Cooperative Monitoring Program Status & Trends

CCRWQCB Meeting · Santa Barbara, CA

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Primary surface water concerns for Ag

Eroded soils

(e.g. Turbidity)

Fertilizers &
soil amendments

(e.g. Nitrate, Phosphate)

Pest control
products

(e.g. pyrethroids, aquatic toxicity)

Definitions

Pattern

Increasing or decreasing trajectory of monitoring results over time for a given parameter

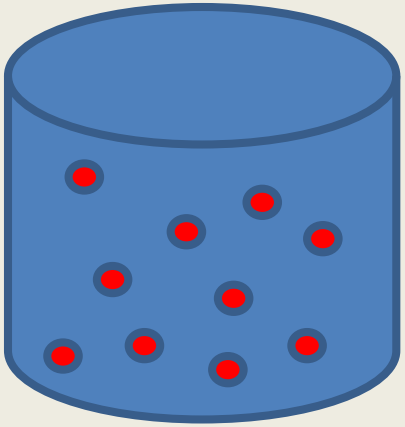
- *(Not necessarily meaningful)*

Trend

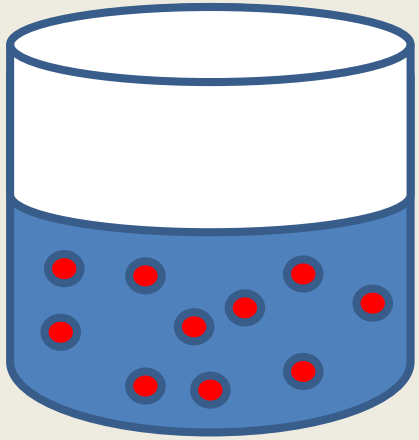
Statistically significant change (increase or decrease) in monitoring results over time

Concentration vs. Load

Example 1



Conc. = 10 balls/10 mL
Load = 10 balls



Conc. = 10 balls/5 mL
Load = (still) 10 balls

As discharge volumes are reduced, concentrations may increase while loading remains the same or decreases

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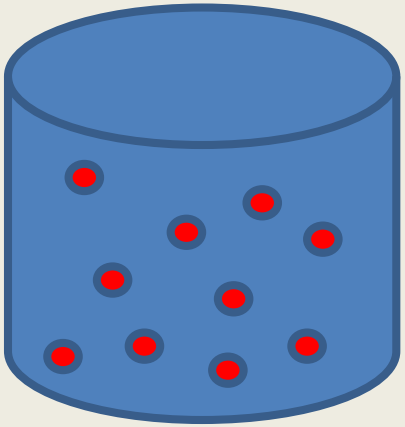
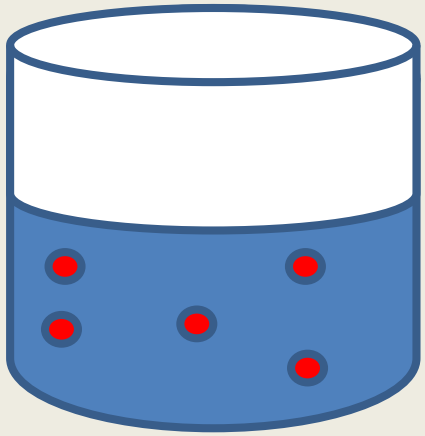
Example 2

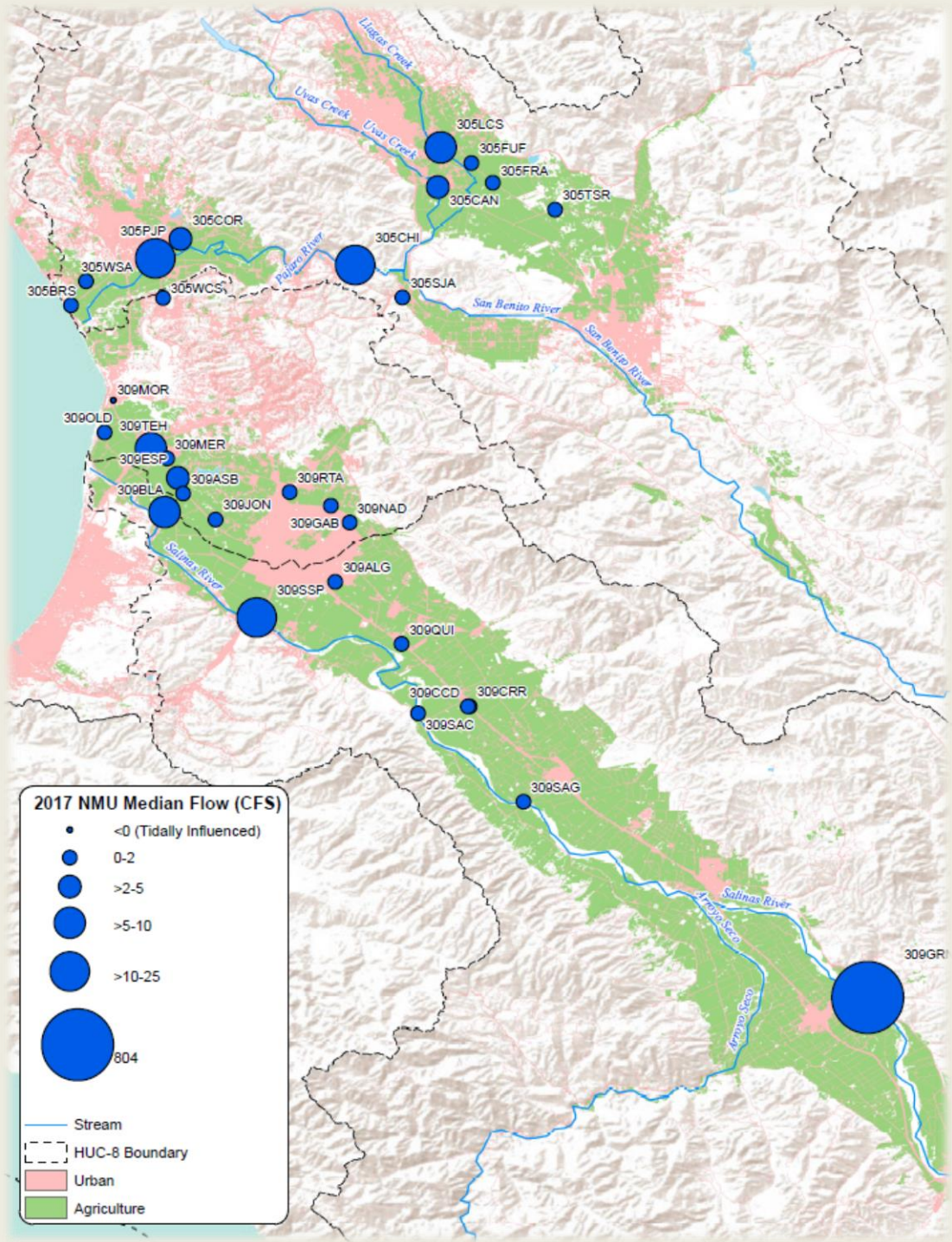


Conc. = 10 balls/10 mL
Load = 10 balls



Conc. = 5 balls/5 mL
Load = 5 balls

Load reductions can occur, even if concentration remains the same



Stream Flow

Pajaro & Salinas

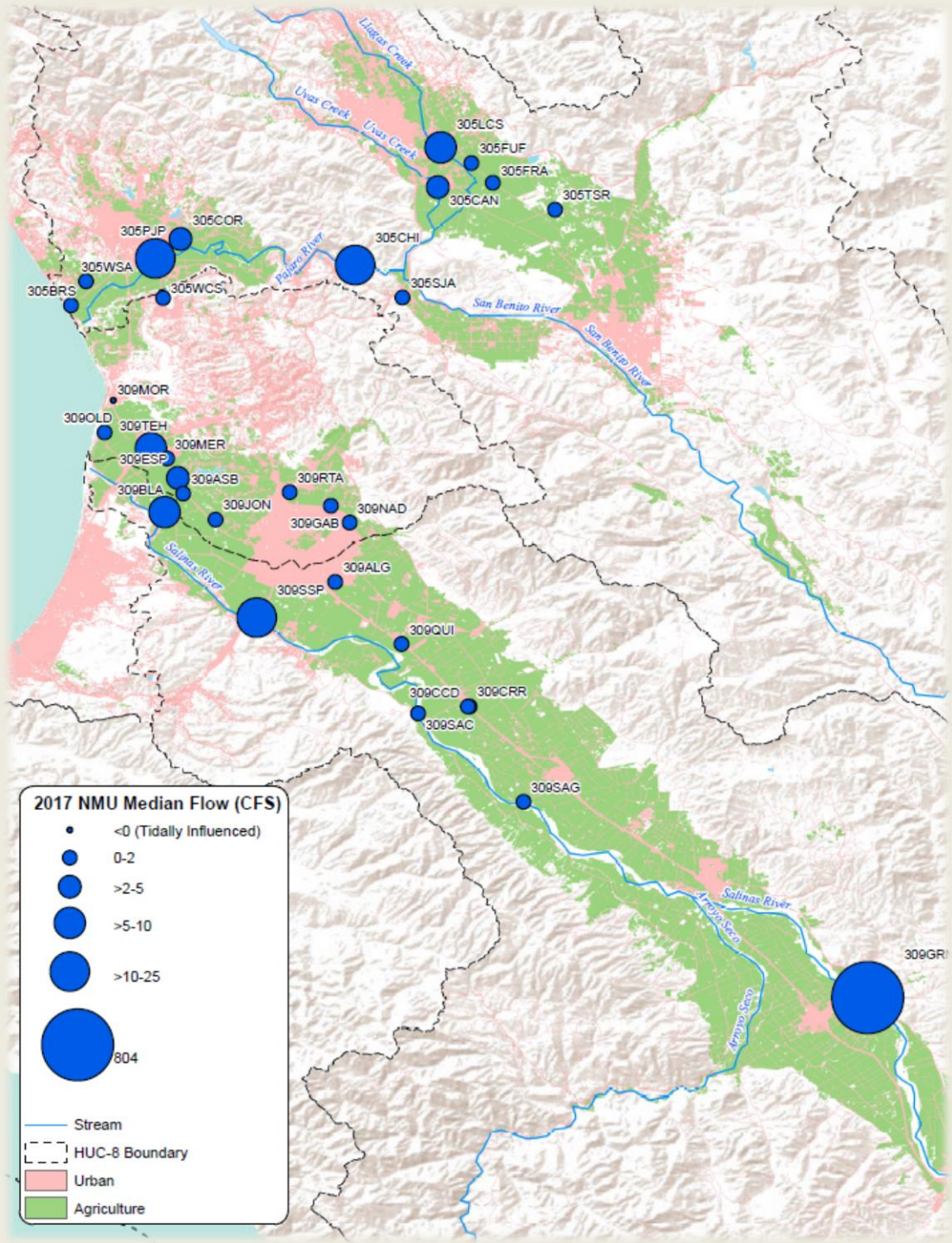
-- STATUS --

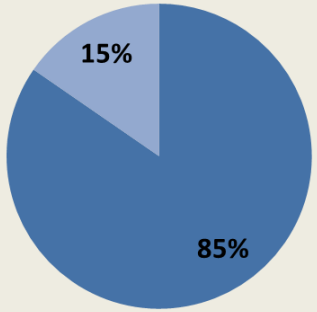
- Median/typical Flow range: -3.6 CFS to 25 CFS
- Min. Flows negative (i.e. in reverse) due to tidal influence and/or wind
- Max. storm Flows >10,000 CFS at Pajaro sites
- Pajaro sites flowed year-round except for Watsonville Slough
- Salinas tile drain sites flowed year-round
- Salinas tributaries east of Hwy 101 periodically dry
- Mainstem Salinas sites had more water than in 2016

