TECHNICAL APPENDIX TO

THE ECONOMIC IMPACT OF RHODE ISLAND PLANT-BASED INDUSTRIES AND AGRICULTURE

AN UPDATE TO THE 2012 STUDY

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All tables in this Technical Appendix can be found at the end of the document under the Tables section. Table T1 shows our sales and jobs estimates for all sectors.

Data

This study uses two distinct types of data:

(i) observations of individual business entities with economic data concerning revenue (sales) and jobs, and
(ii) lists of active, eligible businesses without economic data.

Individual business observations are compiled and cross-referenced from three sources:

(i) a survey of local businesses conducted in 2011 by the University of Rhode Island (URI) College of Business Administration (CBA),
(ii) database listings from ReferenceUSA, collected in 2012, and
(iii) database listings from the AtoZ Databases, collected in 2014.

By combining these sources, we obtained economic data for 229 firms under Agriculture and 1,194 firms in all other sectors, totaling 1,413 firms. This figure includes dropping 61 firms who went out of business since the 2012 study.

Lists of eligible, active businesses without economic data are compiled from:

(i) the State of Rhode Island Directory of Registered Nurseries and Licensed Nursery Stock Dealers, updated annually by the Rhode Island Department of Environmental Management (DEM), and
(ii) the Corporate Database of the State of Rhode Island Office of the Secretary of State (SOS), which includes all active and inactive corporate entities in the State (and non-resident landlords), but does not include sole proprietorships or partnerships that are not distinct legal entities.

These sources resulted in a list of 900 distinct firms belonging in the study, for which no economic data was available. Statistical limitations in some subsectors caused 10 firms to be discarded, for a working total of 890 firms needing economic data to be extrapolated from our sample. Agricultural firms missing data are not included in this count because our methods for agriculture relied on the 2012 Agricultural Census, as described below.

A Note on Aquaculture

Aquaculture (1125) data on gross sales and jobs are provided by the RI Coastal Resource Management Council (CRMC). Aquaculture farmers are not counted in the data summary above, because no estimation is done in the context of this report. Specifically, CRMC reports wholesale value of aquaculture production (similar to USDA Ag Census reporting for land-based agriculture), and we had no business-level sampling to support updating those figures. Nonetheless, it is known for oyster production alone, 30.4% were sold directly to retail by the farmer, and that retail prices average 2-4 times wholesale, depending on the outlet. We will endeavor to update this information for future studies, but for the present study it suffices to say that revenue estimates for aquaculture suffer from dramatic understatement.

Final estimates for this report were completed in December 2014, prior to receipt of detailed aquaculture data from CRMC. Based on personal conversations, the number of aquaculture farming operations was estimated to be 33 (versus the Ag Census figure of 28). This number was used as part of determining the number of other animal production firms (112X), part of the prior information for the Bayesian estimation procedure used to update the Ag Census with our sample data. The actual number of aquaculture farms proved to be 35 when detailed data were received, and this information will corrected in future reports.

Data Cleaning

Data were cleaned through a combination of logical checks and hand-inspection of observations. All data sets were merged into one master set. Duplicate observations for whole businesses and for individual business locations were removed.

The classification of individual businesses was improved relative to the 2012 study because of multiple confirming data sources for more than half of the firms. In addition, the SOS data contained business descriptions given by the firms themselves, allowing for more precise classification of firms without economic data, as well. The process for removal of duplicates was similarly improved.

An important caveat of the analysis is that the SOS listings do not include unincorporated businesses, namely sole proprietorships and partnerships. Thus, while we may have made substantial progress relative to the 2012 study in compiling a larger list of businesses (without economic data) belonging in the study, there are likely a large number of businesses missing from our list. While it may not be perfectly representative

of the population, our sample contains 893 businesses across virtually all subsectors that are not registered with SOS (63.2%).

Normalization to 2012

Because of the various data sources to be combined, jobs and revenues data for the businesses in our sample had to be normalized to the 2012 reporting year. In particular, we had access to data for 2009, 2011, and 2013 for the majority of firms, but no data for 2012. Some firms were also missing data for one of the years. Firms missing data for both 2011 and 2013 were excluded from the analysis. To normalize data to 2012 we implemented a simulation procedure using all available data for all firms, and mapped forward from 2011 (unless it was missing, in which case we mapped backwards from 2013).

