

Economic Impact of the Turfgrass Industry in New England

Raub, K.¹, B.L. Campbell¹, V. Wallace², J. Henderson³, J. Inguagiato, and S. Rackliffe³

¹Department of Agricultural and Resource Economics.

²Department of Extension,

³Department of Plant Science and Landscape Architecture,
University of Connecticut

April 2015

ABSTRACT

Turfgrass is a major industry in the six states of New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. The purpose of this study was to determine the regional and state specific effects of the turfgrass industry on the New England economy in terms of direct sales, employment (jobs), value added, labor, and total impacts created by these economic activities. Six primary sectors of the turfgrass industry were studied in detail: 1) sod farm production, 2) lawn equipment manufacturing, 3) lawn care services, 4) golf courses, 5) non-equipment wholesalers, and 6) lawn care retailing. Six secondary sectors were also evaluated: 1) airports, 2) roadways, 3) municipal grounds maintenance, 4) school grounds, 5) athletic fields, and 6) cemeteries. IMPLAN was used to create an input-output model that includes transactions between industries, employees, households and the government within a specific economy (Miller and Blair, 1985). Results show that the New England turfgrass industry contributed \$11.3 billion and 134,467 jobs to the regional economy, and had \$7.1 billion in value-added.

TABLE OF CONTENTS

LIST OF TABLES	3
LIST OF FIGURES	4
INTRODUCTION	5
RESEARCH METHODOLOGY	5
RESULTS	8
State by State Impacts	8
New England Impact - Total	8
State Impacts	11
Sector by Sector Impacts	25
<i>Sod Farm Production</i>	25
<i>Lawn Equipment Manufacturing</i>	26
<i>Lawn Care Wholesaling</i>	27
<i>Lawn Care Services</i>	28
<i>Lawn Care Retailing</i>	30
<i>Golf Courses</i>	32
<i>Other Wholesaling Consumers</i>	33
CONCLUSIONS	38
LITERATURE	39
APPENDIX A – Economic Multipliers.....	40

LIST OF TABLES

Table 1. Industry sectors, information sources, economic impact analysis.....6

Table 2. Turfgrass industry total impacts for New England.....8

Table 3. Impacts by sector for the New England region.....9

Table 4. Turfgrass total output per state.....11

Table 5. Impact per sector for Connecticut13

Table 6. Impact per sector for Maine.....15

Table 7. Impact per sector for Massachusetts.....17

Table 8. Impact per sector for New Hampshire19

Table 9. Impact per sector for Rhode Island21

Table 10. Impact per sector for Vermont.....23

Table 11. Sod farms and acreage per state in New England.....25

Table 12. Total impact for New England by sod producers.....26

Table 13. Total impact for New England by the lawn equipment manufacturing
sector.....27

Table 14. Total impact for New England by the lawn care wholesaling sector28

Table 15. Lawn care service firms and sales per state; 2002 and 2012 comparison.....29

Table 16. Total impact for New England by the lawn care services sector.....29

Table 17. Total impact for New England by the lawn care services sector: subsector
residential.....29

Table 18. Total impact for New England by the lawn care services sector: subsector
commercial.....30

Table 19. Total impact for New England by the lawn care services sector: subsector landscape
architecture and design services.....30

Table 20. Total impact for New England by the lawn care services sector: subsector landscape
construction.....30

Table 21. Distribution of store types per state.....31

Table 22. Total impact for New England by the lawn care retailing sector.....31

Table 23. Number of golf courses per state in 2012.....32

Table 24. Total impact of New England golf courses.....33

Table 25. Total impact of New England golf courses: subsector playing (green fees and
memberships).....33

Table 26. Total impact of New England golf courses: subsector equipment and apparel sales...33

Table 27. Breakdown of acres associated with various turf operations.....34

Table 28. Impact of golf turf input purchasing, not including labor.....34

Table 29. Total impact for New England by the other wholesaling consumers' sector35

Table 30. Total impact for New England from municipal grounds maintenance35

Table 31. Total impact for New England from airport grounds maintenance36

Table 32. Total impact for New England from roadway maintenance36

Table 33. Total impact for New England from athletic fields.....37

Table 34. Total impact for New England from school grounds.....37

Table 35. Total impact for New England from cemetery maintenance38

LIST OF FIGURES

Figure 1. Percent of total regional output from sod farms by state.....	25
Figure 2. Percent of total regional output from lawn care equipment manufacturing by state....	26
Figure 3. Percent of total regional output from lawn care wholesaling by state.....	27
Figure 4. Percent of total regional output from lawn care services by state.....	28
Figure 5. Percent of total regional output from lawn care retailing by state.....	31
Figure 6. Percent of total regional output from golf courses (greens, memberships, and equipment/apparel sales) by state.....	32

INTRODUCTION

Humans have used turfgrass for over 10 centuries (Beard and Green, 1994). It is estimated that two percent of U.S. land area (Milesi et al. 2005) is covered with turfgrass and in 2002 the lawn care industry was estimated at \$57.8 billion (Haydu, Hodges, and Hall 2006). There have been numerous environmental benefits attributed to the use of turfgrass including, stabilizing sediment to control erosion, improving groundwater recharge, and aiding CO₂ conversion (Beard and Green 1994). Turfgrass has also been shown to reduce noise pollution and it can delay, or prevent, the movement of chemicals from lawns and agricultural areas to watersheds (Blanco-Montero *et al.* 1995). Further, it provides an inexpensive surface for sports/outdoor activities and helps cushion against personal impact injuries (Beard and Green 1994), while also improving mental health and work productivity due to its' aesthetics (Beard and Green, 1994).

Given the numerous benefits, it is essential to understand the structure and impact of the growing turfgrass industry. The industry can be broken into two main sectors, 1) suppliers and 2) consumers of turf products and services. Suppliers include sod and seed producers, manufacturers, wholesalers, and retailers. Consumers, on the other hand, include golf courses, athletic fields, commercial institutions, non-profits, municipal properties and households.

The economic significance of specialty crops, including turfgrass, has grown considerably over the past 20+ years (Haydu et al. 2008). While over 60 state level studies have been performed on nursery crops and turfgrass between 1978 and 2004 (Haydu et al. 2008), the most recent study of the industry was done approximately ten years ago and only four studies have included, or specifically concentrated on, New England. These studies have focused on five primary sectors- sod production, lawn care services, lawn equipment manufacturing, golf courses, and retail sales- and three secondary sectors- cemeteries, airports, and school grounds. This study takes a more in-depth approach and includes six primary sectors and six secondary sectors: sod production, lawn care services, lawn equipment manufacturing, golf courses, retail, and lawn care wholesaling (i.e., equipment); and cemeteries, airports, school grounds, athletic fields, roadways, and municipal.

RESEARCH METHODOLOGY

IMPLAN was used to generate an input-output model that accounts for transactions between industries, employees, households, and government within a specified economy (Miller and Blair 1985). The IMPLAN sectors correspond to the North American Industrial Classification System (NAICS), which classify industries based on the dominant good or service produced (Haydu et al. 2008). Table 1 details the IMPLAN sectors, and corresponding NAICS codes, included in this study. As we are using the latest version of IMPLAN (version 3 with 2012 data) we list the older corresponding IMPLAN sector codes used in previous studies.

Table 1. Industry Sectors, Information Sources, Economic Impact Analysis.

Sector	NAICS		IMPLAN		
	Industry Sector Description	Code	Industry Sector Description	Code	
				Old	New
Sod Farms	Nursery and floriculture production	11142	Nursery & Greenhouse	6	6
Lawn care services	Landscaping services	56173	Services to buildings and dwellings	458	388
Lawn care retail stores	Lawn and garden equipment and supplies stores (1) and home centers (2)	4442 & 44411	Building material and garden supply stores	404	323
Lawn equipment manufacturing	Lawn and garden tractor and home lawn and garden equipment manufacturing	333112	Lawn & garden equipment manufacturing	258	204
Golf Courses	Golf courses and country clubs	71391	Amusement, gambling and recreation services	458	410
Cemeteries	Cemeteries and crematories	812220	Death care services	N/A	420
Lawn equipment wholesaling	Merchant wholesalers of specialized machinery, equipment, and parts	423820	Wholesale trade businesses	N/A	319

IMPLAN derives economic multipliers to estimate the total economic impact of each turfgrass industry sector in a user specified area (Haydu et al. 2008). Direct, indirect, and induced effect multipliers for output, employment and value added are provided per sector in Appendix A.

- *Direct Effects:* Direct sales by industry firms.
- *Indirect Effects:* Effects of intermediate purchases by industry firms from other economic sectors.
- *Induced Effects:* Effects of industry employee household consumer spending.
- *Output:* Total impact generated.
- *Employment:* Jobs (full and part time) created by a sector.
- *Value Added:* Total personal and business net income (Haydu, Hodges and Hall, 2006).

