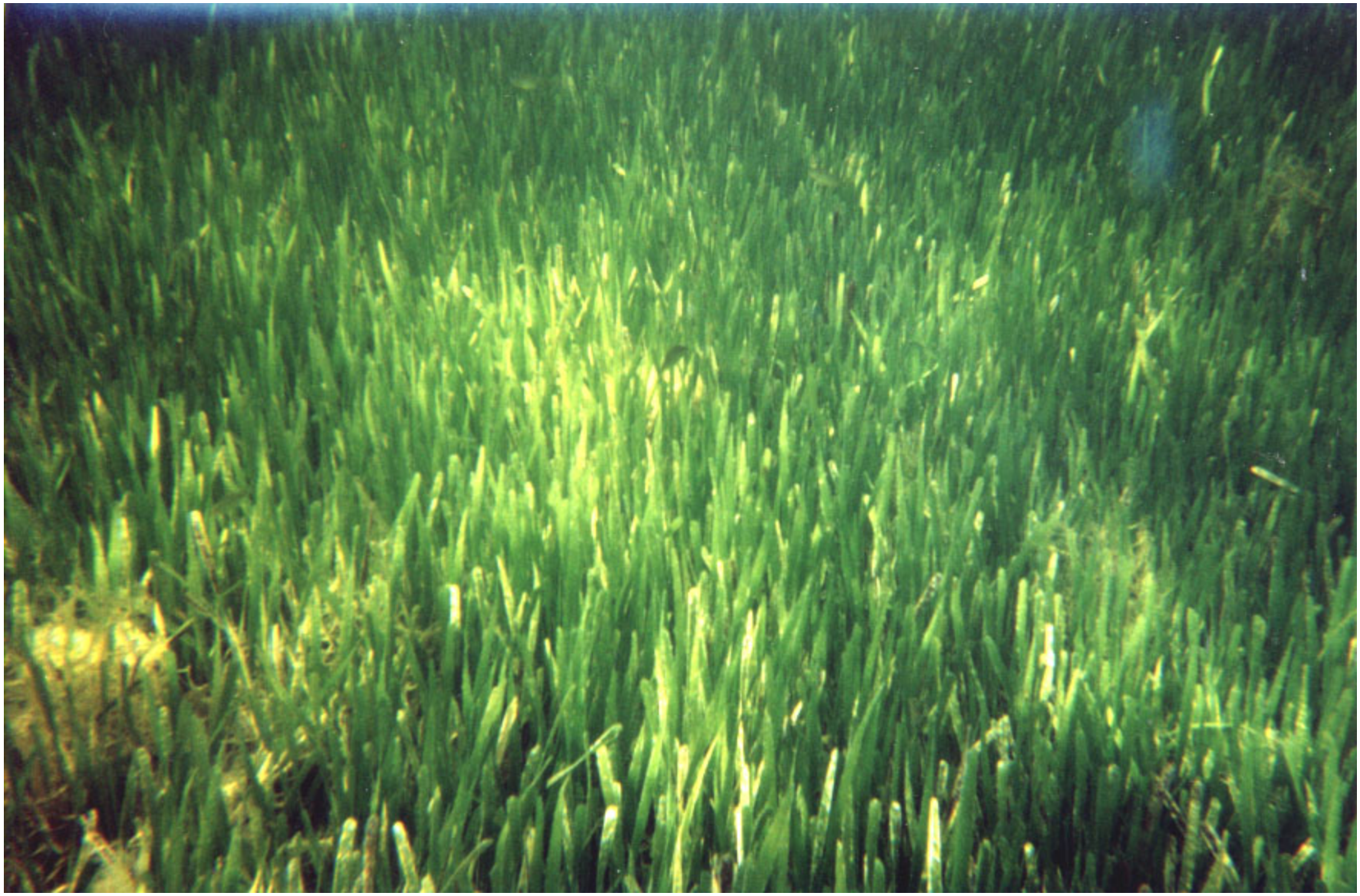
Pollution Issues in the Lower Laguna Madre Related to the Arroyo Colorado

Thomas Whelan III
Associate Professor
Chemistry Department
UTPA

We Love Seagrass and want to keep them healthy.



