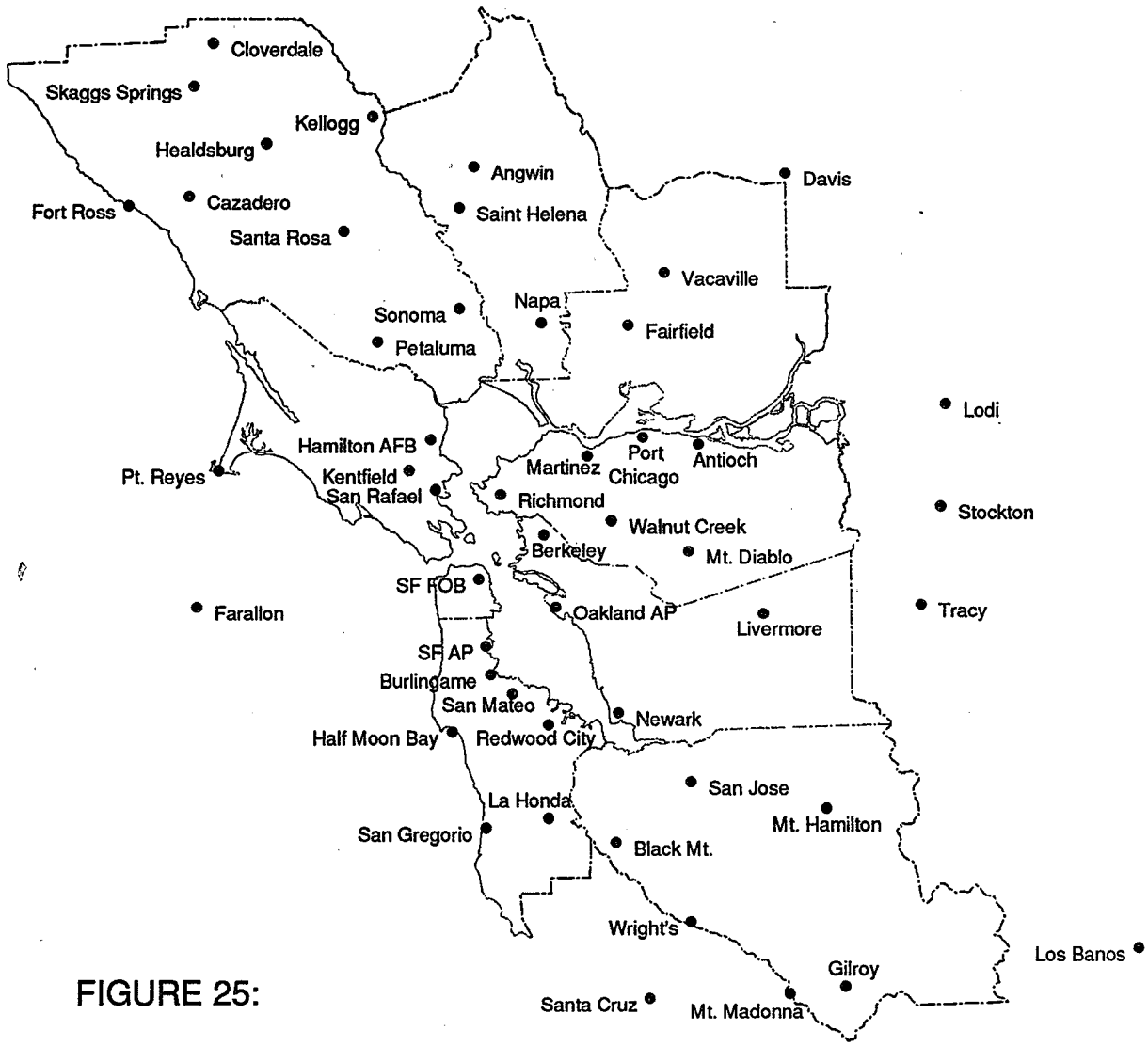
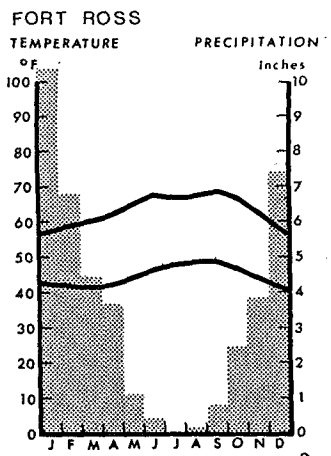


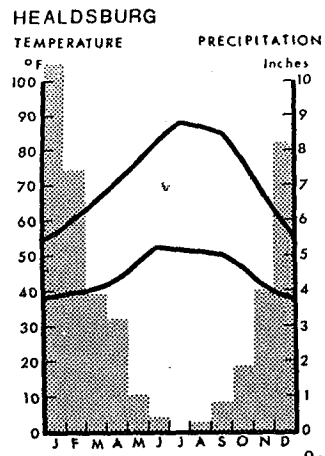
FIGURE 25:

CLIMATOLOGICAL STATIONS

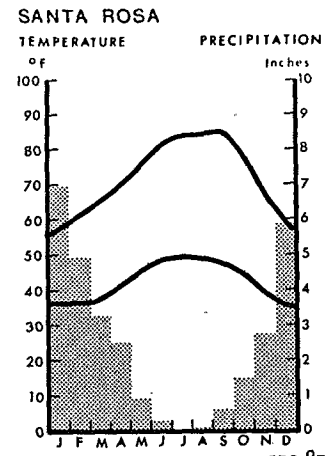
Source: ABAG, 1971



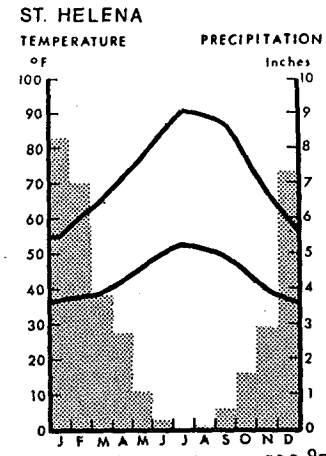
Mean annual temperature 54.5 °F.
Mean annual precipitation 43.11 in
Elevation of station 116 feet



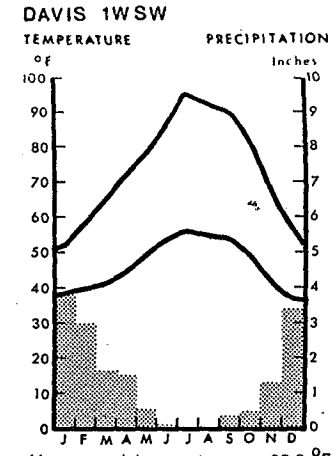
Mean annual temperature 59.2°F.
Mean annual precipitation 52.31 in.
Elevation of station 101 feet



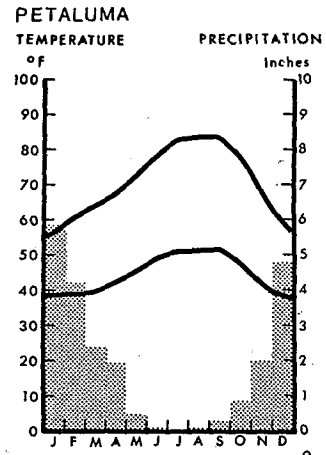
Mean annual temperature 57.3 °F.
Mean annual precipitation 34.53 in.
Elevation of station 167 feet



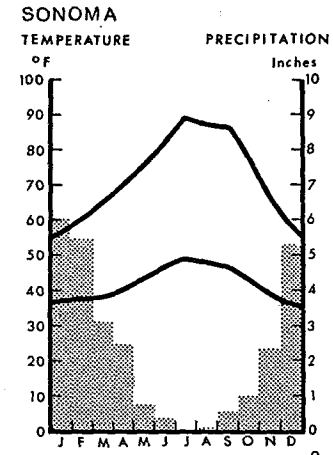
Mean annual temperature 58.8 °F.
Mean annual precipitation 35.81 in.
Elevation of station 255 feet



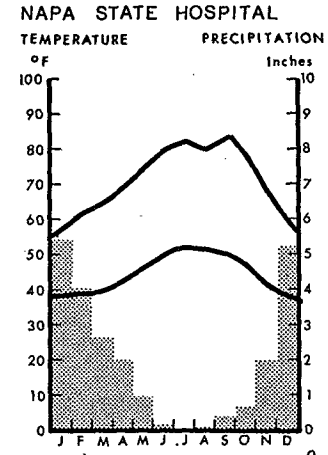
Mean annual temperature 60.9 °F.
Mean annual precipitation 16.43 in.
Elevation of station 51 feet



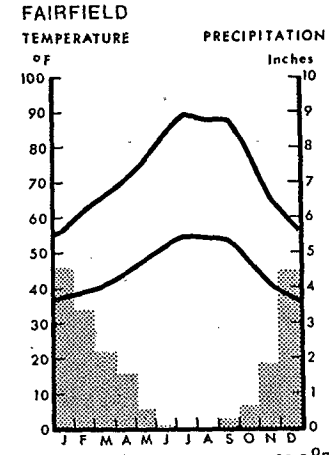
Mean annual temperature 57.8 °F.
Mean annual precipitation 23.53 in
Elevation of station 10 feet



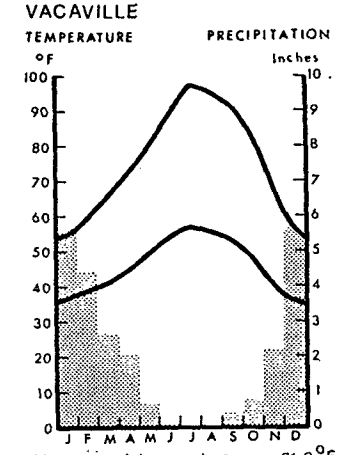
Mean annual temperature 57.6 °F.
Mean annual precipitation 27.91 in.
Elevation of station 20 feet



Mean annual temperature 58.4 °F.
Mean annual precipitation 24.07 in.
Elevation of station 60 feet



Mean annual temperature 60.2 °F.
Mean annual precipitation 20.62 in.
Elevation of station 19 feet

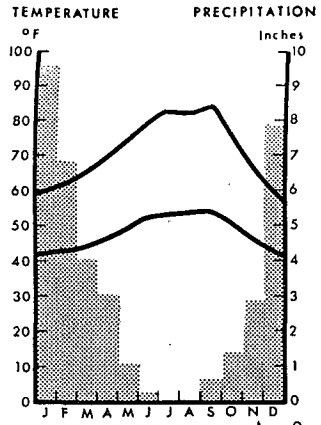


Mean annual temperature 61.0 °F.
Mean annual precipitation 25.36 in.
Elevation of station 175 feet

Temperature and precipitation data for selected stations. (Arranged to show West-East and North-South temperature and rainfall gradients.

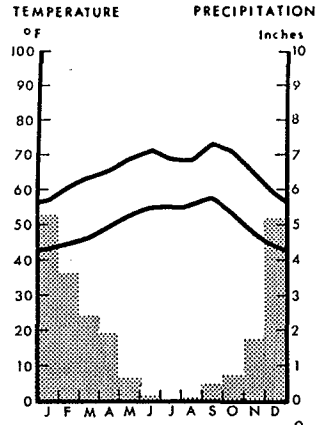
C-095389

SAN RAFAEL



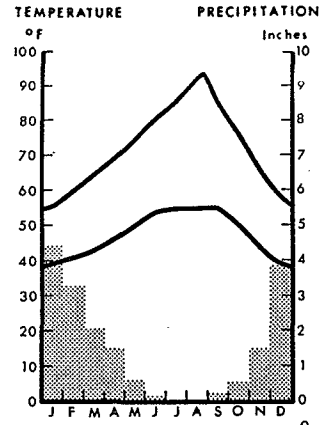
Mean annual temperature 59.2 °F.
Mean annual precipitation 38.03 in.
Elevation of station 31 feet

RICHMOND



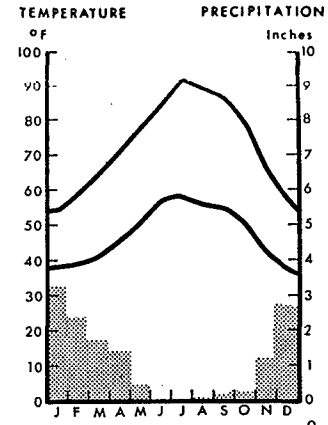
Mean annual temperature 58.1 °F.
Mean annual precipitation 22.05 in.
Elevation of station 55 feet

MARTINEZ



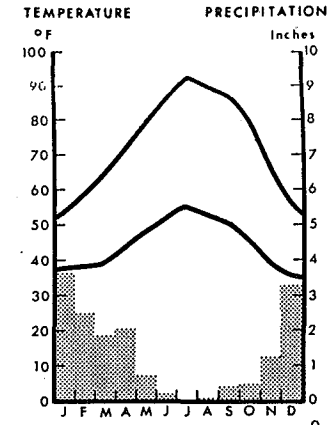
Mean annual temperature 59.4 °F.
Mean annual precipitation 18.42 in.
Elevation of station 26 feet

ANTIOCH FIREBOARD MILLS



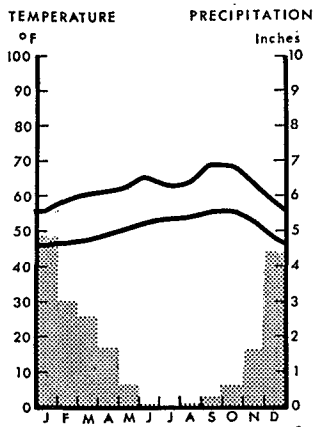
Mean annual temperature 60.2 °F.
Mean annual precipitation 14.50 in.
Elevation of station 28 feet

LODI



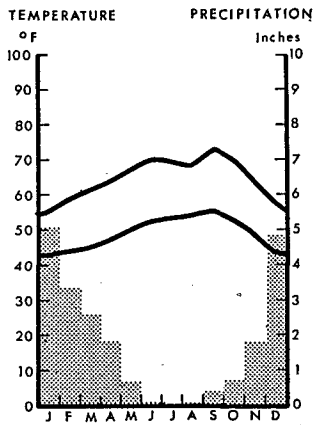
Mean annual temperature 59.3 °F.
Mean annual precipitation 16.38 in.
Elevation of station 40 feet

SAN FRANCISCO FOB



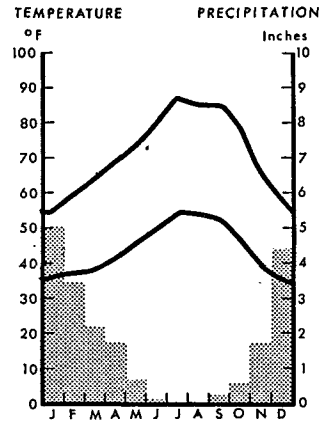
Mean annual temperature 56.7 °F.
Mean annual precipitation 20.49 in.
Elevation of station 52 feet

BERKELEY



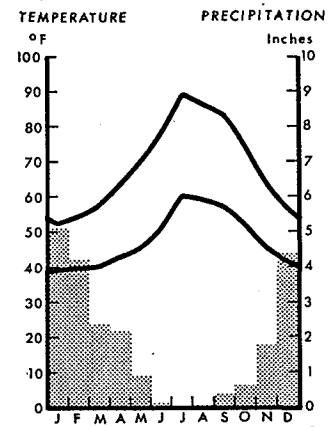
Mean annual temperature 57.4 °F.
Mean annual precipitation 22.49 in.
Elevation of station 299 feet

WALNUT CREEK 2ESE



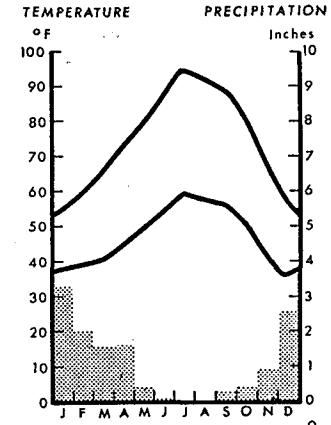
Mean annual temperature 58.5 °F.
Mean annual precipitation 20.75 in.
Elevation of station 245 feet

MT. DIABLO NORTH GATE



Mean annual temperature 58.8 °F.
Mean annual precipitation 22.77 in.
Elevation of station 2,100 feet

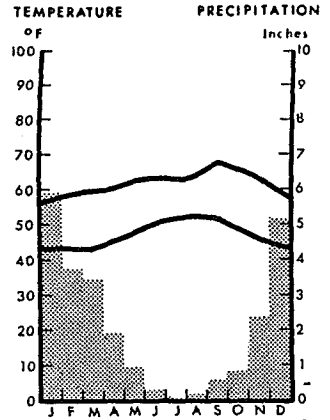
STOCKTON AP



Mean annual temperature 60.9 °F.
Mean annual precipitation 13.34 in.
Elevation of station 22 feet

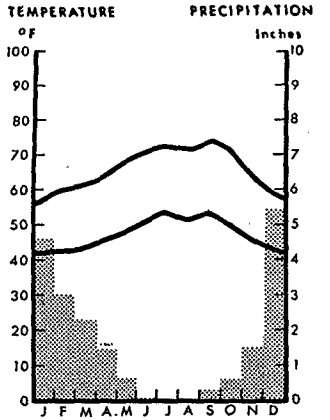
Temperature and precipitation data for selected stations. (Arranged to show West-East and North-South temperature and rainfall gradients.

HALF MOON BAY 2NNW



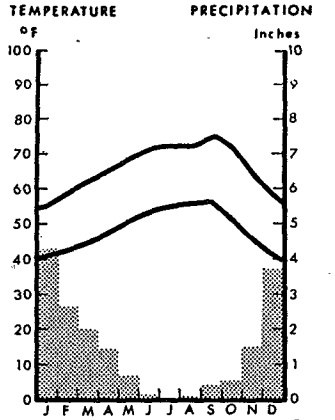
Mean annual temperature 54.6 °F.
Mean annual precipitation 25.61 in.
Elevation of station 60 feet

BURLINGAME



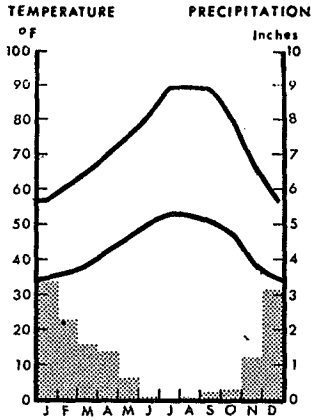
Mean annual temperature 56.8 °F.
Mean annual precipitation 19.04 in.
Elevation of station 10 feet

OAKLAND AP



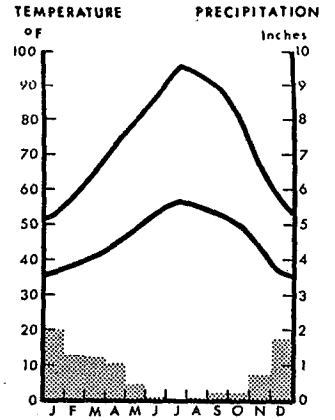
Mean annual temperature 57.4 °F.
Mean annual precipitation 17.65 in.
Elevation of station 3 feet

LIVERMORE



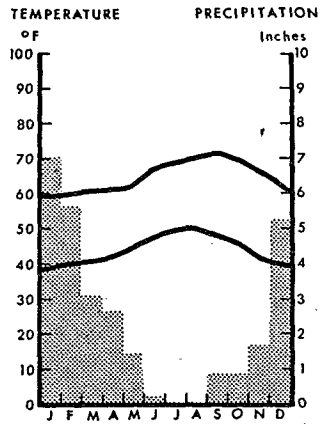
Mean annual temperature 58.9 °F.
Mean annual precipitation 14.74 in.
Elevation of station 469 feet

TRACY CARBONA



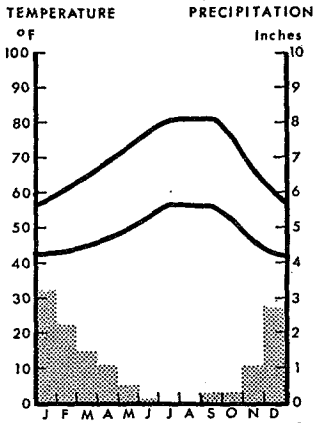
Mean annual temperature 60.7 °F.
Mean annual precipitation 9.68 in.
Elevation of station 140 feet

SAN GREGORIO 3 SE



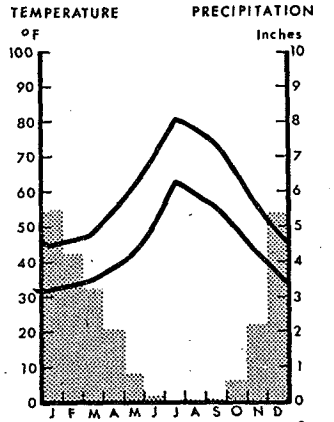
Mean annual temperature 54.3 °F.
Mean annual precipitation 29.60 in.
Elevation of station 355 feet

SAN JOSE



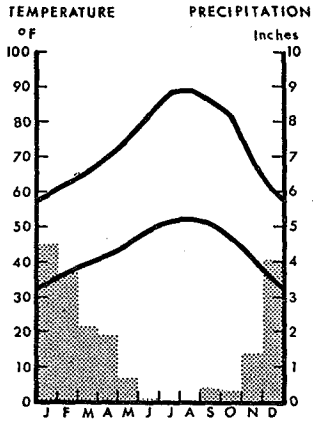
Mean annual temperature 59.7 °F.
Mean annual precipitation 13.11 in.
Elevation of station 95 feet

MT. HAMILTON



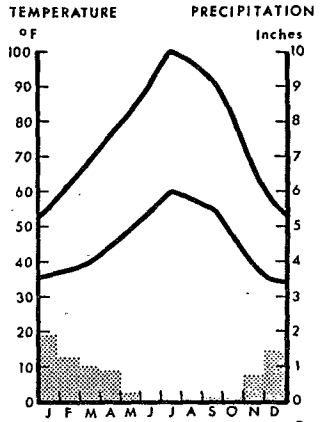
Mean annual temperature 53.2 °F.
Mean annual precipitation 25.11 in.
Elevation of station 4,209 feet

GILROY 8 NE



Mean annual temperature 59.1 °F.
Mean annual precipitation 19.66 in.
Elevation of station 1,050 feet

LOS BANOS



Mean annual temperature 61.9 °F.
Mean annual precipitation 8.73 in.
Elevation of station 125 feet

Temperature and precipitation data for selected stations. (Arranged to show West-East and North-South temperature and rainfall gradients.

APPENDIX II: DESCRIPTION OF LAND USE MAP UNITS

The land uses in the study area (the entire Estuary drainage area) are divided into several categories for purposes of this report. The land use categories are organized using a multi-level scheme (or "nesting" system) originally developed by the U.S. Geological Survey. The system uses Level I (one digit) and Level II (two digit) categories originally described by Anderson and others (1976).

Subsequent work by the Survey in conjunction with the San Mateo County Planning Department and by ABAG staff have led to both Level III (three digit) and Level IV (four digit) subdivisions of these categories. Although this level of information is not available outside of the nine Bay Area counties, the Level III and IV categories have been included to further clarify the type of land uses occurring within each Level II category and because future projects dealing with the land use data may be able to use this more detailed information.

The decision was made to use this classification system after balancing the categories available from previous mapping efforts by ABAG and others with those appropriate for the non-point pollution portion of the Contaminants Status and Trends Report and for the Wetlands Status and Trends Report.

A. CATEGORY 1 -- URBAN AND BUILT-UP

Category 11 -- Residential

Residential areas are delineated to include houses, apartments, garages, sheds, lawn and streets, and can be considered a basis for gross, rather than net, residential acres. Any area of 2.5 acre (one hectare) or more where dwelling units predominate is mapped as residential.*

In the nine county Bay Area, ABAG has subdivided the residential areas into three categories based on density (using the metric hectare which equals 2.47 acres) and a fourth based on structural type. The dwelling unit per hectare value is determined as follows:

Residential density = (structures/hectare) x (units/structure) = units/hectare

The resulting subdivisions of residential use are:

111 -- One and Under Dwelling Units (DUs) per Hectare (approx. 2 to 5 acre lots)
112 -- Two to Eight DUs per Hectare (approx. 1/3 to 1 acre lots)
113 -- Nine and Over DUs per Hectare (less than 1/3 acre lots)
114 -- Mobile Home Parks (technically a part of 113 but listed separately)

Category 12 -- Commercial and Services

There are a number of types of these facilities, ranging from retail commercial, to military, to educational.

Subdivisions occurring in the land use file for most of the nine Bay Area counties, but not available outside of that area and not used as part of this project include:

121 -- Retail and Wholesale
This category includes central business districts, as well as shopping centers, commercial strip development, auto salvage operations and motels.

122 -- Commercial Outdoor Recreation
This category includes intensive areas of recreation which cover a minimum of one hectare, including golf course club houses, tennis courts, amusement parks and drive-in theaters.

123 -- Education
This category includes all public and private schools, including pre-schools and subsidiary land uses (such as parking, administrative structures, recreation areas and dormitories). Seminaries and novitiates are also included. Churches and synagogues may be included in this category in San Mateo County. The category is further subdivided, when the information is available, into:

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* *Due to the general nature of this project, and the fact that these subdivisions of residential are not available outside of the nine Bay Area counties, these subdivisions have not been used. Note, however, for purposes of this work:*
o *Subdivision 111 is viewed as 10% Category 11 and 90% Category 17 (Urban Open);*
o *Subdivision 112 is viewed as 50% Category 11 and 50% Category 17 (Urban Open); and*
o *Subdivisions 113 and 114 are viewed as Category 11.*

1231 -- Elementary and Secondary Schools
1232 -- Colleges and Universities
1233 -- Stadium
1234 -- University Housing

124 -- Hospitals, Rehabilitation Centers and Other Public Facilities
Included in this category are all hospitals, medical centers, mental health centers, sanitariums, and convalescent centers that meet the one hectare size specification.

125 -- Military Installations
All areas which reflect military use such as armories, national guard centers, firing ranges, barracks and arsenals have been mapped in this category. Subdivisions of these areas are:
1251 -- Military Residential
1252 -- Military Commercial/Services
1253 -- General Military Use
1254 -- Military Hospital
1255 -- Military Communications*
1256 -- Military Airport
1257 -- Military Open Areas*

126 -- Other Public Institutions and Facilities
This category includes government facilities of one hectare or more. Such occurrences may be libraries, post offices, police and fire stations, city and county government complexes, and state and federal facilities. Two additional types of facilities have been included:
1261 -- Churches and Synagogues
1262 -- Stadium (when not associated with a college or university)

127 -- Research Centers
Research centers are research offices and laboratories that meet the minimum size requirements.

128 -- Offices
Offices are professional centers that meet the minimum size requirements.

129 -- Hotels
In certain parts of the Bay Area, particularly in San Francisco, areas predominately composed of hotels have been mapped.

Category 13 -- Industrial

This category includes both heavy and light industry.

In the nine-county Bay Area, industrial use has been separated into these two uses based both on the type of production and the product manufactured. For example, the manufacturing of locomotives would be considered heavy industrial, whereas the manufacturing of model trains would be considered light industrial. Again, these more detailed data have not been included as part of this project.

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* *Note: Both categories 1257 (Military Open) and 1255 (Military Communications) are included with category 17 (Urban Open) for purposes of the tables and data compiled for this project.*

131 -- Heavy Industry
These industrial activities are devoted to heavy fabrication, making and assembling parts which are, in themselves, large and heavy, or to the processing of basic raw materials. Most industries in this category involve mechanical, chemical or heat processing. Although salt evaporation ponds along San Francisco Bay might be considered part of this category, they are considered a part of "63 -- Salt Evaporation Ponds" for purposes of this project.

132 -- Light Industry
These industrial activities include the design, assembly, finishing and packaging of products, rather than with processing basic raw materials. Typical industries in this category include electronics firms, small textile mills, warehousing, and assembly plants. These facilities have been mapped along with associated parking lots and grounds.

Category 14 -- Transportation, Communication and Utilities

This category includes the various infrastructure systems.

Subdivisions available in the nine-county Bay Area but not generally included in this effort include:

141 -- Highways
Highways and interchanges which meet a 55-yard (50-meter) minimum mapping specification have been mapped. Both paved areas and adjacent rights-of-way are included.

142 -- Railways
Railroad tracks have been mapped when they meet a 55-yard (50-meter) minimum mapping specification. Also included are switching yards, terminals, classification yards and maintenance yards.

143 -- Airports
Air strips, both public and private, are included. Also included is all land related to airport operations.

144 -- Ports
This category is characterized by port or dock facilities and associated warehouses and storage areas. This category also includes passenger terminals, slips and associated parking areas.

145 -- Power Transmission
All power transmission lines meeting a 55-yard (50-meter) minimum mapping specification have been mapped. Power substations not associated with industrial activities and covering one hectare have been mapped in this category, as well.

146 -- Sewage Treatment Plants
These facilities have been identified downstream or downhill from municipal areas, as opposed to water treatment facilities which are uphill. (Any water treatment facilities have been included as part of "Category 14.")

147 -- Covered Water Reservoirs
These facilities have been identified in certain central urban areas.

Category 15 -- Commercial and Industrial Complexes

Areas of mixed use, as well as areas of multiple uses within a single structure, have been placed in one of two categories. Mixed industrial and commercial areas have been included in this category. Mixed residential and commercial areas have been included as part of Category 16.

Category 16 -- Mixed Urban and Built-Up Land

Mixed residential and commercial uses, whether in an area or within a single structure, have been placed in this category. Mixed land use is common in areas converting from residential to commercial. Also, rural centers often are too small to map separately as commercial or residential.

In some portions of the Bay Area, this category is divided into two subcategories that have not been used as part of this project:

161 -- Transitional (mixed use of land areas)
162 -- Mixed Use In Buildings

17 -- Other Urban and Built-Up Land

Areas that have been affected by urban development but with minimal paving and buildings are included in this category.

Note: for purposes of this project, Subdivisions 1255 (Military Communications), 1257 (Military Open), 90% of 111 (Rural Residential), and 50% of 112 (Low-Density Residential) are included in this category.

In the nine-county Bay Area, this category has been divided into a number of subdivisions that have not been used as part of this project:

171 -- Extensive Recreation
Included in this category are athletic fields and playgrounds. When available, two subdivisions are shown:

1711 -- Golf Courses (the extensive, not the intensive, portion -- thus, the golf clubhouse is usually shown as Category 122)
1712 -- Racetracts

172 -- Cemeteries
Public, private and military cemeteries are included.

173 -- Parks
All leisure, ornamental, zoological and botanical parks are included when the use is apparent. However, areas of extensive tree cover may be classified as forest.

174 -- Open Space--Urban
Undeveloped urban parks, vacant lots and open areas slated for urban renewal or redevelopment are shown in this category.

175 -- Urban Vacant Land
Selected land that has been developed as an urban use and is currently vacant but is planned for redevelopment is shown in this category.

