

# Economic Contributions of the Green Industry to the California Economy, 2007

The present study evaluates the economic impact contributions of the California Green Industry, including the following sectors: Production and Manufacturing, Horticultural Services, and Wholesale and Retail Trade.

by Marco A. Palma, Alan Hodges, and Charles R. Hall.

Prepared for:  
California Landscape Contractors Association  
1491 River Park Drive, #100  
Sacramento, CA 95815-4501  
(916) 830-2780  
[www.clca.org](http://www.clca.org)

Please direct questions or comments to:  
Dr. Marco A Palma.  
Assistant Professor and Extension Economist Department of Agricultural Economics.  
Texas AgriLife Extension Service, Texas A&M University.  
600 John Kimbrough Blvd, Suite 330D.  
2124 TAMU, College Station, TX 77843-2124.  
Phone: (979) 845-5284  
Fax: (979) 845-7444  
[mapalma@tamu.edu](mailto:mapalma@tamu.edu)

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## Glossary of Economic Impact Terms

*Terms are presented in a logical order rather than alphabetically*

**Region** defines the geographic area for which impacts are estimated. Regions are generally an aggregation of one or more counties. This analysis includes estimates for individual states of the U.S.

**Sector** is a grouping of industries that produce similar products or services. Most economic reporting and models in the U.S. are based on the Standard Industrial Classification system (SIC code) or the North American Industrial Classification System (NAICS).

**Impact analysis** estimates the impact of a change in output or employment resulting from a change in final demand to households, governments or exports.

**Input-output (I-O) model.** An input-output model is a representation of the flows of economic activity between industry sectors within a region. The model captures what each business or sector must purchase from every other sector in order to produce its output of goods or services. Using such a model, flows of economic activity associated with any change in spending may be traced either forwards (e.g., spending generates employee wages which induces further spending) or backwards (e.g., purchases of plants that leads growers to purchase additional inputs -- fertilizers, containers, etc.). Multipliers for a region may be derived from an input-output model of the region's economy.

**IMPLAN** is a micro-computer-based input output modeling system and Social Accounting Matrix (SAM). With IMPLAN, one can estimate I-O models of up to 528 sectors for any region consisting of one or more counties. IMPLAN includes procedures for generating multipliers and estimating impacts by applying final demand changes to the model. The current version of the software is *IMPLAN 3*.

**Final Demand** is the term for sales to final consumers (households or government). Sales between industries are termed **intermediate sales**. Economic impact analysis generally estimates the regional economic impacts of final demand changes.

**Direct effects** are the changes in economic activity during the first round of spending. **Secondary effects** are the changes in economic activity from subsequent rounds of re-spending. There are two types of secondary effects: **Indirect effects** are the changes in sales, income or employment within the region in backward-linked industries supplying goods and services to businesses. For example, the increased sales in input supply firms resulting from more nursery industry sales is an indirect effect. **Induced effects** are the increased sales within the region from household spending of the income earned in the Green Industry and supporting industries. Employees in the Green Industry and supporting industries spend the income they earn on housing, utilities, groceries, and other consumer goods and services. This generates sales, income and employment throughout the region's economy. **Total effects** are the sum of direct, indirect and induced effects.

**Multipliers** capture the size of the secondary effects in a given region, generally as a ratio of the total change in economic activity in the region relative to the direct change. Multipliers may be expressed as ratios of sales, income or employment, or as ratios of total income or employment changes relative to direct sales. Multipliers express the degree of interdependency between sectors in a region's economy and therefore vary considerably across regions and sectors. **Type I** multipliers include only direct and indirect effects. **Type II** multipliers also include induced effects. **Type SAM** multipliers used by IMPLAN additionally account for capital investments and transfer payments such as welfare and retirement income. A **sector-specific multiplier** gives the total changes to the economy associated with a unit change in output or employment in a given sector. **Aggregate multipliers** sum multiplier effects across many sectors with a single number. They are based on an assumed distribution of spending across these economic sectors, i.e., a weighted average of sector specific multipliers with the percentage of spending in each sector as the weighting factor.

**Purchaser prices** are the prices paid by the final consumer of a good or service. **Producer prices** are the prices of goods at the factory or production point. For manufactured goods the purchaser price equals the producer price plus a retail margin, a wholesale margin, and a transportation margin. For services, the producer and purchaser prices are equivalent.

**Margins.** The retail, wholesale and transportation margins are the portions of the purchaser price accruing to the retailer, wholesaler, and grower, respectively. Only the retail margins of many goods purchased by consumers accrue to the local region, as the wholesaler, shipper, and manufacturer often lie outside the local area.

**Measures of economic activity.** **Sales or output** is the dollar volume of a good or service produced or sold. **Final Demand** is sales to final consumers, including households, governments, and exports. **Intermediate sales** are sales to other industrial sectors. **Income** is the money earned within the region from production and sales. Total income includes personal income (wage and salary income, including income of sole proprietor's profits and rents). **Jobs** or employment is a measure of the number of jobs required to produce a given volume of sales/production, usually expressed as full time equivalents, or as the total number including part time and seasonal positions. **Value Added Impact** is the sum of total income and indirect business taxes. Value added is the most commonly used measure of the contribution of a region to the national economy, as it avoids double counting of intermediate sales and captures only the "value added" by the region to final products.

## Executive Summary

The environmental horticulture industry, also known as the “Green Industry,” is comprised of a variety of businesses involved in the production, distribution and services associated with ornamental plants, landscape and garden supplies and equipment. Segments of the industry include wholesale nursery, greenhouse and sod growers, landscape architects, contractors and maintenance firms, marketing intermediaries such as brokers, horticultural distribution centers, and re-wholesalers, retail garden centers, home centers and mass merchandisers with lawn and garden departments, and a variety of other retail establishments selling plants and horticultural goods. In addition to these commercial sectors, many state and local governments have significant urban forestry operations for management of parks, botanic gardens, and right-of-ways that are an integral segment of community infrastructure.

The nursery and greenhouse sector has experienced considerable growth in the United States in the last two decades, albeit slowing somewhat in recent years. The landscape design, construction, and maintenance sector has also expanded due to strong economic conditions and robust building activity. Retail sales of horticultural goods have increased for both independent and chain-store type retailers, with considerable consolidation occurring due to the increased presence of home centers and mass merchants in the lawn and garden marketplace. The national outlook for the Green Industry is promising, yet there are challenges resulting from increasing competitive pressures.

In view of its importance, numerous studies have been conducted to document the Green Industry’s economic impacts nationwide and by individual states or regions (Hall, Hodges and Haydu, 2005, 2006; Hodges, Hall and Palma, 2011). The present study aims to evaluate economic impacts of the Green Industry for the state of California. Estimates of economic impacts were derived from a variety of information sources, including national and state-level industry statistics from the 2007 U.S. Economic Census (Census Bureau, 2010), other federal government reports, and primary surveys by horticultural economics researchers. Economic impacts for California were computed using multipliers from the *RIMSII* Input-output analysis system (USDOC/BEA, 2007), to estimate the indirect effects of industry purchases and induced effects of employee household spending arising from new final demand.

