Guadalupe
Small Tributaries Loads

Progress Report to the CEP Technical Committee
August 2003

Lester McKee and Jon Leatherbarrow
SFEI

Collaborators
MLML, AXYS, AMS, Texas, USGS, and RSL

Timeline

Start:	Fall 2002
End:	Fall 2006 (Pending funding)
Sampling:	Winter (Nov-Apr) each year
Lab Analysis:	Spring (Due July 1st) each year
Reporting:	Summer (Due Oct 1st) each year

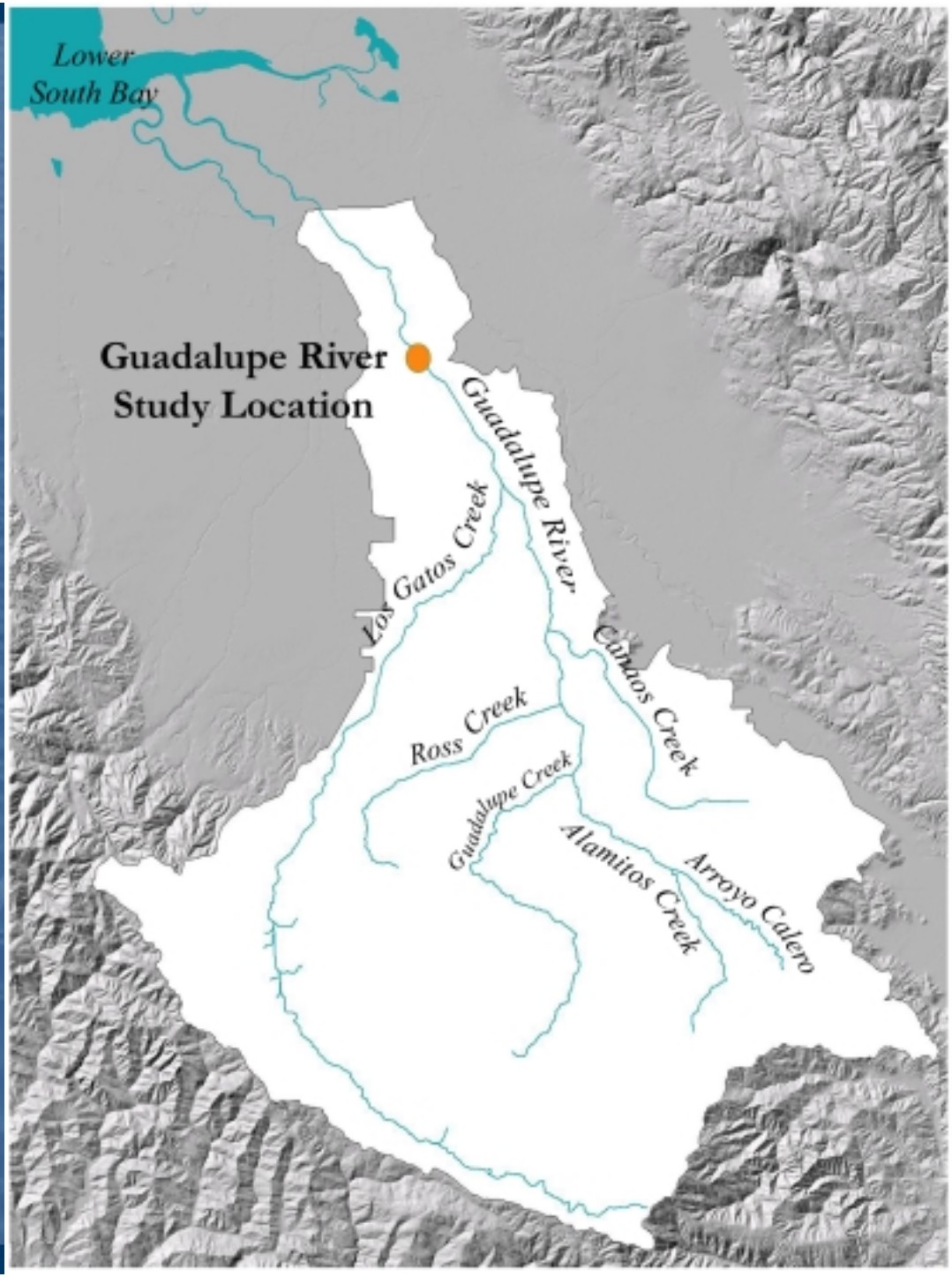
Geographic Location

Watershed facts

Area: 556 km^2 (200 mi^2)
4th largest in Bay Area
5th largest Q

Subwatersheds: 5

Highest Point: Loma Prieta (1,155 m [3,790 ft])



Sampling Location

Sampling Outline

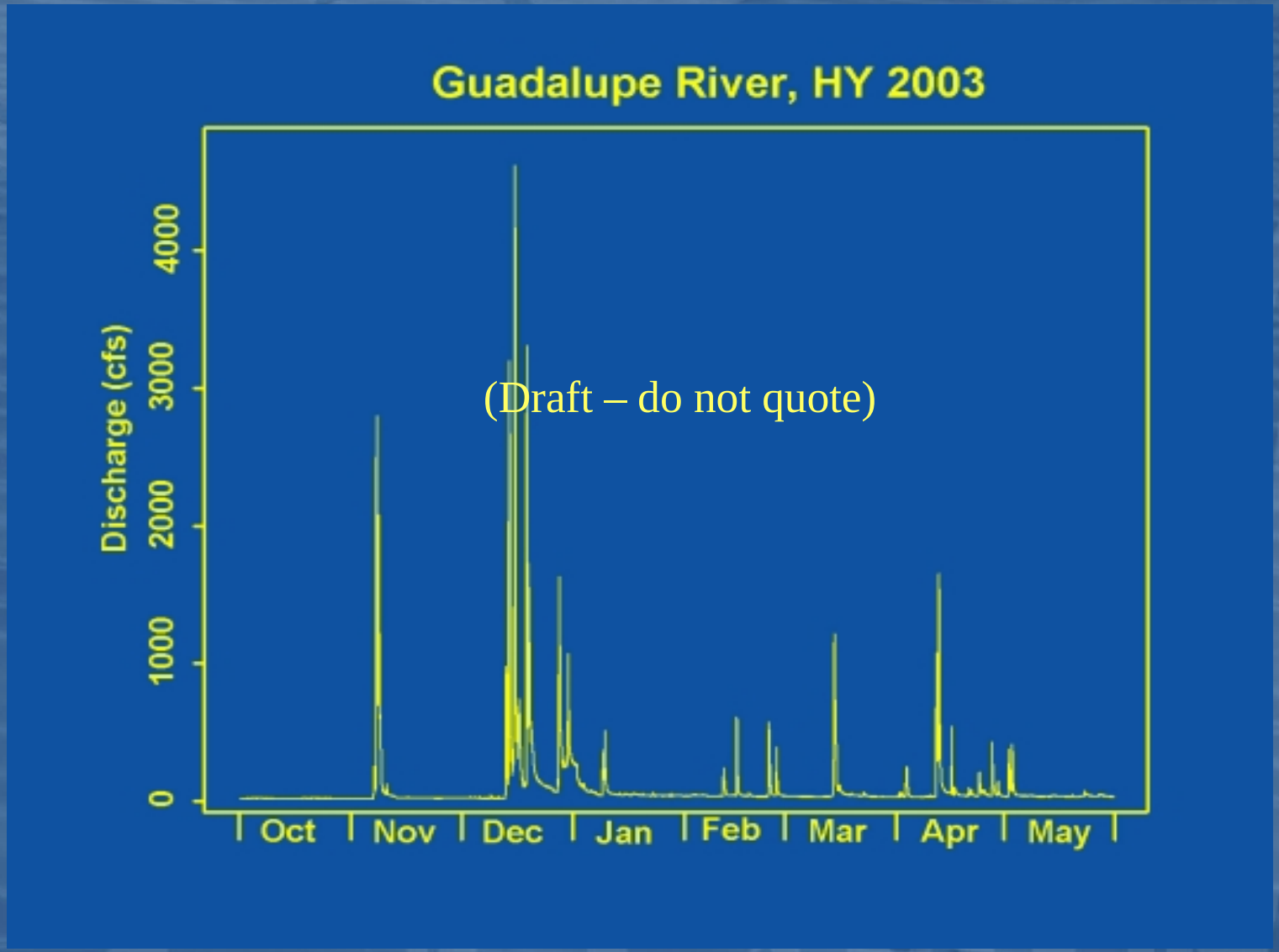
- USGS daily suspended sediment loads (Larry Freeman)
- Real time turbidity probe set at 15 minute intervals (Rand Eads)
- Water sampling for trace contaminants and cognates (Hg, TM, PCBs, OCs, SSC, DOC & POC) (SFEI)
- Laboratory analysis

a) Hg, TM, SSC: Mark Stevenson - Moss Landing
b) PCBs, OCs: Laurie Phillips - AXYS Labs Inc.
c) POC, DOC: Kenneth Davis – Applied Marine Sciences, Texas

