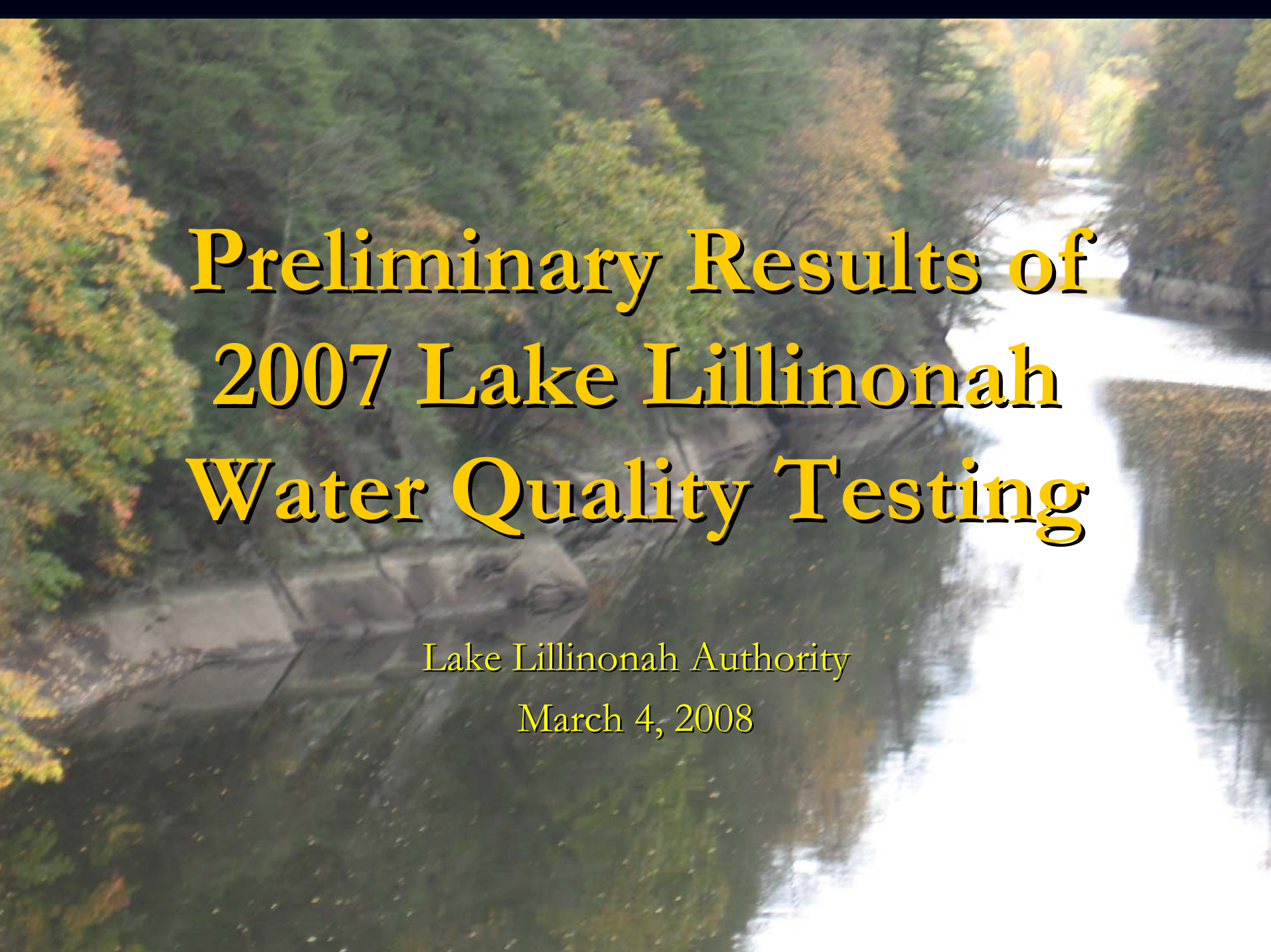


Preliminary Results of 2007 Lake Lillinonah Water Quality Testing

Lake Lillinonah Authority

March 4, 2008

Sampling Locations

<u>8 Lake Sampling Stations:</u>

St. 1 = Near the Dam = 100 feet

St. 2 = Just upstream of Rt. 133 Bridge = 60 feet

St. 3 = Near Barkwood Cove = 55 feet

St. 4 = Head of "S" Bend = 40 feet

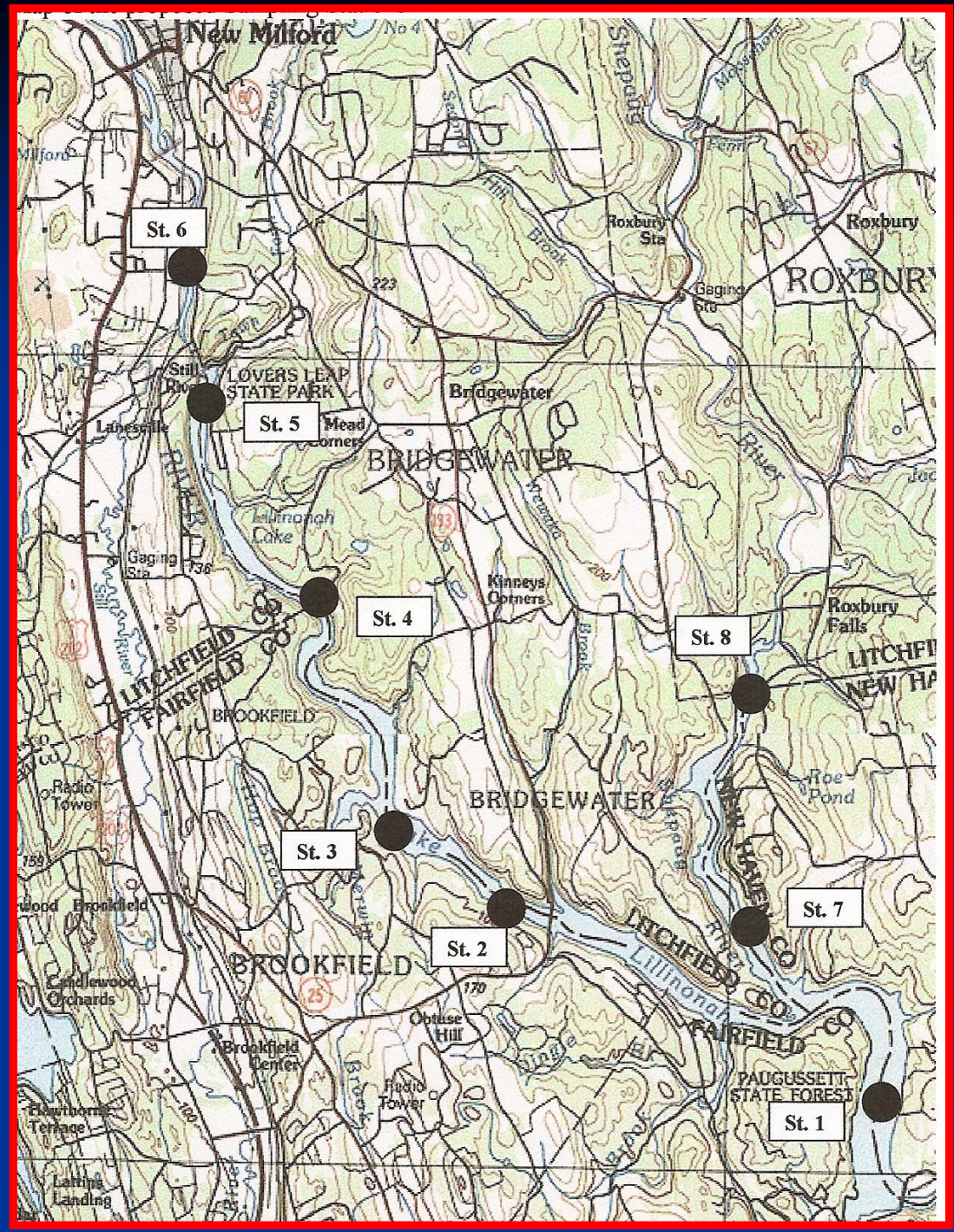
St. 5 = Goodyear Island = 20 feet

St. 6 = Housatonic River = 10 feet

St. 7 = Lower Shepaug Arm = 65 feet

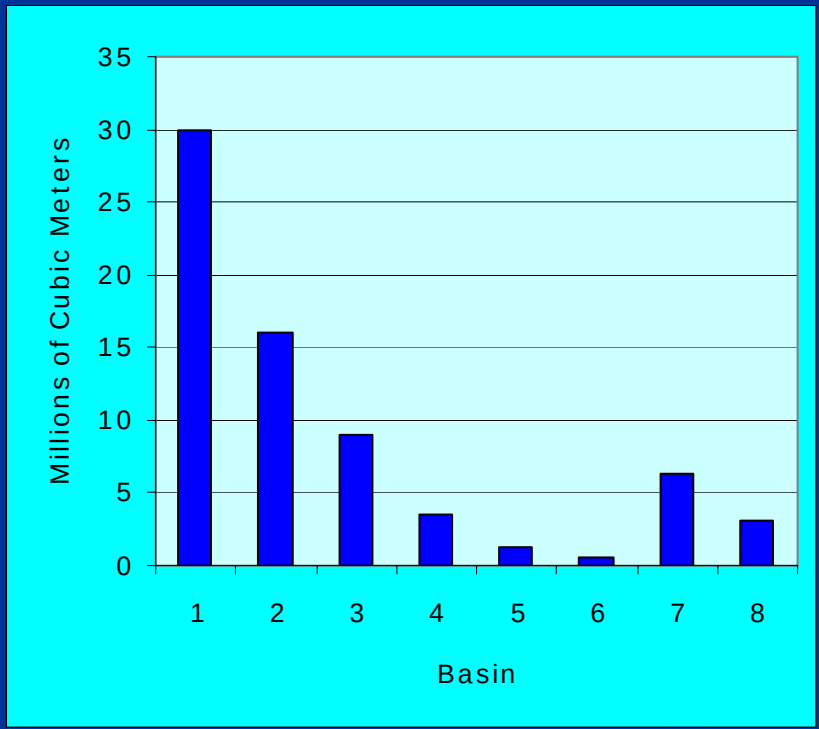
St. 8 = Upper Shepaug Arm = 12 feet

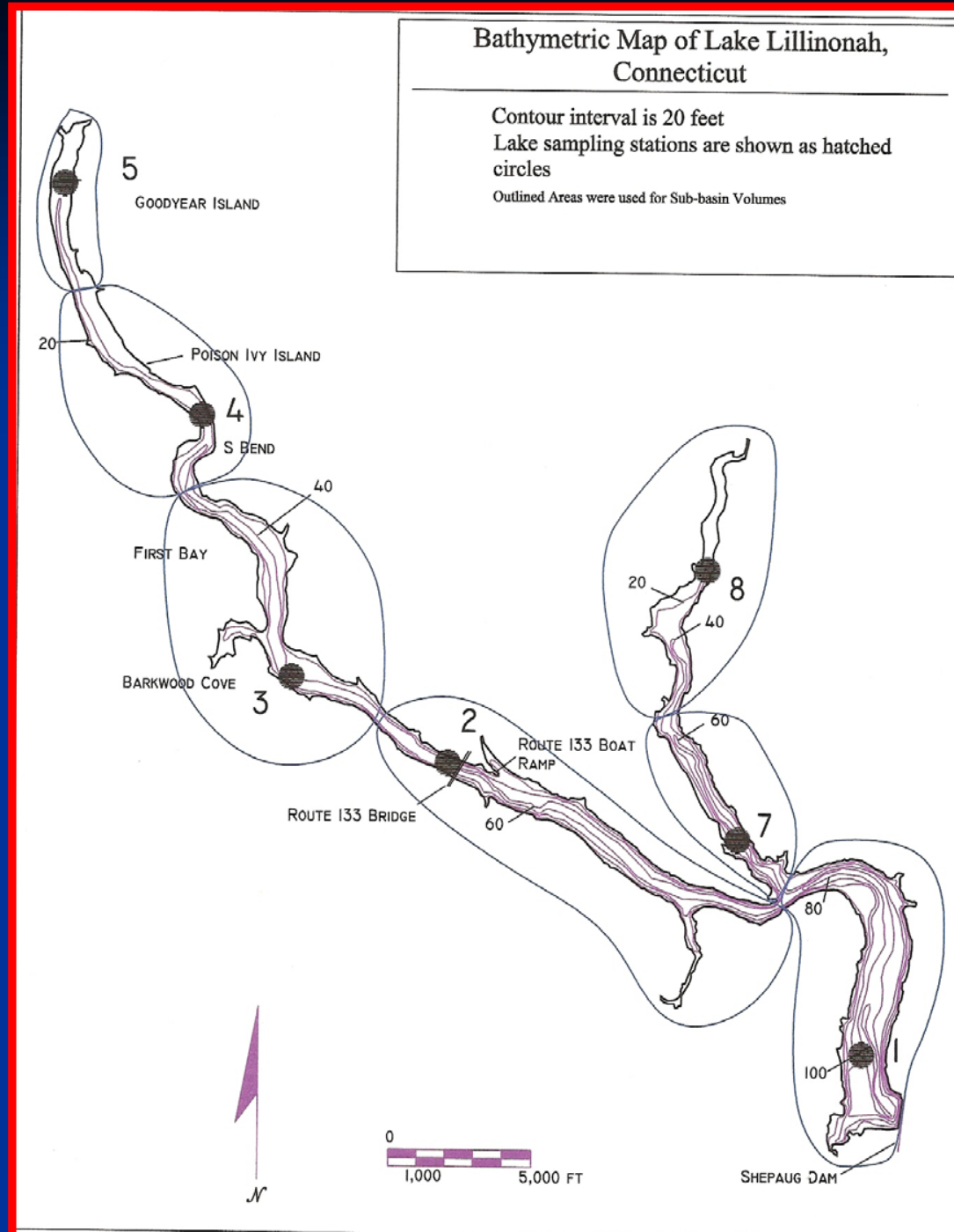
Also sampled Tail Race of Shepaug Dam



Lake Basins

Each sampling station was assigned a basin for purposes of determining the volume of the lake that the samples represented





Cross-sectional View of Impoundment Showing Gradients

Longitudinal changes in important factors that regulate algae production

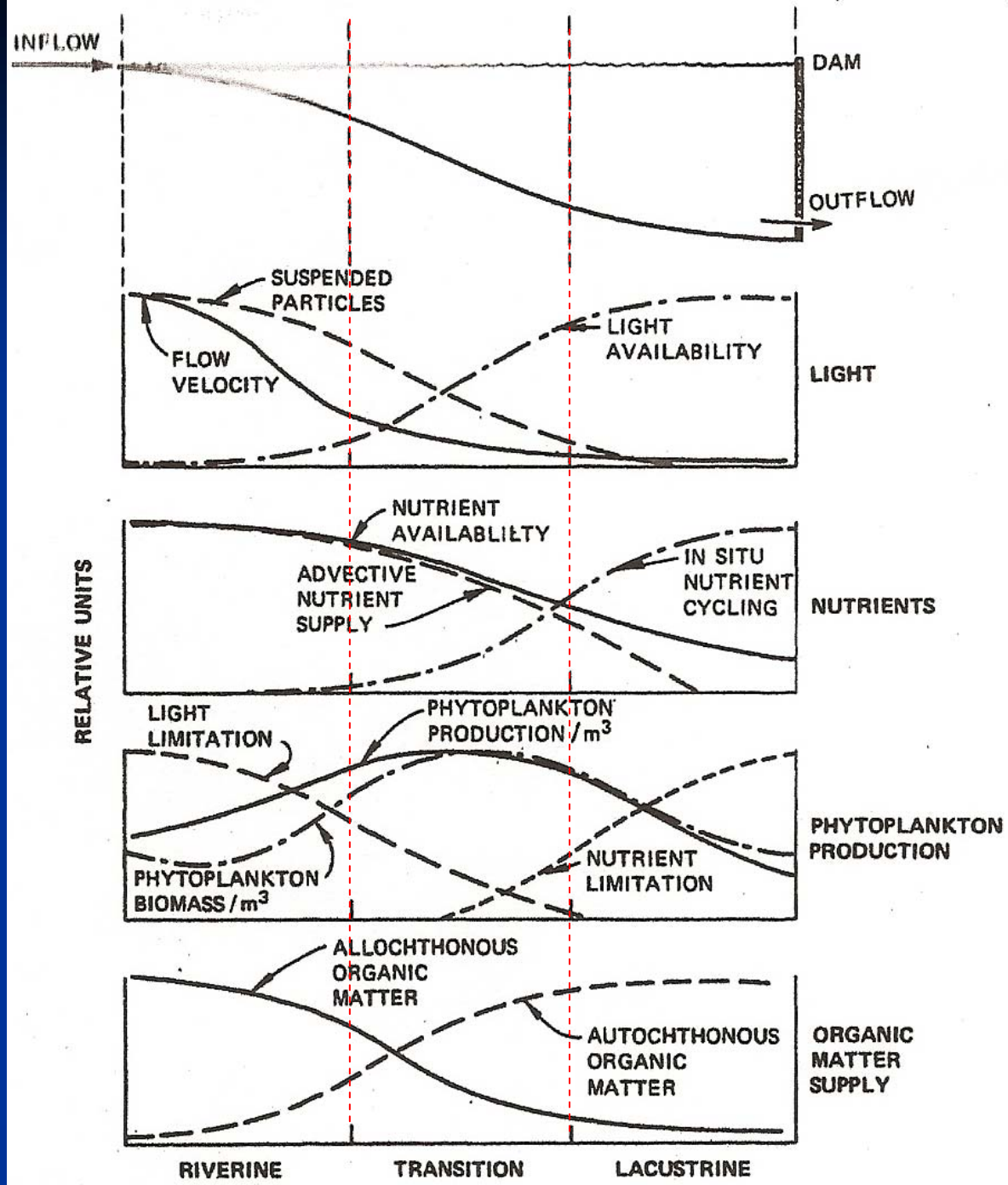
Light

Flow Velocity

Nutrients

Algae Production

Organic Matter Supply



Longitudinal Zonation

Riverine Zone = Narrow channelized basin, high flow, high suspended solids and turbidity.

