1995 SOUTH DAKOTA LAKES ASSESSMENT
FINAL REPORT

SOUTH DAKOTA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

NETTIE H. MYERS, SECRETARY

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

August, 1996

1995 SOUTH DAKOTA LAKES ASSESSMENT
FINAL REPORT

prepared by

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SOUTH DAKOTA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
WATERSHED PROTECTION
Nettie H. Myers, Secretary

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EXECUTIVE SUMMARY

In 1994, the South Dakota Clean Lakes Program received a grant from the U.S. Environmental Protection Agency to conduct an assessment of selected lakes in the state. Funding for this assessment was provided by Section 314 of the Clean Water Act. An assessment report is required of each state as part of the mandatory 305(b) Report to Congress. Information contained in this assessmentt report was used to complete the 1996 South Dakota 305(b) report.

The Clean Lakes Program received grant funds to conduct lake water quality assessments during the summers of 1979, 1989, 1991, 1992, 1993, and 1994. From 1992 through 1994, approximately 30 lakes were sampled each summer on a rotational basis. Protection lakes (21 selected bodies of water) were sampled by the South Dakota Water Resource Institute during 1991, 1992, 1993, 1994, and 1995. In this report, additional water quality data was included from Phase I assessments, Phase III post implementation studies, and special sampling circumstances. Information from these assessments has been compiled in this report to serve as a repository of historical water quality data.

The purpose of this report is to provide water quality information for the 305(b) Report to Congress and to update the South Dakota Lakes Survey. This document is intended to be available as a database containing morphological and water quality information on 112 selected lakes with public access. It is not the purpose of this document to provide information on every public lake in the State.

This lake assessment report is organized into an introduction, a methods and materials section, a lake ranking system, a bibliography, and an appendix. The methods and materials section of the report describes the sampling, analytical, and data analysis procedures and materials used in this assessment.

Five separate rankings were conducted on the lakes in the assessment. Three of the lists were completed using Carlson's Trophic State Index for chlorophyll *a*, total phosphorus, and Secchi transparency. This was done in an attempt to rank the lakes based on water quality. The ranking begins with the most eutrophic lake (or worst water quality) and ends with the most oligotrophic lake (or best water quality) based on the most recent information for each lake contained in the document. A separate list was based on a mean trophic state index using an average of the above mentioned parameters for the most recent data available for each lake. The fifth ranking was based on potential user the population within a sixty five mile radius of the lake. The population figures were taken from the 1990 census data. Lakes with the highest population density were at the beginning of the list and lakes with the lowest population density are at the end of the list.

The appendix section of the report contains survey information for 112 South Dakota lakes. The information provided for each individual lake includes geographic and morphological information, beneficial use classification, water quality information, algal species and densities, and a description of the watershed. Field data and samples were collected under the direction of scientists for the Department of Environment and Natural Resources. The lakes of the state were regionally divided with each scientist sampling an approximately equal number of lakes. The lakes were assigned to an area west of the Missouri River, the north half of the state, east of the Missouri River and the south half of the state, east of the Missouri River.

INTRODUCTION

Lakes included in this assessment were selected in 1989 using the following three criteria:

1) The lake should be over one hundred acres in surface area;
2) The lake had to have significant public access; and
3) The lake had to be publicly owned.

In some instances, exceptions were made for high use lakes that did not fit the size criteria or in areas with very few lakes such as the west river prairie region of the state.

METHODS AND MATERIALS

In-Lake Sampling

Water was collected from three widely separated mid-lake sites in each lake. Samples collected from each site were composited into surface and bottom composite samples. All surface samples were grab samples taken from a depth of 6 inches. Bottom samples were collected using a PVC Van Dorn sampler. Field parameters collected every sampling date from each lake included temperature, pH, dissolved oxygen, depth, and Secchi transparency. In 1994, turbidity measurements were added to the field parameter list.

An Oakton WD-00605-45 pH meter was used for field measurements of pH. Oxygen and temperature measurements were taken using a YSI model 51B dissolved oxygen meter. Dissolved oxygen and temperature measurements were taken at 1 meter intervals in the water column for each of the three sites on each lake. Total depth was measured by sounding with a weighted line. The deepest known site was used to construct dissolved oxygen/temperature profiles for each lake. Secchi disk measurements were conducted at each site on each lake and were averaged for the sample date.

All field data collection was accomplished using the methods described in the South Dakota Clean Lakes Program Standard Operating Procedures. Quality Assurance/Quality Control (QA/QC) procedures were performed in accordance with the South Dakota Clean Lakes QA/QC Project Plan.

Analytical Procedures

Analysis of chemical parameters was conducted by the South Dakota State Health Laboratory. The following methods were used:

Parameter	Method	Reference
Total Phosphorus	Persulfate Digestion	(2) Method 365.2
Ortho Phosphate	Colorimetric Automated ascorbic acid	(1) Method 424G (2) Method 365.1
Total Kjeldahl Nitrogen	Semi Automated Block Digester AAII	(2) Method 351.2
Ammonia Nitrogen	Automated Phenolate	(1) Method 417F (2) Method 350.1
Nitrate-Nitrite	Automated Cadmium Reduction	(1) Method 418F (2) Method 353.2
pH	Electrometric	(1) Method 423 (2) Method 150.1
Total Solids	Evaporation	(1) Method 209A (2) Method 160.3
Total Suspended Solids	Evaporation at 180°	(1) Method 209B (2) Method 160.1
Total Dissolved Solids	Filtration Drying 103-109°	(1) Method 209D (2) Method 160.2
Total Alkalinity	Potentiometric Titration to pH of 4.5	(1) Method 403 (2) Method 310.1
Conductivity	Wheatstone Bridge	(1) Method 205 (2) Method 120.1

Biological Methods

One hundred sixty-one phytoplankton samples were collected in South Dakota during June, July, August and September 1989. Water column composite samples were collected and preserved with Lugol's solution.

A 0.1 ml aliquot of each sample was placed in a Palmer-Maloney Nannoplankton Cell and counted at 400x with an Olympus Microscope equipped with bright-field optics. In all cases the whole water samples were concentrated to facilitate taxonomic enumeration. The phytoplankton encountered during these analyses was placed into 70 taxonomic categories. Three hundred units of plankton were counted from each sample except in samples which contained a sparse amount of phytoplankton. The standard calculation utilized in determining the concentration of organisms with the Palmer-Maloney Nannoplankton Cell is as follows:

$$Organisms\ per\ ml = \frac{C\ X\ 1000\ mm^3}{A\ X\ D\ X\ F}$$

C = number of organisms counted
A = area of a field, mm2
D = depth of field, mm
F = number of fields counted

In this investigation the strip-count method was utilized where a strip (or multiple strips) was counted in a transect across the counting cell. The volume of sample was determined by multiplying the area of the counting cell examined by the depth. Therefore, the total number of units/ml for a given taxon was determined by the following formula:

$$Units/ml = \frac{C\ X\ 1000\ mm^3}{A\ (mm2)\ X\ D\ (mm)}$$

C = number of organisms counted
A = total area counted, mm2
D = depth of Palmer-Maloney Nannoplankton Cell, 0.4 mm

In the case of filamentous diatoms, such as Melosira granulata, each cell was counted as a single unit. With filamentous blue-green algae such as Aphanizomenon flos-aquae and Oscillatoria, extensive fragmentation may occur naturally during the autum season as well as during sample aging. Therefore, many trichomes composed of only a few cells are encountered. In these cases the fragments were "added together" to comprise filaments at least 100 μm in length which were subsequently counted as a single unit.

Trophic State

Using a method developed by Carlson (1977), a trophic state index (TSI) was calculated based on total phosphorus, chlorophyll *a* concentration and Secchi disk measurements. The following calculations were used:

$$TSI\,(TP) = 10\left(6 - \left(\frac{LN\left(\frac{48}{TP}\right)}{LN2}\right)\right)$$

$$TSI\,(SD) = 10\left(6 - \frac{LN\,SD}{LN2}\right)$$

$$TSI\,(CHL) = 10\left(6 - \frac{2.04 - (0.68 \times LN\,CHL)}{LN2}\right)$$

TP = Total Phosphorus in Micrograms per liter
SD = Secchi Disk in meters
CHL = Chlorophyll *a* in milligrams per cubic meter

These indices were calculated for each sample from each lake. The values were combined and a mean value was calculated for total phosphorus, Secchi depth and chlorophyll *a*. The mean TSI for each sampling date was averaged to arrive at a single mean TSI number for each lake for each year. This single TSI value was used to rank lakes by water quality. Lakes with a TSI from 0 to 35 are considered to be oligotrophic (nutrient-poor). Lakes with a TSI from 35 to 50 are considered mesotrophic, lakes with a TSI from 50 to 65 are considered eutrophic (nutrient-rich), and lake with a TSI greater than 65 are listed as hyper-eutrophic (extremely nutrient-rich). There are two oligotrophic lakes in South Dakota and 10 mesotrophic lakes. The majority of South Dakota lakes range from eutrophic to hyper-eutrophic (TSI greater than 65).

MEAN TROPHIC STATE INDICES RANKING

Below are the rankings of the assessment lakes by averaging Carlson's TSI ranking for secchi depth, total phosphorus concentrations, and chlorophyll concentrations. The lakes are ranked from hyper-eutrophic to oligotrophic.

1	PRESTON, LAKE	88.73	57	ROOSEVELT LAKE	67.25
2	SULLY DAM	87.14	58	EAST VERMILLION LAKE	67.21
3	ACADEMY LAKE	85.43	59	RICHMOND LAKE	66.86
4	BURKE LAKE	82.28	60	FREEMAN LAKE	66.55
5	CAMPBELL, LAKE (CAMPBELL)	81.65	61	AMSDEN DAM	66.24
6	DEWBERRY DAM	81.29	62	PLATTE, LAKE	65.15
7	WHITEWOOD LAKE	79.90	63	NORDEN, LAKE	65.06
8	ANDES, LAKE	79.19	64	JONES LAKE	64.45
9	SULLY LAKE	78.99	65	MCCOOK LAKE	64.37
10	ROSETTE LAKE	78.96	66	SOUTH BUFFALO LAKE	64.24
11	NEW WALL LAKE	78.34	67	MINNEWASTA LAKE	63.99
12	CORSICA LAKE	78.09	68	SYLVAN LAKE	63.94
13	THOMPSON, LAKE	78.07	69	WAGGONER LAKE	63.93
14	BEAVER LAKE	77.24	70	HANSON, LAKE	63.92
15	REDFIELD LAKE	77.02	71	NINE MILE LAKE	63.87
16	COTTONWOOD LAKE (SPINK)	76.83	72	LAKOTA LAKE	63.55
17	GEDDES LAKE	76.38	73	PIERPONT LAKE	63.26
18	HENRY, LAKE	76.30	74	BRANT LAKE	63.25
19	RAVINE LAKE	76.08	75	BIG STONE LAKE	63.07
20	ALBERT, LAKE	75.72	76	TWIN LAKES	62.87
21	CARTHAGE, LAKE	75.62	77	FLAT CREEK DAM	62.86
22	HIDDENWOOD, LAKE	74.29	78	BULLHEAD LAKE	61.84
23	COTTONWOOD LAKE (SULLY)	74.06	79	ISABEL, LAKE	61.82
24	CAMPBELL, LAKE (BROOKINGS)	73.69	80	PUNISHED WOMAN LAKE	61.40
25	BYRON, LAKE	73.65	81	MITCHELL, LAKE	61.34
26	RAHN DAM	73.02	82	EUREKA, LAKE	61.26
27	SWAN LAKE	73.02	83	ALICE, LAKE	60.56
28	FISH LAKE	73.01	84	POINSETT, LAKE	60.55
29	SCHOOL LAKE	72.99	85	HORSETHIEF LAKE	60.47
30	DANTE LAKE	72.58	86	BISMARK LAKE	60.23
31	POCASSE, LAKE	72.38	87	CENTER LAKE	60.12
32	HERMAN, LAKE	72.33	88	BRAKKE DAM	59.89
33	SILVER LAKE	72.30	89	LEGION LAKE	59.67
34	WILMARTH LAKE	72.04	90	MURDO DAM	59.09
35	MINA LAKE	71.91	91	SOUTH RED IRON	59.07
36	MADISON, LAKE	71.72	92	FATE DAM	58.73
37	KAMPESKA, LAKE	71.66	93	OLIVER, LAKE	56.99
38	TRAVERSE, LAKE	71.57	94	MARINDAHL LAKE	55.66
39	CLEAR LAKE (DEUEL)	71.55	95	STOCKADE LAKE	55.38
40	COAL SPRINGS RESERVOIR	70.85	96	NEWELL CITY POND	55.27
41	EAST OAKWOOD LAKE	70.85	97	CANYON LAKE	55.17
42	FAULKTON, LAKE	70.63	98	CLEAR LAKE (MARSHALL)	52.57
43	BLUE DOG LAKE	70.59	99	COCHRANE, LAKE	51.88
44	LOUISE, LAKE	70.57	100	IRON CREEK LAKE	50.50
45	ROSEHILL LAKE	70.24	101	ROY LAKE	49.60
46	CRESBARD LAKE	70.06	102	PICKERAL LAKE	48.77
47	PELICAN LAKE	70.02	103	NEWELL LAKE	48.44
48	COVELL LAKE	69.86	104	YANKTON, LAKE	47.62
49	ELM LAKE	69.84	105	SHERIDAN LAKE	46.13
50	HENDRICKS, LAKE	69.80	106	ENEMY SWIM LAKE	44.57
51	HAYES LAKE	69.60	107	SHADEHILL RESERVOIR	42.97
52	WHITE LAKE DAM	69.59	108	ANGOSTURA RESERVOIR	40.52
53	ALVIN, LAKE	69.04	109	ORMAN DAM	38.40
54	WALL LAKE	68.72	110	COLD BROOK RESERVOIR	38.14
55	BIERMAN GRAVEL PIT	67.78	111	PACTOLA RESERVOIR	33.21
56	LOYALTON DAM	67.58	112	DEERFIELD LAKE	31.69

SECCHI DEPTH TROPHIC STATE INDICES RANKING

Below are the rankings of the assessment lakes by Carlson's TSI ranking for secchi depth. The lakes are ranked from hyper-eutrophic to oligotrophic.

1	COAL SPRINGS RESERVOIR	87.14
2	NEW WALL LAKE	85.99
3	PRESTON, LAKE	83.36
4	HENRY, LAKE	79.71
5	WHITEWOOD LAKE	78.89
6	BYRON, LAKE	77.37
7	HENDRICKS, LAKE	77.37
8	SULLY DAM	77.14
9	BLUE DOG LAKE	77.13
10	ANDES, LAKE	75.99
11	HAYES LAKE	75.99
12	ACADEMY LAKE	75.56
13	BEAVER LAKE	75.54
14	SCHOOL LAKE	73.96
15	CAMPBELL, LAKE (CAMPBELL)	73.22
16	BURKE LAKE	73.04
17	CORSICA LAKE	72.86
18	GEDDES LAKE	71.68
19	KAMPESKA, LAKE	71.64
20	WALL LAKE	71.52
21	REDFIELD LAKE	71.20
22	RAVINE LAKE	70.89
23	PELICAN LAKE	70.30
24	FISH LAKE	69.71
25	CAMPBELL, LAKE (BROOKINGS)	69.43
26	CARTHAGE, LAKE	69.43
27	TRAVERSE, LAKE	69.43
28	MINA LAKE	69.16
29	ROSETTE LAKE	69.07
30	HIDDENWOOD, LAKE	67.73
31	DANTE LAKE	67.54
32	COVELL LAKE	67.51
33	ELM LAKE	67.37
34	WHITE LAKE DAM	67.37
35	CLEAR LAKE, (DEUEL CO.)	67.13
36	FREEMAN LAKE	67.13
37	BULLHEAD LAKE	66.78
38	SOUTH BUFFALO LAKE	66.33
39	SWAN LAKE	65.92
40	SULLY LAKE	65.78
41	TWIN LAKES	65.46
42	HERMAN, LAKE	64.55
43	PUNISHED WOMAN LAKE	64.54
44	FAULKTON, LAKE	64.15
45	HANSON, LAKE	63.77
46	POINSETT, LAKE	63.77
47	THOMPSON, LAKE	63.68
48	BIERMAN GRAVEL PIT	63.40
49	BRAKKE DAM	63.40
50	EUREKA, LAKE	63.36
51	MADISON, LAKE	63.22
52	RICHMOND LAKE	62.87
53	ALICE, LAKE	62.86
54	RAHN DAM	62.43
55	BIG STONE LAKE	62.22
56	LAKOTA LAKE	62.09
57	NEWELL CITY POND	62.01
58	ALBERT, LAKE	61.78
59	SYLVAN LAKE	61.52
60	CENTER LAKE	61.36
61	NINE MILE LAKE	61.36
62	COTTONWOOD LAKE	60.66
63	LOYALTON DAM	60.59
64	FATE DAM	60.14
65	EAST VERMILLION LAKE	60.08
66	ALVIN, LAKE	59.57
67	SOUTH RED IRON	59.09
68	POCASSE, LAKE	58.11
69	BISMARK LAKE	57.80
70	FLAT CREEK DAM	57.46
71	WILMARTH LAKE	57.46
72	AMSDEN DAM	56.84
73	MARINDAHL LAKE	56.63
74	JONES LAKE	56.61
75	NORDEN, LAKE	56.55
76	EAST OAKWOOD LAKE	55.83
77	SILVER LAKE	55.72
78	NEWELL LAKE	55.69
79	LEGION LAKE	55.56
80	MURDO DAM	55.44
81	STOCKADE LAKE	54.64
82	MINNEWASTA LAKE	54.61
83	MITCHELL, LAKE	54.31
84	BRANT LAKE	53.78
85	WAGGONER LAKE	53.58
86	HORSETHIEF LAKE	53.31
87	YANKTON, LAKE	52.91
88	ROOSEVELT LAKE	52.78
89	PIERPONT LAKE	52.56
90	COTTONWOOD LAKE	52.55
91	PLATTE, LAKE	52.01
92	CANYON LAKE	51.60
93	CLEAR LAKE, (MARSHALL CO.)	51.13
94	SHADEHILL RESERVOIR	50.44
95	COCHRANE, LAKE	50.37
96	LOUISE, LAKE	49.57
97	CRESBARD LAKE	49.43
98	PICKEREL LAKE	48.79
99	ROSEHILL LAKE	48.56
100	MCCOOK LAKE	48.40
101	ORMAN DAM	47.94
102	OLIVER, LAKE	46.96
103	ISABEL, LAKE	46.67
104	SHERIDAN LAKE	46.08
105	IRON CREEK LAKE	45.94
106	ENEMY SWIM LAKE	44.76
107	ANGOSTURA RESERVOIR	43.14
108	ROY LAKE	42.37
109	DEERFIELD LAKE	34.80
110	PACTOLA RESERVOIR	32.89
111	COLD BROOK RESERVOIR	29.62
112	DEWBERRY DAM	

TOTAL PHOSPHORUS TROPHIC STATE INDICES RANKING

Below are the rankings of the assessment lakes by Carlson's TSI ranking for total phosphorus. The lakes are ranked from hyper-eutrophic to oligotrophic.

1	COTTONWOOD LAKE (SULLY)	106.79	57	FISH LAKE	77.46
2	CRESBARD LAKE	105.57	58	HAYES LAKE	77.28
3	ACADEMY LAKE	104.72	59	PELICAN LAKE	77.17
4	SILVER LAKE	103.78	60	WHITE LAKE DAM	76.39
5	POCASSE, LAKE	102.06	61	MINNEWASTA LAKE	76.24
6	ROSETTE LAKE	102.05	62	BIG STONE LAKE	75.2
7	CAMPBELL, LAKE (CAMPBELL)	101.57	63	BLUE DOG LAKE	74.32
8	LOUISE, LAKE	101.21	64	CLEAR LAKE (DEUEL)	74.32
9	SULLY LAKE	100.21	65	HENDRICKS, LAKE	74.32
10	CORSICA LAKE	98.74	66	BRANT LAKE	73.69
11	SULLY DAM	97.68	67	WALL LAKE	73.4
12	WILMARTH LAKE	97.6	68	SCHOOL LAKE	72.54
13	FAULKTON, LAKE	97.57	69	COVELL LAKE	72.22
14	GEDDES LAKE	96.65	70	BIERMAN GRAVEL PIT	72.16
15	BURKE LAKE	95.72	71	HANSON, LAKE	71.02
16	KAMPESKA, LAKE	95.42	72	PIERPONT LAKE	68.16
17	MINA LAKE	95.34	73	FLAT CREEK DAM	67.1
18	CARTHAGE, LAKE	94.36	74	FREEMAN LAKE	65.75
19	COTTONWOOD LAKE (SPINK)	94.3	75	SOUTH BUFFALO LAKE	65.44
20	PRESTON, LAKE	94.11	76	SYLVAN LAKE	65.34
21	THOMPSON, LAKE	93.52	77	NINE MILE LAKE	65.03
22	REDFIELD LAKE	93.26	78	POINSETT, LAKE	64.04
23	EAST VERMILLION LAKE	93.14	79	HORSETHIEF LAKE	63.69
24	ROSEHILL LAKE	93.01	80	OLIVER, LAKE	62.85
25	ELM LAKE	92.92	81	BISMARK LAKE	62.73
26	ROOSEVELT LAKE	92.22	82	MURDO DAM	62.73
27	NEW WALL LAKE	91.06	83	FATE DAM	62.35
28	RAVINE LAKE	90.22	84	TWIN LAKES	62.35
29	WHITEWOOD LAKE	89.19	85	ALICE, LAKE	61.96
30	BEAVER LAKE	89.15	86	STOCKADE LAKE	61.88
31	RAHN DAM	89.07	87	BRAKKE DAM	61.02
32	HERMAN, LAKE	88.76	88	LAKOTA LAKE	61.02
33	ANDES, LAKE	88.72	89	PUNISHED WOMAN LAKE	60.59
34	AMSDEN DAM	88.68	90	NEWELL CITY POND	60.44
35	BYRON, LAKE	88.58	91	BULLHEAD LAKE	60.15
36	HIDDENWOOD, LAKE	88.18	92	CENTER LAKE	59.54
37	NORDEN, LAKE	86.46	93	EUREKA, LAKE	59.54
38	JONES LAKE	85.39	94	LEGION LAKE	58.14
39	WAGGONER LAKE	85.21	95	MARINDAHL LAKE	58.07
40	COAL SPRINGS RESERVOIR	85.18	96	SOUTH RED IRON	56.05
41	RICHMOND LAKE	84.86	97	CLEAR LAKE (MARSHALL)	54.59
42	ALBERT, LAKE	84.51	98	ROY LAKE	54.59
43	PLATTE, LAKE	84.12	99	NEWELL LAKE	53.06
44	CAMPBELL, LAKE (BROOKINGS)	82.48	100	PICKEREL LAKE	51.57
45	ISABEL, LAKE	82.32	101	CANYON LAKE	50.59
46	HENRY, LAKE	81.73	102	SHADEHILL RESERVOIR	49.59
47	DEWBERRY DAM	81.29	103	COCHRANE, LAKE	48.74
48	DANTE LAKE	80.66	104	SHERIDAN LAKE	48.74
49	MCCOOK LAKE	80.35	105	ENEMY SWIM LAKE	45.31
50	SWAN LAKE	80.12	106	ANGOSTURA RESERVOIR	45.03
51	ALVIN, LAKE	78.87	107	YANKTON, LAKE	44.59
52	MADISON, LAKE	78.74	108	ORMAN DAM	43.54
53	LOYALTON DAM	78.62	109	IRON CREEK LAKE	43.22
54	TRAVERSE, LAKE	78.62	110	PACTOLA RESERVOIR	41.88
55	EAST OAKWOOD LAKE	78.37	111	COLD BROOK RESERVOIR	37.37
56	MITCHELL, LAKE	77.61	112	DEERFIELD LAKE	34.15

CHLOROPHYLL *a* TROPHIC STATE INDICES RANKING

Below are the rankings of the assessment lakes by Carlson's TSI ranking for chlorophyll *a*. The lakes are ranked from hyper-eutrophic to oligotrophic.

1	ALBERT, LAKE	80.86
2	EAST OAKWOOD LAKE	78.34
3	BURKE LAKE	78.07
4	THOMPSON, LAKE	77.02
5	ACADEMY LAKE	76.00
6	COTTONWOOD LAKE (SPINK)	75.53
7	CLEAR LAKE (DEUEL)	73.19
8	MADISON, LAKE	73.19
9	ANDES, LAKE	72.84
10	SCHOOL LAKE	72.48
11	PELICAN LAKE	72.31
12	FISH LAKE	71.84
13	WHITEWOOD LAKE	71.62
14	SULLY LAKE	70.99
15	CAMPBELL, LAKE (CAMPBELL)	70.15
16	DANTE LAKE	69.54
17	CAMPBELL, LAKE (BROOKINGS)	69.16
18	ROSEHILL LAKE	69.16
19	PIERPONT LAKE	69.06
20	ALVIN, LAKE	68.69
21	BEAVER LAKE	68.03
22	RAHN DAM	67.57
23	LAKOTA LAKE	67.54
24	HENRY, LAKE	67.44
25	RAVINE LAKE	67.13
26	HIDDENWOOD, LAKE	66.97
27	FREEMAN LAKE	66.78
28	TRAVERSE, LAKE	66.64
29	REDFIELD LAKE	66.60
30	ROSETTE LAKE	65.77
31	NINE MILE LAKE	65.21
32	LEGION LAKE	65.02
33	WHITE LAKE DAM	65.02
34	SYLVAN LAKE	64.97
35	HORSETHIEF LAKE	64.41
36	FLAT CREEK DAM	64.01
37	LOYALTON DAM	63.54
38	CANYON LAKE	63.31
39	CARTHAGE, LAKE	63.07
40	COTTONWOOD LAKE (SULLY)	62.83
41	CORSICA LAKE	62.66
42	IRON CREEK LAKE	62.33
43	BRANT LAKE	62.29
44	SOUTH RED IRON	62.06
45	WALL LAKE	61.23
46	OLIVER, LAKE	61.15
47	MINNEWASTA LAKE	61.12
48	WILMARTH LAKE	61.07
49	LOUISE, LAKE	60.94
50	SOUTH BUFFALO LAKE	60.94
51	EUREKA, LAKE	60.89
52	GEDDES LAKE	60.79
53	TWIN LAKES	60.79
54	BLUE DOG LAKE	60.33
55	BISMARK LAKE	60.17
56	HERMAN, LAKE	59.94
57	CENTER LAKE	59.45
58	PLATTE, LAKE	59.33
59	PUNISHED WOMAN LAKE	59.06
60	BULLHEAD LAKE	58.60
61	HENDRICKS, LAKE	57.72
62	SILVER LAKE	57.40
63	NEW WALL LAKE	57.08
64	HANSON, LAKE	56.96
65	POCASSE, LAKE	56.96
66	ALICE, LAKE	56.85
67	ROOSEVELT LAKE	56.74
68	COCHRANE, LAKE	56.54
69	ISABEL, LAKE	56.51
70	HAYES LAKE	55.53
71	BRAKKE DAM	55.26
72	CRESBARD LAKE	55.18
73	BYRON, LAKE	55.00
74	JONES LAKE	54.34
75	POINSETT, LAKE	53.84
76	FATE DAM	53.68
77	AMSDEN DAM	53.21
78	WAGGONER LAKE	52.99
79	RICHMOND LAKE	52.84
80	MARINDAHL LAKE	52.29
81	NORDEN, LAKE	52.17
82	MITCHELL, LAKE	52.09
83	CLEAR LAKE (MARSHALL)	51.99
84	ROY LAKE	51.83
85	BIG STONE LAKE	51.80
86	MINA LAKE	51.22
87	FAULKTON, LAKE	50.16
88	STOCKADE LAKE	49.61
89	ELM LAKE	49.23
90	EAST VERMILLION LAKE	48.42
91	KAMPESKA, LAKE	47.92
92	COLD BROOK RESERVOIR	47.44
93	PICKEREL LAKE	45.96
94	YANKTON, LAKE	45.37
95	ENEMY SWIM LAKE	43.64
96	SHERIDAN LAKE	43.58
97	NEWELL CITY POND	43.36
98	COAL SPRINGS RESERVOIR	40.24
99	NEWELL LAKE	36.56
100	ANGOSTURA RESERVOIR	33.39
101	SHADEHILL RESERVOIR	28.87
102	DEERFIELD LAKE	26.11
103	PACTOLA RESERVOIR	24.86
104	ORMAN DAM	23.17
105	BIERMAN GRAVEL PIT	
106	COVELL LAKE	
107	DEWBERRY DAM	
108	MCCOOK LAKE	
109	MURDO DAM	
110	PRESTON, LAKE	
111	SULLY DAM	
112	SWAN LAKE	

65 MILE RADIUS POPULATION RANKING

Below are the rankings of the assessment lakes by populations in a 65 mile radius. The lakes are ranked from largest to smallest population.

1	McCook Lake	408,401	57	Bismark Lake	144,953
2	Marindahl Lake	370,564	58	Legion Lake	141,479
3	Yankton, Lake	366,312	59	Deerfield Lake	141,468
4	Alvin, Lake	320,343	60	Stockade Lake	140,618
5	Covell Lake	319,192	61	Iron Creek Lake	134,858
6	Wall Lake	318,040	62	Newell City Pond	129,522
7	East Vermillion Lake	315,462	63	Corsica Lake	129,428
8	Henry, Lake	289,421	64	Cold Brook Reservoir	127,237
9	Hanson, Lake	271,641	65	Orman Dam	126,883
10	Madison, Lake	270,159	66	Newell Lake	126,408
11	Herman, Lake	270,159	67	Dante Lake	124,545
12	Brant Lake	270,159	68	Andes, Lake	123,134
13	Swan Lake	259,830	69	Angostura Reservoir	121,974
14	Albert, Lake	250,382	70	Wilmarth Lake	112,443
15	Beaver Lake	217,565	71	Geddes Lake	106,639
16	Big Stone Lake	209,493	72	New Wall Lake	102,151
17	Traverse, Lake	209,493	73	Platte, Lake	97,246
18	Thompson, Lake	196,590	74	Bierman Gravel Pit	95,986
19	Fish Lake	196,590	75	Elm Lake	84,738
20	Campbell, Lake (Brookings)	196,590	76	Richmond Lake	83,538
21	Bullhead Lake	196,590	77	Mina Lake	83,538
22	Alice, Lake	196,590	78	Rosehill Lake	81,519
23	East Oakwood Lake	196,590	79	Academy Lake	80,227
24	Kampeska, Lake	196,590	80	Byron, Lake	79,074
25	Norden, Lake	196,590	81	Cresbard Lake	76,839
26	Poinsett, Lake	196,590	82	Loyalton Dam	76,369
27	Preston, Lake	196,590	83	Ravine Lake	76,042
28	Hendricks, Lake	196,590	84	Louise, Lake	75,611
29	Pelican Lake	196,590	85	Faulkton, Lake	69,174
30	Carthage, Lake	196,590	86	Burke Lake	66,267
31	Punished Woman Lake	196,590	87	Jones Lake	62,725
32	Whitewood Lake	196,590	88	Cottonwood Lake (Spink)	62,644
33	School Lake	196,590	89	Redfield Lake	62,644
34	Clear Lake (Deuel)	196,590	90	Roosevelt Lake	57,327
35	Cochrane, Lake	196,590	91	Sully Dam	55,066
36	Oliver, Lake	196,590	92	Rahn Dam	50,496
37	Mitchell, Lake	170,827	93	Brakke Lake	49,002
38	Pierpont Lake	149,477	94	Sully Lake	46,731
39	Clear Lake (Marshall)	149,477	95	Cottonwood Lake, (Sully)	46,515
40	South Buffalo Lake	149,477	96	Fate Dam	45,482
41	South Red Iron Lake	149,477	97	Pocasse, Lake	42,297
42	Minnewasta Lake	149,477	98	Campbell, Lake (Campbell)	41,654
43	Blue Dog Lake	149,477	99	Hiddenwood, Lake	37,620
44	Enemy Swim Lake	149,477	100	Murdo Dam	37,341
45	White Lake Dam	149,477	101	Freeman Lake	35,771
46	Nine Mile Lake	149,477	102	Hayes Lake	34,882
47	Amsden Dam	149,477	103	Waggoner Lake	31,022
48	Roy Lake	149,477	104	Isabell, Lake	26,444
49	Pickerel Lake	149,447	105	Dewberry Lake	26,444
50	Canyon Lake	148,369	106	Coal Springs Dam	25,691
51	Sheridan Lake	147,558	107	Flat Creek Dam	24,060
52	Pactola Reservoir	146,392	108	Shadehill Reservoir	24,047
53	Lakota, Lake	145,639	109	Eureka, Lake	NA
54	Horsethief Lake	145,551	110	Rosette Lake	NA
55	Sylvan Lake	145,233	111	Silver Lake	NA
56	Center Lake	144,960	112	Twin Lakes	NA

Geographic Information

The majority of the bathymetric maps found in this report were provided by the South Dakota Department of Game, Fish and Parks. Some of the lake maps were developed by the Watershed Protection Program of the Department of Environment and Natural Resources. Lake areas and miles of shoreline were planimetered using a digitizer and computer. Volumes of lake basins were computed with the frustum method. The formula used to calculate volume was as follows:

$$h/3\ (a1 + a2 + a1\ a2)$$

h = depth of frustum
a1 = area of frustum surface
a2 = area of frustum bottom

Mean depth was calculated by dividing the lake volume by the surface area.

All of the watershed maps were developed by the DENR utilizing 7.5 minute quad maps and South Dakota County Highway maps. Watershed areas were determined with a digitizer and a computer.

User population figures were developed by tracing a circle on the map with a lake in the center encompassing an area with a radius of 65 miles. Population numbers were calculated using the results of the 1990 census. The lakes were ranked based on the area population within a 65 mile radius.

Information on soil associations was developed by using the South Dakota county soil surveys which were provided by the U.S. Department of Agriculture, Natural Resource Conservation Service. The watershed of each lake was drawn on a soil association map and the percentage of each association was estimated.

QUALITY ASSURANCE/QUALITY CONTROL

In 1992, 1993, and 1994, QA/QC samples showed consistent field technique throughout the sampling period. Blank samples in 1992 had one alkalinity concentration of 12 mg/l during the sampling period. All other samples had a concentrations of 3 mg/l or less. Total solids had three instances when the concentration was above the health lab's detection level. These higher concentrations were most likely due to blowing dust or particles from inside the deionized water jug. Suspended solids exceeded the concentration level once (4 mg/l) in the 1992 sampling period. Contaminates inside the sample bottle were the most likely reason for the slightly higher concentrations. There were no ammonia or nitrate-nitrite levels above detection limits during the sampling period. Four detections of total Kjeldahl nitrogen (TKN) were found in the sampling period. With a detection level of 0.10 mg/l, the elevated concentrations ranged from 0.16 to 0.26 mg/l. There were no detectable levels of total phosphorus found in the blank samples during the sampling period. Total dissolved phosphorus levels exceeded the detection limit once during 1992. The exceedance was most likely caused by lack of proper rinsing of the filter.

The blank samples in 1993 seemed to have more of a problem with total phosphorus and total dissolved phosphorus than in 1992. The deionized water bottle was one year older and may have collected excess phosphorus over the year. Before the 1994 samples were collected, the bottle was thoroughly cleaned. There were no detectable levels of TKN, ammonia, or nitrate and nitrite in the 1993 blank samples. The contaminated deionized water bottle may have also been responsible for scattered limit exceedances in solids and alkalinity.

In June 1994, the Wall Lake QA/QC blank had a concentration total solids of 12 mg/L. The error was more than likely due to contaminated distilled water. The 1994 August Wall Lake QA/QC blank had a total dissolved phosphorus concentration of 0.013 mg/L. This elevated concentration was also shown in the duplicate sample. The elevated concentration in both samples was probably due to contaminated distilled water or insufficient rinsing of the membrane filter.

There were no other major differences in any of the duplicate samples taken in 1992, 1993, or 1994 that are tabulated in the following pages. Most of the small differences occurred in TKN, total phosphorus and total dissolved phosphorus replicates. Because of the eutrophic conditions in most South Dakota lakes, colonies of algae are often collected in the Van Dorn bottle sampler. Most of the differences can be attributed to more colonies of algae entering one duplicate bottle than the other.

QA/QC for 1992

BLANKS

NAME OF LAKE	TOWN	DATE	TIME	DEPTH	FPH	TALKA	TSOL	TSSOL	AMMON	NO3	TKN	TPO4	TDPO4
Clear Lake	Bullville	7/22/92	1530	surface	6.89	2	1	1	0.02	0.10	0.24	0.005	0.005
Lake Bland	Orient	7/29/92	1545	surface	8.31	12	1	1	0.02	0.10	0.16	0.005	0.005
Clear Lake	Clear Lake	8/2/92	NA	surface	7.00	3	32	1	0.02	0.10	0.10	0.005	0.005
Clear Lake	Fullerton	7/28/92	1545	surface	8.05	2	2	4	0.02	0.10	0.26	0.005	0.005
Ken Lake	Tyndall	8/5/92	800	surface	8.45	2	0	1	0.02	0.10	0.10	0.005	0.005
Clear Lake		8/18/92	1230	surface	9.80	3	2	2	0.02	0.10	0.10	0.005	0.005
Spearman Lake	Perryton	8/5/92	1615	surface	8.04	2	0	1	0.02	0.10	0.10	0.005	0.005
Clear Lake	Clear Lake	8/25/92	1850	bottom	8.48	3	18	1	0.02	0.10	0.10	0.005	0.005
Clear Lake	Clear Lake	9/1/92	1030	bottom	8.85	3	17	1	0.02	0.10	0.10	0.005	0.010
Clear Lake	Fairdale	9/3/92	1045	bottom		3	1	1	0.02	0.10	0.20	0.005	0.005

DUPLICATES

NAME OF LAKE	TOWN	DATE	TIME	DEPTH	FPH	TALKA	TSOL	TSSOL	AMMON	NO3	TKN	TPO4	TDPO4
Sheridan Lake	Hill City	7/22/92	1530	surface	8.47	108	173	1	0.02	0.10	0.80	0.023	0.005
Sherri Lake		7/22/92	1530	surface	8.47	108	176	4	0.02	0.10	0.56	0.027	0.007
Lake Alvin	Sioux Falls	7/29/92	1545	bottom	7.89	133	537	14	0.21	0.70	1.54	0.186	0.126
Lake Alan	Akron	7/29/92	1545	bottom	7.89	132	548	12	0.20	0.70	1.51	0.196	0.126
Sherri Lake	Harrisburg	8/26/92	NA	surface	8.62	157	609	18	0.20	0.10	1.10	0.156	0.070
Lake Alvin	Harrisburg	8/26/92	NA	surface	8.62	158	578	18	0.16	0.20	1.21	0.146	0.070
Lake Henry	Musick	7/28/92	1545	bottom	8.05	221	2321	16	0.02	0.10	0.69	0.209	0.023
Lake Hanson	Alexandria	7/28/92	1545	bottom	8.05	219	2332	28	0.02	0.10	0.50	0.093	0.030
Patterson Lake	Valentine	8/5/92	800	bottom	8.45	205	1128	11	0.02	0.10	1.09	0.070	0.023
Lake Poinsett	Estelline	8/5/92	800	bottom	8.45	209	1136	16	0.02	0.20	1.35	0.067	0.027
Center Lake	Custer	8/18/92	1230	surface	9.80	53	88	4	0.02	0.10	0.47	0.040	0.030
Sherry Lake	Custer	8/18/92	1230	surface	9.80	54	76	5	0.02	0.10	0.78	0.037	0.037
Lake Faulkton	Faulkton	8/5/92	1615	bottom	7.65	162	251	2	0.30	0.10	1.64	0.744	0.637
Myler Lake	Alvin	8/5/92	1615	bottom	7.15	168	270	8	0.20	0.01	1.63	0.624	0.634
Sherri Lake	Sherritown	8/25/92	1850	surface	8.48	154	776	22	0.02	0.10	1.39	0.266	0.030
Lake Platte	Platte	8/25/92	1850	surface	8.46	152	780	50	0.02	0.10	1.16	0.272	0.043
Lake Cherri	Cherri Town	9/1/92	1030	surface	8.85	205	1073	24	0.02	0.10	1.78	0.083	0.063
Lake Poinsett		9/1/92	1030	surface	8.85	205	1083	24	0.02	0.10	1.37	0.083	0.030
Lake Faulkton	Faulkton	9/3/92	1045	surface	8.51	169	268	2	0.02	0.10	1.23	0.674	0.574
Lake Sherri	Sherritown	9/3/92	1045	surface		168	272	2	0.02	0.10	1.32	0.717	0.591

QA/QC for 1993

BLANKS

LAKE	COUNTY	DATE	TIME	DEPTH	FPH	TALKA	TSOL	TSSOL	AMMON	NO3	TKN	TPO4	TDPO4
Clear Lake	Phillip	6/16/93	1000	Surface	7.02	---	---	---	0.02	0.10	0.10	0.007	0.010
Clear Lake	Platte	6/22/93	1430	Surface	8.05	24.4	6	1	0.02	0.10	0.10	0.005	0.005
Clear Lake	Clear Lake	7/8/93	915	Surface	8.68	22.7	0	18	0.02	0.10	0.10	0.005	0.005
Blond Lake	Clear Lake	7/8/93	915	Surface	8.68	19.0	0	1	0.02	0.10	0.10	0.005	0.005
Crystal Lake	Phillip	8/3/93	710	Surface	8.12	5.7	13	1	0.02	0.10	0.10	0.259	0.017
Crystal Lake	Winner	8/4/93	1015	Surface	8.46	5.7	15	1	0.02	0.10	0.10	0.010	0.007
Clear Lake	Corsica	8/10/93	830	Surface	8.05	4.1	7	1	0.02	0.10	0.10	0.010	0.010
Clear Lake	Geddes	8/10/93	1030	Surface	7.75	4.5	3	1	0.02	0.10	0.10	0.010	0.020
Crystal Lake	Andover	8/18/93	900	Surface	8.38	4.5	7	3	0.02	0.10	0.10	0.010	0.005
Crystal Lake	Clear Lake	8/18/93	1400	Surface	8.80	4.1	5	2	0.02	0.10	0.10	0.005	0.005

QA/QC for 1993

DUPLICATES

LAKE	COUNTY	DATE	TIME	DEPTH	FPH	TALKA	TSOL	TSSOL	AMMON	NO3	TKN	TPO4	TDPO4
Waggoner	Haakon	6/16/93	1000	Surface	8.01	136.0	735	8	0.02	0.10	0.92	0.236	0.179
Sherry Lake	Phillip	6/16/93	1000	Surface	8.01	119.2	735	8	0.02	0.10	1.05	0.236	0.173
Geddes	Chas Mix	6/22/93	1430	Bottom	7.95	196.0	949	23	0.11	1.30	1.92	0.621	0.515
Sherry Lake	Platte	6/22/93	1430	Bottom	7.95	195.6	943	32	0.10	1.30	2.26	0.607	0.524
Nine-Mile	Marshall	7/7/93	1530	Surface	8.80	176.0	543	4	0.02	0.10	1.43	0.063	0.027
Sherry Lake	Britton	7/7/93	1530	Surface	8.8	260.7	575	4	0.02	0.10	1.55	0.060	0.007
Clear	Deuel	7/8/93	915	Bottom	8.64	206.0	495	9	0.02	0.10	1.38	0.113	0.033
Clear	Deuel	7/8/93	1530	Surface	8.80	243.0	498	4	0.02	0.10	1.51	0.113	0.033
Sherry Lake	Clear Lake	7/8/93	915	Surface	8.68	231.8	460	5	0.02	0.10	1.43	0.123	0.037
Waggoner	Haakon	8/3/93	710	Surface	8.12	129.0	693	2	0.02	0.10	0.93	0.315	0.269
Sherry Lake	Phillip	8/3/93	710	Surface	8.12	131.0	682	2	0.02	0.10	0.82	0.295	0.013
Rahn Dam	Tripp	8/4/93	1015	Surface	8.46	302.0	411	8	0.02	0.10	2.52	0.322	0.199
Sherry Lake	Winner	8/4/93	1015	Surface	8.46	261.0	429	10	0.02	0.10	2.56	0.309	0.199
Corsica	Douglas	8/10/93	830	Bottom	8.34	268.0	659	32	0.02	0.10	1.27	0.574	0.498
Sherry Lake	Corsica	8/10/93	830	Bottom	8.34	262.0	660	22	0.02	0.10	1.59	0.548	0.508
Geddes	Chas Mix	8/10/93	1030	Bottom	7.88	277.0	1300	15	0.08	0.10	1.53	0.525	0.438
Sherry Lake	Geddes	8/10/93	1030	Bottom	7.88	273.0	1316	12	0.08	0.10	2.02	0.501	0.398
Pierpont	Day	8/18/93	900	Surface	8.38	144.0	623	8	0.02	0.10	1.59	0.126	0.053
Sherry Lake	Andover	8/18/93	900	Surface	8.38	144.0	629	3	0.02	0.10	1.66	0.129	0.060
Clear	Deuel	8/18/93	1400	Surface	8.80	192.0	409	15	0.02	0.10	2.01	0.136	0.023
Sherry Lake	Clear Lake	8/18/93	1400	Surface	8.80	193.0	406	12	0.02	0.10	2.07	0.149	0.030
Cochrane	Deuel	6/17/93	1000	Bottom	8.57	---	---	22	0.49	0.06	1.29	0.033	0.010
Cochran Dup	Deuel	6/17/93	1000	Bottom	---	---	---	30	0.19	0.02	1.27	0.032	0.028
Cochrane	*Deuel*	6/17/93	1000	Surface	8.62	---	---	30	0.19	0.08	1.29	0.032	0.007
Cochran Dup	Deuel	6/17/93	1000	Surface	---	---	---	34	0.08	0.05	1.27	0.028	0.013
Pickerel	Day	6/16/93	1400	Bottom	8.34	---	---	11	0.05	0.01	0.55	0.018	0.009
Pickerel Dup	Day	6/16/93	1400	Bottom	---	---	---	13	0.13	0.01	0.56	0.022	0.019
Pickerel	Day	6/16/93	1400	Surface	8.45	---	---	3	0.08	0.01	0.53	0.017	0.007
Pickerel Dup	Day	6/16/93	1400	Surface	---	---	---	4	0.09	0.01	0.51	0.016	0.010
Enemy Swim	Day	7/23/93	1500	Bottom	8.72	---	---	6	0.01	0.01	0.70	0.015	0.008
Enemy Swim Dup	Day	7/23/93	1500	Bottom	---	---	---	6	0.01	0.00	0.77	0.026	0.009
Enemy Swim	Day	7/23/93	1500	Surface	8.34	---	---	3	0.01	0.00	0.69	0.024	0.018
Enemy Swim Dup	Day	7/23/93	1500	Surface	---	---	---	2	0.01	0.00	0.74	0.020	0.010
Clear	Marshall	7/23/93	1330	Bottom	8.27	---	---	2	0.03	0.02	1.21	0.044	0.021
Clear Dup	Marshall	7/23/93	1330	Bottom	---	---	---	5	0.04	0.02	1.12	0.033	0.020
Clear	Marshall	7/23/93	1330	Surface	8.18	---	---	2	0.04	0.02	1.14	0.050	0.015
Clear Dup	Marshall	7/23/93	1330	Surface	---	---	---	3	0.08	0.02	1.23	0.030	0.026
Minnewasta	Day	8/22/93	1638	Bottom	8.82	---	---	16	0.23	0.00	2.65	0.086	0.040
Minnewasta Dup	Day	8/22/93	1638	Bottom	---	---	---	19	0.23	0.01	2.64	0.089	0.048
Minnewasta	Day	8/22/93	1638	Surface	8.86	---	---	15	0.23	0.00	3.18	0.123	0.039
Minnewasta Dup	Day	8/22/93	1638	Surface	---	---	---	15	0.21	0.00	3.12	0.108	0.042
Clear	Marshall	8/22/93	1315	Bottom	8.60	---	---	9	0.02	0.00	1.24	0.038	0.000
Clear Dup	Marshall	8/22/93	1315	Bottom	---	---	---	10	0.01	0.00	1.14	0.033	0.000
Clear	Marshall	8/22/93	1315	Surface	8.57	---	---	5	0.00	0.00	1.10	0.033	0.008
Clear Dup	Marshall	8/22/93	1315	Surface	---	---	---	8	0.01	0.00	1.15	0.028	0.014

QA/QC for 1994

BLANKS

LAKE NAME	COUNTY	DATE	TIME	DEPTH	FIELD pH	TALKA	TSOL	TSSOL	AMMON	NO3-NO2	TKN-N	TPO4	TDPO4
CRYSTAL LAKE	LYMAN	6/14/94	1800	SURFACE	8.04	3	1	0	0.02	0.10	0.10	0.005	0.005
CRYSTAL LAKE	MINNEHAHA	6/22/94	900	SURFACE	8.32	3	12	1	0.02	0.10	0.10	0.005	0.005
CRYSTAL LAKE	JACKSON	8/16/94	1245	SURFACE	7.00	3	3	1	0.02	0.10	0.10	0.005	0.005
CRYSTAL LAKE	LYMAN	8/16/94	2130	SURFACE	7.00	3	2	0	0.02	0.10	0.10	0.005	0.005
CRYSTAL LAKE	MINNEHAHA	8/24/94	1100	SURFACE	8.30	3	1	1	0.02	0.10	0.10	0.005	0.013
CRYSTAL LAKE	DEUEL	8/31/94	1850	SURFACE	8.36	4	1	1	0.02	0.10	0.10	0.005	0.007

DUPLICATES

LAKE NAME	COUNTY	DATE	TIME	DEPTH	FIELD pH	TALKA	TSOL	TSSOL	AMMON	NO3-NO2	TKN-N	TPO4	TDPO4
SHERRY LAKE	LYMAN	6/14/94	1800	SURFACE	8.04	139	300	11	0.02	0.10	0.67	0.076	0.007
FATE DAM	LYMAN	6/14/94	1800	SURFACE	8.04	136	319	11	0.02	0.10	0.74	0.060	0.010
SHERRY LAKE	MINNEHAHA	6/22/94	900	BOTTOM	8.17	186	1,329	19	0.08	0.10	1.44	0.150	0.070
WALL LAKE	MINNEHAHA	6/22/94	900	BOTTOM	8.17	184	1,342	20	0.07	0.10	1.19	0.136	0.073
SHERRY LAKE	JACKSON	8/16/94	1245	SURFACE	8.22	368	3,812	22	0.02	2.50	2.90	0.077	0.020
FREEMAN LAKE	JACKSON	8/16/94	1245	SURFACE	8.22	365	3,893	24	0.02	2.50	2.92	0.073	0.023
SHERRY LAKE	LYMAN	8/16/94	2130	SURFACE	8.42	131	284	4	0.05	0.10	0.77	0.050	0.023
FATE DAM	LYMAN	8/16/94	2130	SURFACE	8.42	133	286	11	0.02	0.10	0.84	0.053	0.020
SHERRY LAKE	MINNEHAHA	8/24/94	1330	BOTTOM	8.10	136	1,280	14	0.02	0.10	1.65	0.153	0.057
WALL LAKE	MINNEHAHA	8/24/94	1330	BOTTOM	8.85	134	1,281	8	0.02	0.10	1.62	0.168	0.083
SHERRY LAKE	DEUEL	8/31/94	1850	BOTTOM	8.56	270	1,279	9	0.02	0.10	2.95	0.053	0.033
ALICE, LAKE	DEUEL	8/31/94	1850	BOTTOM	8.56	271	1,274	11	0.02	0.10	1.72	0.057	0.043

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APPENDIX I Lake Information

ACADEMY LAKE

County: Charles Mix
Latitude: 43 deg. 27 min. 18 sec. N
Longitude: 99 deg. 06 min. 36 sec. W
Area: 31 A (12.6 ha)
Maximum Depth: 11 ft (3.4 m)
Volume: 155 acre-ft ($1.9 \times 10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Snake Creek
Outlet: Snake Creek

Township: 100N
Range: 70W
Section (s): 22
Shoreline L: 1.2mi (1.9 km)
Mean Depth: 5 ft (1.5 m)
Watershed/Lake Area: 894
Thermal Stratification: yes

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 80,227
Ownership Status: State owned
Public Interest: City of Academy

	1989		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.30	4	22.68
Air Temperature (°C)	4	19.50	4	22.00
Secchi Disk Depth (meters)	2	1.25	2	0.34
Conductivity (cond/25° C)	4	1,457	-	-
Turbidity (NTU)	-	-	2	37.00
Lab pH (su) (su)	3	8.97	-	-
Field pH (su) (su)	2	9.00	4	8.36
Total Alkalinity (mg/l)	4	216	4	205
Total Solids (mg/l)	4	1,209	4	1,020
Dissolved Solids (mg/l)	4	1,195	4	993
Suspended Solids (mg/l)	4	14	4	27
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.16	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.09	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.56	4	2.14
Total Phosphorus (mg/l)	4	0.824	4	1.088
Total Dissolved Phosphorus (mg/l)	-	-	4	0.883
Ortho Phosphate as P (mg/l)	4	0.623	-	-
Chlorophyll (mg/m^3)	-	-	2	102.58

Year	1989	1994
TSI Values -- Mean:	77.95	85.43
Secchi Disk	56.78	75.56
Total Phosphorus	99.12	104.72
Chlorophyll *a*		76.00

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 95%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 27,722 A (11,219 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#1	14,194	51.2
#8	7,319	26.4
#12	2,828	10.2
#5	2,245	8.1
#13	1,109	4.0

#1 Agar-Lowry: Well drained, nearly level to strongly sloping, silty soils on uplands.

#8 Beadle-Eakin: Well drained, nearly level to gently rolling, loamy and silty soils on uplands.

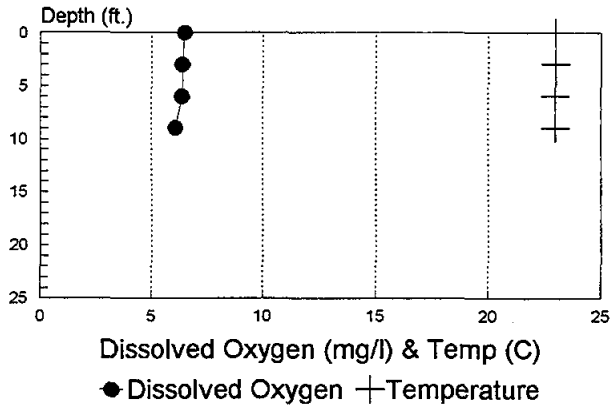
#12 Oakaton: Shallow, well drained, moderately steep and steep, clayey soils on uplands.

#5 Highmore-Java-Glenham: Deep, well drained, nearly level and gently sloping, silty and loamy soils on uplands.

#13 Ethan-Betts-Clarno: Well drained, undulating to steep, loamy soils on uplands.

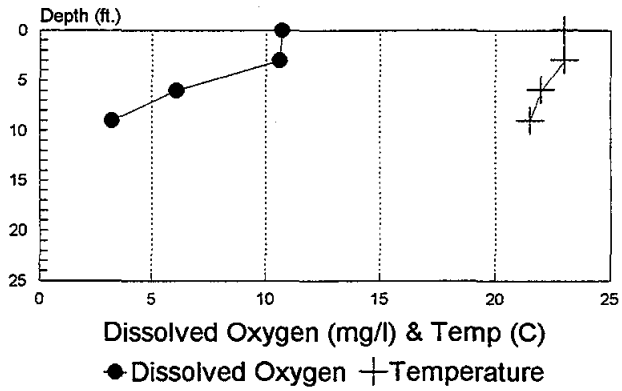
ACADEMY LAKE 6/15/94

Dissolved Oxygen & Temperature Profile



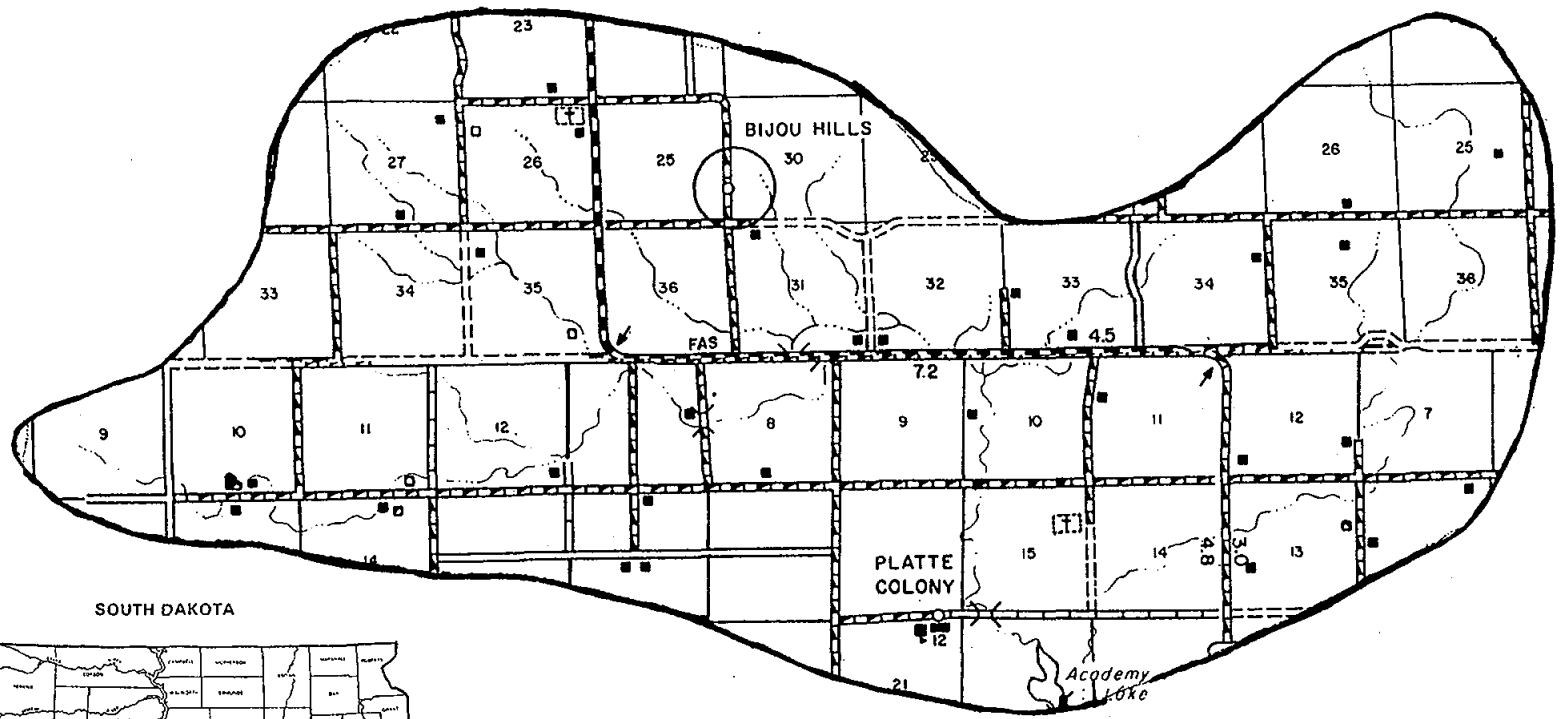
ACADEMY LAKE 8/15/94

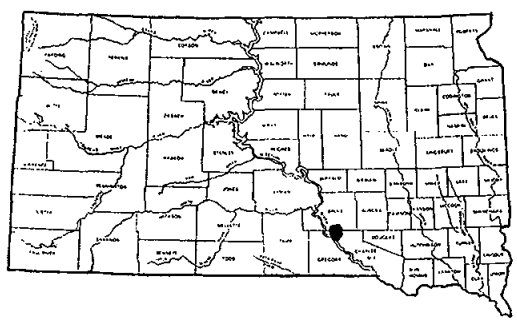
Dissolved Oxygen & Temperature Profile

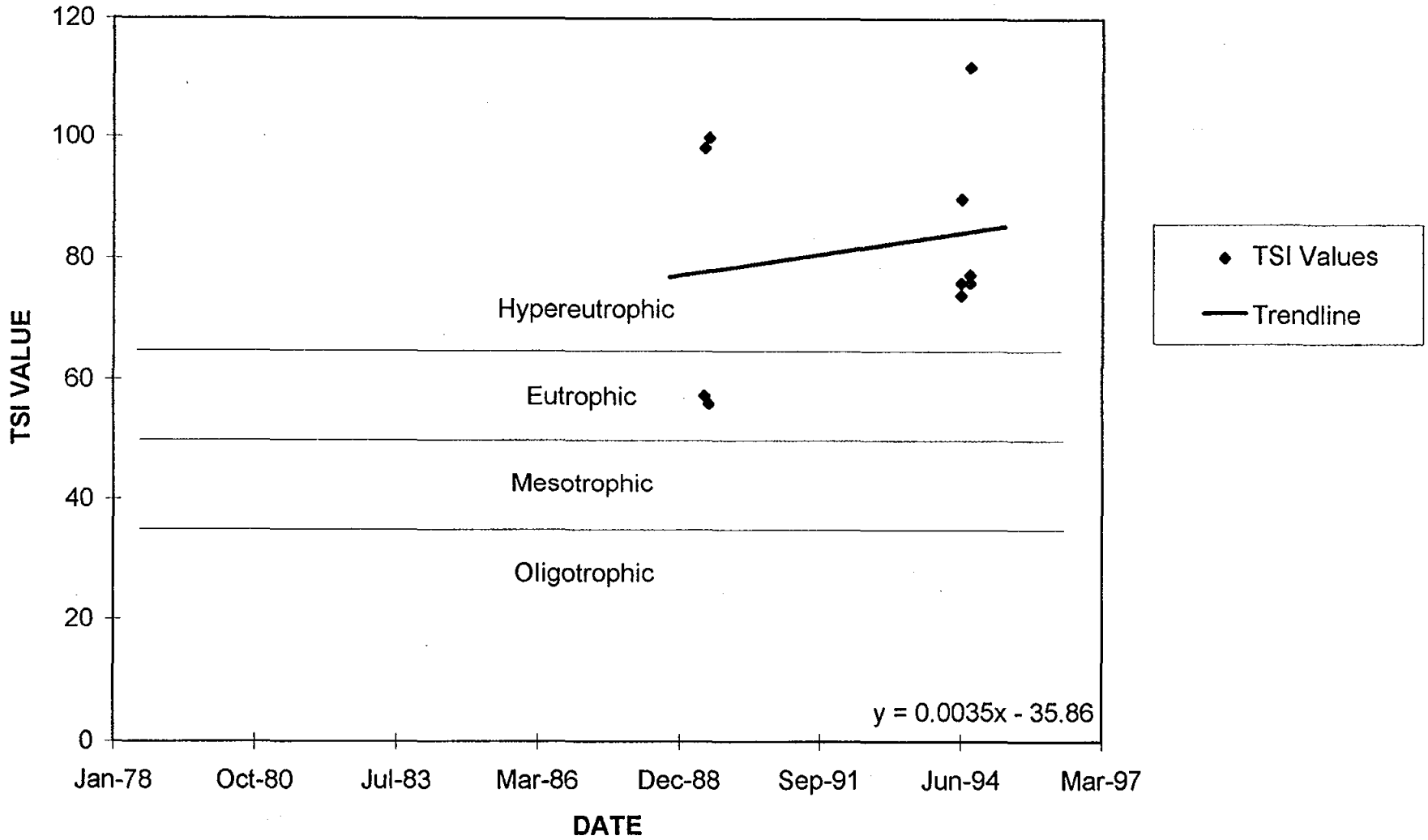


Academy Lake

27,722 acres






ACADEMY LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0035x - 35.86
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE ALBERT

County: Kingsbury - Hamlin
Latitude: 44 deg. 31 min. 53 sec. N
Longitude: 97 deg. 09 min. 49 sec. W
Area: 3,610 acres (1460.9 ha)
Maximum Depth: 10 ft (3.05 m)
Volume: 14,440 acre-ft ($1.78x10^7 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 103N, 112N
Range: 53W
Section (s):34,35,36,1,2,3, 10,11,12,15,14,26,25
Shoreline L: 17.4 mi (28 km)
Mean Depth: 4 ft (1.2 m)
Watershed/Lake Area: 69
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership status: State owned
Public Interest: NA

	1989		1991	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.75	4	23.00
Air Temperature (°C)	4	22.50	4	26.00
Secchi Disk Depth (meters)	2	0.40	2	0.88
Conductivity (cond/25° C)	4	1625	2	1178
Turbidity (NTU)	-	-	-	-
Lab pH (su) (su)	-	-	-	-
Field pH (su) (su)	4	8.85	4	9.06
Total Alkalinity (mg/l)	4	153	4	166
Total Solids (mg/l)	4	1665	4	1027
Dissolved Solids (mg/l)	4	1554	4	1018
Suspended Solids (mg/l)	4	112	4	9
Volatile Suspended Solids (mg/l)	-	-	2	11
Ammonia Nitrogen (mg/l)	4	0.20	4	0.08
Nitrate + Nitrite Nitrogen (mg/l)	4	0.20	4	0.30
Total Kjeldahl Nitrogen (mg/l)	4	2.67	4	2.23
Total Phosphorus (mg/l)	4	0.194	4	0.250
Total Dissolved Phosphorus (mg/l)	-	-	4	0.165
Ortho Phosphate as P (mg/l)	4	0.024	-	-
Chlorophyll (mg/m^3)	-	-	2	168.40

Year	1989	1991
TSI Values -- Mean:	76.41	75.72
Secchi Disk	73.36	61.78
Total Phosphorus	79.46	84.51
Chlorophyll *a*		80.86

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified: None identified.

Algal Species and Densities

June 20, 1989

Taxa	Number	Units/ml
Fragilaria capucina	225	20,274
Algae (other)	3	270
Nitzschia	3	270
Pediastrum	2	180
Diatom (pennate)	2	180
Lyngbya	1	90
Green Algae (other)	1	90
Cryptomonas sp. #1	1	90
Total	238	21,445

Watershed Description

Watershed Area: 250,382 A (101,330 ha)

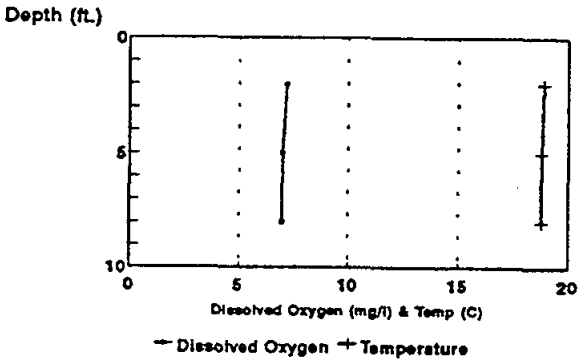
Soil Associations within Watershed

Association	Area (A)	% of Total
#1	231,854	92.6
#5	18,528	7.4

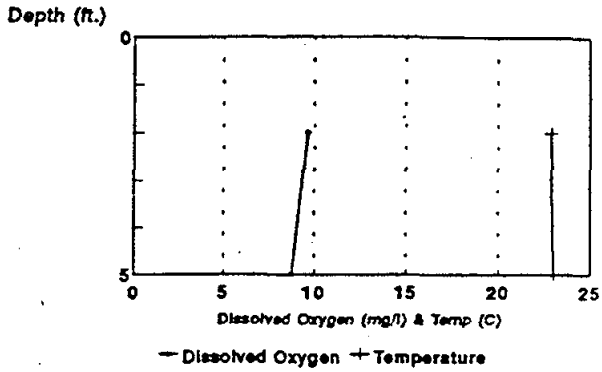
#1 Poinsett-Waubay-Buse: Well drained and moderately well drained, nearly level to steep, silty and loamy soils on till plains and moraines.

#5 Brandt-Estelline: Well drained, nearly level and gently sloping, silty soils over gravelly material on outwash plains.

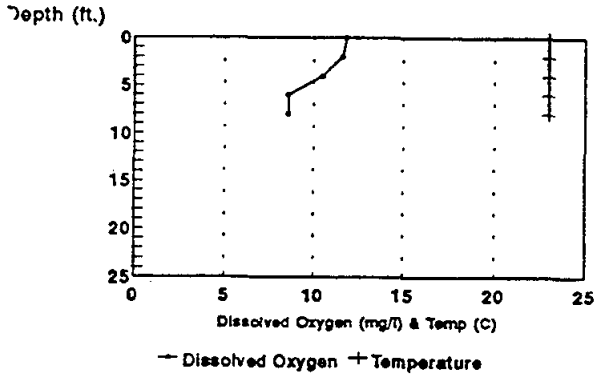
Lake Albert, 6/20/89
Dissolved Oxygen & Temperature Profile



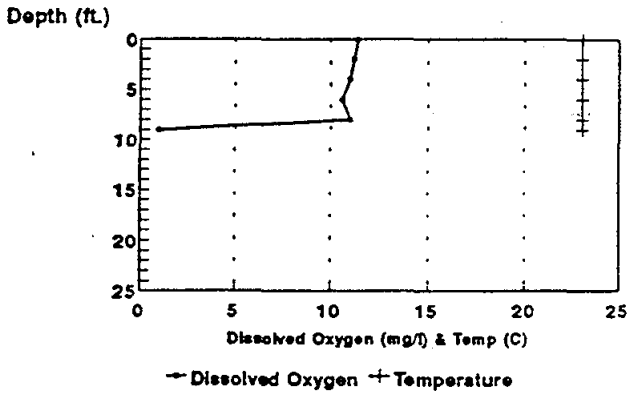
Lake Albert, 7/24/89
Dissolved Oxygen & Temperature Profile



LAKE ALBERT 7/9/91
Dissolved Oxygen & Temperature Profile

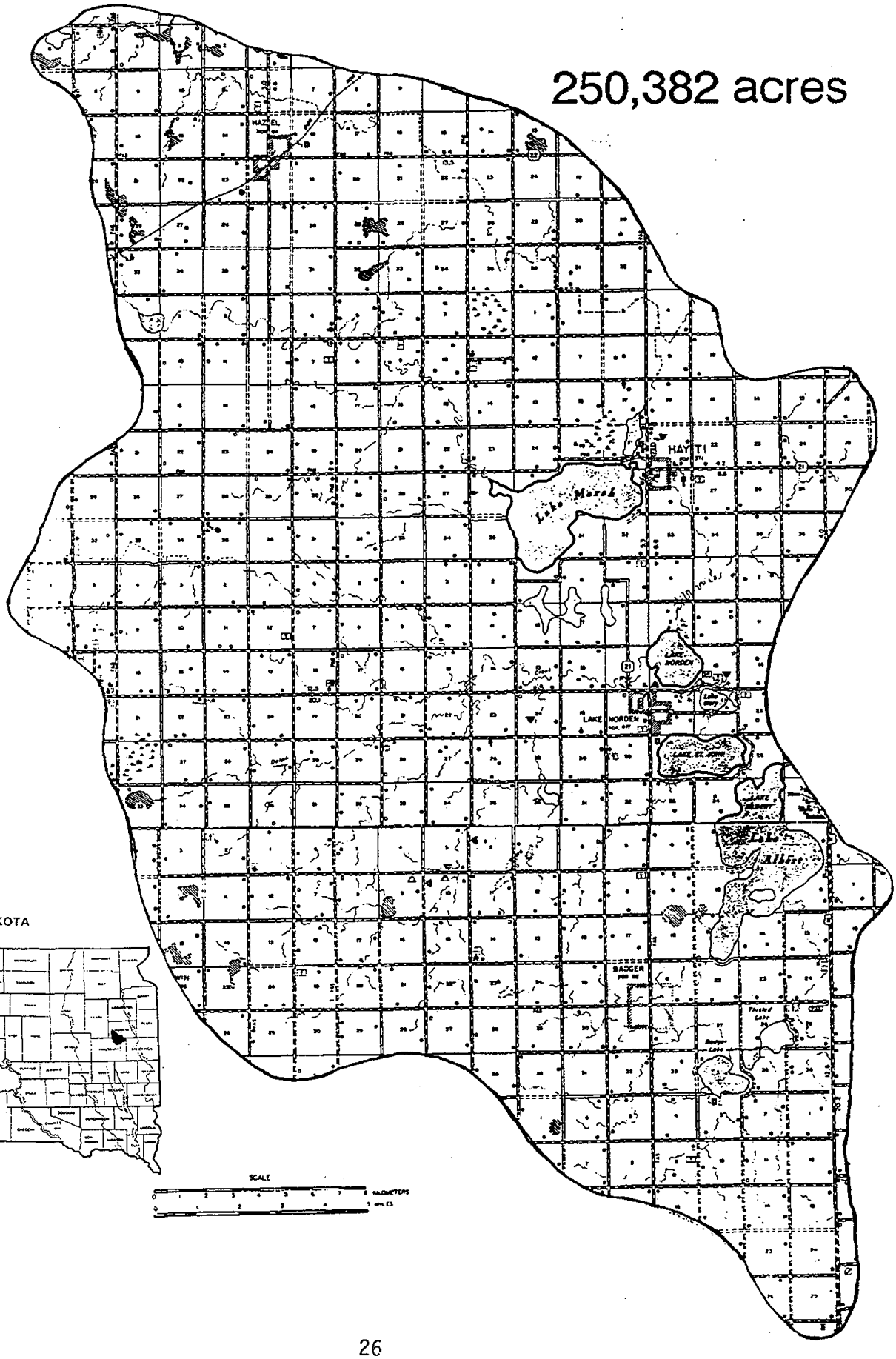


LAKE ALBERT 8/21/91
Dissolved Oxygen & Temperature Profile

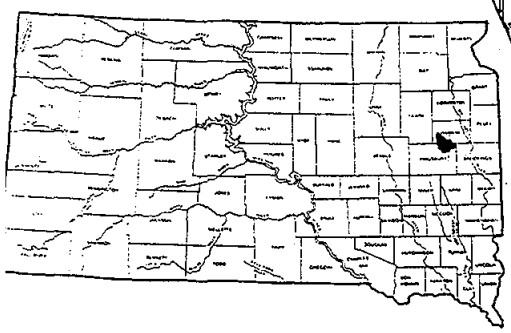


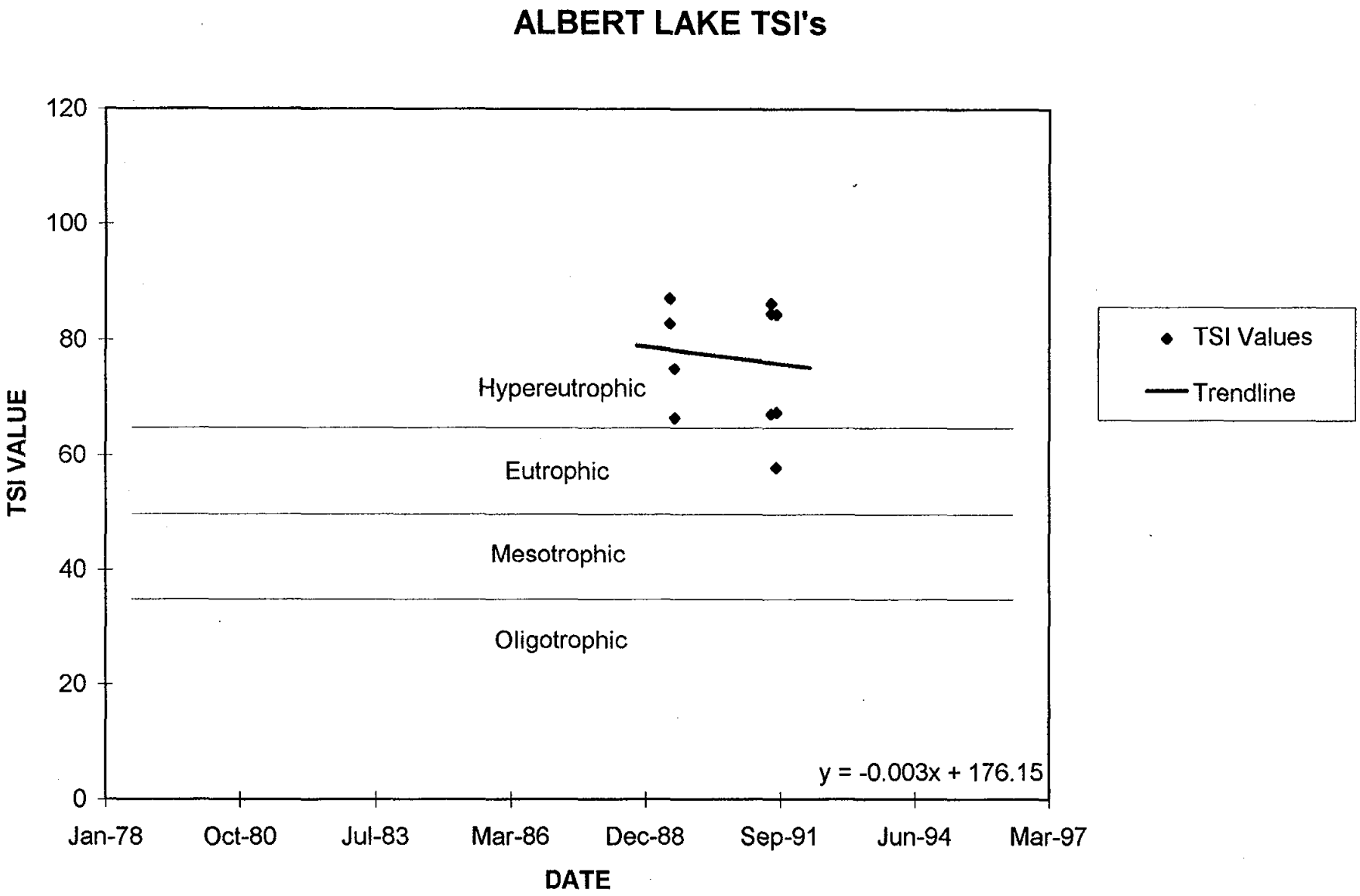
Lake Albert

250,382 acres



SOUTH DAKOTA




ALBERT LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.003x + 176.15
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE ALICE

County: Deuel
Latitude: 44 deg. 52 min. 30 sec. N
Longitude: 96 deg. 37 min. 30 sec. W
Area: 974 A (394 ha)
Maximum Depth: 8 ft (2.4 m)
Volume: 6,207 acre-ft (7.6 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 116N
Range: 48W, 49W
Section (s):(5,6,7,8) (1,12)
Shoreline L: 6.9 mi (11.1 km)
Mean Depth: 6.4 ft (1.9 m)
Watershed/Lake Area: 5.4
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Deuel County Lakes Association

	1991		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.25	4	20.88
Air Temperature (°C)	4	19.95	4	17.50
Secchi Disk Depth (meters)	2	0.46	2	0.82
Conductivity (cond/25° C)	2	2,588	-	-
Turbidity (NTU)	-	-	4	5.91
Lab pH (su) (su)	-	-	-	-
Field pH (su) (su)	4	8.91	4	8.51
Total Alkalinity (mg/l)	4	232	4	268
Total Solids (mg/l)	4	1,805	4	1,258
Dissolved Solids (mg/l)	4	1,763	4	1,247
Suspended Solids (mg/l)	4	42	4	11
Volatile Suspended Solids (mg/l)	2	26	-	-
Ammonia Nitrogen (mg/l)	4	0.20	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.28	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.75	4	1.80
Total Phosphorus (mg/l)	4	0.110	4	0.054
Total Dissolved Phosphorus (mg/l)	4	0.066	4	0.035
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	2	42.88	2	14.57

Year	1991	1994
TSI Values -- Mean:	70.23	60.56
Secchi Disk	71.29	62.86
Total Phosphorus	71.96	61.96
Chlorophyll *a*	67.44	56.85

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton nodosus and Potamogeton pectinatus.

Watershed Description

Watershed Area: 5,214 A (2,110 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA-PA	3,285	63
RL-FS	1,760	21
FU-AA-BY	820	16

FU-AA-PA Forman-Aastad-Paurell: Well drained soils, moderately drained heavy soils formed in loamy glacial till; and very poorly drained silty soils in depressions.

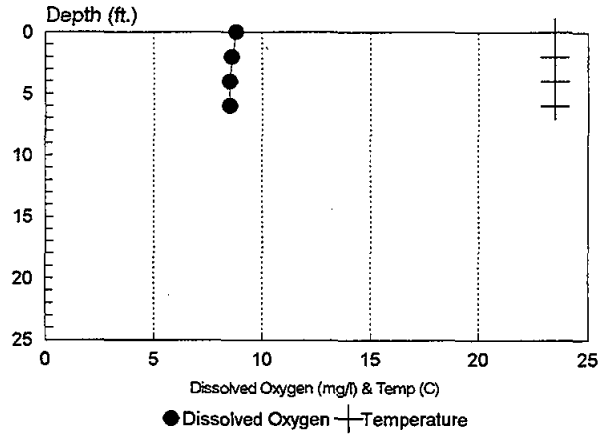
RL-FS Renshaw-Fordville: Somewhat exessively drained and well drained, nearly level to moderately steep, loamy soils that are shallow and moderately deep over outwash sand and gravel.

FU-AA-BY Forman-Aastad-Buse: Well drained and moderately well drained, gently undulating in silty loamy soils formed in loamy glacial till.

JP-SS-RM Shindler-Steinaver-Renner: Deep, well drained, hilly to steep, loamy soils.

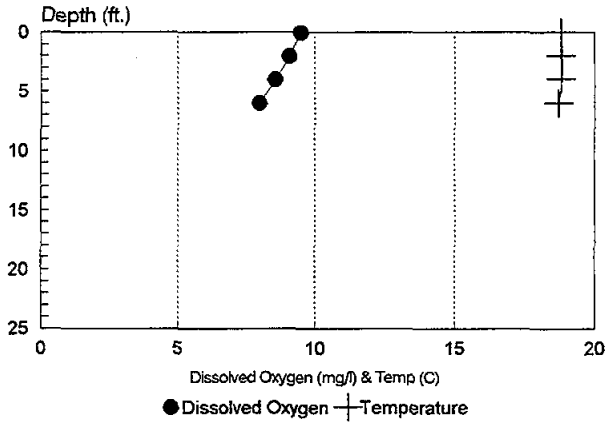
LAKE ALICE 7/23/91

Dissolved Oxygen & Temperature Profile



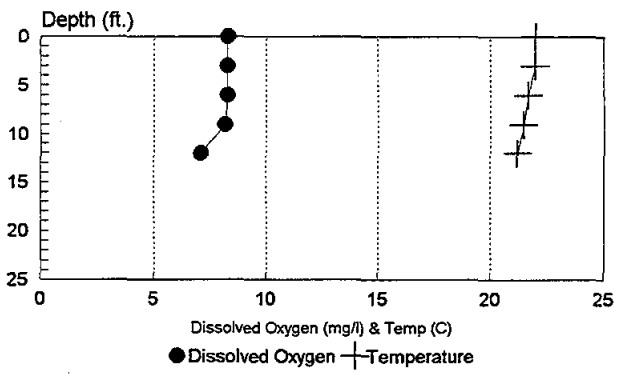
LAKE ALICE 9/11/91

Dissolved Oxygen & Temperature Profile



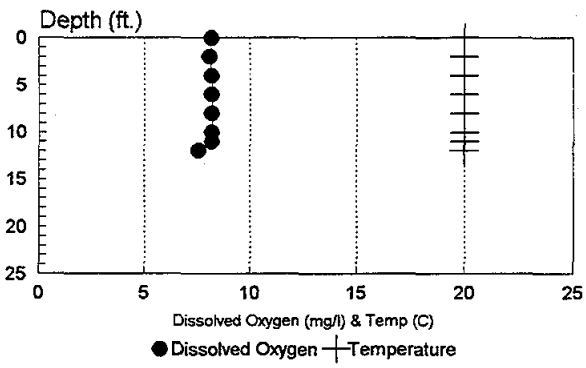
LAKE ALICE 6/29/94

Dissolved Oxygen & Temperature Profile



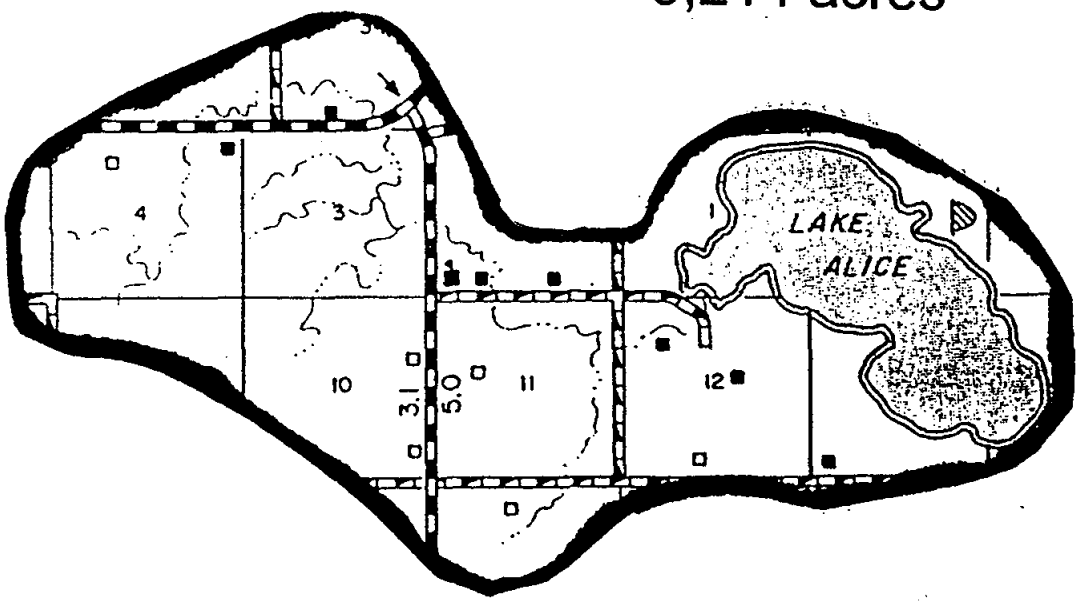
LAKE ALICE 8/31/94

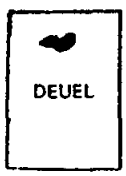
Dissolved Oxygen & Temperature Profile

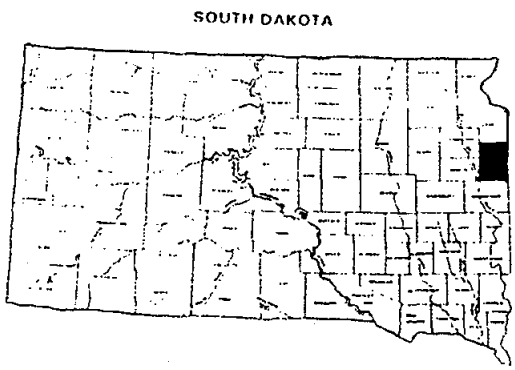


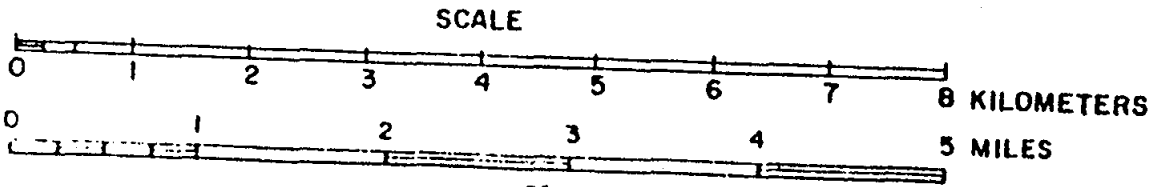
Lake Alice

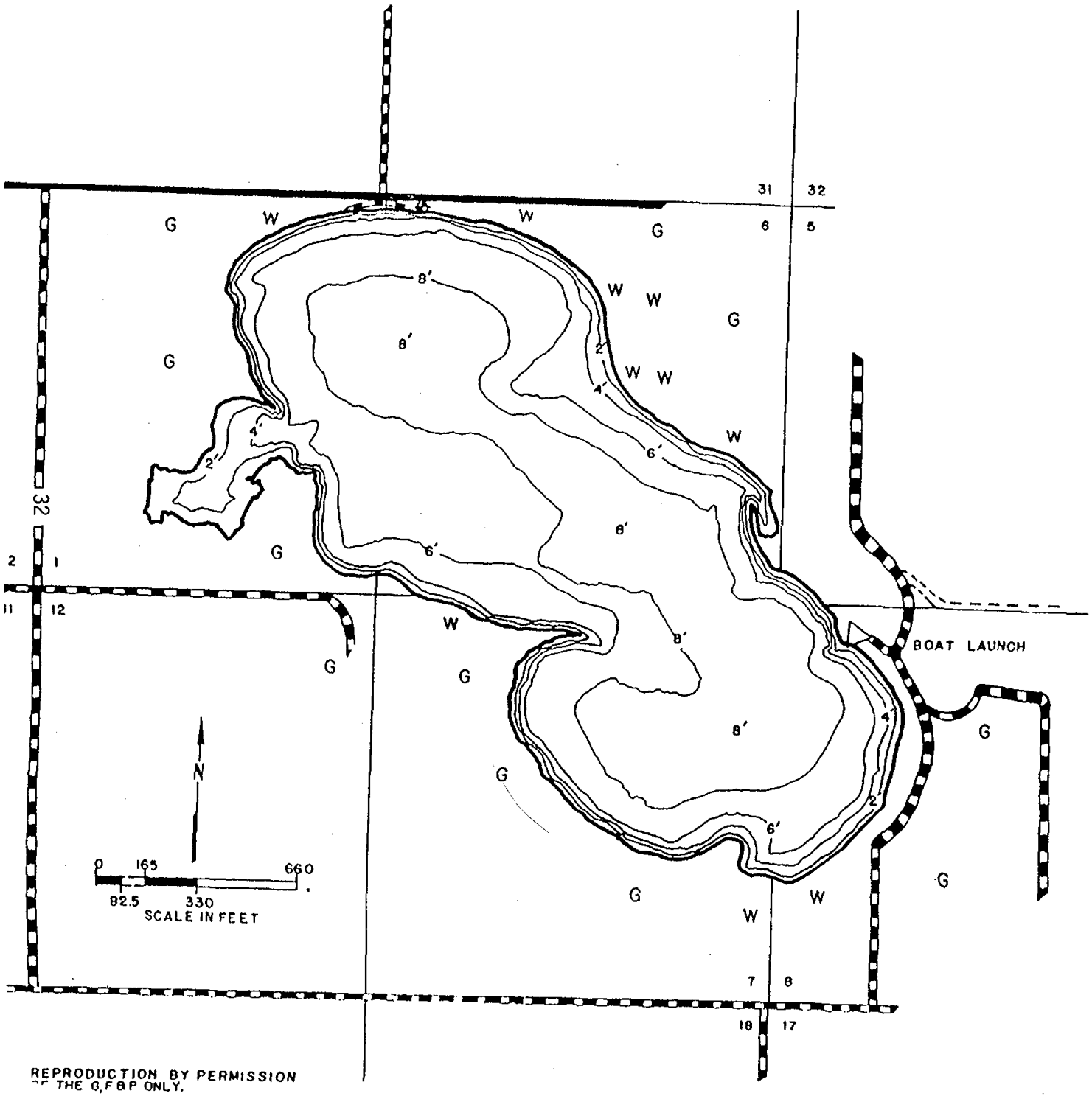
5,214 acres





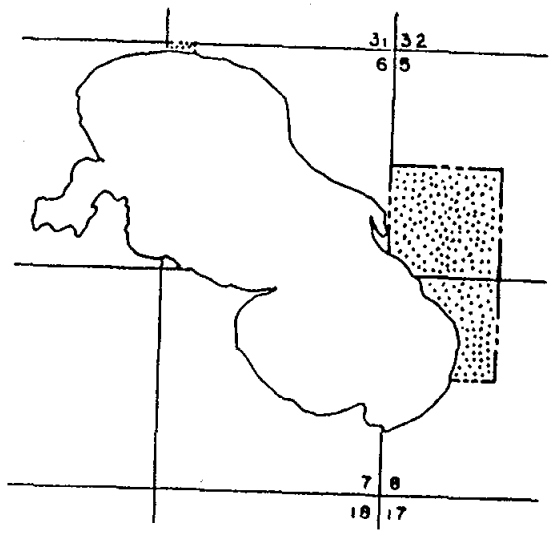






REPRODUCTION BY PERMISSION OF THE G,F&P ONLY.

PUBLIC LAND BOUNDARIES
REFERENCE MAP



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

LAKE ALICE

DEUEL COUNTY

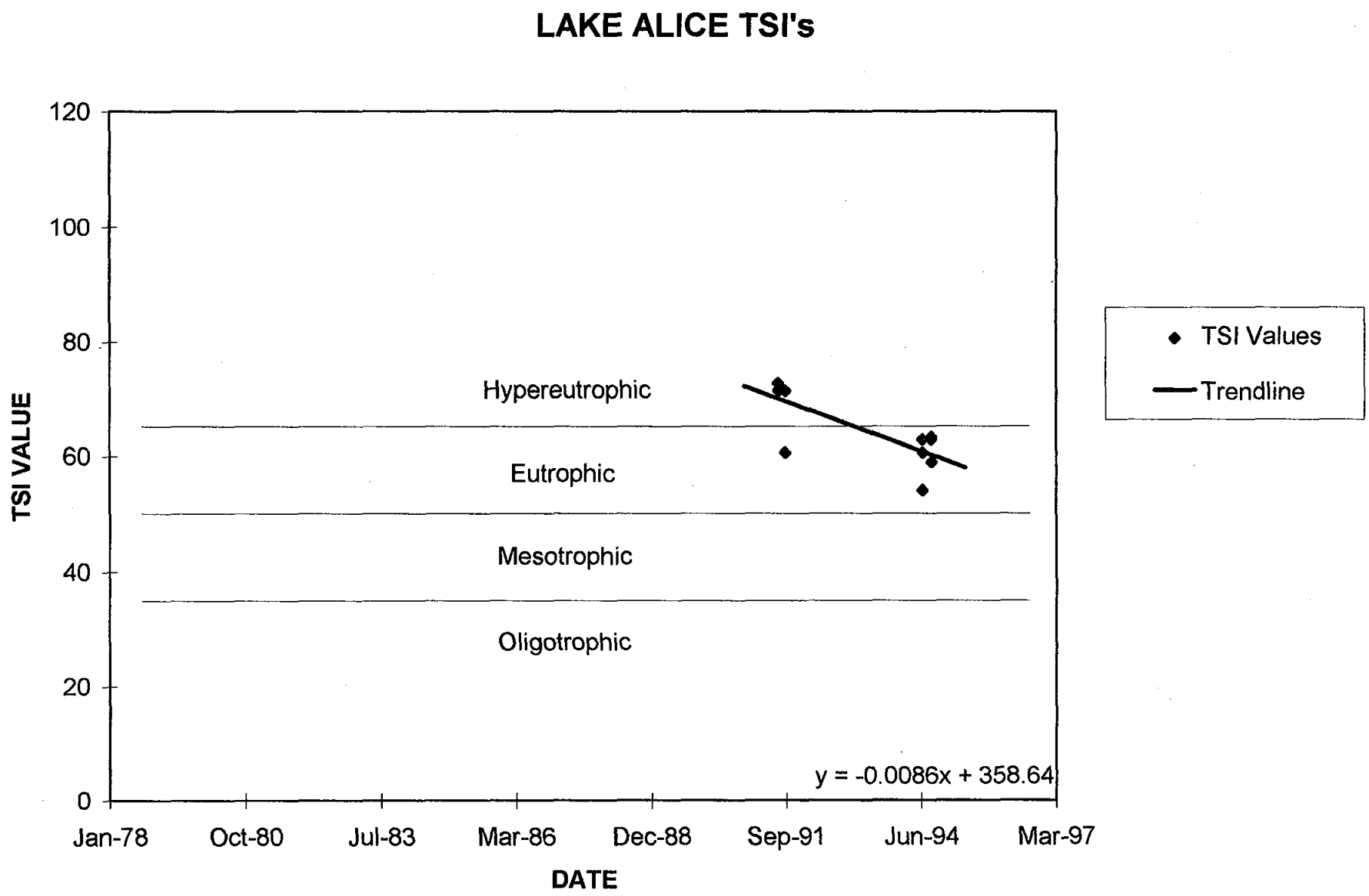
1985

MILES OF SHORELINE : 6.9
AVERAGE DEPTH IN FEET : 6.4
VOLUME IN ACRE FEET: 2' : 1883
4' : 3630
6' : 5168
TOTAL : 6207
PLANIMETERED LAKE ACREAGE : 974
BENCHMARK : NE CORNER OF FIRST PAD ON BOAT RAMP
WATER LEVEL : 2.0' BELOW FULL
SECTIONS : 6, 7, 8 & 1, 12
TOWNSHIP : T116N
RANGE : R48W, R49W
AERIAL PHOTO NO. : 176-7
AERIAL PHOTO DATE : 4-24-77
FIELD DATA COLLECTED : 7-16-80
SCALE : 1" = 1320'

SYMBOLS

DEPTH CONTOUR : —5'—
ROADS : HARD SURFACE :
GRAVEL :
TRAIL :

GRASS : G
WOODED : W
BENCHMAR


LAKE ALICE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0086x + 358.64
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE ALVIN

County: Lincoln
Latitude: 43 deg. 26 min. 24 sec. N
Longitude: 96 deg. 37 min. 00 sec. W
Area: 89.8 A (36.3 ha)
Maximum Depth: 30 ft (9.1 m)
Volume: 1002 acre-ft ($1.236 \times 10^6 m^3$)
Origin of Basin: impoundment
Township: 100N
Range: 49W
Section (s): 4, 33, 34
Shoreline L: 3.7 mi (6 km)
Mean Depth: 11.1 ft (3.4 m)
Watershed/Lake Area: 273
Thermal Stratification: yes
Major Inflows (named or permanent streams): Nine Mile Creek
Outlet: Nine Mile Creek to Big Sioux River

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 320,343
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.55	4	25.00	4	20.54
Air Temperature (°C)	4	27.25	4	26.50	4	18.34
Secchi Disk Depth (meters)	2	0.72	2	0.99	2	1.03
Conductivity (cond/25° C)	4	1,452	2	817	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su) (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.15	4	8.36	4	8.33
Total Alkalinity (mg/l)	4	115	4	128	4	147
Total Solids (mg/l)	4	1,269	4	569	4	571
Dissolved Solids (mg/l)	4	1,257	4	551	4	555
Suspended Solids (mg/l)	4	12	4	18	4	16
Volatile Suspended Solids (mg/l)	-	-	2	6	-	-
Ammonia Nitrogen (mg/l)	4	1.08	4	1.27	4	0.18
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.55	4	0.43
Total Kjeldahl Nitrogen (mg/l)	4	2.33	4	2.28	4	1.40
Total Phosphorus (mg/l)	4	0.439	4	0.488	4	0.185
Total Dissolved Phosphorus (mg/l)	-	-	4	0.426	4	0.109
Ortho Phosphate as P (mg/l)	4	0.260	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	54.49	3	48.69

Year	1989	1991	1992
TSI Values -- Mean:	67.81	73.64	69.04
Secchi Disk	64.81	60.17	59.57
Total Phosphorus	70.80	90.96	78.87
Chlorophyll *a*		69.79	68.69

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton nodosus and Potamogeton pectinatus.

Algal Species and Densities

	June 29, 1989		August 3, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	273	12,494	18	253
Lyngbya	13	595	-	-
Algae (other)	8	366	21	295
Cryptomonas sp. #1	3	137	1	14
Oocystis	1	46	-	-
Glenodinium Gymnodinium	1	46	-	-
Chroococcus	1	46	1	14
Anabaena	-	-	242	3,402
Algae (flagellate)	-	-	9	127
Blue-green (other)	-	-	3	42
Green Algae (other)	-	-	2	28
Diatom (centric)	-	-	2	28
Cryptomonas	-	-	1	14
Total	300	13,730	300	4,217

Watershed Description

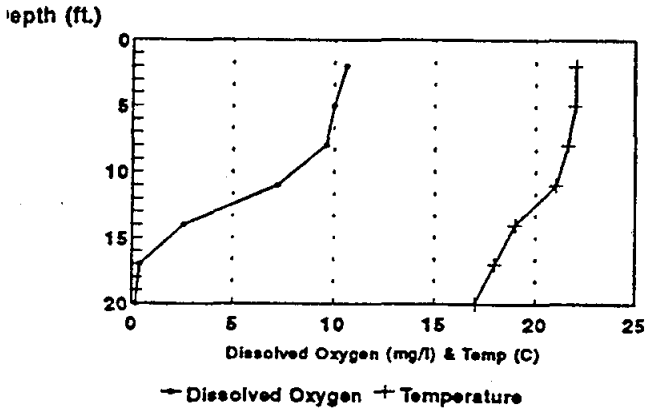
Watershed Area: 24,564 A (10,346 ha)

Soil Associations within Watershed

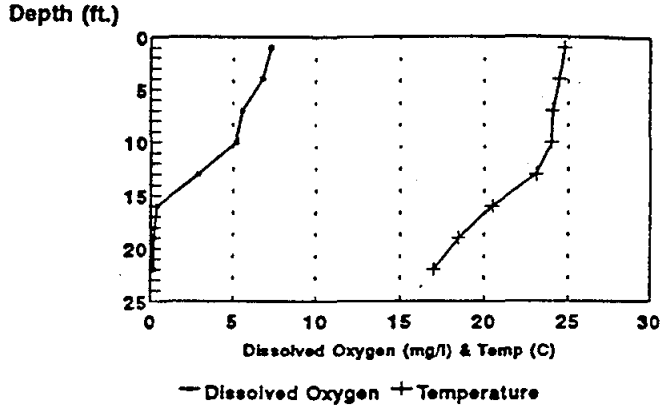
Association	Area (A)	% of Total
EF-CT	11,054	45
WF-CT	9,580	39
EF-JP-WP	2,702	11
JP-SS-RM	1,228	5

EF-CT	Egan-Chancellor: Deep, well drained and somewhat poorly drained, gently undulating, silty soils.
WF-CT	Wentworth-Chancellor: Deep, well drained and somewhat poorly drained, nearly level, silty soils.
EF-JP-WP	Egan-Shindler-Worthing: Deep, well drained, gently sloping to rolling, silty and loamy soils, and poorly drained level, clayey soils.
JP-SS-RM	Shindler-Steinaver-Renner: Deep, well drained, hilly to steep, loamy soils.

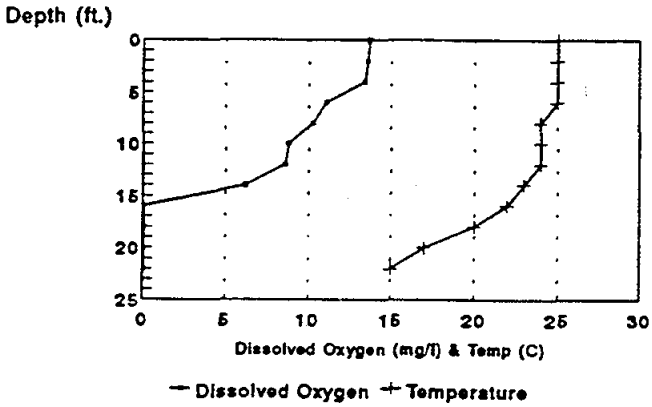
Lake Alvin, 6/29/89
Dissolved Oxygen & Temperature Profile



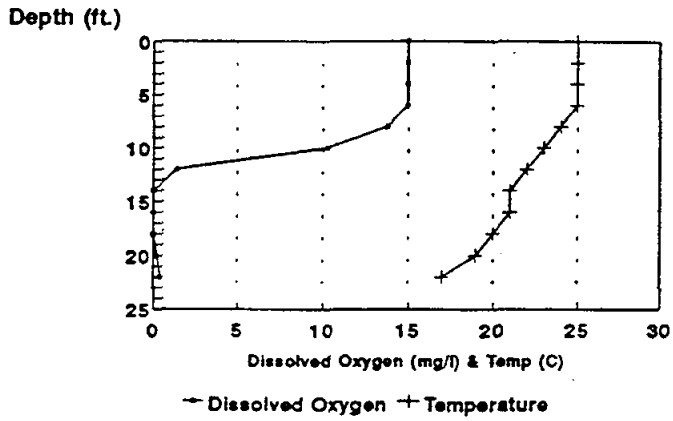
Lake Alvin, 8/3/89
Dissolved Oxygen & Temperature Profile



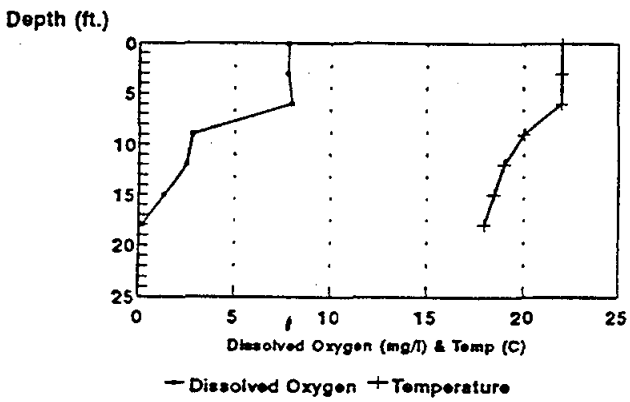
LAKE ALVIN 7/10/91
Dissolved Oxygen & Temperature Profile



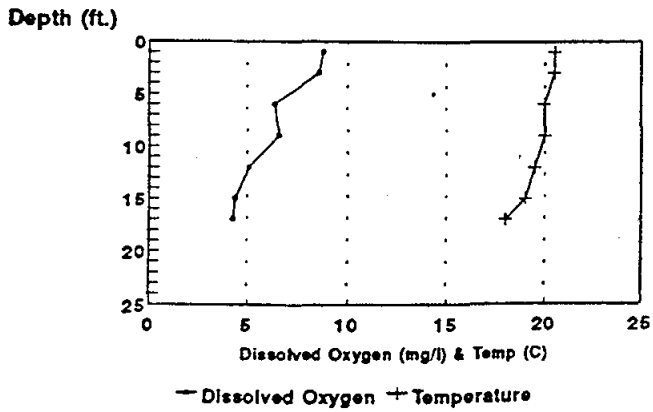
LAKE ALVIN 8/15/91
Dissolved Oxygen & Temperature Profile



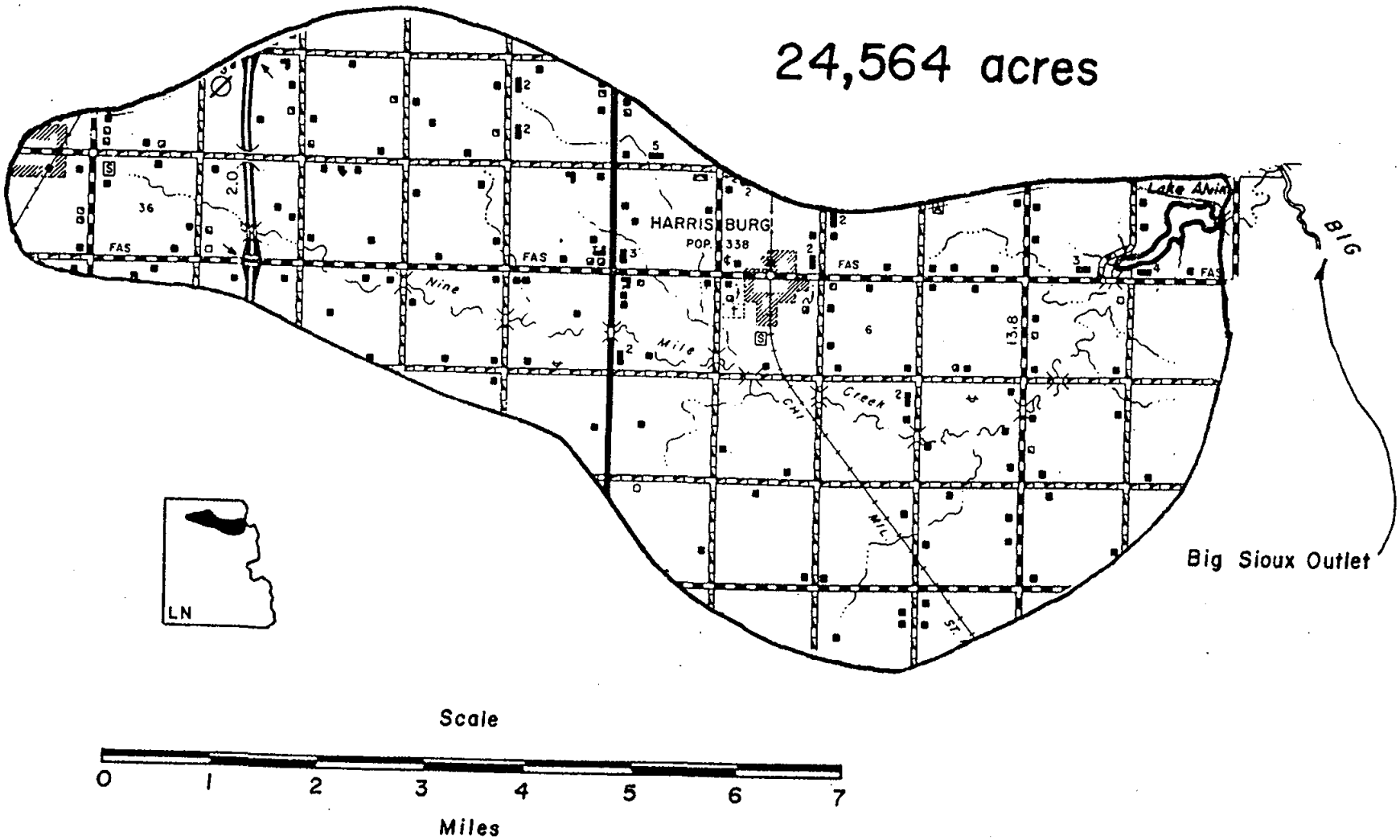
LAKE ALVIN 7/29/92
Dissolved Oxygen & Temperature Profile

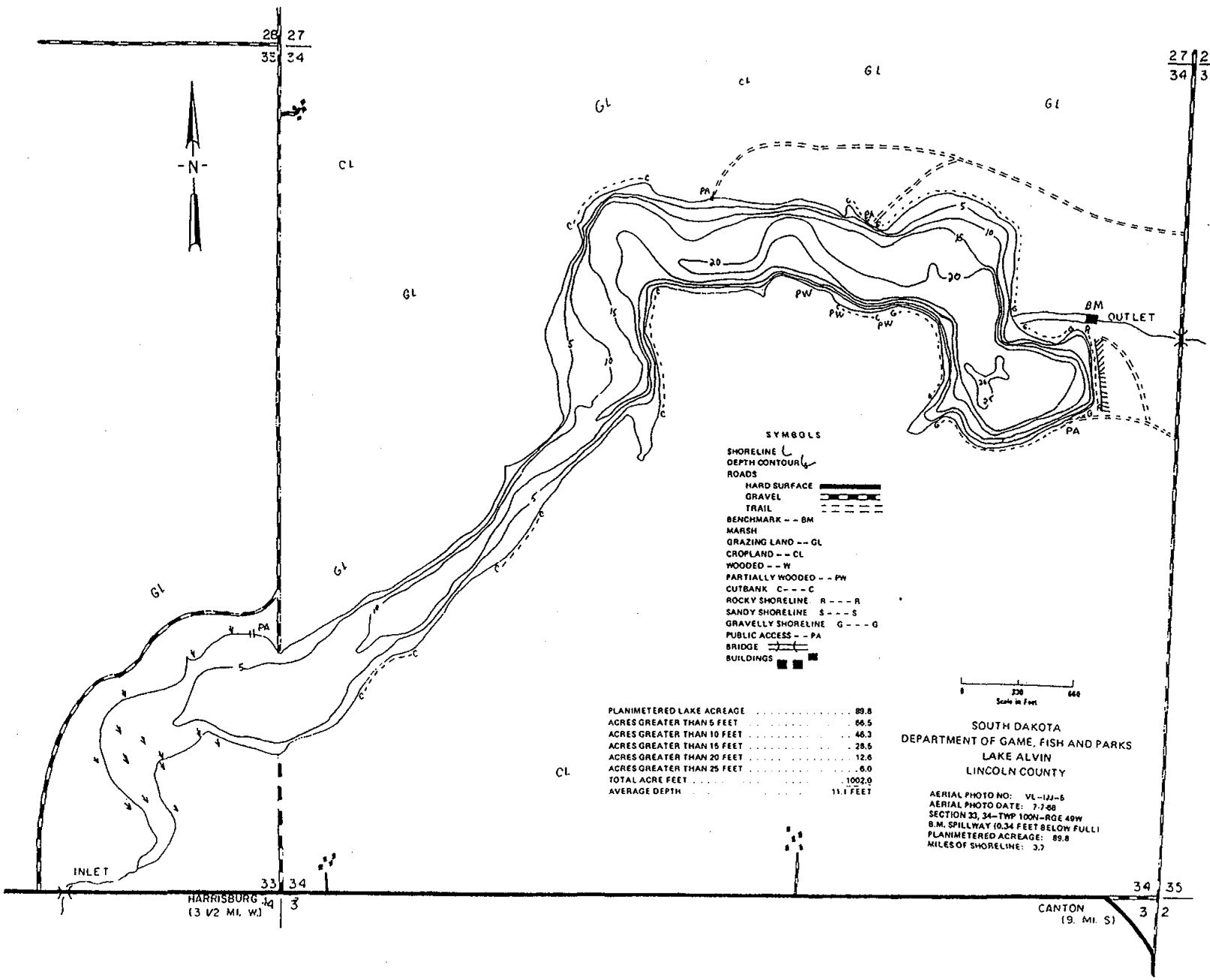


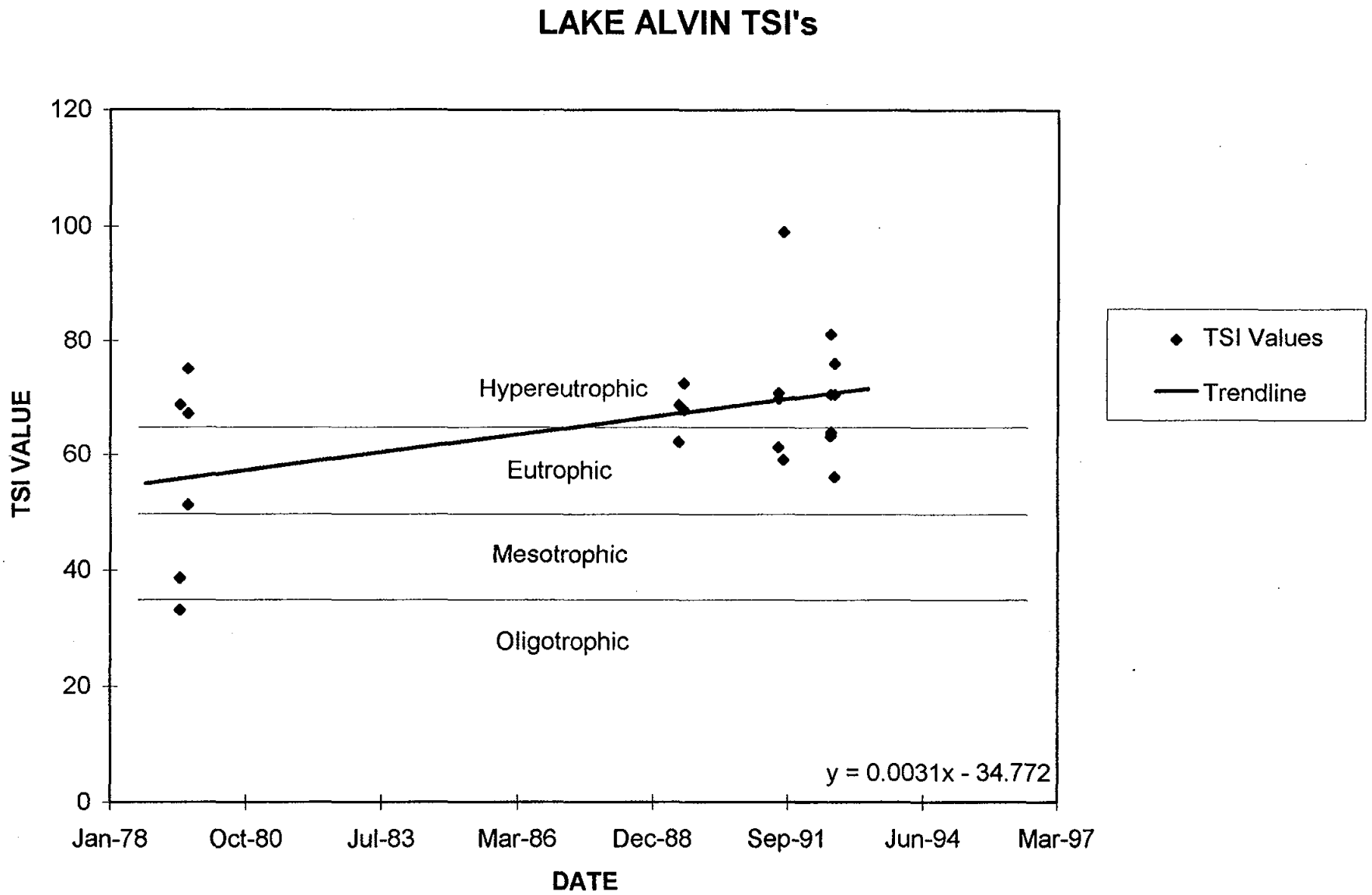
LAKE ALVIN 8/26/92
Dissolved Oxygen & Temperature Profile



Lake Alvin


24,564 acres
HARRISBURG
POP. 338
Lake Alvin
BIG
Nine Mile Creek
CHI MIL ST.
Big Sioux Outlet
FAS
36
2.0
13.8
6
LN
Scale
0 1 2 3 4 5 6 7
Miles


28 27
35 34
27 26
34 35
-N-
CL
GL
PA
PW
BM
OUTLET
INLET
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK -- BM
MARSH
GRAZING LAND -- GL
CROPLAND -- CL
WOODED -- W
PARTIALLY WOODED -- PW
CUTBANK C---C
ROCKY SHORELINE R---R
SANDY SHORELINE S---S
GRAVELLY SHORELINE G---G
PUBLIC ACCESS -- PA
BRIDGE
BUILDINGS
PLANIMETERED LAKE ACREAGE 89.8
ACRES GREATER THAN 5 FEET 66.5
ACRES GREATER THAN 10 FEET 46.3
ACRES GREATER THAN 15 FEET 28.5
ACRES GREATER THAN 20 FEET 12.6
ACRES GREATER THAN 25 FEET 6.0
TOTAL ACRE FEET 1002.0
AVERAGE DEPTH 11.1 FEET
0 330 660
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE ALVIN
LINCOLN COUNTY
AERIAL PHOTO NO: VL-1JJ-5
AERIAL PHOTO DATE: 7-7-68
SECTION 33, 34-TWP 100N-RGE 49W
B.M. SPILLWAY (0.34 FEET BELOW FULL)
PLANIMETERED ACREAGE: 89.8
MILES OF SHORELINE: 3.7
33 34 3
HARRISBURG
(3 1/2 MI. W.)
34 35 3 2
CANTON
(9 MI. S)


LAKE ALVIN TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0031x - 34.772
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

AMSDEN DAM

County: Day
Latitude: 45 deg. 21 min. 30 sec. N
Longitude: 97 deg. 58 min. 06 sec. W
Area: 235 A (95.1 ha)
Maximum Depth: 27 ft (8.2 m)
Volume: 2,209 acre-ft (2.725 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: Mud Creek

Township: 122N
Range: 59W
Section (s): 19-20, 29-30
Shoreline L: 5.9 mi (9.5 km)
Mean Depth: 9.4 ft (2.9 m)
Watershed/Lake Area: 136
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(3) Coldwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State and County owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Sample	Results
Water Temperature (°C)	4	22.63	4	23.20	4	18.93
Air Temperature (°C)	4	23.05	4	23.05	4	18.25
Secchi Disk Depth (meters)	2	1.36	2	1.36	2	1.25
Conductivity (cond/25° C)	4	1,321	2	1,321	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su) (su)	4	8.59	-	-	-	-
Field pH (su) (su)	-	-	4	8.69	4	8.41
Total Alkalinity (mg/l)	4	194		234	4	198
Total Solids (mg/l)	4	1,046	4	1,018	4	578
Dissolved Solids (mg/l)	4	1,038	4	996	4	567
Suspended Solids (mg/l)	4	8	4	22	4	11
Volatile Suspended Solids (mg/l)	-	-	2	3	-	-
Ammonia Nitrogen (mg/l)	4	0.21	4	0.11	4	0.13
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.38	4	0.20
Total Kjeldahl Nitrogen (mg/l)	4	1.10	4	1.23	4	0.95
Total Phosphorus (mg/l)	4	0.245	4	0.279	4	0.405
Total Dissolved Phosphorus (mg/l)	-	-	4	0.222	4	0.358
Ortho Phosphate as P (mg/l)	4	0.153	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	146.73	2	10.05

Year	1989	1991	1992
TSI Values -- Mean:	68.12	73.74	66.24
Secchi Disk	55.77	55.60	56.84
Total Phosphorus	80.48	86.10	88.68
Chlorophyll *a*		79.51	53.21

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton richardsonii, P. pectinatus, and Ceratophyllum demersum.

Algal Species and Densities

June 27, 1989

Taxa	Number	Cells/ml
Cryptomonas sp. #1	57	603
Characium	12	127
Aphanizomenon flos-aquae	11	116
Algae (other)	8	85
Cryptomonas	4	42
Oocystis	3	32
Cryptomonas ovata	3	32
Anabaena	1	11
Total	99	1,047

Watershed Description

Watershed Area: 31,961 A (12,935 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA-PA	11,826	37
NF	8,310	26
KN	4,475	14
FU-BY	2,557	8
PN-WG	1,918	6
RL-FS	1,918	6
PF-CJ	639	2

FU-AA-PA Forman-Aastad-Parnell: Well drained and moderately well drained, gently undulating to moderately steep loamy soils and very poorly drained soils that formed alluvium depression.

NF Nutley: Well drained nearly level to sloping clayey soils that formed in glacio-lacustrine sediments on uplands.

KN Kranzberg: Well drained, nearly level to sloping silty soils that formed in loess over glacial till.

FU-BY Forman-Buse: Well drained, gently undulating to steep loamy soils.

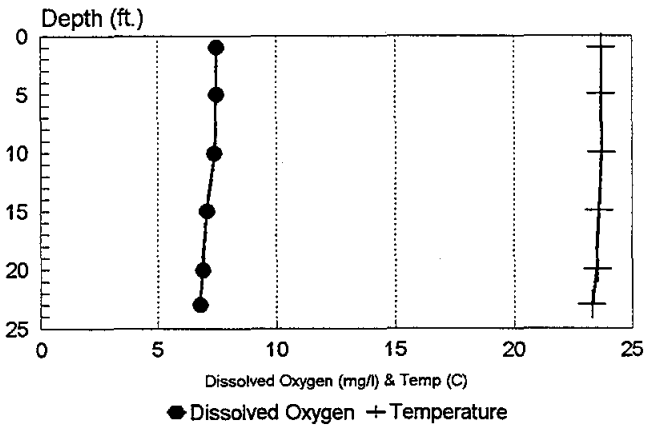
PN-WG Poinsett-Waubay: Well drained and moderately well drained, nearly level to sloping silty soils that formed in glacial drift.

RL-FS Renshaw-Fordville: Well drained nearly level to strongly sloping loamy soils that are shallow and moderately deep over sand and gravel.

PF-CJ Peever-Cavour: Well drained, nearly level to gently sloping soils and soils with claypan subsoils.

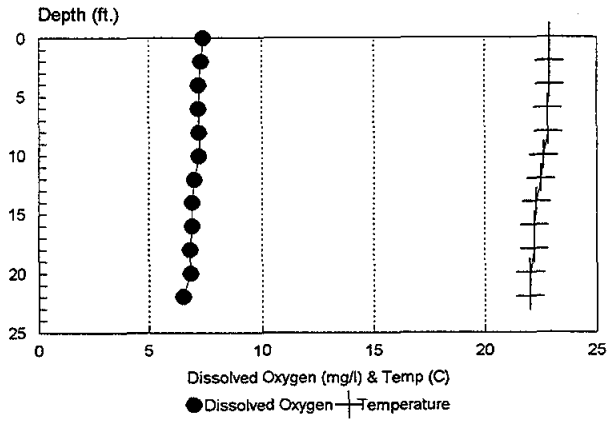
AMSDEN DAM 8/9/79

Dissolved Oxygen & Temperature Profile



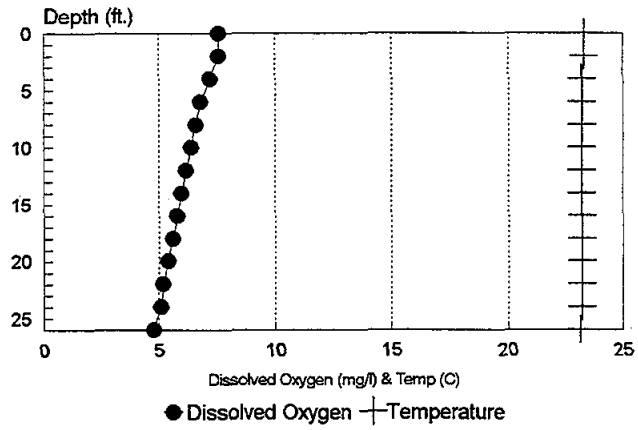
AMSDEN DAM 6/26/91

Dissolved Oxygen & Temperature Profile



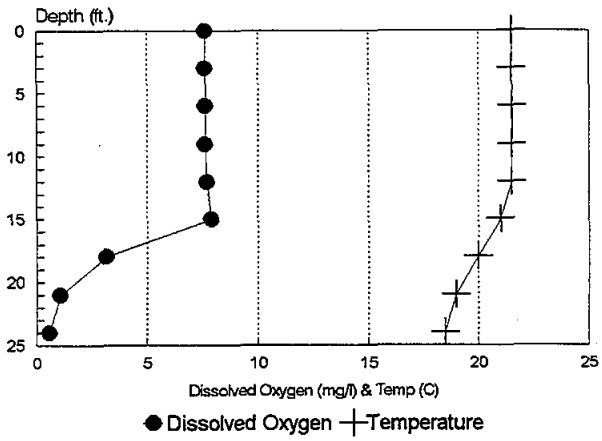
AMSDEN DAM 8/29/91

Dissolved Oxygen & Temperature Profile



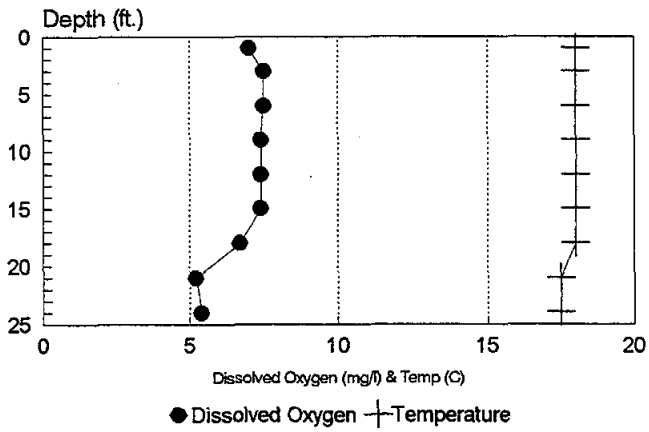
AMSDEN DAM 8/4/92

Dissolved Oxygen & Temperature Profile

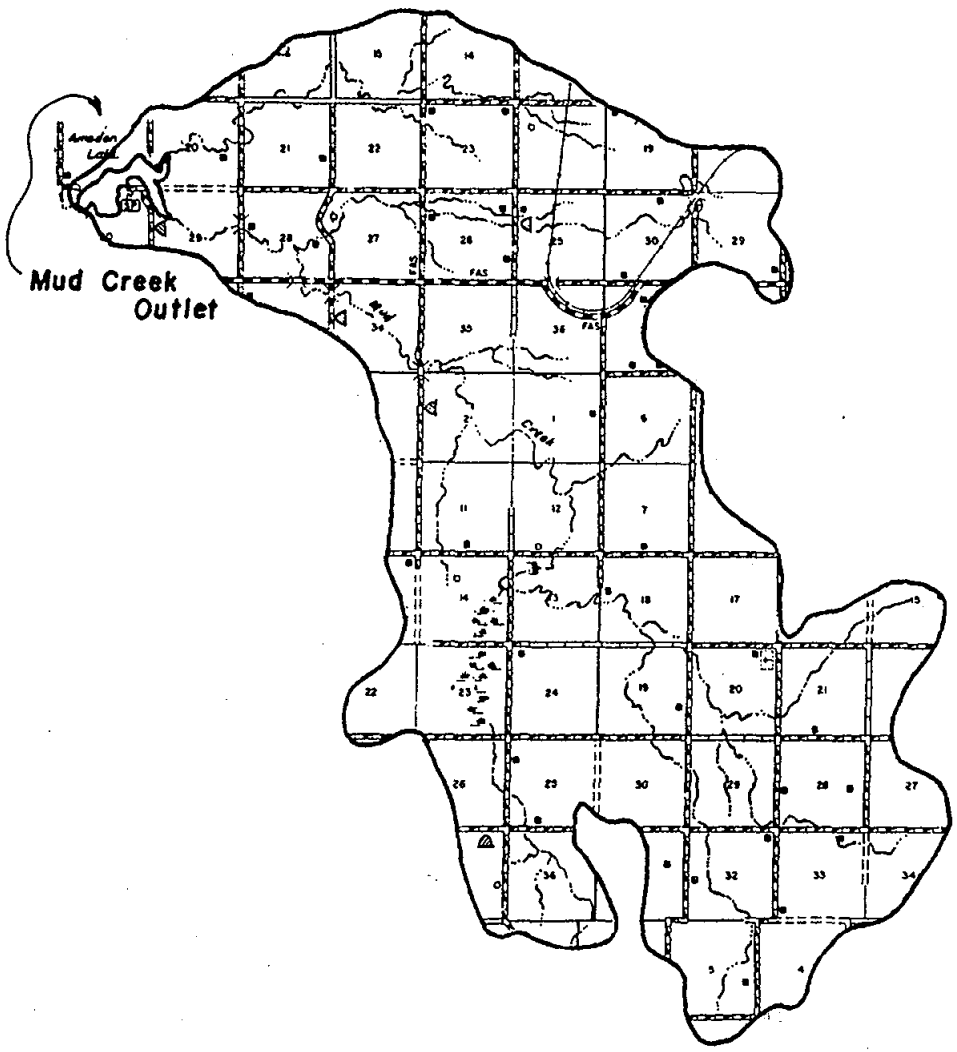


AMSDEN DAM 9/2/92

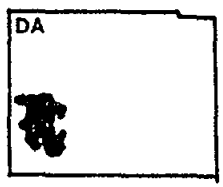
Dissolved Oxygen & Temperature Profile



Amsden Lake



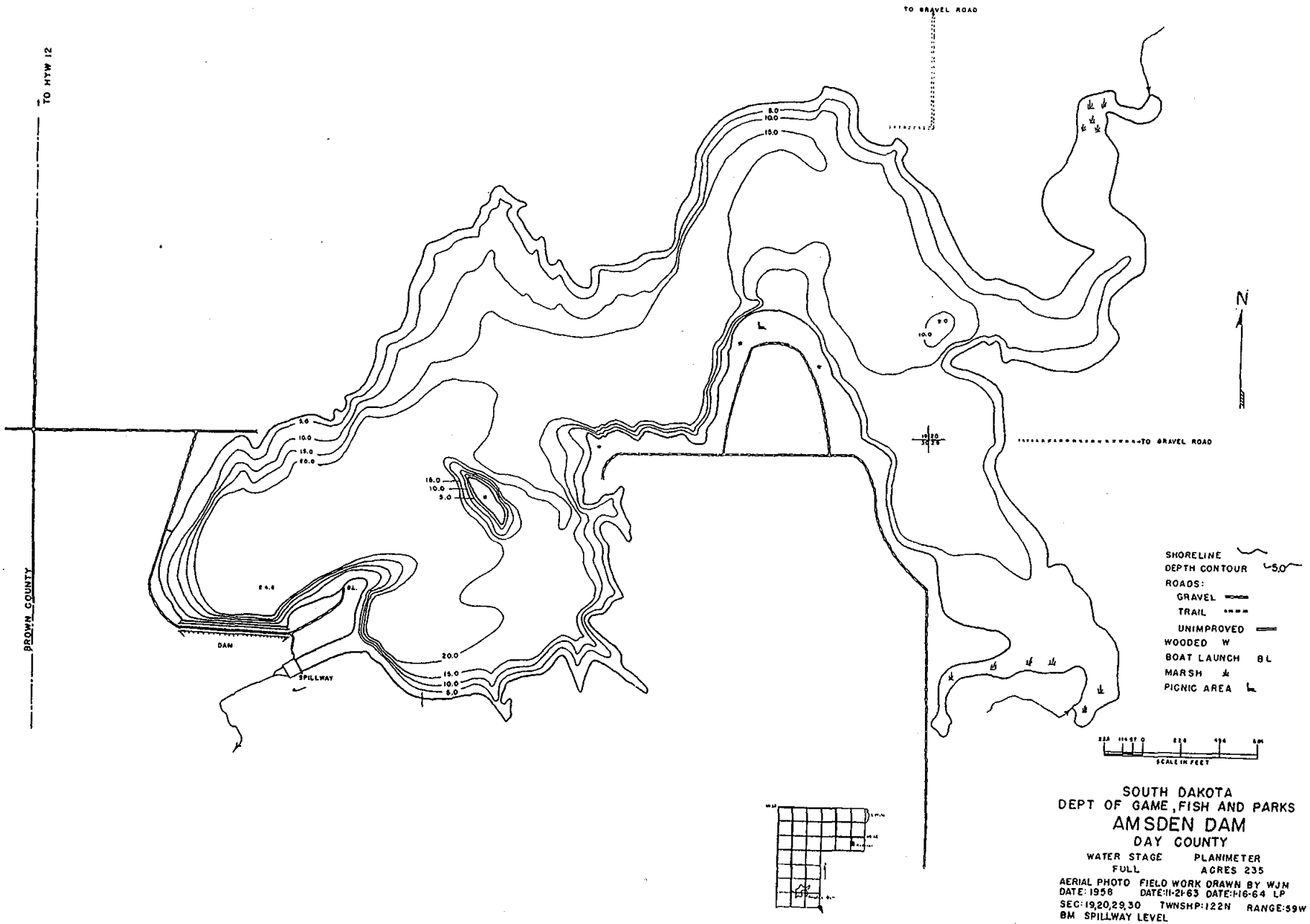
31,961 acres

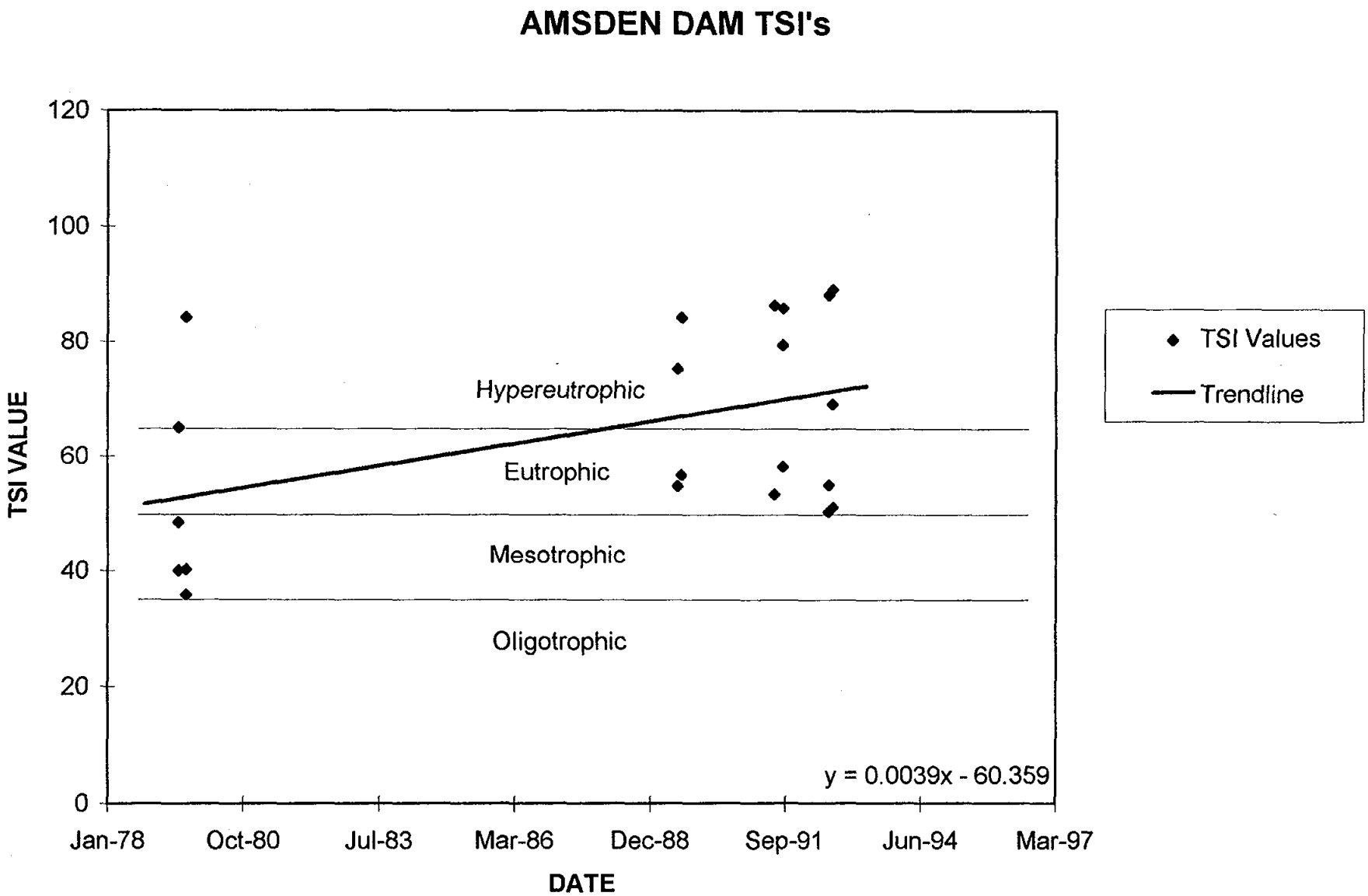


Scale

0 1 2 3 4 5 6

Miles


TO GRAVEL ROAD
TO HYW 12
BROWN COUNTY
TO GRAVEL ROAD
N
8.0
10.0
15.0
20.0
DAM
SPILLWAY
BL
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
GRAVEL
TRAIL
UNIMPROVED
WOODED W
BOAT LAUNCH BL
MARSH
PICNIC AREA
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
AMSDEN DAM
DAY COUNTY
WATER STAGE FULL
PLANIMETER
ACRES 235
AERIAL PHOTO DATE: 1956
FIELD WORK DRAWN BY WJH
DATE: 11-21-63 DATE: 1-16-64 LP
SEC: 19,20,29,30 TWNSHP: 122N RANGE: 59W
BM SPILLWAY LEVEL


AMSDEN DAM TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0039x - 60.359
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE ANDES

County: Charles Mix
Latitude: 43 deg. 10 min. 42 sec.
Longitude: 98 deg. 26 min. 36 sec.
Area: 4,616 A (1868 ha)
Maximum Depth: 10 ft (3.05 m)
Volume: 14,771 acre-ft (1.82 x $10^7 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): Andes Creek
Outlet: unnamed

Township: 96, 97N
Range: 64, 65W
Section (s):5, 6; 1, 2, 3, 10, 11; 20, 21, 28, 30, 31, 32; 10, 15, 16
Shoreline L: N/A
Mean Depth: 3.2 ft (0.98 km)
Watershed/Lake Area: 26.5
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
~~(10) Irrigation~~ ?

Estimated Population within 65-mile Radius: 104,000
Ownership Status: Stae Owned
Public Interest: NA

	1991		1993	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	27	21.74	4	24.44
Air Temperature (°C)	27	23.84	4	31.65
Secchi Disk Depth (meters)	27	0.16	2	0.33
Conductivity (cond/25° C)	-	-	-	-
Turbidity (NTU)	-	-	4	42.31
Lab pH (su) (su)	-	-	-	-
Field pH (su) (su)	27	8.64	4	8.76
Total Alkalinity (mg/l)	27	102	4	158
Total Solids (mg/l)	27	3,955	4	2,827
Dissolved Solids (mg/l)	27	3,804	4	2,804
Suspended Solids (mg/l)	27	151	4	23
Volatile Suspended Solids (mg/l)	27	72.74	-	-
Ammonia Nitrogen (mg/l)	27	0.81	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	27	0.37	4	0.10
Total Kjeldahl Nitrogen (mg/l)	27	8.14	4	4.10
Total Phosphorus (mg/l)	27	1.041	4	0.348
Total Dissolved Phosphorus (mg/l)	27	0.216	4	0.121
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	5	458.46	2	74.37

Year	1991	1993
TSI Values -- Mean:	93.98	79.19
Secchi Disk	86.88	75.99
Total Phosphorus	104.38	88.72
Chlorophyll *a*	90.69	72.84

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 100%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton pectinatus, and Ceratophyllum demersum.

Algae - NA

Watershed Description

Watershed Area: 122,342 A (49,511 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
EA-H3-EU	62,394	51
H3-EA	55,053	45
CY-EU	2,446	2
HG-WL	2,446	2

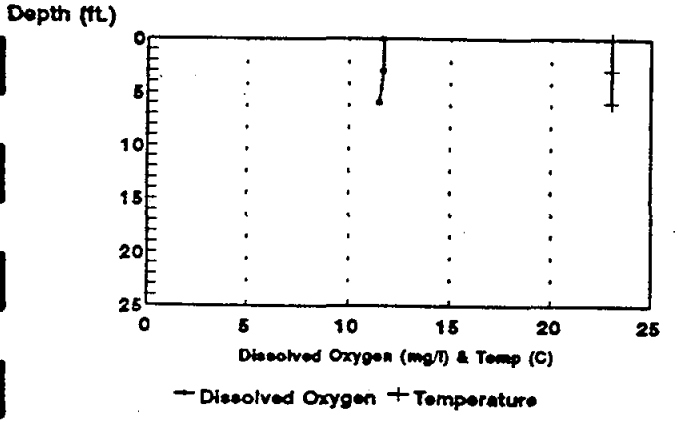
EA-H3-EU Eakin-Highmore-Ethan: Gently undulating well drained soils.

H3-EA Highmore-Eakin: Nearly level to sloping, well drained silty soils that formed in glacial drift.

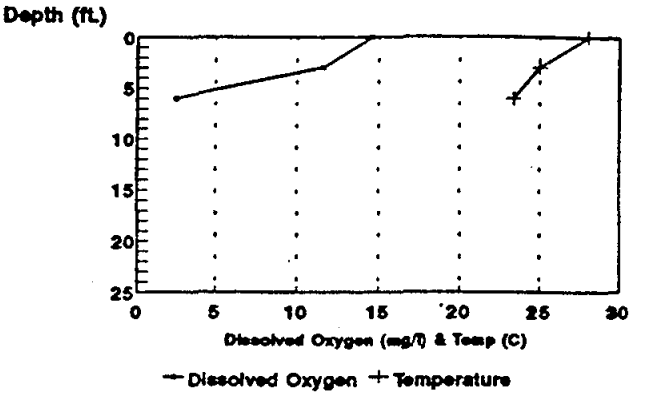
CY-EU Clarno-Ethan: Gently undulating to rolling, well drained soils.

HG-WL Highmore-Walker: Well drained and moderately well drained, nearly level and gently undulating, silty soils on uplands

LAKE ANDES 6/22/93
Dissolved Oxygen & Temperature Profile

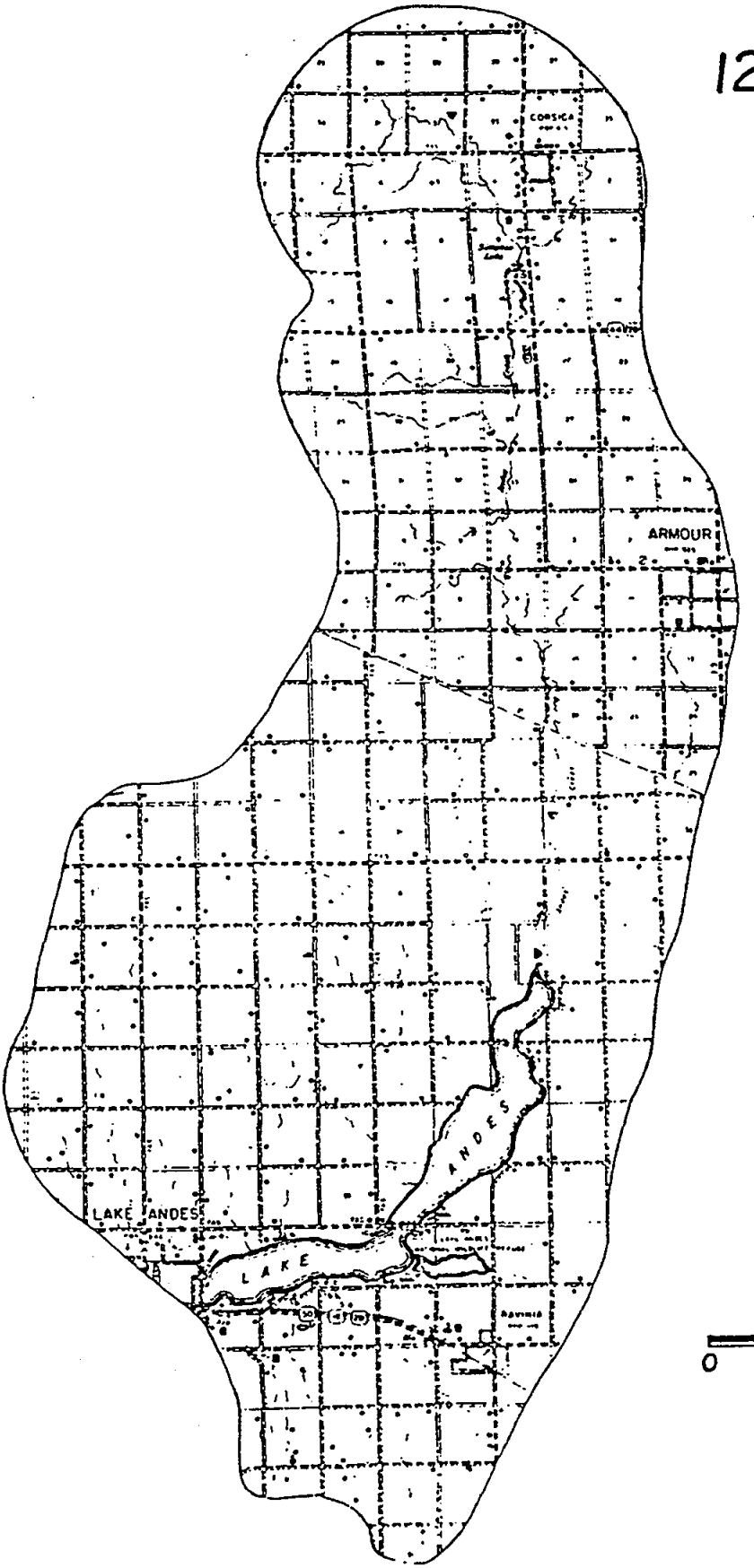


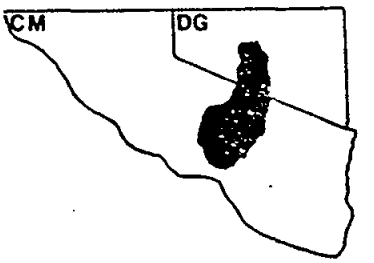
LAKE ANDES 8/10/93
Dissolved Oxygen & Temperature Profile



Lake Andes

122,342 acres

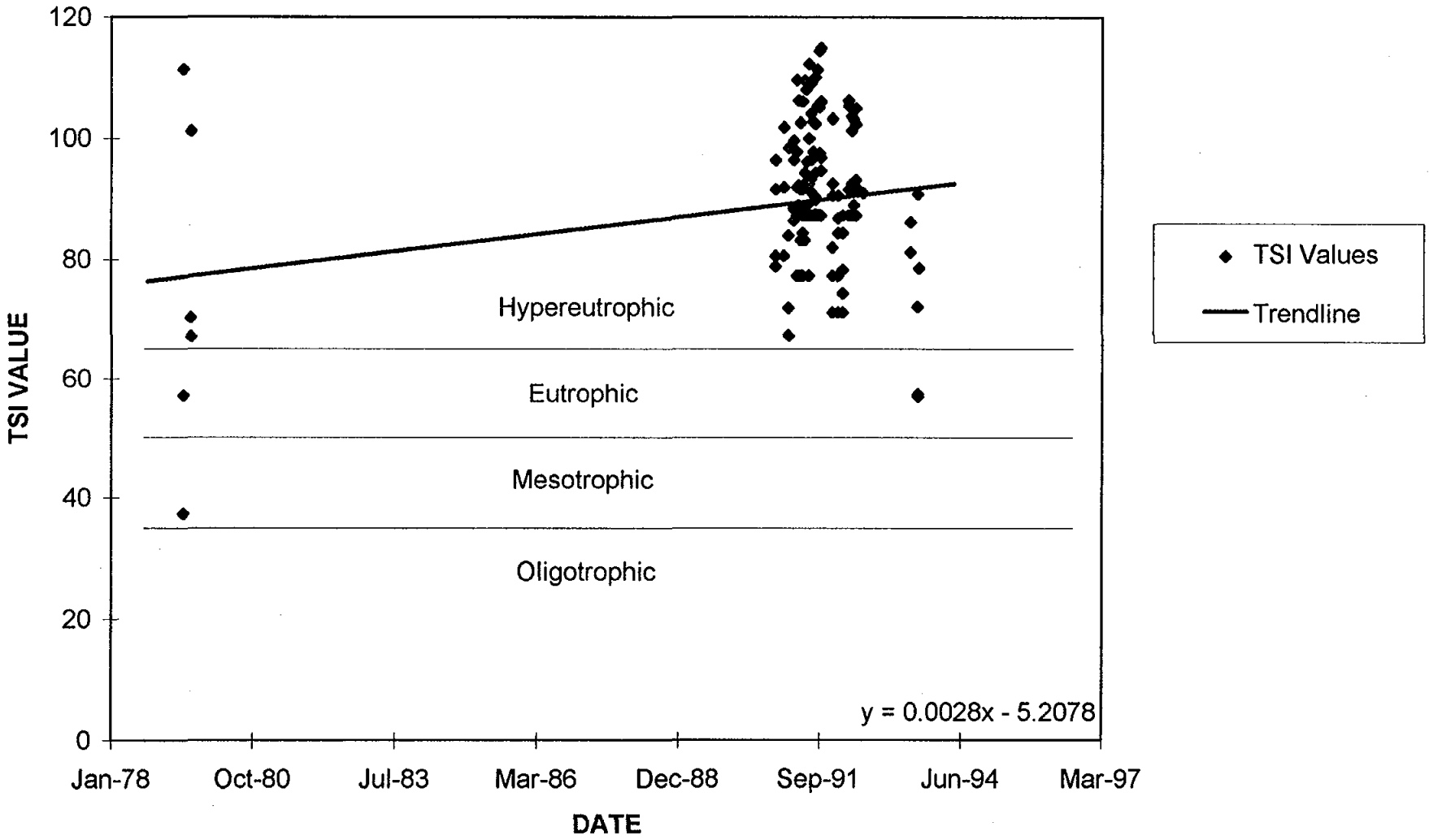




Scale

0 4

Miles


LAKE ANDES TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0028x - 5.2078
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

ANGOSTURA RESERVOIR

County: Fall River
Latitude: 43 deg. 18 min. 00 sec. N
Longitude: 103 deg. 26 min. 00 sec.W
Area: 4,830 A (1955 ha)
Maximum Depth: 50 ft (15.2 m)
Volume: 127,558 acre-ft (1.57 x $10^8 m^3$)
Origin of Basin: impoundment
Township: 8S
Range: 6E
Section (s): 20
Shoreline L: 35.5 mi (57 km)
Mean Depth: 26 ft (8 km)
Watershed/Lake Area: 1,206
Thermal Stratification: yes
Major Inflows (named or permanent streams): Cheyenne River, Dry Creek
Outlet: Cheyenne River, Cascade Creek, and Horse Creek

Lake Use
Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
(10) Irrigation

Estimated Population within 65-mile Radius: 121,974
Ownership Status: State/Federal owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.75	6	18.98	4	18.05
Air Temperature (°C)	4	24.00	6	32.59	4	26.67
Secchi Disk Depth (meters)	2	2.62	3	2.63	2	3.55
Conductivity (cond/25° C)	4	2,769	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su) (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.00	6	7.99	4	8.21
Total Alkalinity (mg/l)	4	113	-	-	-	-
Total Solids (mg/l)	4	2,544	-	-	-	-
Dissolved Solids (mg/l)	4	2,535	-	-	-	-
Suspended Solids (mg/l)	4	9	6	6	4	9
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.04	6	0.09	4	0.01
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.15	4	0.08
Total Kjeldahl Nitrogen (mg/l)	4	0.39	6	0.47	4	0.23
Total Phosphorus (mg/l)	4	0.065	6	0.033	4	0.035
Total Dissolved Phosphorus (mg/l)	-	-	6	0.021	4	0.020
Ortho Phosphate as P (mg/l)	4	0.052	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	1.36	4	0.71

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	17.93	6	18.60	6	17.84
Air Temperature (°C)	6	20.33	6	21.43	6	22.87
Secchi Disk Depth (meters)	3	3.11	9	3.74	9	3.22
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su) (su)	-	-	-	-	-	-
Field pH (su) (su)	6	7.79	6	7.97	6	7.95
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	8	6	6	6	7
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.11	6	0.12	6	0.05
Nitrate + Nitrite Nitrogen (mg/l)	6	0.06	6	0.31	6	0.13
Total Kjeldahl Nitrogen (mg/l)	6	0.31	6	0.36	6	0.53
Total Phosphorus (mg/l)	6	0.025	6	0.025	6	0.017
Total Dissolved Phosphorus (mg/l)	6	0.007	6	0.015	6	0.008
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	2.34	6	2.36	6	1.33

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	50.56	42.27	34.94	42.24	40.24	40.52
Secchi Disk	46.10	46.04	41.74	43.65	40.96	43.14
Total Phosphorus	55.03	47.18	35.85	44.15	40.78	45.03
Chlorophyll *a*		33.61	27.22	38.92	38.99	33.39

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: none identified.

Algal Species and Densities

Taxa	July 17, 1989 Number	July 17, 1989 Units/ml	August 14, 1989 Number	August 14, 1989 Units/ml
Algae (other)	3	106	-	-
Merismopedia	2	71	1	76
Blue-green (other)	2	71	-	-
Diatom (centric)	1	35	-	-
Nitzschia reversa	1	35	-	-
Aphanocapsa	-	-	5	379
Tetrastrum	-	-	1	76
Total	9	317	7	530

Watershed Description

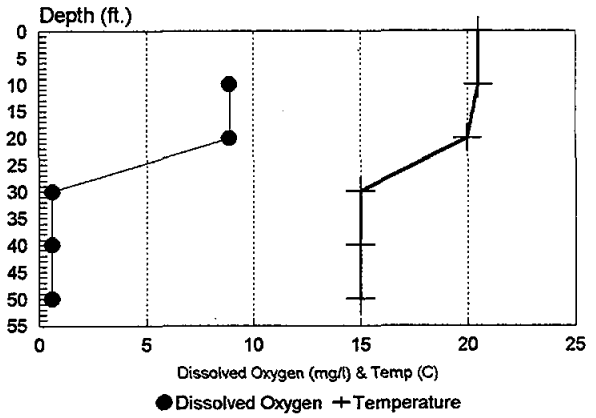
Watershed Area: 5,824,000 A (2,357,895 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

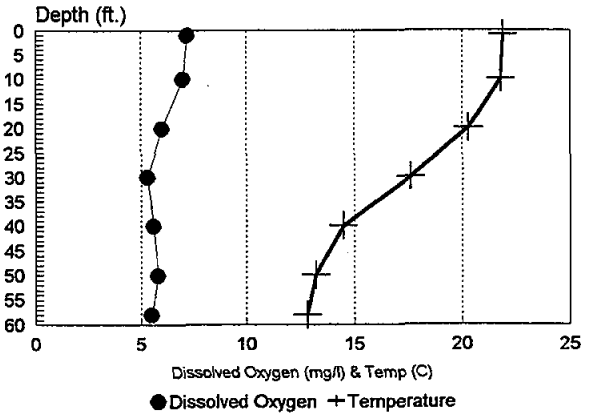
ANGOSTURA RESERVOIR 8/25/79

Dissolved Oxygen & Temperature Profile



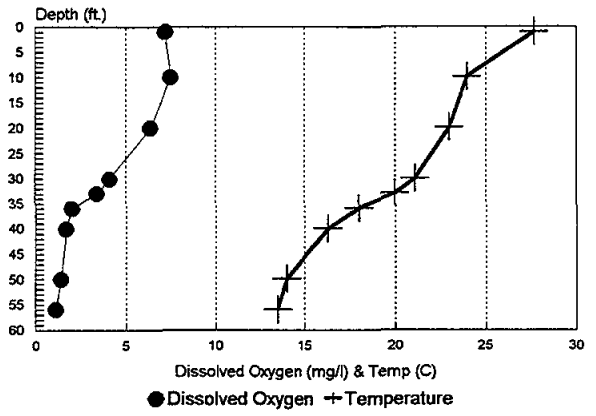
ANGOSTURA RESERVOIR 6/16/91

Dissolved Oxygen & Temperature Profile



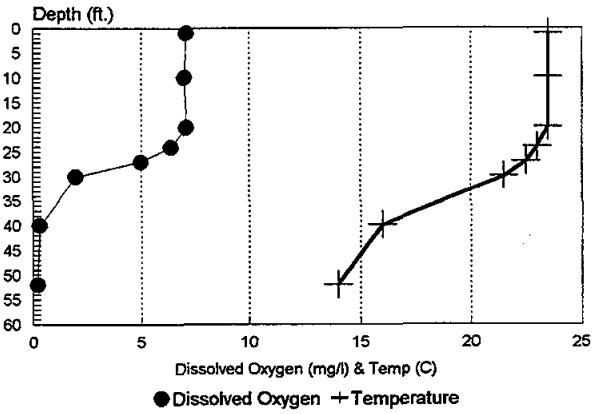
ANGOSTURA RESERVOIR 7/17/91

Dissolved Oxygen & Temperature Profile



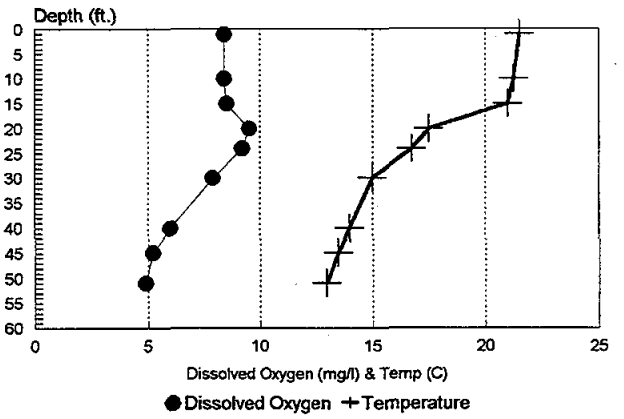
ANGOSTURA RESERVOIR 8/16/91

Dissolved Oxygen & Temperature Profile



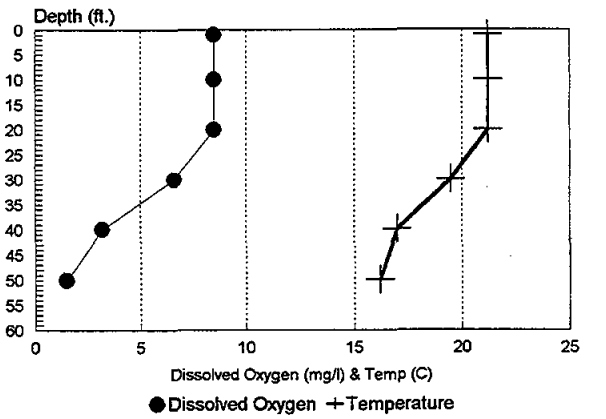
ANGOSTURA RESERVOIR 6/12/92

Dissolved Oxygen & Temperature Profile



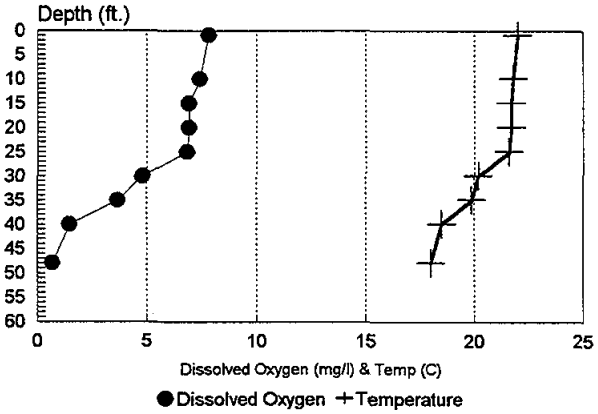
ANGOSTURA RESERVOIR 7/16/92

Dissolved Oxygen & Temperature Profile



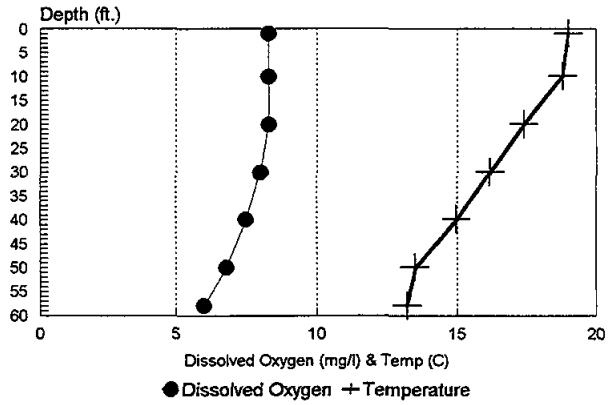
ANGOSTURA RESERVOIR 8/14/92

Dissolved Oxygen & Temperature Profile



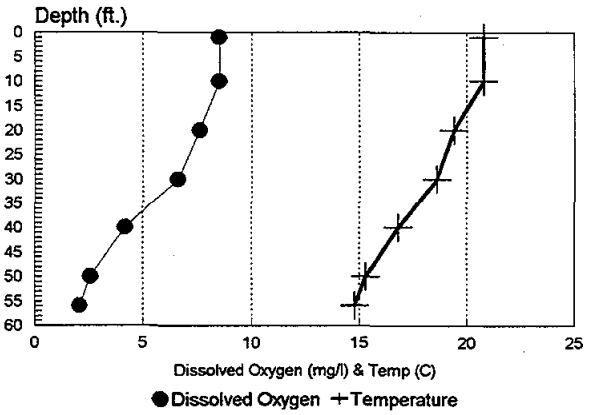
ANGOSTURA RESERVOIR 6/13/93

Dissolved Oxygen & Temperature Profile



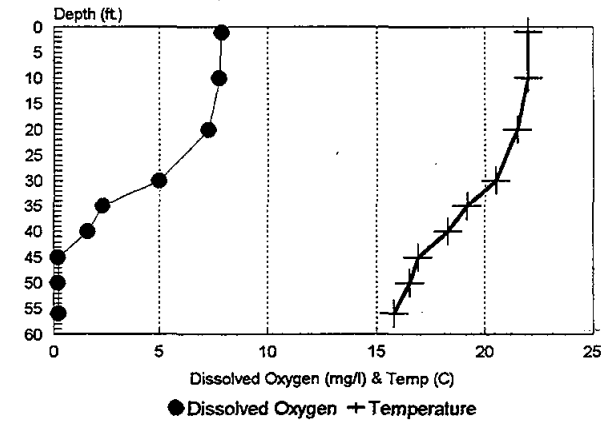
ANGOSTURA RESERVOIR 7/21/93

Dissolved Oxygen & Temperature Profile



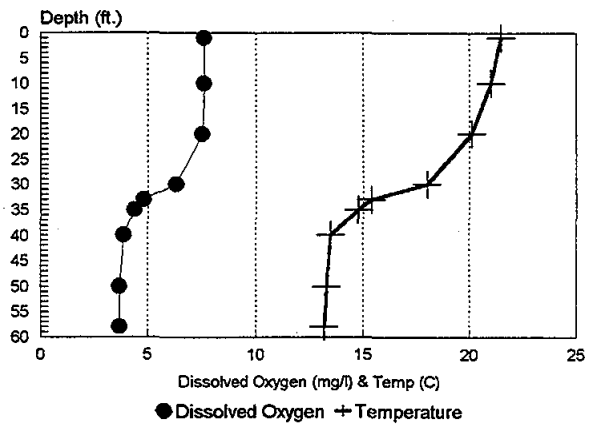
ANGOSTURA RESERVOIR 8/19/93

Dissolved Oxygen & Temperature Profile



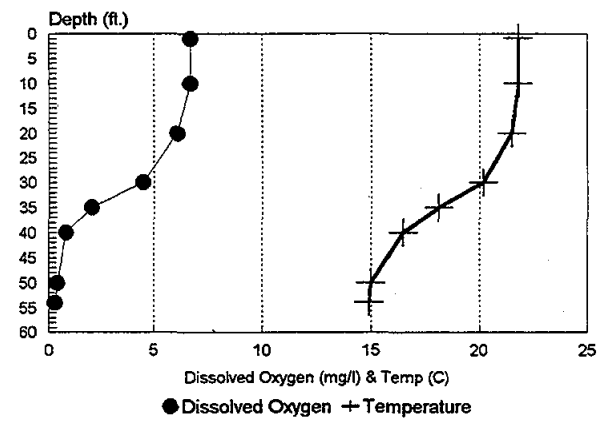
ANGOSTURA RESERVOIR 6/12/94

Dissolved Oxygen & Temperature Profile



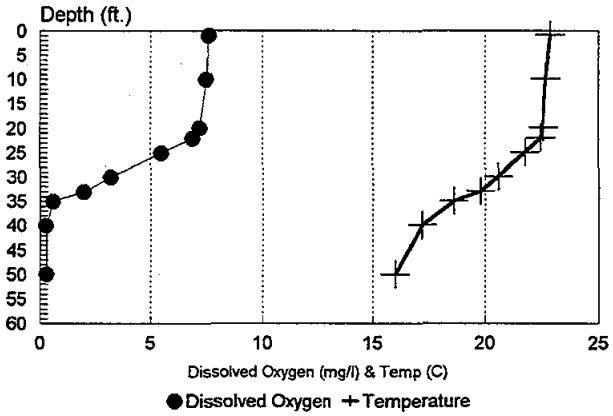
ANGOSTURA RESERVOIR 7/14/94

Dissolved Oxygen & Temperature Profile



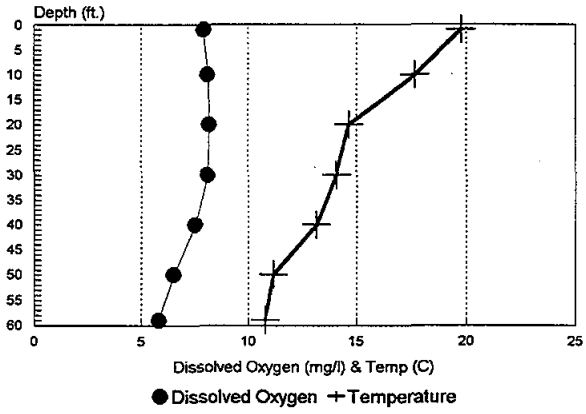
ANGOSTURA RESERVOIR 8/14/94

Dissolved Oxygen & Temperature Profile



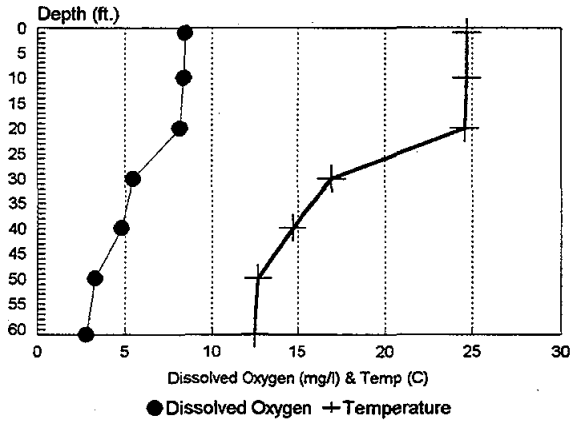
ANGOSTURA RESERVOIR 6/14/95

Dissolved Oxygen & Temperature Profile



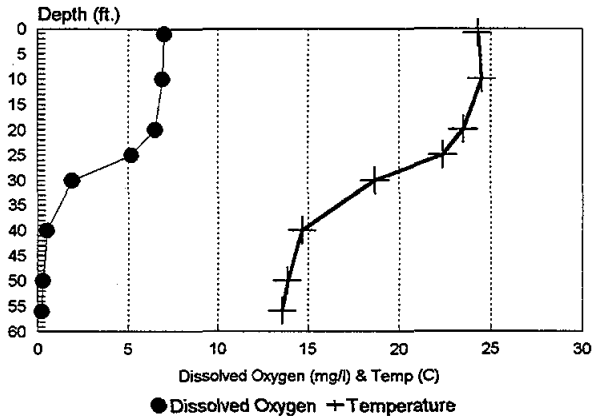
ANGOSTURA RESERVOIR 7/13/95

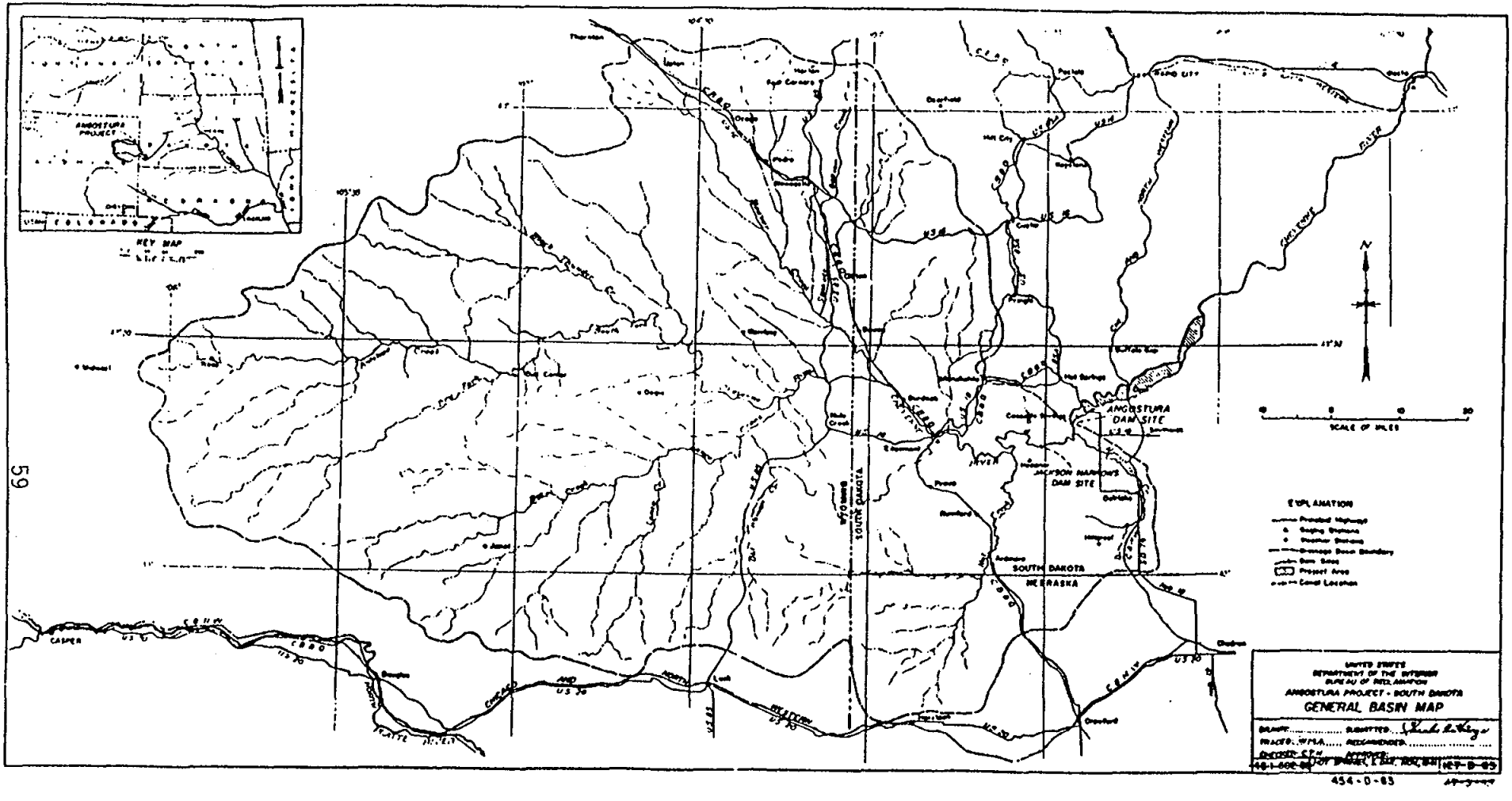
Dissolved Oxygen & Temperature Profile

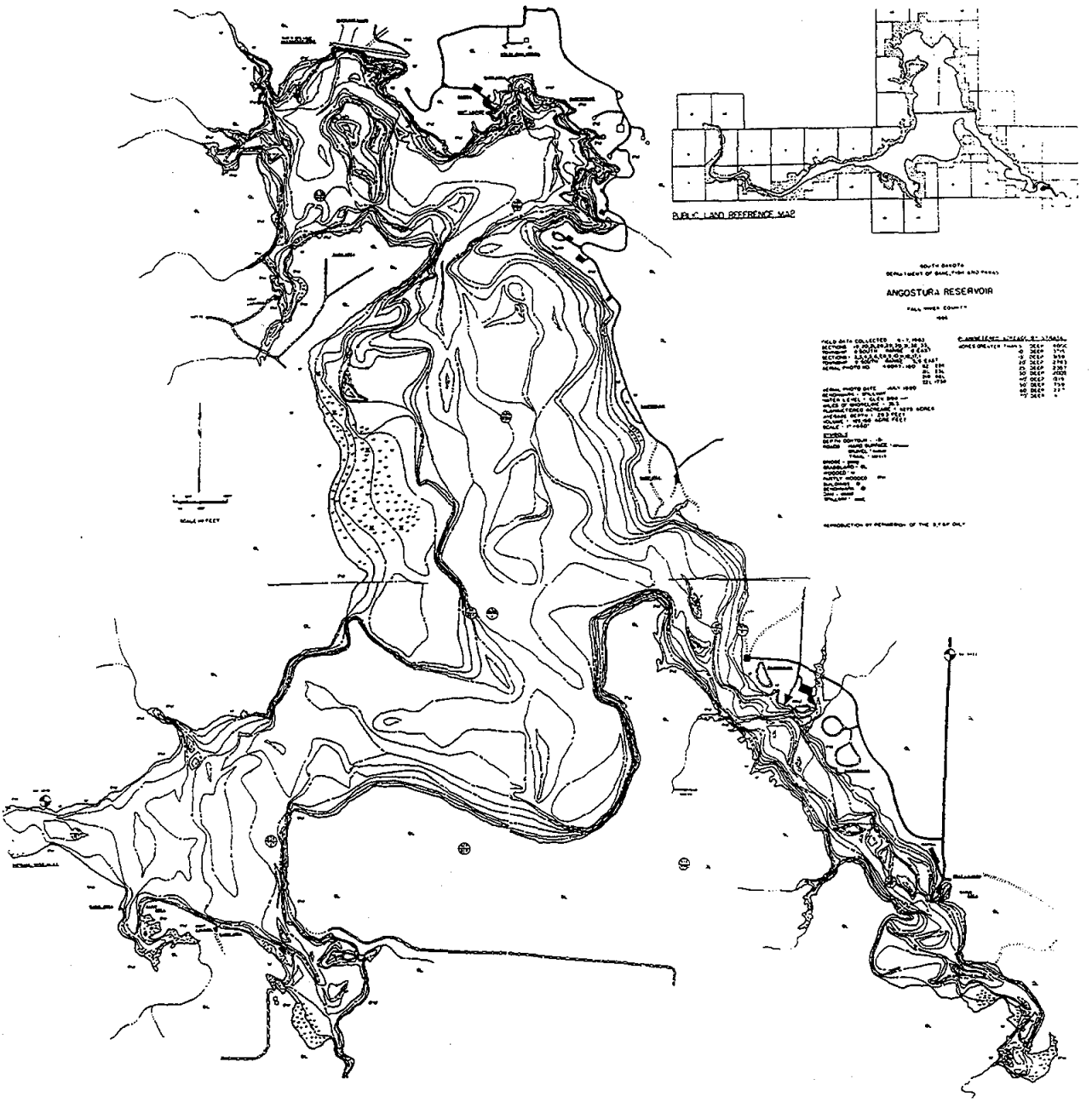


ANGOSTURA RESERVOIR 8/12/95

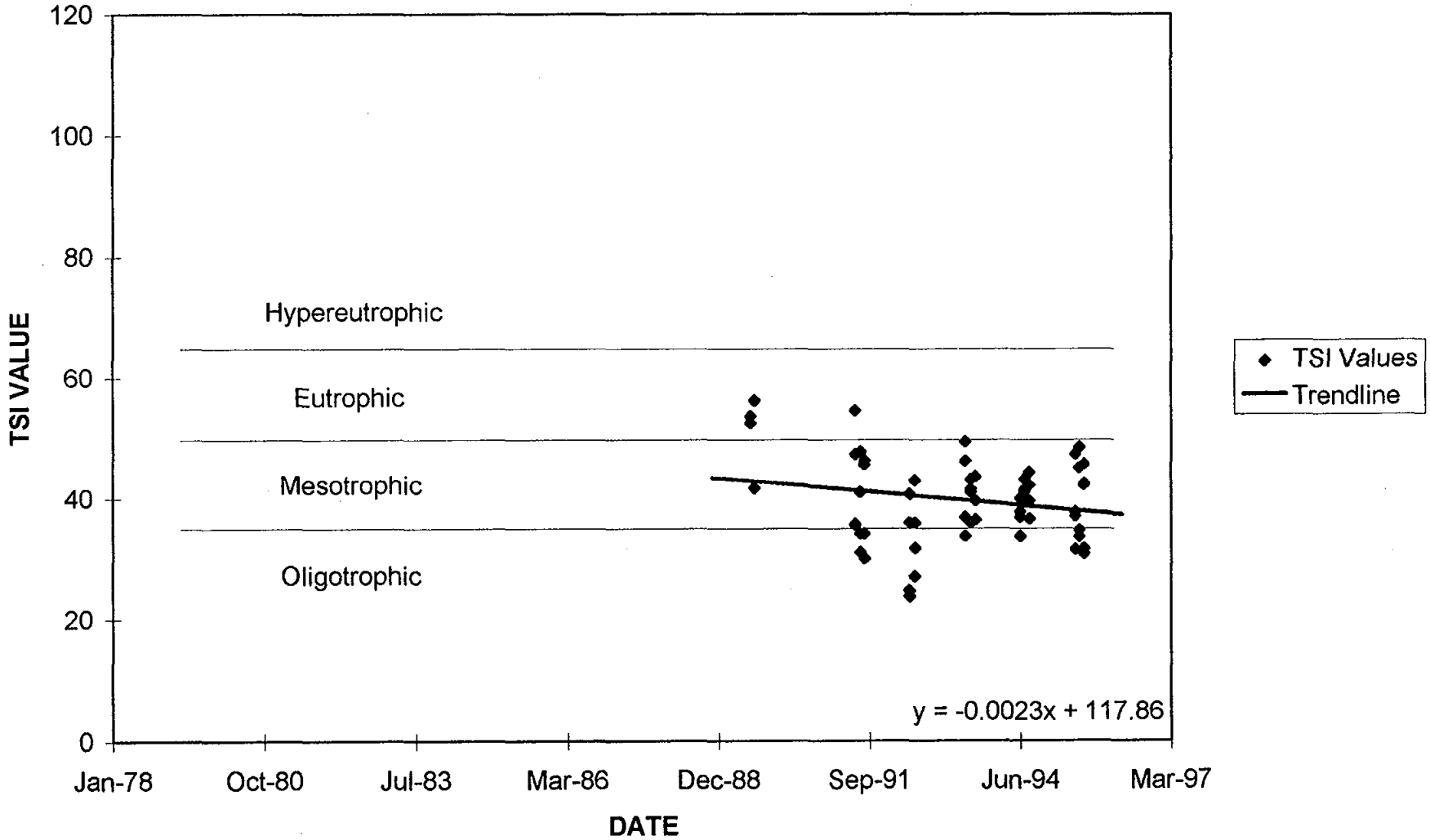
Dissolved Oxygen & Temperature Profile




KEY MAP
AMBOSTURA PROJECT
AMBOSTURA DAM SITE
JACKSON MARROWS DAM SITE
SOUTH DAKOTA
NEBRASKA
WYOMING
SOUTH DAKOTA
CASPER
SCALE OF MILES
EXPLANATION
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
AMBOSTURA PROJECT - SOUTH DAKOTA
GENERAL BASIN MAP
454-D-83


PUBLIC LAND REFERENCE MAP
ANGOSTURA RESERVOIR

ANGUSTORA RESERVIOR TSI's



BEAVER LAKE (STATE)

County: Yankton
Latitude: 43 deg. 01 min. 00 sec. N
Longitude: 97 deg. 26 min. 52 sec.
Area: 72 acres (29.1 ha)
Maximum Depth: 4.5 ft (1.37 m)
Volume: 216 acre-ft ($2.66x10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Beaver Creek
Outlet: Beaver Creek

Township: 95 N
Range: 56 W
Section(s): 27,34
Shoreline L: 2.0 mi (3.2 km)
Mean Depth: 3 ft (0.9 m)
Watershed/Lake Area: 1,061
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation waters
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 217,565
Ownership Status: State owned
Public Interest: Beaver Lake Association

	1990		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	8	19.03	3	23.17	4	22.13
Air Temperature (°C)	8	22.43	3	26.04	4	23.25
Secchi Disk Depth (meters)	8	0.21	3	0.20	2	0.37
Conductivity (cond/25° C)	-	-	1	1,539	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su) (su)	-	-	-	-	-	-
Field pH (su) (su)	8	8.73	2	8.38	4	8.20
Total Alkalinity (mg/l)	8	173	3	122	4	204
Total Solids (mg/l)	8	1,601	3	1,390	4	1,270
Dissolved Solids (mg/l)	8	1,551	3	1,346	4	1,231
Suspended Solids (mg/l)	8	50	3	44	4	39
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	8	0.13	3	0.48	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	8	0.10	3	0.28	4	0.10
Total Kjeldahl Nitrogen (mg/l)	8	2.09	3	3.07	4	1.37
Total Phosphorus (mg/l)	8	0.663	3	0.614	4	0.380
Total Dissolved Phosphorus (mg/l)	-	-	2	0.307	4	0.165
Ortho Phosphate as P (mg/l)	8	0.236	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	116.13	2	45.56

Year	1990	1991	1992
TSI Values -- Mean:	90.13	85.69	77.24
Secchi Disk	82.38	83.10	74.54
Total Phosphorus	97.88	96.76	89.15
Chlorophyll *a*		77.21	68.03

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattails and bulrush

Floating Leaved and Submerged Plant Species Identified: none identified.

