

**The 2012 Economic Impact Study
of
Rhode Island
Plant-Based Industries and Agriculture
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Executive Summary

The key findings of this study are as follows:

1. Total revenues in our sample of businesses are estimated at \$886.53 million, with annual average employment estimated at 6,882 jobs. Our conservative estimates for the state-level direct contributions of green-related industries are \$1.03 billion in revenues, and more than 8,700 jobs. It is likely that the true numbers are higher. These figures are net of any indirect economic effects.
2. The value of agricultural revenues in the State does not appear to be fully reflected in the 2007 Ag Census. Our conservative estimate of the correct value is approximately \$170 million (as compared to \$65.9 million), supporting just over 1,790 jobs (almost 10% more than the official estimate).
3. It appears the Bureau of Labor Statistics official estimates from the QCEW substantially underestimate employment in the areas of Landscaping Services, Landscape Architecture, Florists, and Nursery/Garden Supply Stores. Similar inconsistencies were found in the 2007 Economic Census. Our conservative estimate for these sectors, at the state level, is approximately \$705 million in annual revenues, supporting 4,775 jobs.
4. We estimate the annual revenues of Rhode Island's golf courses and country clubs at about \$144.5 million, accounting for 1,850 jobs.
5. Total economic impact to gross state product is estimated to be \$1.78 billion, supporting 12,372 jobs. These figures include \$754.9 million in indirect economic benefits to other sectors of the State economy, and 3,664 jobs in those sectors.

Acknowledgements

The study is the result of a multi-year collaboration among the University of Rhode Island (URI), the RI Nursery and Landscape Association (RINLA), the RI Turfgrass Foundation (RITF), the RI Agricultural Partnership (RIAgP), the RI Department of Environmental Management (DEM), and the RI Economic Development Corporation (RIEDC).

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Introduction

Rhode Island is the smallest state in the union, but among the most diverse in terms of agricultural production and plant-based industry. Despite the State's small size, estimating the economic impact of these sectors has proven difficult. At the outset of this study, a number of public officials indicated that reliable estimates of economic impacts were unavailable, and local industry groups claimed that the relevant, published Federal government estimates were too low (personal communications, 2011-2012: Kenneth Ayars, Catherine Sparks, Ed Walsh, David Wallace, Shannon Brawley, Tom Sandham, and Dr. Kenneth Payne).¹

In addition, plant-based industry, as a group, defies standardized industry classification systems (e.g. SIC, NAICS) because these businesses reside under such disparate categories as retail, wholesale, services, and entertainment. As a result, the impact of these businesses may be both underestimated and improperly aggregated for the purpose of current policy discussions. This study attempts to fill the knowledge gap surrounding the economic impact of agriculture and plant-based industry in Rhode Island and to correct any misinformation or misconceptions that may exist.

We focus on plant-based industry and agricultural production because of their long and prominent history in Rhode Island, and their interconnectedness extending to the present day. Beyond food and horticultural agriculture, the plant-based industries we include are landscape (and related) contractors, designers, and maintenance professionals, retail farm and garden supply, golf courses, and other related and supporting industries. However, though they qualify according to our definition, this study does not include estimates for forestry, wood products, or aquaculture, due to limitations on available data.² Herein, we refer to all sectors included, collectively, as "green-related industry", in keeping with the terminology of recent economic impact studies of environmental horticulture (e.g., Hall et al., 2005).

Economic data, including revenues and employment, were collected with a survey of local green-related businesses, and combined with records from ReferenceUSA, a frequently updated, industry-standard database of 14 million U.S. firms. For known businesses where individual economic data were unavailable, conservative estimates were derived from state-level profiles including the 2007 USDA/NASS Agricultural Census, contractor and business listings from the RI Secretary of State's office, and licensing information from the RI Department of Environmental Management. In our attempt to provide the most accurate estimates possible, every business for which economic value is estimated in this study has been individually counted; we used no random sampling and businesses not uniquely identified by name and address are ignored in our estimates, despite the risk of substantial under-counting. As a result, our estimates are best considered a *lower bound* on economic value estimates, rather than estimates of the true value.

¹ Ayars is Chief, DEM Division of Agriculture; Sparks is Chief, DEM Division of Forest Environment; Walsh is Executive Director, RITF; Wallace is Past-President, RITF; Brawley is Executive Director, RINLA; Sandham is Past-Director, RIAGP; and Payne is Director, RIAGP.

² These sectors are likely to be substantial; a recent study produced by the University of Connecticut estimated the economic impacts from RI commercial fishing and related processing alone at \$274 million per year and 2,900 jobs (Farm Credit East, 2012).

We find that Rhode Island's geographic pattern of sizes and types of green-related businesses may contribute to perceived inaccuracies in the Federal government figures, because it is difficult for a statistical sample to be representative of the State as a whole. Furthermore, there are also historical reasons why official estimates may be lacking. In the Agricultural Census, USDA has a different objective than evaluating economic impact: they count the "market value of agricultural products sold," (USDA, 2007) a measure that includes neither value-added (like selling apple pies, or markup at farmers markets – unless explicitly reported), nor farmer-provided services (such as turf installation or equipment repair). In the case of the landscaping industry, Rhode Island lacks formal licensing for generalized landscape contracting, unlike many other states. Thus, as revealed in our study, requests to the Secretary of State for a list of landscape-related contractors will return a list of contractors licensed for irrigation, hardscape, excavation, pesticide, and arborist licensing, but will omit many lawn care and garden design/installation businesses. Combined, these reporting differences have led to a systematic reduction in the perceived value of Rhode Island's green-related industry.

We estimate gross revenues (direct economic impact) of green-related businesses at \$1.03 billion per year, and we estimate employment at just over 8,700 jobs. In addition, using conservative adjustments to the latest (2007) RIMS II multipliers, we estimate indirect contributions to other sectors of \$755 million annually and 3,660 additional jobs. The total impact of \$1.78 billion represents more than 3.5% of RI's gross state product (GSP). These numbers are surprising for two reasons: 1) they represent a vibrant component of the State's economy despite being highly conservative, and 2) they are more than double the estimates of local industry groups.

The remainder of this paper is laid out as follows:

This brief introduction is followed by a background of green-related industry in the State, to help explain the choice of sectors for inclusion in the study.

After the background discussion, the following section details the inputs and outputs: which data were used, how they were acquired, and what was produced. It includes a brief discussion of the breakdown of green-related businesses in this study, and how estimation required these businesses to be divided up according to data sources, whereas they are reported according to more traditional categories of Agriculture, Landscaping and Related, Retail Nurseries/ Farm-and-Garden Supply and Florists, Golf Courses, and Other (for those businesses that do not fit neatly into the categories, like wholesale grocers, or agricultural veterinary support).

Next, the State-Level Estimation section details summary statistics of our collected business-level data, and the way in which we extrapolated these observations up to the state-level.

These estimates are followed by the Economic Impact Estimation section, which details the calculation of modified RIMS II multipliers for estimating indirect economic benefits and jobs, and which demonstrates the application thereof to the green-related sectors evaluated herein.

The uninterested reader may skip to the Findings section (immediately following Economic Impact Estimation), where we detail the results of the estimation process, including estimates of direct economic value and jobs alongside estimates of indirect (additional) economic impacts arising elsewhere in the State's economy.

The final section discusses our results in the context of existing estimates and perceptions, and concludes the analysis.