Value-added is the most accurate estimate of the turfgrass industries impact to the regional economy because it represents the net impact after direct effects have been subtracted (Haydu et al. 2008).

Primary data was collected from a variety of sources and inputted into IMPLAN to run a regional analysis of New England. Data sources are detailed below:¹

- *Sod production*: 2012 Agricultural Census (USDA-National Agricultural Statistics Service)
- *Lawn equipment manufacturing*: U.S. Census Bureau 2012 Manufacturing and Industry Series²
- *Lawn equipment wholesaling*: IBIS Word Reports³
- *Landscape services*: 2012 U.S. Census Bureau Economic Census – sales per firm were estimated by dividing U.S. value of sales by number of U.S. firms as state level data was not available.⁴ State firm numbers were from the 2012 U.S. Census Bureau County Business Patterns. Subsectors within landscape services were found by calculating the percentage of firms out of all firms in the U.S. participating in a specific activity, such as commercial landscaping, residential landscaping, landscape architectural and design services, or landscape construction services, and then multiplying by the number of firms in each state. Calculations do not contain snow removal related activities.
- *Golf*: Number of firms for each state were from a 2011 AARP report. Value per firm was from the 2007 U.S. Census Bureau Economic Census and adjusted to real dollars. Values only include memberships and green fees associated with playing golf and do not include other amenities at country clubs, such as food/beverage sales. Equipment apparel and equipment sales were estimated from reports by Bloomberg and Statista. Turf related expenditures were from the GCSAA 2012 Maintenance Budget Survey.
- *Municipalities*: Data came from examining budgets from 5-7 towns/cities per state, including the largest towns/cities and multiplying the total number of towns/cities.
- *Cemeteries*: Number of cemeteries came from expertgps.com with average cemetery size received from personal communications with state/regional cemetery association members.
- *Roadways*: Total road miles per state were from the Department of Transportation with expenditure per mile from a variety of state reports.
- *Airports*: Total number of airports per state were from the Department of Transportation with acres and per acre expenditures from a variety of state and governmental reports.
- *School athletic fields*: Number of fields per sport by state were from maxpreps.com, including football, baseball, soccer, lacrosse, and softball.
- *School grounds*: Number of schools was taken from www.educationbug.org with average area being eleven acres.
- *Retailing*: 2010 National Gardening Survey

¹ More details about the report and specific data sources are available from the report authors.

² The number of firms per state was available in 2012 but sales were not available by state. The per state sales was calculated by estimating the U.S. average per firm (which was available) and then multiplying the average by the number of firms per state.

³ <http://clients1.ibisworld.com/reports/us/industry/productsandmarkets.aspx?entid=947>

⁴ The estimated value per firm is similar to that obtained from the Dunn and Bradstreet report.

RESULTS

The results are presented as totals for all of New England with percentage breakdowns per New England state. The results are impacts associated with a sectors/sub-sectors impact on the New England economy, not just on the state economy. However, impacts outside the state are minimal for all sectors/sub-sectors.

STATE BY STATE IMPACTS

NEW ENGLAND IMPACT – TOTAL

The turfgrass industry contributes to over 134,000 jobs with direct sales of \$10.7 billion (Table 2). Furthermore, there was approximately \$11.3 billion in economic activity attributable to the industry in 2012. Labor earned income was around \$5 billion while valued added was at \$7.1 billion. In total, the direct output for the turfgrass sector was \$6.8 billion in economic activity with another \$1.7 billion and \$2.8 billion coming from the indirect (i.e. intermediate firm purchases) and induced (i.e. employee household spending). To put the numbers in perspective, this equates to \$777 dollars of output per New England resident. In real dollar terms, the turfgrass industry would have direct sales around \$11 billion with a total economic impact of \$11.7 billion in 2014 dollars.

Table 2. Turfgrass Industry Total Impacts for New England.

	Total Direct Sales (dollars in millions)	Total Employment (jobs)	Total Labor Income (dollars in millions)	Total Value Added (dollars in millions)	Total Output (dollars in millions)
Direct	10,672	100,468	3,232	4,172	6,844
Indirect		12,403	705	1,108	1,694
Induced		21,595	1,074	1,822	2,770
Total		134,467	5,011	7,102	11,308

When examining sector specific impacts it is apparent that lawn care services is an extremely important driver of the turfgrass industry (Table 3). Lawn care services had direct sales of over \$4 billion with a total impact of \$6.7 billion. Within lawn care services, commercial maintenance contributes over half of direct sales, total output, and employment. Golf has a \$2.5 billion dollar impact on the New England regional economy contributing almost 35,000 jobs. The golf impact is not the true impact of golf in that this report only looked at facets of the game directly related to turf. For instance, we include green fees and club memberships as well as equipment and apparel sales. We do not include food/drink sales at country clubs, charitable giving by golf organizations, or other similar activities.

Table 3. Impacts by Sector for the New England Region.

Sector	Direct Sales (dollars)	Indirect (dollars)	Induced (dollars)	Labor Income (dollars)	Value Added (dollars)	Total Output (dollars)	Employment (jobs)
Sod Production	26,297,304	3,969,041	8,180,826	14,527,027	24,886,928	38,445,627	460.2
Lawn Equipment Manufacturing	20,866,953	4,377,012	2,712,197	4,796,852	9,157,091	27,956,162	96.9
Lawn care Wholesaling	2,570,616,400	112,054,202	159,342,298	285,231,891	472,760,703	718,683,742	4,286.1
Lawn care Service – Total	4,117,108,889	958,346,375	1,627,377,000	2,947,346,316	4,023,176,971	6,702,832,264	82,085.8
Lawn care Service – Residential	1,334,822,253	281,995,342	534,019,974	966,461,139	1,316,689,733	2,150,837,569	28,738.2
Lawn care Service – Commercial	2,186,268,615	461,872,404	874,656,612	1,582,940,088	2,156,569,860	3,522,797,630	47,069.7
Lawn care Service – Landscape Architectural and Design Services	36,672,954	12,107,954	19,991,687	36,183,917	44,299,190	68,772,597	569.7
Lawn care Service – Landscape Construction	559,345,066	202,370,675	198,708,727	361,761,172	505,618,188	960,424,468	5,708.2
Golf Course - Total	1,600,457,413	404,250,963	634,881,398	1,149,585,910	1,668,292,008	2,500,567,492	34,458.8
Golf Course – Playing	1,367,198,548	371,801,865	593,979,576	1,075,635,041	1,560,218,763	2,332,979,988	31,884.1
Golf Course – Apparel and Equipment	233,258,864	32,449,098	40,901,822	73,950,869	108,073,245	167,587,504	2,574.7
Lawn care Retailing	2,235,108,706	206,619,344	331,330,794	598,103,836	884,683,910	1,291,181,800	12,913.8
Other Wholesaling Activities ^a	101,837,616	4,533,256	6,451,738	11,559,945	19,238,155	28,704,738	165.2

Table 3 Cont'd. Impacts by Sector for the New England Region.

Municipal – Grounds Maintenance	56,003,112	2,499,891	3,517,714	6,287,898	10,515,682	15,762,146	91.6
Airports	1,300,629	57,400	80,229	141,910	237,226	363,940	2.3
Roadways	2,834,621	125,115	178,547	318,820	528,467	796,887	4.7
Fields	12,521,109	556,539	804,123	1,444,668	2,386,311	3,539,335	20.1
School Grounds	10,270,352	455,185	655,174	1,176,714	1,945,795	2,897,399	16.5
Cemetery	18,907,792	839,126	1,215,951	2,189,935	3,624,674	5,345,031	30.0
Golf Course - Upkeep	330,592,748	14,639,807	21,147,706	37,871,614	62,563,964	93,310,651	536.1
Total	10,672,293,281	1,694,150,193	2,770,276,251	5,011,151,777	7,102,195,766	11,308,371,825	134,466.8

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

Examining the total impacts at the state level, MA has the largest turfgrass industry with direct sales almost double that of CT, the state with the second largest turfgrass industry (Table 4). MA has direct sales of \$4.3 billion with an economic output of almost \$5 billion. Over 57,000 MA jobs can be attributed to turf. On the other end of the spectrum Rhode Island generated \$609 million in total output with only 7,430 turf jobs. However, to put these numbers in perspective, Vermont had the highest total output to resident value with \$973 output generated per resident, while Maine had the lowest per resident output at \$690 per resident. A major factor in the economic impacts by state and per resident totals is the type of industry and its value (see multipliers in Appendices A1-A7) to the state. For instance, some sectors provide a larger output per dollar and/or jobs per dollar than other sectors. Revenue from playing golf (i.e. green fees, memberships, etc.) in MA generates the largest impact per dollar of sales at \$1.74. However, NH generates the highest employment per million dollars of sales at 27.35. MA, on the other hand, generates 24.5 jobs per million dollars in sales. This implies that impacts by state are a function of the size of a sector as well as the value generated by the sector throughout the region.

