

ASBS Pilot Study:
Winter 2007-2008

Motivation!

- Regulatory desire for “natural water quality” not water quality standards
 - Focus on receiving waters
- SWRCB wants to initiate a statewide ASBS monitoring program
 - Linkage to large regional programs is a plus
- SWRCB has some flexibility in monitoring design
 - Willing to provide monitoring trade-offs

Monitoring Questions

- What is the range of natural conditions at reference intertidal locations?
 - Develop natural water quality “limits”
- How does this range of natural water quality compare to ASBS sites during wet weather?
 - Compare specific ASBS locations to natural water quality limits
- What is the extent of impact in ASBS with and without discharges?
 - Estimate extent of ASBS shoreline that exceeds natural water quality limits

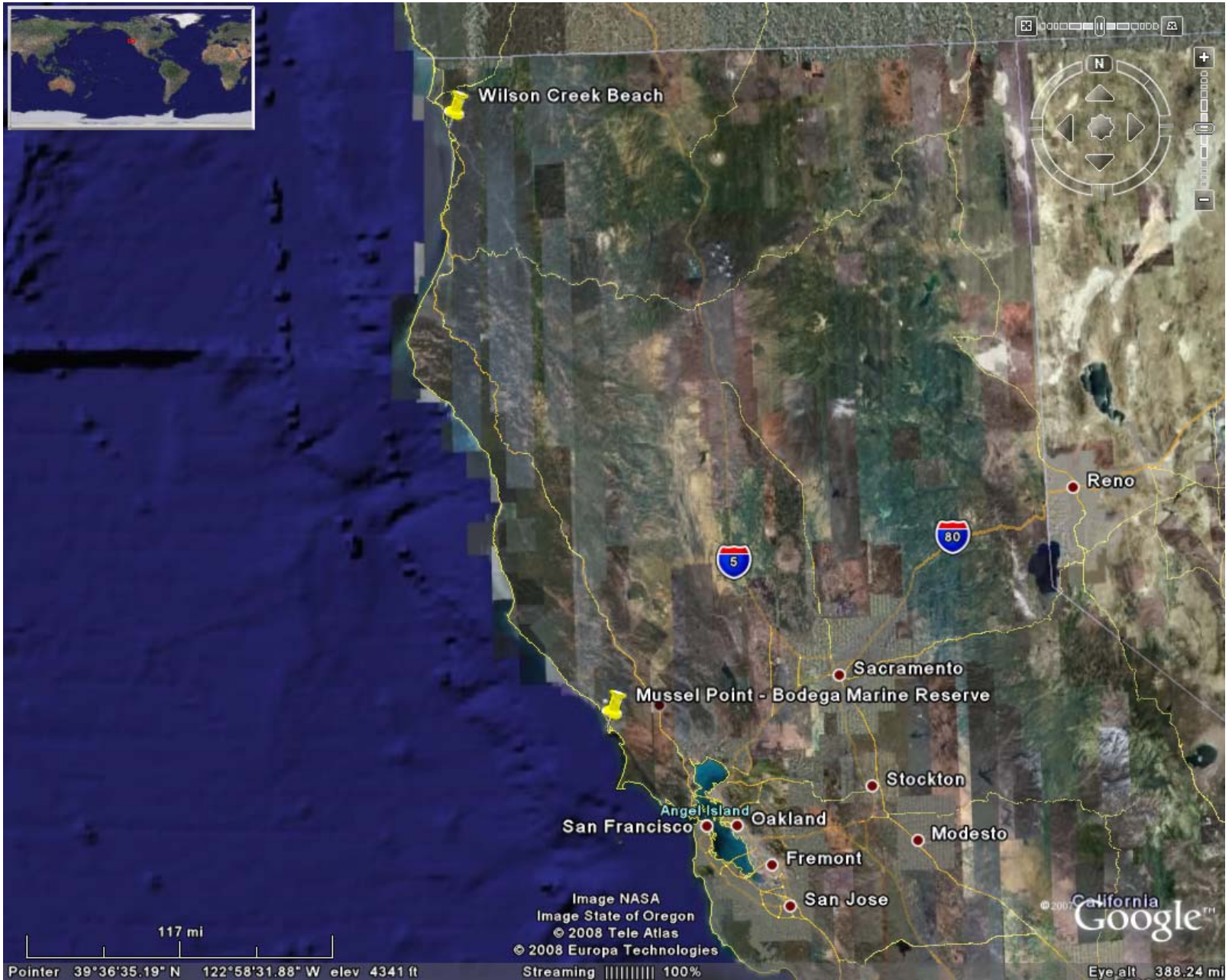
Need For a Pilot Study

- Test reference site criteria
 - Did we pick appropriate reference sites?
- Test sampling protocols
 - Can we sample effectively and efficiently?
- Test laboratory protocols
 - Did we pick the right constituents/methods?
- Use what we learn to improve our regional survey design

