



# **SUCCESSSES AND LESSONS LEARNED IN THE SF BAY AREA**

*SEVEN YEARS OF ADDRESSING TRASH  
REDUCTION REQUIREMENTS*

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# PRESENTATION OUTLINE

- I. Overview of trash reduction requirements
- II. Bay Area compliance approaches
- III. Top 6 lessons learned
- IV. Resources/tools available



# MUNICIPAL REGIONAL (STORMWATER) PERMIT (MRP) PROVISION C.10

- **Trash load reduction targets**

- 2014 - 40%
- 2016 - 60%
- 2017 - 70%
- 2019 - 80%
- 2022 - 100% (no adverse impacts)

- **Mandatory full capture systems** – Permittee specific minimum area

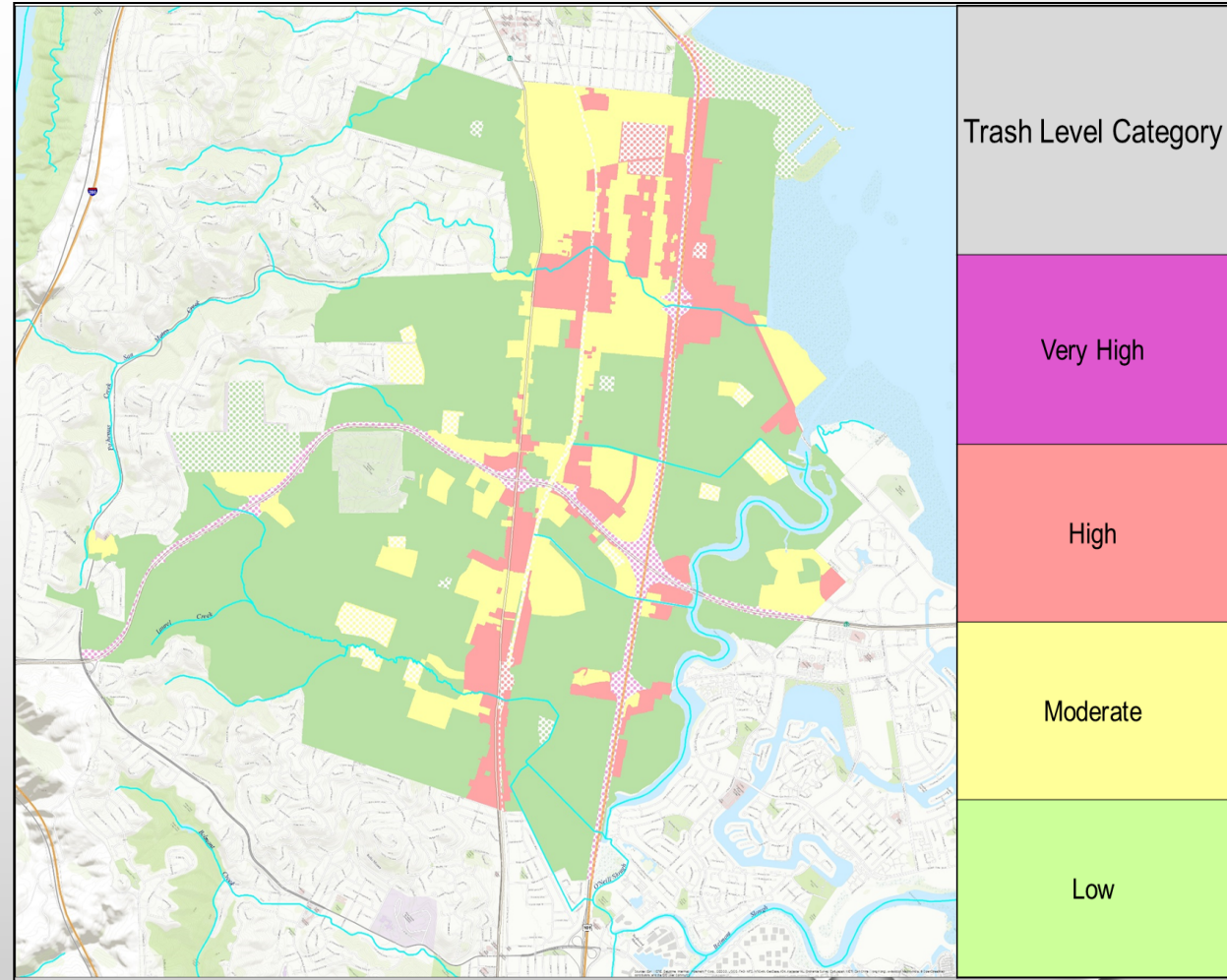
- **Annual creek/shoreline cleanups** – 1x/yr at Permittee specific # sites

- **Receiving water monitoring program**



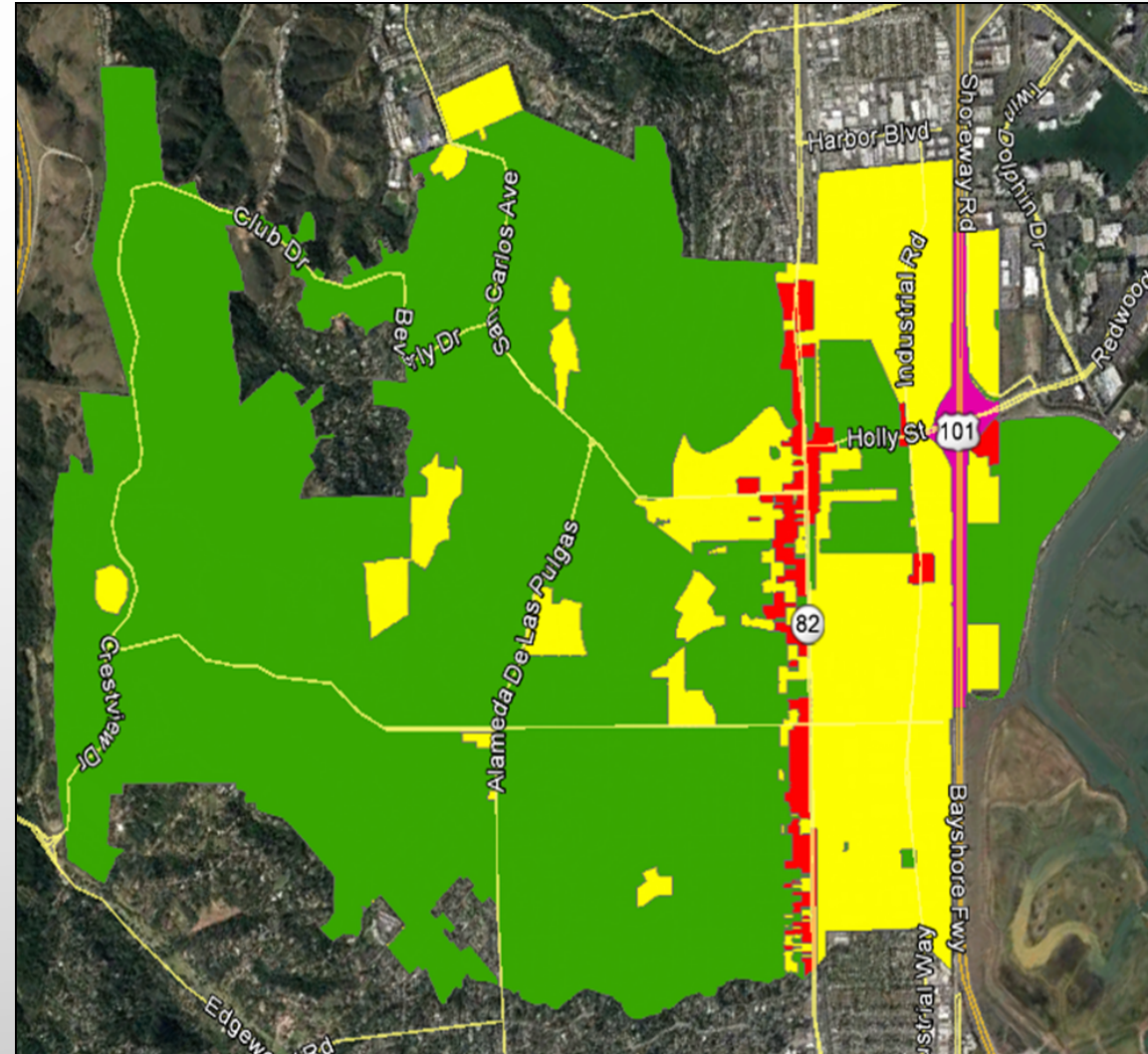
# APPROACHES TO DEMONSTRATING COMPLIANCE