Table 4. Turfgrass Industry Total Output per State.

State	Direct Sales (dollars in millions)	Total Employment	Total Labor Income (dollars in millions)	Total Value Added (dollars in millions)	Total Output (dollars in millions)
CT	2,473	33,536	1,312	1,813	2,853
ME	1,067	11,781	363	547	918
MA	4,270	57,620	2,273	3,157	4,976
NH	1,164	13,846	468	689	1,098
RI	772	10,253	372	541	855
VT	928	7,430	223	356	609
All States	10,672	134,467	5,011	7,102	11,308

STATE IMPACTS

CONNECTICUT

The turfgrass industry in Connecticut contributes over 33,000 jobs with direct sales of \$2.5 billion (Table 5). Further, there is around \$2.9 billion in economic activity attributable to the industry. The largest sector is lawn care services with \$1 billion in direct sales and \$1.7 billion in economic activity generated. The lawn care services sector also contributes 61% of the jobs within the CT turfgrass industry. Commercial maintenance is the largest sub-sector within lawn

care services contributing almost 12,000 of the 20,000 jobs and over half of the economic output for the sector. Lawn care retailing is the second largest with respect to direct sales but is third, after golf, with respect to economic activity.

MAINE

The turfgrass industry in Maine contributes almost 12,000 jobs with direct sales of \$1.1 billion (Table 6). Total economic output generated was \$918 million with value added output at \$547 million. The largest sector with respect to direct sales was lawn care wholesaling, however, lawn care services had the highest total output at \$544 million.

MASSACHUSETTS

The turfgrass industry in Massachusetts has the largest turfgrass sector in New England with almost \$5 billion in total output and employing over 57,000 people (Table 7). Turfgrass in Massachusetts is led by lawn care services followed by golf and lawn care retailing. With respect to golf numbers provided in this report, total output numbers are similar to those found in the 2012 Massachusetts Golf Economy Full Report (SRI International 2014).

NEW HAMPSHIRE

The turfgrass industry in New Hampshire has \$1.2 billion in direct sales with a total economic output of \$1.1 billion. Due to the nature of the NH turfgrass industry, direct sales flow out of the region leading to lower economic output than direct sales. Further, the industry contributes 13,846 jobs (Table 8). The value added impact is \$689 million with labor income of \$468 million. The largest sector in terms of direct sales was lawn care services with \$410 million in direct sales followed closely by lawn care wholesaling at \$406 million. However, lawn care services contributed almost six times the regional total impact as lawn care wholesaling, \$646 million to \$117 million, respectively.

RHODE ISLAND

The turfgrass industry in Rhode Island contributes over 10,000 jobs with direct sales of \$772 million (Table 9). Further, there is around \$855 million in economic activity attributable to the industry. The largest sector is lawn care services with \$321 million in direct sales and \$514 million in economic activity generated. Further, turfgrass production in Rhode Island is the largest of any New England state with respect to direct sales and economic impact. Production of turfgrass contributes \$17 million to the regional economy and employs 222 people.

VERMONT

The turfgrass industry in Vermont contributes to over 7,000 jobs with direct sales of \$928 million with total output around \$609 million (Table 10). Vermont and Connecticut are the only two states in New England that currently have lawn equipment manufacturing. With respect to Vermont, lawn equipment manufacturing contributes over \$17 million to the regional economy. Further, the largest sector in Vermont turfgrass is lawn care wholesaling, but lawn care services has the largest total output.

Table 5. Impacts by Sector for Connecticut.

Sector	Direct Sales	Indirect	Induced	Labor Income	Value Added	Output	Employment
Sod Production	6,106,160	1,048,999	2,075,378	3,983,477	6,004,548	9,230,537	96.9
Lawn Equipment Manufacturing	7,825,108	1,839,002	1,207,407	2,292,114	4,871,008	10,871,517	33.0
Lawn care Wholesaling	405,886,800	18,512,685	25,759,953	49,042,112	80,169,021	114,896,940	610.2
Lawn care Service – Total	1,032,477,048	256,441,398	400,725,494	767,773,909	1,023,302,135	1,689,643,940	20,502.8
Lawn care Service – Residential	334,742,990	77,161,517	130,176,115	249,045,329	333,754,893	542,080,622	7,180.3
Lawn care Service – Commercial	548,266,326	126,380,723	213,211,875	407,904,488	546,647,949	887,858,924	11,760.5
Lawn care Service – Landscape Architectural and Design Services	9,196,741	3,322,892	4,816,513	9,221,709	11,187,813	17,336,146	143.0
Lawn care Service – Landscape Construction	140,270,991	49,576,266	52,520,991	101,602,383	131,711,480	242,368,248	1,419.0
Golf Course - Total	443,901,545	115,749,632	176,574,288	334,947,104	473,360,485	701,950,358	9,178.3
Golf Course – Playing	386,392,976	106,287,102	166,715,812	316,127,142	446,805,876	659,395,890	8,550.5
Golf Course – Apparel and Equipment	57,508,569	9,462,530	9,858,476	18,819,962	26,554,609	42,554,468	627.8
Lawn care Retailing	551,052,596	54,710,809	79,093,477	150,631,470	219,797,514	319,509,018	3,077.2
Other Wholesaling Activities ^a	25,213,991	1,150,021	1,600,226	3,046,532	4,980,159	7,137,481	38.0

Table 5 Cont'd. Impacts by Sector for Connecticut.

Municipal – Grounds Maintenance	15,481,714	706,128	982,560	1,870,610	3,057,882	4,382,506	23.3
Airports	181,732	8,289	11,534	21,958	35,895	51,444	0.3
Roadways	517,467	23,602	32,841	62,524	102,208	146,482	0.8
Fields	2,862,904	130,578	181,696	345,916	565,468	810,420	4.3
School Grounds	2,322,585	105,934	147,405	280,631	458,747	657,468	3.5
Cemetery	3,847,589	175,490	244,190	464,893	759,959	1,089,161	5.8
Golf Course - Upkeep	63,003,757	2,873,630	3,998,587	7,612,559	12,444,232	17,834,871	94.7
Total	2,472,463,247	449,452,546	687,036,223	1,311,716,718	1,812,484,870	2,853,239,791	33,536.4

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

Table 6. Impacts by Sector for Maine.

Sector	Direct Sales	Indirect	Induced	Labor Income	Value Added	Output	Employment
Sod Production	5,094,869	737,603	2,731,950	4,578,242	5,496,025	8,564,422	89.6
Lawn Equipment Manufacturing	-	-	-	-	-	-	-
Lawn care Wholesaling	405,886,800	18,803,601	24,231,445	40,302,250	70,864,343	113,659,347	753.7
Lawn care Service – Total	340,781,422	76,994,480	126,195,286	210,683,499	302,617,300	543,971,190	7,565.1
Lawn care Service – Residential	110,485,935	22,133,536	42,339,888	70,678,939	99,899,964	174,959,360	2,655.6
Lawn care Service – Commercial	180,961,871	36,251,910	69,347,338	115,763,088	163,623,402	286,561,119	4,349.6
Lawn care Service – Landscape Architectural and Design Services	3,035,495	918,776	1,600,028	2,670,611	3,343,653	5,554,299	52.9
Lawn care Service – Landscape Construction	46,298,121	17,690,258	12,908,032	21,570,861	35,750,281	76,896,412	507.0
Golf Course - Total	92,164,674	18,288,620	33,673,254	56,155,748	87,056,463	131,437,468	2,065.0
Golf Course – Playing	70,874,272	16,285,317	30,213,614	50,382,521	77,505,004	117,373,203	1,802.9
Golf Course – Apparel and Equipment	21,290,402	2,003,303	3,459,640	5,773,227	9,551,459	14,064,265	262.1
Lawn care Retailing	204,006,661	16,057,061	29,659,665	49,478,123	77,628,489	114,466,973	1,271.2
Other Wholesaling Activities ^a	19,356,455	896,730	1,155,579	1,921,985	3,379,469	5,420,333	36.0

Table 6 Cont'd. Impacts by Sector for Maine.

Municipal – Grounds Maintenance	12,897,559	597,508	769,984	1,280,654	2,251,803	3,611,667	24.0
Airports	406,224	18,819	24,251	40,336	70,923	113,754	0.8
Roadways	551,949	25,570	32,951	54,805	96,365	154,561	1.0
Fields	1,773,153	82,145	105,857	176,064	309,577	496,531	3.3
School Grounds	1,478,808	68,509	88,285	146,837	258,187	414,106	2.7
Cemetery	2,248,762	104,179	134,251	223,289	392,614	629,714	4.2
Golf Course - Upkeep	49,553,517	2,295,676	2,958,345	4,920,382	8,651,618	13,876,333	92.0
Total	1,067,290,881	131,778,095	217,647,179	363,119,847	547,042,089	917,519,733	11,780.6

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

Table 7. Impacts by Sector for Massachusetts.

