

WM796

OPTIMIZATION OF BEST MANAGEMENT PRACTICES
FOR BEEF CATTLE RANCHING
IN THE LAKE OKEECHOBEE BASIN, Part 2.

PROGRESS REPORT #4

May 3, 2002

by

J. C. Capece, and J. Barkauskaite,



Southern DataStream, Inc., P.O. Box 1577, LaBelle FL 33975

<http://www.SouthernDataStream.com>

and

K.L. Campbell



UNIVERSITY OF
FLORIDA

Department of Agricultural and Biological Engineering
Institute of Food and Agricultural Sciences

more information available at:

<http://www.agen.ufl.edu/~maerc>

<http://www.SouthernDataStream.com/maerc>

TABLE OF CONTENTS

ONA WEATHER STATION SUMMARY	3
RUNOFF SUMMARY 1998-2001.....	4
CONCENTRATIONS SUMMARY 1998-2001	5
SUMMARY OF MEAN CONCENTRATION AND LOAD 1998-2001	9
SUMMARY OF BACKFLOW, RUNOFF AND COMBINED FLOW CONCENTRATIONS 2001	10
ANUAL LOAD ASSESSMENTS 1998-2001	11
LOAD SUMMARY BY PARAMETER 2001	18
LOAD SUMMARY BY STATION 2001	21
QA/QC ANALYSIS RESULTS	29

ONA weather station summary

Beginning Date	End Date	Air Temp (°F)		Rainfall (inch)
		Min	Max	
01/01/2000	12/31/2000	27.3	98.2	25.3
01/01/2001	13/31/2001	12566	95.6	59.9

Runoff summary 1998-2001

Table 1. Summary of runoff depth in cm and inches for summer and winter pasture plot and blocks in the years 1998, 1999, 2000 and 2001.

Station code	Treatment	Runoff Volume							
		1998		1999		2000		2001	
		cm	inch	cm	inch	cm	inch	cm	inch
S1	C	8.7	3.4	10.2	4.0	-1.1	-0.4	27.8	11.0
S2	20	13.5	5.3	13.0	5.1	-3.0	-1.2	29.5	11.6
S3	35	14.5	5.7	9.5	3.7	-0.1	-0.1	31.0	12.2
S4	15	6.6	2.6	15.1	5.9	0.4	0.2	24.2	9.5
S5	35	14.7	5.8	14.9	5.9	1.2	0.5	33.3	13.1
S6	15	15.3	6.0	14.2	5.6	2.4	0.9	38.3	15.1
S7	20	16.0	6.3	20.2	8.0	2.6	1.0	32.6	12.8
S8	C	14.2	5.6	7.6	3.0	2.1	0.8	34.6	13.6
Summer average		12.9	5.1	13.1	5.2	0.5	0.2	31.4	12.4
W1	15	10.5	4.1	6.7	2.6	1.0	0.4	14.5	5.7
W2	20	15.7	6.2	6.9	2.7	1.3	0.5	24.8	9.8
W3	35	12.0	4.7	14.8	5.8	0.6	0.2	27.0	10.6
W4	C	21.5	8.5	10.8	4.3	2.5	1.0	23.1	9.1
W5	35	24.7	9.7	13.4	5.3	1.8	0.7	33.5	13.2
W6	15	20.9	8.2	15.7	6.2	0.6	0.2	24.2	9.5
W7	C	24.4	9.6	15.0	5.9	1.0	0.4	32.1	12.6
W8	20	20.9	8.2	12.9	5.1	2.0	0.8	25.2	9.9
Winter average		18.8	7.4	12.0	4.7	1.3	0.5	25.5	10.0

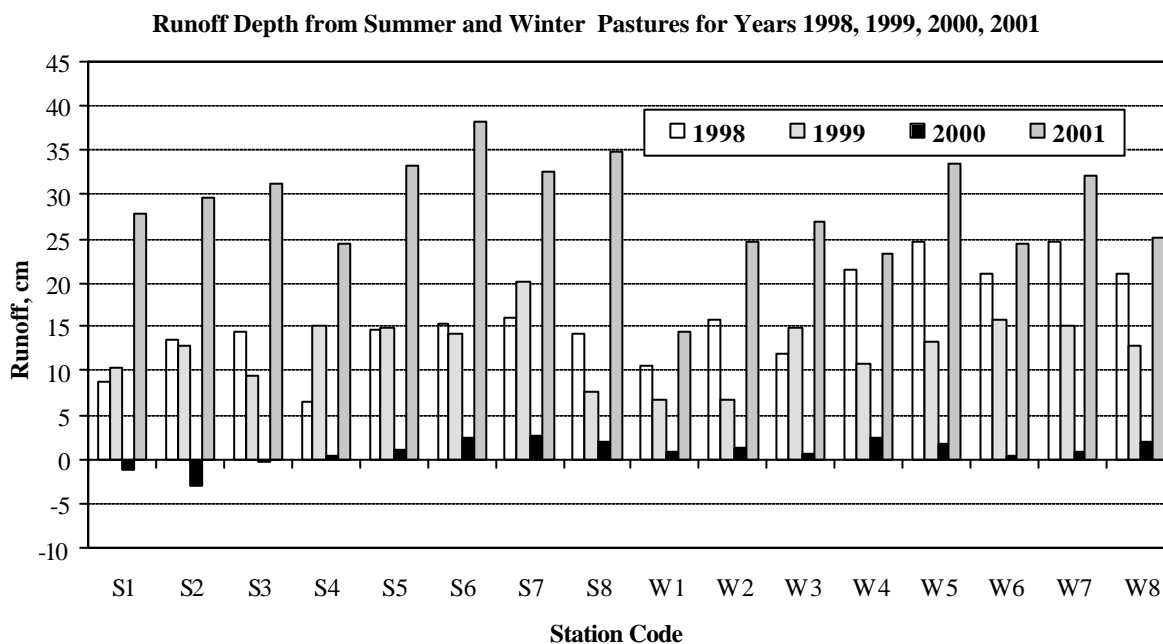


Figure1. Total runoff depth results calculated for summer and winter pastures blocks in the years 1998, 1999, 2000 and 2001.

Concentrations summary 1998-2001

Table 2a. Summary statistics for ISCO samples Total P concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Site	Treatment	Rep	Number of Samples				TP Concentration (mg/L)			
			1998	1999	2000	2001	1998	1999	2000	2001
S1	C	1	97	49	20	98	0.32	0.41	0.06	1.07
S2	20	1	41	44	6	92	0.17	0.56	0.29	0.88
S3	35	1	7	29	5	88	0.81	0.56	0.07	0.79
S4	15	1	91	45	14	96	0.61	0.61	0.64	1.11
S5	35	2	69	42	28	91	0.63	0.73	0.42	0.80
S6	15	2	112	53	21	93	0.31	0.63	0.54	0.85
S7	20	2	125	64	79	109	0.22	0.57	0.25	0.70
S8	C	2	83	52	32	101	0.84	0.69	1.05	0.82
Summer Average			78	47	26	96	0.49	0.60	0.42	0.88
W1	15	1	186	51	16	112	0.06	0.16	0.25	0.12
W2	20	1	143	38	15	114	0.06	0.20	0.13	0.14
W3	35	1	204	31	15	91	0.10	0.10	0.50	0.24
W4	C	1	131	74	17	118	0.06	0.07	0.14	0.11
W5	35	2	187	43	15	123	0.06	0.11	0.31	0.16
W6	15	2	183	51	8	100	0.08	0.08	0.62	0.18
W7	C	2	158	36	10	112	0.10	0.19	0.32	0.15
W8	20	2	216	22	14	110	0.07	0.08	0.30	0.08
Winter Average			176	43	14	110	0.07	0.12	0.32	0.15

Total Phosphorus Concentrations, 1998 - 2001

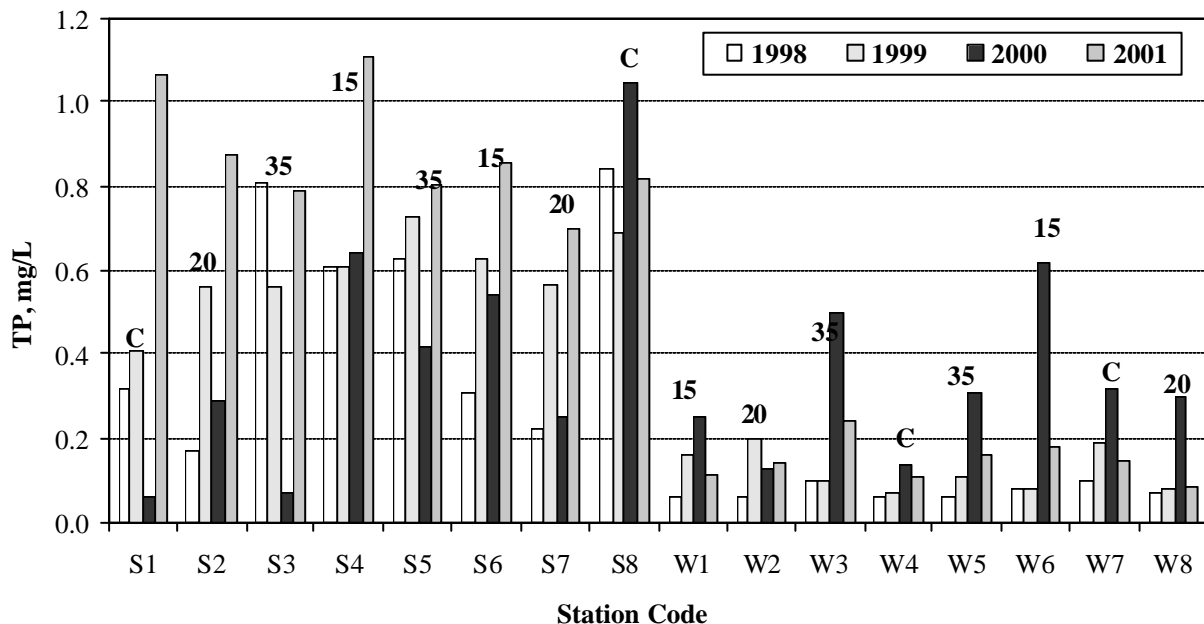


Figure 2a. Summary statistics for ISCO samples Total P concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Table 2b. Summary statistics for ISCO samples NOX concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Site	Treatment	Rep	Number of Samples				NOX Concentration (mg/L)			
			1998	1999	2000	2001	1998	1999	2000	2001
			S1	C	1	97	49	20	98	0.01
S2	20	1	41	44	6	92	0.01	0.02	0.01	0.05
S3	35	1	7	29	5	88	0.02	0.01	0.01	0.07
S4	15	1	91	45	14	96	0.01	0.01	0.01	0.04
S5	35	2	69	42	28	91	0.01	0.01	0.02	0.03
S6	15	2	112	53	21	93	0.01	0.01	0.05	0.03
S7	20	2	125	64	79	109	0.01	0.01	0.12	0.07
S8	C	2	83	52	32	101	0.01	0.01	0.01	0.03
Summer Average			78	47	26	96	0.01	0.01	0.03	0.05
W1	15	1	186	51	16	112	0.01	0.13	0.12	0.26
W2	20	1	143	38	15	114	0.02	0.02	1.56	0.38
W3	35	1	204	31	15	91	0.03	0.01	0.15	0.04
W4	C	1	131	74	17	118	0.01	0.01	0.13	0.12
W5	35	2	187	43	15	123	0.01	0.02	0.25	0.12
W6	15	2	183	51	8	100	0.01	0.02	0.03	0.08
W7	C	2	158	36	10	112	0.02	0.01	0.56	0.07
W8	20	2	216	22	14	110	0.01	0.02	0.09	0.03
Winter Average			176	43	14	110	0.02	0.03	0.36	0.14

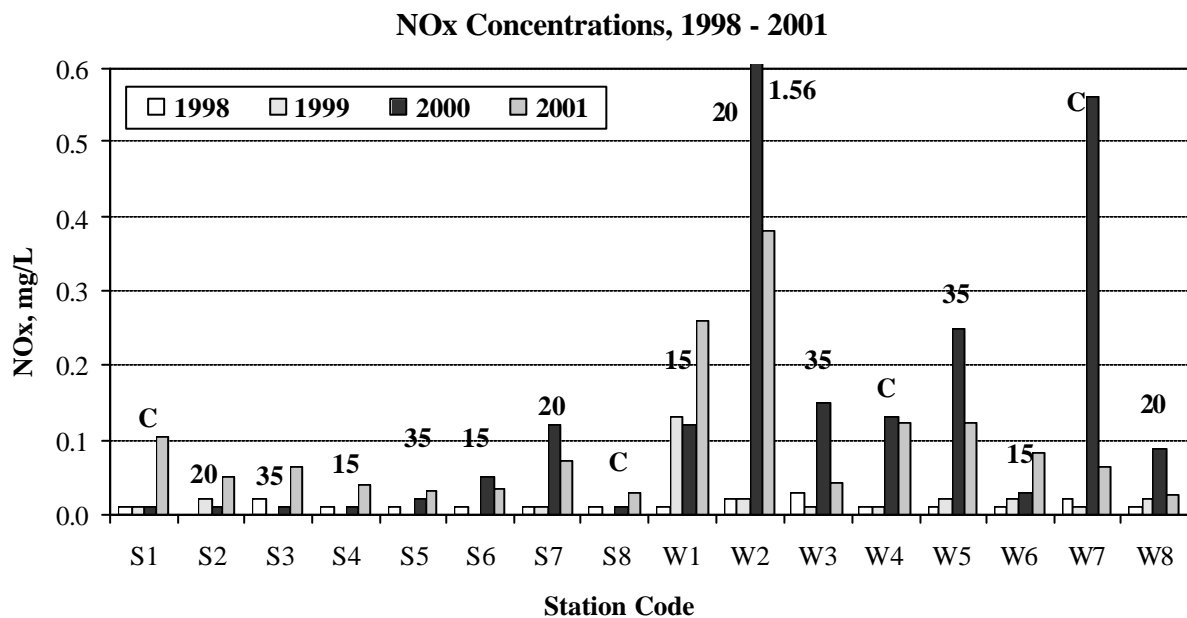


Figure 2b. Summary statistics for ISCO samples NOX concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Table 2c. Summary statistics for ISCO samples NH4 concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Site	Treatment	Rep	Number of Samples				NH4 Concentration (mg/L)			
			1998	1999	2000	2001	1998	1999	2000	2001
			S1	C	1	97	49	20	98	0.24
S2	20	1	41	44	6	92	0.27	0.39	0.28	0.41
S3	35	1	7	29	5	88	0.36	0.4	0.2	0.33
S4	15	1	91	45	14	96	0.22	0.3	0.33	0.30
S5	35	2	69	42	28	91	0.34	0.25	0.24	0.49
S6	15	2	112	53	21	93	0.19	0.25	0.48	0.41
S7	20	2	125	64	79	109	0.26	0.24	0.24	0.44
S8	C	2	83	52	32	101	0.31	0.31	0.33	0.29
Summer Average			78	47	26	96	0.27	0.30	0.29	0.41
W1	15	1	186	51	16	112	0.16	0.18	1.52	0.24
W2	20	1	143	38	15	114	0.15	0.18	2.25	0.58
W3	35	1	204	31	15	91	0.15	0.2	2.38	0.20
W4	C	1	131	74	17	118	0.14	0.22	0.82	0.40
W5	35	2	187	43	15	123	0.16	0.24	1.44	0.25
W6	15	2	183	51	8	100	0.15	0.22	0.6	0.23
W7	C	2	158	36	10	112	0.2	0.24	0.98	0.21
W8	20	2	216	22	14	110	0.17	0.25	0.56	0.20
Winter Average			176	43	14	110	0.16	0.22	1.32	0.29

