

**Central Coast
Regional Monitoring Program
Areas of Special Biological Significance**

MBNMS SAC
December 8, 2016

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 - Basic building blocks for a sustainable, resilient coastal environment and economy
- *34 Areas designated by the State Water Resources Control Board as requiring **protection of species or biological communities to the extent that alteration of natural water quality is undesirable.***
- Prohibition of discharges of waste without an exemption

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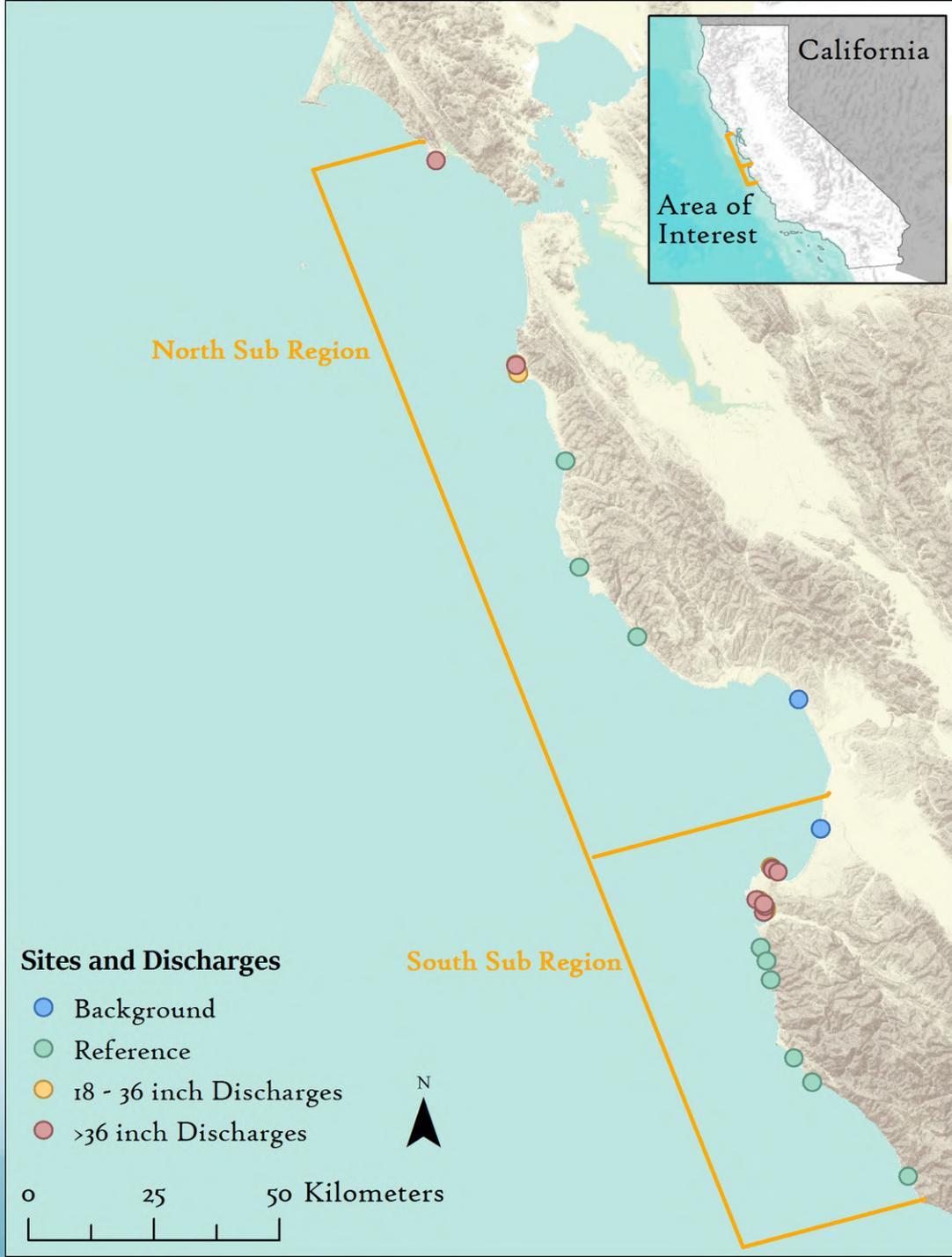
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Central Coast ASBS Study Area



The Participants

- 10 Program Participants:
 - Marin County, San Mateo County, Monterey County, Monterey Bay Aquarium, Hopkins Marine Station, City of Monterey, City of Pacific Grove, City of Carmel-by-the-Sea, Pebble Beach Company, Caltrans
- 4 ASBS:
 - Duxbury Reef, Fitzgerald Marine Reserve, Pacific Grove, and Carmel Bay

The Team

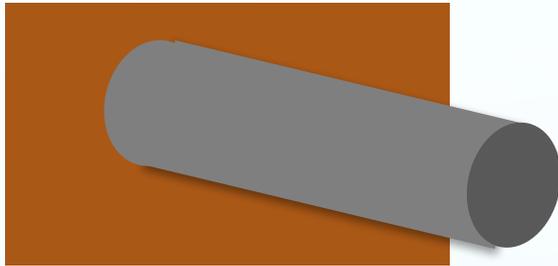
- Applied Marine Sciences
- Monterey Bay National Marine Sanctuary
- ADH Environmental
- Monterey Bay Analytical Services
- Physis Environmental Laboratories
- Granite Canyon Laboratories, UCD
- Marine Pollution Studies Lab, Moss Landing
- Water Pollution Control Lab, CDF&W Ranch Cordova
- Axys Analytical

