



**B A C W A**  
**B A Y A R E A**  
**C L E A N W A T E R**  
**A G E N C I E S**

Bay Area Clean Water Agencies  
2016 Biosolids Trends Survey Report



Photo: Anaerobic Digesters at San Francisco's Oceanside Wastewater Plant

# BACWA 2016 Biosolids Trends Survey

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## 1. Introduction

Biosolids management programs at Publically Owned Treatment Works (POTWs) are under increasing pressure in the San Francisco Bay Region. Northern California POTWs are much more likely to use landfill Alternative Daily Cover (ADC) as a reuse strategy than their counterparts in Southern California<sup>1</sup>. However, new legislation and regulation aimed at diverting organic material from landfills is making it increasingly likely that landfill burial and ADC will be phased out in the future. The California Association of Sanitation Agencies (CASA) prepared *An Evaluation of the Sustainability of Biosolids Use as Landfill Burial or Beneficial Cover Material*<sup>2</sup>, which is an excellent summary of the regulatory challenges facing biosolids reuse and management alternatives for California agencies.

Bay Area Clean Water Agencies (BACWA) is a joint powers agency whose members own and operate POTWs and sanitary sewer systems that collectively provide sanitary services to over 7.1 million people in the nine-county San Francisco Bay Area (Bay Area). BACWA supports a Biosolids Committee, where members can meet to discuss common issues and tour local biosolids facilities. Staff from agencies outside the San Francisco Bay Region may participate in BACWA's Biosolids Committee.

In 2016, BACWA distributed a survey<sup>3</sup> to its member agencies to better understand the state of the biosolids treatment, disposal, and reuse in the Bay Area. The intent of this survey was to summarize information obtained from BACWA members in order to identify current industry trends for the following issues:

- *Biosolids production*
- *Hauling and tipping costs*
- *Hauling distances*
- *Dewatering technologies*
- *Agency challenges*
- *Agencies future biosolids management plans*
- *Marketing and media practices*
- *Biosolids program staffing*

The Survey includes responses from the following agencies, representing more than 95 percent of the total flow of BACWA member agencies, plus the City of Santa Rosa (which is not a BACWA member):

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<sup>1</sup> See SCAP Biosolids Trends Survey <https://bacwa.org/wp-content/uploads/2017/06/2016-SCAP-Biosolids-Trends-Update-3.pdf>

<sup>2</sup> <https://bacwa.org/wp-content/uploads/2017/01/1-11-17-Sustainability-for-biosolids-use-at-landfills.pdf>

<sup>3</sup> Survey questions may be viewed by following this link: <https://www.surveymonkey.com/r/LXKF3RL>

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- Central Contra Costa Sanitary District
- Central Marin Sanitation Agency
- City of American Canyon
- City of Benicia
- City of Hayward
- City of Livermore
- City of Millbrae
- City of Palo Alto
- City of Petaluma
- City of San Jose
- City of San Leandro
- City of San Mateo
- City of Santa Rosa
- City of South San Francisco - San Bruno Water Quality Control Plant
- City of Sunnyvale
- Delta Diablo
- Dublin San Ramon Services District
- East Bay Municipal Utility District
- Fairfield-Suisun Sewer District
- Las Gallinas Valley Sanitary District
- Mt. View Sanitary District
- Napa Sanitation District
- Novato Sanitary District
- Oro Loma SD
- San Francisco Public Utilities Commission
- Sewer Authority Mid-Coastside
- Sewerage Agency of Southern Marin
- Silicon Valley Clean Water
- Union Sanitary District
- Vallejo Sanitation and Flood Control District
- West County Wastewater District

The survey data presented in this report will provide a baseline against which to compare data in future surveys. The body of the report summarizes the data provided by agencies, but the data on reuse and disposal destinations is presented in full in **Appendix A**.

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It is BACWA's intention to conduct this survey on a biennial basis. Agency responses will be used as part of a regional conversation about the future of biosolids management in Northern California, to identify regional needs, and to support efforts to identify and develop additional sustainable biosolids reuse alternatives. The survey was modeled after the Southern California Association of Publicly Owned Treatment Works (SCAP) Biosolids Trends Survey<sup>4</sup> and allows data comparisons between northern and southern California agencies.

BACWA wishes to thank all of our agencies that took the time and effort to assist with the production of this survey and report.

*Inset 1: Biosolids incorporation as Alternative Daily Cover at a landfill*



## 2. Annual Biosolids Production

Survey respondents reported their biosolids production for the 2014 and 2015 calendar years. **Table 1** lists the type of biosolids produced by each agency, based on the classifications defined by EPA Rule 503<sup>5</sup>. Solids designated as EQ are “Exceptional Quality” solids, and “Other Quality” solids do not need to meet the 503 Rules, due to their disposal destination. **Figure 1a and 1b** compare the total tonnage of wet and dry tons, respectively, which were largely unchanged between the two calendar years. The preponderance of wet tons of biosolids produced in the

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<sup>4</sup> SCAP Biosolids Trends Survey <https://bacwa.org/wp-content/uploads/2017/06/2016-SCAP-Biosolids-Trends-Update-3.pdf>

<sup>5</sup>See the “Plain English Guide to the EPA Part 503 Biosolids Rule” at [https://www.epa.gov/sites/production/files/2015-05/documents/a\\_plain\\_english\\_guide\\_to\\_the\\_epa\\_part\\_503\\_biosolids\\_rule.pdf](https://www.epa.gov/sites/production/files/2015-05/documents/a_plain_english_guide_to_the_epa_part_503_biosolids_rule.pdf)

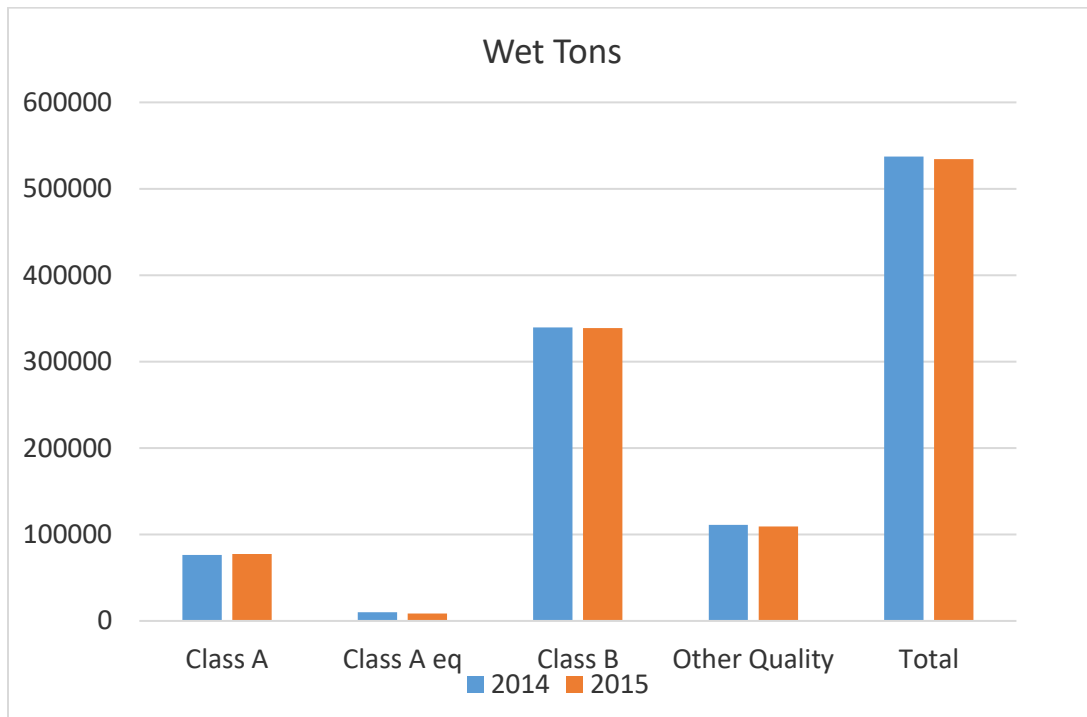
## BACWA 2016 Biosolids Trends Survey

San Francisco Bay Region are Class B, although the difference between Class A and B is smaller when considering dry tons given that agencies producing Class A biosolids produce a higher percentage solids.