NH4 Concentrations, 1998 - 2001

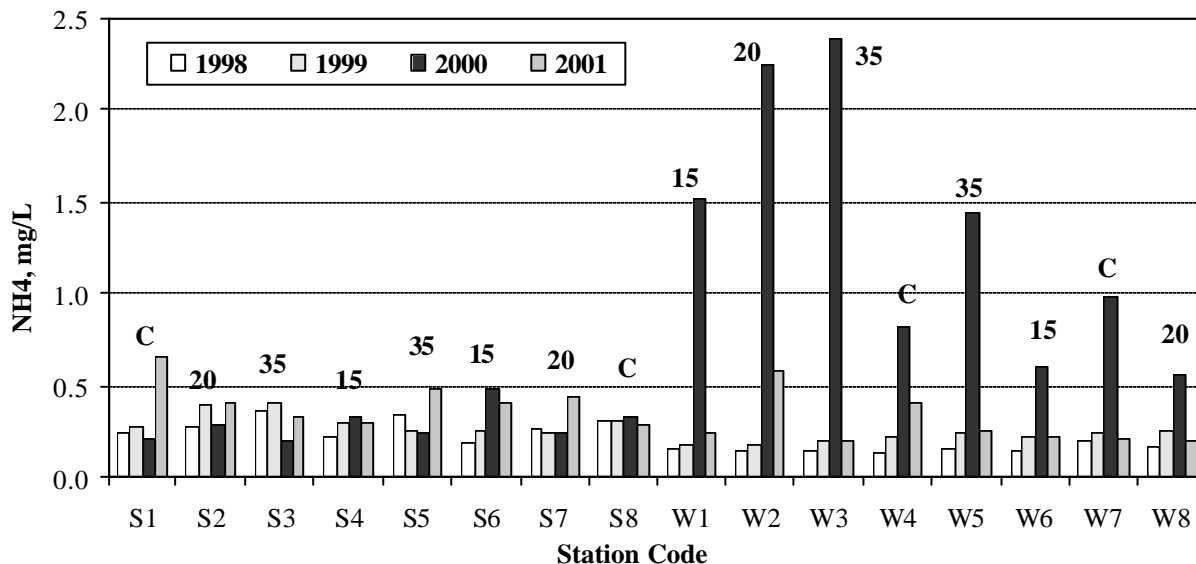


Figure 2c. Summary statistics for ISCO samples NH4 concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Table 2d. Summary statistics for ISCO samples TKN concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Site	Treatment	Rep	Number of Samples				TKN Concentration (mg/L)			
			1998	1999	2000	2001	1998	1999	2000	2001
			S1	C	1	97	49	20	98	3.02
S2	20	1	41	44	6	92	3.02	4.73	2.27	4.32
S3	35	1	7	29	5	88	4.59	4.45	1.66	3.61
S4	15	1	91	45	14	96	3.31	4.1	2.61	3.36
S5	35	2	69	42	28	91	3.97	4.55	2.55	3.43
S6	15	2	112	53	21	93	3.77	4.67	2.89	3.90
S7	20	2	125	64	79	109	3.41	3.99	2.07	4.25
S8	C	2	83	52	32	101	3.54	4.78	4.54	3.72
Summer Average			78	47	26	96	3.58	4.34	2.50	3.84
W1	15	1	186	51	16	112	3.42	3.03	4.70	2.68
W2	20	1	143	38	15	114	3.52	2.94	6.15	3.49
W3	35	1	204	31	15	91	3.16	3.21	7.76	2.78
W4	C	1	131	74	17	118	3.35	3.29	3.83	3.07
W5	35	2	187	43	15	123	3.61	3.52	4.4	2.82
W6	15	2	183	51	8	100	3.22	4.12	5.26	2.98
W7	C	2	158	36	10	112	3.72	3.21	1.96	3.13
W8	20	2	216	22	14	110	3.30	3.06	3.81	2.55
Winter Average			176	43	14	110	3.41	3.30	4.73	2.94

TKN Concentrations, 1998 - 2001

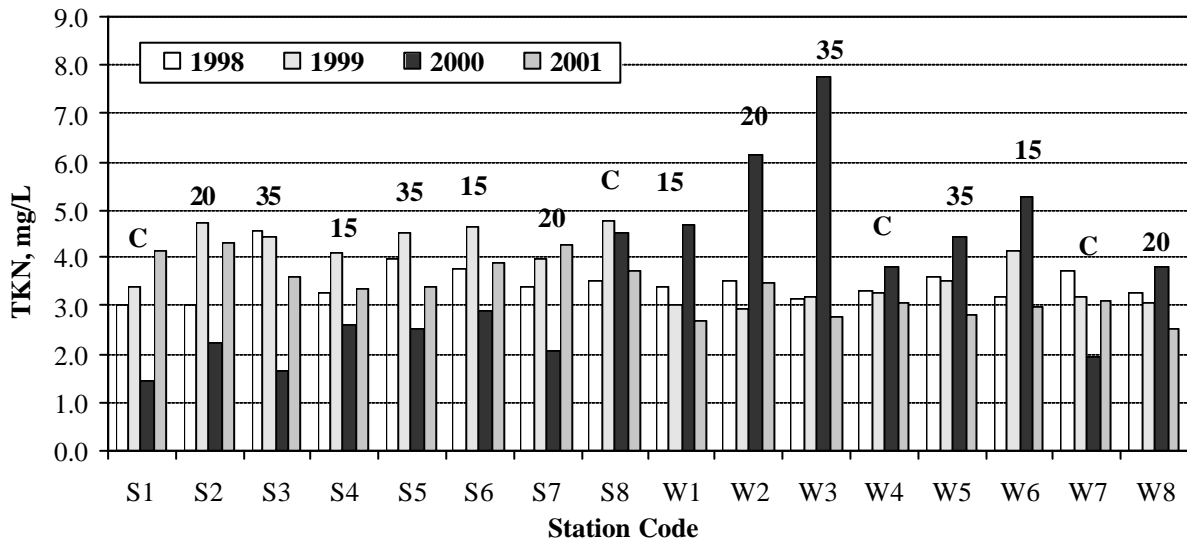


Figure 2d. Summary statistics for ISCO samples TKN concentration results from summer and winter pastures for the year 1998, 1999, 2000 and 2001 showing mean phosphorus concentrations in mg/L (C represents the control plots).

Summary of mean concentration and load 1998-2001

Table3. Summarize the mean concentrations of the 2 replicates for each treatment and the mean for all 8 plots within a block winter and summer

Site	Treatment	NH4				NOX				TKN				TP			
		Concentration (mg/L)				Concentration (mg/L)				Concentration (mg/L)				Concentration (mg/L)			
		1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001
S	0	0.28	0.29	0.27	0.47	0.01	0.01	0.01	0.07	3.28	4.11	2.99	3.93	0.58	0.55	0.56	0.94
	15	0.21	0.28	0.41	0.35	0.01	0.01	0.03	0.04	3.54	4.39	2.75	3.63	0.46	0.62	0.59	0.98
	20	0.27	0.32	0.26	0.43	0.01	0.02	0.07	0.06	3.22	4.36	2.17	4.28	0.20	0.57	0.27	0.79
	35	0.35	0.33	0.22	0.41	0.02	0.01	0.02	0.05	4.28	4.50	2.11	3.52	0.72	0.65	0.25	0.79
W	0	0.17	0.23	0.90	0.31	0.02	0.01	0.35	0.09	3.54	3.25	2.90	3.10	0.08	0.13	0.23	0.13
	15	0.16	0.20	1.06	0.23	0.01	0.08	0.08	0.17	3.32	3.58	4.98	2.83	0.07	0.12	0.44	0.15
	20	0.16	0.22	1.41	0.39	0.02	0.02	0.83	0.20	3.41	3.00	4.98	3.02	0.07	0.14	0.22	0.11
	35	0.16	0.22	1.91	0.23	0.02	0.02	0.20	0.08	3.39	3.37	6.08	2.80	0.08	0.11	0.41	0.20

Table 4. Summarize the mean loads of the 2 replicates for each treatment and the mean for all 8 plots within a block winter and summer

Site	Treatment	NH4				NOX				TKN				TP			
		Load (Kg/ha)				Load (Kg/ha)				Load (Kg/ha)				Load (Kg/ha)			
		1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001
S	0	0.19	0.30	0.05	2.09	0.02	0.01	0.00	0.11	4.68	4.31	0.71	14.78	0.92	0.57	0.16	3.83
	15	0.19	0.36	0.01	1.34	0.01	0.01	0.00	0.12	4.78	6.50	0.59	11.56	0.56	0.77	0.06	4.30
	20	0.23	0.55	0.03	0.95	0.02	0.02	0.00	0.05	7.57	8.67	1.21	13.52	0.58	1.13	0.12	2.78
	35	0.22	0.43	0.01	1.59	0.03	0.00	0.00	0.04	6.77	5.59	0.20	12.14	0.88	0.80	0.04	3.45
W	0	0.35	0.28	0.17	1.21	0.06	0.02	0.02	-0.25	7.65	4.29	1.02	16.31	0.12	0.13	0.05	0.98
	15	0.21	0.22	0.15	0.98	0.03	0.03	0.00	-0.43	5.28	4.38	0.62	12.32	0.11	0.14	0.06	0.72
	20	0.34	0.21	0.32	1.12	0.04	0.02	0.13	0.17	6.27	3.06	1.29	14.11	0.09	0.17	0.04	0.49
	35	0.21	0.32	0.34	0.77	0.03	0.03	0.00	-0.19	6.50	4.65	0.83	13.37	0.12	0.15	0.09	1.03

Summary of Backflow, Runoff and Combined flow concentrations 2001

Table 5a. Summary of TP concentrations associated with backflow, runoff and combined flow for each pasture plot and block in the year 2001.

Station Code	Treatment	TP (mg/L)		
		Inflow	Runoff	Combined
S1	C	0.28	1.28	1.15
S2	20	0.32	0.92	0.88
S3	35	0.24	0.85	0.78
S4	15	0.31	1.22	1.10
S5	35	0.33	0.92	0.80
S6	15	0.42	0.87	0.85
S7	20	0.37	0.77	0.69
S8	C	0.44	0.86	0.81
Summer Average		0.34	0.96	0.88
W1	15	0.13	0.85	0.68
W2	20	0.07	0.15	0.14
W3	35	0.10	0.25	0.24
W4	C	0.09	0.12	0.11
W5	35	0.09	0.17	0.16
W6	15	0.06	0.20	0.18
W7	C	0.05	0.16	0.15
W8	20	0.05	0.09	0.08
Winter Average		0.08	0.25	0.22

Total Phosphorus Concentrations for 2001

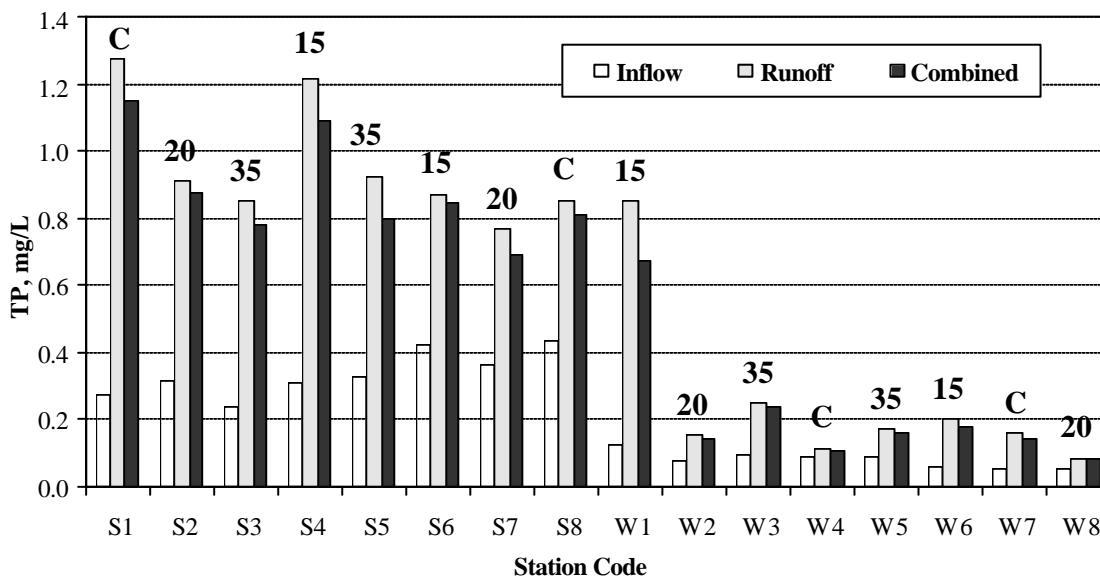


Figure 5a. Total Phosphorus mean concentrations for inflow, runoff and combined flow from every summer and winter blocks in the year 2001.

Table 5b. Summary of TP concentrations associated with backflow, runoff and combined flow for each pasture plot and block in the year 2001.

Station	Treatment	NOX (mg/L)		
		Inflow	Runoff	Combined
S1	C	0.48	0.20	0.11
S2	20	0.14	0.04	0.05
S3	35	0.43	0.03	0.08
S4	15	0.15	0.02	0.04
S5	35	0.03	0.03	0.03
S6	15	0.04	0.03	0.03
S7	20	0.34	0.03	0.09
S8	C	0.04	0.03	0.03
Summer Average		0.21	0.05	0.06
W 1	15	0.66	0.03	0.18
W 2	20	0.62	0.33	0.38
W 3	35	0.08	0.04	0.04
W 4	C	0.38	0.09	0.12
W 5	35	0.48	0.07	0.12
W 6	15	0.41	0.03	0.08
W 7	C	0.26	0.03	0.07
W 8	20	0.09	0.02	0.03
Winter Average		0.37	0.08	0.13

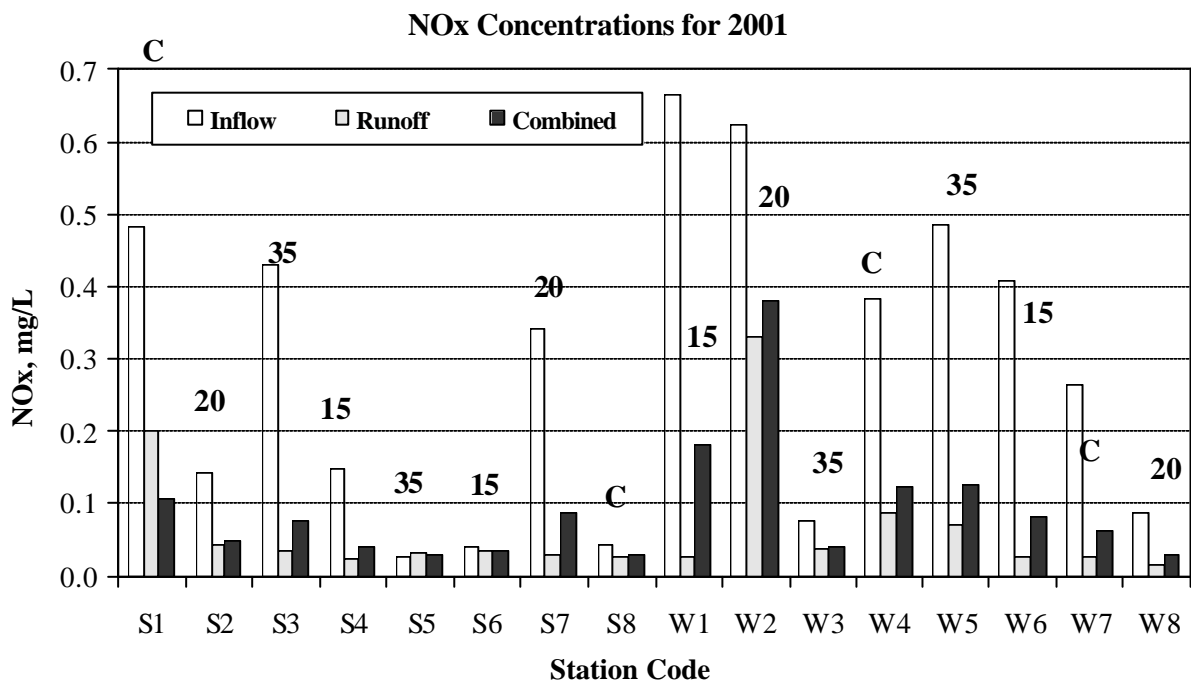


Figure 5b. Total Phosphorus mean concentrations for inflow, runoff and combined flow from every summer and winter blocks in the year 2001.

Table 5c. Summary of NH₄ concentrations associated with backflow, runoff and combined flow for each pasture plot and block in the year 2001.