Scope of Work

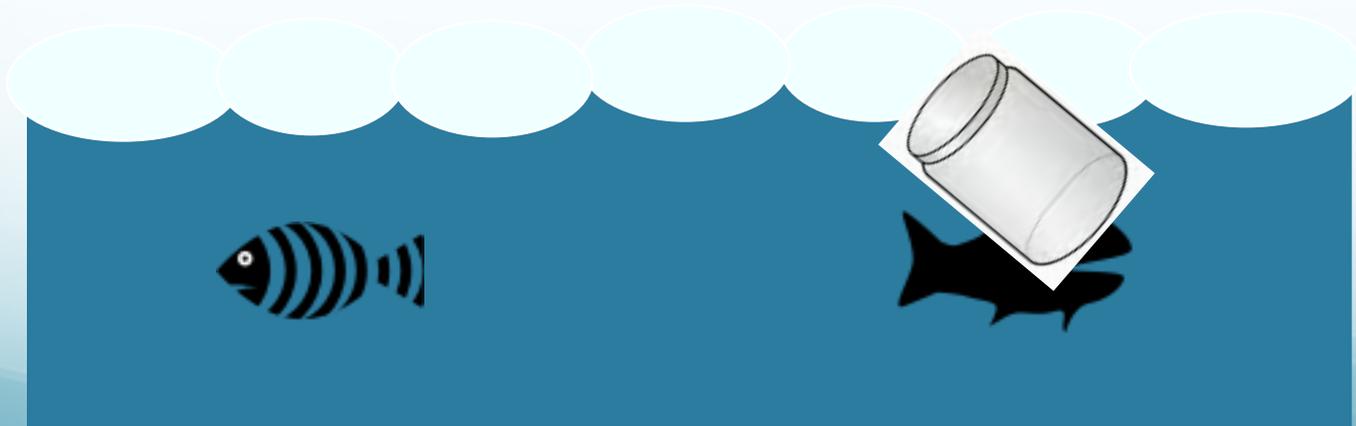
- Approved by Regional and State Water Board Staff
 - 23 outfalls <36 inches, 1 storm x 2 years x 5 analytes
 - 3 outfalls >36 inches, 1 storm x 2 years x 63 analytes
 - 8 outfalls >36 inches, 6 storms over 3 years, discharge, pre-storm and receiving water x 63 analytes
 - 9 reference sites x 6 storms over 3 years x 63 analytes
 - 2 background sites x 6 storms over 3 years x 63 analytes
 - Rocky intertidal community monitoring
 - Bioaccumulation in resident mussels
- \$1,400,000

Sample Types

ASBS Pre-Storm Receiving Water (PRE)