**Total economic contributions for the California Green Industry in 2007, including regional economic multiplier effects, were estimated at \$25.01 Billion in output (revenue) impacts, employment of 257,650 fulltime and part-time jobs, labor earnings impacts of \$8.28 Billion, and \$15.82 Billion in value added impacts (Table ES-1).**

For the *Production and Manufacturing* Group, including *Nursery and Greenhouse Production* and *Lawn and Garden Equipment Manufacturing* sectors, total output impacts were \$8.59 Billion, employment impacts were 59,582 jobs, labor income impacts were \$2.63 Billion, and total value added impacts were \$5.85 Billion. For the *Horticultural Services* Group, *Landscape Services* and *Landscape Architectural Services* sectors, total output impacts were \$14.05 Billion, employment impacts were 170,643 jobs, labor income impacts were \$4.82 Billion, and value added impacts were \$8.31 Billion. For the *Wholesale and Retail Trade* Group, total output impacts were \$2.37 Billion, employment impacts were 27,425 jobs, labor income impacts were \$828 Million, and value added impacts were \$1.66 Billion. The largest individual industry sectors in terms of employment and value added impacts were *Landscaping Services* (157,469 jobs, \$7.15 Billion), *Nursery and Greenhouse Production* (59,275 jobs, \$5.81 Billion), and *Building Materials and Garden Supplies Stores* (15,275 jobs, \$797 Million). Other industry sectors with employment impacts exceeding 1,000 jobs were *Landscape Architectural Services* (13,174 jobs), *Miscellaneous Store Retailers* (3,686 jobs), *Merchant Wholesalers of Durable and Nondurable Goods* (3,145 jobs), *General Merchandise Stores* (2,403 jobs), and *Food and Beverage Stores* (1,726 jobs).

**Table ES-1.** Summary of economic contributions of the Green Industry sectors to the California Economy, 2007

Industry Group / Sector (NAICS)	Number Establishments	Direct Output (Sales)	Total Output Impact	Payroll	Total Labor Income Impact	Total Value Added Impact	Employment	Total Employment Impact
<b><i>Production and Manufacturing</i></b>	<b>2,462</b>	<b>6,770</b>	<b>8,588</b>	<b>2,134</b>	<b>2,632</b>	<b>5,846</b>	<b>43,552</b>	<b>59,582</b>
Nursery and greenhouse production (1114)	2,453	6,682	8,485	2,125	2,620	5,808	43,318	59,275
Lawn and garden equipment manufacturing (333112)	9	88	103	9	12	38	234	307
<b><i>Horticultural Services</i></b>	<b>9,341</b>	<b>8,306</b>	<b>14,046</b>	<b>2,970</b>	<b>4,818</b>	<b>8,311</b>	<b>100,944</b>	<b>170,643</b>
Landscaping services (56173)	8,346	7,238	12,355	2,510	4,146	7,150	92,246	157,469
Landscape architectural services (54132)	995	1,068	1,691	460	672	1,161	8,698	13,174
<b><i>Wholesale and Retail Trade</i></b>	<b>145,592</b>	<b>2,147</b>	<b>2,373</b>	<b>6,548</b>	<b>828</b>	<b>1,659</b>	<b>25,446</b>	<b>27,425</b>
Building material and garden equipment and supplies stores (444)	7,843	1,134	1,134	450	450	797	15,275	15,275
Miscellaneous store retailers (453)	12,746	224	224	5,863	72	158	3,686	3,686
Merchant wholesalers, durable goods (423) and nondurable goods (424)	61,451	476	580	134	166	408	2,442	3,145
General merchandise stores (452)	3,087	119	162	41	55	111	1,952	2,403
Non-store retailers (454)	6,437	78	120	17	30	81	347	785
Food and beverage stores (445)	16,574	92	123	34	44	84	1,401	1,726
All other retail stores, including: Wholesale electronic markets, agents and brokers (425) Furniture and home furnishings stores (442) Gasoline stations (447) Electronics and appliance stores (443) Health and personal care stores (446) Sporting goods, hobby, book, and music stores (451)	37,454	24	30	9	11	20	343	405
<b>Total All Industry Groups</b>	<b>157,395</b>	<b>17,223</b>	<b>25,007</b>	<b>11,652</b>	<b>8,278</b>	<b>15,816</b>	<b>169,942</b>	<b>257,650</b>

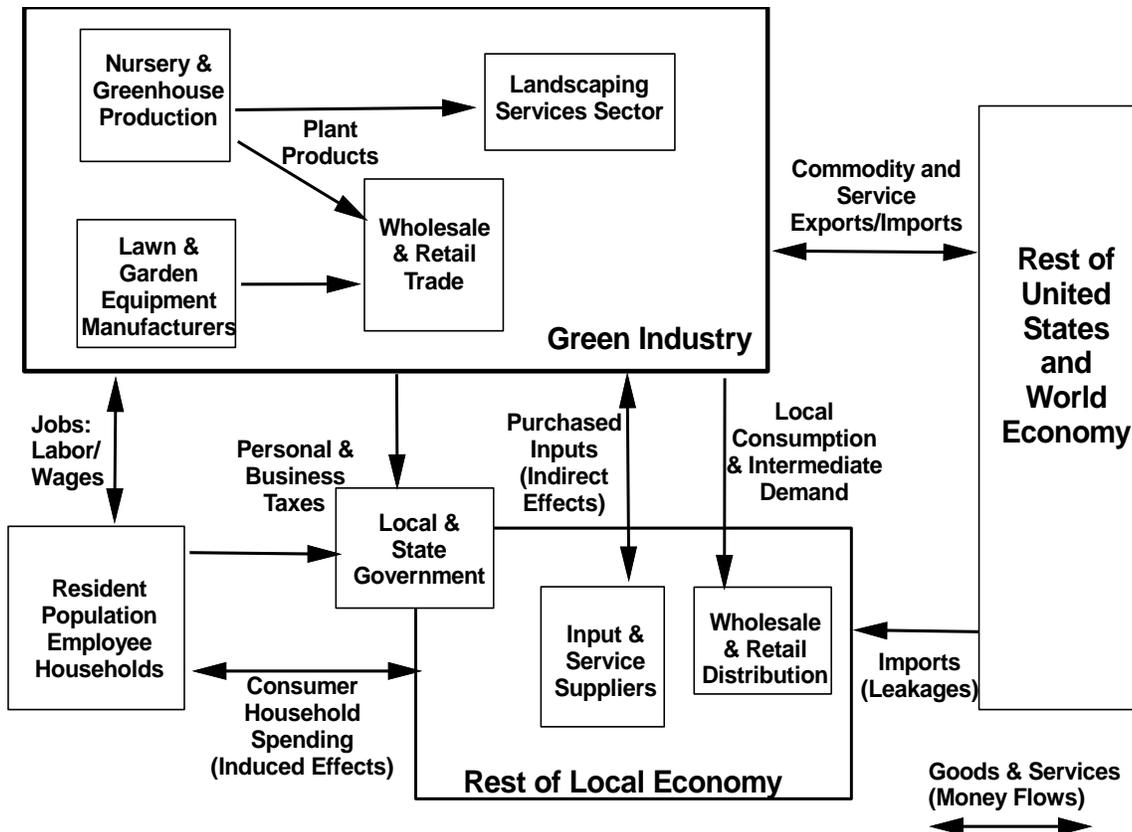
Values for wholesale and retail trade sectors reflect share of sales, employment and payroll for horticulture product lines, and gross margin on sales for output. Total impact estimates include regional economic multiplier effects. **Sources:** Census Bureau: 2007 Economic Census: revenues and employment for manufacturing, trade and service sectors, and product line sales; National Nursery Survey: nursery and greenhouse revenues, employment and out-of-state shipments (2008); Census Bureau: Wholesale and Retail Trade benchmark reports (2005): gross margin on sales; IMPLAN: state data on out-of-state shipments or exports (2001); BEA: RIMSII regional economic multipliers (2007).

