

construction & aggregates

in Fresno County

**An Economic Analysis of the Construction
and Aggregate Industries in Fresno County**

October, 2003



Prepared for Construction Materials Association of California,
Fresno County Chapter

*By Sharon Prager, e concepts and
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by

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Note

An Economic Analysis of the Construction and Aggregate Industries in Fresno County is the fourth in a series of economic studies that analyze the economic impacts of the construction and aggregate industries in the state and selected counties. The first study in 2001 provided statistical data on the importance of the aggregates industry statewide. Research on the economic impacts of the construction and aggregate industries in individual counties was launched in 2002 with the release of the second study examining Tulare County. The third study covering Merced County was published in August, 2003. In addition to this study, an economic report covering Shasta County will be released during Fall, 2003.

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1. EXECUTIVE SUMMARY

This report examines and assesses the contributions of the aggregate and construction industries on the Fresno County economy measured by total output, including revenues, employment, wages, value added impacts, and taxes.

Based on 2000 data, without factoring in any projected growth, this study finds that:

- The total economic impact from the aggregate and construction industries in Fresno County is **\$4.4 billion**.
- Over **\$2.9 billion** in direct output was contributed to the Fresno County economy by the aggregate and construction industries, more than 8% of all Fresno County output. This compares favorably with the \$2.6 billion transportation and wholesale trade, and \$2.1 billion fruit and fruit processing industries.
- **\$430 million** of aggregate and construction's direct output was used by the County's major industries. Finance, insurance, and real estate used \$105 million of aggregate and construction products, followed by transportation, communications, and public utilities (\$87 million), and agriculture (\$62 million).
- Nearly **\$1.5 billion** was contributed indirectly by the aggregate and construction industries to the Fresno County economy.
- The aggregate and construction industries employed over **24,000 people**, 6% of all Fresno County employment.
- The aggregates industry paid an average wage of **\$45,137**, nearly triple the county's per capita income.

During the first two decades of the 21st century, Fresno County's population growth rate is estimated at 42%, and job growth is projected in all major nonfarm industries.

Although both population and job growth continues, during 2000, average unemployment was significantly higher (14.1%), and per capita income significantly lower (\$15,495), than for California overall (6.6% and \$22,711 respectively). While Fresno County has been diversifying its economy, its largest industry is services (22% of the county's employment), and as the rest of the San Joaquin Valley, lags in creating jobs that pay high wages.

If Fresno County is to continue developing a diversified economy and attract "New Economy" companies that offer higher salaries, it will need to link economic development with infrastructure investment. Not only is first-class infrastructure

important for retaining current businesses and employees, it is a fundamental factor for cutting-edge companies when deciding location in a highly competitive global environment. Infrastructure is a key component for achieving regional competitiveness, economic vitality, quality of life, and superior community livability.

Providing the necessary infrastructure requires access to local, large, and low-cost supplies of high quality sand, gravel, and crushed stone – called “aggregates”. Aggregates are the basic raw materials required for building, and for making ready-mix concrete, asphaltic concrete (often called “black top”), road base, sub base, and a wide variety of other products. Without aggregates there would be no buildings, hospitals, roads, airports, shopping centers, homes, sewer systems, or any other structure used by Californians. Approximately 60% of all aggregates are used in public works projects, and nearly 90% of all materials required for building federal, state, and local roads consist of sand, gravel, and stone.

Aggregates are not only essential for construction, but for manufacturing, transportation, wholesale trade, and fruit processing as well. All of these industries utilize transportation systems and distribution infrastructure. Agriculture uses aggregate products such as crushed limestone, and remineralizes soils with byproduct fines from aggregate processing. Agriculture also uses large amounts of concrete for dairies and processing plants, and relies heavily upon roads for production and transportation of agricultural goods.

Nevertheless, according to a 1999 Department of Conservation study, depletion of aggregate supplies in Fresno County is occurring at an alarming rate. Depletion in the Fresno Production-Consumption Region is estimated in less than 8 years unless additional aggregate resources are permitted. Failure to do so puts the County’s future at risk.

This report focuses on the economic contributions of the aggregate and construction industries in Fresno County. However, the findings also have implications for how the County chooses to grow, its ability to have the infrastructure that favorably impacts its economic, social, and environmental future, and the inclusion of aggregate resources in its long range land use planning. All state and regional demographic and economic indicators point toward growth and development continuing in Fresno County for decades to come. That information, combined with the economic data herein, indicates that planning for Fresno County’s future livability also means planning for the continuous availability of aggregates.

2. OVERVIEW

2.1 CALIFORNIA'S INSUFFICIENT INFRASTRUCTURE

Since 1990, California has gained over 4 million new residents – the largest population increase of all 50 states. The California Department of Finance estimates a population of 45 million in 2020, and 50 million in the 2030s. Although California attracts worldwide immigration, most of the state's growth in the 1990s was attributable to the birthrates of Latino and Asian residents. This trend is expected to continue, as future growth rate projections are based primarily on newborn residents.¹

Although growth continues unabated throughout California, it is occurring most rapidly beyond the San Francisco and Los Angeles regions. Over half of the state's population now lives outside the state's coastal megalopolises.

At the same time, California has failed at planning for growth and the concomitant infrastructure required. It has been well publicized that California's expenditures for infrastructure rank near the bottom nationally, and that the state needs to spend over \$90 billion to meet its infrastructure needs.²

California is only producing one-half its housing needs, and while the state's population has grown by 50% during the past 20 years, road capacity has barely increased 7%. In the 1960s approximately 20% of state spending was directed towards infrastructure. Today that figure is closer to 3% despite tremendous growth, and outdated and crumbling infrastructure.³

There is a direct correlation between increased population and infrastructure requirements. Infrastructure comprises public works such as roads, highways, bridges, water and sewer systems, airports, dams, and power plants, as well as schools, libraries, and other public buildings. Residential and commercial construction is also included as infrastructure in this report. A dynamic economy, sustainable environment, quality school system, and a healthy quality of life all depend upon the construction and maintenance of infrastructure.

2.2 FRESNO COUNTY'S CONTINUOUS GROWTH

Population in the Central Valley overall, and in the San Joaquin Valley particularly, is growing at a faster rate than the state. Fresno County is participating in this growth. From 1990-2000 the County grew by 20% to 799,400 residents.⁴ During the first two decades of this century, the State of California is estimating Fresno County's population growth at 42%.⁵ Other estimates indicate that by the year 2040 Fresno County may grow to 2,498,000, or over 3 times its current size.⁶

According to the California Department of Finance, Fresno is now California's 6th largest city, and Fresno County among California's 10 largest counties, as well as one of the 10 fastest growing counties.⁷ From 1995-2002, both the number of single family housing building permits and their average valuation steadily increased. Building permits are not only a construction indicator, "but also an indirect indicator of the perceptions of the local builders and developers of the relevant strength of the economy in the near future."⁸

While California is the nation's leading agricultural state, and Fresno County often ranks as the "nation's most prolific agricultural county", in 2000 only 15.7% of the county's labor force was employed by agriculture.⁹ Services is now the largest industrial sector, and the county is also becoming a leader in retail trade and transportation. Growth is projected in all major nonfarm industries. The county's growing industries include call centers, light assembly, packaging, distribution/warehousing, and medical, financial, and technology support services. An Ernst and Young study placed Fresno as a preferred site for manufacturing and distribution based on its central location and access to over 35 million consumers within a day's drive.¹⁰

Continued strong population growth and maintaining economic vitality require a first-class infrastructure. The Fresno economy, in common with the entire San Joaquin Valley, lags in creating jobs with high wages, and the seasonal nature of agriculture contributes to ongoing double-digit unemployment numbers. During 2000, Fresno County's overall unemployment rate was 14.1%,¹¹ and its per capita income was \$15,495.¹²

In a study by the Central California Futures Institute it was noted that "In light of both increased population and education and training needs mandated by global trading and the New Economy, massive infrastructure and investment programs will be needed in the Central Valley."¹³

If Fresno County is to continue successfully developing a diversified economy it will need to link economic development with infrastructure investment. In a highly competitive global economy, quality infrastructure is a primary consideration of businesses when deciding location. Attracting "New Economy", knowledge-based industries and their higher salaried employees, requires offering a quality of life competitive not only regionally, but globally. Innovative companies and their skilled workforce choose communities with excellent infrastructure and cultural and recreational opportunities. Providing state-of-the-art infrastructure is a key component of community livability.

