Contractor's Report to the Board

Second Assessment of California's Compost- and Mulch-Producing Infrastructure

May 2004

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Acknowledgments

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Executive Summary

The following report presents the results of the second statewide survey of California compost and mulch producers. The first survey was conducted in 2001. The second survey, conducted in 2003, builds upon the baseline infrastructure information developed in the previous survey and also investigates new areas, as listed below.

- The organics diversion industry faced a number of new challenges in 2003, including tougher emissions regulations, Sudden Oak Death Syndrome (SODS), and the prospect of persistent herbicides remaining in compost products. Questions about how these new challenges affected composters and processors were added to the second survey to try to understand the impact these obstacles might have on the continued success of organics diversion in California.

- A deeper look was taken at the practice of using green waste as alternative daily cover (ADC). Although the use of green waste as ADC has been occurring in California since at least 1989, special attention was focused in the 2003 survey on better understanding the impact this practice is having on the industry.

- In addition to surveying operating composting and processing facilities, an additional survey was made of the 58 landfills which reported applying green waste ADC in 2002 (the latest year for which the CIWMB had data at the time of the survey.).

The results of this study provide the California Integrated Waste Management Board (CIWMB) and California's organic materials management industry with definitive information and data on the number of producers, feedstock sources, products, and markets for compost and mulch. The survey also documents the dominance of green waste ADC in some regions[1]. The survey for the first time gauges attitudes about Sudden Oak Death Syndrome, the South Coast Air Quality Management District's (SCAQMD) Proposed Rule (PR) 1133, and other pressing issues facing the organics diversion industry.

Surveying the Industry

This report, the *Second Assessment of California's Compost- and Mulch-Producing Infrastructure,* contains survey results from the most recent survey as well as a comparison of that data with data from the previous Survey.

The second survey generally was well received by the industry and produced a very significant response from composters and processors. However, due to its increased length and the number of competing industry issues—such as Clopyralid, PR 1133, and Sudden Oak Death Syndrome—most respondents took more time in completing the survey, and some required considerable prodding. In addition, this survey confirmed that many previous compost facilities and chipping and grinding (processor) facilities are no longer operating. Also, the number of businesses that chose not to participate was significantly higher than in the previous survey.

Since participation in the survey was voluntary, it is probably more noteworthy that the survey response was as high as it was, than that 32 facilities chose not to participate. If there is one generalization that one can make about composters and processors, it is that for the most part, they are independent. Many facilities are small and have only limited upper management (the level of personnel that would typically complete such a survey). While some facilities have a long

[1] Northern Region, Bay Area Region, Central Valley Region, Central Coast Region, Southern Region

track record (a number have been operating continuously for over 10 years) and appear to be thriving, a significant number of facilities are small and struggling. The benefit of a survey such as this to a smaller facility is sometimes difficult to communicate.

Throughout this report, participating facilities are grouped into one of two major categories:

- Composters—entities that actively compost organic material (composting implies a defined time and temperature period with the end of controlled decomposition).
- Processors—entities that process material but do not intentionally or actively compost the materials they produce.

In California there is a significant regulatory distinction between composters, who are generally required to have a solid waste facility permit, and processors (often called "chippers" and "grinders"), who, until recently, generally were not required to have one. During the survey period, CIWMB regulations relating to organic materials handling changed significantly, which may have had an impact on some facilities' willingness to complete the survey. In addition, an effort was made to survey landfills which reported using more than 20,000 tons of green waste as alternative daily cover (ADC). (Landfills are required to report ADC use to the CIWMB. The most recent reported data at the time of the survey [data for 2002] was used to determine which landfills to include in the study. Before including CIWMB information in the study results, the landfill facilities reporting more than 20,000 tons of ADC used were surveyed by telephone.) For the purpose of reporting the volume and tonnage of green waste used as ADC, these facilities are included in the category "processors," but they were not asked to complete the more detailed survey and thus are not included in the total number of composters and processors who completed the more detailed survey (see "Survey Overview" section).

Study Elements

The following were key elements of the study:

- A comprehensive approach that included developing a project steering committee comprising industry representatives from various sectors.
- Use of an independent contractor with strong ties to the compost and mulch producer community.
- A promotional campaign and a thorough surveying technique which included aggressive follow-up to the initial survey mail out.
- Surveyors made site visits to encourage participation by facilities reluctant to take part in the process.
- Use of 2002 data reported to the CIWMB on landfill use of green waste ADC. (Many other materials, including some organic materials such as sewage sludge, are also used as ADC, but were not included in this study).
- Unlike the previous survey, the second survey asked a number of topical questions on current challenges to the composting industry. These included specific questions on Sudden Oak Death Syndrome, SCAQMD's PR 1133, the persistent herbicide Clopyralid, and others. Results from these questions are contained in the section entitled "Survey Addenda."

Survey Overview

Over 300 surveys were mailed to processors and composters. One hundred seventy facilities were identified as operational, and another 60 were confirmed as no longer operating for various reasons. As mentioned in the "Surveying the Industry" section, 32 facilities declined to participate. To round out the data on the use of green waste as ADC, information reported from 58 landfills on ADC use was added to the survey data. A separate survey consisting of telephone contact and a brief form was conducted for some of the 58 landfills to confirm the reported tonnages and to ascertain if the landfill processed the material itself or received it from an off-site processor. Out of the 58, all landfills reporting use of over 20,000 tons of green waste ADC were contacted for the secondary survey, but not all of those chose to participate. The primary purpose of surveying the landfills was to minimize the possibility of double counting. Some landfills use only green waste generated through curbside programs or from the self-haul sector, while other landfills rely heavily on independent contractors to provide all of their ADC.

A summary of the number of facilities participating (in both the current and previous survey) is shown in Table ES1.

Table ES1. Survey Overview

	2001 Survey	2003 Survey
Participating Operating Facilities	169	170
Composters	104	101
Processors	65	69
Operating Facilities That Declined to Participate	11	32
Composters	5	16
Processors	6	16
Non-Operating Facilities Identified	148	60
Landfills Reporting Green Waste ADC Use	N/A	58*

* In the 2001 survey some, but not all, landfills using green waste ADC were surveyed. In order to include this significant market in the 2003 survey, data from all landfills reporting green waste ADC use were added into the survey data. However, since not all landfills reporting green waste ADC participated in the primary survey, data was obtained from CIWMB records. In addition, a secondary survey consisting of telephone contact and a brief form (Appendix C) was conducted for some of the 58 landfills (those reporting more than 20,000 tons per year use of green waste ADC).

Composters and processors in California process over 8.1 million tons of organic materials per year. From this they produce about 18 million cubic yards of organic material products.

In 2002, landfills reported over 2.1 million tons of green waste used as ADC. This is roughly one quarter of all the green waste tonnage processed in California. Some of this was processed directly at the landfill, by the landfill, while other volumes were produced by composters and processors. A few landfills, in addition to making ADC, make other products. As shown in Table ES2, both composters and processors have seen modest increases in tons of material processed. Table ES3 compares the volumes (in cubic yards) of materials produced by composters and processors.

Table ES2. Comparison of Total Feedstocks Processed (Tons)

	2001 Survey		2003 Survey	
Participating Facilities				
	Tons Processed	Percentage	Tons Processed	Percentage
Composters	3,407,000	56	4,026,081	50
Processors	2,701,000	44	4,090,231	50
Total	6,108,000	100	8,116,312*	100
Non-Participating Facilities				
	Tons Processed	Percentage	Adjusted Tons Processed	Percentage
Composters	NA	NA	704,000**	NA
Processors	NA	NA	1,047,800**	NA
Total	NA	NA	1,751,800**	NA
Total Feedstock Processed				
	Tons Processed	Percentage	Tons Processed	Percentage
Composters	3,407,000	56	4,730,081	48
Processors	2,701,000	44	5,138,031	52
Total	6,108,000	100	9,868,112**	100

*Approximately 2.1 million tons of the feedstock consists of green waste used as ADC. Some of the feedstock was processed by the landfills on site, some was not processed at all, but merely applied directly after collection, and some was processed by composters and processors.

**Represents an estimate of what the facilities that declined to participate in the 2003 survey might be producing. Size and tonnage for non-participating facilities was estimated by distributing these businesses according to the size and tonnage distribution of the participating facilities. More detail on this analysis is contained in the section “Reasons for Nonparticipation.”

Table ES3. Comparison of Organic Products Produced (Cubic Yards)

	2001 Survey	2003 Survey
Composters	6,590,000	5,664,956
Processors	8,363,000	12,755,282*
Total	14,953,000	18,420,238

* This number includes an estimate of the cubic yards of ADC used based on tonnage reported, multiplied by an average bulk density of 3.9 cubic yards per ton.

It is still difficult to compare, especially on a gross basis, tons received (Table ES2) and volume of product made (ES3). Although for the first time the survey did request bulk density information (shown in Table 6), the variances in responses, geography, material types, handling practices, and moisture content still make understanding the results challenging. In particular, there exists a wide variance in the reported bulk density for green waste ADC. And largely, understanding bulk density is not as important to processors, who prepare the material for landfill use, as it is to composters who sell a recovered organic product by both weight and volume.

To try to understand the impact that non-participating facilities had on the survey totals, an estimate of tonnage was made for non-participating facilities (see Tables 8, 9, and 10). By taking the 16 composters and 16 processors and allocating them by the size distribution of the reporting facilities (from the primary survey population), an estimate was made of this "missing" tonnage. The total estimated tonnage using this method is 1.7 million tons (an estimated 1 million tons from processors and 700,000 tons for composters). If this estimate is accurate, the total tonnage processed by California's compost and mulch producing infrastructure, including the landfills using green waste for ADC, is just under 10 million tons (9.8 million total).

Table ES4 shows the breakdown of products made by specific type. Interestingly, the volume of most product types has grown. The use of green waste ADC shows the most remarkable growth. Interestingly, there is a drop in the production of compost from the 2001 survey and the current data.

Table ES4. Product Quantities By Type (Cubic Yards)

	2001 Survey	2003 Survey
Compost	4,232,000	3,011,182
Mulch	1,872,000	2,325,708
Boiler Fuel	3,446,000	3,872,983
ADC	2,795,000	8,482,372
Beneficial Reuse at Landfills	N/A	258,150
Other*	2,608,000	469,843
Total	14,953,000	18,420,238

* "Other" includes products such as fines, wood chips, steer manure, and bark products.

While it is difficult to draw too many conclusions from the second survey, a few points are clear:

- An interesting finding is that overall statewide compost production (at least from facilities surveyed) has decreased from 4.2 million cubic yards in 2001 to 3.0 million cubic yards in 2003. There are several possible explanations for this:

1. A number of compost facilities closed between the study periods.
2. The number of non-participating facilities was higher in 2003 (16 composters as compared to 5 in 2001); some of these may have been large producers of compost.
3. The increase in the use of green waste as ADC may have had an impact on the ability of some facilities ability to obtain feedstock for composting.
4. Spring 2003 was particularly wet, and some composters reported a "bad year" in terms of compost sales.

- The total number of operating facilities has remained somewhat constant, though the amount of material being processed has increased.
- The use of green waste as ADC continues to rise and undoubtedly is having an effect on the viability of the compost market. Composters compete directly for feedstock with ADC users, and the cost of composting is significantly more than the cost of using green waste ADC (In fact, the use of green waste as ADC in some cases is a revenue source for some landfills.

- California composters and mulch producers continue to access an enviable diversity of markets. It would appear that, at least statewide, there is not reliance on a single market. Regionally, however, some markets are dominated by a single large market (as the Southern Region is by the green waste ADC “market”).
- There is still considerable room for diversification in markets. The majority of facilities still manufacture five or fewer products.
- As documented (for the first time) in the previous survey, agriculture is still the largest single market for compost (not green waste, but material processed into compost). This represents a significant achievement, as many observers doubted conventional agriculture would accept urban compost.
- The California Department of Transportation (CalTrans) continues to be, apparently, an untapped market for recovered organic products. Few facilities identified CalTrans as a significant market (Figures 9, 10 and 11 show CalTrans to be 1 percent or less of the total market. Departments of transportation in other states have shown the potential for this market. Texas specified over 400,000 yards of compost in 2003.
- For the first time, a few respondents reported a decline in processing capacity. This may be one small sign of a maturing industry (in 2001, not a single facility reported a decline in processing capacity).
- Because of the large volume of food wastes and/or liquid wastes being disposed of, an opportunity appears to exist for new and existing facilities to process these types of nontraditional feedstocks. Only a handful of facilities surveyed reported processing food waste or liquid wastes.
- The CIWMB should continue to improve its ability to track compost- and mulch-producing facilities. New CIWMB regulations will likely affect a number of processors who were previously unregulated and therefore not in the CIWMB system.
- More effort needs to be spent in future surveys tracking materials through facilities to destinations to assure double counting is minimized. This is particularly true of landfills using green waste ADC. The 2003 survey spent considerable time and effort reconciling initial survey responses with CIWMB green waste ADC data. In the future, all landfills reporting green waste ADC use should be included in the contact list.
- The CIWMB should continue to track the implementation of PR 1133 and similar regional regulations that may affect composters and mulch producers. The burden of regulatory compliance is the number one complaint of facilities responding to the CIWMB priorities question.
- The longer survey form used in 2003 (more than twice as long as in 2001) was harder to complete and more time was spent eliciting responses from reluctant producers. In the future, the CIWMB should disconnect “infrastructure” questions from more subjective questions, like those in the survey addenda. The length of the survey certainly contributed to the significantly higher rate of non-participation experienced in 2003.

Although the new challenges mentioned throughout this report are real and have had a real impact on the compost- and much-producing businesses, it is difficult in a single survey to understand the full impacts of these challenges.

The study addressed the three following threats to the organic materials management industry:

Sudden Oak Death Syndrome. Initially the 12-county quarantine area might have been devastating to composters, but over time and through a joint effort by involving the CIWMB, the compost industry, university researchers, California Department of Food and Agriculture (CDFA), and the U.S. Department of Agriculture (USDA), composting was recognized as a viable treatment for SODS-contaminated materials. As a result, SODS has not had a significant impact on the green waste composting industry (or the landfill or biomass industries, which were recognized as treatment methods in the early stages of the spread of SODS). The survey documented that significant materials do flow across county boundaries, although the entire pattern is not well understood. In general, urban feedstocks are flowing to less urban areas for processing. While this raises some issues regarding transport of potential problems like Sudden Oak Death Syndrome, it is clear that composting is a suitable treatment method.

South Coast Air Quality Management District Proposed Rule 1133. Although the survey uncovered some interesting attitudes regarding PR 1133, it is too soon to understand the full impact this emerging regulation will have on the green waste composting and processing industry. It would appear that green waste ADC producers will largely be unaffected by this regulation. Biosolids and manure composters will be required to enclose at least a portion of their facilities. Composters of green waste will have to monitor PR 1133 to see what the ultimate outcome will be. One unusual outcome of the PR 1133 questions was the larger-than-expected reliance on odor-neutralizing agents by some composters. Clearly, composters and processors have much to overcome in terms of odors (particularly in the dense urban areas, like the southern region). More investigation should be made of the methods which both composters and processors use to control odor. A surprising number of both composters (30 percent) and processors (15 percent) reported using odor neutralizers for odor control. The impact of these mitigating measures is not well documented.

Persistent herbicides. As with PR 1133, the potential impacts of Clopyralid on the composting industry are still not fully known. While the data uncovered by the survey was relevant at the time it was collected, more recent analytical testing conducted voluntarily through an industry partnership with the CIWMB[2] has revealed (at least for green waste facilities) that the samples of compost tested for Clopyralid appear to be decreasing. The most recent sample results showed 11 of 15 facilities testing positive for very low levels of Clopyralid, with the highest number being 6.4 parts per billion (ppb). This is most likely the result of a combination of industry outreach and education and statute requirements, which imposed a number of restrictions on the use and distribution of Clopyralid-containing products (PRC sections 13190–13192). This trend appears to be consistent up and down the West Coast (California, Oregon, and Washington). Each of these states has similar restrictions in place.

ADC. The 2003 survey highlights the dominance that green waste use as ADC has in certain market zones. This will likely continue as long as equal recycling credit is given to this practice.

[2] The USDA, working with CIWMB and in cooperation with 15 compost producers, collected 15 field samples of finished compost from October through November 2003. The compost samples were analyzed by Morris Laboratories, Inc., Sacramento, California.

Areas for further study:

Clearly, the CIWMB needs to study the effect that green waste ADC is having on the compost industry. PRC 41781.3 clarifies the legislative intent that the use of waste-derived ADC constitutes diversion through recycling. However, PRC section 41781.3 requires the Board to adopt regulations for the use of ADC, considering:

> "(1) Those conditions established in past policies adopted by the board affecting the use of alternative daily cover.
>
> (2) Those conditions necessary to provide for the continued economic development, economic viability, and employment opportunities provided by the composting industry in the state.
>
> (3) Those performance standards and limitations on maximum functional thickness necessary to ensure protection of public health and safety consistent with state minimum standards."

The 2003 survey documented once again that agriculture is the largest single market for compost. More work needs to be conducted to understand which segments of the agriculture industry are buying compost and why. Some questions to be addressed are: "Are there certain crops that use compost more than others?" "Is organic agriculture using more compost then conventional agriculture?" "What effects do various commodity prices have on compost sales?"

The CIWMB should continue its work towards increasing markets and reducing barriers to the purchase of recovered organic products by CalTrans.

The largest gap in this survey is reconciling "producer" data with city tonnage collection records. There are still no reliable numbers of curbside green waste collection programs in California. Although we now have a reliable record of the production facilities, the full picture of green waste recycling in California cannot be fully understood without understanding the collection infrastructure. Tying city collection programs to facilities and facilities to end markets would provide a more complete picture of the specific regional needs for market and facility development.

The survey has never asked for financial or employment data, but this might want to be included in either subsequent surveys or in a specific, targeted survey. It would seem easy enough to then create a sense of employees per ton or employees per $1,000 in revenue.

Introduction

Organic materials comprise about 40 percent of California's waste stream. Diverting a high percentage of these materials is key to the state achieving and maintaining the diversion goals of the California Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989 as amended [IWMA]). In general, California has developed a robust infrastructure to divert and process organic materials into useable products. However, unlike landfills and transfer stations, compost and mulch facilities are not required to report process and production data to the California Integrated Waste Management Board (CIWMB). The following report presents the results of the second statewide survey of California compost and mulch producers. The first survey was conducted in 2001. The second survey, conducted in 2003, builds upon the baseline infrastructure information developed in the previous survey and also investigates new areas.

Like the previous survey, the second one used a comprehensive approach that included developing a project steering committee consisting of trusted industry representatives from various sectors of the organics processing and composting industries. The compost- and mulch-producing industry consists of lots of individual operators and facilities that are not always willing to share site-specific data, particularly with State regulatory agencies.

The project also included a promotional campaign and a mixed surveying technique, which included aggressive follow-up to the initial survey mail out. This approach resulted in 138 facilities completing survey forms. Another 60 were confirmed as no longer operating for various reasons. Thirty-two operating facilities declined to participate, up significantly from 2001, when only 11 facilities declined to participate.

This report contains three major sections:

1. **Study design.** Includes listing of steering committee members and descriptions of data-gathering methodology and survey form.
2. **Survey results**. Detailed analysis of survey responses. Including the traditional survey questions and the survey addenda questions.
3. **Study conclusions.**

Study Design

As in the previous survey, a comprehensive outreach program was developed to assure industry buy-in and attempt to achieve a significant response rate. A major key to this approach was the creation of an industry-wide steering committee. The following describes the composition of the steering committee, the promotional strategy, the data-gathering methodology, the survey form, and other aspects of the study design.

Steering Committee

Table 1 below lists members of the project steering committee.

Table 1: Steering Committee

Name	Affiliation
Stuart Buckner	Executive Director, U. S. Composting Council
Evan Edgar	California Refuse Removal Council
Paul Ryan	Association of Compost Producers
Stephen Grealy	President, California Organics Recycling Council
Bill Newland	The Newland Company

Participation by the steering committee was crucial in providing credibility to the project and also in developing a comprehensive contact list of composters and processors.

Promotional Strategy

Promotion for the study occurred on many levels. A general letter of support co-signed by representatives of associations represented on the steering committee was sent to the facility database list. Notices for the study were sent to *Waste News* and *BioCycle* magazines. The study was also announced at local and regional trade shows with composters and processors in attendance.

Data-Gathering Methodology

For the 2003 survey, the steering committee and the CIWMB's project manager for the study reviewed and improved the survey form used in 2001. In addition, it was decided that a number of challenges to the California organics industry should be addressed through the survey. This decision resulted in a more detailed survey then previously used. CIWMB staff, the steering committee, and the contractor reviewed the comprehensive database of facility contacts created for the 2001 survey. Surveys were first mailed to facilities on the contact list, and surveyors later followed up with telephone calls to the facilities. In many cases, repeated phone calls, repeated faxes, and e-mails were made in an effort to contact participating facility operators. In a few cases, surveyors interviewed facility operators on site because they were unable to make phone contact. The data in the following section has been aggregated or otherwise masked so that individual facilities cannot be identified. This anonymity was crucial to the participation of some facility operators.

In a critical change from the previous survey, the researcher was presented with 2002 CIWMB data reported by landfill operators regarding use of green waste as alternative daily cover (ADC). See the, "Summary," section under "Results: Survey" for a detailed description of how this data was used. In addition, in order to estimate the tonnage of green waste ADC processed by facilities

that did not participate, the 16 non-participating processing facilities were disaggregated along the average size distribution of the surveyed facilities and assigned corresponding tonnage amounts. These estimates are shown in Tables 8–10 (below).

Survey Form

A survey form was developed based on the prior surveys and steering committee and CIWMB project manager input. In some cases, other agencies, such as the Department of Pesticide Regulation (DPR), also commented on portions of the survey form related to a particular issue, such as the persistent herbicide Clopyralid. The final survey form used for this project is in Appendix A. To a certain extent, the survey was designed to be concise. While this was true for the first part of the survey, the additional questions added by the survey addenda described in the section below, "Survey Addenda," increased survey length (and the corresponding time for participants to complete and return the survey) more than two-fold.

The survey form requested the following data:

1. Quantity of organic products sold by general type, such as compost, mulch, and boiler fuel. This information was to be correlated with general use, such as agricultural, landscape, and public agency use. For the first time, a question was asked as to the seasonality of feedstock sources. The seasonality question was added at the request of DPR, in an effort to determine the impact of Clopyralid.
2. Identification of additional services provided at point of sale, such as bagging, delivery, and spreading).
3. Identification and quantity of feedstock sources, including municipal contracts and commercial sources.
4. Quantification of processing capacity and change in processing capacity from previous years.
5. Respondents were asked to rank six CIWMB priorities related to organics materials handling.

Survey Addenda

The 2003 survey asked qualitative questions relating to pressing challenges affecting the composting industry. These questions were on the topics listed below.

1. **Persistent herbicides.** These questions related to testing frequency and the types and amounts detected. These questions also tried to determine the likely cause of the residues (if any). A question was also asked about the impacts that concerns about persistent herbicides might have had on a given business.
2. **Sudden Oak Death Syndrome (SODS).** Three questions were asked about SODS. The first tried to identify if facilities were importing from the 12-county quarantine area. The second dealt with finished product being shipped to counties outside the resident county. The third question related to the willingness of participants to share this data with the California Department of Food and Agriculture (CDFA).
3. **South Coast Air Quality Management District's Proposed Rule (PR) 1133.** These questions sought to gauge awareness of PR1133 and its potential impact on composting and mulch businesses. This section also asked questions about odor control and material holding time.

4. **Alternative daily cover.** The ADC question was two-part—has ADC use affected your business and why?

5. **Compost maturity.** These questions related to compost maturity and familiarity with the California Compost Quality Council (CCQC) Maturity Index.

ADC Follow-Up Survey for Some of the 58 Landfills

While the addenda to the 2003 survey (Appendix B) sought information in addition to what was asked in the 2001 survey, the researcher utilized an additional means of gathering information from certain landfills. Towards the conclusion of the 2003 survey, CIWMB data regarding the use of green waste as ADC for 2002 became available. Upon review of this data, it was discovered that of the 58 landfills reporting the use of green waste ADC in 2002, only 20 were included in the detailed 2003 survey contact list. In addition, it was unclear whether the landfills reporting the green waste ADC use processed the material themselves, or relied upon contractors (who may or may not have been surveyed). Consequently, an additional survey for those landfills using more than 20,000 tons per year of green waste ADC was conducted. The researcher utilized telephone contact and a brief survey form (Appendix C). Subjects covered included:

1. Verification of the reported tonnage of green waste ADC.

2. Identification of in-house versus contract grinding.

3. Additional plans for green waste diversion.

The collected data was blended with the original survey data. As described below, the reported tonnage data was reconciled with the survey data using the average bulk density factor reported from survey respondents (Table 6).

Contact List

Maintaining a comprehensive and accurate contact list proved to be an ongoing challenge. The existing list from the 2001 survey was reviewed and collated with other lists, such as the CIWMB's Solid Waste Information (SWIS) list, and the compost and mulch sources list on the CIWMB Web site, to create the initial list for the 2003 survey. Resources of the steering committee and the contractor's existing database of organics processing facilities supplemented this.

The resulting contact list was then supplemented by contacting equipment manufacturers, the Air Resources Board (which issues permits for the use of mobile grinders, such as tub grinders and trommels), biomass facilities, and other stationary sources of emissions. During the course of the study, numerous previously unknown and new facilities were discovered and added to the contact list.

Over 60 facilities were identified as unreachable, out of business, or otherwise no longer processing organics. It is clear that significant numbers of operators have exited the organics processing business in the two years between the first and second survey.

Pre-Test of Survey Form

Due to a number of scheduling and other project conflicts, the survey instrument was only minimally pre-tested. However, the survey proved to be effective at eliciting needed data. Most of the original questions had been tested in the previous survey. A number of key changes were made from the 2001 survey to improve the response quality of the 2003 survey. This included providing definitions of certain terms and providing more detail on some questions—for example, asking for bulk density of specific materials. In 2001, a few questions were asked that did not

result in meaningful data. In 2003, the only question which did not produce meaningful results was the question on feedstock seasonality (see the "Feedstock Seasonality" section under "Results: Survey").

Geographical Distribution

Although any attempt at grouping facilities by county or region is, by nature, arbitrary, this study attempted to begin understanding regional differences by assigning the 58 counties in California to one of five regions (see Map 1). The geographic distribution was determined arbitrarily by consensus of the steering committee, but corresponds to the regions used by the CIWMB. The attempt to break out regional differences had to be balanced against the "risk" of disaggregating data to the point that individual facilities might be readily identified by readers of this report.

Table 2 shows the counties included in each region. For the purposes of comparing the 2001 and 2003 data sets, the regions remained constant for the two surveys. Figure A shows the regions represented graphically. Figure B shows the SODS quarantine Area. Figure C shows the jurisdiction of the South Coast Air Quality Management District (SCAQMD).

Table 2: Counties by Region

Region	County	
Northern Region	Butte Del Norte Humboldt* Lake Lassen Modoc	Plumas Shasta Sierra Siskiyou Tehama Trinity
Bay Area Region	Alameda* Contra Costa* Marin* Napa* San Francisco	San Mateo* Santa Clara* Solano* Sonoma*
Central Coast Region	Monterey* San Benito* San Luis Obispo	Santa Barbara Santa Cruz* Ventura
Central Valley Region	Alpine Amador Calaveras Colusa El Dorado Fresno Glenn Kern Kings Madera Mariposa Merced	Mono Nevada Placer Sacramento San Joaquin Stanislaus Sutter Tulare Tuolumne Yolo Yuba
Southern Region	Imperial Inyo Los Angeles** Orange**	Riverside** San Bernardino** San Diego

* County under Sudden Oak Death Syndrome quarantine.

** County under all or partial SCAQMD jurisdiction.

Results: Survey

This section summarizes the survey results, with collated data appearing in this section or in Appendix D ("Figures"). Throughout the survey, participants are grouped into one of two major categories:

- Composters—entities that actively compost organic material (composting implies a defined time and temperature period with the end of controlled decomposition).
- Processors—entities that process material but do not intentionally or actively compost the materials they produce.

In California, there is a significant regulatory distinction between composters, who generally require a solid waste facility permit, and processors, who, until recently, generally were not required to have one.

Summary

Over 300 surveys were mailed to the database of processors and composters. One hundred seventy facilities were identified as operational, and 60 were confirmed as no longer operating. As described below (see Nonparticipation section), 32 facilities declined to participate.

To round out the data on the use of green waste as ADC, information reported to the CIWMB from 58 landfills that use green waste as ADC was added to the survey data. The researcher conducted a separate survey of those landfills, out of the 58, that used more than 20,000 tons per year of green waste ADC to confirm the reported tonnages and to ascertain if the landfill processed the material itself or received it from an off-site processor. This survey consisted of a combination of telephone contact and a brief survey form (Appendix C).

Though CIWMB data pertaining to all 58 landfills was included in the survey data, not all of the 58 landfills participated in the secondary survey.. The primary purpose of surveying the landfills was to minimize the possibility of double counting. Some landfills use only green waste that arrives at their facility and is generated through curbside programs or from the self-haul sector, while other landfills rely heavily on independent contractors to provide all of their ADC. The feedstock from independent contractors may have been counted already, if an independent contractor had participated in the survey.

A summary of the number of facilities participating (in the current and previous survey) is shown in Table 3.

Table 3. Survey Overview

	2001	2003
Participating Operating Facilities	169	170
Composters	104	101
Processors	65	69
Operating Facilities That Declined to Participate	11	32
Composters	5	16
Processors	6	16
Non-Operating Facilities Identified	148	60
Landfills Reporting Green Waste ADC Use	N/A	58*

* In the 2001 survey some, but not all, landfills using green waste ADC were surveyed. In order to include this significant market in the 2003 survey, data from all landfills reporting green waste ADC use were added into the survey data. However, since not all landfills reporting green waste ADC participated in the primary survey, data was obtained from CIWMB records. In addition, a secondary survey consisting of telephone contact and a brief form (Appendix C) was conducted for some of the 58 landfills (those reporting more than 20,000 tons per year use of green waste ADC.

Feedstock Processed

As shown in Table 4, composters and processors processed over 6 million tons of organic materials as feedstock in the year 2001. In 2003, this number had increased to over 9.8 million tons.

Table 4. Comparison of Total Feedstocks Processed (Tons)

	2001 Survey		2003 Survey	
Participating Facilities				
	Tons Processed	Percentage	Tons Processed	Percentage
Composters	3,407,000	56	4,026,081	50
Processors	2,701,000	44	4,090,231	50
Total	6,108,000	100	8,116,312*	100
Non-Participating Facilities				
	Tons Processed	Percentage	Adjusted Tons Processed	Percentage
Composters	NA	NA	704,000**	NA
Processors	NA	NA	1,047,800**	NA
Total	NA	NA	1,751,800**	NA
Total Feedstock Processed				
	Tons Processed	Percentage	Tons Processed	Percentage
Composters	3,407,000	56	4,730,081	48
Processors	2,701,000	44	5,138,031	52
Total	6,108,000	100	9,868,112**	100

*Approximately 2.1 million tons of the feedstock consists of green waste used as ADC. Some of the feedstock was processed by the landfills on site, some was not processed at all, but merely applied directly after collection, and some was processed by composters and processors.

**Represents an estimate of what the facilities that declined to participate in the 2003 survey might be producing. Size and tonnage for non-participating facilities was estimated by distributing these businesses according to the size and tonnage distribution of the participating facilities. More detail on this analysis is contained in the section “Reasons for Nonparticipation.”

Composters and processors receive a wide array of feedstocks in California. Seventy nine percent of facilities surveyed process green material, the main focus of this project (see Figure 1). Fifty-four percent of respondents process wood waste, 23 percent manure, 22 percent agricultural byproducts, 10 percent food scraps, 9 percent biosolids, and 7 percent other materials, including stable bedding, sawdust, shavings, and fish sludge.

Both composters and processors handle green material and wood waste (the bulk of materials processed). For obvious reasons, processors do not typically handle putrescible materials, such as food scraps, liquid wastes, or biosolids. Processors are also more likely to process construction and demolition materials (typically for the clean wood available in the construction waste stream). Aside from these exceptions, there are no other appreciable differences in materials handled by processors or composters statewide.

Because of the large volume of food wastes and/or liquid wastes being disposed of, an opportunity appears to exist for new and existing facilities to process these types of nontraditional feedstocks. Only a handful of facilities surveyed reported processing food waste or liquid wastes.

Figure 2 highlights the numbers of feedstocks processed by survey respondents. Most facilities process more than one feedstock, with 80 percent reporting at least three feedstock categories. Composters tend to handle a slightly wider variety of feedstocks than processors. Only 32 percent of processors handle more than two feedstocks, while 47 percent of composters handle three or more diverse feedstocks.

Feedstock Seasonality

A new question added for this year's survey dealt with attempting to identify seasonality of feedstocks. This question came from the Department of Pesticide Regulation, which was hoping to use the responses to inform its regulatory process related to the potential for persistent herbicides to enter the feedstock stream (see more on this in the "Survey Addenda" section under "Persistent Herbicides"). Many observers felt that the Clopyralid that might have been showing up in compost was originating in grass clippings. DPR's question tried to ascertain whether or not grass volumes were seasonal.

Unfortunately, most of this data is inconsistent. For example, responses by composters for the same material type in the same region differ significantly. In other words, there was little consensus, at least from survey respondents, as to the seasonality of certain feedstocks.

Sources of Feedstock

Although the primary focus of this project was municipally generated feedstocks (materials diverted from landfills), the organics processing industry straddles many sources of potential feedstocks. These include municipal (franchise) contracts, commercial contracts, self-haul, materials recovery facility (MRF)-generated, in-house city sources, agricultural sources, wastewater treatment plants, and self-generated feedstocks. In 2003, the survey question pertaining to sources of feedstock was improved to include brief definitions of these terms so that the wide variety of respondents would all be using similar terms (in 2001, there was considerable confusion over the term "self-haul").

The surveyed showed that self-haul feedstock constitutes 21 percent of the total, municipal, 13 percent, and commercial, 49 percent (See Figures 3 and 4). In 2001, self-haul was the largest category (although the confusion over the definition of that term may have led to more tonnage being attributed to self-haul. In 2003, the commercial segment provided the largest portion of feedstocks.

Figure 3A compares the sources of feedstocks handled by composters and processors between the two survey periods. In general there does not appear to be a significant change from the first study period to the second.

Processing Capacity

Processing capacity for both composters and processors, in reported tons per day, is shown in Figure 5. The total statewide processing capacity in 2002 was 8.1 million tons (up significantly from the previous survey, which identified 6.1 million tons). Processing capacity relates to available processing equipment and is not necessarily a good measure of actual production. Also, well-operated facilities typically have more capacity then they actually use to allow for maintenance, breakdowns, and other contingencies. To further complicate this, an additional 58 landfills were surveyed about ADC production. Landfills reported using 2.1 million tons of green waste ADC in 2002 (the most recent CIWMB data). Some of this was produced by composters and is included in the above numbers, some was produced by the landfills themselves, and some was produced by contract grinders (processors).

The largest concentration of both processors (24 percent) and composters (27 percent), reported 50 tons per day or less for processing capacity. A much smaller percentage (12 percent of composters and 27 percent of processors) reported processing capacity in excess of 500 tons per day. Facilities were equally distributed in between these two extremes: 19 percent of composters and 14 percent of processors reported 50 to 100 tons per day; 15 percent of composters and 10 percent of processors reported 100 to 200 tons per day; 11 percent of composters and 10 percent of processors reported 200 to 300 tons per day; 4 percent of composters and 6 percent of processors reported 300 to 400 tons per day; and 11 percent of composters and 8 percent of processors reported 400 to 500 tons per day.

The processing capacity distribution reflects the breadth of facilities covered by this study and the diversity of facilities operating in California, from very small municipal projects, primarily focused on diversion, to large-scale commercial facilities receiving a wide range of feedstocks and producing a wide range of products. Processors are twice as likely to be very large (over 500 tons per day processed, than composters).

Additional research is needed to understand how processing capacity relates to feedstock generation and transportation needs. Survey results may give an impression of substantial organics processing capacity, but without relating this information to the amount of organic waste generated and other geographical factors, it is impossible to gauge the overall need for processing capacity in California. The overall trend in 2003 is for fewer facilities to be processing more tonnage.

Figures 5A–5C compare the processing capacity reported in the previous survey and the current survey. Although there are some minor differences, (composters appear to have increased slightly with more facilities processing more than 50 tons per day, but with fewer large facilities that process over 500 tons per day). Among processors, there are fewer smaller facilities (less than 50 tons per day) and more larger (500 tons per day plus) facilities.

Change in Processing Capacity

In addition to asking for existing processing capacity, the survey asked participants if processing capacity had increased or decreased in the past year. Factors which contribute to this include purchase of new equipment, increased permitted acreage (which would allow a facility, especially a compost facility, to handle more material), expanding collection programs, or increased sales volume. In addition, respondents reported the closure of nearby facilities as a reason for increased throughput.

In 2001, not a single facility reported a decrease in processing capacity, In 2003, three facilities (for a total of 39,000 tons) reported a decrease in processing capacity.

Seventy-two percent overall reported that processing capacity remained the same (64 percent of composters and 31 percent of processors). Overall, participants reported a statewide processing capacity increase of 321,000 tons per year. The range of increase was from 20 tons per year to 56,000 tons per year. The average increase in processing capacity was approximately 12,000 tons per year. The average processing capacity increase for composters (12,500 tons per year) was slightly greater than for processors (9,800 tons per year), but the overall increase for composters (213,000 tons per year) was almost double that of processors (108,500 tons per year). These figures do not include any increases in green waste ADC processing capacity, unless that material was processed by a stand-alone processor or by one of the landfills included in the more detailed telephone survey.

Various factors contributed to increases in processing capacity, but the increases generally fell into one of two categories: internal reasons (purchasing new equipment, solving operational problems, or increasing sales volume) or external reasons (decrease in local disposal options for organics, increase in local diversion programs, and/or increase in population). The two most popular reasons for increasing processing capacity are equipment purchase and increasing sales volume.

The majority of closed or inactive facilities identified were processors (38 of 60, or 63 percent). Many were likely casualties of the waning biomass-to-energy industry. However, a significant number of composters, including some rather large facilities, also closed (22 of 60, or 37 percent). See Figure 30.

Tons Processed Annually

Composters and processors reported processing over 8.1 million tons of organics per year. The material was divided almost equally between the two (4,026,081 tons for composters and 4,090,231 tons for processors), a result different from what the 2001 survey revealed. Unlike the 2001 survey, the number of non-participating facilities in 2003 was significant (32 facilities in 2003 versus 11 in 2001). Because of this relatively high volume of non-participation, an estimate was made of the non-participating facilities by distributing the non-participating facilities along the distribution of the primary survey population. This estimate is included in the section entitled “Reasons for Nonparticipation.” This estimate results in approximately 1,751,800 additional tons of feedstock processed annually (1,047,800 tons estimated for processors and 704,000 tons for composters).