Background

Plant-based industry and agriculture are included together in this study because of their interconnected histories in Rhode Island. These RI green-related industries, in the form of agriculture, horticulture, and groundskeeping, date back to the 17th century. Landscaping and landscape architecture started to become established during the Estate Era of the 1840s in Newport, RI, and took off during the post-Civil War “gilded age.” During this time, Frederick Law Olmsted, whose firm did a great deal of work in Rhode Island, famously designed the Stoneacre estate, and his sons carried on his legacy, for example, by creating the master plan for the University of Rhode Island campus (Eudenbach, 2010). The two oldest, currently operating nurseries in the State were founded before 1900, and are included in this study. During the first half of the 20th century, a number of new nurseries and landscaping businesses were established in Newport County and Washington County, RI; a significant number of these were established by immigrants from Holland, Czechoslovakia and Italy, and are still in business today (personal communication, Dr. William Johnson and Dr. Susan Gordon, November 2012).³

Since the Second World War, Rhode Island’s agricultural acreage has declined 75%, from 40 percent of the state’s land area in 1945 to 10 percent in 2007. However, the declines in land area were offset by efficiency gains: by the early 1960s, Rhode Island dairies were ranked fourth in the nation in milk production per cow; broiler chicken and egg production had more than doubled despite a more than 65% reduction in the number of poultry farms; potato yields per acre had almost doubled; and apple production efficiency had more than tripled to seven bushels per tree (Griffiths, 1965). Throughout Rhode Island agriculture there was a shift to crops producing higher net income per acre.

By 1970, 55% of nurseries had been established in the prior 20 years, and horticultural products had become the second largest source of cash receipts for agriculture, behind only dairy (Bristol, 1972, p. 19). The growth was driven in large part by out-of-state demand, with 87% of Rhode Island’s wholesale [nursery] production shipped to other states, primarily Massachusetts and New York (Bristol, 1972, p. 42). This rapid change in production was made possible by conversion of land vacated by potato and dairy farms to nursery, without re-forestation in between (Seaton, 1973). Collaboration with the University of Rhode Island (URI) also played a role: during the 1960s and 1970s, Dr. John McGuire aided the local, regional and national greenhouse/nursery industry with his work on plant diseases, propagation and potting mixes (personal communication, Dr. Susan Gordon, November 2012). During the 1970s, Washington County potato farmers began to convert their operations directly to sod production, with scientific and technical guidance from URI’s Dr. C.R. Skogley. By 1980, eight sod farms were producing 17% of “on-farm value” in the State, ahead of dairy production and behind only nurseries, which produced 31% of on-farm value with 133 farms (Wright and Sullivan, 1982).

In the late 1970s and early 1980s, pressure from suburban development led to creation of a Governor’s Task Force to protect agricultural lands and open space in Rhode Island. The “Farm, Forest and Open Space” statute was overhauled (Rhode Island General Laws [RIGL] ch. 44-27; P.L. 1980, ch. 252), the Farmland Preservation program was created (RIGL 42-82, P.L. 1981, ch.

³ Johnson is Professor of Plant Sciences (Retired, URI) and Gordon is Kinney Azalea Garden Manager.

299), farm machinery and equipment were exempted from the sales and use tax (RIGL, sec. 44-18-30 (32)), and a “Right to Farm” was established (RIGL, ch. 2-23; P.L. 1982, ch. 10, § 1). Together these changes increased the feasibility of continuing agricultural operations and stopped the declining trend in agricultural lands. Continued suburbanization in the State and in New England sustained demand for nursery/greenhouse materials and sod, and brought more consumers closer to RI farms, increasing the opportunity for direct to consumer sales. In 1985, the value of agricultural sales equaled \$93 for every acre of land in Rhode Island, compared with \$63 nationally, including \$1,005 for each acre of farmland compared to \$144 nationally (Smith, 1987).

One driver of direct sales, the farmers market movement, began in RI in the early 1990s and has flourished up to the present day. The number of farmers markets approaches 50, and additionally, according to RI DEM data there are 46 recorded farm stands, 24 pick-your-own orchards, 16 pick-your-own berry farms, 47 Christmas tree farms, where trees could be selected and cut, 12 community supported agricultural initiatives, and 5 vineyards that could be visited.⁴ Since 1997, Rhode Island has been in the top three states in the U.S. in terms of direct-to-consumer food marketing as a share of total agricultural sales, and ranked first in the nation in 2007 (USDA AMS, 2009). Notably, these figures exclude nursery and horticultural products, the largest sector of Rhode Island agriculture.

Thus, plant-based industry and agriculture have deep, interconnected histories in Rhode Island, a reflection of post-World War II economic conditions and development patterns in the State. These sectors have been key players in suburbanization trends and in historical and ongoing policy discussions about the preservation of open space. It is for these reasons that we group plant-based industry and agriculture together under the moniker of green-related industry, and analyze them concurrently for the purposes of this study.

Understanding the Impact Study: Data Inputs and Results

Defining the Green-Industry Sectors. Broadly, the green-related industry sectors included in this study are agriculture, landscape, retail farm and garden supply, golf and other. Agriculture includes food, feed, fiber, and fuel crops, dairy and livestock production, wholesale nurseries and horticultural/greenhouse operations, cut flower growers, and sod growers. Landscape includes landscaping contractors, arborists, parks and recreation services, lawn and turf installation and maintenance, landscape architects and designers, and masonry contractors. Retail supply includes retail lawn and garden centers, florists, farm supply, plant brokers, landscape supply (paving, mulch, seed, etc.), and outdoor power equipment dealers. Golf courses are defined to be 9- and 18-hole public and private golf courses and country clubs. Other green-related industries include agricultural support industries, such as veterinary services, farm product and grocery wholesalers, other landscape-related contractors and suppliers, and cemeteries.

This study combines observations of individual businesses with statistical estimates and aggregated listings of businesses at the state level. Our individual data come from a questionnaire administered in 2011 by the RI Nursery and Landscape Association, the RI Turfgrass Foundation, the RI Agricultural Partnership and the URI College of Business, which

⁴ DEM counts taken between 2008-2011, depending on farm type.

was supplemented by business listings downloaded from the ReferenceUSA database in early 2012. Aggregate data were collected from the most recent USDA/NASS Agricultural Census (2007) for a statistical profile of Rhode Island farms, and current lists of business names, locations and types (without economic data) were provided by the RI Secretary of State's Office (for landscape and related contractors), and the RI Department of Environmental Management (for retail nurseries, farm-and-garden supply stores, and florists). Table 1 summarizes these data sources.

The Survey. A questionnaire including economic information was sent to 1,200 agricultural, landscaping and golf-course businesses, of which 210 returned a completed response. Twenty-two of the returned questionnaires were completed at farmers markets, and contained no identifying information for the responding business. To avoid double-counting, these 22 responses were dropped from the sample. Of the remaining responses, 67 were successfully matched to the ReferenceUSA data to validate data consistency across the two sources, and the rest constituted 121 unique observations at the business-level.

ReferenceUSA. ReferenceUSA is an industry-standard database of business listings and economic information for those businesses collected from state and local records and filings, tax returns, and phone call follow-ups by Infogroup, Inc., which administers the database. The database is subscribed to by thousands of libraries and research organizations around the country, and is recognized as the most comprehensive business listing in the United States, with more than 14 million business listings.

Using NAICS (North American Industry Classification System) and SIC (Standard Industrial Classification) we downloaded a table of all green-related businesses in RI, defined as having their primary or secondary classification falling in a green-related category. A complete list of the codes and their corresponding definitions can be found in Table 23 of the Appendix. The resulting list of more than 2,000 business was hand-checked to remove all firms that were not green-related (by verifying business names and descriptions), and to remove duplicates. After cleaning, the final list contained 967 unique observations of business locations, for which 10 businesses in our sample had multiple locations (23 in total). Our survey instrument did not address whether or not businesses had multiple locations. Since 67 businesses overlapped with the survey, the combined data set at the business-level included 1,088 observations, which are included in the analysis.

RI Department of Environmental Management Listings (2011-2012). RI DEM provided the 2011-2012 State of Rhode Island Directory of Certified Nurseries and Licensed Nursery Stock Dealers. Every florist in our business-level data (and no more) was included in the DEM listings, but the listings did reveal an additional 187 retail garden supply centers not included in our business-level data. 135 of these were branches of big chains (supermarkets, Home Depot, Lowe's, Walmart, etc.), and 52 were non-chain retailers. All businesses from the DEM listings are included in our end results, and those without available economic data (including the nursery centers in big box retailers) are estimated conservatively as described below.

