Effects of Wildfires in San Diego County on Water Quality and Benthic Macroinvertebrate Assemblages in Wadeable Streams.

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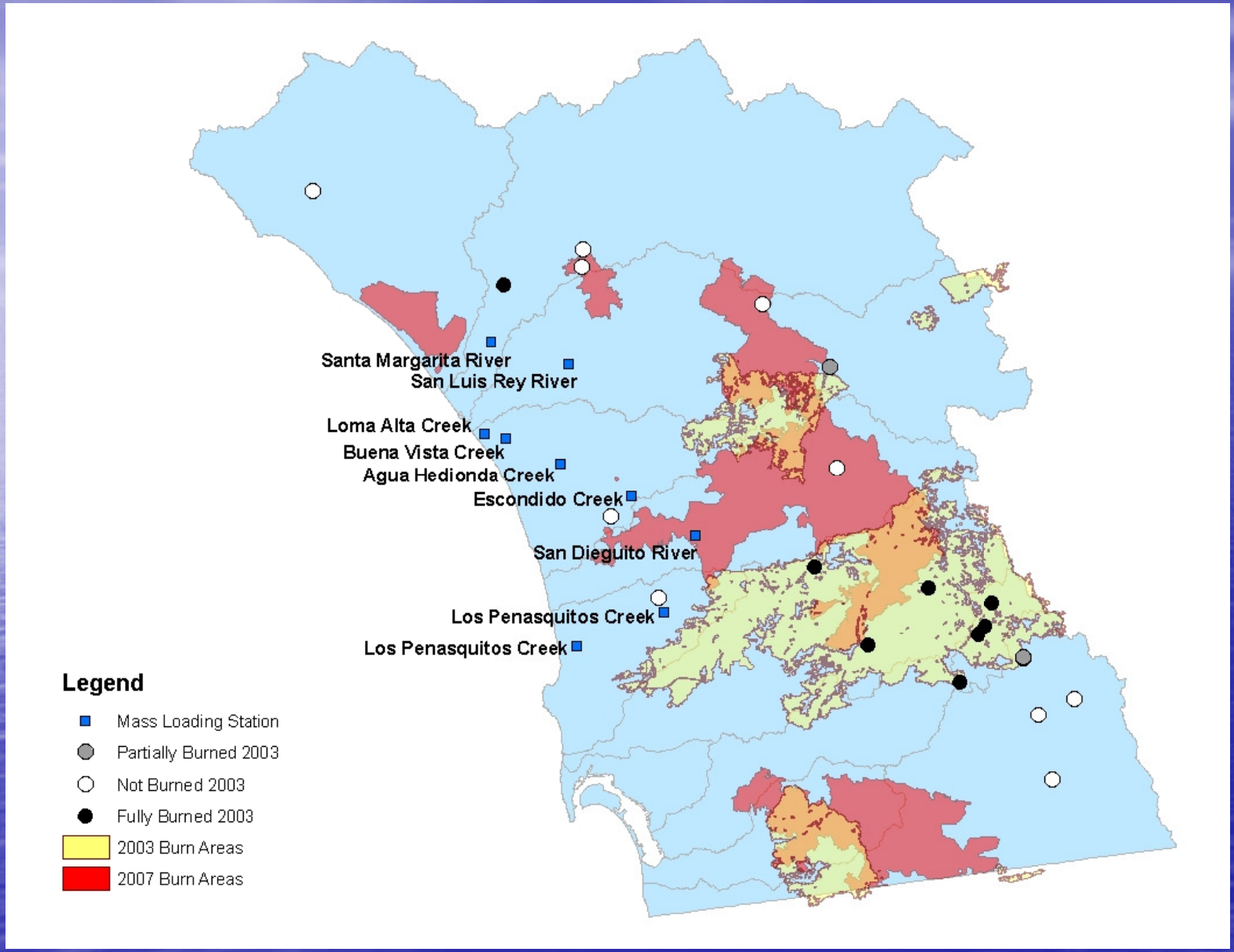
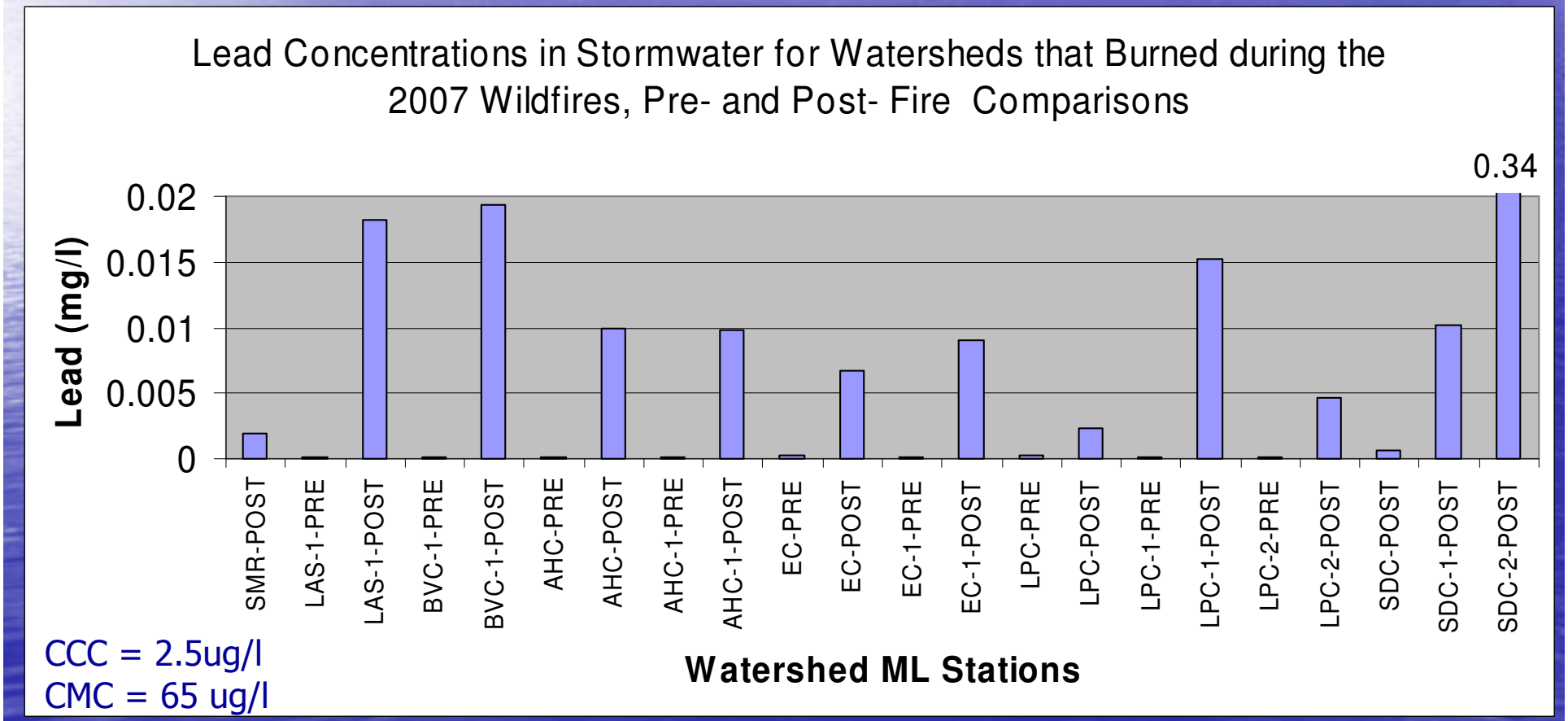
Acknowledgments