# 1. Background and Introduction

## Structure of the Green Industry

The U.S. environmental horticulture industry, also known as the *Green Industry*, is comprised of wholesale nursery, greenhouse, and turfgrass sod growers; landscape service firms such as architects, designers/builders, contractors, and maintenance firms; retail firms such as garden centers, home centers and mass merchandisers with lawn and garden departments, and marketing intermediaries such as brokers and horticultural distribution centers (re-wholesalers). There is also a substantial allied trade industry that supplies various production inputs to the industry. The structure of the Green industry is illustrated in Figure 1-1.

**Figure 1-1.** Market structure and economic linkages of the Green industry



**Input Suppliers** are often referred to as allied trade firms. These are businesses that provide various inputs for ornamental plant production, landscape services, and retail sales. These inputs commonly include agrichemicals, fertilizers, containers, packaging, farm machinery, tools and equipment, propagative materials, and consulting or financial services. The commodities originate from extractive and manufacturing industries such as mining, petroleum, and forestry.

**Plant Producers** are firms engaged in producing Green Industry products include growers of floriculture crops, nursery crops, and turfgrass sod. *Floriculture crops* are generally herbaceous plants including bedding plants, potted flowering plants, foliage plants, cut cultivated greens, and cut flowers. Bedding and garden plants consist of young flowering plants (annuals and perennials) and vegetable plants grown in flats, trays, pots, or hanging baskets, usually inside a controlled greenhouse environment, and sold largely for gardens and landscaping. Potted flowering plants are usually sold in pots for indoor use. The major potted flowering plants are poinsettias, orchids, florist chrysanthemums, and finished florist azaleas. Foliage plants are also sold in pots and hanging baskets for indoor and patio use, including larger specimens for office, hotel, and restaurant interiors. Cut flowers are usually sold in bunches or as bouquets with cut foliage. The most popular cut flowers are roses, carnations, gladioli, and chrysanthemums. Leatherleaf ferns are the leading cut foliage. Combining cut flowers and cut greens in bouquets or other flower arrangements is a value-added retail option.

The main market outlets for floriculture crops are florists, garden centers, mass merchandisers, supermarkets, chain stores, discount stores, home improvement centers, hardware stores, landscape contractors, and re-wholesalers. Other retail outlets are farmers markets, flea markets, and street vendors. Since cut flowers are perishable and live floral crops are sensitive to variations in temperature, they usually require cool transportation and storage conditions to preserve and prolong their quality before final sale. The demand for floral crops, especially cut flowers, is highly seasonal. Sales are normally highest from February through May and in the fall. Sales of cut flowers peak during holidays such as Valentine's Day and Mother's Day. Poinsettia plants are sold mostly from Thanksgiving to Christmas. Cut flowers and foliage plants, however, are increasingly popular throughout the year as indoor decorations for the home and workplace.

*Nursery crops* are woody or perennial plants usually grown in containers or in-ground, including ornamental trees and shrubs, fruit and nut trees (for noncommercial use), vines, and ground covers primarily used for landscaping. Trees and shrubs are classified as deciduous or evergreen. Deciduous includes shade, flowering, ornamental, fruit, and nut trees and shrubs, while evergreens include broadleaf and coniferous trees and Christmas trees. The location of nursery production is determined largely by soil, climate, availability of water, accessibility and distance to markets, and cost of land. Each plant species has a hardiness zone that sets the northern geographic latitude for in-ground growth. Trees and shrubs start out as "liners", undeveloped, but rooted, trees and plants in pots or trays. As seedlings, they are typically protected from intense sunlight or severe weather by shade or temporary cover before transplantation into larger containers or the field for further growth. Sales can occur at any stage depending on the plants' commercial purpose. Since nursery crops are usually grown in the field or in containers often without covered protection, the choice of crops is based on an area's natural vegetative species or the crop's ability to tolerate local climatic conditions. Thus, sales of most nursery crops, except Christmas trees, are more local or regional than floriculture crops, which are less costly to ship to farther markets. Markets for nursery crops include homeowners, developers, public utilities, golf courses, resorts, commercial parks, malls, and government agencies in charge of public parks, and street and highway vegetation. Demand for nursery crops (except Christmas trees) tends to coincide with normal planting seasons in the spring and fall.

*Sod farms* are specialized nurseries that produce turfgrass varieties that are hardy for their particular region. Once sod leaves the nursery/farm, it usually passes through one or more marketing channels and is eventually used for new residential or commercial developments, for re-landscaping existing developments, for sports turf facilities such as athletic fields and golf courses, or for businesses, schools and roadside uses. Although the customer generally decides the type of sod to purchase, the installer also plays an important role. Both the landscape contractor and sod installer often make the decision from whom to buy and may recommend to the property owner the type of sod to plant.

**Wholesale Distributors** are an integral part of the Green Industry supply chain. Intermediaries such as brokers and importers facilitate the transactions of domestic and international growers and retailers. Re-wholesalers, often referred to as horticultural distribution centers (HDCs) or landscape distribution centers, are also market facilitators that offer regionally specific mixes of landscape products for immediate pickup or delivery to landscape professionals and have emerged throughout the United States in a variety of forms. There are self-contained HDCs and HDCs that serve as independent profit centers within vertically-integrated grower, landscape contracting, and retail garden center operations. Landscape distribution traces its development back to the produce dealers of the 1940s and 1950s. Following World War II, a sustained building boom fueled an increasing demand for products and services that landscape professionals, retail garden centers, and other horticultural businesses attempted to fulfill. At the same time, rising land values pushed growers farther away from spreading urban and suburban areas. The resulting longer supply lines created difficulties in meeting the expanding needs of the horticulture industry, and spawned development of this new distribution network from the nursery grower to the horticultural customer. The long-distance distribution system infrastructure for plants is still being refined in many parts of the country. An efficient trucking system extends from Florida all along the East coast, featuring regular routes run by independent trucking companies. Some large producers have developed in-house, large-volume delivery systems to service big-box retailers. But cross-country shipments are still difficult because of the long time that plants are held in trucks, lack of back haul opportunities, and the excessive handling that takes place for small orders. Air transportation is being used more frequently, but only for high-value plants such as cut flowers.

**Horticultural Service Firms** provide landscape design (architectural), installation (construction), and maintenance services. These firms serve a variety of clientele, including residential homeowners, commercial businesses, and municipalities. Some firms in the industry offer a combination of design, installation, and maintenance services (e.g., design-build firms) to appeal to a larger clientele base; however, many businesses gear their services towards specific markets. For instance, some specialize in seeding and fertilizer application in areas along newly constructed

highways and installing erosion control devices. Such work is usually contracted from state departments of transportation or from local governments.

Landscape design or architectural establishments are primarily engaged in planning and designing the development of land areas for projects, such as parks and other recreational areas, airports, highways, hospitals, schools, land subdivisions, and commercial, industrial, and residential areas. These companies apply knowledge of land use and location of structures to the site design of landscape projects.