Station Code	Treatment	NH ₄ (mg/L)		
		Inflow	Runoff	Combined
S1	C	0.45	0.67	0.65
S2	20	0.28	0.42	0.42
S3	35	0.24	0.34	0.33
S4	15	0.23	0.31	0.30
S5	35	0.31	0.55	0.50
S6	15	0.20	0.42	0.40
S7	20	0.89	0.34	0.45
S8	C	0.26	0.29	0.29
Summer Average		0.36	0.42	0.42
W1	15	0.19	0.29	0.27
W2	20	0.29	0.63	0.58
W3	35	0.15	0.20	0.21
W4	C	0.29	0.43	0.39
W5	35	0.24	0.25	0.25
W6	15	0.19	0.23	0.23
W7	C	0.21	0.21	0.21
W8	20	0.18	0.21	0.20
Winter Average		0.22	0.31	0.29

NH₄ Concentrations for 2001

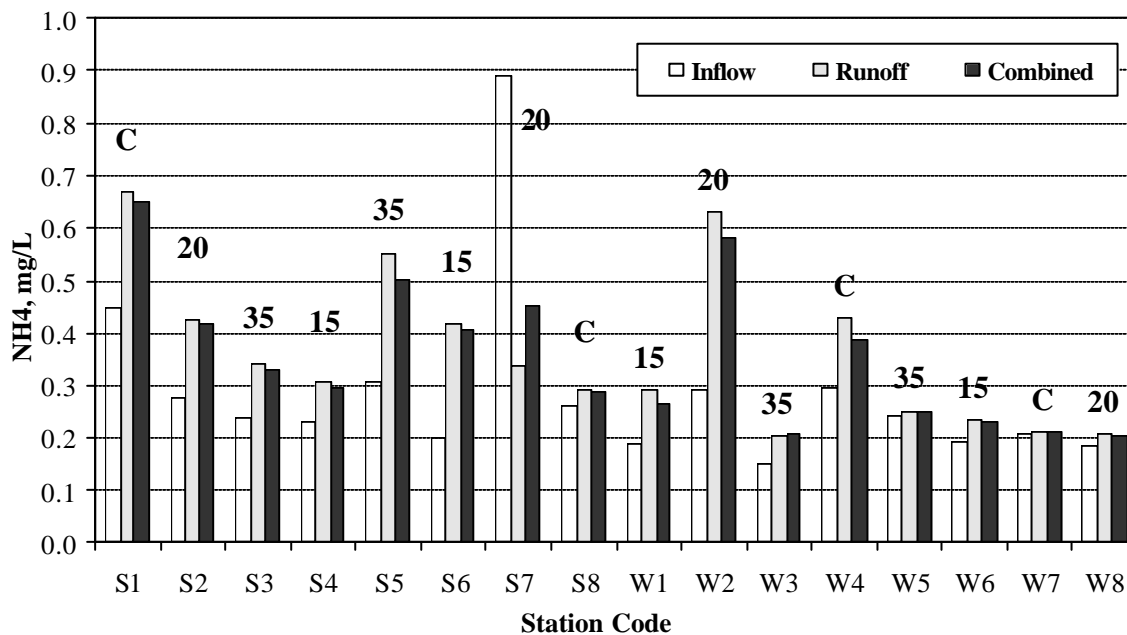


Figure 5c. NH₄ mean concentrations for inflow, runoff and combined flow from every summer and winter blocks in the year 2001.

Table 5d. Summary of TKN concentrations associated with backflow, runoff and combined flow for each pasture plot and block in the year 2001.

Station	Treatment	TKN (mg/L)		
		Inflow	Runoff	Combined
S1	C	1.83	4.46	4.14
S2	20	2.08	4.47	4.32
S3	35	1.65	3.83	3.55
S4	15	2.01	3.54	3.34
S5	35	2.11	3.78	3.44
S6	15	1.14	4.02	3.87
S7	20	5.68	3.88	4.23
S8	C	1.65	3.95	3.67
Summer Average		2.27	3.99	3.82
W1	15	1.44	3.91	3.32
W2	20	1.69	3.78	3.48
W3	35	1.38	2.86	2.75
W4	C	1.65	3.41	3.06
W5	35	1.43	3.01	2.81
W6	15	1.61	3.20	2.97
W7	C	1.28	3.46	3.11
W8	20	1.16	2.81	2.54
Winter Average		1.46	3.31	3.00

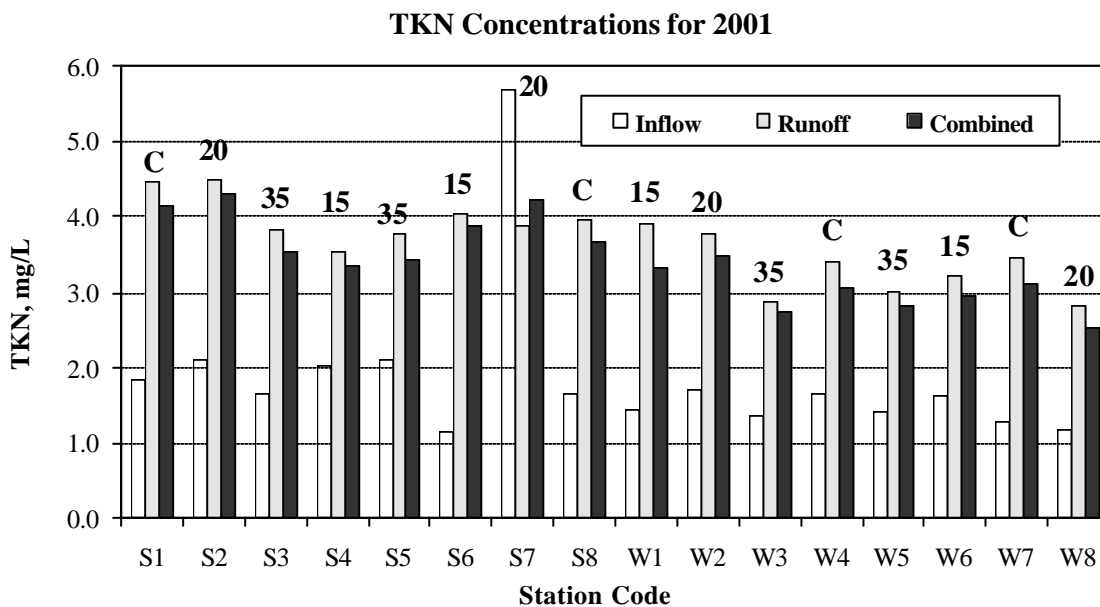


Figure 5d. TKN mean concentrations for inflow, runoff and combined flow from every summer and winter blocks in the year 2001.

Annual Load Assessments 1998-2001

Table 6a. Comparison of loads calculated using TP concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Site	Treatment	Rep	TP			
			Load (Kg/ha)			
			1998	1999	2000	2001
S1	C	1	0.58	0.55	0.01	4.41
S2	20	1	0.51	0.89	0.04	3.16
S3	35	1	0.60	0.47	0.00	2.69
S4	15	1	0.66	0.89	0.03	4.36
S5	35	2	1.17	1.12	0.08	4.20
S6	15	2	0.46	0.64	0.08	4.24
S7	20	2	0.64	1.37	0.21	2.39
S8	C	2	1.25	0.58	0.32	3.26
Summer Average			0.73	0.82	0.10	3.59
W 1	15	1	0.07	0.16	0.04	0.37
W 2	20	1	0.07	0.24	0.03	0.64
W 3	35	1	0.10	0.18	0.07	0.99
W 4	C	1	0.12	0.08	0.06	0.55
W 5	35	2	0.14	0.12	0.11	1.07
W 6	15	2	0.14	0.12	0.08	1.07
W 7	C	2	0.13	0.18	0.04	1.41
W 8	20	2	0.10	0.10	0.05	0.34
Winter Average			0.11	0.15	0.06	0.81

Annual TP Loads, 1998 - 2001

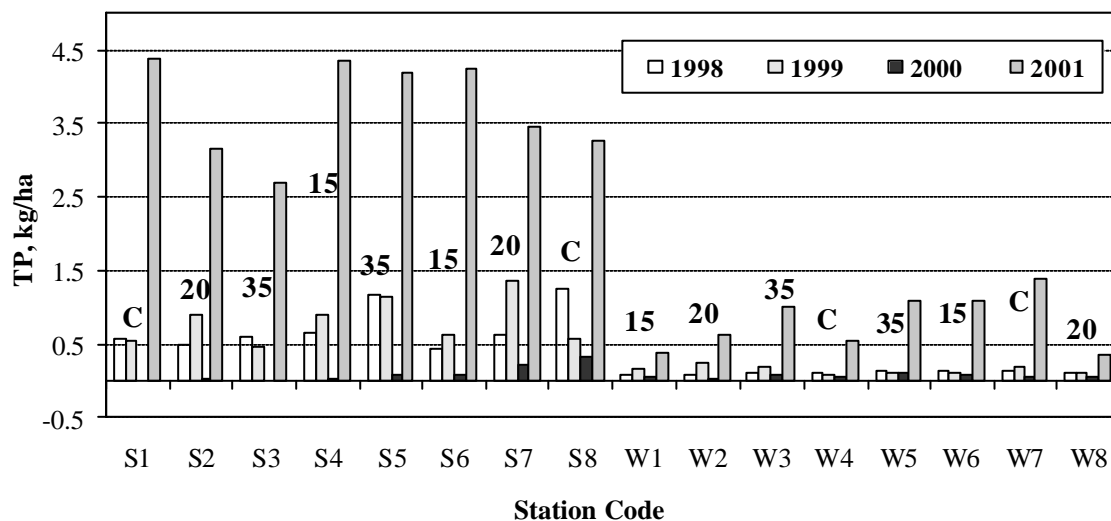


Figure 6a. Comparison of nutrient loads calculated using TP concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Table 6b. Comparison of nutrient loads calculated using NOX concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Site	Treatment	Rep	NOX			
			Load (Kg/ha)			
			1998	1999	2000	2001
S1	C	1	0.02	0.01	0.001	0.11
S2	20	1	0.02	0.02	0.003	0.06
S3	35	1	0.03	0.00	0.000	0.02
S4	15	1	0.01	0.01	0.000	0.03
S5	35	2	0.04	0.01	0.001	0.05
S6	15	2	0.01	0.01	0.002	0.20
S7	20	2	0.01	0.03	0.003	0.06
S8	C	2	0.02	0.01	0.002	0.10
Summer Average			0.02	0.01	0.002	0.08
W1	15	1	0.02	0.03	0.005	-0.61
W2	20	1	0.03	0.02	0.254	0.27
W3	35	1	0.02	0.01	0.001	-0.21
W4	C	1	0.04	0.02	0.023	-0.30
W5	35	2	0.04	0.04	0.007	-0.17
W6	15	2	0.03	0.02	0.002	-0.25
W7	C	2	0.07	0.01	0.008	-0.21
W8	20	2	0.06	0.02	0.016	0.07
Winter Average			0.04	0.02	0.04	-0.18

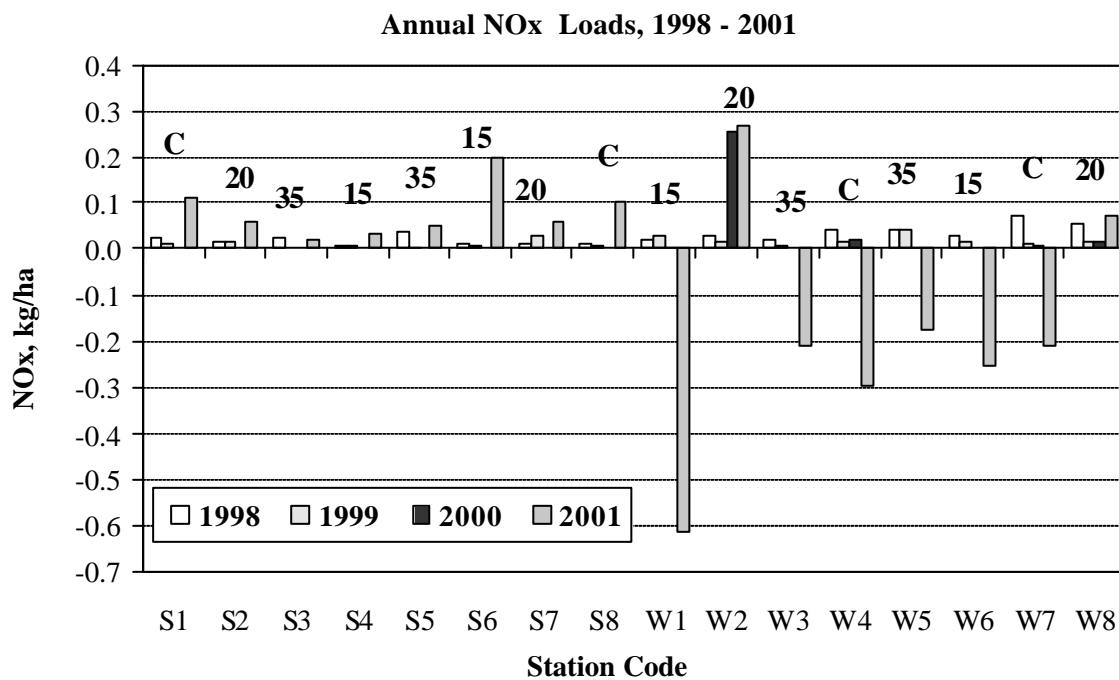


Figure 6b. Comparison of nutrient loads calculated using NOX concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Table 6c. Comparison of nutrient loads calculated using NH₄ concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Site	Treatment	Rep	NH ₄			
			Load (Kg/ha)			
			1998	1999	2000	2001
S1	C	1	0.12	0.34	0.02	3.00
S2	20	1	0.17	0.49	0.02	1.48
S3	35	1	0.10	0.46	0.00	1.08
S4	15	1	0.13	0.39	0.01	0.86
S5	35	2	0.35	0.39	0.02	2.10
S6	15	2	0.26	0.34	0.02	1.83
S7	20	2	0.29	0.61	0.03	1.19
S8	C	2	0.26	0.27	0.08	1.19
Summer Average			0.21	0.41	0.02	1.59
W1	15	1	0.12	0.15	0.25	0.89
W2	20	1	0.25	0.13	0.53	1.40
W3	35	1	0.14	0.32	0.10	0.52
W4	C	1	0.30	0.24	0.29	1.27
W5	35	2	0.29	0.32	0.58	1.03
W6	15	2	0.31	0.29	0.05	1.07
W7	C	2	0.41	0.32	0.06	1.15
W8	20	2	0.43	0.30	0.11	0.84
Winter Average			0.28	0.26	0.25	1.02

Annual NH₄ Loads, 1998 - 2001

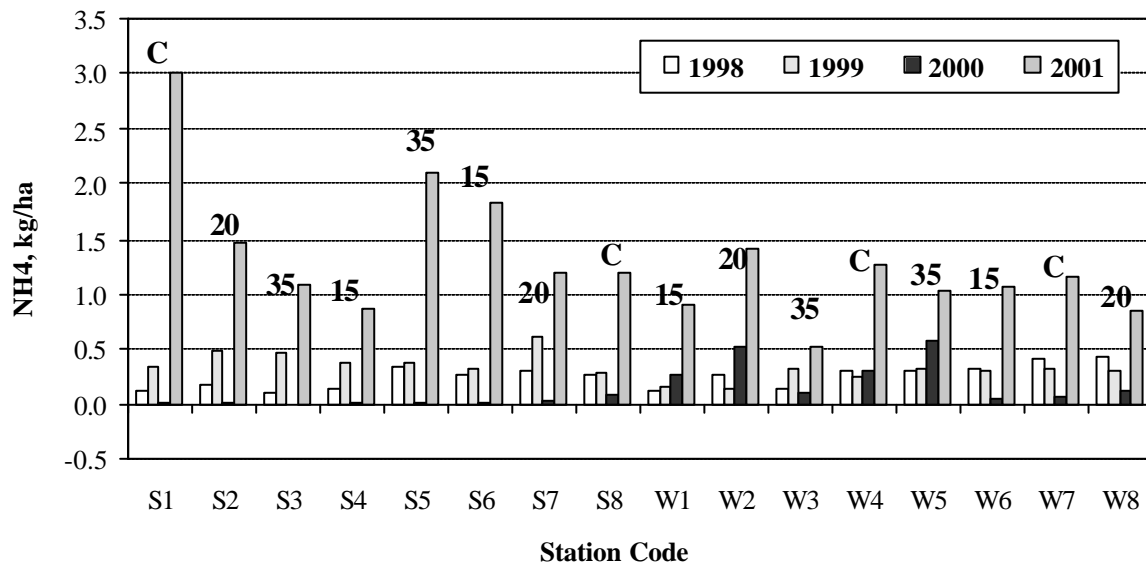


Figure 6c. Comparison of nutrient loads calculated using concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Table 6d. Comparison of nutrient loads calculated using TKN concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Site	Treatment	Rep	TKN			
			Load (Kg/ha)			
			1998	1999	2000	2001
S1	C	1	4.08	4.60	0.15	15.13
S2	20	1	6.98	6.86	0.66	14.08
S3	35	1	6.89	4.25	-0.02	11.65
S4	15	1	2.31	5.83	0.12	8.34
S5	35	2	6.65	6.93	0.43	12.63
S6	15	2	7.25	7.17	1.07	14.79
S7	20	2	8.17	10.48	1.76	12.40
S8	C	2	5.29	4.02	1.26	14.42
Summer Average			5.95	6.27	0.68	12.93
W1	15	1	3.87	2.58	0.77	11.29
W2	20	1	5.62	2.13	1.43	15.92
W3	35	1	4.11	4.80	1.41	9.26
W4	C	1	6.95	4.91	1.43	14.86
W5	35	2	8.88	4.51	0.25	17.49
W6	15	2	6.70	6.19	0.47	13.34
W7	C	2	8.36	3.67	0.60	17.77
W8	20	2	6.92	3.98	1.16	12.30
Winter Average			6.43	4.10	0.94	14.03

