

2003

# Establishing the economic impact of the green industry on Louisiana's economy

Raul A. Pinel

*Louisiana State University and Agricultural and Mechanical College*, rpinel1@lsu.edu

Follow this and additional works at: [https://digitalcommons.lsu.edu/gradschool\\_theses](https://digitalcommons.lsu.edu/gradschool_theses)



Part of the [Agricultural Economics Commons](#)

---

## Recommended Citation

Pinel, Raul A., "Establishing the economic impact of the green industry on Louisiana's economy" (2003). *LSU Master's Theses*. 82.  
[https://digitalcommons.lsu.edu/gradschool\\_theses/82](https://digitalcommons.lsu.edu/gradschool_theses/82)

This Thesis is brought to you for free and open access by the Graduate School at LSU Digital Commons. It has been accepted for inclusion in LSU Master's Theses by an authorized graduate school editor of LSU Digital Commons. For more information, please contact [gradetd@lsu.edu](mailto:gradetd@lsu.edu).

**ESTABLISHING THE ECONOMIC IMPACT OF THE GREEN INDUSTRY ON  
LOUISIANA'S ECONOMY**

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical college  
in partial fulfilment of the  
requirements for the degree of  
Master of Science

in

The Department of Agricultural Economics  
and Agribusiness

By  
Raul A. Pinel  
B.S. Escuela Agrícola Panamericana (Zamorano), 1994  
May, 2003

To God, creator of life and my strongest support

To my parents, Jose A. and Lilian, for their unconditional love, support and patience

## ACKNOWLEDGMENTS

A special thanks to my brothers, P. Antonio and Jose Arnoldo for their help throughout my studies at LSU, and to my grandma Yoya, who is not with us anymore but always will be in my heart, love you.

I would like to thank Patricia and Darin, who have been an essential pillar in my success during the past two years, for their invaluable friendship, encouragement and advice. God bless your hearts, love you guys.

Also, I would like to express my gratitude to Paul, Wendy and Justin (The Ivey's) for being like a second family to me, and for always being there, in good and bad times, without your friendship, help and support I would have not accomplished my goals.

I would like to express my sincere thanks to my friends: Enid Cuellar, Roberto Navajas, Noemi Pavon, April Street, Luke Theriot and Don Hosman. I will always treasure our good times and memories, you are the best. Also. I would like to express a special thanks to Janis Breaux and Elizabeth Roule for their help and patience.

To my major professor Dr. Roger Hinson, and to my committee members Drs. Wes Harrison, Alvin Schupp and Steve Henning, for their help and guidance. To Drs. Albert Ortego and Gail Cramer for their support, and to Debbie Mosher and Pamela Fenn, thank you for your help.

## TABLE OF CONTENTS

DEDICATION.....	ii
ACKNOWLEDGMENTS.....	iii.
LIST OF TABLES.....	ix
LIST OF FIGURES.....	xi
ABSTRACT.....	xii
CHAPTER 1. INTRODUCTION.....	1
1.1. Industry Participants.....	1
1.2. Retail Industry Size and Rate of Growth.....	2
1.3. Size and Growth at the Producer Level.....	4
1.3.1. Leading States in Sales.....	6
1.4. Consumer and Industry Trends.....	7
1.5. Louisiana Production and Value Added.....	7
1.6. Regional Retail Sales.....	8
1.7. Economic Impact Studies.....	9
1.8. Problem Statement.....	9
1.8.1. Sector Growth and Spending Trends.....	9
1.8.2. Demographic Changes.....	10
1.8.3. Linkage Changes.....	11
1.8.4. Data.....	12
1.9. Problem Justification.....	12
1.10. Objectives.....	14
1.10.1. General Objective.....	14
1.10.2. Specific Objectives.....	15
1.11. Organization of the Thesis.....	16
CHAPTER 2. LITERATURE REVIEW.....	17
2.1. Approaches to Evaluate Economic Impact.....	17
2.1.1. Value Added Approach.....	18
2.1.1.1. Procedures to Collect Information in Value Added Studies.....	18
2.1.1.2. Value Added Industry Studies Results.....	21
2.1.2. Input-output Models.....	23
2.1.2.1. Procedures to Collect Information for the IMPLAN Model.....	24
2.1.2.2. Economic Impact Studies (IMPLAN Model).....	27

CHAPTER 3. METHODOLOGY.....	33
3.1. Input-Output Model Theoretical Framework.....	33
3.1.1. Input-Output Tables.....	34
3.1.1.1. Transition Tables.....	34
3.1.1.1.1. Equality of Rows and Columns.....	37
3.1.1.1.2. Regional Models.....	37
3.1.1.1.3. Some Specific Industry Models.....	38
3.1.1.2. Technical Coefficients Table.....	38
3.1.1.3. Interdependent Coefficient Table.....	39
3.1.2. Multiplier Analysis.....	40
3.1.2.1. Output Multipliers.....	41
3.1.2.2. Income Multipliers.....	42
3.1.2.3. Employment Multipliers.....	43
3.1.3. Impact Analysis.....	43
3.2. Surveys to Collect Revenues, Expenditures and Employment.....	44
3.2.1. Nursery Producers: The Survey Instrument.....	45
3.2.2. Nursery Producers: The Target Population.....	46
3.2.3. Landscape Design, Installation and Maintenance: The Survey Instrument.....	47
3.2.4. Landscape Design, Installation and Maintenance: The Target Population.....	47
3.2.5. Golf Courses: The Survey Instrument.....	48
3.2.6. Golf Courses: The Target Population.....	48
3.3. Methods for Collecting Expenditures Reported in Other Industries.....	48
3.3.1. The Survey Instrument.....	49
3.3.1.1. Churches and Cemeteries.....	50
3.3.1.2. Elementary and Secondary Schools, Public: .....	51
3.3.1.3. Colleges and Universities (including sport fields).....	52
3.3.1.4. Private Educational Institutions.....	52
3.3.1.5. Parish/City Grounds, Parks and Playgrounds.....	53
3.3.1.6. State Parks and Recreational Areas.....	54
3.3.1.7. Road Shoulder and Median Maintenance, and Airports.....	55
3.4. Survey Response Rates.....	56
3.4.1. First Mail, Postcards and Second Mail.....	56
3.4.2. Expansion Factors.....	57
3.5. Descriptive Results Methodology.....	57
3.6. Procedure for Input-Output Model Using IMPLAN Software.....	58
3.6.1. Establishing IMPLAN Industry Values (Industry Expenditures).....	59
3.6.1.1. Nursery and Sod Producers.....	60
3.6.1.2. Services Sector.....	63
3.6.1.3. Golf Courses.....	63
3.6.1.4. Expenditures on Grounds Maintenance Reported in Other Sectors.....	65

3.6.1.4.1. Churches and Cemeteries.....	66
3.6.1.4.2. Public Elementary and Secondary Schools.....	66
3.6.1.4.3. Public Colleges and Universities.....	67
3.6.1.4.4. Private Schools, Elementary, Secondary and College/University.....	68
3.6.1.4.5. Parish/city Grounds, Parks and Playgrounds.....	69
3.6.1.4.6. State Parks and Recreational Areas.....	70
3.6.1.4.7. Road Shoulder and Median Maintenance.....	70
3.6.1.4.8. Airports.....	70
3.6.1.4.9. Maintenance and Related Expenditures Reported in Other Industries.....	71
3.6.2.. Establishing Retail Industry Size.....	72
3.6.3. Building the Model .....	74
3.6.3.1 Modifying Regional Database.....	74
3.6.4. Impact Analysis.....	76
<b>CHAPTER 4. RESULTS.....</b>	<b>77</b>
4.1. Input-Output Analysis Results (IMPLAN Software).....	77
4.1.1. Multipliers.....	78
4.1.1.1. Output Multiplier.....	78
4.1.2. Production Sector Impact.....	79
4.1.2.1. Gross Sales.....	80
4.1.2.2. Total Personal Income.....	80
4.1.2.3. Gross State Product.....	81
4.1.2.4. Employment.....	81
4.1.2.5. Total Economic Impact of the Production Sector.....	81
4.1.3. Golf Industry-Economic Impact.....	84
4.1.3.1. Gross Sales, Total Personal Income, Gross State Product and Employment.....	85
4.1.3.2. Total Economic Impact of the Golf Industry.....	85
4.1.4. Retail Sector-Economic Impact.....	86
4.1.4.1. Gross Sales, Total Personal Income, Gross State Product and Employment.....	87
4.1.4.2. Total Economic Impact by the Retail Sector.....	88
4.1.5. Maintenance and Related Expenditures Reported in Other Industries.....	90
4.1.5.1. Gross Sales, Total Personal Income, Gross State Product and Employment.....	91
4.1.5.2. Total Economic Impact by the Green Industry in Other Sectors.....	91

4.1.6. Green Industry Economic Impact.....	94
4.1.6.1. Gross Sales, Total Personal Income, Gross State Product and Employment.....	94
4.1.6.2. Total Economic Impact of the Entire Green Industry .....	94
CHAPTER 5. SUMMARY AND CONCLUSIONS.....	98
5.1. Methodology.....	99
5.2. Results.....	101
5.3. Conclusions.....	103
5.4. Implications.....	104
5.5. Limitations and Future Research.....	106
REFERENCES.....	107
APPENDIX	
A    ORNAMENTAL HORTICULTURE PRODUCER SURVEY.....	111
B    GREEN INDUSTRY ECONOMIC IMPACT STUDY LANDSCAPE DESIGN, INSTALLATION AND MAINTENANCE SECTOR SURVEY.....	116
C    LOUISIANA GOLF COURSE INDUSTRY SURVEY.....	119
D    CHURCHES AND/OR CEMETERIES SURVEY.....	123
E    DESCRIPTIVE STATISTICS OF VARIABLES FOR CHURCHES AND CEMETERIES, AIRPORTS, PRIVATE SCHOOLS (ALL LEVELS), SCHOOL DISTRICTS, PUBLIC COLLEGES/UNIVERSITIES, CITY/PARISH GROUNDS, AND STATE PARKS AND RECREATIONAL AREAS.....	124
F    ESTIMATE OF TOTAL EXPENDITURES, ACRES, NUMBER OF RESPONDENTS AND COST PER ACRE ON GROUNDS MAINTENANCE REPORTED BY SCHOOL DISTRICTS, PARISH/CITY GROUNDS, AND CHURCHES AND CEMETERIES IN LOUISIANA, 2001.....	130

G	ESTIMATE OF TOTAL EXPENDITURES, ACRES, NUMBER OF RESPONDENTS AND COST PER ACRE REPORTED BY RESPONDENTS ON GROUNDS MAINTENANCE BY ALL PRIVATE SCHOOLS, PUBLIC UNIVERSITIES, AIRPORTS, ROAD MAINTENANCE, AND STATE PARKS IN LOUISIANA, 2001.....	131
H	AGGREGATED ONE- DIGIT SIC CODE IMPLAN SECTORS, BY SECTOR/INDUSTRY AND NUMBER.....	132
I	DIRECT, INDIRECT, INDUCED AND TOTAL EFFECTS ON GROSS SALES, TOTAL PERSONAL INCOME, GROSS STATE PRODUCT AND EMPLOYMENT FOR THE PRODUCTION SECTOR, GOLF INDUSTRY, RETAIL SECTOR, 'OTHER' (HORTICULTURAL EXPENDITURES REPORTED IN OTHER SECTORS) AND OVERALL ECONOMIC IMPACT OF THE GREEN INDUSTRY.....	133
	VITA.....	144

## LIST OF TABLES

TABLE	Page
1.1	Number of Operations and Total Sales by Type of Plant Product, United States, 1998.....5
3.1	A Schematic Representation of the Input-Output Transition Table.....35
3.2	General Model (Flow Trade) for a Two Sector Economy.....36
3.3	Target Population, List and Survey Response Rate for Selected Sub-Sectors in the Green Industry.....58
3.4	Expansion Factors for Each Sub-Sector.....59
3.5	Number of Golf Courses by Category.....65
3.6	Total Expenditures by Churches and Cemeteries in 2001.....67
3.7	Total Expenditures on Grounds Maintenance by School Districts in 2001.....67
3.8	Total Expenditures Incurred by Cities/Parishes on Grounds Maintenance in 2001.....69
3.9	Total Expenditures by Airports in Louisiana, 2001.....71
3.10	Annual Expenditures by Lawn and Garden Category for a Typical Louisiana Household, 2001.....73
4.1	Output Multipliers at the One Digit Level of Aggregation of Louisiana’s Economy, Estimated with the Louisiana Input-Output Model, 1999.....79
4.2	Impact of the Production Sector of the Green Industry on Louisiana’s Economy as Estimated with the Louisiana Input-Output Model, 1999.....82
4.3	Impact of the Golf Industry on Louisiana’s Economy as Estimated with the Louisiana Input-Output Model, 1999.....86
4.4	Impact of the Retail Sector on Louisiana’s Economy as Estimated with the Louisiana Input-Output Model, 1999.....89

4.5	Impact of Green Industry Activity In Other Industries on Louisiana’s Economy as Estimated with the Louisiana Input-Output Model, 1999.....	92
4.6	Impact of the Entire Green Industry on Louisiana’s Economy as Estimated with Louisiana IMPLAN Input-Output Model, 1999.....	95

## LIST OF FIGURES

FIGURE	Page
4.1 Total Industry Output (TIO), Total Personal Income (TPI) and Gross State Product (GSP) in million dollars for Producers and Landscapers.....	84
4.2 Number of Jobs in the Production Sector (Producers and Landscapers).....	84
4.3 Total Industry Output, Total Personal Income and Gross State Product for the Golf Industry (Million Dollars).....	87
4.4 Number of Jobs Generated in the Golf Industry in 2001.....	87
4.5 Total Industry Output, Total Personal Income and Gross State Product for the Trade Sector (Million Dollars).....	89
4.6 Number of Employees in the Trade Sector in 2001.....	90
4.7 Total Industry Output, Total Personal Income and Gross State Product for Horticultural Expenditures Reported by Unrelated Sectors Including Construction and Real Estate in 2001 (Million Dollars).....	93
4.8 Number of Jobs in Horticultural Expenditures Reported by Unrelated Sectors Including Construction and Real Estate in 2001.....	93
4.9 Overall Economic Impact of the Green Industry on TIO, TPI and GSP in 2001 (Million Dollars).....	96
4.10 Employment Generation by the Green Industry on Louisiana's Economy, 2001.....	97

## ABSTRACT

The general objective of this study was to provide updated estimates of value of the green industry in Louisiana. Data collection was conducted for the production sector (Nursery Growers and Sod Producers, and Landscape Design, Installation and Maintenance Services) and the Golf Industry. In addition, expenditures on green industry products and services incurred by other sectors were obtained. Among those sectors were churches and cemeteries, public schools (elementary and secondary), public colleges and universities, private schools (elementary, secondary and college/university), parish/city grounds, state parks, road shoulder and median maintenance, and airports. To conduct the surveys, listings from those sectors were obtained from sources such as the Louisiana Department of Agriculture and Forestry, Louisiana Department of Education, Louisiana Department of Transportation, Louisiana Board of Cemeteries, American Business Directory and internet sources. Questionnaires were developed for the three main groups based on previous studies, and a single page questionnaire was developed to collect expenditures from other sectors. Survey procedures followed Dillman's methodology.

Using IMPLAN, a 1999 input-output model was built. This model provided results of direct, indirect, induced and total effects of the green industry in specific sectors such as Production, Golf Industry, Retail, Other, and an overall impact on Louisiana's economy. Those impacts were measured in four categories: gross sales, personal income, gross state product and employment, and multiplier tables were reported.

Economic impact by the Production sector on gross sales was estimated at \$605 million, which includes Greenhouse and Nursery Products (\$119 million) and Landscape and Horticultural Services (\$266 million), while the impact of the Golf Industry on gross sales was estimated at \$151 million. The economic

impact by the Retail Sector and ‘Horticultural Expenditures Reported by Other Industries’ were estimated at \$557 million and \$872 million, respectively. Total economic impact by the green industry on Louisiana’s economy was estimated at \$2.21 billion and 56,685 jobs were generated.

## CHAPTER 1. INTRODUCTION

Through the years, gardening and lawn care activities have become more and more a part of our lives. They provide the opportunity to enjoy leisure time and make homes more attractive and valuable. Many people who are involved in these activities identify stress reduction as another benefit. Even in slow economic growth periods, sales associated with these activities have remained relatively strong. Among other factors, growth has been driven by increasing population, and by increasing disposable income. Consumption patterns have changed as demographic characteristics of the population have changed. In particular, the 'baby boomer' generation has entered a phase in which it is more interested in home improvement activities like gardening, and is devoting more resources to those activities. Gardening also is attractive because it involves activities appropriate to the whole family, and time together can be shared. For these and other reasons, the green industry has grown more than other sectors of agriculture, as can be seen in increasing retail sales, production areas and number of producers.

### 1.1. Industry Participants

The green industry has four important production sub-sectors: floriculture, environment horticulture, turfgrass sod, sprigs and plugs, and unfinished plant/propagation material. Their contribution to the state and national economy is important.

Another important aspect of the green industry is how product flows through the chain of participants in the green industry. The chain flows through growers of greenhouse, nursery and turf products. Growers need input suppliers to provide them with chemicals, fertilizers, and other hardware and equipment for use in the production process, and are in turn input suppliers to other vendors and final customers. Services are provided to the industry by lawn maintenance and landscapers. Sales to the final

consumer are made by retailers, such as garden centers, mass merchandisers (general merchandise and home improvement centers), florists, and wholesalers (Hughes and Hinson, 1997).

As examples of interactions described above, growers have direct interaction with suppliers who provide them with inputs, such as fertilizer, seed, and pesticides. These suppliers get the products to sell from a network of raw material suppliers. These products are sold directly to producers or to businesses, such as landscapers and lawn care maintenance businesses (who also buy equipment and machinery to be used in their activities). Garden centers and mass merchandisers have direct relationships with producers, input suppliers, and customers. They provide products to the final customer and services to other businesses. Retail stores and florists sell to the final customer, and in some cases, they provide additional services for final customers, such as delivery and presentation. Consumers at the household level buy flowers, bedding plants, cut green plants and services to create, maintain and improve their own properties. Customers include families, small businesses, government and corporations.

## 1.2. Retail Industry Size and Rate of Growth

While the green industry grew at a steady pace from 1979 to 1989 (Greenidge, 2002), growth occurred at a faster pace between 1990 and 2001, and total sales reached a level of more than \$93 billion. An example of the rate of growth of lawn and garden retail sales was the 4.5% increase from 2000 to 2001, a year of overall economic decline. Growth also was reported in ten separate categories, such as green goods (plant material), power equipment, fertilizers, chemicals, tools and lawn furniture. Green goods expenditures were estimated at \$22.5, \$23.5 and a projected \$24.6 billion for 2000, 2001 and 2002, respectively. Of the green goods total, flowering plants, bedding plants, and evergreen plants represented 68% in 2001. These estimates were based on annual surveys and on a data bank maintained by Greenidge & Associates.

As another measure of growth, the National Gardening Association (NGA, 2001) reported a 4.6% compound growth rate across gardening categories from 1996 to 2001, ranging from 3.9% to 28.5% for flower gardening and water gardening, respectively. It was estimated that total expenditures by households in the United States were \$22.51, \$26.63, \$30.18 and \$33.51 billion in 1996, 1997, 1998 and 1999, respectively. Expenditures were flat between 1999 and 2000, then increased again from 2000 to 2001 to a level of \$37.73 billion. More than 16 lawn care related activities were included to calculate the total retail sales. Among those categories are indoor plant purchases, lawn care, such as weed and feed fertilizers, hand tools, outdoor furniture, flower gardening (such as annual flower transplants), insect control, landscaping, and fruit trees. Households were asked to report purchases made by household members in these separate lawn care activities. The estimates reported by NGA were based on scientifically validated surveys conducted by Harris Interactive in 2001, and by organizations such as CID Gallup, Inc. in previous years.

Size and growth rate of the green industry are two important measures that can be estimated in different ways as reported by Greenidge (2002) and the National Gardening Association. These organizations used different methodologies, and their estimates of sales are contradictory. Possible explanations may lie in the different procedures used and sources of the information. Even though results may differ in terms of size, whether the industry trend is stable, expanding or shrinking may be discernable. It is important to mention that both sources have different methodologies to collect information, and comparison between them is a difficult task. NGA estimates are based on consumer surveys that may over or under estimate expenditures. On the other hand, figures from the retail sector might include more than lawn and garden purchases (Hinson, 2002).

### 1.3. Size and Growth at the Producer Level

Johnson and Christensen (1995) compared information from the Agricultural Censuses in 1982, 1987 and 1992. They found that greenhouse and nursery crops expanded at a rate of 10% annually from 1982 to 1992 and that aggregate cash receipts in the United States increased by 32.2% from the 1987 Census. In addition, they found that the number of producing units and sales increased significantly in all regions; however, there were differences in the growth rate between the regions. Western and southern regions showed a faster growth rate than other regions. The sixteen states in the southern region had 17,727 producers that accounted for 37.4% of the total. From 1987 to 1992, the number of acres in the open dedicated to this sector grew from 226,000 acres to 283,600 acres, an increase of 25.5%. The area under glass or other protection grew by 29.8%, the biggest increase among different activities.

The ERS, in 1996, reported that most of the growth in the production sector of the green industry has been in the southern and western regions due to increase in demand, favorable weather conditions and closeness to highly populated areas.

In the United States, the number of operations, number of producers and sales for these categories were estimated by the USDA in 1998. The floriculture or greenhouse sector is composed of cut greens, cut flowers, foliage, potted flowers, bedding plants, and propagative products. Nationally, the farm value of these products grew to \$4.3 billion in 1998 (Table 1). The estimated values for this sector in 2000 and 2001 were \$4.58 billion and \$4.74 billion, respectively.

Annual bedding garden plants (flats and pots), herbaceous perennial plants (pots), flowering potted plants and hanging baskets represent the sub-categories with the most operations among greenhouses.

Table 1.1. Number of Operations and Total Sales by Type of Plant Produced, United States, 1998.

	Units	Operations	Total	
			Number	Sales
1. Greenhouses			(1000)	(\$1000)
a. Annual bedding garden plants	Flats	7,892	117,051	957,727
b. Annual bedding garden plants	Pots	8,159	429,829	560,677
c. Herbaceous perennial plants	Flats	1,596	5,167	51,344
d. Herbaceous perennial plants	Pots	6,848	221,505	527,686
e. Potted flowering plants	Pots	5,008	251,684	848,086
f. Foliage plants	Pots	2,419	200,110	522,888
g. Hanging baskets		6,789	20,956	211,345
h. Cut flowers		2,097	NA	512,570
i. Cut cultivated greens		759	NA	130,213
Sub-total				4,322,526
2. Environmental horticulture plants				
a. Deciduous shrubs		4,003	21,674	461,708
b. Deciduous flowering trees		3,656	18,946	335,613
c. Broadleaf evergreens		3,638	89,940	651,737
d. Coniferous evergreens		4,386	78,686	607,935
e. Deciduous other plants		4,480	162,597	756,614
f. Fruits and nut plants		1,480	122,030	254,115
Sub-total				3,096,723
3. Unfinished plants /propagation material		1,856	NA	493,049
4. Turf grass sod, sprigs, or plugs		1,143	NA	835,212

Source: Census of Horticultural Specialties, 1998. USDA. Numbers of operations within a category cannot be summed because many growers are producing in more than one category.

The major types of plants produced (Table 1.1) were annual bedding garden flats (pots), potted flowering plants, herbaceous perennial plants, and foliage plants with 429, 251, 221 and 200 million produced, respectively. The annual bedding plants (\$957 million) and potted flowering plants (\$848 million) categories were the two leading sales categories.

Operations is the number of businesses producing in that specific category. Adding the number of operations, however, does not indicate the number of growers because most businesses produce in more

than one subcategory. USDA/ERS (2000) reported that the number of growers with annual sales over \$10,000 declined from 12,700 in 1997 to 11,624 growers in 2000, and fell another 6% to a level of 10,965 in 2001.

Environmental horticulture refers to plants that last more than one season, such as trees, shrubs, turf grass or sod, bulbs and planting stock. Environmental horticulture sales were \$3.09 billion in 1997 and the number of operations with sales over \$10,000 in 1998 was 5,717 (USDA/NASS/Census of Horticultural Specialties, 1998). Deciduous shrubs, coniferous evergreen, and deciduous others represent the major subcategories within environmental horticulture production.

Sales of unfinished plants and turf grass sub-categories combined reached \$1.32 billion in 1998. In addition, the numbers of operations with annual sales over \$10,000 in unfinished plants/propagation materials and turfgrass sod, sprigs or plugs sub-sectors were 110 and 1,064, respectively (USDA/NASS/Census of Horticultural Specialties, 1998).

### 1.3.1. Leading States in Sales

In 1999, the leading states in cash receipts in the greenhouse/nursery sub-sectors in the United States were California, Florida, Texas, North Carolina, Oregon, Ohio, Michigan, Pennsylvania, New Jersey and Washington. The top three states accounted for 41% (California 20%, Florida 12% and Texas 9%) of cash receipts. In 2001, the third, fourth and fifth places were occupied by Texas, Michigan and Ohio accounting for 53% of the total value (USDA/NASS, 2002). With an increase of 4% from the previous year, California was again the leading state with \$1.02 billion, followed by Florida with \$765 million. Those two states accounted for 38% of the total value (USDA/NASS, 2002).

#### 1.4. Consumer and Industry Trends

Information from the National Gardening Association (NGA, 1995-1996) was used by Hughes and Hinson to estimate retail lawn and garden expenditures in 1995. Spending by a typical Louisiana household was estimated at \$191. The important components were lawn care (\$79.86), landscaping (\$50.85), and flower gardening (\$15.65).

In 2001, most of the purchases by households were made by people from the following groups: white, males, ages between 35 and 54 years, households with more than 3 -4 people, college graduates, people with incomes over \$75,000 annually, and people who lived in the Southern states or Northeast part of the U.S. (NGA, 2001).

Lawn and garden retail sales increased by 12% from 2000 to 2001. Additionally, the number of households involved in outdoor or indoor activities related to lawn and garden activities reached 85 million households of a total of 106.5 million households. Average expenditures per household were \$353, \$532, \$435 and \$444 in 1996, 1999, 2000 and 2001, respectively, and spending on lawn and garden products and services grew at a compound annual rate of 4.6% from 1996 to 2001 (NGA, 2001).

In addition, projections by Greenidge in the *Nursery Retailer* magazine projected that in 2002 the group composed of hardware stores, home gardens and hardware warehouses would account for 39.4% of the market, a group composed of garden centers, nurseries and farm stores would have 31.6%, and the final group of warehouse clubs, chain stores and mass merchandisers would have a market share of 29.0%. That represents sales of \$36.8, \$29.5 and \$27 billion in sales, respectively, for each group.

#### 1.5. Louisiana Production and Value Added

A report from the Louisiana Cooperative Extension Service indicated that in 2001 commercial nursery crop production had a gross farm gate value of \$104 million. Of that total, floriculture and bedding

plants had a value of \$20 million, woody ornamentals \$75 million, fruit and nut trees of \$3 million and foliage plants \$6 million. The total value added was \$53 million, for a total wholesale value of commercial nursery crop production in Louisiana of \$157 million in 2001. The number of sod growers increased by 8, a forty percent increase, and gross farm sales were estimated at \$15 million, with a total value added of \$12 million and a total value of \$27 million (Louisiana Summary, 2001).

The National Agricultural Statistics Service (NASS) estimated that the total number of nursery crop and sod producers in Louisiana with sales over \$10,000 was 261 (Census of Horticulture Specialties, 1998). On the other hand, the number of growers was estimated the same year in the Louisiana Summary, Agriculture and Natural Resources, 1998 where the total number of producers for nursery crops and sod growers was 621. As is shown from these two different sources, the number of growers differs due to criteria and estimation procedures. One reason that the number of growers was different in the estimates reported by the Extension Service of Louisiana State University was that businesses with sales under \$10,000 were included, compared to NASS statistics which do not include growers with sales under \$10,000.

In 2001, the total number of growers for the same categories was 480, a decrease of 141 from 1998 and 2001 (Louisiana Summary, 2001). Additionally, the Louisiana Department of Agriculture and Forestry list contained 541 certified growers with license type one, but this list included small grower operations, retail only, people not active in the industry, and duplicated names.

#### 1.6. Regional Retail Sales

Southern states including Virginia, North Carolina, Florida, Tennessee, Arkansas, Alabama, Texas, Kentucky, South Carolina, Georgia, Louisiana and Mississippi accounted for 30% (\$9.05 billion) of lawn

and garden retail sales in 1998. Customers in those states spent on average \$445 per household (NGA, 1998-1999). The *Nursery Retailer Magazine* (February/March 2002) cited those same states with sales of \$24.75 billion in 2001, representing 28% of total industry sales (Greenidge, 2002).

### 1.7. Economic Impact Studies

Several studies of economic impact of the green industry have been conducted in the United States. The most relevant for this study was conducted by Hughes and Hinson (1997) about the green industry's impact on the Louisiana economy in 1995. This study used a 1992 based IMPLAN input-output model that was updated to 1995. They found that the total impact of the green industry on the Louisiana economy was \$1.308 billion in gross sales. In the literature review, a section containing other studies will be developed to provide the reader with a broader view of the different economic impact studies. These studies are relevant to compare results from studies done in other states with similar characteristics.

### 1.8. Problem Statement

There are many important reasons to know what has happened to sales and production expenditures by the green industry, and the impact of these changes on gross state product, sales, personal income, and employment.

The previous study (Hughes and Hinson, 1997) provides benchmarks for this research. However, that impact study was conducted using economic statistics from 1995 and earlier. These values are outdated. Substantial economic growth and change in the U.S. and Louisiana economies have occurred in recent years.

#### 1.8.1. Sector Growth and Spending Trends

The U.S. economy experienced strong growth from the early 1990's to 2000. That growth was followed by a short recession. During this period, sales of green industry goods experienced strong growth.