Reference Site Criteria

- Beaches that receive watershed discharges
- Watershed $> 90\%$ open space in So Cal
 - 95% in Nor Cal
- No 303d listed segments
- Secondary criteria
 - Watershed size, geology, substrate, island vs mainland

North Coast Region site map



Wilson Creek Beach aerial



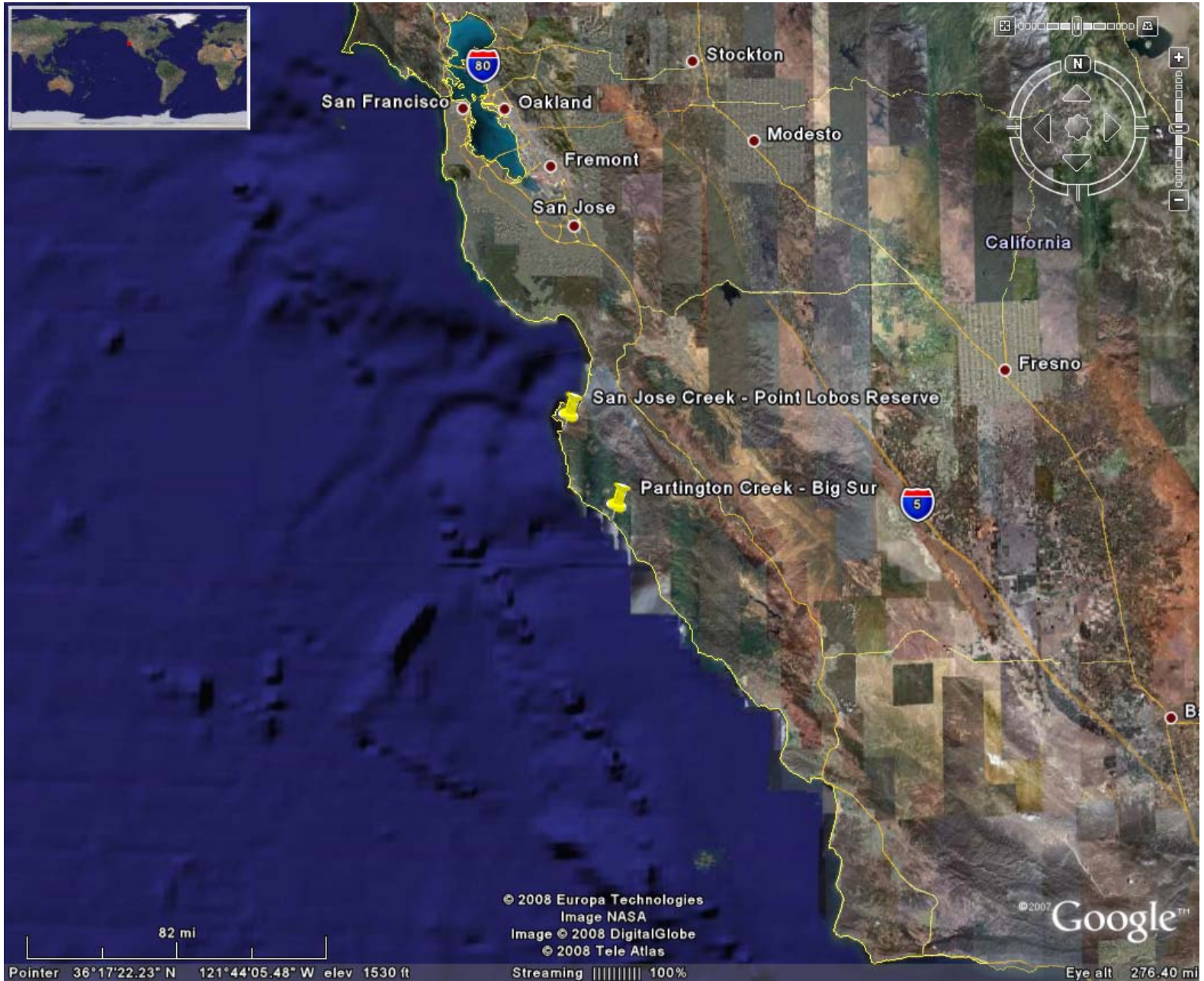
Bodega Marine Reserve – Mussel Point aerial



