Biosolids Land Application Sites, 1995-2024

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File name: biosolids_application_sites_121724.shp

Spatial Reference

Geographic Coordinate System	NAD 1983	Projected Coordinate System	NAD 1983 (Teale) Albers (Meters)
WKID	4269	Projection	3310
Authority	EPSG	Authority	EPSG
Angular Unit	Degree (0.0174532925199433)	Linear Unit	Meters (1.0)
Prime Meridian	Greenwich (0.0)	False Easting	0.00
Datum	D North American 1983	False Northing	-4000000.0
Spheroid	GRS 1980	Central Meridian	-120.0
Semimajor Axis	6378137.0	Standard Parallel 1	34.0
Semiminor Axis	6356752.314140356	Standard Parallel 2	40.5
Inverse Flattening	298.257222101	Latitude of Origin	0.0

Description

This layer includes 67 polygons representing Public Land Survey System sections and parcels that contain sites permitted by the California Regional Water Boards to land apply Class A or B biosolids between 1995 and 2024.[1] The term "biosolids" refers to sewage sludge from wastewater treatment plants (WWTPs) that has been treated to meet regulations set by the U.S. Environmental Protection Agency [2] and the California State Water Board [1] for land application as a fertilizer or soil amendment. Biosolids are categorized as Class A or Class B based on the level of treatment used to reduce contaminants. [2] However, all biosolids may contain per- and polyfluoroalkyl substances (PFAS) because many WWTPs receive PFAS-contaminated waste and these chemicals are not yet regulated in biosolids.[3]

Estimates for the total amount and rate (measured in tons per acre per year) of biosolids applied over the entire permitting period were calculated for approximately 50% of sites, based on available data.

Sites were permitted to apply biosolids under one or more of the following regulatory measures:

- Waste Discharge Requirements (WDR) 95-140 (5F/5S) for Reuse of Biosolids & Septage on Ag/Forest/Rec Sites,[4]
- Statewide General WDRs for Discharges of Biosolids to Land Projects 2000-10-DWQ,[5] and
- Statewide General WDRs for Discharge of Biosolids 2004-0012-DWQ.[6]

General Order Number 2004-0012-DWQ is the only currently active statewide order regulating biosolid applications. However, some counties also run their own biosolids regulatory programs, requiring sites to obtain additional permits.

To request a permit from the state to land-apply biosolids, a site must submit a Notice of Intent (NOI) to the Regional Water Board. Upon approval, the Regional Water Board issues a Notice of Applicability (NOA), granting permission to apply biosolids.[1] NOIs, NOAs, and related permit documentation were accessed through the State Water Board's California Integrated Water Quality System Project (CIWQS) database. [7] Documents not posted in CIWQS, as well as permits issued by counties, were obtained through Public Records Requests to the relevant agencies.

Methods

1. Obtained biosolids application site and permit information.
   a. NOIs, NOAs, and other relevant documents were accessed through the CIWQS database, General Order Report[7] and downloaded on 10/23/2024.
   b. Additional documents not posted on CIWQS were obtained through Public Records Requests to the nine Regional Water Boards and individual counties with their own biosolids regulatory programs.
   c. Data was transcribed from a combination of CIWQS "Facility-At-A-Glance" Reports[7] and permit-related documents (e.g. NOAs) into an Excel spreadsheet (N=110 permits).
      i. In cases where only the site address was provided, coordinates were obtained from Google Maps.
2. Cleaned and processed transcribed data in R.
   a. Reformatted site location data.
      i. Site location data was split into three separate datasets based on the type of location identifier provided: assessor's parcel number (APN); meridian, township, range, section (MTRS); or coordinates.
      ii. Each dataset was expanded by location ID so that each row was associated with a single APN (N=95), MTRS (N=99), or coordinate pair (N=60).
   b. Processed the permit data.
      i. Calculated the total number of years for each NOA. The date of data processing (12/13/2024) was used as the stand-in "end date" for currently active NOAs.
      ii. Calculated the minimum and maximum amount of biosolids applied over the permitting period using the reported amounts of biosolids applied, acres, application frequency, and number of active permit years.
         1. *Note:* These calculations were based on the number of acres reported in the NOA, not the total acres of the polygon.
      iii. Calculated the maximum rate of biosolids application in tons per acre per year.

    c. Aggregated permit data by site (N=93 sites) (this step was necessary for sites that were issued multiple NOAs).
        i. Permit data was grouped by place ID and summarized as follows:
            1. Selected the minimum effective date and maximum expiration date. Summed the years active, minimum amount applied, and maximum amount applied. Calculated the average application rate, weighted by the number of years active. Flagged sites with amended NOAs.
            2. Additional fields did not require summarization because they remained consistent even if a site had more than one amended NOA.