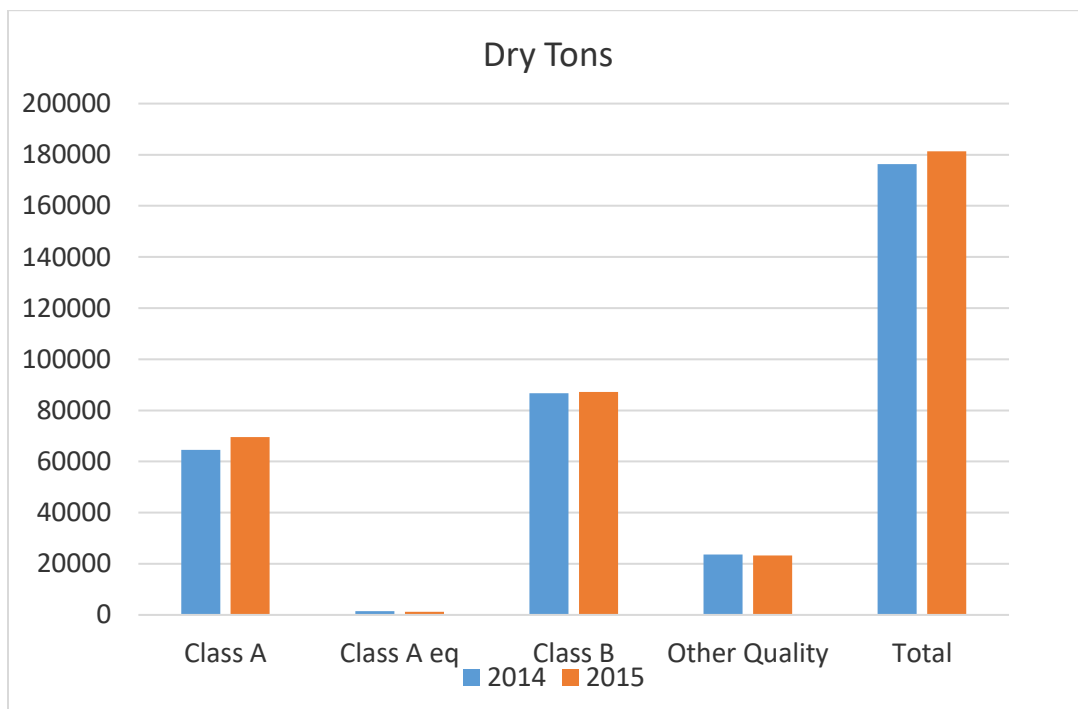
**Table 1. Classes of biosolids produced by respondents**

	<b>Biosolids Class</b>
<b>Central Contra Costa Sanitary District</b>	Other
<b>Central Marin Sanitation Agency</b>	B
<b>City of American Canyon</b>	B
<b>City of Benicia</b>	Other
<b>City of Hayward</b>	A
<b>City of Livermore</b>	B
<b>City of Millbrae</b>	B
<b>City of Palo Alto</b>	Other
<b>City of Petaluma</b>	B
<b>City of San Jose</b>	A
<b>City of San Leandro</b>	A
<b>City of San Mateo</b>	B
<b>City of Santa Rosa</b>	A-EQ and B
<b>City of South San Francisco - San Bruno Water Quality Control Plant</b>	B
<b>City of Sunnyvale</b>	A and B
<b>Delta Diablo</b>	B
<b>Dublin San Ramon Services District</b>	A
<b>East Bay Municipal Utilities District</b>	B
<b>Fairfield-Suisun Sewer District</b>	B
<b>Las Gallinas Valley Sanitary District</b>	B
<b>Mt. View Sanitary District</b>	B
<b>Napa Sanitation District</b>	B
<b>Novato Sanitary District</b>	B
<b>Oro Loma SD</b>	B
<b>San Francisco Public Utilities Commission</b>	B
<b>Sewer Authority Mid Coastside</b>	B
<b>Sewerage Agency of Southern Marin</b>	B
<b>Silicon Valley Clean Water</b>	B
<b>Union Sanitary District</b>	A and B
<b>Vallejo Sanitation and Flood Control District</b>	B
<b>West County Wastewater District</b>	B

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**Figure 1a. Aggregate wet tons of biosolids of different classes produced by survey respondents.**



**Figure 1b. Aggregate dry tons of biosolids of different classes produced by survey respondents.**

## 3. Management Options, Management Costs and Dewatering Statistics

### 3.1 Biosolids Reuse and Disposals Options

The amount of biosolids sent to each type of reuse and disposal destination by each responding agency is reported in **Table 2**. The accompanying **Figures 2a** and **2b** illustrate the relative importance of each reuse and disposal method for wet and dry tons, respectively. Reuse via landfill alternative daily cover (ADC) receives the most tonnage of biosolids in the region, followed by land application. Onsite disposal and incineration come next, followed by compost, then finally, landfill disposal.

*Inset 2: East Bay Municipal Utilities District Digesters*





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Table 2. Wet tons of biosolids delivered by usage, 2015.

	Landfill Disposal	Landfill ADC	Land Application	Compost	Incineration	Onsite disposal	Total
<b>Central Contra Costa Sanitary District</b>							
<b>Central Marin Sanitation Agency</b>					72,297		72,297
<b>City of American Canyon</b>		3,608	2,292				5,900
<b>City of Benicia</b>		197					197
<b>City of Hayward</b>		2,330					2,330
<b>City of Livermore</b>	2,396						2,396
<b>City of Millbrae</b>		5,751	2,060				7,811
<b>City of Palo Alto</b>		236	1,139	121			1,496
<b>City of Petaluma</b>					34,680		34,680
<b>City of San Jose</b>		9,169					9,169
<b>City of San Leandro</b>		53,405					53,405
<b>City of San Mateo</b>			7,590				7,590
<b>City of Santa Rosa</b>		3,083	3,828				6,911
<b>City of South San Francisco - San Bruno Water Quality Control Plant</b>		2,349	16,398	8,514			27,261
<b>City of Sunnyvale</b>		13,981					13,981
<b>Delta Diablo</b>		702	11,700	321		2,641	15,364
<b>Dublin San Ramon Services District</b>		1,119	10,800	114			12,033
<b>East Bay Municipal Utilities District</b>						37,500	37,500
<b>Fairfield-Suisun Sewer District</b>		43,001	33,024				76,025
<b>Las Gallinas Valley Sanitary District</b>		11,219					11,219
<b>Mt. View Sanitary District</b>						4,170	4,170
<b>Napa Sanitation District</b>		750					750
<b>Novato Sanitary District</b>						6,846	6,846
<b>Oro Loma SD</b>						18,000	18,000
<b>San Francisco Public Utilities Commission</b>		9,841					9,841

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<b>Sewer Authority Mid Coastside</b>		37,013	32,909	3,371			73,293
<b>Sewerage Agency of Southern Marin</b>	1,485						1,485
<b>Silicon Valley Clean Water</b>		722	260				982
<b>Union Sanitary District</b>		5,045	13,313	2,981			21,339
<b>Vallejo Sanitation and Flood Control District</b>		2,450	13,313	3,470			19,233
<b>West County Wastewater District</b>			12,292				12,292
Sum	3,881	215,275	160,918	18,892	106,977	69,157	575,100

