

NATIONAL BIOSOLIDS DATA PROJECT



PRELIMINARY RESULTS

Iowa WEA 30th Annual Biosolids Conference

March 16, 2022
DMACC Ankeny Campus

Ned Beecher, NEBRA (presenting virtually)

Juliana Beecher, NEBRA

Janine Burke-Wells, NEBRA

Jen Lichtensteiger, NEIWPCC



BACKGROUND

NATIONAL BIOSOLIDS DATA PROJECT

- 1st Survey 2004 data outdated



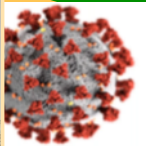
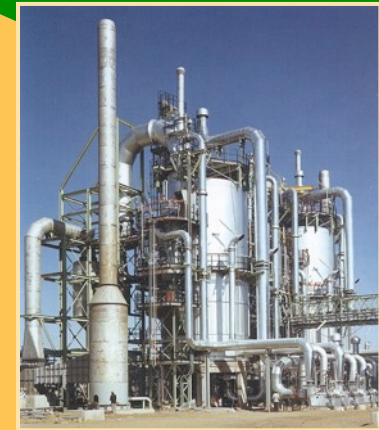
- Comprehensive Biosolids Update Needed
 - Regulation
 - Quality
 - End Use and Disposal Data



BACKGROUND

COLLABORATING WITH... NE REGIONAL SLUDGE GENERATION PROJECT BY NEIWPCC

- Stressors on Solids Management
 - Pandemic
 - Aging Infrastructure
 - Emerging Contaminants
- Solids Disposal Options
 - Incinerators
 - Landfills
 - Beneficial Reuse

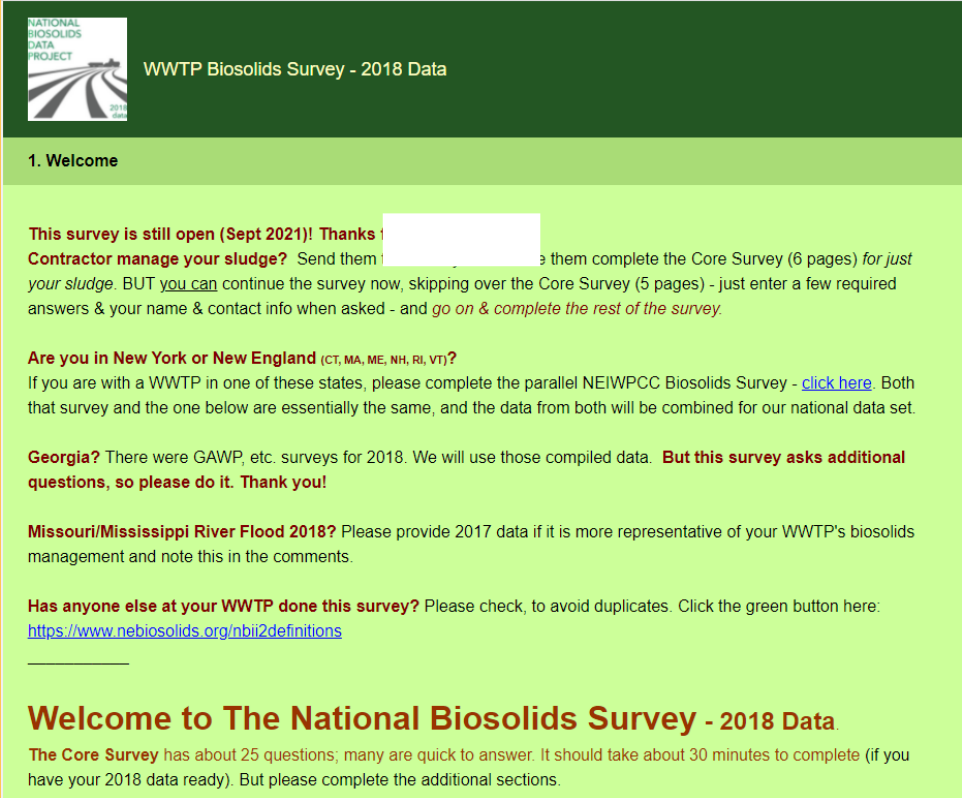


BACKGROUND

NATIONAL BIOSOLIDS DATA PROJECT

2 Separate Online Surveys:

- Biosolids Coordinators Survey – 2018 Data
 - Spreadsheet
 - Online Survey
- WWTP Survey – 2018 Data



The screenshot shows the "WWTP Biosolids Survey - 2018 Data" page. At the top, there is a header with the "NATIONAL BIOSOLIDS DATA PROJECT" logo and the title "WWTP Biosolids Survey - 2018 Data". Below the header, the page is titled "1. Welcome". The main content area is light green and contains several paragraphs of text. The first paragraph states: "This survey is still open (Sept 2021)! Thanks [redacted] Contractor manage your sludge? Send them [redacted] them complete the Core Survey (6 pages) for just your sludge. BUT you can continue the survey now, skipping over the Core Survey (5 pages) - just enter a few required answers & your name & contact info when asked - and go on & complete the rest of the survey." The second paragraph asks: "Are you in New York or New England (CT, MA, ME, NH, RI, VT)?" and provides instructions for users in these states to complete a parallel NEIWPCC Biosolids Survey. The third paragraph mentions "Georgia?" and states that data from GAWP, etc. surveys for 2018 will be used, but this survey asks additional questions. The fourth paragraph asks for "Missouri/Mississippi River Flood 2018?" data. The fifth paragraph asks if anyone else at the WWTP has done the survey and provides a link to "https://www.nebiosolids.org/nbi2definitions". The page concludes with a "Welcome to The National Biosolids Survey - 2018 Data" section, stating that the Core Survey has about 25 questions and should take about 30 minutes to complete.

1. Welcome

This survey is still open (Sept 2021)! Thanks [redacted]
Contractor manage your sludge? Send them [redacted] them complete the Core Survey (6 pages) for just your sludge. BUT you can continue the survey now, skipping over the Core Survey (5 pages) - just enter a few required answers & your name & contact info when asked - and go on & complete the rest of the survey.

Are you in New York or New England (CT, MA, ME, NH, RI, VT)?
If you are with a WWTP in one of these states, please complete the parallel NEIWPCC Biosolids Survey - [click here](#). Both that survey and the one below are essentially the same, and the data from both will be combined for our national data set.

Georgia? There were GAWP, etc. surveys for 2018. We will use those compiled data. **But this survey asks additional questions, so please do it. Thank you!**

Missouri/Mississippi River Flood 2018? Please provide 2017 data if it is more representative of your WWTP's biosolids management and note this in the comments.

Has anyone else at your WWTP done this survey? Please check, to avoid duplicates. Click the green button here:
<https://www.nebiosolids.org/nbi2definitions>

Welcome to The National Biosolids Survey - 2018 Data.
The **Core Survey** has about 25 questions; many are quick to answer. It should take about 30 minutes to complete (if you have your 2018 data ready). But please complete the additional sections.

SURVEY TOPICS

NATIONAL BIOSOLIDS DATA PROJECT

- WWTP Survey Topics
 - General
 - Sewage Sludge and Biosolids
 - Septage Received
 - Energy
 - Economic Data
 - Trends
 - Top 5 Pressures on Biosolids Management Program