RI Secretary of State Listings (2012). The RI Secretary of State's Office (herein, "SecState") provided listings of licensed landscape and landscape-related contractors and other assorted

green-related businesses. While there was extensive overlap between our business-level data and the SecState listings, there were also a substantial number of additional businesses listed that were uncounted in the other data sets. These included nine retail businesses, 28 landscape architecture firms, and 465 landscape and landscape-related contractors, as well as several other types of businesses. The exact breakdown is detailed in the section on generating state-level estimates, below.

USDA/NASS Agricultural Census (2007). The US Department of Agriculture’s National Agricultural Statistics Service (NASS) conducts a nationwide agricultural census every five years. This census evaluates market values of agricultural produce and livestock, but ignores value-added activities in order to provide an apples-to-apples comparison across the whole U.S. The Ag Census claims to include all farms with revenues greater than \$1,000, of which there are 1,219 in Rhode Island. Nonetheless, recent local estimates indicate there may be as many as 3,000 farms of eligible size in the State (personal communication, Dick Went and Kate Sayles, July 2012).⁵ However, since these other estimates are unofficial and unpublished at this time, we defer to the Ag Census for statistical evaluation of agriculture in RI.

The Ag Census provides aggregate and dis-aggregated estimates of farm revenues, employment and counts of farms, broken down by county, NAICS code, and farm size. County-level data were excessively censored when also broken down further, so we used the NAICS and farm size counts to generate a bivariate probability distribution of RI farms according to size and type (NAICS). The details of this process, and how it was applied to our data, will be discussed in the Estimation section.

Results. This study uses the above data inputs to produce state-level estimates of direct economic value and jobs, broken down by categories of Agriculture, Landscaping and Related, Retail Nurseries/Farm-and-Garden Supply and Florists, Golf Courses, and Other, as well as by 6-digit NAICS codes. The direct impact estimates are then used to estimate indirect economic impact and job creation in other RI industries, via RIMS II multipliers.

Generating State-Level Estimates

This section describes the estimation process for extrapolating business data up to the state level. All farms are extrapolated together using the Ag Census as a statistical profile, whereas landscape and landscape-related contractors and retail nurseries/farm-and-garden supply stores are extrapolated based on observed data, with the total numbers of businesses to be extrapolated given by the listings from RI DEM and RI Secretary of State. Each grouping of extrapolated businesses is preceded by highlights of the details in our business-level data sample, before estimation methods are discussed.

While substantial, it is clear that our sample of 1,088 businesses does not constitute the full population of green-related industry in Rhode Island. For extrapolation purposes only, we divide the businesses in our sample into four groups: 1) farms, 2) landscape and landscape-related, 3) retail nurseries and farm-and-garden supply, and 4) all other. The ‘all other’ group is defined as

⁵ Went is President of the RI Association of Conservation Districts, and Sayles is Forestry and Agriculture Technician at Northern RI Conservation District.

such because we had access to no additional information – either another sample of businesses, or an aggregated state-level profile – so for these businesses we are forced to treat our sample as if it were the entire population. Since it is highly unlikely that we have in fact observed the entire state-level population of these businesses, this assumption introduces a strong, conservative bias in any aggregated estimates we produce.

For farming businesses, we are able to extrapolate based on comparing our sample against state- and county-level profiles of business size, in terms of employment and revenues, produced by NASS in the 2007 Agricultural Census. Farming businesses in our (usable) sample numbered 204, compared with 1,219 farms counted in the Ag Census. For landscape-related businesses, we were able to obtain data from the RI Secretary of State’s office, which identified 510 uncounted businesses, including various landscape-related contractors and landscape architects. For the retail businesses, our results were cross-checked against both the SecState Data and the RI DEM listings, identifying 196 unaccounted-for retail businesses (187 supply stores from DEM, and five from SecState, as well as four outdoor power equipment dealers from SecState). Of note are two small categories for which we can be reasonably certain that our business-level data contains the full population: florists and golf courses. Our combined listings of florists from the survey and from ReferenceUSA exactly matched the florists listings from RI DEM, and private conversations with the RI Turfgrass Foundation confirmed that we obtained data on the full set of golf courses in the State.

Table 2 provides a breakdown of our data by category, as defined above. These are the raw values for the observed businesses, and do not include extrapolation to the state-level, or estimation of indirect economic multiplier effects. Please see Table 23 for a breakdown of the categories and their correspondence with NAICS codes.

Farms – Our Sample. Farming businesses in our sample totaled 204, while the Ag Census reported 1,219 farms. The breakdown of our 204 farms includes 191 “crop related” farms, which are described by the 3-digit NAICS code 111. The Ag Census data reported 705 such farms. The remaining 13 farming businesses in our sample were “animal-related” farms, NAICS 112, compared to 514 farms reported in the Ag Census. Also, the crop-related farms employ a mean of 4.64 workers compared to a mean employment of 5.31 in animal-related farms. Thus, our sample is much more representative for crop-producing farms than for animal-producing farms, another example of the difficulty in developing state-level estimates from survey samples in RI.

It should be noted that although we collected our ReferenceUSA data using NAICS codes, the survey data did not give a detailed systematic NAICS description of each farming business. Occasionally, the descriptions provided were omitted or vague. In these cases we categorized the businesses by NAICS code 111998 “All Other Miscellaneous Crop Farming” or 112990 “All Other Animal Production.” In our sample, 118 farms were categorized as 111998 “All Other Miscellaneous Crop Farming,” and 62 farms were classified as 111421 “Nursery & Tree Production,” which includes sod farms and all nursery/horticultural growers, an important sector in Rhode Island agriculture. However, the lack of detail in farm description does not affect the total employment or revenue numbers in our sample, as explained in the extrapolation section below.

In our sample data, farming businesses employ 954 people with a mean of 4.68 workers per farm, compared to 1,641 people with a mean of 1.35 workers per farm, reported in the Ag Census. This suggests that our farms sample was disproportionately representative of larger farms in the State, an issue we address in the extrapolation process. Table 3 below provides a breakdown of the number of farms in each county within certain ranges of employment. The employment ranges were chosen for consistency with the Ag Census data format.

The value in our sample data of 204 farm businesses totaled \$161,855,500 in sales, with a per-farm average of \$793,409. The Ag Census reported total sales of \$65,907,000 million dollars and a mean of \$54,066 per farm. These are simply the raw numbers added up – they do not yet include any accounting for the large number of farms missing from our sample. Table 4 shows that the majority of our sample has sales well above \$100,000 dollars with the bulk of large revenue farms located in Providence and Washington counties. As a result, our mean sales per farm are markedly higher. Specifically, the mean of sales for “crop farms” was \$803,390 dollars and “animal farms” was \$646,769 dollars; for the Ag Census these numbers were \$78,997 and \$1,987, respectively. Again, it is clear that larger farms are relatively better-represented in our sample, a condition for which we correct in making our extrapolation to the state-level economy.

Farms – Extrapolation. In all cases of extrapolation we produce a conservative estimate by assuming that all firms not counted in our sample are among the smallest in terms of employment and revenues. For the farm extrapolation our methods are slightly different than for landscape-related or retail businesses, due to the type of data available. For both farm revenues and employment, individually, we sorted the farms from the lowest to the highest and then counted the missing firms from the bottom-up until the uncounted firms in our sample were equal to the total population. In this manner we produce the most conservative, yet complete estimate possible for the missing farms. The estimate is made further conservative by the fact that the Ag Census does not count many value-added activities, a significant source of income for Rhode Island farmers. As a result, our sample of 204 farms accounted for sales nearly three times as large as the Ag Census estimate for all 1,219 farms.