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 76,360 A (30,903 ha).

Soil Associations within Watershed

Association	Area (A)	% of Total
NM-NX	41,998	55
WJ-B1	22,144	29
BD-WJ	10,690	14
JW	1,527	2

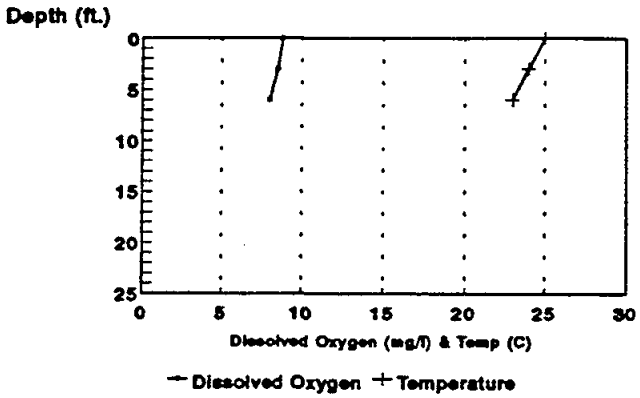
NM-NX Niobell-Noonan: Deep, well drained and moderately well drained, nearly level to gently sloping loamy soils with claypan subsoils that formed in glacial till on uplands.

WJ-B1 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating loamy soils that formed in glacial till on uplands.

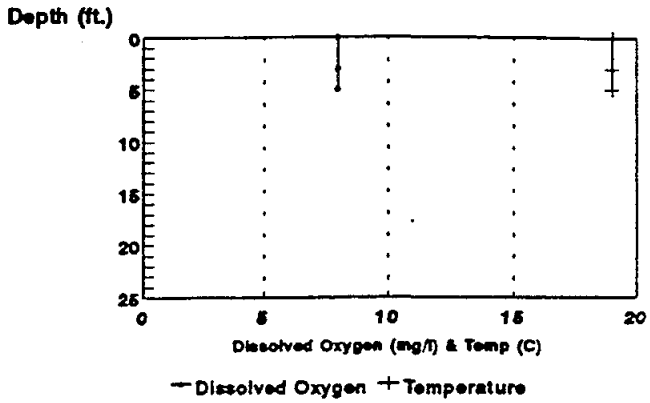
BD-WJ Barnes-Williams: Well drained, gently undulating to undulating loamy soils.

JW Bryant: Deep, well drained, nearly level to gently sloping silty soils that formed in glacial drift on uplands.

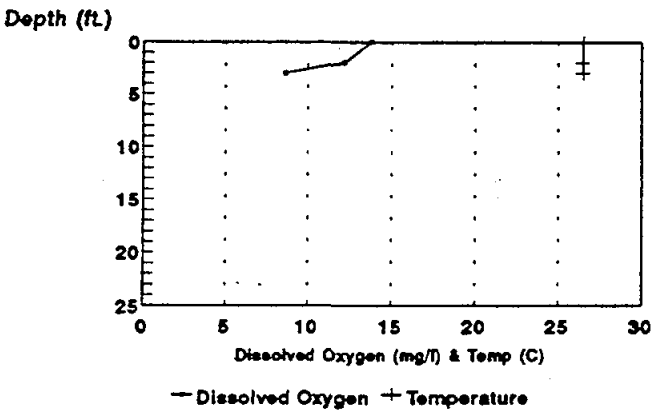
BEAVER LAKE 7/27/92
Dissolved Oxygen & Temperature Profile



BEAVER LAKE 8/25/92
Dissolved Oxygen & Temperature Profile

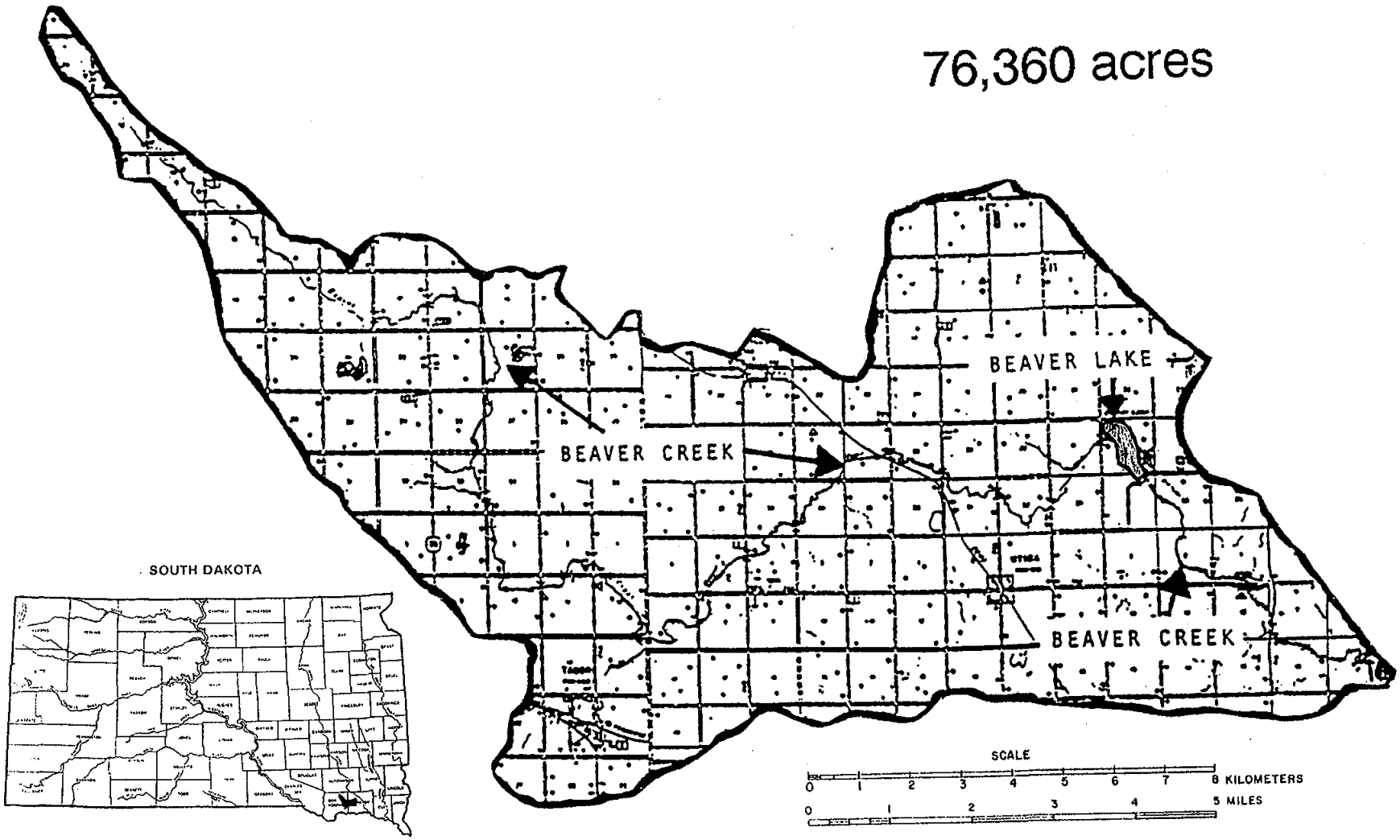


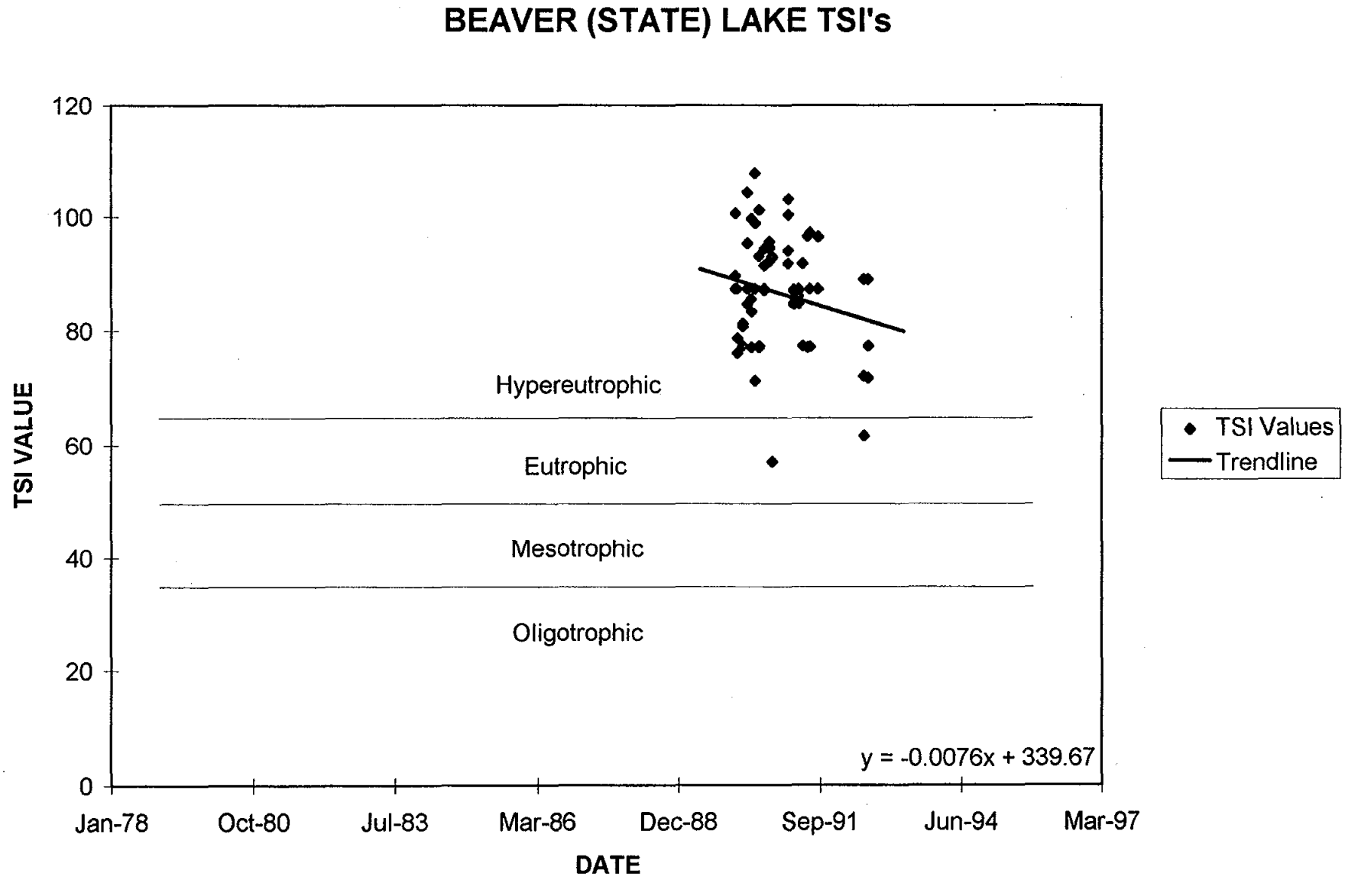
BEAVER LAKE 7/10/91
Dissolved Oxygen & Temperature Profile



Beaver/State Lake

76,360 acres




BEAVER (STATE) LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0076x + 339.67
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

BIERMAN GRAVEL PIT

County: Spink
Latitude: 45 deg. 12 min. 40 sec. N
Longitude: 98 deg. 39 min. 19 sec. W
Area: 14.4 A (5.8 ha)
Maximum Depth: 23 ft (7.0 m)
Volume: 115.2 acre-ft (1.421 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Snake Creek
Outlet: Snake Creek

Township: 120N
Range: 65W
Section (s): 15
Shoreline L: NA
Mean Depth: 8 ft (2.4 m)
Watershed/Lake Area: 1,796
Thermal Stratification: yes

Lake Use
Beneficial Use Classification:
(3) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 95,986
Ownership Status: State and privately owned
Public Interest: NA

	1989	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	23.05
Air Temperature (°C)	4	29.44
Secchi Disk Depth (meters)	1	0.79
Conductivity (cond/25° C)	4	874
Turbidity (NTU)	-	-
Lab pH (su) (su)	-	-
Field pH (su) (su)	2	8.75
Total Alkalinity (mg/l)	4	173
Total Solids (mg/l)	4	590
Dissolved Solids (mg/l)	4	574
Suspended Solids (mg/l)	4	16
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.31
Nitrate + Nitrite Nitrogen (mg/l)	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	1.31
Total Phosphorus (mg/l)	4	0.158
Total Dissolved Phosphorus (mg/l)	-	-
Ortho Phosphate as P (mg/l)	4	0.088
Chlorophyll (mg/m^3)	-	-

Year	1989
TSI Values -- Mean:	67.78
Secchi Disk	63.40
Total Phosphorus	72.16
Chlorophyll *a*	

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 30%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

	July 12, 1989		September 7, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	136	2,490	55	953
Cryptomonas sp. #1	34	622	5	87
Green Algae (other)	31	567	7	121
Merismopedia	26	476	5	87
Oocystis	19	348	4	69
Algae (other)	13	238	8	139
Loefgrenia anomala	8	146	-	-
Chroococcus	8	146	6	104
Aphanocapsa	5	92	6	104
Cryptomonas	4	73	1	17
Glenodinium Gymnodinium	3	55	-	-
Algae (flagellate)	3	55	5	87
Melosira granulata	2	37	26	451
Schroederia	2	37	-	-
Stephanodiscus niagarae	1	18	-	-
Botryococcus	1	18	-	-
Crucigenia	1	18	-	-
Sphaerocystis Schroeteri	1	18	-	-
Dactylococcopsis	1	18	-	-
Lyngbya Diguetii	1	18	-	-
Diatom (centric)	1	18	1	17
Diatom (pennate)	-	-	1	17
Synedra	1	18	-	-
Schizothrix	1	18	3	52
Scenedesmus	1	18	-	-
Cyclotella meneghiniana	1	18	-	-
Anabaena	-	-	6	104
Closterium	-	-	5	87

Characium	-	-	4	69
Coelosphaerium	-	-	2	35
Blue-green (other)	-	-	1	17
Total	305	5,583	151	2,616

Watershed Description

Watershed Area: 25,867 A (10,468 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
WJ-B1	10,347	40
WJ	9,829	38
NM-NX	3,880	15
LD	1,811	7

WJ-B1 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating loamy soils that formed in glacial till; on uplands.

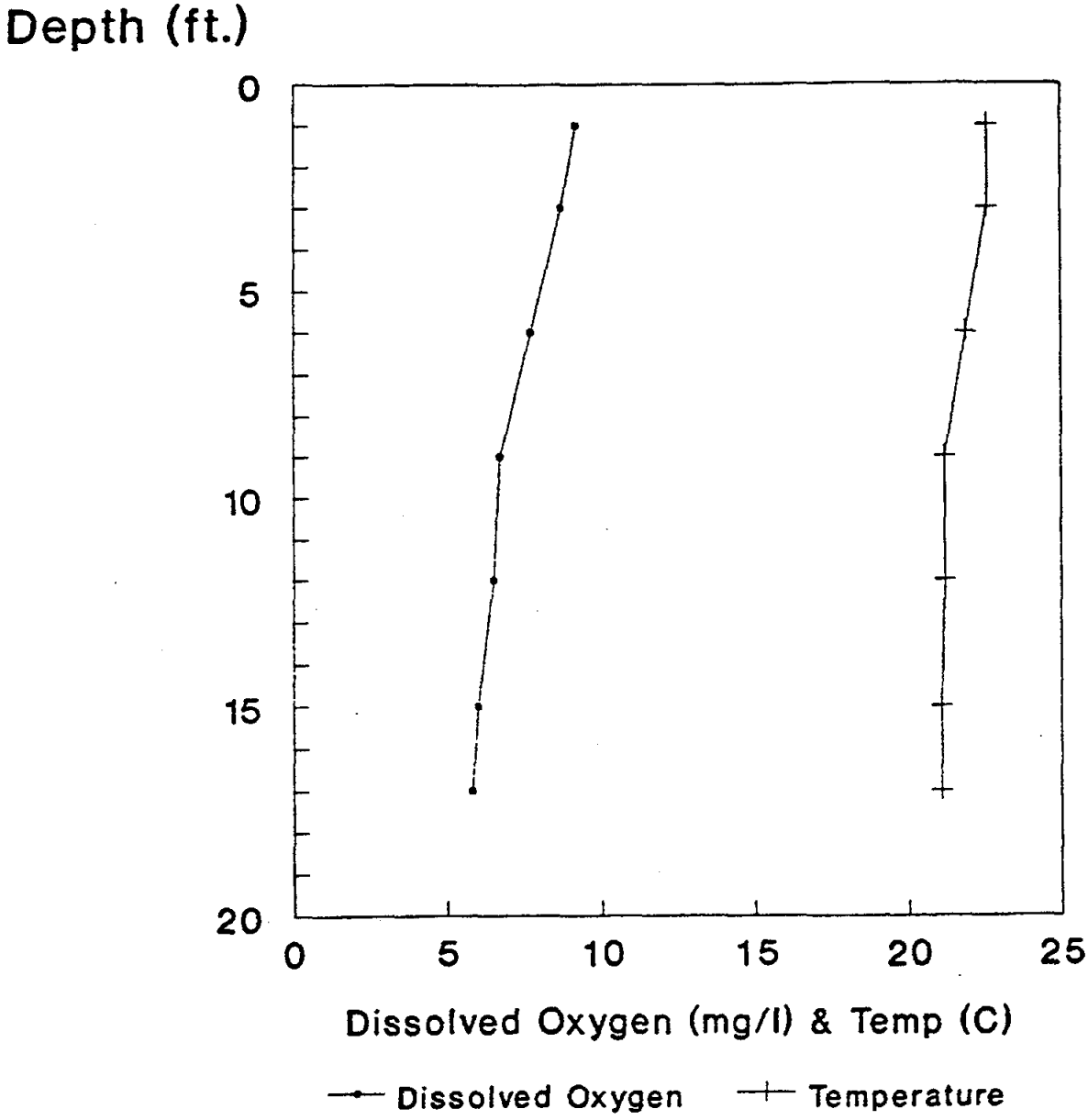
WJ Williams: Well drained level to undulating loamy soils.

NM-NX Niobell-Noonan: Well drained and moderately well drained nearly level to gently undulating loamy soils with claypan subsoils.

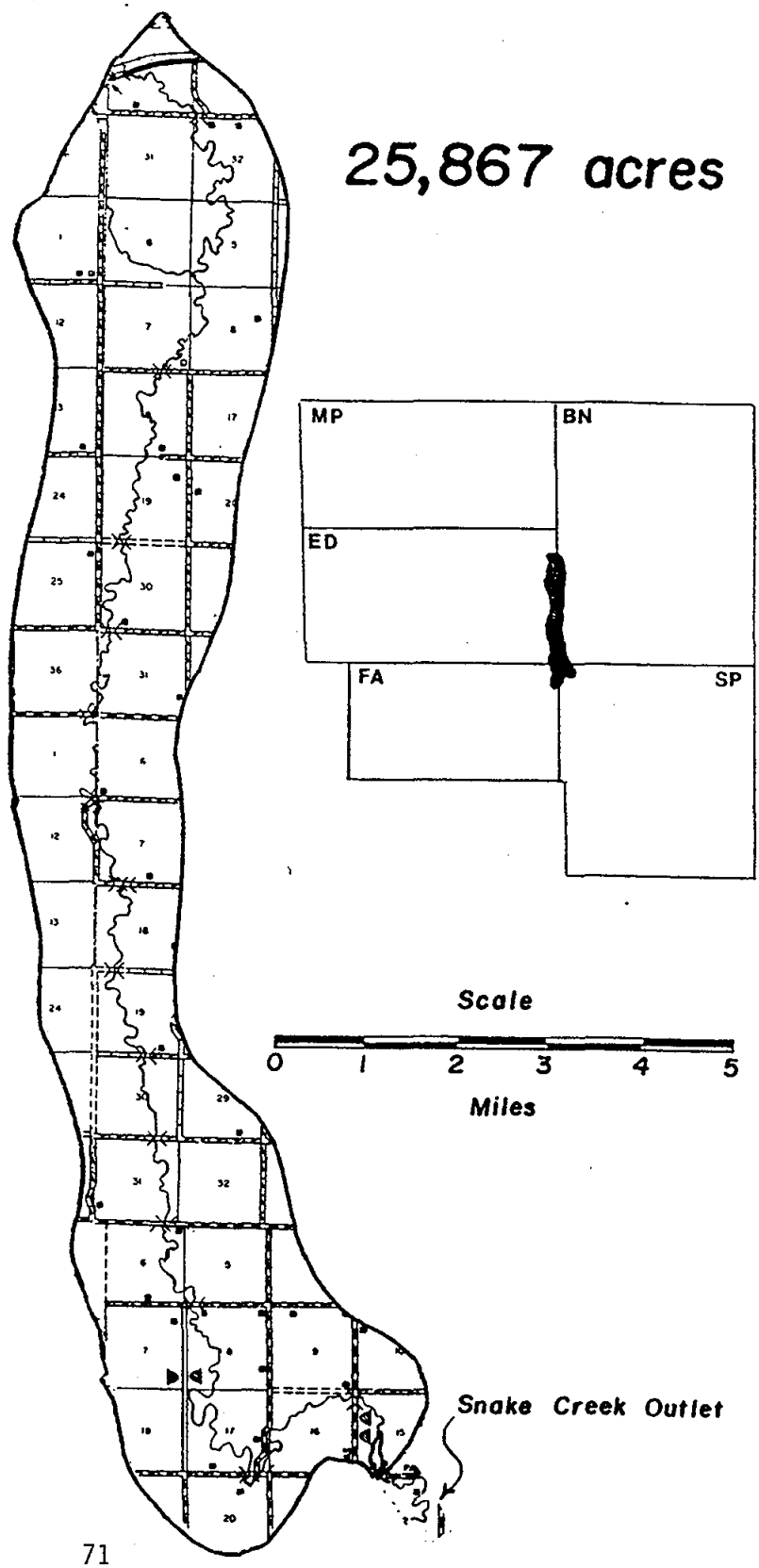
LD Lamoure: Poorly drained nearly level soils, silty soils.

BIERMAN GRAVEL PIT 9/7/89

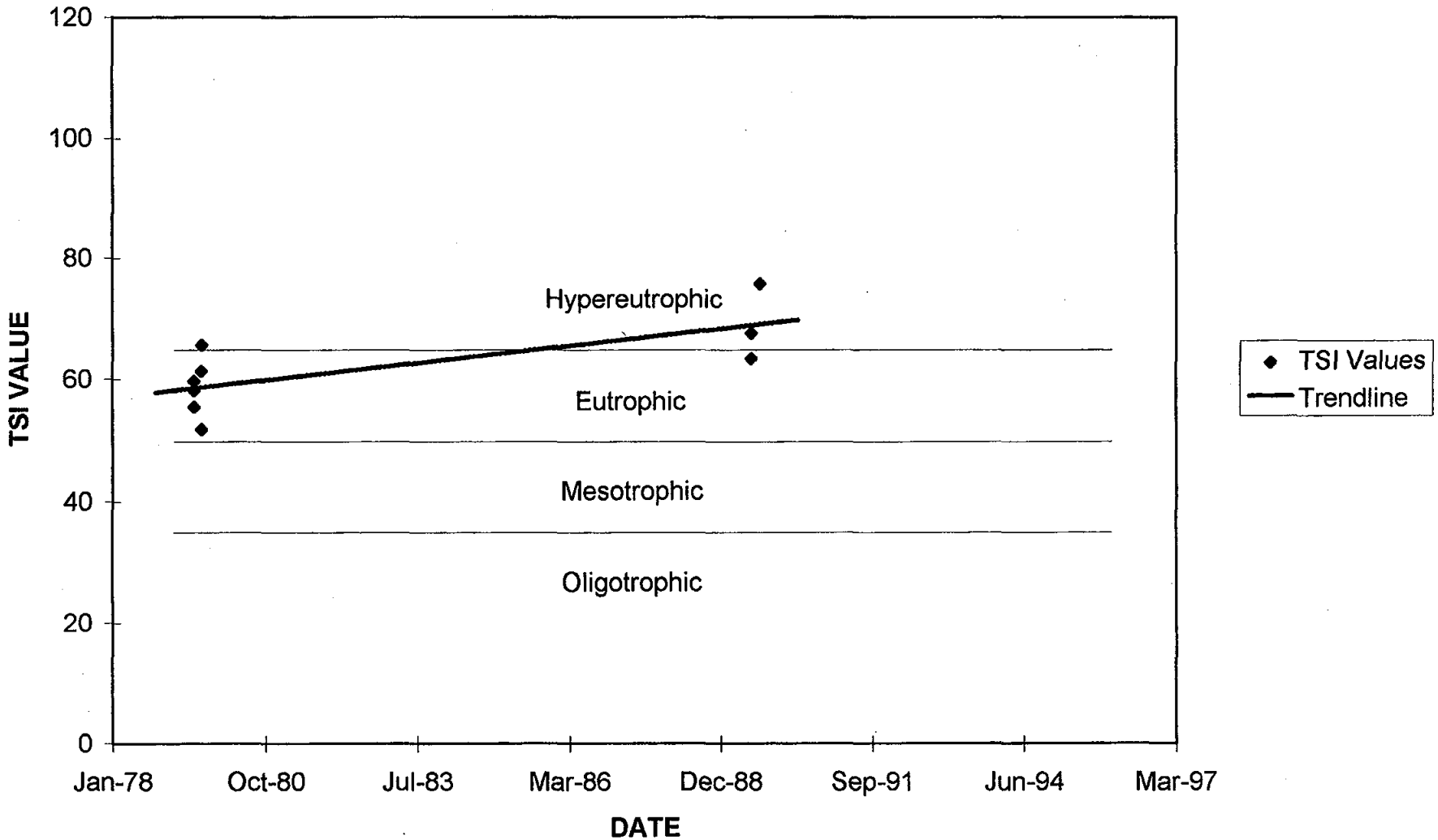
Dissolved Oxygen and Temperature Profile



Bierman Lake



BIERMAN GRAVEL PIT TSI's



BIG STONE LAKE

County: Roberts & Grant
Latitude: 45 deg. 23 min. 06 sec. N
Longitude: 96 deg. 33 min. 42 sec.
Area: 12,360 A (5,002.0 ha)
Maximum Depth: 16 ft (4.9 m)
Volume: 98,880 acre-ft (1.22 x $10^8 m^3$)
Origin of Basin: natural
Township: 122 - 124N
Range: 46-49W
Section (s):
Shoreline Length: NA
Mean Depth: 8 ft (2.4 m)
Watershed/Lake Area: 57
Thermal Stratification: no
Major Inflows (named or permanent streams): Little Minnesota & Whetstone River **Outlet:** Minnesota River

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
(10) Irrigation

Estimated Population within 65-mile Radius: 209,493
Ownership Status: State owned
Public Interest: Citizens for Big Stone Lake

	1985		1986		1987	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	21.92	10	20.42	24	21.63
Air Temperature (°C)	-	-	7	18.94	24	19.38
Secchi Disk Depth (meters)	6	1.11	16	1.08	24	0.83
Conductivity (cond/25° C)	6	870	17	807	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	6	8.94	17	8.52	22	8.61
Total Alkalinity (mg/l)	6	144	17	174	24	155
Total Solids (mg/l)	6	789	17	683	24	871
Dissolved Solids (mg/l)	6	776	17	669	24	849
Suspended Solids (mg/l)	6	13	17	14	24	22
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.23	17	0.09	24	0.07
Nitrate + Nitrite Nitrogen (mg/l)	6	0.10	17	0.15	24	0.10
Total Kjeldahl Nitrogen (mg/l)	6	1.24	17	0.59	24	0.972
Total Phosphorus (mg/l)	6	0.242	17	0.161	24	0.102
Total Dissolved Phosphorus (mg/l)	-	-	-	-	-	-
Ortho Phosphate as P (mg/l)	6	0.080	17	0.048	24	0.015
Chlorophyll (mg/m^3)	-	-	-	-	-	-

	1988		1989		1990	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	24	20.27	24	19.10	24	23.19
Air Temperature (°C)	13	19.43	24	18.51	24	20.96
Secchi Disk Depth (meters)	24	0.89	24	1.36	24	1.19
Conductivity (cond/25° C)	24	1,149	23	984	24	1,173
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	24	8.62	23	8.27	24	8.54
Total Alkalinity (mg/l)	24	155	23	154	24	169
Total Solids (mg/l)	24	1,035	23	880	24	984
Dissolved Solids (mg/l)	24	1,018	23	859	24	971
Suspended Solids (mg/l)	23	17	23	21	24	13
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	24	0.22	24	0.21	24	0.06
Nitrate + Nitrite Nitrogen (mg/l)	24	0.10	24	0.15	24	0.11
Total Kjeldahl Nitrogen (mg/l)	24	1.85	24	1.19	24	1.03
Total Phosphorus (mg/l)	24	0.154	24	0.157	24	0.173
Total Dissolved Phosphorus (mg/l)	-	-	-	-	-	-
Ortho Phosphate as P (mg/l)	24	0.036	24	0.050	24	0.029
Chlorophyll (mg/m^3)	-	-	-	-	-	-

	1991		1992		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	24	22.54	24	19.17	24	16.96
Air Temperature (°C)	24	19.83	24	15.00	24	11.75
Secchi Disk Depth (meters)	24	1.03	24	1.09	24	0.86
Conductivity (cond/25° C)	24	1,079	24	1,058	24	722
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	24	7.74	24	8.01	24	7.84
Total Alkalinity (mg/l)	24	178	24	188	24	189
Total Solids (mg/l)	24	938	24	1,010	24	858
Dissolved Solids (mg/l)	24	911	24	983	24	842
Suspended Solids (mg/l)	24	26	24	27	24	16
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	24	0.12	24	0.10	24	0.03
Nitrate + Nitrite Nitrogen (mg/l)	24	0.51	24	0.13	24	0.11
Total Kjeldahl Nitrogen (mg/l)	24	1.12	24	1.22	24	1.14
Total Phosphorus (mg/l)	24	0.185	24	0.123	24	0.138
Total Dissolved Phosphorus (mg/l)	-	-	11	0.061	12	0.082
Ortho Phosphate as P (mg/l)	24	0.042	-	-	-	-
Chlorophyll (mg/m^3)	-	-	18	13.40	21	9.32

Year	1985	1986	1987	1988	1989	1990	1991	1992
TSI Values -- Mean:	70.93	68.15	66.76	69.22	66.36	68.02	69.53	62.80
Secchi Disk	58.50	58.86	62.61	61.62	55.59	57.54	59.58	58.76
Total Phosphorus	83.36	77.43	70.92	76.82	77.14	78.50	79.47	73.61
Chlorophyll *a*								56.03

Year	1993
TSI Values -- Mean:	63.07
Secchi Disk	62.22
Total Phosphorus	75.20
Chlorophyll *a*	51.80

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Ceratophyllum demersum and Heteranthera dubia.

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 702,054 A (284,121 ha)

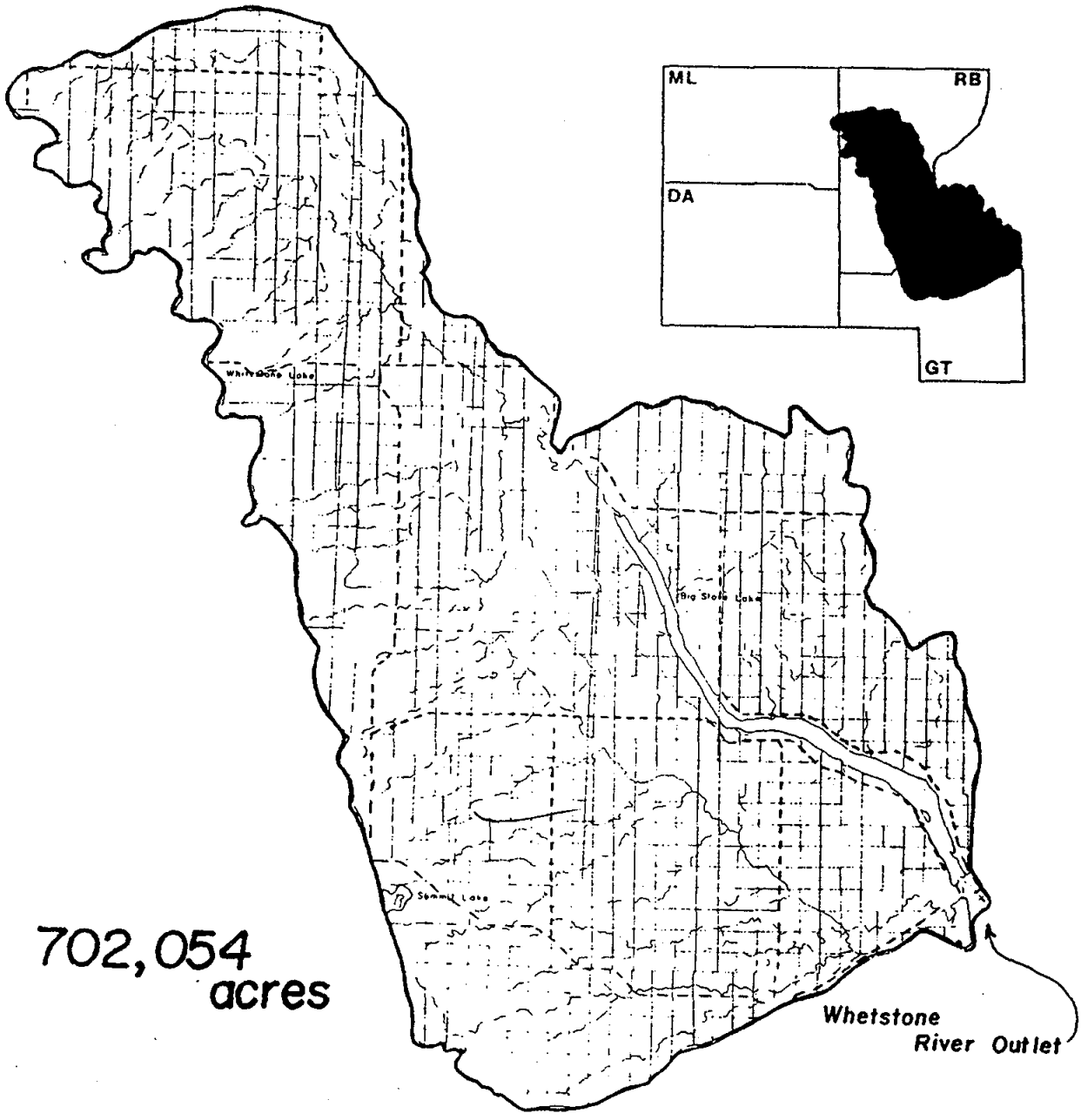
Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA-BY	168,493	24
PF	168,493	24
HY-SU-SL	154,452	22
FU-BY	42,123	6
LA-PL-LD	42,123	6
DK-L7-LD	28,082	4
FU-AA	28,082	4
RL-FS	28,082	4
HB-VL	21,062	3
LA-PL	21,062	3

FU-AA-BY Forman-Aastad-Buse: Well drained and moderately well drained, gently undulating to steep, loamy soils formed in loamy glacial till.

PF	Peever: Well drained, nearly to strongly sloping, loamy soils formed in clayey glacial till.
HY-SU-SL	Heimdal-Svea-Sisseton: Well drained and moderately well drained, nearly level to steep, loamy soils formed in glacial drift.
FU-BY	Forman-Buse: Well drained, undulating to hilly loamy soils formed in loamy glacial till.
LA-PL-LD	LeDelle-Playmoor-Lamoure: Moderately well drained and poorly drained, nearly level, silty soils formed in alluvium.
DK-L7-LD	Douray-Ludden-Lamoure: Poorly drained, nearly level, clayey and silty soils formed in alluvium.
FU-AA	Forman-Aastad: Well drained and moderately well drained, nearly level to rolling loamy soils formed in loamy glacial till.
RL-FS	Renshaw-Fordville: Somewhat excessively drained and well drained, nearly level to steep loamy soils that are shallow and moderately deep over outwash sand and gravel.
HB-VL	Hamerly Vallers: Moderately well drained to poorly drained, nearly level and gently undulating, loamy soils formed in loamy glacial till.
LA-PL	LaDelle-Playmoor: Moderately well drained and poorly drained, nearly level, silty soils.

Big Stone Lake

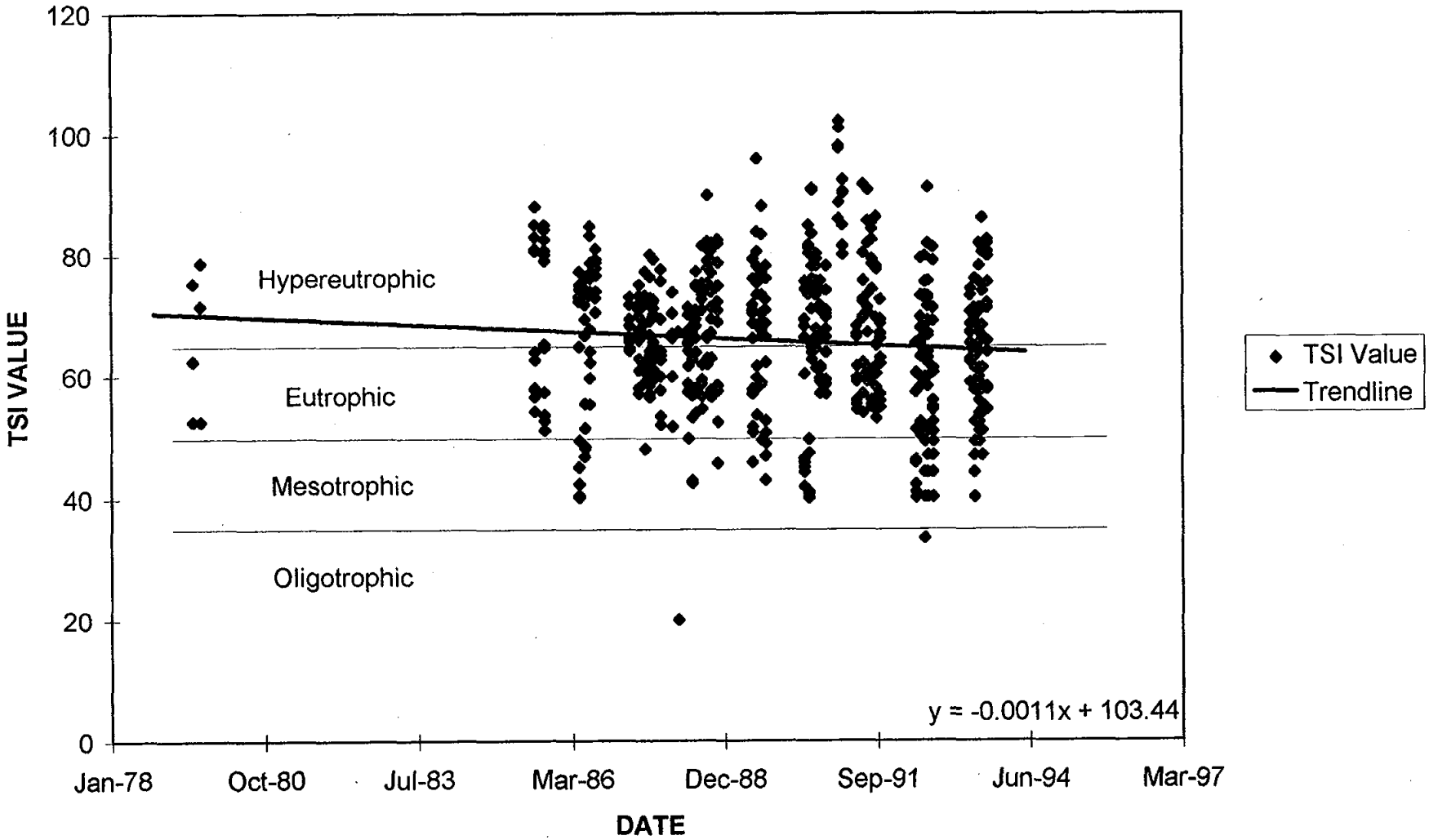


Scale

10 0 5 10 15 20 25 30

Miles

BIG STONE LAKE TSI's



BISMARK LAKE

County: Custer
Latitude: 43 deg. 45 min. 26 sec. N
Longitude: 103 deg. 30 min. 55 sec. W
Area: 25.3 A (10.2 ha)
Maximum Depth: 26 ft (7.9 m)
Volume: 319 acre-ft (3.92 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Willow Creek
Outlet: Willow Creek

Township: 3S
Range: 5E
Section (s): 22
Shoreline L: 1.28 mi (2.1 km)
Mean Depth: 12.6 ft (3.8 m)
Watershed/Lake Area: 81
Thermal Stratification: yes

Lake Use
Beneficial Use Classification:
(3) Coldwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 144,953
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.93	4	14	4	11.88
Air Temperature (°C)	4	48.50	4	20.75	4	11.50
Secchi Disk Depth (meters)	2	1.60	2	1.71	2	1.17
Conductivity (cond/25° C)	4	164	-	-	-	-
Turbidity (NTU)	-	-	-	-	4	10.18
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	2	7.80	4	7.40	4	7.87
Total Alkalinity (mg/l)	4	76	4	55	4	56
Total Solids (mg/l)	4	139	4	124	4	110
Dissolved Solids (mg/l)	4	130	4	111	4	104
Suspended Solids (mg/l)	4	9	4	14	4	6
Volatile Suspended Solids (mg/l)	-	-	2	7	-	-
Ammonia Nitrogen (mg/l)	4	1.17	4	0.37	4	0.24
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.23	4	1.07	4	1.25
Total Phosphorus (mg/l)	4	0.362	4	0.142	4	0.201
Total Dissolved Phosphorus (mg/l)	-	-	4	0.237	4	0.084
Ortho Phosphate as P (mg/l)	4	0.105	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	10.72	2	20.44

Year	1989	1991	1993
TSI Values -- Mean:	60.69	58.40	60.23
Secchi Disk	53.22	52.29	57.80
Total Phosphorus	68.16	69.07	62.73
Chlorophyll *a*		53.84	60.17

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: Much of lakeshore length.
Type of Vegetation: cattail (Typha latifolia)

Floating Leaved and Submergent Plant Species Identified: Anacharis canadensis and Carex sp.

Algal Species and Densities

	July 11, 1989		August 15, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanocapsa	101	2,523	-	-
Green Algae (other)	99	2,473	7	558
Algae (flagellate)	43	1,074	-	-
Cryptomonas sp. #1	24	600	-	-
Oocystis	13	325	1	80
Asterionella formosa	6	150	4	319
Algae (other)	5	125		
Scenedesmus	4	100	-	-
Cryptomonas	2	50	6	478
Pediastrum	2	50	-	-
Diatom (penate)	1	25	-	-
Characium	1	25	1	80
Fragilaria crotonensis	-	-	41	3,270
Anabaena	-	-	9	718
Tetrahedron	-	-	1	80
Total	301	7,520	73	5,821

Watershed Description

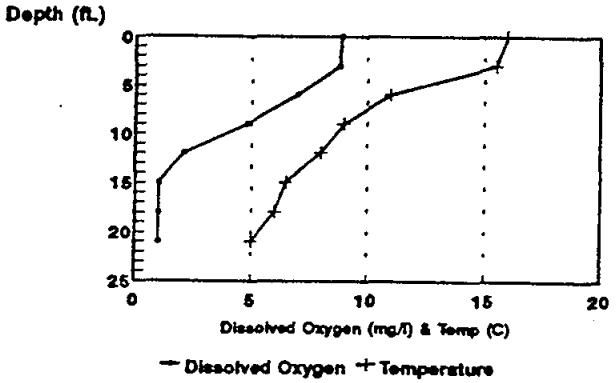
Watershed Area: 2,260 A (915 ha)

Soil Associations within Watershed

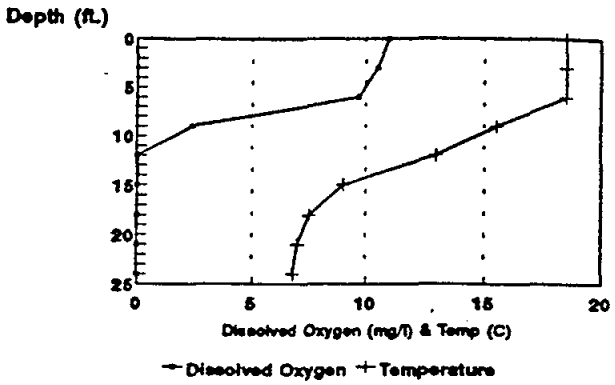
Association	Area (A)	% of Total
#6	2,260	100

#6 Buska-Mocmont-Rock Outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

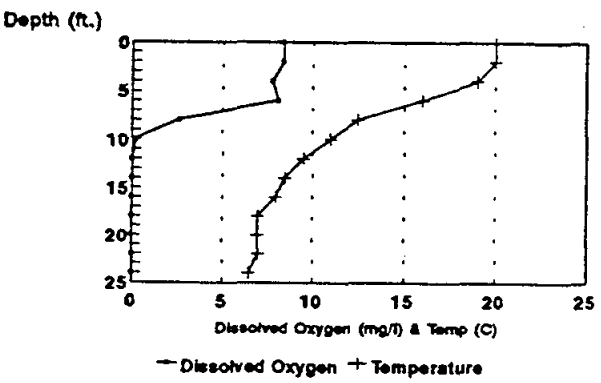
BISMARK LAKE 6/15/93
Dissolved Oxygen & Temperature Profile



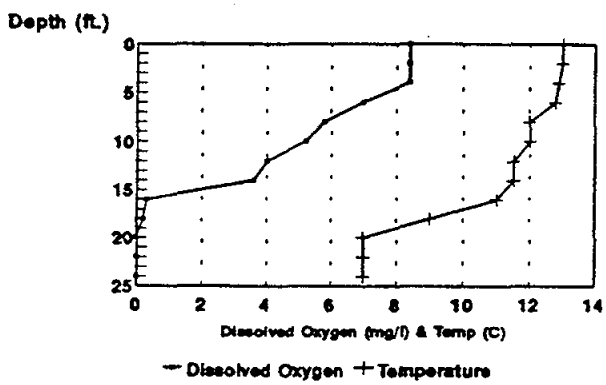
BISMARK LAKE 8/3/93
Dissolved Oxygen & Temperature Profile



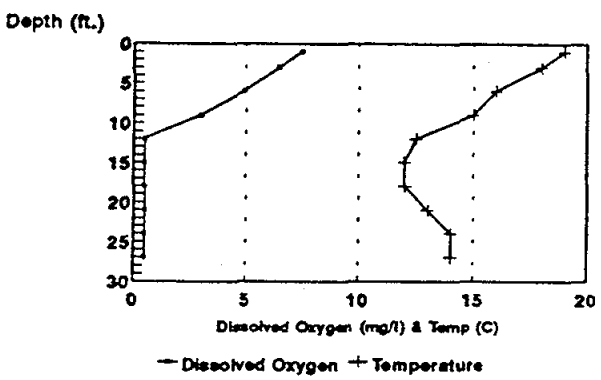
BISMARK LAKE 6/19/91
Dissolved Oxygen & Temperature Profile



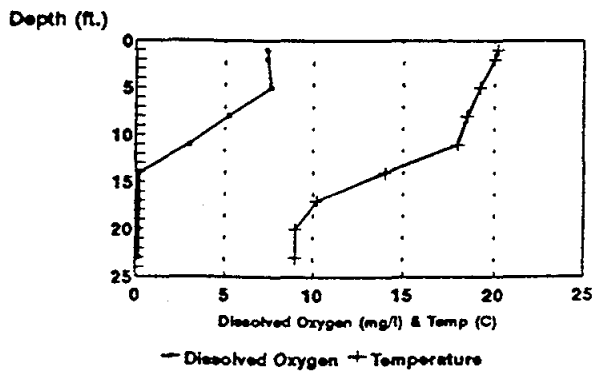
BISMARK LAKE 10/1/91
Dissolved Oxygen & Temperature Profile



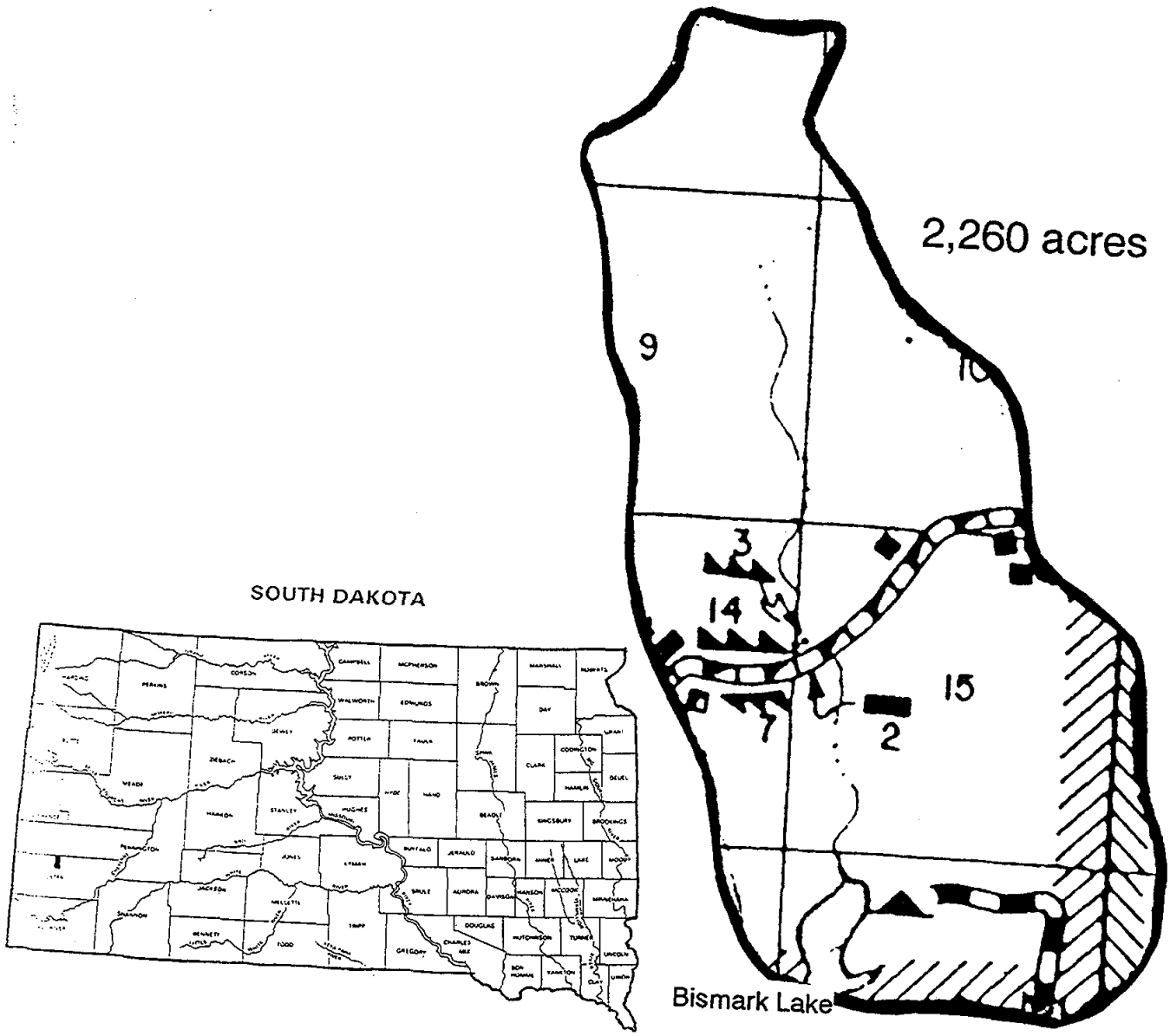
Bismark Lake, 7/11/89
Dissolved Oxygen & Temperature Profile



Bismark Lake, 8/15/89
Dissolved Oxygen & Temperature Profile



Bismark Lake



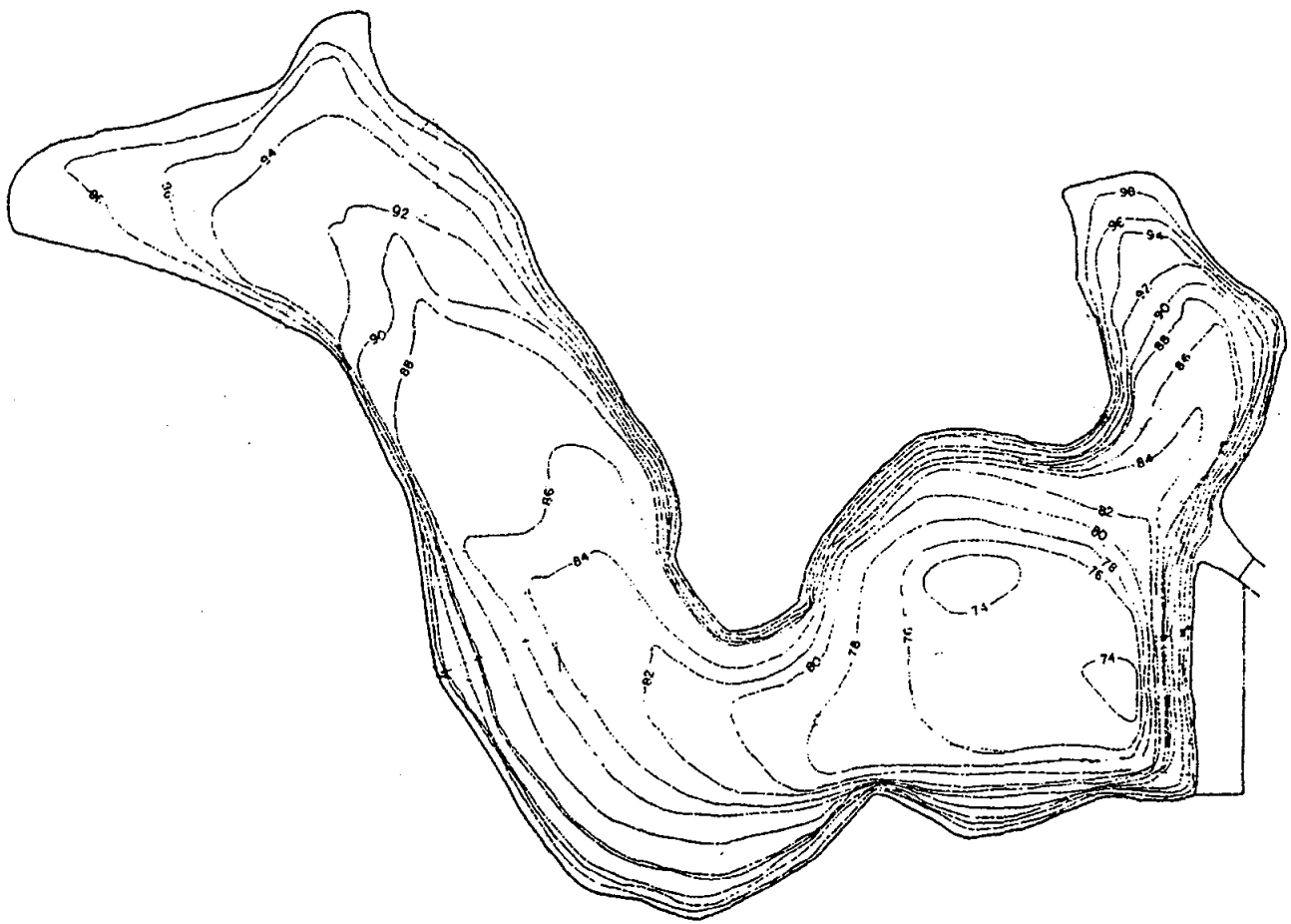
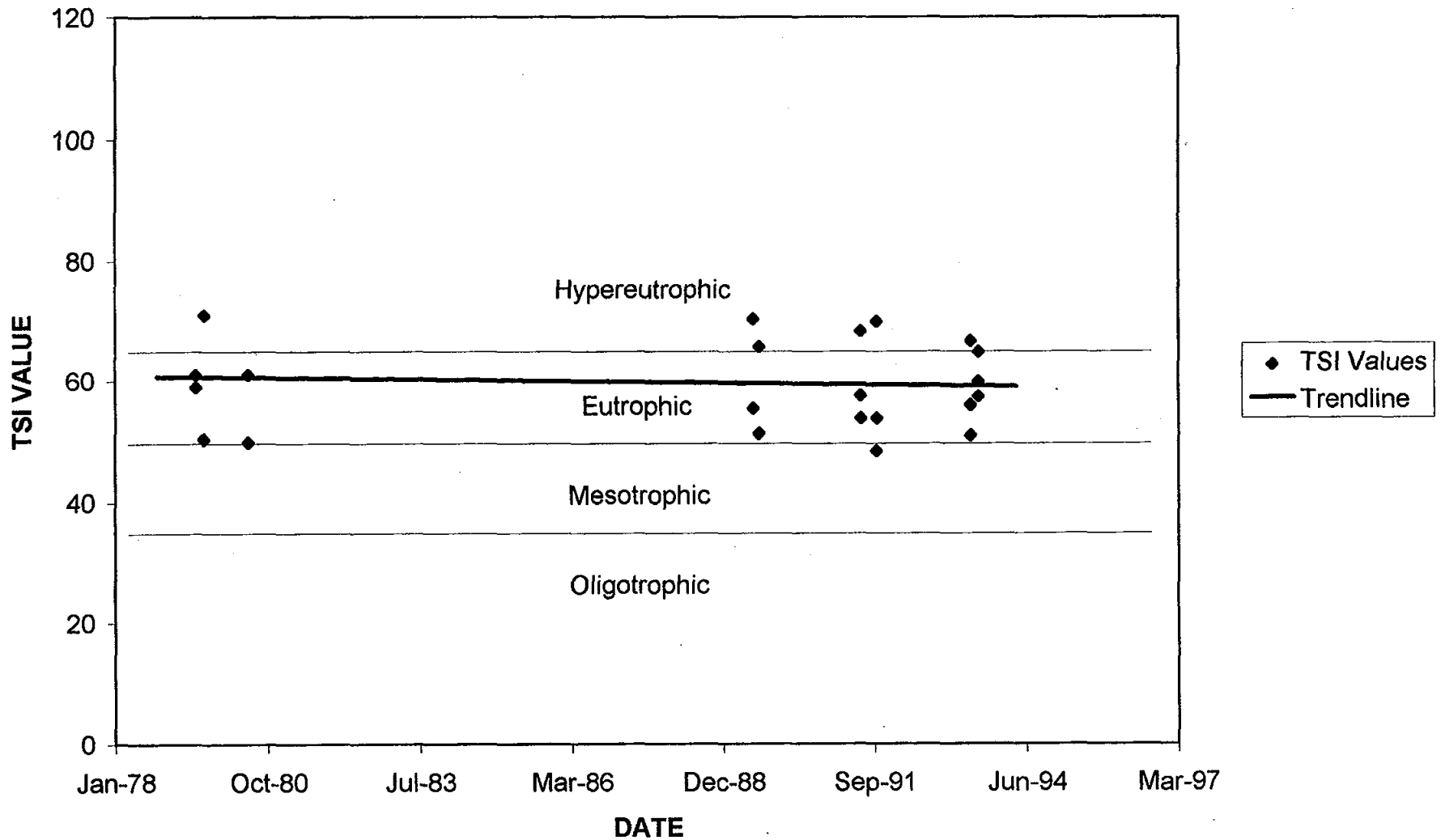


FIGURE 2

BISMARK LAKE

SEDIMENT CONTOURS

BISMARK LAKE TSI's



BLUE DOG LAKE

County: Day
Latitude: 45 deg. 21 min. 06 sec. N
Longitude: 97 deg. 17 min. 48 sec. W
Area: 1,502 A (608 ha)
Maximum Depth: 8 ft (2.4 m)
Volume: 9,219 acre-ft (1.14 x $10^7 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): Owen's Creek
Outlet: unnamed

Township: 122N
Range: 53-54W
Section (s): 9-10, 15-16, 27-32
Shoreline L: 8.7 mi (14 km)
Mean Depth: 6.2 ft (1.9m)
Watershed/Lake Area: 49
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: City of Waubay

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.75	4	21.15	4	19.05
Air Temperature (°C)	4	20.00	4	23.55	4	19.25
Secchi Disk Depth (meters)	2	0.63	2	0.30	2	0.31
Conductivity (cond/25° C)	4	431	2	481	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.53	-	-	-	-
Field pH (su) (su)	-	-	4	8.40	4	8.43
Total Alkalinity (mg/l)	4	182	4	207	4	216
Total Solids (mg/l)	4	350	4	360	4	377
Dissolved Solids (mg/l)	4	325	4	332	4	338
Suspended Solids (mg/l)	4	25	4	29	4	39
Volatile Suspended Solids (mg/l)	-	-	2	8	-	-
Ammonia Nitrogen (mg/l)	4	0.18	4	0.03	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.15	4	0.43	4	0.15
Total Kjeldahl Nitrogen (mg/l)	4	0.81	4	.048	4	0.79
Total Phosphorus (mg/l)	4	0.093	4	0.130	4	0.135
Total Dissolved Phosphorus (mg/l)	-	-	4	0.053	4	0.057
Ortho Phosphate as P (mg/l)	4	0.018	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	29.48	2	20.77

Year	1989	1991	1992
TSI Values -- Mean:	67.21	72.04	70.59
Secchi Disk	66.78	77.61	77.13
Total Phosphorus	67.64	74.46	74.32
Chlorophyll *a*		63.76	60.33

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton richardsonii and P. pectinatus

Algal Species and Densities

	June 22, 1989		July 26, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Diatom (pennate)	51	1,828	1	15
Nitzschia	18	645	-	-
Cryptomonas sp. #1	10	358	22	321
Characium	5	179	-	-
Algae (other)	5	179	8	117
Nitzschia acicularis	4	143	-	-
Anabaena	2	72	-	-
Blue-green (other)	1	36	-	-
Merismopedia		36	-	-
Cryptomonas ovata	1	36	-	-
Green Algae (other)	1	36	-	-
Scenedesmus	1	36	-	-
Aphanizomenon flos-aquae	-	-	23	335
Algae (flagellate)	-	-	1	15
Total	100	3,584	55	802

Watershed Description
Watershed Area: 73,811 A (29,871 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
RL-FS-SK	28,786	39
RL-FS	20,667	28
VS	16,977	23
FU-BY-AA-PA	7,381	10

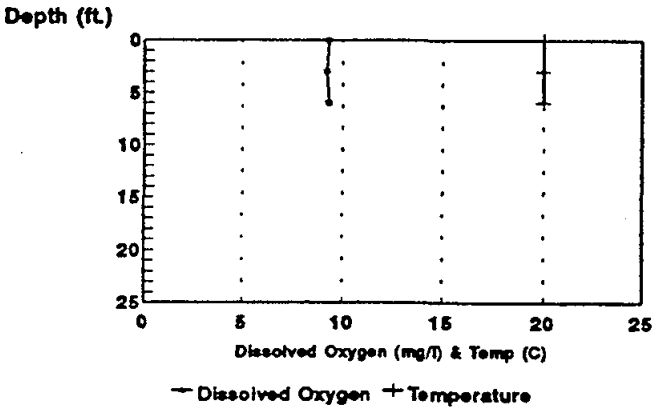
RL-FS-SK Renshaw-Fordville-Sioux: Well drained to excessively drained nearly level to steep loamy soils that are shallow, moderately deep and very shallow over sand and gravel.

RL-FS Renshaw-Fordville: Well drained, nearly level to strongly sloping loamy soils that are shallow and moderately deep over sand and gravel.

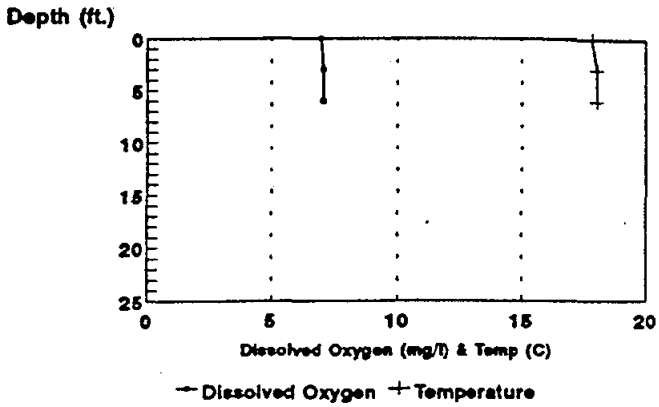
VS Vienna: Well drained, nearly level to sloping silty soils formed in loess and glacial till.

FU-BY-AA-PA Forman-Buse-Aastad-Parnell: Well drained and moderately well drained, nearly level to steep loamy soils and very poorly drained soils that formed in alluvium depression.

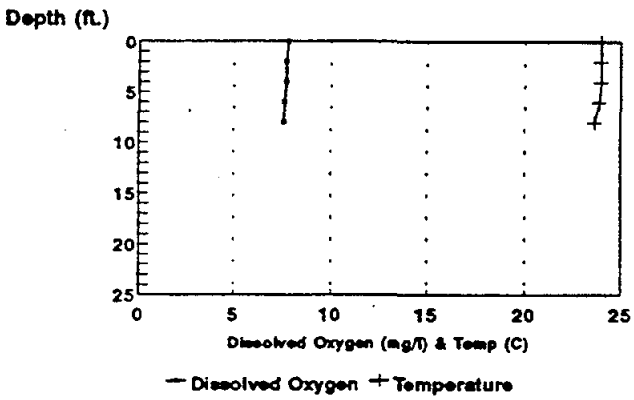
BLUE DOG LAKE 8/4/92
Dissolved Oxygen & Temperature Profile



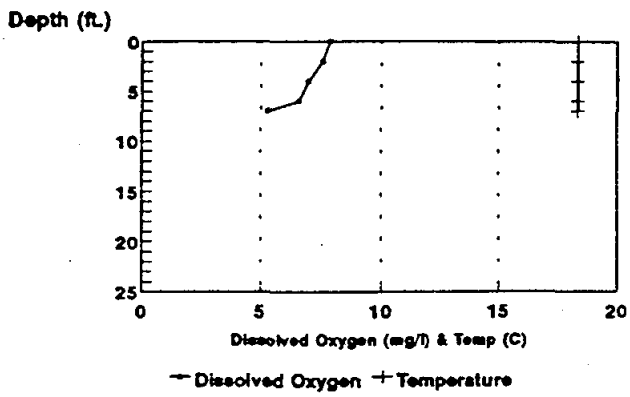
BLUE DOG LAKE 9/2/92
Dissolved Oxygen & Temperature Profile



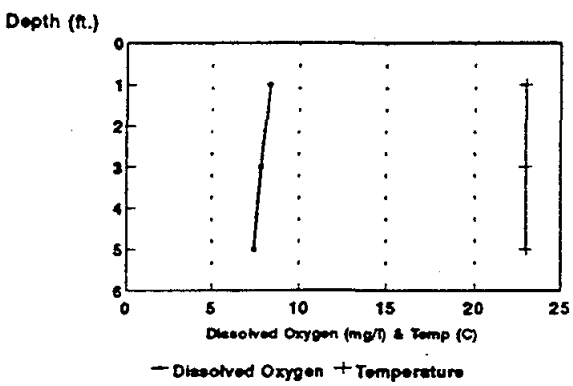
BLUE DOG LAKE 6/27/91
Dissolved Oxygen & Temperature Profile



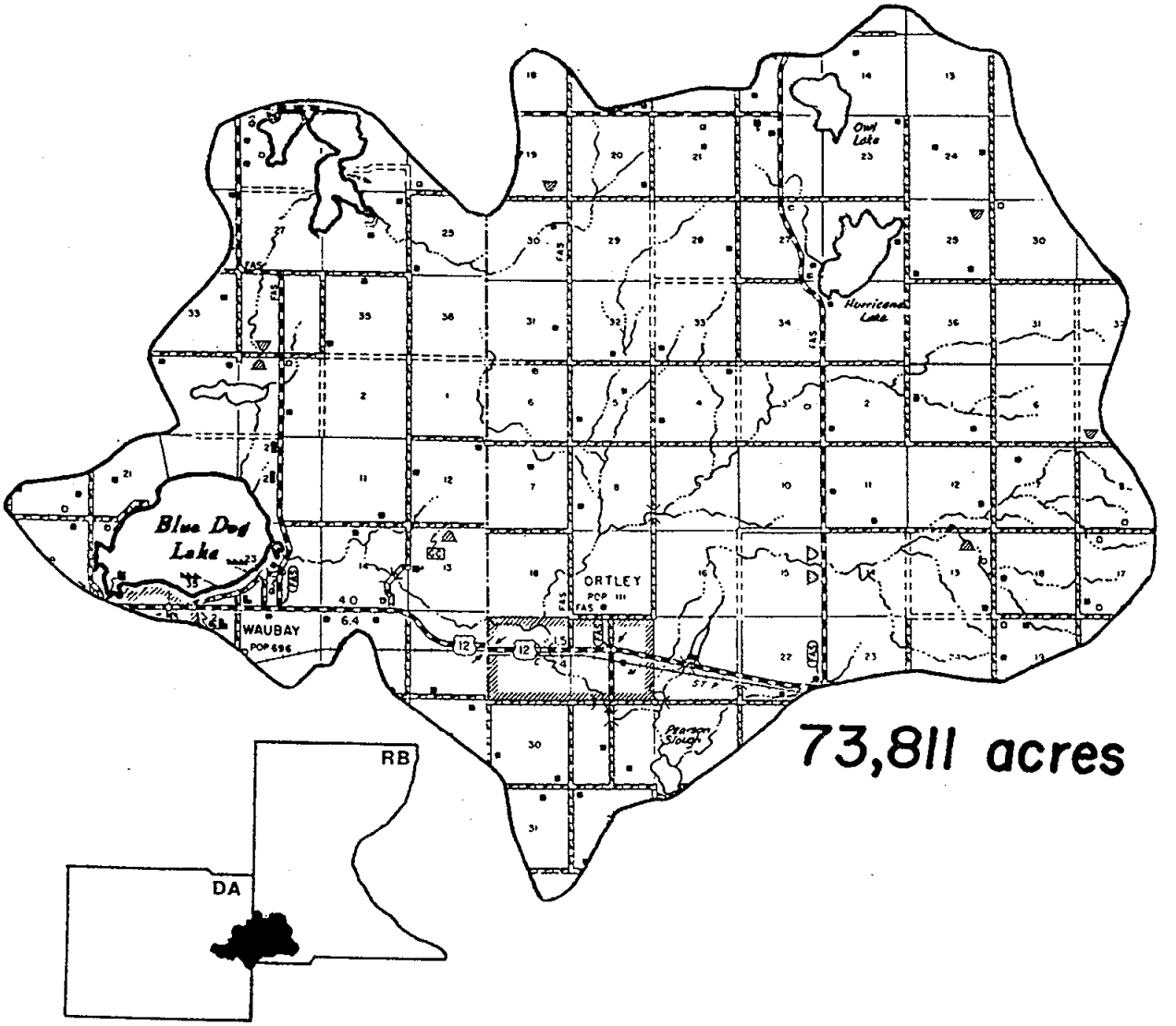
BLUE DOG LAKE 9/11/91
Dissolved Oxygen & Temperature Profile



Blue Dog Lake, 7/26/89
Dissolved Oxygen & Temperature Profile



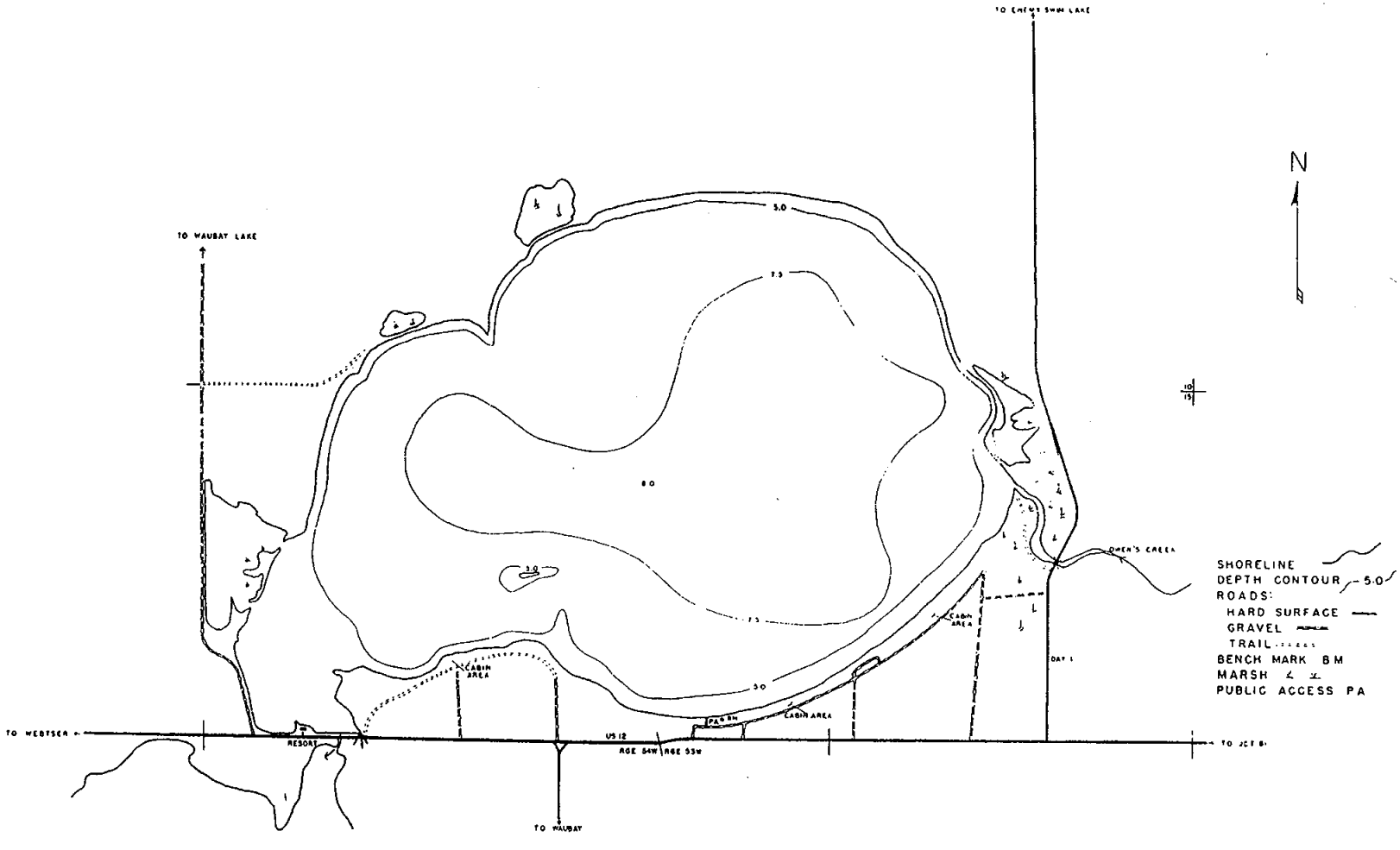
Blue Dog Lake



Scale

0 1 2 3 4 5 6 7 8

Miles



SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS

BLUE DOG LAKE

DAY COUNTY

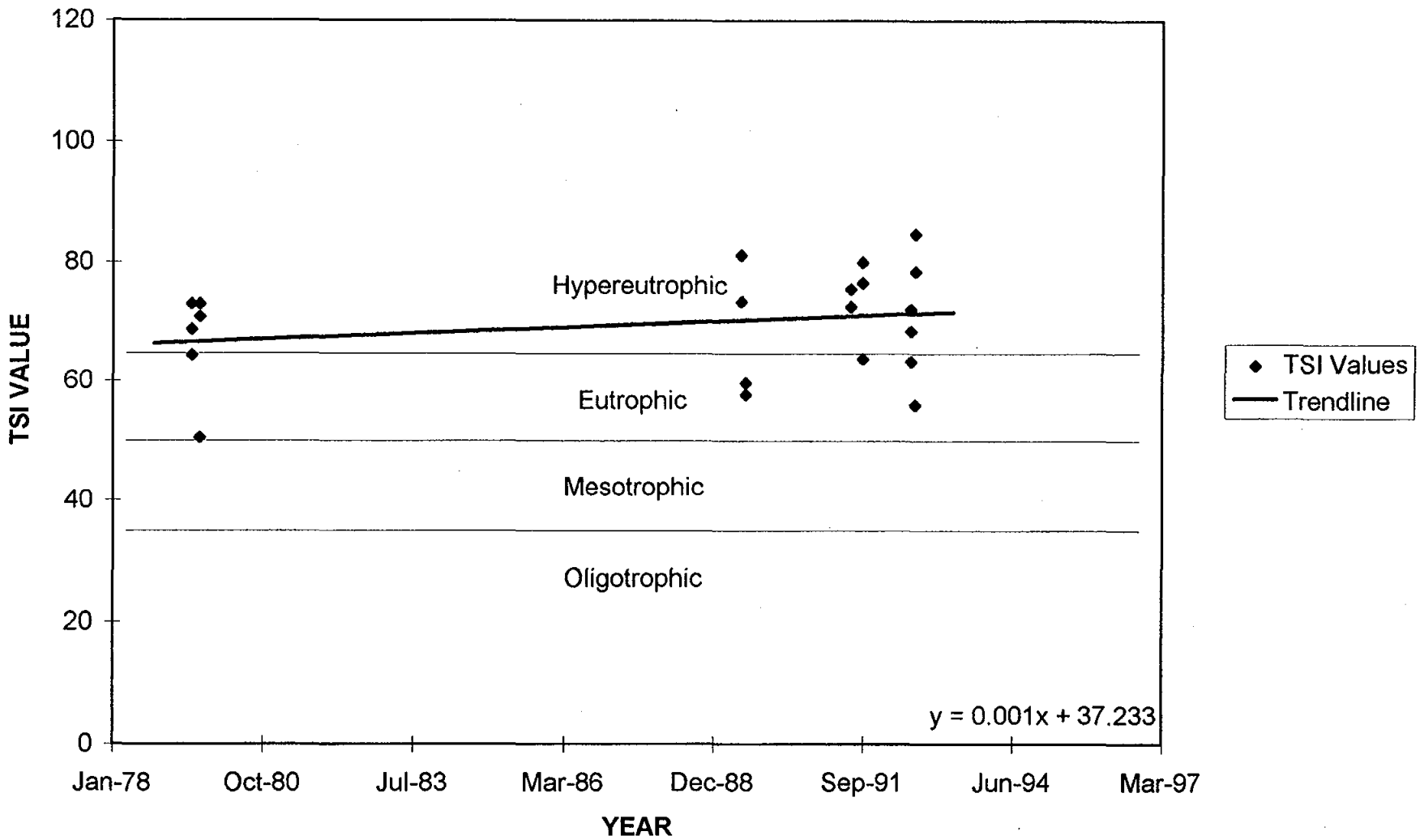
WATER STAGE FULL
PLANIMETER ACRES 1502

AERIAL PHOTO DATE: 1958
SEC. 9.10.15.16
SEC. 21.27.28
8M 75'

FIELD WORK DATE: 9-30-63
TWP. 122 N

DRAWN BY: LP, WJM
DATE: 1-16-64
RGE. 53W
RGE. 54W

BLUE DOG LAKE TSI's



BRAKKE DAM

County: Lyman
Latitude: 43 deg. 53 min. 18 sec. N
Longitude: 99 deg. 56 min. 54 sec W
Area: 130 acres (52.6 ha)
Maximum Depth: 19 ft (5.8 m)
Volume: 1,300 acre-ft (1.604 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: Medicine Creek

Township: 105N
Range: 76W
Section (s): 16, 21-22
Shoreline L: 3.7 mi (5.9 km)
Mean Depth: 10 ft (3.0 m)
Watershed/Lake Area: 111
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 49,002
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.38	4	19.19	4	20.88
Air Temperature (°C)	4	22.72	4	23.50	4	21.25
Secchi Disk Depth (meters)	2	0.15	2	0.53	2	0.79
Conductivity (cond/25° C)	4	614	2	568	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.33	4	8.01	4	8.37
Total Alkalinity (mg/l)	4	157	4	148	4	145
Total Solids (mg/l)	4	487	4	405	4	433
Dissolved Solids (mg/l)	4	432	4	382	4	423
Suspended Solids (mg/l)	4	55	4	24	4	11
Volatile Suspended Solids (mg/l)	-	-	2	5	-	-
Ammonia Nitrogen (mg/l)	4	0.06	4	0.03	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.20	4	0.33	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.73	4	0.61	4	0.79
Total Phosphorus (mg/l)	4	0.147	4	0.086	4	0.051
Total Dissolved Phosphorus (mg/l)	-	-	4	0.032	4	0.022
Ortho Phosphate as P (mg/l)	4	0.067	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	11.39	2	12.40

Year	1989	1991	1992
TSI Values -- Mean:	83.99	63.50	59.89
Secchi Disk	87.14	69.07	63.40
Total Phosphorus	80.84	67.00	61.02
Chlorophyll *a*		54.43	55.26

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton pectinatus and P. nodosus

Algal Species and Densities

	June 15, 1989		August 3, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Characium	29	2,802	1	106
Dactylococcopsis	14	1,353	-	-
Algae (other)	9	870	3	318
Cryptomonas sp. #1	7	676	-	-
Blue-green (other)	4	387	-	-
Lyngbya contorta	2	193	-	-
Cryptomonas	2	193	1	106
Green Algae (other)	2	193	5	531
Chroococcus	2	193	-	-
Algae (flagellate)	2	193	-	-
Diatom (pennate)	1	97	-	-
Diatom (centric)	1	97	-	-
Oocystis	1	97	-	-
Total	76	7,344	10	1,062

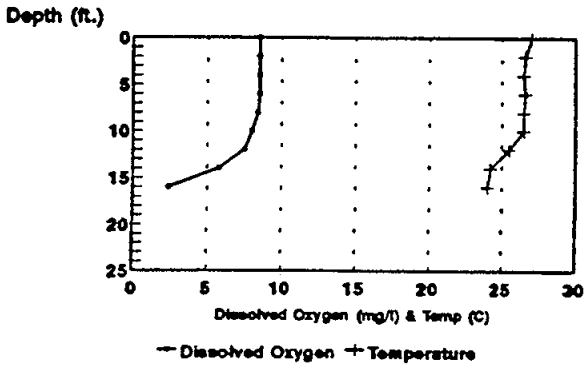
Watershed Description
Watershed Area: 14,435 A (5,842 ha)

Soil Associations within Watershed

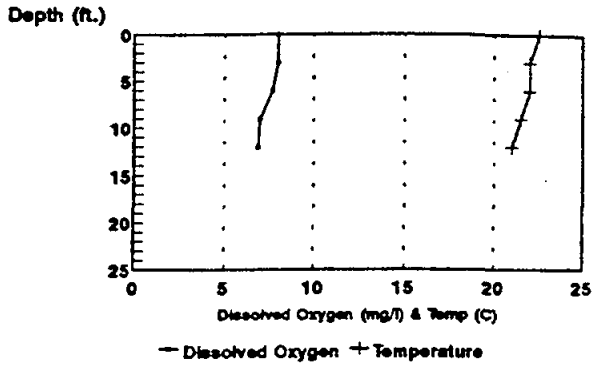
Association	Area (A)	% of Total
NT-PS	14,435	100

NT-PS Opal Promise: Well drained, clayey soils that are moderately deep and deep over shale.

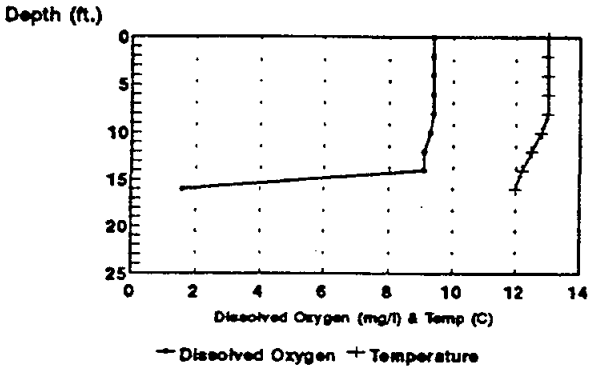
BRAKKE DAM 7/17/91
Dissolved Oxygen & Temperature Profile



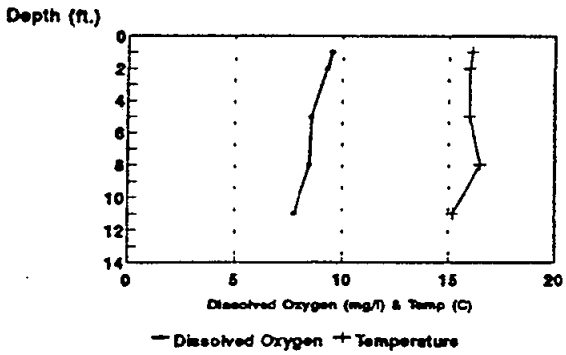
BRAKKE DAM 8/17/92
Dissolved Oxygen & Temperature Profile



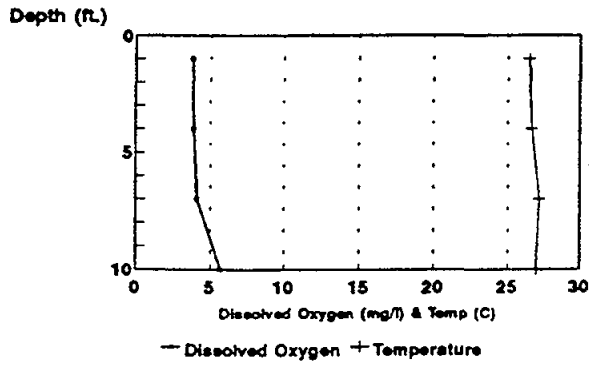
BRAKKE DAM 9/24/91
Dissolved Oxygen & Temperature Profile



Brakke Dam, 6/15/89
Dissolved Oxygen & Temperature Profile

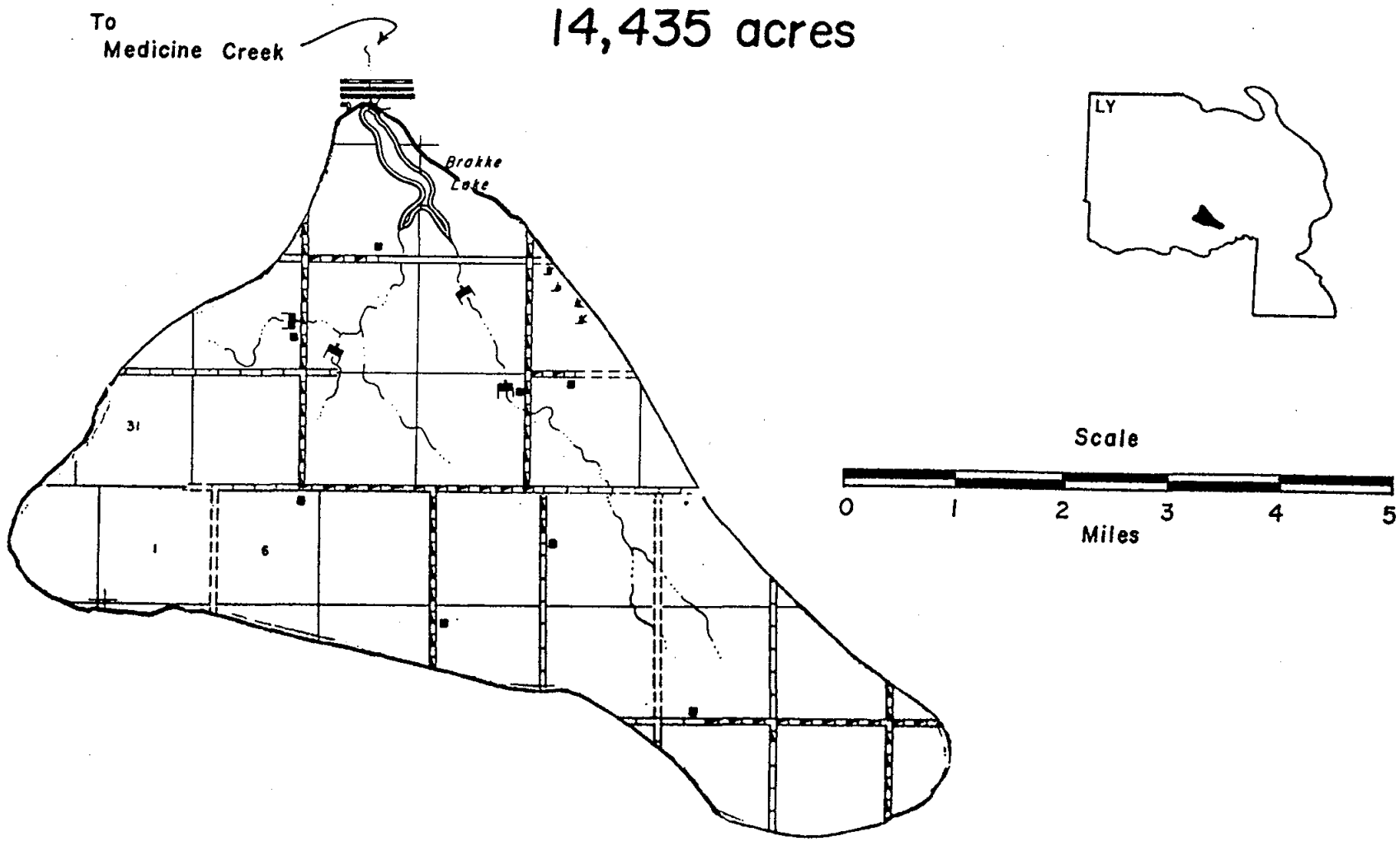


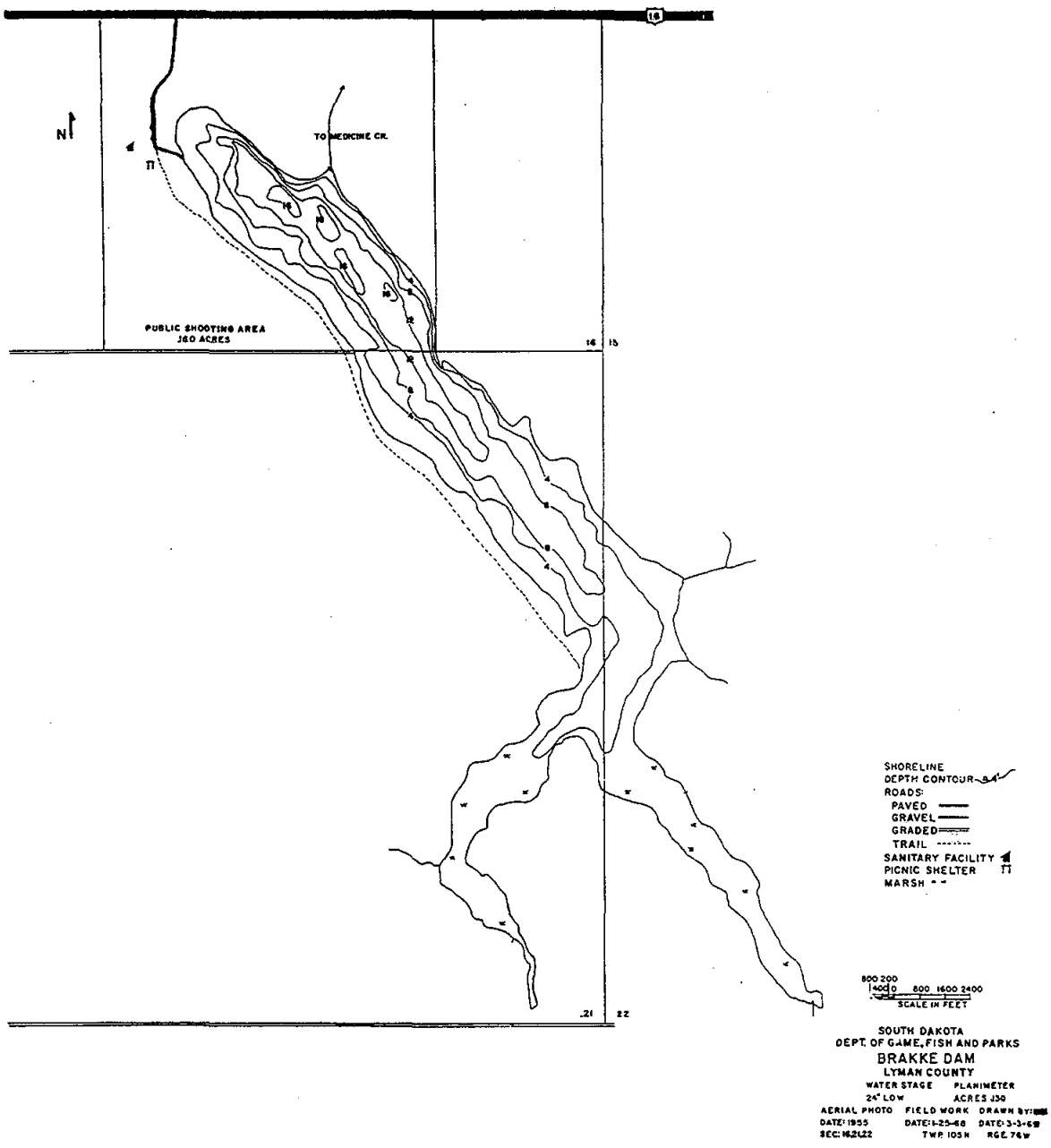
Brakke Dam, 8/3/89
Dissolved Oxygen & Temperature Profile

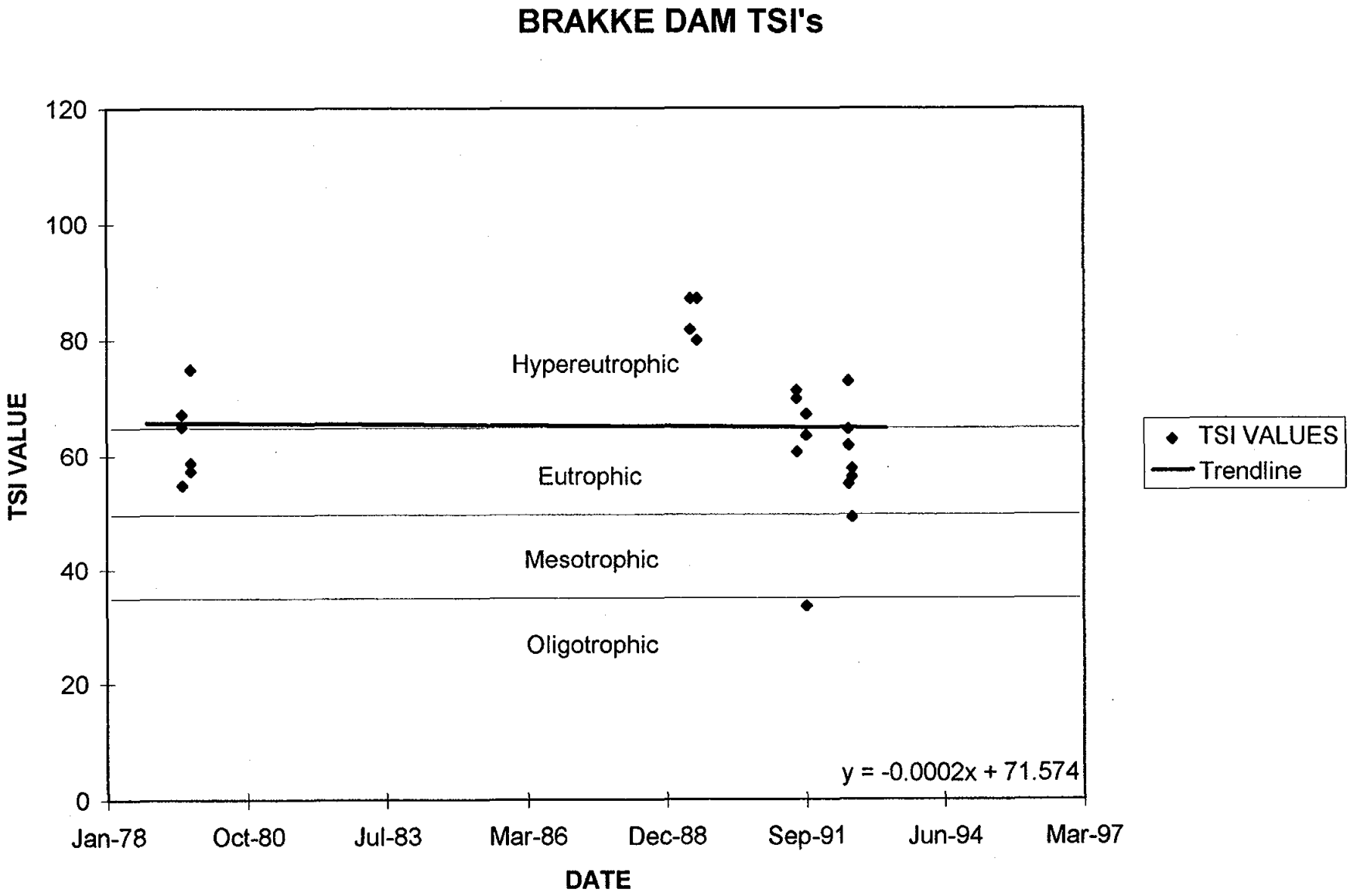


Brakke Lake

14,435 acres




16
N
TO MEDICINE CR.
PUBLIC SHOOTING AREA
160 ACRES
16
15
21
22
SHORELINE
DEPTH CONTOUR
ROADS:
PAVED
GRAVEL
GRADED
TRAIL
SANITARY FACILITY
PICNIC SHELTER
MARSH
800 200
400 0 800 1600 2400
SCALE IN FEET
SOUTH DAKOTA
DEPT. OF GAME, FISH AND PARKS
BRAKKE DAM
LYMAN COUNTY
WATER STAGE
24" LOW
PLANIMETER
ACRES 150
AERIAL PHOTO
DATE: 1955
FIELD WORK
DATE: 1-25-60
DRAWN BY:
DATE: 3-3-60
SEC: 16 & 22
TWP. 105 N
RGE. 76 W


BRAKKE DAM TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0002x + 71.574
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI VALUES
Trendline

BRANT LAKE

County: Lake
Latitude: 43 deg. 55 min. 18 sec. N
Longitude: 96 deg. 53 min. 12 sec. W
Area: 1000 acres (404.7 ha)
Maximum Depth: 14 ft (4.3 m)
Volume: 11,000 acre-ft (1.36 $x10^7 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): unnamed
Outlet: Skunk Creek

Township: 105N
Range: 51W
Section (s): 3, 4, 9, 10
Shoreline L: 6.2 mi (10 km)
Mean Depth: 11 ft (3.4 m)
Watershed/Lake Area: 8
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 270,159
Ownership Status: State owned
Public Interest: Brandt Lake Improvement Association.

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.95	6	24.38	4	20.67
Air Temperature (°C)	4	25.00	6	29.81	4	23.06
Secchi Disk Depth (meters)	2	0.96	3	1.54	2	1.65
Conductivity (cond/25° C)	4	1,339	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.45	6	8.79	4	8.36
Total Alkalinity (mg/l)	4	151	-	-	-	-
Total Solids (mg/l)	4	1,158	-	-	-	-
Dissolved Solids (mg/l)	4	1,136	-	-	-	-
Suspended Solids (mg/l)	4	23	6	11	4	12
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.70	6	0.38	4	1.13
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.07	4	0.11
Total Kjeldahl Nitrogen (mg/l)	4	2.43	6	2.26	4	2.46
Total Phosphorus (mg/l)	4	0.205	6	0.190	4	0.151
Total Dissolved Phosphorus (mg/l)	-	-	6	0.122	4	0.104
Ortho Phosphate as P (mg/l)	4	0.091	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	29.70	4	15.67

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	22.16	6	21.48	6	22.28
Air Temperature (°C)	6	22.00	6	21.43	6	26.00
Secchi Disk Depth (meters)	3	1.49	9	0.89	8	1.54
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	6	8.47	6	8.55	6	8.51
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	13	6	18	6	7
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.63	6	0.25	6	0.33
Nitrate + Nitrite Nitrogen (mg/l)	4	0.19	6	0.26	6	0.13
Total Kjeldahl Nitrogen (mg/l)	6	1.40	6	1.46	6	1.77
Total Phosphorus (mg/l)	6	0.155	6	0.195	6	0.133
Total Dissolved Phosphorus (mg/l)	6	0.124	6	0.129	6	0.097
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	7.33	4	6.61	6	25.35

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	70.66	65.81	62.57	60.42	63.82	63.25
Secchi Disk	60.59	53.76	52.77	54.21	61.62	53.78
Total Phosphorus	80.73	79.83	77.39	76.94	80.73	73.69
Chlorophyll *a*		63.84	57.56	50.12	49.10	62.29

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

Taxa	June 28, 1989 Number	June 28, 1989 Units/ml	August 2, 1989 Number	August 2, 1989 Units/ml
Aphanizomenon flos-aquae	304	13,018	222	4,638
Lyngbya	5	214	3	46
Chroococcus	2	86	3	46
Blue Green (other)	1	43	-	-
Cryptomonas sp. #1	-	-	47	717
Green Algae (other)	-	-	7	107
Microcystis	-	-	6	92
Nitzschia	-	-	5	76
Cryptomonas	-	-	4	61
Algae (other)	-	-	4	61
Diatom (pennate)	-	-	2	31
Scenedesmus	-	-	1	15
Total	312	13,361	304	4,638

Watershed Description

Watershed Area: 7,658 A (3,099 ha)

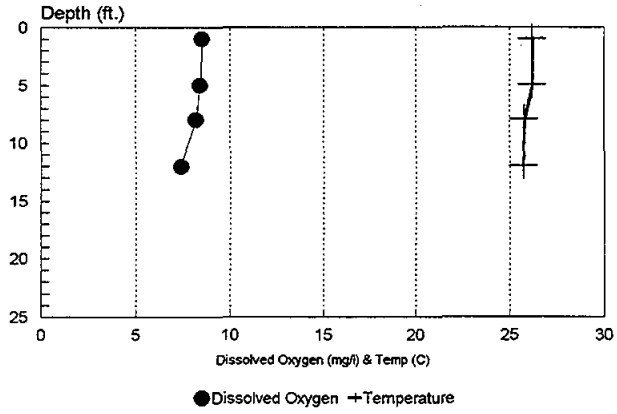
Soil Associations within Watershed

Association	Area (A)	% of Total
EF-WF	5,131	67
DX	2,527	33

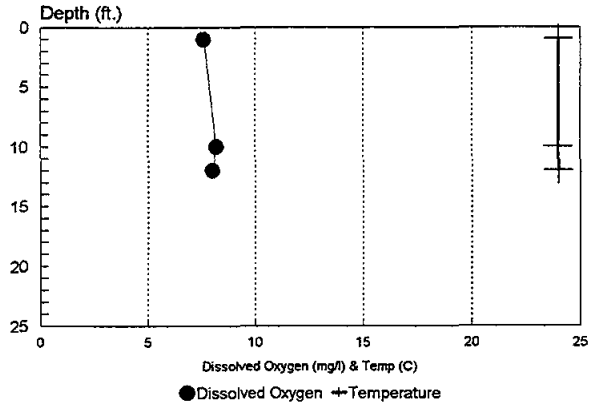
EF-WF Egan-Wentworth: Gently undulating to rolling, well drained, silty soils formed in glacial drift; on uplands.

DX Dempster: Nearly level to sloping, well drained, silty soils formed in alluvium over sand and gravel; on stream terraces and uplands.

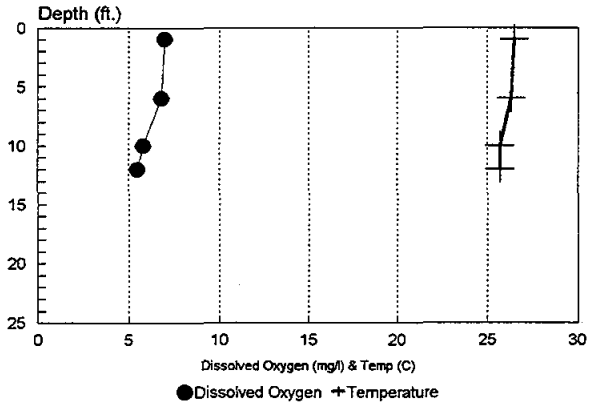
BRANT LAKE 8/6/79
Dissolved Oxygen & Temperature Profile



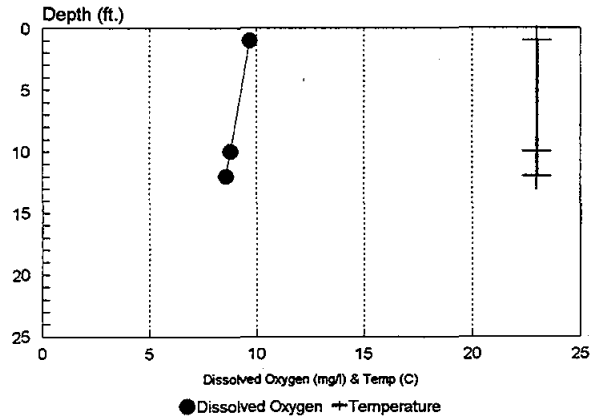
BRANT LAKE 6/20/91
Dissolved Oxygen & Temperature Profile



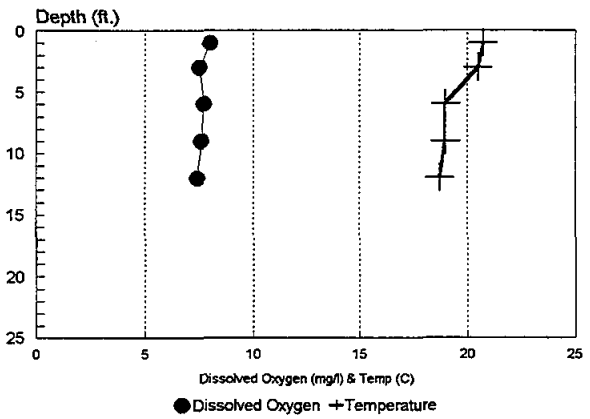
BRANT LAKE 7/21/91
Dissolved Oxygen & Temperature Profile



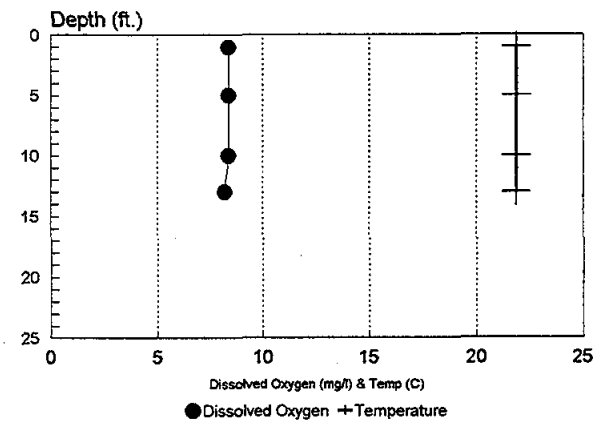
BRANT LAKE 8/19/91
Dissolved Oxygen & Temperature Profile



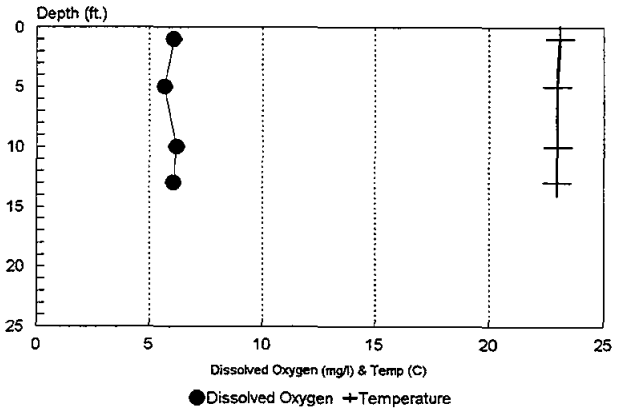
BRANT LAKE 6/11/92
Dissolved Oxygen & Temperature Profile



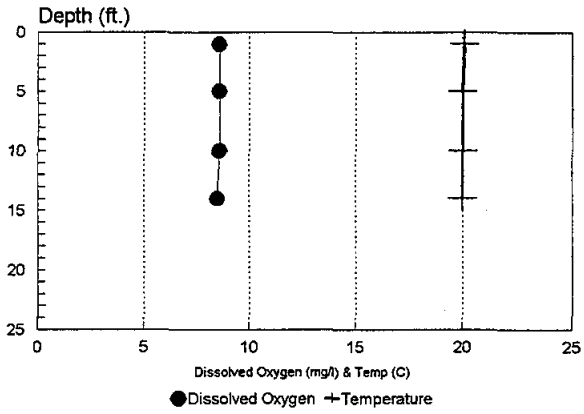
BRANT LAKE 7/19/92
Dissolved Oxygen & Temperature Profile



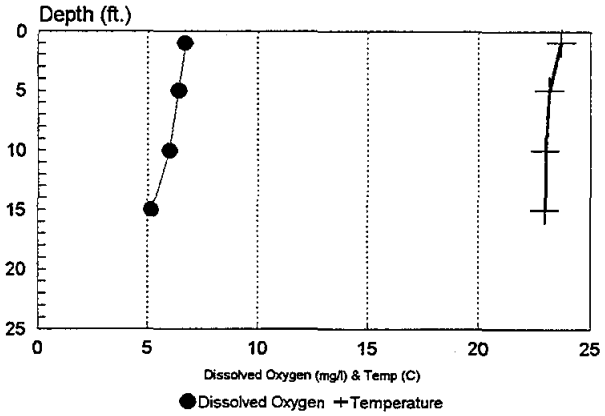
BRANT LAKE 8/13/92
Dissolved Oxygen & Temperature Profile



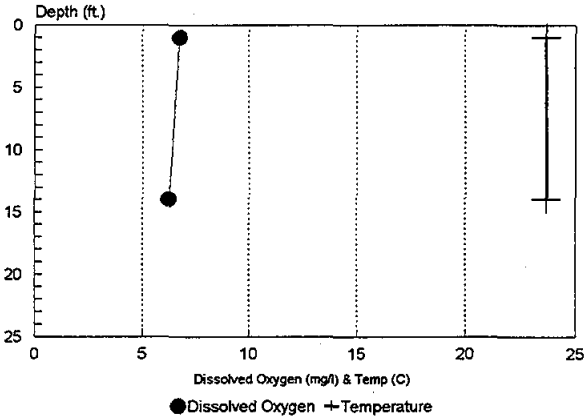
BRANT LAKE 6/12/93
Dissolved Oxygen & Temperature Profile



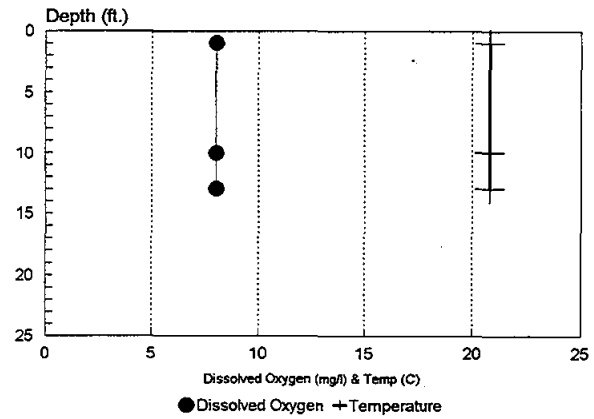
BRANT LAKE 7/20/93
Dissolved Oxygen & Temperature Profile



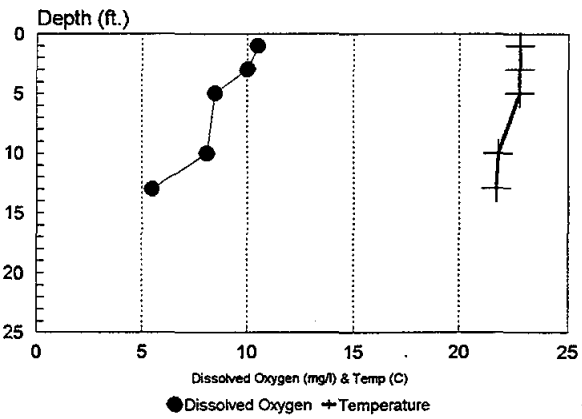
BRANT LAKE 8/18/93
Dissolved Oxygen & Temperature Profile



BRANT LAKE 6/11/94
Dissolved Oxygen & Temperature Profile

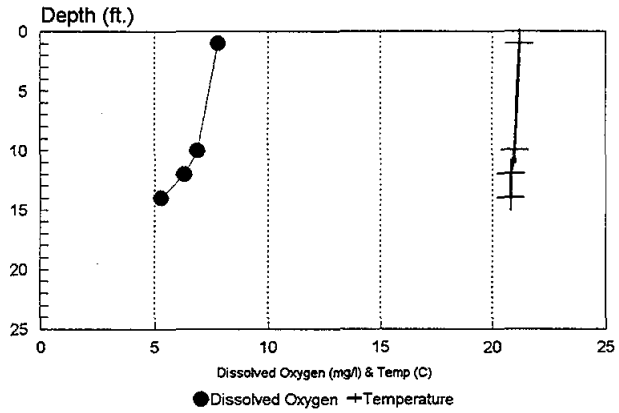


BRANT LAKE 7/13/94
Dissolved Oxygen & Temperature Profile



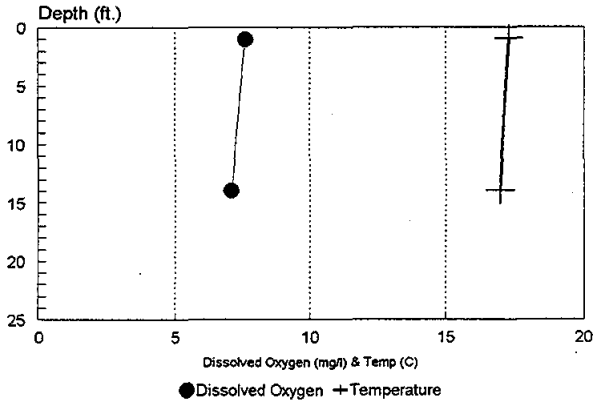
BRANT LAKE 8/13/94

Dissolved Oxygen & Temperature Profile



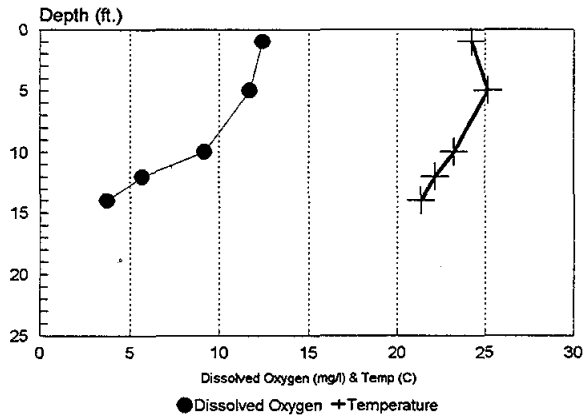
BRANT LAKE 6/11/95

Dissolved Oxygen & Temperature Profile



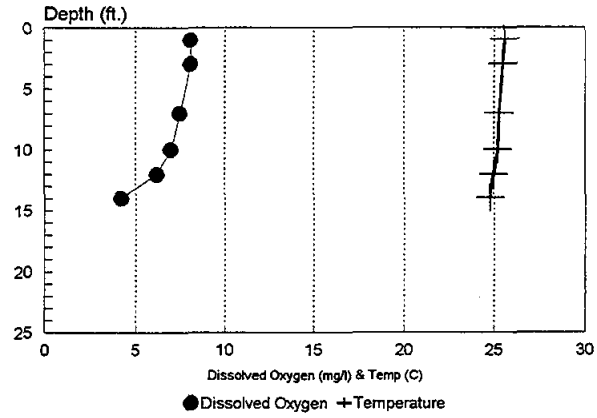
BRANT LAKE 7/12/95

Dissolved Oxygen & Temperature Profile

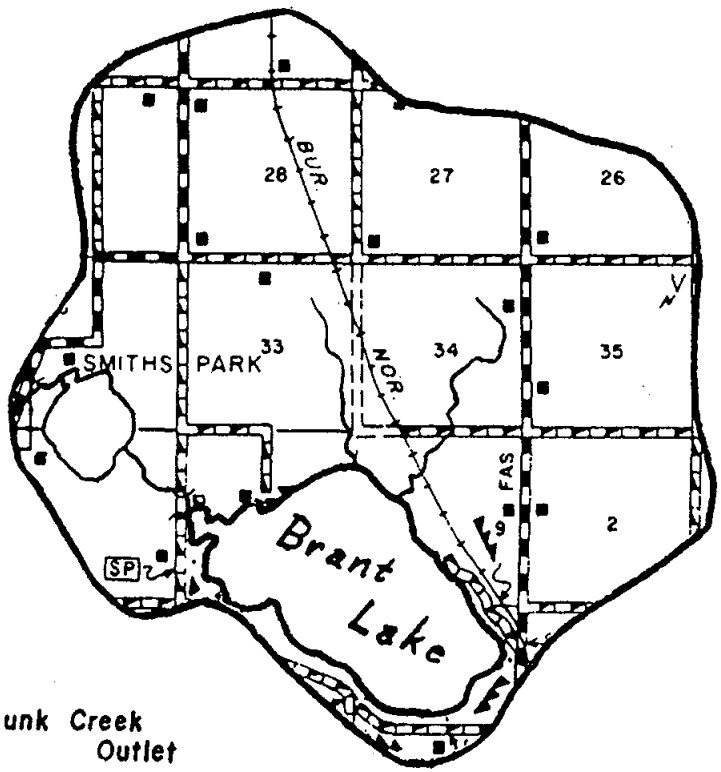


BRANT LAKE 8/11/95

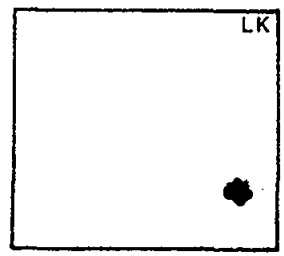
Dissolved Oxygen & Temperature Profile



Brant Lake



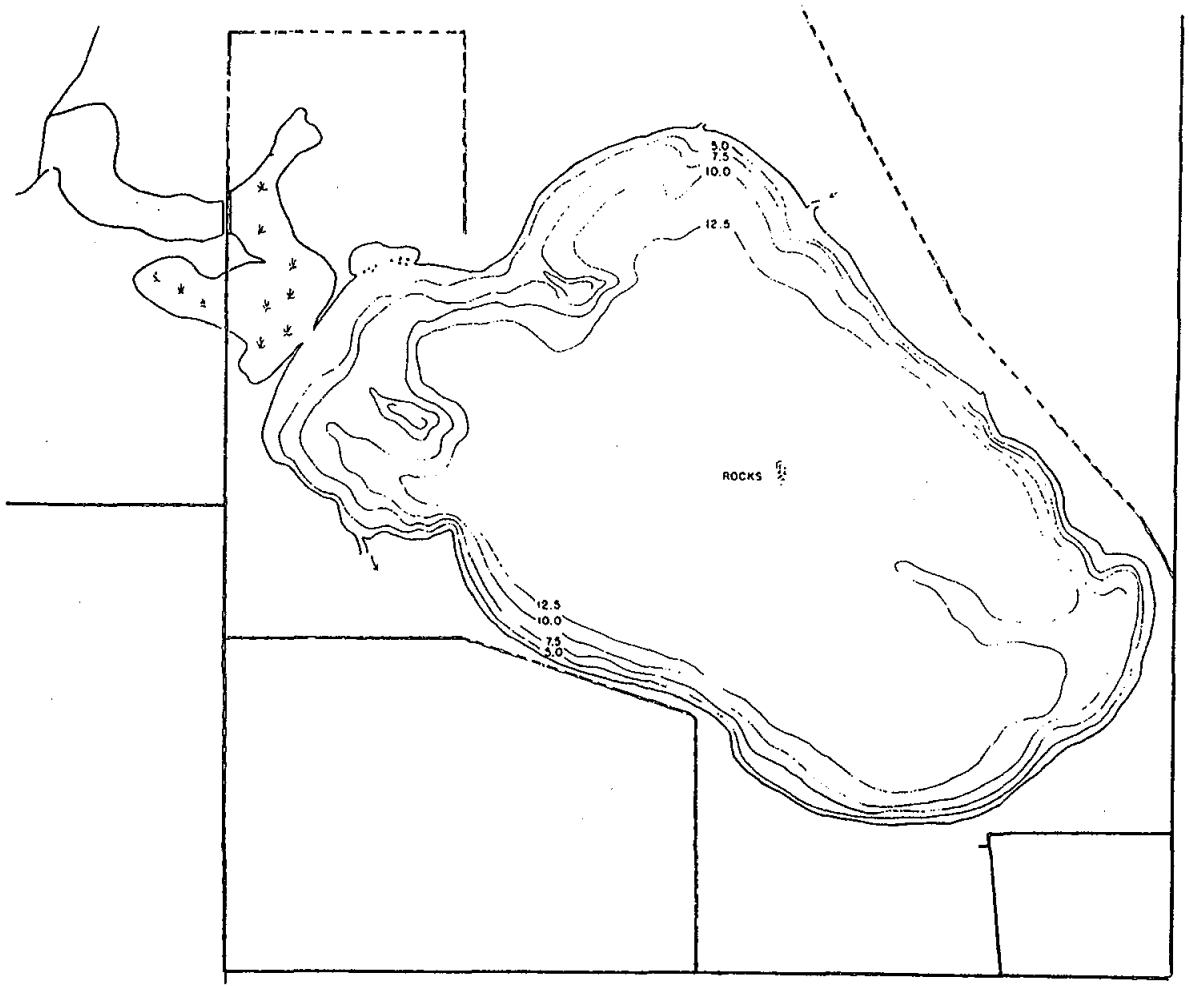
7658 acres



Scale

0 1 2 3 4 5

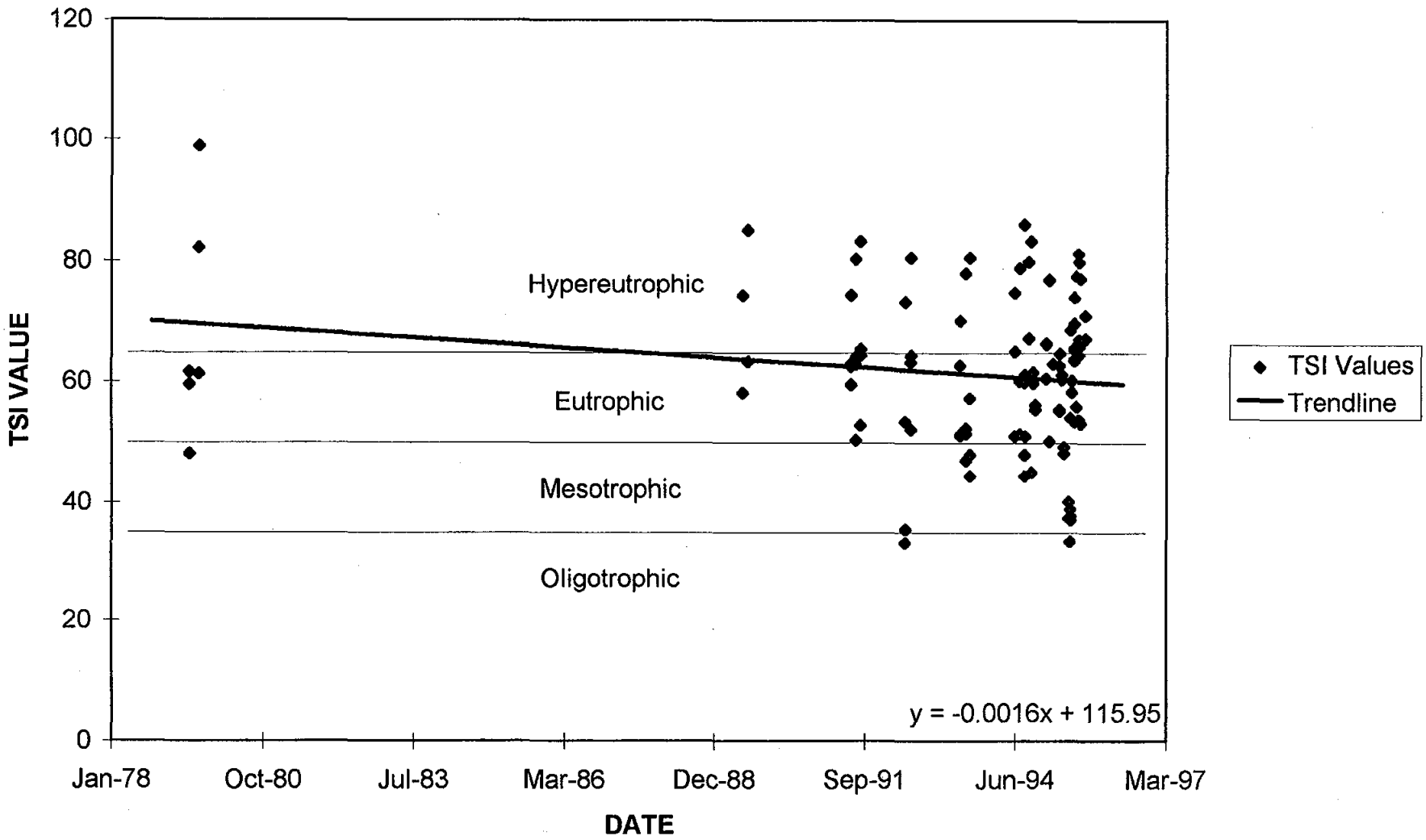
Miles



SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
BENCH MARK BM
BUILDINGS
MARSH

SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
LAKE BRANT
LAKE COUNTY

WATER STAGE FULL — PLANIMETER ACRES
AERIAL PHOTO DATE: 1958 — FIELD WORK DATE: 6-9-64 — DRAWN BY: LP, WJM DATE: 12-10-64
SEC. 1, 3, 9, 10 — TWP. 105N — RGE. 51W


BRANT LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0016x + 115.95
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

BULLHEAD LAKE

County: Deuel
Latitude: 44 deg. 56 min. 59 sec. N
Longitude: 96 deg. 48 min. 16 sec. W
Area: 341.2 A (138.1 ha)
Maximum Depth: 11 ft (3.4 m)
Volume: 2,482 acre-ft ($3.06X10^6m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): groundwater
Outlet: groundwater

Township: 117N
Range: 50W
Section (s): 10, 11, 14,
Shoreline L: 3.3 mi (5.3 km)
Mean Depth: 7.3 ft (2.2 m)
Watershed/Lake Area: 4.4
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation waters
(7) Immersion recreation waters
(8) Limited contact recreation waters
(9) Wildlife propagation and stock watering waters

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Deuel Co. Lakes and Streams Association

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.00	4	21.30	4	20.28
Air Temperature (°C)	4	25.00	4	19.05	4	17.50
Secchi Disk Depth (meters)	2	1.33	2	0.66	2	0.63
Conductivity (cond/25° C)	4	1,229	2	1,399	-	-
Turbidity (NTU)	-	-	-	-	4	14.63
Lab pH (su)	4	9.33	-	-	-	-
Field pH (su) (su)	-	-	4	9.15	4	8.47
Total Alkalinity (mg/l)	4	236	4	313	4	348
Total Solids (mg/l)	4	1,136	4	1,211	4	966
Dissolved Solids (mg/l)	4	1,129	4	1,195	4	953
Suspended Solids (mg/l)	4	8	4	16	4	14
Volatile Suspended Solids (mg/l)	-	-	2	10	-	--
Ammonia Nitrogen (mg/l)	4	0.07	4	0.20	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.81	4	2.10	4	2.05
Total Phosphorus (mg/l)	4	0.058	4	0.099	4	0.054
Total Dissolved Phosphorus (mg/l)	-	-	4	0.038	4	0.024
Ortho Phosphate as P (mg/l)	4	0.011	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	16.08	3	17.42

Year	1989	1991	1994
TSI Values -- Mean:	58.61	64.66	61.84
Secchi Disk	55.93	66.10	66.78
Total Phosphorus	61.29	70.07	60.15
Chlorophyll *a*		57.82	58.60

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: 50% coverage - Ceratophyllum demersum and Potamogeton pectinatus

Algal Species and Densities

	July 10, 1989	
Taxa	Number	Units/ml
Aphanocapsa	107	2,000
Merismopedia	86	1,608
Algae (other)	38	710
Blue-green (other)	28	523
Green Algae (other)	13	243
Aphanothece	7	131
Chroococcus	4	75
Dactylococcopsis	4	75
Oocystis	4	75
Nitzschia	3	56
Diatom (pennate)	2	37
Tetrastrum	2	37
Algae (flagellate)	1	19
Cryptomonas sp. #1	1	19
Euglena	1	19
Sphaerocystis Schroeteri	1	19
Total	302	5,646

Watershed Description

Watershed Area: 1,497 A (606 ha)

Soil Associations within Watershed

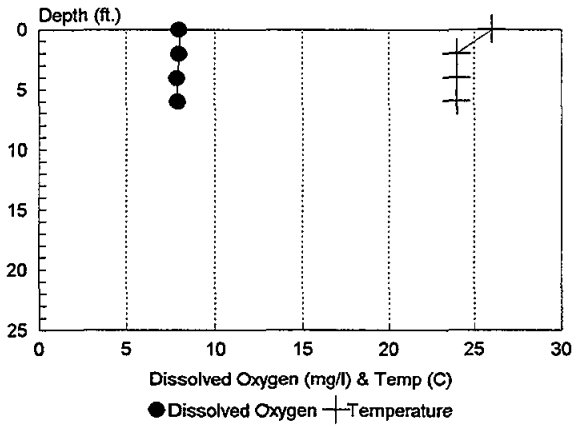
Association	Area (A)	% of Total
#2	148	9.9
#6	1,349	90.1

#2 Barnes-Buse-Southam: Well drained and very poorly drained, nearly level to steep, loamy and silty soils on till plains and moraines.

#6 Arvilla-Renshaw-Fordville: Somewhat excessively drained and well drained, nearly level to strongly sloping, loamy soils over gravelly material on outwash plains.

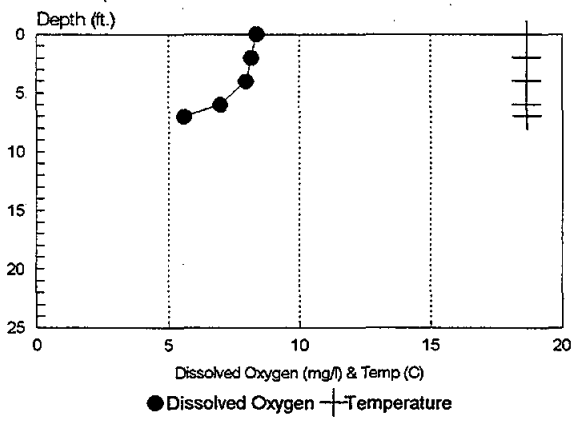
BULLHEAD LAKE 7/23/91

Dissolved Oxygen & Temperature Profile



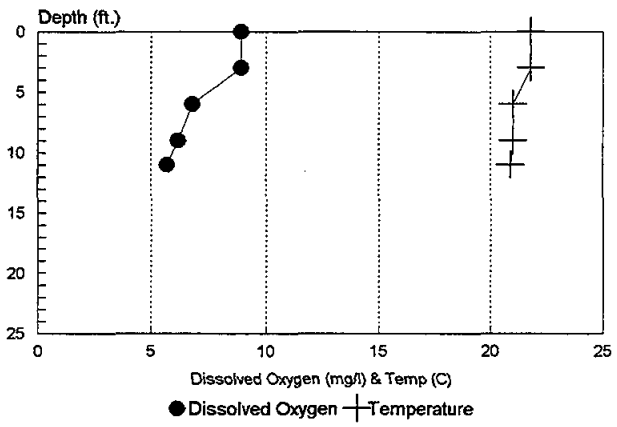
BULLHEAD LAKE 9/11/91

Dissolved Oxygen & Temperature Profile



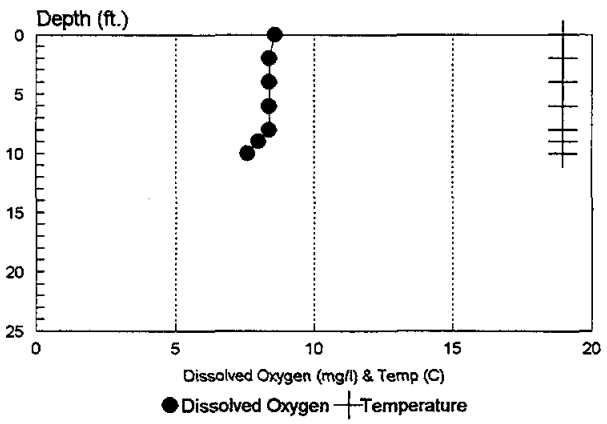
BULLHEAD LAKE 6/29/94

Dissolved Oxygen & Temperature Profile

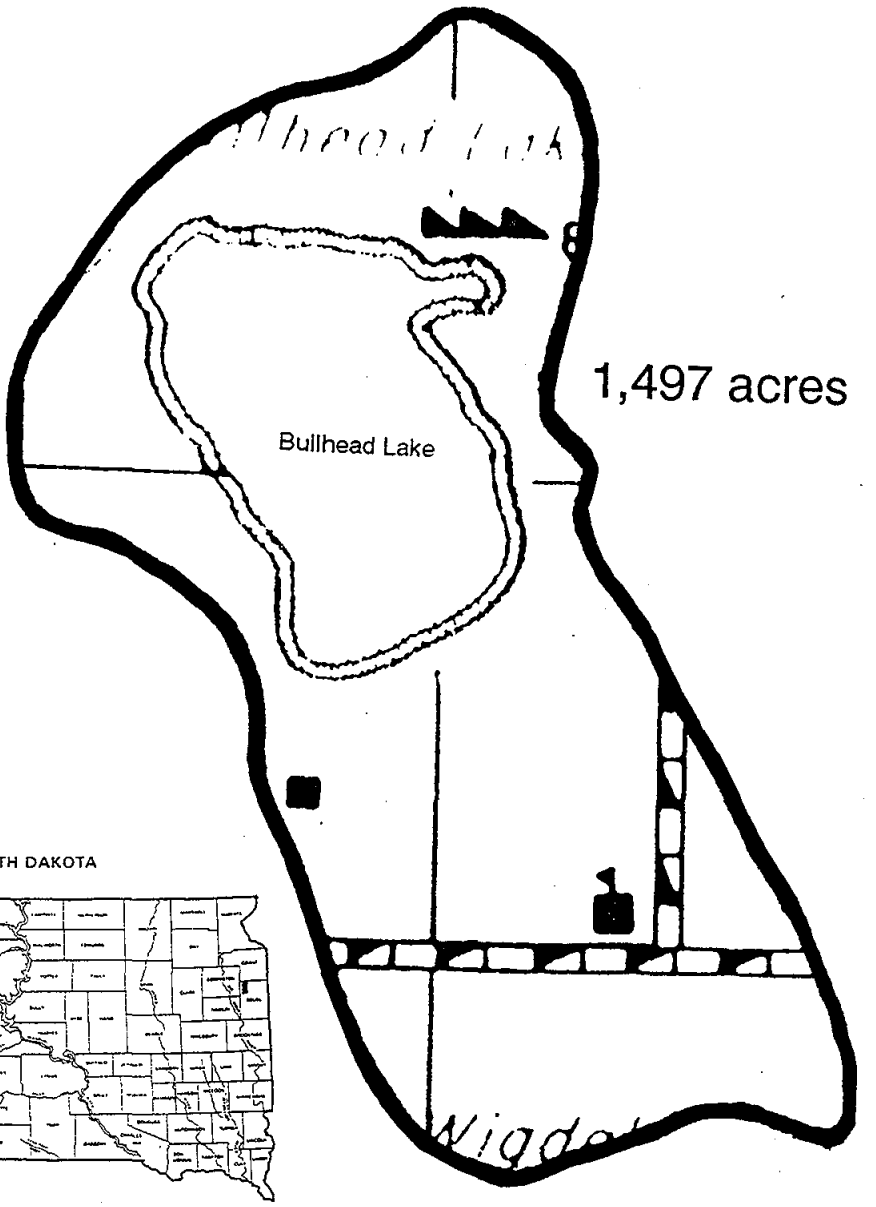


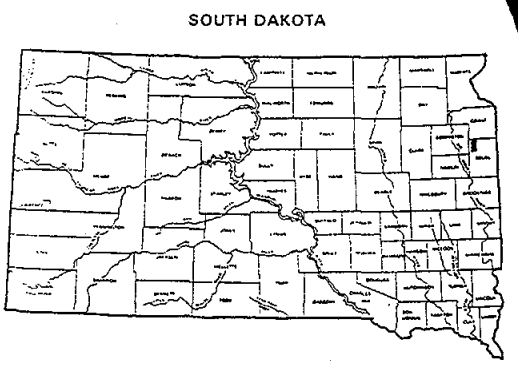
BULLHEAD LAKE 8/31/94

Dissolved Oxygen & Temperature Profile



Bullhead Lake

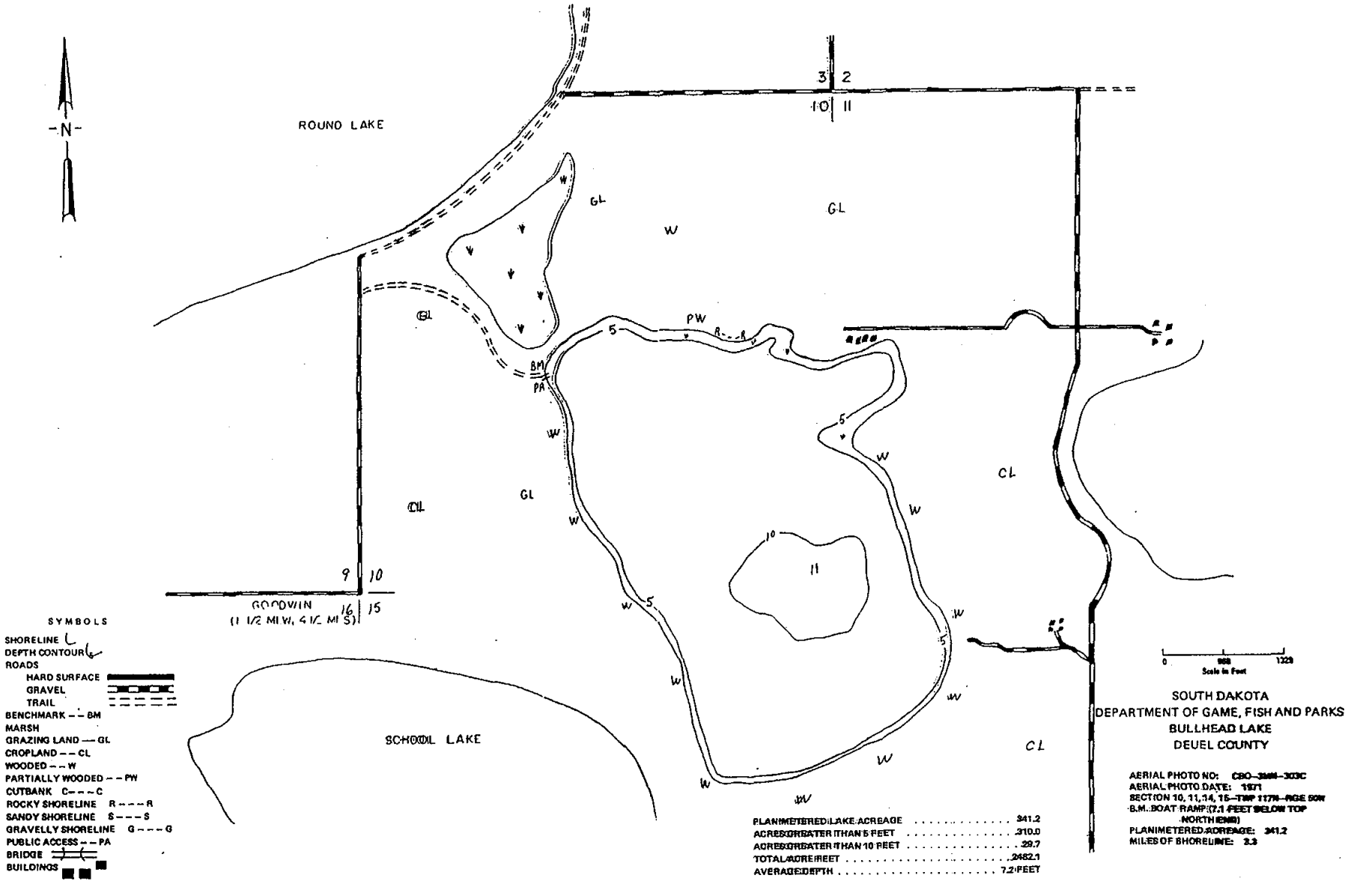


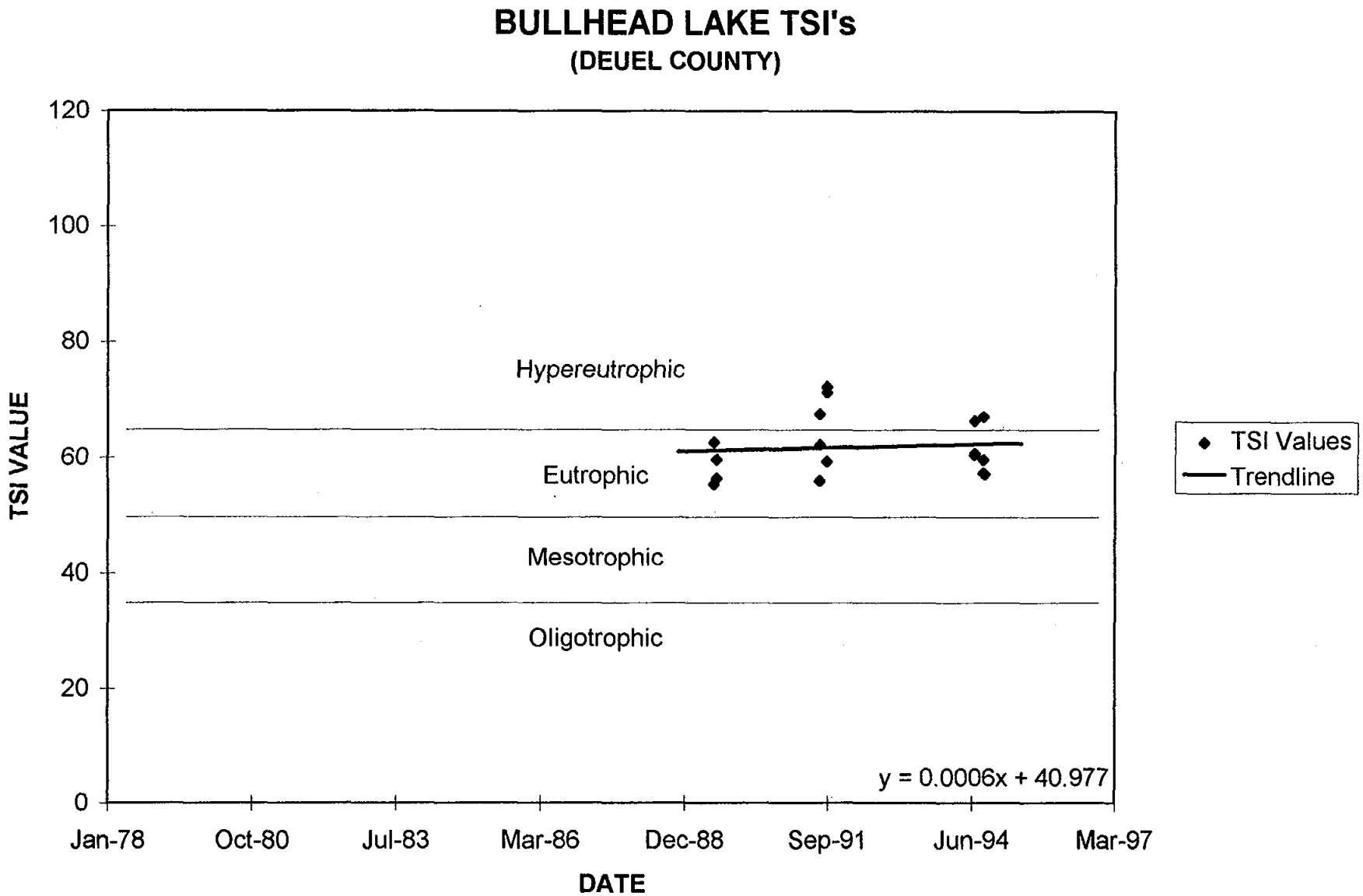


SCALE

0 1

MILES


N
ROUND LAKE
SCHOOL LAKE
GOODWIN
(1 1/2 MI W, 4 1/2 MI S)
GL
W
CL
PW
BM
PA
3
2
10
11
9
10
16
15
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK -- BM
MARSH
GRAZING LAND — GL
CROPLAND -- CL
WOODED -- W
PARTIALLY WOODED -- PW
CUTBANK C--- C
ROCKY SHORELINE R--- R
SANDY SHORELINE S--- S
GRAVELLY SHORELINE G--- G
PUBLIC ACCESS -- PA
BRIDGE
BUILDINGS
PLANIMETERED LAKE ACREAGE 341.2
ACRES GREATER THAN 5 FEET 310.0
ACRES GREATER THAN 10 FEET 29.7
TOTAL ACRE FEET 2482.1
AVERAGE DEPTH . . . . . 7.2 FEET
0
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
BULLHEAD LAKE
DEUEL COUNTY
AERIAL PHOTO NO: CBO-
AERIAL PHOTO DATE: 1971
SECTION 10, 11, 14, 15—TWP 117N—RGE 50W
B.M. BOAT RAMP (7.1 FEET BELOW TOP NORTH END)
PLANIMETERED ACREAGE: 341.2
MILES OF SHORELINE: 3.3


BULLHEAD LAKE TSI's
(DEUEL COUNTY)
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0006x + 40.977
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

BURKE LAKE

County: Gregory
Latitude: 43 deg. 10 min. 34 sec. N
Longitude: 99 deg. 15 min. 28 sec.
Area: 27 acres (10.9 ha)
Maximum Depth: 14 ft (4 m)
Volume: 157.2 acre-ft ($1.94X10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Coon Creek
Outlet: Coon Creek

Township: 97 N
Range: 71 W
Section (s): 33-34
Shoreline L: 1.2 mi (1.9 km)
Mean Depth: 5.8 ft (1.8 m)
Watershed/Lake Area: 58.1
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation waters
(7) Immersion recreation waters
(8) Limited contact recreation waters
(9) Wildlife propagation and stock watering waters

Estimated Population within 65-mile Radius: 66,267
Ownership Status: State owned
Public Interest: City of Burke

	1989		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.00	4	23.00
Air Temperature (°C)	4	16.10	4	23.00
Secchi Disk Depth (meters)	2	0.30	2	0.41
Conductivity (cond/25° C)	2	396	-	-
Turbidity (NTU)	-	-	2	33
Lab pH (su)	-	-	-	-
Field pH (su) (su)	4	8.48	4	8.28
Total Alkalinity (mg/l)	4	196	1	190
Total Solids (mg/l)	4	326	1	296
Dissolved Solids (mg/l)	4	386	1	275
Suspended Solids (mg/l)	4	41	1	21
Volatile Suspended Solids (mg/l)	2	21	-	-
Ammonia Nitrogen (mg/l)	4	0.45	4	0.09
Nitrate + Nitrite Nitrogen (mg/l)	4	0.40	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	3.40	4	2.73
Total Phosphorus (mg/l)	4	0.473	4	0.578
Total Dissolved Phosphorus (mg/l)	4	0.189	4	0.432
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	-	-	4	126.75

Year	1991	1994
TSI Values -- Mean:	84.92	82.28
Secchi Disk	77.15	73.04
Total Phosphorus	92.68	95.72
Chlorophyll *a*		78.07

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 60%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

	July 10, 1989	
Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 1,568 A (634.6 ha)

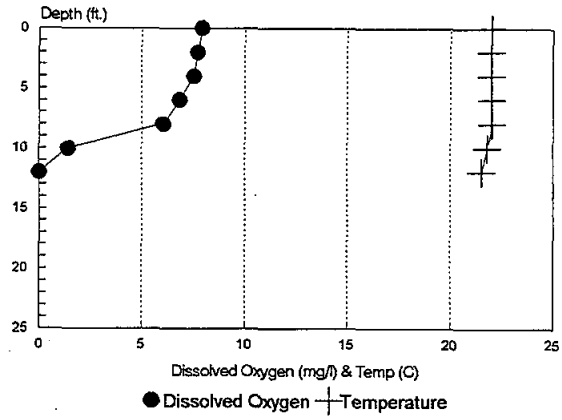
Soil Associations within Watershed

Association	Area (A)	% of Total
AN-HP-TE	1,568	100%

AN-HP-TE Anselmo-Holt-Tassel: Well drained loamy soils on the uplands underlain by sand or sand and gravel.

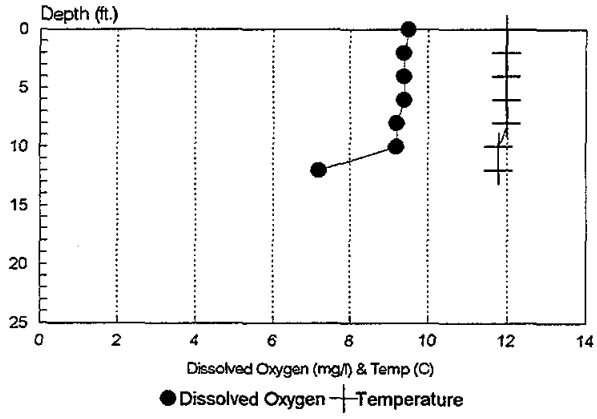
BURKE LAKE 9/7/91

Dissolved Oxygen & Temperature Profile



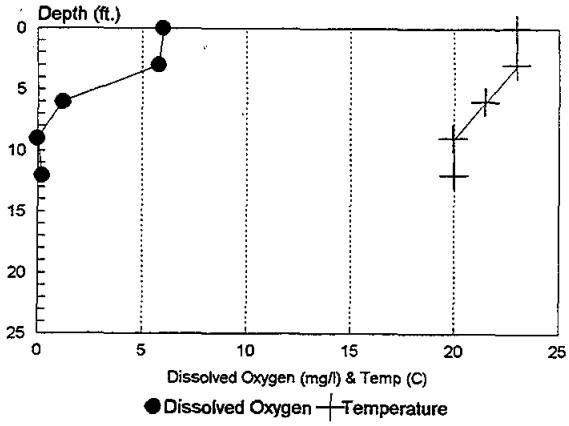
BURKE LAKE 9/24/91

Dissolved Oxygen & Temperature Profile



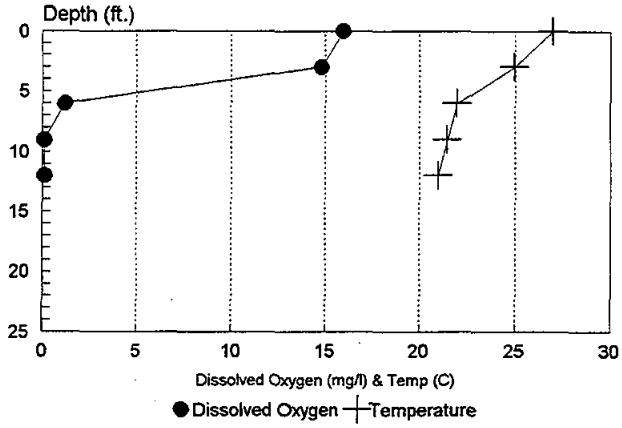
BURKE LAKE 6/15/94

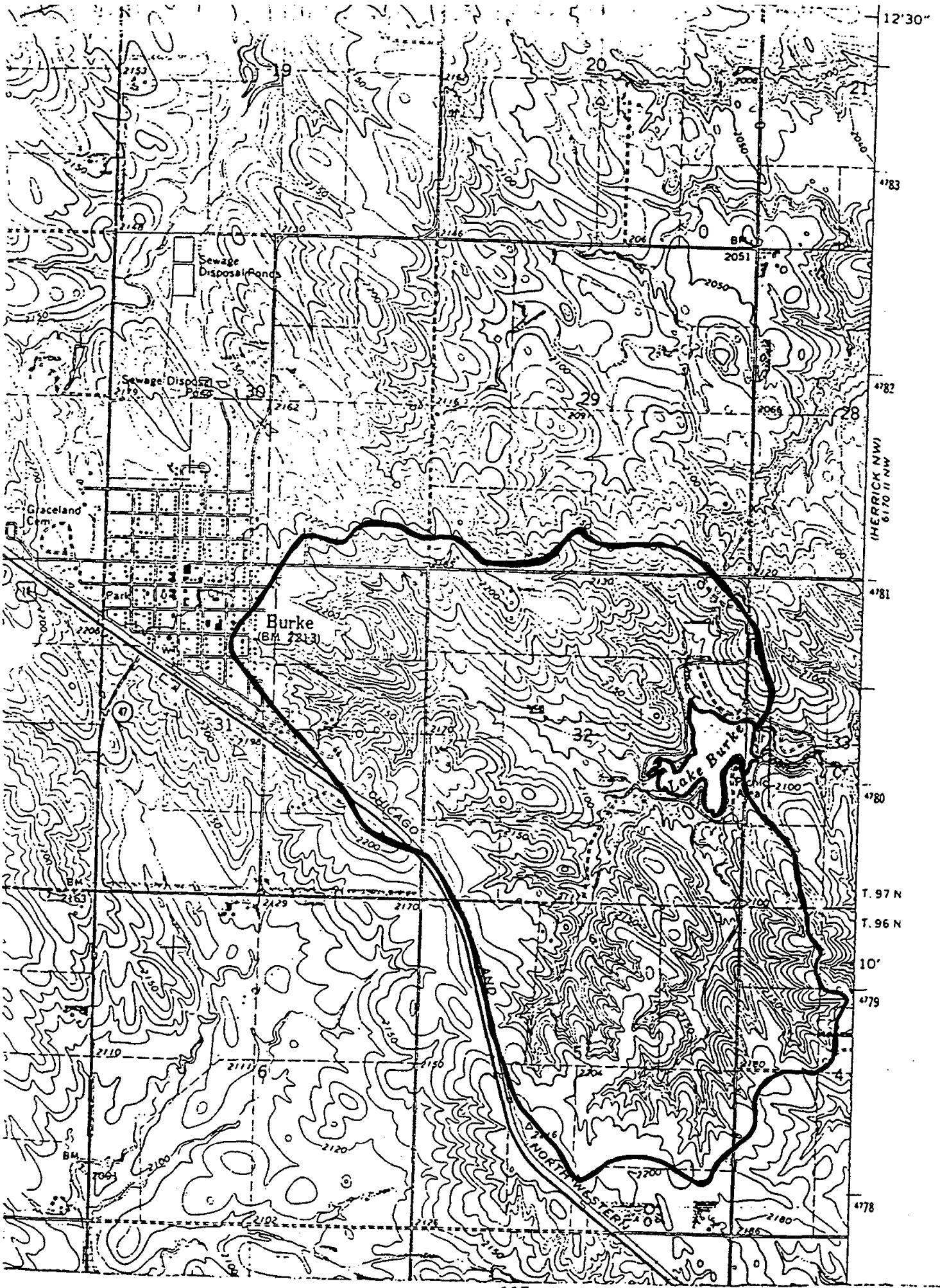
Dissolved Oxygen & Temperature Profile



BURKE LAKE 8/15/94

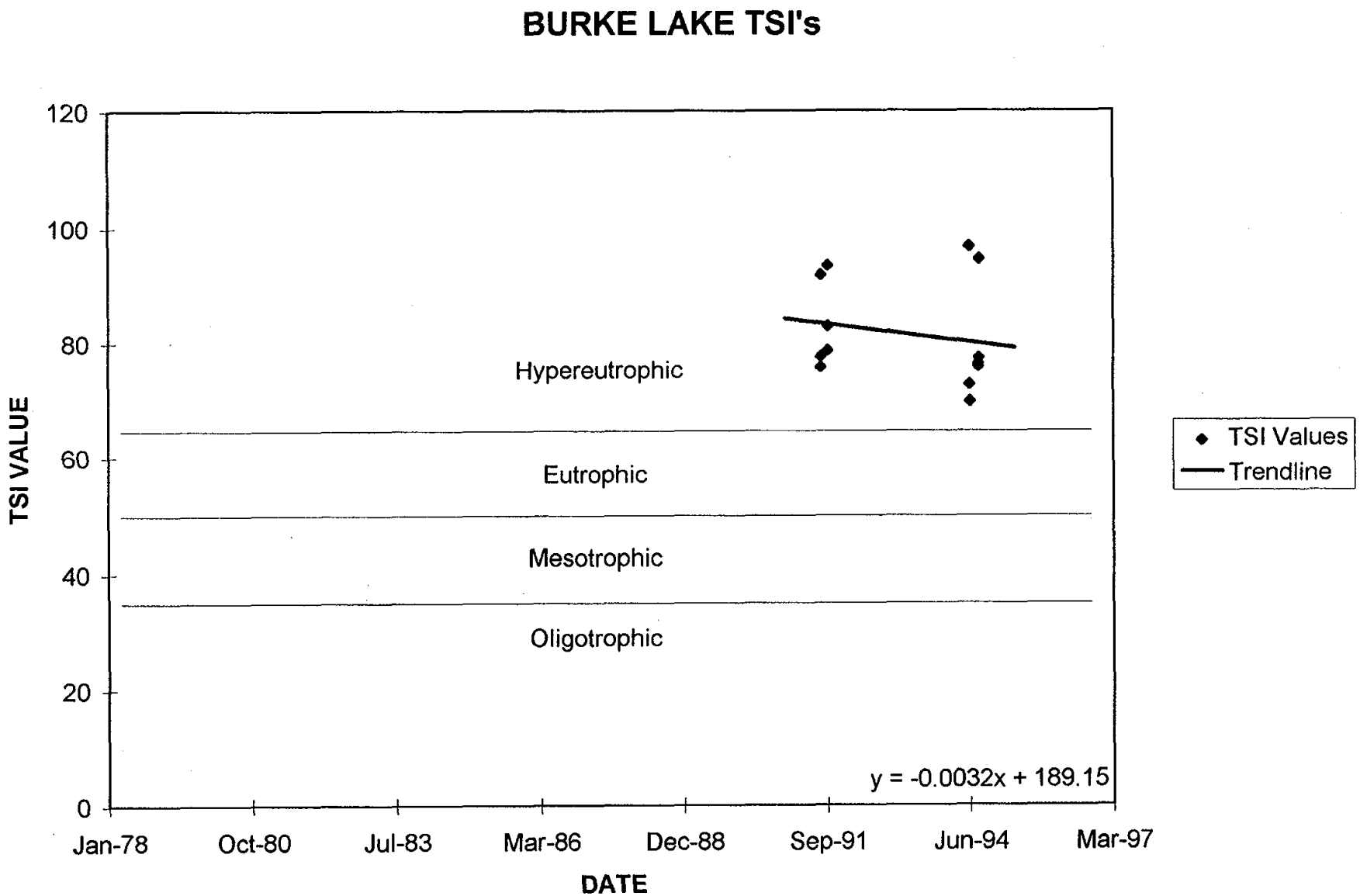
Dissolved Oxygen & Temperature Profile




12'30"
Sewage Disposal Ponds
Sewage Disposal Ponds
Graceland Cem.
Park
Burke
(BM 2213)
Lake Burke
CHICAGO
AND
NORTHWESTERN
(HERRICK NW)
6170 II NW
T. 97 N
T. 96 N
19
20
21
29
28
30
31
32
33
6
4
10'
4783
4782
4781
4780
4779
4778

Burke Lake

Note: Survey Data Collected 2/16/89.
Scale: 1 INCH = 180 FEET


BURKE LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0032x + 189.15
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE BYRON

County: Beadle
Latitude: 44 deg. 33 min. 54 sec. N
Longitude: 98 deg. 08 min. 24 sec. W
Area: 1,749 A (707.7 ha)
Maximum Depth: 10 ft (3.0 m)
Volume: 11,710 acre-ft (1.45 x $10^7 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): Foster Creek
Outlet: unnamed

Township: 113N
Range: 61W
Section (s): 22, 23, 25-26 28, 34, 35
Shoreline L: 12.4 mi (20 km)
Mean Depth: 8 ft (2.4 m)
Watershed/Lake Area: 66
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
(10) Irrigation

Estimated Population within 65-mile Radius: 79,074
Ownership Status: Private and State owned
Public Interest: Lake Byron Lake Association.

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.75	4	24.78	2	21.00
Air Temperature (°C)	4	20.50	4	24.92	2	20.60
Secchi Disk Depth (meters)	2	0.34	4	0.40	2	0.30
Conductivity (cond/25° C)	4	1,755	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.70	4	9.78	-	-
Total Alkalinity (mg/l)	4	208	4	210	2	272
Total Solids (mg/l)	4	1,417	4	1,594	2	1,959
Dissolved Solids (mg/l)	4	1,357	4	1,468	2	1,805
Suspended Solids (mg/l)	4	60	4	49	2	60
Volatile Suspended Solids (mg/l)	-	-	4	22	2	22
Ammonia Nitrogen (mg/l)	4	0.44	4	0.44	2	0.04
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.63	2	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.34	4	2.24	2	1.97
Total Phosphorus (mg/l)	4	0.281	4	0.390	2	0.249
Total Dissolved Phosphorus (mg/l)	-	-	-	0.292	2	0.146
Ortho Phosphate as P (mg/l)	4	0.065	-	-	-	-
Chlorophyll (mg/m^3)	-	-		-	-	-

	1994	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	21.88
Air Temperature (°C)	4	20.60
Secchi Disk Depth (meters)	4	0.30
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	4	6.49
Lab pH (su)	-	-
Field pH (su) (su)	4	8.23
Total Alkalinity (mg/l)	4	176
Total Solids (mg/l)	4	1,139
Dissolved Solids (mg/l)	4	1,104
Suspended Solids (mg/l)	4	35
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.35
Nitrate + Nitrite Nitrogen (mg/l)	4	0.25
Total Kjeldahl Nitrogen (mg/l)	4	1.89
Total Phosphorus (mg/l)	4	0.346
Total Dissolved Phosphorus (mg/l)	4	0.253
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	2	12.06

Year	1989	1991	1992	1994
TSI Values -- Mean:	80.77	81.64	80.45	73.65
Secchi Disk	75.77	73.08	77.14	77.37
Total Phosphorus	85.77	90.21	83.75	88.58
Chlorophyll *a*				55.00

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 40% - 50% %
Type of Vegetation: cattail, reed and bulrush, abd prairie cord grgass

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus.

Algal Species and Densities

Taxa	June 13, 1989 Number	June 13, 1989 Units/ml	July 11, 1989 Number	July 11, 1989 Units/ml
Chlamydomonas	187	10,067	-	-
Cyclotella meneghiniana	34	1830	-	-
Algae (other)	31	1669	3	277
Cryptomonas sp. #1	28	1507	-	-
Green Algae (other)	6	323	-	-
Marssoniella	3	161	-	-
Characium	3	161	-	-
Blue-green (other)	3	161	1	92
Diatom (centric)	3	161	-	-
Cryptomonas	2	108	-	-
Lyngbya Diguetii	2	108	-	-
Tetrastrum	1	54	-	-
Dactylococcopsis	1	54	-	-
Nephrocytium	1	54	-	-
Cryptomonas ovata	1	54	-	-
Aphanizomenon flos-aquae	-	-	294	27,150
Lyngbya	-	-	6	554
Algae (flagellate)	-	-	1	92
Total	306	16,473	305	28,166

Watershed Description

Watershed Area: 115,350 A (46,682 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
PF-CJ	68,303	58.8
FU-BY	10,000	8.6
LD	9,779	8.4
CZ-EN	9,500	8.2
FU	8,234	7.1
B3-EU	4,262	3.7
HR-PR	3,705	3.2
B3-LC	174	.2

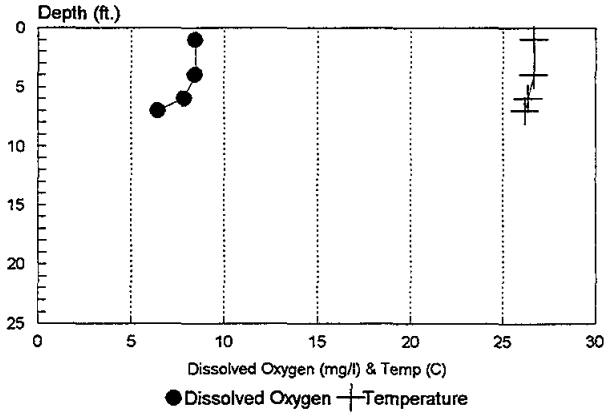
PF-CJ Peever-Cavour: Well drained nearly level to gently sloping loamy soils and soils with claypan subsoils, both formed in firm clay loam and glacial till.

FU-BY Forman-Buse: Well drained,undulating to hilly loamy soils formed in glacial till.

LD	Lamour: Poorly drained, nearly level silty soils.
CZ-EN	Carthage-Enet: Deep moderately well drained and well drained, nearly level to undulating loamy soils formed in glacial outwash; on uplands and upland terraces.
FU	Forman: Well drained, nearly level to undulating loamy soils.
B3-EU	Betts-Ethan: Deep excessively drained and well drained, gently rolling to steep loamy soils formed in glacial till; on uplands.
HR-PR	Houdek-Prosper: Deep well drained and moderately well drained, nearly level to gently rolling, loamy soils formed in glacial till, on uplands.
B3-LC	Betts-Lamo: Deep, excessively drained, gently rolling to steep, loamy soils formed in glacial till, on uplands; and deep, somewhat poorly drained, nearly level, silty soils formed in alluvium; on bottom land.