These products are considered luxury items, and increased expenditures during economic growth were expected because families and individuals had more disposable income. In addition, the government and private sectors had higher revenues, and their investments in buildings and other facilities increased. Landscape installation and maintenance were part of these investments. These decisions resulted in the strong growth rates for purchases of green industry goods. Their growth was particularly strong when compared to expenditures on most other agricultural products.

Even after the economic slowdown began in 2000, the green industry continued to grow. For large government and private projects, current projects continued. Reductions usually occur for those projects in the planning stage. For individuals and families, spending on luxury goods categories continued because wealth had been accumulated. Credit purchases are another way to maintain consumption levels during an economic downturn. Effects of recession appear to have been minimal. During the recovery period, the industry may expect that the increase in consumption/production of green industry products and services will continue.

### 1.8.2. Demographic Changes

Families and individuals have changed their lifestyles in ways that are favorable to the green industry. These changes include spending more time at home doing “in-house” activities, maintaining a similar lifestyle level but spending more on products used at home rather than on outside activities.

Psycho-graphics changes have occurred. People have become cocooners, people who would rather realize activities “in-house” than outside their home (Kotler, 2001). As an example, in the last few years, people have opted to work at home more than ever before, so their lifestyle changes and they can spend more time at their house and with family. Some employers have agreed that employees can work

from home, visiting the office on a regular basis. This is a decision that allows individual and families to have time together and do inside and outside home improvement activities. As this and similar work organizations become more widespread, the green industry expects sales to increase due to more home-oriented projects. These changes in lifestyle and new ways of work have increased further since the September 11 attacks as families rethink their priorities and focus more on family related activities.

The green industry still is growing for other reasons. The main segment of the market for these products, baby boomers between 35 and 52 years old, has increased. At the same time, a new market segment is expected to emerge with more sophisticated tastes and preferences. Those people will look for higher quality, more convenient products, more support and advice from knowledgeable salespeople (Kotler, 2001).

### 1.8.3. Linkage Changes

The model used in the previous study will be reviewed, revised and modified, if necessary, to reflect changes in linkages with other sectors. It may be appropriate to add or eliminate sectors from the model.

Linkages are important because they show the economic relationships among the different sectors. In addition to the changes in the economic environment, there have been ~~the~~ changes in other sectors of the economy and the linkages between the green industry and those other sectors. Relationships between them have emerged, evolved and/or transformed in a new set of linkages. Examples of those new relationships are the ones between suppliers and producers, with new ways to contact each other through automated systems or interactive network or web sites. Through new technology, the service sector provides customers access to more specialized services.

Economic impact studies are conducted at a specific point in time, and the economic situation and relationships among participants in the industry might have changed in a period of growth or slow down. As a result, new economic studies need to be made to update those estimates from previous years.

#### 1.8.4. Data

In the **1995** study, the total impacts of the green industry on Louisiana's economy, personal income, gross state product and employment were calculated using IMPLAN. Procedures will be implemented to improve data collection, providing more appropriate estimates. These estimates will be compared with the database from the IMPLAN model, and decisions will be made regarding whether it is appropriate to update the IMPLAN database based on those surveys. This will generate updated values for the database and more specific information about Louisiana.

Also, the Hughes and Hinson study did not address some sub-sectors, such as churches and cemeteries, which were not included due to lack of information. In addition, survey methodology for producers and the service sector was limited by funding. Their surveys were mailed in conjunction with a Louisiana Department of Agriculture and Forestry mailing to renew licenses. There was not an opportunity for appropriate follow up to achieve a higher response rate. As a result, the response rate was very low.

Sector growth and spending trends, demographic and linkages changes, and data are some of the reasons why an updated economic study should be conducted. For all those reasons, updated estimates of the green industry and its impact on Louisiana's economy are very important and conducting this study will provide new information relative to the green industry.

#### 1.9. Problem Justification

This study will be conducted to update estimates of the economic impact of the green industry on Louisiana's economy (Hughes and Hinson, 1997). Previous studies have shown the impact of the industry

on increases in personal income, gross sales and generation of employment. The total income increase was \$485.97 million, gross sales were \$648.353 million and 26,226 jobs were generated across industries in Louisiana.

Hughes and Hinson (1997) estimated the impact of the production sector of the green industry on Louisiana's economy. Results indicated that 1,338 direct employees were hired in the nursery and greenhouse sector. In 2000, the total number of part time hired workers by the nursery industry in the U.S. was estimated at 53,801 and the number of full time hired workers was estimated at 57,970 (USDA, 2001).

Importance of the green industry can be seen from the sales generated and its impact on Louisiana's economy. Nursery and greenhouse farm cash receipts in Louisiana were \$72.586 million in 1997, or 3.6% of the total sales in the Louisiana agriculture sector (Census of Agriculture, USDA 1997). In 1992 and 1987, sales were \$44.676 million and \$31.617 million, respectively. This is an indicator of the size and growth rate of the green industry over the last few years. Knowledge of these measures are important for all participants, such as businesses and government officials.

Additionally, nursery and greenhouse crops represented the sixth largest agricultural commodity in the United States in 1998 (USDA/ERS, 1998). This increase in demand was driven by a strong national economy, private industry and public building, and construction of new housing developments.

Results of this study will bring benefits to the sectors of the green industry, policymakers, government officials, researchers and investors in the form of information about the overall and specific impacts of the industry. For the industry, results of trends in demand, and other suggestions of changes in tastes and preferences, might suggest new or re-oriented investments. Input suppliers will have information

that suggests which sub-sectors are expanding more rapidly, with implications for their ability to supply customers on time and at competitive costs.

Resource allocation decisions in the private and public sectors are also important. The allocation of resources provided by growers and public support in terms of research support are affected. Public regulatory actions that have cost implications are incomplete without knowledge of both benefits and costs. Economic impact studies provide information about the total value of this industry. With this information, policy makers can better address possible future actions that could impact the green industry.

The public sector also can expect to find useful information to address issues and to assist with solutions to a variety of problems. The information may suggest new research, or alternative regulatory structures. Regulations might deal with the prevention or mitigation of negative impacts of agricultural chemicals through various incentives designed to encourage growers to take specific actions. Public decision-makers also will have additional information about how consumers allocate expenditures in the plants and services categories..

The general hypothesis established for this study is that substantial growth has occurred in the green industry since the previous study in 1995. This expectation is based on the factors described in the problem statement and problem justification, and from industry leaders' perceptions that the industry has experienced significant expansion.

## 1.10. Objectives

### 1.10.1. General Objective

The general objective of this study is to provide a current estimate of the economic impact of the green industry by updating model linkages from a 1995 impact study, and by verifying the strength of those linkages as measured by costs and expenditures.

## 1.10.2. Specific Objectives

1. To update output and technical coefficients in the following sub-sectors:

a. Production areas:

Woody ornamentals, greenhouse products and turfgrass/sod.

Service sectors: landscape installation, maintenance and design services

b. Sectors and industries with economic activity related to horticultural activities:

Installation and grounds maintenance on:

- Golf courses

- Churches and cemeteries

- Public schools

Primary and secondary

College and universities

- Private schools (all levels except pre-school)

- State expenditures

Highway maintenance

Parks

- Parish and city grounds, parks and playgrounds

- Airports

c. Consumer retail expenditures on nursery industry products

d. Landscape maintenance expenditures reported in selected Construction sectors

e. Landscape maintenance expenditures reported in the Real Estate sector

2. To estimate the economic impact of the green industry on Louisiana's economy using the IMPLAN model.

#### 1.11. Organization of the Thesis

Following Chapter 1 (Introduction), Chapter 2 will present the literature review including value added methodology and input-output analysis using IMPLAN. Chapter 3 will include a background of the theoretical framework for input-output analysis and the methodology. Chapter 4 will include results obtained using IMPLAN input-output models, and will report output multipliers. Chapter 5 will summarize the methodology and results, and will present conclusions and implications of this study.

## CHAPTER 2. LITERATURE REVIEW

Most of the economic studies of the green industry and nursery industries were concentrated in three main areas: 1) estimation of efficient farm level operations in the greenhouse and nursery product sector, 2) estimation of demand factors for wholesale and retail trade levels (Harris et al. 1992), and 3) economic impact studies using methodologies such as value added and input-output models, such as IMPLAN. To fulfill the objectives of this study, concentration on economic impacts literature is important, as a way to present different methodologies that have been used and results obtained from those studies conducted at different points of time and specific locations (nation, region or state).

### 2.1. Approaches to Evaluate Economic Impact

The main approaches that have been used to estimate the economic impact of an industry or a specific sector on the economy of a state include value added and the input-output modeling.

Some studies, such as the contribution of the turfgrass industry to Florida's economy in 1991/1992 (Hodges et al., 1994), North Carolina's (Murphy and Hayes, 1994), and Tennessee's turfgrass industry (Brooker et al., 1993) used the value added methodology. On the other hand, studies in states such as Texas (Lard et al., 1996), Arizona (Leones and Ralph, 1995), Florida (Hodges and Haydu, 1999), Illinois (Campbell, 2001) and Louisiana (Hughes and Hinson, 1997) have used the IMPLAN software to calculate the impact of the green industry on the economies of those states.

Most economic impact studies have been conducted using the IMPLAN model. This methodology provides the opportunity to update information and to customize data for the target region, especially if the estimates from the IMPLAN model are regional. Those estimates and linkages with other sectors can be changed to more appropriate values that will better reflect the current values of the conditions in the state's economy.

### 2.1.1. Value Added Approach

Value added is a broad measure of wealth creation that includes all factors of production used by businesses for intensively produced goods and services, such as labor, management, capital, and land (Hodges et al., 1994). The value added concept applies to different categories, from the individual firm to industries and the entire nation. Morley reported that some companies have begun to use value added in their corporate financial statements (Morley et al., 1978). Stanton et al. (1992) applied this methodology in U.S. agriculture to assess the economic contribution of various crop and livestock sectors.

The most typical way to calculate value added is by deducting purchased inputs from total output, because the remainder represents the value added by other economic sectors. Labor and capital expenses are not deducted from the total output because they represent the primary inputs provided by the business.

#### 2.1.1.1. Procedures to Collect Information in Value Added Studies

This section presents a brief description of methodologies reported in the literature for the input-output analysis, especially those using the IMPLAN model. Most of the research done in this area used primary information collected by mail survey, and, in some circumstances, phone interviews were conducted. From those sectors where information was needed, lists containing the population of interest were obtained, and in some cases some stratification was done to accomplish the goals of the data collection.

In 1993, an economic impact study of the turfgrass industry in Texas was conducted (Lard et al., 1996). The Texas Agricultural Statistics Services (TASS) assisted with the collection of data from single family households and commercial businesses. Additionally, information from 17 different sectors was collected by mail questionnaires. They used area frame sampling procedures (AFSP) for single-family

household and commercial businesses sectors. An area frame sampling procedure is necessary when the strata are not clearly definable and researchers use specific criteria to extract some segments that can be defined more easily. List frame sampling (LFS) was used for other sectors, excluding highways and sod producers. A list sample frame is a list of individuals, businesses or other entities from which a sample is selected.

In 1993, a survey methodology was used to collect data for the calculation of the value added by the turfgrass industry to Tennessee's economy (Brooker et al., 1993). Because of the number of components in the sector and the financial resources available, a mail survey was used to collect information when the population of businesses and companies was over 1,000. A census was attempted for the components with populations smaller than 1,000. A census of those components, including registered cemeteries, motels, hotels, golf courses, cities, counties, state and federal parks, state highways, roadsides, hospitals, schools, and colleges and universities, was conducted. However, for churches, industrial firms, single dwelling homes, and multiple dwelling homes, a simple random sampling procedure was used. Separate questionnaires were designed for each component of the Tennessee turfgrass industry. The questionnaires were similar in basic form, but some required special questions.

In 1994, the North Carolina Department of Agriculture conducted a statewide survey to identify and quantify the turfgrass industry's value (Chaffin et al., 1994). The survey methodology allowed the researchers to estimate factors such as acreages, turf types, maintenance areas and expenditures. Data were collected using a LFS procedure and AFSP. Data were summarized using spreadsheet software and then multiplied by their item expansion factors to generalize to the population from the sample. Five years later, an update of the turfgrass survey in North Carolina was conducted by Neas and Smith (2000). In

this study, a similar data collection methodology was used, but it covered a total of fourteen sectors related with the green industry. Among those sectors were single family dwellings, multiple family dwellings, cemeteries and churches. Expansion factors were also calculated for the sectors. As an example, in the list sample frame groups, expansion factors were obtained by dividing the total population by the number of usable responses.

In 1994, Hodges et al. surveyed eight different sectors in the turfgrass industry in Florida. Listings corresponding to two or four digits from the Standard Industrial Classification categories (SIC), 26,000 companies in total, were obtained from different sources. Those lists contained information about number of employees, sales, addresses and telephone numbers. Those listings were compared with independent sources. In addition, a listing of private golf courses was obtained from Florida Golf Guide, and single and multi-family household listings were obtained by the government agency in charge of monitoring population trends (Florida's Bureau of Economic and Businesses Research). All the sectors were surveyed, most by mail, but in some cases phone interviews were conducted.

Value added analysis is a frequently used tool to estimate the economic impact of an industry in an economy. Most of these studies have focused on a single sector, such as the turfgrass or golf course industry. Information usually was collected from primary sources focusing on expenditures, sales and total output. This is a less complicated procedure than using an input-output model, but detailed information is needed to extrapolate from a sample to the entire population. Most of the studies in the literature review showed that samples were drawn from the population using random sample procedures. Results from these studies estimate the economic impact in areas such as expenditures by households, equipment purchased, and amount of area maintained.

### 2.1.1.2. Value Added Industry Studies Results

Harris et al. (1992) found that \$5.5 billion in economic activity was generated by the greenhouse and nursery industry in the U.S. in 1977. Of that total, 45% was generated as a linkage from inputs purchased by the greenhouse and product sector (backward integration). Economic linkages with the processing and distribution of output (forward integration) by the green industry was a larger share ( 55% or \$3 billion) of total economic activity.

In North Carolina, 2.7 million single-family dwellings had over 1.2 million turf acres and almost \$3 billion was invested in turfgrass related equipment (Chaffin et al., 1994). The average property was 1.4 acres (0.4 acres of turf) and 90% was owned by occupants. Results indicated that the two most used types of turfgrass were Kentucky 31 fescue (40%) and in second place was Centipede with (11%). They also found that most single-family lawn care activities involved cultural practices. For each activity reported, the percentages were the following: fertilization 54.4%, weed control 20.3%, irrigation 21.7% and over seeding 21.5%. Kind of expenditures for turfgrass maintenance varied among park systems, business owners, churches, golf courses, schools, airports and cemeteries. Labor accounted for the largest expenditure, followed by equipment supplies and repairs.

Neas and Smith (2000) reported estimates about the turfgrass sector in North Carolina. This study showed that nearly 2.14 million acres were maintained and almost \$1.22 billion was spent to maintain those acres, which represented increases of 21% and 44%, respectively, from the 1994 study. In addition, the total value of turf equipment grew from \$3 billion to \$4.6 billion. The category that had the highest expenditures in turfgrass maintenance was single family dwellings (\$726 million), followed by commercial properties (\$234 million), and golf courses (\$138 million).

Lard et al. (1993) studied the economic impact of the turfgrass industry on the Texas economy. They found that 61.74% (\$2.55 billion) of maintenance expenditures came from single-family households. For every dollar spent to maintain turfgrass, 40 cents went to the supplies and equipment category. Lawn services and water represented almost \$700 million each in expenditures.

Brooker et al. (1993) studied the structure and economic value of the turfgrass industry in Tennessee. The total acreage of turfgrass maintained in Tennessee was estimated at 889,382. Single dwelling homes had 620,659 acres, or 69.8% of the total. Road maintenance sites were second. Additionally, total expenditures on apartments and condominiums were \$360 million. Annual expenditures in new equipment in 1993 totaled \$169 million and total expenditures for equipment replacement was \$1.66 billion.

Hodges et al. (1994) measured the economic contribution of the turfgrass industry to the state of Florida. Expansion multipliers were calculated in order to convert the survey data into estimates for the entire population. Dividing the population by the numbers of firms or households providing complete responses for each major group of variables provided the expansion multipliers. A value added methodology, a measure of wealth creation, was used. Land used and maintained for turfgrass in the period 1991-1992 was 4.4 million acres, with 75% in the residential sector. Consumers spent about \$5 billion in maintenance and the industry provided full and part time jobs to 185,000 people. The total value added by the turf industry was \$7.3 billion, where 35% was contributed by golf courses, and households and vendors contributed 21% each.

Klapproth et al. (2001) conducted a statistical profile and economic survey of the Maryland horticultural industry in 2000. Extrapolated results indicated that gross cash receipts were \$1.5 billion.

Retail sales and landscapers accounted for 87% of those sales (68% and 19%, respectively). The study also reported that more than 14,000 people worked for the industry and 53% of them worked over 150 days. At the same time, limiting factors for the green industry were human resources, government regulations and marketing. These limitations had impacts on the total sales of green goods and products and services in the area.

As results from the various studies conducted using value added methodology show, they concentrated more in a specific sector of the economy, such as the golf course or turf grass. Researchers collected information and calculated the total number of acres, expenditures by the industry in equipment, expenditures by households on products and services related with the sector, number of employees, total sales and the total value added to the economy.

#### 2.1.2. Input-output Models

Impact analysis for PLANning (IMPLAN) was developed by the United States Department of Agriculture (USDA) Forest Service and other federal agencies to assist in land and resource management planning. There are two basic components in the IMPLAN system: the software and the database.

The software performs the necessary calculations to create a model that contains both a descriptive and a predictive model. The descriptive model contains the social accounts and the input-output accounts that describe the transfer of money between industries and institutions. The predictive model is a set of input-output multipliers which predict total regional activity based on changes in consumption. In addition, the software provides an interface for the user to change a region's economic description, create impact scenarios and introduce changes to the local model. On the other hand, the database provides all the information that is needed to create regional IMPLAN models. A local model includes a specific area

location such a state or a city, and a region involves a group of cities, counties or parishes that together represent a broader and more extensive area (IMPLAN PRO, 2000).

The IMPLAN system can be used to analyze a variety of issues, such as natural resource issues and economic base analysis. Some examples are industry relocation, stadium development and military base changes. At the same time, the IMPLAN regional data allow the user to develop multiplier tables (industry to industry transaction, households transaction and/or any institution transaction depending on the type of multiplier), or change any component of the system, such as production functions and trade flows. These changes create custom impact analysis (IMPLAN PRO, 2000).

#### 2.1.2.1. Procedures to Collect Information for the IMPLAN Model

This section shows the procedures followed in previous studies for data collection. That information was collected using listings from different sources, conducting surveys and phone interviews, and finally comparing the results of the information that was collected to the values in the IMPLAN model. Those comparisons are done to verify that values in the IMPLAN software reflect the actual situation of an economy.

Leones and Ralph (1995) evaluated the contribution of the green industry in the state of Arizona. A survey was sent to 640 firms and a 16.1% rate of response was achieved. Payne (1999) updated the economic impact of Arizona's green industry and based the methodology used on the Leones and Ralph study. Statistical samples were drawn from four different sources: Arizona Nursery Association, the Arizona Landscape Contractors Association, Arizona Department of Agriculture, and the Arizona Agricultural Statistics Service. An initial stratified sample of 400 was drawn, followed by a reminder postcard for non-respondents. The second mailing was sent out 21 days after the postcards. Those surveys were designed

for mail data collection but provisions were made for telephone follow ups. The rate of response was lower than expected (136 complete questionnaires). The lower response was attributed in part to the period in which surveys were mailed (spring), because it was a busy time due to tax preparation and the busy growing season.

Barkley et al. (1995) measured the contribution of the golf course industry to the economy of South Carolina. Of 270 golf courses surveyed, 189 surveys were returned and 79 (25%) of those contained complete information about expenditures and revenue by area of operation.

In 1995, Rathwell et al. estimated the contribution of the green industry in South Carolina. They collected information by surveying ornamental horticultural and turfgrass businesses. A total of 480 questionnaires was returned (19.9%) from which 17.7% provided complete data about employment, and 397 provided complete information about sales and expenditures. Survey results indicated that industry sales varied depending on the business type, market outlet and product lines carried. In addition, an effort was made to contact non-respondent businesses by telephone in order to obtain adequate representation for each business class. The results from those surveys helped to compare the values obtained with the value in the database in the IMPLAN model.

An update of this study was conducted by Rathwell et al. (2001), who mailed 4,089 surveys to businesses and individuals in the industry. That list was created from different sources such as the South Carolina Nursery Association, South Carolina Greenhouse Growers Association, South Carolina Turfgrass Foundation as well as and the list used in 1994. Businesses were divided into two categories, (i) primary business class such as retail garden centers, wholesale growers, turfgrass producers, landscapers; and (ii), by product lines such as trees, perennial, greenhouse plants, floral, turf and chemicals, fertilizers, and soil

conditioners. The largest response was from turfgrass farms, followed by retail garden centers, wholesale growers, and florist businesses with 100%, 92.3%, 56.7%, and 56.2%, respectively.

An economic impact study of Florida's environmental horticulture industry, using the IMPLAN Model, was conducted by Hodges and Haydu (1999). The study showed that the total value added by the horticulture industry was \$5.424 billion, which included nurseries (\$1.259 billion), retailers (\$1.655 billion) and landscape services (\$2.509 billion). To obtain these results, primary information was obtained from 2,217 telephone interviews in the period July-August 1998. Telephone interviews were conducted with a computer-assisted system (Cases) that automatically dialed telephone numbers, generated and asked questions in proper sequence, and recorded answers. Telephone surveys were done with commercial/institutional consumers of horticultural products and services, residential households, nurseries, horticultural retailers, and landscape service firms. Three of those groups represented the business sector and the other two were consumer groups surveyed to obtain information about changing attitudes concerning environmental horticulture products and services. To survey those groups, listings from different sources such as the Florida Department of Agriculture, American Business Information (ABI), and the University of Florida Bureau Economic and Business Research were collected and stratified based on firm size (strata by gross sales and/or number of employees). The only group not stratified was households, due to lack of information about the size variable.

Campbell et al. (2001) surveyed more than 11,600 businesses and individuals to generate information for the IMPLAN input-output model. The green industry population was stratified by type of business or group-. For example, businesses were segregated by Standard Industrial Classification (SIC), trade association/membership, cities population size, and homeowners property value. The green industry

population was stratified by type of business or group. The results were stratified random samples of 12,000 green industry survey participants. The main objective of collecting information through surveys was to be able to extrapolate from a sample population to statewide numbers. The nursery, floriculture and sod producer groups had a response rates of 39%, landscape and horticultural services 22%, golf courses and driving ranges 37%, airports 56%, and residential properties 29%.

Hall and Jupe (2001) estimated the economic impact of the green industry in Texas by surveying wholesalers, nursery growers, landscapers, and retail garden centers. The top five Metropolitan Statistical Areas (MSA), Dallas, Fort Worth, San Antonio, Austin, and Houston, represented approximately 50% of total sales for a total of \$4.87 billion.

#### 2.1.2.2. Economic Impact Studies (IMPLAN Model).

Literature review from different sources presented in this section provide a broader view of the use of the IMPLAN input-output model. Most of them began with the collection of primary data to verify the values in databases in the IMPLAN software. To collect that primary data, researchers used mail or telephone survey methodology, then information was tabulated and analyzed. The second step was to compare results with the IMPLAN database and decide if those values were appropriate to be used in the model for the state/region. Results from this input-output model reflected the total economic impact of the industry (called green industry in this case, which includes greenhouse and nursery products, and landscape and horticultural services among others). Results were commonly presented as linkages among sectors in the industry, personal income as a result of wages and salaries, total employment, and gross product. Additional reports on categories such as presented for North Carolina (1999), including single family dwellings, roadsides, commercial properties, golf courses, schools, churches, airports, parks, institutions

(hospitals and professional sports) and cemeteries, are among the sectors included in these economic studies. In addition, results from this input-output model provide multiplier tables that show an easier way to present the effects of linked sectors and the repercussion on the overall performance of the economy.

Most economic impact studies using the IMPLAN model were conducted to estimate the impact of the entire industry on the economy and in some cases specific sectors, such as turfgrass and sod. Usually total impact results included direct contribution from producers, wholesalers, the service sector and retailers.

Results of the contribution from the green industry on Arizona's economy showed that the increase in this industry was estimated to be four and a half time times larger over the period of 1974 to 1994. Leones and Ralph (1995) estimated the contributions of the Arizona's green industry in 1994 at 13,131 jobs (retail nurseries 13%, nursery growers and wholesalers 17%, and landscape services 70%), \$177 million spent in wages and salaries (retail nurseries 14%, nursery growers and wholesalers 15%, and landscape services 71%), \$662 million in total sales (retail nurseries 19%, nursery growers and wholesalers 20%, and landscape services 61%), \$18.8 million paid in taxes to the state of Arizona, and \$11.1 million in foreign sales. In addition, \$54.9 million in sales went to other states, and the total value added to the economy was calculated at \$305 million. In 1999, Payne conducted a similar study for the green industry in Arizona. Full time equivalent jobs had increased to 20,548 (56% increase), payroll had increased by \$130 million and total sales increased by \$285 million (43%). Additionally, the green industry in Arizona had exports to other countries and other states of \$53.2 million (Payne, 1999).

Results from a South Carolina golf course industry study (Barkley et al., 1995) showed that 7,537 FTE jobs were created (FTE= Full Time Equivalent where each FTE is 40 hours/working 52 weeks) and

\$134 million in salaries were paid. An IMPLAN model was used to estimate the total impact (initial plus indirect and induced) of 16,334 FTE jobs and \$379 million in wages and salaries paid to employees. Rathwell et al. (1995) conducted a study in South Carolina to estimate the economic impact of the ornamental horticulture and the turfgrass industries on the state economy. From those sectors, 2,434 businesses participated in the study to determine employment, sales and expenditures. Total sales by different kind of businesses were landscapers \$224 million, building supply/garden centers \$191million, growers \$167 million, general merchandise stores \$84 million, grocery stores \$33 million and florists \$27 million, for a total of \$726 million. The initial contribution of the ornamental horticulture and turfgrass industries was estimated to be 18,478 full-time equivalent jobs and \$235 million in income. The IMPLAN model then was used to estimate a total impact of 28,727 FTE jobs and \$537 million in income. Multipliers were estimated to be 2.10 and 1.59 for income and employment, respectively.

Rathwell et al. (2001) surveyed different components of the South Carolina green industry. This study provided updated estimates of the economic impact of the ornamental horticulture and turfgrass industries. The total impact in 1999, based on the IMPLAN model, was 48,464 FTE jobs and about \$1.2 billion in income, which suggested an employment multiplier of 1.33 and an income multiplier of 1.62. The employment and income multipliers mean that for every one job and dollar in income generated by the ornamental horticulture and turfgrass industries, another 0.33 jobs and \$0.62 in income were brought to the South Carolina economy. In addition, the study reported sales of \$1.4 billion by the industry in 1999.

Hughes and Hinson (1997) constructed a 1992 based Input-Output IMPLAN model. They estimated that the impact of the entire green industry on the Louisiana economy in 1992 dollars was \$1.308 billion in gross sales (households, trade, and landscape and horticultural services sectors with \$315 million,

\$233 million and \$146 million, respectively). The results indicated that \$485 million in total personal income (trade and service sectors had the largest impacts at \$112 and \$107 million, respectively), \$648 million in gross state product (GSP) and 26,226.9 employment positions were created. Hughes and Hinson reported multipliers of 2.89, 3.01 and 3.04 for landscape and horticultural services, agricultural chemicals and services sectors, respectively. These were type II multipliers, which mean that direct, indirect and induced effect from industry and households were included.

Hodges and Haydu (1999) used the IMPLAN model to estimate the economic impact of the green industry on Florida's economy. Total economic impact and multiplier effects were estimated for seven different regions in Florida. Total economic impact, total employment, and total value added were estimated at \$6.36 billion, 187,000 jobs and \$5.42 billion, respectively. Results indicated that single-family households purchased plants and other horticultural goods and services valued at \$2.791 billion. Exports of horticultural products and services from Florida accounted for \$659 million. Multipliers were 1.65 for retailers, 1.69 nurseries and 1.78 for landscaping services, reflecting the labor-intensive nature of the horticulture industry.

In 2001, IMPLAN results indicated that the economic impact of the green industry on Illinois's economy was estimated at \$3.95 billion, where product sales accounted for 41%, service receipts accounted for 42%, and end-user payrolls accounted for 17% (Campbell et al., 2001). The product sector in the Illinois green industry was divided into three sub-sectors: growers, wholesalers only, and retailers only. Service sectors included landscaping design only, landscaping and lawn care, tree care, and interiorscape. The end users sector was divided by gender, ownership, end user fiscal year, and race or ethnic group. The total sales for the three sub-sectors were \$1.63 billion. Growers accounted for 57.1%,

wholesalers-only 1.1%, and retailers-only 41.8%. Employment in the Illinois green industry was 160,000 employees, and of these 53% was end-user workforce, 22% was service workforce and 25% was product workforce employees. Payroll size for wages and salaries in the green industry in Illinois was estimated at \$1.74 billion.

Results from the economic impact of the green industry on Texas showed that the total sales of that industry within the state were estimated at \$7.98 billion (Hall and Jupe, 2001). In addition, another \$1.78 billion of economic impact was generated in other sectors related to the green industry. The total green industry economic impact was over \$9.76 billion, and represented in excess of 222,000 jobs. In 2000, the economic added value by the Texas green industry was \$6.43 billion, including \$437 million in impacts of exports.

All of the studies presented in this section provide the final results after using IMPLAN modeling software. Most important results indicated the total economic impact in the economy of a nation, state or region. Results varied from state to state in those studies, but some of them can be grouped by the size of their economy such as Florida and Texas. On the other hand, states such as Tennessee, Virginia, Illinois and Louisiana present similar circumstances as measured by size of the economy. Those results provide the researcher the information necessary to compare expected results for Louisiana.