Landscape contracting or installation establishments are primarily engaged in installing trees, shrubs, plants, lawns, or gardens, and the construction of walkways, retaining walls, decks, fences, ponds, and other similar “hardscape” structures. Specialized installation services such as irrigation systems, water features, night lighting, and Christmas decorations are becoming more prevalent.

Landscape maintenance establishments provide services such as mowing, trimming, leaf or snow removal, tree removal or trimming, mulching, fertilizing, pest control treatments, and other garden or lawncare services to enhance landscape appearance and health. The prime selling points of these service firms are that they have the knowledge to diagnose problems and the equipment to apply chemicals effectively and safely, and eliminate the need for clients to store toxic chemicals on their premises. Besides offering basic services, many maintenance firms also offer customized programs such as lawn aeration, dethatching, resodding or overseeding, and integrated pest management.

**Retailers** are another point of contact with end consumers of horticultural products, and include independent garden centers, florists, home centers, mass merchants, and other chain stores. Garden centers are establishments primarily engaged in selling trees, shrubs, other plants, seeds, bulbs, mulches, soil conditioners, fertilizers, pesticides, garden tools, and other garden supplies to the general public. These establishments usually sell products purchased from other vendors, but may sell some plants which they grow themselves. Garden center consumer studies indicate that customer loyalty and repeat business result from a convenient store location, plant quality, customer service, and plant selection.

**End Users** are the final consumers of Green Industry products and services. While the vast majority of nursery products used by end users are purchased from Green Industry businesses, this is not the case for services. A significant amount of lawn and landscape services are performed by the end users themselves. However, these services are only for internal consumption, that is, end users do not maintain any landscape plants or green space other than their own. The list of end users includes airports, cemeteries, churches, commercial general business areas, golf courses, homeowners, municipalities, private recreation areas, public roadways, schools and universities, and utilities. Commercial areas are comprised of restaurants, banks, credit unions, commercial building operators, shopping centers, apartments and condominiums, mobile home sites, hotels and motels, medical and nursing care centers, retirement communities and community centers. City park districts, arboretums and zoos, city streets, and other urban public areas are maintained by municipalities. Public roadways encompass both state and county roadsides and highways.

## **Current Green Industry Situation and Outlook**

The green industry has historically been one of the fastest growing sectors in the nation’s agricultural economy; often experiencing growth and expansion even during recessionary periods. However, the industry has reached the mature state of its life cycle and has suffered as most businesses with the recession of 2008-09 (Hall, 2010). The housing bust revealed that the rate of green industry growth was also unsustainable, and current economic conditions are retarding industry recovery. Challenges of excess plant material are exacerbated by the recession (although the recession definitely helped the oversupply situation by forcing some wholesalers to drastically decrease production), including a widening and deepening of the housing crisis and the resulting ‘spend sparingly’ sentiment of consumers. A cash flow ‘domino effect’ is evident that has even the best companies in all business sectors scrambling to meet payroll and pay bills, suppliers anxious to collect on receivables, and employees hopeful that they retain jobs to pay their mortgages.

## 2. Research Methodology

### Industry Sector Classification

The economic sectors associated with the environmental horticulture or “Green” Industry were identified based on their primary product or service activity as described in the North American Industry Classification System (NAICS), or wholesale and retail trade sectors that have significant sales of horticultural merchandise as part of their overall business. The industry groups and sectors, and their corresponding NAICS codes and RIMSII multiplier sectors are indicated in Table 2-1. The *Production and Manufacturing* industry group includes the sectors for *Nursery and Greenhouse Production* and *Lawn and Garden Equipment Manufacturing*. The *Horticultural Services* industry group includes the sectors *Landscaping Services* and *Landscape Architectural Services*. The wholesale sectors within the *Wholesale and Retail Trade* group include *Merchant Wholesalers of Durable Goods* such as lawnmowers and other gardening equipment, and *Merchant Wholesalers of Nondurable Goods* like flowers, nursery stock and florist supplies. Retail sectors that have product line sales of horticultural goods include *Wholesale Electronic Markets, Agents and Brokers, Furniture and Home Furnishings Stores, Electronics and Appliance Stores, Building Material and Garden Equipment and Supplies Dealers, Food and Beverage Stores, Health and Personal Care Stores, Gasoline Stations, Sporting Goods, Hobby, Book, and Music Stores, General Merchandise Stores, Miscellaneous Store Retailers, and Non-store Retailers*. *Retail Lawn and Garden Stores* are classified within the sector *Building Materials and Garden Equipment and Supplies Dealers* and florists are classified within *Miscellaneous Store Retailers*.

**Table 2-1.** Classification of economic sectors associated with the Green industry

Industry Group / Sector	NAICS Code*	RIMS II Sector**
<b><i>Production and Manufacturing</i></b>		
Nursery and greenhouse production	1114	Greenhouse, nursery, and floriculture production
Lawn and garden equipment manufacturing	333112	Lawn and garden equipment manufacturing
<b><i>Horticultural Services</i></b>		
Landscaping services	56173	Services to buildings and dwellings
Landscape architectural services	54132	Architectural, engineering, and related services
<b><i>Wholesale and Retail Trade</i></b>		
Merchant wholesalers, durable goods	423	Wholesale trade
Merchant wholesalers, nondurable goods	424	Wholesale trade
Wholesale electronic markets, agents and brokers	425	Retail trade
Furniture and home furnishings stores	442	Retail trade
Electronics and appliance stores	443	Retail trade
Building material and garden equipment and supplies dealers	444	Retail trade
Food and beverage stores	445	Retail trade
Health and personal care stores	446	Retail trade
Gasoline stations	447	Retail trade
Sporting goods, hobby, book, and music stores	451	Retail trade
General merchandise stores	452	Retail trade
Miscellaneous store retailers	453	Retail trade
Non-store retailers	454	Retail trade

\* North American Industry Classification System.

\*\**Regional Input-Output Modeling System II* (U.S. Dept. of Commerce, Bureau of Economic Analysis, 2007).

## Data Sources

Economic information on the Green Industry in the United States, and more specifically in California, was compiled from a variety of sources. For the nursery and greenhouse sector, national and state information on number of firms, employment, and value of sales was taken from the *National Nursery Survey* for 2008 conducted by the *Green Industry Research Consortium* (Hall, Hodges and Palma, 2010). For the manufacturing, horticultural services and wholesale/retail trade industry sectors, information on number of establishments, employment, payroll and sales or gross receipts was taken from the *2007 Economic Census Industry Report Series* for U.S. totals, and from the *Geographic Area Series* for state-level information (US Census Bureau, 2010). The Economic Census may be considered the most reliable information source available, since it has a well-established statistical methodology, with adjustment for non-responding firms, and provides published reliability parameters. For the wholesale and retail sectors, whose primary business is not in horticulture, employment and payroll were estimated in proportion to horticulture product line sales as a share of total sales. If sales, employment and payroll information were non-disclosed because of a small number of firms, as per *Census Bureau* rules, these values were imputed based on the share of total establishments, so that the sum of state values matched U.S. totals.

Survey data results on the number of establishments, employment, payroll, and sales receipts for sectors of the Green Industry in California in 2007 are shown in Table 2-2. There were a total of 157,395 business establishments involved in the industry, including 2,462 production or manufacturing firms, 9,341 horticultural services firms, and 145,592 wholesale or retail trade firms. Total reported employment was 169,942 employees, and total payroll was \$11.65 Billion. Total sales revenues or receipts for horticultural products and services were \$17.22 Billion, including \$6.77 Billion for producers/manufacturers, \$8.31 Billion for horticultural services, and \$2.15 Billion for wholesale/retail trade.