- Baseline trash generation maps
- Extent of trash full capture systems
- Outcomes of other trash controls
  - On-land visual trash assessments
  - Performance standards for specific controls
- “True” source controls (max 10%)
- Offsets
  - Creek and shoreline cleanups (max 10%)
  - Direct discharge program (max 15%)



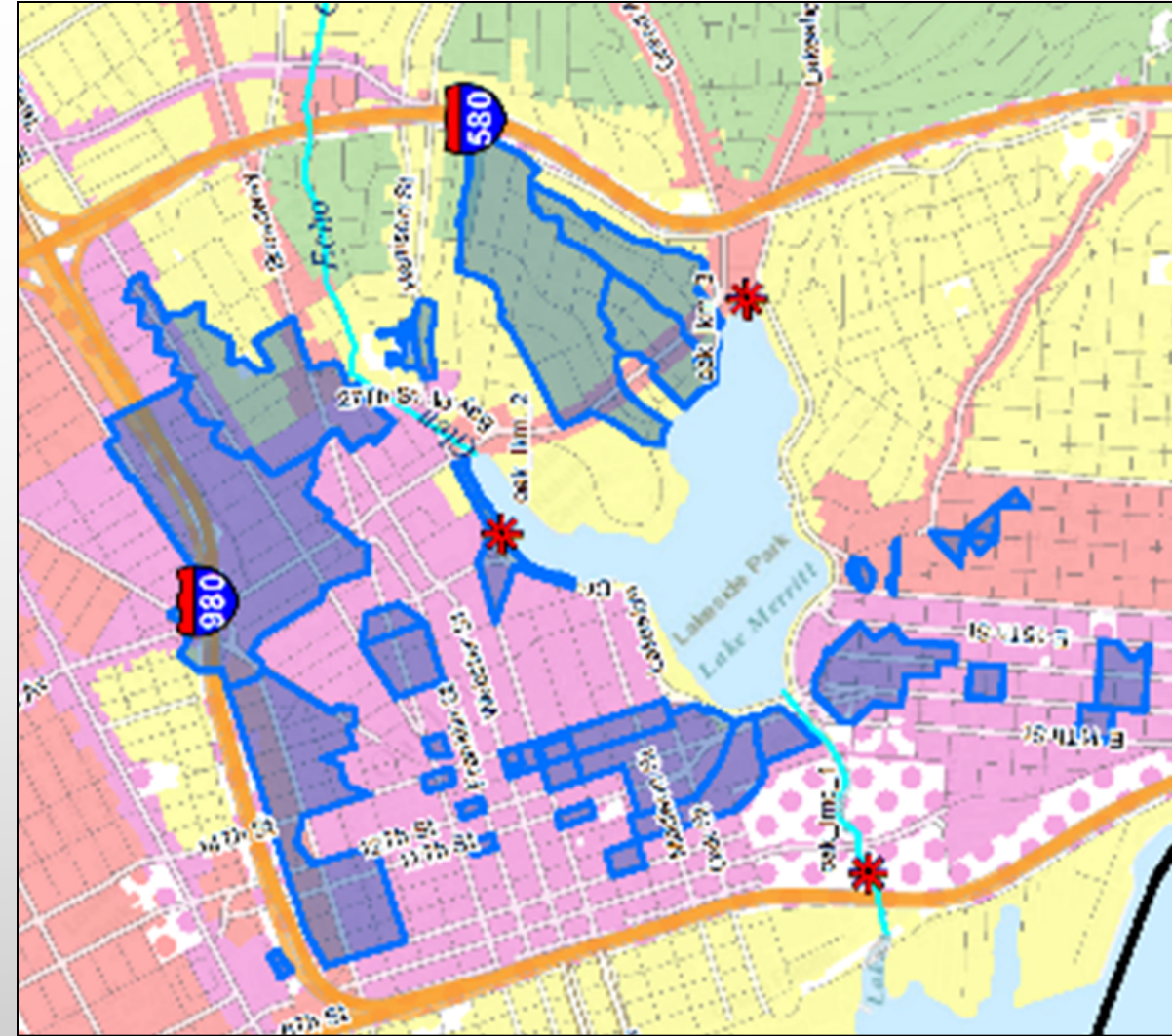
# BASELINE TRASH GENERATION MAPS

- Application of modeled rates
- Verification via On-land Visual Trash Assessment (OVTA) method
- Illustrates **trash generation**
  - *Average levels of trash flowing annually into ms4s per unit of land area*
- Forms starting point for compliance purposes