Of the two methodologies described above, the value added methodology is the more expensive in terms of financial, human and logistical resources needed to collect information. An example is given in the 1994 Florida study, where the collections of a population list and the procedures of collecting data, are detailed. In addition, value added implies the selection of linkages by the researchers. Input-Output models such as the already made "IMPLAN" software have the linkages of the model included, and it can be

customized to fulfill the objectives of the study. For the purpose of this study, input-output model methodology has been selected and the IMPLAN software will be used to estimate the individual and overall economic impacts of the industry.

## CHAPTER 3. METHODOLOGY

This chapter presents the theoretical framework of the input-output model and describes the basis for the input-output model using IMPLAN for the green industry on Louisiana's economy. In addition, this chapter describes the methodology followed to achieve the goals stated in chapter 1 and all the procedures followed in data collection to accomplish those objectives and procedures.

For data collection, the three main groups surveyed were 'nursery growers and sod producers', 'landscaping design, installation and maintenance', and golf courses. Additionally, expenditures made by churches and cemeteries, state parks and recreation areas, airports, parish grounds, parks and playgrounds, school district grounds maintenance, and private college/university grounds maintenance were estimated through surveys to people in charge of those offices, agencies, and/or schools/universities. Information from the Louisiana Department of Transportation was obtained to determine the maintenance expenditures for local roadside and state highway rights of way. Information collected from surveys was used to verify or update IMPLAN model values and obtain current impact estimates of the green industry on Louisiana.

### 3.1. Input-Output Model Theoretical Framework

An input-output analysis is the name given to an analytical framework developed by Leontief in the mid 1930's. The main purpose of the input-output framework is to analyze the interdependence of industries in an economy, so this type of analysis has also received the name of inter-industry analysis. An input-output model consists of a system of linear equations, each one of which describes the distribution of an industry's product throughout the economy (Miller and Blair, 1985). This linear equation system permits the formulation of a matrix that will provide the elements necessary to calculate the economic impacts in an economy. Currently, input-output software has databases that include technical coefficients, regional purchase coefficients (RPC), the linkages among sectors, and the necessary tools to estimate multipliers.

The use of the input-output model has expanded. With the improved availability of high speed computers, the computational requirements are now practical to carry out. This analysis is widely used in the U.S. and routinely applied for national economic analysis, especially by the U.S. Department of Commerce and in regional economic analysis for states, industries and the research community. In recent years, input-output analysis has been extended to other topics such as interregional flows of production and accounting for energy consumption, environmental pollution and employment associated with industrial production (Miller and Blair, 1985). In addition, input-output models have been used to conduct economic impacts in several sectors of the economy, including the total economic impact from the green industry as a whole or the impact from a sector, such as turfgrass, in a specific region.

### 3.1.1. Input-Output Tables

To estimate an input-output model, it is necessary to produce three main types of tables: a transition table, a table of technical coefficients and a table of interdependent coefficients, which are sometimes called total coefficients.

#### 3.1.1.1. Transition Tables

A transition table is the basic table for input-output systems. It contains the values of different economic flows within the economy during a particular period of time, usually a year. In order to develop this table, the economy is divided into a number of sectors based usually on census of production or other national statistics calculations. A census of production aggregates the total output (sales) of a wide range of industries within a national economy. Output of each sector is distributed along a row of the table (sales), while the corresponding column records the inputs of the sector (purchases).

Table 3.1 presents the flow of products from each industrial sector considered as a producer to each of the sectors considered as a consumer. The rows of this table describe the distribution of an industry's output throughout the economy. The columns describe the composition of inputs required by a particular industry to produce its output. The shaded area in Table 3.2 represents the inter-industry exchange of good and services. The rest of the columns (Final Demand) represent product sales made by each sector to final markets. The additional rows, Value Added, account for the nonindustrial inputs to production such as labor.

A more general model is described in Miller and Blair (1985). In Table 3.2, there are selling and purchasing sectors, input and output transactions denoted by  $z$ 's, final demands represented by  $C, I, G, E$ , payment (value added) to sectors denoted by  $L, M, N$  and total output represented by  $X$ 's.

Table 3.1. A Schematic Representation of the Input-Output Transition Table

		Producers			Final Demand			
		Agriculture	Mining	Construction	PCE <sup>1</sup>	GPDI <sup>2</sup>	NEGS <sup>3</sup>	GPGS <sup>4</sup>
Producers	Agriculture							
	Mining							
	Construction							
Value Added	Employee				Gross National Product			
	Owners of Businesses and Capital							
	Government							

Sources: Miller and Blair (1985) and O'Connor and Henry (1975) 1 PCE= Personal Consumption Expenditures, 2 GPDI= Gross Private Domestic Investment 3 NEGS= Net Exports of Goods and Services 4 GPGS=Government Purchases of Goods and Services

Table 3.2 shows the general format for an input-output model for two sectors. Goods and services are represented by  $z$  and subscripts which represent the row and column (input-output) in which they are

being used. As an example,  $z_{12}$  represents inputs from sector one that are being used or purchased by sector two. Interindustry exchange in the general model is represented by the shaded area which is the place where sectors interact, selling and purchasing goods and services ( $z_{ij}$ ). Final demand is grouped in domestic and foreign demand. C represents consumers (household) purchases, I represents purchases for (private) investment purposes, G represents federal, state and local government purchases, and E is the foreign demand (Exports). Therefore, Y can be written as:  $Y_n = C_n + I_n + G_n + E_n$ . In addition, from Table 3.2, employee compensation represented by Labor services is represented by  $L_n$ . Other value added items, such as government taxes, capital, and land, are represented by  $N_n$  and imports are represented by  $M_n$ . Total value added (W) from the payment sector is the sum of all components ( $L + N + M$ ).

Table 3.2 General Model (Flow Trade) for a Two-Sector Economy

		Processing Sectors		Final Demand (Y)				Final Output (X)
		1	2					
Processing Sector	1	$z_{11}$	$z_{12}$	$C_1$	$I_1$	$G_1$	$E_1$	$X_1$
	2	$z_{21}$	$z_{22}$	$C_2$	$I_2$	$G_2$	$E_2$	$X_2$
Payment Sector (W)	Value Added (W)	$L_1$	$L_2$	$L_C$	$L_I$	$L_G$	$L_E$	$L$
		$N_1$	$N_2$	$N_C$	$N_I$	$N_G$	$N_E$	$N$
		$M_1$	$M_2$	$M_C$	$M_I$	$M_G$	$M_E$	$M$
Total Outlays (X)		$X_1$	$X_2$	$C$	$I$	$G$	$E$	$X$

Source: Miller and Blair (1985)

Leontief (1986), Miller and Blair (1985) and O'Connor (1975) presented similar algebraic manipulations of relationships embedded in the table. Information was summed in the values found from the different sectors down to the final output column:

$$\text{Total Outlay or } X = X_1 + X_2 + L + N + M \quad (\text{Equation 1})$$

A similar procedure was followed to obtain the bottom row:

$$\text{Total Output or } X = X_1 + X_2 + C + I + G + E \quad (\text{Equation 2})$$

Then, both equations were equated and similar terms such as  $X_1$  and  $X_2$  were excluded:

$$L + N + M = C + I + G + E \quad (\text{Equation 3})$$

and a last algebraic manipulation was made since  $M$  (imports) was moved to the right side of the equation:

$$L + N = C + I + G + (E - M) \quad (\text{Equation 4})$$

The left-hand side of the equation represents the Gross National Income, which is the total factor payment in the economy, and the right-hand side represents Gross National Product (GNP), total spending on consumption and investment goods, total government purchases and the total value of net exports.

#### 3.1.1.1.1. Equality of Rows and Columns

In an input-output table, the total expenditures incurred in inputs (columns) have to be equal to the total value of output in each productive sector (rows). This condition is imposed on final demand sectors or in primary input sectors. The equality of inputs and outputs in a transition table is considered an accounting identity (O'Connor and Henry, 1975).

#### 3.1.1.1.2. Regional Models

In addition to constructing a national input-output table, a popular methodology is the construction of regional transition tables. However, for this purpose, adequate statistical databases are necessary. These regional studies using input-output analysis are common in the U.S. where data at the regional and state level are available. An important element in regional databases is that purchases from other regions are considered as if they were imports, and sales to other regions or states are treated as exports.

### 3.1.1.1.3. Some Specific Industry Models

Other variations of input-output models address a specific sector or industry. An essential aspect of this methodology is that the industry or sector being emphasized is disaggregated in a number of sub-sectors, and cost structures for these sub-sectors are developed. Each sector includes a row and a column in the inter-industry quadrant of the transition table. An important addition is that industries closely related to the industry being studied are included in the inter-industry quadrant of the table. Other industries that are not closely related to the sector under study are aggregated under a single sector and may or may not be included in the interindustry quadrant. An important element is that if researchers include all sectors, they provide an important addition to the calculations.

One of the most important uses for this methodology (with emphasis on an industry) is to study interrelationships between sub-sectors of the industry under review. This allows policy makers to plan for the future and to determine resource requirements in specific areas.

### 3.1.1.2. Technical Coefficients Table

The second step for input-output analysis is the estimation of the technical coefficients, called the unit cost structure, for input-output analysis. Technical coefficients are calculated using the information from the inter-industry flows. These directional flows are represented by movement from  $i$  to  $j$ , where  $i$  is the total amount of input supplied to sector  $j$  for the same period of time. The technical coefficients ( $a_{ij}$ ) are obtained by dividing the input flow from sector  $i$  to sector  $j$  ( $z_{ij}$ ) by the total output produced by sector  $j$ , denoted by  $X_j$ .

$$a_{ij} = \frac{z_{ij}}{X_j} \quad (\text{Equation 5})$$

Production functions relate the total inputs used by a sector to the maximum amount of output that could be produced by that sector with those inputs.

$$X_j = f(z_{1j}, z_{2j}, \dots, z_{nj}, W_j, M_j) \quad (\text{Equation 6})$$

Using the technical coefficients, the Leontief model becomes:

$$X_j = \frac{z_{1j}}{a_{1j}} = \frac{z_{2j}}{a_{2j}} = \dots = \frac{z_{nj}}{a_{nj}} \quad (\text{Equation 7})$$

This is an important step in the input-output model formulation, because from the technical coefficients a general formulation is developed where an implicit dependence among inter-industry flows on the total output is expressed. In this general formulation,  $z_{ij}$  is replaced on the right-hand side by  $a_{ij}X_j$ .

$$\begin{aligned} X_1 &= a_{11}X_1 + a_{12}X_2 + \dots + a_{1n}X_n + Y_1 \\ X_2 &= a_{21}X_1 + a_{22}X_2 + \dots + a_{2n}X_n + Y_2 \\ &\cdot \\ X_n &= a_{n1}X_1 + a_{n2}X_2 + \dots + a_{nn}X_n + Y_n \end{aligned} \quad (\text{Equation 8})$$

### 3.1.1.3. Interdependent Coefficient Table

Changes in final demands affect different sectors in the economy due to the interrelationship among sectors. A change in one of the final demands for a product has ramifications throughout the entire system and it has an influence on the output of that specific, closely related sector, and it has effects on other sectors in the economy.

To evaluate higher effects from changes in one of the inputs and the relationship with other sectors, mathematical procedures have to be followed and technical coefficients have to be transformed.

O'Connor (1976) showed how those previous equations can be transformed in terms of matrix notation where matrix A becomes an 'n X n' matrix; matrix X is an 'n X 1' vector; matrix Y is a vector. In addition, I represents an identity matrix.

$$A = \begin{bmatrix} a_{11} & \dots & a_{1n} \\ a_{21} & & a_{2n} \\ a_{n1} & \dots & a_{nn} \end{bmatrix}, X = \begin{bmatrix} X_1 \\ \cdot \\ X_n \end{bmatrix}, Y = \begin{bmatrix} Y_1 \\ \cdot \\ Y_n \end{bmatrix} \quad (\text{Equation 9})$$

After the mathematical procedures, O'Connor shows how the system of equations can be written as  $X = AX + Y$ , and  $(X - AX) = Y$  and  $(I - A)X = Y$ . This was solved for the values of X, by pre-multiplying  $(I - A)$  matrix by its inverse to obtain  $X = (I - A)^{-1} (Y)$ .

The interdependence coefficients explain the relationship between the final output of the producing sector and the final demand of the sectors in the economy, and how much output is required to satisfy sector demand.

### 3.1.2. Multiplier Analysis

Economic changes occur in the short and long run. When exogenous changes occur because of only one impacting agent or a small number of such agents, and those changes are occurring in the short run, the term impact analysis is employed. On the other hand, when changes occur in the long run (broader changes), projections and forecasting are the tools to be used. In any of the cases (impact analysis or forecasting), the general formula used is  $X = (I - A)^{-1} Y$ . The usefulness of the results provided by this

formula will depend on the appropriateness and correctness of both  $(I - A)^{-1}$  and  $Y$ . Many summary measures are derived from the Leontief inverse  $(I - A)^{-1}$ . The most important measures are the known as input-output multipliers (Miller and Blair, 1965).

The most commonly used type of multipliers estimate the effects of exogenous changes on (i) output of the sectors in the economy, (ii) effects on household income and (iii) the resulting increase in employment.

Multipliers help to describe the effect of stimuli in the economy in three main types of effects: direct, indirect and induced. The direct effects are the changes in the industries to which a final demand change was made. Indirect effects are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries. Induced effects reflect changes in spending by households as income increases or decreases due to the changes in production.

### 3.1.2.1. Output Multipliers

Output Multipliers are defined as the total value of production of all sectors in the economy necessary to satisfy a dollar's worth of final demand on sector  $j$ 's output. The simple output multiplier for total production includes the direct and indirect effects that are obtained from a model in which households are exogenous. The initial output effect is defined as the initial dollar's worth of sector  $j$  needed to satisfy the additional final demand. The ratio of the direct and indirect effects to the initial effect alone is known as the output multiplier. The general formula for output multipliers is defined as follows:

$$I = \frac{\text{direct} + \text{indirect}}{\text{direct}} \quad (\text{Equation 10})$$

### 3.1.2.2. Income Multipliers

The impact of final demand spending changes on changes in income received by households (labor supply) is addressed by the income multiplier. There are two ways to calculate income changes: (i) income effects or household income multipliers, and (ii) Type I and Type II income multipliers.

The income effects or household income multiplier translates the initial \$1.00 output estimate, which comes from the initial \$1.00 final demand change, into an expanded estimate of the value of resulting employment (household income). This estimate includes direct and indirect effects on income changes due to changes in output for final demand. The general formula used to calculate a household income multiplier is:

$$H_j = \sum_{i=1}^n n + 1, a_{ij} \quad (\text{Equation 11})$$

The Type I multiplier is similar to the income effect multiplier with the variation that the denominator uses not the initial dollar of output, but its' initial labor income. The formula for this Type I multiplier uses Y to represent income and it is used in a different way than when Y is used to represent final demands. The general formula to calculate those direct and indirect effects is:

$$Y_j = \sum_{i=1}^n \frac{a_{n+1, ij}}{a_{n+1, j}} = \frac{H_j}{a_{n+1, j}} \quad (\text{Equation 12})$$

The difference between the multipliers is that the Type II multiplier includes direct and indirect effects, and induced effects that result from an increase in household spending which is caused by an increase in income. The Type II multiplier is calculated using the Leontief inverse  $(I - A)^{-1}$ .

### 3.1.2.3. Employment Multipliers

This type of multiplier allows researchers to estimate the relationship between the value of output of a sector and the employment in that sector in physical rather than monetary terms. The employment multiplier represents the number of jobs for a sector  $n$ .

There are two main employment multipliers: employment effect or household employment, and Type I and II employment multipliers. The general formula to generate the first kind of multiplier is calculated using the following equation:

$$E_j = \sum_{i=1}^n w_{n+1, j} \quad (\text{Equation 13})$$

The Type II multiplier includes the direct, indirect and induced effect for the entire population. For those purposes, the Leontief inverse matrix is used in conjunction with  $W_{n+1, 1}$ .

### 3.1.3. Impact Analysis

Impact analysis is an assessment of changes in overall economic activity as a result of changes in one or several economic activities (industries, sectors). An impact analysis begins to convert a sector (industry) to a set of economic issues and actors (which are involved in the impact). Once the issues have been identified, the actors involved can be identified and their actions converted to a set of expenditures. These expenditures are the initial changes that stimulate further economic activity (IMPLAN Professional, 2000).

The actions and the economic activity that they stimulate are the impact. Two types of main expenditures are identified by the actors: producer and purchaser prices. Producer prices are those paid at the factory door (money that the industry receives for its product). Purchasers' prices are those paid at the retail level. A purchaser's price involves a mix of producer elements. If an impact study involves purchaser prices, the values need to be subdivided to work with the producer-priced input-output model. This is done by using margins which represent the difference between producer and purchaser prices. Margins assign direct expenditures to the input-output sector multipliers. This procedure splits a purchaser price into the appropriate producer values, each value impacting a specific industry.

### 3.2. Surveys to Collect Industry Output, Expenditures and Employment

The following section explains the methods used to collect primary information by mail surveys. Those surveys were sent to different groups which represented major consumers or producers of green goods and services. Listings from different sources were obtained, and Dillman's (2000) suggested methodology was used and modified to fit the circumstances of the study.

The important industries surveyed for revenue and expenditure information were

- nursery and sod producers
- landscape design installation, maintenance (LDIM)
- golf courses

In addition, the following sectors were surveyed to determine areas maintained and expenditures on landscaping and grounds maintenance

- churches and cemeteries
- public elementary and secondary schools - 65 districts

- public colleges and universities - 3 systems
- private schools, elementary, secondary and college/university
- parish/city grounds, parks and playgrounds
- state parks and recreational areas
- road shoulder and median maintenance
- airports

The surveys, mailed to producers, LDIM, and golf courses, were designed to collect information on revenues, expenditures, and employment in sufficient detail to assess the validity of production function information in IMPLAN (trade flow table). That information included expenses on wages and salaries to employees, and expenditures on inputs such as plant material, chemicals and fertilizers, fuel, and other materials.

Each the surveys contained a specific questionnaire designed for each individual group and a cover letter explaining the purpose and importance of the study and the importance of response by individuals and/or companies. Additionally, letters of support from the Louisiana Nursery and Landscape Association (LNLA) and the Louisiana Turfgrass Association were included in the mailing package.

For these subgroups, an instrument was prepared, target population lists were obtained and screened, and changes made if appropriate.

### 3.2.1. Nursery Producers: The Survey Instrument

An instrument was prepared to collect the kind of information described above. The literature review of economic impact studies in the green industry suggested that a questionnaire used by Leones and Ralph was appropriate. This was used as a base and appropriate changes were made (Appendix A). The

instrument was pretested by mail to five growers. One responded by mail, and telephone calls were made to the other four. Four of the five were contacted, and all indicated that the intent of the questions was clear. They also commented that it was long. The length of the form was not reduced significantly because all the information was considered important. However, editorial changes were made based on these comments.

### 3.2.2. Nursery Producers: The Target Population.

A list of nursery growers was obtained from the Louisiana Department of Agriculture and Forestry (LDAF). To better manage survey resources, the target population was commercial operations. The LDAF list was divided into Type 1 and Type 2 licenses. The Type 2 group, with less than 2,500 square feet of growing space, was considered less than commercial sized. In the Type 1 group were 541 names, but the smaller sized operations in this group were considered to be noncommercial. A further screening excluded growers with less than 1 acre in field production, less than 0.5 acres in production containers, or less than 0.04 acres in greenhouse production. In addition, a list of Type 1 licenses had been used for past surveys, and names of some growers who did not meet the size criteria for this target were identified. These names were removed. Also in the previous work, some respondents had identified themselves as small retailers only, and were removed. Finally, some duplicates were found and deleted. These actions reduced the list size to 401.

After the Dillman (2000) procedure of mailing, reminder, and follow-up mailing, the response rate was low. Telephone calls to encourage participation were made. In the responses that were received, some individuals and/or companies indicated that they were not part of the target population because, while they did hold a current license, they no longer worked in the production sector. Other responses indicating

the farm was not in the target group (statements such as “I am in the retail sector” or “I am a small grower”) were received. These responses reduced the target population to 352.

It was considered important to receive input from the ten largest nursery growers. Those growers were tracked, and if they had not responded, telephone follow-ups were made through telephone calls by the research team and by Extension specialists, in an effort to increase the response rate.

### 3.2.3. Landscape Design, Installation and Maintenance: The Survey Instrument

The development of the survey instrument was similar to that described for producers. The literature review of economic impact studies was used, and a questionnaire used by Leones and Ralph was identified as a basis for modifications (Appendix B). The instrument was pretested by mail or email to five individuals in the industry. These were contacted, and all indicated that the intent of the questions was clear. Some minor modifications were suggested and incorporated in the revision.

### 3.2.4. Landscape Design, Installation and Maintenance: The Target Population.

As with producers, the objective was to collect information from commercial firms. Lists of LDIM firms with addresses in Louisiana were obtained from LDAF and the American Business Directory (ABD). The list provided by the LDAF contained businesses with a commercial license Type 1. On the other hand, the ABD listing contains information from all businesses state wide. The ABD is a private organization that provides information about different sectors of the economy across the United States. ABD information is classified by business type, number of employees, and sales. The LDAF list contained 4,183 names. However, there were many duplicates because, in some cases, companies were included by company name, a second time by the owner’s name, and even a third time by the manager’s name. Removal of duplicates resulted in a list of 2,565 names. Because there was little useful information in the data set on which to base stratification, 300 names were selected randomly from this list.

The ABD list contained 938 names. Businesses were categorized based on sales volume into the following groups - businesses with less than \$2.5 million in sales, those with sales between \$2.5 million and \$10 million, and those with sales more than \$10 million. A stratified random sample of 500 was taken from this list.

### 3.2.5. Golf Courses: The Survey Instrument

From the literature review, a questionnaire by Barkley et al. (1994) was used as a format, and was modified to collect appropriate information on kind and size of course, revenues, expenses and employment (Appendix C). The instrument was pretested by mail to five course managers. These individuals indicated that the questions were appropriate and clearly stated. Those pretested instruments were sent via fax and follow-up contacts were by telephone.

### 3.2.6. Golf Courses: The Target Population

A list from ABD contained 129 names of golf courses. This number of courses was expected based on the number reported in Hughes and Hinson (1997). The population was reduced when golf courses no longer in business were identified based on returned mail. In some cases, the reason for return was indicated on the envelope, and these included no access to roads, wrong physical addresses or nonexistent locations. An effort was made to correct these addresses, but with the same result. After these adjustments, the list contained 104 golf courses. The Dillman (2000) procedure was followed, but the response rate was low. Additional telephone contacts were made in an effort to increase the rate.

### 3.3. Methods for Collecting Related Expenditures Reported in Other Industries

This was a group of important users of output from the green industry, particularly with respect to mowing and other maintenance activities. Those activities are part of the green industry and some of this

economic activity is reported under other industries and in some cases those expenditures are not reported at all. The respondents were asked to report both in-house expenditures and expenditures by outside contractors. Value of dollars paid to contractors is assumed to be included in the LDIM group. In-house estimates were calculated to be used in the IMPLAN model.

### 3.3.1. The Survey Instrument

Surveys were intended to estimate and to evaluate the production functions in the transition table, therefore a common instrument was expected to be used. The objective was a single page, easy to complete, document (Appendix D). The format was designed to document expenditures by major categories, to estimate acreage, and to get employment information on maintenance activities associated with these grounds. The instrument used in the 1997 study by Hughes and Hinson asked for expenses in several categories, and the surveys evaluated for the producers and LDIM groups also were helpful, but were considered too detailed. A format was developed that would capture acreage and expenditures in the activities of mowing and other maintenance activities, and purchases of plant materials, fertilizers / chemicals, fuel, and other supplies. This form was pretested by three groups:

- LSU's Director of Landscape Maintenance completed the questionnaire and offered specific suggestions. These were (i) asking for institution's regular maintenance budget and percentages allocated to the categories of interest, and (ii) the issue of whether inmate labor should be included. These were supplied in the LSU response and included on the instrument for other educational institutions.
- The Director of the Division of Education Finance, Louisiana Department of Education, reviewed the instrument and responded that district business managers should be able to complete it. Five

district business managers were suggested for pretesting. These individuals were contacted by telephone and the instrument was sent via email or fax. Four of the five responded with minor comment on the form and that feedback was incorporated. The remaining respondent indicated that he never responded to surveys.

- For state parks and recreation areas, the instrument was reviewed by the Assistant Chief of Operations. This resulted in a suggestion that fuel and other associated expenses could be estimated through manufacturer specifications of fuel use per hour, and similarly for the other categories, and then multiplied by the hours of use reported by the site for each kind of equipment. This approach was tried for state parks, but appeared to provide less useful information while requiring that researchers locate detailed machinery information. That approach was used only with state parks.

The resulting instruments are presented in appendices, and are very similar but not identical.

#### 3.3.1.1. Churches and Cemeteries

Lists of Louisiana cemeteries were obtained from three different sources - the Louisiana Cemetery Board (LCB) and two lists from the ABD. The original list from the LCB contained 1,502 cemeteries. This listing contained registered and licensed cemeteries across the state. Registration is voluntary, but all cemeteries who sell individual plots for more than \$300 have to get a license from this state agency. A total of 457 cemeteries is licensed, and the remaining 1,045 are registered voluntarily. A sample of 300 cemeteries was randomly selected from this list. The ABD cemetery's list was reduced from 102 cemeteries to 85 after duplicates were removed. This list contained commercial cemeteries classified by size. The ABD church list contained 9,972 names. Many churches operate cemeteries, but this distinction

was not available in the dataset. Duplicate names were deleted, resulting in a list of 9,656, from which 281 listings were selected. The total target population for churches and cemeteries was 11,203, though some overlap is recognized.

### 3.3.1.2. Elementary and Secondary Schools, Public

Louisiana has 65 public school districts at this level. The Louisiana Department of Education maintains information on employment within districts. Some information on grounds maintenance expenditures was available from them. However, inappropriate classification of personnel was a problem. Only employees with at least 50% of their time allocated to grounds maintenance were identifiable, leaving most of this activity classified under other categories such as janitorial. This information was considered to be inadequate.

A list was obtained from the Division of Education Finance, containing email, telephone and fax contact information for district business managers and superintendents. Initially, an email methodology was used. In some cases, undeliverable messages were obtained. A second email attempt was made after verification of email addresses. Telephone follow-ups were used, particularly for the larger parishes, to identify a person with information about activities of interest. The response rate was considered acceptable for the smaller sized districts, but not acceptable for the larger districts. Superintendents (or their offices) of the larger school districts were contacted by email and by telephone to obtain the name of a contact so the form could be directed to a specific person. The larger parishes included the cities of New Orleans, Baton Rouge, Lafayette, Hammond, Monroe, Lake Charles, Alexandria, Ruston and Shreveport. Responses ultimately were received from the two largest districts, and an acceptable proportion of the regional population centers.

### 3.3.1.3. Colleges and Universities (including sport fields)

Louisiana has three public higher education systems

- Louisiana State University's Office of Human Resources provided names and contact information for its locations that have significant grounds maintenance (five campuses including the University of New Orleans). Email messaging was used to deliver the instrument.
- Southern University's Director of Physical Plant was contacted by telephone. There are three campuses, and it was indicated that information about all locations would be available through the Baton Rouge office. The instrument was sent by email. Though telephone follow-up was used, no information was received regarding these campuses.
- The University of Louisiana System has eight institutions, and some have multiple campuses. The System's Associate Director provided a list of names with email addresses and telephone contact information. The instrument was sent by email to that contact. Telephone follow-ups resulted in responses from five of the eight campuses.
- The total number of locations for which data collection was attempted was 16.

Expenditures and employment for sports fields (intramural and intercollegiate) were included. The exception was the LSU Baton Rouge campus, whose Athletics Department has a separate group responsible for intercollegiate sports fields. Information was collected from the Director of that program.

### 3.3.1.4. Private Educational Institutions

A list of 237 private elementary, middle, and high schools, and private colleges and universities, was developed. ABD's list, containing 250 names, was edited to remove duplicates and institutions not relevant to this study (beauty schools, organizations related to colleges and/universities or schools such as

alumni associations, schools with office locations only, and other similar listings). A second list of 187 names was obtained from the internet by accessing the yellow pages (Yahoo) with the key words education, Louisiana and private.

#### 3.3.1.5. Parish/City Grounds, Parks and Playgrounds

The 64 parishes in Louisiana, and cities within those parishes, were the target population. Contact with the local parish (East Baton Rouge) parks system suggested two information contacts.

The Louisiana Recreation Park Association (LRPA) is a voluntary association that provides technical training to its members. A list containing telephone numbers and job titles of members was provided, and the individual whose title suggested overall responsibility for that parish was used as the primary contact for parks.

The Louisiana Police Jury Association (LPJA) is an association of parish governments. Its website provides contact information for each parish, including telephone and a general email address. Generally, that list contained an official with the title such as Director of Public Facilities, or Director of Maintenance. These individuals became the primary contact for grounds maintenance associated with public buildings.

Neither LRPA nor LPJA had statistics on acreage in parks and playgrounds or overall estimates of acreage maintained by parish and city governments.

The survey of those individuals was conducted by email. Initial responses indicated that, except for New Orleans and Baton Rouge, few other parishes maintained parks. For parishes, then, collection of expenditures and employment for maintenance of grounds associated with parish buildings was the objective.

Cities and towns are an important source of expenditures. They operate parks and playgrounds, and they have municipal building and other locations that are maintained. However, this information almost

never is centralized in the sense that maintenance of buildings such as courthouses and libraries are handled by separate budgets. These budgets, and subsequent reporting, are not done in a way that landscape installation and maintenance can be identified.

Nevertheless, the instrument was sent to all email addresses on the LPJA list, and to the appropriate person at the parish level from the LRPA list. This email message was repeated at two week intervals, for a total of three sendings. As a summary statement, there was little response to this message. When issues such as incorrect email addresses were identified, those were corrected when possible. Because of the low response, student workers called the LPJA telephone number and asked for a corrected email address, and/or the name and telephone number of the person who would have the needed information. Emails were sent to the corrected address, a subsequent telephone call was made or faxes were sent to the reference.