PRELIMINARY RESULTS

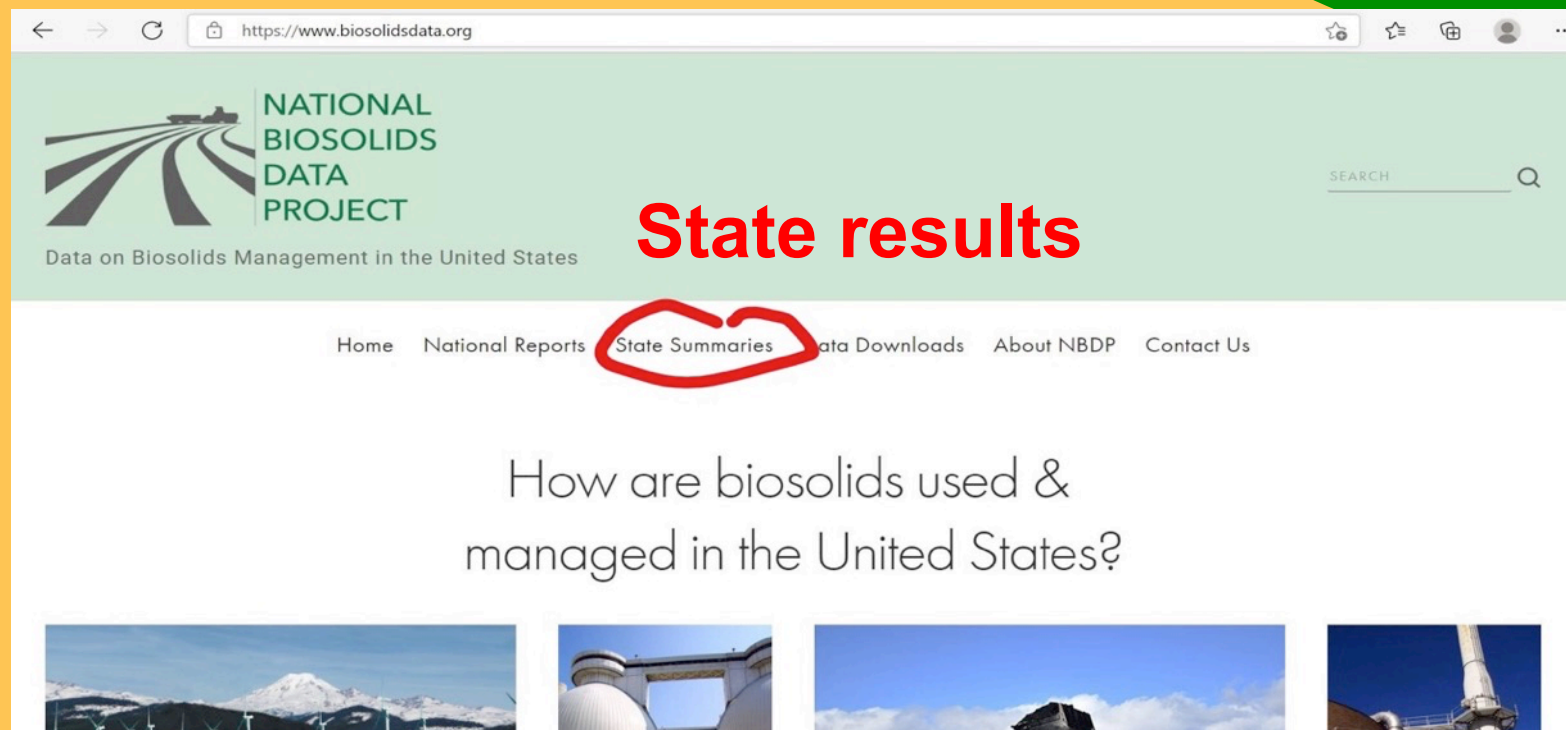
TRENDS: FROM 2004 TO 2018

- More Class A biosolids being produced
- Decrease in biosolids being incinerated
- More pressures and incentives to divert from landfills
- Decreases in state FTEs – significant



PRELIMINARY RESULTS

RESULTS AT [WWW.BIOSOLIDSDATA.ORG](https://www.biosolidsdata.org)



NAVIGATING STATE DATA

PROJECT WEBSITE:
WWW.BIOSOLIDSDATA.ORG

State Summaries

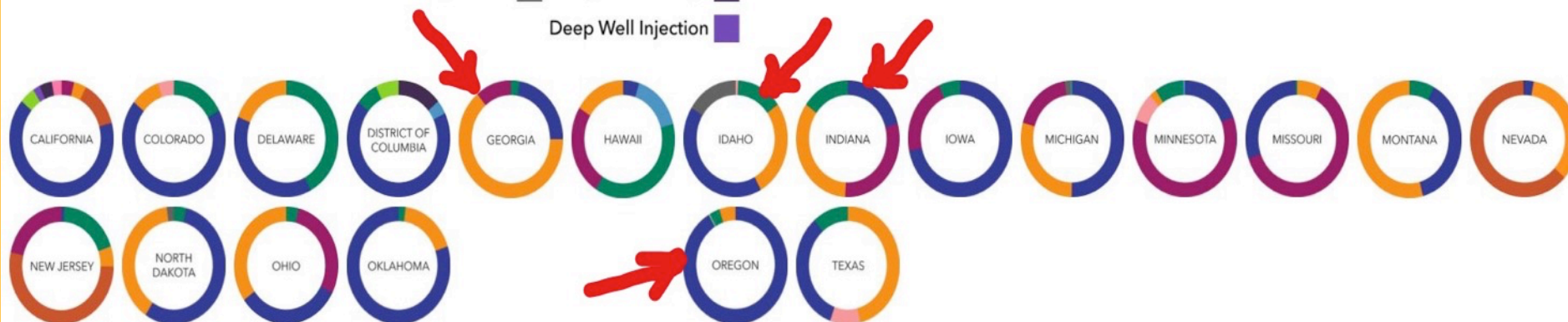
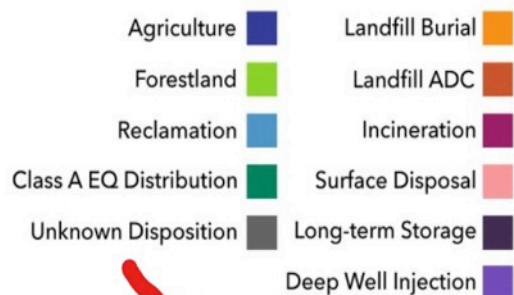
2018 Data 2004 Data

Click on a state below for a summary and details of its 2018 biosolids management.

For state data from 2004, compiled in the first survey on National Biosolids Regulation, Quality, End Use and Disposal, click to Appendix D of that final report (NEBRA et al. 2007).

BIOSOLIDS USE & DISPOSAL IN 2018

APPENDIX D, STATE-WIDE 2004 DATA



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QUIZ

1. Where do they produce the EQ biosolids named “Bloom?”

CHOICES

District of
Columbia
Indiana
California
Florida
Connecticut

South Dakota
Georgia
Maine
Nevada
Kentucky

QUIZ

2. Which western state's 64,600 dry metric tons of solids went almost entirely (97%) to landfills in 2018?

CHOICES

District of
Columbia
Indiana
California
Florida
Connecticut

South Dakota
Georgia
Maine
Nevada
Kentucky

NAVIGATING STATE DATA

Iowa Biosolids

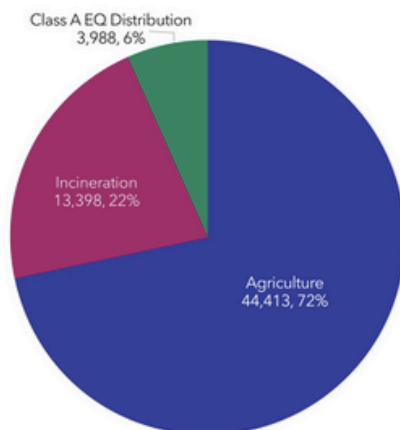
State Data

Confidence in data for this state:

HIGH

2018 data unless noted.

Iowa Biosolids Use & Disposal 2018
(dry metric tons, %)
Total: 61,800



Iowa Septage Management 2018
(% estimated)
Total: 40,000,000 gallons



Biosolids dry cake land application near Dubuque, IA. Photo courtesy of Nutri-Ject Systems, Inc.

State Statistics Dashboard

Demographics & Wastewater

Avg population served per WRRF	2,718
Avg wastewater flow statewide (MGD)	907
WRRFs treating >75% WW flow	79
% of population served by on-site (septic) syste...	26
Biosolids used or disposed / person in 2018 (lbs)	58

Biosolids Application

% of state area in cropland	73.88%
% cropland to which biosolids were applied	0.57%
application rate if all state biosolids were applied to cropland (dt/acre)	0.862
% cropland needed if all biosolids were applied at typical rate of ~3dt/acre	0.188

State Summary

- Iowa has abundant agriculture, and biosolids recycling to soils is prevalent, routine, economical, and encouraged. Landfill disposal of sewage sludge is discouraged and landfill disposal Class A or Class B biosolids is prohibited.
- Nutrient management is a growing concern statewide; effluent standards and non-point nutrient sources are a focus – and biosolids might be.
- Des Moines – the state's largest WRRF – is a national leader in advanced anaerobic digestion and renewable natural gas (RNG) production, putting to use the abundant food processing and other liquid wastes available for co-digestion.
- IA DNR provides robust data on biosolids treatment technologies; see the state's data spreadsheet.