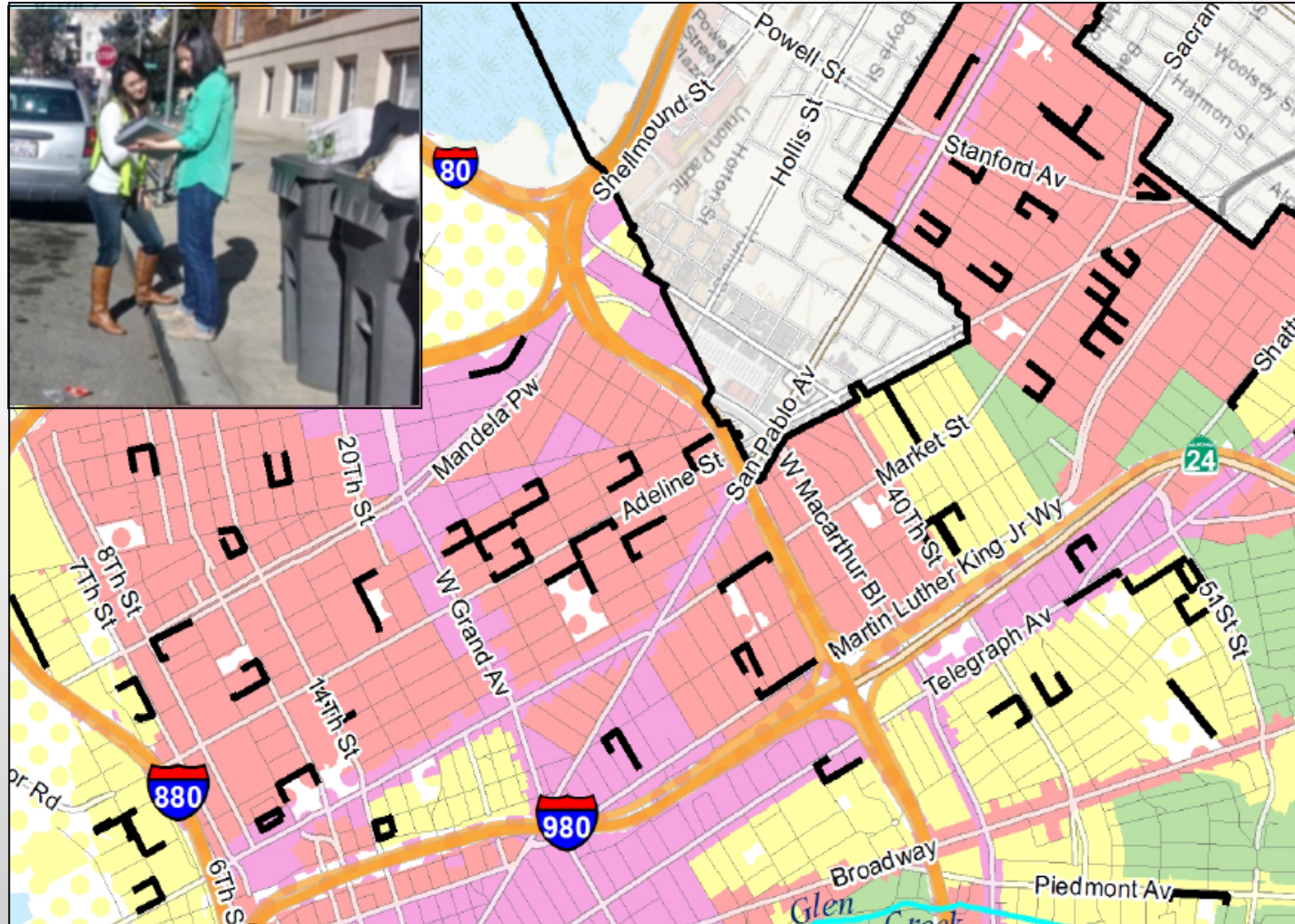
# EXTENT OF FULL CAPTURE SYSTEMS

- Delineation of areas “treated” by these devices/systems
  - **Inlet-based devices** – combination of desktop and field surveys
  - **Large devices** – engineering designs & plans
- Trash generation of areas treated is calculated as the trash load reduced



# OUTCOMES OF OTHER TRASH CONTROLS ON-LAND VISUAL TRASH ASSESSMENTS (OVTAS)

- Rapid visual assessment (qualitative)
  - Magnitude of trash on public right-of-way
- 4 categories
  - A (low) to D (very high)
- Randomly selected sites
  - 10% of streets and sidewalks in areas NOT treated by full capture



# OUTCOMES OF OTHER TRASH CONTROLS

## PERFORMANCE STANDARDS FOR SPECIFIC CONTROLS

- Option that has not yet been exercised in Bay Area
- Based on control measure specific performance studies
  - Street sweeping
  - Curb-inlet screens
  - On-land cleanups
  - Business improvement districts
- Application of studies results to areas where implementation is occurring





# “TRUE” SOURCE CONTROLS

- Reduction in the generation of trash/litter before it begins
  - Single use plastic grocery bag bans
  - Expanded polystyrene food service ware bans
  - Other controls
- Substantive and credible evidence
- **10% maximum** reduction for all true source controls combined



# OPTIONAL OFFSETS

- **Creek and shoreline cleanups (max 10%)**
  - Above and beyond those required by the MRP
  - 3:1 or 10:1 offset
- **Direct discharge program (max 15%)**
  - Control of direct discharges of trash to receiving waters from non-ms4 sources
  - Comprehensive plan approved by the executive officer
    - Sources of the directly discharged trash
    - Control actions that will be implemented in a systematic and comprehensive manner
    - Map of the affected receiving water area and associated watershed
    - How effectiveness of controls will be assessed