Stream Flow

Pajaro & Salinas

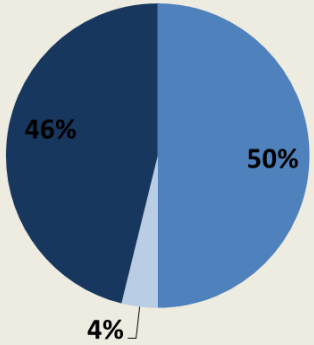
-- TRENDS --





% of Sites with *Pattern*

- Decreasing
- Increasing



% of Sites with *Trend*

- Decreasing Trend
- Increasing Trend
- No Trend

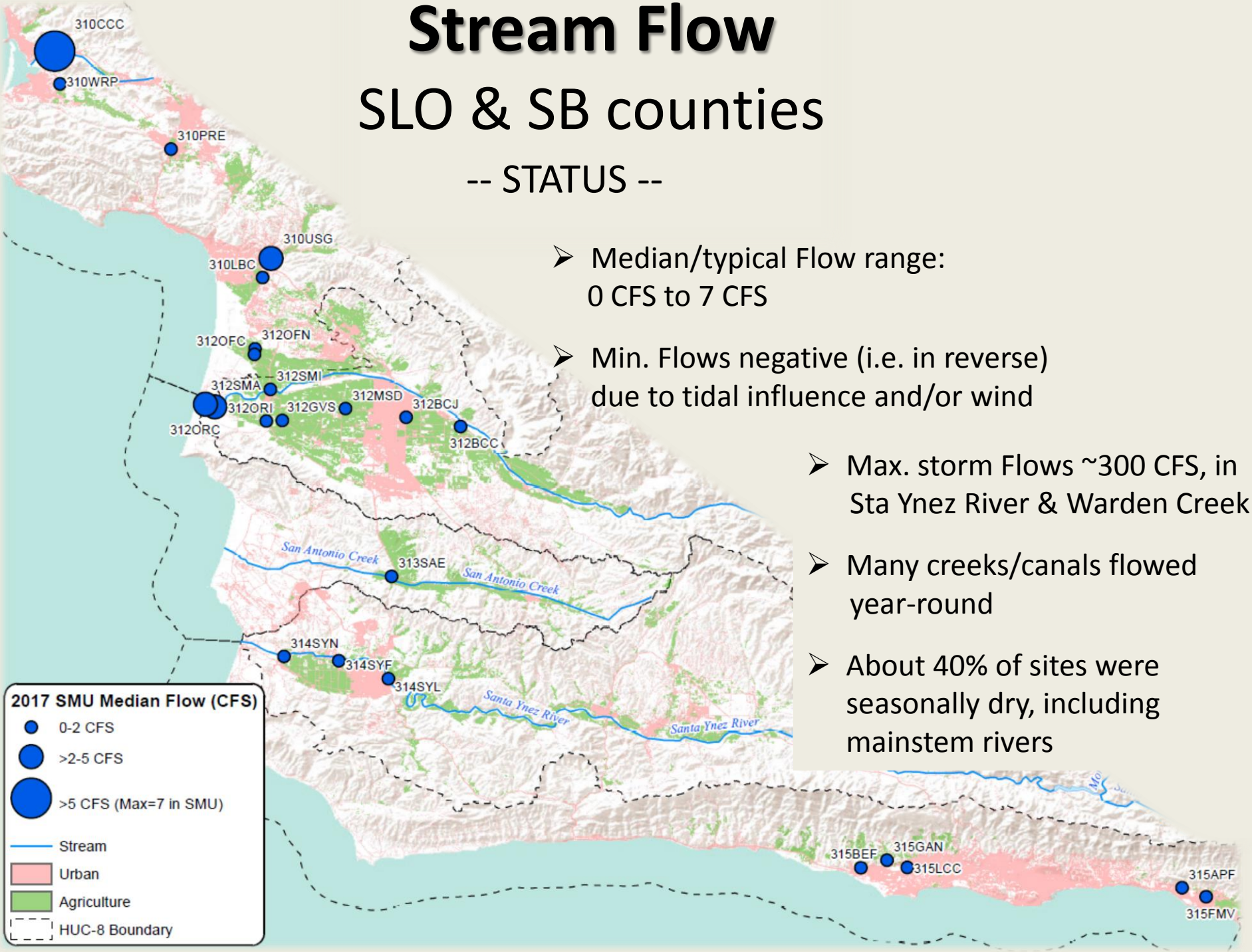
"Pattern" indicates directionality;
"Trend" indicates statistical significance

Stream Flow

SLO & SB counties

-- STATUS --

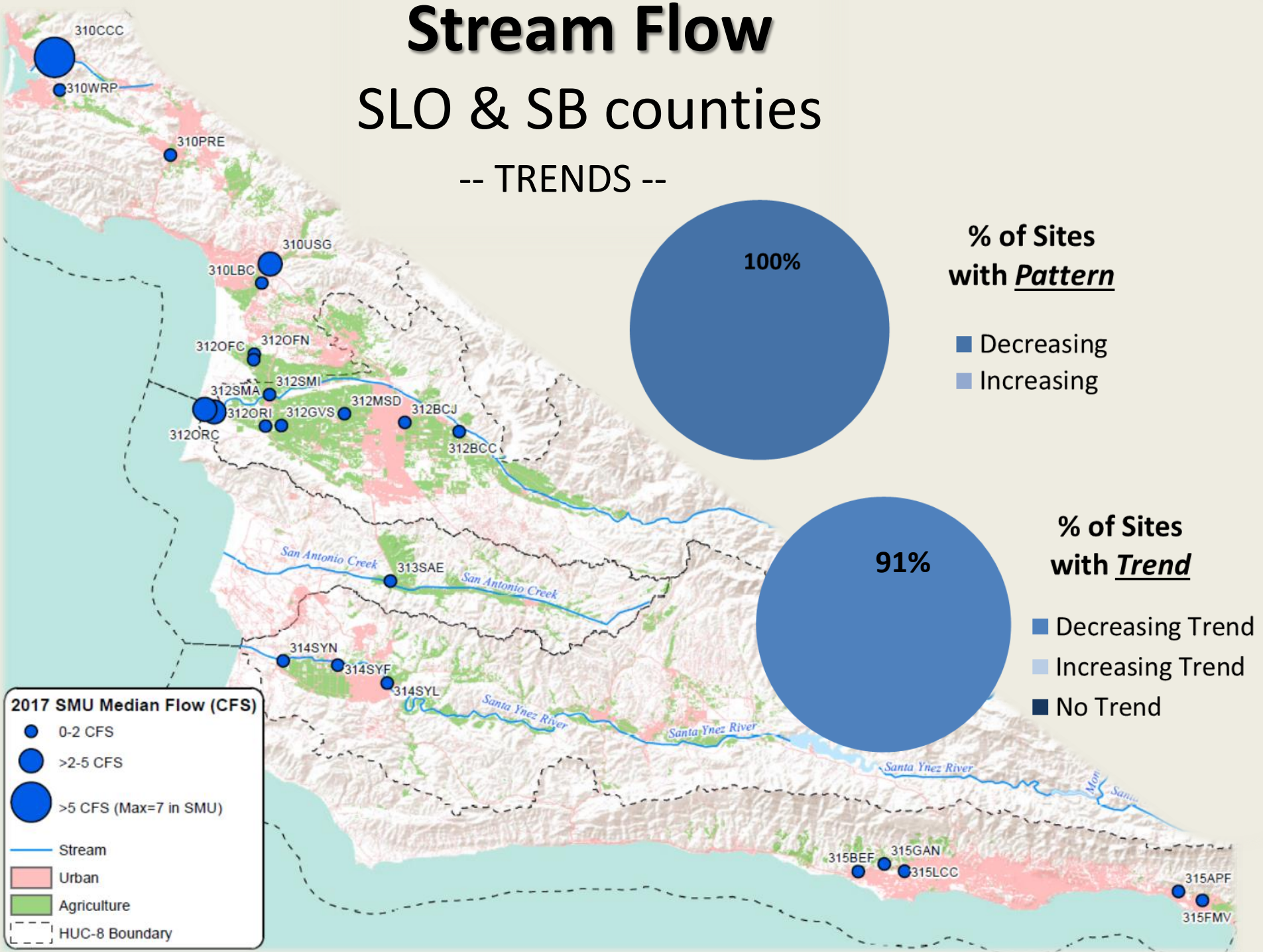
- Median/typical Flow range: 0 CFS to 7 CFS
- Min. Flows negative (i.e. in reverse) due to tidal influence and/or wind
- Max. storm Flows ~300 CFS, in Sta Ynez River & Warden Creek
- Many creeks/canals flowed year-round
- About 40% of sites were seasonally dry, including mainstem rivers



Stream Flow

SLO & SB counties

-- TRENDS --



% of Sites with *Pattern*

- Decreasing
- Increasing

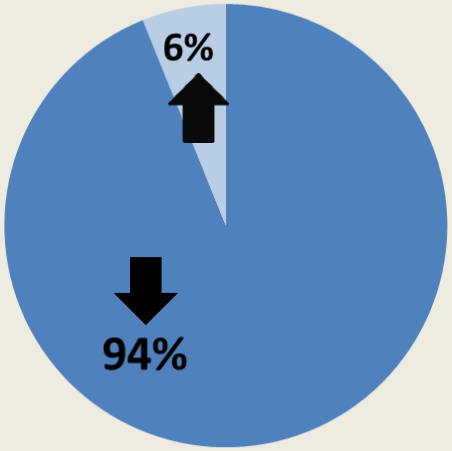
% of Sites with *Trend*

- Decreasing Trend
- Increasing Trend
- No Trend

Reductions in Stream Flow in Central Coast Ag Watersheds

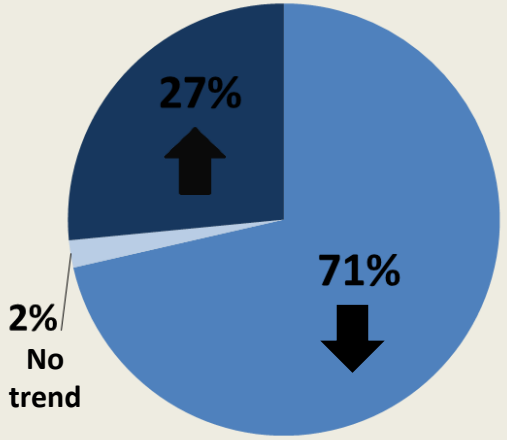
Patterns

(May or may not be biologically relevant)