The simulation procedure consisted of fitting an auto regressive, AR(1), process to the data using ordinary least squares regression and then estimating confidence intervals using the standard errors. An AR(1) time-series process evolves as:

$$Y_t = \alpha + \beta Y_{t-1} + \epsilon_t$$

where $\epsilon_t \sim N(0,\sigma)$. Since data points were separated by two years, we regressed 2011 on 2009 and 2013 on 2011. We then regressed 2013 on 2009 and averaged the results of all three estimation procedures to remove noise in the estimation process. For the two-year regression, the regression equation is:

$$Y_t = a + bY_{t-2} + u_t$$

where we will denote the estimates achieved as $\hat{a}$ and $\hat{b}$, respectively. The resulting estimates for the underlying AR(1) process are given by:

$$\hat{\alpha} = \frac{\hat{a}}{1+\hat{b}}, \qquad \hat{\beta} = \sqrt{\hat{b}}, \qquad \hat{\sigma} \sim \frac{SE_b}{1+\hat{b}},$$

where $\hat{\sigma}$ is the estimated standard deviation of the zero-mean error, ϵ_t. Similarly, for the four-year regression, the estimated parameters are given by:

$$\hat{\alpha} = \frac{\hat{a}}{1+\hat{b}+\hat{b}^2+\hat{b}^3}, \qquad \hat{\beta} = \hat{b}^{0.25}, \qquad \hat{\sigma} = \frac{SE_b}{1+\hat{b}+\hat{b}^2+\hat{b}^3)}.$$

We then averaged the three regression estimates to get population estimates for $\hat{\alpha}$, $\hat{\beta}$, and $\hat{\sigma}$. The β parameter of the AR(1) process is scale independent so $\hat{\beta}$ translates to

the firm level for any sector, but the population average estimates for $\hat{\alpha}$ and $\hat{\sigma}$ need to be scaled according to average sector firm size before being applied. Further, to use $\hat{\sigma}$ at the firm-level, it must be scaled down by the inverse square root of the sample size. For all businesses in our sample, we estimate $\hat{\beta} = 1.00408$ for revenues (sales) and $\hat{\beta} = 0.95189$ for jobs. Parameter estimates for $\hat{\alpha}$ and $\hat{\sigma}$ for all green-related subsectors are below in Table T2. For both revenues and jobs, large values for $\hat{\sigma}$ indicate variability across observations in the subsector and/or smaller sample size.

Bayesian Updating for Agriculture

To estimate gross revenues and jobs in the agriculture sector, we take the 2012 Agricultural Census as prior information and *update* this information using a statistical procedure known as Bayesian updating. All forms of Bayesian analysis rely on a theorem known as Bayes' Rule (or Bayes' Theorem), which states that for two events, A and B, the conditional probability of A, given B, is equal to the probability of B, given A, times the probability of A occurring (without knowledge of B), divided by the probability of B occurring (without knowledge of A). Formally,

$$\Pr(A \mid B) = \frac{\Pr(B \mid A)\Pr(A)}{\Pr(B)} \ .$$

Bayesian updating methods rely on a slightly more complex construct, in which we ask what is the probability of a hypothesis, H, given the data we observe, X. The hypothesis, H, is defined to be one set of parameters, usually describing probability distributions that attempt to characterize the data. Integrating over these probabilities for every possible value of H gives a resulting distribution of parameters, which is then used for inference about the statistical problem at hand.

Statistical Methods

Our analysis uses a class of Bayesian updating methods known as conjugate prior methods. These methods are attractive because they are analytically tractable in the sense that the functional form of the posterior (estimated) distribution is known, given the functional form of the prior distribution. We apply this methodology using normal distributions for the population means of revenues and jobs, because of the Central Limit Theorem, which states that sums (and therefore means) of random variables converge to a normal distribution as sample size gets large.

Following Jackman (2009, pp.83-87), we assume a conjugate prior of normally distributed mean revenues (the same analysis applies for jobs), where the mean and standard deviation parameters of this normal distribution are uncertain. Specifically,

$\mu \mid \sigma^2 \sim N\left(\mu_0, \sigma^2 / n_0\right)$ and $\sigma^2 \sim \text{Inverse-Gamma}\left(\nu_0/2, \nu_0\sigma_0^2/2\right)$, where n_0 and ν_0 can be thought of as the sample size for the prior information.