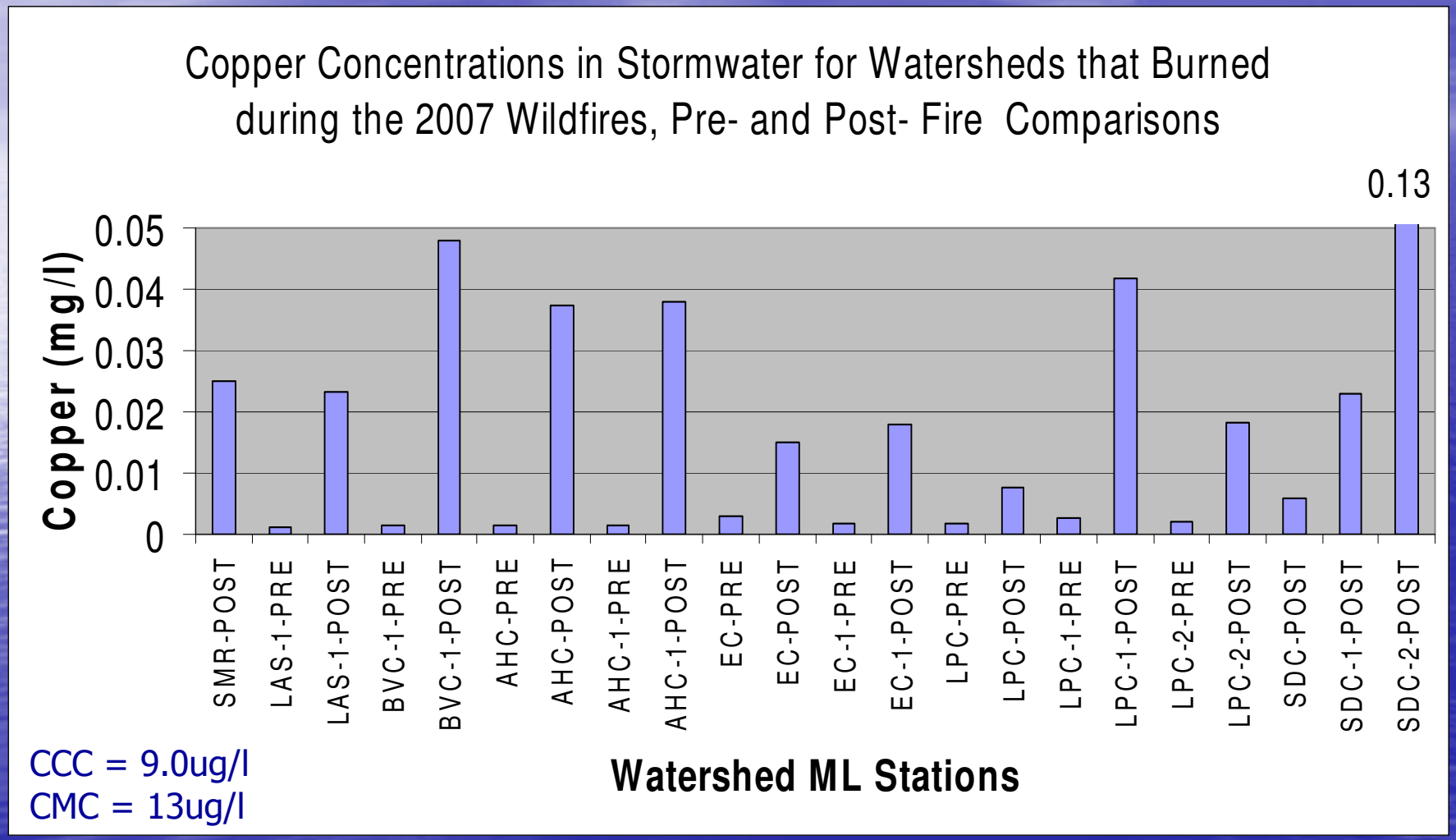
- The Counties of San Diego and Riverside
- The Cities of Chula Vista, Carlsbad, Coronado, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego, San Marcos, Santee, Solana Beach, and Vista.
- The San Diego Unified Port District
- The San Diego County Regional Airport Authority
- USMC Camp Pendleton