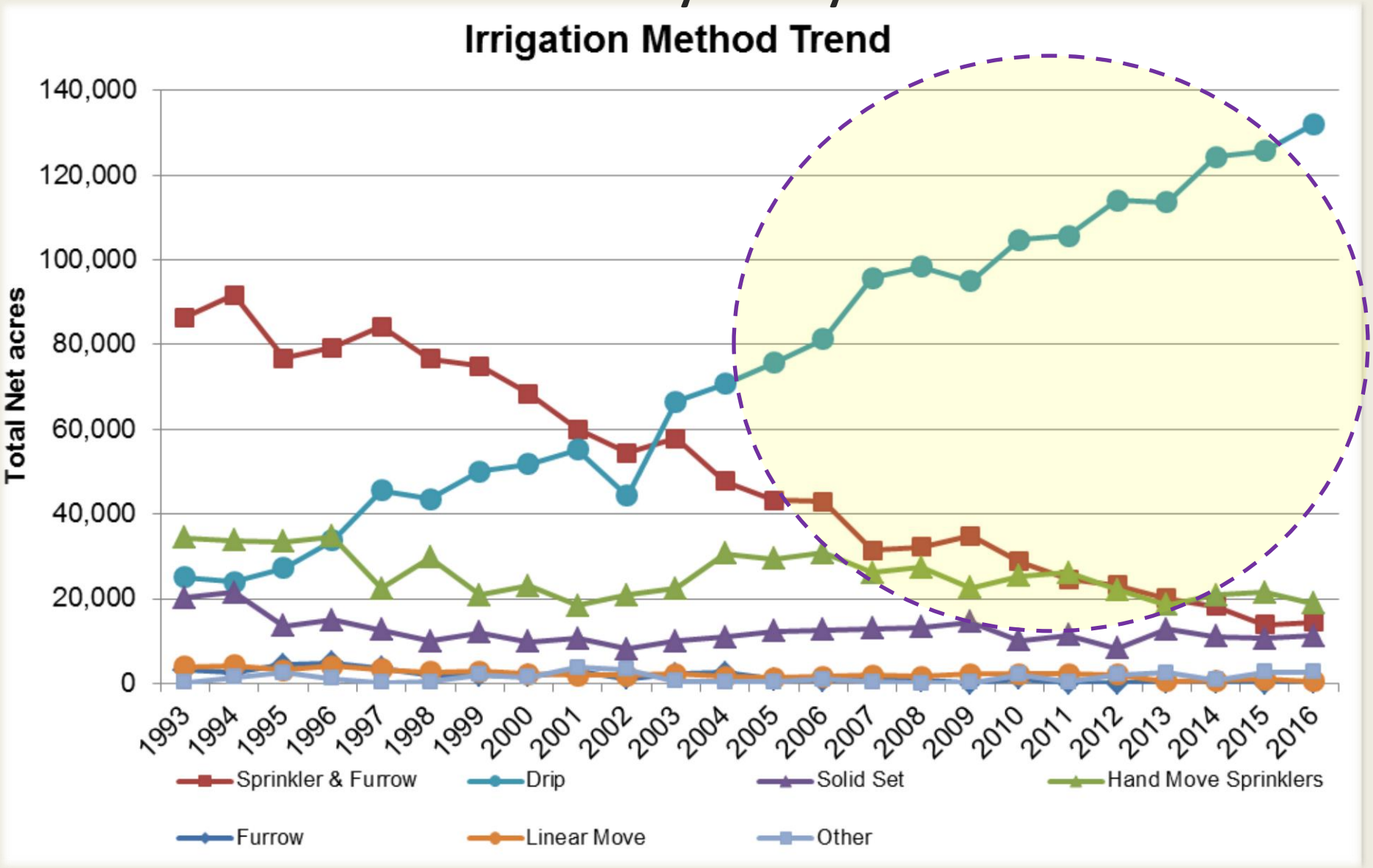


Trends

(Statistical significance)



Monterey County

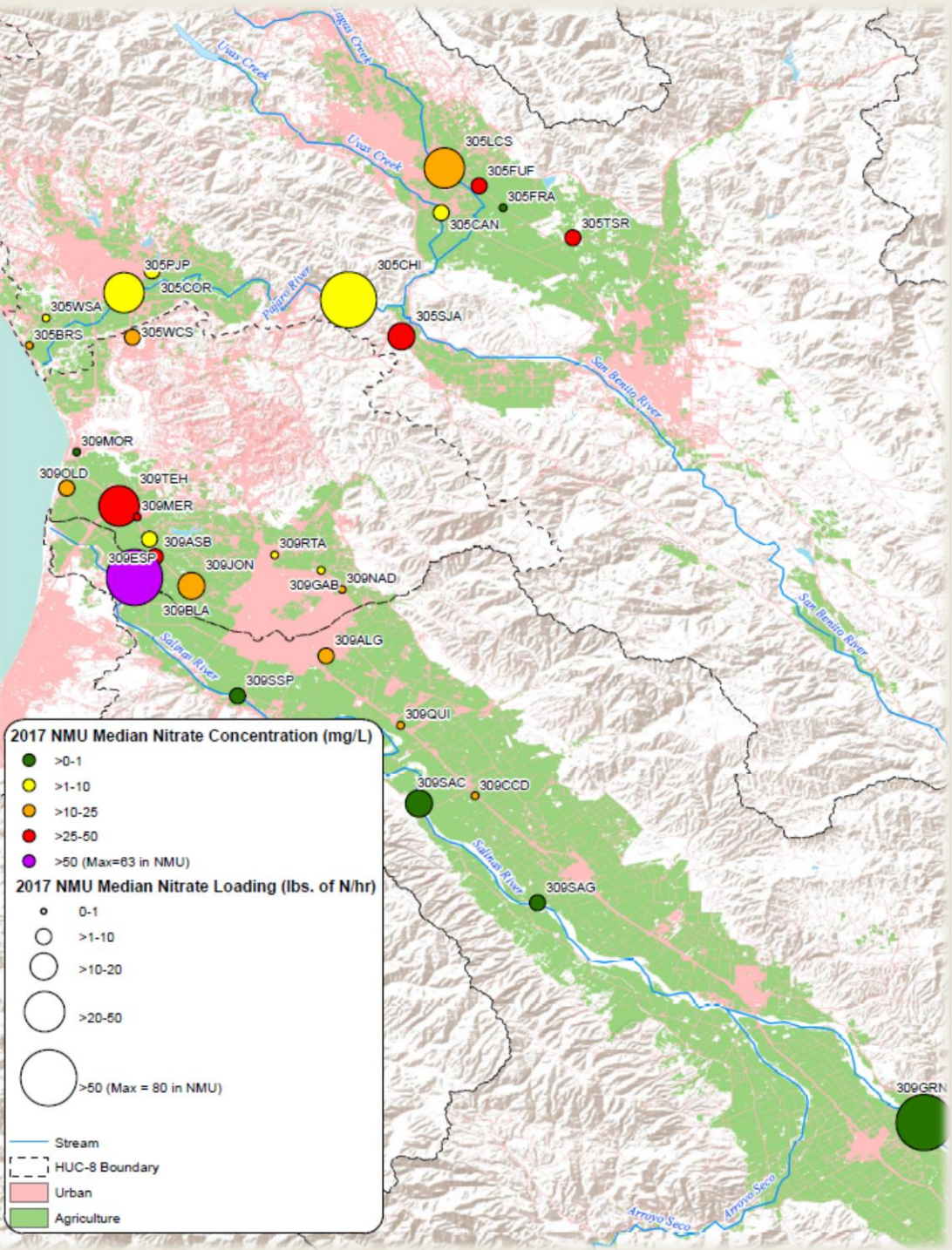


From MCWRA 2015 Extraction Report

Nitrate (as N)

Pajaro & Salinas

-- STATUS --



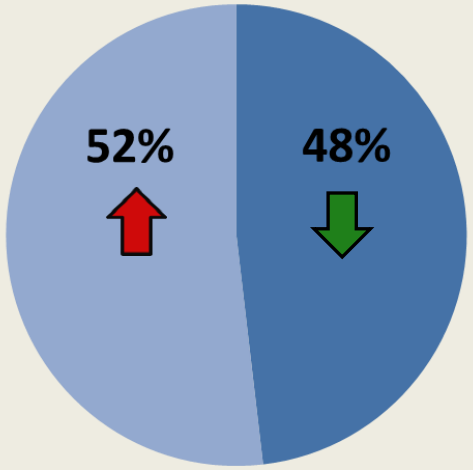
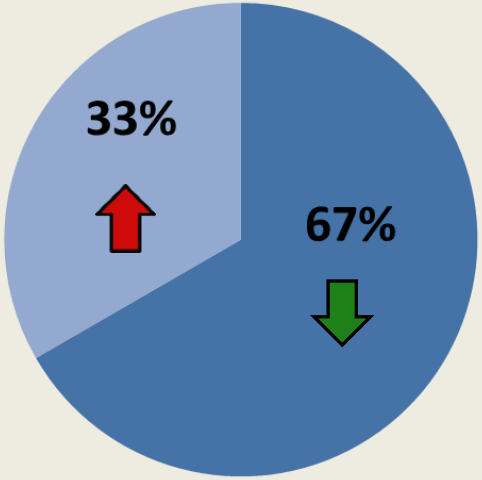
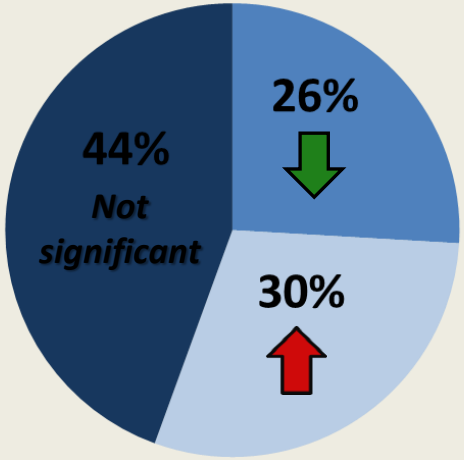
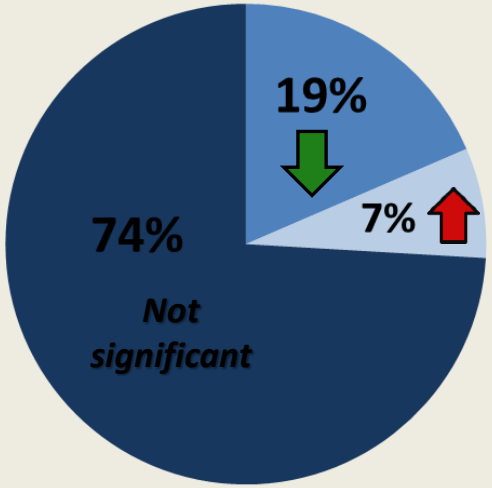
- Median/typical Nitrate range: 0.1 to 63 mg/L
- Several sites met 1 mg/L aquatic life threshold in all/nearly all samples
- About half of sites “typically” exceed 10 mg/L drinking water objective (i.e. on a median basis)
- Loading is driven by Stream Flow, except at very high N concentrations