Our parameter of interest is the mean revenues per firm (proportional to the total, when sample size is known), and the distribution around that mean characterizing uncertainty in the parameter estimate. The marginal posterior density of μ is a student-t density with location parameter μ_1, scale parameter $\sigma_1/\sqrt{n_1}$ and ν_1 degrees of freedom, where $\nu_1 = n_1 = n_0 + n$ and:

$$\mu_1 = \frac{n_0\mu_0 + n\bar{y}}{n_1}, \qquad \sigma_1^2 = \frac{S_1}{\nu_1}, \qquad S_1 = \nu_0\sigma_0^2 + (n-1)s^2 + \frac{n_0 n}{n_1}\left(\bar{y} - \mu_0\right)^2$$

with $\bar{y}$ and s^2 being the sample mean and sample variance of the new data, respectively. Given all this, we can calculate mean revenues (same for jobs) and confidence intervals using the appropriate student-t distribution.

Sales - Estimation Procedure

We treat the prior sample size as the stated number of farms in the 2012 Agricultural Census, despite the admitted uncertainty in that number (USDA, 2012). We also use prior mean and standard deviation provided by the Ag Census (Appendix A) for revenues, and assume proportional uncertainty for jobs since no standard error/estimated sampling error is provided with the employment figures. Prior uncertainty is scaled proportionally when we repeated the analysis using subsectors.

Table T3 contains all information relevant to the Bayesian updating procedure for our analysis of agriculture.

To construct prior means for the subsectors, some imputation was needed from incomplete data provided in the Ag Census. Vineyards and Aquaculture were included only as counts and not estimated according to the Bayesian procedure. As discussed in the Data section above, we estimated the number of aquaculture farming operations at 33 with gross revenues of $3.013M, for this part of the analysis.

For Grape Vineyards (111332), the market-value is censored in the Ag Census, but value of assets is in-line or slightly below the average for the Fruit and Tree Nut Farming category (1113). For Grape Vineyards, we would thus deduct 8 of 65 farms, with $4.418M sales ($67,969 per farm, or $543,754 total), and add back only the ones we observe (5), to be conservative. Our sampled vineyards add $18.537M in place of the estimated $543,754 (a net increase of $17.993M).

We completed this procedure for both revenues and jobs, both for all farms as one large sample, and broken down by subsector, for Crop production (111X), Nursery (1114) and

Animal production (112X). Vineyards and Aquaculture were added to the resulting means as counts, assuming we collected the full population for those subsectors in our raw data (aquaculture data from CRMC).

The aggregated Bayesian analysis, treating all farms as independent and identically distributed (IID), resulted in a revenues estimate of $237.34 million with a 95% confidence interval of ±$50.95 million. The 95% lower confidence bound is about 7% higher than the lower bound estimate from our 2012 study. Confidence intervals were calculated from student-t distribution at the firm level, but were scaled up to avoid over-confidence in the reported figures. In particular, the standard deviation of a large sample increases only with the square-root of sample size, so scaling up to 1,243 total farms in the Ag Census would imply a relative tightening of confidence bounds. In this case, however, we are extrapolating to the larger sample, so there is no gain of information consistent with collecting it. To control for this, we scale up the confidence intervals proportionally for maximal uncertainty in the estimates.

The subsector analysis yielded an estimate of $238.89 million, which is considered to be more precise because of defining different farm types as having different distributions of mean income per farm. However, the subsector analysis yielded even smaller confidence bounds to account for this precision (basically, how well the sample variance matched the prior variance). To obtain the most accurate mean estimate, but also to remain conservative with respect to statistical confidence, we report the total revenues estimate of $238.89 million with the aggregated 95% confidence interval of ±$50.95 million.

Jobs – Estimation Procedure

For the aggregated analysis, USDA does not quantify uncertainty with respect to employment. To be conservative, we assume USDA estimates have double the variance of our sample, which is more than double the proportional variance because of the larger, per-firm job numbers in our sample relative to the Ag Census. Construction of Bayesian priors for jobs estimates proceeds similarly to the process for revenues estimates – all adjustments to the number of farming operations by subsector were handled similarly.