However, even after adding in the estimated tons processed from the non-participating facilities, the percentages of feedstock processed by composters and by processors are still different from those in 2001. In 2001 the composter/processor split was 56 percent processed by composters and 44 percent by processors.. In 2003, the split was roughly 50 percent each. With the added estimated tons from the non-participating facilities, the percentage for composters was 48 percent and for processors, 52.

Figure 6 shows the distribution of total annual tonnage by facility type. The majority of facilities process 100,000 tons or less per year, with only a few facilities processing over 200,000 tons per year. The responses differ slightly from those of the previous survey, in that they show a wider range of tons processed annually: Twenty-six percent of composters and 17 percent of processors reported processing less than 10,000 tons per year; 47 percent of composters and 34 percent of processors reported processing between 10,000 and 50,000 tons per year; and 16 percent of composters and 29 percent of processors reported processing between 50,000 and 100,000 tons per year. Only 4 percent of composters and 10 percent of processors reported processing more than 100,000 tons per year.

The larger range of tons processed reflects the breadth of the study, rather than a new trend. It is not surprising that the tonnage composters process annually is similar to what processors make annually, since both types of facilities use similar processing equipment. The most recent survey suggests however, that processors are generally "larger" (from the standpoint of tons processed statewide) than composters. This would also seem to indicate that there are fewer processors processing a larger proportion of tons (which is in part due to the closure of at least 38 facilities between 2001 and 2003). This trend is also evident with composters, though it is not as strong as it is with processors.

Figure 6A–6C compare the changes in annual tons processed between the two study periods. While there are no overwhelmingly strong trends, these figures show that roughly the same numbers of facilities are processing more tonnage in 2003 compared to 2001.

Volumes Produced by Material Type

Figure 7 shows the total volumes of products made, by type of material. The three products with the highest volume production are ADC (with 8.5 million cubic yards reported), boiler fuel (3.8 million yards reported), and compost (3.0 million yards reported).

Not surprisingly, composters produce most of the compost (though some processors also reported producing compost), while processors produce the bulk of the ADC (landfill processors account for a significant portion of this volume; see below) and the boiler fuel. Other major products made by California composters and processors include mulch, made by both processors and composters, compost feedstock (made by processors for composters), bark products, feedstock for manufactured wood products, manure, and green material that is directly applied to land. Beneficial reuse at landfills (material, mostly mulch, that is used at a landfill, but not for ADC) is a new category added in this year's survey. The total amount of mulch used for non-ADC, beneficial purposes at landfills was 258,150 tons. Table 5 compares these quantities between the two surveys.

Table 5. Quantities (Cubic Yards) of Products by Type

	2001	2003
Compost	4,232,000	3,011,182
Mulch	1,872,000	2,325,708
Boiler Fuel	3,446,000	3,872,983
ADC	2,795,000	8,482,372
Beneficial Reuse at Landfills	N/A	258,150
Other	2,608,000	469,843
Total	14,953,000	18,420,238

"Other" includes products such as fines, wood chips, steer manure, bark products.

Figure 8 shows the breakout of major products by geographic region. (Table 2 lists the counties in each region, See Figure A for a map of the regions.). The Central Valley Region produces the most compost (1.4 million cubic yards per year), followed by the Southern Region (800,000 cubic yards per year). The Northern Region produces the least compost of the five regions (11,000 cubic yards per year). The relatively low production of compost in the Northern Region is attributed to (1) the relatively low population densities of those counties, resulting in a lower organic waste generation rate and (2) reduced access to horticultural and agricultural markets.

The Southern Region produces the largest quantity of products (9.7 million cubic yards per year) Figure 8 also shows the distribution of ADC use, with the Southern Region clearly leading other regions (6.6 million cubic yards per year). The Central Valley and Bay Area regions produce the second largest overall volume of organic products (roughly 3.7 million cubic yards per year, each) though some of the Central Valley feedstock comes from the Southern Region. The Bay Area region leads the others in producing fuel for biomass plants, with 1.6 million cubic yards reported).

Additional region-specific data is shown in Figures 9–11. These figures show the percentage of materials sold by market segment for composters, processors, and composters and processors together. Figure 9 shows that agriculture comprises the largest market for compost, as in 2001, followed closely by landscape markets.

Figure 9 shows the percentage of materials that composters sell, by market segment. On a statewide basis, composters sell 27 percent of their materials to agricultural markets—still the largest single category for composters—and 23 percent to landscape markets. These two categories dominate the remaining categories. Of the remaining categories, composters sell 15 percent of their material for use in the "Other" category, 16 percent for ADC; 12 percent for biomass fuel; 4 percent for nursery use; 1 percent for CalTrans, 1 percent for beneficial reuse at landfills, and 1 percent for municipal uses. ADC and biomass fuel (both of which can be outlets for compost "overs," the oversize materials screened out of finished compost) are still important market categories. The ADC, biomass fuel, and "Other" categories are larger than they were in 2001.

Figure 10 shows the market segments used by processors. Not surprisingly, the landfill cover (ADC) market segments dominate this group. This figure includes the ADC tonnage produced by landfills as well as stand-alone processors. Biomass-to-energy comprises 24 percent. Landscape and nursery uses (5 percent and 2 percent respectively) lead agricultural uses (presumably mulch applied to orchards or otherwise directly land applied) at 2 percent. Municipal uses comprise less than 1 percent, and CalTrans, with only 1 percent of the processor market. Beneficial reuse at landfills comprises 2 percent with the "Other" category supplying the remaining 2 percent.

Figure 11 shows the combined markets, which are dominated by ADC (47 percent). Biomass fuel is a distant second at 20 percent. Landscape, agricultural, and nursery uses follow with 11 percent, 10 percent, and 2 percent respectively. Uses in the "Other" category hold 6 percent of the market, with beneficial reuse at landfills (presumably non-ADC use) at (2 percent), CalTrans (1 percent), and municipal uses (1 percent) making up the remainder.

Material Bulk Density

The 2003 survey included a question on product volume by asking respondents to report material bulk density. This information was requested as a way to convert responses given in cubic yards to tons and vice versa. Answers for the same commodities varied widely. The average bulk densities for the four major products are shown in Table 6.

Table 6. Reported Bulk Density of Products

Product	Average Bulk Density (Cubic yards per ton)	Range
Compost	2.1	1.0–4.0
Mulch	3.9	2.0–6.0
Biomass Fuel	4.7	2.0–8.0
ADC	3.9	1.5–6.0

The range of bulk densities in each material type reflects not only regional processing and handling methods, but also the diversity of feedstocks within a given commodity. For example, a compost made of yard waste exclusively will have a lower bulk density than a compost made of biosolids. The very high end of the range (8 yards per ton) in the fuel category probably reflects those facilities which screen processed material to remove the "fines" (the undersized pieces of organic material which falls through the trommel screen). Fines from these types of operations are often used for purposes such as soil amendments. The ADC category may also be experiencing this phenomenon, as some facilities screen the processed material, sending the overs to ADC. There were fewer responses to the ADC category, perhaps because in many cases there is no incentive to track the material too carefully. Also, in some cases, ADC is not processed through a grinder prior to placement and is compacted after placement, so the bulk density varies depending on the stage of the process. Moisture content also varies widely and can have a significant effect on bulk density.

Market Segments

California has a rich history of organic materials being used in horticultural applications (such as landscaping and nursery use). It is not known how much organic material was returned to agricultural uses prior to the IWMA, but since the original legislation was enacted in 1989 (becoming effective in 1990), the agricultural sector has substantially increased its use of urban-derived organics, particularly of compost.

The survey asked producers to determine the percentage of their products that were sold to major market categories. No studies have been undertaken prior to the two described in this report to assess the breakout of compost and mulch use by industry sector.

Figures 12 and 13 show the distribution of products by market segment throughout the five regions. Figure 12 shows regional market segment information for composters. This figure highlights the dominance of agricultural markets, primarily in the Central Valley Region. The amounts of compost sold into the landscape markets are very similar in the Southern Region and in the Bay Area Region, though clearly ADC is a big factor in the Southern Region.

Figure 13 shows the regional market segmentation for processors. As in preceding figures, Figure 13 shows the dominant use of green waste for landfill ADC in the Southern Region. The massive size of this use tends to dwarf all other uses by processors. Figure 13 also shows that the biomass-to-energy market is still an important market for processors in some regions

Geographical Distribution

Organic materials processing and composting is a regional rather than statewide business. Although many processing and composting facilities typically accept feedstock primarily from within the county in which they are located, increasingly feedstock goes out of the county to be processed. This is especially true for more urbanized counties, which often set up transfer points to move material to less densely populated areas where the siting and operation of facilities are easier. Siting composting and processing facilities in less-urban areas is easier due to lower population density, proximity to markets, and lower costs for land and water.

Figure 14 shows the geographical distribution of responding facilities by region. The number of facilities per region varies significantly by region (with the Southern Region having the most and the Northern Region the least), but the relationship of processors to composters is fairly similar in each region, with the exception of the Central Valley Region, which has significantly more composters than processors. The only region which has more processors then composters is the

Southern Region. This is undoubtedly due to the fact that it is significantly harder (due to population density and urbanization) to site a compost facility in the Southern Region. New South Coast Air Quality Management District (SCAQMD) regulations in the Southern Region are making it even more difficult (see "SCAQMD Proposed Rule 1133" section). The trend of feedstocks from the Southern Region making their way to the Central Valley (as documented in the 2001 Survey) continues to increase.

Figures 14A–14C compare the number of participating facilities in 2001 compared to 2003 by type and by region. Figure 14A shows the number of processors that participated in 2001 and the number of processors that participated in 2003. Changes in participating facilities include slightly more processors in the Southern, Central Coast, Bay Area and Northern regions and fewer in the Central Valley Region. Figure 14B shows the number of composters that participated in 2001 and the number of composters which participated in 2003. The overall trend is for slightly fewer composters participating in 2003 (particularly in the Southern, Bay Area, and Northern regions) and slightly more in the Central Valley and Central Coast regions. Figure 14C shows the combination of participating composters and processors in 2001 and 2003. As discussed previously, in aggregate there are slightly fewer facilities that participated in 2003 than in 2001.

In general, there is a gross relationship between population and/or MSW tons disposed of and the number of facilities in a given region. However, some counties ship material out of county, which can skew these figures significantly. Also, the number of facilities is meaningless without some idea of the size of those facilities. Two of the largest composting facilities are located in the Central Valley Region, but most of their feedstock comes from the Southern Region.

Number of Products

Figure 15 shows the number of products the surveyed facilities produce. The vast majority of processors (79 percent) and composters (77 percent) make one to five products, with few facilities reporting they produce more than five products. This trend is consistent for both processors and composters, with composters having slightly more respondents reporting five or more products, though some reported in excess of 15 separate products. No processors reported 15 or more products; in fact only 2 reported producing 10 to 15.

California processors and composters are well diversified within the existing organics markets. In addition to compost, most composters produce some mulch and some boiler fuel and some access the ADC market (typically overs from screening operations or contaminated material).

Many processors access both the boiler fuel and mulch markets but also produce ADC and other products, such as compost feedstock, directly land-applied material, or feedstock for manufactured wood.

Figure 16 shows the distribution of products/uses (compost, mulch, boiler fuel, ADC, beneficial reuse at landfills, and other products) by combined processors and composters. This chart highlights the diversity of the existing markets for organic materials in California. Figure 17 shows product distribution by composters only. Composters (by definition) produce most of the compost (52 percent of all products), but composters also produce mulch, blends, boiler fuel, and a surprising amount of ADC. The "Other" category in all three figures, as well as in the other figures, includes wood chips, bark products, and feedstock for manufactured wood products.

Composters rely much less on boiler fuel and ADC markets than do processors. Figure 18 shows product distribution by processors only. Figure 18 highlights the dominance of ADC (59 percent) in the processor market. Processors also produce boiler fuel (24 percent), mulch, compost feedstock, and other products.

Product Distribution

Figures 19–28 show the breakdown of products made by composters and processors in each region. These pie charts clearly show the regional diversity and significant differences within regions. For example, for composters in all but one region, compost makes up more than 30 percent of the total market. In the Central Coast Region, compost is 89 percent of the market.

Compost is clearly the most dominant product for composters, though in a given region like the Bay Area, the boiler fuel market may be equally important. Figure 19 shows the breakdown for the Northern Region. Composters in this market produce 75 percent boiler fuel, 18 percent compost, and 7 percent mulch. No Northern Region composters reported making ADC.

Figure 20 shows the breakdown for the Bay Area Region. As previously stated, composters in the Bay Area Region produce almost as much boiler fuel as compost. This may be due as much to the easy access to operating boiler fuel plants and availability of wood waste feedstocks as to the relative difficulty of siting large compost facilities (smaller facilities can process larger volumes of boiler fuel, which does not need the space that composting requires) in the Bay Area. A number of transfer stations in the Bay Area reported producing "compost feedstock" which is sent out of the region to the Central Valley.

Composters in the Bay Area also produce 27 percent ADC (up significantly from 2001), 11 percent mulch, with 4 percent other products (primarily compost feedstock and land applied materials) and 1 percent beneficial reuse at landfills.

Figure 21 highlights the product distribution in the Central Valley Region. A significant 66 percent of material processed by composters is sold as compost in this region. This is followed by mulch at 28 percent. Clearly boiler fuel, at 6 percent, is not as significant a market in the Central Valley Region as it is in other regions. This may not be true for specific facilities or in specific counties. No composters in the Central Valley Region reported producing ADC.

As shown in Figure 22, the Central Coast Region is somewhat similar to the Central Valley Region as far as products made by composters. Surprisingly, 89 percent of materials processed by composters end up as compost in this region, with 4 percent other, 3 percent each mulch and biomass fuel, and 1 percent ADC.

Among composters in the Southern Region (Figure 23), compost makes up 41 percent of the products produced; ADC, 31 percent; mulch and biomass fuel, 12 percent each; and other products, 4 percent. As with the Bay Area Region, the data indicate relatively easy access to a variety of markets. Also, as in the Bay Area Region, a significant quantity of feedstock in the Southern Region travels to other regions, primarily the Central Valley Region but also the Central Coast Region, to be processed.

Figures 24–28, which show the product distribution among processors, contrast dramatically with Figures 19–23. In the Northern Region (Figure 24), processors report 44 percent ADC, 31 percent compost, and 25 percent selling mulch. Interestingly, not a single Northern Region processor reported fuel as a significant product. This may be due to the relatively small number of participating facilities, or because biomass plants in this region do not burn a large amount of urban wood waste, burning "in-forest" and lumber mill chips instead. The non-existent biomass-to-fuel market (Figure 24, Fuel=0%) may also be due to a relatively small sample of processors surveyed in this region or the lack of other available markets in this area.

Figure 25 shows a much broader diversity of products in the Bay Area Region, with biomass fuel (49 percent) and ADC (35 percent) leading the other markets substantially. Beneficial reuse of

green waste at landfills (non-ADC use) leads the remaining markets with 8 percent, and with compost feedstock (6 percent) and mulch (2 percent) comprising the remaining tonnage.

The Central Valley Region (Figure 26) also shows a strong reliance on boiler fuel (53 percent) and ADC (36 percent). Mulch (5 percent), other products (4 percent), and compost (2 percent) complete the picture.

Figure 27 shows a clear preference for boiler fuel by processors in the Central Coast Region (51 percent). Mulch comprises 27 percent, other products, 15 percent, and compost, 2 percent. The production of ADC (5 percent) is not a major factor reported among participating processors on the Central Coast Region.

Processors in the Southern Region (Figure 28) contrast from the four other regions by their significant production of ADC (75 percent). Mulch comprises 14 percent and biomass fuel only 9 percent. Compost (1 percent), beneficial ruse at landfills (1 percent) and other products (less than 1 percent) complete the remaining tonnage.

Services Provided

Figure 29 shows the specialized services facilities provide in addition to processing and composting services. Many facilities provide multiple specialized services, such as blending, spreading, or bagging, while a surprising number (24 percent of composters and 49 percent of processors) provide no additional services.

Processors are more likely not to provide additional services (49 percent), although 24 percent of composters, surprisingly, also do not provide additional services. Survey responses regarding specialized services reveal California's organics processing industry contains a mix of sophisticated, established companies offering multiple products and services and also very new players providing products on a more basic level. Composters are almost twice as likely as processors to report product knowledge as an additional service.

Composters provide more services than processors, though a large percentage (34 percent) still provide no or only one additional service beyond compost production. The most popular service is delivery (reported by 63 percent), followed in descending order by testing/product analysis (53 percent) which is interesting, since all composters are required to conduct, at a minimum, pathogen reduction and metals testing, and most do some more traditional composition analysis. Perhaps product analysis and performance are not as important as many believe. Blending of compost (with other organic materials like topsoil, sand, or fertilizer was reported by 48 percent followed by 46 percent reporting product knowledge as an additional service. Spreading and bagging trailed other services with 20 percent and 19 percent respectively. A few facilities reported loading as an additional service.

As shown in Figure 29A, many composting facilities reported providing more than one service, though clearly providing no services (24 percent) leads all other categories. Ten percent reported providing one additional service, 18 percent provided two services, 16 percent, three services, 10 percent provided four services, and 10 percent, five services. Eleven percent reported providing six services.

Not surprisingly, processors reported even fewer additional services provided, with the largest percentage (49 percent) reporting no additional services provided (see Figure 29). Forty four percent reported delivery as an additional service, followed by product knowledge (29 percent); blending and testing/analysis (16 percent each), bagging (13 percent), and spreading (9 percent).

Very few processors provide multiple services (See Figure 29A). Again, 49 percent provide no additional services at all. Eleven percent provides only one service, 18 percent provide 2 services, 13 percent provide 3 services, 4 percent provide 4 services and 4 percent provide 5 services. No processor reported providing more than 5 additional services.

CIWMB Priorities

For the first time, the survey asked participants to rank CIWMB priorities related to organics materials handling. Respondents were asked to rate the following in order of decreasing importance:

- Expand markets.
- Develop standard specifications.
- Reduce regulatory burden.
- Change ADC policy.
- Financial assistance.
- Other.

Aggregated responses are shown in Table 7. Responses varied, with considerable disagreement on the ADC question. This question highlights the diversity within the organics processing and composting industries. There was very little agreement on any of the priorities listed even between similar types of facilities. Overall, the results showed that reducing the regulatory burden (which was ranked somewhat higher by processors than composters) was the highest ranked of all responses (see below). Responses to each priority are discussed and/or provided below.

Table 7. Results of CIMWB Priorities Question

	Composters' Ranking	Processors' Ranking	Aggregate Ranking
Expand Markets	1	2	2
Develop Standard Specifications	3	4	3
Reduce Regulatory Burden	2	1	1
Change ADC Policy	4*	5	4
Financial Assistance	5	3	5
Other	See Below		

Reduce Regulatory Burden

"Reduce Regulatory Burden" was ranked number one overall by composters and processors, though higher by processors than by composters. This may have a lot to do with the timing of the survey which, while steering clear of most regulatory questions (and being conducted confidentially), coincided with a major change in CIWMB regulatory policy. Although this new change will affect both composters and processors, it will have the greatest impact on processors, some of whom were previously essentially unregulated. In addition, new construction and demolition regulations may also affect some processors.

Specific comments related to "Reduce Regulatory Burden" included:

"Legislative advocacy for compost use."

"Become more pro-biosolids."

"The CIWMB has been a big pain in the neck. No help at all."

"New C&D regs. may kill the wood waste and green waste process."

"Existing CIWMB regs. are o.k., proposed SODS and PR 1133 rules could burden us."

"Require municipal and state agencies to purchase mulch and compost."

"Support the biomass industry."

"Advocate for composters as regs. are developed to deal with SODS, Clopyralid, air emissions, etc."

"Eliminate air quality restrictions."

"Get persistent herbicides off the market."

"Quit changing the rules."

"Tight regulations are excellent for the industry. Raise standards, force compliance, increase professionalism in the industry."

Expand Markets

Coming in a close second in priority was "Expand Markets". This concept was ranked number one among composters. There may be many reasons for this. All markets for organic materials fluctuate, but the past two years have provided a number of additional challenges for organics processors and composters alike. A number of specific challenges like Sudden Oak Death Syndrome and Clopyralid (see below), and other feedstock specific challenges have primarily affected composters. Heavy rains in early 2003 may have also dampened sales in some parts of California. Although not well documented, the value of some agricultural commodities also affects users ability to purchase and apply compost. Many commodities (especially grapes) had bad years in 2003. Similarly, the general economy affects the ability of the green industry (for example, nurseries, landscapers, and horticulturists) to use compost. California's economic crisis in 2002 and 2003 may have hurt compost sales.

"Expand Markets" was the number two priority among processors. As with composters, there are numerous reasons for this. The biomass plants upon which many processors rely were unreliable and fluctuated significantly in 2002, particularly for those processors without contracts (who sell wood fuel on the "spot" market). California's energy crisis also contributed to uncertainty in the biomass markets. ADC markets were steady (and growing) in 2002, though not all ADC producers consider using ADC as a market. Specific comments related to "Expand Markets" included:

"Help get tax credits for farmers that use compost."

"Mandatory procurement/buy back requirements for municipal generators."

"Educate farmers and public on the advantages of compost."

Develop Standard Specifications

"Develop Standard Specifications" was ranked third by composters, somewhat lower by processors. There were no specific comments on "Develop Standard Specifications."

Change ADC Policy

This priority ranked fourth overall. Among composters, it ranked fourth and fifth among processors. The lower ranking among processors is probably due to the fact that more processors produce ADC then composters (though some composters also produce ADC). It also reflects a lack of consensus on ADC policy. Although some composters are opposed to the practice, many composters rely on ADC markets for their overs. Most (if not all) landfill operators are in support of the current ADC policy.

Specific comments on this option run the gamut from “No ADC” to “Enhance ADC Policy”. Additional comments relating to ADC are included in the survey addenda section. In addition to this question, several specific questions regarding the CIWMB’s ADC policy were asked in the survey addenda. These questions and responses are discussed below.

Financial Assistance

Interestingly, “Financial Assistance” ranked lowest overall of all the priorities. However, processors ranked this option third, while composters ranked it fifth.

Specific comments on this option are listed blow.

> “I don't believe CIWMB should help financially at all! Competitive disadvantage. Let composters go to banks for money.”
>
> “Charge more at the gate to promote recycling.”

Other

Other priorities listed by respondents include:

> “Consistent Environmental Mitigations & Permit conditions from LEA to LEA.”
>
> "Keep Clopyralid and SODS on the front burner."
>
> “All of these points plus educate farmers and public on advantages of compost.”
>
> “Compost Research.”
>
> “Encourage biosolids application to agricultural land.”
>
> "School [the] public on value of green waste products and the importance of not over-impacting county landfill, to keep future cost down for the public.”
>
> “Help the public and local officials recognize the importance of composting.”
>
> “Public education/PR.”

Reasons for Nonparticipation

Thirty-two facilities that were contacted (16 composters and 16 processors) declined to participate in the survey. This is up substantially from 2001, when only 11 facilities declined to participate. A few identified issues of confidentiality and a few did not perceive a value in participating in the survey, but the overwhelming reason for nonparticipation was lack of time.

Many processing operations and smaller composting operations are run by a small staff that must balance operations with management responsibilities; in a few cases the person who answers the phone may also operate a loader or a grinder. A few operators indicated they were willing to participate, but indicated on their surveys that they were too busy to provide a comprehensive

response. Most (but not all) of the 32 facilities were generally smaller facilities. It is unclear how this increase in non-participating facilities affects the survey data.

To gauge the impact of the non-participating facilities, an estimate was made by distributing the number of facilities according to the distribution found in the participating facilities (See Figure 6). The result of this estimate is shown in Tables 8 and 9. Table 10 compares this estimated tonnage with the reported tonnage and combines the totals to adjust for those facilities that chose not to participate.

Table 8: Adjustment for Non-Participating Processors

Facility Size (Tons per Year)	Percent Distribution	Estimated Tons Processed Annually
Less than 10	17%	27,200
10–49	34%	108,800
50–99	29%	348,000
100–149	10%	200,000
150–199	5%	140,000
200 or more	7%	224,000
Total		1,047,800

Table 9. Adjustment for Non-Participating Composters

Facility Size (Tons per Year)	Percent Distribution	Estimated Tons Processed Annually
Less than 10	26%	41,600
10–49	47%	150,400
50–99	16%	192,000
100–149	4%	80,000
150–199	4%	112,000
200 or more	4%	128,000
Total		704,000

Table 10. Summary of Adjustment Method

	Tonnage
Estimated Processors	1,047,800
Estimated Composters	704,000
Total Estimate Tonnage	1,751,800
Reported Processors	4,090,231
Reported Composters	4,026,081
Total Reported Tonnage	8,116,312
Combined Processors	5,138,031
Combined Composters	4,730,081
Total Combined Tonnage	9,868,112

The combined tonnage of what was reported via the survey, what landfills reported to the CIWMB for green waste ADC use, and the estimate of what the non-participating facilities might be processing totals almost 10 million tons (9.8 million). It is difficult to know if this methodology is sound, but clearly the numbers reported in the survey are only part of the picture. It is certainly not unlikely that about 10 million tons are diverted and or composted by the infrastructure that has been developed, as a response to the IWMA. This number would also be larger if all of the manure and agricultural waste that was composted was counted. Unfortunately, obtaining reliable numbers for on-farm composting is difficult.

Sixty facilities identified in the survey database had ceased operations (either they have stopped processing organic material or are out-of-business). This number includes both processors and composters, though in some cases, since the companies were no longer operating, it was difficult to confirm whether or not they had been technically composting. However, this number is assumed to consist of 22 composters (including some major facilities) and 38 processors. The most common reason that contacted facilities had stopped operations was increased regulations, either State or local (though often this is the reason given when the operator is facing severe financial difficulties and is forced to close the facility). Many other factors probably contributed, including encroachment, changing business climate, and the biomass-to-energy decline. New CIWMB regulations (both the compostable materials handling regulations and the construction and demolition regulations) may have contributed to some owners choosing to exit the business rather then spend the money to comply with the new regulations.

Investigating the impact of new and changing regulations on the materials management industry is outside the scope of this study, but should be considered during future regulatory development.

Figure 30 shows the geographic distribution of non-operating facilities by region. More processors have closed than composters. The regional distribution of the closed facilities is reasonably similar to the distribution of operating facilities (Figure 14). A few compost operations contacted no longer compost on site, but merely process material for off-site uses. Similarly, a few processing facilities that have ceased processing now transfer material off site for processing.

Results: Survey Addenda

This section summarizes the results of questions asked in the survey addenda. These questions were generally more qualitative than questions asked in the survey. This is the first time that most of these questions have been asked in the survey process. Many of these questions relate to current challenges facing increased organics diversion in California. These questions were asked to help inform the CIWMB about the priorities within the compost- and mulch-producing industries. These include separate questions relating to Sudden Oak Death Syndrome, persistent herbicides (Clopyralid), the South Coast Air Quality Management District's PR 1133 (deals with emissions from composting operations), the use of green waste as ADC, and compost maturity. In the case of the persistent herbicide questions, the questions were reviewed by the Department of Pesticide Regulation to help inform DPR's rulemaking process. Composters and processors who received the primary survey also received and had an opportunity to complete the survey addenda. A summary of the responses to these questions follows. Appendix B contains the form used in the survey addenda.

Persistent Herbicides

During the time that the survey addenda were being developed, fear of persistent herbicides, particularly a broad-leaf herbicide called "Clopyralid" surviving the composting process was a significant concern in California. Reports from Washington state were indicating that the popular herbicide was surviving the composting process, and since it is effective at very low levels (some reports indicated that some crops might be affected by compost containing Clopyralid at concentrations as low as 3 parts per billion [ppb]), there was concern that anywhere it was being used, it might end up in the recycled organics stream. Clopyralid has been registered for use in California since 1997. Use of the herbicide had increased to 23,000 pounds of active ingredient by 1999. Approximately 15 products contain Clopyralid, some of which are used on commercial turf. Although there are concerns for other pathways, the residential and commercial turf to composting sites seemed to be the most obvious means of getting Clopyralid into a composting site. The composting industry undertook a voluntary sampling effort in 2001 to try to understand the possible implications for the industry. At that time, of 20 facilities sampled, 13 had positive results, with concentrations ranging from 2 to 13 parts per billion.

In an effort to better understand the scope of this problem and how to deal with it, CIWMB developed a working group in conjunction with DPR and industry stakeholders to discuss the issue and develop solutions. In addition, a compost industry group sponsored legislation with the intent of reducing the potential for Clopyralid from entering the compost feedstock stream. A number of actions have resulted from these efforts. DPR initiated cancellation of residential uses of Clopyralid in March 2002. DPR has also restricted sales of Clopyralid-containing products to lawn and turf professionals. Licensees are instructed to assure that any green waste treated with Clopyralid stays on-site (through grass cycling or other on-site treatment). Clopyralid dealers are required to provide written notice of the restrictions when they sell Clopyralid-containing products. DPR is currently drafting regulations to enforce the abovementioned actions.

In addition, Dow AgroSciences, the manufacturer, initiated its own outreach program to educate users of Clopyralid. Dow also sponsored research to better understand the mechanics of how Clopyralid behaves when composted. All of these actions appear to have had the desired effect. The most recent round of voluntary testing indicated that 11 of 15 facilities tested had positive results, ranging from 1 to 6.4 parts per billion. These diminished concentrations (though clearly based on a small sub-sample of composters, all of which were green waste facilities) also appear to be consistent along the West Coast. Oregon and Washington have all implemented similar actions as described above for California. In general, concentrations appear to be going down. In

addition some research indicates that in some applications, much higher concentrations (though there is not really any consensus on this) may not have a negative effect on plant growth.

A number of questions were added to the survey addenda to try to develop meaningful data to help inform the various discussions that were going on during the peak of activity on the Clopyralid situation. A number of composters completed the survey in time to present partial results to the CIWMB/DPR Working group. At that time, 36 facilities were surveyed. Following are the results.

Evidence of Testing

The first question was a "yes" or "no" question regarding testing for Clopyralid. Composters are not required to test for Clopyralid, and methods for testing vary. Figure A1 shows the results of this question by region for composters and processors. The majority of composters had tested at least once for presence of Clopyralid (75 percent). Although this question was directed at composters, results for the 36 processors that responded are almost exactly opposite of results for the composters. Seventy-five percent of processors reported not having tested for Clopyralid. Regionally, this trend is fairly consistent. Across regions, 60 to 80 percent of the composters reported testing at least once. For the processors, only 25 to 30 percent had tested for Clopyralid. (Of course, testing for Clopyralid in processed green waste would be unreliable, since most Clopyralid is reportedly applied in spot treatments.) The only region where no processor had tested was in the Northern Region. The number of composters that have tested for Clopyralid but do not want to disclose that they have, is unknown.

Testing Frequency

As mentioned above, composters are not required to test for or disclose testing for Clopyralid, though certainly many reported that they had received questions from users regarding the presence of Clopyralid. Figure A2 shows the distribution of testing frequency of those producers that reported testing at least once. Twenty six percent reported testing only once, 22 percent reported testing quarterly, 22 percent reported testing twice per year, and only 10 percent reported currently testing every batch. The remaining 20 percent who tested reported everything from an unspecified frequency (but more than once) to once every three years. These results, while useful, certainly show that there continues to be confusion as to the importance of testing and also as to how frequently one should test. Larger facilities in general test more frequently.

The question did not specify the type of test. In general, there are two types of tests for Clopyralid. A plant response test or seed germination test is less expensive and will detect plant growth or seed germination problems (which might or might not be attributed to Clopyralid). A gas chromatography/mass spectrometry (GC/MS) test is more expensive but will show presence of Clopyralid, though there is still lab industry discussion over which specific GC/MS test method is the most accurate for Clopyralid.

Herbicides Tested

This question tried to identify which herbicides were sampled, but the nature of the other questions and the current high profile of Clopyralid probably biased the responses. Ninety six percent of respondents tested for Clopyralid. Other herbicides tested for included Round Up, picloram (which is not registered for use in California), and a few others. Comments from this question included:

"Using a phytotoxicity test."

"A full EPA test method 8080."

"2,4-D; Picloram; 2,4-DB; 2,4,5-T; 2,4,5,TP; Dalapon; Dicamba; Dichloroprop; Dinuseb; MCPA (ELCD); MCPP (ELCD)."

"Glyphosate (Round Up Pro and Tricloper Garlon 4)."

"Phytotoxins."

"Broad spectrum - for organochlorines."

"Picloram."

Highest Level Detected

Sixty-two respondents that had tested for Clopyralid provided a response to the question on the highest level of Clopyalid detected. Figure A3 shows the distribution of detected concentrations. Fifty six percent of these reported none-detected. However, since the question did not ask respondents to specify test methods, it is difficult to judge the validity of these results. Twenty-four percent reported 1 to 5 ppb, 6 percent reported 6 to 10 ppb, 10 percent reported 11 to 20 ppb, and 3 percent reported results in the 21 to 50 ppb range. The highest specific recorded result was 35 ppb. These results appear to be consistent with earlier testing done by the California Compost Coalition. The most recent testing by the CDFA in partnership with the CIWMB revealed much lower concentrations overall, with only 11 out of 15 samples showing above the non-detect level and the highest concentration being 6.4 parts per billion. The interpretation of these results (for example, at what level is it safe to apply compost containing Clopyralid?) is still largely debatable.

Sources of Residues

The results of this question were extremely varied, again, showing the level of ongoing confusion, or at least a wide variety of opinions, as to the impact of Clopyralid. Of those respondents reporting 1 to 5 ppb, 33 percent reported that the source of residues was unknown, 20 percent reported residential yard waste, 20 percent reported commercial yard waste, 7 percent reported manure, and the remaining 20 percent reported a combination of residential and commercial yard waste and manure. This pattern was roughly consistent with the remaining tiers of reported Clopyralid. In most cases, not knowing the source of the residue was reported for at least 50 percent of respondents.

Two of the comments received from this question sum up the overall response to this question well:

"Tested chicken and cow manure. Residential and commercial yard waste. Hard to say from one feedstock to another."

"Suspect it was commercial yard waste, but how would we know?"

Impact on Sales

The final persistent herbicide question concerned potential impact on compost sales. This question elicited a large number of comments that are included below. Figure A4 shows a summary of responses to this question. Sixty seven percent of those responding indicated that Clopyralid had no impact on sales. Twenty eight percent did not know whether or not Clopyralid had an impact on sales. This result is roughly consistent when the answers are sorted by the highest level reported as well. Although a few producers are certain that the presence of Clopyralid did impact sales (as evidenced by comments below), the majority either did not notice an impact or could not trace slow sales directly to the Clopyralid issue. Comments added to this

question fall into one of three categories. The first, and perhaps most disturbing, was the idea of ceasing to accept feedstocks that were suspected of containing Clopyralid:

> "We knew Clopyralid was coming and were testing for it. When it arrived, we stopped using yard waste for bulking agent and went to tree waste. Our mission is beneficial reuse of biosolids, not disposal of yard waste. Be nice if we could do both though."
>
> "If Clopyralid level persists or increases, I will discontinue use of feedstock that carries it."
>
> "Controlled feedstock, no green waste used, straw bedding, manure, shavings/sawdust."

The second category of comment is by those that felt certain the presence of Clopyralid has had a negative impact on sales:

> "Tested tomato leaf tissue and got 1 ppb. Definitely affected sales. Profit margin went from healthy 6% to 2.5% (an all time low)."
>
> "Spring sales were off."
>
> "Consumer concerns regarding the possibility of compost contamination from persistent herbicides resulted in significant loss of sales."
>
> "Our compost sales are down this year, but we don't know the reason. No customers have specifically mentioned persistent herbicides as a concern. However, we are very concerned about the future impact of persistent herbicides on the compost industry. We strongly support AB 2356[3]. We are concerned that the DPR is not doing enough to prevent the contamination of compost, particularly for commercial feedstocks. DPR's current proposal to "instruct lawn and turf professionals to assure that green waste stays on site" when Clopyralid is used will not be effective. Our company is considering major investments in new composting capacity in California, but may discontinue those plans if the Clopyralid problem is not properly addressed."

The third category of responses included those that reported that although they were asked about Clopyralid, either it had no impact or it went undetected.

> "Do lots of turf field applications, Clopyralid would be hard to notice. Much compost sold unscreened."
>
> "Issue never got to customers on a widespread basis."
>
> "Maintain a mature citrus orchard—not a problem to date."
>
> "Some concern from public after newspaper articles in early 2002. Did not seem to be a very significant factor."
>
> "No measurable impact, lots of questions."
>
> "Some concern by homeowners, organic farmers, but they have seen our results of tests."
>
> "Just a few concerned customers. Cannot prove damage to sales."
>
> "Customers have stopped asking in our area."
>
> "We don't get asked about Clopyralid as often now."

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[3] Chapter 591, Statutes of 2002, (Keeley, AB 2356) Food and Agricultural Code sections 13190–13192.

Sudden Oak Death Syndrome

Sometime in the late 1990s or early 2000, a *phytophthera* was discovered to be killing oaks (and other species) along the northern California coast. What ultimately became known as "Sudden Oak Death Syndrome." or "SODS," was a concern to composters and processors, as both the USDA and the CDFA sought to slow the spread of this disease. A 12-county quarantine area (see Map #2) was set up, including those counties where SODS had been positively identified. The compost industry worked diligently with USDA, CDFA, and the CIWMB to clarify that composting was a feasible treatment method for material infected with SODS. Ultimately, CDFA enforced the quarantine area and developed compliance agreements to allow composters and processors to ship raw material and finished compost both within the 12-county area and outside of the quarantine area.

The SODS quarantine area includes Alameda, Contra Costa, Humboldt, Marin, Mendocino, Monterey, Napa, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma counties. As of November 15, 2003, no organic material can be transported from the quarantine area (any one of the 12 counties) to an area outside of the quarantine area unless it is being sent to a landfill (or a landfill using green waste ADC) a biomass facility, or a composting facility, or some combination of the three. Additionally, trucks must be equipped with solid tarps, and all shipments must originate and end at a facility with a registered compliance agreement.

A total of 49 facilities within the 12-county quarantine area responded to the survey (28 composters, 21 processors).

Feedstock Received

The nature of this question was to determine whether or not a given facility within the 12-county area received feedstock from other counties within the quarantine zone. A total of 49 facilities that participated in the survey (21 processors and 28 composters) were identified within the quarantine zone.

Of the 21 processors, only eight provided a response to this question. All but one of these responded that they would be wiling to share this data. Of the seven providing data, all but two received 100 percent of their feedstock from within their own county. Only two facilities reported receiving feedstock from another county. All of these were within the 12-county zone (that is, no facility within the 12-county zone reported receiving feedstock from outside of the 12-county area). Processors received over 400,000 tons of feedstock within the 12-county zone.