Topics

1. Present some of our arsenic data in Arroyo/LLM and local drainage canals.
2. Discuss some reasons for additional study in the Arroyo/LLM.
3. Suggest what should be done.

Effect on Seagrasses

- Chemical problems at the mouth of the Arroyo deal with different issues than up stream. Fresh water meets seawater-a collision of ions.

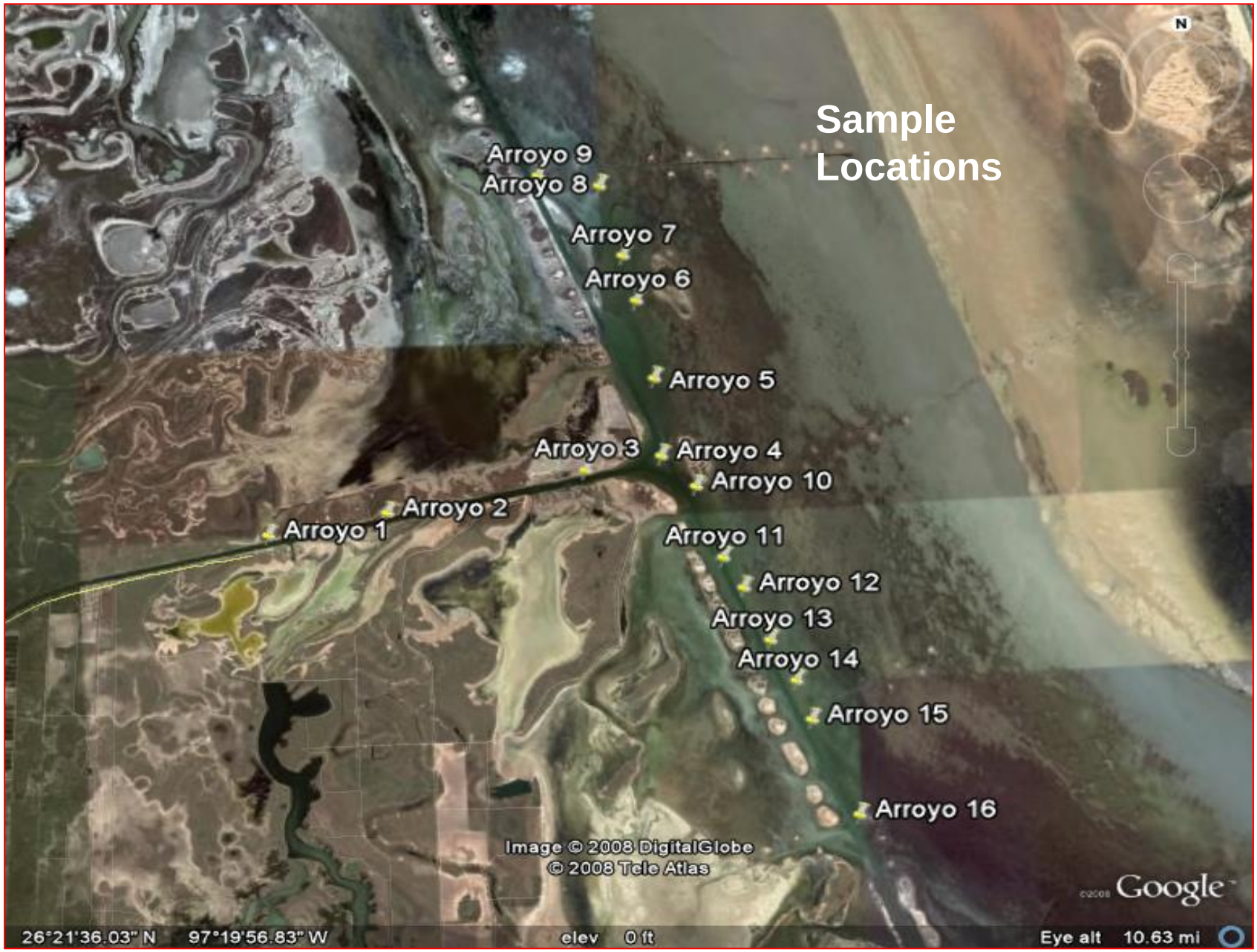
- Key biological problem=how do the toxic components (and eutrophication) effect seagrasses.