Patterns & Trends in Nitrate (as N)

Pajaro & Salinas

= increasing pattern or trend

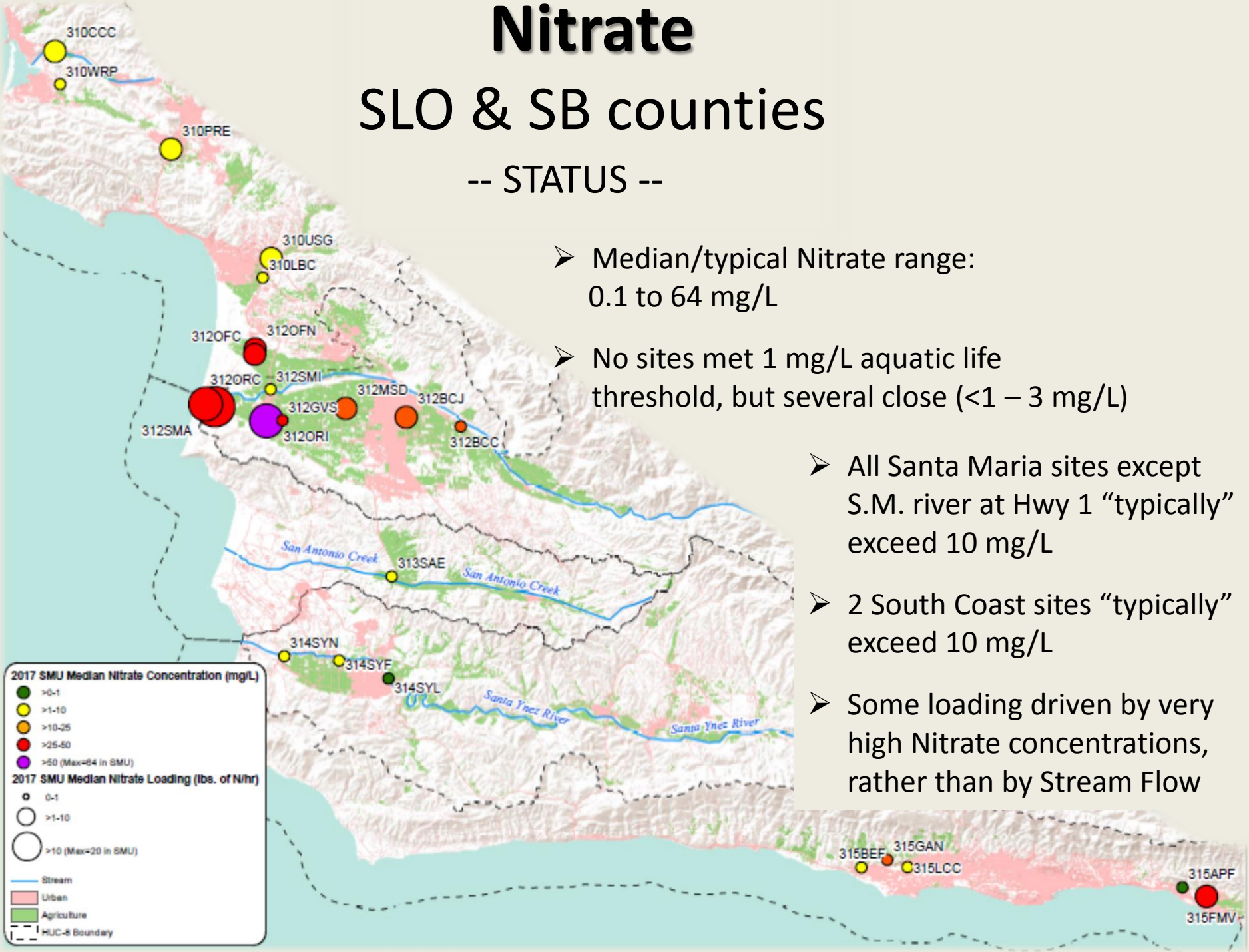
= declining pattern or trend

	Concentrations	Loads
Patterns (May or may not be biologically relevant)		
Trends (Statistical significance)		

Nitrate

SLO & SB counties

-- STATUS --

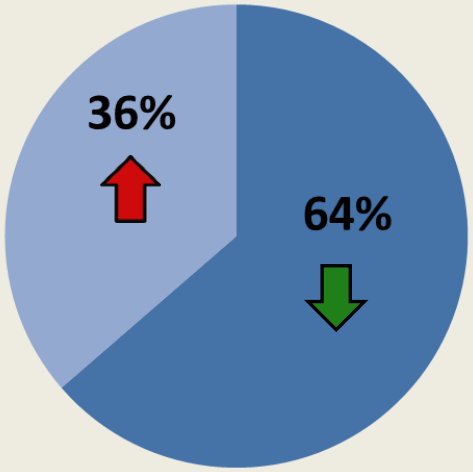
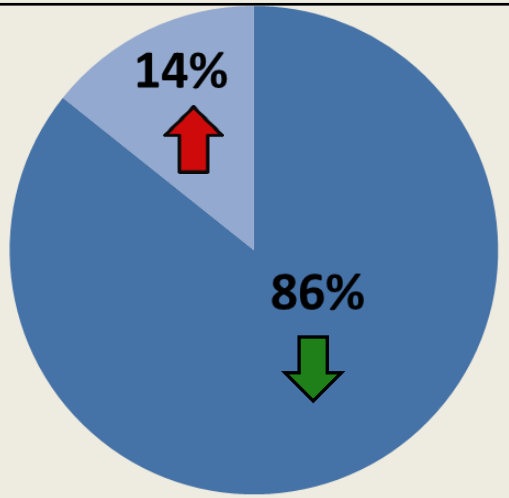
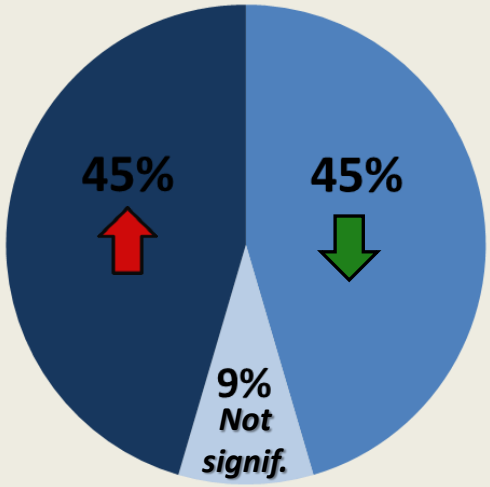
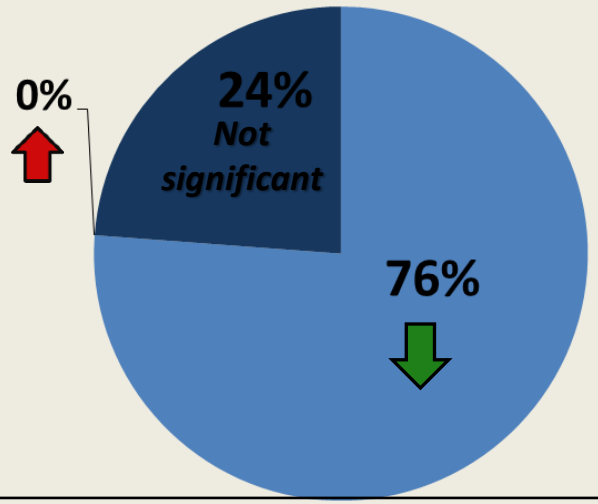


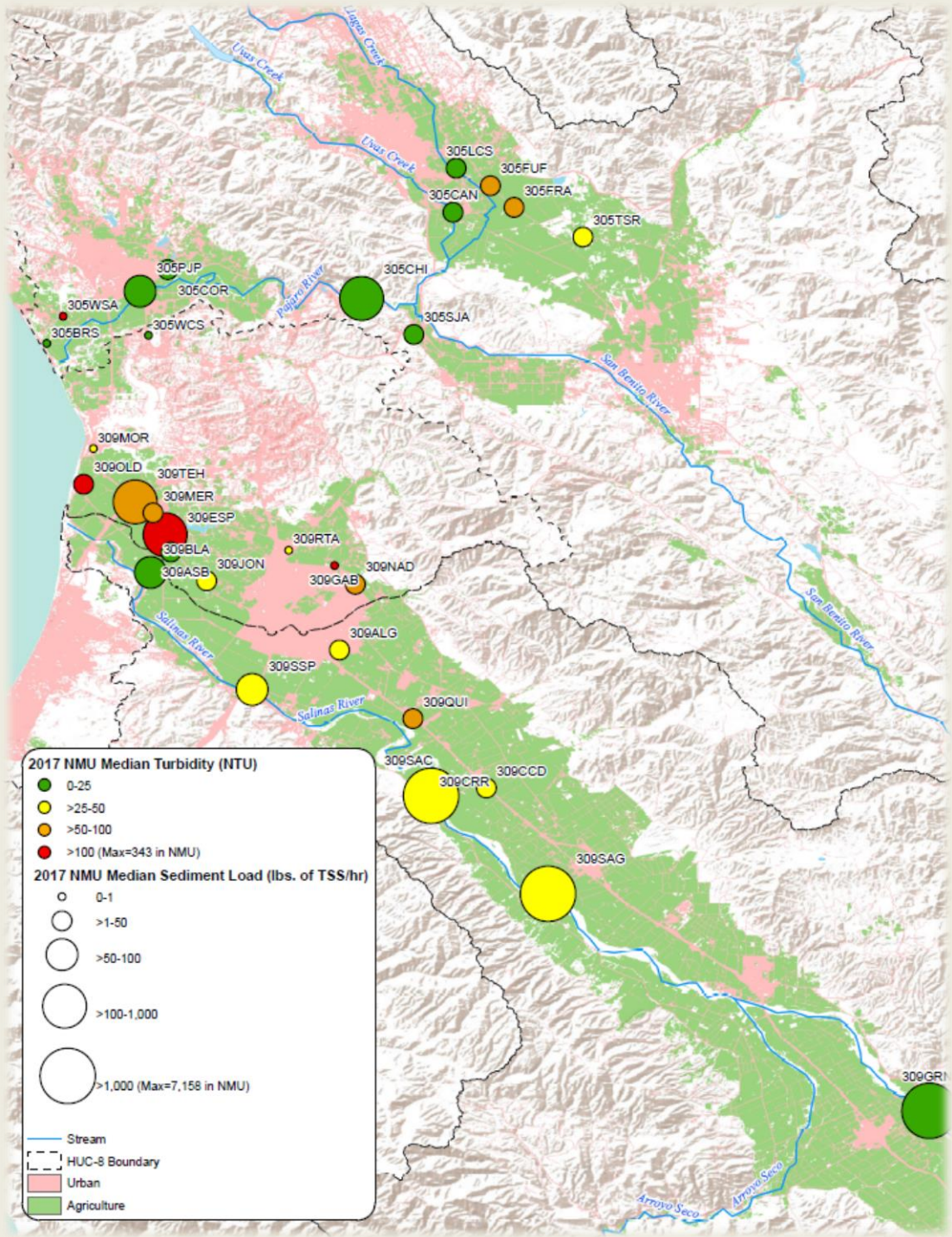
- Median/typical Nitrate range: 0.1 to 64 mg/L
- No sites met 1 mg/L aquatic life threshold, but several close (<1 – 3 mg/L)
- All Santa Maria sites except S.M. river at Hwy 1 “typically” exceed 10 mg/L
- 2 South Coast sites “typically” exceed 10 mg/L
- Some loading driven by very high Nitrate concentrations, rather than by Stream Flow