Since infrastructure directly impacts a county's livability and ability to achieve its goals, it is one of a number of indicators that residents, planners, and decision makers consider when striving for positive outcomes.

2.3 NO INFRASTRUCTURE IS BUILT WITHOUT AGGREGATES

Building and maintaining infrastructure requires a continuous supply of locally available sand, gravel, and crushed stone, called “aggregates”. These natural resources are the first step in the construction process and used in a wide variety of products. Aggregates are necessary for making portland cement concrete and asphaltic concrete.

Physical infrastructure, or the “built environment”, comprises public works projects and residential, commercial, and industrial buildings:

INFRASTRUCTURE CATEGORIES	EXAMPLES
<ul style="list-style-type: none"> • TRANSPORTATION 	Roads, highways, bridges, ports, airports, railroad beds, and public transit
<ul style="list-style-type: none"> • WATER RESOURCES 	Water and sewer systems, pumping and power plants, canals, pipelines, reservoirs, and flood control structures
<ul style="list-style-type: none"> • PUBLIC BUILDINGS 	Schools, libraries, hospitals, laboratories, correctional facilities, and government offices
<ul style="list-style-type: none"> • OUTDOOR AND RECREATIONAL 	Parks, trails, fire stations, forest and agricultural stations
<ul style="list-style-type: none"> • RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL BUILDINGS 	Homes, shopping centers, manufacturing plants, office complexes, agricultural structures

- Aggregates make up more than 94% of asphalt and 80% of concrete pavements.
- Construction of an average home requires 400 tons of aggregates.
- 38,000 tons of aggregates are required for one lane-mile of a four-lane highway.
- Water and sewer facilities use aggregates for filtration in water purification and sewage treatment.
- Thousands of tons of aggregates are required for water and sewage treatment plants, water storage, power plants, prisons, dams, tunnels, and erosion control.
- A school or hospital requires at least 15,000 tons of aggregates.

- Aggregates are also used in agriculture and forestry, environmental protection, and in the manufacturing of glass, paint, cosmetics, pharmaceuticals, and many other consumer products.¹⁴

Without aggregates there would be no buildings, hospitals, roads, airports, shopping centers, homes, sewer systems, or any other structure used by Californians.

Approximately 60% of all aggregates are used in public works projects, and nearly 90% of all materials required to build federal, state, and local roads consist of sand, gravel, and stone.

Aggregates' indispensability to infrastructure demonstrates that aggregates are both a natural resource and a community asset. Therefore, when determining what data to include and exclude in long-range planning, it is important to incorporate local aggregate resources, because the availability of aggregates has direct consequences on a community's livability.

2.4 ALL AGGREGATES ARE NOT ALIKE

Not every aggregate deposit is physically or chemically suited for every use. Certain physical property characteristics and qualities must be present depending on the ultimate application, and specifications have been set by various government agencies to ensure the suitability of the aggregates to the specific use. Concrete aggregate is construction aggregate that meets the quality standards for use in portland cement concrete and asphaltic concrete. The California Geological Survey (formerly the California Division of Mines and Geology) states that "Most aggregate specifications have been established to ensure the manufacture of strong, durable structures capable of withstanding the physical and chemical effects of weathering and use."¹⁵ Specifications for portland cement concrete and concrete products prohibit or limit certain mineral substances within the rock materials, and often mandate particle-size distributions.

High-tech industries receive the attention, but society depends on aggregates as much as on gasoline, electricity, and food products. Citizens drive by road work, or casually notice a ready-mix truck rolling along, but don't link aggregates to those activities. For most uses, there are no substitutes for aggregates – they can't be manufactured or duplicated, and their locations are determined by geological conditions. There are few other industries that can't be moved or grown elsewhere, or that are so critical and unique to their applications. What is often assumed to be a common commodity, accessible everywhere, and taken for granted, is actually quite the opposite.

2.5 FRESNO'S FUTURE DEPENDS ON ALLEVIATING AGGREGATE SHORTAGES

If Fresno County is to build, maintain, and replace current and future infrastructure, it will require hundreds of millions of tons of high-grade construction aggregates.

In 1999, the Department of Conservation's Division of Mines and Geology issued an updated classification report presenting information on the supplies and availability of portland cement concrete (PCC) aggregates. The report also projected the amount of PCC quality aggregates needed for 50 years, and calculated the years until depletion of reserves.

Although this economic study encompasses Fresno County in its entirety, the state's classification report is based on the "Fresno Production-Consumption Region" (Fresno P-C Region), which is defined as covering "the urban and urbanizing areas surrounding Fresno in Fresno County and Madera in Madera County."¹⁶ (See Figure 1 in the Appendix: "General location of the Fresno P-C Region."¹⁷)

According to the 1999 report, the average per capita consumption of aggregates in the Fresno P-C Region is 6.5 tons per person. However, the study also cautions that this rate ". . . may be too low to accurately reflect future use . . ."¹⁸

The state study indicated that anticipated aggregates' consumption through 2047 is estimated to be 528 million tons, of which 50%, or 264 million tons, must be of portland cement concrete (PCC) quality. This is nearly double the consumption estimate made in the original 1984 classification report. At the time of the 1999 update it was estimated that permitted PCC-grade aggregate resources (reserves) within the Fresno P-C Region would run out in 2011.

In fact, over the past four years, factors have arisen indicating that the 2011 depletion date may be overly optimistic. Without considering future growth, there are already insufficient permitted reserves for current market demand, permitted reserves are continually being reduced, and all of the aggregates produced within the Fresno P-C Region are consumed locally. In addition, as the state report points out, production of aggregate reserves under present permits may be limited due to operating restrictions and expiration dates.

Recent economic studies of aggregates in adjacent Tulare and Merced counties show that these counties are facing their own supply crises and are unlikely to be alternative sources of aggregates for the Fresno P-C Region.¹⁹

An alternative source of aggregate resources for the Fresno P-C Region would be the Coalinga area. However, aggregates are a relatively low value, high weight commodity, and if supplies aren't obtained locally, the transportation costs can rapidly exceed the value of the aggregates. Beginning in 2012 (the year following depletion) hauling from

Coalinga would add a minimum of \$50 million annually to construction costs, and even greater expense if hauled from more distant areas.²⁰

There are also additional environmental and safety impacts associated with longer-distance transport. Increased fuel consumption, air pollution, traffic congestion, and road maintenance all affect the environment, and longer transportation distances also raise safety concerns.

The state's Mineral Land Classification Study indicates that in 1983 the region had 119 million tons of reserves which were projected to last 26 years. By the time of the 1999 updated study (based on 1997 data), the reserve depletion projection had dropped to 14 years. Since then, additional conditions, and Fresno County's continued population growth, indicate that depletion is likely to occur before the estimated date of 2011.

Given the long lead time necessary to permit a new deposit, it is crucial to act now to ensure Fresno County's quality of life and economic growth aren't put at risk.

2.6 RESTORING, RECLAIMING, AND REUSING AGGREGATE LAND

Aggregate companies are heavily regulated and must meet the requirements of nearly 80 agencies overseeing federal, state, county, and local laws. Once permitted, the regulatory process continues throughout the life of the operation.

Nevertheless, aggregate production is an interim land use. After providing the building materials necessary for infrastructure, the land is reclaimed and restored. In California, aggregate producers reclaim land to nearly 50 diverse and desirable uses, including open space, agriculture, and recreation. While over 90% of California's wetlands have been lost over the past 100 years due to statewide settlement, California's sand and gravel producers are a major resource for creating and restoring thousands of acres of wetlands and wildlife habitat. The California Office of Mine Reclamation reports that statewide, aggregate producers have reclaimed over 50 square miles of land during the decade of 1990-2000.²¹

Many land use projects are the result of successful partnerships between aggregate producers, communities, and local and county governments. Whether reclaimed to residential or commercial developments that generate additional economic value, or to recreational uses for the public's enjoyment, reclaimed aggregate land is a community asset.