Of the 28 composters that provided data, 16 reported receiving feedstock from the 12-county area. Seven of these reported receiving feedstock from a county other then the one the facility was located in. Similarly to the processors, none of the composters reported receiving feedstock from outside of the 12-county SODS quarantine zone. Composters reported receiving almost 800,000 tons of feedstock from within the 12-county SODS quarantine zone.

The 49 composters and processors reported receiving over 1 million tons of feedstock from within the 12-county quarantine zone. None of the facilities reported receiving feedstock from outside of the 12-county area (though this is not regulated).

Products Shipped

Table 11 below, shows the total volume of finished green waste products, such as compost, mulch, boiler fuel, and ADC, shipped to counties from within the 12-county quarantine zone.

Table 11: Summary of Green Waste Products Shipped From a Facility in the Quarantine Zone

County of Material Origin	Tons of Product Shipped From SODS Processors	Tons of Product Shipped From SODS Composters	Total tons of Product Shipped From Processors and Composters
Alameda*	77394	136281	213,675
Contra Costa*	4300	28300	32,600
Fresno	809		809
Madera	9120		9,120
Monterey*	64007	25000	89,007
Napa*		2750	
Sacramento	1600		1,600
San Joaquin	180200	8000	188,200
Santa Clara*	10074	202377	212,451
Santa Cruz*	10112	4000	14,112
San Luis Obispo	717		717
Solano*	1000	850	1,850
Stanislaus	2000	40000	42,000
San Mateo*	1211.5		1,212
Yolo	27242.41		27,242
San Benito		4000	4,000
San Francisco		2000	2,000
TOTAL	389,787	453,558	843,345

*Counties included in 12-county SODS quarantine area.

Processors within the 12-county quarantine zone shipped finished products to 14 different counties (including seven outside of the 12-county quarantine zone) for a total of almost 400,000 tons shipped. This reflects to some extent the distribution of biomass power plants (all but one of which is outside of the 12-county area). Composters shipped material to 11 counties, including three outside of the 12-county area) for a total of 450,000 tons shipped.

Table 11 shows that large volumes of finished products are leaving the 12-county quarantine area. However, it is assumed that these area all to approved uses. For example, many of the Central Valley Region counties listed contain major biomass facilities. Finished compost can be shipped unrestricted to any county outside of the quarantine area, as could material destined for a landfill (for use as ADC or to a biomass facility for fuel). Processed feedstock could also be sent to a permitted composting facility for composting. Using this table as a starting point, it is fair to assume that roughly a million tons of green waste is sent out of the SODS quarantine zone in a given year. It is not known how much, if any of this is being shipped for unapproved uses. However, given that composting has been approved as a treatment method, there are a number of options for facilities within the 12-county region to access approved facilities (landfills for ADC, compost facilities and biomass plants).

Willingness to Share Data

The survey was conducted primarily during a time of uncertainty with the SODS quarantine regulations, which may explain some reluctance to share data. Overall, 41 percent of respondents were willing to provide and share data on SODS shipments. The figure is slightly higher among composters, (43 percent) than processors (38 percent). The reluctance to share data may also be explained because the majority of the non-SODS questions in the Appendix B survey addenda (pertaining to persistent herbicides, PR 1133, and additional ADC questions) do not relate as specifically to market information.

SCAQMD Proposed Rule 1133

The SCAQMD is the regulatory authority for air quality in Los Angeles, Orange, and most of Riverside and San Bernardino counties (see MAP #3). Over the last few years, the SCAQMD has been developing an Air Quality Management Plan (AQMP) to reduce air pollution within the district. In particular, the SCAQMD has been classified as an extreme non-attainment area for ozone and serious non-attainment for PM10[4]. As part of the overall AQMP, the SCAQMD developed PR 1133, which deals with emissions from composting facilities. Some composting facilities, especially those with high-nitrogen feedstocks, such as manure and biosolids, emit

[4] PM10 stands for particulate matter less than 10 microns in size—basically, this is extremely fine dust.

ammonia emissions as part of the composting process. Ammonia is a precursor to PM10 (under the right conditions, ammonia in the atmosphere can react with other compounds to create PM10). In addition, most composting facilities emit volatile organic compounds (VOC). Similarly, under the right conditions, VOCs released in the atmosphere can react with other compounds and lead to the formation of ozone.

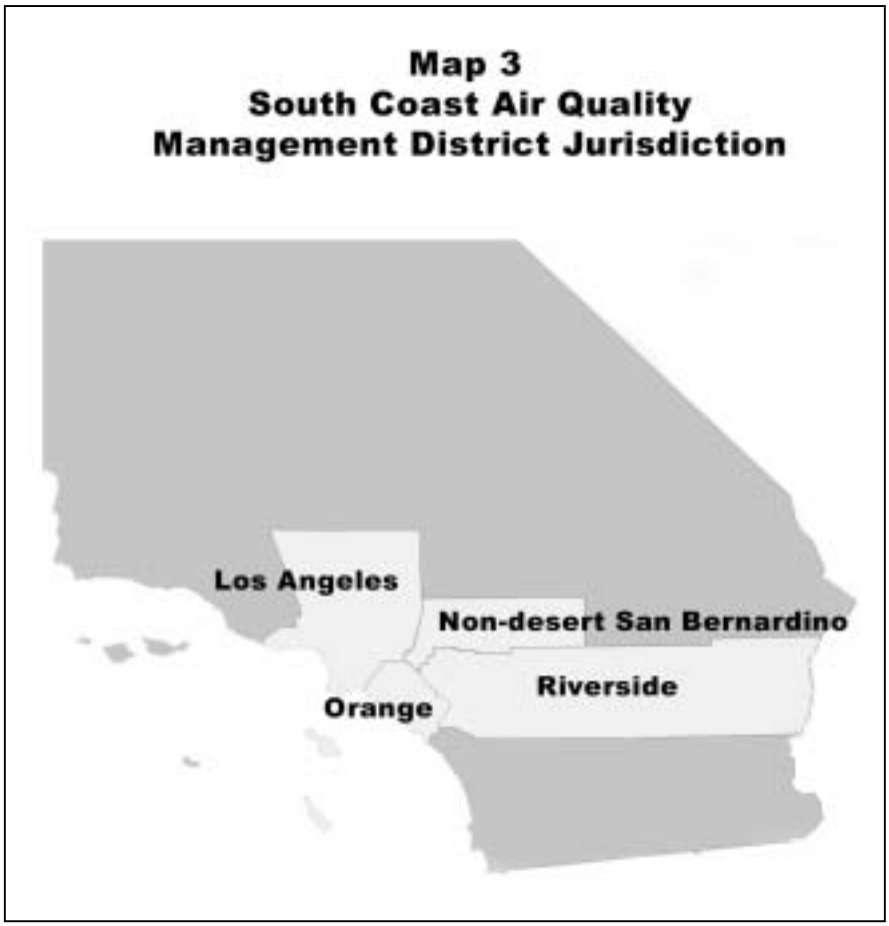
Three portions of PR 1133 were promulgated in early 2003. One section of the rule requires all composting and "chipping and grinding" (processing) facilities and operations to register with the SCAQMD and report basic operating information annually. Another section of the rule applies to biosolids and manure composting operations and requires partial enclosure with emissions treated through a biofilter or equivalent system. A third section of the rule applies to chipping and grinding operations and establishes timelines for the handling and processing of specific materials. The part of the rule that deals with green waste composting is still under development. The CIWMB has worked closely with the SCAQMD to assure that the rule provides for emissions reduction strategies that are the most feasible and economical to implement for the industry.

PR 1133-specific questions were designed to understand a few different points. Are composters and/or processors aware of PR 1133? Do composters and/or processors control for odor at their facilities? How? Although PR 1133 is ostensibly about emissions, there is strong emphasis regarding odors emissions. The remaining questions deal with the potential impact of the proposed rule to impact businesses and how processors and composters would respond. These questions were asked specifically to facilities within the SCAQMD jurisdiction. There were 29 facilities within the SCAQMD jurisdiction that responded to the questions (ten composters and 19 processors). As the survey addenda forms were mailed to all composters and processors in the state, an additional 74 facilities responded to some of the PR 1133 questions. Although technically PR 1133 only affects those facilities within the district's boundaries, it is largely believed that eventually what the SCAQMD requires may spread to other regional air quality management districts, particularly the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD).

Rule Awareness

Figure A5 shows the overall awareness of SCAQMD PR 1133, both within the district's jurisdiction and without. Of the 29 facilities within the SQAQMD that responded to the PR 1133 questions, 100 percent of the composters were familiar with PR 1133. Processors were only somewhat less familiar, with 17 of 19 facilities (89 percent) responding that they were familiar with PR 1133.

Although the PR 1133 questions were designed to be asked solely to those facilities within the SCAQMD jurisdiction, 64 facilities provided a response to some or all of the PR 1133 questions. Since not all of the remaining facilities responded (or were asked to respond) to these questions, however, one cannot use the responses to generalize about statewide awareness of the SCAQMD's activities. For the same reason, the response is not really a fair assessment of statewide appreciation of the SCAQMD's efforts. Nonetheless, it is interesting that a majority of both processors and composters responding (36 of 64, or 56 percent) were aware of PR 1133. It is accurate to say, though, that a significant portion of composters and processors (particularly in areas adjacent to the SCAQMD, such as San Diego and Ventura counties and the southern part of the SJVAPCD) are quite aware of PR 1133.



Odor Control Methods

The question on odor control methods was designed to understand how composters and processors within the SCAQMD control for odor at their facilities. Although PR 1133 is designed to reduce emissions from composting facilities, clearly emissions and odors are related. Figure A6 shows the distribution of existing odor control methods currently used by composters and processors. Surprisingly, 100 percent of the composters provided a positive response for at least one of the odor-management options. Overall, 14 of the 19 processors (74 percent) reported some control measures for odor.

The survey allowed participants to select one or more of six possible methods for odor control. Among the composters, the most popular was feedstock management (80 percent), followed by turning and moisture control (70 percent each). Odor-masking/neutralizing agents (30 percent), biofilters, and aeration using methods other than turning trailed with 20 percent or less. Processors also preferred feedstock management (77 percent reported this option), followed by moisture control and turning (70 percent each), and odor-masking/neutralizing agents (at, surprisingly, 15 percent). Only two composting facilities reported currently using biofilters, and only one reported aeration using methods other than turning for odor control.

The most surprising piece of data is the use by both composters (30 percent) and processors (15 percent) of odor-neutralizing agents. Although specific agents were not disclosed (types and methods of application vary widely), it is interesting to note this relatively high level of use. Odor-neutralizing agents were not always considered reliable or effective, though this appears to

be changing. Another surprising finding was the relatively high use by processors of moisture control for odor reduction. This is most likely in the form of using water for dust control, but it is difficult to tell without further investigation.

Production Cost

This question asked whether or not respondents thought PR 1133 would increase their production costs. From those facilities answering this question from within the SCAQMD, 43 percent answered that PR 1133 would increase production costs. Twenty five percent responded that PR 1133 would not increase production costs. Thirty two percent stated they were not sure. To further break down responses, composters were more likely to think that PR 1133 would increase their production costs—60 percent versus 33 percent for processors. The majority of processors indicated they were not sure what the impact would be—45 percent, versus only 10 percent for composters.

In the larger population of those that responded to this question from outside the SCAQMD jurisdiction, 24 percent stated they believed PR 1133 has the potential to increase their operating costs, particularly if their local AQMD adopts a similar regulatory package. Eighteen percent of those outside SCQAMD jurisdiction stated they did not believe PR 1133 will increase their costs. Fifty-eight percent stated they did not know. Interestingly, a few facilities were convinced that if their local air district adopted something similar to PR 1133, their business would be affected. Comments included:

> "We're not in South Coast but San Joaquin AQMD will no doubt adopt these or some variation."
>
> "If approved for the BAAQMD, the answer would also be NO, because it will put me out of business."

The second part of the production cost question involved options if PR 1133 increased production costs. Figure A7 summarizes the response for those facilities that thought PR 1133 would increase their production costs. Of the facilities that responded that PR 1133 would increase their production costs, 33 percent of composters and 17 percent of processors responded that they would increase their gate fee; and 33 percent of both composters and processors responded that they would close their facility, though one conceded that this would be a last resort. Seventeen percent of composters, but no processors, responded that they would increase the price of the end product. No facilities responded that they would relocate operations outside of the SCAQMD jurisdiction (during the initial testimony for PR 1133, many facility operators argued that if PR 1133 were implemented, facilities would move out of the jurisdiction, which would not provide the air quality benefit sought by PR 1133).

Rule Impacts

However the subsequent question (#4) on PR 1133 which looked at composter and processor response if the cost of meeting PR 1133 requirements caused them to close (a significantly different impact than an increase in processing costs) did elicit the "Ship [material] out of SCAQMD jurisdiction" response (see Figure A8).

This question asked facilities to determine what they would do (and where material might go) if SCAQMD PR1133 forced closure of their operations. Figure A8 summarizes responses to this question. Only one facility (a composter) responded that haulers (generators) could easily find other facilities to take material to. The most popular response was that the green waste would be

disposed of in a landfill (100 percent of processors responding to this question chose this response, and 63 percent of composters chose it). No facilities responded that their green waste would be used as ADC. Thirteen percent of composters and 8 percent of processors responded that they could apply material to open land, such as farmland or freeway right-of-way, 50 percent of composters and only 8 percent of processors responded that they would ship the material out of SCAQMD jurisdiction, and 13 percent of composters and 8 percent of processors thought green waste would be disposed of illegally.

Holding Time

CIWMB added the holding time questions to understand composter and processor industry practice as far as receiving feedstock, the time feedstock is kept on the ground, the time material is kept after processing, and the time the material is actively composted[5] . The question highlights the tremendous variety of practices among composters and processors; but also shows that there are substantial differences in manufacturing processes even among composters.

It is generally expected that SCAQMD Rule 1133 will affect composters more directly then processors. Although not all of the rule is finalized, it is expected at worst, that processors will be required to move material more quickly and that some composters, particularly those composting manure and/or biosolids, will have to make significant design and operation changes in order to continue operating within the SCAQMD. Newly adopted CIWMB regulations also will have an impact on how long a processor is able to keep both feedstock and processed material on site. These regulations will likely have one of three possible impacts: (1) processors can decrease the amount of time feedstock and processed material is held on-site; (2) processors who hold material longer can apply for composting permits; or (3) they can leave the organics processing business. At this time it is too soon to tell the direction in which processors affected by these regulations would go.

The first of the holding-time questions—"How long does incoming feedstock stay on the ground before it is processed?"—provided a roughly equal distribution of responses, though in general it would appear as if composters tend to process material somewhat more rapidly then processors. This may be because composters tend to handle feedstocks which are considered more putrescible and prone to issues if left on the ground for too long (unlike wood waste for example). Figures A9–A11 summarize these responses. The majority of processors (78 percent) and composters (90 percent) move feedstock to processing within seven days. Not surprisingly, more processors (21 percent) than composters (only 10 percent) responded that feedstock was held on the ground longer than 7 days (with one processor noting that its feedstock might stay on the ground one to two years before processing). Eight percent of composters and 6 percent of processors responded that holding time varies, both seasonally and based on feedstock type.

The second question—"How long does processed material stay on site before it is shipped off (or composted)?"—shows a similar trend (Figure A10), though the majority of processors (88 percent) responded that processed material was shipped off in from 24 hours to 7 days. The existing CIWMB regulatory requirement is seven days, so this is an interesting result (PR 1133 proposes similar, though in some cases even shorter holding times, as do the new CIWMB regulations.). Interestingly 40 percent of composters responded that processed feedstock may stay on the site more then seven days prior to being composted. See Figure A10.

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[5] The California Code of Regulations (Title 14, Division 7, Chapter 3.1, Section 17852(a)(1)) defines active compost as "compost feedstock that is in the process of being rapidly decomposed and is unstable. Active compost is generating temperatures of a least 50 degrees Celsius [122 degrees Fahrenheit] during decomposition; or is releasing carbon dioxide at a rate of at least 15 milligrams per gram of compost per day, or the equivalent of oxygen uptake."

The final question in this category was directed only to the composters: “How long does processed material stay in the compost pile?” Figure A11 summarizes answers to this question from composters within the SCAQMD jurisdiction. Responses are split along the time continuum with about one-third of composters responding that compost is on site for only two weeks (27 percent), another third responding compost is on site for 60 days (27 percent), and the final third responding that compost is on site for greater then 90 days. This contrasts completely with the responses to this question from compost facilities outside the SCAQMD jurisdiction. (Figure A12). Not all composters responded to this question, but in aggregate, the responses were consistent with expectations, with the overwhelming majority (83 percent) responding that compost stays on site 90 days or longer. The relative pressure for space in the largely urbanized SCAQMD jurisdiction may partially explain this. It is possible that the relatively smaller sites in dense urban areas have more pressure to get compost off-site and to market sooner than larger, more rural facilities that have more space.

Alternative Daily Cover

The use of green waste as ADC has been controversial since first practiced in California in the late 1980s and early 1990s. Other states allow green waste to be used for landfill cover, but no other states regard this use as recycling for the purposes of calculating mandated recycling rates. For landfill operators, the green waste provides cover material that might otherwise be excavated from virgin top- or subsoil (though clearly there are other cover materials available). The usage also provides a significant cost savings to landfill operators on a number of fronts. Cities participating in green waste ADC programs often cite its lower cost (compared to composting) as one of their justifications.

Some composters believe that this price advantage has taken feedstock that would otherwise be available for composting and that it represents a competitive disadvantage. Many observers wonder at the legitimacy of the practice as “recycling.” The diversion credit point is important, as few landfills were using green waste ADC prior to the implementation of the IWMA. To complicate the issue, some composters use green waste ADC as a market for materials that are otherwise difficult to market, such as overs from screening or feedstock that is too contaminated to clean up economically.

This question asked simply, “Do you think the ability to use green waste as ADC has had an affect on your business? As would be expected of the diverse organics processing and composting constituency, which includes numerous landfills, results were mixed. Comments were also mixed (see below). Comments fit into one of three categories: (1) Respondents who were not in favor of ADC use, (2) those who understand that ADC has a place, and (3) respondents (primarily landfills), that see the positive benefits of using green waste ADC. Ironically, the respondents are split almost 50/50 on this question.

Figure A13 shows that slightly more composters (57 percent) responded that ADC has not had an affect on their business than processors (44 percent), with corresponding results for those who think ADC has had an impact on their business (43 percent of composters versus 56 percent of processors). The aggregate of all facilities responding to this question is 51 percent thinking that green waste ADC has had no impact, versus 49 percent who identify that it has impacted their business. The results change significantly when the responses are sorted among the study regions. Figures A14 and A15 show the regional breakdown among composters and processors. Interestingly, more composters (70 percent) in the Bay Area Region believe that the use of ADC has impacted their business, while the situation is reversed in the Central Coast Region, with 70 percent of composters responding that ADC has not affected their business. In general, the Bay Area Region uses more ADC then does the Central Coast Region (See Figure 8), which might explain the pressure felt by Bay Area composters. The response among composters in the Central

Valley is similar to the Central Coast Region response, again perhaps due to the relatively small amount of green waste used as ADC in that region. Fifty eight percent of composters in the Southern Region (by far the largest regional user of ADC) reported that ADC has affected their business. No facilities in the Northern Region reported that ADC has affected their business, but landfills in the Northern Region do not use much ADC.

Figure A15 shows the regional breakout among processors for this question. Processors in the Bay Area and the Central Coast regions are somewhat evenly matched (reflecting the statewide position) at 40 percent of composters in the Bay Area Region reporting an impact and 50 percent of processors in the Central Coast Region reporting an impact. No processors in the Central Valley Region reported that ADC has impacted their business (this is also true of the Northern Region, but no processors in this region responded to the question). The Southern Region shows a different trend, with 77 percent of processors responding that ADC has affected their business. Clearly, these varied results show that the issue of ADC impact is a regional one.

Comments Opposed to Green Waste as ADC:

> "It pisses us off. It's misleading to call it recycling."
>
> "Yes, because (of ADC) we have no reasonable priced source of green waste."
>
> "Landfills are subsidized using prison labor lowering costs."
>
> "The landfill took our only municipal customer and dumped their 100 tpd [tons per day] as ADC instead of to us for composting. It almost put us out of business."
>
> "The landfill is not diverting material from the landfill, they just landfill it in another capacity."
>
> "ADC has slowed the development of composting infrastructure in our County. Also, local jurisdictions will have to understand that if they want their material composted, they will have to pay more."

Comments Accepting Green Waste as ADC:

> "ADC is a two-edged sword. Although we need all the material we can get to make compost, it's sometimes very useful to be able to divert processed organics to ADC when operational problems stress site capacity constraints or when faced with Clopyralid or SODS issues."
>
> "ADC provides an outlet for material with a lesser quality for composting, curbside, etc."
>
> "We only use green waste overs as ADC. The screened overs have some plastic contamination in it. Without ADC I would eventually have to landfill overs."
>
> "It keeps a lot of surplus material out of the market. It would be better if it went to co-gen. We need only take enough green waste to compost as compost markets (not including give-away programs) can sell, surplus should go to ADC or co-gen."
>
> "We ship ADC to the county landfill. If we did not have that option, we would send it to direct land application."
>
> "Another outlet for material."

Comments Supporting Green Waste as ADC:

> "ADC has had a positive effect because it gives us an option when there is equipment breakdowns."

"We haul ADC to our own landfill to manage our incoming feedstock."

"Save landfilling cost to the consumer, allows beneficial use options at the landfill."

"It allows us to use green material as ADC saving the disposers from a fee increase; and it allows the excess green material that is received in greater quantity then can be composted to be productively used."

"91% of our output goes to ADC."

"Positive impact—Reduction in soil use, provide market for customers (cities)."

"Increased our revenues."

Impact on Business

Of those facilities indicating that the use of green waste ADC has impacted their business, respondents were asked to identify categories of how ADC had impacted their businesses. These included three possible categories (though respondents could and did check more then one response). In addition, many operators added comments as discussed above. Of the three possible reasons, "ADC costs less than composting and feedstock has been directed elsewhere" ranked number one among processors and composters. This makes sense given the current volume of green waste currently being diverted to ADC (over 2 million tons). "We have lost our ability to get feedstock" which is somewhat similar to the above, was ranked second, and "Landfill tip fee is lower than the gate fee" ranked third. These responses are summarized in Figure A16.

Clearly, the use of ADC has had an impact on many of the state's composting (and processing) facilities. How to acknowledge this and how the CIWMB plans to comply with existing statute (that ADC should not impact green waste industry) are unknown at this time.

Compost Maturity

The final "qualitative" question asked for the survey addenda involved compost maturity. Compost maturity relates to the degree to which a compost has completed the composting process and is suitable for a particular use. Some uses require a greater degree of compost maturity than others. Not all uses require mature compost, and there is some confusion or lack of consensus both in the compost industry and among compost users as to what constitutes mature compost. The CIWMB has spent considerable resources investigating compost maturity and its importance to the marketability of compost. The CIWMB supported the development of the California Compost Quality Council Compost Maturity Index. In July 2002, the CIWMB published a report on a study examining the relationship between compost maturity and crop performance characteristics (*Compost Maturity and Nitrogen Release Characteristics in Central Coast Vegetable Production*, CIWMB pub. #442-02-015).

The survey asked two questions, the first about the importance of compost quality and the second about familiarity with the CCQC Compost Maturity Index. Although the compost maturity questions were directed specifically to facilities that identified themselves as "composters," a few processors also submitted responses. This again highlights the current problem that not all facilities producing compost are necessarily permitted to do so.

Importance of Compost Maturity

Seventy composters provided a response to this question. Fifty four percent of these responded that compost maturity is very important to their customers. An additional 34 percent responded that maturity was somewhat important. Eleven percent responded that maturity was either

unimportant or they were not sure. Only 8 processors responded to the question, so clearly compost maturity is not very important to most of the processors, primarily because most of them do not sell compost. These responses are summarized in Figure A17.

Awareness of CCQC Maturity Index

This question was a "yes" or "no" question regarding the familiarity with the CCQC's Compost Maturity Index. The index is easy to use and combines popular compost stability tests with compost maturity tests to create a quantitative index which numerically rates composts as very mature[6], mature, or immature. Additional information can be found at www.ccqc.org, or on the CIWMB's website (www.ciwmb.ca.gov/Publications/Organics/44303007.pdf).

As with the previous maturity question, this question was directed to composters, though a few processors provided responses. Results for composters were split roughly in half. Of 72 composters providing responses, 46 percent were familiar with the Compost Maturity Index and 54 percent were not. Clearly, the CIWMB and the compost industry have more work to do to increase awareness of the index. It is unclear whether this result reflects a lack of sufficient outreach, or that not all uses require a very mature compost (in fact, the majority of popular compost uses, such as landscaping and erosion control, probably do not require a very mature compost). Immature compost can be used beneficially to build organic matter content in depleted soils. There are also other means of measuring both suitability for a particular use and maturity.

[6] Maturity is the degree or level of completeness of the composting process. For mature compost, raw starting materials (feedstocks) have been sufficiently decomposed to produce a stable product. In contrast, immature compost may contain one or more compounds that inhibit plant growth, may contain viable weed seeds, or have other undesirable characteristics, such as odor.

Conclusions

Surveying an industry as varied as California's compost- and mulch producing infrastructure is a constant challenge. Perhaps the most significant challenge is the relative immaturity of the industry and the difficulty in getting small, owner/operator facilities to provide a comprehensive response to a complicated survey instrument. California's broad geography and significant regional differences also make making meaningful generalizations about the compost and processing industries difficult. Adding all of the compost addenda questions to the previous survey document more than doubled the length of the survey. Even though many of the addenda questions were not as time consuming to answer as some of the other questions, the overall appearance of the 11-page survey may have discouraged some respondents. The length of the survey was very likely a factor for some of the 32 facilities that chose not to participate, but also may have resulted in partial completion by some facilities.

While it is difficult to draw too many conclusions from this year's survey, a few points are clear:

- An interesting finding is that overall statewide compost production (at least from facilities surveyed) has decreased from 4.2 million cubic yards in 2001 to 3.0 million cubic yards in 2003. There are several possible explanations for this:

1. A number of compost facilities closed between the study periods.
2. The number of non-participating facilities was higher in 2003 (16 composters); some of these may have been large producers of compost.
3. The increase in the use of green waste as ADC may have had an impact on some facilities' ability to obtain feedstock for composting.
4. The Spring of 2003 was particularly wet and some composters reported a "bad year" in terms of compost sales.

- The number of operating facilities has remained somewhat constant, though the amount of material being processed has increased.
- The use of green waste as ADC continues to rise and undoubtedly is having an effect on the viability of the compost market. Composters compete directly for feedstock with ADC users, and the cost of composting is significantly more than the cost of using green waste ADC (In fact, the use of green waste as ADC in some cases is a revenue source for some landfills.
- California composters and mulch producers continue to access an enviable diversity of markets. It would appear that, at least statewide, there is not reliance on a single market. Regionally, however, some markets are dominated by a single large market (as the Southern Region is by the green waste ADC market).
- There is still considerable room for diversification in markets. The majority of facilities still manufacture five or fewer products.
- As documented (for the first time) in the previous survey, agriculture is still the largest single market for compost (not green waste, but material processed into compost). This represents a significant achievement, as many observers doubted conventional agriculture would accept urban compost.
- CalTrans continues to be appear to be an untapped market for recovered organic products. Few facilities identified CalTrans as a significant market (Figures 9, 10 and 11 show

CalTrans to be 1 percent or less of the total market. Departments of transportation in other states, most recently Texas (which specified over 400,000 yards of compost in 2003), have shown the potential for this market.

- For the first time, a few respondents reported a decline in processing capacity. This may be one small sign of a maturing industry (in 2001, no facilities reported a decline in processing capacity).
- Because of the large volume of food wastes and/or liquid wastes being disposed of, an opportunity appears to exist for new and existing facilities to process these types of nontraditional feedstocks. Only a handful of facilities surveyed reported processing food waste or liquid wastes.
- The CIWMB should continue to improve its ability to track compost- and mulch-producing facilities. New CIWMB regulations will likely affect a number of processors who were previously unregulated and therefore not in the CIWMB system.
- More effort needs to be spent in future surveys tracking materials through facilities to destinations to assure double counting is minimized. This is particularly true of landfills using green waste ADC. This year's survey spent considerable time and effort reconciling initial survey responses with CIWMB green waste ADC data. In the future all landfills reporting green waste ADC use should be included in the contact list.
- The CIWMB should continue to track the implementation of PR 1133 and similar regional regulations which may affect composters and mulch producers. The burden of regulatory compliance is the number one complaint of facilities responding to the CIWMB priorities question.
- The longer survey form (more than twice as long as in 2001) was harder to complete and more time was spent eliciting responses from producers reluctant to participate. In the future, the CIWMB should disconnect "infrastucture" questions from more subjective questions, like those in the survey addenda. The length of the survey certainly contributed to the significantly higher rate of non-participation experienced in 2003.

Although the additional challenges mentioned throughout this report are real and have had a real impact on the compost- and mulch-producing businesses, it is difficult in a single survey to understand the full impacts of these challenges.

Sudden Oak Death Syndrome. Initially, the 12-county quarantine area might have been devastating to composters, but over time, in coordination with the CIWMB, the compost industry, university researchers, CDFA, and USDA, composting was recognized as a viable treatment for SODS-contaminated materials. Because of this, SODS has not had a significant impact on the green waste composting industry (or the landfill or biomass industries, which were recognized as treatment methods early on). The survey documented that significant materials do flow across county boundaries. Although the entire pattern is not well understood, urban feedstocks generally flow to less urban areas for processing. While this pattern raises some issues regarding transport of potential problems like Sudden Oak Death Syndrome, it is clear that composting is a suitable treatment method.

SCAQMD PR 1133. Although the survey uncovered some interesting attitudes regarding PR 1133, it is too soon to understand the full impact this emerging regulation will have on the green waste composting and processing industry. It would appear that green waste ADC producers will largely be unaffected by this regulation. Biosolids and manure composters will be required to enclose at least a portion of their facilities. Composters of green waste will have to monitor PR

1133 to see what the ultimate outcome will be. One unusual outcome of the PR 1133 questions was the larger-than-expected reliance on odor neutralizing agents by some composters. Clearly composters and processors have much to overcome in terms of odors (particularly in the dense urban areas like the Southern Region). More investigation should be made of the methods which both composters and processors use to control odor. A surprising number of both composters (30 percent) and processors (15 percent) reported using odor neutralizers for odor control. The impact of these is not well documented.

Persistent herbicides. As with PR 1133, the potential impacts of Clopyralid on the composting industry are still unclear. While the data uncovered by the survey was relevant at the time it was collected, more recent analytical testing conducted voluntarily through an industry partnership with the CIWMB has revealed (at least for green waste facilities) that Clopyralid numbers appear to be trending downwards. The most recent numbers showed 11 of 15 facilities testing positive for very low levels of Clopyralid, with the highest number being 6.4 ppb. This is most likely a combination of industry outreach and education and the result of legislation that imposed a number of restrictions on the use and distribution of Clopyralid-containing products.[7] This trend appears to be consistent up and down the West Coast (California, Oregon, and Washington). Each of these states has similar restrictions in place.

ADC. This year's survey highlights the dominance that green waste use as ADC has in certain market zones. This will likely continue as long as equal recycling credit is given to this practice.

Areas for further study:

The following four areas are recommended for further study:

1. Clearly, the CIWMB needs to study the effect that green waste ADC is having on the compost industry. Chapter 978 of the Statutes of 1996 (Bustamante, AB 1647) clarified the legislative intent that the use of waste-derived ADC constitutes diversion through recycling. However, PRC section 41781.3 requires the Board to adopt regulations for the use of ADC considering:

   > "(1) Those conditions established in past policies adopted by the board affecting the use of alternative daily cover.
   >
   > (2) Those conditions necessary to provide for the continued economic development, economic viability, and employment opportunities provided by the composting industry in the state.
   >
   > (3) Those performance standards and limitations on maximum functional thickness necessary to ensure protection of public health and safety consistent with state minimum standards."

2. The current survey documented once again that agriculture is the largest single market for compost. Agriculture continues to represent the largest potential market for composted organic products. More work needs to be conducted to understand which segments of the agriculture industry are buying compost and why. Are there certain crops that use compost more than others? Is organic agriculture using more compost then conventional agriculture? What effects do various commodity prices have on compost sales?

[7] Chapter 591, Statutes of 2002, (Keeley, AB 2356) Food and Agricultural Code sections 13190–13192

3. The CIWMB should continue its work towards increasing markets and reducing barriers for CalTrans to purchase recovered organic products.

4. The largest gap in this survey is reconciling “producer” data with city tonnage collection records. There are still no reliable numbers for curbside green waste collection programs in California. Although we now have reliable numbers regarding the production facilities, the full picture of green waste recycling in California cannot be fully understood without understanding the collection infrastructure. Tying city collection programs to facilities and facilities to end markets would provide a more complete picture of the specific regional needs for market and facility development.

5. The survey has never asked for financial or employment data, but the CIWMB may want to include this information in either subsequent surveys or in a specific targeted survey. Having this data would enable the CIWMB to arrive at estimates regarding number of employees per ton of material recycled or per $1,000 in revenue.

Appendix A: Survey Form

Survey Instrument
1/16/03

Assessment of California's Compost and Mulch Infrastructure

Survey Form

Facility: _____ **Date:** _____

Contact: _____ **Phone:**_____

Call History:

A. FACILITY SPECIFIC INFORMATION

1. What types of feedstock does this facility accept and process?

a. Green material

a1. Residential: brush _____tons per year

grass clippings _____tons per year

other _____tons per year

a2. Commercial brush _____tons per year

grass clippings _____tons per year

other _____tons per year

b. Wood waste _____tons per year

c. Construction and demolition wood _____tons per year

d. Manure _____tons per year

e. Agricultural residue

e1. Grape Pomace _____tons per year

e2. Cannery Waste _____tons per year

e3. Other Ag residue _____tons per year

f. Food scraps

f1. Vegetative only _____tons per year

f2. Postconsumer _____tons per year

g. Liquid waste _____tons per year

h. Biosolids _____tons per year

i. Other: _____ _____tons per year

2. Is feedstock volume seasonal or is it constant:

a.	Green material		
	a1. Residential	Brush	Constant/Seasonal:
		grassclippings	Constant/Seasonal:
		other	Constant/Seasonal:
	a2. Commercial	Brush	Constant/Seasonal:
		grassclippings	Constant/Seasonal:
		other	Constant/Seasonal:
b.	Wood		Constant/Seasonal:
c.	Construction and demolition wood		Constant/Seasonal:
d.	Manure		Constant/Seasonal:
e.	Agricultural residue		
	e1. Grape pomace		Constant/Seasonal:
	e2. Cannery waste		Constant/Seasonal:
e3.	Other Ag residue		Constant/Seasonal:
f.	Food scraps		
	f1. Vegetative only		Constant/Seasonal:
	f2. Postconsumer		Constant/Seasonal:
g.	Liquid waste		Constant/Seasonal:
h.	Biosolids		Constant/Seasonal:
i.	Other: _____		Constant/Seasonal:

3. What are the major sources of feedstocks for this facility? Please provide the percentage of your total volume that comes from these sources:

a.	Municipally hauled	____% (delivered by City)
b.	Commercial hauled	____% (residential material hauled by City contractor)
c.	MRF generated	____% (delivered from MRF or Transfer Station)
d.	Self-haul	____% (delivered by commercial or residential entity)
e.	Agricultural sources	____% (farm or ag processing source)
f.	Waste water treatment plant	____%
g.	Institutional sources	____% (delivered from schools, parks, golf courses, hospitals, prisons, army bases, etc)
h.	Other: _____	____%

4a. What is the incoming processing capacity of this facility?

a. 0 – 50 tpd
b. 50 – 100 tpd
c. 100 – 200 tpd
d. 200 – 300 tpd
e. 300 – 400 tpd
f. 400 – 500 tpd
g. 500 – tpd+

SWIS Capacity:

_____

Other Capacity:

_____

4b. This facility processes about _____ tons per year.

4c. This site is approx._____ acres.

5. Has this facility's processing capacity changed in the past year?

a. No, processing capacity has stayed the same.

b. No, it has decreased by _____ tons per day/year.

c. Yes. Processing capacity has increased by _____ tons per day/year, because we:

c1. Purchased higher capacity equipment
c2. Increased our permitted acreage
c3. Increased processing contracts
c4. Curbside program expanded
c5. Increased sales volume
c6. Other _____

B. QUANTITY OF ORGANIC PRODUCTS SOLD

1. What general types of products does this facility produce by volume?

a. Compost _____ cu. yds per yr. Avg. bulk density _____ yds/ton

b. Mulch _____ cu. yds per yr. Avg. bulk density _____ yds/ton

c. Boiler fuel _____ cu. yds per yr. Avg. bulk density _____ yds/ton

d. ADC _____ cu. yds per yr. Avg. bulk density _____ yds/ton

e. Beneficial reuse at landfills _____ cu. yds per yr. Avg. bulk density _____ yds/ton

f. Other: _____ _____ cu. yds per yr. Avg. bulk density _____ yds/ton

2. How many different products does this facility produce?

a. 1 – 5 b. 5 – 10 c. 10 – 15 d. 15+

3. What percentage of your production is sold into these market segments and how has this changed in the past 12 months?

a. Agriculture _____% Increased or decreased by _____%

b. Landscape _____% Increased or decreased by _____%

c. Nursery ____% Increased or decreased by _____%

d. CalTrans ____% Increased or decreased by _____%

e. ADC ____% Increased or decreased by _____%

f. Boiler fuel ___% Increased or decreased by _____%

g. Municipal projects ___% Increased or decreased by _____%

h. Beneficial reuse at landfills ___% Increased or decreased by _____%

i. Other: _____ _____% Increased or decreased by _____%

4. Of the products made, what percentage is sold wholesale, retail, or given away?

WHOLESALE	B. RETAIL	C. GIVE AWAY
A1. Landscapers	B1. Bagging plant	C1. Contractual to City
A2. Nurseries	B2. For resale	C2. On-site give away
A3. Boiler fuel	B3. Directly to consumers	C3. Used in-house
A4. CalTrans	B4. Agriculture	
A5. ADC		
A6. Beneficial reuse at landfills		
A7. Other: _____		

5. What additional services (e.g., bagging, spreading, delivery, etc.) Do you provide at the point of sale?

a. Blending b. Spreading c. Bagging

d. Delivery e. Testing/Analysis f. Product Knowledge

g. Other: _____

C. CIWMB PRIORITIES

1. Rank the following in importance from 1 – 5; What should the CIWMB do to help increase the success of your business?

a. Expand markets

b. Develop standard specifications

c. Reduce regulatory burden

d. Change ADC policy

e. Financial assistance

f. Other: _____

Appendix B: Survey Addenda Forms

Assessment of California's Compost and Mulch Infrastructure

Survey Addenda – Persistent Herbicides

The following questions are important in informing the CIWMB about priorities of the compost and mulch producing industry.