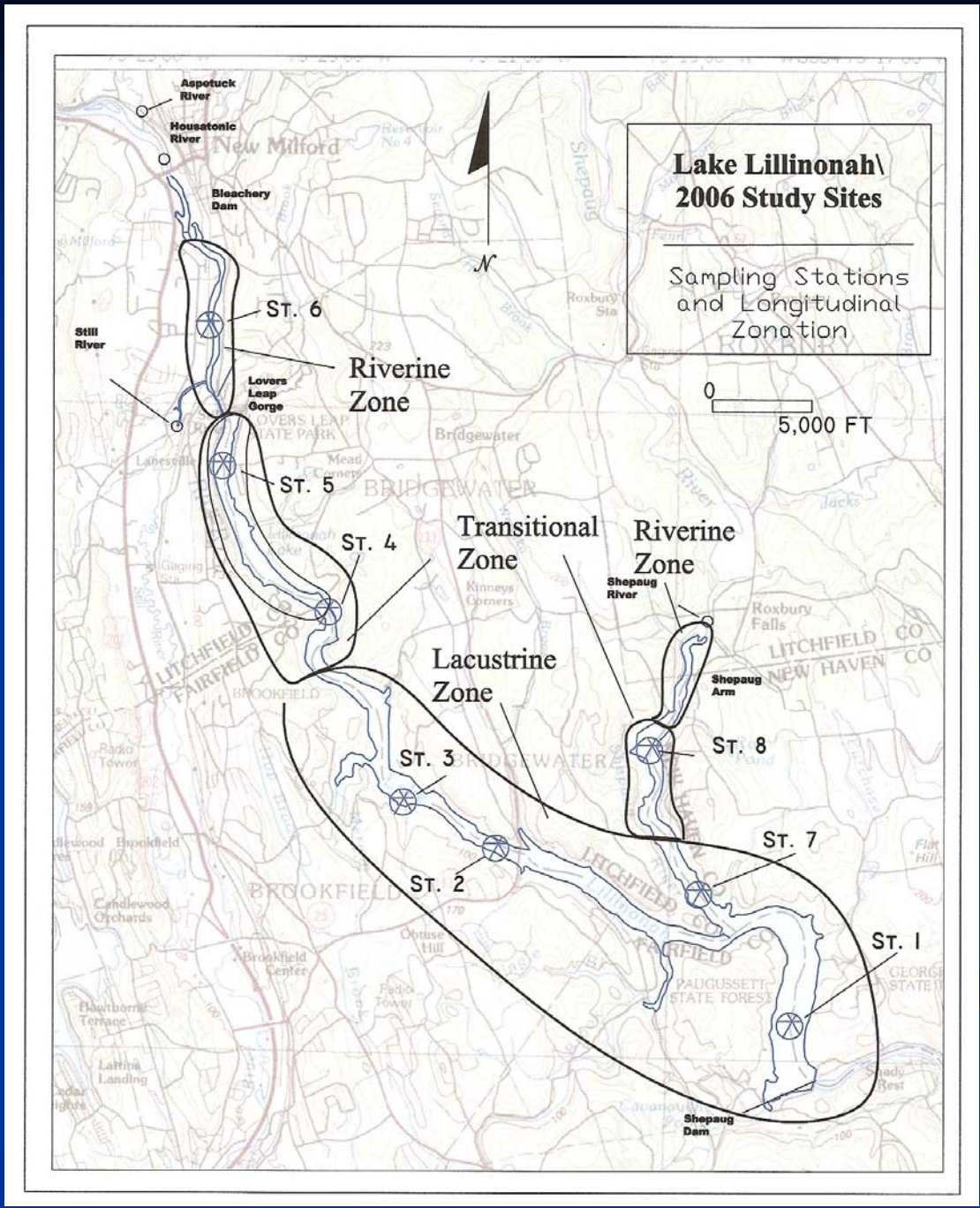
Station 6

Transitional Zone = Broader deeper basin, reduced flow, less turbid, less solids.

Stations 4, 5, & 8

Lacustrine Zone = Broad and deep, a lake like basin, little flow, relatively clear water

Stations 1, 2, 3 & 7



April

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30

May

1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31

June

1 2

3 4 5 6 7 8 9

10 11 12 13 14 15 16

17 18 19 20 21 22 23

24 25 26 27 28 29 30

July

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30 31

August

1 2 3 4

5 6 7 8 9 10 11

12 13 14 15 16 17 18

19 20 21 22 23 24 25

26 27 28 29 30 31

September

1

2 3 4 5 6 7 8

9 10 11 12 13 14 15

16 17 18 19 20 21 22

23 24 25 26 27 28 29

30

October

1 2 3 4 5 6

7 8 9 10 11 12 13

14 15 16 17 18 19 20

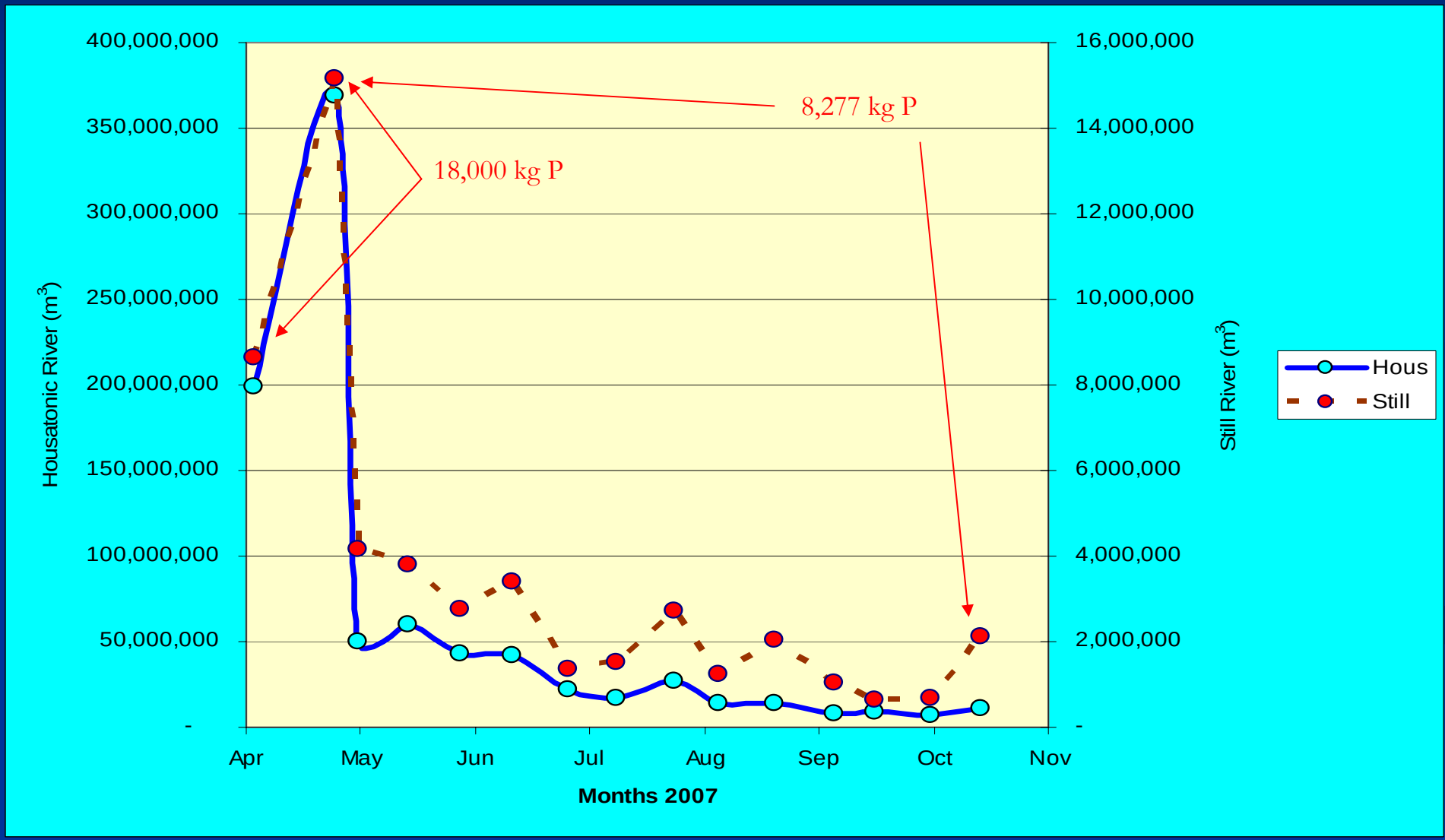
21 22 23 24 25 26 27

28 29 30 31

2007 Season

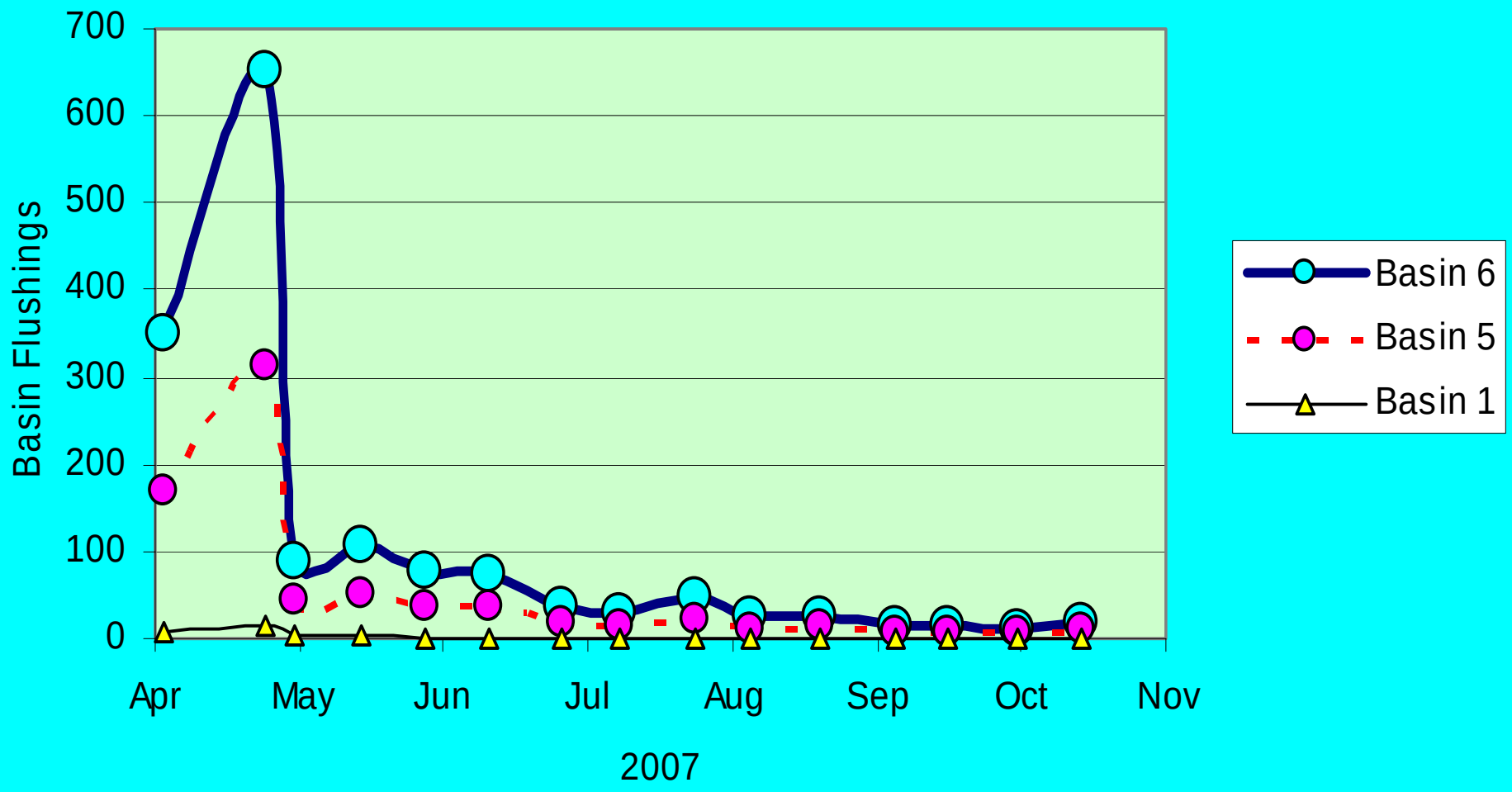
15 sampling events roughly every 2 weeks