Bodega Marine Reserve – Mussel Point sampling photo



Central Coast Region site map



Pt Lobos Reserve – San Jose Creek aerial



Big Sur – Partington Creek aerial



South Coast Region site map



Big Sycamore Canyon aerial



Big Sycamore Canyon sampling photo



Deer Creek Beach aerial



Deer Creek sampling photo



El Morro Canyon aerial



El Morro Canyon sampling photo



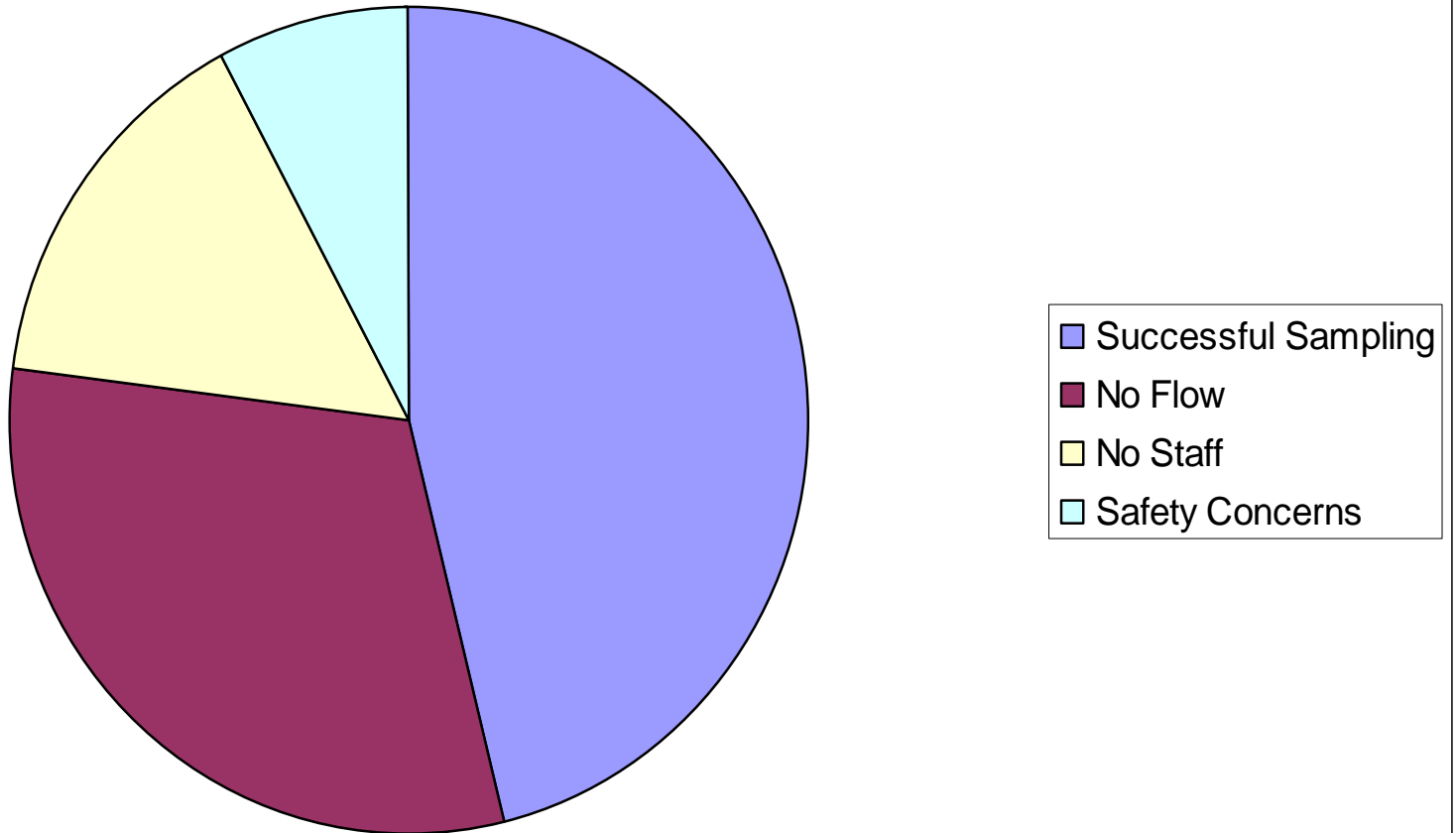
Sampling Protocol

- Forecast storm greater than long-term average at the nearest rain gauge
- Within 24 h of rainfall
- Collected from receiving water
 - Ca. 1 m depth in the wave wash