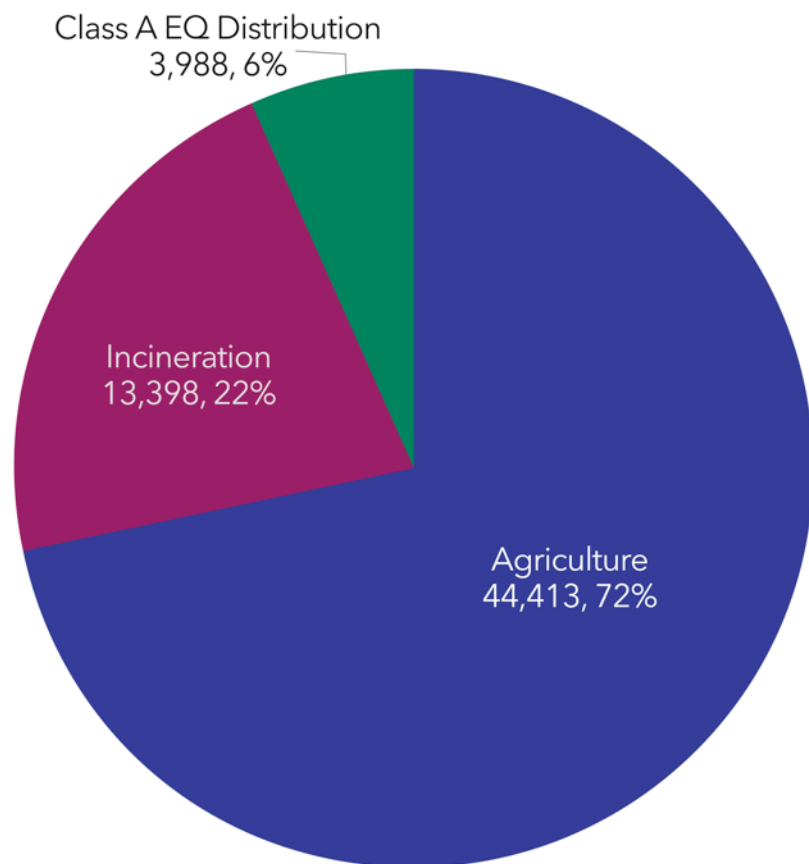
[STATE NARRATIVE SUMMARY REPORT \(PDF\)](#)



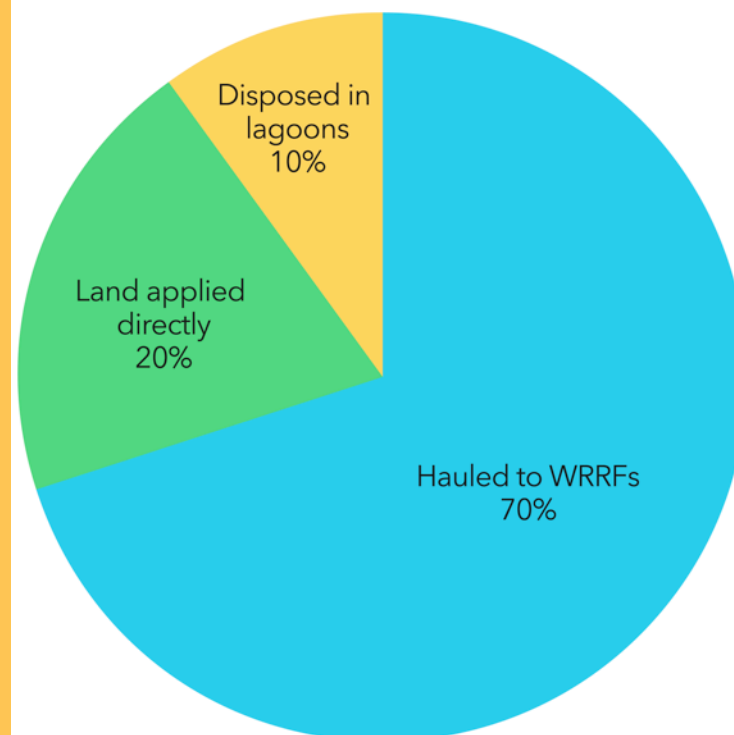
NAVIGATING STATE DATA

EXAMPLE: IOWA

Iowa Biosolids Use & Disposal 2018
(dry metric tons, %)
Total: 61,800



Iowa Septage Management 2018
(% estimated)
Total: 40,000,000 gallons



State Statistics Dashboard

Demographics & Wastewater

Avg population served per WRRF	2,718
Avg wastewater flow statewide (MGD)	507
WRRFs treating >75% WW flow	70
% of population served by on-site (septic) syste..	25
Biosolids used or disposed / person in 2018 (lbs)	39

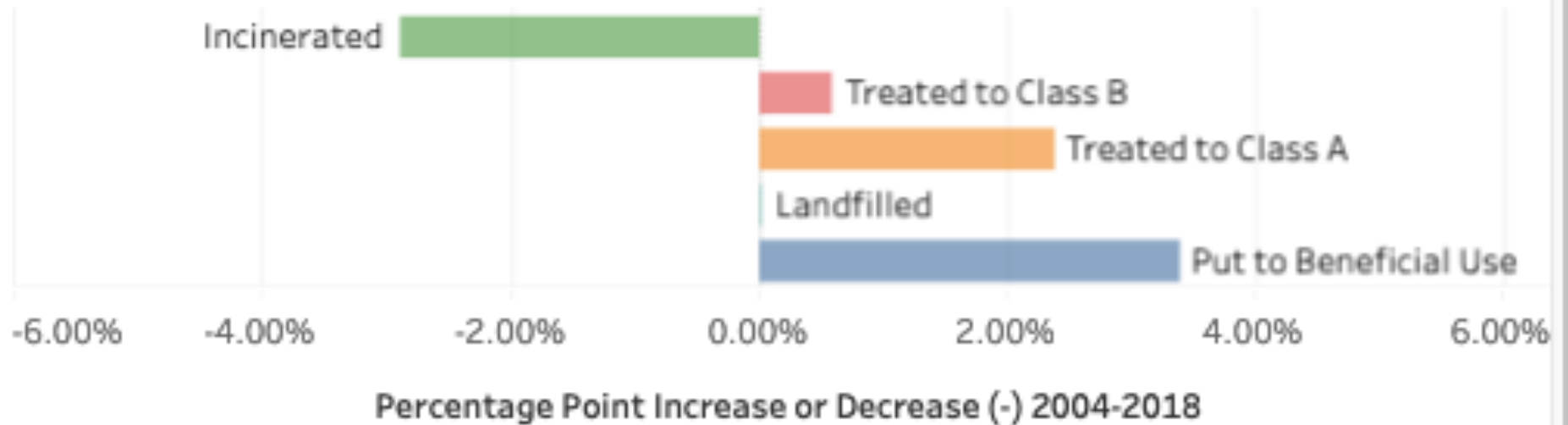
Biosolids Application

% of state area in cropland	74.000
% cropland to which biosolids were applied	0.070
application rate if all state biosolids were applied to cropland (dt/acre)	0.002
% cropland needed if all biosolids were applied at typical rate of ~3dt/acre	0.100
If all state's biosolids applied, what % of state's applied N would come from biosolids?	0.200
If all state's biosolids applied, what % of state's applied P would come from biosolids?	0.400

Changes in Biosolids Use & Disposal

Change* in solids reported used or disposed from 2004 to 2018: **-5,201** dry metric tons

*change may be due to changes in population or solids treatment, and/or different systems of data tracking and reporting.



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DASHBOARD

Iowa State Biosolids Statistics

Data Quality & Methods	2018	explanations & sources
<p>Quality & Confidence in this state's data:</p> <p>Data sources & methods:</p> <p>State biosolids included in 2018 EPA ECHO data</p>	<p>HIGH</p> <p>State biosolids coordinator, who was very thorough in completing this survey, tracks land application closely & compiles data from annual reports from WRRFs, which are now submitted electronically.</p> <p>103% % in ECHO vs. the total presented here</p>	<p>ranking by survey team based on information provided in survey (options: High, Moderate, Low, None)</p> <p>https://echa.epa.gov/facilities/facility-search/tracked-facilities/</p>
<p>Demographics & Wastewater</p> <p>State population:</p> <p>Total land area in state (acres):</p> <p>Population density (persons/square mile):</p> <p>Total number of WRRFs reported in state survey:</p> <p>total number of WRRFs permitted/reported elsewhere:</p> <p>number of WRRFs in EPA ECHO reports for 2018:</p> <p>Average population served per WRRF:</p> <p>Average wastewater flow statewide (MGD, NBDP):</p> <p>avg.wastewater flow statewide (MGD, Seiple):</p> <p>Number of WRRFs that treat >75% of state flow:</p> <p>% of population served by on-site (septic) systems:</p> <p>Biosolids used or disposed / person in 2018 (lbs):</p>	<p>3,156,145</p> <p>35,748,480</p> <p>56.5</p> <p>871</p> <p>763</p> <p>81</p> <p>2,718</p> <p>507</p> <p>371</p> <p>70</p> <p>25%</p> <p>39</p>	<p>U. S. Census estimate for July 1, 2018</p> <p>https://www.census.gov/newsroom/releases/states/national.html</p> <p>calculated</p> <p>survey response by state expert</p> <p>Seiple et al., 2020; state experts, etc.</p> <p>https://echa.epa.gov/facilities/facility-search/tracked-facilities/</p> <p>calculated</p> <p>survey response by state expert</p> <p>Seiple et al., 2020</p> <p>https://doi.org/10.1016/j.jenvman.2020.110852</p> <p>Seiple et al., 2020</p> <p>https://doi.org/10.1016/j.jenvman.2020.110853</p> <p>survey response by state expert</p> <p>calculated</p>
<p>Biosolids Application</p> <p>Agricultural land cropland (acres):</p> <p>% of state area in cropland:</p> <p>Number of farms with that cropland:</p> <p>% cropland to which biosolids were applied:</p> <p>Application rate if all state biosolids were applied to cropland (dry metric tons/ac.):</p> <p>% cropland needed if all state biosolids were applied at typical rate (~3 dt/ac):</p>	<p>26,545,960</p> <p>74%</p> <p>77,943</p> <p>0.07%</p> <p>0.2%</p> <p>0.1%</p>	<p>https://opdsdata.nps.usda.gov/reports/5C88D84-6032-3778-K889-5260660500</p> <p>calculated</p> <p>https://opdsdata.nps.usda.gov/reports/55656303-0005-3005-6774-2091C06A848C</p> <p>calculated</p> <p>calculated</p> <p>calculated</p>
<p>Nutrient Sources - Comparison</p> <p>Nitrogen (N) in all this state's biosolids (metric tonnes, 2018):</p> <p>N in this state's animal manures (metric tonnes):</p> <p>N in this state's purchased fertilizer (metric tonnes, 2011):</p> <p>If all state's biosolids applied, what % of state's applied N would come from biosolids?</p> <p>Phosphorus (P) in this state's biosolids (metric tonnes, 2018):</p> <p>P in this state's animal manures (metric tonnes):</p> <p>P in this state's purchased fertilizer (metric tonnes, 2011):</p>	<p>2,966</p> <p>398,551</p> <p>1,214,110</p> <p>0.2%</p> <p>1,236</p> <p>144,981</p> <p>200,085</p>	<p>calculated assuming avg. 4.8% biosolids N</p> <p>https://echa.epa.gov/facilities/facility-search/tracked-facilities/</p> <p>https://echa.epa.gov/facilities/facility-search/tracked-facilities/</p> <p>calculated</p> <p>calculated assuming avg. 2% biosolids P</p> <p>https://echa.epa.gov/facilities/facility-search/tracked-facilities/</p> <p>https://echa.epa.gov/facilities/facility-search/tracked-facilities/</p>