Water Year 2003

- 103% of mean annual precipitation (MAP)
- 97% of mean annual runoff (MAR)
- Peak flow return interval 1:6 years

Hydrograph



(Draft – do not quote)

USGS 2003 Water Year Sample Summary

- Number of USGS technician cross-section samples = 12
- Number of USGS technician single vertical samples = 26
- Number of single vertical Observer samples = 200
- TOTAL number of samples = 238

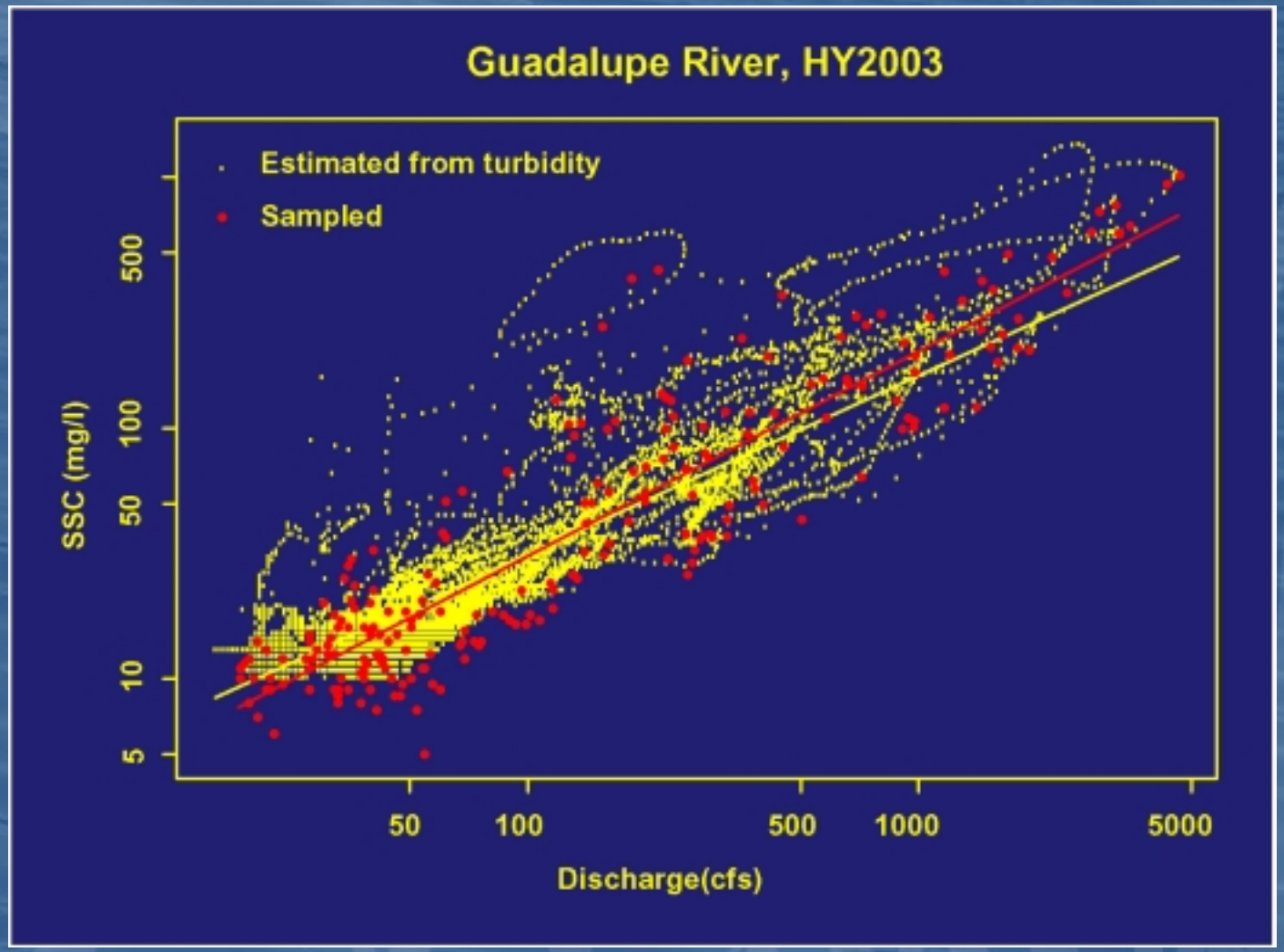
Calculation Methods

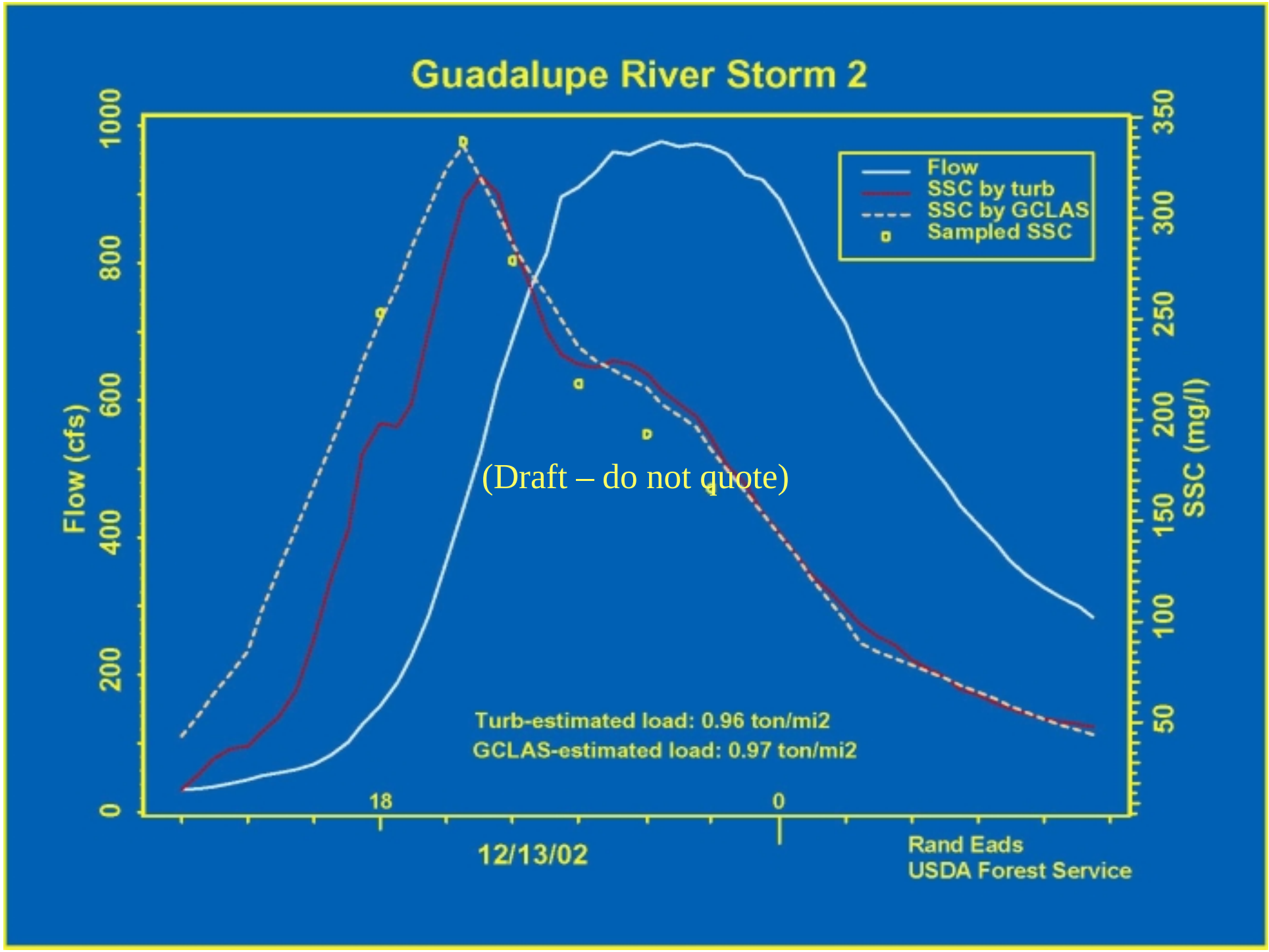
- USGS software: Graphical Constituent Load Analysis System (GCLAS).
- Interpolates concentration values between samples at 15 minute intervals.
- Corrects single vertical values to cross-sectional values.
- Estimated concentration points are added manually when sample coverage is insufficient to define storm.
- Calculates daily mean concentration and suspended sediment loads for any selected time period.