Estimation Procedure for Non-Agricultural Sectors

For non-agricultural sectors, we did not use the Bayesian updating procedure due to a lack of suitable priors. Future work should apply the Bayesian procedure to 2012 Economic Census data when those figures become available, depending on whether uncertainty in the official figures can be appropriately parameterized. Instead, we used an extrapolation method in which we counted firms missing economic data and treated them as being resampled from our dataset.

The resulting distribution of mean estimates is known to be a normal distribution as the number of resampling iterations gets large. To make estimates conservative, we fitted a lognormal distribution to jobs and revenues, and rescaled the estimates to reflect population medians instead of population means. This reduces the possible impact of any outsize large firms in our sample data. We also avoided any extrapolation for sectors/subsectors containing fewer than 15 firms. The lognormal distribution is characterized by the resulting random variable from raising a normally distributed random variable, *X*, to a power of *e*. Namely, $Y \sim \ln N\left(\mu,\sigma^2\right)$ if $Y = e^X$ and $X \sim N\left(\mu,\sigma^2\right)$. The mean and variance of the lognormal random variable, *Y*, are given by:

$$E[Y] = \exp\left(\mu + \frac{\sigma^2}{2}\right)$$

$$\mathrm{Var}[Y] = \left(\exp\left(\sigma^2\right) - 1\right)\exp\left(2\mu + \sigma^2\right)$$

On the other hand, the median of the lognormal distribution is e^{μ}. As discussed above, we rescale our sample mean to the implied sample median, using a lognormal fit. Letting m and s^2 denote the sample mean and variance, respectively, the above formulas give the implied sample median according to:

$$e^{\hat{\mu}} = \frac{m^2}{\sqrt{m^2 + s^2}},$$

which is proportionally smaller than the sample mean according to the implied sample σ^2 parameter and the formula for $E[Y]$ above.

As with agriculture, for non-agricultural sectors we scaled confidence intervals proportionally with the size of the extrapolated population, since scaling by $\sqrt{N}$ would not be appropriate (no new information is being added with the additional sample size). Tables T4a and T4b below shows the details of our estimates for the non-agricultural sectors for sales and for jobs, respectively.

Confidence Intervals

All statistical estimates must come with a measurement of uncertainty. Estimates here are no different because they include sampled firms we directly observe plus estimates of sales and jobs for firms we do not observe. As elsewhere where we have made conservative assumptions where possible, we are conservative in our reporting of confidence intervals so as not to project overconfidence in the estimates.

Here, we report 95% confidence intervals. For example, our estimate for gross revenues for Agriculture is $238.9 million, plus or minus $50.95 million. This means we are 95% certain that the true value lies within $50.95 million of our estimate, or between $188.95 million and $289.85 million. Table T5 below shows the 95% confidence intervals by sector for both revenues and jobs.

Application of Economic Multipliers

We use the standard practice of applying RIMS II multipliers to estimate indirect economic impacts on other sectors. Essentially, these indirect impacts are spillover effects, representing the amount of economic activity in other sectors of the economy that is supported by the sectors in our study. The multipliers thus help answer the question: what would happen to the rest of the economy if there were an X% change in the green-related sectors? (USDC, 1997)

We applied 2002/2007 RIMS II multipliers in a manner consistent with the previous study (Sproul and Elsner, 2013). In particular, we applied multipliers by NAICS code to our industry subsectors at the highest level of resolution available. Because multipliers map spillover effects to other sectors, we were able to remove all spillover effects into agriculture to avoid double counting (since we presume to be counting all of agriculture, already). For conservatism, we use Jobs-to-Jobs multipliers instead of Output-to-Jobs multipliers, as the latter were shown to produce unrealistic estimates. Final multipliers are presented in Table T6.

Works Cited

Jackman, S. (2009). Bayesian analysis for the social sciences (Vol. 846). John Wiley & Sons.