<p>If all state's biosolids applied, what % of state's applied P would come from biosolids?</p>	<p>0.4%</p>	<p>calculated</p>
<p>State Regulatory Involvement</p> <p>Biosolids oversight agency / division: Permitting.... of biosolids programs: ...of land application sites: FTEs: state biosolids regulatory program:</p> <p>Biosolids program FTEs per million population:</p> <p>Enforcement: Inspections of biosolids facilities & field sites in 2018: Formal violations issued: Amount of state regulations beyond Part 503:</p> <p>Amount of state regulation of nutrient management & phosphorus: Accessibility of biosolids data to public: State encouragement of biosolids recycling to soils: Voluntary additional protections by land appliers known & reported by state coordinator:</p>	<p>Environment agency - water / wastewater program</p> <p>0.3 0.10 20 0 Low None (Part 503 requirements only) Moderate High None</p>	<p>survey response by state expert calculated survey response by state expert survey response by state expert rankings by survey team based on information provided in survey (options: High, Moderate, Low, None)</p>
<p>Trends</p> <p>New land application activity, 2018 - new permits & acreage, acres applied: acres applied in 2018:</p> <p>Local regulations & their impacts?: details...</p> <p>Legislative & state regulatory actions in 2018 & their impacts?: details...</p> <p>Biosolids beneficial use increasing... ..in 2018?: in 2020?: details...</p>	<p>No data 18,889 None Some It's staying the same. It's staying the same.</p>	<p>rankings by survey team based on information provided in survey (options: High, Moderate, Low, None)... With quotes of survey responses by state expert(s) 0 0 survey response by state expert survey response by state expert 0</p>
<p>Changes in Biosolids Use & Disposal</p> <p>Change* in solids reported used or disposed (in units used by state): Beneficial Use - percentage point increase or decrease (-): Landfill & surface disposal - % point increase or decrease (-): Incineration - percentage point increase or decrease (-): Class A - percentage point increase or decrease (-): Class B - percentage point increase or decrease (-): No class or not known - percentage point increase or decrease (-):</p>	<p>(5,201) 3% 0% -3% 2% 1% -3%</p>	<p>*Change may be due to population increase/decrease, change in treatment at a large WWTP, and/or different systems of data tracking and reporting.</p> <p>calculated comparing these 2018 data to 2004 data compiled by the same survey team (NEBRA, 2007)</p>
<p>Pressures on biosolids, 2018</p> <p>1 PUBLIC INVOLVEMENT- concerns of neighbors, environmental groups, and others 2 MANAGEMENT ISSUES - the hassle of biosolids recycling/land application 3 COST - disposal options are least expensive 4 AGRICULTURAL ISSUES - declining farmland due to less agriculture or due to development, sprawl, seasonal restrictions, or competition with manures, etc. 5 REGULATIONS ON BENEFICIAL USE- strict EPA and/or state regulation and enforcement</p>		<p>survey response by state expert</p>

Iowa

Infrastructure & Wastewater

	2004 Data	2018 Data	
Total Number of WWTPs:	78 (survey), 730 CWNS	871	
WWTP & Biosolids Infrastructure Totals			
Number of Separate Preparers (in- or out-of-state, receiving solids from your state):	no data	1	-----
Total number of your state's WWTPs sending to those Separate Preparers:	0	1	-----
Number of operating sludge incinerators in your state (total):	2	1	-----
Fluidized bed:	1	0	-----
Multiple hearth:	1	1	-----
Number of Part 258 landfills in your state accepting sewage sludge:	data not requested for 2004	0	-----
Number of WWTPs in your state with industrial pre-treatment programs:	data not requested for 2004	20	-----
Number of WWTPs in your state with sludge lagoons:	data not requested for 2004		-----
Wastewater Flow Totals			
Total statewide average daily wastewater flow (MGD):	data not requested for 2004	507	-----
Total statewide WWTP design capacity for wastewater flow (MGD):	data not requested for 2004	667	-----
Total statewide average daily dry weather flow (MGD):	data not requested for 2004	346	-----
Other Totals			
Number of documented odor & nuisance complaints received by state in 2018 related to biosolids transportation and use or disposal outside of the gates of the WWTP:	data not requested for 2004	0	-----
Number of WWTPs involved in those complaints:	data not requested for 2004	0	-----
Percent of population served by on-site systems (e.g. septic systems):	no data	25%	-----

The 871 WWTPs are all municipal WWTPs. • Davenport City is the 1 separate preparer, composting Davenport biosolids. • Iowa has 871 municipal WWTPs that have NPDES discharge permits. Our major POTWs are 107 facilities (in 2020) based on the design average wet weather flow equal to or greater than 1 MGD. The design AWW flow for the 107 facilities ranges from 1 mgd to 134 mgd. • Major POTW facilities have biosolids annual reporting requirements to EPA and state. Minor facilities keep their biosolids report at their site. • Design flow definitions are in the Iowa Wastewater Facilities Design Standards Chapter 14. • The average dry weather flow in this survey is based on the average of the facility's design average dry weather flow, which is 3.248 MGD. The average statewide wastewater design capacity is based on the average of the facility's design average wet weather flow, (the same number that designates a "major" facility), and is 6.236 mgd. The statewide average daily wastewater flow is the average of the ADW and AWW, in design. We did not run the DNR flow data for the actual average daily wastewater flow. All the flow numbers reported here are based on the wastewater treatment plant design flow in the construction permits that are approved by Iowa DNR. • Two dozen or more wastewater facilities are lagoon facilities that do not desludge every year. The survey data reported here are based on those POTWs that sent annual reports for biosolids land application.

Biosolids Use and Disposal

Biosolids Used and Disposed

UNITS:	Dry U.S. tons	Dry metric tons			
BIOSOLIDS USED OR DISPOSED, 2018 (adjusted total): 61,800					
Summary					
	Number of Entities (WWTPs & Sep. Preparers) Going To...	Quantity of Biosolids	Number of Entities (WWTPs & Sep. Preparers) Going To...	Quantity of Biosolids	NOTE: Quantity of sewage sludge or biosolids used or disposed means the quantity that goes out the gate of the WWTPs. Use the units (the form of measurement) you chose above. The beneficial use numbers include some composted biosolids. The disposal numbers include incinerated biosolids. There is no Iowa wastewater sludge going to landfill. State law prohibits Class A and Class B biosolids going to landfill. Solid Waste Rule 121 on land application of waste, discourages sewage sludge going to landfill.
Beneficial Use (applied to soils, not including ADC)	78	50,200	81	48,401	
Disposal & Alternative Dispositions	2	16,460	1	13,398	
Other	0	0	0	0	
TOTAL	78	66,660	82	61,799	
Beneficial Use					
	Number of Entities (WWTPs & Sep. Preparers) Going To...	Quantity of Biosolids	Number of Entities (WWTPs & Sep. Preparers) Going To...	Quantity of Biosolids	The Class A EQ material is composted biosolids sold to the market. This program is a separate preparer in Davenport, IA; the city's Composting Facility.
Agricultural (EQ, Class A, & Class B)	65	48,200	60	44,413	
Forestland (EQ, Class A, & Class B)	0	0	0	0	
Reclamation (EQ, Class A, & Class B)	0	0	0	0	
Class A EQ Distribution (bagged or bulk, public distribution, or unsure where it went)	11	2,000	1	3,988	
Beneficial Use Subtotal	76	50,200	61	48,401	
Long-term storage	0	0	0	0	
Number of acres to which biosolids were applied:	data not provided			16,689	
Disposal & Alternative Dispositions					
	Number of Entities (WWTPs & Sep. Preparers) Going To...	Quantity of Biosolids	Number of Entities (WWTPs & Sep. Preparers) Going To...	Quantity of Biosolids	
Landfill (total)	0	0	1	3,065	

NOTE: Quantity of sewage sludge or biosolids used or disposed means the quantity that goes out the gate of the WWTPs. Use the units (the form of measurement) you chose above.