Arsenic in Arroyo/LLM

Possible indicator of extent of inorganic contamination

If arsenic is present, other pollutants are likely present

Toxic levels may not be present in water but could be accumulated in seagrass resulting in death


Sample Locations
Arroyo 9
Arroyo 8
Arroyo 7
Arroyo 6
Arroyo 5
Arroyo 3
Arroyo 4
Arroyo 10
Arroyo 2
Arroyo 1
Arroyo 11
Arroyo 12
Arroyo 13
Arroyo 14
Arroyo 15
Arroyo 16
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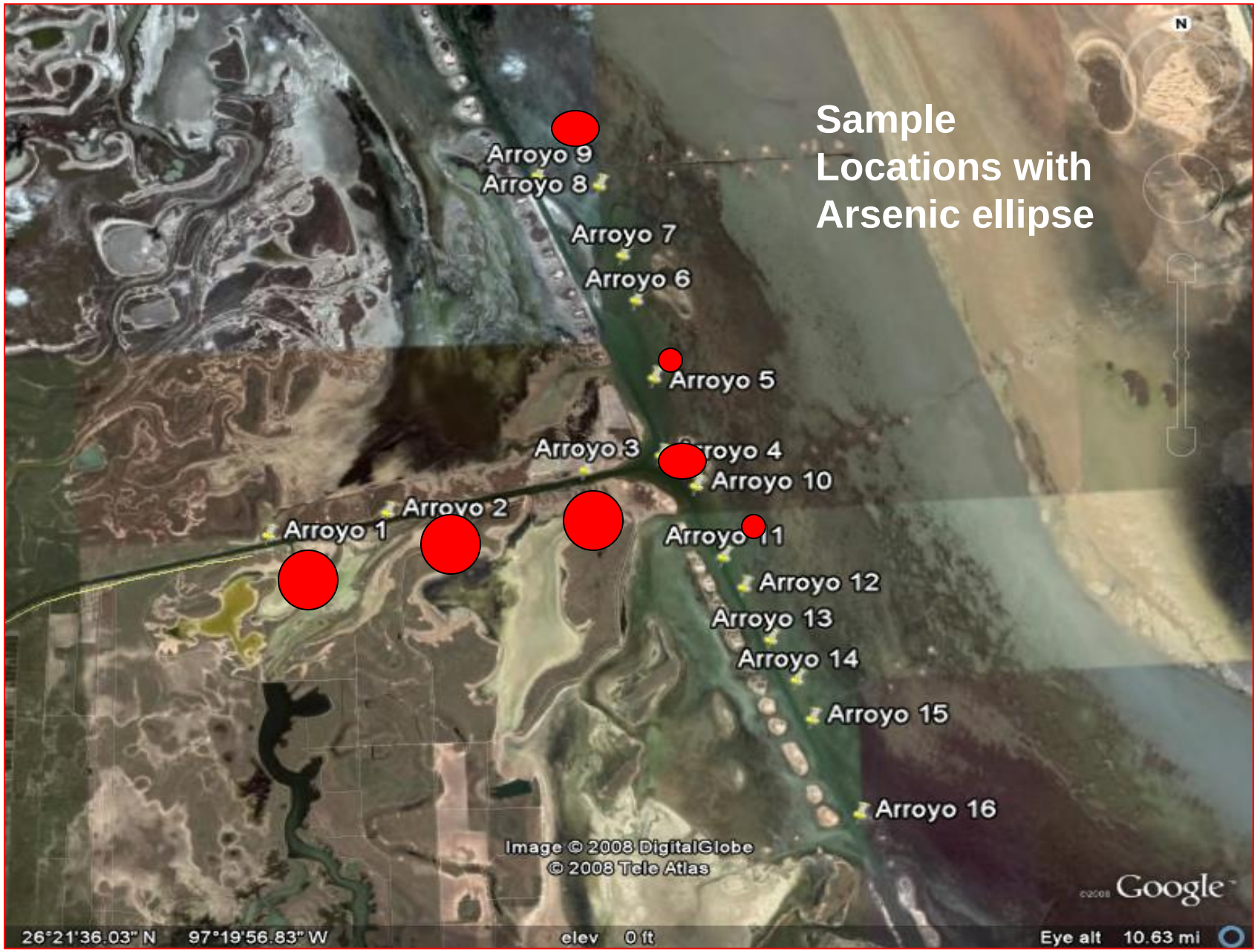
Google
26°21'36.03" N 97°19'56.83" W
elev 0 ft
Eye alt 10.63 mi
N