Sector	Direct Sales	Indirect	Induced	Labor Income	Value Added	Output	Employment
Sod Production	2,053,208	352,400	745,121	1,338,145	2,045,916	3,150,729	41.1
Lawn Equipment Manufacturing	-	-	-	-	-	-	-
Lawn care Wholesaling	676,478,000	29,882,458	45,173,963	81,095,232	133,539,187	192,763,590	1,025.0
Lawn care Service – Total	1,795,102,140	428,603,551	760,804,223	1,366,552,495	1,824,828,789	2,984,509,915	34,565.1
Lawn care Service – Residential	581,996,335	123,181,254	246,296,177	442,502,393	596,702,954	951,473,766	11,994.6
Lawn care Service – Commercial	953,235,772	201,755,184	403,401,726	724,762,485	977,323,338	1,558,392,682	19,645.7
Lawn care Service – Landscape Architectural and Design Services	15,989,788	5,228,749	9,324,670	16,751,235	20,321,302	30,543,208	233.0
Lawn care Service – Landscape Construction	243,880,245	98,438,364	101,781,650	182,536,382	230,481,195	444,100,259	2,691.8
Golf Course - Total	742,135,506	207,179,060	302,584,660	543,508,936	780,535,102	1,188,452,074	16,219.7
Golf Course – Playing	635,680,551	190,186,547	283,125,445	508,560,558	730,873,607	1,108,992,542	15,064.9
Golf Course – Apparel and Equipment	106,454,955	16,992,513	19,459,215	34,948,378	49,661,495	79,459,532	1,154.8
Lawn care Retailing	1,020,061,543	99,297,720	154,078,290	276,803,117	409,251,913	597,136,763	5,718.1
Other Wholesaling Activities ^a	33,632,972	1,485,689	2,245,947	4,031,872	6,639,269	9,583,772	51.0

Table 7 Cont'd. Impacts by Sector for Massachusetts.

Municipal – Grounds Maintenance	12,927,317	571,046	863,262	1,549,708	2,551,899	3,683,661	19.6
Airports	274,379	12,120	18,322	32,892	54,163	78,185	0.4
Roadways	875,991	38,696	58,497	105,012	172,924	249,615	1.3
Fields	5,335,975	235,709	356,327	639,669	1,053,341	1,520,495	8.1
School Grounds	3,946,417	174,327	263,534	473,091	779,036	1,124,537	6.0
Cemetery	10,272,894	453,791	686,005	1,231,500	2,027,906	2,927,279	15.6
Golf Course - Upkeep	133,440,542	5,894,547	8,910,915	15,996,665	26,341,642	38,024,115	202.2
Total	4,269,463,369	766,800,878	1,265,632,204	2,273,329,797	3,156,840,176	4,975,596,843	57,620.0

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

Table 8. Impacts by Sector for New Hampshire.

Sector	Direct Sales	Indirect	Induced	Labor Income	Value Added	Output	Employment
Sod Production	301,714	39,513	89,266	155,770	280,189	430,494	7.9
Lawn Equipment Manufacturing	-	-	-	-	-	-	-
Lawn care Wholesaling	405,886,800	17,729,448	28,246,771	49,274,752	75,920,904	116,600,520	716.4
Lawn care Service – Total	409,577,672	85,118,925	151,517,050	265,775,802	390,824,529	646,213,645	8,278.2
Lawn care Service – Residential	132,790,608	26,054,701	51,827,709	90,866,523	127,875,345	210,673,017	2,953.0
Lawn care Service – Commercial	217,494,080	42,674,277	84,887,177	148,827,776	209,443,507	345,055,533	4,836.6
Lawn care Service – Landscape Architectural and Design Services	3,648,294	1,178,449	1,937,429	3,396,573	4,260,531	6,764,171	59.9
Lawn care Service – Landscape Construction	55,644,691	15,211,498	12,864,735	22,684,930	49,245,146	83,720,924	428.7
Golf Course - Total	140,014,244	32,804,773	54,585,982	95,352,836	140,661,505	214,796,817	3,491.1
Golf Course – Playing	118,859,575	30,959,996	50,697,876	88,526,857	130,580,569	200,517,447	3,251.4
Golf Course – Apparel and Equipment	21,154,669	1,844,777	3,888,106	6,825,979	10,080,936	14,279,370	239.7
Lawn care Retailing	202,706,057	17,719,575	32,606,159	57,038,582	79,972,512	118,637,678	1,343.6
Other Wholesaling Activities ^a	5,280,639	230,663	367,494	641,071	987,740	1,516,987	9.2

Table 8 Cont'd. Impacts by Sector for New Hampshire.

Municipal – Grounds Maintenance	1,597,310	69,772	111,161	193,914	298,776	458,865	2.8
Airports	185,295	8,094	12,895	22,495	34,659	53,230	0.3
Roadways	387,914	16,944	26,996	47,093	72,559	111,437	0.7
Fields	1,211,532	52,921	84,314	147,080	226,616	348,041	2.1
School Grounds	1,037,143	45,303	72,178	125,909	193,997	297,944	1.8
Cemetery	861,446	37,629	59,950	104,580	161,133	247,470	1.5
Golf Course - Upkeep	39,996,767	1,747,090	2,783,484	4,855,617	7,481,373	11,490,011	70.6
Total	1,163,767,125	153,642,897	267,412,722	468,238,813	688,647,379	1,098,196,141	13,846.4

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

Table 9. Impacts by Sector for Rhode Island.

Sector	Direct Sales	Indirect	Induced	Labor Income	Value Added	Output	Employment
Sod Production	12,625,310	1,774,771	2,364,345	4,143,358	10,867,175	16,764,426	221.6
Lawn Equipment Manufacturing	-	-	-	-	-	-	-
Lawn care Wholesaling	135,295,600	5,814,927	8,413,128	14,709,559	24,796,474	37,769,489	224.3
Lawn care Service – Total	320,515,860	68,825,955	124,509,121	218,412,255	302,179,550	513,850,936	6,430.0
Lawn care Service – Residential	103,915,567	20,764,338	41,841,956	73,379,676	99,726,654	166,521,860	2,266.4
Lawn care Service – Commercial	170,200,445	34,009,337	68,531,787	120,186,550	163,339,540	272,741,569	3,712.0
Lawn care Service – Landscape Architectural and Design Services	2,854,980	888,352	1,469,117	2,578,689	3,248,616	5,212,450	46.7
Lawn care Service – Landscape Construction	43,544,868	13,163,928	12,666,261	22,267,340	35,864,740	69,375,057	404.9
Golf Course - Total	128,863,928	21,318,856	52,466,276	91,860,541	138,205,534	192,622,487	2,418.6
Golf Course – Playing	112,040,821	19,923,748	49,717,786	87,037,183	130,379,820	181,682,354	2,238.0
Golf Course – Apparel and Equipment	16,823,106	1,395,108	2,748,490	4,823,358	7,825,714	10,940,133	180.6
Lawn care Retailing	161,200,612	12,284,650	23,347,453	40,901,116	62,870,287	89,956,711	936.9
Other Wholesaling Activities ^a	13,168,064	565,955	818,832	1,431,653	2,413,393	3,676,030	21.9

Table 9 Cont'd. Impacts by Sector for Rhode Island.

Municipal – Grounds Maintenance	10,999,533	472,754	683,987	1,195,887	2,015,953	3,070,660	18.2
Airports	32,070	1,378	1,994	3,487	5,878	8,952	0.1
Roadways	156,483	6,725	9,730	17,013	28,679	43,683	0.3
Fields	698,622	30,026	43,442	75,955	128,041	195,029	1.2
School Grounds	727,318	31,260	45,227	79,075	133,300	203,040	1.2
Cemetery	554,037	23,812	34,452	60,236	101,542	154,666	0.9
Golf Course - Upkeep	20,175,360	867,125	1,254,570	2,193,498	3,697,665	5,632,208	33.4
Total	771,669,373	110,585,114	211,919,155	371,458,482	541,332,413	854,640,079	10,253.3

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

Table 10. Impacts by Sector for Vermont.