The beneficial use numbers include some composted biosolids. The disposal numbers include incinerated biosolids. There is no Iowa wastewater sludge going to landfill. State law prohibits Class A and Class B biosolids going to landfill. Solid Waste Rule 121 on land application of waste, discourages sewage sludge going to landfill.

The Class A EQ material is composted biosolids sold to the market. This program is a separate preparer in Davenport, IA: the city's Composting Facility.

Burial	data not requested for 2004	data not requested for 2004	0	0
Alternative daily (ADC), intermediate, or final cover	data not requested for 2004	data not requested for 2004	1	3,055
Surface Disposal	0	0	0	0
Incineration	2	16,460	1	13,398
Cement kiln or industrial furnace	data not requested for 2004	data not requested for 2004	0	0
Deep well injection	data not requested for 2004	data not requested for 2004	0	0
Gasification	data not requested for 2004	data not requested for 2004	0	0
Pyrolysis	data not requested for 2004	data not requested for 2004	0	0
Disposal & Alternative Dispositions Subtotal	2	16,460	1	13,398
TOTAL	76	66,660	82	61,799

The material included as ADC (row 49) is the ash from Cedar Rapids' incinerator that went to landfill ADC. The mass of this landfilled ash is not included in the disposal total, so as not to be double-counted.

Biosolids Quality Summary

	Number of Entities (WWTPs & Sep. Preparers) Producing...	Quantity of Biosolids	Number of Entities (WWTPs & Sep. Preparers) Producing...	Quantity of Biosolids	NOTE: For "number of entities," the total may not match because some entities go to more than one use or disposal.
Class A EQ	11	5,200	2	6,374	The two facilities producing EQ biosolids are Des Moines' composting facility and Iowa City's WWTP.
Other Class A	0	0	0	0	
Class B	65	45,000	79	42,027	
Other (no data, etc.)	0	16,460	1	13,398	
TOTAL	76	66,660	82	61,799	

Biosolids Treatment Practices

	Estimated Number of WWTPs or Separate Preparers Using...	Estimated Quantity of Biosolids Produced Using...	Estimated Number of WWTPs or Separate Preparers Using...	Estimated Quantity of Biosolids Produced Using...	
Stabilization					
Aerobic Digestion (total)	25	no data	35	8,206	
Class A (ATAD/Other)	data not requested for 2004	data not requested for 2004	0	0	
Class B	data not requested for 2004	data not requested for 2004	35	8,206	
Anaerobic digestion (AD) (total)	44	no data	46	33,435	
Class A (e.g. thermophilic)	data not requested for 2004	data not requested for 2004	3	2,406	
Class B (mesophilic)	data not requested for 2004	data not requested for 2004	45	31,029	
WWTPs co-digesting (FOG, food, glycol, etc.)	data not requested for 2004	data not requested for 2004	at least Des Moines	N/A	
Biogas used (heating, electricity, fuel, etc./year)	data not requested for 2004	data not requested for 2004	13	N/A	
Lime/Alkaline (total)	8	no data	3	880	
Class A lime/alkaline	data not requested for 2004	data not requested for 2004	0	0	
Class B lime/alkaline	data not requested for 2004	data not requested for 2004	3	880	
Composting	1	no data	1	3,988	
Thermal (e.g. heat drying, not incineration/gasification/pyroly)	0	no data	0	0	
Gasification	data not requested for 2004	data not requested for 2004	0	0	
Pyrolysis	data not requested for 2004	data not requested for 2004	0	0	
Hydrolysis (thermal, chemical, etc.)	data not requested for 2004	data not requested for 2004	0	N/A	
Long-term (lagoons, reed beds, etc.)	0	no data	0	N/A	
Oxidation ditch / extended aeration	data not requested for 2004	data not requested for 2004	0	N/A	
Other stabilization technology	0	no data	1	13,398	Cedar Rapids WWTP sends sewage sludge to incineration. It used low pressure oxidation (LPO) on secondary sludge to stabilize sludge. They produced 13,398 dry tons of sludge in 2018. The "Other" stabilization technology (row 88) is this LPO. • "Other" dewatering technologies include reed beds, rotary press, Fournier Press, and more. • "Other" thickening technology includes rotary drum thickener.
Dewatering					
Belt Filter Press	4	no data	11	65,676	
Plate & Frame Press	0	no data	2	4,614	
Screw Press	0	no data	1	119	
Centrifuge	3	no data	5	27,242	
Vacuum Filter	5	no data	0	0	
Drying beds (open-air)	25	no data	9	12,548	
Solar drying (e.g. in greenhouse)	data not requested for 2004	data not requested for 2004	0	0	
Other dewatering technology	0	no data	8	1,435	
Thickening					
Gravity thickener	data not requested for 2004	data not requested for 2004	9	19,579	
Gravity belt thickener (GBT)	data not requested for 2004	data not requested for 2004	6	2,013	
Centrifuge	data not requested for 2004	data not requested for 2004	1	968	
Dissolved air flotation (DAF)	data not requested for 2004	data not requested for 2004	5	15,798	
Other thickening technology	data not requested for 2004	data not requested for 2004	12	5,002	
Other					
Biosolids sold in bags (explain at right what size bags)	data not requested for 2004	data not requested for 2004	0	0	

State Pollutant (trace metal, etc.) Concentration Limits in Biosolids Applied to Land, 2018

Enter numbers only where state limits differed in 2018 from U.S. EPA limits.

	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Zinc (Zn)
EPA Table 1 (mg/kg)	75	85		4300	840	57	75	420	100	7500
EPA Table 3 (mg/kg) & CPLR (kg/ha)	41	39		1500	300	17		420	36 (CPLR = 100)	2800
State ceiling limit (higher limit) (mg/kg)										
State high quality (lower number) limit (mg/kg)										
State CPLR (kg/ha)										
State APLR (kg/ha/365days)										

TESTING

For each of the following constituents, indicate if testing is required by your state, as of 2018.	Is testing required for all sewage sludge or biosolids?	Or is testing required only for biosolids being beneficially used as fertilizers and soil amendments?	Frequency of testing (indicate how often testing must be done for each parameter):		If frequency depends on wastewater flow or amount of biosolids used or disposed of, please explain:
			In accordance with Part 503 requirements	In accordance with other frequency required by state (if applicable, please specify)	
Part 503 metals (As, Cu, Hg, etc.)	no	yes	yes		
Other metals (boron, silver...)	no	no	no		
Dioxins/furans	no	no	no		
PCBs	no	no	no		
Priority pollutants (https://www.epa.gov/sites/production/files/2015-09/documents/priority-pollutant-list-epa.pdf)	no	no	no		
Other organic compounds (e.g. PCBs, pharmaceuticals)	no	no	no		
Radioactive isotopes (alpha, beta, Ra 226, etc.)	no	no	no		
Nutrients (NPK)	no	yes	yes		
Pathogen reduction (Class A or B)	no	yes	yes		
Vector attraction reduction (VAR)	no	yes	yes		
PFAS (as of 2018)	no	no	no		
Microplastics (as of 2018)	no	no	no		
TCLP (toxicity characteristic leaching procedure)	no	no	no		
Paint Filter Liquids Test	no	no	no		

Iowa biosolids testing parameters, limits, and testing frequency are identical to 40 CFR 503.