1. Have you tested finished compost for residues of persistent herbicides?

a. No. b. Yes

2. If Yes, how often are you testing?

a. One time only

b. Regular intervals (specify) _____

c. Other _____

3. For which herbicides have you sampled?

a. Clopyralid

b. Other _____

4. What was the highest level detected?

A. Clopyralid

a. None detected

b. 1 – 5 ppb

c. 6 – 10 ppb

d. 11 – 20 ppb

e. 21 – 50 ppb

f. 51 ppb or higher.

B. Other herbicide (specify) _____

a. None detected

b. 1 – 5 ppb

c. 6 – 10 ppb

d. 11 – 20 ppb

e. 21 – 50 ppb

f. 51 ppb or higher.

5. What were the sources or feedstocks for the herbicide residues?

a. Unknown
b. Residential yard waste
c. Commercial yard waste
d. Manure
e. Other _____
f. Other _____

6. How have concerns about persistent herbicides affected sales of your product?

a. No impact
b. Sales decreased
c. Sales increased
d. Don't know

Comments:

Assessment of California's Compost and Mulch Infrastructure

Survey Addenda – Sudden Oak Death Syndrome (SODS)

The following questions are important in informing the CIWMB about priorities of the compost and mulch producing industry.

1. **Please indicate the total yearly tonnage of green material or native soil that your business receives from any SODS regulated county listed below:**

Alameda	Mendocino	Santa Clara
Contra Costa	Monterey	Santa Cruz
Humboldt	Napa	Solano
Marin	San Mateo	Sonoma

2. **Please indicate the total yearly tonnage of product(s) made from green material that your business ships to any county in California or out-of-state.**

Alameda	Merced	Santa Clara
Contra Costa	Mendocino	Santa Cruz
Del Norte	Monterey	Siskiyou
Fresno	Napa	Solano
Glenn	Sacramento	Sonoma
Humboldt	San Benito	Stanislaus
Kern	San Bernardino	Tehama
Kings	San Francisco	Trinity
Lake	San Joaquin	Yolo
Los Angeles	San Luis Obispo	Other county or state (list below separately)

3. **Are you willing to share your specific answers to these additional questions to further enhance the likelihood that CDFA will approve composting as an approved treatment for SODS?**

   a. Yes b. No

Assessment of California's Compost and Mulch Infrastructure

Survey Addenda – PR 1133

1. Are you aware of the South Coast Air Quality Management District's Proposed Rule 1133 (Concerning air emissions from compost/mulch facilities)?

a. Yes b. No.

2. Do you control for odor at this facility?

a. Yes b. No

2A. If yes, what odor control method(s) do you use?

a. Turning b. Moisture c. Aeration other than turning d. Biofiltration

e. Odor masking/reduction agents f. Feedstock management

g. Other

3. Will South Coast Air Quality Mgt. District's PR 1133 increase your production costs?

a. Yes b. No c. Don't know

3A. If yes, your response to the increase will be?

a. Increase gate fee
b. Close your facility
c. Increase product price
d. Relocate all or part of facility out of SCAQMD
e. Other _____

4. If the cost of meeting PR 1133 requirements forces you to close this facility, in your opinion, what impact will the closing have on your haulers' ability to send organic materials to a processing facility?

a. Haulers can easily find other processing facilities to take material to.

b. Haulers will have difficulty finding other processing facilities to take material to. Haulers will most likely:

b1. Dispose in landfill
b2. Use as ADC
b3. Apply to land
b4. Ship out of the SCAQMD jurisdiction
b5 Dispose illegally
b6. Other

5. HOLDING TIME

5A. How long does incoming feedstock stay on the ground before it is processed:

a. 24 hours or less.

b. 48 hours or less

c. Less than 7 days

c. Greater than 7 days

5B. How long does processed material stay on site before it is shipped off (or composted)

a. 24 hours or less.

b. 48 hours or less

c. Less than 7 days

c. Greater than 7 days

5C. (FOR COMPOSTERS ONLY) How long does processed material stay in the compost pile?

a. Two weeks (for pathogen and weed seed kill)

b. 30 days

c. 60 days

d. 90 days

e. Greater than 90 days.

Assessment of California's Compost and Mulch Infrastructure

Survey Addenda – OTHER

ADC QUESTIONS

1. **Do you think the ability to use green waste as ADC has had an affect on your business?**

   a. No. b. Yes. Because:

   b1. We have lost ability to get feedstock

   b2. Landfill tip fee is lower than gate fee

   b3. ADC costs less than composting, and feedstock has been directed elsewhere.

   b4. Other

COMPOST MATURITY QUESTIONS (TO BE ASKED TO COMPOSTERS ONLY)

1. **How important is compost maturity to your customers or do you test for maturity?**

   a. Very Important

   b. Somewhat Important

   c. Unimportant

   d. Very Unimportant

   e. Not sure

2. **Are you familiar with the Compost Maturity Index developed by the California Compost Quality Council?**

   a. Yes

   b. No.

Appendix C: ADC Survey Form

Assessment of California's Compost and Mulch Infrastructure

ADC Survey Form

Facility: _____ **Date:** _____

Contact: _____ **Phone:**_____

A. FACILITY SPECIFIC INFORMATION

This facility reported _____ tons of green material ADC to the CIWMB in 2002.

This facility reported _____ tons of "other" to the CIWMB as ADC in 2002.

What does other consist of?

1. Processing

Does this facility process its own green waste ADC or use contractors?

We do our own processing, our own grinders

ADC is not processed/ground

On-site contractor: names: _____

Contract grinders; names: _____

2. What are the major sources of feedstocks for this facility? Please provide the percentage of your total volume that comes from these sources:

a. Municipally hauled ____% (delivered by City)

b. Commercial hauled ____% (residential material hauled by City contractor)

c. MRF Generated ____% (delivered from MRF or Transfer Station)

d. Self-haul ____% (delivered by commercial or residential entity)

e. Agricultural sources ____% (farm or ag processing source)

f. Waste water treatment plant ____%

g. Institutional sources ____% (delivered from schools, parks, golf courses, hospitals, prisons, army bases, etc)

h. Other _____ ____%

3. ADC or Beneficial Re-use

In addition to the ADC reported to the CIWMB, is any green material used as on-site beneficial re-use?

No.

Yes

b1. Erosion control

b2. Road building

b3. Alternative intermediate cover

4. Are there any plans for non-ADC use of green material?

5. What is the bulk density of green waste ADC?

Appendix D: Figures

Survey Figures

Survey Addenda Figures

Figure 1
Percentage of Composters and Processors Using Specific Feedstocks

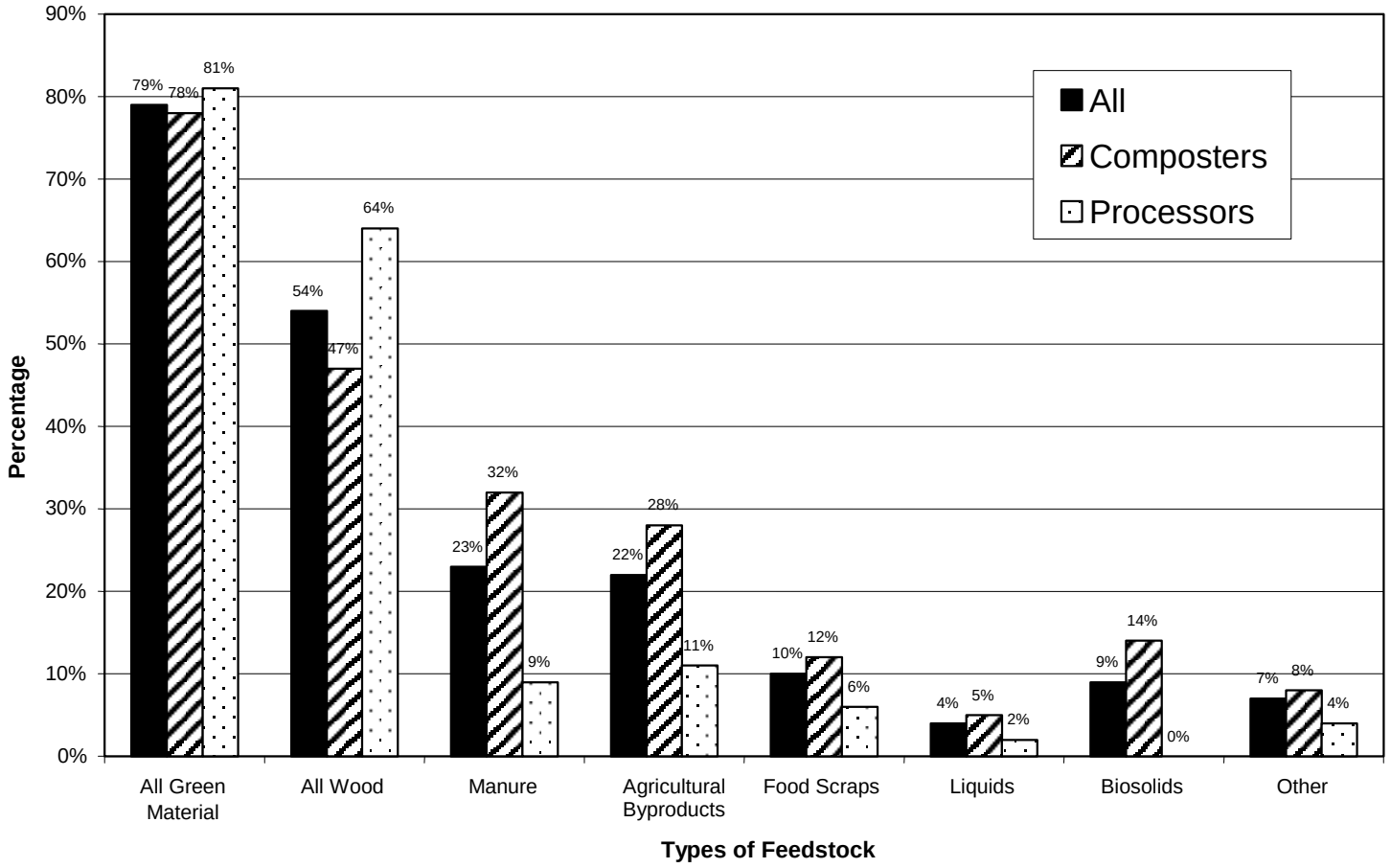

Figure 2
Number of Feedstocks Used by Composters and Processors

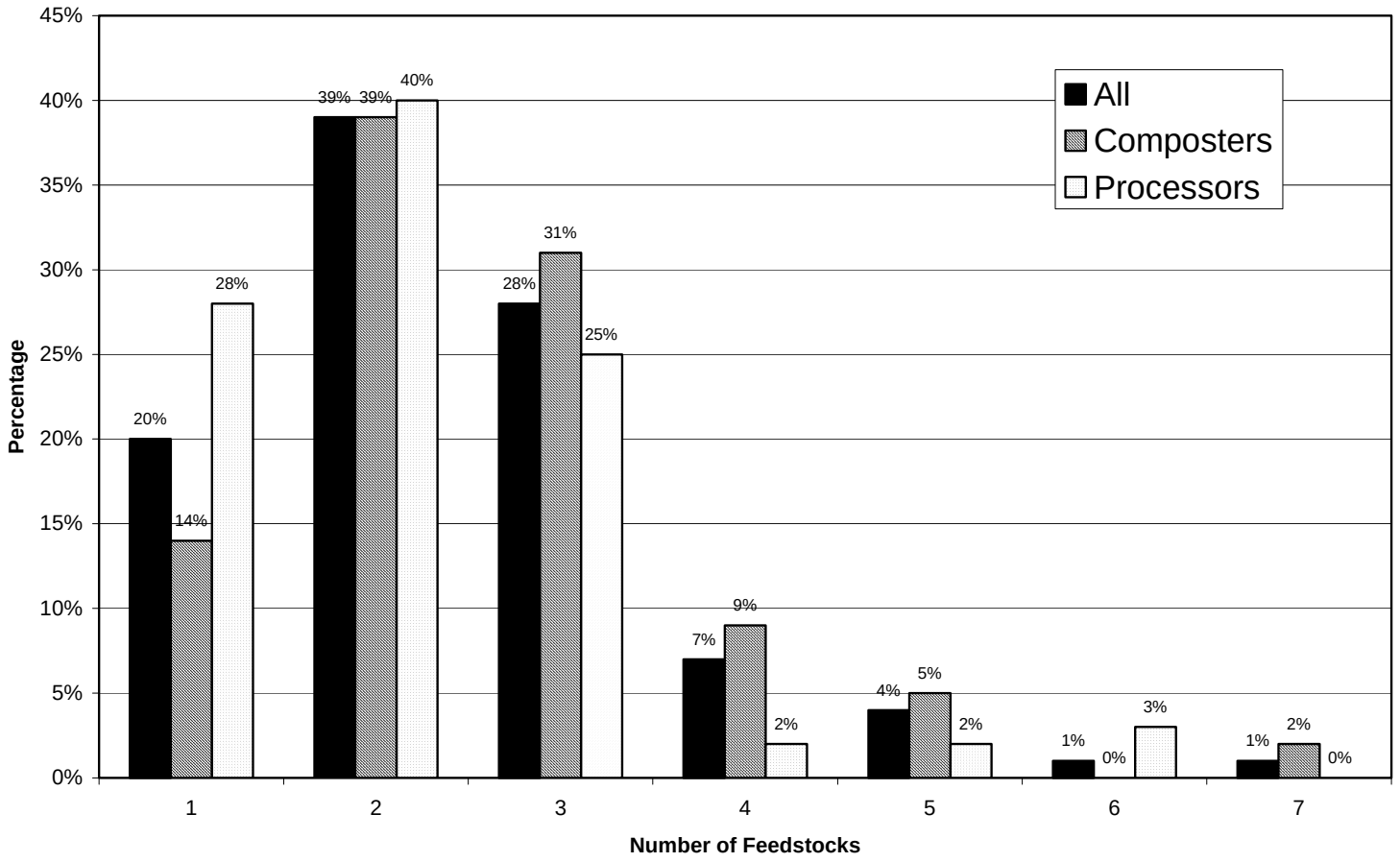

Figure 3
Percentage of Composters and Processors Using Feedstocks From Specific Sources

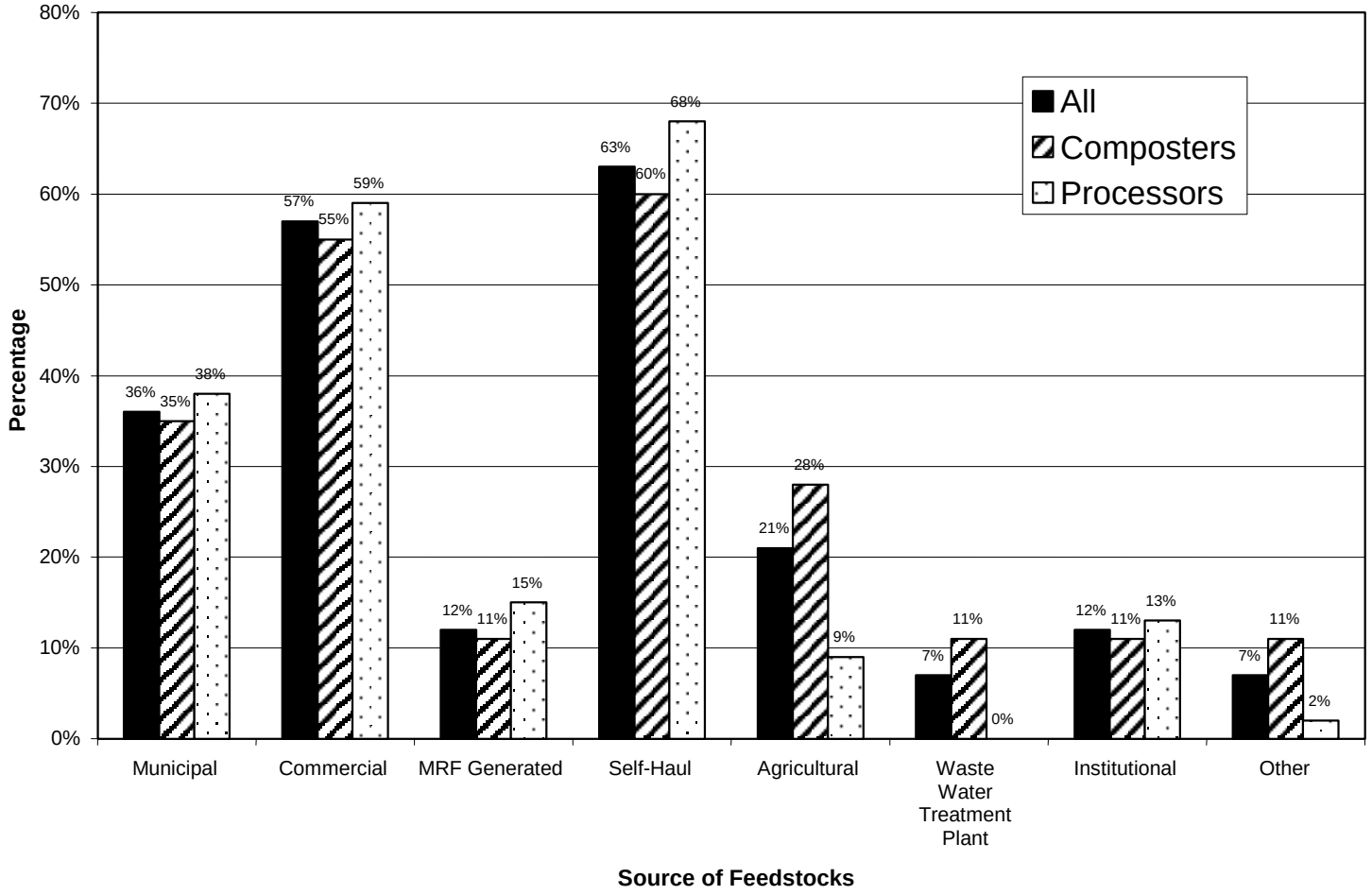

Figure 3A

Comparison of Composters and Processors Using Feedstocks From Specific Sources

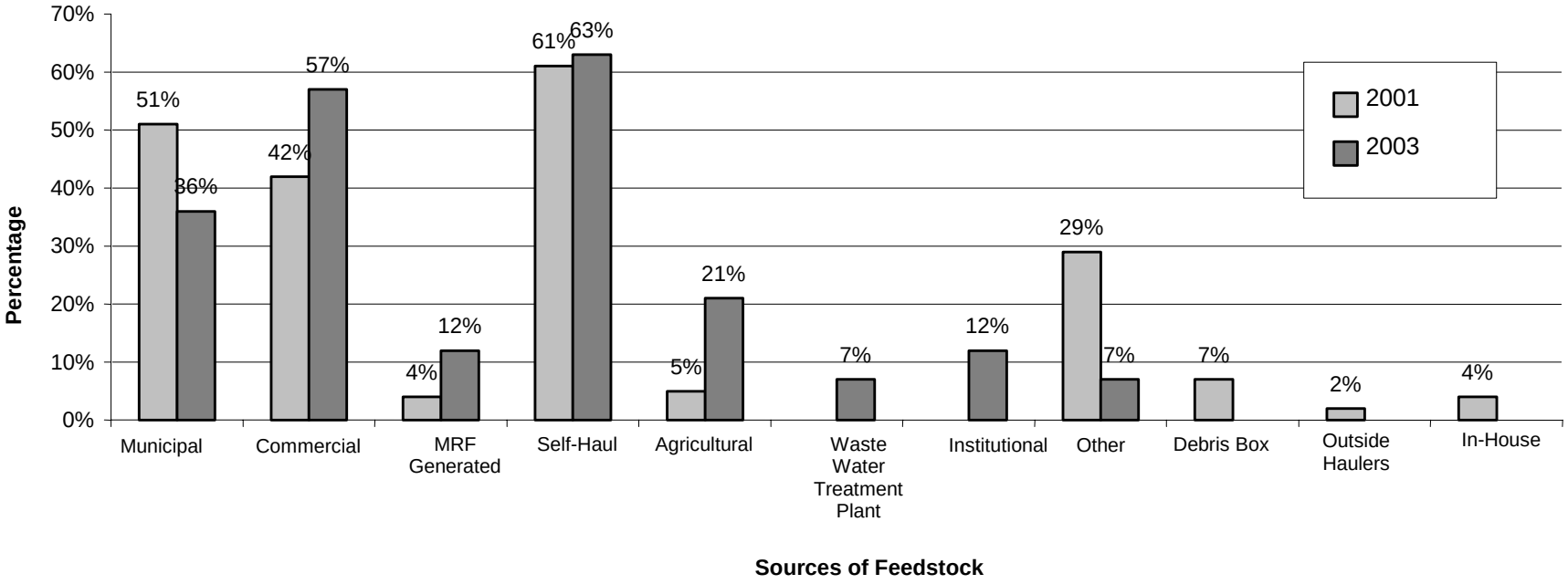

Figure 4
Feedstock Sources

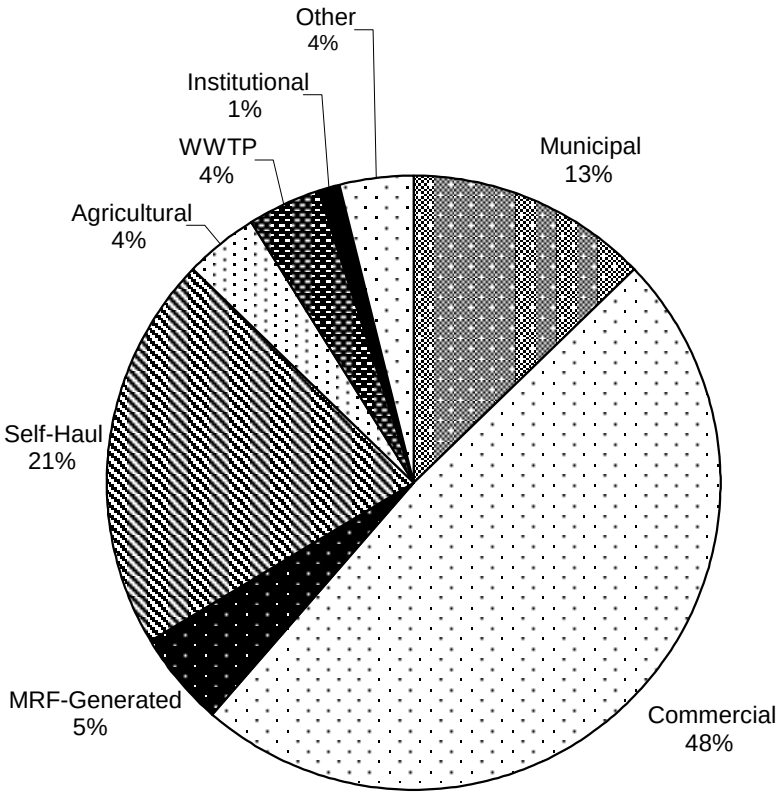

Figure 5
Processing Capacity

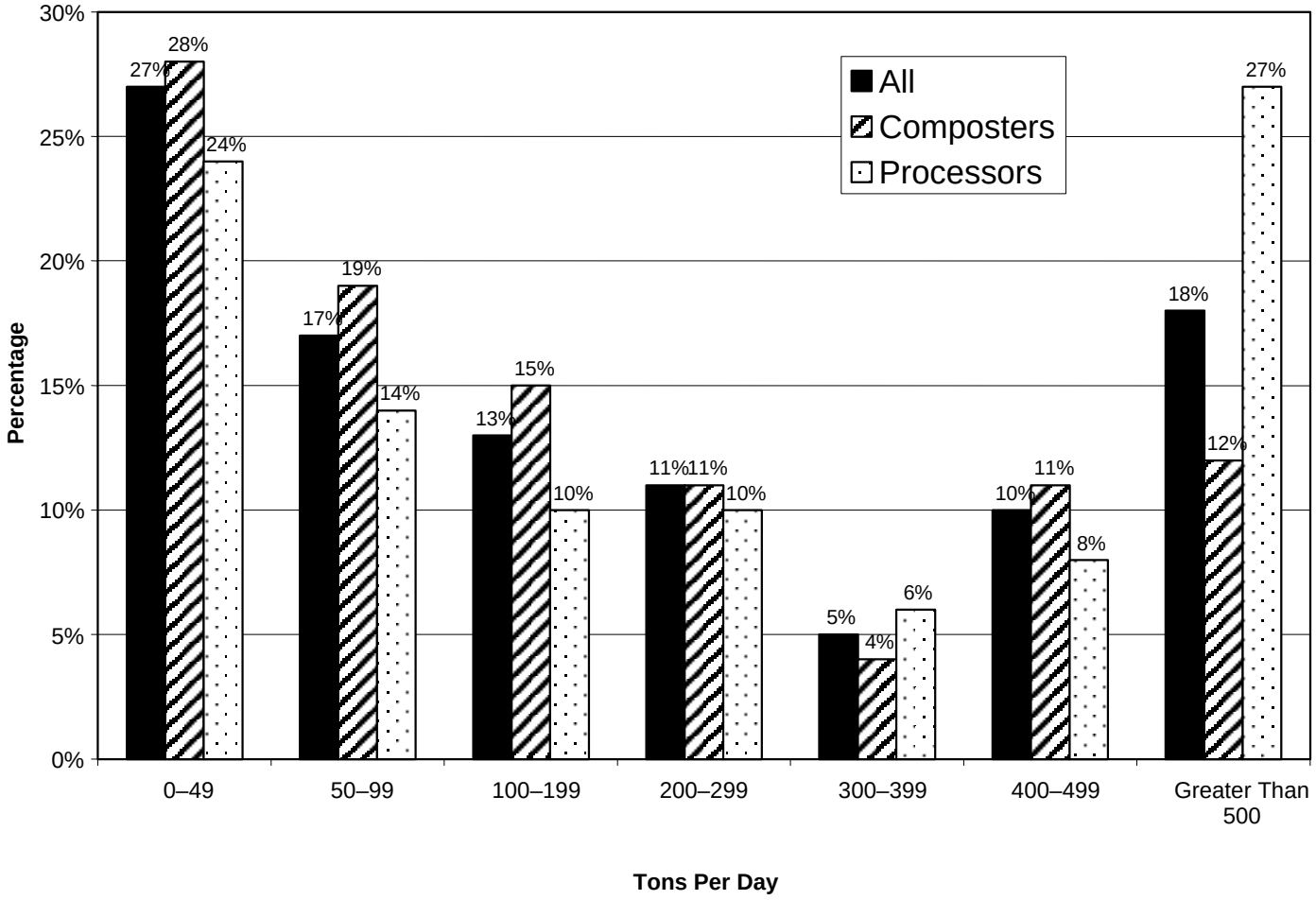

Figure 5A
Comparison of Processing Capacity (Composters and Processors)

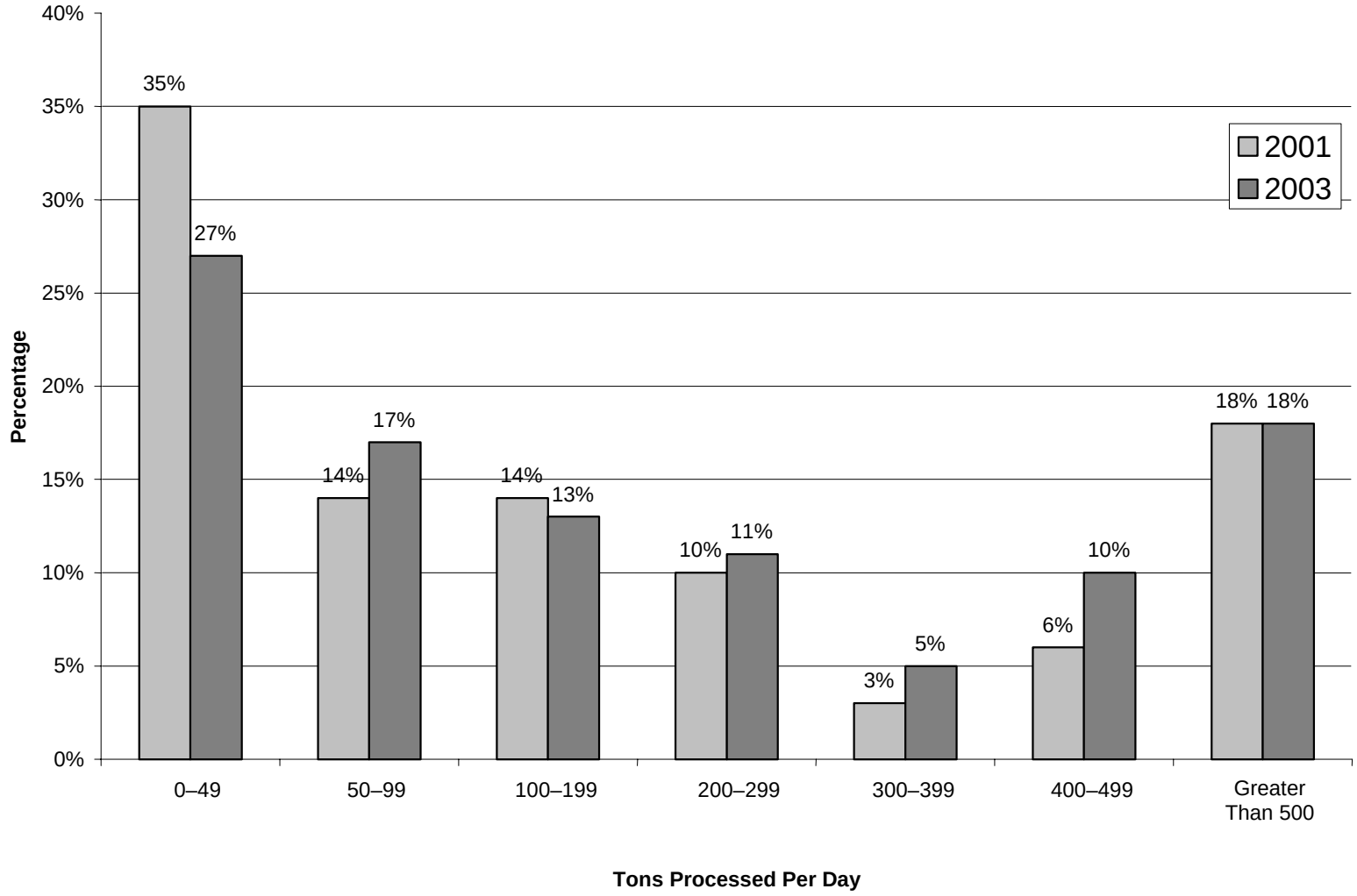

Figure 5B
Comparison of Processing Capacity (Composters)

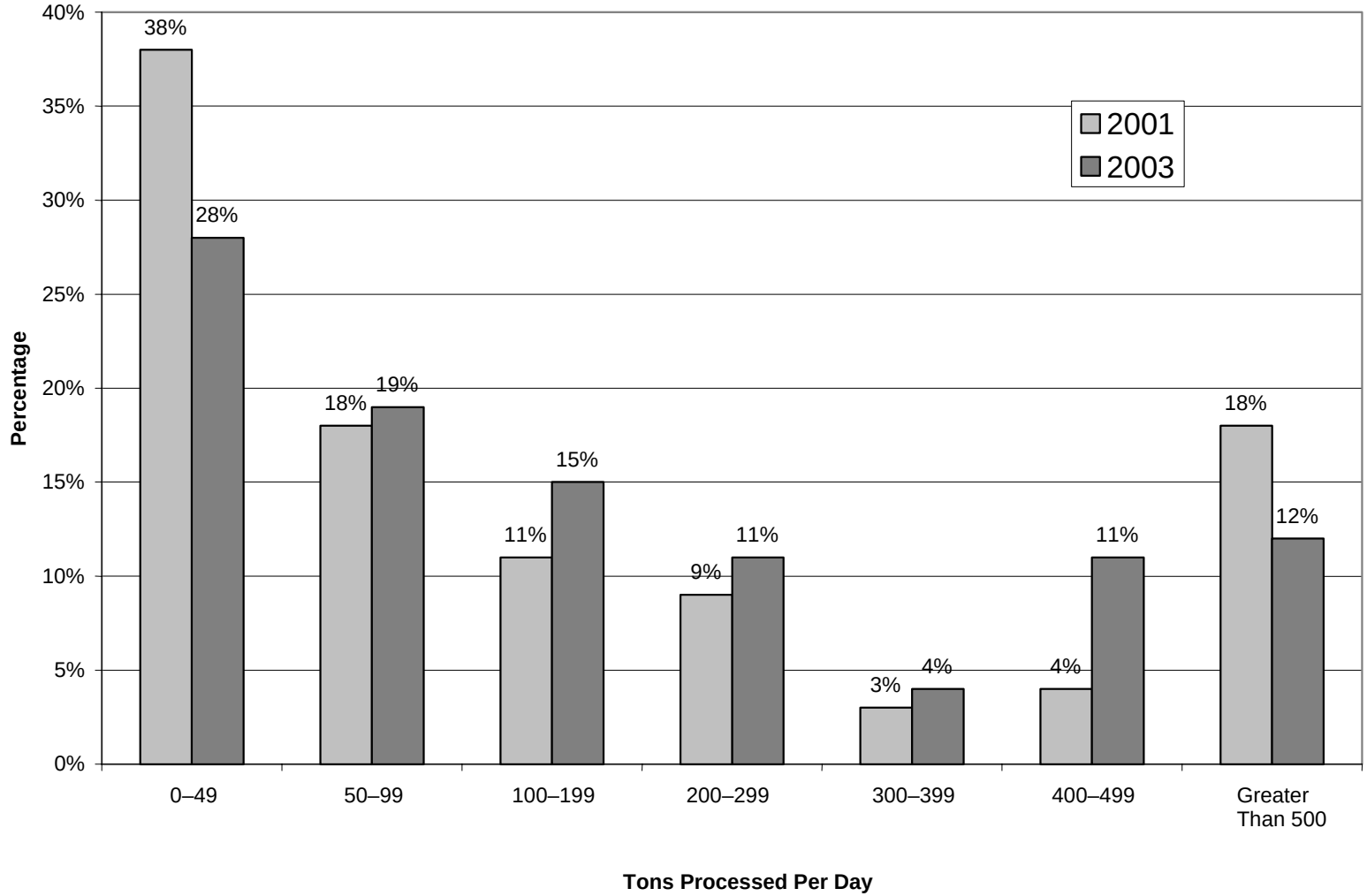

Figure 5C
Comparison of Processing Capacity (Processors)

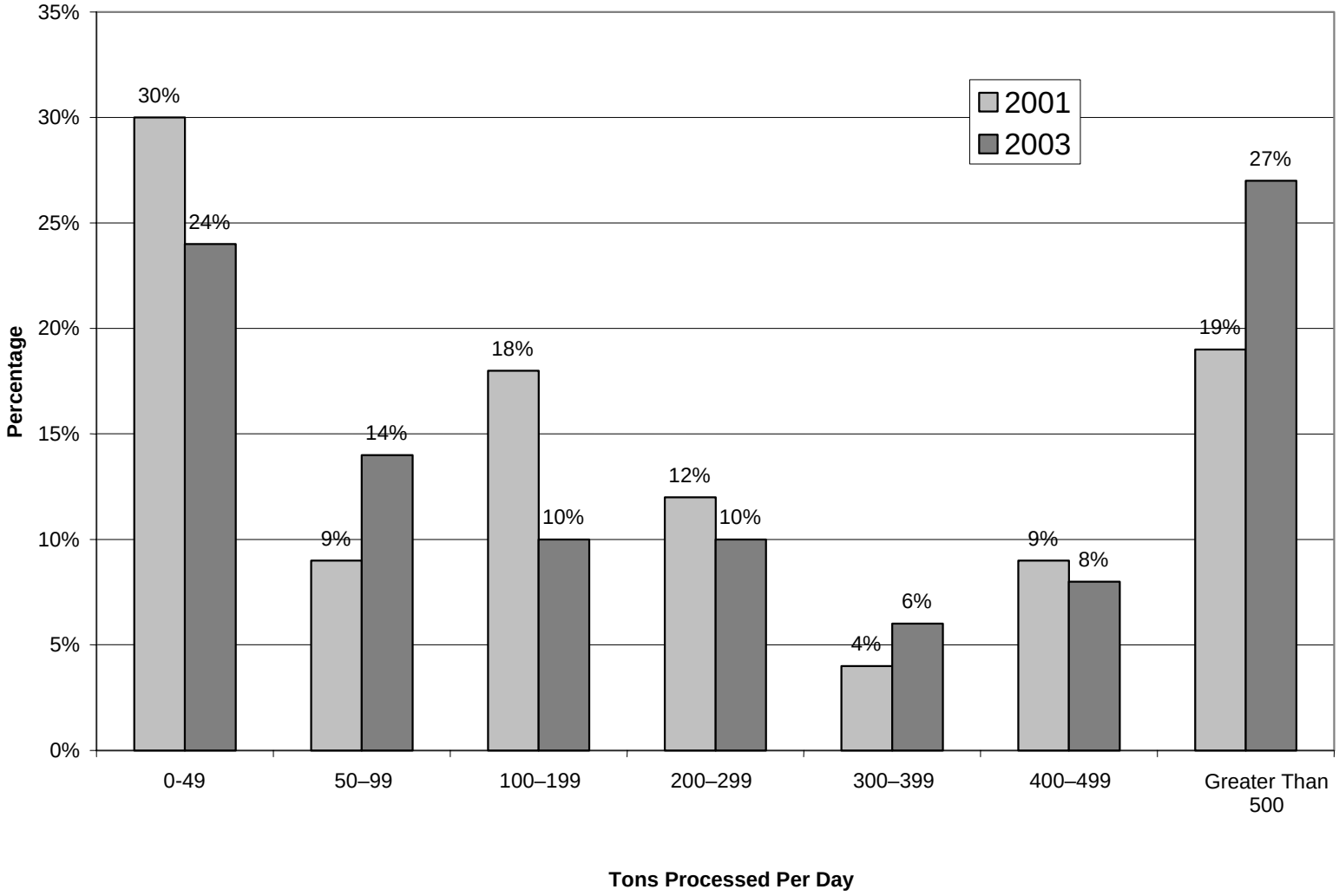

Figure 6
Tons of Feedstock Processed Annually

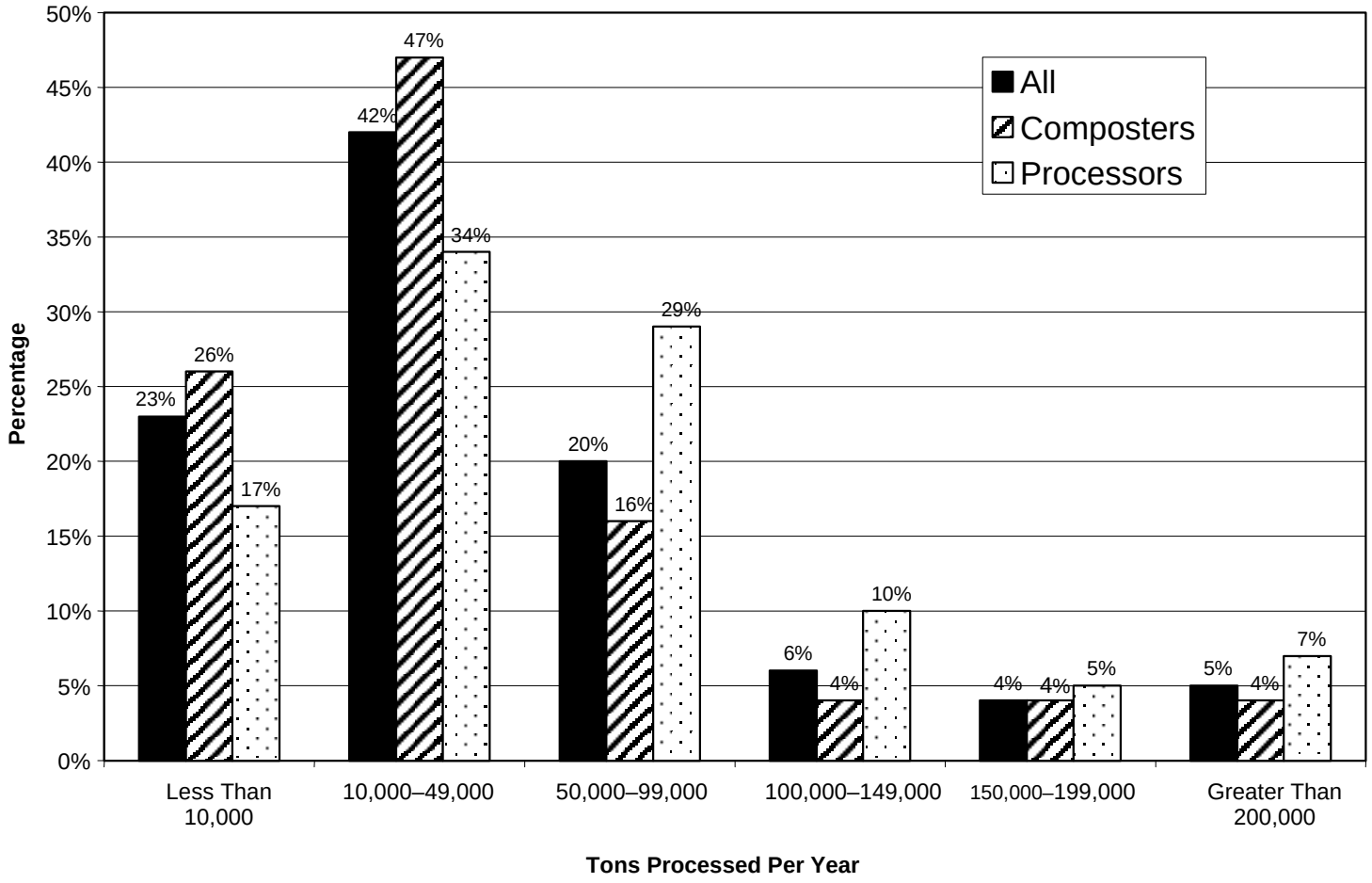

Figure 6A
Tons of Feedstock Processed Annually by Survey Year (Composters and Processors)