This procedure resulted in additional responses, but most of the responses were from smaller parishes. Because most expenditures are in larger parishes, remaining resources were concentrated on the larger parishes. Responses from New Orleans and Baton Rouge were considered essential, so telephone calls were focused there until the appropriate official was identified and a response was received. Next in priority were the parishes with larger regional cities, seven in total, but associated metro-area parishes such as Jefferson Parish in the New Orleans area brought that number to 10. Again, telephone and email contact was used to obtain responses.

#### 3.3.1.6. State Parks and Recreational Areas

The Louisiana Department of Culture, Recreation and Tourism, through the Assistant Secretary for the Office of State Parks, indicated that 34 state parks and recreational areas are maintained. After

consultation with that office about the most effective method of dissemination, the Assistant Chief of Operations was instructed to disseminate the instrument via email. The completed forms were returned to the Assistant Chief, who forwarded them to the researchers. As a result of this cooperation, a very high response rate was achieved.

#### 3.3.1.7. Road Shoulder and Median Maintenance, and Airports

Louisiana's Department of Transportation and Development (DOTD), in cooperation with parishes, cities and local transportation districts, mows and otherwise maintains shoulders and medians of highways and roads, and installs and maintains some beautification projects. With one or two exceptions, this maintenance is funded by DOTD. Contact with this agency resulted in a conference in which the research team was given a computer run of the 2001 budget, which provided detail about mowing and other expenditures that are part of the green industry. Expenditures were summarized from the budget.

For airports, DOTD's Office of Public Works and Intermodal Transportation, Division of Aviation provided the names, addresses and contact persons for the 72 locations in Louisiana. Because of size, the two largest airports (New Orleans and Baton Rouge), and five other larger commercial airports, received the instrument. From the other 65, a random sample of 20 was taken. The procedure was to use email if the appropriate address was available, or to use the regular mail procedure otherwise. The initial response rate was low. Overall, there appeared to be sufficient information to estimate expenditures for the smaller locations. Additional efforts were concentrated on the seven selected airports through telephone contacts.

### 3.4. Survey Response Rates

#### 3.4.1. First Mail, Postcards and Second Mail

Table 3.3 shows the different groups with information about the original lists, target populations, samples used for the first mail/reminder postcards and the second mail and the numbers of surveys received from each group. In some cases, the original list differs from the target population because some of the names in those lists did not meet the requirement for that specific group.

Information presented in Table 3.3 shows that the first mailing list for nursery growers was 401. The original number of growers with Type 1 licenses from the Louisiana Department of Agriculture and Forestry (LDAF) was 541. Then, after further analysis the list was reduced to 401 based on the responses to the survey. Once the survey was received, it was necessary to check if the information was complete enough to be included in the dataset. The fifth column is the number of respondents in each group, and the sixth is the number of completed, useful surveys, and the seventh column (RR) presents the response rate for each group. Some of the most common reasons for excluding responses from the dataset were that the response was incomplete, blank, involved in other kinds of activities with no relation to the green industry, no longer in business, or in the case of nursery and sod producers, had sales below \$5000.

Additional rows in Table 3.3 follow the same format as the description of the procedure for growers. The response rate was very high in the case of state parks. It was low and a particular problem for LDIM and golf courses, two important components of economic impact. For LDIM, the random sample of 792 businesses resulted in a response rate of 7.7%, despite reminder and telephone follow-up to encourage responses. However, this was a result consistent with the response to Hughes and Hinson (1997) to the analogous LDIM list.

Golf course responses were another problem area. Of the 104 instruments in the first mailing and reminder postcards, and of the second mailing of 94, a total of 13 responses was received. Of that 13, seven were public courses from a single parish, and another was a university course. The result of the mail survey effort was about 5%.

The Dillman (2000) procedure, intensive follow-up efforts by telephone, email, fax, and a focus on large parishes where more expenditures were expected, provided the responses that were used to generate estimates of expenditures and employment for the remaining sectors.

### 3.4.2. Expansion Factors

The major purpose of this survey procedure was to generate information from which state wide estimates of expenditures and employment could be generated.

Expansion factors are implied in these response rate relationships. The number of completed surveys collected was used as the denominator to calculate the expansion factor, and the target population number is used as the numerator. The expansion factor is the inverse proportion of respondents (Table 3.4).

### 3.5. Descriptive Results Methodology

Descriptive results were obtained from the information collected from surveys for the following groups: school districts, parish/city grounds, and churches and cemeteries (Appendix F), and private schools, public universities, airports, road shoulder maintenance and state parks (Appendix G). Basic statistics including the mean, standard deviation, maximum value, and minimum value were calculated for the appropriate variables. In addition, the frequency was calculated for variables where answers were categorized such as yes or no responses.

Table 3.3. Target Population, List and Survey Response Rate for Selected Sub-Sectors in the Green Industry.

Sub-sector	1	2	3	4	5	6	RR
Nursery and sod producers	541	401	352	332	63	50	17.89
Landscaping design, installation and maintenance	5,121	3,503	792	772	52	43	7.70
Golf courses	129	104	104	98	13	13	12.50
Churches and cemeteries	11,576	11,213	676	609	116	107	17.15
Schools, public elementary and secondary	65	65	65	55	13	13	20.0
Colleges/universities, public	16	16	16	14	9	9	56.25
Schools, private, elementary through colleges/universities	236	236	236	224	24	22	10.16
Parish grounds, parks and playgrounds	64	64	64	56	13	13	20.31
State parks	34	34	34	6	28	28	82.35
Airports	72	72	27	24	9	9	29.62

1= Original listing 2= Target population 3= First mail/reminder postcards 4= Second mail 5= number of responses 6= completed responses RR= response return percentage

### 3.6. Procedure for Input-Output Model Using IMPLAN Software

The first step in using IMPLAN is to create a new model. A name is assigned and a study area (state/region) is defined. The study area was defined by selecting the Louisiana database based on 1999 data obtained from the MIG (Minnesota IMPLAN Group). Once the data have been selected, the initial phase (definition of area/region) of the model has been conducted by constructing the model and building the study area.

Once the initial model has been built, changes can be made to customize information and values provided by the IMPLAN software. In this study, expenditures of economic activities related to the green industry were reviewed, revised and changed as appropriate to ensure that the most accurate and proper information was used. Procedurally, these values are changed in the regional databases after data were expanded to the total population. Once those new values for that specific production function had been estimated (based on the survey information above) changes in the regional database can be made. In addition, individual and overall impact analysis can be conducted by “shocking the system” by changing sales values (output).

Table 3.4. Expansion Factors for Each Sub-Sector

Sub-sector	Expansion Factor
Nursery growers and sod producers	7.04
Landscaping installation, maintenance and design	18.41
Golf courses	8.00
Churches and cemeteries	6.31
Airports	8.00
Private schools (except preschool level),	10.72
School districts (public elementary and secondary)	5.00
Public colleges/Universities	1.77
Parish grounds, parks and playgrounds	4.92
State parks	1.25

### 3.6.1. Establishing IMPLAN Industry Values (Industry Expenditures)

IMPLAN allows researchers to customize its database to create regional models. Because 1999 was the most recent database developed by MIG for Louisiana, that year was used as the basis for this

study. The database contained information about population, employment, income, households and their relationship with the different industries in Louisiana. Values from the IMPLAN database were used for the impact analysis unless it could be demonstrated that changes were appropriate. In the following section, procedures followed to determine the need to modify values in the databases are described.

#### 3.6.1.1. Nursery and Sod Producers

The first industry analyzed was nursery and sod producers (IMPLAN data Sector 23). Industry experts consulted considered the IMPLAN estimates to be too low, and alternative estimates of output were sought. Five alternatives were identified:

- The IMPLAN data, from the 1999 data set, placed the estimate of industry output (equivalent to gross sales) at \$73 million, with employment of 1,723, employee compensation of \$23 million, and total value added of \$53 million.
- The Census of Horticultural Specialties (NASS, 1999) for 1998 was \$72 million. This value was obtained by conducting a census of woody ornamental, floricultural and sod business with sales over \$10,000. Strengths of this estimate include legally mandated compliance, and that it is carried out by an agency with well-developed procedures and with experience in collection of data in agriculture. A distinct weakness is a likely underestimation bias because of the confidentiality issue. Despite language in statutes that prohibits sharing information and that protects confidentiality, there is a strong sense among many farmers that sharing might occur. This could be an incentive for them to under report sales. Additionally, this was for 1997, and it is documented that this industry grew rapidly through the 1990's.

- The *Louisiana Summary 2001* estimated sales at about \$120 million when the values for nursery growers and sod producers were combined. This source is compiled by state Specialists and parish-level agents of the Louisiana Cooperative Extension Service, after consulting with agricultural agency representatives, agricultural and agribusiness leaders and others (Louisiana Summary, 2001). This procedure has both strengths and weaknesses. The major strength of this procedure is that a majority of parish agents have an extensive knowledge of the nursery industry situation within their area, and their data inputs are complemented by an overview provided by the state level specialist based upon his own experience. These production estimates have been provided by this source since 1940. The major weakness of this publication is that the values reported are subjective to terms of information provided by the state/parish agents in the area.
- A Trade Flows and Marketing Practices survey (TFMP) by Hampton (2001), conducted in 1998, estimated total sales by marketing channel for small and large nurseries at \$112 million. This study was conducted as a part of a national effort to collect information about production, sales and marketing practices by nurseries. For this study a well-developed methodology was used to collect information for the TFMP in 1998 in conjunction with the LASS state agency. A similar survey instrument was used in two previous TFMP studies, so growers were familiar with the format. For Louisiana, 501 nurseries were surveyed from which 171 usable responses were obtained. In addition, telephone follow-ups made by LASS staff obtained an additional 123 complete responses, for a total of 294 responses. This is a high response rate for surveys. One disadvantage is that sales were reported by selecting a sales category, and it was assumed the mid point was an appropriate estimate of sales. This may result in an upward biased estimate.

- The producer's component of this study, described in 3.2.2, generated an estimate of \$177 million in gross sales. The average sales (\$503,770) reported by businesses were multiplied by the total target population (352). The survey was targeted to the 401 growers in the initial target population. One disadvantage was that the response rate was low despite efforts to get additional responses. An additional criteria was that information be collected from the ten largest producers. Most of those large growers responded. When combined with the overall response rate, the estimated sales were expected to be biased upward. Another disadvantage was the survey length, which was longer than expected because additional information was requested to gather data for other studies. The major strength of this study was the step by step methodology suggested by Dillman, and the extraordinary efforts made to achieve a higher response rate.

It is acknowledged that the NASS estimate has the stronger methodology, but the potential under reporting and the age are arguments against its use. The TFMP estimate also was strong methodologically, but might be biased upward because sales were reported in categories and the estimate is based on the assumption that the midpoint of the range is an acceptable approximation of the group mean. The survey conducted in 2001 was rejected because total sales were biased upward as previously explained. After considering these factors, output as estimated in the *Louisiana Summary 2001* was chosen for inclusion in the model. While that estimate is not survey based, it does represent a collective judgment of state experts and local Extension agents who possess extensive knowledge of their local areas. That knowledge is complemented by the overview and insight of state agents. This appears to best represent the current output of the production sector.

### 3.6.1.2. Services Sector

Service sector values were chosen using a combination of information from the ES202 data and values provided by the IMPLAN software in the regional model datafile. ES202 data are state and county level employment and wages at the 4-digit SIC code level (IMPLAN Professional, 2000). The IMPLAN data placed the estimate of total output at \$266 million, employment at 9,364 jobs, employee compensation at \$76 million and total value-added at \$166 million. These values indicated an increase of total output of \$120 million (82%) since the previous estimate (\$146 million) was reported by Hughes and Hinson in 1997. An increase of this magnitude was consistent with estimates of industry growth reported by the National Gardening Association Survey, which suggested a substantial increase in consumer purchases over the five-year period. Average spent per household on green goods grew from \$333 to \$444 nationally from 1996 to 2001 (NGA, 2001). The southern region had expenditures of \$408 per household on lawn care and garden activities, compared to expenditures for similar activities in 1997 of \$190.92 for the deep south region. Those values were calculated by adding average expenditures per category in green goods and services as explained in section 3.6.1.4.10. Total values of expenditures by households on lawn and care activities reported by NGA grew from \$22 billion in 1996 to \$37.7 billion in 2001. Thus, values from IMPLAN, used in this impact study, were conservative as well as appropriate in terms of their representation of calculated sales.

### 3.6.1.3. Golf Courses

Values for this industry were taken from secondary data because there was insufficient response to the mail survey. Secondary information, provided by the 1994 South Carolina golf industry study and a 2001 National Golf Foundation study, were used to estimate revenues, expenditures and employment

for nine, eighteen and twenty-seven plus hole golf courses. The NGF published, in 2001, an operating and financial performance profile for eighteen hole golf courses for climate region two, which includes Louisiana (NGF, 2001). Expenditures incurred by golf courses on grounds maintenance, revenues from pro-shop, food and drinks were calculated using information delineated by size and type. The South Carolina Study (1994) provided information for golf courses subdivided by size (9, 18, and 27+ holes). NGF classified the 18-hole golf courses in three categories: daily fee, municipal, and private. To obtain the total number for each category, a new list of golf courses were obtained from the internet (<http://www.golfcourse.com>), and 58 additional courses were added to the original list of 104 provided by the ABD. Size and classification for golf courses were available at that website. This new information indicated that the total number of golf courses in the state of Louisiana was greater than the original list obtained from ABD. Table 3.5 illustrates the new number of golf courses by category and number of holes.

The next step was to estimate revenues, expenditures and total employment generated by golf courses. To estimate total revenues, average revenues for the 18 hole type golf courses were obtained from the NGF: daily fee (\$654,000), municipal (\$940,000), and private (\$1,725,000) (NGF, 2001). Then those numbers were multiplied by the number of golf courses with 18 holes to obtain total revenues for that facility size. To obtain revenues for the nine hole and the 27+ hole golf courses, information from the South Carolina study (Barkley et al. 1995) was used to estimate the revenues for those other two sizes of golf courses as a proportion of total revenues for 18 hole courses. Similarly, the proportion of expenditures of nine and 27+ golf courses facilities were estimated compared to the 18 hole facilities. Nine and twenty-seven hole golf courses were 19% and 199% of the revenues generated by 18 hole golf courses. On the other hand, expenditures were 10% and 198% for nine and twenty-seven plus hole golf courses. To

calculate employment generated by golf courses, averages from the South Carolina study - 6.3 for a nine-hole course, and 26.9 and 49.5 employees for eighteen and twenty-seven plus hole golf courses, respectively - were used.

Table 3.5. Number of Golf Courses by Category

Type/Size Golf Course	9 holes	18 holes	27+ holes	Total
Daily fee	29	51	0	80
Municipal	5	15	0	20
Private	23	35	4	62
Total	57	101	4	162

Source: <http://www.golfcouse.com>

Total revenues at daily fee courses were estimated at \$54 million, municipal courses were \$15 million and private courses were \$82 million, for a total of \$151 million. Total expenditures were \$38 million, \$10 million and \$71 million, respectively, for a total of \$119 million. Total employment was estimated at 3,274.

#### 3.6.1.4. Expenditures on Grounds Maintenance Reported in Other Sectors

Economic activity in the sectors identified at the beginning of this section is important to the green industry. Reported as expenditures for several of these sectors, these expenditures are income to individuals and businesses. A group of different sub-sectors were grouped as a dummy variable to model their impact on the economy. For that purpose, these surveys provided an estimate of the total expenditures on wages and salaries by those sectors.

#### 3.6.1.4.1. Churches and Cemeteries.

The total expenditures on grounds maintenance by churches and cemeteries were calculated using information collected from the survey (Table 3.6), and the proportions of only churches, only cemeteries, and combined churches and cemeteries, were estimated. Those proportions were 23%, 54%, and 23%, respectively. Then, average business expenditures per acre maintained were calculated by dividing the total expenditures by the number of acres for each group. Finally, the proportion for each group was multiplied by the average grounds maintenance expenditure per acre for each of the groups: churches \$2,186, cemeteries \$3,446, and both (church and cemetery) \$1,364. As an example, the 23% of respondents that were churches was multiplied by the total population (11,213) to obtain the proportion of 'churches', or 2,579. That number was multiplied by the average cost per acre (\$2,186) to obtain the total amount of grounds maintenance expenditures for churches (\$5.6 million). A similar procedure was followed for the groups 'churches and cemeteries' and 'cemeteries'.

The estimated values for these three groups were \$5.63, \$20.87, and \$3.5 million, respectively.

The total values estimated for the combined three groups was more than \$30 million.

#### 3.6.1.4.2. Public Elementary and Secondary Schools

The public school district grounds maintenance sub-sector was divided into three sizes - the two large districts, the medium sized districts (8), and small districts (55) - identified in an earlier section. For the medium and small groups, expansion factors (1.6 and 9.17, respectively) are reported in Table 3.7. Total reported expenses in the expense categories of wages paid and other materials expenses were multiplied by these expansion factors. The total annual cost of labor (wages) for this group was \$5.1 million and total value spent on plant material, chemicals and fertilizers, other material, and fuel was \$1.2 million.

Total expenditures on wages and other materials were \$6.3 million. Results for this sector are presented in Table 3.7.

Table 3.6. Total Expenditures by Churches and Cemeteries in 2001.

Cemetery/Church Size	%	Total population	Average expenses	Total expenses
-----Dollars-----				
Churches	23	2,578	2,186	5,637,194
Cemeteries	54	6,057	3,446	20,876,896
Both	23	2,578	1,364	3,518,374
Total	100	11,203	n/a	30,032,465

Source: Survey of Churches and Cemeteries 2001.

Table 3.7. Total Expenditures on Grounds Maintenance by School Districts in 2001.

School District Size	No.	Expansion factor	Wages	Other materials	Total expenses
-----Dollars-----					
Small	55	9.17	4,132,222	913,328	5,045,650
Medium	8	1.6	590,616	143,712	743,328
Large	2	na	436,430	156,800	593,290
Total	65	na	5,159,288	1,213,840	6,373,128

Source: Survey School Districts 2001.

#### 3.6.1.4.3. Public Colleges and Universities

Total expenditures on grounds maintenance by public universities were estimated. Size in acres was available for most institutions on their own internet sites. Since all acres are not maintained grounds, total acres were divided by maintained acres for the institutions that responded. That proportion, about 90%, was used to estimate acreage for the non-responding institutions

For total expenditures, averages of expenditures by category for the responding institutions were divided by acres maintained. These costs, \$783.57 per acre, were assumed to be representative of the nonrespondents, and total expenditures were estimated at \$4.2 million, of which 80% was spent in-house (\$3.4 million). Total expenditures incurred on other materials (plant material, chemicals and fertilizers, fuel, and others supplies) were estimated at \$365,495.

#### 3.6.1.4.4. Private Schools: Elementary, Secondary and College/University

To estimate total expenditures on in-house grounds maintenance, this sub-sector was divided into elementary and secondary schools (189), and colleges and universities (48). Total expenditures on grounds maintenance incurred by elementary and secondary schools were estimated at \$3.29 million (part-time, full time and inmate labor) on 1,565 acres. The average cost per acre was estimated at \$2,065. In addition, elementary and secondary schools spent \$738,489 on other supplies such as plant materials, chemicals and fertilizers, fuel and other materials. Total expenditures for these two categories were estimated at \$ 4.03 million.

The second subgroup (private colleges and universities) spent \$4.13 million on grounds maintenance (labor) and \$486,043 on other materials for a total of \$4.61 million. To calculate these values, information from public schools was used, and it was assumed that average size for private colleges and universities was 25% of the average size of public colleges and universities. In addition, the assumption that 90% of the grounds were maintained was included in the calculation. Then, values were expanded to the target population for this subgroup of 48 colleges/universities.

The total expenditures, combining the two subgroups (elementary and secondary, and colleges and universities) were estimated at \$8.65 million in 2001.

### 3.6.1.4.5. Parish/City Grounds, Parks and Playgrounds

Parish/city grounds, parks and playgrounds, and parish school districts had similar procedures. The procedure for these was common in terms of data collection at the parish level. Parishes were grouped into the two largest metropolitan areas of New Orleans and Baton Rouge, a second tier of regional population concentrations, and all other parishes were treated as a third group. Results are presented in Table 3.8.

Table 3.8. Total Expenditures Incurred by Cities/Parishes on Grounds Maintenance in 2001.

City/Parish Size	Number	Total acres	Average wages per acre	Total wages expenses	Other expenses
-----Dollars-----					
Small	54	2,835	n/a	n/a	356,400
Medium	8	3,872	n/a	n/a	1,914,678
Large	2	10,023	n/a	n/a	291,200
Total	64	16,730	2,189	36,621,970	2,562,278

Source: Survey Parish/City Grounds, Parks and Playgrounds 2001.

Wages and total expenditures on materials for city/ parish grounds, parks and playgrounds were estimated at \$39.18 million. To calculate these values, parishes were divided into three groups depending on size, as described above. To obtain the total value for wages and other expenditures, the total number of acres was estimated. The estimation procedure is described as follows: the number of sites per parish (10.5) was estimated from telephone calls to parishes, asking for a response to the question of how many sites in the parish were maintained by either the parish or the city. The average size of each site was assumed to be 5 acres. Then, that number was multiplied by the number of small parishes (54) for a total

of 2,835 acres and added to the information from the two larger parishes (10,023 acres) and total acres for the eight mid-size parishes (3,872 acres). That total number of acres for the three groups (16,730) then was multiplied by the average wage per acre (\$2,189) for a total of \$36.6 million. The second value for expenditures on other categories such as plant material, chemical and fertilizers, fuel and other supplies was calculated by multiplying the percentage spent in each category by the total budget assigned to grounds maintenance. For each category, values for large, medium and small parishes were estimated following similar procedures to those described above, and then added to estimate the total value for those expenditures at \$2,562,278.

#### 3.6.1.4.6. State Parks and Recreational Areas

Expenditures on grounds maintenance by state parks and recreational areas were estimated by multiplying the total expenditures reported by 28 of the 34 state park agencies by the expansion factor (1.21 from dividing 34 by 28) for a total value of \$571,046.

#### 3.6.1.4.7. Road Shoulder and Median Maintenance

The value reported by the Louisiana Department of Transportation was obtained by adding categories such as hand spraying herbicides, mowing, cutting brush and landscape maintenance. Total value was calculated at \$11.4 million. Additionally, a value of \$6.9 million was paid to contractors.

#### 3.6.1.4.8. Airports

Airport expenditures were estimated by dividing the airports in three groups: large (2), mid-size (12), and small size airports (58). The total amount spent on grounds maintenance by mid-size commercial airports was estimated at \$205,312. That value was obtained by multiplying the total value of the eight medium size airports by their expansion factor 1.5 (12/8). Obtaining a value for the 58 small airports was

more problematic, since very few of the small airports responded to the survey. To get an estimate, it was assumed that the average small airport's expenditures were 20% of those of the average medium-sized airport. The latter was calculated and the resulting value was multiplied by 0.2, and the total was reached by multiplying by 58, for a total of \$212,392. New Orleans airport reported expenditures of \$48,520 and it was assumed that Baton Rouge airport had expenditures of \$24,460, or fifty percent compared to the New Orleans airport. The total expenditures by airports were estimated by summing over groups for a total of \$490,485.

Table 3.9. Total Expenditures by Airports in Louisiana, 2001.

Airport Size	Number	Expenses (\$)
Small	58	212,392
Medium	12	205,312
Large	2	72,980
Total	72	490,485

Source: Survey Airports 2001.

#### 3.6.1.4.9. Maintenance and Related Expenditures Reported in Other Industries.

This component is intended to include expenditures on grounds maintenance by other sectors that are not included in the landscape and horticultural services sector (sector 27) in the IMPLAN model. Those expenditures made by other sectors were estimated using information from the IMPLAN model. This group includes the following sectors: new residential structures (sector 48), new industrial and commercial buildings (sector 49), new utility structures (sector 50), new government facilities (sector 54), and maintenance and repair other facilities (sector 56). With this procedure, estimates of those expenditures were calculated using the percentage of payroll devoted to horticultural products and then multiplied by the total payroll compensation for that sector.

The second step was to divide that result by the labor coefficient assigned to the landscaping service sector to obtain the value of expenditures for activities related to the LDIM. Data from sector 27 were used to represent the construction sector in the regional database, because it was assumed that the construction sector behaves similar to LDIM (sector 27). As an example, sector 48 was estimated at \$28 million. To calculate that value, the percentage devoted to horticulture (0.021796) was multiplied by the payroll compensation for that sector (\$373.5 million). Then, the result of \$8.14 million was divided by the labor coefficient in the landscaping sector (0.28661) for a total of \$28.4 million for sector 48. Similar procedures were used to calculate the values in sectors 49 (\$56 million), 50 (\$37 million), 54 (\$96 million) and 56 (\$117 million) for a total of \$336 million.

Real estate expenditures were estimated at \$187.83 million. To obtain that value a similar procedure for the one described above for the construction sector was followed. The payroll of that sector 462 (real estate) was multiplied by percentage of payroll devoted to horticulture. Then that result was divided by the labor coefficient devoted to sector 27 (landscaping sector).

### 3.6.2. Establishing Retail Industry Size

Information from the National Gardening Survey 2001 (The National Garden Association) was used to estimate retail level purchases by Louisiana households at different categories listed in Table 3.10. Total annual lawn and garden expenditures for the southern states was estimated to be \$697 per household.

Table 3.10. indicates the annual expenditures by a typical Louisiana household in 2001. The categories with higher expenditures were lawn care (\$156.60), landscaping (\$69.19) and flower gardening (\$44.69), respectively. On the other hand, categories such as herb gardening, ornamental gardening and container gardening had the lowest expenditures by households in 2001 at \$3.41, \$8.00 and \$11.55,

respectively. Expenditures were calculated for each category by multiplying the percentage of households that purchase those products by the average dollars spent in each category.

Table 3.10 Annual Expenditures by Lawn and Garden Category for a Typical Louisiana Household, 2001.

Lawn and garden category	Expenditures (\$)
Lawn care	156.60
Flower gardening	44.69
Indoor houseplants	18.92
Shrub care	15.81
Insect control	25.46
Flower Bulbs	10.80
Tree care	21.39
Landscaping	69.19
Container gardening	11.55
Ornamental gardening	8.00
Herb gardening	3.41
Water gardening	22.80
Total	408.62

Source: The National Garden Association. "National Gardening Survey 2001". Conducted by Harris Interactive

As an example, for the lawn care category, the percent of households was 58% and the average dollars spent in that category was \$270. The expenditures for household in Louisiana were estimated at \$156.60. Total expenditures by households estimated above were calculated using the mark up for nursery products contained in the IMPLAN software from the margins information. Margins, or value added, is the difference between the producer and purchaser price. Margining assigns direct expenditures to the

correct Input-Output sector multiplier. It splits the purchaser's price into the appropriate values for each specific industry sector (IMPLAN, 2000)

The margin for lawn and garden products was estimated at 48.2% using information from the Census of Retail, 1997. That number was multiplied by the total expenditures per household (\$408.82) and by the total household population in Louisiana (1,666,703). The total value of expenditures by households in retail outlets was estimated at \$676 million. This value is an unmargined value which includes the mark-up price. The margin value was estimated at \$326 million after multiplying the number by the average mark-up for these type of products. The mark up value is called in the input-output model a margin value, which includes most retail, wholesale and transportation markups.

Total value of retail for the florist sector was also estimated using information from the Census of Retail (1997). The total value of \$87.5 million (unmargined value) was multiplied by the mark-up (48.2%) to obtain the margined value of \$42 million.

### 3.6.3. Building the Model

The first step in conducting impact analysis is to build the model. For that purpose, a name has to be assigned and a database for a specific location/region has to be selected. For this purpose, a Louisiana database from 1999 (latest version from MIG Inc.) was used. The next step was to create social accounts and at that point changes in the regional database were made. To make those changes, additional calculations were necessary.

#### 3.6.3.1 Modifying Regional Database

Once the values for the different sectors were estimated, the next step was to decide if the values from the regional database in IMPLAN were appropriate to use for the study, or if additional changes were required.

Two dummy variables were created to incorporate sectors that are not included in the original 528 sectors in the IMPLAN model. They were included in the regional database tables, adding sector 526 (golf courses) and sector 527 (other sectors such as cemeteries, private and public schools, state parks, airports, the construction sectors and real estate sector).

Some additional calculations were made by using primary and secondary information for the following groups: nursery growers and sod producers, and golf courses, to estimate new values for the regional database. Regional tables were modified for those two sectors, and no changes were made for the LDIM sector. Also, for sector 527 (Other Related Expenditures) the values for regional tables were assumed to be the same as used by the LDIM sector because the nature of activities performed by those sectors.

To make changes in a regional database for an IMPLAN model, technical coefficients needed to be calculated. That procedure was as follows: the technical coefficients were calculated as weighted averages of the survey results. See the following steps using labor as an example:

- Step 1: for each survey responding to the question, payments to labor were calculated as a fraction of gross sales.
- Step 2: each responding survey received a weight based on its gross sales versus gross sales for all surveys that answered the question.
- Step 3: The weight from Step 2 was multiplied by the result for Step 1 for each responding survey.
- Step 4: the results from Step 3 are summed to yield the final result.

All important coefficients were calculated in this manner and the Regional Purchase Coefficients (RPC) were calculated using the same procedures (Hughes, 2002). In IMPLAN, an RPC is derived using

an econometric equation that predicts how much local production actually is used locally (IMPLAN Professional, 2000). On the other hand, all coefficients for this study were obtained as described above. All changes made to the regional tables were made using the database software Access'97. Finally, a multiplier database was constructed. Once the model was built, economic impact analysis was begun.