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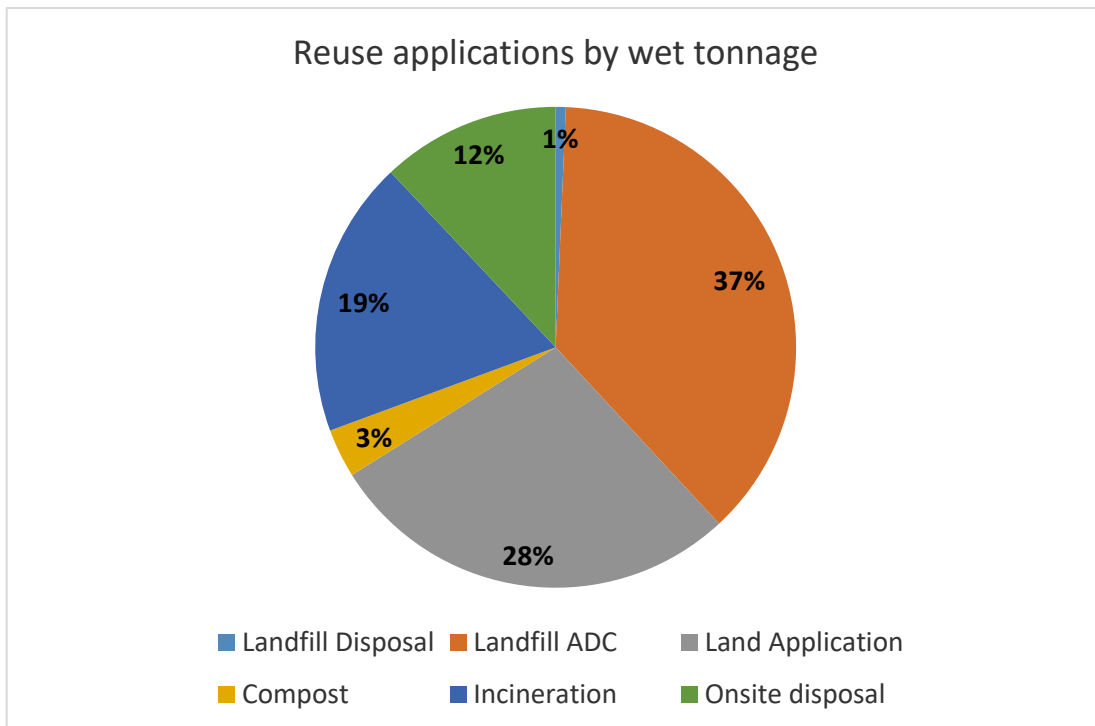


Figure 2a. Relative wet tonnage of biosolids per reuse and disposal method in 2015

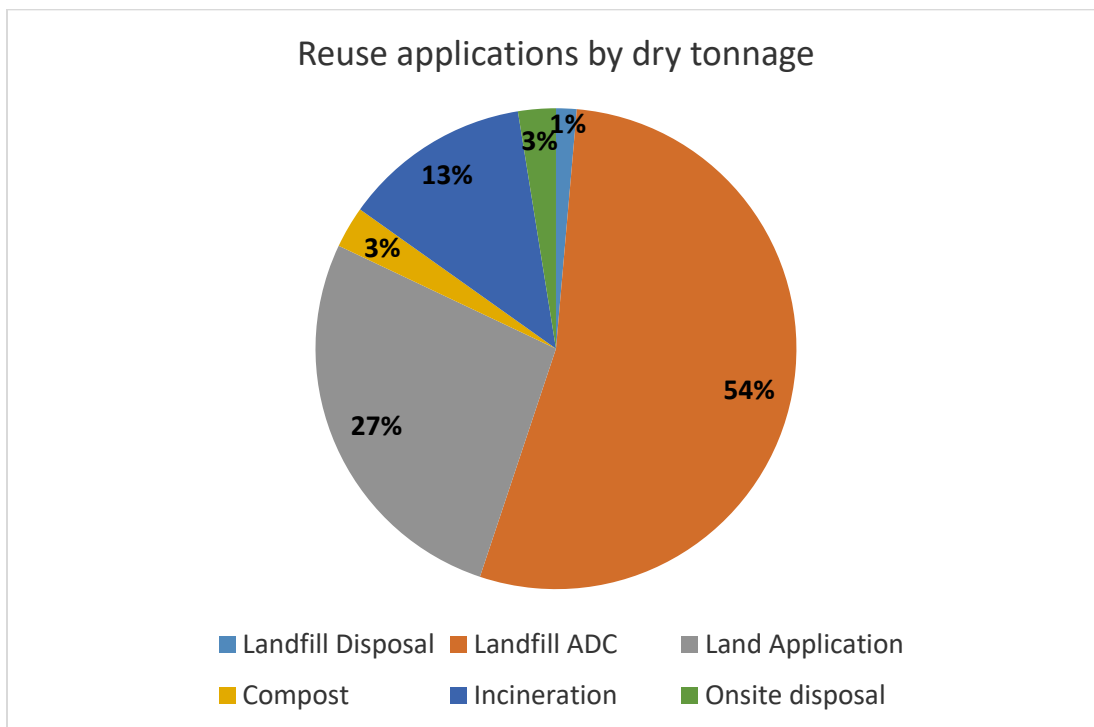
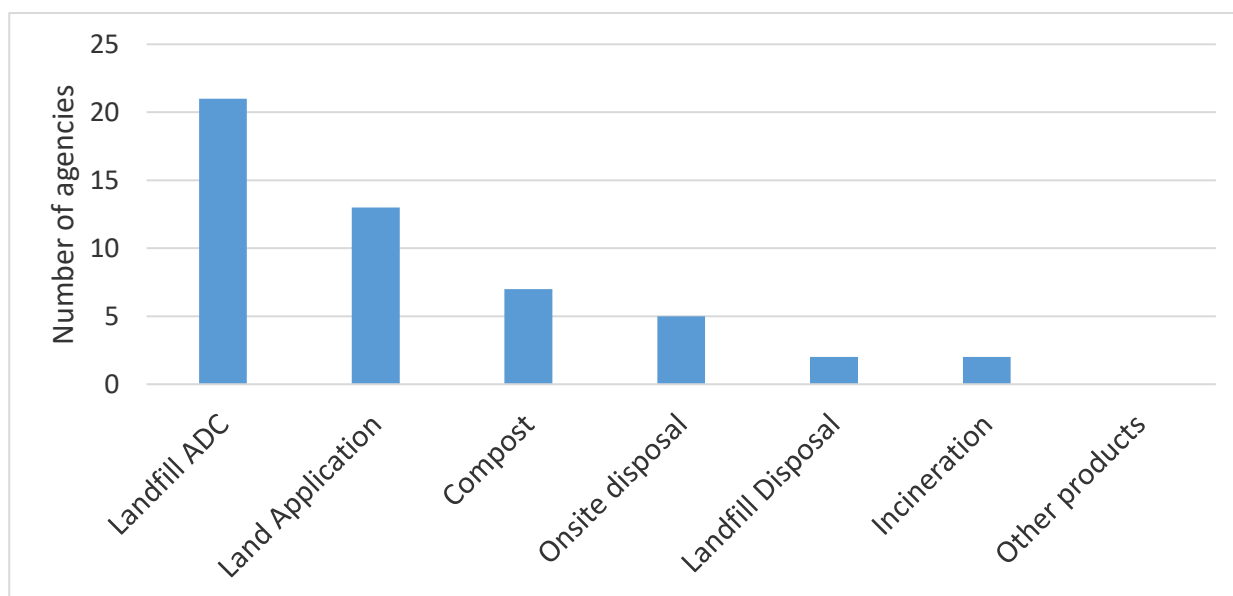


Figure 2a. Relative dry tonnage of biosolids per reuse and disposal method in 2015

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Another way to measure the relative importance of reuse and disposal methods is by counting the number of agencies that employ each, as illustrated in **Figure 3**. As can be seen in **Table 2**, many agencies use more than one reuse or disposal alternative. Out of the thirty-one responding agencies, nineteen use landfill ADC as one of their reuse alternatives. Land application is the next most popular, followed by compost and onsite disposal. Landfill disposal is used by just three agencies. Incineration is used by two agencies, although one of these agencies, the City of Palo Alto, will be transitioning away from incineration by 2019.