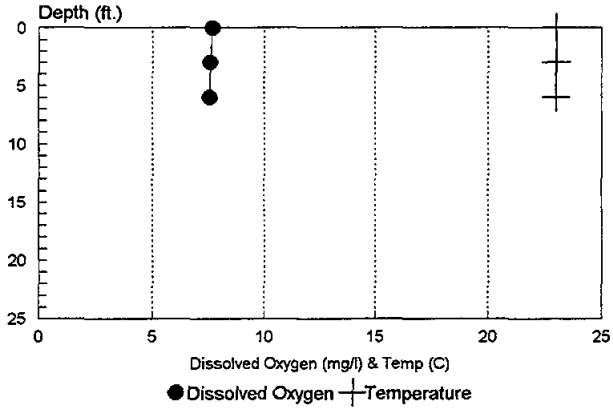
LAKE BYRON 8/7/79

Dissolved Oxygen & Temperature Profile



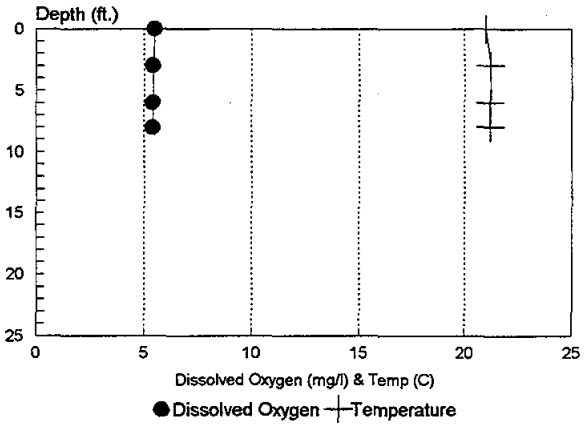
LAKE BYRON 6/21/94

Dissolved Oxygen & Temperature Profile

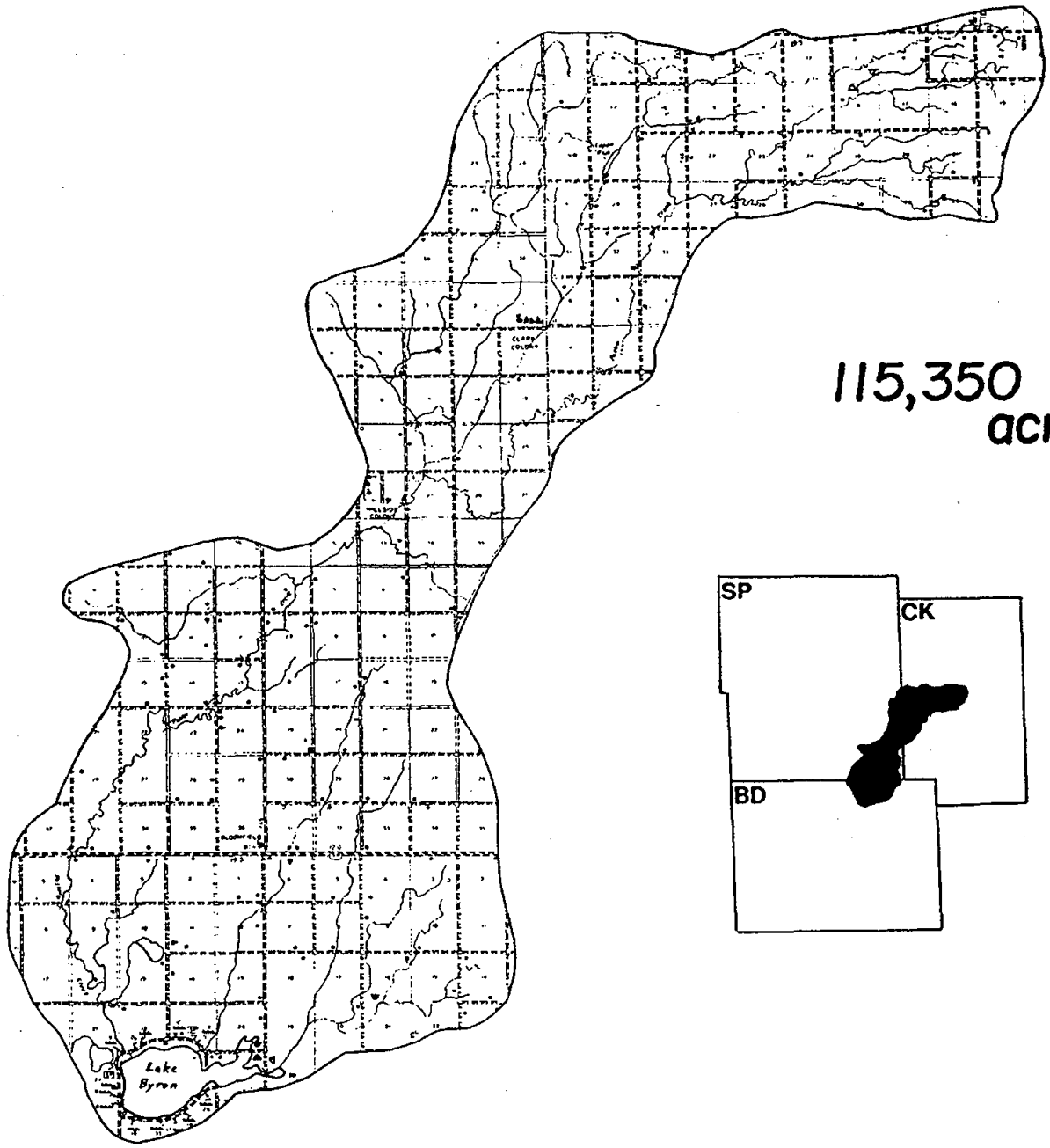


LAKE BYRON 8/23/94

Dissolved Oxygen & Temperature Profile



Lake Byron

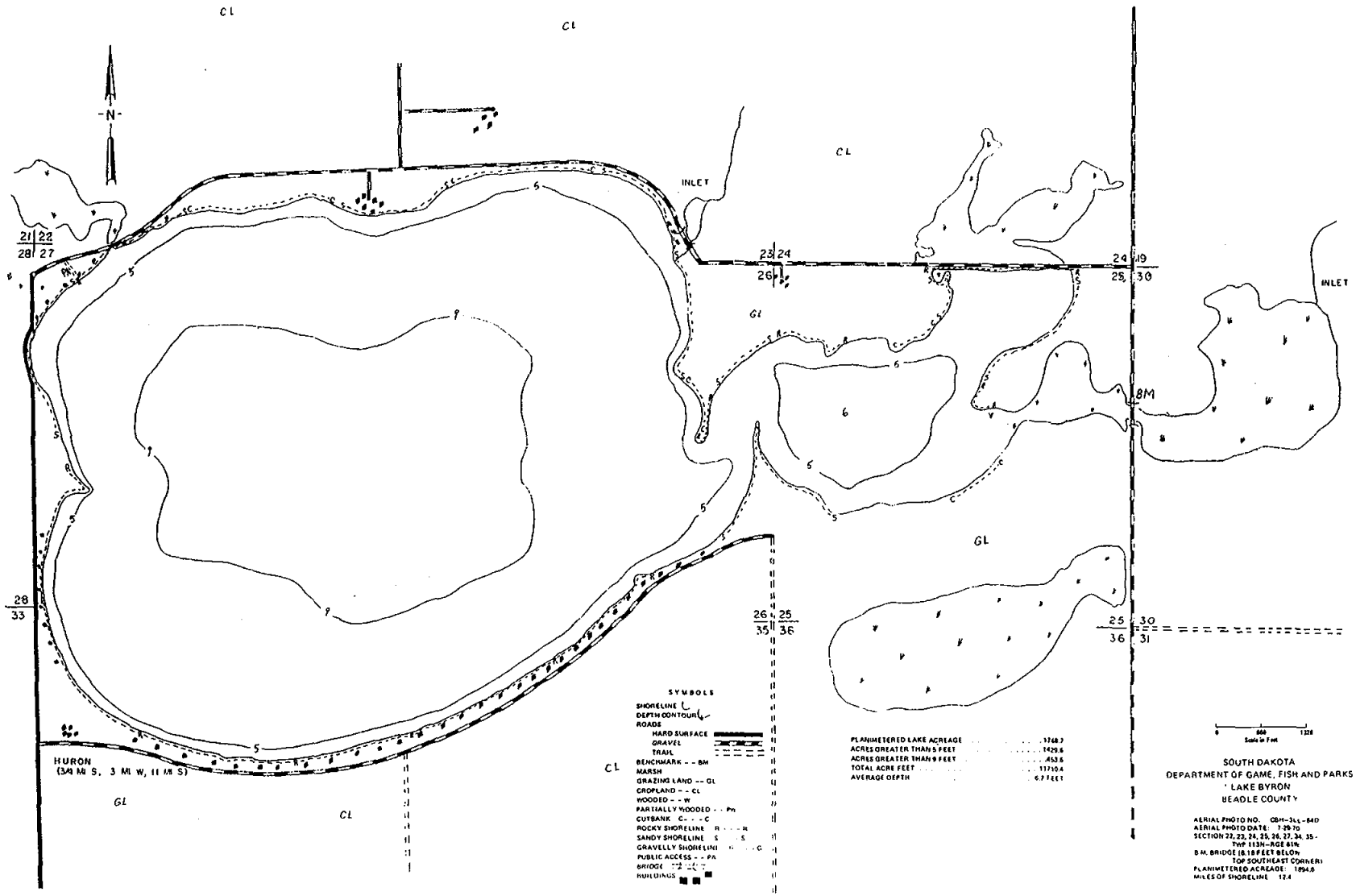


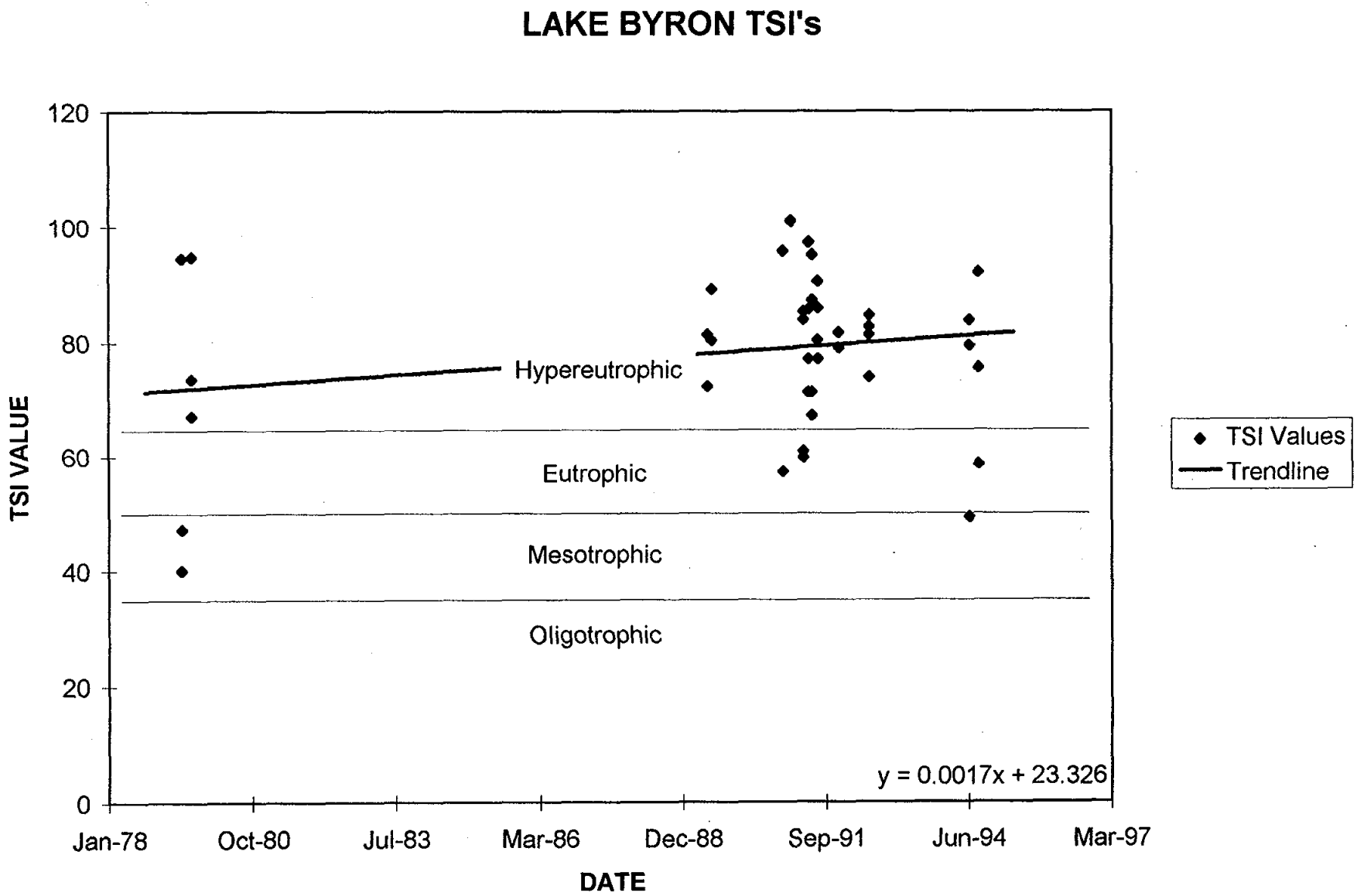
115,350 acres

Scale

0 5 10 15

Miles


CL
CL
CL
INLET
INLET
-N-
21 22
28 27
23 24
26
24 19
25 30
GL
BM
GL
28
33
26 25
35 36
25 30
36 31
HURON
(34 MI S, 3 MI W, 11 MI S)
GL
CL
CL
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK - - BM
MARSH
GRAZING LAND -- GL
CROPLAND - - CL
WOODED - - W
PARTIALLY WOODED - - PW
CUTBANK C - - C
ROCKY SHORELINE R - - R
SANDY SHORELINE S - - S
GRAVELLY SHORELINE G - - G
PUBLIC ACCESS - - PA
BRIDGE
BUILDINGS
PLANIMETERED LAKE ACREAGE 1768.7
ACRES GREATER THAN 5 FEET 1429.6
ACRES GREATER THAN 9 FEET 453.6
TOTAL ACRE FEET 11710.4
AVERAGE DEPTH 6.7 FEET
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE BYRON
BEADLE COUNTY
AERIAL PHOTO NO. CBH-3L-840
AERIAL PHOTO DATE: 7-29-70
SECTION 22, 23, 24, 25, 26, 27, 34, 35 -
TWP 113N-RGE 61W
B.M. BRIDGE (8.18 FEET BELOW
TOP SOUTHEAST CORNER)
PLANIMETERED ACREAGE: 1894.8
MILES OF SHORELINE 12.4


LAKE BYRON TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0017x + 23.326
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE CAMPBELL

County: Brookings
Latitude: 44 deg. 12 min. 30 sec. N
Longitude: 96 deg. 50 min. 43 sec.
Area: 796 A (322.1 ha)
Maximum Depth: 7 ft (2.1 m)
Volume: 4000 acre-ft (4.934 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): Battle Creek
Outlet: Big Sioux River

Township: 109N
Range: 50W
Section (s): 28, 29, 32, 33
Shoreline L: 7.2 mi (11.6 km)
Mean Depth: 4 ft (1.2 m)
Watershed/Lake Area: 130
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Lake Campbell Improvement Association

	1991		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	32	22.08	4	21.60
Air Temperature (°C)	32	23.44	4	22.60
Secchi Disk Depth (meters)	24	0.40	2	0.52
Conductivity (cond/25° C)	-	-	-	-
Turbidity (NTU)	-	-	4	13.78
Lab pH (su)	32	8.60	-	-
Field pH (su) (su)	-	-	4	8.39
Total Alkalinity (mg/l)	32	143	4	185
Total Solids (mg/l)	32	797	4	1,168
Dissolved Solids (mg/l)	23	762	4	1,150
Suspended Solids (mg/l)	32	36	4	18
Volatile Suspended Solids (mg/l)	32	16	-	-
Ammonia Nitrogen (mg/l)	32	0.21	4	0.35
Nitrate + Nitrite Nitrogen (mg/l)	32	0.50	4	0.15
Total Kjeldahl Nitrogen (mg/l)	32	1.82	4	1.87
Total Phosphorus (mg/l)	32	0.191	4	0.222
Total Dissolved Phosphorus (mg/l)	32	0.099	4	0.151
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	1	33.50	2	51.09

Year	1991	1994
TSI Values -- Mean:	72.61	73.69
Secchi Disk	73.36	69.43
Total Phosphorus	79.44	82.48
Chlorophyll *a*	65.02	69.16

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5% shoreline
Type of Vegetation: Cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus, P. foliosus, and Zannichellia palustris.

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 103,762 A (41,991 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
EF-YH	83,010	80
EF-WF	17,640	17
DX	3,113	3

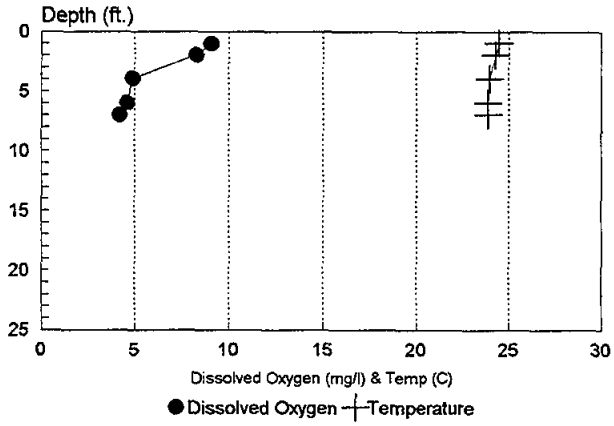
EF-VH Egan-Viborg: Well drained and moderately well drained, nearly level to sloping, silty soils.

EF-WF Egan-Wentworth: Well drained, gently undulating to rolling, silty soils.

DX Dempster: Nearly level to sloping, well drained, silty soils formed in alluvium over sand and gravel, on stream terraces and uplands.

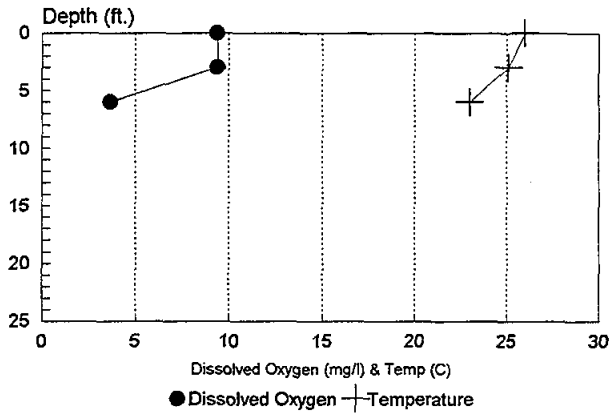
LAKE CAMPBELL 8/2/79

Dissolved Oxygen & Temperature Profile



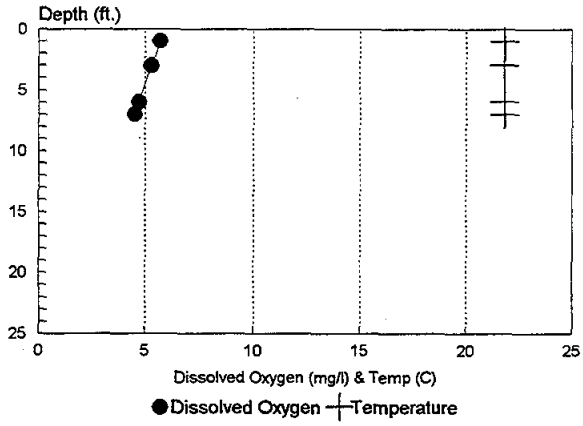
LAKE CAMPBELL 6/21/94

Dissolved Oxygen & Temperature Profile



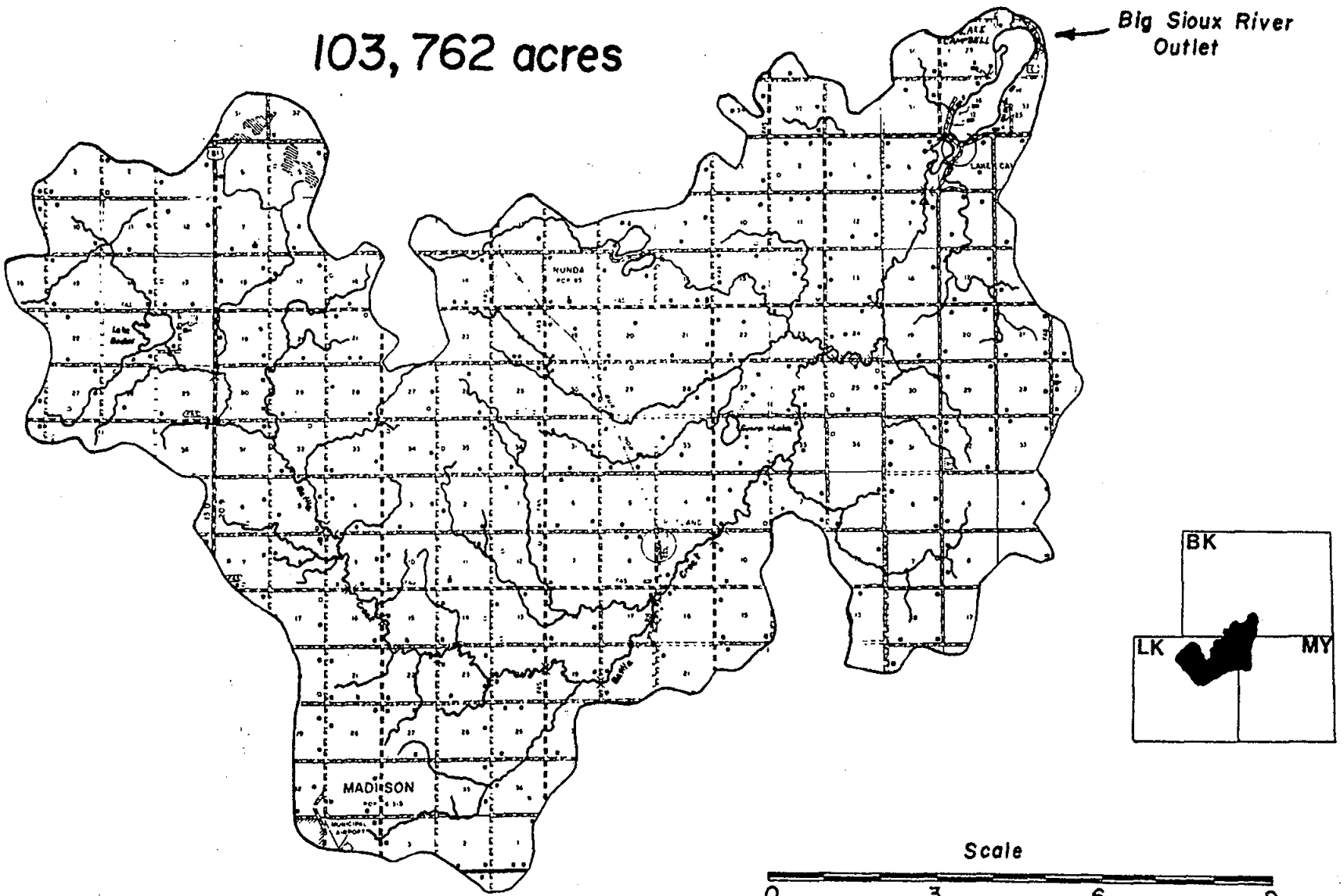
LAKE CAMPBELL 8/24/94

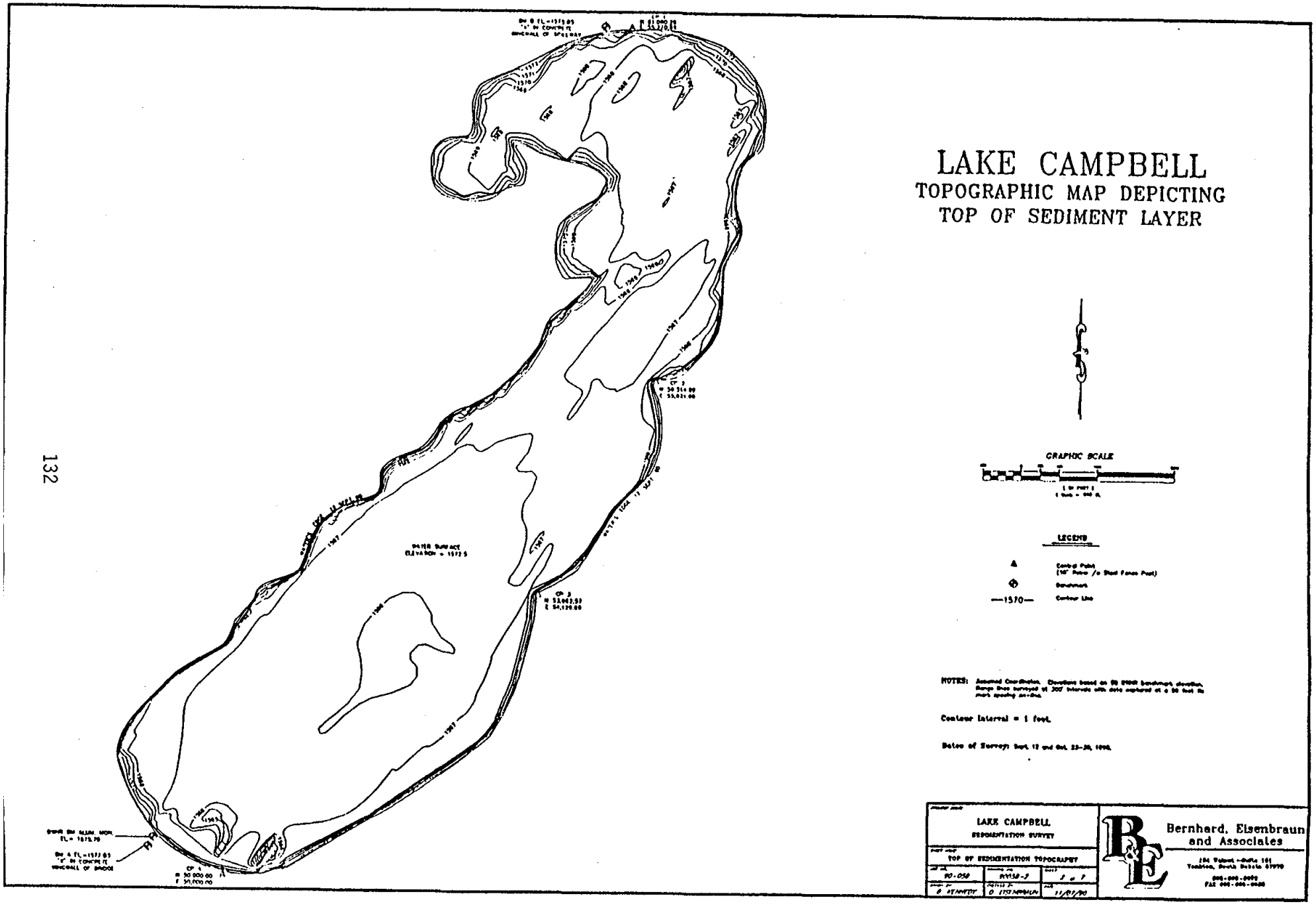
Dissolved Oxygen & Temperature Profile

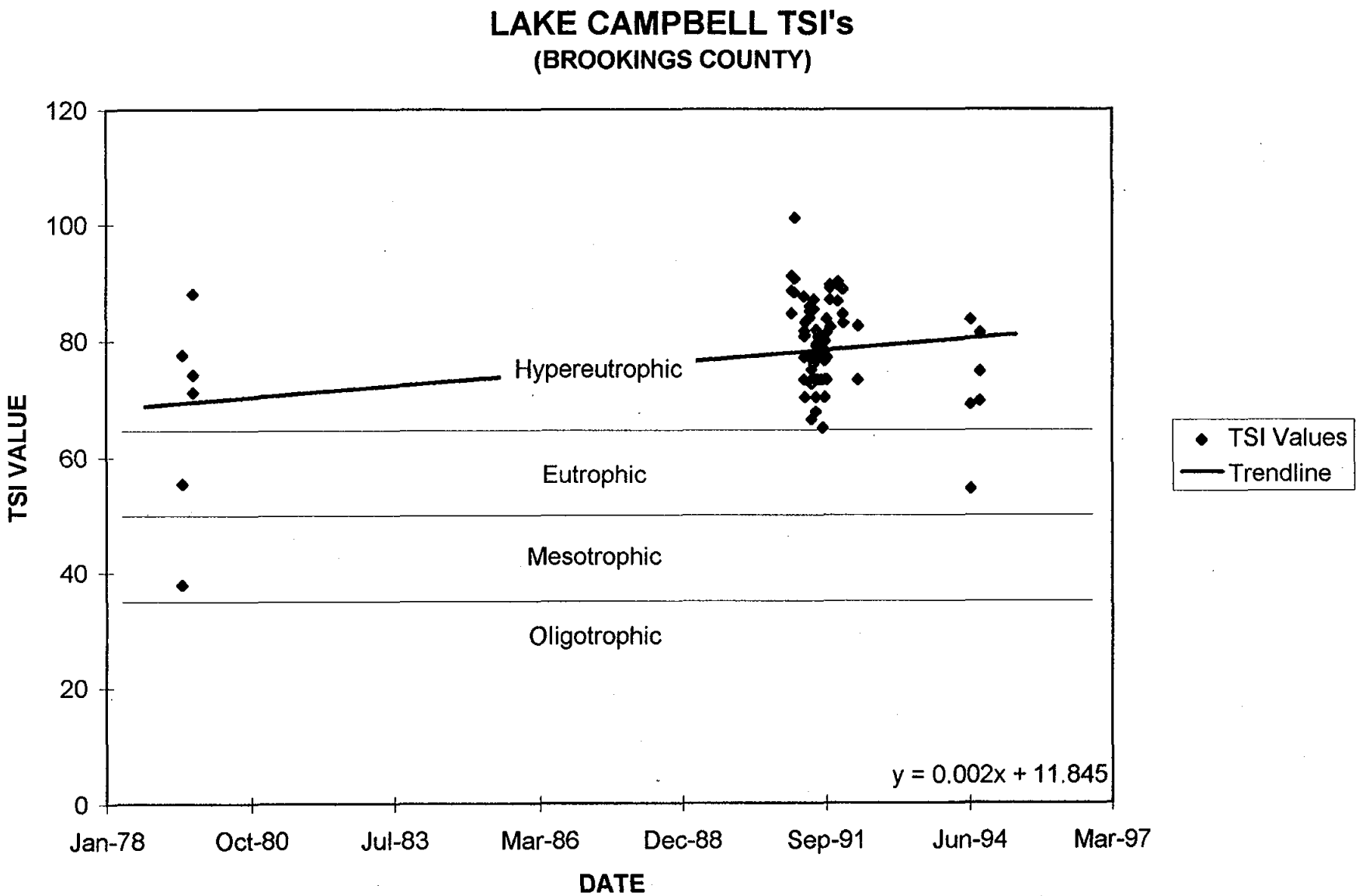


Lake Campbell

103,762 acres




LAKE CAMPBELL
TOPOGRAPHIC MAP DEPICTING
TOP OF SEDIMENT LAYER
GRAPHIC SCALE
LEGEND
Contour Line
—1570—
NOTES:
Contour Interval = 1 foot.
LAKE CAMPBELL
SEDIMENTATION SURVEY
TOP OF SEDIMENTATION TOPOGRAPHY
Bernhard, Eisenbraun and Associates


LAKE CAMPBELL TSI's
(BROOKINGS COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.002x + 11.845
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE CAMPBELL

County: Campbell
Latitude: 45 deg. 44 min. 18 sec. N
Longitude: 100 deg. 07 min. 54 sec. W
Area: 45.9 A (18.6 ha)
Maximum Depth: 17 ft (5.1 m)
Volume: 355.3 acre-ft (4.38 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: Olson Creek

Township: 126N
Range: 77W
Section (s): 10, 11, 15
Shoreline L: 3.1 mi (5 km)
Mean Depth: 7.7 ft (2.4 m)
Watershed/Lake Area: 232
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 41,654
Ownership Status: State owned
Public Interest: Campbell County Sportsmans Club.

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.38	4	23.03	4	20.13
Air Temperature (°C)	4	23.33	4	27.79	4	19.50
Secchi Disk Depth (meters)	2	0.61	2	1.47	2	0.40
Conductivity (cond/25° C)	4	411	2	564	-	-
Turbidity (NTU)	-	-	-	-	4	16.75
Lab pH (su)	4	8.17	-	-	-	-
Field pH (su) (su)	-	-	4	8.98	4	8.17
Total Alkalinity (mg/l)	4	142	4	194	4	197
Total Solids (mg/l)	4	297	4	391	4	430
Dissolved Solids (mg/l)	4	285	4	379	4	421
Suspended Solids (mg/l)	4	12	4	13	4	10
Volatile Suspended Solids (mg/l)	-	-	2	9	-	-
Ammonia Nitrogen (mg/l)	4	0.25	4	0.07	4	0.13
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.33	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.61	4	1.35	4	2.49
Total Phosphorus (mg/l)	4	0.712	4	0.570	4	0.930
Total Dissolved Phosphorus (mg/l)	-	-	4	0.489	4	0.831
Ortho Phosphate as P (mg/l)	4	0.480	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-	2	56.53

Year	1989	1991	1994
TSI Values -- Mean:	81.20	74.76	81.65
Secchi Disk	67.14	54.41	73.22
Total Phosphorus	95.26	95.12	101.57
Chlorophyll *a*			70.15

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 80-90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton sp.

Algal Species and Densities

	July 18, 1989	
Taxa	Number	Units/ml
Algae (other)	99	2,216
Oocystis	61	1,365
Cryptomonas	52	1,164
Algae (flagellate)	24	537
Lagerheimia	23	515
Anabaena	10	224
Green Algae (other)	9	201
Cryptomonas sp. #1	8	179
Scenedesmus	5	112
Characium	2	45
Cryptomonas ovata	2	45
Chroococcus	2	45
Aphanocapsa	1	22
Diatom (pennate)	1	22
Crucigenia	1	22
Total	300	6,714

Watershed Description

Watershed Area: 10,651 A (4,310 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
BR-GA	10,651	100

BR-GA Bryant-Grassna: Deep, well drained and moderately well drained nearly level to moderately sloping silty soils on uplands and upland swales.

Pollution Problems

Non-Point Pollution Sources

Shoreline Erosion: slight

Land Use: 51% cropland, 49% range or pasture.

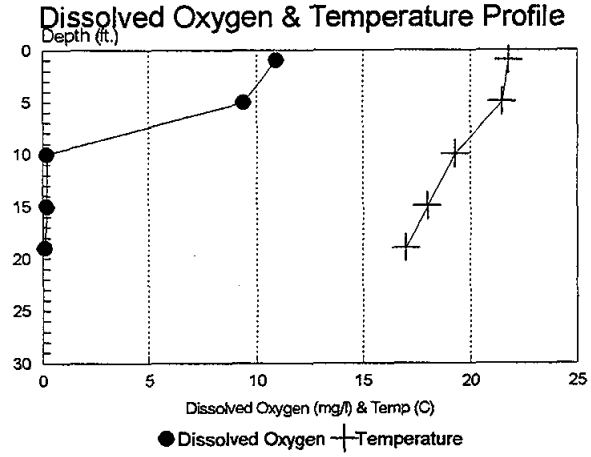
Point Source Pollution Sources

No point source pollution sources were listed.

CAMPBELL LAKE 8/22/79

(Campbell Co.)

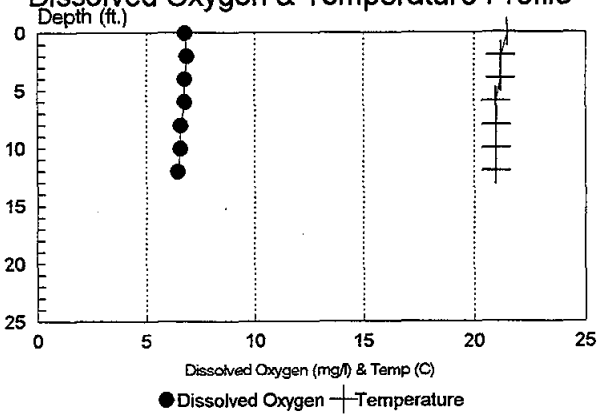
Dissolved Oxygen & Temperature Profile



CAMPBELL LAKE 6/24/91

(Campbell Co.)

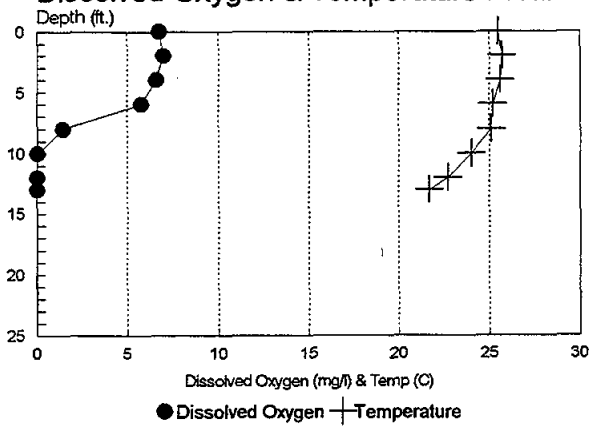
Dissolved Oxygen & Temperature Profile



CAMPBELL LAKE 8/28/91

(Campbell Co.)

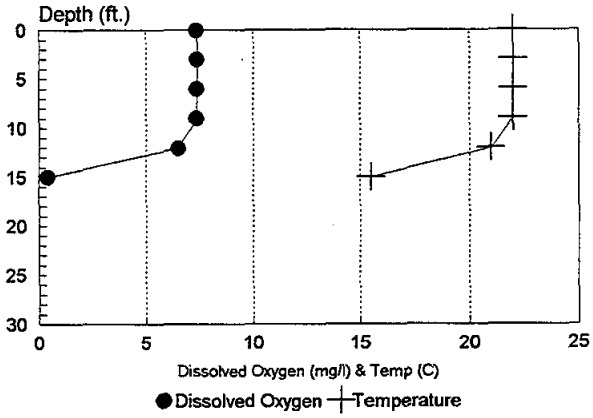
Dissolved Oxygen & Temperature Profile



LAKE CAMPBELL 6/27/94

(Campblell Co.)

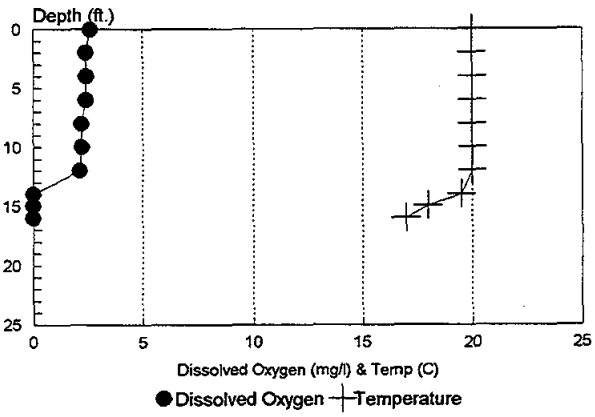
Dissolved Oxygen & Temperature Profile



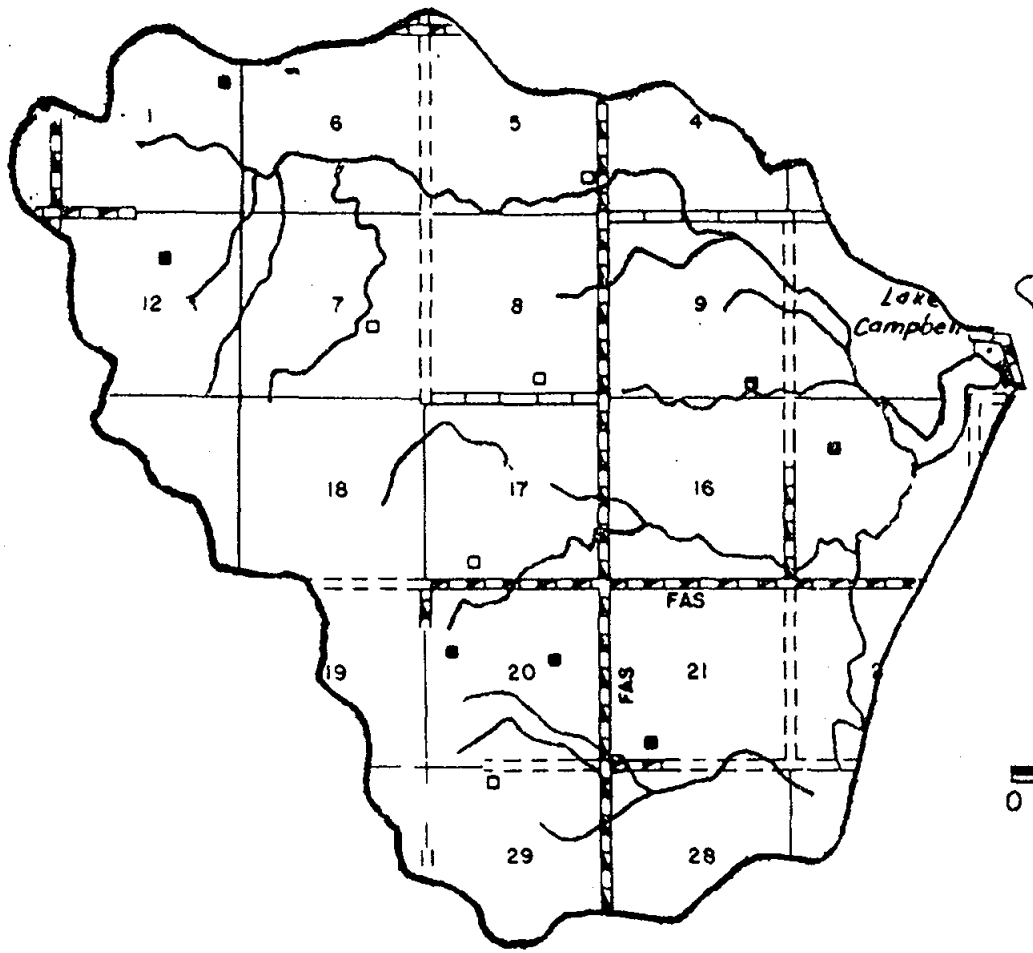
LAKE CAMPBELL 8/30/94

(Campbell Co.)

Dissolved Oxygen & Temperature Profile



Lake Campbell



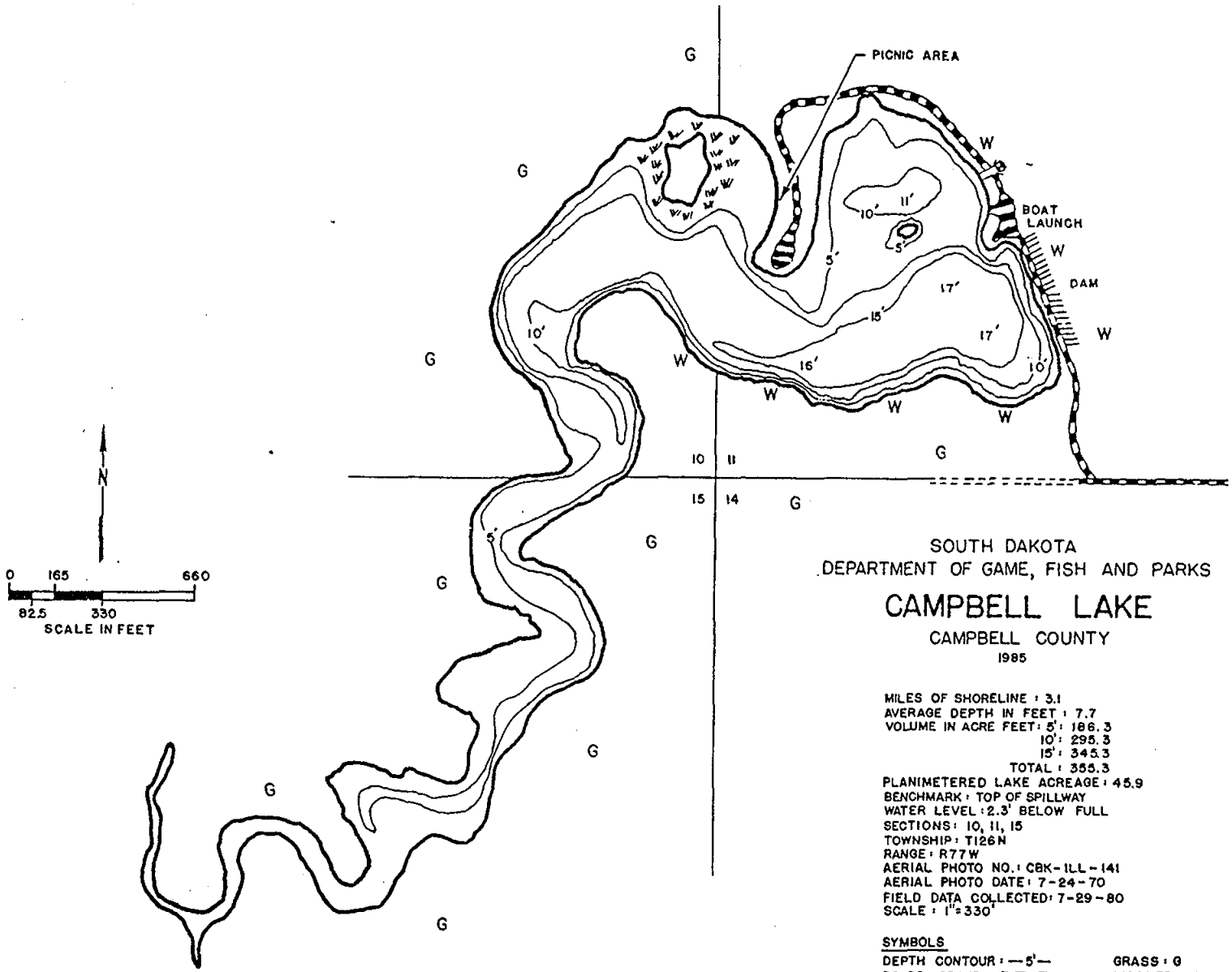
10,651 acres

Olson Creek Outlet

Scale

0 1 2 3

Miles



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

CAMPBELL LAKE

CAMPBELL COUNTY
1985

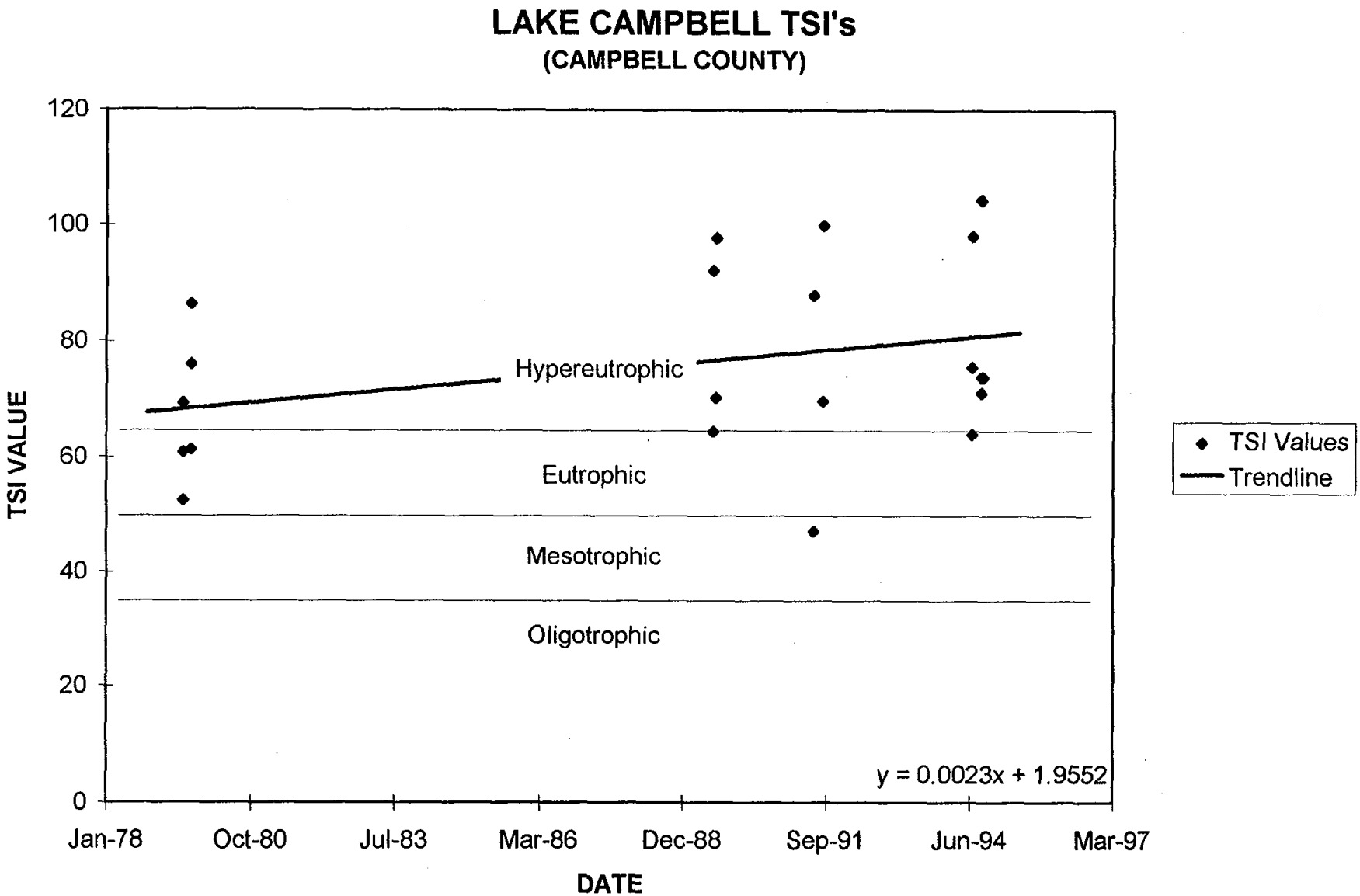
MILES OF SHORELINE : 3.1
AVERAGE DEPTH IN FEET : 7.7
VOLUME IN ACRE FEET: 5' : 186.3
10' : 295.3
15' : 345.3
TOTAL : 355.3
PLANIMETERED LAKE ACREAGE : 45.9
BENCHMARK : TOP OF SPILLWAY
WATER LEVEL : 2.3' BELOW FULL
SECTIONS : 10, 11, 15
TOWNSHIP : T126N
RANGE : R77W
AERIAL PHOTO NO. : CBK-1LL-141
AERIAL PHOTO DATE : 7-24-70
FIELD DATA COLLECTED: 7-29-80
SCALE : 1"=330'

SYMBOLS

DEPTH CONTOUR : —5'—
ROADS : GRAVEL :
TRAIL :
DAM :
GRASS : G
WOODED : W
BENCHMARK :
SPILLWAY :

CAMPBELL LAKE IS OWNED BY CAMPBELL COUNTY.

REPRODUCTION BY PERMISSION
OF THE G,F&P ONLY.


LAKE CAMPBELL TSI's
(CAMPBELL COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0023x + 1.9552
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

CANYON LAKE

County: Pennington
Latitude: 44 deg. 01 min. 04 sec.
Longitude: 103 deg. 17 min 30 sec.
Area: 27 A (10.9 ha)
Maximum Depth: 10 ft (3.01m)
Volume: 135 acre-ft ($1.66x10^5 m^3$)
Origin of Basin: reservoir
Major Inflows (named or permanent streams): Rapid Creek
Outlet: Rapid Creek

Township: 1N
Range: 7E
Section (s): 8
Shoreline L: 1.5 mi (2.4 km)
Mean Depth: 5 ft (1.5m)
Watershed/Lake Area: 9,118
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(1) Domestic water supply
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 148,369
Ownership Status: City owned
Public Interest: City of Rapid City

	1988		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	16	17.36	-	-	4	15.13
Air Temperature (°C)	16	26.08	3	16.30	4	20.00
Secchi Disk Depth (meters)	-	-	2	1.25	2	1.79
Conductivity (cond/25° C)	16	376	-	-	-	-
Turbidity (NTU)	-	-	-	-	4	9.35
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	16	7.89	3	7.58	4	8.11
Total Alkalinity (mg/l)	16	172	3	157	4	154
Total Solids (mg/l)	16	212	3	265	4	239
Dissolved Solids (mg/l)	16	204	3	251	4	237
Suspended Solids (mg/l)	16	8	3	14	4	2
Volatile Suspended Solids (mg/l)	-	-	1	2	-	-
Ammonia Nitrogen (mg/l)	16	0.04	3	0.02	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	16	0.12	3	0.10	4	0.10
Total Kjeldahl Nitrogen (mg/l)	16	0.30	3	0.22	4	0.20
Total Phosphorus (mg/l)	16	0.021	3	0.023	4	0.023
Total Dissolved Phosphorus (mg/l)	-	-	3	0.007	4	0.016
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	4.02	2	28.41

Year	1988	1991	1992
TSI Values -- Mean:	47.81	52.01	55.17
Secchi Disk		56.78	51.60
Total Phosphorus	47.81	55.03	50.59
Chlorophyll *a*		44.22	63.31

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified:
Anacharis canadensis

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 246,189 A (99,633 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#3	14,771	6
#5	142,790	58
#7	14,771	6
#8	7,386	3
#9	64,009	26

#3 Vanocker-Sawdust-Paunsaugunt: Deep and shallow, well drained, gently sloping to very steep, loamy soils formed in material weathered from limestone and calcareous sandstone; on mountains.

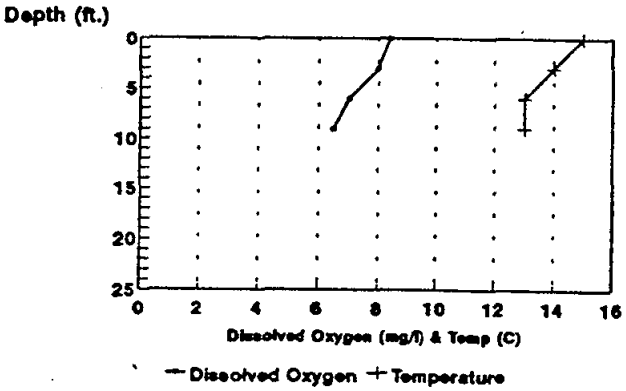
#5 Pactola-Rock Outcrop-Virkul: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from steeply tilted metamorphic rock; on mountains.

#7 Heely-Cordeston: Moderately deep and deep, well drained, nearly level to steep, loamy soils formed in material weathered from steeply tilted metamorphic rock and in alluvium; on mountain prairies.

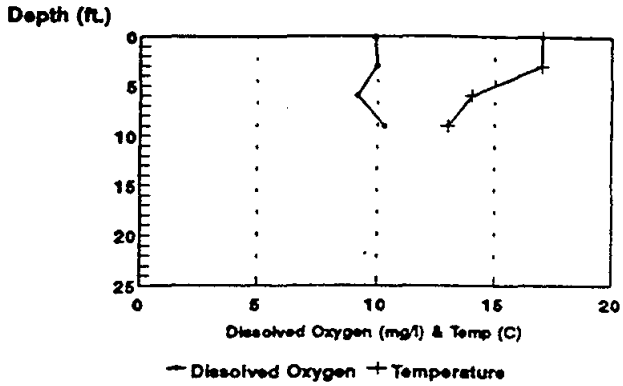
#8 Grummit-Arvada: Shallow and deep, well drained, nearly level to very steep, clayey and loamy soils formed in material weathered from acid shale and sedimentary rock; on uplands.

#9 Stovho-Trebor-Rock outcrop: Deep and moderately deep, well drained, gently rolling to very steep silty soils; on uplands.

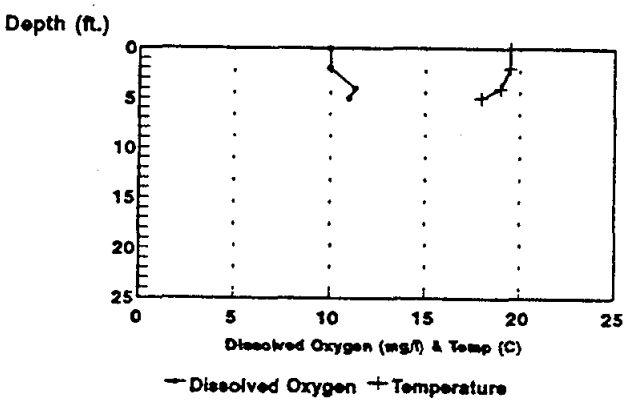
CANYON LAKE 7/22/92
Dissolved Oxygen & Temperature Profile



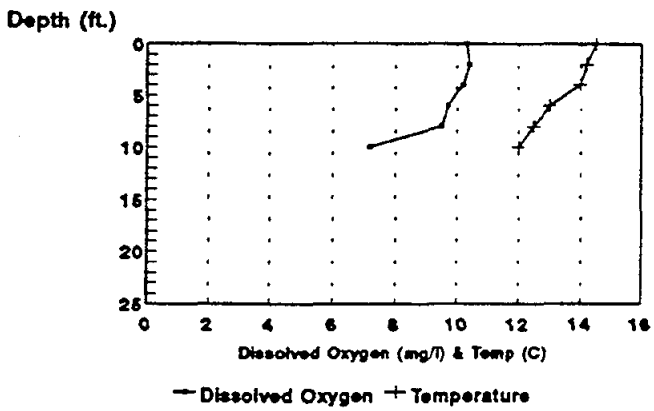
CANYON LAKE 8/18/92
Dissolved Oxygen & Temperature Profile



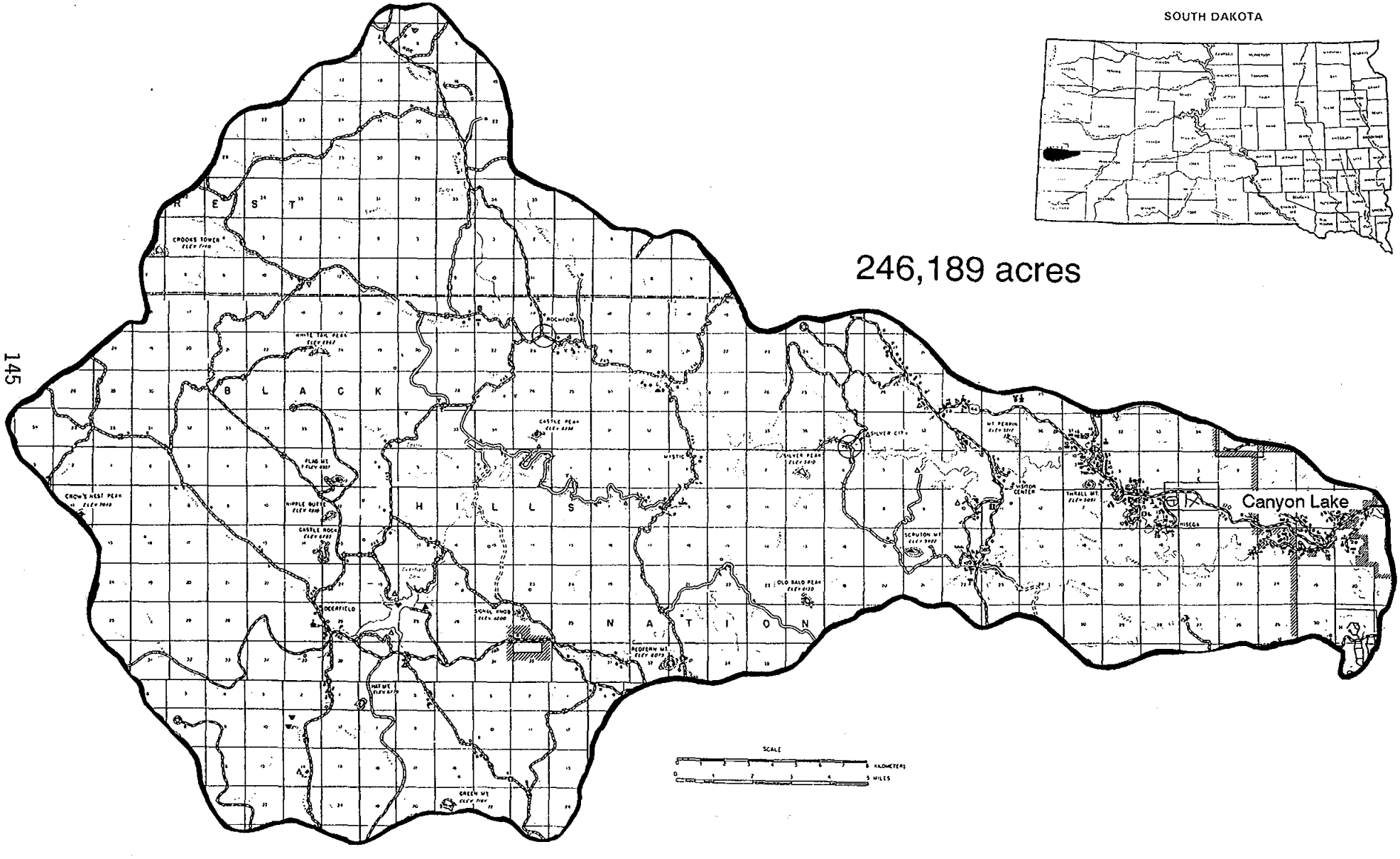
CANYON LAKE 6/18/91
Dissolved Oxygen & Temperature Profile

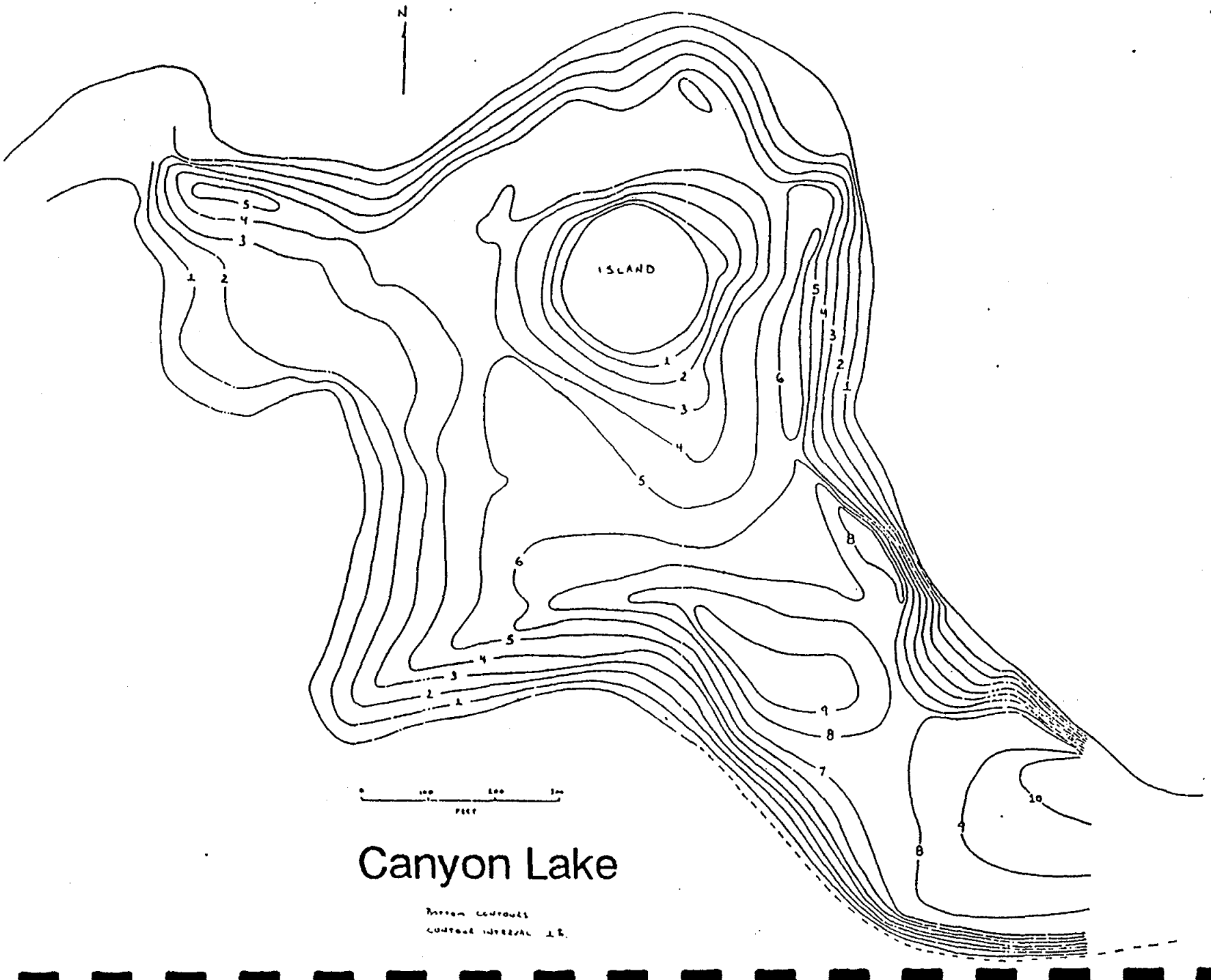


CANYON LAKE 10/2/91
Dissolved Oxygen & Temperature Profile

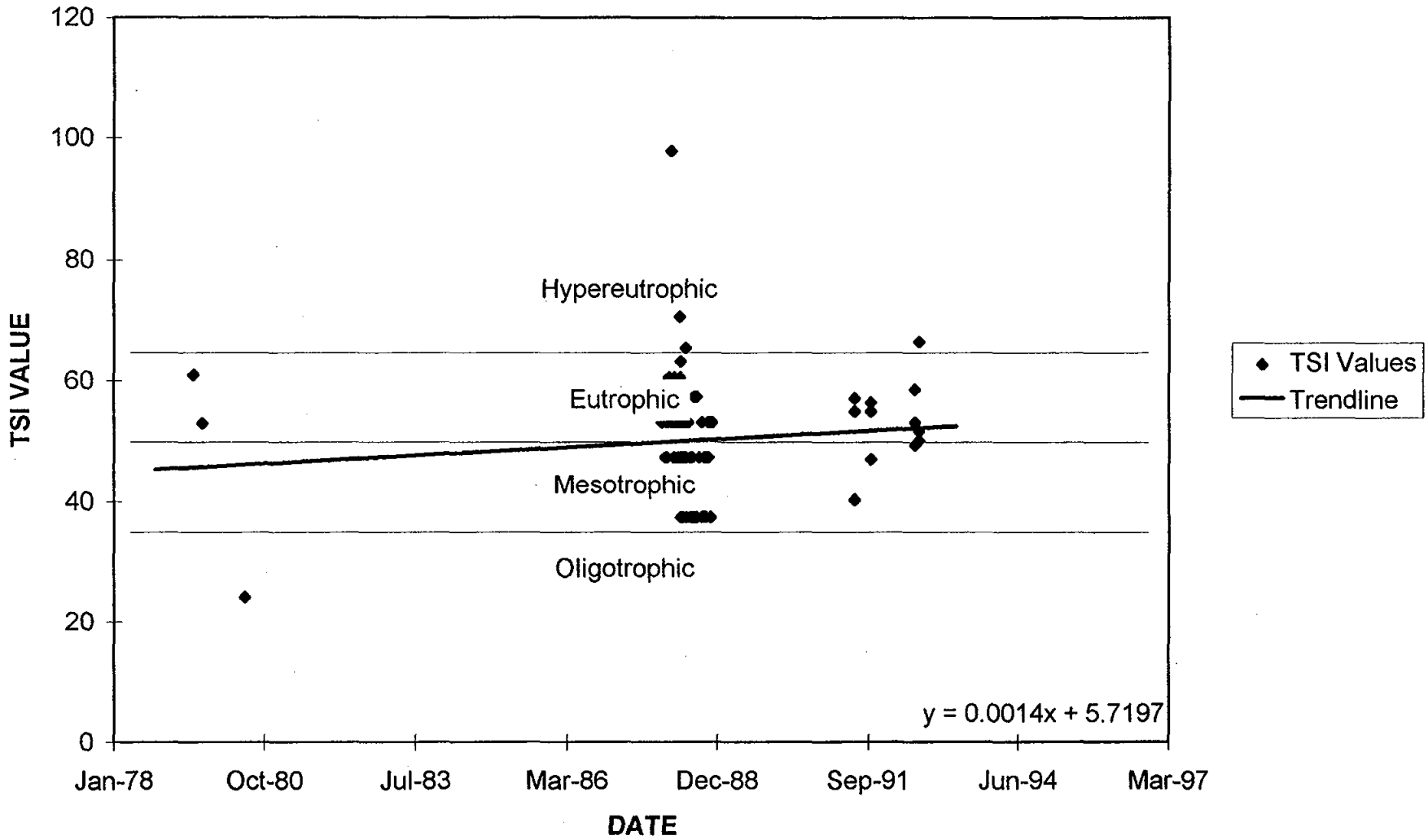


Canyon Lake


SOUTH DAKOTA
246,189 acres
Canyon Lake
BLACK HILLS NATION
SCALE


N
ISLAND
Canyon Lake

CANYON LAKE TSI's



LAKE CARTHAGE

County: Miner
Latitude: 44 deg. 10 min. 53 sec. N
Longitude: 97 deg. 42 min. 10 sec. W
Area: 203.3 A (82.3 ha)
Maximum Depth: 24 ft (7.3 m)
Volume: 1549.3 acre-ft(2.035 x $10^6 m^3$)
Origin of Basin: impoundment
Township: 108N
Range: 57W
Section (s): 4, 5, 7, 8
Shoreline L: 4 mi (6.4 km)
Mean Depth: 8.1 ft (2.5 m)
Watershed/Lake Area: 465
Thermal Stratification: no
Major Inflows (named or permanent streams): Redstone Creek
Outlet: Redstone Creek

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: NA

	1989		1993	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.15	4	23.20
Air Temperature (°C)	4	21.00	4	28.42
Secchi Disk Depth (meters)	2	1.02	2	0.52
Conductivity (cond/25° C)	4	838	-	-
Turbidity (NTU)	-	-	4	22.54
Lab pH (su)	-	-	-	-
Field pH (su) (su)	4	8.55	4	8.03
Total Alkalinity (mg/l)	4	145	4	190
Total Solids (mg/l)	4	673	4	591
Dissolved Solids (mg/l)	4	657	4	572
Suspended Solids (mg/l)	4	16	4	20
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.39	4	0.03
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.53
Total Kjeldahl Nitrogen (mg/l)	4	1.40	4	1.74
Total Phosphorus (mg/l)	4	0.430	4	0.531
Total Dissolved Phosphorus (mg/l)	-	-	4	0.443
Ortho Phosphate as P (mg/l)	4	0.311	-	-
Chlorophyll (mg/m^3)	-	-	1	27.47

Year	1989	1993
TSI Values -- Mean:	72.51	75.62
Secchi Disk	59.70	69.43
Total Phosphorus	85.31	94.36
Chlorophyll *a*		63.07

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton foliosus

Algal Species and Densities

July 24, 1989

Taxa	Number	Units/ml
Aphanizomenon flos-aquae	84	1,807
Chroococcus	20	430
Cryptomonas	20	430
Characium	17	366
Algae (other)	2	43
Anabaena	1	22
Lyngbya	1	22
Cryptomonas	1	22
Microcystis	1	22
Aphanocapsa	1	22
Botryococcus	1	22
Total	149	3,206

Watershed Description

Watershed Area: 94,574 A (38,274 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
BE	37,274	39
FU	24,849	26
PF	15,292	16
FU-BY	10,513	11
LC	7,646	8

BE — Beadle: Well drained, nearly level to gently undulating, loamy soils formed in clayey glacial till.

FU — Forman: Well drained, nearly level to rolling loamy soils formed in loamy glacial till.

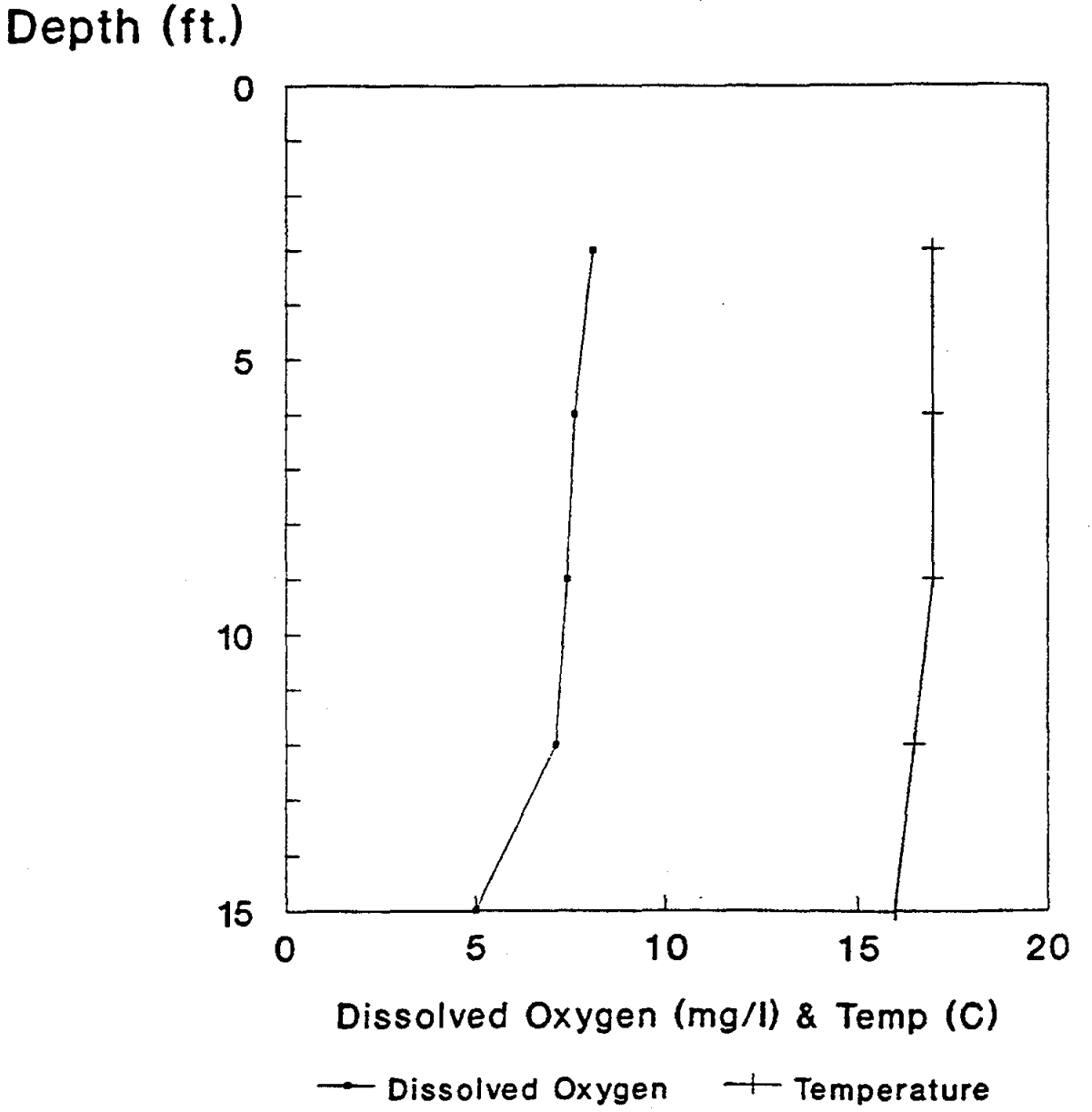
PF — Peever: Well drained, nearly level to gently undulating, loamy soils formed in clayey glacial till.

FU-BY — Forman-Buse: Well drained undulating to hilly loamy soils formed in glacial till.

LC — Lamo: Somewhat poorly drained, nearly level, silty soils.

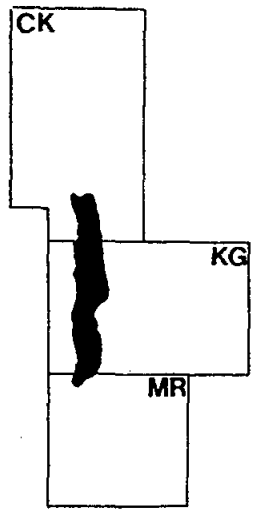
LAKE CARTHAGE 6/19/89

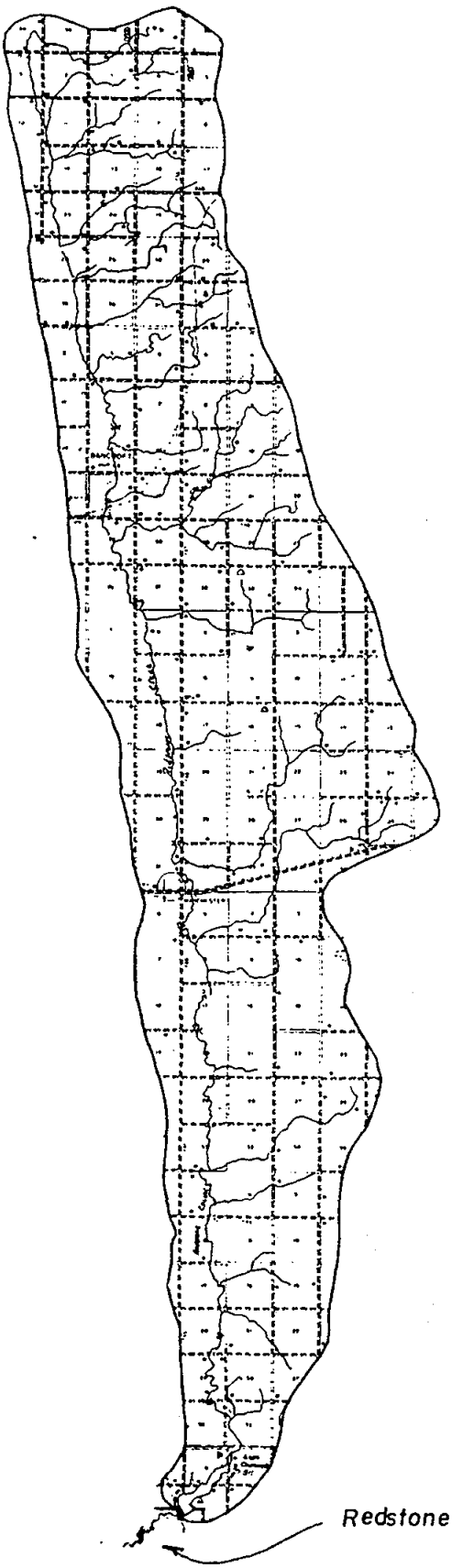
Dissolved Oxygen and Temperaturre Profile



Lake Carthage

94,574 acres

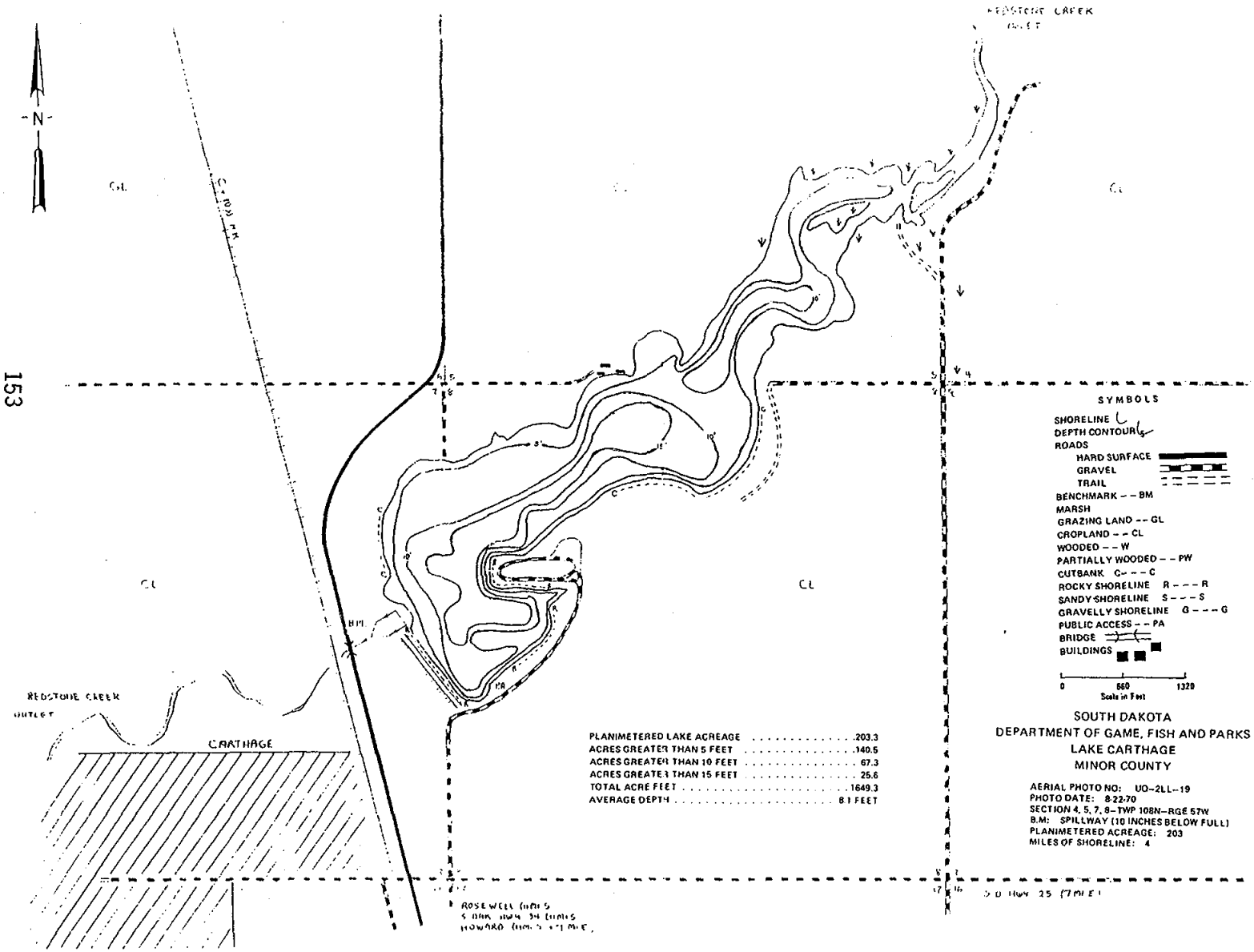




Scale

0 5 10

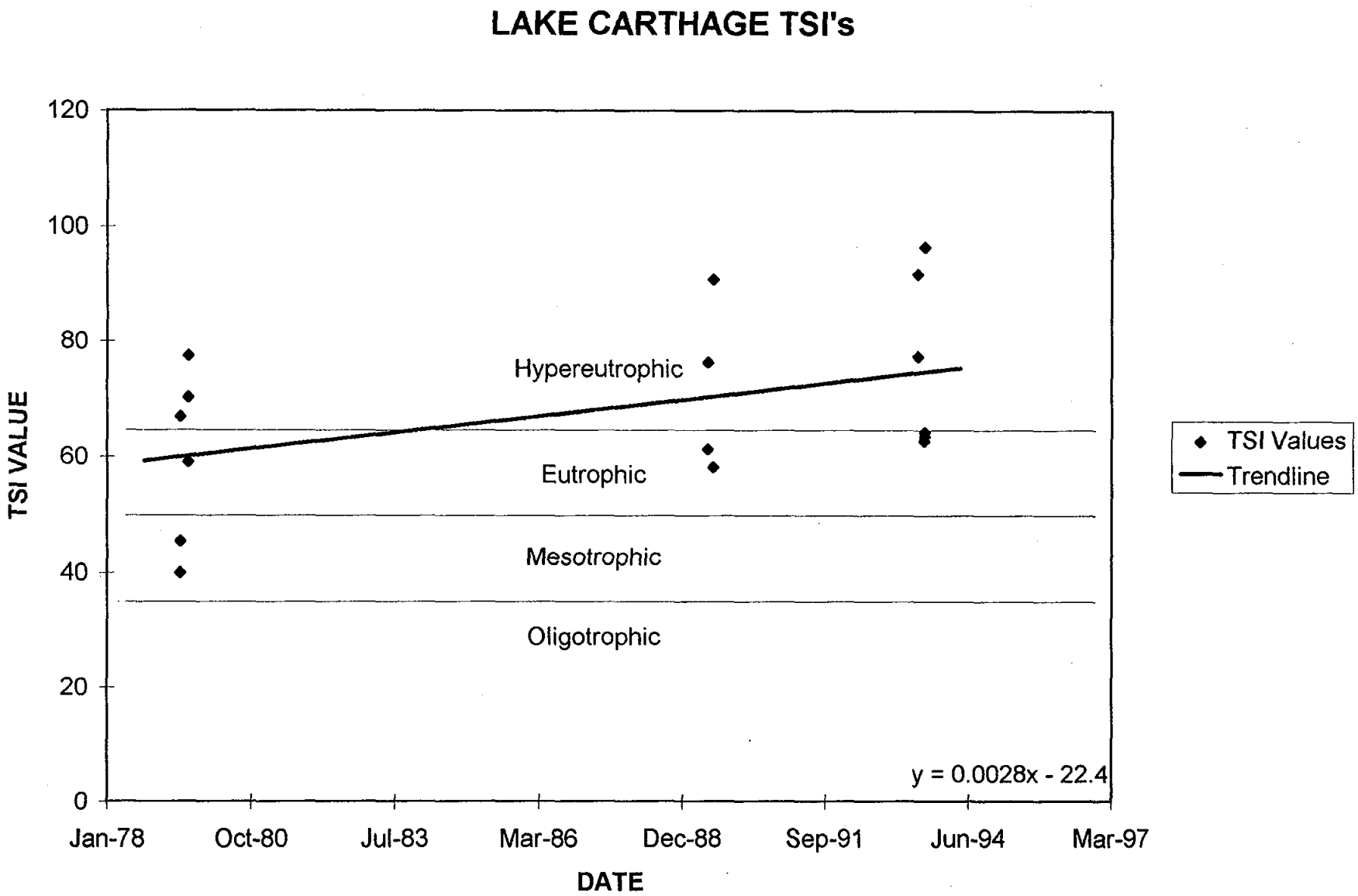
Miles



PLANIMETERED LAKE ACREAGE	203.3
ACRES GREATER THAN 5 FEET	140.5
ACRES GREATER THAN 10 FEET	67.3
ACRES GREATER THAN 15 FEET	25.6
TOTAL ACRE FEET	1649.3
AVERAGE DEPTH	8.1 FEET

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE CARTHAGE
MINOR COUNTY

AERIAL PHOTO NO: UO-2LL-19
PHOTO DATE: 8-22-70
SECTION 4, 5, 7, 8-TWP 108N-RGE 57W
B.M: SPILLWAY (10 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 203
MILES OF SHORELINE: 4


LAKE CARTHAGE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0028x - 22.4
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

CENTER LAKE

County: Custer
Latitude: 43 deg. 47 min. 59 sec. N
Longitude: 103 deg. 24 min. 57 sec. W
Area: 26.5 A (10.7 ha)
Maximum Depth: 40 ft (12.2 ha)
Volume: 450 acre-ft (5.55 x $10^5 m^3$)
Origin of Basin: impoundment
Township: 3N
Range: 6E
Section (s): 9
Shoreline L: 1.1 mi (1.8 km)
Mean Depth: 17 ft (5.2 m)
Watershed/Lake Area: 236.6
Thermal Stratification: yes
Major Inflows (named or permanent streams): Grace Coolidge Creek
Outlet: Grace Coolidge Creek

Lake Use

Beneficial Use Classification:
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 144,960
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.53	4	12.25	4	14.09
Air Temperature (°C)	4	23.33	4	23.00	4	21.50
Secchi Disk Depth (meters)	2	1.42	2	1.25	2	0.91
Conductivity (cond/25° C)	4	105	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	2	9.00	4	7.95	4	8.00
Total Alkalinity (mg/l)	4	64	4	44	4	52
Total Solids (mg/l)	4	87	4	99	4	91
Dissolved Solids (mg/l)	4	73	4	86	4	84
Suspended Solids (mg/l)	4	15	4	13	4	7
Volatile Suspended Solids (mg/l)	-	-	2	5	-	-
Ammonia Nitrogen (mg/l)	4	0.21	4	0.11	4	0.27
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.00	4	0.53	4	0.80
Total Phosphorus (mg/l)	4	0.100	4	0.109	4	0.098
Total Dissolved Phosphorus (mg/l)	-	-	4	0.077	4	0.075
Ortho Phosphate as P (mg/l)	4	0.022	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	16.08	2	18.98

Year	1989	1991	1992
TSI Values -- Mean:	60.15	60.22	60.12
Secchi Disk	54.97	56.78	61.36
Total Phosphorus	65.34	66.05	59.54
Chlorophyll *a*		57.82	59.45

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 100%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

	July 10, 1991		August 1, 1991	
Taxa	Number	Units/ml	Number	Units/ml
Cosmarium	38	673	-	-
Algae (other)	26	460	9	732
Green Algae (other)	10	177	-	-
Characium	9	152	-	-
Anabaena	9	159	-	-
Staurastrum	8	142	-	-
Oocystis	7	124	1	81
Diatom (pennate)	6	106	-	-
Coelosphaerium	2	35	1	81
Lagerheimia	2	35	-	-
Scenedesmus	1	18	-	-
Cryptomonas sp. #1	1	18	-	-
Chroococcus	1	18	-	-
Melosira granulata	-	-	2	163
Fragilaria crotonensis	-	-	2	163
Total	138	2,443	15	1,220

Watershed Description

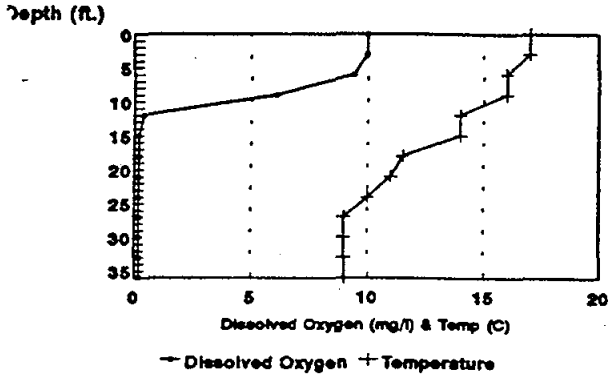
Watershed Area: 6,270 A (2,537 ha)

Soil Associations within Watershed

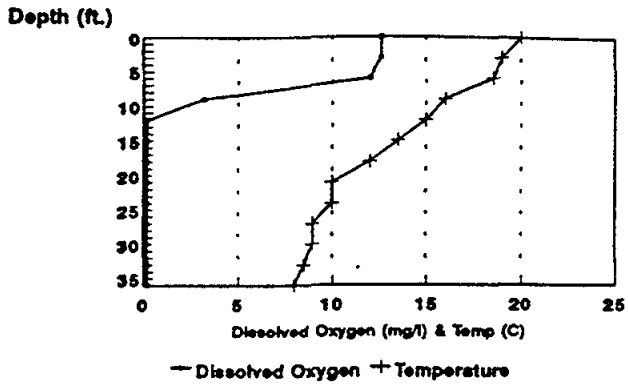
Association	Area (A)	% of Total
#6	6,270	100

#6 Buska-Mocmont-Rock outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

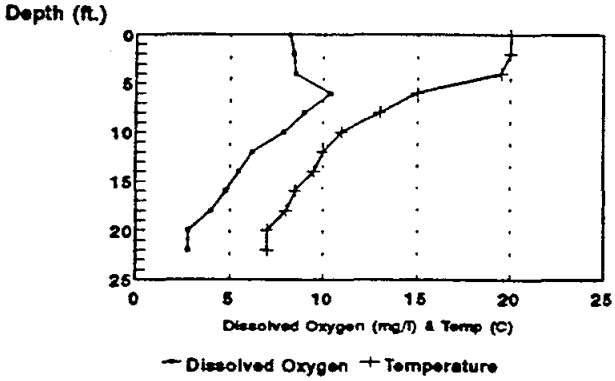
CENTER LAKE 7/22/92
Dissolved Oxygen & Temperature Profile



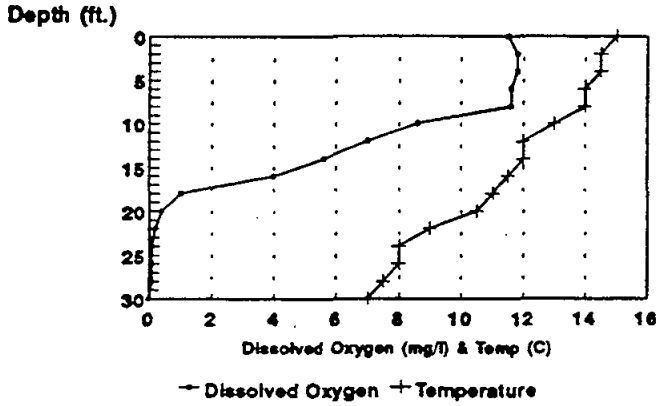
CENTER LAKE 8/18/92
Dissolved Oxygen & Temperature Profile



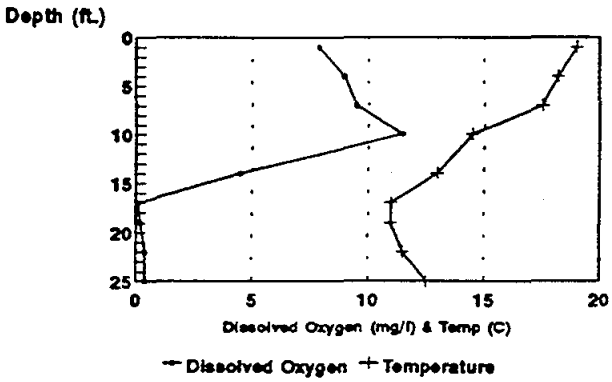
CENTER LAKE 6/19/91
Dissolved Oxygen & Temperature Profile



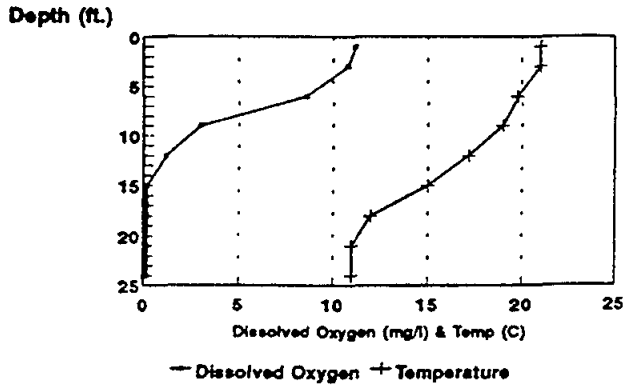
CENTER LAKE 10/1/91
Dissolved Oxygen & Temperature Profile



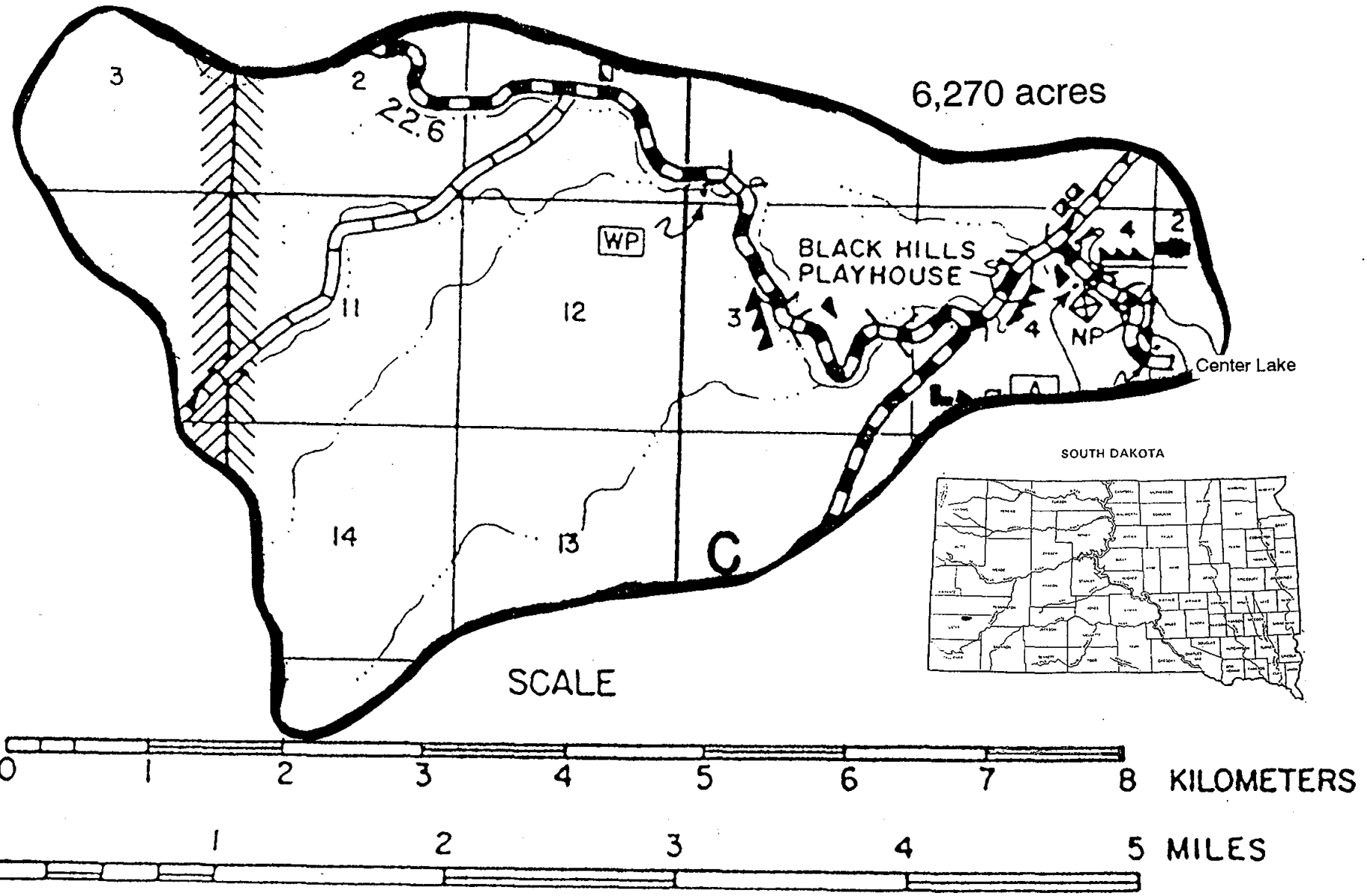
Center Lake, 7/11/89
Dissolved Oxygen & Temperature Profile



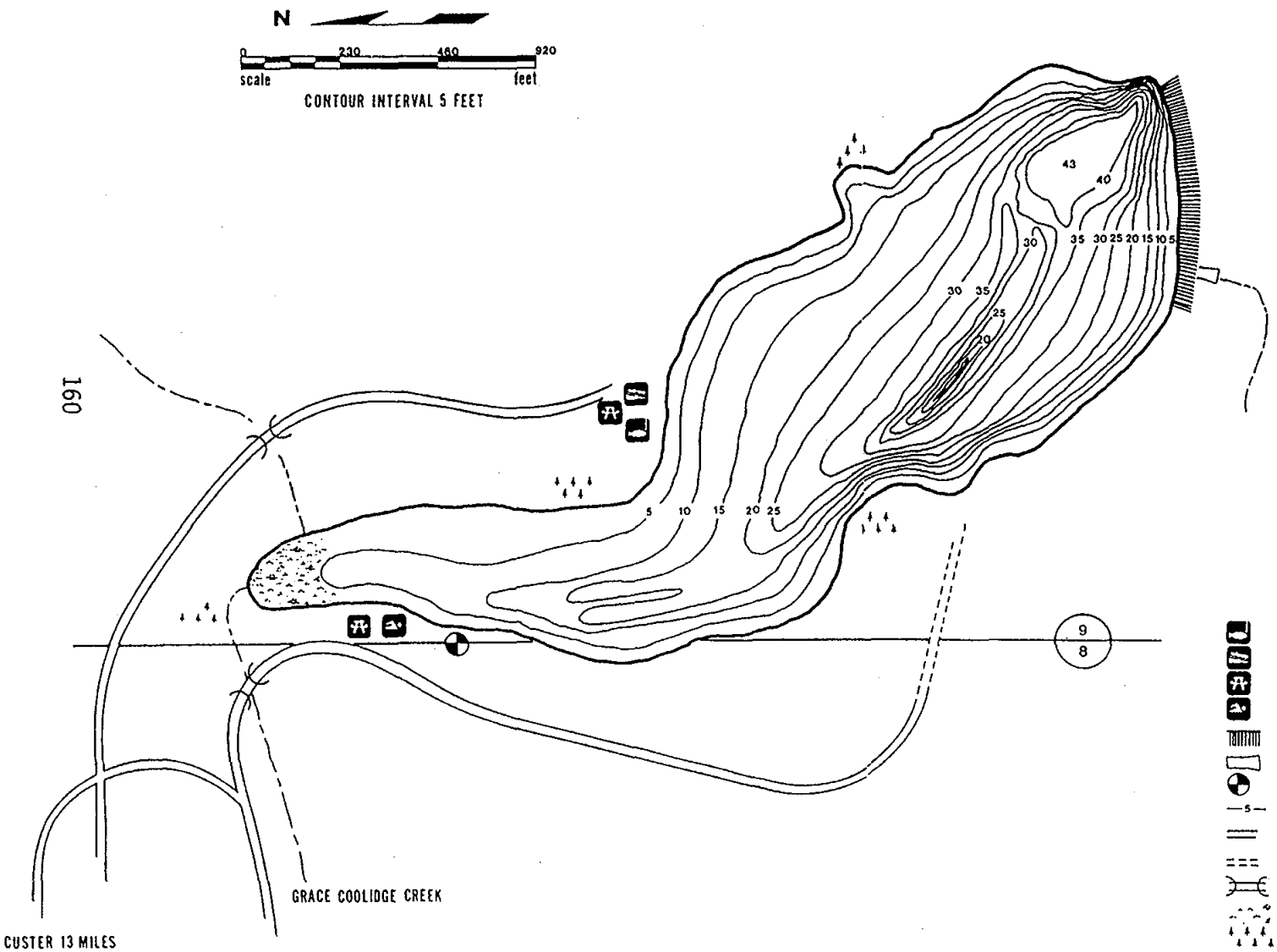
Center Lake, 8/15/89
Dissolved Oxygen & Temperature Profile



Center Lake


6,270 acres
3
2
22.6
WP
2
BLACK HILLS
PLAYHOUSE
4
2
11
12
3
4
NP
Center Lake
SOUTH DAKOTA
14
13
C
SCALE
0 1 2 3 4 5 6 7 8 KILOMETERS
0 1 2 3 4 5 MILES

REPRODUCTION OF THIS MATERIAL REQUIRES WRITTEN PERMISSION FROM S.D. GAME FISH & PARKS



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

CENTER LAKE

CUSTER COUNTY
1987

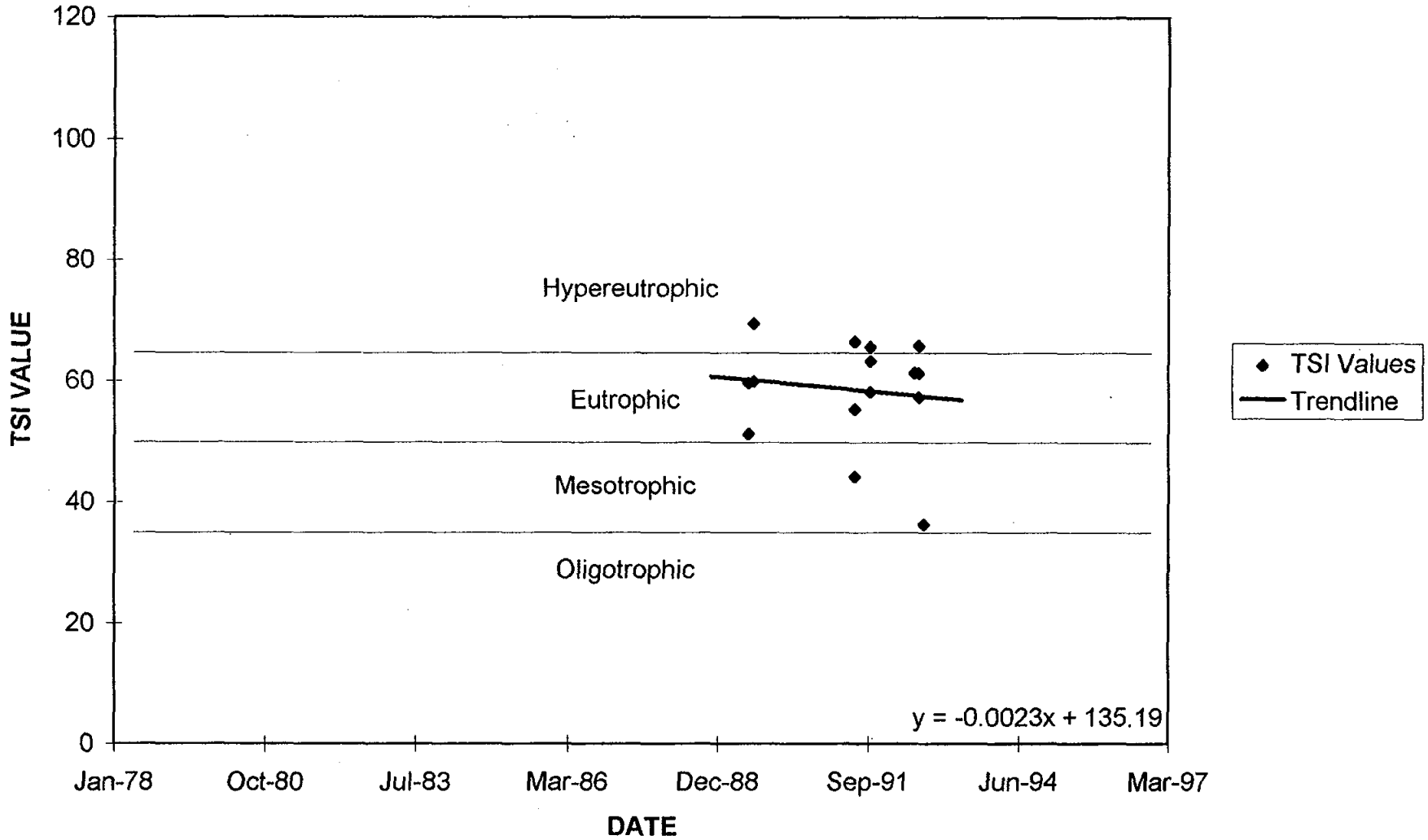
- FISHING ACCESS
- BOAT LAUNCH
- PICNIC AREA
- SWIMMING AREA
- DAM
- SPILLWAY
- BENCHMARK
- DEPTH CONTOUR
- IMPROVED LIGHT DUTY
- UNIMPROVED DIRT
- BRIDGE
- EMERGED VEGETATION
- FOREST

FIELD DATA COLLECTED : 6/87
AERIAL PHOTO NO. : 478-163
AERIAL PHOTO DATE : 7/27/78
LEGAL DISCRIPTION : T3S, R6E, SEC. 8&9
SCALE : 1" = 230'
WATER LEVEL : 4636 msl
MILES OF SHORELINE : 1.1 mi
AVERAGE DEPTH IN FEET : 17 ft
PLANIMETERED LAKE ACREAGE : 26.5 ac

VOLUME :

depth	ac/ft
5	120
10	97
15	77
20	58
25	42
30	31
35	18
40	7
total	450

CENTER LAKE TSI's



CLEAR LAKE

County: Deuel
Latitude: 44 deg. 45 min. 06 sec. N
Longitude: 96 deg. 39 min. 30 sec. W
Area: 532 A (215.3 ha)
Maximum Depth: 6 ft (1.8 m)
Volume: 2400 acre-ft (2.761 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 115N
Range: 49W
Section (s): 13-14, 23-24
Shoreline L: 4.5 mi (7.2 km)
Mean Depth: 4.5 ft (1.4 m)
Watershed/Lake Area: 46.7
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Deuel Co. Lakes and Streams Association and Clear Lake Betterment Association.

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.88	4	22.36	4	21.98
Air Temperature (°C)	4	24.72	4	21.67	4	23.07
Secchi Disk Depth (meters)	2	0.14	2	0.35	2	0.61
Conductivity (cond/25° C)	4	788	2	778	-	-
Turbidity (NTU)	-	-	-	-	4	13.39
Lab pH (su)	4	8.00	-	-	-	-
Field pH (su) (su)	-	-	4	8.96	4	8.74
Total Alkalinity (mg/l)	4	159	3	157	4	209
Total Solids (mg/l)	4	793	3	664	4	452
Dissolved Solids (mg/l)	4	695	3	637	4	442
Suspended Solids (mg/l)	4	98	3	27	4	10
Volatile Suspended Solids (mg/l)	-	-	2	26	-	-
Ammonia Nitrogen (mg/l)	4	0.31	3	0.16	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	3	0.42	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.82	3	1.91	4	1.70
Total Phosphorus (mg/l)	4	0.418	3	0.194	4	0.126
Total Dissolved Phosphorus (mg/l)	-	-	3	0.058	4	0.34
Ortho Phosphate as P (mg/l)	4	0.031	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	76.38	1	77.05

Year	1989	1991	1993
TSI Values -- Mean:	89.71	76.32	71.55
Secchi Disk	88.50	75.02	67.13
Total Phosphorus	90.91	80.84	74.32
Chlorophyll *a*		73.10	73.19

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton pectinatus

Algal Species and Densities

July 10, 1989

Taxa	Number	Units/ml
Aphanocapsa	143	84,157
Merismopedia	79	46,492
Blue-green (other)	15	8,828
Lyngbya Diguetii	14	8239
Lyngbya contorta	13	7,651
Algae (other)	12	7,062
Chroococcus	11	6,474
Green Algae (other)	6	3,531
Dactylococcopsis	4	2,354
Nitzschia	2	1,177
Tetrastrum	2	1,177
Diatom (pennate)	1	589
Nitzschia reversa	1	589
Actinastrum	1	589
Staurastrum	1	589
Aphanizomenon flos-aquae	1	589
Algae (flagellate)	1	589
Phacus	1	589
Total	308	181,262

Watershed Description

Watershed Area: 24,826 A (10,047 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
KN-BW-VS	9,930	40
RL-FS	8,193	33
VS-LP	5,710	23
FU-AA-PA	993	4

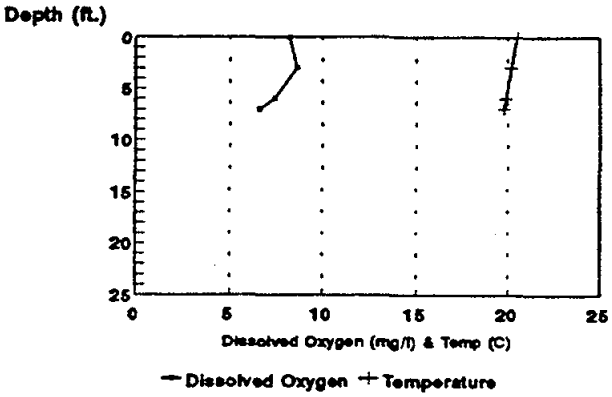
KN-BW-VS Kranzburg-Brookings-Vienna: Well drained and moderately well drained, nearly level to gently undulating, silty soils formed in loess over glacial till.

RL-FS Renshaw-Fordville: Somewhat excessively drained and well drained, nearly level to moderately steep, loamy soils that are shallow and moderately deep of outwash and gravel.

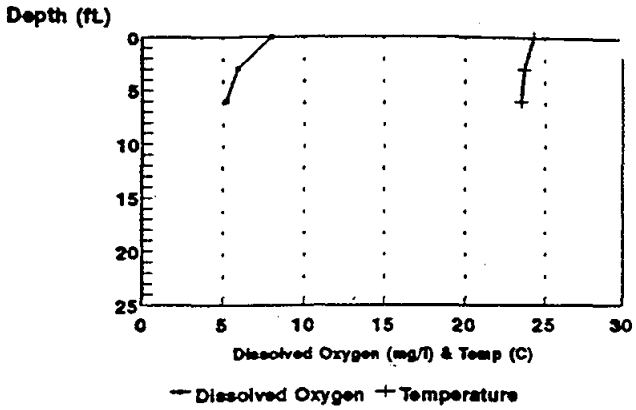
VS-LP Vienna-Lismore: Well drained through somewhat poorly drained, nearly level to undulating, silty soils.

FU-AA-PA Forman-Aastad-Buse: Well drained and moderately well drained, gently undulating to hilly, loamy soils formed in loamy glacial till.

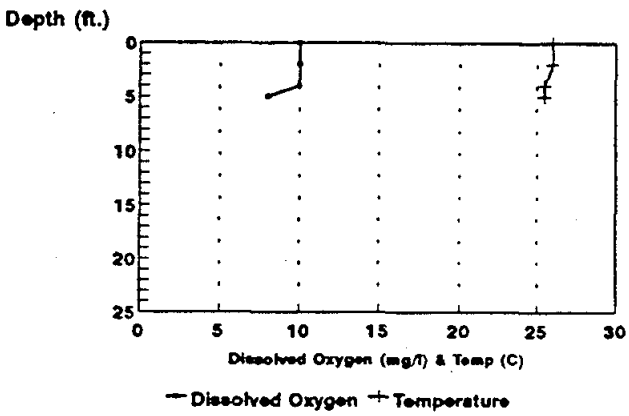
CLEAR LAKE 7/8/93 (DEUEL COUNTY)
Dissolved Oxygen & Temperature Profile



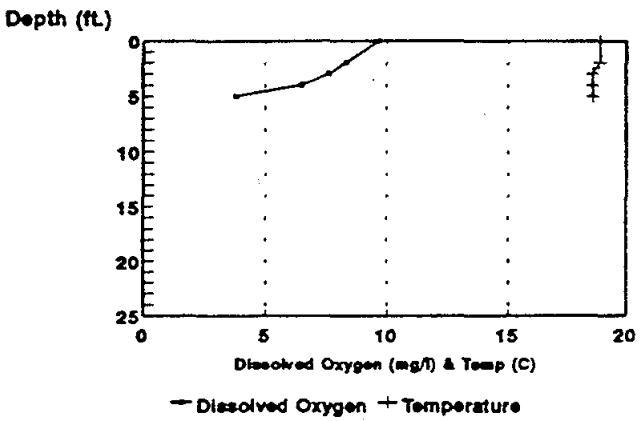
CLEAR LAKE 8/18/93 (DEUEL COUNTY)
Dissolved Oxygen & Temperature Profile



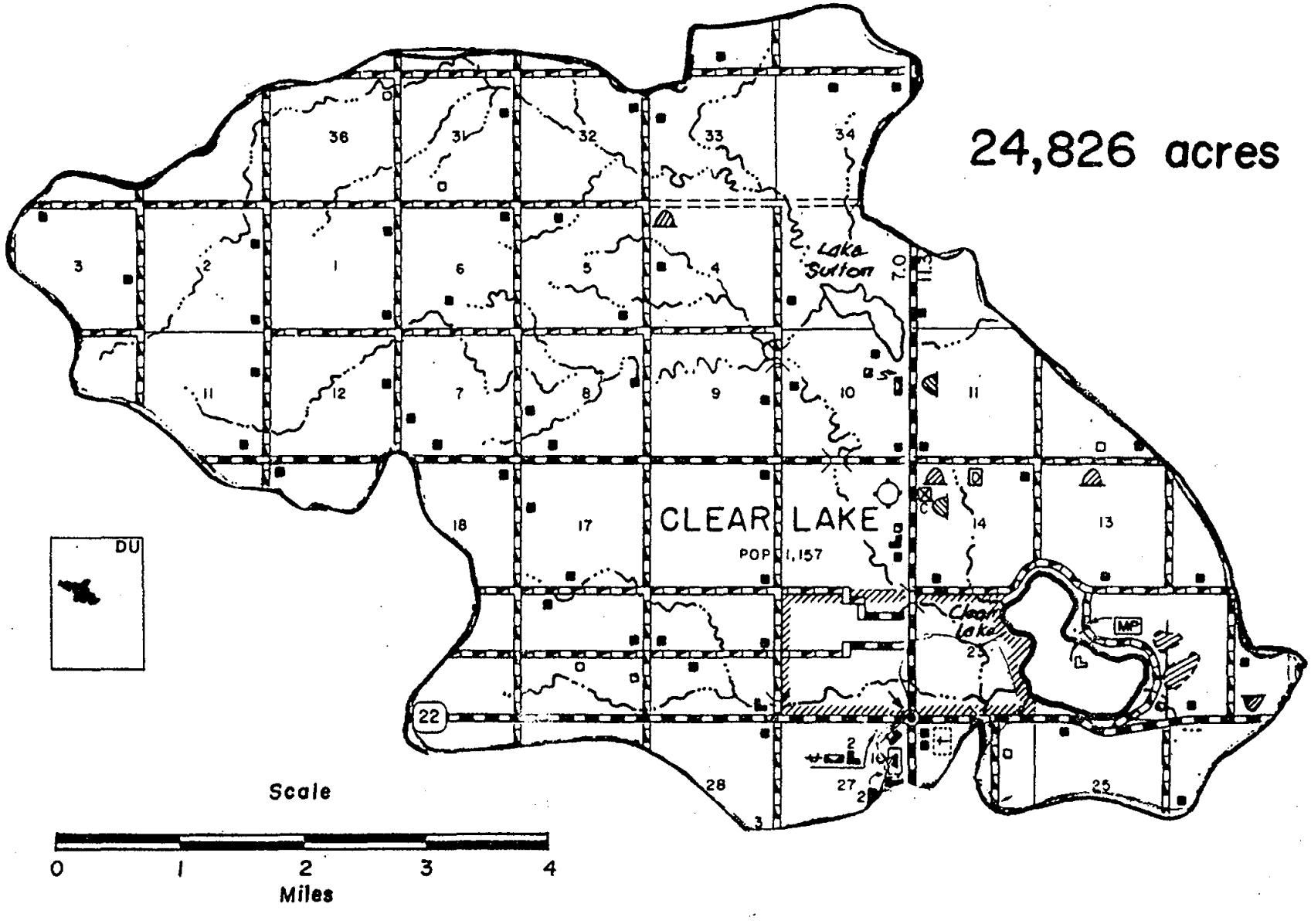
CLEAR LAKE 6/27/91 (DEUEL COUNTY)
Dissolved Oxygen & Temperature Profile



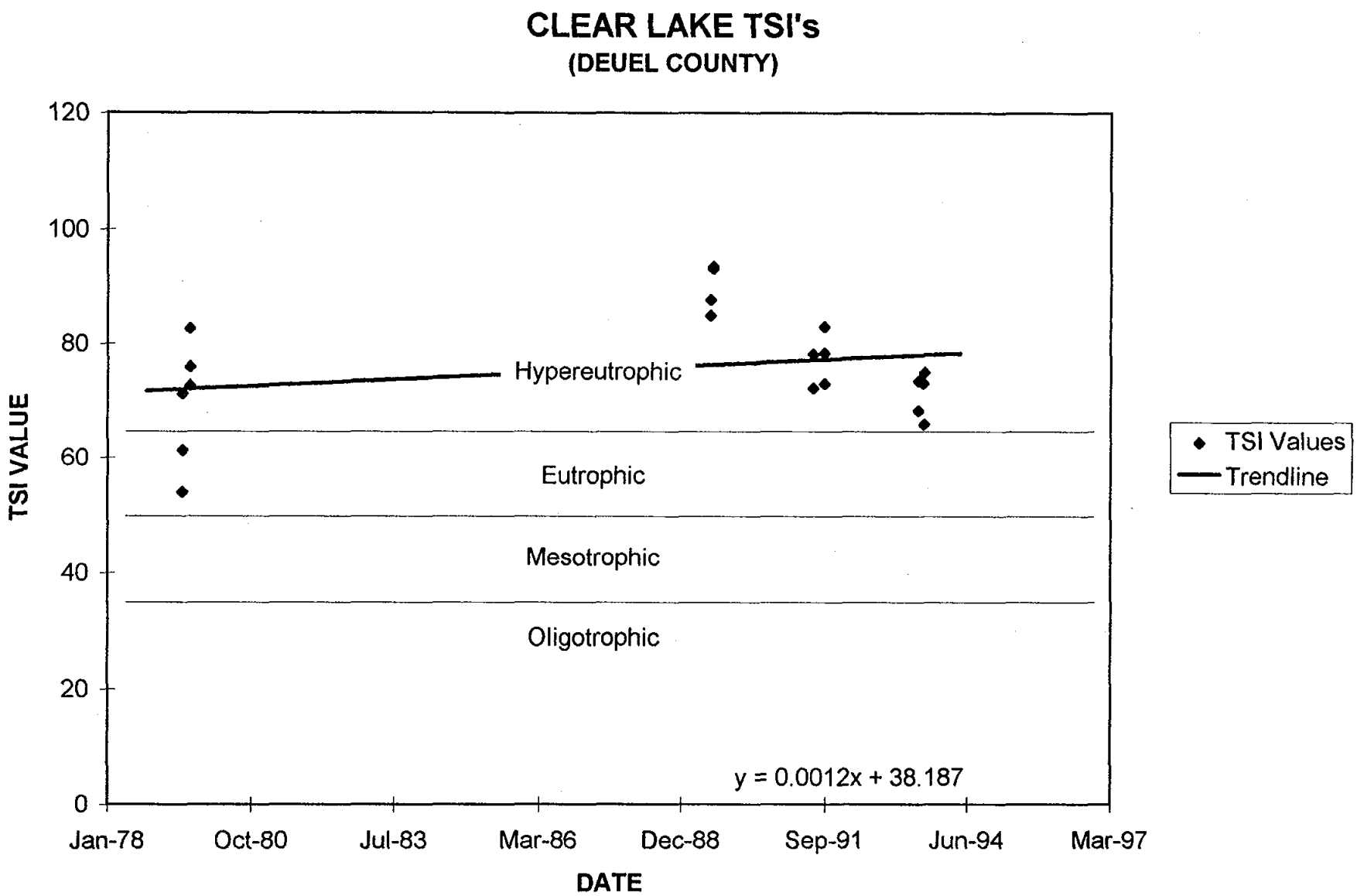
CLEAR LAKE 9/12/91 (DEUEL COUNTY)
Dissolved Oxygen & Temperature Profile



Clear Lake


24,826 acres
CLEAR LAKE
POP 1,157
Lake Sutton
Clear Lake
MP
DU
22
Scale
0 1 2 3 4
Miles

SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
CLEAR LAKE
MARSHALL COUNTY
WATER STAGE
FLOW
PLANIMETER
ACRES 1037
AERIAL PHOTO
DATE 1958
FIELD WORK DRAWN BY LP, WJM
DATE 10-3-63 DATE 1-13-64
SEC 13 14 24 12
TWP 126N
RGE 54 W
SHORELINE
DEPTH CONTOUR -5.0
ROADS
HARD SURFACE
GRAVEL
TRAIL
WOODED W
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA
N


CLEAR LAKE TSI's
(DEUEL COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0012x + 38.187
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

CLEAR LAKE

County: Marshall
Latitude: 45 deg. 41 min. 36 sec. N
Longitude: 97 deg. 21 min. 36 sec. W
Area: 1087 A (439.9 ha)
Maximum Depth: 20 ft (6.1 m)
Volume: 13,044 acre-ft ($1.609x10^7 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 126N
Range: 53, 54W
Section (s): 12-14,18-19,24
Shoreline L: 7.6 mi (12k m)
Mean Depth: 12 ft (3.7 m)
Watershed/Lake Area: 11
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	22.00	6	24.00	4	19.84
Air Temperature (°C)	4	22.50	6	29.44	4	23.89
Secchi Disk Depth (meters)	2	2.41	3	1.67	4	2.07
Conductivity (cond/25° C)	4	783	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.65	-	-	-	-
Field pH (su) (su)	-	-	6	8.64	4	8.51
Total Alkalinity (mg/l)	4	265	-	-	-	-
Total Solids (mg/l)	4	607	-	-	-	-
Dissolved Solids (mg/l)	4	597	-	-	-	-
Suspended Solids (mg/l)	4	10	6	30	4	12
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.20	6	0.04	4	0.29
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.03
Total Kjeldahl Nitrogen (mg/l)	4	1.48	6	1.57	4	2.19
Total Phosphorus (mg/l)	4	0.074	6	0.061	4	0.083
Total Dissolved Phosphorus (mg/l)	-	-	6	0.024	4	0.036
Ortho Phosphate as P (mg/l)	4	0.005	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	14.87	4	69.09

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	20.12	6	14.33	4	23.47
Air Temperature (°C)	6	19.33	6	21.48	4	22.90
Secchi Disk Depth (meters)	3	1.88	9	2.92	9	1.85
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	6	8.41	6	8.60	6	8.31
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	7	6	5	6	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.05	6	0.02	6	0.02
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	6	0.02	6	0.05
Total Kjeldahl Nitrogen (mg/l)	5	1.13	6	0.98	6	1.10
Total Phosphorus (mg/l)	6	0.043	6	0.028	6	0.034
Total Dissolved Phosphorus (mg/l)	5	0.014	6	0.015	6	0.011
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	7.95	6	7.98	6	8.87

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	55.39	58.33	63.72	53.59	48.94	52.57
Secchi Disk	47.32	52.60	49.49	50.90	44.53	51.13
Total Phosphorus	63.46	65.34	69.54	58.96	51.34	54.59
Chlorophyll *a*		57.05	72.12	50.91	50.94	51.99

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Ceratophyllum demersum, Potamogeton pectinatus, and Ruppia maritima

Algal Species and Densities

July 27, 1989

Taxa	Number	Units/ml
Blue-green (other)	108	2,163
Melosira granulata	69	1,382
Chroococcus	17	340
Algae (other)	9	180
Melosira ambigua	4	80
Ceratium hirundinella	4	80
Aphanocapsa	3	60
Green Algae (other)	2	40
Stephanodiscus	1	20
Anabaena	1	20
Total	219	4,386

Watershed Description

Watershed Area: 11,682 A (4727.7 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA-BY	10,981	94
FU-PN	701	6

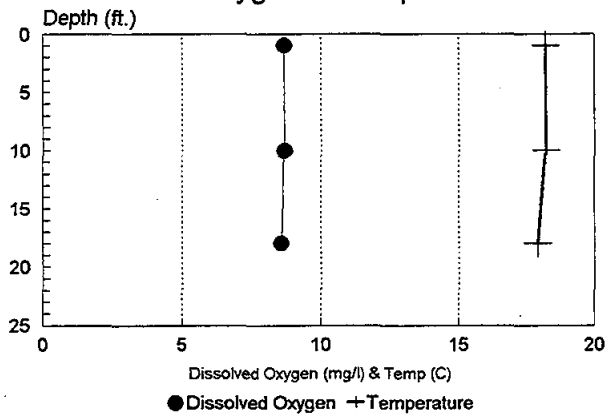
FU-AA-BY Foman-Aastad-Buse: Nearly level to steep, well drained and moderately well drained, loamy soils formed in glacial till.

FU-PN Forman-Poinsett: Nearly level to rolling well drained, loamy and silty soils formed in glacial drift.

CLEAR LAKE 6/21/79

(Marshall County)

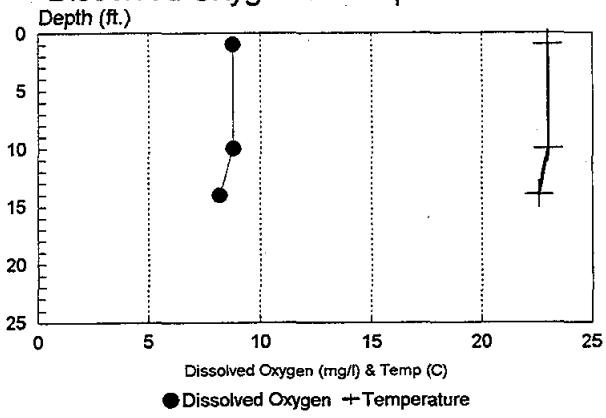
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 6/18/91

(Marshall County)

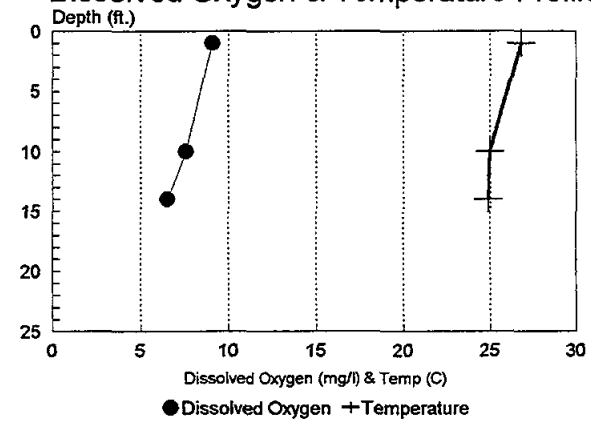
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 7/19/91

(Marshall County)

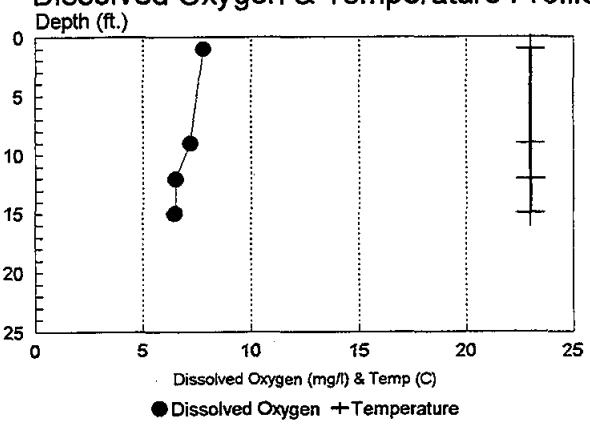
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 8/18/91

(Marshall County)

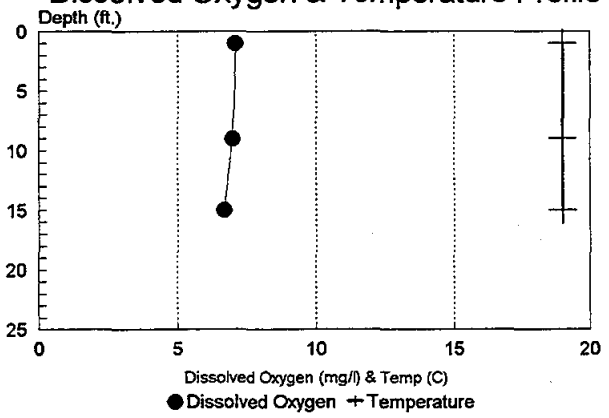
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 6/18/92

(Marshall County)

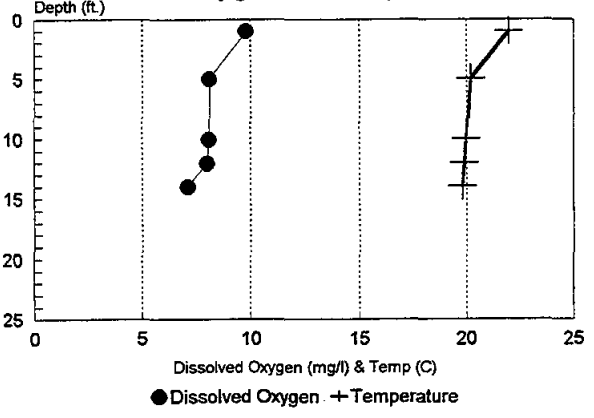
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 7/18/92

(Marshall County)

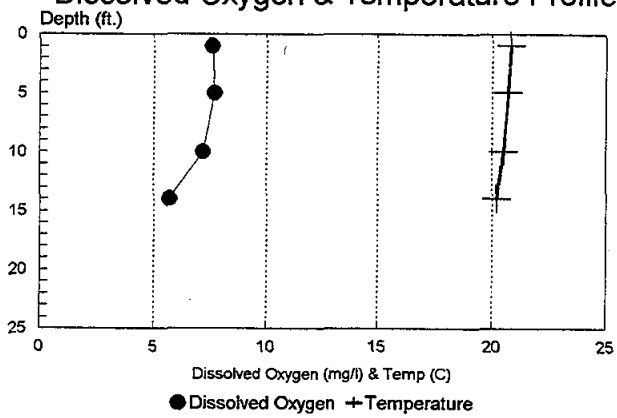
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 8/16/92

(Marshall County)

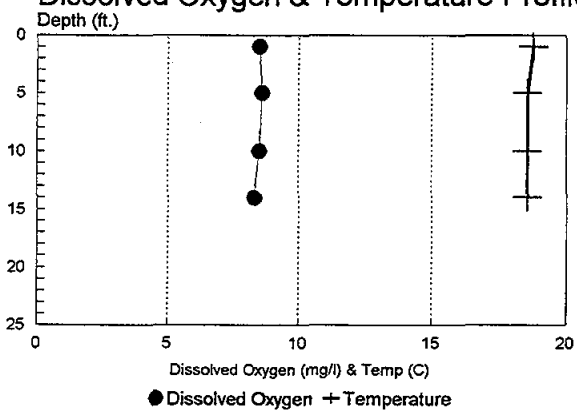
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 6/15/93

(Marshall County)

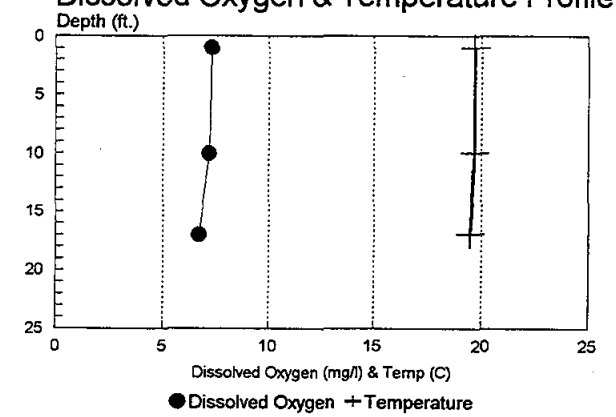
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 7/22/93

(Marshall County)

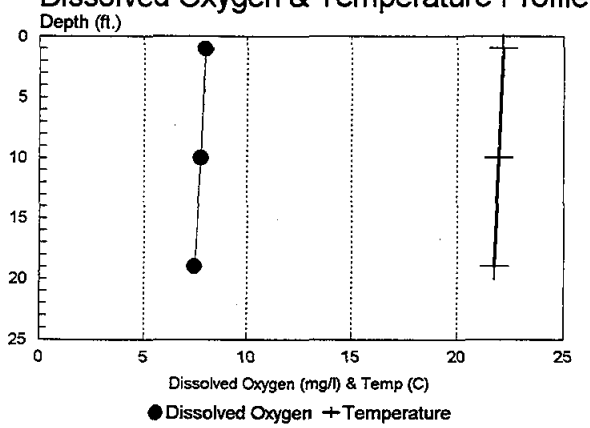
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 8/22/93

(Marshall County)

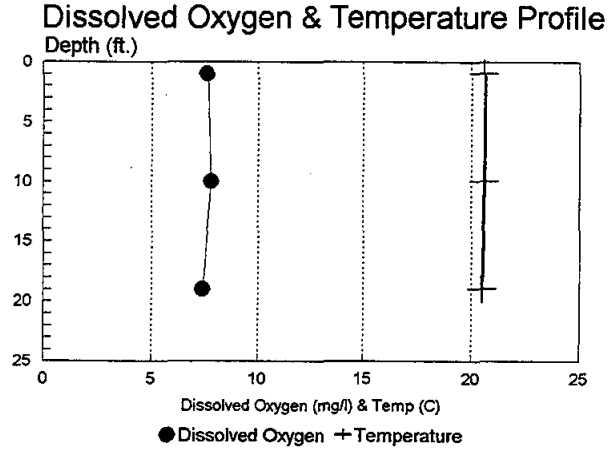
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 6/15/94

(Marshall County)

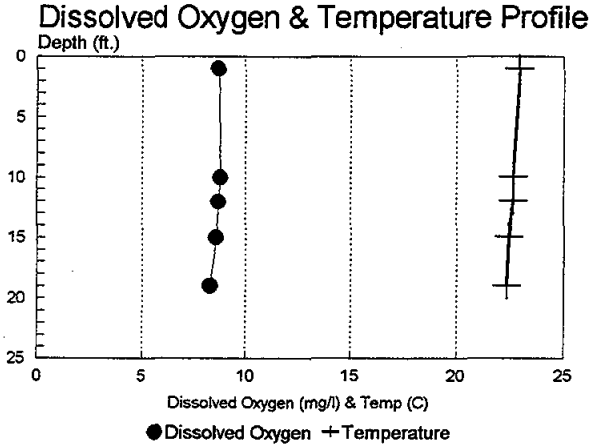
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 7/16/94

(Marshall County)

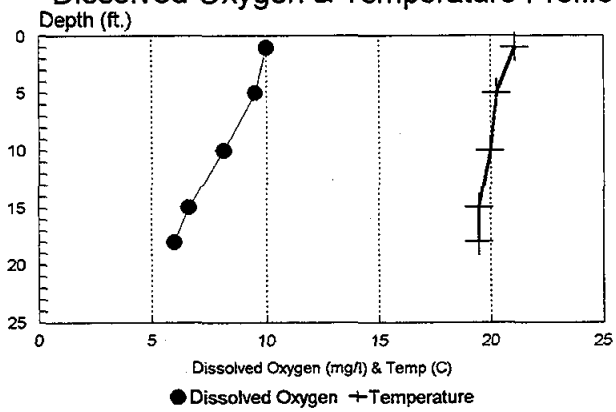
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 8/16/94

(Marshall County)

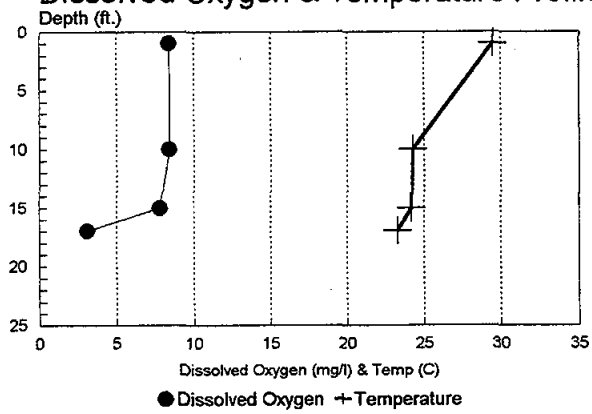
Dissolved Oxygen & Temperature Profile



CLEAR LAKE 7/16/95

(Marshall County)

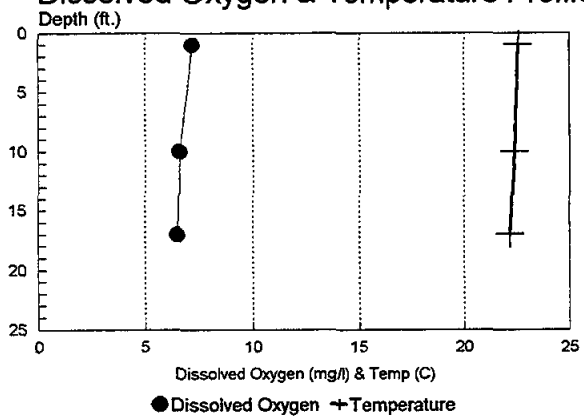
Dissolved Oxygen & Temperature Profile



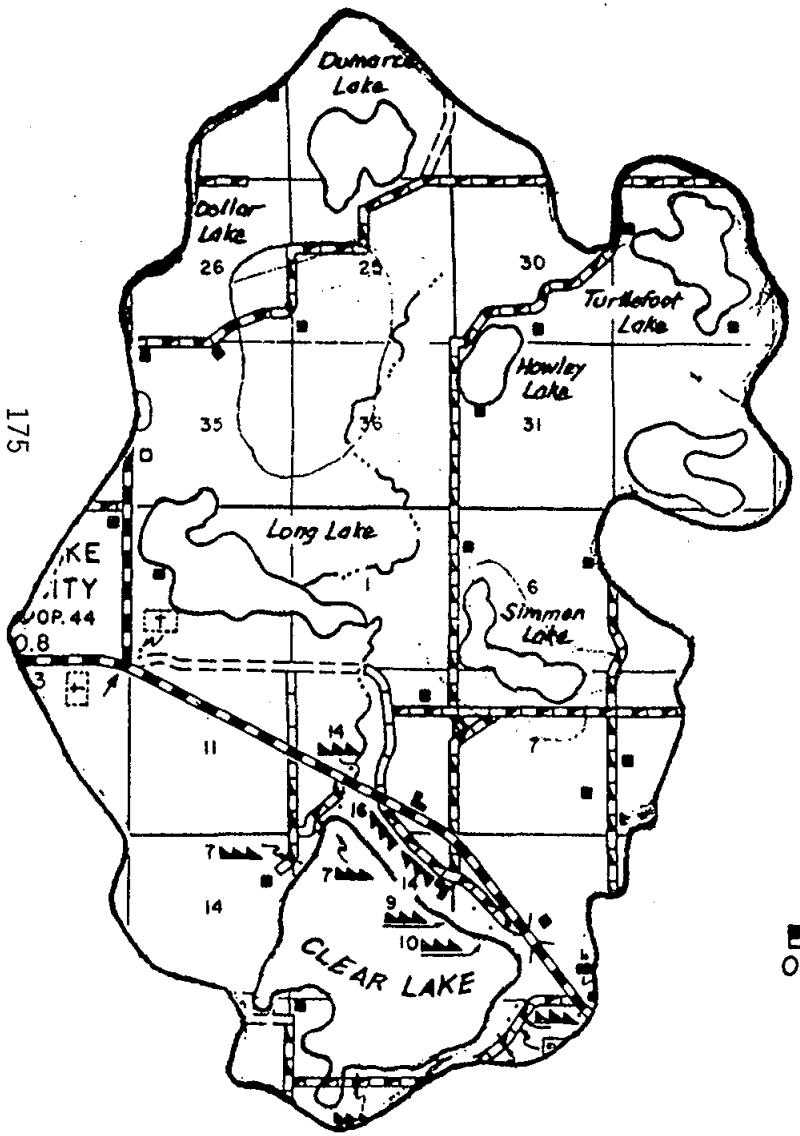
CLEAR LAKE 8/15/95

(Marshall County)

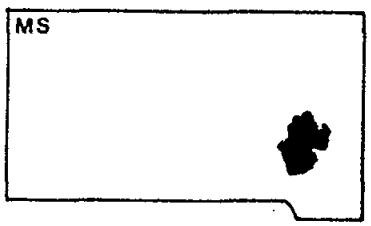
Dissolved Oxygen & Temperature Profile



Clear Lake



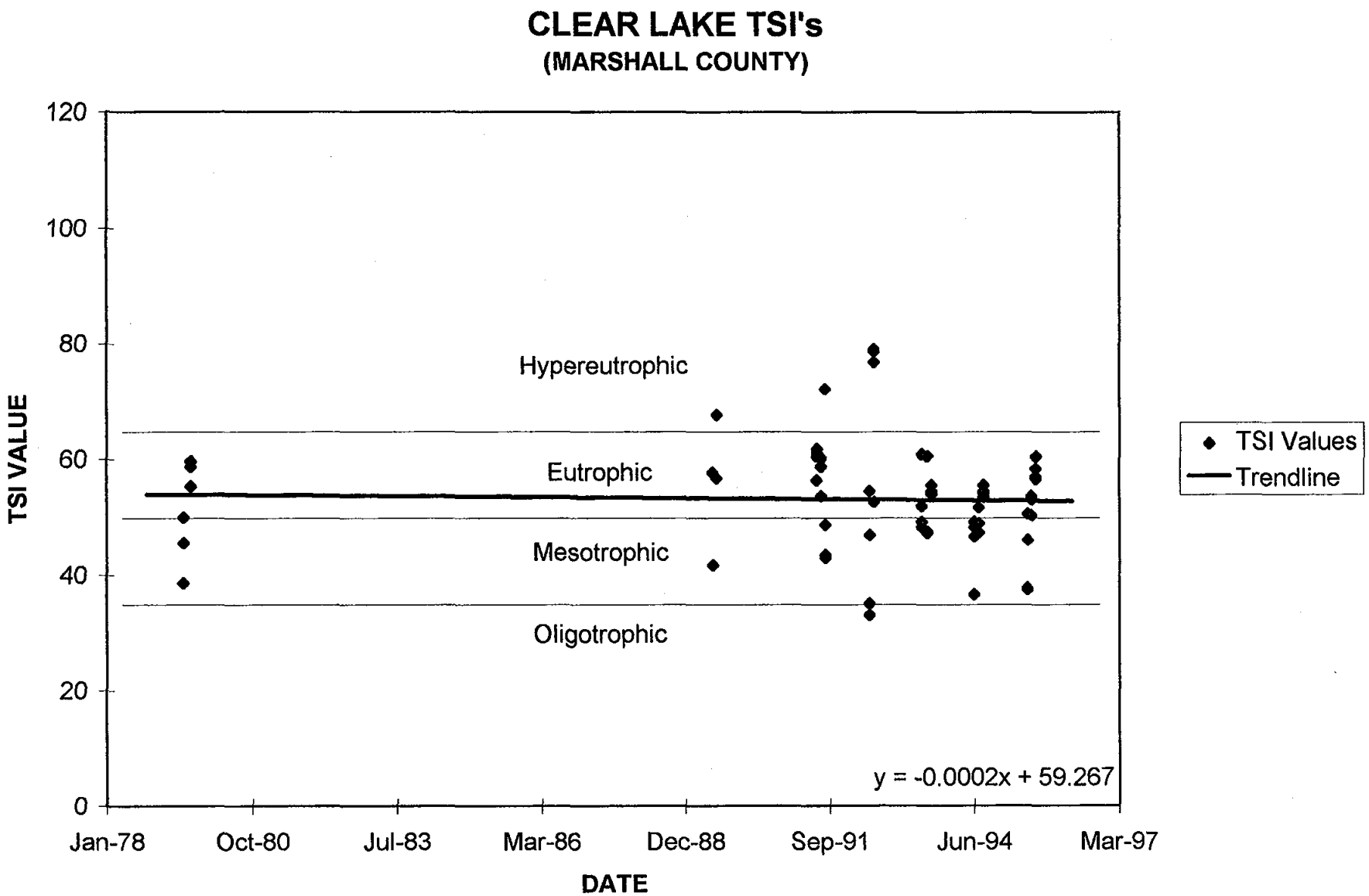
11,682 acres



Scale

0 1 2 3 4 5

Miles


CLEAR LAKE TSI's
(MARSHALL COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0002x + 59.267
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

COAL SPRINGS RESERVOIR

County: Perkins
Latitude: 45 deg. 35 min. 11 sec. N
Longitude: 102 deg. 06 min. 29 sec. W
Area: 90 A (36.4 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 17N
Range: 16E
Section (s): 24
Shoreline L: 4.1 mi (6.6 km)
Mean Depth: NA
Watershed/Lake Area: 87.7
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 25,691
Ownership Status: State owned
Public Interest: NA

	1989		1991	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	2	23.90	2	21.75
Air Temperature (°C)	2	22.00	2	24.50
Secchi Disk Depth (meters)	1	0.56	1	0.15
Conductivity (cond/25° C)	2	960	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su) (su)	2	8.70	2	8.24
Total Alkalinity (mg/l)	2	304	2	337
Total Solids (mg/l)	2	689	2	883
Dissolved Solids (mg/l)	2	670	2	850
Suspended Solids (mg/l)	2	19	2	33
Volatile Suspended Solids (mg/l)	-	-	2	19
Ammonia Nitrogen (mg/l)	2	0.30	2	0.16
Nitrate + Nitrite Nitrogen (mg/l)	2	0.45	2	1.10
Total Kjeldahl Nitrogen (mg/l)	2	1.57	2	1.82
Total Phosphorus (mg/l)	2	0.253	2	0.273
Total Dissolved Phosphorus (mg/l)	-	-	2	0.138
Ortho Phosphate as P (mg/l)	2	0.113	-	-
Chlorophyll (mg/m^3)	-	-	1	2.68

Year	1989	1991
TSI Values -- Mean:	74.85	70.85
Secchi Disk	68.40	87.14
Total Phosphorus	81.29	85.18
Chlorophyll *a*		40.24

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 70%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Anacharis canadensis and Carex sp.

Algal Species and Densities

July 25, 1989

Taxa	Number	Units/ml
Lyngbya Diguetii	5	68
Algae (other)	1	14
Total	6	82

Watershed Description
Watershed Area: 7,892 A (3,194 ha)

Soil Associations within Watershed

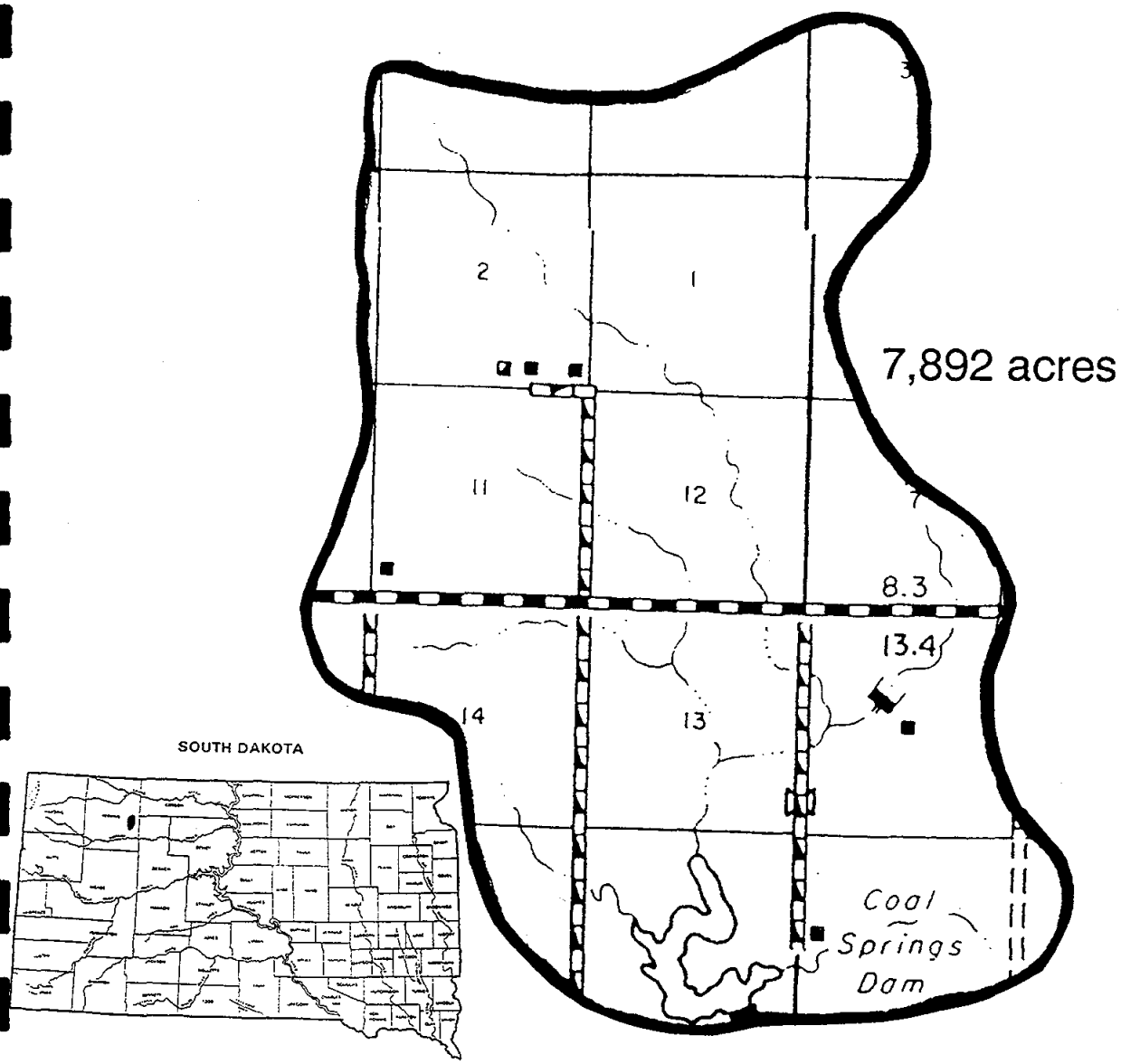
Association	Area (A)	% of Total
#8	3,946	50
#2	2,447	31
#1	1,499	19

#8 Reeder-Rhoades-Lantry: Moderately deep, well drained, gently sloping to strongly sloping loamy soils and deep, moderately well drained, nearly level to strongly sloping claypan soils; underlain by sandstone, siltstone, and shale; on uplands.

#2 Cabba-Lantry-Amour: Shallow and moderately deep, well drained, moderately sloping to steep loamy soils underlain by siltstone and sandstone; on uplands.

#1 Verbar-Reeder-Cohagen: Moderately deep and shallow, well drained to excessively drained, gently sloping to steep loamy and sandy soils underlain by sandstone; on uplands.

Coal Springs Reservoir

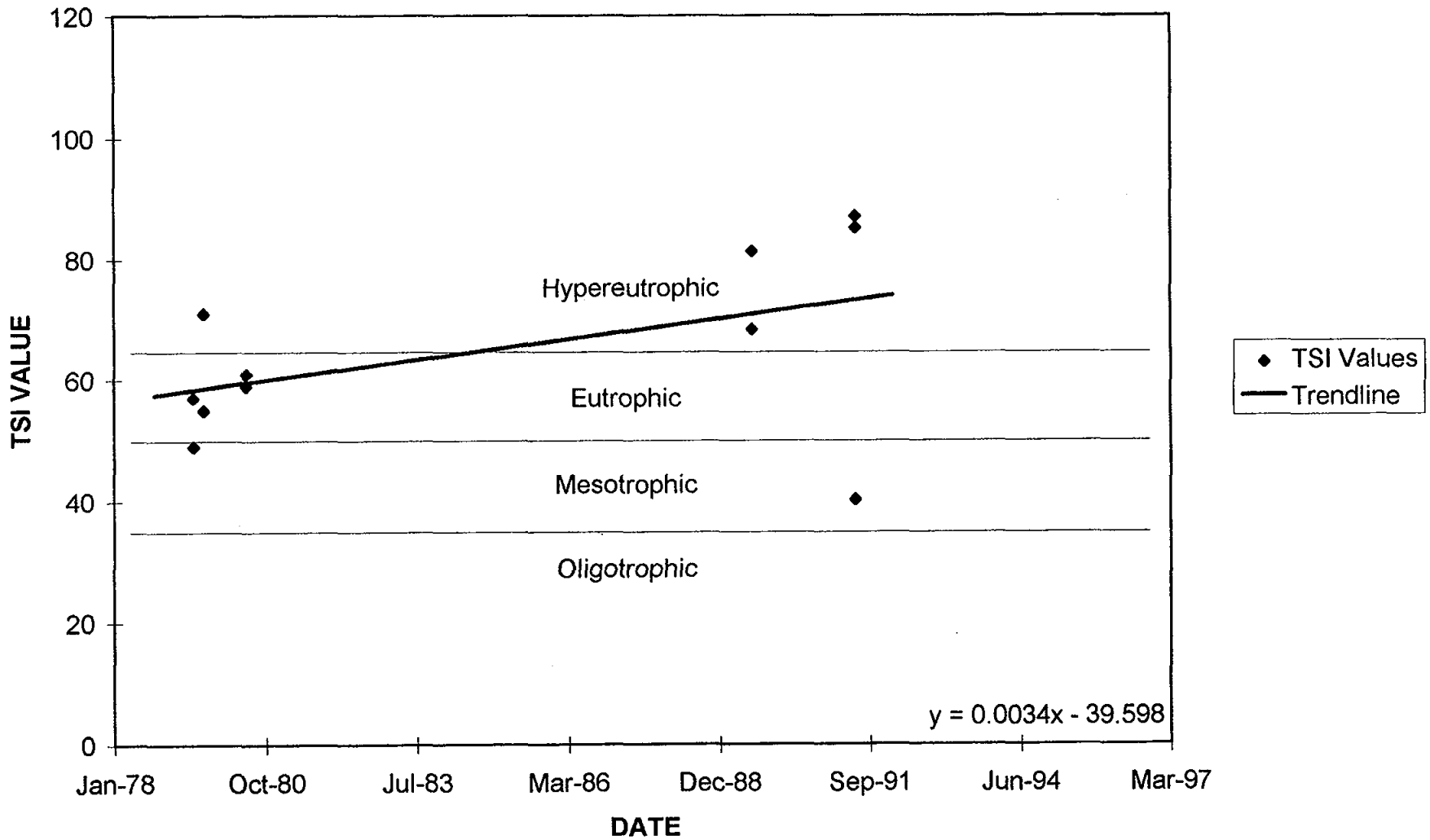


SCALE

0 1 2 3 4 5 6 7 8 KILOMETERS

0 1 2 3 4 5 MILES

COAL SPRINGS RESERVOIR TSI's



LAKE COCHRANE

County: Deuel
Latitude: 44 deg. 42 min. 30 sec. N
Longitude: 96 deg. 28 min. 48 sec. W
Area: 366 A (148.3 ha)
Maximum Depth: 26.5 ft (8.2 m)
Volume: 4028 acre-ft (4.9 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 114N
Range: 47W
Section (s): 4, 5, 8
Shoreline L: 3.7 mi (6 km)
Mean Depth: 11 ft (3.4 m)
Watershed/Lake Area: 2.4
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Deuel Co. Lakes and Streams Association and the Lake Cochrane Improvement Association.

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.00	6	21.78	4	20.70
Air Temperature (°C)	4	25.28	6	28.33	4	22.78
Secchi Disk Depth (meters)	2	0.94	3	1.42	2	1.12
Conductivity (cond/25° C)	4	2961	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.66	-	-	-	-
Field pH (su) (su)	-	-	4	8.66	4	8.81
Total Alkalinity (mg/l)	4	249	-	-	-	-
Total Solids (mg/l)	4	3018	-	-	-	-
Dissolved Solids (mg/l)	4	3009	-	-	-	-
Suspended Solids (mg/l)	4	10	6	15	4	23
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.06	6	0.10	4	0.13
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.00
Total Kjeldahl Nitrogen (mg/l)	4	1.42	6	1.42	4	1.55
Total Phosphorus (mg/l)	4	0.043	6	0.034	4	0.044
Total Dissolved Phosphorus (mg/l)	-	-	6	0.014	4	0.009
Ortho Phosphate as P (mg/l)	4	0.011	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	20.59	4	23.60

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	20.63	6	21.91	10	22.82
Air Temperature (°C)	6	20.67	4	20.25-	6	25.93
Secchi Disk Depth (meters)	3	1.62	9	1.59	11	1.95
Conductivity (cond/25° C)	-	-	-	-	3	2,113
Turbidity (NTU)	-	-	-	-	4	3.76
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	6	8.62	6	8.51	10	8.32
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	4	2,190
Dissolved Solids (mg/l)	-	-	-	-	4	2,181
Suspended Solids (mg/l)	6	19	6	13	10	8
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.17	6	0.11	10	0.07
Nitrate + Nitrite Nitrogen (mg/l)	6	0.03	6	0.17	10	0.07
Total Kjeldahl Nitrogen (mg/l)	6	1.25	6	1.31	10	1.28
Total Phosphorus (mg/l)	6	0.025	6	0.028	10	0.022
Total Dissolved Phosphorus (mg/l)	4	0.009	6	0.009	9	0.006
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	29.87	6	29.86	18	14.11

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	59.27	57.32	60.49	56.66	57.07	51.88
Secchi Disk	60.82	54.99	58.40	53.02	53.32	50.37
Total Phosphorus	57.73	56.74	61.50	53.06	54.00	48.74
Chlorophyll *a*		60.25	61.58	63.89	63.89	56.54

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: None identified.

Floating Leaved and Submergent Plant Species Identified: Chara sp. and Ruppia maritima

Algal Species and Densities

July 6, 1989

Taxa	Number	Units/ml
Aphanocapsa	168	17,032
Chroococcus	44	4,461
Aphanothece	35	3,548
Lyngbya contorta	20	2,028
Algae (other)	11	1,115
Gomphosphaeria	6	608
Oocystis	4	406
Green Algae (other)	4	406
Chaetoceros	3	304
Merismopedia	3	304
Lyngbya Diguetii	2	203
Peridinium	1	101
Algae (flagellate)	1	101
Schizothrix	1	101
Total	303	30,718

Watershed Description

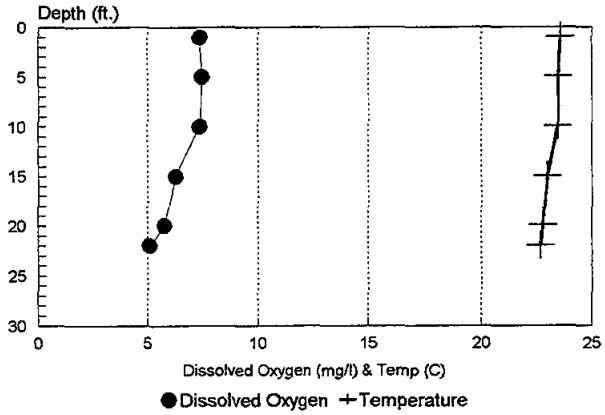
Watershed Area: 883 A (357 ha)

Soil Associations within Watershed

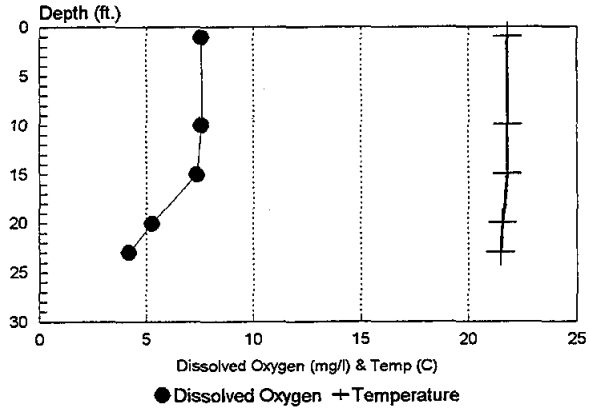
Association	Area (A)	% of Total
FU-AA-PA	883	100

FU-AA-PA Forman-Aastad-Parnell: Well drained and moderately well drained loamy soils formed in loamy glacial till; and very poorly drained silty soils in depressions.

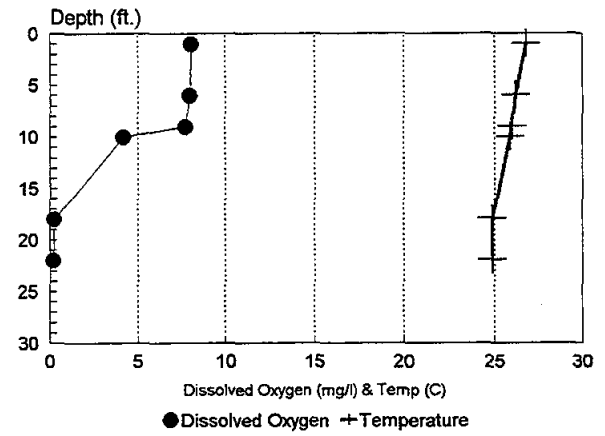
LAKE COCHRANE 8/4/79
Dissolved Oxygen & Temperature Profile



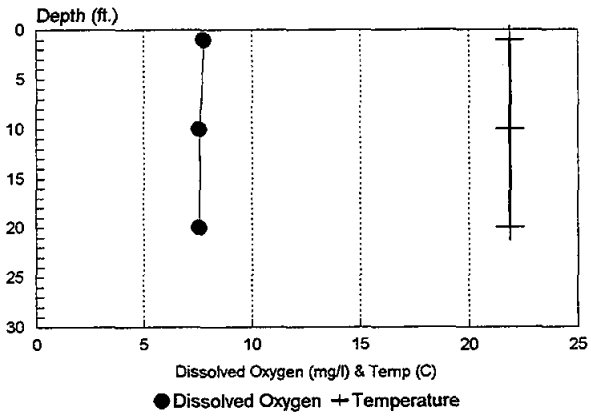
LAKE COCHRANE 6/23/91
Dissolved Oxygen & Temperature Profile



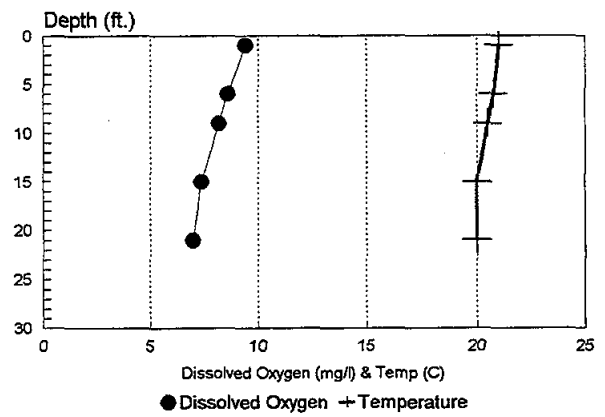
LAKE COCHRANE 7/21/91
Dissolved Oxygen & Temperature Profile



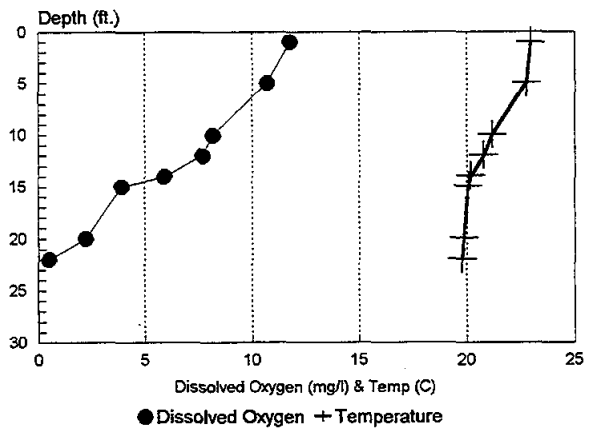
LAKE COCHRANE 8/20/91
Dissolved Oxygen & Temperature Profile



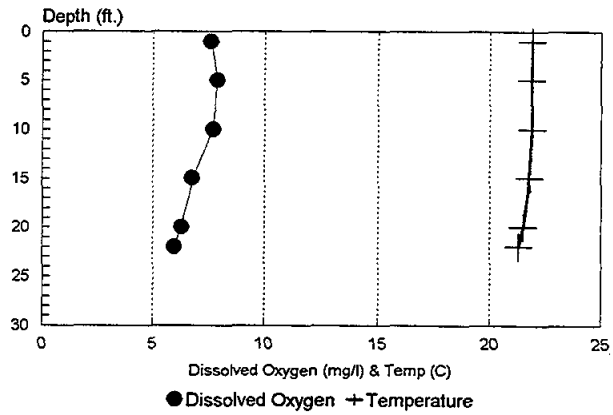
LAKE COCHRANE 6/18/92
Dissolved Oxygen & Temperature Profile



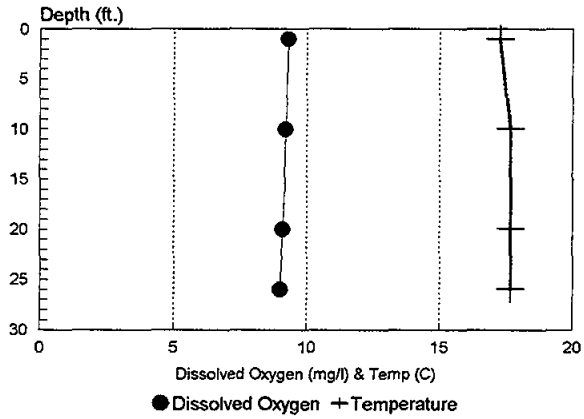
LAKE COCHRANE 7/18/92
Dissolved Oxygen & Temperature Profile



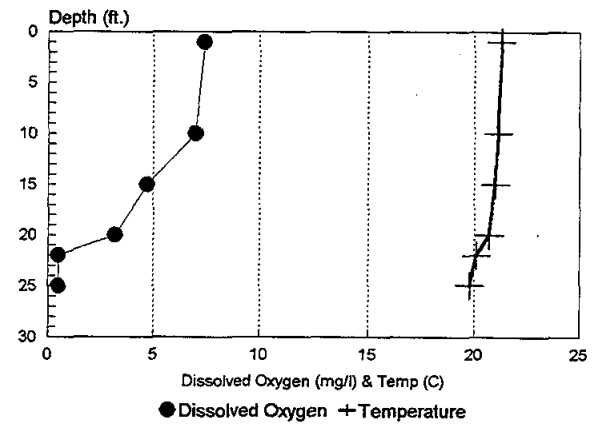
LAKE COCHRANE 8/16/92
Dissolved Oxygen & Temperature Profile



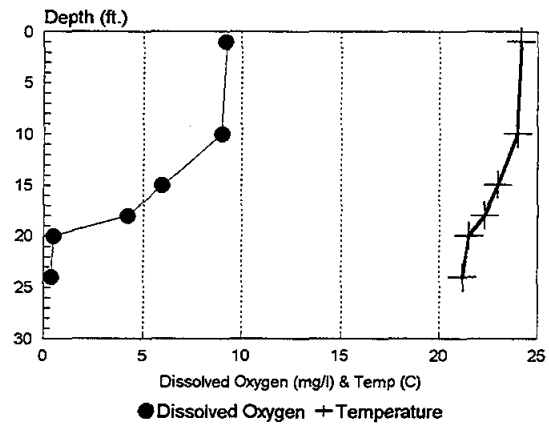
LAKE COCHRANE 6/17/93
Dissolved Oxygen & Temperature Profile



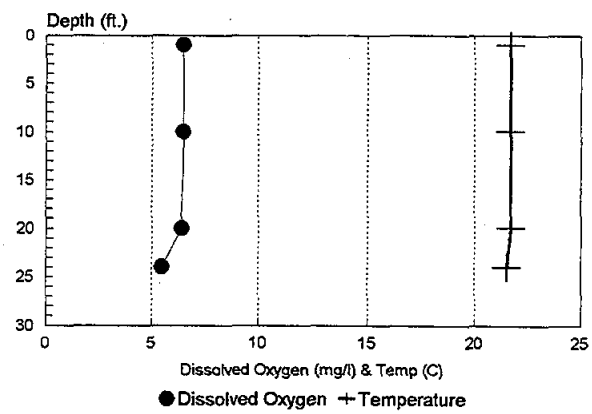
LAKE COCHRANE 7/23/93
Dissolved Oxygen & Temperature Profile



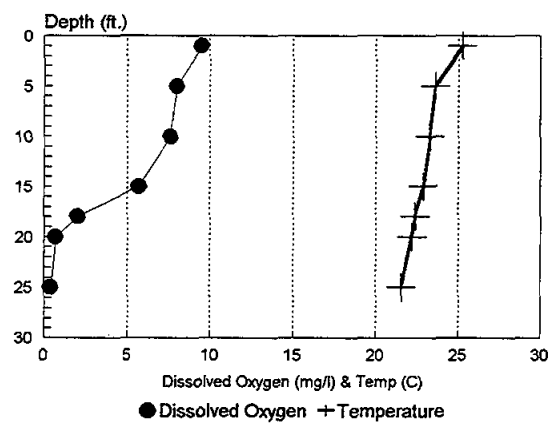
LAKE COCHRANE 8/21/93
Dissolved Oxygen & Temperature Profile



LAKE COCHRANE 6/15/94
Dissolved Oxygen & Temperature Profile

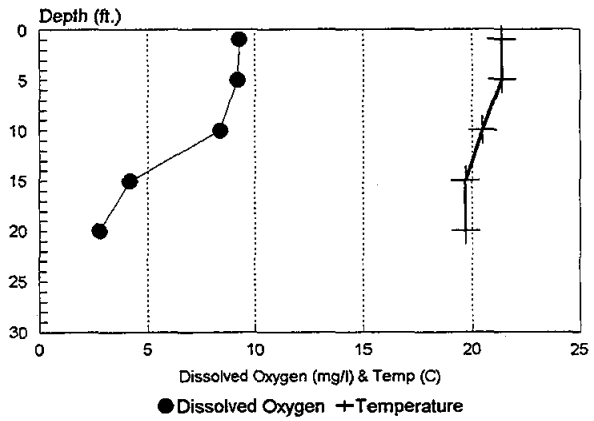


LAKE COCHRANE 7/17/94
Dissolved Oxygen & Temperature Profile



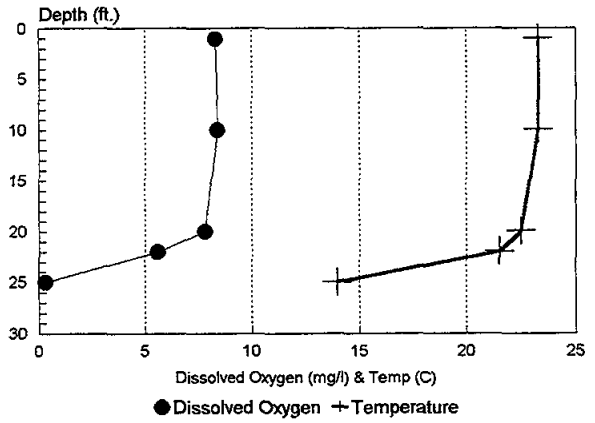
LAKE COCHRANE 8/17/94

Dissolved Oxygen & Temperature Profile



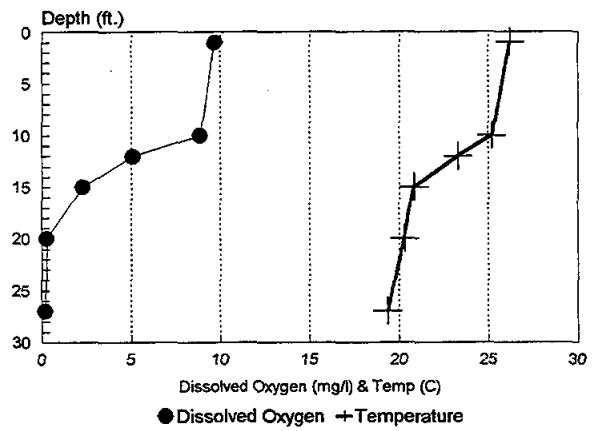
LAKE COCHRANE 6/15/95

Dissolved Oxygen & Temperature Profile



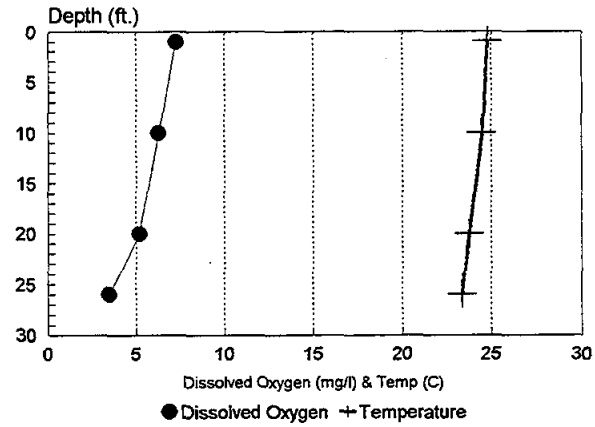
LAKE COCHRANE 7/16/95

Dissolved Oxygen & Temperature Profile



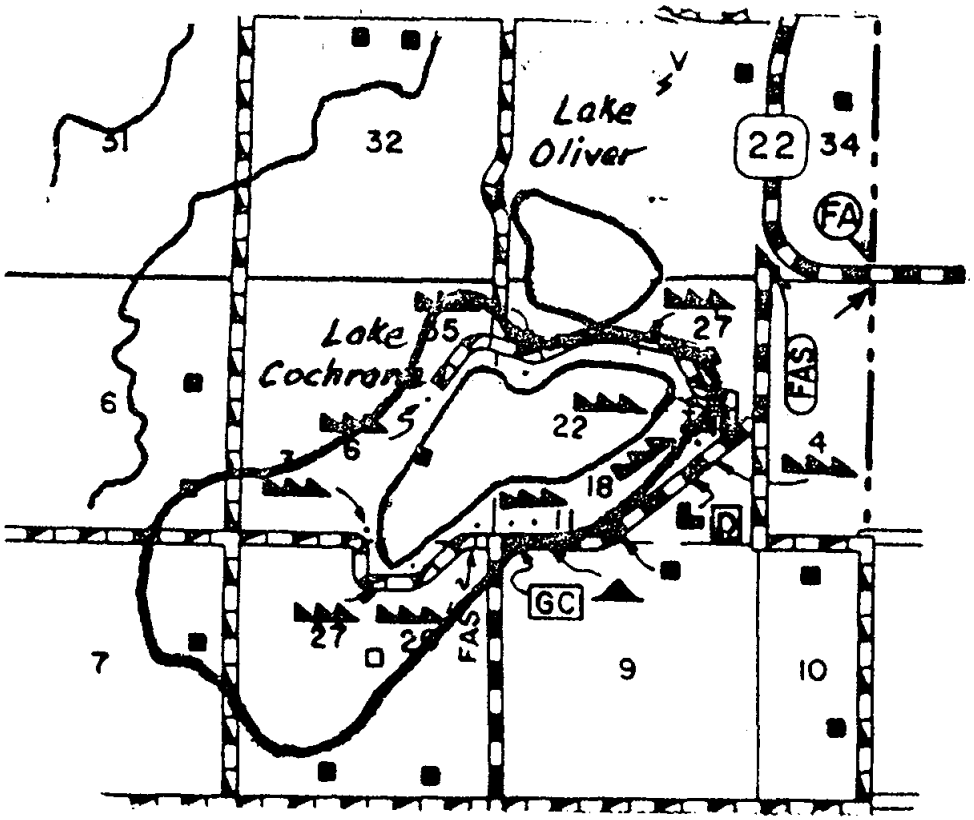
LAKE COCHRANE 8/15/95

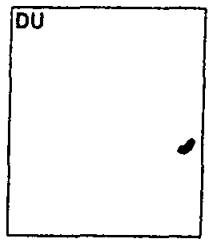
Dissolved Oxygen & Temperature Profile



Lake Cochrane

883 acres

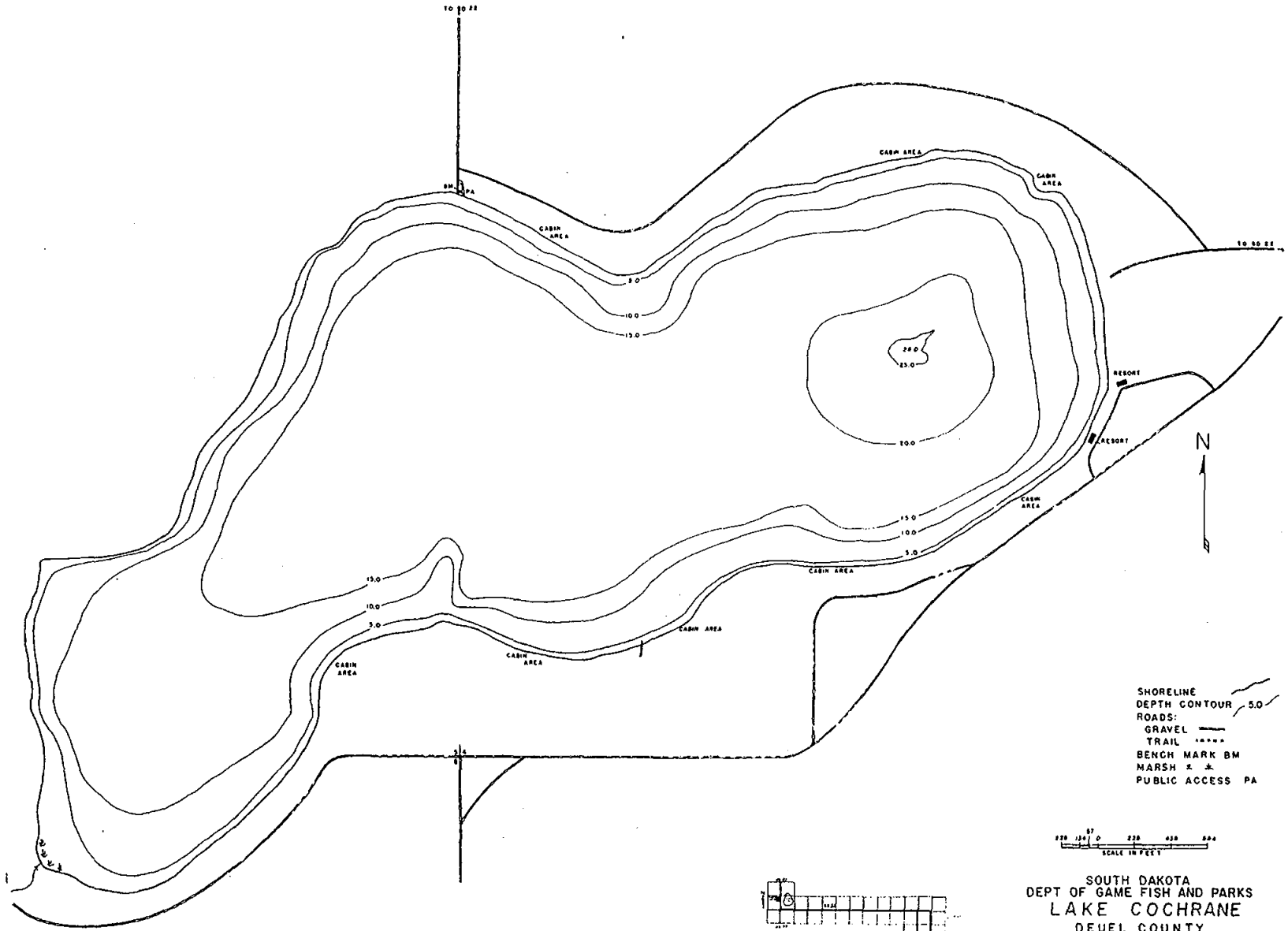




Scale

0 1 2 3

Miles



SOUTH DAKOTA
DEPT OF GAME FISH AND PARKS

LAKE COCHRANE

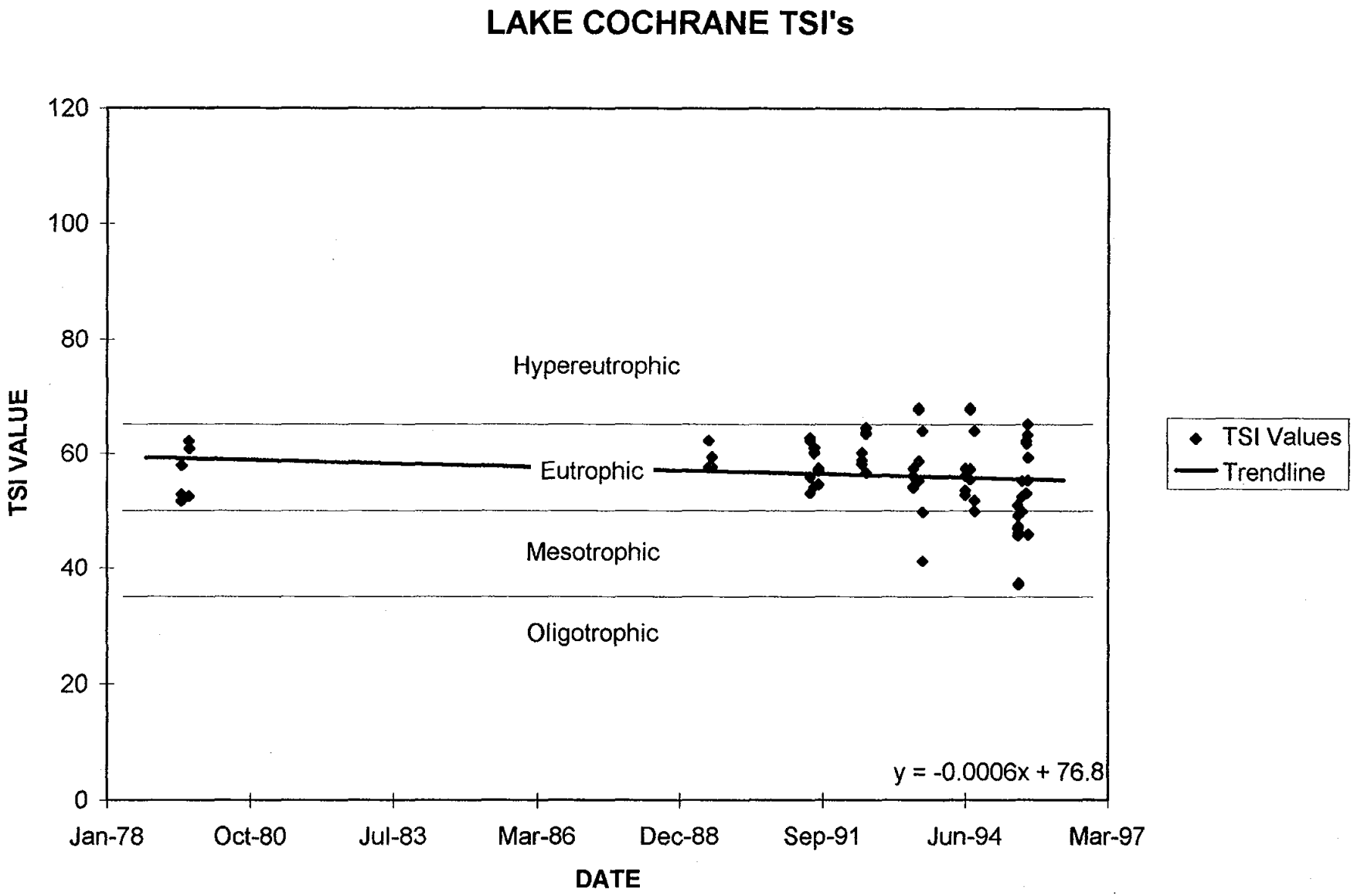
DEUEL COUNTY

WATER STAGE LOW
PLANIMETER ACRES 366.5

AERIAL PHOTO DATE: 1958
FIELD WORK DATE: 6-11-63
DRAWN BY: LP, WJM DATE: 1-6-64

SEC 4, 5, 8 TWP. 114 N RGE. 47 W

BM 6.5'


LAKE COCHRANE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0006x + 76.8
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

COLD BROOK RESERVOIR

County: Fall River
Latitude: 43 deg. 27 min. 22 sec. N
Longitude: 103 deg. 28 min. 18 sec. W
Area: 32 A (13 ha)
Maximum Depth: 30 ft (9 m)
Volume: 7,20 acre-ft (8.88 x $10^5 m^3$)
Origin of Basin: impoundment
Township: 7S
Range: 5E
Section (s): 11
Shoreline L: 1.4 mi (2.3 km)
Mean Depth: 22.5 ft (6.8 m)
Watershed/Lake Area: 1,355.8
Thermal Stratification: no
Major Inflows (named or permanent streams): Cold Brook Creek
Outlet: Cold Brook Creek

Lake Use

Beneficial Use Classification:
(1) Domestic water supply
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 127,237
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.33	4	17.32	4	21.58
Air Temperature (°C)	4	24.00	4	16.75	4	20.00
Secchi Disk Depth (meters)	2	5.11	2	6.77	2	8.22
Conductivity (cond/25° C)	4	457	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.33	4	8.50	4	8.40
Total Alkalinity (mg/l)	4	110	4	142	4	128
Total Solids (mg/l)	4	317	4	343	4	318
Dissolved Solids (mg/l)	4	311	4	339	4	316
Suspended Solids (mg/l)	4	6	4	4	4	1
Volatile Suspended Solids (mg/l)	-	-	2	2	-	-
Ammonia Nitrogen (mg/l)	4	0.03	4	0.02	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.25	4	0.32	4	0.43
Total Phosphorus (mg/l)	4	0.046	4	0.025	4	0.010
Total Dissolved Phosphorus (mg/l)	-	-	4	0.025	4	0.008
Ortho Phosphate as P (mg/l)	4	0.038	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	1.34	2	5.59

Year	1989	1991	1992
TSI Values -- Mean:	45.43	38.91	38.14
Secchi Disk	36.48	32.42	29.62
Total Phosphorus	54.37	50.87	37.37
Chlorophyll *a*		33.44	47.45

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Anacharis canadensis, Chara sp., Ceratophyllum sp., and
Potamogeton sp.