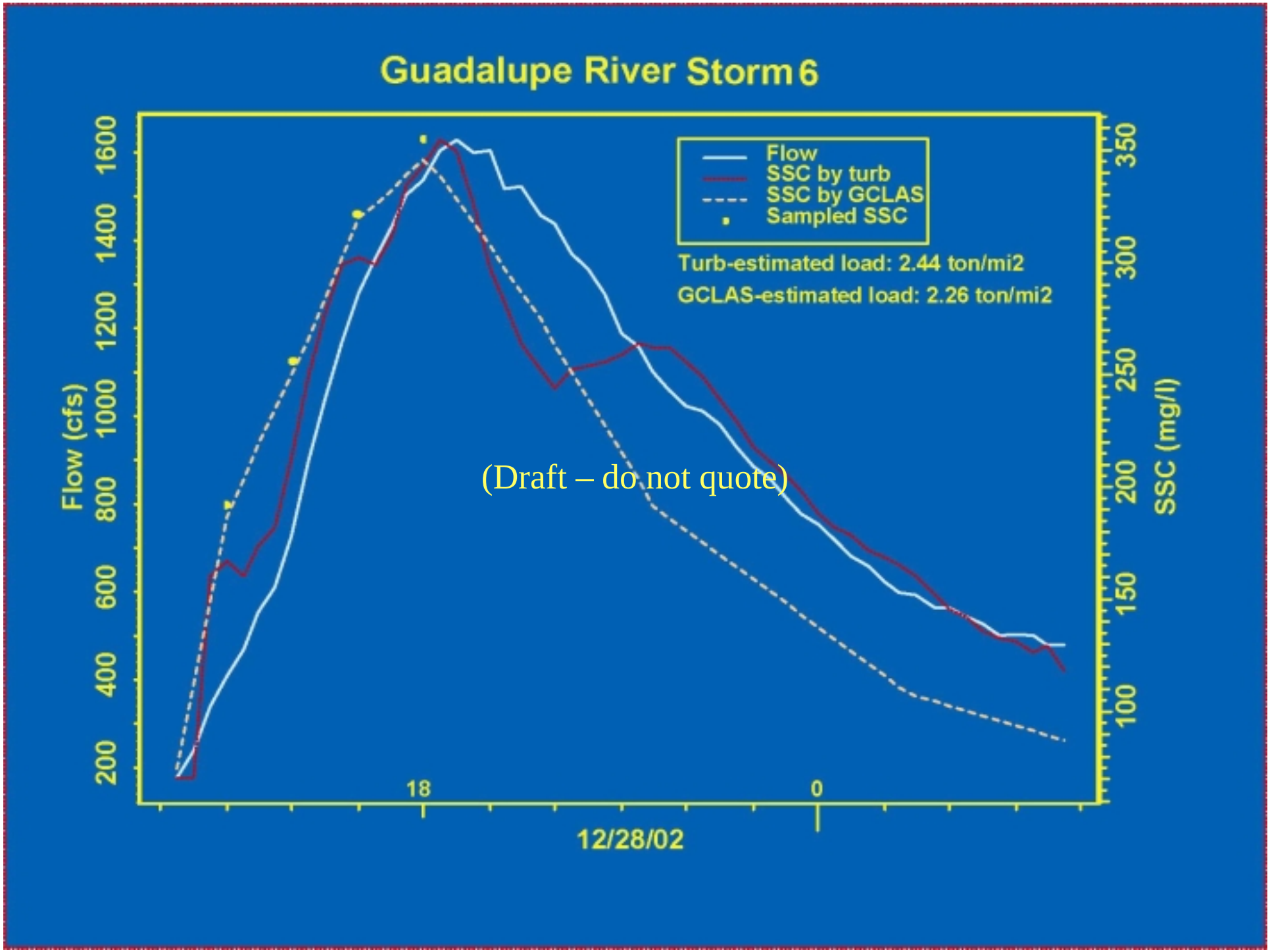
RSL 2003 Water Year Sample Summary

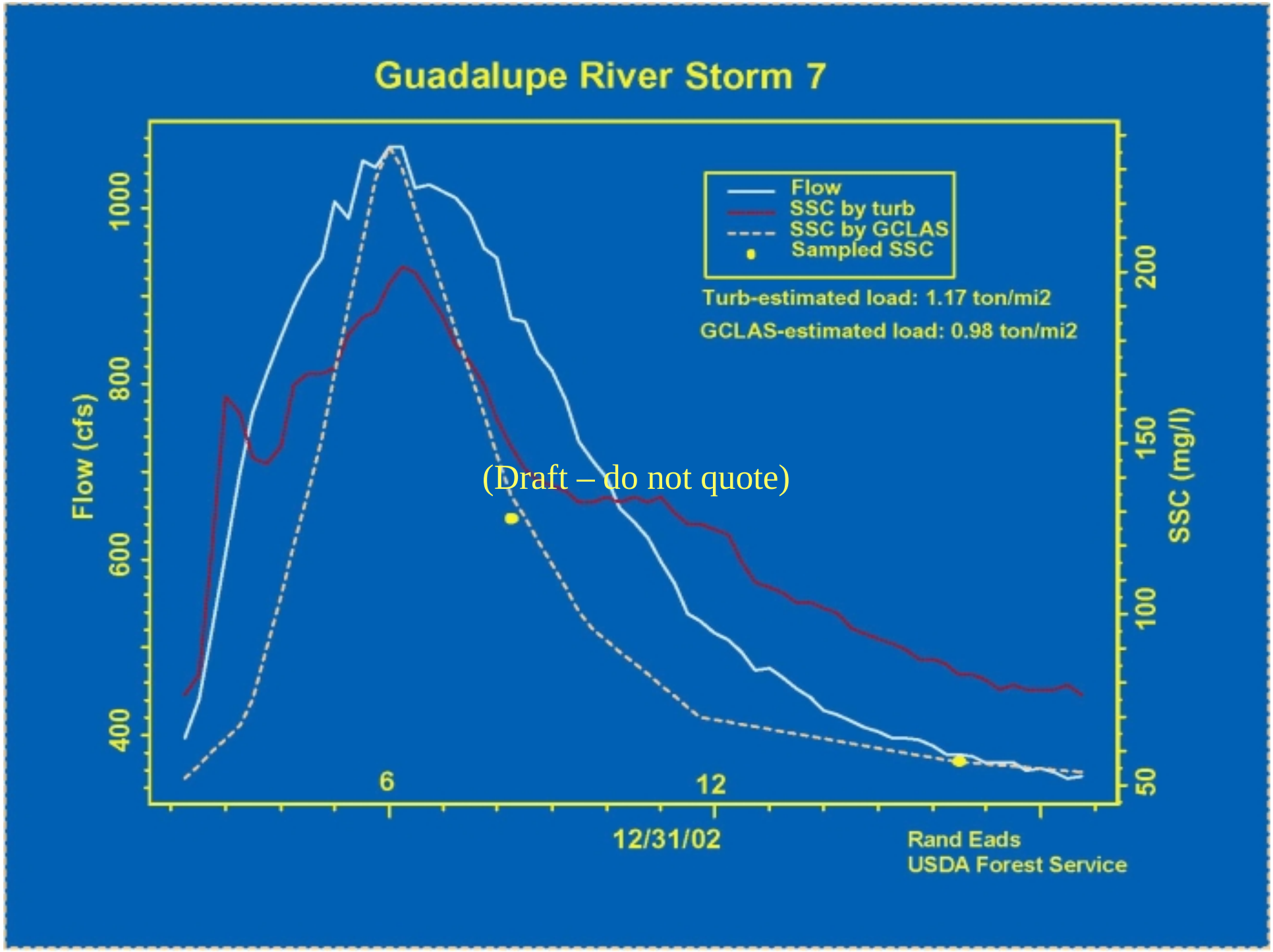
- DTS 12 Turbidity Sensor installed mid channel
- ~ 22,000 data points
- >99.5% data recovery
- Missing data occurred during low flow when algal growth obscured the optics