B. CATEGORY 2 -- AGRICULTURAL LAND

Category 21 -- Cropland and Pasture

Included in this category are harvested, idle, and cultivated cropland, as well as pasture. Level III and IV categories that have been mapped in San Mateo County but are not used for this project include:

211 -- Cropland
- 2111 -- Irrigated
- 2112 -- Non-Irrigated

212 -- Pasture

Category 22 -- Orchards, Groves, Vineyards, Nurseries and Ornamental Horticulture Areas

This land produces most of the various nut and fruit crops. Horticulture areas include greenhouses, floriculture areas, and sod farms used year after year for these purposes. Level III and IV categories that have been mapped in San Mateo County but are not used for this project include:

221 -- Orchards or Groves
222 -- Vineyards and Kiwi Fruit
223 -- Greenhouses and Floriculture

Category 23 -- Confined Feeding

Included in this category are large poultry farms, as well as hog and cattle feedlots. The use is characterized by large animal populations in confined areas with many associated buildings, fences, and waste disposal areas.

Category 24 -- Farmsteads and Other Agriculture

The largest component of this land use is inactive farm land.

C. CATEGORY 3 -- RANGELAND

This division of land use includes areas where the natural vegetation is largely grasses and grass-like plants, shrub and brush, and chaparral.

Category 31 -- Herbaceous Rangeland

Category 32 -- Shrub and Brush Rangeland

Level III and IV categories that have been mapped in San Mateo County include:
321 -- Chaparral
322 -- Coastal Shrub

Category 33 -- Mixed Rangeland

D. CATEGORY 4 -- FOREST LAND

Category 41 -- Deciduous Forest

These areas include the forested areas in which deciduous trees (those loosing their leaves in a dormant season) predominate.

Category 42 -- Evergreen Forest

These areas include the forested areas in which evergreen trees (those which remain green throughout the year) predominate. Level III and IV categories that have been mapped in San Mateo County include:
421 -- Redwood and Douglas Fir
422 -- Pine
423 -- Evergreen Mix

Category 43 -- Mixed Forest

These areas include both deciduous and evergreen trees. Neither predominates.

E. CATEGORY 5 -- WATER

These areas include those locations in the general land mass predominately covered by water with a minimum mapped width of approximately 55 yards (50 meters).

Category 51 -- Streams and Canals

Category 52 -- Lakes

Category 53 -- Reservoirs

Category 54 -- Bays and Estuaries

Category 55 -- Sedimentation Ponds

Category 56 -- Water on USGS Base Maps but Land on USGS Land Use Maps

This category includes those areas depicted as water on the USGS 7.5'quadrangle maps, but shown as land on the USGS land use maps. This category, along with Category 64, were created to deal with discrepancies which occur in the mapping of the land-water boundary on these two data sources.

F. CATEGORY 6 -- WETLANDS

These areas have been mapped by the U.S. Geological Survey using criteria developed in their national land use mapping program. The mapping was developed to indicate general land use patterns, not specifically to identify wetlands areas. Mapping completed by the U.S. Fish and Wildlife Service and referenced in the Wetlands Status and Trends Report is a more appropriate source of this type of information, both because wetlands that are smaller in extent have been identified, and because the categories are more comprehensive. No attempt has been made to integrate the wetlands mapped by the Fish and Wildlife Service into the land use maps; by maintaining two separate sources of maps, wetlands present in areas dominated by another land use (such as industrial) can be identified. For more information on wetlands mapping, see the Wetlands Status and Trends Report.

Category 61 -- Forested Wetlands

According to USGS, "Forested Wetlands are wetlands dominated by woody vegetation. Forested Wetlands includes seasonally flooded bottomland hardwoods, mangrove swamps, shrub swamps, and wooded swamps including those around bogs" (Anderson and others, 1976). Within the land use study study area, the only type of forested wetlands are those classified in the Wetlands Status and Trends Report as "Riparian Forest" or "Palustrine Wooded Vegetation."

Category 62 -- Nonforested Wetlands

According to USGS, "Nonforested Wetlands are dominated by wetland herbaceous vegetation or are nonvegetated. These wetlands include tidal and nontidal fresh, brackish, and salt marshes and nonvegetated flats and also freshwater meadows, wet prairies, and open bogs" (Anderson and others, 1976). This category includes those classified in the Wetlands Status and Trends Report as tidal and freshwater marshes, as well as seasonal and diked ponds and marshes.

Category 63 -- Salt Evaporation Ponds

Wetlands along San Francisco Bay used for the production of salt. This category includes those lands classified as "Salt Evaporators" or "Lacustrine Non-Vegetated Diked" in the Wetlands Status and Trends Report.

Category 64 -- Land on USGS Base Maps but Water on USGS Land Use Maps

This category includes those areas depicted as land on the USGS 7.5' quadrangle maps, but shown as water on the USGS land use maps. This category, along with Category 64, were created to deal with discrepancies which occur in the mapping of the land-water boundary on these two data sources.

G. CATEGORY 7 -- SPARSELY VEGETATED LAND

These areas have limited ability to support life and are characterized by a general absence of vegetation. The U.S. Geological Survey terms this category "Barren Land."

Category 71 -- Salt Flats

These areas are generally dry, as opposed to the salt evaporation ponds in the Bay Area, which have been mapped as Category 63.

Category 72 -- Beaches

This category includes the smooth, gently sloping areas of sand and gravel in shoreline areas.

Category 73 -- Sand Other than Beaches

This category includes non-beach sand, or dunes.

Category 74 -- Bare Exposed Rock

Included are bedrock exposures, talus slopes and other non-vegetated rock.

Category 75 -- Strip Mines, Quarries and Gravel Pits

The decision was made to include these areas of extractive mining as a subdivision of barren land rather than of urban or built-up land.

Category 76 -- Transitional Areas

These areas of sparsely vegetated land are characterized by having an urban component of use. When the information is available, they have been subdivided into:

761 -- Sanitary Land Fills
762 -- Other Transitional

Category 77 -- Mixed Sparsely Vegetated Land

This category is used when a variety of sparsely vegetated land types occur, or when the appropriate subcategory could not be identified. The U.S. Geological Survey terms this category "Mixed Barren Land."

H. TUNDRA (CATEGORY 8) AND PERENNIAL SNOW OR ICE (CATEGORY 9)

Although these categories are not present in the Bay Area region and Delta region, they are present in the Central Valley watershed (in portions of the Sierra Nevada, Cascade and Trinity Mountains which drain into the Central Valley and from there into San Francisco Bay). Subdivisions of these categories mapped by the U.S Geological Survey include:

Category 81 - Shrub and Brush Tundra

Category 82 - Herbaceous Tundra

Category 83 - Bare Ground

Category 84 - Wet Tundra

Category 85 - Mixed Tundra

Category 91 - Perennial Snowfields

Category 92 - Glaciers

APPENDIX III: LAND USE AND POPULATION DATA

The following pages contain the population data used and the land use data developed for the San Francisco Estuary Project.

Section A contains the population and population density data developed using the U.S. Bureau of the Census and the California Department of Finance reports.

Section B contains maps showing the HUCO and SuperHUCO areas in the Bay Area, Delta and Central Valley Watershed. As explained in Part IV, a HUCO is the area formed from the intersection of the hydrologic unit boundaries with county boundaries. SuperHUCOs are aggregates of HUCOs. The table following those two maps is a table defining each HUCO.

Section C contains the land use data taken from dBASE computer files for the Central Valley Area. Note that Level II land use data subdividing the non-urban land uses has been aggregated to Level I data in this table. The actual Level II data are available on IBM-PC compatible diskette from ABAG for a fee.

Section D contains the land use data taken from dBASE computer files for the Delta Region. Again, note that Level II land use data subdividing the non-urban land uses has been aggregated to Level I data in this table. The actual Level II data is available on IBM-PC compatible diskette from ABAG for a fee.

Section E contains the land use data taken from dBASE computer files for the Bay Area Region. Again, note that Level II land use data subdividing the non-urban land uses has been aggregated to Level I data in this table. The actual Level II, III and IV data is available on IBM-PC compatible diskette from ABAG for a fee. In addition, HUCT (hydrologic unit/census tract) data are available for 1985 in the Bay Area. The breakdowns of the water category are not available, however, because ABAG's census tract file excludes most water areas.

Sections F through I contain the same information as Section D and E, but organized by SuperHUCO, rather than split between the three-county Delta Region and the nine-county Bay Area Region.

A. POPULATION DATA FOR CALIFORNIA'S COUNTIES

The following tables contain the population and population density data developed using the U.S. Bureau of the Census and the California Department of Finance reports. These tables form the basis of the population density figures in the text. These data are also available in people/sq. km. (the metric equivalent of people/sq. mile) from ABAG for a small fee.

TABLE A1: HISTORIC POPULATION AND POPULATION DENSITIES IN CALIFORNIA COUNTIES

[Note: no density for 1860--many county boundary changes. Zero population indicates county not formed at that time.]

COUNTY	COUNTY CODE	POPULATION IN 1860	POPULATION IN 1900	SIZE IN 1900 (in sq. mi.)	DENSITY 1900	POPULATION IN 1950	SIZE IN 1950 (in sq. mi.)	DENSITY 1950
ALAMEDA	6001	8927	130197	736	26	740315	736	150
ALPINE	6003	0	509	739	0	241	739	0
AMADOR	6005	10930	11116	589	3	9151	589	2
BUTTE	6007	12106	17117	1646	2	64930	1646	6
CALAVERAS	6009	16299	11200	1021	2	9902	1021	2
COLUSA	6011	2274	7364	1153	1	11651	1153	2
CONTRA COSTA	6013	5328	18046	730	4	298984	730	61
DEL NORTE	6015	1993	2408	1007	0	8078	1007	1
EL DORADO	6017	20562	8986	1715	1	16207	1715	2
FRESNO	6019	4605	37862	5978	1	276515	5978	7
GLENN	6021	0	5150	1319	1	15448	1319	2
HUMBOLDT	6023	2694	27104	3579	1	69241	3579	3
IMPERIAL	6025	0	0	0	0	62975	4173	2
INYO	6027	0	4377	10223	0	11658	10223	0
KERN	6029	0	16480	8130	0	228309	8130	4
KINGS	6031	0	9871	1392	1	49900	1392	5
LAKE	6033	0	6017	1262	1	13680	1262	2
LASSEN	6035	0	4511	4553	0	18474	4553	1
LOS ANGELES	6037	11333	170298	4070	6	4151687	4070	152
MADERA	6039	0	6368	2145	0	36964	2145	3
MARIN	6041	3334	15702	523	5	85619	523	24
MARIPOSA	6043	6243	4720	1456	0	5145	1456	0
MENDOCINO	6045	3967	20465	3512	1	40854	3512	2
MERCED	6047	1141	9215	1944	1	69780	1944	5
MODOC	6049	0	5076	4064	0	9678	4064	0
MONO	6051	0	2167	3019	0	2115	3019	0
MONTEREY	6053	4739	19380	3303	1	130498	3303	6
NAPA	6055	5521	16451	744	3	46603	744	9
NEVADA	6057	16446	17789	960	3	19888	960	3
ORANGE	6059	0	19696	798	4	216224	798	41
PLACER	6061	13270	15786	1416	2	41649	1416	4
PLUMAS	6063	4363	4657	2573	0	13519	2573	1
RIVERSIDE	6065	0	17897	7214	0	170046	7214	3
SACRAMENTO	6067	24142	45915	971	7	277140	971	42
SAN BENITO	6069	0	6633	1388	1	14370	1388	2
SAN BERNADINO	6071	5551	27929	20064	0	281642	20064	2
SAN DIEGO	6073	4324	35090	8385	1	556808	4212	20
SAN FRANCISCO	6075	56802	342782	46	1103	775357	46	2495
SAN JOAQUIN	6077	9435	35452	1415	4	200750	1415	21
SAN LUIS OBISPO	6079	1782	16637	3308	1	51417	3308	2
SAN MATEO	6081	3214	12094	447	4	235659	447	79
SANTA BARBARA	6083	3543	18934	2748	1	98220	2748	5
SANTA CLARA	6085	11912	60216	1293	7	290547	1293	34
SANTA CRUZ	6087	4944	21512	446	7	66534	446	22

TABLE A1: HISTORIC POPULATION AND POPULATION DENSITIES IN CALIFORNIA COUNTIES

[Note: no density for 1860--many county boundary changes. Zero population indicates county not formed at that time.]

COUNTY	COUNTY CODE	POPULATION IN 1860	POPULATION IN 1900	SIZE IN 1900 (in sq. mi.)	DENSITY 1900	POPULATION IN 1950	SIZE IN 1950 (in sq. mi.)	DENSITY 1950
SHASTA	6089	4360	17318	3786	1	36413	3786	2
SIERRA	6091	5619	4098	959	1	2410	959	0
SISKIYOU	6093	7629	16962	6281	0	30733	6281	1
SOLANO	6095	7169	24143	834	4	104833	834	19
SONOMA	6097	11867	38480	1604	3	103405	1604	10
STANISLAUS	6099	2245	9550	1506	1	127231	1506	13
SUTTER	6101	3390	5886	602	2	26239	602	7
TEHAMA	6103	4044	10996	2953	0	19276	2953	1
TRINITY	6105	5125	4383	3190	0	5087	3190	0
TULARE	6107	4638	18375	4808	0	149264	4808	5
TUOLUMNE	6109	16229	11166	2234	1	12584	2234	1
VENTURA	6111	0	14367	1862	1	114647	1862	9
YOLO	6113	4716	13618	1014	2	40640	1014	6
YUBA	6115	13668	8620	640	2	24420	640	6
*** Total ***		372423	1485138	156299		10591554	156299	

TABLE A2: CURRENT POPULATION AND POPULATION DENSITIES IN CALIFORNIA COUNTIES
[Source: California Department of Finance]

COUNTY	COUNTY CODE	CURRENT SIZE (in sq. mi.)	POPULATION IN 1975	DENSITY 1975	POPULATION IN 1985	DENSITY 1985
ALAMEDA	6001	736	1107900	224	1196987	242
ALPINE	6003	739	800	0	1185	0
AMADOR	6005	589	15200	4	23403	6
BUTTE	6007	1646	120700	11	164005	15
CALAVERAS	6009	1021	15500	2	26802	4
COLUSA	6011	1153	12800	2	14698	2
CONTRA COSTA	6013	730	586600	120	717598	147
DEL NORTE	6015	1007	16200	2	18800	3
EL DORADO	6017	1715	59400	5	104707	9
FRESNO	6019	5978	452400	11	576193	14
GLENN	6021	1319	19300	2	23196	3
HUMBOLDT	6023	3579	106600	4	113001	5
IMPERIAL	6025	4173	83400	3	106001	4
INYO	6027	10223	17600	0	18398	0
KERN	6029	8130	361800	7	480594	9
KINGS	6031	1392	69400	7	84899	9
LAKE	6033	1262	26100	3	48304	6
LASSEN	6035	4553	18800	1	24602	1
LOS ANGELES	6037	4070	7190300	263	8085296	296
MADERA	6039	2145	48700	3	76299	5
MARIN	6041	523	219500	63	226105	64
MARIPOSA	6043	1456	8400	1	13398	2
MENDOCINO	6045	3512	58000	2	73799	3
MERCED	6047	1944	118900	9	160500	12
MODOC	6049	4064	7900	0	9499	0
MONO	6051	3019	7200	0	9302	0
MONTEREY	6053	3303	270900	12	329696	15
NAPA	6055	744	90600	18	104001	21
NEVADA	6057	960	34100	5	68291	10
ORANGE	6059	798	1713400	320	2127901	398
PLACER	6061	1416	91300	10	138405	15
PLUMAS	6063	2573	14100	1	19199	1
RIVERSIDE	6065	7214	534500	11	820602	17
SACRAMENTO	6067	971	691600	106	893798	137
SAN BENITO	6069	1388	21400	2	30495	3
SAN BERNADINO	6071	20064	696800	5	1086396	8
SAN DIEGO	6073	4212	1594100	56	2131603	75
SAN FRANCISCO	6075	46	695400	2237	734998	2365
SAN JOAQUIN	6077	1415	299400	32	416704	44
SAN LUIS OBISPO	6079	3308	130700	6	190101	8
SAN MATEO	6081	447	582000	194	616592	206
SANTA BARBARA	6083	2748	281100	15	334604	18
SANTA CLARA	6085	1293	1180300	136	1400107	161
SANTA CRUZ	6087	446	156100	52	214298	71
SHASTA	6089	3786	92400	3	131693	5

TABLE A2: CURRENT POPULATION AND POPULATION DENSITIES IN CALIFORNIA COUNTIES
[Source: California Department of Finance]

COUNTY	COUNTY CODE	CURRENT SIZE (in sq. mi.)	POPULATION IN 1975	DENSITY 1975	POPULATION IN 1985	DENSITY 1985
SIERRA	6091	959	2800	0	3495	0
SISKIYOU	6093	6281	35400	1	42804	1
SOLANO	6095	834	188000	34	275199	49
SONOMA	6097	1604	247100	23	335401	31
STANISLAUS	6099	1506	224600	22	304903	30
SUTTER	6101	602	46400	12	58500	15
TEHAMA	6103	2953	32700	2	44307	2
TRINITY	6105	3190	9800	0	13602	1
TULARE	6107	4808	216400	7	280499	9
TUOLUMNE	6109	2234	26600	2	40805	3
VENTURA	6111	1862	440700	35	600203	48
YOLO	6113	1014	101700	15	124005	18
YUBA	6115	640	45700	11	54299	13
*** Total ***		156299	21537500		26365077	

TABLE A3: FUTURE POPULATION AND POPULATION DENSITIES IN CALIFORNIA COUNTIES
[Source: California Department of Finance]

COUNTY	COUNTY CODE	CURRENT SIZE (in sq. mi.)	POPULATION IN 1995	DENSITY 1995	POPULATION IN 2005	DENSITY 2005
ALAMEDA	6001	736	1323694	268	1397451	283
ALPINE	6003	739	1401	0	1874	0
AMADOR	6005	589	33303	8	40353	10
BUTTE	6007	1646	202574	19	240871	22
CALAVERAS	6009	1021	37853	5	47738	7
COLUSA	6011	1153	17973	2	20554	3
CONTRA COSTA	6013	730	824896	168	913535	186
DEL NORTE	6015	1007	20372	3	21058	3
EL DORADO	6017	1715	141064	12	176056	15
FRESNO	6019	5978	683213	17	786449	20
GLENN	6021	1319	26491	3	29235	3
HUMBOLDT	6023	3579	118972	5	120396	5
IMPERIAL	6025	4173	131551	5	154074	5
INYO	6027	10223	18751	0	18843	0
KERN	6029	8130	602081	11	718688	13
KINGS	6031	1392	109767	12	122506	13
LAKE	6033	1262	70691	8	91038	11
LASSEN	6035	4553	27774	1	31185	1
LOS ANGELES	6037	4070	8885846	325	9379268	344
MADERA	6039	2145	102608	7	128191	9
MARIN	6041	523	234383	67	237413	68
MARIPOSA	6043	1456	18043	2	22622	2
MENDOCINO	6045	3512	86437	4	97835	4
MERCED	6047	1944	211916	16	264122	20
MODOC	6049	4064	10890	0	12550	0
MONO	6051	3019	10026	0	11147	0
MONTEREY	6053	3303	396182	18	450189	20
NAPA	6055	744	116700	24	129498	26
NEVADA	6057	960	98853	15	128145	20
ORANGE	6059	798	2463752	461	2725015	509
PLACER	6061	1416	181985	19	225218	24
PLUMAS	6063	2573	22289	1	25077	2
RIVERSIDE	6065	7214	1177125	24	1512779	31
SACRAMENTO	6067	971	1091299	168	1272378	195
SAN BENITO	6069	1388	43023	5	53728	6
SAN BERNADINO	6071	20064	1476210	11	1834532	14
SAN DIEGO	6073	4212	2630296	93	3065064	108
SAN FRANCISCO	6075	46	781454	2514	745237	2398
SAN JOAQUIN	6077	1415	550573	58	671392	71
SAN LUIS OBISPO	6079	3308	267066	12	335174	15
SAN MATEO	6081	447	650617	217	661224	220
SANTA BARBARA	6083	2748	390129	21	423112	23
SANTA CLARA	6085	1293	1569902	181	1705710	197
SANTA CRUZ	6087	446	263816	88	308373	103
SHASTA	6089	3786	164351	7	193566	8

TABLE A3: FUTURE POPULATION AND POPULATION DENSITIES IN CALIFORNIA COUNTIES
[Source: California Department of Finance]

COUNTY	COUNTY CODE	CURRENT SIZE (in sq. mi.)	POPULATION IN 1995	DENSITY 1995	POPULATION IN 2005	DENSITY 2005
SIERRA	6091	959	3951	1	4328	1
SISKIYOU	6093	6281	45897	1	48191	1
SOLANO	6095	834	353708	63	426968	76
SONOMA	6097	1604	401580	37	455676	42
STANISLAUS	6099	1506	380409	38	455367	45
SUTTER	6101	602	68278	17	75613	19
TEHAMA	6103	2953	54830	3	64287	3
TRINITY	6105	3190	15881	1	17955	1
TULARE	6107	4808	354645	11	432335	14
TUOLUMNE	6109	2234	57736	4	70916	5
VENTURA	6111	1862	726279	58	839694	67
YOLO	6113	1014	143657	21	160271	24
YUBA	6115	640	60671	14	65289	15
*** Total ***		156299	30955714		34667353	

B. HUCO AND SUPERHUCO MAPS AND DEFINITIONS

This section contains maps showing the HUCO and SuperHUCO areas in the Bay Area, Delta and Central Valley Watershed. As explained in Part IV, a HUCO is the area formed from the intersection of the hydrologic unit boundaries with county boundaries. SuperHUCOs are aggregates of HUCOs. The table following those two maps is a table defining each HUCO.

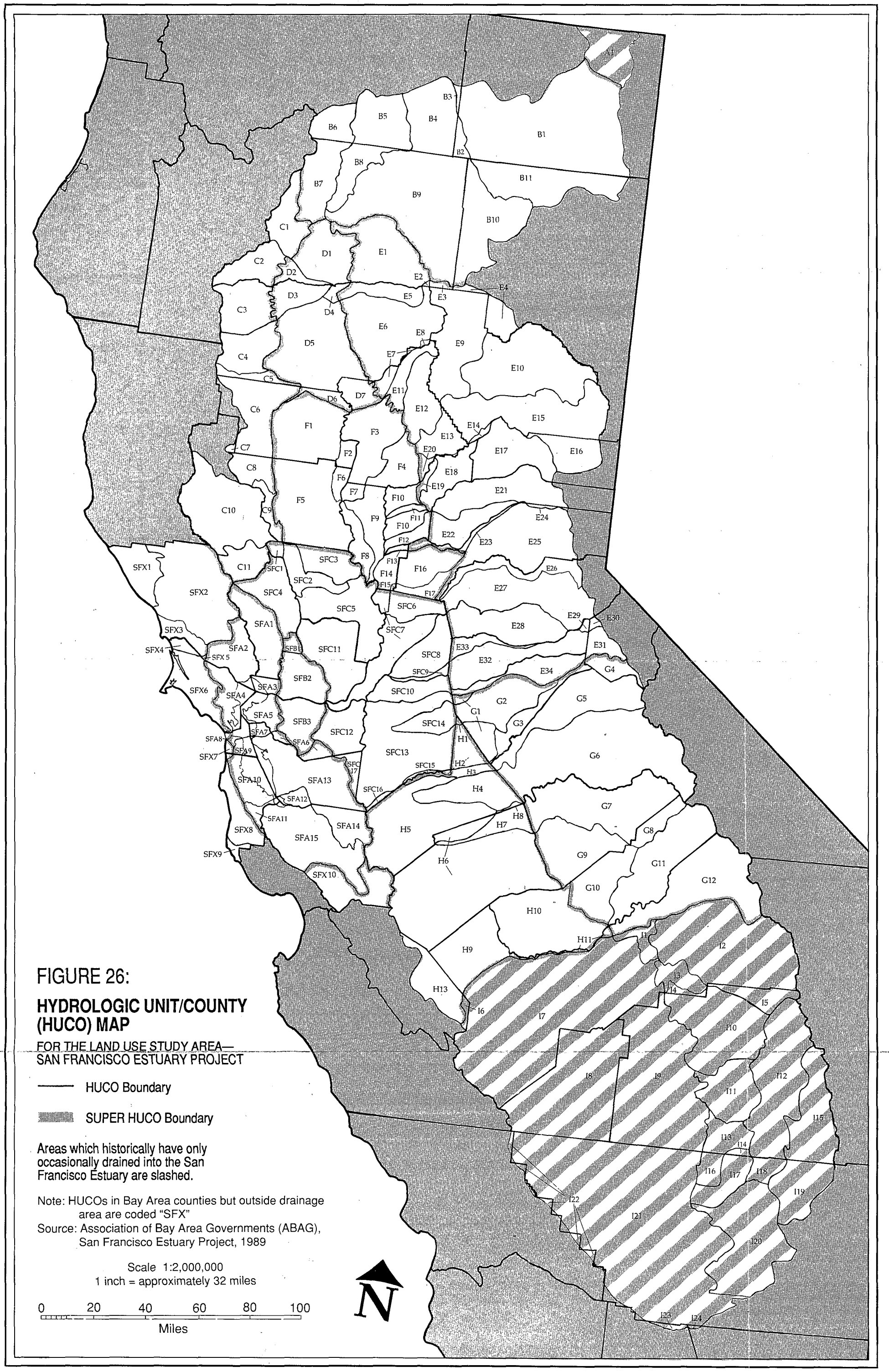

FIGURE 26:

HYDROLOGIC UNIT/COUNTY (HUCO) MAP

FOR THE LAND USE STUDY AREA—
SAN FRANCISCO ESTUARY PROJECT

——— HUCO Boundary

SUPER HUCO Boundary

Areas which historically have only occasionally drained into the San Francisco Estuary are slashed.

Note: HUCOs in Bay Area counties but outside drainage area are coded "SFX"

Source: Association of Bay Area Governments (ABAG), San Francisco Estuary Project, 1989

Scale 1:2,000,000
1 inch = approximately 32 miles

0 20 40 60 80 100
Miles

N

C—095411

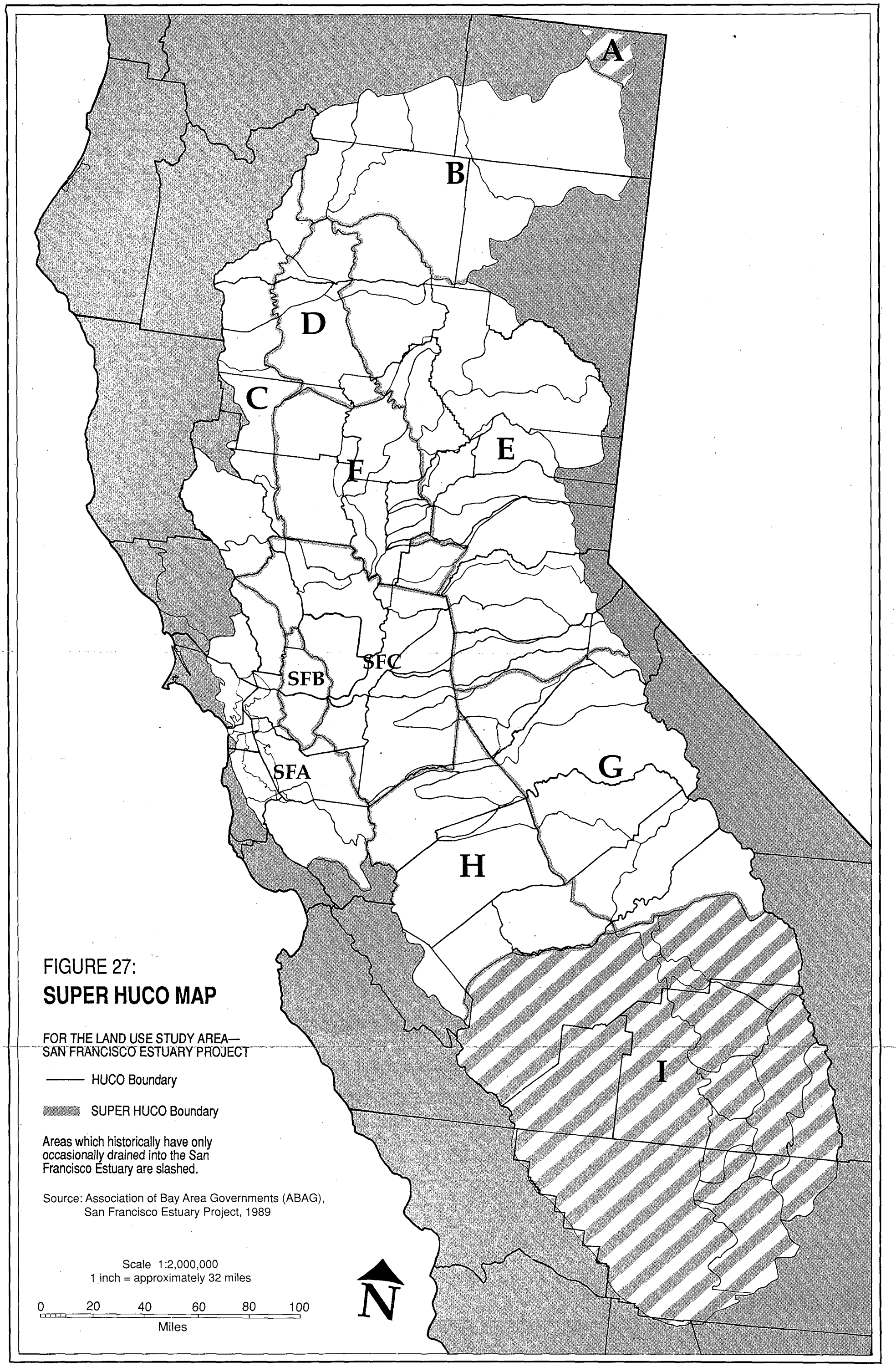

FIGURE 27:

SUPER HUCO MAP

FOR THE LAND USE STUDY AREA—
SAN FRANCISCO ESTUARY PROJECT

——— HUCO Boundary

SUPER HUCO Boundary

Areas which historically have only occasionally drained into the San Francisco Estuary are slashed.