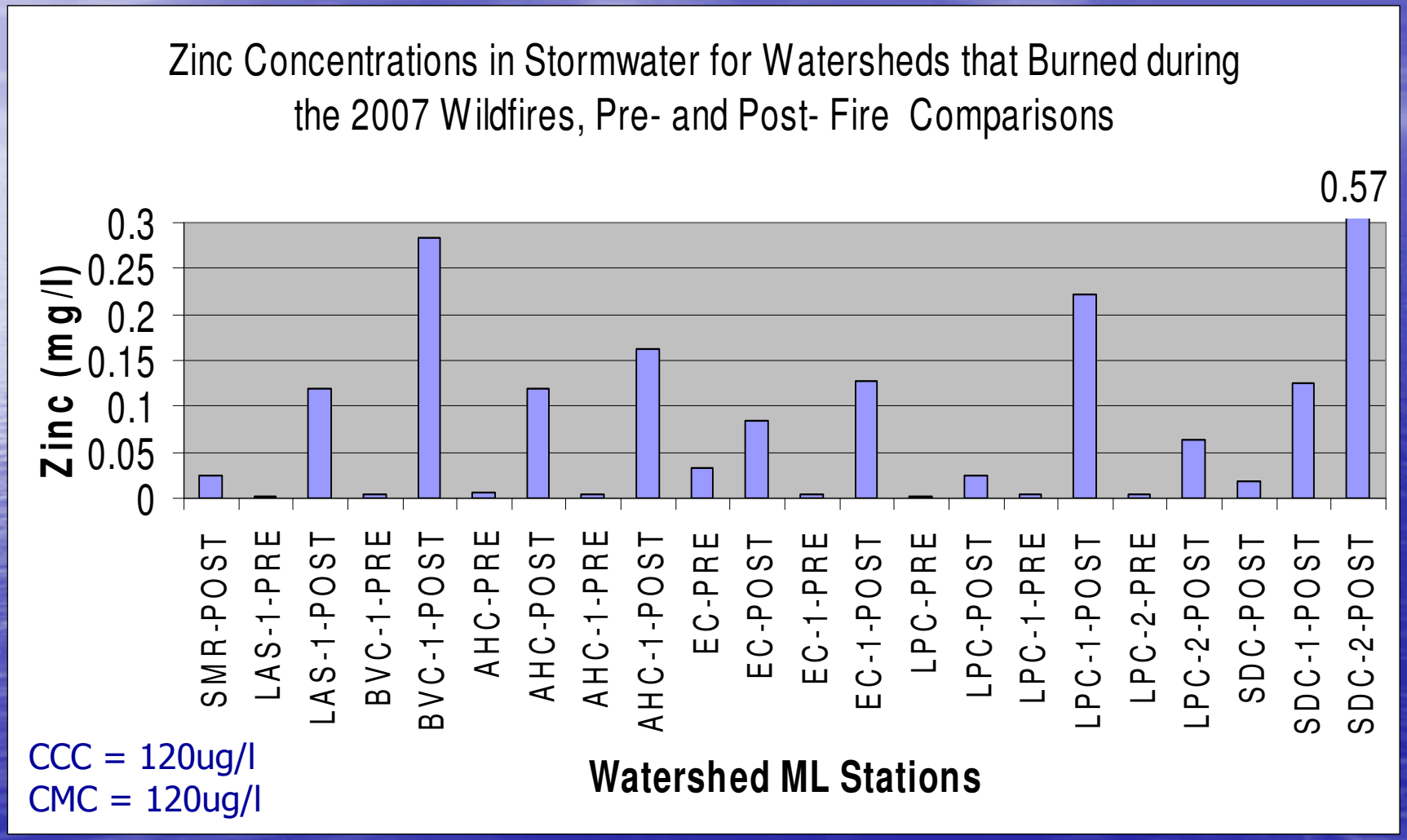

Santa Margarita River
San Luis Rey River
Loma Alta Creek
Buena Vista Creek
Agua Hedionda Creek
Escondido Creek
San Dieguito River
Los Penasquitos Creek
Los Penasquitos Creek
Legend
Mass Loading Station
Partially Burned 2003
Not Burned 2003
Fully Burned 2003
2003 Burn Areas
2007 Burn Areas