**Table 2-2.** Establishments, direct output, payroll and direct employment in California Green industry sectors, 2007

Industry Group / Sector (NAICS)	Number Establishments	Direct Output (Million \$)	Payroll (Million \$)	Employment (jobs)
<b>Production and Manufacturing</b>	<b>2,462</b>	<b>6,770</b>	<b>2,134</b>	<b>43,552</b>
Nursery and greenhouse production (1114)	2,453	6,682	2,125	43,318
Lawn and garden equipment manufacturing (333112)	9	88	9	234
<b>Horticultural Services</b>	<b>9,341</b>	<b>8,306</b>	<b>2,970</b>	<b>100,944</b>
Landscaping services (56173)	8,346	7,238	2,510	92,246
Landscape architectural services (54132)	995	1,068	460	8,698
<b>Wholesale and Retail Trade</b>	<b>145,592</b>	<b>2,147</b>	<b>6,548</b>	<b>25,446</b>
Building material and garden equipment and supplies stores (444)	7,843	1,134	450	15,275
Miscellaneous store retailers (453)	12,746	224	5,863	3,686
Merchant wholesalers, durable goods (423) and nondurable goods (424)	61,451	476	134	2,442
General merchandise stores (452)	3,087	119	41	1,952
Non-store retailers (454)	6,437	78	17	347
Food and beverage stores (445)	16,574	92	34	1,401
All other retail stores	37,454	24	9	343
<b>Total All Industry Groups</b>	<b>157,395</b>	<b>17,223</b>	<b>11,652</b>	<b>169,942</b>

Wholesale and retail trade sector sales, payroll and employment reflect share of business for horticulture product lines sales.

**Sources.** Census Bureau, 2007 Economic Census: manufacturing, services and wholesale/retail trade sectors; National Nursery Survey: nursery and greenhouse production sector (2008).

Primary market research data regarding the structure and performance of the *Nursery and Greenhouse Production* sector were generated by the fifth *National Nursery Survey* conducted by the Green Industry Research Consortium (S-1051 Multi-state research project under USDA-NIFA), a group of economists and horticulturists from land-grant institutions across the country. The survey sampled all 50 states in the U.S. using a standard methodology. Lists of firms in each state were compiled from the respective state Departments of Agriculture, resulting in a combined listing of nearly 39,000 nursery operations, from which a sample of 15,000 firms was selected for the survey, with sampling in each state based on its proportion of the overall business population, and where possible stratified by three size classes based on production area, inventory or sales volume. Firms size strata were small (less than five acres), medium (5 to 19 acres), and large (20 or more acres), and sampling was weighted on larger firms, with 100 percent of the large firms, 60 percent of the medium firms, and 25 percent of the small firms. In states for which size information was not available, 40 percent of the identified firms were sampled. A total of 3,044 usable questionnaires were returned, representing an overall response rate of 15.9 percent. Survey respondents reported total annual sales at the National level of \$4.45 Billion in 2008, or an average of \$1.73 Million per firm, and total employment of 48,833 permanent and temporary jobs. Based on adjusted population of validated active firms (19,803), total U.S. nursery industry sales were estimated at \$27.14 Billion, and total employment was estimated at 262,941 jobs. Further detail on the survey methodology and results were reported by Hodges, Palma and Hall (2010).

Data on product line sales of horticultural goods by the *Wholesale and Retail Trade* sectors were taken from the special series on product line sales for the *2007 Economic Census* (Census Bureau, 2010), and this information is summarized for the Pacific region in Tables 2-3 and 2-4. Specific product lines within the retail sector category of *Lawn, Garden and Farm Equipment and Supplies* include *Cut flowers-arranged and unarranged, Fertilizer, lime, chemicals and other soil treatments, Indoor potted plants-blooming and non-blooming, Indoor potted plants and floral items, Lawn and garden machinery, equipment and parts, Lawn and garden tools, Outdoor nursery stock, All other lawn and garden supplies, and All other lawn, garden, and farm equipment and supplies*. Values for farm supplies and equipment were netted-out of figures for retail product line sales. Pertinent product lines within the wholesale trade sectors included *Lawn and garden machinery, equipment and parts* (durable goods) and *Flowers and florists' supplies* (nondurable goods).

**Table 2-3.** Product line sales of horticulture goods by wholesale trade establishments in the Pacific, by state, 2007

State	All Wholesale trade (NAICS 42)	Merchant wholesalers, durable goods (NAICS 423)	Merchant wholesalers, nondurable goods (NAICS 424)	Wholesale electronic markets and agents and brokers (NAICS 425)
-----Thousand Dollars-----				
Alaska	6.0	6.0	0.0	0.0
California	2573.7	613.0	1882.2	78.5
Hawaii	49.6	3.8	45.9	0.0
Oregon	318.1	97.2	180.7	0.0
Washington	707.5	133.7	535.5	0.0
Total Pacific Region	3654.9	853.7	2644.3	78.5
<b>Total US</b>	<b>22,451.8</b>	<b>8,400.6</b>	<b>11,271.7</b>	<b>1,103.6</b>

Source: U.S. Census Bureau

**Table 2-4.** Product line sales of horticulture goods by retail trade establishments in the Pacific, by state, 2007

State	Furniture and home furnishings stores	Electronics and appliance stores	Building material and garden equipment, supply stores	Food and beverage stores	Health and personal care stores	Gasoline stations	Sporting goods, hobby, book, and music stores	General merchan- dise stores	Miscel- laneous store retailers	Non-store retailers	Total All Retail Sectors
-----Million dollars-----											
Alaska	0.0	0.0	45.2	11.3	0.0	0.0	0.0	21.7	13.5	0.0	91.7
California	18.9	3.1	3,718.9	319.3	35.9	0.3	9.9	455.8	514.2	180.8	5,257.2
Hawaii	0.0	0.0	132.6	19.0	4.8	0.0	0.0	19.1	40.5	5.3	221.2
Oregon	1.3	0.0	518.7	31.3	1.3	12.3	0.4	142.8	42.4	104.7	855.1
Washington	3.0	0.0	946.0	84.4	1.3	15.2	1.1	192.6	69.1	79.9	1,392.5
Total Pacific Region	23.2	3.1	5361.4	465.3	43.3	27.8	11.4	832	679.7	370.7	7817.7
<b>Total US</b>	<b>186.7</b>	<b>63.6</b>	<b>39,003.7</b>	<b>2,451.0</b>	<b>64.4</b>	<b>219.1</b>	<b>27.1</b>	<b>6,059.5</b>	<b>4,405.5</b>	<b>2,895.8</b>	<b>55,376.5</b>

Source: U.S. Census Bureau. Note: missing values imputed based on number of establishments.

## Economic Impact Analysis

The regional economic impacts of the Green Industry were evaluated using economic multipliers from the Regional Input-Output Modeling System II (RIMSII) available from the U.S. Commerce Department, Bureau of Economic Analysis (USDOC/BEA, 2007). This input-output system includes over 500 distinct industry sectors. The sectors used for this analysis of the Green Industry are indicated in Table 2-1. Information for these models was derived from the U.S. National Income and Product Accounts, together with regional economic data collected for fiscal year 2007. Input-output models represent the structure of a regional economy in terms of transactions between industries, employees, households, and government institutions (Miller and Blair, 2009).