Discharge vs. SSC Hysteresis Loops (Draft – do not quote)




Guadalupe River Storm 2
Flow (cfs)
SSC (mg/l)
0
200
400
600
800
1000
50
100
150
200
250
300
350
Flow
SSC by turb
SSC by GCLAS
Sampled SSC
(Draft – do not quote)
Turb-estimated load: 0.96 ton/mi2
GCLAS-estimated load: 0.97 ton/mi2
18
0
12/13/02
Rand Eads
USDA Forest Service


Guadalupe River Storm 6
Flow
SSC by turb
SSC by GCLAS
Sampled SSC
Turb-estimated load: 2.44 ton/mi2
GCLAS-estimated load: 2.26 ton/mi2
(Draft – do not quote)
Flow (cfs)
200
400
600
800
1000
1200
1400
1600
SSC (mg/l)
100
150
200
250
300
350
18
0
12/28/02



(Draft – do not quote)

Comparison of Monthly Load Totals (Metric Tonnes)

- USGS (GCLAS)
  - Oct. 2002 (no record)
  - Nov. = 1,476
  - Dec. = 6,794
  - Jan. 2003 = 170
  - Feb. = 240
  - Mar. = 208
  - Apr. = 610
  - May = 203
  - **Total = 9,701**

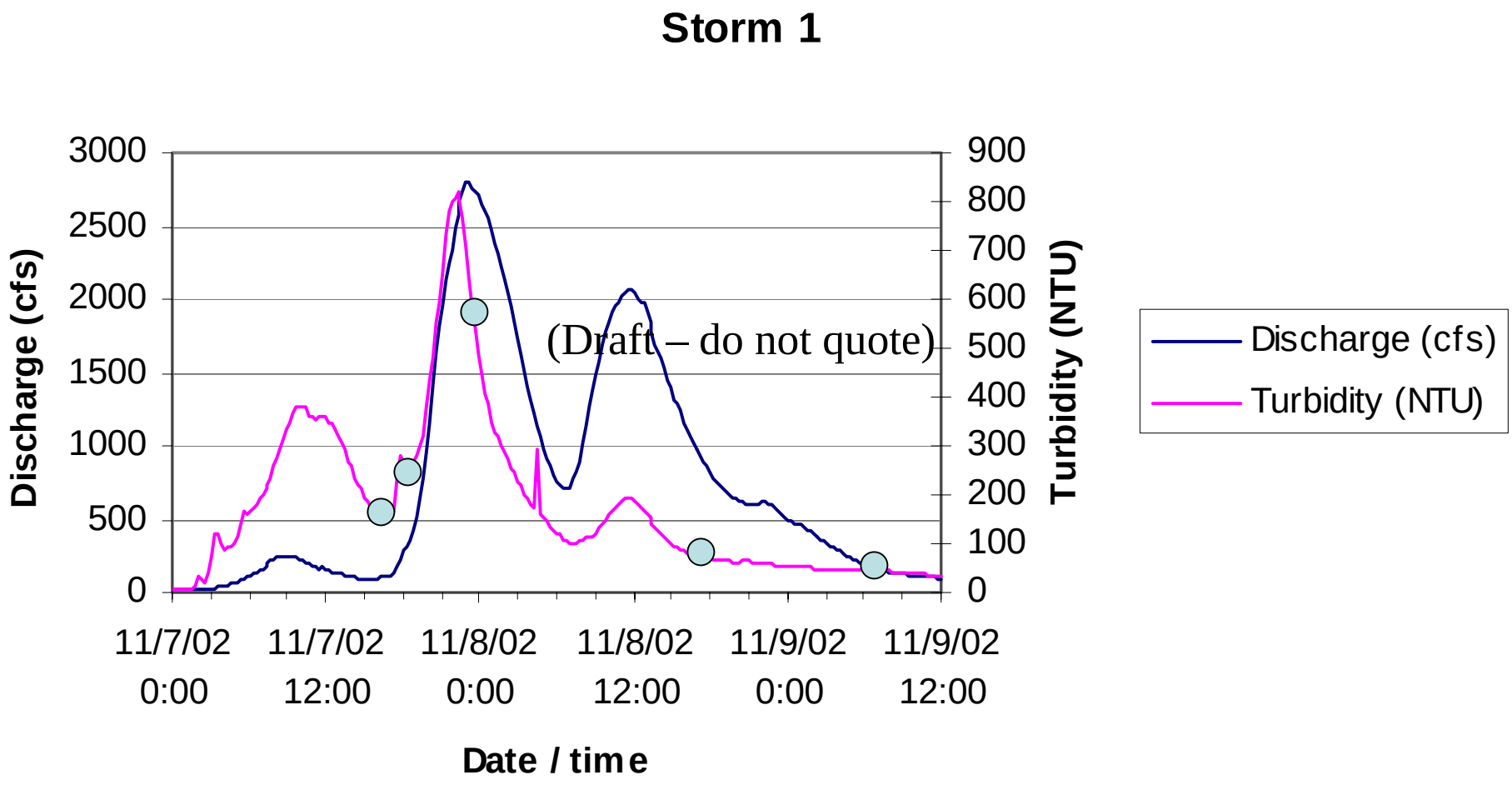
(Draft – do not quote)

- USFS (NTU Predicted)
  - Oct. 2002 = 19
  - Nov. = 2,085
  - Dec. = 7,027
  - Jan. 2003 = 165
  - Feb. = 184
  - Mar. = 268
  - Apr. = 487
  - May = 93
  - **Total = 10,328**