3. Mapped site location data in ArcGIS Pro.
    a. Mapped to parcels.
        i. Joined the APN dataset from step 2.a.ii to the 2018 California Tax Assessor's Parcel shapefile (residential parcel data developed by LightBox)[8] by Tax APN (N=86 joined parcels).
    b. Mapped to Public Land System Survey sections (PLSS).
        i. Dissolved the 2022 US Bureau of Land Management's PLSS section shapefile[9] by meridian, township, range, section (MTRS) field, resulting in 158,680 polygons that are approximately 1x1 mile grid squares, i.e. PLSS sections.
        ii. Selected sites from the MTRS dataset from step 2.a.ii that did not have an APN listed or that did not match to the parcel shapefile. Joined data to the MTRS shapefile (N=55 joined sections).
    c. Mapped coordinates to PLSS sections.
        i. Converted the coordinates in the dataset from step 2.a.ii into points.
        ii. Selected sites that do not have an APN or MTRS listed and whose coordinates were flagged as reliable (N=31 points).
            1. Reliability of coordinates was determined through visual inspection in Google Maps Satellite View. Coordinates located in residential or urban areas were deemed unreliable as it is unlikely that biosolids were applied in these areas (N=6 points).
        iii. Spatially joined points to MTRS sections, using the completely contains argument (N=29 sections).
    d. Merged the parcels and PLSS sections into one shapefile (N=170 polygons).
    e. Dissolved by place ID (N=73 sites).
        i. N=20 sites with missing or unreliable locations were excluded from the dataset.
4. Joined permit data from step 2.c to the shapefile from step 3.e by place ID (N=73 sites).
5. Removed overlapping polygons on a case-by-case basis, depending on the relationship of the sites (N=6 sites removed) (Table 1).

a. Overlapping sites that could be considered as one site (N=6 overlapping sites) were combined by retaining the most recent location information, aggregating the permit information (see step 2.c), and removing the overlapping polygon (N=3 sites remaining). For example, Visalia Biosolids Application Project was permitted under two different orders (No. 95-140 and No. 2000-10-DWQ and had two different place IDs, but could be considered as the same site.

b. Overlapping sites that were unrelated and one was actively permitted and the other was historically permitted (N=4 overlapping sites) were resolved by assigning the overlapping area to the actively permitted site (N=2 sites remaining).

c. Overlapping sites that were unrelated and both were actively permitted (N=4 overlapping sites) were resolved by assigning the overlapping area to the smaller polygon (N=4 sites remaining).

d. Overlapping sites that were unrelated and both were historically permitted (N=2 overlapping sites) were resolved by assigning the overlapping area to most recently active site (N=1 site remaining).

Table 1. Overlaps.

Overlapped sites	Reason for overlap	Solution
Ed Silva Biosolids Application Area and Denali-Silva Ranch Biosolids Application Area	Change of ownership occurred in 2021 and site acquired a new permit.	Sites were combined into one site under the name Denali-Silva Ranch Biosolids Application Area.
Visalia Biosolids Application Project (x2)	Site was originally permitted under General Order No. 95-140 and then under 2000-10-DWQ.	Sites were combined into one site under the name Visalia Biosolids Application Project.
Gooselake Ranch North and Gooselake Ranch South	Both site locations came from coordinates that were joined to the same PLSS section.	Sites were combined into one site under the name Gooselake Ranch.
Synagro West, LLC; Emigh Land, LP and Unknown Site Name	Unknown Site Name represents a parcel that was historically permitted by the San Francisco Water Board to apply biosolids between 2001 to 2019. The parcel became part of the Synagro West, LLC; Emigh Land, LP site in 2020.	Retained the active site, Synagro West, LLC; Emigh Land, LP. Removed the historic site, Unknown Site Name.
Hamilton Brothers Farm and Ian Anderson	The Ian Anderson site had coordinates that joined to the same	Retained the active site, Hamilton Brothers Farm.