Given that larger farms were over-represented in our sample, we chose a very conservative extrapolation method. This is not to say that large farms were over-counted, but rather that a larger share of small farms are missing from our sample. As mentioned above, 6-digit NAICS code detail was not available on all of our farms (we often had them recorded as miscellaneous crop or miscellaneous animal farming, which is 3-digit detail). In a nutshell, we took the distribution of all farms, by revenue dollars (and then separately, by employment), and chose to fill in the farms missing from our sample as if they were the smallest ones remaining in the counts provided by the Ag Census.

Table 5 shows the counts of farms by size, in terms of revenues, according to the Ag Census, and contrasts them against the counts in our sample. Two things should immediately become apparent: we found that more large farms existed than were counted in the Ag Census, and we missed a lot of very small farms. However, when we extrapolate to the state level, we add in only missing farms *from the smallest to the biggest*. That is, for each category of sales size, we take the average revenues and multiply by the missing number (the difference column) before adding it to our state-level total. Thus, since we know that we are missing 1,015 farms, we take the

smallest 1,015 from the difference column and, therefore, include only 23 of the 49 missing farms in the last row of the table. As a result, all of the revenues we added through this process are for farms smaller than \$100K. This extrapolation process is very conservative, because we allow no probability of medium or large size farms to be missing from our sample. The method resulted in estimated additional revenues of \$8.80 million (combined, for more than 1,000 farms), on top of counted revenues of \$161.86 million.

For farm employment, we used a similar method. For our 204 farm observations from the ReferenceUSA and survey data combined, we obtained a count of 955 jobs. We then obtained the breakdown of farms by number of employees, from the Ag Census. Table 6 shows the resulting estimates. Once again, we counted every missing farm as if it were the smallest one remaining, and then estimated the missing workers according to the number of missing firms in an employment category times the average employment in firms of that size, according to the Ag Census figures.

The final, conservative estimate for farm revenues (NAICS 111- and 112- only) is \$170.65 million, accounting for 1,793 jobs. These are estimates of direct economic benefits, and do not include estimated indirect economic value or indirect jobs impacts in other sectors.

A note on Vineyards and Wineries. Our sample contains revenues and employment data for the four largest vineyard/winery operations in RI. In the ReferenceUSA data, two were classified as Grape Vineyards (NAICS 111332, a sub-code of crop-based agriculture), while two were classified as Wineries (NAICS 312130). While the reasons for classification are unknown, we defer to the classifications found in the ReferenceUSA database. For reasons of confidentiality, names and details of the operations are not disclosed here, though all four are of similar size. For reference purposes, counting the two ‘Winery’ operations as agriculture would add approximately \$6.4 million and zero jobs to our extrapolated counts for Agriculture (removing them from Other). There would be a negligible difference of 3% less indirect value for this amount (\$192K) in the multipliers section below.

Landscape and Landscape-Related Businesses. As stated above, we crossed checked our data against the SecState’s landscape data to insure there was no double counting of landscape-related businesses in our sample, or in the extrapolated estimates. Our combined sample (from the survey and from ReferenceUSA) of landscape-related businesses in Rhode Island numbered 520, including 14 site preparation and masonry contractors, and 506 firms in landscaping (466) and landscape architecture (40). The NAICS descriptions for those firms classified as ‘landscape-related’ can be found in Table 7.

Before any extrapolation, we counted \$258.0 million in revenues for these businesses, and 2,259 jobs. The SecState data revealed an additional 531 landscape-related firms (in addition to three “other” and nine retail businesses). The largest category was landscaping services, with 465 firms. Notably, these data include 19 observations classified as NAICS 221310 “Water and Irrigation Systems,” for which we have no comparable businesses in our sample, as well as two observations classified as NAICS 484220 “Specialized Freight” (Hauling). Thus, these businesses cannot be reliably included in our employment and revenue calculations, so they are

omitted in order to keep estimates conservative. This left 510 firms to bring our estimates to the state-level.

For these businesses, we do not have any outside breakdowns of business sizes in the population at the state level. In order to keep estimates conservative, we treated each business outside our sample as if it came from the *smallest* 25% of businesses in terms of revenues (and separately, from the smallest 25% sorted by employment). The surplus businesses from the SecState data were thus counted as having sales and employment equal to the average of the bottom quartile in our sample. One notable exception was a landscape lighting firm. We had only one such firm in our sample with sales of \$4.6 million and 15 employees. To avoid overestimating, we counted the landscape lighting firm to be extrapolated as if it were landscaping services (\$151.9K and 1.52 employees, bottom quartile average). The extrapolation results can be found in Table 8.

The total estimates for landscape-related businesses not included in our original sample are additional revenues of \$81.06 million and 775 additional jobs. As with the agricultural estimates, the actual total is likely higher. Adding these totals to the counts in our data, we obtained conservative estimates for landscape-related businesses totaling direct economic benefits of more than \$339.1 million in annual revenues and 3,034 jobs.

Retail Nurseries and Florists, Garden Centers and Supply. Our combined sample of retail businesses in Rhode Island numbered 258, including 136 florists, 103 retail nurseries and garden centers, and 19 outdoor power equipment stores. Table 9 contains the NAICS descriptions for the Retail businesses in our data set.

All florists listed in the DEM Registry were observed in our data set, and vice versa, so we are reasonably confident that we have the full state-level population of florists actually counted. Florists alone contribute 791 jobs and \$69.61 million in sales to our direct economic impact estimates for the retail sector of green-related industries. In total, the retail businesses in our sample contribute \$241.0 million in revenues and 1,513 jobs. Extrapolation for the green-related retail sector was done in the same fashion as for landscape-related firms, by assuming that any missing firms came from the average of the bottom quartile of firms in our data set, by NAICS code. This assumption is particularly conservative for the retail businesses because of the large number of big-box retailers included in the group to be extrapolated. Including extrapolation for the missing firms, we estimate direct economic value from all retail firms at \$290.55 million of revenues and 1,723 jobs.

Beyond comparing the list from RI DEM against our sample, we obtained Federal government estimates of state-level totals for number of firms and employment for these NAICS codes, to compare the total counts. The estimates were 2010 annual averages, estimated from the Quarterly Census of Employment and Wages (QCEW), obtained from the data warehouse on the website of the Bureau of Labor Statistics (BLS): <http://data.bls.gov>. As with the Ag Census, comparison of our analysis against the BLS data indicates substantial under-counting of green-related businesses in the official numbers. For example, QCEW/BLS counted 190 workers in 39 firms for the Garden Supply stores category, while we counted 633 workers in 103 firms, and our conservative state-level estimate is 837 jobs at 295 firms. Our estimates thus indicate under-counting of employment in this sector by BLS by a factor of four. Florists and Landscape

Architecture firms were also under-counted in the BLS data, though not quite as severely. While our sample itself did not individually count more workers in Landscaping Services than did BLS, our conservative estimate of the full state-level total indicates BLS under-counting these workers by almost 20%.

Golf Courses and Country Clubs. Our combined survey and ReferenceUSA data contained 62 business locations (59 firms) for golf courses and country clubs in Rhode Island, generating \$144.56 million in sales and 1,872 jobs. The RI Turfgrass Foundation confirmed that no golf courses in the State were missing from our sample, so no extrapolation is needed for this category.

All Other Green-Related Business Types. The breadth and quality of our sample data allowed us to capture agriculture and landscape-related businesses that were not represented in the Ag Census, the State-Landscape or other available datasets. The Other category contains 44 businesses, generating \$81.1 million in sales and 284 jobs. Table 11 breaks down the NAICS codes included in the Other category and the number of firms in our business-level sample.