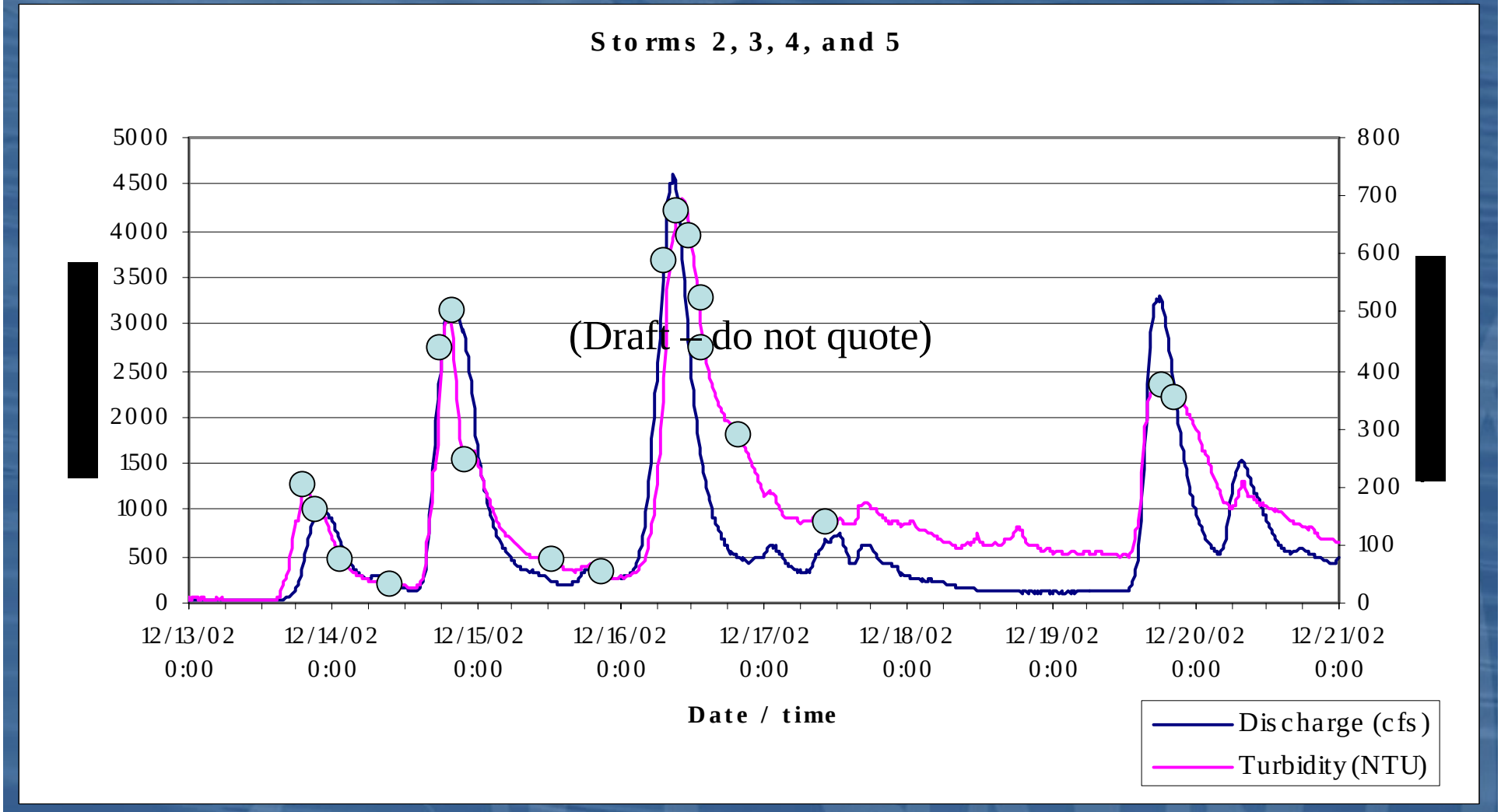
Contaminant Sampling Overview

Type	Nº of samples	Results in
PCBs, OC Pests	16	50%
Hg	26	90%
Other TMs	26	42%
Suspended sediment	26	90%
Dissolved Organic Carbon	20	80%
Particulate Organic Carbon	20	80%