Annual TKN Loads, 1998 - 2001

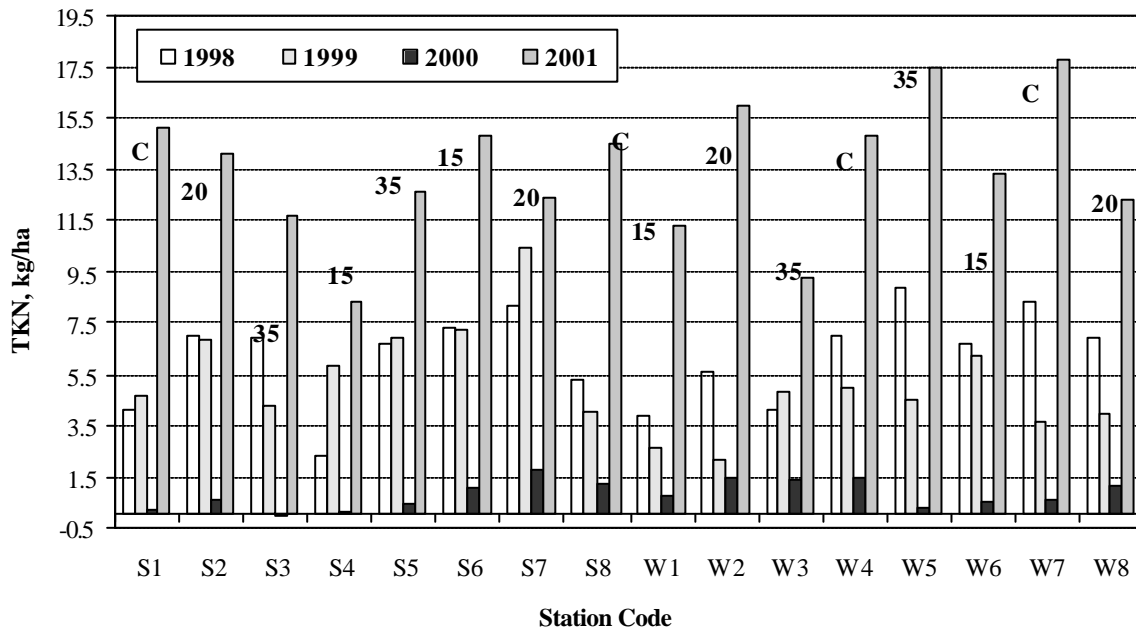


Figure 6d. Comparison of nutrient loads calculated using TKN concentrations from ISCO and grab samples collected from summer and winter pastures in the years 1998, 1999, 2000 and 2001.

Load summary by Parameter 2001

Table 7. Comparison of nutrient loads calculated using TP, NO_x, NH₄, TKN, ortho-P concentrations from ISCO and grab samples collected from summer and winter pastures in the year 2001.

Station Code	Treatment	Nutrient Load, kg/ha				
		TP	NO _x	TKN	NH ₄	ortho_P
S1	C	4.41	0.11	15.13	3.00	0.72
S2	20	3.16	0.06	14.08	1.48	0.34
S3	35	2.69	0.02	11.65	1.08	0.30
S4	15	4.36	0.03	8.34	0.86	0.35
S5	35	4.20	0.05	12.63	2.10	0.34
S6	15	4.24	0.20	14.79	1.83	0.35
S7	20	3.46	0.06	12.40	1.19	0.15
S8	C	3.26	0.10	14.42	1.19	0.36
Summer average		3.7	0.1	12.9	1.6	0.4
W 1	15	0.37	-0.61	11.29	0.89	0.16
W 2	20	0.64	0.27	15.92	1.40	0.02
W 3	35	0.99	-0.21	9.26	0.52	0.06
W 4	C	0.55	-0.30	14.86	1.27	0.02
W 5	35	1.07	-0.17	17.49	1.03	0.08
W 6	15	1.07	-0.25	13.34	1.07	0.11
W 7	C	1.41	-0.21	17.77	1.15	0.06
W 8	20	0.34	0.07	12.30	0.84	0.07
Winter average		0.8	-0.2	14.0	1.0	0.1

Total Load of TP for Summer and Winter Pastures for 2001

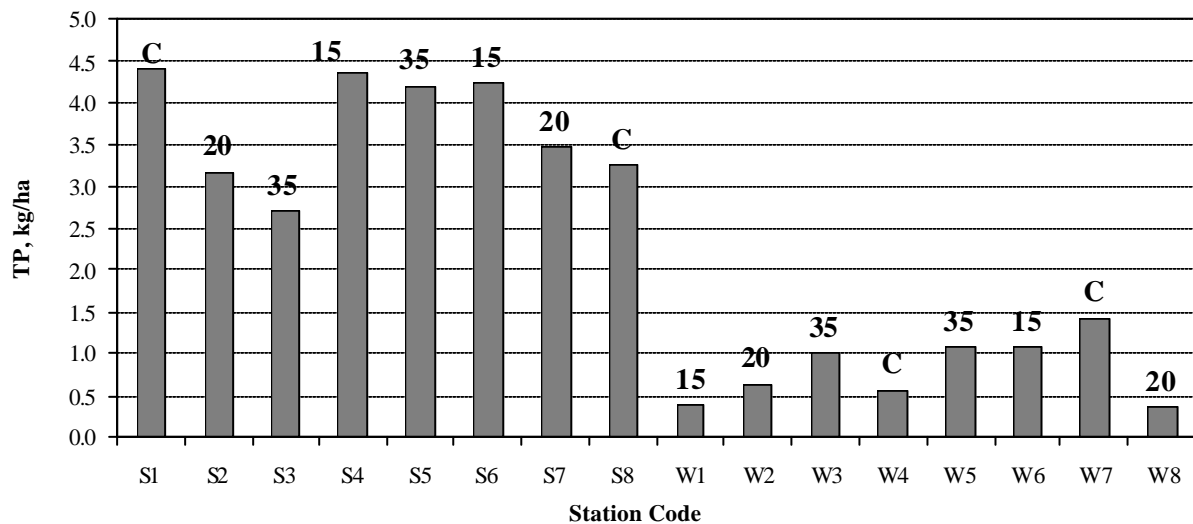


Figure 7a. Nutrient loads calculated using TP concentrations from ISCO and grab samples collected from summer and winter pastures in the year 2001.

Total Load of Nox for Summer and Winter Pastures for 2001

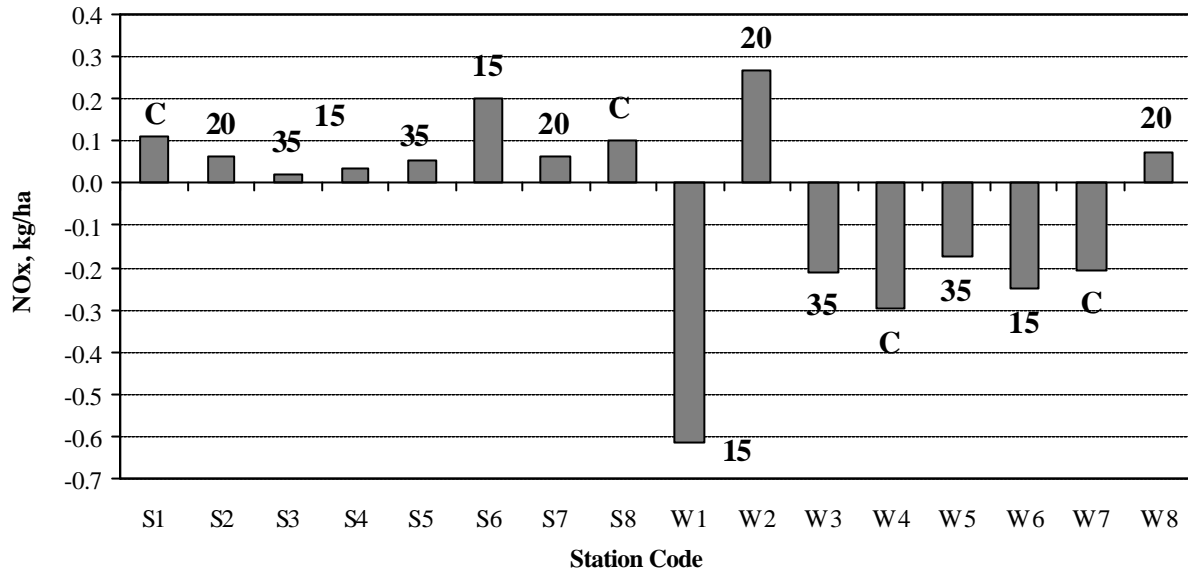


Figure 7b. Nutrient loads calculated using NO_x concentrations from ISCO and grab samples collected from summer and winter pastures in the year 2001.

Total Load of NH₄ for Summer and Winter Pastures for 2001

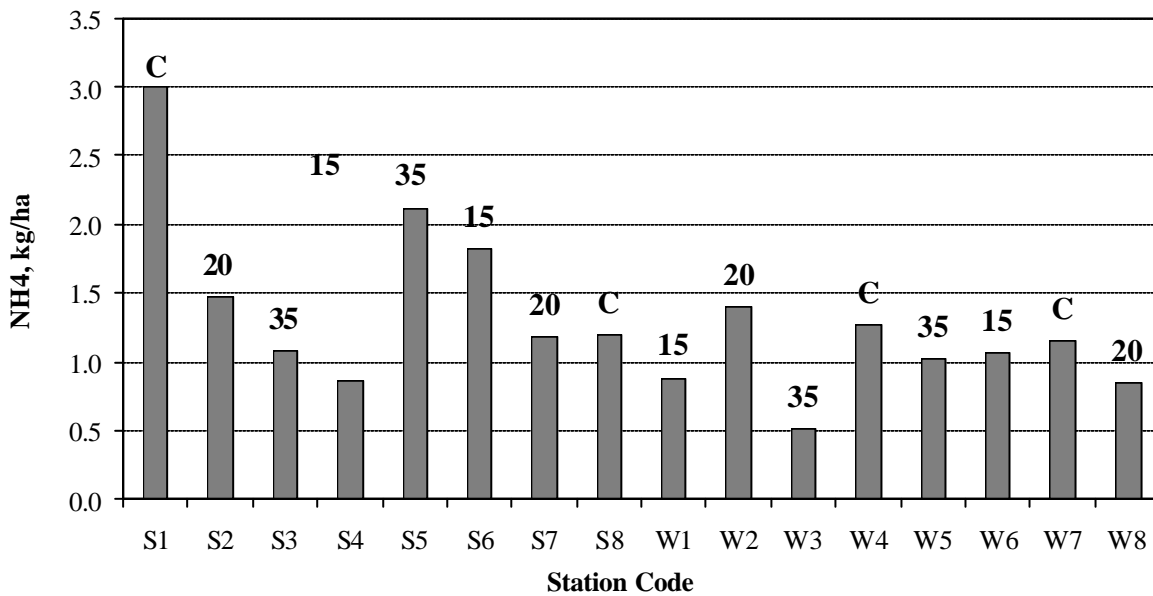


Figure 7c. Nutrient loads calculated using NH₄ concentrations from ISCO and grab samples collected from summer and winter pastures in the year 2001.

Total Load of TKN for Summer and Winter Pastures for 2001

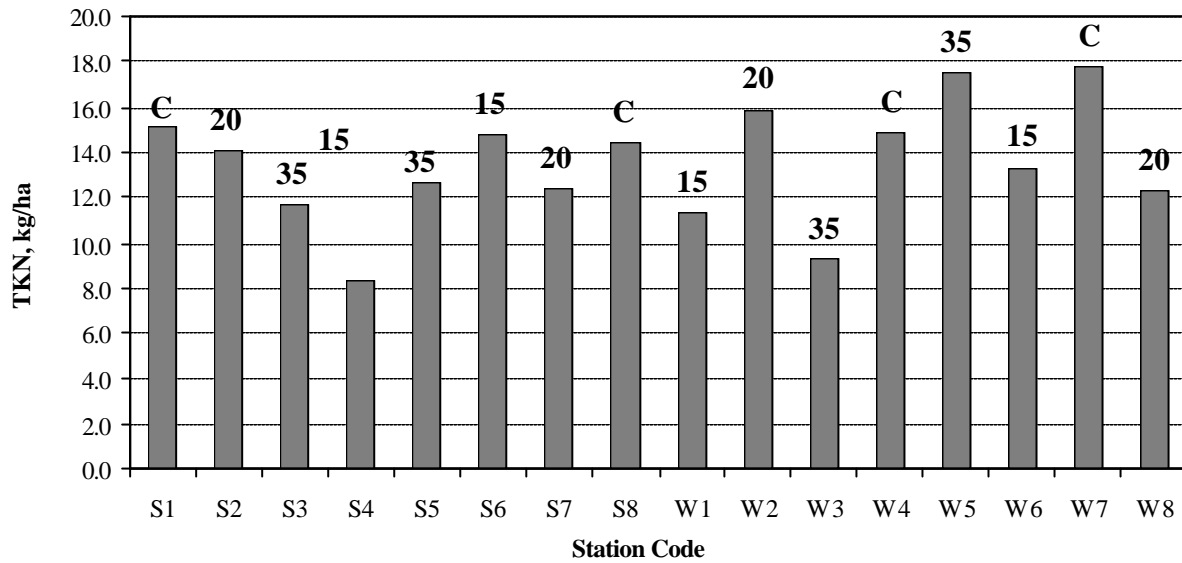


Figure 7d. Nutrient loads calculated using TKN concentrations from ISCO and grab samples collected from summer and winter pastures in the year 2001.

Total Load of ortho_P for Summer and Winter Pastures for 2001

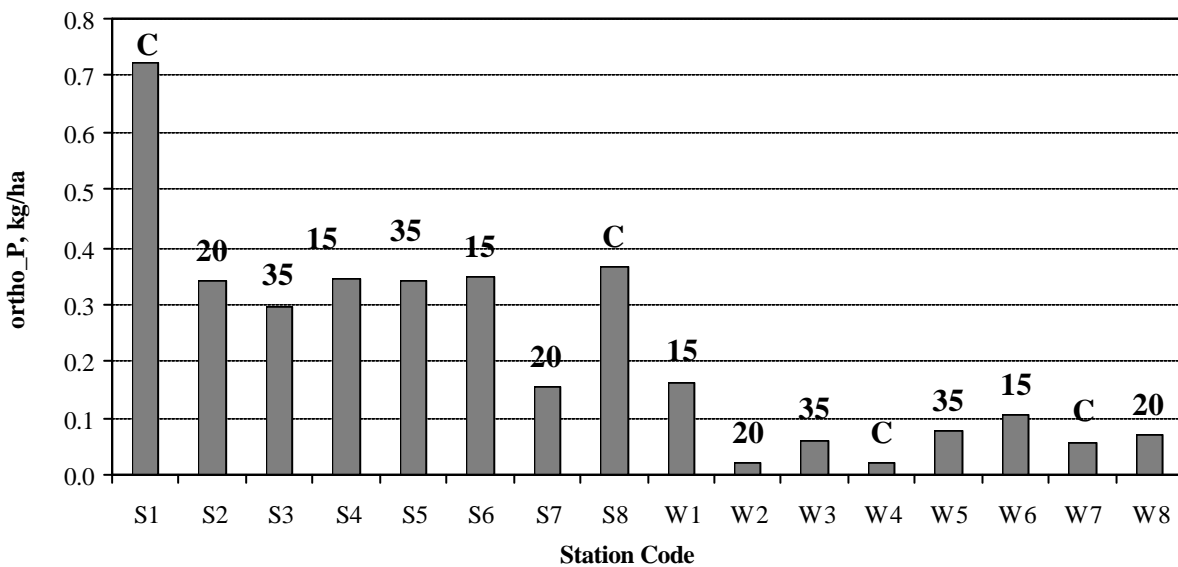


Figure 7e. Nutrient loads calculated using ortho-P concentrations from ISCO and grab samples collected from summer and winter pastures in the year 2000.