Sampling Summary

- Samples from all but one site
- Lower than average rainfall to the south
 - Some false starts
 - Three sites sampled, but no discharge
- Additional concerns associated with access and safety

Summary of Sampling Attempts



Number of Site Attempts

Site	Feb22	Feb24	Mar14	Apr03
Wilson Ck	-		X	
Bodega Marine Res	X			
San Jose Ck/Pt Lobos	X			
Pardington Ck/Big Sur	X			
Big Sycamore Ck	-	-	x	
Deer Ck	x			
El Morro Canyon	x	-	-	
Santa Catalina Isl	X			
San Nicolas Isl	-	-	-	-

X=success, **x**=partial success, **-** = unsuccessful

Can We Do Sampling Better?

- Safety access
- Sampling protocol
- Storm mobilization criteria
- Other

Chemistry Results Road Map

- Reference site summary
- Comparison among reference sites with and without discharge
- Regional reference condition
- Relationships between discharge and receiving water at reference sites

Reference Site Summary

Constituent	Units	All Sites n = 8
TSS	mg/L	40.8 (2.3 - 180)
Ammonia	mg/L	0.02 (ND - 0.04)
Nitrate	mg/L	0.02 (ND - 0.06)
Nitrite	mg/L	0.005 (ND - 0.01)
Phosphorus	mg/L	0.19 (ND - 1.13)
Chromium	µg/L	0.87 (0.1 - 3.17)
Copper	µg/L	0.86 (ND - 2.76)
Lead	µg/L	0.98 (ND - 4.65)
Nickel	µg/L	1.53 (ND - 4.58)
Zinc	µg/L	2.13 (ND - 9.37)
Total PAH	µg/L	0.081 (0.001 - 0.444)
Total DDT	µg/L	ND
Total PCB	µg/L	ND
Toxicity Assay	% fertilization	96.8 (92 - 99)