-
1. Mark Baldassare, A California State of Mind (Berkeley: University of California Press, 2002), 37.
 2. Ibid., 38.
 3. "Infrastructure in California: Overburdened, Outdated, and Overlooked", California Rebuild America Coalition Fact Sheet
 4. US Census Bureau, Census 2000.
 5. State of California Employment Development Department, County Snapshots, <www.calmis.ca.gov/file/COSnaps/fresnSNAP/pdf.
 6. "A Landscape of Choice," Fresno Business Council, as shown on <<http://www.fresnobc.org>.
 7. "Population Estimates for California Cities," California Department of Finance, Demographic Research Unit, as shown on <<http://www.dof.ca.gov/html/demograp/e-1press.doc>.
 8. "Building Permits: Number of Building Permits Issued – 7 Year Trend," as shown on <<http://www.ersys.com/USA/06/0627000/permits.htm>.
 9. The Fresno Bee (Fresno), 17 August 2002.
 10. Fresno Chamber of Commerce, as shown on <<http://www.fresnochamber.com>.
 11. State of California Employment Development Department, County Snapshots.
 12. Census 2000.
 13. Dr. Joseph J. Penbera, Forecasts for the Central Valley to 2010 and Beyond, Central California Futures Institute, (Fresno: California State University), 2.
 14. 50 Fascinating Facts about Stone, Sand and Gravel (Arlington, VA: National Stone, Sand and Gravel Association).
 15. John P. Clinkenbeard, Mineral Land Classification of Merced County, California (Sacramento: California Department of Conservation, Division of Mines and Geology, 1999), 14.
 16. Leslie G. Youngs and Russell V. Miller, Update of Mineral Land Classification: Aggregate Materials in the Fresno Production-Consumption Region, California (Sacramento: California Department of Conservation, Division of Mines and Geology, 1999), 1.
According to the 1999 updated state report, the boundary was originally drawn in 1988 to include 95% of the aggregate market area of the region's producers. As of 1999, the boundary still encompassed 95% of the aggregates market. However, the growing Sierra Nevada foothill areas of Fresno and Madera counties may soon consume more than 5% of the region's production.
 17. Ibid., 2.
 18. Ibid., x.
 19. See Randy Evans and Sharon Prager, Construction & Aggregates in Tulare County (Sacramento: Construction Materials Association of California, 2002); Construction & Aggregates in Merced County (Sacramento: Construction Materials Association of California, 2003).
 20. Youngs and Miller, 26-27.
 21. Sharon Prager, Reclamation Survey (Sacramento: Construction Materials Association of California, 2001), 6-7.

3. THE AGGREGATE AND CONSTRUCTION INDUSTRIES' CONTRIBUTION TO FRESNO COUNTY'S ECONOMY

This portion of the report describes the contribution of aggregates and construction to the Fresno County economy in 2000. In addition to the direct contribution that these industries create through production and services, their purchases have significant economic impacts. The economic contributions of other selected industries are also shown for context and comparison purposes.

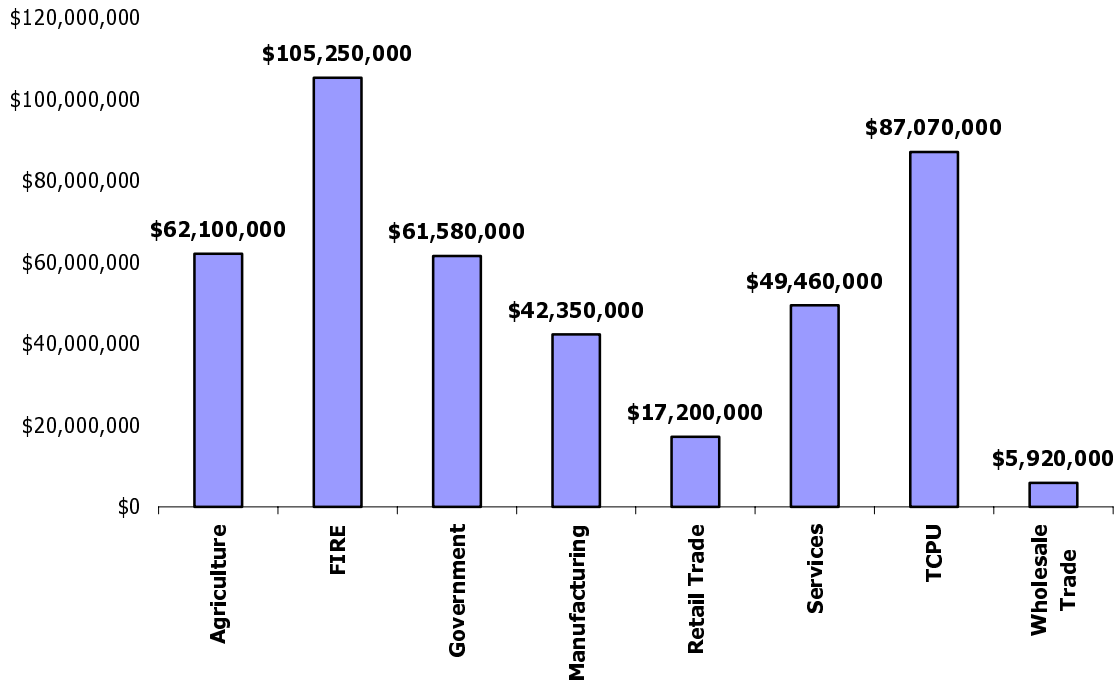
3.1 THE FRESNO COUNTY ECONOMY – 2000

Fresno County drives the San Joaquin Valley economy. The total economic output of all Fresno County industries in 2000 was \$35 billion. Services was the largest industry in terms of direct output (\$6.2 billion), followed by manufacturing (\$5.5 billion), and agriculture (\$4.3 billion). The direct output for the aggregate and construction industries was \$2.9 billion.

Not only are the aggregate and construction industries important economic contributors, they are integral for providing the infrastructure required to maintain the county's economy and quality of life, as well as public facilities needed for future generations. Fresno County continues to require expanded infrastructure to sustain a growing economy and population.

In addition, aggregates and construction play a vital role in supporting and maintaining all other Fresno County industries. In 2000 aggregates and construction had a total input of \$430 million into other industries. In other words, \$430 million of aggregate and construction products and services were used to produce goods and services in other industries. Over \$105 million of aggregate and construction products were required by the finance, insurance, and real estate sector, followed by \$87 million of products used by transportation, communications, and public utilities. Agriculture and manufacturing relied on over \$62 million and \$42 million, respectively, of aggregate and construction production. Figure 1 is the amount that the aggregate and construction industries contribute to the output of the major industries in Fresno County.

**FIGURE 1
AGGREGATE AND CONSTRUCTION INPUTS INTO MAJOR FRESNO COUNTY
INDUSTRIES, 2000**



Source: IMPLAN Professional 2.0; 2000 Fresno County Implan Data.

Note: Agriculture includes agricultural crops, agricultural services, forestry, and fishing; TCPU-Transportation, communications, and public utilities; FIRE-Finance, insurance, and real estate.

3.2 AGGREGATES AND CONSTRUCTION IN FRESNO COUNTY

Since sand, gravel and crushed stone are the basic raw materials used in construction, road building, and asphaltic and ready-mix concrete, the aggregates industry is an indispensable component of the construction industry. Fresno County’s public and private infrastructure – its roads, highways, homes, schools, and buildings depend upon aggregates for construction. Indeed, 5 percent of all construction output in Fresno County is attributable to the aggregate industry’s contribution. Having access to local, large, and high-quality supplies of aggregates is a prerequisite for efficient, cost-effective building.

In 2000, the total direct and indirect contributions of the aggregate and construction industries to Fresno County was \$4.4 billion. This total is larger than the transportation and wholesale industry, or fruits and fruit processing.

The aggregate and construction industries employed over 24,000 people in Fresno County in 2000 – 6 percent of all county employment. Purchases by the aggregate and construction industries employed over 17,500 additional personnel. Additionally, the

creation of over 7,000 service jobs can be attributed to the activities of the construction and aggregate industries.

**TABLE 1
TOTAL IMPACT OF THE AGGREGATE AND CONSTRUCTION INDUSTRY ON THE FRESNO COUNTY ECONOMY**

2000 Fresno County Aggregates & Construction Industry	Output	Employment
Direct	\$2,992,000,000	24,256
Indirect	\$1,462,000,000	17,590
Total	\$4,454,000,000	41,846

Source: IMPLAN Professional 2.0; 2000 Fresno County Implan Data.

3.3 INDUSTRY COMPARISONS – WHERE DO AGGREGATES AND CONSTRUCTION FIT IN THE FRESNO ECONOMY?

The construction industry depends upon the aggregates industry. Without readily available aggregates, construction costs skyrocket and work is delayed or postponed. In this sense, the construction industry can be seen as a value-added component of the aggregates industry. The connection between aggregates and construction is similar to the soil needed for crop production, or to silicon for semiconductors. Recognizing the importance of the construction industry to the Fresno County economy, therefore, is not possible without conferring equal weight to the aggregates industry.