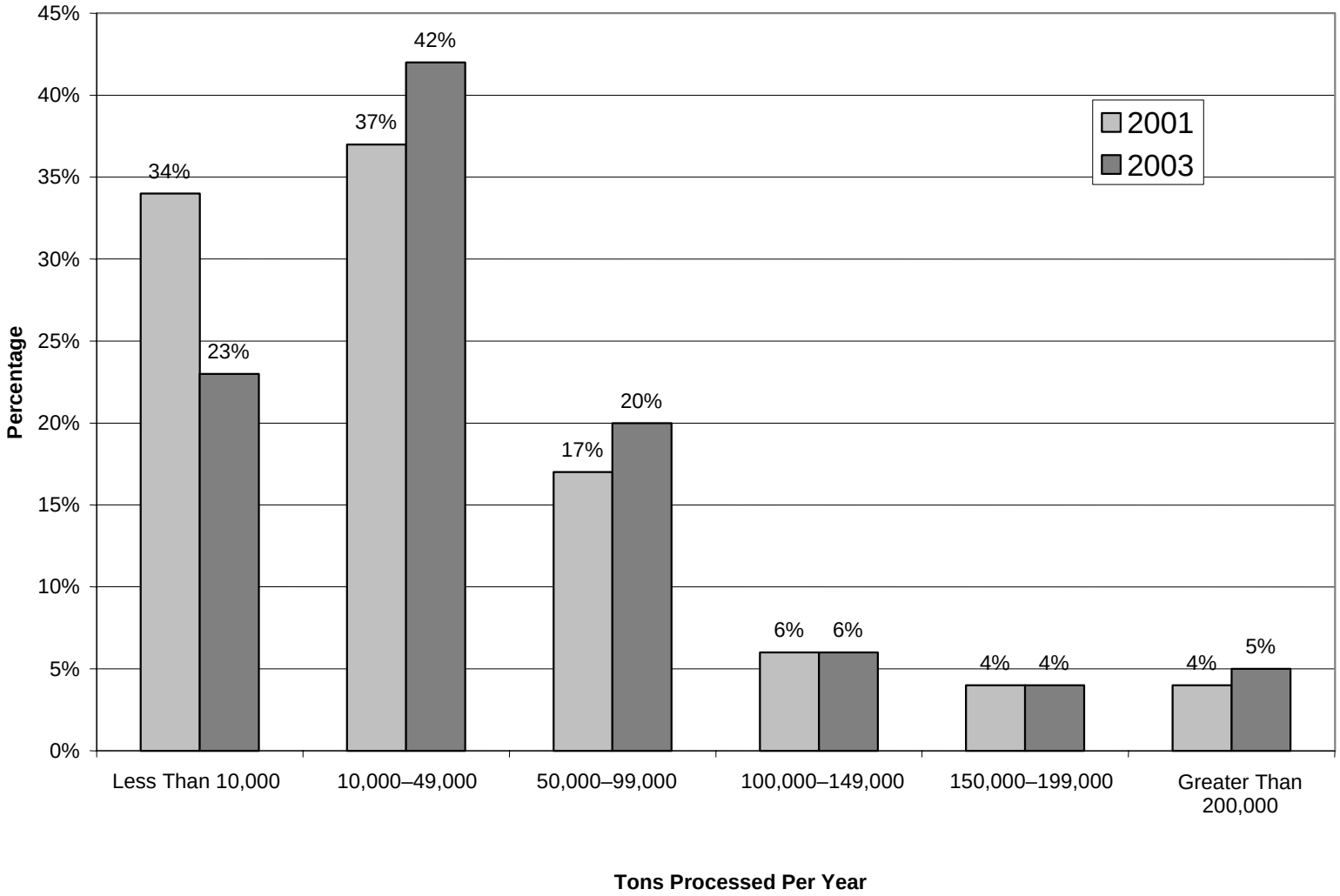

Figure 6B
Tons of Feedstock Processed Annually by Survey Year (Composters)

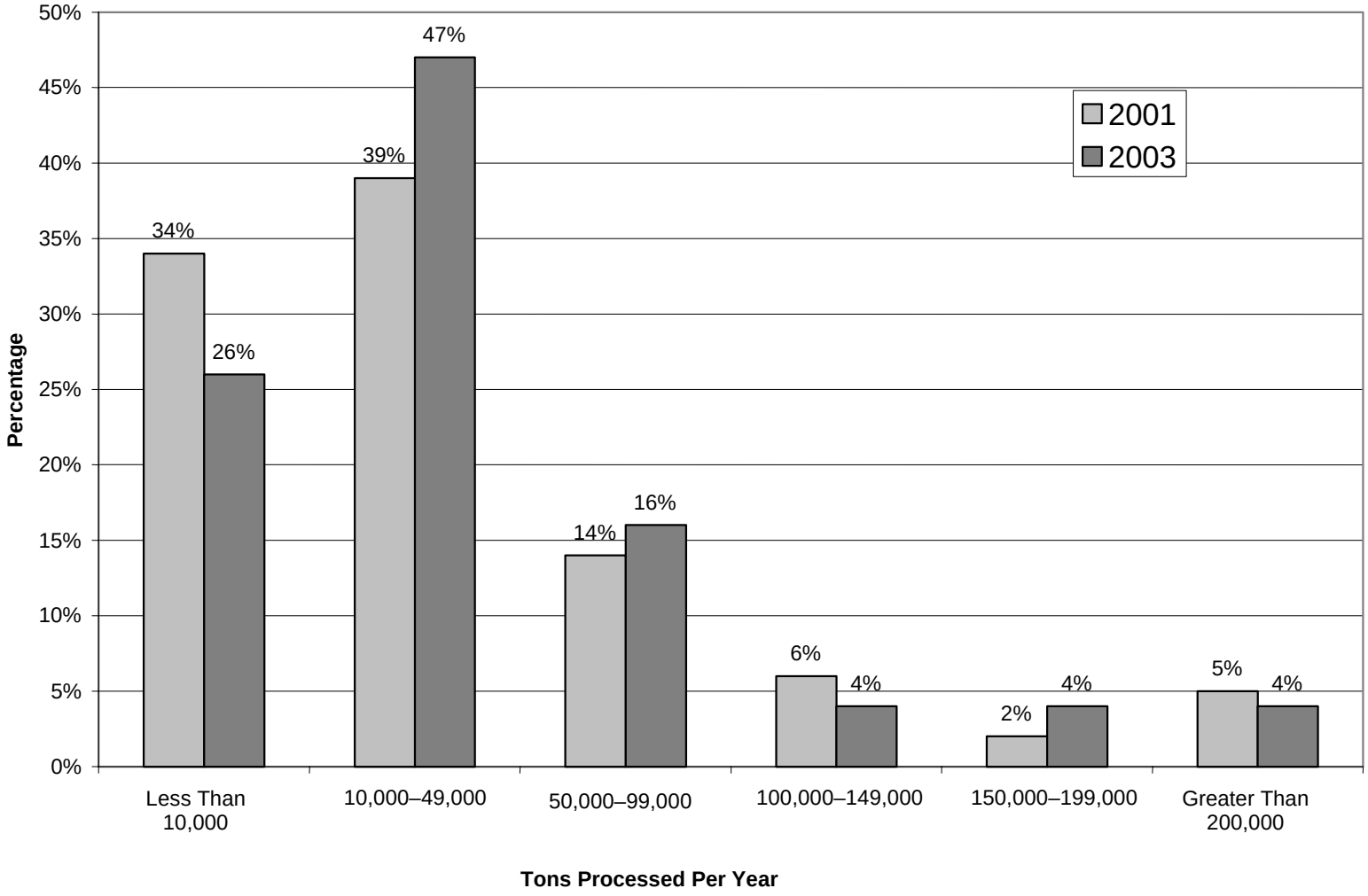

Figure 6C
Tons of Feedstock Processed Annually by Survey Year (Processors)

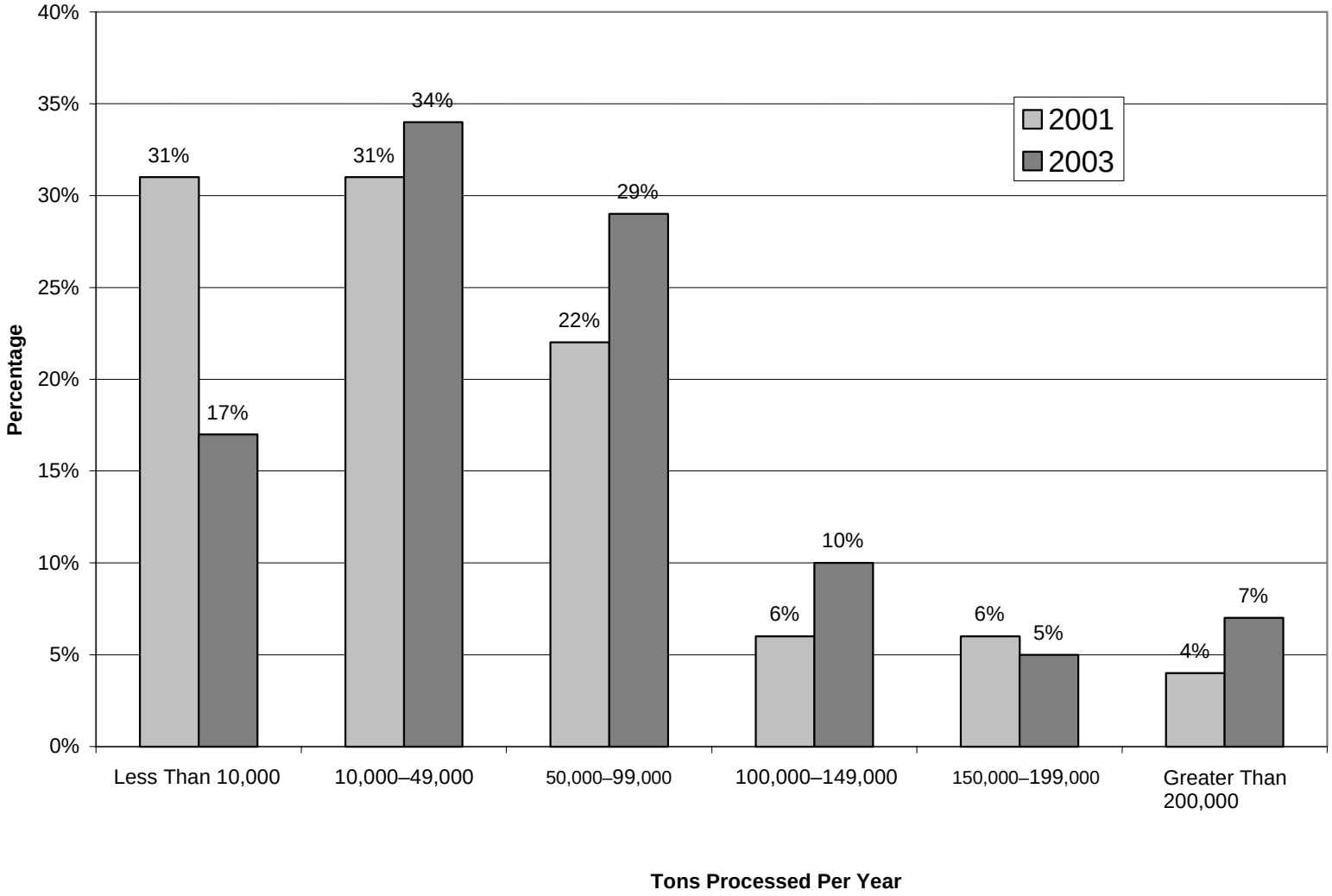

Figure 7
Product Volume by Type

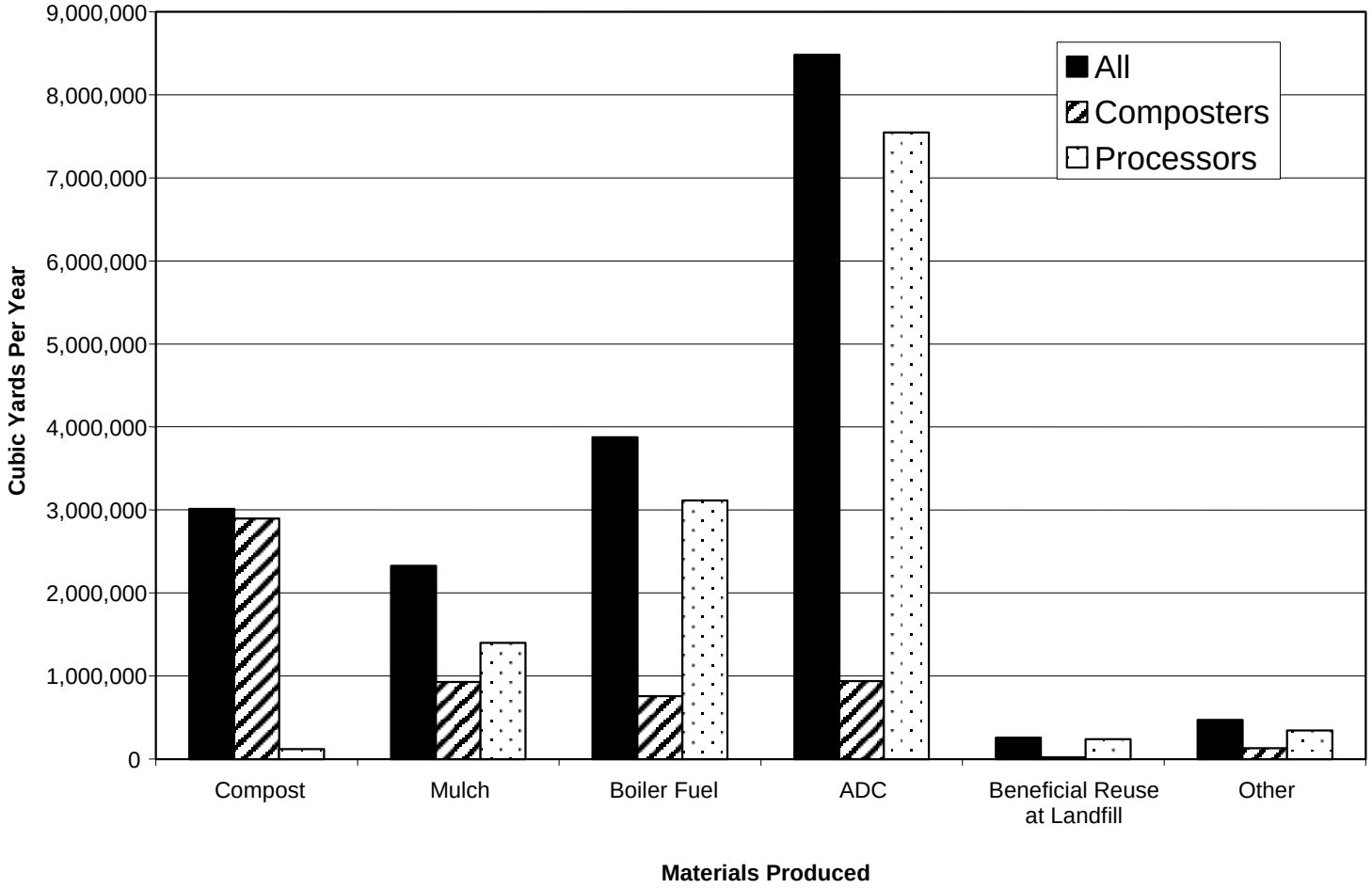

Figure 8
Product Volume by Region

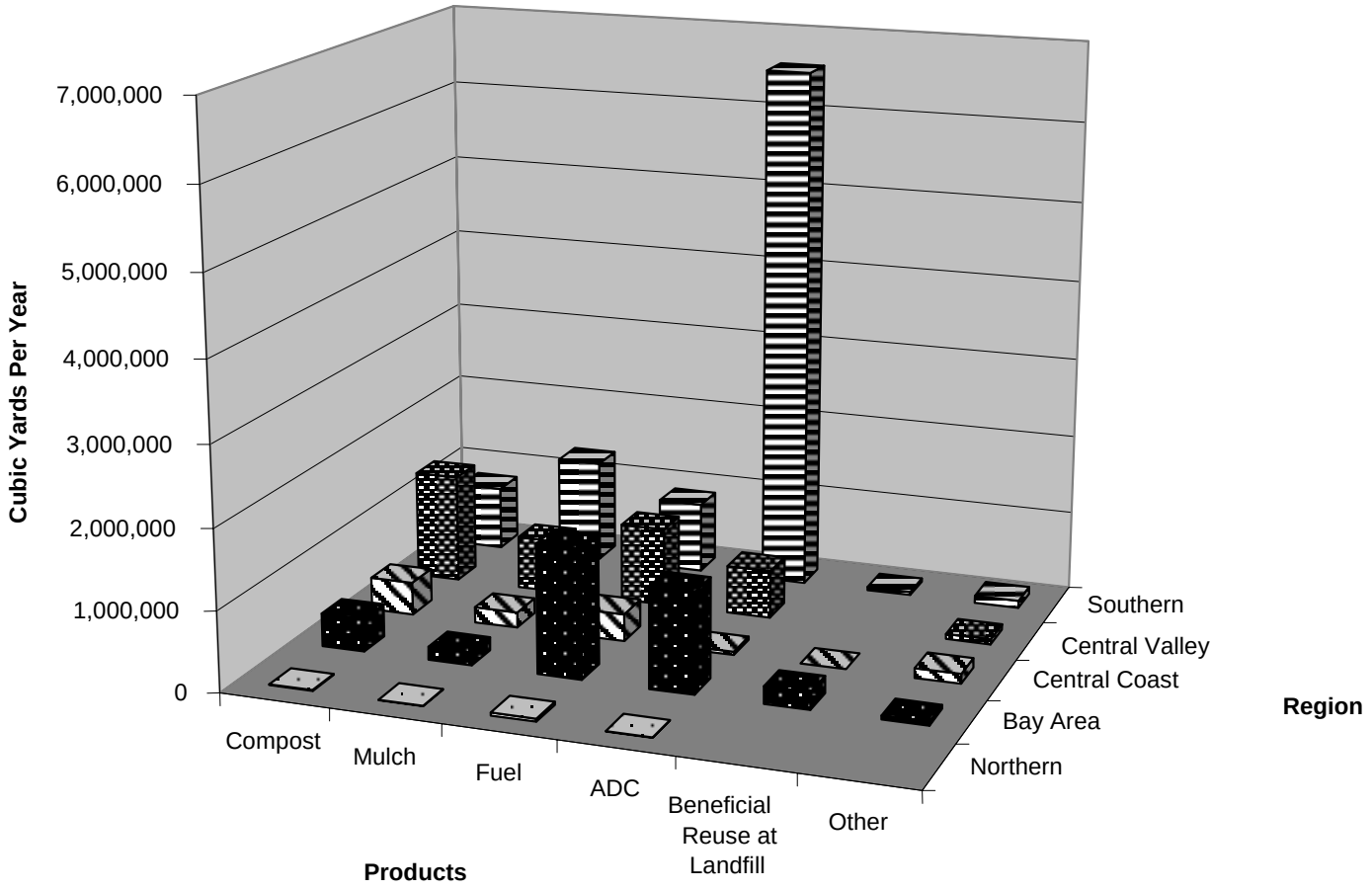

Figure 9
Percentage of Materials Sold by Market Segment (Composters)

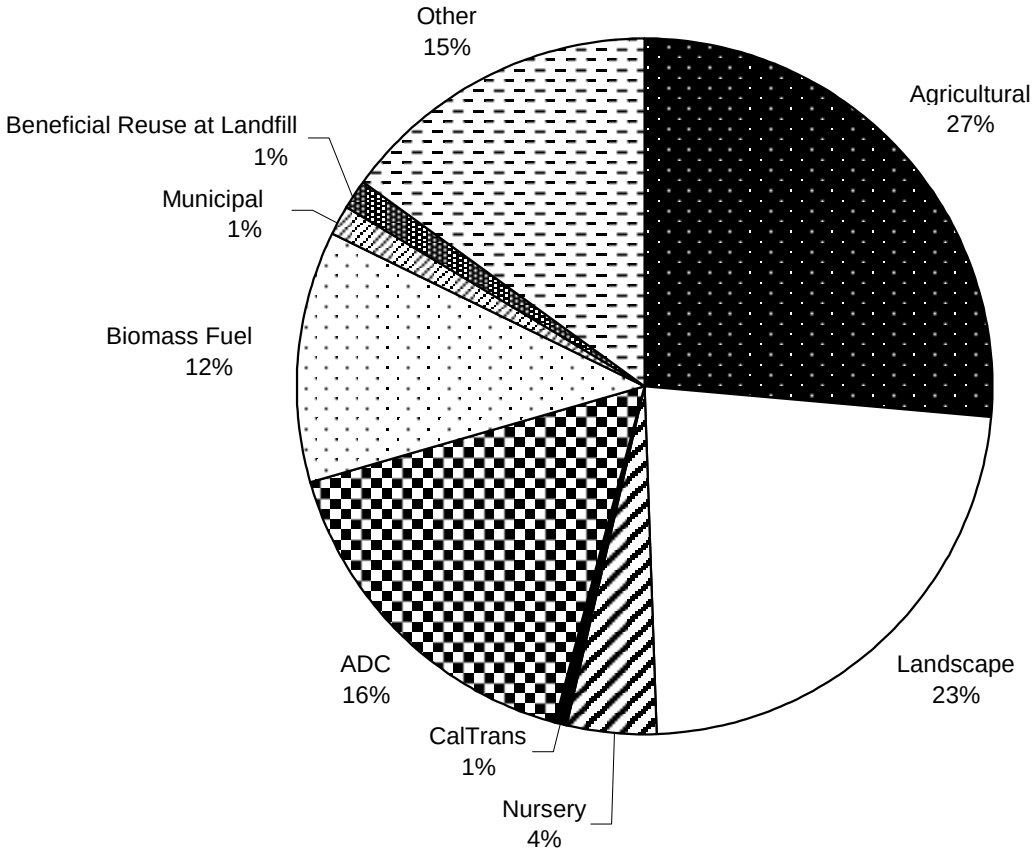

Figure 10
Percentage of Materials Sold by Market Segment (Processors)

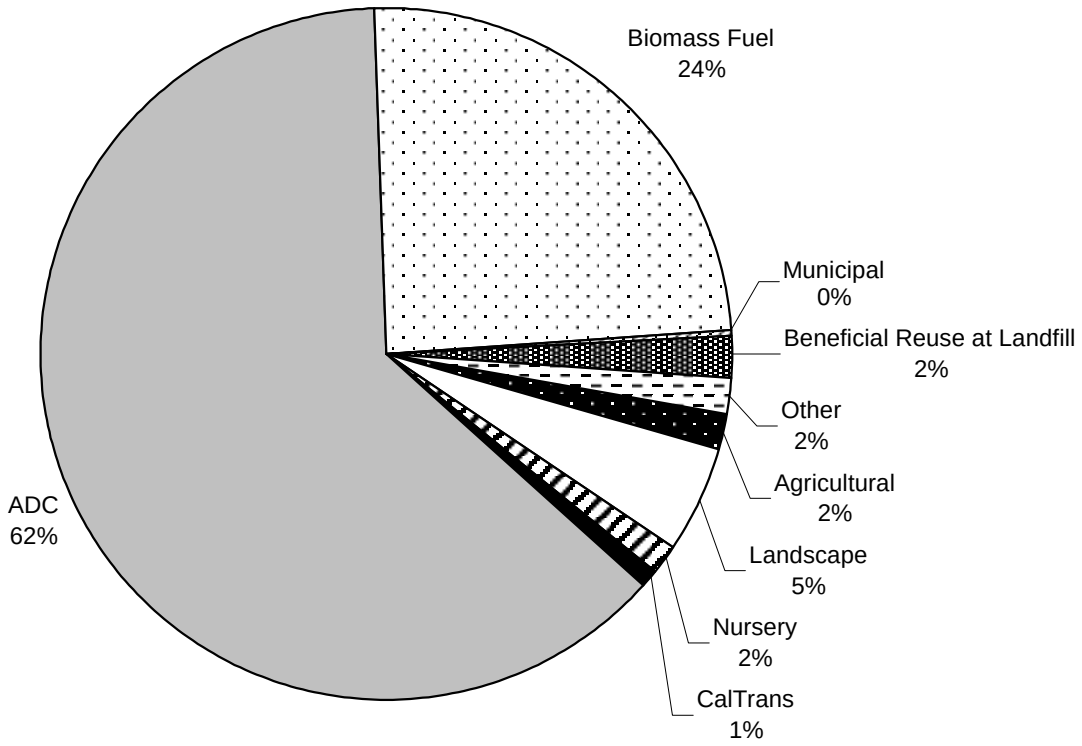

Figure 11
Percentage of Materials Sold by Market Segment (Composters and Processors)

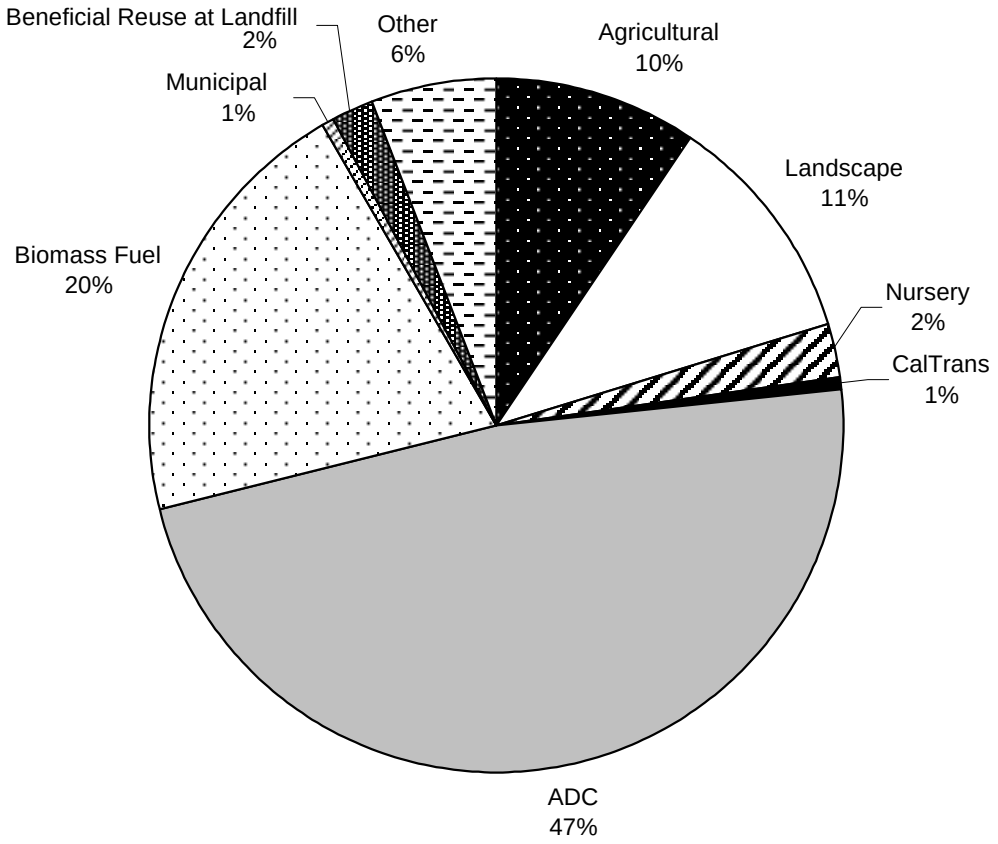

Figure 12
Distribution of Products Sold by Region (Composters)

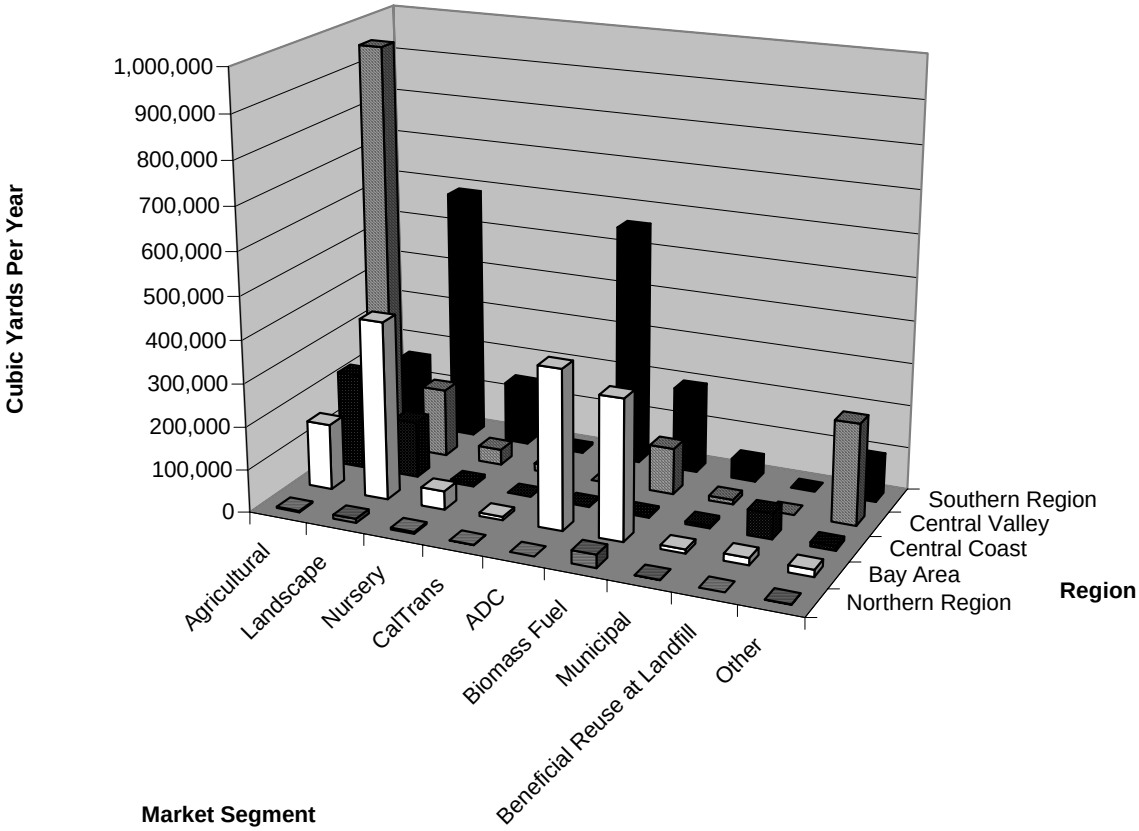

Figure 13
Distribution of Products Sold by Region (Processors)