#### 3.6.4. Impact Analysis

Impact analysis was conducted individually and “in-group” for different sectors. The first step was to identify a sector by its name, code number, and to insert the appropriate total output for that sector. Employment was determined by a proportion already established in the software. Once the sector to be analyzed had been selected, the ‘analyze’ option was selected and then the ‘run impact’ option was selected. At this point, the software completed all the interactions and calculations explained before using the Leontief inverse  $(I-A)^{-1}$  and  $Y$  (See Section 3.1.1.3.). Tables containing information about total output (direct, indirect and induced), employment, value added, income, and multipliers were obtained. Results are presented in chapter 4.

Those economic impacts were conducted individually for the following groups: nursery growers and sod producers, LDIM, golf courses, other sectors (cemeteries and churches, private and public schools, etc.) and the retail sector. Then, an overall economic impact using all sectors at the same time was conducted. Results from those analyses are presented in Chapter 4.

## CHAPTER 4. RESULTS

This chapter presents a set of results from the input-output model using IMPLAN software. The IMPLAN results show the impacts of the individual sectors that were modeled and the total economic impact of the green industry on Louisiana's economy. These results from the input-output software contain multipliers tables and the linkages among the sub-sectors in the industry.

### 4.1. Input-output Analysis Results (IMPLAN Input-Output Model)

This section presents economic impact results from individual sectors and as a whole on Louisiana's economy using a 1999 based Louisiana input-output model. Individual results for production, landscaping services, golf courses, retail, and other related economic activity impacts were conducted to measure the impact of those sectors in the state economy. Then, an overall economic impact was conducted to determine the total economic impact of the green industry on Louisiana's economy by all the sectors related to the green industry.

Results are presented by sector, and each sector contains results in four different categories. Those economic impact results are presented under ten aggregated sectors and two individual industries, using an IMPLAN procedure to aggregate industries by SIC one digit codes. Aggregation is the process of combining IMPLAN results by adding the values of related individual industries (Appendix H). This allows results to be presented in a broader context.

Economic impact is an assessment of change in overall economic activity as a result of some change in one or several economic activities. Economic impacts are measured by Gross Sales (Total Industry Output), Total Personal Income, Gross State Product and Employment. Direct, indirect, induced and total effects for each category were estimated. Gross sales are a single number in millions of dollars for each

industry, representing the value of an industry's total impact. Personal income is an increase in income as a result of economic activity. Gross state product is composed of four components: employment compensation, proprietorship income, other proprietary type income and indirect business taxes. Employment is the number of jobs created by each industry.

In addition, multiplier tables indicate the direct, indirect, induced and total effects of a specific industry in a particular area. Direct effects show changes in gross sales, personal income, gross state product and employment resulting from changes in direct final demand. The indirect effects are the changes in inter-industry purchases as they respond to the new demands of the industry directly affected. Induced effects represent the impacts on all local industries caused by the expenditures of new household incomes generated by the direct and indirect effects of final demand changes. The total impact is the sum of the direct, indirect and induced effects (IMPLAN Professional, 2000).

#### 4.1.1. Multipliers

Type I and Type II multipliers for Total Output are presented. Direct and indirect combined are represented by the Type I multiplier, while adding the induced effects produces the Type II multiplier.

##### 4.1.1.1. Output Multiplier

The Type II multiplier for greenhouse and nursery products was estimated at 1.607538 (Table 4.1). That means that a one dollar increase in output (sales) by that industry will result in a \$1.607538 increase in total economic activity (direct, indirect and induced effects).

Total economic activity when the induced effect is not taken into account (Type I Multiplier) was estimated at 1.206531. The Type I multiplier for landscape and horticultural services was estimated at 1.254097, while the Type II multiplier was estimated at 1.640646. Type I and Type multipliers for the

Construction sector were estimated at 1.428074 and 1.674599, respectively. Multipliers Types I and II for the Trade sector were estimated at 1.195513 and 1.558692, respectively.

Table 4.1. Output Multipliers at the One Digit Level of Aggregation of Louisiana's Economy, Estimated with the Louisiana Input-Output Model, 1999.

Industry	Type I Multiplier	Type II Multiplier
Greenhouse and Nursery Products	1.206531	1.607538
Agricultural, Forestry, Fishery Services	1.269084	1.728999
Landscape and Horticultural Services	1.254097	1.640646
Mining	1.639430	1.847480
Construction	1.428074	1.674599
Manufacturing	1.466647	1.626910
Transportation, Communication and Utilities	1.329233	1.724161
Trade	1.195513	1.558692
Finance, Insurance, and Real Estate Services	1.198711	1.419024
Government	1.244887	1.619046
Other	1.316461	1.442826
	1.210273	1.444727

#### 4.1.2. Production Sector Impact

Results are presented in the following format. IMPLAN output for the four sectors modeled consisted of four tables that indicated direct, indirect, induced and total effects on gross sales, total personal income, gross state product and employment (presented in Appendix I). The total impacts column for each of those 4 tables is included in a summary table that represents the level at which IMPLAN results are commonly discussed. As an example, Table 4.2 presents a picture of the economic impact of the Production Sector (Greenhouse and Nursery Products, and Landscape and Horticultural Services) on gross sales and other measures on Louisiana's economy in 2001. This format is repeated for the other three sectors that were modeled individually, and for the total impact. A discussion of these detailed tables is provided in this section to illustrate their contribution.

#### 4.1.2.1. Gross Sales

Total direct economic impact by the production sector on Gross Sales was estimated at \$370.9 million dollars (Appendix Table I-1). By definition, there is no direct impact from the other aggregated sectors and individual industries, so this value includes only the Greenhouse and Nursery sector (\$105 million) and the Landscape and Horticultural Services (\$265.9 million). Total indirect effect impact was estimated at \$89.25 million, which includes Services at \$18.22 million, Transportation, Communication and Utilities (TCU) at \$14.81 million, Greenhouse and Nursery Products at \$14.89 million, and Finance, Insurance and Real Estate (FIRE) at \$10.51 million. Total induced effect was estimated at \$144.88 million. Total economic impact by the production sector on gross sales in Louisiana was estimated at \$605.04 million, which includes Greenhouse and Nursery sector at \$119.89 million and the Landscape and Horticultural Services at \$266.15 million.

#### 4.1.2.2. Total Personal Income

Appendix Table I-2 indicates the direct, indirect, induced and total effect on Total Personal Income of the production sector on other sectors. Total direct effect was estimated at \$159.25 million, composed of Greenhouse and Nursery Products at \$48.28 million, and Landscape and Horticultural Services at \$110.42 million

Total indirect effect of the production sector on Total Personal Income was \$34.42 million and induced effect was \$52.48 million. Total economic impact of those two industries on Total Personal Income was estimated at \$246.17 million. The major impacts on Total Personal Income by the production sector were Landscape and Horticultural Services at \$110.53 million, Greenhouse and Nursery Products at \$55.75 million, Services at \$33.69 million and Trade at \$18.22 million.

#### 4.1.2.3. Gross State Product

Direct, indirect, induced and total effects of the production sector on Gross State Product is presented in Appendix Table I-3. Total direct effect on Gross State Product was estimated at \$242.28 million, which includes Greenhouse and Nursery Products at \$76.49 million, and Landscape and Horticultural Services at \$165.79 million. Indirect effects were estimated at \$53.20 million, which includes Services (\$11.61 million), Greenhouse and Nursery Products (10.78 million), TCU (\$8.27 million), FIRE (\$6.53 million) and Trade (\$6.39 million). The induced effect was estimated at \$90.06 million and total effect (direct, indirect plus induced effects ) at \$385.55 million.

#### 4.1.2.4. Employment

The effects of the production sector on employment in Louisiana's economy are presented in Appendix Table I-4. Direct effect by the production sector on employment was estimated at 11,825.40 jobs. The indirect and induced effects were estimated at 1,225.80 and 2,110.9 jobs, respectively. Total effect on employment by the production sector was 15,162.10 jobs. The sectors that were most affected by the production sector were Landscaping and Horticultural Services with 9,360.8 jobs, Greenhouse and Nursery products with 2,854.30 jobs, and Services with 1,169 jobs.

#### 4.1.2.5. Total Economic Impact of the Production Sector

Total economic impacts of the production sector on Gross Sales, Total Personal Income, Gross State Product and Employment are a summary of total economic impact of each activity as presented in Appendix I. Table 4.2 presents total values for those categories in ten aggregated topics and two individual industries.

Total gross sales (total industrial output) of Greenhouse and Nursery Producers were estimated at \$119.89 million, while Landscape and Horticultural Services were estimated at \$266.14 million (a total of \$386.03 million in direct contribution). Personal income, gross state product and employment impacts by the Greenhouse and Nursery Products were estimated at \$55.75 million, \$87.34 million and 2,824 jobs, respectively. The Landscape and Horticultural Sector's impact on Personal Income, Gross State Product and Employment were estimated at \$110.53 million, \$165.95 million and 9,360.80 jobs, respectively. Total direct jobs created by both Greenhouse and Nursery Products, and Landscape and Horticultural Services, were estimated at 12,185.10.

Table 4.2. Impact of the Production Sector of the Green Industry on Louisiana's Economy as Estimated with the Louisiana Input-Output Model, 1999.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employment
	------(Dollars)-----			
Greenhouse and Nursery Products	119,898,760	55,757,088	87,345,944	2,824.30
Agricultural, Forestry, Fishery Services	2,150,342	1,132,967	1,400,407	87
Landscape and Horticultural Services	266,147,072	110,531,152	165,950,320	9,360.80
Mining	2,995,813	726,184	1,996,800	11.5
Construction	10,303,542	4,941,400	5,204,663	151.7
Manufacturing	21,424,154	3,330,327	5,627,123	79.0
Transportation, Communication and Utilities	28,934,414	7,808,634	16,359,627	189.3
Trade	41,057,704	18,229,398	30,124,686	893.5
Finance, Insurance, and Real Estate Services	41,949,756	7,990,869	28,724,582	296
Government	64,302,440	33,696,368	40,154,736	1,169.00
Other	4,241,299	1,316,343	1,803,772	31.4
Total	413,534	413,534	413,534	47.7
<b>Total</b>	<b>605,039,154</b>	<b>246,178,827</b>	<b>385,558,468</b>	<b>15,162.10</b>

Results from the Louisiana input output model indicate that economic activity by the production sector led to additional economic activity in the rest of the Louisiana economy, and demonstrated the

importance of this industry in Louisiana. Total economic impact on gross sales of the production sector was estimated at \$605.03 million, while total economic impact on personal income, gross state product and employment were estimated at \$246.17 million, \$385.55 million, and 15,162 jobs, respectively

As a proportion of total gross sales, the Production Sector accounted for 64% of the impact in that category while the indirectly affected sectors contributed 36%. For the other three measures of impact, the contributions of the indirectly affected sectors were 37%, 34% and 20% for TPI, GSP and Employment, respectively.

Multipliers for the green industry (Production sector) were calculated for TIO, TPI, GSP and Employment. The multiplier value for TIO was estimated at 1.567313. That value was obtained by dividing total economic impact on gross sales (\$605.03 million) by the sum of TIO from the Greenhouse and Nursery Product (\$119.89 million) and the Landscape and Horticultural Services (\$266.14 million) for a total of \$386.03 million. Similar methodology was used to obtain green industry multipliers for TPI, GSP and employment, estimated at 1.480455, 1.522168 and 1.245441, respectively. These multipliers differ from the general multipliers in Table 4.1 since in this case multipliers are based on changes in TIO, TPI, GSP and Employment for Greenhouse and Nursery Products and Landscape and Horticultural Services (Production Sector) only. Figure 4.1 presents the impacts of the Greenhouse and Nursery Products, Landscape and Horticultural Services, and all other sectors on TIO, TPI, and GSP.

Figure 4.2 indicates the number of jobs generated in the producer sector and the landscaping sector in 2001 by the green industry. Total jobs created by these two sectors were estimated at 12,185.10. For further details, please refer to Section 4.1.2.4 and Appendix Table I-4.

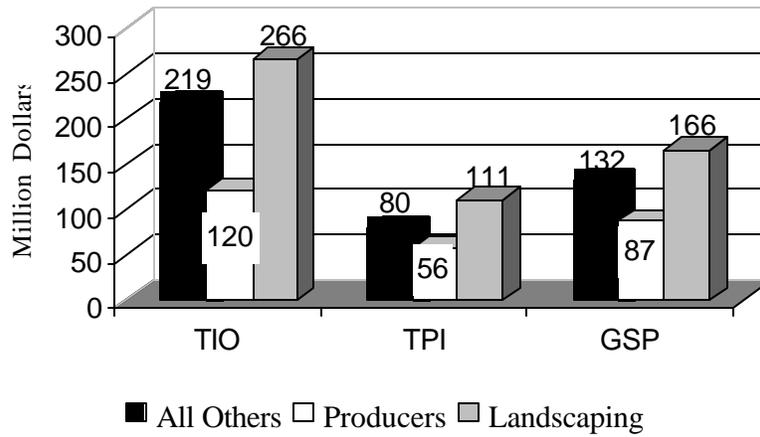


Figure 4.1. Total Industry Output (TIO), Total Personal Income (TPI) and Gross State Product (GSP) in million dollars for Producers and Landscapers.

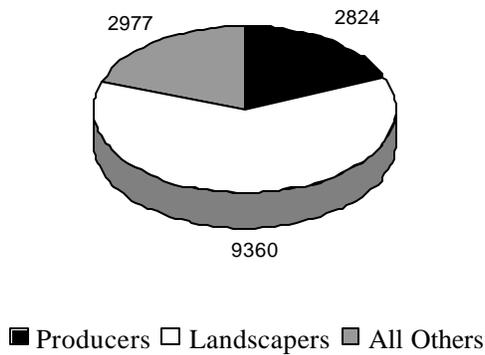


Figure 4.2. Number of Jobs in the Production Sector (Producers and Landscapers)

#### 4.1.3. Golf Industry Economic Impacts

The Golf Industry is an important part of the Louisiana ornamental horticultural industry. Maintenance of golf courses across the state represents an essential part of expenditures on horticultural

services and expenses related to the Green Industry. In addition, golf courses are a source of employment and represent linkages with other sectors related to the green industry.

#### 4.1.3.1. Gross Sales, Total Personal Income, Gross State Product and Employment

Appendix Tables I-5 through I-8 provide detail about the impacts of the Golf industry on Louisiana's economy. Direct sales totaled \$151.33 million. The golf impact is reported under the category of 'other' because it is not a separate IMPLAN industry. Instead, the software has two unassigned or dummy industries that may be used to customize analysis. This approach was used to include a separate impact analysis for golf. These appendix tables follow the same format as those discussed for the Production sector,

#### 4.1.3.2. Total Economic Impact of the Golf Industry

The golf industry had an overall impact on gross sales of \$202.44 million in 2001 (Table 4.3). Total Personal Income, Gross State Product, and Employment were estimated at \$86.83 million, \$122.15 million and 4,018 jobs, respectively. Sectors with a more significant impact on Gross Sales, in addition to golf, were the Service sector (\$16.25 million), Trade (\$11.28 million), and FIRE (\$11.08 million). The impact was predominantly in golf (75% of the total impact), leaving 25% in the indirectly affected aggregated sectors and individual industries. The direct impact on Total Personal Income by golf was \$68.46 million, followed by Services (\$8.62 million) and Trade (\$5.10 million). The largest impacts on Gross State Product were by Services at \$10.06 million and Trade at \$8.36 million. Golf itself was the sector with the major impact on jobs generation, with 3,290.80 jobs.

Multipliers for the Golf Industry were calculated for TIO, TPI, GSP and Employment. The multiplier value for the TIO was estimated at 1.337748. That value was obtained by dividing the total

economic impact on gross sales (\$202.44 million) by the TIO from the Golf Industry (\$151.48 million). Similar methodology was used to obtain golf industry multipliers for TPI, GSP and employment. Those multipliers were estimated at 1.268331, 1.349425 and 1.464437, respectively.

The impact of golf can be seen in Figures 4.3 and 4.4. The impact of golf compared to the indirectly affected sectors were 80% for Total Personal Income, 74% for Gross State Product, and 82% for Employment.

Table 4.3. Impact of the Golf Industry on Louisiana's Economy as Estimated with the Louisiana Input-Output Model, 1999.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employment
-----Dollars-----				
Greenhouse and Nursery Products	34,700	16,137	25,279	0.8
Agricultural, Forestry, Fishery Services	20,858	10,990	13,584	0.8
Landscape and Horticultural Services	71,366	29,638	44,499	2.5
Mining	458,605	111,420	305,610	1.8
Construction	1,421,328	545,680	574,201	17.2
Manufacturing	3,981,847	612,976	1,011,820	18
Transportation, Communication and Utilities	4,980,932	1,251,848	2,850,509	29.2
Trade	11,287,147	5,106,984	8,368,820	276.9
Finance, Insurance, and Real Estate Services	11,089,433	1,679,422	7,825,301	57.6
Government	16,253,649	8,625,146	10,068,227	310.6
Golf	1,036,886	299,156	422,961	7.4
Total	151,483,072	68,464,952	90,527,984	3,290.80
Total	202,444,365	86,835,455	122,151,778	4,018.60

#### 4.1.4. Retail Sector-Economic Impact

The contribution of the retail sales margin of ornamental horticultural products to the Louisiana economy also was estimated. Model results at the retail (Trade) level indicated the importance of this component of the Louisiana lawn and garden industry to the state economy. Retail sector analysis

included two components: total expenditures by households in Louisiana in 2001 (\$326 million) and expenditures on the florist sector (\$42 million) totaling \$368 million.

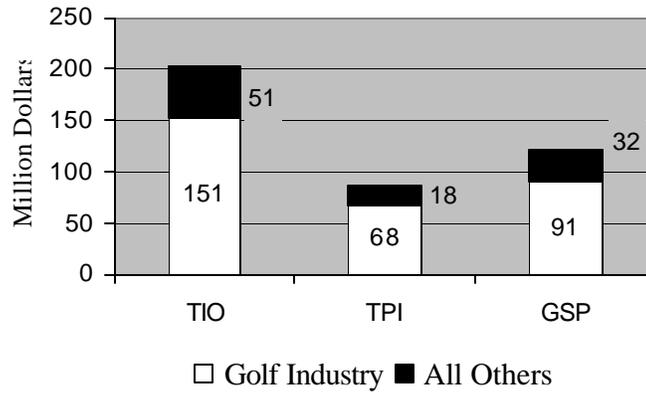


Figure 4.3. Total Industry Output, Total Personal Income and Gross State Product for the Golf Industry (Million Dollars)

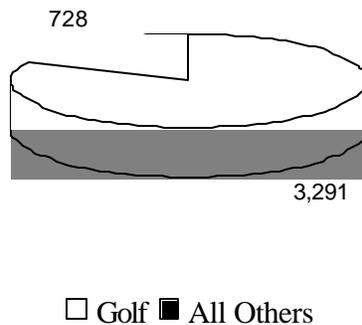


Figure 4.4. Number of Jobs Generated in the Golf Industry in 2001.

#### 4.1.4.1. Gross Sales, Total Personal Income, Gross State Product and Employment

Direct, indirect, induced and total effects of the Retail Sector of Louisiana's economy on Gross Sales, Total Personal Income, Gross State Product and Employment are presented in Appendix Tables

I-9 through I.12. Total direct impact on gross sales was estimated at \$364 million, while direct impacts on personal income, gross state product and employment were estimated at \$249.58 million, \$420.39 million and 14,218.70 jobs, respectively.

#### 4.1.4.2. Total Economic Impact by the Retail Sector

Total impact of the Trade sector on gross sales was estimated at \$557.20 million (Table 4.4). The biggest impact was in the Trade sector with \$398.33 million, which includes wholesale trade, general merchandise stores, miscellaneous retail, food stores, building materials, gardening, and others. The impact on gross sales by the Trade sector represented 71% of the total impact. The Trade sector was followed by Services with \$62.60 million. Total Personal Income was estimated at \$249.58 million, while Gross State product was estimated at \$420.39 million. Total employment generated by the retail sector was estimated at 14,218 with major impacts on Trade, Services and FIRE. TPI, GSP and Employment impacts were mostly in the Trade sector, but the indirectly affected sectors were 24%, 23% and 14%, respectively, of total contributions.

Multipliers for the Retail Sector were calculated for TIO, TIP, GSP and Employment. The multiplier value for the TIO was estimated at 1.398850. That value was obtained by dividing the total economic impact on gross sales (\$557.19 million) by the TIO from the Trade (\$398.32 million). Similar methodology was used to obtain Trade Sector multipliers for TPI, GSP and employment. Those multipliers were estimated at 1.275333, 1.287222 and 1.152261, respectively

Figure 4.5 indicates the TIO, TPI and GSP of \$398 million, \$196 million and \$328 million, respectively, for the Trade Sector that includes retail activities at different levels.

Table 4.4. Impact of the Retail Sector on Louisiana's Economy as Estimated with the Louisiana Input-Output Model, 1999.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employment
	-----Dollars-----			
Greenhouse and Nursery Products	109,202	50,783	79,553	2.6
Agricultural, Forestry, Fishery Services	60,531	31,893	39,421	2.4
Landscape and Horticultural Services	380,715	158,111	237,387	13.4
Mining	1,684,707	409,657	1,122,335	6.4
Construction	7,010,854	3,070,270	3,225,855	95.3
Manufacturing	15,767,863	2,870,241	4,438,214	85.0
Transportation, Communication and Utilities	23,759,704	6,119,519	13,356,071	138.2
Trade	398,327,616	195,692,288	327,847,392	12,339.30
Finance, Insurance, and Real Estate Services	41,737,768	6,883,646	29,146,150	251
Government	62,607,040	32,108,994	38,165,996	1,187.80
Other	4,392,173	1,529,405	1,983,006	34.7
Other	419,246	419,246	419,246	48.3
<b>Total</b>	<b>557,199,090</b>	<b>249,579,197</b>	<b>420,388,577</b>	<b>14,218.70</b>

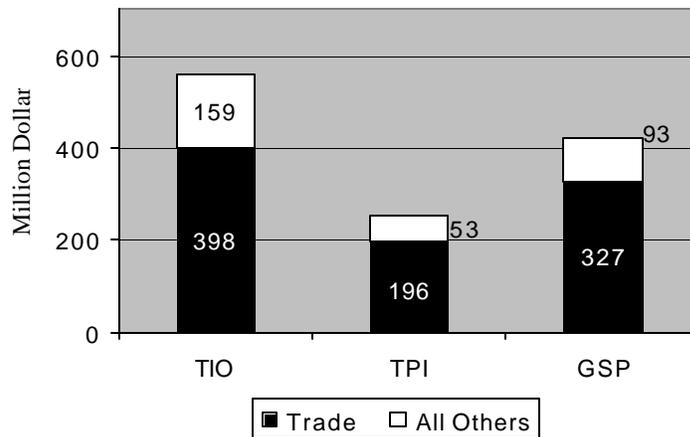


Figure 4.5. Total Industry Output, Total Personal Income and Gross State Product for the Trade Sector (Million Dollars)

Figure 4.6 shows that the number of jobs generated in the Retail Sector by the green industry was estimated at 12,339 jobs and 1,879 jobs for all other sectors.



Figure 4.6. Number of Employees in the Trade Sector in 2001.

#### 4.1.5. Maintenance and Related Expenditures Reported in Other Industries

This section accounts for landscape installation and maintenance expenditures reported within other industries and performed by employees of those industries. An example is grounds maintenance activities by Churches and Cemeteries. These activities represent an important contribution from those industries to Louisiana's economy. For this analysis, the industries included construction ( New Residential Structures, New Industrial and Commercial Buildings, New Utility Structures, New Government Facilities and Maintenance and Repair Other Facilities), Real Estate, and 'Other' which includes Churches and Cemeteries, Public Schools, Public Colleges and Universities, Private Schools (all levels), Parish/City Grounds, State Parks, Road Shoulder and Median Maintenance, and Airports. The expenditures incurred by other sectors in green goods and services are represented in the aggregated industry 'other' because IMPLAN input-output model does not have a sector that includes all these sub-sectors. To estimate the economic impact of all those sub-sectors, one of the two dummy variables provided by the software was used and the model was customized to the needs of the study.

#### 4.1.5.1. Gross Sales, Total Personal Income, Gross State Product and Employment

The impact of the Green Industry activities in other sectors (horticultural maintenance expenditures reported in other sectors) on Gross Sales is presented in Appendix Table I-13. The direct effect from grounds maintenance in other industries on Gross Sales was estimated at \$533 million. Appendix Tables I-14 through I-16 present the direct, indirect, induced and total effect by grounds maintenance in other industries on total personal income, gross state product and employment.

#### 4.1.5.2. Total Economic Impact By the Green Industry in Other Sectors

Table 4.5 summarizes the total impact on Gross Sales, Personal Income, Gross State Product and Employment by the Green Industry in these specified sectors of Louisiana's economy. Total impacts on Gross Sales was estimated at \$872.50 million, Total Personal Income (\$577.02 million), Gross State Product (\$774.91 million), and Employment (23,850.30 jobs). The sectors with major impacts on Gross Sales were FIRE (\$73.67 million), Trade (\$74.98 million), and Services (\$107.97 million). Major impacts on Total Personal Income were estimated in Services (\$57.30 million), and Trade (\$33.92 million). Gross State Product impacts on other sectors of the economy were FIRE (\$51.98 million), Services (\$66.88 million), and Trade (\$55.59 million).

As a proportion of total gross sales, the grounds maintenance activities in unrelated sectors accounted for 61% of the impact in that category while the indirectly affected sectors contributed 39%. For the other three measures of impact, the contribution of the indirectly affected sectors was 78%, 72% and 79% for TPI, GSP and Employment, respectively.

Multipliers for the green industry activity in other sectors of the economy were calculated for TIO, TPI, GSP and Employment. The multiplier value for the TIO was estimated at 1.6339918. That value was

obtained by dividing the total economic impact on gross sales (\$872.50 million) by the TIO from 'Horticultural Expenditures in Unrelated Sectors' (\$533.96 million). Similar methodologies were used to obtain multipliers for TPI, GSP and employment. Those multipliers were estimated at 1.26821819, 1.37429073 and 1.25417700, respectively.

Table 4.5. Impact of Green Industry Activity In Other Industries on Louisiana's Economy as Estimated with the Louisiana Input-Output Model, 1999.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employment
	-----Dollars-----			
Greenhouse and Nursery Products	229,216	106,594	166,984	5.4
Agricultural, Forestry, Fishery Services	2,290,784	610,341	838,830	37.9
Landscape and Horticultural Services	472,456	196,211	294,590	16.6
Mining	3,046,469	740,127	2,030,146	11.6
Construction	9,442,275	3,625,061	3,814,532	113.3
Manufacturing	26,436,890	4,069,289	6,717,384	119.6
Transportation, Communication and Utilities	33,089,672	8,316,337	18,936,764	194.2
Trade	74,984,848	33,927,688	55,597,312	1,839.40
Finance, Insurance, and Real Estate Services	73,671,768	11,157,059	51,986,788	382.9
Government	107,979,208	57,300,280	66,887,148	2,063.30
Horticultural Expenditures Reported in Unrelated Sectors	6,888,419	1,987,399	2,809,887	49.3
Total	533,969,056	454,989,056	563,865,024	19,016.70
	872,501,060	577,025,441	774,914,475	23,850.30

Figure 4.7 indicates that TIO, TPI and GSP for horticultural expenditures in unrelated sectors including the Construction sector and Real Estate sector were estimated at \$533.96 million, \$454.98 million and \$563.86 million, respectively.

Figure 4.8 indicates that the total number of employees generated in those Horticultural expenditures as reported by Unrelated Sectors including Construction and Real Estate was estimated at 19,016.

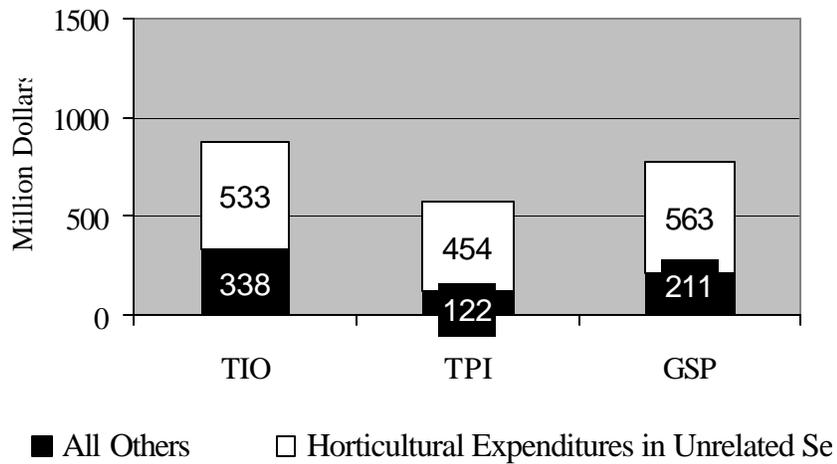
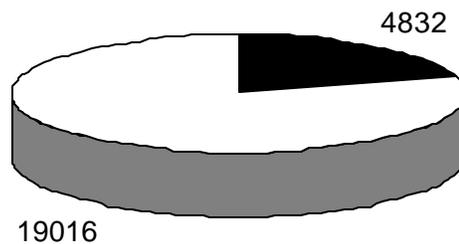


Figure 4.7 Total Industry Output, Total Personal Income and Gross State Product for Horticultural Expenditures Reported by Unrelated Sectors Including Construction and Real Estate in 2001 (Million Dollars).



■ All Others  
□ Horticultural Expenditures in Unrelated Sectors

Figure 4.8. Number of Jobs in Horticultural Expenditures Reported by Unrelated Sectors Including Construction and Real Estate in 2001.

#### 4.1.6. Green Industry Economic Impact

##### 4.1.6.1. Gross Sales, Total Personal Income, Gross State Product and Employment

Total economic impact of the Entire Green Industry on Gross Sales was estimated at \$2.21 billion, and detailed results of direct, indirect, induced and total effects are presented in Table I-17 (Appendix I). Appendix Tables I-18 through I-20 indicate the total economic impact of the green industry on Louisiana's Total Personal Income, Gross State Product and Employment .