Load summary by Station 2001

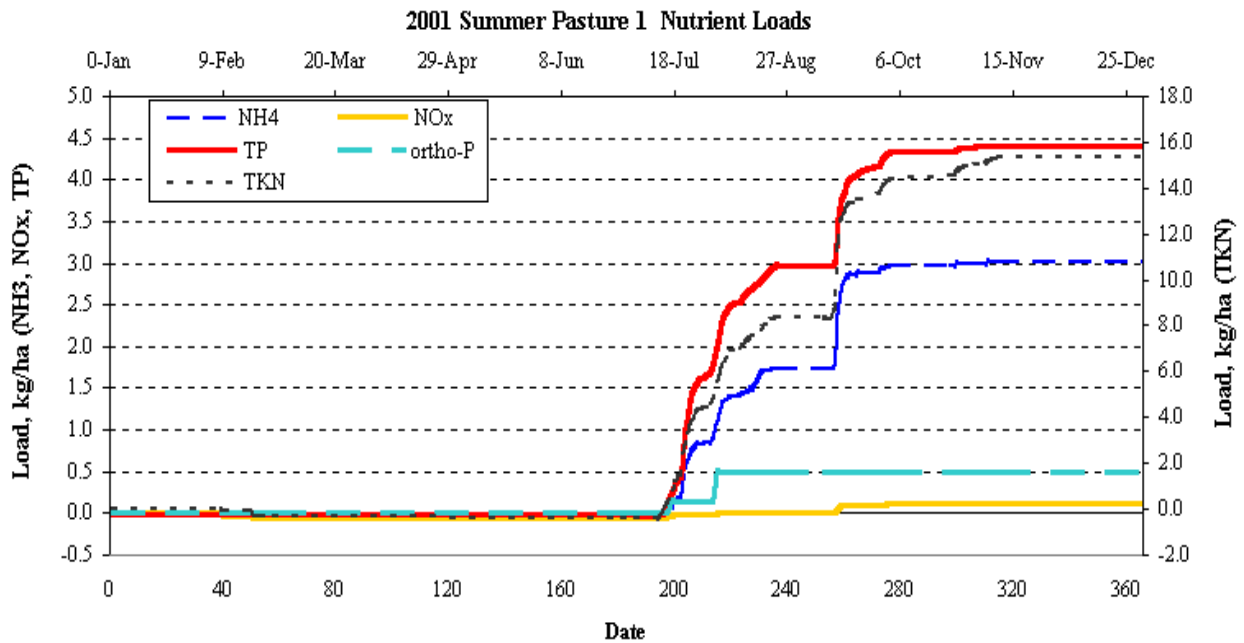


Figure 8. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 2 in the year 2001.

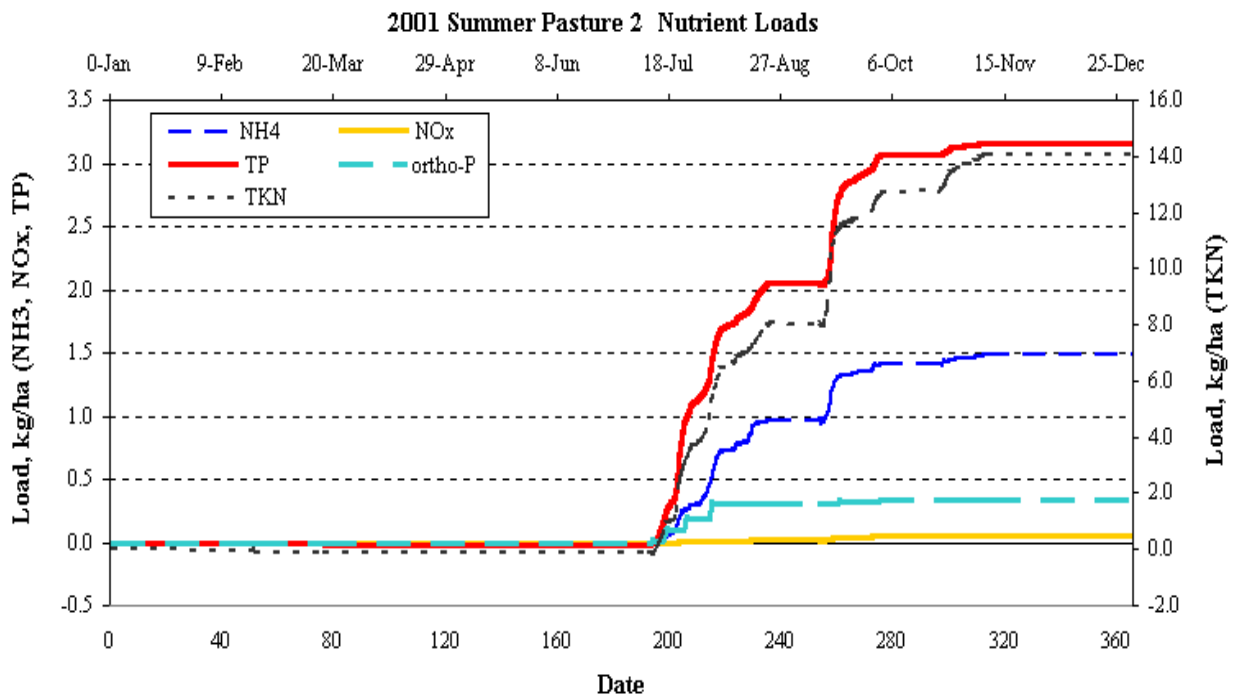


Figure 9. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 2 in the year 2001.

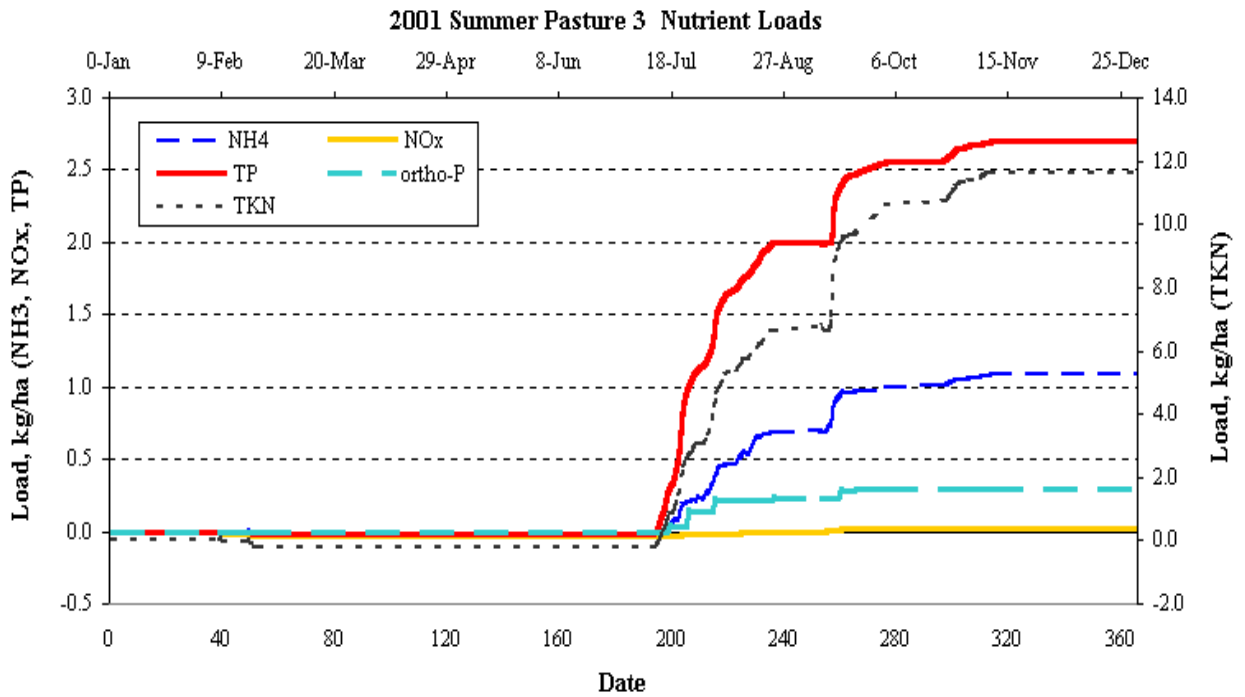


Figure 10. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 3 in the year 2001.

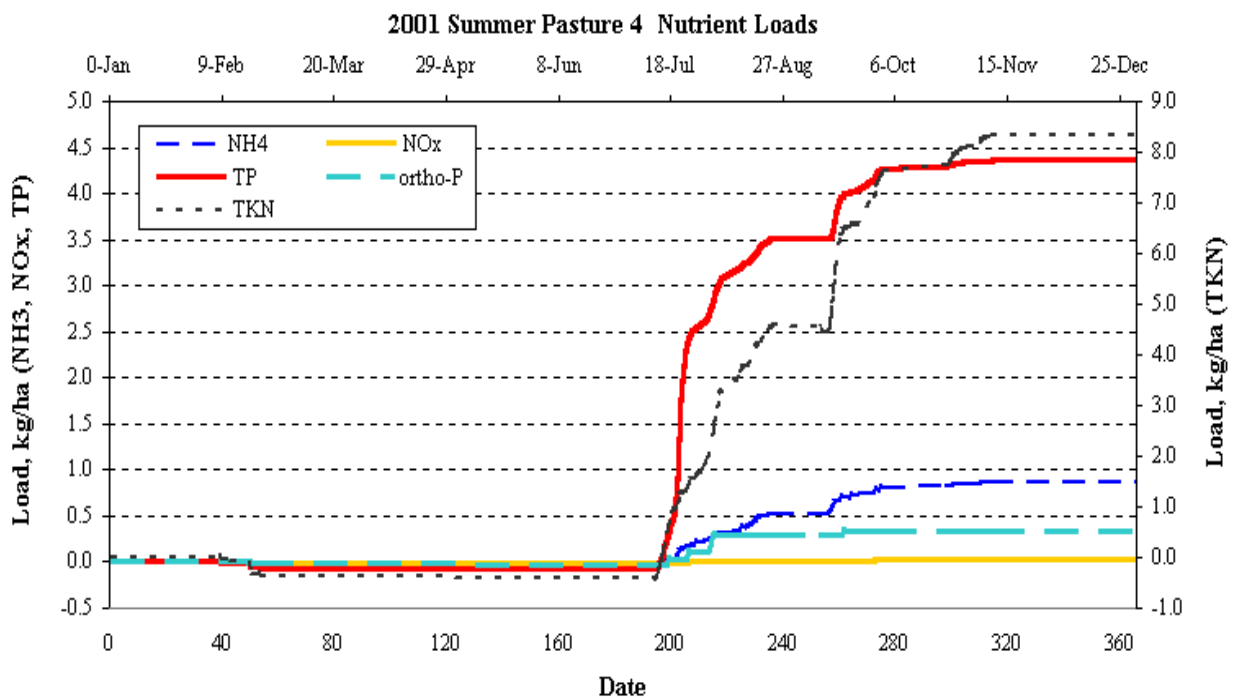


Figure 11. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 4 in the year 2001.

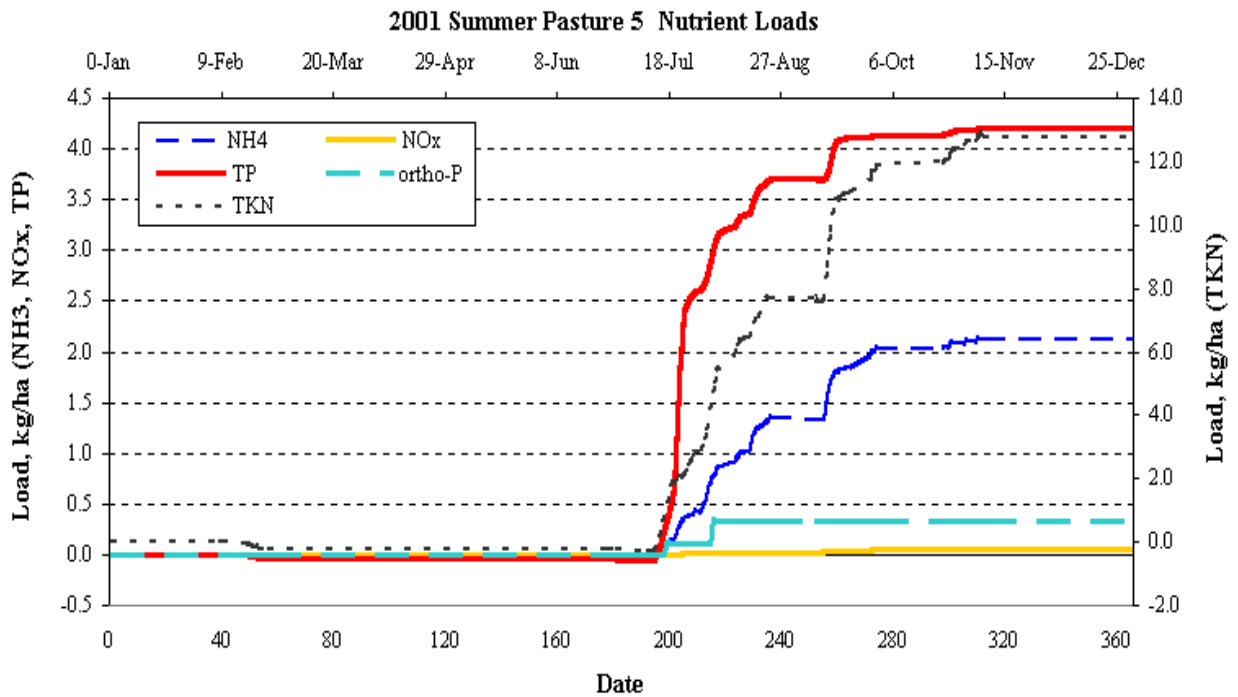


Figure 12. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 5 in the year 2001.

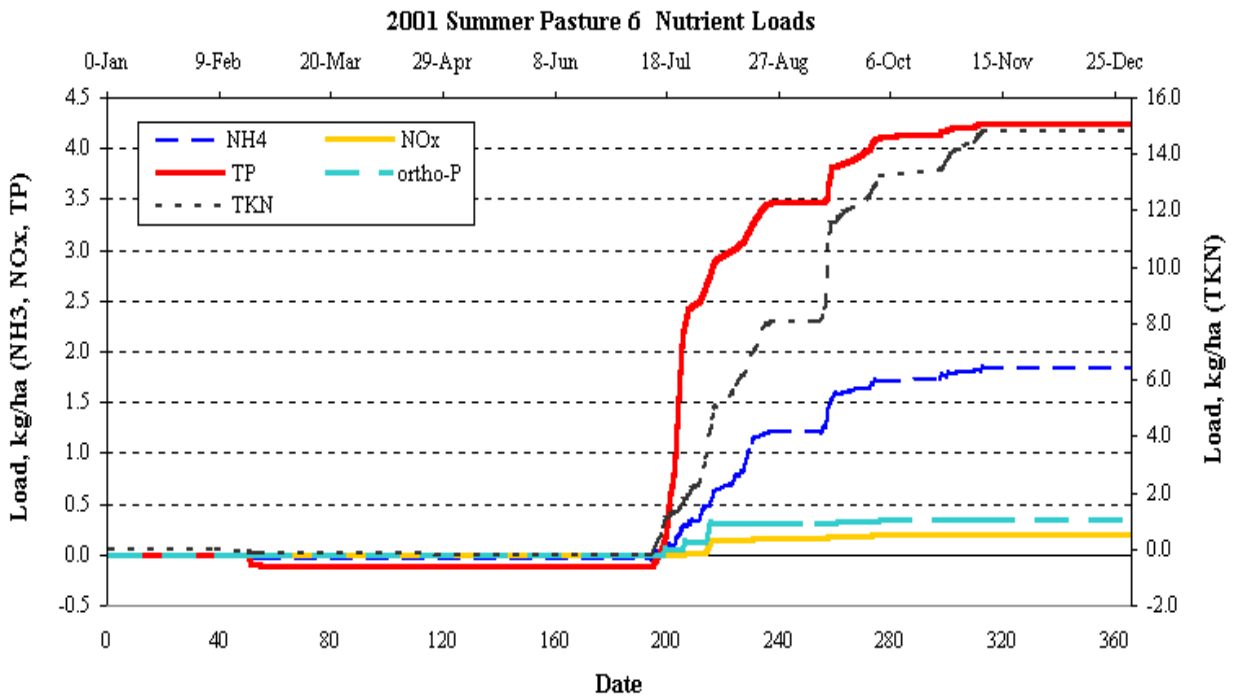


Figure 13. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 6 in the year 2001.