REPORTING

For each of the following, indicate what WWTPs and/or biosolids preparers must report to the state:	Is reporting to the state required for these parameters?	Frequency of reporting (indicate how often testing must be done for each parameter):		How are these data stored by the state?	Are data compiled by the state in reports or summaries? If so, please attach.
		In accordance with Part 503 requirements	In accordance with other frequency required (if applicable, please specify)		
The amounts of biosolids/ sewage sludge used or disposed	yes	yes		electronic	yes
Part 503 metals (As, Cu, Hg, etc.)	yes	yes		electronic	yes
Other metals (boron, silver...)	no	not applicable (N/A)		not applicable (N/A)	no
Dioxins/furans	no	not applicable (N/A)		not applicable (N/A)	no
PCBs	no	not applicable (N/A)		not applicable (N/A)	no
Priority pollutants (https://www.epa.gov/sites/production/files/2015-09/documents/priority-pollutant-list-epa.pdf)	no	not applicable (N/A)		not applicable (N/A)	no
Other organic compounds (e.g. PCBs, pharmaceuticals)	no	not applicable (N/A)		not applicable (N/A)	no
Radioactive isotopes (alpha, beta, Ra 226, etc.)	no	not applicable (N/A)		not applicable (N/A)	no
Nutrients (NPK)	yes	yes		electronic	yes
Cumulative Pollutant Loading Rates (CPLR)	yes	yes		electronic	yes
How biosolids achieve Class A or Class B	yes	yes		electronic	yes
How biosolids achieve vector attraction reduction (VAR)	yes	yes		electronic	yes
Solids stabilization process(es) used	yes	yes		electronic	yes
Other biosolids treatments	yes	yes		electronic	yes
Land use or disposal practice	yes	yes		electronic	yes
PFAS (as of 2018)	no	not applicable (N/A)		not applicable (N/A)	no
Microplastics (as of 2018)	no	not applicable (N/A)		not applicable (N/A)	no
TCLP (toxicity characteristic leaching procedure)	no	not applicable (N/A)		not applicable (N/A)	no
Paint Filter Liquids Test	no	not applicable (N/A)		not applicable (N/A)	no

Iowa biosolids regulation only has a land application rule. Iowa does not have surface disposal and incineration rules. Landfilling is discouraged. • Iowa's biosolids land application rule mirrors federal 40 CFR 503 in most areas, but includes a few best management practices that suit the state's agricultural and land use conditions. • In 2016, Iowa changed the biosolids annual reports submittal requirement from paper reporting to electronic reporting. For the items and data in the annual report that are required by EPA biosolids annual electronic reporting, Iowa asks the same of WWTPs. WWTPs can use EPA's report to satisfy state reporting needs. For the information that is not required by EPA, Iowa developed a supplemental form for WWTPs to submit. Information in IA's supplemental report covers the location of land application sites, total annual biosolids applied on each site, size of the parcel, etc. • CPLR needs to be developed if any limit in 40 CFR Part 503 Table 3 is exceeded by a WWTP.



QUIZ

3. Which Midwest state manages its ~200,000 dry U. S. tons of biosolids in equal parts landfill disposal, incineration, and land application?

CHOICES

District of
Columbia
Indiana
California
Florida
Connecticut

South Dakota
Georgia
Maine
Nevada
Kentucky

QUIZ

4. Which state makes the most wastewater solids?

5. Which state makes the least?

CHOICES

District of
Columbia
Indiana
California
Florida
Connecticut

South Dakota
Georgia
Maine
Nevada
Kentucky

California Biosolids

State Data

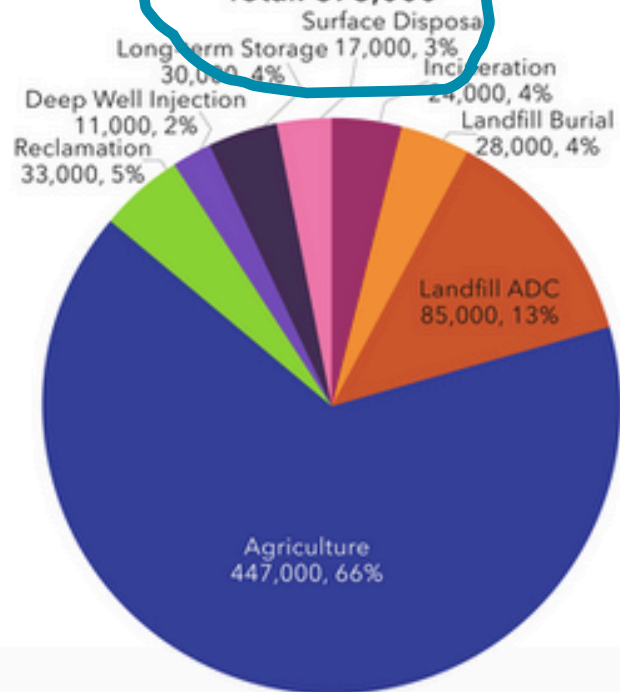
Confidence in data for this state:

HIGH

2018 data unless noted.

California Biosolids Use & Disposal 2018 (dry metric tons, %)

Total: 675,000



Central Valley composting Photo courtesy of Synagra

State Statistics Dashboard

Demographics & Wastewater

Avg population served per WRRF	150,217
Avg wastewater flow statewide (MGD, Seiple)	3,381
WRRFs treating >75% WW flow	50
% of population served by on-site (septic) systems	10
Biosolids used or disposed / person in 2018 (lbs)	34

Biosolids Application

% of state area in cropland	10.000
% cropland to which biosolids were applied	no data

NAVIGATING STATE DATA

EXAMPLE: OREGON

Demographics & Wastewater

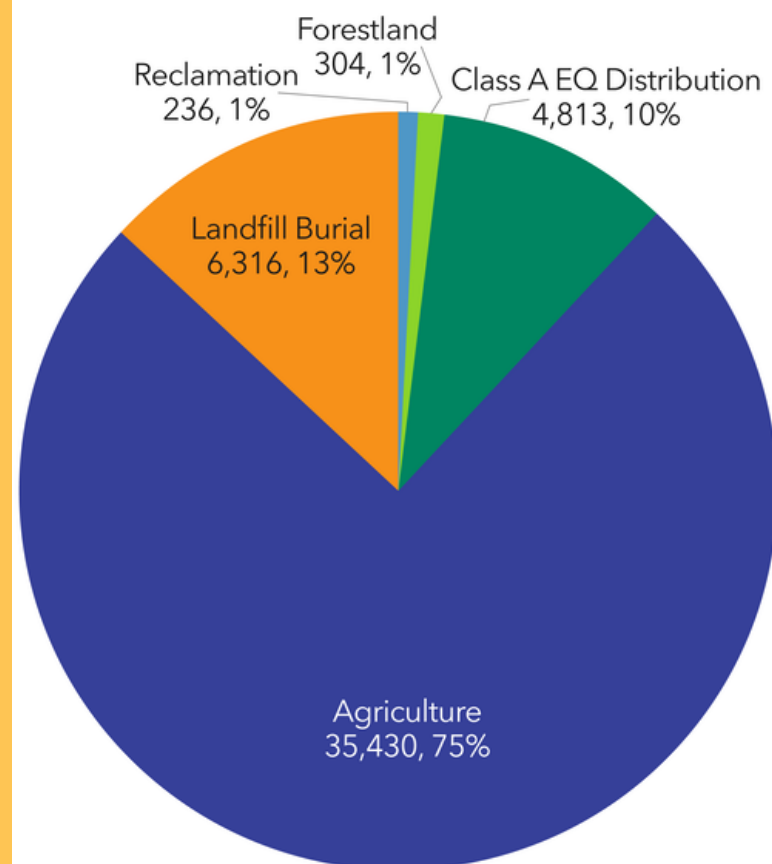
Avg population served per WRRF	7,928
Avg wastewater flow statewide (MGD, Seiple)	416
WRRFs treating >75% WW flow	16
% of population served by on-site (septic) systems	30
Biosolids used or disposed / person in 2018 (lbs)	22

Biosolids Application

% of state area in cropland	8.00
% cropland to which biosolids were applied	0.44
application rate if all state biosolids were applied to cropland (dt/acre)	0.01
% cropland needed if all biosolids were applied at typical rate of ~3dt/acre	0.33
If all state's biosolids applied, what % of state's applied N would come from biosolids?	0.80
If all state's biosolids applied, what % of state's applied P would come from biosolids?	2.10

Oregon Biosolids Use & Disposal 2018 (dry US tons, %)