# SUMMARY OF COMPLIANCE OPTIONS

## SF BAY AREA PHASE I MS4S

### Trash Reduction Options

1. Full Capture Systems

+

2. Other Actions (via OVTA Results)

+

3. True Source Controls (10% Max)

+

4. RW Clean up Offset (10% Max)

+

5. Direct Discharge Offset (15% Max)

+

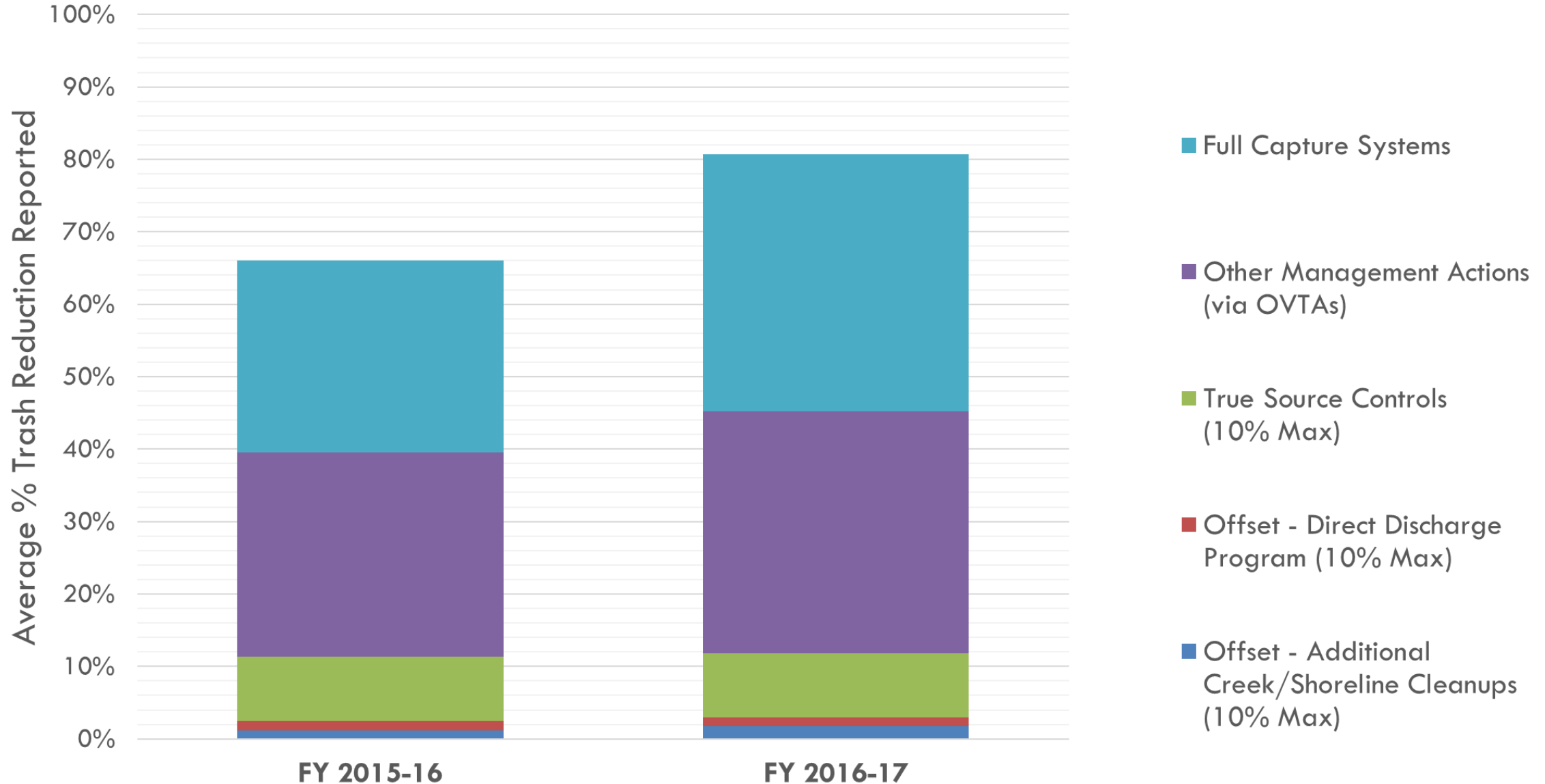
**Baseline  
Trash Load**

=

**Trash  
Reduction  
(% Progress)**

# AVERAGE LOAD REDUCTIONS BY CATEGORY

## MS4 Permittees in San Mateo and Santa Clara Counties



The background features a light gray gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the page.

# **TOP 6 LESSONS LEARNED**

# BASED ON...

- **Review of worldwide literature**
  - Trash generation
  - Control measure effectiveness
  - Monitoring/assessment methods
- **Characterization of 1,000's of gallons of trash**
- **Regional development of trash generation rates**
- **Performance standard studies**
  - Single use bags and expanded polystyrene bans
  - Street sweeping
  - Curb inlet screens
- **Siting, installation and operation/maintenance of thousands of full capture devices**
- **Over 4,000 on-land visual trash assessments**
- **Calculating trash load reductions for >50 cities/counties**
- **Receiving water monitoring program**



# #6

Proprietary full capture systems benefit water quality, **but** they cannot be installed everywhere and they require a fastidious maintenance program

# TRASH FULL CAPTURE SYSTEMS

- **Large systems – HDS, GSRDs, Netting**
  - Siting can be challenging
    - Low lying areas - lack of gradient/velocities
    - Utility conflicts (above and below ground)
  - Small catchments – higher costs per unit of trash reduction
  - Maintenance – dedicated staffing, special equipment & sops
- **Small systems – inlet based devices**
  - Oversight of vendors
  - Constrained by the size of catch basin
  - Public inlets – limited treatment of private lands
  - Maintenance
    - Site specific cleaning schedules (leaf litter)
    - Dedicated staff - dispersed system of devices
    - Tracking maintenance and addressing issues





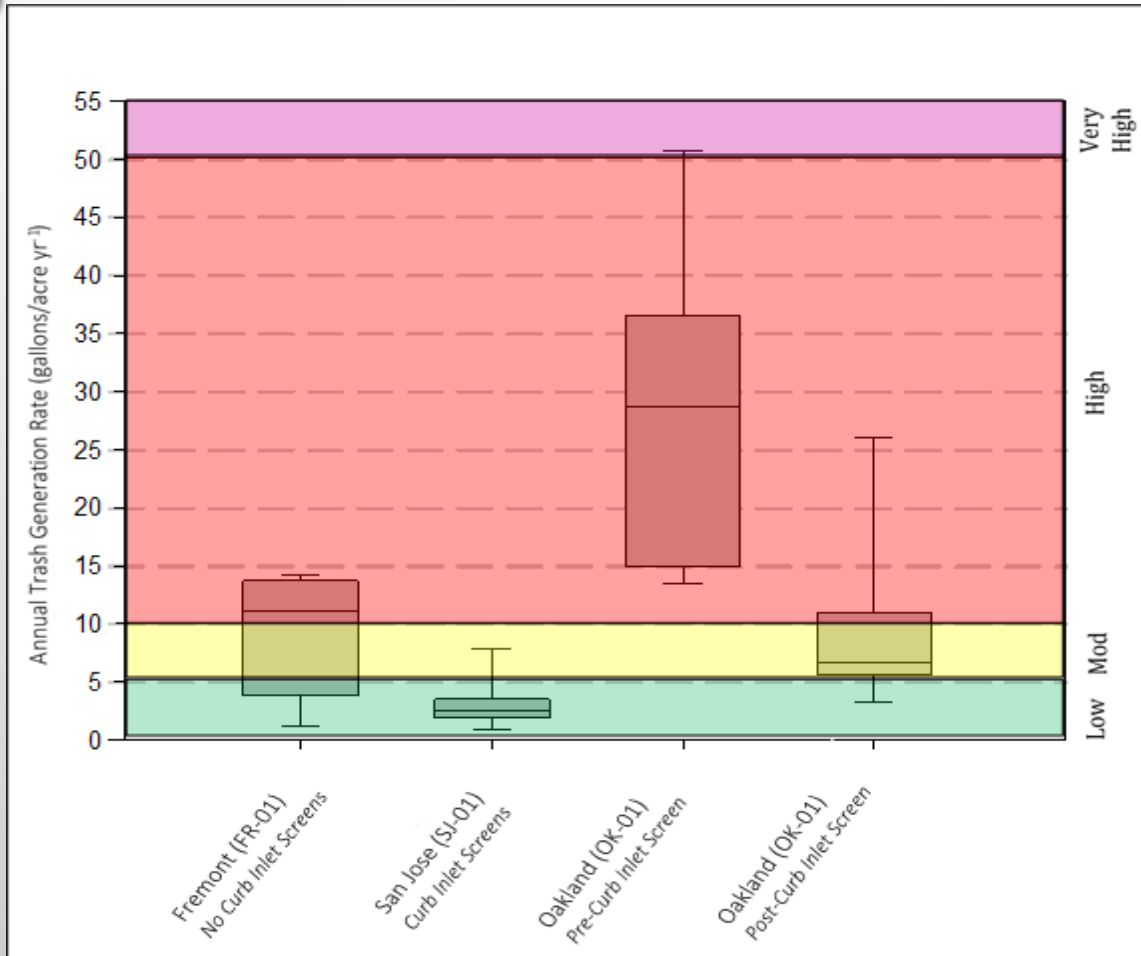


**#5**

**CURB-INLET SCREENS CAN BE EFFECTIVE TRASH  
CONTROL MEASURES**



# CURB-INLET SCREENS



TRACKING CALIFORNIA'S TRASH (BASMAA 2017)

