Biosolids – A Changing Landscape

Source: Mary Cousins, 2022

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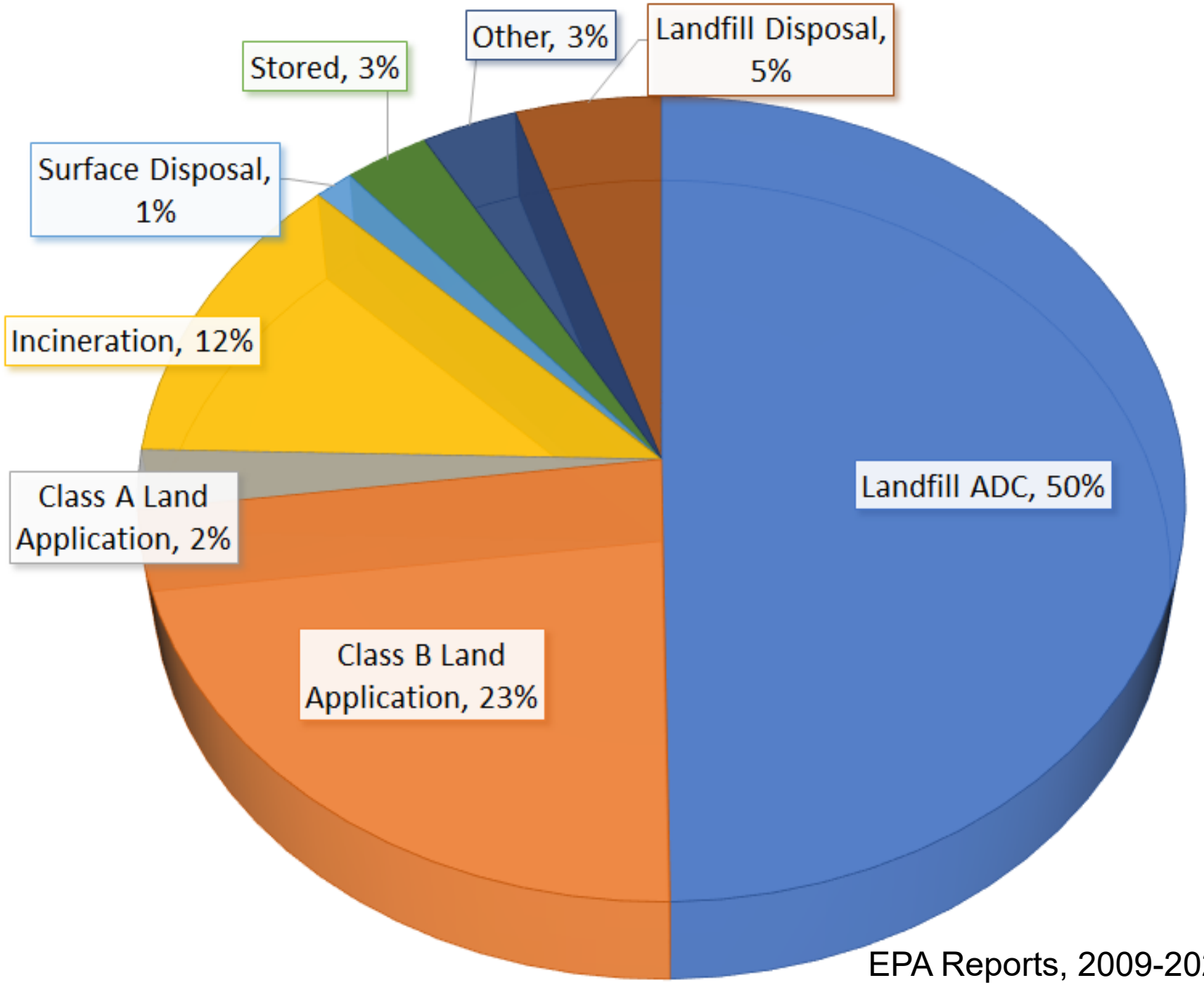
For the last decade, Bay Area biosolids have primarily been used as ADC at landfills or as a soil amendment land-applied to agricultural lands