Algal Species and Densities

	July 17, 1989		August 14, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanothece	84	990	-	-
Algae (flagellate)	47	554	1	84
Aphanocapsa	13	153	50	4,223
Algae (other)	10	118	3	253
Oocystis	6	71	-	-
Green Algae (other)	5	59	-	-
Cryptomonas sp. #1	4	47	-	-
Cryptomonas	3	35	-	-
Chroococcus	1	12	-	-
Scenedesmus	1	12	-	-
Total	174	2,050	54	4,561

Watershed Description

Watershed Area: 43,387 A (17,546 ha)

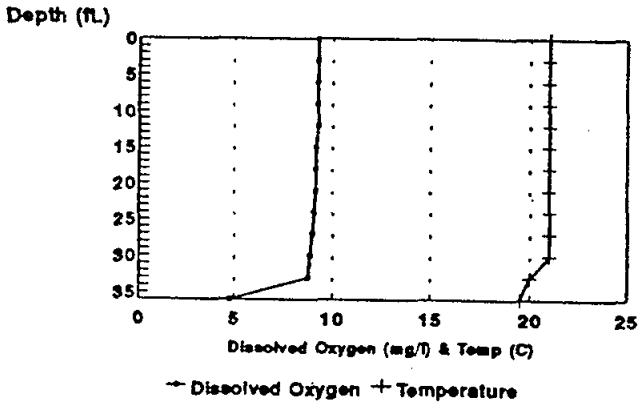
Soil Associations within Watershed

Association	Area (A)	% of Total
#2	41,217	95
#3	2,169	5

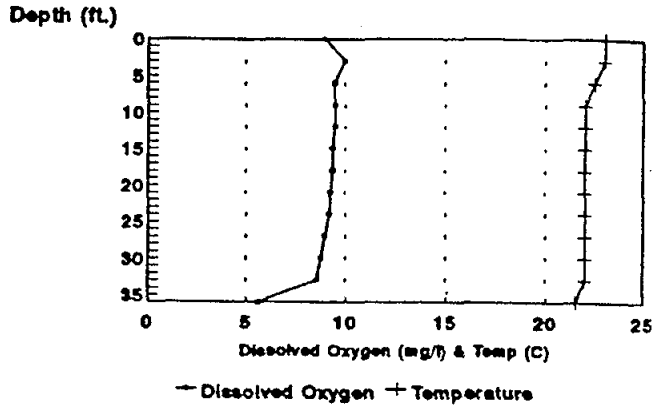
#2 Paunsaugunt-Vanocker: Shallow and deep, well drained, strongly sloping to very steep, loamy soils on mountains.

#3 Tilford-Spearfish: Deep and shallow, well drained, nearly level to steep, silty and loamy soils on uplands.

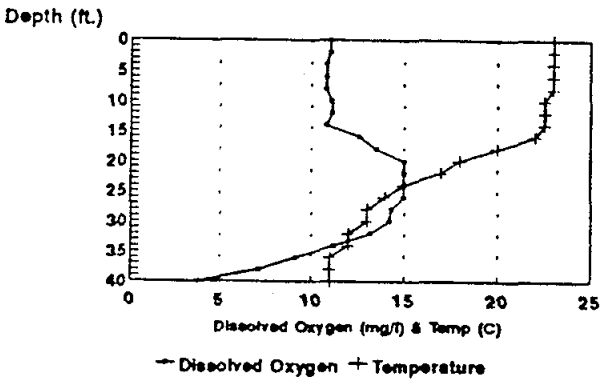
COLDBROOK RESERVOIR 7/22/92
Dissolved Oxygen & Temperature Profile



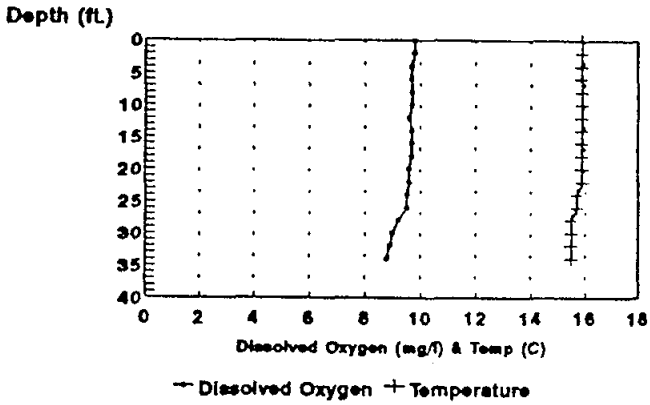
COLDBROOK RESERVOIR 8/17/92
Dissolved Oxygen & Temperature Profile



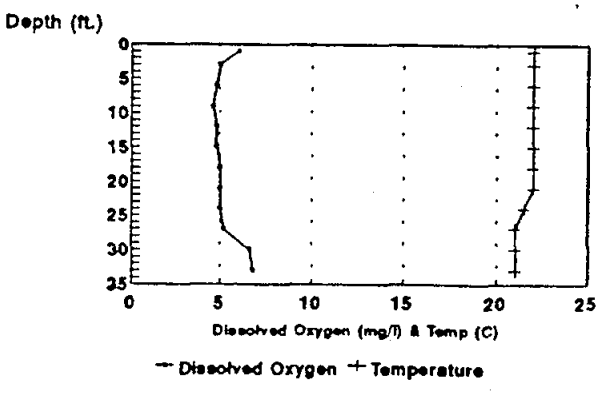
COLDBROOK RESERVOIR 6/19/91
Dissolved Oxygen & Temperature Profile



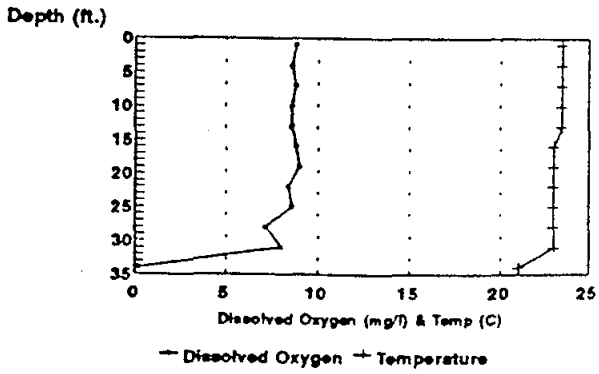
COLDBROOK RESERVOIR 10/1/91
Dissolved Oxygen & Temperature Profile



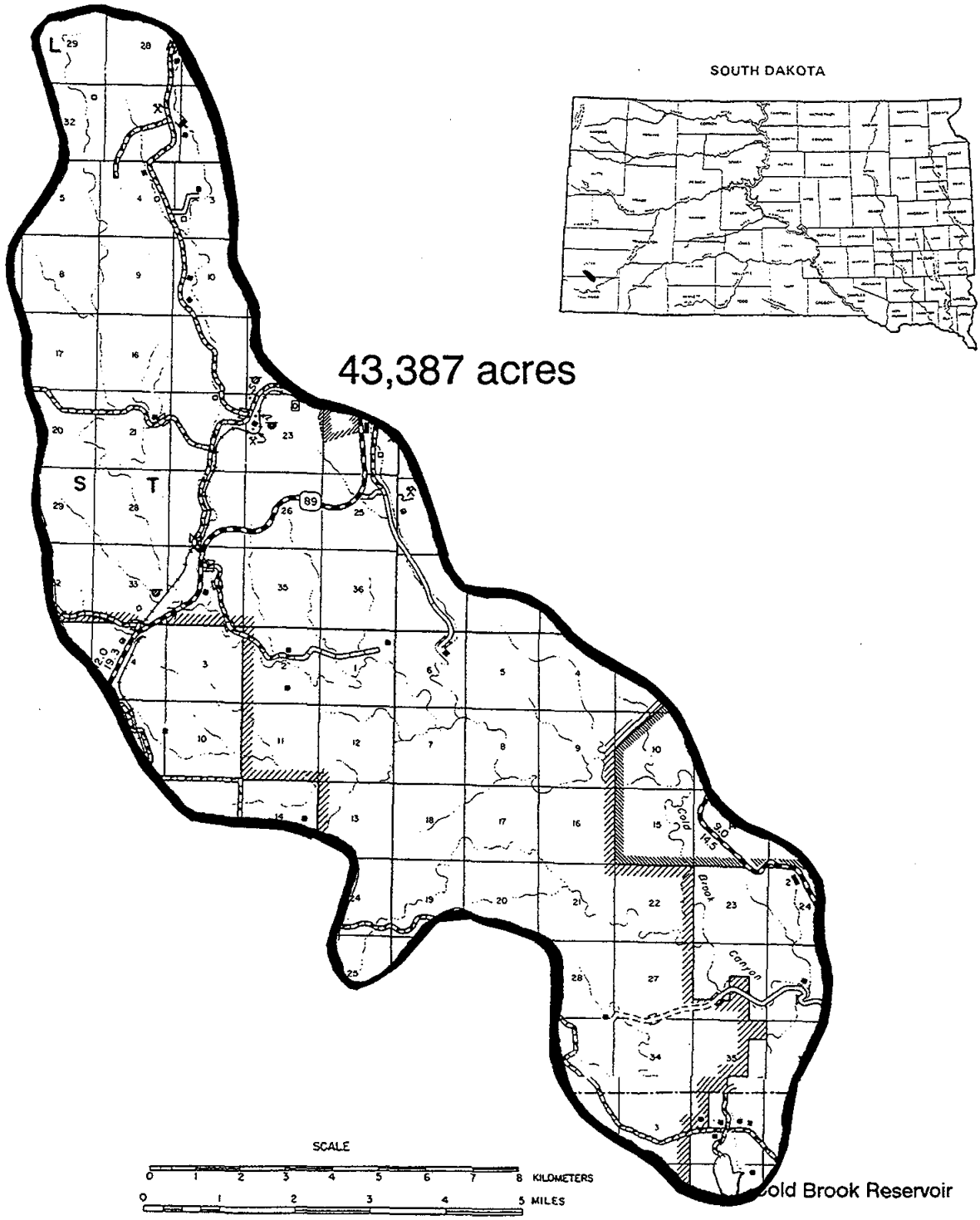
Cold Brook, 7/12/89
Dissolved Oxygen & Temperature Profile

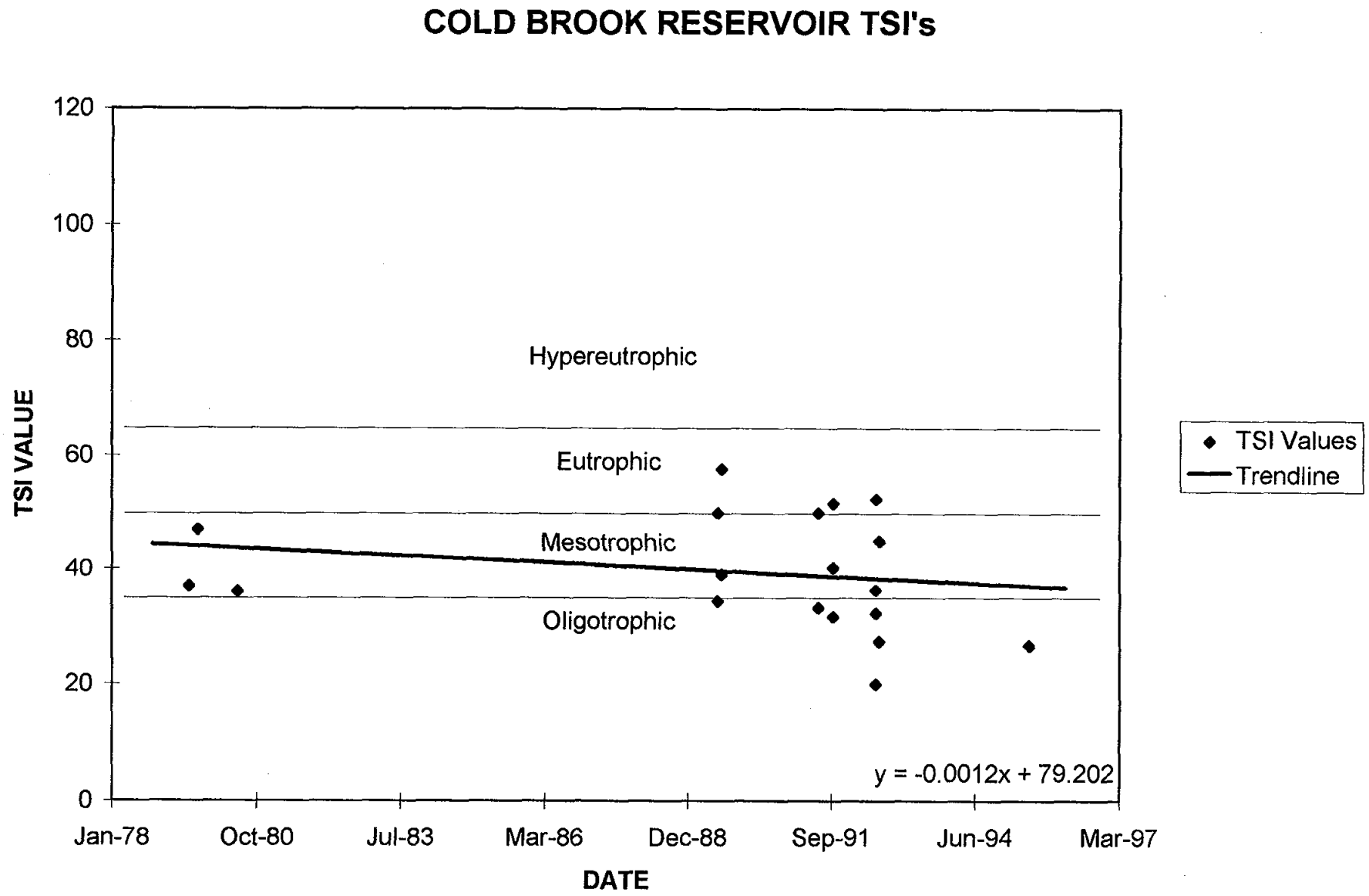


Cold Brook, 8/14/89
Dissolved Oxygen & Temperature Profile



Cold Brook Reservoir




COLD BROOK RESERVOIR TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0012x + 79.202
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

CORSICA LAKE

County: Douglas
Latitude: 43 deg. 24 min. 54 sec. N
Longitude: 98 deg. 17 min. 48 sec. W
Area: 110 A (44.5 ha)
Maximum Depth: 13.5 ft (4.1 m)
Volume: 824 acre-ft ($1.02x^6m^3$)
Origin of Basin: impoundment
Township: 99N
Range: 63W
Section (s): 3, 4, 9
Shoreline L: 3.2 mi (5.2 km)
Mean Depth: 7.5 ft (2.3 m)
Watershed/Lake Area: 402
Thermal Stratification: yes
Major Inflows (named or permanent streams): Choteau Creek
Outlet: Choteau Creek

Lake Use
Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 129,428
Ownership Status: State owned
Public Interest: Lake Corsica Association.

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.35	4	24.25	4	23.08
Air Temperature (°C)	4	22.00	4	27.50	4	27.09
Secchi Disk Depth (meters)	2	0.50	2	0.58	2	0.41
Conductivity (cond/25° C)	4	1,504	2	771	-	-
Turbidity (NTU)	-	-	-	-	4	35.07
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	2	9.10	4	8.44	4	7.97
Total Alkalinity (mg/l)	4	181	4	215	4	219
Total Solids (mg/l)	4	1,362	4	618	4	528
Dissolved Solids (mg/l)	4	1,334	4	595	4	503
Suspended Solids (mg/l)	4	28	4	23	4	25
Volatile Suspended Solids (mg/l)	-	-	2	6	-	-
Ammonia Nitrogen (mg/l)	4	0.12	4	0.16	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.65	4	0.15
Total Kjeldahl Nitrogen (mg/l)	4	2.20	4	1.49	4	1.28
Total Phosphorus (mg/l)	4	0.660	4	0.862	4	0.693
Total Dissolved Phosphorus (mg/l)	-	-	4	0.613	4	0.612
Ortho Phosphate as P (mg/l)	4	0.425	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	44.67	2	26.35

Year	1989	1991	1993
TSI Values -- Mean:	83.80	77.91	78.09
Secchi Disk	69.92	67.88	72.86
Total Phosphorus	97.69	98.02	98.74
Chlorophyll *a*		67.84	62.66

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 95%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Ceratophyllum demersum, Potamogeton nodosus, P. richardsonii, and P. pectinatus

Algal Species and Densities

	June 14, 1989		July 12, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Anabaena	168	2,724	5	261
Aphanizomenon flos-aquae	41	665	-	-
Cryptomonas ovata	27	438	-	-
Cryptomonas sp. #1	16	215	8	417
Algae (other)	11	178	5	261
Algae (flagellate)	8	130	3	156
Cryptomonas	6	97	2	104
Diatom (centric)	5	81	-	-
Closterium	4	65	268	13,970
Green Algae (other)	3	49	1	52
Diatom (pennate)	3	49	-	-
Fragilaria	2	32	-	-
Nitzschia acicularis	2	32	-	-
Blue-green (other)	1	16	-	-
Glenodinium Gymnodinium	1	16	1	52
Scenedesmus	1	16	-	-
Lyngbya	1	16	-	-
Schizothrix	-	-	3	156
Characium	-	-	2	104
Oocystis	-	-	1	52
Total	300	4,865	300	15,638

Watershed Description

Watershed Area: 44,226 A (17,898 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
CY-EU	31,843	72
EA-H3-EU	4,422	10
HR-S4	2,654	6
B4-MB	1,769	4
HR-PR	1,769	4
LC	1,769	4

CY-EU Clarno-Ethan: Gently undulating to rolling, well drained soils.

EA-H3-EU Eakin-Highmore-Ethan: Gently undulating to undulating, well drained soils.

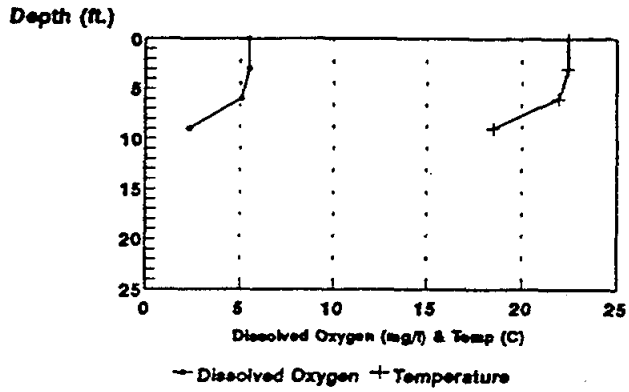
HR-S4 Houdek-Stickney: Nearly level, well drained soils and moderately well drained soils with compact clayey subsoils.

B4-MB Blendon-Macken: Gently undulating, well drained, loamy upland soils and poorly drained clayey soils in upland depressions.

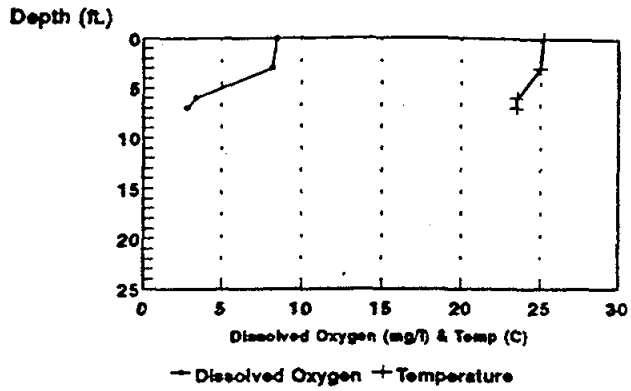
HR-PR Houdek-Prosper: Nearly level, well drained and moderately well drained soils.

LC Lamo: Somewhat poorly drained silty soils.

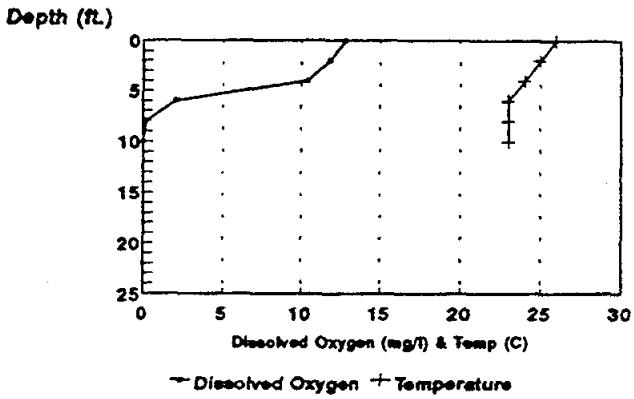
CORSICA LAKE 6/23/93
Dissolved Oxygen & Temperature Profile



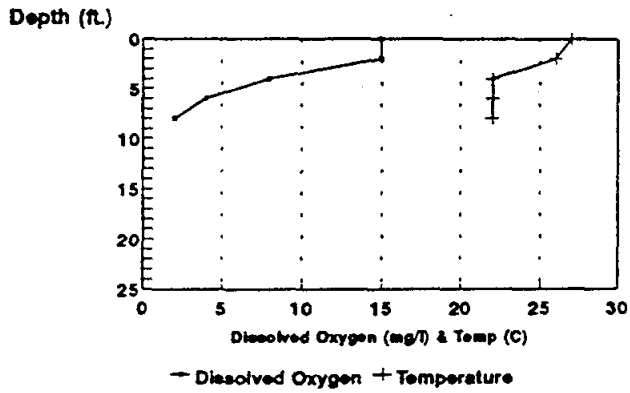
CORSICA LAKE 8/10/93
Dissolved Oxygen & Temperature Profile



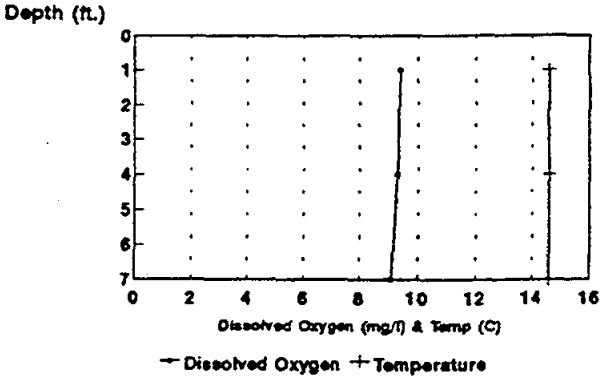
CORSICA LAKE 7/11/91
Dissolved Oxygen & Temperature Profile



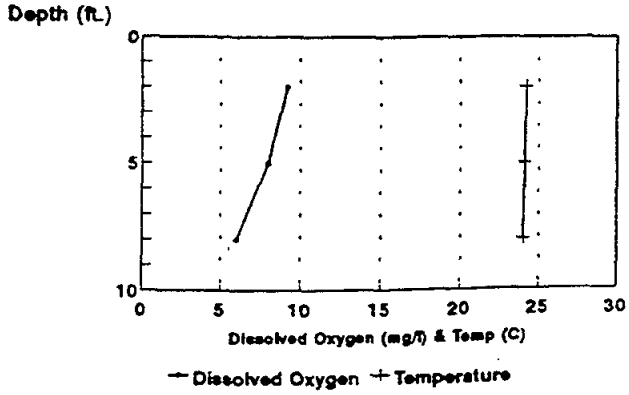
CORSICA LAKE 8/13/91
Dissolved Oxygen & Temperature Profile



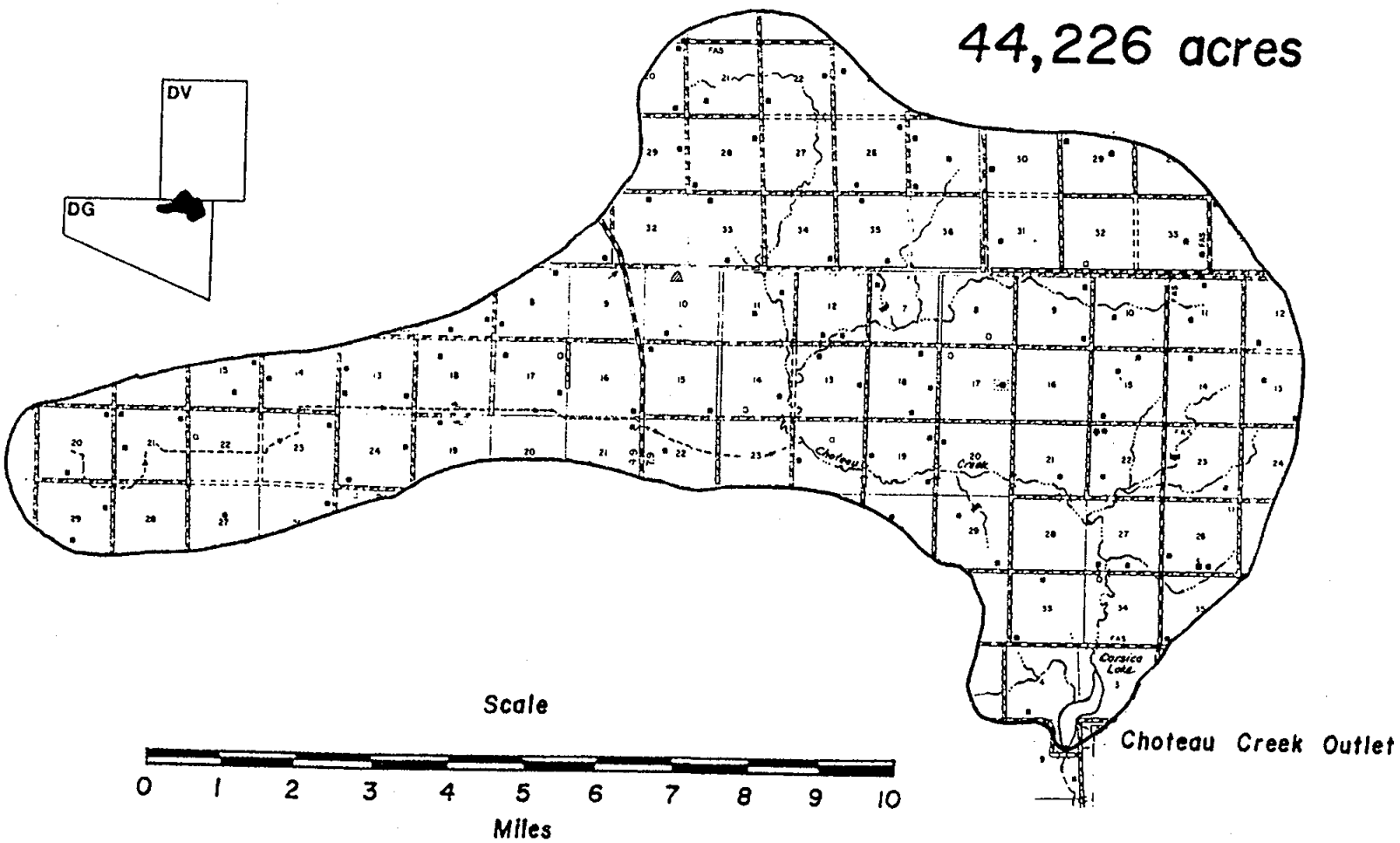
Corsica Lake, 6/14/89
Dissolved Oxygen & Temperature Profile

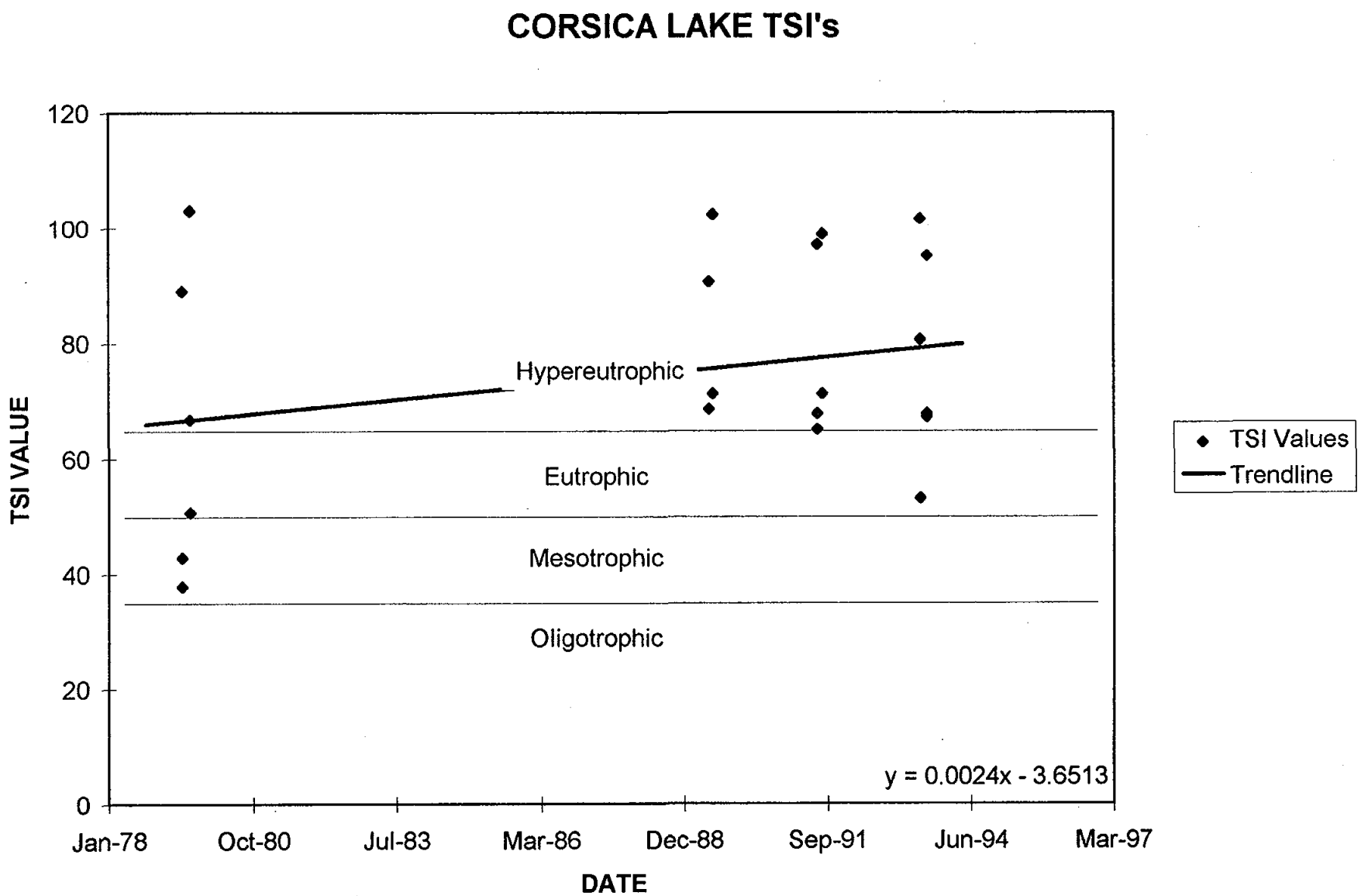


Corsica Lake, 7/12/89
Dissolved Oxygen & Temperature Profile



Corsica Lake




CORSICA LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0024x - 3.6513
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

COTTONWOOD LAKE

County: Spink
Latitude: 44 deg. 47 min. 18 sec. N
Longitude: 98 deg. 40 min. 30 sec. W
Area: 1,649.6 A (667.6 ha)
Maximum Depth: 9.0 ft (2.7 m)
Volume: 10,722 acre-ft (1.32 x$10^7 m^3$)
Origin of Basin: natural
Township: 115N
Range: 65W
Section (s): 4-5, 7-9, 17-18
Shoreline L: 11.4 mi(18 km)
Mean Depth: 6.5 ft (2.0 m)
Watershed/Lake Area: 92
Thermal Stratification: no
Major Inflows (named or permanent streams): Medicine Creek
Outlet: Medicine Creek

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

1439) 152

Estimated Population within 65-mile Radius: 62,644
Ownership Status: State owned
Public Interest: NA

4-3

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.88	4	22.75	4	20.13
Air Temperature (°C)	4	22.97	4	26.75	4	17.40
Secchi Disk Depth (meters)	2	0.46	2	0.61	2	0.96
Conductivity (cond/25° C)	4	1,400	2	1,583	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	2	9.15	4	8.58	4	8.93
Total Alkalinity (mg/l)	4	307	4	394	4	461
Total Solids (mg/l)	4	1,103	4	1,158	4	1,305
Dissolved Solids (mg/l)	4	965	4	1,118	4	1,285
Suspended Solids (mg/l)	4	48	4	41	4	20
Volatile Suspended Solids (mg/l)	-	-	2	-	-	-
Ammonia Nitrogen (mg/l)	4	0.08	4	0.02	4	0.47
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.40	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	1.30	4	1.36	4	2.27
Total Phosphorus (mg/l)	4	0.560	4	0.359	4	0.517
Total Dissolved Phosphorus (mg/l)	-	-	4	0.258	4	0.426
Ortho Phosphate as P (mg/l)	4	0.379	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	12.06	1	97.82

Year	1989	1991	1992
TSI Values -- Mean:	83.14	71.68	76.83
Secchi Disk	71.29	67.14	60.66
Total Phosphorus	95.00	92.90	94.30
Chlorophyll *a*		55.00	75.53

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: bulrush

Floating Leaved and Submergent Plant Species Identified: None identified.

Algal Species and Densities

	July 20, 1989		September 7, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Chroococcus	257	13,428	-	-
Aphanizomenon flos-aquae	44	2,299	6	92
Cryptomonas sp. #1	1	52	10	153
Cryptomonas	1	52	1	15
Characium	1	52	-	-
Stephanodiscus niagarae	-	-	60	918
Staurastrum	-	-	5	77
Dactylococcopsis	-	-	4	61
Algae (other)	-	-	3	46
Green Algae (other)	-	-	3	46
Oocystis	-	-	2	31
Phacus	-	-	1	15
Algae (flagellate)	-	-	1	15
Cyclotella meneghiniana	-	-	1	15
Total	304	15,884	97	1,495

Watershed Description

Watershed Area: 151,501 A (61,312 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
HR-PR	-	-
KB-B3	-	-
HC	-	-
HR-CE	-	-
GL-KB	-	-

HR-PR Houdek-Prosper: Well drained and moderately well drained nearly level to undulating loamy soils.

KB-B3 Java-Betts: Deep, rolling to hilly well drained and excessively drained loamy soils that formed in glacial till.

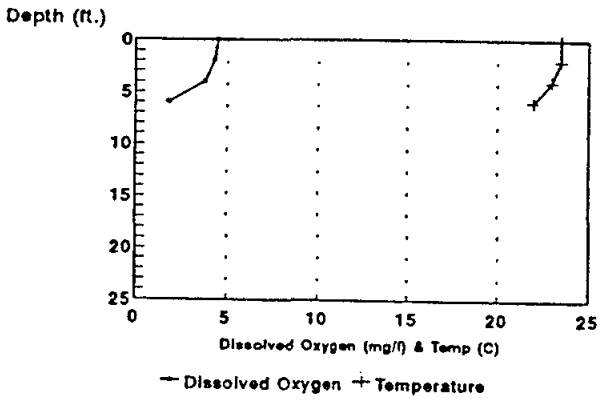
HC Hand Association: Deep nearly level well drained loamy soils that formed in glacial meltwater deposits.

HR-CE Houdek-Cavo: Deep nearly level to gently sloping well drained loamy soils and soils with claypan subsoils that formed in glacial till.

GL-KB Glenham-Java: Deep nearly level to undulating well drained loamy soils that formed in glacial till.

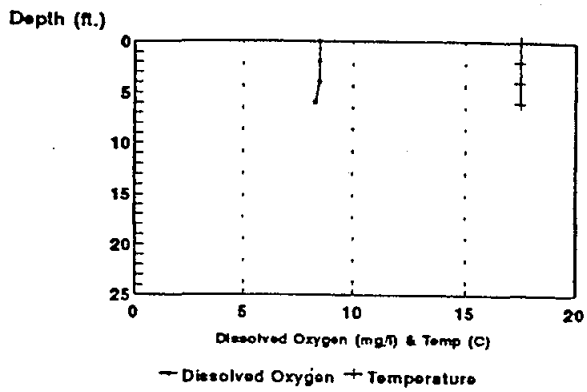
COTTONWOOD LAKE 8/3/92 (SPINK COUNTY)

Dissolved Oxygen & Temperature Profile



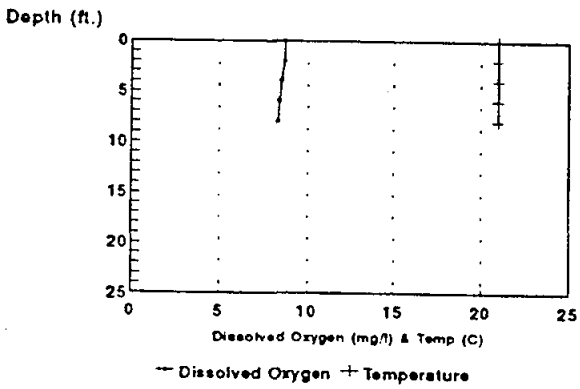
COTTONWOOD LAKE 9/3/92 (SPINK COUNTY)

Dissolved Oxygen & Temperature Profile



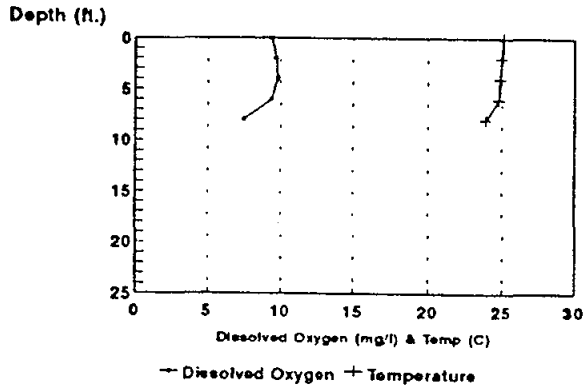
COTTONWOOD LAKE 8/8/91 (SPINK COUNTY)

Dissolved Oxygen & Temperature Profile



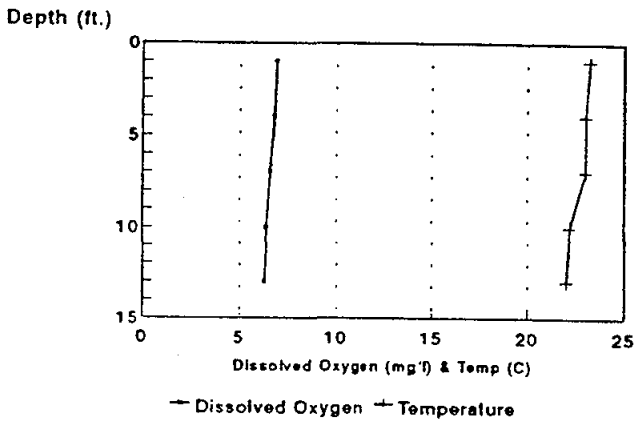
COTTONWOOD LAKE 8/29/91 (SPINK COUNTY)

Dissolved Oxygen & Temperature Profile



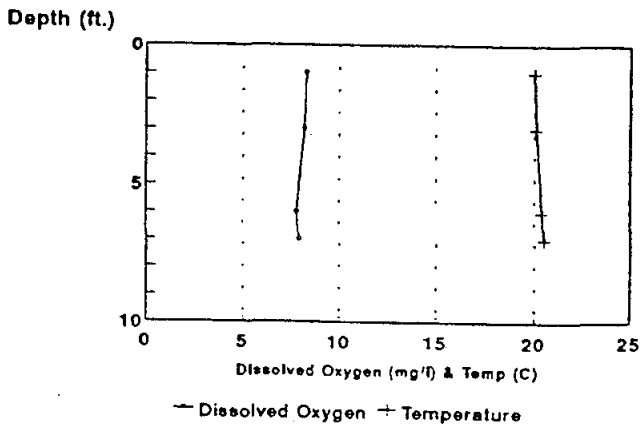
Cottonwood Lake, 8/15/89

Dissolved Oxygen & Temperature Profile



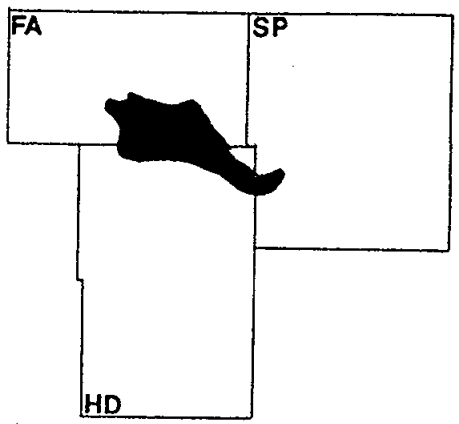
Cottonwood Lake, 9/7/89

Dissolved Oxygen & Temperature Profile



Cottonwood Lake

151,501 acres

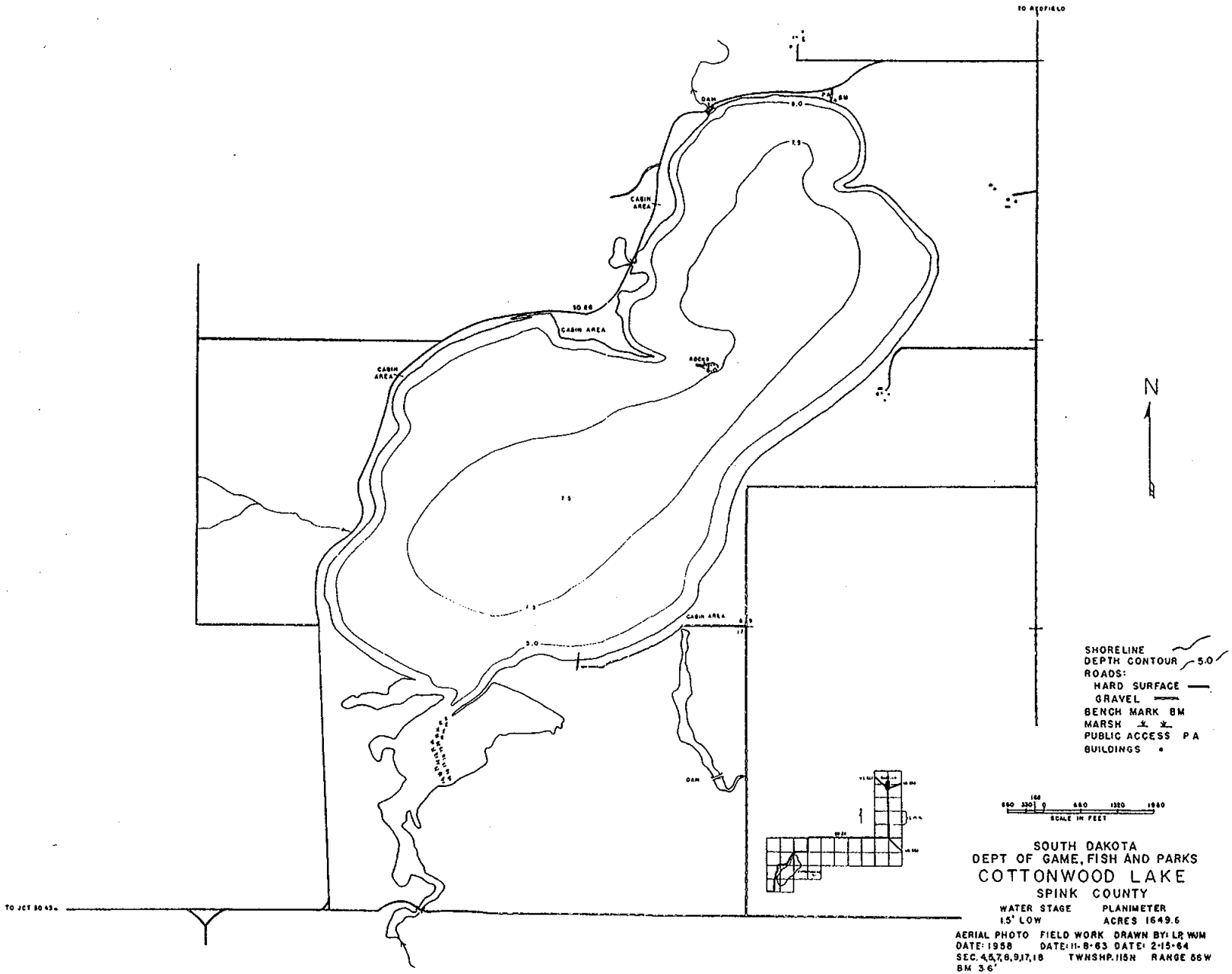


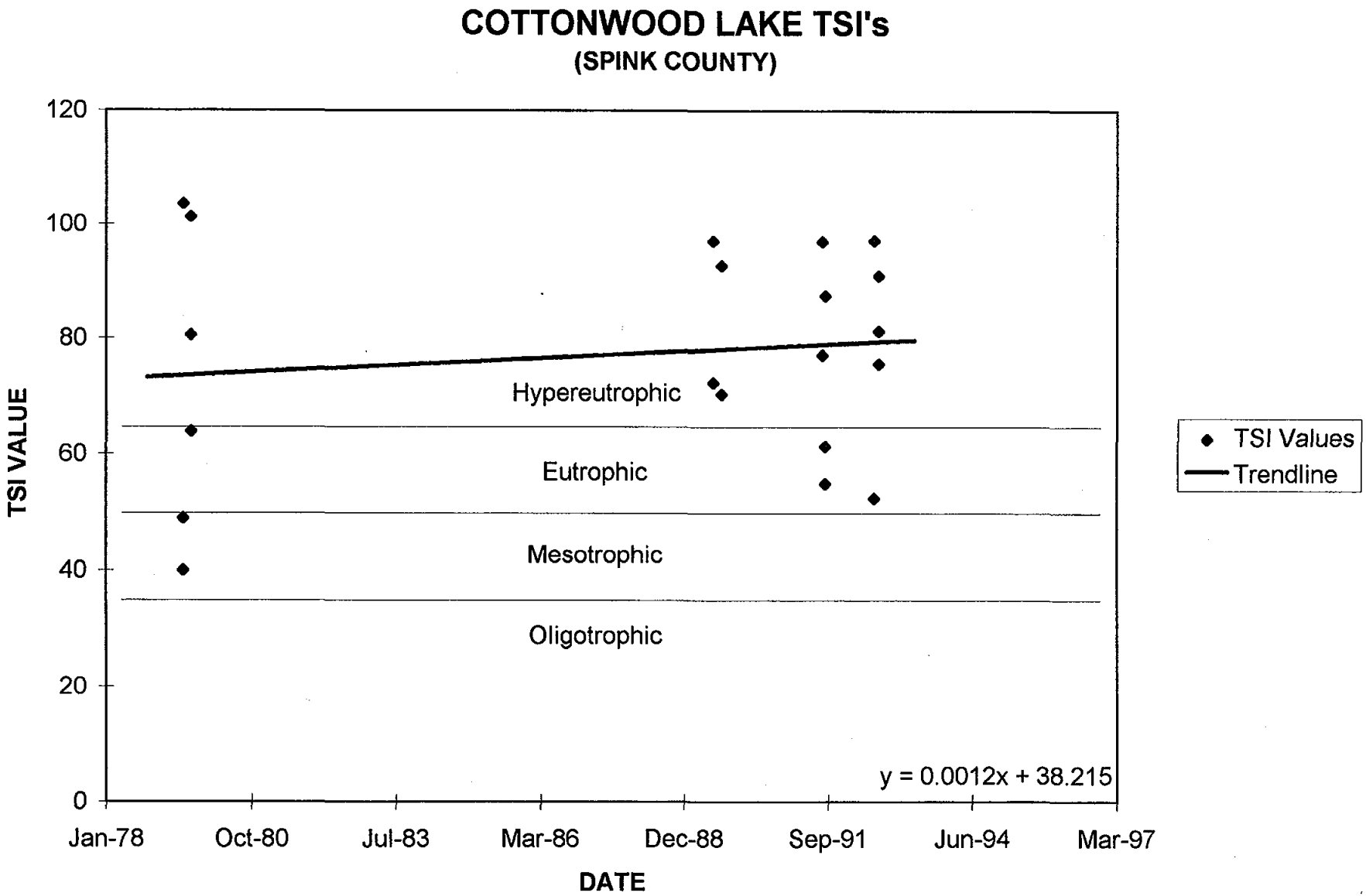
Medicine Creek Outlet

Scale

0 5 10

Miles


TO REDFIELD
DAM
CABIN AREA
CABIN AREA
CABIN AREA
CABIN AREA
ROCKS
DAM
TO JCT 30 43
N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
BENCH MARK BM
MARSH
PUBLIC ACCESS PA
BUILDINGS
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
COTTONWOOD LAKE
SPINK COUNTY
WATER STAGE 1.5' LOW
PLANIMETER ACRES 1649.6
AERIAL PHOTO DATE: 1958
FIELD WORK DATE: 11-8-63
DRAWN BY: LP, WJM DATE: 2-15-64
SEC. 4,5,7,8,9,17,18 TWNSHP. 115N RANGE 56W
BM 3.6'


COTTONWOOD LAKE TSI's
(SPINK COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0012x + 38.215
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

COTTONWOOD LAKE

County: Sully
Latitude: 44 deg. 50 min. 06 sec. N
Longitude: 99 deg. 54 min. 24 sec. W
Area: 454.4 A (189.9 ha)
Maximum Depth: 20 ft (6.1 m)
Volume: 3995.3 acre-ft(4.929 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 116N
Range: 75W
Section (s): 19-20, 29-30
Shoreline L: 4.3 mi (7 km)
Mean Depth: 8.8 ft (2.7 m)
Watershed/Lake Area: 114
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 46,515
Ownership Status: State owned
Public Interest: NA

	1989		1991	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	23.25	2	21.25
Air Temperature (°C)	4	28.06	2	21.50
Secchi Disk Depth (meters)	2	1.10	1	1.68
Conductivity (cond/25° C)	4	2,855	2	2,473
Turbidity (NTU)	-	-	-	-
Lab pH (su)	4	8.75	-	-
Field pH (su) (su)	-	-	2	8.89
Total Alkalinity (mg/l)	4	359	2	320
Total Solids (mg/l)	4	2,235	2	1,818
Dissolved Solids (mg/l)	4	2,176	2	1,804
Suspended Solids (mg/l)	4	60	2	14
Volatile Suspended Solids (mg/l)	-	-	2	12
Ammonia Nitrogen (mg/l)	4	0.17	2	0.11
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	2	0.65
Total Kjeldahl Nitrogen (mg/l)	4	1.55	2	1.48
Total Phosphorus (mg/l)	4	1.343	2	1.320
Total Dissolved Phosphorus (mg/l)	-	-	2	1.275
Ortho Phosphate as P (mg/l)	4	1.365	-	-
Chlorophyll (mg/m^3)	-	-	1	26.80

Year	1989	1991
TSI Values -- Mean:	83.04	74.06
Secchi Disk	58.66	52.55
Total Phosphorus	107.43	106.79
Chlorophyll *a*		62.83

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 80%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

July 20, 1989

Taxa	Number	Units/ml
Aphanizomenon flos-aquae	284	14,721
Anabaena	7	363
Closterium	4	207
Algae (other)	3	156
Characium	2	104
Cryptomonas sp. #1	2	104
Cyclotella meneghiniana	1	52
Green Algae (other)	1	52
Total	304	15,758

Watershed Description

Watershed Area: 51,995 A (21,042 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#5	38,476	74
#9	8,839	17
#7	4,680	9

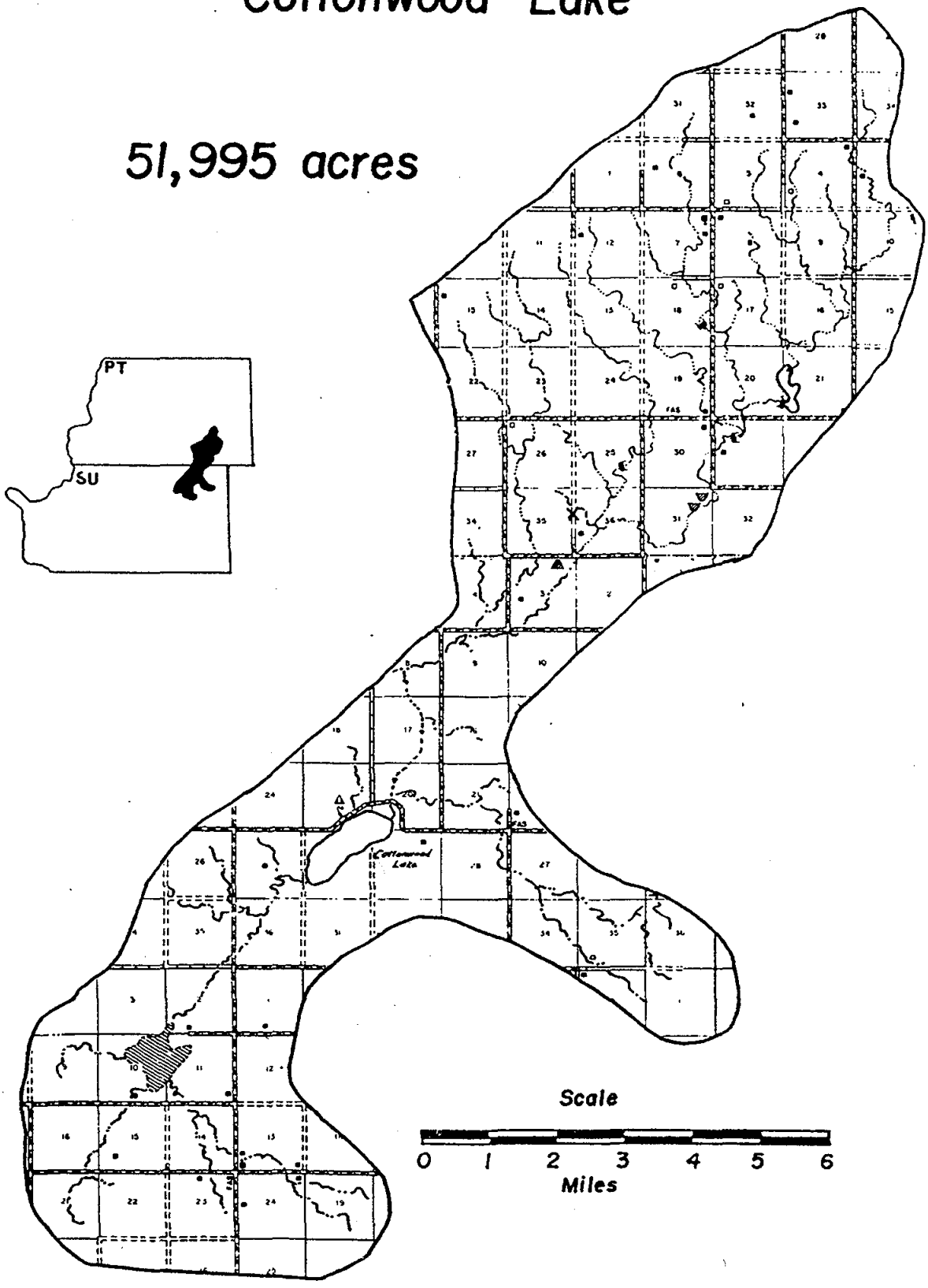
#5 Highmore-Eakin: Deep, nearly level to undulating, well drained silty soils found dominantly in silty glacial drift and loamy glacial till on uplands.

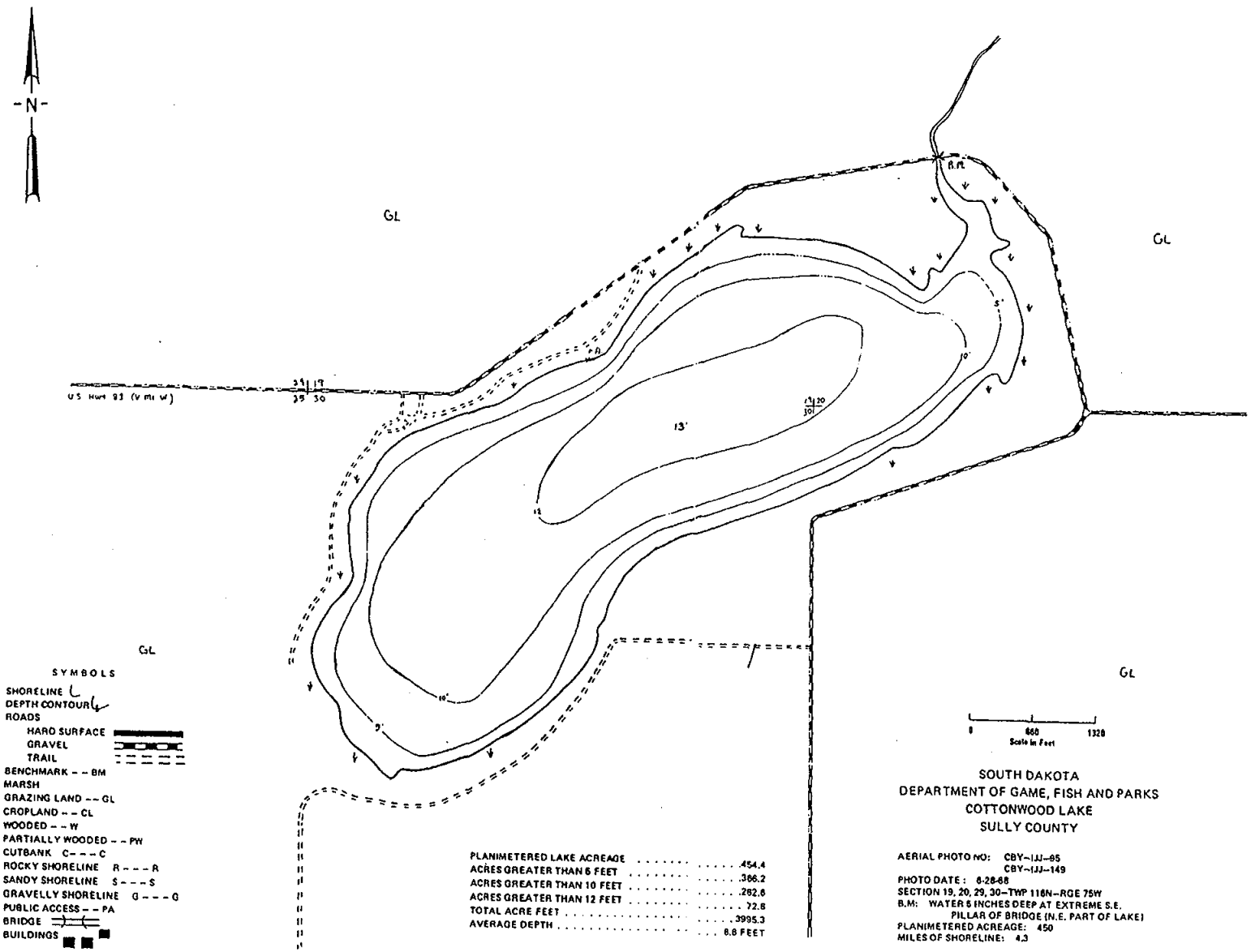
#9 Raber-Glenham: Deep, nearly level to undulating, well drained loamy soils formed in glacial till on uplands.

#7 Oahe-Talmo: Well to excessively drained, nearly level to hilly loamy soils over sand and gravel on terraces and uplands.

Cottonwood Lake

51,995 acres

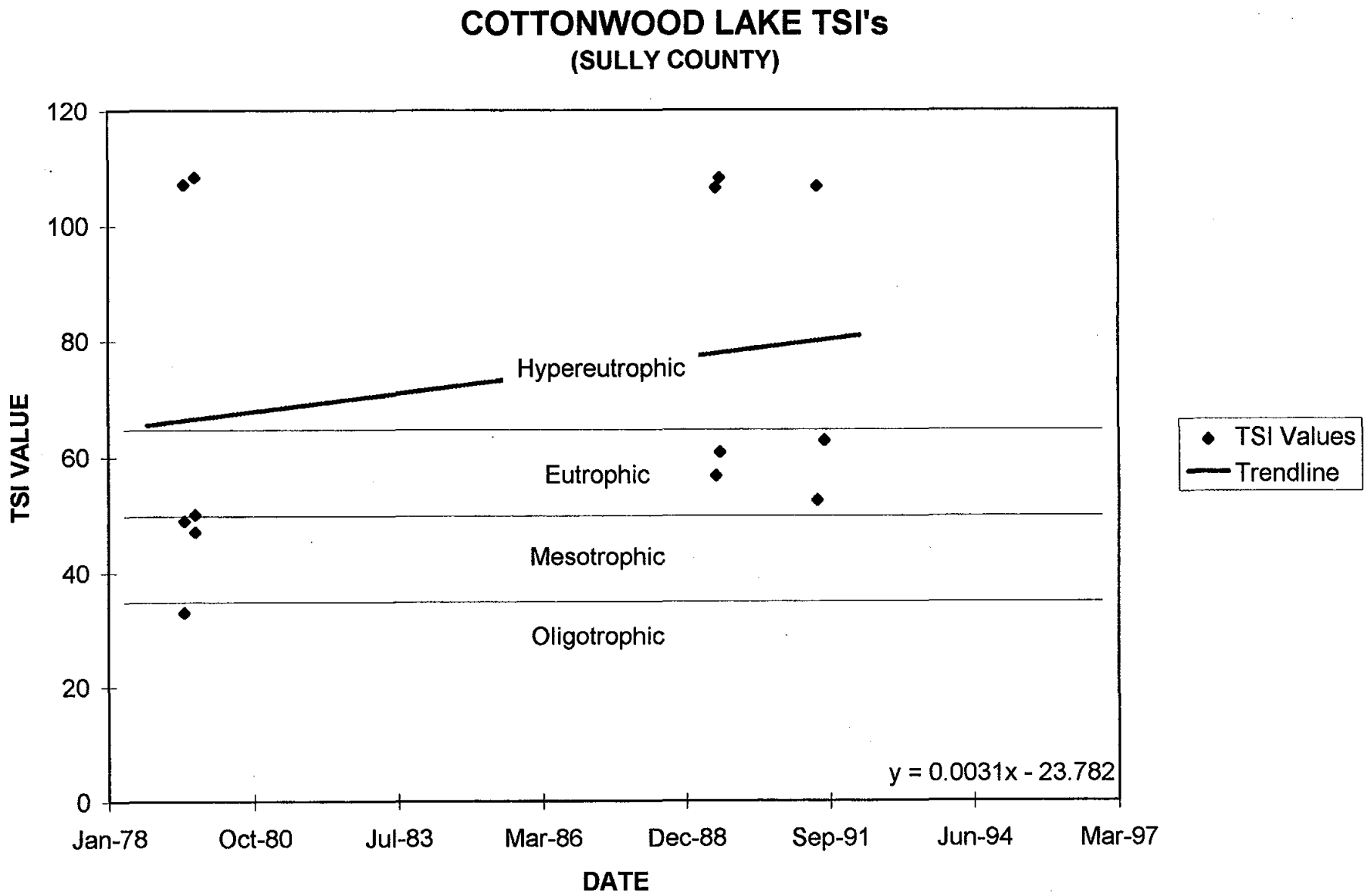




PLANIMETERED LAKE ACREAGE 454.4
ACRES GREATER THAN 6 FEET 366.2
ACRES GREATER THAN 10 FEET 262.6
ACRES GREATER THAN 12 FEET 72.8
TOTAL ACRE FEET 3995.3
AVERAGE DEPTH ..... 8.8 FEET

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
COTTONWOOD LAKE
SULLY COUNTY

AERIAL PHOTO NO: CBY-IJJ-65
CBY-IJJ-149
PHOTO DATE: 6-28-65
SECTION 19, 20, 29, 30-TWP 116N-RGE 75W
B.M: WATER 6 INCHES DEEP AT EXTREME S.E. PILLAR OF BRIDGE (N.E. PART OF LAKE)
PLANIMETERED ACREAGE: 450
MILES OF SHORELINE: 4.3


COTTONWOOD LAKE TSI's
(SULLY COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0031x - 23.782
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

COVELL LAKE

County: Minnehaha
Latitude: 43 deg. 33 min. 24 sec.N
Longitude: 96 deg. 44 min. 30 sec. W
Area: 16 A (6.4 ha)
Maximum Depth: 8.8 ft (2.7 m)
Volume: 95.7 acre-ft ($1.177 \times 10^5 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: Big Sioux River

Township: 101N
Range: 49W
Section (s): 17
Shoreline L: 1.3 mi (2 km)
Mean Depth: 5.9 ft (1.8 m)
Watershed/Lake Area: 35
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 319,192
Ownership Status: City owned
Public Interest: City of Sioux Falls

	1989	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	23.00
Air Temperature (°C)	4	29.50
Secchi Disk Depth (meters)	2	0.59
Conductivity (cond/25° C)	4	564
Turbidity (NTU)	-	-
Lab pH (su)	-	-
Field pH (su) (su)	4	8.30
Total Alkalinity (mg/l)	4	78
Total Solids (mg/l)	4	362
Dissolved Solids (mg/l)	4	338
Suspended Solids (mg/l)	4	24
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.09
Nitrate + Nitrite Nitrogen (mg/l)	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	0.95
Total Phosphorus (mg/l)	4	0.96
Total Dissolved Phosphorus (mg/l)	-	-
Ortho Phosphate as P (mg/l)	4	0.039
Chlorophyll (mg/m^3)	-	-

	1989
TSI Values -- Mean:	69.86
Secchi Disk	67.51
Total Phosphorus	72.22
Chlorophyll *a*	

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Polygonum sp. and Arrowhead

Algal Species and Densities

	June 29, 1989		August 3, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Green Algae (other)	111	3549	285	59,975
Algae (other)	43	1375	3	631
Chroococcus	39	1247	1	210
Oocystis	28	895	3	631
Aphanizomenon flos-aquae	20	640	-	-
Scenedesmus	18	576	1	210
Pediastrum	10	320	-	-
Fragilaria crotonensis	6	192	-	-
Cyanarcus	5	160	-	-
Marssoniella	4	128	-	-
Asterionella formosa	4	128	-	-
Cryptomonas	3	96	2	421
Melosira granulata	2	64	-	-
Coelosphaerium	2	64	3	631
Diatom (centric)	2	64	1	210
Blue-green (other)	1	32	1	210
Actinastrum	1	32	-	-
Algae (flagellate)	1	32	-	-
Cryptomonas sp. #1	1	32	-	-
Elakatothrix	1	32	-	-
Glenodinium Gymnodinium	1	32	-	-
Aphanocapsa	1	32	-	-
Crucigenia	-	-	3	631
Kirchneriella	-	-	1	210
Total	304	9,720	304	59,975

Watershed Description

Watershed Area: 562 A (227 ha)

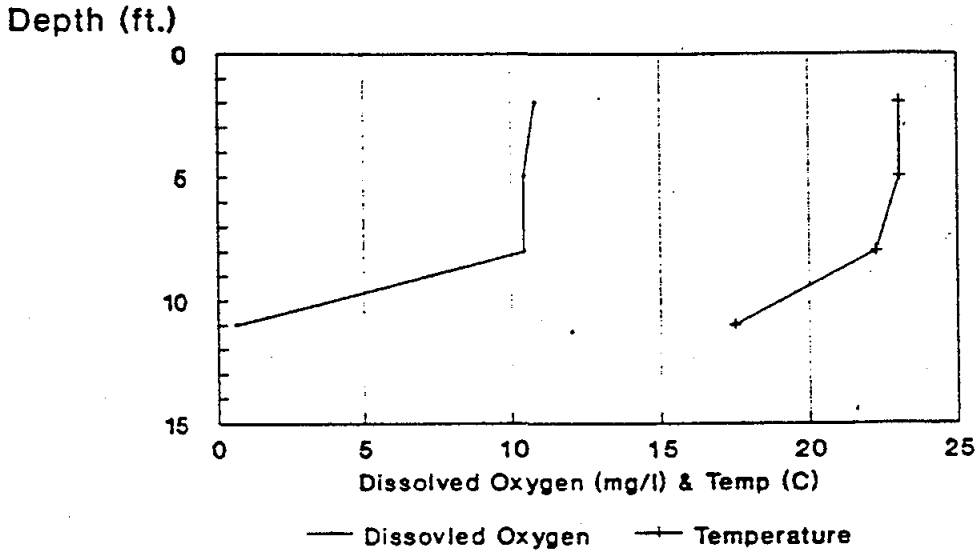
Soil Associations within Watershed

Association	Area (A)	% of Total
#5	562	100

#5 Nora-Moody: Medium-textured and moderately fine textured soils in loess on uplands.

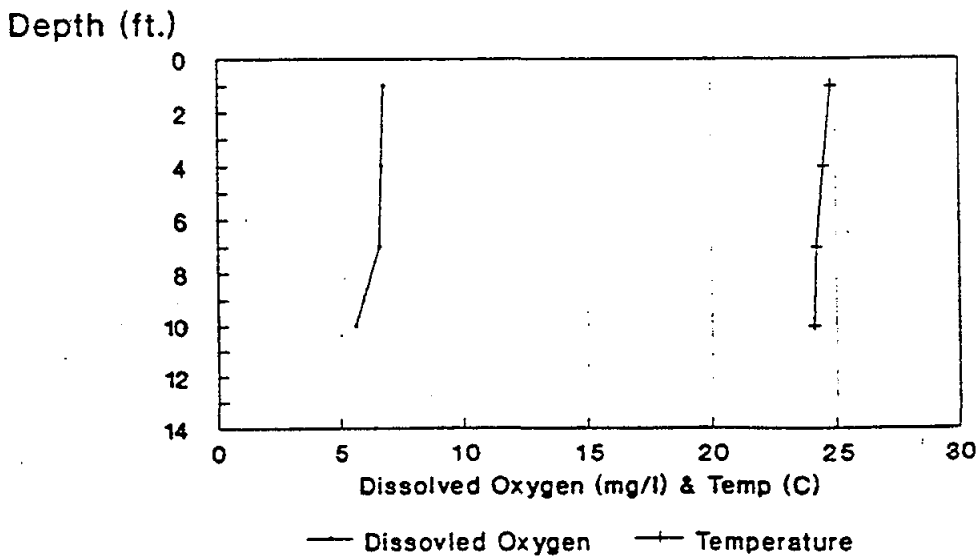
Covell Lake, 6/29/89

Dissolved Oxygen & Temperature Profile

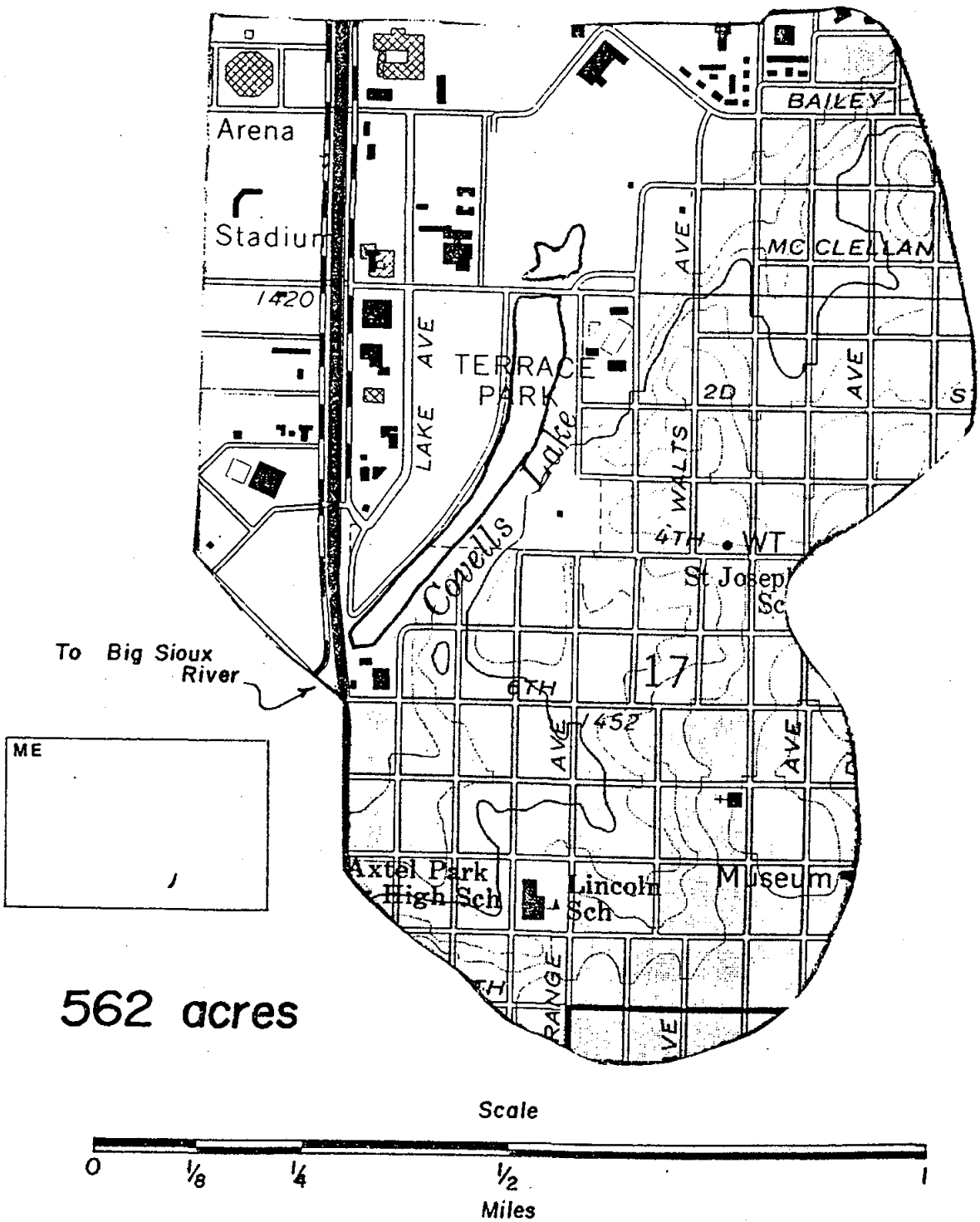


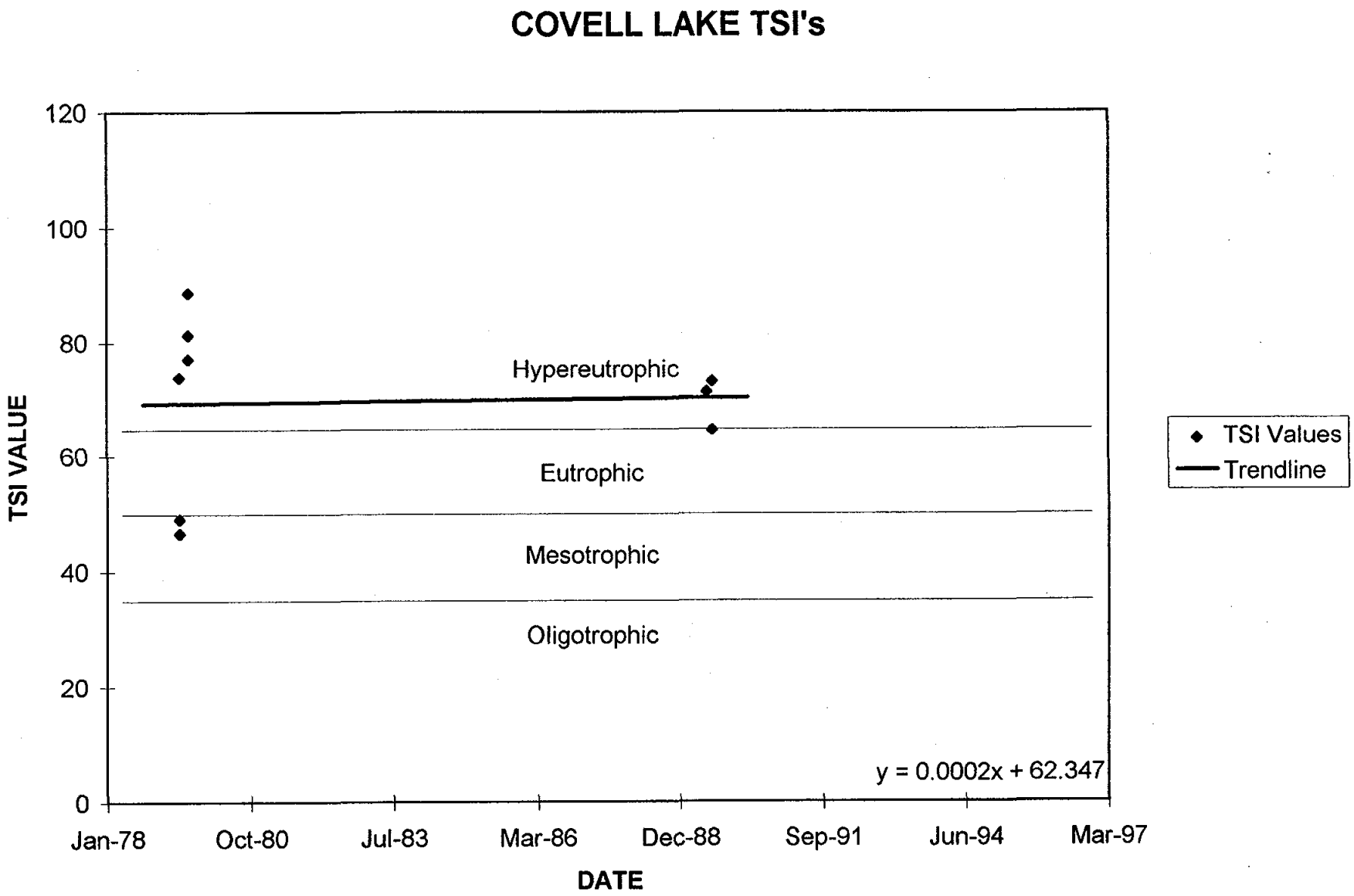
Covell Lake, 8/3/89

Dissolved Oxygen & Temperature Profile



Covells Lake




COVELL LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0002x + 62.347
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

CRESBARD LAKE

County: Faulk
Latitude: 45 deg. 10 min. 30 sec. N
Longitude: 99 deg. 00 min. 34 sec. W
Area: 66.6 A (26.9 ha)
Maximum Depth: 14 ft
Volume: 446.35 acre-ft ($5.50x10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: North Fork Snake Creek Outlet

Township: 120N
Range: 68W
Section (s): 27, 34
Shoreline L: 2.9 mi (4.7 km)
Mean Depth: 6.7 ft (2 m)
Watershed/Lake Area: 363.6
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 76,839
Ownership Status: NA
Public Interest: Faulk County Lake Association.

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.00	4	23.20	4	21.34
Air Temperature (°C)	4	28.50	4	28.25	4	24.50
Secchi Disk Depth (meters)	1	1.40	2	1.40	2	2.08
Conductivity (cond/25° C)	4	528	2	655	-	--
Turbidity (NTU)	-	-	-	-	4	4.43
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	2	8.60	4	7.63	4	8.09
Total Alkalinity (mg/l)	4	192	4	199	4	235
Total Solids (mg/l)	4	359	4	361	4	492
Dissolved Solids (mg/l)	4	342	4	352	4	489
Suspended Solids (mg/l)	4	17	4	10	4	3
Volatile Suspended Solids (mg/l)	-	-	2	11	-	--
Ammonia Nitrogen (mg/l)	4	0.12	4	0.38	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.18	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.42	4	1.79	4	1.83
Total Phosphorus (mg/l)	4	1.555	4	1.782	4	1.161
Total Dissolved Phosphorus (mg/l)	-	-	4	1.685	4	1.063
Ortho Phosphate as P (mg/l)	4	1.373	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	6.70	2	12.28

Year	1989	1991	1993
TSI Values -- Mean:	82.37	72.12	70.06
Secchi Disk	55.12	55.12	49.43
Total Phosphorus	109.61	112.00	105.57
Chlorophyll *a*		49.23	55.18

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton sp. and Ceratophyllum demersum

Algal Species and Densities

	July 24, 1989		September 7, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Glenodinium Gymnodinium	198	2160	-	-
Algae (other)	31	338	51	1269
Cryptomonas	20	218	23	572
Cryptomonas sp. #1	13	142	9	224
Green Algae (other)	10	109	11	274
Trachelomonas	6	65	-	-
Algae (flagellate)	5	55	5	124
Chroococcus	5	55	2	50
Stephanodiscus	3	33	70	1742
Aphanocapsa	2	22	1	25
Diatom (pennate)	2	22	1	25
Pediastrum	1	11	-	-
Nephrocytium	1	11	-	-
Scenedesmus	1	11	2	50
Quadrigula	1	11	-	-
Gomphosphaeria	1	11	-	-
Diatom (centric)	-	-	40	996
Asterionella formosa	-	-	27	672
Closterium	-	-	15	373
Oocystis	-	-	10	249
Melosira granulata	-	-	6	149
Blue-green (other)	-	-	1	25
Staurastrum	-	-	1	25
Total	300	3272	300	7467

Watershed Description

Watershed Area: 24,213 A (9,799 ha)

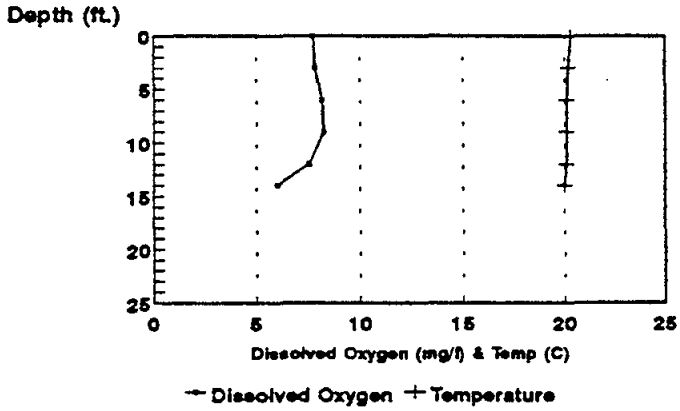
Soil Associations within Watershed;

Association	Area (A)	% of Total
#1	15,206	62.8
#2	9,007	37.2

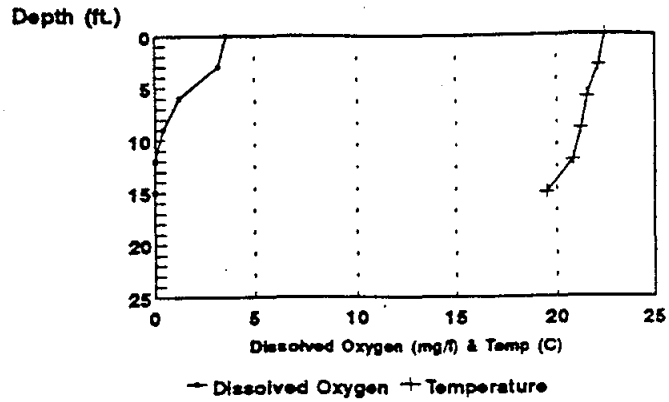
#1 Williams-Bowbells: Well drained and moderately well drained, nearly level and undulating, loamy soils on uplands and in upland swales.

#2 Williams-Bowbells-Vida: Well drained and moderately well drained, nearly level to moderately sloping, loamy soils on uplands and in upland swales.

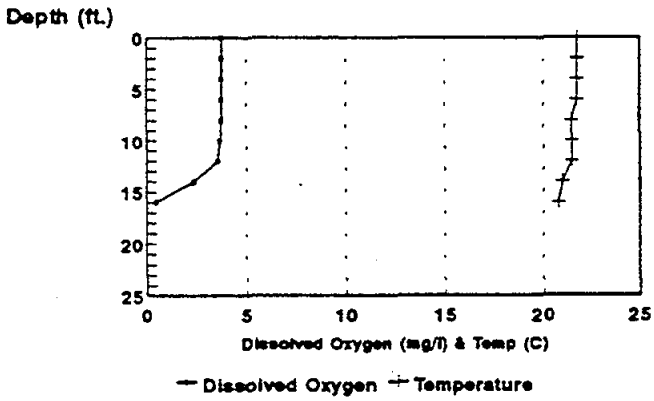
CRESBARD LAKE 7/6/93
Dissolved Oxygen & Temperature Profile



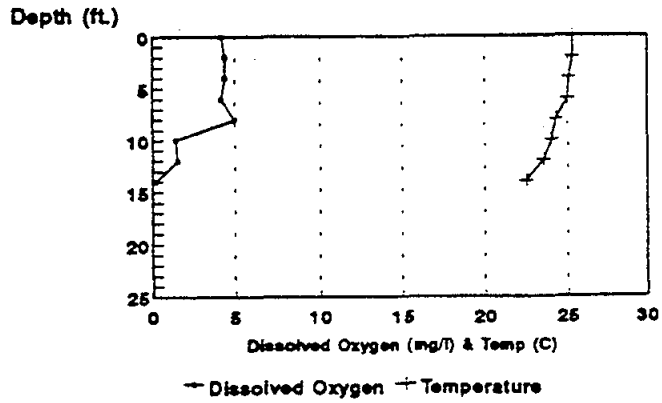
CRESBARD LAKE 8/16/93
Dissolved Oxygen & Temperature Profile



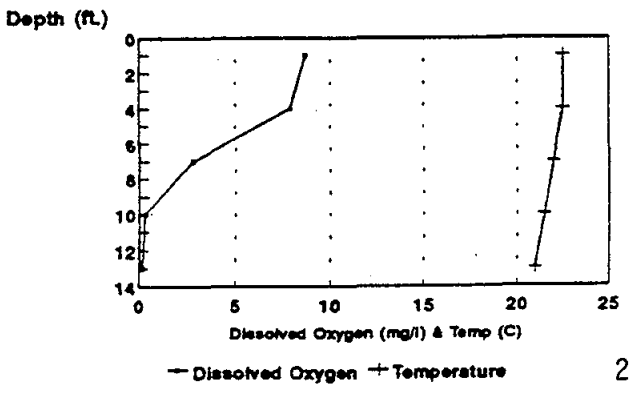
CRESBARD LAKE 6/25/91
Dissolved Oxygen & Temperature Profile



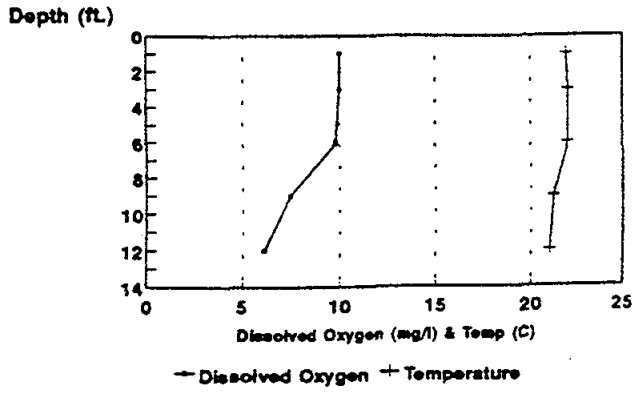
CRESBARD LAKE 8/27/91
Dissolved Oxygen & Temperature Profile



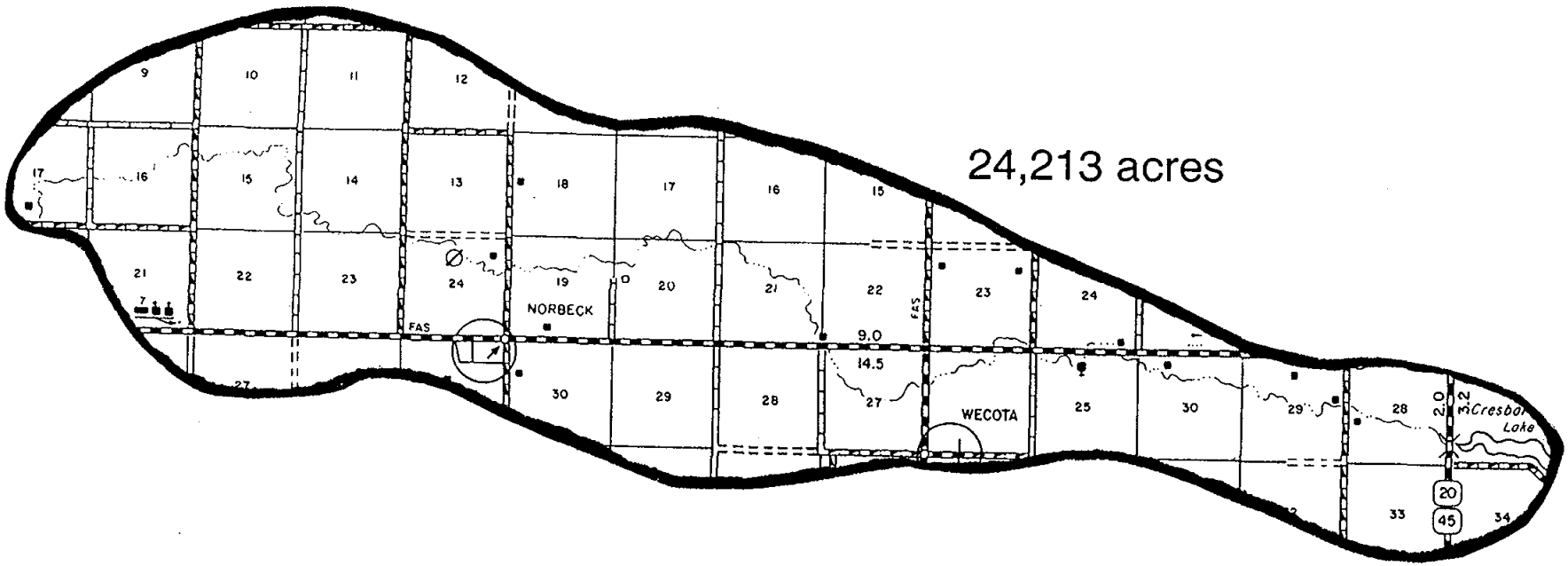
Cresbard Lake, 7/24/89
Dissolved Oxygen & Temperature Profile



Cresbard Lake, 9/7/89
Dissolved Oxygen & Temperature Profile



Cresbard Lake

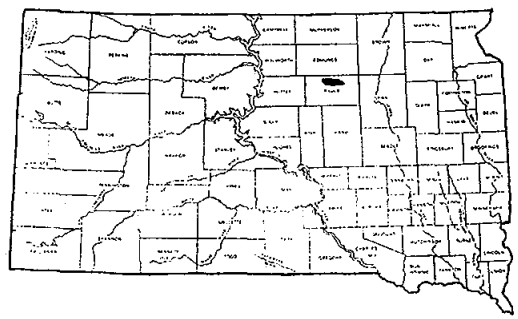


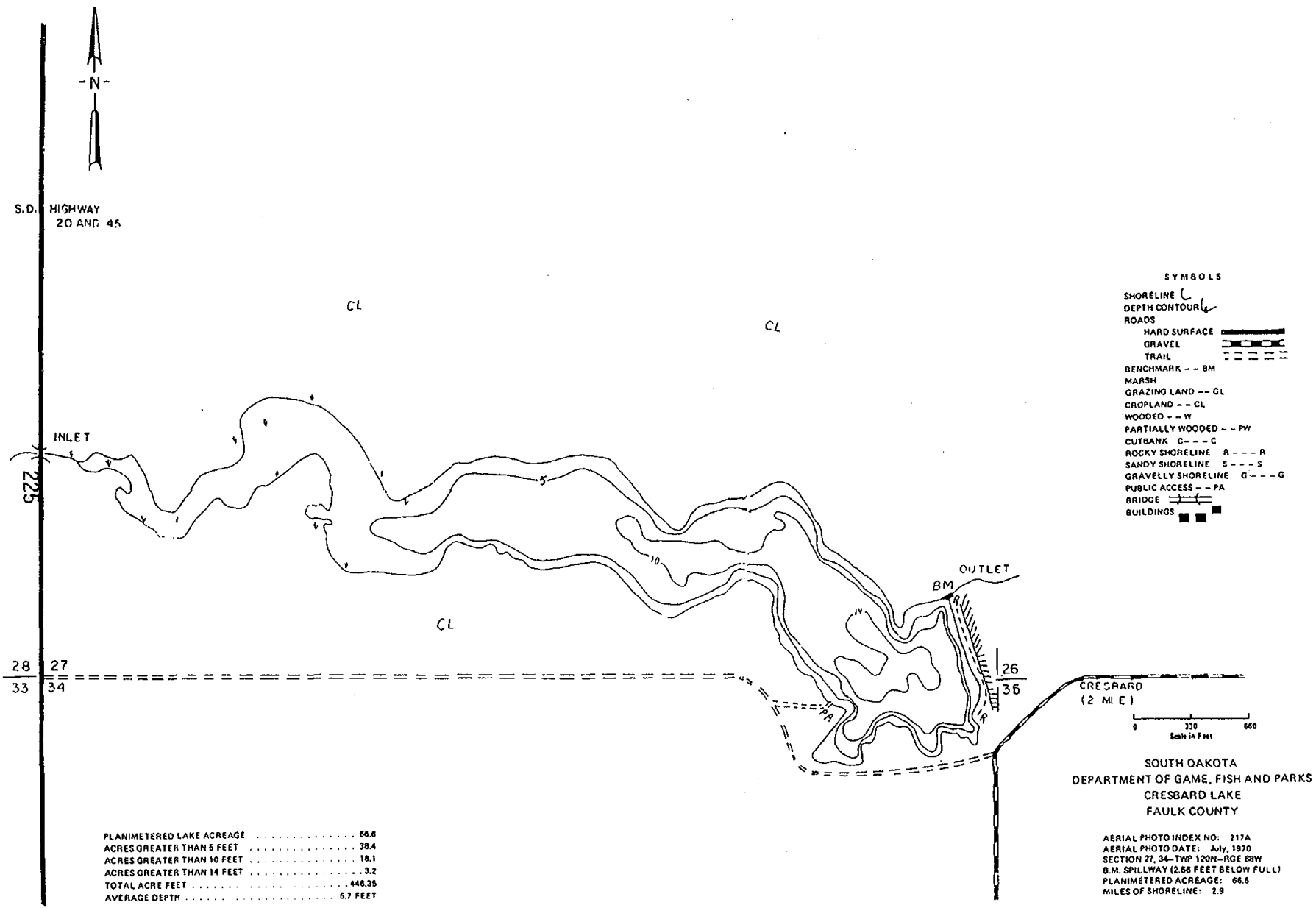
SCALE

0 1 2 3 4 5 6 7 8 KILOMETERS

0 1 2 3 4 5 MILES

SOUTH DAKOTA

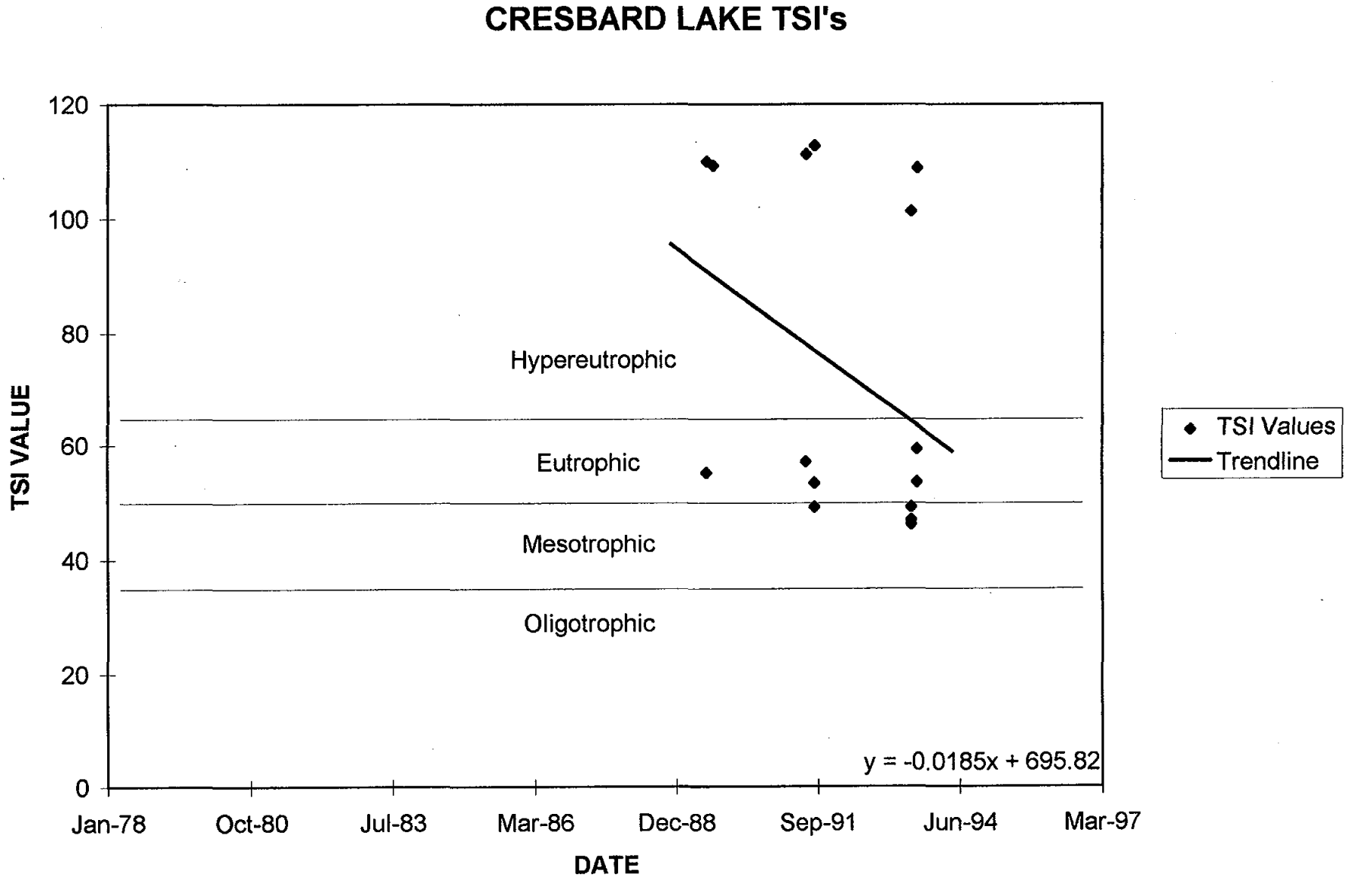




PLANIMETERED LAKE ACREAGE	66.6
ACRES GREATER THAN 5 FEET	38.4
ACRES GREATER THAN 10 FEET	18.1
ACRES GREATER THAN 14 FEET	3.2
TOTAL ACRE FEET	446.35
AVERAGE DEPTH	6.7 FEET

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
CRESBARD LAKE
FAULK COUNTY

AERIAL PHOTO INDEX NO: 217A
AERIAL PHOTO DATE: July, 1970
SECTION 27, 34–TWP 120N–RGE 69W
B.M. SPILLWAY (2.56 FEET BELOW FULL)
PLANIMETERED ACREAGE: 66.6
MILES OF SHORELINE: 2.9


CRESBARD LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0185x + 695.82
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

DANTE LAKE

County: Charles Mix
Latitude: 43 deg. 04 min. 00 sec. N
Longitude: 98 deg. 10min. 36 sec. W
Area: 18.7 A (7.6 ha)
Maximum Depth: 22 ft (6.7 m)
Volume: 193.5 acre-ft(2.387 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 95N
Range: 62W
Section (s): 4 & 9
Shoreline L: 0.7 mi (1.1 km)
Mean Depth: 10.4 ft (3.2 m)
Watershed/Lake Area: 133
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 124,545
Ownership Status: State owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	18.30	-	-	4	20.43
Air Temperature (°C)	4	18.25	1	26.00	4	27.05
Secchi Disk Depth (meters)	2	0.94	1	0.30	2	0.59
Conductivity (cond/25° C)	4	2,625	-	-	-	-
Turbidity (NTU)	-	-	-	-	4	23.74
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.23	1	8.65	4	8.01
Total Alkalinity (mg/l)	4	163	1	78	4	187
Total Solids (mg/l)	4	2,710	1	4,008	4	1,859
Dissolved Solids (mg/l)	4	2,694	1	3,958	4	1,848
Suspended Solids (mg/l)	4	16	1	50	4	11
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.14	1	0.03	4	0.39
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	1	0.70	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.89	1	2.71	4	2.38
Total Phosphorus (mg/l)	4	0.163	1	0.190	4	0.345
Total Dissolved Phosphorus (mg/l)	-	-	1	0.064	4	0.290
Ortho Phosphate as P (mg/l)	4	0.055	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-	2	53.10

Year	1989	1991	1994
TSI Values -- Mean:	65.33	78.49	72.58
Secchi Disk	60.82	77.14	67.54
Total Phosphorus	69.85	79.85	80.66
Chlorophyll *a*			69.54

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 95%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Ceratophyllum demersum, Potamogeton pusillus, P. foliosus, P. pectinatus, and P. nodosus

Algal Species and Densities

June 14, 1989

Taxa	Number	Units/ml
Fragilaria capucina	66	1,244
Cryptomonas sp. #1	17	320
Aphanizomenon flos-aquae	16	302
Trachelomonas	11	207
Algae (flagellate)	9	170
Chaetoceros	8	151
Closterium	6	113
Aphanocapsa	4	75
Ceratium hirundinella	4	75
Algae (other)	4	75
Diatom (centric)	4	75
Cryptomonas	3	57
Blue-green (other)	1	19
Characium	1	19
Total	154	2,903

Watershed Description

Watershed Area: 2,491 A (1,008 ha)

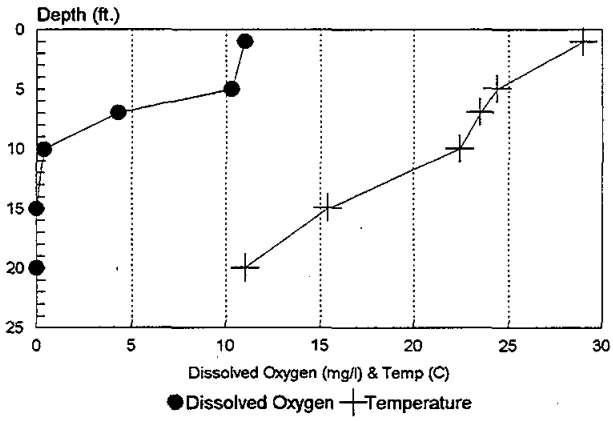
Soil Associations within Watershed

Association	Area (A)	% of Total
H-E-O	2,491	100

H-E-O Hemme-Ethan-Onita: Well drained and moderately well drained, nearly level to gently rolling, silty, and loamy soils on uplands and in upland swales.

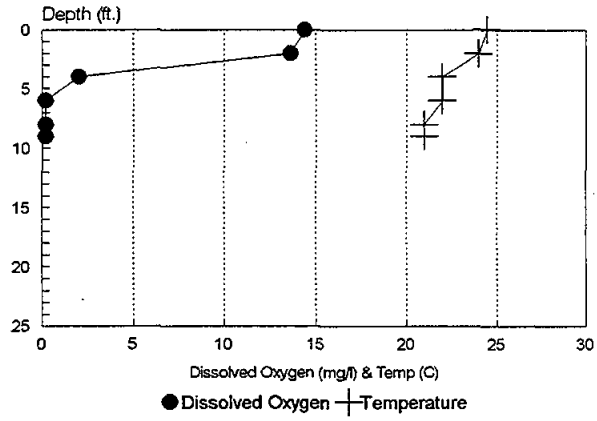
DANTE LAKE 7/25/79

Dissolved Oxygen & Temperature Profile



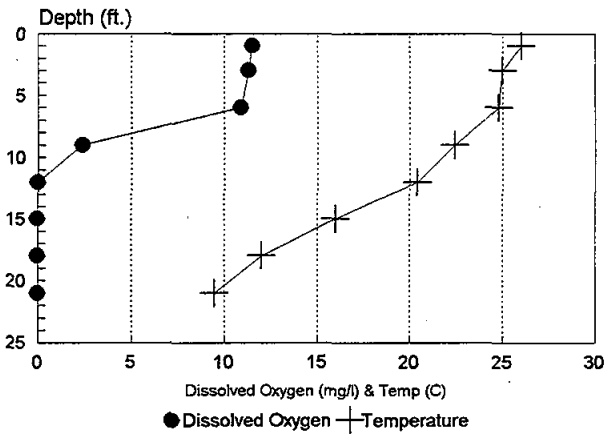
DANTE LAKE 8/14/91

Dissolved Oxygen & Temperature Profile



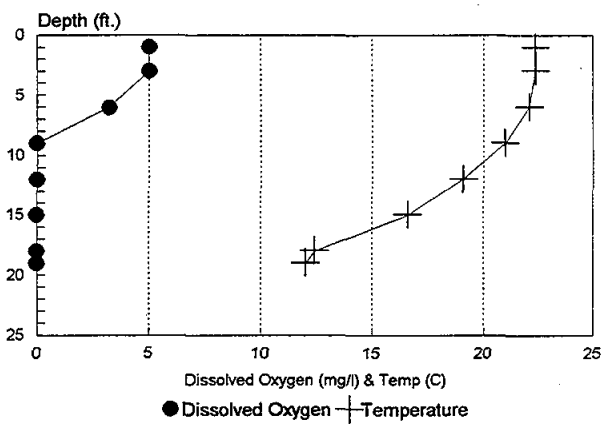
DANTE LAKE 6/20/94

Dissolved Oxygen & Temperature Profile

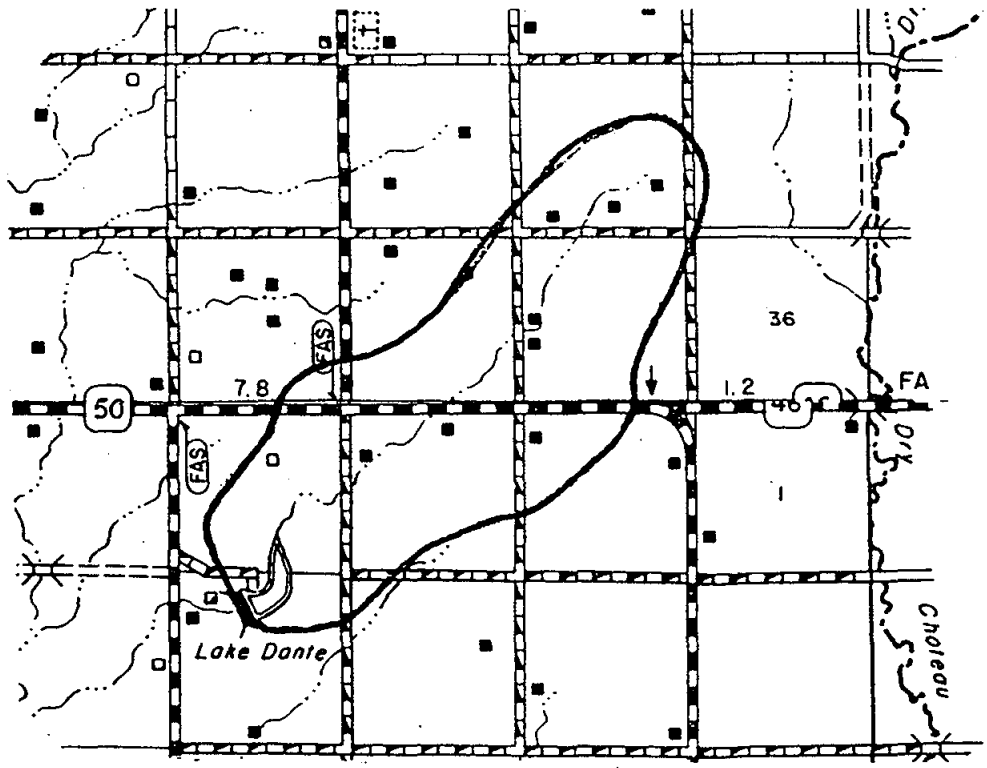


DANTE LAKE 8/22/94

Dissolved Oxygen & Temperature Profile

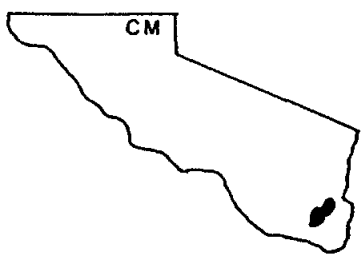


Lake Dante



To Missouri River

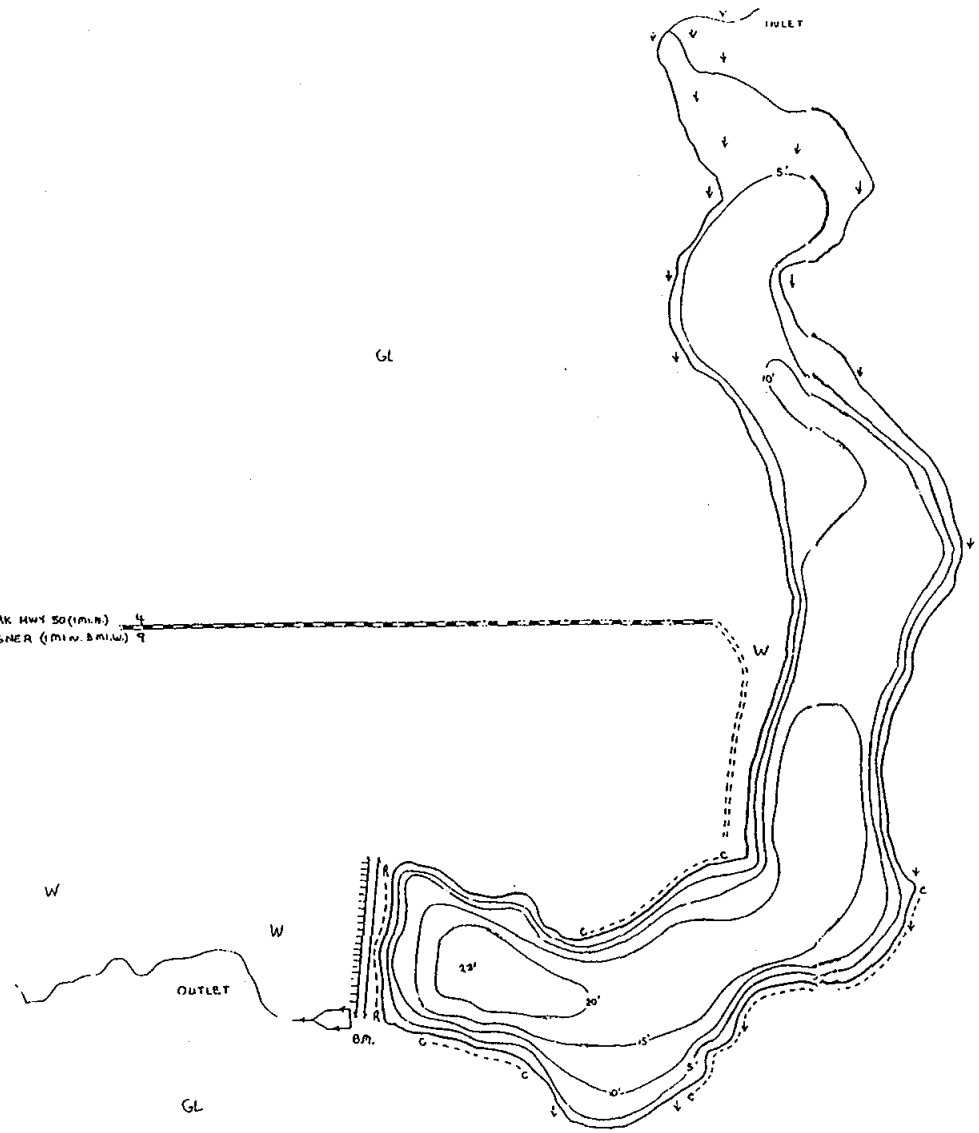
2491 acres



Scale

0 1 2 3 4 5

Miles



GL

SYMBOLS

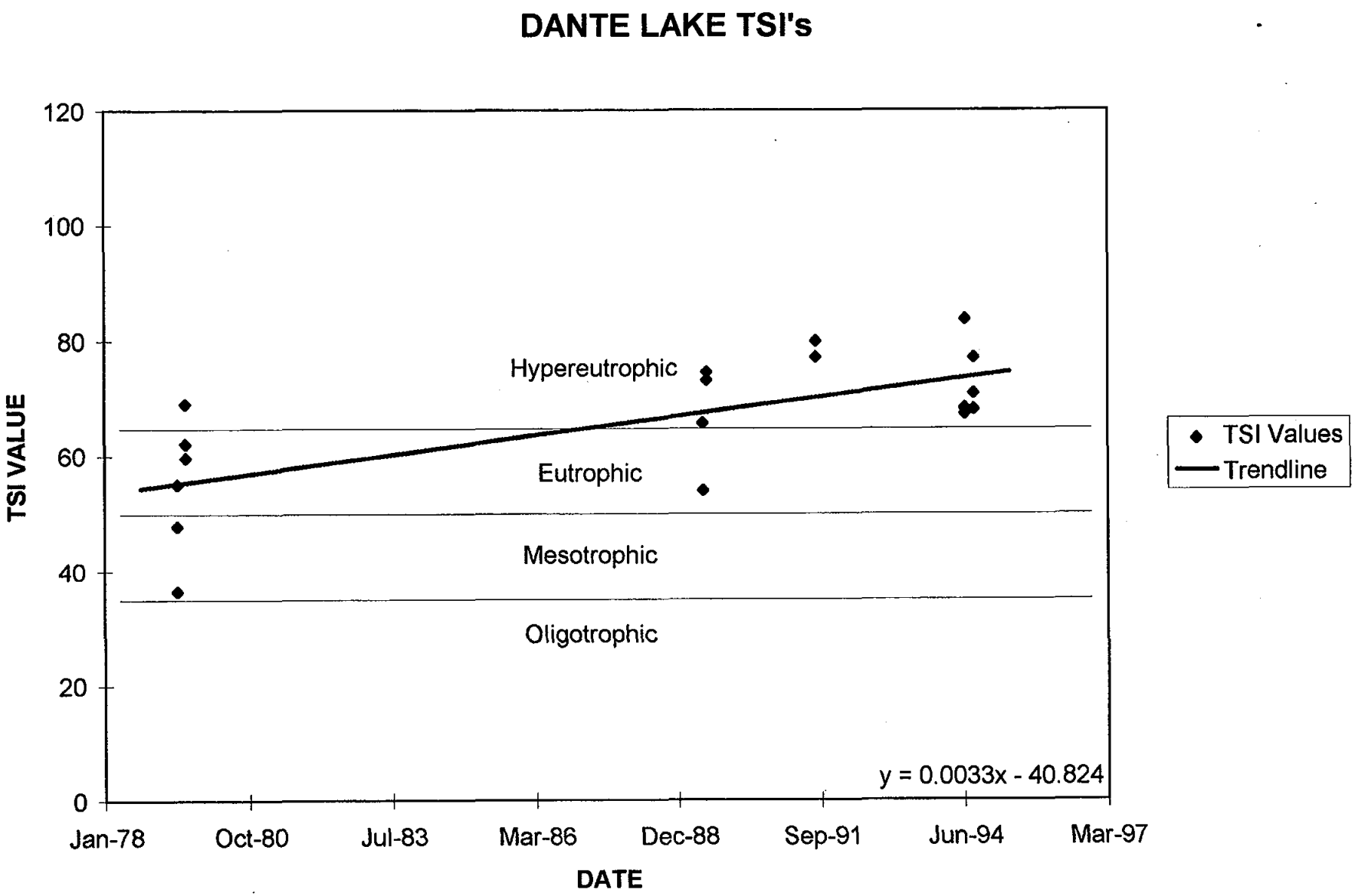
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK – – BM
MARSH
GRAZING LAND — GL
CROPLAND – – CL
WOODED – – W
PARTIALLY WOODED – – PW
CUTBANK C– – – C
ROCKY SHORELINE R– – – R
SANDY SHORELINE S– – – S
GRAVELLY SHORELINE G– – – G
PUBLIC ACCESS – – PA
BRIDGE
BUILDINGS

0 165 330
Scale In Feet

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE DANTE
CHARLES MIX COUNTY

SECTION 4, 9–TWP 95N–RGE 62W
B.M: SPILLWAY (10 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 18
MILES OF SHORELINE: .7

PLANIMETERED LAKE ACREAGE	18.2
ACRES GREATER THAN 5 FEET	14.2
ACRES GREATER THAN 10 FEET	9.8
ACRES GREATER THAN 15 FEET	4.7
ACRES GREATER THAN 20 FEET	1.0
TOTAL ACRE FEET	193.5
AVERAGE DEPTH	10.4 FEET


DANTE LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0033x - 40.824
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

DEERFIELD LAKE

County: Pennington
Latitude: 44 deg. 01 min. 11 sec. N
Longitude: 103 deg. 47 min. 49 sec. W
Area: 414 A (168 ha)
Maximum Depth: 90 ft (27.4 m)
Volume: 15,504 acre-ft ($1.91X10^7 m^3$)
Origin of Basin: impoundment
Township: 1N
Range: 3E
Section (s): 20
Shoreline L: 9.8 mi (16 km)
Mean Depth: 36 ft (11 m)
Watershed/Lake Area: 147
Thermal Stratification: yes
Major Inflows (named or permanent streams): Castle & Gold Run Creek
Outlet: Castle Creek Outlet

Lake Use

Beneficial Use Classification:
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 141,468
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	16.60	6	27.13	4	12.33
Air Temperature (°C)	4	22.78	6	14.27	4	20.56
Secchi Disk Depth (meters)	2	3.81	3	4.87	2	5.66
Conductivity (cond/25° C)	4	366	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.40	6	8.29	4	8.23
Total Alkalinity (mg/l)	4	181	-	-	-	-
Total Solids (mg/l)	4	219	-	-	-	-
Dissolved Solids (mg/l)	4	231	-	-	-	-
Suspended Solids (mg/l)	4	6	6	2	4	1
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.03	6	0.05	4	0.03
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.00
Total Kjeldahl Nitrogen (mg/l)	4	0.30	6	0.24	4	0.29
Total Phosphorus (mg/l)	4	0.028	6	0.027	4	0.023
Total Dissolved Phosphorus (mg/l)	-	-	6	0.015	4	0.009
Ortho Phosphate as P (mg/l)	4	0.013	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	1.50	4	0.51

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	21.74	6	13.77	6	15.99
Air Temperature (°C)	6	13.03	6	22.47	6	21.70
Secchi Disk Depth (meters)	3	16.33	9	5.63	8	5.73
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	6	8.26	6	8.21	6	7.82
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	1	6	2	5	1
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.07	6	0.04	6	0.02
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	6	0.02	6	0.03
Total Kjeldahl Nitrogen (mg/l)	6	0.19	6	0.19	6	0.24
Total Phosphorus (mg/l)	6	0.035	6	0.026	6	0.012
Total Dissolved Phosphorus (mg/l)	6	0.011	6	0.011	6	0.011
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	1.39	6	1.59	6	0.64

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	47.86	38.44	31.58	40.15	37.58	31.69
Secchi Disk	40.70	37.17	34.99	37.54	35.08	34.80
Total Phosphorus	55.03	43.63	35.85	50.20	42.56	34.15
Chlorophyll *a*		34.53	23.90	33.80	35.11	26.11

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

Taxa	Number	Units/ml
Aphanocapsa	1	125
Fragilaria crotonensis	1	125
Total	2	250

Watershed Description

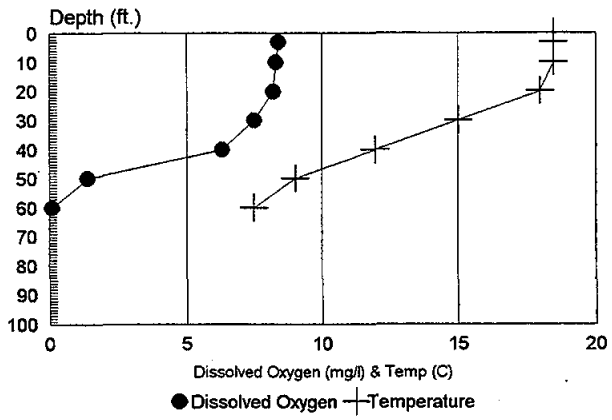
Watershed Area: 60,800 A (24,615 ha)

Soil Associations within Watershed

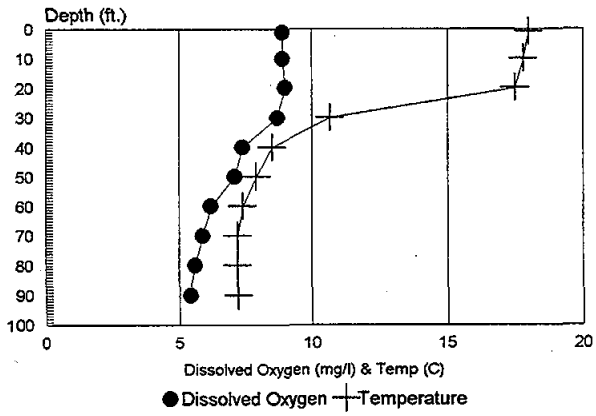
Association	Area (A)	% of Total

Gently sloping to very steep silty and loamy soils.

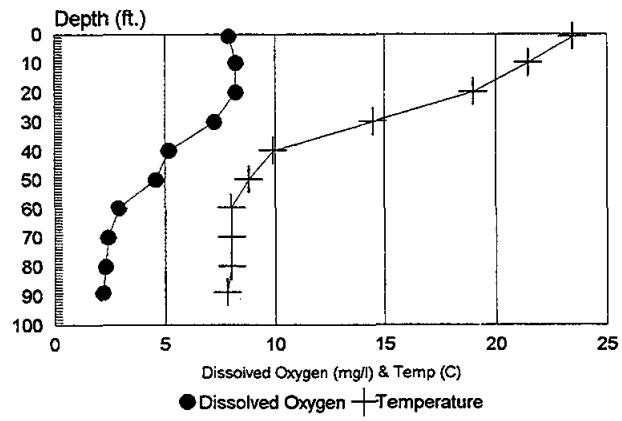
DEERFIELD LAKE 8/15/79
Dissolved Oxygen & Temperature Profile



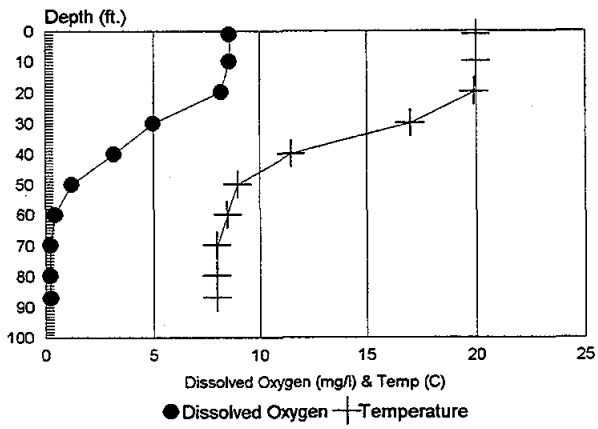
DEERFIELD LAKE 6/16/91
Dissolved Oxygen & Temperature Profile



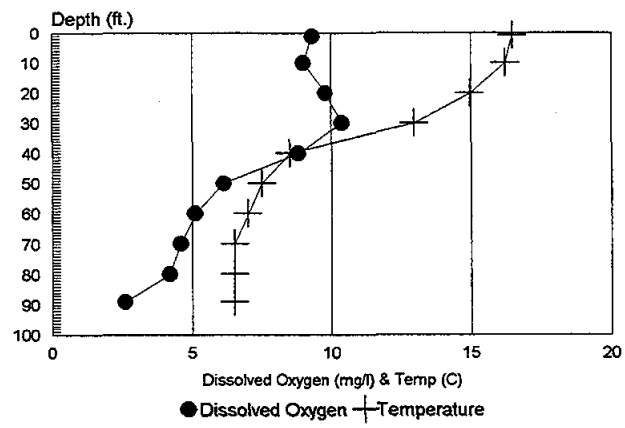
DEERFIELD LAKE 7/17/91
Dissolved Oxygen & Temperature Profile



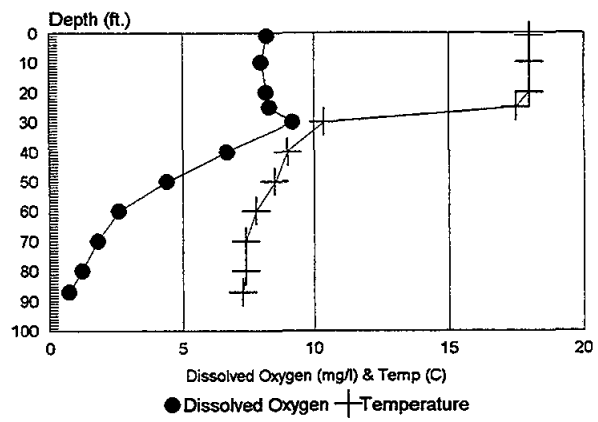
DEERFIELD LAKE 8/16/91
Dissolved Oxygen & Temperature Profile



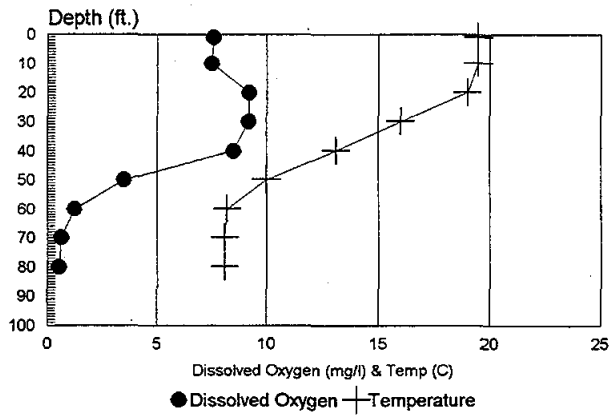
DEERFIELD LAKE 6/12/92
Dissolved Oxygen & Temperature Profile



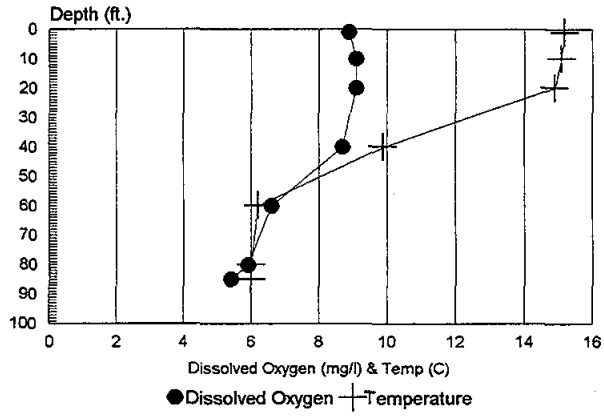
DEERFIELD LAKE 7/16/92
Dissolved Oxygen & Temperature Profile



DEERFIELD LAKE 8/14/92
Dissolved Oxygen & Temperature Profile



DEERFIELD LAKE 6/13/93
Dissolved Oxygen & Temperature Profile



DEERFIELD LAKE 7/22/93
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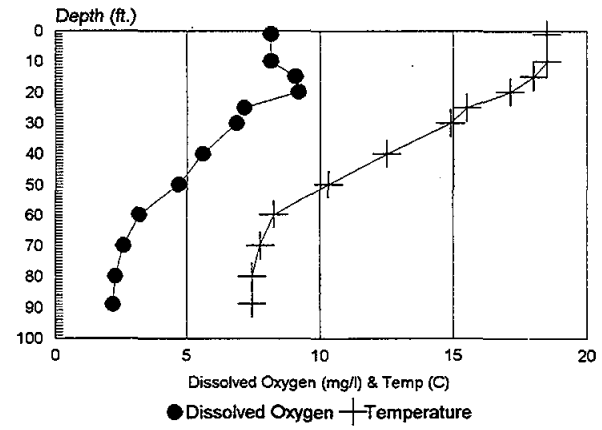
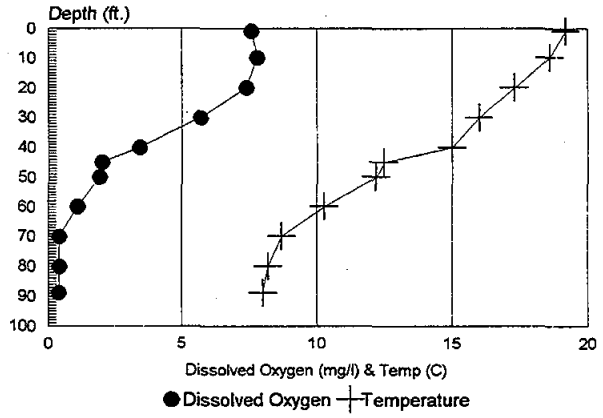
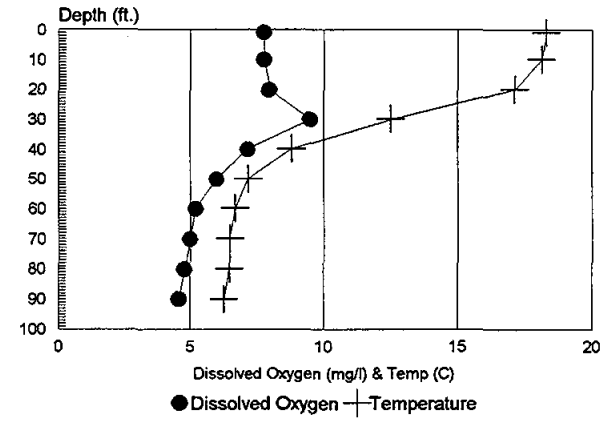


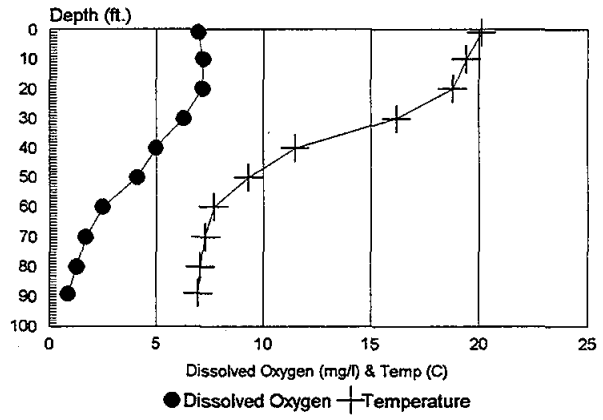
DEERFIELD LAKE 8/19/93
Dissolved Oxygen & Temperature Profile



DEERFIELD LAKE 6/12/94
Dissolved Oxygen & Temperature Profile

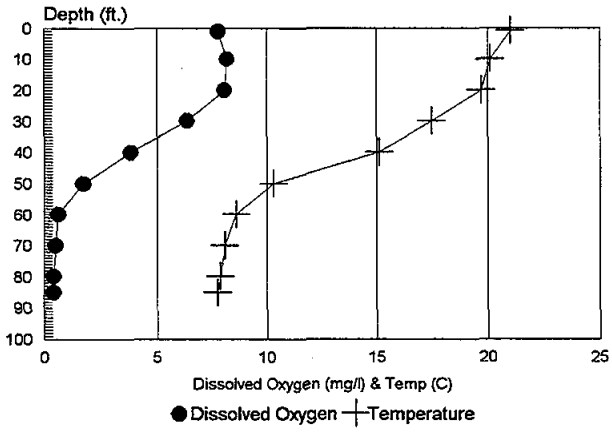


DEERFIELD LAKE 7/14/94
Dissolved Oxygen & Temperature Profile



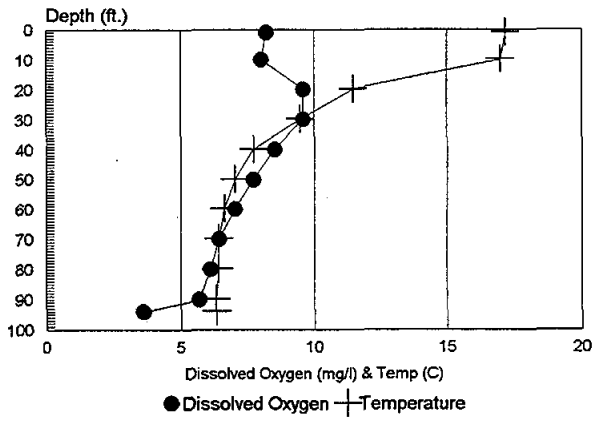
DEERFIELD LAKE 8/14/94

Dissolved Oxygen & Temperature Profile



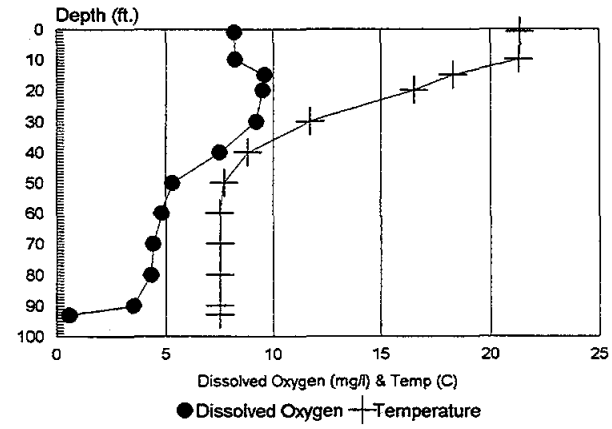
DEERFIELD LAKE 6/14/95

Dissolved Oxygen & Temperature Profile



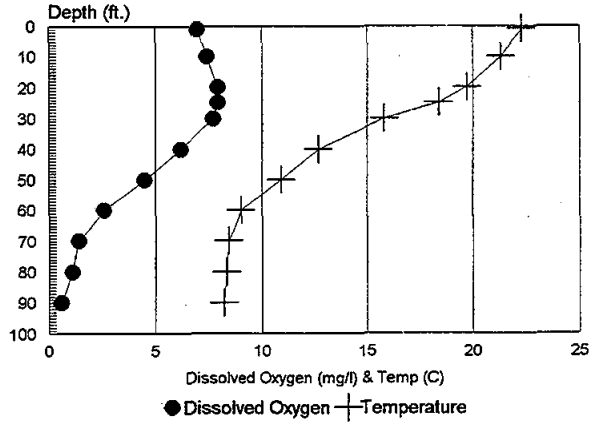
DEERFIELD LAKE 7/14/95

Dissolved Oxygen & Temperature Profile

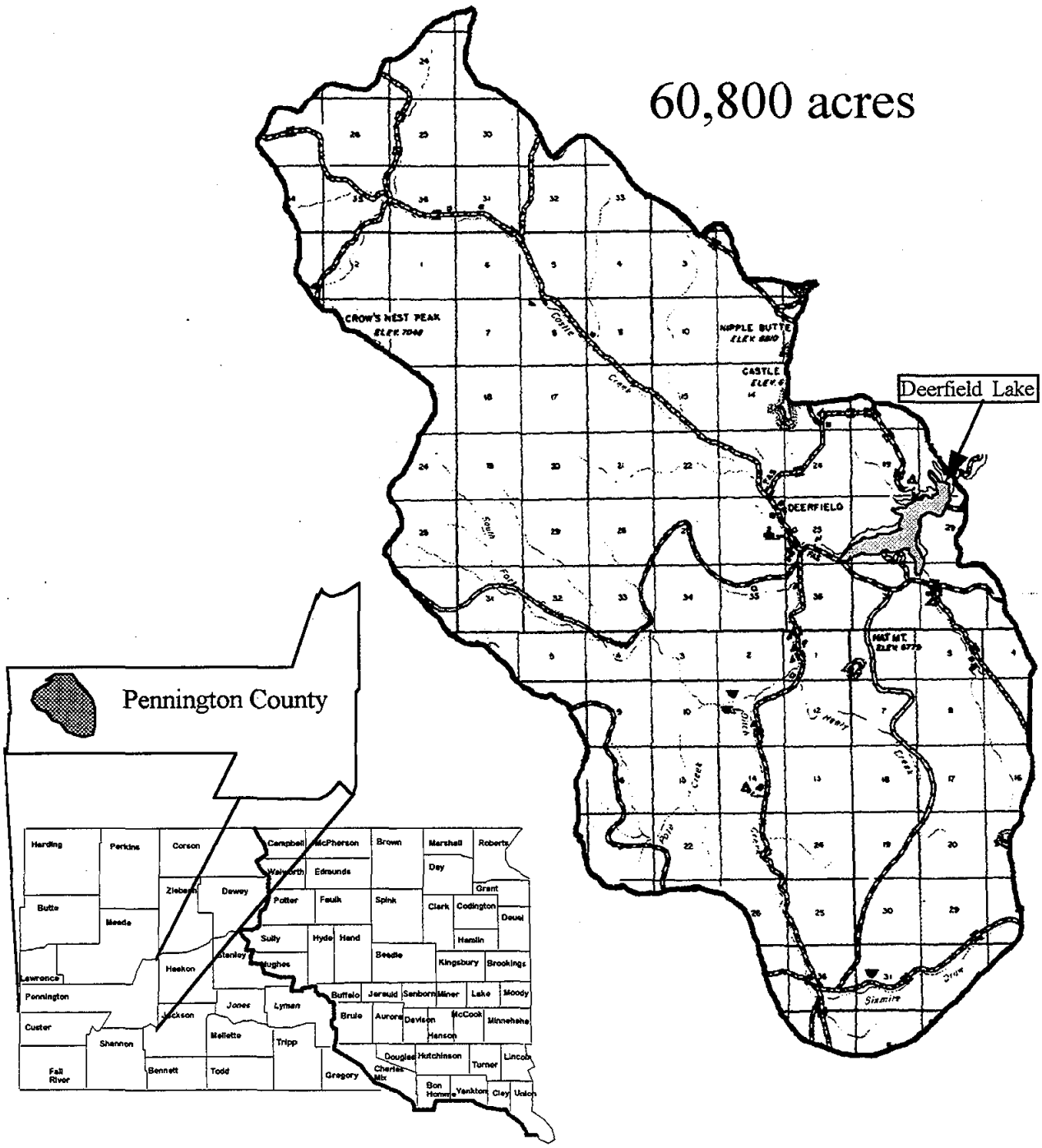


DEERFIELD LAKE 8/12/95

Dissolved Oxygen & Temperature Profile



Deerfield Lake



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

DEERFIELD LAKE

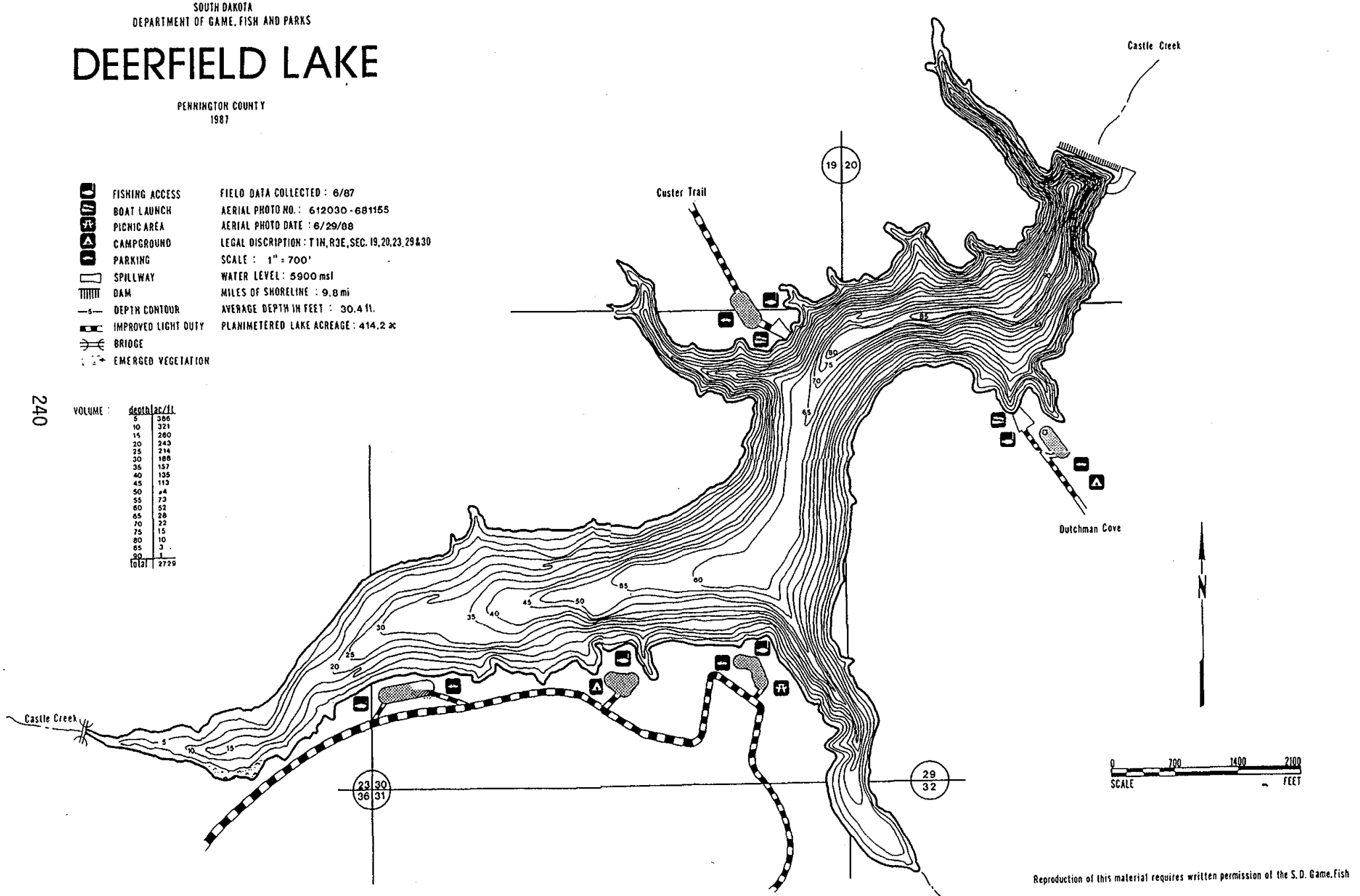
PENNINGTON COUNTY
1987

FISHING ACCESS
BOAT LAUNCH
PICNIC AREA
CAMPGROUND
PARKING
SPILLWAY
DAM
DEPTH CONTOUR
IMPROVED LIGHT DUTY
BRIDGE
EMERGED VEGETATION

FIELD DATA COLLECTED : 6/87
AERIAL PHOTO NO. : 612030-681155
AERIAL PHOTO DATE : 6/29/88
LEGAL DISCRIPTION : T1N, R3E, SEC. 19,20,23,29&30
SCALE : 1" = 700'
WATER LEVEL : 5900 msl
MILES OF SHORELINE : 9.8 mi
AVERAGE DEPTH IN FEET : 30.4 ft.
PLANIMETERED LAKE ACREAGE : 414.2 ac

VOLUME :

depth	ac/ft
5	386
10	321
15	280
20	243
25	214
30	188
35	157
40	135
45	113
50	94
55	73
60	52
65	28
70	22
75	15
80	10
85	3
90	1
total	2729



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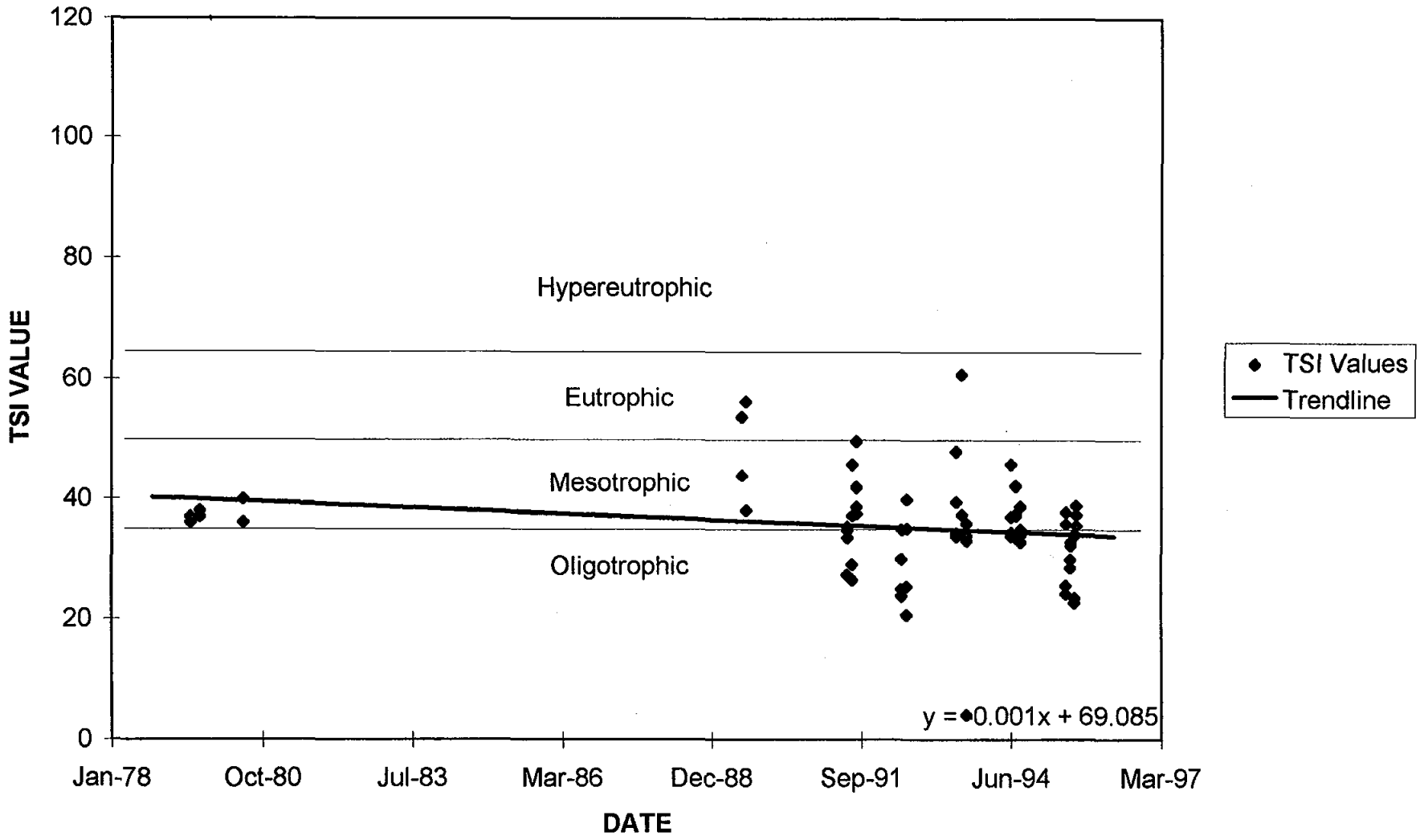

DEERFIELD LAKE TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.001x + 69.085
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

DEWBERRY DAM

County: Dewey
Latitude: 45 deg. 23 min. 54 sec. N
Longitude: 100 deg. 58 min. 36 sec. W
Area: 65 A (26.3 ha)
Maximum Depth: 37.5 ft (11.6 m)
Volume: 910 acre-ft (1.123 x $10^6 m^3$)
Origin of Basin: impoundment
Township: 31N
Range: 17W
Section (s): 26
Shoreline Length: NA
Mean Depth: 13.9 ft (4.3 m)
Watershed/Lake Area: 155
Thermal Stratification: yes
Major Inflows (named or permanent streams): unnamed stream
Outlet: unnamed

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 26,444
Ownership Status: Private owned
Public Interest: NA

	1989		1991	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	2	27.30	1	26.00
Air Temperature (°C)	2	36.67	1	27.00
Secchi Disk Depth (meters)	1	1.07	-	-
Conductivity (cond/25° C)	2	847	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su) (su)	2	9.90	1	9.60
Total Alkalinity (mg/l)	2	269	1	257
Total Solids (mg/l)	2	682	1	625
Dissolved Solids (mg/l)	2	655	1	619
Suspended Solids (mg/l)	2	27	1	6
Volatile Suspended Solids (mg/l)	-	-	1	4
Ammonia Nitrogen (mg/l)	2	0.07	1	0.04
Nitrate + Nitrite Nitrogen (mg/l)	2	0.10	1	0.06
Total Kjeldahl Nitrogen (mg/l)	2	1.22	1	2.02
Total Phosphorus (mg/l)	2	1.018	1	.210
Total Dissolved Phosphorus (mg/l)	-	-	-	-
Ortho Phosphate as P (mg/l)	2	0.934	1	0.047
Chlorophyll (mg/m^3)	-	-	-	-

Year	1989	1991
TSI Values -- Mean:	81.11	81.29
Secchi Disk	59.07	
Total Phosphorus	103.16	81.29
Chlorophyll *a*		

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 60-70%
Type of Vegetation: None identified

Floating Leaved and Submergent Plant Species Identified: None identified but 90% coverage

Algal Species and Densities

August 3, 1989

Taxa	Number	Units/ml
Aphanocapsa	52	736
Algae (other)	8	113
Microcystis	2	28
Dactylococcopsis	2	28
Algae (flagellate)	1	14
Total	65	920

Watershed Description

Watershed Area: 10,088 A (4,083 ha)

Soil Associations within Watershed

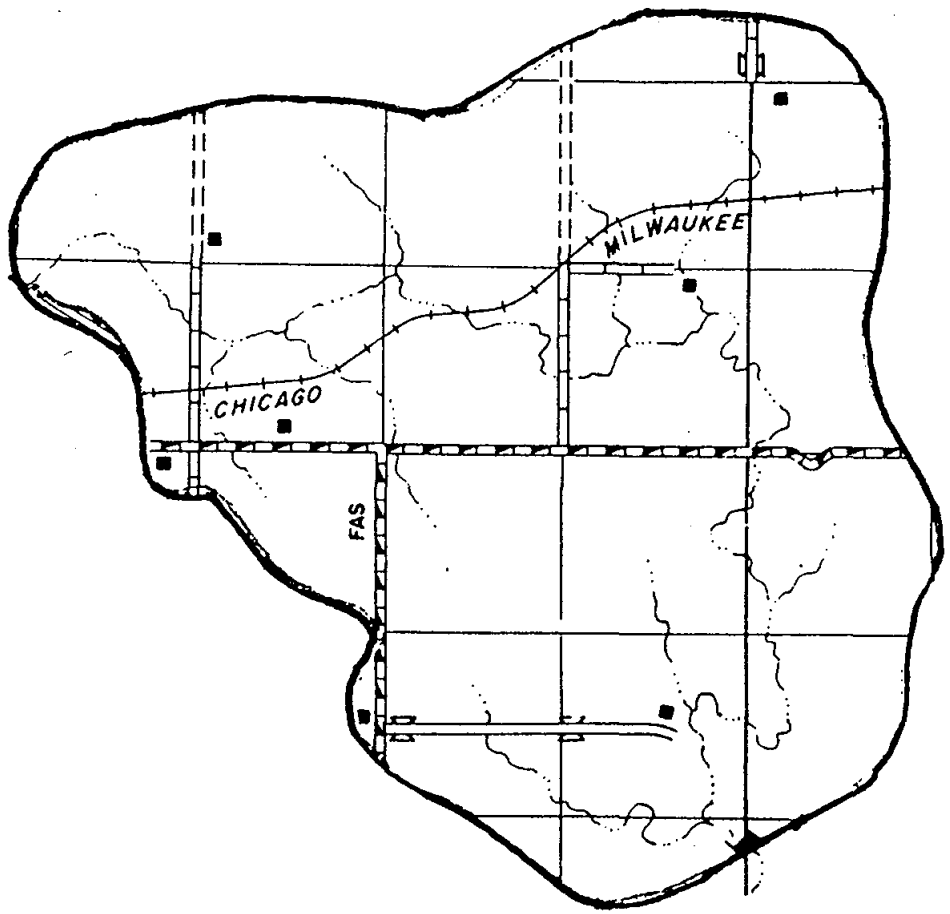
Association	Area (A)	% of Total
VN-FM	8,171	81
MW-RH	1,917	19

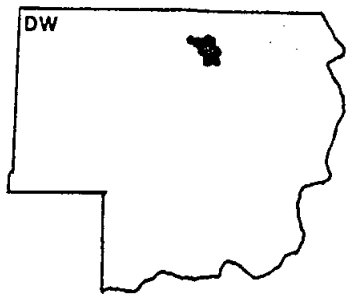
VN-FM Vebar-Flasher: Moderately deep and shallow, well drained and excessively drained, nearly level to steep, loamy and sandy soils.

MW-RH Morton-Reeder: Moderately deep, well drained, nearly level to sloping, silty and loamy soils.

Dewberry Lake

10,088 acres

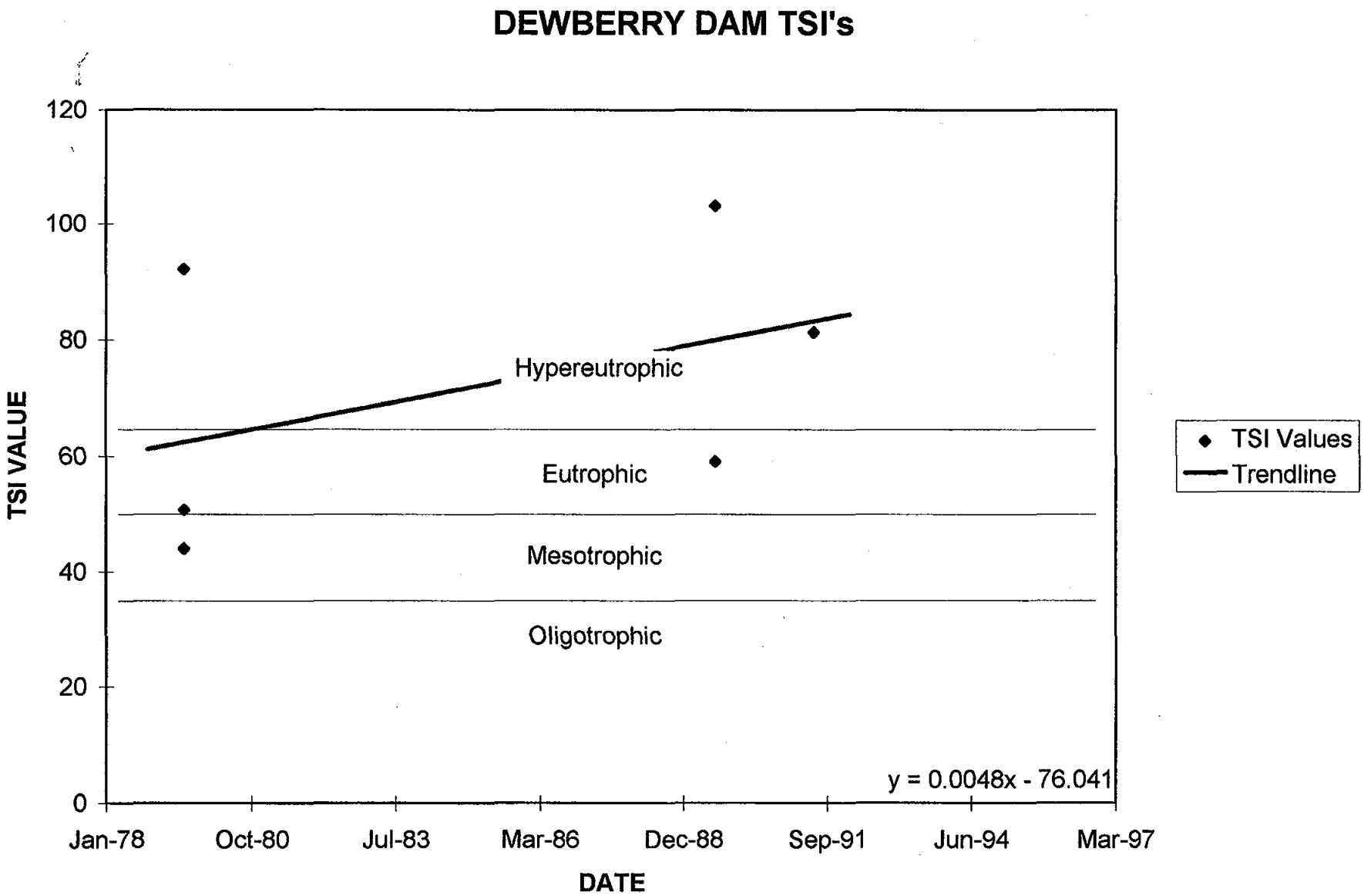




Scale

0 1 2 3 4

Miles


DEWBERRY DAM TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0048x - 76.041
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

EAST OAKWOOD LAKE

County: Brookings
Latitude: 44 deg. 26 min. 12 sec. N
Longitude: 96 deg. 58 min. 06 sec. W
Area: 928 A (375.5 ha)
Maximum Depth: 9 ft (2.7 m)
Volume: 5000 acre-ft (6.168 x $10^6 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 111N
Range: 51W
Section (s): 4-5, 8-9, 16-17
Shoreline L: 10.7 mi (17.2 km)
Mean Depth: 5 ft (1.5 m)
Watershed/Lake Area: 55
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned Oakwood Lakes State Park is maintained by the South Dakota Game, Fish and Parks Department.
Public Interest: Oakwood Lakes Area Development Association.

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.70	4	22.63	4	22.30
Air Temperature (°C)	4	24.75	4	20.50	4	26.75
Secchi Disk Depth (meters)	2	1.25	2	0.30	2	1.34
Conductivity (cond/25° C)	4	1,169	2	949	-	-
Turbidity (NTU)	-	-	-	-	4	36.80
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.45	4	8.65	4	8.75
Total Alkalinity (mg/l)	4	148	4	140	4	152
Total Solids (mg/l)	4	1,058	4	832	4	873
Dissolved Solids (mg/l)	4	1,041	4	787	4	841
Suspended Solids (mg/l)	4	17	4	45	4	32
Volatile Suspended Solids (mg/l)	-	-	1	20	-	-
Ammonia Nitrogen (mg/l)	4	0.30	4	0.06	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.60	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.59	4	2.45	4	2.59
Total Phosphorus (mg/l)	4	0.109	4	0.208	4	0.179
Total Dissolved Phosphorus (mg/l)	-	-	4	0.030	4	0.067
Ortho Phosphate as P (mg/l)	4	0.011	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	133.56	2	130.32

Year	1989	1991	1994
TSI Values -- Mean:	65.37	78.64	70.85
Secchi Disk	56.78	77.14	55.83
Total Phosphorus	71.96	80.19	78.37
Chlorophyll *a*		78.59	78.34

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton pectinatus

Algal Species and Densities

June 22, 1989

Taxa	Numbers	Units/ml
Cryptomonas sp. #1	59	599
Anabaena	39	304
Algae (other)	27	274
Aphanocapsa	7	71
Oocystis	6	61
Lyngbya	6	61
Pediastrum	5	51
Aphanizomenon flos-aquae	4	41
Green Algae	3	30
Melosira granulata	3	30
Diatom (pennate)	3	30
Stephanodiscus niagarae	3	30
Ceratium hirundinella	2	20
Botryococcus	1	10
Diatom (centric)	1	10
Scenedesmus	1	10
Total	161	1,633

Watershed Description

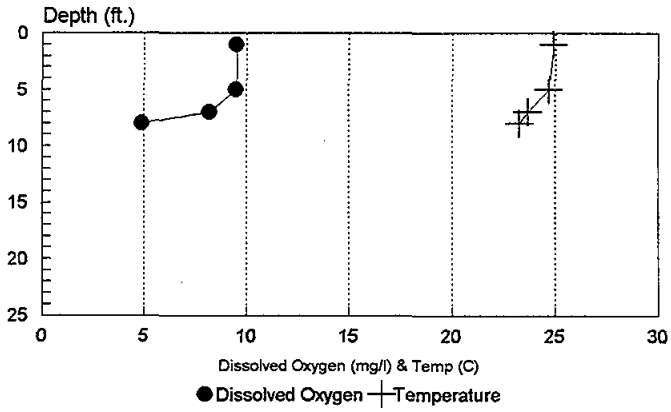
Watershed Area: 50,999 A (20,639 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

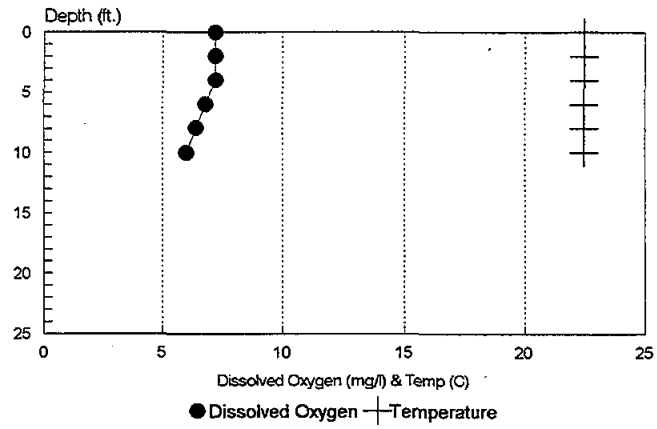
EAST OAKWOOD LAKE 8/1/79

Dissolved Oxygen & Temperature Profile



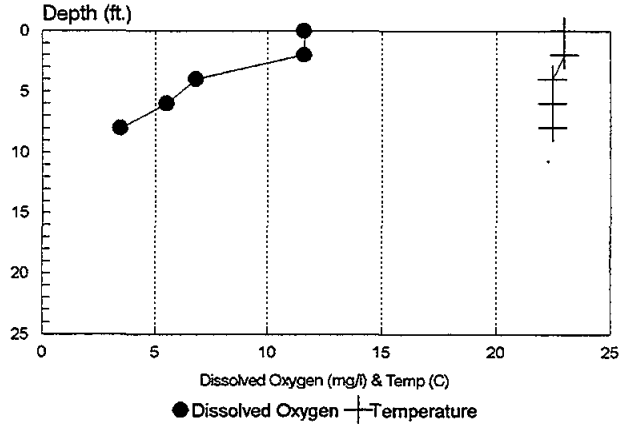
EAST OAKWOOD LAKE 8/19/91

Dissolved Oxygen & Temperature Profile



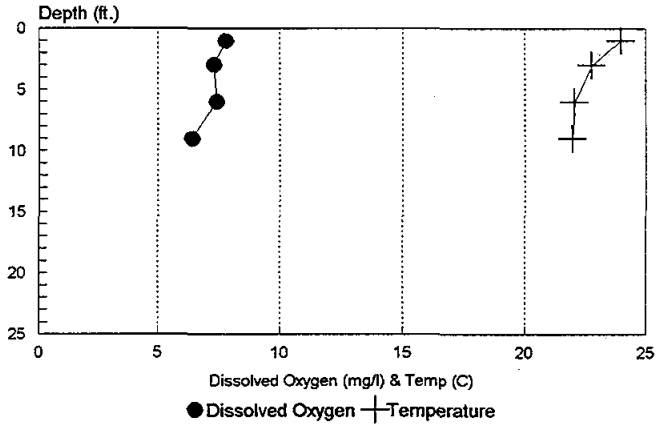
EAST OAKWOOD LAKE 9/9/91

Dissolved Oxygen & Temperature Profile



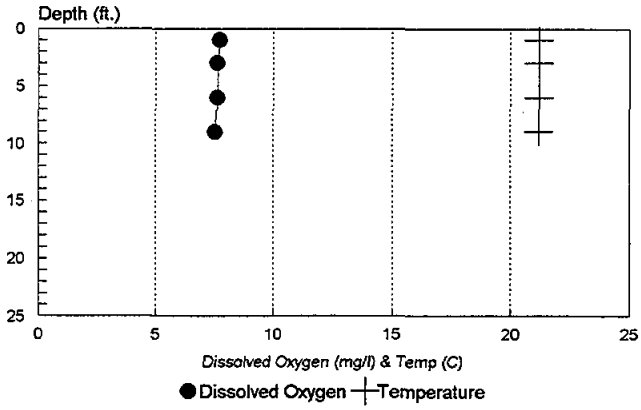
EAST OAKWOOD LAKE 6/21/94

Dissolved Oxygen & Temperature Profile

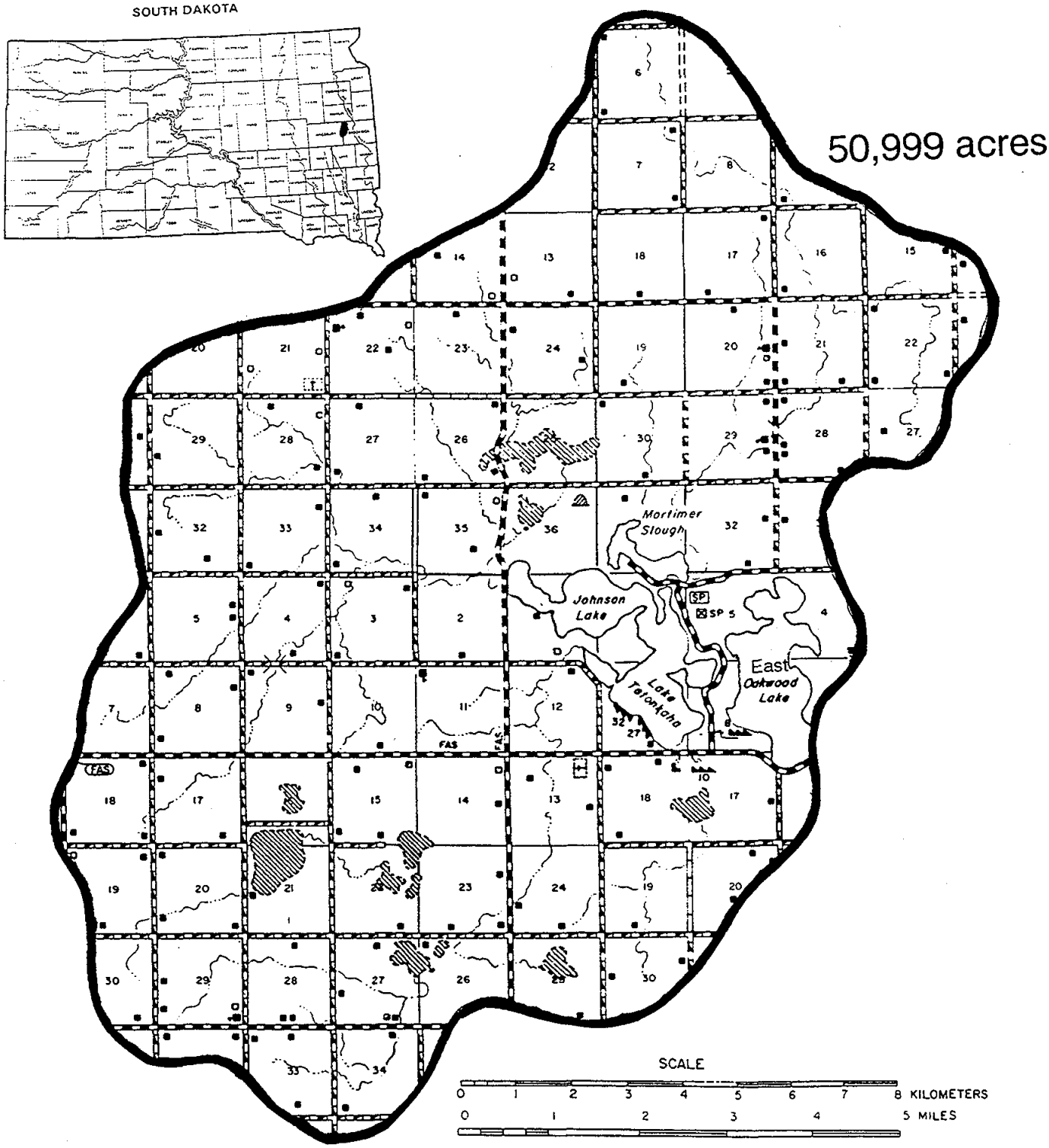


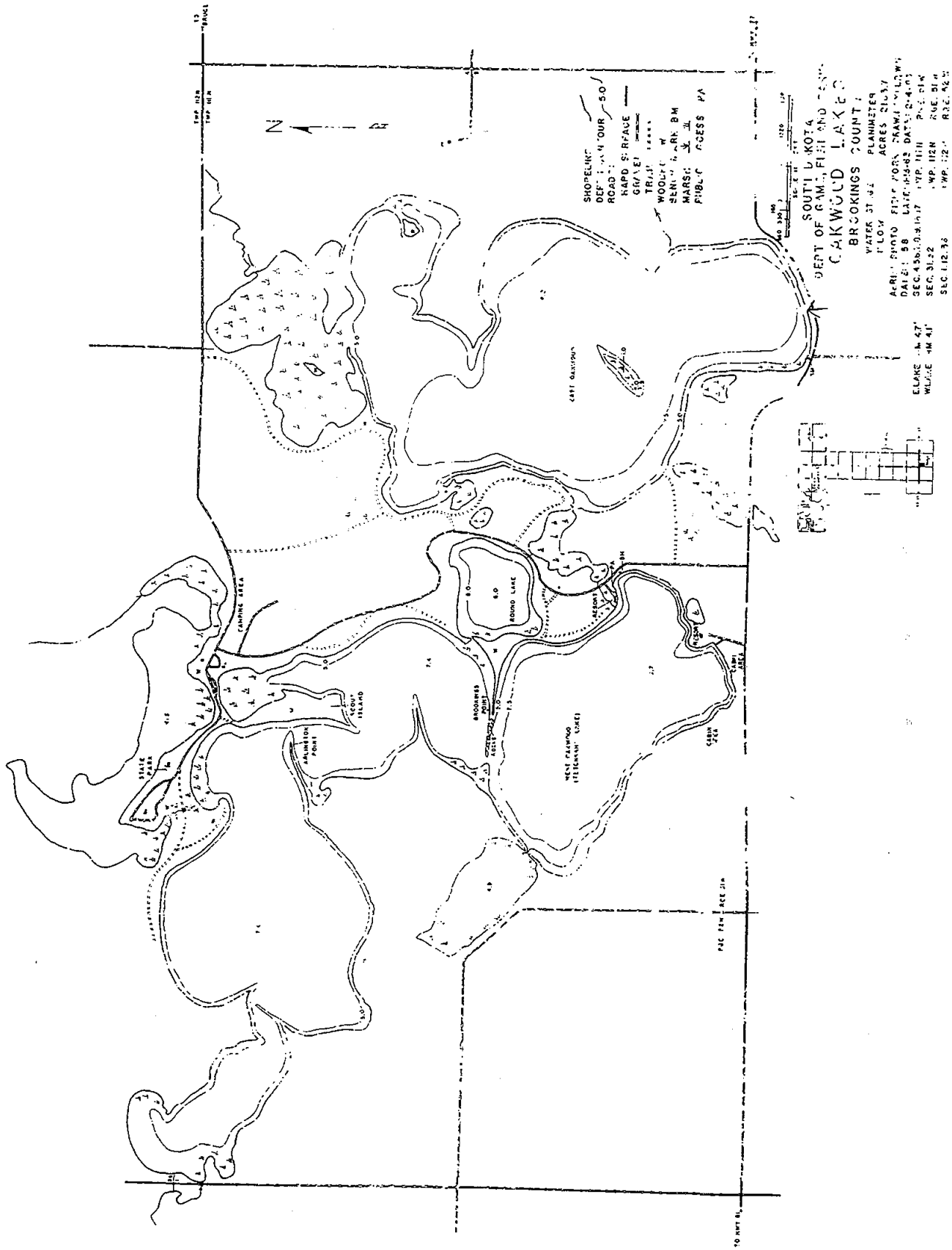
EAST OAKWOOD LAKE 8/23/94

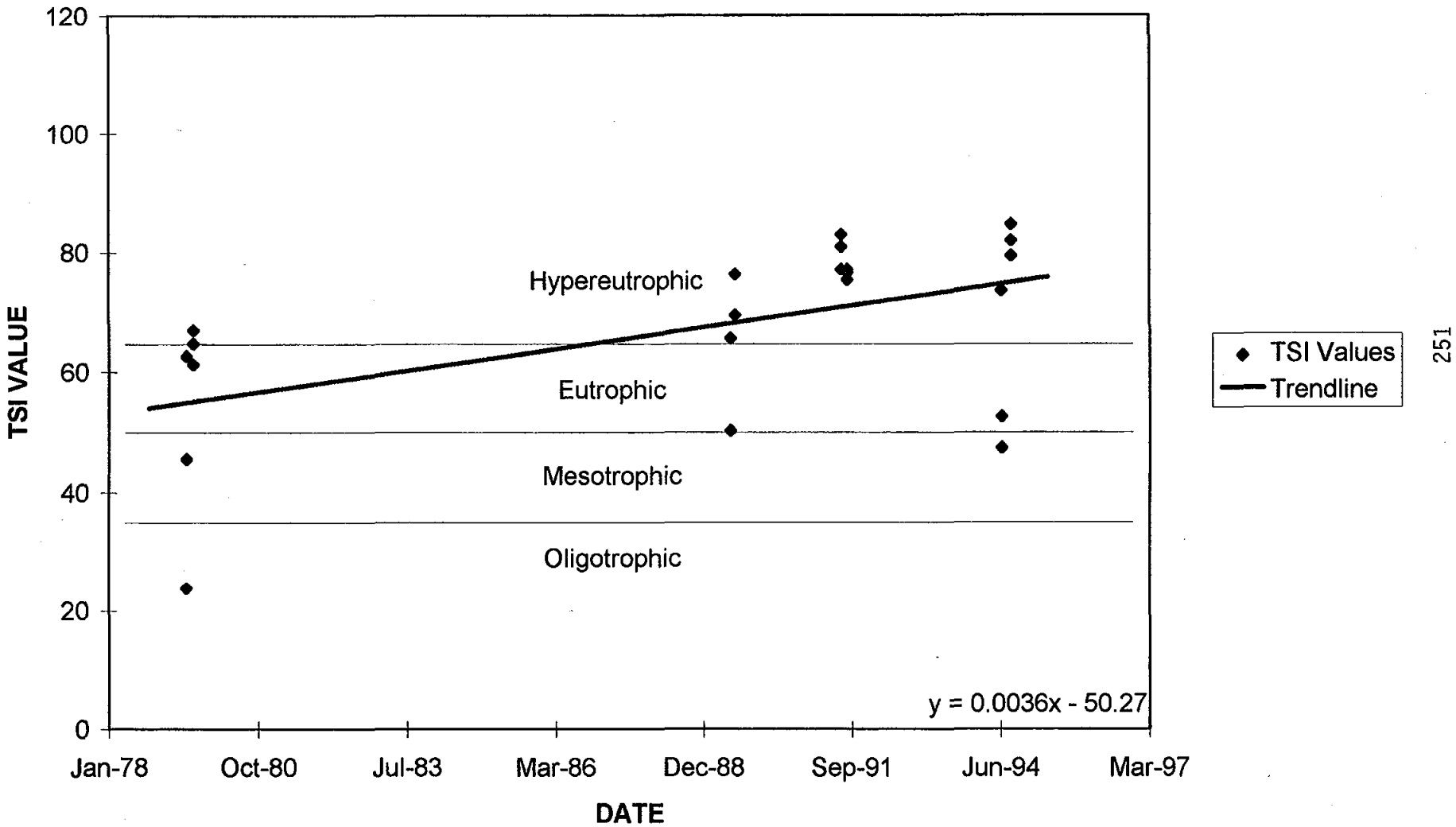
Dissolved Oxygen & Temperature Profile



East Oakwood Lake




SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
OAKWOOD LAKES
BROOKINGS COUNTY
CAMPING AREA
ROUND LAKE
BROOKINGS POINT
ARLINGTON POINT
STATE PARK
CABIN AREA


EAST OAKWOOD LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0036x - 50.27
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

EAST VERMILLION LAKE

County: McCook
Latitude: 43 deg. 36 min. 00 sec. N
Longitude: 97 deg. 10 min. 18 sec. W

Township: 102N
Range: 53W
Section (s): 14-15, 22-23, 26-27, & 33-35

Area: 550 A (222.6 ha)
Maximum Depth: 23 ft (7 m)
Volume: 6,600 acre-ft (8.142 x $10^6 m^3$)
Origin of Basin: impoundment

Shoreline L: 10.1 mi(16.3 km)
Mean Depth: 12 ft (3.7 m)
Watershed/Lake Area: 481
Thermal Stratification: yes

Major Inflows (named or permanent streams): East & West Fork Vermillion River
Outlet: East Fork Vermillion River

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 315,462
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.70	6	24.52	4	21.07
Air Temperature (°C)	4	28.50	6	30.93	4	24.72
Secchi Disk Depth (meters)	2	0.67	3	1.49	2	1.91
Conductivity (cond/25° C)	4	1,142	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	4	8.60	6	8.64	4	9.98
Total Alkalinity (mg/l)	4	164	-	-	-	-
Total Solids (mg/l)	4	993	-	-	-	-
Dissolved Solids (mg/l)	4	977	-	-	-	-
Suspended Solids (mg/l)	4	16	6	14	4	7
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.26	6	0.25	4	0.30
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.01	4	0.07
Total Kjeldahl Nitrogen (mg/l)	4	2.02	6	1.18	4	1.51
Total Phosphorus (mg/l)	4	0.291	6	0.168	4	0.223
Total Dissolved Phosphorus (mg/l)	-	-	6	0.113	4	0.186
Ortho Phosphate as P (mg/l)	4	0.140	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	19.15	4	94.84

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	22.87	6	22.24	6	22.74
Air Temperature (°C)	6	22.67	6	23.03	6	27.87
Secchi Disk Depth (meters)	3	1.54	9	1.16	8	0.99
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su) (su)	6	8.38	6	8.43	6	7.69
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	14	6	19	6	13
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.37	6	0.26		0.22
Nitrate + Nitrite Nitrogen (mg/l)	6	0.22	6	4.36	6	0.20
Total Kjeldahl Nitrogen (mg/l)	6	1.20	6	1.80	6	1.79
Total Phosphorus (mg/l)	6	0.388	6	0.380	6	0.534
Total Dissolved Phosphorus (mg/l)	6	0.335	6	0.323	6	0.487
Ortho Phosphate as P (mg/l)	-	-	-	-	-	
Chlorophyll (mg/m^3)	6	6.26	6	6.24	6	6.17

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	75.93	63.09	69.05	63.79	65.11	67.21
Secchi Disk	65.77	54.28	50.66	53.73	57.84	60.08
Total Phosphorus	86.10	75.44	81.26	89.08	88.96	93.14
Chlorophyll *a*		59.53	75.23	48.56	48.54	48.42

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified:
Potamogeton pectinatus

Algal Species and Densities

Taxa	July 6, 1989 Number	July 6, 1989 Units/ml	August 8, 1989 Number	August 8, 1989 Units/ml
Aphanizomenon flos-aquae	242	6437	286	16,963
Cryptomonas sp. #1	33	878	8	474
Characium	15	399	-	-
Lyngbya	8	213	-	-
Algae (other)	3	80	2	119
Algae (flagellate)	2	53	-	-
Blue-green (other)	-	-	3	178
Dactylococcopsis	-	-	1	59
Total	303	8059	300	17,793

Watershed Description

Watershed Area: 264,789 A (107,160 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
HR-PR	111,212	42
CY-EU	87,380	33
#2	26,479	10
HR-EU-WP	21,183	8
LC	18,535	7

HR-PR Houdek-Prosper: Well drained and moderately well drained, nearly level to gently undulating loamy soils formed in loamy glacial till; on uplands.