Some of these categories bear explanation as to their inclusion in this study. Cemeteries and Crematories are included as they are an alternative landscape services category (grounds care) – our study omits a very large number of these firms in the State. Veterinary services firms are included in our study only if they are described as being involved in agricultural support activities. Likewise, the lone architectural firm we included is self-described as being involved in landscape architecture and design. The lone ‘broken stone’ operation (NAICS 212319) is a gravel, mulch and topsoil seller, and might easily be classified as retail garden supply. The ‘brick/stone materials wholesalers’ (NAICS 423320) are similarly involved in landscape supply. Finally, ‘all other specialty and trade contractors’ includes primarily arborists – though it is doubtful we have captured the complete population of these firms in the State. In all, we have deferred to the ReferenceUSA classifications where possible to make the economic impact estimates precise (they are based on the RIMS II multipliers – attributed according to NAICS).

Without precise state-level numbers for comparison, it is impossible to say whether these business types are being under-counted in their own categories. However, all of these businesses are involved in activities supporting agriculture and/or the landscaping industry, so their inclusion in the study is not in question. To maintain conservative estimates we do not extrapolate beyond our sample of these businesses, treating them as the entire population of “all other” agriculture and landscape-related firms in the state – with one exception. Three brick and stone materials wholesalers (NAICS 423320) are indicated in the SecState data beyond our business-level data, so these must be extrapolated for consistency with our other methods. Table 12 details the estimation (again, bottom quartile). Including these estimates generates state-level estimates for the All Other category of \$82.4 million in revenues and 287 jobs.

Estimates of State-Level Aggregates. Thus far, we have divided up the business-level data set according to NAICS codes and categories, and extrapolated up to the state-level using information in the Ag Census, the RI DEM directory of licensed nursery stock dealers, and contractor listings from the RI Secretary of State. These estimates will be the basis for estimating total economic impacts; they are the inputs to the methods using RIMS II multipliers in the

following section. Table 13 details the state-level estimates for each category of interest, for comparison against the direct counts in our dataset exhibited in Table 2. We count 2,812 green-related firms, generating just under \$1.03 billion in sales and just over 8,700 jobs.

Economic Impact Estimation (Multipliers)

Indirect economic impact estimates were generated according to 2002/2007 RIMS II multipliers, the industry standard for making these estimates, upon which many popular economic estimation software platforms are built, such as IMPLAN. As evidenced by the limitations in other aggregated data sources (e.g., BLS, QCEW, Ag Census), some of the multipliers were limited to precision of only 2-digit NAICS codes, as opposed to the 6-digit precision with which we tried to collect data. Two digit codes imply low precision/high aggregation, e.g., treating all wholesalers in the economy as having the same multiplier. This section details the necessary modifications made to the official RIMS II multipliers in order to remain conservative in our estimates and avoid double-counting of indirect economic impacts.

In order to properly scale the multipliers for agriculture, we needed to account for the representative nature of our sample compared to the general farming population in RI. Accordingly, we generated a weighted average of multipliers according to the balance of 111- (crop farms, generally) and 112- (animal farms, generally) NAICS codes in the Ag Census. We balanced our estimated revenues for agricultural firms across these same proportions. Specifically, 111- codes account for \$55.693 million of the Ag Census total estimated \$65.917 million, or 84.49%. The remaining 15.51% represents their estimated \$10.214 million of sales generated by 112- codes.

Unfortunately, the RIMS II multipliers did not include an aggregated figure for crop farming (111- codes), so some judgment calls were needed to generate a proper estimate given the lack of detailed classification in our agricultural data. An additional challenge was that, at one step higher resolution (4-digits), the Ag Census had codes 1111- and 1119- suppressed due to small numbers of firms and/or income. On the other hand, codes 1112-, 1113-, and 1114- constituted the bulk of all crop farming income, totaling \$52.407 million. To generate weights for the missing 1111- and 1119- codes, we allocated the remaining \$3.286 million proportionally across the 2 farms listed as 1111- and the 218 farms listed as 1119- in the Ag Census. A weighted average was also calculated for animal farming (112- codes), though without any estimation needed as 1121-, 1123-, and 'all other' were not censored at the state level. Including these agricultural-weighted estimates, the final working list of multipliers is given in Table 10.

The multipliers given in Table 10 were multiplied with state-level revenue totals by category to estimate total economic impact of direct (already counted) plus indirect impact. The resulting amount is the contribution to state gross product (the state-level equivalent of GDP). For example, a multiplier of 1.0 means no indirect impacts at all, while a multiplier of 2.0 means indirect impacts of the same magnitude as the direct impacts (e.g., Table 13).

The estimates were made to be as conservative as possible by dropping all agricultural multipliers (the other procedures employed here were designed to count all of agricultural economic activity), and by dropping all multipliers in each business' own category. This means that any retail business has all indirect effects on the retail industry dropped, even though we are

measuring a tiny portion of the full retail industry in the State. This resulted in downward adjustments of the multipliers of 3.35% less than the base multipliers provided in RIMS II, according to a simple/non-weighted average of the effects.

A small form of double-counting may remain, in that we count businesses in nearly all broadly defined industry-areas of the economy, but we do not make further adjustments to the multipliers. The reasoning lies in the fact that our sampled businesses comprise a very small share of these industry areas, averaging 2.09% of the gross state product. Without tedious calculations, a simple comparison of this 2.09% potential over-counting approximately cancels with the 3.35% multiplier reduction from our conservative approach to within-industry spillover effects. According to the Rhode Island Economic Development Corporation (RIEDC), the level of detail needed to make these calculations exact is not applied in standard analyses (personal communication, Tim Cole, January 2012).⁶ Overall, the effect is to remain conservative in our estimates.

The results of our multiplier calculations for economic output can be found in Tables 14 and 15. We found a weighted average multiplier of 1.735 for additional indirect economic value for green-related businesses in our study. In total, our conservative estimate of indirect economic benefits using the RIMS II multipliers is \$754.95 million at the state level. This brings the total estimated contribution to gross state product, from green-related industry, to approximately \$1.78 billion.

The indirect economic effects, in terms of jobs, are calculated in a similar fashion as above, and both jobs-to-jobs and output-to-jobs multipliers are therefore adjusted proportionally to the adjustment in output multipliers. Before proceeding with estimation, we split agricultural jobs according to crop farming vs. animal farming. Unfortunately, we could not find data to confirm or reject the proportional split in the Ag Census. Within the ReferenceUSA subset of our sample, we had 120 firms reliably classified as crop farming (111-), who averaged 5.73 employees and 0.54 employees per \$100K of sales, and we had 13 firms reliably classified as animal farming (112-), who averaged 5.31 employees and 1.21 employees per \$100K of sales.

Our solution to dividing up total estimated agricultural employment of 1,748 across crop and animal farming categories was to allocate them according to revenue shares. This has two advantages: 1) it is conservative in estimating jobs-to-jobs multipliers because these multipliers are higher for animal farming, which has a small share of total estimated farm revenues, and 2) it allows for comparison against the output-to-jobs multipliers in the same units, as a sanity check. First we estimate indirect/spillover effects of jobs created in the economy, according to the Output-To-Jobs Multipliers given by RIMS II. The multipliers give the number of jobs created per \$1 million in estimated (pre-multiplier) total sales, which is meant to *include* jobs we already count. The results are shown in Table 16.

While impressive, the job results in Table 16 may be too large to be believed. A total job count of 20,826 implies 12,118 additional jobs indirectly created in the economy – an additional jobs figure that is approximately 150% of the base number of jobs we counted. For the purposes of this study, we will assume the more conservative results given by the Jobs-To-Jobs multipliers,

⁶ Cole is Senior Strategy and Research Manager at RIEDC.

which take the number of estimated total jobs we counted and multiply to include the indirect, additional jobs created. We present the indirect jobs figures directly, in addition to the new jobs totals generated, in Table 17.