EPA Reports, 2009-2020

Biosolids

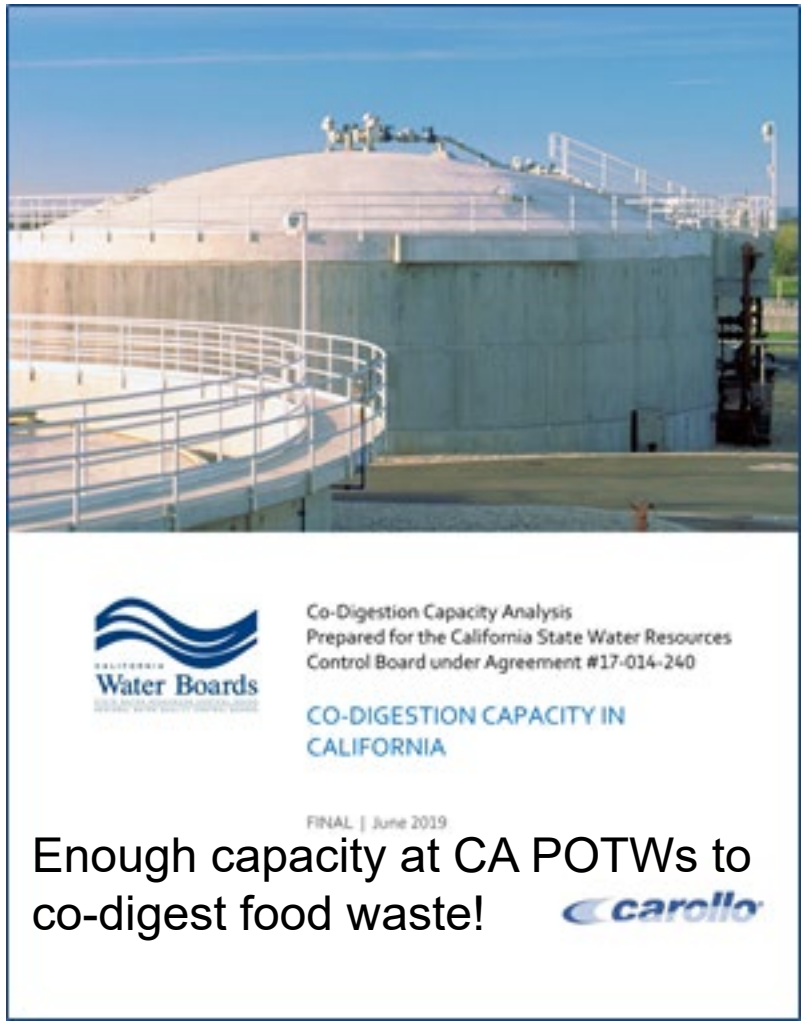
- Offset inorganic fertilizer use
- Increase soil carbon content/stability
- Increase water holding capacity
- Increase nutrient use efficiency
- Increase crop yield
- Sequester carbon in the soil

...recent legislation and new regulations target beneficial use of recycled organics, in turn, a change in biosolids management.

