Year	Hatchery Load lbs/year	Flow at USGS cfs	TP mg/m3	% TP > 8 mg/m3
1990	755	137	9.1	58
1991	745	138	7.8	43
1992	708	141	8.3	63
1993	271	146	7.8	46
1994	188	138	7.9	38
1995	307	120	8.2	54
1996	251	125	7.2	21
1997	170	131	6.5	3
1998	189	111	6.3	5
1999	199	105	6.3	4
2000	203	101	6.5	12
2001	212	113	7.5	33
2002	206	132	8.3	46

Table 1. Long-Term Trend of Hatchery Net Loading, Platte River Flows, and Lake Total P.

Source or Sink	Total Phosphorus Lbs
Supplied by Feed	3481
Associated with Fish	566
Solids Disposal	2658
Lost in Pond	51
Sub-Total	**2709**
Discharged	206

Table 2. Annual Summary of Hatchery Phosphorus and Sources and Sinks for 2002.

Site	Date	Jug & Needle TP (mg/m3)	Sigma TP (mg/m3)
Pond Inlet	28-Oct-02	11.90	12.60
Creek	10-Jan-03	11.06	14.30
Spring	10-Jan-03	9.45	7.41
River	10-Jan-03	9.02	9.33
Creek	14-Jan-03	11.40	13.61
Spring	14-Jan-03	13.10	11.28
Spring	17-Jan-03	10.58	10.72
River	17-Jan-03	7.20	8.00
Creek	21-Jan-03	13.16	12.90
Spring	21-Jan-03	13.47	13.77
River	21-Jan-03	7.19	6.92
Creek	18-Feb-03	9.00	8.16
Spring	18-Feb-03	13.73	13.60
River	18-Feb-03	10.48	9.50
Spring	25-Feb-03	11.58	10.24
Spring	28-Feb-03	18.02	11.80
River	28-Feb-03	19.88	8.46
Pond Outlet	25-Apr-03	12.69	12.92
Creek	25-Apr-03	6.72	7.02
Spring	25-Apr-03	11.21	13.09
River	25-Apr-03	11.46	11.88
Pond Inlet	29-Apr-03	18.02	27.60
Pond Outlet	29-Apr-03	21.03	34.38
Spring	29-Apr-03	9.33	7.73
River	29-Apr-03	13.89	18.33
Spring	2-May-03	16.92	6.50
Creek	2-May-03	9.58	7.26
Pond Outlet	2-May-03	15.57	14.38
River	2-May-03	12.47	12.87
Pond Inlet	6-May-03	26.94	19.68
Creek	6-May-03	23.65	12.91
Pond Inlet	16-May-03	23.10	25.50
Pond Outlet	16-May-03	15.90	15.20
Creek	16-May-03	8.50	10.00
Spring	16-May-03	20.90	8.00
Pond Inlet	20-May-03	34.00	19.60
Pond Outlet	20-May-03	17.00	20.30
Creek	20-May-03	10.90	9.30
Spring	20-May-03	12.80	7.10

Table 3. Total Phosphorus from Jug & Needle and Sigma Samplers.

Depth Feet	Surface Area Sq Feet	Layer Volume Cu Feet	Sample Depth Feet	9/17/2002 Median TP mg/m3		10/2/2002 Median TP mg/m3	
0.0	1.10032560E+08						
		3.58538276E+08	**S**	5.4	1936106692	6.9	2473914106
3.5	94846455						
		6.51252492E+08	**7.5**	6.5	4233141198	6.4	4168015949
11.5	67966668						
		6.77604114E+08	**15**	6.9	4675468387	6.7	4539947564
22.5	55234080						
		6.36411600E+08	**30**	6.5	4136675400	5.1	3245699160
37.5	29620800						
		3.51529200E+08	**45**	7.3	2566163160	6.6	2320092720
52.5	17249760						
		1.76091300E+08	**60**	7.9	1391121270	6.5	1144593450
67.5	6229080						
		5.52123000E+07	**75**	9.7	535559310	10	552123000
82.5	1132560						
		7.35075000E+06	**90**	11.2	82328400	9.6	70567200
95.0	43560						
		2.91399003E+09		**6.71**	**New**	**6.35**	**New**
		Total Volume					
				6.85	**Old**	**6.21**	**Old**

Table 4. New Algorithm to Calculate Volume-Weighted Average Total Phosphorus.