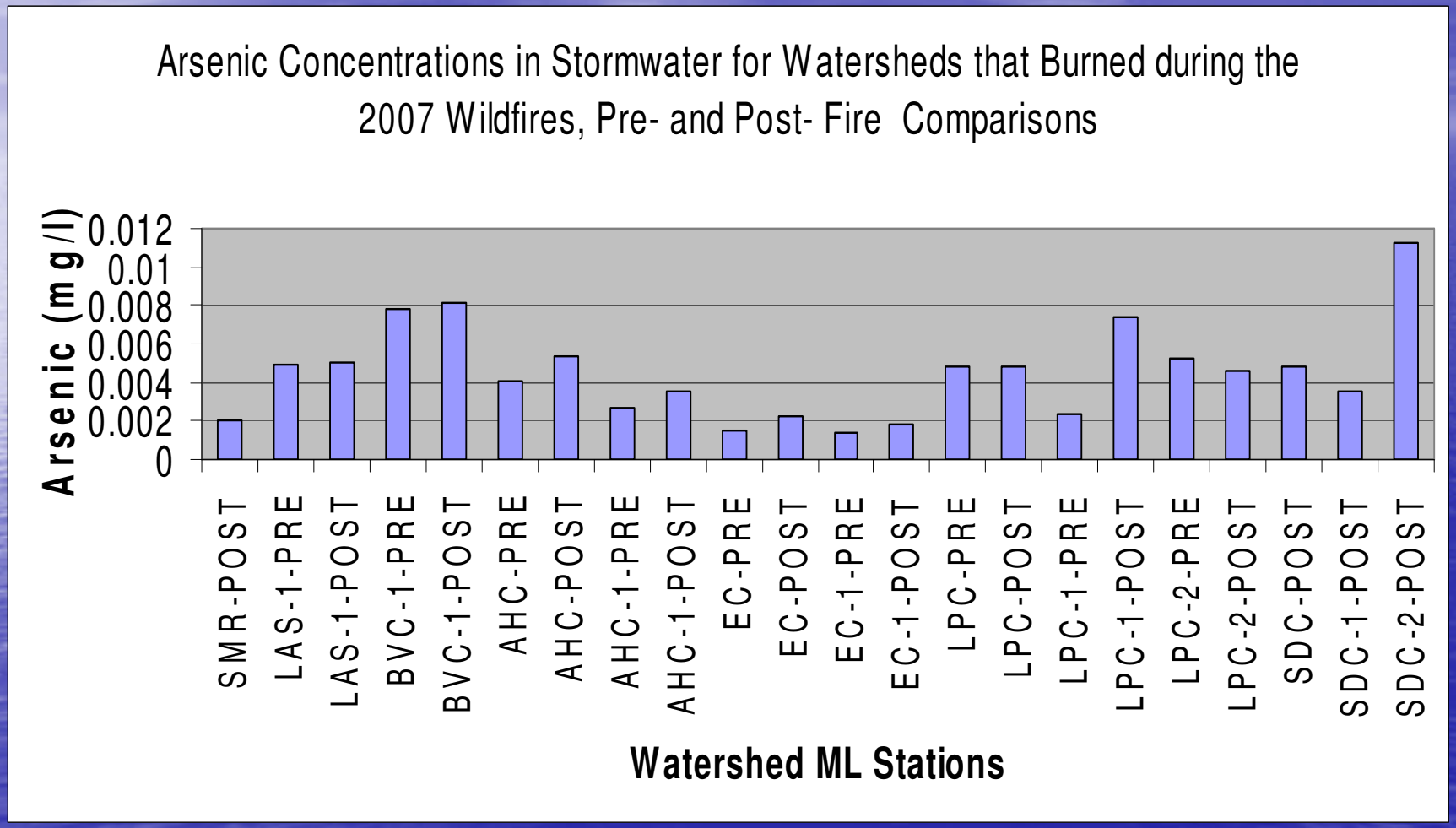
Heavy Metal Concentrations



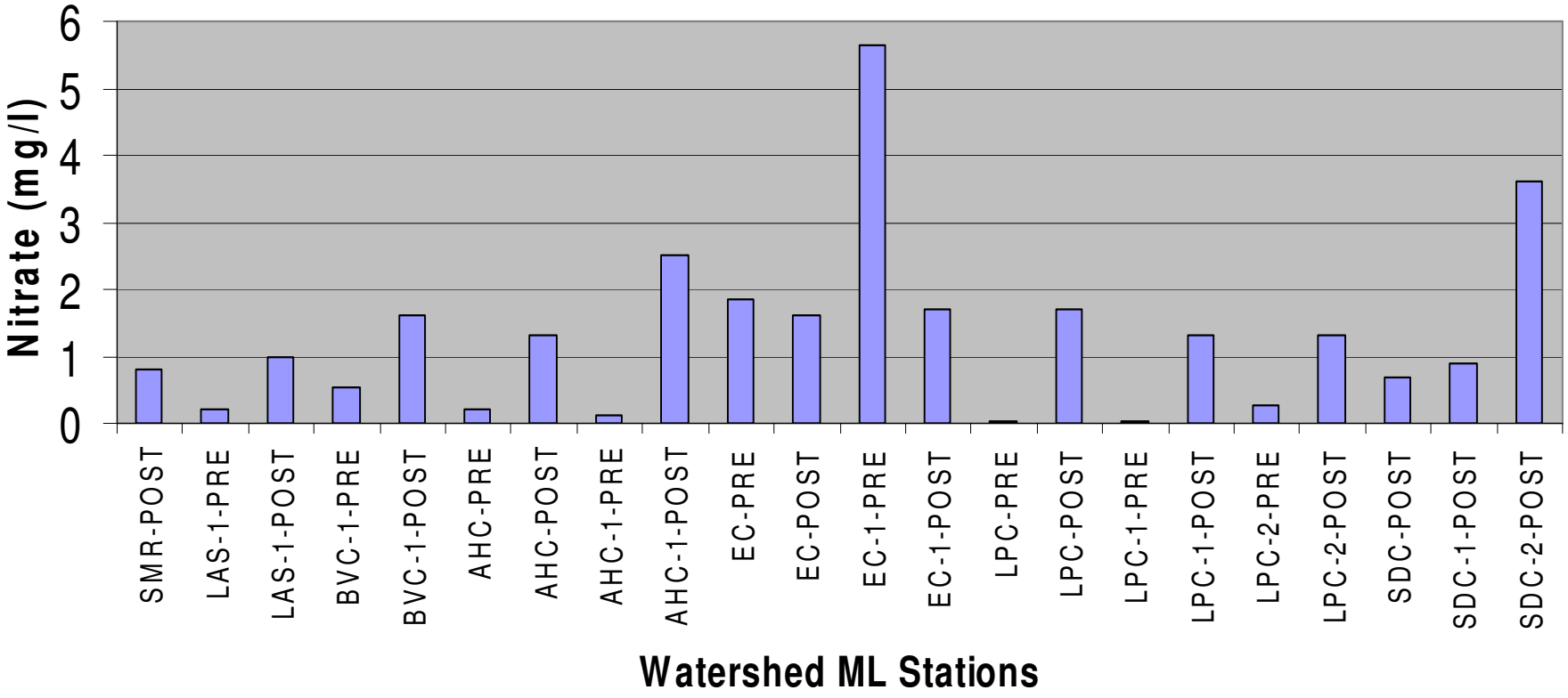
CCC = 2.5ug/l
CMC = 65 ug/l

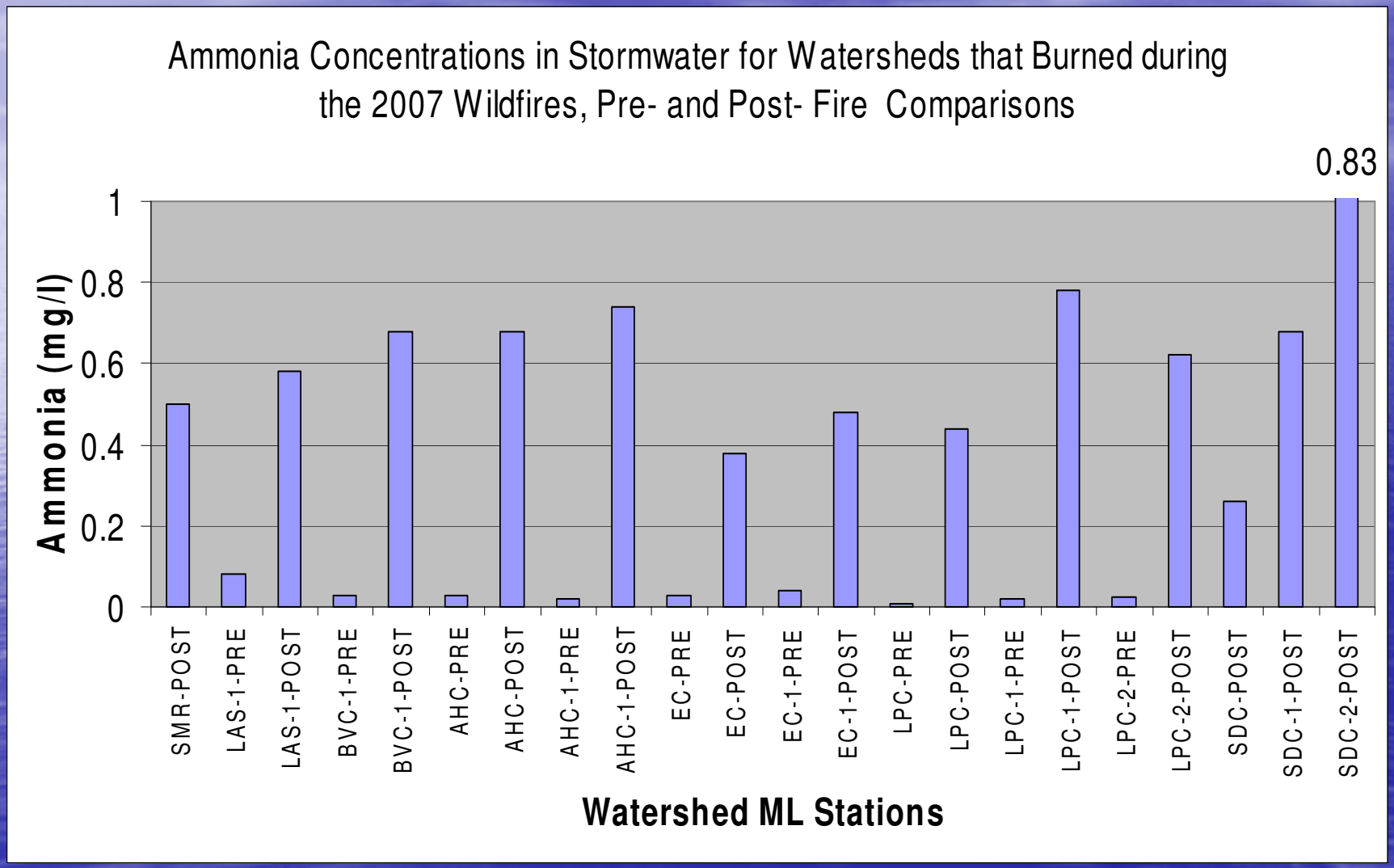

Copper Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
0.13
0.05
0.04
0.03
0.02
0.01
0
Copper (mg/l)
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations
CCC = 9.0ug/l
CMC = 13ug/l