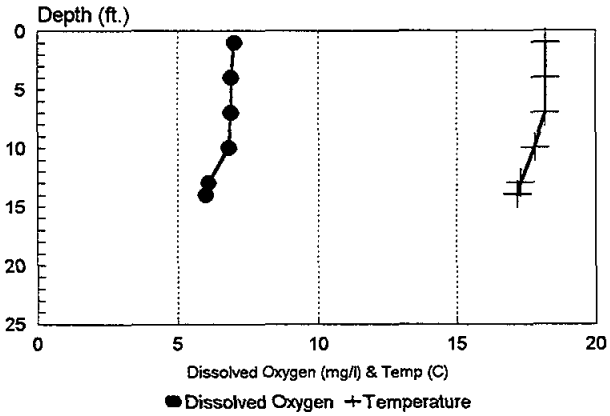
CY-EUClarno-Ethan: Nearly level to undulating, well drained loamy soils formed in the glacial till; on uplands.

#2 Crossplain-Clarno-Tetonka: Moderately well drained to poorly drained, nearly level and gently sloping loamy and silty soils on uplands and in upland swales and depressions.

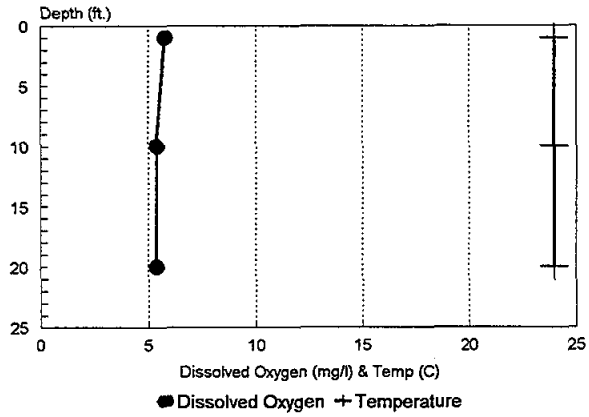
HR-EU-WP Houdek-Ethan-Worthing: Well drained to poorly drained, nearly level to undulating, loamy and silty soils formed in loamy glacial till and local alluvium; on uplands.

LC Lamo: Somewhat poorly drained, nearly level, silty soils formed in alluvium; on bottom lands.

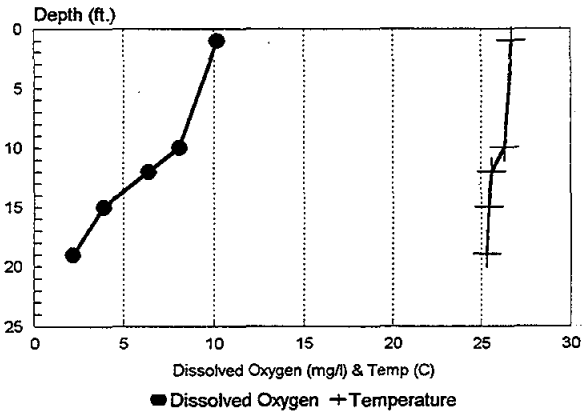
EAST VERMILLION LAKE 5/28/79
Dissolved Oxygen & Temperature Profile



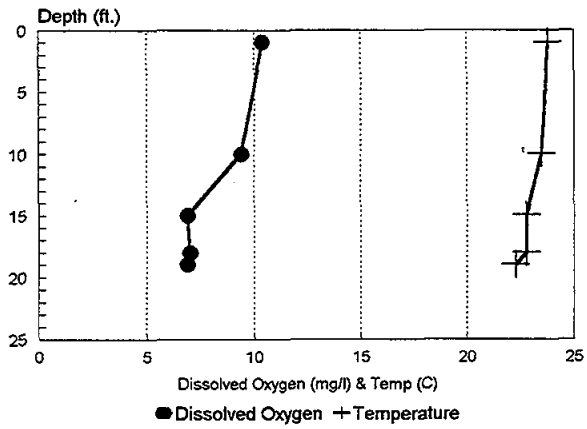
EAST VERMILLION LAKE 6/20/91
Dissolved Oxygen & Temperature Profile



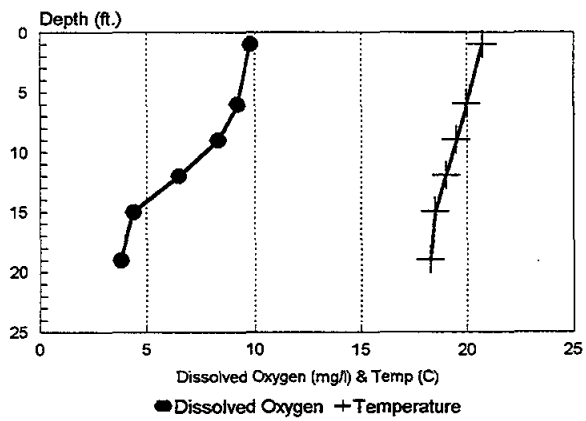
EAST VERMILLION LAKE 7/20/91
Dissolved Oxygen & Temperature Profile



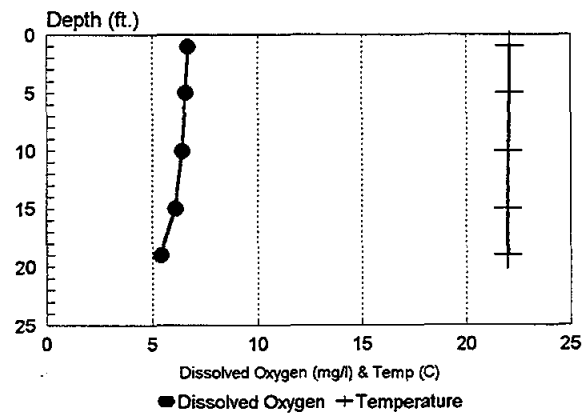
EAST VERMILLION LAKE 8/19/91
Dissolved Oxygen & Temperature Profile



EAST VERMILLION LAKE 6/11/92
Dissolved Oxygen & Temperature Profile

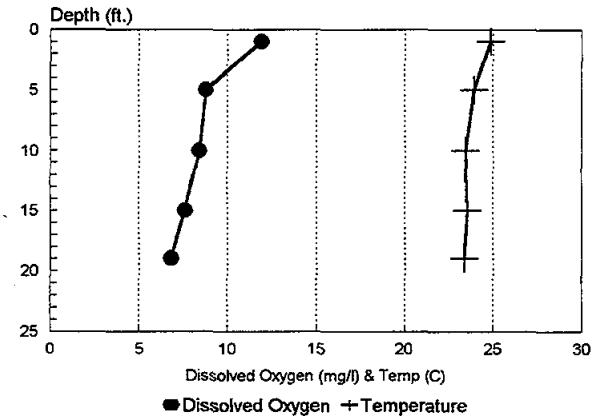


EAST VERMILLION LAKE 7/19/92
Dissolved Oxygen & Temperature Profile



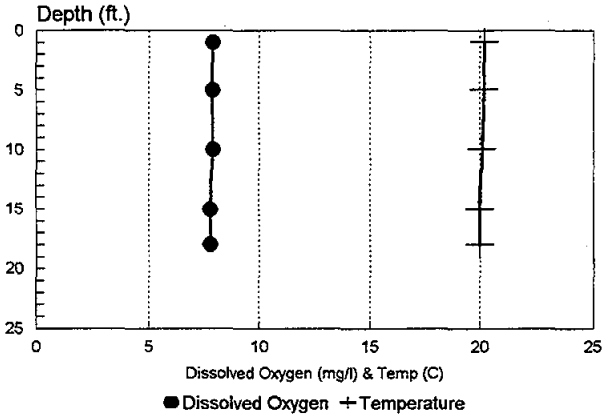
EAST VERMILLION LAKE 8/13/92

Dissolved Oxygen & Temperature Profile



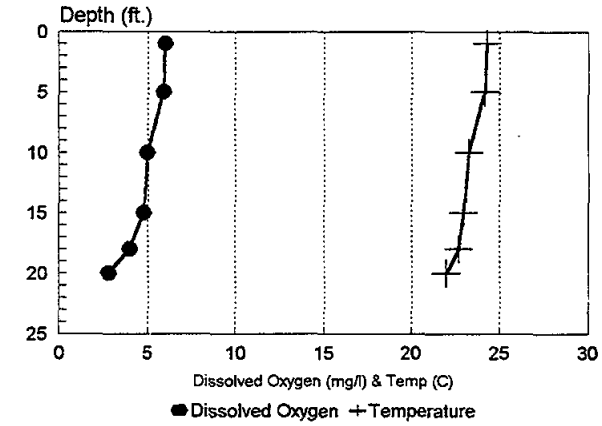
EAST VERMILLION LAKE 6/12/93

Dissolved Oxygen & Temperature Profile



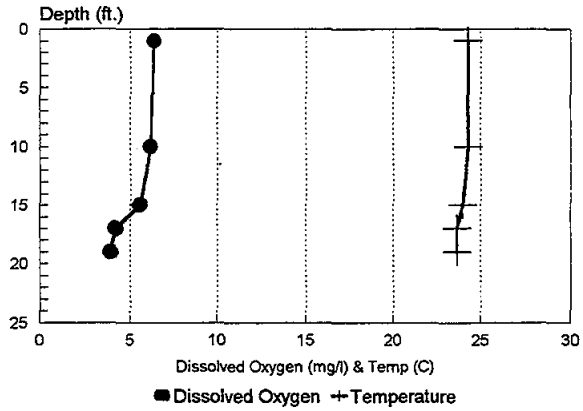
EAST VERMILLION LAKE 7/20/93

Dissolved Oxygen & Temperature Profile



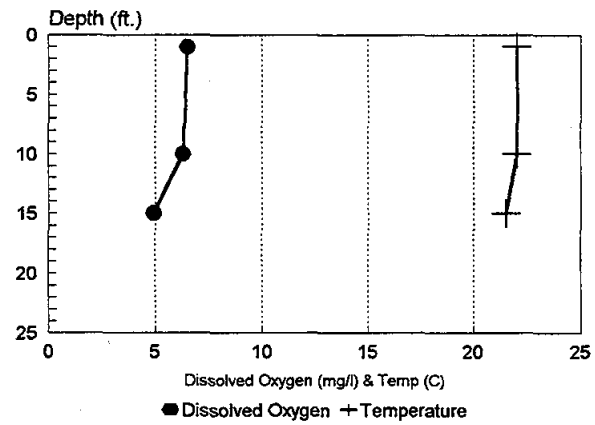
EAST VERMILLION LAKE 8/18/93

Dissolved Oxygen & Temperature Profile



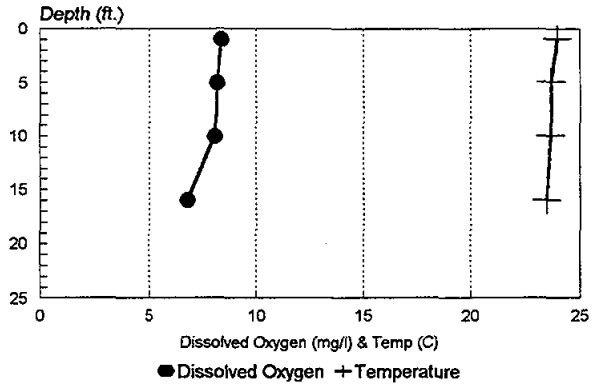
EAST VERMILLION LAKE 6/11/94

Dissolved Oxygen & Temperature Profile



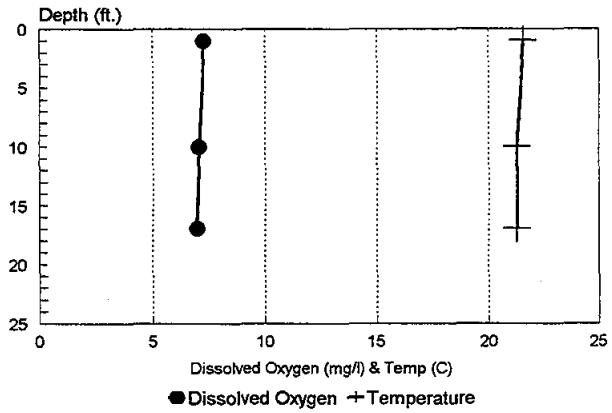
EAST VERMILLION LAKE 7/13/94

Dissolved Oxygen & Temperature Profile



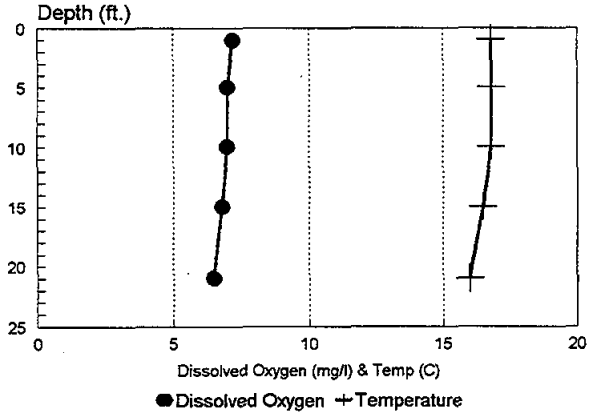
EAST VERMILLION LAKE 8/13/94

Dissolved Oxygen & Temperature Profile



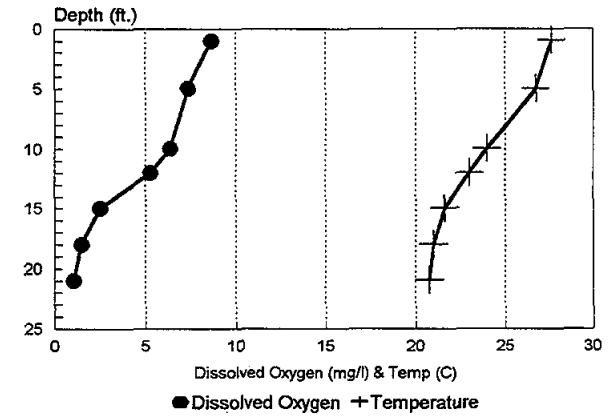
EAST VERMILLION LAKE 6/13/95

Dissolved Oxygen & Temperature Profile



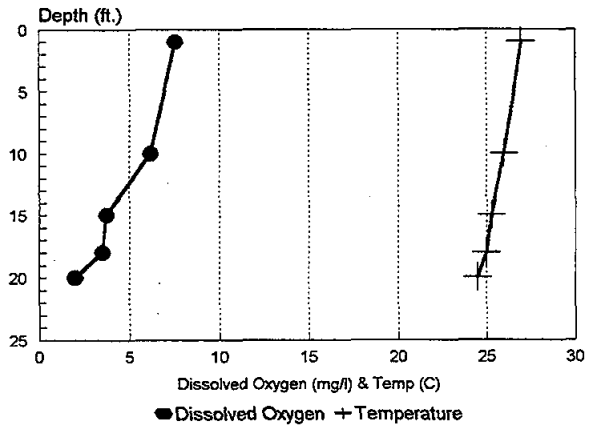
EAST VERMILLION LAKE 7/12/95

Dissolved Oxygen & Temperature Profile



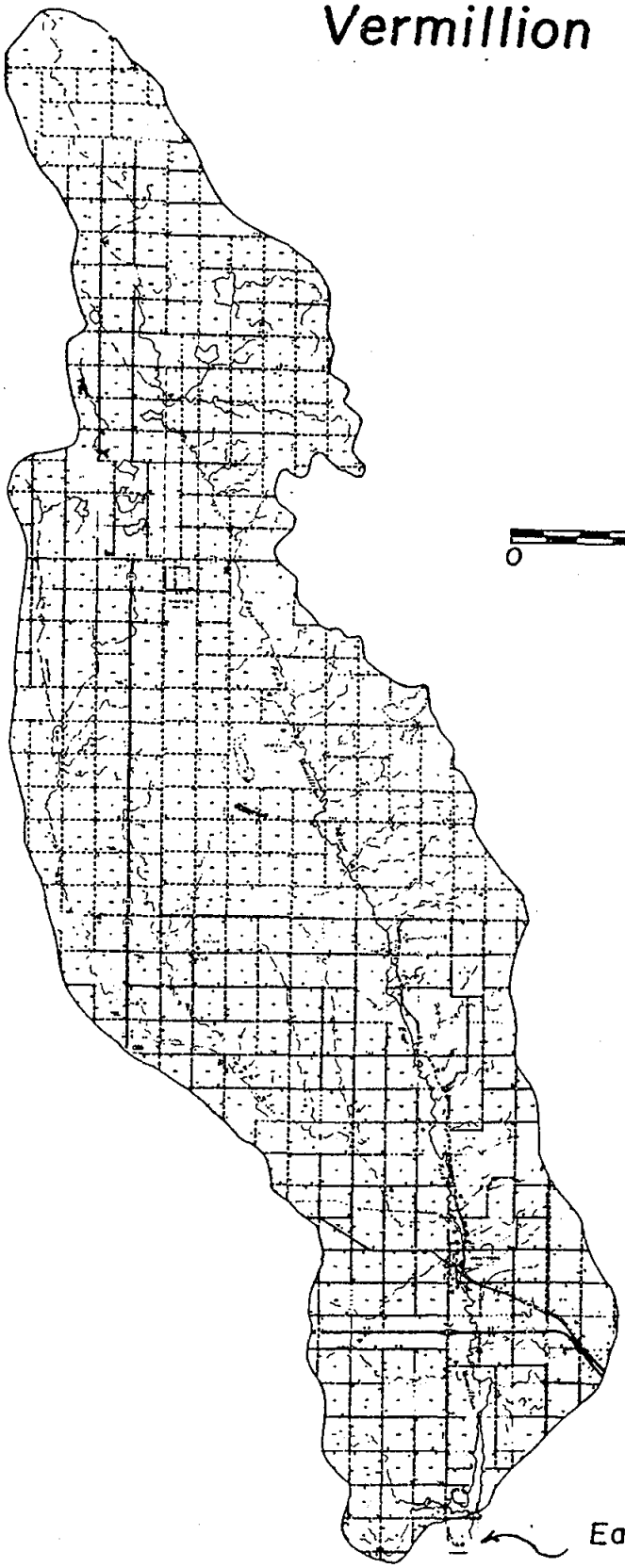
EAST VERMILLION LAKE 8/11/95

Dissolved Oxygen & Temperature Profile



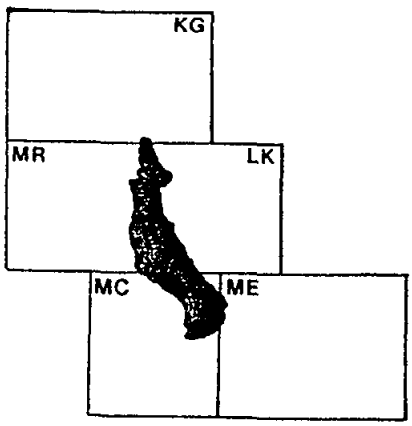
Vermillion Lake

264,789 acres

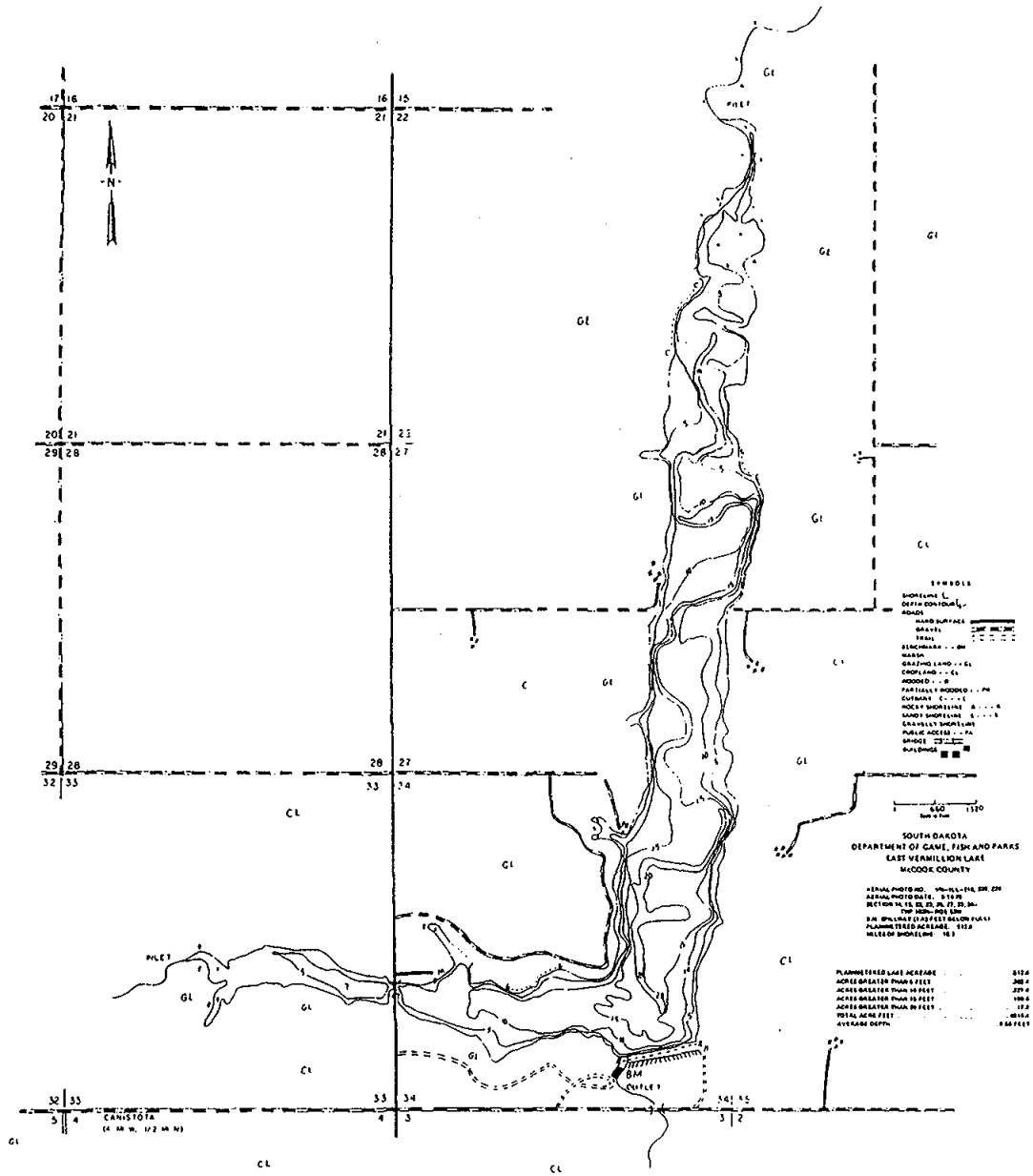


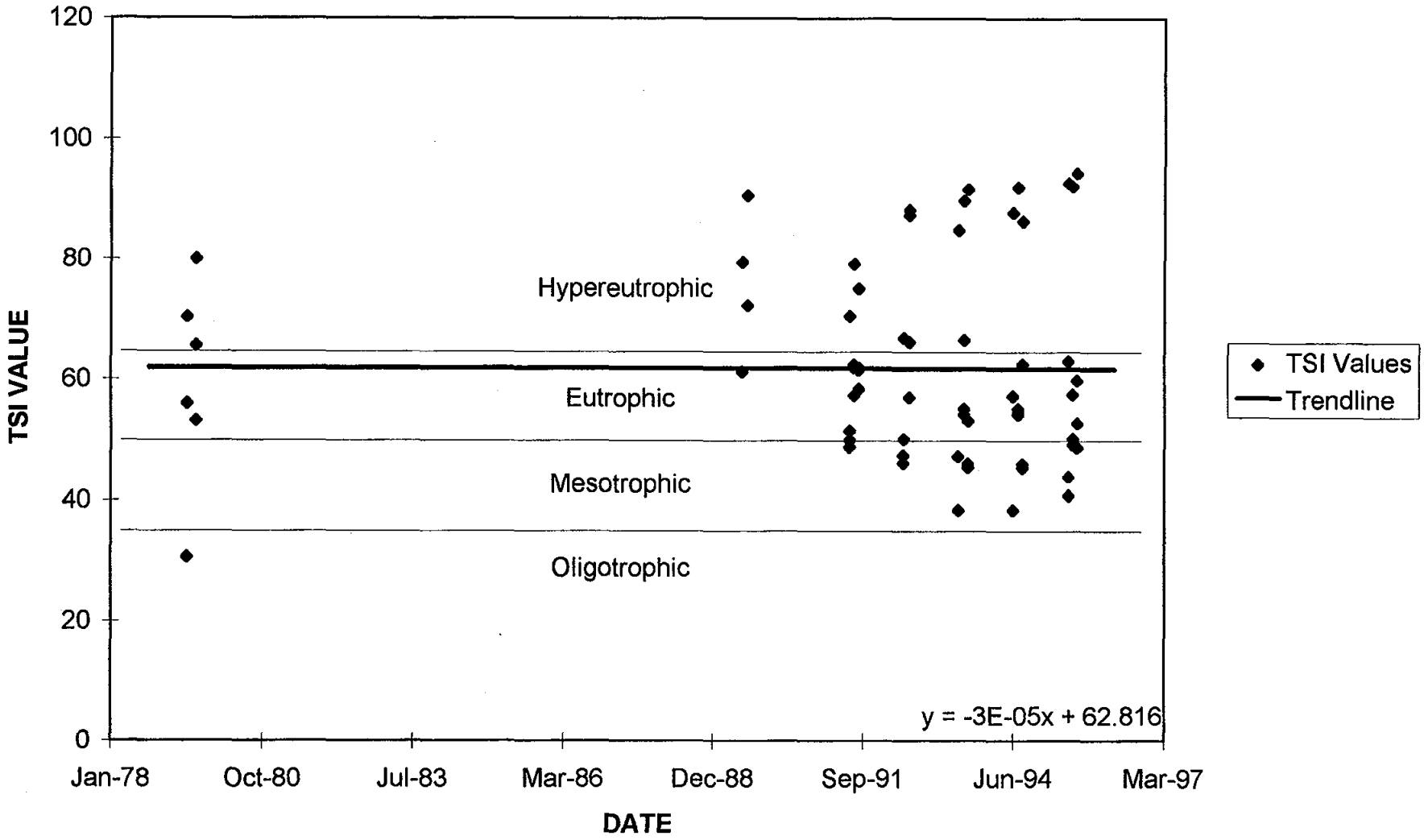
Scale

0 4 8 12 16



East Fork Vermillion River Outlet


N
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
EAST VERMILLION LAKE
McCOOK COUNTY
CANISTOTA
OUTLET
BM


EAST VERMILLION LAKE TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -3E-05x + 62.816
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

ELM LAKE

County: Brown
Latitude: 45 deg. 51 min. 18 sec. N
Longitude: 98 deg. 42 min. 30 sec.W

Township: 128 N
Range: 65, 66W
Section (s): 4-5, 8-9, 17 20-21, 25, 29-32, 35-36

Area: 1,209 A (489.3 ha)
Maximum Depth: 34 ft (10.8 m)
Volume: 21,762 acre-ft (2.685 x $10^7 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Elm River
Outlet: Elm River

Shoreline L: 32.4 mi(52 km)
Mean Depth: 18 ft (5.5 m)
Watershed/Lake Area: 89
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 84,738
Ownership Status: City of Aberdeen and private ownership.
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.25	4	22.42	4	20.46
Air Temperature (°C)	4	26.39	4	27.75	4	19.50
Secchi Disk Depth (meters)	2	0.20	2	0.96	2	0.60
Conductivity (cond/25° C)	4	438	2	557	-	-
Turbidity (NTU)	-	-	-	-	3	18.82
Lab pH (su)	4	8.06	-	-	-	-
Field pH (su) (su)	-	-	4	8.23	4	8.05
Total Alkalinity (mg/l)	4	120	4	156	4	166
Total Solids (mg/l)	4	389	4	395	4	367
Dissolved Solids (mg/l)	4	346	4	374	4	354
Suspended Solids (mg/l)	4	43	4	21	4	13
Volatile Suspended Solids (mg/l)	-	-	2	7	-	-
Ammonia Nitrogen (mg/l)	4	0.08	4	0.02	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.88	4	0.68	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.26	4	0.73	4	1.12
Total Phosphorus (mg/l)	4	0.471	4	0.483	4	0.466
Total Dissolved Phosphorus (mg/l)	-	-	4	0.436	4	0.418
Ortho Phosphate as P (mg/l)	4	0.320	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	6.70	1	6.70

Year	1989	1991	1993
TSI Values -- Mean:	87.97	67.69	69.84
Secchi Disk	82.99	60.59	67.37
Total Phosphorus	92.95	93.26	92.92
Chlorophyll *a*		49.23	49.23

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: None identified

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

July 19,1989

Taxa	Number	Units/ml
Aphanizomenon flos-aquae	2	115
Oocystis	1	23
Algae (other)	1	23
Algae (flagellate)	1	23
Total	5	115

Watershed Description

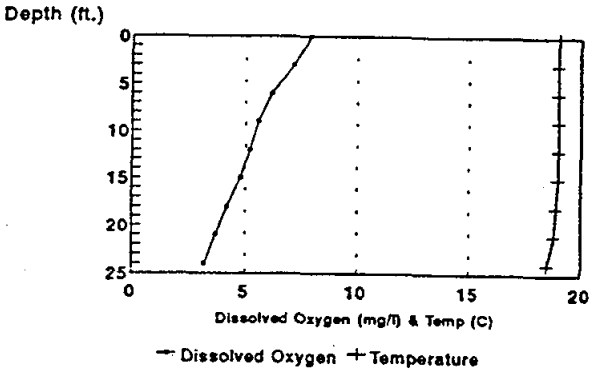
Watershed Area: 107,854 A (43,648 ha)
Soil Associations within Watershed

Association	Area (A)	% of Total
NM-NX	98,794	91.6
WJ	9,060	8.4

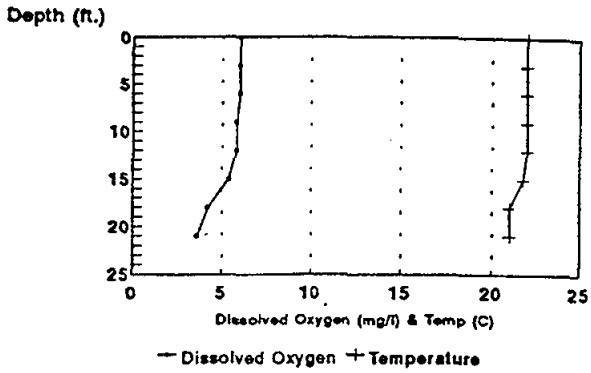
NM-NX Niobell-Noonan: Well drained and moderately well drained, nearly level to gently undulating soils with claypan subsoils.

WJ Williams: Well drained, nearly level to undulating loamy soils.

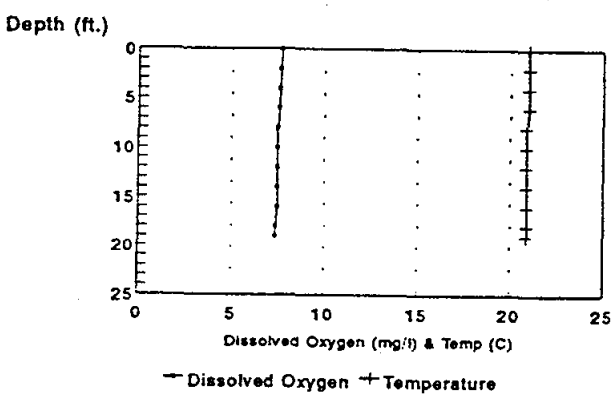
ELM LAKE 7/6/93
Dissolved Oxygen & Temperature Profile



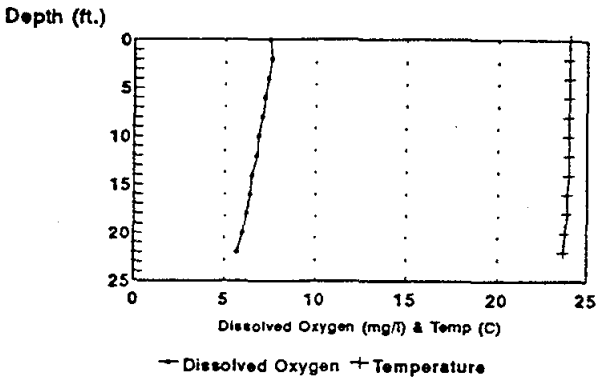
ELM LAKE 8/17/93
Dissolved Oxygen & Temperature Profile



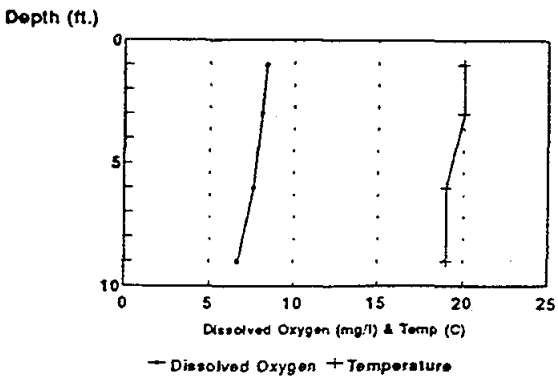
ELM LAKE 8/8/91
Dissolved Oxygen & Temperature Profile



ELM LAKE 8/28/91
Dissolved Oxygen & Temperature Profile

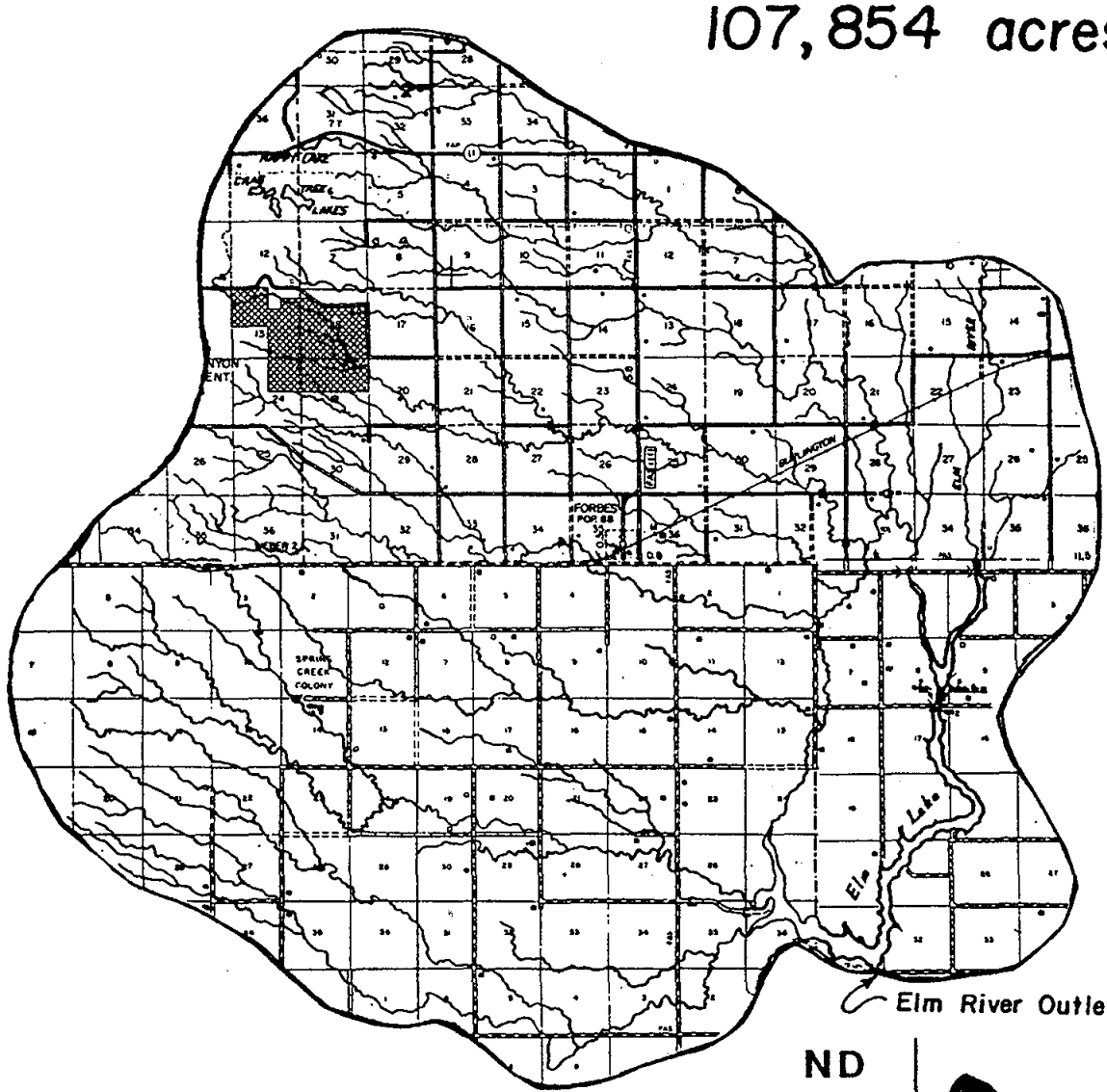


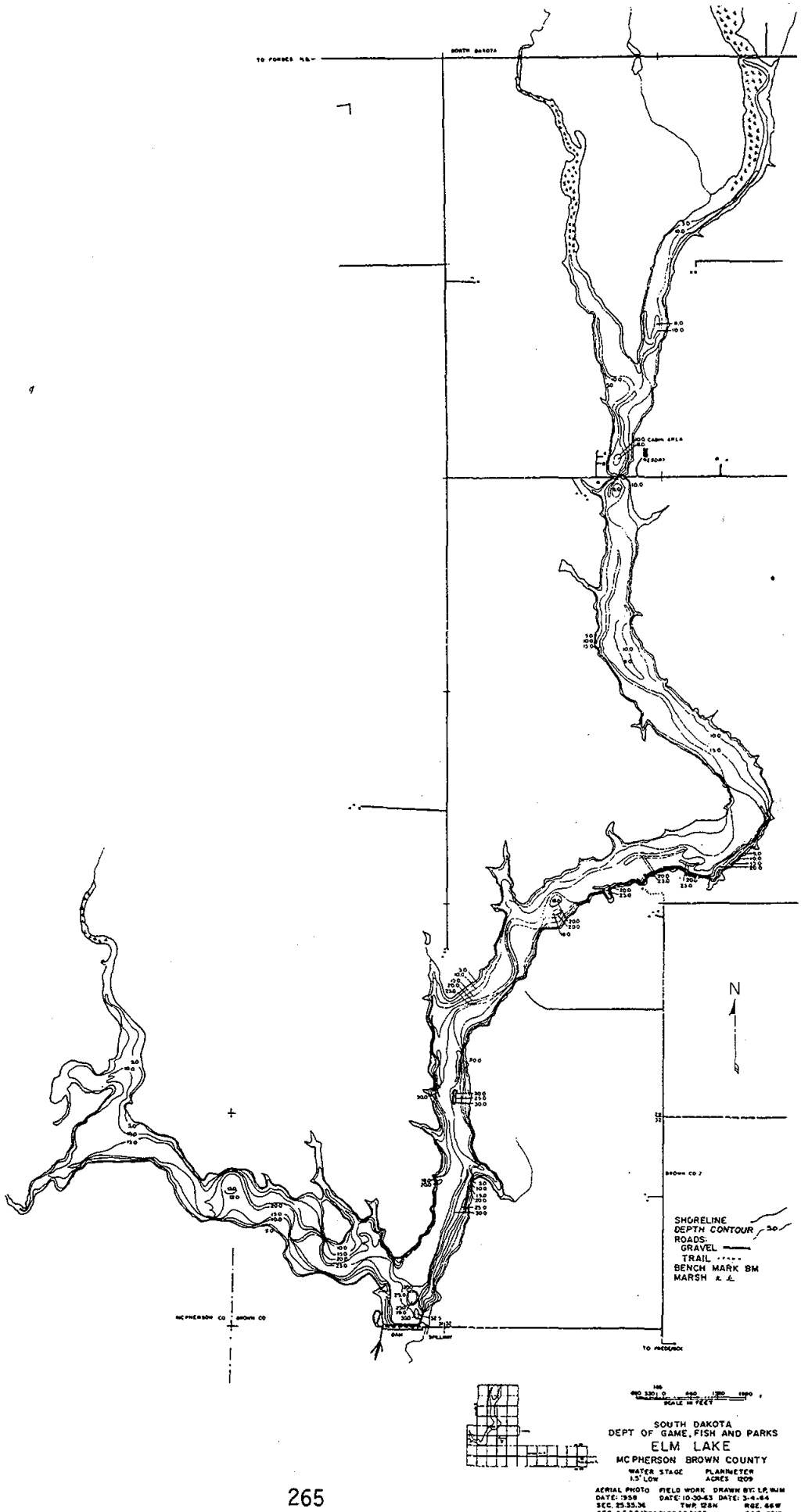
Elm Lake, 8/9/89
Dissolved Oxygen & Temperature Profile

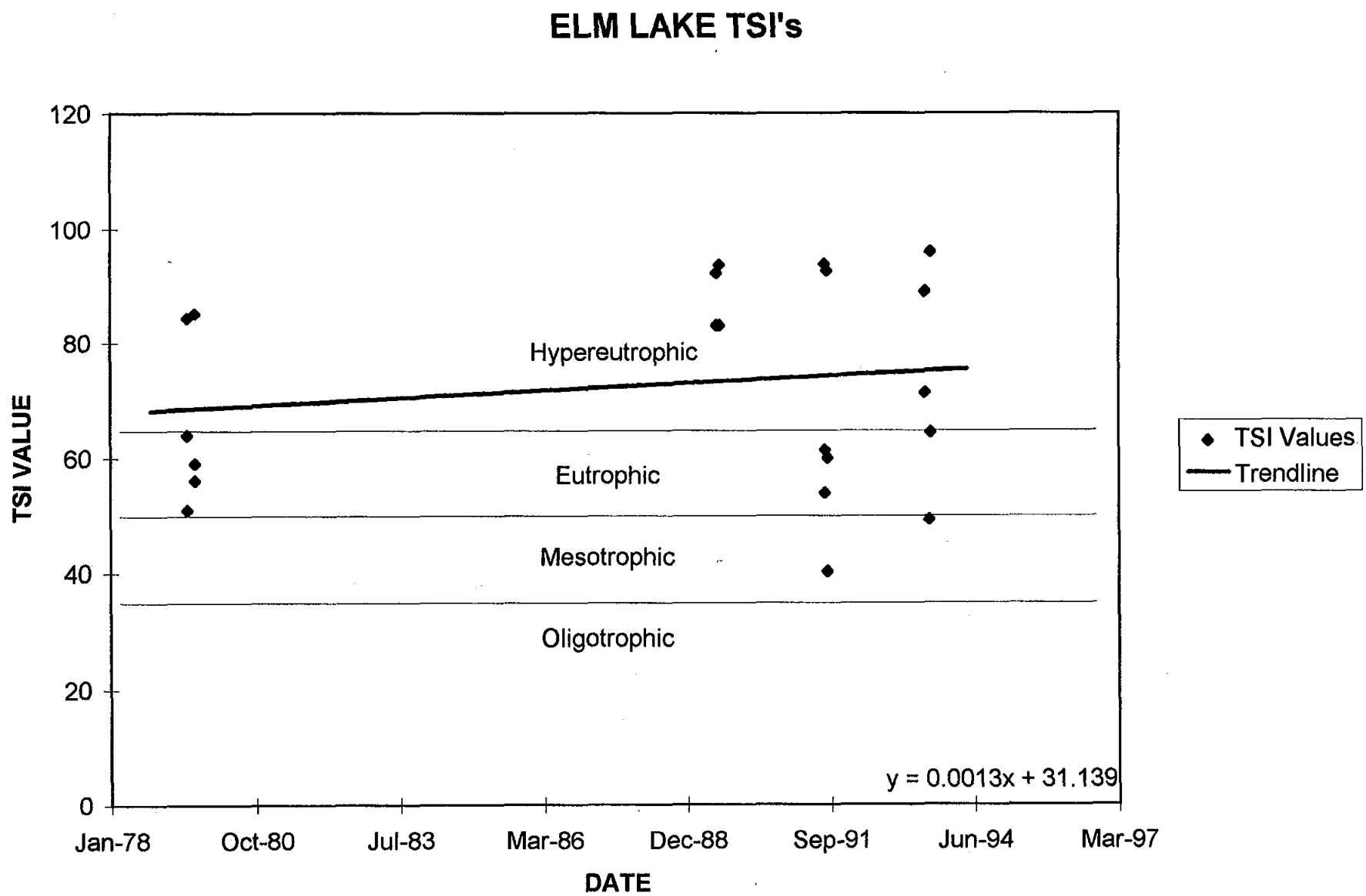


Elm Lake

107,854 acres




N
SHORELINE
DEPTH CONTOUR
ROADS:
GRAVEL
TRAIL
BENCH MARK BM
MARSH
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
ELM LAKE
MC PHERSON BROWN COUNTY
WATER STAGE
1.5' LOW
PLANIMETER
ACRES 1209
AERIAL PHOTO
DATE: 1958
FIELD WORK
DATE: 10-30-63
DRAWN BY: L.R. WM
DATE: 3-4-64
SEC. 25,33,34
TWP. 128N
RGE. 66W
SEC. 4,5,8,9,17,20,21,29,30,31,32.
RGE. 65W


ELM LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0013x + 31.139
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

ENEMY SWIM LAKE

County: Day
Latitude: 45 deg. 26 min. 24 sec. N
Longitude: 97 deg. 16 min. 00 sec. W
Area: 2146 A (868.5 ha)
Maximum Depth: 26 ft (7.9 m)
Volume: 33,792 acre-ft ($4.17x10^7 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 123N
Range: 53W
Section(s): 9-16
Shoreline L: 11.8 mi (18.9 km)
Mean Depth: 16 ft (4.9 m)
Watershed/Lake Area: 10
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.25	6	23.15	4	20.03
Air Temperature (°C)	4	24.44	6	28.70	4	30.28
Secchi Disk Depth (meters)	2	1.11	3	1.64	4	1.82
Conductivity (cond/25° C)	4	443	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.62	-	-	-	-
Field pH (su) (su)	-	-	6	8.71	4	8.43
Total Alkalinity (mg/l)	4	209	-	-	-	-
Total Solids (mg/l)	4	309	-	-	-	-
Dissolved Solids (mg/l)	4	295	-	-	-	-
Suspended Solids (mg/l)	4	12	6	8	4	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.10	6	0.03	4	0.10
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.01
Total Kjeldahl Nitrogen (mg/l)	4	0.98	6	0.88	4	0.88
Total Phosphorus (mg/l)	4	0.044	6	0.032	4	0.027
Total Dissolved Phosphorus (mg/l)	-	-	6	0.019	4	0.017
Ortho Phosphate as P (mg/l)	4	0.010	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	5.87	4	3.59

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	19.85	6	20.98	6	22.83
Air Temperature (°C)	6	23.00	6	22.30	6	25.43
Secchi Disk Depth (meters)	3	2.93	9	2.40	9	2.88
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.53	6	8.47	5	8.09
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	5	6	4	6	4
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.03	6	0.01	6	0.01
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	6	0.01	6	0.03
Total Kjeldahl Nitrogen (mg/l)	6	0.71	6	0.60	6	0.71
Total Phosphorus (mg/l)	6	0.019	6	0.020	6	0.025
Total Dissolved Phosphorus (mg/l)	6	0.010	6	0.007	6	0.008
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	4.78	6	4.77	6	3.79

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	58.52	51.19	47.52	46.09	45.59	44.57
Secchi Disk	58.46	52.90	51.39	44.49	47.34	44.76
Total Phosphorus	58.58	52.73	48.06	47.84	43.54	45.31
Chlorophyll *a*		47.93	43.10	45.92	45.89	43.64

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Ceratophyllum demersum, Myriophyllum spicatum, Potamogeton illinoensis, P. richardsonii, P. pusillus, P. pectinatus, P. friesii, P. zosteriformis, and Najas quadelupensis

Algal Species and Densities

Taxa	June 21, 1989 Number	June 21, 1989 Units/ml	July 26, 1989 Number	July 26, 1989 Units/ml
Aphanocapsa	101	1,898	178	3,558
Algae (flagellate)	64	1,203	6	120
Aphanothece	40	752	41	820
Cryptomonas sp. #1	30	564	6	120

(continued)

Taxa	June 21, 1989 Number	June 21, 1989 Units/ml	July 26, 1989 Number	July 26, 1989 Units/ml
Fragilaria crotonensis	14	263	-	-
Algae (other)	14	263	8	160
Oocystis	12	225	1	20
Cryptomonas	5	94	2	40
Gomphosphaeria	5	94	12	240
Aphanizomenon flos-aquae	5	94	5	100
Diatom (pennate)	3	56	1	20
Chroococcus	3	56	15	300
Geen Algae (other)	3	56	11	220
Crucigenia	2	38	3	60
Stephanodiscus niagarae	2	38	-	-
Nitzschia	2	38	-	-
Merismopedia	-	-	4	80
Scenedesmus	-	-	2	40
Synedra	-	-	2	40
Lyngbya Diguetii	-	-	1	20
Stephanodiscus	-	-	1	20
Diatom (centric)	-	-	1	20
Total	303	5,694	300	5,997

Watershed Description

Watershed Area: 22,310 A (9,029 ha)

Soil Associations within Watershed

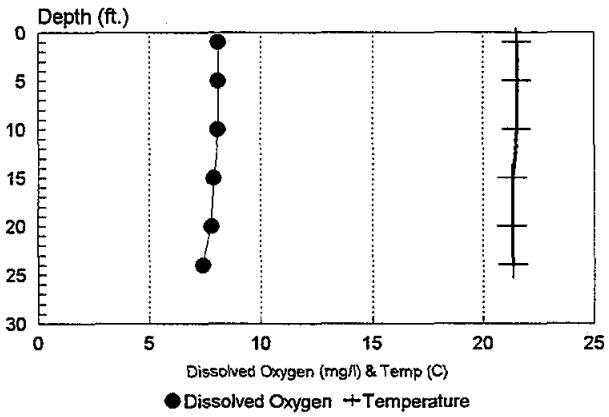
Association	Area (A)	% of Total
FU-AA-BY	12,047	54
RL-FS	6,470	29
RL-FS-SK	3,793	17

FU-AA-BY Forman-Aastad-Buse: Well drained and moderately drained, gently undulating to steep, loamy soils formed in loamy glacial till.

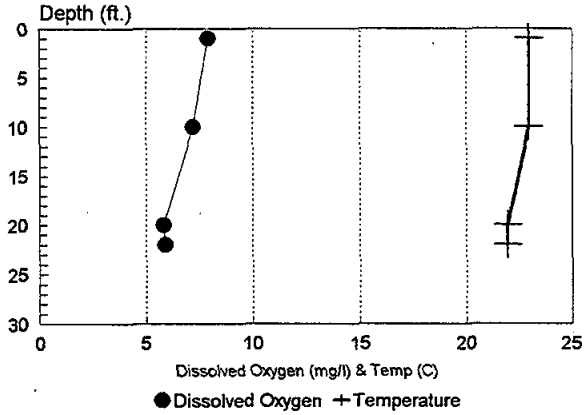
RL-FS Renshaw-Fordville: Well drained, nearly level to strongly sloping loamy soils that are shallow and moderately deep over sand and gravel.

RL-FS-SK Renshaw-Fordville-Sioux: Well drained to excessively drained, nearly level to steep loamy soils that are shallow, moderately deep and very shallow over sand and gravel.

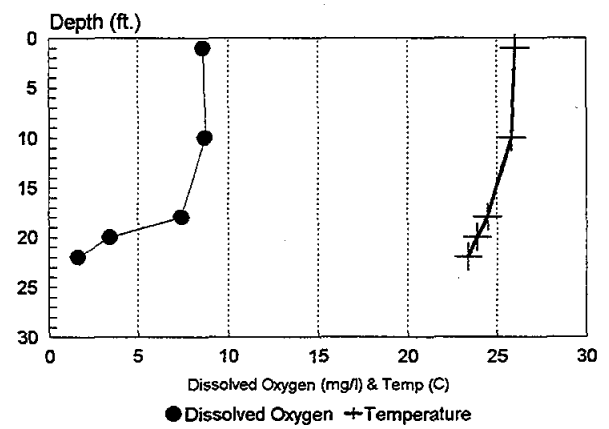
ENEMY SWIM LAKE 8/13/79
Dissolved Oxygen & Temperature Profile



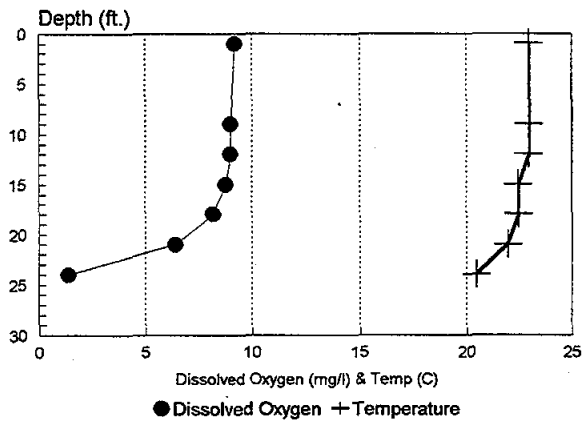
ENEMY SWIM LAKE 6/18/91
Dissolved Oxygen & Temperature Profile



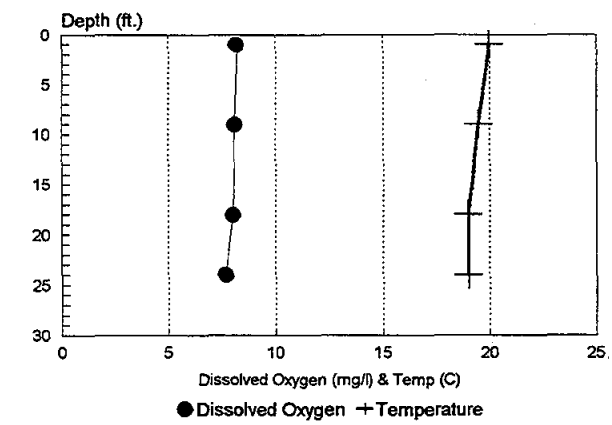
ENEMY SWIM LAKE 7/19/91
Dissolved Oxygen & Temperature Profile



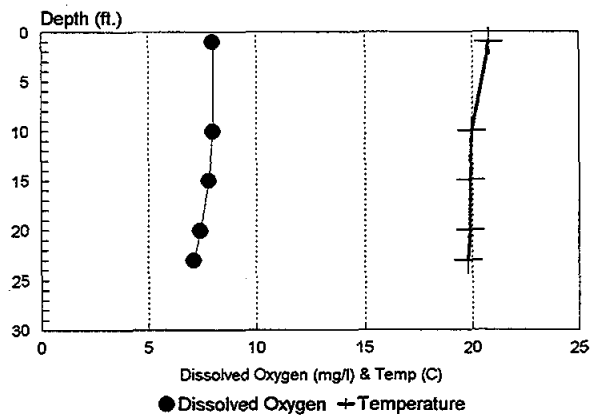
ENEMY SWIM LAKE 8/18/91
Dissolved Oxygen & Temperature Profile



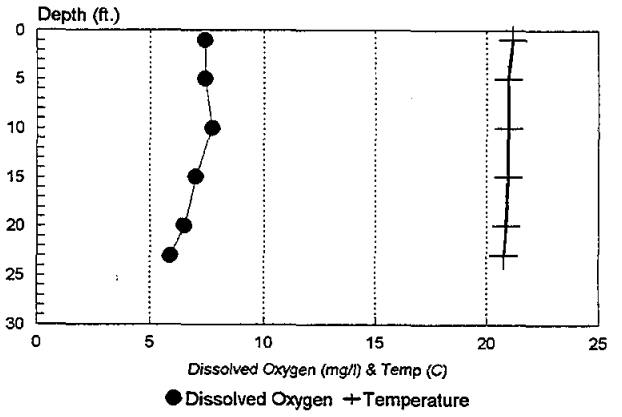
ENEMY SWIM LAKE 6/18/92
Dissolved Oxygen & Temperature Profile



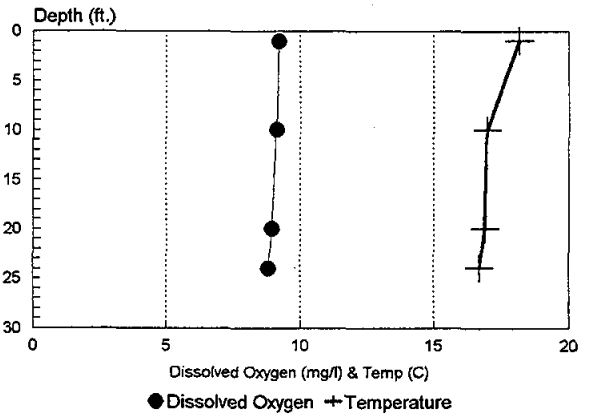
ENEMY SWIM LAKE 7/18/92
Dissolved Oxygen & Temperature Profile



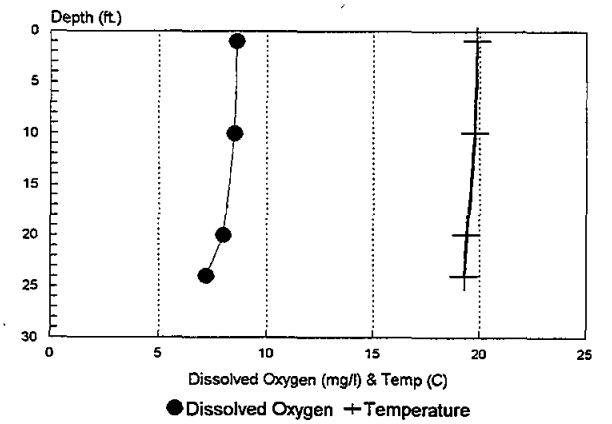
ENEMY SWIM LAKE 8/16/92
Dissolved Oxygen & Temperature Profile



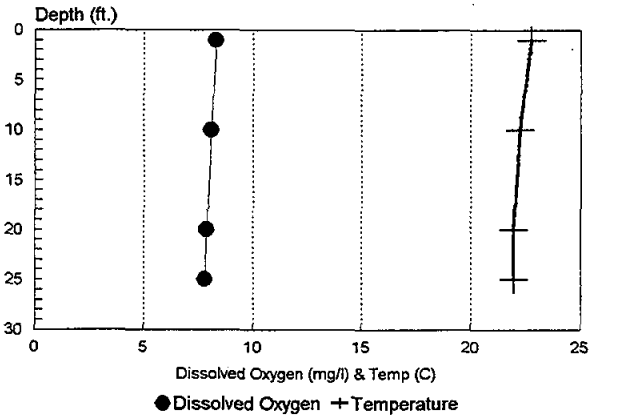
ENEMY SWIM LAKE 6/16/93
Dissolved Oxygen & Temperature Profile



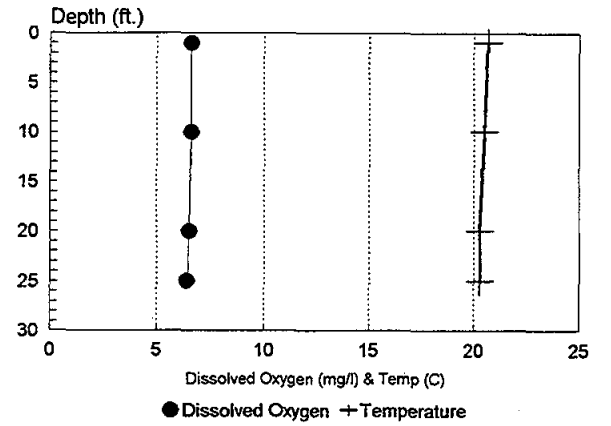
ENEMY SWIM LAKE 7/23/93
Dissolved Oxygen & Temperature Profile



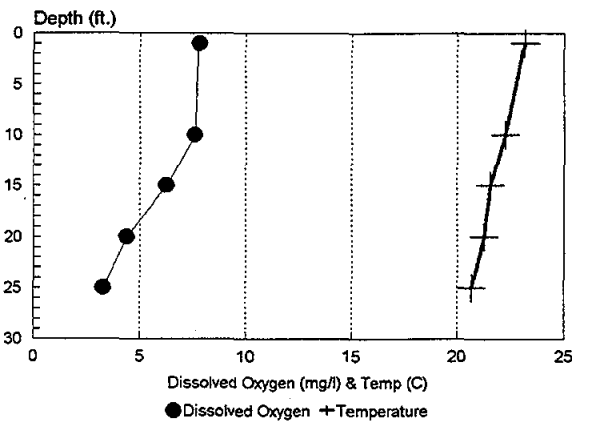
ENEMY SWIM LAKE 8/22/93
Dissolved Oxygen & Temperature Profile



ENEMY SWIM LAKE 6/15/94
Dissolved Oxygen & Temperature Profile

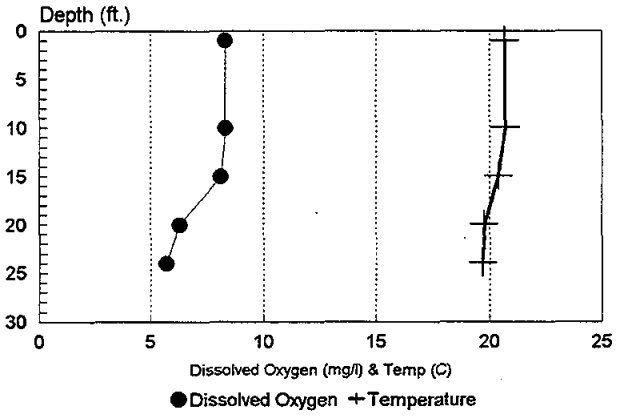


ENEMY SWIM LAKE 7/17/94
Dissolved Oxygen & Temperature Profile



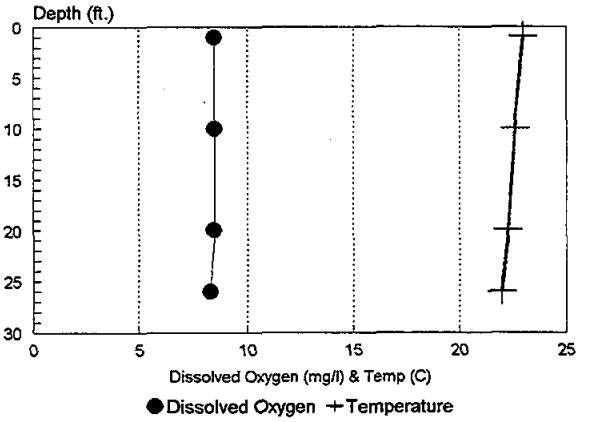
ENEMY SWIM LAKE 8/17/94

Dissolved Oxygen & Temperature Profile



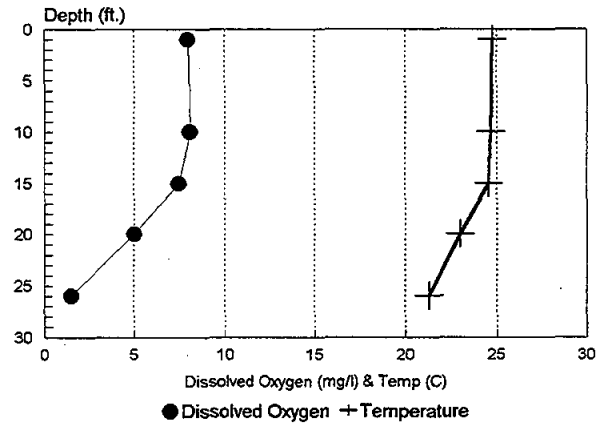
ENEMY SWIM LAKE 6/19/95

Dissolved Oxygen & Temperature Profile



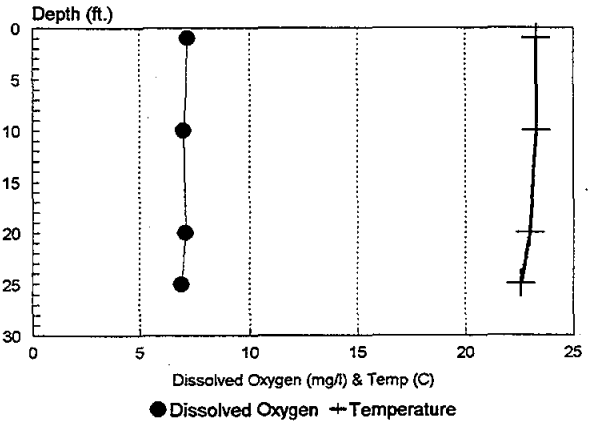
ENEMY SWIM LAKE 7/15/95

Dissolved Oxygen & Temperature Profile



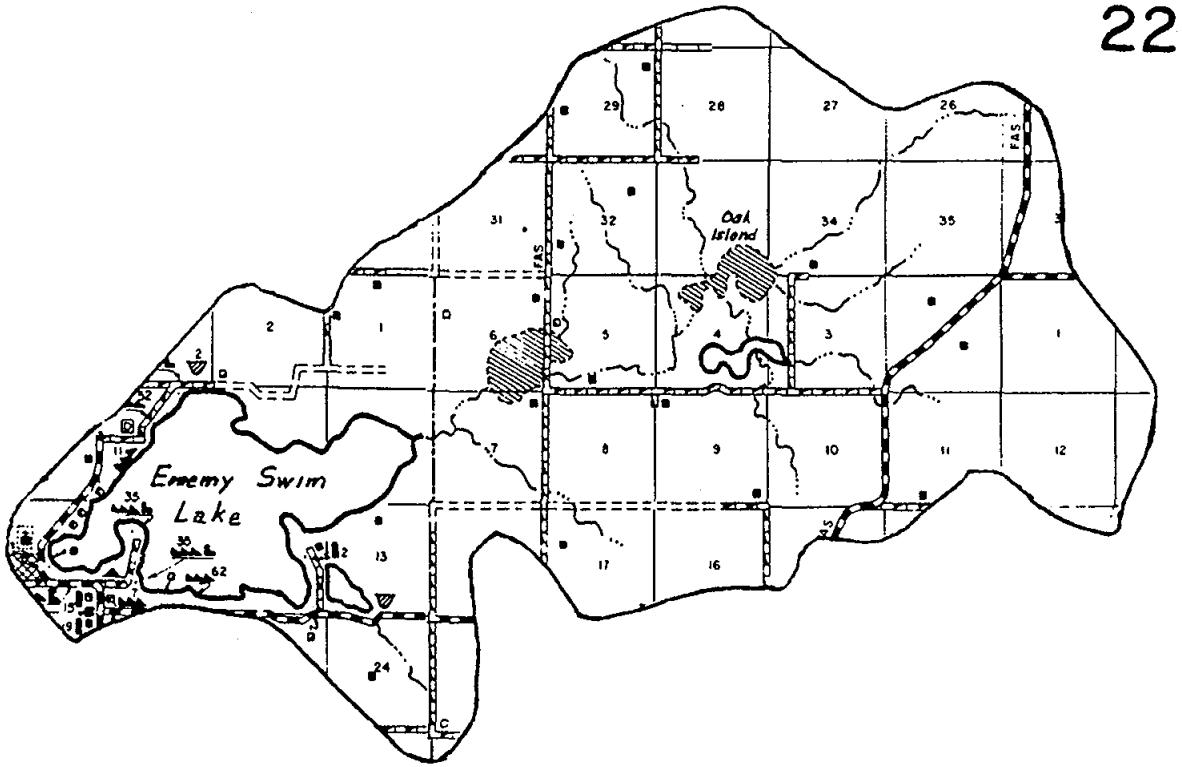
ENEMY SWIM LAKE 8/15/95

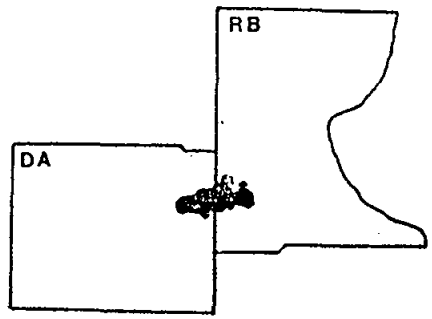
Dissolved Oxygen & Temperature Profile



Enemy Swim Lake

22,310 acres

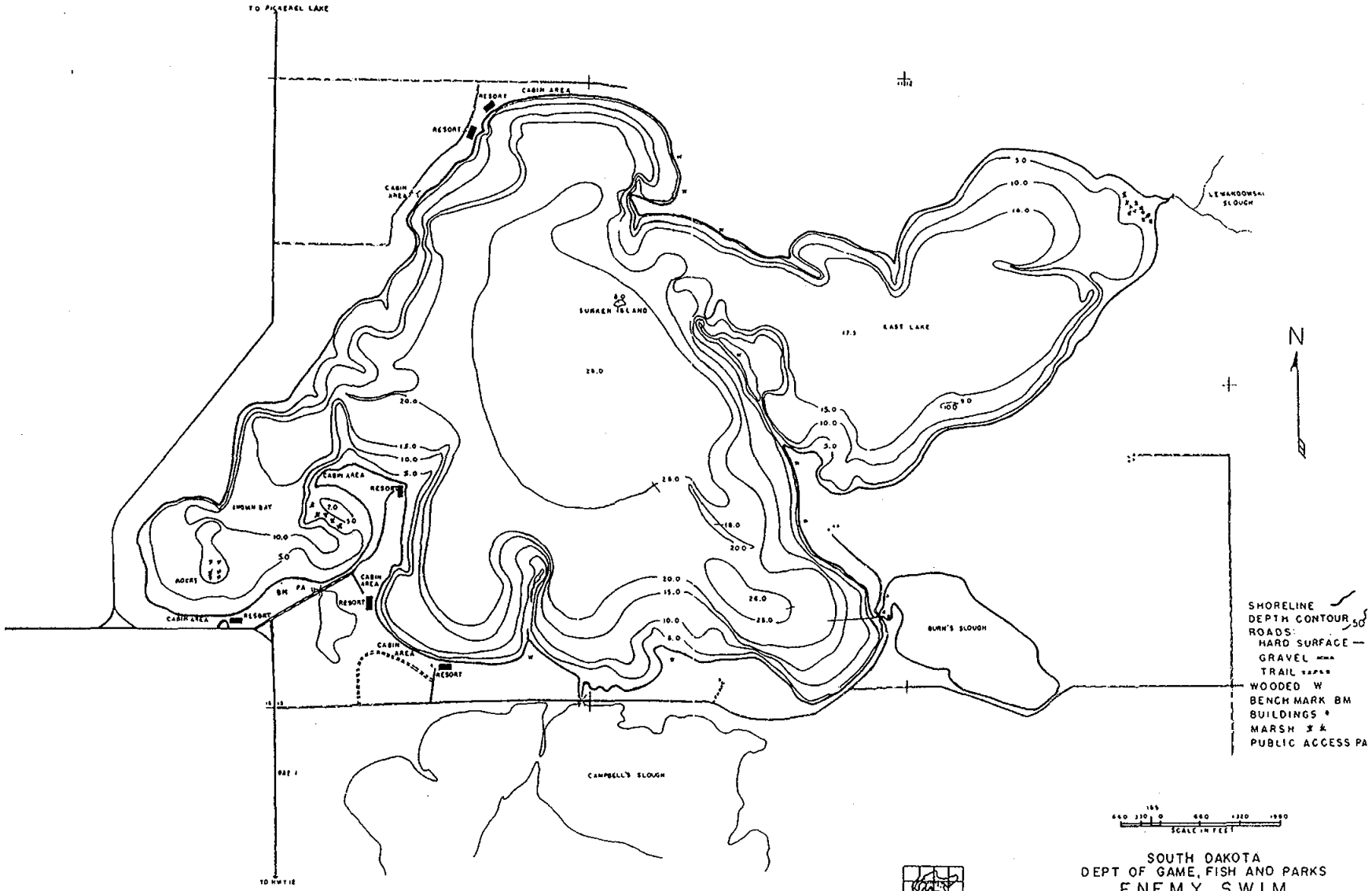


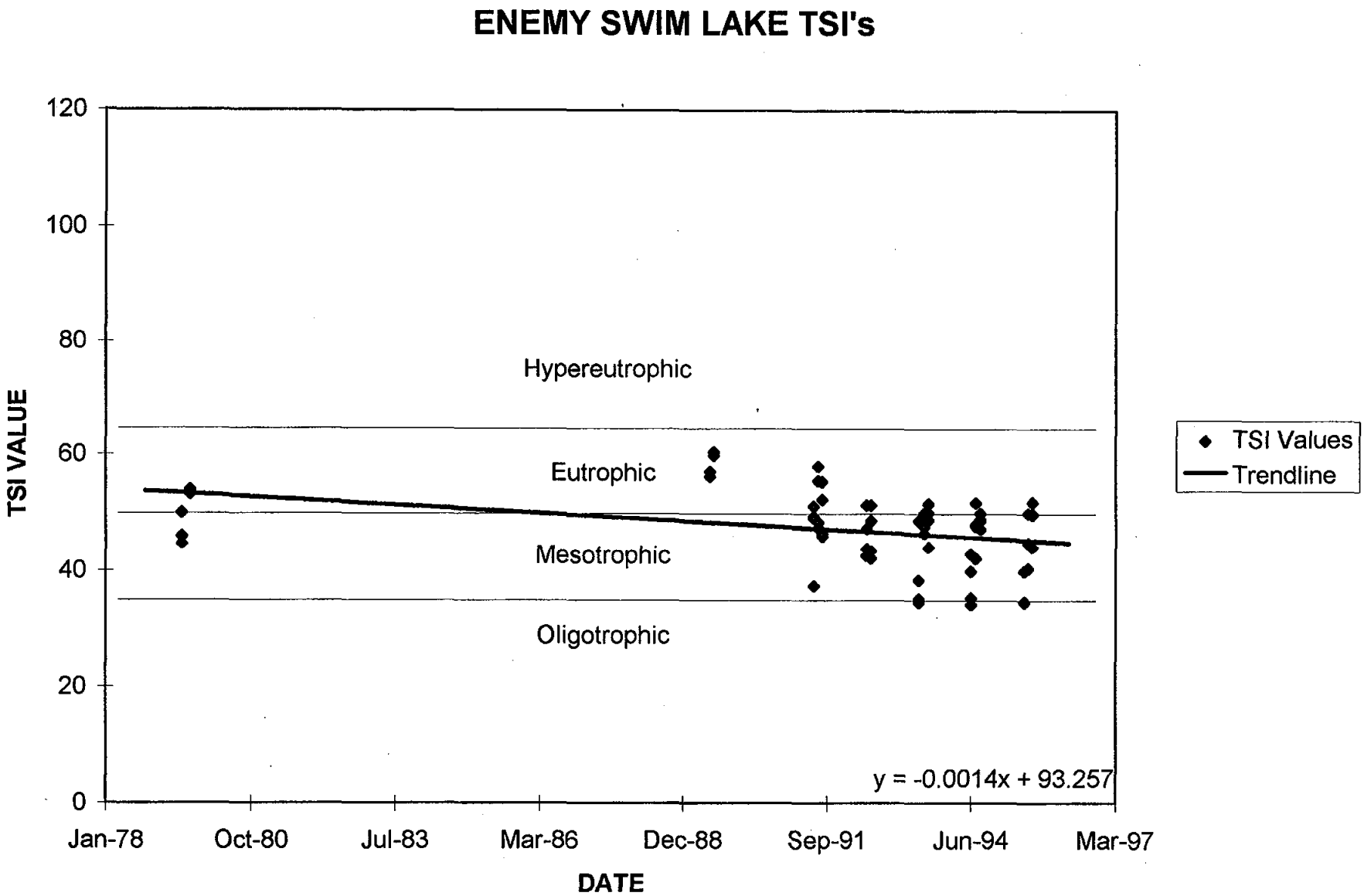


Scale

0 1 2 3 4 5 6 7 8 9 10

Miles


TO PICKEREL LAKE
RESORT
CABIN AREA
CABIN AREAS
LEWANDOWSKI SLOUGH
SUNKEN ISLAND
EAST LAKE
N
SHORELINE
DEPTH CONTOUR 50
ROADS:
HARD SURFACE
GRAVEL
TRAIL
WOODED W
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA
BROWN BAY
BM PA
BURN'S SLOUGH
CAMPBELL'S SLOUGH
TO HWY 12
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
ENEMY SWIM
DAY COUNTY
WATER STAGE FULL
PLANIMETER ACRES 2146.4
AERIAL PHOTO DATE: 1958
FIELD WORK DATE: 9-25-63
DRAWN BY: L.P. WJM DATE 1-7-64
SEC 12 13 14 15 16 10 11
TWP 123 N
RGE 53 W
BM-50'


ENEMY SWIM LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0014x + 93.257
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE EUREKA (East Lake)

County: Mc Pherson
Latitude: 45 deg. 46 min. 21 sec. N
Longitude: 99 deg. 37 min. 44 sec. W
Area: 40.00 A (11.4 ha)
Maximum Depth: 15 ft (4.57 m)
Volume:
Origin of Basin: Man-made
Township: 127 N
Range: 73 W
Section (s): 35
Shoreline L:
Mean Depth: 7.5 ft (2.29 m)
Watershed/Lake Area:
Thermal Stratification: No
Major Inflows (named or permanent streams): City of Eureka storm sewers
Outlet: None

Lake Use
Beneficial Use Classification:
(4) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: NA
Ownership Status:
Public Interest: City of Eureka

	1994	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	20.41
Air Temperature (°C)	4	14.75
Secchi Disk Depth (meters)	2	0.79
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	4	9.99
Lab pH (su)	-	-
Field pH (su)	4	8.46
Total Alkalinity (mg/l)	2	111
Total Solids (mg/l)	4	3,231
Dissolved Solids (mg/l)	4	3,218
Suspended Solids (mg/l)	4	13
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.30
Nitrate + Nitrite Nitrogen (mg/l)	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	1.64
Total Phosphorus (mg/l)	4	0.047
Total Dissolved Phosphorus (mg/l)	4	0.023
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	3	22.00

Year	1994
TSI Values -- Mean:	61.26
Secchi Disk	63.36
Total Phosphorus	59.54
Chlorophyll *a*	60.89

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA
Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

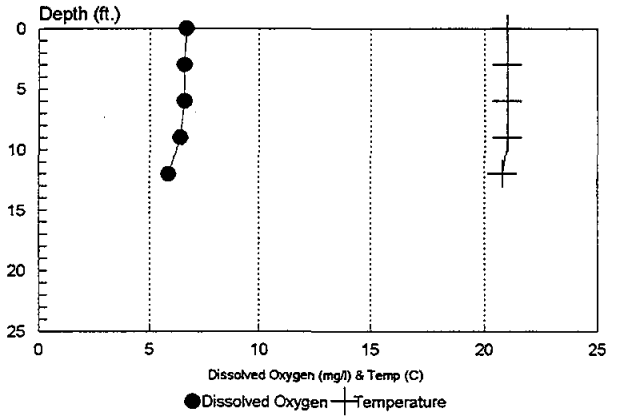
Watershed Area: NA

Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

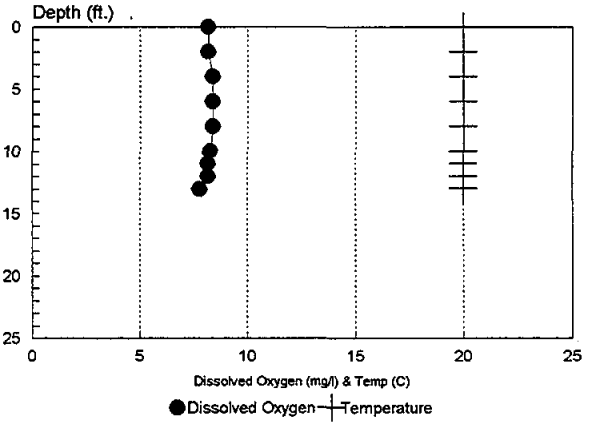
LAKE EURKA 6/29/94

Dissolved Oxygen & Temperature Profile

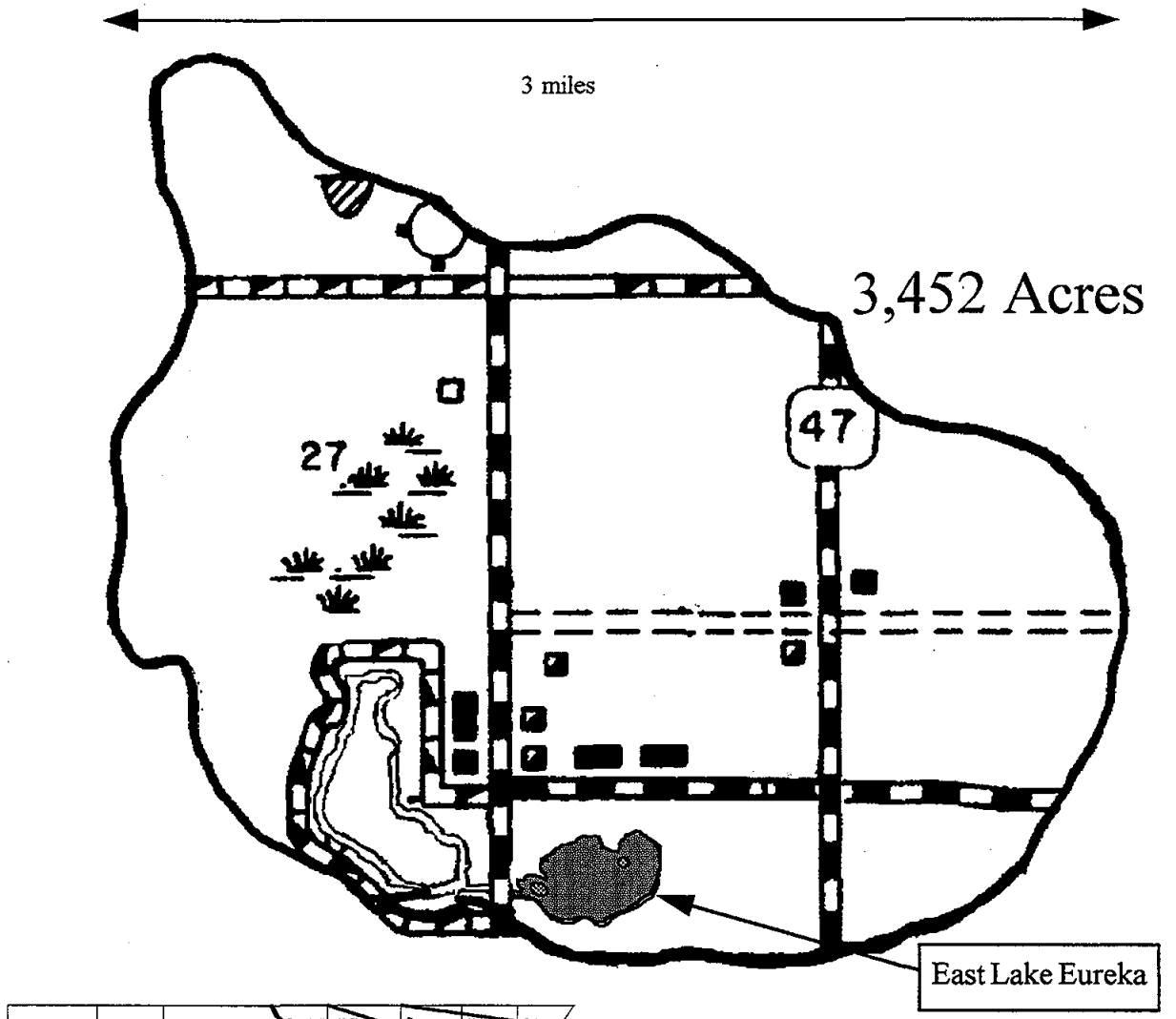


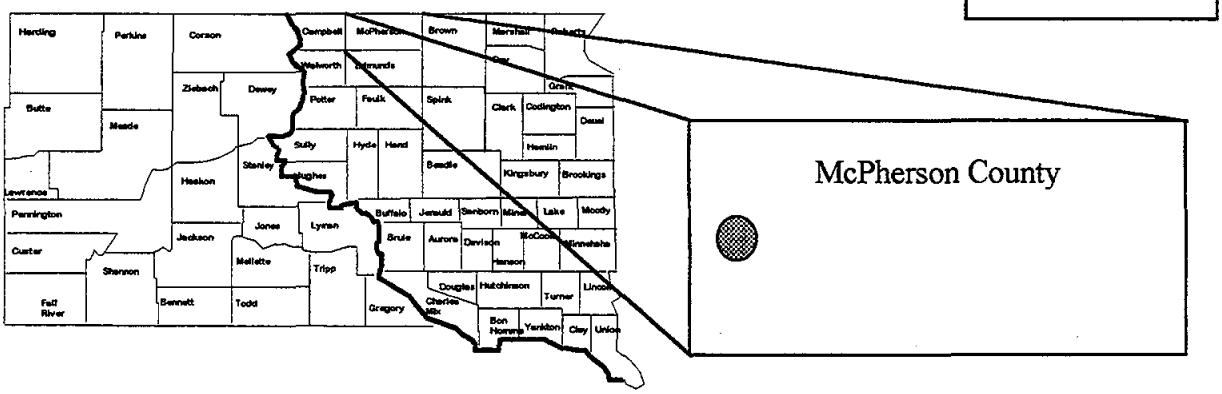
LAKE EURKA 8/30/94

Dissolved Oxygen & Temperature Profile



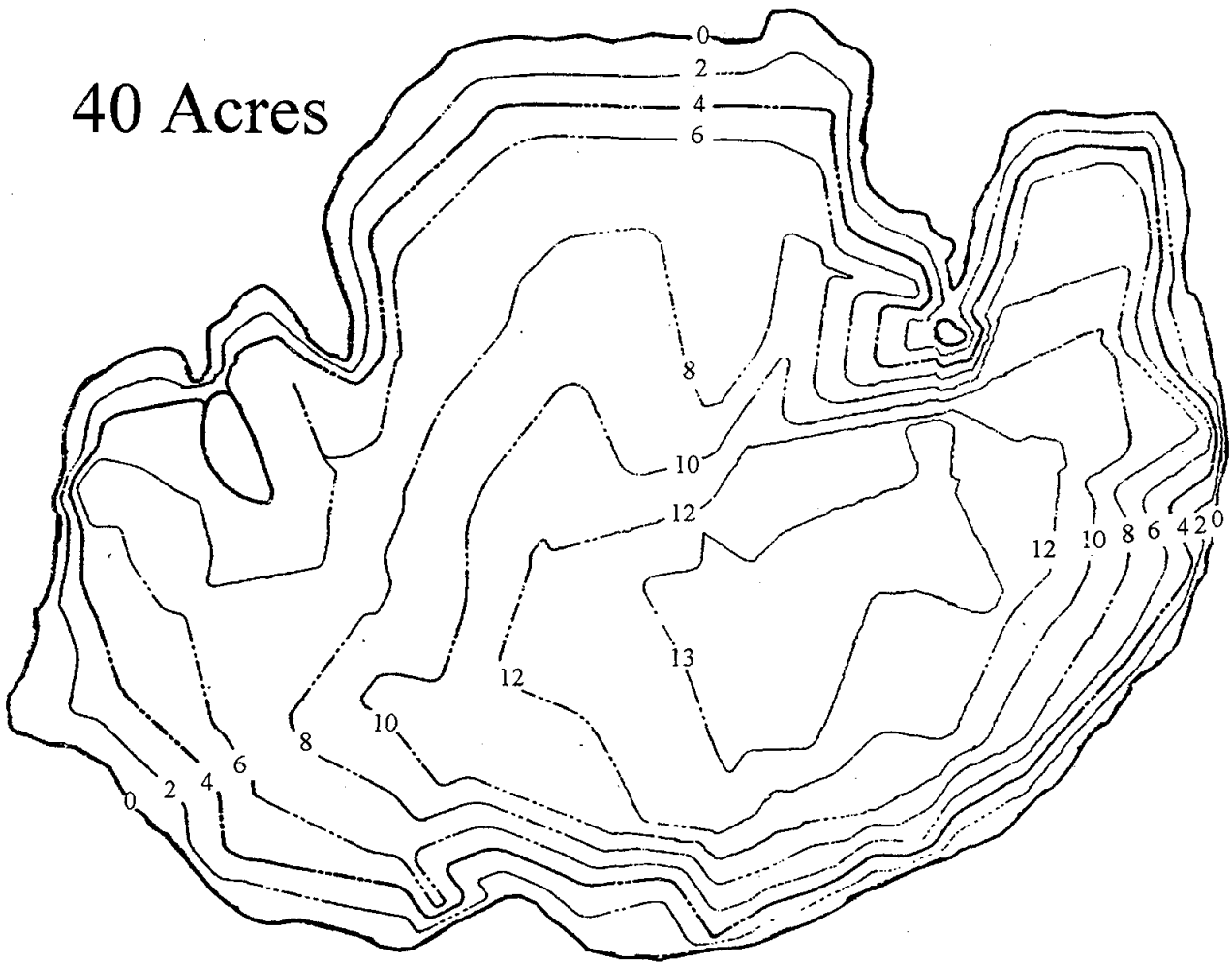
Lake Eureka
(East Lake)



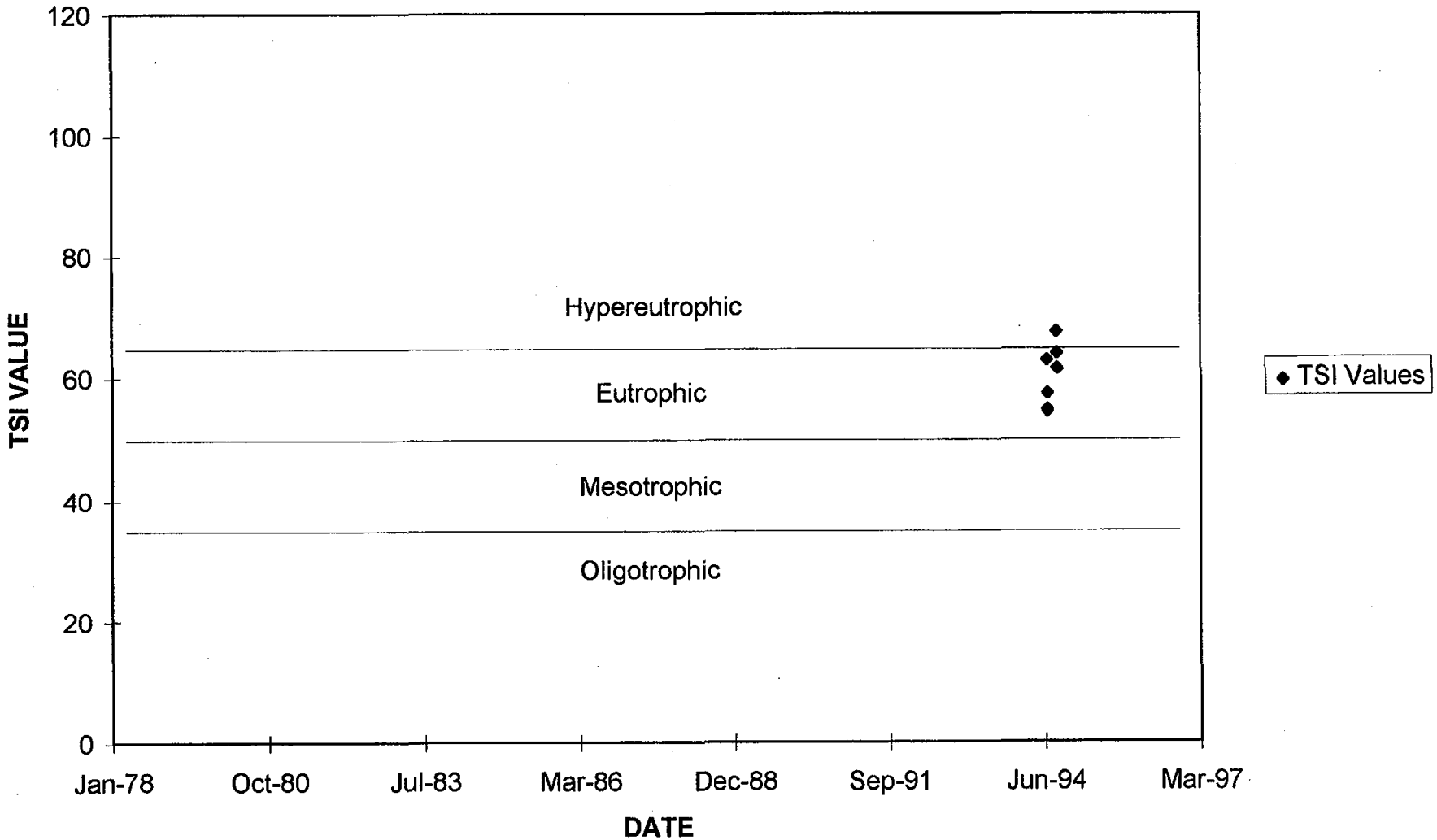


Lake Eureka
(East Lake)

40 Acres



LAKE EUREKA TSI's



FATE DAM

County: Lyman
Latitude: 43 deg. 56 min. 36 sec. N
Longitude: 100 deg. 00 min. 30 sec. W
Area: 150 A (60.7 ha)
Maximum Depth: 25 ft (7.6 m)
Volume: 1500 acre-ft (1.85 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Nail Creek
Outlet: Medicine Creek Outlet

Township: 106N
Range: 77W
Section(s): 36
Shoreline L: 3.9 mi (6.3 km)
Mean Depth: 10 ft (3.0 m)
Watershed/Lake Area: 113
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

EstimatedPopulation within 65-mile Radius: 45,482
Ownership Status: State owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.95	4	18.78	4	22.87
Air Temperature (°C)	4	23.58	4	22.00	4	22.50
Secchi Disk Depth (meters)	2	0.23	2	0.75	2	0.99
Conductivity (cond/25° C)	4	648	2	345	-	-
Turbidity (NTU)	-	-	-	-	2	7.28
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.28	4	7.62	4	8.20
Total Alkalinity (mg/l)	4	122	4	148	4	134
Total Solids (mg/l)	4	507	4	238	4	301
Dissolved Solids (mg/l)	4	473	4	215	4	291
Suspended Solids (mg/l)	4	34	4	23	4	11
Volatile Suspended Solids (mg/l)	-	-	2	2	-	-
Ammonia Nitrogen (mg/l)	4	0.06	4	0.08	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.33	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.78	4	0.67	4	0.58
Total Phosphorus (mg/l)	4	0.200	4	0.167	4	0.055
Total Dissolved Phosphorus (mg/l)	-	-	4	0.064	4	0.020
Ortho Phosphate as P (mg/l)	4	0.020	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	3.35	2	10.56

Year	1989	1991	1994
TSI Values -- Mean:	83.44	59.62	58.73
Secchi Disk	81.29	64.21	60.14
Total Phosphorus	85.60	72.22	62.35
Chlorophyll *a*		42.43	53.68

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 40-50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

	June 15, 1989		August 3, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Cryptomonas sp. #	15	281	-	-
Algae (other)	3	56	87	5,237
Algae (flagellate)	2	37	14	843
Schizothrix	2	37	38	2,287
Green Algae (other)	1	19	5	301
Melosira granulata	-	-	18	1,083
Anabaena	-	-	16	963
Schizothrix tenerrima	-	-	14	843
Blue-green (other)	-	-	10	602
Lyngbya Digetii	-	-	7	421
Tetrahedron	-	-	6	361
Aphanocapsa	-	-	5	301
Scenedesmus	-	-	4	241
Actinastrum	-	-	3	181
Dactylococcopsis	-	-	3	181
Nitzschia	-	-	3	181
Cryptomonas	-	-	2	120
Franceia	-	-	1	60
Chroococcus	-	-	1	60
Total	23	431	237	14,266

Watershed Description

Watershed Area: 16,957 A (6,862 ha)
Soil Associations within Watershed

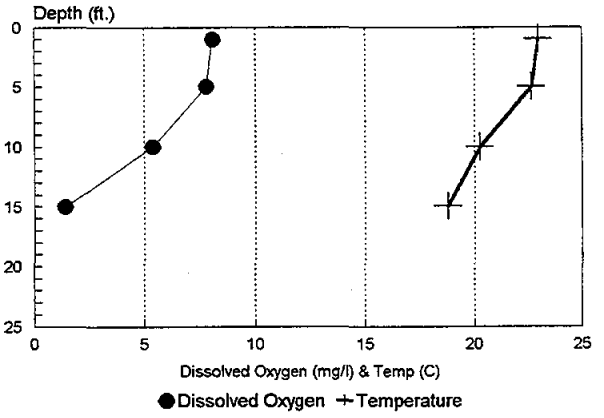
Association	Area (A)	% of Total
NT-PS	15,092	89
NT-Z3	1,865	11

NT-PS Opal-Promise: Well drained, clayey soils that are moderately deep and deep over shale.

NT-Z3 Opal-Sansarc: Well drained, sloping to moderately steep clayey soils that are deep and shallow over shale.

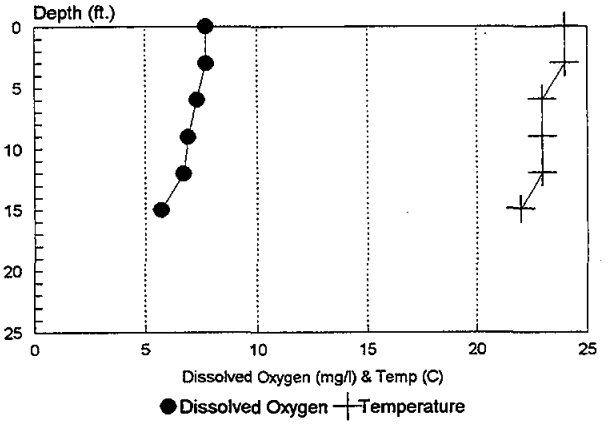
FATE DAM 6/27/79

Dissolved Oxygen & Temperature Profile



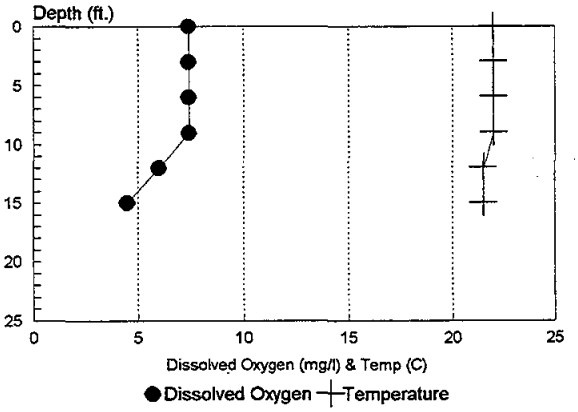
FATE DAM 6/14/94

Dissolved Oxygen & Temperature Profile

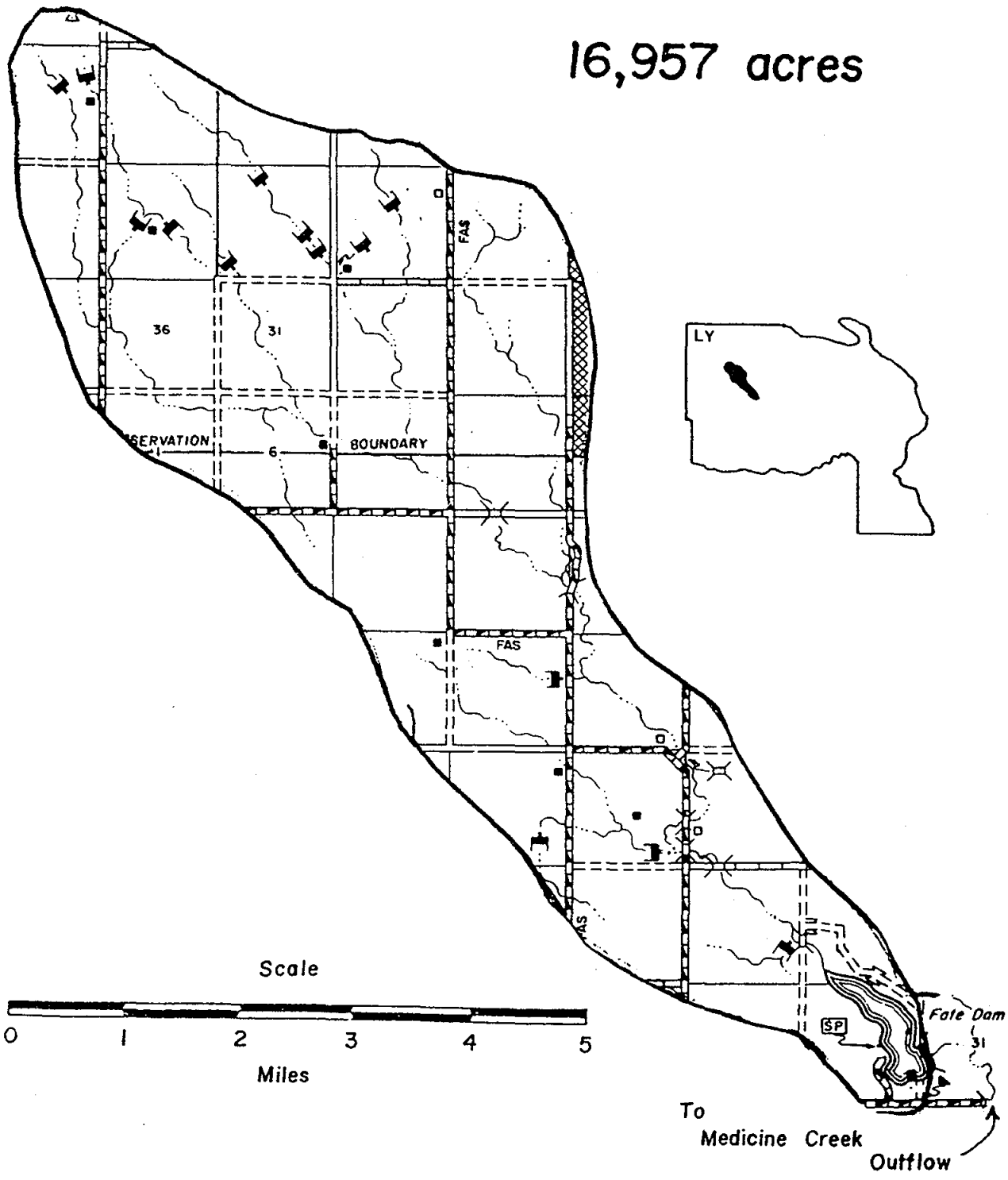


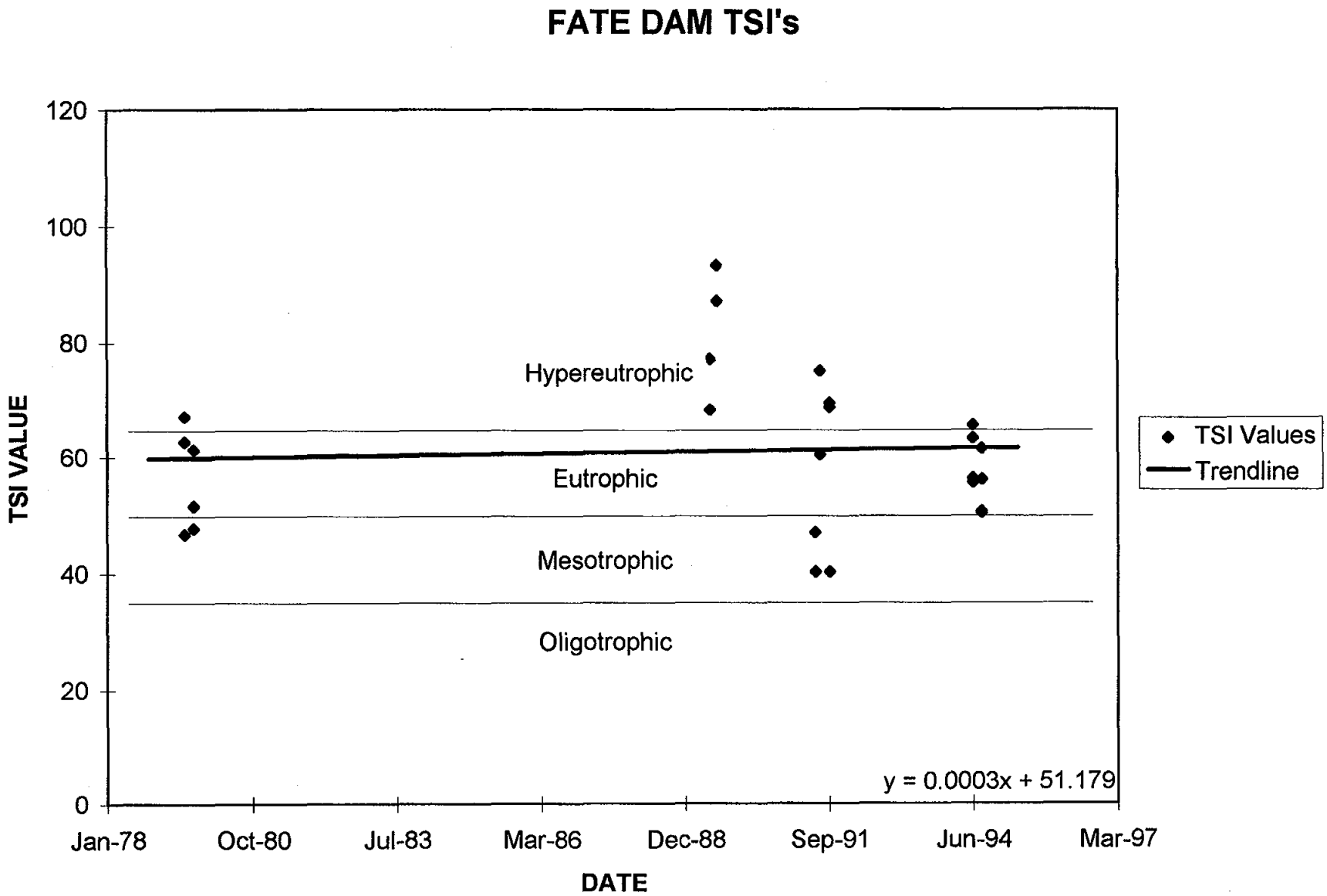
FATE DAM 8/16/94

Dissolved Oxygen & Temperature Profile



Fate Dam


16,957 acres
LY
36
31
6
SERVATION
BOUNDARY
FAS
FAS
FAS
Scale
0
1
2
3
4
5
Miles
SP
Fate Dam
31
To
Medicine Creek
Outflow


FATE DAM TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0003x + 51.179
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE FAULKTON

County: Faulk
Latitude: 45 deg. 01 min. 56 sec. N
Longitude: 99 deg. 10 min. 32 sec. W
Area: 92.8 A (37.6 ha)
Maximum Depth: 24 ft (7.3 m)
Volume: 867.2 acre-ft ($1.07x10^6 m^3$)
Origin of Basin: impoundment
Township: 118N
Range: 69W
Section(s): 17
Shoreline L: 4.7 mi (7.6 km)
Mean Depth: 9.3 ft (2.8 m)
Watershed/Lake Area: 1,094
Thermal Stratification: yes
Major Inflows (named or permanent streams): South Fork Snake Creek
Outlet: South Fork Snake Creek

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 69,174
Ownership Status: State owned
Public Interest: Faulk County Lakes Association

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.25	4	22.15	4	18.79
Air Temperature (°C)	4	24.94	4	25.90	4	19.50
Secchi Disk Depth (meters)	1	0.79	2	0.94	2	0.75
Conductivity (cond/25° C)	4	380	2	256	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	2	8.50	4	7.40	4	8.13
Total Alkalinity (mg/l)	4	114	4	104	4	165
Total Solids (mg/l)	4	273	4	214	4	258
Dissolved Solids (mg/l)	4	261	4	202	4	254
Suspended Solids (mg/l)	4	13	4	12	4	4
Volatile Suspended Solids (mg/l)	-	-	2	9	-	-
Ammonia Nitrogen (mg/l)	4	0.25	4	0.18	4	0.09
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.31	4	1.07	4	1.34
Total Phosphorus (mg/l)	4	0.731	4	0.934	4	0.682
Total Dissolved Phosphorus (mg/l)	-	-	4	0.800	4	0.583
Ortho Phosphate as P (mg/l)	4	0.598	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	29.48	2	7.37

Year	1989	1991	1992
TSI Values -- Mean:	80.36	75.58	70.63
Secchi Disk	63.36	60.82	64.15
Total Phosphorus	97.36	102.16	97.57
Chlorophyll *a*		63.76	50.16

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: Nearly 100%
Type of Vegetation: cattail and flowering rush

Floating Leaved and Submergent Plant Species Identified: Butomus umbellatus, Potamogeton zosteriformes, Potamogeton pectinatus, Lemna spp., and Ceratophyllum demersum

Algal Species and Densities

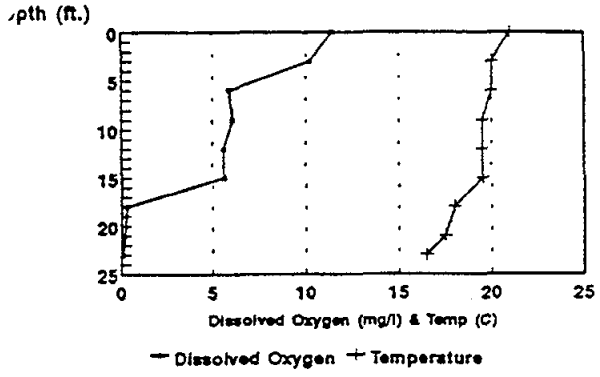
Taxa	June 24, 1989 Number	June 24, 1989 Units/ml	September 7, 1989 Number	September 7, 1989 Units/ml
Fragilaria capucina	54	2,091	-	-
Cryptomonas	50	1,936	40	2,053
Algae (flagellate)	48	1,859	6	308
Anabaena	47	1,820	-	-
Algae (other)	41	1,588	141	7,235
Aphanizomenon flos-aquae	17	658	-	-
Green Algae (other)	8	310	44	2,258
Melosira granulata	8	310	1	51
Diatom (pennate)	8	310	-	-
Asterionella formosa	5	194	-	-
Scenedesmus	3	116	5	257
Diatom (centric)	3	116	1	51
Gomphosphaeria	2	77	-	-
Aphanocapsa	1	39	1	51
Chroococcus	1	39	-	-
Ceratium hirundinella	1	39	-	-
Kirchneriella	1	39	-	-
Dinobryon	1	39	1	51
Cryptomonas sp. #1	1	39	1	51
Oocystis	-	-	18	924
Dactylococcopsis	-	-	12	616
Blue-green (other)	-	-	10	513
Stephanodiscus niagarae	-	-	8	411
Marssoniella	-	-	2	103
Mallomonas	-	-	2	103
Cryptomonas ovata	-	-	2	103
Lagerheimia	-	-	2	103
Staurastrum	-	-	1	51
Closterium	-	-	1	51
Green Algae (other)	-	-	1	51
Total	300	11,617	300	15,394

Watershed Description

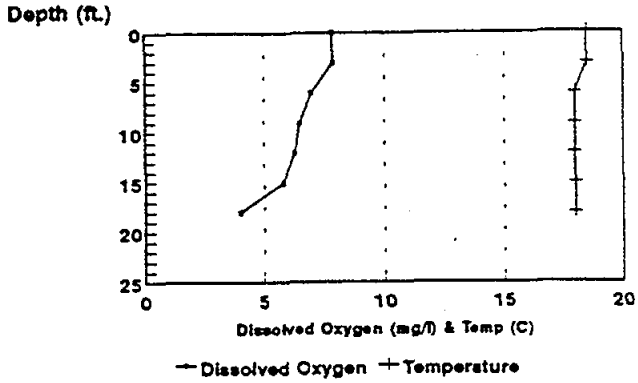
Watershed Area: 101,489 A (41,073 ha)
Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

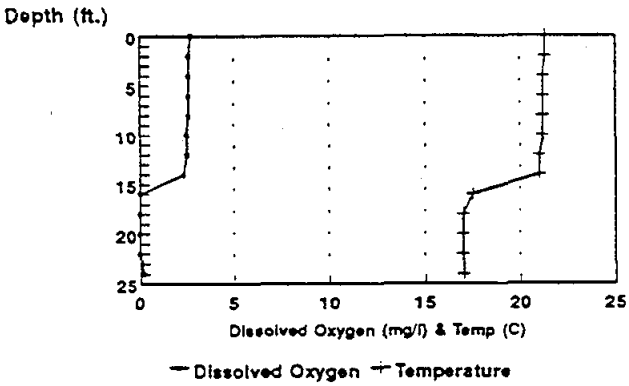
LAKE FAULKTON 8/5/92
Dissolved Oxygen & Temperature Profile



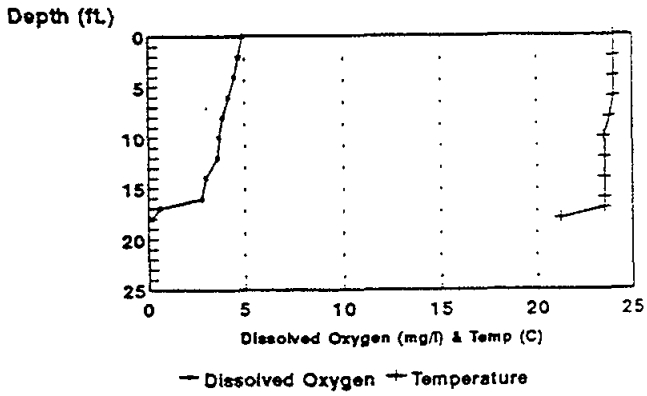
LAKE FAULKTON 9/3/92
Dissolved Oxygen & Temperature Profile



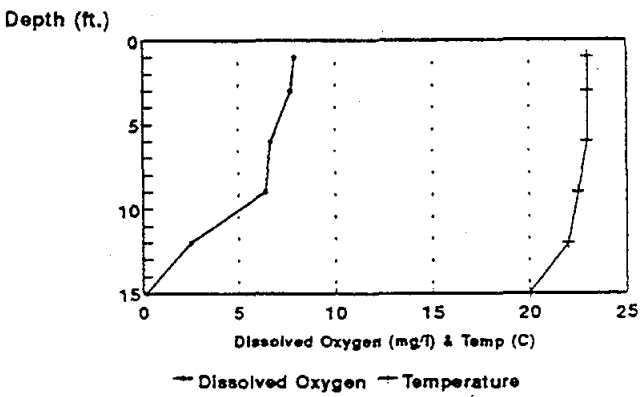
LAKE FAULKTON 6/25/91
Dissolved Oxygen & Temperature Profile



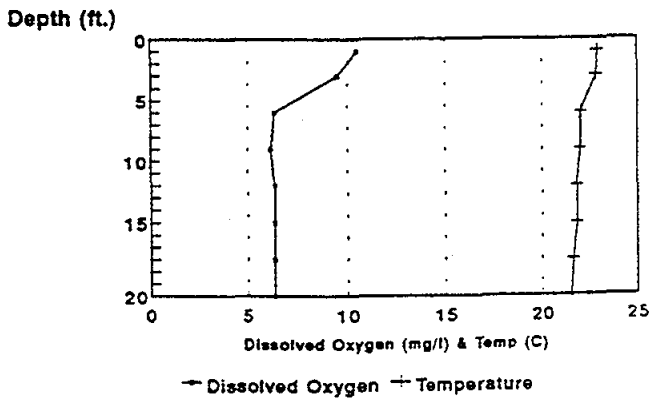
LAKE FAULKTON 8/27/91
Dissolved Oxygen & Temperature Profile



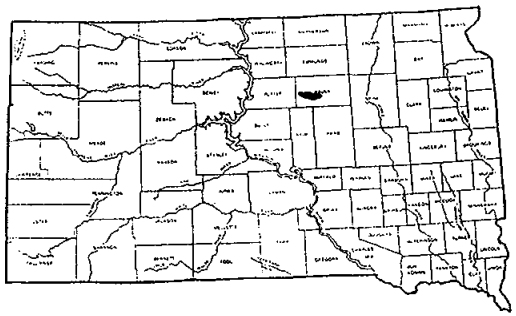
Lake Faulkton, 7/24/89
Dissolved Oxygen & Temperature Profile



Lake Faulkton, 9/7/89
Dissolved Oxygen & Temperature Profile



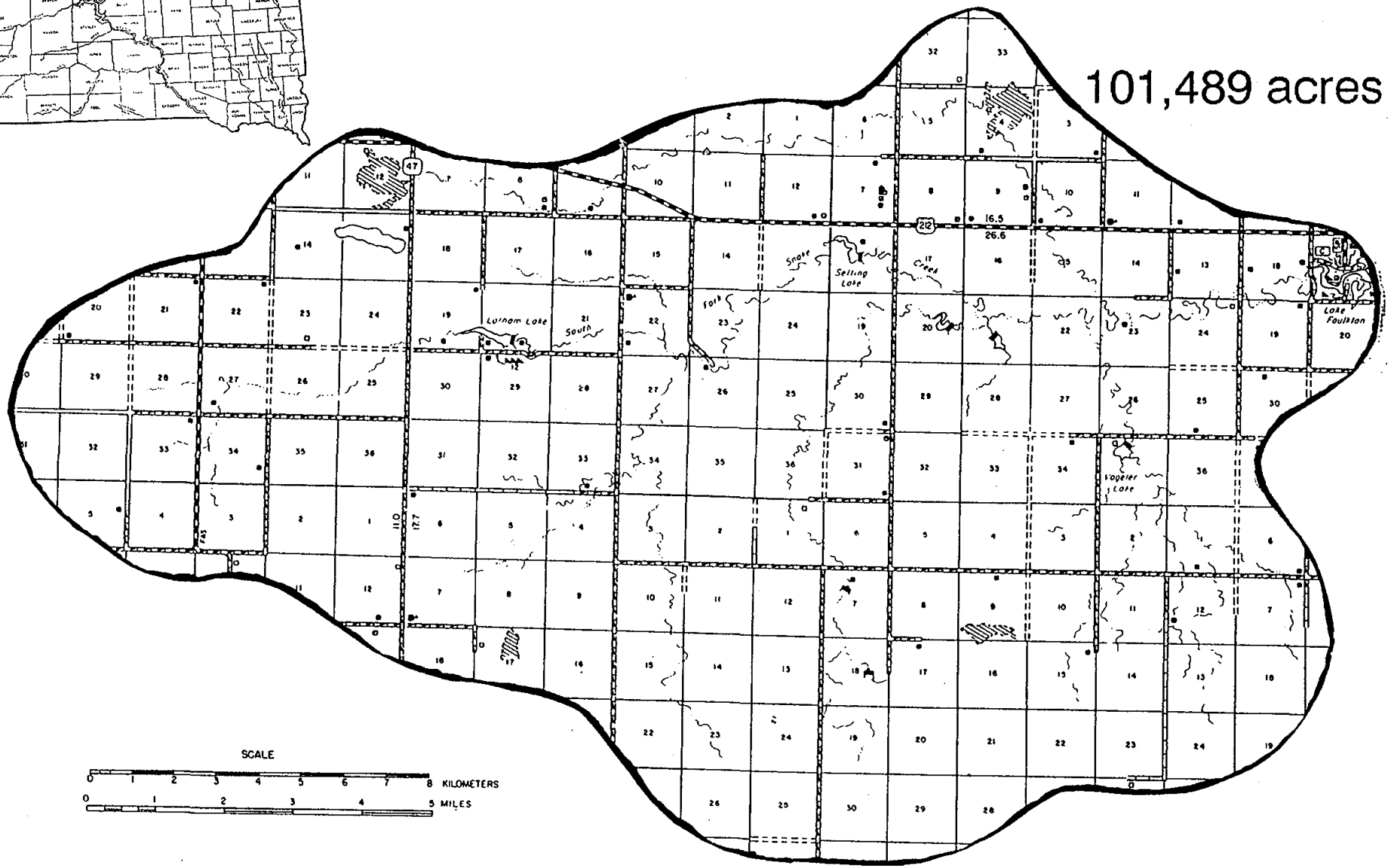
SOUTH DAKOTA



Lake Faulkton

101,489 acres

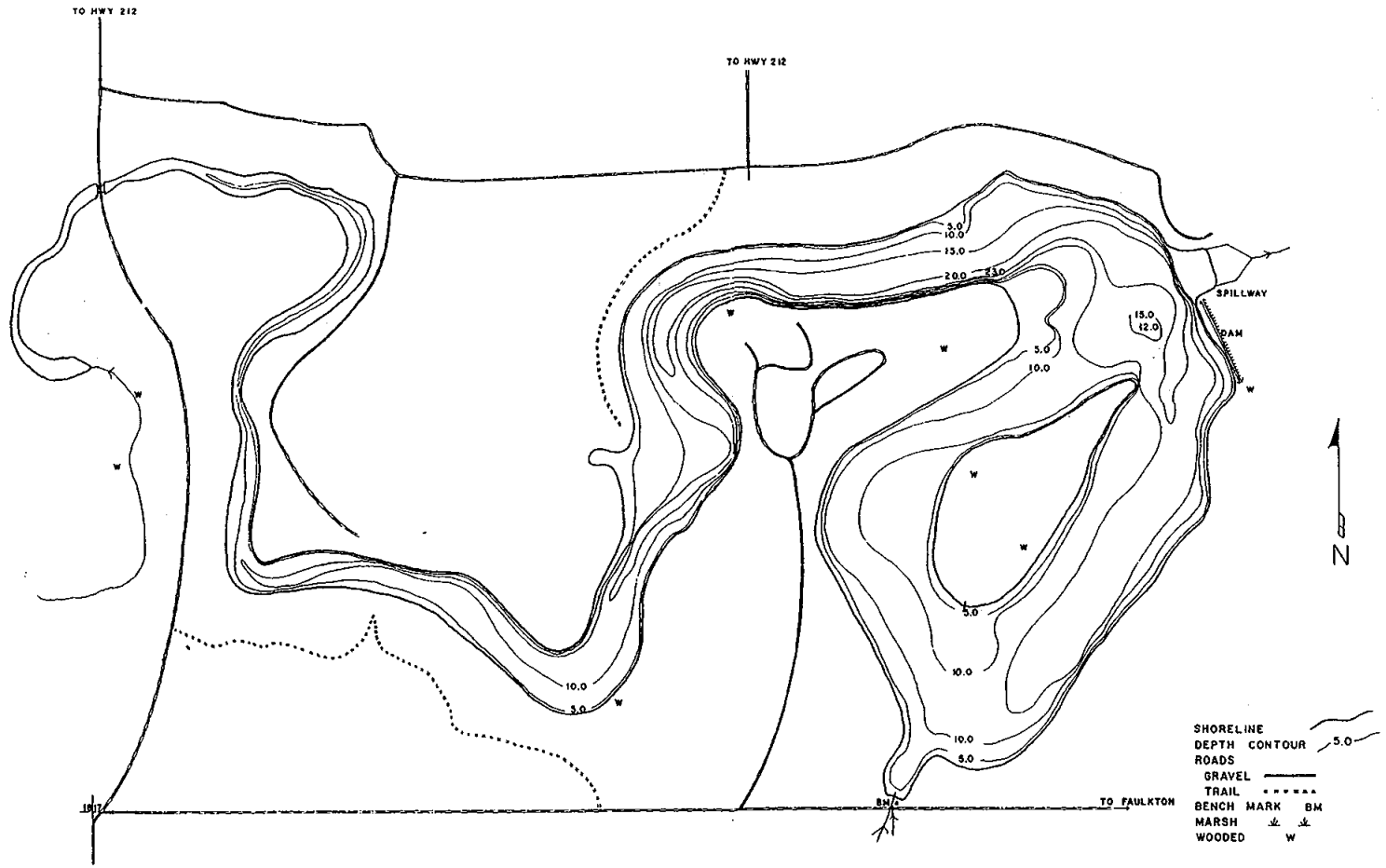
292



SCALE

0 1 2 3 4 5 6 7 8 KILOMETERS

0 1 2 3 4 5 MILES

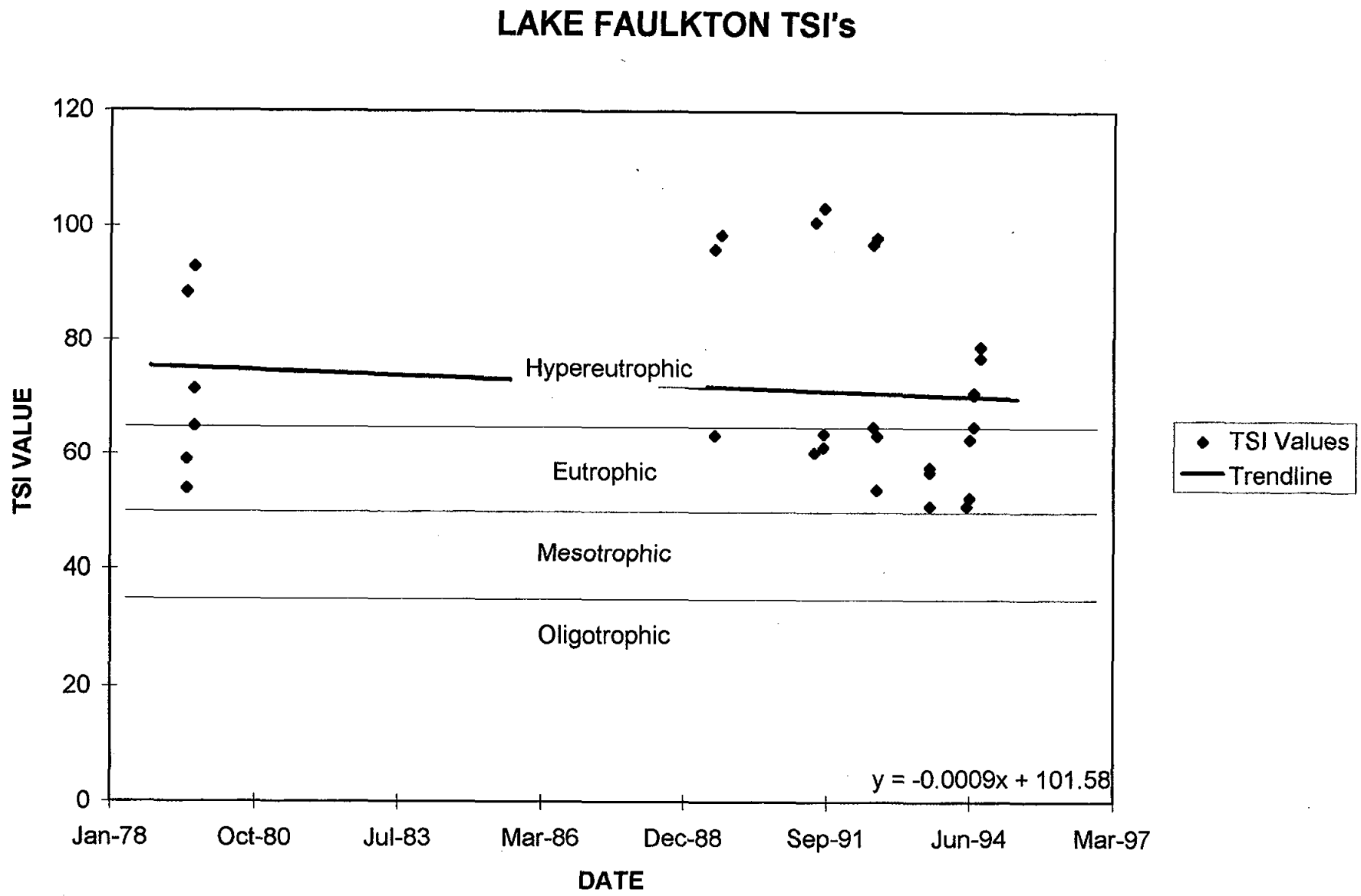


CONTOUR	ACRES	AVE. DEPTH	ACRE FEET
0-5	13.0	2.5	32.5
5-10	14.2	7.5	106.5
10-15	14.5	12.8	186.2
15-20	10.3	17.5	180.3
20-25	2.6	21.5	23.0
TOTALS	54.7	8.7	531.8

SCALE IN FEET

SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
FAULKTON LAKE
FAULK COUNTY
WATER STAGE PLANIMETER
ACRES 54.7

AERIAL PHOTO DATE: 1957
FIELD WORK DATE: 8-4-64
DRAWN BY: L.P. DR DATE: 6-7-65
SEC. 17, 18 TWP. 118N RGE. 65 W
6TH P.M.


LAKE FAULKTON TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0009x + 101.58
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

FISH LAKE

County: Deuel
Latitude: 44 deg. 36 min. 06 sec. N
Longitude: 96 deg. 28 min. 24 sec. W
Area: 738 A (298.6 ha)
Maximum Depth: 8 ft (2.4 m)
Volume: 2952 acre-ft ($3.64x10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 113N
Range: 47W
Section(s): 8, 9, 16, 17
Shoreline L: 6.1 mi (9.8 km)
Mean Depth: 4 ft (1.2 m)
Watershed/Lake Area: 34
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Deuel County Lakes and Streams Association, Fish Lake Improvement Association

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.00	4	21.79	4	22.50
Air Temperature (°C)	4	24.44	4	20.90	4	23.75
Secchi Disk Depth (meters)	2	0.38	2	0.40	2	0.51
Conductivity (cond/25° C)	4	911	2	716	-	-
Turbidity (NTU)	-	-	-	-	4	18.69
Lab pH (su)	4	8.25	-	-	-	-
Field pH (su)	-	-	4	8.82	4	8.56
Total Alkalinity (mg/l)	4	189	4	169	4	217
Total Solids (mg/l)	4	833	4	576	4	511
Dissolved Solids (mg/l)	4	816	4	540	4	487
Suspended Solids (mg/l)	4	17	4	36	4	25
Volatile Suspended Solids (mg/l)	-	-	2	10	-	-
Ammonia Nitrogen (mg/l)	4	0.09	4	0.29	4	0.06
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.38	4	0.15
Total Kjeldahl Nitrogen (mg/l)	4	2.02	4	2.05	4	1.45
Total Phosphorus (mg/l)	4	0.253	4	0.195	4	0.154
Total Dissolved Phosphorus (mg/l)	-	-	4	0.055	4	0.056
Ortho Phosphate as P (mg/l)	4	0.075	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	125.96	2	67.17

Year	1989	1993	1994
TSI Values -- Mean:	78.84	77.28	73.01
Secchi Disk	73.92	73.36	69.71
Total Phosphorus	83.75	80.48	77.46
Chlorophyll *a*		78.01	71.84

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 30%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus, P. pusillus, P. zosteriformis, Ceratophyllum demersum, and P. richardsonii

Algal Species and Densities

July 10, 1989

Taxa	Number	Units/ml
Aphanocapsa	149	16,036
Schizothrix	113	12,162
Merismopedia	14	1507
Algae (other)	6	646
Green Algae (other)	6	646
Blue-green (other)	5	538
Oocystis	3	323
Chroococcus	3	323
Melosira granulata	2	215
Lyngbya Diguetii	1	108
Glenodinium Gymnodinium	1	108
Nitzschia	1	108
Total	304	32,718

Watershed Description

Watershed Area: 25,131 A (10,170.5 ha)
Soil Associations within Watershed

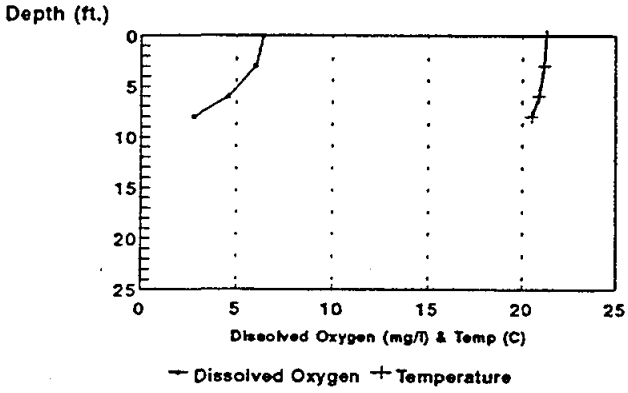
Association	Area (A)	% of Total
SJ-NL	12,163	48.4
FU-AA-PA	12,163	48.4
FU-BY	805	3

SJ-NL Singsaas-Oak Lake: Well drained and moderately well drained nearly level, to gently undulating silty and loamy soils.

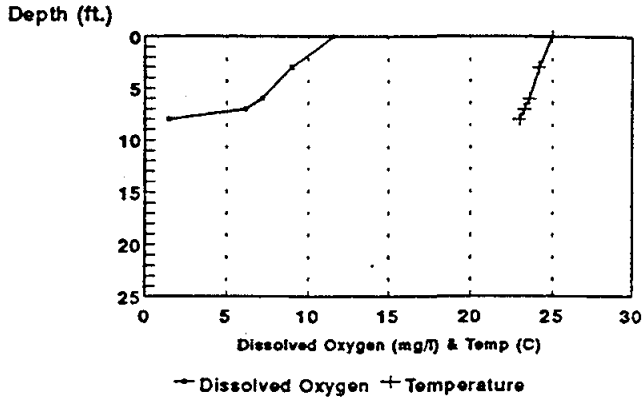
FU-AA-PA Forman-Aastad-Parnell: Well drained and moderately well drained, loamy soils formed in loamy glacial till; and very poorly drained silty soils in depressions.

FU-BY Forman-Buse: Well drained, undulating to hilly, loamy soils formed in loamy glacial till.

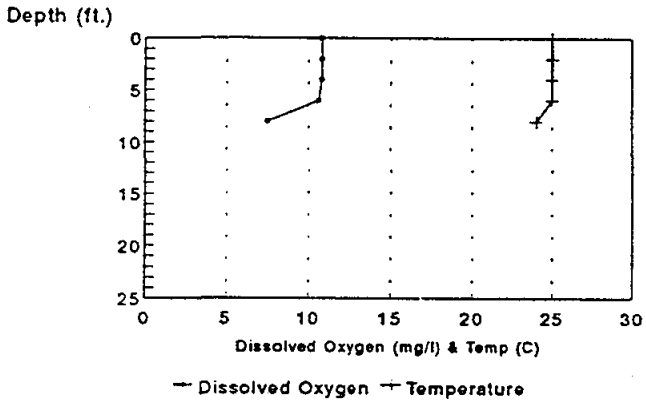
FISH LAKE 7/8/93
Dissolved Oxygen & Temperature Profile



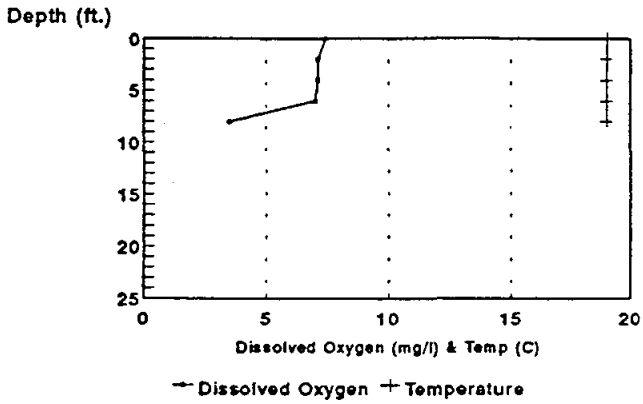
FISH LAKE 8/18/93
Dissolved Oxygen & Temperature Profile



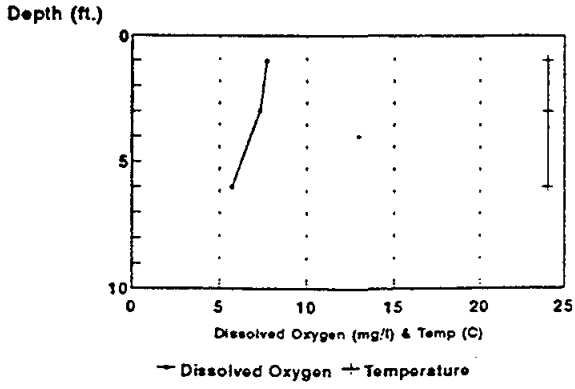
FISH LAKE 6/27/91
Dissolved Oxygen & Temperature Profile



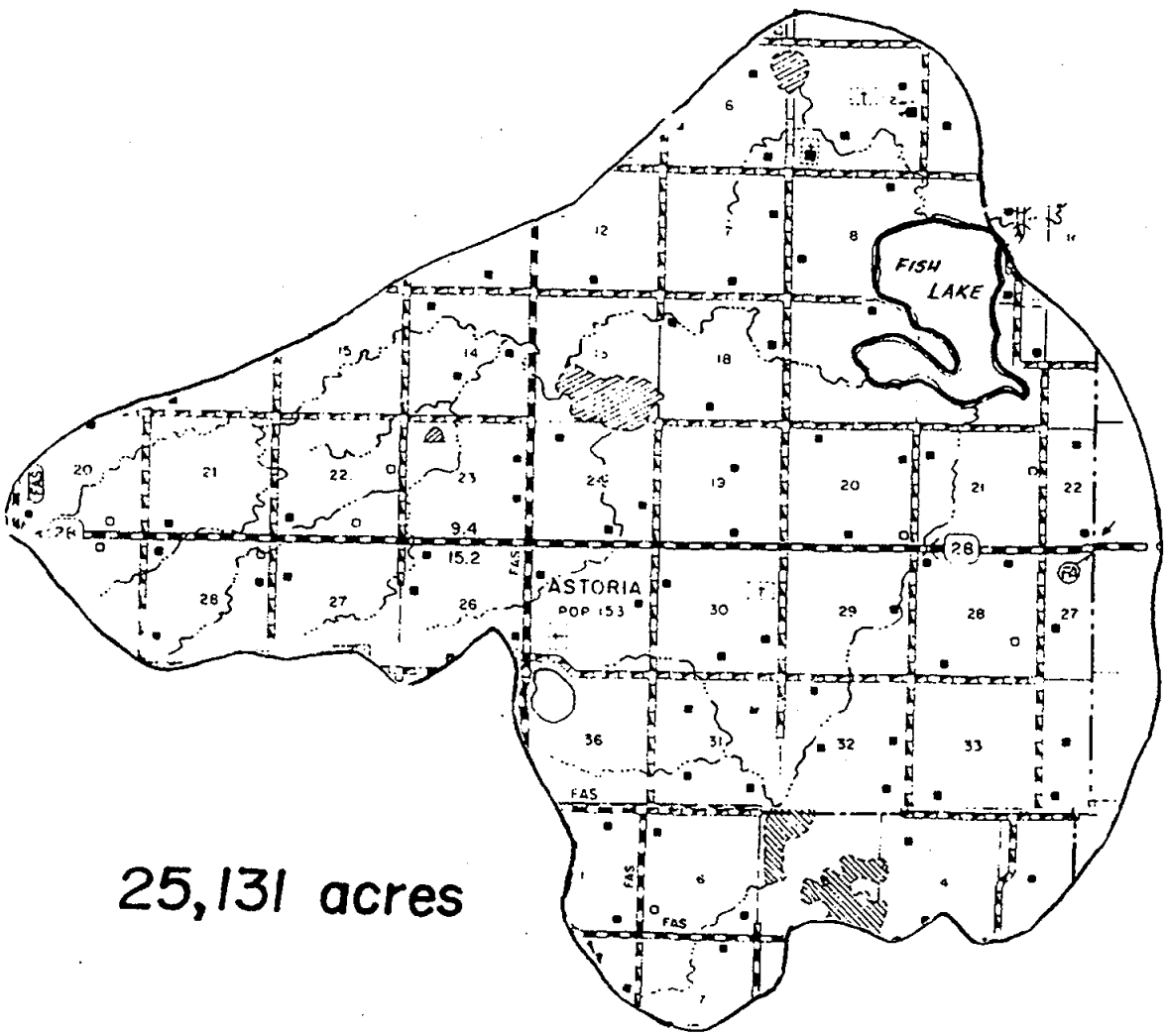
FISH LAKE 9/12/91
Dissolved Oxygen & Temperature Profile



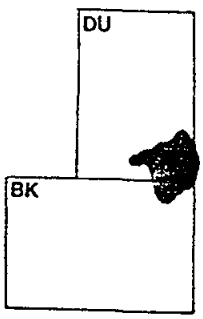
Fish Lake, 8/1/89
Dissolved Oxygen & Temperature Profile

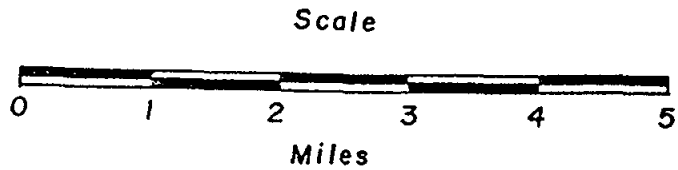


Fish Lake

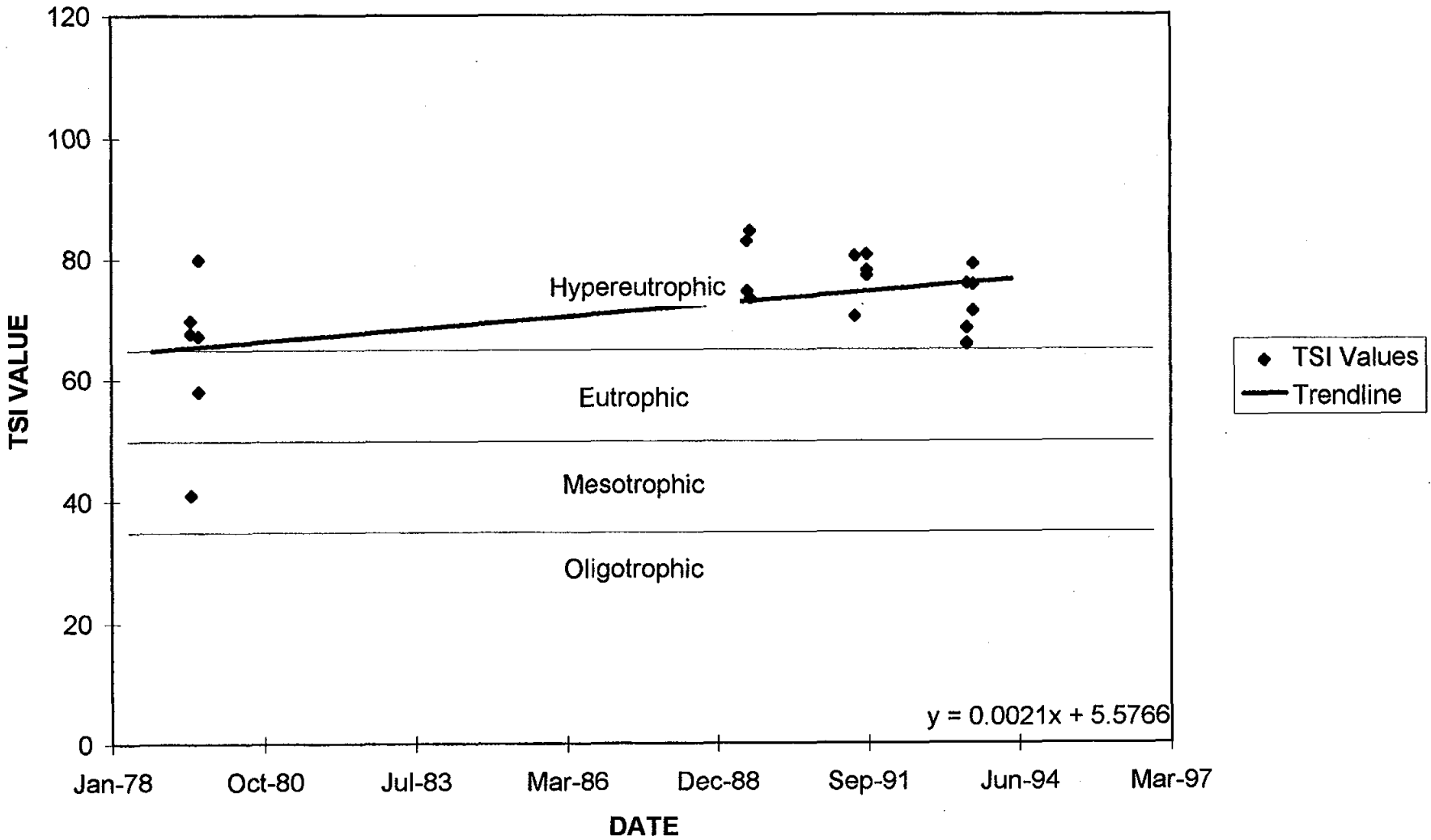


25,131 acres





FISH LAKE TSI's



FLAT CREEK LAKE

County: Perkins
Latitude: 45 deg. 47 min. 02 sec. N
Longitude: 102 deg. 10 min. 23 sec. W
Area: 203 A (82.2 ha)
Maximum Depth: 24 ft (7.3 m)
Volume: 1,610 acre-ft ($1.98x10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Flat Creek
Outlet: Flat Creek

Township: 21N
Range: 16E
Section(s): 20, 21
Shoreline L: 4.2 mi (6.7 km)
Mean Depth: 7.9 ft (2.4 m)
Watershed/Lake Area: 251
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 24,060
Ownership Status: State owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.45	2	21.00	4	21.40
Air Temperature (°C)	4	16.61	2	15.00	4	28.00
Secchi Disk Depth (meters)	2	0.41	1	0.27	2	1.19
Conductivity (cond/25° C)	4	2,202	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.73	2	9.04	4	8.45
Total Alkalinity (mg/l)	4	302	2	339	4	315
Total Solids (mg/l)	4	1,764	2	2,044	4	1,561
Dissolved Solids (mg/l)	4	1,742	2	1,965	4	1,548
Suspended Solids (mg/l)	4	23	2	79	4	13
Volatile Suspended Solids (mg/l)	-	-	2	37	-	-
Ammonia Nitrogen (mg/l)	4	0.26	2	0.03	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	2	0.60	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.86	2	2.19	4	1.33
Total Phosphorus (mg/l)	4	0.179	2	0.237	4	0.083
Total Dissolved Phosphorus (mg/l)	-	-	2	0.063	4	0.020
Ortho Phosphate as P (mg/l)	4	0.012	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	42.88	2	30.24

Year	1989	1991	1994
TSI Values -- Mean:	75.39	76.58	62.86
Secchi Disk	72.89	78.66	57.46
Total Phosphorus	77.90	83.63	67.10
Chlorophyll *a*		67.44	64.01

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

	June 21, 1989		July 25, 1991	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	266	8,517	-	-
Algae (other)	10	320	3	94
Cyclotella meneghiniana	7	224	1	31
Green Algae (other)	6	192	1	31
Anabaena	3	96	44	1,370
Diatom (centric)	2	64	1	31
Aphanocapsa	2	64	-	-
Blue-green (other)	1	32	2	63
Synedra	1	32	-	-
Algae (flagellate)	1	32	6	188
Cosmarium	1	32	-	-
Schizothrix	-	-	240	7,510
Cryptomonas	-	-	2	63
Closterium	-	-	1	31
Lyngbya Diguetii	-	-	1	31
Oocystis	-	-	1	31
Nitzschia acicularis	-	-	1	31
Total	300	9,606	304	9,512

Watershed Description

Watershed Area: 50,976 A (20,630 ha)
Soil Associations within Watershed

Association	Area (A)	% of Total
#1	30,586	60
#12	10,192	20
#5	5,098	10
#11	5,098	10

#1 Vebar-Reeder-Cohagen: Moderately deep and shallow, well drained to excessively drained, gently sloping to steep loamy and sandy soils underlain by sandstone; on uplands.

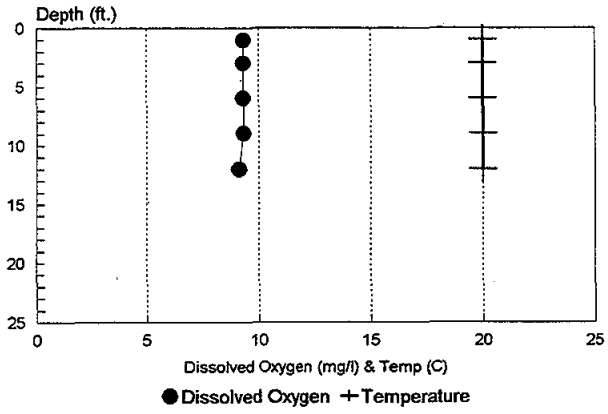
#12 Shambo-Farnuf-Stady: Deep, well drained, nearly level and gently sloping loamy soils and well drained, nearly level loamy soils that are moderately deep over sand and gravel; formed in alluvium on terraces.

#5 Morton-Lantry: Moderately deep, well drained, nearly level to strongly sloping loamy soils underlain by siltstone and sandstone; on uplands.

#11 Farnuf-Shambo-Fluvaquents: Deep, well drained and poorly drained, nearly level and gently sloping loamy soils formed in alluvium on terraces and bottom land.

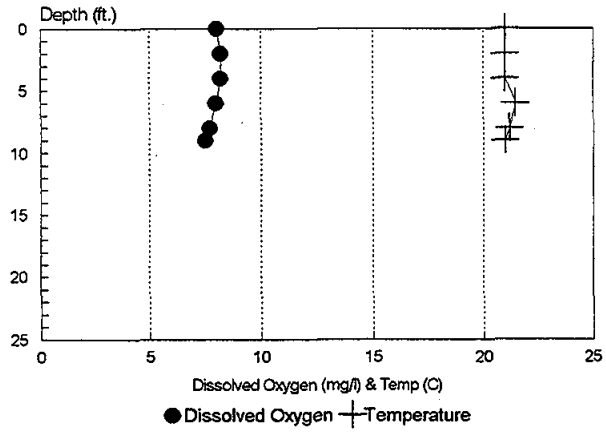
FLAT CREEK LAKE 8/22/79

Dissolved Oxygen & Temperature Profile



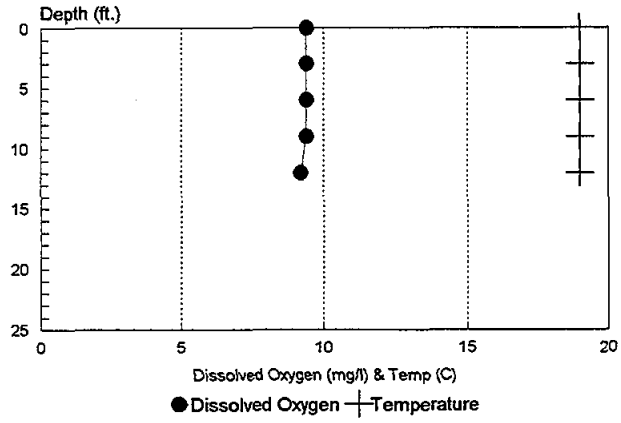
FLAT CREEK LAKE 6/18/91

Dissolved Oxygen & Temperature Profile



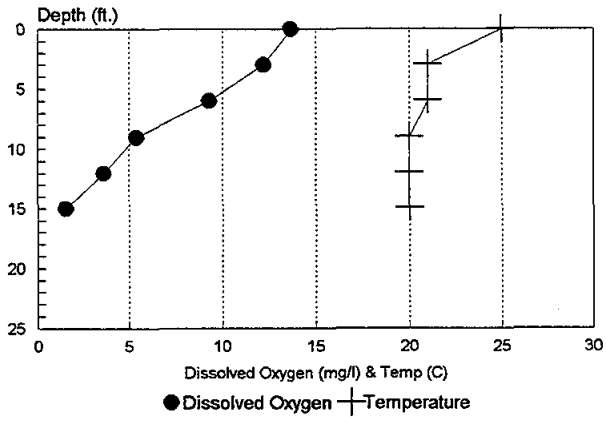
FLAT CREK LAKE 6/13/94

Dissolved Oxygen & Temperature Profile

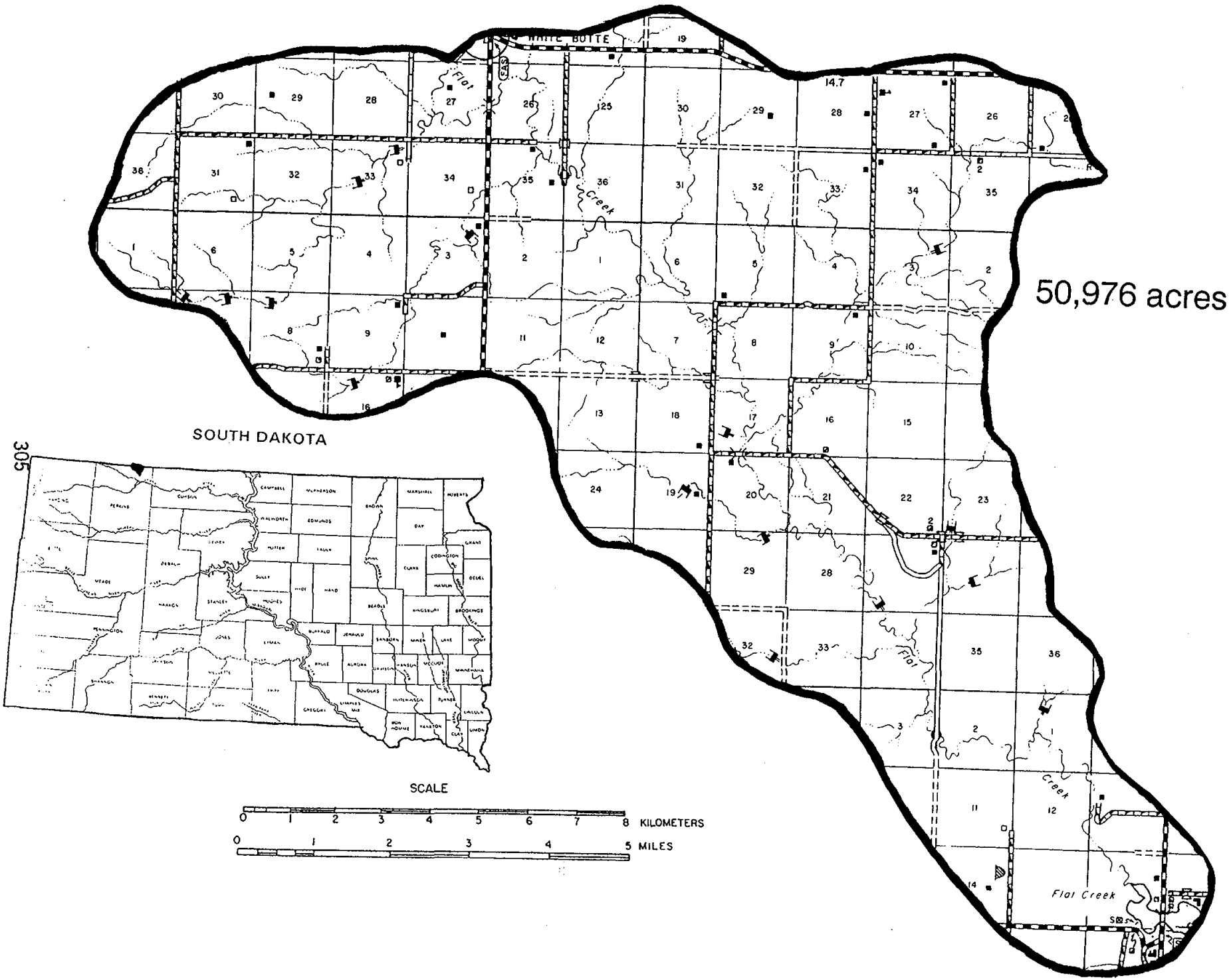


FLAT CREK LAKE 8/17/94

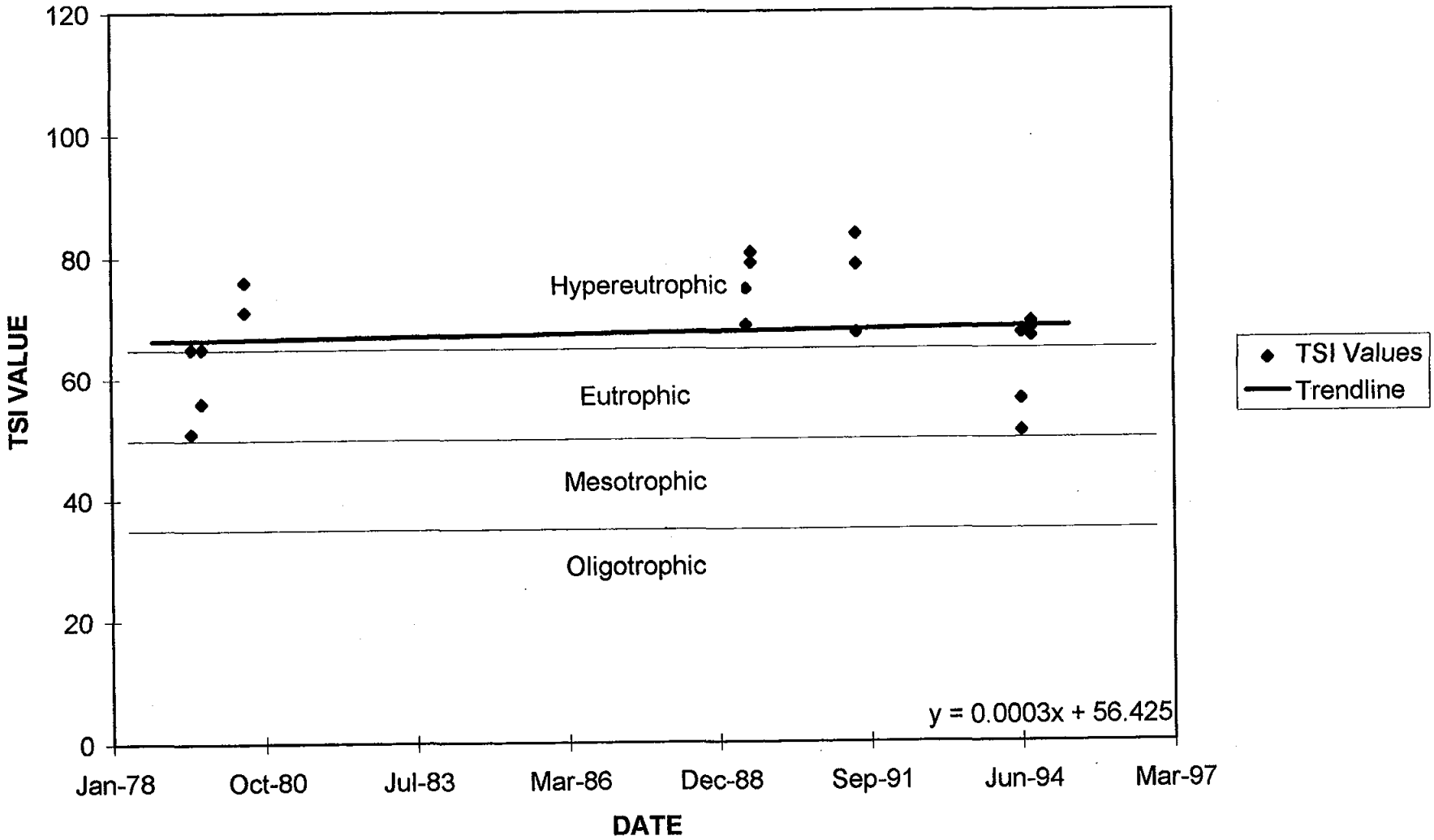
Dissolved Oxygen & Temperature Profile



Flat Creek Lake



FLAT CREEK LAKE TSI's



FREEMAN LAKE

County: Jackson
Latitude: 43 deg. 53 min. 18 sec. N
Longitude: 101 deg. 09 min. 00 sec. W
Area: 65.6 A (26.5 ha)
Maximum Depth: 16 ft (4.9 m)
Volume: 449 acre-ft ($5.53x10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 2N
Range: 25W
Section(s): 8
Shoreline L: 1.7 mi (2.7 km)
Mean Depth: 6.8 ft (2.7 m)
Watershed/Lake Area: 52
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 35,771
Ownership Status: State owned
Public Interest: NA

	1989		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	3	17.77	4	22.43
Air Temperature (°C)	4	23.72	4	27.00
Secchi Disk Depth (meters)	2	1.43	2	0.61
Conductivity (cond/25° C)	4	1,659	-	-
Turbidity (NTU)	-	-	2	18
Lab pH (su)	-	-	-	-
Field pH (su)	4	8.78	4	8.19
Total Alkalinity (mg/l)	2	169	4	355
Total Solids (mg/l)	4	1,294	4	4,415
Dissolved Solids (mg/l)	4	1,284	4	4,394
Suspended Solids (mg/l)	2	11	4	21
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.05	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.50	4	10.03
Total Kjeldahl Nitrogen (mg/l)	4	1.22	4	2.76
Total Phosphorus (mg/l)	4	0.053	4	0.075
Total Dissolved Phosphorus (mg/l)	-	-	4	0.025
Ortho Phosphate as P (mg/l)	4	0.010	-	-
Chlorophyll (mg/m^3)	-	-	3	40.08

Year	1989	1994
TSI Values -- Mean:	57.58	66.55
Secchi Disk	54.87	67.13
Total Phosphorus	60.30	65.75
Chlorophyll *a*		66.78

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 40%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

	June 14, 1989		July 20, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Nephrocytium	82	2,454	-	-
Oocystis	49	1,467	-	-
Sphaerocystis Schroeteri	17	509	-	-
Green Algae (other)	12	359	-	-
Algae (other)	11	329	5	70
Cryptomonas sp. #1	9	269	36	501
Aphanocapsa	2	60	-	-
Cryptomonas	2	60	5	70
Closterium	1	30	-	-
Chroococcus	-	-	25	348
Merismopedia	-	-	22	306
Cryptomonas ovata	-	-	8	111
Algae (flagellate)	-	-	4	56
Lyngbya	-	-	2	28
Ceratium hirundinella	-	-	1	14
Characium	-	-	1	14
Diatom (pennate	-	-	1	14
Total	188	5,627	110	1,529

Watershed Description

Watershed Area: 3,402 A (1,377 ha)
Soil Associations within Watershed

Association	Area (A)	% of Total
PK-KR	1,701	50
PK-SB	1,123	33
S14-NT	578	17

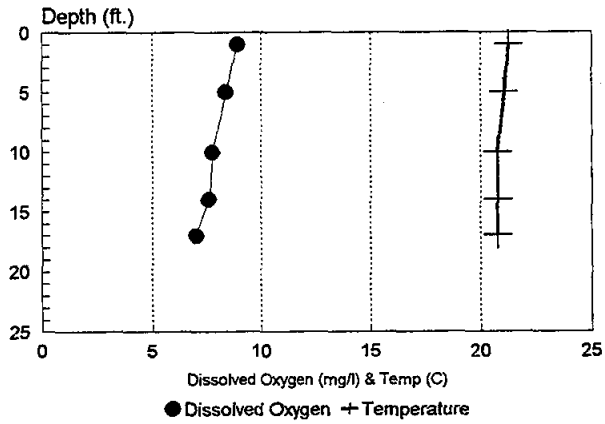
PK-KR Pierre-Kyle: Nearly level to sloping clayey soils that are moderately deep and deep over shale.

PK-SB Pierre-Samsil: Gently sloping to strongly sloping clayey soils that are moderately deep and shallow over shale.

S14-NT Sansarc-Opal: Sloping to steep, clayey soils that are shallow and moderately deep over shale.