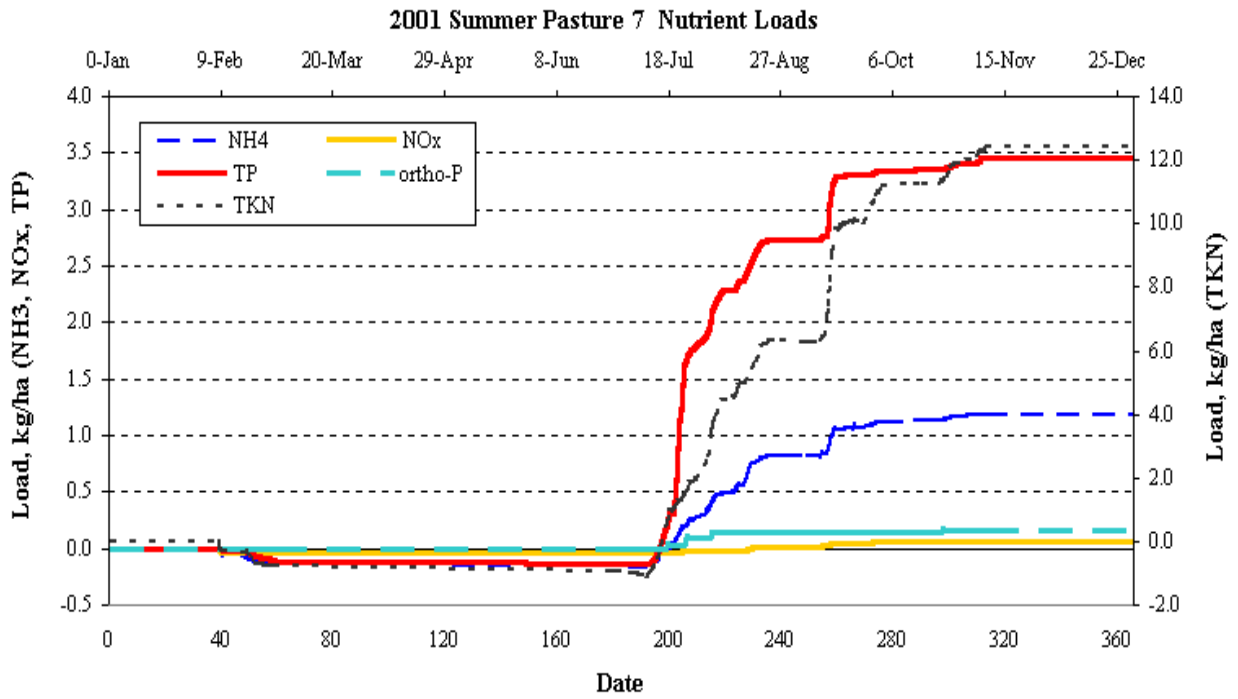


Figure 14. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 7 in the year 2001.

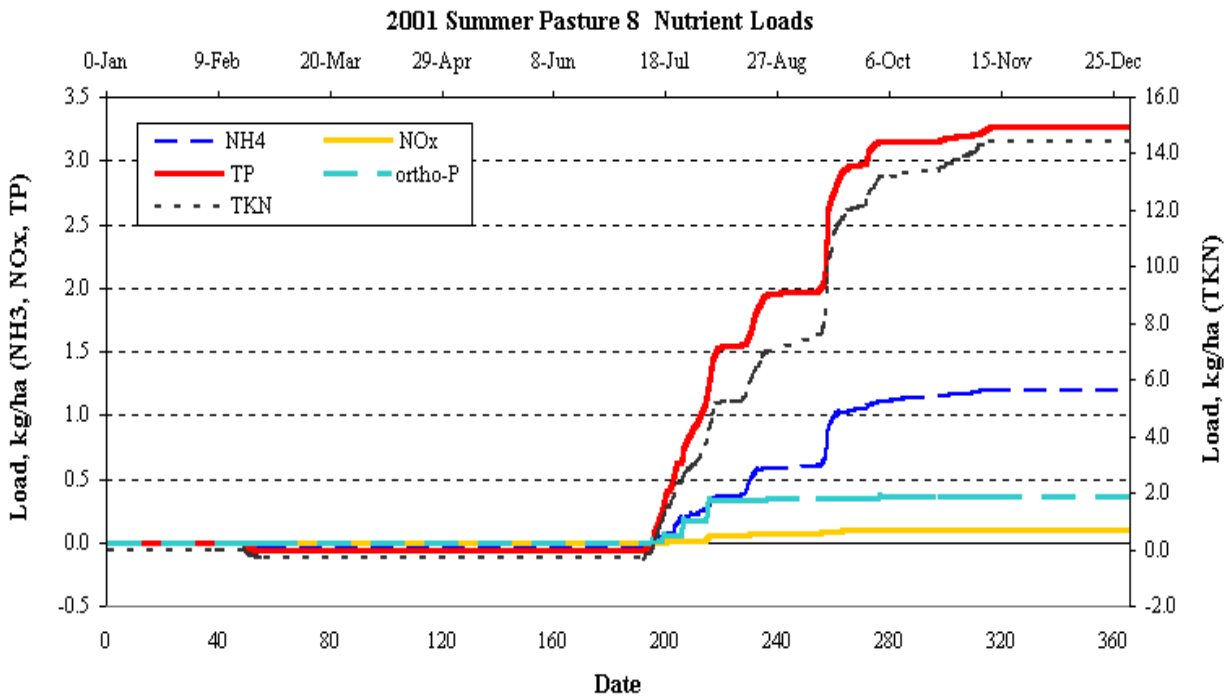


Figure 15. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at summer pasture 8 in the year 2001.

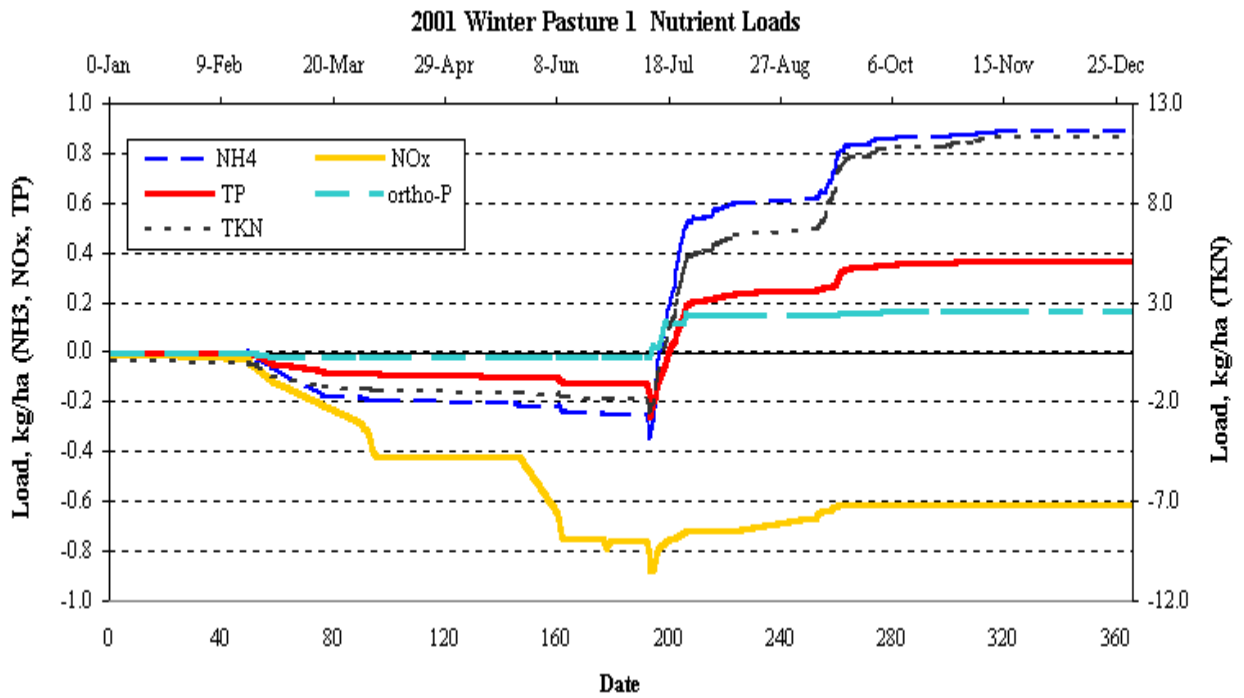


Figure 16. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 1 in the year 2001.

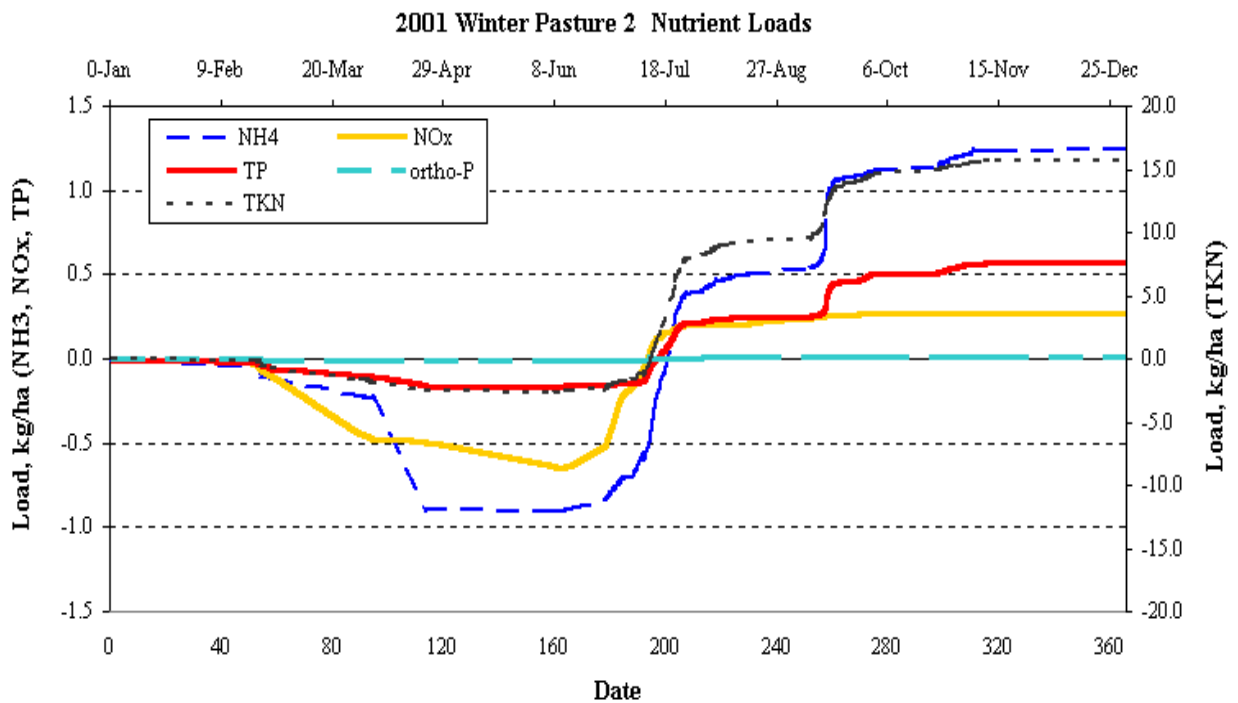


Figure 17. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 4 in the year 2001.

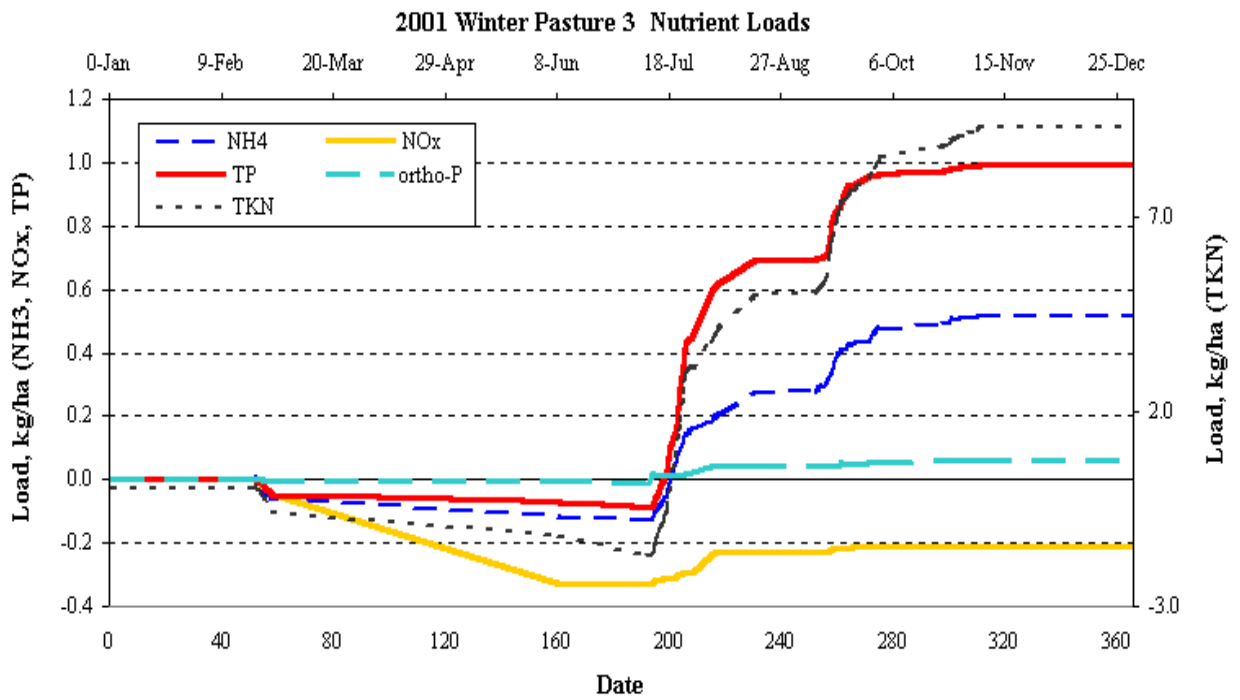


Figure 18. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 3 in the year 2001.