Aggregates are not only essential for construction, but also for agriculture, manufacturing, and wholesale trade and transportation. Manufacturing and wholesale trade need the transportation systems and distribution infrastructure. Over 500 trucking and warehousing firms, two railways, and the main overnight parcel carriers operate in the Fresno area. Infrastructure is also important for agriculture, especially since large amounts of concrete are used for food processing plants and dairies. Agriculture uses aggregate products such as crushed limestone, and remineralizes soils with byproduct fines from aggregate processing. Agriculture also relies heavily upon roads for production and transportation of agricultural goods.

While all industries are interdependent, it is useful to examine individual industries to gauge their performance and impacts. Since this study focuses on the aggregate and construction industries, some other prominent Fresno County industries have been selected for comparison. This is not meant to imply that any industry is less important than another. Instead, it is simply a measure of the contribution of each. For instance, while direct output (dollars contributed to the total Fresno County economy through production) may be higher in one industry, wages or employment may be higher in another. The industries used herein for comparison purposes were simply chosen because of their acknowledged importance to Fresno County and make for easy comparisons to aggregates and construction.

Construction

The construction industry builds structures for both the public and private sector, including roads, highways, bridges, dams, commercial buildings, hospitals, power plants, pipelines, sewage treatment facilities, homes, apartments, railroads, and airports. The term “construction” includes new work, additions, alterations, reconstruction, installations, and repairs. In other words, virtually every project that needs building, remodeling, or repairing involves some sector of the construction industry. The industry employs a wide range of trades and craftspeople, as well as architects, engineers, contractors, supervisors, truck drivers, equipment operators, and skilled and unskilled labor.

For this report, the construction industry¹ includes:

- **New Residential Structures**
- **New Industrial And Commercial**
- **New Utility Structures**
- **New Highways And Streets**
- **New Farm Structures**
- **New Mineral Extraction Facilities**
- **New Government Facilities**
- **Maintenance And Repair, Residential**
- **Maintenance And Repair Other Facilities**

In Fresno County, there are 2,050 businesses engaged in the construction industry.²

Aggregates

Sand, gravel, and crushed stone are collectively referred to as “aggregates”. These basic raw materials are the first step in the construction process and used in a huge variety of products. Aggregates are required for making portland cement concrete and asphaltic concrete – essential substances for building and maintaining our public and private infrastructure. Without aggregates there would be no buildings, hospitals, roads, airports, shopping centers, homes, sewer systems, or any other structure used by Californians. Approximately 60% of all aggregates are used in public works projects, and nearly 90% of all materials required in constructing federal, state, and local roads consist of sand, gravel, and stone.

¹ All Industry definitions constructed from IMPLAN Professional 2.0

² D&B Sales & Marketing Solutions, July – September 2003.

The aggregates industry includes the following:

- **Dimension Stone**
- **Sand And Gravel**
- **Nonmetallic Minerals**
- **Misc. Nonmetallic Minerals**
- **Paving Mixtures And Blocks**
- **Asphalt Felts And Coatings**
- **Cement, Hydraulic**
- **Concrete Block And Brick**
- **Concrete Products**
- **Ready-Mixed Concrete**
- **Gypsum Products**

In Fresno County, there are 41 businesses engaged in the aggregates industry.³

Fruits and Fruit Processing

As part of the agriculture industry, fruits are a major crop in Fresno County. In fact, fruits had the largest output of any agricultural category in Fresno County in 2000. Fruit processing is the manufacturing component of the fruit industry.

The fruits and fruit processing industry are made up of the following industries:

- **Fruits (Crops)**
- **Canned Fruits & Vegetables**
- **Dehydrated Food Products**
- **Frozen Fruits, Juices & Vegetables**

In Fresno County, there are 1,154 businesses engaged in the fruits and fruit processing industry.⁴

Transportation and Wholesale Trade

Fresno County's central location, combined with the traversing of Highway 99, helps make the distribution of goods another important economic contributor. This is especially true in Fresno County with the movement of food products. Transportation is the movement of the goods, while wholesale trade includes establishments or places of business primarily engaged in selling merchandise to a) retailers; b) industrial, commercial, institutional, farm, construction contractors; and c) professional business

³ Ibid

⁴ Ibid

users, or to other wholesalers, or those acting as agents or brokers in buying merchandise for, or selling merchandise to, such persons or companies.

Transportation and Wholesale Trade is made up of the following industries:

- **Railroad Transportation**
- **Transportation Equipment**
- **Motor Freight Transport and Warehousing**
- **Wholesale Trade**

In Fresno County, there are 2,551 businesses engaged in the transportation and wholesale trade industry.⁵

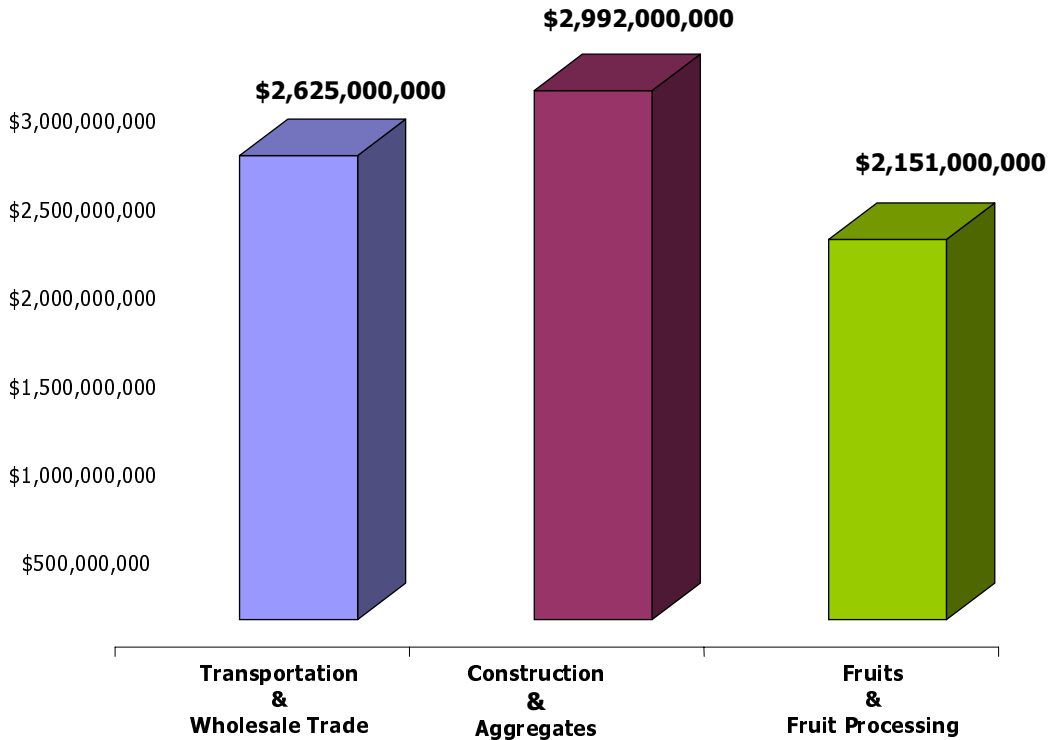
⁵ Ibid

Direct Output

The total output of all Fresno County industries in 2000 was \$35 billion. Together, the direct output of the aggregate and construction industries was \$2.9 billion, or 8% of all Fresno County output.

The direct output of aggregates and construction is larger than the other industries used for comparison. The direct output for transportation and wholesale trade in 2000 was \$2.6 billion, while fruits and fruit processing was \$2.1 billion.