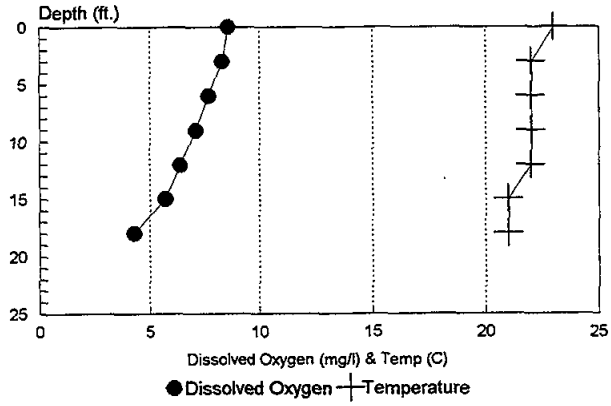
FREEMAN LAKE 5/25/79

Dissolved Oxygen & Temperature Profile



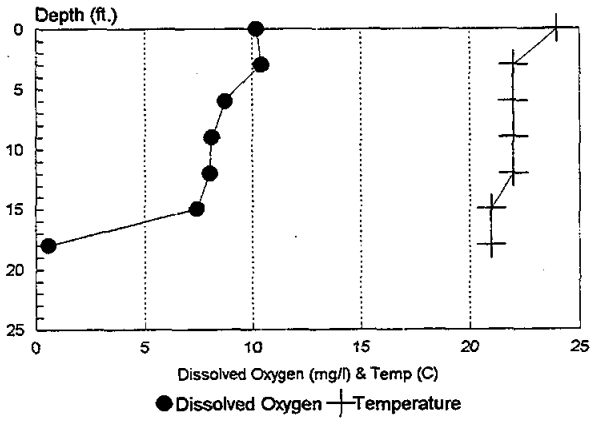
FREEMAN DAM 6/14/94

Dissolved Oxygen & Temperature Profile

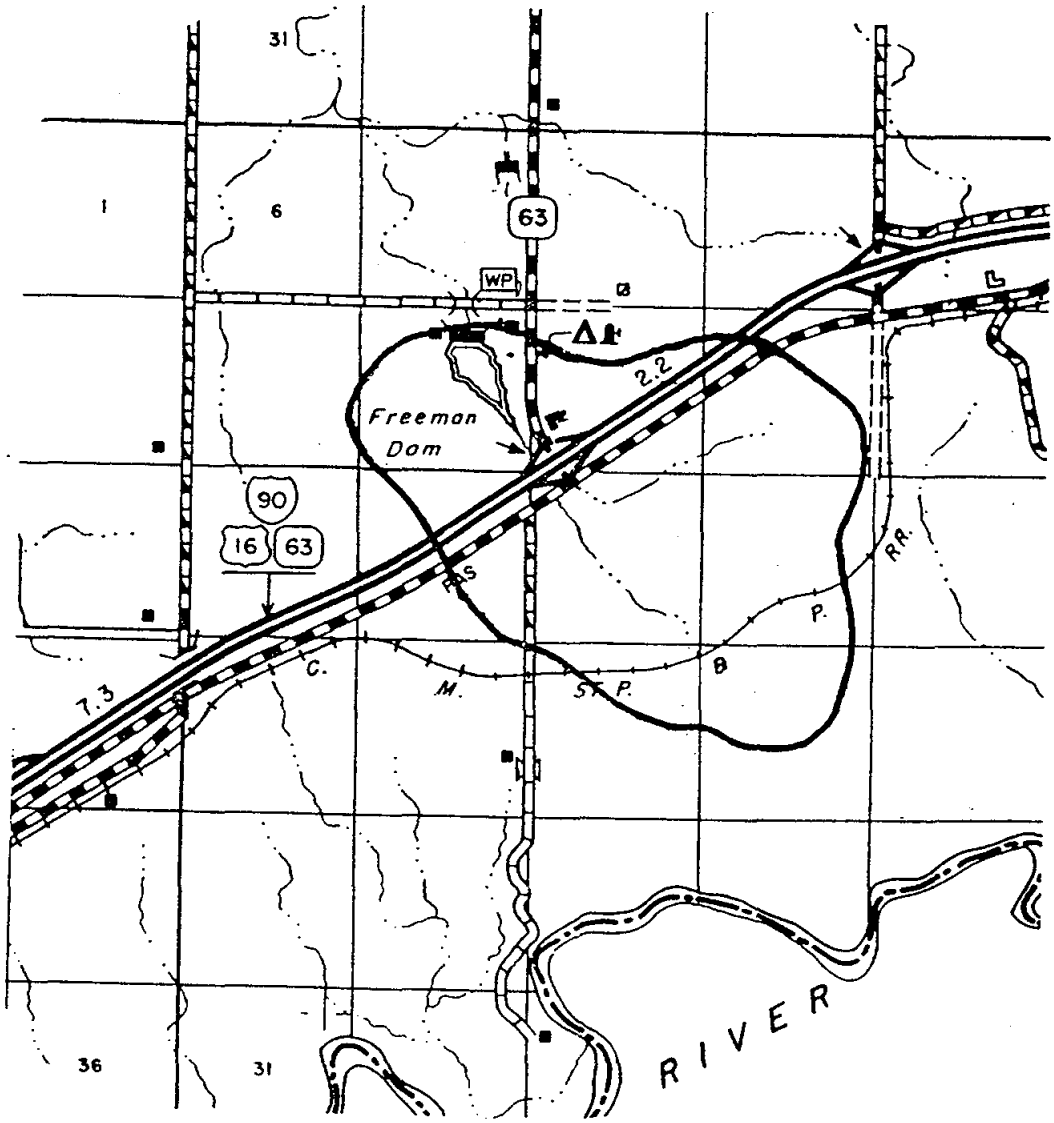


FREEMAN DAM 8/16/94

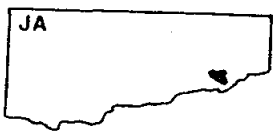
Dissolved Oxygen & Temperature Profile



Freeman Lake



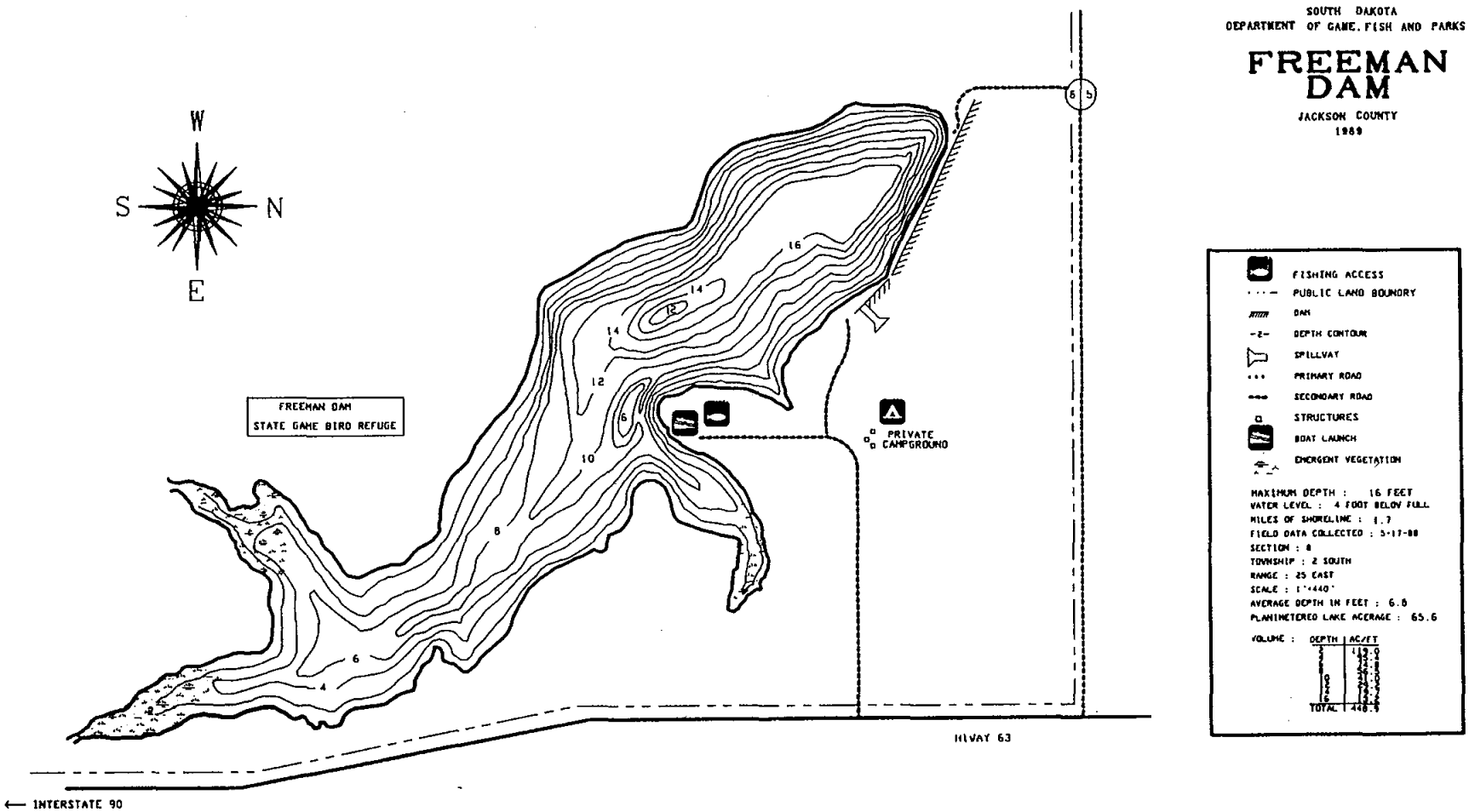
3402 acres

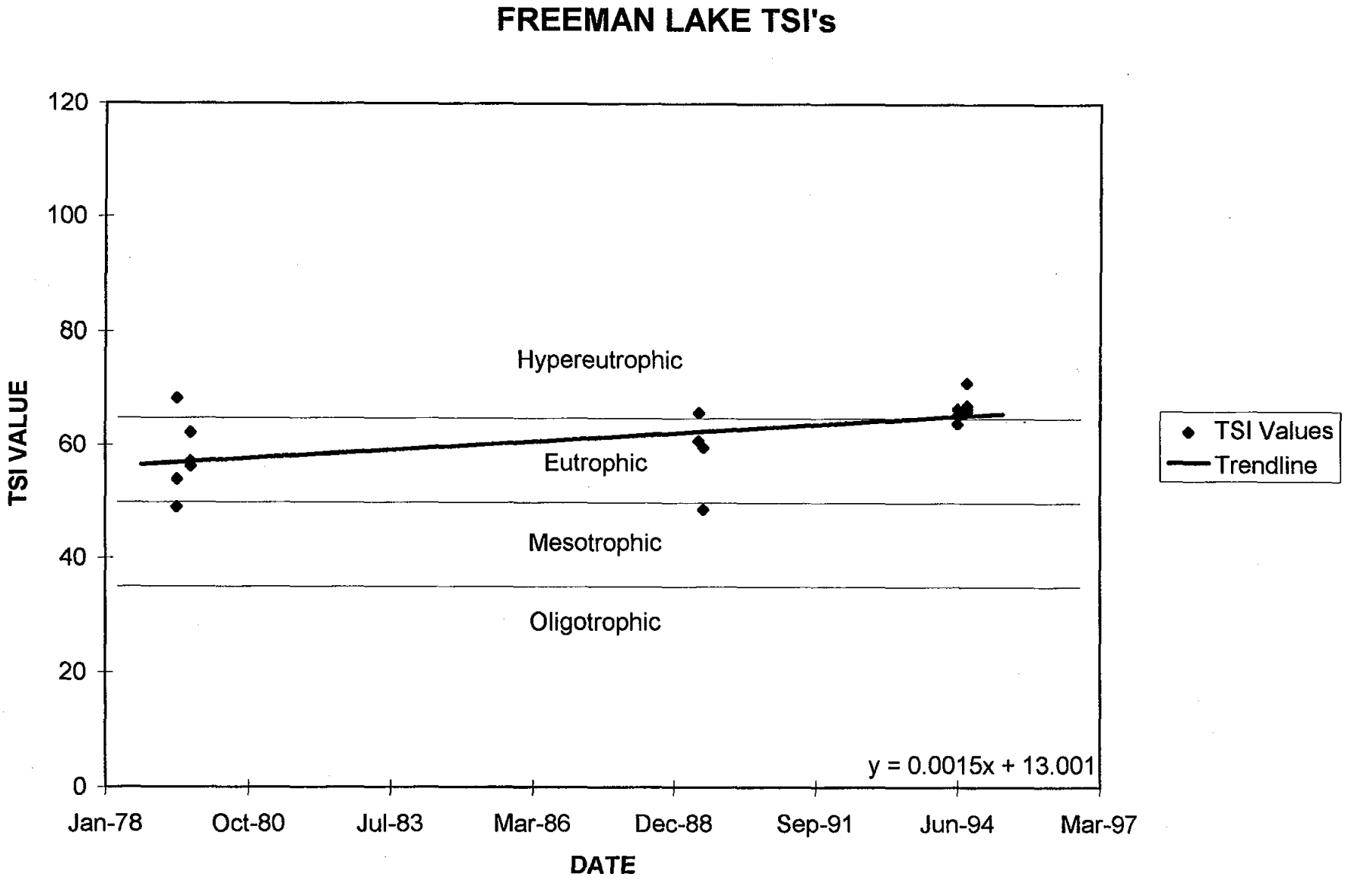


Scale

0 1 2 3 4 5

Miles


SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
FREEMAN DAM
JACKSON COUNTY
1989
W
S
N
E
FREEMAN DAM
STATE GAME BIRD REFUGE
PRIVATE CAMPGROUND
HIWAY 63
INTERSTATE 90
FISHING ACCESS
PUBLIC LAND BOUNDRY
DAM
DEPTH CONTOUR
SPILLWAY
PRIMARY ROAD
SECONDARY ROAD
STRUCTURES
BOAT LAUNCH
EMERGENT VEGETATION
MAXIMUM DEPTH : 16 FEET
WATER LEVEL : 4 FOOT BELOW FULL
MILES OF SHORELINE : 1.7
FIELD DATA COLLECTED : 5-17-88
SECTION : 8
TOWNSHIP : 2 SOUTH
RANGE : 25 EAST
SCALE : 1"=440'
AVERAGE DEPTH IN FEET : 6.8
PLANIMETERED LAKE ACERAGE : 65.6
VOLUME : DEPTH | AC/FT
TOTAL | 448.9


FREEMAN LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0015x + 13.001
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

GEDDES LAKE

County: Charles Mix
Latitude: 43 deg. 11 min. 33 sec. N
Longitude: 98 deg. 42 min. 59 sec. W
Area: 70 A (28.3 ha)
Maximum Depth: 12 ft
Volume: NA
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Pease Creek
Outlet: Pease Creek

Township: 97N
Range: 67W
Section(s): 25
Shoreline Length: NA
Mean Depth: NA
Watershed/Lake Area: 1023
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 106,639
Ownership Status: State owned
Public Interest: Charles Mix County Lake Restoration Organization.

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.55	2	24.00	4	23.58
Air Temperature (°C)	4	23.50	2	26.00	4	29.75
Secchi Disk Depth (meters)	2	0.34	1	0.34	2	0.45
Conductivity (cond/25° C)	4	1,742	-	-	-	-
Turbidity (NTU)	-	-	-	-	4	22.55
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	2	8.00	2	7.95	4	7.91
Total Alkalinity (mg/l)	4	251	2	167	4	234
Total Solids (mg/l)	4	1,617	2	583	4	1,116
Dissolved Solids (mg/l)	4	1,565	2	532	4	1,096
Suspended Solids (mg/l)	4	52	2	61	4	21
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.32	2	0.24	4	0.06
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	2	0.75	4	0.78
Total Kjeldahl Nitrogen (mg/l)	4	1.30	2	1.25	4	1.84
Total Phosphorus (mg/l)	4	0.243	2	0.175	4	0.591
Total Dissolved Phosphorus (mg/l)	-	-	2	0.138	4	0.473
Ortho Phosphate as P (mg/l)	4	0.075	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-	2	21.78

Year	1989	1991	1994
TSI Values -- Mean:	77.99	78.43	76.38
Secchi Disk	75.77	75.77	71.68
Total Phosphorus	80.22	81.09	96.65
Chlorophyll *a*			60.79

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 71,625 acres (28,987 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#4	35,813	50
#5	21,488	30
#7	11,460	16
#2	3,581	5

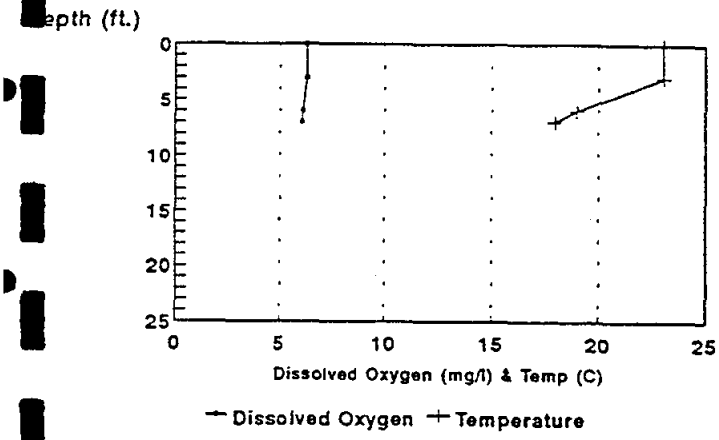
#4 Eakin-Highmore-Ethan: Well drained, nearly level to gently rolling, silty and loamy soils on uplands.

#5 Highmore-Eakin: Well drained, nearly level to undulating, silty soils on uplands.

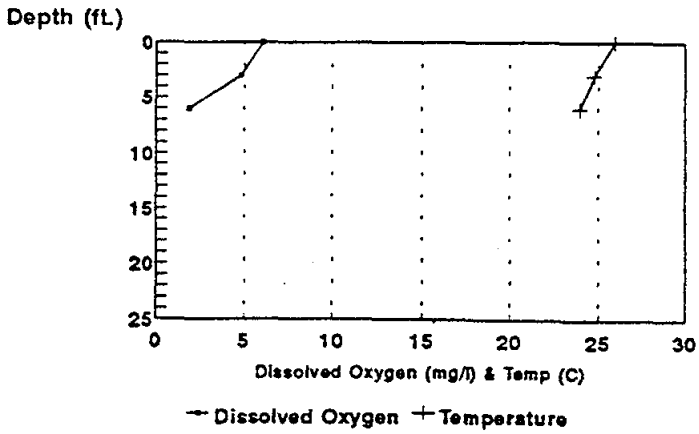
#7 Highmore-Walke: Well drained and moderately well drained, nearly level and gently undulating, silty soils on uplands.

#2 DeGrey-Walke: Moderately well drained, nearly level, silty soils on uplands.

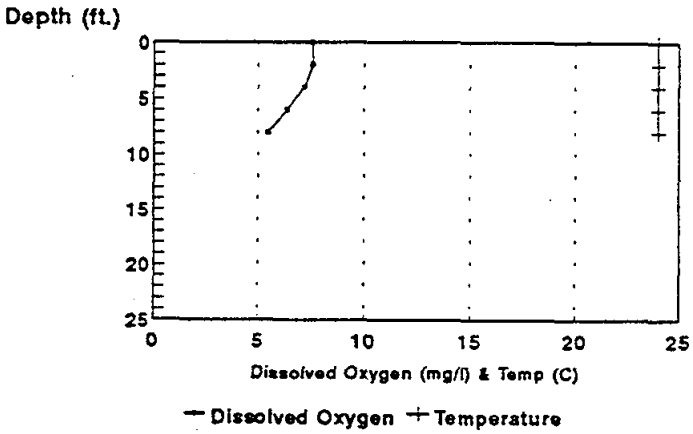
GEDDES LAKE 6/22/93
Dissolved Oxygen & Temperature Profile



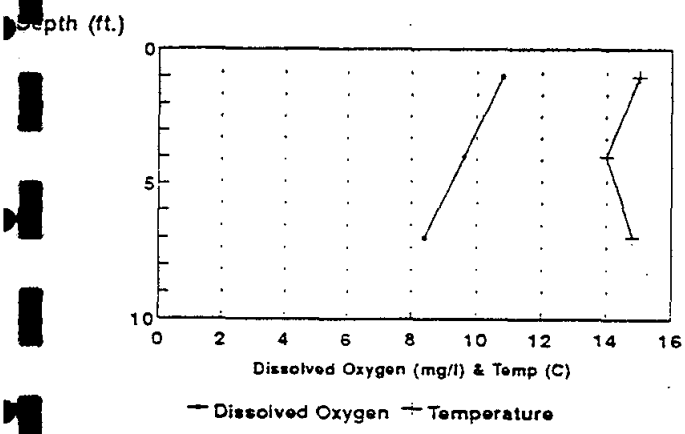
GEDDES LAKE 8/10/93
Dissolved Oxygen & Temperature Profile



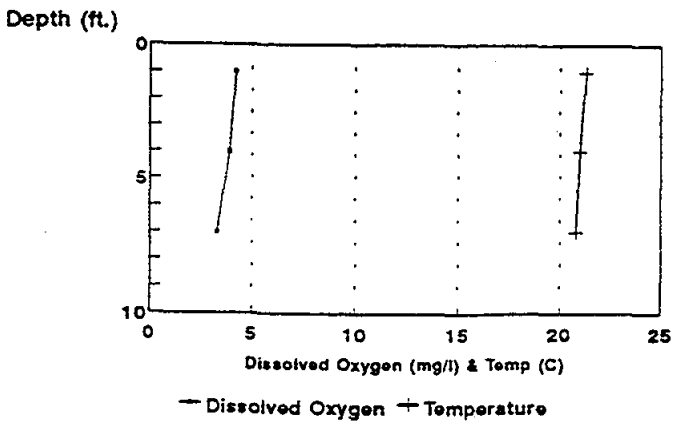
GEDDES LAKE 8/14/91
Dissolved Oxygen & Temperature Profile



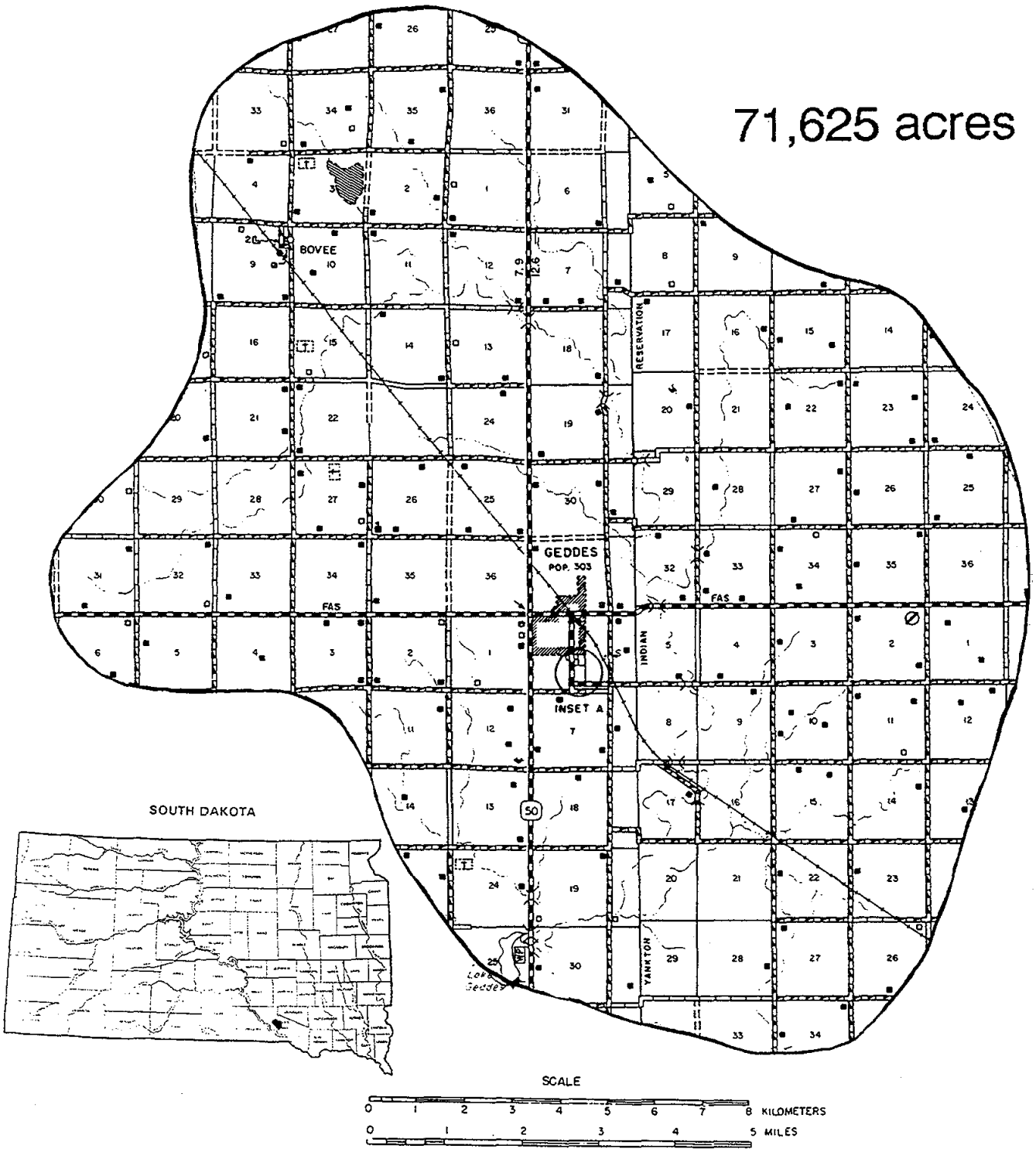
Geddes Lake, 6/15/89
Dissolved Oxygen & Temperature Profile

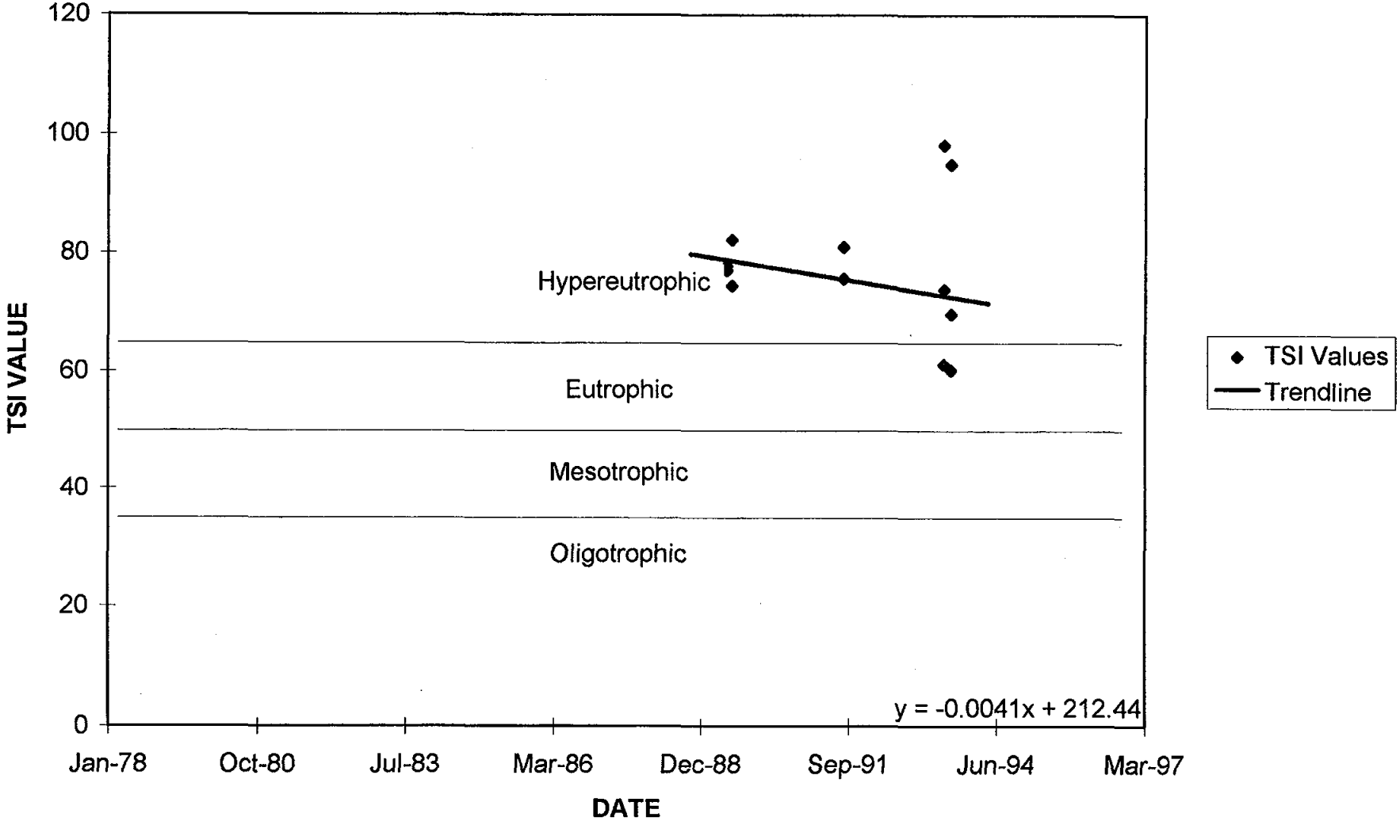


Geddes Lake, 7/17/89
Dissolved Oxygen & Temperature Profile



Lake Geddes


71,625 acres
BOVEE
GEDDES
POP. 303
INSET A
RESERVATION
INDIAN
YANKTON
FAS
SOUTH DAKOTA
SCALE
0 1 2 3 4 5 6 7 8 KILOMETERS
0 1 2 3 4 5 MILES


GEDDES LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0041x + 212.44
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE HANSON

County: Hanson
Latitude: 43 deg. 37 min. 24 sec. N
Longitude: 97 deg. 47 min. 54 sec. W
Area: 54.9 A (22.2 ha)
Maximum Depth: 16.5 ft (5.0 m)
Volume: 418.5 acre-ft (5.163 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Pierre Creek
Outlet: Pierre Creek

Township: 102N
Range: 58W
Section(s): 21
Shoreline L: 2.2 mi (3.5 km)
Mean Depth: 7.6 ft (2.3 m)
Watershed/Lake Area: 729.6
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 271,641
Ownership Status: State and County owned
Public Interest: Lake Hanson Association.

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.00	4	24.17	4	20.50
Air Temperature (°C)	4	29.50	4	27.50	4	23.00
Secchi Disk Depth (meters)	2	0.78	2	0.87	2	0.77
Conductivity (cond/25° C)	4	2,338	2	1,620	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.13	4	8.18	4	8.34
Total Alkalinity (mg/l)	4	194	4	194	4	160
Total Solids (mg/l)	4	2,367	4	1,638	4	724
Dissolved Solids (mg/l)	4	2,348	4	1,609	4	714
Suspended Solids (mg/l)	4	20	4	29	4	10
Volatile Suspended Solids (mg/l)	-	-	2	14	-	-
Ammonia Nitrogen (mg/l)	4	0.06	4	0.03	4	0.06
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.60	4	0.45
Total Kjeldahl Nitrogen (mg/l)	4	1.17	4	0.58	4	1.19
Total Phosphorus (mg/l)	4	0.141	4	0.078	4	0.117
Total Dissolved Phosphorus (mg/l)	-	-	4	0.053	4	0.071
Ortho Phosphate as P (mg/l)	4	0.016	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	9.83	2	14.74

Year	1989	1991	1992
TSI Values -- Mean:	68.75	58.77	63.92
Secchi Disk	63.86	62.03	63.77
Total Phosphorus	73.87	61.29	71.02
Chlorophyll *a*		52.99	56.96

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus and Ceratophyllum demersum

Algal Species and Densities

	July 5, 1989		August 7, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Chroococcus	83	3663	2	111
Algae	68	3001	45	2501
Nephrocytium	28	1236	-	-
Diatom (centric)	27	1192	8	445
Oocystis	21	927	-	-
Cryptomonas sp. #1	19	839	26	1445
Crucigenia	17	750	-	-
Kirchneriella	15	662	-	-
Algae (flagellate)	6	265	3	167
Quadrigula	5	221	-	-
Coelosphaerium	5	221	-	-
Aphanizomenon	3	132	-	-
Diatom (pennate)	2	88	-	-
Blue-green (other)	1	44	-	-
Merismopedia	1	44	-	-
Pediastrum	1	44	-	-
Oscillatoria	-	-	89	4946
Lyngbya	-	-	44	2445
Green Algae (other)	-	-	21	1167
Anabaena	-	-	20	1111
Glenodinium Gymnodinium	-	-	15	834
Nitzschia	-	-	13	722
Tetrastrum	-	-	7	389
Cryptomonas	-	-	3	167
Characium	-	-	3	167
Cyclotella meneghiniana	-	-	2	111
Cryptomonas ovata	-	-	1	56
Attheya	-	-	1	56
Total	302	13330	303	16838

Watershed Description

Watershed Area: 40,053 A (16,209 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
CY-TK-PR	24,032	60
CY-EU-TK	6,408	16
PR-CY-S4	5,207	13
HC-CY-DE	4,406	11

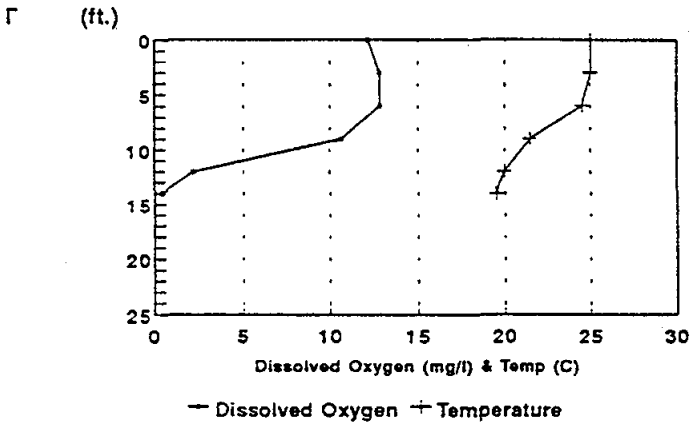
CY-TK-PR Clarno-Tetonka-Prosper: Well drained, poorly drained and moderately well drained, level to undulating, loamy and silty soils formed in glacial till and alluvium; on uplands.

CY-EU-TK Clarno-Ethan-Tetonka: Well drained and poorly drained, level to rolling, loamy and silty soils formed in glacial till and alluvium; on uplands.

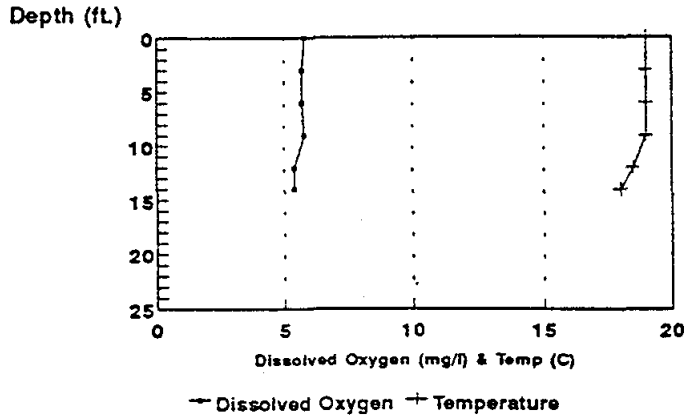
PR-CY-S4 Prosper-Clarno-Strokney: Moderately well drained and well drained, nearly level to undulating, loamy and silty soils formed in alluvium and glacial till; on uplands.

HC-CY-DE Hand-Clarno-Davison - Well drained and moderately well drained, nearly level to gently rolling, loamy soils formed in glacial melt water deposits and glacial till; on uplands.

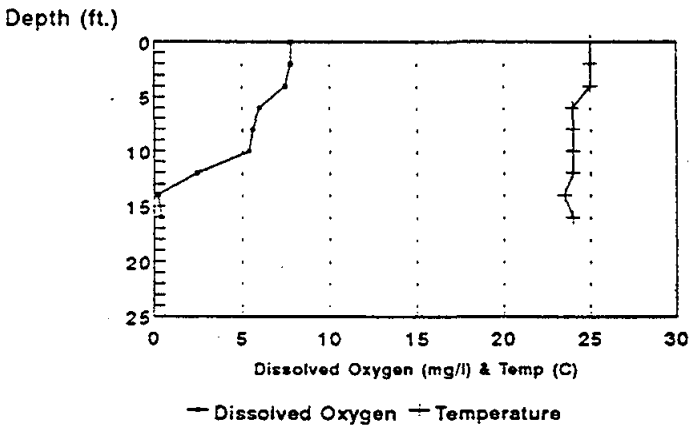
LAKE HANSON 7/28/92
Dissolved Oxygen & Temperature Profile



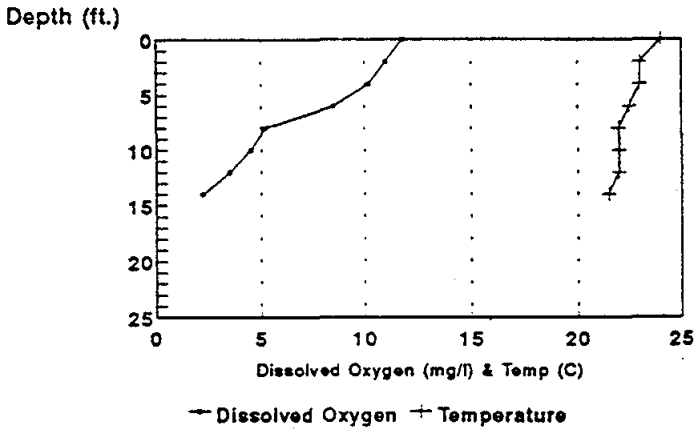
LAKE HANSON 8/26/92
Dissolved Oxygen & Temperature Profile



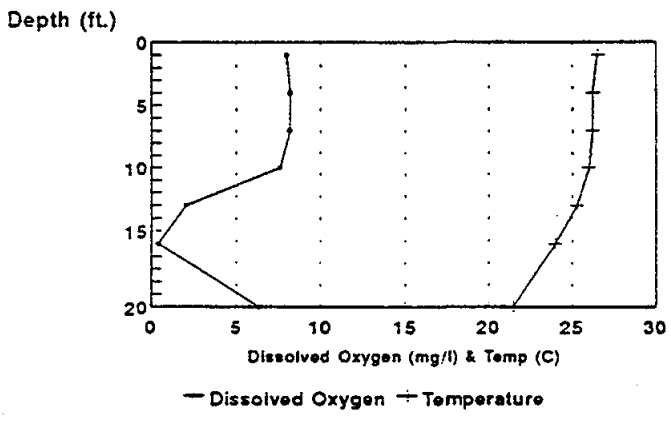
LAKE HANSON 7/11/91
Dissolved Oxygen & Temperature Profile



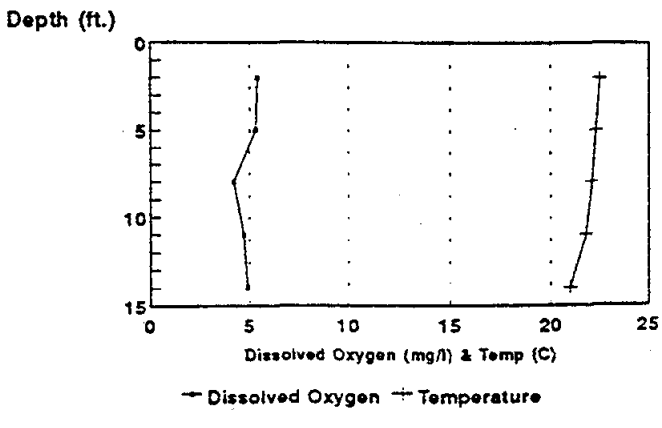
LAKE HANSON 8/13/91
Dissolved Oxygen & Temperature Profile



Lake Hanson, 7/5/89
Dissolved Oxygen & Temperature Profile

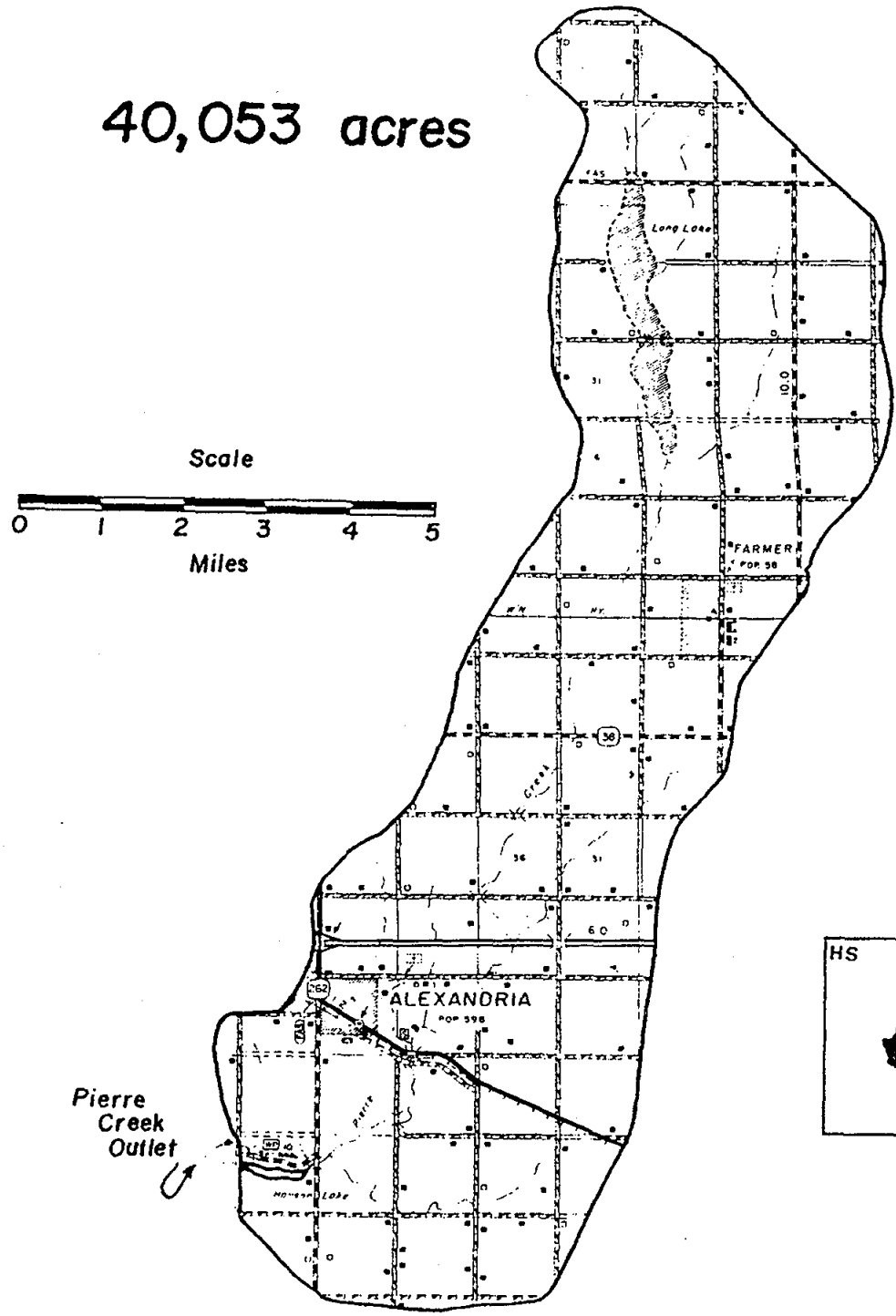


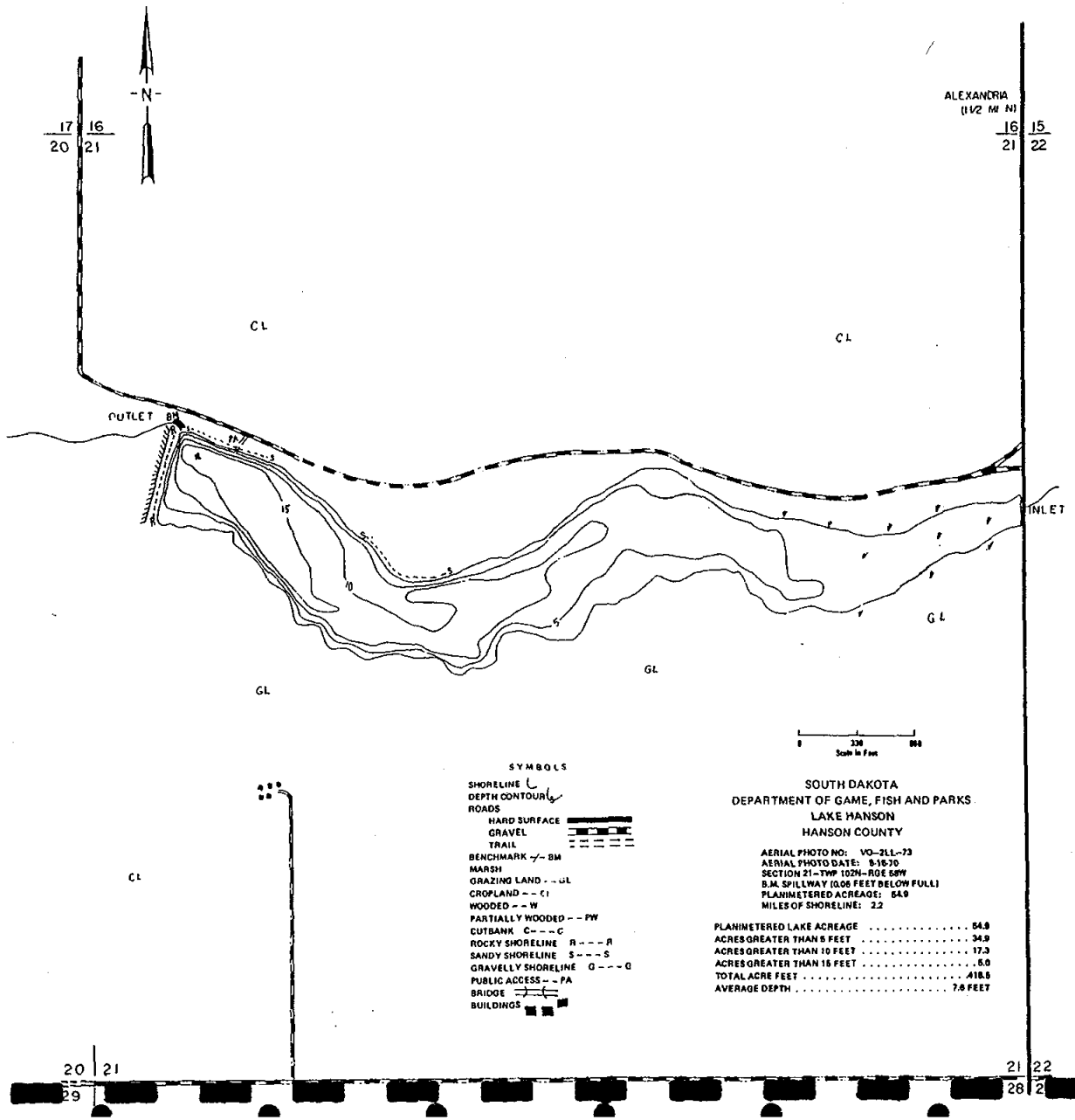
Lake Hanson, 8/7/89
Dissolved Oxygen & Temperature Profile

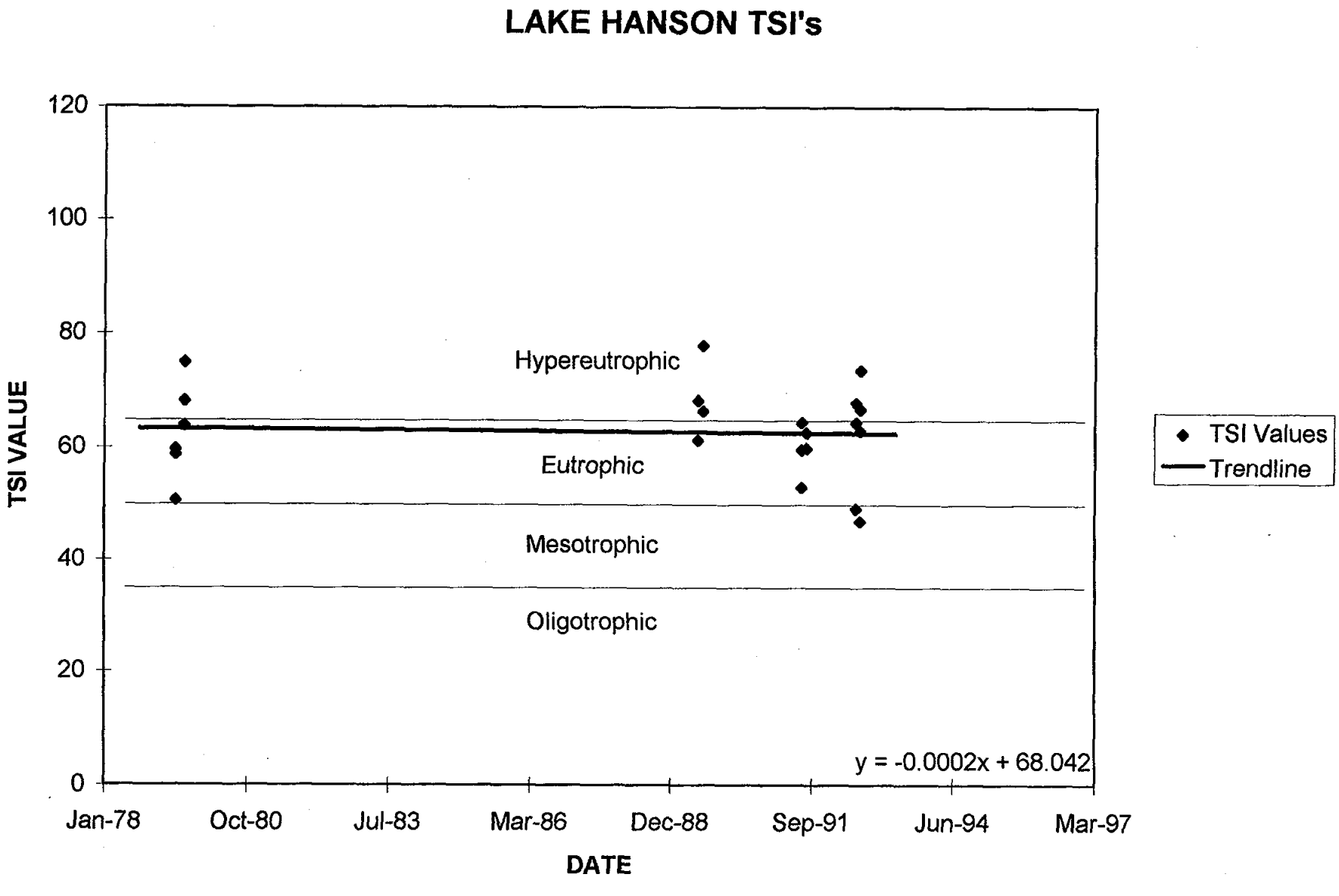


Hanson Lake

40,053 acres




-N-
17 16
20 21
ALEXANDRIA
(1½ MI N)
16 15
21 22
CL
CL
OUTLET BM
INLET
GL
GL
GL
CL
20 21
29
21 22
28 2
SYMBOLS
SHORELINE
DEPTH CONTOURS
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK BM
MARSH
GRAZING LAND GL
CROPLAND C
WOODED W
PARTIALLY WOODED PW
CUTBANK C
ROCKY SHORELINE R
SANDY SHORELINE S
GRAVELLY SHORELINE G
PUBLIC ACCESS PA
BRIDGE
BUILDINGS
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE HANSON
HANSON COUNTY
AERIAL PHOTO NO: VO-2LL-73
AERIAL PHOTO DATE: 8-16-70
SECTION 21-TWP 102N-RGE 58W
B.M. SPILLWAY (0.06 FEET BELOW FULL)
PLANIMETERED ACREAGE: 64.9
MILES OF SHORELINE: 2.2
PLANIMETERED LAKE ACREAGE 64.9
ACRES GREATER THAN 5 FEET 34.9
ACRES GREATER THAN 10 FEET 17.3
ACRES GREATER THAN 15 FEET 5.0
TOTAL ACRE FEET 418.5
AVERAGE DEPTH . . . . . 7.8 FEET


LAKE HANSON TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0002x + 68.042
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

HAYES LAKE

County: Stanley
Latitude: 44 deg. 21 min. 54 sec. N
Longitude: 100 deg. 00 min. 48 sec. W
Area: 73.7 A (29.8 ha)
Maximum Depth: 17 ft (5.2 m)
Volume: 449.7 acre-ft (5.547 x $10^5 m^3$)
Origin of Basin: impoundment
Township: 5N
Range: 26W
Section(s): 29, 30
Shoreline L: 3.6 mi (5.8 km)
Mean Depth: 6.1 ft (1.9 m)
Watershed/Lake Area: 384
Thermal Stratification: yes
Major Inflows (named or permanent streams): Frozen Man Creek
Outlet: Frozen Man Creek

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 34,882
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.53	4	17.64	4	19.13
Air Temperature (°C)	4	19.44	4	25.00	4	24.00
Secchi Disk Depth (meters)	2	0.49	2	1.04	2	0.33
Conductivity (cond/25° C)	4	753	-	-	-	-
Turbidity (NTU)	-	-	-	-	2	28.50
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.03	4	8.34	4	7.90
Total Alkalinity (mg/l)	4	122	4	160	4	132
Total Solids (mg/l)	4	571	4	724	4	335
Dissolved Solids (mg/l)	4	558	4	714	4	315
Suspended Solids (mg/l)	4	13	4	10	4	20
Volatile Suspended Solids (mg/l)	-	-	2	7	-	-
Ammonia Nitrogen (mg/l)	4	0.06	4	0.06	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.45	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.11	4	1.19	4	0.92
Total Phosphorus (mg/l)	4	0.119	4	0.117	4	0.168
Total Dissolved Phosphorus (mg/l)	-	-	4	0.071	4	0.095
Ortho Phosphate as P (mg/l)	4	0.014	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	9.38	2	12.73

Year	1989	1991	1993
TSI Values -- Mean:	72.85	61.68	69.60
Secchi Disk	70.36	59.49	75.99
Total Phosphorus	75.34	73.04	77.28
Chlorophyll *a*		52.53	55.53

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: 80%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: None identified

Algal Species and Densities

No Date

Taxa	Number	Units/ml
Algae (other)	13	543
Kirchneriella	6	251
Cryptomonas	4	167
Scenedesmus	3	125
Dinobryon	3	125
Oocystis	2	84
Cryptomonas ovata	2	84
Nephrocytium	1	42
Diatom (pennate)	1	42
Chroococcus	1	42
Crucigenia	1	42
Dactylococcopsis	1	42
Green Algae (other)	1	42
Total	39	1,629

Watershed Description
Watershed Area: 28,277 A (11,444 ha)

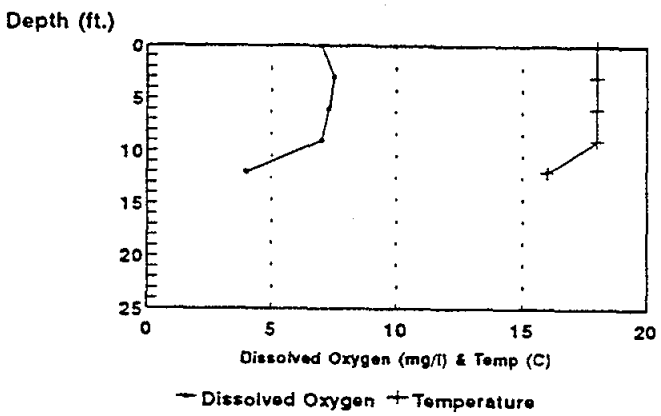
Soil Associations within Watershed

Association	Area (A)	% of Total
NT-PS	25,449	90
S14-NT	2,828	10

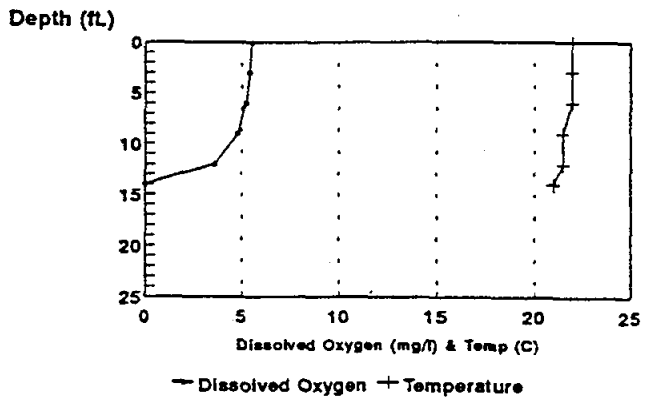
NT-PS Opal-Promise: Moderately deep and deep, nearly level to sloping, clayey soils formed in clay residium over shale; on uplands.

S14-NT Sansarc-Opal: Rolling to steep, clayey soils that are shallow and moderately deep over shale; on uplands.

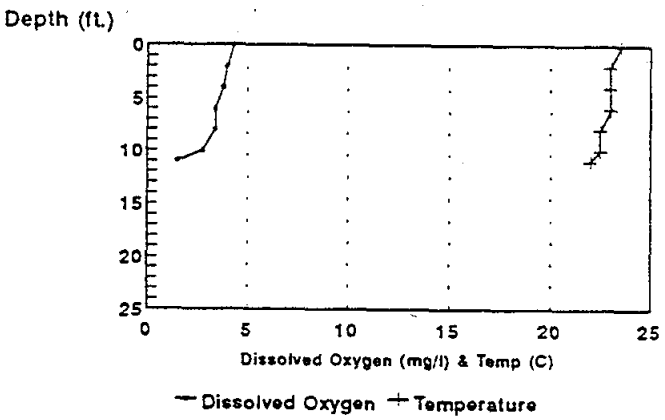
HAYES LAKE 6/14/93
Dissolved Oxygen & Temperature Profile



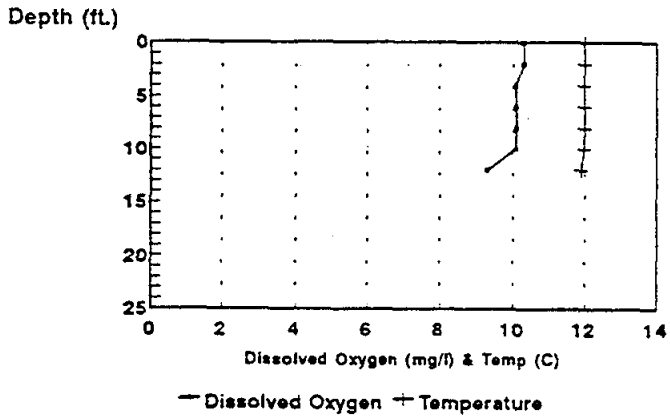
HAYES LAKE 8/2/93
Dissolved Oxygen & Temperature Profile



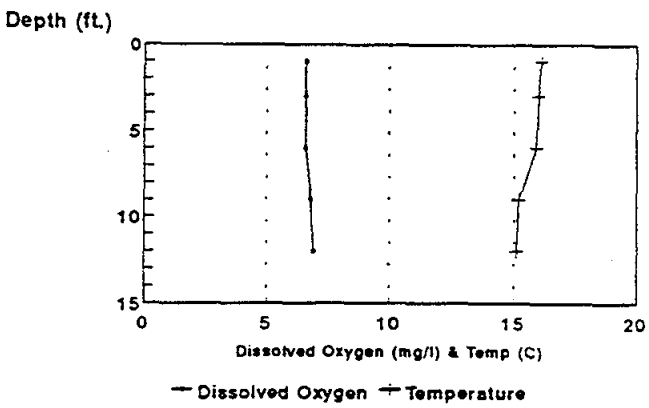
HAYES LAKE 6/17/91
Dissolved Oxygen & Temperature Profile



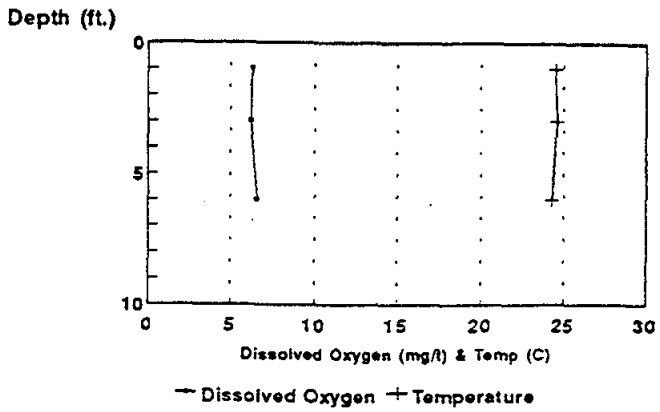
HAYES LAKE 10/10/91
Dissolved Oxygen & Temperature Profile



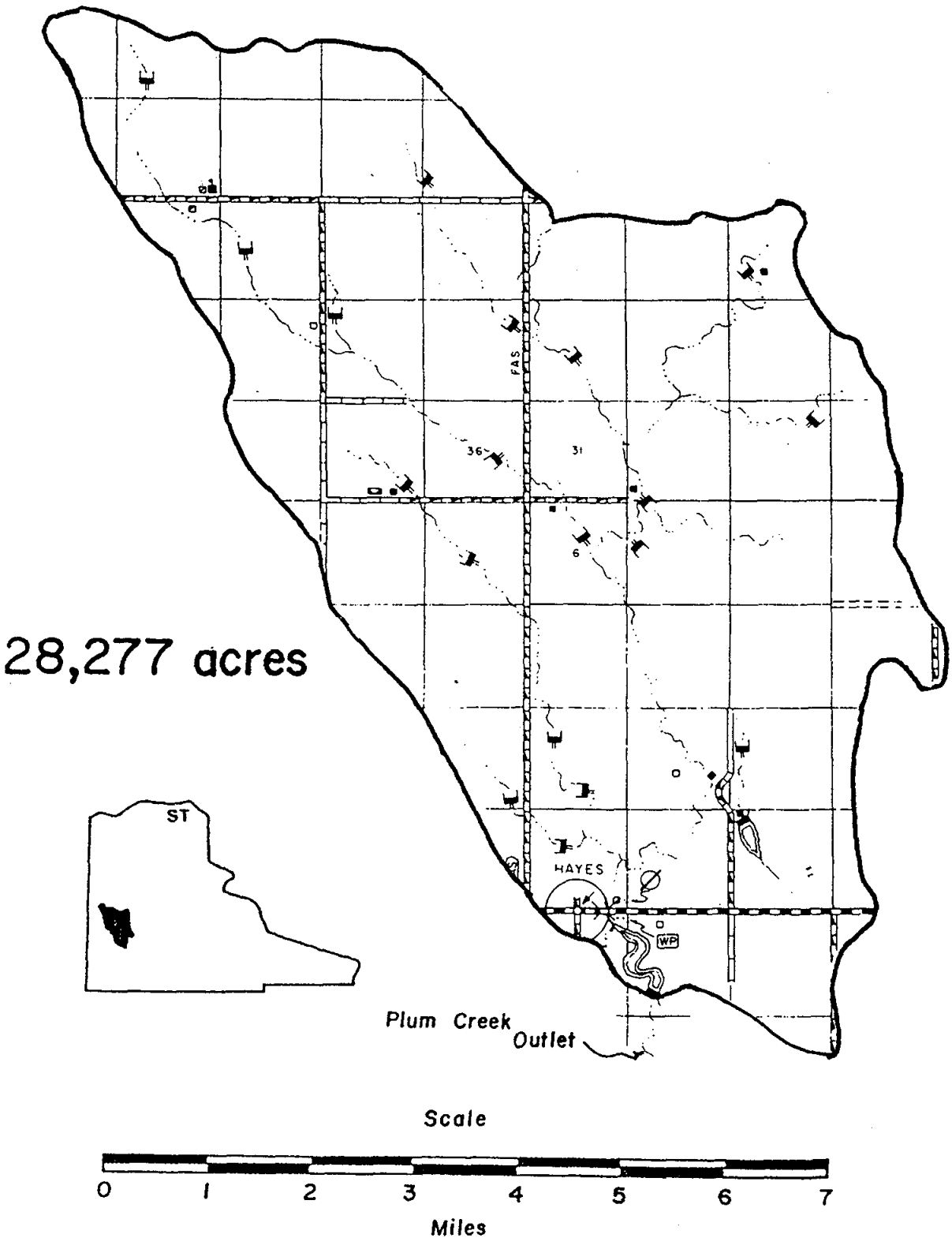
Lake Hayes, 6/13/89
Dissolved Oxygen & Temperature Profile

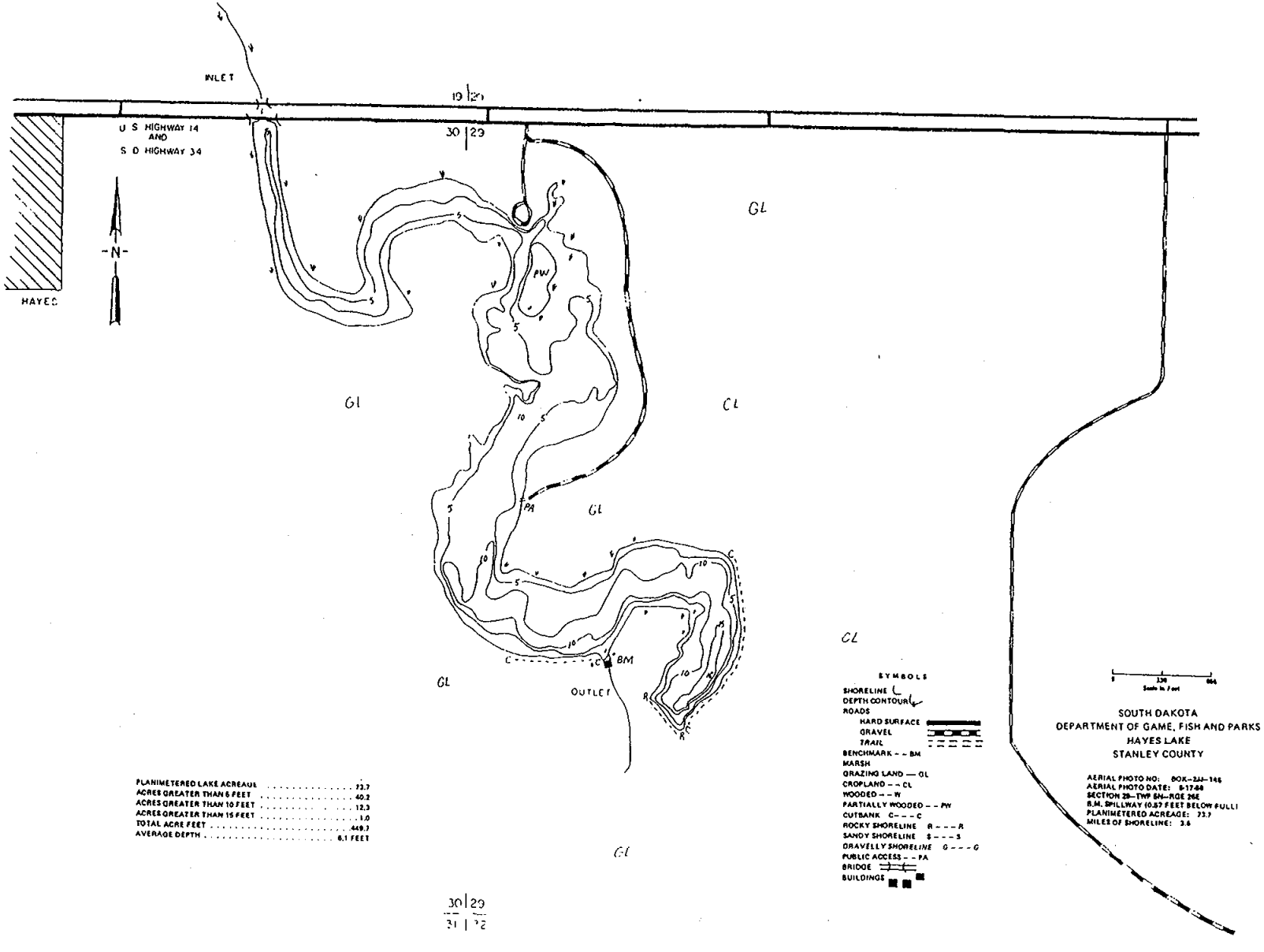


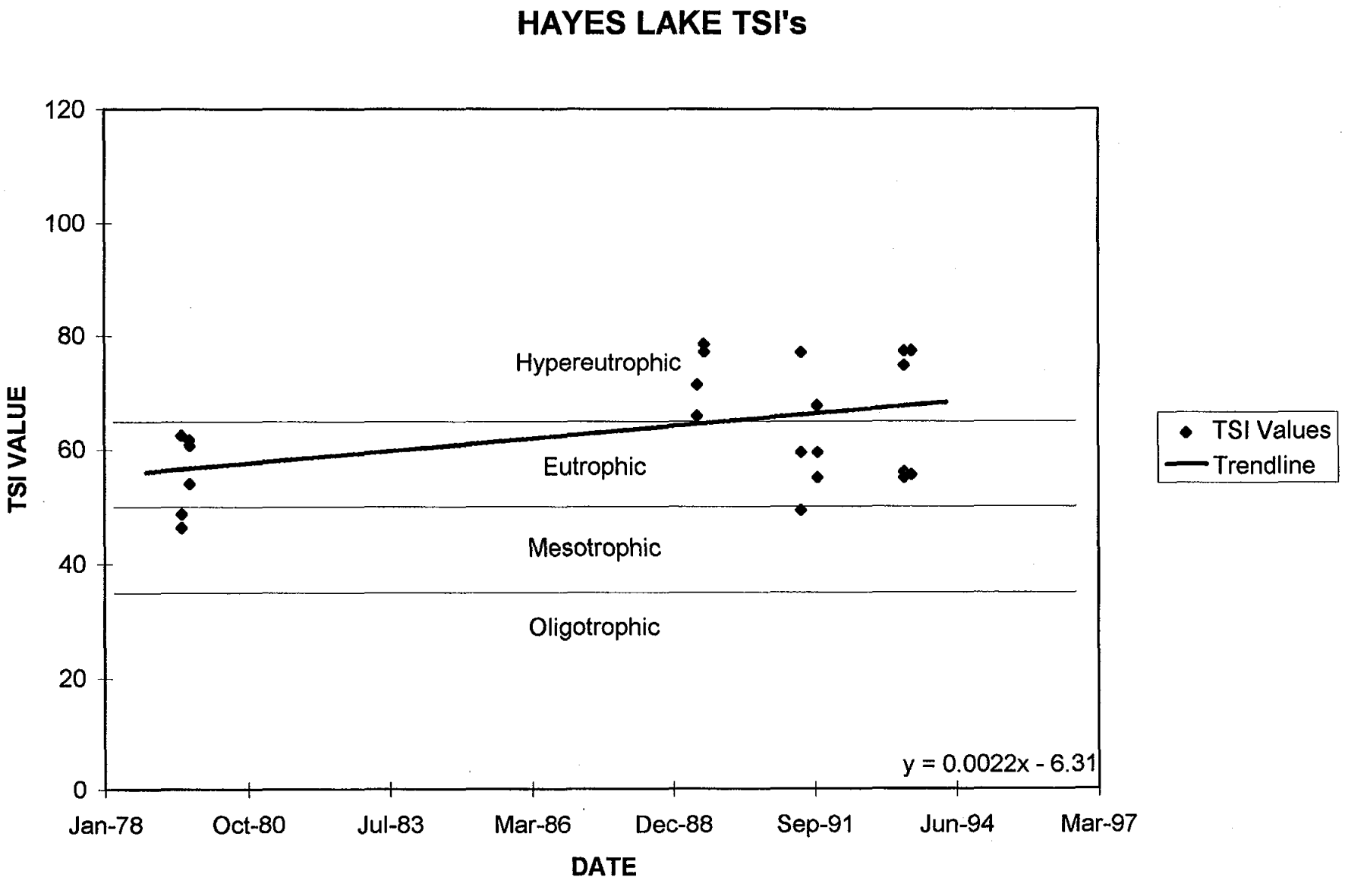
Lake Hayes, 8/2/89
Dissolved Oxygen & Temperature Profile



Hayes Lake


28,277 acres
ST
FAS
36
31
6
HAYES
WP
Plum Creek
Outlet
Scale
0 1 2 3 4 5 6 7
Miles


INLET
19 | 20
30 | 29
U S HIGHWAY 14
AND
S D HIGHWAY 34
HAYES
N
GL
CL
PW
PA
BM
OUTLET
C
R
5
10
PLANIMETERED LAKE ACREAGE 73.7
ACRES GREATER THAN 5 FEET 40.2
ACRES GREATER THAN 10 FEET 12.3
ACRES GREATER THAN 15 FEET 1.0
TOTAL ACRE FEET 449.7
AVERAGE DEPTH . . . . . 6.1 FEET
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK - - BM
MARSH
GRAZING LAND — GL
CROPLAND - - CL
WOODED - - W
PARTIALLY WOODED - - PW
CUTBANK C- - - C
ROCKY SHORELINE R - - - R
SANDY SHORELINE S - - - S
GRAVELLY SHORELINE G - - - G
PUBLIC ACCESS - - PA
BRIDGE
BUILDINGS
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
HAYES LAKE
STANLEY COUNTY
AERIAL PHOTO NO: BOK-2JJ-146
AERIAL PHOTO DATE: 8-17-68
SECTION 29—TWP 5N—RGE 26E
B.M. SPILLWAY (0.57 FEET BELOW FULL)
PLANIMETERED ACREAGE: 73.7
MILES OF SHORELINE: 3.6


HAYES LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0022x - 6.31
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE HENDRICKS

County: Brookings
Latitude: 44 deg. 29 min. 54 sec. N
Longitude: 96 deg. 27 min. 12 sec. W
Area: 1,497 A (605.8 ha)
Maximum Depth: 10 ft (3.0 m)
Volume: 8000 acre-ft (9.869 x $10^6 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): Deer Creek
Outlet: Lac Qui Parle River

Township: 5N
Range: 26W
Section(s): 15, 21-22, 27-29, 33
Shoreline L: 10.8 mi (4.4 km)
Mean Depth: 5.0 ft (1.5 m)
Watershed/Lake Area: 21
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation waters
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Lake Hendricks Improvement Association.

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.70	21	21.34	4	21.58
Air Temperature (°C)	4	26.40	12	22.29	4	26.15
Secchi Disk Depth (meters)	2	0.61	21	0.44	2	0.30
Conductivity (cond/25° C)	4	741	-	-	-	-
Turbidity (NTU)	-	-	-	-	4	26.39
Lab pH (su)	-	-	21	8.44	-	-
Field pH (su)	4	8.40	-	-	4	8.07
Total Alkalinity (mg/l)	4	155	21	151	4	168
Total Solids (mg/l)	4	700	21	589	4	513
Dissolved Solids (mg/l)	4	678	21	559	4	486
Suspended Solids (mg/l)	4	23	21	30	4	27
Volatile Suspended Solids (mg/l)	-	-	21	10	-	-
Ammonia Nitrogen (mg/l)	4	0.10	21	0.17	4	0.06
Nitrate + Nitrite Nitrogen (mg/l)	4	0.15	21	0.61	4	0.25
Total Kjeldahl Nitrogen (mg/l)	4	1.01	21	1.39	4	0.78
Total Phosphorus (mg/l)	4	0.189	21	0.173	4	0.134
Total Dissolved Phosphorus (mg/l)	-	-	21	0.120	4	0.097
Ortho Phosphate as P (mg/l)	4	0.090	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-	2	15.91

Year	1989	1991	1994
TSI Values -- Mean:	73.42	75.21	69.80
Secchi Disk	67.14	71.90	77.37
Total Phosphorus	79.70	78.53	74.32
Chlorophyll *a*			57.72

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: None Identified

Algal Species and Densities
June 21, 1989

Taxa	Number	Units/ml
Aphanocapsa	279	17,419
Algae (other)	12	749
Dactylococcopsis	3	187
Cryptomonas	2	125
Cryptomonas sp.#1	1	62
Diatom (centric)	1	62
Characium	1	62
Algae (flagellate)	1	62
Total	300	18,370

Watershed Description
Watershed Area: 31,430 A (12,720 ha)
Soil Associations within Watershed

Association	Area (A)	% of Total
KN-BW-VS	19,801	63
FU-BY	9,743	31
SJ-NL	1,257	4
LD	629	2

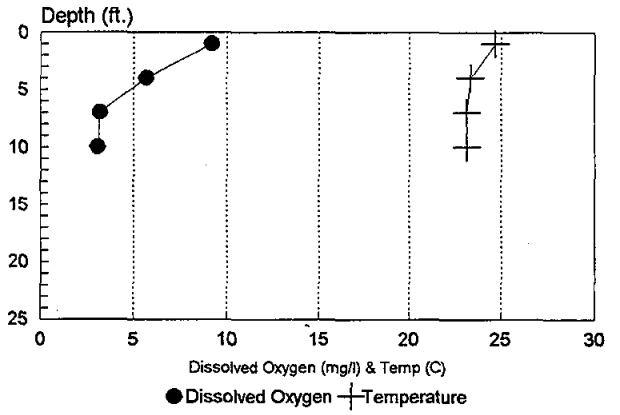
KN-BW-VS Kranzburg-Brookings-Vienna: Well drained and moderately well drained, nearly level to sloping, silty soils.

FU-BY Forman-Buse: Well drained, undulating to hilly, loamy soils formed in loamy glacial till.

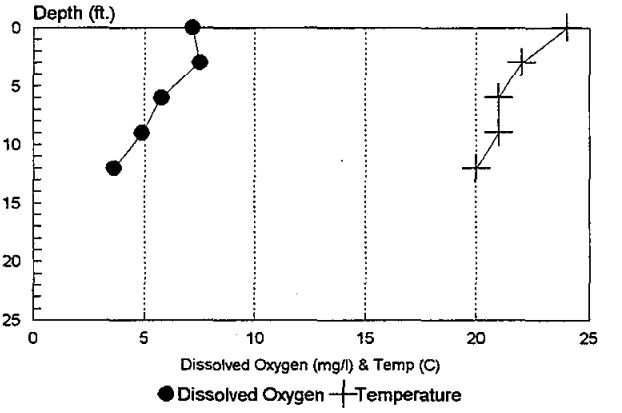
SJ-NJ Singaas-Oak-Lake: Well drained and moderately well drained, nearly level to undulating silty and loamy soils.

LD Lamour: Poorly drained, neary level, silty soils.

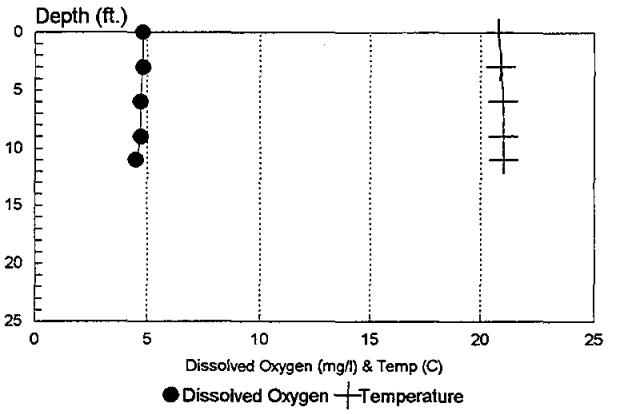
LAKE HENDRICKS 8/4/79
Dissolved Oxygen & Temperature Profile

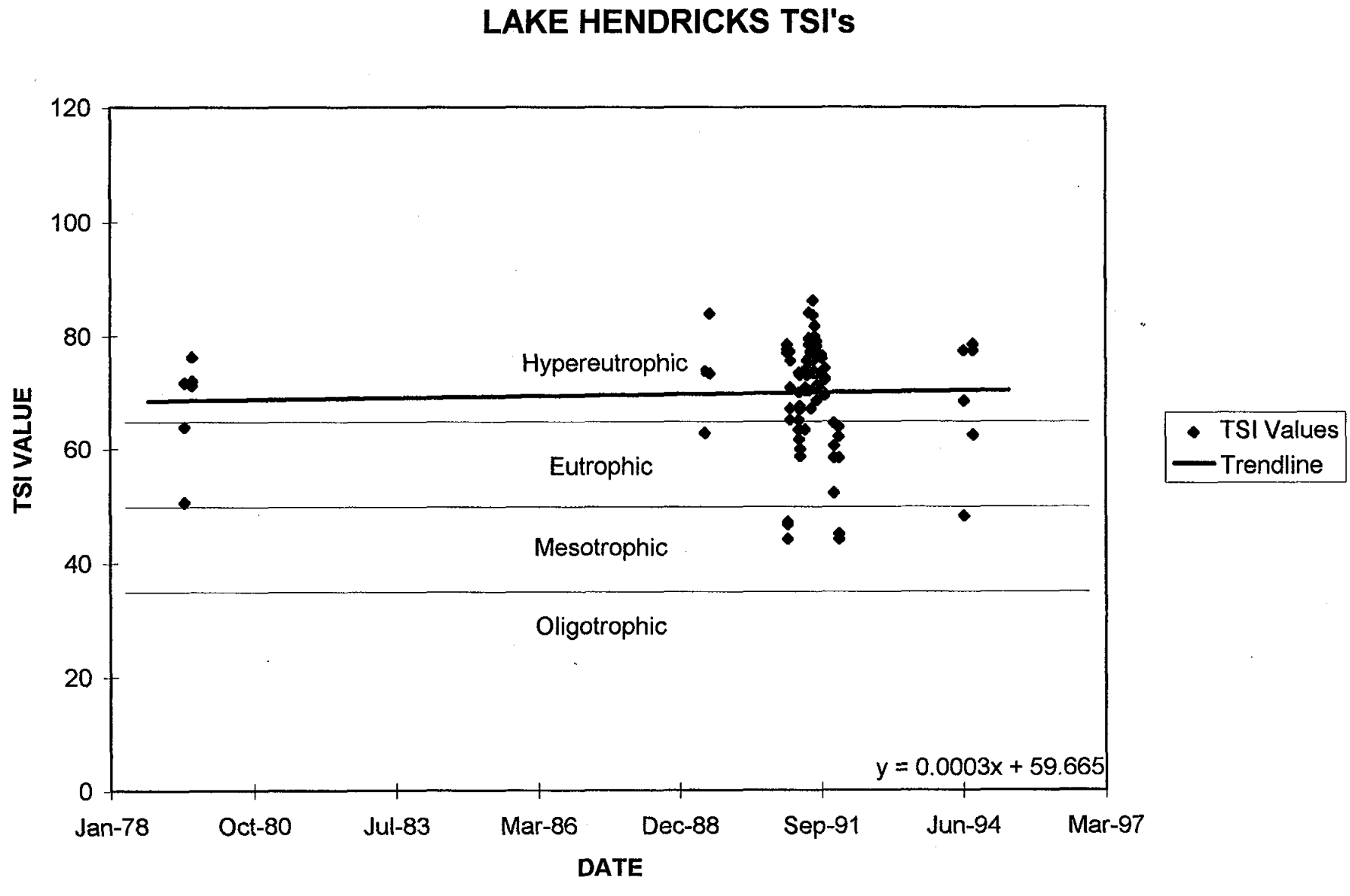


LAKE HENDRICKS 6/21/94
Dissolved Oxygen & Temperature Profile



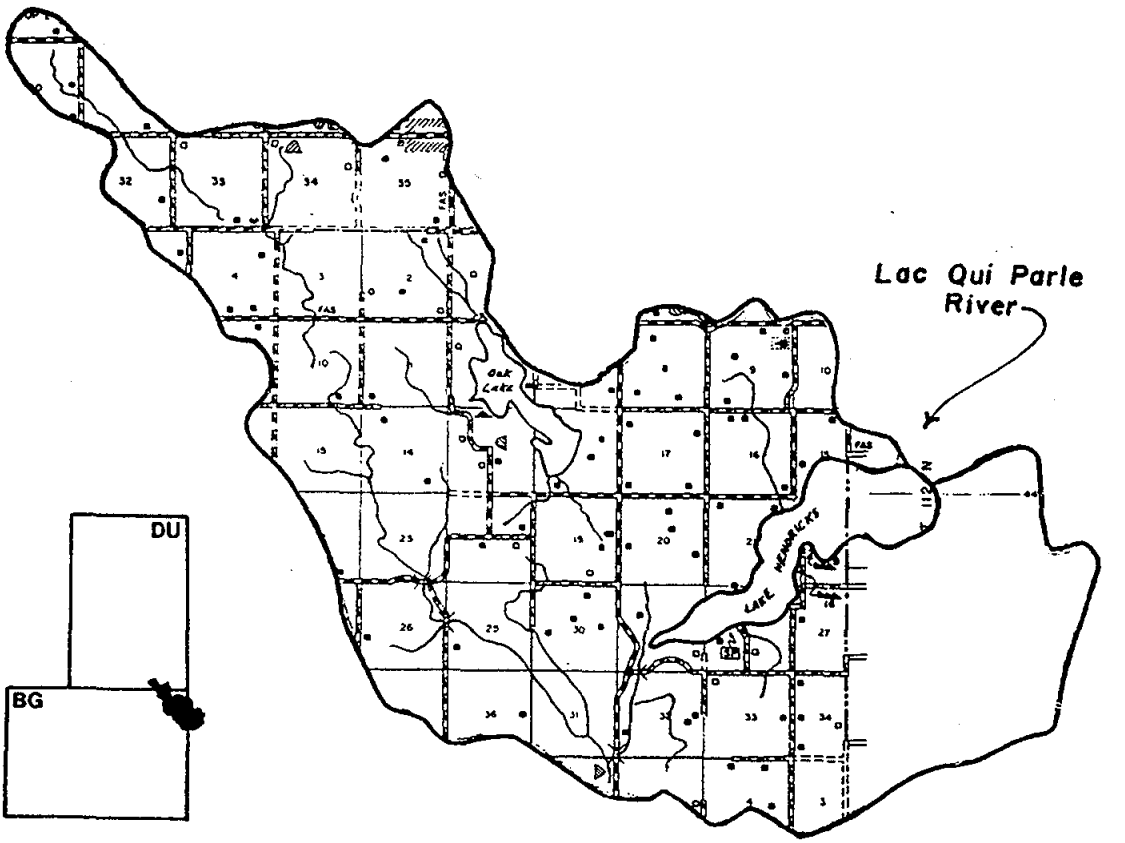
LAKE HENDRICKS 8/24/94
Dissolved Oxygen & Temperature Profile




LAKE HENDRICKS TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0003x + 59.665
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

Lake Hendricks

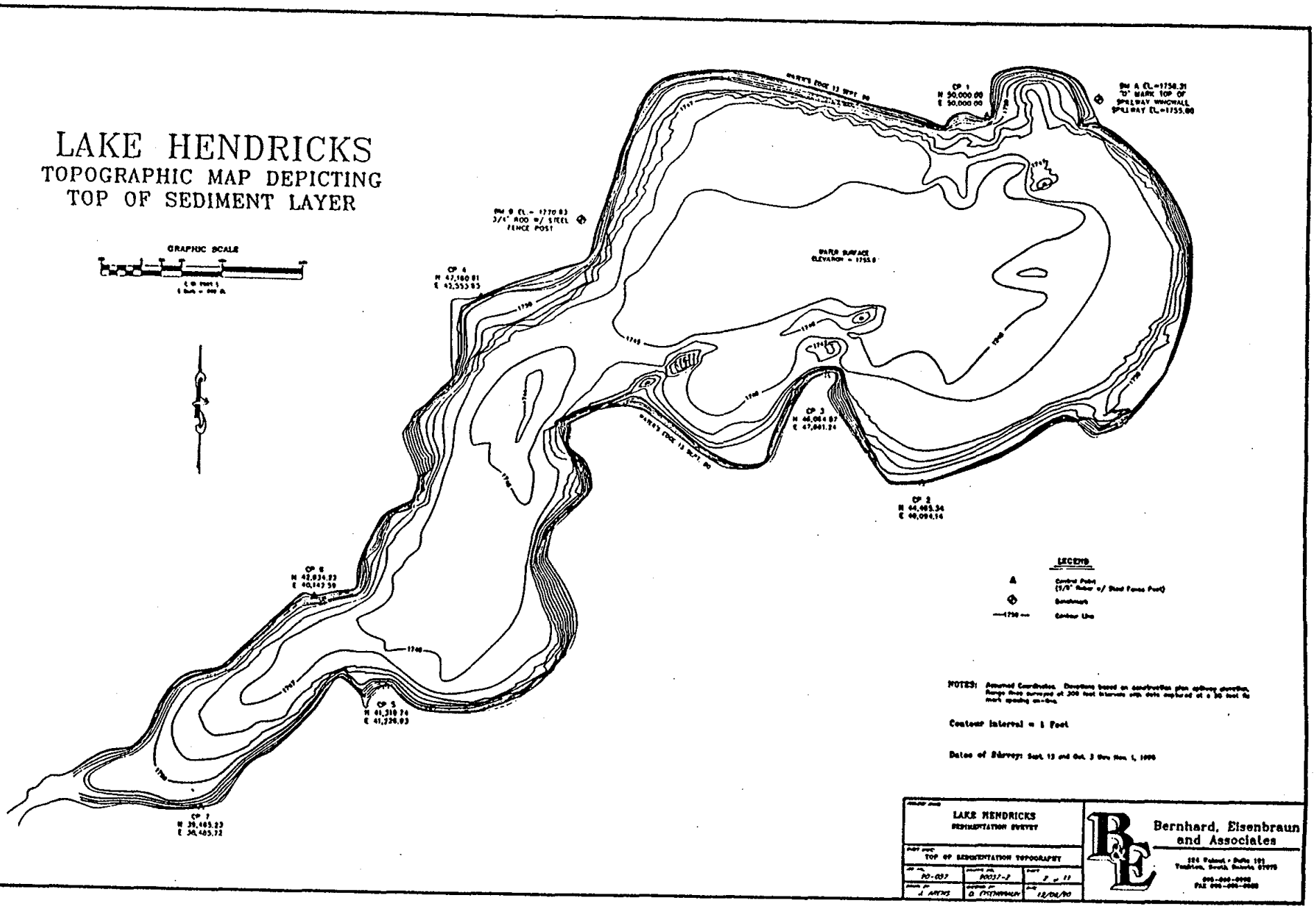
31,430 acres

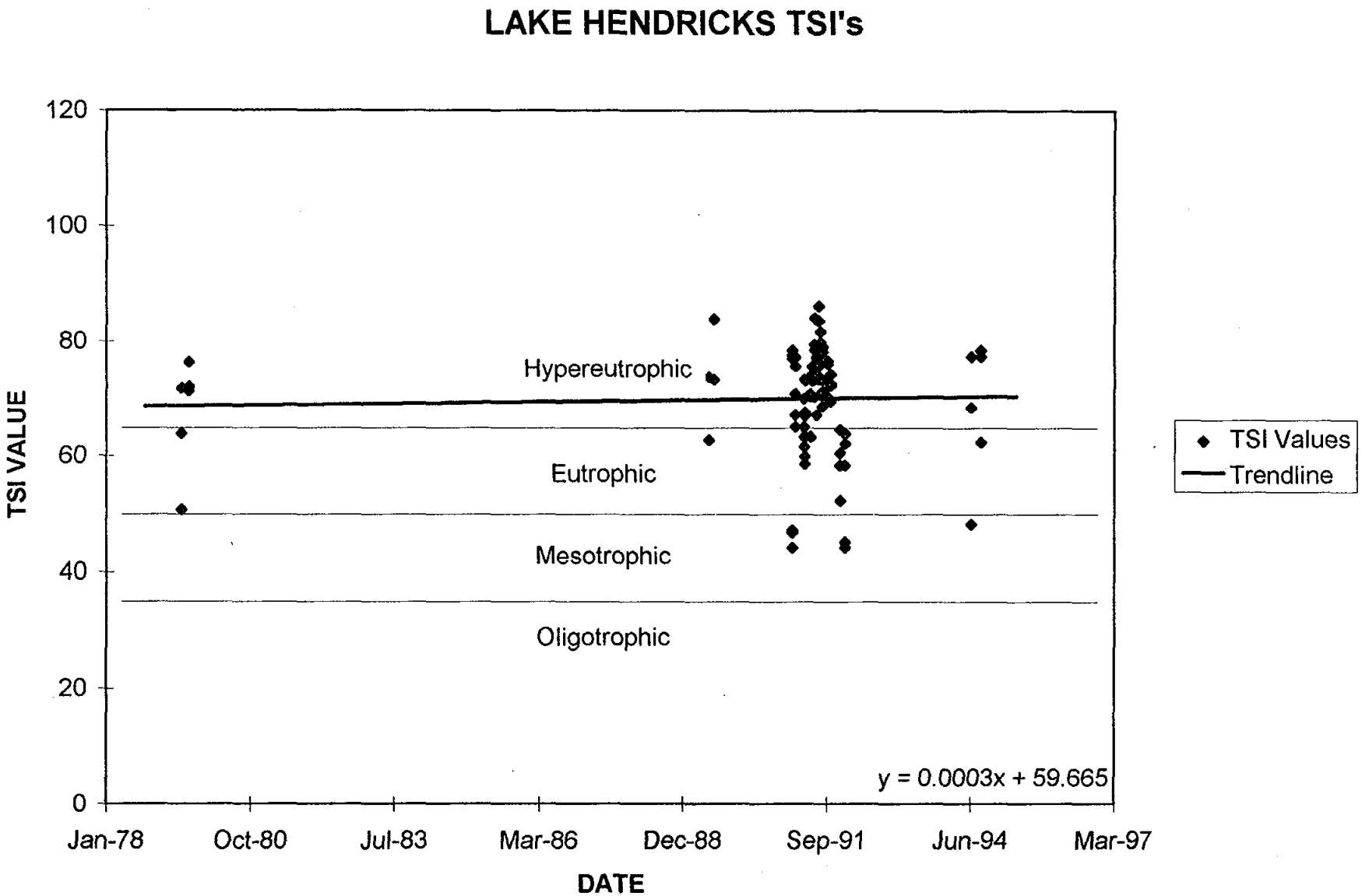


Scale

0 1 2 3 4 5 6 7 8

Miles


LAKE HENDRICKS
TOPOGRAPHIC MAP DEPICTING
TOP OF SEDIMENT LAYER
GRAPHIC SCALE
CP 1
N 50,000.00
E 50,000.00
CP 2
N 44,465.34
E 40,094.14
CP 3
CP 4
N 47,160.81
E 42,553.83
CP 5
N 41,310.74
E 41,226.03
CP 6
N 42,834.22
E 40,142.59
CP 7
N 39,465.23
E 38,485.72
WATER SURFACE
ELEVATION = 1755.8
LEGEND
Contour Line
NOTES:
Contour Interval = 1 Foot
Dates of Survey:
LAKE HENDRICKS
SEDIMENTATION SURVEY
TOP OF SEDIMENTATION TOPOGRAPHY
Bernhard, Eisenbraun
and Associates


LAKE HENDRICKS TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0003x + 59.665
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE HENRY

County: Bon Homme
Latitude: 43 deg. 08 min. 42 sec. N
Longitude: 97 deg. 42 min. 12 sec. W
Area: 38 A (15.3 ha)
Maximum Depth: 14 ft (4.3 m)
Volume: 248 acre-ft ($3.05x10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Dawson Creek
Outlet: Dawson Creek

Township: 96N
Range: 58W
Section(s): 9
Shoreline L: 7 mi (11.3 km)
Mean Depth: 8.4 ft (2.6 m)
Watershed/Lake Area: 913
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 289,421
Ownership Status: State owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	23.60	4	24.07	4	24.78
Air Temperature (°C)	4	28.00	4	25.50	4	27.00
Secchi Disk Depth (meters)	2	0.47	2	0.35	2	0.26
Conductivity (cond/25° C)	4	2,599	2	3,346	-	-
Turbidity (NTU)	-	-	-	-	4	25.26
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.70	4	8.30	4	8.11
Total Alkalinity (mg/l)	4	127	4	114	4	207
Total Solids (mg/l)	4	2,445	4	3,033	4	2,156
Dissolved Solids (mg/l)	4	2,412	4	2,996	4	2,126
Suspended Solids (mg/l)	4	33	4	38	4	30
Volatile Suspended Solids (mg/l)	-	-	2	6	-	-
Ammonia Nitrogen (mg/l)	4	0.26	4	0.02	4	0.04
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.55	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.85	4	2.17	4	1.64
Total Phosphorus (mg/l)	4	0.298	4	0.244	4	0.217
Total Dissolved Phosphorus (mg/l)	-	-	4	0.118	4	0.074
Ortho Phosphate as P (mg/l)	4	0.095	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	69.68	2	42.88

Year	1989	1991	1994
TSI Values -- Mean:	77.58	76.58	76.30
Secchi Disk	70.82	75.12	79.71
Total Phosphorus	84.35	82.42	81.73
Chlorophyll *a*		72.20	67.44

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: Ceratophyllum demersum and Potamogeton pectinatus

Algal Species and Densities

	June 27, 1989		July 31, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	222	10586	-	-
Anabaena	35	1669	63	5684
Cryptomonas sp. #1	12	572	-	-
Algae (other)	9	429	8	722
Crucigenia	6	286	-	-
Glenodinium Gymnodinium	6	286	26	2346
Green Algae (other)	4	191	2	180
Oocystis	2	95	-	-
Scenedesmus	2	95	-	-
Attheya	1	48	-	-
Algae (flagellate)	1	48	4	361
Schizothrix	-	-	93	8390
Lyngbya Diguetii	-	-	93	8390
Chaetoceros	-	-	12	1083
Aphanocapsa	-	-	3	271
Blue-green (other)	-	-	2	180
Characium	-	-	1	90
Diatom (other)	-	-	1	90
Total	300	14,305	308	27,787

Watershed Description

Watershed Area: 34,699 A (14,043 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
CY-TK-PR	28,106	81
HC-CY-DE	3,817	11
CY-EU-TK	1,735	5
B3-EU	1,388	4

CY-TK-PR Clarno-Tetonka-Prosper: Well drained, poorly drained, and moderately well drained, level to undulating, loamy and silty soils formed in glacial till and alluvium; on uplands.

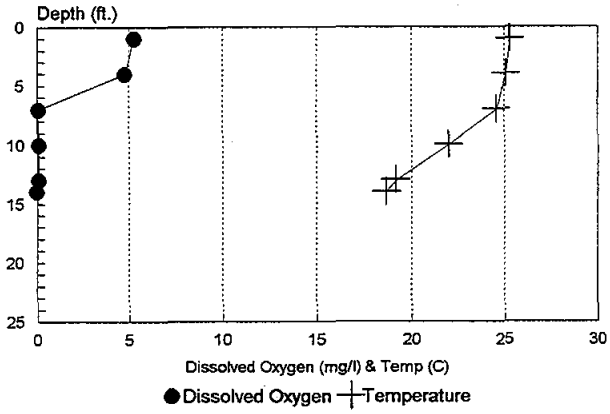
HC-CY-DE Hand-Clarno-Davison: Well drained and moderately well drained, nearly level to gently rolling, loamy soils formed in glacial meltwater deposits and glacial till; on uplands.

CY-EU-TK Clarno-Ethan-Tetonka: Well drained and poorly drained, level to rolling, loamy and silty soils formed in glacial till and alluvium; on uplands.

B3-EU Betts-Ethan: Sloping to hilly, excessively drained and well drained loamy soils that formed in glacial till; on uplands.

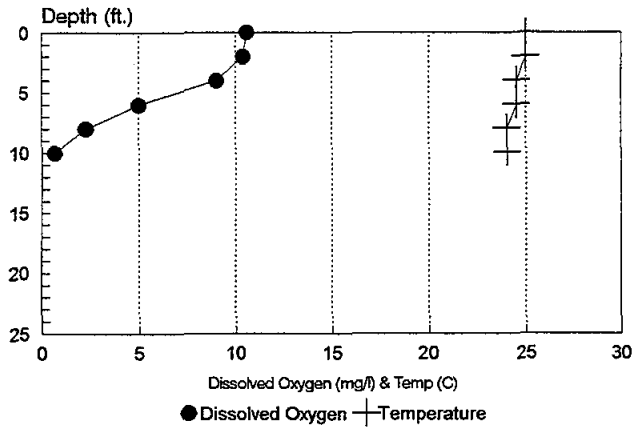
LAKE HENRY 7/28/79

Dissolved Oxygen & Temperature Profile



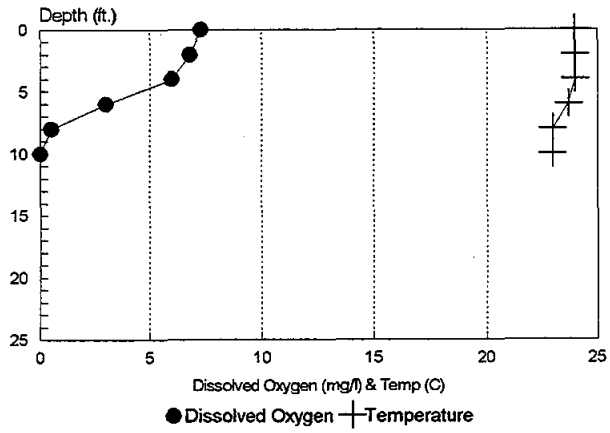
LAKE HENRY 7/11/91

Dissolved Oxygen & Temperature Profile



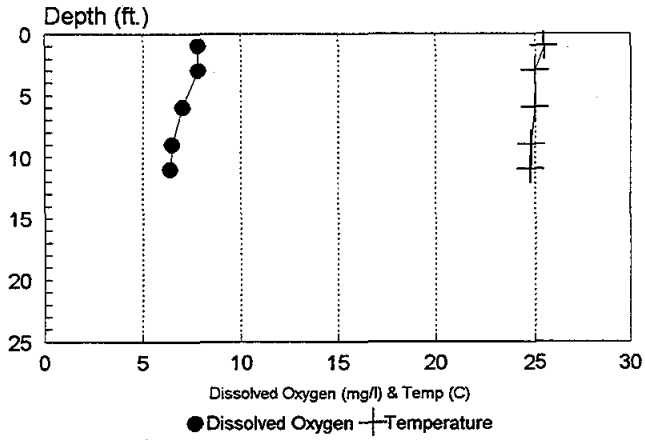
LAKE HENRY 8/14/91

Dissolved Oxygen & Temperature Profile



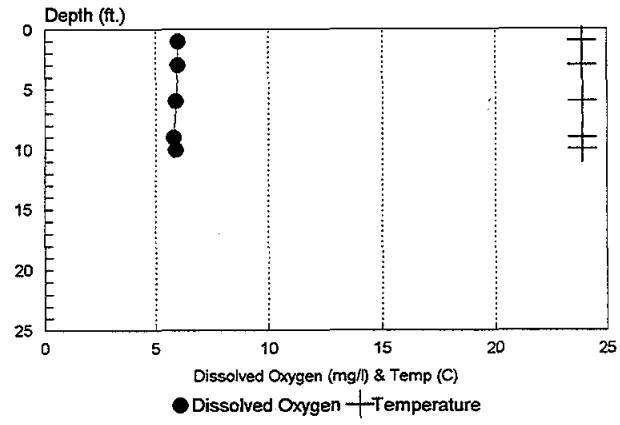
LAKE HENRY 6/20/94

Dissolved Oxygen & Temperature Profile

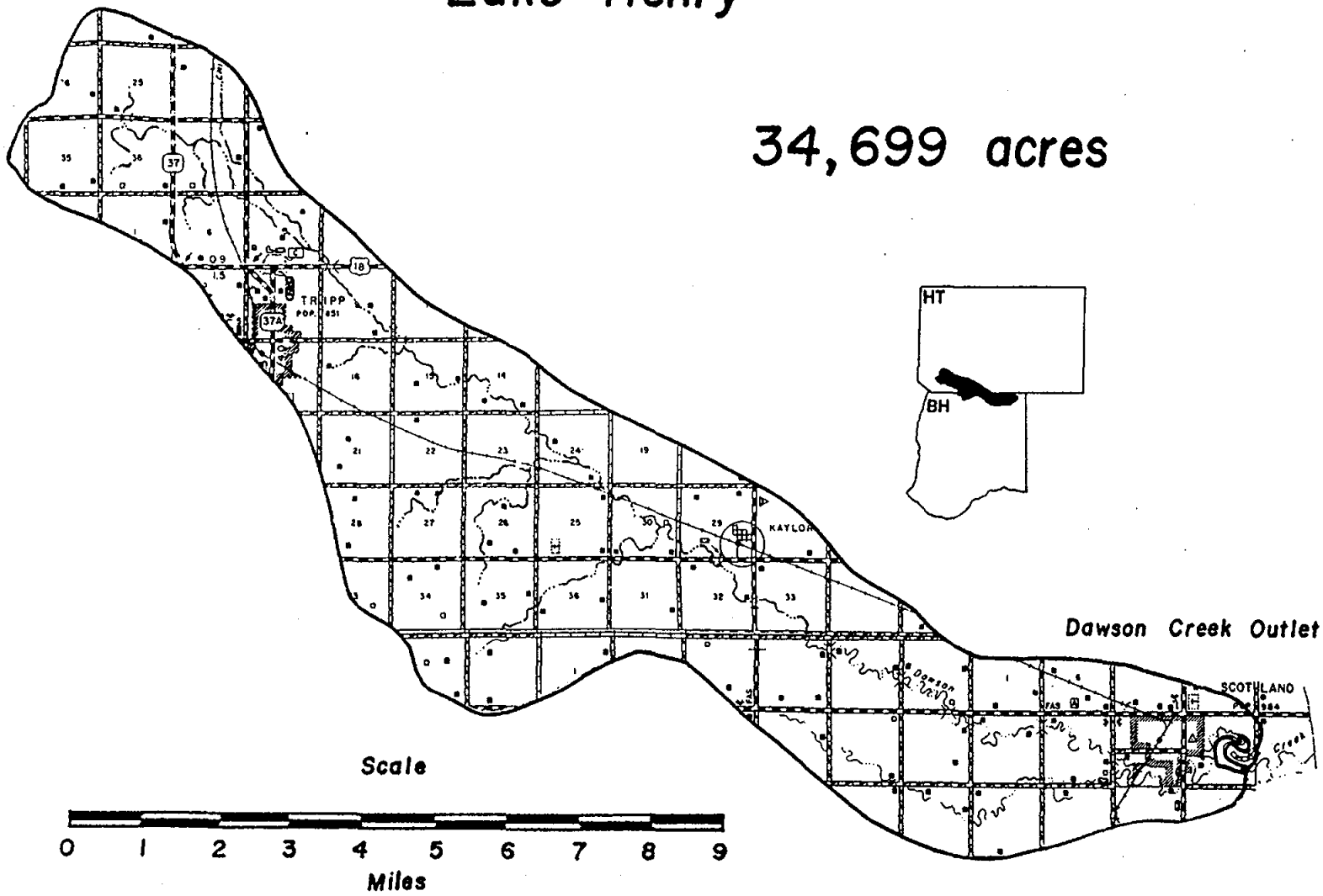


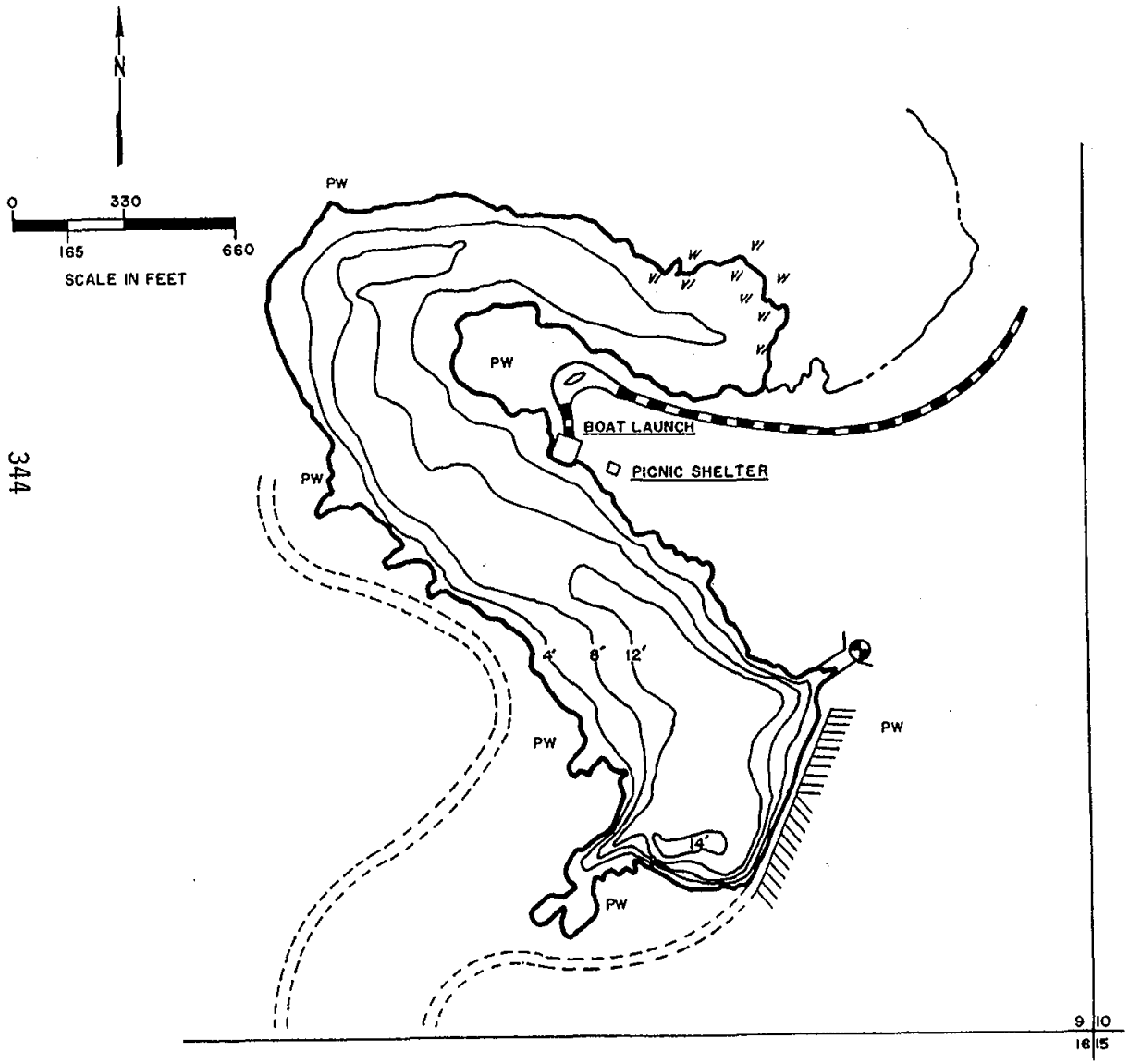
LAKE HENRY 8/22/94

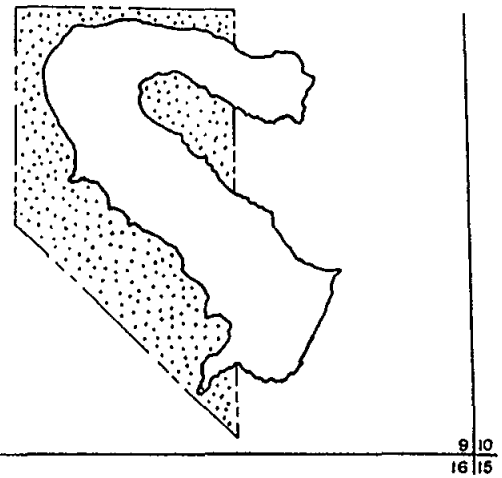
Dissolved Oxygen & Temperature Profile



Lake Henry


34,699 acres
HT
BH
TRIPP
POP. 651
KAYLOR
Dawson Creek Outlet
SCOTLAND
Scale
0 1 2 3 4 5 6 7 8 9
Miles





PUBLIC LAND BOUNDARIES
REFERENCE MAP

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

LAKE HENRY
BON HOMME COUNTY
1985

FIELD DATA COLLECTED : 6-11-85
AERIAL PHOTO NO. : 181-R
AERIAL PHOTO DATE : 1978
SECTION : 9
TOWNSHIP : T 96 N
RANGE : R 58 W
SCALE : 1"=330'

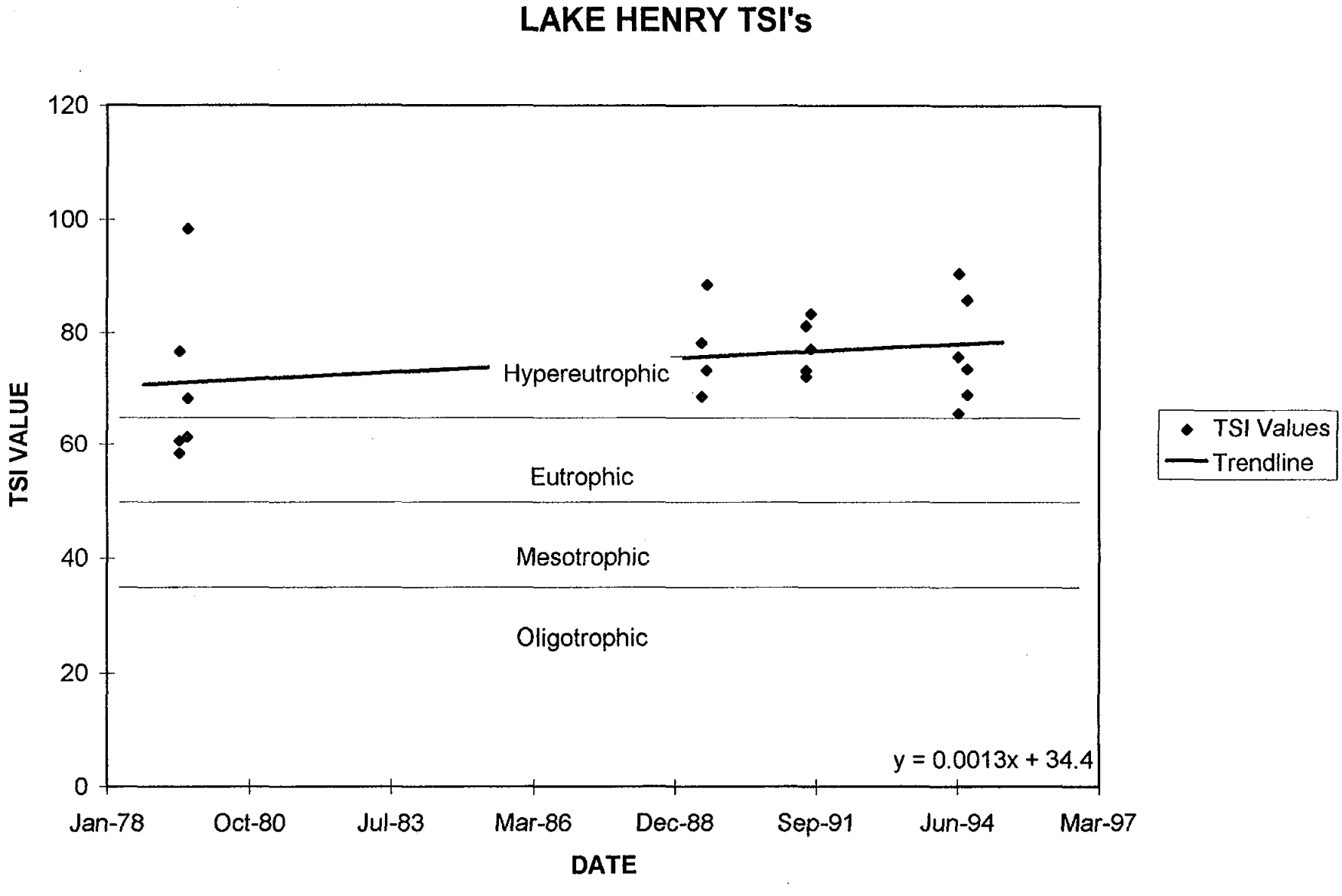
WATER LEVEL : FULL
BENCHMARK : SPILLWAY
PLANIMETERED LAKE ACREAGE :
MILES OF SHORELINE : 7
AVERAGE DEPTH IN FEET : 6.6
VOLUME IN ACRE FEET : 4' : 126
6' : 78
12' : 39
14' : 6
TOTAL : 248

SYMBOLS

DEPTH CONTOUR : —4'—
PARTLY WOODED : PW
BENCHMARK :

ROADS : GRAVEL :
TRAIL : - - -
SPILLWAY :
DAM :

REPRODUCTION BY PERMISSION OF *S.D. GAME, FISH AND PARKS* ONLY


LAKE HENRY TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0013x + 34.4
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE HERMAN

County: Lake
Latitude: 44 deg. 00 min. 00 sec.
Longitude: 97 deg. 10 deg. 45 sec.
Area: 1,350 A (546.3 ha)
Maximum Depth: 8.0 ft (2.4 m)
Volume: 7425 acre-ft ($9.159 \times 10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: Silver Creek

Township: 106N
Range: 53W
Section(s): 10-11, 14-15, 22-23
Shoreline L: 9.5 mi (15.3 km)
Mean Depth: 5.5 ft (1.7 m)
Watershed/Lake Area: 27
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 270,159
Ownership Status: State and County owned
Public Interest: Lake Herman Development Association.

	1991		1992		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.25	26	19.88	17	20.37
Air Temperature (°C)	4	18.50	26	24.69	17	21.79
Secchi Disk Depth (meters)	2	0.52	16	0.44	11	0.73
Conductivity (cond/25° C)	2	1,630	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.63	25	7.32	17	8.37
Total Alkalinity (mg/l)	4	162	26	160	17	175
Total Solids (mg/l)	4	1,456	26	1,223	17	881
Dissolved Solids (mg/l)	4	1,435	26	1,185	17	863
Suspended Solids (mg/l)	4	21	26	38	17	17
Volatile Suspended Solids (mg/l)	2	20	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.03	26	0.03	17	0.23
Nitrate + Nitrite Nitrogen (mg/l)	4	0.75	26	0.12	17	0.34
Total Kjeldahl Nitrogen (mg/l)	4	1.34	26	1.15	17	1.38
Total Phosphorus (mg/l)	4	0.211	26	0.284	17	0.355
Total Dissolved Phosphorus (mg/l)	4	0.101	25	0.147	17	0.286
Ortho Phosphate as P (mg/l)	-	-	-	-	-	
Chlorophyll (mg/m^3)	2	24.12	15	32.43	16	20.23

Year	1991	1992	1993
TSI Values -- Mean:	70.62	73.91	72.33
Secchi Disk	69.49	71.88	64.55
Total Phosphorus	80.59	85.16	88.76
Chlorophyll *a*	61.80	64.70	59.94

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10-20%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

	June 27, 1989			
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	222	10586	-	-
Anabaena	35	1669	63	5684
Cryptomonas sp. #1	12	572	-	-
Algae (other)	9	429	8	722
Crucigenia	6	286	-	-
Glenodinium Gymnodinium	6	286	26	2346
Green Algae (other)	4	191	2	180
Oocystis	2	95	-	-
Scenedesmus	2	95	-	-
Attheya	1	48	-	-
Algae (flagellate)	1	48	4	361
Schizothrix	-	-	93	8390
Lyngbya Diguetii	-	-	93	8390
Chaetoceros	-	-	12	1083
Aphanocapsa	-	-	3	271
Blue-green (other)	-	-	2	180
Characium	-	-	1	90
Diatom (other)	-	-	1	90
Total	300	14,305	308	27,787

Watershed Description

Watershed Area: 36,275 A (14,680 ha)

Soil Associations within Watershed

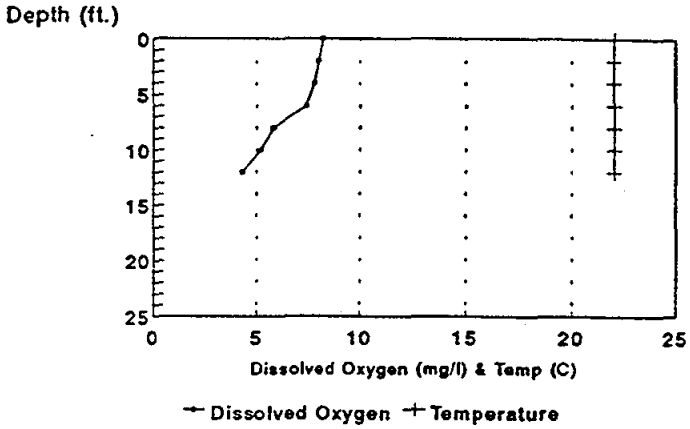
Association	Area (A)	% of Total
EF-VH	19,589	54
EF-WF	13,421	37
WF-SH	3,265	9

EF-VH Egan-Viborg: Nearly level to gently sloping, well drained and moderately well drained, silty soils formed in glacial drift; on uplands.

EF-WF Egan-Wentworth: Gently undulating to rolling, well drained, silty soils formed in glacial drift; on uplands.

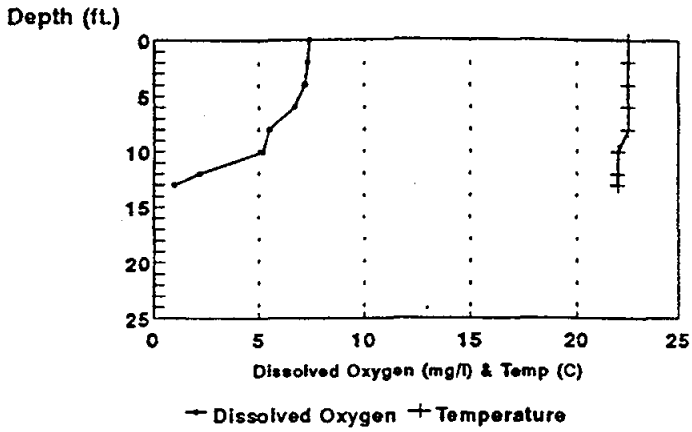
LAKE HERMAN 7/10/91

Dissolved Oxygen & Temperature Profile

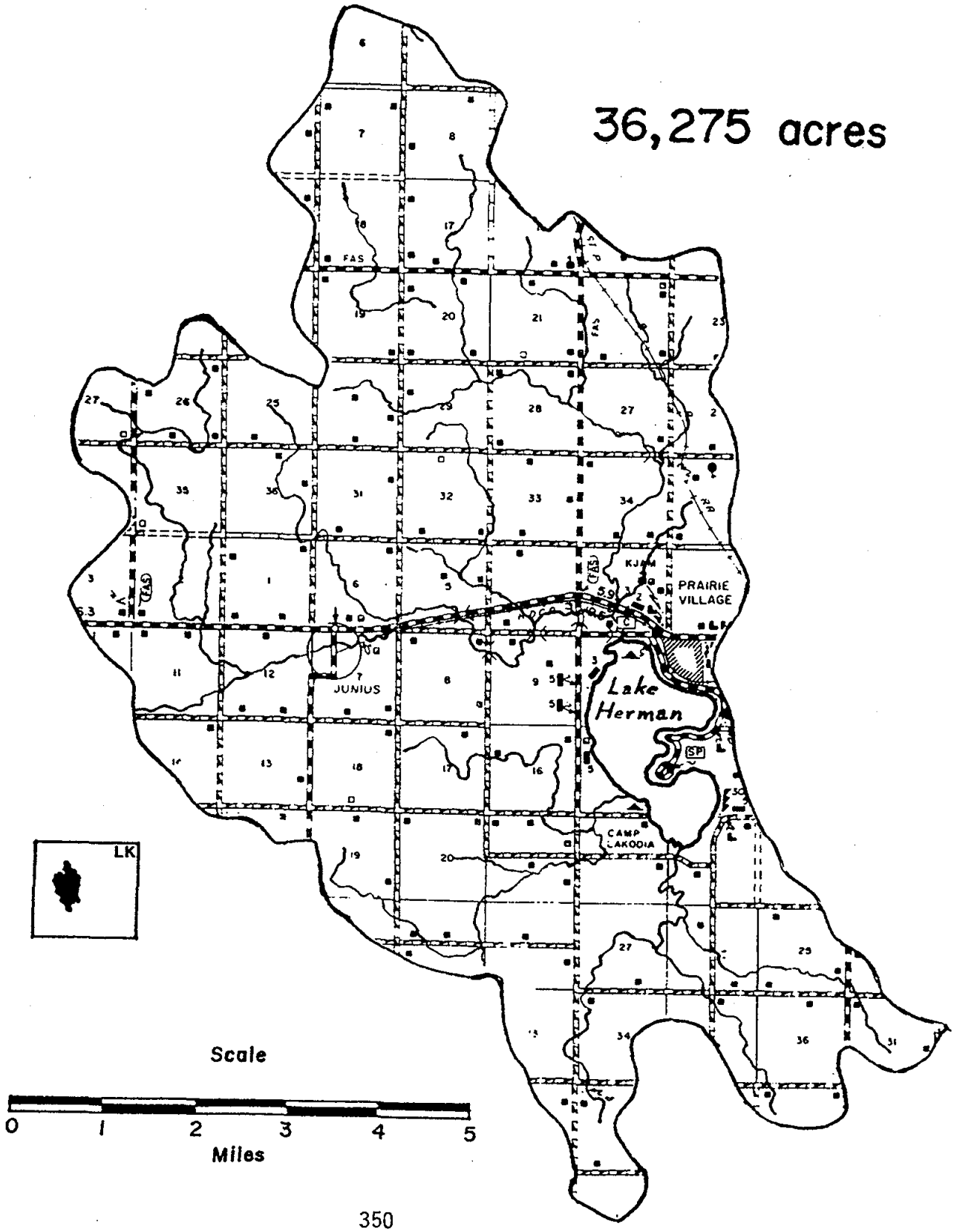


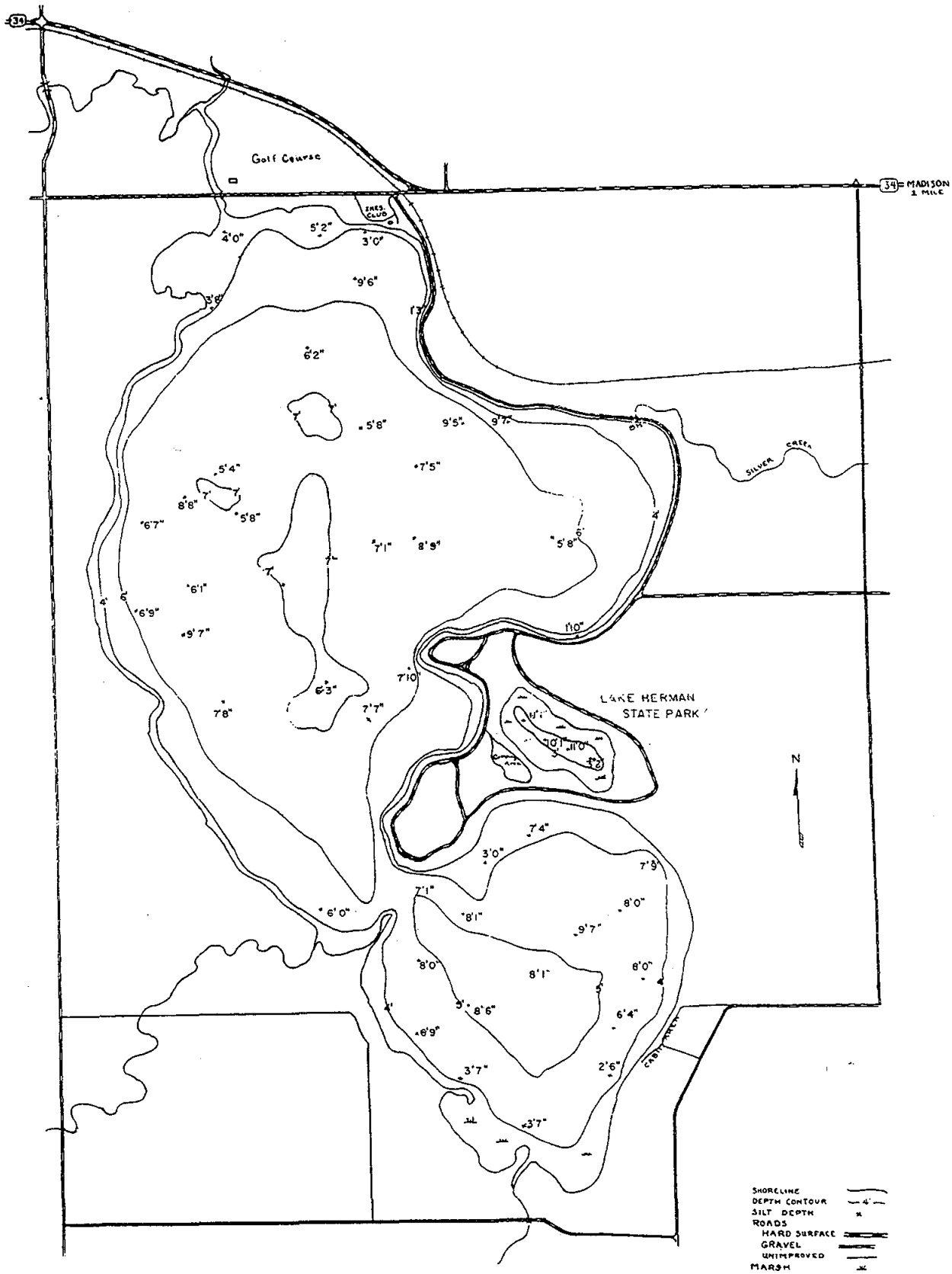
LAKE HERMAN 8/21/91

Dissolved Oxygen & Temperature Profile



Lake Herman

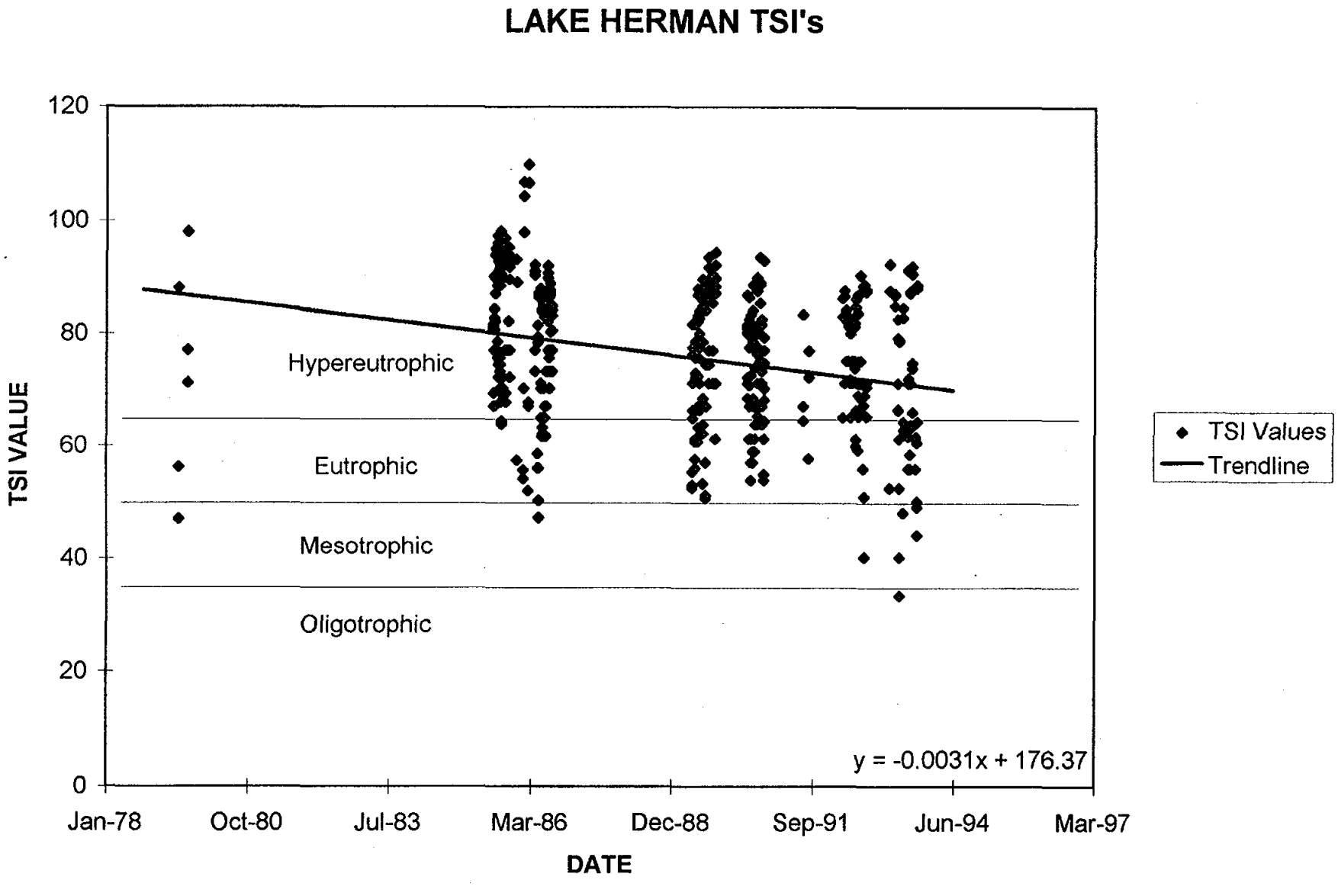

36,275 acres
FAS
PRAIRIE VILLAGE
JUNIUS
Lake Herman
SP
CAMP LAKODIA
LK
Scale
0 1 2 3 4 5
Miles



SOUTH DAKOTA
DEPT. OF GAME FISH AND PARKS

LAKE HERMAN
LAKE COUNTY

WATER STAGE 12" BELOW SM.
PLANIMETER ACRES 1350
AERIAL PHOTO DATE:
FIELD WORK DATE: JUNE 1967
SEC 10, 11, 14, 15, 23 TWNSHP. 106N RANGE 53W
SM SPILLWAY LEVEL


LAKE HERMAN TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0031x + 176.37
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE HIDDENWOOD

County: Walworth
Latitude: 45 deg. 32 min. 48 sec. N
Longitude: 99 deg. 58 min. 42 sec. W
Area: 28 A (11.3 ha)
Maximum Depth: 11 ft (3.4 m)
Volume: 140 acre-ft (1.727 x $10^5 m^3$)
Origin of Basin: impoundment
Township: 124N
Range: 76W
Section(s): 23, 24
Shoreline L: 1.1 mi (1.8 km)
Mean Depth: 5.0 ft (1.5 m)
Watershed/Lake Area: 892
Thermal Stratification: yes
Major Inflows (named or permanent streams): Hiddenwood Creek
Outlet: Hiddenwood Creek

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 37,620
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.75	4	21.85	4	20.35
Air Temperature (°C)	4	27.22	4	26.00	4	25.75
Secchi Disk Depth (meters)	2	0.47	2	0.91	2	0.59
Conductivity (cond/25° C)	-	616	2	556	-	-
Turbidity (NTU)	-	-	-	-	4	13.31
Lab pH (su)	4	8.73	-	-	-	-
Field pH (su)	-	-	4	8.55	4	8.54
Total Alkalinity (mg/l)	4	154	4	136	4	221
Total Solids (mg/l)	4	474	4	428	4	559
Dissolved Solids (mg/l)	4	452	4	410	4	545
Suspended Solids (mg/l)	4	22	4	18	4	14
Volatile Suspended Solids (mg/l)	-	-	2	10	-	-
Ammonia Nitrogen (mg/l)	4	0.23	4	0.32	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.43	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.19	4	1.63	4	1.38
Total Phosphorus (mg/l)	4	0.497	4	0.489	4	0.333
Total Dissolved Phosphorus (mg/l)	-	-	4	0.385	3	0.247
Ortho Phosphate as P (mg/l)	4	0.297	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	80.40	1	40.87

	1989	1991	1993
TSI Values -- Mean:	82.23	75.88	74.29
Secchi Disk	70.82	61.29	67.73
Total Phosphorus	93.65	92.73	88.18
Chlorophyll *a*		73.61	66.97

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: Potamogeton pectinatus and Potamogeton foliosus

Algal Species and Densities

July 18, 1989

Taxa	Number	Units/ml
Algae (other)	102	5,380
Oocystis	43	2,268
Scenedesmus	41	2,163
Green Algae (other)	26	1,371
Crucigenia	14	738
Aphanizomenon flos-aquae	9	475
Cryptomonas sp. #1	9	475
Mallomonas	8	422
Cryptomonas	7	369
Anabaena	6	316
Characium	6	316
Cryptomonas ovata	4	211
Blue-green (other)	4	211
Melosira granulata	4	211
Diatom (centric)	3	158
Tetrastrum	3	158
Staurastrum	1	53
Dactylococcopsis	1	53
Elakatothrix	1	53
Chroococcus	1	53
Total	301	15,877

Watershed Description

Watershed Area: 24,963 A (10,103 ha)

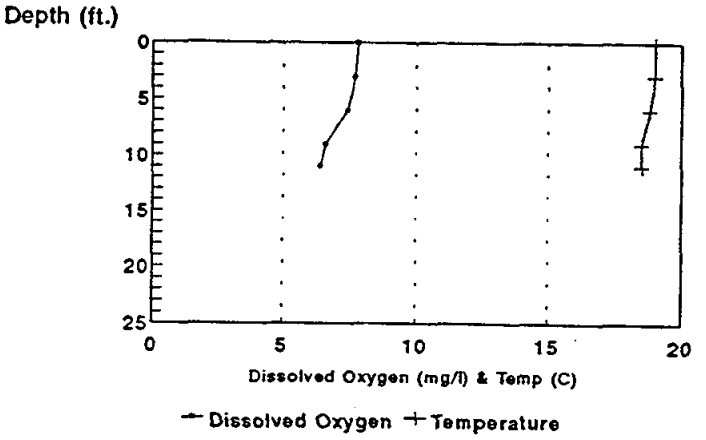
Soil Associations within Watershed

Association	Area (A)	% of Total
WJ-B1	19,721	79
H3	5,242	21

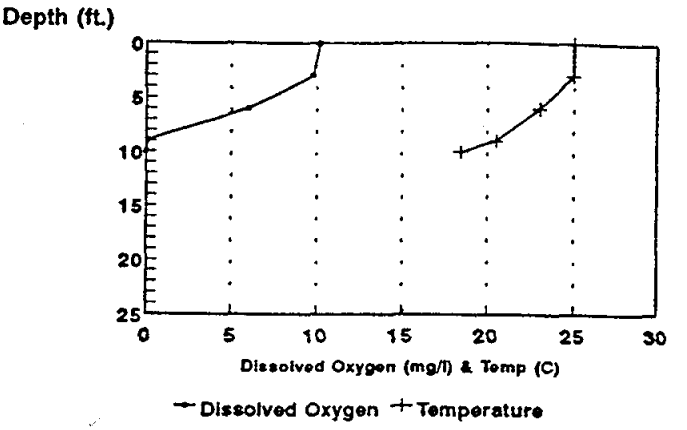
WJ-B1 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating loamy soils.

H3 Highmore: Deep, well drained nearly level to sloping soils that formed in silty glacial drift.

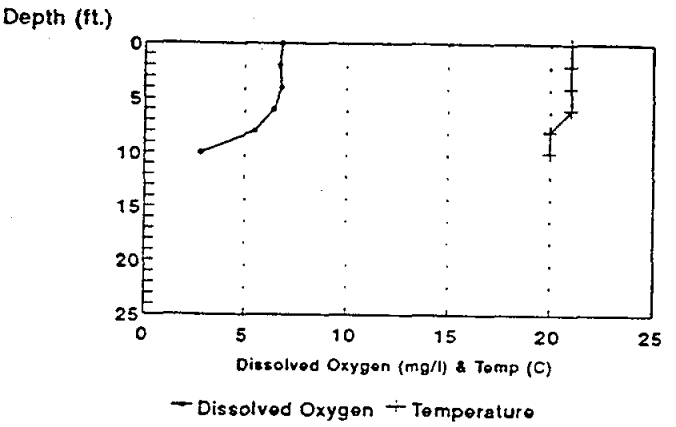
LAKE HIDDENWOOD 7/6/93
Dissolved Oxygen & Temperature Profile



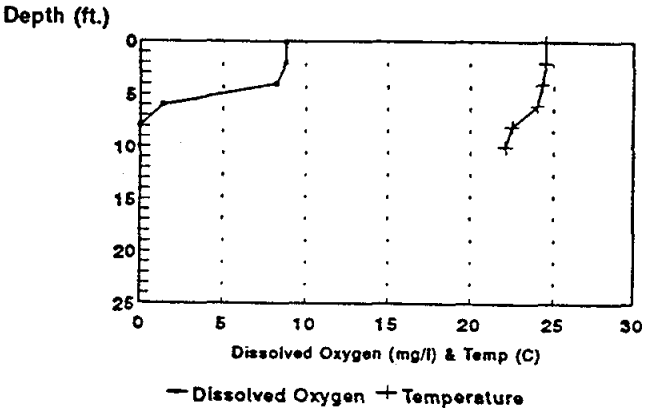
LAKE HIDDENWOOD 8/16/93
Dissolved Oxygen & Temperature Profile



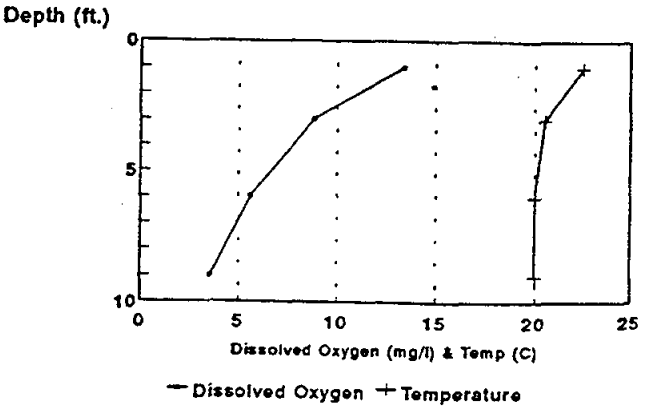
LAKE HIDDENWOOD 6/24/91
Dissolved Oxygen & Temperature Profile



LAKE HIDDENWOOD 8/28/91
Dissolved Oxygen & Temperature Profile

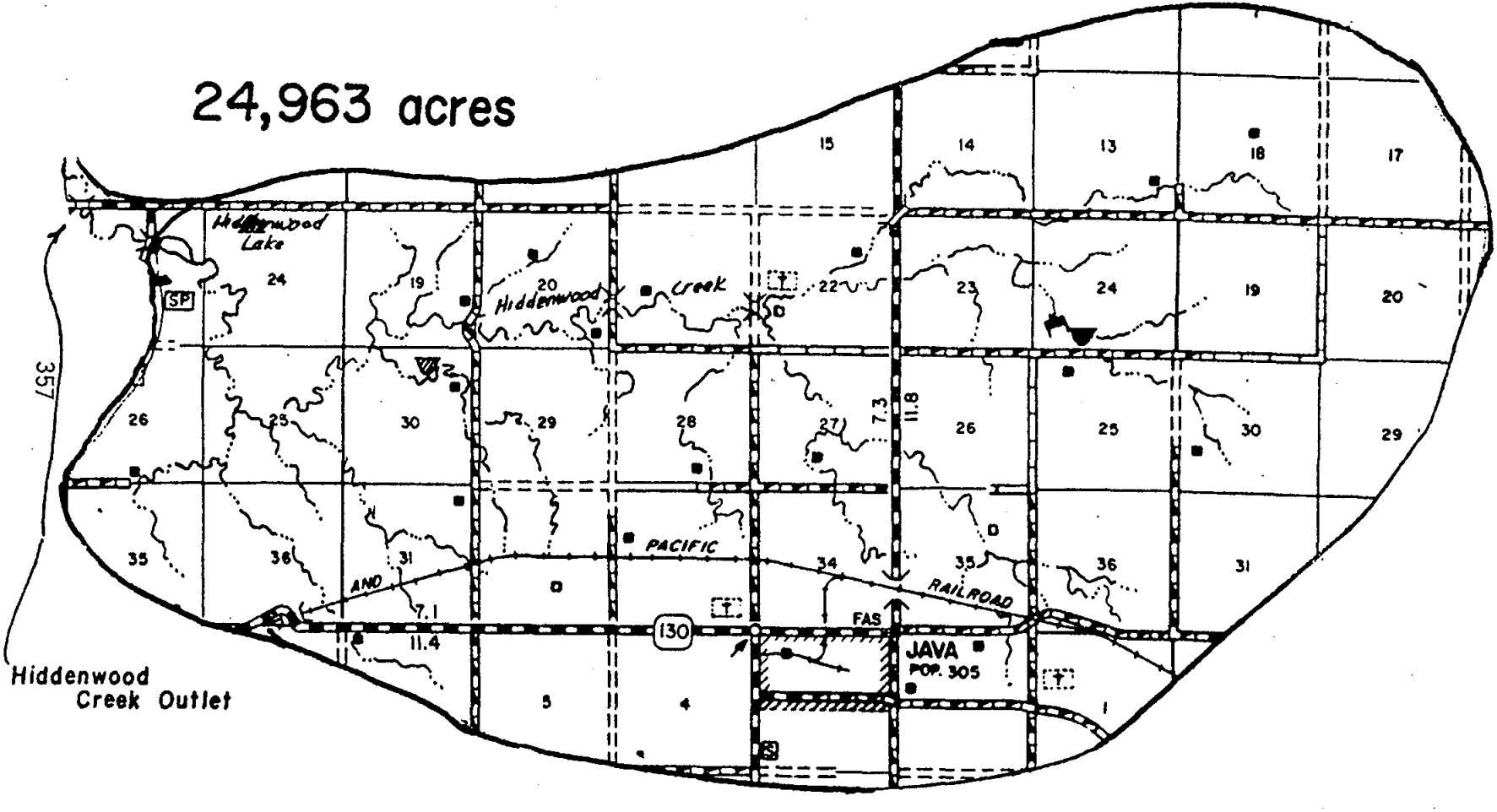


Lake Hiddenwood, 8/8/89
Dissolved Oxygen & Temperature Profile



Hiddenwood Lake

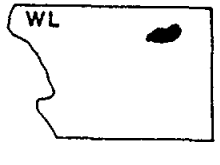
24,963 acres



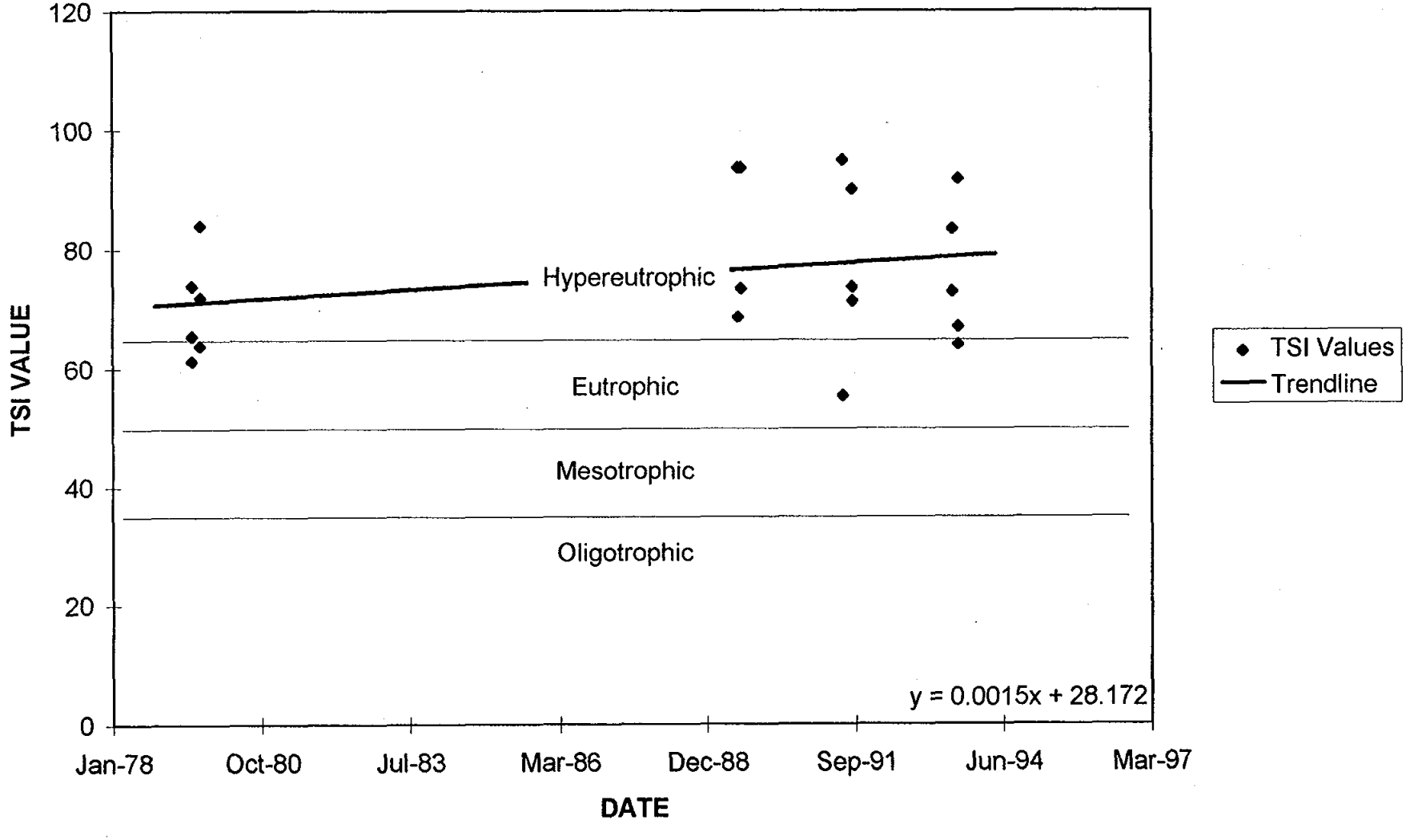
Scale

0 1 2 3 4 5 6

Miles



LAKE HIDDENWOOD TSI's



HORSETHIEF LAKE

County: Pennington
Latitude: 43 deg. 53 min. 36 sec. N
Longitude: 103 deg. 28 min. 53 sec. W
Area: 16.4 A (6.6 ha)
Maximum Depth: 35 ft (10.7 m)
Volume: NA
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Pine Creek
Outlet: unnamed

Township: 2N
Range: 5E
Section(s): 11
Shoreline L: 0.9 mi (1.5 km)
Mean Depth: NA
Watershed/Lake Area: 157
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 145,551
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.50	4	12.88	4	13.43
Air Temperature (°C)	4	28.06	4	21.10	4	19.00
Secchi Disk Depth (meters)	2	1.71	2	1.49	2	1.59
Conductivity (cond/25° C)	4	103	2	79	-	-
Turbidity (NTU)	-	-	-	-	2	8.78
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	2	8.70	4	7.19	4	7.59
Total Alkalinity (mg/l)	4	42	4	31	4	31
Total Solids (mg/l)	4	89	4	76	4	71
Dissolved Solids (mg/l)	4	77	4	62	4	64
Suspended Solids (mg/l)	4	12	4	14	4	7
Volatile Suspended Solids (mg/l)	-	-	2	4	-	-
Ammonia Nitrogen (mg/l)	4	0.19	4	0.39	4	0.18
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.75	4	1.16	4	1.11
Total Phosphorus (mg/l)	4	0.083	4	0.210	4	0.138
Total Dissolved Phosphorus (mg/l)	-	-	4	0.171	4	0.071
Ortho Phosphate as P (mg/l)	4	0.029	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	8.04	2	31.49

Year	1989	1991	1994
TSI Values -- Mean:	53.66	55.69	60.47
Secchi Disk	52.29	54.21	53.31
Total Phosphorus	55.03	61.83	63.69
Chlorophyll *a*		51.02	64.41

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submerged Plant Species Identified: None identified.

Algal Species and Densities

	July 11, 1989		August 16, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Characium	40	714	-	-
Fragilaria crotonensis	37	661	-	-
Algae (other)	20	357	14	1,067
Coelosphaerium	16	286	-	-
Algae (flagellate)	10	179	-	-
Oocystis	4	71	1	76
Green Algae (other)	4	71	17	1,296
Scenedesmus	4	71	-	-
Cryptomonas sp. #1	3	54	-	-
Diatom (pennate)	3	54	-	-
Anabaena	3	54	2	152
Chroococcus	2	36	-	-
Cryptomonas	2	36	-	-
Cryptomonas ovata	1	18	-	-
Franceia	1	18	4	305
Cosmarium	1	18	4	305
Botryococcus	1	18	-	-
Staurastrum	-	-	3	229
Total	153	2,733	45	3,430

Watershed Description

Watershed Area: 2,578 A (1,043 ha)

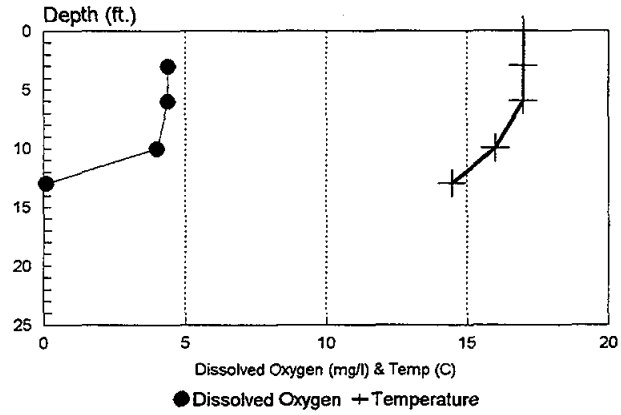
Soil Associations within Watershed

Association	Area (A)	% of Total
#6	2,578	100

#6 Buska-Mocmont-Rock outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

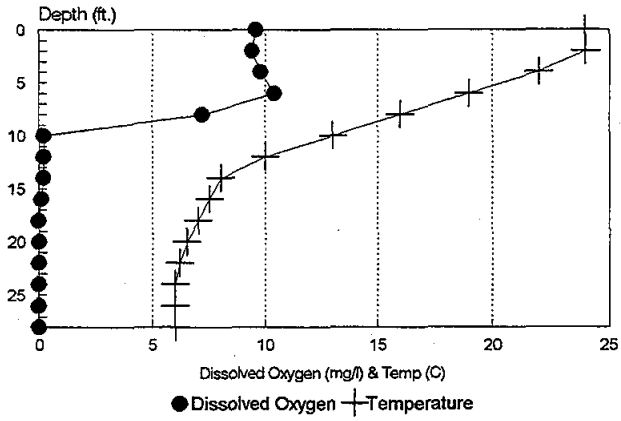
HORSETHIEF LAKE 8/15/79

Dissolved Oxygen & Temperature Profile



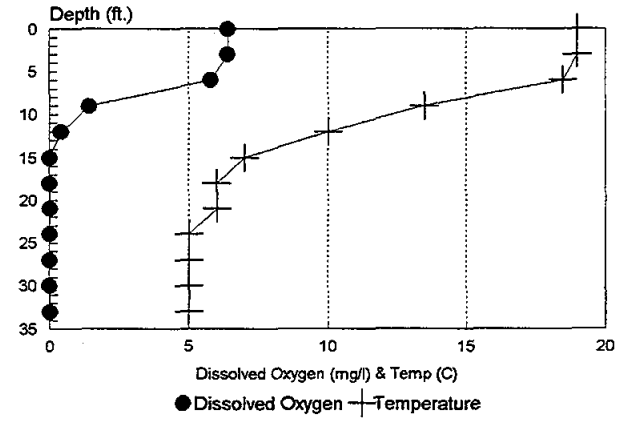
HORSETHIEF LAKE 7/15/91

Dissolved Oxygen & Temperature Profile



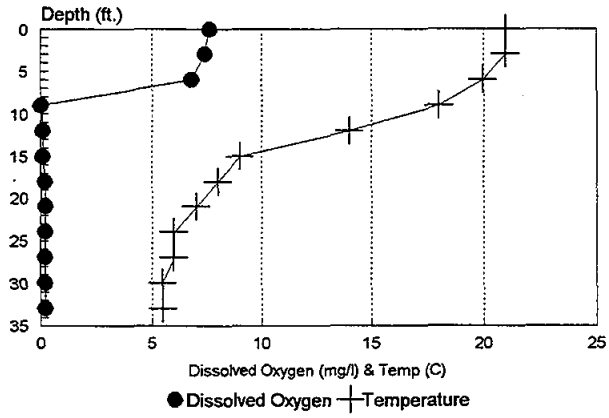
HORSETHIEF LAKE 6/14/94

Dissolved Oxygen & Temperature Profile

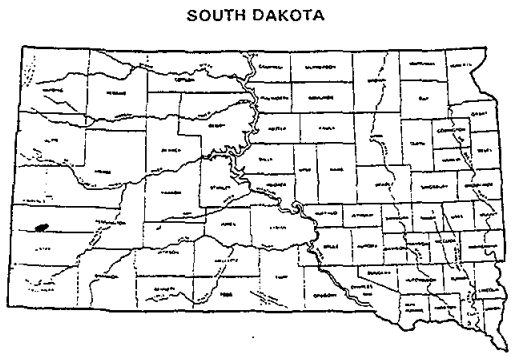


HORSETHIEF LAKE 8/17/94

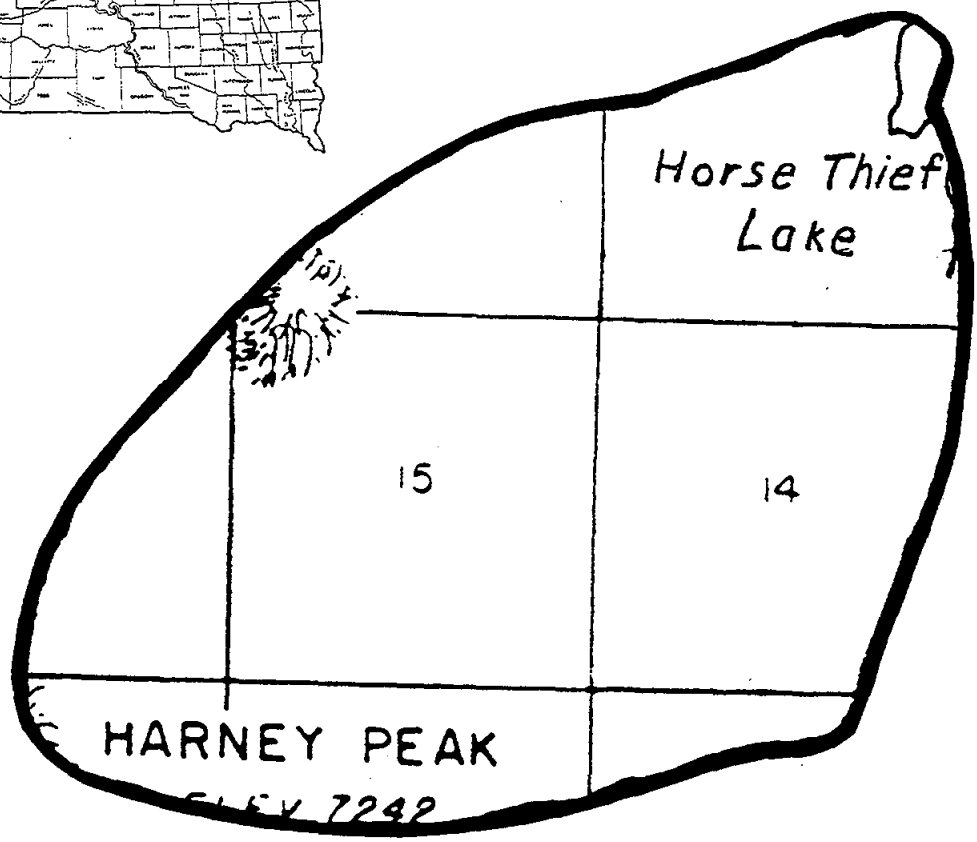
Dissolved Oxygen & Temperature Profile



Horsethief Lake



2,578 acres



SCALE

0 1 2 MILES

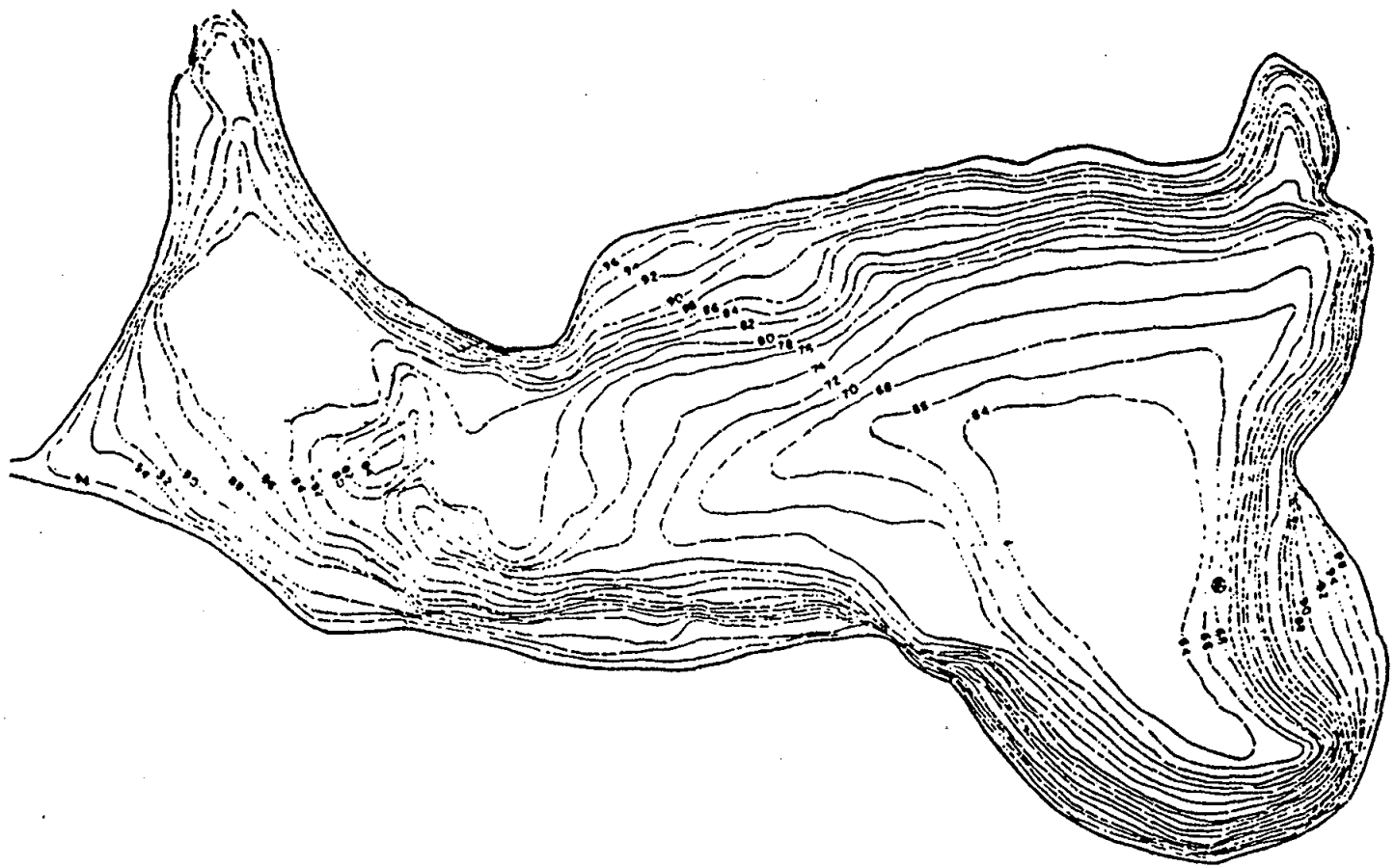


FIGURE 14

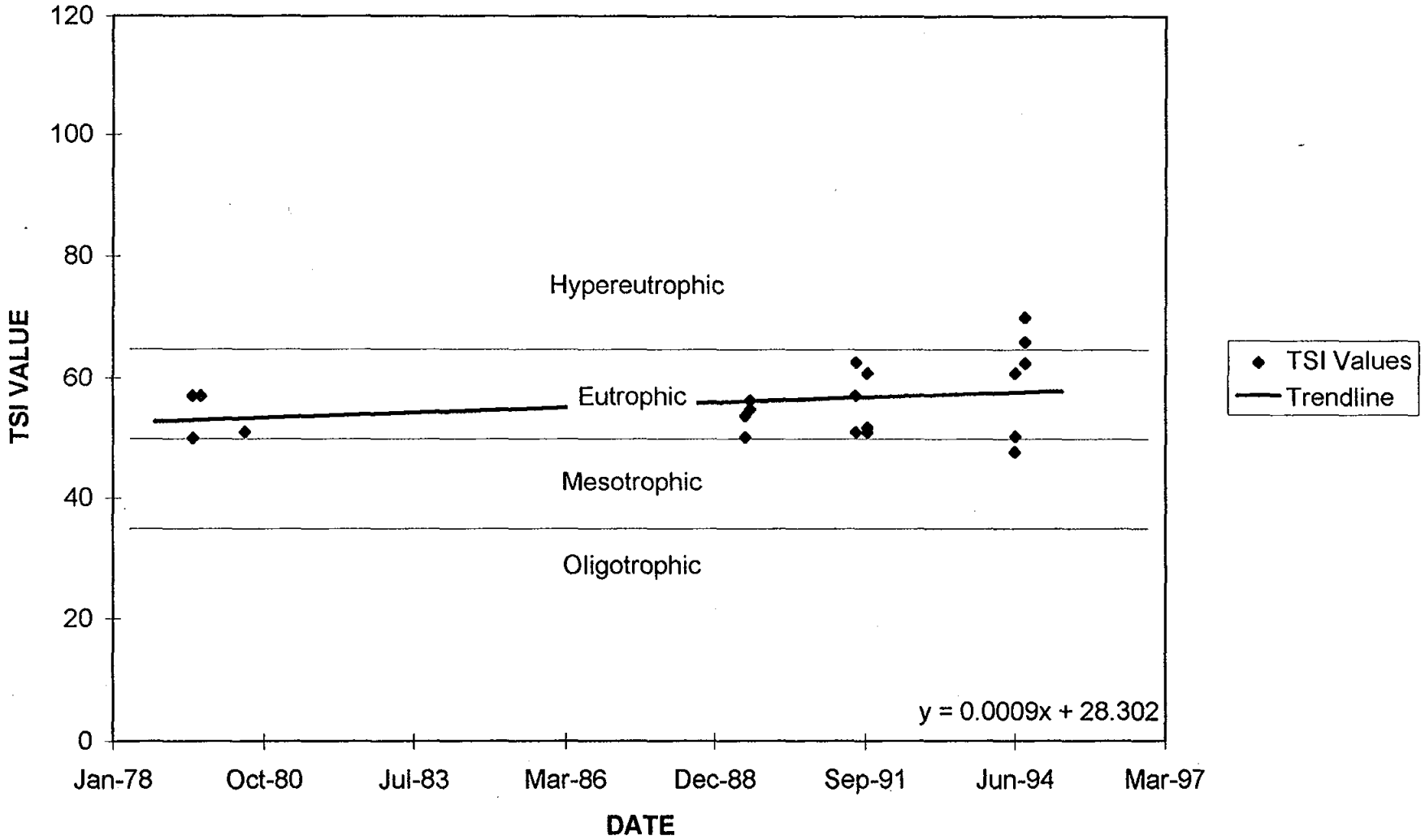
HORSETHIEF LAKE

SEDIMENT CONTOURS

100 0 100 200

meters feet

HORSETHIEF LAKE TSI's



Year	1989	1991	1992
TSI Values -- Mean:	53.79	48.21	50.50
Secchi Disk	48.20	50.14	45.94
Total Phosphorus	59.39	51.43	43.22
Chlorophyll *a*		43.07	62.33

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail (Typha latifolia)

Floating Leaved and Submerged Plant Species Identified: None identified

Algal Species and Densities

July 12, 1989

Taxa	Number	Units/ml
Algae (other)	21	1,001
Green Algae (other)	5	238
Algae (flagellate)	3	143
Cryptomonas	1	48
Total	30	1,431

Watershed Description

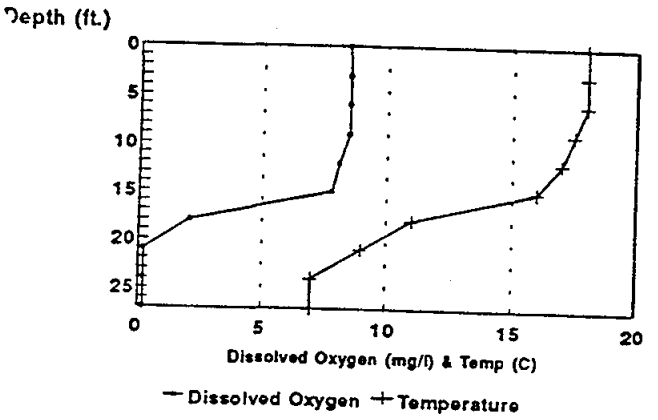
Watershed Area: 1,398 A (566 ha)

Soil Associations within Watershed

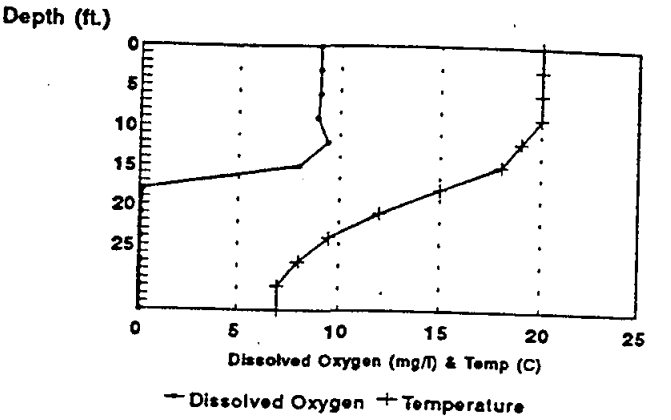
Association	Area (A)	% of Total
#8	1,398	100

#8 Citadel-Vanocker-Grizzly: Deep, well drained, moderately sloping to very steep loamy soils; on uplands.

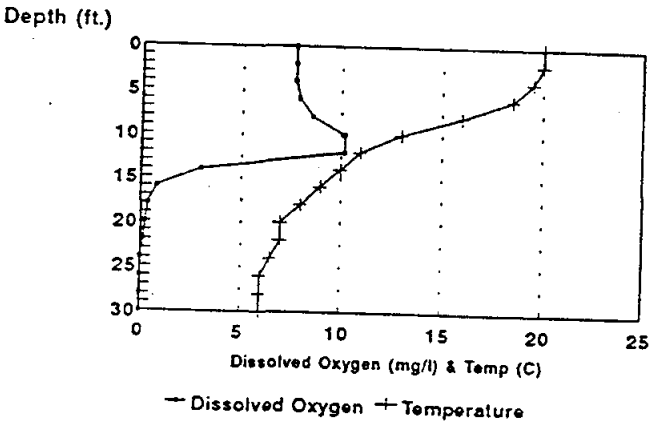
IRON CREEK LAKE 7/23/92
Dissolved Oxygen & Temperature Profile



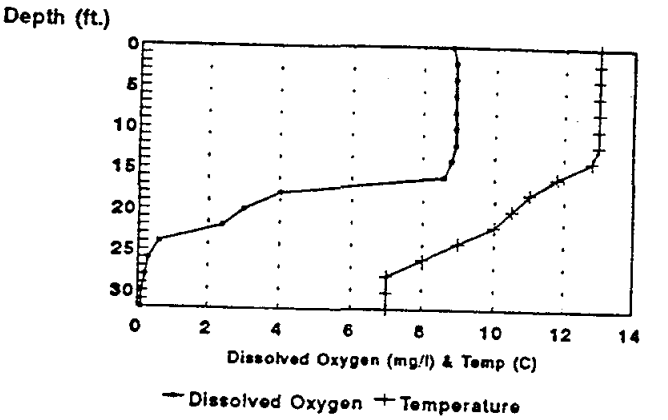
IRON CREEK LAKE 8/19/92
Dissolved Oxygen & Temperature Profile



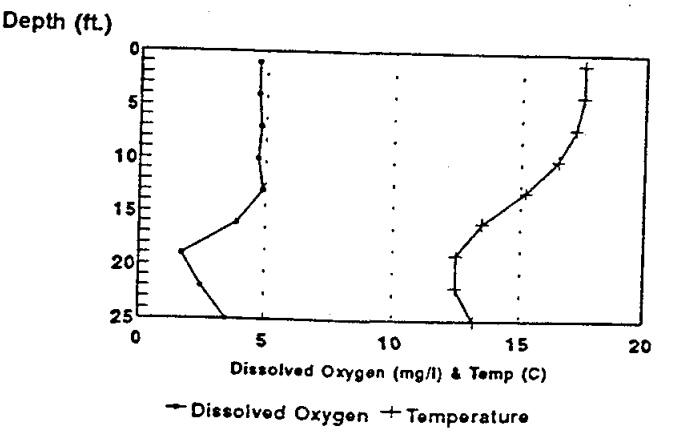
IRON CREEK LAKE 6/18/91
Dissolved Oxygen & Temperature Profile



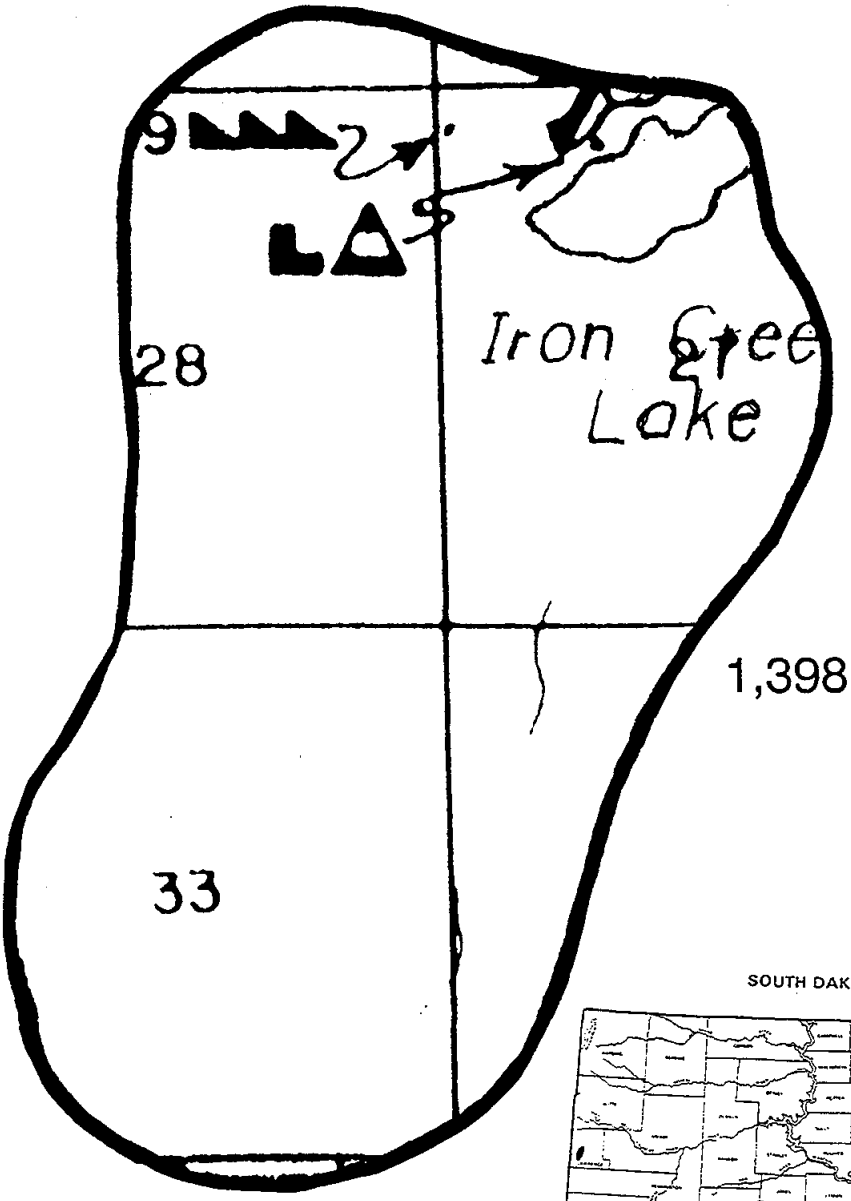
IRON CREEK LAKE 9/30/91
Dissolved Oxygen & Temperature Profile



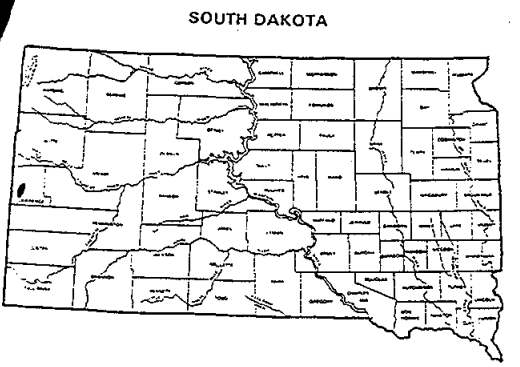
Iron Creek Lake, 8/7/89
Dissolved Oygen & Temperature Profile



Iron Creek Lake



1,398 acres



SCALE

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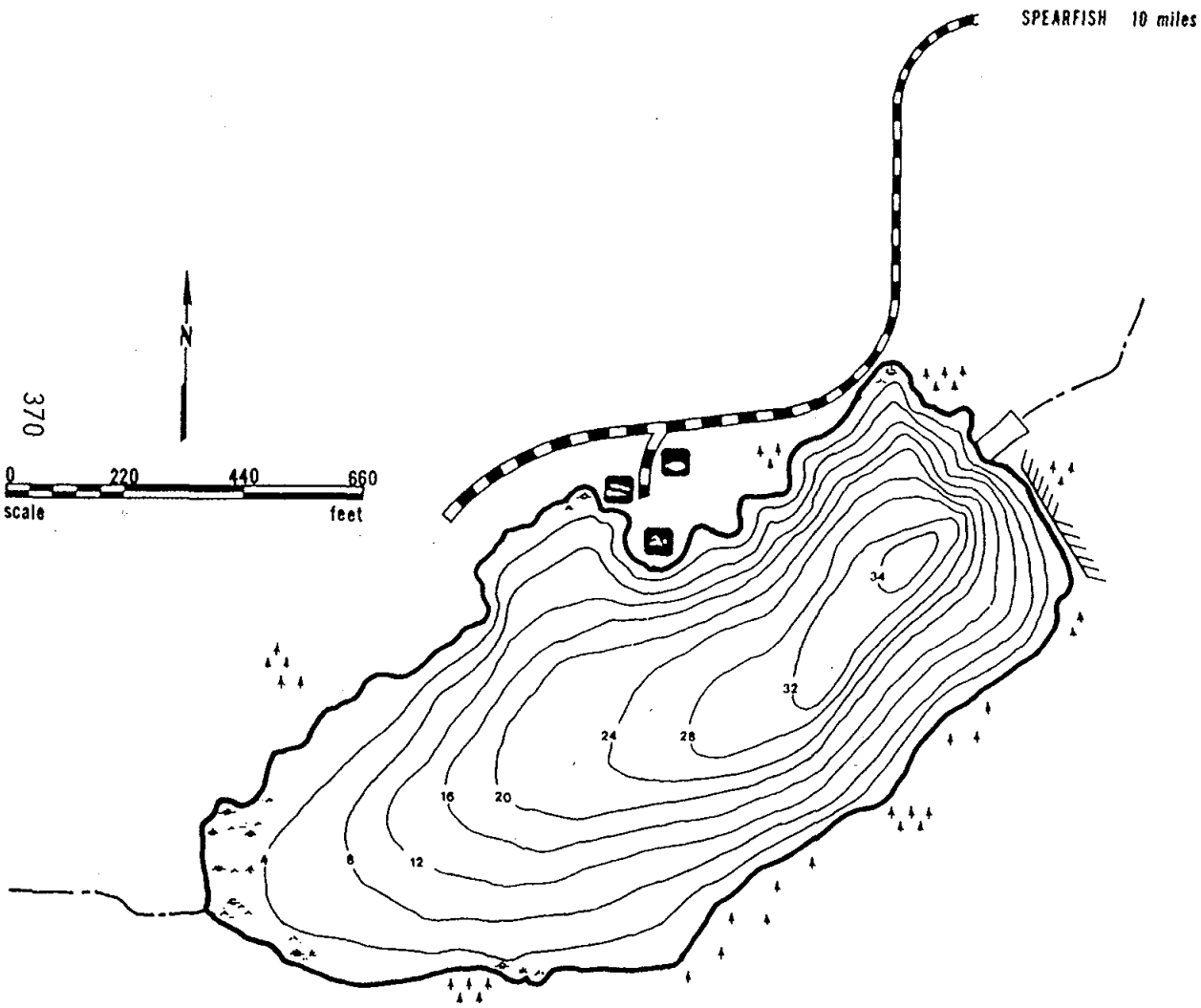

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

IRON CREEK LAKE

LAWRENCE COUNTY

1986

SYMBOLS

- FISHING ACCESS
- BOAT LAUNCH
- SWIMMING AREA
- DAM
- SPILLWAY
- —4— DEPTH CONTOUR
- GRAVEL ROAD
- FOREST
- EMERGENT VEGETATION

WATER LEVEL : 5444 MSL

MILES OF SHORELINE : .9

AVERAGE DEPTH IN FEET : 14.4

PLANIMETERED LAKE ACREAGE : 21.6 ac

MAP DATA

FIELD DATA COLLECTED : 6/25/86

AERIAL PHOTO NO.: 46081-180 - 61 L

AERIAL PHOTO DATE : 1980

SECTION : 27

TOWNSHIP : T.5N.

RANGE : R.1E.