##### 4.1.6.2. Total Economic Impact of the Entire Green Industry

The estimation of the total economic impact of the green industry indicates the overall contribution of this industry to the state economy. This is the total contribution by the production sector, golf industry, retail sector and grounds maintenance reported in unrelated sectors of the economy.

Results of the overall economic impact are presented in Table 4.6. Total economic impacts of the green industry were estimated at \$2.21 billion, Total Personal Income at \$1.14 billion, Gross State Product at \$1.68 billion and employment was 56,685.60 jobs. Also, sectors with the biggest impacts were Greenhouse and Nursery Producers at \$119.46 million, Landscape and Horticultural Services at \$266.77 million, Trade at \$511.27 million, FIRE at \$166.79 million, Services at \$248.65 million and Horticultural Expenditures Reported by Unrelated Sectors at \$685.93 million.

The largest impacts on total personal income were in Horticultural Expenditures Reported by Unrelated Sectors, Trade, Services, and Landscape and Horticulture Services at \$524.11 million, \$245.89 million, \$130.45 million and \$110.51 million, respectively.

Of the \$1.68 billion in Gross State Product, the Trade sector accounted for \$410.11 million, FIRE had \$116.53 million, Horticultural Expenditures Reported by Unrelated Sectors had \$655.97 million, and

Landscape and Horticultural Services had \$165.95 million. The sectors that contributed most to job generation in Louisiana's economy were Trade, Landscape and Horticultural Services, Horticultural Expenditures Reported by Unrelated Sectors, Services, and Greenhouse and Nursery Producers with 14,904.80 jobs, 9,360.80 jobs, 22,394.20 jobs, 4,683.60 jobs, and 2,824.30 jobs, respectively.

Total impact of the Green Industry on Louisiana's economy is presented in Figure 4.9. Overall impacts on TIO, TPI, and GSP for the main sectors are illustrated. Total Industry Output (Gross Sales) for the production sector was estimated at \$386 million, FIRE at \$166.79 million, Trade at \$511.27 million, and Grounds Maintenance in Other Related Sectors (including golf) at \$685.93 million. Total Personal income for the Production Sector was estimated at \$166 Million, while Gross State Product for the same sector was estimated at \$253 million.

Table 4.6. Impact of the Entire Green Industry on Louisiana's Economy as Estimated with Louisiana IMPLAN Input-Output Model, 1999.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employment
	-----Dollars-----			
Greenhouse and Nursery Products	119,898,760	55,757,088	87,345,944	2,824.30
Agricultural, Forestry, Fishery Services	6,953,410	2,389,035	3,161,387	167.3
Landscape and Horticultural Services	266,147,072	110,511,152	165,950,320	9,360.80
Mining	8,115,051	1,970,207	5,407,910	31
Construction	27,895,302	12,057,978	12,688,470	371
Manufacturing	66,947,024	10,763,391	17,608,112	298.2
Transportation, Communication and Utilities	89,817,360	23,251,018	50,971,104	545.4
Trade	511,271,456	245,896,016	410,111,744	14,904.80
Finance, Insurance, and Real Estate	166,796,576	27,435,964	116,530,496	977.5
Services	248,653,776	130,451,264	153,755,488	4,683.60
Government	16,385,729	5,072,650	6,941,935	121.5
Horticultural Expenditures Reported in Other Sectors (including Golf)	685,931,008	524,117,856	655,976,768	22,394.20
<b>Total</b>	<b>2,215,065,091</b>	<b>1,149,810,694</b>	<b>1,686,632,878</b>	<b>56,685.60</b>

As a proportion of total gross sales, the production sector, golf industry, retail sector, construction sector, real estate sector and grounds maintenance activities in unrelated sectors accounted for 73% of the impact while the indirectly affected sectors contributed 27%. For the other three measures of impact, the contribution of the indirectly affected sectors were 84%, 84% and 82% for TPI, GSP and Employment, respectively.

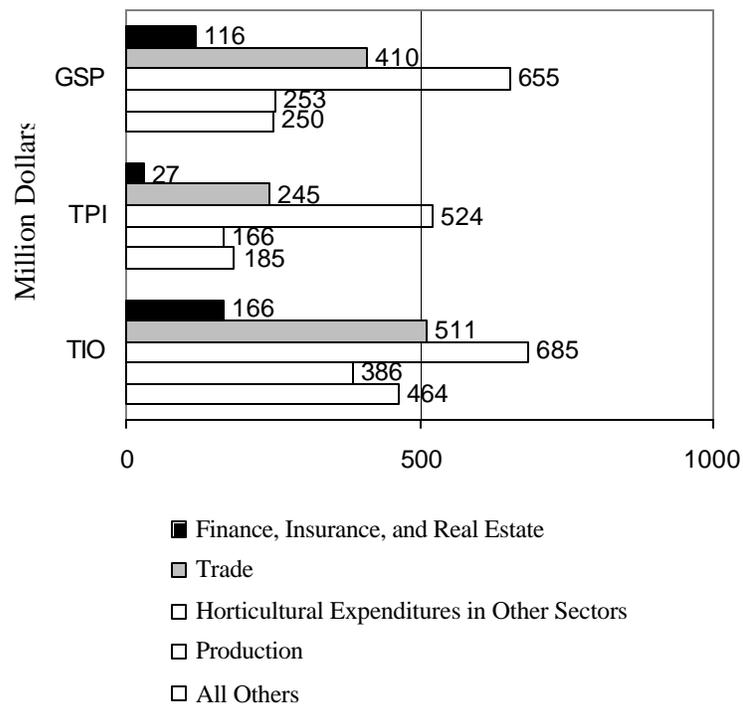
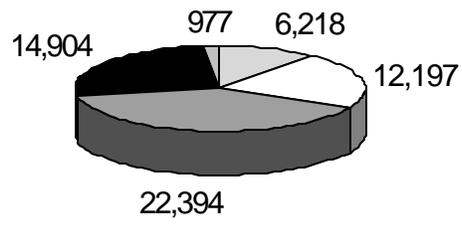


Figure 4.9. Overall Economic Impact of the Green Industry on TIO, TPI and GSP in 2001 (Million Dollars).

Total impact of the Green Industry on employment in Louisiana was estimated at 56,685 jobs. Figure 4.10 indicates how the green industry impacts the main sectors on Louisiana's economy. Jobs generated in the Production Sector were estimated at 12,197, Trade at 14,904, FIRE at 977, Horticultural Expenditures Reported in Other Sectors at 22,394 and All Other Sectors at 6,218.



- All Others
- Production
- Horticultural Expenditures in other Sectors
- Trade
- Finance, Insurance, and Real Estate

Figure 4.10. Employment Generation by the Green Industry on Louisiana's Economy, 2001

## CHAPTER 5. SUMMARY AND CONCLUSIONS

Lawn and garden activities have become an increasingly important part of the domestic lifestyle. As a result, sales of ornamental goods and services have increased. Literature indicates that sales grew at a steady pace until 2000, when the national economy suffered a slowdown. Even under unfavorable conditions, sales in the green industry were stable, and sales increased in some geographical areas of the country.

This study was conducted to update a 1995 study in which total impact of the green industry on Louisiana's economy was estimated at \$1.3 billion. To update the impact of the green industry, a Louisiana input-output model was built using a 1999 IMPLAN database. Also, primary data were collected through surveys in 2001, and secondary data from state/federal agencies and private organizations were used.

The first objective for this study was to collect data from the production sector (Nursery Growers and Sod Producers, and Landscape Design, Installation and Maintenance), value added linkages such as Golf Courses; Churches and Cemeteries; Public Schools (primary, secondary, and college and universities); Private Schools (all levels except pre-school); State Highway Maintenance expenditures; State Parks; City/Parish Grounds, Playgrounds and Parks; and Airports. Consumer retail expenditures on nursery industry products, Landscape Maintenance expenditures reported in the Construction Sector, and Landscape Maintenance expenditures reported in the Real Estate Sector, were estimated. The second objective was to estimate the economic impact of those sectors on the overall economy of Louisiana.

Results indicated that lawn and garden activities have strong linkages with the general economy, and they make an important and substantial contributions in terms of total output, income, Gross State Product and Employment.

## 5.1. Methodology

The methodology for survey-based data was based on Dillman's procedures. The first step was to identify and obtain listings of the relevant target populations. Listings were obtained from different state/federal agencies and organizations, and from the Internet. Questionnaires were developed for all groups, based on formats from previous studies, input from researchers and extension professionals, and pre-testing of the instruments. Feedback was received and incorporated into the final draft of the questionnaires. Following Dillman, a first mailing of a packet containing the survey instrument, letter(s) of support, and a business reply envelope were sent to the different target populations. Two weeks later, a reminder postcard was mailed, and was followed three weeks later by a second mailing of the complete packet. Some groups, such as the school districts and state parks, were surveyed using email, following procedures that mimicked Dillman's mail procedures.

Follow-ups were conducted for each group, with a special focus on nursery growers and sod producers, and the landscape design, installation and maintenance services. Follow-ups also were needed for school districts, and, in this case, email messages were re-sent to business managers, and telephone calls were made to district superintendents. The follow-up procedure was similar for city/parish agencies, where contacts by phone and fax were made to improve the response rate. An important expansion compared to the previous study was the effort to incorporate electronic technology into the design, particularly in the related sectors that were not included in the previous study. Despite follow-up efforts, the response rate to regular mail and email surveys was lower than desired.

Expenditure information for these related areas of activity was not available elsewhere, so the survey data were used. Values for expenditures on grounds maintenance in these other related sectors were

Churches and Cemeteries (\$30.03 million), Public Schools (\$6.67 million), Public Colleges and Universities (\$3.81 million), All Private Schools (\$8.65 million), Parish/City Grounds (\$39.18 million), State Parks (\$571,046), and Airports (\$490,485). Total Expenditures on Road Shoulder and Median Maintenance (\$11.42 million) were obtained from the Louisiana Department of Transportation. Horticultural Maintenance Expenditures made in Unrelated Industries were calculated from the IMPLAN database. These included Residential, Industrial and Government Construction, estimated at \$246.14 million, and the Real Estate Sector, which was estimated at \$187.24 million.

The impact of retail activity was included. Secondary data were used to estimate total expenditures by Louisiana households on Green Industry goods and services. For typical households in the Southern region (which includes Louisiana), annual expenditures on lawn care and garden activities were estimated at \$408.82 in 2001 compared to \$190.92 in 1995, an increase of 114%. As a result, total estimated expenditures by Louisiana households grew from \$292 million to \$676 million, for a total increase of \$383 million, or 130.96%. Also, the value for the Florist sector was estimated at \$42 million, from the 1997 Census of Retail.

To estimate economic impacts, modifications were made in the regional databases of the IMPLAN model to represent the current output and production function of Louisiana's Green Industry. For Nursery and Sod Producers, total sales values from the Louisiana Summary (2001) were used, and technical coefficients were modified from survey responses. For the LDIM and Retail sectors, no changes were made to the database.

For Golf Courses, response to the survey was low, so output and technical coefficients were obtained from secondary information. Modification of the data base was similar in procedure to that for

Nursery and Sod Producers. The Golf Industry and the sector that included Expenditures on Grounds Maintenance in Unrelated Industries were included as dummy activities in the IMPLAN model. It was assumed that those sectors behave in the same manner as LDIM in terms of cost structure, so the same set of technical coefficients was used.

## 5.2. Results

Individual sector impacts and an overall economic impact of the green industry on Louisiana's economy were estimated using IMPLAN software. Individual impacts for the Production Sector, Golf Industry, Retail Sector and Landscape Maintenance Expenditures Reported in Unrelated Sectors were estimated.

The direct impact by the Production Sector on sales was estimated at \$386.03 million, which includes \$119.89 million from Greenhouse and Nursery Products and \$266.14 million from Landscape and Horticultural Services. Total impacts on the economy were estimated at \$605.03 million, \$246.17 million, \$385.55 million and 15,162 jobs, for Gross Sales, Total Personal Income, Gross State Product and Employment, respectively. Those values represent increases of 0.22%, 28.21%, 52.73% and 60.49% compared with results from the 1997 study, respectively. All categories indicated a substantial growth except in sales.

As a proportion of total Gross Sales, the Production Sector accounted for 64% of the impact in that category, while the indirectly affected sectors contributed 36%. These proportions were very similar for TPI, GSP and Employment.

Total impact of the Golf Industry on total Gross Sales, Total Personal Income, Gross State Product and Employment in Louisiana were estimated at \$202.44 million, \$86.83 million, \$122.15 million and 4,018

jobs, respectively. The direct impact by the Golf Industry on sales was estimated at \$151.48 million, while the direct impact of this industry on Total Personal Income, Gross State Product and Employment were estimated at \$68.46 million, \$90.52 million and 3,290.80 jobs, respectively. The impact of the Golf Industry on Gross Sales was predominantly in Golf (75% of the total impact) and 25% in the indirectly affected sectors.

Total economic impact of the Retail sector on Gross Sales was calculated at \$557.19 million. Impacts by this sector on Total Personal Income, Gross State Product and Employment were estimated at \$249.57, \$420.38 million and 14,218.70 jobs, respectively. Direct impact by the Trade sector on Gross Sales was estimated at \$398.32 million, which includes \$326 million in lawn and garden activities, \$48 million in the Florist sector and the remaining \$30.32 million in other retail sales. The impact on Gross Sales of the Trade sector was 71% of the total impact, and TPI, GSP and Employment were slightly higher proportions.

The impact of the green industry activity on other parts of Louisiana's economy was also estimated. These are activities that have expenditures on green goods and services, but they are reported in other unrelated sectors. The impact of these Expenditures Reported in Unrelated Sectors on Gross Sales was \$872.50 million. Values for Total Personal Income, Gross State Product and Employment were estimated at \$577.02 million, \$774.91 million and 23,850 jobs, respectively. Direct impact of these expenditures on Gross Sales, Total Personal Income, Gross State Product and Employment on Louisiana's economy were estimated at \$533.99 million, \$454.98 million, \$563.86 million and 19,016 jobs, respectively. The values for the Trade sector were \$74.98 million, \$33.92 million, \$55.59 million and 1,839.40 jobs on Gross Sales, Total Personal Income, Gross State Product and Employment, respectively.

Overall economic impact of the entire green industry on Louisiana's economy was very substantial and reflected a trend in ornamentals in the last decade. Hughes and Hinson(1997), using a 1995 model, reported total economic impact on Gross Sales, Total Personal Income, Gross State Product and Employment of \$1.30 billion, \$485.97 million, 848.35 million and 26,226.9 jobs, respectively. Total economic impact by the green industry on Louisiana economy using a 1999 database IMPLAN input-output model was estimated at \$2.21 billion on Gross Sales, \$1.14 billion on Total Personal Income, \$1.68 billion on Gross State Product, and 56,685 jobs on Employment. The estimated values were larger partly because selected industries and sub-sectors were included in 2001 that were not included in 1996.

As a proportion of total Gross Sales, the Production Sector, Golf Industry, Retail Sector, Construction Sectors, Real Estate Sector and Grounds Maintenance Activities in Unrelated Sectors accounted for 73% of the impact in that category while the indirectly affected sectors contributed 27%. For the other three measures of impact, the contribution of the indirectly affected sectors were 84%, 84% and 82% for TPI, GSP and Employment, respectively.

Results from economic impacts showed that aggregated sectors such as Manufacturing, Transportation, Communication and Utilities (TCU), Trade, Finance, Insurance and Real Estate (FIRE), and Services were the strongest linkages.

### 5.3. Conclusions

This study estimated individual and overall economic impact of sectors of the green industry on Louisiana's economy, and that impact is very substantial (\$2.21 Billion). Total impact of the Green Industry on Louisiana's economy represented 2.14% of total gross product of the entire Louisiana economy.

While evaluating the previous stated hypothesis based on results from the economic impacts, this study indicates that a substantial proportion of green goods and services purchases in Louisiana are by

sectors not directly related to the green industry. The increased impact since the 1995 study is large, though part of that increase is accounted by the areas of economic activity that were added and industry growth.

The total impact of the Production sector was estimated at \$605 million, while the Golf Industry, Retail (Trade) Sector and 'Horticultural Expenditures Reported by Unrelated Sectors' were estimated at \$202 million, \$557 million and \$872 million, respectively. The green industry is important for employment generation, as shown by the 56,685 jobs created in 2001 in Louisiana.

#### 5.4. Implications

This study addressed the importance of the green industry in Louisiana. The substantial impact by this sector on the economy could have implications for policy in several areas. All parties, including industry members, policy makers, and researchers, can use the updated information to set new goals and work together toward a set of general objectives that can benefit the entire industry and the state.

Knowledge of the industry situation can directly benefit industry members. They will have the information necessary to make decisions regarding expanding or contracting their current businesses. They may choose to affect legislation that impacts the green industry, including expenditures on research. Legislation on regulatory issues might be a place where this information could be used. This could help the industry to raise public awareness and find support for future investigations.

Results from the economic impacts indicated that demographic and lifestyle changes had an impact on consumption patterns for green goods and services as documented by NGA. Many families and individuals have moved toward in-home activities, such as house improvement and gardening, resulting in more 'green' oriented activities. As a result of those circumstances, growth in consumption of green goods and services can be expected. In addition, consumer awareness about these products has increased, and

it could lead to an increase in demand by consumers for additional information, such as technology used, labeling, pesticides application, and support for further research and even some additional regulation.

Estimated per capita impact by the green industry on Louisiana was \$494, while estimated per capita impact on Florida, Illinois, Texas and Arizona were \$381, \$641, \$366 and \$163, respectively. Most of the studies conducted in the states cited above did not include expenditures on horticultural goods and services by other industries. In the case of Illinois, the study includes similar areas to those included in this study, but the classification of those expenditures was different. In addition, per capita estimates indicate the substantial growth potential within the industry, as a result of the high per capita estimated value for this industry.

Another issue is the relative impacts of production in the green industry contrasted to production in other agricultural sectors. One study that focused on the overall agricultural sector was “Multiplier Analysis for Agriculture in Louisiana’s Economy” (Hughes, 1994). In that study, the dominant crop and livestock sectors were included, but neither Greenhouse and Nursery Producers nor Horticultural and Landscape Services were included. Because these sectors were not included, direct comparisons were not possible. Future research, if placed in the context of the entire agricultural sector, could provide more information about the relative impacts of a dollar of sales in the agricultural alternative.

The IMPLAN model can be used to make some predictive statements. As an example, if consumer’s incomes declined and they chose to reduce purchases of green industry products at retail by 10% or \$40.08 per household, the impact on Louisiana’s economy as measured by Gross Sales would be a reduction of \$63 million.

A similar question would involve changes in output of the production sector. Suppose these producers and their production disappeared. They are being pressured by powerful buyers, such as mass

merchandisers, who increasingly are requiring their suppliers to connect to electronic replenishment systems and to use other technologies that require investment. This could create a gap between small producers and growers who lead in adoption of these systems. Small producers might go out of business because they could not or would not make the required investments. If the greenhouse/nursery and sod growers were no longer in business in Louisiana, the total impact on Louisiana's Gross Sales would be a decline of \$120 million in direct impacts, and \$67 million in indirect impacts. This would be a significant blow to agricultural output and to supplier industries.

While it is unlikely that the industry will disappear altogether, the impacts of smaller declines can be demonstrated, and the positive impacts of growth can be shown as well.

#### 5.5. Limitations and Future Research

Even though results showed an increase in the total economic impact by the green industry on Louisiana's economy, there is room for improvement. Some areas, such as data collection, were improved, but response rates in some groups were still low, especially in the nursery growers, LDIM and golf courses sectors.

Another limitation was the reliance on external sources to obtain information, including accuracy of email lists. Further research can be improved by developing stronger linkages with state agencies and stronger support of the Louisiana Nursery and Landscaping Association members in an attempt to generate higher number of responses.

## REFERENCES

- Adrian, J., W. Loyd and P. Duffy. "Economic feasibility of Turfgrass-Sod Production." Alabama Agricultural Experimental Station, Bulletin # 625, March 1995.
- American Business Directory. InfoUSA Inc. <http://www.goleads.com/directory.asp>, 2002.
- Barkley, D. L., M. S. Henry, M. G. Evatt. "Contribution of the Golf Course Industry to the State Economy: South Carolina, 1994." Extension Rep. 159. Dept. of Agriculture and Applied Economics, Cooperative Extension Service, College of Agriculture, Forestry, and Life Sciences, Clemson, SC. 1995.
- Behe, B. and S. Barton. "Consumer Perception of Product and Service Quality Attributes in Six U.S. States." *J. of Environmental Horticulture*, 18(2):71-78, June 2000.
- Brooker, J., M. Gray, E. Carson, and T. Samples. "Tennessee Turfgrass Industry; Structure and Value." Department of Agricultural Economics and Rural Sociology, Tennessee State University. Published by the Cooperative Agricultural Research Program, School of Agriculture and Home Economics, Knoxville, Tennessee, 1993.
- Brooker, J., S. Turner and R. Hinson. "Trade Flows and Marketing Practices Within the United States Nursery Industry:1998." *Southern Cooperative Series Bulletin* 397, 2000.
- Campbell, G. E.. "The Illinois Green Industry." Department of Natural Resources and Environmental Sciences, Department Report Series 2001-01, University of Illinois, November, 2001.
- Chaffin, J., T. Bunch and D. Luckenbach. "1994 North Carolina Turfgrass Report." No. 183, North Carolina Agricultural Statistics, North Carolina Department of Agriculture, Raleigh, NC. 1994.
- Dillman, D. "Mail and Internet Surveys: The Tailored Design Method." 2<sup>nd</sup> Edition, John Wiley & Sons, New York, 2000.
- Greenidge, C. "2002 Looks Bright as Sales Steadily Rise." *Nursery Retailer Magazine*, February/March 2002.
- Hall, C. and M. K. Jupe. "The Economic Impact of The Green Industry in Texas." SNA Research Conference. 46: 567-569, 2001.
- Hampton, W. R. "Trade Flows and Marketing Practices of Louisiana and Gulf States Nurseries." Louisiana State University. Thesis Presented to the Department of Agricultural Economics and Agribusiness, December, 2001.

- Harris, T., L. Rader and W. Johnson. "Economic Linkages of the U.S. Greenhouse and Nursery Products Industry." *J. of Environmental Horticulture*, 10(1): 4-7, March 1992.
- Hodges, A. and J. Haydu. "Economic Impact of Florida's Environmental Horticulture Industry, 1997." Florida Agricultural Experiment Station, Economic Report EIR99-1, March 1999.
- Hodges A., J. Haydu, P. Van Blockland and A. Bell. "Contribution of the Turfgrass Industry to Florida's Economy, 1991/92: A Value Added Approach." Florida Agricultural Experiment Station, Economic Report ER94-1, December 1994.
- Hudson, J.T., B.K. Behe. H.G. Ponder and W.E. Barrick. "Consumer Perceptions and Expectations of Garden Center Product and Service Quality". *J. of Environmental Horticulture*, 15(1): 12-15, March 1997.
- Hughes, D. W. "Multiplier Analysis of Agriculture in Louisiana's Economy." Louisiana Agriculture, Louisiana State University, Agricultural Center, Spring 1994, Volume 37 (2), baton Rouge, LA..
- Hughes, D. W. and R. Hinson. "The Value of the Ornamental Plants and Turfgrass Industries to the Louisiana Economy." Department of Agricultural Economics and Agribusiness, Louisiana State University, Agricultural Center, Baton Rouge, LA. 1997.
- IMPLAN Professional. "Social Accounting and Economic Impact Analysis." 2<sup>nd</sup> Edition. Minnesota IMPLAN Group, Inc. June 2000.
- Johnson, L. A. and K. I. Jensen. "Economic Factors Affecting Sales of U.S. Nursery Stock." *J. of Environmental Horticulture*, 10(2): 108-110, June 1992.
- Johnson D. and R. Christensen. "Green Industry Today-Some Issues and Futures Prospects." *Journal of Agribusiness*, 13(1): 65-76, Spring 1995.
- Klapproth, J., R. Garibay and D. Knopf. "Maryland Horticulture Industry." Economic Profile. USDA, Maryland Agriculture Statistics Service, December 2001.
- Kotler, P. "A Frame Work for Marketing Management." Northwestern University, Prentice Hall, New Jersey, 2001.
- Lard, C. F., C. R. Hall and B. Berry. "The Total Economic Impact of the Turfgrass Industry in Texas on the Economy of Texas." Summary Report to be Published in the Turfgrass 1996 Research Program Report, Texas Agricultural Experiment Station. 1996.

- Leones, J. and V. Ralph. "Economic Contribution of Arizona's Green Industry." Department of Agricultural and Resource Economics, University of Arizona, Submitted to Arizona Nursery Association and Arizona Landscape Contractors Association, October, 1995.
- Leontief, W. "Input-Output Economics." Oxford University Press, Second Edition, Oxford, 1986.
- Louisiana Summary. Agriculture and Natural Resources. Louisiana State University, Agricultural Center, Publication 2382, 2001.
- Louisiana Summary. Agriculture and Natural Resources. Louisiana State University, Agricultural Center, Publication 2382, 1998.
- Miller, R. and P. Blair. "Input-Output Analysis: Foundations and Extensions". Prentice Hall Inc., New Jersey, 1985.
- Morley, M. F. "The Value Added Statement: A Review of its use in Corporate Reports." Gee & Co., London, 1978.
- National Golf Foundation. "Operating and financial Profiles of 18-Hole Golf Facilities in the U.S.: Climate Region 2." Order No. 990C1882. Jupiter, Florida. 2001.
- Neas, K. and H. Smith. "1999 North Carolina Turfgrass Survey." North Carolina Agricultural Statistics Service, 2000.
- O'Connor, R. and E. Henry. "Input-Output Analysis and Its Implications." Hafner Inc., New York, 1975.
- Payne, T. "Economic Contribution of Arizona's Green Industry". Submitted to Arizona Nursery Association and Arizona Landscape Contractors Association, August, 1999.
- Stanton, B.F., J. Jenkins, M. Ahearn, and G. Hanson. "Perspectives of Farm Size and Structure Provided by Value Added Measures." Unpublished manuscript, USDA, Washington. 1992.
- Rathwell, P. J., M. S. Henry, D. L. Barkley and M. G. Evatt. "Contributions of the Ornamental Horticulture and Turfgrass Industries to the State Economy: South Carolina, 1994". Extension Economic Report 160, 1995. Dept. of Agriculture and Applied Economics, Cooperative Extension Service, College of Agriculture, Forestry, and Life Sciences, Clemson, SC.
- Rathwell, P. J., M. G. Evatt and M. S. Henry. "Contributions of the Ornamental Horticulture and Turfgrass Industries to the South Carolina Economy, 1999." Extension Economic Report 194, 1999. Dept. of Agriculture and Applied Economics, Cooperative Extension Service, College of Agriculture, Forestry, and Life Sciences, Clemson, SC.

The National Gardening Association. "National Gardening Survey 1995-1996." Conducted by The Gallup Organization Inc., Burlington, VT, 1996.

The National Gardening Association. "National Gardening Survey 2001." Conducted by Harris Interactive, Burlington, VT, 1996.

United States Department of Agriculture. "Census of Agriculture." National Agricultural Statistics Services, Volume 1, Geographical Series Part 18. AC97-A-51, Washington, D.C.1997.

United States Department of Agriculture. "Census of Horticultural Specialties." Economic Research Service, Washington, D.C., 1998.

United States Department of Agriculture. "Floriculture Crops, Summary, 2000." National Agricultural Statistics Services, Washington, D.C., April, 2001. Sp. Cr 6-1(051).

United States Department of Agriculture. "Floriculture Crops, Summary, 2001." National Agricultural Statistics Services, Washington, D.C., April, 2002. Sp. Cr 6-1 (052).

United States Department of Agriculture. "Nursery Crops, Summary 2000." National Agricultural Statistics Services, Washington, D.C., August, 2001. Sp. Cr 6-2 (051).

United States Department of Agriculture. "Statistics Highlights 2000 & 2001 of the U.S. Agriculture." National Agricultural Statistics Services, Washington, D.C., 2001.

Zeithaml, V.A., A. Parasuraman, and L.L. Berry. 1990. Delivering Quality Service: Balancing Customer Perceptions and Expectations. The Free Press, New York, NY.

### **Personal Communication**

Hall, Charles. Email communication. August 6, 2002.

Hodges, Allan. Email communication. May 6, 2002.

Hughes, David. Personal communication. Nov 9, 2002.

Hughes, David. Email communication. September 23, 27. October 6. November 6, 7, 8, 2002. January 10, 12, 15, 17, 23, 26, 27, 26, 29, February 12, 17, 26, 27, 28, March 1,2,4 ,2003

Owings, Allan. Personal communication. March 24, 2002.

Perry, Leonard. Email communication. August 6, 2002.

**APPENDIX A**  
**ORNAMENTAL HORTICULTURE PRODUCER SURVEY**

This information is critical to our process for estimating the total dollar impact of the 'green' industry (ornamental horticulture and turfgrass) in Louisiana. Information you provide will be confidential. No individual's sales, revenues or expenditures information will be identifiable.

**Your informed estimates of these numbers will be sufficient. It is not necessary to spend time digging through records.**

**I. ORGANIZATION AND SALES**

1. Please indicate the acreage or square feet you devote to the following *nursery production* activities

- \_\_\_\_\_ field production of ornamental products
- \_\_\_\_\_ container production of ornamental products
- \_\_\_\_\_ greenhouse production: flowers, foliage, bedding plants, etc.
- \_\_\_\_\_ sod production
- \_\_\_\_\_ production of intermediate products such as liners
- \_\_\_\_\_ other, please describe:

If your firm is not involved in the activities above, or is a small grower/ retailer (less than \$5,000 in annual sales), please stop here, indicate that your firm is not involved in these activities, and return the questionnaire.