- **LOS ANGELES REGION**

- ~85% Effective

- **BAY AREA REGION**

- TCT Study Indicates Reduction of **ONE** Trash Generation Category
- Further Performance Standard Studies Underway



#4

**“TRUE” SOURCE CONTROLS PROVIDE  
DEMONSTRABLE WATER QUALITY BENEFITS**



# “TRUE” SOURCE CONTROLS

- **Reductions of litter-prone items in storm drains**
  - Single use plastic grocery bags
  - Expanded polystyrene food service ware
- **Additional bans/prohibitions could reduce the generation of trash**
  - Cigarette butts
  - Plastic disposable bottles
  - Plastic utensils and straws

Single Use Plastic Grocery Bags	# SD Inlets	Average # Bags per yr in Each SD Inlet		Reduction
		Pre Ordinance	Post Ordinance	
		<b>53</b>	<b>1.98</b>	<b>0.56</b>

EPS Food Service Ware	# SD Inlets	Average Gallons per yr in Each SD Inlet		Reduction
		Pre Ordinance	Post Ordinance	
		<b>53</b>	<b>0.46</b>	<b>0.12</b>

STORM DRAIN TRASH CHARACTERIZATION STUDY (SCVURPPP 2016)



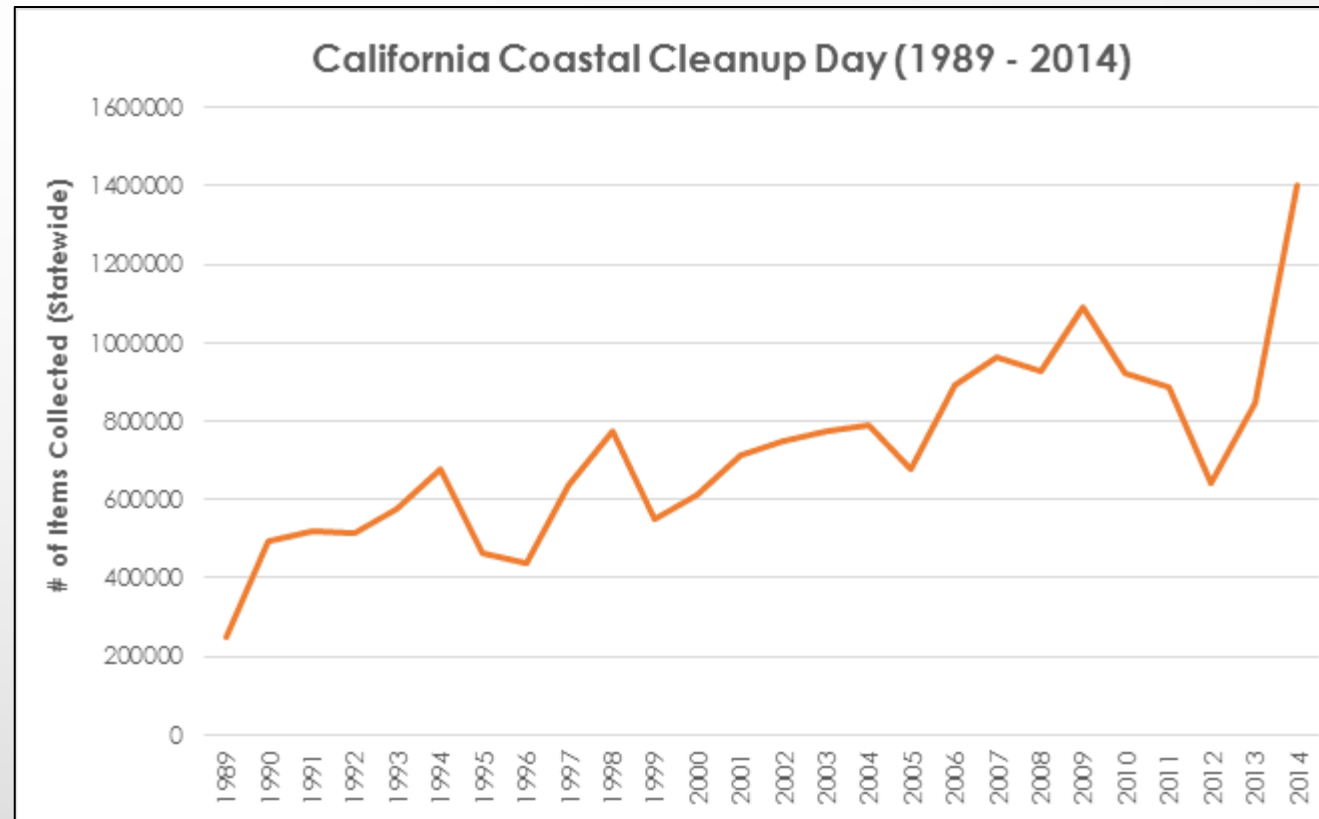
#3

**CLEANING UP TRASH IN RECEIVING WATERS  
PROVIDES VALUABLE AND DIRECT WATER  
QUALITY BENEFITS**



# WATER QUALITY BENEFITS OF TRASH CLEANUP EVENTS

- Millions of gallons of trash removed from receiving waters every year
  - Volunteer efforts
  - City/county staff
- Direct water quality benefit
- Engagement of community members
- Provides assistance in achieving trash reduction goals
  - Road to 100% - Last 10-20% reduction may not be attainable without allowing “credit” for cleanup events



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#2

**BIORETENTION FACILITIES**  
(AND OTHER TYPES OF TRADITIONAL STORMWATER TREATMENT)  
**ARE EQUIVALENT TO**  
**FULL TRASH CAPTURE DEVICES**  
(IN MOST AREAS)

# TRASH FULL CAPTURE SYSTEM DEFINITION

## (SWRCB TRASH AMENDMENTS)

A stormwater treatment control, or series of treatment controls that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) not less than the peak flow rate resulting from a one-year, one-hour, storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