Source: Association of Bay Area Governments (ABAG), San Francisco Estuary Project, 1989

Scale 1:2,000,000
1 inch = approximately 32 miles

C—095412

HYDROLOGIC UNIT/COUNTY (HUCO) MAP UNITS
FOR THE LAND USE STUDY AREA -- SAN FRANCISCO ESTUARY PROJECT

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Alameda 6001	Middle San Joaquin	18040003	SFC*
	Lower San Joaquin	18040007	SFC17
	Suisun Bay	18050001	SFB*
	San Pablo Bay	18050002	SFA7
	Coyote	18050003	SFA12
	San Francisco Bay	18050004	SFA13
Alpine 6003	South Fork American (Sa) =	18020022	E30
	South Fork American (WL)}	18020129	E30
	{Stanislaus (Sa) =	18040006	G4
	Upper Stanislaus (WL)}	18040010	G4
	{Mokelumne (Sa) =	18040009	E31
	Mokelumne (WL)}	18040012	E31
Amador 6005	South Fork American	18020022	E29
	Mokelumne	18040009	E32
	Cosumnes	18040010	E33
Butte 6007	Sacramento-Lower Thomes**	18020103	D7
	Sacramento-Stone Corral**	18020104	F*
	Lower Butte	18020105	F5
	Lower Feather	18020106	F4
	Mill-Big Chico	18020119	E7
	Upper Butte	18020120	E11
	North Fork Feather	18020121	E12
	Middle Fork Feather	18020123	E13
	Honcut Headwaters	18020124	E20
Calaveras 6009	Stanislaus	18040006	G3
	Lower San Joaquin	18040007	G1
	Calaveras	18040008	G2
	Mokelumne	18040009	E34
Colusa 6011	Lower Butte	18020105	F6
	{Sacramento-Stone Corral** (Ch) =	18020104	F5
	Middle Sacramento (Sa)}	18020010	F5
	Lower Cache	18020110	SFC*
	Upper Stony	18020115	C8
	Upper Cache	18020116	C9

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Contra Costa 6013	Lower San Joaquin	18040007	SFC12
	Suisun Bay	18050001	SFB3
	San Pablo Bay	18050002	SFA5
	San Francisco Bay	18050004	SFA6
El Dorado 6017	{North Fork American (SA) =	18020021	E26
	North Fork American (Ch)}	18020128	E26
	American	18020023	E*
	South Fork American	18020022	E27
	Mokelumne	18040009	E*
	Cosumnes	18040010	E28
Fresno 6019	Upper Kaweah	18030007	I4
	Mill	18030008	I3
	Upper Dry	18030009	I1
	Upper King	18030010	I2
	{Antelope-Kettleman Plains (Mo) =	18030004	I7
	Tulare-Buena Vista Lakes (Fr) =	18030012	I7
	Fresno Slough (Mo)}	18040002	I7
	{Middle San Joaquin-Lower Chowchilla (Fr) =	18040001	H11
	Upper San Joaquin (Mo)} ≠	18040001	H11
	Upper San Joaquin (Fr)	18040006	G12
	Middle San Joaquin	18040003	H9
Glenn 6021	Sacramento-Lower Thomas**	18020103	D6
	Sacramento-Stone Corral**	18020104	F1
	Lower Butte	18020105	F4
	Upper Stony	18020115	G6
Inyo 6027	South Fork Kern	18030002	I*

HYDROLOGIC UNIT/COUNTY (HUCO) MAP UNITS
FOR THE LAND USE STUDY AREA -- SAN FRANCISCO ESTUARY PROJECT

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Kern	Upper Kern	18030001	I18
6029	South Fork Kern	18030002	I19
	{Lower Kern =	18030003	I20
	Middle Kern-Upper		
	Tehachapi-Grapevine}	18030003	I20
	{Upper Poso (Ba) =	18030004	I17
	Antelope-Kettleman	18030004	I17
	Plains (SLO)}		
	Upper Deer-Upper White	18030005	I16
	Tulare-Buena Vista Lakes	18030012	I21
Kings	{Antelope-Kettleman		
6031	Plains (Mo) =	18030004	I8
	Tulare-Buena		
	Vista Lakes (Fr)}	18030012	I8
Lake	Upper Stony	18020115	C7
6033	Upper Cache	18020116	C10
	Upper Putah	18020117	C11
Lassen	Upper Pit	18020002	B11
6035	Lower Pit	18020003	B10
	North Fork Feather	18020121	E4
Los Angeles	Lower Kern	18030003	I24
6037			
Madera	{Middle San Joaquin (Mo) =	18040003	H10
6039	Middle San Joaquin-		
	Lower Chowchilla (Ma) =	18040001	H10
	Upper San Joaquin (Mo)} ≠	18040001	H10
	Upper San Joaquin (Ma)	18040006	G11
	Upper Chowchilla-		
	Upper Fresno (Ma)	18040007	G10
	Upper Merced	18040008	G8

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Marin	Bodega Bay	18010111	SFX4
6041	San Pablo Bay	18050002	SFA4
	{Tomales-Drakes Bay =	18050005	SFX6
	San Francisco Coastal}	18050005	SFX6
Mariposa	{Middle San Joaquin (SJ) =	18040003	G9
6043	Upper Chowchilla-		
	Upper Fresno (Ma)}	18040007	G9
	{Merced (SJ) =	18040004	G7
	Upper Merced (Ma)}	18040008	G7
	Tuolumne	18040005	G*
Mendocino	Upper Elder-Upper Thomes	18020114	C*
6045	Upper Stony	18020115	C*
	Upper Cache	18020116	C*
Merced	Middle San Joaquin	18040003	H6
6047	Merced	18040004	H7
Modoc	Goose Lake	18020001	A1
6049	Upper Pit	18020002	B1
	Lower Pit	18020003	B2
Mono	Upper Tuolumne	18040009	G*
6051	Upper Stanislaus	18040010	G*
Monterey	Antelope-Kettleman Plains	18030004	G*
6053			
Napa	Lower Sacramento	18020109	SFC*
6055	Lower Cache	18020110	SFC*
	Upper Cache	18020116	SFC*
	Russian	18010110	SFX*
	Suisun Bay	18050001	SFB1
	San Pablo Bay	18050002	SFA1
	Upper Putah	18020117	SFC4
Nevada	Upper Bear	18020125	E22
6057	Upper Yuba	18020126	E21

HYDROLOGIC UNIT/COUNTY (HUCO) MAP UNITS
FOR THE LAND USE STUDY AREA -- SAN FRANCISCO ESTUARY PROJECT

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Placer 6061	{Bear (Sa) =	18020017	E23
	Upper Bear (Ch)}	18020126	E23
	{Lower Bear (Ch) =	18020108	F16
	Lower Sacramento (Sa)}	18020018	F16
	{North Fork American (Sa) =	18020021	E25
	North Fork Amierican (Ch)}	18020128	E25
	American	18020023	F17
	Upper Yuba	18020125	E24
Plumas 6063	North Fork Feather	18020121	E9
	East Branch-North Fork Feather	18020122	E10
	Middle Fork Feather	18020123	E15
	Upper Yuba	18020125	E14
Sacramento 6067	Lower Sacramento	18020018	SFC7
	North Fork American (Sa)	18020021	SFC*
	South Fork American (Sa)	18020022	SFC*
	American	18020023	SFC6
	Lower San Joaquin	18040007	SFC*
	Mokelumne	18040009	SFC9
	Cosumnes	18040010	SFC8
	Suisun Bay	18050001	SFB*
San Benito 6069	Fresno Slough	18040002	I6
	Middle San Joaquin	18040003	H13
San Francisco 6075	San Pablo Bay	18050002	SFA8
	San Francisco Bay	18050004	SFA9
	San Fransisco Coastal	18050005	SFX7
San Joaquin 6077	Middle San Joaquin	18040003	SFC16
	Stanislaus	18040006	SFC15
	Lower San Joaquin	18040007	SFC13
	Calaveras	18040008	SFC14
	Mokelumne	18040009	SFC10
	San Francisco Coastal	18050004	SFX*
San Luis Obispo 6079	Lower Kern	18030003	I*
	{Antelope-Kettleman Plains (SL) =	18030004	I22
	Tulare-Buena Vista Lakes (Ba)}	18030012	I22
San Mateo 6081	Coyote	18050003	SFA11
	San Francisco Bay	18050004	SFA10
	San Francisco Coastal	18050005	SFX8
	Monterey Bay	18060001	SFX9
Santa Clara 6085	Middle San Joaquin	18040003	SFA*
	Coyote	18050003	SFA15
	San Francisco Bay	18050004	SFA14
	San Francisco Coastal	18050005	SFX*
	Monterey Bay	18060001	SFX*
	Pajaro	18060002	SFX10
Santa Cruz 6087	Coyote	18050003	SFA*
Shasta 6089	Lower Pit	18020003	B9
	McCloud	18020004	B8
	Sacramento Headwaters	18020005	B7
	Sacramento Lower Cow-Lower Clear	18020101	D1
	Lower Cottonwood	18020102	D2
	Sacramento-Upper Clear	18020112	C1
	Cotton Headwaters	18020113	C2
	Upper Cow-Battle	18020118	E1
	Mill-Big Chico	18020119	E2
	North Fork Feather	18020121	E3
Sierra 6091	Middle Fork Feather	18020123	E16
	Upper Yuba	18020125	E17

HYDROLOGIC UNIT/COUNTY (HUCO) MAP UNITS
FOR THE LAND USE STUDY AREA -- SAN FRANCISCO ESTUARY PROJECT

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Siskiyou 6093	Upper Pit	18020002	B3
	Lower Pit	18020003	B4
	McCloud	18020004	B5
	Sacramento Headwaters	18020005	B6
Solano 6095	{Lower Sacramento (Sa) =	18020018	SFC11
	Lower Sacramento (SR) =	18020109	SFC11
	Putah (Sa)}	18020020	SFC11
	Suisun Bay	18050001	SFB2
	San Pablo Bay	18050002	SFA3
	Upper Putah	18020117	SFC*
Sonoma 6097	Gualala-Salmon	18010109	SFX1
	Russian	18010110	SFX2
	Bodega Bay	18010111	SFX3
	Upper Cache	18020116	SFC*
	Upper Putah	18020117	SFC*
	San Pablo Bay	18050002	SFA2
	Tomales-Drakes Bay	18050005	SFX5
Stanislaus 6099	Middle San Joaquin	18040003	H5
	Merced	18040004	H8
	Tuolumne	18040005	H4
	Stanislaus	18040006	H3
	Lower San Joaquin	18040007	H2
	Calaveras	18040008	H1
	San Francisco Bay	18050004	SFA*
Sutter 6101	{Middle Sacramento (Sa) = Sacramento-Stone Corral** (Ch)}	18020010	F8
		18020104	F8
	{Feather (Sa) =	18020015	F9
	Lower Feather (Ch)}	18020106	F9
	Bear	18020017	F13
	Lower Sacramento	18020018	F14
	American	18020023	F15
	Lower Butte	18020105	F7

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Tehama 6103	Sacramento-Lower Cow-Lower Clear	18020101	D4
	Lower Cottonwood	18020102	D3
	Sacramento-Lower Thomas**	18020103	D5
	Cottonwood Headwaters	18020113	C3
	Upper Elder-Upper Thomas	18020114	C4
	Upper Stony	18020115	C5
	Upper Cow-Battle	18020118	E5
	Mill-Big Chico	18020119	E6
	Upper Butte	18020120	E8
Trinity 6105	Sacramento Headwaters	18020005	B*
	Sacramento Upper Clear	18020112	C*
	Cottonwood Headwaters	18020113	C*
Tulare 6107	Upper Kern	18030001	I12
	South Fork Kern	18030002	I15
	Upper Poso	18030004	I14
	Upper Deer-Upper White	18030005	I13
	Upper Tule	18030006	I11
	Upper Kaweah	18030007	I10
	Upper King	18030010	I5
	Tulare-Buena Vista Lakes	18030012	I9
Tuolumne 6109	Merced	18040004	G*
	{Tuolumne (SJ) =	18040005	G6
	Upper Tuolumne (WL)}	18040009	G6
	{Stanislaus (SJ) =	18040006	G5
	Upper Stanislaus (WL)}	18040010	G5
Ventura 6111	Lower Kern	18030003	I23

HYDROLOGIC UNIT/COUNTY (HUCO) MAP UNITS
FOR THE LAND USE STUDY AREA -- SAN FRANCISCO ESTUARY PROJECT

COUNTY Code	HYDROLOGIC UNIT	Code	HUCO Code
Yolo 6113	{Middle Sacramento (Sa) = Sacramento-Stone Corral** (SR)}	18020010 18020104	SFC3 SFC3
	Feather	18020015	SFC*
	{Cache (Sa) = Lower Cache (SR)}	18020019 18020110	SFC2 SFC2
	{Lower Sacramento (Sa) = Lower Sacramento (SR) = Putah (Sa)}	18020018 18020109 18020020	SFC5 SFC5 SFC5
	Upper Cache	18020116	SFC1
	Upper Putah	18020117	SFC*
Yuba 6115	Feather	18020015	F*
	{Bear (Sa) = Upper Bear (Ch)}	18020017 18020126	F12 F12
	Lower Feather	18020106	F10
	Lower Yuba	18020107	F11
	Honcut Headwaters	18020124	E19
	Upper Yuba	18020125	E18

* Too small to be shown on map
** Sacramento omitted from name on the Chico sheet

C. LAND USE DATA FOR THE CENTRAL VALLEY WATERSHED

This section contains the land use data taken from dBASE computer files for the Central Valley Area. Note that Level II land use data subdividing the non-urban land uses has been aggregated to Level I data in this table. The actual Level II data are available on IBM-PC compatible diskette from ABAG for a fee. In addition, ABAG has these same data available in hectares (the metric equivalent of 2.47 acres).

TABLE C1: 1975 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6003	18020022	E	553	0	0	0	0	0	0	553	0	939	7114	0	879	1275	0
6003	18020129	E	0	0	0	0	0	0	0	0	0	336	583	0	138	287	0
6003	18040006	G	49	20	0	0	20	0	0	10	0	1442	5118	0	217	0	0
6003	18040009	E	20	0	20	0	0	0	0	0	0	3665	20669	0	2065	1294	0
6003	18040010	G	0	0	0	0	0	0	0	0	0	10690	56593	0	0	3468	0
6003	18040012	E	0	0	0	0	0	0	0	0	0	6471	42553	0	0	5800	0
6005	18020022	E	652	0	0	0	0	0	0	652	0	405	8378	49	346	326	0
6005	18040009	E	3438	1363	622	573	158	10	425	287	23060	103335	163889	158	5246	534	0
6005	18040010	E	227	168	59	0	0	0	0	0	9485	28998	28277	0	198	0	0
6007	18020103	D	7410	4693	1482	0	988	0	0	247	45497	21845	14286	0	988	0	0
6007	18020104	F	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6007	18020105	F	3952	2470	741	0	247	0	247	247	187473	48165	24947	13338	494	0	0
6007	18020106	F	8398	5928	494	247	741	0	0	988	56810	22971	20007	1976	5681	0	0
6007	18020119	E	247	247	0	0	0	0	0	0	0	247	44460	0	0	0	0
6007	18020120	E	9139	7410	494	0	0	0	0	1235	0	7904	123253	0	1235	0	0
6007	18020121	E	988	741	0	0	0	0	247	0	0	19266	186979	247	247	0	0
6007	18020123	E	494	247	0	0	0	0	0	247	0	12103	115349	0	494	0	0
6007	18020124	E	741	741	0	0	0	0	0	0	1976	3458	33345	0	0	0	0
6009	18040006	G	1492	1018	227	59	20	0	49	119	8764	19770	85699	0	4604	0	0
6009	18040007	G	227	168	10	30	0	0	20	0	9722	31507	37959	0	128	0	0
6009	18040008	G	1630	603	445	188	30	0	227	138	42336	70059	157863	0	9939	0	0
6009	18040009	E	494	237	69	30	20	0	109	30	6037	12123	153525	79	613	0	0
6011	18020010	F	20	0	10	0	10	0	0	0	30707	0	0	0	0	0	0
6011	18020104	F	8032	1907	464	287	5207	0	69	99	289375	73912	105202	2411	0	0	0
6011	18020105	F	0	0	0	0	0	0	0	0	36714	247	0	2470	0	0	0
6011	18020110	SFC	0	0	0	0	0	0	0	0	0	0	79	0	0	0	0
6011	18020115	C	109	109	0	0	0	0	0	0	3478	48382	56000	316	0	0	0
6011	18020116	C	0	0	0	0	0	0	0	0	1798	34402	30964	0	0	0	0
6017	18020021	E	227	40	178	0	10	0	0	0	3458	17389	102278	0	3043	909	0
6017	18020022	E	8082	3428	1087	701	1186	0	781	899	16766	65603	407876	138	14109	1709	0

TABLE C1: 1975 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6017	18020023	E	0	0	0	0	0	0	0	0	603	573	79	0	59	0	0
6017	18020128	E	0	0	0	0	0	0	0	0	0	1729	13091	0	741	0	0
6017	18040009	E	0	0	0	0	0	0	0	0	20	0	1423	0	0	0	0
6017	18040010	E	3567	1442	504	247	731	0	277	366	25550	51603	247484	30	4337	0	0
6019	18030004	I	15709	751	405	13674	731	0	69	79	118214	157635	118985	0	1176	0	0
6019	18030007	I	0	0	0	0	0	0	0	0	0	5187	21736	0	0	0	0
6019	18030008	I	247	0	0	0	0	0	247	0	1235	16302	66196	0	0	0	0
6019	18030009	I	0	0	0	0	0	0	0	0	7163	26182	45695	0	0	0	0
6019	18030010	I	741	741	0	0	0	0	0	0	0	112385	584896	0	4940	68666	0
6019	18030012	I	58786	30628	15808	4940	3458	0	1729	2223	595764	21242	13091	247	3211	0	0
6019	18040001	H	1235	741	247	247	0	0	0	0	13417	6669	0	830	356	0	0
6019	18040002	I	14998	1275	504	10107	2174	0	583	356	533727	133904	20037	18574	1018	0	0
6019	18040003	H	2006	326	128	119	1037	0	217	178	223160	93485	10	59	405	0	0
6019	18040006	G	1976	1729	0	247	0	0	0	0	0	31122	498446	0	0	51623	0
6021	18020103	D	879	148	20	158	415	0	30	109	29818	7212	1344	0	1334	0	0
6021	18020104	F	6224	2025	583	119	3221	0	148	128	248522	107850	37435	1393	1166	0	0
6021	18020105	F	0	0	0	0	0	0	0	0	41783	247	0	0	0	0	0
6021	18020115	G	484	168	40	158	0	0	0	119	9109	114855	180834	89	741	0	0
6027	18030002	I	0	0	0	0	0	0	0	0	0	0	336	0	0	0	0
6029	18030001	I	1107	978	10	0	20	0	0	99	346	33147	31715	0	445	0	0
6029	18030002	I	731	711	10	0	0	0	0	10	10334	139209	96290	583	4782	0	0
6029	18030003	I	7944	2875	494	2193	1877	0	168	336	37504	372772	465378	267	8862	0	0
6029	18030004	I	168	0	0	0	128	0	40	0	23406	132293	113936	0	40	0	0
6029	18030005	I	0	0	0	0	0	0	0	0	128	26014	47266	0	0	0	0
6029	18030012	I	67648	23346	5819	22665	9317	69	1403	5029	1043041	826175	11975	2500	7252	0	0
6031	18030004	I	2934	415	188	1650	504	0	178	0	44490	113472	3873	0	682	0	0
6031	18030012	I	14820	5958	4693	1571	869	0	741	988	605861	75098	0	6274	929	0	0
6033	18020115	C	0	0	0	0	0	0	0	0	0	879	7993	0	0	0	0
6033	18020116	C	12765	10137	899	287	613	0	168	662	43512	175765	246052	138	790	0	0
6033	18020117	C	1403	484	840	0	30	0	30	20	10868	36131	79929	0	2223	0	0

TABLE C1: 1975 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6035	18020002	B	247	247	0	0	0	0	0	0	31122	130663	248482	10868	0	0	0
6035	18020003	B	0	0	0	0	0	0	0	0	11362	48412	353210	494	2717	0	0
6035	18020121	E	741	494	247	0	0	0	0	0	0	7904	81757	0	0	0	0
6037	18030003	I	99	0	0	0	99	0	0	0	198	1956	1215	0	0	0	0
6039	18040001	H	2668	1719	306	267	277	0	69	30	133775	61296	741	1265	168	0	0
6039	18040003	H	4970	2747	869	128	484	40	346	356	248502	62037	445	22714	1551	0	0
6039	18040006	G	494	494	0	0	0	0	0	0	0	7657	411749	0	0	19019	0
6039	18040007	G	3952	3458	494	0	0	0	0	0	1235	22230	217854	0	0	0	0
6039	18040008	G	0	0	0	0	0	0	0	0	0	4446	80769	0	0	12350	0
6043	18040003	G	899	652	0	49	59	0	119	20	49	110804	81915	0	277	0	0
6043	18040004	G	1976	1610	0	10	0	0	59	296	385	51080	138656	0	356	0	0
6043	18040005	G	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6043	18040007	G	1729	1729	0	0	0	0	0	0	247	7163	134368	0	0	0	0
6043	18040008	G	1235	988	247	0	0	0	0	0	0	18772	383344	0	0	741	0
6045	18020114	C	0	0	0	0	0	0	0	0	0	0	69	0	0	0	0
6045	18020115	C	0	0	0	0	0	0	0	0	0	49	158	0	0	0	0
6045	18020116	C	0	0	0	0	0	0	0	0	0	1018	721	0	0	0	0
6047	18040003	H	23001	13447	4653	425	2411	0	830	1235	553902	386288	74663	92012	889	0	0
6047	18040004	H	316	237	10	30	40	0	0	0	48037	50852	2608	1107	6254	0	0
6049	18020001	A	494	247	247	0	0	0	0	0	16055	30134	106704	6175	0	0	0
6049	18020002	B	2223	1729	494	0	0	0	0	0	106704	455962	633308	14820	4693	0	0
6049	18020003	B	0	0	0	0	0	0	0	0	494	2717	34333	0	247	0	0
6051	18040009	G	0	0	0	0	0	0	0	0	0	20	20	0	0	148	0
6051	18040010	G	0	0	0	0	0	0	0	0	0	0	0	0	0	79	0
6053	18030004	G	0	0	0	0	0	0	0	0	0	30	20	0	0	0	0
6057	18020125	E	5928	5187	247	0	494	0	0	0	2223	26923	285779	247	8398	0	0
6057	18020126	E	8151	3952	0	2717	988	0	0	494	3705	9139	138073	0	1729	0	0
6061	18020017	E	494	99	40	10	267	0	79	0	6620	3705	3488	0	0	0	0
6061	18020018	F	6284	1996	1304	356	2006	0	99	524	106250	23060	28227	0	958	0	0
6061	18020021	E	1689	869	366	0	89	0	0	366	2677	5523	56859	0	1966	0	0

TABLE C1: 1975 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6061	18020023	F	8230	3992	939	326	1324	0	1047	603	39174	3705	9198	0	504	0	0
6061	18020108	F	0	0	0	0	0	0	0	0	1235	0	1235	0	0	0	0
6061	18020125	E	247	0	0	0	247	0	0	0	0	247	8645	247	741	0	0
6061	18020126	E	2223	2223	0	0	0	0	0	0	8892	2964	30628	0	0	0	0
6061	18020128	E	2470	1482	0	247	494	0	0	247	741	58292	346541	1482	10621	0	0
6063	18020121	E	4199	3211	0	494	494	0	0	0	0	16549	397176	494	988	0	0
6063	18020122	E	2964	2470	247	247	0	0	0	0	16302	41743	597493	2717	2964	0	0
6063	18020123	E	2470	1235	0	0	0	0	0	1235	19760	119548	430027	14820	1235	0	0
6063	18020125	E	0	0	0	0	0	0	0	0	0	0	12350	0	0	0	0
6069	18040002	I	0	0	0	0	0	0	0	0	0	10740	2450	0	0	0	0
6069	18040003	H	138	0	0	69	0	0	69	0	10789	117908	68182	0	227	0	0
6079	18030003	I	0	0	0	0	0	0	0	0	227	879	0	0	0	0	0
6079	18030004	I	10	0	0	0	10	0	0	0	11708	14899	366	0	0	0	0
6079	18030012	I	0	0	0	0	0	0	0	0	0	21509	3280	0	0	0	0
6087	18050003	SFA	0	0	0	0	0	0	0	0	10	0	207	0	0	0	0
6089	18020003	B	2430	1482	494	0	138	0	247	69	30124	68923	834682	1235	5454	0	0
6089	18020004	B	257	0	20	0	237	0	0	0	0	15186	137125	0	1284	0	0
6089	18020005	B	3102	405	99	0	2193	0	109	296	0	52651	180676	0	2263	0	0
6089	18020101	D	24463	12963	3833	1482	4229	0	0	1956	44144	27486	148674	0	4169	0	0
6089	18020102	D	1462	909	59	148	326	0	0	20	9011	21390	32871	0	1186	0	0
6089	18020112	C	751	593	59	20	40	0	0	40	207	32199	136344	0	247	0	0
6089	18020113	C	109	59	0	0	0	0	0	49	346	66255	104115	0	20	0	0
6089	18020118	E	909	909	0	0	0	0	0	0	4693	27051	380627	0	2717	0	0
6089	18020119	E	0	0	0	0	0	0	0	0	0	0	3211	0	247	0	0
6089	18020121	E	0	0	0	0	0	0	0	0	0	0	12844	0	494	0	0
6091	18020123	E	494	494	0	0	0	0	0	0	23218	26182	112138	3458	0	0	0
6091	18020125	E	247	247	0	0	0	0	0	0	0	49894	247247	988	1729	0	0
6093	18020002	B	0	0	0	0	0	0	0	0	0	494	9633	0	988	0	0
6093	18020003	B	0	0	0	0	0	0	0	0	741	36062	254657	0	14326	0	0
6093	18020004	B	751	306	59	346	20	0	0	20	0	9218	259755	494	8477	0	3211

TABLE C1: 1975 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6093	18020005	B	3982	1195	494	316	1047	0	425	504	3231	9060	103681	287	9781	0	2707
6099	18040003	H	25658	17735	3132	504	2964	0	632	692	288397	141333	133291	6145	1393	0	0
6099	18040004	H	0	0	0	0	0	0	0	0	484	3814	30	0	0	0	0
6099	18040005	H	23999	16203	2875	2025	662	0	287	1946	97130	86569	9900	0	2648	0	0
6099	18040006	H	6432	5029	524	267	227	0	10	375	23524	18663	504	771	99	0	0
6099	18040007	H	2025	2025	0	0	0	0	0	0	22764	61394	1867	0	0	0	0
6099	18040008	H	0	0	0	0	0	0	0	0	3922	0	0	0	346	0	0
6099	18050004	SFA	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0
6101	18020010	F	356	79	40	20	0	0	217	0	59912	0	0	0	0	0	0
6101	18020015	F	10	0	0	0	0	0	10	0	30351	1116	919	0	869	0	0
6101	18020017	F	0	0	0	0	0	0	0	0	9455	296	30	0	0	0	0
6101	18020018	F	504	99	69	10	138	0	168	20	70741	109	79	0	119	0	0
6101	18020023	F	109	0	109	0	0	0	0	0	1946	0	0	0	0	0	0
6101	18020104	F	0	0	0	0	0	0	0	0	36309	0	0	0	0	0	0
6101	18020105	F	0	0	0	0	0	0	0	0	10621	10127	0	5681	0	0	0
6101	18020106	F	5434	4199	494	247	494	0	0	0	108433	26676	741	1482	0	0	0
6103	18020101	D	0	0	0	0	0	0	0	0	4159	4871	9011	0	711	0	0
6103	18020102	D	1255	662	59	59	474	0	0	0	8388	34936	101448	0	573	0	0
6103	18020103	D	10058	3695	968	692	3794	0	138	771	177949	213507	143072	40	5987	0	0
6103	18020113	C	178	0	178	0	0	0	0	0	445	87873	128331	0	0	0	0
6103	18020114	C	0	0	0	0	0	0	0	0	3349	53293	153654	0	0	0	0
6103	18020115	C	494	0	0	0	0	0	0	494	929	27605	17932	0	0	0	0
6103	18020118	E	494	494	0	0	0	0	0	0	474	48926	98701	0	0	0	0
6103	18020119	E	494	494	0	0	0	0	0	0	247	17211	503870	0	0	0	0
6103	18020120	E	0	0	0	0	0	0	0	0	0	988	4446	0	0	0	0
6105	18020005	B	0	0	0	0	0	0	0	0	0	0	109	0	0	0	0
6105	18020112	C	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0
6105	18020113	C	0	0	0	0	0	0	0	0	0	79	267	0	0	0	0
6107	18030001	I	158	69	0	89	0	0	0	0	40	71027	466731	850	2895	76323	0
6107	18030002	I	0	0	0	0	0	0	0	0	49	38996	325852	1986	1344	247	0

TABLE C1: 1975 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6107	18030004	I	0	0	0	0	0	0	0	0	267	0	11125	0	0	0	0
6107	18030005	I	0	0	0	0	0	0	0	0	1275	25273	118896	0	0	0	0
6107	18030006	I	1729	1235	0	0	247	0	0	247	3211	41644	209229	0	0	0	0
6107	18030007	I	247	0	0	0	0	0	247	0	988	79040	371488	0	741	2717	0
6107	18030010	I	0	0	0	0	0	0	0	0	0	1729	59280	0	0	42237	0
6107	18030012	I	36931	20797	8665	1265	3270	0	1423	1512	822717	130653	21756	1788	2164	0	0
6109	18040004	G	10	10	0	0	0	0	0	0	0	109	267	0	0	0	0
6109	18040005	G	15126	12824	395	731	99	0	494	583	1897	60584	313354	49	1759	0	0
6109	18040006	G	1986	1275	99	287	59	0	148	119	3833	28346	234729	30	1709	0	0
6109	18040009	G	701	247	0	0	0	0	0	454	0	67955	496272	0	0	69358	0
6109	18040010	G	20	0	0	0	0	0	0	20	0	17122	125763	0	0	22852	0
6111	18030003	I	0	0	0	0	0	0	0	0	148	3290	12182	0	0	0	0
6115	18020015	F	0	0	0	0	0	0	0	0	217	356	356	0	0	0	0
6115	18020017	F	0	0	0	0	0	0	0	0	7123	267	198	0	0	0	0
6115	18020106	F	8151	2470	4199	0	741	0	0	741	79287	33345	3952	0	247	0	0
6115	18020107	F	247	0	247	0	0	0	0	0	11609	2964	4940	0	6669	0	0
6115	18020124	E	247	247	0	0	0	0	0	0	3952	1729	21242	0	0	0	0
6115	18020125	E	2223	1976	0	0	0	0	0	247	1482	7904	17784	247	988	0	0
6115	18020126	F	247	247	0	0	0	0	0	0	19019	12103	11856	0	0	0	0
*** Total ***			548014	284603	75473	74377	64941	119	15472	33029	7856171	7329478	17490050	247158	228277	381961	5918