**FIGURE 2
FRESNO COUNTY SELECTED INDUSTRY OUTPUT, 2000**

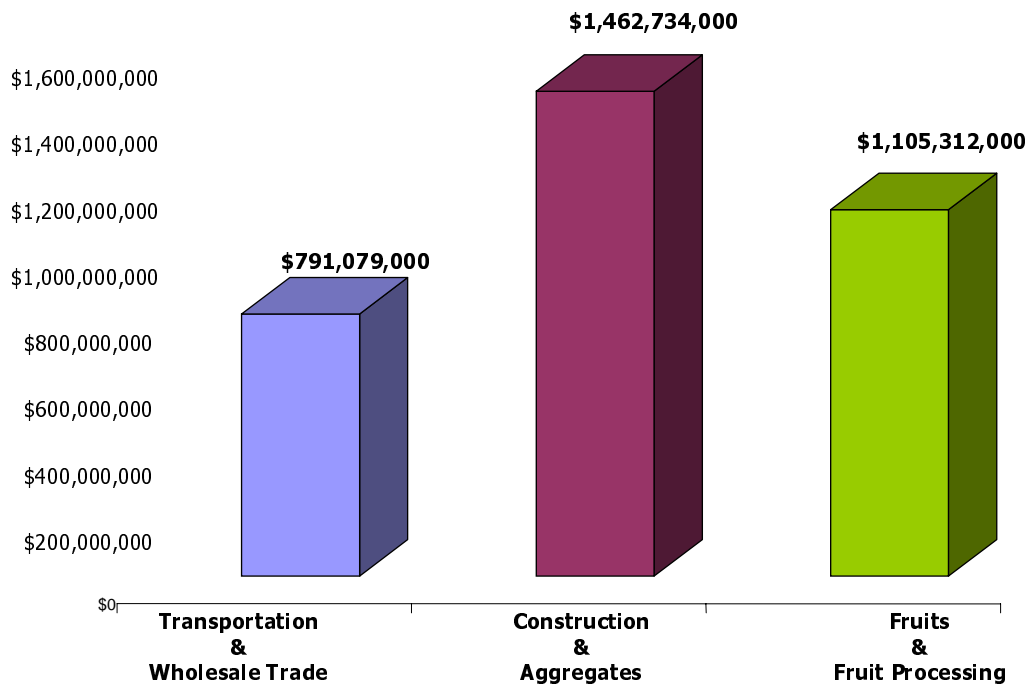


Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

Indirect Output

In addition to the direct output of industries, their indirect contribution is an important component of the impacts on an economy. The indirect contributions of an industry are the revenues, salaries, and taxes generated by an industry's purchases. The aggregate and construction's indirect contribution to Fresno County in 2000 was over \$1.4 billion. This was more than either transportation and wholesale trade or fruits and fruit processing. Figure 3 compares the indirect contributions of the industries in Fresno County in 2000.

**FIGURE 3
2000 INDIRECT OUTPUT OF SELECTED FRESNO COUNTY INDUSTRIES**



Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

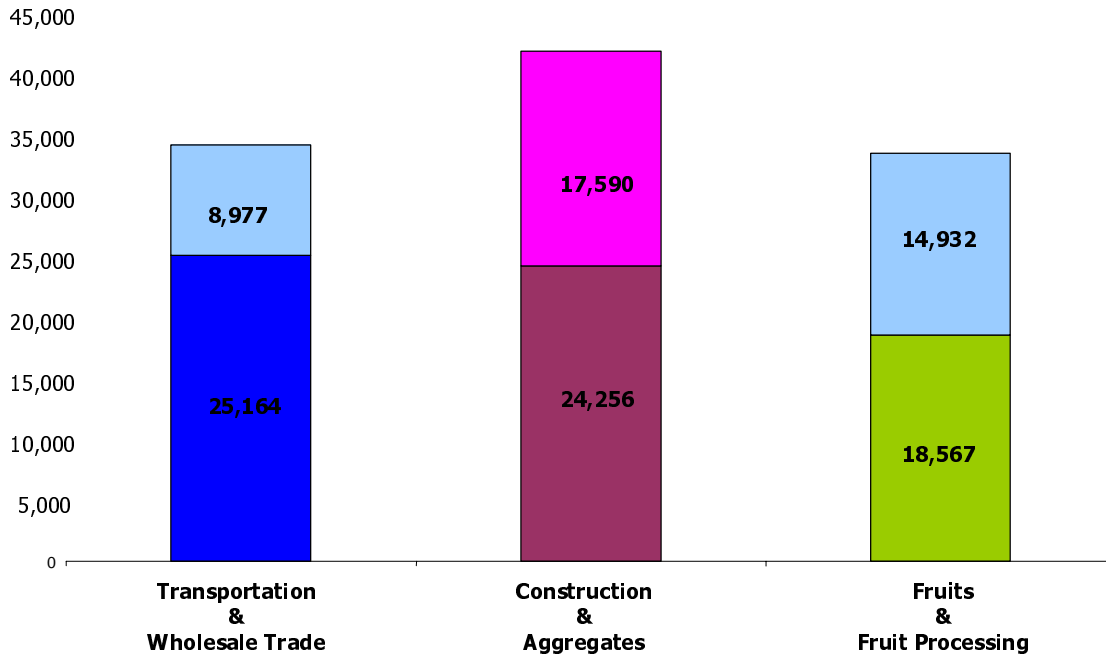
Employment

Direct employment of the aggregate and construction industries in 2000 was over 24,000. At the same time, transportation and wholesale trade employed just over 25,000. Fruits and fruit processing employed an estimated 18,500.

In addition to those employed directly by the aggregate and construction industries, the purchases made by aggregate and construction created employment in other industries. The indirect employment of the aggregate and construction industries in 2000 was over 17,500. This figure is greater than the indirect employment generated by either of the other industries.

FIGURE 4
2000 EMPLOYMENT (DIRECT & INDIRECT) FOR SELECT FRESNO COUNTY INDUSTRIES

Bottom is Direct Employment, Top is Indirect Employment



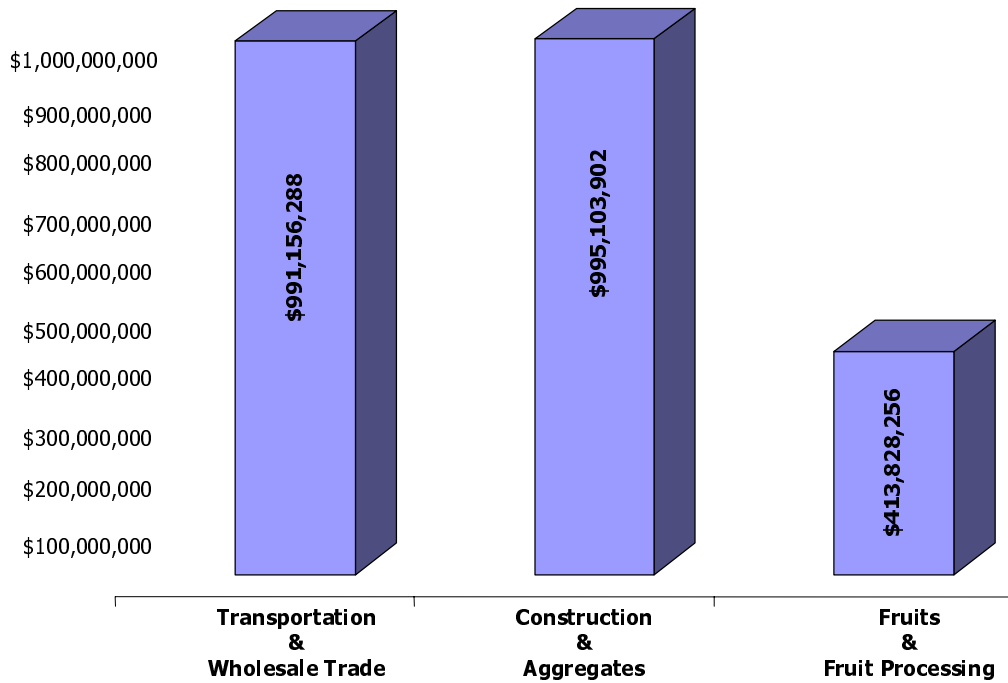
Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

Dividing the number of employees by the direct output, an aggregate and construction employee contributed \$123,351 to industry output. This compares to \$104,316 per employee for transportation and wholesale trade, and \$115,851 per employee for fruits and fruit processing.

Labor Income

Labor income represents all forms of employment income. This includes both proprietor and employee income. Direct labor income by the aggregate and construction industries in Fresno County in 2000 was \$995 million. This compares favorably to transportation and wholesale trade with direct labor income of \$991 million. Labor income for fruits and fruit processing was \$413 million.