### Previous Certification of Devices by State and Regional Boards:

- Assumes screening/trapping of 5mm or greater **only** occurs for flows resulting one-year, one-hour storm
- Trash transported by **larger storm events bypass and/or overflow** the certified systems



# MULTI-BENEFIT TREATMENT SYSTEMS

(CURRENTLY ON THE SWRCB'S WEBSITE AS CERTIFIED)

- BIORETENTION
- CAPTURE AND USE SYSTEMS
- DETENTION BASIN
- INFILTRATION TRENCH OR BASIN
- MEDIA FILTER



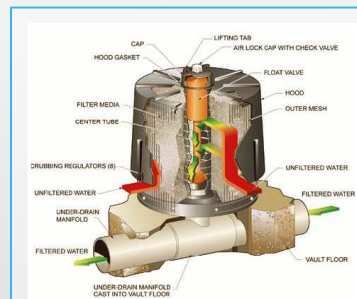
Detention Basin



Bioretention



Infiltration Trench



Media Filter



Capture and Use Systems

# BIORETENTION EQUIVALENT TO TRASH FULL CAPTURE SYSTEM

- Compared 1-year 1-hour storm to standard bioretention sizing criteria
  - 4% surface area criteria
  - 6-inch ponding depth
- Standard bioretention facility is capable of capturing flow for areas with 1-year 1-hour storm depth of **0.59 inches or less**



*From: Hydraulic Analysis of Bioretention as a Full Capture System for Trash  
(Dubin Environmental 2016)*

# BIORETENTION EQUIVALENT TO FULL TRASH CAPTURE

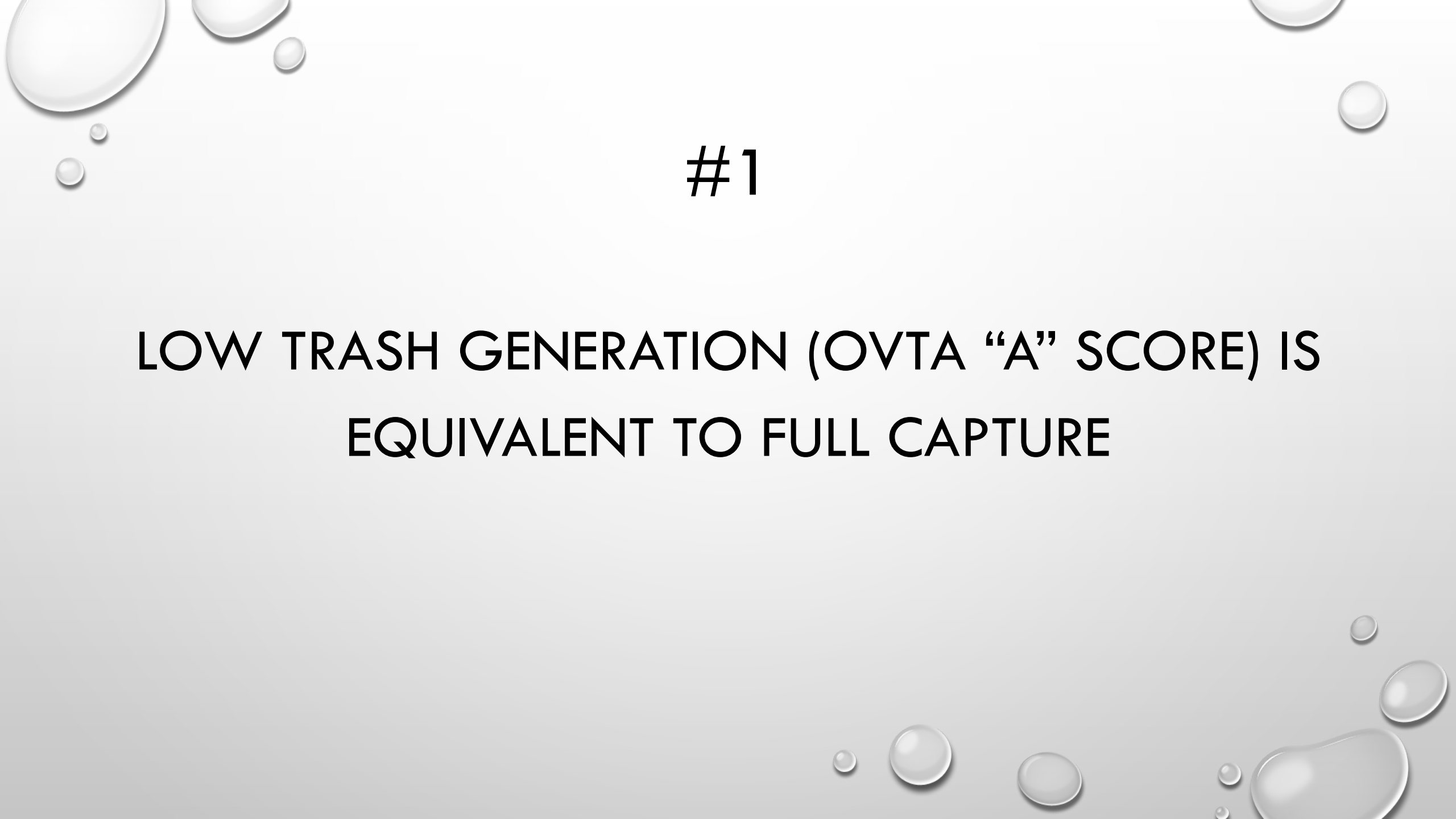
**Bioretention Facility Captures Trash in  
One-Year, One-Hour Storm**  
(Overflow/Bypass of Larger Storms (No Screening))



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**Full Capture System Captures Trash in  
One-Year, One-Hour Storm**  
(Overflow/Bypass of Larger Storms (No Screening))



The background features a light gray gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

#1

**LOW TRASH GENERATION (OVTA “A” SCORE) IS  
EQUIVALENT TO FULL CAPTURE**

# Full Capture Equivalency Approach

*using On-land Visual Trash Assessments*

## ■ Approach

- Inverse of definition in Trash Amendments
  - The amount of trash that **overflows/bypasses a certified full capture system** under an acceptable maintenance regime
- Compare that amount, to amount that enters a storm drain inlet from the surrounding land area