Patterns & Trends in Nitrate (as N)
Southern Unit (SLO & SB Counties)

= increasing pattern or trend

= declining pattern or trend

	Concentrations	Loads
Patterns (May or may not be biologically relevant)		
Trends (Statistical significance)		



Sediment

Pajaro & Salinas

-- STATUS --

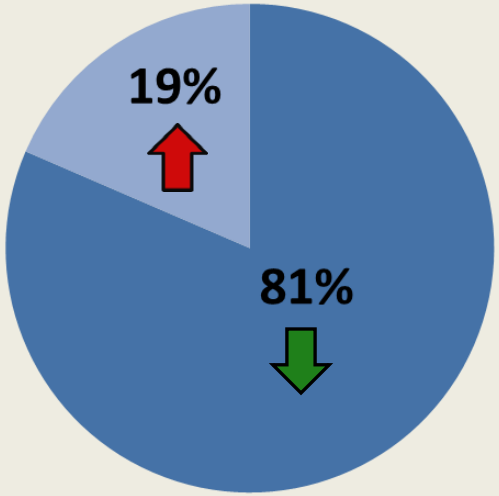
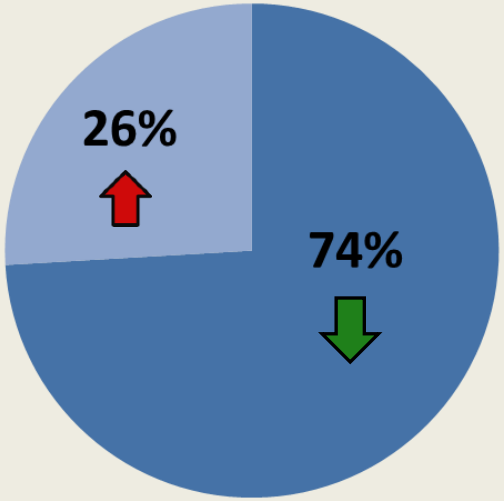
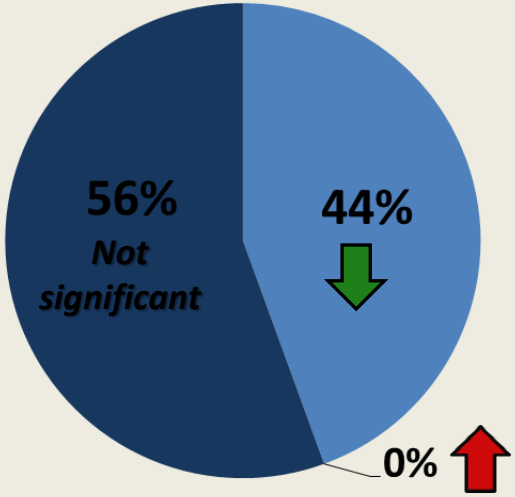
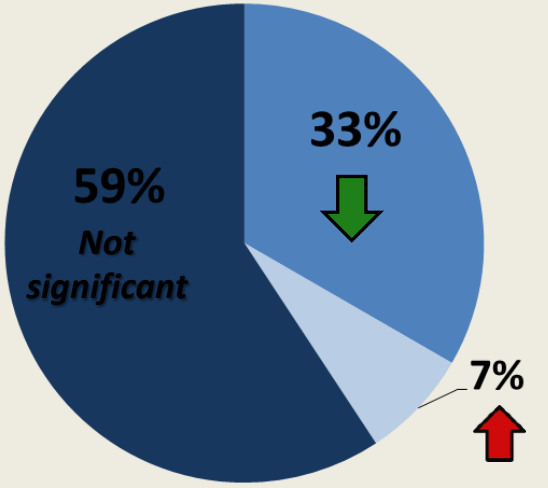
- Median/typical Turbidity range: 2 to 343 NTU
- 8 of 12 Pajaro sites “typically” met the 25 NTU aquatic life threshold
- Salinas sites “typically” exceeded 25 NTU aquatic life threshold
- Loading is driven by Stream Flow, except when suspended sediments are very high

Patterns & Trends in Sediment

Pajaro & Salinas

= increasing pattern or trend

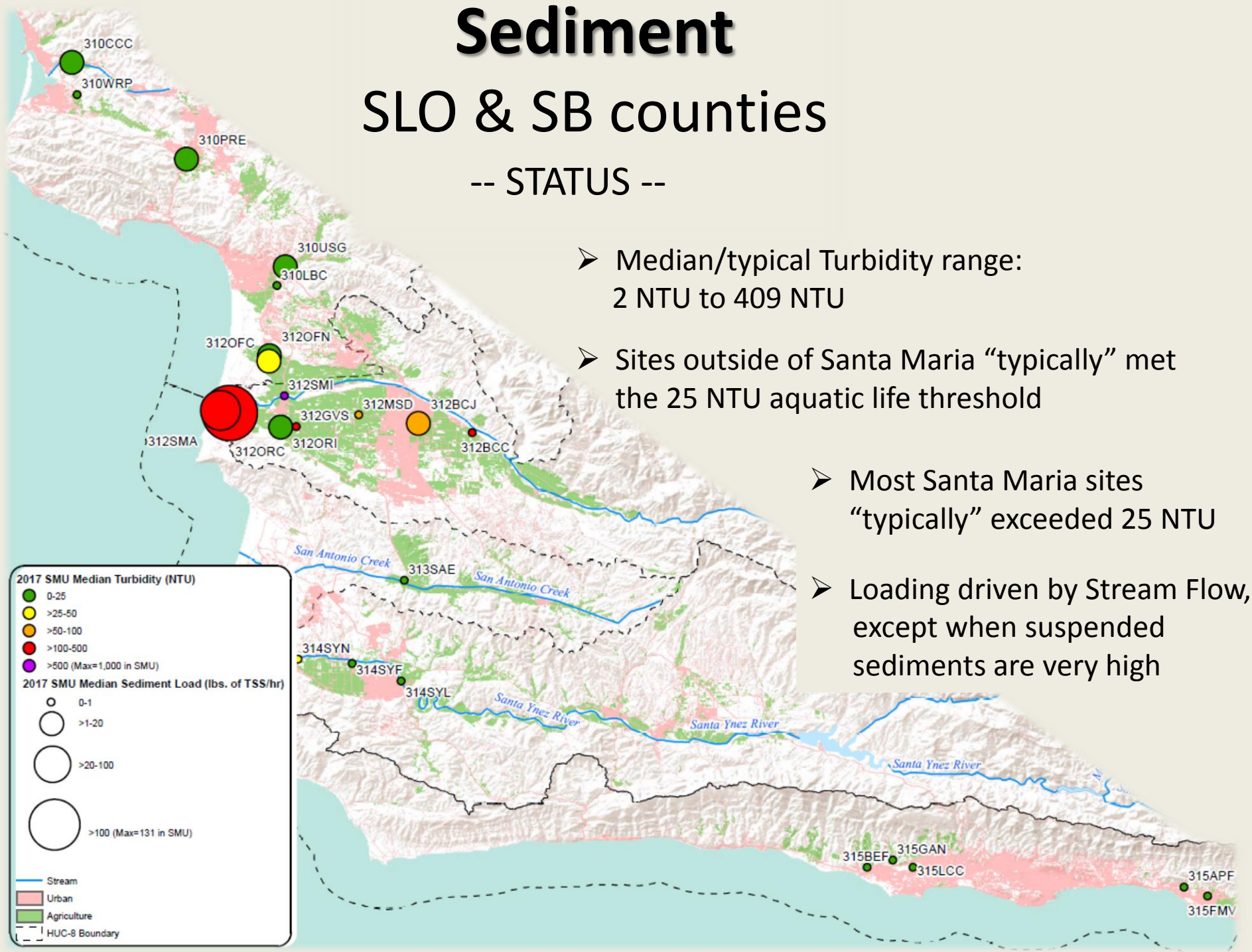
= declining pattern or trend

	Concentrations	Loads
Patterns (May or may not be biologically relevant)		
Trends (Statistical significance)		

Sediment

SLO & SB counties

-- STATUS --



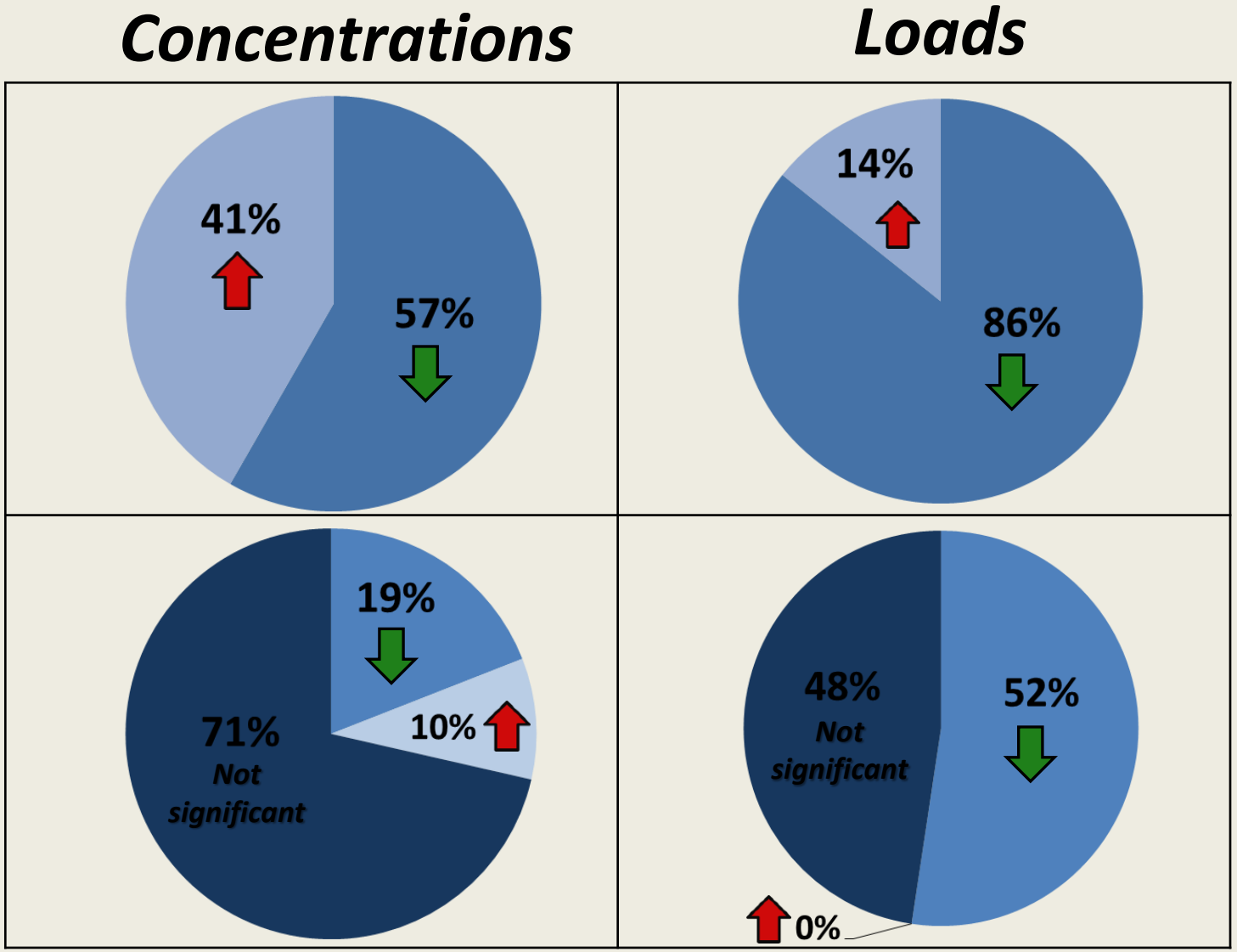
- Median/typical Turbidity range: 2 NTU to 409 NTU
- Sites outside of Santa Maria "typically" met the 25 NTU aquatic life threshold
- Most Santa Maria sites "typically" exceeded 25 NTU
- Loading driven by Stream Flow, except when suspended sediments are very high