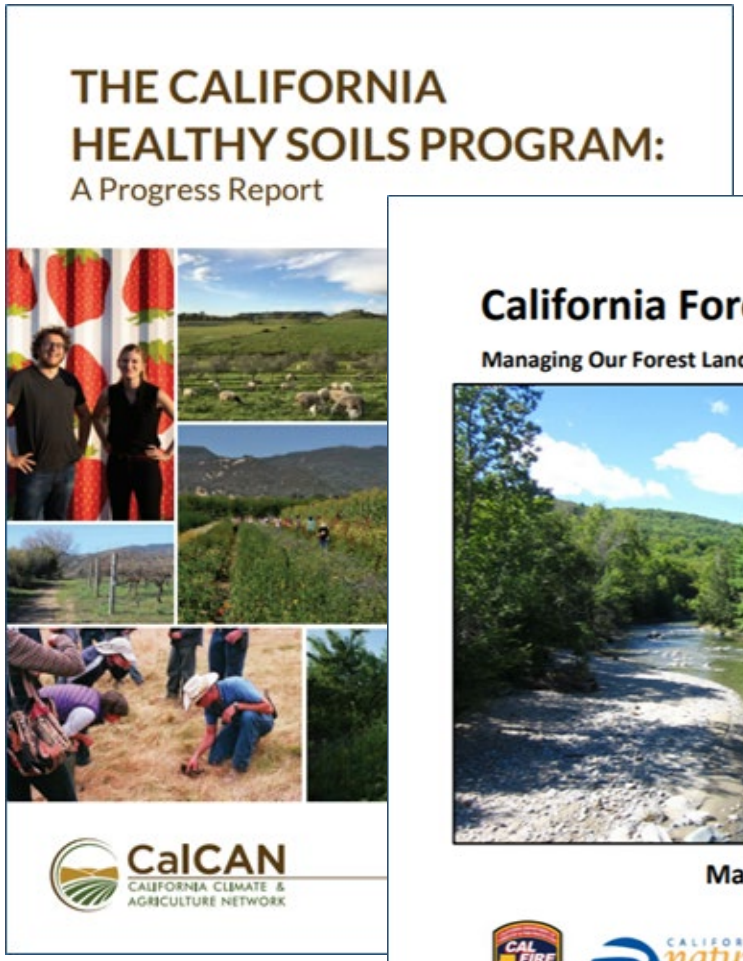
Dr. Gabby Black
UC Davis, 2021

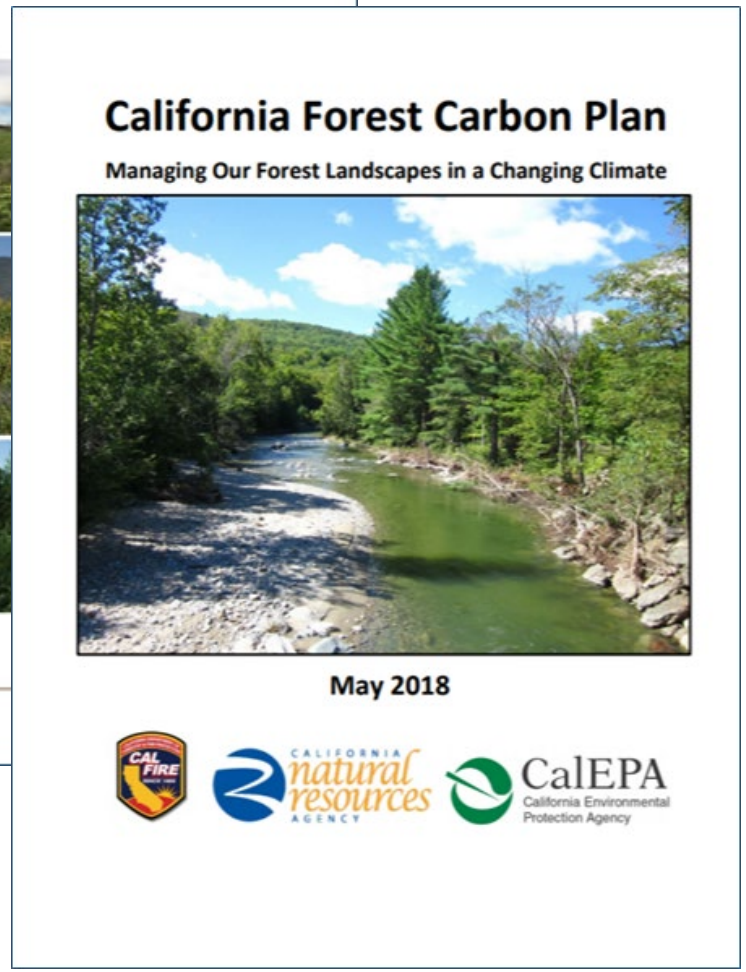
SB 1383 - Short-Lived Climate Pollutant Reduction Organic Waste/Methane Reduction Regulations

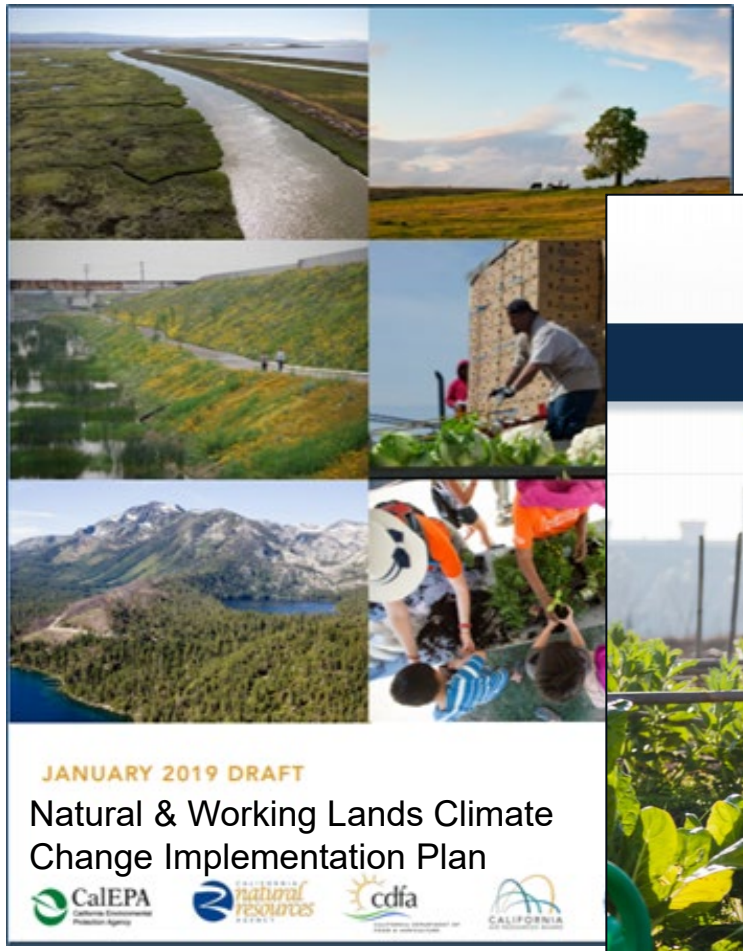
- Regulations effective: January 1, 2022
- 40% methane reduction by 2030 (relative to 2013 levels)
- Organic waste diversion from landfills (includes biosolids, digestate, and sludges)
  - 50% by 2020 (relative to 2014 levels)
  - **75% by 2025** (relative to 2014 levels)
- Incentivizes increasing annual biogas production/compost