**Figure 3. Number of agencies out of thirty-one respondents applying biosolids reuse alternatives in 2015.**

While compost is the third-most common reuse application (as illustrated in **Figure 3**), it is fairly minor in terms of tonnage (only 3%, see **Figure 2**). The relatively minor use of compost by Bay Area agencies is notable, since SCAP's 2016 Biosolids survey found that composting represented approximately half of the tonnage of biosolids reuse for Southern California agencies. While there are currently no agencies reporting use of "Other Products," in 2016 several agencies will begin sending their solids to the new Lystek Facility. The Lystek Facility is hosted by the Fairfield-Suisun Sewer District and will produce liquid fertilizer for agriculture (see Inset 3 on pg. 13).

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*Inset 3. Lystek and Fairfield-Suisun Sewer District partnered to develop a facility to receive biosolids and convert them to liquid fertilizer. The new facility came online in 2016.*

### LYSTEK LAND APPLICATION OF LIQUID BIOFERTILIZER, SOLANO COUNTY



### LYSTEK-FAIRFIELD ORGANIC MATERIAL RECOVERY CENTER, SOLANO COUNTY



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### 3.2 Management Costs

Agencies that send biosolids to multiple destinations report a range of costs per ton. Minimum and maximum reported hauling and tipping costs for each agency are reported in **Table 3**.

Where costs were provided by the respondent as a range, the mean of the range was used for that destination. Total costs per agency are calculated by multiplying tons of solids by cost per ton for each destination and summing the destinations. Average costs for each agency are calculated by dividing total cost by tons of biosolids. In future surveys, cost trends will be tracked to see how they are changing over time.

**Table 3: Hauling and tipping costs for agencies**

	Minimum cost/ton	Maximum cost/ton	Average Cost/ton	Total cost
<b>Central Contra Costa Sanitary District<sup>a</sup></b>	\$0.00	\$0.00	\$0.00	\$0
<b>Central Marin Sanitation Agency</b>	\$20.25	\$45.58	\$56.14	\$249,423
<b>City of American Canyon<sup>b</sup></b>	\$0.00	\$0.00	\$0.00	\$0
<b>City of Benicia</b>	\$79.28	\$79.28	\$79.28	\$184,722
<b>City of Hayward<sup>c</sup></b>	not provided	not provided	not provided	not provided
<b>City of Livermore</b>	\$40.00	\$40.00	\$40.00	\$312,440
<b>City of Millbrae</b>	\$54.95	\$54.95	\$65.24	\$82,205
<b>City of Palo Alto<sup>a</sup></b>	\$0.00	\$0.00	\$0.00	\$0
<b>City of Petaluma</b>	\$43.35	\$43.35	\$43.35	\$397,476
<b>City of San Jose</b>	\$30.00	\$30.00	\$30.00	\$1,602,150
<b>City of San Leandro</b>	\$36.95	\$36.95	\$36.95	\$280,451
<b>City of San Mateo</b>	\$34.75	\$34.75	\$34.75	\$240,157
<b>City of Santa Rosa</b>	\$1.84	\$7.52	\$3.90	\$126,691
<b>City of South San Francisco - San Bruno Water Quality Control Plant</b>	\$55.00	\$55.00	\$55.00	\$768,955
<b>City of Sunnyvale<sup>d</sup></b>	\$32.18	\$135.00	\$117.33	\$1,802,592
<b>Delta Diablo</b>	\$32.18	\$50.42	\$32.35	\$389,301
<b>Dublin San Ramon Services District</b>	\$3.50	\$3.50	\$3.50	\$131,250
<b>East Bay Municipal Utilities District</b>	\$30.40	\$36.22	\$33.69	\$2,561,426
<b>Fairfield-Suisun Sewer District</b>	\$22.00	\$22.00	\$22.00	\$246,818
<b>Las Gallinas Valley Sanitary District</b>	\$11.00	\$11.00	\$11.00	\$45,870
<b>Mt. View Sanitary District</b>	\$15.00	\$15.00	\$15.00	\$11,250
<b>Napa Sanitation District<sup>e</sup></b>	\$0.00	\$0.00	\$0.00	\$0
<b>Novato Sanitary District</b>	\$7.72	\$7.72	\$7.72	\$139,039

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<b>Oro Loma SD</b>	\$33.50	\$33.50	\$33.50	\$329,674
<b>San Francisco Public Utilities Commission</b>	\$42.32	\$94.42	\$60.70	\$4,449,015
<b>Sewer Authority Mid Coastside</b>	\$42.08	\$42.08	\$42.08	\$62,489
<b>Sewerage Agency of Southern Marin</b>	\$51.03	\$72.96	\$65.10	\$63,932
<b>Silicon Valley Clean Water</b>	\$36.98	\$150.00	\$40.44	\$862,925
<b>Union Sanitary District</b>	\$30.41	\$49.27	\$33.81	\$650,320
<b>Vallejo Sanitation and Flood Control District</b>	\$12.00	\$12.00	\$12.00	\$147,504
<b>West County Agency<sup>b</sup></b>	\$0.00	\$0.00	\$0.00	\$0
<b>Total</b>				\$16,138,073

<sup>a</sup> Onsite incineration. No cost reported.

<sup>b</sup> Solids hauled as part of agency's franchise agreement

<sup>c</sup> Costs not reported in survey, no response upon follow-up

<sup>d</sup> Contract with Synagro includes dewatering, therefore costs are not comparable to other agencies.

<sup>e</sup> Onsite disposal, no reported cost to agency

The range of hauling and tipping costs associated with each reuse and disposal alternative are plotted in **Figure 4**. For agencies with available land, onsite disposal is by far the cheapest option. Land application and landfill ADC are both relatively inexpensive when compared to compost, which begins at \$50 per wet ton. City of Sunnyvale costs for land application, landfill ADC, and compost included dewatering and were therefore omitted from Figure 4.

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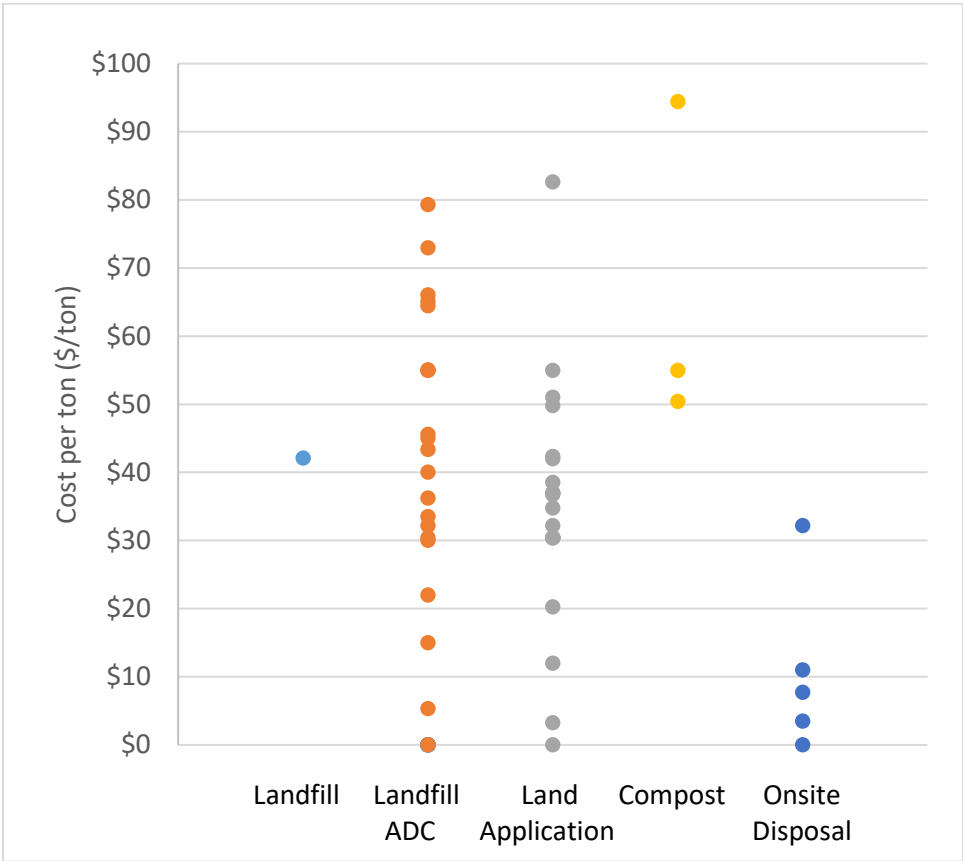