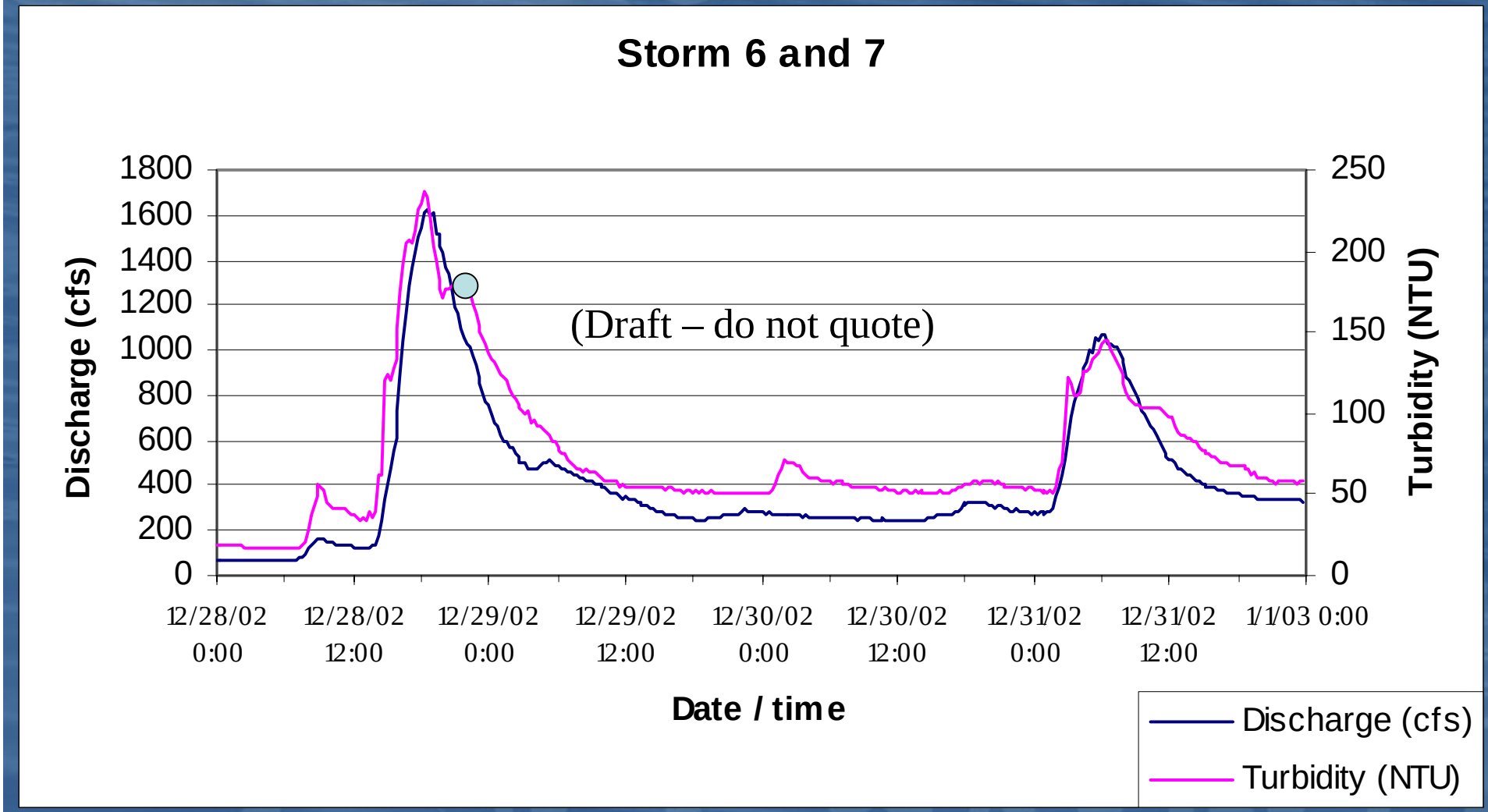
Sampling Relative to Discharge



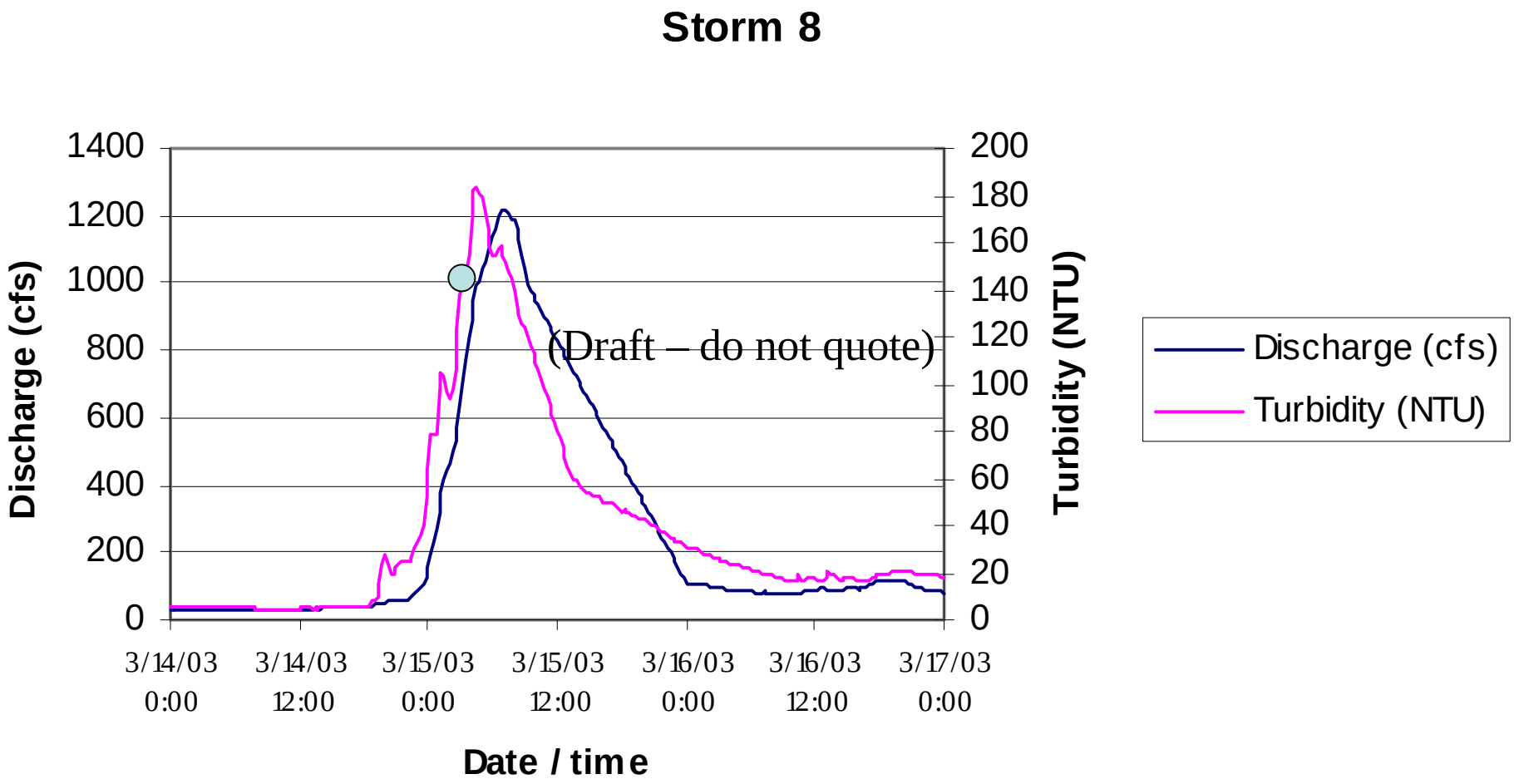
Sampling Relative to Discharge



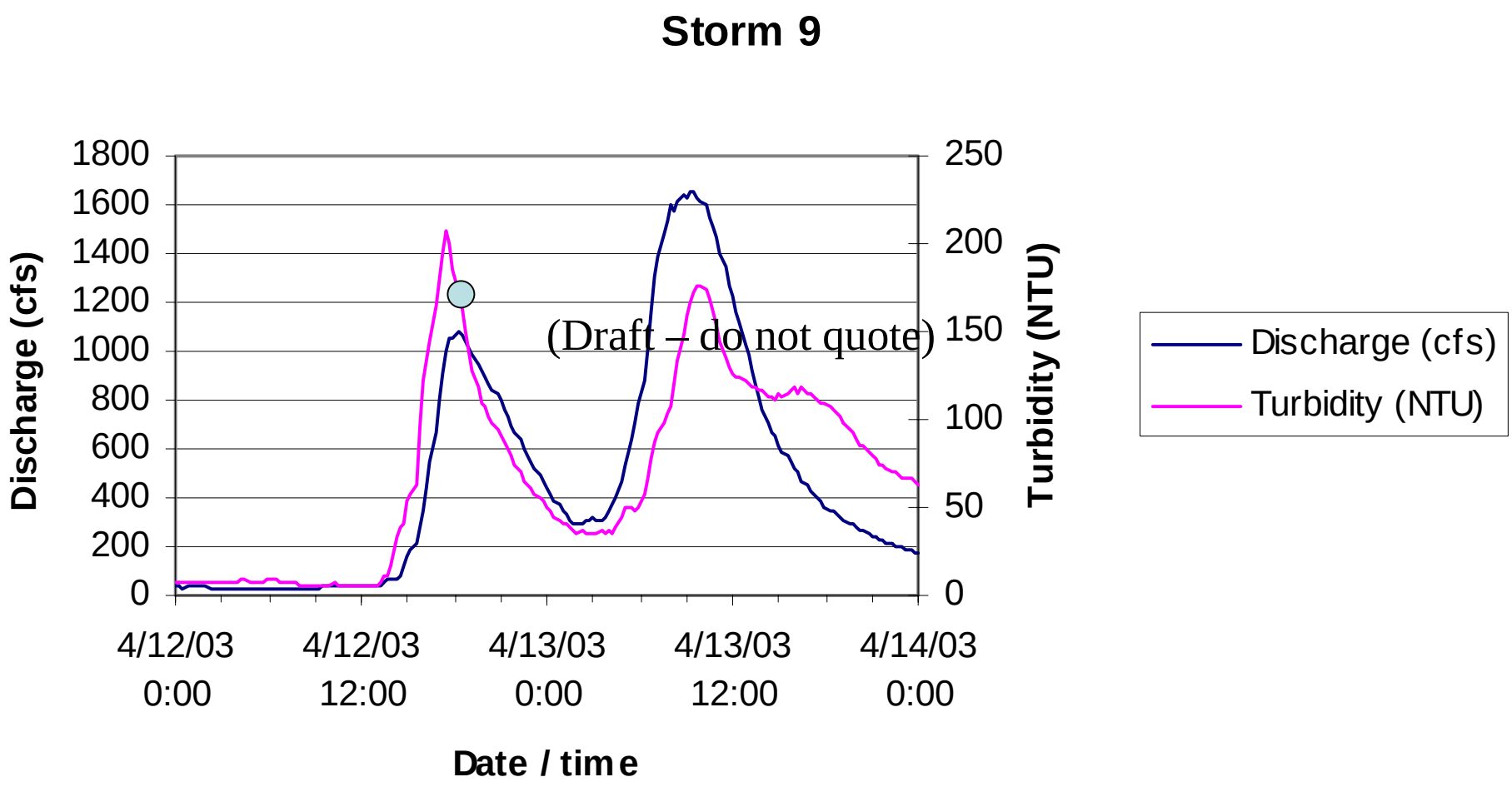
Sampling Relative to Discharge



Sampling Relative to Discharge



Sampling Relative to Discharge

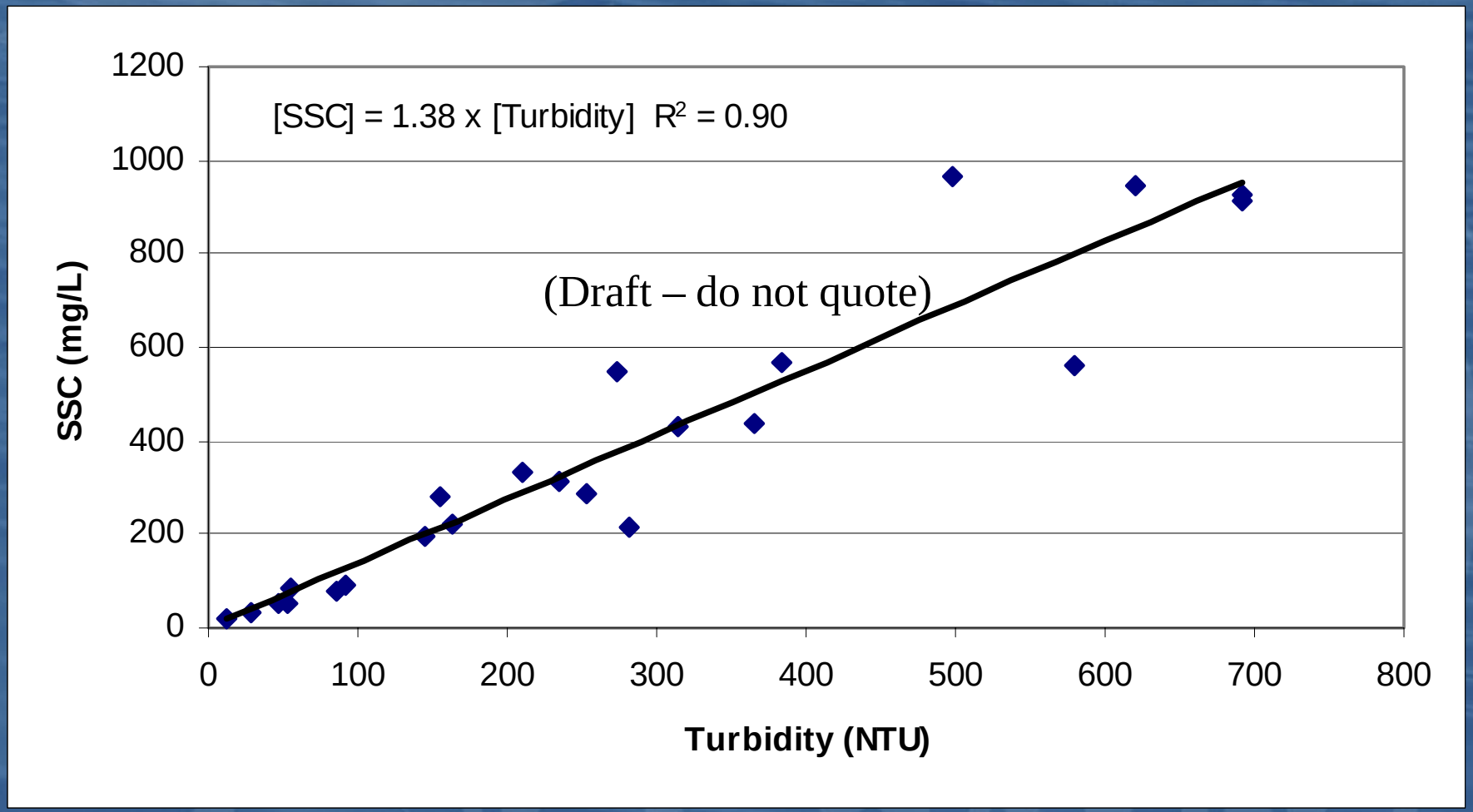