**FIGURE 5
LABOR INCOME IN 2000 FOR SELECT FRESNO COUNTY INDUSTRIES**

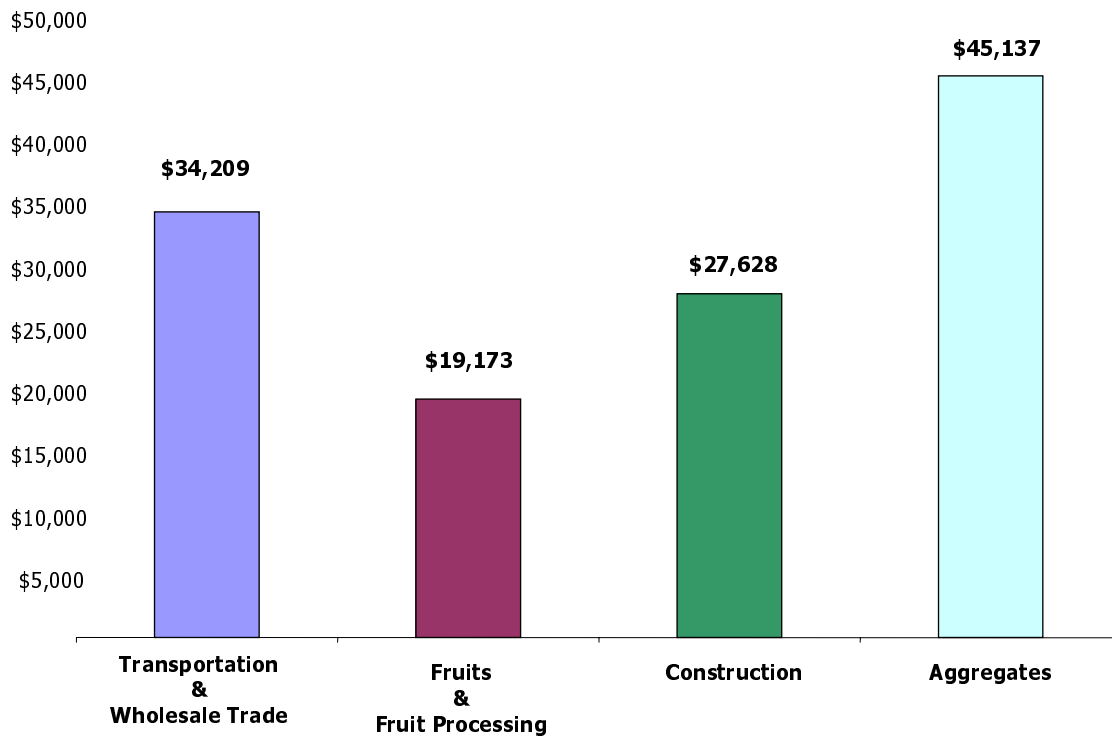


Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

Employee Compensation

Unlike labor income, employee compensation are wages paid to employees in the form of pay and benefits. While aggregates and construction had an average wage of \$28,015, aggregates alone had the highest wage of the selected industries at \$45,137. Figure 6 is the average wage paid to an employee in the selected industries in Fresno County in 2000.

**FIGURE 6
AVERAGE WAGES IN 2000 FOR SELECT FRESNO COUNTY INDUSTRIES**

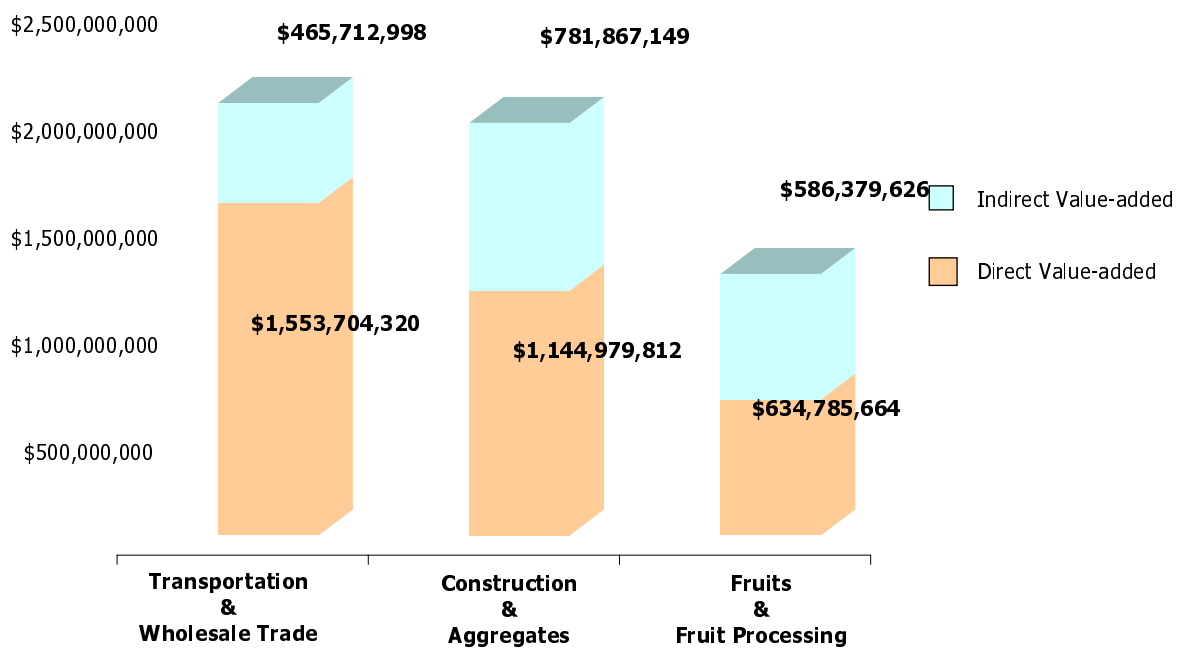


Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

Value-added Contributions

Value-added contributions represent employee compensation⁶, proprietor income⁷, other property income⁸ and indirect business taxes⁹. The direct value-added contribution of the aggregate and construction industries to the Fresno County economy in 2000 was \$1.1 billion. Figure 7 is the direct and indirect value-added contributions of the select industries in 2000.

**FIGURE 7
2000 VALUE-ADDED CONTRIBUTIONS OF SELECT FRESNO COUNTY INDUSTRIES**



Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

⁶ Includes wages, salary payments and non-cash compensation sources such as benefits.

⁷ Includes income derived from self-employment.

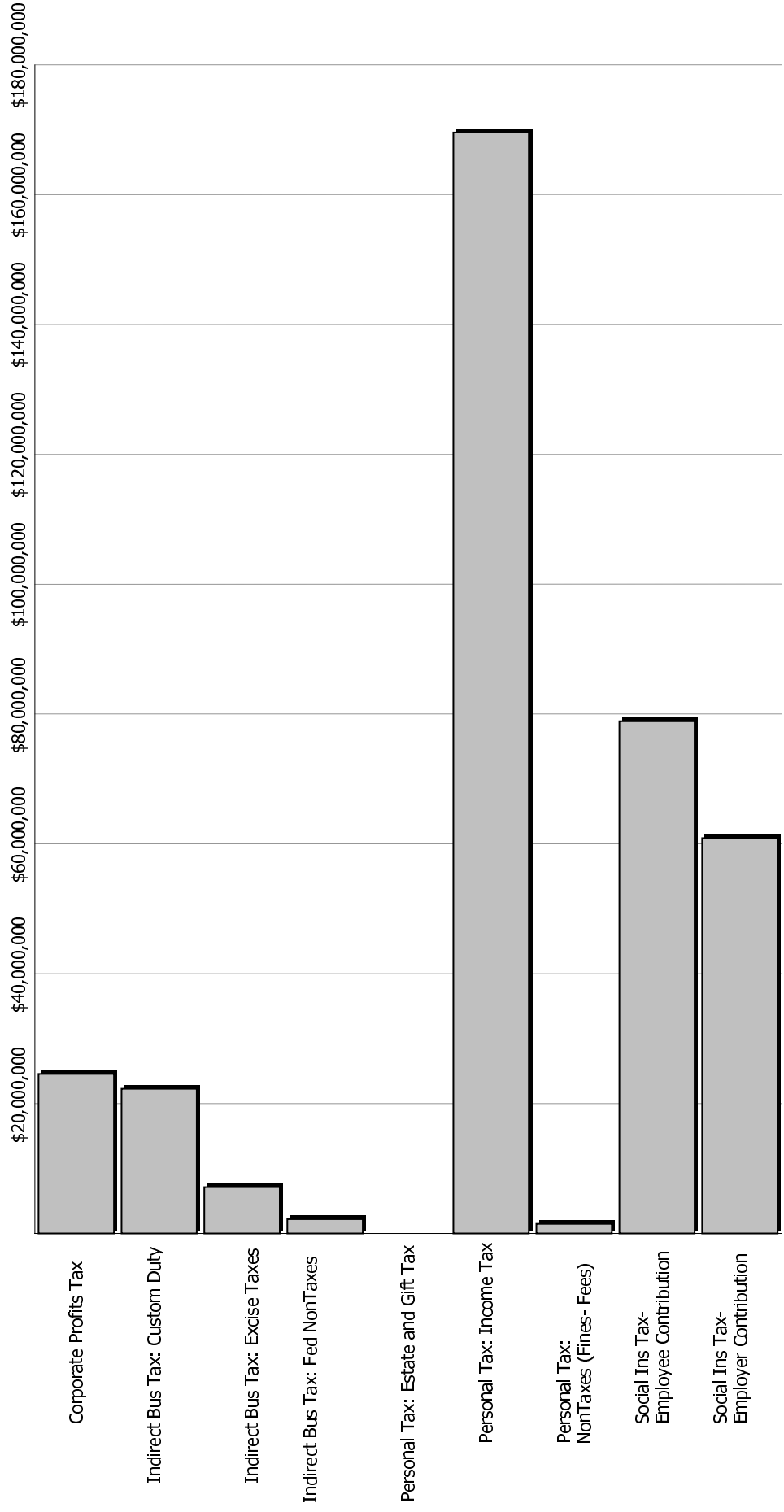
⁸ Includes payments from interest, rents, royalties, dividends and profits.