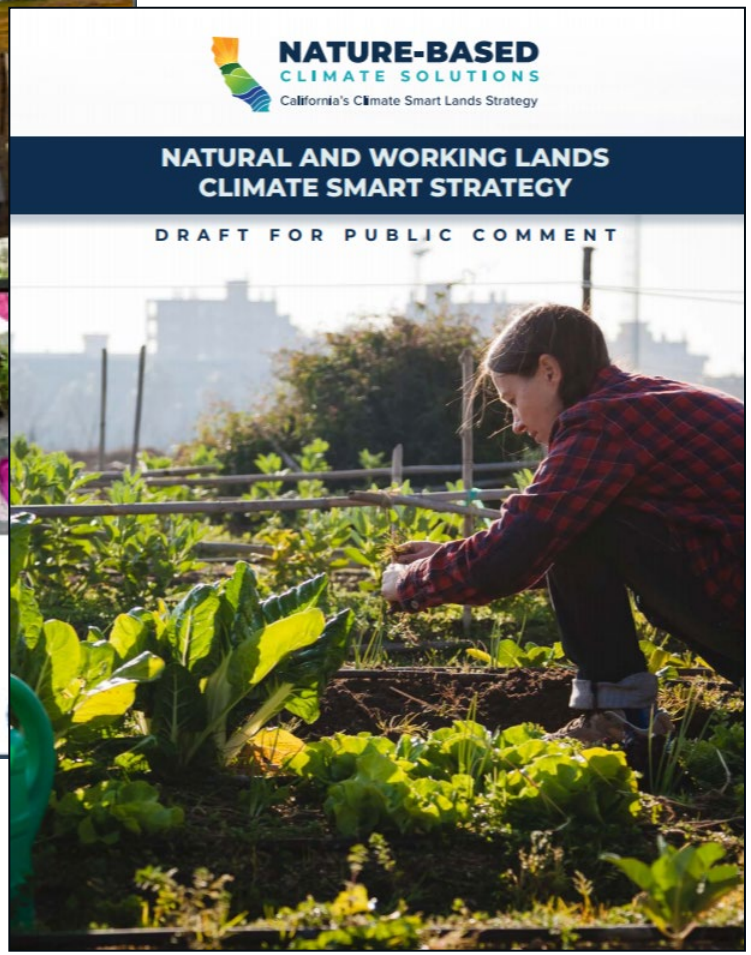


Other climate mitigation programs seek to enhance soil health and carbon sequestration