Figure 4. Tipping and Hauling Costs for each reuse/disposal alternative.

*Inset 4: Biosolids Land Application in Merced County*





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### 3.3 Hauling Distance

The range of round-trip hauling distances for each agency, as well as total ton-miles, are listed in **Table 4**. The ton-miles provides a metric for the total hauling burden for each agency. In future surveys, hauling distance trends will be tracked to see how they are changing over time.

**Table 4. Round-trip Distance Hauled**

	<b>Minimum distance hauled (miles)</b>	<b>Maximum distance hauled (miles)</b>	<b>Total ton-miles</b>
<b>Central Contra Costa Sanitary District</b>	0	0	0
<b>Central Marin Sanitation Agency</b>	35	296	327,318
<b>City of American Canyon</b>	64	64	12,608
<b>City of Benicia Plant</b>	60	60	139,800
<b>City of Hayward</b>	70	70	167,688
<b>City of Livermore</b>	14	172	434,834
<b>City of Millbrae</b>	131	200	275,464
<b>City of Palo Alto</b>	0	0	0
<b>City of Petaluma</b>	104	104	953,576
<b>City of San Jose</b>	2	2	106,810
<b>City of San Leandro</b>	250	250	1,897,500
<b>City of San Mateo</b>	140	150	1,005,820
<b>City of Santa Rosa</b>	1	47	625,844
<b>City of South San Francisco - San Bruno Water Quality Control Plant</b>	80	124	1,172,512
<b>City of Sunnyvale</b>	2	250	2,303,582
<b>Delta Diablo</b>	80	240	1,628,880
<b>Dublin San Ramon Services District</b>	0	0	0
<b>East Bay Municipal Utilities District</b>	90	260	12,456,330
<b>Fairfield-Suisun Sewer District</b>	20	20	224,380
<b>Las Gallinas Valley Sanitary District</b>	0	0	626
<b>Mt. View Sanitary District</b>	76	76	57,000
<b>Napa Sanitation District</b>	0	0	0
<b>Novato Sanitary District</b>	0	0	0
<b>Oro Loma SD</b>	62	62	610,142
<b>San Francisco Public Utilities Commission</b>	69	284	10,011,832
<b>Sewer Authority Mid Coastside</b>	5	5	7,722
<b>Sewerage Agency of Southern Marin</b>	43	58	46,126
<b>Silicon Valley Clean Water</b>	144	250	2,594,370
<b>Union Sanitary District</b>	70	252	3,101,667
<b>Vallejo Sanitation and Flood Control District</b>	26	26	319,592
<b>West County Wastewater District</b>	57	57	530,328

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## 3.4 Dewatering Statistics

The on-site methods employed by agencies to dewater biosolids prior to final use included drying beds, centrifuges, presses, and dryers. Dewatering equipment employed by each agency, as well as the resulting percentage of solids, is listed in **Table 5**.

**Table 5. Percentage Solids, Dewatering technology type and manufacturer for each agency**

Agency	Percent Solids	Dewatering Technology	Equipment Manufacturer
<b>Central Contra Costa Sanitary Agency</b>	20 to 30%	Centrifuge	Sharples
<b>Central Marin Sanitation Agency</b>	20 to 30%	Centrifuge	Centrisys CS 18-4
<b>City of American Canyon</b>	10 to 20%	screw press	OR-TEC Rocker
<b>City of Benicia</b>	10 to 20%	Belt Filter Press	Ashbrook-Simon-Hartley belt press
<b>City of Hayward</b>	90 to 99.99%	Drying Bed	drying bed
<b>City of Livermore</b>	10 to 20%	Belt Filter Press	Ashbrooks
<b>City of Millbrae</b>	10 to 20%	Belt Filter Press	Andritz (pilgrim) Press. Netzsch cake progressive cavity pump
<b>City of Palo Alto</b>	20 to 30%	Belt Filter Press	Ashbrook Simon-Hartley, Model WP (i.e., Bellmer Winklepress)
<b>City of Petaluma</b>	10 to 20%	Screw Press	FKC Co. Ltd
<b>City of San Jose</b>	90 to 99.99%	Drying Bed	We currently use drying beds
<b>City of San Leandro</b>	90 to 99.99%	Belt Filter Press, Drying Bed	BDP 2-meter Belt Filter Press
<b>City of San Mateo</b>	20 to 30%	Centrifuge	Westfalia Bowl&Scroll
<b>City of Santa Rosa*</b>	10 to 20%	Belt Filter Press	Ashbrook Corp
<b>City of South San Francisco - San Bruno Water Quality Control Plant</b>	10 to 20%	Belt Filter Press	(2) Komline Sanderson two meter belt filter presses, ten roll
<b>City of Sunnyvale</b>	20 to 30%	Centrifuge, Drying Bed	Andritz (centrifuge) and FRC (belt press)
<b>Delta Diablo</b>	20 to 30%	Centrifuge	Flottweg
<b>Dublin San Ramon Services District</b>	0 to 5%	No dewatering	N/A
<b>East Bay Municipal Utility District</b>	20 to 30%	Centrifuge	3 Humbolt; 2 Flottweg
<b>Fairfield-Suisun Sewer District</b>	20 to 30%	Drying Bed, screw press	FKC Screw Press
<b>Las Gallinas Valley Sanitary District</b>	5 to 10%	Biosolids are thickened in sludge lagoons	None
<b>Mt. View Sanitary District</b>	30 to 40%	Centrifuge	Alfa Laval
<b>Napa Sanitation District</b>	10 to 20%	Belt Filter Press	Ashbrook
<b>Novato Sanitary District</b>	5 to 10%	sludge lagoons	NA

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<b>Oro Loma SD</b>	40 to 90%	Belt Filter Press	Two - 2.0M BDP Presses
<b>San Francisco Public Utilities Commission</b>	20 to 30%	Centrifuge and Screw Press	Southeast Plant - Sharples and Gulfcoast Centrifuges; Oceanside Plant - Fukoku Kogyo
<b>Sewer Authority Mid Coastside</b>	10 to 20%	Belt Filter Press	Ashbrook
<b>Sewerage Agency of Southern Marin</b>	20 to 30%	Belt Filter Press	BDP Industries 3DP (for the belt press)
<b>Silicon Valley Clean Water</b>	40 to 90%	Centrifuge	Primary Fournier Filter Press, standby Contec Centrifuge
<b>Union Sanitary District</b>	20 to 30%	Centrifuge	Andritz
<b>Vallejo Sanitation and Flood Control District</b>	20 to 30%	Belt Filter Press	Ashbrook
<b>West County Wastewater District</b>	40 to 90%	Drying bed	

## 4. Challenges and Future Planning

### 4.1 Challenges

Agencies were asked to rank the challenges facing their biosolids program. The following challenges were ranked from the aggregate responses from most to least important.