Reference Sites

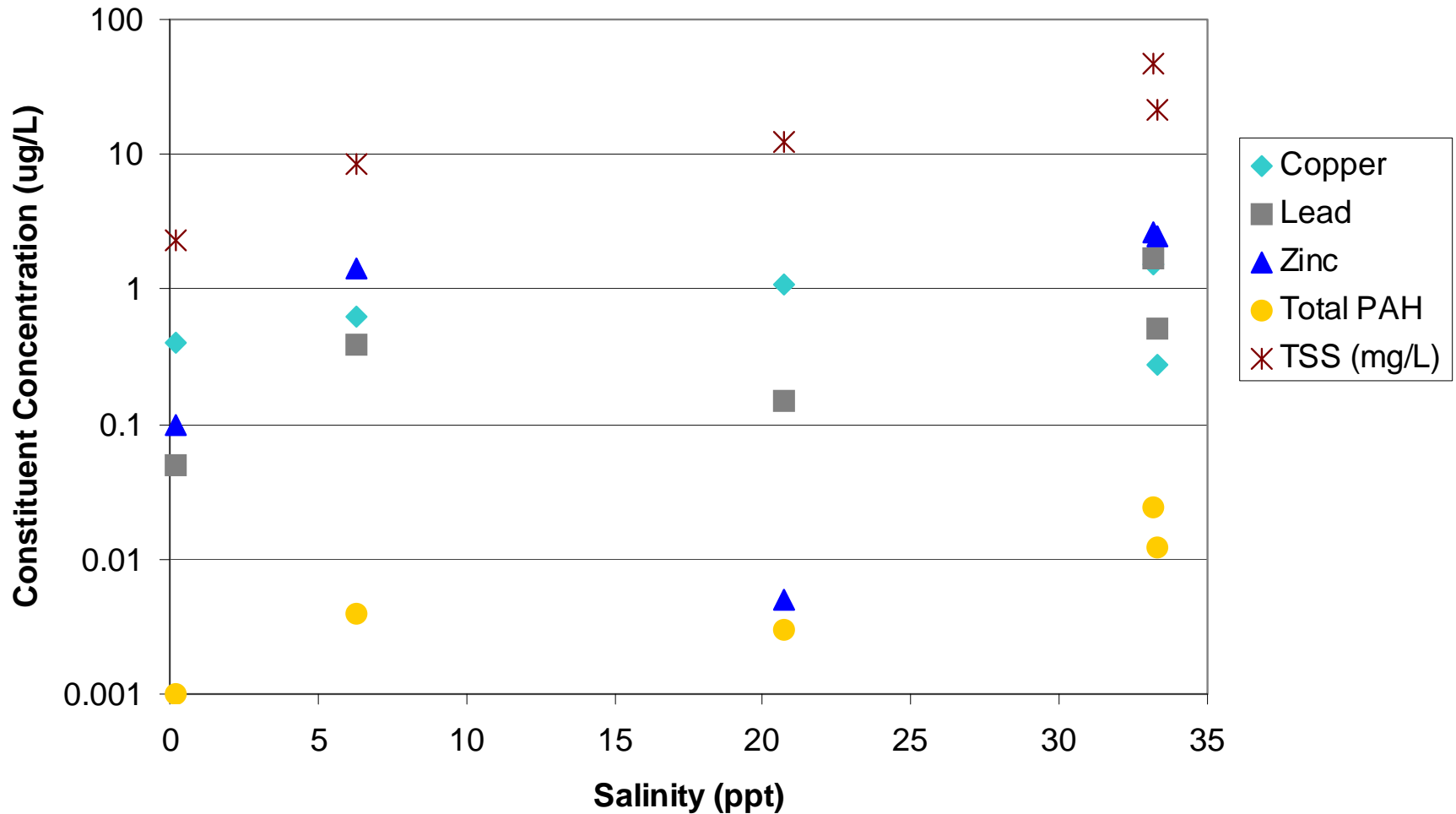
With and Without Discharge

Constituent	Units	Sites with Discharge n = 5	Sites without Discharge n = 1 - 3*
TSS	mg/L	18.4 (2.3 - 47.2)	78.2 (4.8 - 180)
Ammonia	mg/L	0.02 (ND - 0.04)	ND
Nitrate	mg/L	0.02 (ND - 0.06)	0.04
Nitrite	mg/L	0.004 (ND - 0.01)	0.01
Phosphorus	mg/L	0.006 (ND - 0.03)	1.13
Chromium	µg/L	0.57 (0.1 - 1.12)	1.37 (0.36 - 3.17)
Copper	µg/L	0.7 (ND - 1.54)	1.13 (0.31 - 2.76)
Lead	µg/L	0.55 (ND - 1.71)	1.69 (0.07 - 4.65)
Nickel	µg/L	1.33 (ND - 3.23)	1.87 (0.45 - 4.58)
Zinc	µg/L	1.34 (ND - 2.69)	3.46 (ND - 9.37)
Total PAH	µg/L	0.009 (0.001 - 0.024)	0.444
Total DDT	µg/L	ND	ND
Total PCB	µg/L	ND	ND
Toxicity Assay	% fertilization	96.4 (92 - 99)	99