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US Department of Commerce (USDC). (March 1997). “REGIONAL MULTIPLIERS: A User Handbook for the Regional Input-Output Modeling System (RIMS II).” Third Edition. U.S. Government Printing Office, Washington, DC 20402

Tables

Table T1: Direct Economic Impacts by Sector and NAICS (2012 Data)

Sector	NAICS	Firms	Sales ($M)	Jobs
Agriculture				
Animal production	(112X)	409	44.1	366
Aquaculture	(1125)	28	3.0	105
Crop production	(111X)	459	63.1	776
Grape Vineyards	(111332)	5	18.5	65
Nursery and Sod	(1114)	342	110.1	1,251
Subtotal:		***1,243***	***238.9***	***2,563***
Agricultural Support and Related Industries				
Farm Machinery and Equipment Wholesalers	(423820)	3	11.4	26
Farm Management Services	(115116)	2	0.5	4
Produce, Grocery and Related Wholesalers	(4244, 4245)	58	505.6	661
Support Activities for Animal Production	(115210)	14	16.9	40
Wineries (not Vineyards)	(312310)	3	16.1	37
Subtotal:		***80***	***550.6***	***768***
Cemeteries				
Cemeteries and Crematories	(812220)	82	111.6	472
Golf				
Golf Courses and Country Clubs	(713910)	74	213.5	2,505
Landscaping Contractors and Services				
Landscape Architectural Services	(541320)	67	25.8	194
Landscaping Services	(561730)	951	455.5	4,485
Masonry Contractors	(238140)	115	64.6	639
Other Services to Buildings and Dwellings	(561790)	6	1.0	6
Other Specialty Trade Contractors	(238990)	118	125.1	602
Site Preparation Contractors	(238910)	44	34.0	158
Subtotal:		***1,301***	***706.1***	***6,084***
Landscape Related Suppliers				
Brick/Stone Materials Wholesalers	(423320)	11	16.6	73
Florist and Nursery Supply Wholesalers	(424930)	5	12.3	75
Florists	(453110)	153	90.1	890
Nursery, Garden Center and Farm Supply Stores	(444220)	301	430.9	1,786
Other Building Material Dealers	(444190)	47	99.4	463
Outdoor Power Equipment Stores	(444210)	30	34.2	147
Subtotal:		***547***	***683.5***	***3,434***
	Totals:	**3,327**	**2,504.1**	**15,826**

Table T2: AR(1) Parameter Estimates, All Subsectors

	Sales: $\hat{\beta} = 1.00408$		Jobs: $\hat{\beta} = 0.95189$	
Sector	$\hat{\alpha}$	$\hat{\sigma}$	$\hat{\alpha}$	$\hat{\sigma}$
Agriculture				
Animal production	$77,470	$755,279	0.174	0.195
Crop production	$22,490	$89,177	0.301	0.833
Grape Vineyards	$167,715	$3.43M	0.722	4.189
Nursery and Sod	$64,962	$357,622	0.461	0.720
Agricultural Support and Related Industries				
Farm Machinery and Equipment Wholesalers	$171,575	$71,266	0.463	0.183
Farm Management Services	$10,889	$1,051	0.108	0.000
Produce, Grocery and Related Wholesalers	$62,340	$10,954	0.716	0.137
Support Activities for Animal Production	$54,515	$32,866	0.154	0.034
Wineries (not Vineyards)	$62,340	$31,973	0.661	0.204
Cemeteries				
Cemeteries	$64,783	$5,364	0.363	0.058
Golf				
Golf Courses and Country Clubs	$130,008	$16,801	0.367	0.052
Landscaping Contractors and Services				
Landscape Architectural Services	$19,686	$3,272	0.176	0.027
Landscaping Services	$26,363	$1,594	0.311	0.018
Masonry Contractors	$28,039	$2,827	0.326	0.029
Other Services to Buildings and Dwellings	$7,686	$2,073	0.057	0.020
Other Specialty Trade Contractors	$59,385	$13,092	0.302	0.031
Site Preparation Contractors	$41,796	$10,055	0.229	0.050
Landscape Related Suppliers				
Brick/Stone Materials Wholesalers	$67,804	$19,533	0.359	0.080
Florist and Nursery Supply Wholesalers	$111,194	$76,769	0.810	0.562
Florists	$27,839	$5,673	0.328	0.063
Nursery, Garden Center and Farm Supply Stores	$76,923	$6,873	0.377	0.031
Other Building Material Dealers	$104,631	$25,408	0.586	0.150
Outdoor Power Equipment Stores	$56,667	$16,394	0.273	0.035