# Full Capture Equivalency Approach

*using On-land Visual Trash Assessments*

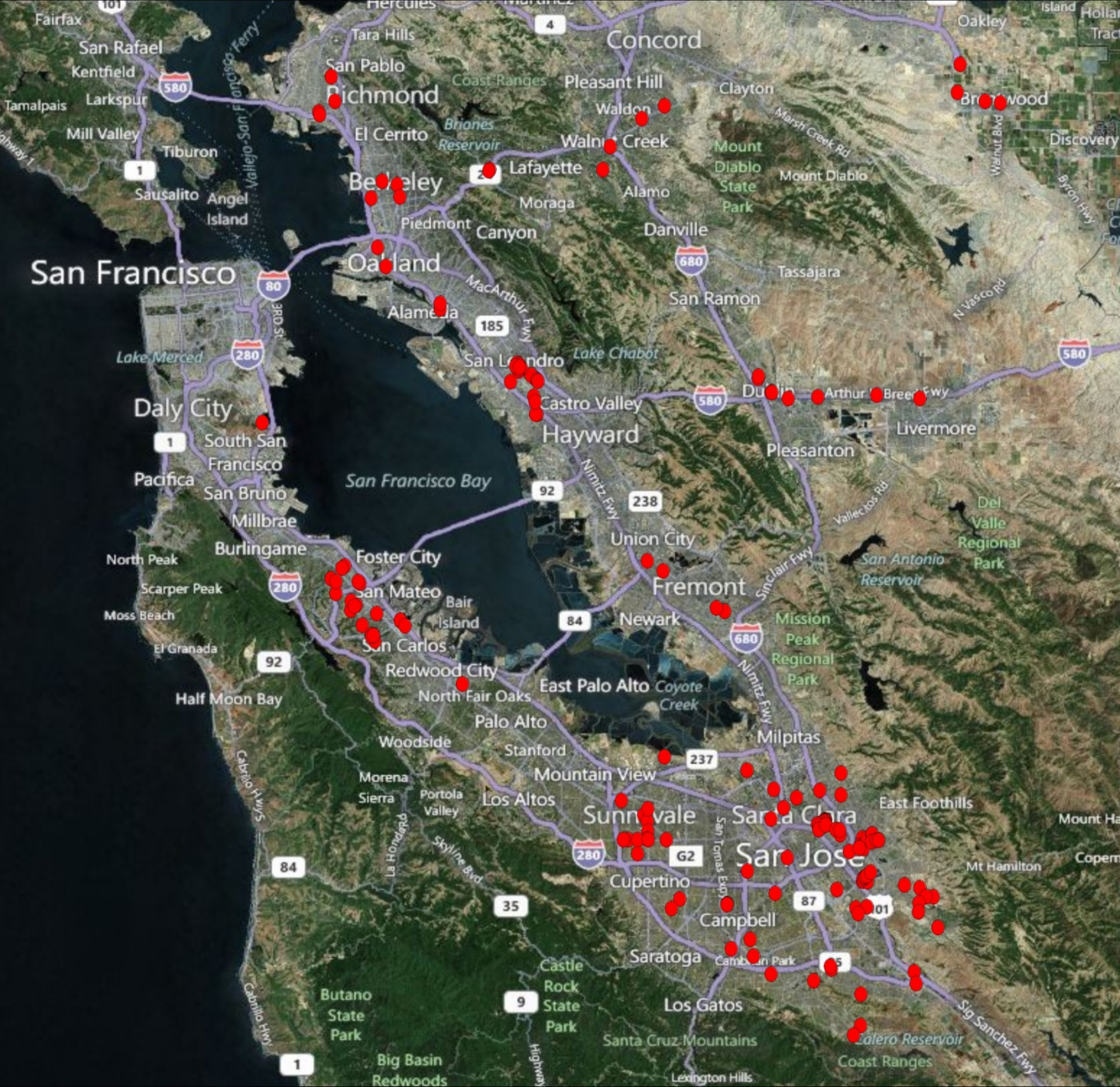
**Amount of Trash that Enters  
a Storm Drain Inlet**



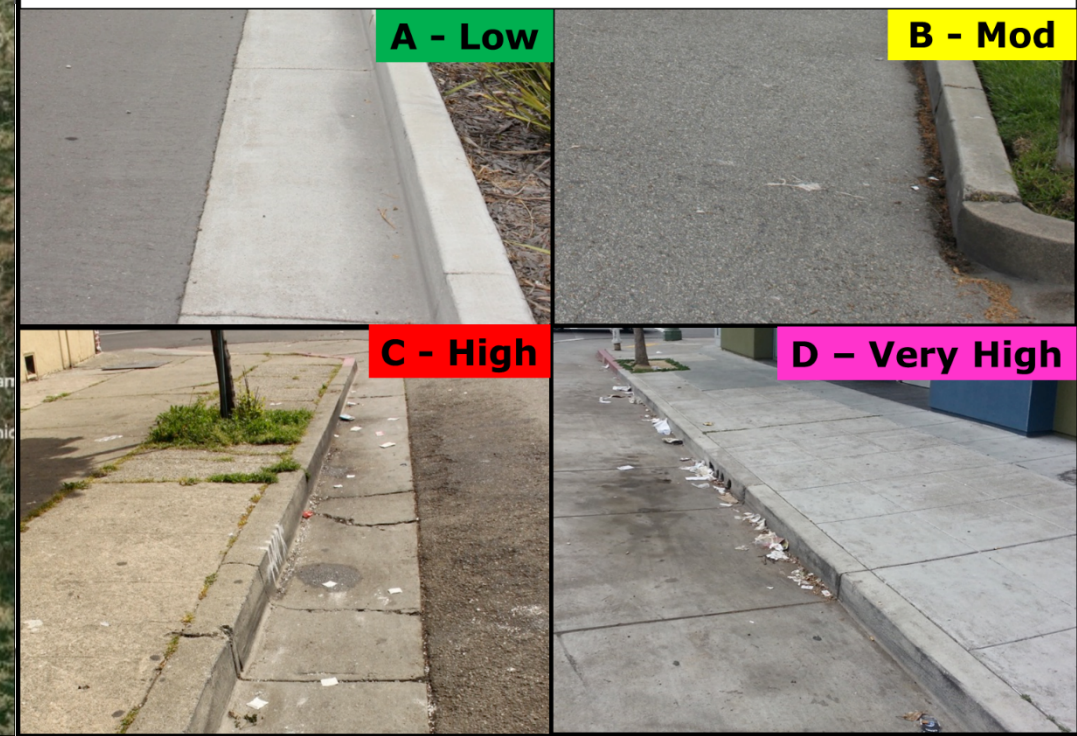
**Amount of Trash that overflows or  
bypasses a full capture system**