Monthly Concentrations

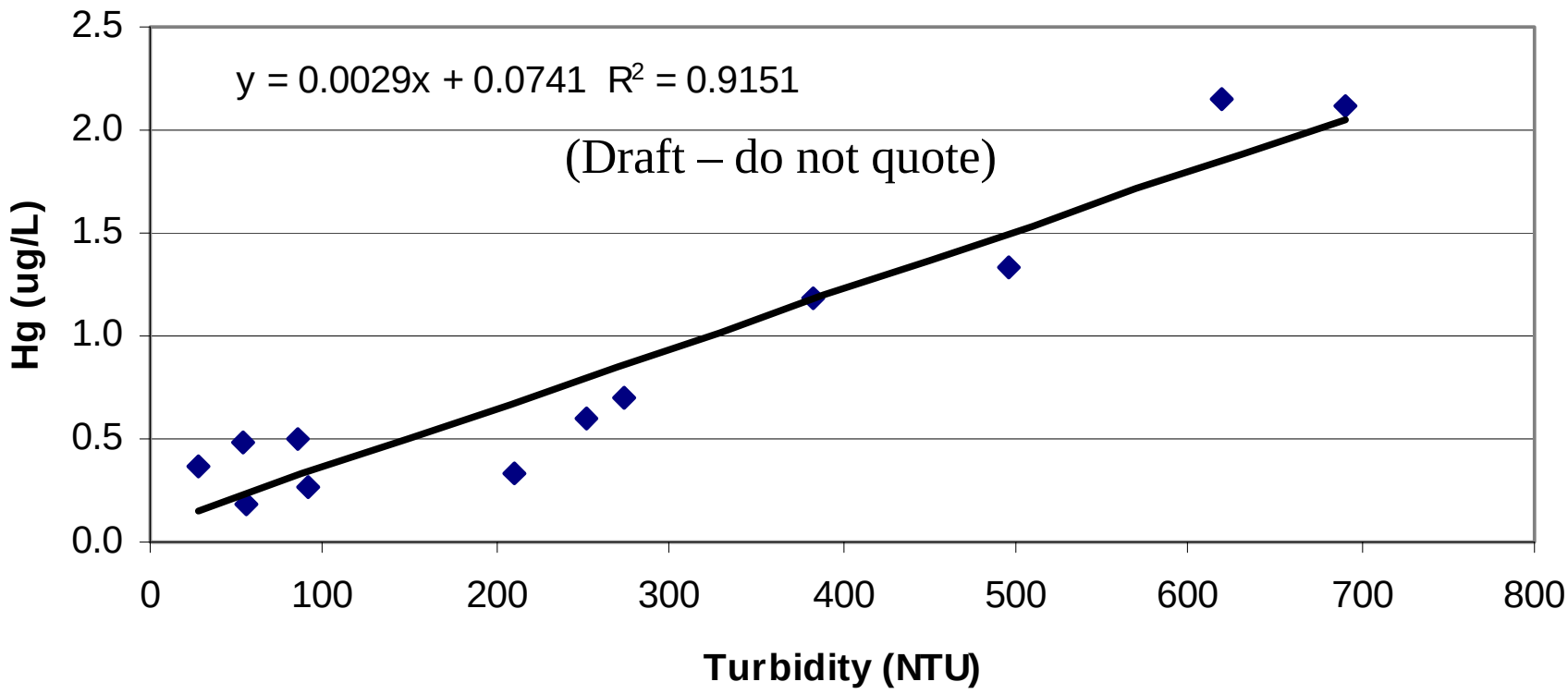
	SSC (mg/L)	Hg (µg/L)	Hg (µg/g)	Cu (µg/L)	Ni (µg/L)	Total PCBs (ng/L)
Nov	50	4.66	93.9	-	-	54.7
Dec	32-967	0.18-18.67	1.0-47.9	8-46	13-113	4.1-89.8
Mar	282	6.81	24.2	18	15	-
Apr	225	5.77	25.7	-	-	-
May	18	5.15	279.4	-	-	-

(Draft – do not quote)