Number	Description	K&E (1980)	Current	Proposed for 2003			
				Hatchery	Tributary	Wet-Events	Lake
1	Platte River at Burnt Mill Rd below Bronson Lake					x	
2	Platte River at Fewins Road	x			x		
3	Brundage Creek near mouth	x			x		
4	Stanley Creek at Carmean Road					x	
5	Brundage Creek at Carmean Road					x	
6	Kinney Creek at Carmean Road					x	
7	Brundage Spring diversion to Hatchery		x	x			
8	Brundage Creek diversion to Hatchery		x	x			
9	Platte River diversion to Hatchery		x	x			
10	Inlet to Sedimentation Pond		x	x			
11	Discharge from Sedimentation Pond		x	x			
12	Platte River at US-31 below Hatchery	x			x	x	
13	Upstream Cater Creek at County 669					x	
14	Carter Creek at Brownell Rd near mouth	x			x	x	
15	Platte river Pioneer Road	x			x	x	
16	Collison Creek near mouth	x			x	x	
17	Platte River at USGS (Indian Hill Road)	x	x		x	x	
18	North Branch at Deadstream Road	x	x		x	x	
19	North Branch at Hooker Road					x	
20	Lake Outlet at M-22	x			x		
21	Platte Lake at center-deep Station	x	x				x

	Samples	
Hatchery: 5 Locations. Twice per Week. 52 Weeks per Year	1560	
Tributaries: 9 Locations. Every 2 weeks.	702	
Wet Events: 12 Locations. 3 Events. 6 Samples per Event	648	
Lake: Every 2 weeks. 8 Depths per Sample.	624	
All samples measured in triplicate.	3534	Total

Table 5. Proposed Sampling Locations and Frequency for 2003.

Date	CMU TP (mg/m3)	GLEC TP (mg/m3)	Container	Standard TP (mg/m3)
10/24/02	4.86	3.40	Original	4
10/24/02	5.12	3.00	Original	4
10/24/02	4.97	3.30	Original	4
10/24/02	4.94	4.40	CMU or GLEC	4
10/24/02	4.80	3.50	CMU or GLEC	4
10/24/02	5.07	4.10	CMU or GLEC	4
Average	**4.96**	**3.62**		
10/24/02	7.04	7.60	Original	8
10/24/02	7.51	6.20	Original	8
10/24/02	7.22	7.40	Original	8
10/24/02	8.80	8.20	CMU or GLEC	8
10/24/02	8.80	7.40	CMU or GLEC	8
10/24/02	8.17	3.90	CMU or GLEC	8
Average	**7.92**	**6.78**		
10/24/02	10.13	11.30	Original	12
10/24/02	10.23		Original	12
10/24/02	10.68	11.90	Original	12
10/24/02	10.80	12.80	CMU or GLEC	12
10/24/02	10.13	12.50	CMU or GLEC	12
10/24/02	9.91	13.30	CMU or GLEC	12
Average	**10.31**	**12.36**		
11/8/02	4.15		Original	4
11/8/02	4.90		Original	4
11/8/02	4.00		Original	4
Average	**4.35**			
11/8/02	8.73		Original	8
11/8/02	8.27		Original	8
11/8/02	8.66		Original	8
Average	**8.55**			
11/8/02	12.82		Original	12
11/8/02	12.58		Original	12
11/8/02	11.93		Original	12
Average	**12.44**			

Table 6. GLEC and CMU Total Phosphorus Measurements Compared to Standards.

Date	Original CMU TP mg/m3	50% CMU TP mg/m3	CMU Ratio	Original GLEC TP mg/m3	50% GLEC TP mg/m3	GLEC Ratio
4-Jun-02	10.93	5.74	0.53			
18-Jun-02	12.09	6.15	0.51			
21-Jun-02	12.58	6.64	0.53			
25-Jun-02	20.89	9.85	0.47			
28-Jun-02	16.72	6.87	0.41			
2-Jul-02	17.70	10.41	0.59			
9-Jul-02	16.86	11.70	0.69			
12-Jul-02	15.20	7.88	0.52			
16-Jul-02	18.58	9.95	0.54			
19-Jul-02	19.73	11.08	0.56			
23-Jul-02	22.02	6.50	0.30			
26-Jul-02	17.55	7.36	0.42			
30-Jul-02	12.01	5.76	0.48	9.27	3.33	0.36
6-Aug-02	16.65	7.65	0.46			
9-Aug-02	18.32	8.56	0.47			
13-Aug-02	21.61	9.62	0.45			
16-Aug-02	16.66	8.48	0.51			
20-Aug-02	14.12	13.71	0.97			
23-Aug-02	82.41	43.01	0.52			
27-Aug-02	21.43	12.11	0.57			
30-Aug-02	34.22	10.61	0.31			
13-Sep-02	16.50	9.59	0.58			
27-Sep-02	24.12	12.60	0.52			
22-Oct-02	16.82	8.60	0.51			
8-Nov-02	11.16	10.57	0.95			
		Average	**0.53**			**0.36**

Table 7. Comparison of GLEC and CMU Using 50% Dilution Test.