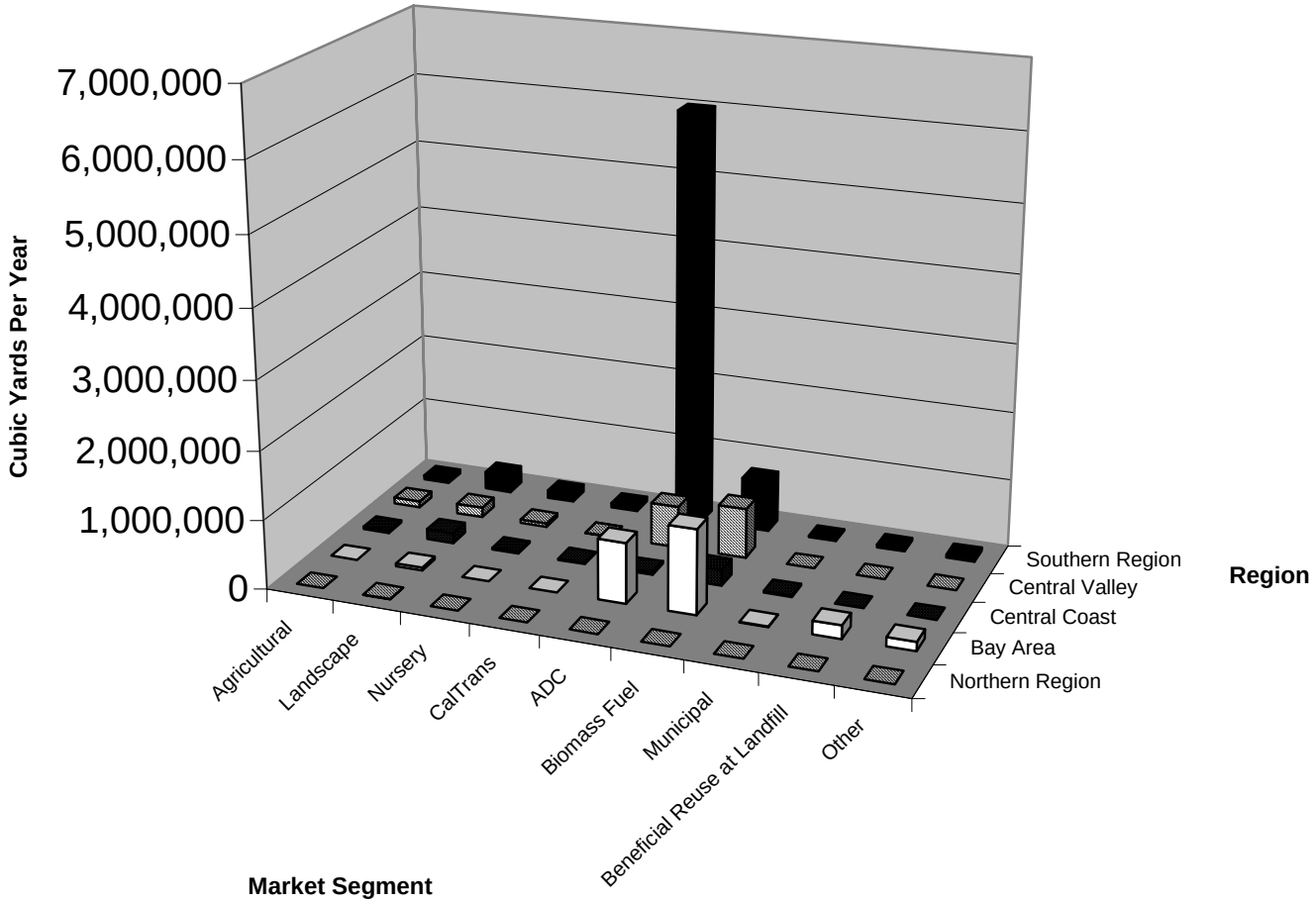

Figure 14
Participating Facilities by Region

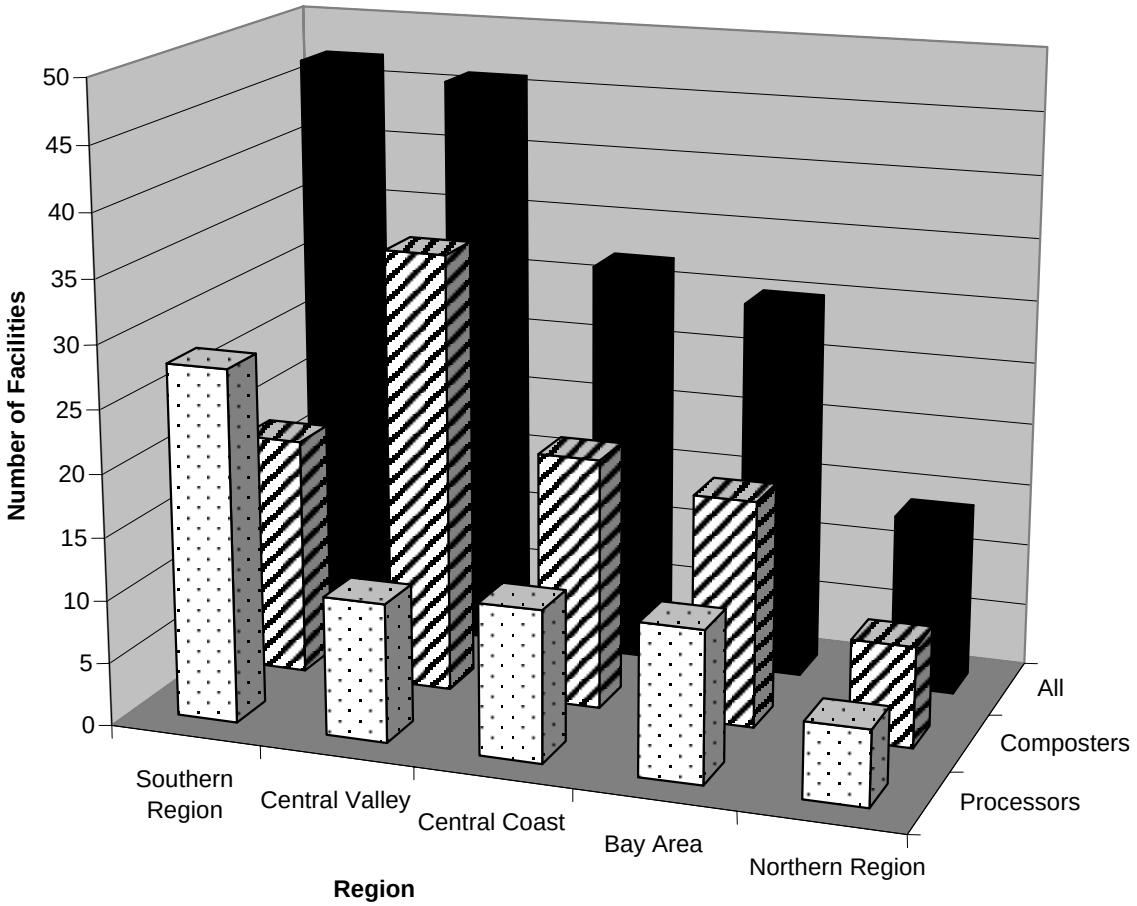

Figure 14A
Participating Processors by Region

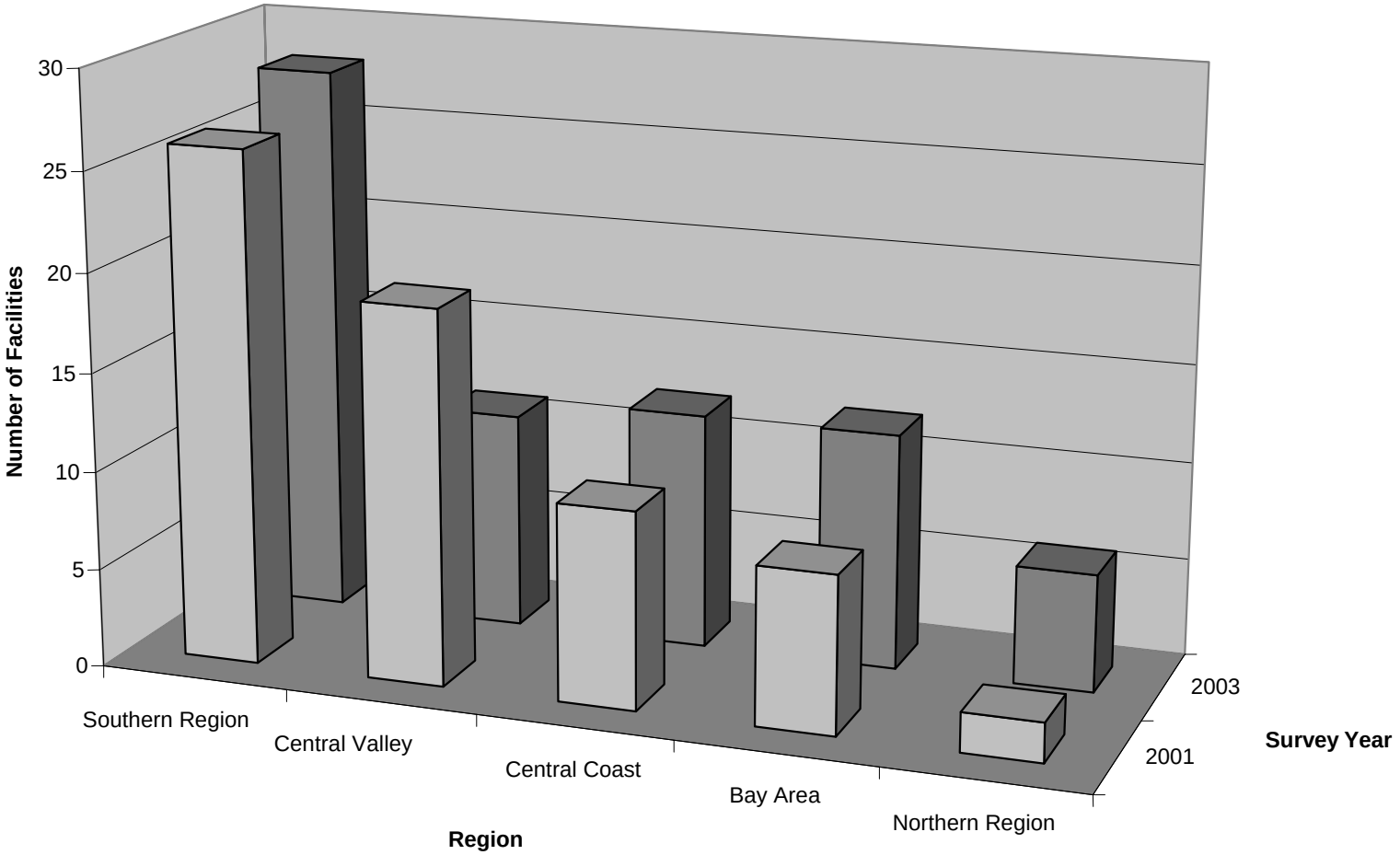

Figure 14B
Participating Composters by Region

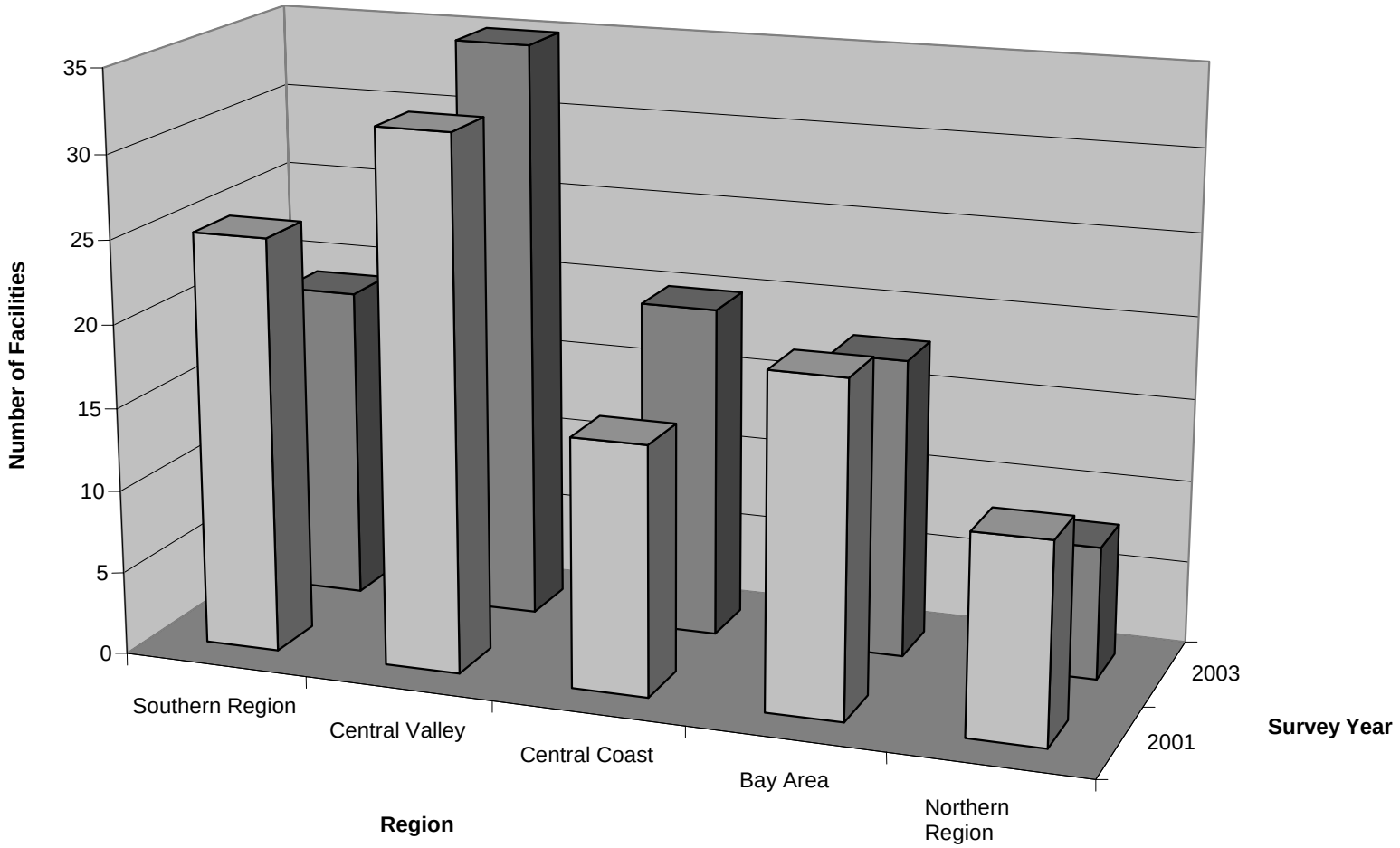

Figure 14C
Participating Facilities by Region and Survey Year

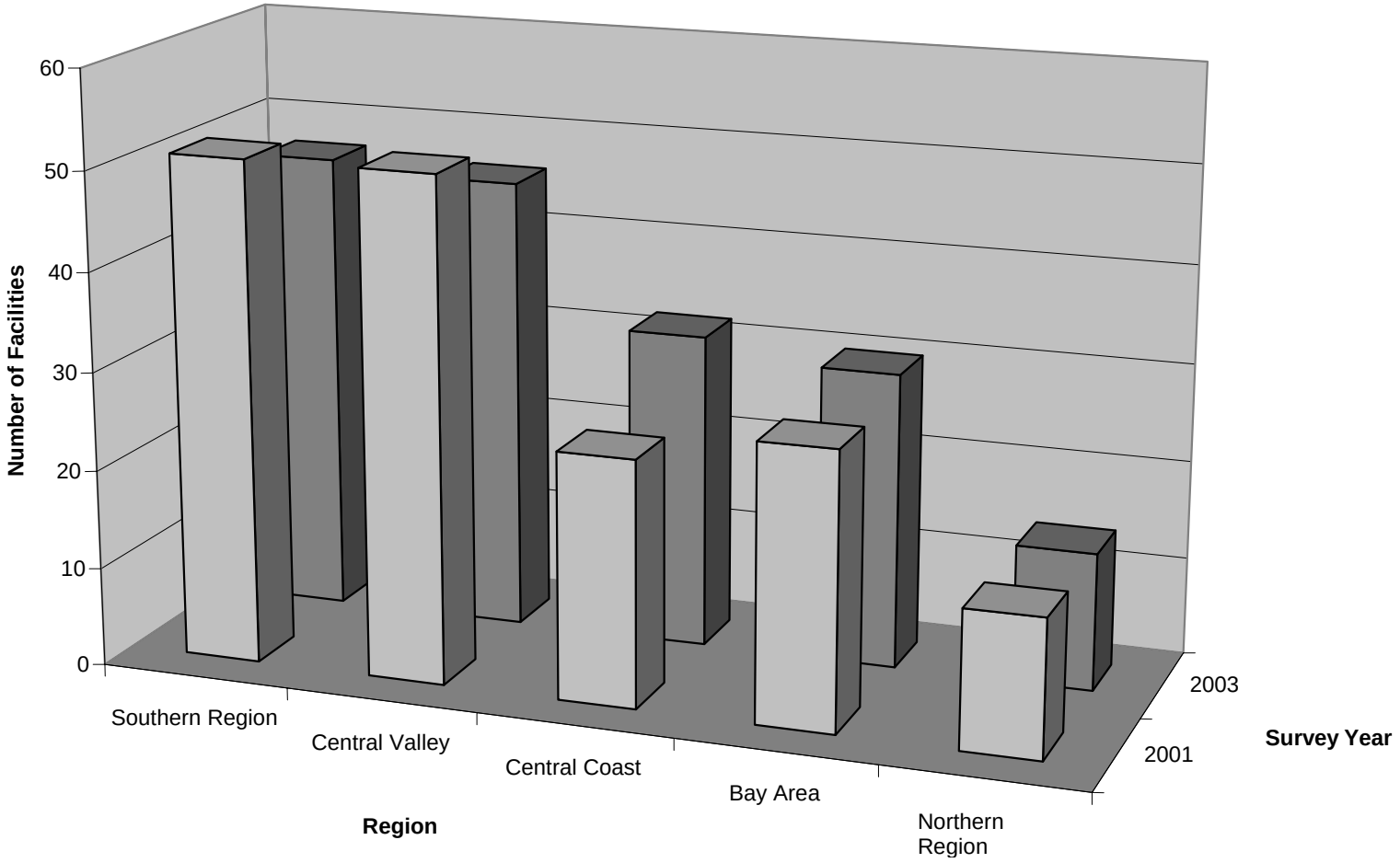

Figure 15
Percentage of Composters and Processors Producing Specified Numbers of Products

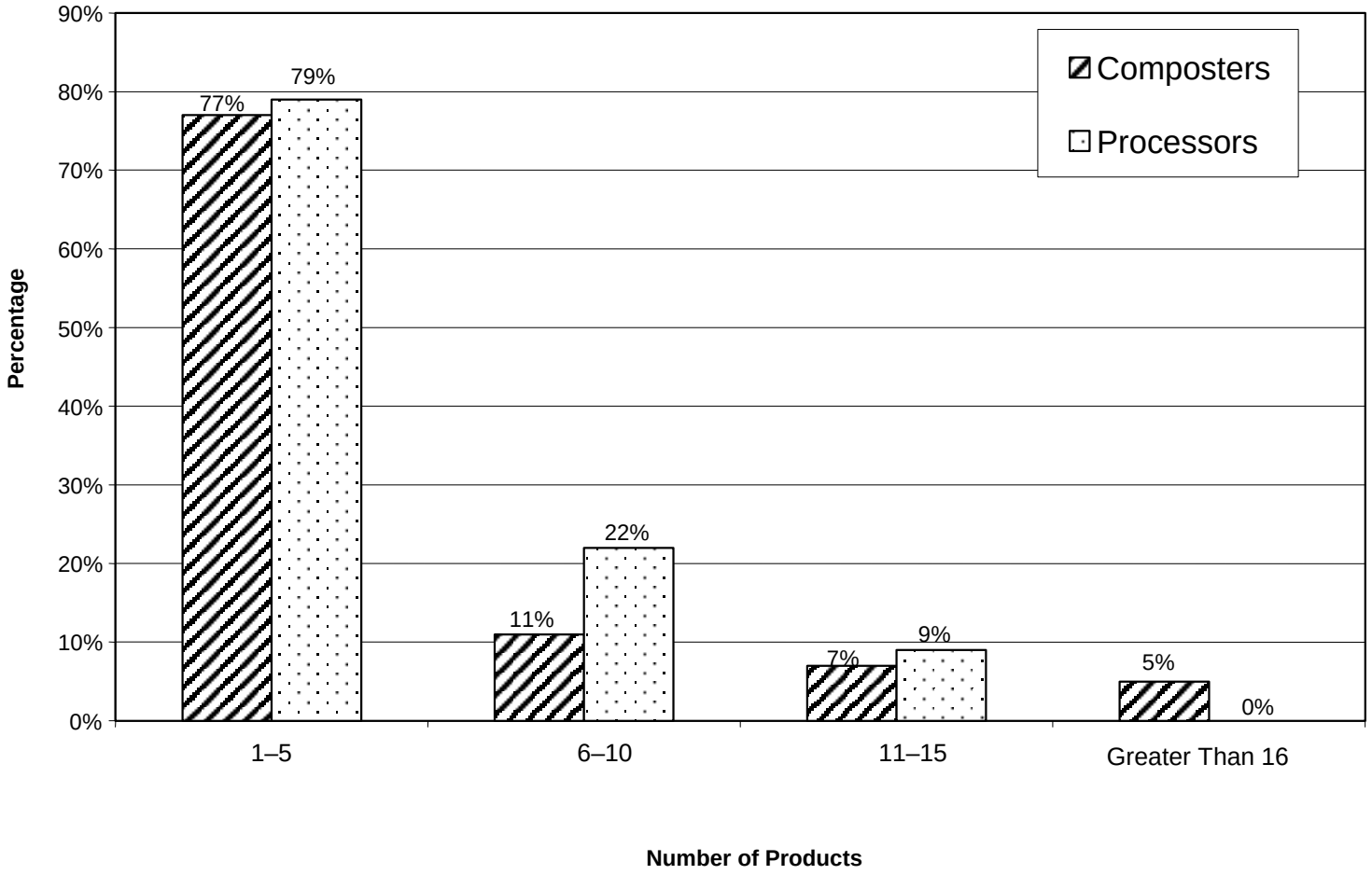

Figure 16
Product Distribution (Composters and Processors)

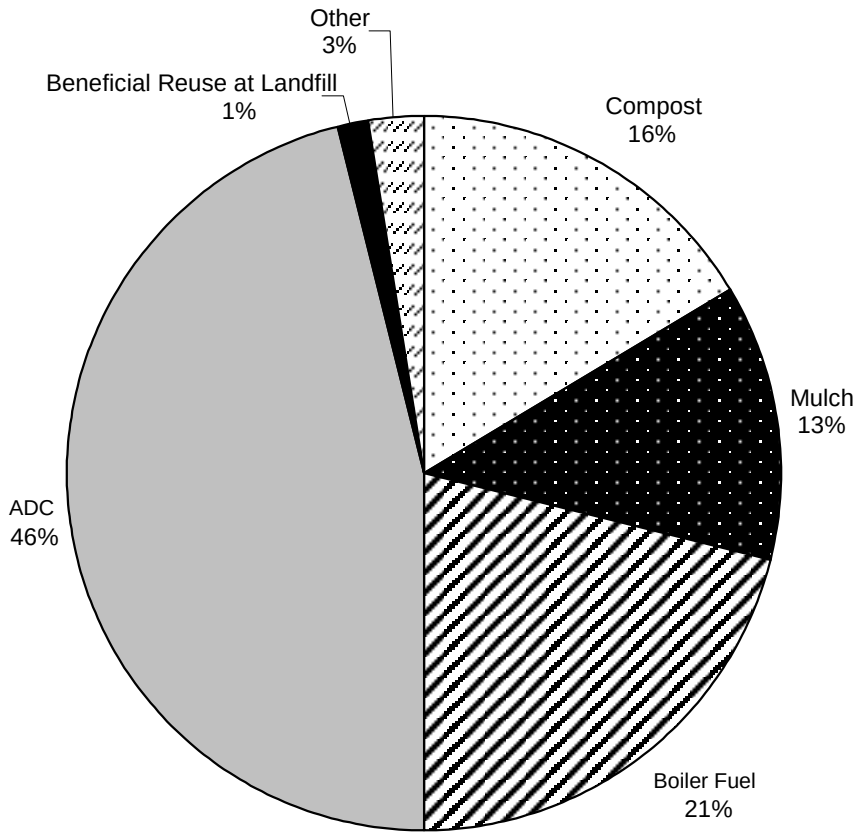

Figure 17
Product Distribution (Composters)

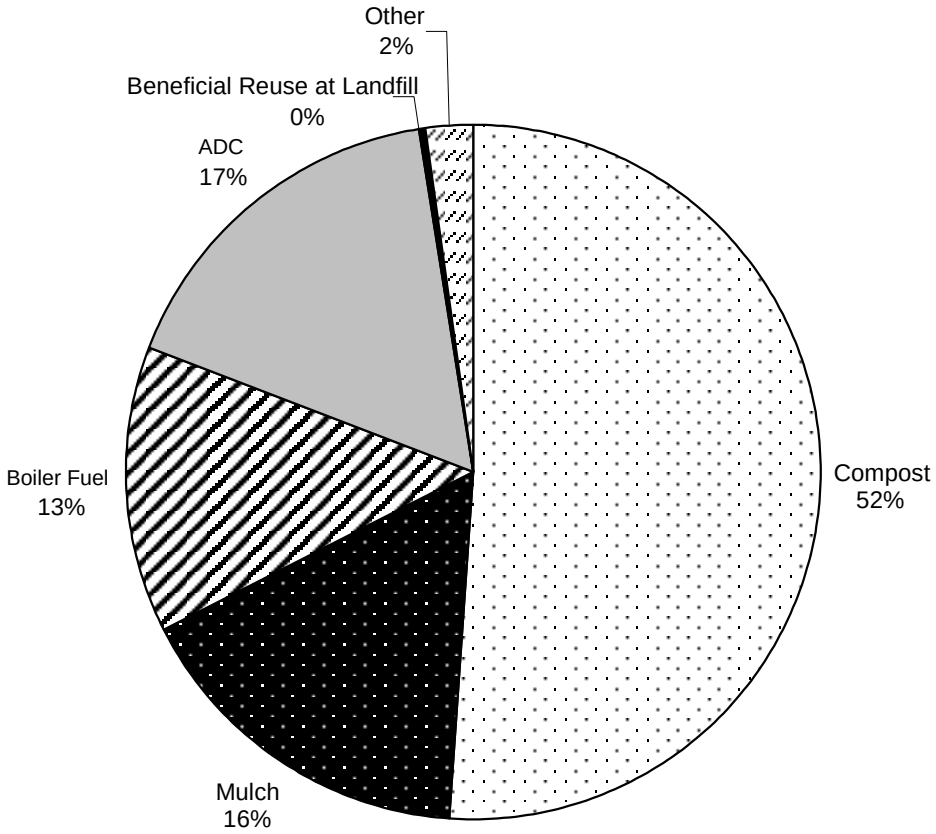

Figure 18
Product Distribution (Processors)

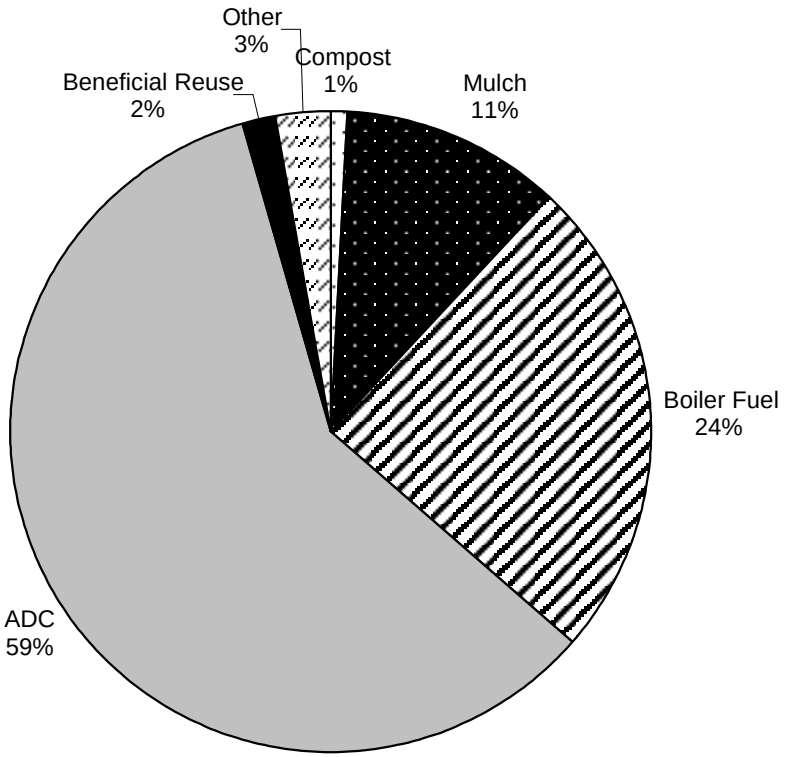

Figure 19
Product Distribution (Composters—Northern Region)

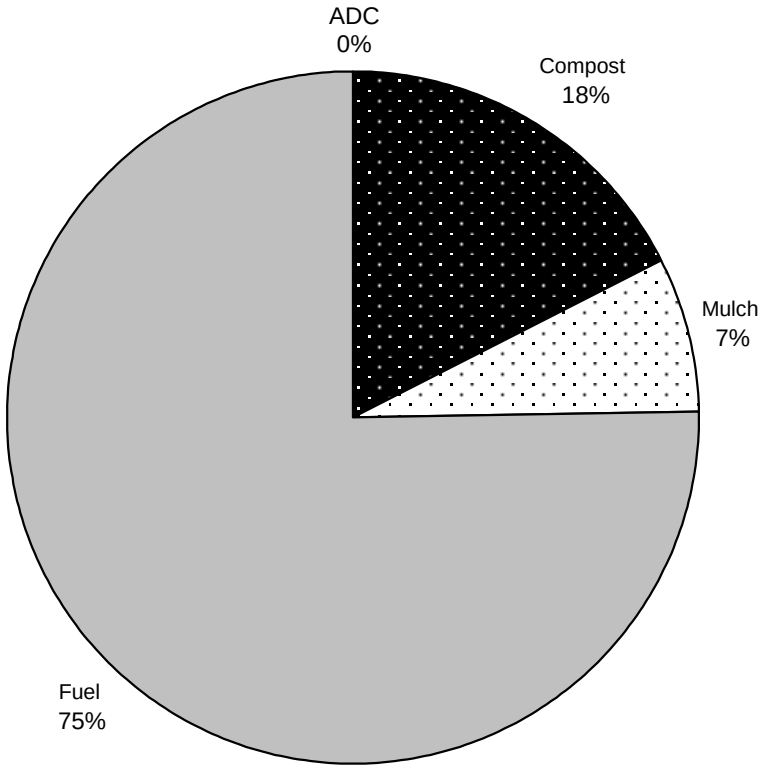

Figure 20
Product Distribution (Composters—Bay Area Region)

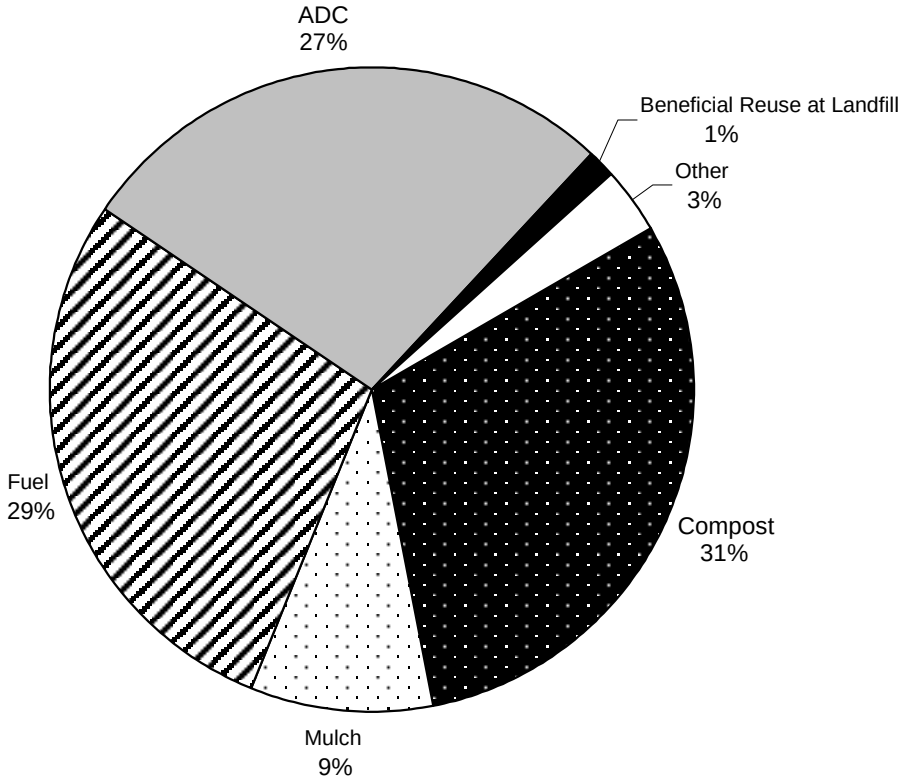

Figure 21
Product Distribution (Composters—Central Valley Region)

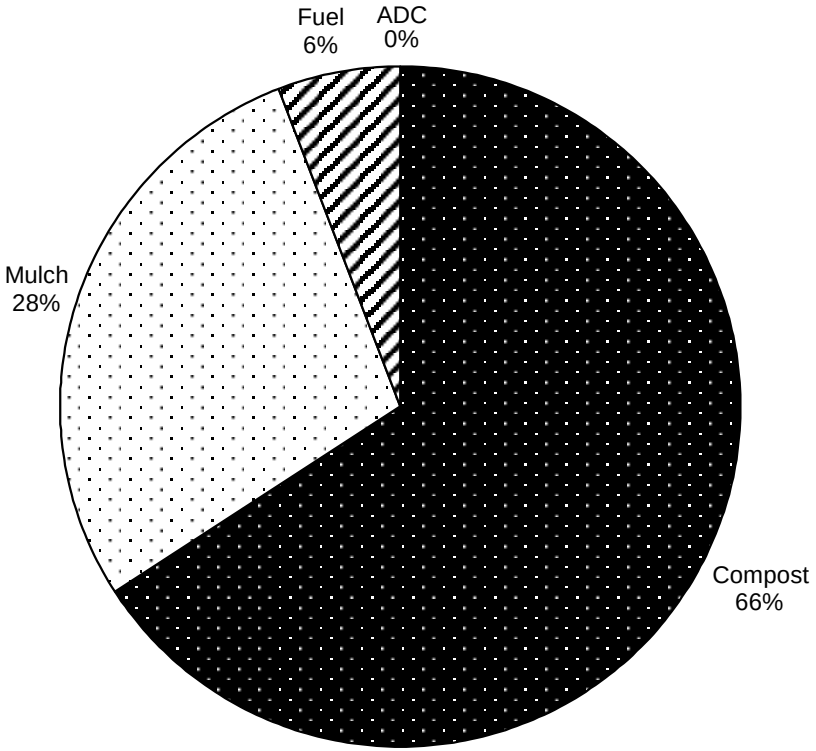

Figure 22
Product Distribution (Composters—Central Coast Region)

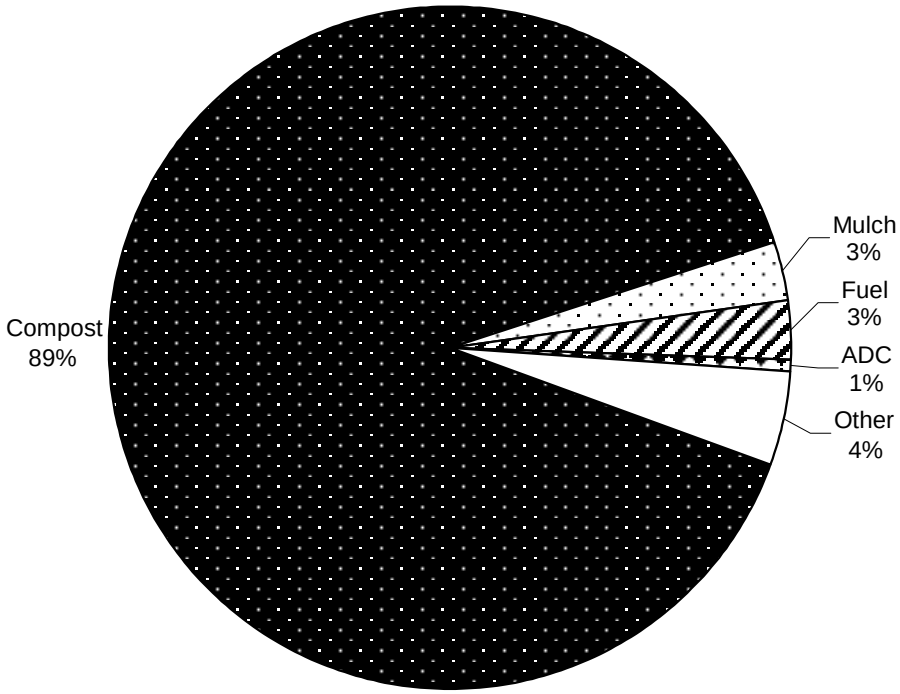

Figure 23
Product Distribution (Composters—Southern Region)

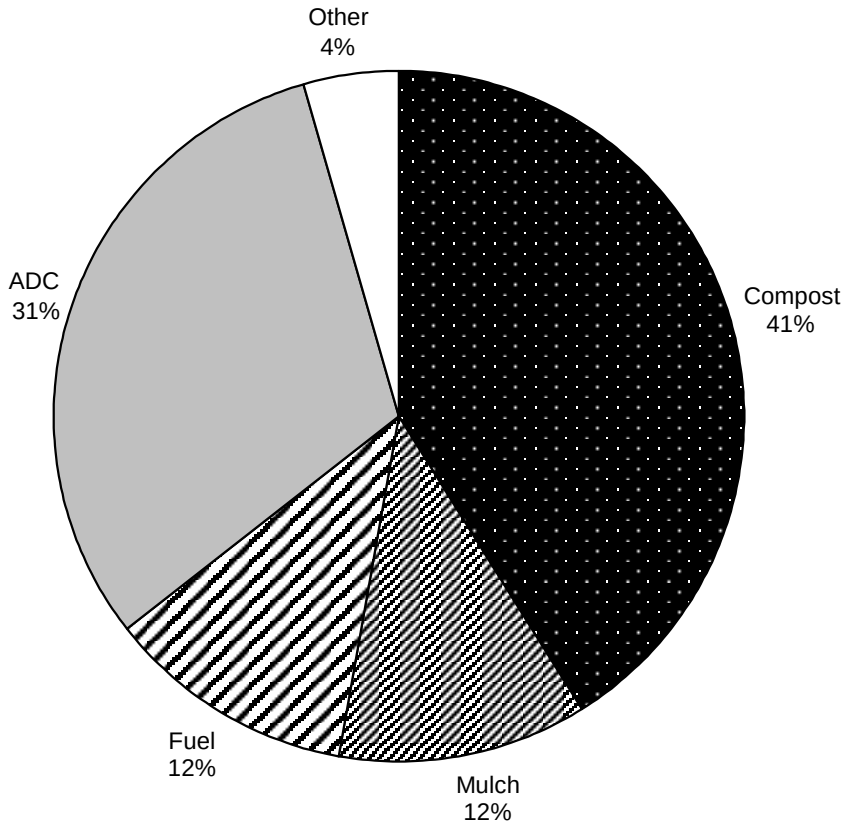

Figure 24
Product Distribution (Processors—Northern Region)

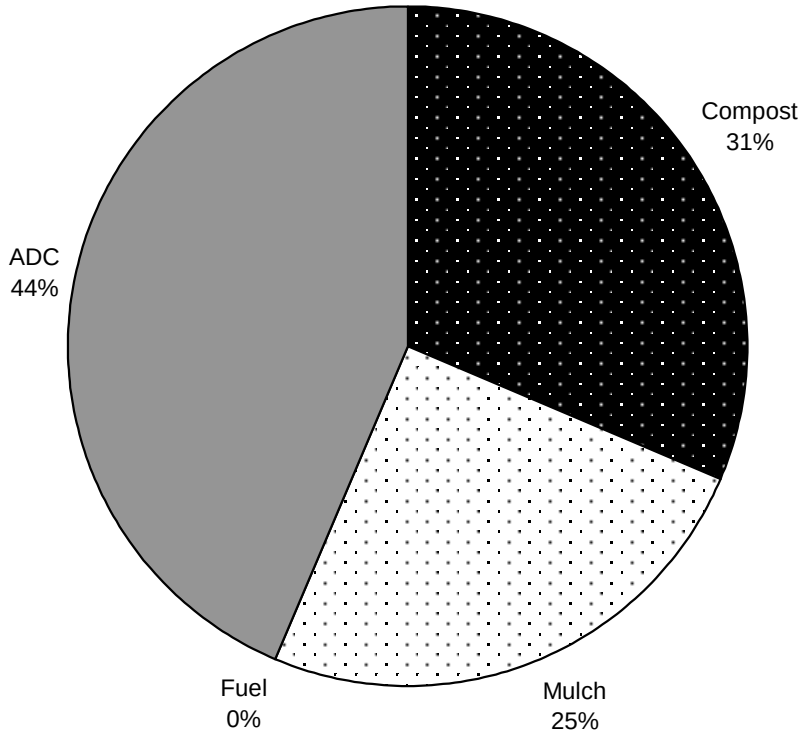

Figure 25
Product Distribution (Processors—Bay Area Region)

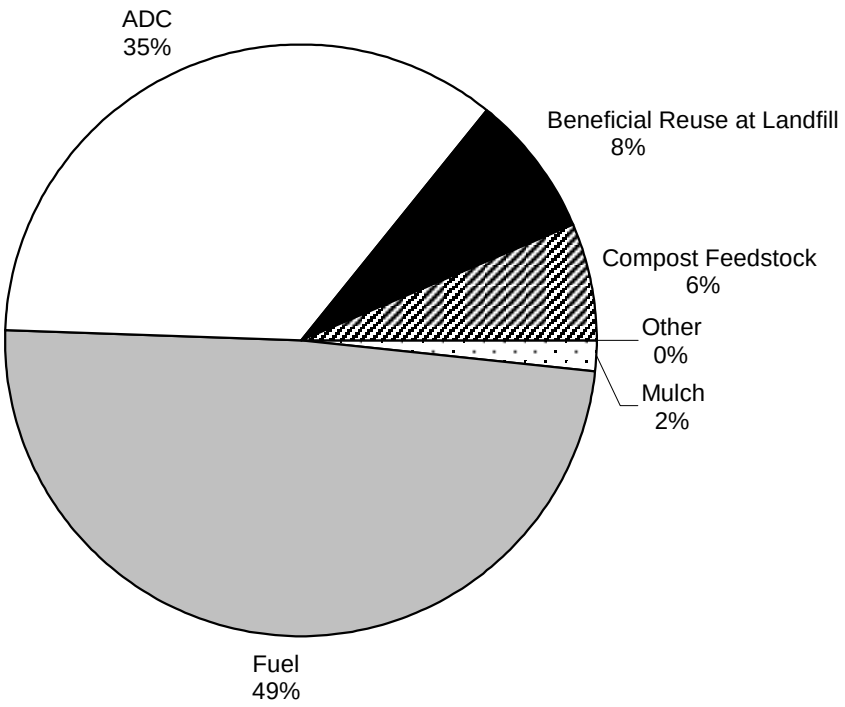

Figure 26
Product Distribution (Processors—Central Valley Region)