TABLE C2: 1985 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6003	18020022	E	820	0	0	0	0	0	0	820	0	911	6901	0	852	1275	0
6003	18020129	E	0	0	0	0	0	0	0	0	0	336	583	0	138	287	0
6003	18040006	G	74	30	0	0	30	0	0	15	0	1438	5101	0	217	0	0
6003	18040009	E	30	0	30	0	0	0	0	0	0	3663	20662	0	2065	1294	0
6003	18040010	G	0	0	0	0	0	0	0	0	0	10690	56593	0	0	3468	0
6003	18040012	E	0	0	0	0	0	0	0	0	0	6471	42553	0	0	5800	0
6005	18020022	E	1005	0	0	0	0	0	0	1005	0	390	8055	49	333	326	0
6005	18040009	E	5296	2100	958	882	245	15	655	442	22914	102685	162859	158	5212	534	0
6005	18040010	E	351	259	91	0	0	0	0	0	9468	28943	28225	0	198	0	0
6007	18020103	D	10070	6378	2013	0	1344	0	0	336	44033	21143	13827	0	956	0	0
6007	18020104	F	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6007	18020105	F	5370	3357	1008	0	336	0	336	336	186455	47903	24811	13338	492	0	0
6007	18020106	F	11414	8057	672	336	1008	0	0	1344	55185	22314	19434	1976	5518	0	0
6007	18020119	E	336	336	0	0	0	0	0	0	0	247	44371	0	0	0	0
6007	18020120	E	12419	10070	672	0	0	0	0	1680	0	7706	120198	0	1205	0	0
6007	18020121	E	1344	1008	0	0	0	0	336	0	0	19234	186658	247	247	0	0
6007	18020123	E	672	336	0	0	0	0	0	336	0	12086	115188	0	494	0	0
6007	18020124	E	1008	1008	0	0	0	0	0	0	1964	3433	33115	0	0	0	0
6009	18040006	G	2579	1759	393	101	35	0	86	205	8682	19590	84916	0	4562	0	0
6009	18040007	G	393	291	17	52	0	0	35	0	9702	31441	37880	0	128	0	0
6009	18040008	G	2818	1042	768	324	52	0	393	240	42155	69763	157193	0	9897	0	0
6009	18040009	E	855	410	119	52	35	0	188	52	6024	12098	153204	79	610	0	0
6011	18020010	F	22	0	12	0	12	0	0	0	30705	0	0	0	0	0	0
6011	18020104	F	9221	2188	534	329	5977	0	79	114	288642	73725	104935	2411	0	0	0
6011	18020105	F	0	0	0	0	0	0	0	0	36714	247	0	2470	0	0	0
6011	18020110	SFC	0	0	0	0	0	0	0	0	0	0	79	0	0	0	0
6011	18020115	C	126	126	0	0	0	0	0	0	3478	48375	55992	316	0	0	0
6011	18020116	C	0	0	0	0	0	0	0	0	1798	34402	30964	0	0	0	0
6017	18020021	E	400	69	314	0	17	0	0	0	3453	17364	102137	0	3038	909	0
6017	18020022	E	14249	6044	1917	1237	2090	0	1376	1586	16564	64800	402887	138	13936	1709	0

TABLE C2: 1985 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6017	18020023	E	0	0	0	0	0	0	0	0	603	573	79	0	59	0	0
6017	18020128	E	0	0	0	0	0	0	0	0	0	1729	13091	0	741	0	0
6017	18040009	E	0	0	0	0	0	0	0	0	20	0	1423	0	0	0	0
6017	18040010	E	6289	2544	889	435	1289	0	487	645	25337	51176	245436	30	4303	0	0
6019	18030004	I	20014	956	516	17421	931	0	89	101	116927	155921	117693	0	1163	0	0
6019	18030007	I	0	0	0	0	0	0	0	0	0	5187	21736	0	0	0	0
6019	18030008	I	314	0	0	0	0	0	314	0	1235	16290	66142	0	0	0	0
6019	18030009	I	0	0	0	0	0	0	0	0	7163	26182	45695	0	0	0	0
6019	18030010	I	944	944	0	0	0	0	0	0	0	112353	584728	0	4938	68666	0
6019	18030012	I	74893	39021	20140	6294	4406	0	2203	2833	580608	20694	12753	247	3129	0	0
6019	18040001	H	1573	944	314	314	0	0	0	0	13195	6558	0	830	351	0	0
6019	18040002	I	19108	1623	642	12876	2769	0	743	452	530544	133106	19918	18574	1013	0	0
6019	18040003	H	2554	415	163	151	1321	0	277	227	222772	93322	10	59	405	0	0
6019	18040006	G	2517	2203	0	314	0	0	0	0	0	31090	497937	0	0	51623	0
6021	18020103	D	1057	178	25	190	499	0	35	131	29684	7180	1339	0	1329	0	0
6021	18020104	F	7482	2435	701	143	3870	0	178	156	247731	107507	37317	1393	1161	0	0
6021	18020105	F	0	0	0	0	0	0	0	0	41783	247	0	0	0	0	0
6021	18020115	G	583	203	47	190	0	0	0	143	9107	114818	180777	89	741	0	0
6027	18030002	I	0	0	0	0	0	0	0	0	0	0	336	0	0	0	0
6029	18030001	I	1470	1299	12	0	27	0	0	131	343	32965	31539	0	442	0	0
6029	18030002	I	971	944	12	0	0	0	0	12	10325	139076	96199	583	4777	0	0
6029	18030003	I	10549	3819	657	2912	2492	0	222	447	37396	371676	464007	267	8835	0	0
6029	18030004	I	222	0	0	0	170	0	52	0	23401	132266	113914	0	40	0	0
6029	18030005	I	0	0	0	0	0	0	0	0	128	26014	47266	0	0	0	0
6029	18030012	I	89836	31003	7729	30099	12372	91	1862	6679	1030793	816478	11841	2500	7163	0	0
6031	18030004	I	3589	506	230	2018	615	0	217	0	44309	113015	3858	0	679	0	0
6031	18030012	I	18125	7287	5740	1922	1062	0	906	1208	602925	74735	0	6274	926	0	0
6033	18020115	C	0	0	0	0	0	0	0	0	0	879	7993	0	0	0	0
6033	18020116	C	23628	18765	1665	531	1134	0	311	1225	42501	171670	240316	138	768	0	0
6033	18020117	C	2596	897	1554	0	54	0	54	37	10767	35798	79191	0	2203	0	0

TABLE C2: 1985 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6035	18020002	B	324	324	0	0	0	0	0	0	31117	130638	248435	10868	0	0	0
6035	18020003	B	0	0	0	0	0	0	0	0	11362	48412	353210	494	2717	0	0
6035	18020121	E	971	647	324	0	0	0	0	0	0	7884	81547	0	0	0	0
6037	18030003	I	111	0	0	0	111	0	0	0	198	1949	1210	0	0	0	0
6039	18040001	H	4179	2695	479	417	435	0	109	47	132743	60821	736	1265	165	0	0
6039	18040003	H	7788	4305	1363	200	758	62	541	558	246261	61478	442	22714	1536	0	0
6039	18040006	G	773	773	0	0	0	0	0	0	0	7652	411475	0	0	19019	0
6039	18040007	G	6192	5419	773	0	0	0	0	0	1223	22025	215831	0	0	0	0
6039	18040008	G	0	0	0	0	0	0	0	0	0	4446	80769	0	0	12350	0
6043	18040003	G	1435	1040	0	79	94	0	190	32	49	110498	81688	0	277	0	0
6043	18040004	G	3152	2569	0	15	0	0	94	472	383	50763	137799	0	353	0	0
6043	18040005	G	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6043	18040007	G	2759	2759	0	0	0	0	0	0	245	7111	133392	0	0	0	0
6043	18040008	G	1971	1576	395	0	0	0	0	0	0	18737	382643	0	0	741	0
6045	18020114	C	0	0	0	0	0	0	0	0	0	0	69	0	0	0	0
6045	18020115	C	0	0	0	0	0	0	0	0	0	49	158	0	0	0	0
6045	18020116	C	0	0	0	0	0	0	0	0	0	1018	721	0	0	0	0
6047	18040003	H	31050	18152	6281	573	3255	0	1121	1667	549516	383230	74068	92012	882	0	0
6047	18040004	H	427	321	12	40	54	0	0	0	47987	50800	2606	1107	6247	0	0
6049	18020001	A	593	296	296	0	0	0	0	0	16045	30114	106635	6175	0	0	0
6049	18020002	B	2673	2077	593	0	0	0	0	0	106664	455792	633071	14820	4691	0	0
6049	18020003	B	0	0	0	0	0	0	0	0	494	2717	34333	0	247	0	0
6051	18040009	G	0	0	0	0	0	0	0	0	0	20	20	0	0	148	0
6051	18040010	G	0	0	0	0	0	0	0	0	0	0	0	0	0	79	0
6053	18030004	G	0	0	0	0	0	0	0	0	0	30	20	0	0	0	0
6057	18020125	E	11873	10389	494	0	990	0	0	0	2181	26429	280523	247	8242	0	0
6057	18020126	E	16327	7916	0	5441	1978	0	0	990	3510	8647	130675	0	1640	0	0
6061	18020017	E	748	151	59	15	405	0	121	0	6499	3636	3423	0	0	0	0
6061	18020018	F	9527	3026	1976	538	3041	0	151	793	104076	22591	27649	0	939	0	0
6061	18020021	E	2561	1319	553	0	136	0	0	553	2643	5451	56121	0	1941	0	0

TABLE C2: 1985 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6061	18020023	F	12476	6052	1423	494	2008	0	1588	914	36010	3409	8455	0	462	0	0
6061	18020108	F	0	0	0	0	0	0	0	0	1235	0	1235	0	0	0	0
6061	18020125	E	375	0	0	0	375	0	0	0	0	245	8531	247	731	0	0
6061	18020126	E	3369	3369	0	0	0	0	0	0	8652	2882	29801	0	0	0	0
6061	18020128	E	3745	2248	0	375	748	0	0	375	739	58114	345479	1482	10589	0	0
6063	18020121	E	5718	4374	0	672	672	0	0	0	0	16487	395719	494	986	0	0
6063	18020122	E	4036	3364	336	336	0	0	0	0	16275	41676	596520	2717	2959	0	0
6063	18020123	E	3364	1682	0	0	0	0	0	1682	19728	119360	429353	14820	1233	0	0
6063	18020125	E	0	0	0	0	0	0	0	0	0	0	12350	0	0	0	0
6069	18040002	I	0	0	0	0	0	0	0	0	0	10740	2450	0	0	0	0
6069	18040003	H	198	0	0	99	0	0	99	0	10786	117873	68162	0	227	0	0
6079	18030003	I	0	0	0	0	0	0	0	0	227	879	0	0	0	0	0
6079	18030004	I	15	0	0	0	15	0	0	0	11705	14897	366	0	0	0	0
6079	18030012	I	0	0	0	0	0	0	0	0	0	21509	3280	0	0	0	0
6087	18050003	SFA	0	0	0	0	0	0	0	0	10	0	207	0	0	0	0
6089	18020003	B	3463	2112	704	0	198	0	353	99	30092	68846	833763	1235	5446	0	0
6089	18020004	B	366	0	27	0	338	0	0	0	0	15176	137028	0	1284	0	0
6089	18020005	B	4421	578	141	0	3125	0	156	422	0	52357	179665	0	2250	0	0
6089	18020101	D	34859	18471	5464	2112	6027	0	0	2789	42096	26217	141793	0	3972	0	0
6089	18020102	D	2085	1294	84	212	464	0	0	27	8924	21183	32555	0	1173	0	0
6089	18020112	C	1070	845	84	27	57	0	0	57	207	32137	136087	0	247	0	0
6089	18020113	C	156	84	0	0	0	0	0	72	346	66238	104088	0	20	0	0
6089	18020118	E	1294	1294	0	0	0	0	0	0	4688	27027	380274	0	2715	0	0
6089	18020119	E	0	0	0	0	0	0	0	0	0	0	3211	0	247	0	0
6089	18020121	E	0	0	0	0	0	0	0	0	0	0	12844	0	494	0	0
6091	18020123	E	618	618	0	0	0	0	0	0	23201	26162	112054	3458	0	0	0
6091	18020125	E	309	309	0	0	0	0	0	0	0	49884	247195	988	1729	0	0
6093	18020002	B	0	0	0	0	0	0	0	0	0	494	9633	0	988	0	0
6093	18020003	B	0	0	0	0	0	0	0	0	741	36062	254657	0	14326	0	0
6093	18020004	B	909	371	72	417	25	0	0	25	0	9213	259609	494	8472	0	3211

TABLE C2: 1985 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6093	18020005	B	4814	1445	598	383	1267	0	514	610	3209	9001	102994	287	9717	0	2707
6099	18040003	H	34844	24083	4253	684	4026	0	860	939	283704	139036	131122	6145	1376	0	0
6099	18040004	H	0	0	0	0	0	0	0	0	484	3814	30	0	0	0	0
6099	18040005	H	32589	22003	3905	2752	899	0	390	2643	92877	82780	9470	0	2537	0	0
6099	18040006	H	8734	6830	711	363	309	0	12	509	22257	17660	477	771	94	0	0
6099	18040007	H	2752	2752	0	0	0	0	0	0	22571	60876	1853	0	0	0	0
6099	18040008	H	0	0	0	0	0	0	0	0	3922	0	0	0	346	0	0
6099	18050004	SFA	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0
6101	18020010	F	450	99	49	25	0	0	274	0	59818	0	0	0	0	0	0
6101	18020015	F	12	0	0	0	0	0	12	0	30349	1116	919	0	869	0	0
6101	18020017	F	0	0	0	0	0	0	0	0	9455	296	30	0	0	0	0
6101	18020018	F	635	124	86	12	175	0	212	25	70610	109	79	0	119	0	0
6101	18020023	F	136	0	136	0	0	0	0	0	1919	0	0	0	0	0	0
6101	18020104	F	0	0	0	0	0	0	0	0	36309	0	0	0	0	0	0
6101	18020105	F	0	0	0	0	0	0	0	0	10621	10127	0	5681	0	0	0
6101	18020106	F	6852	5296	622	311	622	0	0	0	107302	26397	734	1482	0	0	0
6103	18020101	D	0	0	0	0	0	0	0	0	4159	4871	9011	0	711	0	0
6103	18020102	D	1699	897	82	82	642	0	0	0	8363	34829	101137	0	571	0	0
6103	18020103	D	13629	5007	1312	936	5140	0	188	1045	176773	212096	142126	40	5948	0	0
6103	18020113	C	242	0	242	0	0	0	0	0	445	87848	128294	0	0	0	0
6103	18020114	C	0	0	0	0	0	0	0	0	3349	53293	153654	0	0	0	0
6103	18020115	C	669	0	0	0	0	0	0	669	926	27501	17866	0	0	0	0
6103	18020118	E	669	669	0	0	0	0	0	0	474	48869	98585	0	0	0	0
6103	18020119	E	669	669	0	0	0	0	0	0	247	17206	503700	0	0	0	0
6103	18020120	E	0	0	0	0	0	0	0	0	0	988	4446	0	0	0	0
6105	18020005	B	0	0	0	0	0	0	0	0	0	0	109	0	0	0	0
6105	18020112	C	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0
6105	18020113	C	0	0	0	0	0	0	0	0	0	79	267	0	0	0	0
6107	18030001	I	205	89	0	116	0	0	0	0	40	71022	466692	850	2895	76323	0
6107	18030002	I	0	0	0	0	0	0	0	0	49	38996	325852	1986	1344	247	0

TABLE C2: 1985 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6107	18030004	I	0	0	0	0	0	0	0	0	267	0	11125	0	0	0	0
6107	18030005	I	0	0	0	0	0	0	0	0	1275	25273	118896	0	0	0	0
6107	18030006	I	2240	1601	0	0	321	0	0	321	3204	41560	208806	0	0	0	0
6107	18030007	I	321	0	0	0	0	0	321	0	988	79028	371429	0	741	2717	0
6107	18030010	I	0	0	0	0	0	0	0	0	0	1729	59280	0	0	42237	0
6107	18030012	I	47864	26953	11229	1640	4239	0	1843	1959	813512	129188	21516	1788	2141	0	0
6109	18040004	G	15	15	0	0	0	0	0	0	0	106	262	0	0	0	0
6109	18040005	G	23203	19674	605	1121	151	0	758	894	1857	59292	306650	49	1719	0	0
6109	18040006	G	3046	1956	151	440	91	0	227	183	3819	28232	233803	30	1702	0	0
6109	18040009	G	1077	378	0	0	0	0	0	697	0	67910	495944	0	0	69358	0
6109	18040010	G	30	0	0	0	0	0	0	30	0	17120	125753	0	0	22852	0
6111	18030003	I	0	0	0	0	0	0	0	0	148	3290	12182	0	0	0	0
6115	18020015	F	0	0	0	0	0	0	0	0	217	356	356	0	0	0	0
6115	18020017	F	0	0	0	0	0	0	0	0	7123	267	198	0	0	0	0
6115	18020106	F	9682	2934	4989	0	879	0	0	879	78247	32908	3900	0	245	0	0
6115	18020107	F	294	0	294	0	0	0	0	0	11589	2959	4930	0	6657	0	0
6115	18020124	E	294	294	0	0	0	0	0	0	3945	1727	21205	0	0	0	0
6115	18020125	E	2640	2346	0	0	0	0	0	294	1460	7785	17520	247	973	0	0
6115	18020126	F	294	294	0	0	0	0	0	0	18999	12091	11844	0	0	0	0
*** Total ***			758063	400073	101752	100050	88265	168	21568	46206	7773273	7281550	17412766	247158	226395	381961	5918

TABLE C3: 1995 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6003	18020022	E	820	0	0	0	0	0	0	820	0	911	6901	0	852	1275	0
6003	18020129	E	0	0	0	0	0	0	0	0	0	336	583	0	138	287	0
6003	18040006	G	74	30	0	0	30	0	0	15	0	1438	5101	0	217	0	0
6003	18040009	E	30	0	30	0	0	0	0	0	0	3663	20662	0	2065	1294	0
6003	18040010	G	0	0	0	0	0	0	0	0	0	10690	56593	0	0	3468	0
6003	18040012	E	0	0	0	0	0	0	0	0	0	6471	42553	0	0	5800	0
6005	18020022	E	1005	0	0	0	0	0	0	1005	0	390	8055	49	333	326	0
6005	18040009	E	5296	2100	958	882	245	15	655	442	22914	102685	162859	158	5212	534	0
6005	18040010	E	351	259	91	0	0	0	0	0	9468	28943	28225	0	198	0	0
6007	18020103	D	10070	6378	2013	0	1344	0	0	336	44033	21143	13827	0	956	0	0
6007	18020104	F	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6007	18020105	F	5370	3357	1008	0	336	0	336	336	186455	47903	24811	13338	492	0	0
6007	18020106	F	11414	8057	672	336	1008	0	0	1344	55185	22314	19434	1976	5518	0	0
6007	18020119	E	336	336	0	0	0	0	0	0	0	247	44371	0	0	0	0
6007	18020120	E	12419	10070	672	0	0	0	0	1680	0	7706	120198	0	1205	0	0
6007	18020121	E	1344	1008	0	0	0	0	336	0	0	19234	186658	247	247	0	0
6007	18020123	E	672	336	0	0	0	0	0	336	0	12086	115188	0	494	0	0
6007	18020124	E	1008	1008	0	0	0	0	0	0	1964	3433	33115	0	0	0	0
6009	18040006	G	2579	1759	393	101	35	0	86	205	8682	19590	84916	0	4562	0	0
6009	18040007	G	393	291	17	52	0	0	35	0	9702	31441	37880	0	128	0	0
6009	18040008	G	2818	1042	768	324	52	0	393	240	42155	69763	157193	0	9897	0	0
6009	18040009	E	855	410	119	52	35	0	188	52	6024	12098	153204	79	610	0	0
6011	18020010	F	22	0	12	0	12	0	0	0	30705	0	0	0	0	0	0
6011	18020104	F	9221	2188	534	329	5977	0	79	114	288642	73725	104935	2411	0	0	0
6011	18020105	F	0	0	0	0	0	0	0	0	36714	247	0	2470	0	0	0
6011	18020110	SFC	0	0	0	0	0	0	0	0	0	0	79	0	0	0	0
6011	18020115	C	126	126	0	0	0	0	0	0	3478	48375	55992	316	0	0	0
6011	18020116	C	0	0	0	0	0	0	0	0	1798	34402	30964	0	0	0	0
6017	18020021	E	400	69	314	0	17	0	0	0	3453	17364	102137	0	3038	909	0
6017	18020022	E	14249	6044	1917	1237	2090	0	1376	1586	16564	64800	402887	138	13936	1709	0

TABLE C3: 1995 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6017	18020023	E	0	0	0	0	0	0	0	0	603	573	79	0	59	0	0
6017	18020128	E	0	0	0	0	0	0	0	0	0	1729	13091	0	741	0	0
6017	18040009	E	0	0	0	0	0	0	0	0	20	0	1423	0	0	0	0
6017	18040010	E	6289	2544	889	435	1289	0	487	645	25337	51176	245436	30	4303	0	0
6019	18030004	I	20014	956	516	17421	931	0	89	101	116927	155921	117693	0	1163	0	0
6019	18030007	I	0	0	0	0	0	0	0	0	0	5187	21736	0	0	0	0
6019	18030008	I	314	0	0	0	0	0	314	0	1235	16290	66142	0	0	0	0
6019	18030009	I	0	0	0	0	0	0	0	0	7163	26182	45695	0	0	0	0
6019	18030010	I	944	944	0	0	0	0	0	0	0	112353	584728	0	4938	68666	0
6019	18030012	I	74893	39021	20140	6294	4406	0	2203	2833	580608	20694	12753	247	3129	0	0
6019	18040001	H	1573	944	314	314	0	0	0	0	13195	6558	0	830	351	0	0
6019	18040002	I	19108	1623	642	12876	2769	0	743	452	530544	133106	19918	18574	1013	0	0
6019	18040003	H	2554	415	163	151	1321	0	277	227	222772	93322	10	59	405	0	0
6019	18040006	G	2517	2203	0	314	0	0	0	0	0	31090	497937	0	0	51623	0
6021	18020103	D	1057	178	25	190	499	0	35	131	29684	7180	1339	0	1329	0	0
6021	18020104	F	7482	2435	701	143	3870	0	178	156	247731	107507	37317	1393	1161	0	0
6021	18020105	F	0	0	0	0	0	0	0	0	41783	247	0	0	0	0	0
6021	18020115	G	583	203	47	190	0	0	0	143	9107	114818	180777	89	741	0	0
6027	18030002	I	0	0	0	0	0	0	0	0	0	0	336	0	0	0	0
6029	18030001	I	1470	1299	12	0	27	0	0	131	343	32965	31539	0	442	0	0
6029	18030002	I	971	944	12	0	0	0	0	12	10325	139076	96199	583	4777	0	0
6029	18030003	I	10549	3819	657	2912	2492	0	222	447	37396	371676	464007	267	8835	0	0
6029	18030004	I	222	0	0	0	170	0	52	0	23401	132266	113914	0	40	0	0
6029	18030005	I	0	0	0	0	0	0	0	0	128	26014	47266	0	0	0	0
6029	18030012	I	89836	31003	7729	30099	12372	91	1862	6679	1030793	816478	11841	2500	7163	0	0
6031	18030004	I	3589	506	230	2018	615	0	217	0	44309	113015	3858	0	679	0	0
6031	18030012	I	18125	7287	5740	1922	1062	0	906	1208	602925	74735	0	6274	926	0	0
6033	18020115	C	0	0	0	0	0	0	0	0	0	879	7993	0	0	0	0
6033	18020116	C	23628	18765	1665	531	1134	0	311	1225	42501	171670	240316	138	768	0	0
6033	18020117	C	2596	897	1554	0	54	0	54	37	10767	35798	79191	0	2203	0	0

TABLE C3: 1995 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6035	18020002	B	324	324	0	0	0	0	0	0	31117	130638	248435	10868	0	0	0
6035	18020003	B	0	0	0	0	0	0	0	0	11362	48412	353210	494	2717	0	0
6035	18020121	E	971	647	324	0	0	0	0	0	0	7884	81547	0	0	0	0
6037	18030003	I	111	0	0	0	111	0	0	0	198	1949	1210	0	0	0	0
6039	18040001	H	4179	2695	479	417	435	0	109	47	132743	60821	736	1265	165	0	0
6039	18040003	H	7788	4305	1363	200	758	62	541	558	246261	61478	442	22714	1536	0	0
6039	18040006	G	773	773	0	0	0	0	0	0	0	7652	411475	0	0	19019	0
6039	18040007	G	6192	5419	773	0	0	0	0	0	1223	22025	215831	0	0	0	0
6039	18040008	G	0	0	0	0	0	0	0	0	0	4446	80769	0	0	12350	0
6043	18040003	G	1435	1040	0	79	94	0	190	32	49	110498	81688	0	277	0	0
6043	18040004	G	3152	2569	0	15	0	0	94	472	383	50763	137799	0	353	0	0
6043	18040005	G	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6043	18040007	G	2759	2759	0	0	0	0	0	0	245	7111	133392	0	0	0	0
6043	18040008	G	1971	1576	395	0	0	0	0	0	0	18737	382643	0	0	741	0
6045	18020114	C	0	0	0	0	0	0	0	0	0	0	69	0	0	0	0
6045	18020115	C	0	0	0	0	0	0	0	0	0	49	158	0	0	0	0
6045	18020116	C	0	0	0	0	0	0	0	0	0	1018	721	0	0	0	0
6047	18040003	H	31050	18152	6281	573	3255	0	1121	1667	549516	383230	74068	92012	882	0	0
6047	18040004	H	427	321	12	40	54	0	0	0	47987	50800	2606	1107	6247	0	0
6049	18020001	A	593	296	296	0	0	0	0	0	16045	30114	106635	6175	0	0	0
6049	18020002	B	2673	2077	593	0	0	0	0	0	106664	455792	633071	14820	4691	0	0
6049	18020003	B	0	0	0	0	0	0	0	0	494	2717	34333	0	247	0	0
6051	18040009	G	0	0	0	0	0	0	0	0	0	20	20	0	0	148	0
6051	18040010	G	0	0	0	0	0	0	0	0	0	0	0	0	0	79	0
6053	18030004	G	0	0	0	0	0	0	0	0	0	30	20	0	0	0	0
6057	18020125	E	11873	10389	494	0	990	0	0	0	2181	26429	280523	247	8242	0	0
6057	18020126	E	16327	7916	0	5441	1978	0	0	990	3510	8647	130675	0	1640	0	0
6061	18020017	E	748	151	59	15	405	0	121	0	6499	3636	3423	0	0	0	0
6061	18020018	F	9527	3026	1976	538	3041	0	151	793	104076	22591	27649	0	939	0	0
6061	18020021	E	2561	1319	553	0	136	0	0	553	2643	5451	56121	0	1941	0	0

TABLE C3: 1995 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6061	18020023	F	12476	6052	1423	494	2008	0	1588	914	36010	3409	8455	0	462	0	0
6061	18020108	F	0	0	0	0	0	0	0	0	1235	0	1235	0	0	0	0
6061	18020125	E	375	0	0	0	375	0	0	0	0	245	8531	247	731	0	0
6061	18020126	E	3369	3369	0	0	0	0	0	0	8652	2882	29801	0	0	0	0
6061	18020128	E	3745	2248	0	375	748	0	0	375	739	58114	345479	1482	10589	0	0
6063	18020121	E	5718	4374	0	672	672	0	0	0	0	16487	395719	494	986	0	0
6063	18020122	E	4036	3364	336	336	0	0	0	0	16275	41676	596520	2717	2959	0	0
6063	18020123	E	3364	1682	0	0	0	0	0	1682	19728	119360	429353	14820	1233	0	0
6063	18020125	E	0	0	0	0	0	0	0	0	0	0	12350	0	0	0	0
6069	18040002	I	0	0	0	0	0	0	0	0	0	10740	2450	0	0	0	0
6069	18040003	H	198	0	0	99	0	0	99	0	10786	117873	68162	0	227	0	0
6079	18030003	I	0	0	0	0	0	0	0	0	227	879	0	0	0	0	0
6079	18030004	I	15	0	0	0	15	0	0	0	11705	14897	366	0	0	0	0
6079	18030012	I	0	0	0	0	0	0	0	0	0	21509	3280	0	0	0	0
6087	18050003	SFA	0	0	0	0	0	0	0	0	10	0	207	0	0	0	0
6089	18020003	B	3463	2112	704	0	198	0	353	99	30092	68846	833763	1235	5446	0	0
6089	18020004	B	366	0	27	0	338	0	0	0	0	15176	137028	0	1284	0	0
6089	18020005	B	4421	578	141	0	3125	0	156	422	0	52357	179665	0	2250	0	0
6089	18020101	D	34859	18471	5464	2112	6027	0	0	2789	42096	26217	141793	0	3972	0	0
6089	18020102	D	2085	1294	84	212	464	0	0	27	8924	21183	32555	0	1173	0	0
6089	18020112	C	1070	845	84	27	57	0	0	57	207	32137	136087	0	247	0	0
6089	18020113	C	156	84	0	0	0	0	0	72	346	66238	104088	0	20	0	0
6089	18020118	E	1294	1294	0	0	0	0	0	0	4688	27027	380274	0	2715	0	0
6089	18020119	E	0	0	0	0	0	0	0	0	0	0	3211	0	247	0	0
6089	18020121	E	0	0	0	0	0	0	0	0	0	0	12844	0	494	0	0
6091	18020123	E	618	618	0	0	0	0	0	0	23201	26162	112054	3458	0	0	0
6091	18020125	E	309	309	0	0	0	0	0	0	0	49884	247195	988	1729	0	0
6093	18020002	B	0	0	0	0	0	0	0	0	0	494	9633	0	988	0	0
6093	18020003	B	0	0	0	0	0	0	0	0	741	36062	254657	0	14326	0	0
6093	18020004	B	909	371	72	417	25	0	0	25	0	9213	259609	494	8472	0	3211

TABLE C3: 1995 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6093	18020005	B	4814	1445	598	383	1267	0	514	610	3209	9001	102994	287	9717	0	2707
6099	18040003	H	34844	24083	4253	684	4026	0	860	939	283704	139036	131122	6145	1376	0	0
6099	18040004	H	0	0	0	0	0	0	0	0	484	3814	30	0	0	0	0
6099	18040005	H	32589	22003	3905	2752	899	0	390	2643	92877	82780	9470	0	2537	0	0
6099	18040006	H	8734	6830	711	363	309	0	12	509	22257	17660	477	771	94	0	0
6099	18040007	H	2752	2752	0	0	0	0	0	0	22571	60876	1853	0	0	0	0
6099	18040008	H	0	0	0	0	0	0	0	0	3922	0	0	0	346	0	0
6099	18050004	SFA	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0
6101	18020010	F	450	99	49	25	0	0	274	0	59818	0	0	0	0	0	0
6101	18020015	F	12	0	0	0	0	0	12	0	30349	1116	919	0	869	0	0
6101	18020017	F	0	0	0	0	0	0	0	0	9455	296	30	0	0	0	0
6101	18020018	F	635	124	86	12	175	0	212	25	70610	109	79	0	119	0	0
6101	18020023	F	136	0	136	0	0	0	0	0	1919	0	0	0	0	0	0
6101	18020104	F	0	0	0	0	0	0	0	0	36309	0	0	0	0	0	0
6101	18020105	F	0	0	0	0	0	0	0	0	10621	10127	0	5681	0	0	0
6101	18020106	F	6852	5296	622	311	622	0	0	0	107302	26397	734	1482	0	0	0
6103	18020101	D	0	0	0	0	0	0	0	0	4159	4871	9011	0	711	0	0
6103	18020102	D	1699	897	82	82	642	0	0	0	8363	34829	101137	0	571	0	0
6103	18020103	D	13629	5007	1312	936	5140	0	188	1045	176773	212096	142126	40	5948	0	0
6103	18020113	C	242	0	242	0	0	0	0	0	445	87848	128294	0	0	0	0
6103	18020114	C	0	0	0	0	0	0	0	0	3349	53293	153654	0	0	0	0
6103	18020115	C	669	0	0	0	0	0	0	669	926	27501	17866	0	0	0	0
6103	18020118	E	669	669	0	0	0	0	0	0	474	48869	98585	0	0	0	0
6103	18020119	E	669	669	0	0	0	0	0	0	247	17206	503700	0	0	0	0
6103	18020120	E	0	0	0	0	0	0	0	0	0	988	4446	0	0	0	0
6105	18020005	B	0	0	0	0	0	0	0	0	0	0	109	0	0	0	0
6105	18020112	C	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0
6105	18020113	C	0	0	0	0	0	0	0	0	0	79	267	0	0	0	0
6107	18030001	I	205	89	0	116	0	0	0	0	40	71022	466692	850	2895	76323	0
6107	18030002	I	0	0	0	0	0	0	0	0	49	38996	325852	1986	1344	247	0