Absorbance @ 885 nm	Total P mg/m3	Absorbance @ 885 nm	Total P mg/m3
0.0400	4.67	0.0787	10.28
0.0424	5.01	0.0801	10.48
0.0412	4.84	0.0743	9.64
0.0405	4.74	0.0784	10.23
0.0412	4.84	0.0764	9.94
0.0445	5.32	0.0781	10.19
0.0440	5.25	0.0749	9.72
0.0431	5.12	0.0767	9.99
0.0432	5.13	0.0766	9.97
0.0423	5.00	0.0754	9.80
0.0438	5.22	0.0758	9.86
0.0444	5.30	0.0785	10.25
0.0431	5.12	0.0792	10.35
0.0442	5.28	0.0781	10.19
0.0431	5.12	0.0777	10.13
0.0421	4.97	0.0766	9.97
Average	**5.06**		**10.06**
Standard Dev	**0.202**		**0.237**
True Value	**5.0**		**10.0**

Table 8. CMU Total Phosphorus Measurements Compared to Standards.

Date	Container	Storage Time Days	Storgage Type	Actual TP mg/m3	Measured TP mg/m3
28-Mar-03	Old Poly	3	Refrigerated	10	10.11
28-Mar-03	Old Poly	3	Refrigerated	10	10.03
28-Mar-03	Old Poly	3	Refrigerated	10	9.94
28-Mar-03	Old Poly	3	Refrigerated	10	9.83
28-Mar-03	Old Poly	3	Refrigerated	10	10.19
28-Mar-03	Old Poly	3	Refrigerated	10	10.01
28-Mar-03	Glass	3	Refrigerated	10	10.01
28-Mar-03	Glass	3	Refrigerated	10	10.07
28-Mar-03	Glass	3	Refrigerated	10	9.93
28-Mar-03	Glass	3	Refrigerated	10	10.11
28-Mar-03	Glass	3	Refrigerated	10	10.04
28-Mar-03	Glass	3	Refrigerated	10	10.01

Table 9. CMU Total Phosphorus for Glass and New Polyethylene Bottles.

Date	Container	Storage Time Days	Storgage Type	Actual TP mg/m3	Measured TP mg/m3
23-Apr-03	New Poly	4	Refrigerated	0	1.59
23-Apr-03	New Poly	4	Refrigerated	0	1.72
23-Apr-03	New Poly	4	Refrigerated	0	1.41
23-Apr-03	New Poly	4	Refrigerated	0	1.13
23-Apr-03	New Poly	4	Refrigerated	0	1.22
23-Apr-03	New Poly	4	Refrigerated	0	1.26
23-Apr-03	Old Poly	4	Refrigerated	0	-0.67
23-Apr-03	Old Poly	4	Refrigerated	0	-0.42
23-Apr-03	Old Poly	4	Refrigerated	0	-0.59
23-Apr-03	Old Poly	4	Refrigerated	0	-0.55
23-Apr-03	Old Poly	4	Refrigerated	0	-0.48
23-Apr-03	Old Poly	4	Refrigerated	0	-0.45

Table 10. CMU Total Phosphorus for Old and New Polyethylene Bottles.

Date	Container	Storage Time Days	Storgage Type	Actual TP mg/m3	Measured TP mg/m3
19-Sep-02	Old Poly	14	Refrigerated	5	4.69
19-Sep-02	Old Poly	14	Refrigerated	5	5.41
19-Sep-02	Old Poly	14	Refrigerated	10	9.76
19-Sep-02	Old Poly	14	Refrigerated	10	9.88
19-Sep-02	Old Poly	14	Refrigerated	50	50.04
19-Sep-02	Old Poly	14	Refrigerated	50	50.65
19-Sep-02	Old Poly	14	Refrigerated	25	25.65
19-Sep-02	Old Poly	14	Refrigerated	25	25.68
19-Sep-02	Old Poly	14	Refrigerated	0	-0.09
19-Sep-02	Old Poly	14	Refrigerated	0	-0.13
19-Sep-02	Old Poly	14	Refrigerated	0	-0.18
19-Sep-02	Old Poly	14	Refrigerated	0	-0.19
19-Sep-02	Old Poly	14	Refrigerated	5	4.78
19-Sep-02	Old Poly	14	Refrigerated	5	5.49
19-Sep-02	Old Poly	14	Refrigerated	10	9.78
19-Sep-02	Old Poly	14	Refrigerated	10	9.90
19-Sep-02	Old Poly	14	Refrigerated	50	49.48
19-Sep-02	Old Poly	14	Refrigerated	50	50.07
19-Sep-02	Old Poly	14	Refrigerated	25	25.43
19-Sep-02	Old Poly	14	Refrigerated	25	25.46
19-Sep-02	Old Poly	14	Refrigerated	0	0.07
19-Sep-02	Old Poly	14	Refrigerated	0	0.03
19-Sep-02	Old Poly	14	Refrigerated	0	-0.01
19-Sep-02	Old Poly	14	Refrigerated	0	-0.03