SCALE : 1:220

VOLUME IN ACRE FEET :

depth	ac/ft
4	80.2
8	66.4
12	52.2
16	40.6
20	30.8
24	21.2
28	12.8
32	6.5
34	1.1
TOTAL	311.8

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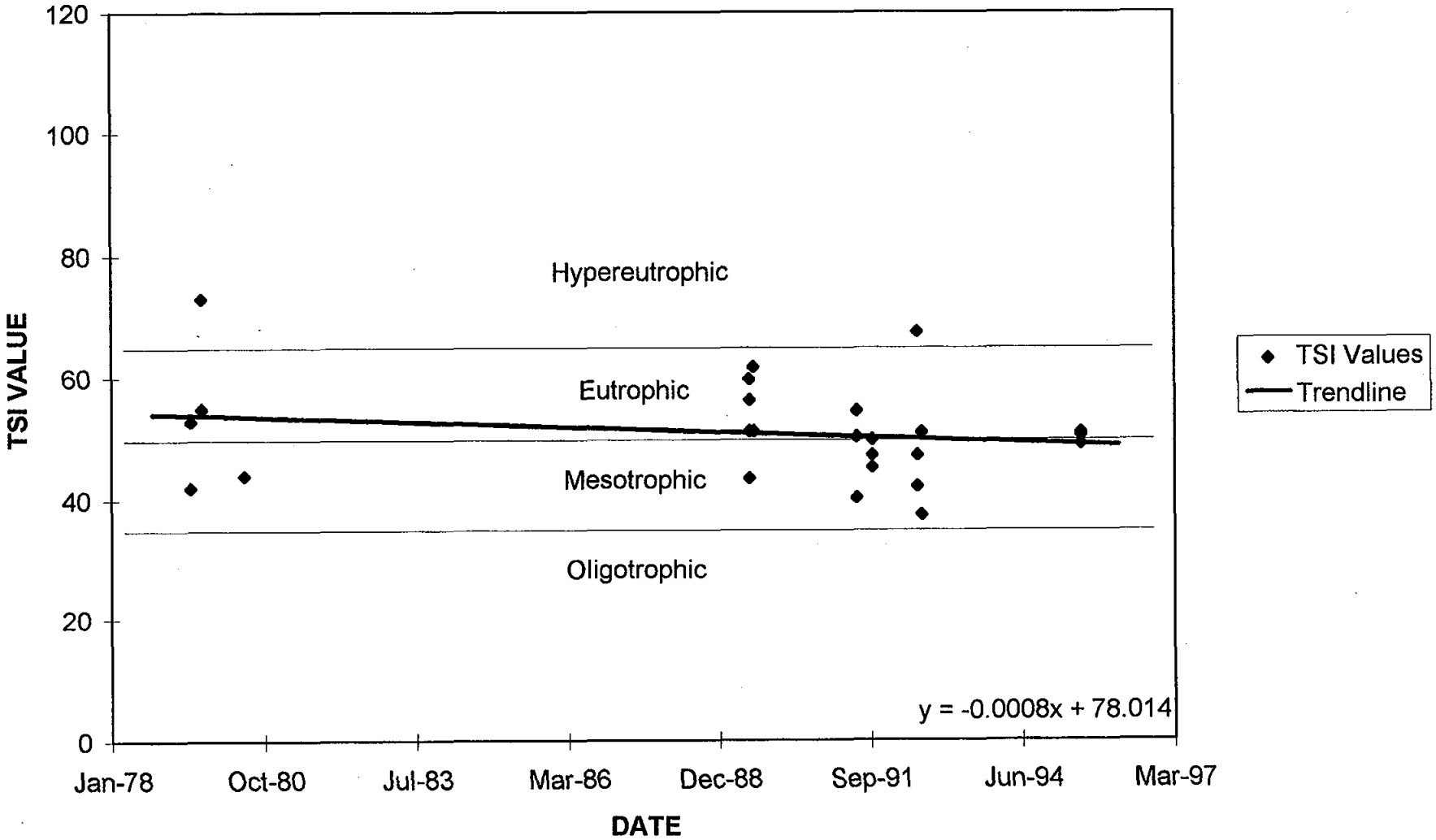
IRON CREEK LAKE TSI's



LAKE ISABEL

County: Dewey
Latitude: 45 deg. 26 min. 06 sec. N
Longitude: 101 deg. 24 min. 54 sec. W
Area: 81 A (32.8 ha)
Maximum Depth: 24.5 ft (7.6 m)
Volume: 714 acre-ft ($8.812 \times 10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 17N
Range: 22E
Section(s): 16
Shoreline L: 3.2 mi (5 km)
Mean Depth: 8.8 ft (2.7 km)
Watershed/Lake Area: 83
Thermal Stratification: yes

Lake Use
Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 26,444
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.58	4	15.88	4	19.25
Air Temperature (°C)	4	26.67	4	16.75	4	25.50
Secchi Disk Depth (meters)	2	0.69	2	2.00	2	2.53
Conductivity (cond/25° C)	4	276	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	7.68	4	8.88	4	9.46
Total Alkalinity (mg/l)	4	101	4	188	4	200
Total Solids (mg/l)	4	240	4	316	4	
Dissolved Solids (mg/l)	4	231	4	311	4	367
Suspended Solids (mg/l)	4	9	4	5	4	366
Volatile Suspended Solids (mg/l)	-	-	2	3	-	1
Ammonia Nitrogen (mg/l)	4	0.05	4	0.02	4	-
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.02
Total Kjeldahl Nitrogen (mg/l)	4	1.04	4	1.24	4	0.10
Total Phosphorus (mg/l)	4	0.224	4	0.142	4	1.22
Total Dissolved Phosphorus (mg/l)	-	-	4	0.115	4	0.419
Ortho Phosphate as P (mg/l)	4	0.128	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	26.47	2	14.07

Year	1989	1991	1992
TSI Values -- Mean:	74.19	62.51	61.82
Secchi Disk	65.44	50.03	46.67
Total Phosphorus	82.95	75.34	82.32
Chlorophyll *a*		62.71	56.51

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: Impacted by macrophyte growth

Floating Leaved and Submerged Plant Species Identified: NA

Algal Species and Densities

	June 20, 1989		No Date	
Taxa	Number	Units/ml	Number	Units/ml
Cryptomonas sp. #1	29	864	95	1,268
Algae (other)	11	328	34	454
Scenedesmus	6	179	1	13
Cryptomonas	4	119	4	53
Green Algae (other)	2	60	9	120
Chroococcus	2	60	-	-
Diatom (pennate)	1	30	-	-
Algae (flagellate)	-	-	20	267
Oocystis	-	-	18	240
Blue-green (other)	-	-	13	174
Cryptomonas ovata	-	-	3	40
Aphanocapsa	-	-	3	40
Merismopedia	-	-	2	27
Phacus	-	-	1	13
Ceratium hirundinella	-	-	1	13
Dinobryon	-	-	1	13
Total	55	1,639	205	2,736

Watershed Description

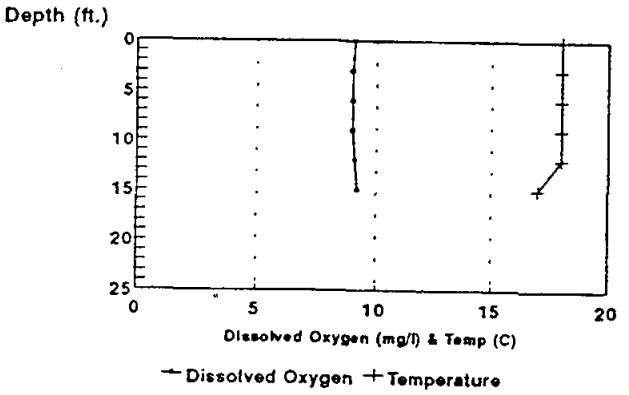
Watershed Area: 6,736 A (2,726 ha)

Soil Associations within Watershed

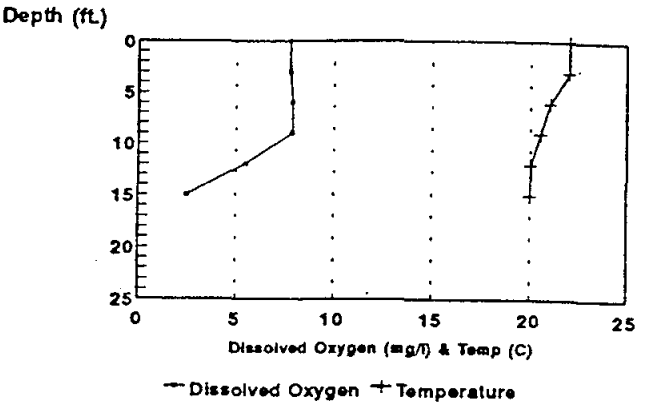
Association	Area (A)	% of Total
RN-EK	6,736	100

RN-EK Rhoades-Ekalaka: Deep and moderately deep, moderately well drained and well drained, nearly level to sloping, loamy soils that have a claypan subsoil.

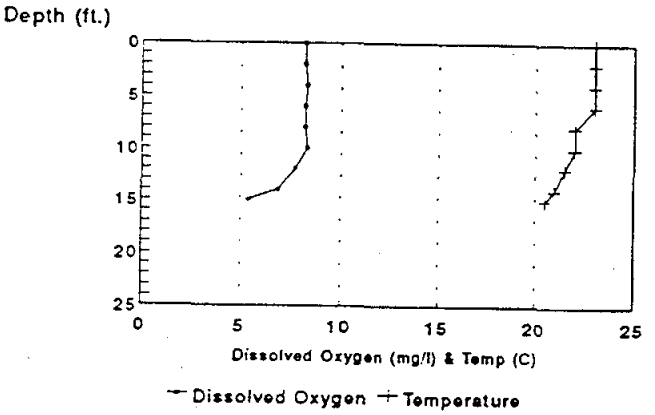
LAKE ISABEL 7/23/92
Dissolved Oxygen & Temperature Profile



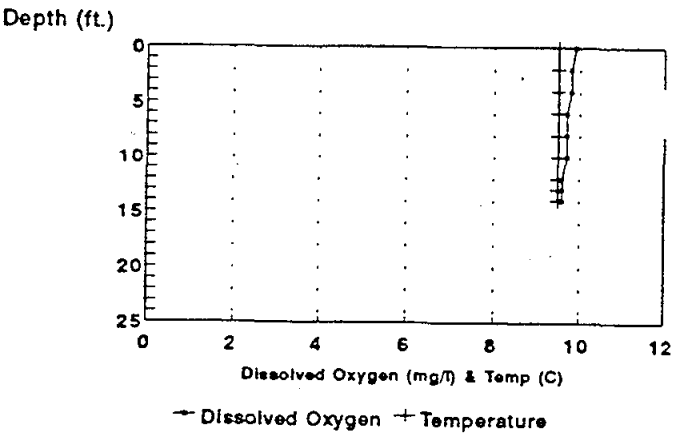
LAKE ISABEL 8/19/92
Dissolved Oxygen & Temperature Profile



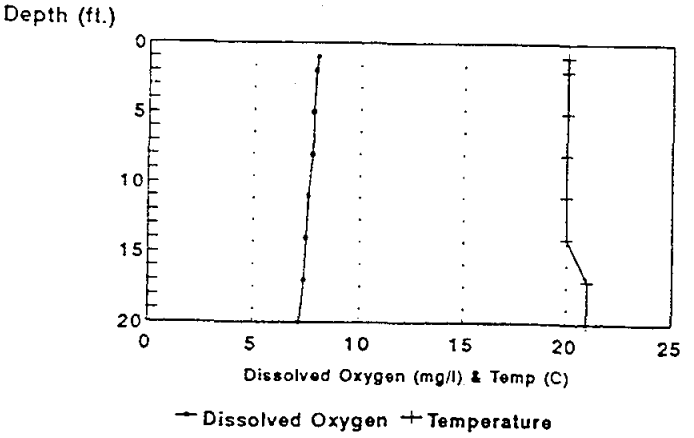
LAKE ISABEL 6/17/91
Dissolved Oxygen & Temperature Profile



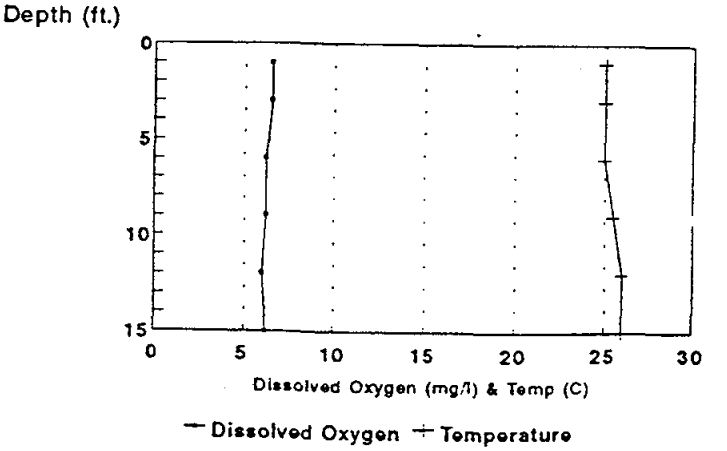
LAKE ISABEL 10/9/91
Dissolved Oxygen & Temperature Profile



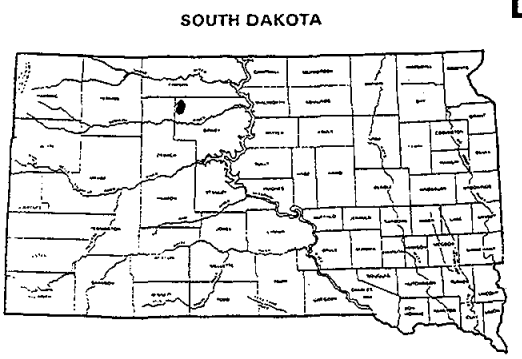
Lake Isabel 6/20/89
Dissolved Oygen & Temperature Profile

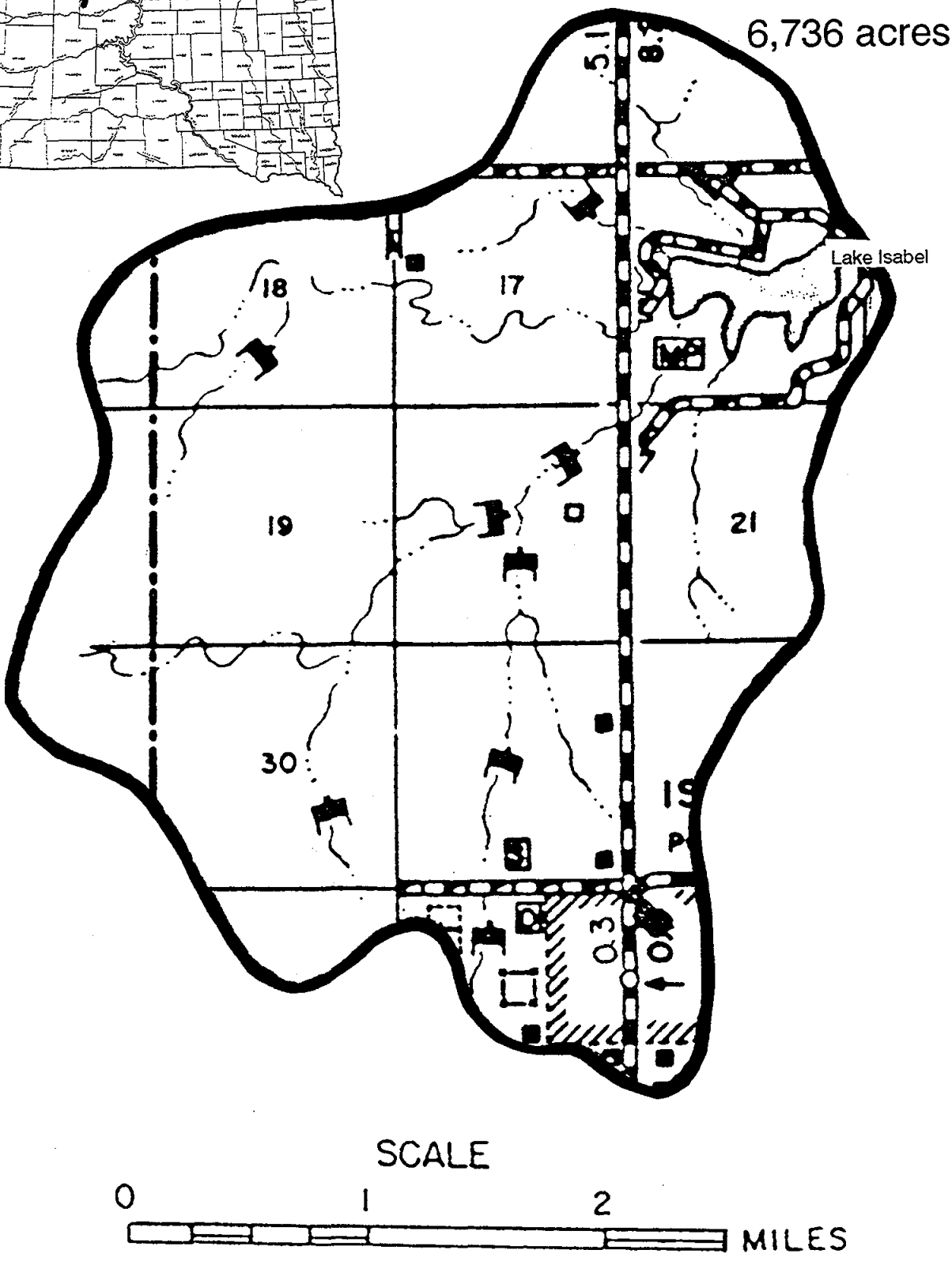


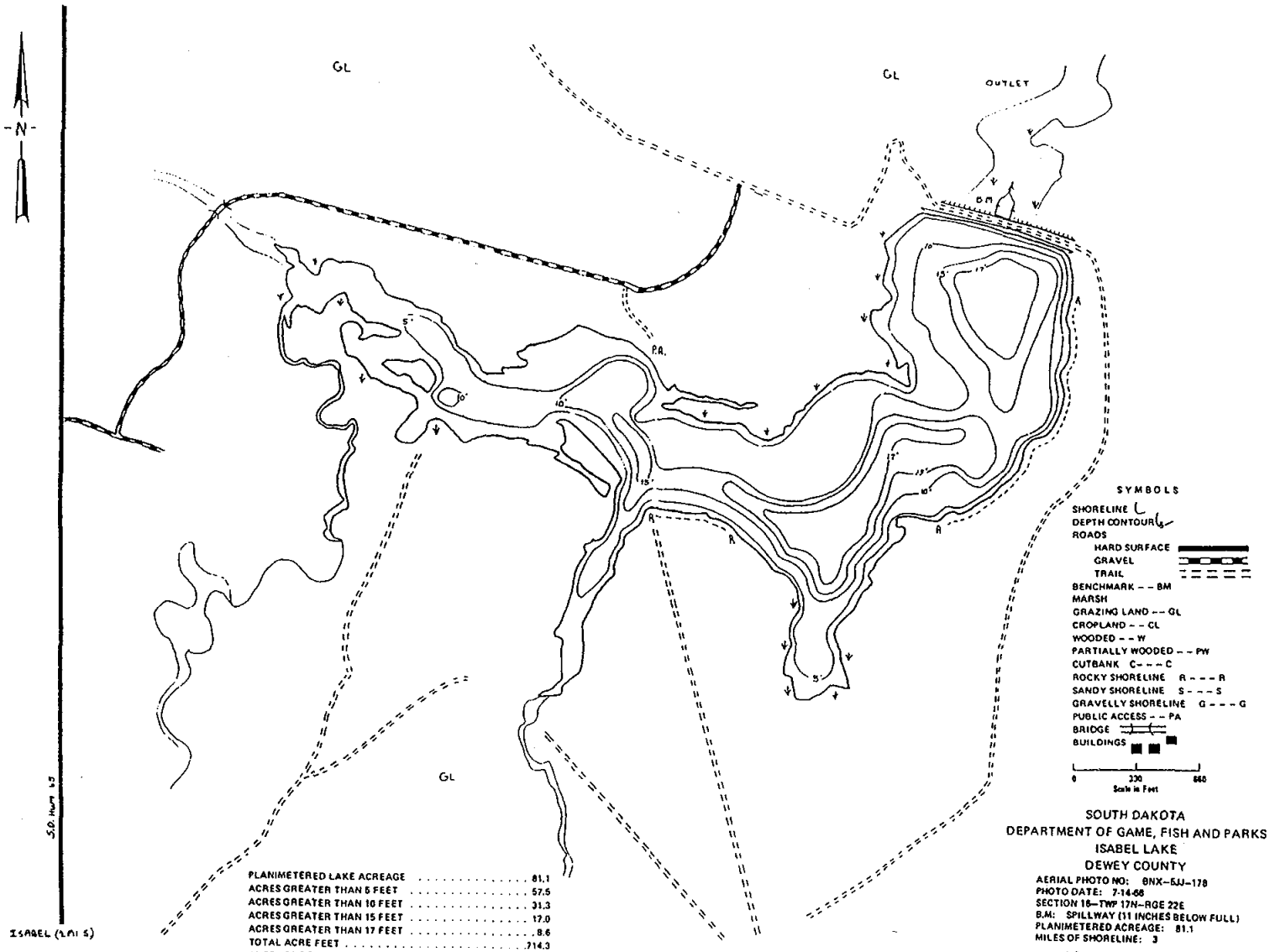
Lake Isabel 7/31/89
Dissolved Oygen & Temperature Profile



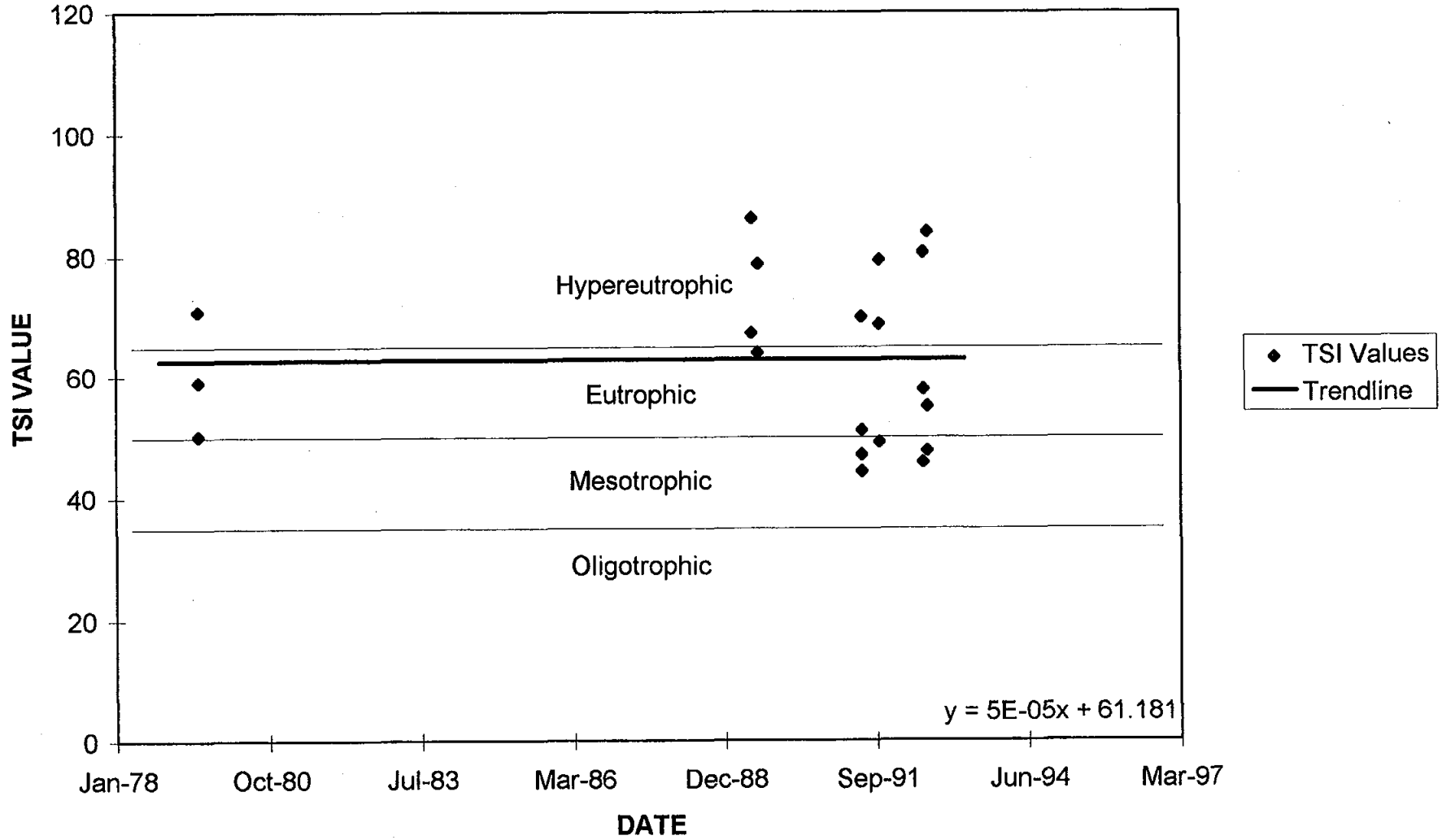
Lake Isabel


SOUTH DAKOTA


6,736 acres
Lake Isabel
18
17
19
21
30
5.1
0.3
0.8
SCALE
0
1
2
MILES


-N-
GL
GL
OUTLET
BM
P.A.
GL
S.D. HWY 63
ISABEL (LAKE)
PLANIMETERED LAKE ACREAGE 81.1
ACRES GREATER THAN 5 FEET 57.5
ACRES GREATER THAN 10 FEET 31.3
ACRES GREATER THAN 15 FEET 17.0
ACRES GREATER THAN 17 FEET 8.6
TOTAL ACRE FEET 714.3
AVERAGE DEPTH . . . . . 8.8 FEET
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK -- BM
MARSH
GRAZING LAND -- GL
CROPLAND -- CL
WOODED -- W
PARTIALLY WOODED -- PW
CUTBANK C- - - C
ROCKY SHORELINE R - - - R
SANDY SHORELINE S - - - S
GRAVELLY SHORELINE G - - - G
PUBLIC ACCESS -- PA
BRIDGE
BUILDINGS
0
330
660
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
ISABEL LAKE
DEWEY COUNTY
AERIAL PHOTO NO: 8NX-5JJ-178
PHOTO DATE: 7-14-68
SECTION 16--TWP 17N--RGE 22E
B.M: SPILLWAY (11 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 81.1
MILES OF SHORELINE: 3

LAKE ISABEL TSI's



JONES LAKE

County: Hand
Latitude: 44 deg. 28 min. 18 sec. N
Longitude: 98 deg. 56 min. 48 sec. W
Area: 100.5 A (40.7 ha)
Maximum Depth: 18.0 ft (5.5 m)
Volume: 752.1 acre-ft (9.278 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Turtle Creek
Outlet: Turtle Creek

Township: 112N
Range: 68W
Section(s): 25 & 36
Shoreline L: 3.6 mi (5.7 km)
Mean Depth: 7.5 ft (2.3 m)
Watershed/Lake Area: 233
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 62,725
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Resluts
Water Temperature (°C)	4	20.10	4	22.88	4	21.75
Air Temperature (°C)	4	23.00	4	24.50	4	25.15
Secchi Disk Depth (meters)	2	1.02	2	1.33	2	1.27
Conductivity (cond/25° C)	4	451	2	513	-	-
Turbidity (NTU)	-	-	-	-	4	5.31
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	9.05	4	9.05	4	8.25
Total Alkalinity (mg/l)	4	158	4	196	4	186
Total Solids (mg/l)	4	334	4	402	4	383
Dissolved Solids (mg/l)	4	319	4	387	4	379
Suspended Solids (mg/l)	4	15	4	15	4	5
Volatile Suspended Solids (mg/l)	-	-	2	8	-	-
Ammonia Nitrogen (mg/l)	4	0.07	4	0.12	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.70	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.22	4	1.79	4	1.32
Total Phosphorus (mg/l)	4	0.419	4	0.653	4	0.288
Total Dissolved Phosphorus (mg/l)	-	-	4	0.589	4	0.246
Ortho Phosphate as P (mg/l)	4	0.277	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	67.45	2	11.28

Year	1989	1991	1993
TSI Values -- Mean:	75.45	75.19	65.45
Secchi Disk	59.70	55.93	56.61
Total Phosphorus	91.21	97.77	85.39
Chlorophyll *a*		71.88	54.34

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: None identified

Algal Species and Densities

	June 12, 1989		July 10, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanocapsa	95	658	40	716
Melosira granulata	63	436	-	-
Algae (other)	28	194	28	501
Aphanizomenon flos-aquae	19	132	4	72
Anabaena	18	125	14	251
Oocystis	17	118	-	-
Nitzschia	12	83	-	-
Cryptomonas sp. #1	7	48	-	-
Green Algae (other)	7	48	-	-
Algae (flagellate)	7	48	33	591
Characium	6	42	26	465
Dinobryon	5	35	-	-
Scenedesmus	4	28	-	-
Diatom (centric)	4	28	-	-
Asterionella formosa	3	21	-	-
Chroococus	2	14	6	107
Cryptomonas ovata	2	14	6	107
Cryptomonas	1	7	-	-
Pediastrum	1	7	-	-
Diatom (pennate)	1	7	-	-
Blue-green (other)	1	7	1	18
Coelosphaerium	-	-	2	36
Stephanodiscus	-	-	1	18
Total	303	2,099	161	2,881

Watershed Description

Watershed Area: 23,402 A (9,471 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
GL-KB	8,191	35
GL-CE-KA	7,489	32
HR-PR	4,446	19
GR-CE	3,276	14

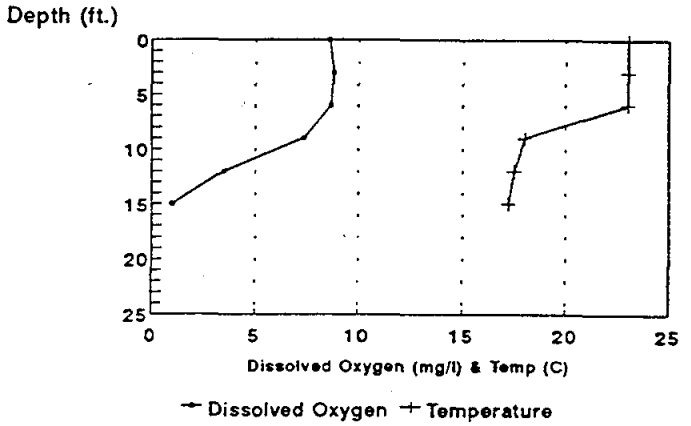
GL-KB Glenham-Java: Deep, nearly level to undulating well drained loamy soils that formed in glacial till.

GL-CE-KA Glenham-Cavo-Jerauld: Deep nearly level to gently undulating, well drained loamy soils and soils with claypan subsoils that formed in glacial till.

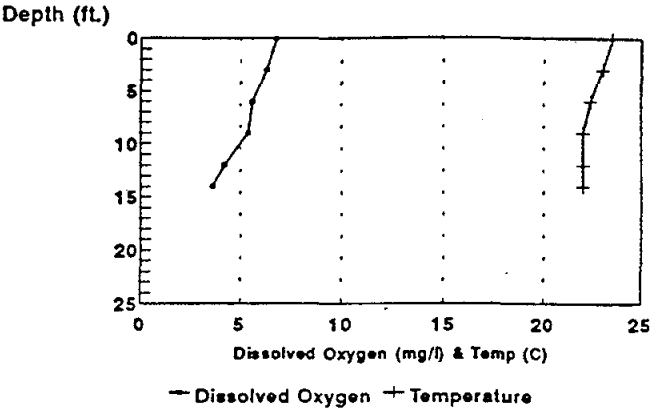
HR-PR Houdek-Prosper: Deep, nearly level to gently undulating, well drained and moderately well drained loamy soils that formed in glacial till.

HR-CE Houdek-Cavo: Deep, nearly level to gently sloping well drained loamy soils and soils with claypan subsoils that formed in glacial till.

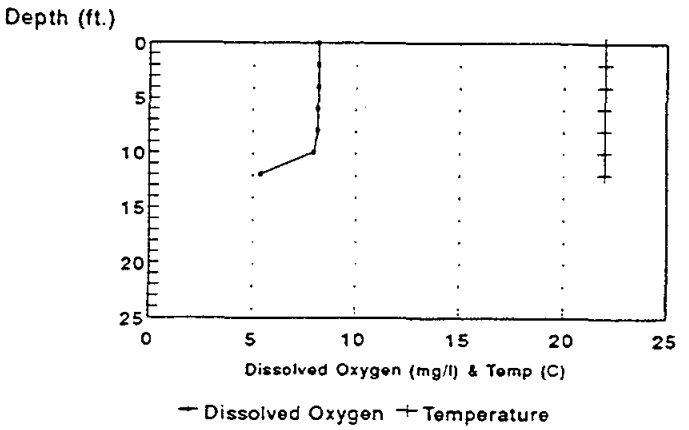
JONES LAKE 6/22/93
Dissolved Oxygen & Temperature Profile



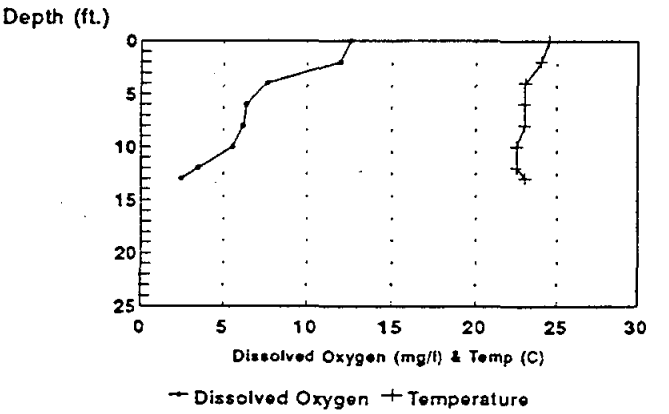
JONES LAKE 8/9/93
Dissolved Oxygen & Temperature Profile



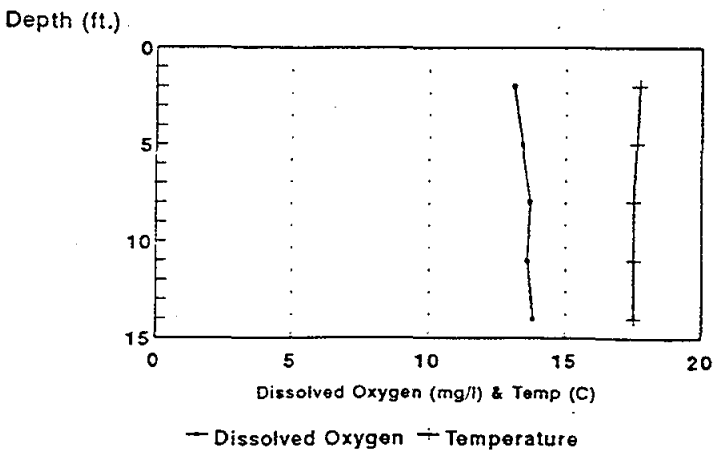
JONES LAKE 7/8/91
Dissolved Oxygen & Temperature Profile



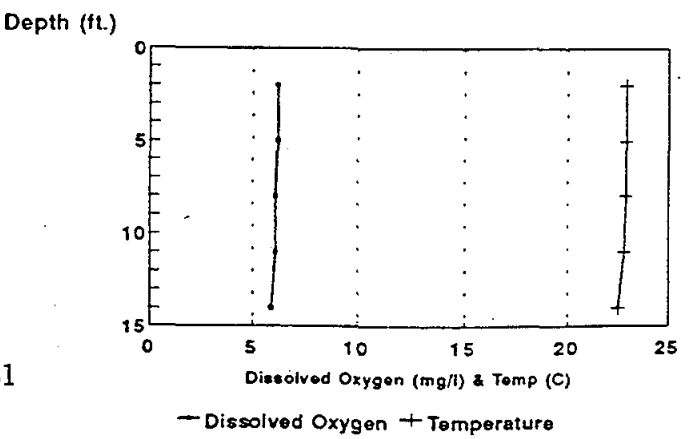
JONES LAKE 8/20/91
Dissolved Oxygen & Temperature Profile



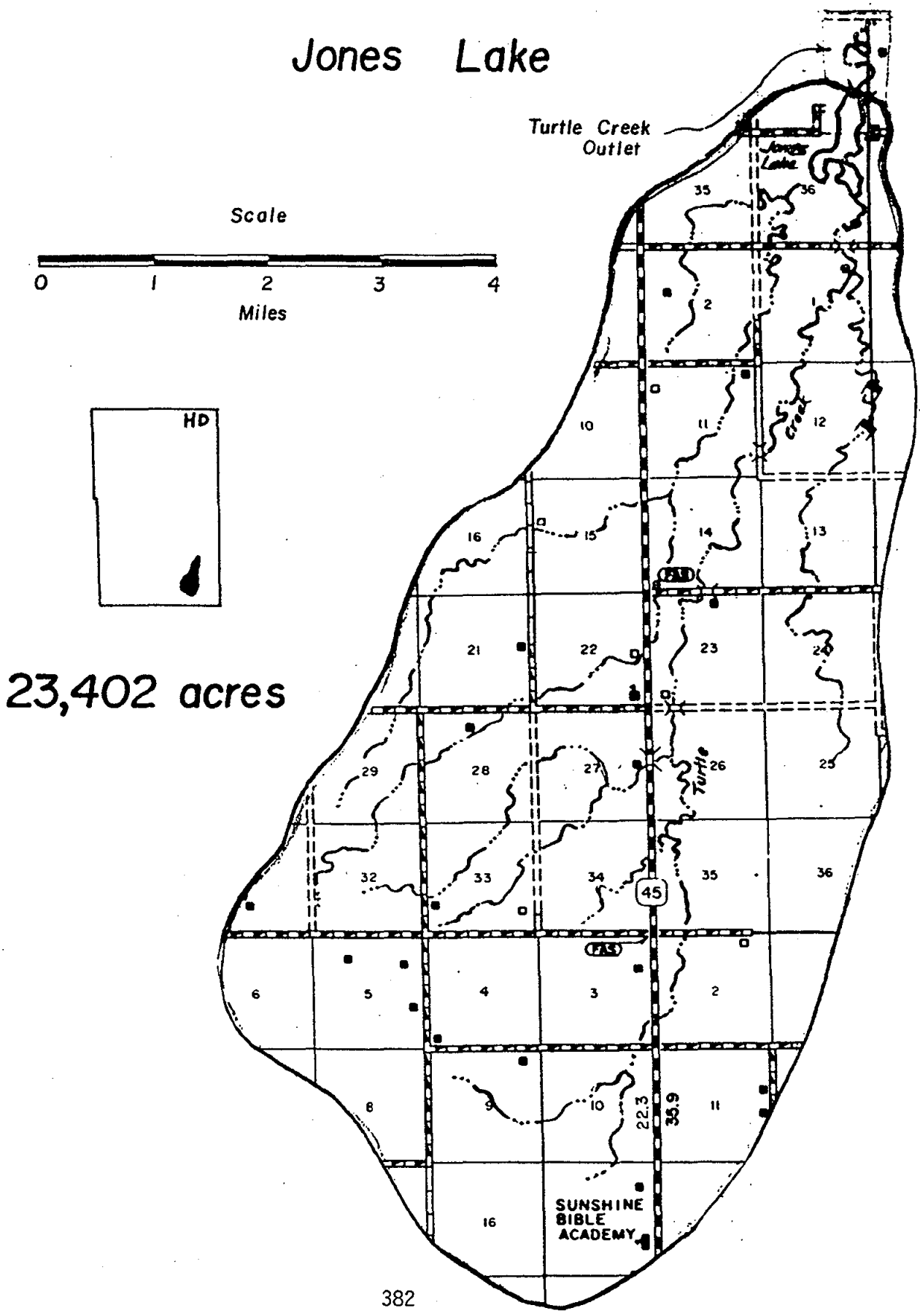
Jones Lake, 6/12/89
Dissolved Oygen & Temperature Profile

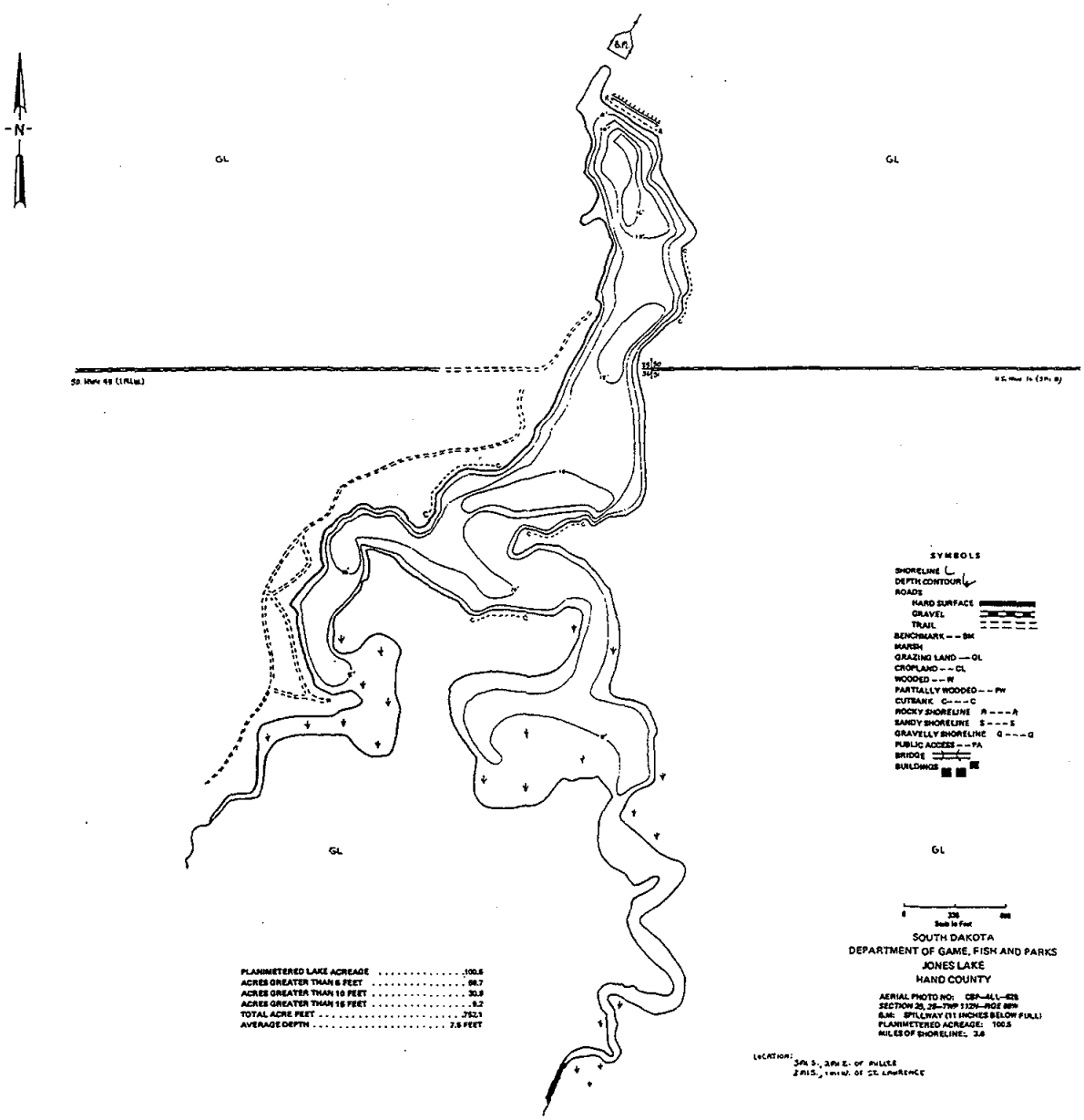


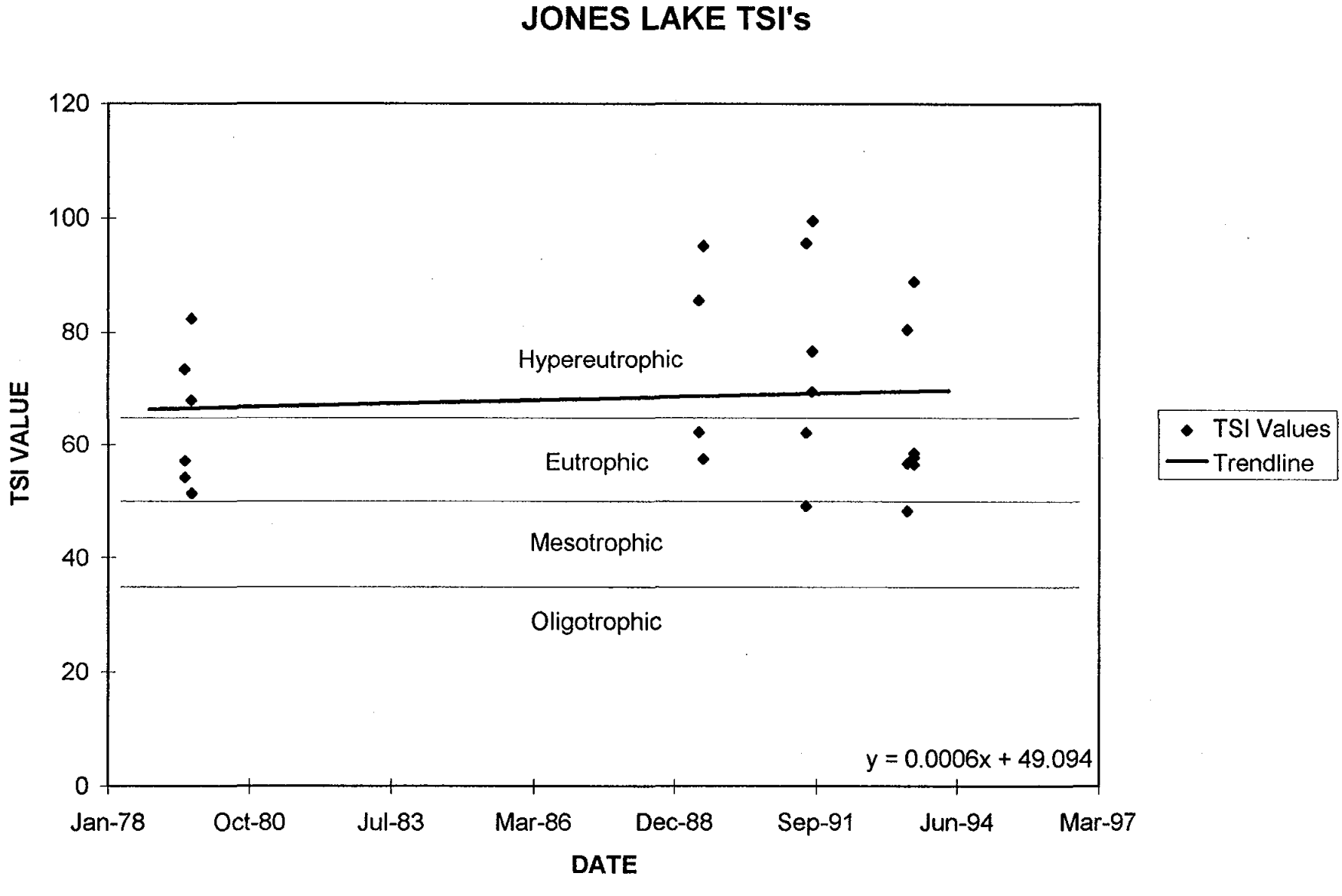
Jones Lake, 7/10/89
Dissolved Oygen & Temperature Profile



Jones Lake


Turtle Creek Outlet
Jones Lake
Scale
0 1 2 3 4
Miles
HD
23,402 acres
35
36
2
1
10
11
12
16
15
14
13
FAS
21
22
23
24
29
28
27
26
25
Turtle
32
33
34
45
35
36
FAS
6
5
4
3
2
8
9
10
22.3
35.9
11
16
SUNSHINE BIBLE ACADEMY


N
GL
GL
GL
GL
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK — — BM
MARSH
GRAZING LAND — GL
CROPLAND — — CL
WOODED — — W
PARTIALLY WOODED — — PW
CUTBANK C— — — C
ROCKY SHORELINE R — — — R
SANDY SHORELINE S — — — S
GRAVELLY SHORELINE G — — — G
PUBLIC ACCESS — — PA
BRIDGE
BUILDINGS
PLANIMETERED LAKE ACREAGE 100.5
ACRES GREATER THAN 5 FEET 68.7
ACRES GREATER THAN 10 FEET 30.9
ACRES GREATER THAN 15 FEET 9.2
TOTAL ACRE FEET 752.1
AVERAGE DEPTH . . . . . 7.5 FEET
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
JONES LAKE
HAND COUNTY
AERIAL PHOTO NO:
SECTION 25, 26—TWP 112N—RGE 68W
B.M: SPILLWAY (11 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 100.5
MILES OF SHORELINE: 3.8
LOCATION:


JONES LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0006x + 49.094
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE KAMPESKA

County: Codington
Latitude: 44 deg. 55 min. 54 sec. N
Longitude: 97 deg. 12 min. 12 sec. W
Area: 4,817 A (1949 ha)
Maximum Depth: 14.5 ft (4.4 m)
Volume: 48170 acre-ft (5.942 x $10^7 m^3$)
Origin of Basin: natural (glacial)
Township: 117N
Range: 53W
Section(s): 15-22, 27-30, 32
Shoreline L: 13.7 mi (22 km)
Mean Depth: 10 ft (3.0 m)
Watershed/Lake Area: 44
Thermal Stratification: no
Major Inflows (named or permanent streams): Big Sioux River
Outlet: Big Sioux River

Lake Use

Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State, City, and County ownership
Public Interest: Lake Kampeska Development Association

	1989		1992	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.13	48	18.14
Air Temperature (°C)	4	25.00	48	16.43
Secchi Disk Depth (meters)	2	0.76	48	0.45
Conductivity (cond/25° C)	4	547	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	4	8.69	-	-
Field pH (su)	-	-	48	8.43
Total Alkalinity (mg/l)	4	211	48	219
Total Solids (mg/l)	4	391	48	403
Dissolved Solids (mg/l)	4	380	48	376
Suspended Solids (mg/l)	4	12	48	27
Volatile Suspended Solids (mg/l)	-	-	48	8
Ammonia Nitrogen (mg/l)	4	0.06	48	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	48	0.11
Total Kjeldahl Nitrogen (mg/l)	4	0.55	48	0.56
Total Phosphorus (mg/l)	4	0.588	48	0.558
Total Dissolved Phosphorus (mg/l)	-	-	48	0.488
Ortho Phosphate as P (mg/l)	4	0.510	-	-
Chlorophyll (mg/m^3)	-	-	24	5.86

Year	1989	1992
TSI Values -- Mean:	80.01	71.66
Secchi Disk	63.92	71.64
Total Phosphorus	96.10	95.42
Chlorophyll *a*		47.92

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush
Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

July 6, 1989

Taxa	Number	Units/ml
Algae (other)	28	1,062
Fragilaria	7	265
Chroococus	7	265
Merismopedia	6	228
Tetrastrum	4	152
Green Algae (other)	4	152
Diatom (pennate)	3	114
Blue-green (other)	3	114
Aphanizomenon flos-aquae	1	38
Dactylococcopsis	1	38
Diatom (centric)	1	38
Total	65	2,465

Watershed Description

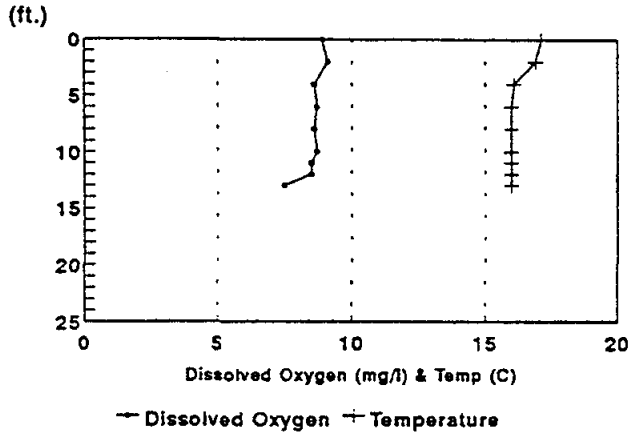
Watershed Area: 212,864 A (86,146 ha)

Soil Associations within Watershed

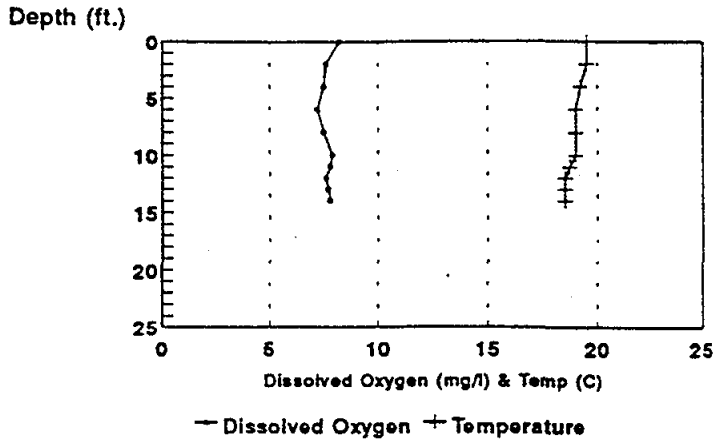
Association	Area (A)	% of Total
KN-BW-VS	80,888	38
RL-FS	27,672	13
VS-LP	23,415	11
FS-ES	23,415	11
RL-FS-SK	23,415	11
LD	12,133	6
VS	8,514	4
FU-AA-PA	6,386	3
BY	4,257	2

KN-BW-VS	Kranzburg-Brookings-Vienna: Well drained and moderately well drained, nearly level to gently undulating silty soils formed in loess over glacial till.
RL-FS	Renshaw-Fordville: Somewhat excessively drained and well drained, nearly level to moderately steep, loamy soils that are shallow and moderately deep over sand and gravel.
VS-LP	Vienna-Lismore: Well drained through somewhat poorly drained, nearly level to undulating, silty soils.
FS-ES	Fordville-Estelline: Well drained, nearly level to gently undulating loamy and silty soils that are moderately deep over sand and gravel.
RL-FS-SK	Renshaw-Fordville-Sioux: Well drained to excessively drained, nearly level to steep loamy soils that are shallow, moderately deep and very shallow over sand and gravel.
LD	Lamoure: Poorly drained, nearly level, silty soils.
VS	Vienna: Well drained, nearly level to sloping silty soils formed in loess and glacial till.
FU-AA-PA	Forman-Aastad-Buse: Well drained and moderately well drained, undulating to hilly, loamy soils.
BY	Buse: Well drained, undulating to hilly loamy soils.

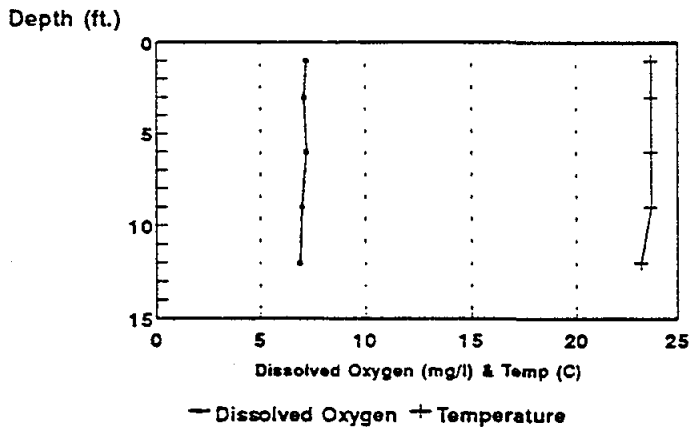
LAKE KAMPESKA 6/9/92
Dissolved Oxygen & Temperature Profile



LAKE KAMPESKA 8/26/92
Dissolved Oxygen & Temperature Profile

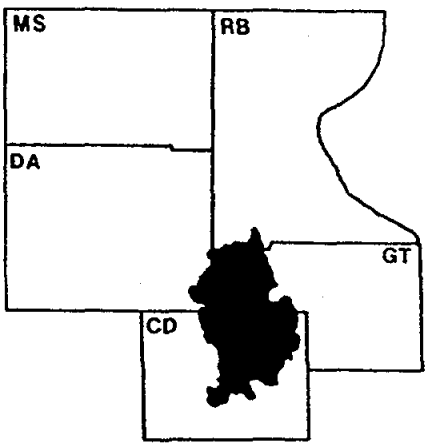


Lake Kampeska, 8/2/89
Dissolved Oxygen & Temperature Profile



Lake Kampeska

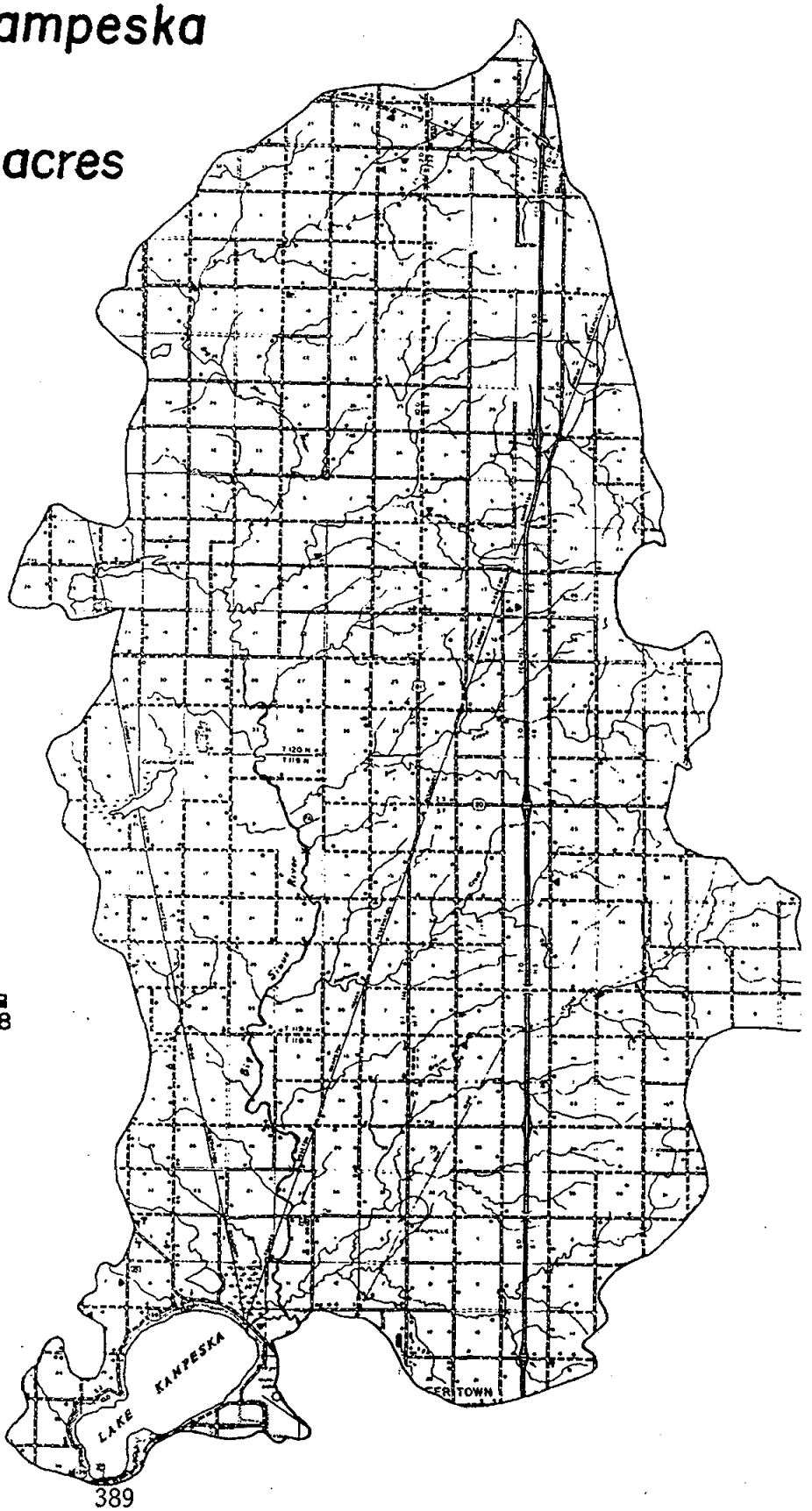
212,864 acres

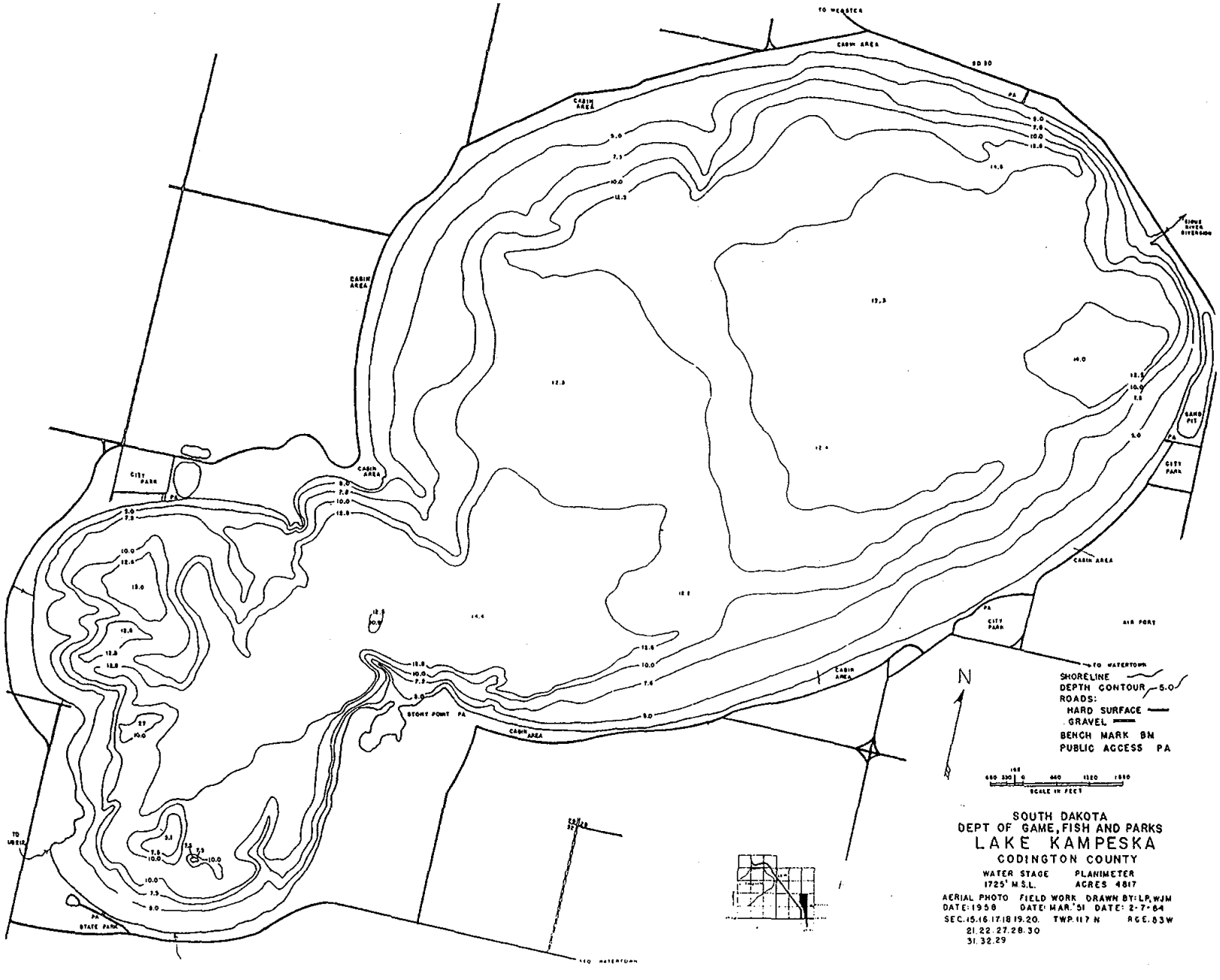


Scale

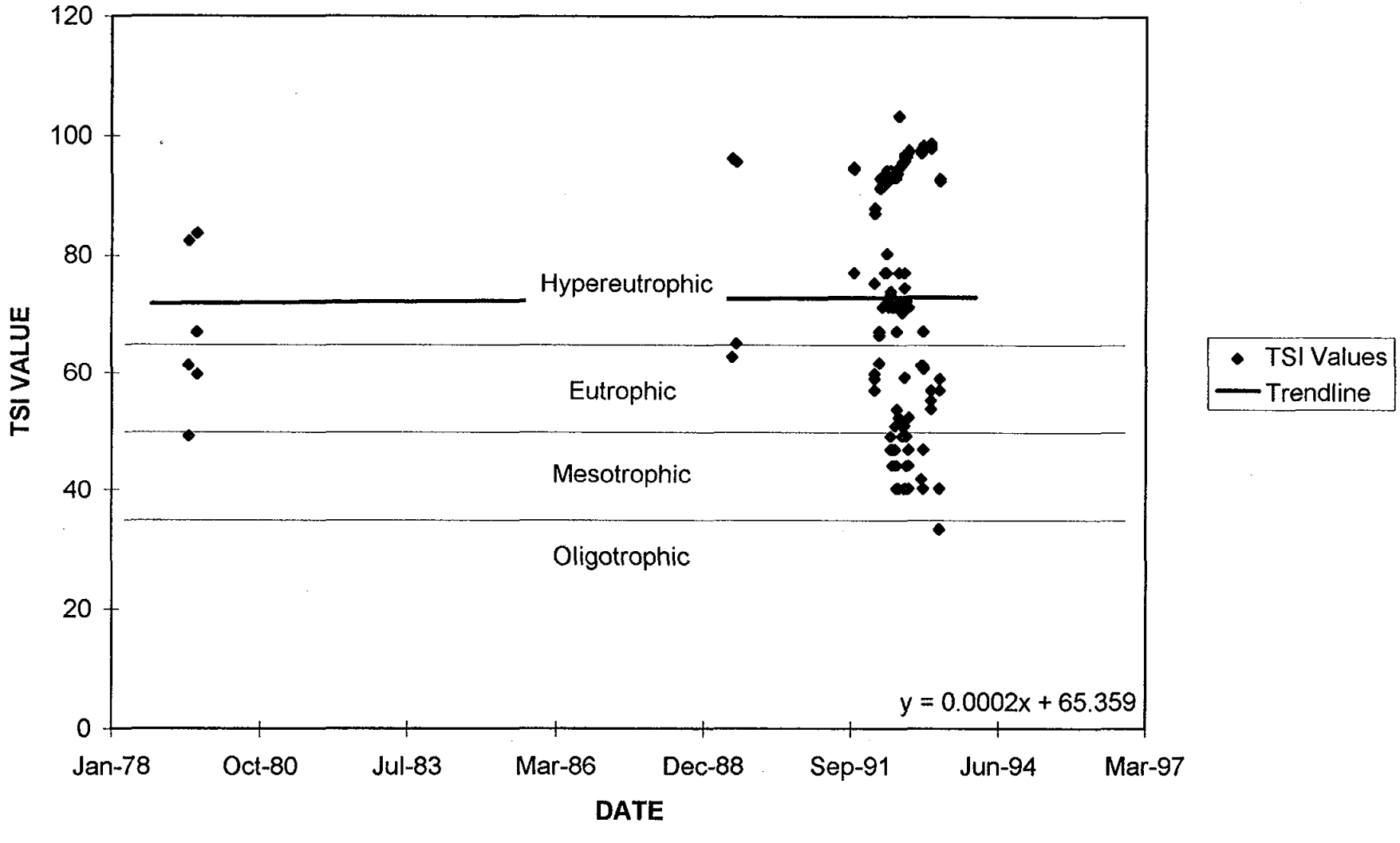
0 2 4 6 8

Miles




TO WEBSTER
CABIN AREA
SD 30
PA
CABIN AREA
CABIN AREA
CABIN AREA
CITY PARK
PA
SAND PIT
PA
CITY PARK
CABIN AREA
PA
CITY PARK
AIR PORT
TO WATERTOWN
CABIN AREA
STONY POINT PA
CABIN AREA
TO WEBSTER
PA
STATE PARK
TO WATERTOWN
N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
BENCH MARK BM
PUBLIC ACCESS PA
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
LAKE KAMPESKA
CODINGTON COUNTY
WATER STAGE 1725' M.S.L.
PLANIMETER ACRES 4817
AERIAL PHOTO DATE: 1958
FIELD WORK DATE: MAR. '51
DRAWN BY: LP, WJM DATE: 2-7-64
SEC. 15.16.17.18.19.20. 21.22.27.28.30 31.32.29
TWP. 117 N
RGE. 53 W

LAKE KAMPESKA TSI's



LAKOTA LAKE (BILTMORE)

County: Custer
Latitude: 43 deg. 50 min. 58 sec. N
Longitude: 103 deg. 25 min. 33 sec. W
Area: 10.9 A (4.4 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: impoundment
Township: 2S
Range: 6E
Section (s): 27
Shoreline L: 0.94 mi (1.5 km)
Mean Depth: NA
Watershed/Lake Area: 752
Thermal Stratification: no
Major Inflows (named or permanent streams): Iron & Toll Gate Creek
Outlet: Iron Creek

Lake Use

Beneficial Use Classification:
(3) Coldwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 145,639
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	2	21.35	4	14.55	4	17.38
Air Temperature (°C)	2	29.44	4	24.65	4	24.50
Secchi Disk Depth (meters)	1	0.82	2	1.28	2	0.87
Conductivity (cond/25° C)	2	122	1	104	-	-
Turbidity (NTU)	-	-	-	-	2	14.35
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	2	8.00	4	7.56	4	8.43
Total Alkalinity (mg/l)	2	47	3	46	4	42
Total Solids (mg/l)	2	109	3	107	4	82
Dissolved Solids (mg/l)	2	92	3	97	4	77
Suspended Solids (mg/l)	2	17	3	9	4	6
Volatile Suspended Solids (mg/l)	-	-	1	0	-	-
Ammonia Nitrogen (mg/l)	2	0.03	4	0.05	4	0.04
Nitrate + Nitrite Nitrogen (mg/l)	2	0.10	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	2	0.44	4	0.44	4	0.82
Total Phosphorus (mg/l)	2	0.082	4	0.174	4	0.072
Total Dissolved Phosphorus (mg/l)	-	-	4	0.139	4	0.028
Ortho Phosphate as P (mg/l)	2	0.003	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	7.37	2	43.30

Year	1989	1991	1994
TSI Values -- Mean:	60.78	55.83	63.55
Secchi Disk	62.81	56.44	62.09
Total Phosphorus	58.74	60.87	61.02
Chlorophyll *a*		50.16	67.54

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified.

Algal Species and Densities

July 11, 1989

Taxa	Number	Units/ml
Oocystis	116	1309
Cryptomonas sp. #1	27	305
Fragilaria crotonensis	19	214
Green Algae (other)	18	203
Staurastrum	17	192
Cryptomonas	15	169
Chroococcus	6	68
Sphaerocystis Schroeteri	4	45
Tetrahedron	4	45
Ceratium hirundinella	3	34
Coelosphaerium	2	23
Blue-green (other)	1	11
Lagerheimia	1	11
Closterium	1	11
Total	303	3,420

Watershed Description
Watershed Area: 8,192 A (3315 ha)

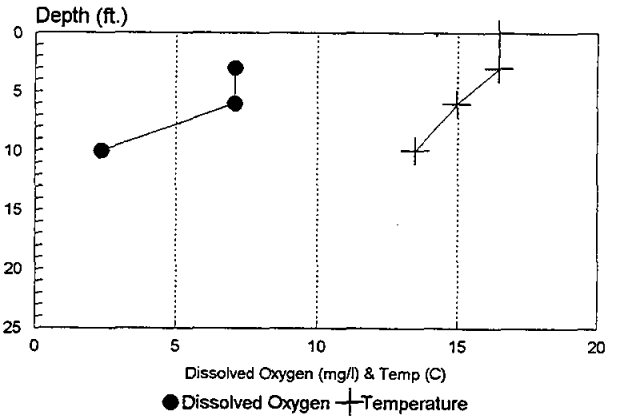
Soil Associations within Watershed

Association	Area (A)	% of Total
#6	8,192	100

#6 Buska-Mocmont-Rock Outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

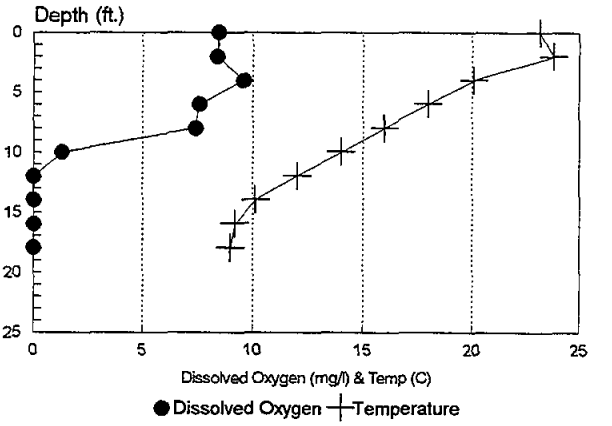
LAKOTA LAKE 8/14/79

Dissolved Oxygen & Temperature Profile



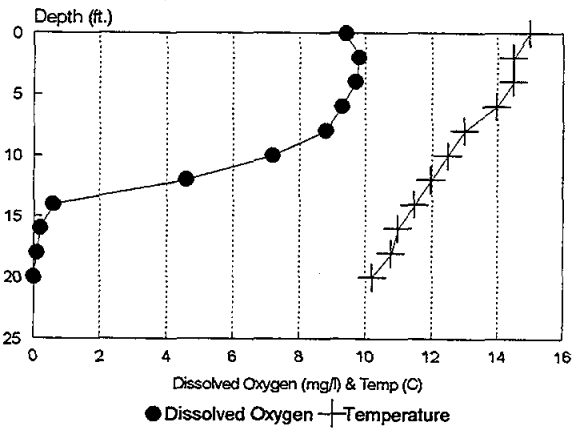
LAKOTA LAKE 7/15/91

Dissolved Oxygen & Temperature Profile



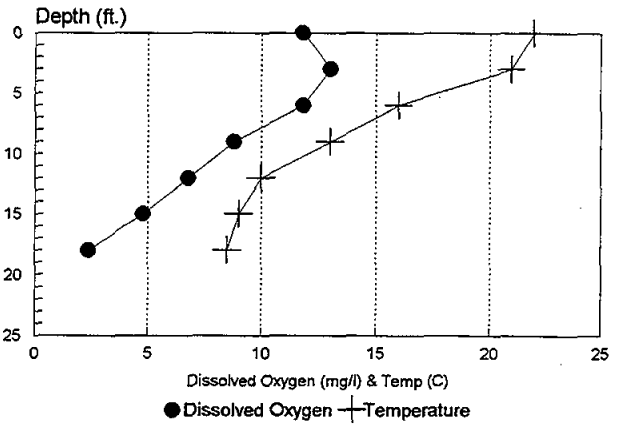
LAKOTA LAKE 10/1/91

Dissolved Oxygen & Temperature Profile



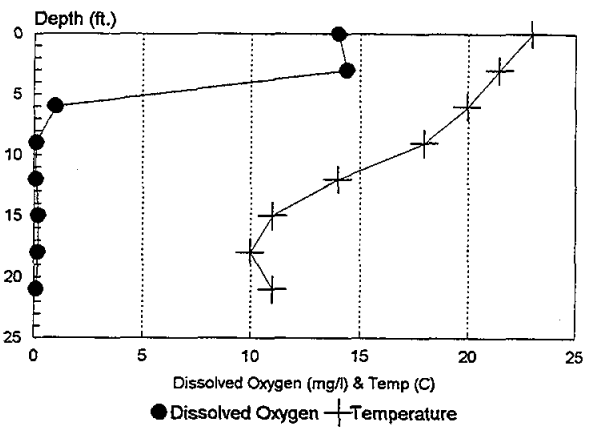
LAKOTA LAKE 6/14/94

Dissolved Oxygen & Temperature Profile

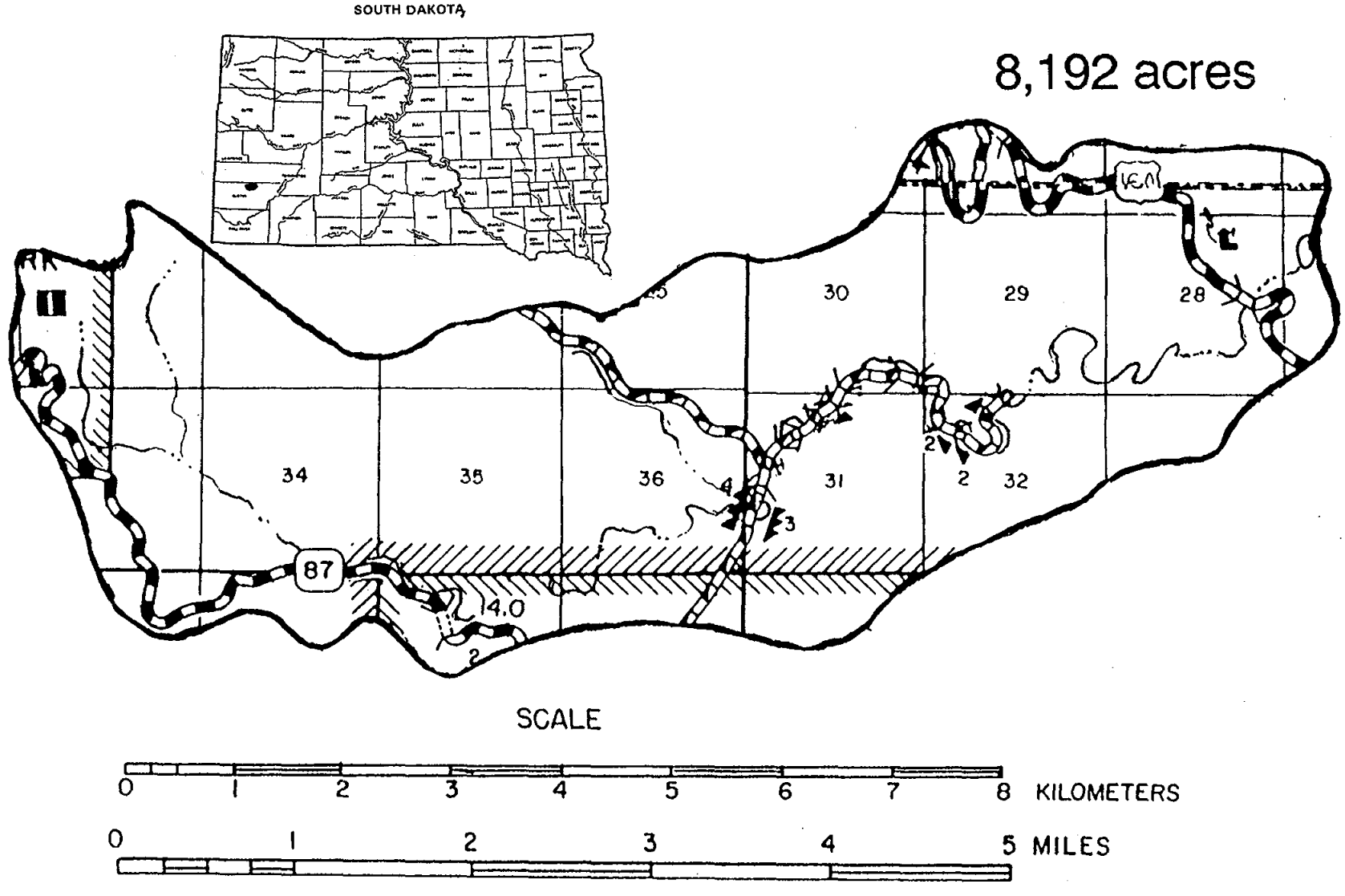


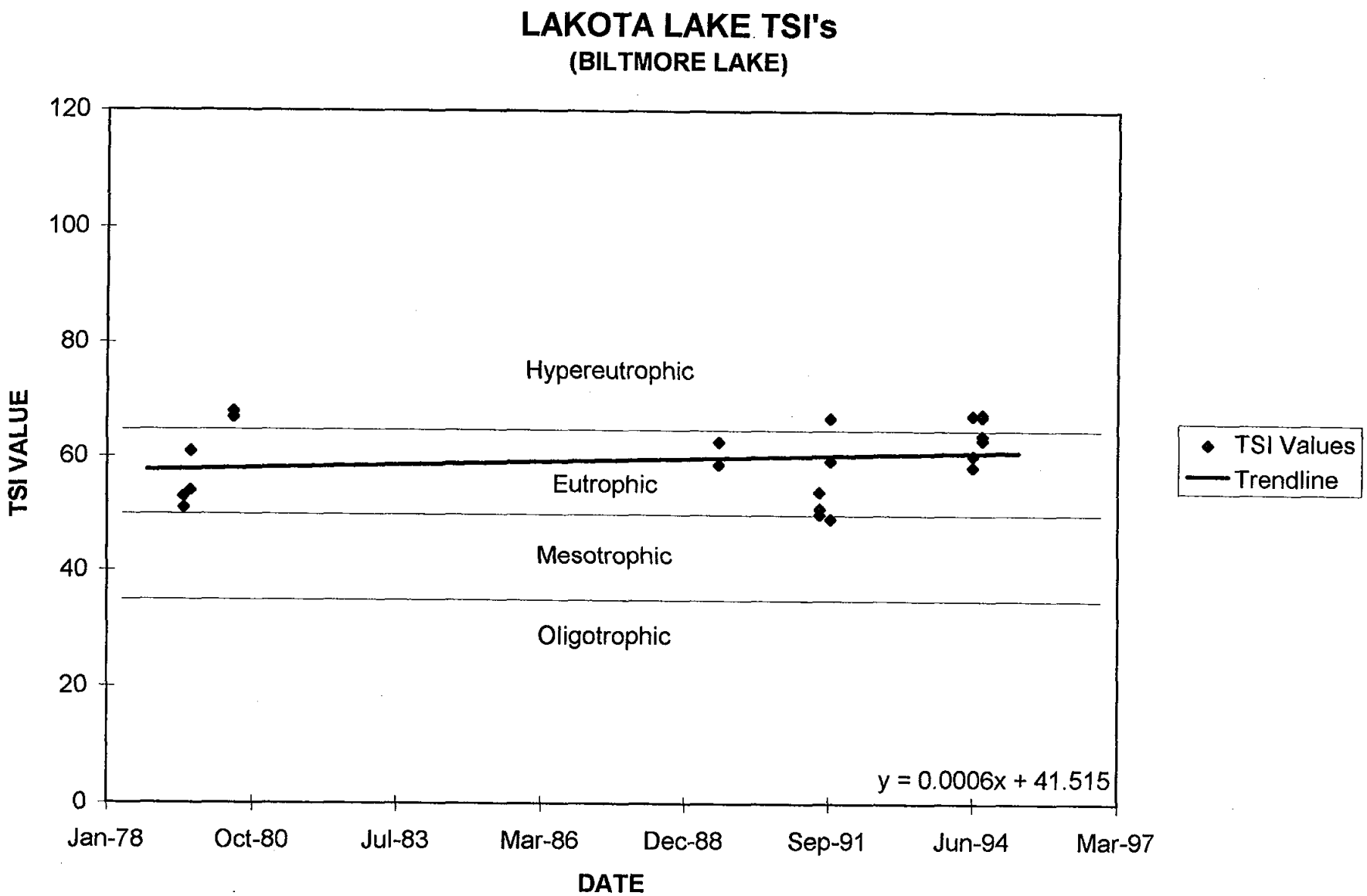
LAKOTA LAKE 8/16/94

Dissolved Oxygen & Temperature Profile



Lakota Lake


SOUTH DAKOTA
8,192 acres
30
29
28
34
35
36
31
32
87
4.0
SCALE
0 1 2 3 4 5 6 7 8 KILOMETERS
0 1 2 3 4 5 MILES


LAKOTA LAKE TSI's
(BILTMORE LAKE)
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0006x + 41.515
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LEGION LAKE

County: Custer
Latitude: 43 deg. 45 min. 38 sec. N
Longitude: 103 deg. 27 min. 42 sec. W
Area: 9.2 A (3.7 ha)
Maximum Depth: 22 ft (6.7 m)
Volume: 90.3 acre-ft ($1.11 \times 10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Galena Creek
Outlet: Galena Creek

Township: 3S
Range: 5E
Section(s): 25
Shoreline L: 0.6 mi (1 km)
Mean Depth: 9.7 ft (3 m)
Watershed/Lake Area: 223
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(3) Coldwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 141,479
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.78	4	13.20	4	16.75
Air Temperature (°C)	4	50.00	4	20.50	4	19.50
Secchi Disk Depth (meters)	2	1.34	2	0.94	2	1.36
Conductivity (cond/25° C)	4	183	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	2	7.60	4	8.20	4	7.80
Total Alkalinity (mg/l)	4	69	4	60	4	77
Total Solids (mg/l)	4	146	4	151	4	137
Dissolved Solids (mg/l)	4	140	4	141	4	132
Suspended Solids (mg/l)	4	7	4	11	4	5
Volatile Suspended Solids (mg/l)	-	-	2	9	-	-
Ammonia Nitrogen (mg/l)	4	0.27	4	0.04	4	0.03
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.28	4	0.69	4	0.63
Total Phosphorus (mg/l)	4	0.091	4	0.098	4	0.063
Total Dissolved Phosphorus (mg/l)	-	-	4	0.047	4	0.023
Ortho Phosphate as P (mg/l)	4	0.021	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	18.09	2	43.30

Year	1989	1991	1992
TSI Values -- Mean:	60.71	63.46	59.67
Secchi Disk	55.77	60.82	55.56
Total Phosphorus	65.65	70.59	58.14
Chlorophyll *a*		58.97	65.02

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush
Floating Leaved and Submergent Plant Species Identified: Anacharis canadensis

Algal Species and Densities

	July 11, 1989		August 15, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Anabaena	8	698	-	-
Algae (other)	5	166	17	1,115
Oocystis	3	100	1	66
Cryptomonas	2	66	-	-
Cryptomonas ovata	1	33	1	66
Characium	1	33	4	262
Aphanocapsa	1	33	-	-
Cryptomonas sp. #1	-	-	9	591
Fragilaria crotonensis	-	-	3	197
Green Algae (other)	-	-	2	131
Microcystis	-	-	1	66
Coelosphaerium	-	-	1	66
Total	21	698	39	2,559

Watershed Description

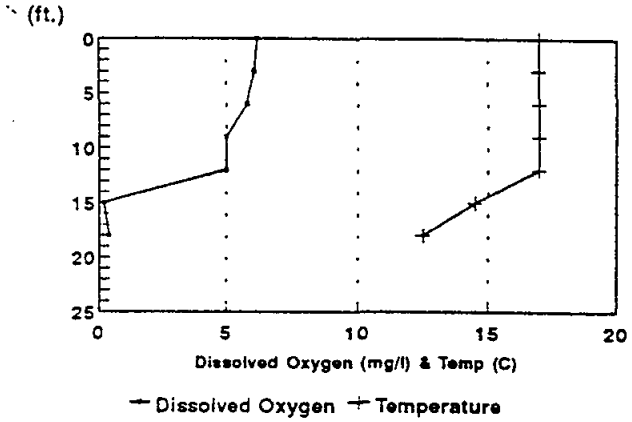
Watershed Area: 2,051 A (830 ha)

Soil Associations within Watershed

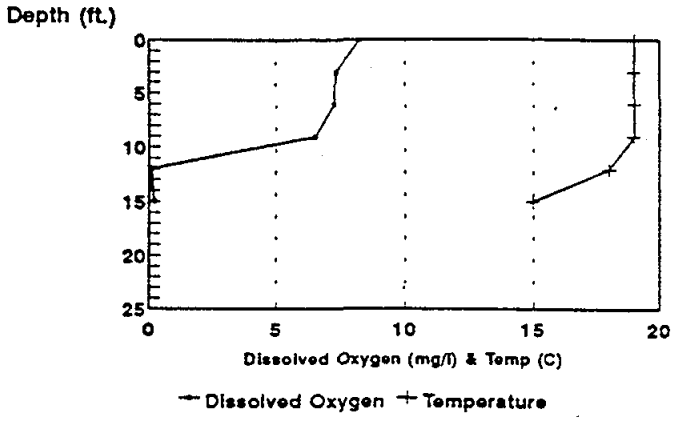
Association	Area (A)	% of Total
#6	2,051	100

#6 Buska-Mocmont-Rock outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite, on mountains.

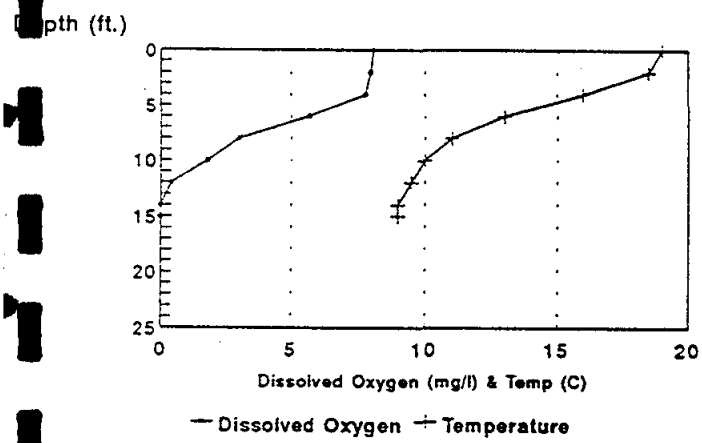
LEGION LAKE 7/22/92
Dissolved Oxygen & Temperature Profile



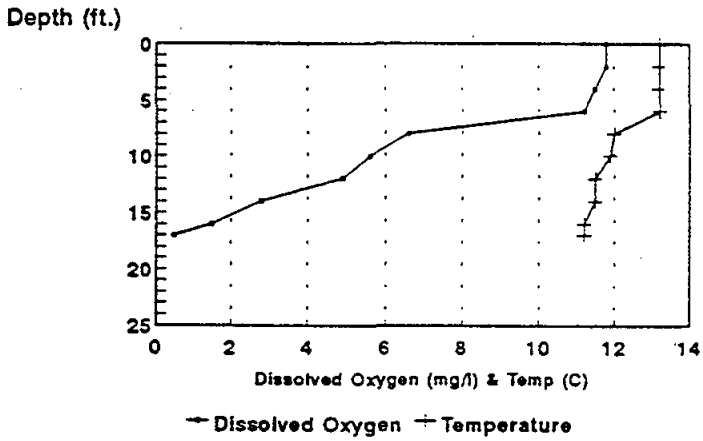
LEGION LAKE 8/18/92
Dissolved Oxygen & Temperature Profile



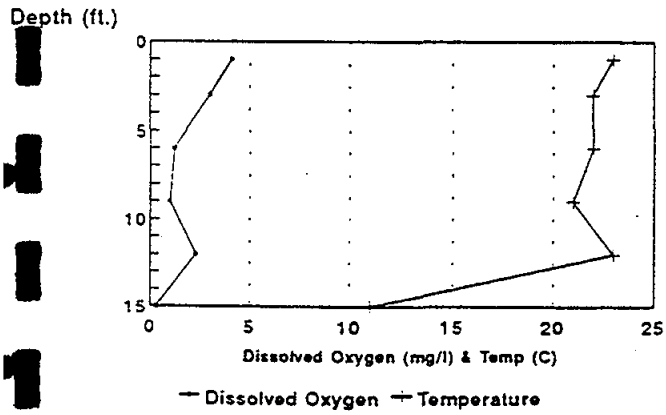
LEGION LAKE 6/19/91
Dissolved Oxygen & Temperature Profile



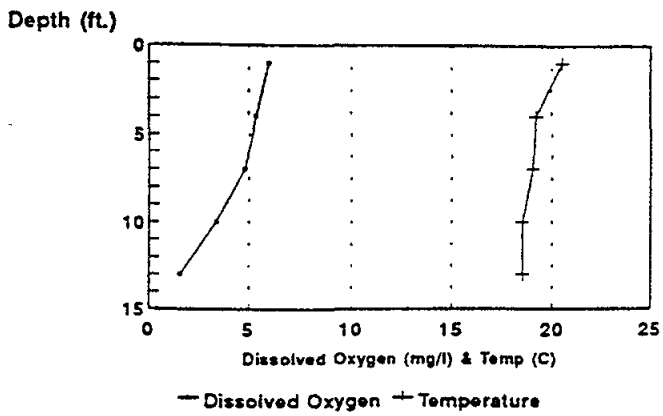
LEGION LAKE 10/1/91
Dissolved Oxygen & Temperature Profile



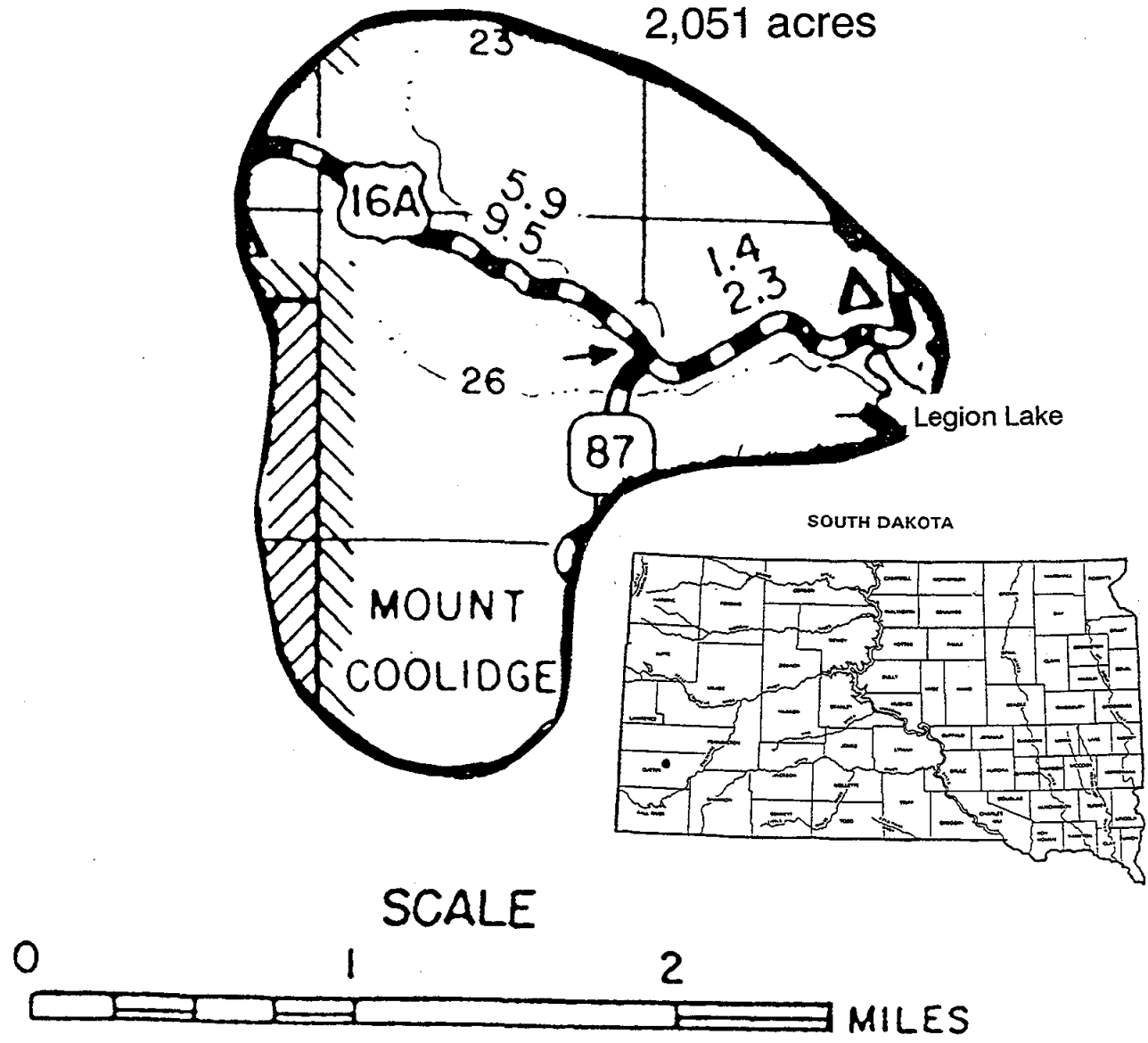
Legion Lake, 7/11/89
Dissolved Oxygen & Temperature Profile

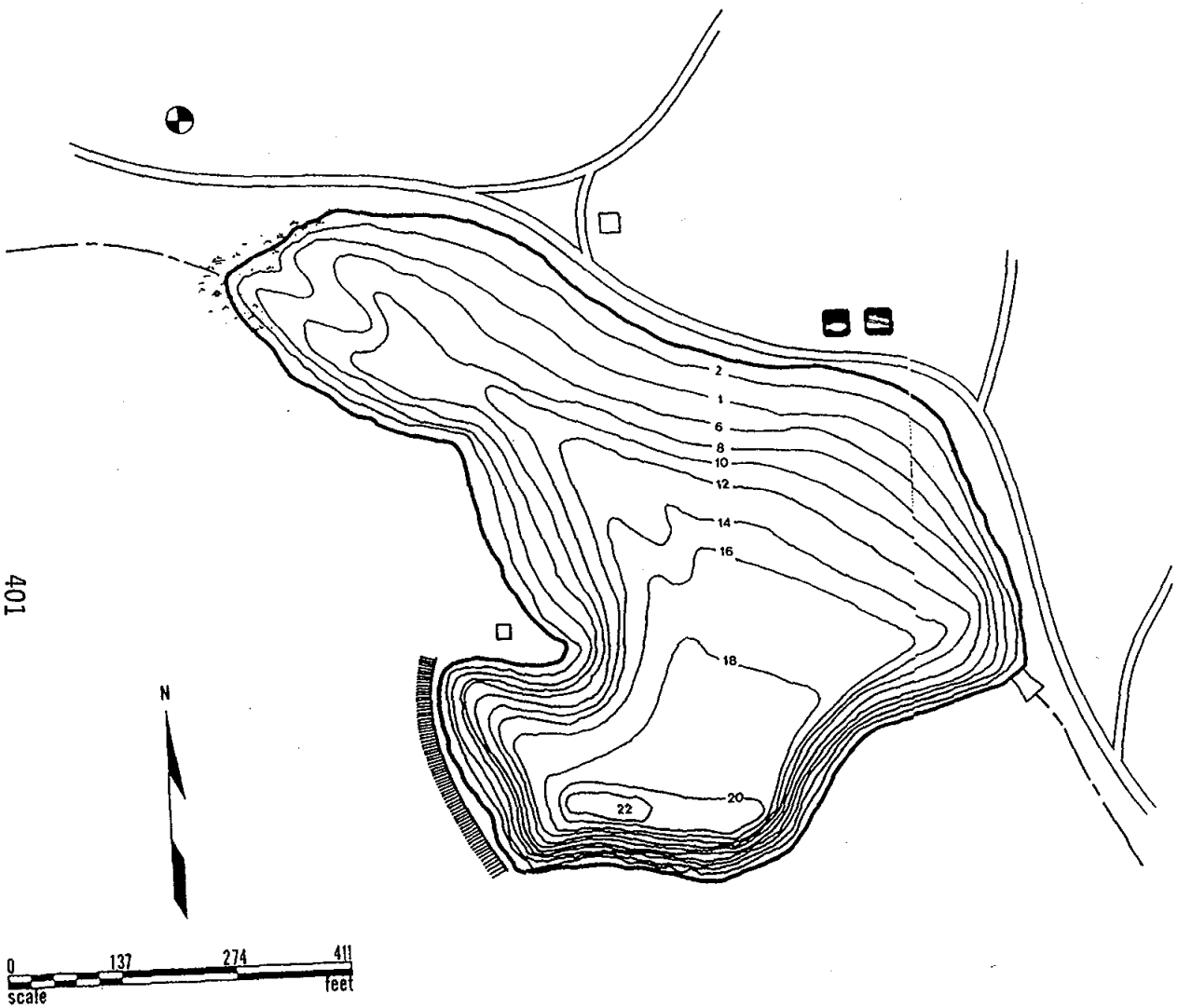


Legion Lake, 8/15/89
Dissolved Oxygen & Temperature Profile



Legion Lake


2,051 acres
23
16A
5.9
9.5
1.4
2.3
26
87
Legion Lake
MOUNT
COOLIDGE
SOUTH DAKOTA
SCALE
0
1
2
MILES



401

25 30

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

LEGION LAKE

CUSTER COUNTY
1987

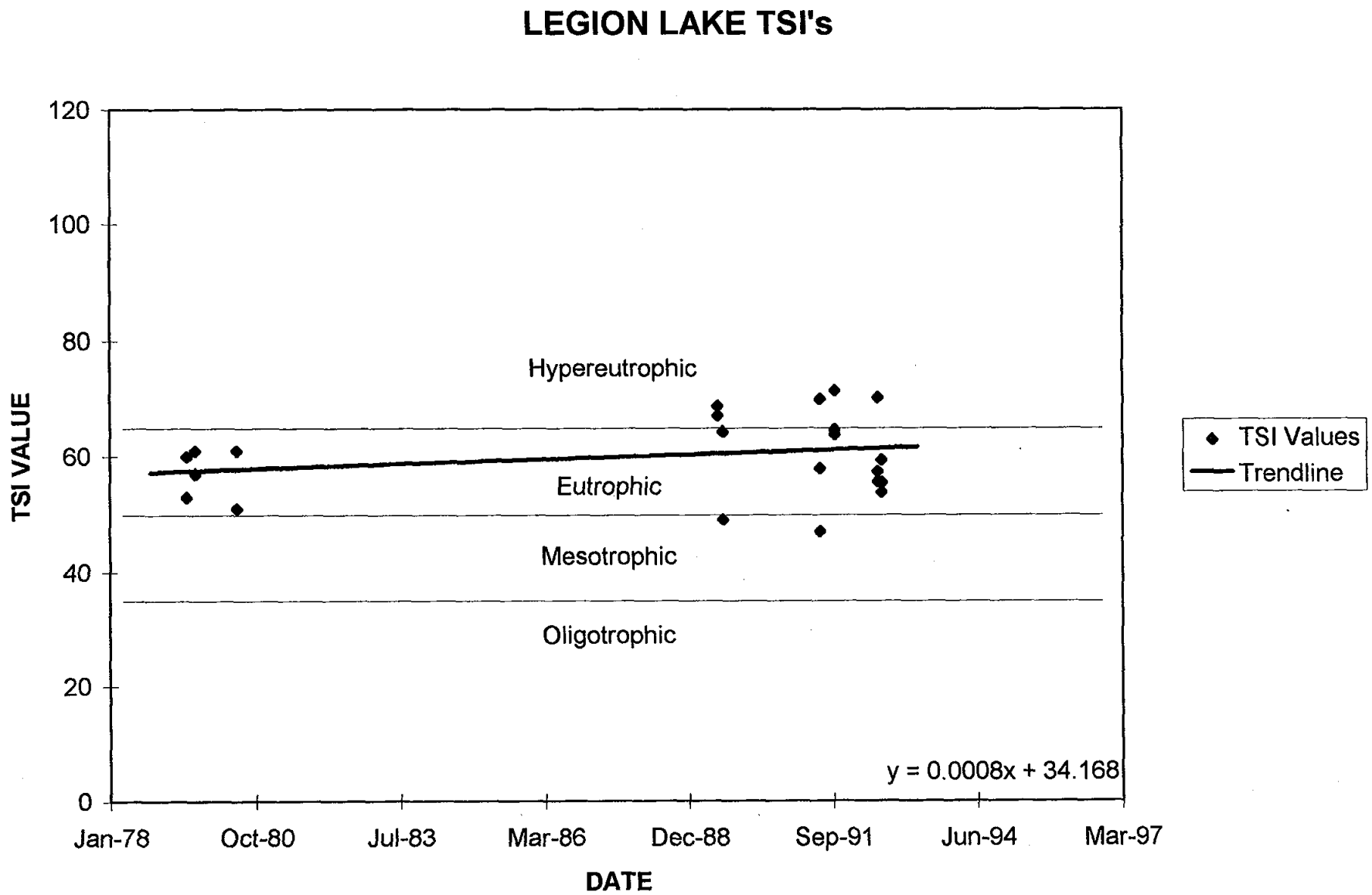
FISHING ACCESS
BOAT LAUNCH
DAM
SPILLWAY
BENCHMARK
DEPTH CONTOUR
IMPROVED LIGHT DUTY
EMERGED VEGETATION
FOREST

FIELD DATA COLLECTED : 6/87
AERIAL PHOTO NO. : 478-255
AERIAL PHOTO DATE : 7/78
MILES OF SHORELINE : 0.6 mi
AVERAGE DEPTH IN FEET : 9.7 ft
PLANIMETERED LAKE ACREAGE : 9.2

VOLUME :

depth	ac/ft
2	18
4	16
6	13
8	11
10	9
12	8
14	6
16	5
18	3
20	1
22	0.3
total	90.3

LEGAL DISCRIPTION : T3S, R5E, Sec. 25
SCALE : 1" = 137'
WATER LEVEL : Full


LEGION LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0008x + 34.168
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE LOUISE

County: Hand
Latitude: 44 deg. 37 min. 30 sec. N
Longitude: 99 deg. 08 min. 18 sec. W
Area: 163 A (66.0 ha)
Maximum Depth: 25 ft (7.6 m)
Volume: 1463.6 acre-ft ($1.805 \times 10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Wolf Creek
Outlet: Wolf Creek

Township: 113N
Range: 69W
Section(s): 4
Shoreline L: 6 mi (9.7 km)
Mean Depth: 9 ft (2.7 m)
Watershed/Lake Area: 642
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 75,611
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.80	4	23.42	4	20.00
Air Temperature (°C)	4	22.00	4	22.00	4	23.75
Secchi Disk Depth (meters)	2	1.08	2	1.26	2	2.06
Conductivity (cond/25° C)	4	594	2	319	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.68	4	8.26	4	8.82
Total Alkalinity (mg/l)	4	165	4	113	4	187
Total Solids (mg/l)	4	419	4	243	4	307
Dissolved Solids (mg/l)	4	407	4	232	4	304
Suspended Solids (mg/l)	4	12	4	11	4	3
Volatile Suspended Solids (mg/l)	-	-	2	3	-	-
Ammonia Nitrogen (mg/l)	4	0.11	4	0.27	4	0.38
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.65	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.70	4	1.30	4	1.73
Total Phosphorus (mg/l)	4	0.425	4	1.327	4	0.856
Total Dissolved Phosphorus (mg/l)	-	-	4	1.255	4	0.787
Ortho Phosphate as P (mg/l)	4	0.299	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	18.76	3	22.11

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results
Water Temperature (°C)	4	19.50	-	-
Air Temperature (°C)	4	26.00	-	-
Secchi Disk Depth (meters)	-	-	-	-
Conductivity (cond/25° C)	-	-	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su)	-	-	-	-
Total Alkalinity (mg/l)	4	252	8	109
Total Solids (mg/l)	4	456	8	292
Dissolved Solids (mg/l)	4	410	8	243
Suspended Solids (mg/l)	4	45	8	51
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.01	8	0.03
Nitrate + Nitrite Nitrogen (mg/l)	4	0.05	8	0.06
Total Kjeldahl Nitrogen (mg/l)	4	1.41	8	1.54
Total Phosphorus (mg/l)	4	0.925	8	1.170
Total Dissolved Phosphorus (mg/l)	4	0.796	8	0.552
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-

Year	1989	1991	1992	1993	1994
TSI Values -- Mean:	74.88	74.65	70.57	101.36	96.47
Secchi Disk	58.86	56.66	49.57	-	-
Total Phosphorus	90.89	107.94	101.21	101.36	96.47
Chlorophyll *a*		59.33	60.94		

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Ceratophyllum demersum, Potamogeton pectinatus, P. pusillus, and Polygonum coccineum

Algal Species and Densities

Taxa	June 12, 1989 Number	June 12, 1989 Units/ml	July 10, 1989 Number	July 10, 1989 Units/ml
Diatom (centric)	155	3,491	1	30
Asterionella formosa	30	676	-	-
Cryptomonas sp. #1	25	563	-	-
Algae (other)	24	541	45	1,039
Algae (flagellate)	18	405	47	1,395
Cryptomonas	7	158	20	594
Schroederia	6	135	-	-
Diatom (pennate)	6	135	-	-
Nitzschia acicularis	6	135	-	-
Characium	5	113	3	89
Actinastrum	4	90	-	-
Green Algae (other)	4	68	6	178
Melosira granulata	3	68	65	1,929
Aphanocapsa	3	68	17	505
Dinobryon	3	68	-	-
Cryptomonas ovata	1	23	33	979
Anabaena	1	23	2	59
Aphanizomenon flos-aquae	1	23	69	2,048
Oocystis	1	23	-	-
Chroococcus	1	23	1	30
Scenedesmus	1	23	-	-
Tetrastrum	1	23	-	-
Dactylococcopsis	1	23	1	30
Ceratium hirundinella	-	-	1	30
Coelosphaerium	-	-	1	30
Total	307	6,914	302	8,962

Watershed Description

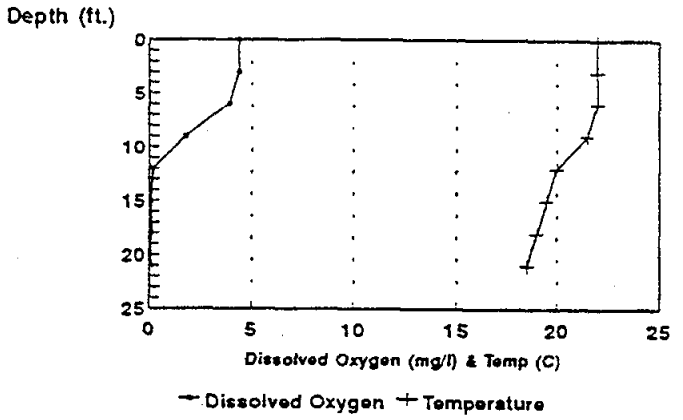
Watershed Area: 104,694 A (42,370 ha)

Soil Associations within Watershed

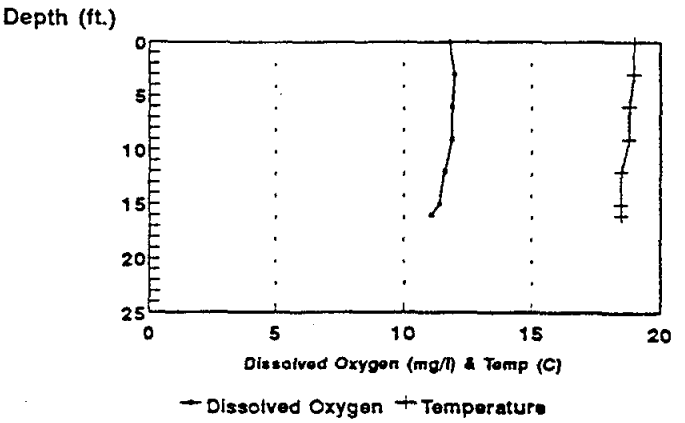
Association	Area (A)	% of Total
GL-CE-KA	104,694	100

GL-CE-KA Glenham-Cavo-Jerauld: Deep, nearly level to gently undulating, well drained, loamy soils and soils with claypan subsoils that formed in glacial till.

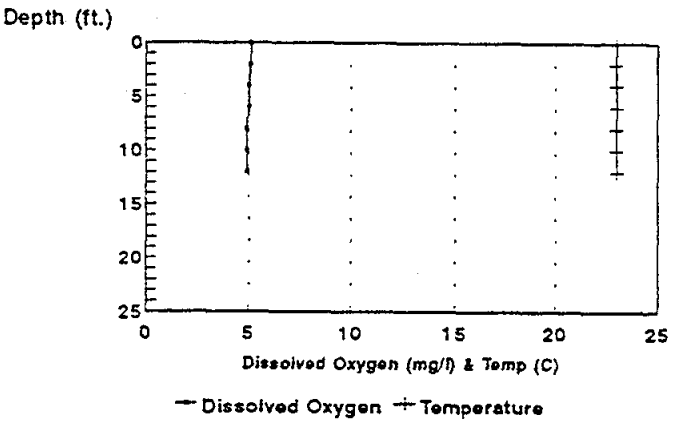
LAKE LOUISE 8/3/92
Dissolved Oxygen & Temperature Profile



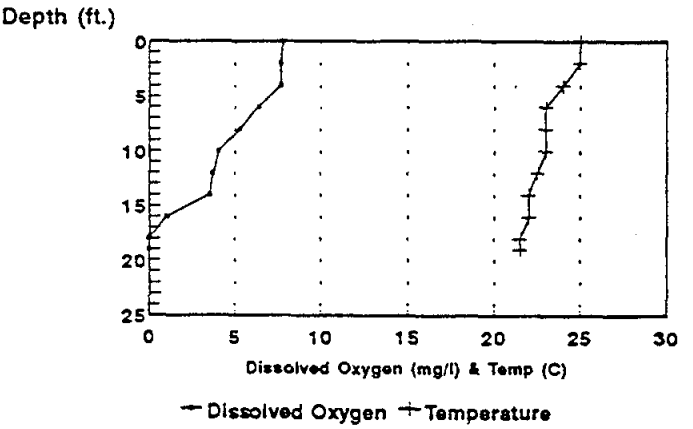
LAKE LOUISE 9/2/92
Dissolved Oxygen & Temperature Profile



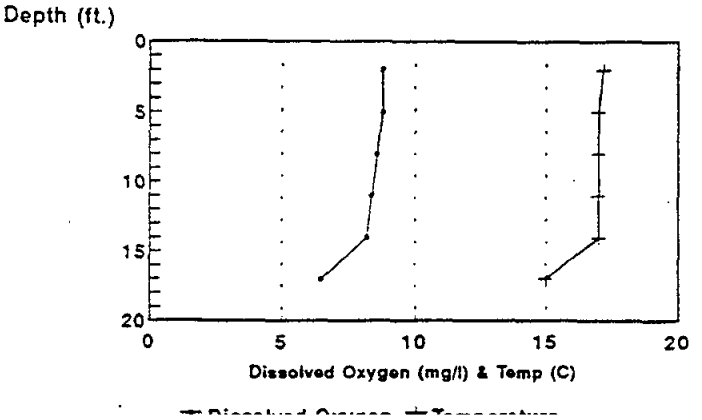
LAKE LOUISE 7/8/91
Dissolved Oxygen & Temperature Profile



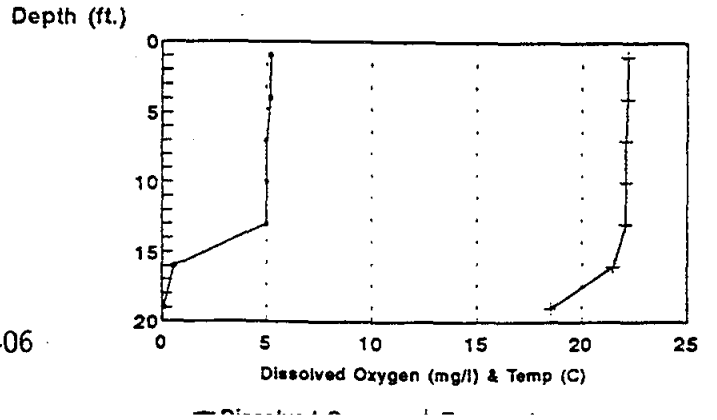
LAKE LOUISE 8/19/91
Dissolved Oxygen & Temperature Profile



Lake Louise, 6/12/89
Dissolved Oxygen & Temperature Profile

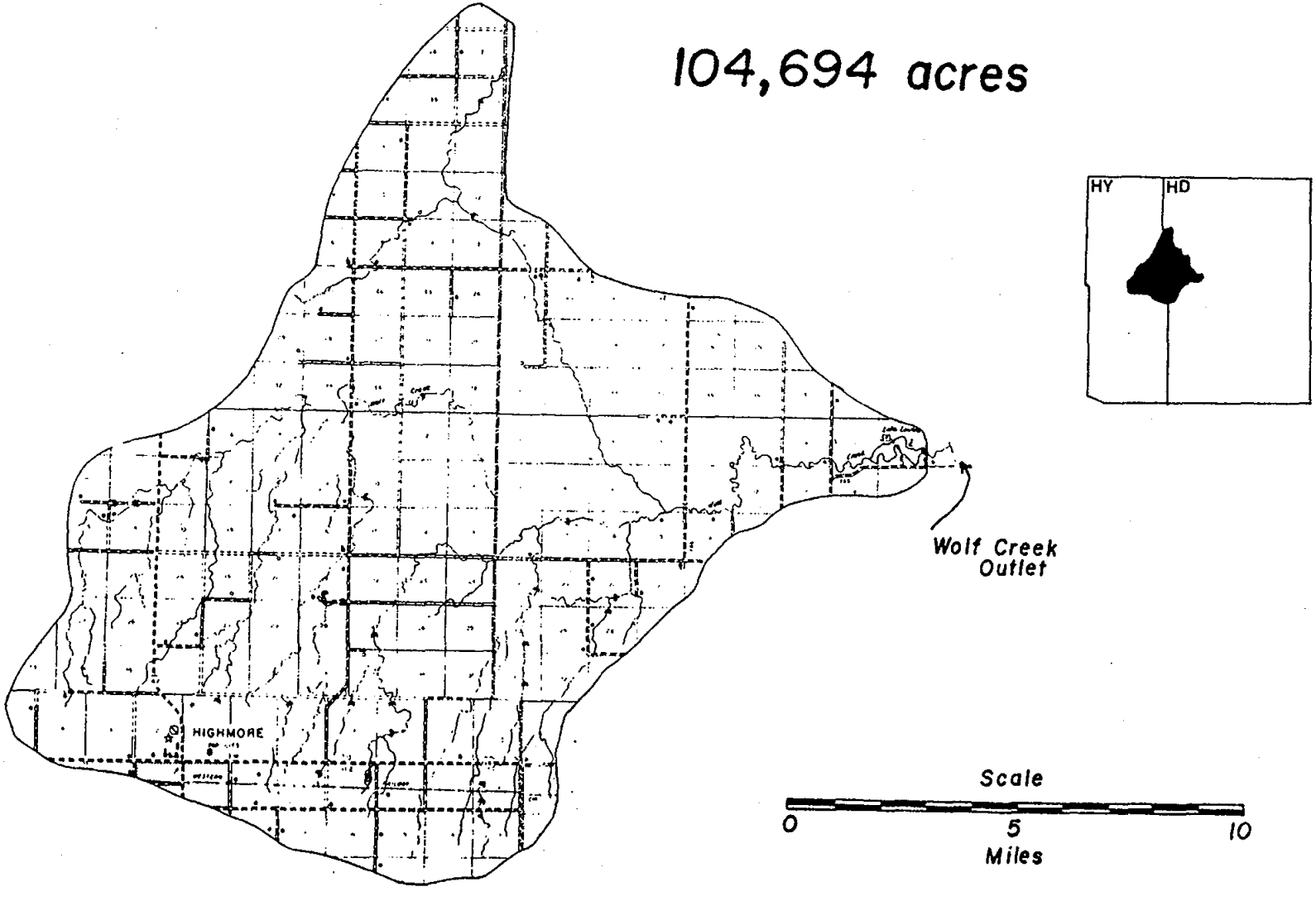


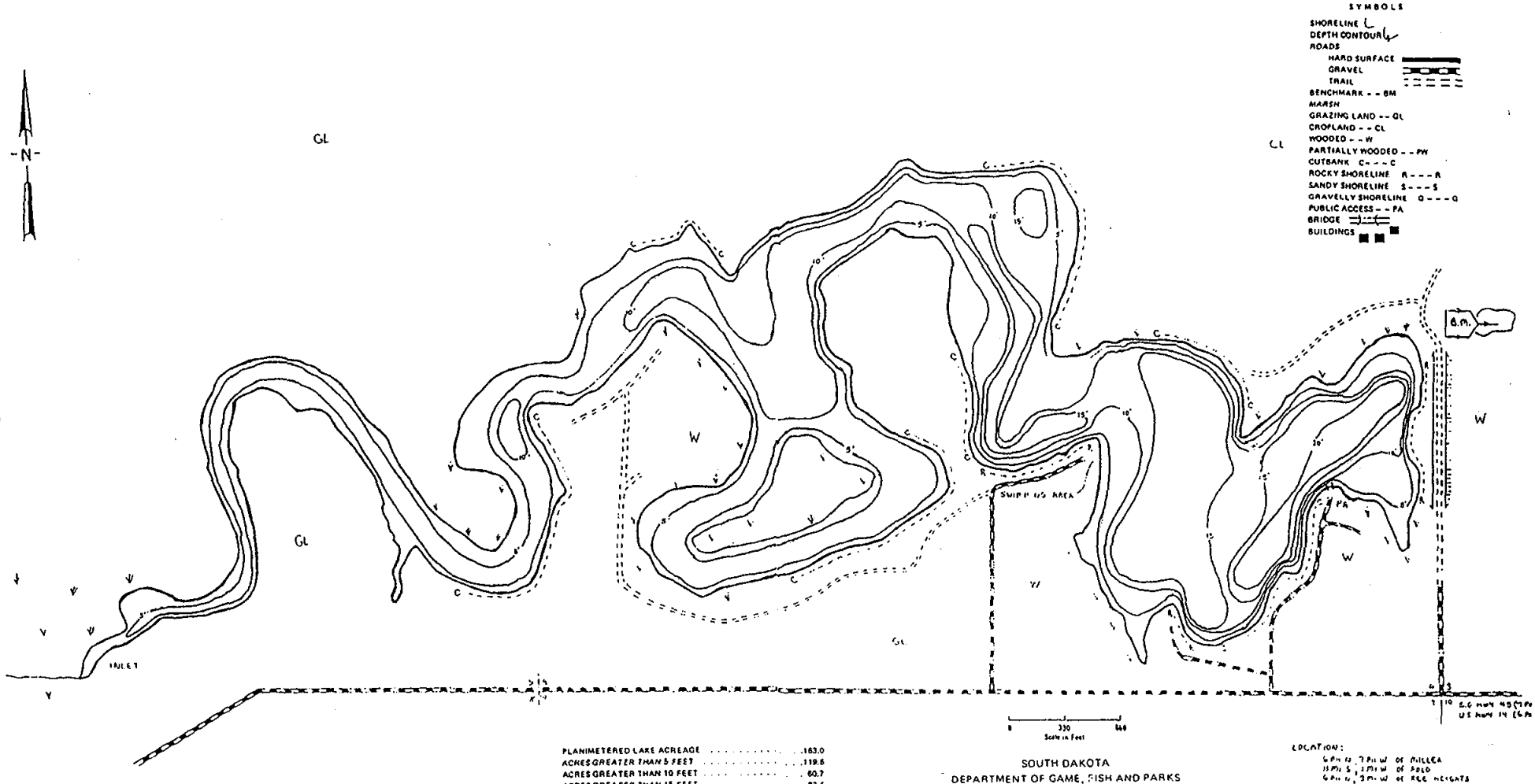
Lake Louise, 7/10/89
Dissolved Oxygen & Temperature Profile



Lake Louise

104,694 acres





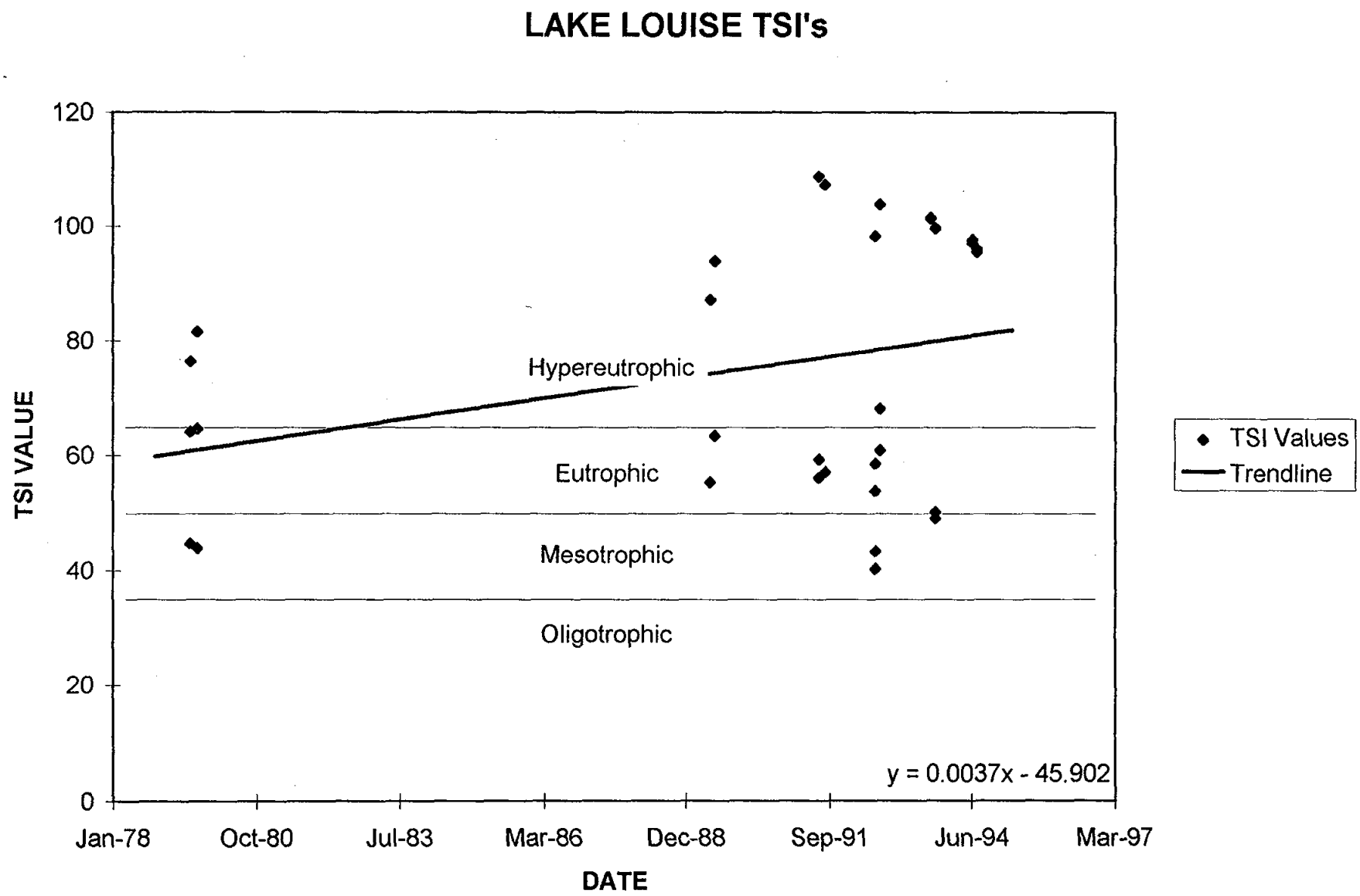
PLANIMETERED LAKE ACREAGE	163.0
ACRES GREATER THAN 5 FEET	119.8
ACRES GREATER THAN 10 FEET	60.7
ACRES GREATER THAN 15 FEET	82.6
ACRES GREATER THAN 20 FEET	42.0
TOTAL ACRE FEET	1463.6
AVERAGE DEPTH	9.0 FEET

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE LOUISE
HAND COUNTY

AERIAL PHOTO NO. CBP-4LL 85D
PHOTO DATE 7-27-70
SECTION 4-TWP-113N-RGE 69W
B.M. SPILLWAY (6 INCHES OVER FULL)
PLANIMETERED ACREAGE: 164
MILES OF SHORELINE 6

LOCATION:
6 mi. to 7 mi. W of MILLER
11 mi. S & 1 mi. W of POLO
6 mi. N & 3 mi. W of RED HEIGHTS

408


LAKE LOUISE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0037x - 45.902
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LOYALTON DAM

County: Edmunds
Latitude: 45 deg. 16 min. 36 sec. N
Longitude: 99 deg. 12 min. 18 sec. W
Area: 9.8 A (3.9 ha)
Maximum Depth: 14 ft (4.3 m)
Volume: 99.3 acre-ft ($1.22x10^5 m^3$)
Origin of Basin: impoundment
Township: 121N
Range: 69W
Section(s): 19
Shoreline L: 0.5 mi (0.8 km)
Mean Depth: 10.1 ft (3 m)
Watershed/Lake Area: 757
Thermal Stratification: no
Major Inflows (named or permanent streams): Dry Run Creek
Outlet: Dry Run Creek

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 76,369
Ownership Status: NA
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	2	21.75	4	23.55	4	21.70
Air Temperature (°C)	2	28.33	4	28.75	4	23.50
Secchi Disk Depth (meters)	1	1.46	2	1.42	2	0.96
Conductivity (cond/25° C)	2	3,451	2	3,841	-	-
Turbidity (NTU)	-	-	-	-	4	7.54
Lab pH (su)	2	9.11	-	-	-	-
Field pH (su)	-	-	4	8.28	4	8.90
Total Alkalinity (mg/l)	2	612	4	746	4	681
Total Solids (mg/l)	2	2,254	4	2,551	4	2,168
Dissolved Solids (mg/l)	2	2,238	4	2,534	4	2,160
Suspended Solids (mg/l)	2	16	4	17	4	8
Volatile Suspended Solids (mg/l)	-	-	2	16	-	-
Ammonia Nitrogen (mg/l)	2	0.41	4	0.07	4	0.03
Nitrate + Nitrite Nitrogen (mg/l)	2	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	2	2.18	4	1.93	4	2.61
Total Phosphorus (mg/l)	2	0.200	4	0.157	4	0.181
Total Dissolved Phosphorus (mg/l)	-	-	4	0.098	4	0.140
Ortho Phosphate as P (mg/l)	2	0.107	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	29.48	2	28.81

Year	1989	1991	1994
TSI Values -- Mean:	67.18	65.20	67.58
Secchi Disk	54.51	54.97	60.59
Total Phosphorus	79.85	76.87	78.62
Chlorophyll *a*		63.76	63.54

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

July 19, 1989

Taxa	Number	Units/ml
Chroococcus	95	2,099
Oocystis	5	110
Algae (other)	2	44
Tetrahedron	1	22
Total	103	2,275

Watershed Description

Watershed Area: 7,423 acres (3,004 ha)

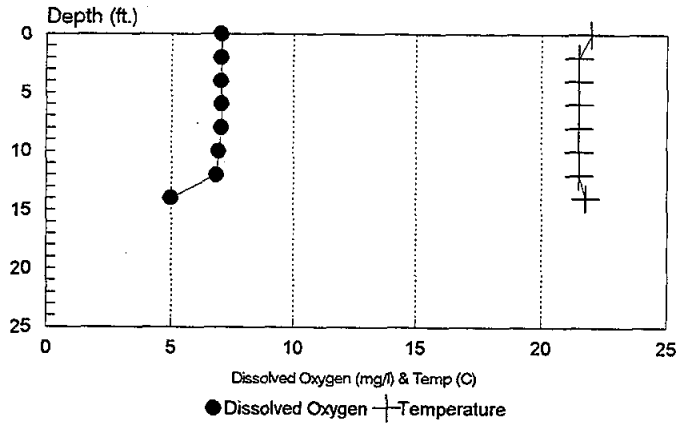
Soil Associations within Watershed

Association	Area (A)	% of Total
#3	7,423	100

#3 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating loamy soils formed in glacial till.

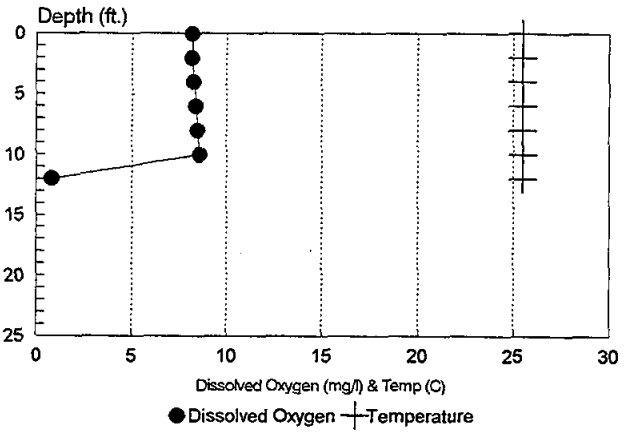
LOYALTON DAM 6/25/91

Dissolved Oxygen & Temperature Profile



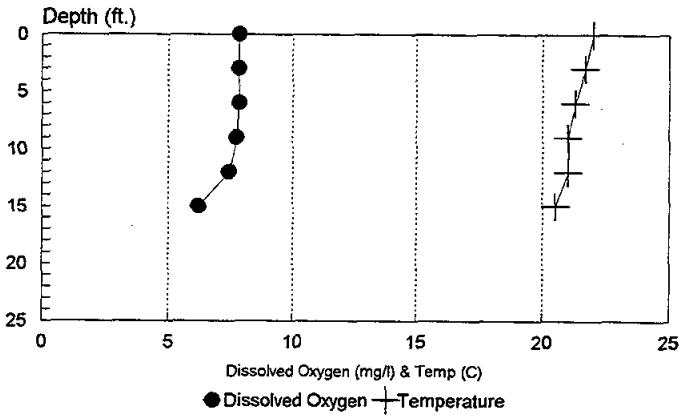
LOYALTON DAM 8/27/91

Dissolved Oxygen & Temperature Profile



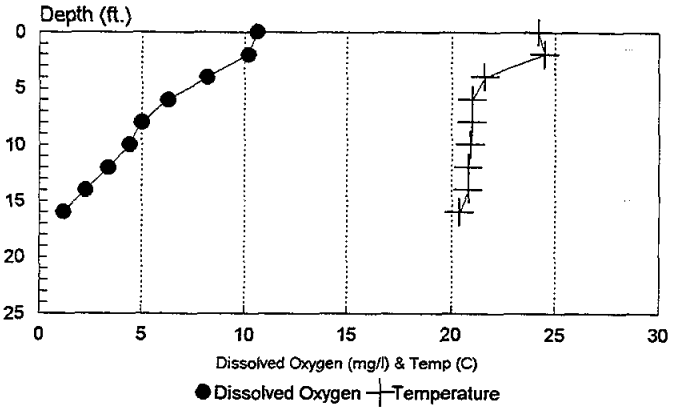
LOYALTON DAM 6/29/94

Dissolved Oxygen & Temperature Profile



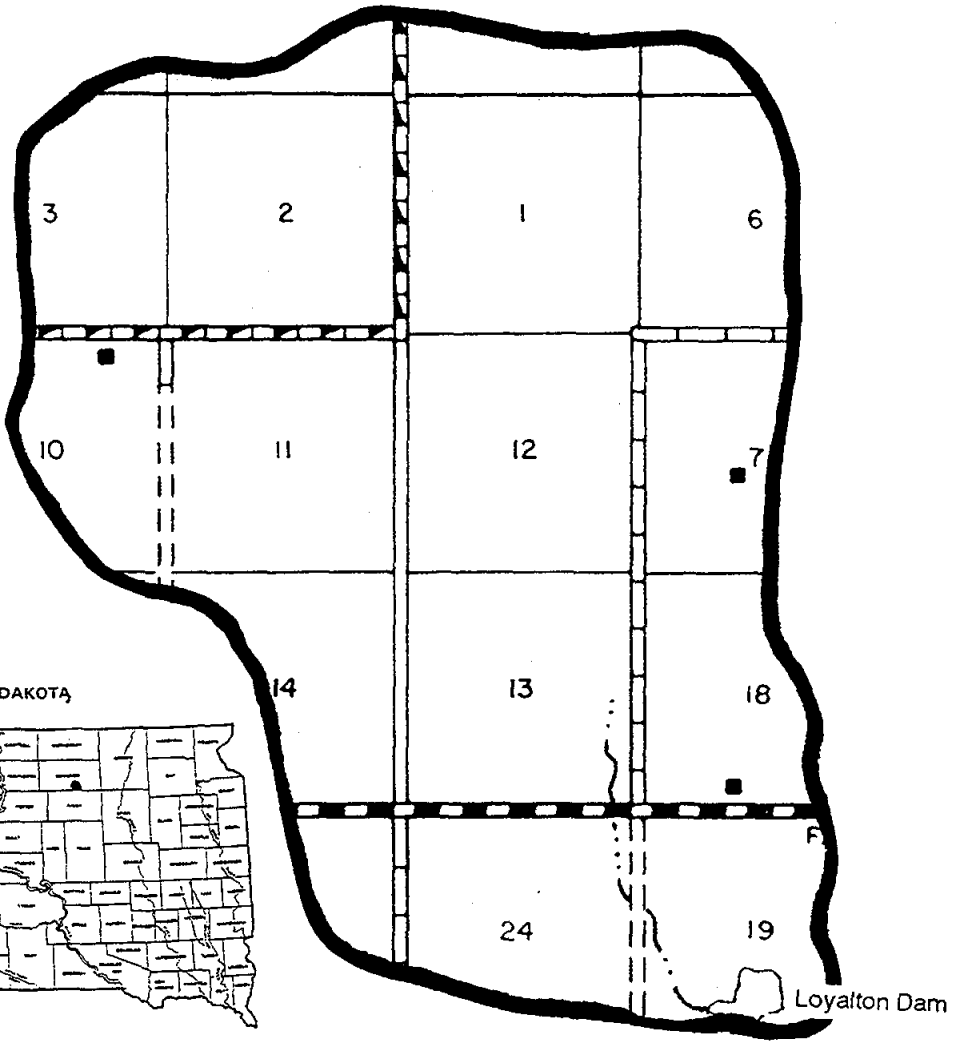
LOYALTON DAM 8/29/94

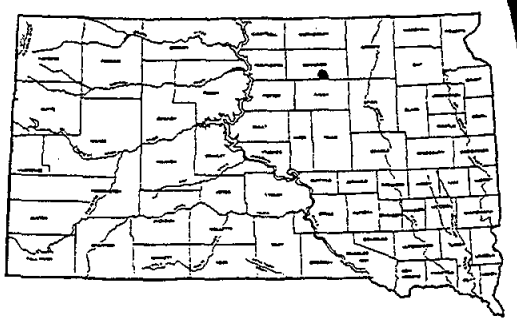
Dissolved Oxygen & Temperature Profile



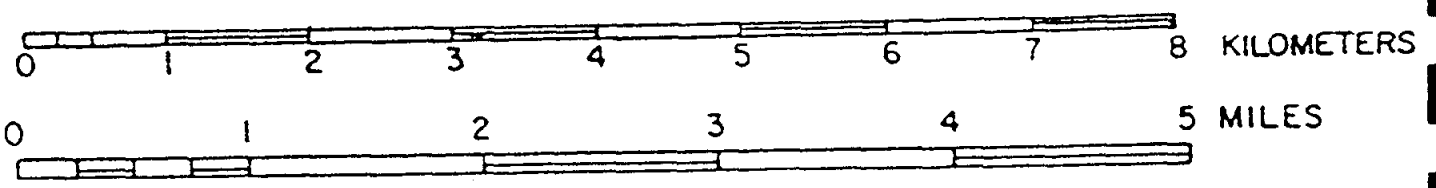
Loyalton Dam

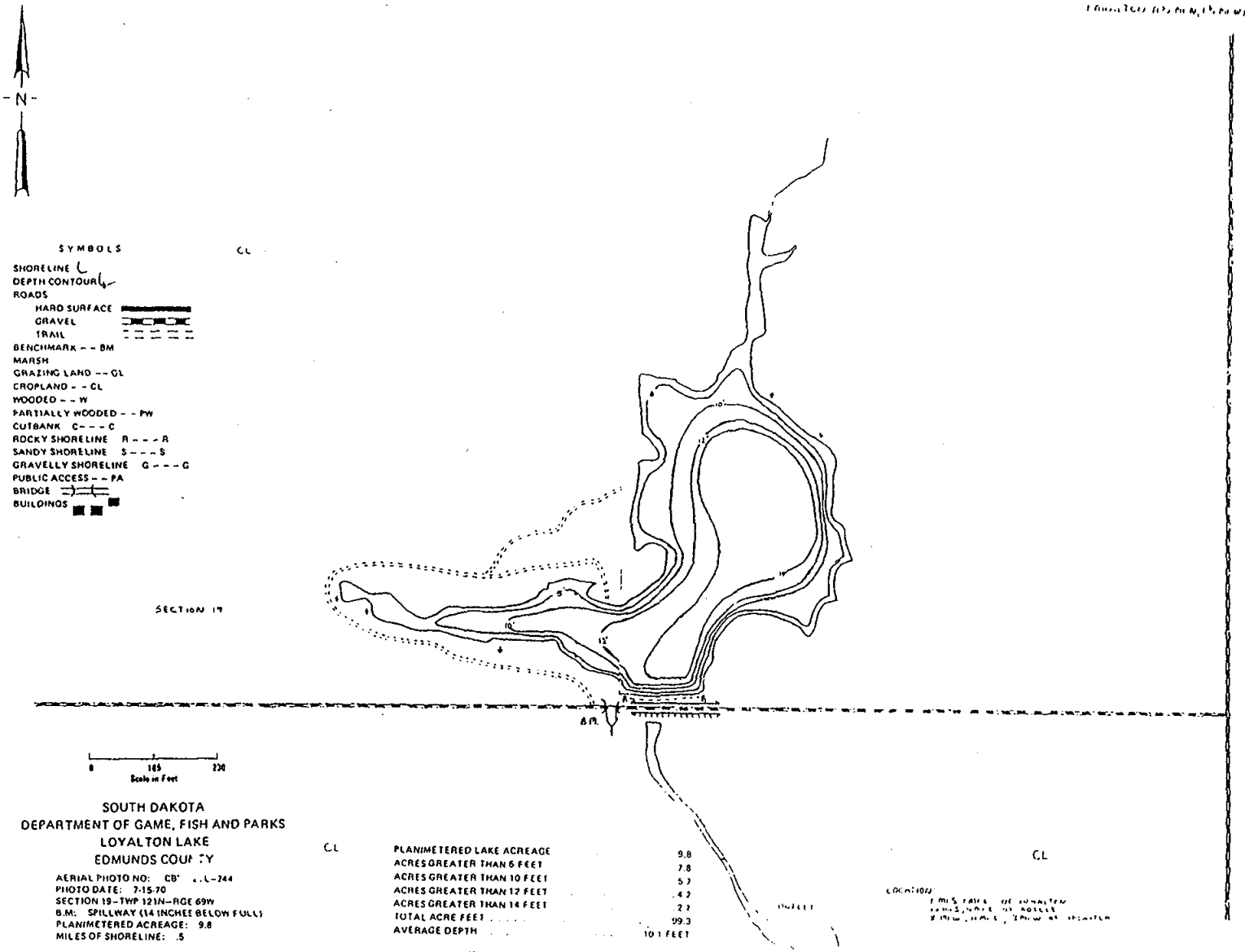
7,423 acres

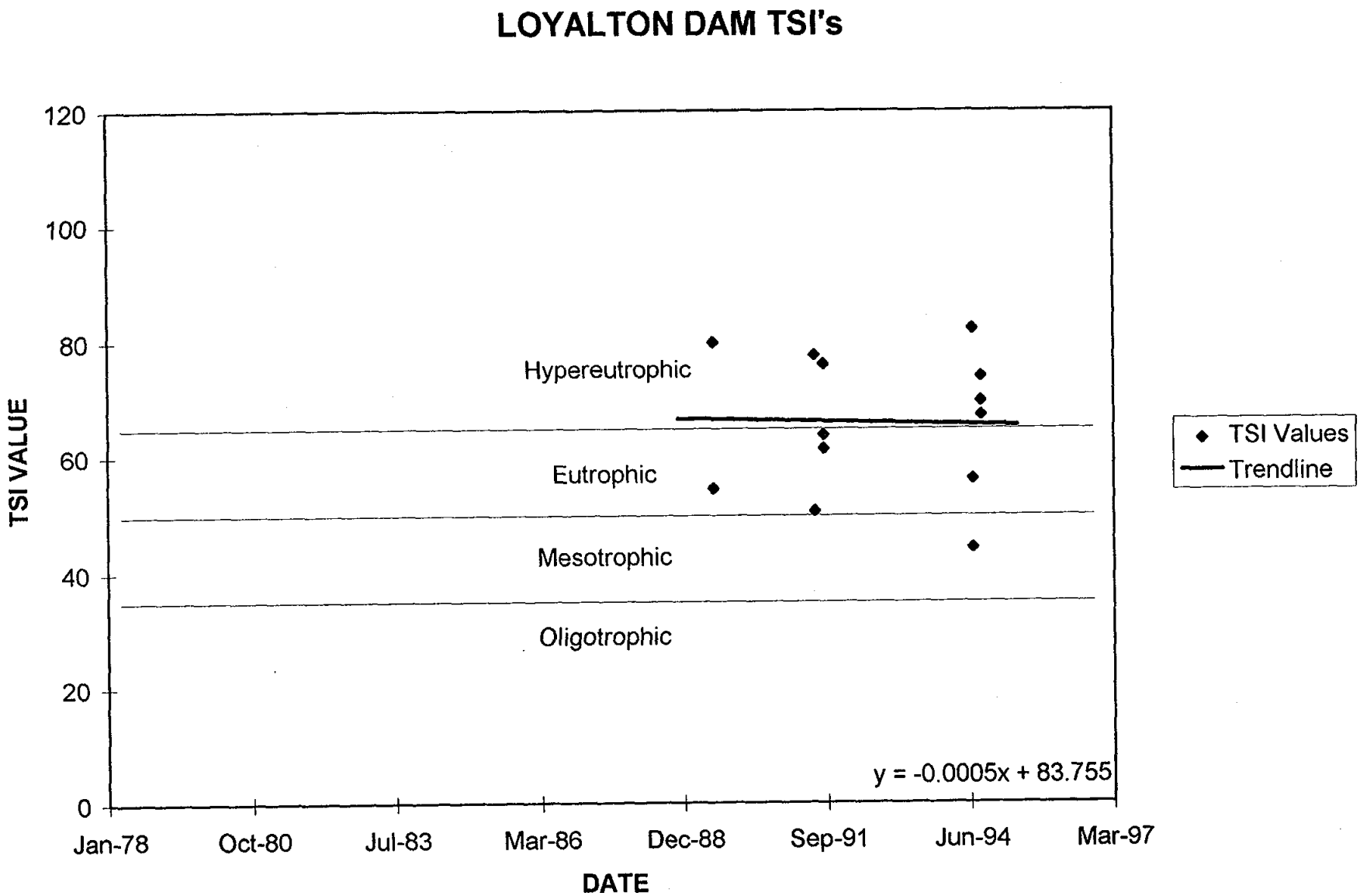




SCALE




-N-
SYMBOLS
SHORELINE
DEPTH CONTOURS
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK - - BM
MARSH
GRAZING LAND -- GL
CROPLAND - - CL
WOODED - - W
PARTIALLY WOODED - - PW
CUTBANK C- - - C
ROCKY SHORELINE R - - - R
SANDY SHORELINE S - - - S
GRAVELLY SHORELINE G - - - G
PUBLIC ACCESS - - PA
BRIDGE
BUILDINGS
SECTION 19
BM
0 165 330
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LOYALTON LAKE
EDMUNDS COUNTY
AERIAL PHOTO NO: CB' ..L-244
PHOTO DATE: 7-15-70
SECTION 19-TWP 121N-RGE 69W
B.M: SPILLWAY (14 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 9.8
MILES OF SHORELINE: .5
PLANIMETERED LAKE ACREAGE 9.8
ACRES GREATER THAN 6 FEET 7.8
ACRES GREATER THAN 10 FEET 5.7
ACRES GREATER THAN 12 FEET 4.2
ACRES GREATER THAN 14 FEET 2.2
TOTAL ACRE FEET 99.3
AVERAGE DEPTH 10.1 FEET
CL
CL
CL


LOYALTON DAM TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0005x + 83.755
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE MADISON

County: Lake
Latitude: 43 deg. 57 min. 18 sec. N
Longitude: 97 deg. 00 min. 42 sec. W

Township: 106N
Range: 51-52 W
Section(s): 19, 21-23, 36 25-27, 29-32

Area: 2,799.3 A (1132.9 ha)
Maximum Depth: 20 ft (6.1 m)
Volume: 27,153 acre-ft ($3.350x10^7 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): Silver Creek
Outlet: unnamed

Shoreline L: 15.7 mi (25 km)
Mean Depth: 9.7 ft (3.0 m)
Watershed/Lake Area: 10
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 270,159
Ownership Status: State, County, and Privately owned
Public Interest: Lake Madison Development Association.

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.25	4	22.83	4	19.77
Air Temperature (°C)	4	23.50	4	22.50	4	16.63
Secchi Disk Depth (meters)	2	0.85	2	1.71	2	0.80
Conductivity (cond/25° C)	4	1,453	2	1,612	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.70	4	8.46	4	8.55
Total Alkalinity (mg/l)	4	119	4	152	4	127
Total Solids (mg/l)	4	1,304	4	1,317	4	1,252
Dissolved Solids (mg/l)	4	1,285	4	1,299	4	1,229
Suspended Solids (mg/l)	4	19	4	18	4	23
Volatile Suspended Solids (mg/l)	-	-	2	15	-	-
Ammonia Nitrogen (mg/l)	4	0.50	4	0.23	4	0.50
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.40	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.43	4	1.66	4	2.38
Total Phosphorus (mg/l)	4	0.246	4	0.189	4	0.186
Total Dissolved Phosphorus (mg/l)	-	-	4	0.116	4	0.074
Ortho Phosphate as P (mg/l)	4	0.099	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	154.10	2	77.05

Year	1989	1991	1992
TSI Values -- Mean:	72.78	72.26	71.72
Secchi Disk	62.29	52.29	63.22
Total Phosphorus	83.28	84.51	78.74
Chlorophyll *a*		79.99	73.19

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus and P. richardsonii

Algal Species and Densities

	June 28, 1989		August 2, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	237	5,742	245	15,319
Oocystis	32	775	-	-
Melosira granulata	26	630	-	-
Algae (other)	4	97	3	188
Diatom (pennate)	1	24	-	-
Algae (flagellate)	1	24	-	-
Lyngbya Diguetii	-	-	61	3,814
Microcystis	-	-	3	188
Total	301	7,292	312	19,508

Watershed Description
Watershed Area: 29,191 A (11,814 ha)

Soil Associations within Watershed

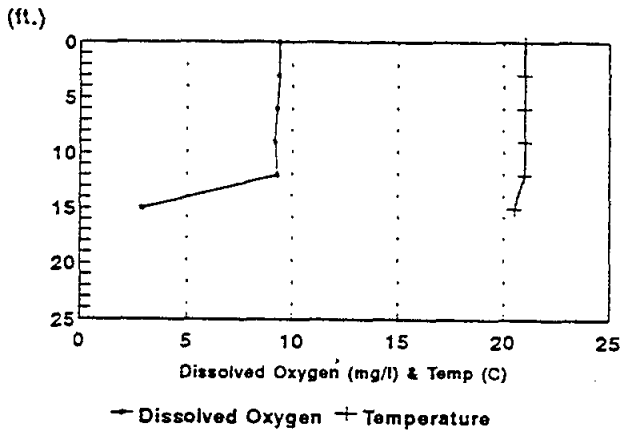
Association	Area (A)	% of Total
EF-VH	19,558	67
EF-WF	4,962	17
DX	4,671	16

EF-VH Egan-Viborg: Nearly level to gently sloping, well drained and moderately well drained, silty soils formed in glacial drift; on uplands.

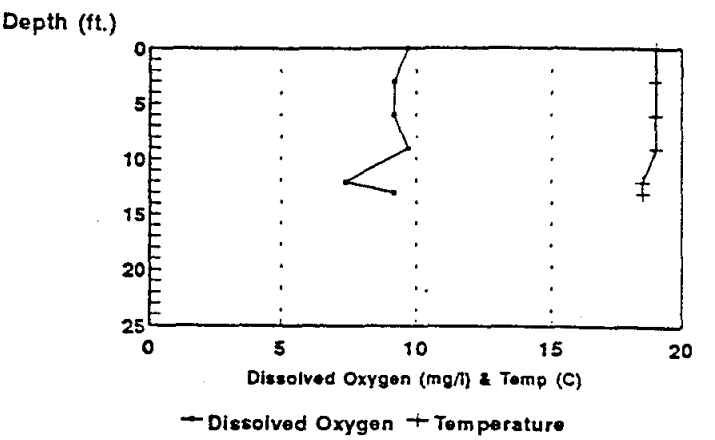
EF-WF Egan-Wentworth: Gently undulating to rolling well drained, silty soils formed in glacial drift; on uplands.

DX Dempster: Nearly level to sloping, well drained, silty soils formed in alluvium over sand and gravel; on stream terraces and uplands.

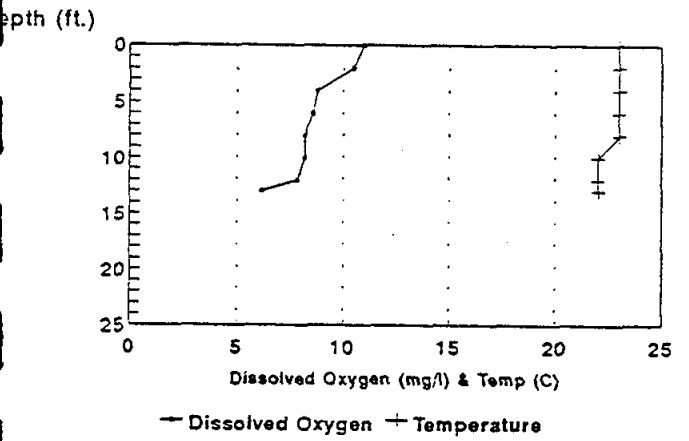
LAKE MADISON 7/29/92
Dissolved Oxygen & Temperature Profile



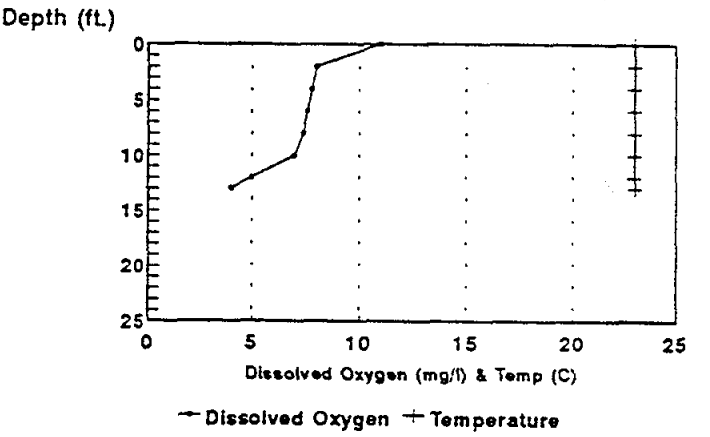
LAKE MADISON 8/26/92
Dissolved Oxygen & Temperature Profile



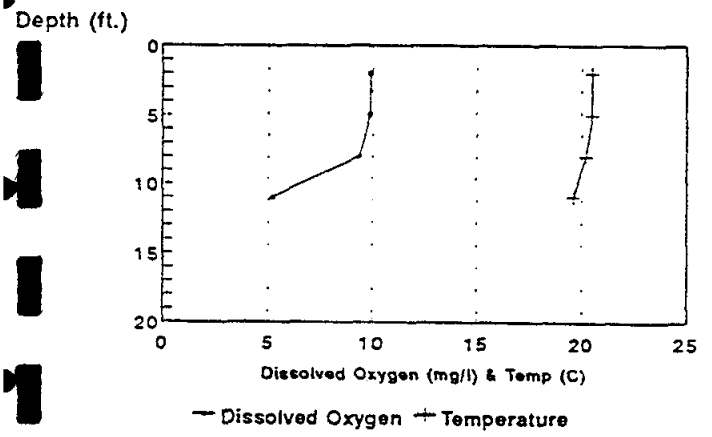
LAKE MADISON 7/10/91
Dissolved Oxygen & Temperature Profile



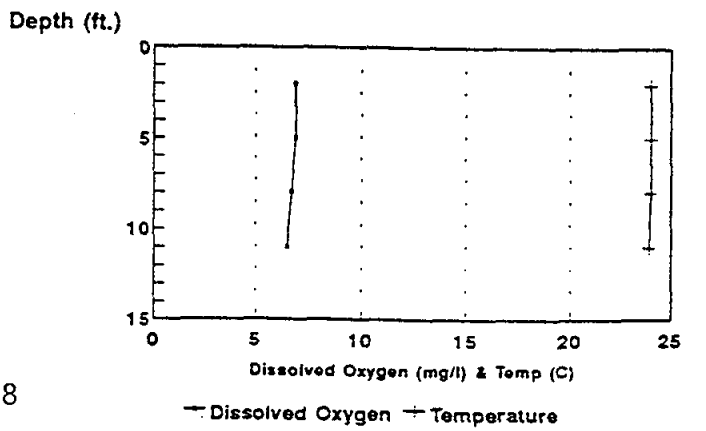
LAKE MADISON 8/21/91
Dissolved Oxygen & Temperature Profile



Lake Madison, 6/28/89
Dissolved Oxygen & Temperature Profile

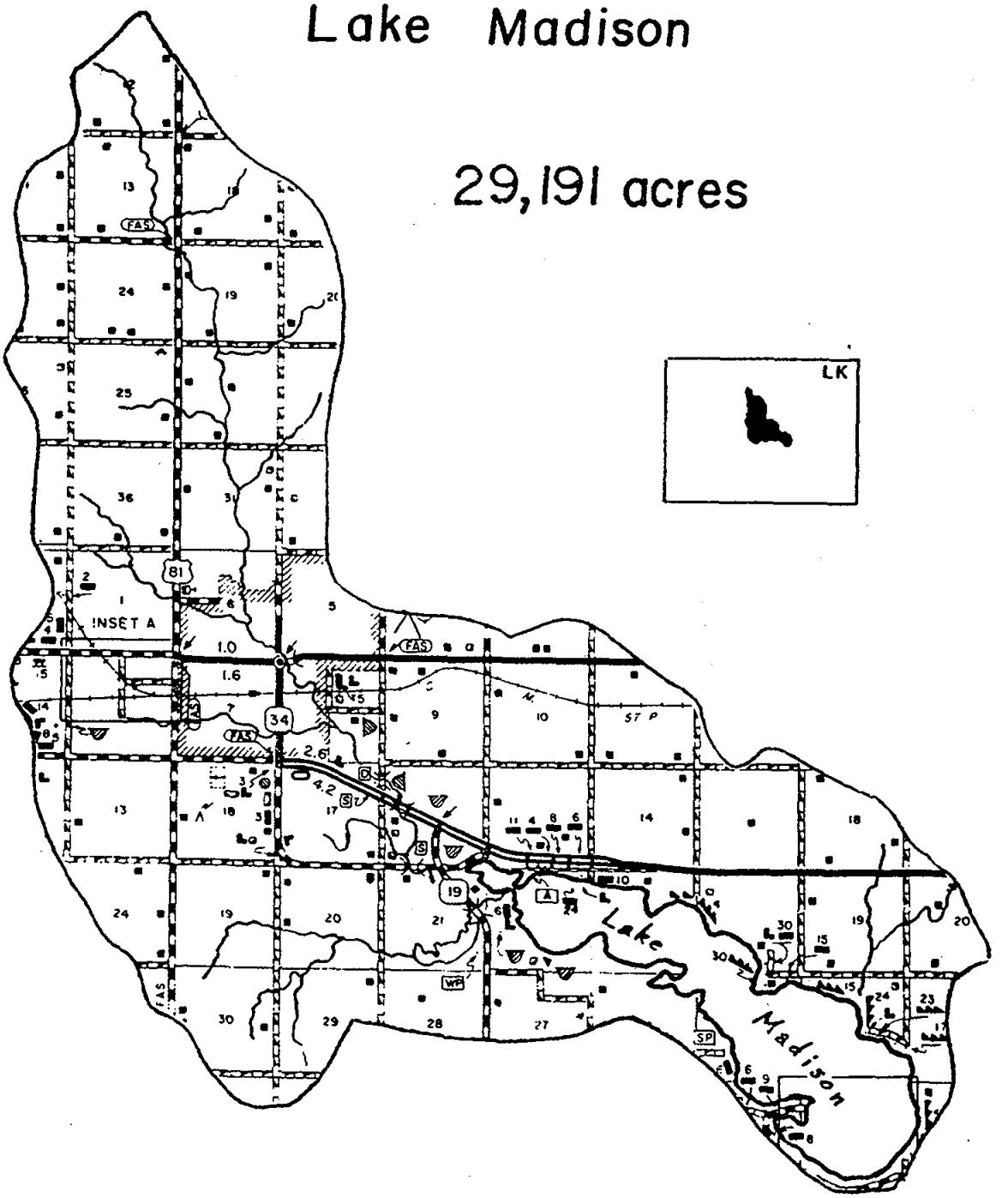


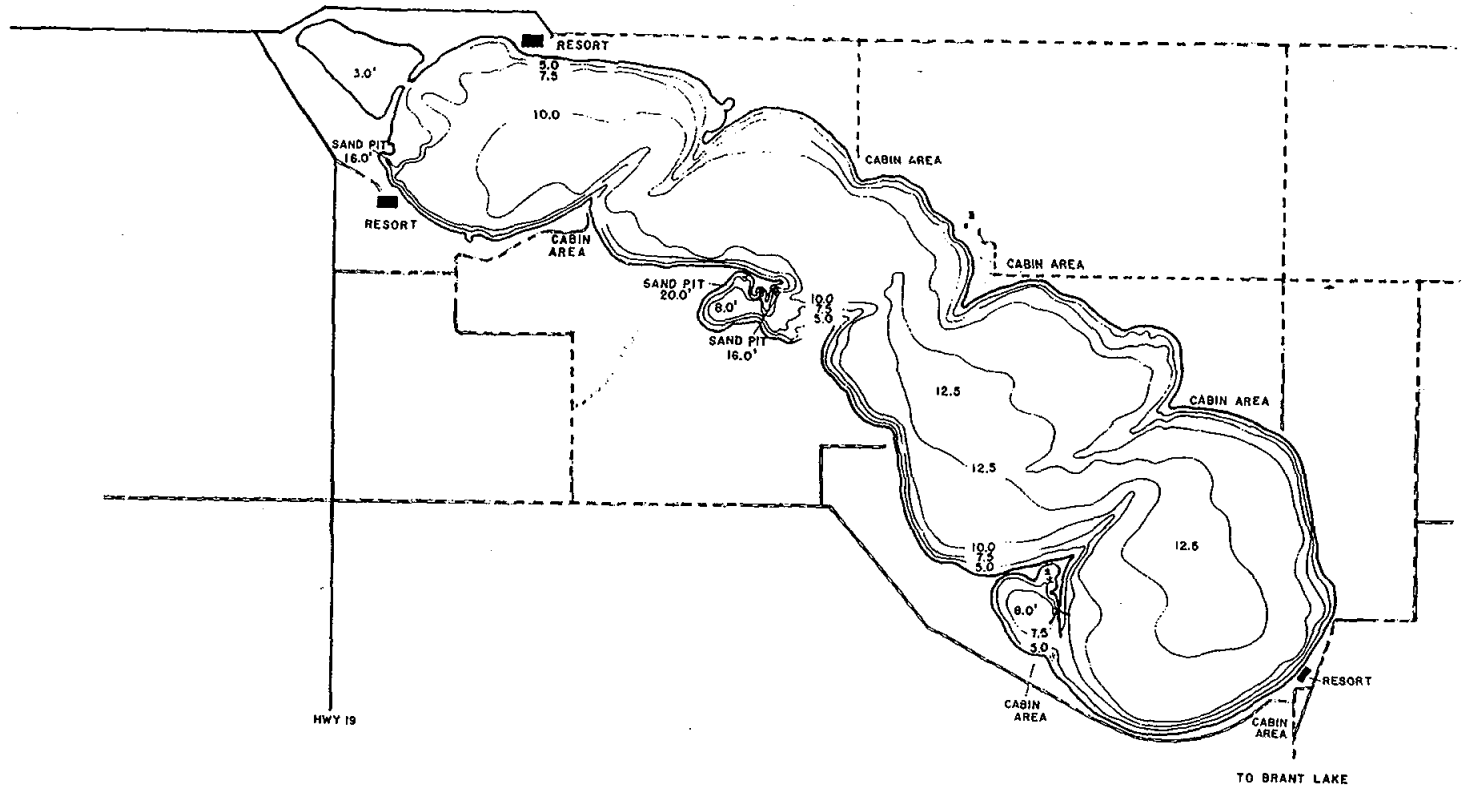
Lake Madison, 8/2/89
Dissolved Oxygen & Temperature Profile



Lake Madison

29,191 acres





420

SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
TRAIL
BENCH MARK BM
MARSH
BUILDINGS

CONTOUR	ACRES	AVE. DEPTH	ACRE FEET
0-5.0	246.9	2.5	617.3
5.0-7.5	276.5	6.25	1728.1
7.5-10.0	580.2	8.75	5076.8
10.0-12.5	1270.1	11.25	14288.6
12.5-15.0	425.6	12.5	5320.0
TOTALS	2799.3	9.7	27030.8

1320 660 330 0 1320 2640 3960
SCALE IN FEET

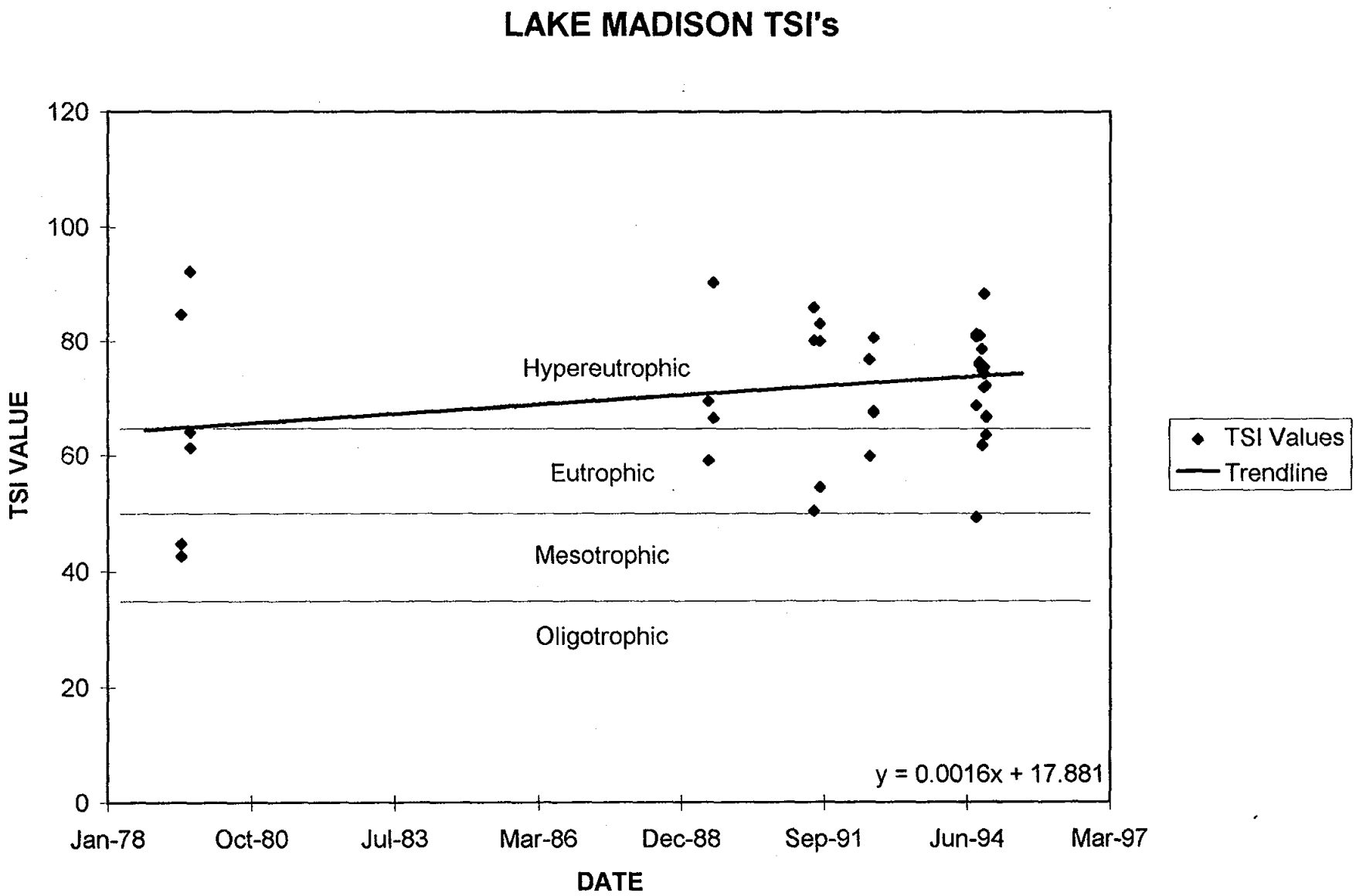
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS

LAKE MADISON

LAKE COUNTY

WATER STAGE PLANIMETER
ACRES 2799.3

AERIAL PHOTO FIELD WORK DRAWN BY: LP, WJM
DATE: 1956 DATE: 6-11-64 DATE: 7-22-65
SEC. 22, 23, 24, 25, 26, 30, 31, 32, 36 TWP. 106N RGE. 51W, 52W
BM. 3.6'


LAKE MADISON TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0016x + 17.881
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

MARINDAHL LAKE

County: Yankton
Latitude: 43 deg. 02 min. 48 sec. N
Longitude: 97 deg. 15 min. 30 sec. W
Area: 139 A (56.3 ha)
Maximum Depth: 32 ft (9.8 m)
Volume: 1746.5 acre-ft ($2.15x10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Clay Creek
Outlet: Clay Creek

Township: 95N
Range: 54W
Section(s): 7, 17, 18, 20
Shoreline L: 3.8 mi (6.1 km)
Mean Depth: 12.6 ft (3.8 m)
Watershed/Lake Area: 309
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 370,564
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.50	6	23.98	4	21.33
Air Temperature (°C)	4	23.00	6	29.44	4	24.17
Secchi Disk Depth (meters)	2	2.82	3	1.00	2	1.96
Conductivity (cond/25° C)	4	1,585	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	7.95	4	8.03	4	7.96
Total Alkalinity (mg/l)	4	135	-	-	-	-
Total Solids (mg/l)	4	1,801	-	-	-	-
Dissolved Solids (mg/l)	4	1,795	-	-	-	-
Suspended Solids (mg/l)	4	6	6	18	4	13
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.25	6	0.22	4	0.36
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.24
Total Kjeldahl Nitrogen (mg/l)	4	1.08	6	1.10	4	1.15
Total Phosphorus (mg/l)	4	0.085	6	0.13	4	0.080
Total Dissolved Phosphorus (mg/l)	-	-	6	0.08	4	0.048
Ortho Phosphate as P (mg/l)	4	0.034	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	16.89	4	8.43

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	18.92	6	19.73	6	19.26
Air Temperature (°C)	6	23.00	6	23.60	6	27.37
Secchi Disk Depth (meters)	3	1.61	9	1.22	9	1.26
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.29	6	8.09	6	7.72
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	9.33	6	12	6	8
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.63	6	0.94	6	0.61
Nitrate + Nitrite Nitrogen (mg/l)	6	0.31	6	1.54	6	0.22
Total Kjeldahl Nitrogen (mg/l)	6	1.26	6	1.69	6	1.60
Total Phosphorus (mg/l)	6	0.29	6	0.108	6	0.075
Total Dissolved Phosphorus (mg/l)	6	0.24	6	0.075	6	0.045
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	7.82	6	7.82	5	9.15

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	51.56	61.09	57.62	61.15	55.69	55.66
Secchi Disk	45.05	59.99	50.32	53.14	57.14	56.63
Total Phosphorus	58.07	64.98	71.05	79.57	59.18	58.07
Chlorophyll *a*		58.30	51.48	50.75	50.74	52.29

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

Taxa	June 26, 1989 Number	June 26, 1989 Units/ml	August 1, 1989 Number	August 1, 1989 Units/ml
Aphanizomenon flos-aquae	23	314	-	-
Cryptomonas sp. #1	18	246	34	493
Chroococcus	8	109	4	58
Algae (other)	8	109	13	188
Fragilaria capucina	4	55	-	-
Green Algae (other)	3	41	7	101
Diatom (pennate)	1	14	1	14
Aphanocapsa	-	-	11	159
Cryptomonas	-	-	10	145
Diatom (centric)	-	-	8	116
Algae (flagellate)	-	-	7	101
Ceratium hirundinella	-	-	4	58
Blue-green (other)	-	-	4	58
Melosira granulata	-	-	2	29
Peridinium	-	-	2	29
Cryptomonas ovata	-	-	1	14
Total	65	887	108	1,566

Watershed Description

Watershed Area: 42,889 A (17,357 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#2	19,300	45
#7	19,300	45
#1	2,573	6
#4	1,716	4

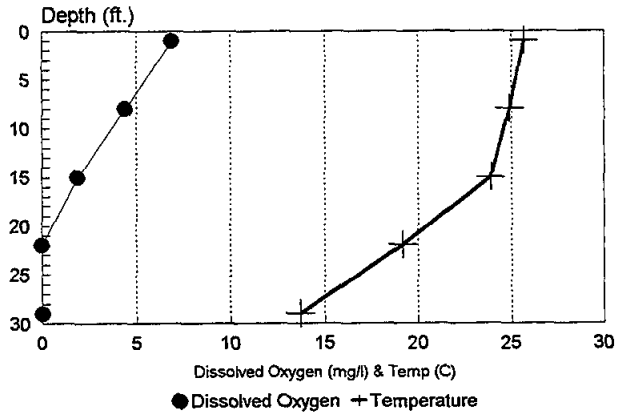
#2 Egan-Ethan-Trent: Deep, nearly level to gently rolling, well drained and moderately well drained silty and loamy soils on uplands.

#7 Egan-Worthing: Well drained and very poorly drained, level to gently rolling, silty soils on uplands and in depressions.

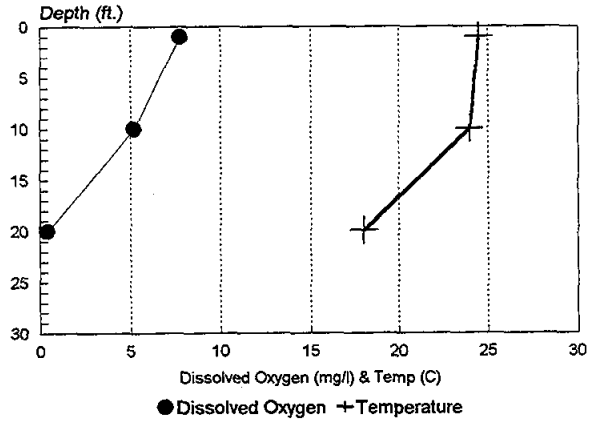
#1 Clarno-Bonilla-Tetonka: Deep, nearly level to undulating well drained, moderately well drained, silty and loamy soils on uplands.

#4 Ethan-Betts: Deep, moderately steep and steep, well drained excessively drained loamy soils on uplands.