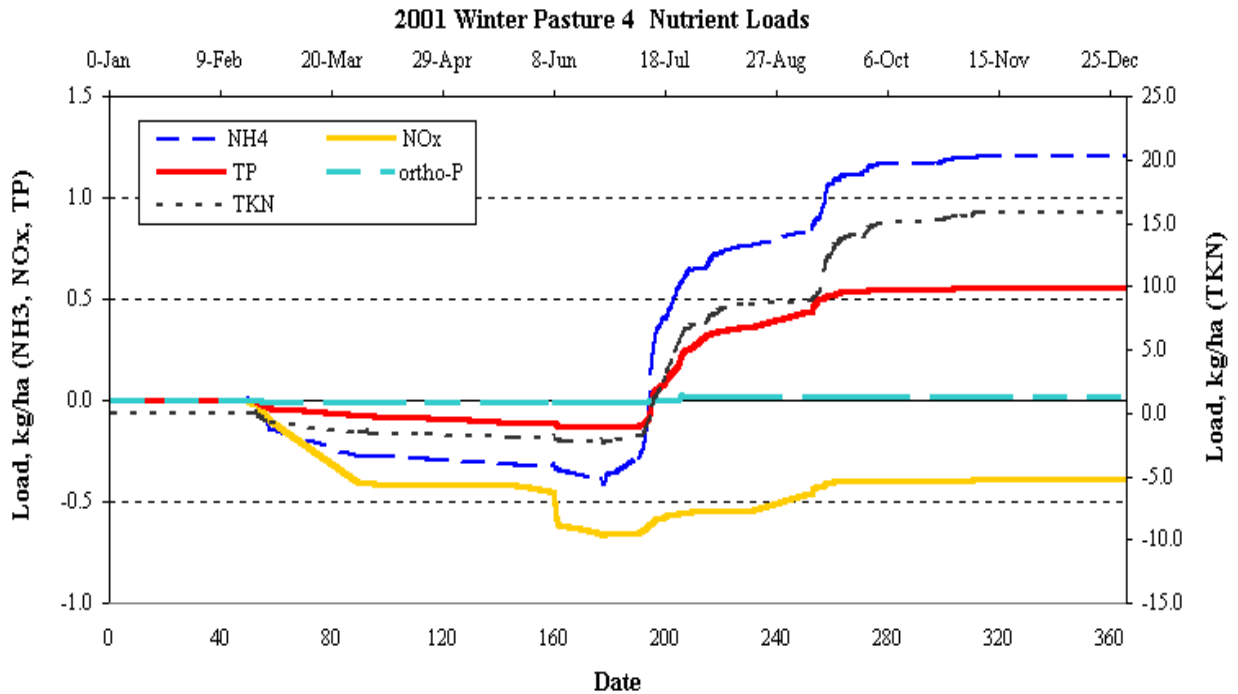


Figure 19. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 4 in the year 2001.

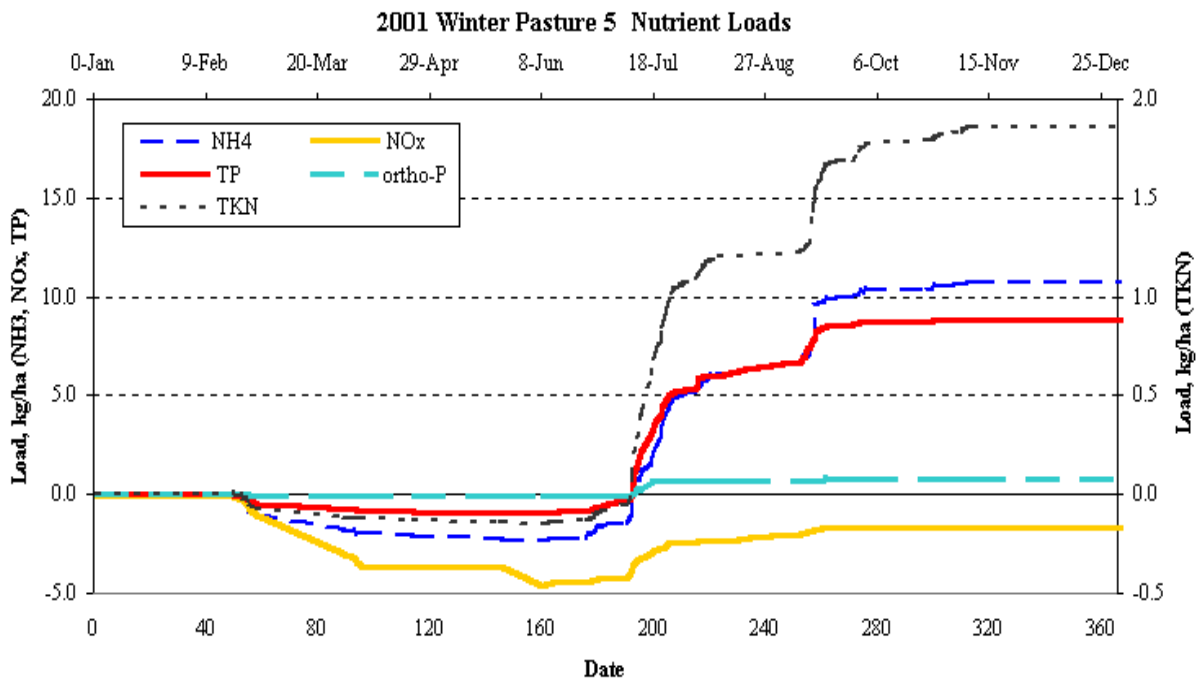


Figure 20. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 5 in the year 2001.

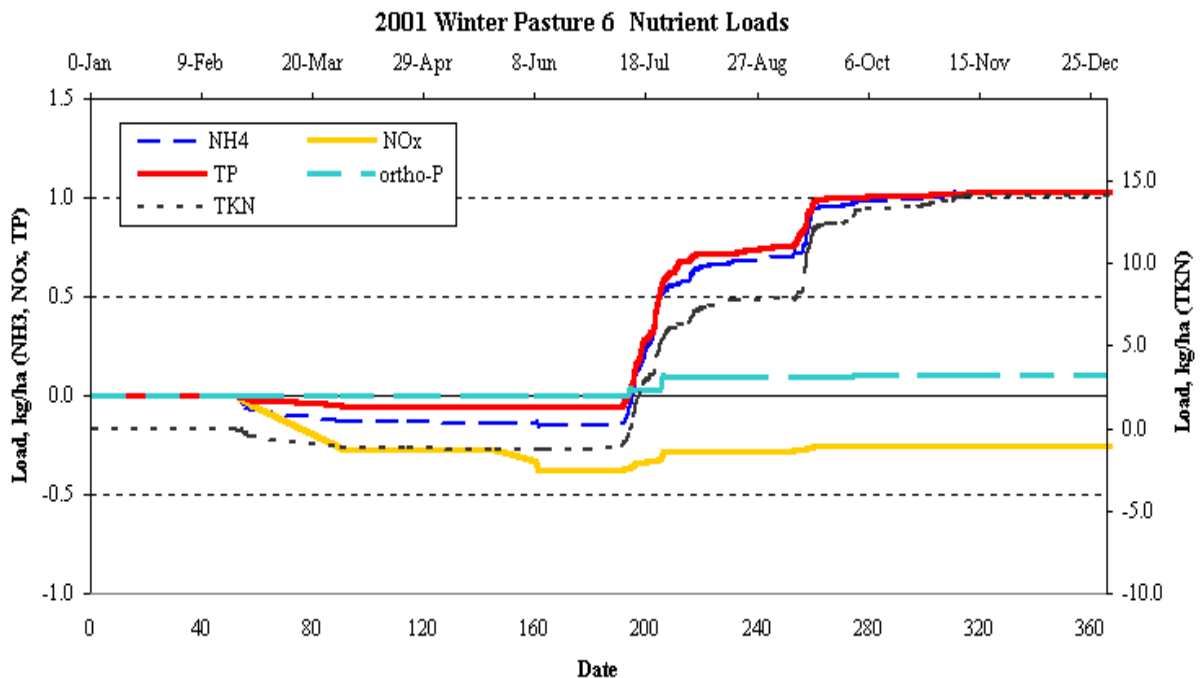


Figure 21. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 6 in the year 2001.

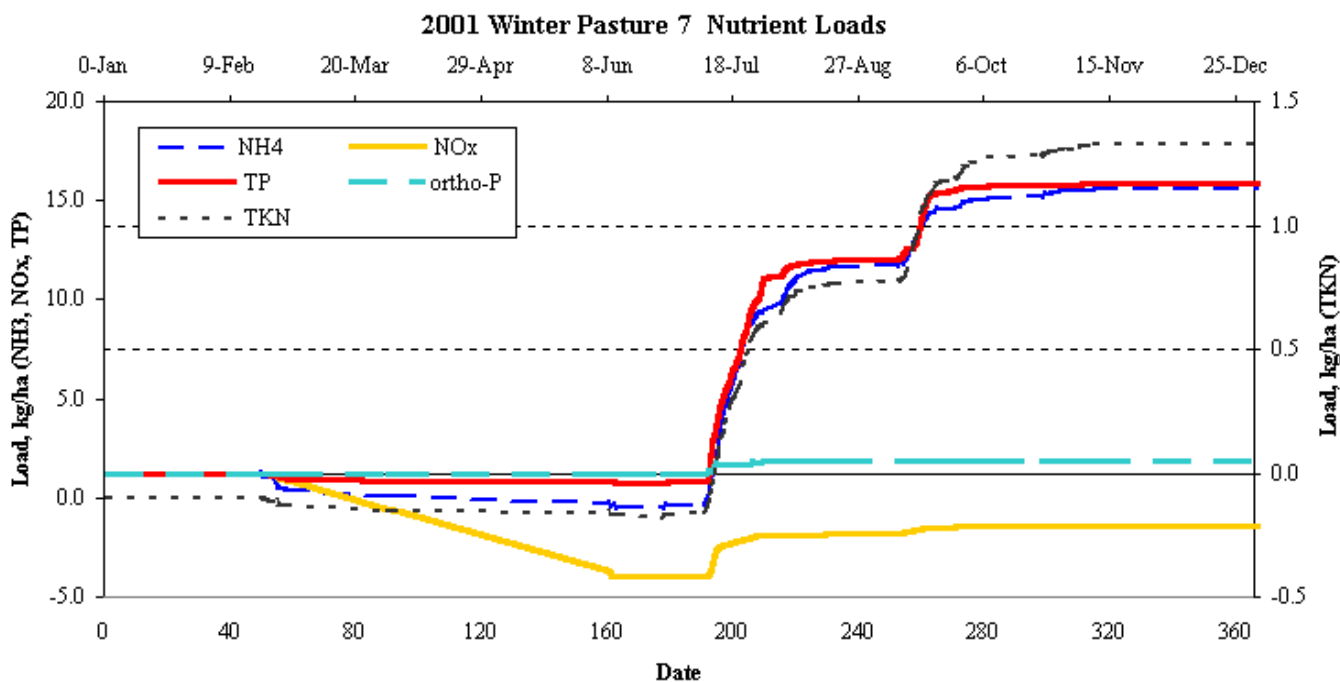


Figure 22. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 7 in the year 2001.

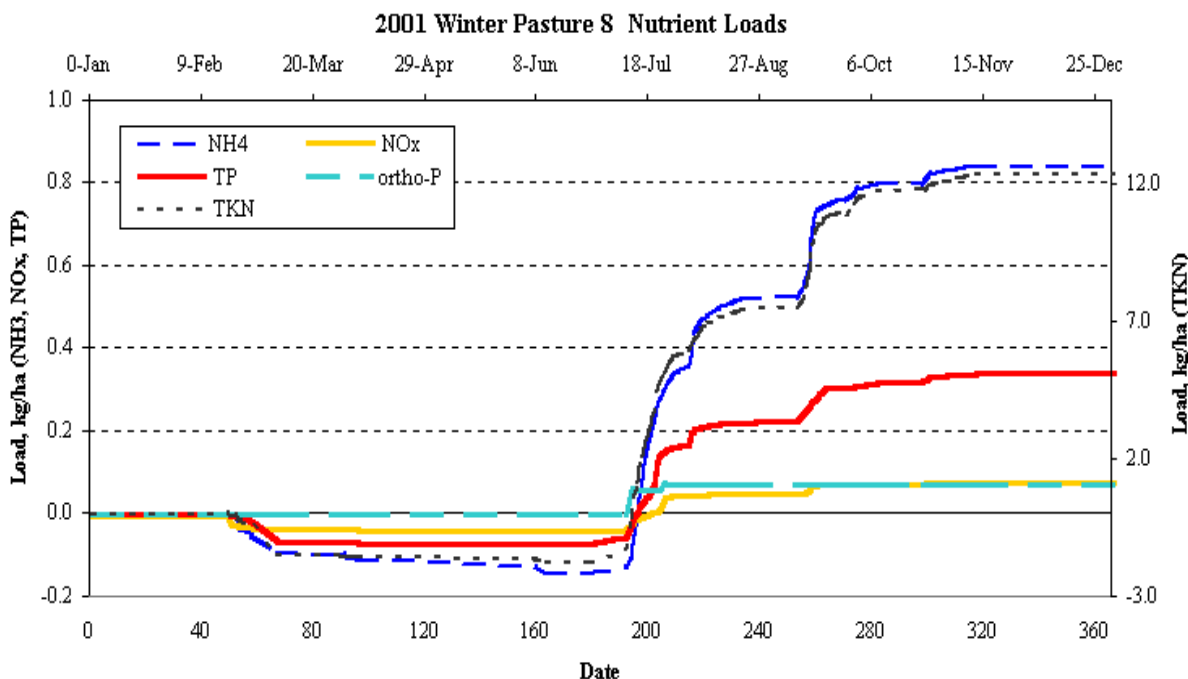


Figure 23. Nutrient load in kg/ha of elemental N and P as calculated using ISCO and grab samples at winter pasture 8 in the year 2001.

QA/QC analysis results

Table 8. ISCO sample sets collected at each flume station and description of QA/QC problems related to equipment blanks (**EB**) and field duplicate (**FD**) criteria

Project Code	Station Code	FQC	Set Date	Number Of Samples	EB Problems	FD Problems	QA/QC Pass	TP ONLY QA/QC Pass
BIR	S1	EB	02/07/01	7	NH4	NH4 TKN TP	No	No
BIR	S1	EB	02/12/01	5	NH4 NOX TP	OK	No	No
BIR	S1	EB	02/21/01	4	NH4	NH4	No	YES
BIR	S1	EB	06/26/01	9	TKN	OK	No	YES
BIR	S1	EB	07/12/01	5	OK	NOX TP	No	No
BIR	S1	EB	07/18/01	11	OK	OK	YES	YES
BIR	S1	EB	07/25/01	14	OK	OK	YES	YES
BIR	S1	EB	08/10/01	11	TP	OK	No	No
BIR	S1	EB	08/22/01	12	OK	NO FD	No	No
BIR	S1	EB	09/12/01	12	OK	OK	YES	YES
BIR	S1	EB	09/16/01	8	OK	OK	YES	YES
BIR	S1	EB	09/21/01	9	OK	OK	YES	YES
BIR	S1	EB	10/10/01	12	OK	NO FD	No	No
BIR	S1	EB	11/01/01	9	OK	OK	YES	YES
BIR	S2	EB	02/07/01	4	NH4	OK	No	YES
BIR	S2	EB	02/21/01	9	NH4	OK	No	YES
BIR	S2	EB	07/12/01	8	OK	NOX	No	YES
BIR	S2	EB	07/18/01	11	OK	OK	YES	YES
BIR	S2	EB	07/25/01	15	OK	OK	YES	YES
BIR	S2	EB	08/10/01	11	OK	OK	YES	YES
BIR	S2	EB	08/22/01	10	OK	OK	YES	YES
BIR	S2	EB	09/12/01	11	TKN TP	TKN TP	No	No
BIR	S2	EB	09/16/01	9	TP	OK	No	No
BIR	S2	EB	09/21/01	10	OK	OK	YES	YES
BIR	S2	EB	10/10/01	11	OK	TP	No	No
BIR	S2	EB	11/01/01	10	OK	OK	YES	YES
BIR	S3	EB	02/07/01	5	NH4	OK	No	YES
BIR	S3	EB	02/12/01	5	NH4	OK	No	YES
BIR	S3	EB	02/21/01	4	NH4	OK	No	YES
BIR	S3	FD	07/11/01	6	No EB	NH4 TKN TP	No	No
BIR	S3	EB	07/12/01	3	OK	NO FD	No	No
BIR	S3	EB	07/13/01	6	OK	NO FD	No	No
BIR	S3	EB	07/18/01	10	OK	NH4 TKN TP	No	No
BIR	S3	EB	07/25/01	15	OK	OK	No	YES
BIR	S3	EB	08/10/01	9	TP	OK	No	No
BIR	S3	EB	08/22/01	10	OK	OK	YES	YES
BIR	S3	EB	09/12/01	12	TP	NH4 TKN TP	No	No
BIR	S3	EB	09/16/01	11	TP	OK	No	No
BIR	S3	EB	09/21/01	4	OK	NH4	No	YES
BIR	S3	EB	10/10/01	11	OK	TP	No	No
BIR	S3	EB	11/01/01	10	OK	OK	YES	YES
BIR	S4	EB	02/07/01	10	NH4	NOX	No	YES