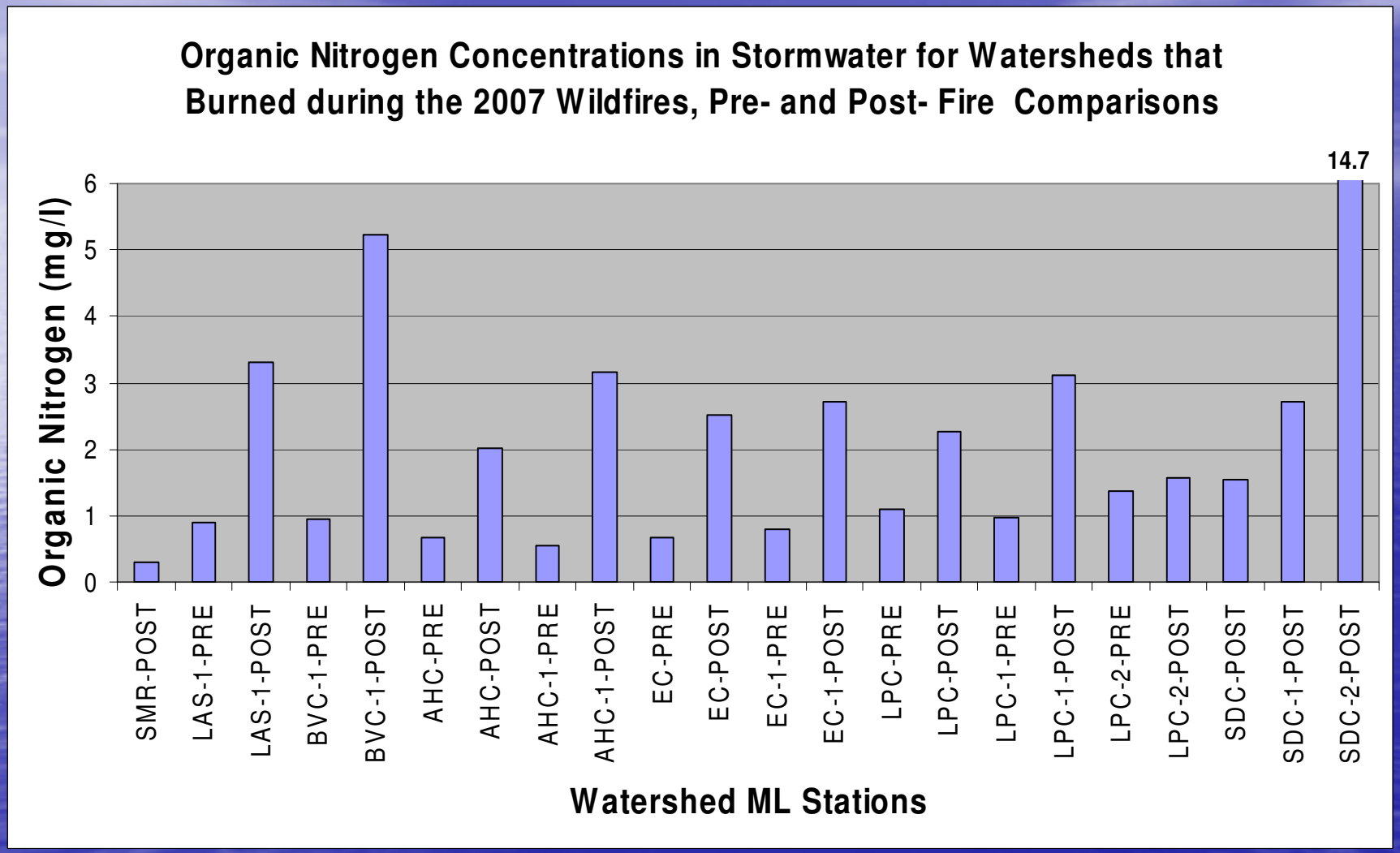

Zinc Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
0.57
Zinc (mg/l)
0.3
0.25
0.2
0.15
0.1
0.05
0
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations
CCC = 120ug/l
CMC = 120ug/l

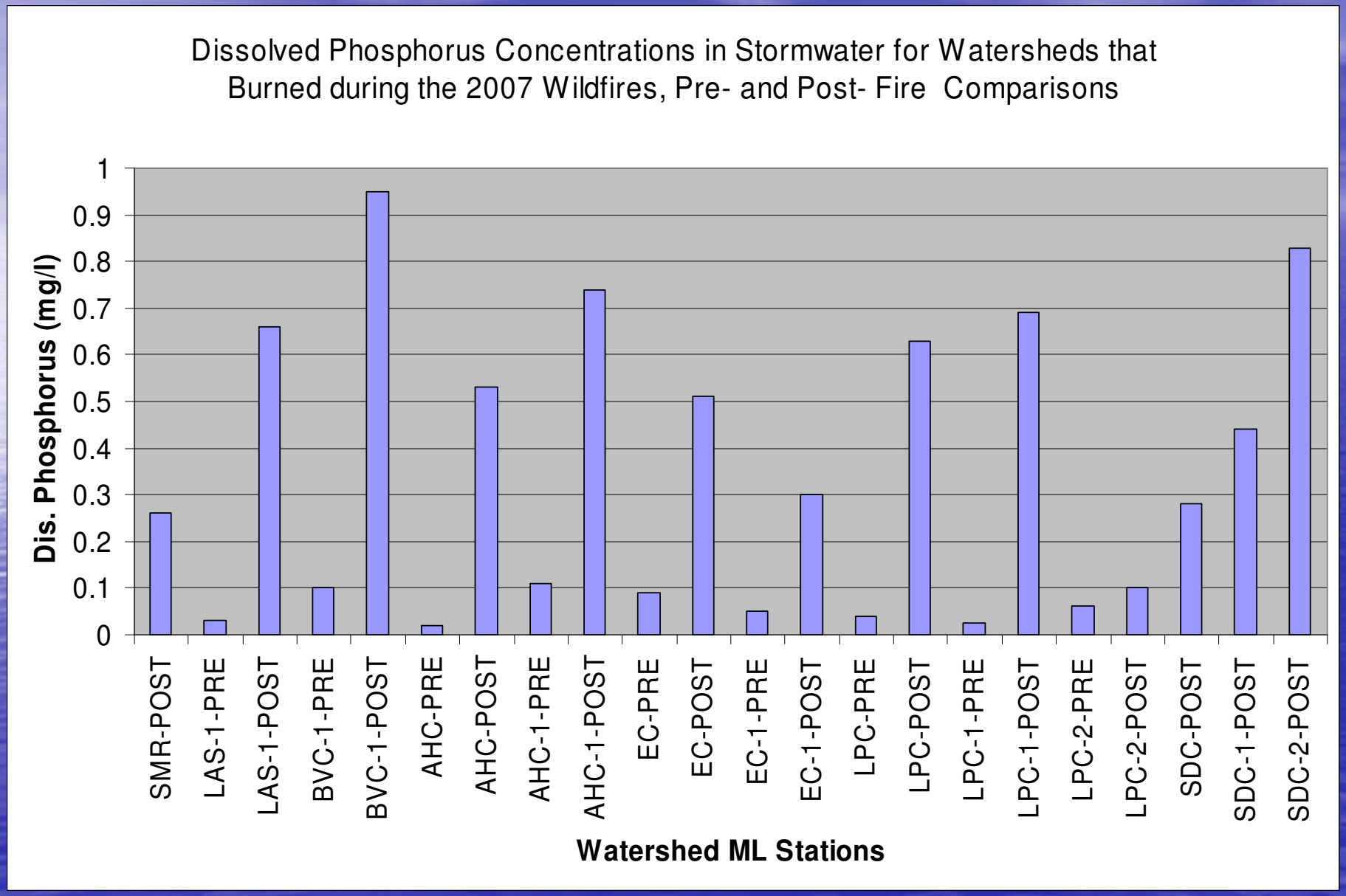

Arsenic Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
Arsenic (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations

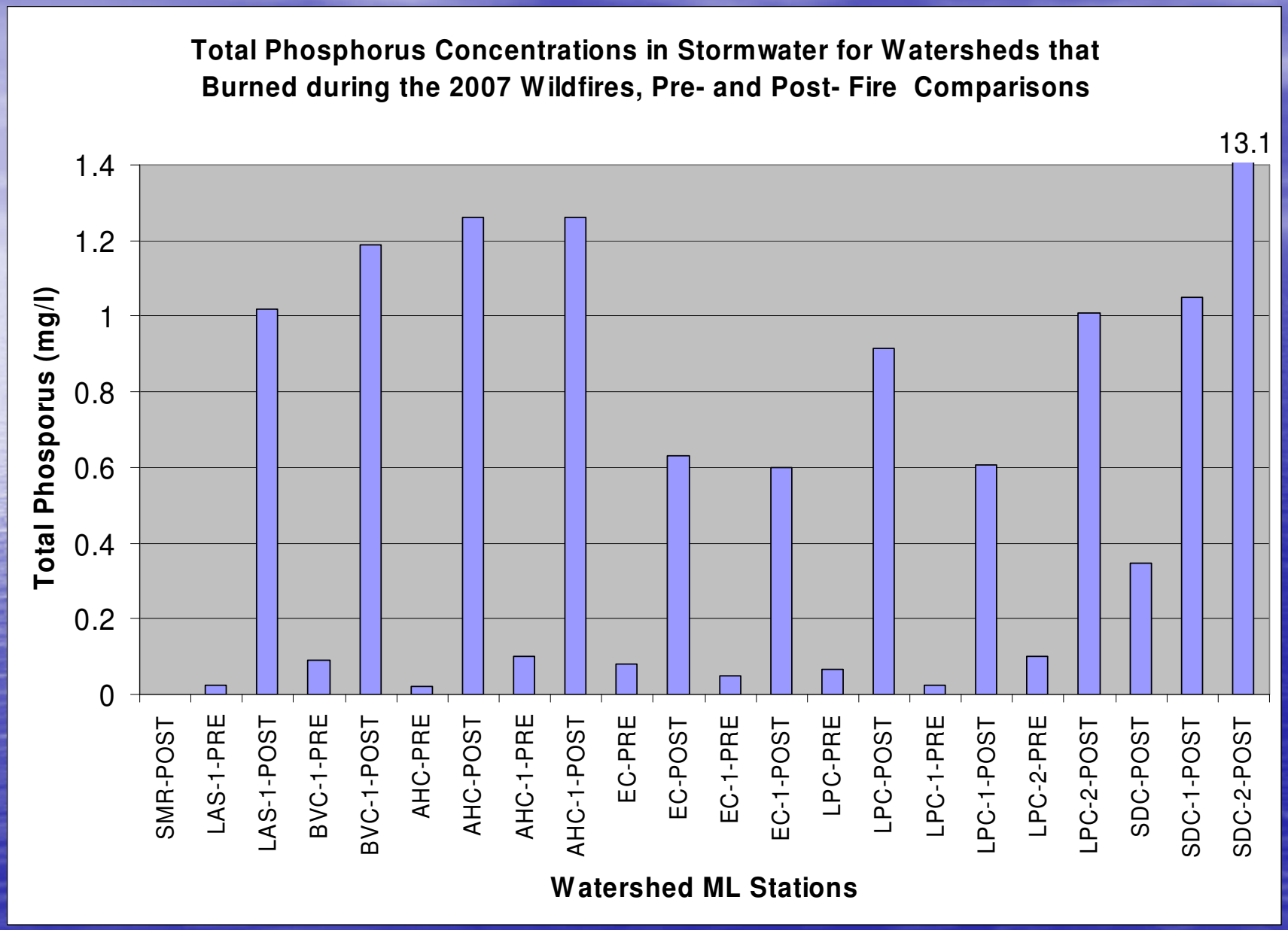
Nutrient Concentrations




Ammonia Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
0.83
1
0.8
0.6
0.4
0.2
0
Ammonia (mg/l)
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations


Organic Nitrogen Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
Organic Nitrogen (mg/l)
0
1
2
3
4
5
6
14.7
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations

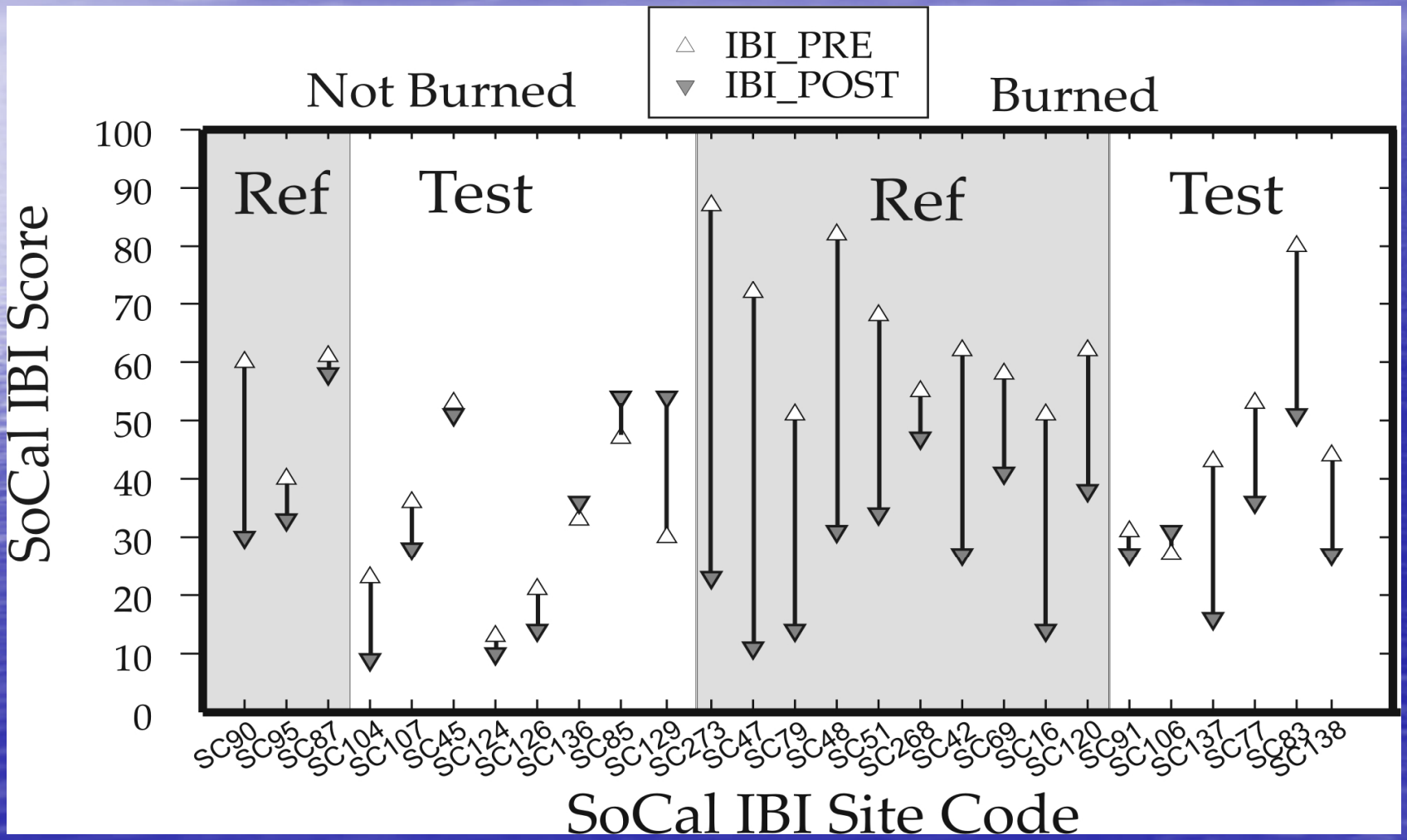

Dissolved Phosphorus Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
Dis. Phosphorus (mg/l)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations

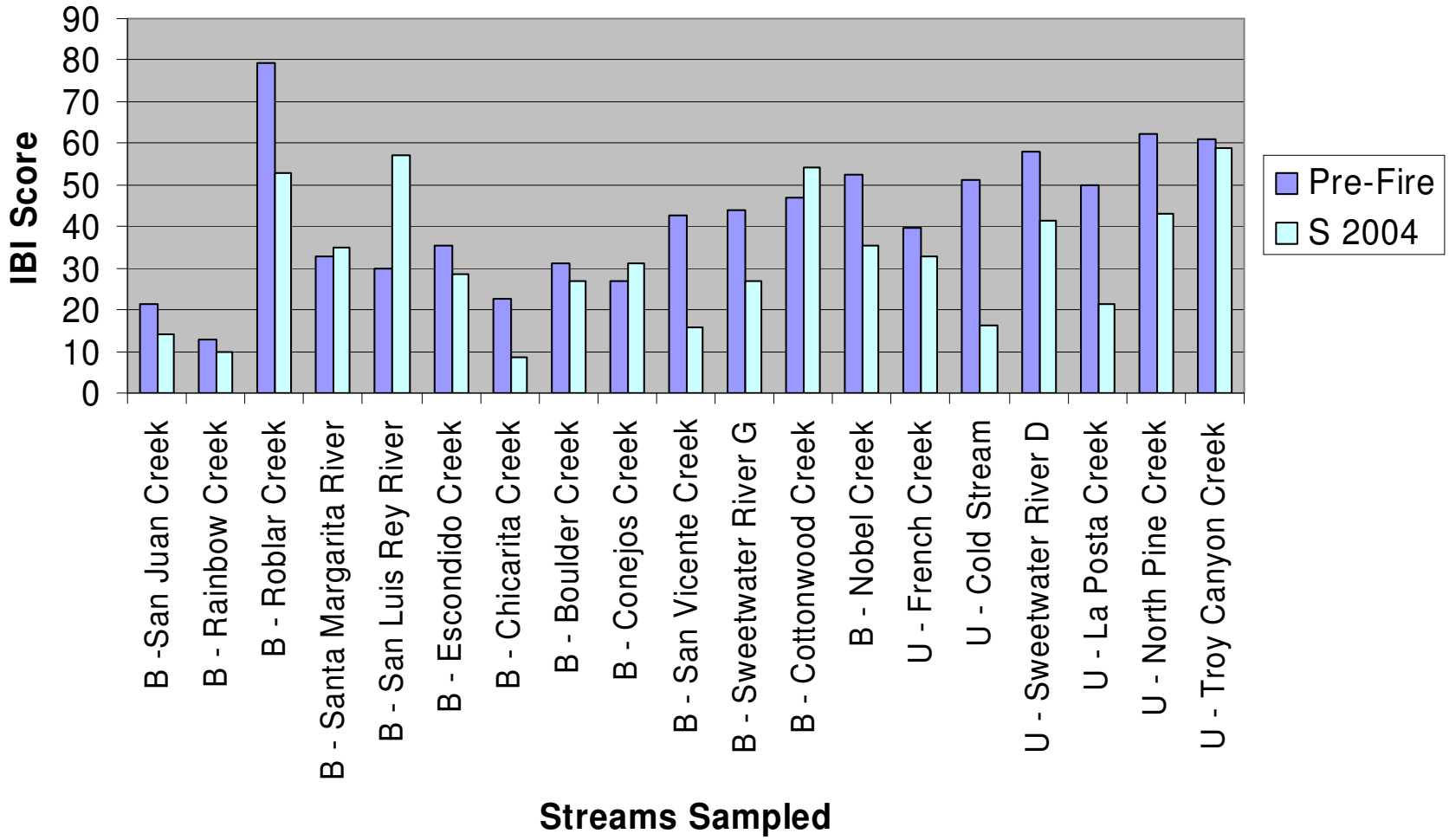

Total Phosphorus Concentrations in Stormwater for Watersheds that Burned during the 2007 Wildfires, Pre- and Post- Fire Comparisons
13.1
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Total Phosporus (mg/l)
SMR-POST
LAS-1-PRE
LAS-1-POST
BVC-1-PRE
BVC-1-POST
AHC-PRE
AHC-POST
AHC-1-PRE
AHC-1-POST
EC-PRE
EC-POST
EC-1-PRE
EC-1-POST
LPC-PRE
LPC-POST
LPC-1-PRE
LPC-1-POST
LPC-2-PRE
LPC-2-POST
SDC-POST
SDC-1-POST
SDC-2-POST
Watershed ML Stations