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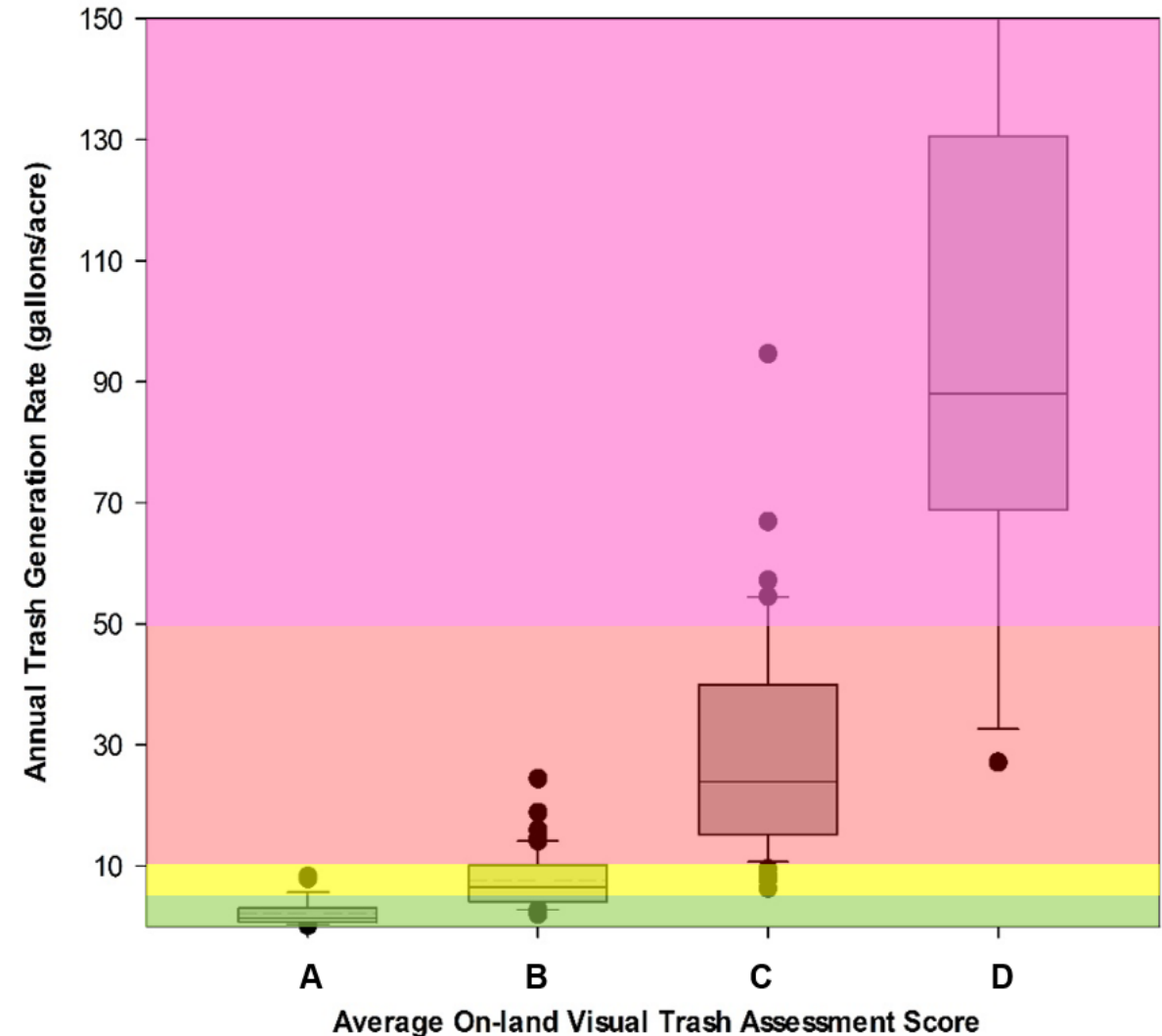


### On-land Visual Assessment Categories



## Amount of Trash that Enters Inlet\* (gal/acre yr<sup>-1</sup>) vs. OVTA Scores

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Maximum	8.3	24.4	94.7	252.8
90th %	5.0	14.0	48.1	145.4
75th %	2.9	9.7	38.6	129.0
Median	1.4	6.5	23.0	88.0
Mean	<b>2.2</b>	<b>7.6</b>	<b>26.9</b>	<b>100.3</b>
25th %	0.8	4.2	15.3	69.8
10th%	0.4	2.8	11.2	42.2
Minimum	0.2	2.0	6.3	27.1
<i>n</i>	38	54	46	16



\* Assumed volume of trash discharged via all storms (i.e., not just the 1 yr, 1hr Full Capture Design Storm)



# Trash Levels

Trash Level	Map Display	OVTA Score	Mean Trash Volume Entering Inlet (gal / acre / year)
<b>Low</b>	<b>Green</b>	<b>A</b>	<b>2.2</b>
<b>Medium</b>	<b>Yellow</b>	<b>B</b>	<b>7.5</b>
<b>High</b>	<b>Red</b>	<b>C</b>	<b>30</b>
<b>Very High</b>	<b>Purple</b>	<b>D</b>	<b>100</b>

# Amount of Trash that Bypasses/Overflows Full Capture Systems

(For all storms Under an acceptable maintenance regime)



Trash Entering Inlet (gal /acre yr <sup>-1</sup> )	Full Capture Efficiency	Trash Captured gal /acre yr <sup>-1</sup>	Trash Overflowing/ Bypassing gal /acre yr <sup>-1</sup>
Moderate (7.5)	70%	5.25	<b>2.25</b>
Moderate (7.5)	50%	3.75	<b>3.75</b>
High (30)	70%	21	<b>9</b>
High (30)	50%	15	<b>15</b>
Very High (100)	70%	70	<b>30</b>
Very High (100)	50%	50	<b>50</b>

# Full Capture Equivalency Approach

*using On-land Visual Trash Assessments*

Average amount of trash that enters a SD inlet from an area with an “A” OVTA



Amount of trash that overflows/bypasses a full capture system that removes 70% of the trash transported by all storm events

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**FULL CAPTURE EQUIVALENCY**  
*USING OVTA APPROACH*

*THE CONSISTENT ACHIEVEMENT OF*  
**LOW TRASH GENERATION**

*AS DEMONSTRATED BY “A” OVTA SCORES*



# FINAL RECOMMENDATIONS

- **USE YOUR TIME WISELY**
  - WHERE'S THE TRASH? – BASELINE MAPS
  - WHAT'S FEASIBLE & COST-EFFECTIVE (LIFE-CYCLE COSTS)
- **ACTIVELY PARTICIPATE IN IMPLEMENTATION**
  - OVERSIGHT OF FULL CAPTURE VENDORS
  - LEARN FROM OVTAS - WHAT'S WORKING, WHAT'S NOT?
  - ENGAGE THE COMMUNITY AND REGULATORS
- **DEVELOP EFFECTIVE TRACKING AND REPORTING SYSTEMS**
- **ADAPTIVELY MANAGE**



# SF BAY AREA RESOURCES/TOOLS AVAILABLE

- [TRASH GENERATION STUDY](#)
- [PHASE I MS4 LONG-TERM TRASH REDUCTION PLANS & ASSESSMENT STRATEGIES](#)
- [ON-LAND VISUAL TRASH ASSESSMENT PROTOCOLS \(A, B & C\)](#)
- **GUIDANCE FOR DEMONSTRATING TRASH FULL CAPTURE EQUIVALENCY USING OVTAS (UNDER DEVELOPMENT)**
- [TRACKING CALIFORNIA'S TRASH REPORTS](#)
- [REGION 2 \(SF BAY\) WATER BOARD TRASH INFORMATION](#)
- [STATE WATER BOARD TRASH IMPLEMENTATION INFO](#)

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