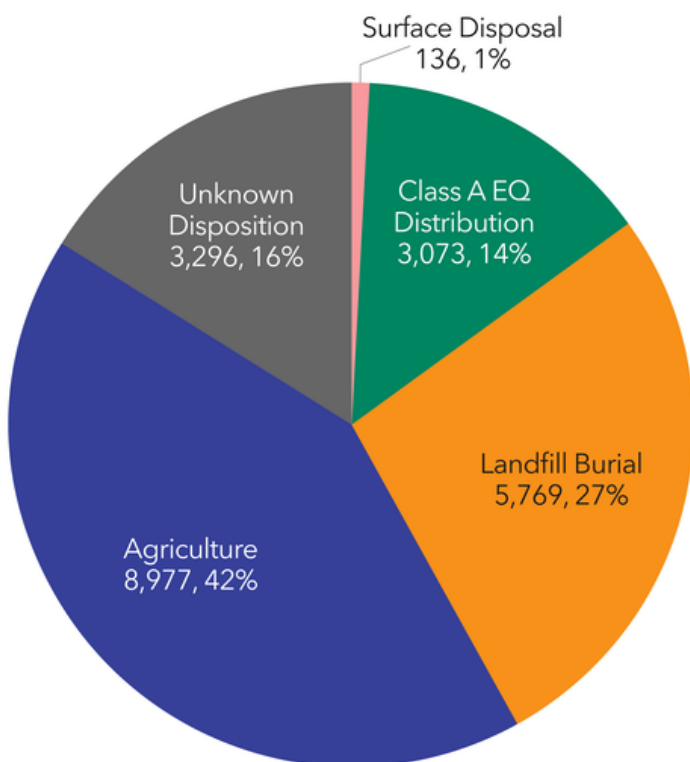
Total: 47,100



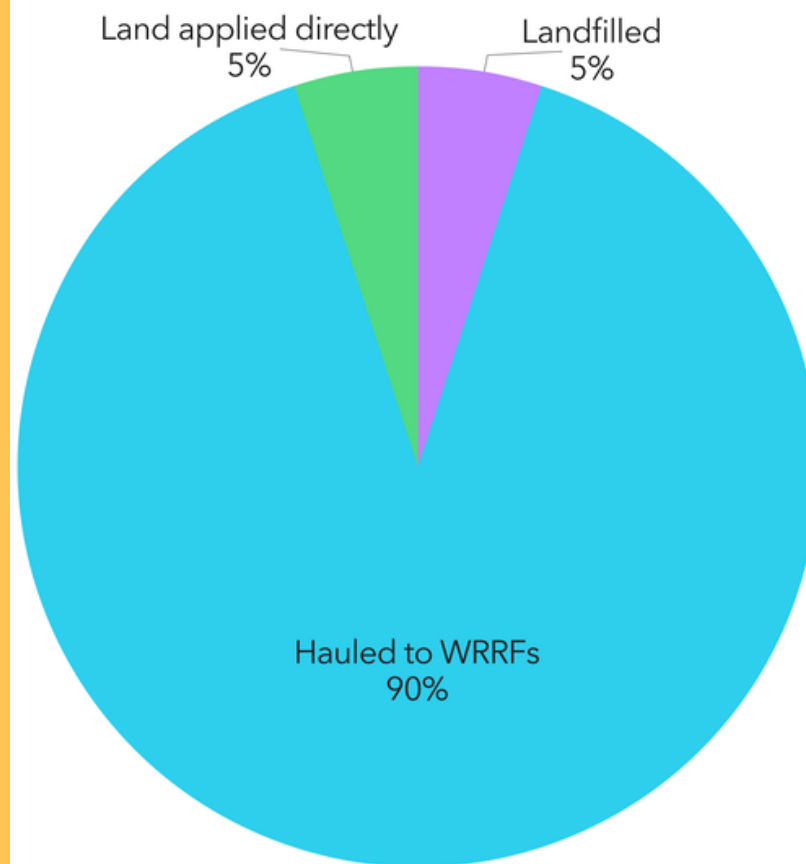
NAVIGATING STATE DATA

EXAMPLE: IDAHO

Idaho Biosolids Use & Disposal 2018
(dry US tons, %)
Total: 21,300



Idaho Septage Management 2018
(% estimated)
Total: 6,600,000 gallons



PRELIMINARY RESULTS

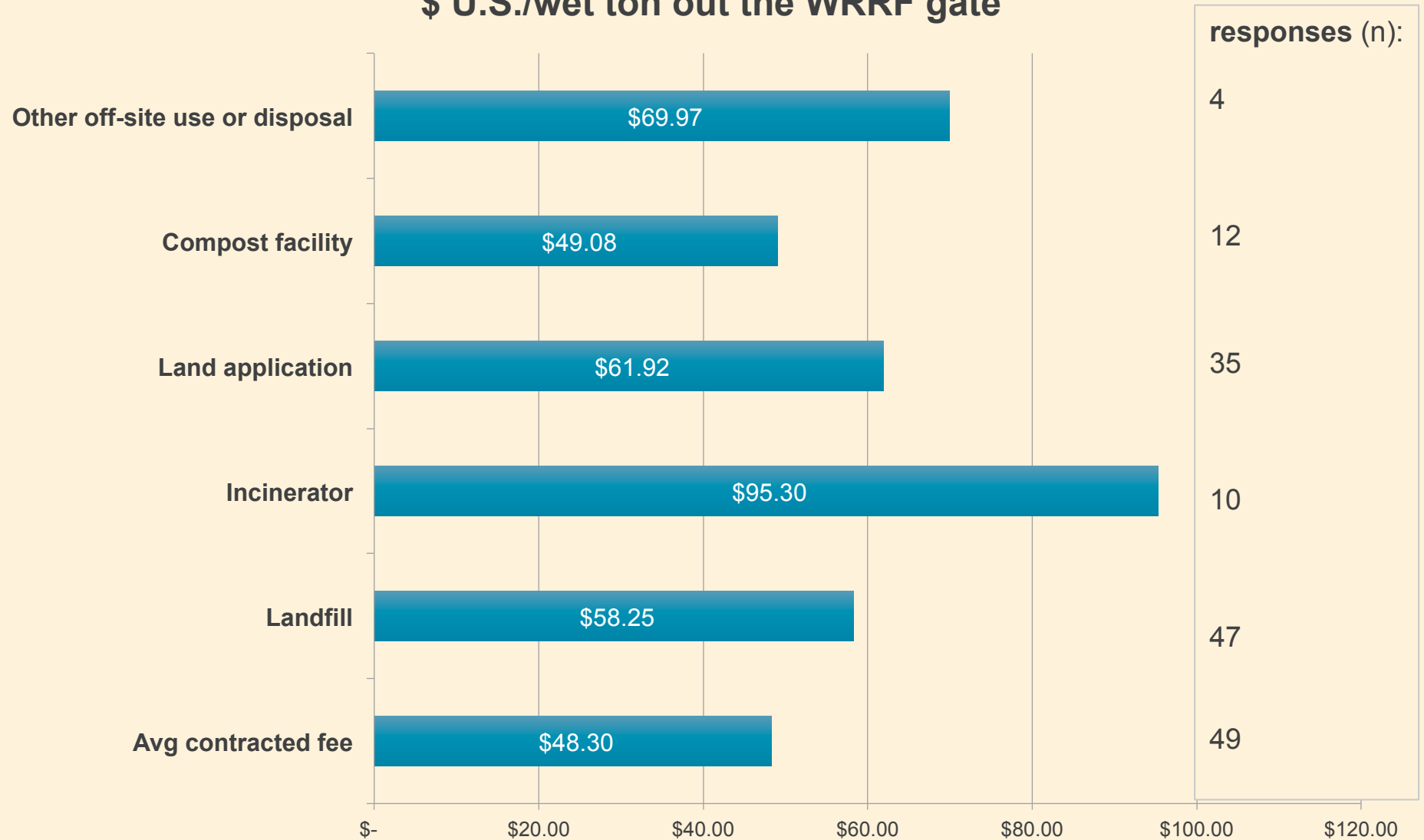
DATA FROM THE SURVEY OF WRRFs

- 452 valid responses
- Total solids reported: 2,113,875 dry metric tons
- Represents 34% of U. S. total wastewater flow
- Extrapolation: More than 6.1 million dmt shown here
 - The final national total will come from summing all states
- Good representation of:
 - Geography
 - WRRF size
 - Types of end use & disposal