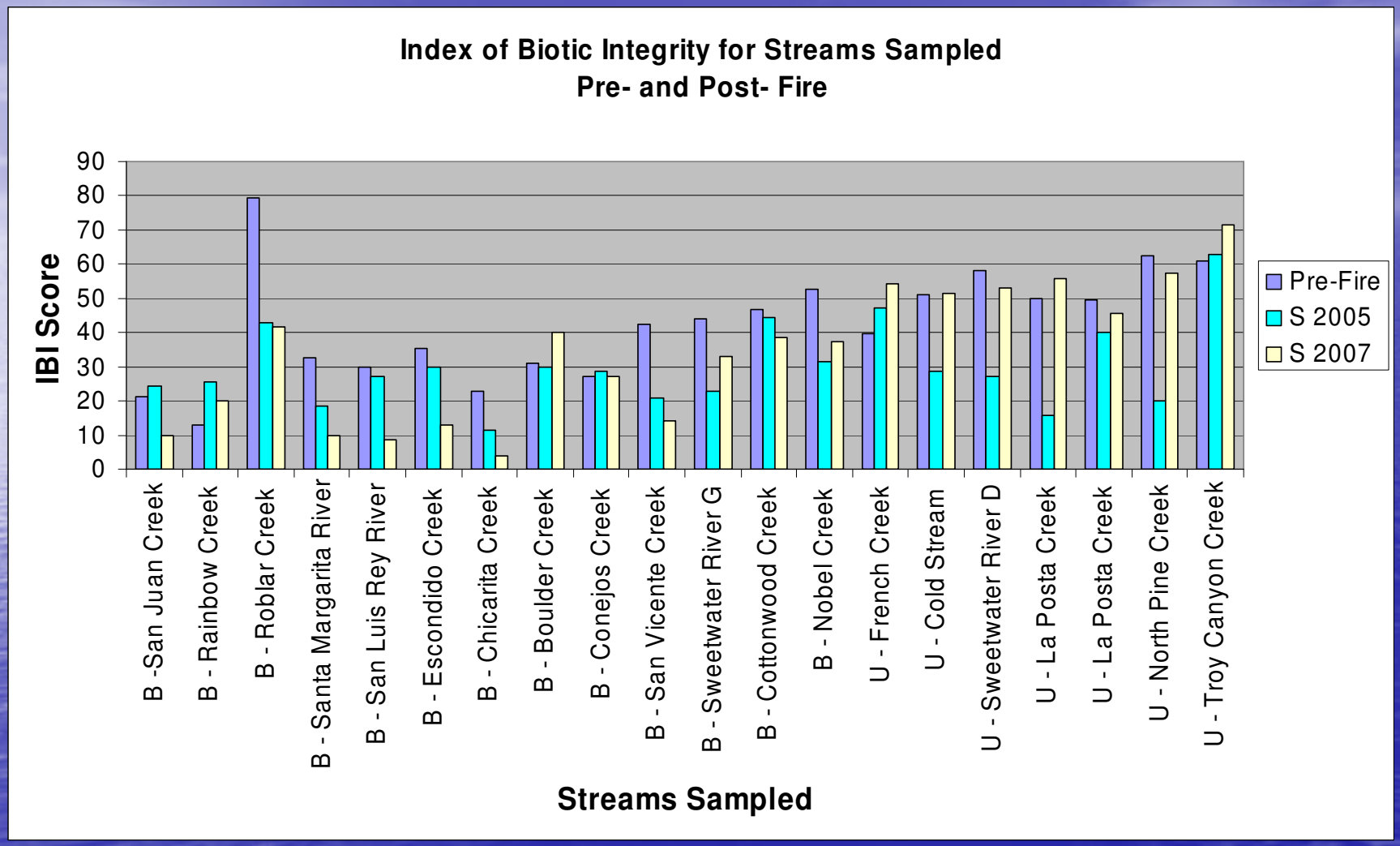
Post-Fire Study Streams Sampled

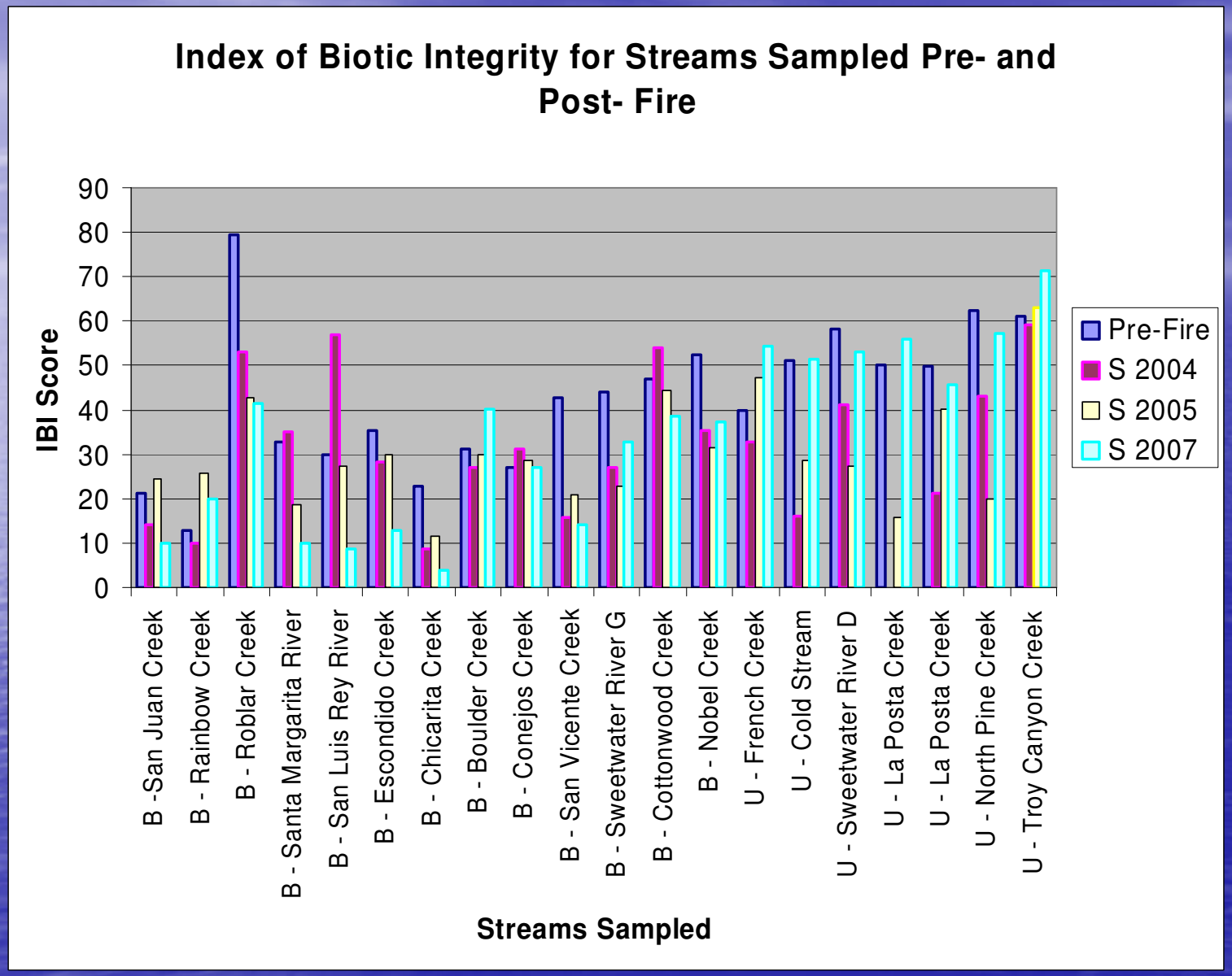
Watershed	Stream	Watershed	Stream
901	B -San Juan Creek	909	B - Sweetwater River G
902	B - Rainbow Creek	911	B - Cottonwood Creek
902	B - Roblar Creek	911	B - Nobel Creek
902	B - Santa Margarita River	903	U - French Creek
903	B - San Luis Rey River	909	U - Cold Stream
904	B - Escondido Creek	909	U - Sweetwater River D
906	B - Chicarita Creek	911	U - La Posta Creek
907	B - Boulder Creek	911	U - La Posta Creek
907	B - Conejos Creek	911	U - North Pine Creek
907	B - San Vicente Creek	911	U - Troy Canyon Creek

Index of Biotic Integrity Scores for Pre-Fire and 2004 Data




Index of Biotic Integrity for Streams Sampled
Pre- and Post- Fire
IBI Score
90
80
70
60
50
40
30
20
10
0
B -San Juan Creek
B - Rainbow Creek
B - Roblar Creek
B - Santa Margarita River
B - San Luis Rey River
B - Escondido Creek
B - Chicarita Creek
B - Boulder Creek
B - Conejos Creek
B - San Vicente Creek
B - Sweetwater River G
B - Cottonwood Creek
B - Nobel Creek
U - French Creek
U - Cold Stream
U - Sweetwater River D
U - La Posta Creek
U - North Pine Creek
U - Troy Canyon Creek
Streams Sampled
Pre-Fire
S 2004


Index of Biotic Integrity for Streams Sampled
Pre- and Post- Fire
IBI Score
90
80
70
60
50
40
30
20
10
0
B -San Juan Creek
B - Rainbow Creek
B - Roblar Creek
B - Santa Margarita River
B - San Luis Rey River
B - Escondido Creek
B - Chicarita Creek
B - Boulder Creek
B - Conejos Creek
B - San Vicente Creek
B - Sweetwater River G
B - Cottonwood Creek
B - Nobel Creek
U - French Creek
U - Cold Stream
U - Sweetwater River D
U - La Posta Creek
U - La Posta Creek
U - North Pine Creek
U - Troy Canyon Creek
Streams Sampled
Pre-Fire
S 2005
S 2007


Index of Biotic Integrity for Streams Sampled Pre- and Post- Fire
IBI Score
90
80
70
60
50
40
30
20
10
0
B -San Juan Creek
B - Rainbow Creek
B - Roblar Creek
B - Santa Margarita River
B - San Luis Rey River
B - Escondido Creek
B - Chicarita Creek
B - Boulder Creek
B - Conejos Creek
B - San Vicente Creek
B - Sweetwater River G
B - Cottonwood Creek
B - Nobel Creek
U - French Creek
U - Cold Stream
U - Sweetwater River D
U - La Posta Creek
U - La Posta Creek
U - North Pine Creek
U - Troy Canyon Creek
Streams Sampled
Pre-Fire
S 2004
S 2005
S 2007