	section as the Hamilton Brothers Farm.	Removed the historic site, Ian Anderson.
Synagro Kent Hirdes Biosolids Ranch and Synagro West LLC and Joe Mullinax; Synagro-Mullinax Ranch (20 Hills Ranch) Biosolids Land Application Area - Site 1	Both sites shared a parcel.	Retained both active sites, but assigned the overlapping area to the smaller site, Synagro Kent Hirdes Biosolids Ranch.
Mahoney, Christine and Dan, Emigh Souza Ranch and Mayhood Ranch	A parcel from Mayhood Ranch overlapped a section from Mahoney, Christine and Dan, Emigh Souza Ranch.	Retained both active sites, but assigned the overlapping area to the smaller site, Mahoney, Christine and Dan, Emigh Souza Ranch.
H Bar "O" Farms, Inc (A) and Rodney Palla Ranch	Both site locations came from coordinates that were joined to the same PLSS section.	Retained the most recently active site, Rodney Palla Ranch, and removed H Bar "O" Farms, Inc (A).

Table 2. Attribute Table.

Field Heading	Field Description	Source
FID	ESRI generated field.	ESRI
Shape	Polygon- ESRI generated field.	ESRI
place_id	Unique identifier for facilities permitted to apply biosolids.	California Integrated Water Quality System Project (CIWQS)
source	Source of polygon geography: APN, MTRS, Coordinates.	WESS
gen_permit	General order number associated with a permit.	CIWQS
wdid	Waste Discharge Identification number.	CIWQS
place_name	Name of the permitted site.	CIWQS
place_type	Type of site (e.g. composting facility, irrigated lands, wastewater treatment facility)	CIWQS
place_addr	Site address.	CIWQS

place_coun	County where the site is located.	CIWQS
region	Regional Water Board that oversees the site permit.	CIWQS
effective_	Date that the permit became effective.	CIWQS/Notice of Applicability (NOA)
expiration	Date that the permit expired.	CIWQS/NOA
years_acti	Total years that a permit had been active, up to the date of data processing (12/13/2024).	WESS
status	Permit status: Active or Historical	CIWQS/NOA
amended	Signifies whether the site is associated with at least one amended NOA.	CIWQS/NOA
class	Class of biosolids applied: A or B.	NOA
total_acres*	Total acres permitted to receive biosolids.	NOA
total_min_*	Total minimum amount of biosolids estimated to be applied over the permitting period (years_active).	WESS
total_max_*	Total maximum amount of biosolids estimated to be applied over the permitting period (years_active).	WESS
total_unit*	Units associated with the minimum/maximum application of biosolids.	WESS
app_rate_m*	Estimated rate of biosolids application in tons per acre per year.	WESS
rate_terti*	Biosolids application rate binned into tertiles (Null = unknown application rate, 1 = low application rate, 2 = medium application rate, and 3 = high application rate).	WESS
Shape_Length	Shape length in meters.	ESRI
Shape_Area	Shape area in square meters.	ESRI

*Null values are represented by "-999."

References

1. *Biosolids | California State Water Resources Control Board*. (n.d.). Retrieved December 22, 2024, from https://www.waterboards.ca.gov/water_issues/programs/biosolids/.

2. US EPA, O. (2020, March 2). *Sewage Sludge Laws and Regulations* [Other Policies and Guidance]. https://www.epa.gov/biosolids/sewage-sludge-laws-and-regulations

3. US EPA, O. (2024, June 4). *Per- and Polyfluoroalkyl Substances (PFAS) in Sewage Sludge* [Reports and Assessments]. https://www.epa.gov/biosolids/and-polyfluoroalkyl-substances-pfas-sewage-sludge

4. Waste Discharge Requirements (WDR) 95-140 (5F/5S) for Reuse of Biosolids & Septage on Ag/Forest/Rec Sites, Pub. L. No. 95–140 (1995). https://sanitation.lacity.gov/san/sandocview?docname=cnt009597

5. General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities (General Order), Pub. L. No. 2000-10- DWQ (2000). https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2000/wqo2000-10.pdf

6. General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities (General Order), Pub. L. No. 2004- 0012- DWQ (2004). https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2004/wqo/wqo2004-0012.pdf

7. *California Integrated Water Quality System Project (CIWQS) | California State Water Resources Control Board*. (n.d.). Retrieved December 22, 2024, from https://www.waterboards.ca.gov/ciwqs/publicreports.html

8. DMP Lightbox. (2018). SmartParcels®. DMP Lightbox. Retrieved October 2020. https://www.digmap.com/platform/smartparcels/.

9. Public Land Survey System (PLSS): Sections - California Open Data. Retrieved September 20, 2022. https://data.ca.gov/dataset/public-land-survey-system-plss-sections.