1. Rising costs
2. Regulatory restrictions on using biosolids for alternative daily cover
3. Securing long term disposal options
4. Hauling distance
5. Public perception/relations
6. Space for drying operations
7. Local restrictions on land application
8. Wet weather impeding drying operations
9. Other

Reasons listed as “other” included lack of space for drying beds, and sea level rise related to height restrictions for levees.

Another challenge mentioned is the impact of increasing air quality regulations that limit biosolids treatment options by potentially creating compliance issues and future uncertainty. For example, high temperature drying uses less space but requires combustion of natural gas, which increases both conventional pollutants and greenhouse gas emissions. These impacts

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might require pollutant offsets or cause an agency to exceed regulatory thresholds for additional programs<sup>6</sup>.

### **4.2 Future Biosolids Management Plans**

The survey asked respondents about their plans for biosolids management in 2016, in five years, and beyond 2025 when ADC may be phased out as a reuse alternative. Only two agencies were planning to make changes in 2016:

- Fairfield-Suisun Sewerage District: *“In 2015, the District embarked on a public-private partnership with Lystek to develop a regional Organic Materials Recovery Center (OMRC) at the District WWTP. The OMRC will transform 100% of the District's biosolids into federally-registered liquid fertilizers.”* (see inset on pg. 12 on Lystek facility).
- SFPUC: *“We plan to: initiate an in-city biosolids gardening demonstration; produce Class A biosolids at our Oceanside Plant via TPAD; develop products for Class A cake; begin construction on our Southeast Plant for Class A conversion; engage in 3 research projects; participate on a hydrolysis pilot project.”*

Agencies' responses on their plans for management in five years and beyond 2025 are listed in **Table 6**. Of the thirty-one responding agencies, only twelve have concrete plans for beyond 2025.

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*Inset 5: City of San Jose, preparation to transfer biosolids to Newby Landfill*



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<sup>6</sup> These programs may include, among others, Title V, the State Cap and Trade program, or the Bay Area Air Quality Management District's proposed Rule 11-18.

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**Table 6. Plans for biosolids in 5 years and beyond 2025**

<b>Name of agency</b>	<b>Plans for biosolids in 5 years</b>	<b>Plans for biosolids beyond 2025, if any</b>
<b>Central Contra Costa Sanitary District</b>	Same plan/strategy	Same plan/strategy
<b>Central Marin Sanitation Agency</b>	Participating in various programs to explore biosolids diversification options, such as the Bay Area Biosolids to Energy Coalition. CMSA recently initiated a facilities master plan that include a task to determine future biosolids options.	
<b>City of American Canyon</b>	continue ADC and/or land application	
<b>City of Benicia -</b>	Same plan/strategy	
<b>City of Hayward</b>	unknown	
<b>City of Livermore</b>	same plan	
<b>City of Millbrae</b>	Currently we are doing a study for class A Biosolids and Pelletizing	
<b>City of Palo Alto</b>	Decommission incinerators and switch to dewater and haul facility that would haul unstabilized biosolids for final treatment at another facility	Currently in development
<b>City of Petaluma</b>	Same plan as 2016, while continuing to evaluate future reuse options.	Comply with all biosolids regulations using a diversified biosolids reuse portfolio
<b>City of San Jose</b>	We plan to have a new mechanical dewatering facility and transition out of our drying beds. The City is also looking into diversification options for final use. At this time we are planning to look into diverse contractual	We plan to have a diversified portfolio that includes multiple contracts for reuse. We are also transition our current mesophilic digestion process to a Temperature Phased Anaerobic Digestion (TPAD) process to provide flexibility to add batch tanks in the future if there is the need to provide Class A biosolids.

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	options to haul our Class B biosolids for potential further treatment and reuse.	
<b>City of San Leandro</b>	Evaluating technologies to increase gas production and reduce biosolids production	
<b>City of San Mateo</b>	Similar treatment	Likely shifting to thermophilic AD/ increase digester # for Class A product.
<b>City of Santa Rosa</b>	Same strategy at this point	Same strategy at this point
<b>City of South San Francisco - San Bruno Water Quality Control Plant</b>	Continue ADC	
<b>City of Sunnyvale</b>	Same plan as 2015.	Construction of a new Thickening/Dewatering Facility by 2025, concurrent with new Secondary Treatment Facilities. Assessing equipment options, such as rotary drum thickeners, screw presses, bioscrubber and other emerging technologies
<b>Delta Diablo</b>	Investigating biosolids to energy options and interested in reducing the volume of biosolids produced	
<b>Dublin San Ramon Services District</b>	We may dewater a small portion of the biosolids in 5 years	We are exploring a number of options, we are currently working on an updated treatment plant and biosolids master plan
<b>East Bay Municipal Utility District</b>	unknown, likely not landfill ADC	We are developing a biosolids master plan.
<b>Fairfield-Suisun Sewer District</b>	The District intends to send 100% of its biosolids to the Lystek OMRC	The District intends to send 100% of its biosolids to the Lystek OMRC
<b>Las Gallinas Valley Sanitary District</b>	Most likely same as current	

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<b>Mt. View Sanitary District</b>	We are looking at other possibilities: Lystek, Bioforce	We are working on it
<b>Napa Sanitation District</b>	Continue existing plan/strategy	Continue existing plan/strategy
<b>Novato Sanitary District</b>	Continue to use the DLD	Continue to use the DLD
<b>Oro Loma Sanitary District</b>	We negotiated a fixed price (with CPI escalator) until 2027.	We negotiated a fixed price (with CPI escalator) until 2027.
<b>San Francisco Public Utilities Commission</b>	In five years, we plan to be actively engaged in soil blending projects, and we expect the conversion of our Southeast plant to Class A to be near completion.	We plan: a complete phase-out from landfill; to develop multiple outlets including soil blending and land application; to mature the local biosolids to soil demonstrations; to actively collaborate with academia on monitoring trace organic compounds; to strengthen soil blending operations using San Francisco's Class A biosolids as feedstock; to strengthen regional partnerships promoting biosolids safety and benefits.
<b>Sewer Authority Mid Coastside</b>	No change	
<b>Sewerage Agency of Southern Marin</b>	Same plan/strategy	The Waste Management site is planning to incorporate composting Class A onsite before 2025 once funding is secured.
<b>Silicon Valley Clean Water</b>	Not defined	
<b>Union Sanitary District</b>	Possibly increase percentage sent to composting facility and possibly pilot small amount of solids other option like Lystek.	
<b>Vallejo Sanitation and Flood Control District</b>	Continue to land apply at Tubbs	Land apply at Tubbs as long as possible
<b>West County Wastewater District</b>	Same plan/strategy as 2016.	

### 5. Public Outreach

#### 5.1 Marketing

The survey asked whether agencies directly market their biosolids products. Only Santa Rosa replied in the affirmative, that they market their compost. In Southern California, seven of 33 agencies surveyed report that they directly market their biosolids products.

#### 5.2 Outreach and Education

Agencies were asked whether they conduct any outreach or education pertaining to their biosolids programs, and via what venue. Only six agencies replied that they conduct outreach pertaining to biosolids, and they use a combination of YouTube videos, their website, and print media. In Southern California, sixteen of the 33 respondents reported they use social media to promote their biosolids program, as illustrated in **Figure 5**.

Seventeen agencies in this survey replied that they conduct outreach but not for biosolids in particular. Seven agencies replied that they do not conduct outreach at all.