Table 11. Stability of CMU Total Phosphorus Standards.

Date	Container	Storage Time Days	Storgage Type	Actual TP mg/m3	Measured TP mg/m3
6-Jun-03	Old Poly	6	Frozen	10	9.81
6-Jun-03	Old Poly	6	Frozen	10	10.19
6-Jun-03	Old Poly	6	Frozen	10	9.99
6-Jun-03	Old Poly	6	Frozen	10	10.00
6-Jun-03	Old Poly	6	Frozen	10	9.97
6-Jun-03	Old Poly	6	Frozen	10	10.14
6-Jun-03	Old Poly	6	Refirgerated	10	10.06
6-Jun-03	Old Poly	6	Refirgerated	10	10.14
6-Jun-03	Old Poly	6	Refirgerated	10	10.00
6-Jun-03	Old Poly	6	Refirgerated	10	10.07
6-Jun-03	Old Poly	6	Refirgerated	10	9.90
6-Jun-03	Old Poly	6	Refirgerated	10	10.03

Figure 12. CMU Total Phosphorus for Refrigerated and Frozen Storage.

Date	Method	Total P mg/m3
20-Aug-02	normal	102.35
20-Aug-02	normal	119.29
20-Aug-02	normal	107.21
20-Aug-02	spun after digestion	31.46
20-Aug-02	spun after digestion	29.13
20-Aug-02	spun after digestion	30.91

Table 13. CMU Total Phosphorus With and Without Centrifuging.

Date	pH		TDS (mg/l)		Calcium (mg/l)		Total Alkalinity (mg/l)		Chlorophyll (mg/m3)	
	CMU	GLEC	CMU	GLEC	CMU	GLEC	CMU	GLEC	CMU	GLEC
2-Apr-02	7.06	8.09	202.7	173.5	68.1	34.5	143	146	1.1	3.63
2-Apr-02	7.08	8.03	214.7	178.9	64.1	32.5	155	148		
2-Apr-02	7.13	8.06	216.0	169.3	64.1	35.5	153	144		
2-Apr-02	7.16	8.05	195.3	169.4	70.5	37.5	152	150		
2-Apr-02	7.23	8.06					156	146		
2-Apr-02	7.33	8.09					155	148		
2-Apr-02	6.83	8.09					136	146		
2-Apr-02	7.26	8.08					156	144		
2-Apr-02	7.28	8.03								
2-Apr-02	7.16	8.04								
2-Apr-02	7.18	8.06								
16-Apr-02	7.2	7.92	204.0	186.8	56.1	40.7	152	146	5.13	3.78
16-Apr-02	7.4	8.03	194.0	181.3	51.3	37.7	153	148		
16-Apr-02	7.2	8.08	197.0	184.5	48.1	42.6	152	150		
16-Apr-02	7.3	8.05	200.7	181.5	52.1	27.7	158	148		
16-Apr-02	7.4	8.10					153	144		
16-Apr-02	7.5	8.07					153	144		
16-Apr-02	7.2	8.08					156	142		
16-Apr-02	7.1	8.04					153	148		

Table 14. Various Comparisons between GLEC and CMU.

Date	Chlorophyll (mg/m3) Filtered at Hatchery	Chlorophyll (mg/m3) Filtered at CMU
23-Apr-03	2.06	3.00
23-Apr-03	1.93	2.86
23-Apr-03	2.08	3.05
Average	**2.02**	**2.97**
7-May-03	2.57	4.76
7-May-03	2.38	4.29
7-May-03	4.10	3.57
Average	**3.02**	**4.21**
21-May-03	4.02	2.70
21-May-03	3.68	2.76
21-May-03	2.92	2.97
Average	**3.54**	**2.81**

Table 15. CMU Chlorophyll for Samples Filtered at the Hatchery and at CMU.