2. Year established: \_\_\_\_\_ Year established in Louisiana, if different \_\_\_\_\_

Are you headquartered in Louisiana? \_\_\_\_yes \_\_\_\_ no

3. How many locations does the firm have? (count each address as one location, even if there are several different kinds of activity there)

one \_\_\_\_ two \_\_\_\_ if more, write in number \_\_\_\_ number in Louisiana \_\_\_\_\_

4. What is your firm's legal structure?

\_\_\_\_\_ proprietorship \_\_\_\_\_ corporation \_\_\_\_\_ partnership \_\_\_\_\_ other

5. Indicate the level of education you have completed.

- \_\_\_\_\_ high school
- \_\_\_\_\_ four year Bachelor's degree
- \_\_\_\_\_ advanced degree

6. What was the level of gross sales from your Louisiana facilities in 2001, to the nearest \$5,000?

\$ \_\_\_\_\_

- what proportion was sold to retail \_\_\_\_\_ % and wholesale \_\_\_\_\_ % customers?
- what proportion was sold to buyers in \_\_\_\_\_ % Louisiana \_\_\_\_\_ % all other states and foreign countries?
- what was your growth rate for total sales from 1996 to 2001? \_\_\_\_\_ %

7. How diverse is (was) your customer base?

	<u>1996</u>	<u>2001</u>
number of buyers	_____	_____
percent of sales going to your 4 biggest buyers	_____	_____

**II. EXPENSES:** In this section, questions relate to last year's (2001) expenses, in the categories of *general overhead* and of *direct costs* for ornamental plant production. Please provide your best informed estimates of costs in these categories. Your response can be either in dollars or as a percentage of sales. In the right-most column, please indicate the portion of expenditures that came from suppliers in Louisiana.

	dollars	or	% of sales	% purchased in La.
<b>8. Overhead Expenses</b> (annual costs, such as the total note paid for land or equipment purchases)				
report the column that is most convenient for you, no need to do both				
<b>facilities</b>				
ownership/leasing expenses (i.e., mortgages, rent) for land and buildings	\$ _____		_____ %	
maintenance and repair (no wages/salaries here)	\$ _____		_____ %	
remodeling, additions, and/or construction	\$ _____		_____ %	
<b>equipment</b>				
purchases	\$ _____		_____ %	_____ %
leases	\$ _____		_____ %	_____ %
repair	\$ _____		_____ %	_____ %
fuel	\$ _____		_____ %	
<b>utility and other expenses</b>				
water (inc. irrigation), sewer, electricity, gas, etc)	\$ _____		_____ %	
telephone and other communications	\$ _____		_____ %	
taxes (income, corporate, property, etc)	\$ _____		_____ %	
all other overhead expenditures	\$ _____		_____ %	

**9. Direct Crop Expenses**

all plant material	\$ _____		_____ %	_____ %
chemicals, fertilizers	\$ _____		_____ %	_____ %
soil, soil conditioners, bark and mulch	\$ _____		_____ %	_____ %
wages, salaries and benefits	\$ _____		_____ %	
other crop expenses	\$ _____		_____ %	

10. What proportion of the following expenses was purchased from wholesalers?

<u>item</u>	<u>% purchased from wholesalers</u>
equipment	_____ %
chemicals, fertilizers	_____ %
soil, soil conditioners, bark and mulch	_____ %

11. Please give your 'best guess' estimate of planned expenditures on major construction or equipment purchases for the year 2002?

\$ \_\_\_\_\_ equipment      \$ \_\_\_\_\_ construction

12. We are interested in the way the value of nursery industry assets differs depending on whether the buyer is within or outside the industry. What is your estimate of the selling price of your nursery operation if you were to sell to:

another nurseryman \$ \_\_\_\_\_

someone who intends to use the assets for purposes other than nursery production \$ \_\_\_\_\_

13. Regarding your tendency to take risks, how would you characterize yourself relative to other nurserymen? (please check one answer)

\_\_\_\_ I tend to take on substantial levels of risk in my investment decisions.

\_\_\_\_ I tend to avoid risk when possible in my investment decisions.

\_\_\_\_ I neither seek nor avoid risk in my investment decisions.

14. What is your debt/asset ratio? This is your total debt divided by your total assets, multiplied by 100 to yield a percentage.

\_\_\_\_\_ % debt/asset ratio

### I II. MARKETING

15. To what kind of customers do you make wholesale sales? Please report the proportions going to each of these kinds of customers.

<u>kind of customer</u>	<u>percent in 2001</u>
retailers - mass merchandisers/home centers	_____ %
retailers - garden centers	_____ %
retailers - all others (grocery, hardware, etc)	_____ %
landscape firms	_____ %
re-wholesalers	_____ %

16. Of your wholesale sales in 2001, in what percentage did you have to make concessions (in terms of price or other factors) to get the sale completed?

\_\_\_\_\_ %

17. Of your wholesale sales, please indicate the percentage that was *contract production* for the years 1996 and 2001. We define contracting as a situation where you produce a product for a specific buyer. This does not include the situation where you make production decisions and orders are later "booked" ahead of purchase. Please keep in mind that a contract may be verbal or written.

<u>percent in 1996</u>	<u>kind of customer</u>	<u>percent in 2001</u>
_____ %	retailers - mass merchandisers/home centers	_____ %
_____ %	retailers - garden centers	_____ %
_____ %	retailers - all others (grocery, hardware, etc)	_____ %
_____ %	landscape firms	_____ %
_____ %	re-wholesalers	_____ %

**Please respond to questions 18, 19, and 20 even if you do not produce under contract.**

Here, we ask how your relationship with customers, particularly large ones, has changed over the period 1996 to 2001. We are interested in the differences between your mass merchandiser customers and your traditional garden center customers. Overall, mass merchandisers' market share has increased, while the traditional garden center's share declined. The table below contains a list of terms often found in business contracts. If you contract, please check the items that were (are) included in the terms of your contracts. If you do not contract, please respond on the basis of your perception of items you believe were (are) included in the terms of contracts.

18. Are (were) these items in the contract (check if yes)?

<u>item</u>	<u>mass merchandisers/ home centers</u>		<u>garden centers</u>	
	<u>1996</u>	<u>2001</u>	<u>1996</u>	<u>2001</u>
product information tags	----	----	----	----
barcode sticker	----	----	----	----
custom containers	----	----	----	----
transportation to retailer	----	----	----	----
returnable shipping equipment (carts, etc.)	----	----	----	----
on-time delivery	----	----	----	----
take back unsold product	----	----	----	----
minimum volume	----	----	----	----
continuous inventory replenishment	----	----	----	----

19. In general, does a contract provide that you will be paid more for performing any of the activities in the table below?

	<u>mass merchandisers/ home centers</u>		<u>garden centers</u>	
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>
product information tags	----	----	----	----
barcode sticker	----	----	----	----
custom containers	----	----	----	----
transportation to customer	----	----	----	----
returnable shipping equipment	----	----	----	----
unloading product	----	----	----	----
take back unsold merchandise	----	----	----	----

20. Please rate the following factors associated with contracting. Use a 1 to 5 scale, with 1 = very unimportant and 5 = very important.

<u>item</u>	<u>rating</u>
reduced price risk	----
assured market or sale	----
improve access to capital	----
reduced choice in production and/or marketing decisions	----
less costly to make a sale (in terms of time and money)	----

21. How do you use the Internet? (Check all that apply.)

- I don't use the Internet \_\_\_\_\_
- business-to-business buying/selling (B2B) \_\_\_\_\_
- e-mail \_\_\_\_\_
- promotion (web page, video conference, etc.) \_\_\_\_\_

22. Of your wholesale sales, what percentage was made in the following ways in 2001?

- trade shows \_\_\_\_\_%
- sales people in assigned geographic or other territories \_\_\_\_\_%
- sales people in main office (telephone, fax, etc) \_\_\_\_\_%
- electronic business-to-business selling (B2B) \_\_\_\_\_%
- mail order \_\_\_\_\_%
- drop-in customers \_\_\_\_\_%
- Total** **100 %**

23. Specifically, how does increasing retail consolidation affect you? Check an answer for each one of the items below.

	<u>lower</u>	<u>the same</u>	<u>higher</u>
price received for my product is	----	----	----
my volume of sales is	----	----	----
my ability to negotiate is	----	----	----
my costs are	----	----	----

**IV. WORKFORCE**

24. Please indicate the amount of employee and family labor used in your Louisiana operations in 2001.

<u>type of employee</u>	<u>number</u>	<u>average number of weeks worked</u>	<u>average number of hours per week</u>
seasonal full time	-----	-----	-----
seasonal part time	-----	-----	-----
full year part time	-----	-----	-----
full time employees	-----	-----	-----
hired managers	-----	-----	-----
owners (involved in day-to-day operation)	-----	-----	-----
<i>unpaid</i> owner and family labor	-----	-----	-----

**THANK YOU FOR YOUR COOPERATION!**

**APPENDIX B**  
**GREEN INDUSTRY ECONOMIC IMPACT STUDY**  
**LANDSCAPE DESIGN, INSTALLATION AND MAINTENANCE SECTOR SURVEY**

Information you provide to us is important to estimation of the total dollar impact of Louisiana's 'green' industry. We are very aware that the sales, expenditure and other information we ask for is confidential. Please be assured that this information will be used only to generate the estimates needed for the study, and will not be disclosed to anyone. Reports produced from this research will be in summary form, and will not reveal any individual information. **As you complete this form, please remember that your informed estimates of these numbers is sufficient. It is not necessary to spend time digging through your records.**

**I. FIRM ORGANIZATION**

1. Please indicate the percentage of your total dollar sales and the number of jobs by kind of activity:

*Landscape design services:*

\_\_\_\_\_ % residential      \_\_\_\_\_ % commercial/industrial<sup>1</sup>      \_\_\_\_\_ % public/government<sup>2</sup>  
 \_\_\_\_\_ # of jobs      \_\_\_\_\_ # of jobs      \_\_\_\_\_ # of jobs

*Landscape installation services:*

\_\_\_\_\_ % residential      \_\_\_\_\_ % commercial/industrial      \_\_\_\_\_ % public/government  
 \_\_\_\_\_ # of jobs      \_\_\_\_\_ # of jobs      \_\_\_\_\_ # of jobs

*Landscape maintenance services:*

\_\_\_\_\_ % residential      \_\_\_\_\_ % commercial/industrial      \_\_\_\_\_ % public/government  
 \_\_\_\_\_ # of jobs      \_\_\_\_\_ # of jobs      \_\_\_\_\_ # of jobs

2. Year established: \_\_\_\_\_ Year established in Louisiana, if different \_\_\_\_\_

3. A. Is your business headquartered in Louisiana? \_\_\_\_yes \_\_\_\_ no

B. How many locations (offices, stores, yards, etc.) do you have? (count each address as one location, even if there are several different kinds of activities at the location)

\_\_\_\_\_ in total      \_\_\_\_\_ in Louisiana

C. Are you affiliated with a retailer \_\_\_\_yes \_\_\_\_ no

D. Please describe your Louisiana operations:

\_\_\_\_\_ total space in greenhouses, in square feet  
 \_\_\_\_\_ total outdoor/shade production areas, in acres  
 \_\_\_\_\_ total number of landscape installation crews  
 \_\_\_\_\_ total number of landscape maintenance crews

4. Check the best description of your firm's legal structure:

\_\_\_\_\_ sole proprietorship      \_\_\_\_\_ corporation  
 \_\_\_\_\_ partnership      \_\_\_\_\_ other, please describe

<sup>1</sup> stores, restaurants, hotels, malls, office complexes, parks, industrial plants and facilities

<sup>2</sup> public or government organizations such as government office buildings, parks, highways

**II. EXPENSES:** This section requests that you provide information about the firm's expenses in 2001, both in general overhead categories and for items directly relevant to ornamental plant purchases. Please provide your best informed estimates of costs in 2001 for these categories. The values can be either in dollars or as a percentage of sales.

	dollars	or	percent of sales
<b>5. Overhead Expenses</b>	report the column that is most convenient for you, not		
<b>facilities</b>			
ownership/leasing expenses (i.e., mortgages, rent) for land and facilities	\$ _____		_____ %
facility maintenance and repair (don't report wages/salaries here)	\$ _____		_____ %
facility remodeling, additions, and/or construction	\$ _____		_____ %
<b>equipment</b>			
equipment purchases	\$ _____		_____ %
equipment leases			
equipment repair	\$ _____		_____ %
fuel	\$ _____		_____ %
<b>utility and other expenses</b>			
utilities: water/sewer (including irrigation), electricity and natural gas	\$ _____		_____ %
telephone and other communications	\$ _____		_____ %
taxes	\$ _____		_____ %
all other overhead expenditures	\$ _____		_____ %
<b>Expenses for Ornamental Crop Production</b>			
all plant material	\$ _____		_____ %
chemicals and fertilizers	\$ _____		_____ %
hardscape materials, irrigation, etc	\$ _____		_____ %
soil, soil conditioners and mulch	\$ _____		_____ %
sub-contracts: design, maintenance and service (excluding plant matter & turf)	\$ _____		_____ %
wages, salaries and benefits	\$ _____		_____ %

6. Please give your 'best guess' estimate of expenditures in 2002 on major construction projects and equipment purchases

\$ \_\_\_\_\_ equipment                      \$ \_\_\_\_\_ construction

7. What percentage of the value of plants and planting material you use or sell in Louisiana is from:  
 \_\_\_\_\_ % Louisiana suppliers      \_\_\_\_\_ % all others

**III. SALES:** Information you provide is strictly confidential; no individual's sales, revenues or expenditures information will be revealed.

8. Approximately how much were your total sales from Louisiana operations during 2001?  
 \$ \_\_\_\_\_

9. For each category, please report the percentage of sales in each category. Your informed estimate is adequate.

Sales categories	dollars	or	percent of sales
	report the column that is most convenient for		
design services	\$ _____		_____ %
installation services	\$ _____		_____ %
maintenance services	\$ _____		_____ %
sub-contracts: design, maintenance and service	\$ _____		_____ %
other	\$ _____		_____ %

10 What is your average mark-up percentage for:  
 green goods \_\_\_\_\_ %      hard goods \_\_\_\_\_ %

11. What percent of the dollar volume of sales from your Louisiana facilities went to buyers in:  
 \_\_\_\_\_ % Louisiana      \_\_\_\_\_ % all other buyers

**IV. WORKFORCE/EMPLOYMENT**

12. Please indicate the number of employees and managers in your Louisiana operations in 2001 by type:

type of employee	# of <u>employees</u>	payroll, excluding <u>benefits</u>	average number of <u>weeks worked</u>	average number of <u>hours per week</u>
Seasonal full time	_____	\$ _____	_____	_____
Seasonal part time	_____	\$ _____	_____	_____
Full year part time	_____	\$ _____	_____	_____
Full time employees	_____	\$ _____	_____	_____
Hired managers	_____	\$ _____	_____	_____
Owners (involved in day-to-day operation)	_____	\$ _____	_____	_____
<i>unpaid owner and family labor*</i>	_____	_____	_____	_____

\* full time equivalents (40 person hours per week for 280 days of the year).

**THANK YOU FOR YOUR COOPERATION!**

## APPENDIX C

### LOUISIANA GOLF COURSE INDUSTRY SURVEY

To calculate the economic impact of Louisiana's golf industry, we use surveys to estimate the industry's revenues, expenses and employment. This questionnaire is our method of collection that data. Information you provide is strictly confidential. No individual course or club's revenues or expenditures will be revealed. In responding, either use your records or provide your 'informed estimates'. Its more important for us to get your informed estimates than for you to be a non-respondent.

#### I. General characteristics

- A. Which of the following ownership types best describes your golf operation? (Please check one)
- |                                       |  |  |
|---------------------------------------|--|--|
| <input type="checkbox"/> private      | privately owned, and use generally is restricted to members and guests. Example: membership-only golf clubs.         |  |
| <input type="checkbox"/> semi-private | privately owned, but the facility is open on a fee basis to nonmembers. Resort-oriented golf courses are an example. |  |
| <input type="checkbox"/> public       | owned by a government agency and generally open to the public for play. City golf courses would be an example.       |  |

- B. How many holes does your facility have?
- |  |                                   |   |
|--|-----------------------------------|---|
| <input type="checkbox"/> 9 holes                 | <input type="checkbox"/> 36 holes | <input type="checkbox"/> 63 holes           |
| <input type="checkbox"/> 18 holes                | <input type="checkbox"/> 45 holes | <input type="checkbox"/> 72 holes           |
| <input type="checkbox"/> 27 holes                | <input type="checkbox"/> 54 holes | <input type="checkbox"/> driving range only |
| <input type="checkbox"/> Other (Number of holes) |                                   |   |

- C. What was your club's first full year of operation? \_\_\_\_\_

- D. Total number of rounds played during your most recently budgeted year.
- |                     |                |               |
|---------------------|----------------|---------------|
|                     | 18 hole rounds | 9 hole rounds |
| total rounds played | _____          | _____         |

- E. A tourist is anyone who does not claim Louisiana as his/her state of residence. What percent of the total rounds were played by tourists?
- \_\_\_\_\_ % tourists

- F. If your course has private equity or non-equity memberships, please answer this question *for your most common type of golf and non-golf membership.*

	number of members	initiation fee	stock transfer price	monthly dues
golf	_____	\$ _____	\$ _____	\$ _____
non-golf	_____	\$ _____	\$ _____	\$ _____

**II. Expenses**

Here, we ask that you provide information about the club's expenses in 2001, both in general overhead categories and for items directly relevant to horticulture industry purchases. Please provide your best informed estimates of costs in 2001 for these categories. The values can be either in dollars or reported as a percentage of sales.

<b>Overhead Expenses</b> (annual costs, such as amount of note paid)	<b>dollars</b>	or	<b>percent of sales</b>
<b>facilities</b>			
ownership/leasing expenses (i.e., mortgages, rent)	\$ _____		
facility maintenance and repair (no wages/salaries here)	\$ _____		_____ %
facility remodeling, additions, and/or construction	\$ _____		_____ %
<b>equipment</b>			
equipment purchases	\$ _____		_____ %
equipment leases	\$ _____		_____ %
equipment repair	\$ _____		_____ %
fuel	\$ _____		_____ %
<b>utility and other expenses</b>			
utilities: water/sewer (including irrigation) electricity and natural gas	\$ _____		
telephone and other communications	\$ _____		
taxes	\$ _____		
all other overhead expenditures	\$ _____		
<b>expenses for course maintenance</b>			
all plant materials purchased	\$ _____		_____ %
chemicals, fertilizers	\$ _____		_____ %
soil, soil conditioners and mulch	\$ _____		_____ %
installation / maintenance sub-contracts	\$ _____		_____ %
all other course expenses (except wages)	\$ _____		_____ %

**III. Revenue and Wage/Salary Expenditures**

Please provide data for year 2001.

**A. Course Maintenance expenses**

\$ \_\_\_\_\_ wages and benefits associated with golf course maintenance

**B. Pro Shop / Driving Range / Golf Lessons**

- \$ \_\_\_\_\_ total sales from pro shop
- \$ \_\_\_\_\_ what is the typical percentage mark-up on your sales at the pro shop?
- \$ \_\_\_\_\_ wages and benefits associated with pro shop and driving range.
- \$ \_\_\_\_\_ revenue generated by driving range and cart rental
- \$ \_\_\_\_\_ revenue (income) resulting from private lessons and clinics
- \$ \_\_\_\_\_ revenue (income) resulting from contracting golf outings
- \$ \_\_\_\_\_ any wages and benefits not included with pro shop operations, driving range, or lessons

**C. Food and Beverage (snack bar, dining rooms)**

- \$ \_\_\_\_\_ total sales associated with food and beverage service
- \$ \_\_\_\_\_ wages and benefits associated with food and beverage service

**D. Administration/Clubhouse**

- \$ \_\_\_\_\_ wages and benefits for employees not included in the above categories.
- \$ \_\_\_\_\_ non labor expenditures not included under golf course maintenance, pro-shop, and food and beverage.

**E. Revenue and / or Membership Fees**

\$ \_\_\_\_\_ total revenue generated by membership and greens fees (including carts).

**IV. Employment Information**

Please provide information on employment at your facilities in the categories of (1) Golf Course Maintenance, (2) Pro Shop and Related Golf Operations, (3) Food and Beverage, and (4) All Other employees. Use employment data for your most recently completed budget year, and include supervisory personnel within all these categories.

**A. Golf Course Maintenance Employment**

Please include your Golf Course Superintendent (or equivalent) and all employees supervised directly or indirectly by that person.

	full-time, year-round	full- time, seasonal	part-time, year-round	part-time, seasonal
number of employees	_____	_____	_____	_____
average number of months worked	_____	_____	_____	_____
average number of hours worked per week	_____	_____	_____	_____

**B. Pro Shop and Related Golf Services Employment**

Please include your Director of Golf (or equivalent) and all employees described in the following list: *golf pros; golf shop employees; cart maintenance personnel; bag room, golf valet, caddie, forecaddie, ranger, starters, and driving range personnel; and locker room personnel.* Exclude food and beverage employees. If your pro shop is contracted to a concessionaire, please have the concessionaire complete the relevant parts on this page.

employees	full-time, year-round	full-time, seasonal	part-time, year-round	part-time, seasonal
number on club payroll	-----	-----	-----	-----
number on concessionaire's payroll	-----	-----	-----	-----
average number of months worked	██████████	-----	██████████	-----
average hours worked per week	██████████	██████████	-----	-----

**C. Food and Beverage Employment**

Please include all employees who prepare and/or serve food and/or beverages on premises and are directly employed by the club. If your food and beverage facilities are contracted, please have your concessionaire complete this page.

employees	full-time, year-round	full-time, seasonal	part-time, year-round	part-time, seasonal
number on club payroll	-----	-----	-----	-----
number on concessionaire's payroll	-----	-----	-----	-----
average number of months worked	██████████	-----	██████████	-----
average hours worked per week	██████████	██████████	-----	-----

**D. Other club employment (don't include those whose primary function is to develop and/or market real estate, or whose primary duties are with on-premises lodging facilities).**

Please include all employees at your course who were not listed in the previous sections. Some examples of these employees are *recreational and social personnel other than golf; clubhouse and clubhouse ground maintenance and custodial personnel; and administrative and professional personnel such as club manager, accounting and bookkeeping personnel, marketing, advertising and public relations personnel, receptionist and secretarial personnel, personnel department, security personnel, valets, etc.*

employees	full-time, year-round	full-time, seasonal	part-time, year-round	part-time, seasonal
number of employees	-----	-----	-----	-----
average number of months worked	██████████	-----	██████████	-----
average hours worked per week	██████████	██████████	-----	-----

**THANK YOU FOR YOUR COOPERATION!**

## APPENDIX D CHURCHES AND/OR CEMETERIES SURVEY

Your information is important in estimating the total dollar impact of the horticulture and turfgrass industry on Louisiana's economy. We are only interested in expenses. However, it is important to identify the largest expense categories. No individual's expenditures will be reported. Your **informed estimates** of these numbers will be sufficient. Please respond only for Louisiana facilities.

1. Are you a \_\_\_\_ Church \_\_\_\_ Cemetery \_\_\_\_ Both

2. Is maintenance of church grounds and/or cemetery done  
\_\_\_\_\_ in-house \_\_\_\_\_ by a contractor or someone else in a similar capacity

**3. If you answered contractor** to question 2, please report your total annual expenditure for grounds and cemetery maintenance, and return the form in the enclosed envelope.

\$ \_\_\_\_\_

**If you answered "in-house" to question 2, please continue.**

4. How many acres do you maintain? \_\_\_\_\_

5. How many **church or cemetery employees**, by type, work in church and/or cemetery grounds maintenance? Please estimate only the portion of time spent on grounds and cemeteries work.

employees	full-time	full-time, seasonal	part-time, year-round	part-time, seasonal
no. of employees	_____	_____	_____	_____
aver. months worked	_____	_____	_____	_____
average hours worked per week	_____	_____	_____	_____

6. Please report **expenses related to church grounds and cemetery maintenance** in the following categories.

kind of expense	dollars	% purchased in Louisiana
maintenance and repair of <b>facilities</b> (not wages/salaries)	\$ _____	_____ %
remodeling and/or construction of <b>facilities</b>	\$ _____	_____ %
purchases / leases of <b>equipment</b>	\$ _____	_____ %
repair of <b>equipment</b>	\$ _____	_____ %
fuel for <b>equipment</b>	\$ _____	_____ %
water (inc. irrigation), sewer, electricity, gas, etc.	\$ _____	_____ %
plant material (outdoors, not indoors)	\$ _____	_____ %
chemicals, fertilizers	\$ _____	_____ %
soil, soil conditioners, bark and mulch	\$ _____	_____ %
wages, salaries and benefits	\$ _____	_____ %

**Thank you for your cooperation!**

## APPENDIX E

### DESCRIPTIVE STATISTICS OF VARIABLES FOR CHURCHES AND CEMETERIES, AIRPORTS, PRIVATE SCHOOLS (ALL LEVELS), SCHOOLS DISTRICTS, PUBLIC COLLEGES/UNIVERSITIES, CITY/PARISH GROUNDS, AND STATE PARKS AND RECREATIONAL AREAS

Table E-1. Descriptive Statistics: Churches and Cemeteries

Variable	N	Mean	Std Dev	Minimum	Maximum
Type (1=church, 2=cemetery, 3=both)	107	2.00	0.69	1.00	3.00
Grounds maintenance done in-house	107	0.71	0.46	0.00	1.00
Grounds maintenance done by contractors	107	0.32	0.47	0.00	1.00
Payment for contracted grounds maintenance (dollars)	36	29,038.22	95,555.94	6.00	432,000.00
Acres maintained	63	8.37	18.31	1.00	125.00
No. of employees (full time)	22	3.23	3.21	1.00	12.00
No. of employees (full time, seasonal)	2	3.50	2.12	2.00	5.00
No. of employees (part time, year-round)	14	1.79	1.12	1.00	4.00
No. of employees (part time, seasonal)	14	1.36	0.50	1.00	2.00
Average no. workers (full time, seasonal)	7	10.29	3.15	4.00	12.00
Average no. workers (part time, year-round)	14	9.71	3.85	2.00	12.00
Average no. workers (part time, seasonal)	11	6.45	2.02	3.00	9.00
Average hours/week (part time, year-round)	17	4.12	3.20	2.00	15.00
Average hours/week (part time, seasonal)	13	5.27	5.88	2.00	24.00
Expenditures on facility maintenance and repair (dollars)	4	695.50	989.56	75.00	2,169.00
Remodeling/construction of facilities (dollars)	2	6,825.50	7,596.45	1,454.00	12,197.00
Purchases/leases of equipment (dollars)	6	721.00	1,110.34	75.00	2,955.00
Purchases/leases of equipment (% purchased in LA)	1	1.00		1.00	1.00
Repair of equipment (dollars)	8	28.85	42.35	5.00	127.70
Repair of equipment (% purchased in LA)	0				
Fuel for equipment (dollars)	17	258.71	503.87	2.00	1,678.00
Water, sewer, electricity, gas, etc (dollars)	8	1,023.52	1,604.06	6.00	4,161.00
Plant material (Dollars)	6	7,800.00	18,452.67	5.00	45,452.00
Plant material (Percentage purchased in LA)	0				
Chemicals, fertilizers (Dollars)	12	74.31	118.86	5.00	398.00
Chemicals, fertilizers (Percentage purchased in LA)	0				
Soil, soil conditioners, bark and mulch (Dollars)	7	15.29	12.71	4.00	35.00
Soil, soil conditioners, bark and mulch (% purchased in LA)	1	1.00	.	1.00	1.00
Wages, salaries and benefits (Dollars)	8	40,286.63	77,365.38	17.00	213,147.00

Table E-2. Descriptive Statistics of Activities Reported by Louisiana Airports

Variable	N	Mean	Std Dev	Minimum	Maximum
Total acres	8	1,018.00	691.68	150	2,300
Acres maintained	9	484.67	358.28	100	1,000
Grounds maintenance done in-house	9	0.89	0.33	0	1
Grounds maintenance done by contractors	9	0.22	0.44	0	1
Payment for contracted grounds maintenance (Dollars)	1	3,537		3,537	3,537.
No. of hours (mowing)	7	1,974.29	1,566.85	240	4,000
Expenses in new equipment (Dollars)	4	16,000.00	17,644.64	3,000	42,000
No. of hours (trimming, installing, maintaining, etc)	5	318.00	380.55	20	940
Plant material (Dollars)	1	3,000.00		3,000	3,000
Chemicals and fertilizers (Dollars)	4	12,225.00	14,475.35	440	32,000
Other supplies (Dollars)	3	350	217.94	200	600
Plant material, chemicals, fertilizers, other supplies (Dollars)	5	10,590.00	13,039.00	600	32,000

Table E-3. Descriptive Statistics of Activities Reported by Private Schools All Levels (Except Pre-School)

Variable	N	Mean	Std Dev	Minimum	Maximum
Acres maintained	19	14.21	23.53	0.50	100.00
Payment for contracted grounds maintenance (dollars)	18	13309.44	20362.86	800.00	75000.00
Percentage of labor (contractors)	7	2.29	1.80	1.00	6.00
Number of full time employees	7	20608.14	6289.86	13500.00	30757.00
Annual wage, full-time employees (dollars)	10	2.00	1.41	1.00	5.00
No. of part time employees	8	10292.50	6528.52	5100.00	26000.00
Annual wage part time employees (dollars)	6	18836.67	35505.56	1800.00	91120.00
Total wages expenses (dollars)	0				
Inmate labor expenses (dollars)	0				
Number of days worked (inmate labor)	12	6506.67	7676.92	200.00	25000.00
Expenses in new equipment (dollars)	17	41158.29	128226.75	1500.00	536791.00
Grounds maintenance budget (dollars)	12	15.42	21.79	1.00	71.00
Plant material (percentage of maintenance budget)	11	4387.79	8130.14	18.00	21471.64
Plant material (dollars)	9	13.00	7.42	1.00	25.00
Chemicals and fertilizers (percentage maintenance budget)	8	2182.25	3426.94	18.00	10000.00
Chemicals and fertilizers (dollars)	10	16.10	18.92	2.00	60.00
Fuel (Percentage of maintenance budget)	8	2953.00	4090.92	180.00	11200.00
Fuel (dollars)	11	18.64	26.04	2.00	75.00
Other supplies (percentage of maintenance budget)	10	1079.10	1646.19	36.00	5000.00