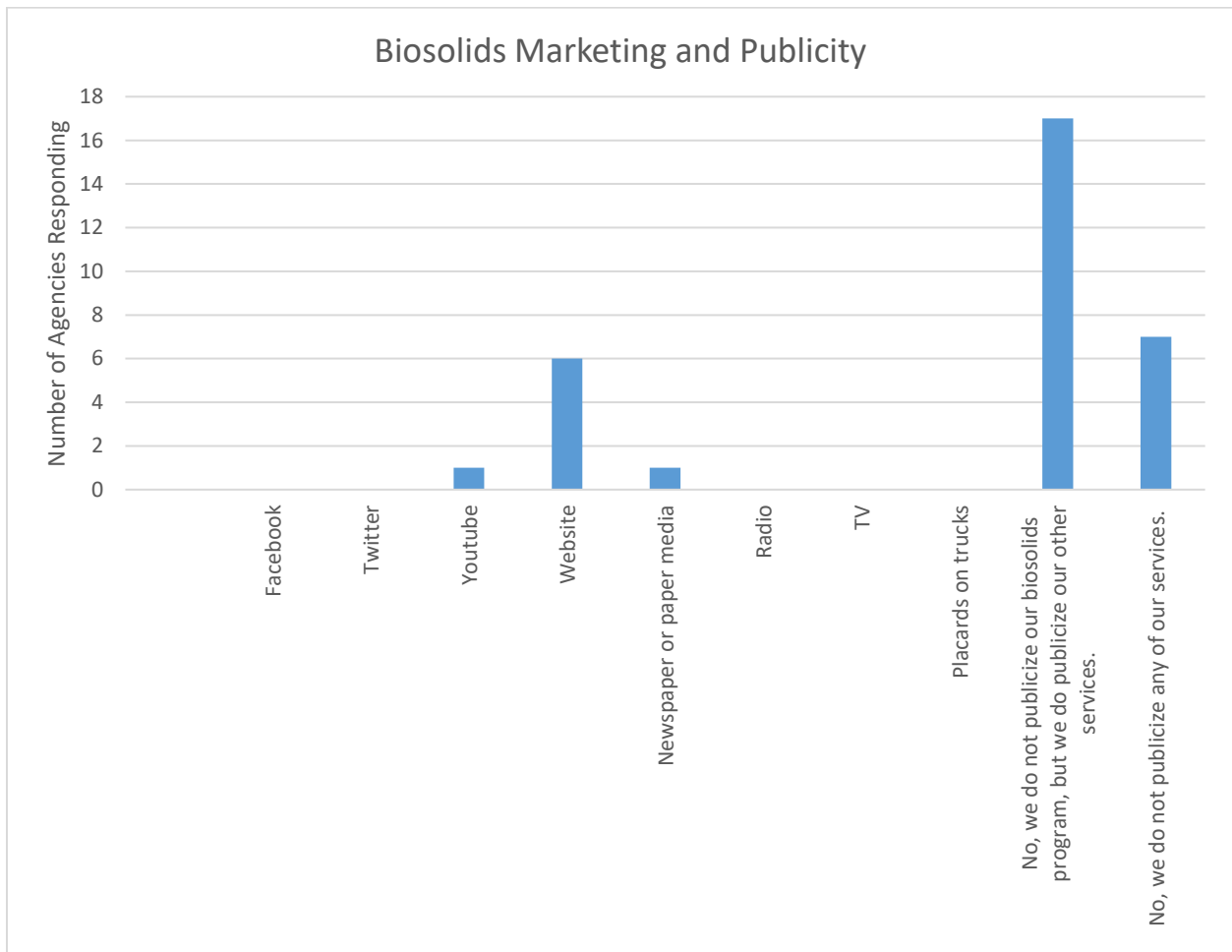
### 6. Biosolids Staff

The final survey question asked respondents whether their agencies have dedicated biosolids staff, and if so, how many full time equivalent positions (FTUs). Twenty-nine agencies responded that they do not have dedicated staff, with the following exceptions:

- City of Santa Rosa – 9 FTUs
- City of Sunnyvale – 2 contractors



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**Figure 5. Number of agencies doing biosolids marketing and publicity via traditional and social media.**

### 7. Future Surveys

BACWA intends to repeat this survey in 2018, and every two years thereafter. This will give the Region the ability to track changes in biosolids trends over time. Additionally, the Biosolids Committee may choose to expand the scope of this survey to a greater geographical area. BACWA member agencies are all permitted by the San Francisco Regional Water Quality Control Board, but the Regional Water Board's jurisdiction does not have a bearing on biosolids regulation or management.

If the next two years brings clarity on the future regulatory scenarios for biosolids reuse and disposal in California, future survey questions may be refined to better understand how agencies are responding to this shifting landscape.

*Inset 6. City of San Jose dredges sludge from lagoons. Roughly 1 MGD of digester effluent is pumped to Residual Sludge Management area sludge lagoons where the material consolidates for 3 to 4 years. Consolidated material is then pumped to drying beds for one drying season.*

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# BACWA 2016 Biosolids Trends Survey

## APPENDIX A – AGENCY DATA: 2015 Reuse and Disposal Alternatives

Central Contra Costa Sanitary District	
	Destination 1
<b>type</b>	incineration
<b>location</b>	onsite
<b>wet tons</b>	72,297
<b>cost (\$/ton)</b>	\$0
<b>distance (miles)</b>	0

Central Marin Sanitation Agency					
	Destination 1	Destination 2	Destination 3	Destination 4	Destination 5
<b>type</b>	ADC	Land Application	Land Application	Land Application	Other Products
<b>location</b>	Redwood Landfill, Novato	Synagro's Sonoma County land application site	Synagro's Solano County land application site	Synagro's Merced County land application site	Lystek Organic Material Recovery Center @ FSSD
<b>wet tons</b>	3,608	582	1,692	18	0
<b>cost (\$/ton)</b>	\$45.58	\$38.53	\$36.75	\$20.25	n/a
<b>distance (miles)</b>	34.6	36.4	104	296	86.4

City of American Canyon	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Hay Road Landfill, Solano County
<b>wet tons</b>	197
<b>cost (\$/ton)</b>	\$0.00
<b>distance (miles)</b>	64

City of Benicia	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Hay Road Landfill, Vacaville, California
<b>wet tons</b>	2,330
<b>cost (\$/ton)</b>	\$79.28
<b>distance (miles)</b>	60

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City of Hayward	
	Destination 1
<b>type</b>	Landfill
<b>location</b>	Altamont Landfill & Resource Recovery Facility
<b>wet tons</b>	2395.54
<b>cost (\$/ton)</b>	not reported
<b>distance (miles)</b>	70

City of Livermore		
	Destination 1	Destination 2
<b>type</b>	ADC	Land App
<b>location</b>	Vasco Rd Landfill	Robinson Ranch, Winton, CA
<b>wet tons</b>	5,751	2,060
<b>cost (\$/ton)</b>	\$40.00	\$40.00
<b>distance (miles)</b>	14	172

City of Millbrae				
	Destination 1	Destination 2	Destination 3	Destination 4
<b>type</b>	Land App	Land App	Compost	ADC
<b>location</b>	Merced County	Sacramento County	Merced County	ADC
<b>wet tons</b>	223	916	121	236
<b>cost (\$/ton)</b>	\$54.95	\$54.95	\$54.95	\$54.95
<b>distance (miles)</b>	131	100	131	200

City of Palo Alto	
	Destination 1
<b>type</b>	incineration
<b>location</b>	onsite
<b>wet tons</b>	34,680
<b>cost (\$/ton)</b>	\$0
<b>distance (miles)</b>	0

City of Petaluma	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Hay Road Landfill
<b>wet tons</b>	9,294
<b>cost (\$/ton)</b>	\$43.35
<b>distance (miles)</b>	104

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City of San Jose	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Newby Island Landfill
<b>wet tons</b>	53,405
<b>cost (\$/ton)</b>	\$30.00
<b>distance (miles)</b>	2

City of San Leandro	
	Destination 1
<b>type</b>	Land App
<b>location</b>	Robinson Ranch, Merced
<b>wet tons</b>	7,590
<b>cost (\$/ton)</b>	\$36.95
<b>distance (miles)</b>	250