Sector	Direct Sales	Indirect	Induced	Labor Income	Value Added	Output	Employment
Sod Production	116,044	15,755	174,766	328,035	193,075	305,019	3.1
Lawn Equipment Manufacturing	13,041,846	2,538,010	1,504,790	2,504,738	4,286,083	17,084,645	63.9
Lawn care Wholesaling	541,182,400	21,311,083	27,517,038	50,807,986	87,470,774	142,993,856	956.5
Lawn care Service – Total	218,654,747	42,362,066	63,625,826	118,148,356	179,424,668	324,642,638	4,744.6
Lawn care Service – Residential	70,890,819	12,699,996	21,538,129	39,988,279	58,729,923	105,128,944	1,688.3
Lawn care Service – Commercial	116,110,121	20,800,973	35,276,709	65,495,701	96,192,124	172,187,803	2,765.3
Lawn care Service – Landscape Architectural and Design Services	1,947,657	570,736	843,930	1,565,100	1,937,275	3,362,323	34.2
Lawn care Service – Landscape Construction	29,706,150	8,290,361	5,967,058	11,099,276	22,565,346	43,963,568	256.8
Golf Course - Total	53,377,516	8,910,022	14,996,938	27,760,745	48,472,919	71,308,288	1,086.1
Golf Course – Playing	43,350,353	8,159,155	13,509,043	25,000,780	44,073,887	65,018,552	976.4
Golf Course – Apparel and Equipment	10,027,164	750,867	1,487,895	2,759,965	4,399,032	6,289,736	109.7
Lawn care Retailing	96,081,238	6,549,529	12,545,750	23,251,428	35,163,195	51,474,657	566.8
Other Wholesaling Activities ^a	5,185,495	204,198	263,660	486,832	838,125	1,370,135	9.1

Table 10 Cont'd. Impacts by Sector for Vermont.

Municipal – Grounds Maintenance	2,099,680	82,683	106,760	197,125	339,369	554,787	3.7
Airports	220,929	8,700	11,233	20,742	35,708	58,375	0.4
Roadways	344,817	13,578	17,532	32,373	55,732	91,109	0.6
Fields	638,923	25,160	32,487	59,984	103,268	168,819	1.1
School Grounds	758,081	29,852	38,545	71,171	122,528	200,304	1.3
Cemetery	1,123,064	44,225	57,103	105,437	181,520	296,741	2.0
Golf Course - Upkeep	24,422,805	961,739	1,241,805	2,292,893	3,947,434	6,453,113	43.2
Total	927,639,286	81,890,663	120,628,768	223,288,120	355,848,839	609,179,238	7,430.1

^a The categories in other wholesaling activities do not include labor expenses or contracted expenses, even though these are considerable for all sectors listed. The values presented are only for inputs to turfgrass.

SECTOR BY SECTOR IMPACTS

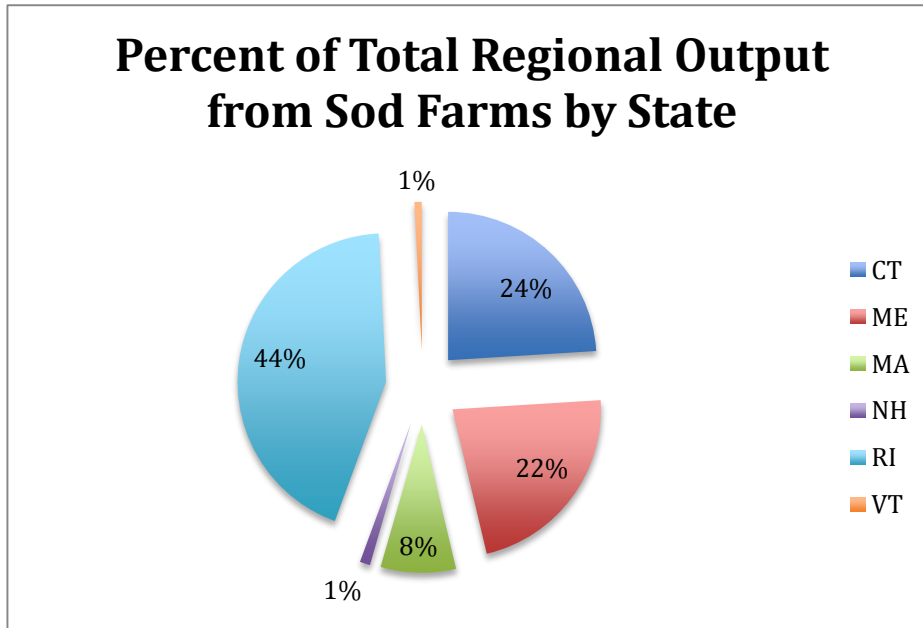
SOD PRODUCERS

Sod producers are farms either partially or exclusively dedicated to growing sod. Based on 2012 Agricultural Census estimates New England has 121 sod farms covering 5,869 acres. Table 11 shows a breakdown of farms and acreage per state with Figure 1 indicating the state breakdown based on total regional output.

Table 11. Sod Farms and Acreage per State in New England.

State	Number of Farms	Acres	Value of Sales (\$ millions)
CT	8	1,357	6.1
ME	9	958	5.1
MA	6	607	2.1
NH	1	65	0.3
RI	15	2,857	12.6
VT	1	25	0.1
TOTAL	40	5,869	26.4

Figure 1.



The regional impact of sod producers is detailed below in Table 12, including the induced and indirect impacts for employment, labor income, value added, and total output. In total, this sector provides 460 jobs and \$14.5 million in labor income to the New England economy. The total output is around \$38.5 million.

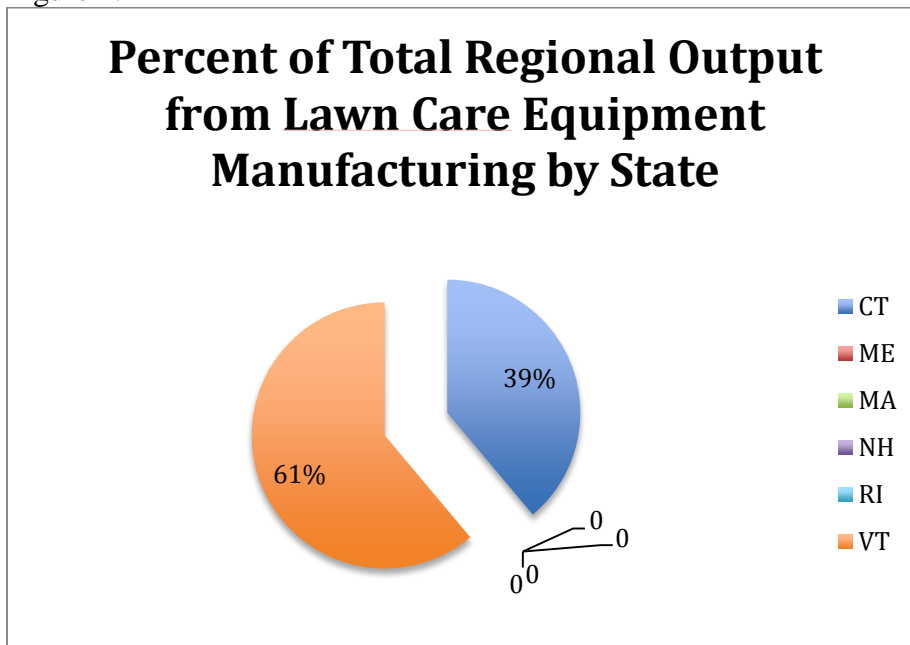
Table 12. Total Impact for New England by Sod Producers.

	Direct Sales (in thousands)	Total Employment	Total Labor Income (in thousands)	Total Value Added (in thousands)	Total Output (in thousands)
Direct	26,297	346	9,867	17,301	26,296
Indirect		47	1,622	2,254	3,969
Induced		67	3,039	5,331	8,181
Total		460	14,527	24,887	38,446

LAWN EQUIPMENT MANUFACTURING

“The lawn equipment manufacturing sector includes firms that manufacture commercial turf and grounds care equipment (including parts and attachments), push type lawnmowers, powered lawn edgers/trimmers, yard vacuums and blowers, lawn tractors and riding mowers, and parts and attachments for consumer lawn and garden equipment” (Haydu et al. 2006). In 2012, only Vermont (1) and Connecticut (2) had lawn equipment manufacturing as measured by the U.S. Census Bureau 2012 Manufacturing and Industry Series. Interestingly, since 2004 every state except Rhode Island had lawn equipment manufacturing at some point. Figure 2 shows the percentage contribution of each of the six New England states to the regional output.

Figure 2.



The regional impact of the lawn care equipment manufacturing sector is detailed below in Table 13. In total, this sector provides 97 jobs and \$4.8 million in labor income to the New England economy. Value added and total output were \$9.1 million and \$28 million, respectively.

Table 13. Total Impact for New England by the Lawn Equipment Manufacturing Sector.