Findings

The preceding analysis demonstrates that green-related businesses comprise an important part of the Rhode Island economy, and quantifies a lower-bound estimate of their contributions. Our complete, state-level estimates can be found in Tables 15 and 17. In terms of gross state product, we estimate \$1.027 billion of direct sales and \$754.9 million of indirect value, for a total of just under \$1.782 billion. In terms of jobs, we estimate 8,708 jobs in green-related industries, with an estimated 3,664 additional indirect jobs created, for a total of 12,372 jobs, economy-wide, in the State. Thus, we estimate that green-related industry contributes a minimum of 3.55% of the \$50.1 billion 2011 RI state gross product (BEA, 2012), and 2.3% of 457,100 total non-farm jobs as of June 2012 (BLS, 2012). This amounts to 2.7% of all jobs in the State.

According to the sectors we defined above, Tables 18 and 19 show the aggregated economic output and job numbers. The tables show that Landscape is largest in terms of direct and total economic output and direct and total jobs, comprising more than one third of all green-related industry in the state. However, given the conservatism in our approach, these proportions would be expected to change in future studies with access to more detailed data. Second to Landscape in terms of output is the Retail sector, while Golf Courses are second in terms of jobs. Agriculture, Retail sector and Golf are all similarly sized in terms of jobs impact, however the Retail sector generates substantially more output than the other two sectors.

Beyond the important categories, we also highlight the standout business types that drive these results: Landscaping Services, Retail, Florists, Golf, and Nursery and Tree Production (NAICS 1114-), which is an agricultural category including horticulture, floriculture and sod production. Tables 20 and 21 show the direct and total economic output and jobs impacts for these critical green-industry sectors. The five largest sectors of green-related industry account for 75-80% of the economic impact, whether measured in direct (or total) output or jobs. While the counts for Florists and Golf Courses are estimated to be complete, it must be stressed that the estimates for Landscaping Services and Retail Supply are very conservative, and could easily be revealed by future research to be significantly larger.

Note here that the estimated values for NAICS 1114- represent only farms observed in our data set, and do not include any extrapolated revenues or jobs. The Ag Census reports 61.8% of all farm revenues belonging to this sector, while combining our counts with a weighted average (according to the multipliers methodology) of the extrapolated farms would lead to an estimate of 70.47%. The conservative numbers actually used in the table (only our counts) comprise only 60.01% of estimated farm revenues. Thus, precise output estimates in Table 20 might reasonably be 3 to 17% larger than the values shown.

Conclusion

Figure 1 shows the breakdown of direct economic impacts by sector (Landscape – 33%; Retail – 28%; Agriculture – 17%; Golf – 14%). We counted more than 1,000 businesses engaged in landscaping services, contracting and design, and almost 500 retail businesses including farm

and garden supply, outdoor power equipment dealers, and florists. In addition to disparities with BLS/QCEW numbers, our estimates reveal disparities with the 2007 Economic Census (Census Bureau, 2007) for key business groups, including florists and landscaping services, where we observed 60% more firms and more than twice as many jobs. Table 22 breaks down the comparison for these two subsectors. We also found golf course revenues to be underreported by more than 20% and golf course jobs by approximately 40%. The disparities can be explained by sampling error in the national-level estimates, by dramatic growth in these sectors since 2007, or by some combination of the two.

The Landscape, Retail and Golf sectors are closely linked to Rhode Island agriculture. While a common perception is that agriculture exists primarily to produce food, fiber and fuel, the 2007 Agricultural Census found that RI agriculture generated 61.8% of gross sales from nursery, greenhouse, floriculture and sod production, and our own data were roughly consistent with this percentage. However, the Agricultural Census does not fully count direct marketing activities, including farmers markets for produce, direct sales of horticultural varieties, and service activities performed by farmers, including equipment repair and turfgrass installation. Our conservative estimate of \$170.6 million in annual agricultural revenues is more than two and a half times the USDA's 2007 estimate of \$65.9 million, implying that Rhode Island farmers may produce 60% of their economic impact via direct interaction with consumers. These findings are consistent with the State's history of leadership in agricultural value: RI was second in the nation in agricultural sales per acre in 1985, at a time when turf had already become a key sector and the farmers market movement was well under way (Smith, 1987).

Taken together, our results show that the economic impact of green-related businesses is substantially larger than the official figures imply. Landscaping, retail garden centers, and golf courses are key sectors, and landscape-related agriculture is also a substantial driver. The study provides a current picture of these industries, which appear to be substantially more robust than the 2007 figures from both the Agricultural Census and the Economic Census. We cannot say conclusively whether these changes are due to undercounting in the official figures, or due to substantial economic growth in the past five years, although it is likely that undercounting plays a substantial role.

Our study uncovers the previously undisclosed economic value of green-related industry throughout Rhode Island. By taking advantage of the unique, small size of the State, we reveal the extent of unobserved economic activity and provide a more accurate picture going forward. We hope these findings can prove a solid reference for policymakers and researchers alike, and that our methods can provide a springboard for future studies looking to fill in the gaps when standardized approaches have fallen short.

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**Appendix
Tables and Figures**

Figure 1 – Shares of Direct Impacts, Key Sectors

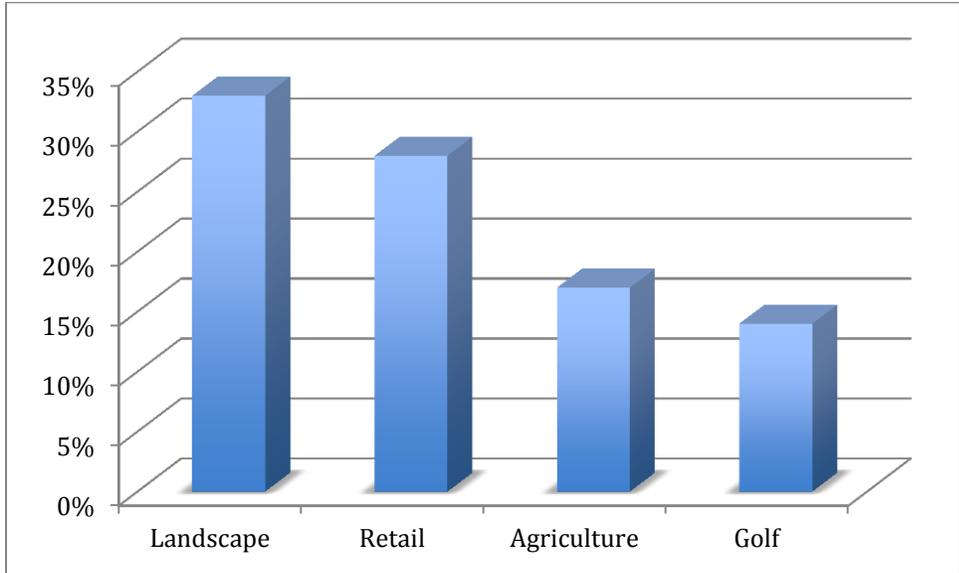


Table 1 – Data Sources

<i>Business-Level Economic Data</i>	<i>Business Listings, No Economic Data</i>	<i>Statistical Data and Counts</i>
<ul style="list-style-type: none"> • Survey • ReferenceUSA 	<ul style="list-style-type: none"> • RI DEM • RI Sec State 	<ul style="list-style-type: none"> • Ag Census

Table 2 – Sales and Jobs Data, by Category

Category	Firms	Sales	Jobs
Agriculture	204	\$161,855,502	954
Landscape	520	\$258,027,499	2,259
Retail	258	\$241,011,497	1,513
Golf Courses	62	\$144,562,498	1,872
Other	44	\$ 81,076,500	284
Total	1,088	\$886,533,497	6,882

Table 3 – Farms by Employment and County

Employment Category	County					Total
	Bristol	Kent	Newport	Providence	Washington	
0 Workers	1	6	5	11	17	40
1 Worker	3	5	6	13	10	37
2 Workers	1	2	4	16	4	27
3-4 Workers	4	8	10	16	17	55
5-9 Workers	0	2	6	7	8	23
10+ Workers	0	2	9	6	5	22
Total	9	25	40	69	61	204