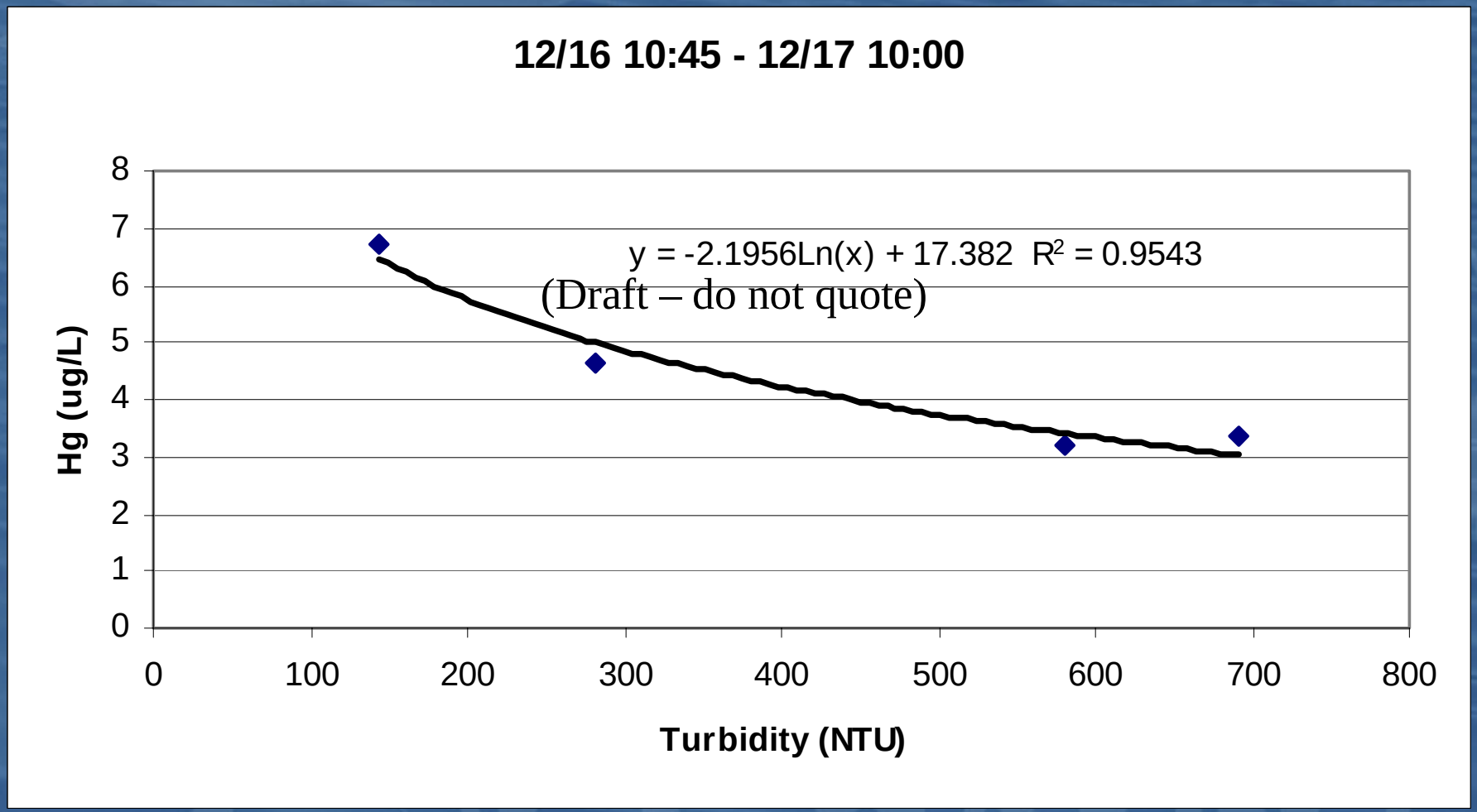
Correlative Relationships Turbidity - SSC



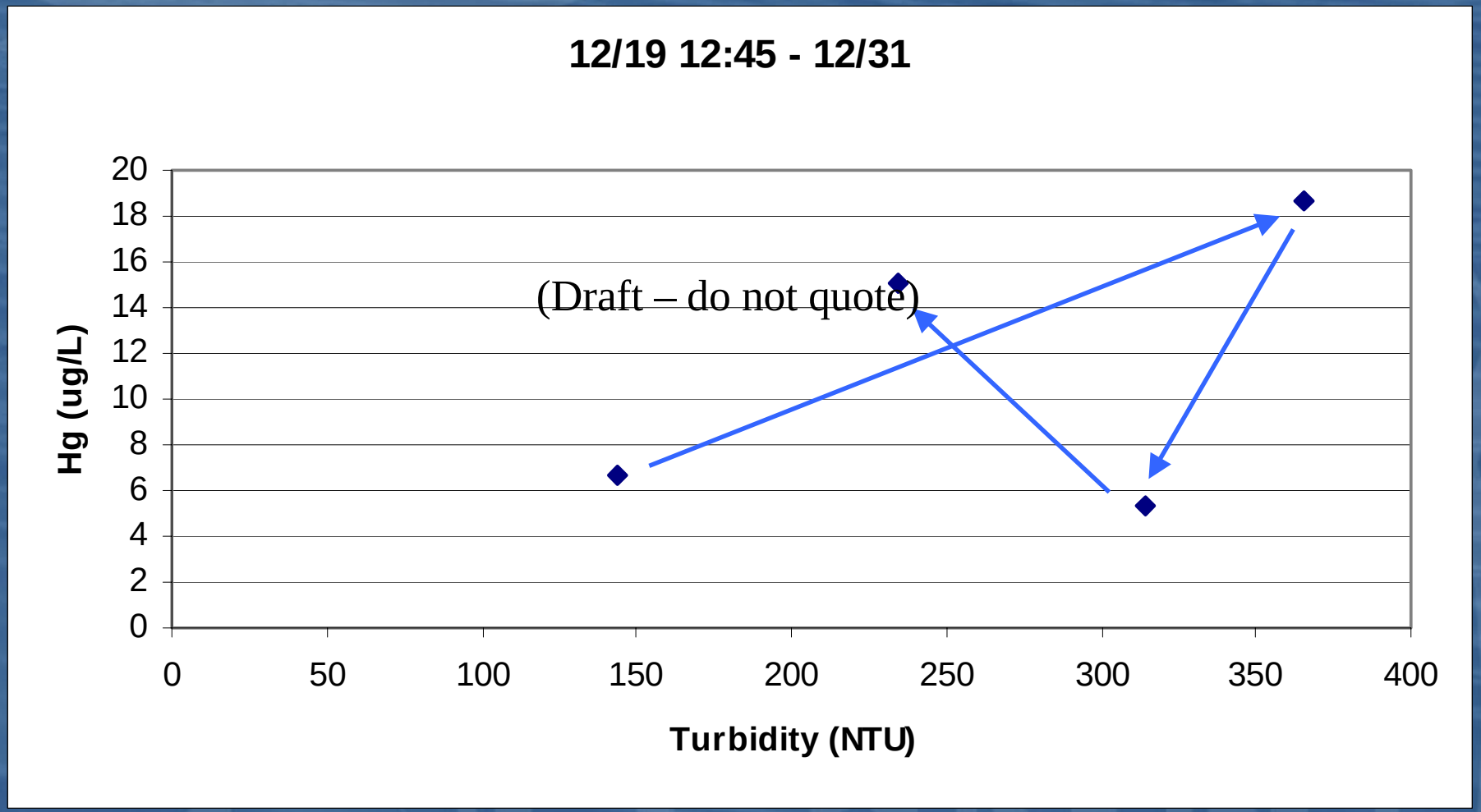
Correlative Relationships
Turbidity - Hg



Correlative Relationships
Turbidity - Hg



Correlative Relationships
Turbidity – Hg



December Flood Month

- ~44% of the WY 2003 discharge
- ~ 67% of the suspended sediment load
- ~1:6 year return event

Discharge (Guadalupe R. @ San Jose 11169000)

- Maximum daily = 1,770 cfs
- Maximum instantaneous = 6,160 cfs

Loads (Preliminary)

(Draft – do not quote)

<u>December</u>

- Hg ~95 kg
- PCBs ~1.4 kg

<u>Annual</u>

- Hg ~240 kg
- PCBs ~3.2 kg
- Cu ~1,800 kg
- Ni ~4,100 kg

Proposed WY 2004 Sampling Scheme

Add the following components for Hg

- Routine monthly for period with no floods (~3 samples)
- Sample 3 hours before expected flood event (~6 samples)
- Sample 1 week after flood event (~6 samples)

Total ~15 extra samples

Based on today's feed back, we will write up a Conceptual Scope of Work to include the modified sampling scheme and budget allocations

Summary

- 2003 sampling was very successful
- Wet season was prolonged by floods in April/May
- Not all lab results are in but AXYS estimates end of August

Request

- Draft due date be changed to Sep 30th
- Final report due date be changed to Oct 31st