TABLE C3: 1995 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6107	18030004	I	0	0	0	0	0	0	0	0	267	0	11125	0	0	0	0
6107	18030005	I	0	0	0	0	0	0	0	0	1275	25273	118896	0	0	0	0
6107	18030006	I	2240	1601	0	0	321	0	0	321	3204	41560	208806	0	0	0	0
6107	18030007	I	321	0	0	0	0	0	321	0	988	79028	371429	0	741	2717	0
6107	18030010	I	0	0	0	0	0	0	0	0	0	1729	59280	0	0	42237	0
6107	18030012	I	47864	26953	11229	1640	4239	0	1843	1959	813512	129188	21516	1788	2141	0	0
6109	18040004	G	15	15	0	0	0	0	0	0	0	106	262	0	0	0	0
6109	18040005	G	23203	19674	605	1121	151	0	758	894	1857	59292	306650	49	1719	0	0
6109	18040006	G	3046	1956	151	440	91	0	227	183	3819	28232	233803	30	1702	0	0
6109	18040009	G	1077	378	0	0	0	0	0	697	0	67910	495944	0	0	69358	0
6109	18040010	G	30	0	0	0	0	0	0	30	0	17120	125753	0	0	22852	0
6111	18030003	I	0	0	0	0	0	0	0	0	148	3290	12182	0	0	0	0
6115	18020015	F	0	0	0	0	0	0	0	0	217	356	356	0	0	0	0
6115	18020017	F	0	0	0	0	0	0	0	0	7123	267	198	0	0	0	0
6115	18020106	F	9682	2934	4989	0	879	0	0	879	78247	32908	3900	0	245	0	0
6115	18020107	F	294	0	294	0	0	0	0	0	11589	2959	4930	0	6657	0	0
6115	18020124	E	294	294	0	0	0	0	0	0	3945	1727	21205	0	0	0	0
6115	18020125	E	2640	2346	0	0	0	0	0	294	1460	7785	17520	247	973	0	0
6115	18020126	F	294	294	0	0	0	0	0	0	18999	12091	11844	0	0	0	0
*** Total ***			758063	400073	101752	100050	88265	168	21568	46206	7773273	7281550	17412766	247158	226395	381961	5918

TABLE C4: 2005 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6003	18020022	E	820	0	0	0	0	0	0	820	0	911	6901	0	852	1275	0
6003	18020129	E	0	0	0	0	0	0	0	0	0	336	583	0	138	287	0
6003	18040006	G	74	30	0	0	30	0	0	15	0	1438	5101	0	217	0	0
6003	18040009	E	30	0	30	0	0	0	0	0	0	3663	20662	0	2065	1294	0
6003	18040010	G	0	0	0	0	0	0	0	0	0	10690	56593	0	0	3468	0
6003	18040012	E	0	0	0	0	0	0	0	0	0	6471	42553	0	0	5800	0
6005	18020022	E	1005	0	0	0	0	0	0	1005	0	390	8055	49	333	326	0
6005	18040009	E	5296	2100	958	882	245	15	655	442	22914	102685	162859	158	5212	534	0
6005	18040010	E	351	259	91	0	0	0	0	0	9468	28943	28225	0	198	0	0
6007	18020103	D	10070	6378	2013	0	1344	0	0	336	44033	21143	13827	0	956	0	0
6007	18020104	F	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6007	18020105	F	5370	3357	1008	0	336	0	336	336	186455	47903	24811	13338	492	0	0
6007	18020106	F	11414	8057	672	336	1008	0	0	1344	55185	22314	19434	1976	5518	0	0
6007	18020119	E	336	336	0	0	0	0	0	0	0	247	44371	0	0	0	0
6007	18020120	E	12419	10070	672	0	0	0	0	1680	0	7706	120198	0	1205	0	0
6007	18020121	E	1344	1008	0	0	0	0	336	0	0	19234	186658	247	247	0	0
6007	18020123	E	672	336	0	0	0	0	0	336	0	12086	115188	0	494	0	0
6007	18020124	E	1008	1008	0	0	0	0	0	0	1964	3433	33115	0	0	0	0
6009	18040006	G	2579	1759	393	101	35	0	86	205	8682	19590	84916	0	4562	0	0
6009	18040007	G	393	291	17	52	0	0	35	0	9702	31441	37880	0	128	0	0
6009	18040008	G	2818	1042	768	324	52	0	393	240	42155	69763	157193	0	9897	0	0
6009	18040009	E	855	410	119	52	35	0	188	52	6024	12098	153204	79	610	0	0
6011	18020010	F	22	0	12	0	12	0	0	0	30705	0	0	0	0	0	0
6011	18020104	F	9221	2188	534	329	5977	0	79	114	288642	73725	104935	2411	0	0	0
6011	18020105	F	0	0	0	0	0	0	0	0	36714	247	0	2470	0	0	0
6011	18020110	SFC	0	0	0	0	0	0	0	0	0	0	79	0	0	0	0
6011	18020115	C	126	126	0	0	0	0	0	0	3478	48375	55992	316	0	0	0
6011	18020116	C	0	0	0	0	0	0	0	0	1798	34402	30964	0	0	0	0
6017	18020021	E	400	69	314	0	17	0	0	0	3453	17364	102137	0	3038	909	0
6017	18020022	E	14249	6044	1917	1237	2090	0	1376	1586	16564	64800	402887	138	13936	1709	0

TABLE C4: 2005 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6017	18020023	E	0	0	0	0	0	0	0	0	603	573	79	0	59	0	0
6017	18020128	E	0	0	0	0	0	0	0	0	0	1729	13091	0	741	0	0
6017	18040009	E	0	0	0	0	0	0	0	0	20	0	1423	0	0	0	0
6017	18040010	E	6289	2544	889	435	1289	0	487	645	25337	51176	245436	30	4303	0	0
6019	18030004	I	20014	956	516	17421	931	0	89	101	116927	155921	117693	0	1163	0	0
6019	18030007	I	0	0	0	0	0	0	0	0	0	5187	21736	0	0	0	0
6019	18030008	I	314	0	0	0	0	0	314	0	1235	16290	66142	0	0	0	0
6019	18030009	I	0	0	0	0	0	0	0	0	7163	26182	45695	0	0	0	0
6019	18030010	I	944	944	0	0	0	0	0	0	0	112353	584728	0	4938	68666	0
6019	18030012	I	74893	39021	20140	6294	4406	0	2203	2833	580608	20694	12753	247	3129	0	0
6019	18040001	H	1573	944	314	314	0	0	0	0	13195	6558	0	830	351	0	0
6019	18040002	I	19108	1623	642	12876	2769	0	743	452	530544	133106	19918	18574	1013	0	0
6019	18040003	H	2554	415	163	151	1321	0	277	227	222772	93322	10	59	405	0	0
6019	18040006	G	2517	2203	0	314	0	0	0	0	0	31090	497937	0	0	51623	0
6021	18020103	D	1057	178	25	190	499	0	35	131	29684	7180	1339	0	1329	0	0
6021	18020104	F	7482	2435	701	143	3870	0	178	156	247731	107507	37317	1393	1161	0	0
6021	18020105	F	0	0	0	0	0	0	0	0	41783	247	0	0	0	0	0
6021	18020115	G	583	203	47	190	0	0	0	143	9107	114818	180777	89	741	0	0
6027	18030002	I	0	0	0	0	0	0	0	0	0	0	336	0	0	0	0
6029	18030001	I	1470	1299	12	0	27	0	0	131	343	32965	31539	0	442	0	0
6029	18030002	I	971	944	12	0	0	0	0	12	10325	139076	96199	583	4777	0	0
6029	18030003	I	10549	3819	657	2912	2492	0	222	447	37396	371676	464007	267	8835	0	0
6029	18030004	I	222	0	0	0	170	0	52	0	23401	132266	113914	0	40	0	0
6029	18030005	I	0	0	0	0	0	0	0	0	128	26014	47266	0	0	0	0
6029	18030012	I	89836	31003	7729	30099	12372	91	1862	6679	1030793	816478	11841	2500	7163	0	0
6031	18030004	I	3589	506	230	2018	615	0	217	0	44309	113015	3858	0	679	0	0
6031	18030012	I	18125	7287	5740	1922	1062	0	906	1208	602925	74735	0	6274	926	0	0
6033	18020115	C	0	0	0	0	0	0	0	0	0	879	7993	0	0	0	0
6033	18020116	C	23628	18765	1665	531	1134	0	311	1225	42501	171670	240316	138	768	0	0
6033	18020117	C	2596	897	1554	0	54	0	54	37	10767	35798	79191	0	2203	0	0

TABLE C4: 2005 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6035	18020002	B	324	324	0	0	0	0	0	0	31117	130638	248435	10868	0	0	0
6035	18020003	B	0	0	0	0	0	0	0	0	11362	48412	353210	494	2717	0	0
6035	18020121	E	971	647	324	0	0	0	0	0	0	7884	81547	0	0	0	0
6037	18030003	I	111	0	0	0	111	0	0	0	198	1949	1210	0	0	0	0
6039	18040001	H	4179	2695	479	417	435	0	109	47	132743	60821	736	1265	165	0	0
6039	18040003	H	7788	4305	1363	200	758	62	541	558	246261	61478	442	22714	1536	0	0
6039	18040006	G	773	773	0	0	0	0	0	0	0	7652	411475	0	0	19019	0
6039	18040007	G	6192	5419	773	0	0	0	0	0	1223	22025	215831	0	0	0	0
6039	18040008	G	0	0	0	0	0	0	0	0	0	4446	80769	0	0	12350	0
6043	18040003	G	1435	1040	0	79	94	0	190	32	49	110498	81688	0	277	0	0
6043	18040004	G	3152	2569	0	15	0	0	94	472	383	50763	137799	0	353	0	0
6043	18040005	G	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0
6043	18040007	G	2759	2759	0	0	0	0	0	0	245	7111	133392	0	0	0	0
6043	18040008	G	1971	1576	395	0	0	0	0	0	0	18737	382643	0	0	741	0
6045	18020114	C	0	0	0	0	0	0	0	0	0	0	69	0	0	0	0
6045	18020115	C	0	0	0	0	0	0	0	0	0	49	158	0	0	0	0
6045	18020116	C	0	0	0	0	0	0	0	0	0	1018	721	0	0	0	0
6047	18040003	H	31050	18152	6281	573	3255	0	1121	1667	549516	383230	74068	92012	882	0	0
6047	18040004	H	427	321	12	40	54	0	0	0	47987	50800	2606	1107	6247	0	0
6049	18020001	A	593	296	296	0	0	0	0	0	16045	30114	106635	6175	0	0	0
6049	18020002	B	2673	2077	593	0	0	0	0	0	106664	455792	633071	14820	4691	0	0
6049	18020003	B	0	0	0	0	0	0	0	0	494	2717	34333	0	247	0	0
6051	18040009	G	0	0	0	0	0	0	0	0	0	20	20	0	0	148	0
6051	18040010	G	0	0	0	0	0	0	0	0	0	0	0	0	0	79	0
6053	18030004	G	0	0	0	0	0	0	0	0	0	30	20	0	0	0	0
6057	18020125	E	11873	10389	494	0	990	0	0	0	2181	26429	280523	247	8242	0	0
6057	18020126	E	16327	7916	0	5441	1978	0	0	990	3510	8647	130675	0	1640	0	0
6061	18020017	E	748	151	59	15	405	0	121	0	6499	3636	3423	0	0	0	0
6061	18020018	F	9527	3026	1976	538	3041	0	151	793	104076	22591	27649	0	939	0	0
6061	18020021	E	2561	1319	553	0	136	0	0	553	2643	5451	56121	0	1941	0	0

TABLE C4: 2005 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6061	18020023	F	12476	6052	1423	494	2008	0	1588	914	36010	3409	8455	0	462	0	0
6061	18020108	F	0	0	0	0	0	0	0	0	1235	0	1235	0	0	0	0
6061	18020125	E	375	0	0	0	375	0	0	0	0	245	8531	247	731	0	0
6061	18020126	E	3369	3369	0	0	0	0	0	0	8652	2882	29801	0	0	0	0
6061	18020128	E	3745	2248	0	375	748	0	0	375	739	58114	345479	1482	10589	0	0
6063	18020121	E	5718	4374	0	672	672	0	0	0	0	16487	395719	494	986	0	0
6063	18020122	E	4036	3364	336	336	0	0	0	0	16275	41676	596520	2717	2959	0	0
6063	18020123	E	3364	1682	0	0	0	0	0	1682	19728	119360	429353	14820	1233	0	0
6063	18020125	E	0	0	0	0	0	0	0	0	0	0	12350	0	0	0	0
6069	18040002	I	0	0	0	0	0	0	0	0	0	10740	2450	0	0	0	0
6069	18040003	H	198	0	0	99	0	0	99	0	10786	117873	68162	0	227	0	0
6079	18030003	I	0	0	0	0	0	0	0	0	227	879	0	0	0	0	0
6079	18030004	I	15	0	0	0	15	0	0	0	11705	14897	366	0	0	0	0
6079	18030012	I	0	0	0	0	0	0	0	0	0	21509	3280	0	0	0	0
6087	18050003	SFA	0	0	0	0	0	0	0	0	10	0	207	0	0	0	0
6089	18020003	B	3463	2112	704	0	198	0	353	99	30092	68846	833763	1235	5446	0	0
6089	18020004	B	366	0	27	0	338	0	0	0	0	15176	137028	0	1284	0	0
6089	18020005	B	4421	578	141	0	3125	0	156	422	0	52357	179665	0	2250	0	0
6089	18020101	D	34859	18471	5464	2112	6027	0	0	2789	42096	26217	141793	0	3972	0	0
6089	18020102	D	2085	1294	84	212	464	0	0	27	8924	21183	32555	0	1173	0	0
6089	18020112	C	1070	845	84	27	57	0	0	57	207	32137	136087	0	247	0	0
6089	18020113	C	156	84	0	0	0	0	0	72	346	66238	104088	0	20	0	0
6089	18020118	E	1294	1294	0	0	0	0	0	0	4688	27027	380274	0	2715	0	0
6089	18020119	E	0	0	0	0	0	0	0	0	0	0	3211	0	247	0	0
6089	18020121	E	0	0	0	0	0	0	0	0	0	0	12844	0	494	0	0
6091	18020123	E	618	618	0	0	0	0	0	0	23201	26162	112054	3458	0	0	0
6091	18020125	E	309	309	0	0	0	0	0	0	0	49884	247195	988	1729	0	0
6093	18020002	B	0	0	0	0	0	0	0	0	0	494	9633	0	988	0	0
6093	18020003	B	0	0	0	0	0	0	0	0	741	36062	254657	0	14326	0	0
6093	18020004	B	909	371	72	417	25	0	0	25	0	9213	259609	494	8472	0	3211

TABLE C4: 2005 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6093	18020005	B	4814	1445	598	383	1267	0	514	610	3209	9001	102994	287	9717	0	2707
6099	18040003	H	34844	24083	4253	684	4026	0	860	939	283704	139036	131122	6145	1376	0	0
6099	18040004	H	0	0	0	0	0	0	0	0	484	3814	30	0	0	0	0
6099	18040005	H	32589	22003	3905	2752	899	0	390	2643	92877	82780	9470	0	2537	0	0
6099	18040006	H	8734	6830	711	363	309	0	12	509	22257	17660	477	771	94	0	0
6099	18040007	H	2752	2752	0	0	0	0	0	0	22571	60876	1853	0	0	0	0
6099	18040008	H	0	0	0	0	0	0	0	0	3922	0	0	0	346	0	0
6099	18050004	SFA	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0
6101	18020010	F	450	99	49	25	0	0	274	0	59818	0	0	0	0	0	0
6101	18020015	F	12	0	0	0	0	0	12	0	30349	1116	919	0	869	0	0
6101	18020017	F	0	0	0	0	0	0	0	0	9455	296	30	0	0	0	0
6101	18020018	F	635	124	86	12	175	0	212	25	70610	109	79	0	119	0	0
6101	18020023	F	136	0	136	0	0	0	0	0	1919	0	0	0	0	0	0
6101	18020104	F	0	0	0	0	0	0	0	0	36309	0	0	0	0	0	0
6101	18020105	F	0	0	0	0	0	0	0	0	10621	10127	0	5681	0	0	0
6101	18020106	F	6852	5296	622	311	622	0	0	0	107302	26397	734	1482	0	0	0
6103	18020101	D	0	0	0	0	0	0	0	0	4159	4871	9011	0	711	0	0
6103	18020102	D	1699	897	82	82	642	0	0	0	8363	34829	101137	0	571	0	0
6103	18020103	D	13629	5007	1312	936	5140	0	188	1045	176773	212096	142126	40	5948	0	0
6103	18020113	C	242	0	242	0	0	0	0	0	445	87848	128294	0	0	0	0
6103	18020114	C	0	0	0	0	0	0	0	0	3349	53293	153654	0	0	0	0
6103	18020115	C	669	0	0	0	0	0	0	669	926	27501	17866	0	0	0	0
6103	18020118	E	669	669	0	0	0	0	0	0	474	48869	98585	0	0	0	0
6103	18020119	E	669	669	0	0	0	0	0	0	247	17206	503700	0	0	0	0
6103	18020120	E	0	0	0	0	0	0	0	0	0	988	4446	0	0	0	0
6105	18020005	B	0	0	0	0	0	0	0	0	0	0	109	0	0	0	0
6105	18020112	C	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0
6105	18020113	C	0	0	0	0	0	0	0	0	0	79	267	0	0	0	0
6107	18030001	I	205	89	0	116	0	0	0	0	40	71022	466692	850	2895	76323	0
6107	18030002	I	0	0	0	0	0	0	0	0	49	38996	325852	1986	1344	247	0

TABLE C4: 2005 LAND USES IN THE CENTRAL VALLEY WATERSHED
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6107	18030004	I	0	0	0	0	0	0	0	0	267	0	11125	0	0	0	0
6107	18030005	I	0	0	0	0	0	0	0	0	1275	25273	118896	0	0	0	0
6107	18030006	I	2240	1601	0	0	321	0	0	321	3204	41560	208806	0	0	0	0
6107	18030007	I	321	0	0	0	0	0	321	0	988	79028	371429	0	741	2717	0
6107	18030010	I	0	0	0	0	0	0	0	0	0	1729	59280	0	0	42237	0
6107	18030012	I	47864	26953	11229	1640	4239	0	1843	1959	813512	129188	21516	1788	2141	0	0
6109	18040004	G	15	15	0	0	0	0	0	0	0	106	262	0	0	0	0
6109	18040005	G	23203	19674	605	1121	151	0	758	894	1857	59292	306650	49	1719	0	0
6109	18040006	G	3046	1956	151	440	91	0	227	183	3819	28232	233803	30	1702	0	0
6109	18040009	G	1077	378	0	0	0	0	0	697	0	67910	495944	0	0	69358	0
6109	18040010	G	30	0	0	0	0	0	0	30	0	17120	125753	0	0	22852	0
6111	18030003	I	0	0	0	0	0	0	0	0	148	3290	12182	0	0	0	0
6115	18020015	F	0	0	0	0	0	0	0	0	217	356	356	0	0	0	0
6115	18020017	F	0	0	0	0	0	0	0	0	7123	267	198	0	0	0	0
6115	18020106	F	9682	2934	4989	0	879	0	0	879	78247	32908	3900	0	245	0	0
6115	18020107	F	294	0	294	0	0	0	0	0	11589	2959	4930	0	6657	0	0
6115	18020124	E	294	294	0	0	0	0	0	0	3945	1727	21205	0	0	0	0
6115	18020125	E	2640	2346	0	0	0	0	0	294	1460	7785	17520	247	973	0	0
6115	18020126	F	294	294	0	0	0	0	0	0	18999	12091	11844	0	0	0	0
*** Total ***			758063	400073	101752	100050	88265	168	21568	46206	7773273	7281550	17412766	247158	226395	381961	5918

D. LAND USE DATA FOR THE DELTA REGION

This section contains the land use data taken from dBASE computer files for the Delta. Again, note that Level II land use data subdividing the non-urban land uses has been aggregated to Level I data in this table. The actual Level II data is available on IBM-PC compatible diskette from ABAG for a fee. In addition, ABAG has these same data available in hectares (the metric equivalent of 2.47 acres).

TABLE D1: 1975 LAND USES IN THE DELTA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6067	18020018	SFC	41526	20224	8062	4100	3883	79	2687	2490	205603	6748	0	2401	7598	0	0
6067	18020021	SFC	128	0	0	0	0	0	0	128	10	10	0	0	0	0	0
6067	18020022	SFC	217	0	0	0	0	0	0	217	10	168	40	0	0	0	0
6067	18020023	SFC	71245	44885	10542	2905	2974	99	1838	8003	35252	4495	2865	0	12785	0	0
6067	18040007	SFC	99	59	40	0	0	0	0	0	948	20	0	642	109	0	0
6067	18040009	SFC	543	178	168	40	0	0	138	20	21963	2322	0	30	20	0	0
6067	18040010	SFC	1927	721	237	247	168	0	188	366	172930	13466	12014	1077	2677	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6077	18040003	SFC	128	0	0	0	128	0	0	0	998	6363	5385	0	89	0	0
6077	18040006	SFC	1235	593	217	0	237	0	40	148	12320	40	0	692	178	0	0
6077	18040007	SFC	35815	18604	7361	2766	4446	0	820	1818	492844	61691	20264	3863	1907	0	0
6077	18040008	SFC	14632	8161	3685	1146	385	0	385	869	91064	4960	99	0	474	0	0
6077	18040009	SFC	3567	1769	375	573	128	0	306	415	133864	2510	207	385	622	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6113	18020010	SFC	1363	0	0	20	1255	0	89	0	101477	0	613	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	18436	7104	2628	2263	4327	356	840	919	261563	2272	99	2440	879	0	0
6113	18020019	SFC	583	0	0	0	395	0	0	188	19918	682	0	0	1354	0	0
6113	18020020	SFC	484	237	178	10	49	0	0	10	4535	0	0	0	40	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	217	148	69	0	0	0	0	0	20037	3873	32861	0	0	0	0
6113	18020110	SFC	178	128	0	0	0	0	49	0	31122	14721	51702	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			192324	102811	33562	14069	18377	534	7380	15591	1632117	142618	160204	11530	28731	0	0

TABLE D2: 1985 LAND USES IN THE DELTA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6067	18020018	SFC	53651	26130	10416	5298	5017	101	3473	3216	194266	6373	0	2401	7173	0	0
6067	18020021	SFC	165	0	0	0	0	0	0	165	-10	-10	0	0	0	0	0
6067	18020022	SFC	282	0	0	0	0	0	0	282	7	119	27	0	0	0	0
6067	18020023	SFC	92047	57991	13620	3752	3843	128	2374	10339	22020	2811	1783	0	7978	0	0
6067	18040007	SFC	128	77	52	0	0	0	0	0	924	20	0	642	106	0	0
6067	18040009	SFC	701	230	217	52	0	0	178	25	21820	2307	0	30	20	0	0
6067	18040010	SFC	2490	931	306	319	217	0	242	472	172446	13429	11980	1077	2670	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6077	18040003	SFC	178	0	0	0	178	0	0	0	993	6338	5362	0	89	0	0
6077	18040006	SFC	1719	825	301	0	331	0	54	207	11844	37	0	692	170	0	0
6077	18040007	SFC	49854	25898	10246	3851	6190	0	1141	2532	480840	60189	19772	3863	1865	0	0
6077	18040008	SFC	20368	11360	5130	1596	536	0	536	1210	85655	4668	94	0	445	0	0
6077	18040009	SFC	4965	2463	524	798	178	0	427	578	132501	2485	205	385	615	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6113	18020010	SFC	1662	0	0	25	1529	0	109	0	101181	0	610	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	22475	8660	3204	2759	5276	435	1023	1119	257574	2235	99	2440	867	0	0
6113	18020019	SFC	711	0	0	0	482	0	0	230	19802	677	0	0	1346	0	0
6113	18020020	SFC	590	289	217	12	59	0	0	12	4429	0	0	0	40	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	264	180	84	0	0	0	0	0	20019	3870	32834	0	0	0	0
6113	18020110	SFC	217	156	0	0	0	0	59	0	31110	14716	51682	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			252469	135188	44317	18461	23836	664	9616	20387	1583077	138542	158505	11530	23383	0	0

TABLE D3: 1995 LAND USES IN THE DELTA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6067	18020018	SFC	65527	31915	12723	6469	6128	124	4241	3930	183160	6005	0	2401	6758	0	0
6067	18020021	SFC	203	0	0	0	0	0	0	203	-27	-27	0	0	0	0	0
6067	18020022	SFC	343	0	0	0	0	0	0	343	5	72	17	0	0	0	0
6067	18020023	SFC	112425	70827	16635	4584	4693	156	2900	12629	9062	1161	724	0	3273	0	0
6067	18040007	SFC	156	94	62	0	0	0	0	0	899	20	0	642	104	0	0
6067	18040009	SFC	857	282	264	62	0	0	217	32	21679	2292	0	30	20	0	0
6067	18040010	SFC	3041	1139	373	390	264	0	296	578	171971	13392	11947	1077	2663	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6077	18040003	SFC	237	0	0	0	237	0	0	0	990	6308	5340	0	89	0	0
6077	18040006	SFC	2272	1089	400	0	437	0	72	272	11303	37	0	692	163	0	0
6077	18040007	SFC	65865	34212	13536	5088	8176	0	1509	3344	467151	58475	19212	3863	1818	0	0
6077	18040008	SFC	26908	15008	6778	2107	709	0	709	1598	79487	4335	86	0	412	0	0
6077	18040009	SFC	6560	3253	692	1055	237	0	563	763	130945	2455	203	385	608	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6113	18020010	SFC	1927	0	0	27	1773	0	126	0	100917	0	610	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	26051	10038	3712	3196	6116	501	1186	1299	254040	2203	99	2440	857	0	0
6113	18020019	SFC	823	0	0	0	558	0	0	264	19701	674	0	0	1339	0	0
6113	18020020	SFC	684	336	252	15	69	0	0	15	4337	0	0	0	37	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	306	210	99	0	0	0	0	0	20005	3868	32809	0	0	0	0
6113	18020110	SFC	252	180	0	0	0	0	69	0	31100	14711	51663	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***																	
			314436	168582	55526	22993	29398	781	11888	25271	1532383	134259	156766	11530	18140	0	0

TABLE D4: 2005 LAND USES IN THE DELTA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6067	18020018	SFC	76407	37213	14835	7543	7143	146	4945	4582	172989	5666	0	2401	6378	0	0
6067	18020021	SFC	237	0	0	0	0	0	0	237	-44	-44	0	0	0	0	0
6067	18020022	SFC	400	0	0	0	0	0	0	400	2	27	7	0	0	0	0
6067	18020023	SFC	131090	82587	19397	5345	5471	183	3381	14726	-2811	-353	-247	0	-1040	0	0
6067	18040007	SFC	183	109	72	0	0	0	0	0	874	17	0	642	101	0	0
6067	18040009	SFC	1000	326	309	72	0	0	254	37	21551	2277	0	30	20	0	0
6067	18040010	SFC	3544	1326	437	454	309	0	346	672	171539	13358	11918	1077	2655	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6077	18040003	SFC	289	0	0	0	289	0	0	0	986	6284	5318	0	89	0	0
6077	18040006	SFC	2769	1329	487	0	531	0	89	333	10814	35	0	692	156	0	0
6077	18040007	SFC	80297	41711	16502	6202	9969	0	1838	4076	454811	56931	18708	3863	1773	0	0
6077	18040008	SFC	32807	18298	8262	2569	865	0	865	1949	73927	4034	82	0	383	0	0
6077	18040009	SFC	7995	3964	842	1284	289	0	687	931	129542	2430	198	385	600	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6113	18020010	SFC	2149	0	0	32	1978	0	141	0	100697	0	608	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	29055	11197	4142	3567	6820	561	1324	1447	251071	2176	99	2440	847	0	0
6113	18020019	SFC	919	0	0	0	622	0	0	296	19614	672	0	0	1334	0	0
6113	18020020	SFC	763	373	279	15	79	0	0	15	4258	0	0	0	37	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	343	235	109	0	0	0	0	0	19992	3866	32789	0	0	0	0
6113	18020110	SFC	279	203	0	0	0	0	79	0	31090	14706	51648	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			370527	198870	65672	27084	34365	889	13948	29702	1486560	130359	155183	11530	13333	0	0

E. LAND USE DATA FOR THE BAY AREA REGION

This section contains the land use data taken from dBASE computer files for the Bay Area Region. Again, note that Level II land use data subdividing the non-urban land uses has been aggregated to Level I data in this table. The actual Level II, III and IV data is available on IBM-PC compatible diskette from ABAG for a fee. In addition, HUCT (hydrologic unit/census tract) data are available for 1985 in the Bay Area. The breakdowns of the water category are not available, however, because ABAG's census tract file excludes most water areas. In addition, ABAG has these same data tables available in hectares (the metric equivalent of 2.47 acres).