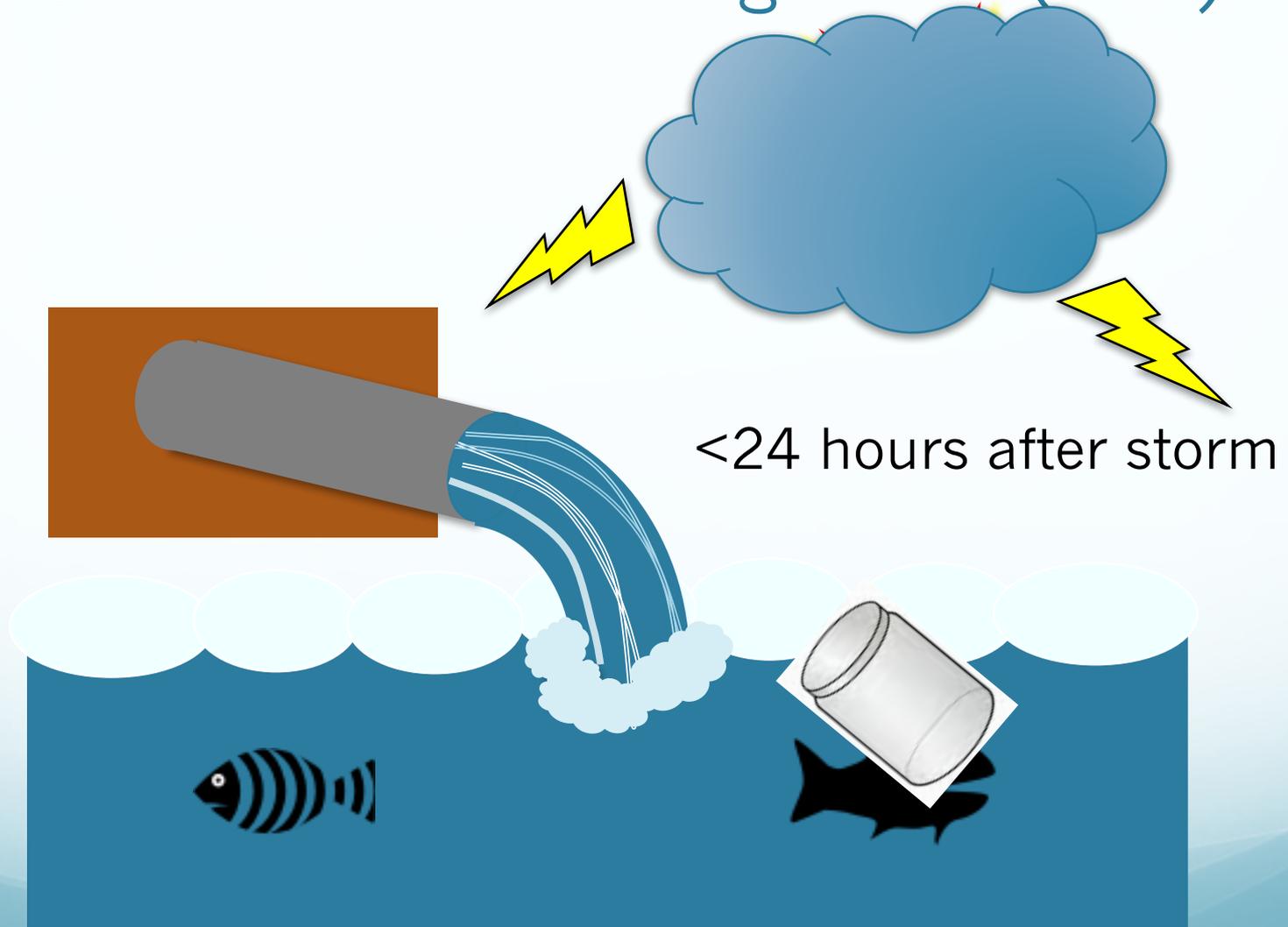


<48 hours before storm



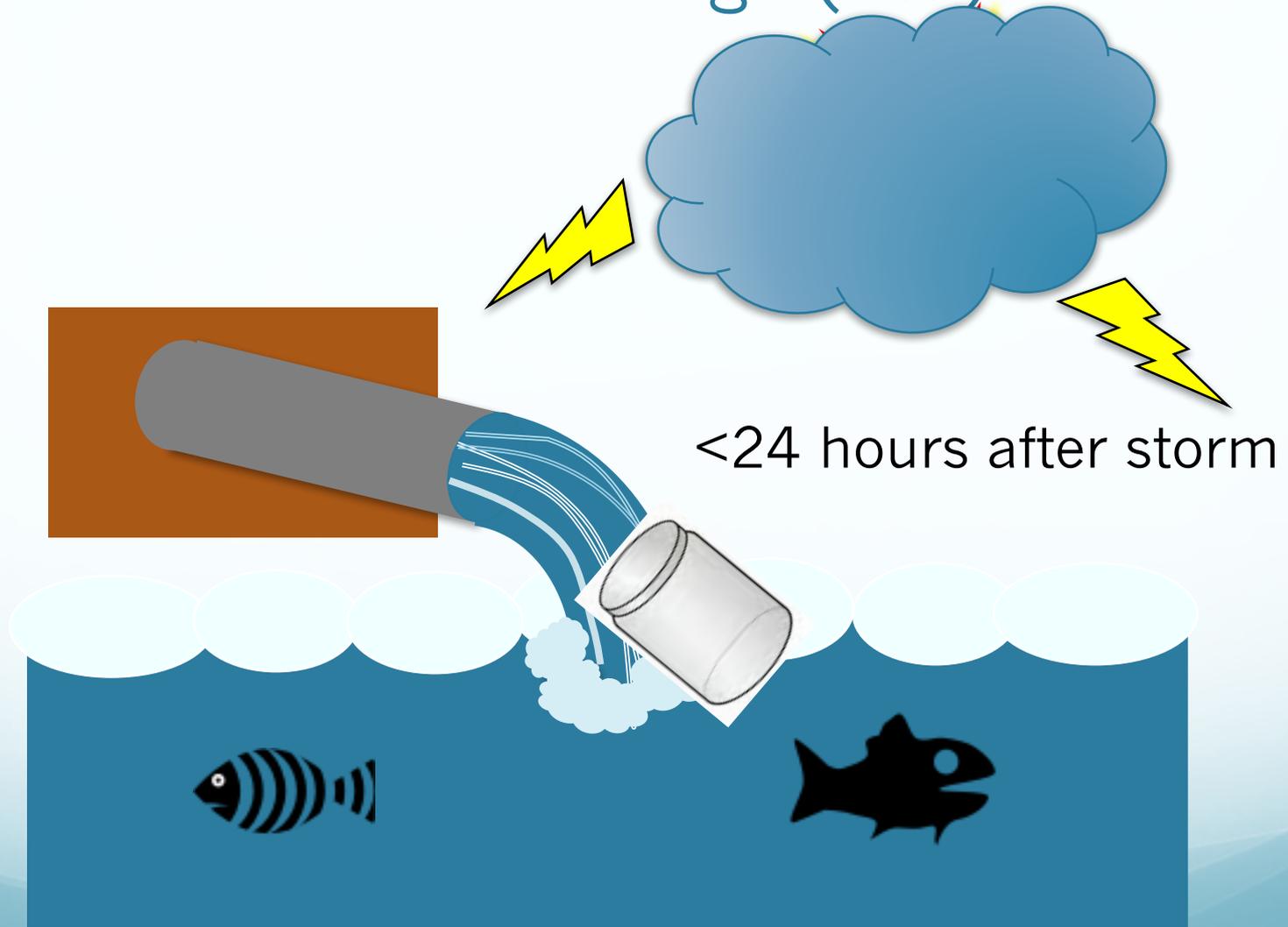
Sample Types

ASBS Storm Receiving Water (REC)