Patterns & Trends in Sediment

Southern Unit (SLO & SB Counties)

= increasing pattern or trend

= declining pattern or trend

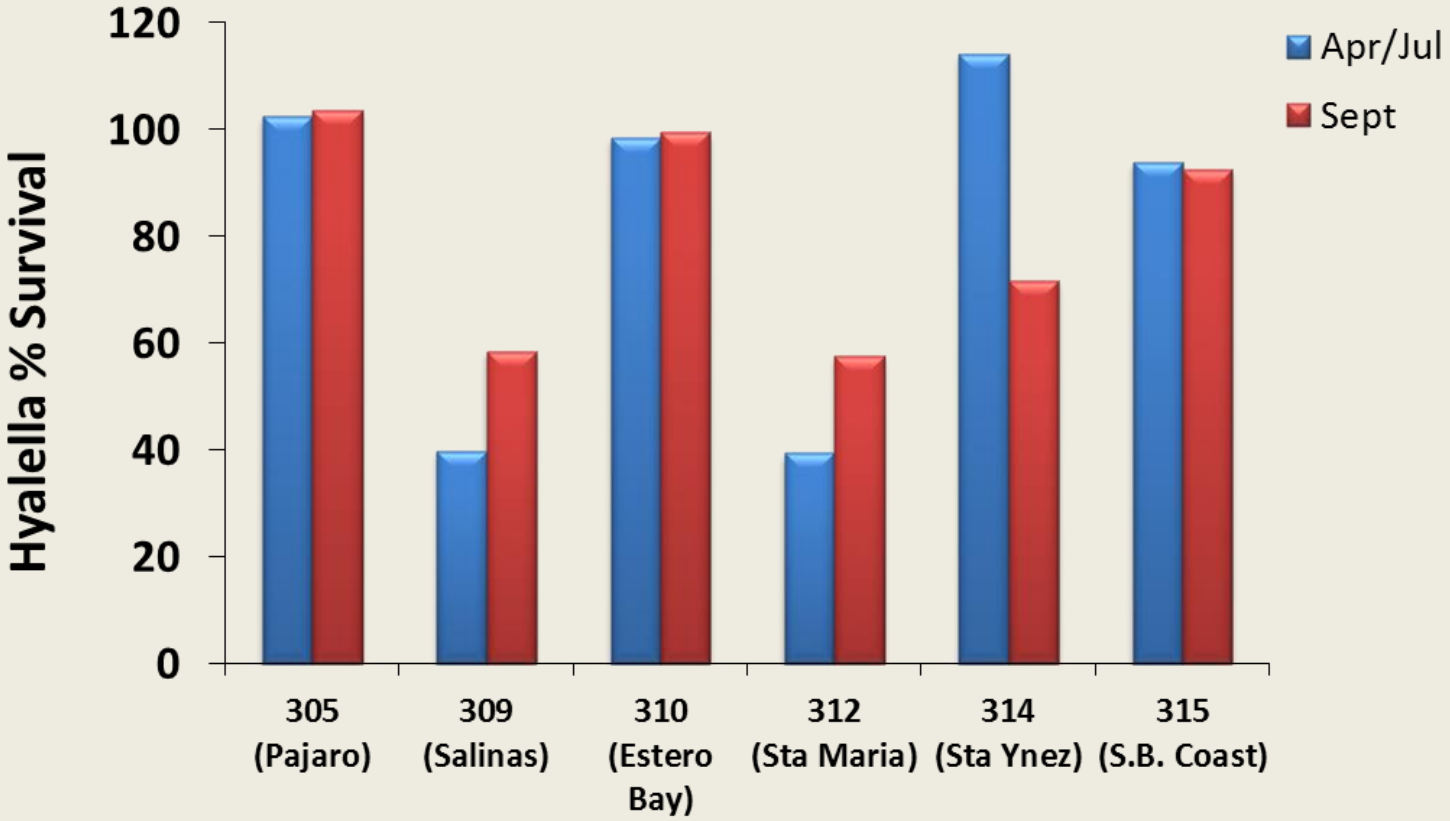


Toxicity to Aquatic Algae in 2017

- Toxicity to algae identified in 1 sample each from
  - Pajaro (Miller Canal, Dec.)
  - Salinas (Moro Coho, April)
  - Santa Maria (Main St. Canal, April)
  - Santa Ynez (Floradale Ave, April)

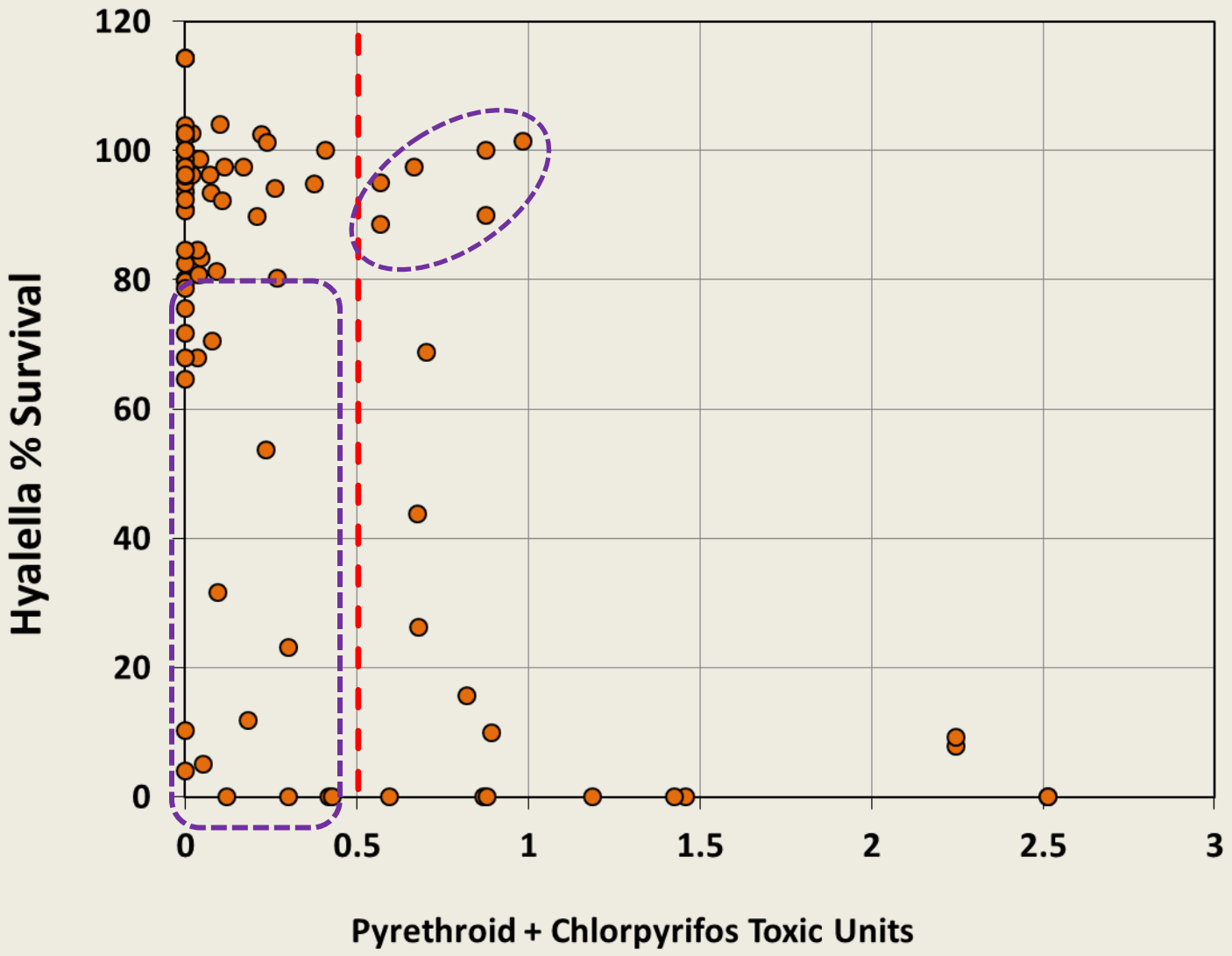
- Toxicity to algae in 4 samples from South Coast H.U.
  - Bell Creek (April)
  - Franklin Creek (Dec)
  - Glen Annie (April & Dec)