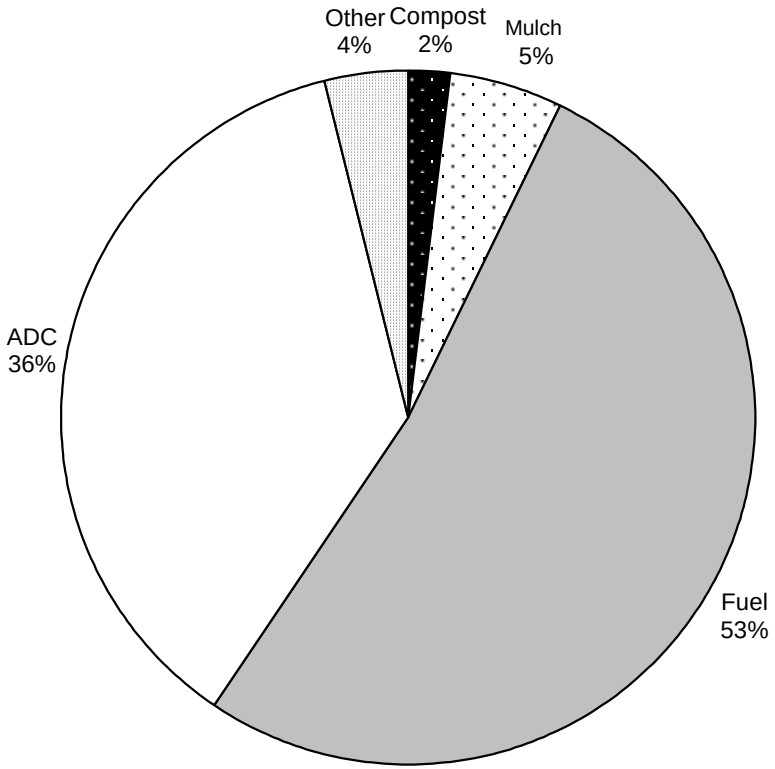

Figure 27
Product Distribution (Processors—Central Coast Region)

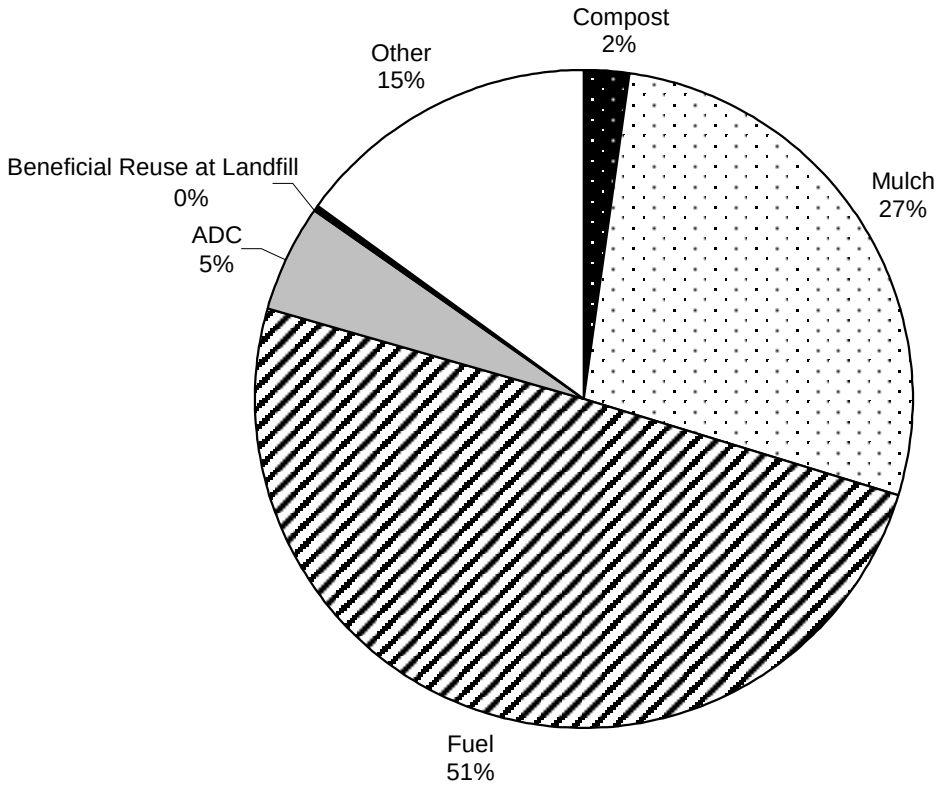

Figure 28
Product Distribution (Processors—Southern Region)

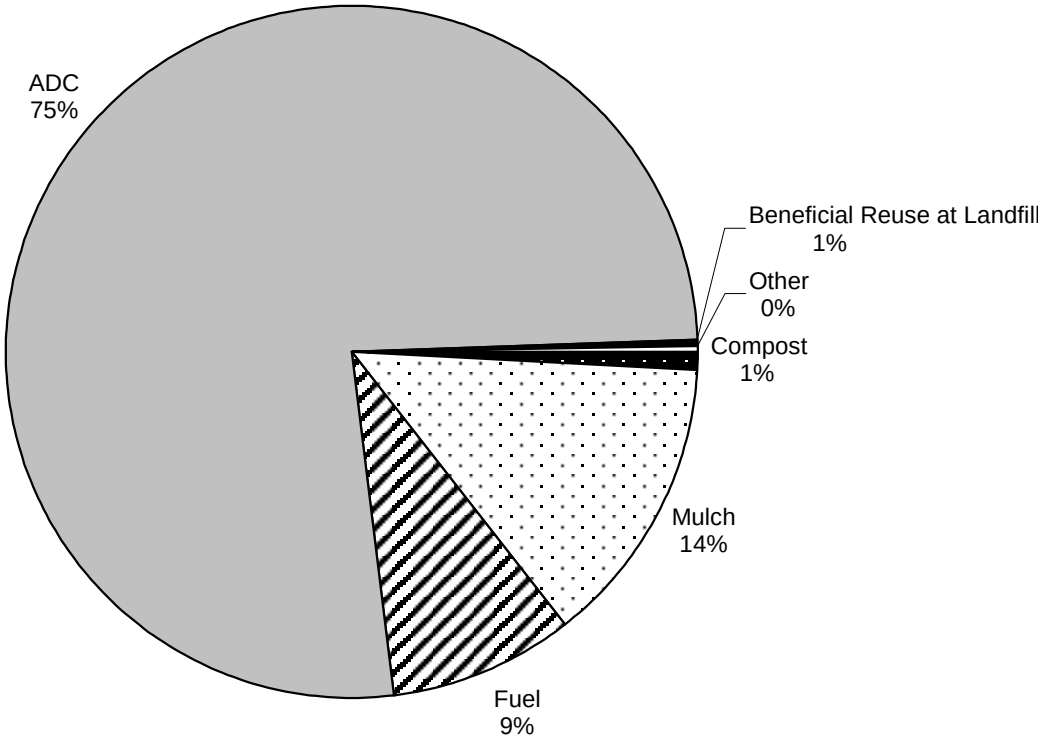

Figure 29
Percentage of Processors and Composters Providing Specialized Services

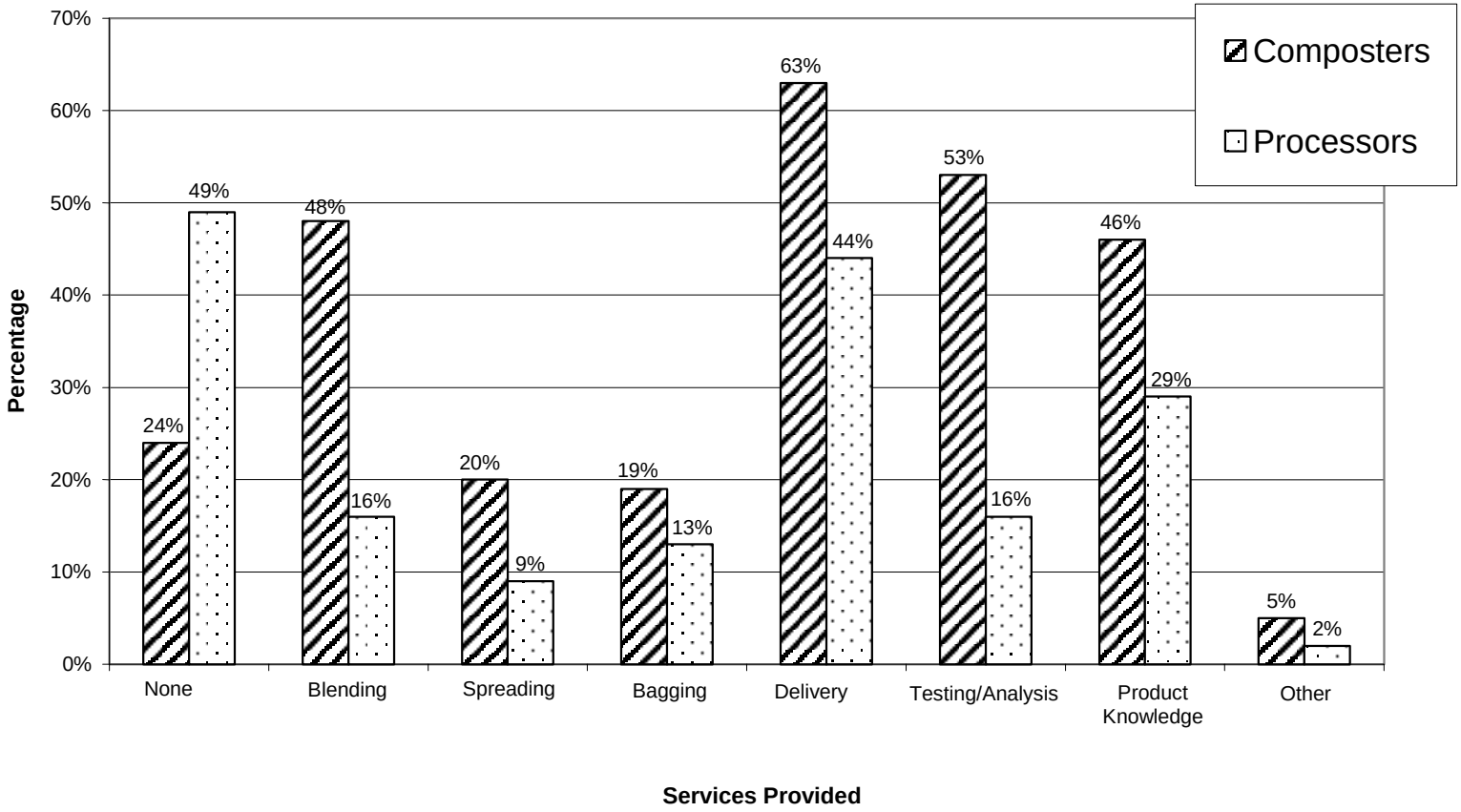

Figure 29A
Number of Services Provided by Composters and Processors

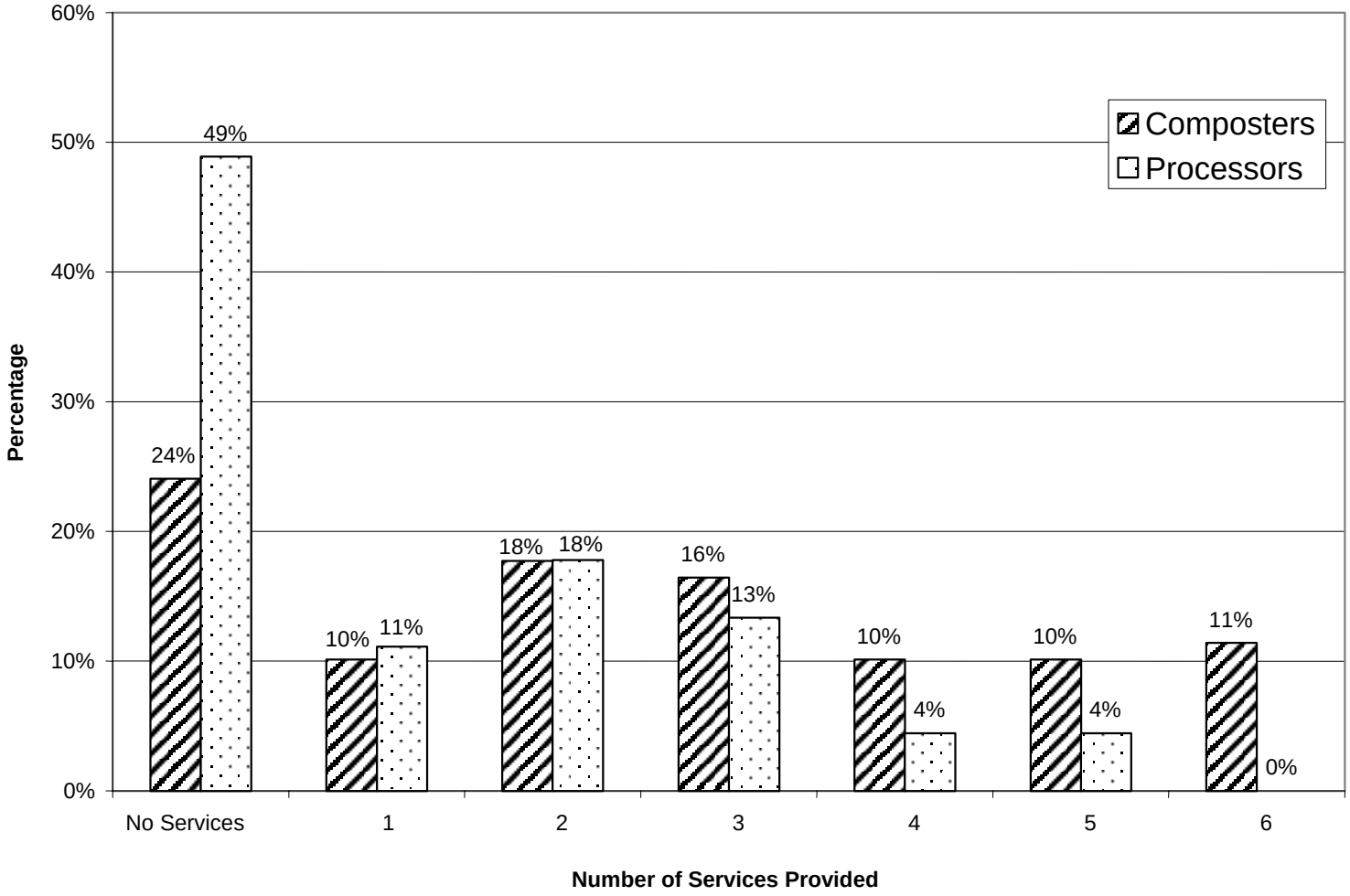

Figure 30
Comparison of Closed/Non-Operating Facilities

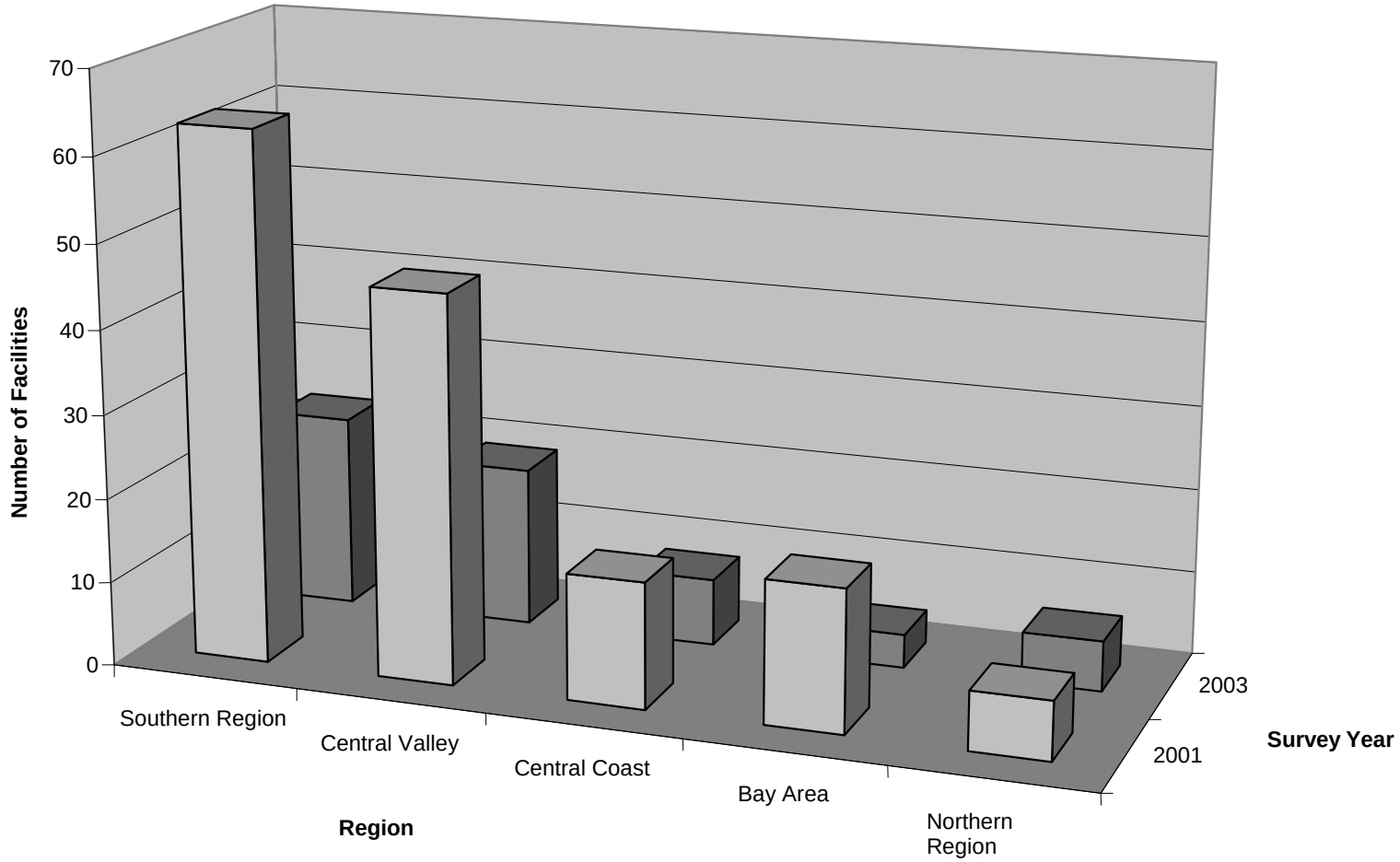

Figure A1

Percentage of Composters and Processors That Have Tested at Least Once for Clopyralid

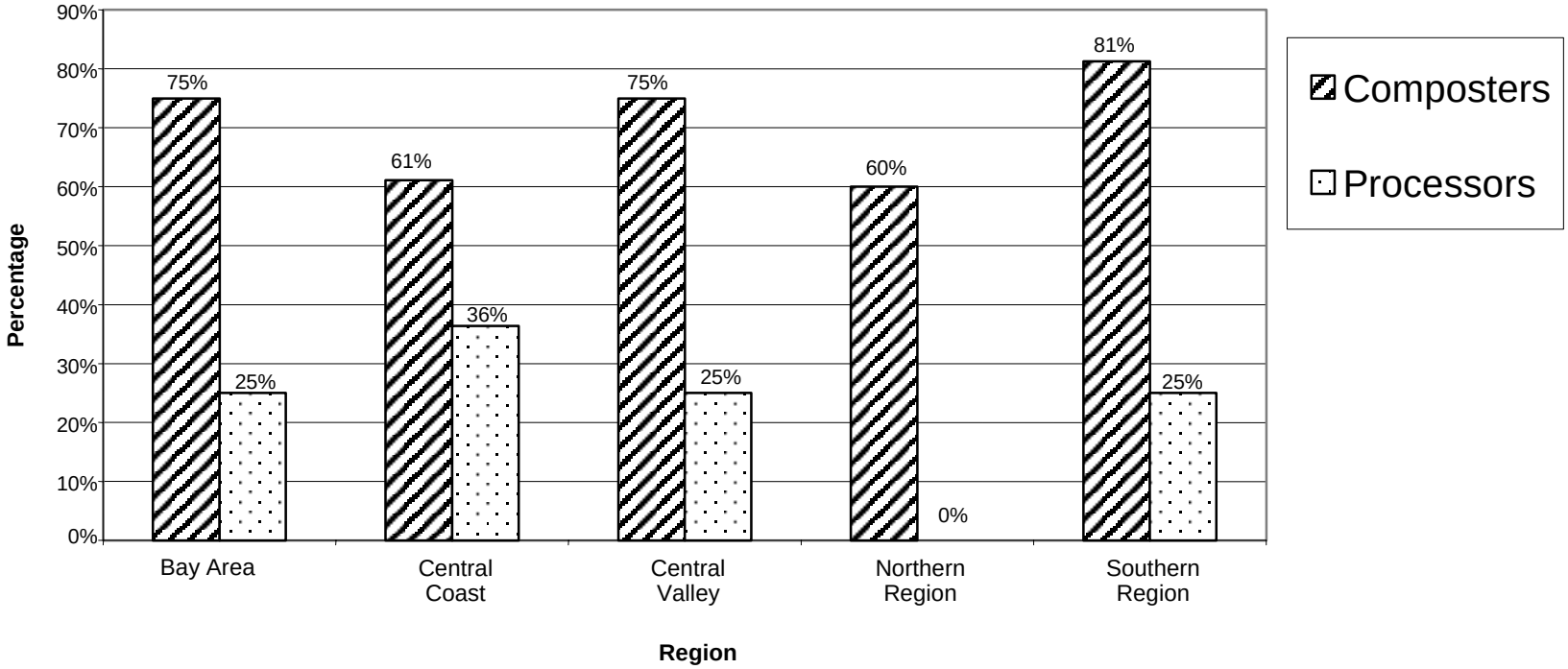

Figure A2
Clopyralid Testing Frequency for All Facilities That Reported Testing

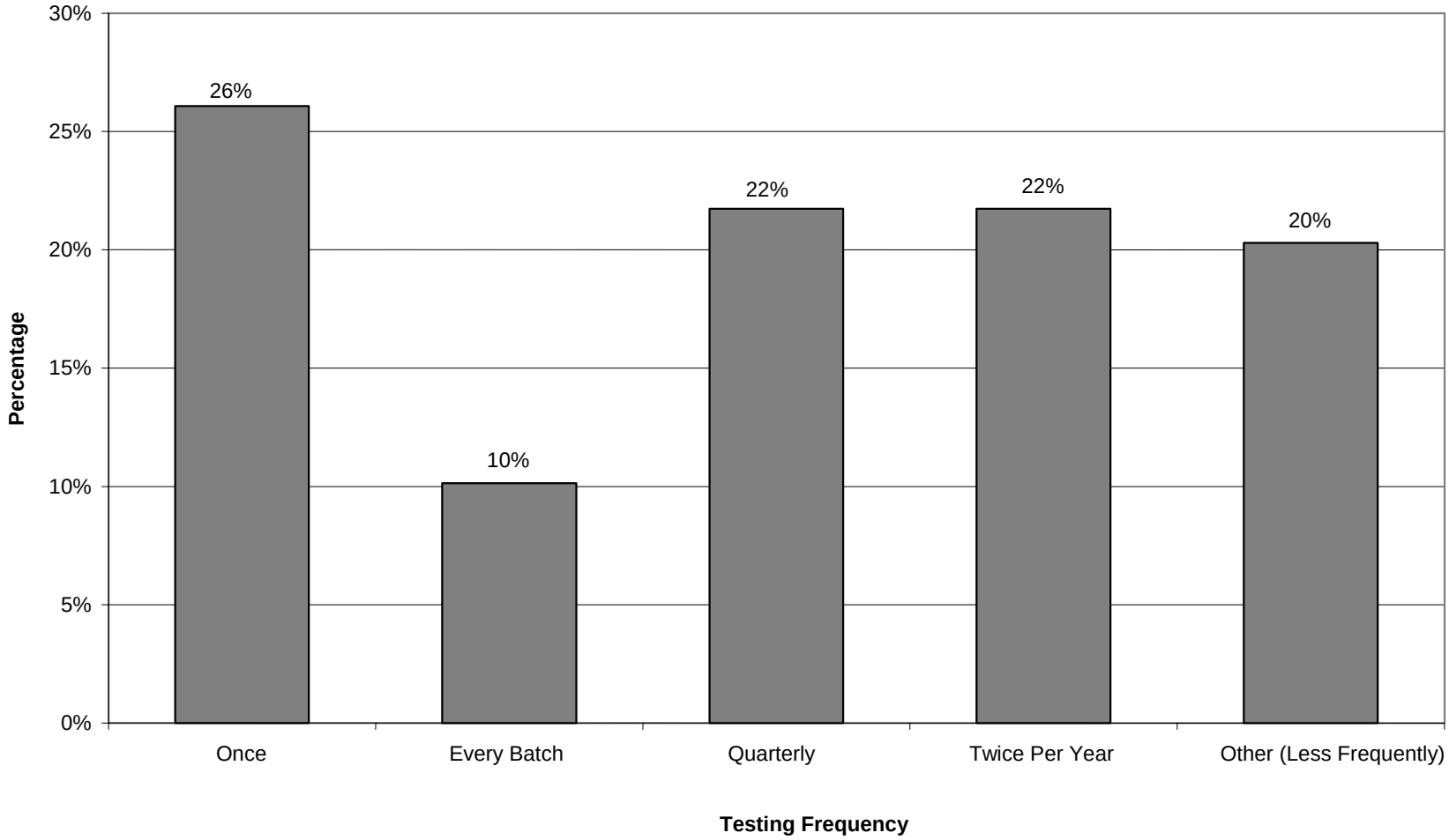

Figure A3
Concentrations of Clopyralid Detected (Parts Per Billion)

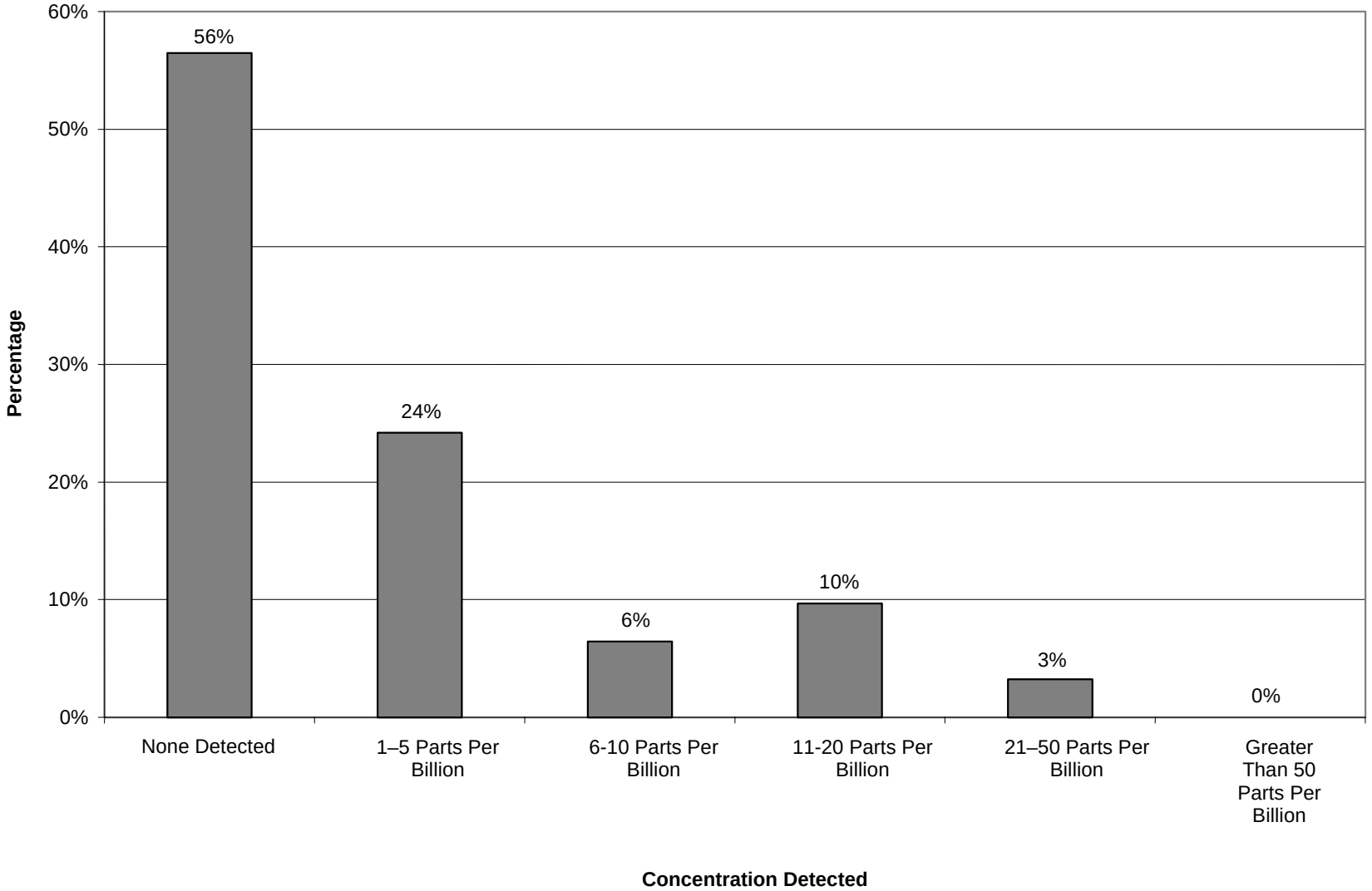

Figure A4
Perceived Impact of Clopyralid on Compost Sales

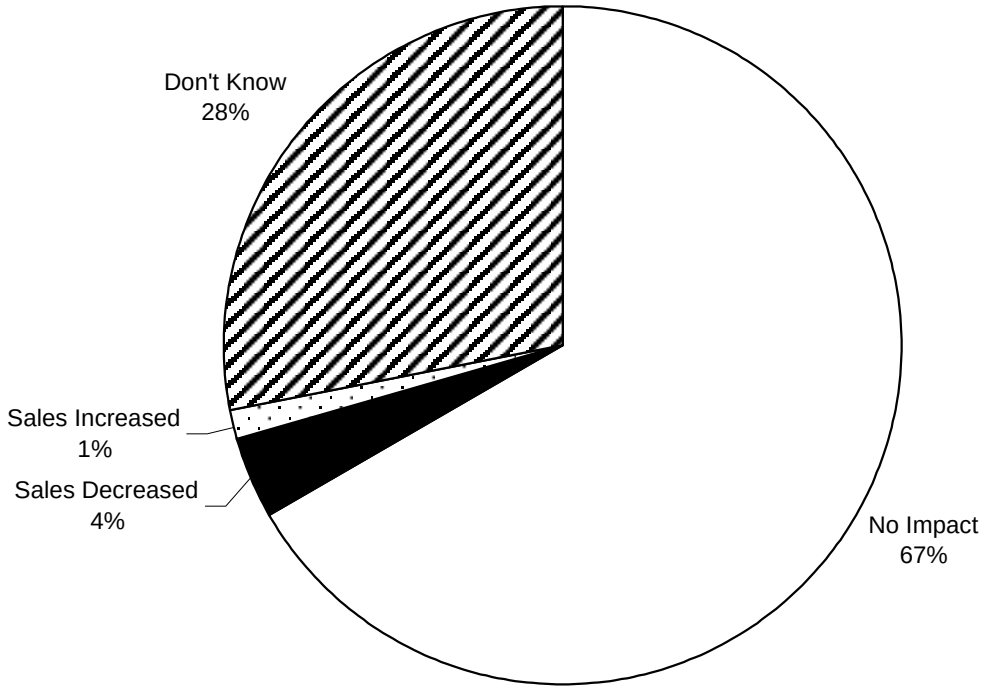

Figure A5
Awareness of PR 1133 Among Composters and Processors

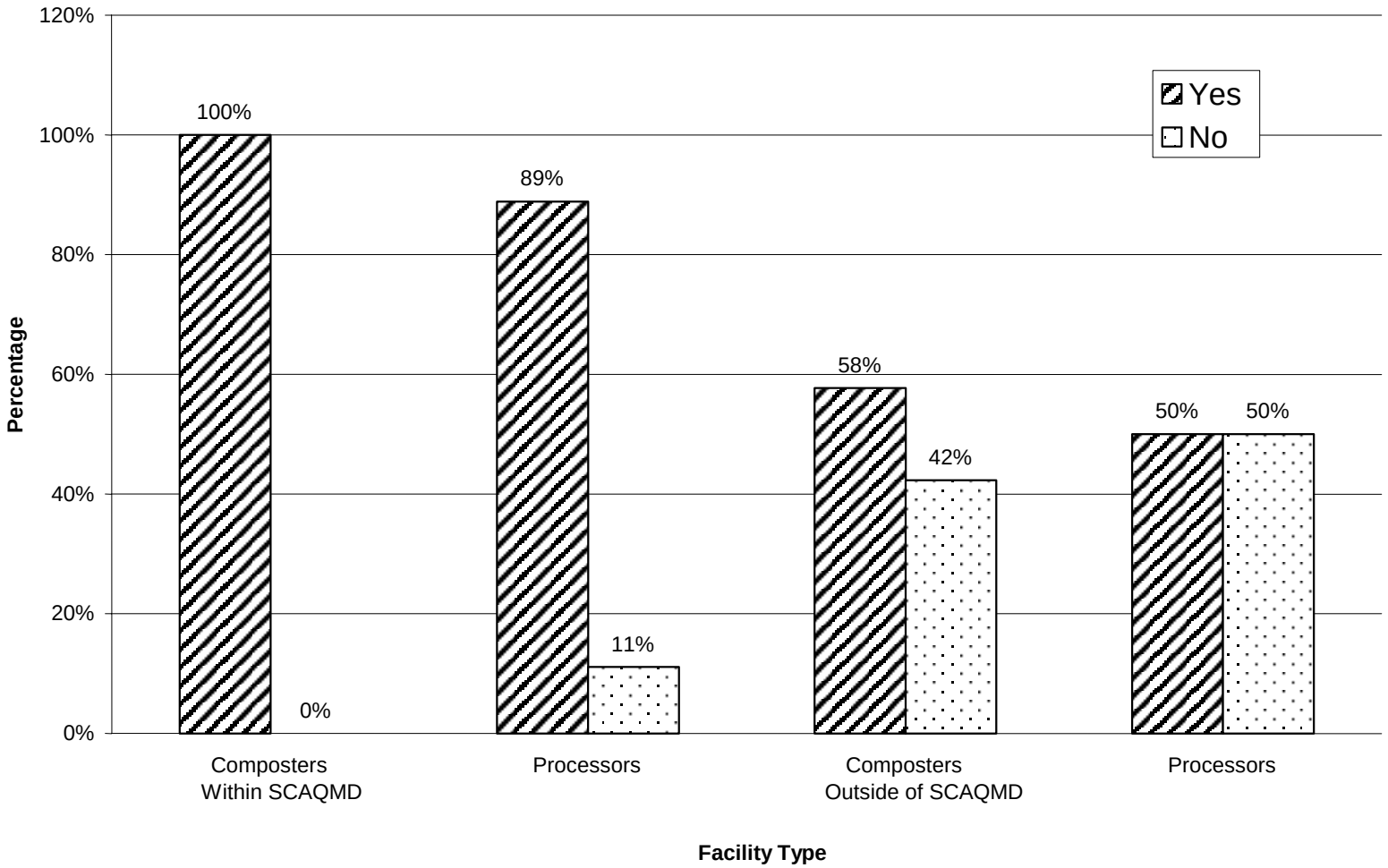

Figure A6
Odor Control Methods Used By Composters and Processers Within SCAQMD Jurisdiction