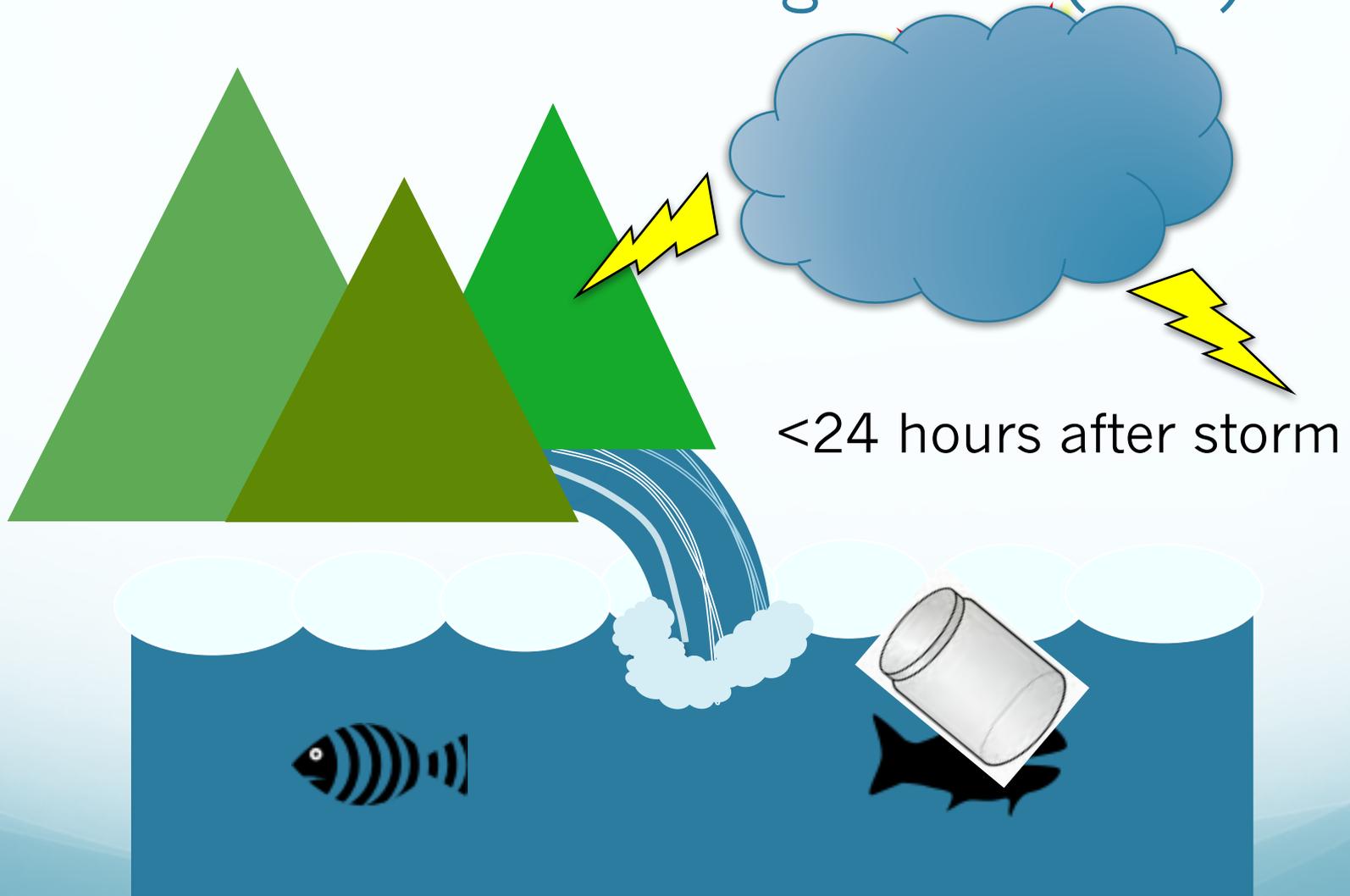
Sample Types

ASBS Discharge (DIS)



Sample Types

Reference Receiving Water (REF)