Sample ID	Latitude/ Longitude	As µg/L	Cr µg/L	Cu µg/L	Pb µg/L
Arroyo 1	26° 21 00 N 97° 23 27 W	7.45	<1.25	1.24	<1.25
Arroyo 2	26° 21 14 N 97° 22 16 W	8.26	<1.25	2.02	<1.25
Arroyo 3	26° 21 35 N 97° 20 23 W	7.19	<1.25	2.47	<1.25
Arroyo 4	26° 21 42 N 97° 19 41 W	2.59	<1.25	1.29	<1.25
Arroyo 5	26° 22 24 N 97° 19 42 W	2.86	<1.25	0.79	<1.25
Arroyo 6	26° 23 07 N 97° 19 51 W	1.59	<1.25	0.74	<1.25
Arroyo 7	26° 23 40 N 97° 19 58 W	1.68	<1.25	0.92	<1.25
Arroyo 8	26° 24 22 N 97° 20 10 W	0.93	<1.25	1.31	<1.25
Arroyo 9	26° 24 29 N 97° 20 45 W	7.85	<1.25	0.82	<1.25
Arroyo 10	26° 21 24 N 97° 19 21 W	3.44	<1.25	1.50	<1.25
Arroyo 11	26° 20 42 N 97° 19 07 W	2.28	<1.25	1.58	<1.25
Arroyo 12	26° 20 24 N 97° 18 56 W	1.67	<1.25	0.55	<1.25
Arroyo 13	26° 19 53 N 97° 18 42 W	1.42	<1.25	0.83	<1.25
Arroyo 14	26° 19 29 N 97° 18 42 W	1.64	<1.25	0.78	<1.25
Arroyo 15	26° 19 06 N 97° 18 20 W	1.72	<1.25	1.11	<1.25
Arroyo 16	26° 18 10 N 97° 17 55 W	1.42	<1.25	1.12	<1.25

Some Sources of Arsenic

- Irrigation/Drainage Canal (units ug/L)

	Copper	Arsenic	Lead
Mercedes	<0.1	3.8	na
Roma	<0.1	14.3	13.8
Edinburg	<0.1	23.5	4.1
Birding Center	<0.1	2.2	<0.1
Mission	0.12	3.0	0.4