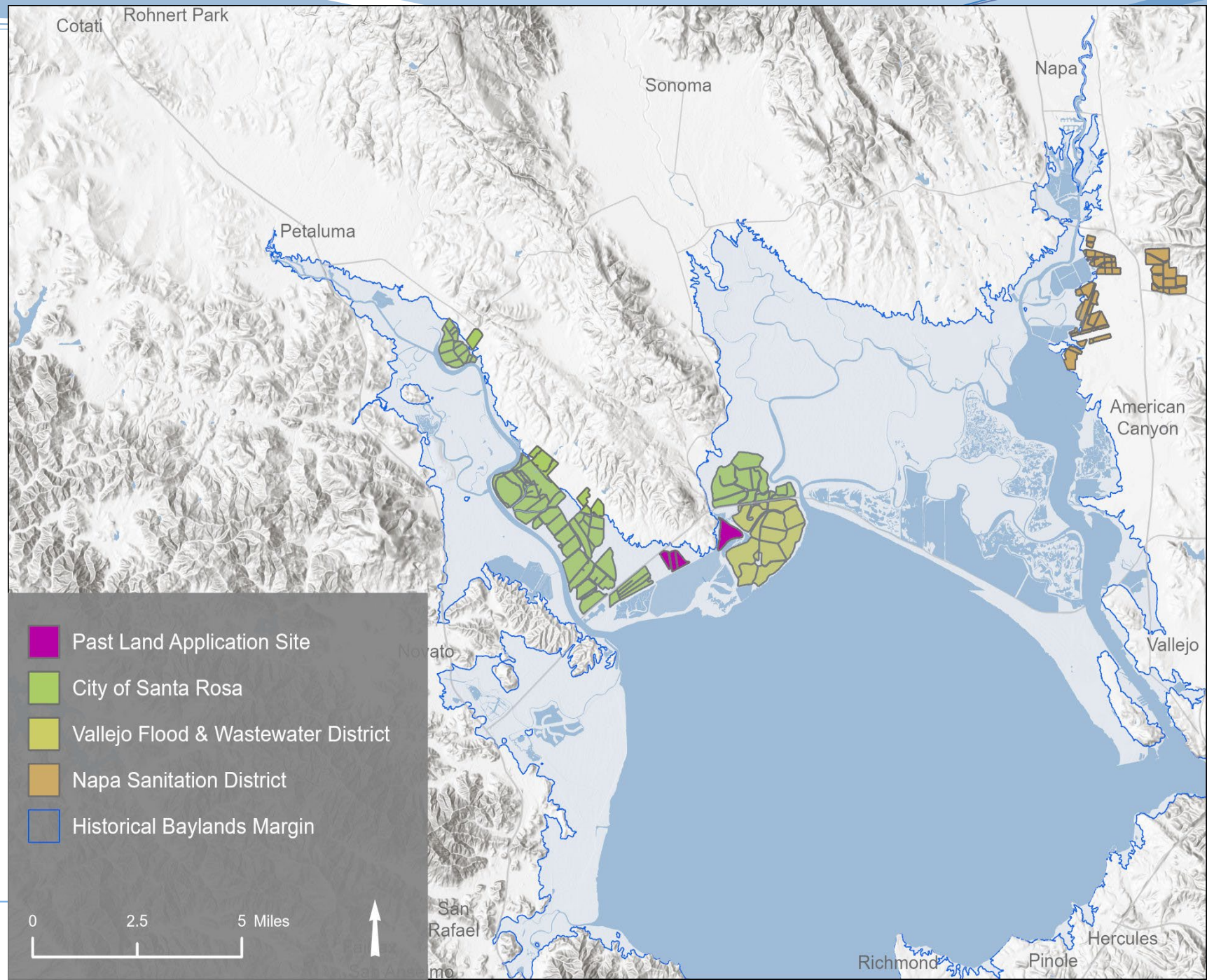






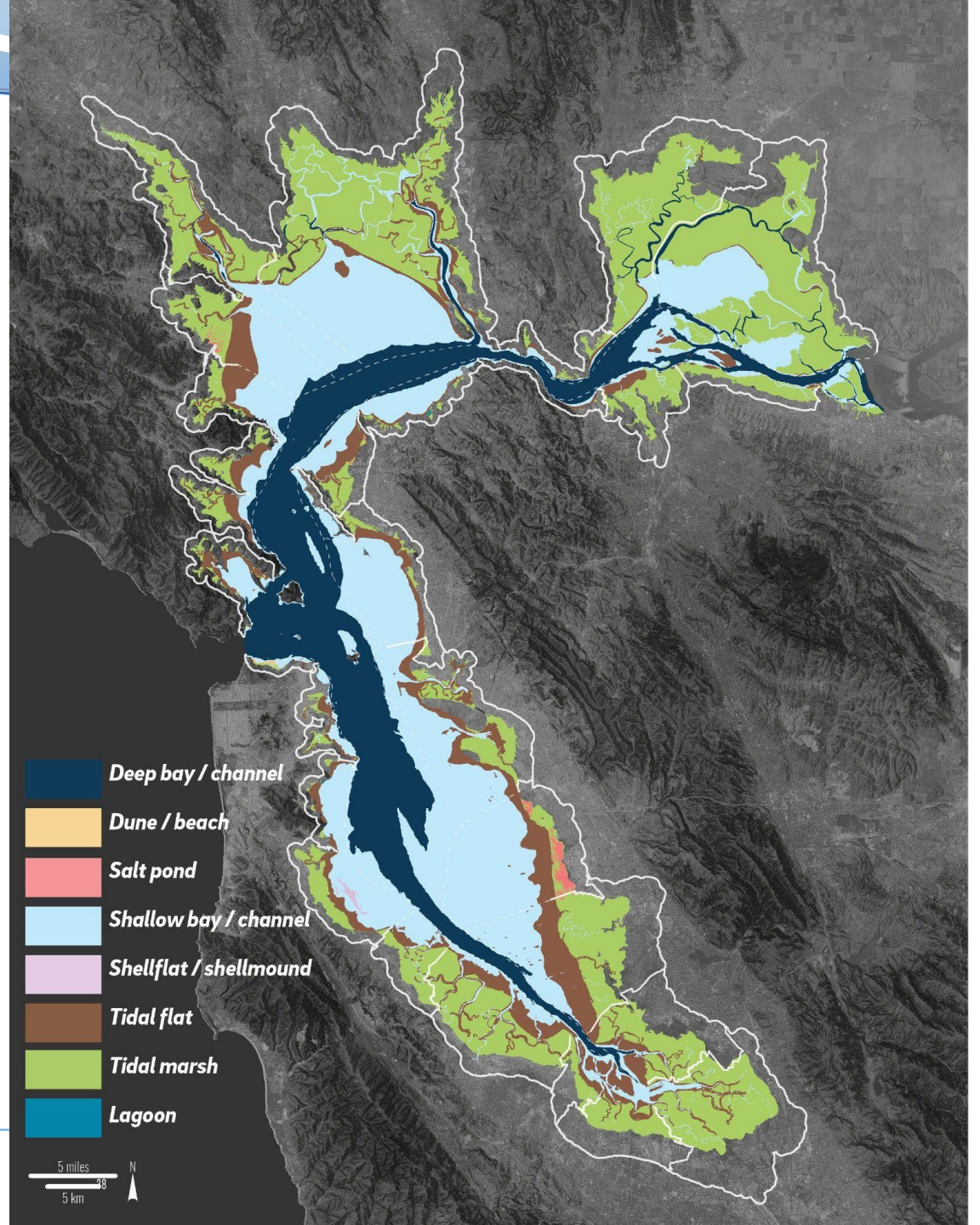


About 4.5% of Bay Area biosolids are land applied to diked agricultural lands within the Baylands…



Planning for sea level rise in the Bay Area now includes considering…

- Restoring tidal wetlands is a key strategy to protect shoreline communities
- The connection of wetlands to the waters of the Bay



Two questions came to us regarding biosolids management in the Baylands:

(1) Is biosolids land application compatible with future wetland restoration relative to the biosolids constituents impact on human health and wildlife?

(2) Could land application benefit the restoration process?

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METALS	WETLAND RESTORATION CONCENTRATION CRITERIA		AVERAGE SOIL CONCENTRATION AT BIOSOLIDS LAND APPLICATION SITES (mg/kg)	AVERAGE BIOSOLIDS CONCENTRATION (mg/kg)	COMPARISON OF SOIL CONCENTRATION TO WETLAND CRITERIA
	Surface Material (mg/kg, dry)	Foundation Material (mg/kg, dry)			
Arsenic	15.3	70	6	5.1	Suitable
Cadmium	1.2	9.6	0.1	1.7	Suitable
Chromium	112	370	83	23	Suitable
Copper	68.1	270	34	299	Suitable
Lead	46.7	218	12	13	Suitable
Mercury	0.4	0.7	0.1	1.0	Suitable
Nickel	112	120	54	17	Suitable
Selenium	1.6	1.6	1.6	10.0	Suitable*
Silver	1	3.7	No Data and Non-Detect	1.4	?
Zinc	158	410	82	702	Suitable
Organochlorine Pesticides/PCBs (µg/kg, dry weight)	6 Constituents, Set by Constituent	6 Constituents, Set by Constituent		PCB Standard[1] Other Constituents Monitored[2], Standard not Triggered[3]	Method detection limit insufficient to detect at WC limits: 6 constituents
Polycyclic Aromatic Hydrocarbons (µg/kg, dry weight)	3390	44792		Monitored[2], Standard not Triggered[3]	1 constituent, method detection limit ?