River Flows During Period Preceding Each Sampling Event

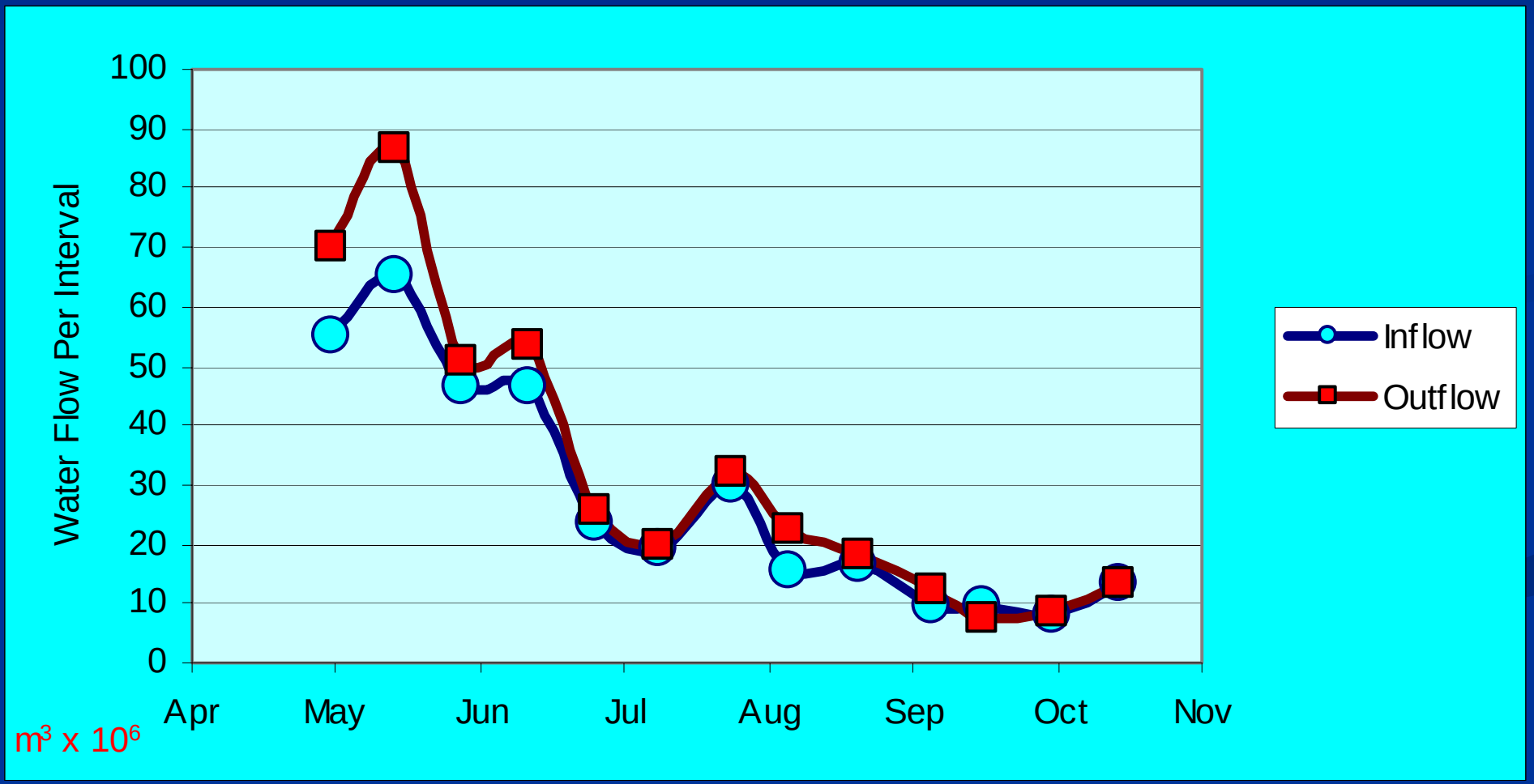


Flushing Rates For Selected Basins

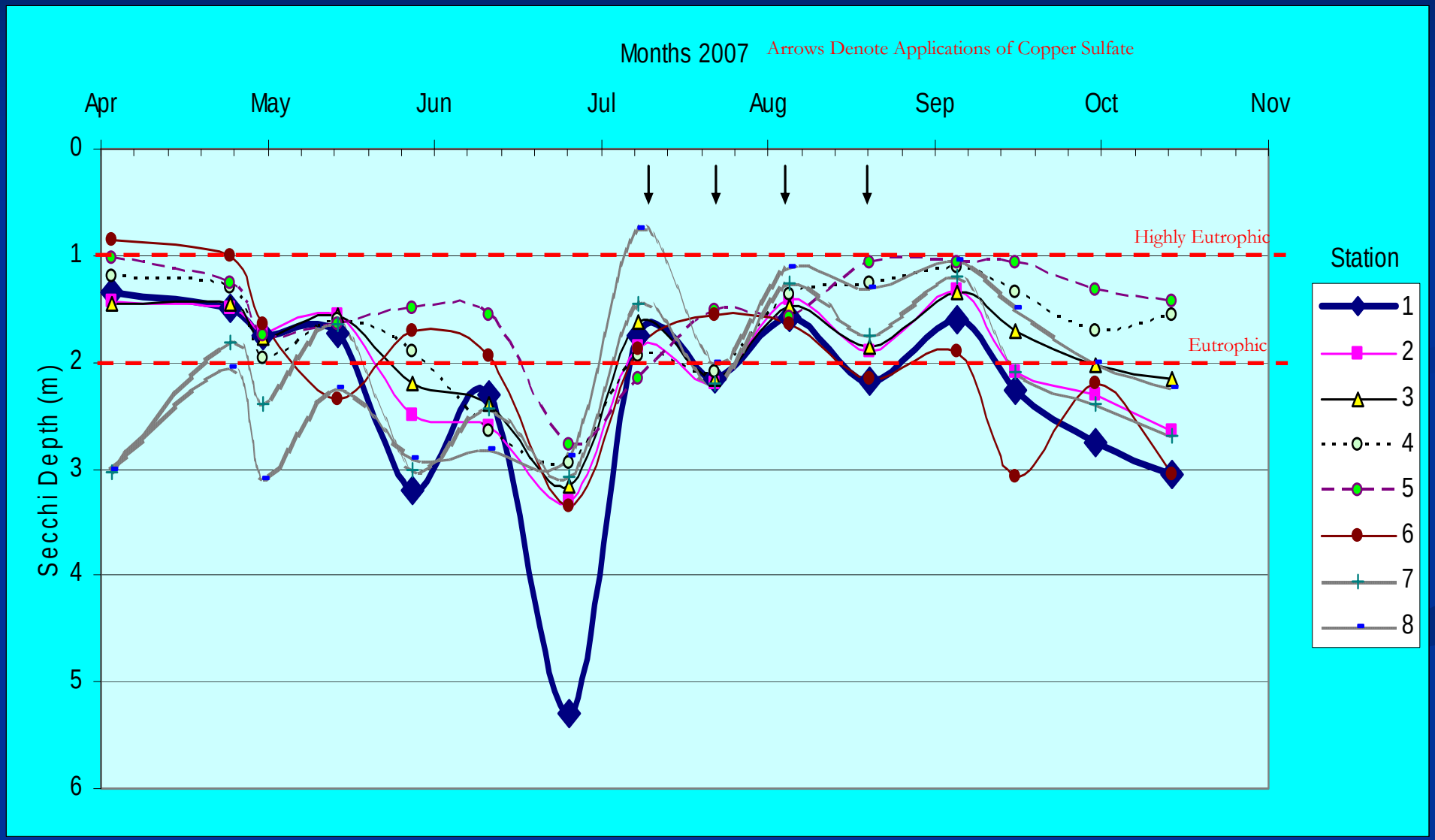
Using Interval Preceding Sampling Event



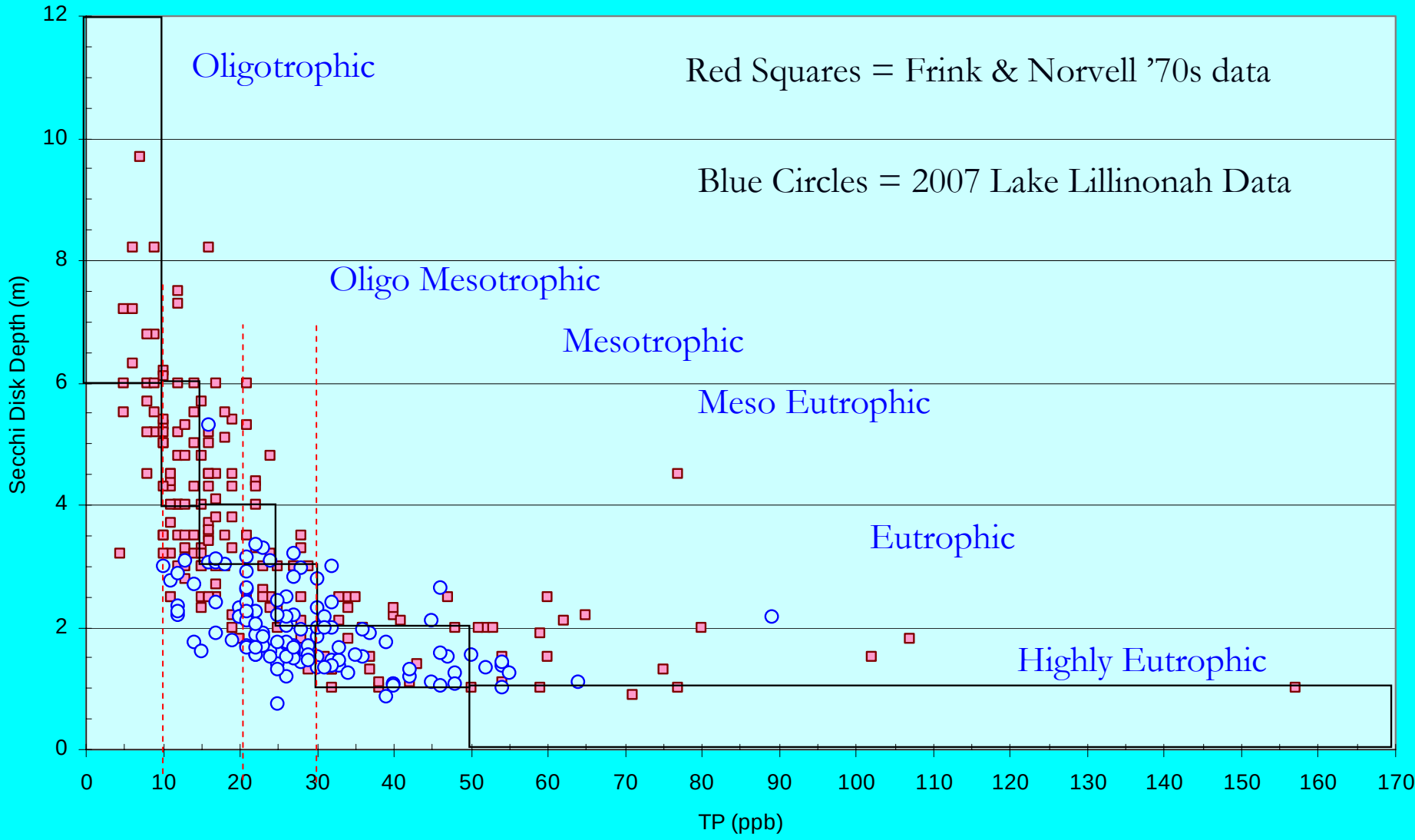
Inflow and Outflow Volumes

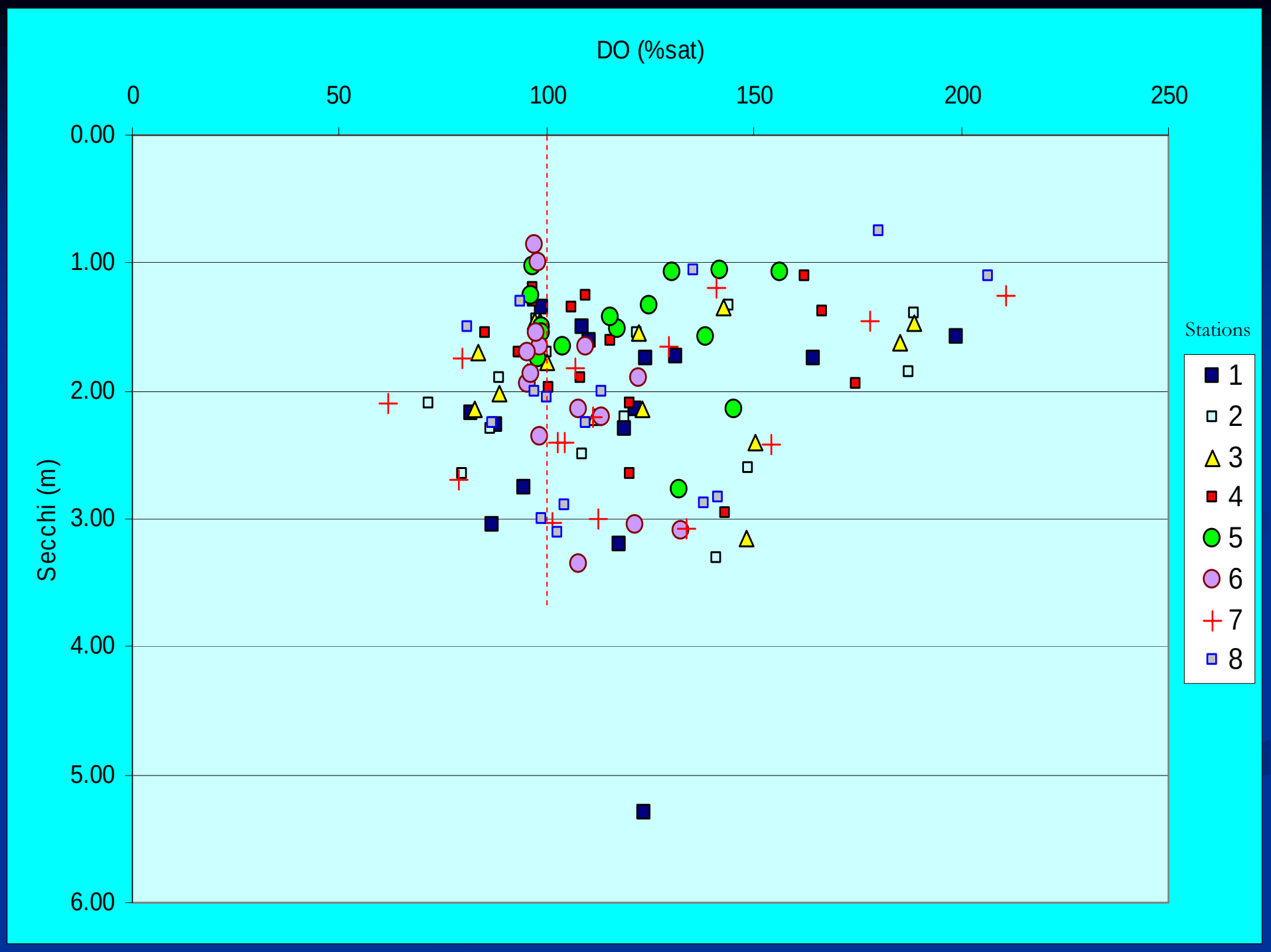


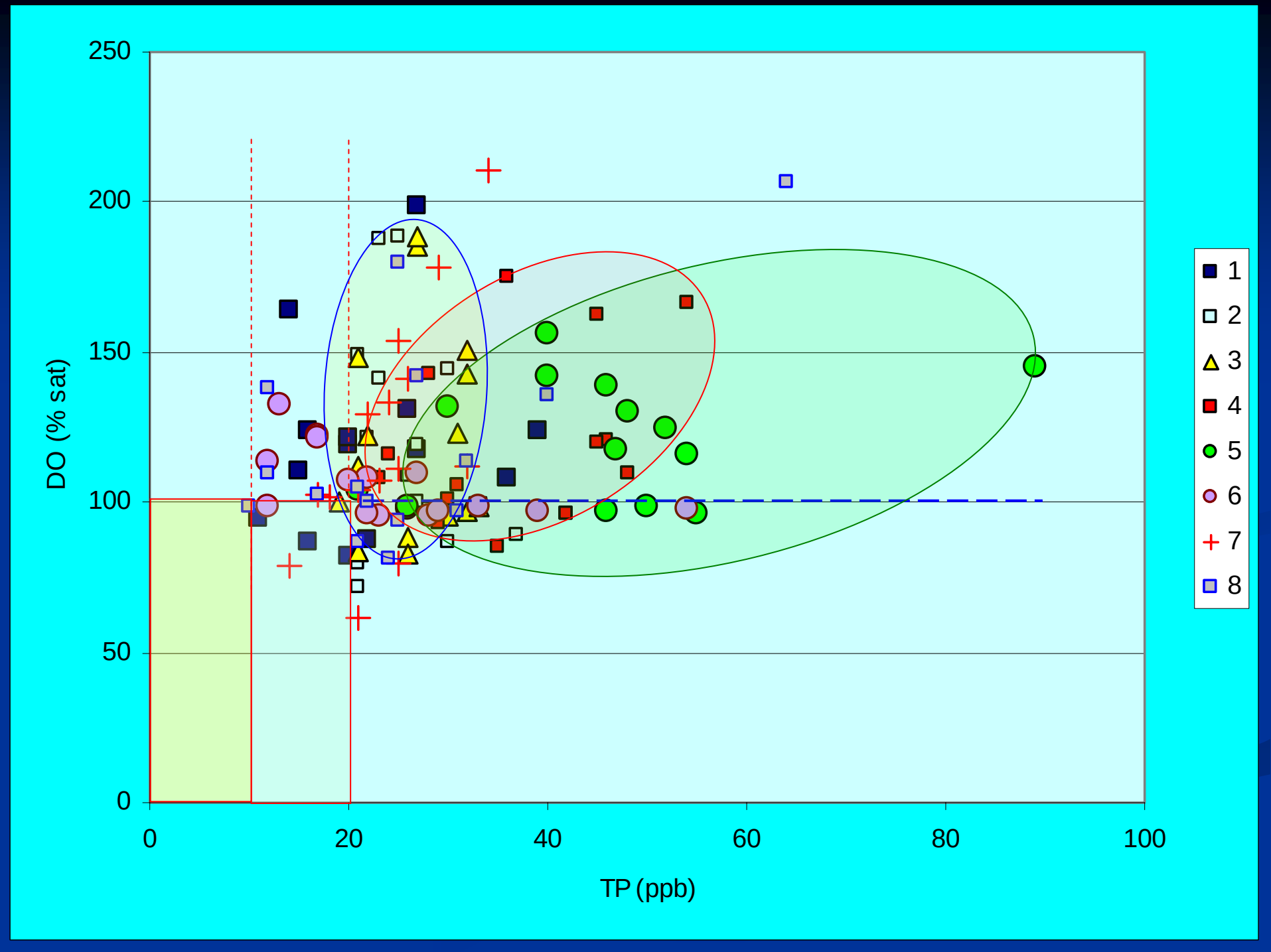
Lake Lillinonah Secchi Depths During 2007



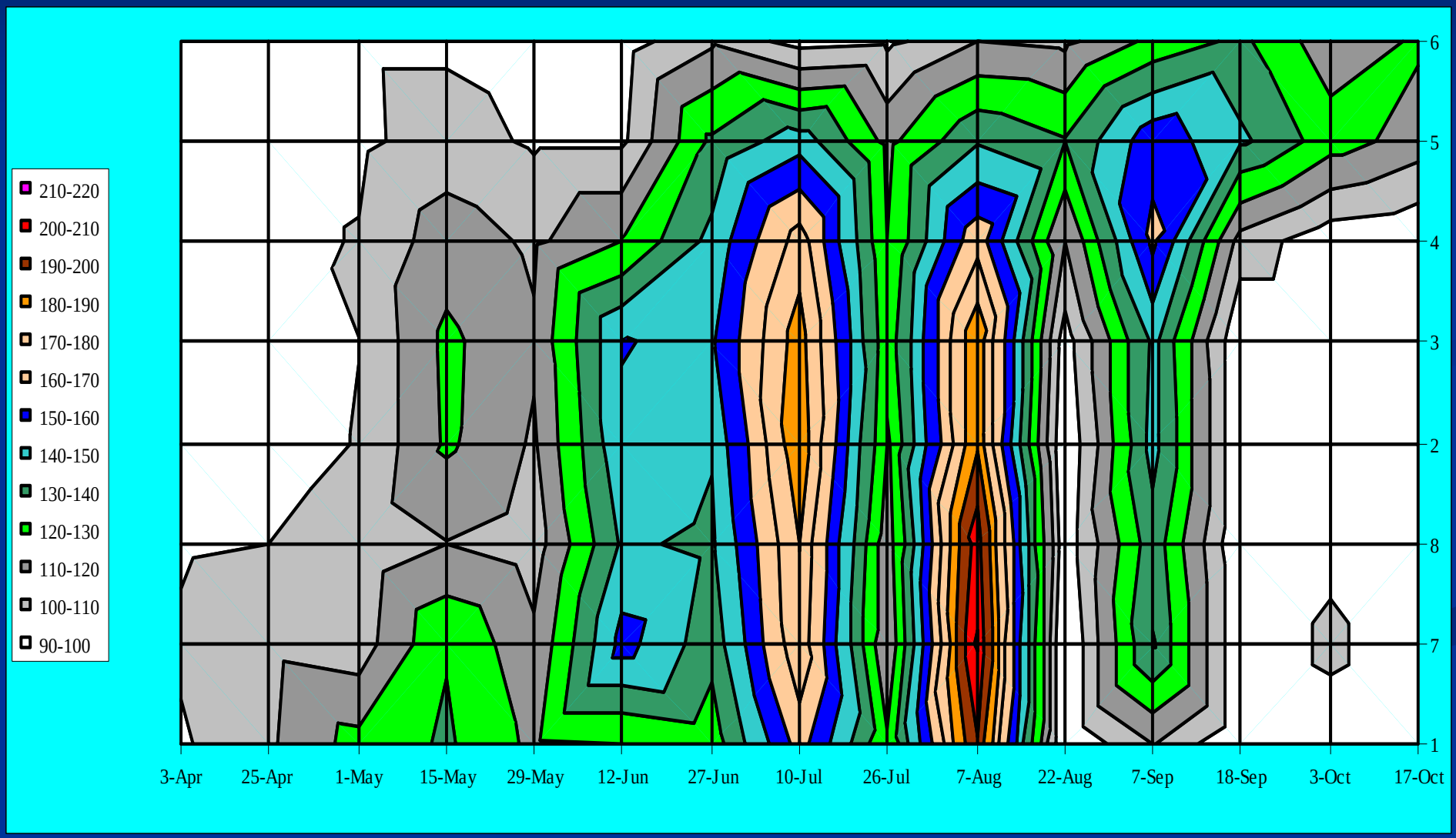
Secchi Disk Depth vs. Total Phosphorus Concentration

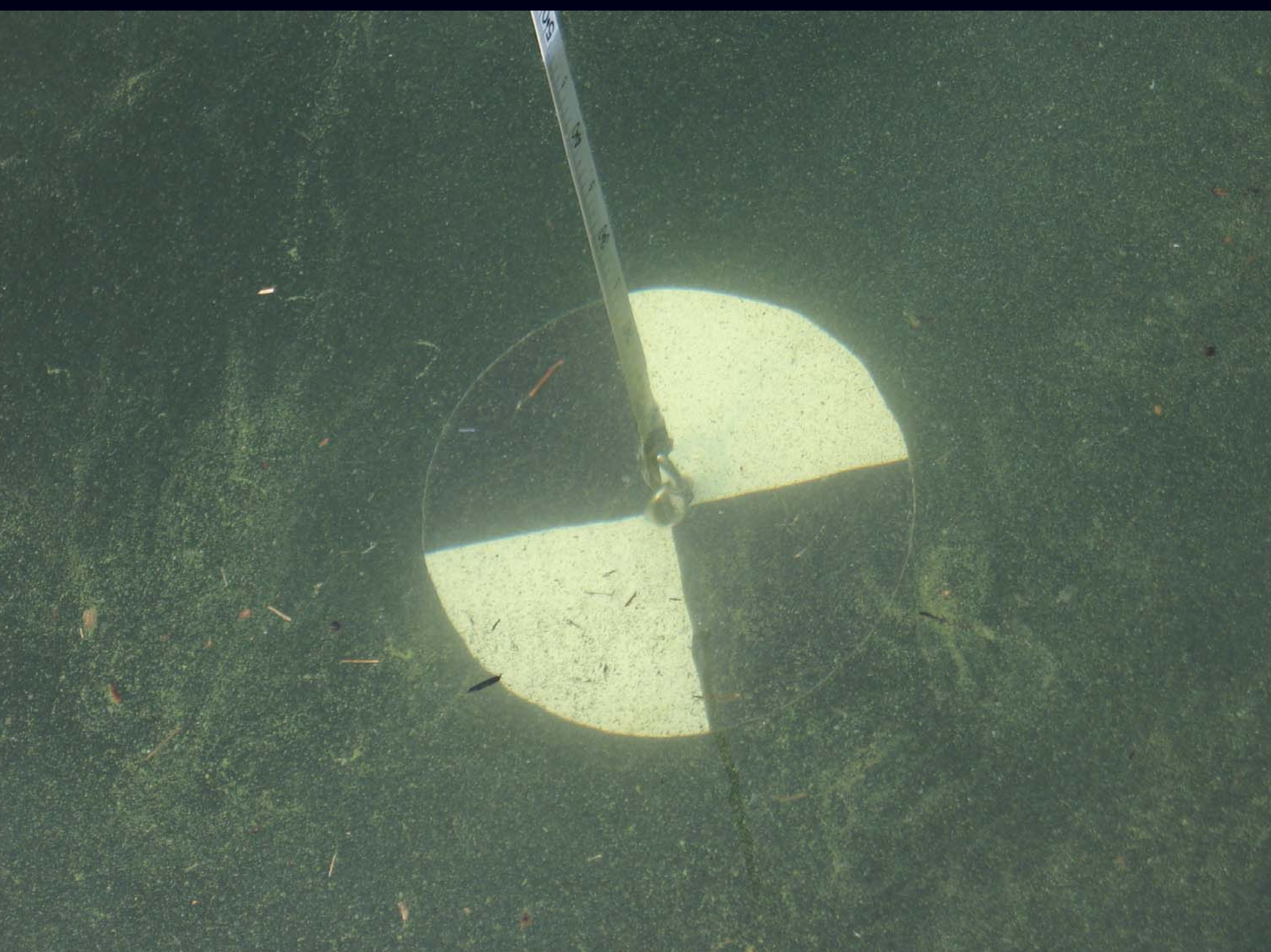



DO (%sat)
0
50
100
150
200
250
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Secchi (m)
Stations
1
2
3
4
5
6
7
8


250
200
150
100
50
0
DO (% sat)
0
20
40
60
80
100
TP (ppb)
1
2
3
4
5
6
7
8

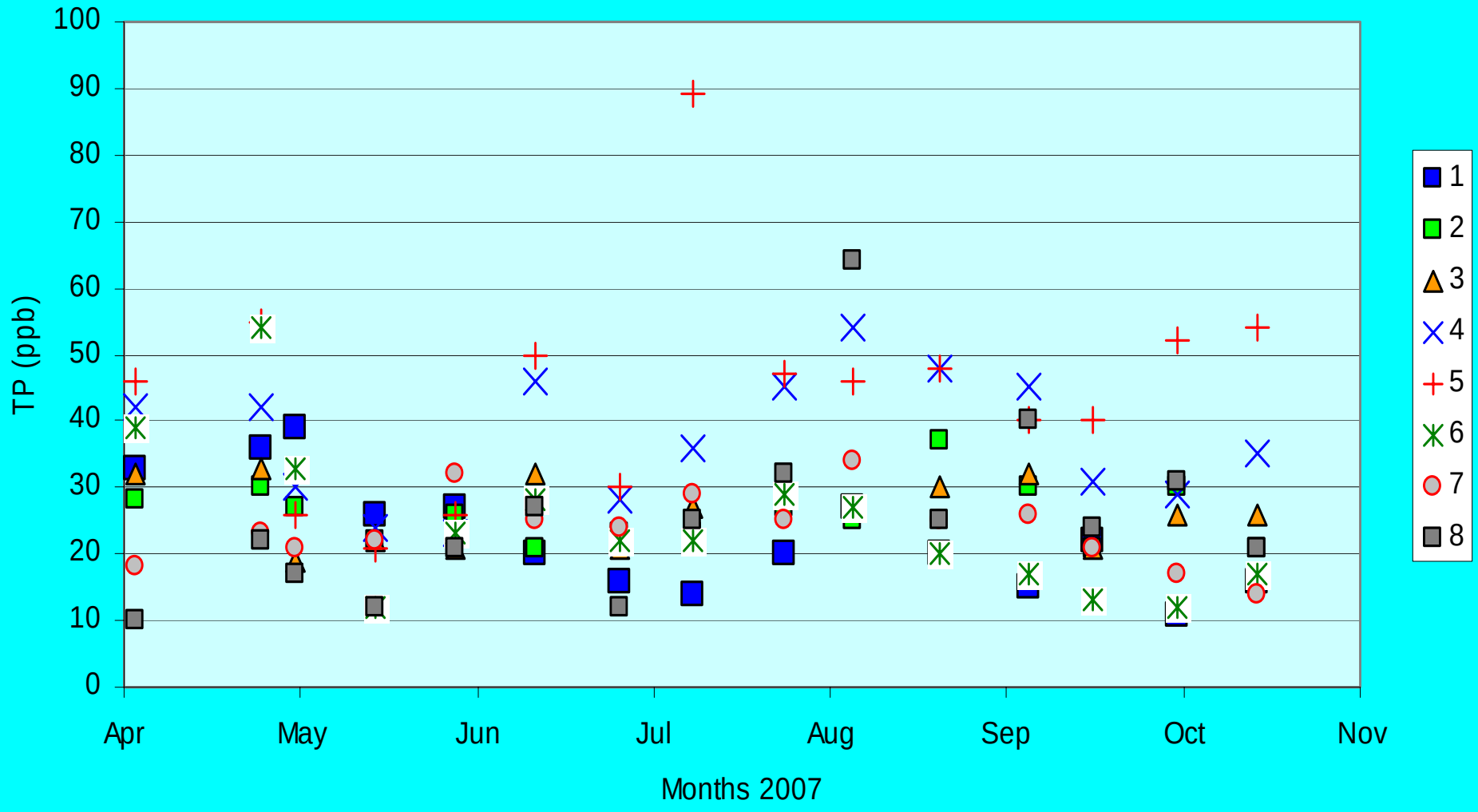
Dissolved Oxygen Percent Saturation in Lake Lillinonah During 2007



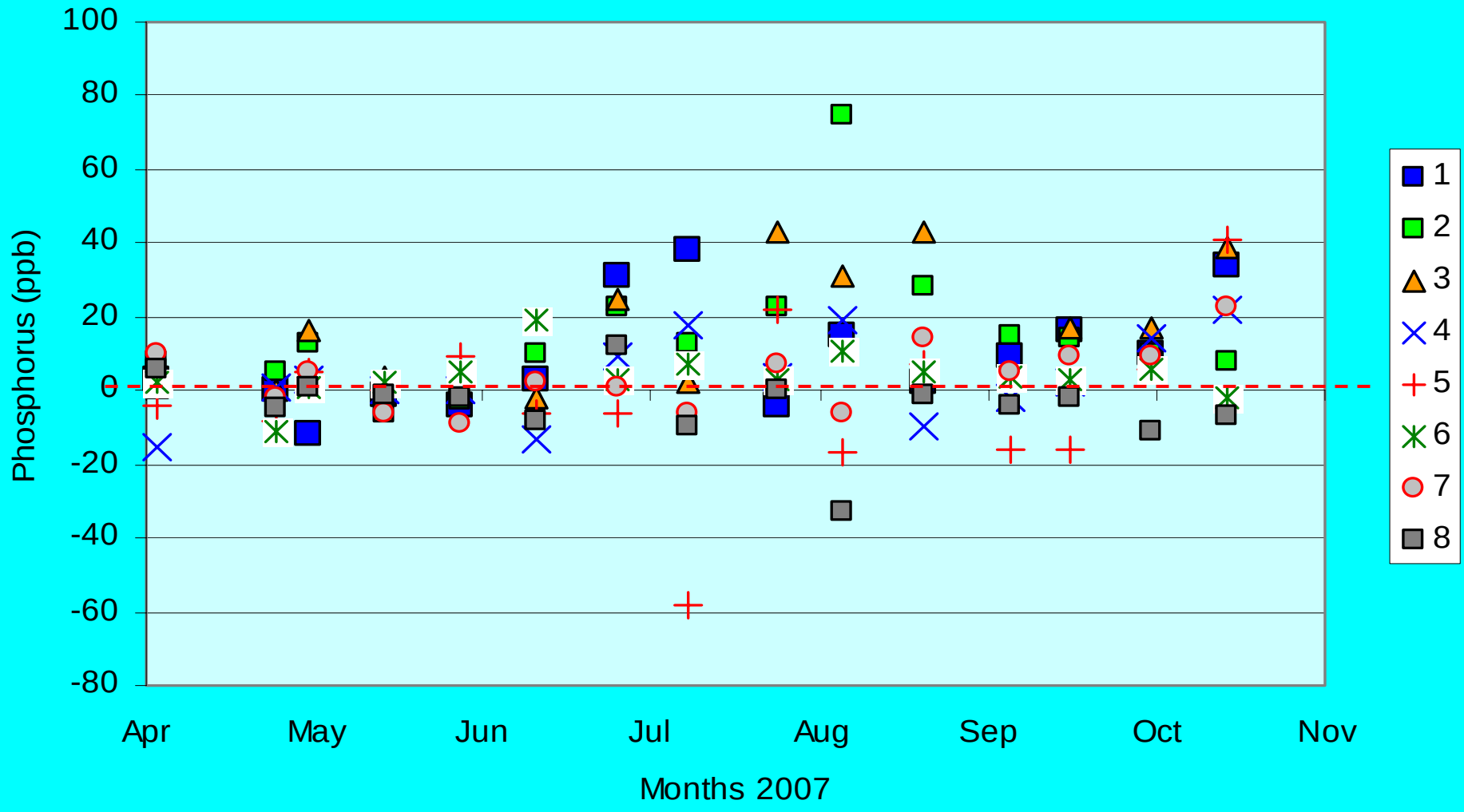


Lake Phosphorus Values During 2007

Surface Samples

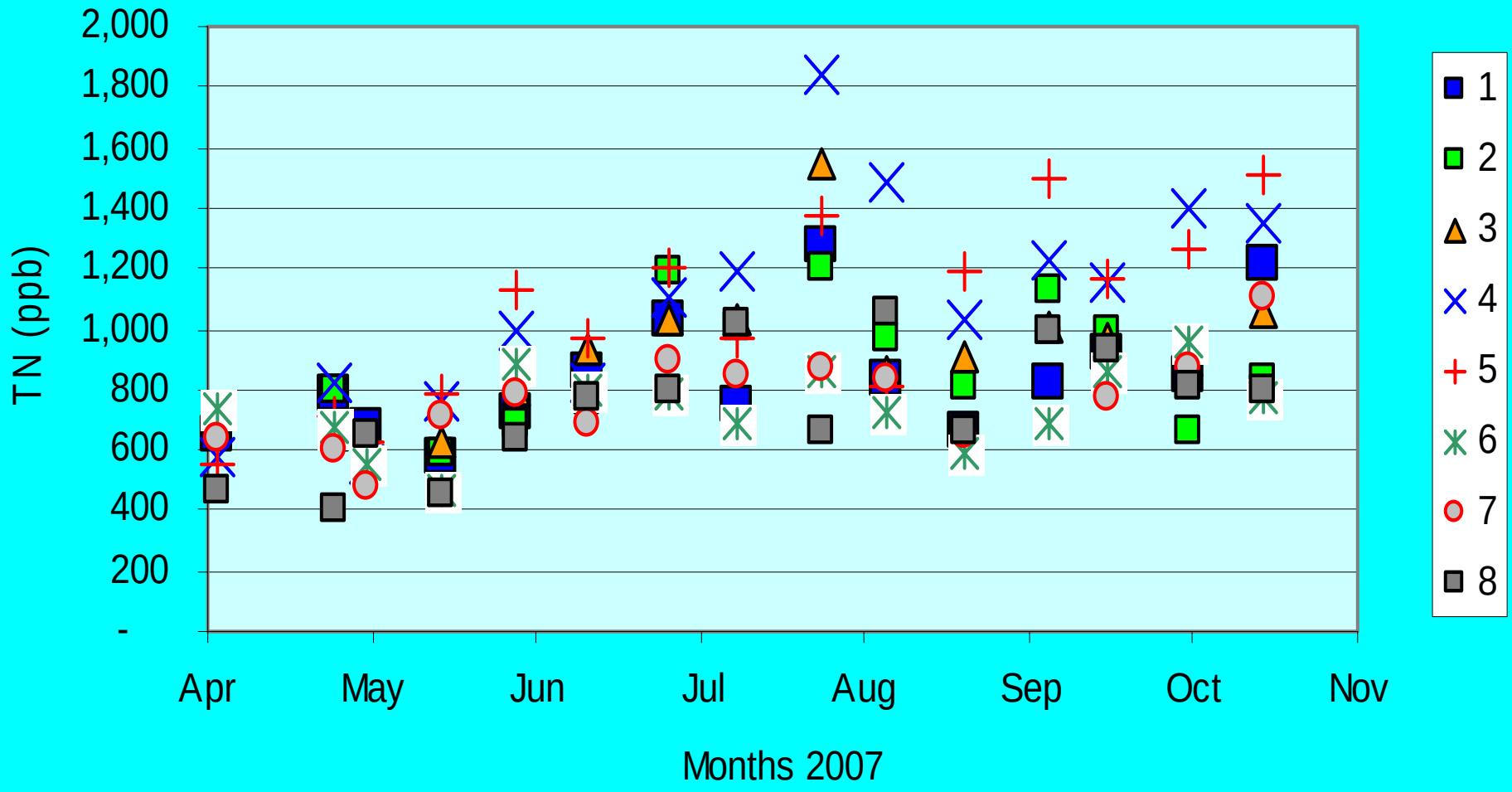


Difference Between Surface and Bottom Phosphorus Values



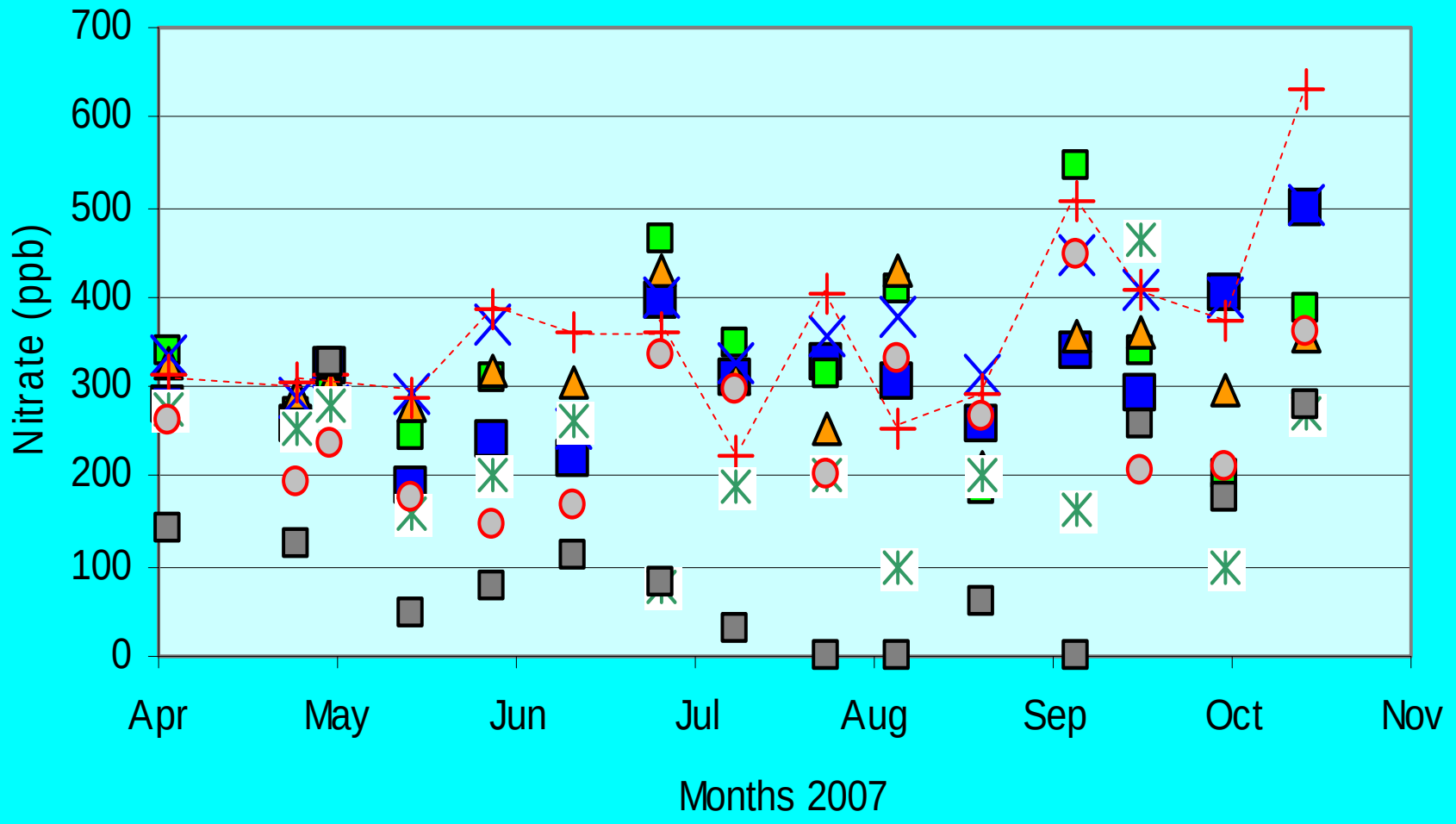
Lake Nitrogen Values During 2007

Water Column Average

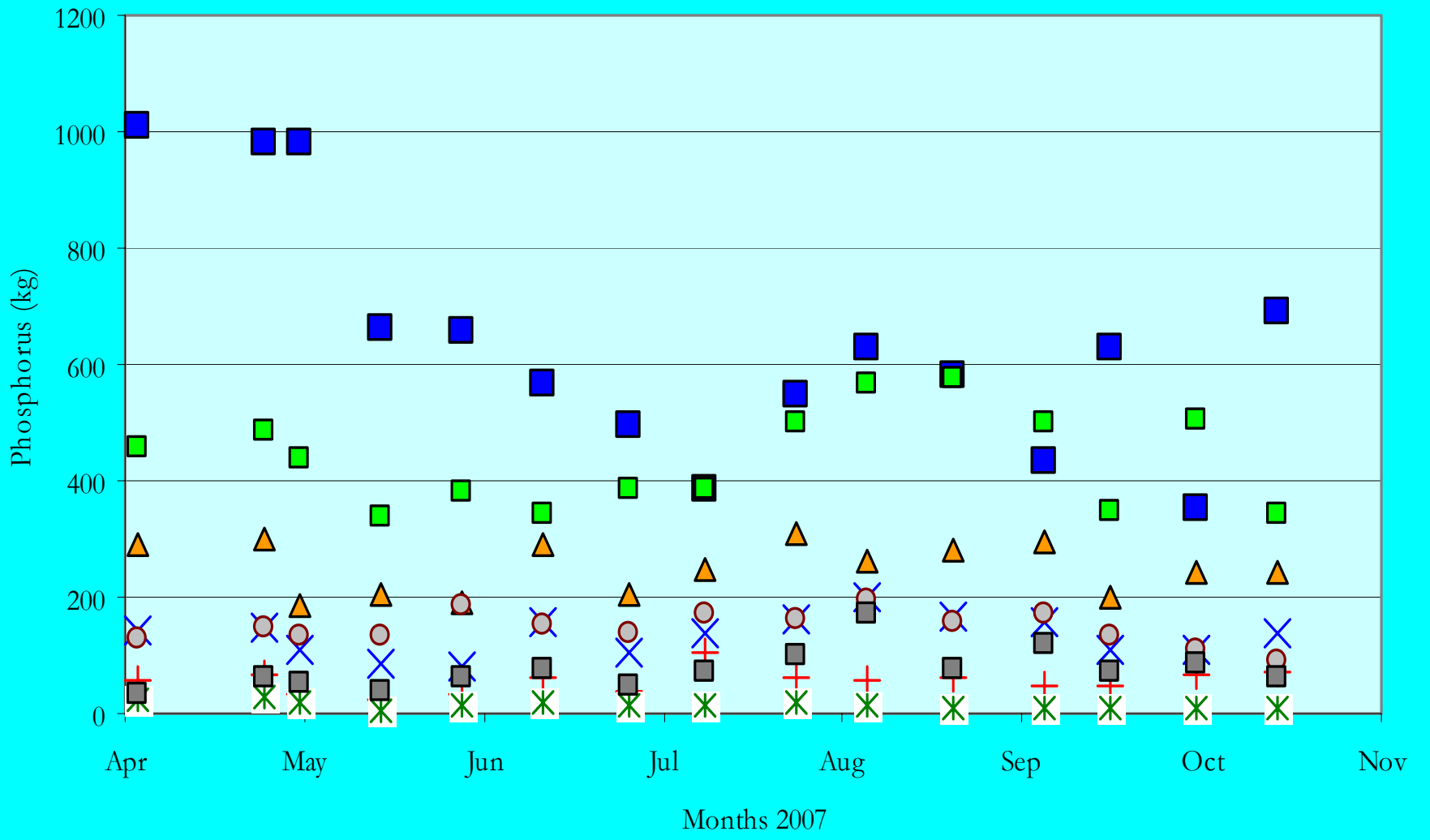


Lake Nitrate Values During 2007

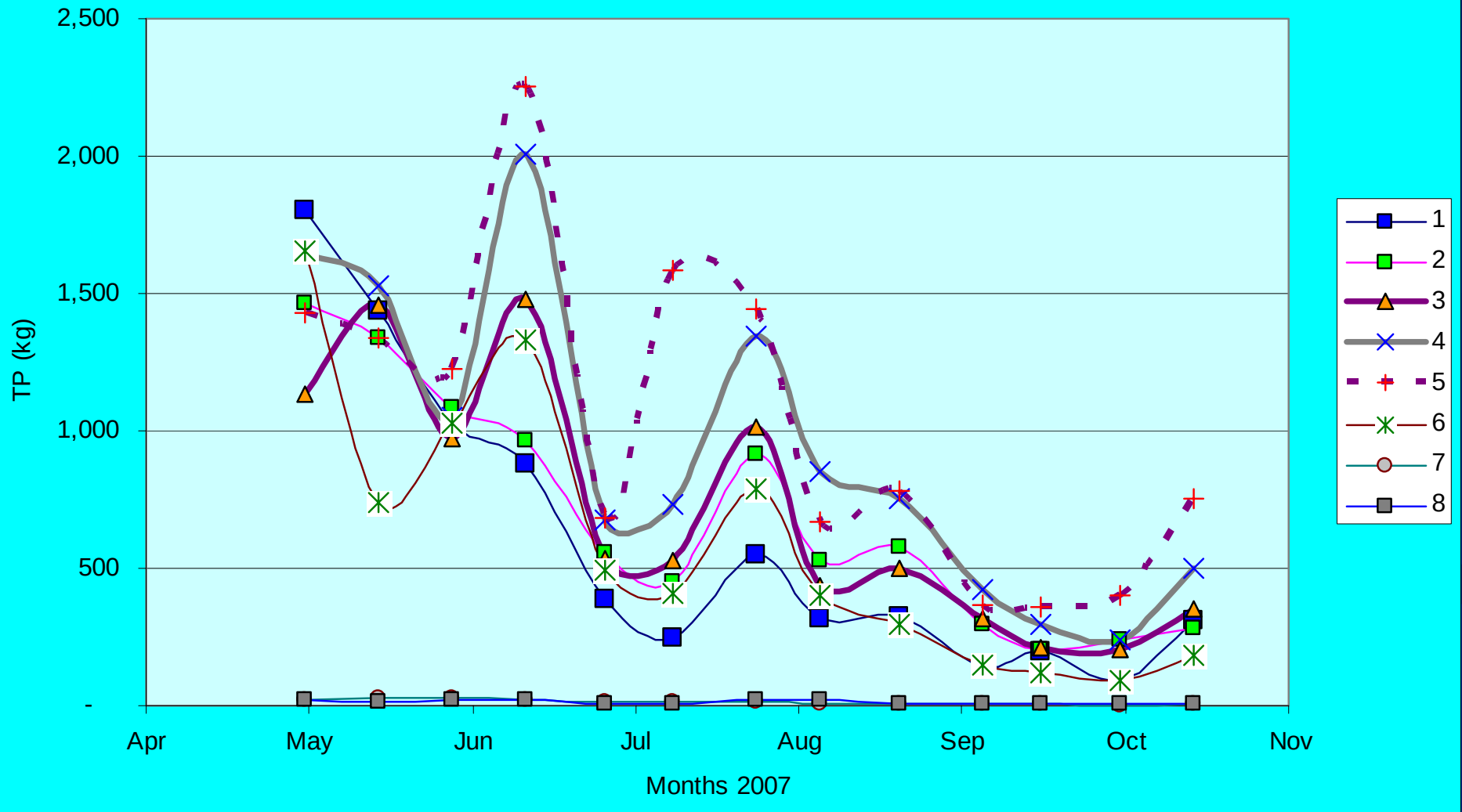
Water Column Average



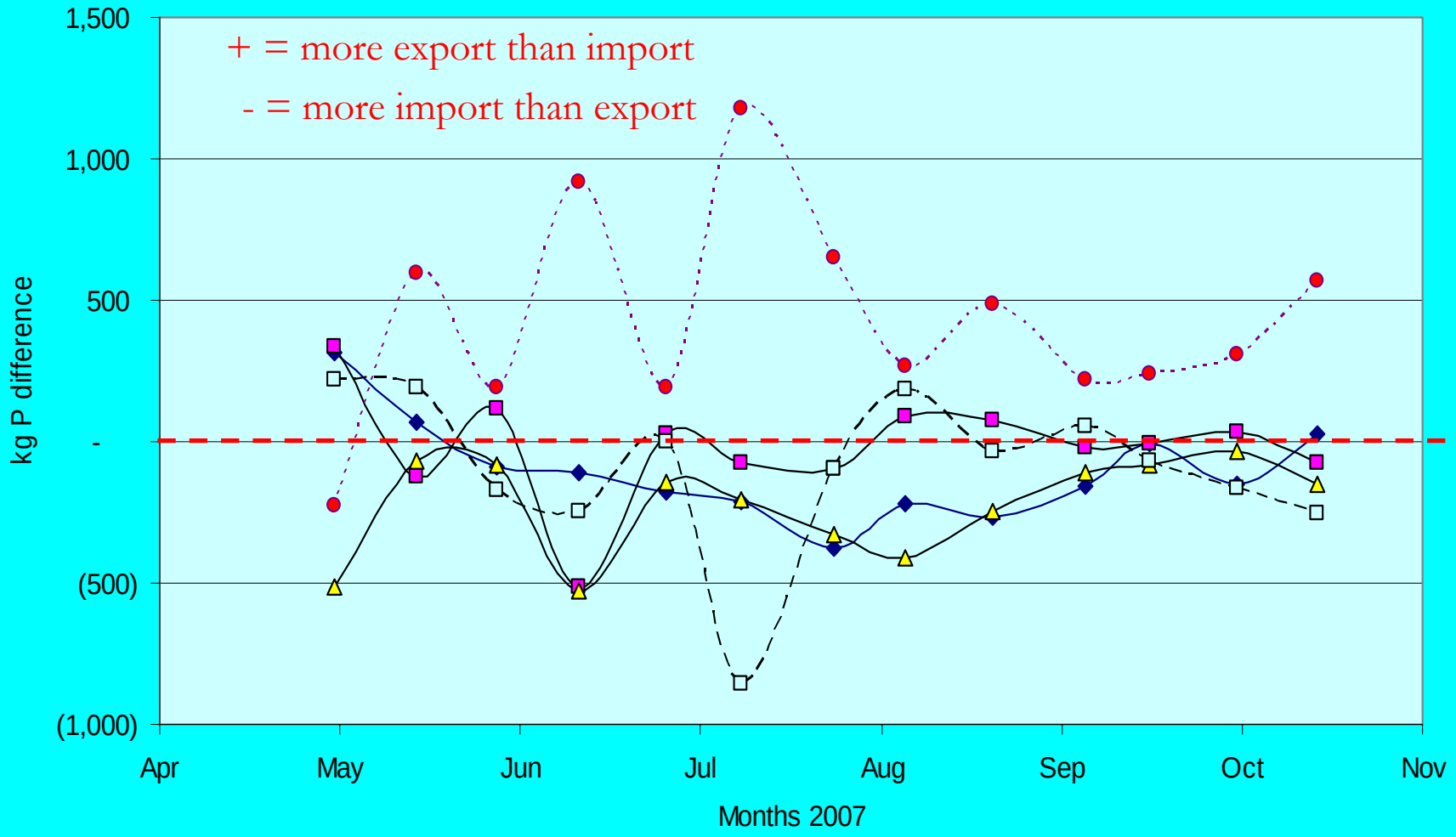
Phosphorus Mass Trends For Each Station During 2007



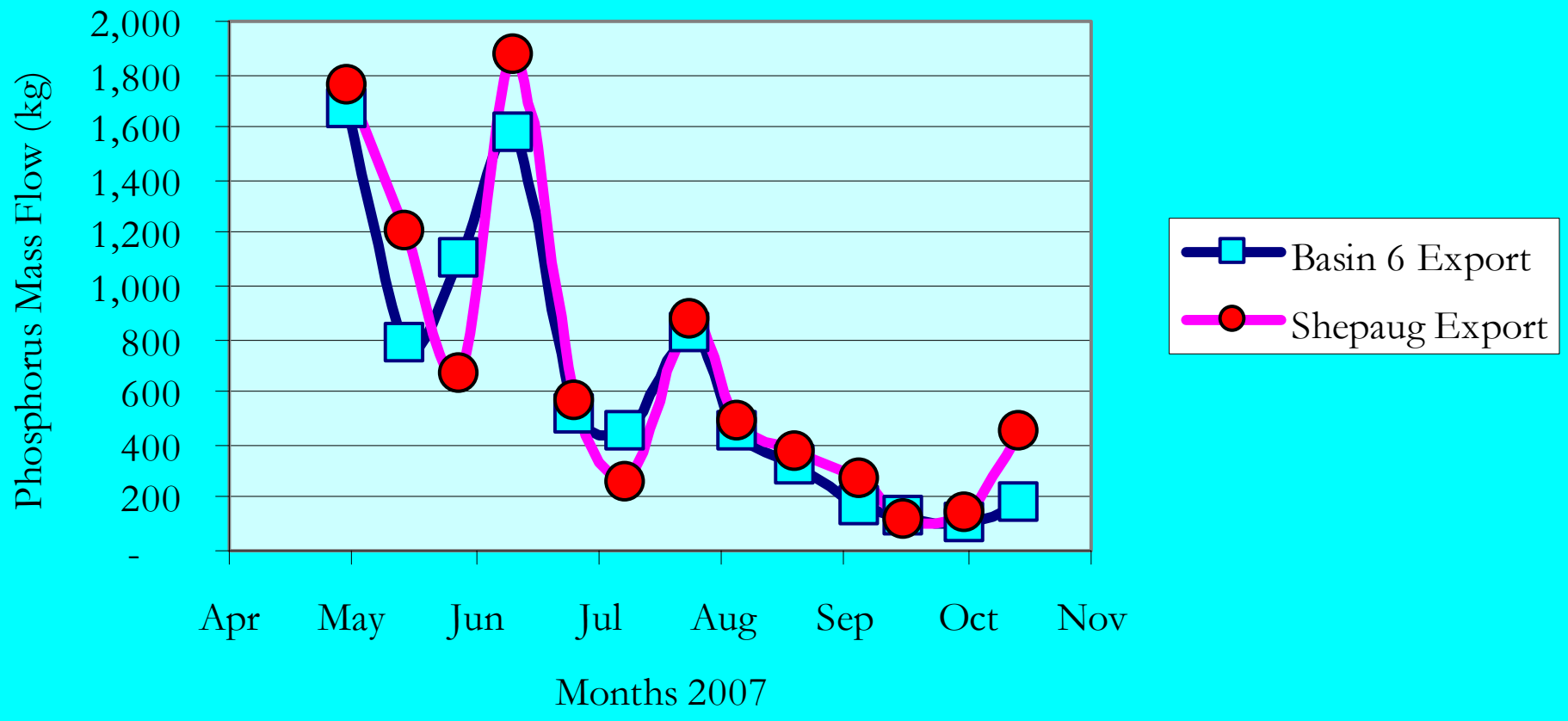
Phosphorus Mass Exported From Each Basin



Difference Between Inflow and Export From Each Main-stem Basin



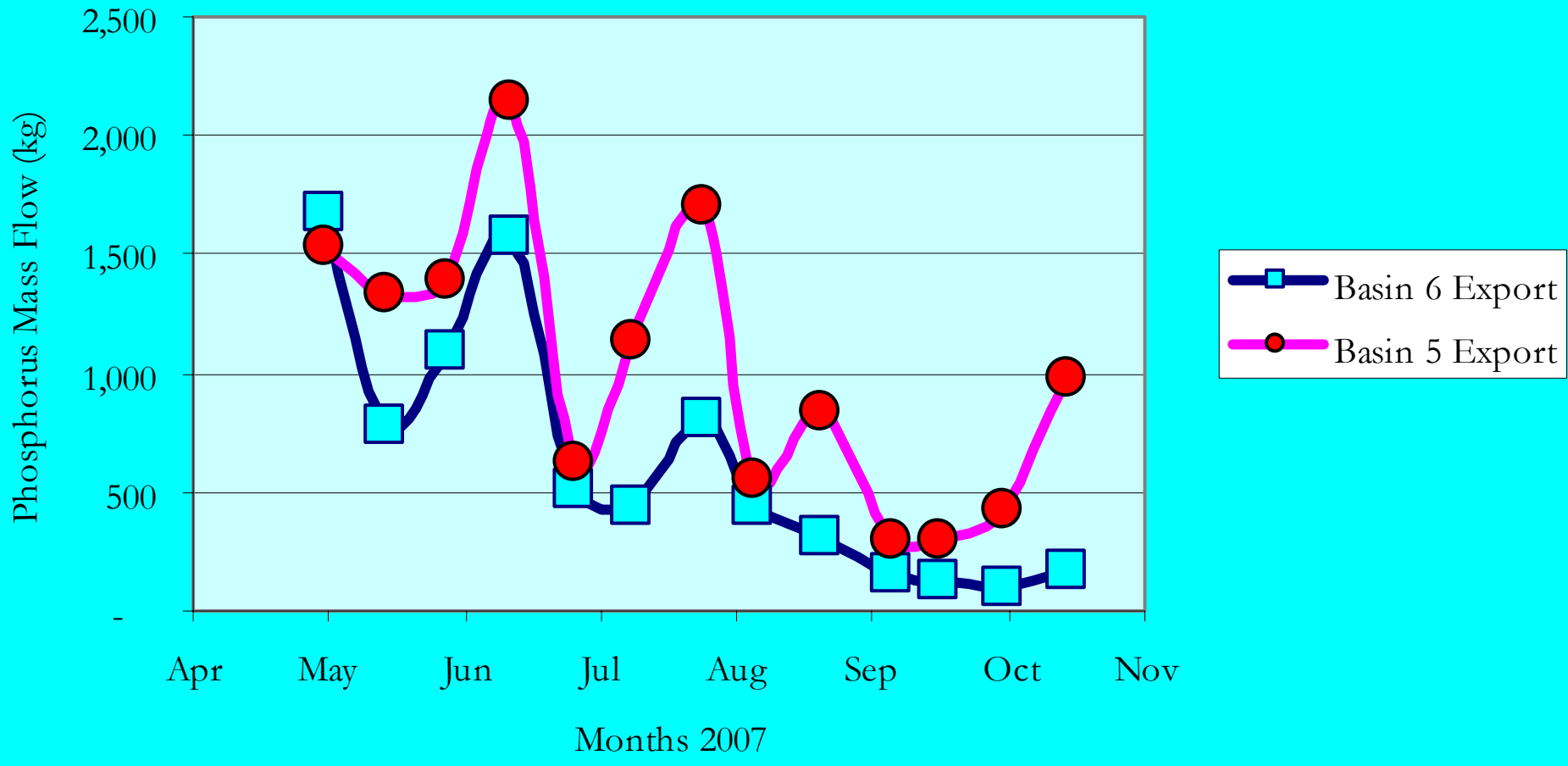
Lake Phosphorus Mass Balance (1st)



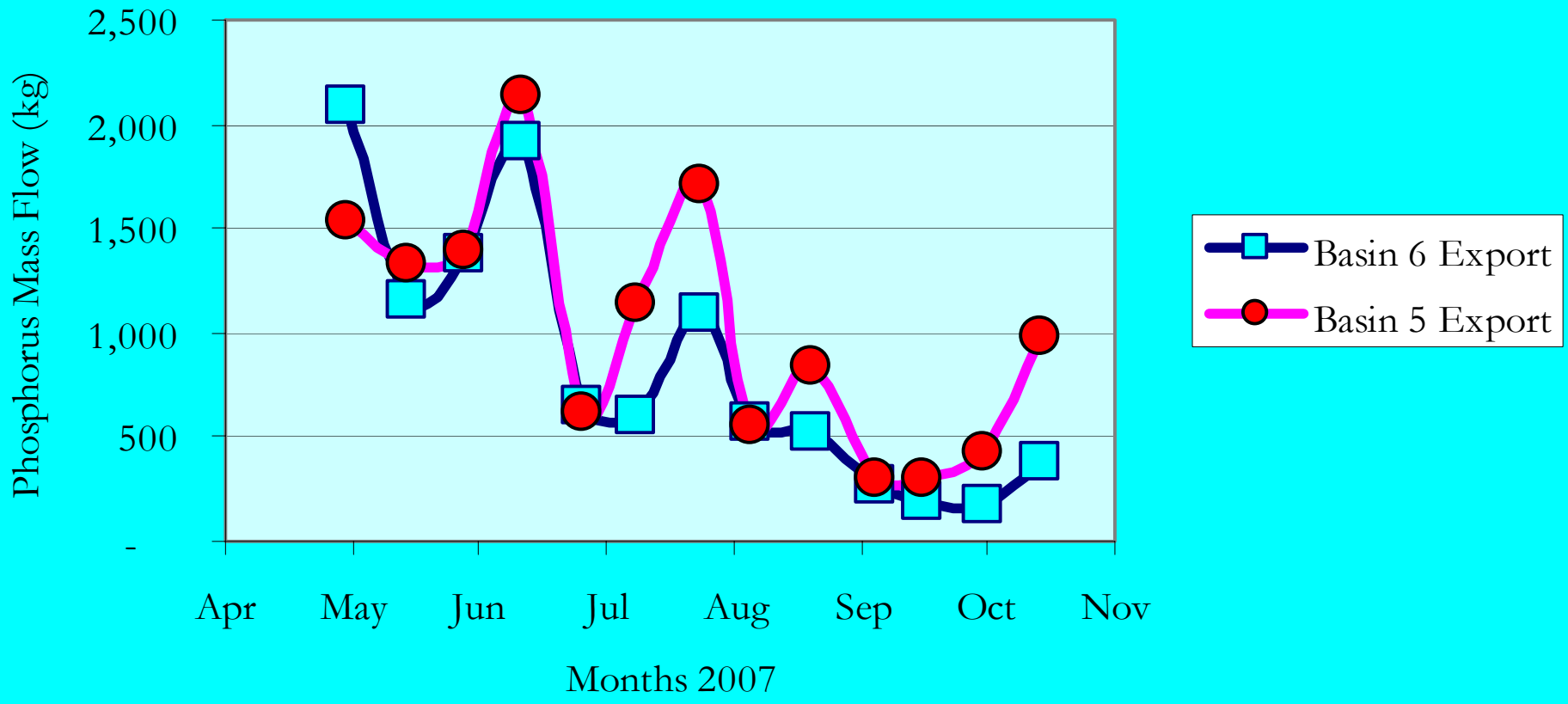
April To October
In = 27,572 kg
Out = 23,335 kg

May to October
In = 8,227 kg
Out = 9,017 kg

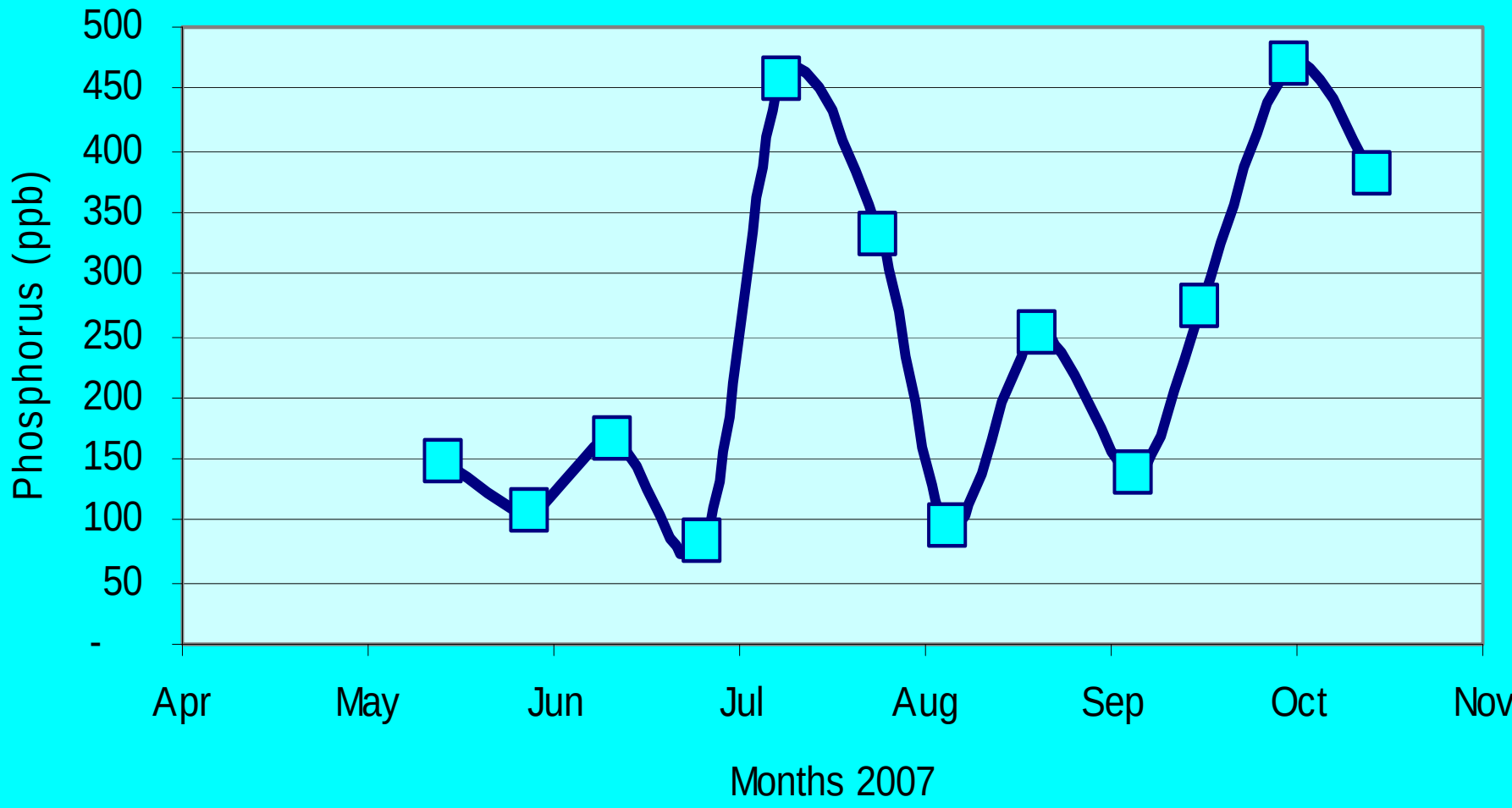
Trends in Phosphorus Mass Flow at Basins 5 and 6



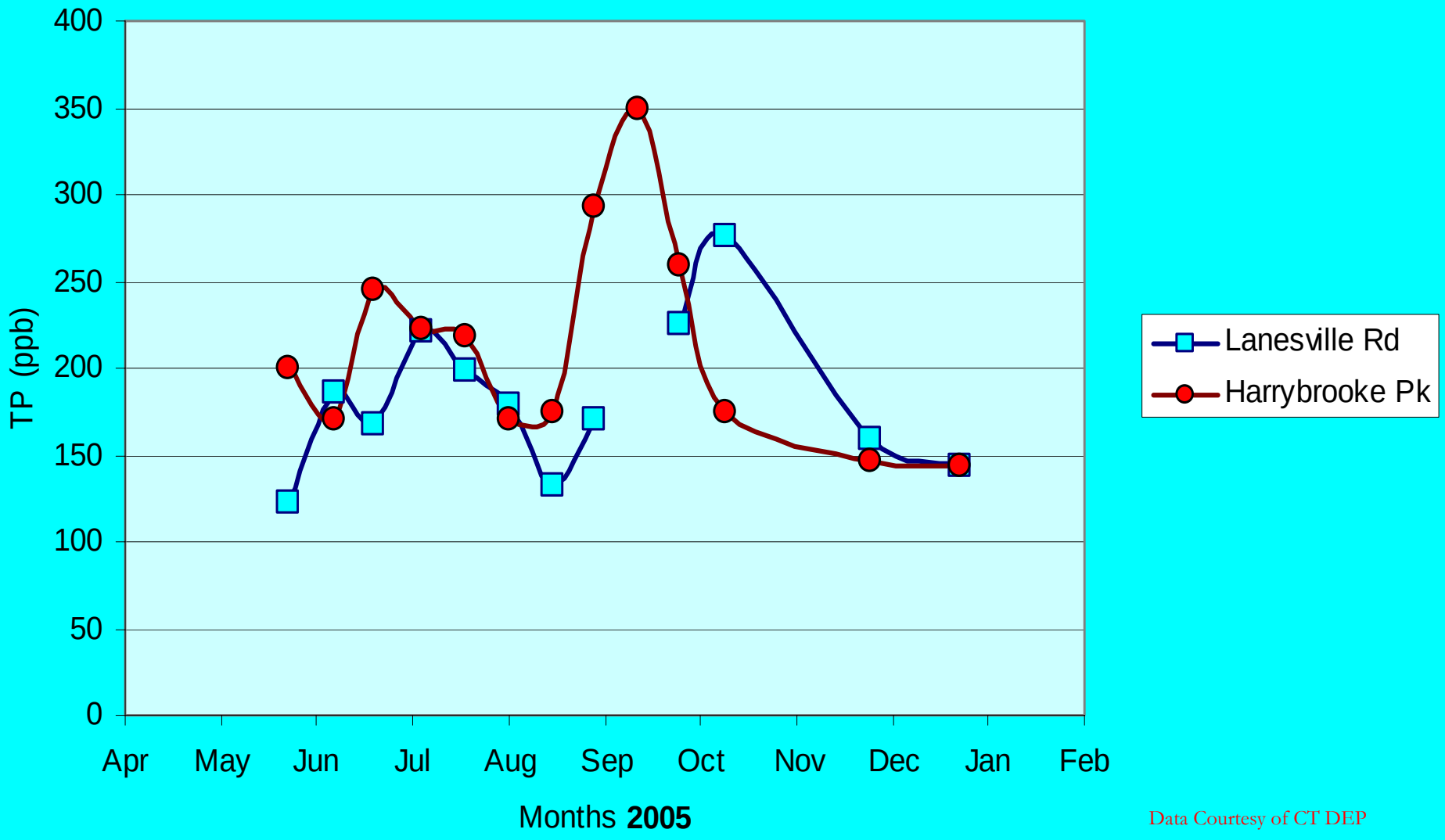
Still River Concentration Set At 100 ppb



Phosphorus Concentrations in Still River Required to Bring Mass Flow at Basin 5 to Unity

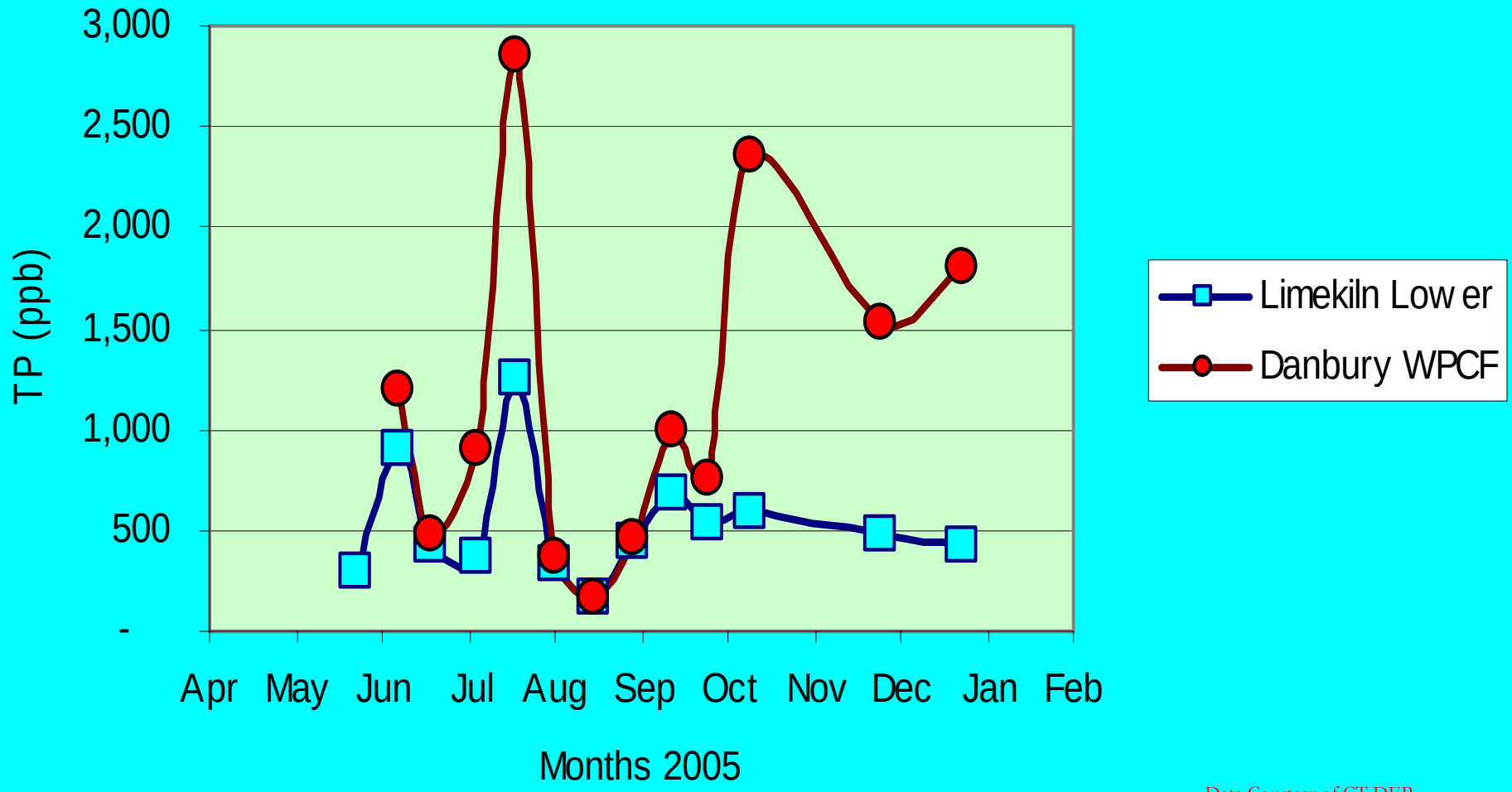


Still River Phosphorus Concentrations From 2005



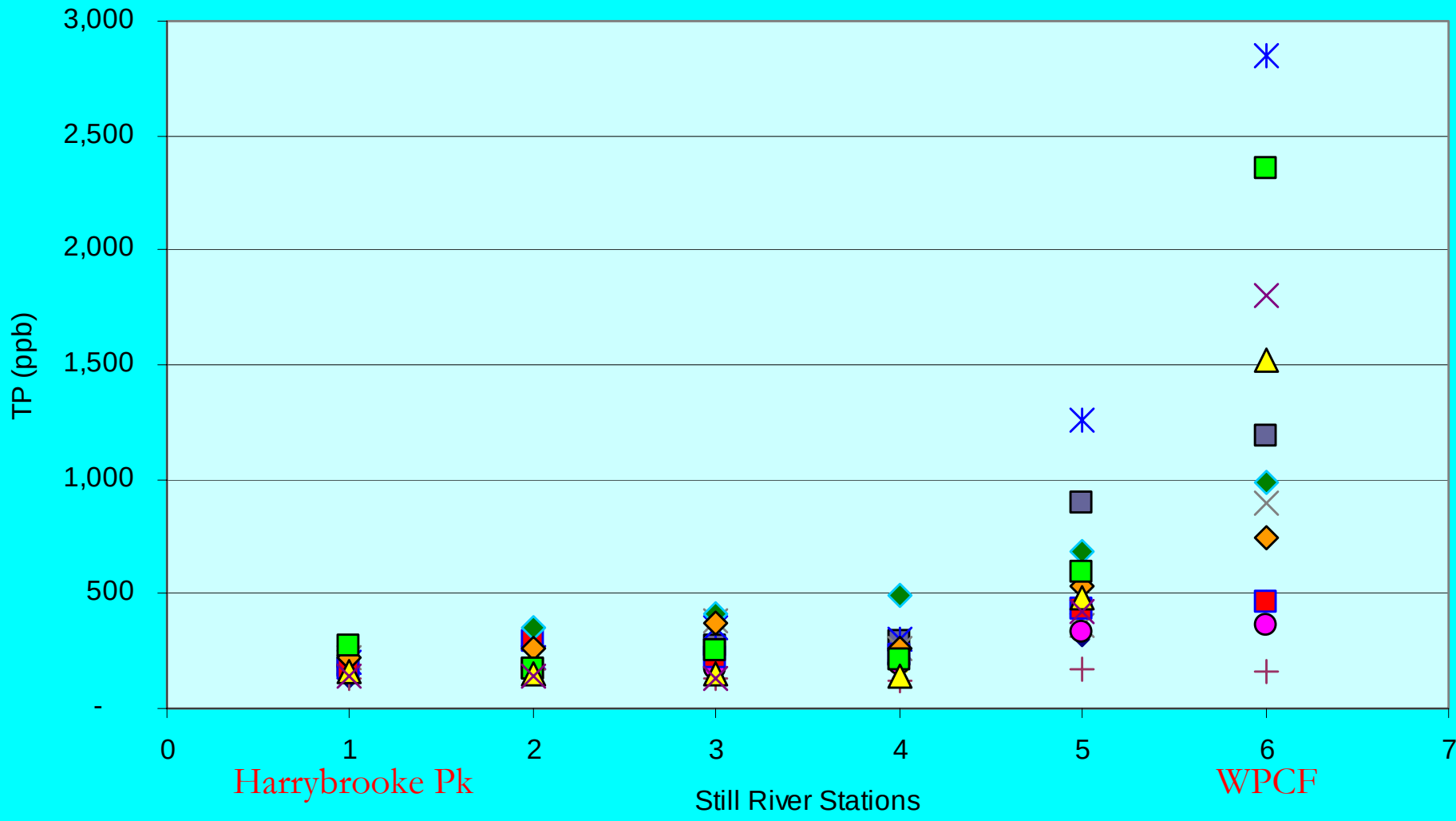
Data Courtesy of CT DEP

Phosphorus Concentrations in Limekiln Brook

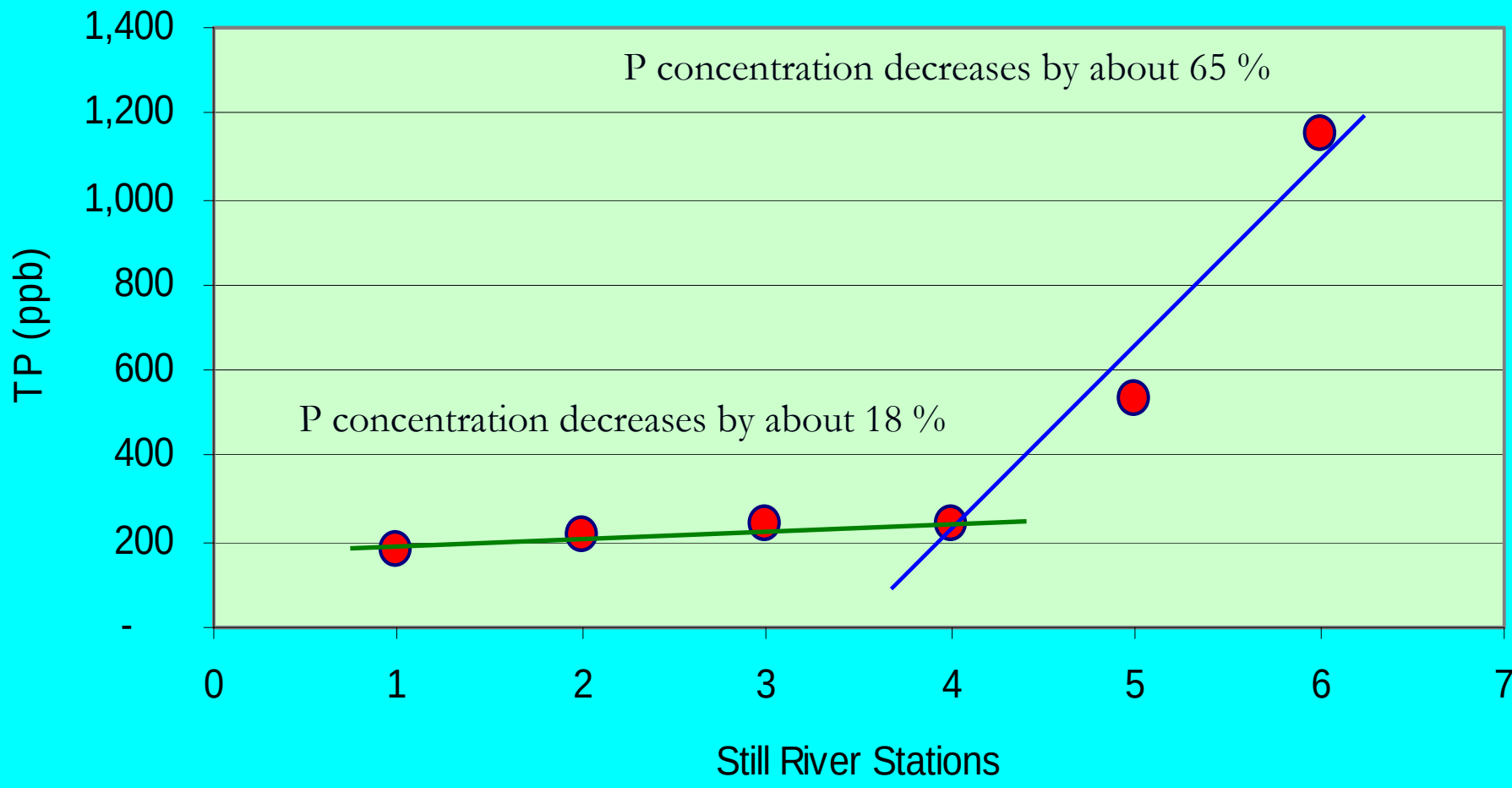


Data Courtesy of CT DEP

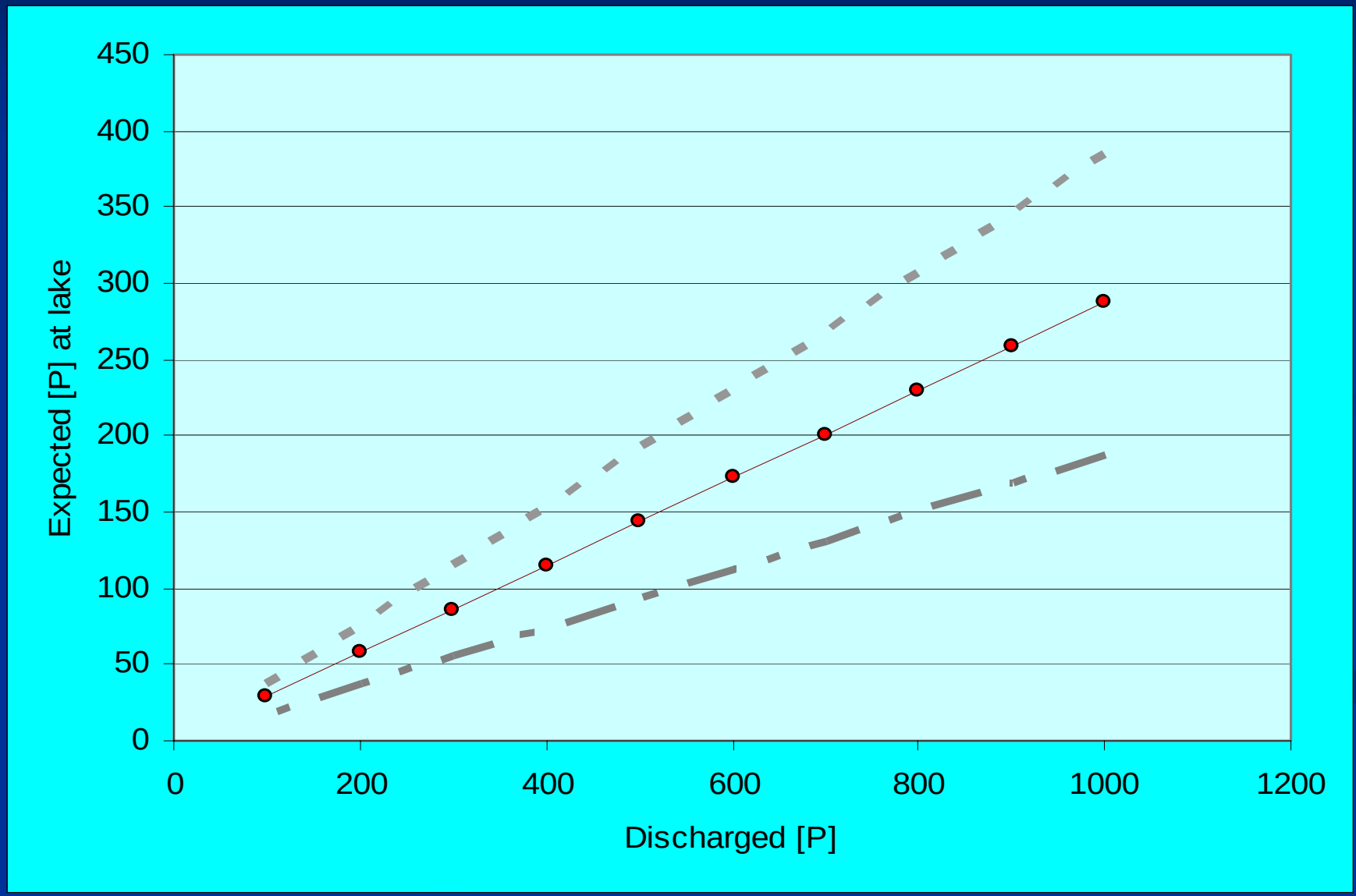
Decay of WPCF Phosphorus in Still River System