Economic multipliers derived from the models were used to estimate the total economic activity generated by sales (or output) to final demand or exports. This includes the effects of intermediate purchases by industry firms from other economic sectors (indirect effects) and the effects of industry employee household consumer spending (induced effects), in addition to direct sales by industry firms. The models were constructed with households internalized to derive Type II multipliers, which account for the induced effect of household spending. Separate multipliers are provided for output (sales revenues or receipts), employment, value added, and labor income (earnings). The output and employment total effects multipliers for each industry sector in California are shown in Table 2-5. The multipliers for output, value added, labor income, and indirect business taxes are expressed in units of dollars per dollar final demand or output, while the employment multiplier is expressed in jobs per million dollars final demand. Differences in values of the multipliers reflect the structure of industry sectors and regional mix of supplier industries. The multipliers were applied to estimated industry sales or output in order to estimate total economic impacts using the following formula:  $I_{hij} = S_{hi} \times G_i [A_{hij} + E_{hi} \times (B_{hij} + C_{hij})]$ , where the variables are defined as:

- $I_{hij}$  is total impact for measures (j) of output, employment, value added, labor income, or indirect business taxes, in each sector (i), and state (h).
- $S_{hi}$  is industry sales in sector i and state h.
- $E_{hi}$  is the proportion of industry sales exported or shipped outside the state, by sector i in state h.
- $A_{hij}$  is the direct effects multiplier for measure j in sector i and state h.
- $B_{hij}$  is the indirect effects multiplier for measure j in sector i and state h.
- $C_{hij}$  is the induced effects multiplier for measure j in sector i and state h.
- $G_i$  is the gross margin on sales for sector I in the wholesale and retail trade sectors.

The calculation assumes that only the export portion of output is sold to final demand, and therefore is subject to the indirect and induced effects multipliers, while the remainder of in-state sales is subject to intermediate demand from other business sectors and to direct effects multipliers. Data on exports were taken from the *Impact Analysis for Planning (IMPLAN)* database for 2001, except in the case of the nursery and greenhouse sector, where some information was taken from the 2008 *National Nursery Survey*.

**Table 2-5.** Output and employment multipliers for Green industry sectors in California, 2007

Multiplier	Greenhouse, nursery, and floriculture production	Lawn and garden equipment manufacturing	Services to buildings and dwellings (Landscaping)	Architectural, engineering, and related services (Landscape Architecture)	Wholesale trade	Retail trade
-----Dollars per Dollar Final Demand-----						
Output	2.025	1.843	2.343	2.262	2.031	2.081
Employment	17.92	8.77	29.86	16.25	12.94	21.72

Source: *Regional Input-Output modeling System II (RIMSII)*, Bureau of Economic Analysis

### 3. Results for California Green Industry Sectors

#### California Economic Contributions by Sector

Economic contribution estimates for the Green Industry in California in 2007 are summarized in Table 3-1. Direct output was \$17.22 Billion, and total output impacts, including indirect and induced regional economic multiplier effects of nonlocal output, were \$25.01 Billion. Total industry payroll was \$11.65 Billion and the total labor earnings impact (with multiplier effects) was \$8.28 Billion. The industry had direct employment of 169,942 fulltime and part-time jobs, and total employment impacts of 257,650 jobs in the broader economy. The total value added impact was \$15.82 Billion, including employee compensation, proprietor (business owner) income, other property income and indirect business taxes paid to state/local and federal governments.

For the *Production and Manufacturing* Group, including *Nursery and greenhouse production* and *Lawn and garden equipment manufacturing* sectors, total output impacts were \$8.59 Billion, employment impacts were 59,582 jobs, earnings impacts were \$2.63 Billion, and value added impacts were \$5.85 Billion.

For the *Horticultural Services* Group of *Landscape services* and *Landscape architectural services*, total output impacts were \$14.05 Billion, employment impacts were 170,643 jobs, earnings impacts were \$4.82 Billion, and value added impacts were \$8.31 Billion.

For the *Wholesale and Retail Trade* Group, total output impacts were \$2.38 Billion, employment impacts were 27,425 jobs, earnings impacts were \$828 Million, and value added impacts were \$1.66Billion.

**Table 3-1.** Summary of economic contributions of the Green Industry sectors to California Economy, 2007

Industry Group / Sector (NAICS)	Direct Output (Sales)	Total Output Impact	Payroll	Total Labor Income Impact	Total Value Added Impact	Employment	Total Employment Impact
	-----Million Dollars-----					Fulltime & Part-time Jobs	
<b>Production and Manufacturing</b>	<b>6,770</b>	<b>8,588</b>	<b>2,134</b>	<b>2,632</b>	<b>5,846</b>	<b>43,552</b>	<b>59,582</b>
Nursery and greenhouse production (1114)	6,682	8,485	2,125	2,620	5,808	43,318	59,275
Lawn and garden equipment manufacturing (333112)	88	103	9	12	38	234	307
<b>Horticultural Services</b>	<b>8,306</b>	<b>14,046</b>	<b>2,970</b>	<b>4,818</b>	<b>8,311</b>	<b>100,944</b>	<b>170,643</b>
Landscaping services (56173)	7,238	12,355	2,510	4,146	7,150	92,246	157,469
Landscape architectural services (54132)	1,068	1,691	460	672	1,161	8,698	13,174
<b>Wholesale and Retail Trade</b>	<b>2,147</b>	<b>2,373</b>	<b>6,548</b>	<b>828</b>	<b>1,659</b>	<b>25,446</b>	<b>27,425</b>
Building material and garden equipment and supplies stores (444)	1,134	1,134	450	450	797	15,275	15,275
Miscellaneous store retailers (453)	224	224	5,863	72	158	3,686	3,686
Merchant wholesalers, durable goods (423) and nondurable goods (424)	476	580	134	166	408	2,442	3,145
General merchandise stores (452)	119	162	41	55	111	1,952	2,403
Non-store retailers (454)	78	120	17	30	81	347	785
Food and beverage stores (445)	92	123	34	44	84	1,401	1,726
All other retail stores, including: Wholesale electronic markets, agents and brokers (425) Furniture and home furnishings stores (442) Gasoline stations (447)	24	30	9	11	20	343	405
Electronics and appliance stores (443) Health and personal care stores (446) Sporting goods, hobby, book, and music stores (451)							
<b>Total All Industry Groups</b>	<b>17,223</b>	<b>25,007</b>	<b>11,652</b>	<b>8,278</b>	<b>15,816</b>	<b>169,942</b>	<b>257,650</b>

Values for wholesale and retail trade sectors reflect share of sales, employment and payroll for horticulture product lines, and gross margin on sales for output. Employment data represent fulltime and part-time jobs. Total impact estimates include regional economic multiplier effects.

The largest individual industry sectors in terms of employment and value added impacts were *Landscaping Services* (157,469 jobs, \$7.15 Billion), *Nursery and Greenhouse Production* (59,275 jobs, \$5.81 Billion), and *Building Materials and Garden Supplies Stores* (15,275 jobs, \$797 Million), as shown in Table 3-1. Other industry sectors with employment impacts exceeding 1,000 jobs were *Landscape Architectural Services* (13,174 jobs), *Miscellaneous Store Retailers* (3,686 jobs), *Merchant Wholesalers of Durable and Nondurable Goods* (3,145 jobs), *General Merchandise Stores* (2,403 jobs), and *Food and Beverage Stores* (1,726 jobs).