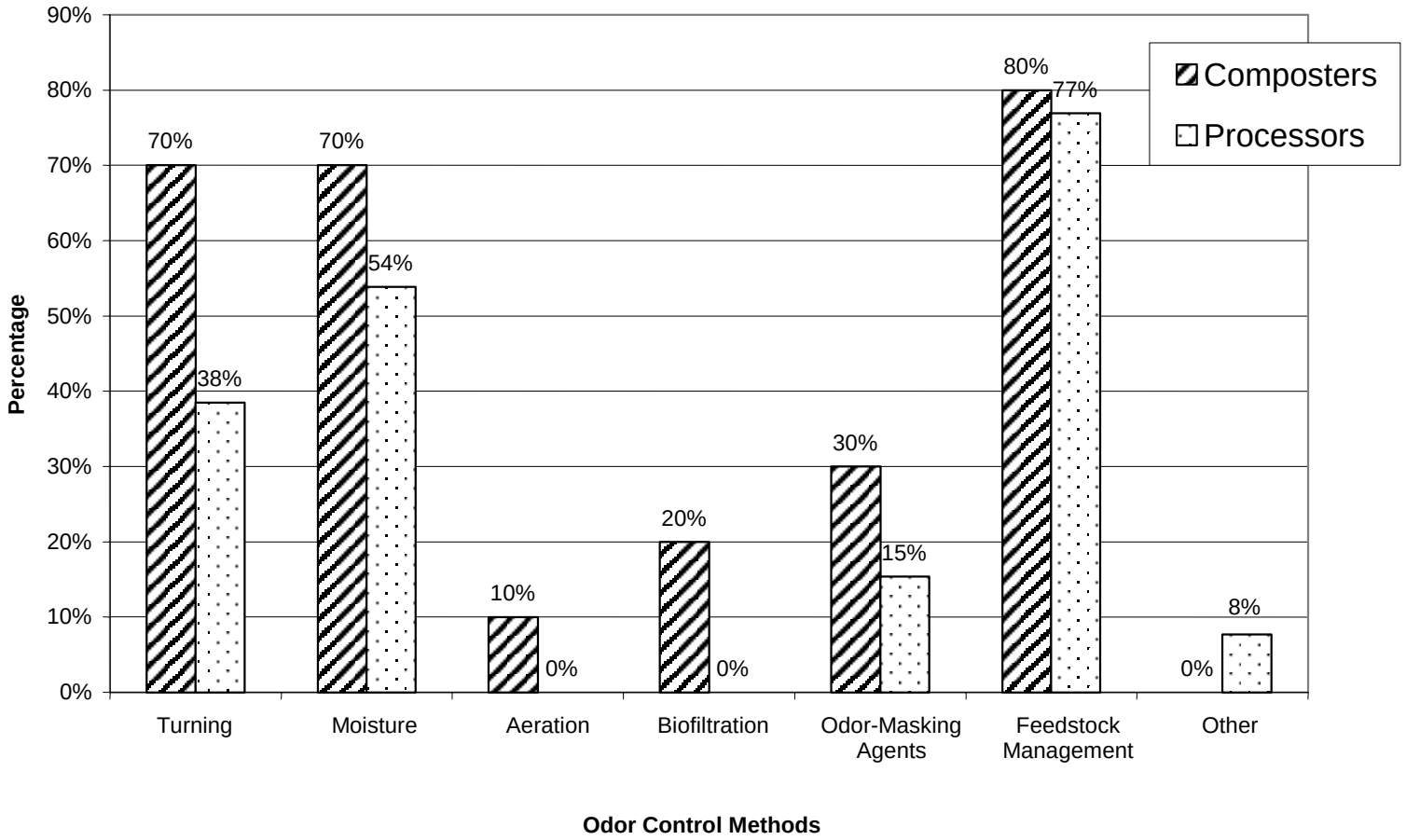

Figure A7
Responses Regarding Increase in Production Cost Due to PR 1133

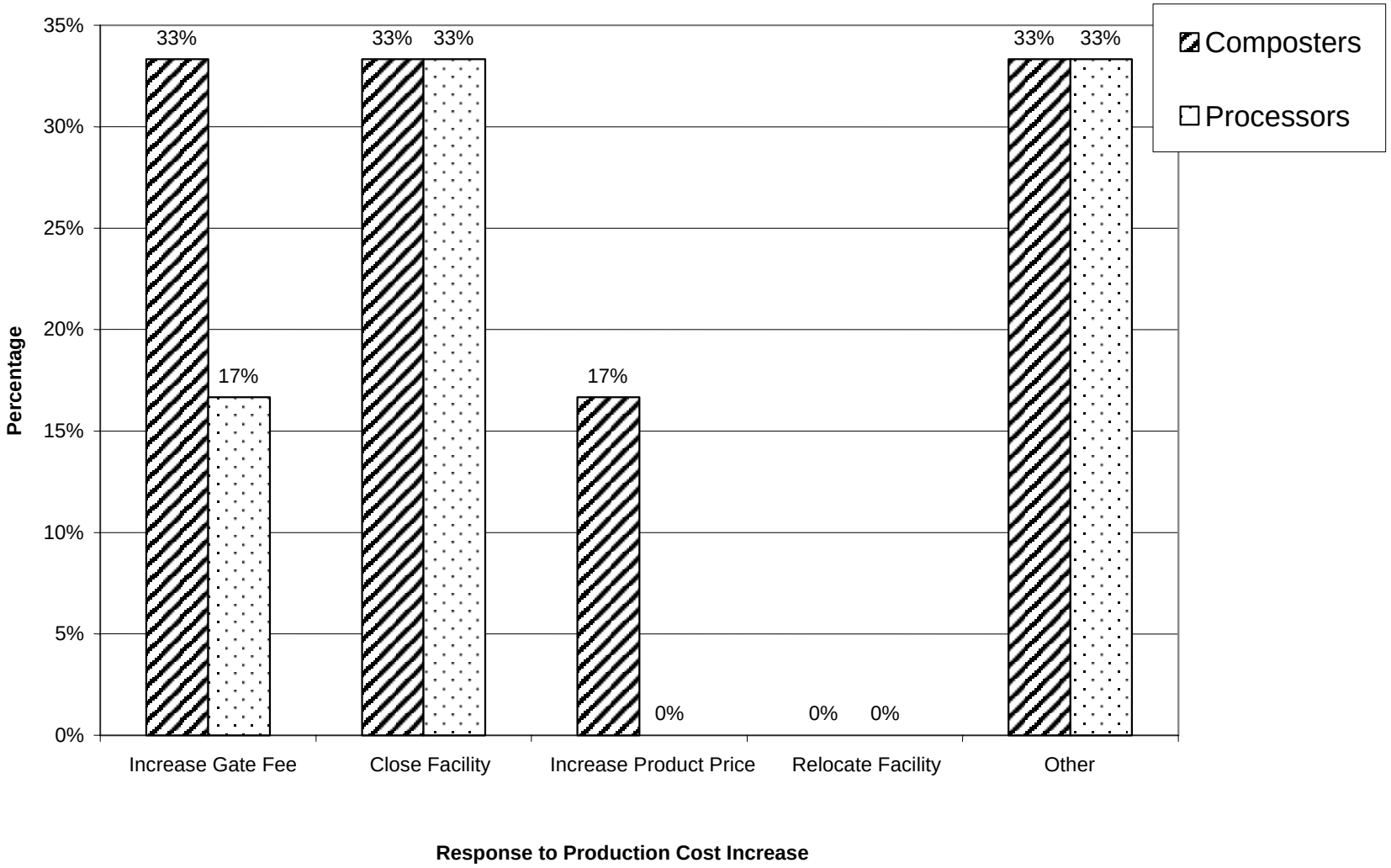

Figure A8
Responses If PR 1133 Causes Facility to Close

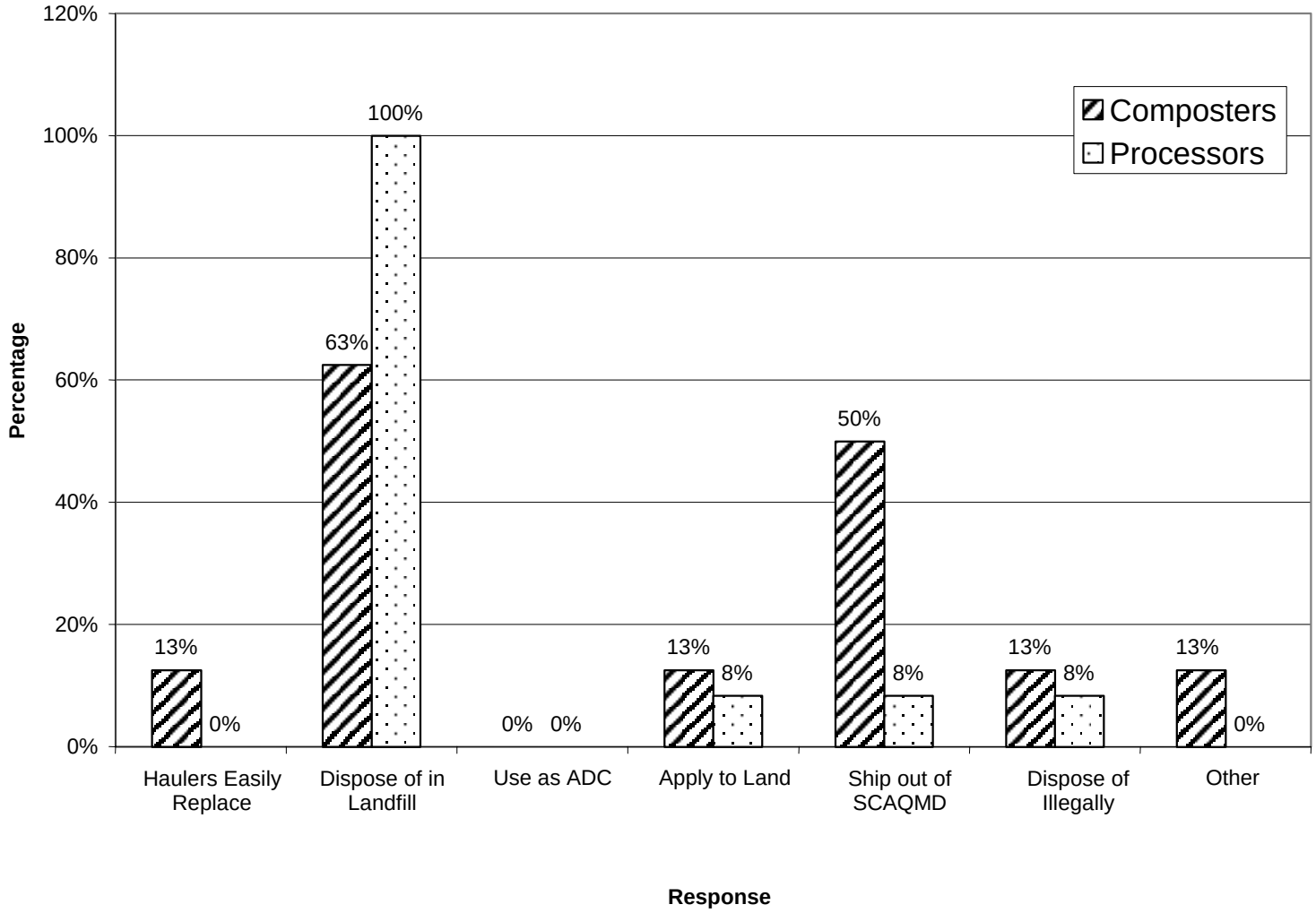

Figure A9
Holding Time for Incoming Feedstocks

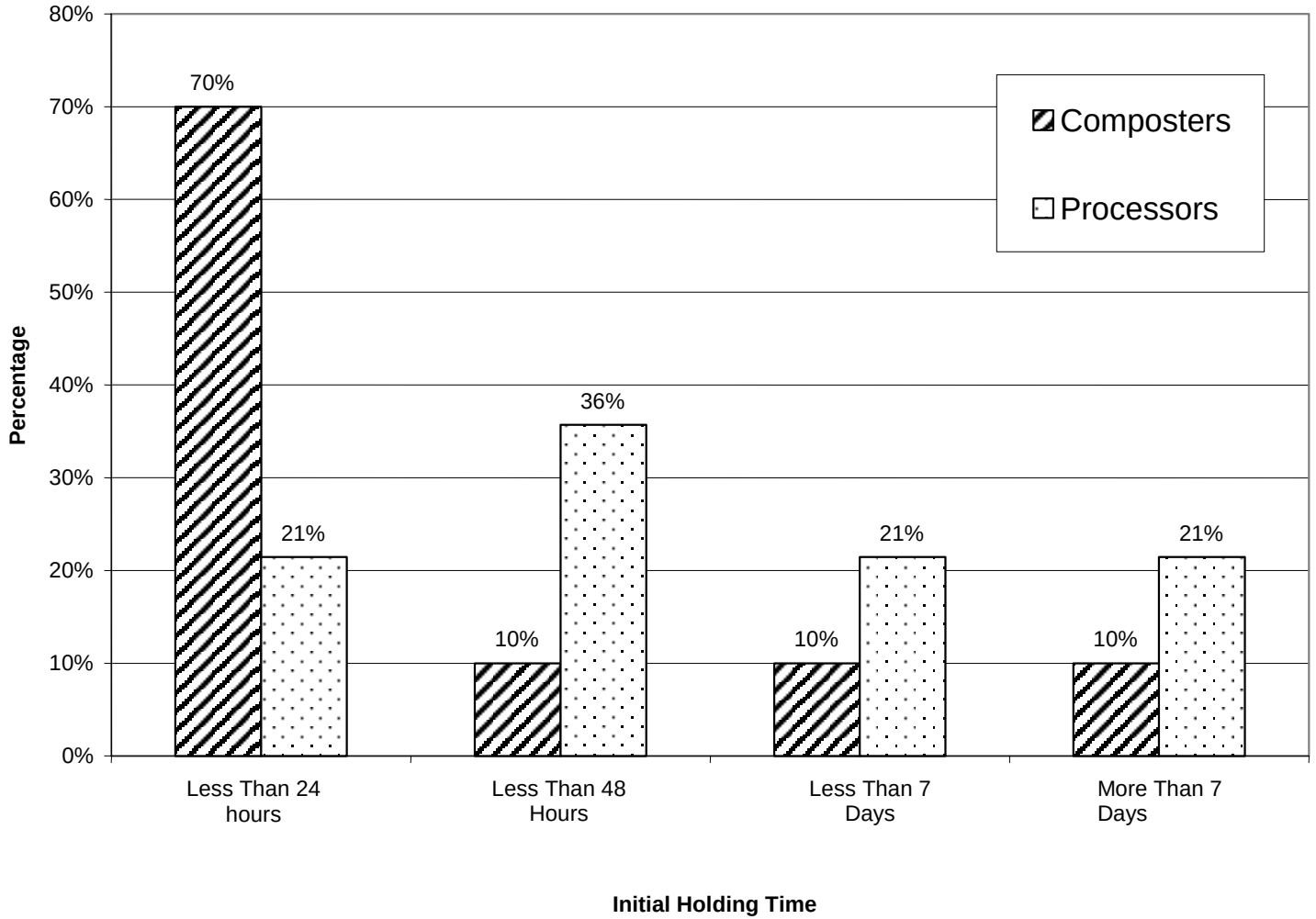

Figure A10
Time Processed Material Stays On Site Prior to Shipment or Composting

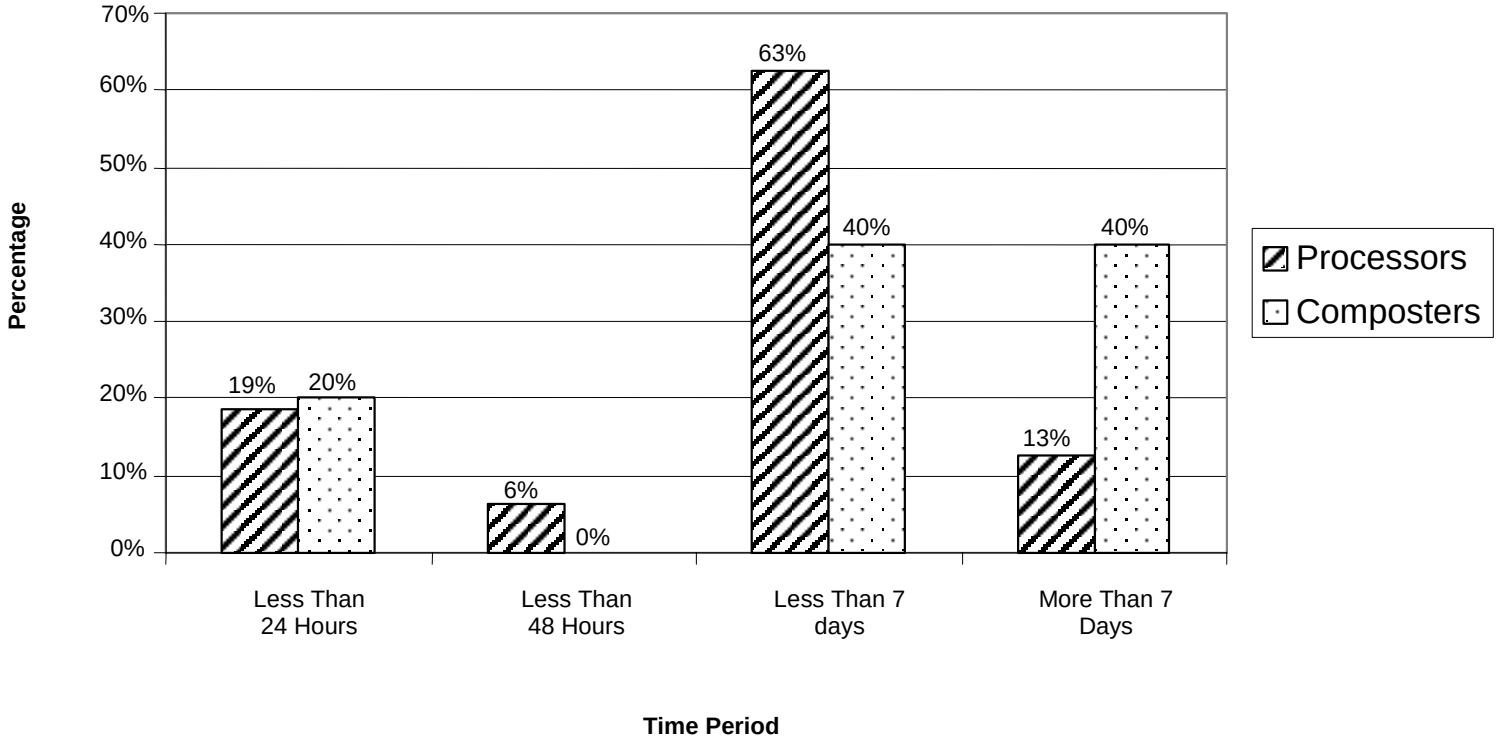

Figure A11
Compost Retention Time (Compost Facilities Within SCAQMD Jurisdiction)

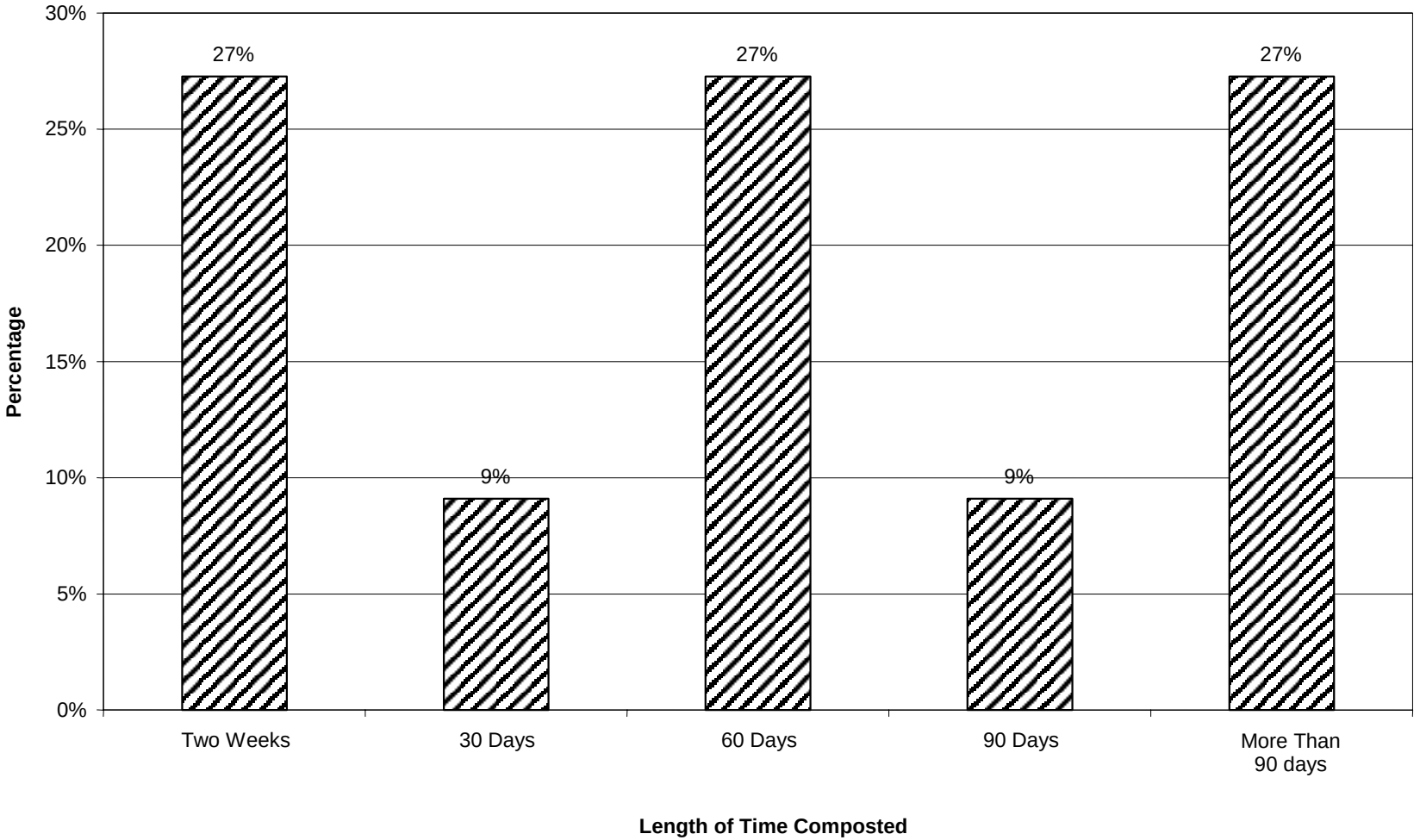

Figure A12
Compost Retention Time (Compost Facilities Outside SCAQMD Jurisdiction)

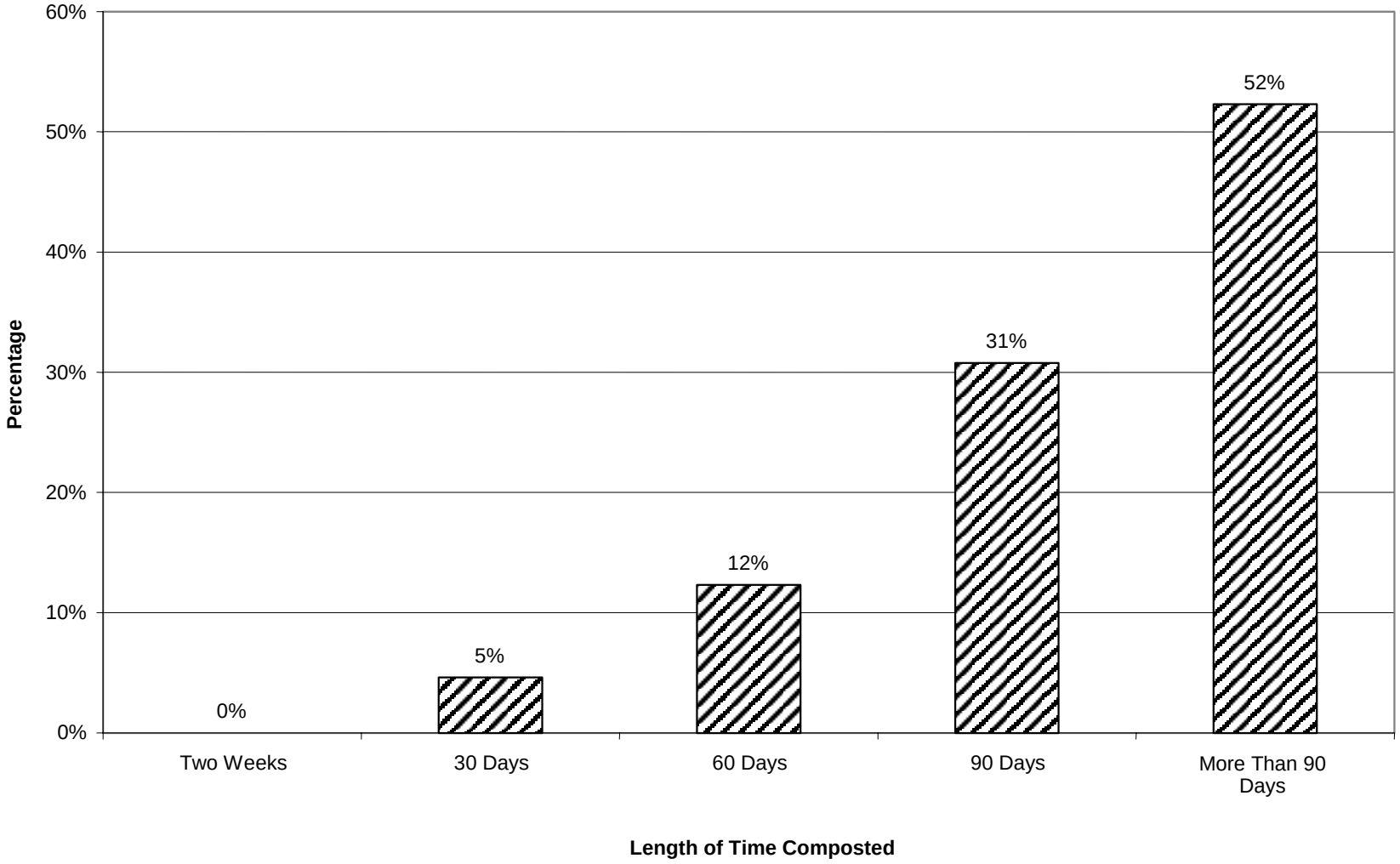

Figure A13
Impacts of Green Waste ADC Use on Composters and Processors

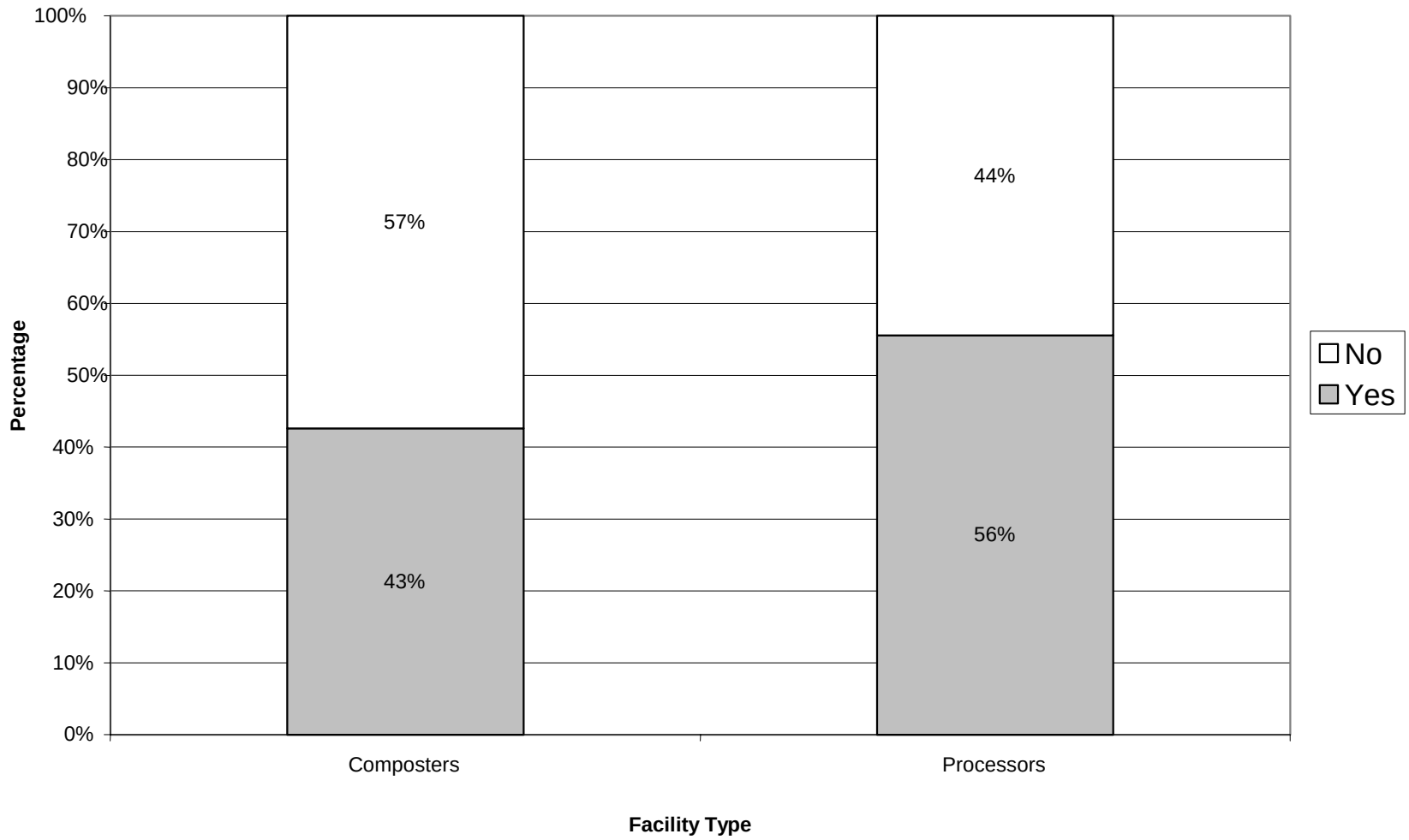

Figure A14
Impacts of Green Waste ADC Use on Composters by Region

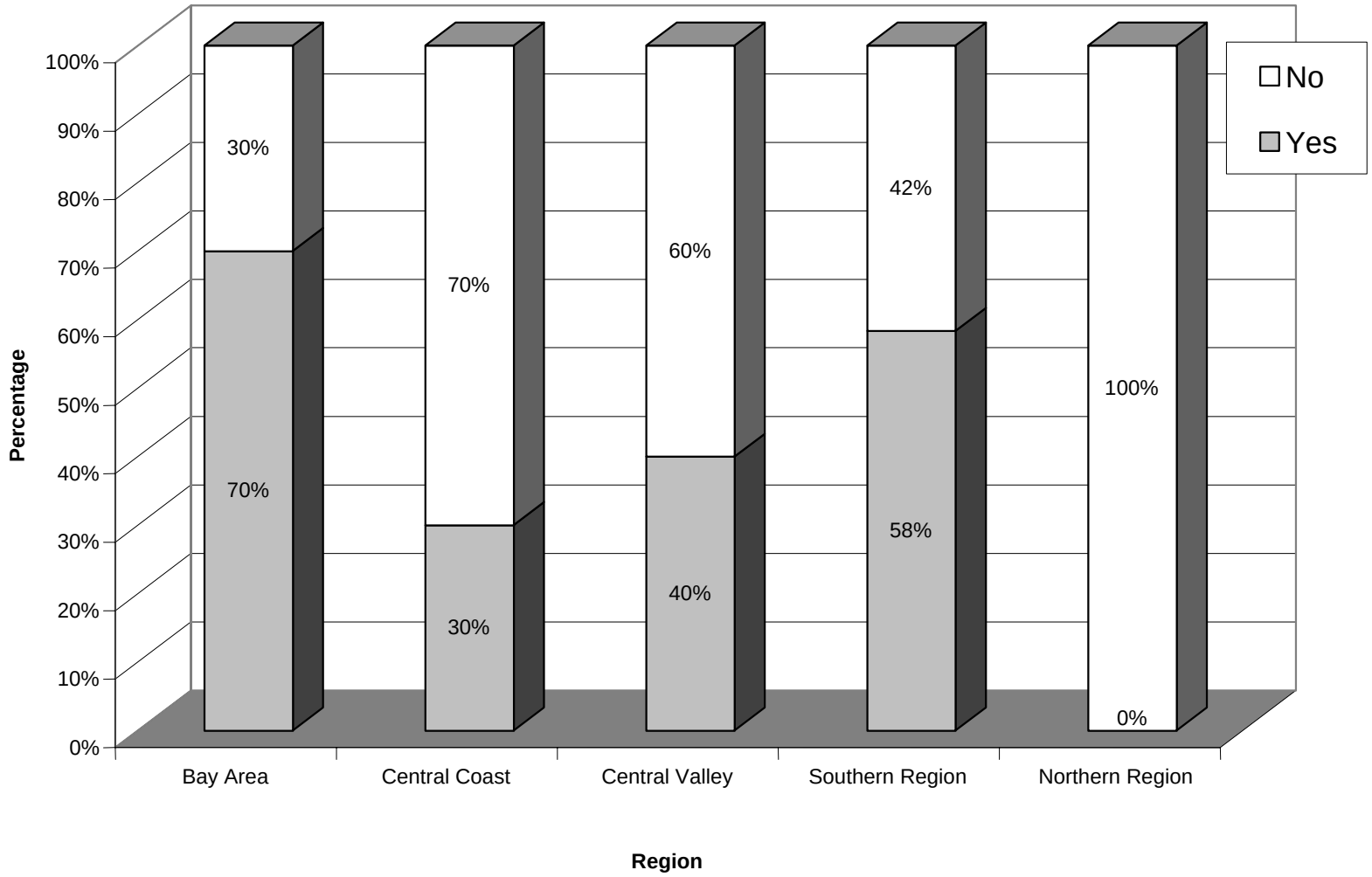

Figure A15
Impacts of Green Waste ADC Use on Processors by Region

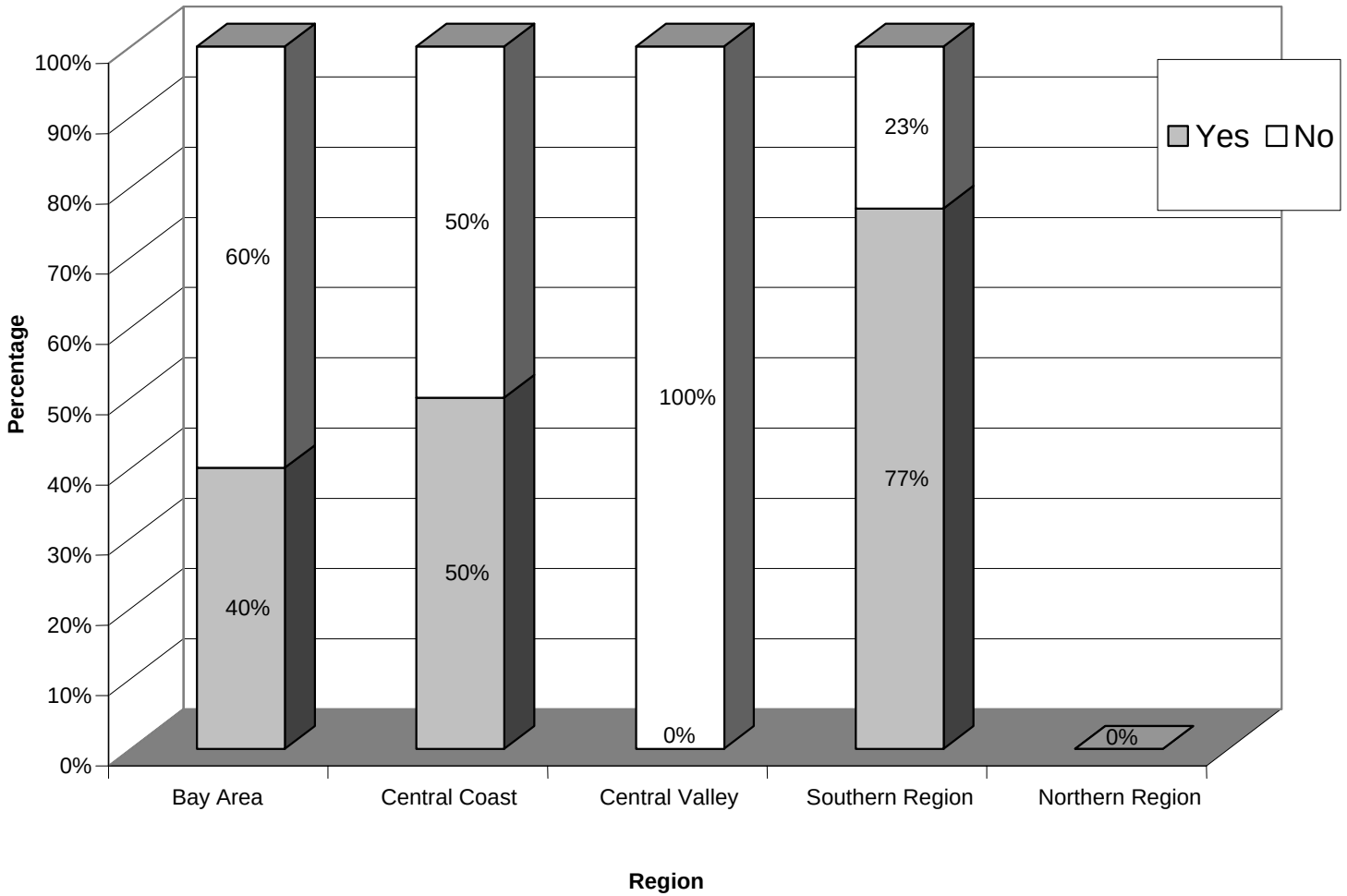

Figure A16
Specific Impacts of Green Waste ADC Use on Composting and Processing Businesses

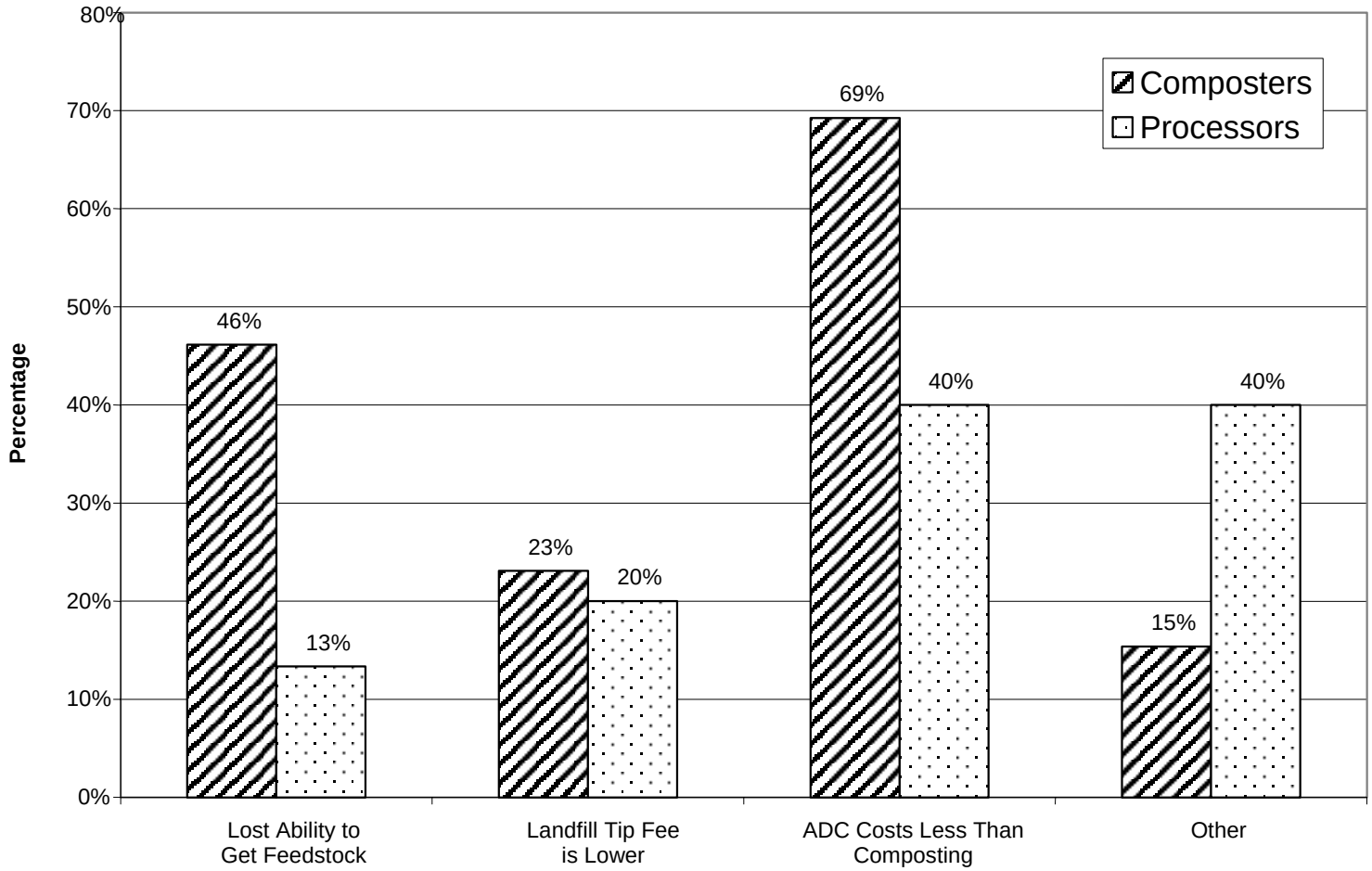

Figure A17
Importance of Compost Maturity to Composters and Processors