Table T3: Bayesian Updating for Agriculture

Prior Means (Sales)	NAICS	Farms	Sales	Percent
Animal production	(112X)	409	$8,754	14.7%
Crop production	(111X)	464	$15,711	26.3%
Nursery and Sod	(1114)	342	$33,270	55.8%

Prior Means (Workers)	NAICS	Farms	Sales	Percent
Animal production	(112X)	409	262	14.0%
Crop production	(111X)	464	600	32.1%
Nursery and Sod	(1114)	342	912	48.8%

Sample Data (Sales)	NAICS	Farms	Mean Sales	Std. Dev.
Animal production	(112X)	22	$1,712,505	$2,612,168
Crop production	(111X)	133	$497,156	$1,010,427
Grape Vineyards	(111332)	5	$3,707,419	$2,199,766
Nursery and Sod	(1114)	69	$1,436,025	$2,317,694
All Agriculture		***229***	***$966,898***	***$1,822,143***

Sample Data (Workers)	NAICS	Farms	Mean Workers	Std. Dev.
Animal production	(112X)	22	5.602	7.395
Crop production	(111X)	133	3.232	6.608
Grape Vineyards	(111332)	5	13.431	11.674
Nursery and Sod	(1114)	69	8.579	11.592
All Agriculture		***229***	***5.321***	***8.961***

Estimates	NAICS	Sales ($M)	Jobs
Animal production	(112X)	$44.059M	365.58
Aquaculture	(1125)	$3.013M	105
Subtotal	***(112)***	**$47.072M**	**470.58**
Crop production	(111X)	$63.145M	775.65
Grape Vineyards	(111332)	$18.537M	65
Nursery and Sod	(1114)	$110.135M	1,251.49
Subtotal	***(111)***	***$191.82M***	***2,092.14***
All Agriculture		**$238.889M**	**2,562.72**

Table T4a: Estimation for Non-Agricultural Sectors, Sales ($M)

	Firms		Sample		
Sector	**Sampled**	**No Data**	**Mean**	**Std. Dev.**	**Total, Est.**
Agricultural Support and Related Industries					
Farm Machinery and Equipment Wholesalers	3	0	3.81	2.61	**11.4**
Farm Management Services	2	0	0.24	0.03	**0.5**
Produce, Grocery and Related Wholesalers	32	26	10.00	9.84	**505.6**
Support Activities for Animal Production	14	0	1.21	2.60	**16.9**
Wineries (not Vineyards)	3	0	5.38	4.70	**16.1**
Cemeteries					
Cemeteries	43	39	1.44	0.74	**111.6**
Golf					
Golf Courses and Country Clubs	74	0	2.89	3.05	**213.5**
Landscaping Contractors and Services					
Landscape Architectural Services	40	27	0.44	0.44	**25.8**
Landscaping Services	509	442	0.59	0.76	**455.5**
Masonry Contractors	50	65	0.62	0.42	**64.6**
Other Services to Buildings and Dwellings	6	0	0.17	0.11	**1.0**
Other Specialty Trade Contractors	73	45	1.32	2.36	**125.1**
Site Preparation Contractors	15	29	0.93	0.82	**34.0**
Landscape Related Suppliers					
Brick/Stone Materials Wholesalers	11	0	1.50	1.37	**16.6**
Florist and Nursery Supply Wholesalers	5	0	2.47	3.63	**12.3**
Florists	141	12	0.62	1.42	**90.1**
Nursery, Garden Center and Farm Supply Stores	113	188	1.71	1.54	**430.9**
Other Building Material Dealers	37	10	2.32	3.27	**99.4**
Outdoor Power Equipment Stores	23	7	1.26	1.66	**34.2**