Sample
Locations with
Arsenic ellipse
Arroyo 9
Arroyo 8
Arroyo 7
Arroyo 6
Arroyo 5
Arroyo 3
Arroyo 4
Arroyo 10
Arroyo 2
Arroyo 1
Arroyo 11
Arroyo 12
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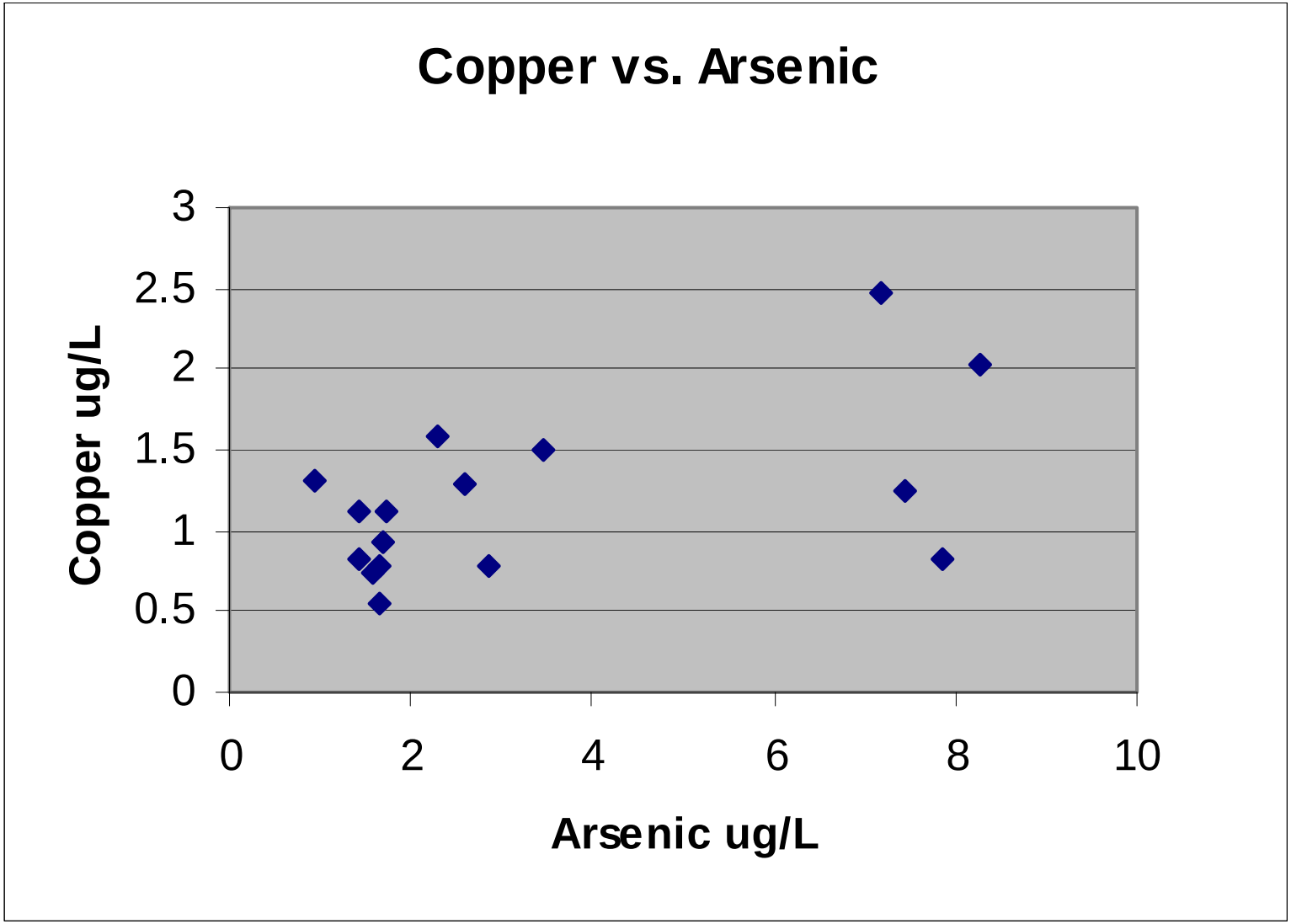
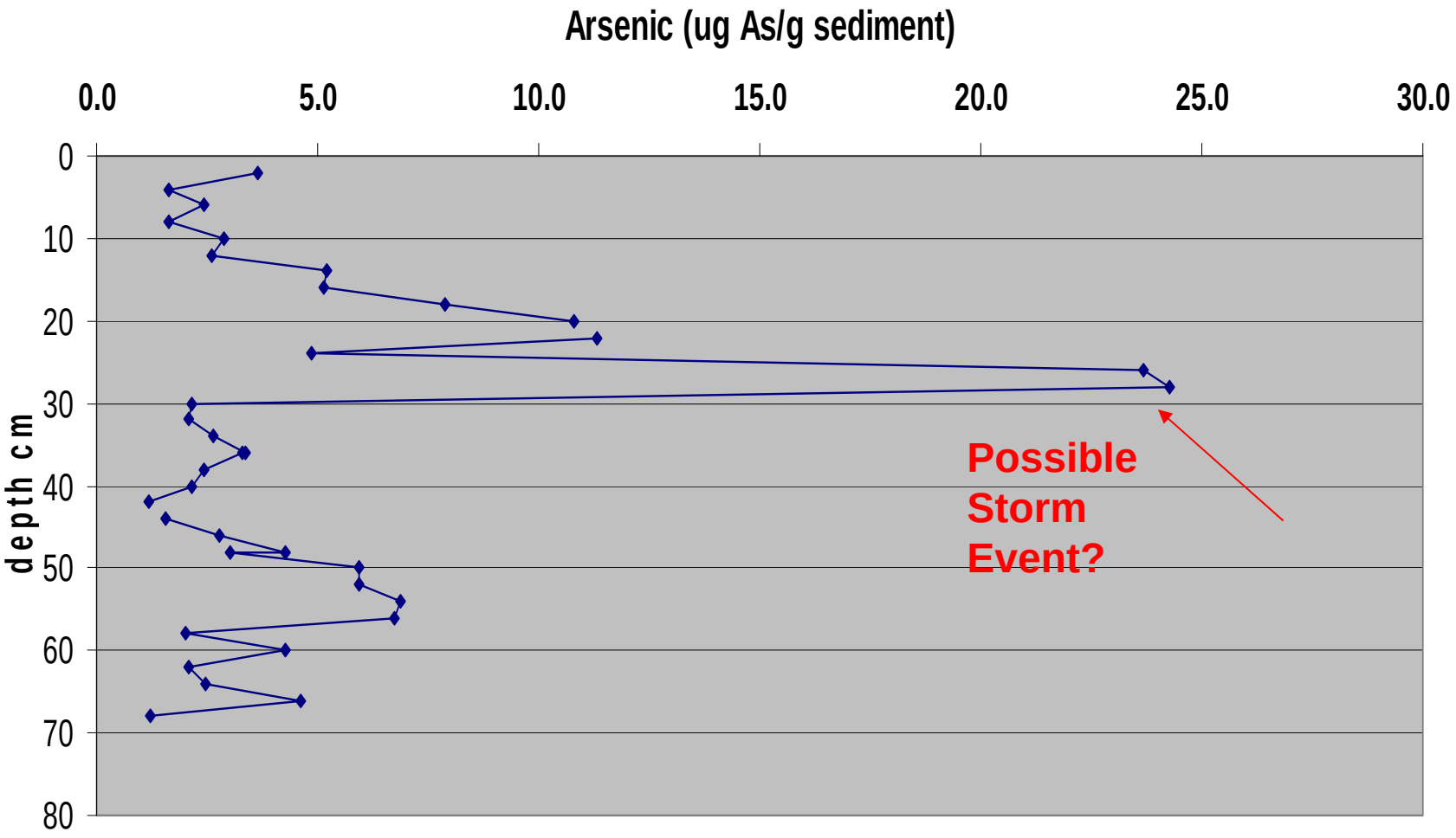