Toxicity to *Hyalella* in Sediment, 2017

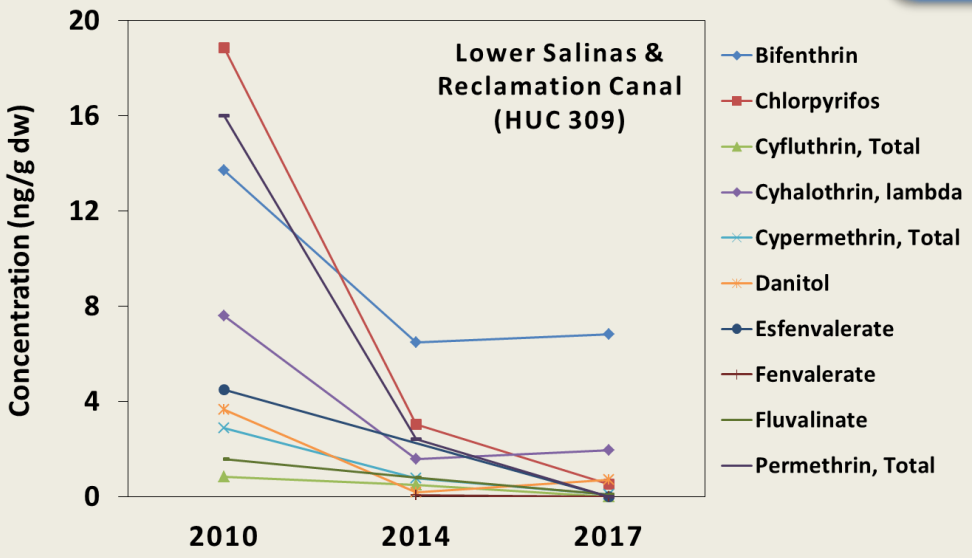


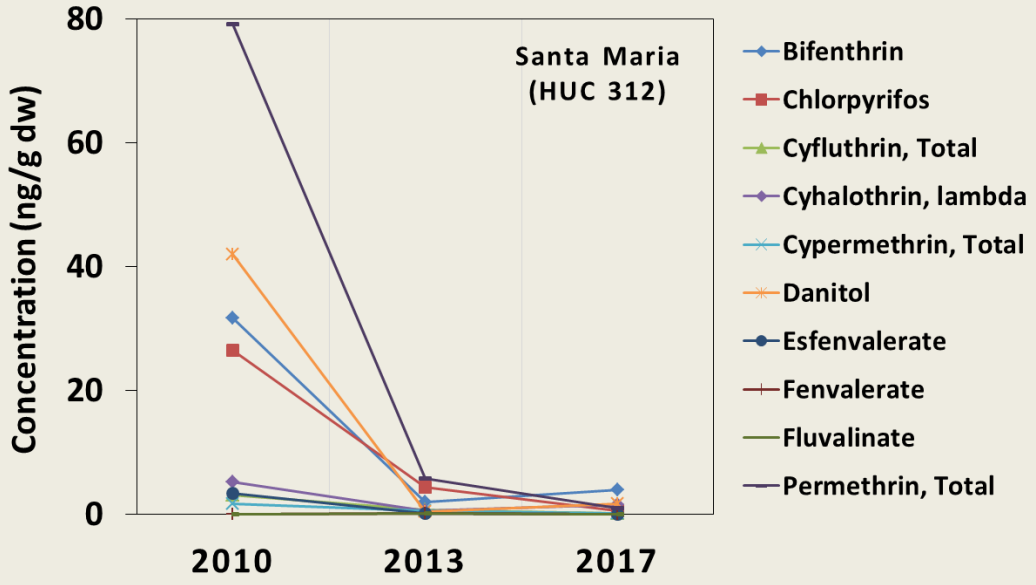
Bars represent average across two 2017 monitoring events and all sites in each hydrologic unit

Hyalella Survival in Sediment vs. Toxic Units

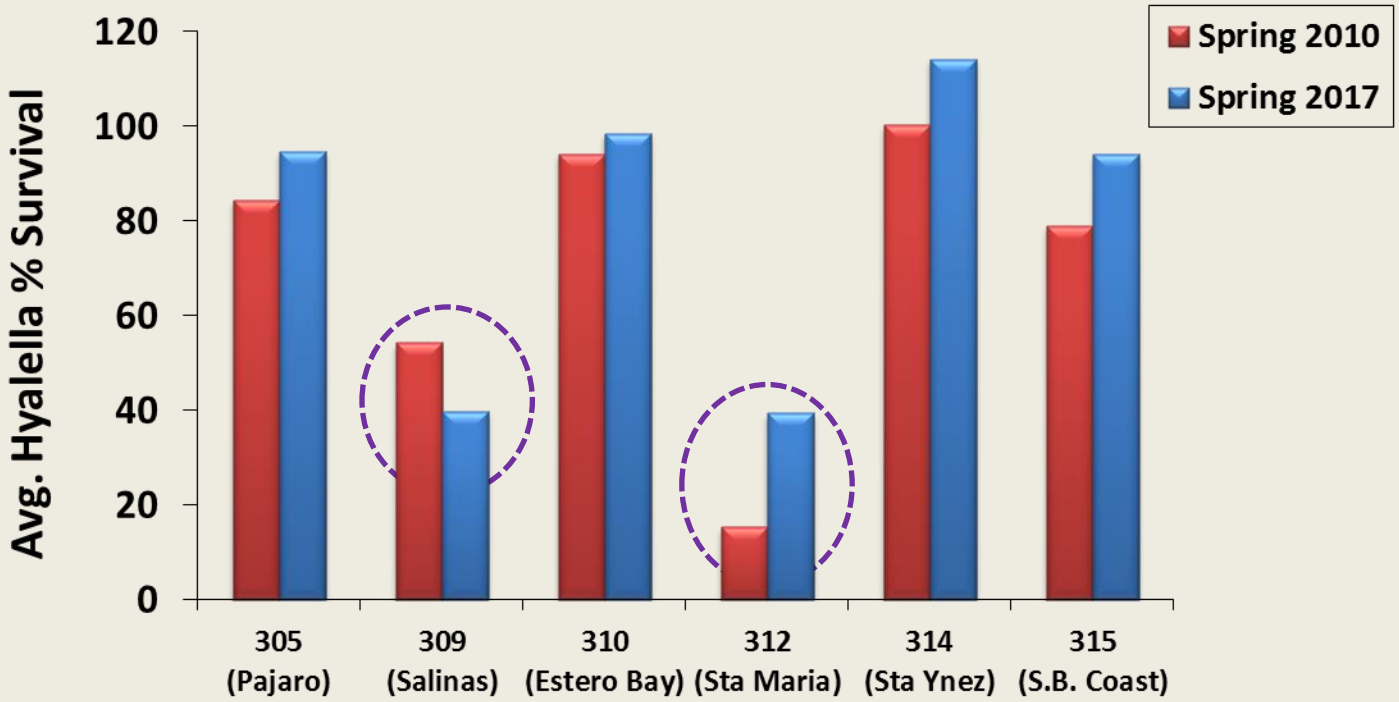


Pesticide Concentrations in Sediment, 2010-2017





Survival Rates in Sediment 2010 vs. 2017

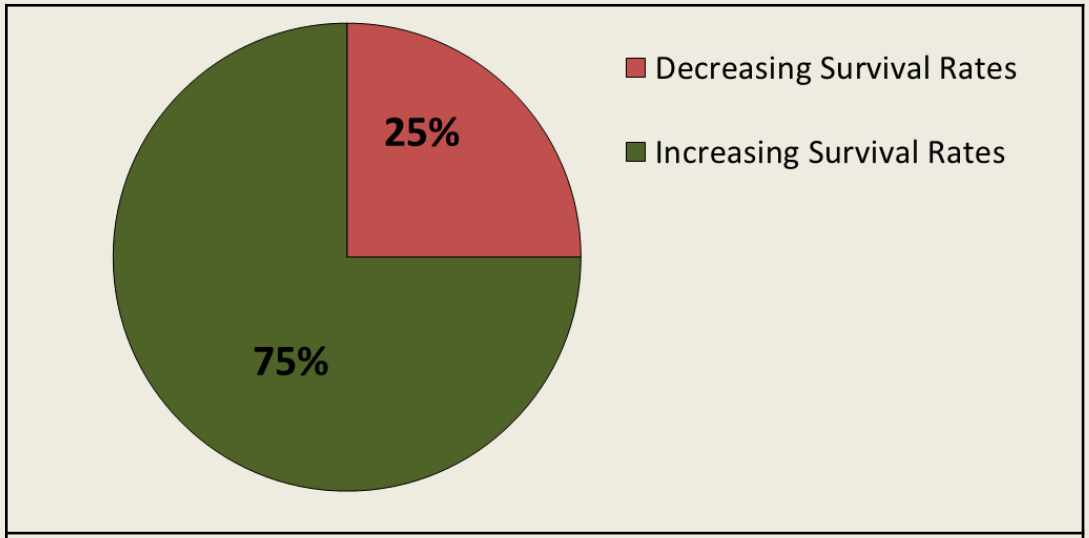


Bars represent average across one 2010 and two 2017 monitoring events, and all sites in each hydrologic unit

Patterns & Trends in Water Column Toxicity to *Ceriodaphnia* (Water Flea)

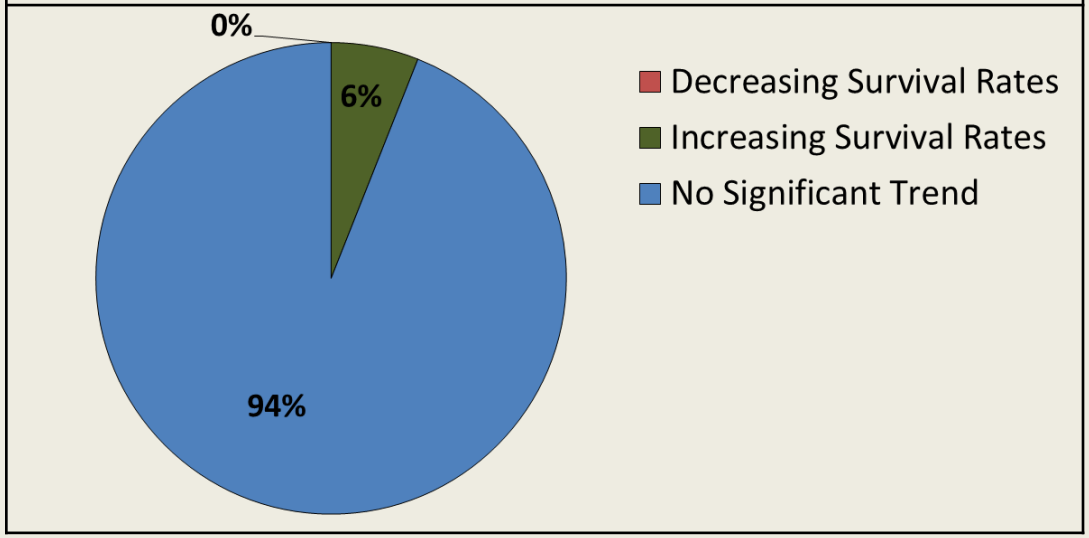
Patterns

(May or may not be biologically relevant)