	Direct Sales (in thousands)	Total Employment	Total Labor Income (in thousands)	Total Value Added (in thousands)	Total Output (in thousands)
Direct	20,867	48	2,207	4,875	20,867
Indirect		26	1,576	2,520	4,377
Induced		23	1,014	1,762	2,712
Total		97	4,797	9,157	27,956

LAWN CARE WHOLESALING

For this report lawn care wholesaling constitutes "... push and ride-on lawn mowers, leaf blowers, mulching machines and snow clearing equipment." (IBIS World Report, 2014). As shown in Figure 3 Massachusetts provides the largest total regional output followed by Vermont. The overall impact of lawn care wholesaling to the regional economy is \$719 million or \$49 per resident (Table 14).

Figure 3.

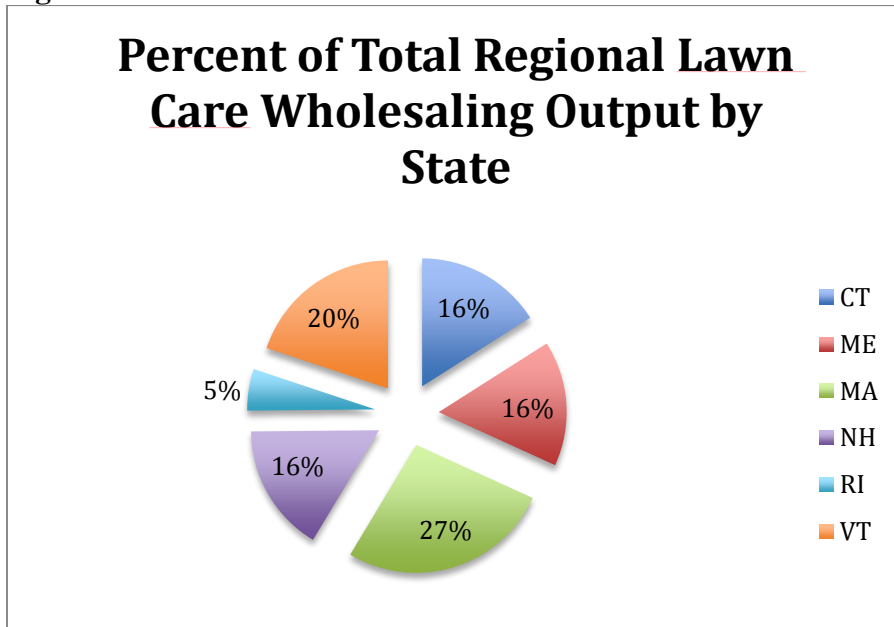


Table 14. Total Impact for New England by the Lawn Care Wholesaling Sector.

	Direct Sales (in millions)	Total Employment	Total Labor Income (in millions)	Total Value Added (in millions)	Total Output (in millions)
Direct	2,571	2,115	177	298	447
Indirect		865	49	71	112
Induced		1,306	60	104	159
Total		4,286	285	473	719

LAWN CARE SERVICES

The lawn care service sector includes residential and commercial lawn care, landscape and design services, and landscape construction. For this analysis we did not include snow plow/removal as part of the sector. Massachusetts has the greatest contribution accounting for 45% of the total regional output while Vermont has the smallest with only 5% of the output. The percentage contribution per state is shown in Figure 4.

Figure 4.

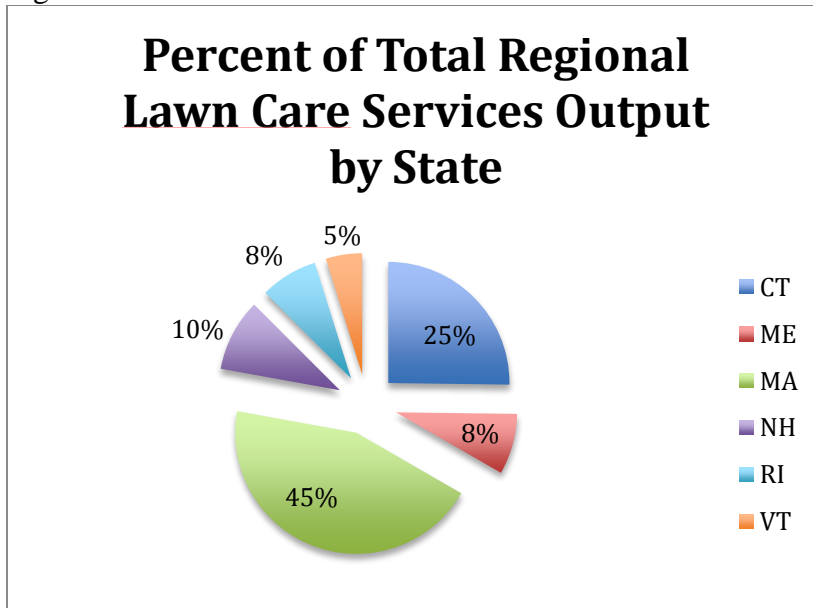


Table 15 shows a breakdown of lawn care service contributions per state and a comparison to 2002 values. The lawn care service sector has grown by 4,689 firms and \$3.3 billion in sales over the past 10 years.

Table 15. Lawn Care Service Firms and Sales per State, 2002 and 2012 Comparison.

State	2002 ^a		2012	
	Number of Firms	Sales (dollars in millions – real dollars) ^b	Number of Firms	Sales (in millions)
CT	897	320	1,936	1,032
ME	227	62	639	341
MA	1,237	479	3,366	1,795
NH	278	85	768	410
RI	251	58	601	321
VT	141	33	410	219
TOTAL	3,031	1,037	7,720	4,109

^a 2002 numbers come from Haydu, Hodges, and Hall 2006.

^b Adjusted to 2012 real dollars.

The regional impact of the lawn care services sector is detailed below in Table 16. In total, the New England lawn care services sector provides 82,086 jobs and \$2.9 billion in labor income to the regional economy. Tables 16-19 give the direct, indirect, induced and total impacts for lawn care service sub-sectors of residential, commercial, landscape architectural and design services, and landscape construction, respectively.

Table 16. Total Impact for New England by the Lawn Care Services Sector.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	4,117	62,312	1,905	2,331	4,117
Indirect		7,103	410	622	958
Induced		12,670	631	1,071	1,627
Total		82,086	2,947	4,023	6,703

Table 17. Total Impact for New England by the Lawn Care Services Sector: Sub-sector Residential.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	1,335	22,496	638	780	1,335
Indirect		2,080	122	185	282
Induced		4,162	207	351	534
Total		28,738	967	1,317	2,151

Table 18. Total Impact for New England by the Lawn Care Services Sector: Sub-sector Commercial.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	2,186	36,845	1,045	1,278	2,186
Indirect		3,407	199	303	462
Induced		6,817	339	575	875
Total		47,070	1,583	2,157	3,523

Table 19. Total Impact for New England by the Lawn Care Services Sector: Sub-sector Landscape Architectural and Design Services.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	37	318	23	23	37
Indirect		96	6	8	12
Induced		156	8	13	20
Total		570	36	44	69

Table 20. Total Impact for New England by the Lawn Care Services Sector: Sub-sector Landscape Construction.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	559	2,653	200	250	559
Indirect		1,520	85	125	202
Induced		1,535	78	131	199
Total		5,708	362	506	960

LAWN CARE RETAILING

The lawn care retailing sector provides the turfgrass-related goods used for landscaping, lawn care, and pest management (insect, weed, and disease). This sector is mainly comprised of home improvement centers, such as Home Depot, Lowes, and Ace Hardware (Haydu et al. 2006) but is also made up of independent garden centers. This sector provides turfgrass and turfgrass maintenance products in their lawn and garden centers (Haydu et al. 2006). Table 21 gives estimated store types by state in 2014.

The New England lawn care retailing sector provides \$2.24 billion in direct sales to the regional economy. Massachusetts contributes the most with 45% of the direct sales and Vermont the least, only contributing 5% of the total. The percentage contribution of each state is given in Figure 5.

Table 21. Distribution of Store-Types per State.