Copper vs. Arsenic
Copper ug/L
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
10
Arsenic ug/L

Arsenic Sediment Profile
Green Island Area



Metals in Uncontaminated Seagrass

Leaf	SUMMER	WINTER	Percent Change
Cu	12.1 ± 3.1	7.1 ± 0.5	-41
Zn	24.1 ± 5.7	24.6 ± 5.7	2
Mn	256 ± 96	95 ± 69	-63
Fe	287 ± 77	169 ± 49	-42
As	1.04 ± .2	1.97 ± 0.3	89
Pb	0.81 ± 0.1	1.29 ± 0.4	59
Roots/Rhizomes			
Cu	7.96 ± 3.8	4.90 ± 0.3	-38
Zn	25.4 ± 4.3	23.4 ± 5.3	-8
Mn	45.0 ± 17	21.0 ± 16	-53
Fe	418 ± 84	113 ± 38	-73
As	1.47 ± 0.7	1.21 ± 0.9	-18
Pb	0.75 ± 0.0	1.20 ± 0.7	60

Why do any more studies?

Detection of specific chemical compounds suggests a specific upstream source.

For example, benzene suggests gasoline leak.

Inorganic Contaminants
Point Source??

- Arsenic — probably not
- Mercury — possible
- Tin (tetrabutyl) — Yes
- Cadmium — Yes
- Lead — probably not
- Copper — possible
- Iron — basis for comparison

Organic Constituents Point Source??

Volatile Components

Benzene	possibly
Dichloroethene	yes
Carbon Tetrachloride	yes

Semi-volatile components

Chlorinated Pesticides	probably not
PCBs	possible
Naphthalene	possible
Benzenopyrene	yes

Why do any more studies?

How is the Arroyo affecting the seagrasses?

Why do any more studies?

By knowing the extent of contaminants in the LLM we can **monitor changes** over time to see if we are doing some good up stream in the Arroyo.

What we should do

Analyze water , sediments, seagrasses and fish (quarterly) at 25 locations in the lower Arroyo and LLM/Green Island area for 3 years.

For: volatile organic compounds

semi-volatile organic compounds

trace metals

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