Total Petroleum Hydrocarbons (mg/kg, dry weight)	2 groups of constituents, Set by Constituent Groups	2 groups of constituents, Set by Constituent Groups		Monitored[2], Standard not Triggered[3]	2 groups of constituents, method detection limit ?
Volatile Organic Compounds (µg/kg, dry weight)	43 Constituents, Set by Constituent	No Current Constituent Standard		Monitored[2], Standard not Triggered[3]	16 constituents have method detection limits suitable for wetland criteria; 27 constituents have either insufficient method detection limits for wetland criteria or more information is needed on method detection limits

Comparing soil to wetland criteria, we see Baylands land app sites satisfy criteria – Region 2 wants to confirm this broadly using monitoring programs and following statewide strategies for examining PFAS and MPs.

PFAS: State Water Board Investigative Orders to POTWs

Region 2 Study involves two phases, sampling:

- Influent, effluent, biosolids at 15 POTWs
- 1-170 million gallons per day receiving 0-100% residential flow
- Different processes along the treatment train
- 40 target PFAS analytes plus Total Oxidizable Precursors (TOP) assay

CALIFORNIA WATER BOARDS San Francisco Bay - R2

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Microplastics: Statewide Strategy

Senate Bill 1263 mandates the Strategy to protect coastal waters

2019 testing for microplastics in effluent discharge from eight POTWs; appears to contribute an appreciable but much lower microplastics load than urban stormwater runoff

Identified research needs… a partnership formed to address those needs:

OCEAN PROTECTION COUNCIL

SCCWRP Established 1969
SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT
Applying next-generation science to aquatic ecosystems management
A PUBLIC AGENCY

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CASA

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Mission and Vision to beneficially use all biosolids!