TABLE E1: 1975 LAND USES IN THE BAY AREA REGION
(in acres)
[Note: data obtained from USGS without ABAG information--
salt evaporators included in wetlands]

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040007	SFC	514	10	0	0	504	0	0	0	3241	35637	7558	0	237	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0
6001	18050002	SFA	12765	8368	1848	1275	751	0	0	524	0	0	1284	0	0	0	0
6001	18050003	SFA	14822	8714	3013	1228	573	0	326	968	8556	11490	968	13247	425	0	0
6001	18050004	SFA	95883	50912	19473	10549	7479	2095	59	5315	33385	109638	113166	6899	3468	0	0
6013	18040007	SFC	9445	5987	958	1215	178	0	435	672	71353	63400	25846	1699	3251	0	0
6013	18050001	SFB	62116	40548	8655	4881	2480	524	425	4604	12587	45606	29907	7064	3517	0	0
6013	18050002	SFA	30796	17428	3290	6965	1008	0	0	2104	445	21361	21015	988	534	0	0
6013	18050004	SFA	5296	4248	731	0	49	0	0	267	4881	30707	10305	0	227	0	0
6041	18010111	SFX	119	0	40	0	0	0	79	0	24868	287	484	0	0	0	0
6041	18050002	SFA	35696	26192	6303	109	790	0	543	1759	9327	15176	45241	3488	573	0	0
6041	18050005	SFX	3656	2500	287	0	178	0	207	484	15887	95144	83338	1591	978	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	10	20	59	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0
6055	18020117	SFC	119	69	40	0	10	0	0	0	7776	66888	140256	0	613	0	0
6055	18050001	SFB	109	0	109	0	0	0	0	0	2816	7035	20373	0	0	0	0
6055	18050002	SFA	22615	10463	2648	6807	1245	10	237	1205	59952	34214	118738	4535	711	0	0
6075	18050002	SFA	7934	3754	2865	0	316	0	0	998	0	0	0	0	0	0	0
6075	18050004	SFA	14968	7697	3606	1146	1541	0	0	978	0	119	0	0	30	0	0
6075	18050005	SFX	7163	5088	534	0	59	0	0	1482	0	217	0	0	128	0	0
6081	18050003	SFA	10851	8388	1037	220	296	0	464	445	356	2263	11886	403	0	0	0
6081	18050004	SFA	55523	33068	9485	2744	5444	316	445	4021	99	18742	6491	8331	1186	0	0
6081	18050005	SFX	10423	7538	1146	0	366	0	454	919	6471	70454	64576	267	207	0	0
6081	18060001	SFX	0	0	0	0	0	0	0	0	5582	6294	7845	0	0	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	59	49	0	0	0	0
6085	18050003	SFA	138120	92753	20590	5935	4565	5128	1650	7499	30618	100559	170371	10851	3260	0	0
6085	18050004	SFA	99	49	20	20	0	0	10	0	296	47098	91350	326	99	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0

TABLE E1: 1975 LAND USES IN THE BAY AREA REGION
(in acres)
[Note: data obtained from USGS without ABAG information--
salt evaporators included in wetlands].

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6085	18060001	SFX	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6085	18060002	SFX	8032	5800	761	336	257	0	375	504	40399	59122	127175	0	69	0	0
6095	18020018	SFC	9682	2915	1423	593	3705	0	287	761	250339	2361	207	1195	1788	0	0
6095	18020020	SFC	30	0	0	0	30	0	0	0	3191	0	0	0	40	0	0
6095	18020109	SFC	889	642	20	0	227	0	0	0	5227	7173	30934	119	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0
6095	18050001	SFB	14968	5078	6027	1028	2035	0	237	563	70178	37831	9949	52651	6956	0	0
6095	18050002	SFA	8754	5049	1166	1452	366	109	10	603	1650	7687	20	10423	336	0	0
6097	18010109	SFX	1255	781	79	0	49	0	49	296	553	12439	158011	0	99	0	0
6097	18010110	SFX	46317	34946	5503	1601	1769	0	1107	1393	108532	67253	362636	366	682	0	0
6097	18010111	SFX	1107	435	415	0	20	0	207	30	45359	10127	14948	464	781	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6097	18050002	SFA	13516	8932	2371	385	563	326	395	543	79406	47128	33799	5404	751	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2124	0	59	0	0	0	0
*** Total ***			643581	398352	104441	48489	36852	8507	8003	38937	905462	1033567	1708944	130310	30944	0	0

TABLE E2: 1985 LAND USES IN THE BAY AREA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	0	3315	35425	7580	138	207	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6001	18050002	SFA	12824	7689	2124	1252	667	5	0	894	0	0	1265	64	0	0	0
6001	18050003	SFA	18589	10589	2853	1559	637	1028	487	748	5965	10935	929	12288	346	0	0
6001	18050004	SFA	104948	53458	16752	6790	7375	3530	74	14452	28593	106899	112153	9225	2497	0	0
6013	18040007	SFC	11737	7190	971	1070	215	0	269	1055	69298	63000	25735	5869	2818	0	0
6013	18050001	SFB	74280	46483	10707	5627	3120	825	49	5330	9435	40382	28400	7077	1729	0	0
6013	18050002	SFA	32935	18481	3473	6148	865	82	119	2744	405	19162	20289	1981	417	0	0
6013	18050004	SFA	7640	5105	1124	0	30	0	0	1072	4216	29608	10102	0	35	0	0
6041	18010111	SFX	195	0	47	0	0	0	57	0	25073	304	511	15	0	0	0
6041	18050002	SFA	37813	26273	5748	170	790	146	412	1845	9258	14667	43875	3653	479	0	0
6041	18050005	SFX	5767	2376	1902	0	210	0	203	371	15759	92331	82234	1430	753	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1470	729	27	0	20	0	0	637	7138	64702	132758	363	516	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	0	2739	7469	20358	324	0	0	0
6055	18050002	SFA	26528	10959	2596	6597	1010	119	222	2460	57287	33155	116498	4268	610	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6081	18050003	SFA	10139	5414	1023	119	324	0	72	2991	499	3628	10665	763	124	0	0
6081	18050004	SFA	52712	28533	7225	3364	5081	440	207	7842	333	14803	10248	7452	2507	0	0
6081	18050005	SFX	9724	5310	1089	62	830	0	158	2275	13074	70558	57929	242	598	0	0
6081	18060001	SFX	333	22	0	27	138	0	17	128	4639	7677	6780	5	220	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	158389	98121	22744	13881	4980	1882	563	12762	22304	95216	166194	11980	1640	0	0
6085	18050004	SFA	124	5	40	0	0	0	0	0	262	46836	91099	1057	99	0	0

TABLE E2: 1985 LAND USES IN THE BAY AREA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	11315	6140	948	632	785	0	54	1924	37976	58460	125854	462	77	0	0
6095	18020018	SFC	17102	4584	1633	600	1865	96	119	6123	241050	2319	257	2379	1477	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	0	3322	0	54	0	47	0	0
6095	18020109	SFC	1245	800	74	0	185	0	0	25	5036	6758	30554	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6095	18050001	SFB	21852	9319	6541	2097	1583	0	62	795	65327	35128	9613	53048	6378	0	0
6095	18050002	SFA	11755	6550	3036	452	311	0	17	840	1625	5577	12	6197	195	0	0
6097	18010109	SFX	3231	1524	91	0	40	0	44	1141	538	10609	156835	0	104	0	0
6097	18010110	SFX	60448	39537	4523	1924	3707	1213	563	6886	100364	65561	359044	1462	593	0	0
6097	18010111	SFX	1299	447	336	0	27	0	131	99	44509	9744	14941	210	632	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6097	18050002	SFA	22440	10510	1398	818	526	124	366	7724	70489	46910	35086	4980	704	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0
*** Total ***			747410	421733	104800	55242	37341	9497	4411	87744	851873	998991	1680126	137065	25851	0	0

TABLE E3: 1995 LAND USES IN THE BAY AREA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	272	3315	35425	7580	138	207	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6001	18050002	SFA	12844	7771	2124	1205	667	5	0	1072	0	0	1230	64	0	0	0
6001	18050003	SFA	21837	11831	3549	3036	637	1028	487	1270	4132	9705	825	12288	259	0	0
6001	18050004	SFA	114628	59527	18577	8909	7375	3530	74	16635	25300	103078	110209	9225	1890	0	0
6013	18040007	SFC	15766	10604	1376	1351	215	0	269	1951	67433	61421	25253	5869	2722	0	0
6013	18050001	SFB	84099	55447	11342	6294	3120	825	49	7022	7845	35494	25300	7077	1499	0	0
6013	18050002	SFA	34837	20375	3609	6158	865	82	119	3631	400	18011	19609	1981	351	0	0
6013	18050004	SFA	9715	7020	1312	0	30	0	0	1354	4080	28299	9472	0	32	0	0
6041	18010111	SFX	195	0	47	0	0	0	57	91	25073	304	511	15	0	0	0
6041	18050002	SFA	42748	30811	6442	190	790	146	412	3957	8452	13689	40827	3653	371	0	0
6041	18050005	SFX	6592	3213	1904	0	210	0	203	1062	15726	91993	81777	1430	753	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1556	815	27	0	20	0	0	694	7136	64674	132703	363	516	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	104	2739	7469	20358	324	0	0	0
6055	18050002	SFA	31021	14630	3540	6748	1010	119	222	4752	54762	32095	115628	4268	571	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6081	18050003	SFA	12414	7603	1074	183	324	0	72	3159	432	3129	9016	763	69	0	0
6081	18050004	SFA	55232	30211	7884	3552	5081	440	207	7857	279	13716	9779	7452	1598	0	0
6081	18050005	SFX	11794	7319	1070	143	830	0	158	2275	12906	69405	57208	242	573	0	0
6081	18060001	SFX	363	52	0	27	138	0	17	128	4631	7664	6770	5	220	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	168839	104950	24243	16631	4980	1882	563	15591	18335	90442	164722	11980	1396	0	0
6085	18050004	SFA	126	7	40	0	0	0	0	79	262	46834	91099	1057	99	0	0

TABLE E3: 1995 LAND USES IN THE BAY AREA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	13731	7689	1371	1109	785	0	54	2722	36620	57924	125328	462	77	0	0
6095	18020018	SFC	20869	6746	2695	1346	1865	96	119	8003	237550	2127	242	2379	1415	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	27	3322	0	54	0	47	0	0
6095	18020109	SFC	1405	963	74	0	185	0	0	183	4997	6733	30460	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6095	18050001	SFB	29433	15798	7242	2682	1583	0	62	2065	62691	31396	8480	53048	6301	0	0
6095	18050002	SFA	13084	7869	3120	457	311	0	17	1309	1455	4441	12	6197	175	0	0
6097	18010109	SFX	3791	2087	91	0	40	0	44	1529	536	10574	156311	0	104	0	0
6097	18010110	SFX	74367	52394	5486	2337	3707	1213	563	8667	93781	62862	354428	1462	573	0	0
6097	18010111	SFX	1465	613	336	0	27	0	131	358	44443	9707	14884	210	630	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6097	18050002	SFA	26034	13864	1613	860	526	124	366	8682	68881	45695	34340	4980	684	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0
*** Total ***																	
			839358	495788	115964	65270	37341	9497	4411	111081	819561	965474	1656691	137065	23181	0	0

TABLE E4: 2005 LAND USES IN THE BAY AREA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	272	3315	35425	7580	138	207	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6001	18050002	SFA	12846	7803	2134	1166	667	5	0	1072	0	0	1220	64	0	0	0
6001	18050003	SFA	22867	12113	3767	3616	637	1028	487	1220	3554	9309	813	12288	222	0	0
6001	18050004	SFA	121796	63397	19553	11374	7375	3530	74	16492	22746	100112	108813	9225	1613	0	0
6013	18040007	SFC	19298	13760	1645	1497	215	0	269	1912	65509	60191	24912	5869	2675	0	0
6013	18050001	SFB	88053	59045	11503	6654	3120	825	49	6857	7252	33671	23803	7077	1440	0	0
6013	18050002	SFA	35669	21062	3710	6281	865	82	119	3552	400	17512	19315	1981	311	0	0
6013	18050004	SFA	10438	7699	1366	0	30	0	0	1344	4019	27773	9337	0	32	0	0
6041	18010111	SFX	195	0	47	0	0	0	57	91	25073	304	511	15	0	0	0
6041	18050002	SFA	45226	33256	6637	180	790	146	412	3804	8055	13173	39335	3653	304	0	0
6041	18050005	SFX	7331	3954	1904	0	210	0	203	1060	15667	91575	81520	1430	751	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1576	835	27	0	20	0	0	694	7136	64670	132688	363	516	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	104	2739	7469	20358	324	0	0	0
6055	18050002	SFA	32686	15368	4406	6862	1010	119	222	4698	54209	31367	115277	4268	546	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6081	18050003	SFA	13056	8245	1070	193	324	0	72	3154	412	2991	8546	763	59	0	0
6081	18050004	SFA	55879	30697	7785	3814	5081	440	207	7855	279	13447	9626	7452	1356	0	0
6081	18050005	SFX	12511	8015	1089	143	830	0	158	2275	12827	68962	57027	242	561	0	0
6081	18060001	SFX	368	57	0	27	138	0	17	128	4631	7664	6768	5	220	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	172149	106956	24381	18071	4980	1882	563	15316	16663	89365	164218	11980	1344	0	0
6085	18050004	SFA	126	7	40	0	0	0	0	79	262	46834	91099	1057	99	0	0

TABLE E4: 2005 LAND USES IN THE BAY AREA REGION
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	16631	9771	1650	1689	785	0	54	2680	35049	57220	124705	462	74	0	0
6095	18020018	SFC	22546	8200	2853	1494	1865	96	119	7919	236016	2016	240	2379	1386	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	27	3322	0	54	0	47	0	0
6095	18020109	SFC	1442	1000	74	0	185	0	0	183	4989	6726	30433	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6095	18050001	SFB	31218	16766	7768	3016	1583	0	62	2023	61498	30939	8381	53048	6266	0	0
6095	18050002	SFA	13516	8279	3112	459	311	0	17	1336	1349	4125	12	6197	168	0	0
6097	18010109	SFX	3910	2206	91	0	40	0	44	1529	536	10567	156200	0	104	0	0
6097	18010110	SFX	81340	59026	5876	2374	3707	1213	563	8581	90679	61841	351575	1462	558	0	0
6097	18010111	SFX	1502	650	336	0	27	0	131	358	44425	9700	14872	210	630	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6097	18050002	SFA	28148	15766	1724	968	526	124	366	8675	68053	44919	33834	4980	667	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0
*** Total ***			882897	529516	120326	71931	37341	9497	4411	109868	802710	951034	1645349	137065	22205	0	0

F. LAND USE DATA FOR THE COMBINED 12-COUNTY BAY/DELTA AREA -- 1975

TABLE F1: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFA

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050002	SFA	12765	8368	1848	1275	751	0	0	524	0	0	1284	0	0	0	0
6001	18050003	SFA	14822	8714	3013	1228	573	0	326	968	8556	11490	968	13247	425	0	0
6001	18050004	SFA	95883	50912	19473	10549	7479	2095	59	5315	33385	109638	113166	6899	3468	0	0
6013	18050002	SFA	30796	17428	3290	6965	1008	0	0	2104	445	21361	21015	988	534	0	0
6013	18050004	SFA	5296	4248	731	0	49	0	0	267	4881	30707	10305	0	227	0	0
6041	18050002	SFA	35696	26192	6303	109	790	0	543	1759	9327	15176	45241	3488	573	0	0
6055	18050002	SFA	22615	10463	2648	6807	1245	10	237	1205	59952	34214	118738	4535	711	0	0
6075	18050002	SFA	7934	3754	2865	0	316	0	0	998	0	0	0	0	0	0	0
6075	18050004	SFA	14968	7697	3606	1146	1541	0	0	978	0	119	0	0	30	0	0
6081	18050003	SFA	10851	8388	1037	220	296	0	464	445	356	2263	11886	403	0	0	0
6081	18050004	SFA	55523	33068	9485	2744	5444	316	445	4021	99	18742	6491	8331	1186	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	59	49	0	0	0	0
6085	18050003	SFA	138120	92753	20590	5935	4565	5128	1650	7499	30618	100559	170371	10851	3260	0	0
6085	18050004	SFA	99	49	20	20	0	0	10	0	296	47098	91350	326	99	0	0
6095	18050002	SFA	8754	5049	1166	1452	366	109	10	603	1650	7687	20	10423	336	0	0
6097	18050002	SFA	13516	8932	2371	385	563	326	395	543	79406	47128	33799	5404	751	0	0
*** Total ***																	
			467638	286016	78447	38836	24987	7983	4140	27229	228969	446240	624683	64894	11599	0	0

TABLE F2: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFB

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0
6013	18050001	SFB	62116	40548	8655	4881	2480	524	425	4604	12587	45606	29907	7064	3517	0	0
6055	18050001	SFB	109	0	109	0	0	0	0	0	2816	7035	20373	0	0	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6095	18050001	SFB	14968	5078	6027	1028	2035	0	237	563	70178	37831	9949	52651	6956	0	0
*** Total ***			77192	45626	14790	5908	4515	524	662	5167	85581	90511	60228	59715	10473	0	0

TABLE F3: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040007	SFC	514	10	0	0	504	0	0	0	3241	35637	7558	0	237	0	0
6013	18040007	SFC	9445	5987	958	1215	178	0	435	672	71353	63400	25846	1699	3251	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0
6055	18020117	SFC	119	69	40	0	10	0	0	0	7776	66888	140256	0	613	0	0
6067	18020018	SFC	41526	20224	8062	4100	3883	79	2687	2490	205603	6748	0	2401	7598	0	0
6067	18020021	SFC	128	0	0	0	0	0	0	128	10	10	0	0	0	0	0
6067	18020022	SFC	217	0	0	0	0	0	0	217	10	168	40	0	0	0	0
6067	18020023	SFC	71245	44885	10542	2905	2974	99	1838	8003	35252	4495	2865	0	12785	0	0
6067	18040007	SFC	99	59	40	0	0	0	0	0	948	20	0	642	109	0	0
6067	18040009	SFC	543	178	168	40	0	0	138	20	21963	2322	0	30	20	0	0
6067	18040010	SFC	1927	721	237	247	168	0	188	366	172930	13466	12014	1077	2677	0	0
6077	18040003	SFC	128	0	0	0	128	0	0	0	998	6363	5385	0	89	0	0
6077	18040006	SFC	1235	593	217	0	237	0	40	148	12320	40	0	692	178	0	0
6077	18040007	SFC	35815	18604	7361	2766	4446	0	820	1818	492844	61691	20264	3863	1907	0	0
6077	18040008	SFC	14632	8161	3685	1146	385	0	385	869	91064	4960	99	0	474	0	0
6077	18040009	SFC	3567	1769	375	573	128	0	306	415	133864	2510	207	385	622	0	0
6095	18020018	SFC	9682	2915	1423	593	3705	0	287	761	250339	2361	207	1195	1788	0	0
6095	18020020	SFC	30	0	0	0	30	0	0	0	3191	0	0	0	40	0	0
6095	18020109	SFC	889	642	20	0	227	0	0	0	5227	7173	30934	119	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6113	18020010	SFC	1363	0	0	20	1255	0	89	0	101477	0	613	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	18436	7104	2628	2263	4327	356	840	919	261563	2272	99	2440	879	0	0
6113	18020019	SFC	583	0	0	0	395	0	0	188	19918	682	0	0	1354	0	0
6113	18020020	SFC	484	237	178	10	49	0	0	10	4535	0	0	0	40	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	217	148	69	0	0	0	0	0	20037	3873	32861	0	0	0	0
6113	18020110	SFC	178	128	0	0	0	0	49	0	31122	14721	51702	0	0	0	0

TABLE F3: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			213003	112434	36003	15877	23030	534	8102	17023	1973243	318067	365086	14543	34659	0	0

TABLE F4: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFX

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6041	18010111	SFX	119	0	40	0	0	0	79	0	24868	287	484	0	0	0	0
6041	18050005	SFX	3656	2500	287	0	178	0	207	484	15887	95144	83338	1591	978	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	10	20	59	0	0	0	0
6075	18050005	SFX	7163	5088	534	0	59	0	0	1482	0	217	0	0	128	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050005	SFX	10423	7538	1146	0	366	0	454	919	6471	70454	64576	267	207	0	0
6081	18060001	SFX	0	0	0	0	0	0	0	0	5582	6294	7845	0	0	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6085	18060001	SFX	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6085	18060002	SFX	8032	5800	761	336	257	0	375	504	40399	59122	127175	0	69	0	0
6097	18010109	SFX	1255	781	79	0	49	0	49	296	553	12439	158011	0	99	0	0
6097	18010110	SFX	46317	34946	5503	1601	1769	0	1107	1393	108532	67253	362636	366	682	0	0
6097	18010111	SFX	1107	435	415	0	20	0	207	30	45359	10127	14948	464	781	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2124	0	59	0	0	0	0
*** Total ***			78072	57087	8764	1936	2697	0	2480	5108	249786	321367	819151	2687	2944	0	0

TABLE F5: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040007	SFC	514	10	0	0	504	0	0	0	3241	35637	7558	0	237	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0
6001	18050002	SFA	12765	8368	1848	1275	751	0	0	524	0	0	1284	0	0	0	0
6001	18050003	SFA	14822	8714	3013	1228	573	0	326	968	8556	11490	968	13247	425	0	0
6001	18050004	SFA	95883	50912	19473	10549	7479	2095	59	5315	33385	109638	113166	6899	3468	0	0
6013	18040007	SFC	9445	5987	958	1215	178	0	435	672	71353	63400	25846	1699	3251	0	0
6013	18050001	SFB	62116	40548	8655	4881	2480	524	425	4604	12587	45606	29907	7064	3517	0	0
6013	18050002	SFA	30796	17428	3290	6965	1008	0	0	2104	445	21361	21015	988	534	0	0
6013	18050004	SFA	5296	4248	731	0	49	0	0	267	4881	30707	10305	0	227	0	0
6041	18010111	SFX	119	0	40	0	0	0	79	0	24868	287	484	0	0	0	0
6041	18050002	SFA	35696	26192	6303	109	790	0	543	1759	9327	15176	45241	3488	573	0	0
6041	18050005	SFX	3656	2500	287	0	178	0	207	484	15887	95144	83338	1591	978	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	10	20	59	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0
6055	18020117	SFC	119	69	40	0	10	0	0	0	7776	66888	140256	0	613	0	0
6055	18050001	SFB	109	0	109	0	0	0	0	0	2816	7035	20373	0	0	0	0
6055	18050002	SFA	22615	10463	2648	6807	1245	10	237	1205	59952	34214	118738	4535	711	0	0
6067	18020018	SFC	41526	20224	8062	4100	3883	79	2687	2490	205603	6748	0	2401	7598	0	0
6067	18020021	SFC	128	0	0	0	0	0	0	128	10	10	0	0	0	0	0
6067	18020022	SFC	217	0	0	0	0	0	0	217	10	168	40	0	0	0	0
6067	18020023	SFC	71245	44885	10542	2905	2974	99	1838	8003	35252	4495	2865	0	12785	0	0
6067	18040007	SFC	99	59	40	0	0	0	0	0	948	20	0	642	109	0	0
6067	18040009	SFC	543	178	168	40	0	0	138	20	21963	2322	0	30	20	0	0
6067	18040010	SFC	1927	721	237	247	168	0	188	366	172930	13466	12014	1077	2677	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6075	18050002	SFA	7934	3754	2865	0	316	0	0	998	0	0	0	0	0	0	0
6075	18050004	SFA	14968	7697	3606	1146	1541	0	0	978	0	119	0	0	30	0	0
6075	18050005	SFX	7163	5088	534	0	59	0	0	1482	0	217	0	0	128	0	0
6077	18040003	SFC	128	0	0	0	128	0	0	0	998	6363	5385	0	89	0	0
6077	18040006	SFC	1235	593	217	0	237	0	40	148	12320	40	0	692	178	0	0

TABLE F5: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6077	18040007	SFC	35815	18604	7361	2766	4446	0	820	1818	492844	61691	20264	3863	1907	0	0
6077	18040008	SFC	14632	8161	3685	1146	385	0	385	869	91064	4960	99	0	474	0	0
6077	18040009	SFC	3567	1769	375	573	128	0	306	415	133864	2510	207	385	622	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050003	SFA	10851	8388	1037	220	296	0	464	445	356	2263	11886	403	0	0	0
6081	18050004	SFA	55523	33068	9485	2744	5444	316	445	4021	99	18742	6491	8331	1186	0	0
6081	18050005	SFX	10423	7538	1146	0	366	0	454	919	6471	70454	64576	267	207	0	0
6081	18060001	SFX	0	0	0	0	0	0	0	0	5582	6294	7845	0	0	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	59	49	0	0	0	0
6085	18050003	SFA	138120	92753	20590	5935	4565	5128	1650	7499	30618	100559	170371	10851	3260	0	0
6085	18050004	SFA	99	49	20	20	0	0	10	0	296	47098	91350	326	99	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6085	18060001	SFX	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6085	18060002	SFX	8032	5800	761	336	257	0	375	504	40399	59122	127175	0	69	0	0
6095	18020018	SFC	9682	2915	1423	593	3705	0	287	761	250339	2361	207	1195	1788	0	0
6095	18020020	SFC	30	0	0	0	30	0	0	0	3191	0	0	0	40	0	0
6095	18020109	SFC	889	642	20	0	227	0	0	0	5227	7173	30934	119	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0
6095	18050001	SFB	14968	5078	6027	1028	2035	0	237	563	70178	37831	9949	52651	6956	0	0
6095	18050002	SFA	8754	5049	1166	1452	366	109	10	603	1650	7687	20	10423	336	0	0
6097	18010109	SFX	1255	781	79	0	49	0	49	296	553	12439	158011	0	99	0	0
6097	18010110	SFX	46317	34946	5503	1601	1769	0	1107	1393	108532	67253	362636	366	682	0	0
6097	18010111	SFX	1107	435	415	0	20	0	207	30	45359	10127	14948	464	781	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
6097	18050002	SFA	13516	8932	2371	385	563	326	395	543	79406	47128	33799	5404	751	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2124	0	59	0	0	0	0
6113	18020010	SFC	1363	0	0	20	1255	0	89	0	101477	0	613	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	18436	7104	2628	2263	4327	356	840	919	261563	2272	99	2440	879	0	0
6113	18020019	SFC	583	0	0	0	395	0	0	188	19918	682	0	0	1354	0	0

TABLE F5: 1975 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020020	SFC	484	237	178	10	49	0	0	10	4535	0	0	0	40	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	217	148	69	0	0	0	0	0	20037	3873	32861	0	0	0	0
6113	18020110	SFC	178	128	0	0	0	0	49	0	31122	14721	51702	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			835905	501163	138004	62558	55229	9040	15383	54528	2537579	1176184	1869148	141840	59675	0	0

G. LAND USE DATA FOR THE COMBINED 12-COUNTY BAY/DELTA AREA -- 1985

TABLE G1: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFA

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050002	SFA	12824	7689	2124	1252	667	5	0	894	0	0	1265	64	0	0	0
6001	18050003	SFA	18589	10589	2853	1559	637	1028	487	748	5965	10935	929	12288	346	0	0
6001	18050004	SFA	104948	53458	16752	6790	7375	3530	74	14452	28593	106899	112153	9225	2497	0	0
6013	18050002	SFA	32935	18481	3473	6148	865	82	119	2744	405	19162	20289	1981	417	0	0
6013	18050004	SFA	7640	5105	1124	0	30	0	0	1072	4216	29608	10102	0	35	0	0
6041	18050002	SFA	37813	26273	5748	170	790	146	412	1845	9258	14667	43875	3653	479	0	0
6055	18050002	SFA	26528	10959	2596	6597	1010	119	222	2460	57287	33155	116498	4268	610	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0
6081	18050003	SFA	10139	5414	1023	119	324	0	72	2991	499	3628	10665	763	124	0	0
6081	18050004	SFA	52712	28533	7225	3364	5081	440	207	7842	333	14803	10248	7452	2507	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	158389	98121	22744	13881	4980	1882	563	12762	22304	95216	166194	11980	1640	0	0
6085	18050004	SFA	124	5	40	0	0	0	0	0	262	46836	91099	1057	99	0	0
6095	18050002	SFA	11755	6550	3036	452	311	0	17	840	1625	5577	12	6197	195	0	0
6097	18050002	SFA	22440	10510	1398	818	526	124	366	7724	70489	46910	35086	4980	704	0	0
*** Total ***																	
			518962	292241	75115	43203	24169	7363	2685	59186	201236	427772	618844	63909	9653	0	0

TABLE G2: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFB

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6013	18050001	SFB	74280	46483	10707	5627	3120	825	49	5330	9435	40382	28400	7077	1729	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	0	2739	7469	20358	324	0	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6095	18050001	SFB	21852	9319	6541	2097	1583	0	62	795	65327	35128	9613	53048	6378	0	0
*** Total ***			96241	55802	17253	7724	4703	825	111	6126	77501	83054	58374	60448	8107	0	0

TABLE G3: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	0	3315	35425	7580	138	207	0	0
6013	18040007	SFC	11737	7190	971	1070	215	0	269	1055	69298	63000	25735	5869	2818	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1470	729	27	0	20	0	0	637	7138	64702	132758	363	516	0	0
6067	18020018	SFC	53651	26130	10416	5298	5017	101	3473	3216	194266	6373	0	2401	7173	0	0
6067	18020021	SFC	165	0	0	0	0	0	0	165	-10	-10	0	0	0	0	0
6067	18020022	SFC	282	0	0	0	0	0	0	282	7	119	27	0	0	0	0
6067	18020023	SFC	92047	57991	13620	3752	3843	128	2374	10339	22020	2811	1783	0	7978	0	0
6067	18040007	SFC	128	77	52	0	0	0	0	0	924	20	0	642	106	0	0
6067	18040009	SFC	701	230	217	52	0	0	178	25	21820	2307	0	30	20	0	0
6067	18040010	SFC	2490	931	306	319	217	0	242	472	172446	13429	11980	1077	2670	0	0
6077	18040003	SFC	178	0	0	0	178	0	0	0	993	6338	5362	0	89	0	0
6077	18040006	SFC	1719	825	301	0	331	0	54	207	11844	37	0	692	170	0	0
6077	18040007	SFC	49854	25898	10246	3851	6190	0	1141	2532	480840	60189	19772	3863	1865	0	0
6077	18040008	SFC	20368	11360	5130	1596	536	0	536	1210	85655	4668	94	0	445	0	0
6077	18040009	SFC	4965	2463	524	798	178	0	427	578	132501	2485	205	385	615	0	0
6095	18020018	SFC	17102	4584	1633	600	1865	96	119	6123	241050	2319	257	2379	1477	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	0	3322	0	54	0	47	0	0
6095	18020109	SFC	1245	800	74	0	185	0	0	25	5036	6758	30554	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6113	18020010	SFC	1662	0	0	25	1529	0	109	0	101181	0	610	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	22475	8660	3204	2759	5276	435	1023	1119	257574	2235	99	2440	867	0	0
6113	18020019	SFC	711	0	0	0	482	0	0	230	19802	677	0	0	1346	0	0

TABLE G3: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020020	SFC	590	289	217	12	59	0	0	12	4429	0	0	0	40	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	264	180	84	0	0	0	0	0	20019	3870	32834	0	0	0	0
6113	18020110	SFC	217	156	0	0	0	0	59	0	31110	14716	51682	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			284793	148501	47066	20131	26538	761	10004	28227	1912237	311252	356794	20412	28449	0	0

TABLE G4: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPER HUCO = SFX

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6041	18010111	SFX	195	0	47	0	0	0	57	0	25073	304	511	15	0	0	0
6041	18050005	SFX	5767	2376	1902	0	210	0	203	371	15759	92331	82234	1430	753	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050005	SFX	9724	5310	1089	62	830	0	158	2275	13074	70558	57929	242	598	0	0
6081	18060001	SFX	333	22	0	27	138	0	17	128	4639	7677	6780	5	220	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	11315	6140	948	632	785	0	54	1924	37976	58460	125854	462	77	0	0
6097	18010109	SFX	3231	1524	91	0	40	0	44	1141	538	10609	156835	0	104	0	0
6097	18010110	SFX	60448	39537	4523	1924	3707	1213	563	6886	100364	65561	359044	1462	593	0	0
6097	18010111	SFX	1299	447	336	0	27	0	131	99	44509	9744	14941	210	632	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0
*** Total ***			99882	60377	9682	2645	5767	1213	1228	14593	243977	315456	804620	3826	3026	0	0