State	Number of Stores	
	Home Improvement Stores ^a	Lawn and Outdoor Equipment Stores ^b
CT	53	76
ME	27	34
MA	96	76
NH	48	38
RI	16	11
VT	32	19

^a Reference: IBIS World Reports

(<http://clients1.ibisworld.com/reports/us/industry/productsandmarkets.aspx?entid=1031>)

^b Reference: IBIS World Reports

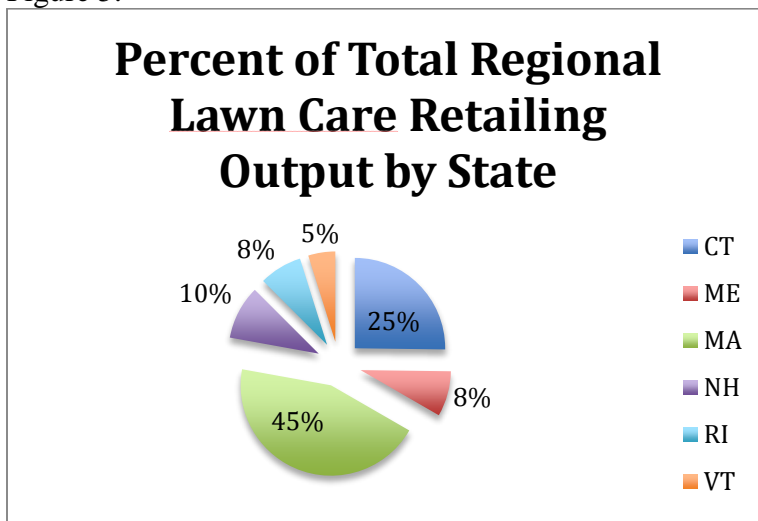
(<http://clients1.ibisworld.com/reports/us/industry/default.aspx?entid=1036>)

The regional impact of the lawn care retailing sector is detailed below in Table 22. In total, the New England lawn care retailing sector provides 12,914 jobs and almost \$600 million in labor income to the regional economy. As can be seen in Figure 5, MA and CT are the largest states for lawn care retailing.

Table 22. Total Impact for New England by the Lawn Care Retailing Sector.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	2,235	8,932	390	528	753
Indirect		1,399	80	139	207
Induced		2,583	128	218	331
Total		12,914	598	885	1,291

Figure 5.



GOLF COURSES

New England’s 934 golf courses directly contribute \$2.5 billion to the regional economy (Tables 23 - 26) with MA having both the largest number of courses but also the most economic impact of any New England state (Figure 6). When breaking the numbers down further, we see playing golf (i.e. green fees and memberships) contributes the bulk of the impact.

Table 23. Number of Golf Courses per State in 2012.

State	Courses	Population/Course
CT	178	20,170
ME	140	9,494
MA	377	17,629
NH	113	11,688
RI	57	18,426
VT	69	9,073
Total	934	15,592

^a Reference: American Association of Retired People (<http://www.aarp.org/entertainment/arts-leisure/info-08-2011/golf-courses.html>)

Figure 6.

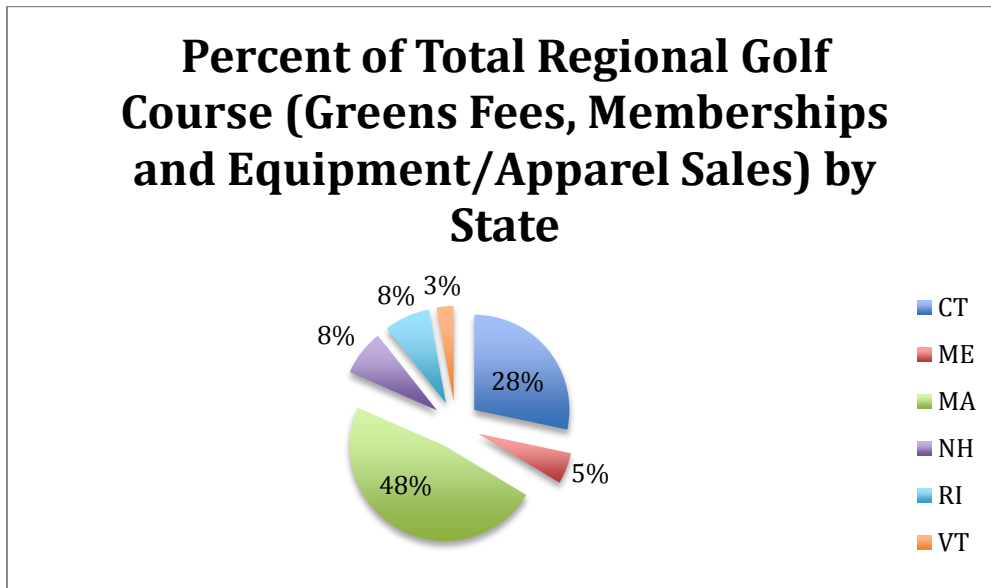


Table 24. Total Impact of New England Golf Courses.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	1,601	26,635	742	986	1,461
Indirect		2,929	161	268	404
Induced		4,894	248	419	635
Total		34,459	1,150	1,668	2,501

Table 25. Total Impact of New England Golf Courses: Sub-sector Playing (i.e. green fees and memberships).

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	1,367	24,597	696	922	1,367
Indirect		2,712	148	246	372
Induced		4,576	232	392	594
Total		31,884	1,076	1,560	2,333

Table 26. Total Impact of New England Golf Courses: Sub-sector Equipment and Apparel Sales.

	Direct Sales (dollars in millions)	Employment	Labor Income (dollars in millions)	Value Added (dollars in millions)	Output (dollars in millions)
Direct	233	2,039	45	59	94
Indirect		218	13	22	33
Induced		318	16	27	41
Total		2,575	74	108	168

OTHER WHOLESALING CONSUMERS

This study went beyond many previous studies to include a more complete analysis of wholesaling consumers. These firms sell directly to airports, school grounds, athletic fields, roadways, municipalities, cemeteries, and golf courses. Table 27 lists the total regional output by wholesaler. These values do not include labor or contracted services which are major components in maintaining turf at airports, roadways, athletic fields, etc. The numbers are only estimates associated with input sales by firms to manage turf at the locations indicated. Cemetery users contribute the most with \$5.3 million in regional output with airports contributing the least with only \$363,940 in total regional output.

Table 27. Breakdown of Acres Associated with Various Turf Operations.

LOCATION	NUMBER IN NEW ENGLAND	APPROX. ACREAGE
Airports (number)	365	14,600
Roadways (miles)	117,473	284,783 ^a
Athletic Fields (number)	14,846	14,219
School Grounds (number)	7,132	50,707
Municipalities/Towns (number)	1,662	NA
Cemetery (number)	6,130	120,499
Golf Courses (number)	934	93,867
Household lawns (number)	5,625,126	3,937,588

^a Assumed 10 feet on each side of roadway as maintained. This is an overestimate as an unknown amount of area is not turf related.

In the various turf locations listed in Table 27, the impact of household lawns is captured in the lawn care retailing sector discussed above, so it will not be discussed here. Further, the results for turf-related expenditures at golf courses are presented in order to detail the impact associated with direct turf input purchasing. Golf turf expenditures in the context of this report can be thought of as sales by wholesalers/retailers to golf courses. The estimates for golf related turf expenditures are not incorporated into the sum of other wholesaler impacts because they are accounted for in the golf sector.

Golf turf inputs expenditures, not including labor, was estimated to be \$331 million with a regional total output of \$93 million. Total direct employment, golf course level, was 262 with indirect and induced employment at 107 and 168, respectively.

Table 28. Impact of Golf Turf Input Purchasing, not Including Labor. ^{ab}

	Direct Sales (in million dollars)	Total Employment	Total Labor Income (in million dollars)	Total Value Added (in million dollars)	Total Output (in million dollars)
Direct	331	262	23	39	58
Indirect		107	7	10	15
Induced		168	8	14	21
Total		536	38	63	93

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

The regional impact of the other wholesalers (not including golf course input expenditures) is detailed in Table 29. In total, this sector provides 165 jobs and \$12 million in labor income to the New England economy. Detailed impacts for each sub-sector within other wholesaling are in Tables 29-35.

Table 29. Total Impact for New England by the Other Wholesaling Consumers' Sector. ^{ab}

	Direct Sales (in million dollars)	Total Employment	Total Labor Income (in million dollars)	Total Value Added (in million dollars)	Total Output (in million dollars)
Direct	102	81	7	12	18
Indirect		33	2	3	5
Induced		51	3	4	7
Total		165	12	19	29

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

Table 30. Total Impact for New England from Municipal Grounds Maintenance. ^{ab}

	Direct Sales (in million dollars)	Total Employment	Total Labor Income (in million dollars)	Total Value Added (in million dollars)	Total Output (in million dollars)
Direct	56	45	4	7	10
Indirect		19	1	2	3
Induced		28	1	2	4
Total		92	6	11	16

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

Table 31. Total Impact for New England from Airport Grounds Maintenance. ^{ab}

	Direct Sales (in thousand dollars)	Total Employment	Total Labor Income (in thousand dollars)	Total Value Added (in thousand dollars)	Total Output (in thousand dollars)
Direct	1.3	1.1	88	149	226
Indirect		0.6	25	36	57
Induced		0.6	30	52	80
Total		2.3	142	237	364

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

Table 32. Total Impact for New England from Roadway Maintenance. ^{ab}

	Direct Sales (in thousand dollars)	Total Employment	Total Labor Income (in thousand dollars)	Total Value Added (in thousand dollars)	Total Output (in thousand dollars)
Direct	2.8	2	197	332	493
Indirect		1	55	80	125
Induced		1	68	117	179
Total		5	319	529	797

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

Table 33. Total Impact for New England from Athletic Fields Maintenance. ^{ab}

	Direct Sales (in thousand dollars)	Total Employment	Total Labor Income (in thousand dollars)	Total Value Added (in thousand dollars)	Total Output (in thousand dollars)
Direct	12,521	10	887	1,495	2,179
Indirect		4	248	364	557
Induced		6	310	528	804
Total		20	1,445	2,386	3,539

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

Table 34. Total Impact for New England from School Grounds. ^{ab}

	Direct Sales (in thousand dollars)	Total Employment	Total Labor Income (in thousand dollars)	Total Value Added (in thousand dollars)	Total Output (in thousand dollars)
Direct	10,270	8	724	1,220	1,787
Indirect		3	202	296	455
Induced		5	251	430	655
Total		17	1,177	1,946	2,897

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

Table 35. Total Impact for New England from Cemetery Maintenance ^{ab}

	Direct Sales (in thousand dollars)	Total Employment	Total Labor Income (in thousand dollars)	Total Value Added (in thousand dollars)	Total Output (in thousand dollars)
Direct	18,908	15	1,344	2,275	3,290
Indirect		6	374	552	839
Induced		9	472	798	1,216
Total		30	2,190	3,625	5,345

^a These values do not include labor or contracted services.