Mission

(What is the Coalition doing?)

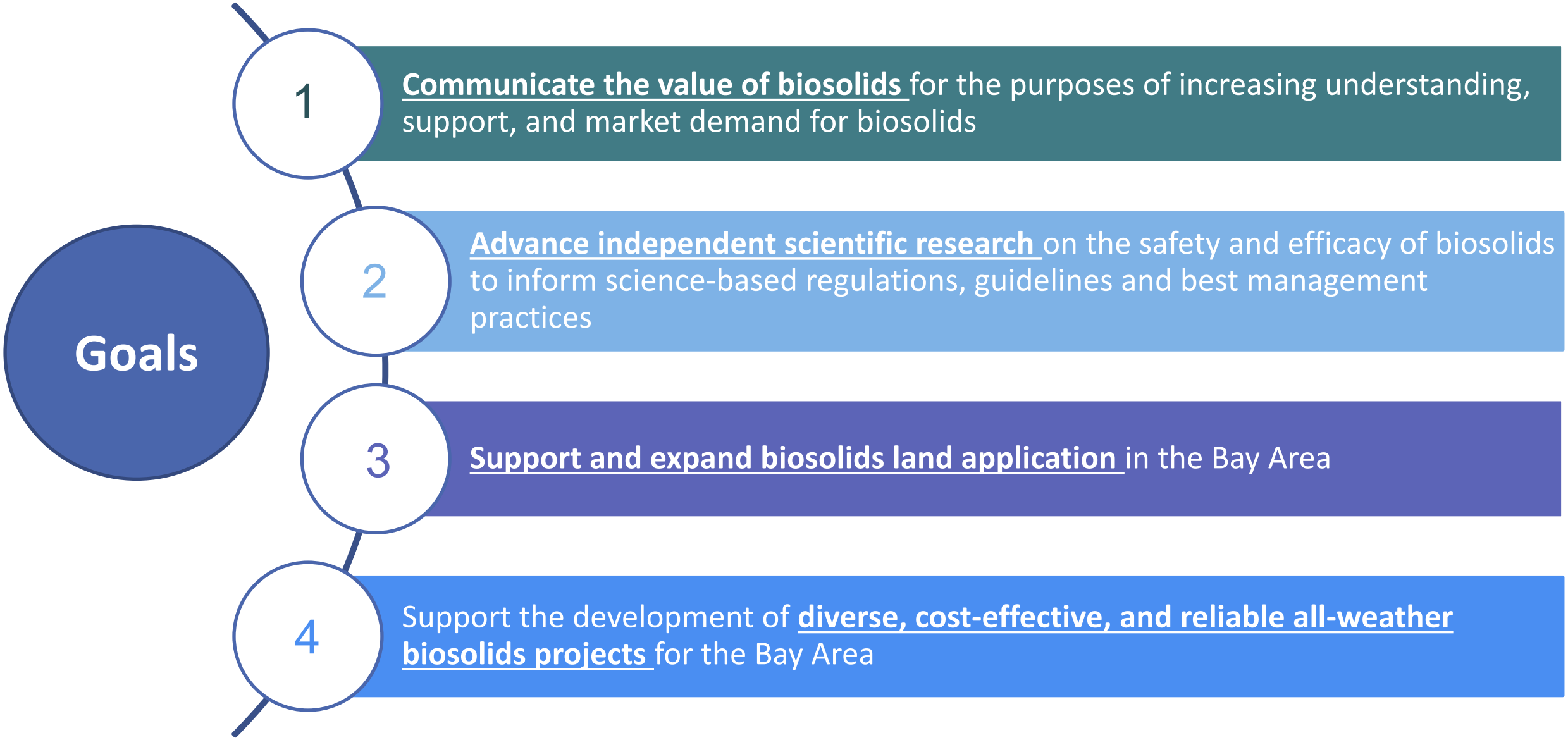
Work collaboratively with Bay Area Utilities to enhance environmental quality by developing cost effective and socially conscious solutions for biosolids management.

Vision

(Why is the Coalition doing it?)

Create a Bay Area region where all biosolids are beneficially used and recognized as an environmental asset.

The Coalition supports development of a diverse set of local, sustainable solutions!