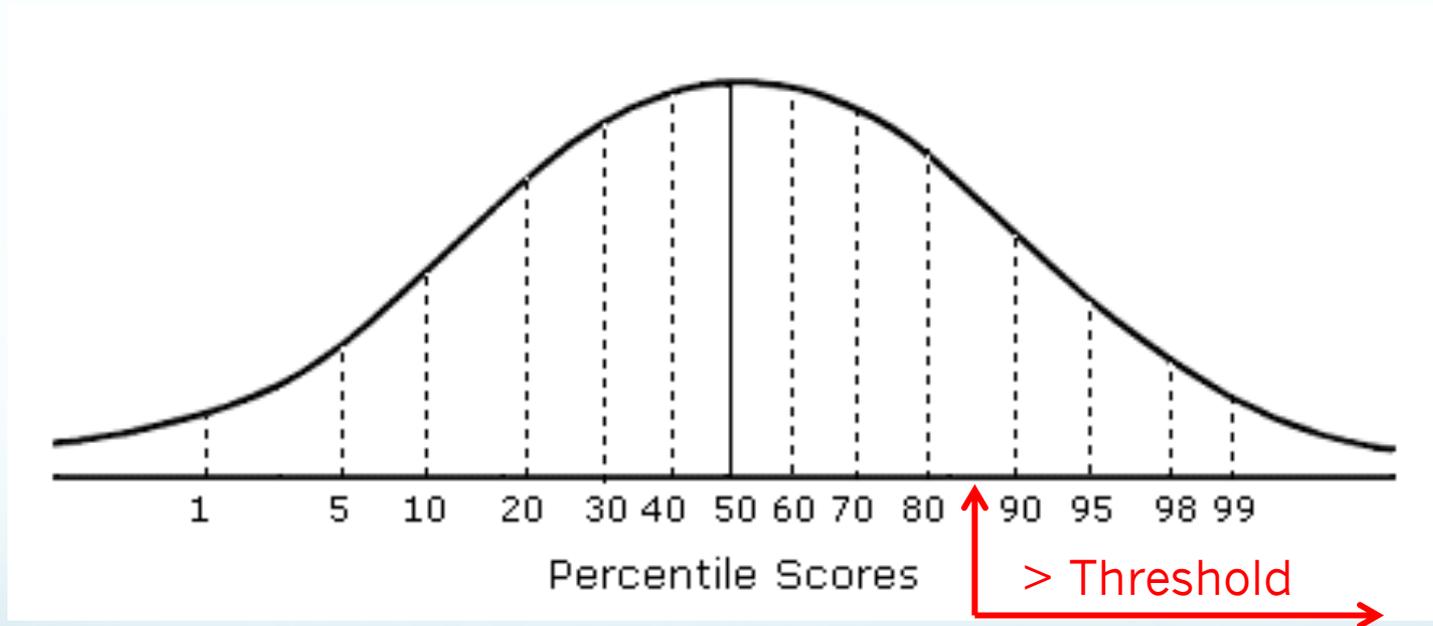


Determining Exceedances

- Compare storm receiving water concentrations pre-storm and 85th reference percentile thresholds

85th percentile Threshold

- Values measured in the ocean at the mouths of reference streams



- Substantially lower than Ocean Plan objectives

Activities

	Year 1 2013–2014	Year 2 2014–2015	Year 3 2015–2016	Total
Reference dry weather	11			11
<36-inch outfalls	23	23	0	46
>36-inch outfalls (x 3)	48	42	54	144
Reference	30	26	10	66
Mooring Field	X	X		
Bioaccumulation		X	X	
Rocky Intertidal		X		

267 samples: >15,000 data points

Significant north-to-south differences in reference conditions?

- Every constituent had higher concentrations at northern reference sites than at southern reference sites
 - Significant differences for every trace metal, except silver
 - Significant difference for rates of kelp germination
- In north, concentrations of every trace metal, except silver, were significantly associated with TSS
- In south, only copper, lead, mercury, and zinc were significantly associated with TSS
- Large differences in 85th percentile thresholds between northern and southern reference sites

Significant north-to-south differences in pre-storm conditions?

- Every trace metal, TSS and urea had higher average pre-storm concentrations at northern ASBS sites than at southern ASBS sites
 - Significant differences for every trace metal, except silver
- Every FIB, orthophosphate and PAHs had higher average pre-storm concentrations in the south