^b Sales at these operations can also be thought of as expenditures on turf related items or sales to suppliers selling the inputs.

CONCLUSIONS

Based on the results presented in this report it is clear that the turfgrass industry has a substantial impact on the regional New England economy. The turfgrass industry contributes over \$10.6 billion in direct sales, \$5 billion in labor income, \$7.1 billion in value added, with a total output impact of \$11.3 billion in 2012. Furthermore 134,000 people are either directly or indirectly impacted by the turfgrass industry. These contributions to the economy do not take into account aesthetic or sectors (such as golf) that have impacts farther away from turf than this report examined. With respect to state differences, MA had the largest impact while VT had the smallest impact on the regional economy. However, each state makes important contributions through the various turfgrass sectors and as an entire industry.

LITERATURE AND INFORMATION SOURCES CITED

- Beard, J.B. and Green, R.L. 1994. The role of turfgrasses in environmental protection and their benefits to humans. *Journal of Environmental Quality*, 23, 452-460.
- Blanco-Montero, C.A., Bennett, T.B., Neville, P., Crawford, C.S., Milne, B.T., and Ward, C.R. 1995. Potential environmental and economic impacts of turfgrass in Albuquerque, New Mexico (USA). *Landscape Ecology*, 10(2), 121-128.
- Haydu, J.J., Hodges, A.W., and Hall, C.R. 2008. Estimating the economic impact of the U.S. golf course industry: challenges and solutions. *HortScience*, 43(3), 759-763.
- Haydu, J.J., Hodges, A.W., and Hall, C.R. 2006. Economic impacts of the turfgrass and lawn care industry in the United States. Food & Res. Econ. Dept. FCES, IFAS, UF
- IMPLAN* Group, LLC, *IMPLAN* System (Version 3.0 with 2012 data), 16740 Birkdale Commons Parkway, Suite 206, Huntersville, NC 28078 www.IMPLAN.COM
- Miller, R.E. and Blair, P.D. 1985. *Input-output analysis: foundations and extensions*. Prentice-Hall, Englewood Cliffs, NJ, 464.
- Milesi, C., S. W. Running, C. D. Elvidge, J. B. Dietz, B. T. Tuttle, and R. R. Nemani. 2005. Mapping and modeling the biogeochemical cycling of turf grasses in the United States. *Environmental Management* 36 (3): 426–38
- SRI International. 2014. The Massachusetts golf economy: Full report. Available at: http://www.massgolfeconomy.com/uploads/9/3/9/3/9393486/ma_golf_full_rpt_sri_final_2014.pdf

APPENDIX A –ECONOMIC MULTIPLIERS

Table A-1. Multipliers for sod farms (nursery and greenhouse sector).

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.163	0.336	11.263	2.080	2.438	0.660	0.098	0.235
Maine	1.000	0.145	0.536	10.688	2.037	4.854	0.660	0.079	0.339
Massachusetts	1.000	0.165	0.368	15.173	1.888	2.760	0.660	0.104	0.244
New Hampshire	1.000	0.130	0.295	20.954	2.675	2.458	0.660	0.074	0.194
Rhode Island	1.000	0.140	0.187	14.424	1.616	1.503	0.660	0.078	0.123
Vermont	1.000	0.137	1.526	10.373	2.494	14.215	0.660	0.071	0.955

Source: *Implan*

Table A-2. Multipliers for lawn care services (services to buildings and dwellings).

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.214	0.369	16.437	1.401	2.680	0.601	0.153	0.258
Maine	1.000	0.200	0.383	18.789	1.784	3.460	0.544	0.117	0.243
Massachusetts	1.000	0.204	0.428	15.781	1.419	3.211	0.617	0.139	0.285
New Hampshire	1.000	0.196	0.390	17.401	1.583	3.250	0.578	0.128	0.256
Rhode Island	1.000	0.199	0.402	16.981	1.585	3.237	0.588	0.107	0.264
Vermont	1.000	0.179	0.304	19.324	1.676	2.815	0.531	0.107	0.190

Source: *Implan*

Table A-3. Multipliers for lawn care wholesaling (Wholesale trade businesses).

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.262	0.364	4.190	1.707	2.739	0.713	0.177	0.244
Maine	1.000	0.266	0.343	5.171	2.401	3.096	0.628	0.158	0.217
Massachusetts	1.000	0.252	0.382	4.234	1.613	2.842	0.710	0.171	0.252
New Hampshire	1.000	0.251	0.399	4.817	1.994	3.327	0.653	0.159	0.262
Rhode Island	1.000	0.246	0.357	4.718	1.930	2.872	0.660	0.158	0.234
Vermont	1.000	0.226	0.292	5.352	2.100	2.704	0.615	0.131	0.183

Source: *Implan*

Table A-4. Multipliers for lawn care equipment manufacturing (land & garden equipment manufacturing)

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.286	0.182	2.340	1.294	1.322	0.203	0.167	0.127
Maine	1.000	0.194	0.115	2.500	1.350	1.038	0.149	0.107	0.073
Massachusetts	1.000	0.291	0.162	2.404	1.400	1.215	0.181	0.169	0.108
New Hampshire	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rhode Island	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vermont ^a	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

^a Multipliers for Vermont were not provided by *Implan* so the Maine multipliers were applied.

Source: *Implan*

Table A-5. Multipliers for lawn care retailing (building material and garden supply stores).

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.253	0.414	11.591	1.561	3.000	0.736	0.181	0.289
Maine	1.000	0.233	0.431	12.601	1.992	3.893	0.713	0.143	0.273
Massachusetts	1.000	0.270	0.486	12.361	1.737	3.642	0.718	0.187	0.323
New Hampshire	1.000	0.259	0.477	13.767	1.924	3.971	0.686	0.171	0.313
Rhode Island	1.000	0.226	0.429	12.155	1.630	3.454	0.723	0.152	0.282
Vermont	1.000	0.202	0.387	12.186	1.733	3.587	0.722	0.121	0.243

Source: *Implan***Table A-6.** Multipliers for golf courses (amusement, gambling and recreation services).

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.217	0.387	15.875	1.454	2.808	0.744	0.153	0.271
Maine	1.000	0.229	0.426	19.512	2.075	3.846	0.685	0.138	0.270
Massachusetts	1.000	0.269	0.466	19.123	1.887	3.491	0.692	0.180	0.310
New Hampshire	1.000	0.260	0.426	21.710	2.091	3.546	0.650	0.168	0.280
Rhode Island	1.000	0.177	0.443	14.977	1.425	3.565	0.758	0.114	0.291
Vermont	1.000	0.188	0.312	17.907	1.732	2.882	0.711	0.110	0.195

Source: *Implan*

Table A-7. Multipliers for cemeteries (deathcare services sector).

STATE	Output (dollars per dollar output)			Employment (jobs per million dollars output)			Value Added (dollars per dollar output)		
	Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Connecticut	1.000	0.193	0.498	8.141	1.190	3.620	0.741	0.132	0.348
Maine	1.000	0.239	0.513	11.856	2.008	4.643	0.623	0.135	0.325
Massachusetts	1.000	0.232	0.570	9.565	1.520	4.289	0.696	0.147	0.379
New Hampshire	1.000	0.216	0.542	9.664	1.610	4.527	0.693	0.131	0.356
Rhode Island	1.000	0.197	0.515	10.419	1.521	4.153	0.669	0.124	0.338
Vermont	1.000	0.196	0.446	11.667	1.686	4.139	0.629	0.111	0.279

Source: *Implan*