Goal 2: Advance Scientific Research … to answer Region 2's questions and expand use of biosolids

- Three-year Research Plan priorities:
  - Benefits of biosolids used as a soil amendment
  - Demonstrating biosolids safety
  - Expanding biosolids markets
- Maintain and expand partnerships with local scientific community:
  - *Benefits of Land Application of Biosolids (2018-2020)*: UC Merced, Dr. Rebecca Ryals – published 2021!
  - *Plant Uptake of PFAS from Biosolids Amended Soils (2020-2022)*: UC Davis, Dr. Thomas Young and Dr. Gabbi Black
  - **Identifying research to support recycling biosolids back to the soil!**

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THANK YOU!

Questions?

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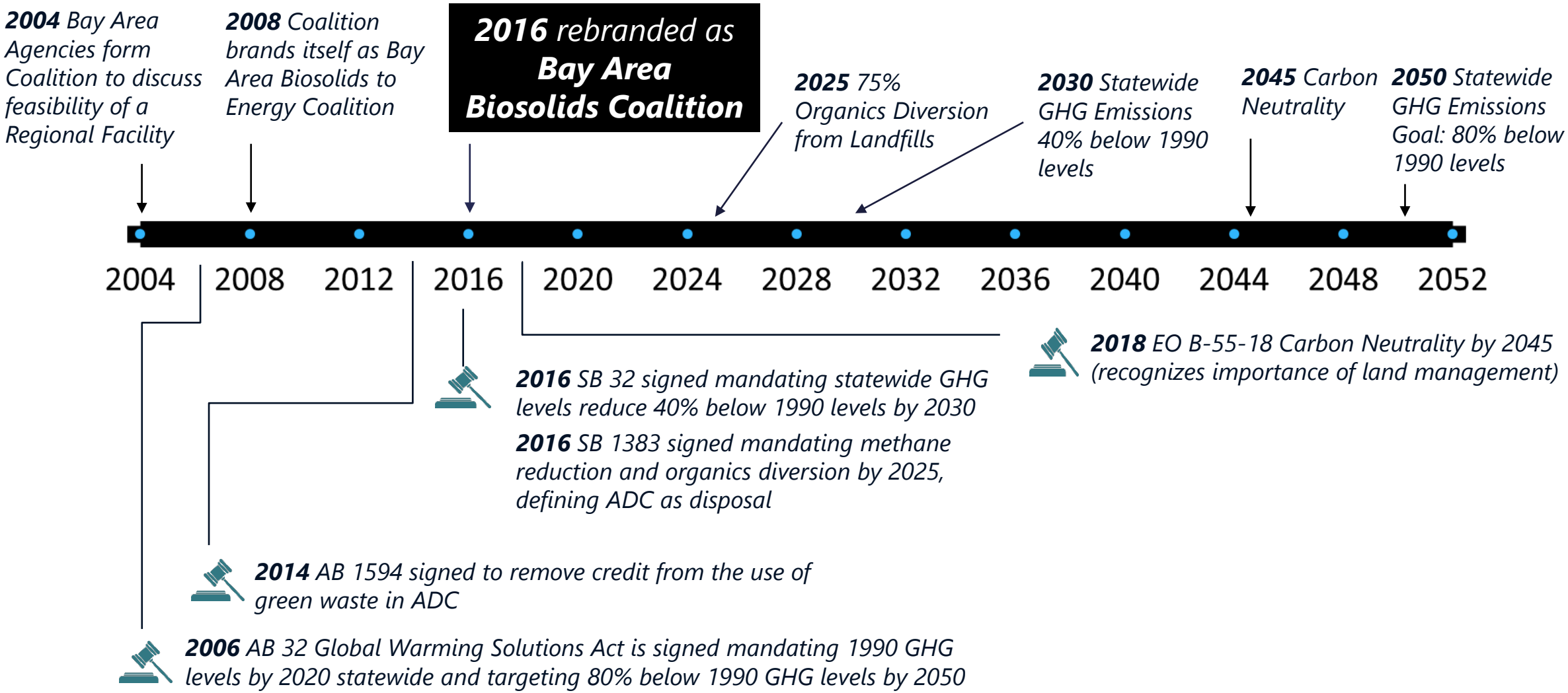
Extra Slides Beyond This Point

Coalition formed to address threats to land application and state actions on climate change!



Coalition tracks federal, state, local regs that may impact treatment and beneficial use, including:

- EPA/SWRCB – PFAS (Per-/Poly-fluoroalkyl substances) order and regulation
- CalRecycle/SWRCB – Methane reductions via diversion and recycling of organic waste (SB 1383)
- CARB – Toxic air contaminants monitoring and reduction (AB 617 & AB 2588)
- CEC/CPUC/CARB – Carbon neutrality by 2045 (SB 100 and Advance Clean Vehicles)
- BAAQMD
  - Toxic air contaminants (Rule 11-18)
  - Methane and nitrous oxide reduction (proposed Regulation 13)
  - Clean Air Plan to further limit NOx and target Carbon Neutrality

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Interactions with restoration goals