TABLE G5: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	0	3315	35425	7580	138	207	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6001	18050002	SFA	12824	7689	2124	1252	667	5	0	894	0	0	1265	64	0	0	0
6001	18050003	SFA	18589	10589	2853	1559	637	1028	487	748	5965	10935	929	12288	346	0	0
6001	18050004	SFA	104948	53458	16752	6790	7375	3530	74	14452	28593	106899	112153	9225	2497	0	0
6013	18040007	SFC	11737	7190	971	1070	215	0	269	1055	69298	63000	25735	5869	2818	0	0
6013	18050001	SFB	74280	46483	10707	5627	3120	825	49	5330	9435	40382	28400	7077	1729	0	0
6013	18050002	SFA	32935	18481	3473	6148	865	82	119	2744	405	19162	20289	1981	417	0	0
6013	18050004	SFA	7640	5105	1124	0	30	0	0	1072	4216	29608	10102	0	35	0	0
6041	18010111	SFX	195	0	47	0	0	0	57	0	25073	304	511	15	0	0	0
6041	18050002	SFA	37813	26273	5748	170	790	146	412	1845	9258	14667	43875	3653	479	0	0
6041	18050005	SFX	5767	2376	1902	0	210	0	203	371	15759	92331	82234	1430	753	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1470	729	27	0	20	0	0	637	7138	64702	132758	363	516	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	0	2739	7469	20358	324	0	0	0
6055	18050002	SFA	26528	10959	2596	6597	1010	119	222	2460	57287	33155	116498	4268	610	0	0
6067	18020018	SFC	53651	26130	10416	5298	5017	101	3473	3216	194266	6373	0	2401	7173	0	0
6067	18020021	SFC	165	0	0	0	0	0	0	165	-10	-10	0	0	0	0	0
6067	18020022	SFC	282	0	0	0	0	0	0	282	7	119	27	0	0	0	0
6067	18020023	SFC	92047	57991	13620	3752	3843	128	2374	10339	22020	2811	1783	0	7978	0	0
6067	18040007	SFC	128	77	52	0	0	0	0	0	924	20	0	642	106	0	0
6067	18040009	SFC	701	230	217	52	0	0	178	25	21820	2307	0	30	20	0	0
6067	18040010	SFC	2490	931	306	319	217	0	242	472	172446	13429	11980	1077	2670	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0

TABLE G5: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6077	18040003	SFC	178	0	0	0	178	0	0	0	993	6338	5362	0	89	0	0
6077	18040006	SFC	1719	825	301	0	331	0	54	207	11844	37	0	692	170	0	0
6077	18040007	SFC	49854	25898	10246	3851	6190	0	1141	2532	480840	60189	19772	3863	1865	0	0
6077	18040008	SFC	20368	11360	5130	1596	536	0	536	1210	85655	4668	94	0	445	0	0
6077	18040009	SFC	4965	2463	524	798	178	0	427	578	132501	2485	205	385	615	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050003	SFA	10139	5414	1023	119	324	0	72	2991	499	3628	10665	763	124	0	0
6081	18050004	SFA	52712	28533	7225	3364	5081	440	207	7842	333	14803	10248	7452	2507	0	0
6081	18050005	SFX	9724	5310	1089	62	830	0	158	2275	13074	70558	57929	242	598	0	0
6081	18060001	SFX	333	22	0	27	138	0	17	128	4639	7677	6780	5	220	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	158389	98121	22744	13881	4980	1882	563	12762	22304	95216	166194	11980	1640	0	0
6085	18050004	SFA	124	5	40	0	0	0	0	0	262	46836	91099	1057	99	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	11315	6140	948	632	785	0	54	1924	37976	58460	125854	462	77	0	0
6095	18020018	SFC	17102	4584	1633	600	1865	96	119	6123	241050	2319	257	2379	1477	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	0	3322	0	54	0	47	0	0
6095	18020109	SFC	1245	800	74	0	185	0	0	25	5036	6758	30554	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6095	18050001	SFB	21852	9319	6541	2097	1583	0	62	795	65327	35128	9613	53048	6378	0	0
6095	18050002	SFA	11755	6550	3036	452	311	0	17	840	1625	5577	12	6197	195	0	0
6097	18010109	SFX	3231	1524	91	0	40	0	44	1141	538	10609	156835	0	104	0	0
6097	18010110	SFX	60448	39537	4523	1924	3707	1213	563	6886	100364	65561	359044	1462	593	0	0
6097	18010111	SFX	1299	447	336	0	27	0	131	99	44509	9744	14941	210	632	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6097	18050002	SFA	22440	10510	1398	818	526	124	366	7724	70489	46910	35086	4980	704	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0

TABLE G5: 1985 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020010	SFC	1662	0	0	25	1529	0	109	0	101181	0	610	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	22475	8660	3204	2759	5276	435	1023	1119	257574	2235	99	2440	867	0	0
6113	18020019	SFC	711	0	0	0	482	0	0	230	19802	677	0	0	1346	0	0
6113	18020020	SFC	590	289	217	12	59	0	0	12	4429	0	0	0	40	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	264	180	84	0	0	0	0	0	20019	3870	32834	0	0	0	0
6113	18020110	SFC	217	156	0	0	0	0	59	0	31110	14716	51682	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			999878	556921	149116	73702	61177	10162	14027	108132	2434951	1137534	1838631	148595	49235	0	0

H. LAND USE DATA FOR THE COMBINED 12-COUNTY BAY/DELTA AREA -- 1995

TABLE H1: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFA

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050002	SFA	12844	7771	2124	1205	667	5	0	1072	0	0	1230	64	0	0	0
6001	18050003	SFA	21837	11831	3549	3036	637	1028	487	1270	4132	9705	825	12288	259	0	0
6001	18050004	SFA	114628	59527	18577	8909	7375	3530	74	16635	25300	103078	110209	9225	1890	0	0
6013	18050002	SFA	34837	20375	3609	6158	865	82	119	3631	400	18011	19609	1981	351	0	0
6013	18050004	SFA	9715	7020	1312	0	30	0	0	1354	4080	28299	9472	0	32	0	0
6041	18050002	SFA	42748	30811	6442	190	790	146	412	3957	8452	13689	40827	3653	371	0	0
6055	18050002	SFA	31021	14630	3540	6748	1010	119	222	4752	54762	32095	115628	4268	571	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0
6081	18050003	SFA	12414	7603	1074	183	324	0	72	3159	432	3129	9016	763	69	0	0
6081	18050004	SFA	55232	30211	7884	3552	5081	440	207	7857	279	13716	9779	7452	1598	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	168839	104950	24243	16631	4980	1882	563	15591	18335	90442	164722	11980	1396	0	0
6085	18050004	SFA	126	7	40	0	0	0	0	79	262	46834	91099	1057	99	0	0
6095	18050002	SFA	13084	7869	3120	457	311	0	17	1309	1455	4441	12	6197	175	0	0
6097	18050002	SFA	26034	13864	1613	860	526	124	366	8682	68881	45695	34340	4980	684	0	0
*** Total ***																	
			565484	327021	82108	49980	24169	7363	2685	72159	186772	409509	607198	63909	7494	0	0

C-095478

TABLE H2: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFB

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6013	18050001	SFB	84099	55447	11342	6294	3120	825	49	7022	7845	35494	25300	7077	1499	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	104	2739	7469	20358	324	0	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6095	18050001	SFB	29433	15798	7242	2682	1583	0	62	2065	62691	31396	8480	53048	6301	0	0
*** Total ***			113640	71245	18589	8976	4703	825	111	9191	73275	74433	54140	60448	7800	0	0

TABLE H3: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	272	3315	35425	7580	138	207	0	0
6013	18040007	SFC	15766	10604	1376	1351	215	0	269	1951	67433	61421	25253	5869	2722	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1556	815	27	0	20	0	0	694	7136	64674	132703	363	516	0	0
6067	18020018	SFC	65527	31915	12723	6469	6128	124	4241	3930	183160	6005	0	2401	6758	0	0
6067	18020021	SFC	203	0	0	0	0	0	0	203	-27	-27	0	0	0	0	0
6067	18020022	SFC	343	0	0	0	0	0	0	343	5	72	17	0	0	0	0
6067	18020023	SFC	112425	70827	16635	4584	4693	156	2900	12629	9062	1161	724	0	3273	0	0
6067	18040007	SFC	156	94	62	0	0	0	0	0	899	20	0	642	104	0	0
6067	18040009	SFC	857	282	264	62	0	0	217	32	21679	2292	0	30	20	0	0
6067	18040010	SFC	3041	1139	373	390	264	0	296	578	171971	13392	11947	1077	2663	0	0
6077	18040003	SFC	237	0	0	0	237	0	0	0	990	6308	5340	0	89	0	0
6077	18040006	SFC	2272	1089	400	0	437	0	72	272	11303	37	0	692	163	0	0
6077	18040007	SFC	65865	34212	13536	5088	8176	0	1509	3344	467151	58475	19212	3863	1818	0	0
6077	18040008	SFC	26908	15008	6778	2107	709	0	709	1598	79487	4335	86	0	412	0	0
6077	18040009	SFC	6560	3253	692	1055	237	0	563	763	130945	2455	203	385	608	0	0
6095	18020018	SFC	20869	6746	2695	1346	1865	96	119	8003	237550	2127	242	2379	1415	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	27	3322	0	54	0	47	0	0
6095	18020109	SFC	1405	963	74	0	185	0	0	183	4997	6733	30460	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6113	18020010	SFC	1927	0	0	27	1773	0	126	0	100917	0	610	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	26051	10038	3712	3196	6116	501	1186	1299	254040	2203	99	2440	857	0	0
6113	18020019	SFC	823	0	0	0	558	0	0	264	19701	674	0	0	1339	0	0

TABLE H3: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020020	SFC	684	336	252	15	69	0	0	15	4337	0	0	0	37	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	306	210	99	0	0	0	0	0	20005	3868	32809	0	0	0	0
6113	18020110	SFC	252	180	0	0	0	0	69	0	31100	14711	51663	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			354803	187720	59742	25690	32100	877	12276	36400	1856136	305146	354410	20412	23048	0	0

TABLE H4: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFX

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6041	18010111	SFX	195	0	47	0	0	0	57	91	25073	304	511	15	0	0	0
6041	18050005	SFX	6592	3213	1904	0	210	0	203	1062	15726	91993	81777	1430	753	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050005	SFX	11794	7319	1070	143	830	0	158	2275	12906	69405	57208	242	573	0	0
6081	18060001	SFX	363	52	0	27	138	0	17	128	4631	7664	6770	5	220	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	13731	7689	1371	1109	785	0	54	2722	36620	57924	125328	462	77	0	0
6097	18010109	SFX	3791	2087	91	0	40	0	44	1529	536	10574	156311	0	104	0	0
6097	18010110	SFX	74367	52394	5486	2337	3707	1213	563	8667	93781	62862	354428	1462	573	0	0
6097	18010111	SFX	1465	613	336	0	27	0	131	358	44443	9707	14884	210	630	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0
*** Total ***			119867	78385	11051	3616	5767	1213	1228	18602	235762	310644	797709	3826	2979	0	0

TABLE H5: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	272	3315	35425	7580	138	207	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6001	18050002	SFA	12844	7771	2124	1205	667	5	0	1072	0	0	1230	64	0	0	0
6001	18050003	SFA	21837	11831	3549	3036	637	1028	487	1270	4132	9705	825	12288	259	0	0
6001	18050004	SFA	114628	59527	18577	8909	7375	3530	74	16635	25300	103078	110209	9225	1890	0	0
6013	18040007	SFC	15766	10604	1376	1351	215	0	269	1951	67433	61421	25253	5869	2722	0	0
6013	18050001	SFB	84099	55447	11342	6294	3120	825	49	7022	7845	35494	25300	7077	1499	0	0
6013	18050002	SFA	34837	20375	3609	6158	865	82	119	3631	400	18011	19609	1981	351	0	0
6013	18050004	SFA	9715	7020	1312	0	30	0	0	1354	4080	28299	9472	0	32	0	0
6041	18010111	SFX	195	0	47	0	0	0	57	91	25073	304	511	15	0	0	0
6041	18050002	SFA	42748	30811	6442	190	790	146	412	3957	8452	13689	40827	3653	371	0	0
6041	18050005	SFX	6592	3213	1904	0	210	0	203	1062	15726	91993	81777	1430	753	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1556	815	27	0	20	0	0	694	7136	64674	132703	363	516	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	104	2739	7469	20358	324	0	0	0
6055	18050002	SFA	31021	14630	3540	6748	1010	119	222	4752	54762	32095	115628	4268	571	0	0
6067	18020018	SFC	65527	31915	12723	6469	6128	124	4241	3930	183160	6005	0	2401	6758	0	0
6067	18020021	SFC	203	0	0	0	0	0	0	203	-27	-27	0	0	0	0	0
6067	18020022	SFC	343	0	0	0	0	0	0	343	5	72	17	0	0	0	0
6067	18020023	SFC	112425	70827	16635	4584	4693	156	2900	12629	9062	1161	724	0	3273	0	0
6067	18040007	SFC	156	94	62	0	0	0	0	0	899	20	0	642	104	0	0
6067	18040009	SFC	857	282	264	62	0	0	217	32	21679	2292	0	30	20	0	0
6067	18040010	SFC	3041	1139	373	390	264	0	296	578	171971	13392	11947	1077	2663	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0

TABLE H5: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6077	18040003	SFC	237	0	0	0	237	0	0	0	990	6308	5340	0	89	0	0
6077	18040006	SFC	2272	1089	400	0	437	0	72	272	11303	37	0	692	163	0	0
6077	18040007	SFC	65865	34212	13536	5088	8176	0	1509	3344	467151	58475	19212	3863	1818	0	0
6077	18040008	SFC	26908	15008	6778	2107	709	0	709	1598	79487	4335	86	0	412	0	0
6077	18040009	SFC	6560	3253	692	1055	237	0	563	763	130945	2455	203	385	608	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050003	SFA	12414	7603	1074	183	324	0	72	3159	432	3129	9016	763	69	0	0
6081	18050004	SFA	55232	30211	7884	3552	5081	440	207	7857	279	13716	9779	7452	1598	0	0
6081	18050005	SFX	11794	7319	1070	143	830	0	158	2275	12906	69405	57208	242	573	0	0
6081	18060001	SFX	363	52	0	27	138	0	17	128	4631	7664	6770	5	220	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	168839	104950	24243	16631	4980	1882	563	15591	18335	90442	164722	11980	1396	0	0
6085	18050004	SFA	126	7	40	0	0	0	0	79	262	46834	91099	1057	99	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	13731	7689	1371	1109	785	0	54	2722	36620	57924	125328	462	77	0	0
6095	18020018	SFC	20869	6746	2695	1346	1865	96	119	8003	237550	2127	242	2379	1415	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	27	3322	0	54	0	47	0	0
6095	18020109	SFC	1405	963	74	0	185	0	0	183	4997	6733	30460	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6095	18050001	SFB	29433	15798	7242	2682	1583	0	62	2065	62691	31396	8480	53048	6301	0	0
6095	18050002	SFA	13084	7869	3120	457	311	0	17	1309	1455	4441	12	6197	175	0	0
6097	18010109	SFX	3791	2087	91	0	40	0	44	1529	536	10574	156311	0	104	0	0
6097	18010110	SFX	74367	52394	5486	2337	3707	1213	563	8667	93781	62862	354428	1462	573	0	0
6097	18010111	SFX	1465	613	336	0	27	0	131	358	44443	9707	14884	210	630	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6097	18050002	SFA	26034	13864	1613	860	526	124	366	8682	68881	45695	34340	4980	684	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0

TABLE H5: 1995 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. ------- USE=12	URBAN INDUST. ----- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020010	SFC	1927	0	0	27	1773	0	126	0	100917	0	610	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	26051	10038	3712	3196	6116	501	1186	1299	254040	2203	99	2440	857	0	0
6113	18020019	SFC	823	0	0	0	558	0	0	264	19701	674	0	0	1339	0	0
6113	18020020	SFC	684	336	252	15	69	0	0	15	4337	0	0	0	37	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	306	210	99	0	0	0	0	0	20005	3868	32809	0	0	0	0
6113	18020110	SFC	252	180	0	0	0	0	69	0	31100	14711	51663	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			1153794	664371	171490	88263	66739	10278	16300	136351	2351944	1099733	1813457	148595	41321	0	0

I. LAND USE DATA FOR THE COMBINED 12-COUNTY BAY/DELTA AREA -- 2005

TABLE 11: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFA

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050002	SFA	12846	7803	2134	1166	667	5	0	1072	0	0	1220	64	0	0	0
6001	18050003	SFA	22867	12113	3767	3616	637	1028	487	1220	3554	9309	813	12288	222	0	0
6001	18050004	SFA	121796	63397	19553	11374	7375	3530	74	16492	22746	100112	108813	9225	1613	0	0
6013	18050002	SFA	35669	21062	3710	6281	865	82	119	3552	400	17512	19315	1981	311	0	0
6013	18050004	SFA	10438	7699	1366	0	30	0	0	1344	4019	27773	9337	0	32	0	0
6041	18050002	SFA	45226	33256	6637	180	790	146	412	3804	8055	13173	39335	3653	304	0	0
6055	18050002	SFA	32686	15368	4406	6862	1010	119	222	4698	54209	31367	115277	4268	546	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0
6081	18050003	SFA	13056	8245	1070	193	324	0	72	3154	412	2991	8546	763	59	0	0
6081	18050004	SFA	55879	30697	7785	3814	5081	440	207	7855	279	13447	9626	7452	1356	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	172149	106956	24381	18071	4980	1882	563	15316	16663	89365	164218	11980	1344	0	0
6085	18050004	SFA	126	7	40	0	0	0	0	79	262	46834	91099	1057	99	0	0
6095	18050002	SFA	13516	8279	3112	459	311	0	17	1336	1349	4125	12	6197	168	0	0
6097	18050002	SFA	28148	15766	1724	968	526	124	366	8675	68053	44919	33834	4980	667	0	0
*** Total ***			586529	341201	84667	55037	24169	7363	2685	71408	180001	401301	601875	63909	6721	0	0

TABLE I2: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFB

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. ------- USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6013	18050001	SFB	88053	59045	11503	6654	3120	825	49	6857	7252	33671	23803	7077	1440	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	104	2739	7469	20358	324	0	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6095	18050001	SFB	31218	16766	7768	3016	1583	0	62	2023	61498	30939	8381	53048	6266	0	0
*** Total ***			119380	75812	19276	9670	4703	825	111	8983	71489	72154	52544	60448	7706	0	0

TABLE I3: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	272	3315	35425	7580	138	207	0	0
6013	18040007	SFC	19298	13760	1645	1497	215	0	269	1912	65509	60191	24912	5869	2675	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1576	835	27	0	20	0	0	694	7136	64670	132688	363	516	0	0
6067	18020018	SFC	76407	37213	14835	7543	7143	146	4945	4582	172989	5666	0	2401	6378	0	0
6067	18020021	SFC	237	0	0	0	0	0	0	237	-44	-44	0	0	0	0	0
6067	18020022	SFC	400	0	0	0	0	0	0	400	2	27	7	0	0	0	0
6067	18020023	SFC	131090	82587	19397	5345	5471	183	3381	14726	-2811	-353	-247	0	-1040	0	0
6067	18040007	SFC	183	109	72	0	0	0	0	0	874	17	0	642	101	0	0
6067	18040009	SFC	1000	326	309	72	0	0	254	37	21551	2277	0	30	20	0	0
6067	18040010	SFC	3544	1326	437	454	309	0	346	672	171539	13358	11918	1077	2655	0	0
6077	18040003	SFC	289	0	0	0	289	0	0	0	986	6284	5318	0	89	0	0
6077	18040006	SFC	2769	1329	487	0	531	0	89	333	10814	35	0	692	156	0	0
6077	18040007	SFC	80297	41711	16502	6202	9969	0	1838	4076	454811	56931	18708	3863	1773	0	0
6077	18040008	SFC	32807	18298	8262	2569	865	0	865	1949	73927	4034	82	0	383	0	0
6077	18040009	SFC	7995	3964	842	1284	289	0	687	931	129542	2430	198	385	600	0	0
6095	18020018	SFC	22546	8200	2853	1494	1865	96	119	7919	236016	2016	240	2379	1386	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	27	3322	0	54	0	47	0	0
6095	18020109	SFC	1442	1000	74	0	185	0	0	183	4989	6726	30433	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6113	18020010	SFC	2149	0	0	32	1978	0	141	0	100697	0	608	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	29055	11197	4142	3567	6820	561	1324	1447	251071	2176	99	2440	847	0	0
6113	18020019	SFC	919	0	0	0	622	0	0	296	19614	672	0	0	1334	0	0

TABLE 13: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFC

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020020	SFC	763	373	279	15	79	0	0	15	4258	0	0	0	37	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	343	235	109	0	0	0	0	0	19992	3866	32789	0	0	0	0
6113	18020110	SFC	279	203	0	0	0	0	79	0	31090	14706	51648	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***																	
			416160	222675	70316	30075	37067	986	14336	40708	1806847	299893	352442	20412	18164	0	0

TABLE I4: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)
SUPERHUCO = SFX

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6041	18010111	SFX	195	0	47	0	0	0	57	91	25073	304	511	15	0	0	0
6041	18050005	SFX	7331	3954	1904	0	210	0	203	1060	15667	91575	81520	1430	751	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050005	SFX	12511	8015	1089	143	830	0	158	2275	12827	68962	57027	242	561	0	0
6081	18060001	SFX	368	57	0	27	138	0	17	128	4631	7664	6768	5	220	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	16631	9771	1650	1689	785	0	54	2680	35049	57220	124705	462	74	0	0
6097	18010109	SFX	3910	2206	91	0	40	0	44	1529	536	10567	156200	0	104	0	0
6097	18010110	SFX	81340	59026	5876	2374	3707	1213	563	8581	90679	61841	351575	1462	558	0	0
6097	18010111	SFX	1502	650	336	0	27	0	131	358	44425	9700	14872	210	630	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0
*** Total ***			131355	88698	11740	4234	5767	1213	1228	18471	230933	308046	793670	3826	2947	0	0

TABLE I5: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. -------- USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. ------- USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN ----- USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6001	18040003	SFC	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0
6001	18040007	SFC	630	10	0	0	348	0	0	272	3315	35425	7580	138	207	0	0
6001	18050001	SFB	0	0	0	0	0	0	0	0	0	74	2	0	0	0	0
6001	18050002	SFA	12846	7803	2134	1166	667	5	0	1072	0	0	1220	64	0	0	0
6001	18050003	SFA	22867	12113	3767	3616	637	1028	487	1220	3554	9309	813	12288	222	0	0
6001	18050004	SFA	121796	63397	19553	11374	7375	3530	74	16492	22746	100112	108813	9225	1613	0	0
6013	18040007	SFC	19298	13760	1645	1497	215	0	269	1912	65509	60191	24912	5869	2675	0	0
6013	18050001	SFB	88053	59045	11503	6654	3120	825	49	6857	7252	33671	23803	7077	1440	0	0
6013	18050002	SFA	35669	21062	3710	6281	865	82	119	3552	400	17512	19315	1981	311	0	0
6013	18050004	SFA	10438	7699	1366	0	30	0	0	1344	4019	27773	9337	0	32	0	0
6041	18010111	SFX	195	0	47	0	0	0	57	91	25073	304	511	15	0	0	0
6041	18050002	SFA	45226	33256	6637	180	790	146	412	3804	8055	13173	39335	3653	304	0	0
6041	18050005	SFX	7331	3954	1904	0	210	0	203	1060	15667	91575	81520	1430	751	0	0
6055	18010110	SFX	0	0	0	0	0	0	0	0	7	2	12	0	0	0	0
6055	18020109	SFC	0	0	0	0	0	0	0	0	0	42	415	0	0	0	0
6055	18020110	SFC	0	0	0	0	0	0	0	0	0	72	222	0	0	0	0
6055	18020116	SFC	0	0	0	0	0	0	0	0	0	101	42	0	0	0	0
6055	18020117	SFC	1576	835	27	0	20	0	0	694	7136	64670	132688	363	516	0	0
6055	18050001	SFB	109	0	5	0	0	0	0	104	2739	7469	20358	324	0	0	0
6055	18050002	SFA	32686	15368	4406	6862	1010	119	222	4698	54209	31367	115277	4268	546	0	0
6067	18020018	SFC	76407	37213	14835	7543	7143	146	4945	4582	172989	5666	0	2401	6378	0	0
6067	18020021	SFC	237	0	0	0	0	0	0	237	-44	-44	0	0	0	0	0
6067	18020022	SFC	400	0	0	0	0	0	0	400	2	27	7	0	0	0	0
6067	18020023	SFC	131090	82587	19397	5345	5471	183	3381	14726	-2811	-353	-247	0	-1040	0	0
6067	18040007	SFC	183	109	72	0	0	0	0	0	874	17	0	642	101	0	0
6067	18040009	SFC	1000	326	309	72	0	0	254	37	21551	2277	0	30	20	0	0
6067	18040010	SFC	3544	1326	437	454	309	0	346	672	171539	13358	11918	1077	2655	0	0
6067	18050001	SFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6075	18050002	SFA	7294	3280	2127	20	227	10	17	1613	0	0	0	0	0	0	0
6075	18050004	SFA	14832	7272	2855	2033	1346	0	128	1198	0	0	0	0	0	0	0

TABLE I5: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6075	18050005	SFX	7563	5014	746	0	30	0	0	1769	0	188	0	0	49	0	0
6077	18040003	SFC	289	0	0	0	289	0	0	0	986	6284	5318	0	89	0	0
6077	18040006	SFC	2769	1329	487	0	531	0	89	333	10814	35	0	692	156	0	0
6077	18040007	SFC	80297	41711	16502	6202	9969	0	1838	4076	454811	56931	18708	3863	1773	0	0
6077	18040008	SFC	32807	18298	8262	2569	865	0	865	1949	73927	4034	82	0	383	0	0
6077	18040009	SFC	7995	3964	842	1284	289	0	687	931	129542	2430	198	385	600	0	0
6077	18050004	SFX	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
6081	18050003	SFA	13056	8245	1070	193	324	0	72	3154	412	2991	8546	763	59	0	0
6081	18050004	SFA	55879	30697	7785	3814	5081	440	207	7855	279	13447	9626	7452	1356	0	0
6081	18050005	SFX	12511	8015	1089	143	830	0	158	2275	12827	68962	57027	242	561	0	0
6081	18060001	SFX	368	57	0	27	138	0	17	128	4631	7664	6768	5	220	0	0
6085	18040003	SFA	0	0	0	0	0	0	0	0	0	375	430	0	0	0	0
6085	18050003	SFA	172149	106956	24381	18071	4980	1882	563	15316	16663	89365	164218	11980	1344	0	0
6085	18050004	SFA	126	7	40	0	0	0	0	79	262	46834	91099	1057	99	0	0
6085	18050005	SFX	0	0	0	0	0	0	0	0	7	5	89	0	0	0	0
6085	18060001	SFX	5	5	0	0	0	0	0	0	2	7	346	0	0	0	0
6085	18060002	SFX	16631	9771	1650	1689	785	0	54	2680	35049	57220	124705	462	74	0	0
6095	18020018	SFC	22546	8200	2853	1494	1865	96	119	7919	236016	2016	240	2379	1386	0	0
6095	18020020	SFC	94	0	44	0	22	0	0	27	3322	0	54	0	47	0	0
6095	18020109	SFC	1442	1000	74	0	185	0	0	183	4989	6726	30433	133	0	0	0
6095	18020117	SFC	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
6095	18050001	SFB	31218	16766	7768	3016	1583	0	62	2023	61498	30939	8381	53048	6266	0	0
6095	18050002	SFA	13516	8279	3112	459	311	0	17	1336	1349	4125	12	6197	168	0	0
6097	18010109	SFX	3910	2206	91	0	40	0	44	1529	536	10567	156200	0	104	0	0
6097	18010110	SEX	81340	59026	5876	2374	3707	1213	563	8581	90679	61841	351575	1462	558	0	0
6097	18010111	SFX	1502	650	336	0	27	0	131	358	44425	9700	14872	210	630	0	0
6097	18020116	SFC	47	0	0	0	47	0	0	0	0	116	170	0	0	0	0
6097	18020117	SFC	0	0	0	0	0	0	0	0	0	175	472	0	0	0	0
6097	18050002	SFA	28148	15766	1724	968	526	124	366	8675	68053	44919	33834	4980	667	0	0
6097	18050005	SFX	0	0	0	0	0	0	0	0	2028	0	44	0	0	0	0

TABLE I5: 2005 LAND USES IN THE 12-COUNTY BAY/DELTA AREA
(in acres)

COUNTY CODE	HYDRO UNIT	SUPER HUCO	TOTAL URBAN USE=1	URBAN RESIDEN. USE=11	URBAN COMM. SERV. USE=12	URBAN INDUST. USE=13	URBAN LIFELINE SYSTEMS USE=14	URBAN MIXED COMM/IND USE=15	URBAN MIXED RES/COMM USE=16	URBAN OPEN USE=17	TOTAL AG USE=2	TOTAL RANGE USE=3	TOTAL FOREST USE=4	TOTAL WETLAND USE=6	TOTAL SPARSE VEG USE=7	TOTAL TUNDRA USE=8	TOTAL SNOW USE=9
6113	18020010	SFC	2149	0	0	32	1978	0	141	0	100697	0	608	0	0	0	0
6113	18020015	SFC	0	0	0	0	0	0	0	0	534	20	0	0	0	0	0
6113	18020018	SFC	29055	11197	4142	3567	6820	561	1324	1447	251071	2176	99	2440	847	0	0
6113	18020019	SFC	919	0	0	0	622	0	0	296	19614	672	0	0	1334	0	0
6113	18020020	SFC	763	373	279	15	79	0	0	15	4258	0	0	0	37	0	0
6113	18020104	SFC	0	0	0	0	0	0	0	0	25125	1531	27980	0	0	0	0
6113	18020109	SFC	343	235	109	0	0	0	0	0	19992	3866	32789	0	0	0	0
6113	18020110	SFC	279	203	0	0	0	0	79	0	31090	14706	51648	0	0	0	0
6113	18020116	SFC	0	0	0	0	0	0	0	0	0	16618	5701	0	0	0	0
6113	18020117	SFC	0	0	0	0	0	0	0	0	0	99	375	0	0	0	0
*** Total ***			1253424	728386	185998	99015	71707	10386	18360	139570	2289270	1081393	1800531	148595	35538	0	0

APPENDIX IV -- DISCUSSION OF FORECASTING

Forecasting techniques vary depending upon the complexity of the problem. It is essential that users of the population and land use projections contained in this STR understand that variations in forecasting methodologies can affect the results. The following discussion explains how some of these variations can affect projections.

In making a forecast, several factors have to be considered.