Table 4 – Farms by Sales and County

Employment Category	County					Total
	Bristol	Kent	Newport	Providence	Washington	
\$0-1K	0	1	1	2	0	4
\$1K-5K	1	1	4	5	6	17
\$5K-10K	0	1	1	2	3	7
\$10K-25K	0	1	1	5	9	16
\$25K-50K	1	3	1	2	3	10
\$50K-100K	1	2	1	1	2	7
\$100K-250K	1	4	6	12	9	32
\$250K-500K	1	2	4	15	5	27
\$500K-1M	4	4	8	13	18	47
\$1M-2.5M	0	5	5	9	4	23
\$2.5M-5M	0	1	5	2	1	9
\$5M up	0	0	3	1	1	5
Total	9	25	40	69	61	204

Table 5 – Farm Revenues Extrapolation

Category	Sales	Farms	Average	Sample	No. Missing	Est. Sales
\$0 - 1K	\$ 54,000	361	\$ 150	4	357	\$ 53,402
\$1K - 5K	\$ 713,000	266	\$ 2,680	17	249	\$ 667,432
\$5K - 10K	\$1,054,000	147	\$ 7,170	7	140	\$1,003,810
\$10K - 25K	\$2,878,000	179	\$16,078	16	163	\$2,620,749
\$25K - 50K	\$3,193,000	93	\$34,333	10	83	\$2,849,667
\$50K - 100K	\$3,896,000	56	\$69,571	7	23	\$1,600,143
Total					1,015	\$8,795,202

Table 6 – Farm Employment Extrapolation

Category	Workers	Farms	Average	Sample	No. Missing	Est. Workers
0	0	895	0	40	855	0
1	83	83	1	37	46	46
2	156	78	2	27	51	102
4 to 9	203	58	3.5	55	3	10.5
5 to 9	349	55	6.3	23	32	203.1
10+	850	50	17	22	28	476
Total					1,015	838

Table 7 – Landscape-Related NAICS Codes

NAICS	Description
238140	Masonry Contractors
238910	Site Preparation Contractors
541320	Landscape Architectural Services
561730	Landscaping Services

Table 8 – Extrapolation for ‘Landscape-Related’

NAICS	Missing Firms	Avg. Sales	Avg. Employ	Est. Sales	Est. Employ
238140	3	\$480,000	4	\$ 1,440,000	12
238910	13	\$466,000	2.66	\$ 6,058,000	35
541320	28	\$100,350	0.7	\$ 2,809,800	20
561730	466	\$151,839	1.52	\$70,756,974	708
Total	510			\$81,064,774	775

Table 8A – Reconciliation of Totals Across Data Sources

NAICS	Firms	Sales Est.	Employ. Est.	Total Sales	Total Empl.
238140	3	\$480,000	4	\$ 1,440,000	12
238910	13	\$466,000	2.66	\$ 6,058,000	35
423320	3	\$448,000	1	\$ 1,344,000	3
<i>444210</i>	<i>4</i>	<i>\$216,000</i>	<i>1.6</i>	<i>\$ 864,000</i>	<i>6</i>
<i>444220</i>	<i>192</i>	<i>\$253,594</i>	<i>1.0625</i>	<i>\$ 48,690,010</i>	<i>204</i>
541320	28	\$100,350	0.7	\$ 2,809,800	20
561730	466	\$151,839	1.52	\$ 70,756,974	708
Total	709			\$131,962,784	988

The 466th firm under 561730 is the landscape lighting firm that would have been estimated at \$1.5 million revenue under our standard extrapolation method, so we included it under 561730 to be conservative. The boldface italicized rows are retail. Five of these (in 444220) are garden supply, and the four from 444210 are outdoor power equipment stores. All nine come from the SecState data set. Thus, total firms from the SecState data are: 3+13+3+4+5+28+466=522, broken down as three masonry contractors, 13 site prep contractors, three brick/stone materials, four outdoor power equipment stores, five garden supply stores, 28 landscape architects, 465 landscapers, and one landscape lighting firm counted as landscape. Removing the brick/stone (3) and retail (9) businesses, leaves 510 “landscape-related” to be extrapolated.

Table 9 – NAICS Codes for Retail Businesses

NAICS	Description
444210	Outdoor Power Equipment Stores
444220	Nursery, Garden Center & Farm Supply Stores (Retail)
453110	Florists

Table 10 – Extrapolation for ‘Retail’

NAICS	Missing Firms	Avg. Sales	Avg. Employ	Est. Sales	Est. Employ
444210	4	\$216,000	1.6	\$ 864,000	6
444220	192	\$253,594	1.0625	\$48,690,010	204
Total	196			\$49,554,010	210

Table 11 – Counts of “All Other” Firms by NAICS

NAICS	NAICS Description	No. Firms
115112	“Soil Preparation Planting & Cultivating”	3
115116	“Farm Management Services”	3
115210	“Support Activities For Animal Production”	6
212319	“Crushed and Broken Stone Mining and Quarrying”	1
238910	“All Other Specialty & Trade Contractors”	7
311119	“Other Animal Food Manufacturing”	1
311511	“Fluid Milk Manufacturing”	1
312130	“Wineries”	2
3351	“Light Fixture Manufacturing”	1
423320	“Brick/Stone Materials Wholesalers”	3
424410	“General Line Grocery Merchant Wholesalers”	1
424480	“Fresh Fruit & Vegetable Merchant Wholesalers”	1
424520	“Livestock Merchant Wholesalers”	1
424590	“Other Farm Product Raw Material Merchant Wholesalers”	2
541310	“Architectural Services”	1
541940	“Veterinary Services”	3
812220	“Cemeteries and Crematories”	7
Total		44

Table 12 – Extrapolation of Missing ‘All Other’ Firms

NAICS	Missing Firms	Avg. Sales	Avg. Employ	Est. Sales	Est. Employ
423320	3	\$448,000	1	\$1,344,000	3
Total	3			\$1,344,000	3

Table 13 – State-Level Estimated Sales and Jobs

Category	Firms	Sales	Jobs
Agriculture	1,219	\$170,650,704	1,792
Landscape	1,030	\$339,092,273	3,034
Retail	454	\$290,565,507	1,723
Golf Courses	62	\$144,562,498	1,872
Other	47	\$82,420,500	287
Total	2,812	\$1,027,291,483	8,708

Table 14 – Economic Output Multipliers by NAICS

NAICS	Industry Description	Multiplier
111	Crop Farming, Generally	1.601
112	Animal Production, Generally	1.408
115	Support activities for agriculture and forestry	1.818
21231	Stone mining and quarrying	1.678
23	Construction	1.922
311119	Other animal food manufacturing	1
31151	Fluid milk and butter manufacturing	1.462
312130	Wineries	1.574
33512	Lighting fixture mfg	1.608
42	Wholesale trade	1.691
43-49	Retail trade	1.709
5413	Architectural, engineering, and related services	1.741
541940	Veterinary services	2.034
5617	Services to buildings and dwellings	1.81
713	Other amusement and recreation industries	1.835
812200	Death care services	2.04