City of San Mateo		
	Destination 1	Destination 2
<b>type</b>	Land App	ADC
<b>location</b>	Solano Co,	Potrero Hills Landfill- Contra Costa
<b>wet tons</b>	3,828	3,083
<b>cost (\$/ton)</b>	\$34.75	\$34.75
<b>distance (miles)</b>	150	140

City of Santa Rosa									
	Dest. 1	Dest. 2	Dest. 3	Dest. 4	Dest. 5	Dest. 6	Dest. 7	Dest. 8	Dest. 9
<b>type</b>	landfill	Land app	Land App	Land App	Land App	Land App	Land App	Compo st	Storage
<b>location</b>	landfill	South County land app	South County land app via storage	stone farm	stone farm via storage	brown farm	brown farm via storage	City of Santa Rosa Compo st Facility	Alpha Storage for use in 2016
<b>wet tons</b>	2349	9382	2591	22	399	180	568	8514	3971
<b>cost (\$/ton)</b>	\$5.33	\$5.33 - \$7.96	\$6.21 - \$8.83	\$4.30	\$3.24	\$3.24	\$3.24	\$1.84	\$3.24
<b>distance (miles)</b>	24	36.5 - 57	36.5 - 57	6.9	4.9	4.5	4.5	0.5	6

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City of South San Francisco - San Bruno Water Quality Control Plant		
	Destination 1	Destination 2
<b>type</b>	ADC	ADC
<b>location</b>	Newby Island Landfill	Potrero Hills Landfill, Suisun City
<b>wet tons</b>	12,753	1,228
<b>cost (\$/ton)</b>	\$55.00	\$55.00
<b>distance (miles)</b>	80	124

City of Sunnyvale						
	Destination 1	Destination 2	Destination 3	Destination 4	Destination 5	Destination 6
<b>type</b>	Land App	Land App	ADC	ADC	Compost	Onsite Disposal
<b>location</b>	Sacramento County	Merced County	Vasco Road Landfill	Potrero Hills Landfill	Central Valley Composting Facility	Sunnyvale Biosolids Monofill
<b>wet tons</b>	6,685	5,015	93	609	321	2,641
<b>cost (\$/ton)</b>	\$135.00	\$135.00	\$135.00	\$135.00	\$135.00	\$14.63
<b>distance (miles)</b>	130	250	80	160	220	2

Delta Diablo			
	Destination 1	Destination 2	Destination 3
<b>type</b>	Land App	ADC	Compost
<b>location</b>	Various Sacramento and Solano County sites	Potrero Hills Landfill	Synagro's El Nido Compost Facility
<b>wet tons</b>	10,800	1,119	114
<b>cost (\$/ton)</b>	\$32.18	\$32.18	\$50.42
<b>distance (miles)</b>	140	80	240

Dublin San Ramon Sanitary District	
	Destination 1
<b>type</b>	Onsite Disposal
<b>location</b>	DSRSD
<b>wet tons</b>	37,500
<b>cost (\$/ton)</b>	\$3.50
<b>distance (miles)</b>	0

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East Bay Municipal Utilities District		
	Destination 1	Destination 2
<b>type</b>	ADC	Land App
<b>location</b>	landfill ADC	land application
<b>wet tons</b>	43,001	33,024
<b>cost (\$/ton)</b>	\$30.40	\$36.22
<b>distance (miles)</b>	90	260

Fairfield-Suisun Sewer District	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Potrero Hills Landfill
<b>wet tons</b>	11,219
<b>cost (\$/ton)</b>	\$22.00
<b>distance (miles)</b>	20

Las Gallinas Valley Sanitary District	
	Destination 1
<b>type</b>	Onsite Disposal
<b>location</b>	LGVSD
<b>wet tons</b>	4,170
<b>cost (\$/ton)</b>	\$11.00
<b>distance (miles)</b>	0.15

Mt. View Sanitary District	
	Destination 1
<b>type</b>	ADC
<b>location</b>	B&J Hay Road Landfill
<b>wet tons</b>	750
<b>cost (\$/ton)</b>	\$15.00
<b>distance (miles)</b>	76

Napa Sanitation District	
	Destination 1
<b>type</b>	Onsite Disposal
<b>location</b>	NSD
<b>wet tons</b>	6,846
<b>cost (\$/ton)</b>	\$0.00
<b>distance (miles)</b>	0

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Novato Sanitary District	
	Destination 1
<b>type</b>	Onsite Disposal
<b>location</b>	Novato Designated Land Disposal
<b>wet tons</b>	18,000
<b>cost (\$/ton)</b>	\$7.72
<b>distance (miles)</b>	0

Oro Loma SD	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Altamont Landfill
<b>wet tons</b>	9,841
<b>cost (\$/ton)</b>	\$33.50
<b>distance (miles)</b>	62

San Francisco Public Utilities Commission							
	Destination 1	Destination 2	Destination 3	Destination 4	Destination 5	Destination 6	Destination 7
<b>type</b>	Land App	Land App	Land App	Compost	ADC	ADC	ADC
<b>location</b>	Sonoma County	Solano County	Sacramento County	Merced	Hay Road Landfill	Potrero Hills Landfill	Altamont Landfill
<b>wet tons</b>	2,349	21,549	4,324	3,371	20,376	14,512	2,125
<b>cost (\$/ton)</b>	\$42.32	\$49.81	\$82.64	\$94.42	\$65.12	\$64.43	\$66.06
<b>distance (miles)</b>	69	126	246	284	124	136	136

Sewer Authority Mid Coastside	
	Destination 1
<b>type</b>	Landfill
<b>location</b>	Ox Mountain Landfill
<b>wet tons</b>	1,485
<b>cost (\$/ton)</b>	\$42.08
<b>distance (miles)</b>	5.2

Sewerage Agency of Southern Marin		
	Destination 1	Destination 2
<b>type</b>	ADC	Land App
<b>location</b>	Waste Management Inc. (Redwood Landfill),	Synagro, Land Application
<b>wet tons</b>	700	252
<b>cost (\$/ton)</b>	\$72.96	\$51.03
<b>distance (miles)</b>	43	58



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Silicon Valley Clean Water					
	Destination 1	Destination 2	Destination 3	Destination 4	Destination 5
<b>type</b>	Compost	Land App	Land App	Land App	ADC
<b>location</b>	Central Valley Compost	Solano County	Merced County	Silva Ranch Sacramento County	Potrero Hills Landfill
<b>wet tons</b>	2,981	67	120	4,330	5,044
<b>cost (\$/ton)</b>	\$150.00	\$36.98	\$36.98	\$41.98	\$45.01
<b>distance (miles)</b>	250	150	250	250	144

Union Sanitary District					
	Destination 1	Destination 2	Destination3	Destination 4	Destination 5
<b>type</b>	Compost	Land App	Land App	Land App	ADC
<b>location</b>	Central Valley Composting Facility	Merced County	9896 WT	Solano County	Vasco Road Landfill
<b>wet tons</b>	3,470	3,319	9,896	98	2,450
<b>cost (\$/ton)</b>	\$49.27	\$30.41	\$30.41	\$30.41	\$30.41
<b>distance (miles)</b>	252	220	161	147	70

Vallejo Sanitation and Flood Control District	
	Destination 1
<b>type</b>	Land App
<b>location</b>	Tubbs Island, Sonoma County
<b>wet tons</b>	12,292
<b>cost (\$/ton)</b>	\$12.00
<b>distance (miles)</b>	26

West County Wastewater District	
	Destination 1
<b>type</b>	ADC
<b>location</b>	Keller Canyon, Pittsburg
<b>wet tons</b>	9,304
<b>cost (\$/ton)</b>	\$0.00
<b>distance (miles)</b>	57