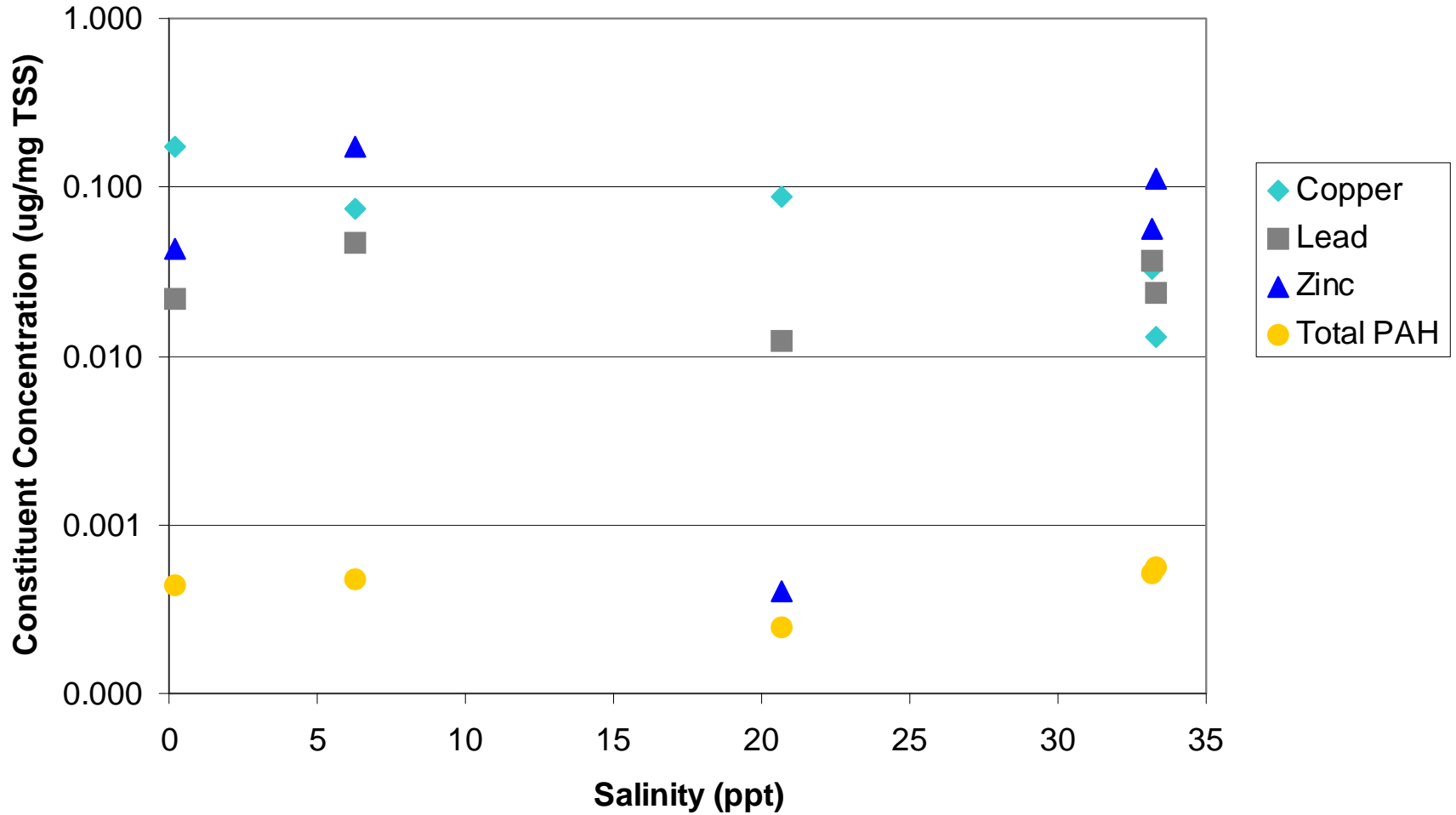
Comparison of Regional Reference Condition

Constituent	Units	North Coast n = 1	Central Coast n = 2	South Coast n = 2
TSS	mg/L	12.3	5.35 (2.3 - 8.4)	34.5 (21.7 - 47.2)
Ammonia	mg/L	0.03	0.02 (ND - 0.04)	0.015 (ND - 0.03)
Nitrate	mg/L	0.06	0.01	0.005 (ND - 0.01)
Nitrite	mg/L	0.01	ND	0.005 (ND - 0.01)
Phosphorus	mg/L	ND	ND	0.016 (ND - 0.032)
Chromium	µg/L	1.12	0.11 (0.1 - 0.12)	0.76 (0.6 - 0.92)
Copper	µg/L	1.07	0.31 (ND - 0.62)	0.91 (0.28 - 1.54)
Lead	µg/L	0.15	0.20 (ND - 0.39)	1.11 (0.51 - 1.71)
Nickel	µg/L	1.56	0.66 (ND - 1.31)	1.88 (0.53 - 3.23)
Zinc	µg/L	ND	0.77 (0.1 - 1.45)	2.56 (2.44 - 2.69)
Total PAH	µg/L	0.003	0.003 (0.001 - 0.004)	0.018 (0.012 - 0.024)
Total DDT	µg/L	ND	ND	ND
Total PCB	µg/L	ND	ND	ND
Toxicity Assay	% fertilization	98	96.5 (96 - 97)	95.5 (92 - 99)

Concentrations of selected constituents vs. salinity in receiving water



TSS normalized concentrations of selected constituents vs. salinity in receiving water



Preliminary Summary of Chemistry at Reference Sites

- Consistently low concentrations at pilot reference sites
 - Chlorinated hydrocarbons not detected
 - Wasn't toxic
- Comparisons are hampered by small sample size
- Minor differences in regional reference conditions
- No strong relationship between salinity and receiving water chemistry

Can We Do Chemistry Better?

- Need all constituents?
 - More constituents?
- Still sample only at point zero?
- Missing constituents?