Table E-4. Descriptive Statistics of Activities Reported by School Districts (Public Schools)

Variable	N	Mean	Std Dev	Minimum	Maximum
Total acres	13	2,075.52	5,629.46	100.00	20,731.00
Acres maintained	13	449.06	496.71	50.00	1,690.00
Payment for contracted grounds maintenance (Dollars)	6	230,424.67	338,393.88	5,000.00	900,000.00
Hours (mowing, trimming, , etc)	11	7,662.91	6,843.75	245.00	21,600.00
Average wage (Dollars)	11	9.46	2.25	6.44	13.50
Annual labor cost (Dollars)	8	113,719.88	81,768.79	1,000.00	250,000.00
Expenses in new equipment (Dollars)	11	25,621.55	22,422.57	500.00	60,967.00
Plant material (Dollars)	7	3,642.86	1,599.85	1500.00	6,000.00
Chemicals and fertilizers (Dollars)	11	9,116.17	15,167.97	350.00	50,000.00
Other supplies (Dollars)	9	15,340.94	22,805.58	300.00	59,168.45
Fuel (Dollars)	6	8,094.44	7,477.54	2,192.61	23,000.00

Table E-5. Descriptive Statistics of Activities Reported by Public Colleges/Universities

Variable	N	Mean	Std Dev	Minimum	Maximum
Acres maintained	9	377.11	264.77	100	1000
Payment for contracted grounds maintenance (dollars)	4	99,939.75	95,666.44	11,509.00	200,000
Percentage of labor (contractors)	4	53,075.00	51,137.94	7,000.00	120,000
No. of full time employees	7	15.29	7.83	4	27
Annual wage, full-time employees (dollars)	7	27,184.43	20,065.87	15,185	72,000
No. of part time employees	4	5.25	3.59	2.00	10
Annual wage part time employees (dollars)	4	7,613.25	3,218.16	4,635.00	12,168
Total wages expenses (dollars)	5	430,861.80	363,250.15	100,000	1,005,000
Inmate labor (dollars)	2	55,000.00	35,535.34	30,000.00	80,000
Number of days worked (inmate labor)	0				
Expenses in new equipment (dollars)	6	66,158.33	70,004.22	1,200	200,000
Grounds maintenance budget (dollars)	8	84,206.25	80,834.56	35,000	273,400
Plant material (percentage of maintenance budget)	5	29.00	6.51	25.00	40
Plant material (dollars)	5	16,685.00	8,054.48	8,750.00	30,000
Chemicals and fertilizers (percentage of maintenance budget)	7	14.42	8.94	2.00	25
Chemicals and fertilizers (dollars)	7	9,085.00	6,903.79	2,550.00	20,400
Fuel (percentage of maintenance budget)	7	19.86	17.37	5	55
Fuel (dollars)	7	10,742.50	6,904.19	3,500	23,100
Other supplies (percentage of maintenance budget)	8	23.50	19.73	2	58
Other supplies (dollars)	8	16,659.13	22,059.73	2,100	69,600

Table E-6. Descriptive Statistics of Activities Reported by City/Parish Grounds, Parks and Playgrounds

Variable	N	Mean	Std Dev	Minimum	Maximum
Acres maintained	13	2558.62	5664.09	10	20681
Payment for contracted grounds maintenance (dollars)	9	237,829.00	378,055.19	3,500.00	1,200,000
Percentage of labor (contractors)	8	57.25	27.12	20.00	100
Number of full time employees	11	25.00	29.51	1	84
Annual wage, full-time employees (dollars)	11	19,474.87	4,784.16	12,799.56	27,000
Number of part time employees	8	38.12	68.48	1.00	200
Annual wage part time employees (dollars)	8	10,981.25	11,695.37	4,000.00	39,000
Total wages expenses (dollars)	6	2944884.52	4304231.73	25000	11,357,000
Inmate labor (dollars)	1	26,437.20	.	26,467.2	26,467.2
Number of days (inmate labor)	5	64.60	51.87	20	150
Expenses in new equipment (dollars)	13	96722.85	161033.31	500	600,000
Grounds maintenance budget (dollars)	11	580961.55	1240896.72	9000	4,161,577
Plant material (percentage of maintenance budget)	9	14.72	23.95	0.50	75
Plant material (dollars)	8	21,520.17	30,431.74	600.00	83,231.54
Chemicals and fertilizers (percentage of maintenance budget)	11	12.00	12.94	1	45
Chemicals and fertilizers (dollars)	9	27,839.87	68,009.80	600	208,078.85
Fuel (percentage of maintenance budget)	10	20.95	18.48	1	60
Fuel (dollars)	9	85,532.22	238,011.16	340	720,000
Other supplies (percentage of maintenance budget)	11	13.36	12.10	2	40
Other supplies (dollars)	11	83,968.88	139,856.47	750	416,157.7

Table E-7. Descriptive Statistics of Activities for State Parks and Recreational Areas

Variable	N	Mean	Std Dev	Minimum	Maximum
Total acres	28	838.57	1,660.04	5	6,500
Acres maintained	28	147.36	330.25	3	1,750
No. of hours (mowing)	28	952.84	811.66	53.4	3,200
No. of hours (trimming, installing, maintaining landscapes, etc)	28	654.71	639.53	20	2,308
Plant material (dollars)	20	772.65	917.33	50.00	2,700
Chemicals and fertilizers (dollars)	27	845.14	1,300.82	75.00	5,400
Other supplies (dollars)	24	1,120.79	1,602.53	63.00	6,400

## APPENDIX F

### ESTIMATES OF TOTAL EXPENDITURES, ACRES, NUMBER OF RESPONDENTS AND COST PER ACRE ON GROUNDS MAINTENANCE REPORTED BY SCHOOL DISTRICTS, PARISH/CITY GROUNDS, AND CHURCHES AND CEMETERIES IN LOUISIANA, 2001

Table F.

Kind of Expenses	Classification		
	School District Size		
School District	Small	Medium	Large
Acres	844.8	3003	1990
Labor expenditures	\$450,624 (4)	\$369,135 (3)	\$593,250 (2)
Plant material expenditures	9,000 (2)	10,500 (3)	6,000 (2)
Chemicals and fertilizers	7,139 (2)	42,146 (5)	50,000 (4)
Fuel	7,193 (2)	35,374 (3)	39,800 (2)
Other supplies	76,268 (5)	1800 (2)	60,000 (2)
Average cost per acre	\$651.30	\$152.83	\$298.12
	Parish/City Size		
Parish/City Grounds	Small	Medium	Large
Acres	140 (2)	2,418 (5)	10,023 (5)
Labor expenditures	\$361,200 (2)	\$12,296,180 (5)	\$9,358,244 (2)
Plant material expenditures	\$1,350 (2)	\$47,400 (4)	\$143,231.54 (2)
Chemicals and fertilizers	\$2,100 (2)	\$36,200 (4)	\$685,878.85 (3)
Fuel	\$5,250 (2)	\$41,500 (2)	\$772,700 (2)
Other supplies	\$4,500 (2)	\$56,900 (4)	\$658,857.70 (3)
Cost per acre (labor)	\$2,672.85 (2)	\$5,160.53 (5)	\$1,024.70 (2)
	Churches and Cemetery Type		
Churches and Cemeteries	Churches	Cemeteries	Churches and Cemeteries
Total expenditures	\$116,986 (16)	\$1,351,225 (38)	\$372,581.92 (19)
Acres	53.5 (16)	392.03 (38)	273 (19)
Cost per acre	\$2,186.65 (16)	3,446.74 (38)	\$8,437.67 (19)

Value in parentheses is number of observations

## APPENDIX G

### ESTIMATES OF TOTAL EXPENDITURES, ACRES, NUMBER OF RESPONDENTS AND COST PER ACRE REPORTED BY RESPONDENTS ON GROUNDS MAINTENANCE BY ALL PRIVATE SCHOOLS, PUBLIC UNIVERSITIES, AIRPORTS, ROAD MAINTENANCE, AND STATE PARKS IN LOUISIANA, 2001.

Table G.

Category	Total expenditures	No. Respondents	Cost per acre
All Private Schools (165 acres)			
Labor cost	\$318,380	12	\$1,829.63
Plant material	\$26,614	9	\$161.30
Chemicals and fertilizers	\$16,658	9	\$100.96
Fuel	\$23,444	8	\$142.08
Other supplies	\$5,843	9	\$35.41
Public Universities (4,348 acres)			
Labor cost	\$3,452,469	8	\$794.03
Plant material	\$21,168.75	4	\$19.22
Chemicals and fertilizers	\$13,308.42	4	\$18.12
Fuel	\$11,949.58	6	\$16.27
Other supplies	\$18,467.57	7	\$29.34
Airports (6,774 acres)	\$196,070	8	\$28.94
Road Maintenance	\$18,300,000	na	na
State Parks (4,126 acres)	\$464,820	28	\$110.23

## APPENDIX H

### AGGREGATED ONE-DIGIT SIC CODE IMPLAN SECTORS, BY SECTOR/INDUSTRY AND NUMBER\*

Table H.

Industry	Sectors/Industry
Greenhouse and Nursery Products	23
Agricultural, Forestry, Fishery Services	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26
Landscape and Horticultural Services	27
Mining	28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 47, 42, 43, 44, 45, 46, 47
Construction	48, 49, 50, 51, 52, 53, 54, 55, 56, 57
Manufacturing	58 to 203, 205 to 213, 215 to 308, 310 to 432
Agricultural Chemicals	204
Petroleum Products	214
Farm Machinery and Equipment	309
Transportation, Communication and Utilities	433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446
Trade	447, 448, 449, 450, 451, 452, 453, 454, 455
Finance, Insurance, and Real Estate Services	456, 457, 458, 459, 460, 461, 462 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509
Government	510, 511, 512, 513, 514, 515, 519, 520, 521, 522, 523
Other	516, 517, 518, 524, 525, 526, 527, 528

\* List provide by IMPLAN Input-Output Model

## APPENDIX I

### DIRECT, INDIRECT, INDUCED AND TOTAL EFFECTS ON GROSS SALES, TOTAL PERSONAL INCOME, GROSS STATE PRODUCT AND EMPLOYMENT FOR THE PRODUCTION SECTOR, GOLF INDUSTRY, RETAIL SECTOR, ‘OTHER’ (HORTICULTURAL EXPENDITURES REPORTED IN OTHER SECTORS) AND OVERALL ECONOMIC IMPACT OF THE GREEN INDUSTRY

Golf Industry and Landscape Grounds Maintenance Reported by Unrelated Sectors do not present direct impacts. These two industries are not part of the 528 sectors included in IMPLAN.

Table I-1. Impact of the Production Sector on Gross Sales (Direct, Indirect, Induced and Total Effects) Estimated with 1999-Based the Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	105,000,000	14,800,384	98,374	119,898,760
Agricultural, Forestry, Fishery Services	0	2,091,209	59,133	2,150,342
Landscape and Horticultural Services	265,900,000	44,752	202,324	266,147,072
Mining	0	1,695,666	1,300,147	2,995,813
Construction	0	6,274,074	4,029,469	10,303,542
Manufacturing	0	10,135,607	11,288,547	21,424,154
Transportation, Communication and Utilities	0	14,813,455	14,120,958	28,934,414
Trade	0	9,058,606	31,999,096	41,057,704
Finance, Insurance, and Real Estate Services	0	10,511,180	31,438,576	41,949,756
Government	0	18,223,298	46,079,144	64,302,440
Other	0	0	2,939,575	4,241,299
Total	370,900,000	89,250,199	144,888,957	605,039,154

Table I-2. Impact of the Production Sector on Personal Income (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	48,828,648	6,882,693	45,747	55,757,088
Agricultural, Forestry, Fishery Services	0	1,101,811	31,156	1,132,967
Landscape and Horticultural Services	110,428,544	18,586	84,025	110,531,152
Mining	0	410,309	315,875	726,184
Construction	0	3,394,397	1,547,003	4,941,400
Manufacturing	0	1,592,538	1,757,789	3,330,327
Transportation, Communication and Utilities	0	4,259,640	3,548,994	7,808,634
Trade	0	3,751,083	14,478,315	18,229,398
Finance, Insurance, and Real Estate Services	0	3,229,701	4,761,168	7,990,869
Government	0	9,244,056	24,452,314	33,696,368
Other	0	468,236	848,107	1,316,343
Total	159,257,192	34,427,676	52,493,965	246,178,827

Table I-3. Impact of the Production Sector on Gross State Product (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	76,492,240	10,782,043	71,665	87,345,944
Agricultural, Forestry, Fishery Services	0	1,361,896	38,511	1,400,407
Landscape and Horticultural Services	165,796,256	27,904	126,155	165,950,320
Mining	0	1,130,396	866,404	1,996,800
Construction	0	3,576,802	1,627,861	5,204,663
Manufacturing	0	2,758,610	2,868,513	5,627,123
Transportation, Communication and Utilities	0	8,278,427	8,081,201	16,359,627
Trade	0	6,399,057	23,725,628	30,124,686
Finance, Insurance, and Real Estate Services	0	6,539,833	22,184,750	28,724,582
Government	0	11,611,284	28,543,454	40,154,736
Other	0	604,675	1,199,097	1,803,772
Total	242,288,496	53,202,889	90,067,084	385,558,468

Table I-4. Impact of the Production Sector on Employment (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
Greenhouse and Nursery Products	2,473.40	348.6	2.3	2,824.30
Agricultural, Forestry, Fishery Services	0	84.6	2.4	87
Landscape and Horticultural Services	9,352.10	1.6	7.1	9,360.80
Mining	0	6.5	5	11.5
Construction	0	102.9	48.7	151.7
Manufacturing	0	27.9	51.1	79.0
Transportation, Communication and Utilities	0	106.4	82.9	189.3
Trade	0	108.6	784.9	893.5
Finance, Insurance, and Real Estate	0	132.5	163.4	296
Services	0	288.5	880.5	1,169.00
Government	0	10.3	21	31.4
Other	0	0	47.7	47.7
Total	11,825.40	1,225.80	2,110.90	15,162.10

Table I-5. Impact of the Golf Industry on Gross Sales (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
Greenhouse and Nursery Products	0	0	34,700	34,700
Agricultural, Forestry, Fishery Services	0	0	20,858	20,858
Landscape and Horticultural Services	0	0	71,366	71,366
Mining	0	0	458,605	458,605
Construction	0	0	1,421,328	1,421,328
Manufacturing	0	0	3,981,847	3,981,847
Transportation, Communication and Utilities	0	0	4,980,932	4,980,932
Trade	0	0	11,287,147	11,287,147
Finance, Insurance, and Real Estate	0	0	11,089,433	11,089,433
Services	0	0	16,253,649	16,253,649
Government	0	0	1,036,886	1,036,886
Other (Golf Industry)	151,337,200	0	145,867	151,483,072
Total	151,337,200	0	51,107,161	202,444,365

Table I-6. Impact of the Golf Industry on Total Personal Income (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	0	0	16,137	16,137
Agricultural, Forestry, Fishery Services	0	0	10,990	10,990
Landscape and Horticultural Services	0	0	29,638	29,638
Mining	0	0	111,420	111,420
Construction	0	0	545,680	545,680
Manufacturing	0	0	612,976	612,976
Transportation, Communication and Utilities	0	0	1,251,848	1,251,848
Trade	0	0	5,106,984	5,106,984
Finance, Insurance, and Real Estate	0	0	1,679,422	1,679,422
Services	0	0	8,625,146	8,625,146
Government	0	0	299,156	299,156
Other (Golf Industry)	68,319,088	0	145,867	68,464,952
Total	68,319,088	0	18,516,370	86,835,455

Table I-7. Impact of the Golf Industry on Gross State Product (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	0	0	25,279	25,279
Agricultural, Forestry, Fishery Services	0	0	13,584	13,584
Landscape and Horticultural Services	0	0	44,499	44,499
Mining	0	0	305,610	305,610
Construction	0	0	574,201	574,201
Manufacturing	0	0	1,011,820	1,011,820
Transportation, Communication and Utilities	0	0	2,850,509	2,850,509
Trade	0	0	8,368,820	8,368,820
Finance, Insurance, and Real Estate	0	0	7,825,301	7,825,301
Services	0	0	10,068,227	10,068,227
Government	0	0	422,961	422,961
Other (Golf Industry)	90,382,120	0	145,867	90,527,984
Total	90,382,120	0	31,769,661	122,151,778

Table I-8. Impact of the Golf Industry on Employment (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Number of Jobs-----			
Greenhouse and Nursery Products	0	0	0.8	0.8
Agricultural, Forestry, Fishery Services	0	0	0.8	0.8
Landscape and Horticultural Services	0	0	2.5	2.5
Mining	0	0	1.8	1.8
Construction	0	0	17.2	17.2
Manufacturing	0	0	18	18
Transportation, Communication and Utilities	0	0	29.2	29.2
Trade	0	0	276.9	276.9
Finance, Insurance, and Real Estate Services	0	0	57.6	57.6
Government	0	0	7.4	7.4
Other (Golf Industry)	3,274.00	0	16.8	3,290.80
<b>Total</b>	<b>3,274.00</b>	<b>0</b>	<b>744.6</b>	<b>4,018.60</b>

Table I-9. Impact of the Retail Sector on Gross Sales (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	0	9,470	99,732	109,202
Agricultural, Forestry, Fishery Services	0	581	59,950	60,531
Landscape and Horticultural Services	0	175,598	205,117	380,715
Mining	0	366,602	1,318,106	1,684,707
Construction	0	2,925,728	4,085,126	7,010,854
Manufacturing	0	4,323,393	11,444,470	15,767,863
Transportation, Communication and Utilities	0	9,443,700	14,316,004	23,759,704
Trade	364,000,000	1,886,562	32,441,078	398,327,616
Finance, Insurance, and Real Estate Services	0	9,864,947	31,872,820	41,737,768
Government	0	1,411,996	2,980,177	4,392,173
Other	0	0	419,246	419,246
<b>Total</b>	<b>364,000,000</b>	<b>46,308,885</b>	<b>146,890,227</b>	<b>557,199,090</b>

Table I-10. Impact of the Retail Sector on Total Personal Income (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	0	4,404	46,379	50,783
Agricultural, Forestry, Fishery Services	0	306	31,586	31,893
Landscape and Horticultural Services	0	72,926	85,185	158,111
Mining	0	89,419	320,238	409,657
Construction	0	1,501,899	1,568,371	3,070,270
Manufacturing	0	1,108,448	1,761,793	2,870,241
Transportation, Communication and Utilities	0	2,521,505	3,598,015	6,119,519
Trade	180,209,664	804,330	14,678,293	195,692,288
Finance, Insurance, and Real Estate Services	0	2,056,716	4,826,931	6,883,646
Government	0	7,318,932	24,790,062	32,108,994
Other	0	669,583	859,822	1,529,405
Total	0	0	419,246	419,246
Total	180,209,664	16,150,499	53,219,033	249,579,197

Table I-11. Impact of the Retail Sector on Gross State Product (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	0	6,899	72,655	79,553
Agricultural, Forestry, Fishery Services	0	379	39,042	39,421
Landscape and Horticultural Services	0	109,491	127,896	237,387
Mining	0	243,964	878,371	1,122,335
Construction	0	1,575,510	1,650,346	3,225,855
Manufacturing	0	1,530,079	2,908,135	4,438,214
Transportation, Communication and Utilities	0	5,163,248	8,192,823	13,356,071
Trade	302,460,960	1,333,092	24,053,334	327,847,392
Finance, Insurance, and Real Estate Services	0	6,654,975	22,491,176	29,146,150
Government	0	9,228,287	28,937,710	38,165,996
Other	0	767,347	1,215,659	1,983,006
Total	0	0	419,246	419,246
Total	302,460,960	26,616,483	91,311,129	420,388,577

Table I-12. Impact of the Retail Sector on Employment (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Number of Jobs-----				
Greenhouse and Nursery Products	0	0.2	2.3	2.6
Agricultural, Forestry, Fishery Services	0	0	2.4	2.4
Landscape and Horticultural Services	0	6.2	7.2	13.4
Mining	0	1.4	5	6.4
Construction	0	45.9	49.4	95.3
Manufacturing	0	33.2	51.8	85.0
Transportation, Communication and Utilities	0	54.2	84	138.2
Trade	11,508.30	35.3	795.8	12,339.30
Finance, Insurance, and Real Estate	0	85.3	165.7	251
Services	0	295.2	892.6	1,187.80
Government	0	13.4	21.3	34.7
Other	0	0	48.3	48.3
Total	11,508.30	570.5	2,140.00	14,218.70

Table I-13. Impact of the Green Industry Activity on Gross Sales (Direct, Indirect, Induced and Total Effects) Estimated with the 1999- Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	0	0	229,216	229,216
Agricultural, Forestry, Fishery Services	0	0	2,290,784	2,290,784
Landscape and Horticultural Services	0	0	472,456	472,456
Mining	0	0	3,046,469	3,046,469
Construction	0	0	9,442,275	9,442,275
Manufacturing	0	0	26,436,890	26,436,890
Transportation, Communication and Utilities	0	0	33,089,672	33,089,672
Trade	0	0	74,984,848	74,984,848
Finance, Insurance, and Real Estate	0	0	73,671,768	73,671,768
Services	0	0	107,979,208	107,979,208
Government	0	0	6,888,419	6,888,419
Other	533,000,000	0	969,064	533,969,056
Total	533,000,000	0	339,501,068	872,501,060

Table I-14. Impact of the Green Industry Activity on Total Personal Income (Direct, Indirect, Induced and Total Effects) Estimated with the 1999- Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	0	0	106,594	106,594
Agricultural, Forestry, Fishery Services	0	0	610,341	610,341
Landscape and Horticultural Services	0	0	196,211	196,211
Mining	0	0	740,127	740,127
Construction	0	0	3,625,061	3,625,061
Manufacturing	0	0	4,069,289	4,069,289
Transportation, Communication and Utilities	0	0	8,316,337	8,316,337
Trade	0	0	33,927,688	33,927,688
Finance, Insurance, and Real Estate	0	0	11,157,059	11,157,059
Services	0	0	57,300,280	57,300,280
Government	0	0	1,987,399	1,987,399
Other	454,020,000	0	969,064	454,989,056
Total	454,020,000	0	123,005,449	577,025,441

Table I-15. Impact of the Green Industry Activity on Gross State Product (Direct, Indirect, Induced and Total Effects) Estimated with the 1999- Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	0	0	166,984	166,984
Agricultural, Forestry, Fishery Services	0	0	838,830	838,830
Landscape and Horticultural Services	0	0	294,590	294,590
Mining	0	0	2,030,146	2,030,146
Construction	0	0	3,814,532	3,814,532
Manufacturing	0	0	6,717,384	6,717,384
Transportation, Communication and Utilities	0	0	18,936,764	18,936,764
Trade	0	0	55,597,312	55,597,312
Finance, Insurance, and Real Estate	0	0	51,986,788	51,986,788
Services	0	0	66,887,148	66,887,148
Government	0	0	2,809,887	2,809,887
Other	563,865,024	0	0	563,865,024
Total	563,865,024	0	211,049,428	774,914,475

Table I-16. Impact of the Green Industry Activity on Employment (Direct, Indirect, Induced and Total Effects) Estimated with the 1999- Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	0	0	5.4	5.4
Agricultural, Forestry, Fishery Services	0	0	37.9	37.9
Landscape and Horticultural Services	0	0	16.6	16.6
Mining	0	0	11.6	11.6
Construction	0	0	113.3	113.3
Manufacturing	0	0	119.6	119.6
Transportation, Communication and Utilities	0	0	194.2	194.2
Trade	0	0	1,839.40	1,839.40
Finance, Insurance, and Real Estate	0	0	382.9	382.9
Services	0	0	2,063.30	2,063.30
Government	0	0	49.3	49.3
Other	18,905.00	0	111.7	19,016.70
Total	18,905.00	0	4,945.30	23,850.30

Table I-17. Impact of the Entire Green Industry on Gross Sales (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	105,000,000	14,687,024	456,750	120,143,776
Agricultural, Forestry, Fishery Services	0	2,388,676	4,564,734	6,953,410
Landscape and Horticultural Services	265,000,000	213,200	941,428	266,154,624
Mining	0	2,044,500	6,070,551	8,115,051
Construction	0	9,080,140	18,815,162	27,895,302
Manufacturing	0	14,267,513	52,679,512	66,947,024
Transportation, Communication and Utilities	0	23,881,176	65,936,184	89,817,360
Trade	351,000,000	10,852,783	149,418,672	511,271,456
Finance, Insurance, and Real Estate	0	19,994,400	146,802,176	166,796,576
Services	0	33,488,828	215,164,944	248,653,776
Government	0	2,659,512	13,726,218	16,385,729
Other	684,000,000	0	1,931,008	685,931,008
Total	1,405,000,000	133,557,752	676,507,338	2,215,065,091

Table I-18. Impact of the Entire Green Industry on Total Personal Income (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	48,828,648	6,829,977	212,405	55,871,028
Agricultural, Forestry, Fishery Services	0	1,172,839	1,216,196	2,389,035
Landscape and Horticultural Services	110,054,768	88,542	390,976	110,534,288
Mining	0	495,391	1,474,815	1,970,207
Construction	0	4,834,495	7,223,483	12,057,978
Manufacturing	0	2,654,717	8,108,674	10,763,391
Transportation, Communication and Utilities	0	6,679,457	16,571,562	23,251,018
Trade	173,773,616	4,516,338	67,606,064	245,896,016
Finance, Insurance, and Real Estate Services	0	5,203,834	22,232,130	27,435,964
Government	0	16,271,770	114,179,496	130,451,264
Other	522,186,880	0	3,960,194	5,072,650
Total	854,843,912	49,859,813	1,931,008	524,117,856
			245,107,003	1,149,810,694

Table I-19. Impact of the Entire Green Industry on Gross State Product (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model

Industry	Direct	Indirect	Induced	Total
-----Dollars-----				
Greenhouse and Nursery Products	76,492,240	10,699,460	332,741	87,524,440
Agricultural, Forestry, Fishery Services	0	1,489,892	1,671,496	3,161,387
Landscape and Horticultural Services	165,235,072	132,936	587,007	165,955,024
Mining	0	1,362,537	4,045,373	5,407,910
Construction	0	5,087,437	7,601,034	12,688,470
Manufacturing	0	4,222,707	13,385,405	17,608,112
Transportation, Communication and Utilities	0	13,236,728	37,734,376	50,971,104
Trade	291,658,784	7,666,901	110,786,072	410,111,744
Finance, Insurance, and Real Estate Services	0	12,938,936	103,591,560	116,530,496
Government	0	20,472,702	133,282,784	153,755,488
Other	654,045,760	1,342,809	5,599,126	6,941,935
Total	1,187,431,856	78,653,043	1,931,008	655,976,768
			420,547,982	1,686,632,878

Table I-20. Impact of the Entire Green Industry on Employment (Direct, Indirect, Induced and Total Effects) Estimated with the 1999-Based Louisiana Input-Output Model.

Industry	Direct	Indirect	Induced	Total
	-----Dollars-----			
Greenhouse and Nursery Products	2,473.40	346	10.8	2,830.10
Agricultural, Forestry, Fishery Services	0	91.7	75.6	167.3
Landscape and Horticultural Services	9,320.40	7.5	33.1	9,361.00
Mining	0	7.8	23.2	31
Construction	0	145.2	225.8	371
Manufacturing	0	59.8	238.4	298.2
Transportation, Communication and Utilities	0	158.4	387.1	545.4
Trade	11,097.30	142.3	3,665.20	14,904.80
Finance, Insurance, and Real Estate	0	214.4	763	977.5
Services	0	572.2	4,111.40	4,683.60
Government	0	23.2	98.2	121.5
Other	22,171.70	0	222.5	22,394.20
Total	45,062.80	1,768.50	9,854.20	56,685.60

## VITA

Raul A. Pinel was born on May 3, 1970, in Choluteca, Honduras. He studied in his hometown until ninth grade at Santa Maria Goretti Catholic School. Raul moved to Tegucigalpa to finish high school at San Miguel Catholic High School. From 1986 to 1987, Raul was part of the public speaking team and won several oratory contest at local, state and national levels.

Upon graduation, Raul was awarded with a scholarship to study at Zamorano (Pan American Agricultural School) twenty-five miles away from the capital Tegucigalpa. After three years, in December 1991, Raul graduated with a technical degree in tropical agriculture, and then began working as a research assistant in May 1992 at Zamorano. After two more years of study, he earned a bachelor of science in agricultural economics and agribusiness in Spring 1994.

In May 1994, Raul began working at Zamorano as the Administrator of the Academic Computer Center and was an instructor in Agricultural Computer Science I and II, Agricultural Accounting, Agricultural Statistics, Agricultural Economics, Management of Small Agricultural Businesses and Agricultural Administration. In November 1994, Raul won the prize for the best agricultural research in Monteria, Colombia in a Latin American Contest with participants from countries in the Caribbean, as well as Central and South America.

From 1994-1998, Raul traveled to many conferences, seminars and workshops in Latin America, U.S. and Europe, and was involved in organizations that provided help to visually impaired people. Those events were sponsored by the German Agency for International Cooperation, The United States Agency for International Development and other non-profit organizations.

In June 1998, Raul decided to go to Lewiston , Idaho, to learn English. He spent four months there and returned to his job until the October 1998. In January 1999, Raul returned to Lewiston after being awarded a scholarship for the Intensive English Institute (IEI), graduating with honors and finishing all seven levels.

In Fall 2000, Raul began studies at Louisiana State University seeking a master's degree, completing his studies in Spring 2003. After graduation, Raul plans to begin working in the field of research and/or education, which is the best way to practice all the skills learned during the last few years. After some work experience, he plans to return to school and finish a doctoral program to complete his education.