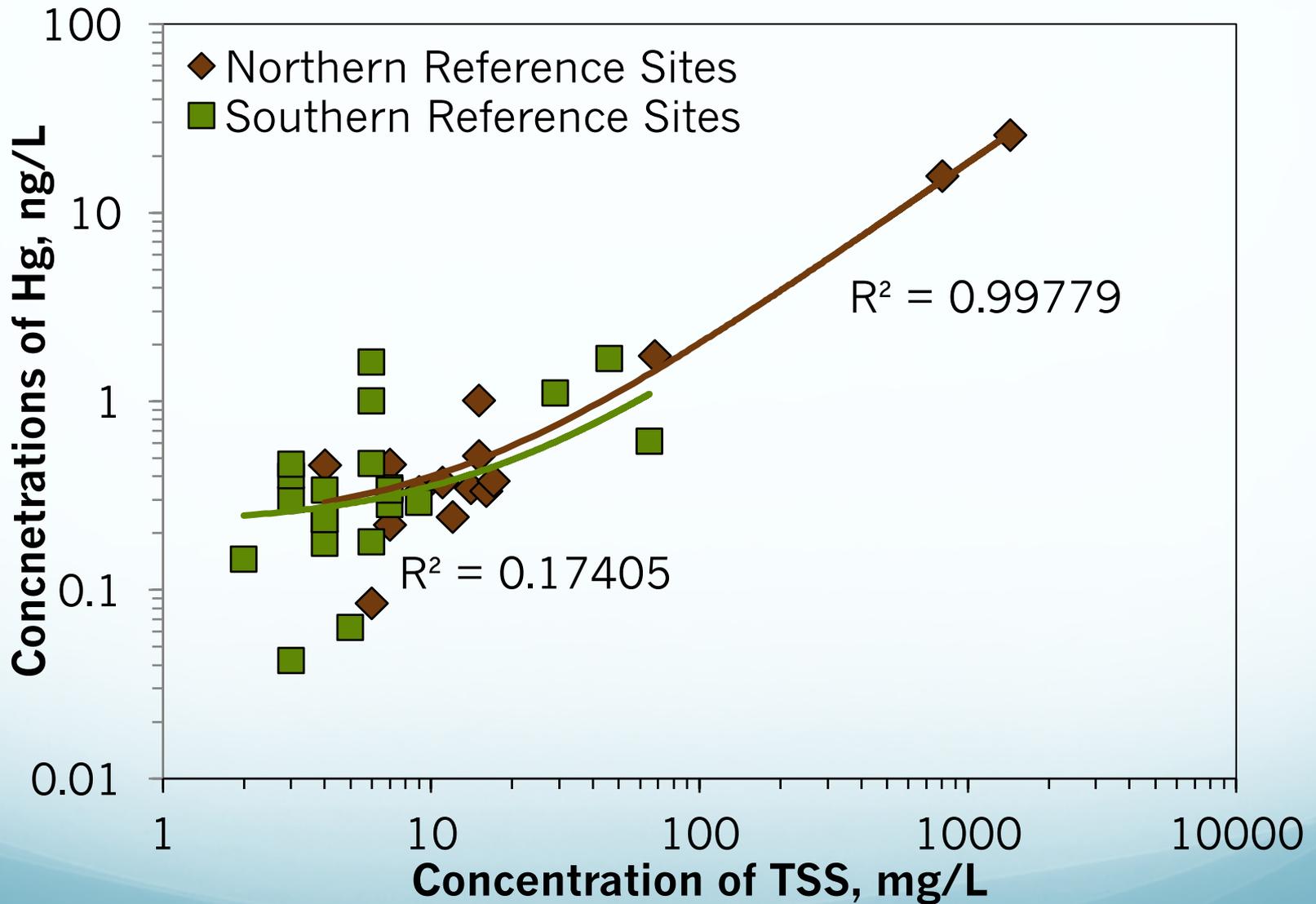
Storm discharges altering receiving water quality?

- Constituent concentrations increased in storm receiving water samples relative to pre-storm concentrations overall, BUT
 - These increases did not necessarily result in concentrations above the overall 85th percentile threshold
 - Concentrations above the overall 85th percentile threshold were not necessarily significantly higher in storm receiving water samples than in pre-storm samples.

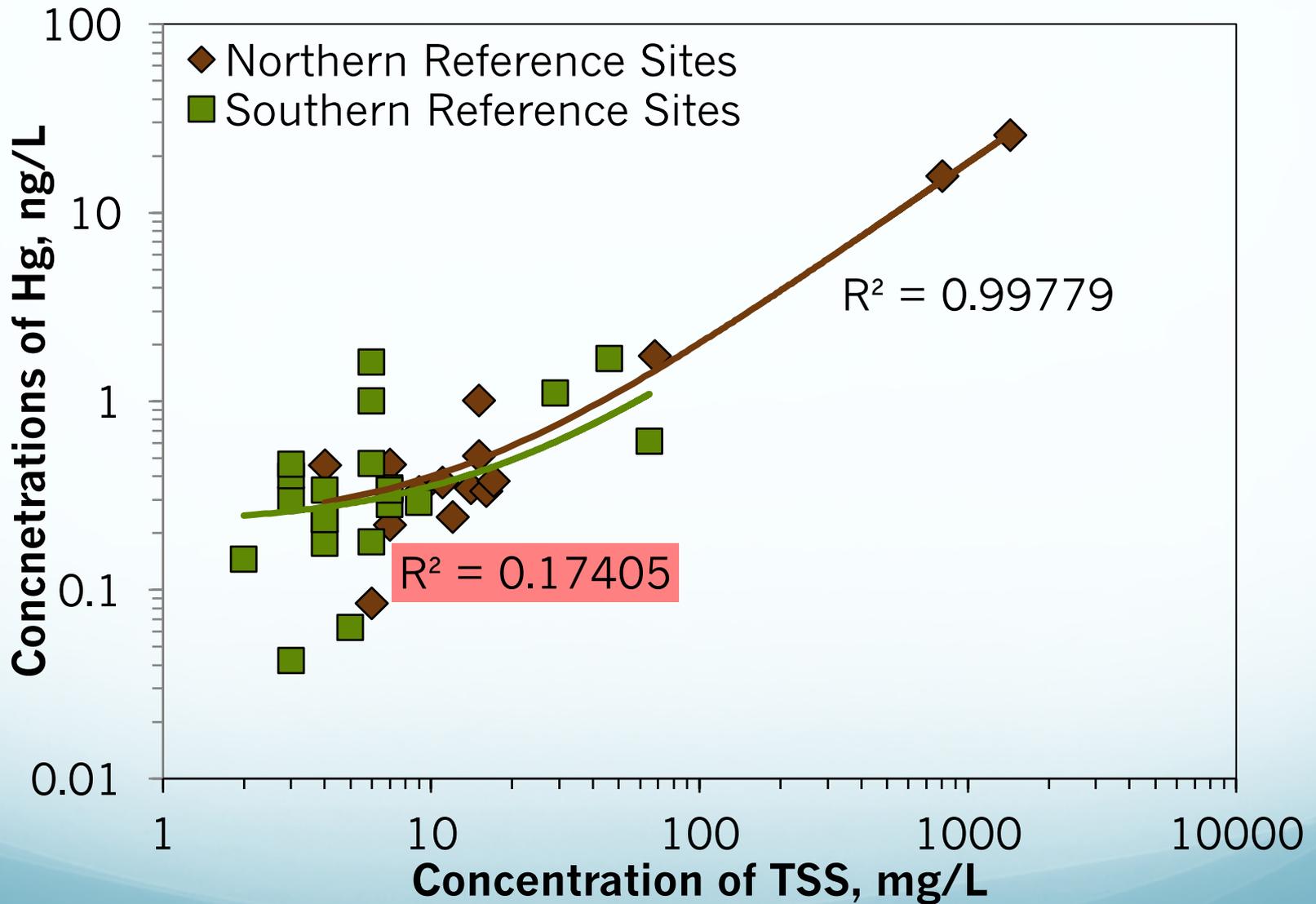
Alterations of receiving water quality due to anthropogenic waste?