Table 15 – Economic Output Multipliers and Estimates

NAICS Industry Desc.		Est. Value	Multiplier	Total Indirect	Total Value
111	Crop Farming, Generally	\$ 144,182,780	1.601	\$ 86,653,851	\$ 230,836,631
112	Animal Production, Generally	\$ 26,467,924	1.408	\$ 10,798,913	\$ 37,266,837
115	Support activities for ag. forestry	\$ 2,138,000	1.818	\$ 1,748,884	\$ 3,886,884
21231	Stone mining and quarrying	\$ 1,988,000	1.678	\$ 1,347,864	\$ 3,335,864
23	Construction	\$ 24,935,000	1.922	\$ 22,990,070	\$ 47,925,070
311119	Other animal food mfg.	\$ 3,244,000	1.000	\$ 0	\$ 3,244,000
31151	Fluid milk and butter mfg.	\$ 11,288,000	1.462	\$ 5,215,056	\$ 16,503,056
312130	Wineries	\$ 6,420,000	1.574	\$ 3,685,080	\$ 10,105,080
33512	Lighting fixture mfg	\$ 4,620,000	1.608	\$ 2,808,960	\$ 7,428,960
42	Wholesale trade	\$ 40,316,000	1.691	\$ 27,858,356	\$ 68,174,356
43-47	Retail trade	\$ 290,565,507	1.709	\$206,010,945	\$ 496,576,452
5413	Arch., engineering, and related	\$ 21,029,300	1.741	\$ 15,582,711	\$ 36,612,011
541940	Veterinary services	\$ 2,014,000	2.034	\$ 2,082,476	\$ 4,096,476
5617	Svc. to buildings and dwellings	\$ 296,552,973	1.810	\$240,207,908	\$ 536,760,881
713	Other amusement and rec. indust.	\$ 144,562,498	1.835	\$120,709,686	\$ 265,272,184
812220	Death care services	\$ 6,967,500	2.040	\$ 7,246,200	\$ 4,213,700
Total		\$1,027,291,482		\$754,946,959	\$1,782,238,442
Weighted Average Multiplier:			1.735		

Table 16 – Indirect Jobs Contributions via Output Multipliers, by NAICS

NAICS	Industry Desc.	Est. Value	Multiplier	Jobs Total
111	Crop Farming, Generally	\$ 144,182,780	23.212	3,347
112	Animal Production, Generally	\$ 26,467,924	10.258	272
115	Support activities for ag. and forestry	\$ 2,138,000	35.036	75
21231	Stone mining and quarrying	\$ 1,988,000	10.139	20
23	Construction	\$ 24,935,000	15.602	389
311119	Other animal food mfg.	\$ 3,244,000	0	0
31151	Fluid milk and butter mfg.	\$ 11,288,000	6.017	68
312130	Wineries	\$ 6,420,000	8.823	57
33512	Lighting fixture mfg	\$ 4,620,000	8.945	41
42	Wholesale trade	\$ 40,316,000	10.238	413
43-47	Retail trade	\$ 290,565,507	18.18	5,282
5413	Arch., engineering, and related svc.	\$ 21,029,300	13.031	274
541940	Veterinary services	\$ 2,014,000	14.547	29
5617	Svc. to buildings and dwellings	\$ 296,552,973	24.829	7,363
713	Other amusement and rec. indust.	\$ 144,562,498	20.205	2,921
812220	Death care services	\$ 6,967,500	18.714	130
Total		\$1,027,291,482		20,681

Table 17 – Indirect Jobs Contributions via Jobs Multipliers, by NAICS

NAICS	Industry Desc.	Est. Jobs	Multiplier	Jobs Indirect	Jobs Total
111	Crop Farming, Generally	1,515	1.28	424	1,939
112	Animal Production, Generally	278	1.423	118	396
115	Support activities for ag. and forestry	27	1.219	6	33
21231	Stone mining and quarrying	7	1.898	6	13
23	Construction	177	1.833	147	324
311119	Other animal food mfg.	4	1	0	4
31151	Fluid milk and butter mfg.	17	2.272	22	39
312130	Wineries	12	1.863	10	22
33512	Lighting fixture mfg	15	1.966	14	29
42	Wholesale trade	38	2.169	44	82
43-47	Retail trade	1,723	1.429	739	2,462
5413	Arch., engineering, and related svc.	149	1.982	146	295
541940	Veterinary services	19	2.073	20	39
5617	Svc. to buildings and dwellings	2,762	1.346	956	3,718
713	Other amusement and rec. indust.	1,872	1.502	940	2,812
812220	Death care services	93	1.755	70	163
Total		8,708		3,664	12,372

Table 18 – Economic Impact by Category

Category	Firms	Output	Indirect	Total	Share
Agriculture	1,219	\$ 170,650,704	\$ 97,452,764	\$ 268,103,468	15.00%
Landscape	1,030	\$ 339,092,273	\$275,772,707	\$ 614,864,980	34.50%
Retail	454	\$ 290,565,507	\$206,010,945	\$ 496,576,452	27.90%
Golf Courses	62	\$ 144,562,498	\$120,709,686	\$ 265,272,184	14.90%
Other	47	\$ 82,420,500	\$ 55,000,858	\$ 137,421,358	7.70%
Total	2,812	\$1,027,291,483	\$754,946,959	\$1,782,238,442	100.00%

Table 19 – Jobs Impact by Category

Category	Firms	Jobs	Indirect	Total	Share
Agriculture	1,219	1,792	542	2,334	18.90%
Landscape	1,030	3,034	1,203	4,237	34.20%
Retail	454	1,723	739	2,462	19.90%
Golf Courses	62	1,872	940	2,812	22.70%
Other	47	287	240	527	4.30%
Total	2,812	8,708	3,664	12,372	100.00%

Table 20 – Direct Economic Impact of Standout Sectors

NAICS	Description	Output	Jobs
561730	Landscaping Services	\$296,552,973	2,762
444220	Retail Garden Centers and Supply	\$206,428,536	837
453110	Florists	\$ 69,607,996	791
713910	Golf Courses	\$144,562,498	1,872
1114-	Nursery & Tree Production	\$102,414,514	502
Total		\$819,566,517	6,764
	Share of Green Industry	79.80%	77.70%

Table 21 – Total Economic Impact of Standout Sectors

NAICS	Description	Output	Jobs
561730	Landscaping Services	\$ 536,760,881	3,718
444220	Retail Garden Centers and Supply	\$ 352,786,368	1,196
453110	Florists	\$ 18,960,070	1,130
713910	Golf Courses	\$ 265,272,184	2,812
1114-	Nursery & Tree Production	\$ 163,965,634	643
Total		\$1,437,745,137	9,498
	Share of Green Industry	80.70%	76.80%

Table 22 – Comparison with 2007 Economic Census

Category	<i>Our Study</i>			<i>2007 Economic Census</i>		
	Firms	Revenues	Jobs	Firms	Revenues	Jobs
Florists	136	\$ 69.6M	791	81	\$ 23.8M	343
Landscaping Svcs.	1,030	\$339.1M	3,034	611	\$228.6M	1,498

Table 23 – NAICS Codes and Descriptions

NAICS	Primary NAICS Description
112990	All Other Animal Production
111998	All Other Miscellaneous Crop Farming
238990	All Other Specialty Trade Contractors
541310	Architectural Services
112111	Beef Cattle Ranching & Farming
111334	Berry (Except Strawberry) Farming
423320	Brick, Stone/Related Constr Material
112112	Cattle Feedlots
812220	Cemeteries and crematories
111920	Cotton Farming
112120	Dairy Cattle & Milk Production
115116	Farm Management Services
111422	Floriculture Production
453110	Florists
311511	Fluid Milk Mfg
424480	Fresh Fruit & Vegetable Merchant Whlsrs
424410	General Line Grocery Merchant Whlsrs
713910	Golf Courses & Country Clubs
111332	Grape Vineyards
112920	Horse & Other Equine Production
541320	Landscape Architectural Svcs
561730	Landscaping Svcs
424520	Livestock Merchant Whlsrs
238140	Masonry Contractors
111421	Nursery & Tree Production
444220	Nursery, Garden Center & Farm Supply St
311119	Other Animal Food Mfg
212319	Other Crushed & Broken Stone Mining & Q
424590	Other Farm Product Raw Material Merchants
111419	Other Food Crops Grown Under Cover
335129	Other Lighting Equipment Mfg
111339	Other Non-citrus Fruit Farming
111219	Other Vegetable (Except Potato) & Melon
444210	Outdoor Power Equipment Stores
238910	Site Preparation Contractors
115112	Soil Preparation Planting & Cultivating
115210	Support Activities For Animal Production
541940	Veterinary Svcs
312130	Wineries