⁹ Includes household excise and sales taxes paid to business by households, excluding taxes on profit and income.

Taxes

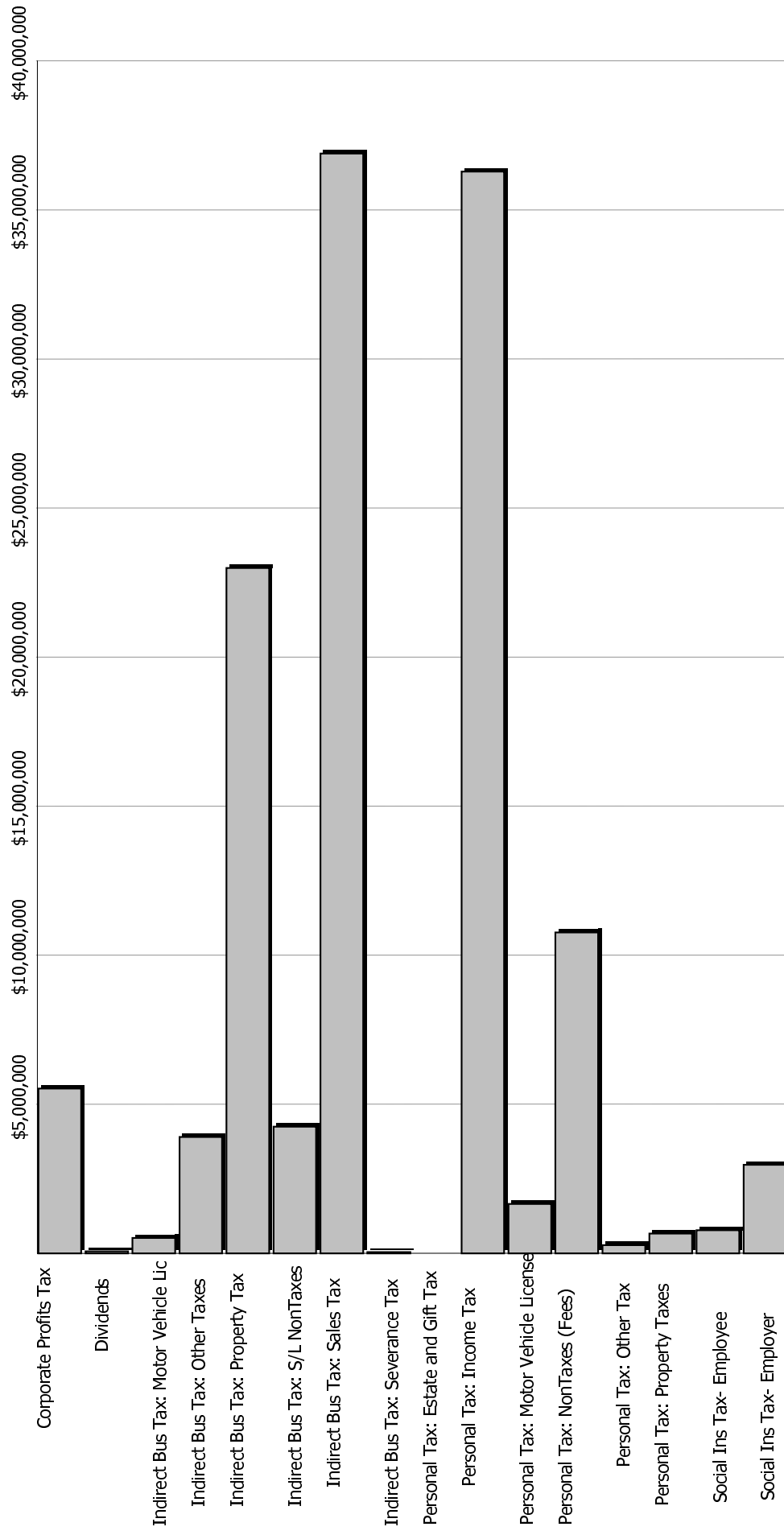
Federal, state and local governments receive significant additional tax revenues from the economic activity generated by the aggregate and construction industries. In Fresno County, aggregates and construction contributed over \$367 million in federal taxes, and \$127 million in state and local taxes. This compares to \$317 million in both federal and state taxes paid by fruits and fruit processing, and \$657 million paid by transportation and wholesale trade. The following charts illustrate the estimated tax impact of the aggregate and construction industries in Fresno County in 2000.

FIGURE 8
2000 FEDERAL TAX CONTRIBUTIONS OF THE FRESNO COUNTY AGGREGATE AND CONSTRUCTION INDUSTRIES



Source: Applied Development Economics; IMPLAN Professional 2.0, Fresno County 2000

**FIGURE 9
2000 STATE/LOCAL TAX CONTRIBUTIONS OF THE FRESNO COUNTY AGGREGATE AND CONSTRUCTION INDUSTRIES**



4. CONCLUSION

This study finds that the aggregate and construction industries contribute \$4.4 billion to Fresno County's economy, comparing favorably to other major county industries such as transportation and wholesale trade, and fruits and fruit processing.

The aggregate and construction industries' \$2.9 billion direct output contributes over 8% of the county's total output, employs 6% of the county's workforce, and pays nearly half a billion dollars in federal, state, and local taxes. In a county where the per capita personal income is about \$15,495, the aggregates industry paid an average of \$45,137 per employee.

In addition, at least \$430 million of aggregate and construction products and services are used by other industries to produce their goods. Finance, insurance, and real estate (FIRE), followed by transportation, communications, and public utilities (TCPU), are the two industry division classifications in Fresno County that have the greatest need for aggregate and construction products. Agriculture and manufacturing are also substantial users of aggregate and construction goods and services. This underscores the linkage and essentiality of aggregates and construction to other important county industries, and in turn, to Fresno County's total industry output.

This study also notes that all construction depends upon having sufficient long-term quantities of locally available supplies of aggregates. Aggregates are the basic raw materials necessary for making ready mix concrete, asphaltic concrete, and a variety of other products required for building infrastructure.

Nevertheless, as documented in a State Department of Conservation Mineral Land Classification study, depletion of aggregate supplies is occurring at an alarming rate. The 1999 report noted that the estimated average per capita consumption of aggregates cited may not accurately reflect future use. In the years since the report, several factors have developed indicating that the report's estimated depletion date of 2011 may be overly optimistic. Unless new aggregate resources are permitted, Fresno County will risk its economic growth, quality of life, and community livability.

Fresno County's population and jobs both continue to grow, and the county has been diligent in diversifying its economy. However, the county's high unemployment rate and low per capita income causes it to lag behind the rest of the state. If the county is to

continue growing successfully, and attract New Economy companies that pay higher wages, it will need to link economic development with infrastructure investment.

Much of Fresno County's continued achievement will be determined by recognizing and planning for the first class infrastructure that successful growth requires: affordable housing, efficient transportation systems, school construction, improved water storage capacity, and all other public works and private structures that protect its quality of life and vibrant economy.

Citizens have rightly learned to appreciate and value natural resources such as open space and wetlands. However, if community livability is a worthwhile value, now and in the future, greater recognition and education will be required if residents are to make land use decisions affecting the availability of aggregates, another important and irreplaceable natural resource.