Employment and value added contributions by the Green Industry in 2007 are summarized for the Pacific region in Table 3-2. The largest state in terms of total employment contributions in the Pacific region was California (257,650 jobs) followed by Washington (41,443 jobs), Oregon (38,794 jobs), Hawaii (17,974 jobs), and Alaska (2,479 jobs). Nationwide, California was the leading state in terms of output contributions, employment contributions and value added contributions.

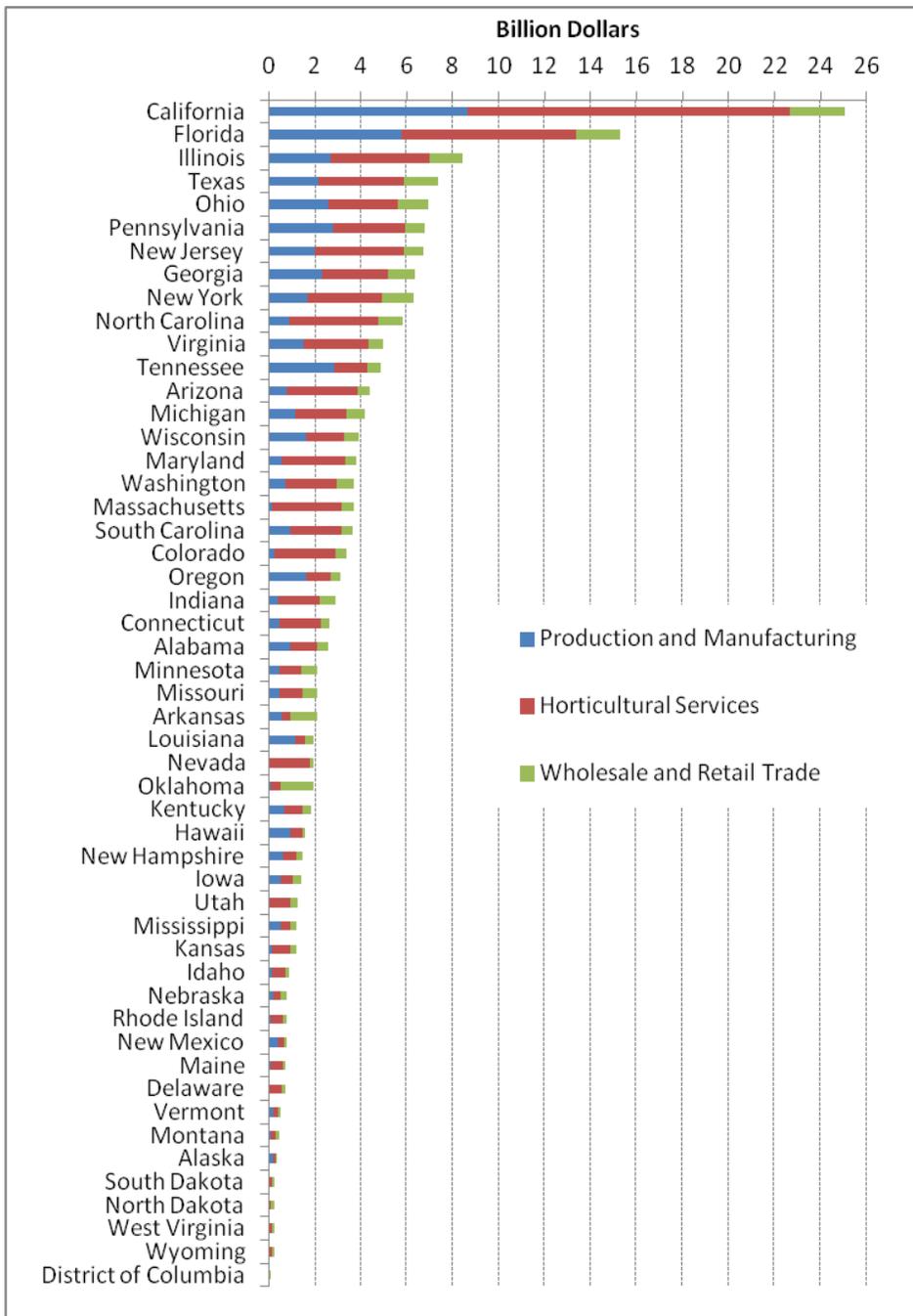
**Table 3-2.** Employment and value added contributions by industry group for the Pacific region, 2007

State	Employment (Fulltime & Part-time Jobs)				Value Added (Million Dollars)			
	Production and Manufacturing	Horticultural Services	Wholesale and Retail Trade	Total All Industry Groups	Production and Manufacturing	Horticultural Services	Wholesale and Retail Trade	Total All Industry Groups
Alaska	781	873	825	2,479	116.7	55.9	47.0	219.7
California	59,582	170,643	27,425	257,650	5,846.0	8,311.0	1,659.0	15,816.0
Hawaii	10,052	6,582	1,340	17,974	623.8	283.5	72.5	979.8
Oregon	19,730	14,342	4,723	38,794	936.5	606.7	289.3	1,832.5
Washington	5,951	27,383	8,109	41,443	505.0	1,289.8	502.4	2,297.2
<b>Pacific Total</b>	<b>96,096</b>	<b>219,823</b>	<b>42,422</b>	<b>358,341</b>	<b>8,028</b>	<b>10,547</b>	<b>2,570</b>	<b>21,145</b>
<b>Total US</b>	<b>471,981</b>	<b>1,123,428</b>	<b>357,515</b>	<b>1,952,925</b>	<b>32,414.0</b>	<b>54,521.0</b>	<b>20,510.7</b>	<b>107,445.8</b>