(1) What type of technique(s) is (are) to be used in the forecast?
(2) What are the constraints that would affect the forecast?
(3) What changes in the historical data would affect the direction of the forecast?

Each of these factors are examined in the sections which follow.

Techniques

The simplest form of forecast is that of a trend. A trend forecast is a projection of some past event using some statistical technique. The most likely statistical technique is that of least squares. But even here, some degree of complexity is added to the analysis. What form of least squares should be used -- a linear or non-linear? This question generally can be answered by plotting the data and observing its historical behavior. Therefore, a trend forecast simply uses time as the independent variable to determine the direction of the variable being predicted. Although this technique may be viewed as overly simple, its usefulness should not be underestimated.

As the complexity in a model is increased to "improve" its "explainability," the instability of the model also increases. For example, one may prefer a population model that uses a series of equations in which birth rates and net migration become the explanatory variable. Although this model may be appealing, one now has to develop predictions of future migration and birth rates. Will the forecast be any better? Analysis of various forecasts seems to indicate that simple models perform quite well, when the historical data maintains some degree of stability.

At ABAG, staff prefers to use simple trend models in their "initial first cut" when doing long-term population forecasts. This "initial first cut" is used to determine the "envelope" of the future forecast. ABAG uses linear and non-linear least squares to determine the envelope of the potential future based upon historical data. The most recent forecast covered the period 1975-1989.

Before reviewing the forecast numbers for the year 2005 using various techniques, a statistical point should be made. The exponential trend model, with historical data covering the period 1975-1989 to predict the year 2005 population, appears at first to have the best fit of data to predict the year 2005 population level. The correlation coefficient (r^2) is 0.98 and the standard error of the estimate (SE) is 6.876E-03. The equation is:

$$F(x) = 5.4459E\text{-}05 * e(1.276E\text{-}02*(X)) \text{ where } X = \text{year.}$$

The statistical analysis looks good so far: a high correlation coefficient and a small SE. However, one also needs to look at a third statistic, the Durban-Watson (DW) statistic. The DW statistic tells us something about bias in a model, and whether it may be a good predictor of the future. A DW value of 2 implies that the model is not biased and that the variation in the predicted value and the actual value in the historical period is random. A value greater than or less than 2 indicates that the model has either a positive or negative bias. That is, that the model is producing a value that is either under or over predicting in the historical period and that bias will affect future forecasts. The DW statistic for the above model is 0.67 which indicates substantial bias. This analysis emphasizes that model statistics should be viewed with caution, and such simple statistics as a high correlation coefficient or a small SE may not be sufficient to suggest that a model is a "good predictor of the future."

Table IV-1 shows the Bay Area population for the year 2005 for:

- each of the three trend models used by ABAG in its projections program (linear least squares, exponential least squares, and geometric least squares);
- the two sources of population projects used in this STR: (1) the Department of Finance numbers (used as a basis for population in Tables A1 - A3 and Figures 2, 9, 10, 12, 13, 18 and 19); and (2) Projections 87 (ABAG, 1987) (used as a basis for the land use change values for the nine-county Bay Area); and
- the Projections 90 values which became available in December 1989.

TABLE IV-1
POPULATION PROJECTIONS AND FORECASTS FOR THE BAY AREA

	2005
Linear Least Squares	6,906,700
Exponential Least Squares	7,143,800
Geometric Least Squares	7,131,900
Projections 90 (ABAG, 1989)	6,832,850
Projections 87 (ABAG, 1987)	6,663,400
Population Projections (DOF, 1986)	6,672,712

The difference between the highest trend forecast and that of both the Department of Finance and Projections 87 (ABAG, 1987) is over 470,000 individuals. Both ABAG forecasts and that of the Department of Finance are lower than the linear least squares. Why are the ABAG forecasts, including Projections 90, lower than the three trend models? The answer is found in the second of the three questions listed above -- "what are the constraints that would affect the forecast?"

Constraints

The constraints in this case are local development policies. ABAG undertakes a bi-annual survey of housing and development policies of local governments in the nine-county Bay Area. If the dwelling units that are potentially available are compared with the dwelling unit projected using least squares, one can see a major difference. Table IV-2 illustrates this difference.

TABLE IV-2
COMPARISON BETWEEN LEAST SQUARES PROJECTION OF HOUSEHOLDS AND ABAG'S FORECAST IN PROJECTIONS 90

Growth Between 1990 and 2005 in the Bay Area

Linear Least Squares	506,100
Exponential Least Squares	693,400
ABAG's Forecast from Projections 90	422,100

The purpose of Table 2 is to illustrate the downside of using statistical projection techniques based solely on historical trend data. The data in this example covers 1975-1989. It illustrates that future growth in the Bay Areas will not necessarily follow the historical trends.

The lower household forecast affects overall population growth. In addition to considering constraints that might affect historical growth, a final factor is the consideration of changes in the historical data that would affect the forecast.

Historical Data

Historical data represents "footprints" of an event that occurred in the past. The "footprint" tells us something about past direction and an inference to future direction, but not necessarily a guarantee. Therefore, in doing a projection one must ask the question -- "what changes in the recent past may affect the behavior of the data and hence, the direction of the projection?" In the case of the Bay Area, ABAG has identified a major constraint--housing--that will affect future population growth. Other factors may be the changing spatial distribution of the population being measured.

Conclusion

Therefore, simple statistics, such as correlation coefficients, standard error of the estimate or even the DW statistic may prove inadequate when doing long term forecasts. The combination of the above statistics, plus the other factors considered in this discussion (including constraints and historical data), improves the changes of accuracy, but in no case guarantees accuracy. This process is used by ABAG in estimating future growth.

APPENDIX V -- COMMENTS RECEIVED ON SECOND DRAFT

Comments on the second draft of the STR on Land Use and Population were received from:

- John Malamut, Bay Planning Coalition
- Barbara Salzman, Marin Audubon Society
- Felix Smith, U.S. Fish and Wildlife Service
- Stephen Monismith, Stanford University
- Andrew Gunther, Aquatic Habitat Institute
- Tom Wakeman, U.S. Corp of Army Engineers

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December 15, 1989

Mr. Sam Ziegler
San Francisco Estuary Project
P.O. Box 2050
Oakland, CA 94604-2050

Re: Comments on Second Draft Land Use STR

Dear Sam,

I would like to congratulate you and the staff for the work you have done to make this second draft readable and clear. It is an immense improvement over the first draft. This product is well worth the time and effort that staff and commentors expended on it.

The following comments are divided between the Executive Summary and the STR:

Comments on Executive Summary

Page 1, 3rd paragraph: Was this quote derived from the MAC?

Page 16, Land Use Subcommittee: Kassandra Fletcher of BIANC was omitted from this list. Also, if BCDC has two representatives, you may as well list me as an additional subcommittee member from the Bay Planning Coalition.

Page 16, last sentence: "and the SFEP Management Conference" should be deleted. At this point, any conclusions were drawn by ABAG staff.

Comments on 2nd Draft Land Use Status and Trends Report

Page ii, last sentence: See above comment. In fact, there are no "listed" conclusions.

Page 3: I have trouble understanding how such a large area can be included within the "Land Use Study Area Boundary". The only tangential explanation is found in the appendix under figures 26 and 27, where some areas have been identified as "Areas which historically have only occasionally drained into the San Francisco Estuary". This is not a satisfactory explanation.

Page 12, 4th paragraph, 3rd sentence: delete extra "are" before "no longer".

Page 14, 4th paragraph, 3rd sentence: Same as above comment.

Page 18, 5th paragraph, 2nd sentence: Add "Some" before "scientists". I have enclosed two articles that might add to this discussion. They are reports from the American Geophysical Union meetings held recently in San Francisco.

Page 19, 1st paragraph, last sentence: What does "Such areas" refer to? Estuaries, tributaries, and groundwater?

Page 19, 2nd paragraph, 4th sentence: Why does the Presidio "mirror global sea level change"?

Page 19: Our comment from the first draft asked you to point out that BCDC's two reports resulted in different conclusions. This information should be supplied to display that estimates vary widely.

Page 29, last sentence: Level II and Level III are not explained here. You should refer the reader to the appendix or explain in the text.

Page 46, last paragraph, 1st sentence: Development should be followed by a comma not a period.

Page 60, 2nd paragraph, 3rd sentence: Why is "AND" capitalized?

Page 61, last paragraph, 1st sentence: Change "for" to "from".

Page 64, 2nd paragraph, 2nd sentence and last sentence: It is not clear whether this "development pressure index" will be used.

Page 64, 3rd and 4th sentence: I still do not understand how this comparison will result in this information. Also, I do not think this analysis will be presented in the Wetlands STR.

Page 65: This chapter does not have "Conclusions". It should be retitled to reflect its contents: Data Gaps and Other Land Use Management Issues.

Page 66, Under 2. Land Use Data, 5th sentence: How would this information allow one to determine development pressure on wetlands?

Page 67, 3rd bullet, 2nd question: Replace "other" with "the".

Mr. Sam Ziegler, San Francisco Estuary Project
Bay Planning Coalition Comments on Land Use STR
December 15, 1989

Suggested Additions to the Glossary:

Development pressure

HUCO and SuperHUCO

Non-urban

Point and Nonpoint sources of runoff

San Francisco Bay Region - The counties should be identified.

Urban

Urbanization

Watershed

Wetlands - The report refers to wetlands identified in the National Wetlands Inventory. For this purpose, the U.S. Fish and Wildlife Service definition of wetlands should be included. However, the report also conceptually refers to wetlands in terms of "development pressure". This generally indicates jurisdictional wetlands. For this purpose, the Environmental Proptection Agency/Army Corps of Engineers definition of wetlands also should be included. This difference, and the purposes each definition serve should be discussed as part of the definition.

I look forward to working with the ad hoc group on this second draft. If you have any questions, please give me a call.

Sincerely,

John Malamut
Assistant Director

Marin Audubon Society Box 599 Mill Valley, California 94942-05

December 9, 1989

Mike Monroe
SF Estuary Project
P.O. Box 2050
Oakland, CA 94604-2050

RE: COMMENTS ON REVISED LAND USE STR

Dear Mike,

This STR is much improved. My major concern, although the discussions on how projections are made are better, is that the document still does not make clear that wetlands are considered to be available land with both of the agencies that develop population projections and also in policies of most local jruisdicitons.

While the author of this report may not be considering wetlands to be available for development, the sources of data on which this report is based, do consider them available. The Dept. of Finance, ABAG, and the policies of most local jurisdictions reflect development potential on privately owned wetlands. Local jurisdictions usually allow development potential on wetlands, at least because they are afraid of being sued if not because they want the development itself. The development potential on wetlands can be quite high.

Para 2, page 32, recognizes that wetlands "are subject to Page significant development constraints..." But how can it be concluded that wetlands are not considered available for development, if local jurisdictions consider them to be available and you don't even know where they are?

Some additional specific comments are below:

INTRODUCTION- First Bullet - The objective of this document is not to provide answers about effects of specific major events, but to provide information about effects on the estuary of historic events that have had significant effects.

Page 9. E, Para. 2, I do not understand how it could be assumed that the amount of wetlands would remain unchanged when wetlands are not adequately accounted for in the data base for this STR nor are wetlands considered as a constraint in land use projections of ABAG and the Dept. of Finance.

C—095500

F. USING LAND USE DATA, para. 1, What are the additional types of information needed in using the data base?

The use of the reduction erosion for urbanized land as an example implies that urban development is a benefit to the estuary. Balance this discussion with another example.

Page 16, Para. 3, "...perhaps interrupted by a year or two of above average values, followed by a series of years when precipitation was generally above average." seems redundant.

Page 23, D. Para 1, Weren't much of the low lands described as "natural grasslands" wetlands?

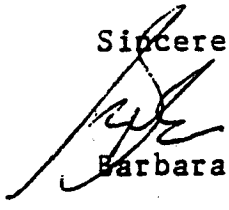
Page 44 B. ASSUMPTIONS, The Bay Area: Is it really the fertility rate you are taking about, or is it the reproductive rate?

Page 46, Here again, as pointed out in para. 3, Local Policy Survey data are used to define the supply of land available to accommodate future households..." Local policies usually allow some development potential in wetlands, if only because jurisdictions are afraid of being sued. Therefore, the supply of land available for development should be considered an overestimate.

Perhaps the definition, but what is the difference between productive forest, as opposed to a non-productive forest?

Thanks for considering my comments.

Sincerely,



Barbara Salzman

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825

December 7, 1989

Mr. Sam Ziegler
San Francisco Estuary Project
P. O. Box 2050
Oakland, California 94604-2050

Subject: DRAFT Status and Trends Report on Land Use and Population

Dear Mr. Ziegler:

A lot of work has gone into this revised DRAFT. It is much improved in both content and readability.

Suggested minor changes, additions and thoughts follow.

Page 26, paragraph 5. Change second sentence to read, "Shasta Dam on the Sacramento River, Friant Dam on the San Joaquin River, and other stream diversions were constructed which altered natural run-off and drainage patterns to the Central Valley, the Delta and San Francisco Bay".

Page 27, first paragraph, second sentence. Change to read "Other projects controlled flows, provide irrigation water and flood protection to downstream lands and Delta islands and protect Delta waterway against the intrusion of saline water."

Page 45, Economic Assumptions. Water supply could be a major problem by the year 2000. This will require maximum water conservation, water reuse and waste water reclamation efforts.

Comment. Industrial waste and urban trash and garbage disposal are present problems and will continue to be problems well into the future.

The California Water Ethic being discussed by the Water Resources Control Board as an integral part of the solution for the Bay-Delta water quality/quantity concerns, is inextricably tied to a California Land Ethic. A California Land Ethic must be developed for the California Water Ethic cannot logically proceed and be effective without a Land Ethic.

Sincerely,

Felix E. Smith

C-095502

cc: FWS, FWE, Portland, OR
FWS, FWE, Sacramento, CA
Land Use Com. Chair.,
BCDC, Blanchfield

Leslie Salt Co.
A CARGILL CO.

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March 29, 1990

Mr. Sam Ziegler, Project Officer
San Francisco Estuary Project
P. O. Box 2050
Oakland, CA 94604-2050

Subject: Second Draft--Status & Trends Report
on Land Use & Population
Leslie Salt Co. file: 2000.013:0

Dear Mr. Ziegler:

This letter concerns the Second Draft of the Status & Trends Report on Land Use & Population, specifically pages 18 and 19.

The penultimate sentence on page 18 cites an EPA estimate of sea level rise without any citation or footnote. In which official publication did the Agency make that finding? What is the scientific authority for this estimate?

The last sentence on page 18 refers to the graph on page 19 labeled Figure 6; Global Sea Level Rise Predictions.

The proposed text omits the qualifying language which the BCDC took care to include with this graph in its report "Sea Level Rise: Predictions and Implications for San Francisco Bay," pages 28 and 29. Some of that language is as follows:

> "A comparison of several predictions with the historic trend, all relative to the year 1980, is presented on Figure 1 (Dean, 1986). The four EPA estimates are based on multiple regression (a statistical analysis) of sea level on the meteorological and oceanographic parameters that influence the long-term trend in sea level (Hansen, et al, 1981). Although this methodology helps in developing an understanding of the processes involved and may eventually prove to be the best approach, at present the predictions using this methodology are questionable, as they rely on uncertain information. Similar comments pertain to the other estimates shown on Figure 1. The projected rise in sea level for the next century ranges from approximately one-foot to 10 feet. The uncertainty associated with this wide range limits the usefulness of these predictions in developing practical planning guidelines for immediate implementation."

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To use this graph without the BCDC qualifying language is taking it out of context and creating an unwarranted emotional response in the reader, lacking scientific justification.

The final paragraph on page 19 cites BCDC projections as follows:

> "Projecting the current 19-year rate to the year 2007, BCDC predicts a minimum mean sea level rise at Sausalito of 0.37 feet (11 cm) and a maximum rise of 2.78 feet (84 cm) at the Alviso Slough. At the Presidio, which mirrors global sea level change, a rise of 0.43 feet (13 cm) is expected. Pittsburgh, near the western boundary of the Delta, is expected to see a rise of 1.32 feet (40 cm)."

When one takes the time to read the BCDC report, one finds that these sentences are incorrect.

First of all, on pages 45 and 46 of the BCDC report, they indicate that the 19-year record on which these projections are based include "unsually high water levels in 1982 and 1983. These high water levels were associated with an extreme climatic event called 'El Nino'. Neglecting the unusual values associated with all El Nino events during the recent period yields a rate of 0.0059 feet/year" (as contrasted to 0.0072 when El Nino is included).

Later on page 45 the BCDC report states "the periodic rise in sea level associated with El Nino is included, however in the analysis of highest tides discussed below."

Therefore, the elevations projected by BCDC are not a "minimum" mean sea level rise.

Furthermore, the numbers presented in the Status and Trends Report as "minimum sea level rise" at Sausalito, Alviso Slough, Presidio, and Pittsburg, are a combination of the maximum sea level increases plus land subsidence. The sea level rise component is 0.14 foot (1.7 inches) over twenty years at all locations.

If BCDC had used the more defensible rate of 0.0059 feet/year, the twenty-year sea level rise would be 1.4 inches!

The other component for the BCDC projections is vertical land motion, for which BCDC reports an incomplete data base. The following paragraph is on page 44 of the BCDC report:

> "The validity of the planning criteria is largely dependent on the accuracy of the input data on which the extrapolation procedure is based. For the water level data, relatively good information is available; for the vertical land motions, more extensive and up-to-date information is needed to fully validate the procedure. The vertical land motions in some locations such as the South Bay, are the dominant component

> of the relative sea level change, and in those areas the need for such information is especially important. The vertical land motion projections established in this report are based, particularly for methodological purposes, on the assumption that past trends will continue. However, as pointed out previously, past subsidence trends in the South Bay, because of possible subsidence arrest, may not be valid in accurately projecting future relative sea level change in this area."

Therefore, the most extreme figure cited as "minimum mean sea level rise" on page 19 of the Status and Trends Report, 2.78 feet at the Alviso Slough, is questionable (by the source of the projections).

Furthermore, the 2.78 feet in the BCDC table of Mean Sea Level Projections is a mean sea level figure--not a "rise of 2.78 feet" as stated in the draft Status and Trends Report. The projected rise, as indicated previously, is 0.14 feet (1.7 inches).

The total picture, as evident from these additions, is significantly different from the data selected out of context, as presented in the draft.

In fact, a careful review of the referenced BCDC report indicates a serious lack of hard data on the three significant factors: sea level rise, vertical land motion, rate of sedimentation. The BCDC report urges the collection of more field data.

Page 23 - "Around the San Francisco Bay shoreline there are very few releveled benchmarks. Without accurate vertical land motion data for a shoreline area, change in relative mean sea level cannot be determined and accurate prediction of future relative mean sea level change cannot be made. It is therefore extremely important that communities around the Bay...establish and maintain a shoreline benchmark leveling system, in order to understand vertical motion."

Page 36 - "These are serious shortcomings that can only be rectified by a data collection program instituted at the local or regional level."

Page 44 - "For the vertical land motions, more extensive and up-to-date information is needed to fully validate the procedure."

Page 51 - "Once again, limitations on the interpretation of the results apply due to questions concerning the vertical land changes and the assumption that past recorded trends will continue."

Page 58 - "Areas which are experiencing a rapid rise in relative sea level may actually accumulate more sediment than those undergoing more gradual decline."

Page 61 - "Nevertheless, the response of tidal marshes and diked wetlands throughout the Bay will depend upon local rates of sedimentation for which there is very little data."

Leslie

Page 67 - First recommendation: Commission should initiate "a study of sedimentation in San Francisco Bay to include information on rates of sedimentation and/or erosion in shallow regions such as mudflats and tidal marshes."

Perhaps the most important contribution that the Status and Trends Report could make in the topic of sea level rise is to reinforce this need for field measurements and required funding.

Yours very truly,

Paul Shepherd

Paul P. Shepherd
Member, Land Use Subcommittee

PPS2/4:hey

cc: Bay Planning Coalition, S.F.
Mr. Alan Pendleton, BCDC

Stanford University
Water Resources Program

Stephen G. Monismith
Assistant Professor of Civil Engineering

April 3, 1990

Mr. Sam Ziegler
San Francisco Estuary Project
PO Box 2050
Oakland Ca. 94607

Dear Sam,

Following up on my promise at the last TAC meeting, I am writing to pass on my comments regarding the Status and Trends Report on Land Use and Population. Please bear in mind that my comments are made on the basis of only having had the opportunity to review the second draft of this report.

The authors of this report appear to have done three things in writing this report:
(1) They have collected and melded together data concerning land use and population from several different and not entirely compatible sources;
(2) They have constructed a model for predicting future changes in land use and population based on available data subject to assumptions laid out in the text;
(3) They have applied their model to its designed task and have made a cursory examination of its results.
Given the limited resources I understand were available for this report, I think the authors should be commended for their efforts, especially in regards to the first task.

However, I don't find the presentation of the model or the interpretation of its results to be in a form that is easy to understand or of sufficient analytical depth to be of much use. While the authors appear to have applied a numerical model (based on some sort of multiple regression?) nowhere is this model concisely presented or described. For example, how exactly did the assumptions stated on p. 43 ff. translate into model coefficients etc.? Why were ABAG's assumptions laid out when it was the California Department of Finance whose population numbers were used? In general, this comes down to a question of adequately and clearly explaining

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methodology so that others might have sufficient information to assess for themselves the accuracy of the predictions. For example, given the apparent skill at graphical representation of data that the ABAG staff demonstrate in this report, a simple (block?) diagram showing how input data are transformed into output predictions would seem to be an reasonable task for them to undertake in the interest of improving the report.

In any event, as was brought up in the TAC meeting, a major weakness of the report is its lack of discussion of the likely accuracy of the projections it presents and of the sensitivity of model results to model assumptions. Rectifying this problem is not entirely out of the question. I gather that the model was used to make a projection of 1985 conditions in the ABAG domain using 1975 data. The authors state that the projections "... were quite similar." What exactly does "quite similar" mean? If the numerical outcomes of this comparison were to be given, the reader might be able to better decide the significance of the predictions given in the report. I also wonder, for example, how 1995 population predictions for a high-growth county like Solano compare with current best estimates of its population. Does ABAG have the information to make this comparison?

The question of connecting assumptions to results is integral to estimating the overall value of the report to the Estuary project. At its beginning, the report presents four questions that it proposes to answer. The failure of the report to address how the assumptions used affect the answers arrived at is a failure to answer a significant part of two important question it poses: "What assumptions are needed to develop future estimates of population and amount of urban land?" and "What recent ..trends can be identified which have and will influence population growth and urbanization?" Clearly identifying which assumptions and trends are important (as opposed to simply stating assumptions and trends) is fundamental to understanding the management implications of changes in land use. Unfortunately, the synthesis of data required to answer these kinds of questions is inherently a more difficult and time-consuming task than is collecting data or running a model. I suspect that this task is, in fact, far more difficult and time-consuming than was intended for the scope of the work of the report.

More generally, the report is lacking in synthesis and analysis. The authors placed a emphasis on their hard-won numbers at the expense of stating what they meant, if anything. The fact that the conclusions to the report add up to little more than a single page of text speaks for itself. Perhaps, at the very least, the introduction to the report might be restructured to better reflect the report's data-intensive nature. Material could also be cut from the report with little loss. In particular, the information presented about climate and geomorphology is in no way connected in the report to land use or population issues except that the report notes that precipitation patterns affect contaminant loadings. Even this connection is not very relevant, as it is the purview of another report that is currently in the works.

Besides these general comments, I found a couple of small errors that should be corrected: (1) There are problems with the population/area/density tables, A1-A3. For example, according to A3, the 1995 county sizes will be only small fractions of their 1985 values. I could not figure out what the units of population density are - they are certainly not people/sq mi.

(2) The reference to "Grove (1917)" should be to Gilbert; I believe Grove was one of the man's given names.

Since I only looked closely at a few references and numbers, I hope that I have only been "lucky", and that there are not many others.

I was also disappointed that the report did not deal with changes in the deposition of wetlands. While they only account for a small percentage of the total acreage in the study area, at least in the inner Bay Area, (Alameda, Marin, San Mateo, and Santa Clara county) these biologically important regions currently face intense development pressure. Is it sufficient for a Land Use report to pass the buck on this issue?

I apologize for sounding negative and critical. I also realize that this somewhat unconstructive criticism may be perceived as unfair given that the second draft of the report was intended to be a nearly final version of the STR. However, after carefully reviewing the report, and, in light of the limitations I have discussed above, I cannot not be terribly positive about the projected land use and population data it presents. While reiterating my belief that the authors have accomplished a great deal in collecting and amalgamating the available data, I regret that they were not able to apply a similar level of effort to interpretation and analysis.

If you have any questions concerning my comments please do not hesitate to call me.

Regards,

Stephen G. Monismith
Assistant Professor

San Francisco Bay - Delta
Aquatic Habitat Institute

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1301 South 46th Street
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(415) 231-9539

March 16, 1990

Mr. Sam Ziegler
San Francisco Estuary Project
P.O. Box 2050
Oakland, CA 94607

Dear Sam:

Please accept this letter as a description of my comments at the Technical Advisory Committee meeting of March 8,1990, regarding the Second Draft of the Status and Trends Report on Land Use and Population. As you recall, I raised some questions regarding certain aspects of the report, and you requested that I provide a written summary of my concerns.

One key problem with the report is that there is inadequate description of the methods used to develop the database and make the projections. Ms. Perkins said that as part of the second draft she was requested to remove information regarding methods. This is unfortunate, as it is not really possible for an interested reader to determine how the data in the report was generated. Readers cannot make their own assessments regarding the sufficiency of the methods.

For example, the report describes an exercise in which the validity of method used to exptrapole the 1975 LUDA data to 1985 is tested using ABAG's BASIS database (p.32). The report states that the estimated 1985 land uses using the two methods were "quite similar", but it does not present this data to allow the reader to assess the results of this test. Similarly, a field-checking exercise is referenced (p. 31), but the results of this exercise are not described. Field-checking is an essential step to determine the accuracy of a remotely-sensed data (such as LUDA), and the results of this field-checking should be available (maybe as an appendix) for the reader to use.

The method by which the projections of future land uses are made also must be provided in the report. Currently, a four-line description on p.43 is the only information provided to the reader regarding how the future land use projections for the Bay Area are developed. Rather than just reference *Projections '87*, the STR must provide a discussion of how the methods utilize

the assumptions described on pp. 44-47. This is essential if the reader is to be able to understand the technique used to develop the data presented in the report.

Another key problem in the report, which is related to the lack of discussion of methods, is that there is no presentation of a sensitivity analysis for the model. Although projected trends are discussed for relatively small changes in land use (2-5%), no analysis of how sensitive these changes are to the assumptions is provided. The report describes different assumptions regarding fertility rates (pp. 44-45), with ABAG assuming a rate of 1.76 between 1985-1990 and the Department of Finance assuming 1.96 for the same period. Would using one rate or the other significantly change the future land use trends in the report?

Figure 1 shows how these two growth rates affect population growth using a simple exponential model. Although the model used in the STR is undoubtedly more complex, it must contain such a basic exponential growth function. After 10 years, a 1.96% growth rate produces a population of 121,652, 2% higher than if the population grew at a rate of 1.76%(119,244). After 20 years, the planning horizon in the STR, there is a 4% difference in population.

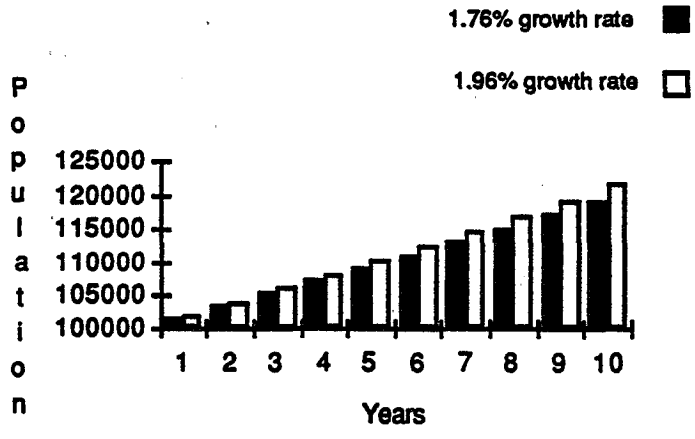

Figure 1: Simple exponential growth of a population with different growth rates. Initial population $A_0 = 100{,}000$, $A(t) = A_0e^{rt}$.

I would think a 4% difference in population in 2005 would change the land use predictions in the STR. As the report states on p. 43, "These projections ...should not be interpreted either as a floor or a ceiling on growth." It is precisely because of this uncertainty that alternate growth scenarios should be examined to determine how robust the predictions are in the face of

changing assumptions. It certainly seems unlikely that we can be confident in the projected changes in land use to four significant figures as presented.

It also seems unlikely that the actual land use data available, whether from LUDA or BASIS, are as accurate as portrayed in the STR. I would suggest that Figure 14, and all other figures that rely on these data, be altered to reflect the appropriate degree of certainty we can place in the data. If field-checking demonstrated that these land use categories are known with the very high accuracy indicated, then the results of the field surveys should be presented (or at least referenced) in the report.

Finally, with regards to the review of the STR by the TAC, I do not think it is reasonable for SFEP to deliver a 180 page report 2-3 days before a meeting and expect the committee to act. I don't understand why the delay occurred, as the report is dated November 1989. Because the time for review was so short, Jeanne Perkins of ABAG was placed in a very difficult position. In the future, the quality of the review from the TAC would benefit by providing the committee with materials to be reviewed a minimum of two weeks prior to meetings.

I hope the project finds these comments of use in revising the STR. I am aware that I am delivering these comments after the STR is well along, but unfortunately this is the first copy of the report that I have seen.

Sincerely,

Andrew Gunther
Alternate Member
Technical Advisory
Committee

cc: Jeanne Perkins
Emily Renzel
Amy Zimpfer
Tom Wakeman
Larry Smith

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
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27 March 1990

Sam Zeigler
Project Coordinator
San Francisco Estuary Project
P. O. Box 2050
Oakland, CA 94607

SUBJECT: Status and Trends Report on Land Use & Population

Dear Mr. Zeigler:

Referring to the second draft of the above report, presented to the Technical Advisory Committee (TAC) on 8 March 1990, I would suggest that some statement or series of statements be included to guide future users and protect SFEP from misuse of the STR data. If I understood Ms. Perkins correctly, the methods, procedures and data presented in this document conform to accepted practices within her field, and she believes the report so states. Nevertheless, because of the potential utility of these kind of data and the lack of a rigorous assessment of either database or model generated uncertainty for these data, I would recommend that scaling limits or bounds be specified as to the possible applications of the data. For example, the data may be quite satisfactory for extrapolating regional housing demands, but I think it would be unacceptable for determining kilograms per capita generation of a heavy metal contaminant from "Draino". If a disclaimer or caveat is included in the report to state that there are limits beyond which the data are not appropriate for higher order calculations, I believe the TAC would be more supportive of the document.

Thank you, Jeanne Perkins and Emily Renzel for presenting the draft STR to the Committee and giving us an opportunity to comment. If you have any questions regarding this suggestion, please contact me at (415) 744-3263.

Sincerely,

Tom Wakeman
TAC Co-chair