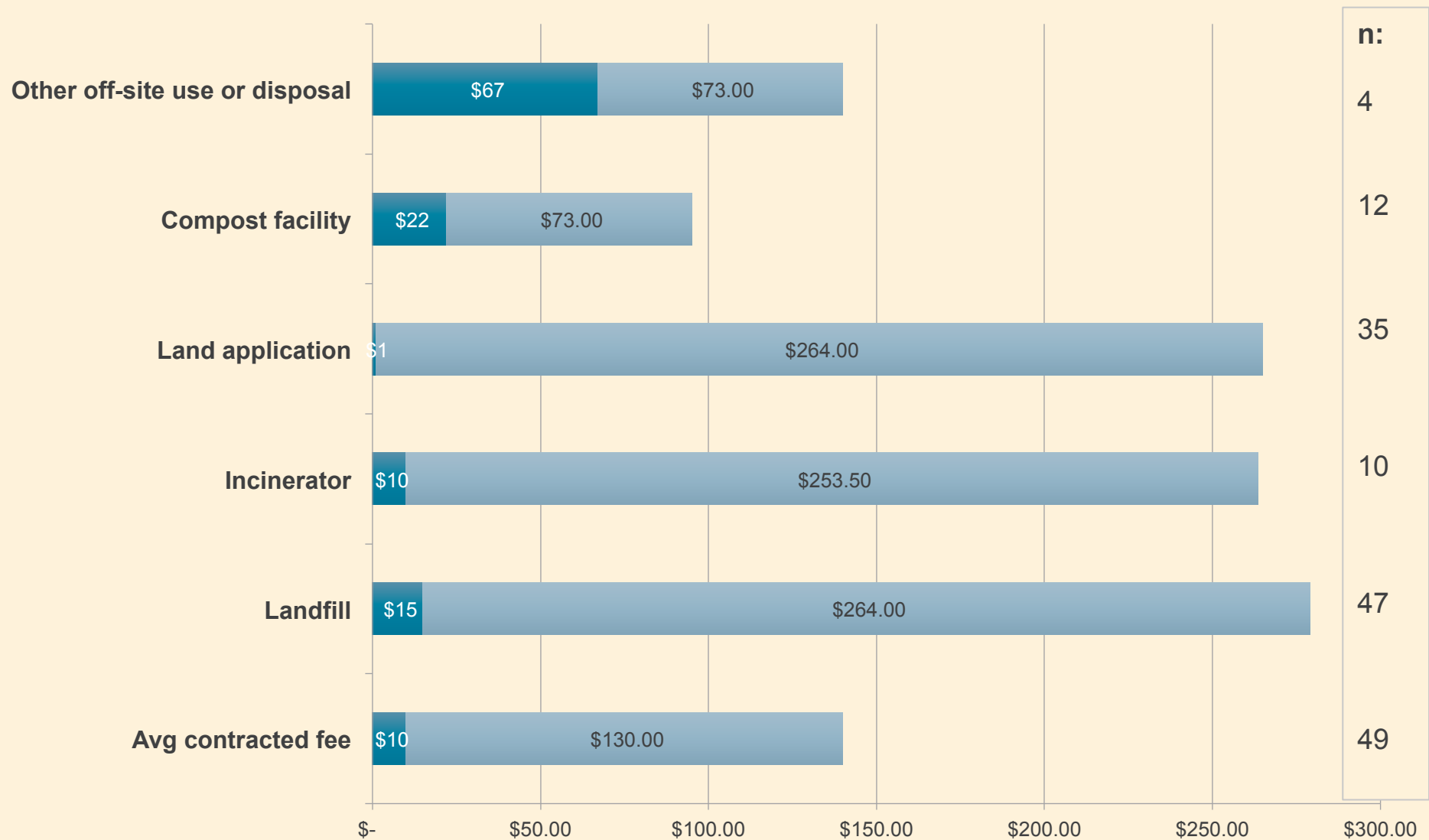
PRELIMINARY DATA

Average 2018 cost for biosolids use or disposal: \$ U.S./wet ton out the WRRF gate



PRELIMINARY DATA

Range of 2018 costs for biosolids use or disposal: \$ U.S./wet ton out the WRRF gate



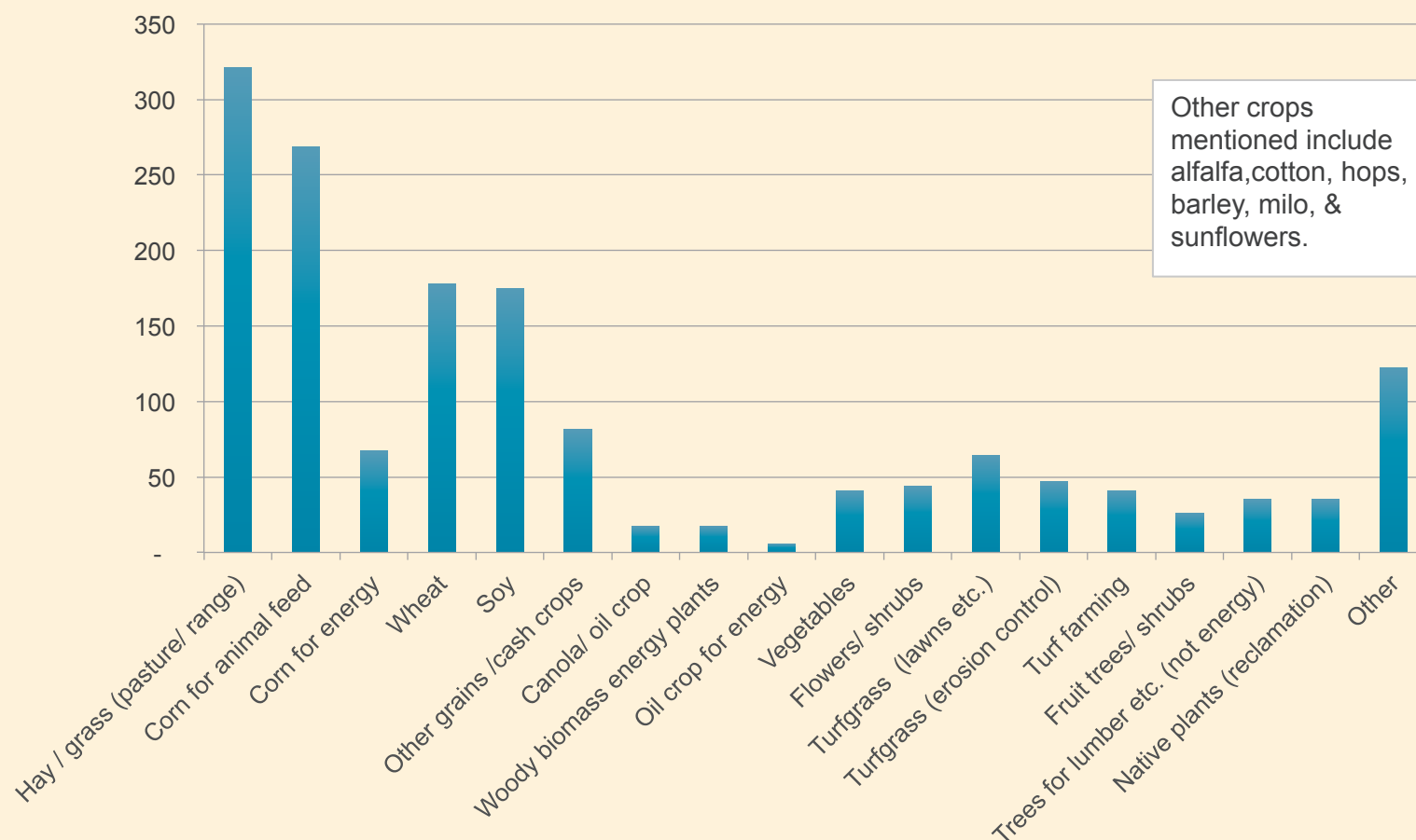
PRELIMINARY DATA

WHAT CROPS ARE GROWN WITH BIOSOLIDS?

Number of U. S. biosolids programs growing each crop
(extrapolated nationwide estimate based on 197 respondents)

These numbers are low-end estimates.

What is accurate is the relative abundance of the different crops.



QUIZ

6. Many states have limited landfill capacity, but this state leads the pack in WRRFs struggling to find places for their solids because landfills are limiting the wet materials they take in (because of slopes slumping and potential fires).

CHOICES

District of
Columbia
Indiana
California
Florida
Connecticut

South Dakota
Georgia
Maine
Nevada
Kentucky

QUIZ

7. Which southern state imposed strict new regulations in 2021 that reduced a lot of land application because of concerns about phosphorus?

CHOICES

District of
Columbia
Indiana
California
Florida
Connecticut

South Dakota
Georgia
Maine
Nevada
Kentucky

PRELIMINARY DATA

MORE INTERESTING FACTS & FIGURES

- Average per capita biosolids generation is ~35 pounds per year!
- Less than 1% of U.S. cropland needed for land application of all biosolids
- Septage management – Still not a lot of data...



PRELIMINARY DATA

MORE INTERESTING FACTS & FIGURES

- In 2018, did all of your biosolids meet Part 503 Table 3 (high quality) standards?
 - 330 Yes
 - 13 No
- FTEs working at WRRFs on biosolids treatment, end use, & disposal (extrapolated nationwide total): 5,060 FTEs



PRELIMINARY DATA

WWTP'S SEPTAGE DISPOSAL FEE (US cents per gallon)

**Avg. septage disposal
fee - special rate**

**Avg. septage disposal
fee - others**

Average: 9.7

Average: 9.8

Max: 67.0

Max: 67.0

Min: 1.0

Min: 1.0

N = 57

N = 73

NEXT STEPS

APPLYING THE DATA

- Share with stakeholders, regulators, researchers, & biosolids managers
- Understand local and regional markets
 - Assess capacity issues in some states
- Update policies & best management
 - Biosolids as a resource for energy & soil health
 - Further reducing potential risks from CECs, nutrients, odors
- Update data collection
 - Input to EPA electronic reporting system
 - Encouraging state data compilations



THANK YOU IOWA WEA

*ESPECIALLY EMY LIU, AIMEE DEVEREUX
& OTHER ORGANIZERS*

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Quiz answers:
1 DC, 2 NV, 3
IN, 4 CA, 5 SD,
6 GA, 7 FL



AND THANK YOU TO OUR PARTNERS:

NACWA



AND THANK YOU TO OUR PARTNERS:



AND THANK YOU TO OUR PARTNERS:

