

2006 Monitoring Presentation



TONIGHT'S PRESENTATION

- TEMPERATURE MONITORING

- ALGAE SAMPLING

- NUTRIENT MONITORING

- STORM CHASING

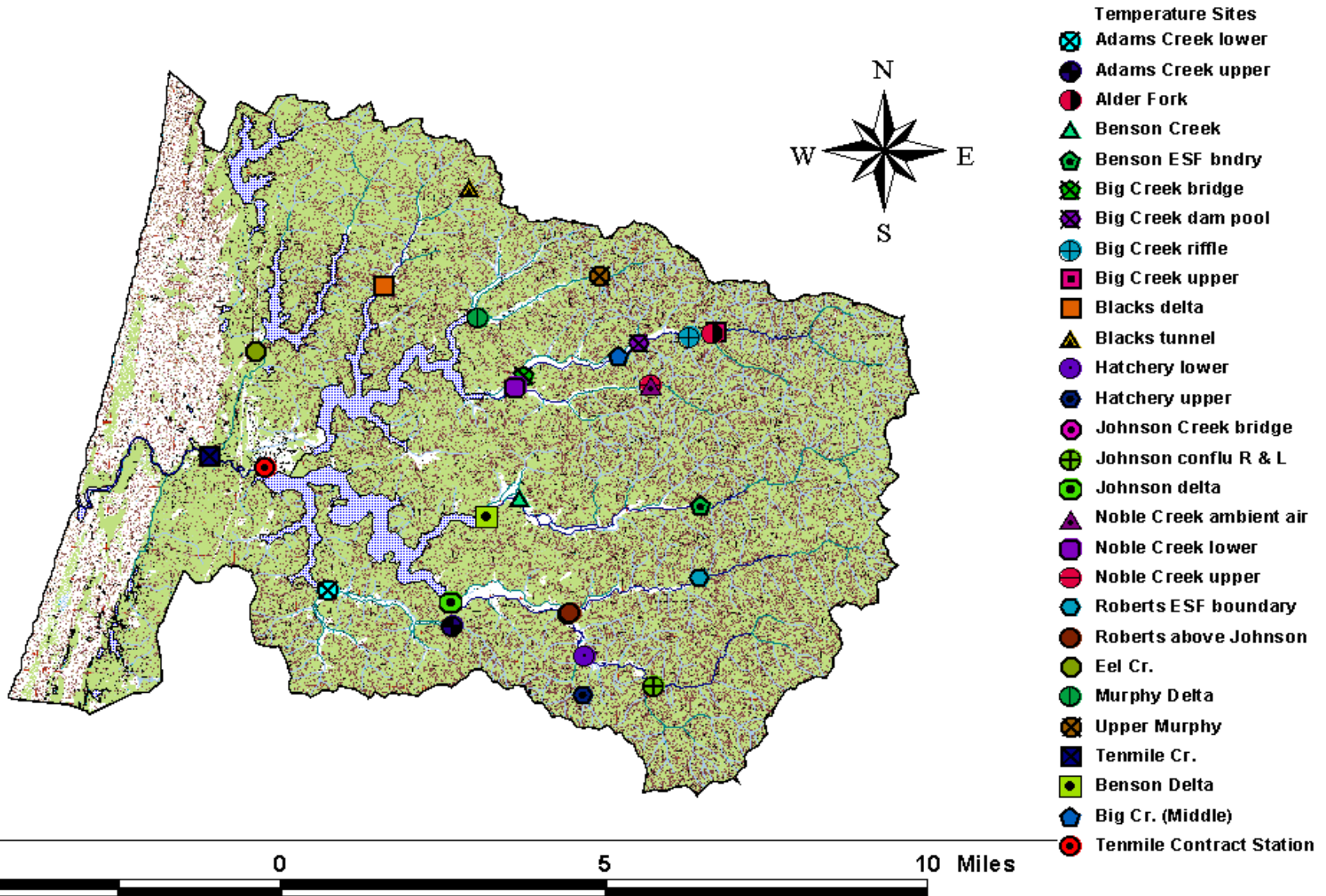
- DELTA BUILDING

- FISH ASSEMBLAGE

- PROJECT EFFECTIVENESS

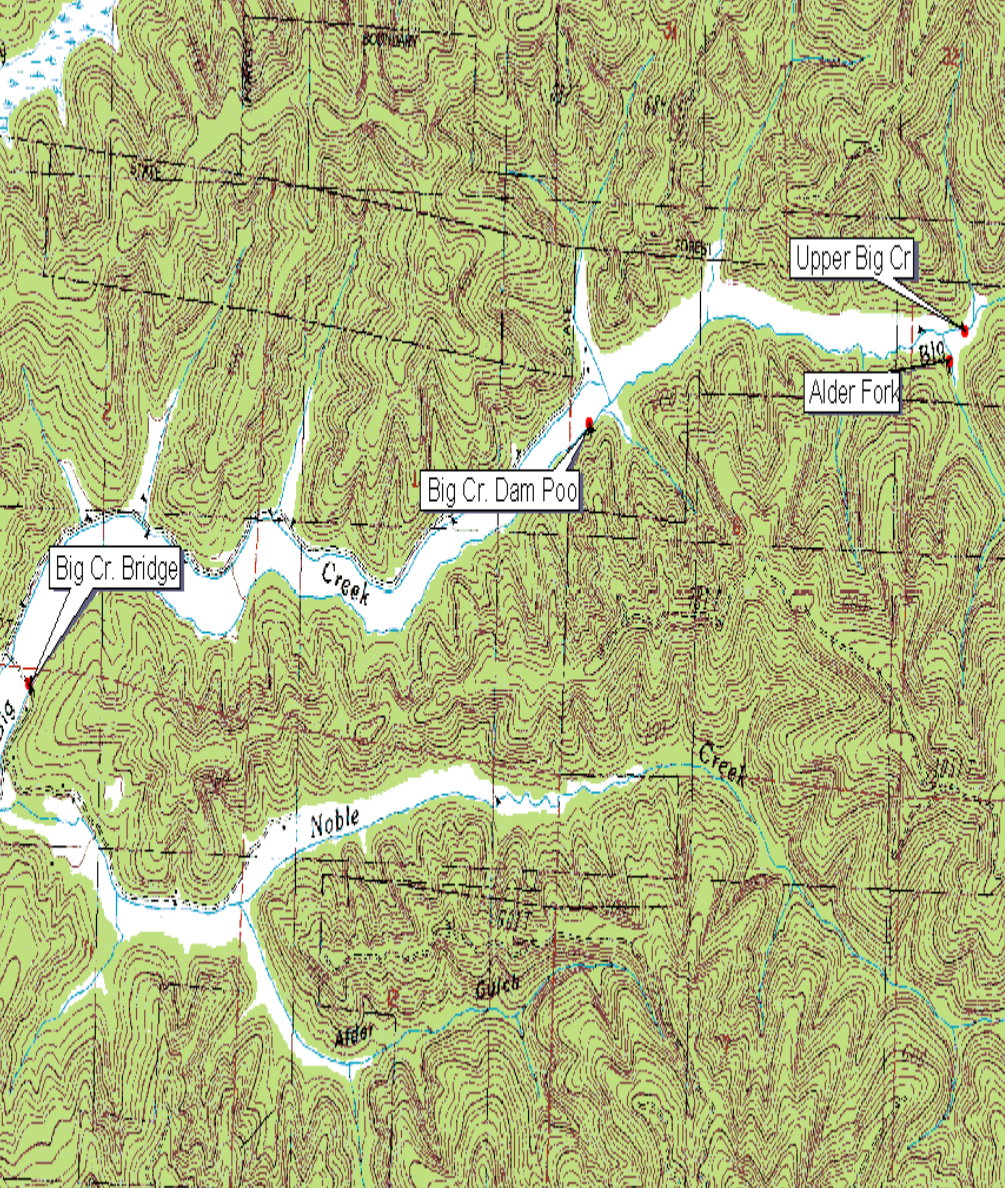


2006 Temperature Monitoring



Site Name	Lat	Long	Start Date	Stop date	Seasonal Maximum		Seasonal Minimum		Seasonal Max ΔT		7-Day averages		
					Date	Value	Date	Value	Date	Value	Date	Maximum	Minimum
Big Cr. Bridge	43.3	124.1	06/03/06	10/29/06	07/23/06	72.3	10/28/06	42.1	07/20/06	9.4	07/23/06	70.5	63.4
Big Cr. (Middle)	43.60801	124.0643	06/03/06	10/29/06	07/23/06	72.3	10/28/06	41.6	07/26/06	17.4	07/25/06	70.7	61.0
Big Cr. Dam	43.60851	124.0614	06/03/06	10/29/06	07/25/06	70.3	10/28/06	41.9	06/11/06	9.2	07/25/06	69.4	66.0
Big Cr. Riffle	43.61172	124.0406	06/03/06	10/29/06	07/24/06	74.1	10/29/06	44.8	09/11/06	14.5	07/25/06	72.8	60.8
Alder Fork	43.61139	124.0392	06/03/06	10/29/06	07/24/06	64.9	10/26/06	45.1	06/24/06	7.0	07/25/06	63.7	59.2
Upper Big Cr.	43.6119	124.0377	06/03/06	10/29/06	07/23/06	70.0	10/26/06	44.8	07/20/06	9.0	07/24/06	67.9	61.2
Benson Cr. Bridge	43.61814	124.0967	06/03/06	10/29/06	07/27/06	68.6	10/27/06	43.7	08/18/06	10.4	07/26/06	66.6	62.4
Benson ESF Boundary	43.57235	124.0405	06/08/06	11/05/06	07/24/06	67.7	11/01/06	41.6	06/25/06	8.8	07/24/06	66.7	62.7
Benson Cr. Delta	43.56752	124.1055	05/23/06	10/30/06	07/24/06	71.2	10/30/06	41.6	07/07/06	9.5	07/25/06	69.3	62.6
Lower Murphy Cr.	43.5	124	05/26/06	11/05/06	07/27/06	64.9	11/01/06	39.5	08/18/06	9.7	07/25/06	64.1	58.6
Roberts ESF Boundary	43.5	124	06/08/06	11/05/06	06/26/06	67.2	11/01/06	42.4	07/07/06	10.0	06/28/06	66.6	58.3
Roberts Cr.	43.54436	124.0777	05/24/06	10/19/06	06/26/06	71.7	10/13/06	48.5	05/29/06	9.4	06/27/06	70.4	63.1
Johnson Cr. Delta	43.54692	124.1151	05/23/06	10/30/06	07/25/06	73.2	10/30/06	41.6	06/24/06	8.6	07/25/06	71.8	68.9
Robertson Bridge	43.5	124	05/24/06	10/24/06	10/22/06	80.2	10/11/06	44.8	10/22/06	22.6	10/21/06	69.6	55.6
Lower Johnson Cr. Bridge	43.54597	124.0794	05/24/06	10/19/06	07/25/06	74.4	05/28/06	51.7	08/17/06	7.2	07/25/06	73.0	68.9
Mid Johnson	43.5	124	05/24/06	10/19/06	07/24/06	75.6	05/28/06	50.9	06/24/06	10.4	07/25/06	74.2	68.0
Johnson Cr. Ambient Air	43.5	124	05/24/06	10/19/06	09/01/06	86.0	10/10/06	34.8	09/01/06	42.0	07/23/06	81.3	55.7
Johnson Cr. Confluence	43.53031	124.0527	05/24/06	10/19/06	06/11/06	57.6	10/12/06	49.8	05/30/06	5.3	06/20/06	56.5	52.8
Lower Hatchery Cr.	43.53503	124.0742	05/24/06	10/19/06	06/25/06	58.1	10/11/06	48.0	06/24/06	6.4	06/26/06	57.0	52.2
Upper Hatchery Cr.	43.53041	124.0769	05/24/06	10/19/06	09/09/06	57.6	10/10/06	44.5	08/31/06	7.5	09/04/06	56.5	51.9
Blacks Delta	43.62129	124.1393	05/23/06	10/17/06	06/13/06	68.6	10/12/06	45.1	06/13/06	14.8	07/25/06	63.7	57.8
Upper Blacks Cr.	43.5	124	05/25/06	10/17/06	07/24/06	63.8	10/12/06	45.1	08/18/06	8.0	07/25/06	62.5	56.8
Noble Cr. Ambient Air	43.59947	124.0574	05/27/06	11/05/06	09/01/06	86.7	10/31/06	25.3	09/01/06	42.7	07/23/06	81.2	54.5
Upper Noble Cr.	43.59947	124.0574	05/26/06	11/05/06	06/24/06	61.3	11/01/06	42.4	06/23/06	8.6	07/26/06	60.3	58.9
Noble Bridge (Upper)	43.5	124	05/26/06	11/05/06	06/25/06	71.2	10/31/06	40.3	06/24/06	14.6	07/24/06	68.4	63.4

Site Name	Start Date	Stop date	Seasonal Maximum		Seasonal Minimum		Seasonal Max ΔT		7-Day averages				Days >	Days >	Days >
			Date	Value	Date	Value	Date	Value	Date	Maximum	Minimum	Δ T	55 F	64 F	70 F
Upper Big Cr.	06/03/06	10/29/06	07/23/06	70.0	10/26/06	44.8	07/20/06	9.0	07/24/06	67.9	61.2	6.6	115	17	0
Upper Big Cr.	05/27/05	10/26/05	07/05/05	64.9	06/08/05	49.3	06/29/05	7.9	07/16/05	63.3	58.2	5.1	107	3	0
Big Cr. Upper	06/02/04	09/22/04	08/31/04	66.9	06/15/04	50.6	07/06/04	8.1	08/29/04	65.0	59.0	6.0	107	6	0
Big Cr. Upper	06/03/03	11/04/03	07/22/03	65.2	11/01/03	41.9	06/04/03	7.9	07/21/03	63.2	60.3	2.9	136	4	0
Big upper	06/07/02	10/09/02	07/29/02	66.9	10/03/02	50.1	07/09/02	9.6	07/30/02	64.5	57.6	6.9	114	18	0
Big Creek upper	06/02/01	10/01/01	08/07/01	66.2	06/04/01	48.2	08/05/01	7.2	08/08/01	63.9	59.0	4.9	115	4	0



Big Cr. 7 Day Avg. Maximum Temperature (°F)

Upper- 64.6°

Alder Fork- 61.5°

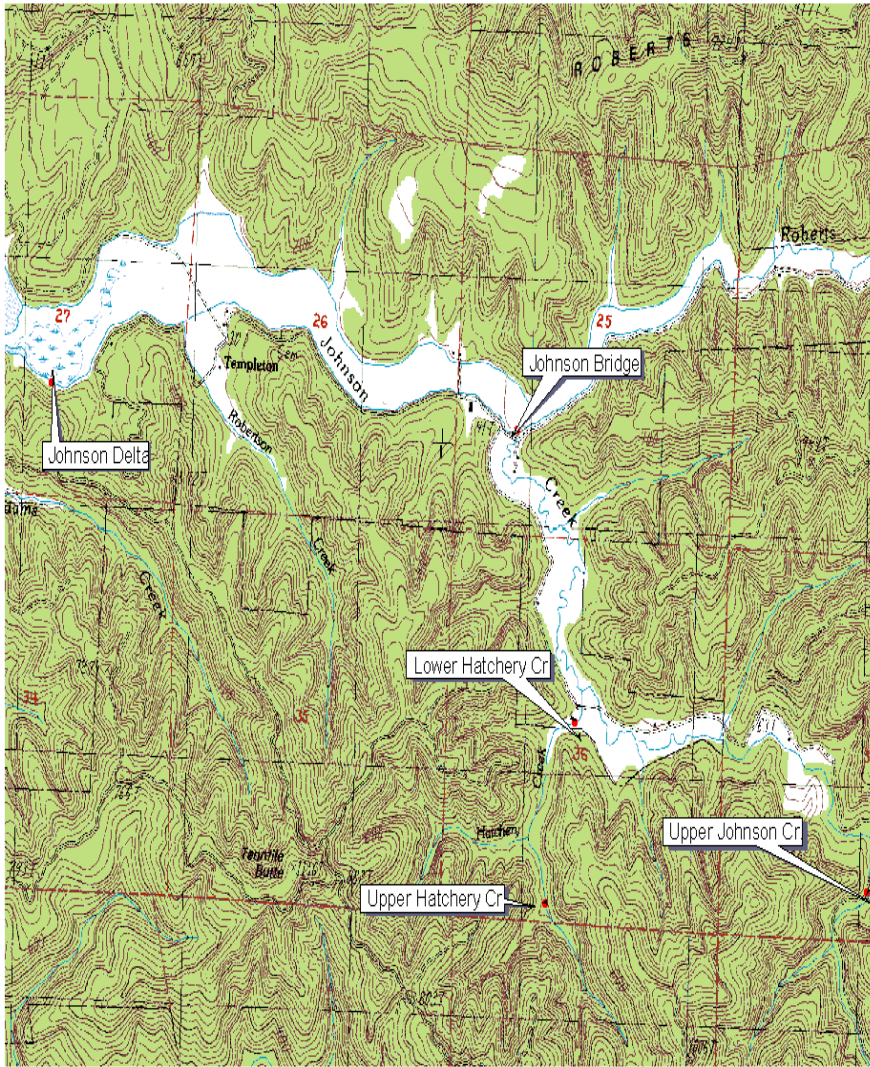
Dam pool- 69.3°

Bridge- 67.9°

Final EPA Temperature Guidance (2003) (°F)

Salmon Rearing- 64°

Salmon Migration- 68°



Johnson Cr. 7 Day Avg. Maximum Temperature (°F)

Upper- 57.8°

Upper Hatchery- 57°

Lower Hatchery- 57°

Bridge- 70.92°

Delta- 74.4°

Final EPA Temperature Guidance (2003) (°F)

Salmon Rearing- 64°

Salmon Migration- 68°



Benson Cr. 7 Day Avg.
Maximum Temperature (°F)

Upper- 67.5°

Bridge- 67.5°

Delta- 68.1°

Final EPA Temperature Guidance
(2003) (°F)

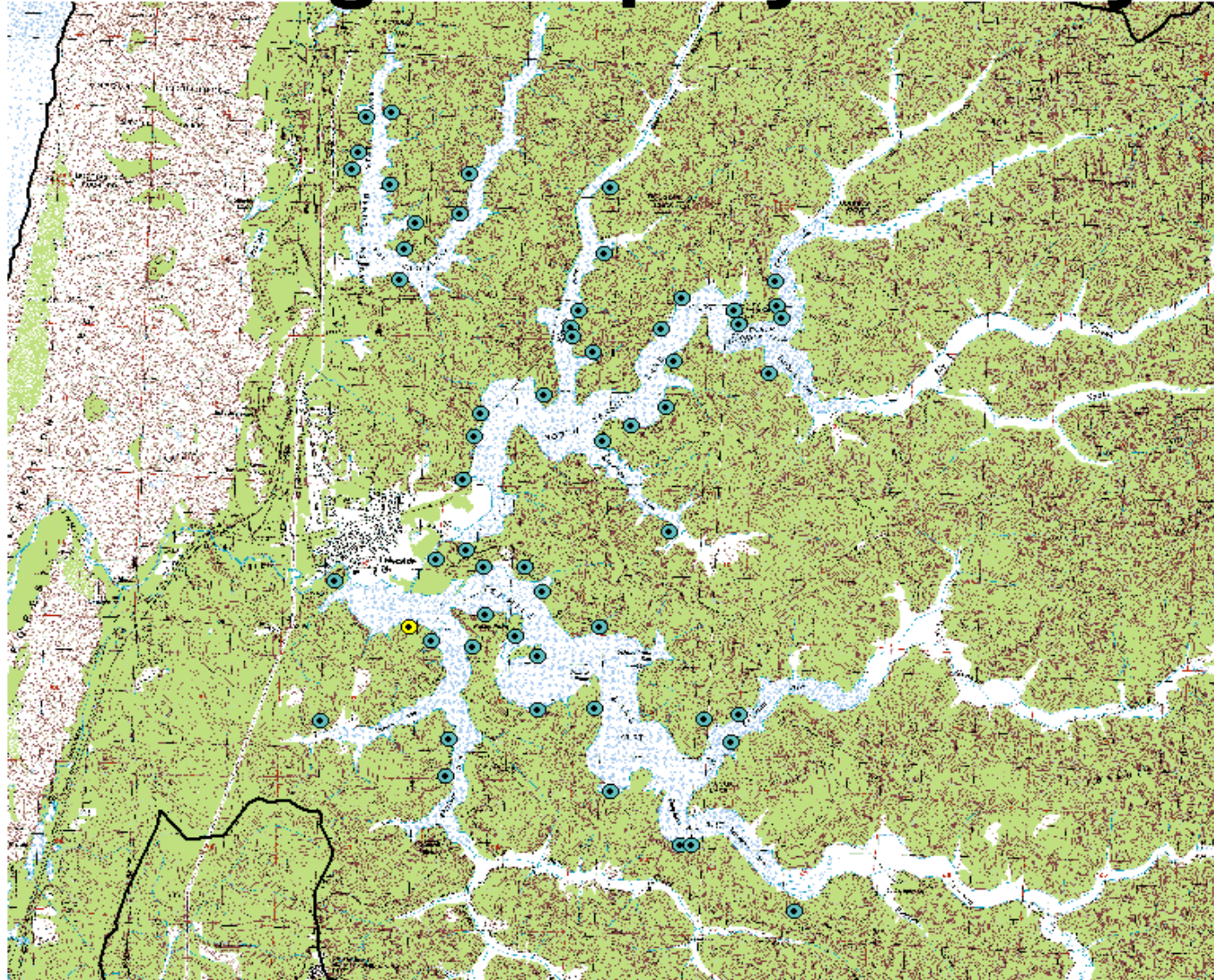
Salmon Rearing- 64°

Salmon Migration- 68°

Eagle/ Osprey Surveys



2006 Eagle/Osprey Surveys



Nesting Sites

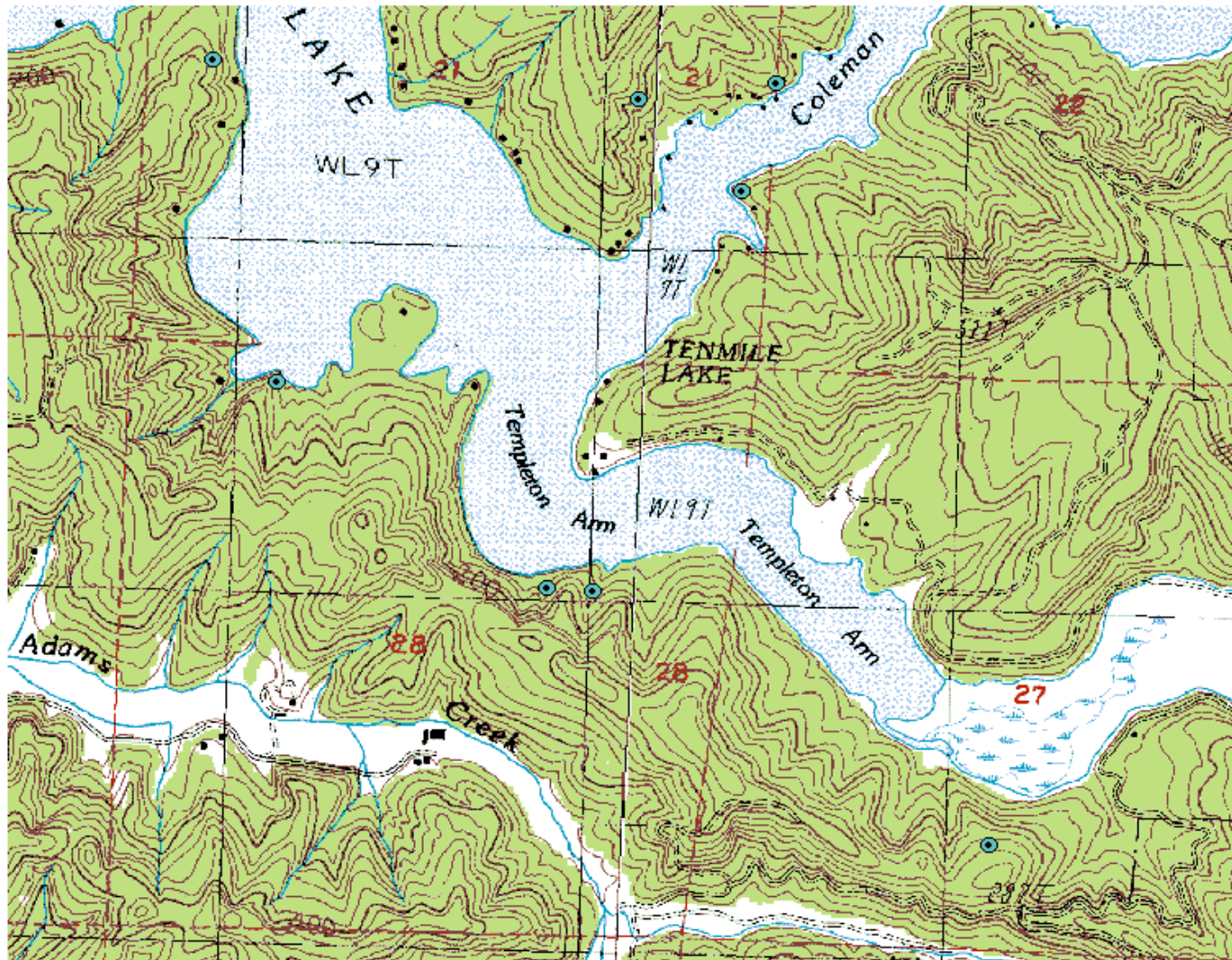
<u>Basin</u>	<u>2002</u>	<u>2004</u>	<u>2006</u>
North Lake	18	24	20
South Lake	22	24	24
Eel Lake	9	9	10
Total	49	57	54







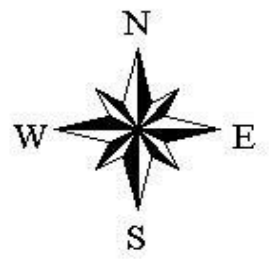
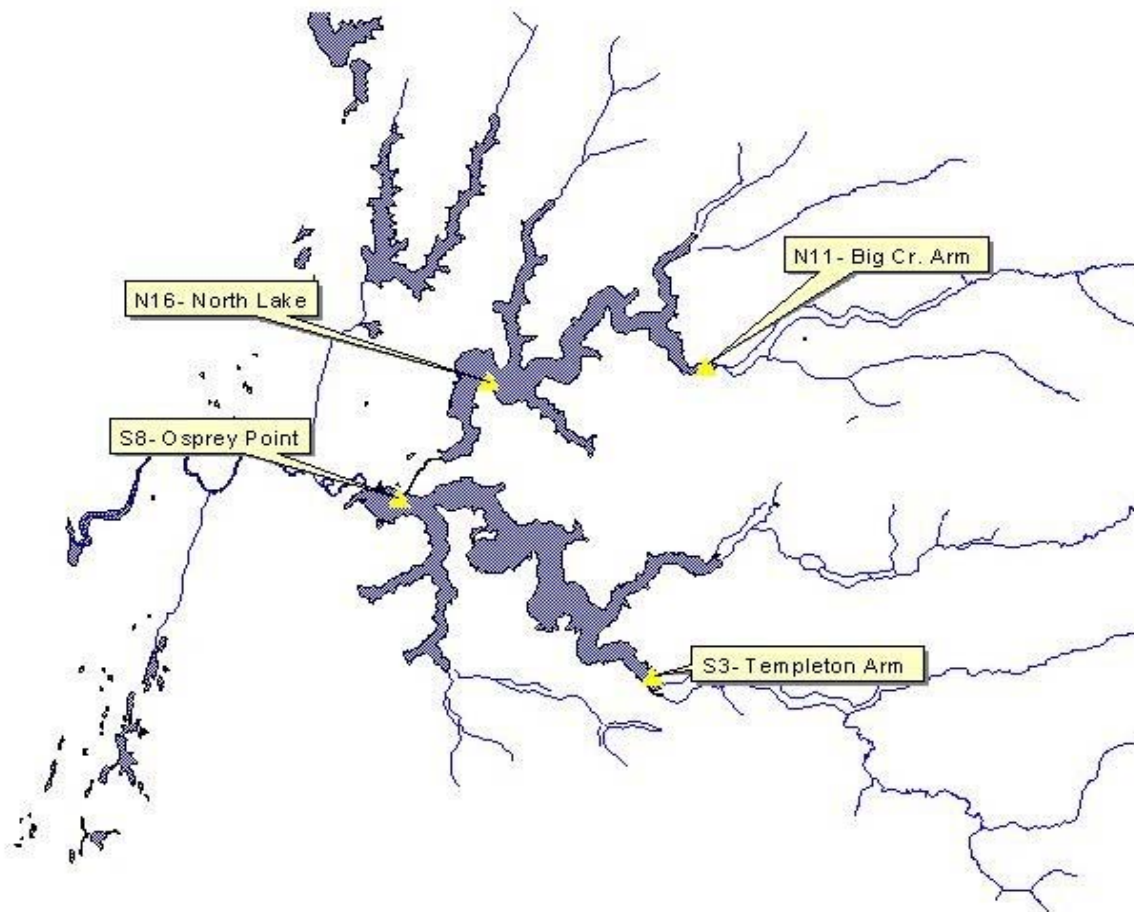
Templeton Arm Sites







Algae

















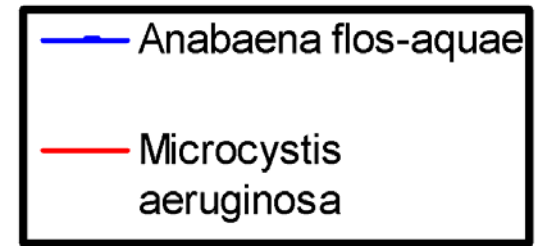
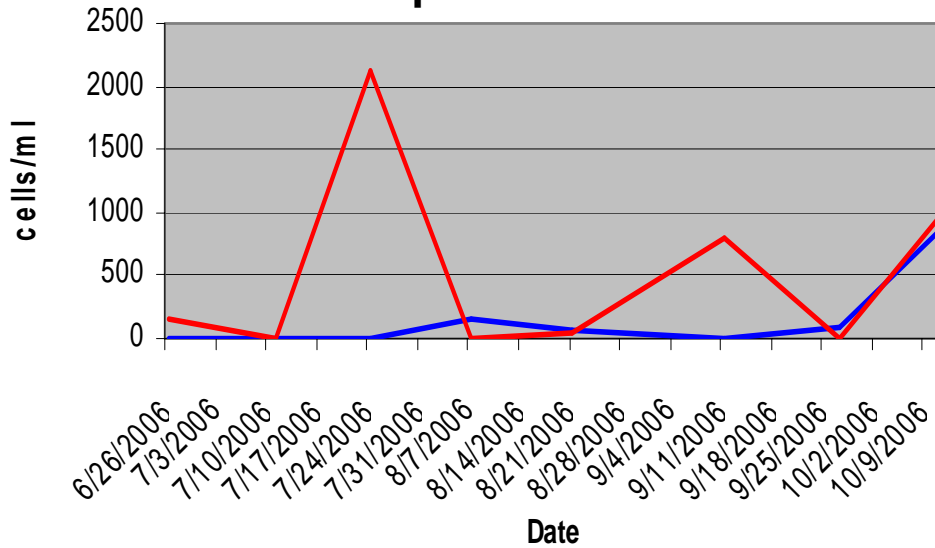




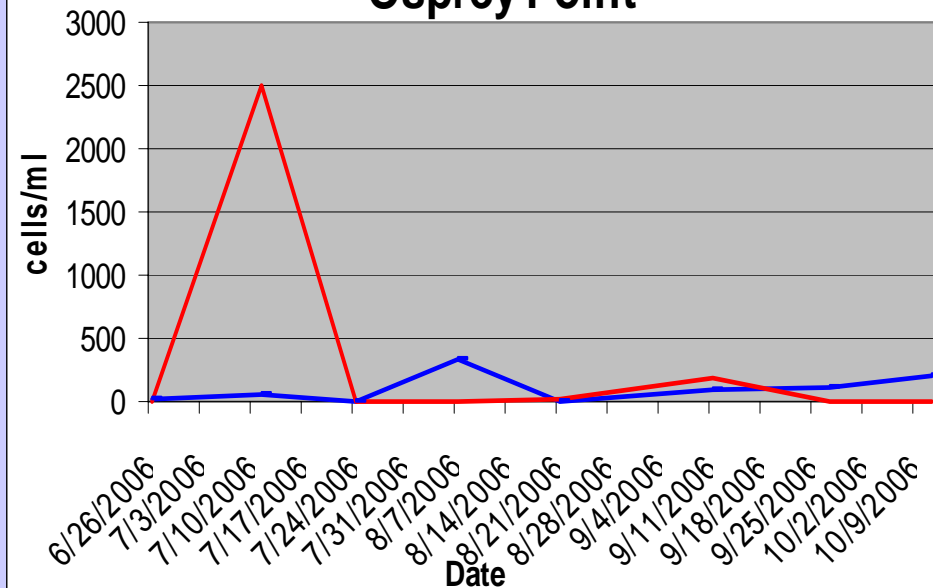


SOUTH LAKE SITES

Templeton Arm

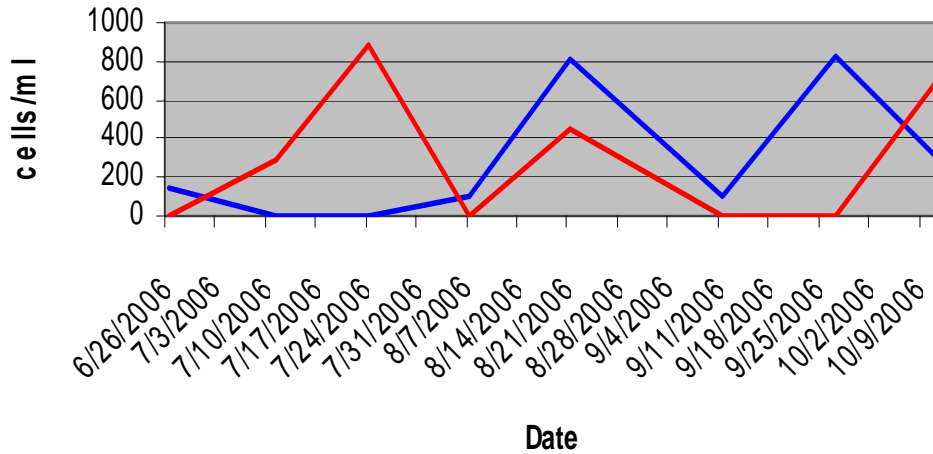


Osprey Point

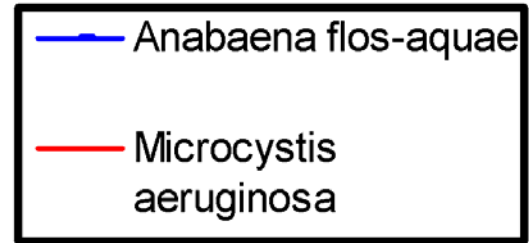
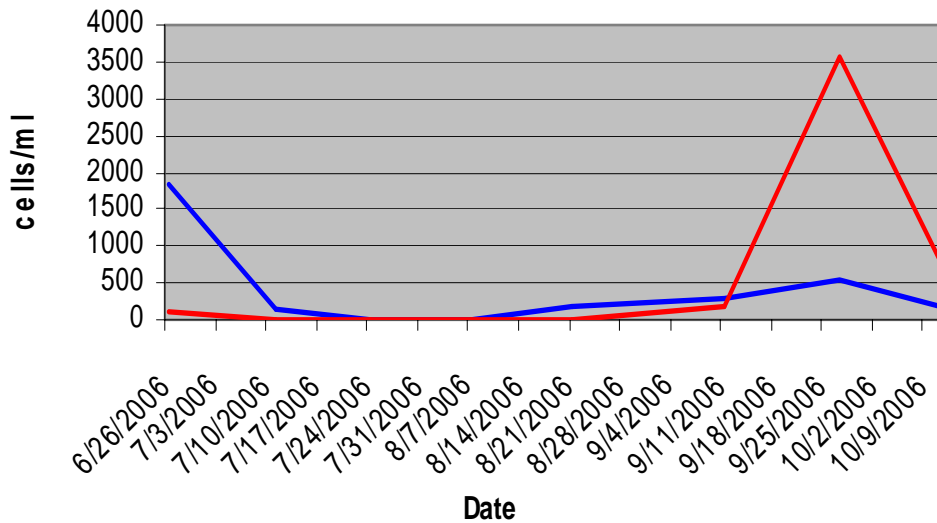


NORTH LAKE SITES

Big Arm



North Lake



**Aquatic Analysts Repeated Sub-sampling for
MSAE on Tenmile Sep 27 Duplicates**

Slide	JU82	JU83
Sample	N16	D
	MSAE (cells/ml)	MSAE (cells/ml)
Original sub-sample	0	3553
2nd sub-sample	74	2116
3rd sub-sample	2502	1523
4th sub-sample	737	2538
Mean	828	2433
±95% Confidence Interval	1852	1361

- 1. Treatment systems should consist of sand filtration followed by chlorination, followed by activated charcoal filtration. It is essential that sand filtration be done before disinfection to remove as many algal cells as possible without killing or rupturing them.**
- 2. Chlorination systems should be capable of maintaining at least 1 ppm of chlorine residual for at least 20 minutes contact time before the water enters the activated charcoal system.**
- 3. The final step in the process should be effective activated charcoal treatment to remove toxin remaining after the sand filtration and disinfection processes.**
- 4. All treatment equipment used should meet NSF standard 53, and should be adequately sized to treat the maximum amount of water that you use. Treatment equipment needs regular monitoring and servicing to assure that it functions properly.**
- 5. Ideally all water entering your home should be treated as recommended. It is possible to treat only water used in the kitchen, but this increases chances that animals or pets would inadvertently drink untreated water.**

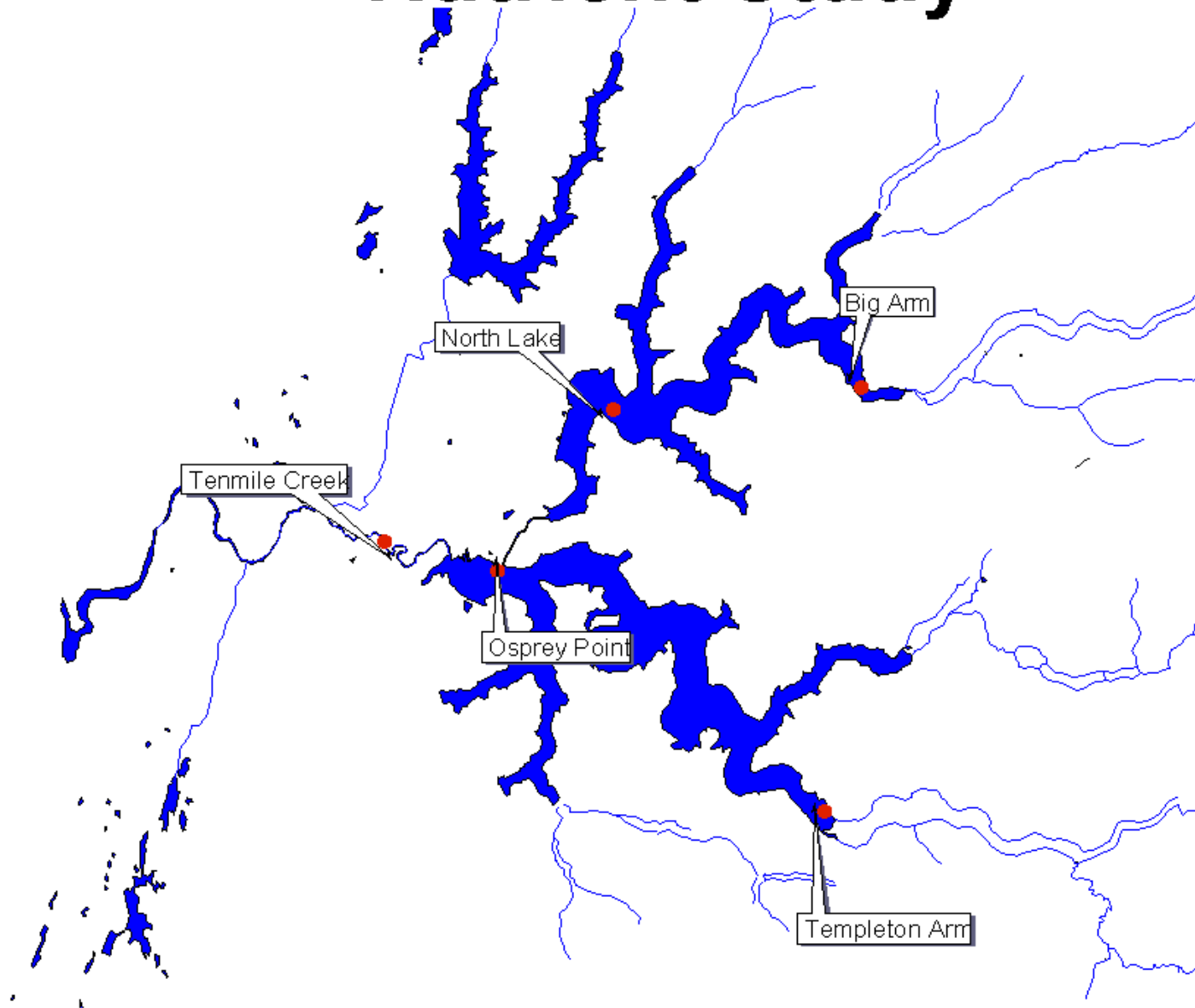
As more monitoring is done and toxin levels are measured this advisory may be altered. The advisory is to remain in effect until specifically changed or lifted by county and state health officials.



Table 1. Cell Density of potentially toxigenic cyanobacteria in Tenmile Lakes, Sep 27 and Oct 11, 2006.

Lab Station ID	Description	Date	<i>Microcystis aeruginosa</i> (cells/ml)	<i>Anabaena flos-aquae</i> (cells/ml)	<i>Anabaena planktonica</i> (cells/ml)	<i>Anabaena circinalis</i> (cells/ml)	<i>Anabaena sp.</i> (cells/ml)	Total <i>Anabaena</i> (cells/ml)
L1	Lindross Arm at Homeowner Tap	9/27/2006	0	326	41	0	0	367
L2	Lindross Arm in Lake at Homeowner Intake	9/27/2006	735	392	221	0	0	613
L1	Lindross Arm at Homeowner Tap	10/11/2006	0	580	232	0	0	812
L2	Lindross Arm in Lake at Homeowner Intake	10/11/2006	0	756	571	33	0	1360

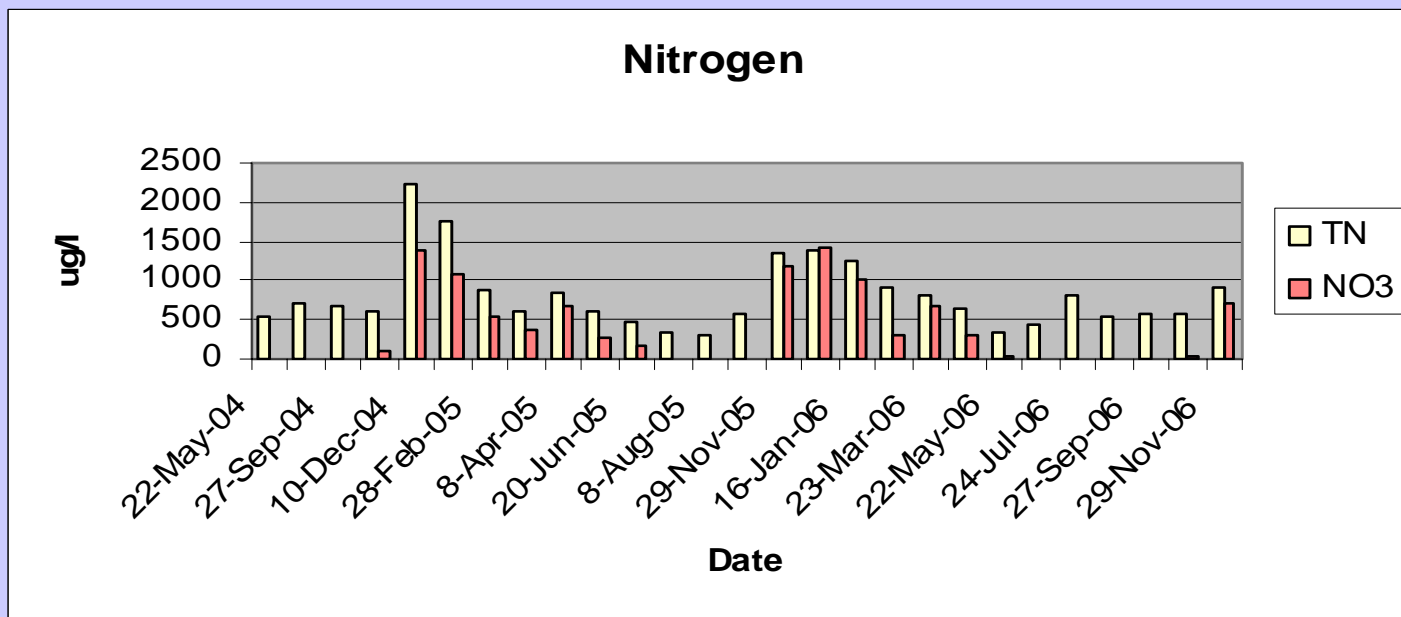
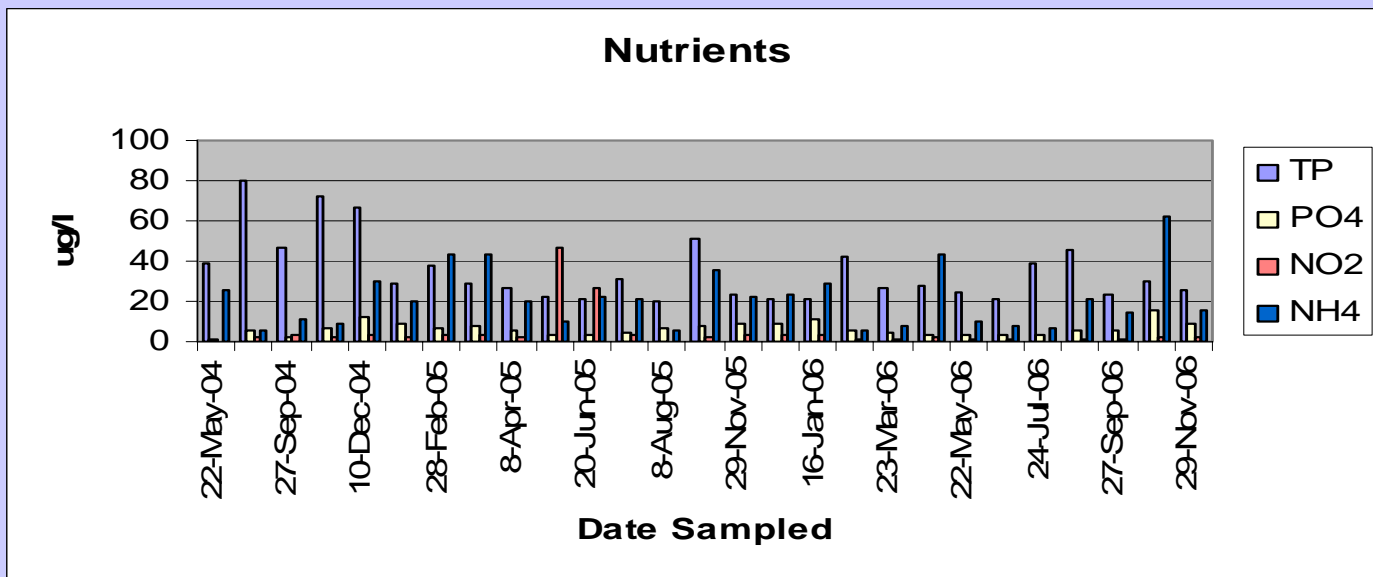
Nutrient Study



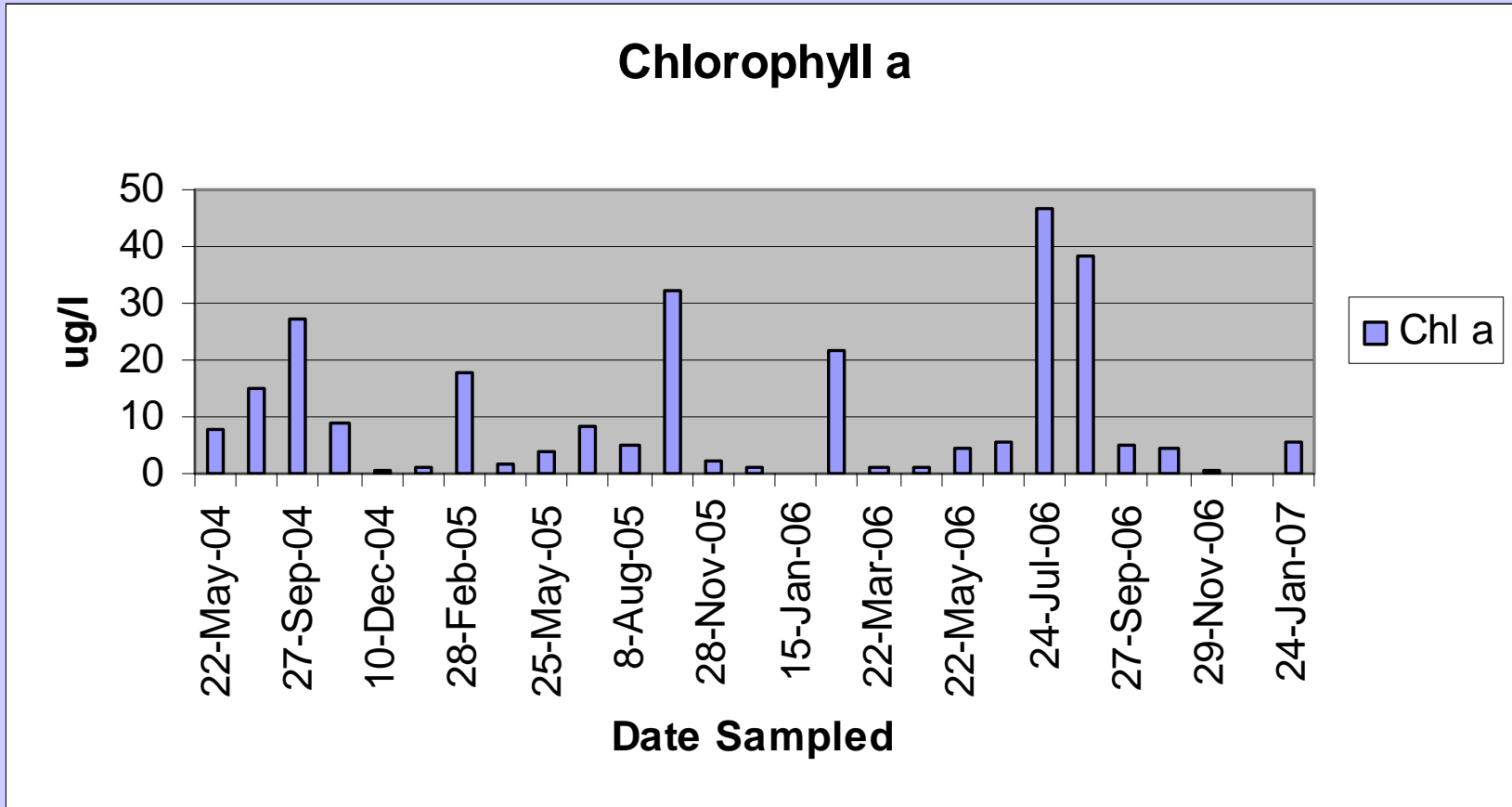




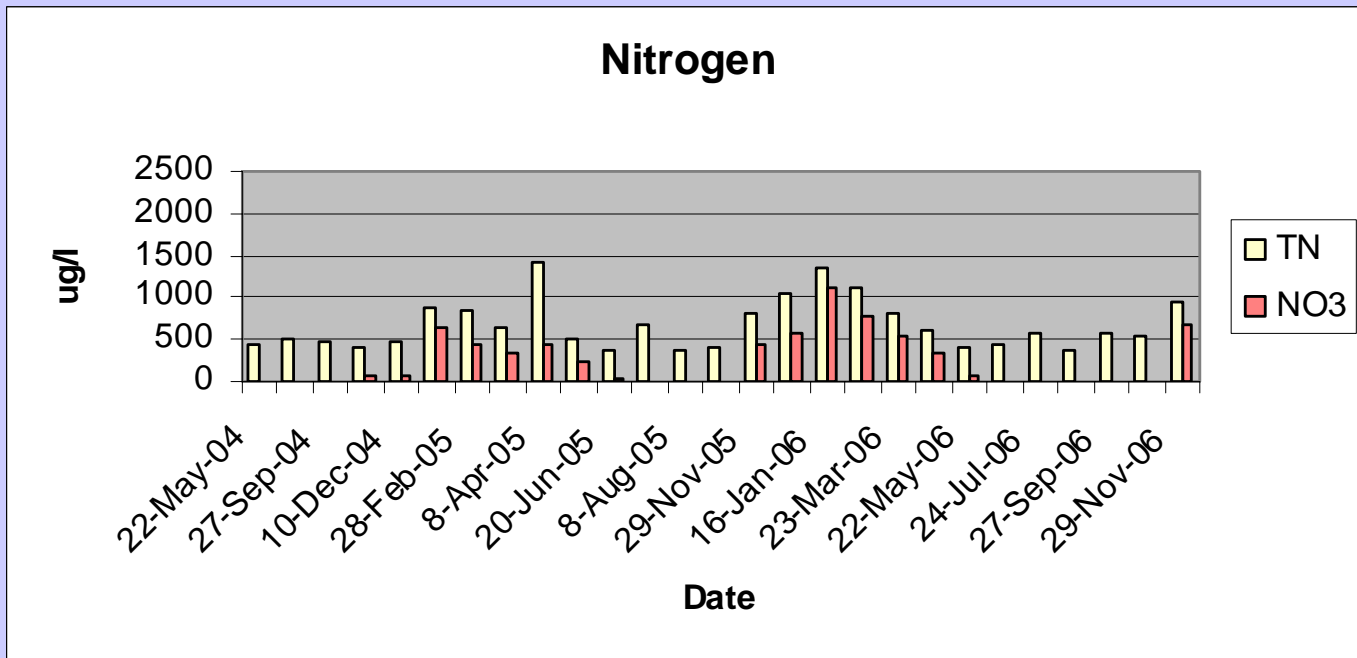
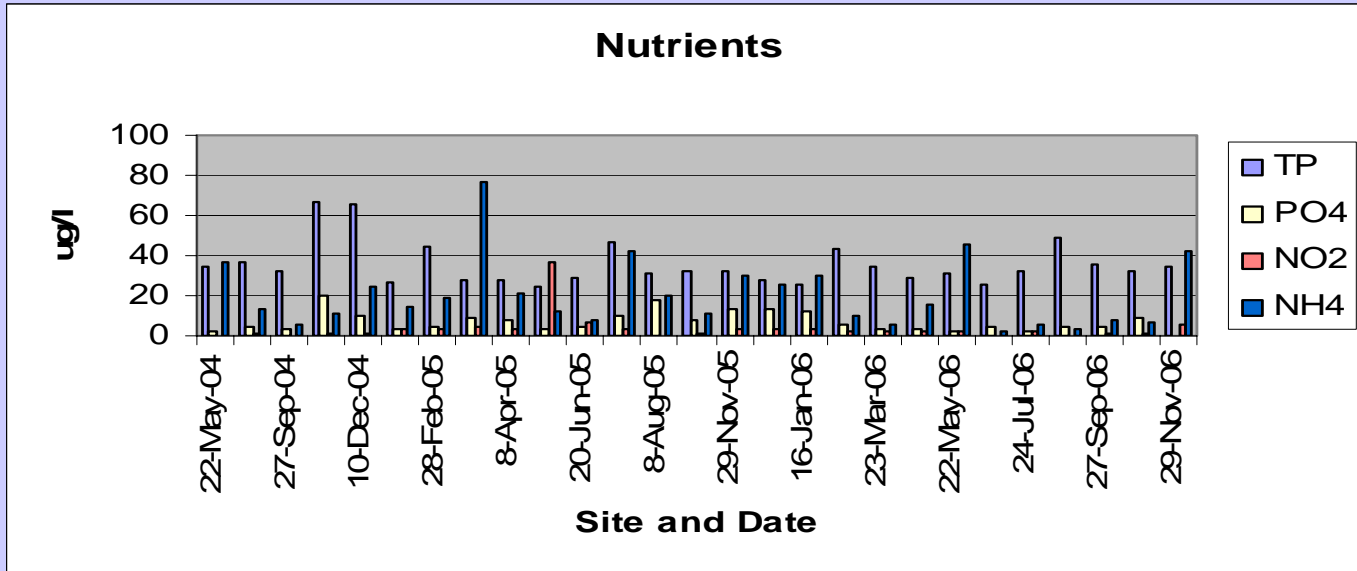
TEMPLETON ARM



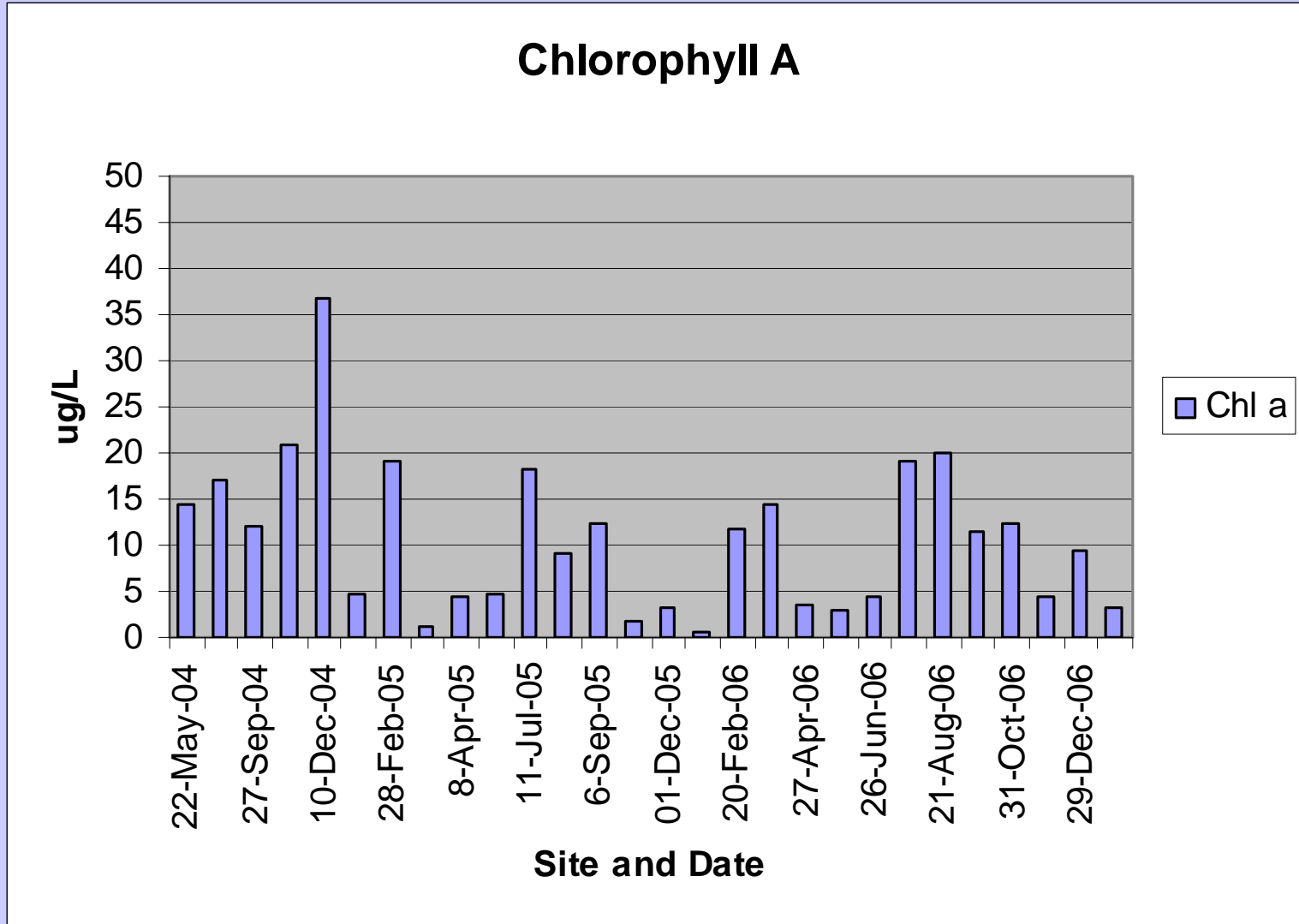
TEMPLETON ARM



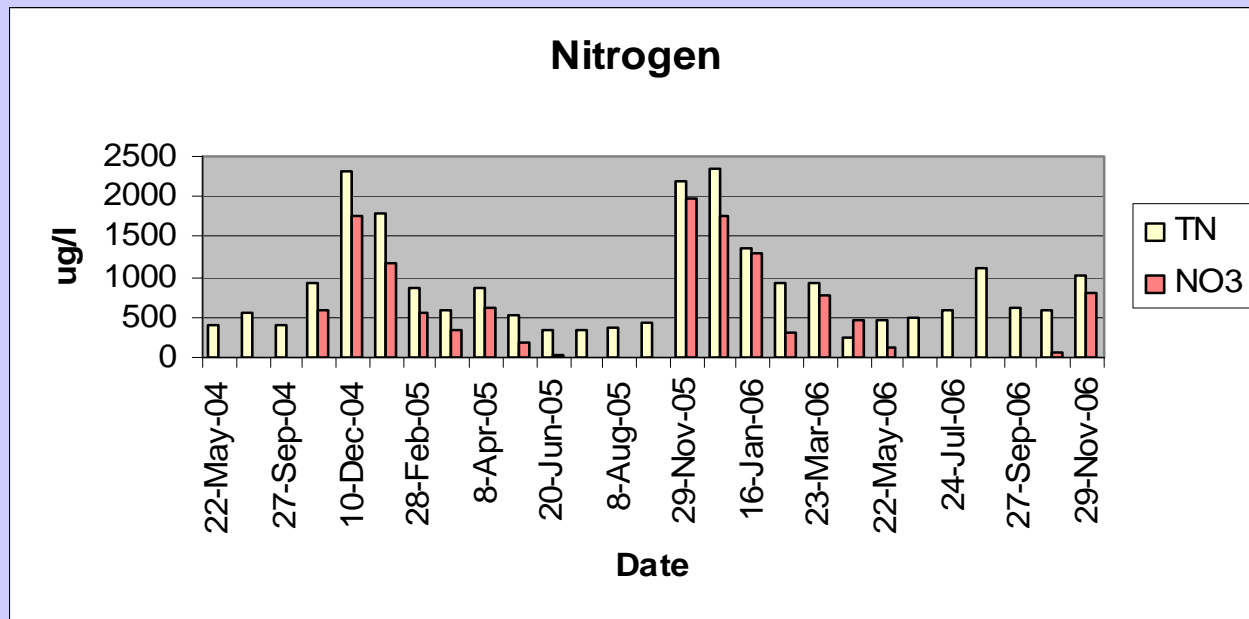
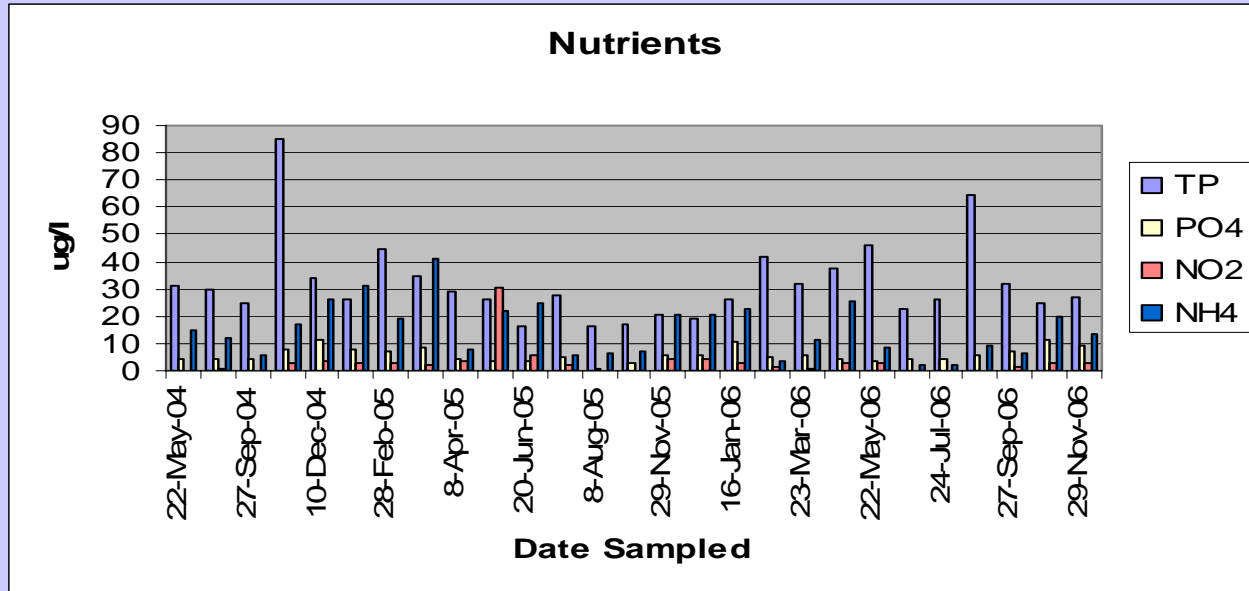
OSPREY POINT



OSPREY POINT

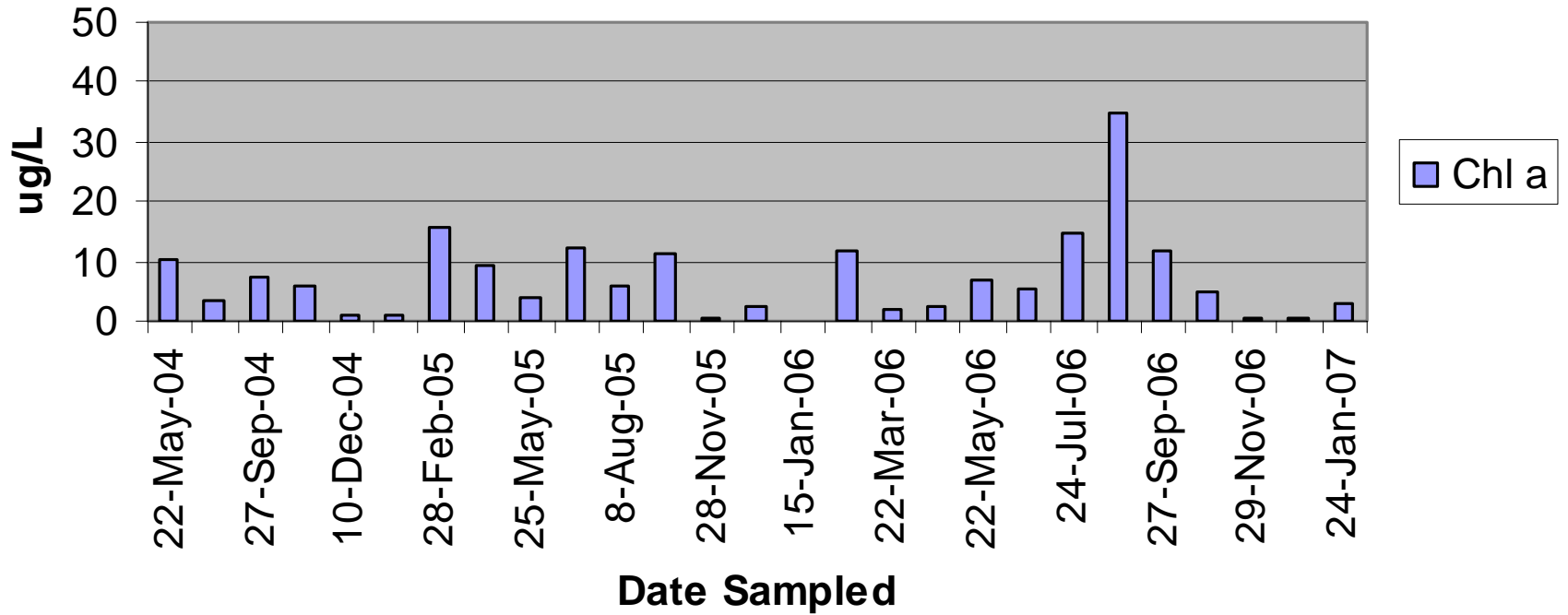


BIG CREEK ARM

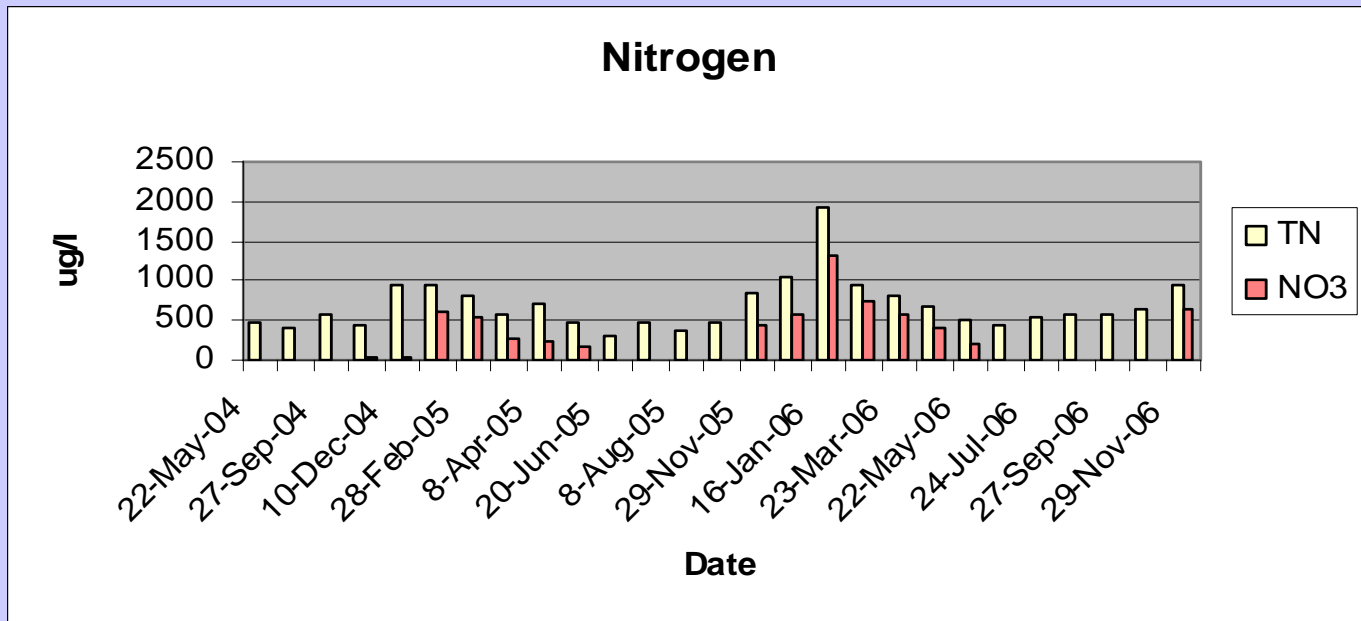
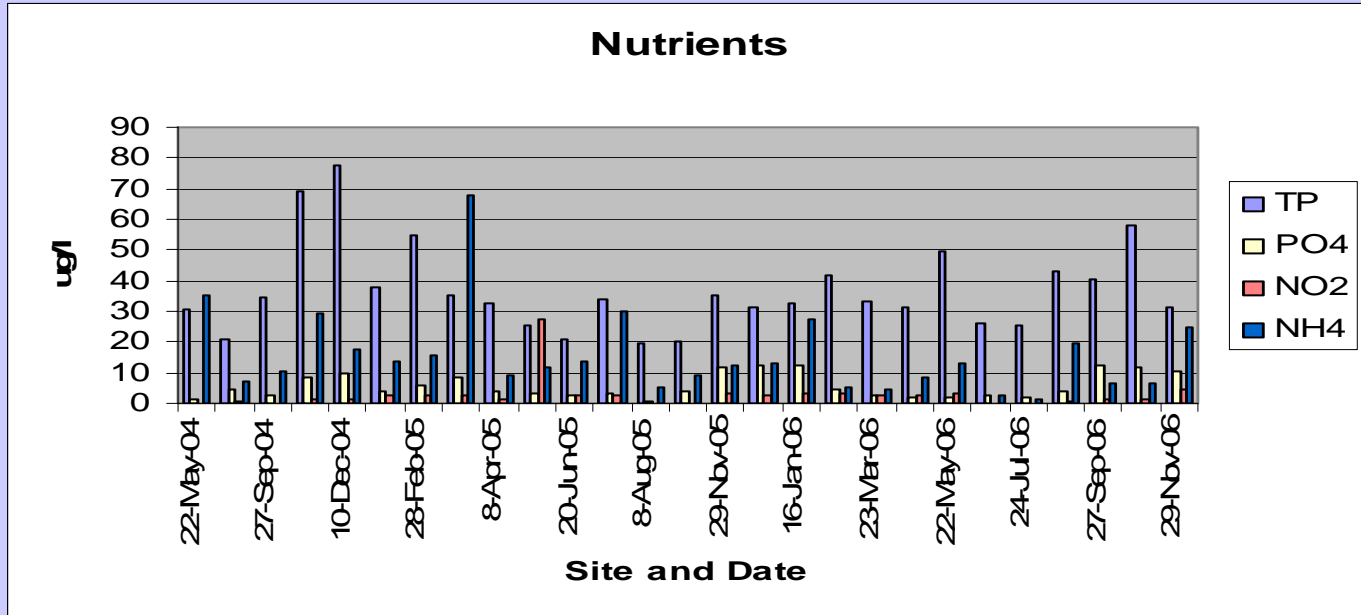


BIG CREEK ARM

Chlorophyll A

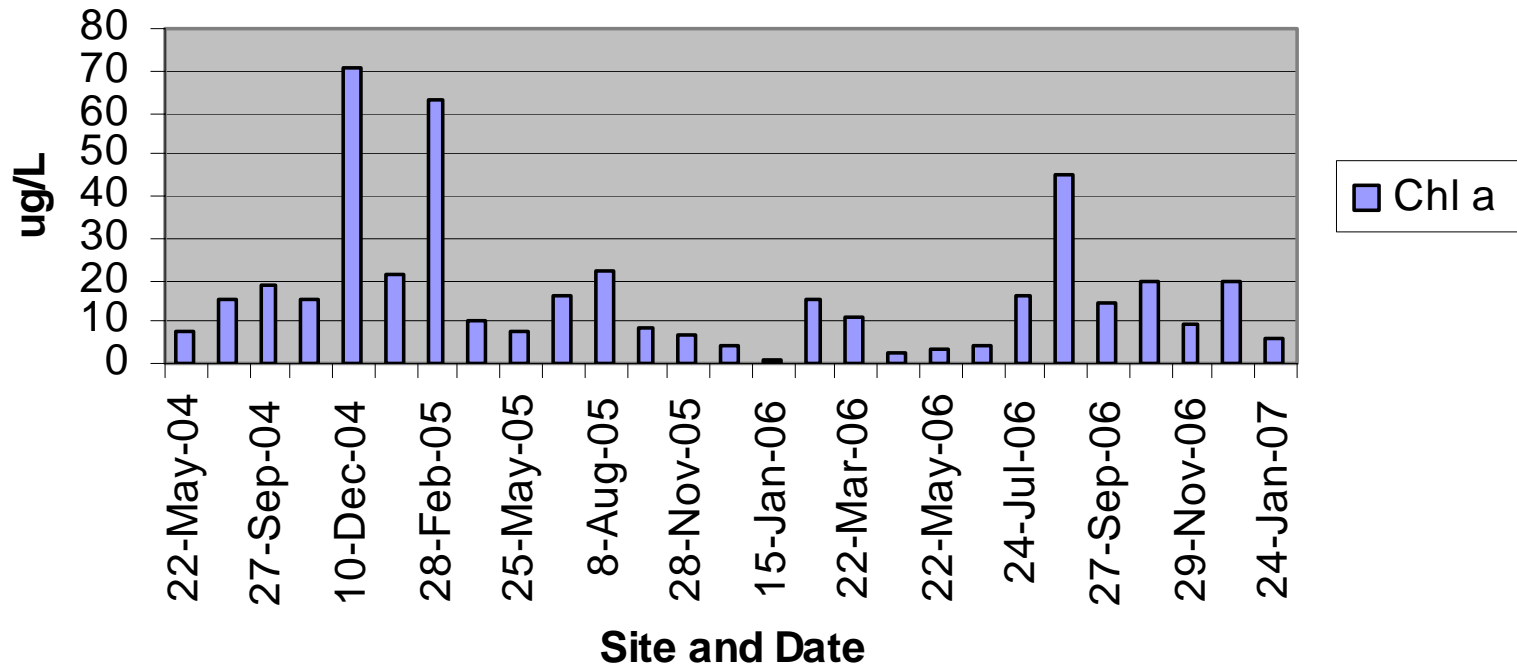


NORTH LAKE

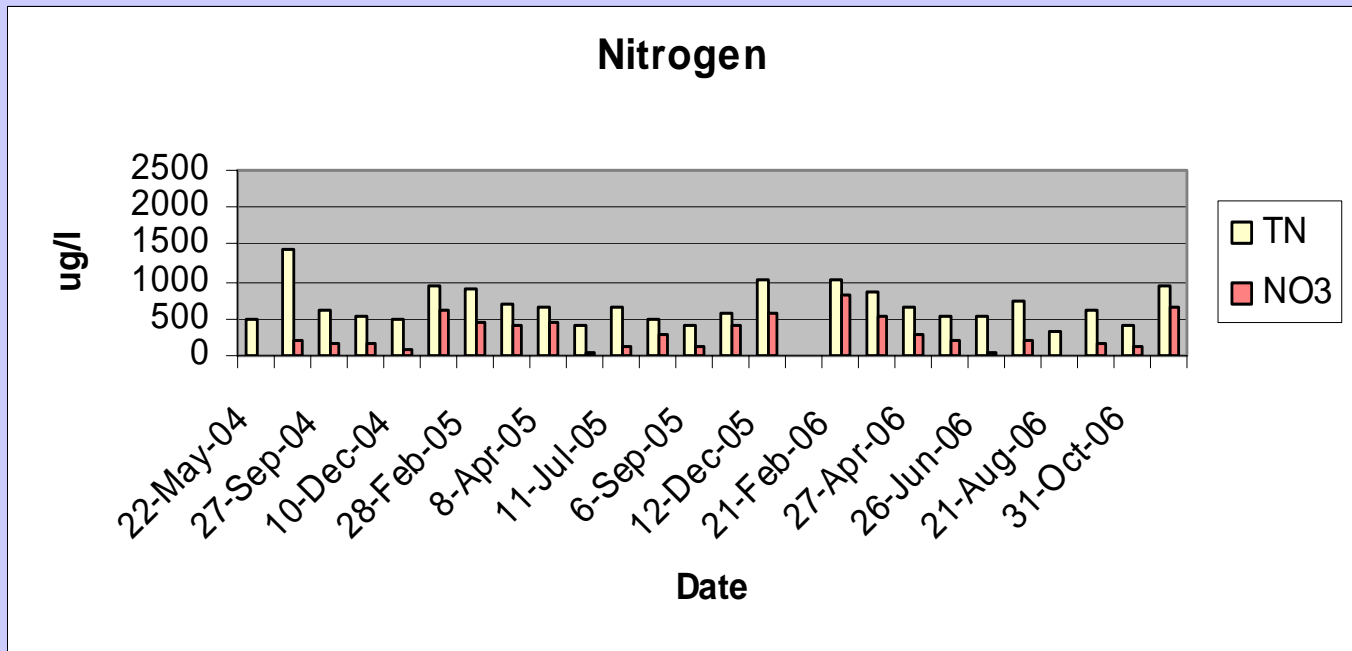
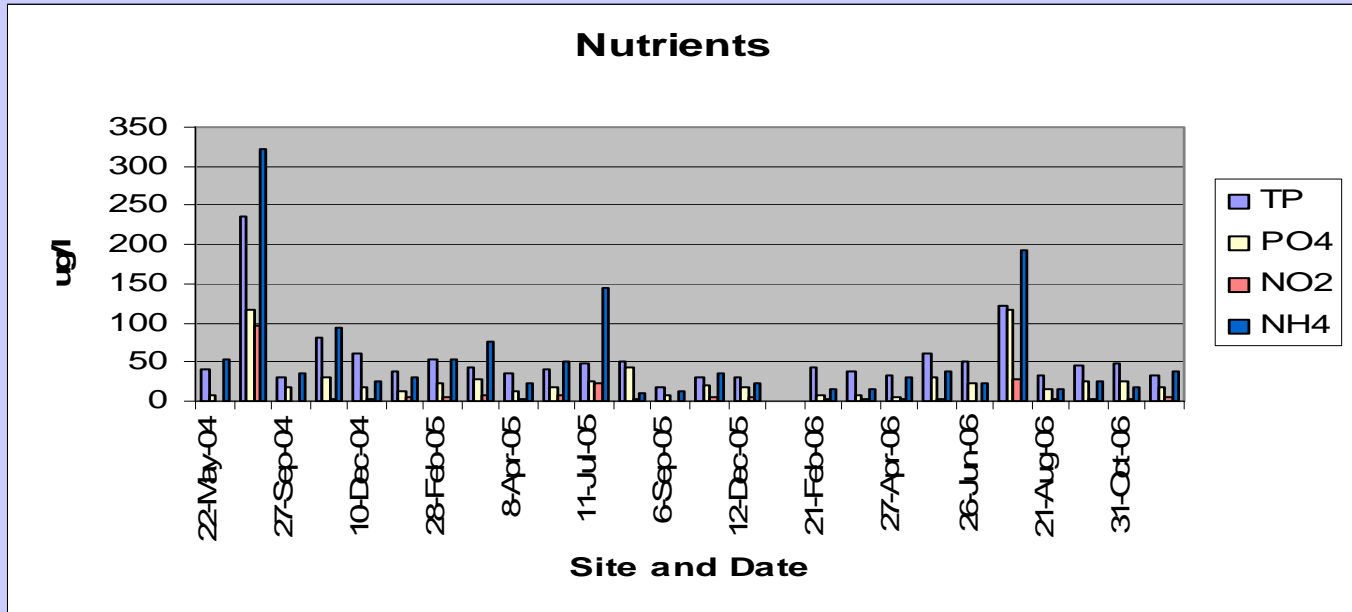


NORTH LAKE

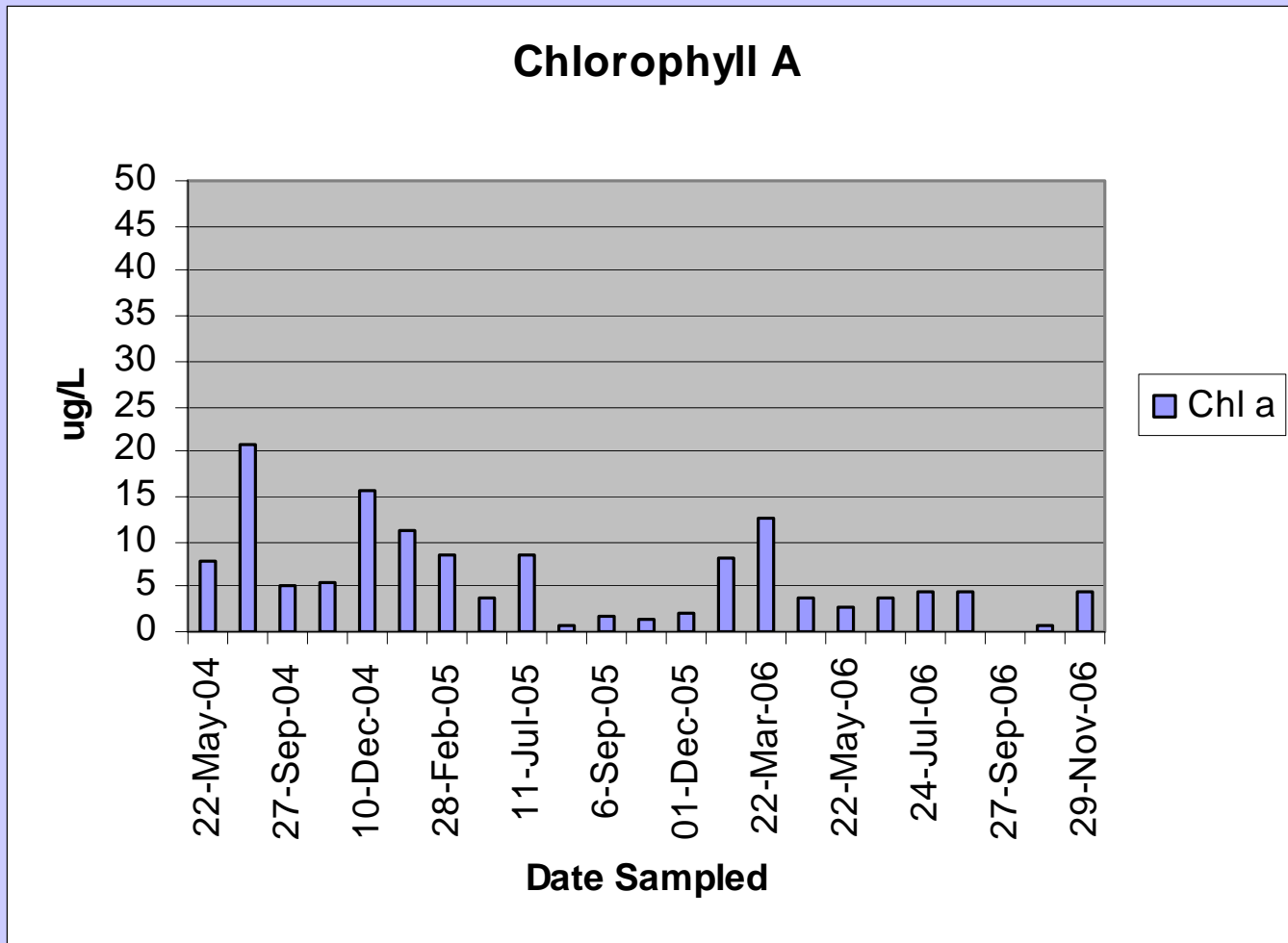
Chlorophyll A



TENMILE CREEK



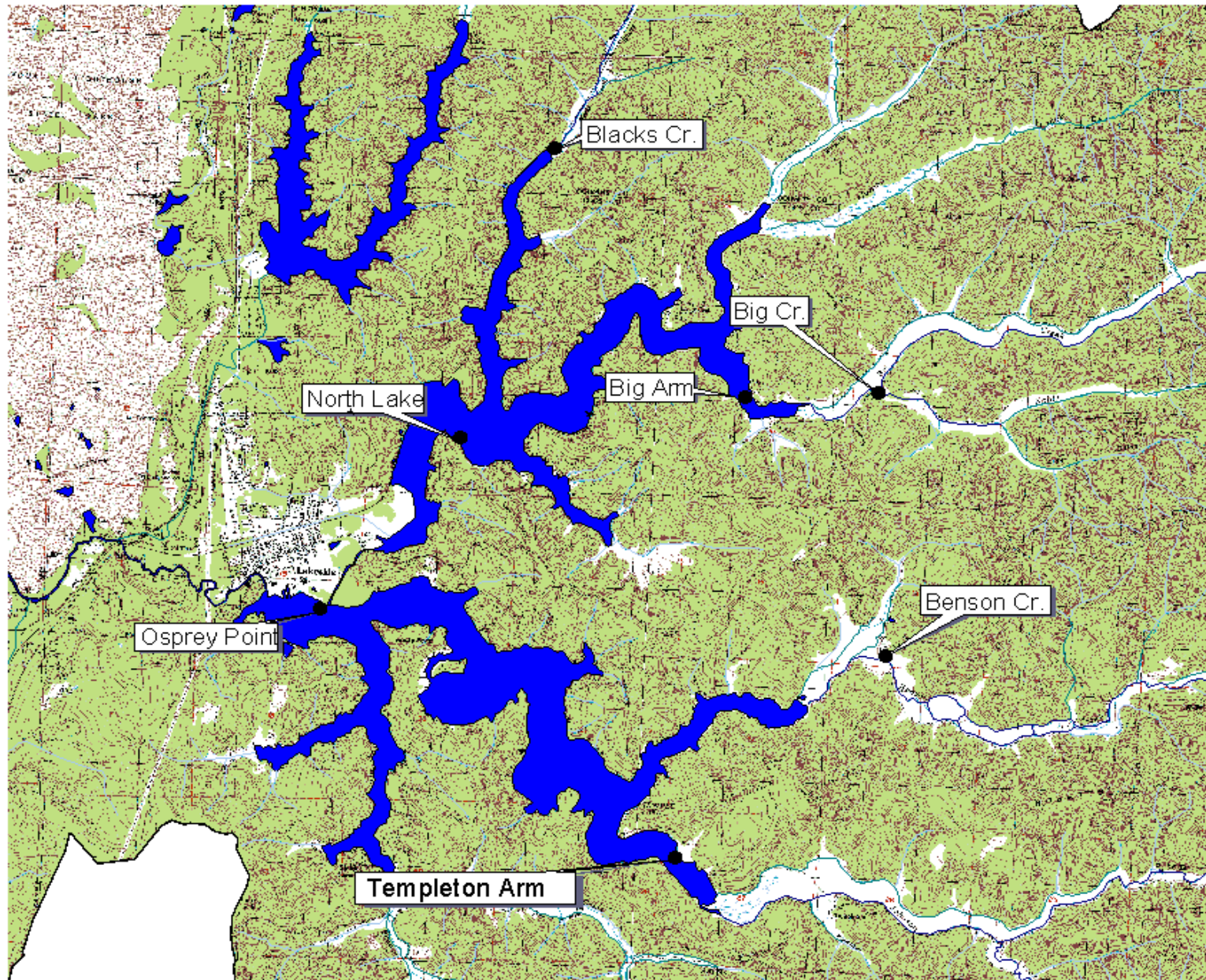
TENMILE CREEK



Tenmile Nutrient Summary

Parameter	USEPA	Tenmile Lakes (2.5yr avg.)
NO ₂ -+NO ₃ -	.02 (mg/L)	.25-.48 (mg/L)
TN	.19 (mg/L)	.63-.84 (mg/L)
TP	7.1 (ug/L)	29-52 (ug/L)
Chlorophyll <u>a</u>	2.3 (ug/L)	6-16 (ug/L)

Storm Chasing



Rainfall Triggers

Return Periods for Daily Precipitation

North Bend

2 year Storm Event

Hours:	24	48	72	96	120
Inches:	2.68	4.1	5.15	5.95	6.73

5 year Storm Event

Hours:	24	48	72	96	120
Inches:	3.81	5.51	6.6	7.57	8.41

10 year Storm Event

Hours:	24	48	72	96	120
Inches:	4.87	6.49	7.51	8.57	9.45

25 year Storm Event

Hours:	24	48	72	96	120
Inches:	6.43	7.74	8.59	9.74	10.66



Blacks Creek Auto Sampler





Big Cr. Auto Sampler

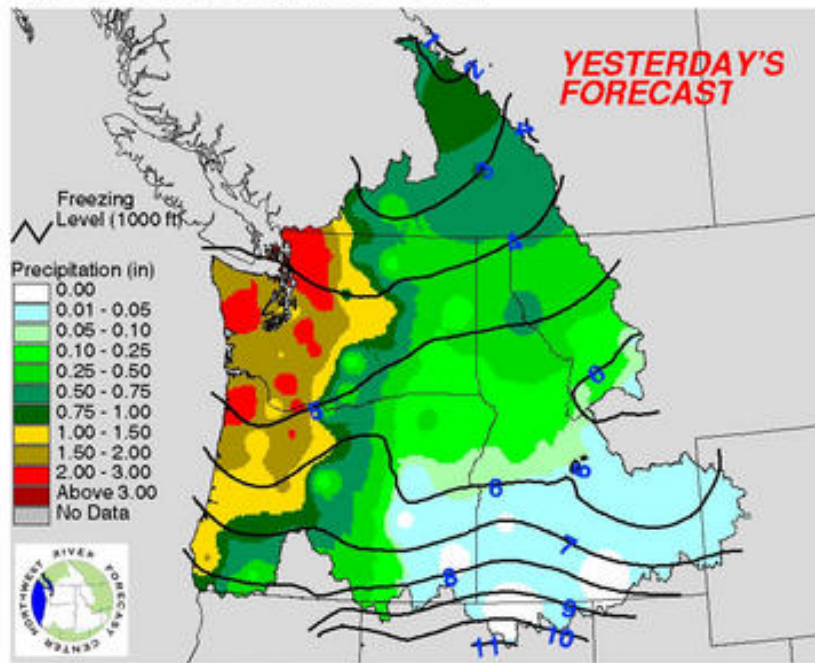




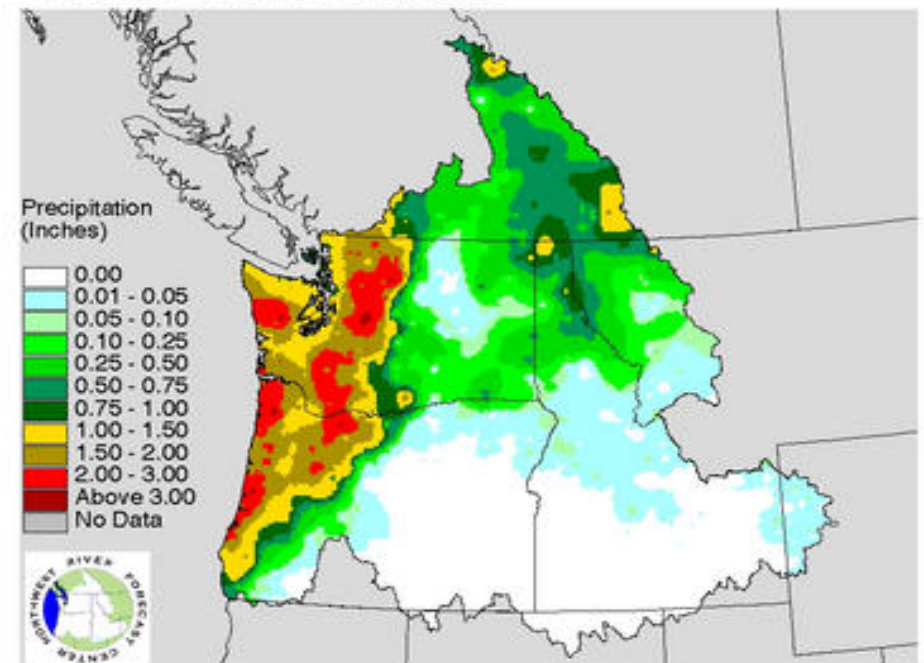
Benson Auto Sampler



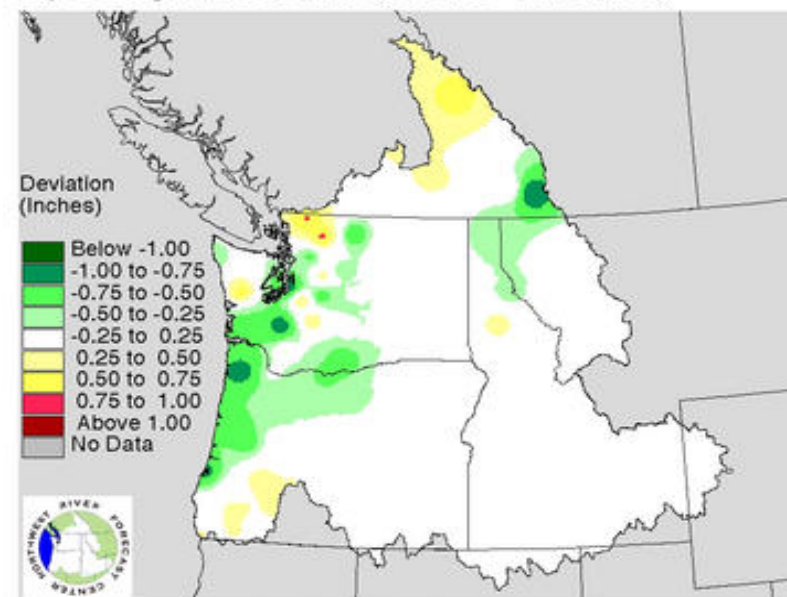
Day 1 (Tuesday) Precipitation Forecast



Yesterday's Observed Precipitation



Day 1 Precipitation Deviation (Forecast - Observation)



December 2006 Storm Event

Rainfall - inches

12/12 - .8 12/13 - .46

12/14 - .76 12/15 - 1.7

12/16 - .01 12/17 - .14

February 2007 Storm Event

Rainfall - inches

2/23 - .38 2/24 - .24

2/25 - 1.52 2/26 - 1.19

2/27 - .46

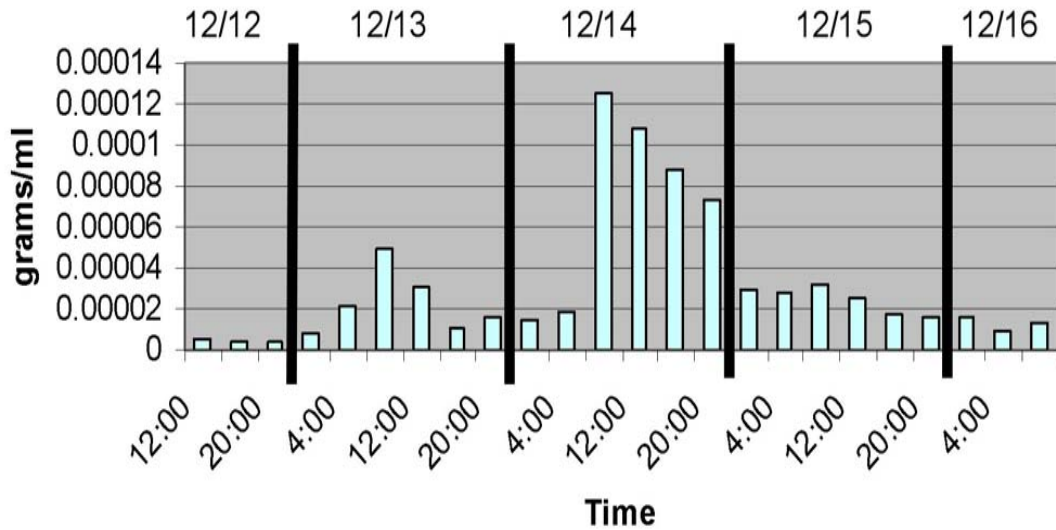








Big Cr.

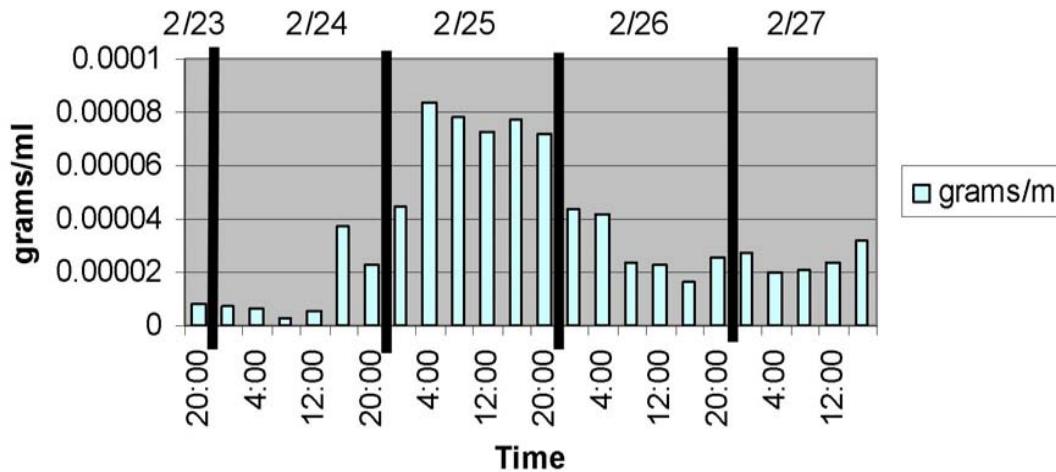


Big Cr.

12/12/06-12/16/06

Avg. TSS- .5 mg/L

Big Cr.



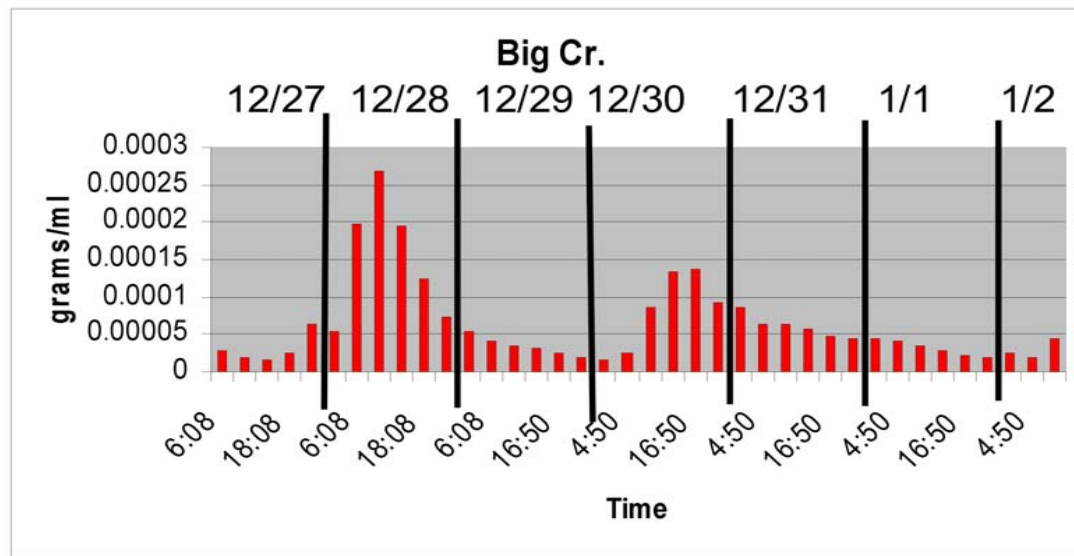
2/23/07-2/27/07

Avg. TSS- 22 mg/L

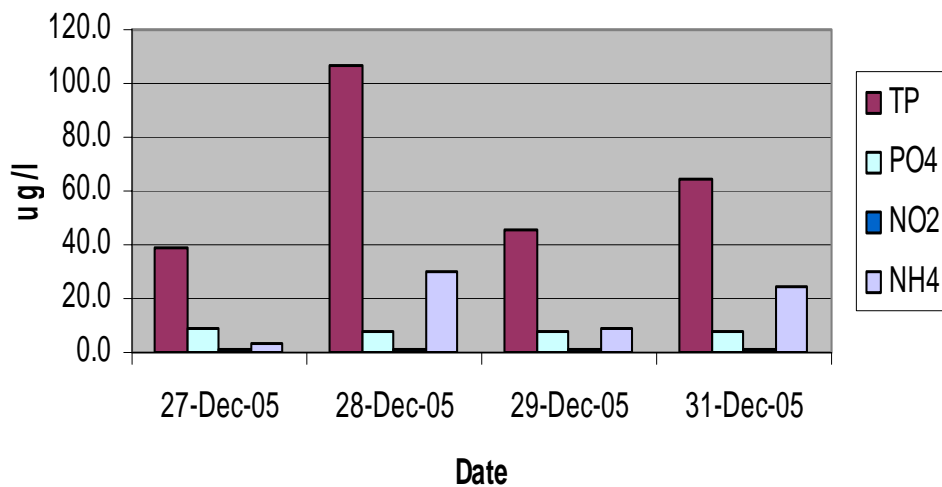
2005 Data

Big Cr.

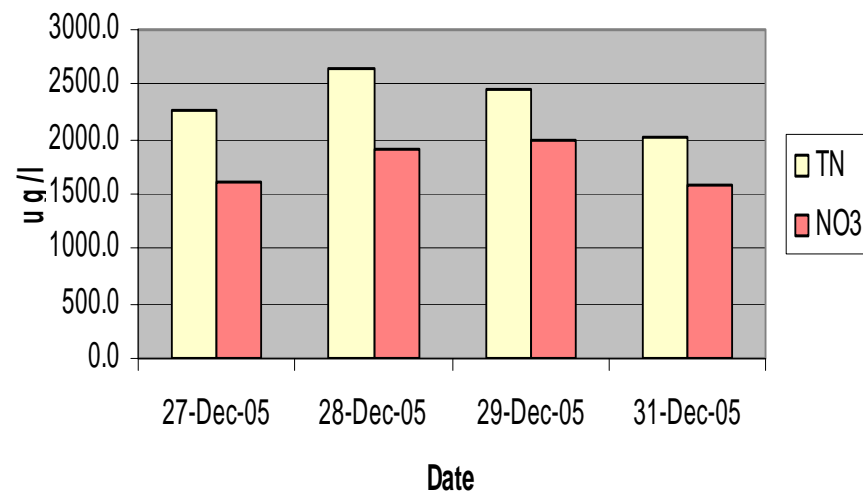
Avg. TSS- 64 mg/L



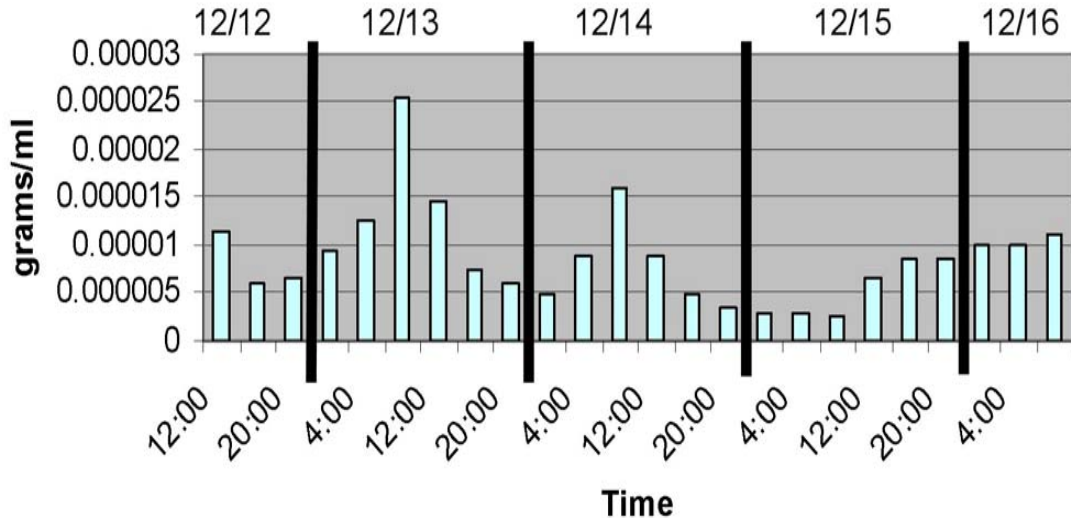
Big



Big



Benson Cr.

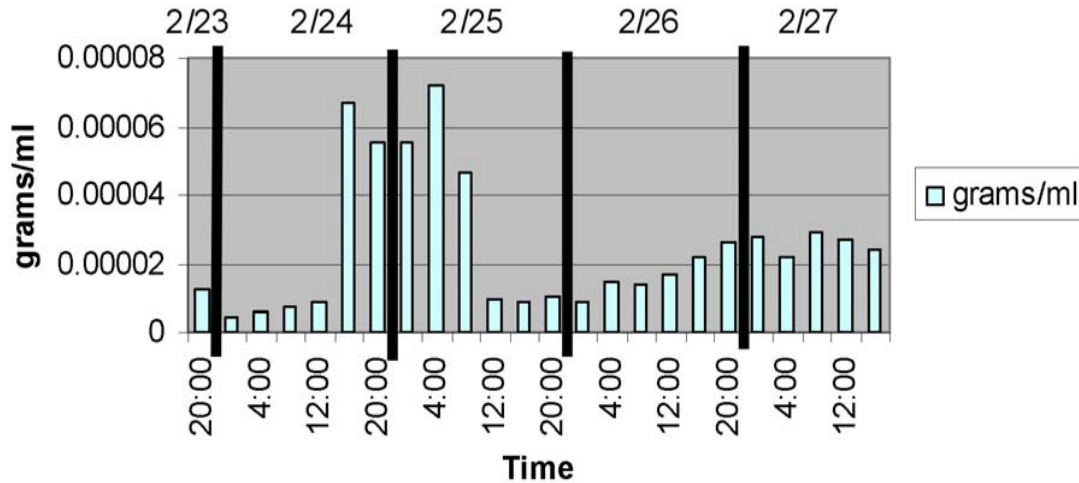


Benson Cr.

12/12/06-12/16/06

Avg. TSS- .61mg/L

Benson Cr.



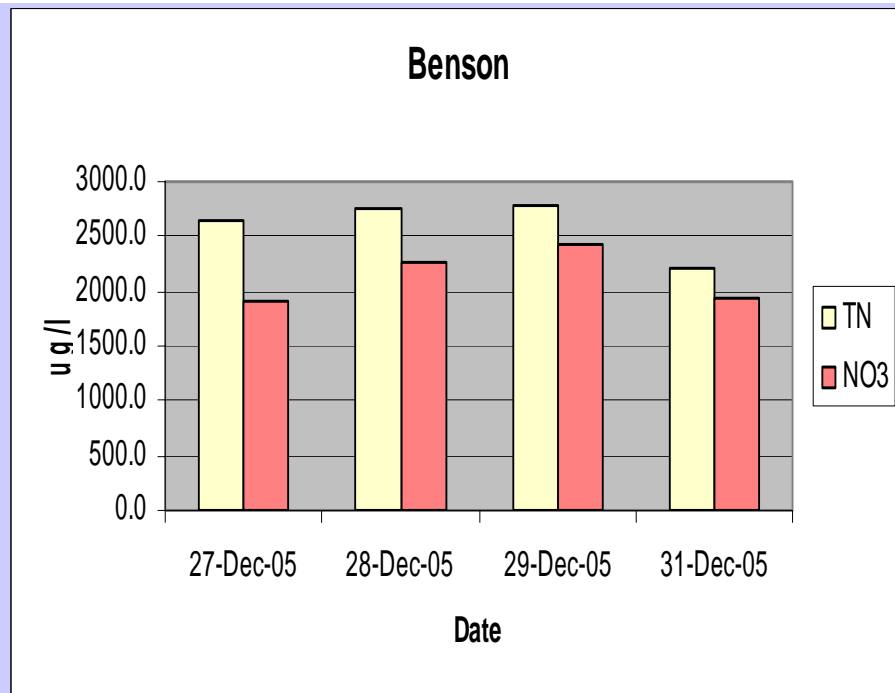
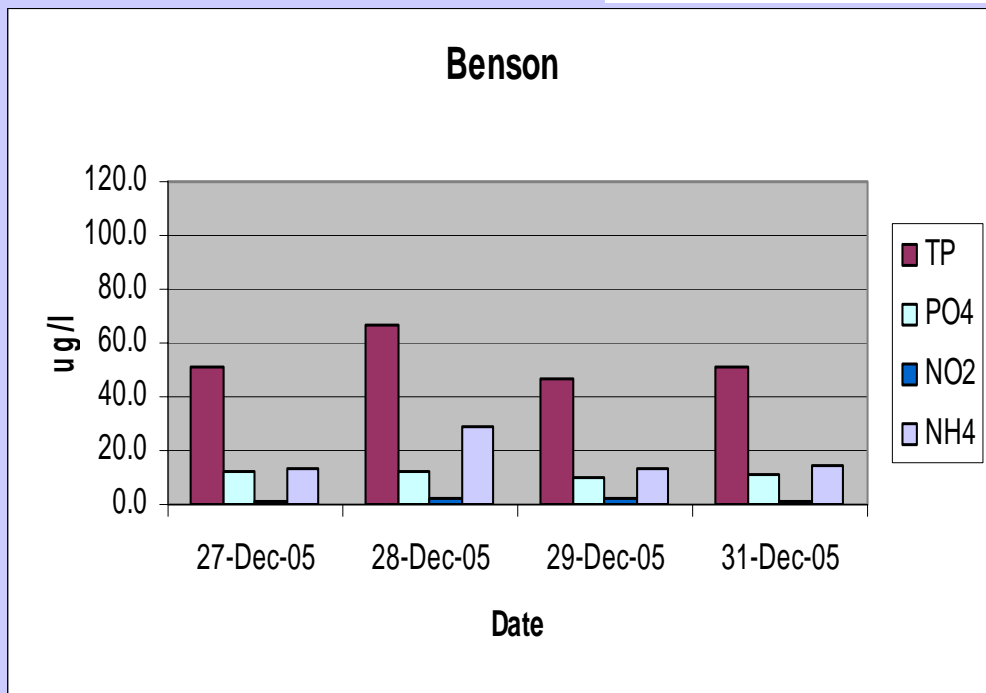
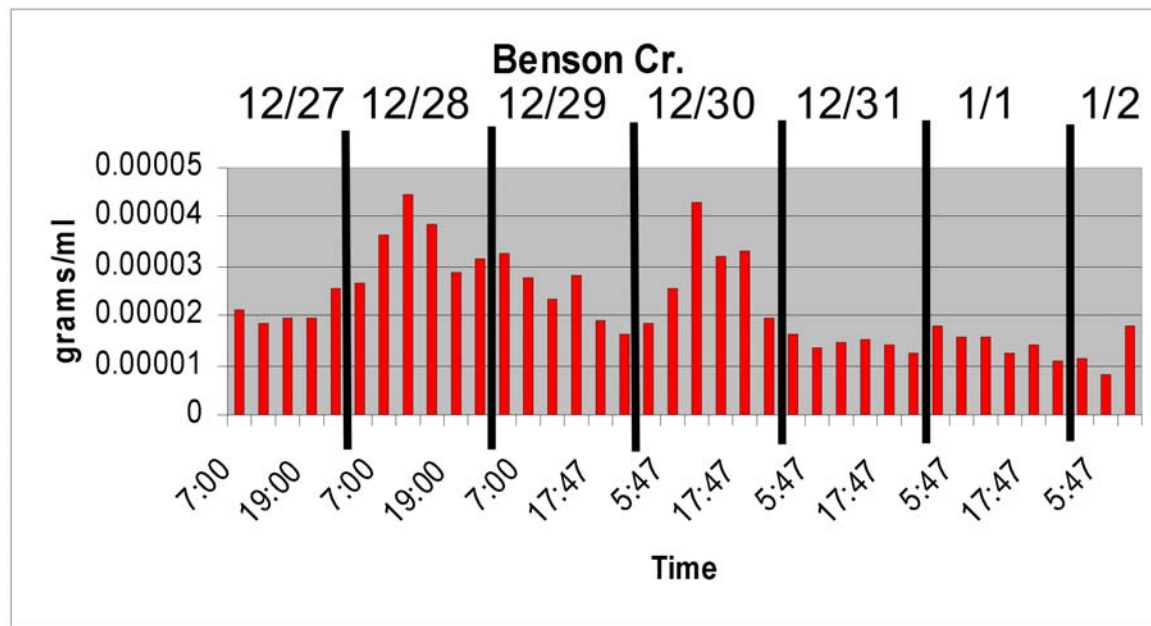
2/23/07-2/27/07

Avg. TSS- 16 mg/L

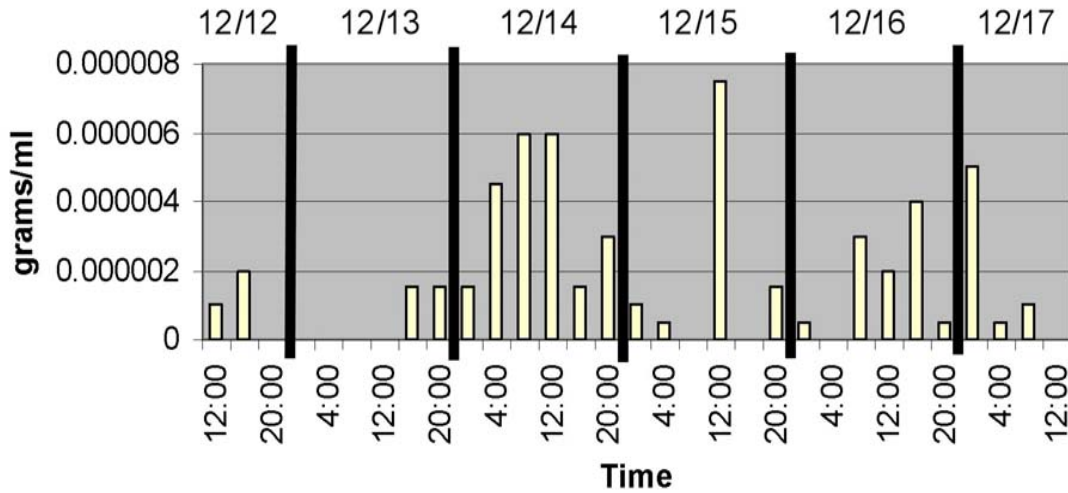
2005 Data

Benson Cr.

Avg. TSS- 22.7 mg/L



Blacks Cr.

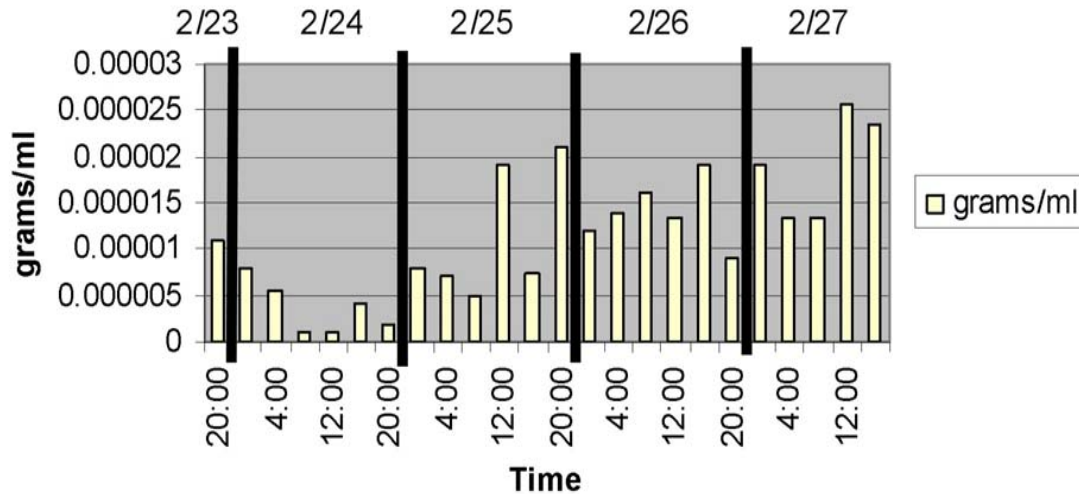


Blacks Cr.

12/12/06-12/16/06

Avg. TSS- .12 mg/L

Blacks Cr.



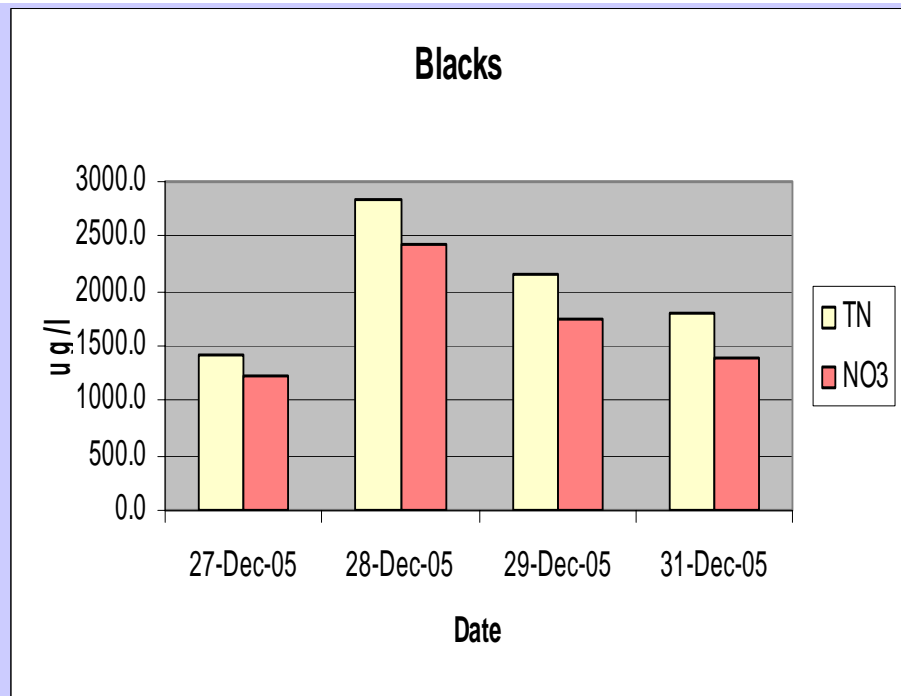
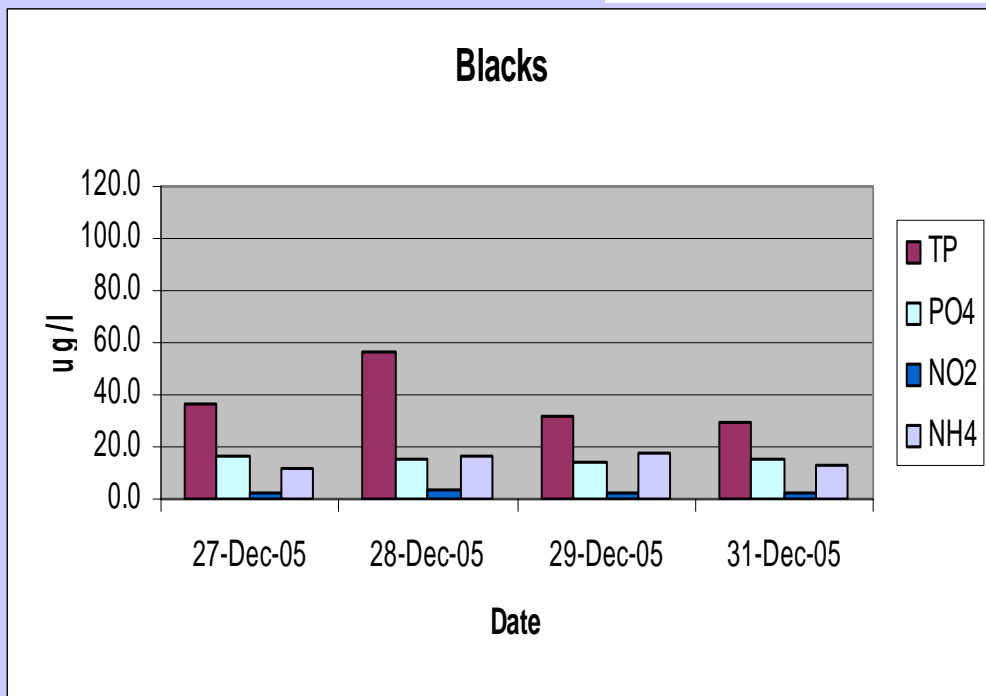
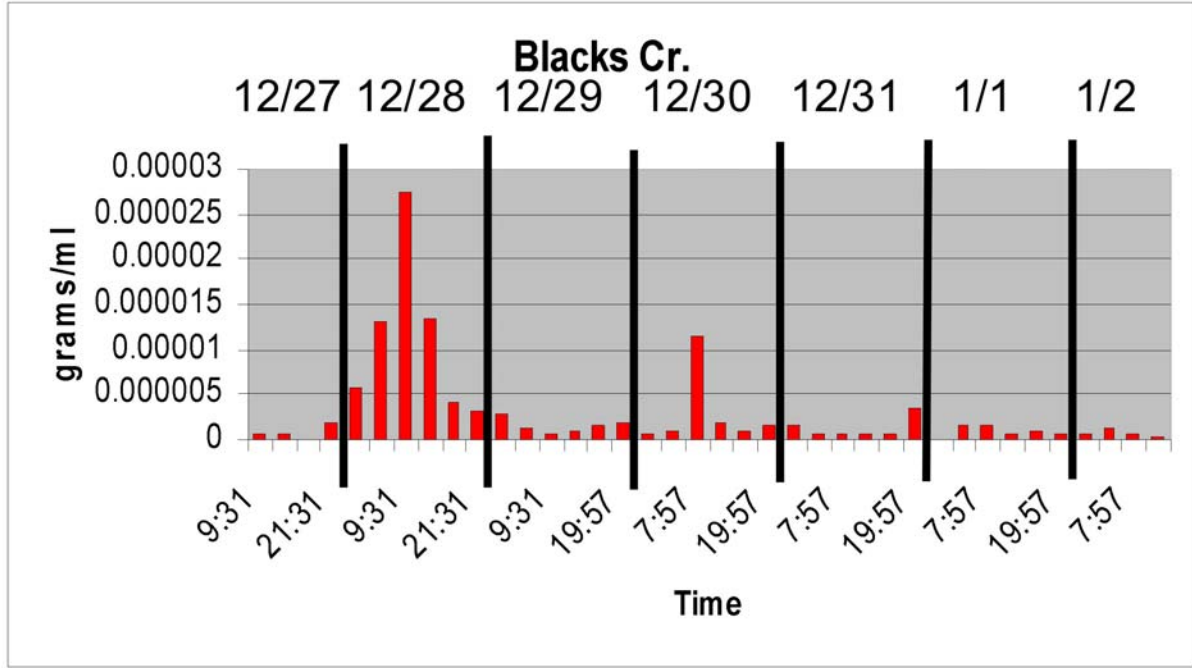
2/23/07-2/27/07

Avg. TSS- 7.8 mg/L

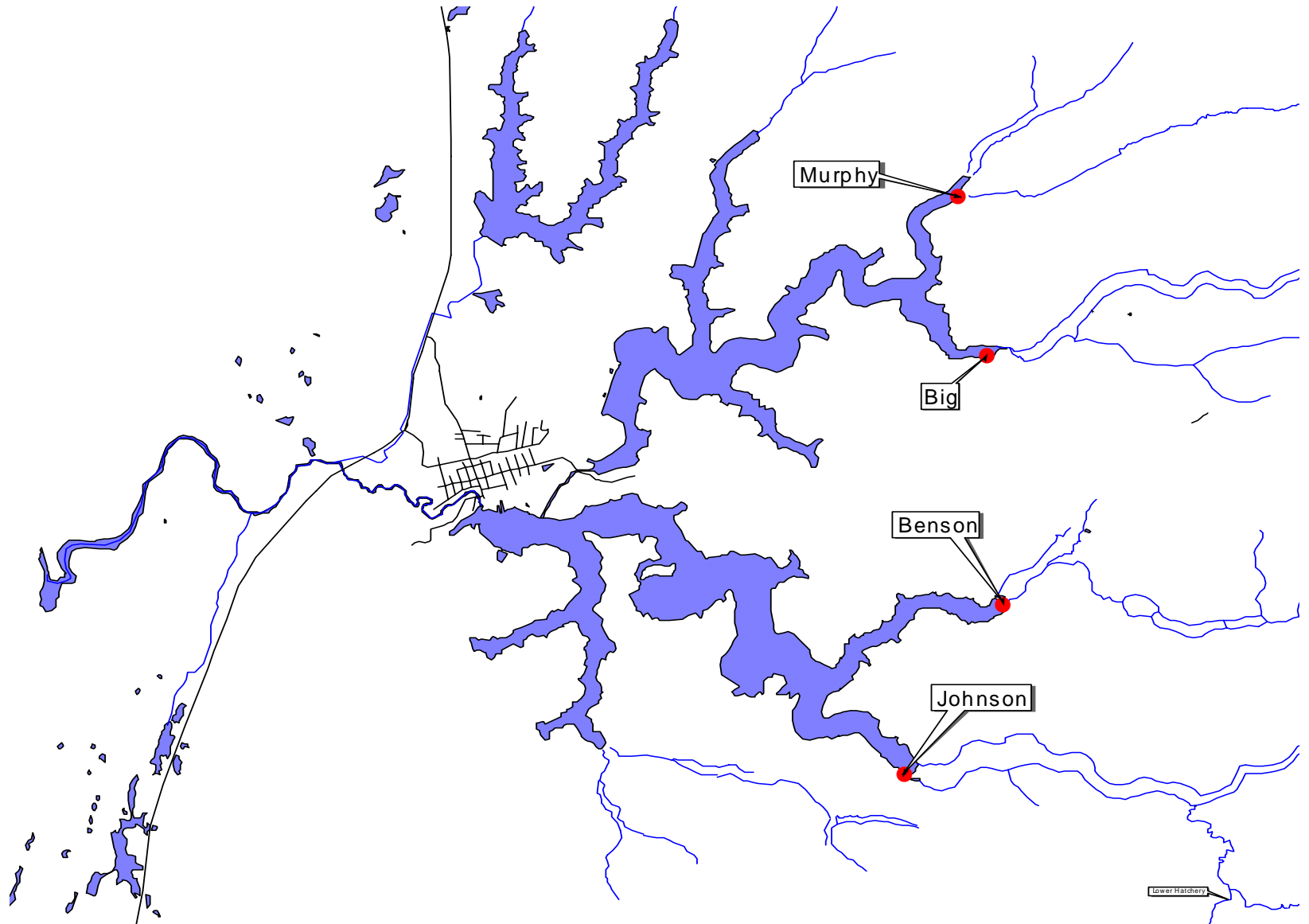
2005 Data

Blacks Creek

Avg. TSS- 3.01mg/L



Delta Building Sites



Templeton Arm

2004

2006



Templeton Arm

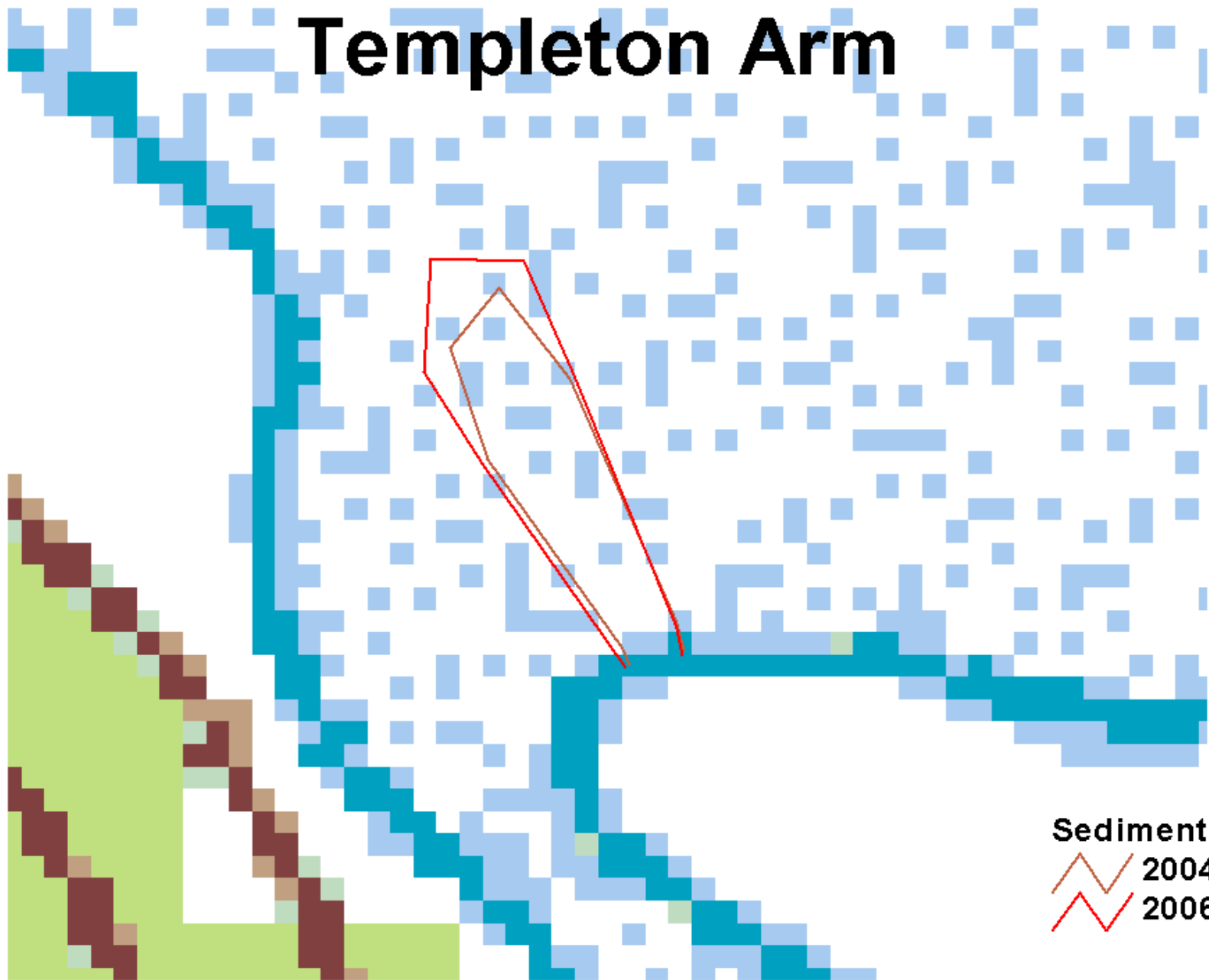
2004

- Length-191'6", length is from instrument to far tip of delta
- 0': Width: 26'5"
- 40':. Width: 40'
- 90': Width: 19'

2006

- Survey length- 191'6", total delta length- 219'6"
- 0': width-49'5"
- 40': width-38'4.5"
- 90': width-21'6"

Templeton Arm



Sedimentation

2004

2006

Benson Cr.