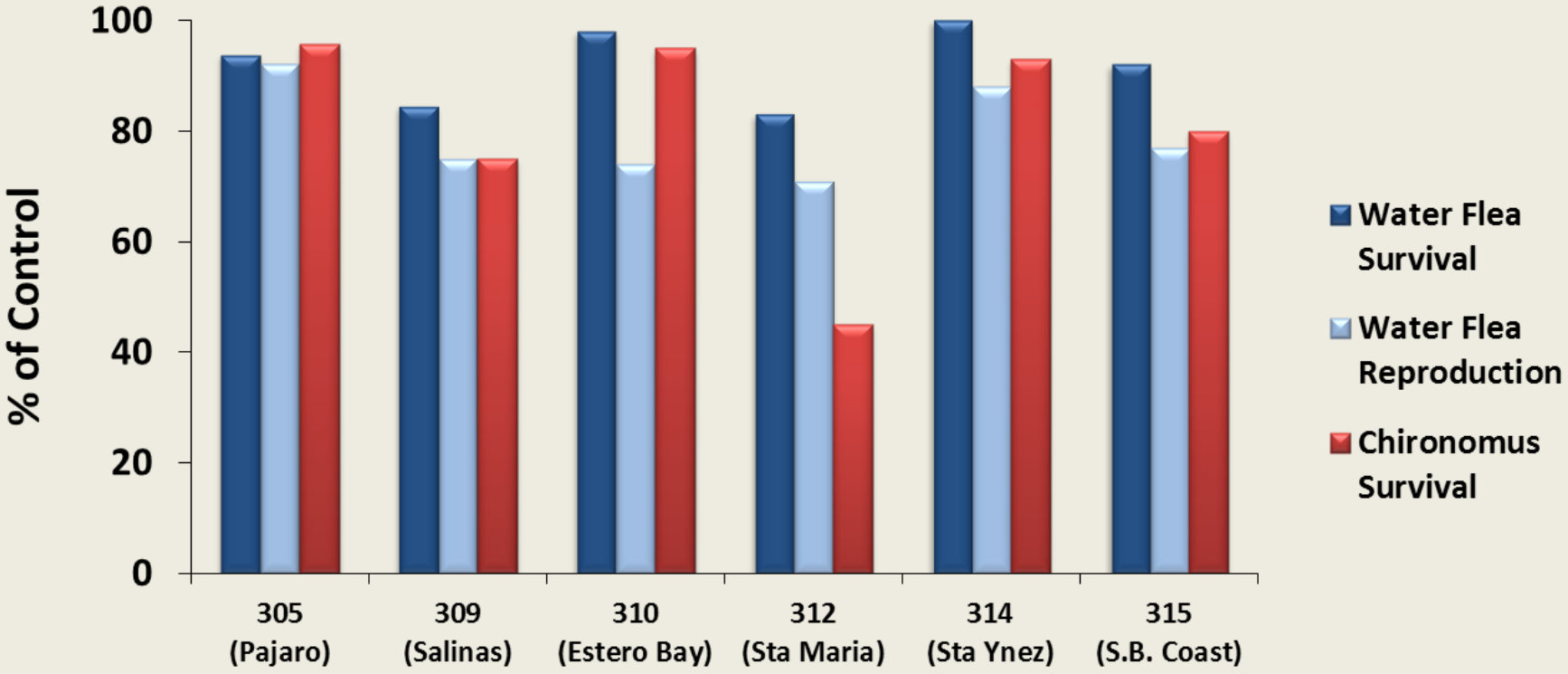


Trends

(Statistical significance)

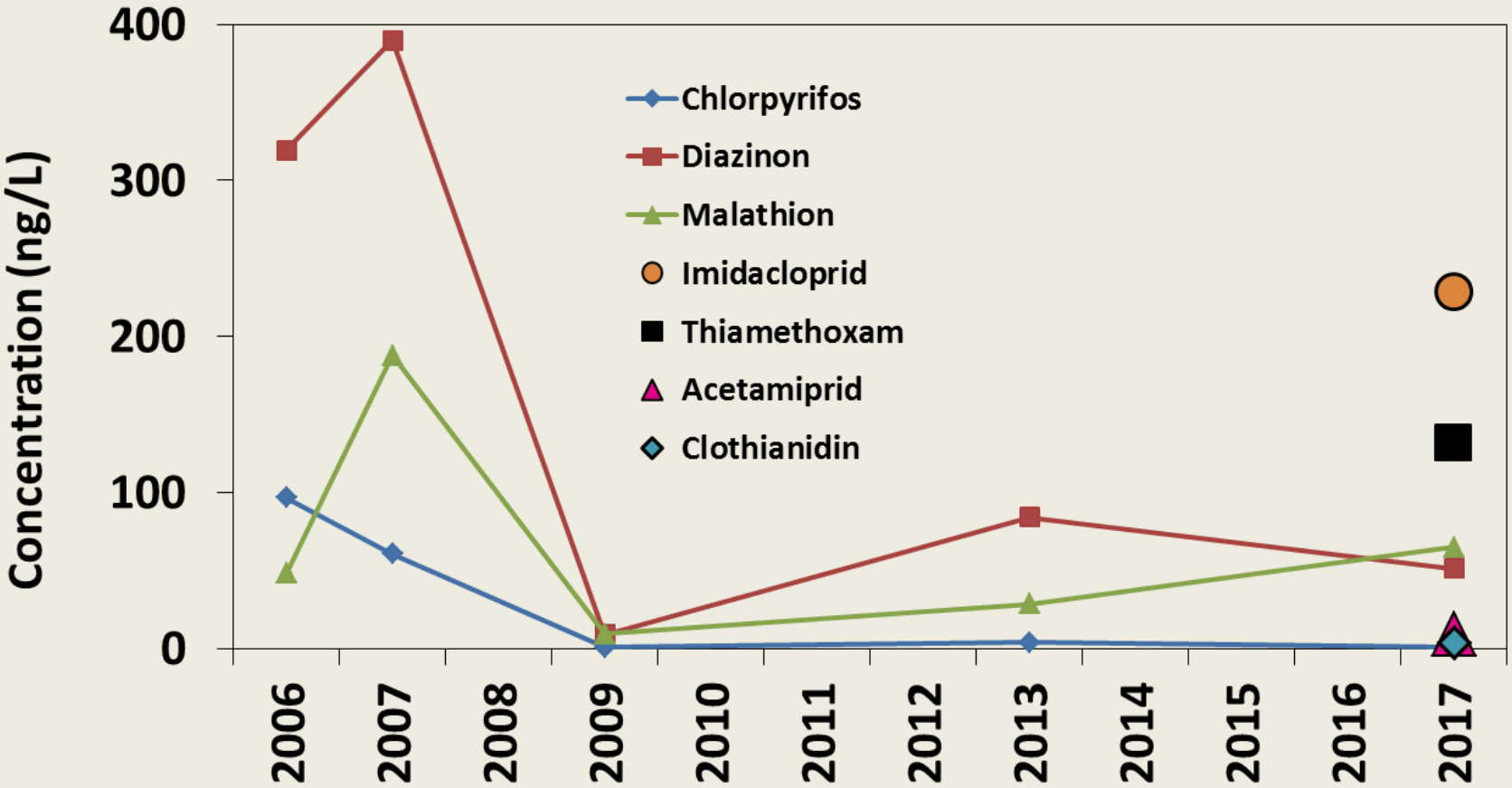


Toxicity to Invertebrates in Water, All Species/Endpoints (2017)

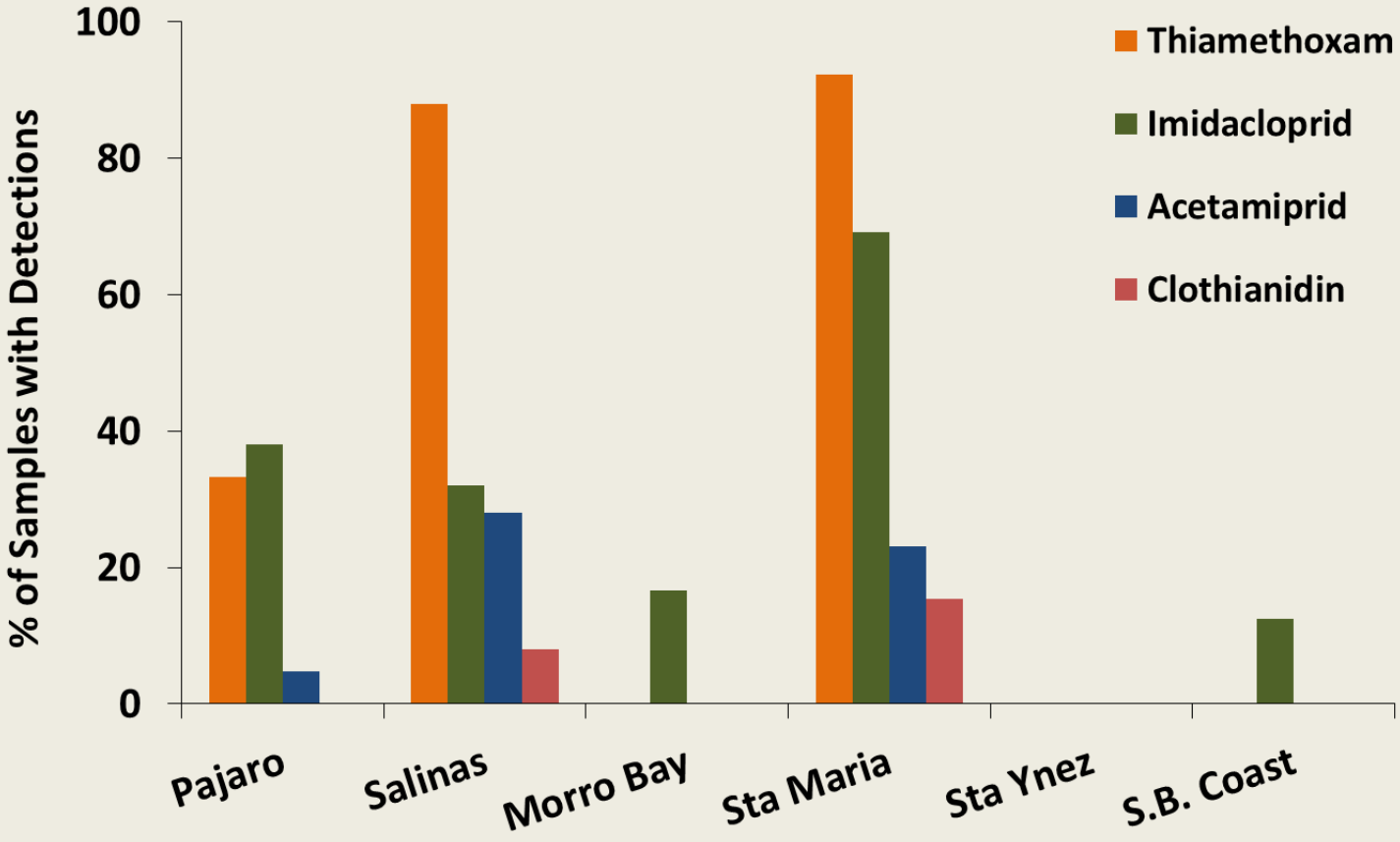


Bars represent average across four 2017 monitoring events and all sites in each hydrologic unit

Annual Average Pesticide Concentrations in Water
-- Organophosphates & Neonicotinoids--



2017 *Neonicotinoid Detections*



Summary

- Reductions in Ag discharges result in decreased Stream Flow and reduced pollutant loading
  - Concentrations may decrease *or increase* as a result
- Reduced Stream Flow and Nitrate/Sediment loading likely the result of both drought and improved management by growers
  - CMP program design yields sufficient statistical power to detect trends
- More aquatic toxicity and pesticide detections in Salinas and Santa Maria than in other areas
- *Ceriodaphnia* (Water Flea) survival rates improving as Organophosphate use/detections decline
  - Subtle changes in sediment toxicity & pesticide concentrations may also be occurring… time will tell
- Neonicotinoid sampling shows primarily Thiamethoxam and Imidacloprid detections, most frequently around Salinas and Santa Maria
  - Invertebrate tox test species yield different results in certain watersheds