Ensuring and enhancing Fresno County's future livability will require thoughtful decision making utilizing data on the complex and interrelated spheres of economy, environment, and society. Aggregates are a community asset directly affecting all three spheres. Local supplies of aggregates, or lack thereof, will impact the range of choices available to decision makers, clearly shaping long range planning and the resultant outcomes.

Glossary

Direct output: This is the contribution directly attributed to an industry – their employees, revenues and wages.

Employee compensation: wage and salary payments as well as benefits, including health and life insurance, retirement payments and other non-cash compensation.

Indirect effect: the secondary impact caused by changing input needs of directly affected industries (e.g., additional input purchases to produce additional output).

Indirect business taxes: consist primarily of excise and sales taxes paid by individuals to businesses; these taxes occur during the normal operation of the businesses but do not include taxes on profit and income.

Indirect output: the revenues, salaries and taxes generated by the purchases made by an industry.

Industries: the collection of businesses in an economy within a given region; purchasing goods and services and paying workers.

Labor income: represents all forms of employment income as the sum of employee compensation and proprietor income.

Output: industry output is a measure of the value of goods and services produced in a given area.

Proprietary income: consists of payments received by self-employed individuals as income. This includes income received by private business owners, doctors, lawyers and so forth.

Value-added: employee compensation, proprietary income, other property type income, and indirect business taxes. Generally, the value of goods and services less the cost of materials.

Appendix A

THE IMPLAN ECONOMIC MODEL

The IMPLAN United States Economic Model

The IMPLAN economic impact model was used to estimate the economic and tax contributions of the aggregate & construction, poultry and poultry processing, transportation and wholesale trade and tourism industries to the Merced County economy in 2000. The model, which is licensed by the Minnesota IMPLAN Group, Inc., was developed over a period of eight years at the University of Minnesota. IMPLAN is used by more than 500 universities and government agencies to estimate the economic and fiscal impacts of investments and/or changes in industry employment. IMPLAN is an economic impact assessment modeling system that estimates the national and local, private- sector impacts of economic changes.

IMPLAN Economic Impact Analysis

IMPLAN is an input-output model. Input-output accounting describes commodity flows from producers to intermediate and final consumers. The total industry purchases of commodities, services, employment compensation, value added, and imports is equal to the value of the commodities produced. Purchases for final use (final demand) drive the model. Industries producing goods and services for final demand purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the jurisdiction (imports and taxes) stop the cycle.

The model summarizes these complex interactions as economic multipliers, which can be used to estimate the total economic impact of the employment, sales and taxes generated by the industries in Merced County. No adjustments were made to the model for specific industries or special conditions in Merced County.

Industry Definition

IMPLAN industrial sectors are made up of BEA (Bureau of Economic Analysis) Commodity and Standard Industry Classifications (SIC). The industries defined for the model constructed for Merced County contain aggregated and partial industry sectors as defined by Standard Industry Classifications. Below is a crosswalk for the industries from the IMPLAN model to the Standard Industry Classifications.

IMPLAN SECTOR TO SIC CROSSWALK

IMPLAN Sector	SIC
Construction	
New Residential Structures	1500, 1600, 1700
New Industrial And Commercial	1500, 1600, 1700
New Utility Structures	1500, 1600, 1700
New Highways And Streets	1500, 1600, 1700
New Farm Structures	1500, 1600, 1700
New Mineral Extraction Facilities	1500, 1600, 1700
New Government Facilities	1500, 1600, 1700
Maintenance And Repair, Residential	1500, 1600, 1700
Maintenance And Repair Other Facilities	1500, 1600, 1700
Aggregates	
Dimension Stone	1410, 1420
Sand And Gravel	1440
Nonmetallic Minerals	1480
Misc. Nonmetallic Minerals, N.E.C.	1490
Paving Mixtures And Blocks	2951
Asphalt Felts And Coatings	2992
Cement, Hydraulic	3251
Concrete Block And Brick	3271
Concrete Products, N.E.C	3272
Ready-Mixed Concrete	3273
Gypsum Products	3275
Poultry	
Poultry & Eggs	0191, 0219, 0251, 0252, 0253, 0259, 0291
Poultry Processing	2015, 2021
Transportation	
Transportation Equipment	3799
Motor Freight Transport & Warehousing	4200, 4789
Wholesale Trade	
Wholesale Trade – Non-durable Goods	5000, 5100
Wholesale Trade – Durable Goods	5000, 5100
Eating & Drinking	
	5800
Hotels & Lodging Places	
	7000
Amusement and Recreation Services	
	7910, 7991, 7992, 7993, 7996, 7999

Source: IMPLAN Pro

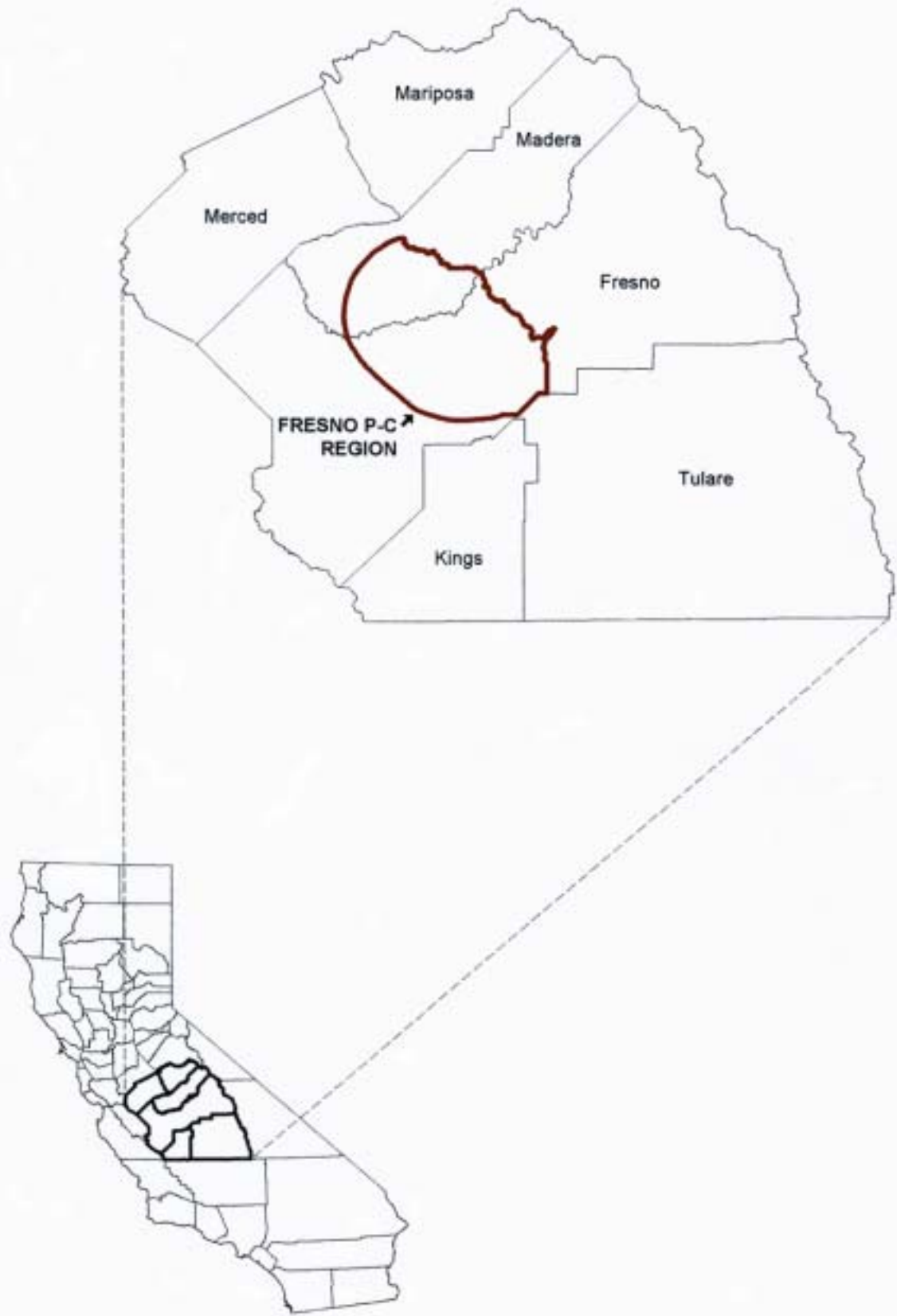


Figure 1. General location of the Fresno P-C Region