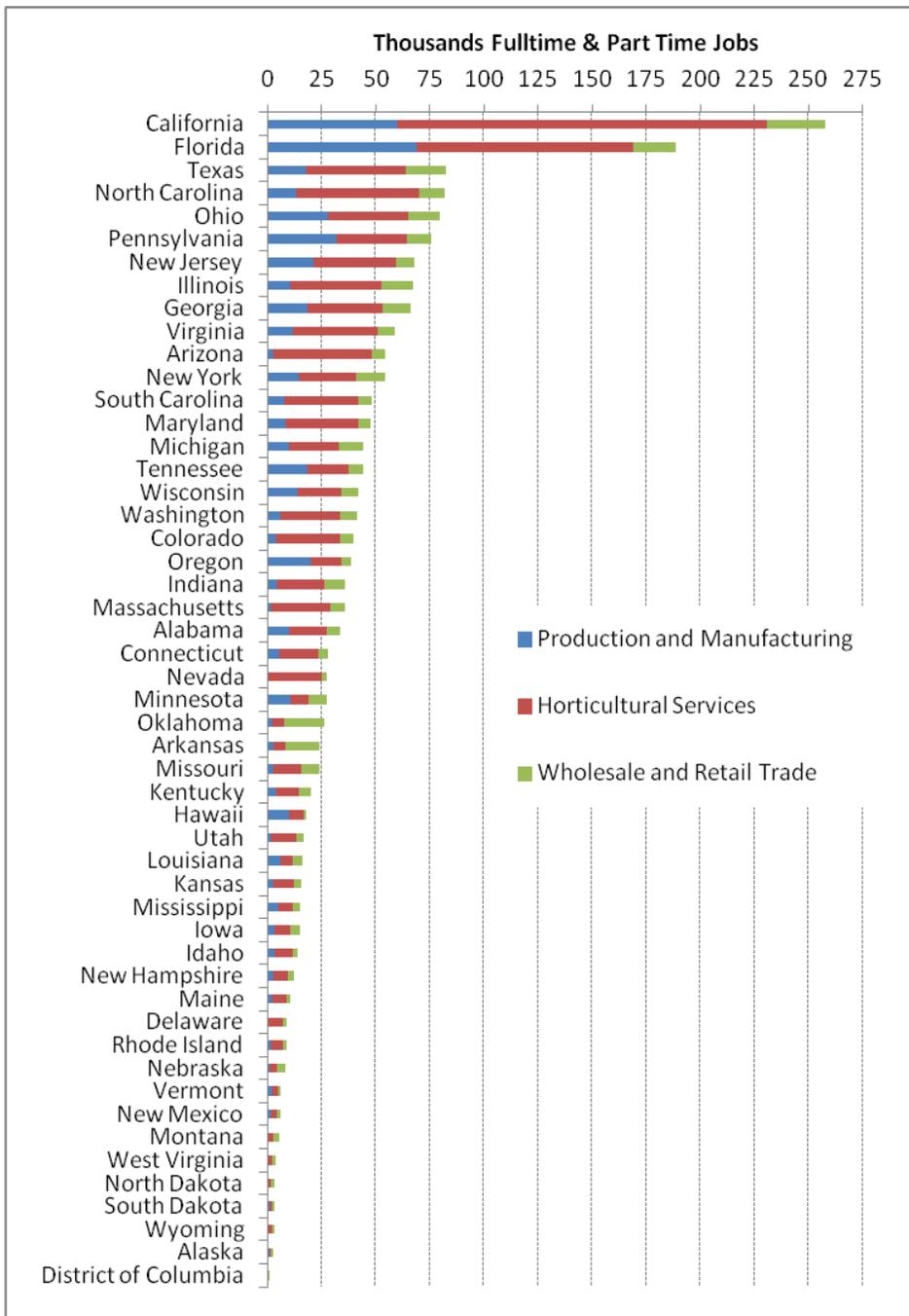
Values for wholesale and retail trade sectors reflect share of sales, employment and payroll for horticulture product lines. Estimates include regional economic multiplier effects.

California is the largest Green Industry state in the U.S. Figures 3-1, 3-2, and 3-3 represent the total economic contributions of the green industry in every state in the U.S. California represents 14.2% of output contributions, 13.2% of employment contributions and 14.7% value added contributions for the green industry in the U.S.

**Figure 3-1.** Output contributions of the Green industry in U.S. states, 2007



**Figure 3-2.** Employment contributions of the Green industry in U.S. states, 2007



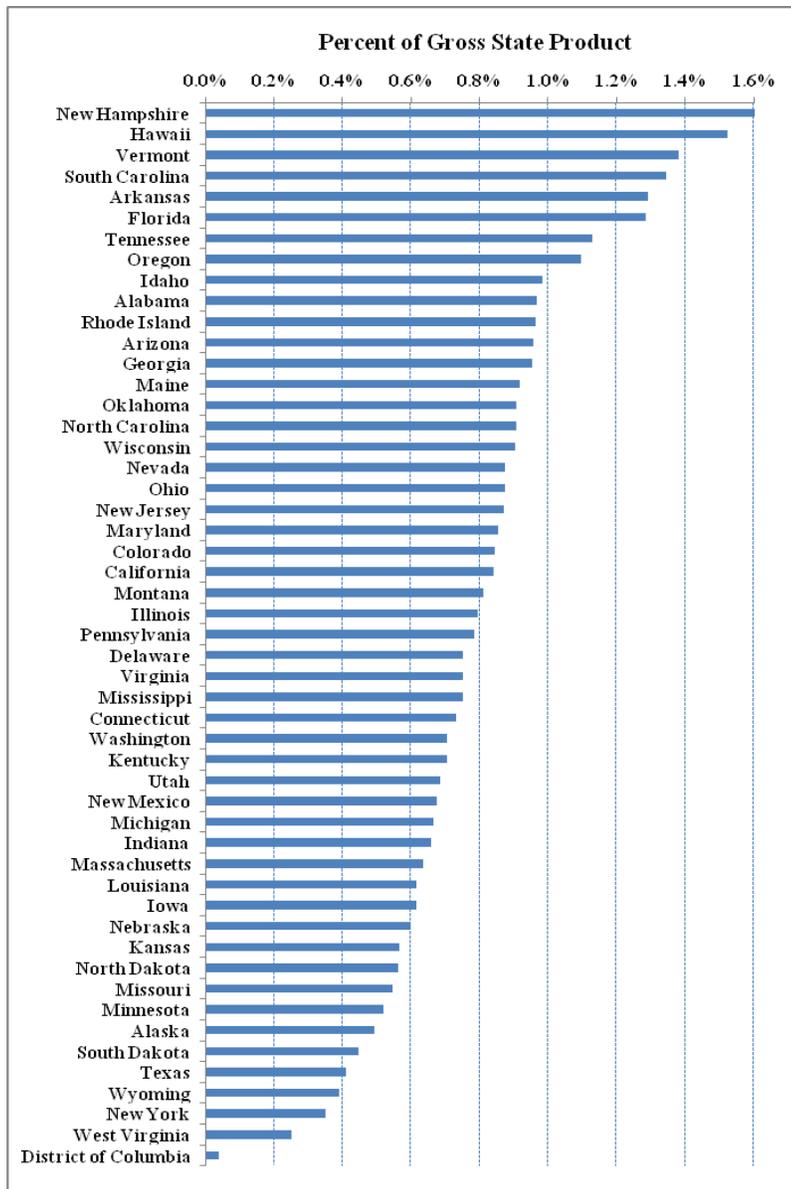
**Figure 3-3.** Value added contributions of the Green industry in U.S. states, 2007



### California Contribution to Gross State Product

The contribution of the Green Industry to Gross Domestic Product (GDP) is a measure of the industry’s importance to the overall economy. GDP is equivalent to the sum of value added by all industries, and alternatively represents gross output minus intermediate purchases of goods and services from other U.S. industries or imports (USDOC-BEA). Gross State Product (GSP) is the state-level counterpart of GDP for the nation. The contribution of the Green industry to GSP in each state is presented in Figure 3-4. California Green Industry represents 0.83 percent of total overall economic activity in the state.

**Figure 3-4.** Value added contributions by the Green industry as a share of Gross State Product, 2007



### California Economic Impact Changes 2002-2007

Overall the California green industry has experienced moderate growth for the 2002-2007 period (Hall, Hodges and Haydu, 2005; Hodges, Hall and Palma, 2011). Total output impacts in California increased 22.8 percent from \$20.36 billion in 2002 to \$25.00 billion in 2007. Total employment impacts remained relatively flat with a slight increase of 1.4 percent from 253,977 jobs in 2002 to 257,650 in 2007. Total value added impacts increased from \$13.66 billion in 2002 to \$15.82 billion in 2007 for a 15.8 percent increase.

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