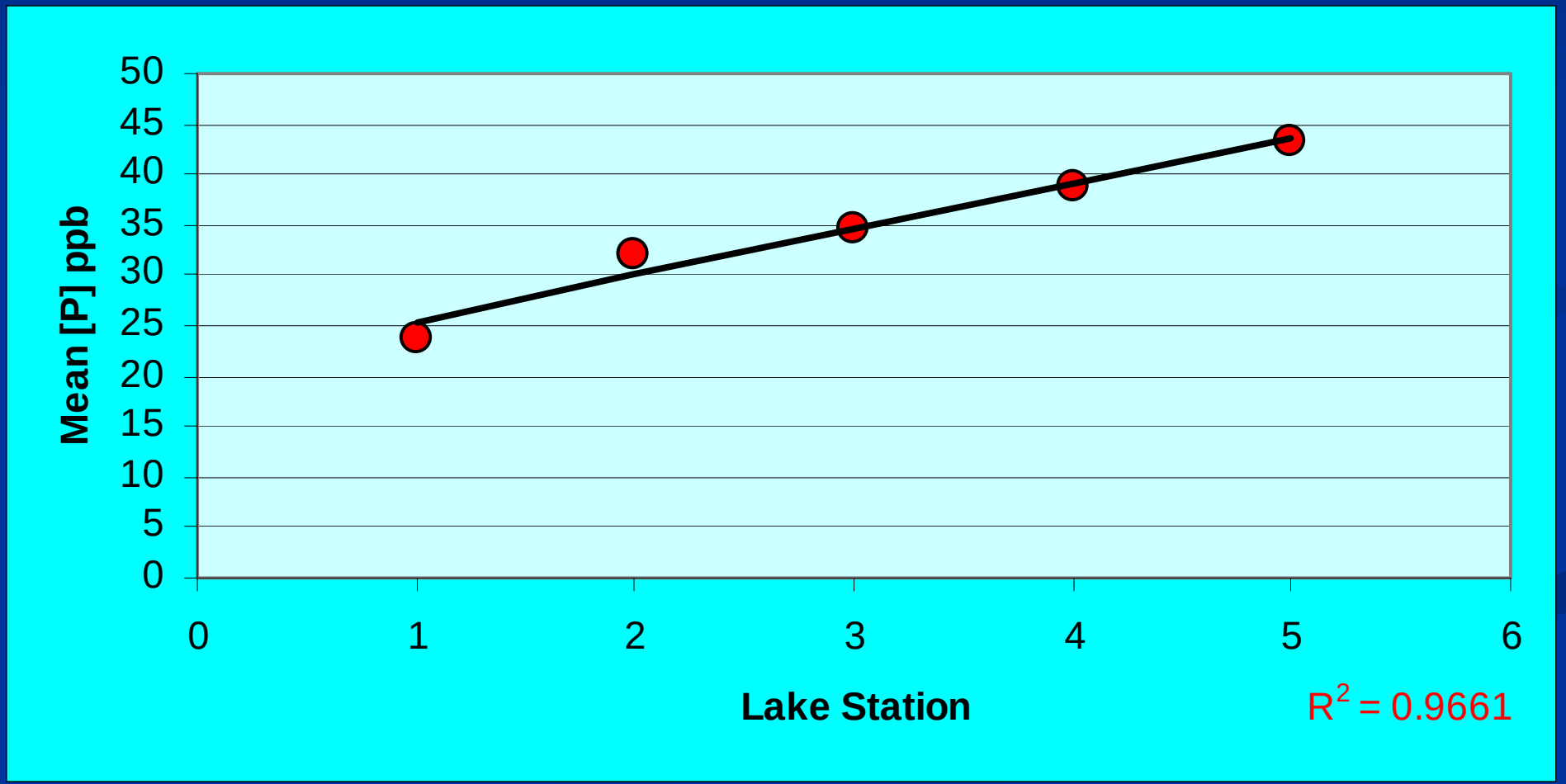
Decay of Original WPDF [P] in Still River System



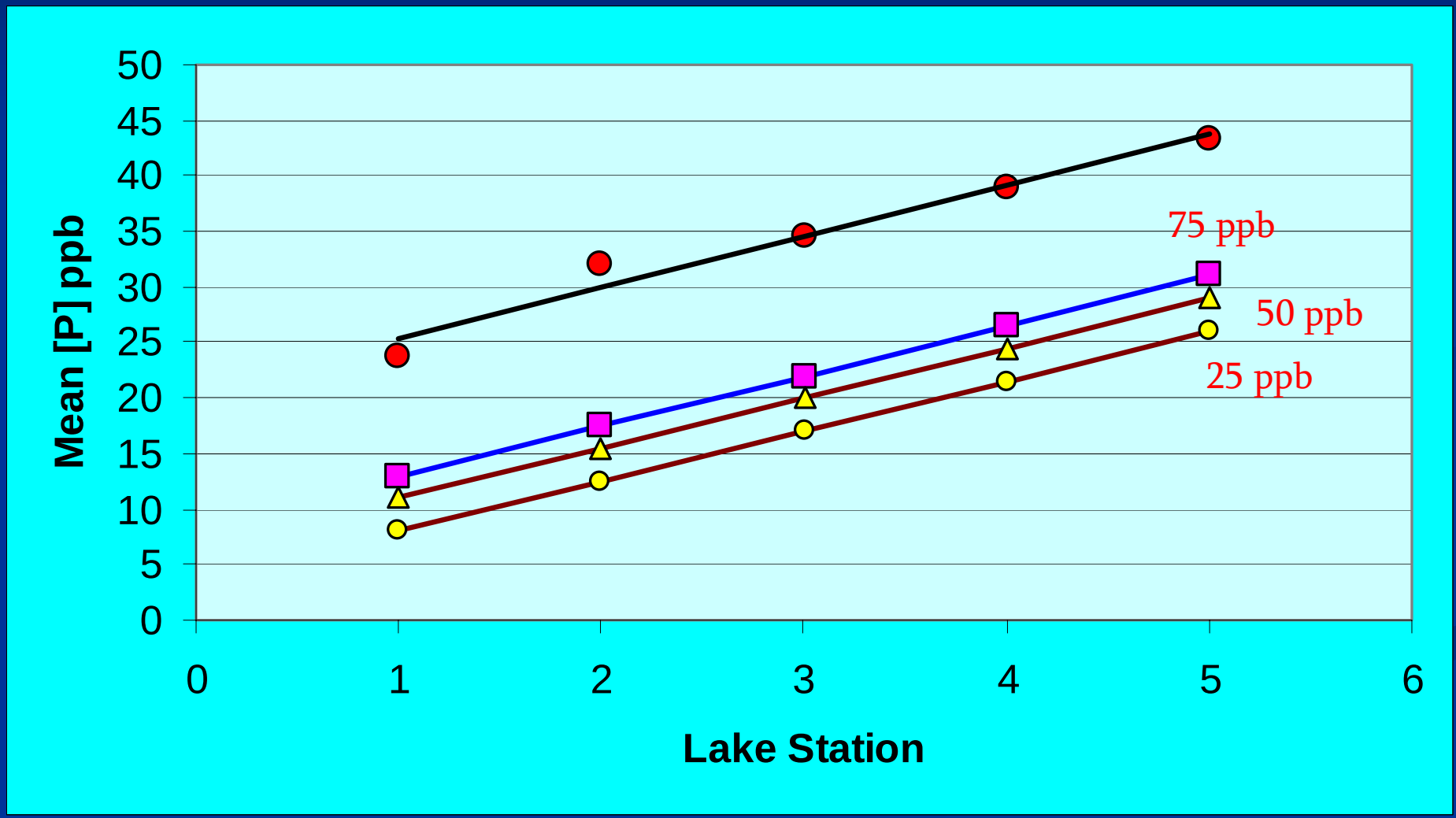
Expected [P] at Mouth of Still River Given Limekiln Brook [P] and Observed Decay

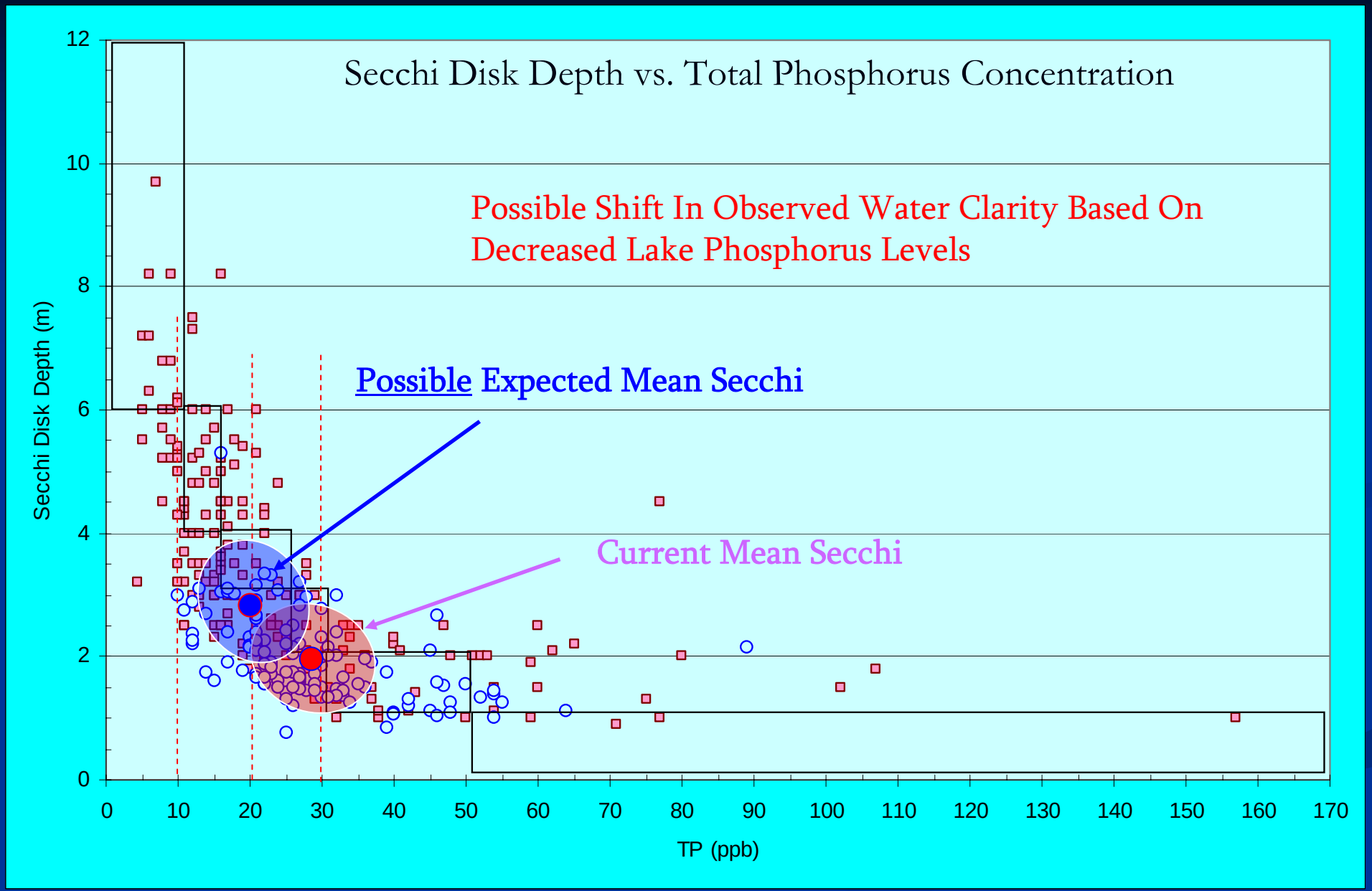


Observed Decrease in Lake P Concentration From Lovers Leap to Shepaug Dam During 2007

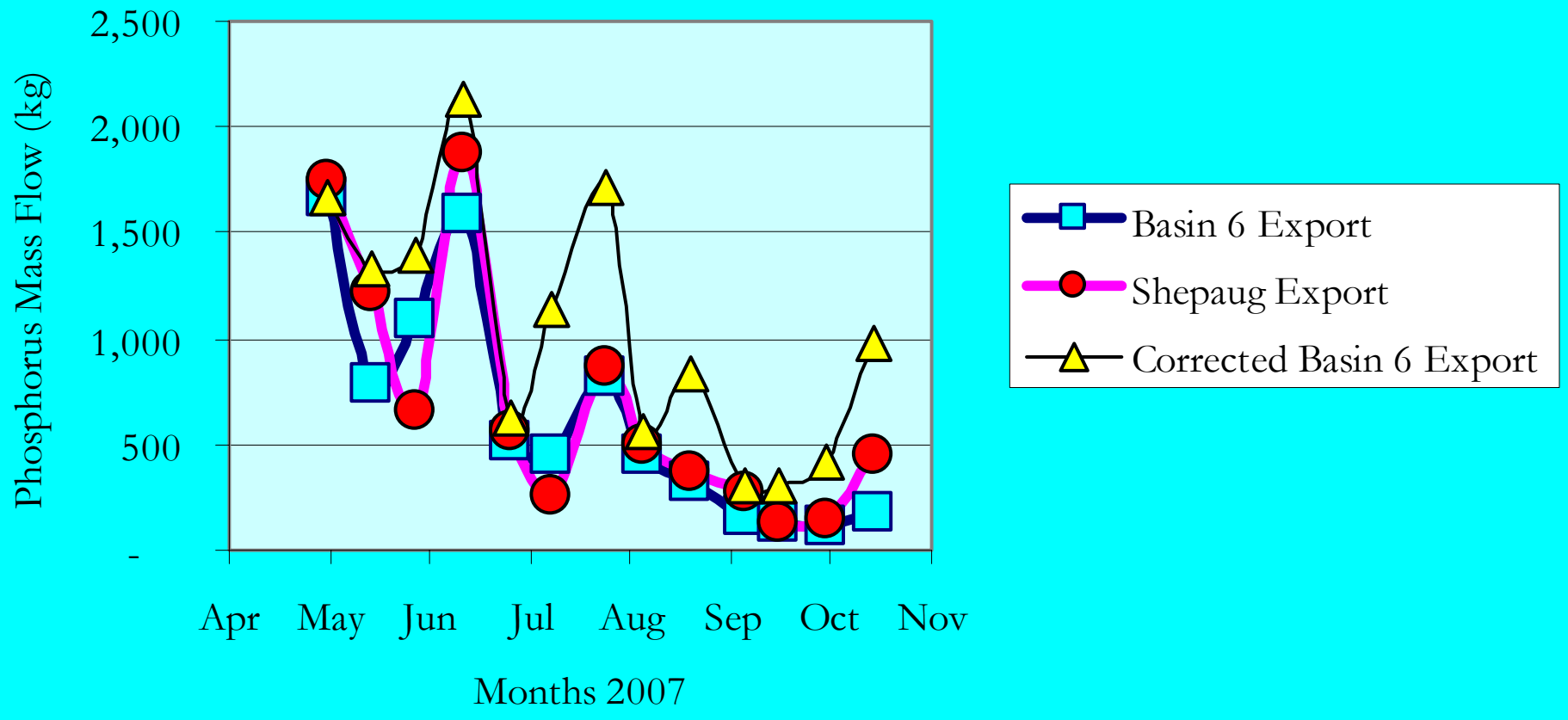


Possible Lake [P] Concentrations With Different Scenarios of Still River [P]




Secchi Disk Depth vs. Total Phosphorus Concentration
Possible Shift In Observed Water Clarity Based On Decreased Lake Phosphorus Levels
Possible Expected Mean Secchi
Current Mean Secchi
Secchi Disk Depth (m)
TP (ppb)
0
2
4
6
8
10
12
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

Lake Phosphorus Mass Balance (2nd)



April To October
In = 34,700 kg
Out = 23,335 kg

May To October
In = 13,402 kg
Out = 9,107 kg

Lake Phosphorus Mass Balance (3rd)