Table T4b: Estimation for Non-Agricultural Sectors, Jobs

	Firms		Sample		
Sector	**Sampled**	**No Data**	**Mean**	**Std. Dev.**	**Total, Est.**
Agricultural Support and Related Industries					
Farm Machinery and Equipment Wholesalers	3	0	8.6	5.9	**26**
Farm Management Services	2	0	2.0	0.0	**4**
Produce, Grocery and Related Wholesalers	32	26	13.3	14.4	**661**
Support Activities for Animal Production	14	0	2.9	2.3	**40**
Wineries (not Vineyards)	3	0	12.3	6.5	**37**
Cemeteries					
Cemeteries	43	39	6.7	7.0	**472**
Golf					
Golf Courses and Country Clubs	74	0	33.8	42.6	**2,505**
Landscaping Contractors and Services					
Landscape Architectural Services	40	27	3.3	3.2	**194**
Landscaping Services	509	442	5.8	7.7	**4,485**
Masonry Contractors	50	65	6.1	3.8	**639**
Other Services to Buildings and Dwellings	6	0	1.1	0.9	**6**
Other Specialty Trade Contractors	73	45	5.6	4.8	**602**
Site Preparation Contractors	15	29	4.3	3.6	**158**
Landscape Related Suppliers					
Brick/Stone Materials Wholesalers	11	0	6.7	4.9	**73**
Florist and Nursery Supply Wholesalers	5	0	15.1	23.3	**75**
Florists	141	12	6.1	13.8	**890**
Nursery, Garden Center and Farm Supply Stores	113	188	7.0	6.1	**1,786**
Other Building Material Dealers	37	10	10.9	16.9	**463**
Outdoor Power Equipment Stores	23	7	5.1	3.1	**147**

Table T5: 95% Confidence Intervals for Sales and Jobs Estimates

Sector	Firms	Sales ($M)	95% CI (+/- $M)
Agriculture	*1,243*	*238.9*	*50.9*
Agricultural Support and Related Industries	*80*	*550.6*	*140.6*
Cemeteries	82	111.6	*10.3*
Golf	74	213.5	*6.0*
Landscaping Contractors and Services	*1,301*	*706.1*	*77.5*
Landscape Related Suppliers	*547*	*683.5*	*84.7*
Total	**3,327**	**2,504.1**	*369.1*

Sector	Firms	Jobs	95% CI (+/-)
Agriculture	*1,243*	*2,563*	*242*
Agricultural Support and Related Industries	*80*	*768*	*206*
Cemeteries	82	472	98
Golf	74	2,505	83
Landscaping Contractors and Services	*1,301*	*6,084*	*402*
Landscape Related Suppliers	*547*	*3,434*	*373*
Total	**3,327**	**15,826**	**1,403**

Table T6: Output and Jobs Final Multipliers

Sector	NAICS	Output	Jobs
Agriculture			
Animal production	(112X)	1.408	1.423
Aquaculture	(1125)	1.408	1.423
Crop production	(111X)	1.601	1.280
Grape Vineyards	(111332)	1.601	1.280
Nursery and Sod	(1114)	1.601	1.280
Agricultural Support and Related Industries			
Farm Machinery and Equipment Wholesalers	(423820)	1.691	2.169
Farm Management Services	(115116)	1.818	1.219
Produce, Grocery and Related Wholesalers	(4244, 4245)	1.691	2.169
Support Activities for Animal Production	(115210)	1.818	1.219
Wineries (not Vineyards)	(312310)	1.574	1.863
Cemeteries			
Cemeteries	(812220)	2.040	1.755
Golf			
Golf Courses and Country Clubs	(713910)	1.835	1.502
Landscaping Contractors and Services			
Landscape Architectural Services	(541320)	1.741	1.982
Landscaping Services	(561730)	1.810	1.346
Masonry Contractors	(238140)	1.922	1.833
Other Services to Buildings and Dwellings	(561790)	1.810	1.346
Other Specialty Trade Contractors	(238990)	1.922	1.833
Site Preparation Contractors	(238910)	1.922	1.833
Landscape Related Suppliers			
Brick/Stone Materials Wholesalers	(423320)	1.691	2.169
Florist and Nursery Supply Wholesalers	(424930)	1.691	2.169
Florists	(453110)	1.709	1.429
Nursery, Garden Center and Farm Supply Stores	(444220)	1.709	1.429
Other Building Material Dealers	(444190)	1.709	1.429
Outdoor Power Equipment Stores	(444210)	1.709	1.429