- Trace metals in discharges that did not conform to reference patterns of strong associations with TSS were consistent with high percentages of dissolved trace metals and probable anthropogenic sources

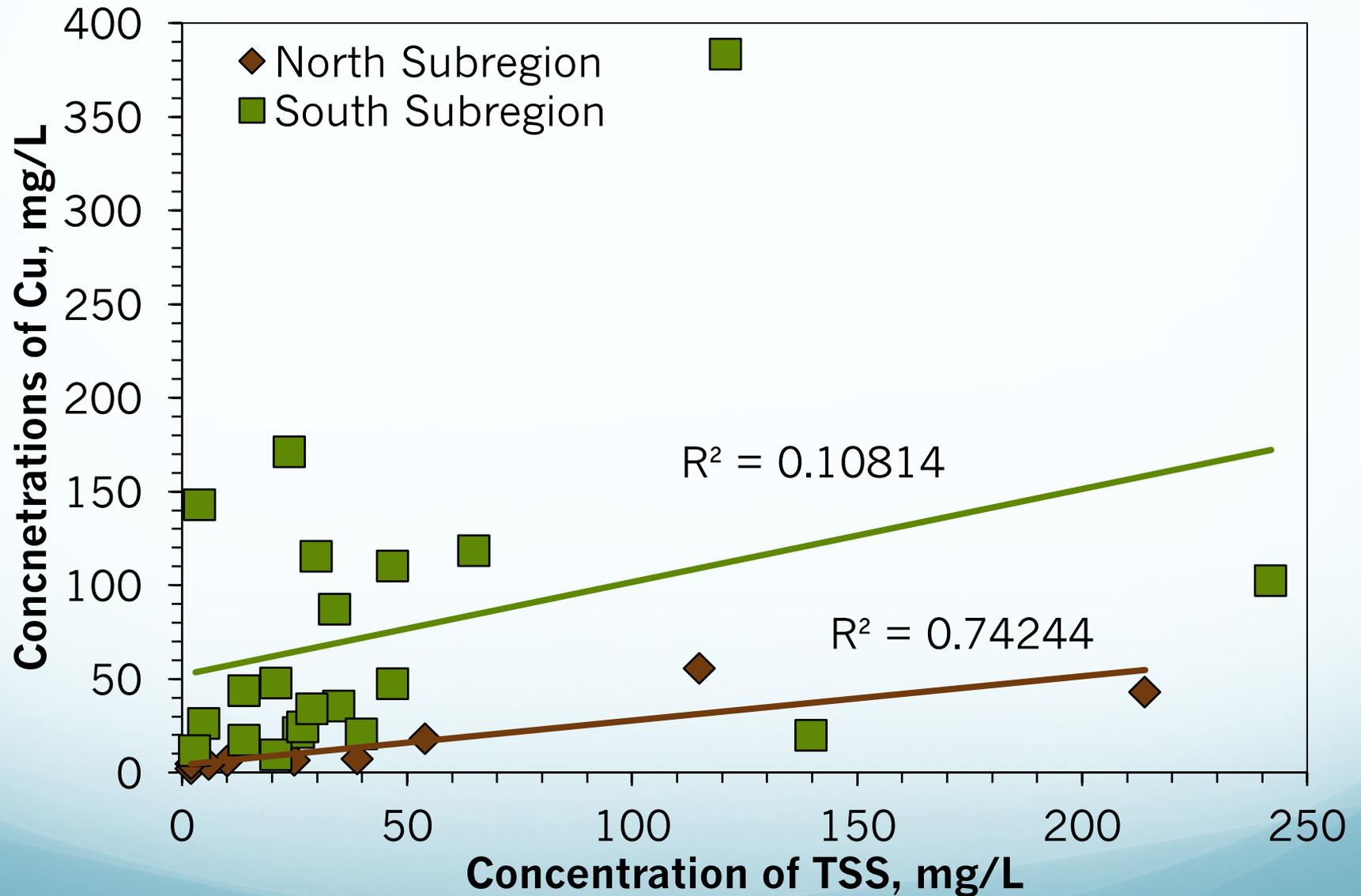
REF Copper vs. TSS



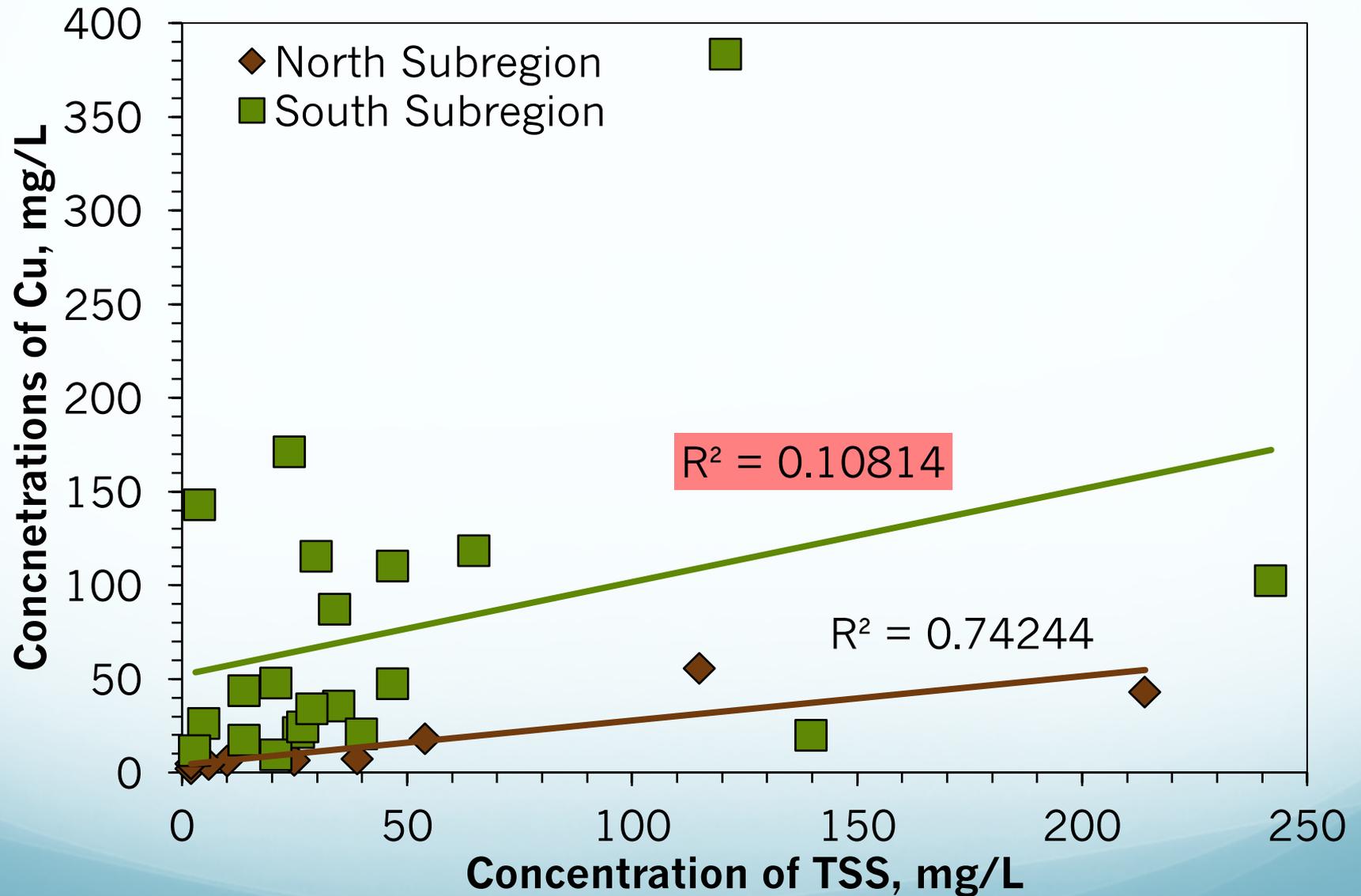
REF Copper vs. TSS



DIS Copper vs. TSS



DIS Copper vs. TSS



Alterations of receiving water quality could be due to anthropogenic waste

- Trace metals in discharges that did not conform to reference patterns of strong associations with TSS were consistent with high percentages of dissolved trace metals and probable anthropogenic sources
- PAHs and pesticides could not be associated with any natural sources and probably have anthropogenic sources

Marine biological resources not obviously affected by ASBS storm discharges

- Rocky Intertidal Communities No
- Mussel Bioaccumulation No
- Toxicity Testing Potentially
 - Some trace metals (dissolved)
 - Pesticides
- Algal Blooms No

Compliance

- Compliance Plans developed by individual participants
 - Different approaches
 - Making exceedance determinations using subsets of the regional reference sites
 - Considering source-tracking studies
 - Proposing diversions of storm discharges to sanitary sewers

Looking Ahead



Looking Ahead



- MBNMS needs a cohesive regional water quality monitoring program

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- MBNMS needs a cohesive regional water quality monitoring program
 - Stormwater, domestic and industrial wastewater, and rivers
 - Cost-effectively track trends and determine causes of and solutions for water quality problems