2004



2006



Coleman Arm

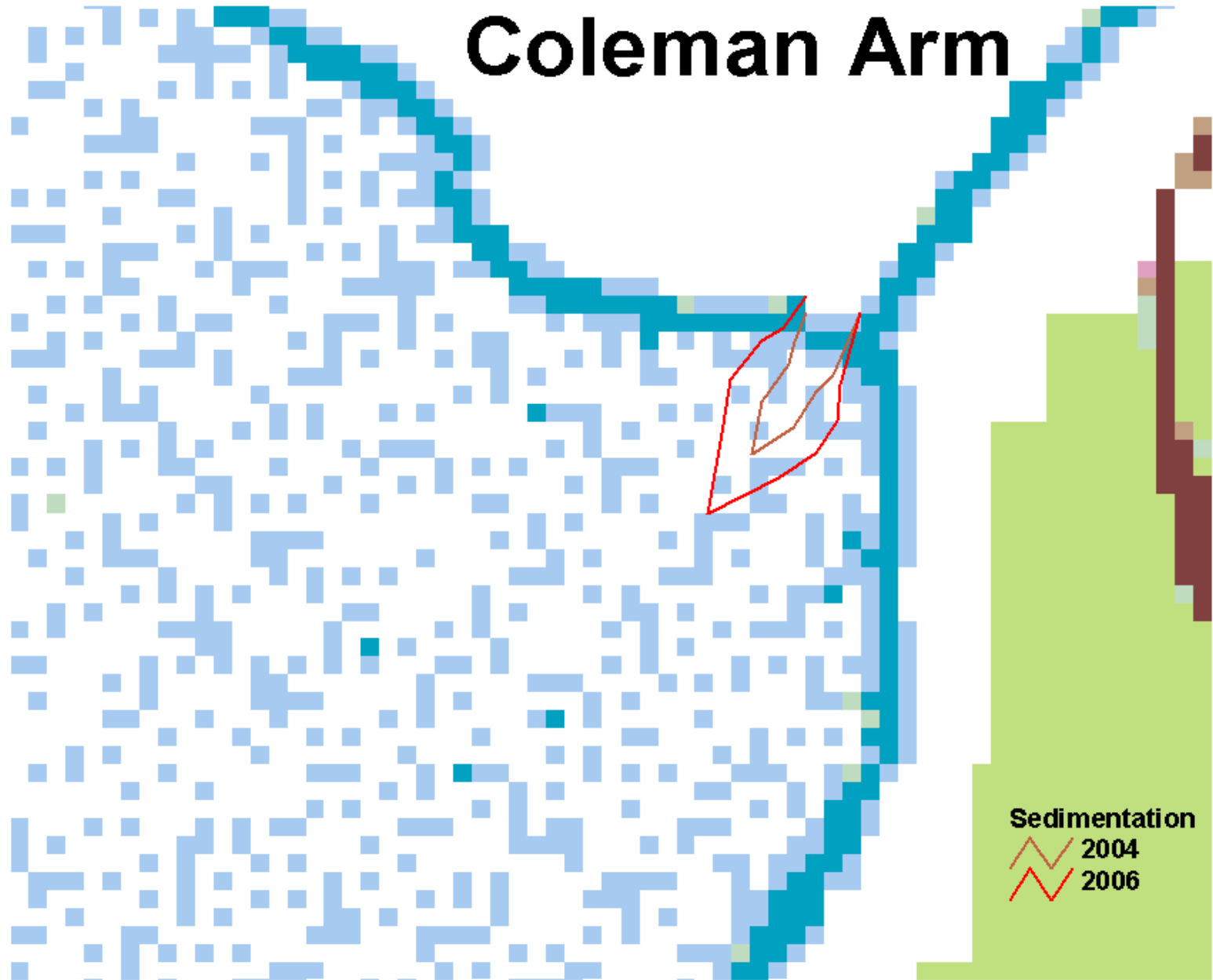
2004

- Length- 74' 11"
- 0': no width
- 20': Width: 17' 19"
- 40': Width: 10' 2"
- 50': Width: 20' 7"

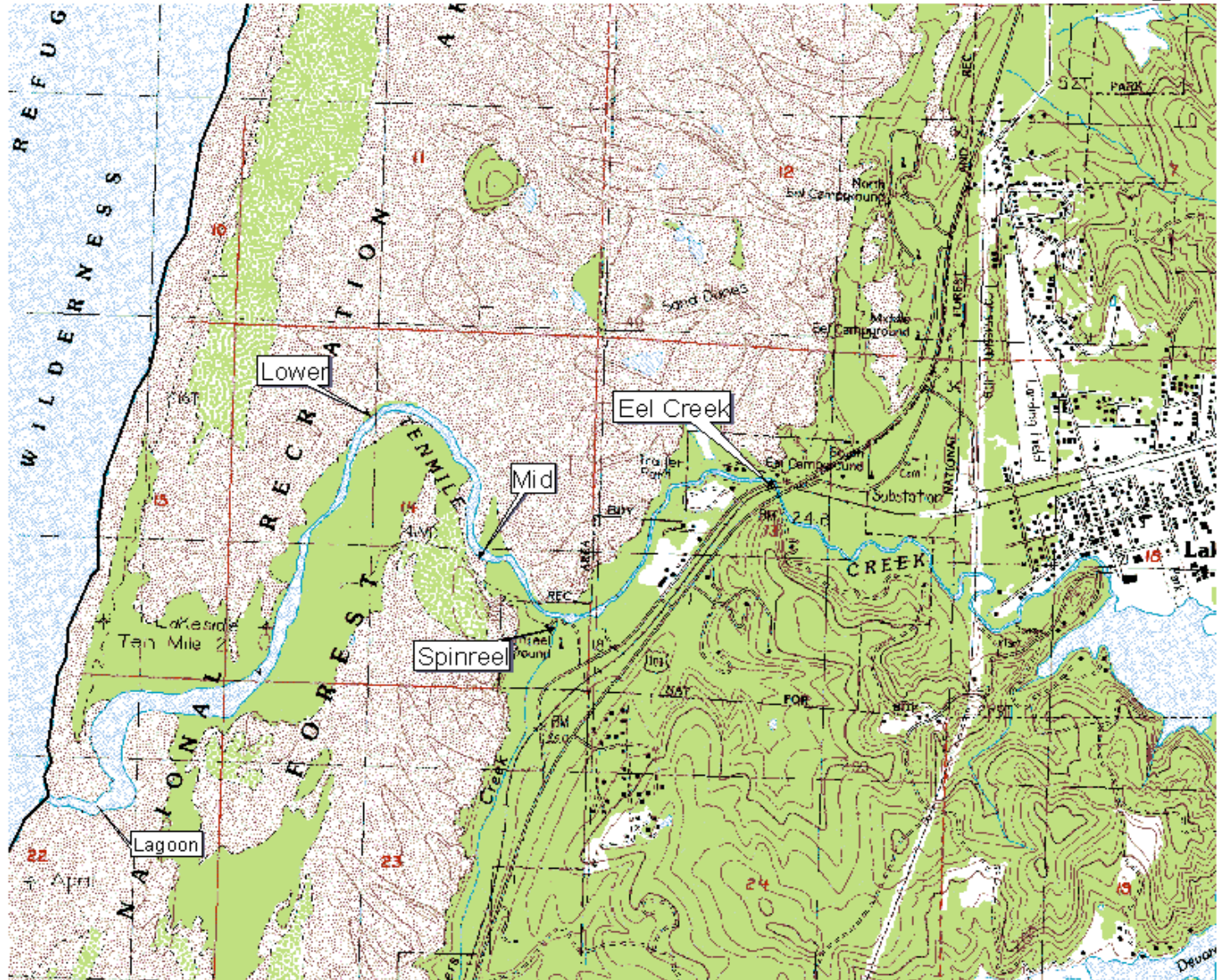
2006

- Survey Length- 74' 11", total delta length-106' 1"
- 0': width-29' 1.5"
- 20': width-48' 3.75"
- 40': width-48' 3.75"
- 50': width-34' 3"

Coleman Arm



Tenmile Cr. Fish Assemblage















WEEDS



6/9/06
Sampling



TENMILE CR. SEINING RESULTS

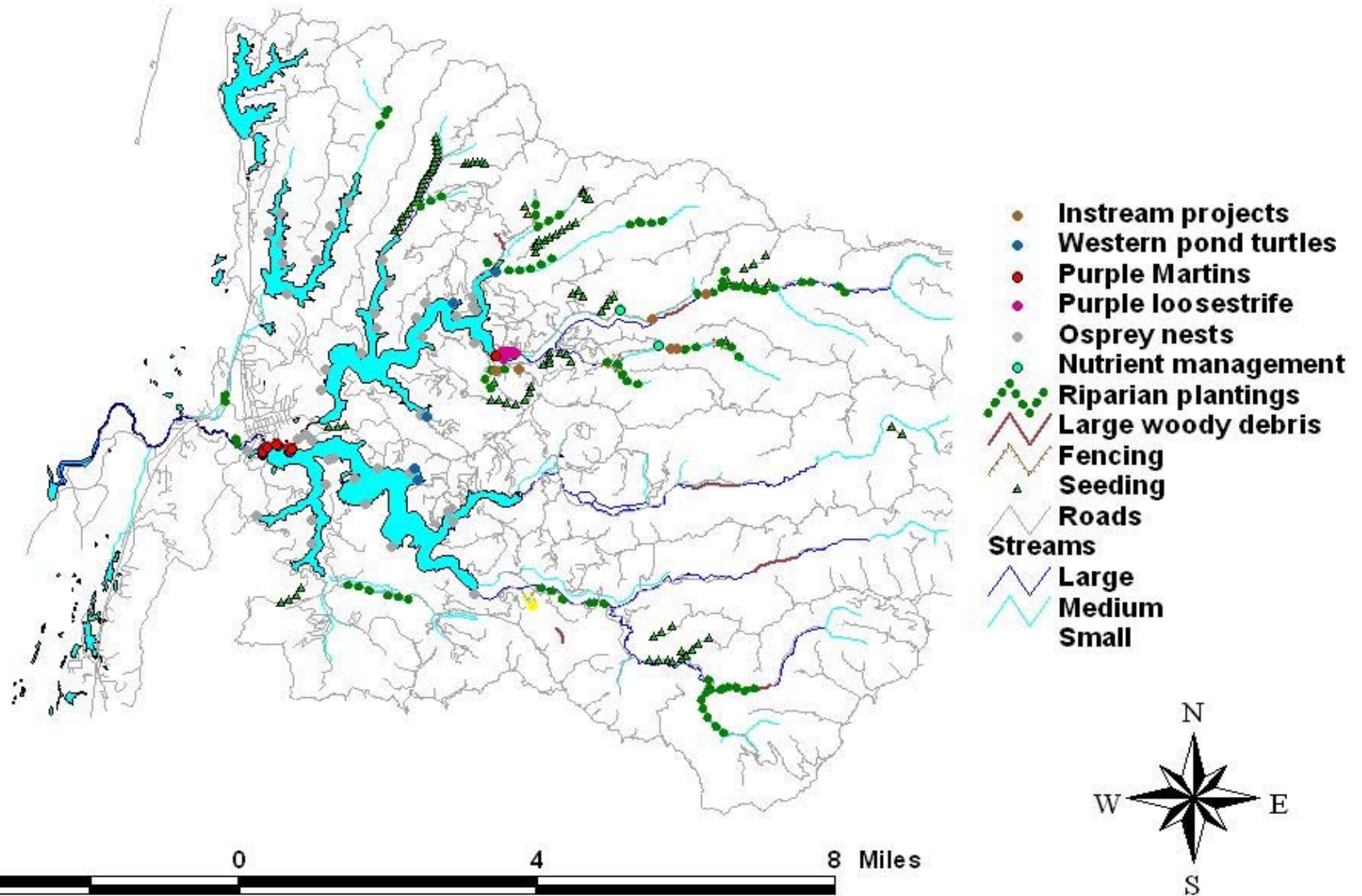
2005

SITE	SALMONID	BLUE Gill	LM BASS	PRICKLY SCULPIN	STAGHORN SCULPIN	THREE SPINE STICKLEBACK
EEL CR.		29	9	7		
SPINREEL		6	16	4		
MID				1		4
LOWER						
LAGOON					7	

2006

SITE	SALMONID	BLUE Gill	LM BASS	PRICKLY SCULPIN	STAGHORN SCULPIN	THREE SPINE STICKLEBACK
EEL CR.			3	1		
SPINREEL				2		
MID	3					
LOWER						
LAGOON					14	250

Projects



Projects Monitored

5100 Road Decom.

Adams Bridge

Adams Culverts (1-4)

Adams Riparian

Benson Bridge

Benson Rip

Big Cr. Culverts(1,2,3,5,6,7,10,11,16,18)

Big Cr. Fence

Big Cr. Rip. I

Big Cr. Rip. II

Big Cr. Rip. III

Big Cr. Rip. IV

Big Cr. Riparian(Lower)

Big Cr. Riparian(mid)

Big Cr. Riparian(upper)

Big Cr. Tree Plot 1-4

Bowron Bridge

Clear Cr. Culverts (1-4)

Eel Cr. Culvert South

Eel Cr. Erosion Mat

Eel Cr. Retrofit

Freelund Bridge #1

Freelund Bridge #2

Goose Cr. Bridge

Goose Cr. Rip

Goose Cr. Trib. A Bridge

Hatchery Cr. Bridge

House Gulch Bridge

House Gulch Fence

House Gulch Riparian

Johnson Cr. Bridge

Johnson Cr. Fence

Johnson Cr. Riparian (left fork)

Johnson Cr. Riparian (mainstem)

Johnson Riparian I

Johnson Riparian III

Kellogg Bridge

Maria Gulch Fencing

Noble Cr. Bridge (Lower)

Noble Cr. Bridge (Upper)

Noble Cr. Erosion Control

Noble Cr. Fence (Lower)

Noble Cr. Fence (Upper)

Noble Erosion

Noble Riparian

Noble/Alder Bridge

Noble/Alder Fence

Northlake Ext. Culvert #3

Northlake ext. Culvert #4

Plum Gulch Fence

Plum Gulch Fjord

Robertson Bridge

Robertson Bridge II

Robertson Fence

Robertson Lg. Woods

Robertson Riparian

Saunders Lake Rip

Shutters Bridge #3

Shutters Bridge #4

Shutters Bridge I

Shutters Bridge II

Shutters Culverts (1-4)

Sunlake Boulder Cluster

Sunlake Bridge

Sunlake Culvert excavation

Sunlake Culverts (1-4)

Sunlake Lg. Woods

Sunlake Riparian

Swanson Bridge

Swanson Culvert I

Swanson Culvert II

Upper Big Cr.

Watering Source

Upper Noble Cr. Bridge

Wilkins Bridge

Wilkins Riparian

Willow Cr. Bridge



Noble/
Alder Cr.
Bridge
1/10/06



Lower Big Cr.
Riparian
1/10/06

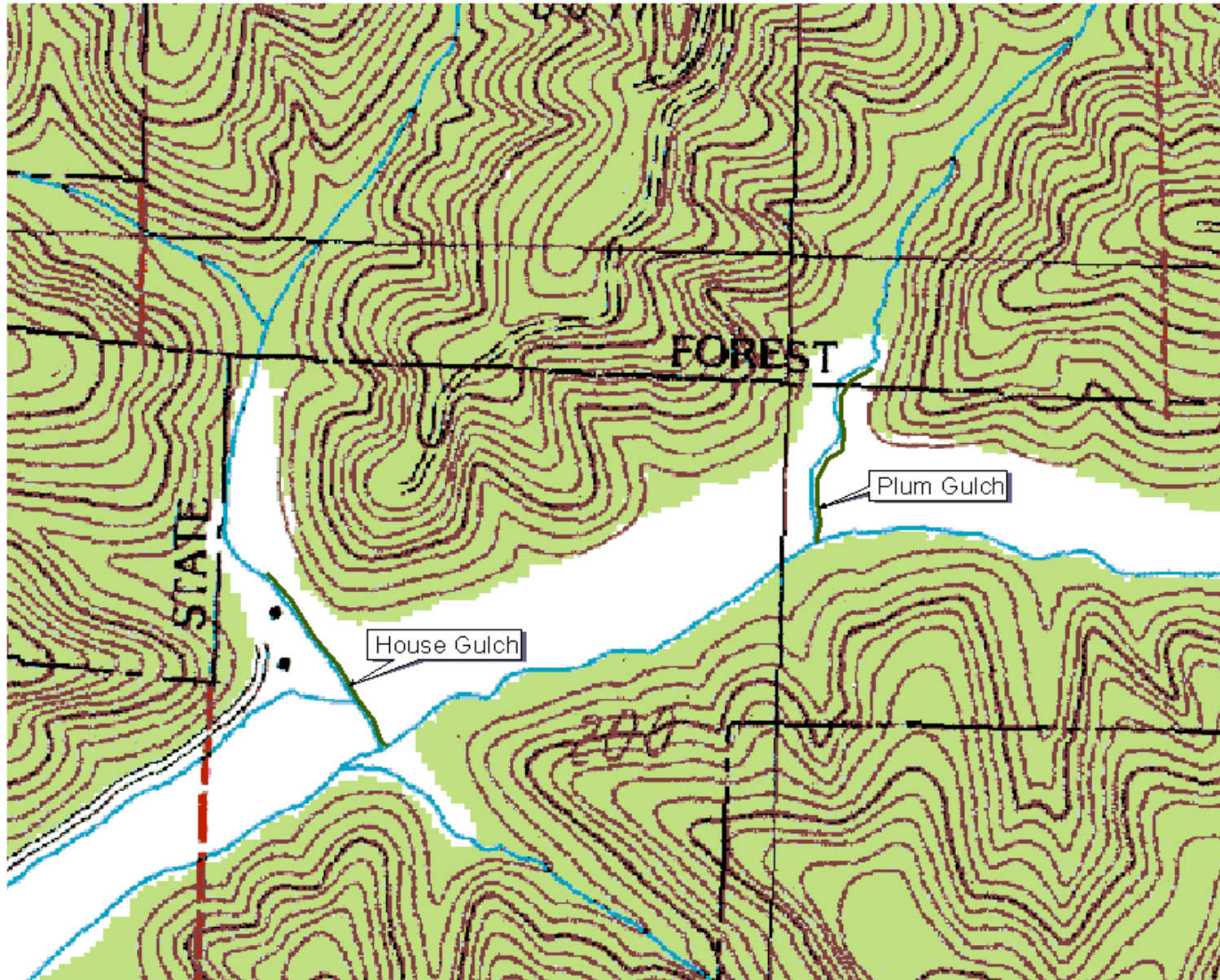


7-14-06
Noble/ Alder
Bridge



7/31/06
Big Cr.
Riparian
Lower

Riparian Effectivness Monitoring







Effectiveness monitoring of
livestock exclusion projects

OWEB, Tetra Tech





FOR SALE BY OWNER

41-290-9331 AS IS

\$135,000 100.70^{ft} lake frontage 200ft deep
No septic - grandfathered in

Electricity, Phone line, Road at top - access permit



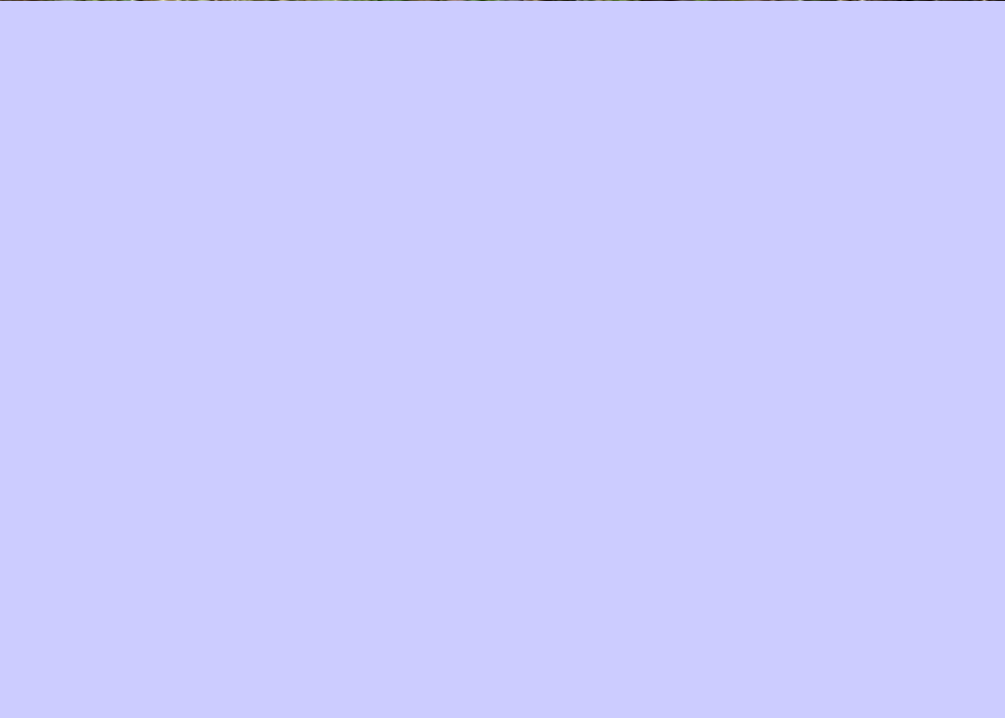
Sunlake Dr.

May 13, 2000

Sunlake Dr.

February 20, 2007







Judy Banks Realty

1500+ Sq. FT.
Home on 3.3 AC.
Built 2002. W/ Garage
RV Parking - Private
(541)-404-4004
(541)-759-3306

Judy Banks Realty

VIEW LOT 4.25 AC
DEQ APPROVED
(541)-404-4004
(541)-759-3306

2007 Monitoring Projects

- Purple Martin Surveys
- Algae Sampling
- Nutrient Sampling
- Temperature Monitoring
- Delta Building
- Effectiveness Monitoring
- Storm Chasing
- Summer Baseline Water Quality Monitoring
- Tenmile Fish Assemblage

Thank You

City of Lakeside

OWEB

ODEQ

Milo Crumrine

ODFW

Lakeside Marina

Preferred Systems

BLM

Jacob Kann

ODSL

Project Site Landowners

Volunteers



The End