Project Code	Station Code	FQC	Set Date	Number Of Samples	EB Problems	FD Problems	QA/QC Pass	TP ONLY QA/QC Pass
BIR	S4	EB	02/21/01	5	NH4	OK	No	YES
BIR	S4	EB	07/12/01	11	OK	OK	YES	YES
BIR	S4	EB	07/18/01	10	OK	OK	YES	YES
BIR	S4	EB	07/25/01	14	OK	OK	YES	YES
BIR	S4	EB	08/10/01	11		TP OK	No	No
BIR	S4	EB	08/22/01	11	NH4	OK	No	YES
BIR	S4	EB	09/12/01	13		TP TKNTP	No	No
BIR	S4	EB	09/16/01	9	NH4	TKNTP	No	No
BIR	S4	EB	09/21/01	10	OK	NH4	No	YES
BIR	S4	EB	10/10/01	11	OK	NH4 TP	No	No
BIR	S4	EB	11/01/01	9	OK	NH4	No	YES
BIR	S5	EB	02/07/01	8	NH4	NH4 TKNTP	No	No
BIR	S5	EB	02/12/01	5	NH4	TP NH4	No	No
BIR	S5	EB	02/21/01	5	NH4 TKN	OK	No	YES
BIR	S5	EB	07/12/01	12	NH4	OK	No	YES
BIR	S5	EB	07/19/01	10		TP OK	No	No
BIR	S5	EB	07/25/01	14	OK	OK	YES	YES
BIR	S5	EB	08/10/01	11	OK	OK	YES	YES
BIR	S5	EB	08/22/01	12	NH4 TKN	OK	No	YES
BIR	S5	EBC	09/11/01	7	No EB	NO FD	No	No
BIR	S5	EB	09/16/01	8		TKNTP	No	No
BIR	S5	EB	09/21/01	4		TKNTP	No	No
BIR	S5	EB	09/28/01	8	OK	OK	YES	YES
BIR	S5	EB	10/10/01	10	OK	TKNTP	No	No
BIR	S5	EB	11/01/01	9	OK	OK	YES	YES
BIR	S6	EB	02/07/01	5		TP OK	No	No
BIR	S6	EB	02/21/01	5	NH4	OK	No	YES
BIR	S6	EB	06/26/01	3	OK	NO FD	No	No
BIR	S6	EB	07/12/01	13	OK	NH4	No	YES
BIR	S6	EB	07/19/01	9		TP OK	No	No
BIR	S6	EB	07/25/01	16	OK	OK	YES	YES
BIR	S6	EB	08/10/01	11		TP OK	No	No
BIR	S6	EB	08/22/01	12	OK	OK	YES	YES
BIR	S6	EB	09/12/01	11	OK	OK	YES	YES
BIR	S6	EB	09/16/01	9	NH4	TP TKNTP	No	No
BIR	S6	EB	09/21/01	9	OK	OK	YES	YES
BIR	S6	EB	10/10/01	10	OK	OK	YES	YES
BIR	S6	EB	11/01/01	10	OK	OK	YES	YES
BIR	S7	EB	02/07/01	9	NH4	TP NH4 TKNTP	No	No
BIR	S7	EB	02/12/01	5	NH4	OK	No	YES
BIR	S7	EB	02/21/01	8	NH4	OK	No	YES
BIR	S7	EB	06/26/01	5	OK	NO FD	No	No
BIR	S7	EB	07/12/01	14	NH4	OK	No	YES
BIR	S7	EB	07/19/01	10		TP TKNTP	No	No
BIR	S7	EB	07/25/01	14	OK	OK	YES	YES
BIR	S7	EB	08/10/01	11	OK	OK	YES	YES
BIR	S7	EB	08/22/01	13	OK	OK	YES	YES
BIR	S7	EB	09/12/01	12	OK	NH4	No	YES
BIR	S7	EB	09/16/01	8	NH4	TP TKNTP	No	No

Project Code	Station Code	FQC	Set Date	Number Of Samples	EB Problems	FD Problems	QA/QC Pass	TP ONLY QA/QC Pass
BIR	S7	EB	09/21/01	10	TKN	TP	No	No
BIR	S7	EB	10/10/01	11	OK	NOX	No	YES
BIR	S7	EB	11/01/01	10	OK	OK	YES	YES
BIR	S8	EB	02/07/01	7	NH4	OK	No	YES
BIR	S8	EB	02/12/01	4	NH4	OK	No	YES
BIR	S8	EB	02/21/01	5	NH4	OK	No	YES
BIR	S8	EB	07/12/01	13	OK	OK	YES	YES
BIR	S8	EB	07/19/01	10	OK	TKNTP	No	No
BIR	S8	EB	07/25/01	14	OK	OK	YES	YES
BIR	S8	EB	08/10/01	13	OK	OK	YES	YES
BIR	S8	EBC	08/22/01	9	No EB	NO FD	No	YES
BIR	S8	EB	09/12/01	12	TKNTP	OK	No	No
BIR	S8	EB	09/16/01	9	NH4	NH4	No	YES
BIR	S8	EB	09/21/01	13	TP	NH4	No	No
BIR	S8	EB	10/10/01	11	OK	TP	No	No
BIR	S8	EB	11/01/01	12	OK	NH4	No	YES
BIR	W1	EB	02/12/01	7	OK	OK	YES	YES
BIR	W1	EB	03/07/01	3	NH4	OK	No	YES
BIR	W1	EB	03/16/01	11	NH4	NH4	No	YES
BIR	W1	EB	05/11/01	5	NH4	NO FD	No	No
BIR	W1	EB	06/04/01	7	NH4	NO FD	No	No
BIR	W1	EB	06/11/01	6	NH4	NO FD	No	No
BIR	W1	EB	06/25/01	7	OK	NH4	TP	No
BIR	W1	EB	07/02/01	7	OK	OK	YES	YES
BIR	W1	EB	07/13/01	7	OK	OK	YES	YES
BIR	W1	EB	07/18/01	15	OK	OK	YES	YES
BIR	W1	EB	07/25/01	9	TP	OK	No	No
BIR	W1	EB	08/03/01	9	TP	TP	No	No
BIR	W1	EB	08/17/01	3	No EB	NO FD	No	No
BIR	W1	EB	08/31/01	12	TKNTP	TP	No	No
BIR	W1	EB	09/13/01	11		NO FD	No	No
BIR	W1	EB	09/16/01	9	OK	OK	YES	YES
BIR	W1	EBC	No EB	10	OK	NO FD	No	No
BIR	W1	EB	10/10/01	8	No EB	NO FD	No	No
BIR	W1	EB	11/02/01	11	OK	OK	YES	YES
BIR	W2	EB	02/12/01	4	OK	OK	YES	No
BIR	W2	EB	02/21/01	6	NH4	OK	No	YES
BIR	W2	EB	03/07/01	8	NH4	NO FD	No	No
BIR	W2	EB	06/04/01	3	NH4	NO FD	No	No
BIR	W2	EB	06/11/01	5	NH4	NO FD	No	No
BIR	W2	EB	06/25/01	10		OK	No	YES
BIR	W2	EB	07/02/01	11	OK	TP	No	No
BIR	W2	EB	07/13/01	8	NH4	NH4 NOX	No	YES
BIR	W2	EB	07/18/01	9		NO FD	No	No
BIR	W2	EB	07/25/01	7	OK	OK	YES	YES
BIR	W2	EB	08/03/01	11	OK	OK	YES	YES
BIR	W2	EB	08/17/01	4	OK	OK	YES	No
BIR	W2	EB	08/31/01	9		NH4 NOX	TP	No
BIR	W2	EB	09/13/01	13	OK	OK	YES	No

Project Code	Station Code	FQC	Set Date	Number Of Samples	EB Problems	FD Problems	QA/QC Pass	TP ONLY QA/QC Pass
BIR	W2	EB	09/16/01	10		OK	No	YES
BIR	W2	EB	09/21/01	14	OK	OK	YES	YES
BIR	W2	EB	10/10/01	8	OK	NO FD	No	No
BIR	W2	EB	11/02/01	11	OK	OK	YES	YES
BIR	W3	EB	02/12/01	8	OK	NOX	No	YES
BIR	W3	EB	06/04/01	2	OK	OK	YES	No
BIR	W3	EB	07/02/01	6	OK	NO FD	No	No
BIR	W3	EBC	07/13/01	12	No EB	NO FD	No	YES
BIR	W3	EB	07/18/01	12	OK	NO FD	No	No
BIR	W3	EB	07/25/01	9	OK	OK	YES	YES
BIR	W3	EB	08/03/01	9	OK	OK	YES	YES
BIR	W3	EB	08/17/01	4		TP	TP	No
BIR	W3	EB	08/31/01	10		TP	OK	No
BIR	W3	EB	09/13/01	11		TP	OK	No
BIR	W3	EB	09/16/01	10	OK	OK	YES	YES
BIR	W3	EB	09/21/01	11		TP	OK	No
BIR	W3	EB	10/10/01	8	OK		TP	No
BIR	W3	EB	11/02/01	10	OK	OK	YES	YES
BIR	W4	EB	02/12/01	6		TP	NOX	No
BIR	W4	EB	02/21/01	6	NH4	TKNTP	OK	No
BIR	W4	EB	03/07/01	7	NH4		NO FD	No
BIR	W4	EB	04/11/01	3	OK		NO FD	No
BIR	W4	EB	05/01/01	5	OK		NO FD	No
BIR	W4	EB	06/04/01	6	NH4		NO FD	No
BIR	W4	EB	06/11/01	6	NH4		NO FD	No
BIR	W4	EB	06/25/01	13	OK		OK	YES
BIR	W4	EB	07/02/01	7	OK		OK	YES
BIR	W4	EB	07/13/01	9	OK	NH4	TP	No
BIR	W4	EB	07/18/01	10	OK		NO FD	No
BIR	W4	EB	07/25/01	8	OK		OK	YES
BIR	W4	EB	08/03/01	10	OK		OK	YES
BIR	W4	EB	08/17/01	4		TP	TP	No
BIR	W4	EB	08/31/01	9	OK		OK	YES
BIR	W4	EB	09/13/01	12		TP	TKNTP	No
BIR	W4	EB	09/16/01	11	OK		TP	No
BIR	W4	EB	09/21/01	10	OK	NH4		No
BIR	W4	EB	10/10/01	8	OK		OK	YES
BIR	W4	EB	11/02/01	9	OK		OK	YES
BIR	W5	EB	02/12/01	5	OK		OK	YES
BIR	W5	EB	02/21/01	6	OK		OK	YES
BIR	W5	EB	03/07/01	8	NH4		OK	No
BIR	W5	EB	04/11/01	3		TP	NO FD	No
BIR	W5	EB	05/02/01	5	NH4		NO FD	No
BIR	W5	EB	06/04/01	5	OK		NO FD	No
BIR	W5	EB	06/11/01	6	NH4		NO FD	No
BIR	W5	EB	06/25/01	11	OK		OK	YES
BIR	W5	EB	07/02/01	7	OK		OK	YES
BIR	W5	EB	07/13/01	9	OK		NH4 NOX	No
BIR	W5	EB	07/18/01	14	OK		NO FD	No

Project Code	Station Code	FQC	Set Date	Number Of Samples	EB Problems	FD Problems	QA/QC Pass	TP ONLY QA/QC Pass
BIR	W5	EB	07/25/01	11	OK	OK	YES	YES
BIR	W5	EB	08/03/01	11	NH4 TP	TKNTP	No	No
BIR	W5	EB	08/17/01	2	TKNTP	NO FD	No	No
BIR	W5	EB	08/31/01	12	NH4	TP	No	No
BIR	W5	EB	09/13/01	12	OK	TP	No	No
BIR	W5	EB	09/16/01	10	OK	NH4 TP	No	No
BIR	W5	EB	09/21/01	9	OK	NH4	No	YES
BIR	W5	EB	10/10/01	8	OK	OK	YES	YES
BIR	W5	EB	11/02/01	9	OK	TKN	No	YES
BIR	W6	EB	02/12/01	5	OK		No	YES
BIR	W6	EB	02/21/01	6	NH4	TP	No	No
BIR	W6	EB	03/07/01	3	NH4	OK	No	YES
BIR	W6	EB	04/11/01	3	OK	NO FD	No	No
BIR	W6	EB	05/02/01	4	OK	NO FD	No	No
BIR	W6	EB	06/04/01	7	NH4	NO FD	No	No
BIR	W6	EB	06/11/01	3	OK	NO FD	No	No
BIR	W6	EB	06/25/01	5	NH4 TKN	TP	No	No
BIR	W6	EB	07/02/01	6	OK	OK	YES	YES
BIR	W6	EB	07/13/01	10	OK	OK	YES	YES
BIR	W6	EB	07/18/01	13	OK	OK	YES	YES
BIR	W6	EB	07/25/01	8	OK	OK	YES	YES
BIR	W6	EB	08/03/01	9	NH4 TP	NOX	No	No
BIR	W6	EB	08/17/01	6	TKNTP	OK	No	No
BIR	W6	EB	08/31/01	9	NH4	OK	No	YES
BIR	W6	EB	09/13/01	10		NOX	No	YES
BIR	W6	EB	09/16/01	9		NH4	No	YES
BIR	W6	EB	09/21/01	11	TKN	OK	No	YES
BIR	W6	EB	10/10/01	7	OK	OK	YES	YES
BIR	W6	EB	11/02/01	9	OK	OK	YES	YES
BIR	W7	EB	02/12/01	5	OK	NH4 NOX	No	YES
BIR	W7	EB	02/21/01	5	NH4	NO FD	No	No
BIR	W7	EB	03/07/01	5	NH4	OK	No	YES
BIR	W7	EB	06/04/01	5	NH4	NO FD	No	No
BIR	W7	EB	06/11/01	3	NH4	NO FD	No	No
BIR	W7	EB	06/25/01	8	OK	OK	YES	YES
BIR	W7	EB	07/02/01	7	OK	TKNTP	No	No
BIR	W7	EB	07/13/01	11	OK	OK	YES	YES
BIR	W7	EB	07/18/01	12	OK	OK	YES	YES
BIR	W7	EB	07/25/01	9	OK	OK	YES	YES
BIR	W7	EB	08/03/01	10	NH4 TP	OK	No	No
BIR	W7	EB	08/17/01	7	OK	OK	YES	YES
BIR	W7	EB	08/31/01	9	OK	OK	YES	YES
BIR	W7	EB	09/13/01	12	OK	OK	YES	YES
BIR	W7	EB	09/16/01	9	TP	OK	No	No
BIR	W7	EB	09/21/01	13	TKN	NH4	No	YES
BIR	W7	EB	10/10/01	9	TP	OK	No	No
BIR	W7	EB	11/02/01	10	OK	OK	YES	YES
BIR	W8	EB	02/12/01	6	OK	OK	YES	YES
BIR	W8	EB	02/21/01	6	NH4	OK	No	YES

Project Code	Station Code	FQC	Set Date	Number Of Samples	EB Problems	FD Problems	QA/QC Pass	TP ONLY QA/QC Pass		
BIR	W8	EB	03/07/01	10	NH4	NO FD	No	No		
BIR	W8	EB	06/04/01	3	NH4	NO FD	No	No		
BIR	W8	EB	06/11/01	1	NH4	TP	No	No		
BIR	W8	EB	06/25/01	3	OK	NO FD	No	No		
BIR	W8	EB	07/02/01	5	OK	NO FD	No	No		
BIR	W8	EB	07/13/01	10	OK	NO FD	No	No		
BIR	W8	EB	07/18/01	12	OK	TKN	No	YES		
BIR	W8	EB	07/25/01	10	NH4	TKN	OK	No	YES	
BIR	W8	EB	08/03/01	10	NH4	TP	OK	No	No	
BIR	W8	EB	08/17/01	6	NH4		OK	No	YES	
BIR	W8	EB	08/31/01	11		TP		TP	No	No
BIR	W8	EB	09/13/01	11	OK	NH4	TP	No	No	
BIR	W8	EB	09/16/01	9		TP	OK	No	No	
BIR	W8	EB	09/21/01	12	OK		OK	YES	YES	
BIR	W8	EB	10/10/01	9	OK			TP	No	No
BIR	W8	EB	11/02/01	10	OK		OK		YES	YES
							82	133		
							32%	53%		