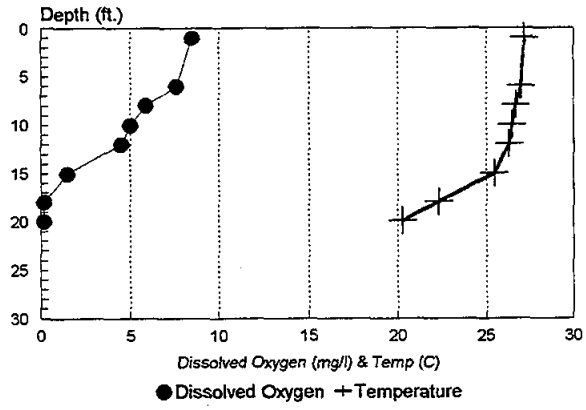
MARINDAHL LAKE 7/28/79
Dissolved Oxygen & Temperature Profile



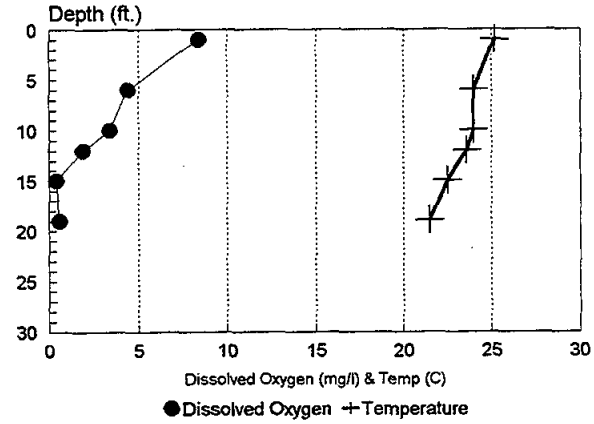
MARINDAHL LAKE 6/20/91
Dissolved Oxygen & Temperature Profile



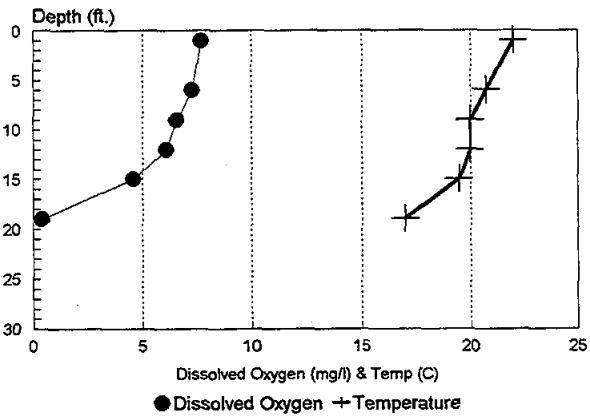
MARINDAHL LAKE 7/20/91
Dissolved Oxygen & Temperature Profile



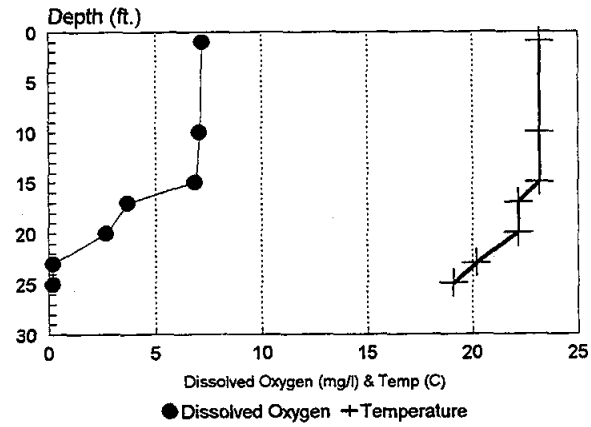
MARINDAHL LAKE 8/19/91
Dissolved Oxygen & Temperature Profile



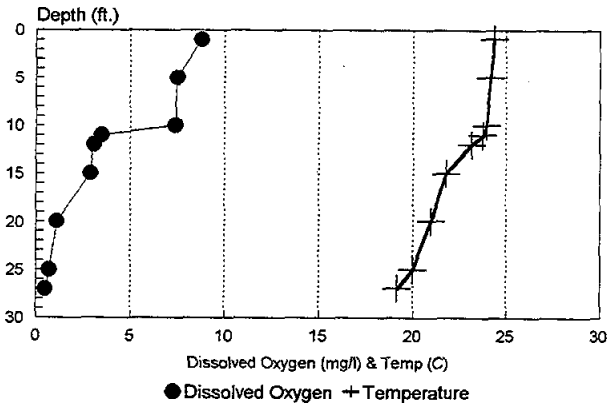
MARINDAHL LAKE 6/11/92
Dissolved Oxygen & Temperature Profile



MARINDAHL LAKE 7/19/92
Dissolved Oxygen & Temperature Profile



MARINDAHL LAKE 8/13/92
Dissolved Oxygen & Temperature Profile



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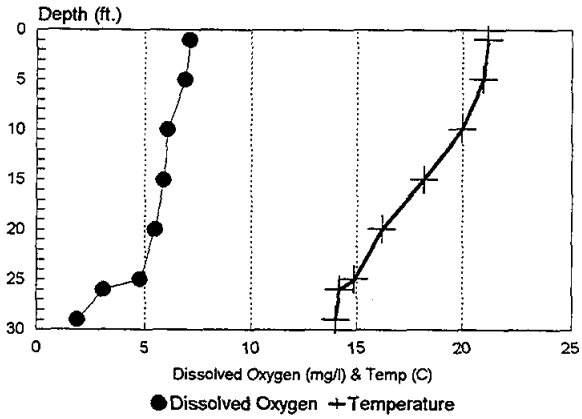
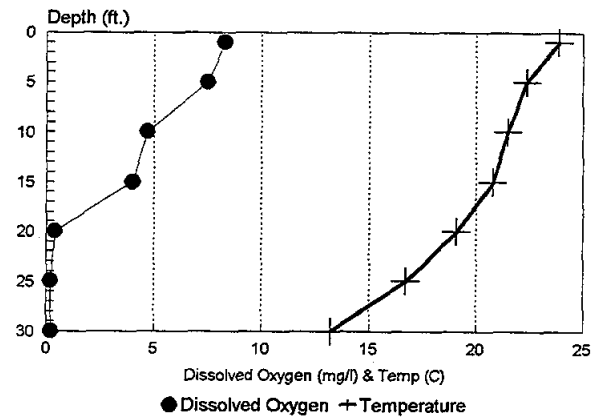
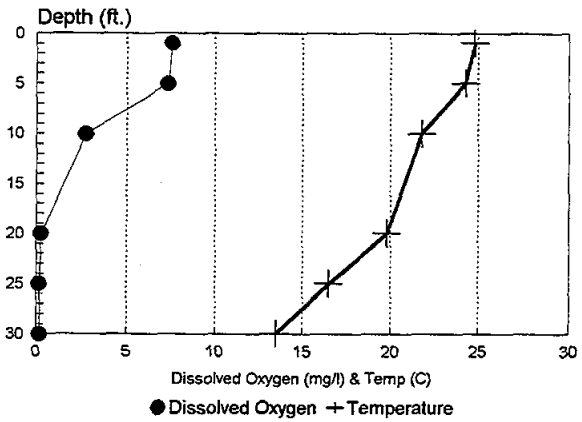
Dissolved Oxygen & Temperature Profile



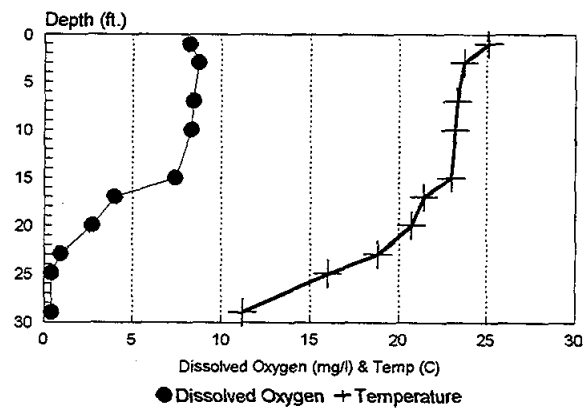
MARINDAHL LAKE 7/20/93
Dissolved Oxygen & Temperature Profile



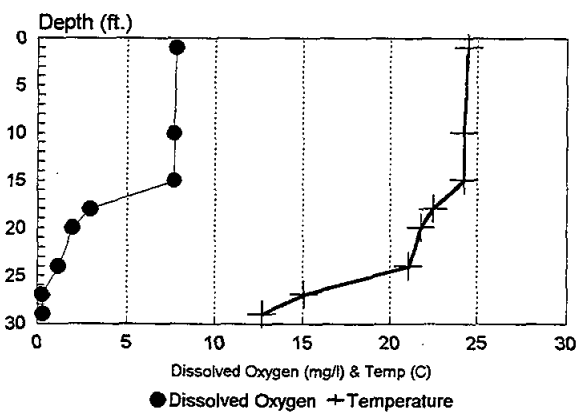
MARINDAHL LAKE 8/18/93
Dissolved Oxygen & Temperature Profile



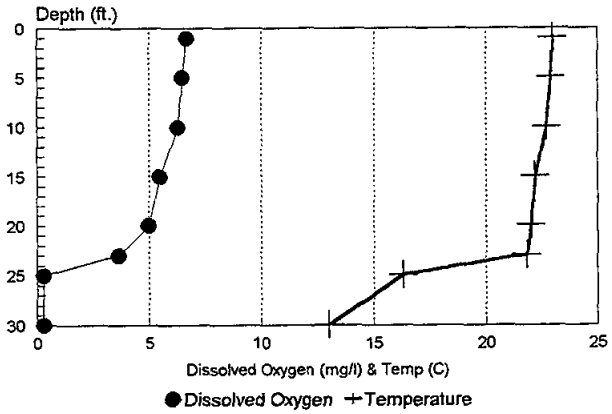
MARINDAHL LAKE 6/11/94
Dissolved Oxygen & Temperature Profile



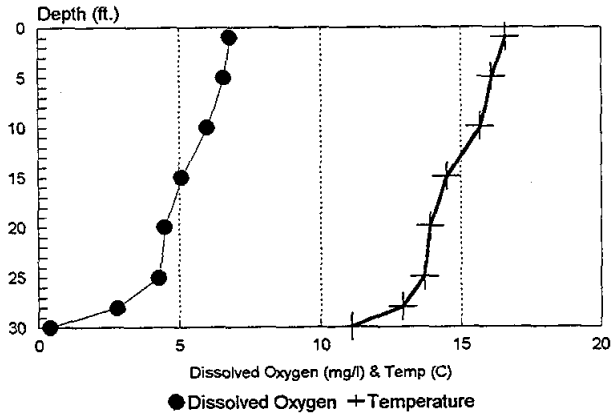
MARINDAHL LAKE 7/13/94
Dissolved Oxygen & Temperature Profile



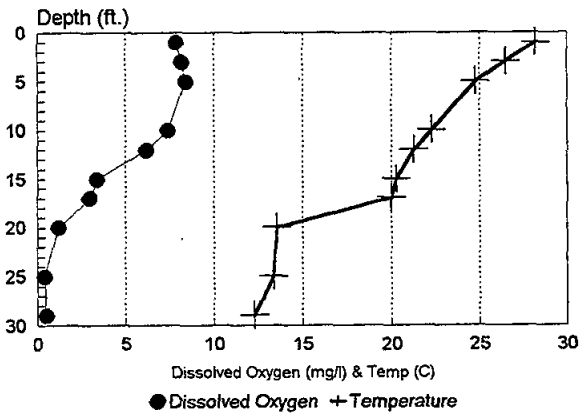
MARINDAHL LAKE 8/13/94
Dissolved Oxygen & Temperature Profile



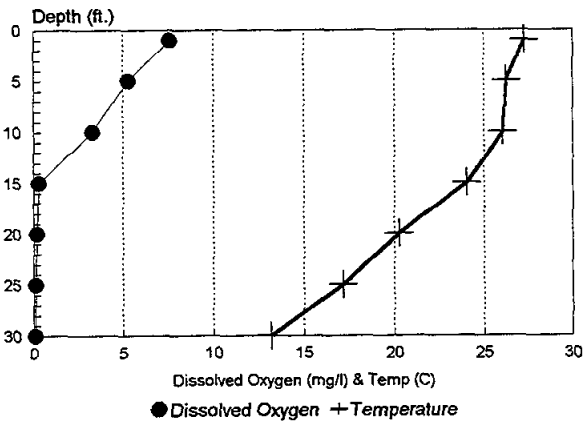
MARINDAHL LAKE 6/13/95
Dissolved Oxygen & Temperature Profile



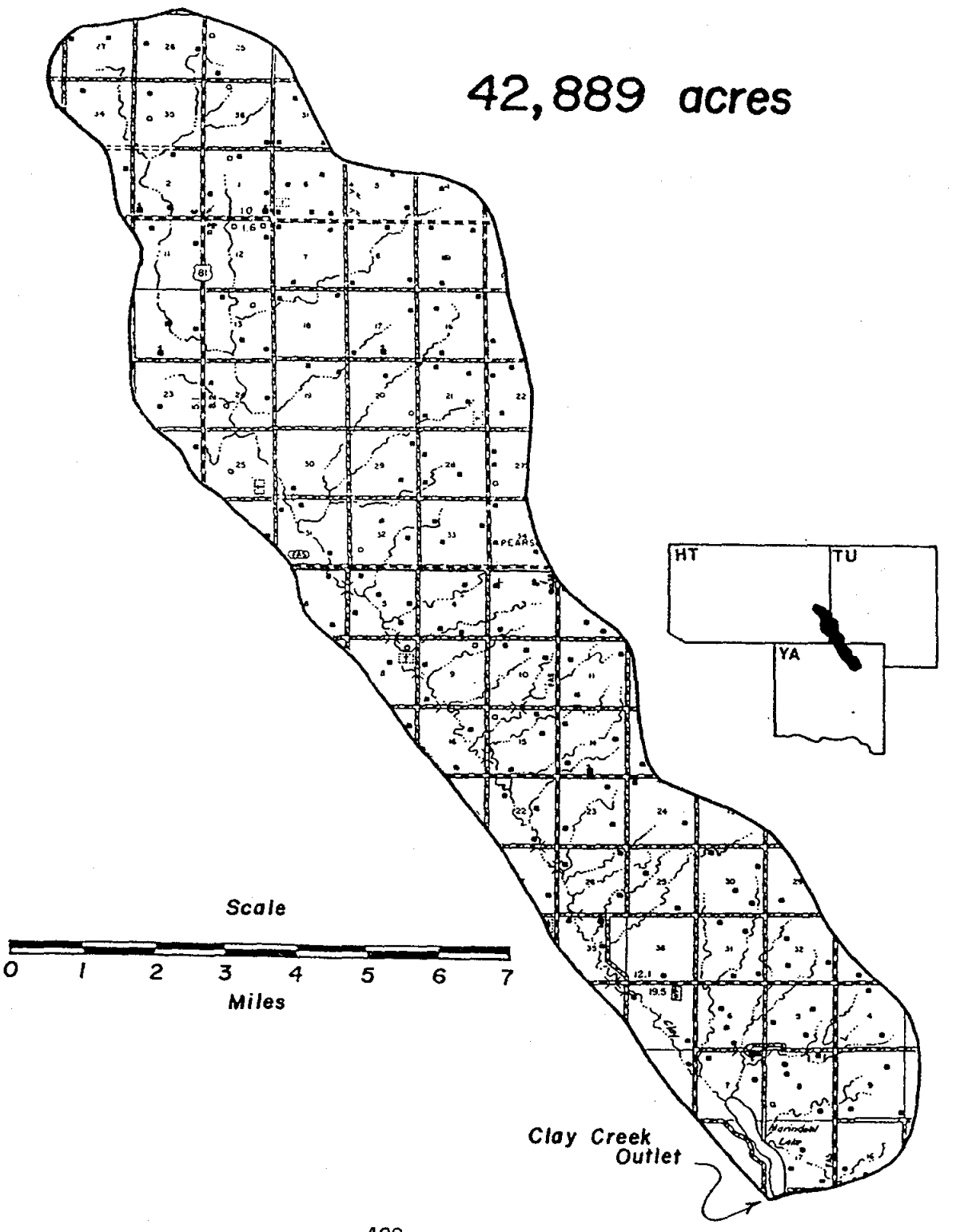
MARINDAHL LAKE 7/12/95
Dissolved Oxygen & Temperature Profile

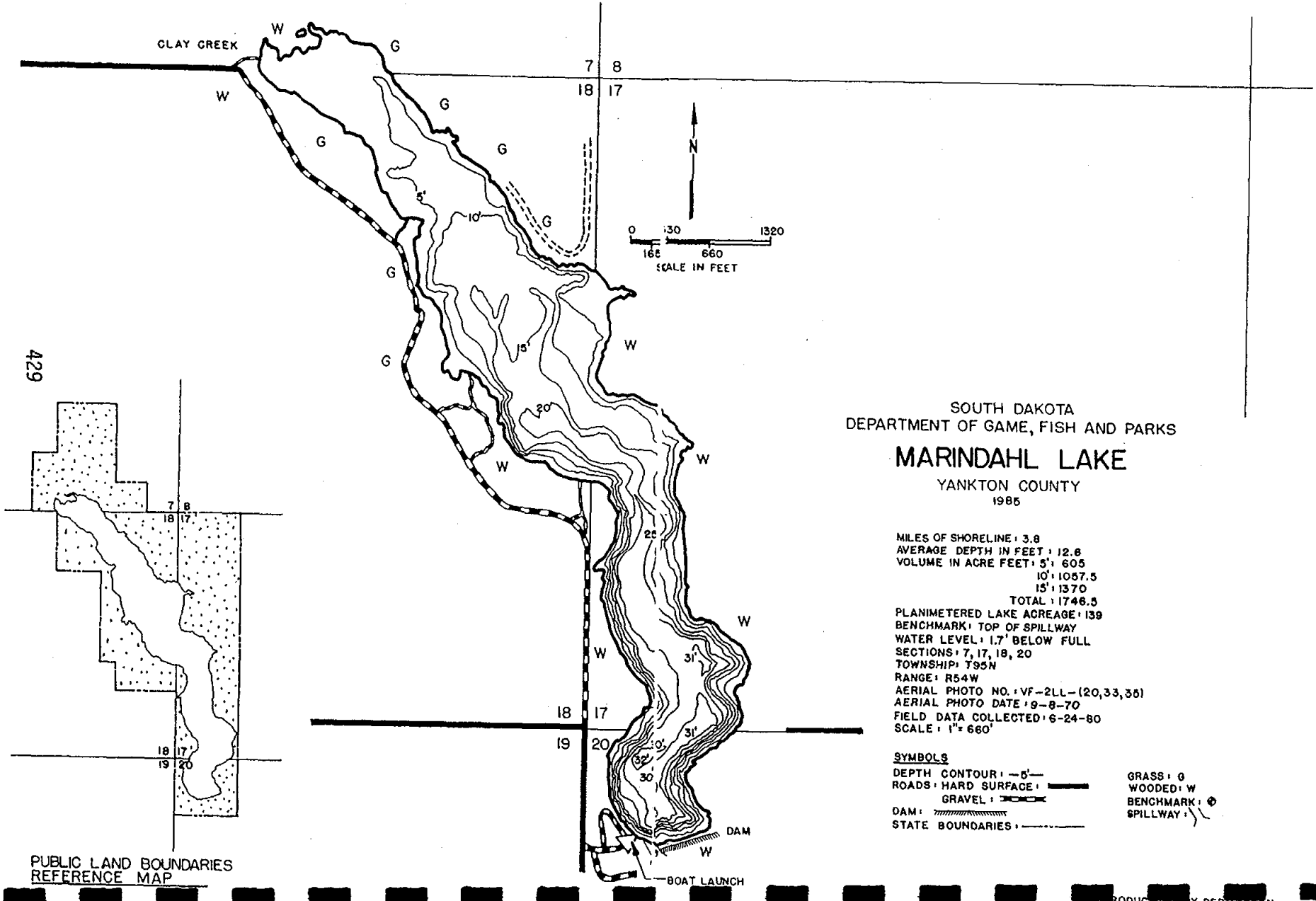


MARINDAHL LAKE 7/12/95
Dissolved Oxygen & Temperature Profile



Marindahl Lake





SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

MARINDAHL LAKE

YANKTON COUNTY
1985

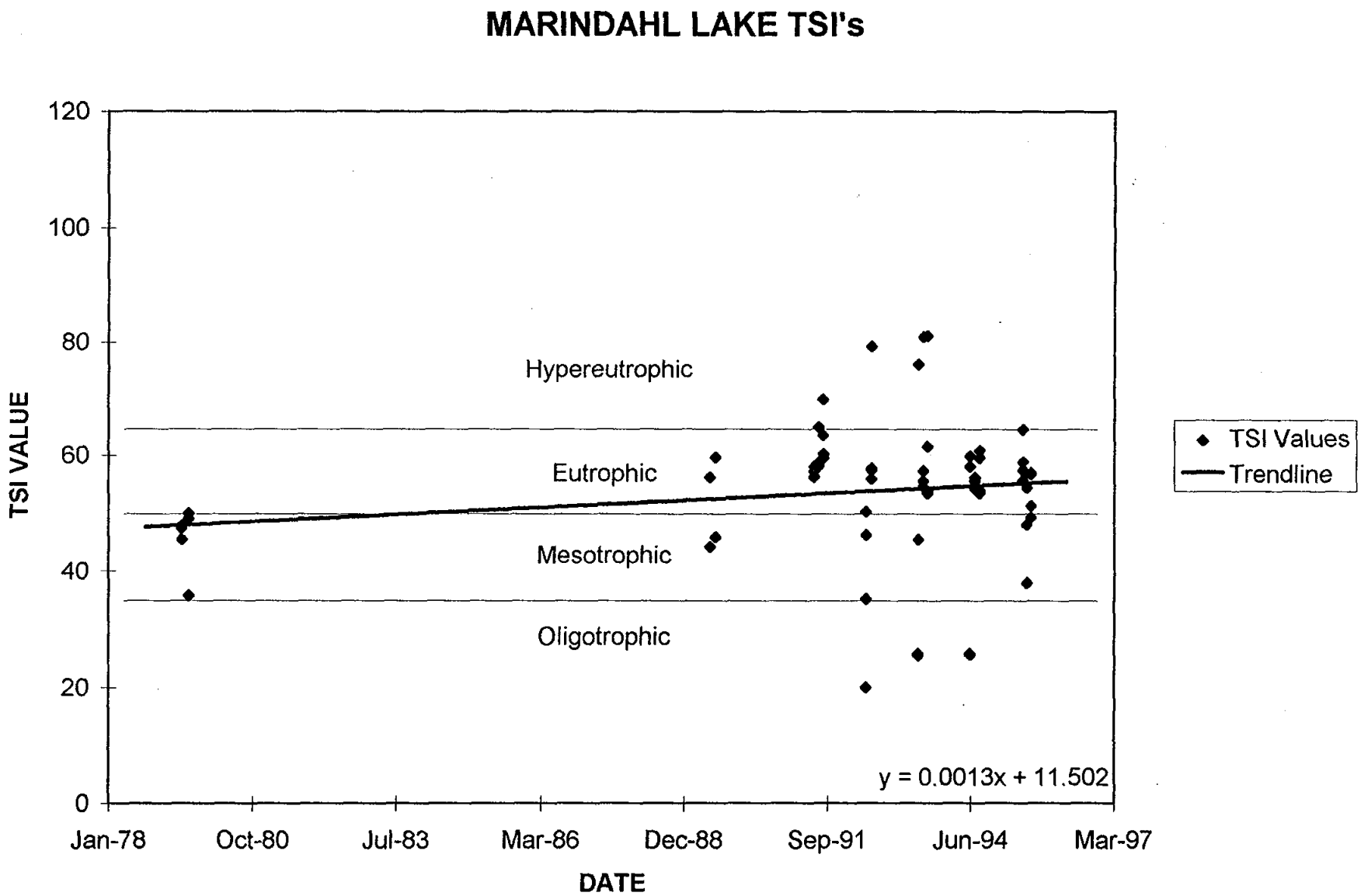
MILES OF SHORELINE : 3.8
AVERAGE DEPTH IN FEET : 12.6
VOLUME IN ACRE FEET : 5' : 605
10' : 1057.5
15' : 1370
TOTAL : 1746.5
PLANIMETERED LAKE ACREAGE : 139
BENCHMARK : TOP OF SPILLWAY
WATER LEVEL : 1.7' BELOW FULL
SECTIONS : 7, 17, 18, 20
TOWNSHIP : T95N
RANGE : R54W
AERIAL PHOTO NO. : VF-2LL-(20,33,36)
AERIAL PHOTO DATE : 9-8-70
FIELD DATA COLLECTED : 6-24-80
SCALE : 1" = 660'

SYMBOLS

DEPTH CONTOUR : —5'—
ROADS : HARD SURFACE :
GRAVEL :
DAM :
STATE BOUNDARIES :

GRASS : G
WOODED : W
BENCHMARK :
SPILLWAY :

REPRODUCTION BY PERMISSION OF S.D. G.F.&P. ONLY


MARINDAHL LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0013x + 11.502
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

McCOOK LAKE

County: Union
Latitude: 42 deg. 32 min. 30 sec.
Longitude: 96 deg. 30 sec. 28 sec.
Area: 273 A (110.5 ha)
Maximum Depth: 6.5 ft (2.0 m)
Volume: 732 acre-ft (903,009 m^3)
Origin of Basin: natural
Township: 89N
Range: 48W
Section(s): 3-4, 7-9, 15-16, 21
Shoreline L: 6.9 mi (11.1 km)
Mean Depth: 4 ft (1.2 m)
Watershed/Lake Area: 11
Thermal Stratification: no
Major Inflows (named or permanent streams): groundwater only
Outlet: none

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 408,401
Ownership Status: Private and State owned
Public Interest: McCook Lake Association.

	1988		1989		1991	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	12	23.47	24	23.31	-	-
Air Temperature (°C)	12	22.04	24	24.86	3	24.40
Secchi Disk Depth (meters)	9	0.35	24	0.36	3	2.24
Conductivity (cond/25° C)	12	822	24	822	3	874
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	12	8.11	24	7.40	3	7.90
Total Alkalinity (mg/l)	12	182	24	167	3	172
Total Solids (mg/l)	12	656	24	654	3	615
Dissolved Solids (mg/l)	12	581	24	571	3	544
Suspended Solids (mg/l)	12	75	24	83	3	71
Volatile Suspended Solids (mg/l)	-	-	-	-	3	12
Ammonia Nitrogen (mg/l)	12	0.02	24	0.08	3	0.03
Nitrate + Nitrite Nitrogen (mg/l)	12	0.10	24	0.10	3	0.80
Total Kjeldahl Nitrogen (mg/l)	12	0.47	24	0.67	-	-
Total Phosphorus (mg/l)	12	0.090	24	0.143	3	0.197
Total Dissolved Phosphorus (mg/l)	-	-	-	-	3	0.137
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-	-	-

Year	1988	1989	1991
TSI Values -- Mean:	72.44	75.28	64.37
Secchi Disk	75.28	74.86	48.40
Total Phosphorus	69.59	75.70	80.35
Chlorophyll *a*			

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: Potamogeton sp.

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 2,985 A (1,208 ha)

Soil Associations within Watershed

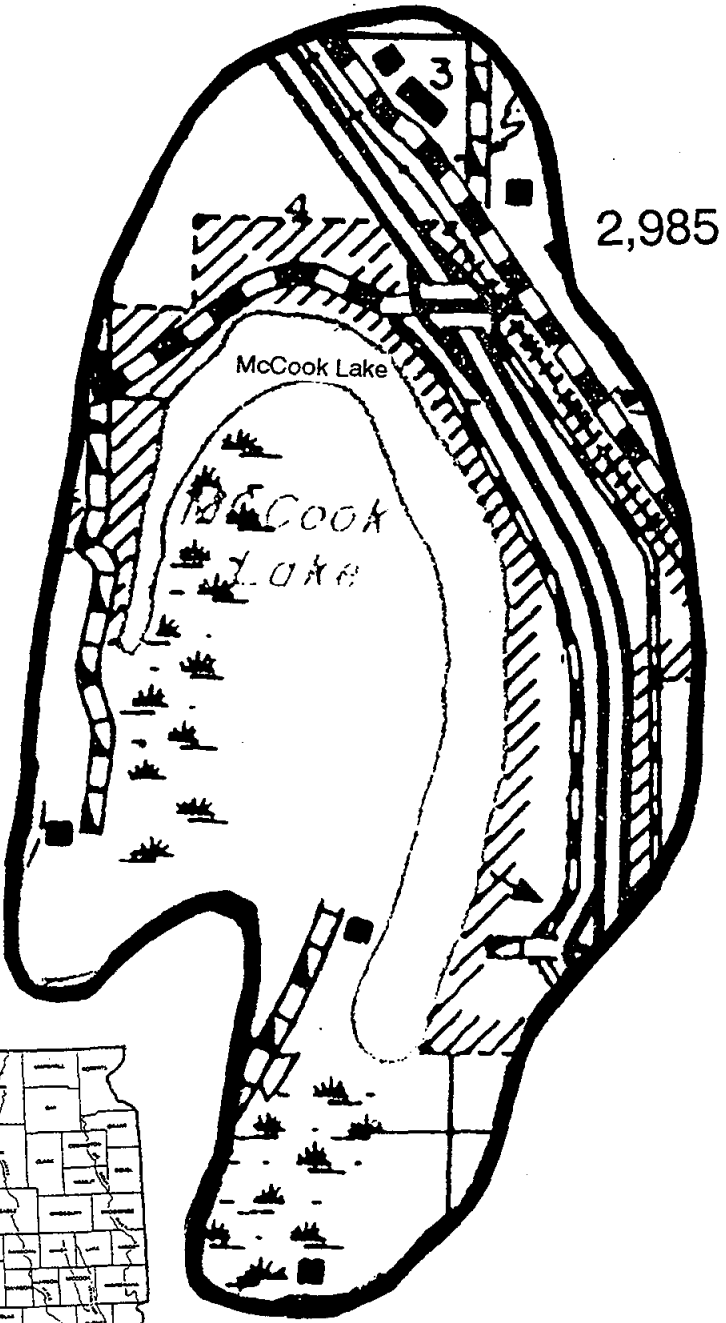
Association	Area (A)	% of Total
#9	2,657	89
#10	209	7
#11	119	4

#9 Albaton-Haynie-Onawa: Deep, poorly drained to well drained, level and nearly level, clayey and silty soils.

#10 Forney-Luton: Deep, poorly drained, level, clayey soils.

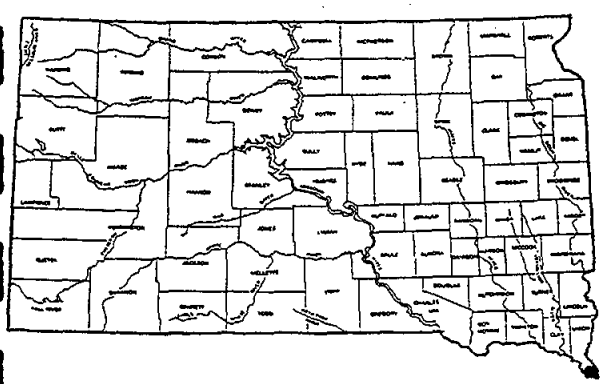
#11 Modale-Blyburg-Benclare: Deep, well drained to somewhat poorly drained, nearly level and level, silty soils.

McCook Lake



2,985 acres

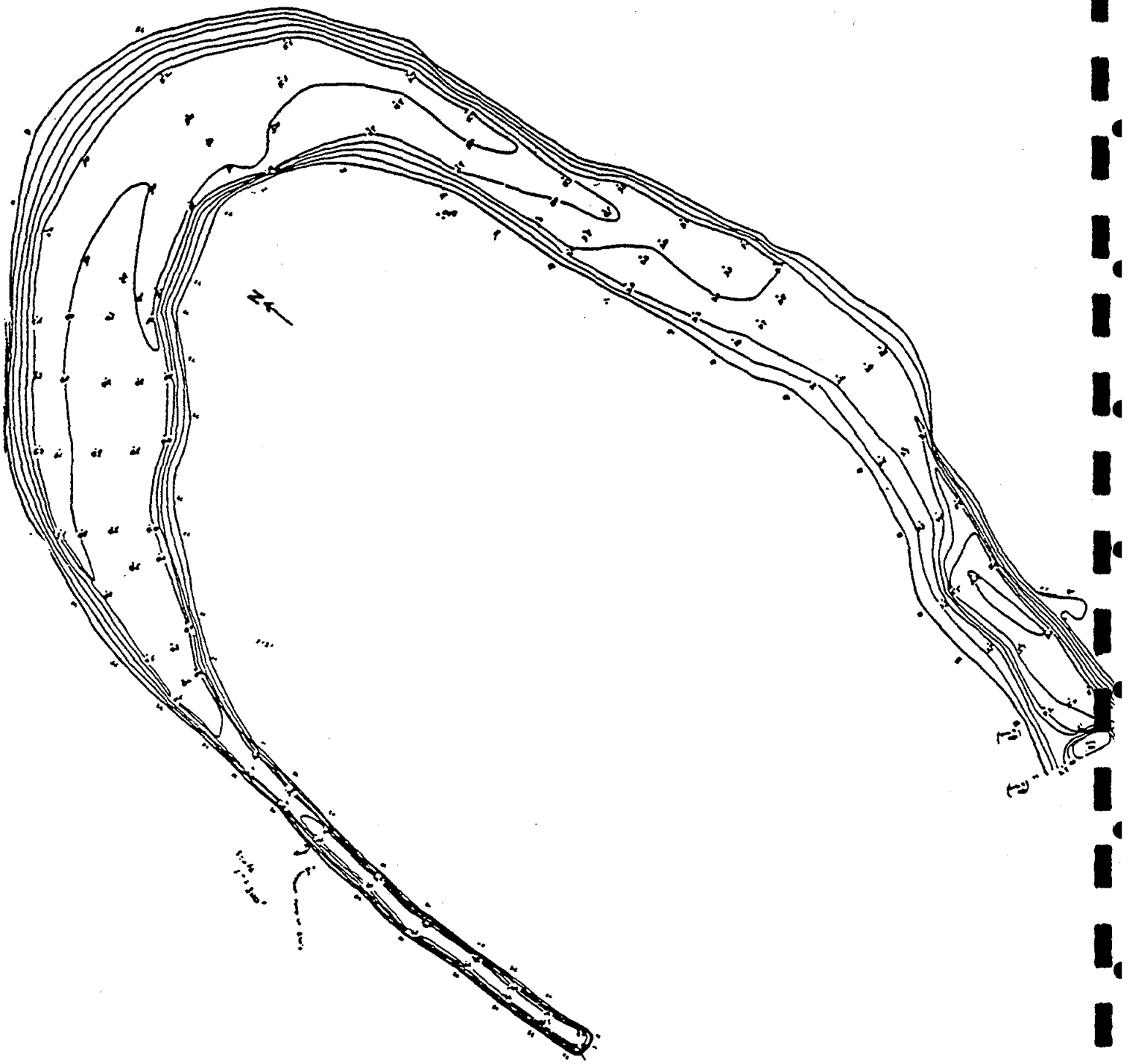
SOUTH DAKOTA



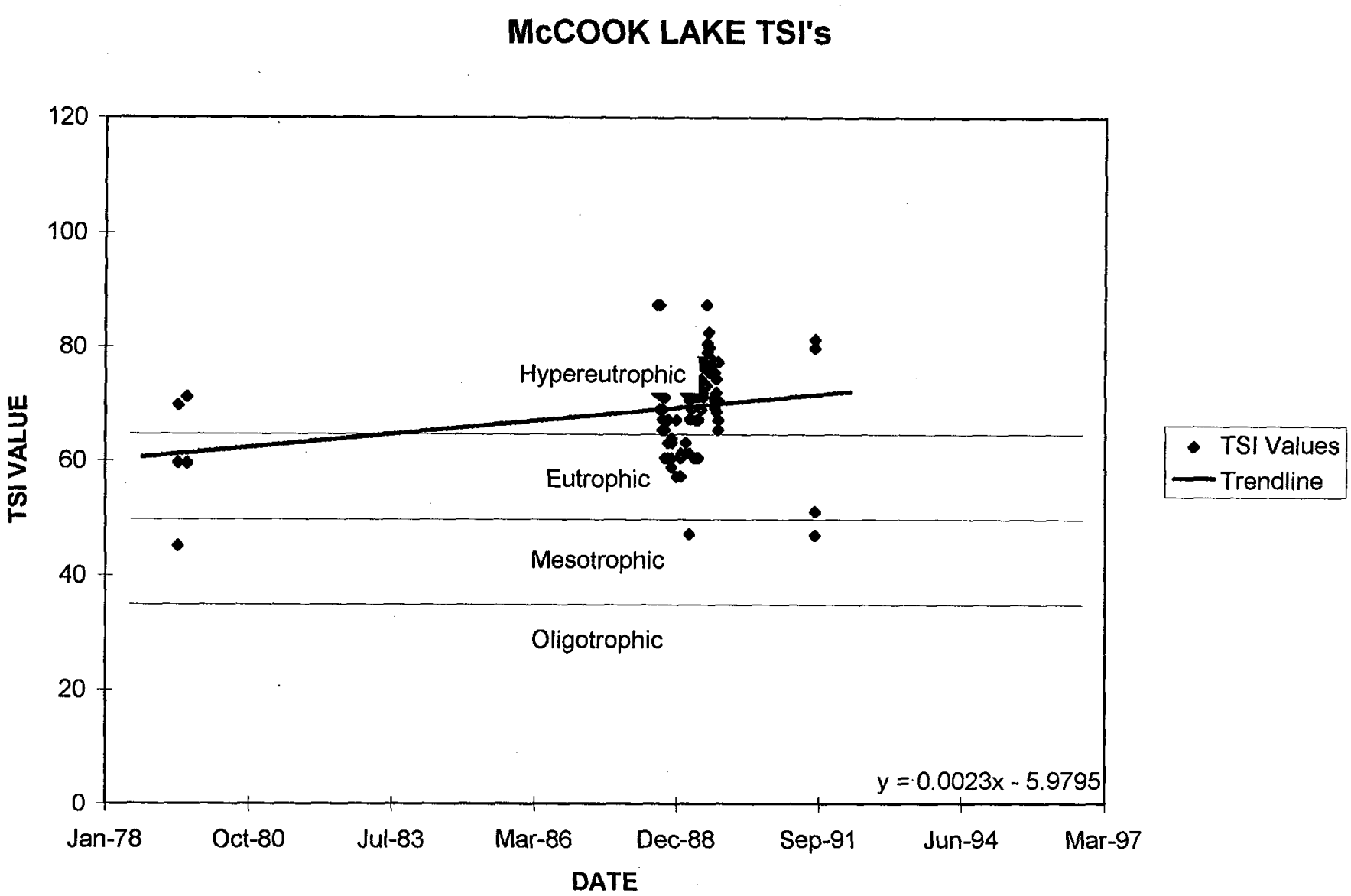
SCALE

0 1 2 MILES

McCook Lake



Water depth of McCook Lake. Contour interval = 1 foot


McCOOK LAKE TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0023x - 5.9795
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

MINA LAKE

County: Edmunds
Latitude: 45 deg. 26 min. 30 sec. N
Longitude: 98 deg. 44 min. 00 sec. W
Area: 806 A (326.3 ha)
Maximum Depth: 27 ft (8.2 m)
Volume: 7258.5 acre-ft (8.95 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Snake Creek
Outlet: Snake Creek

Township: 123N
Range: 65-66W
Section(s): 7, 12-14, 23-26
Shoreline L: 20.9 mi (34 km)
Mean Depth: 9 ft (2.7 m)
Watershed/Lake Area: 191
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 83,538
Ownership Status: State owned
Public Interest: Mina Lake Association.

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.75	-	-	4	21.35
Air Temperature (°C)	4	29.72	4	25.30	4	15.50
Secchi Disk Depth (meters)	2	0.22	2	1.16	2	0.53
Conductivity (cond/25° C)	4	436	-	-	-	-
Turbidity (NTU)	-	-	-	-	4	24.13
Lab pH (su)	4	7.97	-	-	-	-
Field pH (su)	-	-	4	7.88	3	8.21
Total Alkalinity (mg/l)	4	93	-	-	3	106
Total Solids (mg/l)	4	386	4	477	3	437
Dissolved Solids (mg/l)	4	350	4	464	3	420
Suspended Solids (mg/l)	4	36	4	13	3	17
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.07	4	0.04	3	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.93	4	0.45	3	0.57
Total Kjeldahl Nitrogen (mg/l)	4	0.87	4	0.85	3	1.02
Total Phosphorus (mg/l)	4	0.683	4	0.643	3	0.565
Total Dissolved Phosphorus (mg/l)	-	-	4	0.620	3	0.519
Ortho Phosphate as P (mg/l)	4	0.528	-	-	-	-
Chlorophyll (mg/m^3)	-	-	3	39.53	2	8.21

Year	1989	1991	1992
TSI Values -- Mean:	90.08	79.80	71.91
Secchi Disk	82.08	57.88	69.16
Total Phosphorus	98.07	97.59	95.34
Chlorophyll *a*		66.64	51.22

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail, bulrush, reed, and sedge

Floating Leaved and Submergent Plant Species Identified: Ceratophyllum demersum, Lemna minor

Algal Species and Densities

July 19, 1989

Taxa	Number	Units/ml
Blue-green (other)	1	21
Chroococcus	1	21
Algae (other)	1	21
Total	3	63

Watershed Description

Watershed Area: 153,640 A (62,178 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
NM-NX	95,257	62
WJ-B1	43,019	28
JW	15,364	10

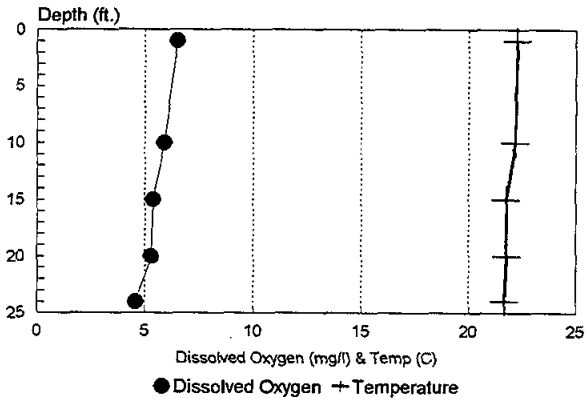
NM-NX Niobell-Noonan: Deep, moderately well drained, nearly level to gently undulating, loamy soils that have a claypan subsoil.

WJ-B1 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating, loamy soils formed in glacial till.

JW Bryant: Deep, well drained, nearly level to sloping loamy soils formed in glacial drift.

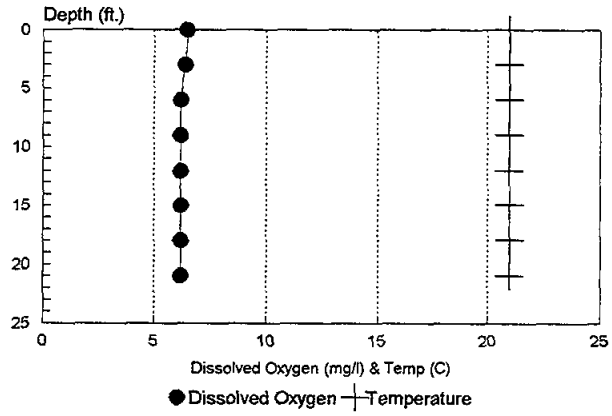
MINA LAKE 8/14/79

Dissolved Oxygen & Temperature Profile



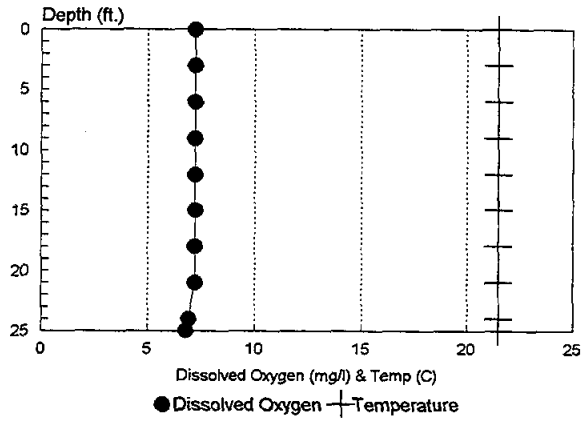
MINA LAKE 6/27/94

Dissolved Oxygen & Temperature Profile



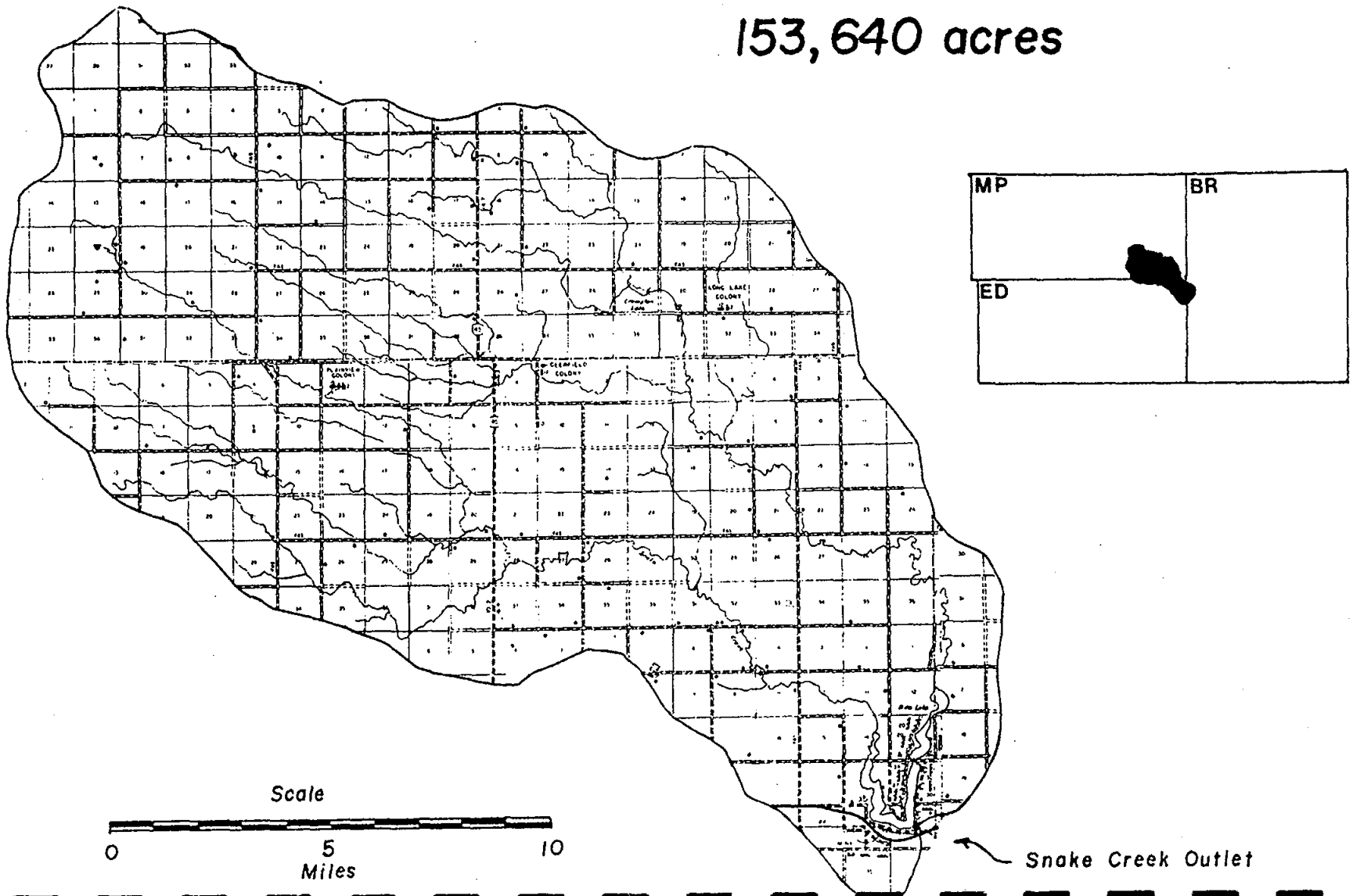
MINA LAKE 8/30/94

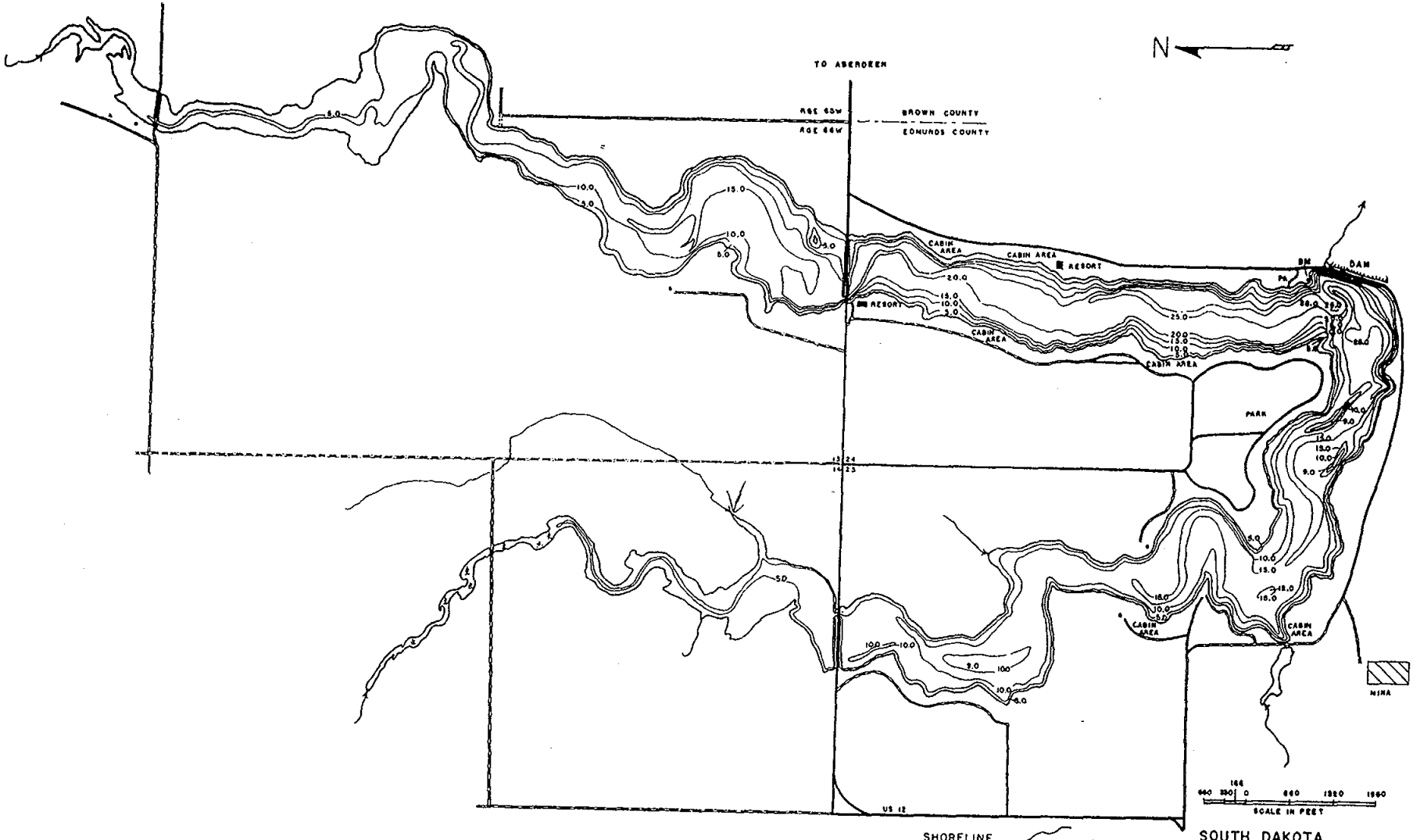
Dissolved Oxygen & Temperature Profile



Mina Lake

153,640 acres





SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA

SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS

LAKE MINA

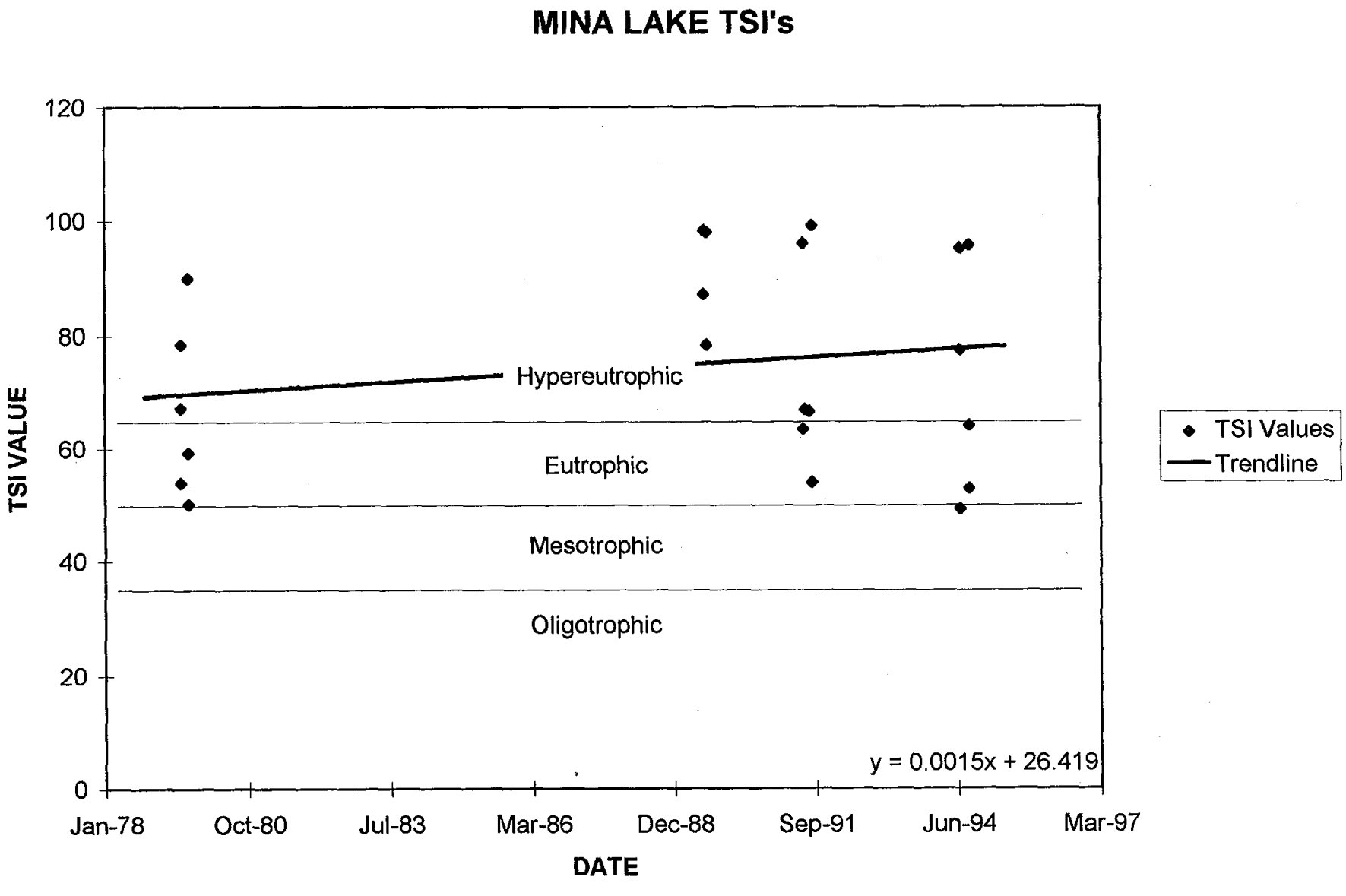
EDMUNDS-BROWN COUNTY

WATER STAGE 1'LOW
PLANIMETER ACRES 806.8

AERIAL PHOTO DATE: 1958
FIELD WORK DATE: 11-5-63
DRAWN BY: LP, WJM DATE: 2-25-64

SEC. 14,13,23,24,25,26,12 TWP. 123 N RGE. 66 W
SEC. 6,7 RGE. 65 W

BM 26'


MINA LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0015x + 26.419
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

MINNEWASTA LAKE

County: Day
Latitude: 45 deg. 23 min. 24 sec. N
Longitude: 97 deg. 21 min. 42 sec. W
Area: 601 A (246.9 ha)
Maximum Depth: 14 ft (4.3 m)
Volume: 6,732 acre-ft (8.28 x $10^6 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 122 N
Range: 54-55W
Section(s): 1-2,7,11-13,18
Shoreline L: 5.5 mi (9 km)
Mean Depth: 10.5 ft (3.2m)
Watershed/Lake Area: 4
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	21.33	6	24.20	4	20.48
Air Temperature (°C)	4	23.89	6	28.70	4	23.06
Secchi Disk Depth (meters)	2	0.43	3	1.20	2	1.41
Conductivity (cond/25° C)	4	2,315	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.81	-	-	-	-
Field pH (su)	-	-	6	8.67	4	8.88
Total Alkalinity (mg/l)	4	552	-	-	-	-
Total Solids (mg/l)	4	2,244	-	-	-	-
Dissolved Solids (mg/l)	4	2,211	-	-	-	-
Suspended Solids (mg/l)	4	33	6	14.25	4	14
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.60	6	0.12	4	0.31
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.02
Total Kjeldahl Nitrogen (mg/l)	4	3.26	6	3.19	4	3.09
Total Phosphorus (mg/l)	4	0.176	6	0.108	4	0.099
Total Dissolved Phosphorus (mg/l)	-	-	6	0.065	3	0.062
Ortho Phosphate as P (mg/l)	4	0.054	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	12.41	4	7.66

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	20.08	6	21.84	6	23.97
Air Temperature (°C)	6	22.00	6	23.17	6	24.93
Secchi Disk Depth (meters)	3	1.53	9	1.06	9	1.45
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.87	6	8.68	6	8.30
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	13.50	6	13	6	9
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.19	6	0.52	6	0.36
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	6	0.39	6	0.08
Total Kjeldahl Nitrogen (mg/l)	6	2.72	6	3.48	6	2.97
Total Phosphorus (mg/l)	6	0.109	6	0.144	6	0.143
Total Dissolved Phosphorus (mg/l)	6	0.053	6	0.105	6	0.104
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	37.37	5	44.23	6	22.51

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	74.66	61.31	59.04	64.71	68.02	63.99
Secchi Disk	72.18	57.34	55.02	53.86	59.21	54.61
Total Phosphorus	77.14	71.32	71.57	74.19	77.10	76.24
Chlorophyll *a*		55.28	50.55	66.09	67.74	61.12

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

Taxa	July 26, 1989 Number	July 26, 1989 Units/ml	No Date Number	No Date Units/ml
Chroococcus	748	26,246	-	-
Aphanizomenon flos-aquae	5	175	-	-
Stephanodiscus	5	175	-	-
Cryptomonas sp. #1	4	140	-	-
Algae (other)	3	105	1	36
Pediastrum	1	35	-	-
Anabaena	1	35	-	-
Green Algae (other)	1	35	-	-
Total	768	26,948	1	36

Watershed Description:

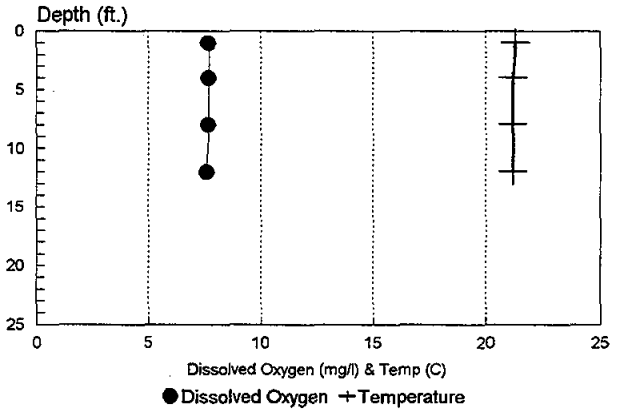
Watershed Area (excluding lake surface): 2,564 A (1,038 ha)

Soil Associations within Watershed

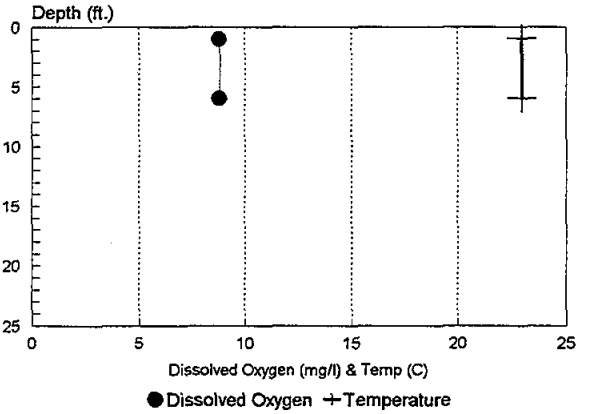
Association	Area (A)	% of Total
RL-FS-SK	2,564	100

RL-FS-SK Renshaw-Fordville-Sioux: Well drained to excessively drained nearly level to steep loamy soils that are shallow, moderately deep and very shallow over sand and gravel.

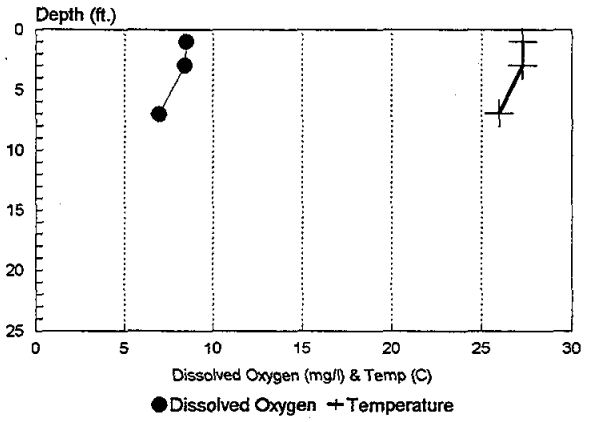
MINNEWASTA LAKE 8/12/79
Dissolved Oxygen & Temperature Profile



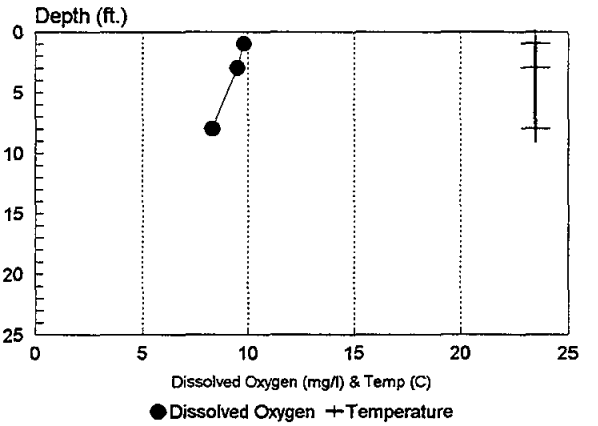
MINNEWASTA LAKE 6/18/91
Dissolved Oxygen & Temperature Profile



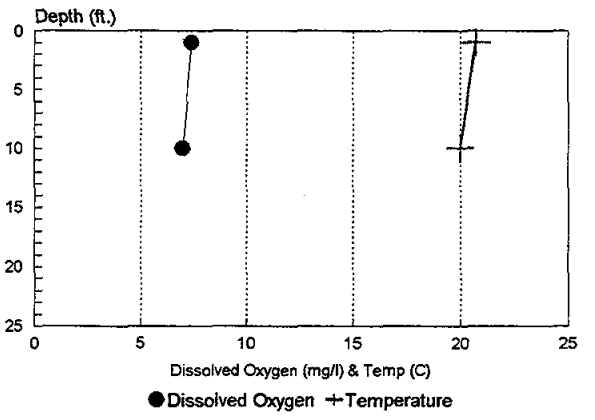
MINNEWASTA LAKE 7/19/91
Dissolved Oxygen & Temperature Profile



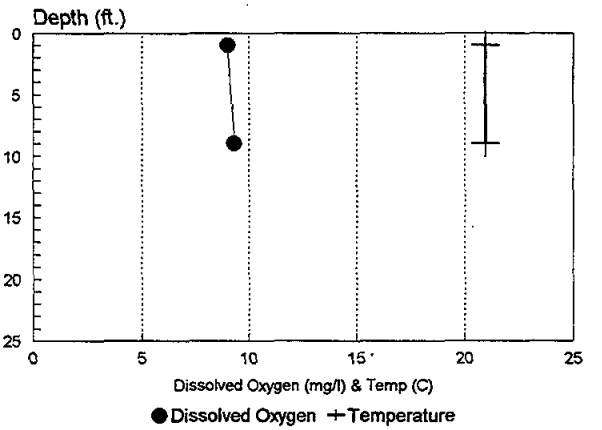
MINNEWASTA LAKE 8/18/91
Dissolved Oxygen & Temperature Profile



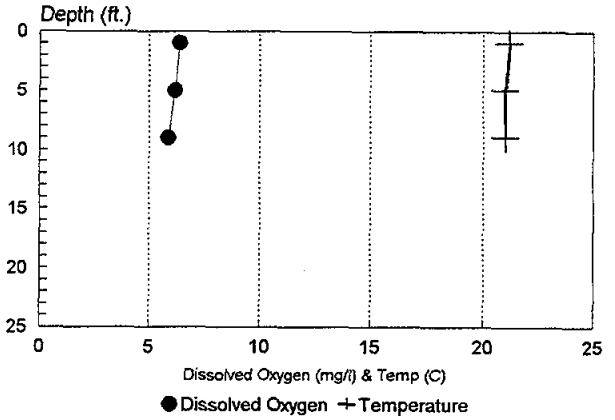
MINNEWASTA LAKE 6/18/92
Dissolved Oxygen & Temperature Profile



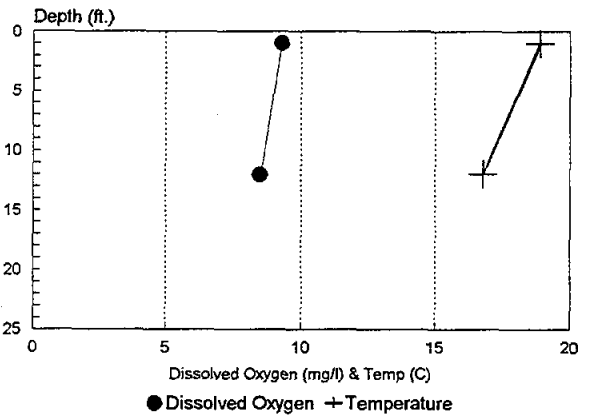
MINNEWASTA LAKE 7/18/92
Dissolved Oxygen & Temperature Profile



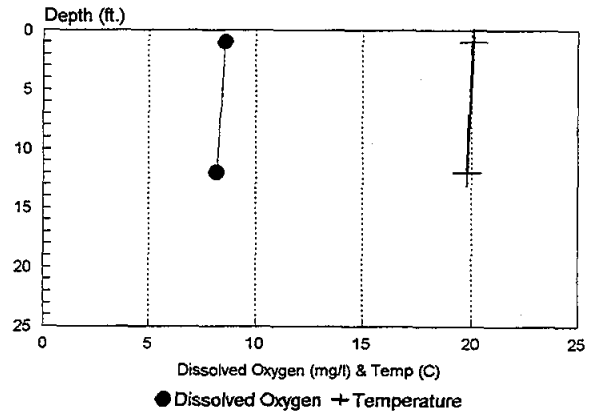
MINNEWASTA LAKE 8/16/92
Dissolved Oxygen & Temperature Profile



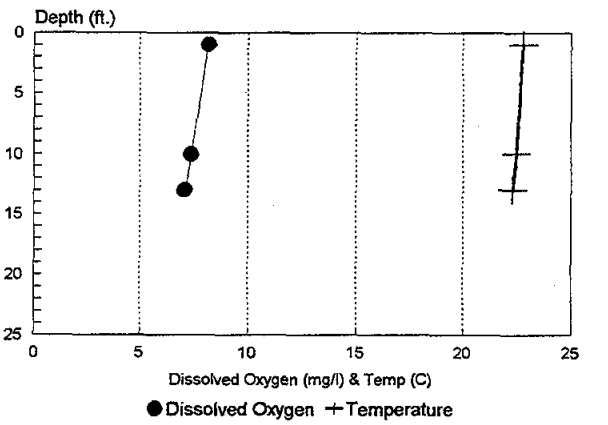
MINNEWASTA LAKE 6/16/93
Dissolved Oxygen & Temperature Profile



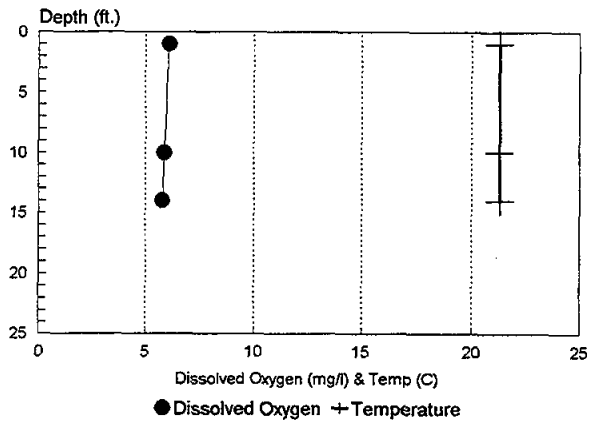
MINNEWASTA LAKE 7/23/93
Dissolved Oxygen & Temperature Profile



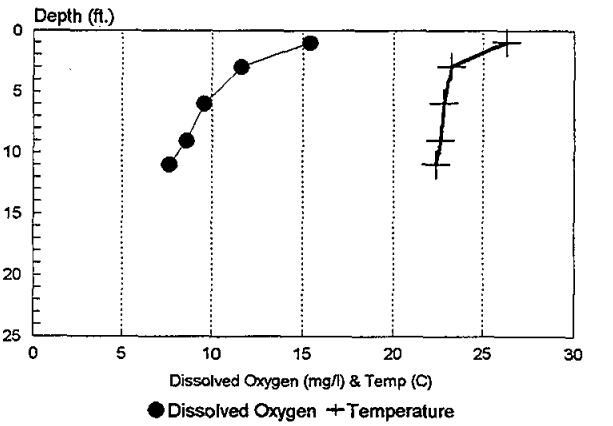
MINNEWASTA LAKE 8/22/93
Dissolved Oxygen & Temperature Profile



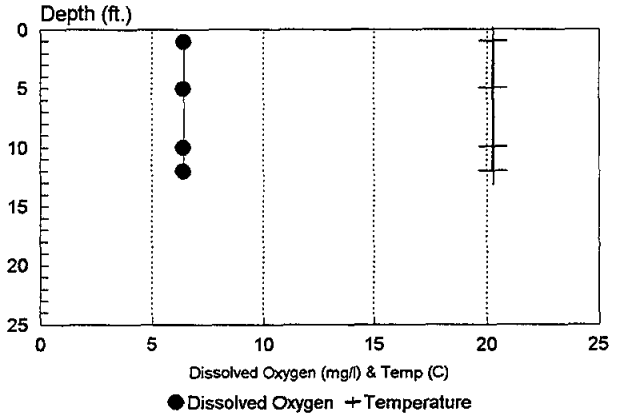
MINNEWASTA LAKE 6/15/94
Dissolved Oxygen & Temperature Profile



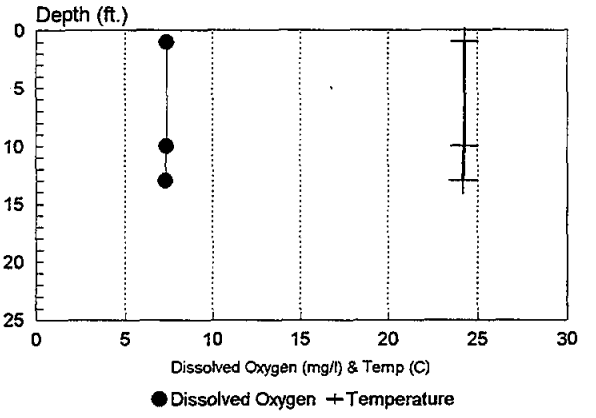
MINNEWASTA LAKE 7/17/94
Dissolved Oxygen & Temperature Profile



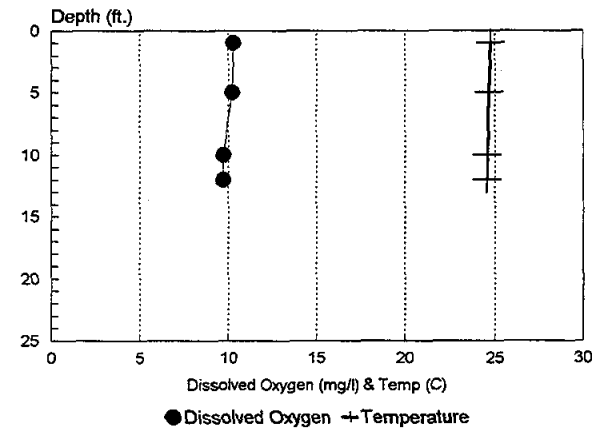
MINNEWASTA LAKE 8/17/94
Dissolved Oxygen & Temperature Profile



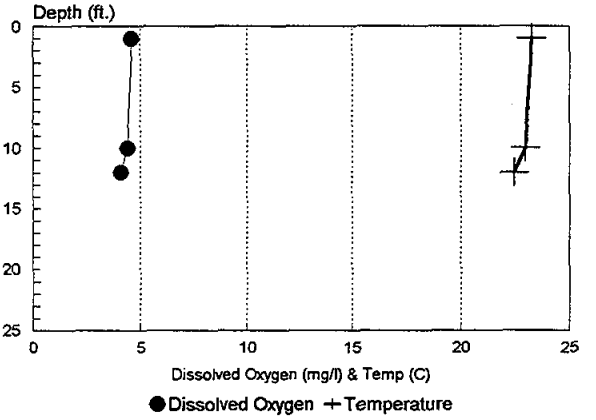
MINNEWASTA LAKE 6/19/95
Dissolved Oxygen & Temperature Profile



MINNEWASTA LAKE 7/15/95
Dissolved Oxygen & Temperature Profile

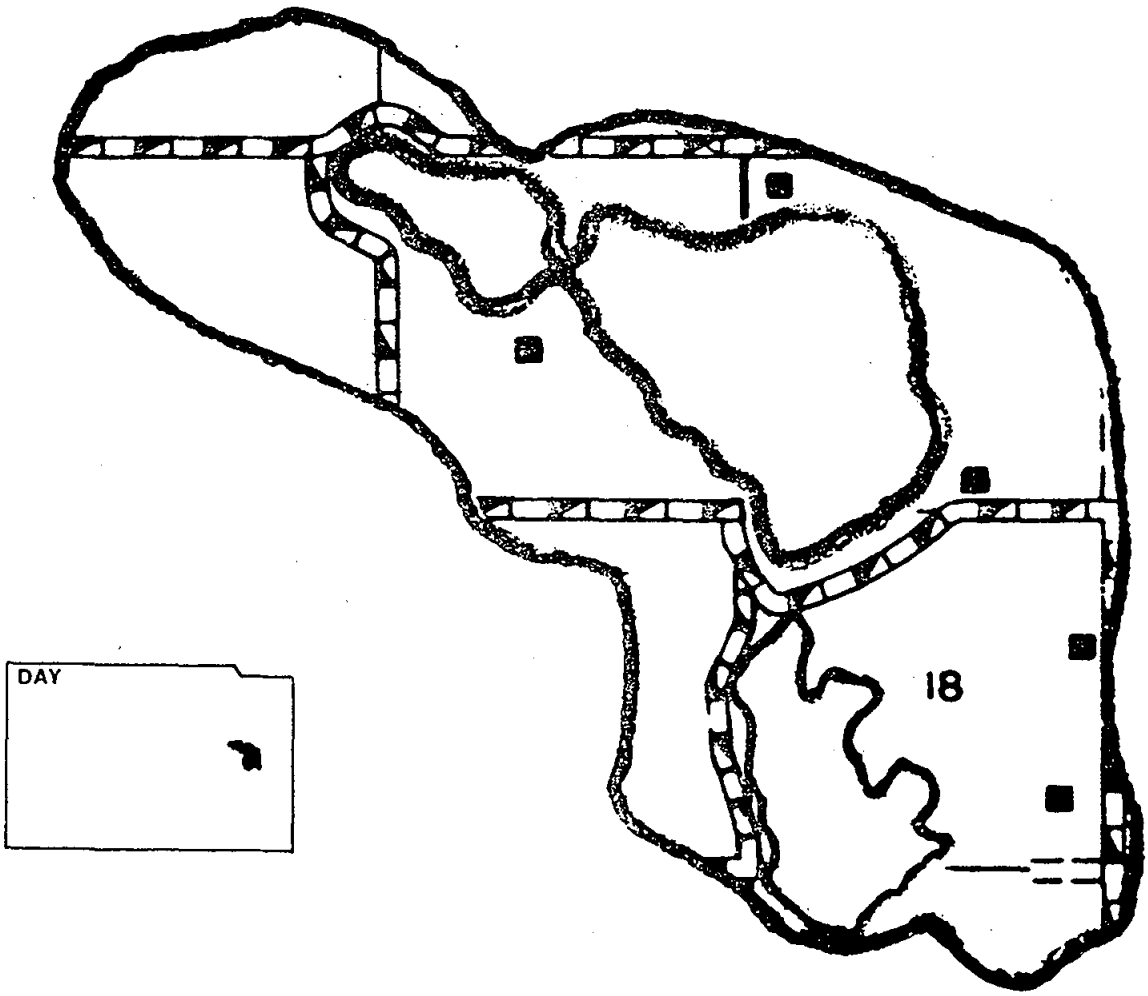


MINNEWASTA LAKE 8/15/95
Dissolved Oxygen & Temperature Profile



Minnewasta Lake

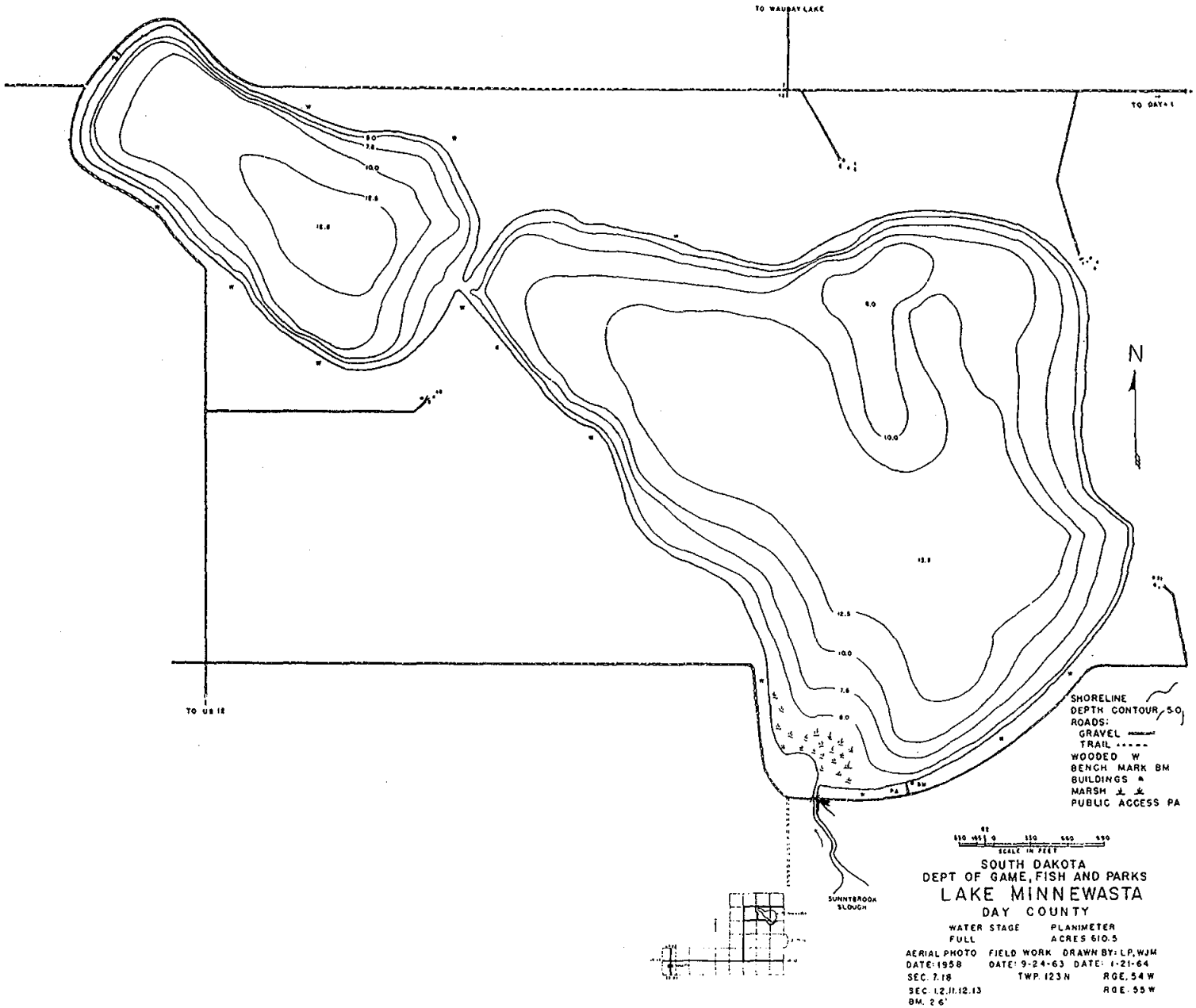
2,564 acres

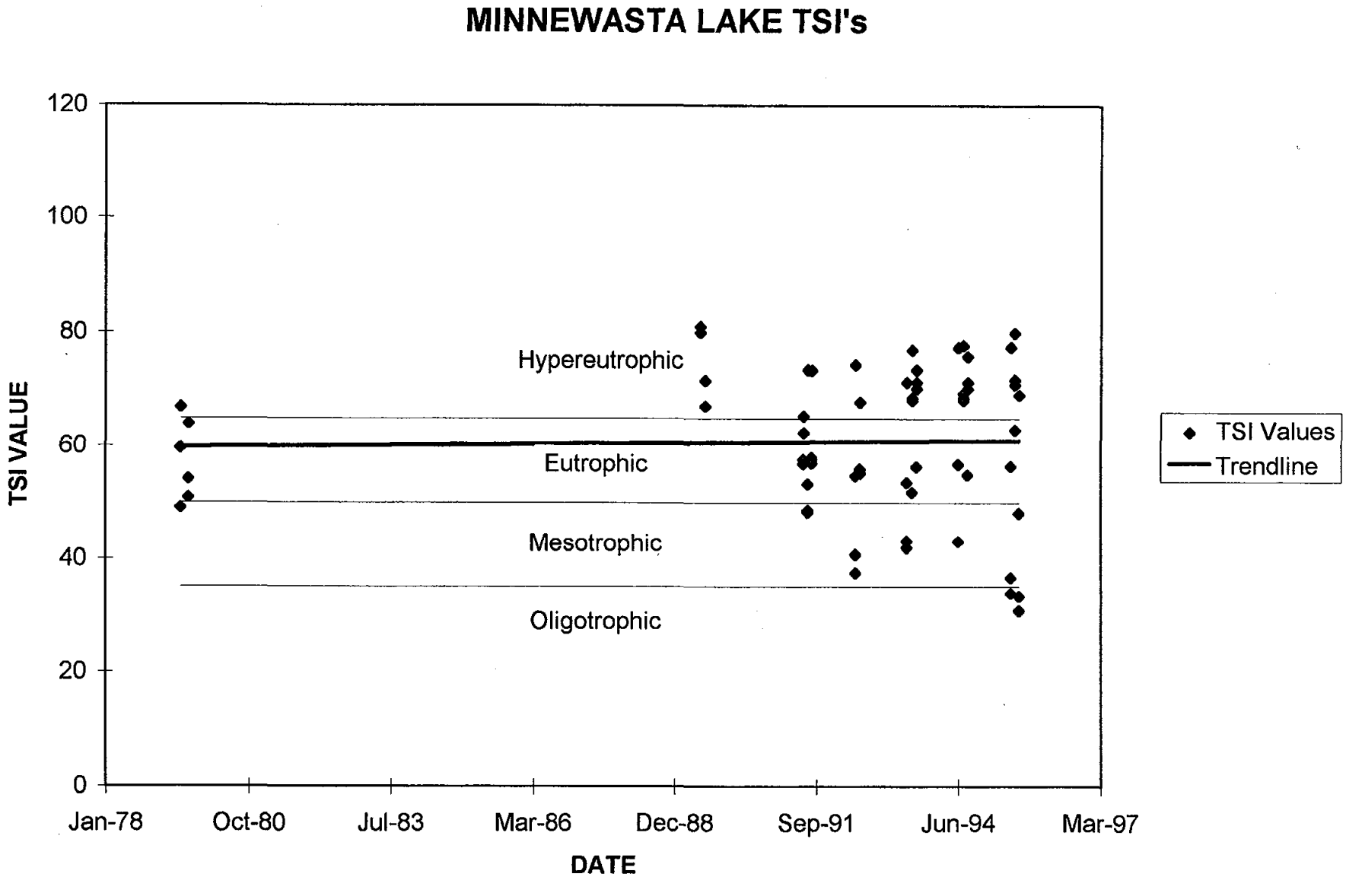


Scale

0 1 2

Miles


TO WAUBAY LAKE
TO DAY-1
TO US 12
N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
GRAVEL
TRAIL
WOODED W
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA
SCALE IN FEET
SUNNYBROOK SLOUGH
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
LAKE MINNEWASTA
DAY COUNTY
WATER STAGE
FULL
PLANIMETER
ACRES 610.5
AERIAL PHOTO
DATE: 1958
FIELD WORK
DATE: 9-24-63
DRAWN BY: LP, WJM
DATE: 1-21-64
SEC. 7, 18
TWP. 123 N
RGE. 54 W
SEC. 1, 2, 11, 12, 13
RGE. 55 W
BM. 26'


MINNEWASTA LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE MITCHELL

County: Davison
Latitude: 43 deg. 45 min. 40 sec.
Longitude: 98 deg. 03 min. 15 sec.
Area: 671A (271.3 ha)
Maximum Depth: 29 ft (8.8 m)
Volume: 8,212 acre-ft (1.012 x $10^7 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Firesteel Creek
Outlet: Firesteel Creek

Township: 103, 104N
Range: 60W
Section(s): 4-5, 9, 31-32
Shoreline L: 10 mi (16.1 km)
Mean Depth: 12.2 ft (3.7m)
Watershed/Lake Area: 343
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 170,827
Ownership Status: City owned
Public Interest: Lake Mitchell Improvement Association.

	1991		1992		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	25.00	8	21.20	6	22.96
Air Temperature (°C)	6	31.48	8	23.27	6	22.67
Secchi Disk Depth (meters)	3	0.98	4	0.90	3	1.40
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.44	8	8.48	6	8.11
Total Alkalinity (mg/l)	-	-	4	194	-	-
Total Solids (mg/l)	-	-	4	670	-	-
Dissolved Solids (mg/l)	-	-	4	651	-	-
Suspended Solids (mg/l)	6	17	8	17	6	10.33
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.09	8	0.17	6	0.28
Nitrate + Nitrite Nitrogen (mg/l)	6	0.00	8	0.06	6	0.09
Total Kjeldahl Nitrogen (mg/l)	6	1.09	8	0.99	6	1.23
Total Phosphorus (mg/l)	6	0.165	8	0.232	6	0.515
Total Dissolved Phosphorus (mg/l)	6	0.131	7	0.128	6	0.452
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	23.62	6	29.72	8	19.24

Chemical Parameters	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	23.02	6	24.13
Air Temperature (°C)	6	23.60	6	32.03
Secchi Disk Depth (meters)	9	1.39	9	1.48
Conductivity (cond/25° C)	-	-	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su)	6	8.35	6	8.07
Total Alkalinity (mg/l)	-	-	-	-
Total Solids (mg/l)	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-
Suspended Solids (mg/l)	6	11	6	19
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.45	6	0.23
Nitrate + Nitrite Nitrogen (mg/l)	6	0.43	6	0.10
Total Kjeldahl Nitrogen (mg/l)	6	1.25	6	1.27
Total Phosphorus (mg/l)	6	0.237	6	0.202
Total Dissolved Phosphorus (mg/l)	6	0.209	6	0.148
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	6	17.18	6	8.97

Year	1991	1992	1993	1994	1995
TSI Values -- Mean:	66.82	69.31	69.42	65.18	61.34
Secchi Disk	60.26	61.48	55.16	55.30	54.31
Total Phosphorus	78.62	82.61	93.54	81.77	77.61
Chlorophyll *a*	61.59	63.84	59.58	58.47	52.09

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattails and bulrush

Floating Leaved and Submerged Plant Species Identified: Potamogeton pectinatus, P. nodosus, and Polygonum coccineum

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 229,911 A (93,045 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
HR-PR	50,580	22
HR-S4	48,281	21
BE-S4-DV	20,692	9
CY-HR-B3	20,692	9
LE	20,692	9
KA-LE	16,094	7
EU-CY-B3	16,094	7
DV-S4	13,795	6
HR-PR-TK	11,496	5
EN-DB	6,897	3
RD-FH	4,598	2

HR-PR Houdek-Prosper: Nearly level to gently undulating well drained and moderately well drained soils.

HR-S4 Houdek-Stickney: Nearly level, well and moderately well drained, loamy soils formed in glacial till; on uplands.

CY-HR-B3 Clarno-Houdek-Betts: Nearly level to steep, well to excessively drained, loamy soils formed in glacial till; on uplands.

LE Lane: Nearly level to gently sloping, well drained silty soils that formed in local clayey alluvial sediments.

KA-LE Jerauld-Lane: Nearly level to gently sloping, moderately well drained claypan soils and deep silty soils that formed in local clayey alluvial sediments.

EU-CY-B3 Ethan-Clarno-Betts: Undulating to hilly, well drained to excessively drained soils.

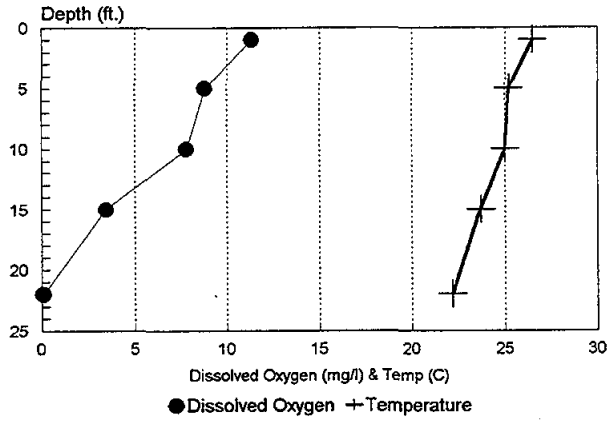
DV-S4 Dudley-Stickney: Nearly level, deep, moderately well drained loamy soils with claypan subsoils that formed in glacial till; on uplands.

HR-PR-TK Houdek-Prosper-Tetonka: Nearly level, well and moderately well drained, loamy soils formed in galcial till and somewhat poorly drained silty soils; on uplands.

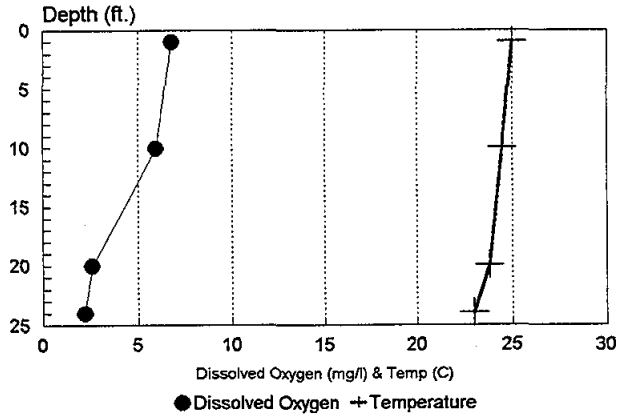
EN-DB Enet-Delmont: Nearly level to gently undulating, well to somewhat excessively drained, loamy soils formed in alluvium over sand and gravel; on terraces and uplands.

RD-FH Redstoe-Firesteel: Nearly level to hilly, well to somewhat poorly drained, calcareous, loamy and silty soils over siltstone; on uplands.

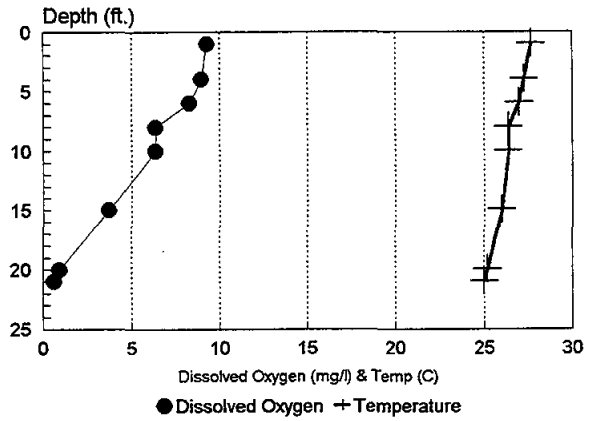
LAKE MITCHELL 5/26/79
Dissolved Oxygen & Temperature Profile



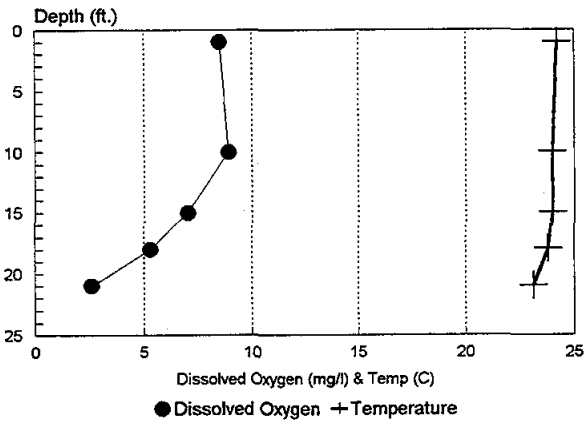
LAKE MITCHELL 6/20/91
Dissolved Oxygen & Temperature Profile



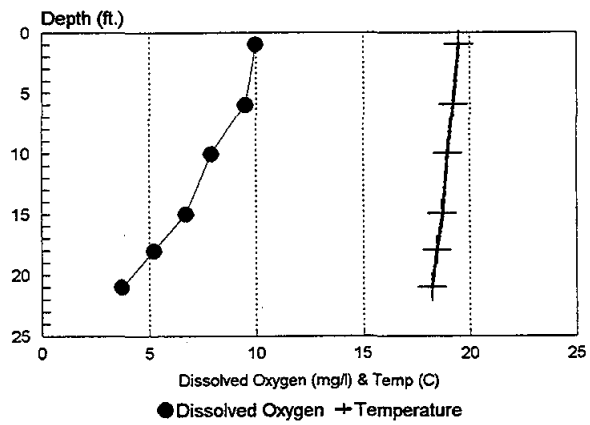
LAKE MITCHELL 7/20/91
Dissolved Oxygen & Temperature Profile



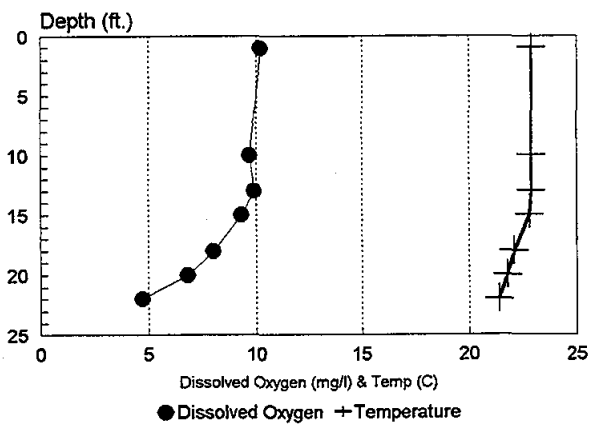
LAKE MITCHELL 8/19/91
Dissolved Oxygen & Temperature Profile



LAKE MITCHELL 6/11/92
Dissolved Oxygen & Temperature Profile

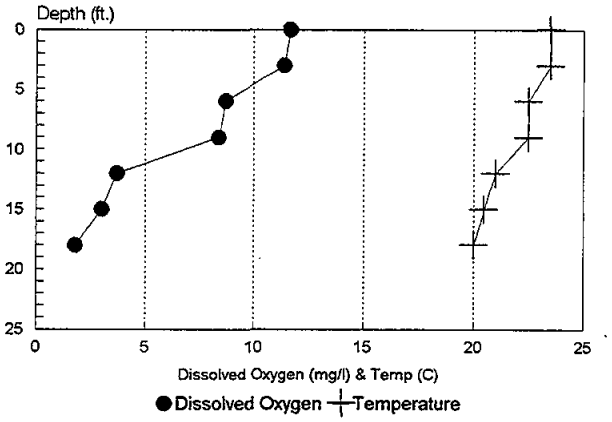


LAKE MITCHELL 7/15/92
Dissolved Oxygen & Temperature Profile



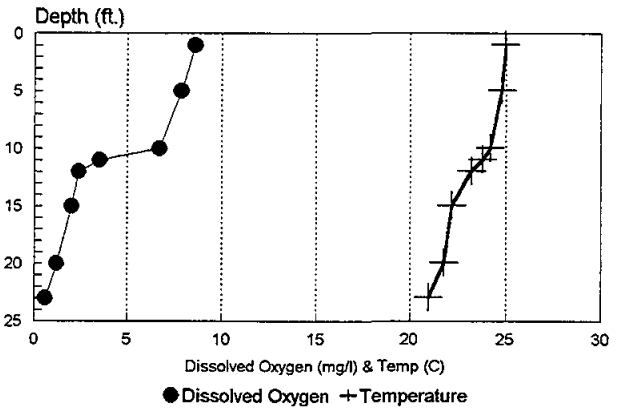
LAKE MITCHELL 7/28/92

Dissolved Oxygen & Temperature Profile



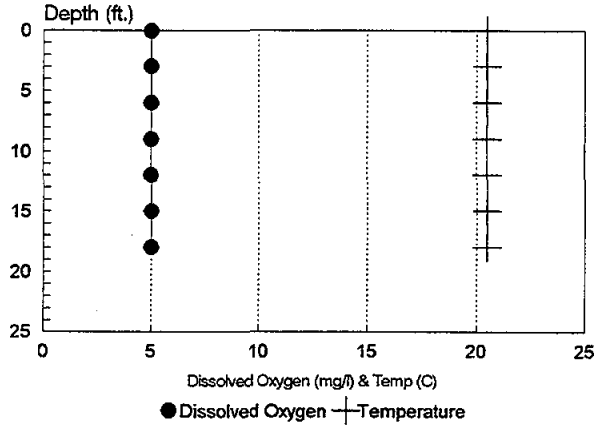
LAKE MITCHELL 8/13/92

Dissolved Oxygen & Temperature Profile



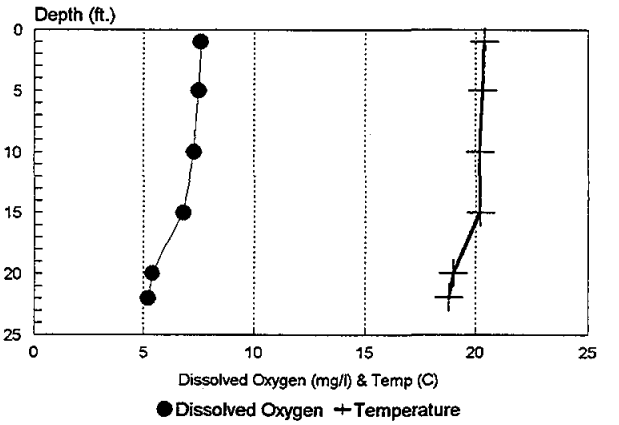
LAKE MITCHELL 8/26/92

Dissolved Oxygen & Temperature Profile



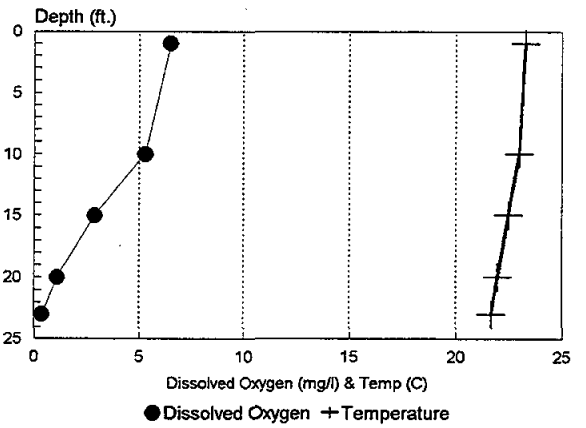
LAKE MITCHELL 6/12/93

Dissolved Oxygen & Temperature Profile



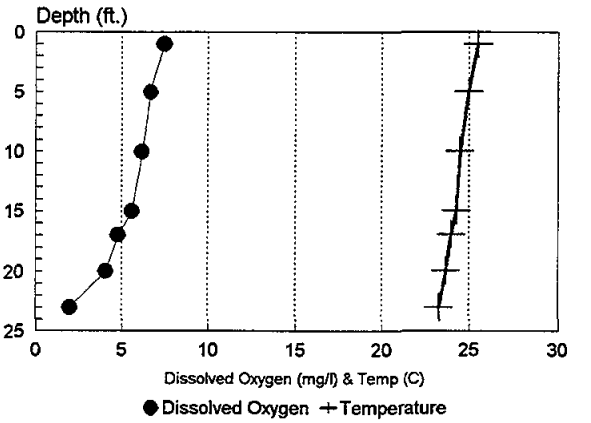
LAKE MITCHELL 7/20/93

Dissolved Oxygen & Temperature Profile

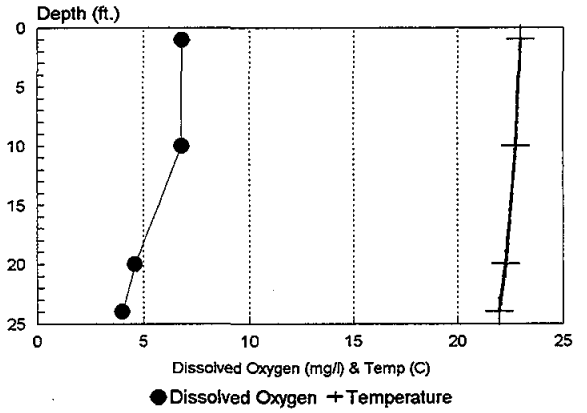


LAKE MITCHELL 8/18/93

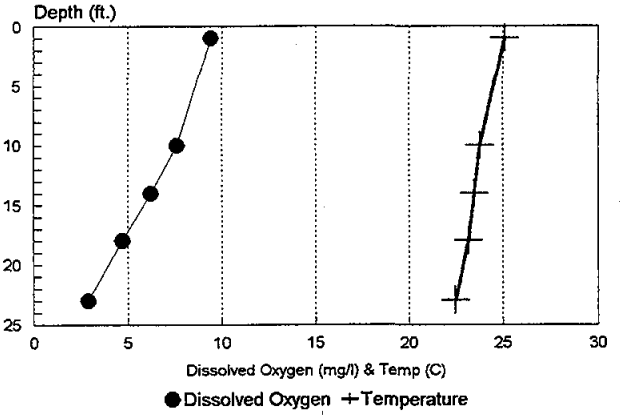
Dissolved Oxygen & Temperature Profile



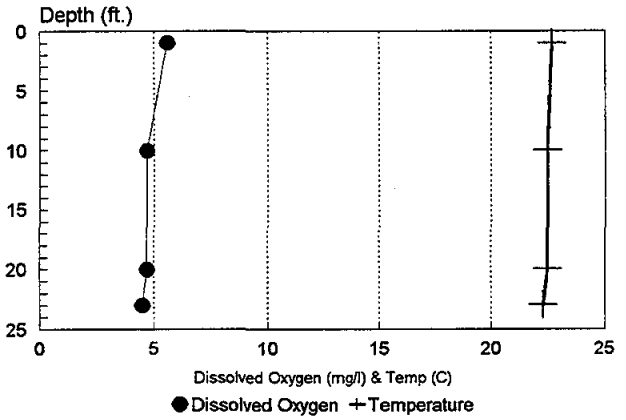
LAKE MITCHELL 6/11/94
Dissolved Oxygen & Temperature Profile



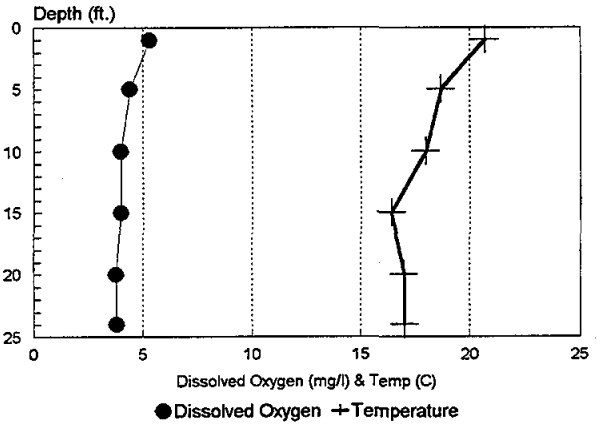
LAKE MITCHELL 7/13/94
Dissolved Oxygen & Temperature Profile



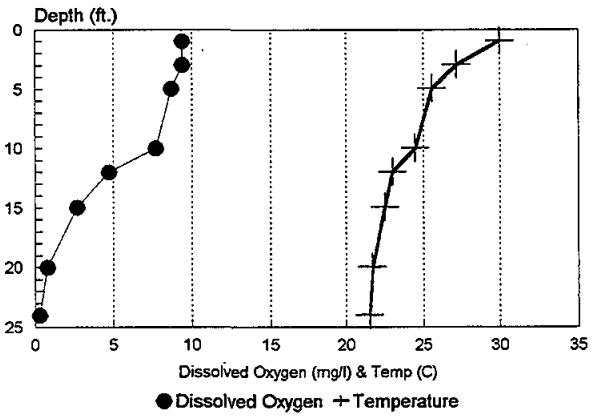
LAKE MITCHELL 8/13/94
Dissolved Oxygen & Temperature Profile



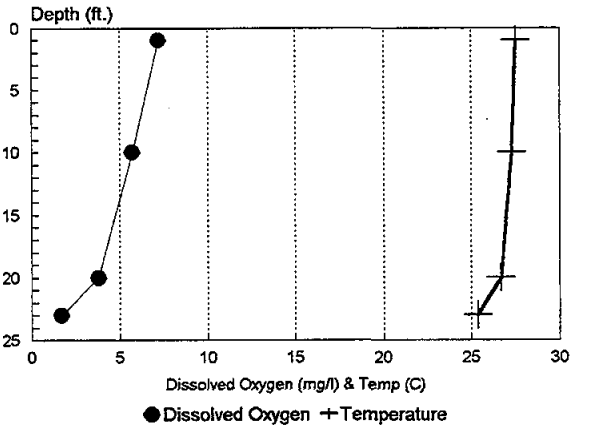
LAKE MITCHELL 6/13/95
Dissolved Oxygen & Temperature Profile



LAKE MITCHELL 7/12/95
Dissolved Oxygen & Temperature Profile

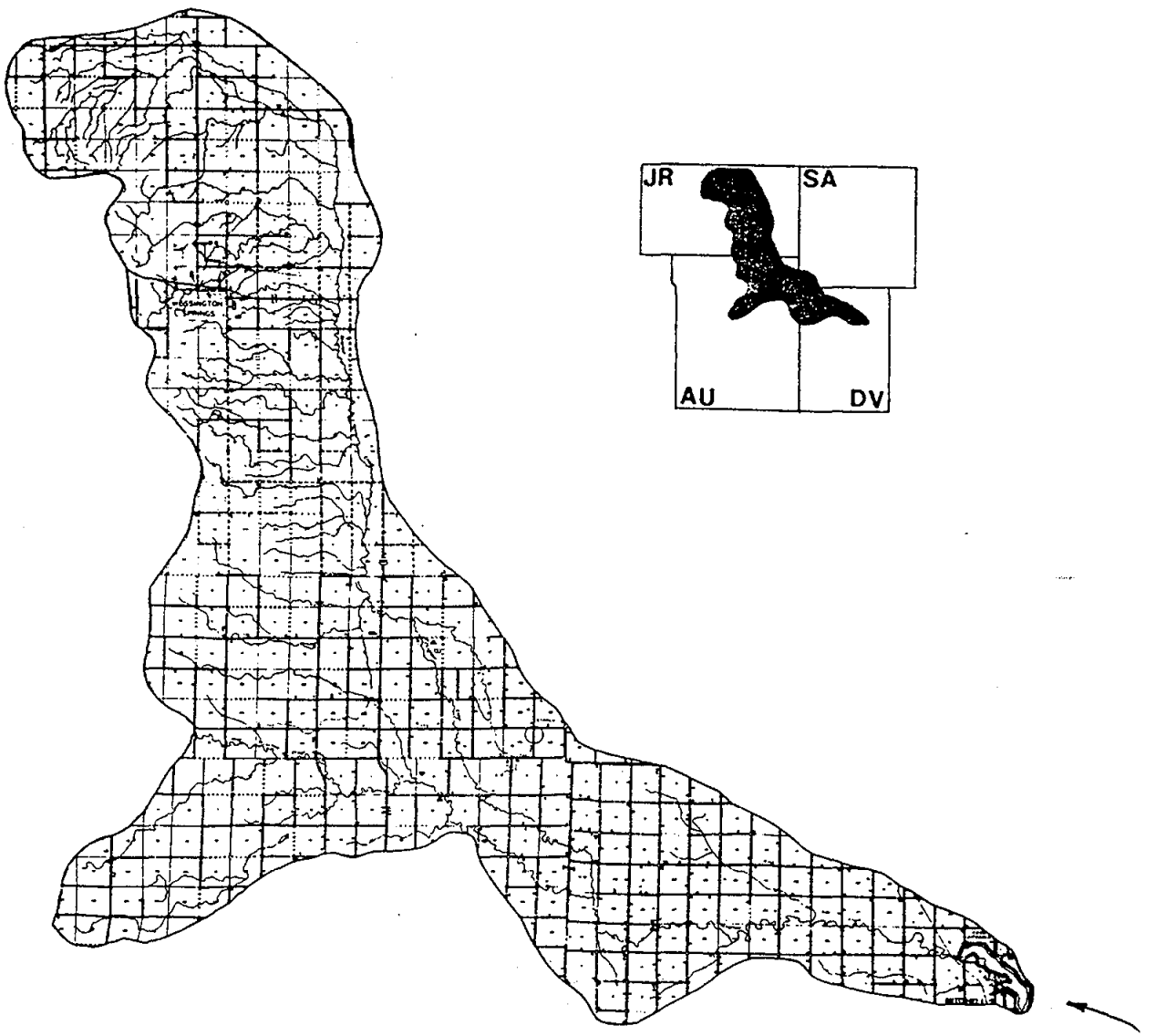


LAKE MITCHELL 8/11/95
Dissolved Oxygen & Temperature Profile



Lake Mitchell

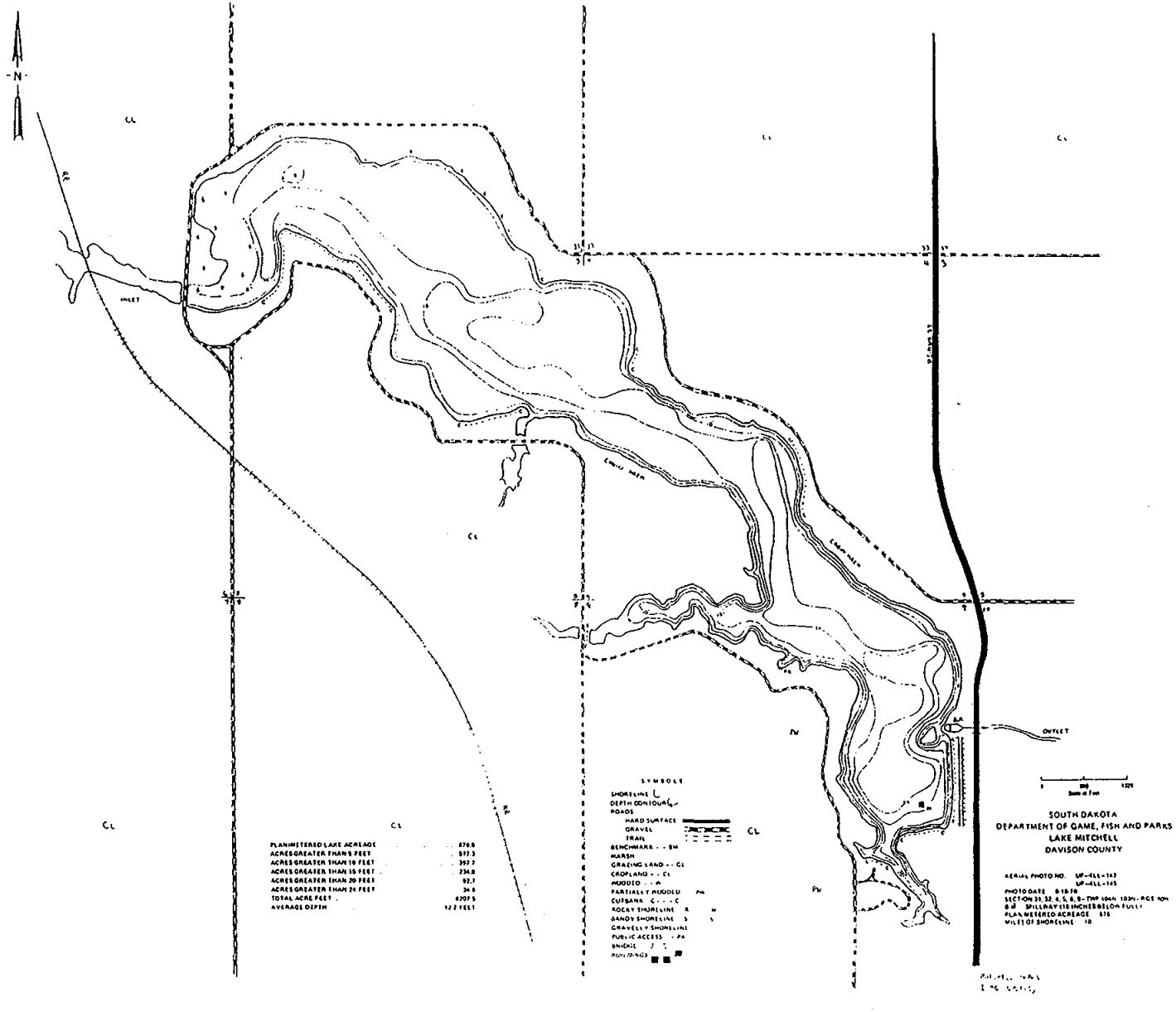
229,911 acres

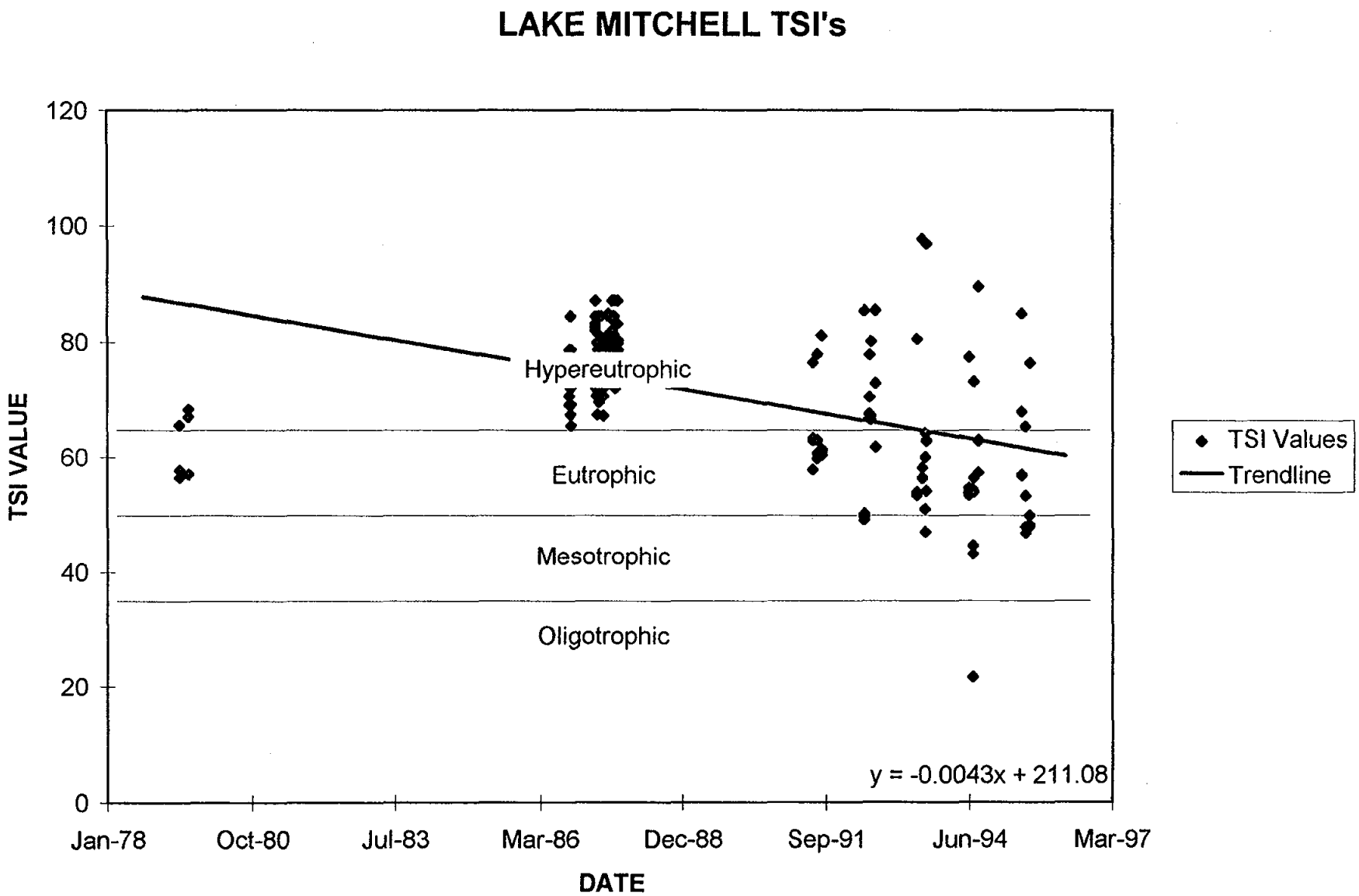


Scale

0 5 10 15 20

MILES


N
INLET
OUTLET
SYMBOLS
SHORELINE
DEPTH CONTOURS
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK
MARSH
GRAZING LAND
CROPLAND
MUDDED
PARTIALLY MUDDED
CUTBANK
ROCKY SHORELINE
SANDY SHORELINE
GRAVELLY SHORELINE
PUBLIC ACCESS
SWIMMING
PLANIMETERED LAKE ACREAGE 876.6
ACRES GREATER THAN 5 FEET 573.3
ACRES GREATER THAN 10 FEET 393.7
ACRES GREATER THAN 15 FEET 234.0
ACRES GREATER THAN 20 FEET 92.7
ACRES GREATER THAN 24 FEET 34.6
TOTAL ACRE FEET 8207.5
AVERAGE DEPTH 12.2 FEET
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
LAKE MITCHELL
DAVISON COUNTY
AERIAL PHOTO NO.
PHOTO DATE
PLANIMETERED ACREAGE
MILES OF SHORELINE


LAKE MITCHELL TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0043x + 211.08
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

MURDO DAM

County: Jones
Latitude: 43 deg. 55 min. 06 sec. N
Longitude: 100 deg. 43 min. 06 sec. W
Area: 41 A (16.6 ha)
Maximum Depth: 26 ft (7.9 m)
Volume: 451 acre-ft ($5.564 \times 10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 1S
Range: 28W
Section(s): 36
Shoreline Length: NA
Mean Depth: 11 ft (3.4 m)
Watershed/Lake Area: 119
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 37,341
Ownership Status: City owned
Public Interest: NA

	1989		1991	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	18.28	4	17.87
Air Temperature (°C)	4	22.52	4	22.00
Secchi Disk Depth (meters)	2	1.83	2	1.37
Conductivity (cond/25° C)	4	2,490	2	2,004
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	8.23
Field pH (su)	4	8.58	4	8.33
Total Alkalinity (mg/l)	3	220	4	135
Total Solids (mg/l)	4	2,263	4	1,666
Dissolved Solids (mg/l)	4	2,257	4	1,655
Suspended Solids (mg/l)	4	7	4	12
Volatile Suspended Solids (mg/l)	-	-	2	2
Ammonia Nitrogen (mg/l)	4	0.04	4	0.19
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30
Total Kjeldahl Nitrogen (mg/l)	4	1.04	4	1.14
Total Phosphorus (mg/l)	4	0.050	4	0.156
Total Dissolved Phosphorus (mg/l)	-	-	4	0.117
Ortho Phosphate as P (mg/l)	4	0.016	-	-
Chlorophyll (mg/m^3)	-	-	-	-

Year	1989	1991
TSI Values -- Mean:	55.57	59.09
Secchi Disk	51.29	55.44
Total Phosphorus	59.85	62.73
Chlorophyll *a*		

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

	June 14, 1989		July 20, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Algae (other)	19	326	12	163
Algae (flagellate)	15	258	10	136
Cryptomonas sp. #1	6	103	68	925
Cryptomonas	1	17	1	14
Oocystis	1	17	6	82
Attheya	-	-	37	503
Green Algae (other)	-	-	8	109
Aphanizomenon flos-aquae	-	-	4	54
Characium	-	-	3	41
Ceratium hirundinella	-	-	1	14
Diatom (pennate)	-	-	1	14
Blue-green (other)	-	-	1	14
Aphanocapsa	-	-	1	14
Total	42	722	153	2,081

Watershed Description

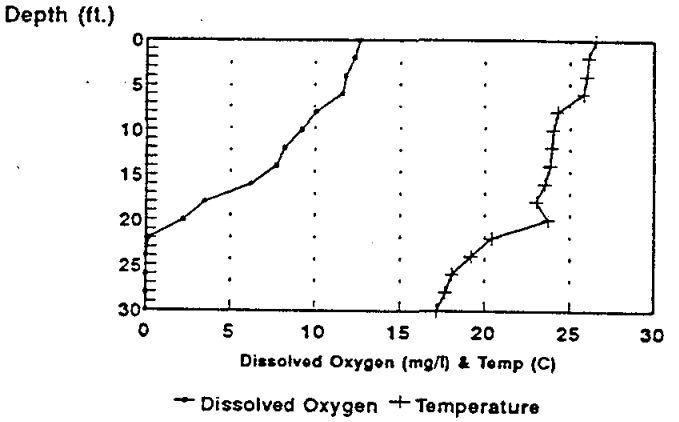
Watershed Area: 4,886 A (1,977 ha)

Soil Associations within Watershed

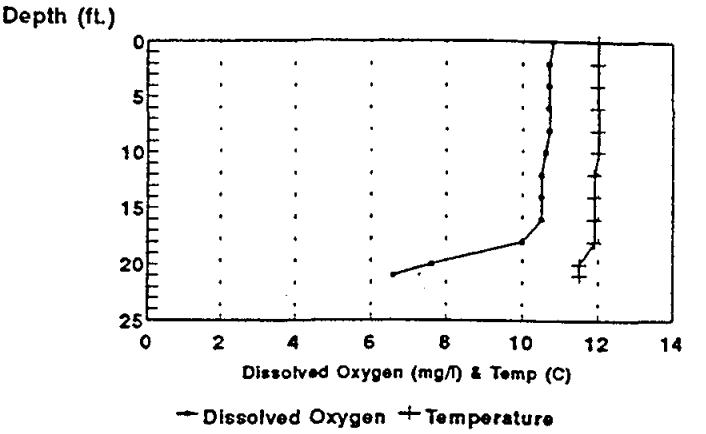
Association	Area (A)	% of Total
NT-PS	4,886	100

NT-PS Opal-Promise: Deep and moderately deep, nearly level to sloping, clayey soils that are moderately deep over clay shale.

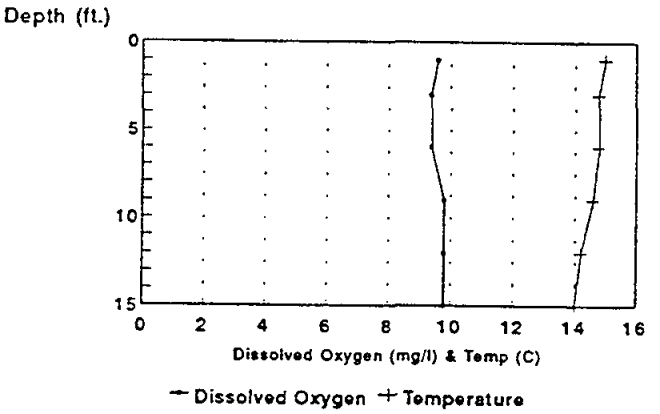
LAKE MURDO 7/16/91
Dissolved Oxygen & Temperature Profile



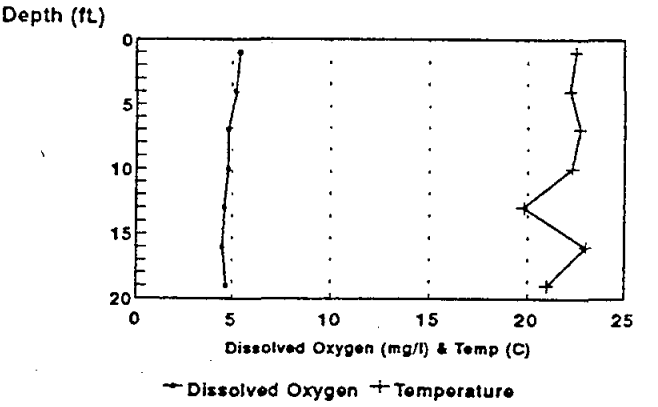
LAKE MURDO 10/10/91
Dissolved Oxygen & Temperature Profile



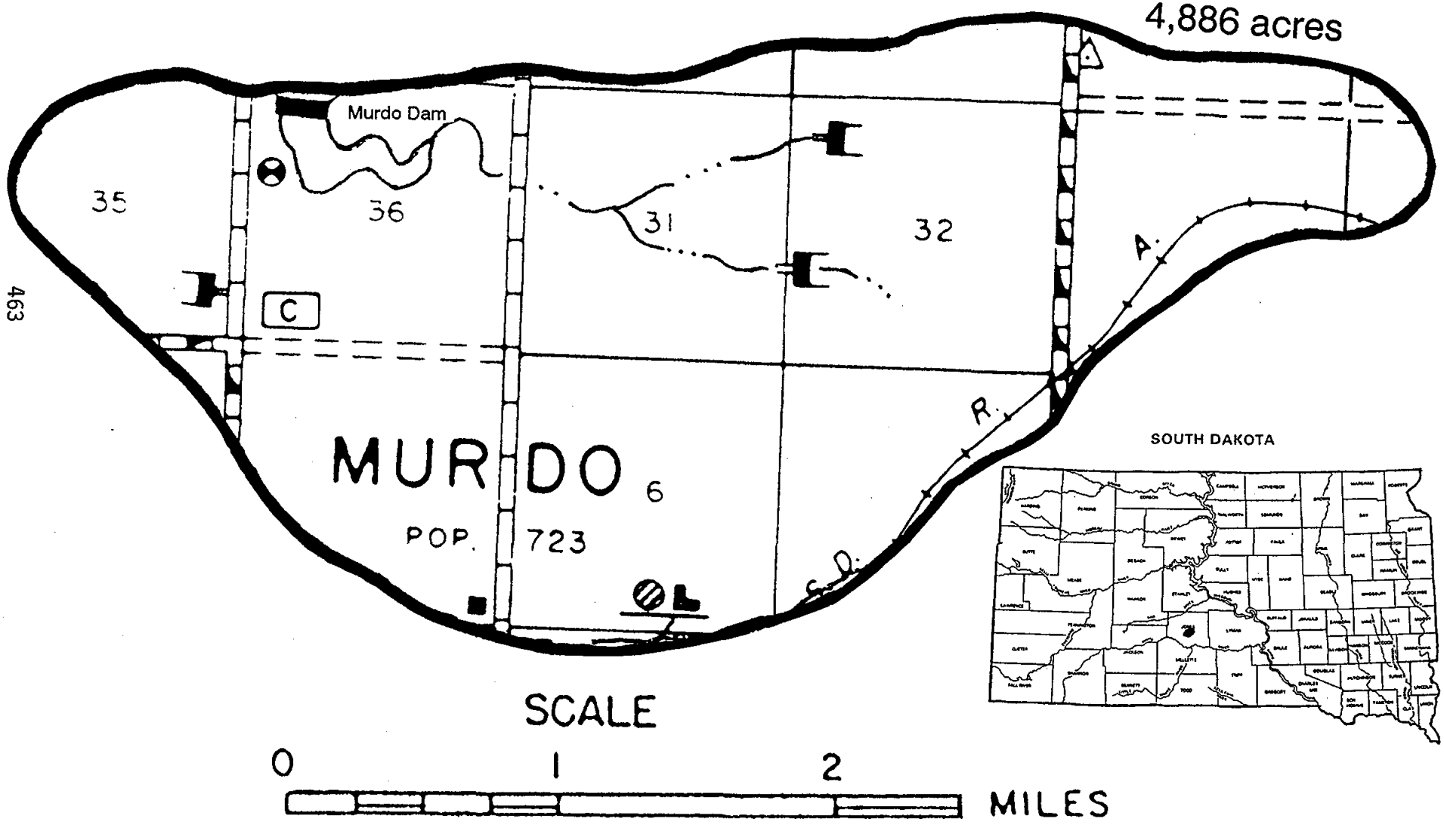
Lake Murdo 6/14/89
Dissolved Oxygen & Temperature Profile



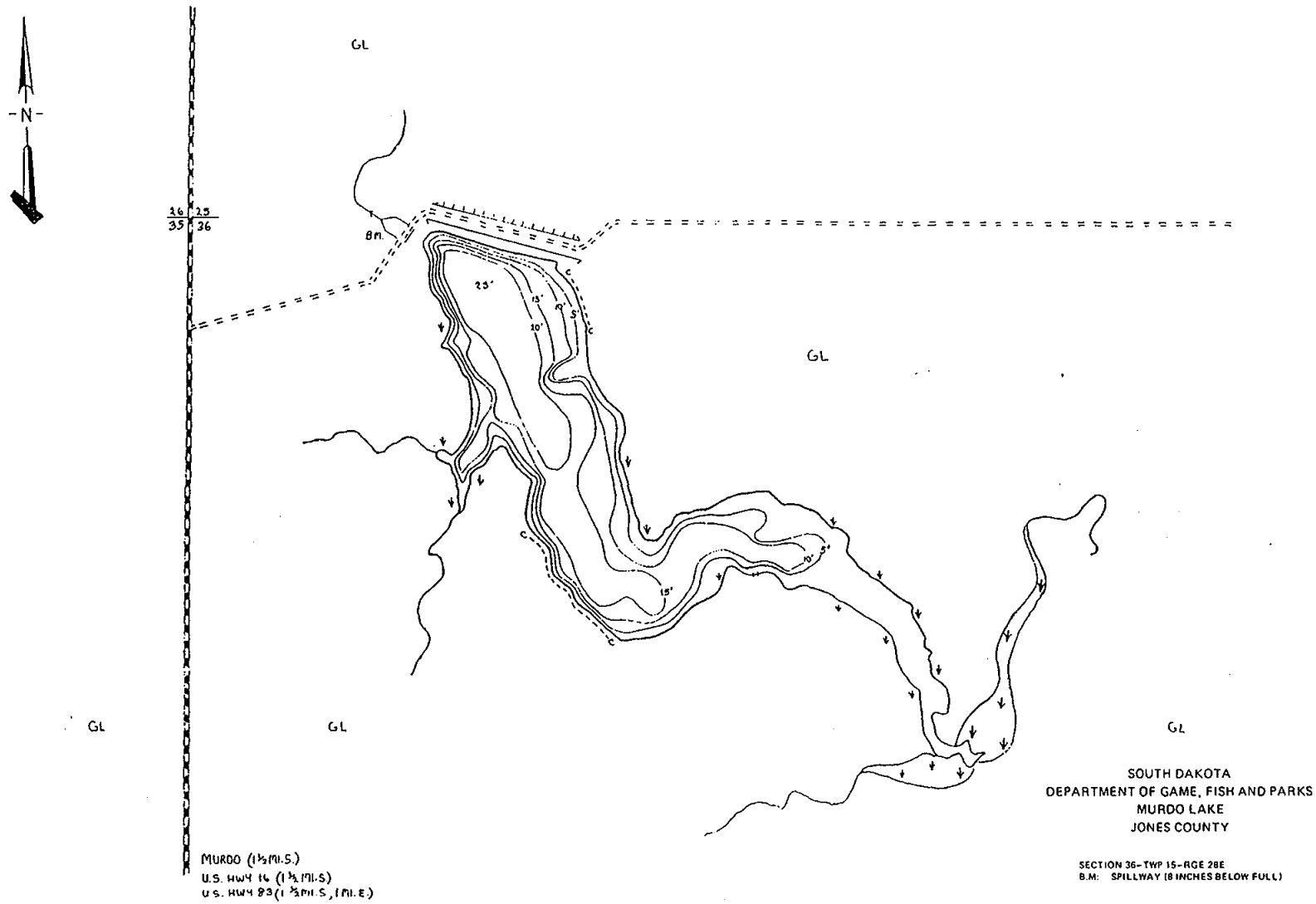
Lake Murdo 7/20/89
Dissolved Oxygen & Temperature Profile



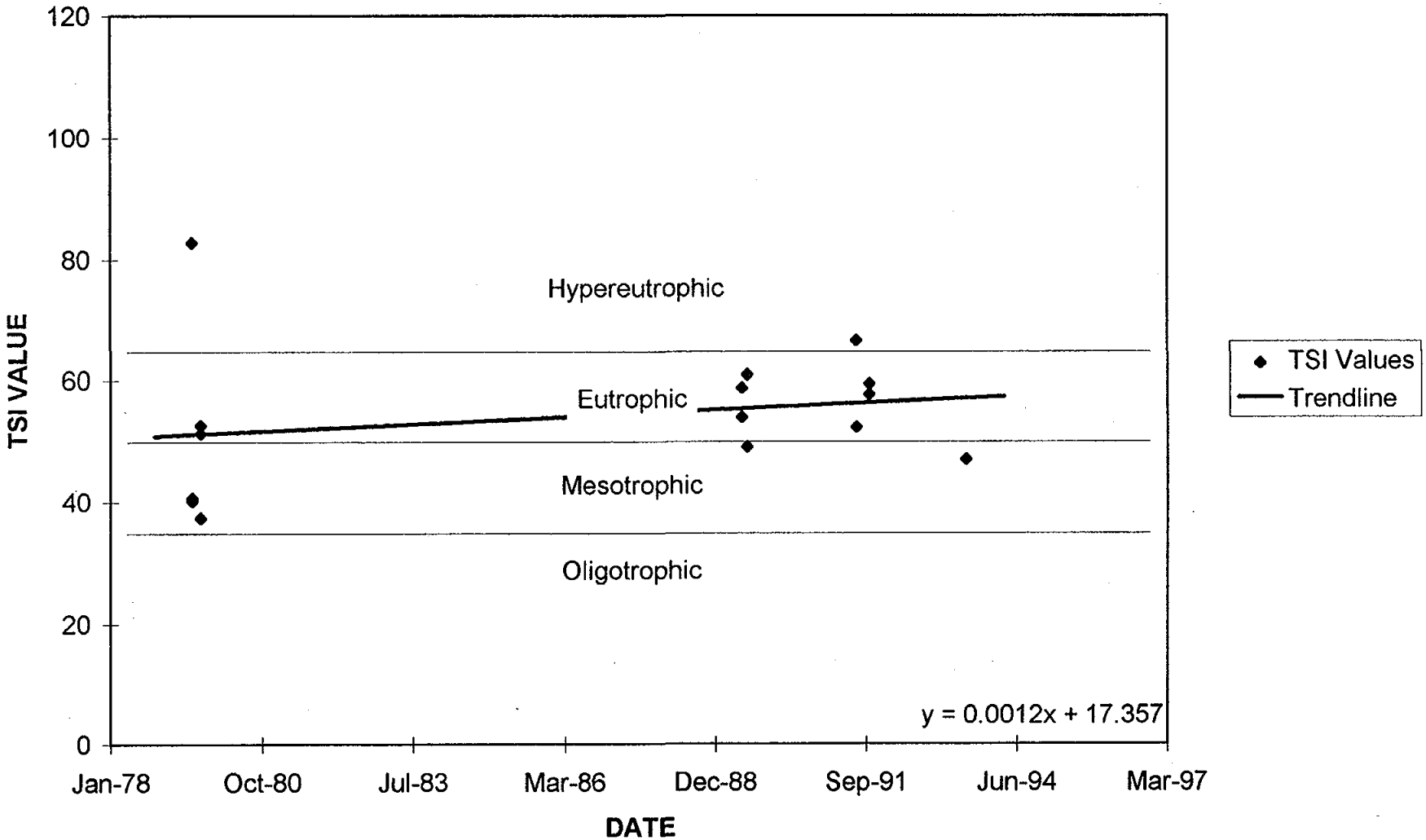
Murdo Dam



463


N
GL
GL
GL
GL
36
35
25
36
B.M.
25'
15'
10'
5'
MURDO (1½MI.S.)
U.S. HWY 16 (1½MI.S.)
U.S. HWY 83 (1½MI.S., 1MI.E.)
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
MURDO LAKE
JONES COUNTY
SECTION 36-TWP 15-RGE 28E
B.M. SPILLWAY (8 INCHES BELOW FULL)

MURDO DAM TSI's



NEW WALL LAKE

County: Pennington
Latitude: 43 deg. 58 min. 39 sec. N
Longitude: 102 deg. 16 min. 40 sec. W
Area: 42 A (17 ha)
Maximum Depth: 24 ft (7.3 m)
Volume: 483.5 acre-ft ($5.96x10^5 m^3$
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 1S
Range: 15E
Section(s): 1-2, 11-12
Shoreline L: 3.0 mi (5 km)
Mean Depth: 12.9 ft (3.9m)
Watershed/Lake Area: 91
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 102,151
Ownership Status: State and privately owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	23.73	4	17.26	4	18.25
Air Temperature (°C)	4	29.17	4	23.10	4	23.00
Secchi Disk Depth (meters)	2	0.79	2	0.72	2	0.17
Conductivity (cond/25° C)	2	523	2	396	-	-
Turbidity (NTU)	-	-	-	-	2	60.70
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.65	4	8.33	4	7.76
Total Alkalinity (mg/l)	4	220	4	183	4	121
Total Solids (mg/l)	4	382	4	298	4	447
Dissolved Solids (mg/l)	4	364	4	282	4	373
Suspended Solids (mg/l)	4	18	4	16	4	74
Volatile Suspended Solids (mg/l)	-	-	2	1	-	-
Ammonia Nitrogen (mg/l)	4	0.12	4	0.05	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	4	0.20
Total Kjeldahl Nitrogen (mg/l)	4	1.23	4	1.03	4	1.68
Total Phosphorus (mg/l)	4	0.100	4	0.081	4	0.560
Total Dissolved Phosphorus (mg/l)	-	-	4	0.046	4	0.323
Ortho Phosphate as P (mg/l)	4	0.018	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	34.84	2	14.91

Year	1989	1991	1993
TSI Values -- Mean:	67.32	64.10	78.34
Secchi Disk	63.36	64.81	85.99
Total Phosphorus	71.29	65.34	91.96
Chlorophyll *a*		62.15	57.08

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 70%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Ceratophyllum sp., Myriophyllum sp., and Potamogeton sp.

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 3,810 A (1,542 ha)

Soil associations within Watershed

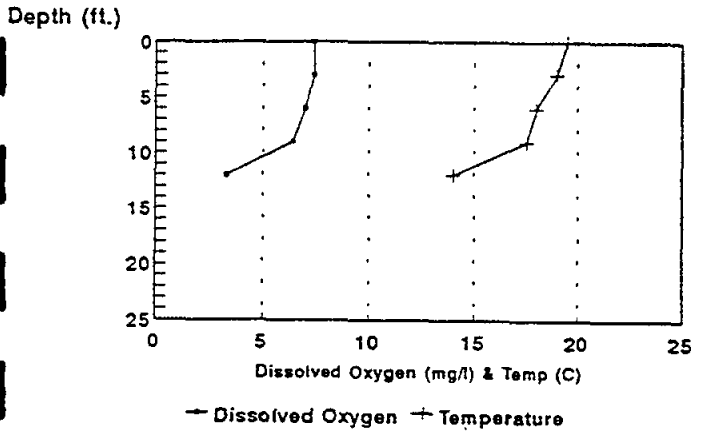
Association	Area (A)	% of Total
#9	2,808	73.7
#11	655	17.2
#6	354	9.3

#9 Blackpipe-Norrest-Wortman: Moderately deep, well drained, nearly level to rolling, loamy and silty soils on uplands.

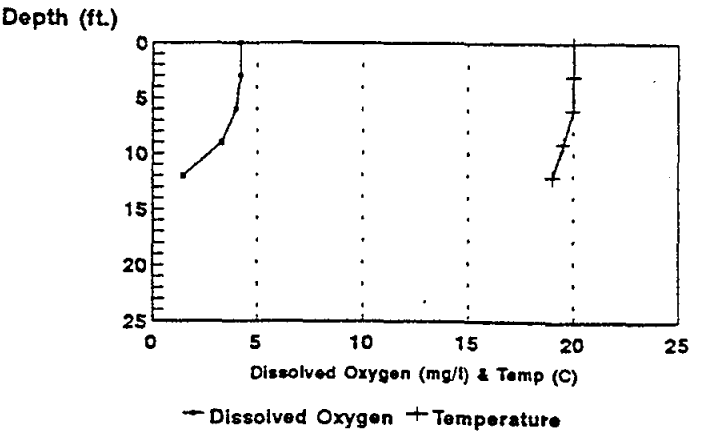
#11 Samsil-Pierre: Shallow and moderately deep, well drained, moderately sloping to very steep, clayey soils on uplands.

#6 Orella-Fairburn-Badland: Shallow, well drained, moderately sloping to steep, clayey and loamy soils and Badland on uplands.

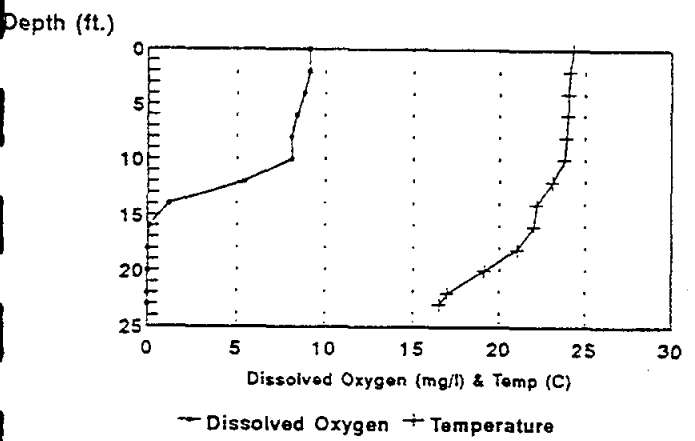
NEW WALL LAKE 6/15/93
Dissolved Oxygen & Temperature Profile



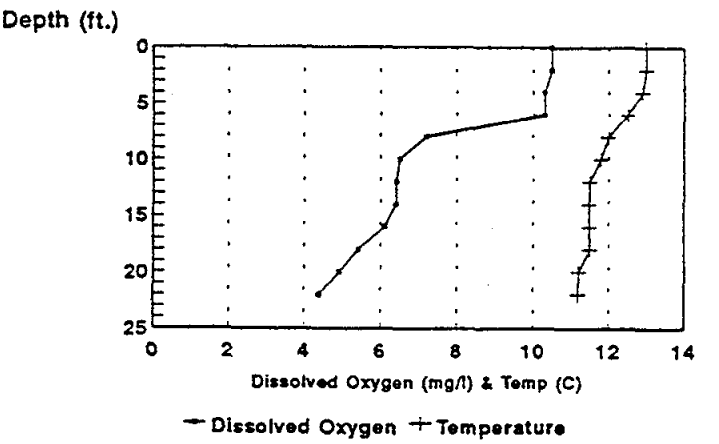
NEW WALL LAKE 8/3/93
Dissolved Oxygen & Temperature Profile



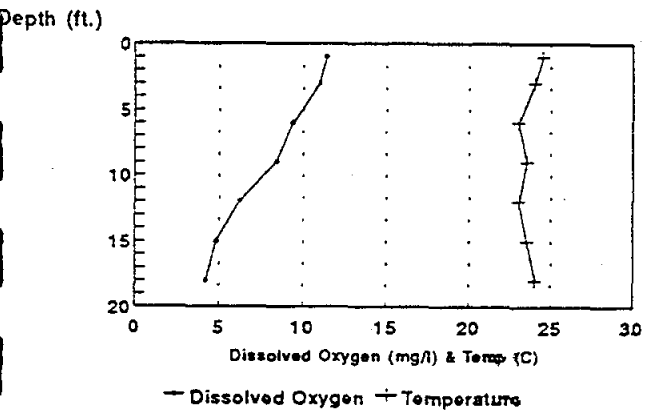
NEW WALL LAKE 7/16/91
Dissolved Oxygen & Temperature Profile



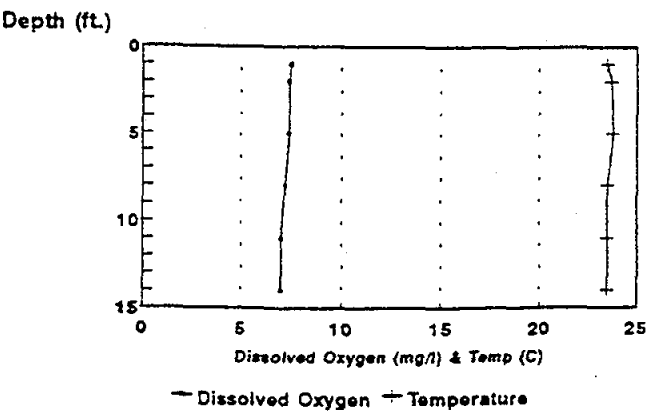
NEW WALL LAKE 10/9/91
Dissolved Oxygen & Temperature Profile



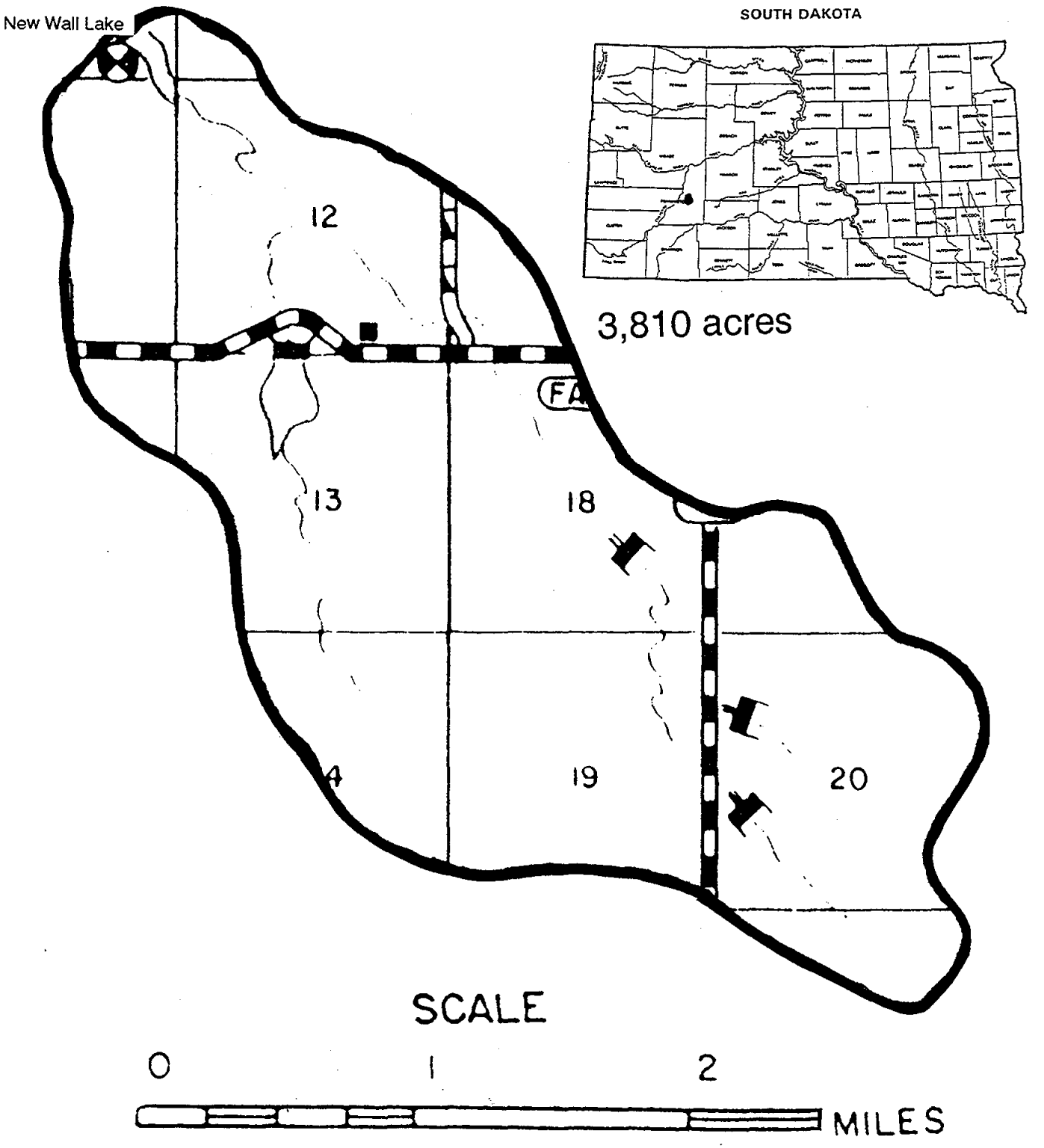
New Wall Lake, 7/12/89
Dissolved Oxygen & Temperature Profile

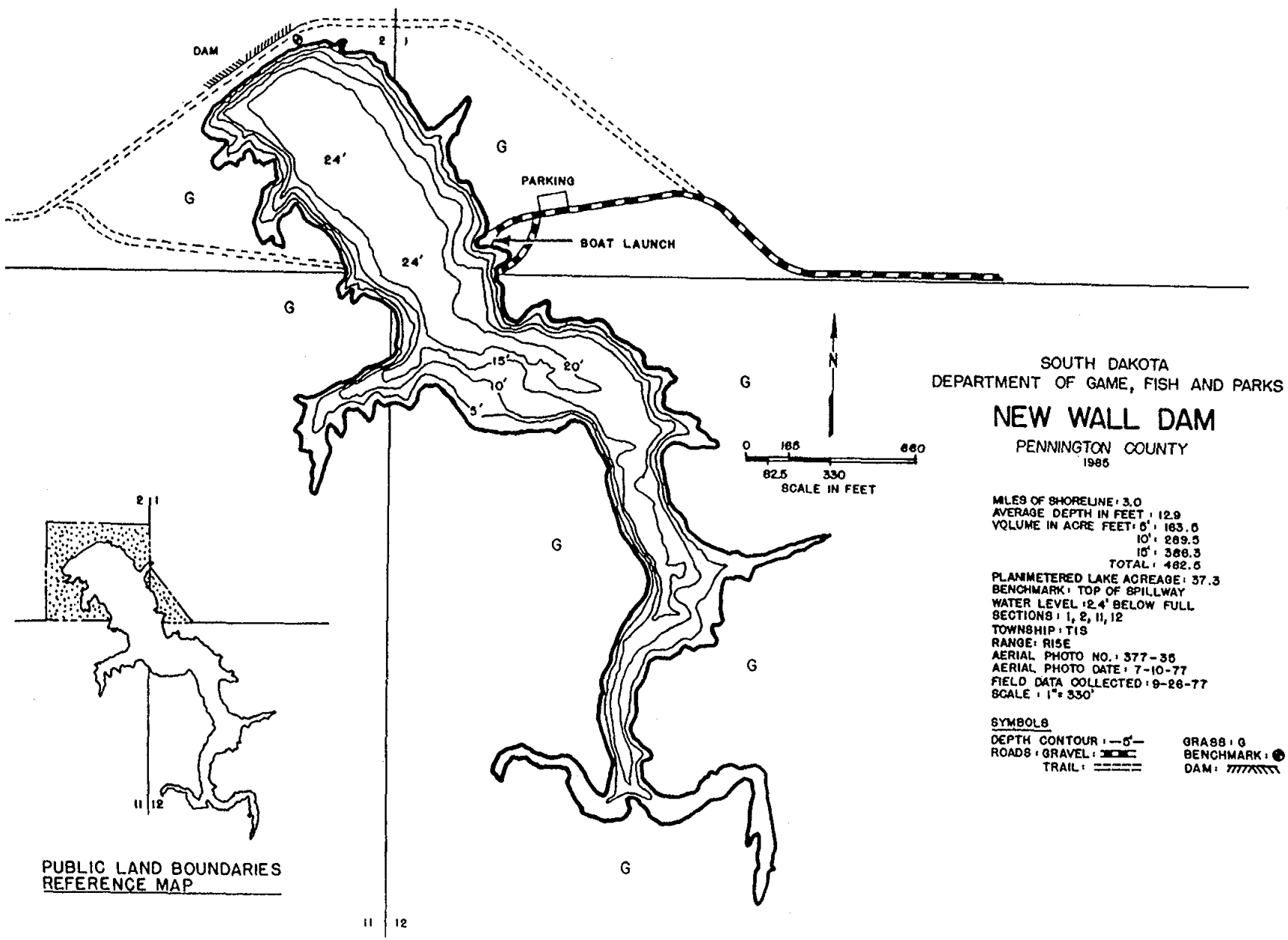


New Wall Lake, 8/16/89
Dissolved Oxygen & Temperature Profile



New Wall Lake





SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

NEW WALL DAM

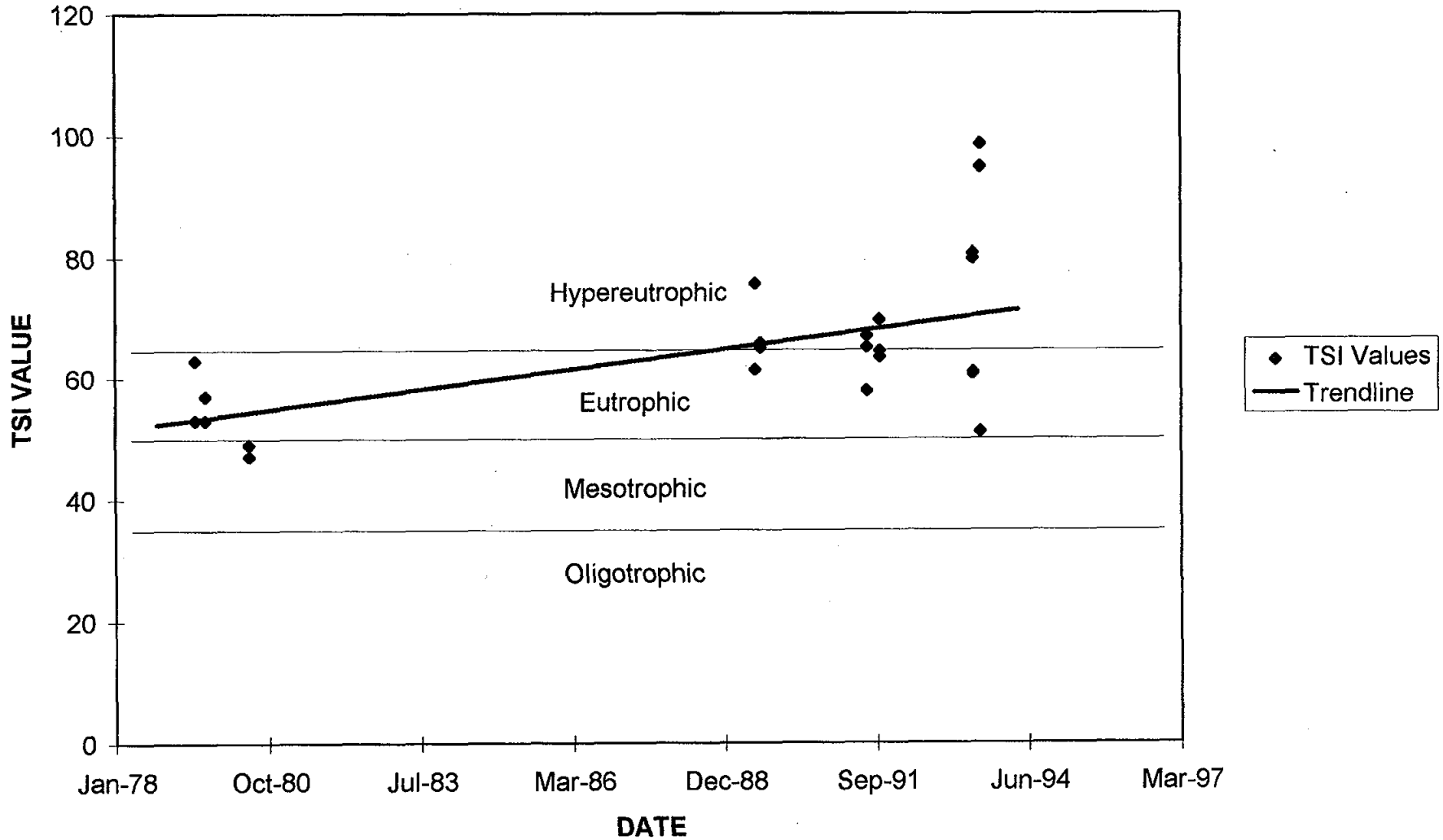
PENNINGTON COUNTY
1985

MILES OF SHORELINE: 3.0
AVERAGE DEPTH IN FEET: 12.9
VOLUME IN ACRE FEET: 5': 163.6
10': 269.5
15': 386.3
TOTAL: 482.6
PLANIMETERED LAKE ACREAGE: 37.3
BENCHMARK: TOP OF SPILLWAY
WATER LEVEL: 2.4' BELOW FULL
SECTIONS: 1, 2, 11, 12
TOWNSHIP: T1S
RANGE: R1SE
AERIAL PHOTO NO.: 377-35
AERIAL PHOTO DATE: 7-10-77
FIELD DATA COLLECTED: 9-26-77
SCALE: 1"=330'

SYMBOLS
DEPTH CONTOUR: —5'—
ROADS: GRAVEL:
TRAIL:
GRASS: G
BENCHMARK:
DAM:

REPRODUCTION BY PERMISSION
OF THE G,F&P ONLY.

NEW WALL LAKE TSI's



NEWELL CITY POND

County: Butte
Latitude: 44 deg. 42 min. 55 sec. N
Longitude: 103 deg. 26 min. 55 sec. W
Area: 20 A (8.1 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 9N
Range: 5E
Section(s): 25
Shoreline L: 0.7 mi (1.1 km)
Mean Depth: NA
Watershed/Lake Area: 27
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(3) Coldwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 129,522
Ownership Status: City owned
Public Interest: City of Newell

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.95	4	16.88	4	18.83
Air Temperature (°C)	4	29.44	4	19.75	4	23.00
Secchi Disk Depth (meters)	2	1.34	2	1.81	2	0.87
Conductivity (cond/25° C)	4	2,448	-	-	-	-
Turbidity (NTU)	-	-	-	-	2	10.49
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	7.83	4	8.40	4	8.03
Total Alkalinity (mg/l)	4	86	4	702	4	157
Total Solids (mg/l)	4	2,467	4	2,002	4	2,695
Dissolved Solids (mg/l)	4	2,454	4	1,991	4	2,681
Suspended Solids (mg/l)	4	13	3	15	4	14
Volatile Suspended Solids (mg/l)	-	-	2	11	-	-
Ammonia Nitrogen (mg/l)	4	0.04	4	0.03	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	0.78	4	0.67	4	0.79
Total Phosphorus (mg/l)	4	0.044	4	0.041	4	0.056
Total Dissolved Phosphorus (mg/l)	-	-	3	0.015	4	0.045
Ortho Phosphate as P (mg/l)	4	0.010	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	4.02	2	3.69

Year	1989	1991	1993
TSI Values -- Mean:	55.40	50.22	55.27
Secchi Disk	55.77	51.41	62.01
Total Phosphorus	55.03	55.03	60.44
Chlorophyll *a*		44.22	43.36

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 25%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

No Date

Taxa	Number	Unit/ml
Blue-green (other)	3	228
Algae (other)	2	152
Oocystis	1	76
Cryptomonas	1	76
Total	7	531

Watershed Description

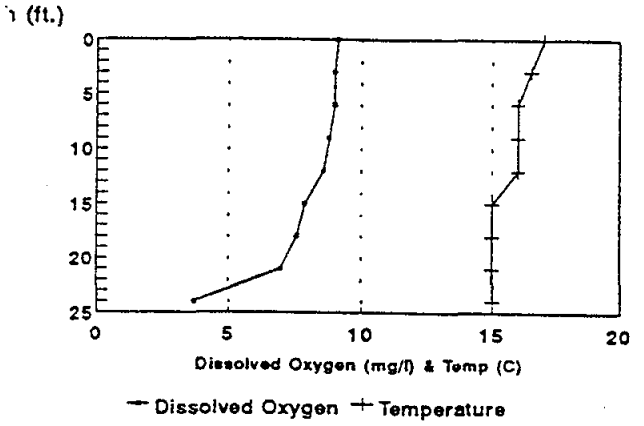
Watershed Area: 539 A (218 ha)

Soil Associations within Watershed

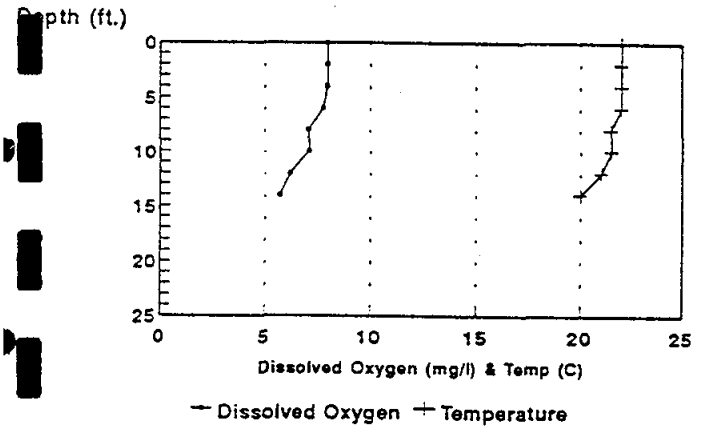
Association	Area (A)	% of Total
#1	539	100

#1 Winler-Lismas: Moderately deep and shallow, nearly level to moderately steep clayey soils over clay shale.

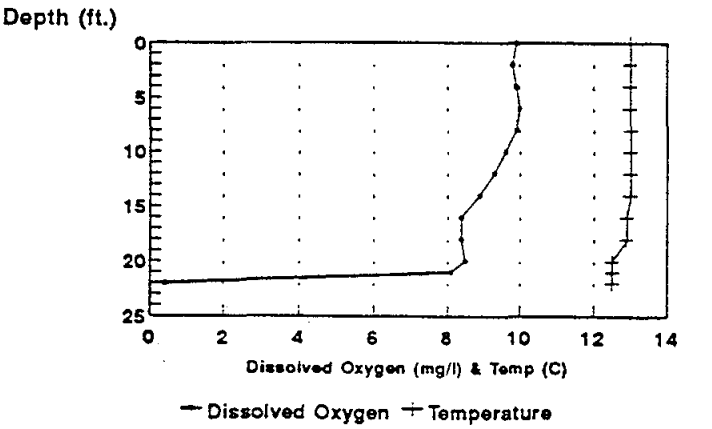
NEWELL CITY POND 6/14/93
Dissolved Oxygen & Temperature Profile



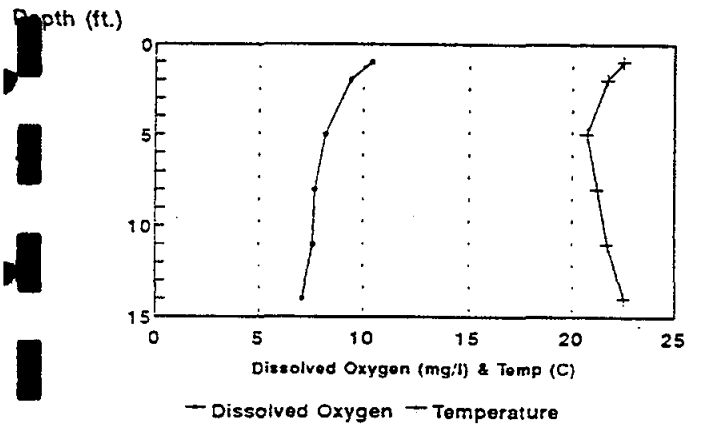
NEWELL CITY POND 6/18/91
Dissolved Oxygen & Temperature Profile



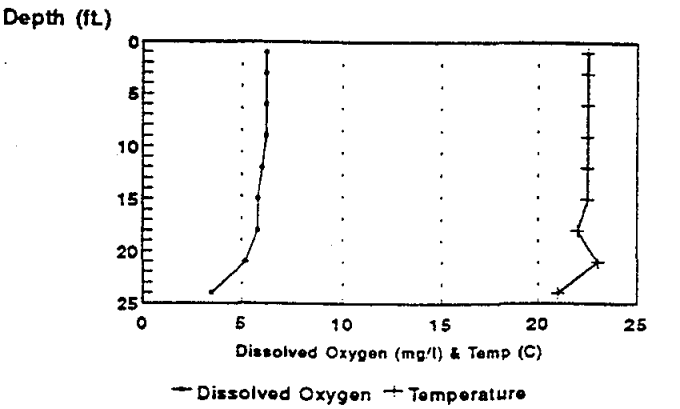
NEWELL CITY POND 9/30/91
Dissolved Oxygen & Temperature Profile



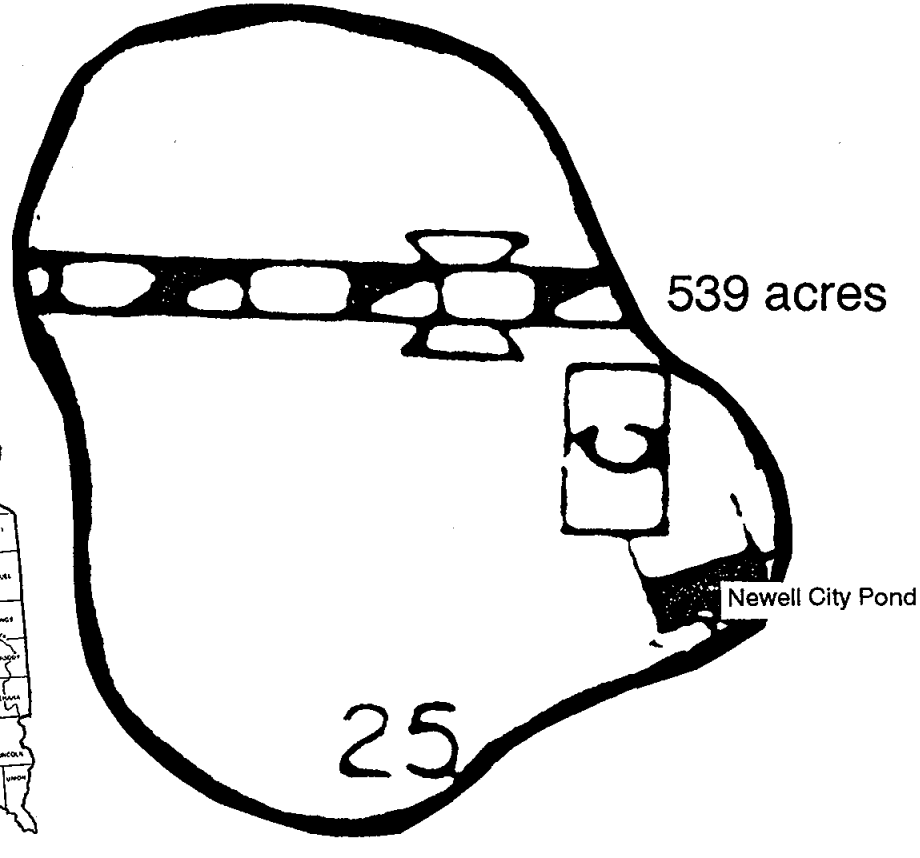
Newell City Pond, 6/27/89
Dissolved Oxygen & Temperature Profile



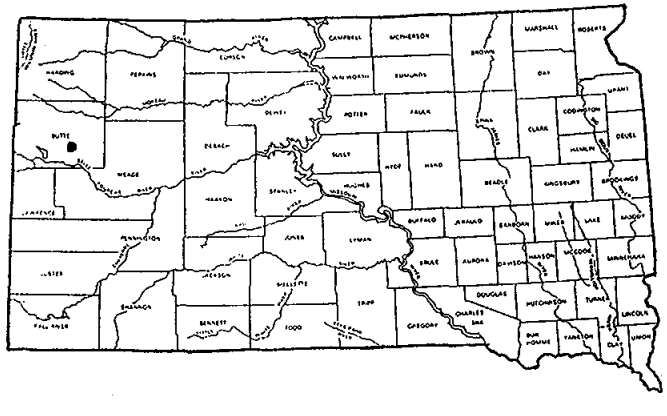
Newell City Pond, 8/7/89
Dissolved Oxygen & Temperature Profile



Newell City Pond



SOUTH DAKOTA



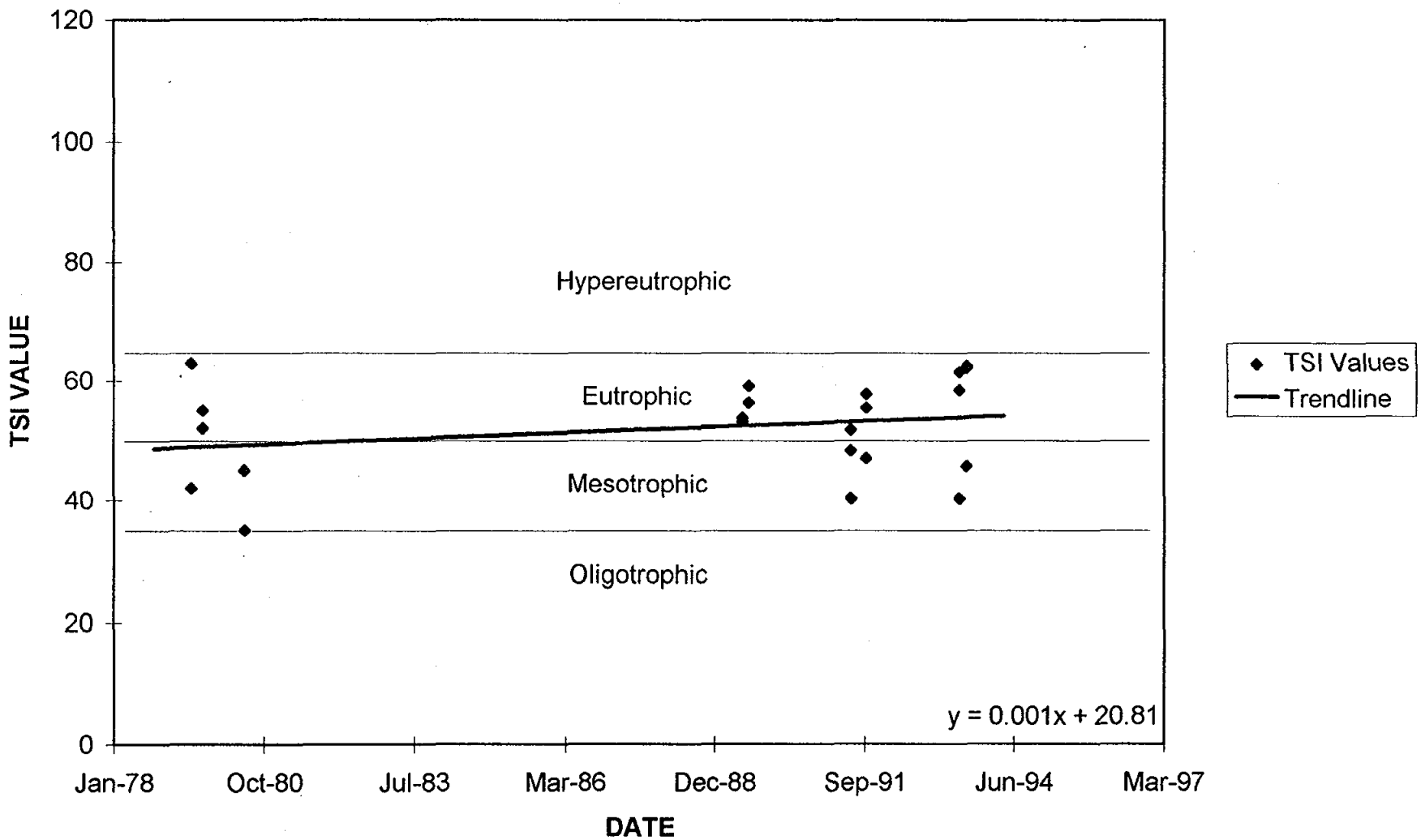
SCALE

0 1

MILES

475

NEWELL CITY POND TSI's



NEWELL LAKE

County: Butte
Latitude: 44 deg. 50 min. 00 sec. N
Longitude: 103 deg. 23 min. 00 sec. W
Area: 183 A (74 ha)
Maximum Depth: 31 ft (9.4 m)
Volume: 2,463.7 acre-ft ($3.04x10^6 m^3$)
Origin of Basin: impoundment
Township: 10N
Range: 6E
Section(s): 9
Shoreline L: 4.7 mi (7.6 km)
Mean Depth: 13.5 ft (4.1 m)
Watershed/Lake Area: 51
Thermal Stratification: no
Major Inflows (named or permanent streams): South Willow Creek
Outlet: South Willow Creek

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 126,408
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.78	6	22.20	4	19.11
Air Temperature (°C)	4	29.44	6	32.96	4	25.28
Secchi Disk Depth (meters)	2	2.01	3	2.24	2	2.13
Conductivity (cond/25° C)	4	569	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	2	8.15	6	8.10	4	8.43
Total Alkalinity (mg/l)	4	75	-	-	-	-
Total Solids (mg/l)	4	397	-	-	-	-
Dissolved Solids (mg/l)	4	385	-	-	-	-
Suspended Solids (mg/l)	4	12	6	4.67	4	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.03	6	0.04	4	0.01
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.05
Total Kjeldahl Nitrogen (mg/l)	4	0.61	6	0.56	4	0.47
Total Phosphorus (mg/l)	4	0.052	6	0.024	4	0.039
Total Dissolved Phosphorus (mg/l)	-	-	6	0.013	4	0.028
Ortho Phosphate as P (mg/l)	4	0.014	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	1.70	3	4.36

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	19.21	6	20.99	6	20.66
Air Temperature (°C)	6	19.33	6	25.80	6	23.60
Secchi Disk Depth (meters)	3	0.45	8	2.22	9	1.35
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.06	6	8.20	6	8.00
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	19	6	3	6	5
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.09	6	0.01	6	0.01
Nitrate + Nitrite Nitrogen (mg/l)	6	0.03	6	0.01	6	0.04
Total Kjeldahl Nitrogen (mg/l)	6	0.32	6	0.23	6	0.39
Total Phosphorus (mg/l)	6	0.087	6	0.016	6	0.032
Total Dissolved Phosphorus (mg/l)	6	0.021	6	0.008	6	0.015
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	5.95	6	5.96	5	1.84

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	50.40	44.90	49.99	63.14	47.82	48.44
Secchi Disk	49.92	48.35	49.10	71.62	48.51	55.69
Total Phosphorus	50.87	50.59	55.85	69.75	46.88	53.06
Chlorophyll *a*		35.75	45.00	48.06	48.08	36.56

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5-10%
Type of Vegetation: cattail (Typha latifolia)

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

Taxa	June 27, 1989 Number	June 27, 1989 Units/ml	July 12, 1989 Number	July 12, 1989 Units/ml
Algae (flagellate)	87	2,187	-	-
Cryptomonas sp. #1	31	564	7	195
Algae (flagellate)	14	255	3	83
Algae (other)	6	134	7	346
Green algae (other)	5	124	33	1,019
Diatom (pennate)	3	62	-	-
Tetrahedron	2	53	-	-
Asterionella formosa	2	36	-	-
Oocystis	1	26	131	3,644
Blue-green (other)	1	26	-	-
Scenedesmus	1	26	-	-
Ceratium hirundinella	1	18	-	-
Nitzschia	1	18	-	-
Diatom (pennate)	1	18	-	-
Dactylococcopsis	1	18	1	28
Aphanocapsa	-	-	100	4,400
Diatom (centric)	-	-	21	584
Chroococcus	-	-	15	417
Cryptomonas	-	-	6	217
Merismopedia	-	-	5	139
Closterium	-	-	3	83
Characium	-	-	3	83
Staurastrum	-	-	1	28
Cosmarium	-	-	1	28
Loefgrenia anomala	-	-	1	28
Lyngbya Diguetii	-	-	1	28
Glenodinium Gymnodinium	-	-	1	28
Scenedesmus	-	-	1	78
Total	141	3,277	302	8,402

Watershed Description

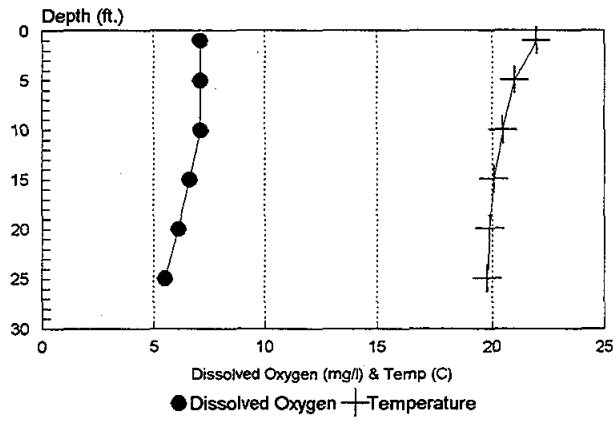
Watershed Area: 9,343 A (3,781 ha)

Soil Associations within Watershed

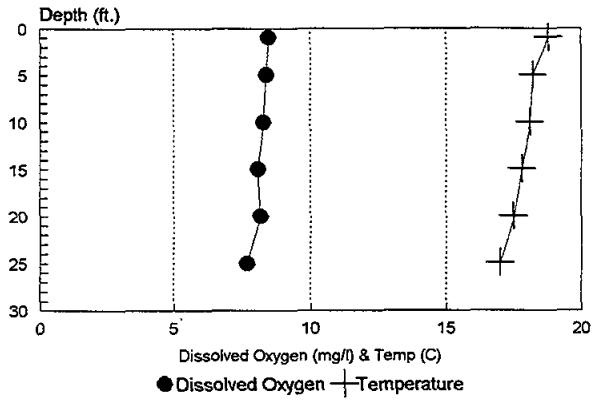
Association	Area (A)	% of Total
#1	9,343	100

#1 Winler-Lismas: Moderately deep and shallow, nearly level to moderately steep clayey soils over clay shale.

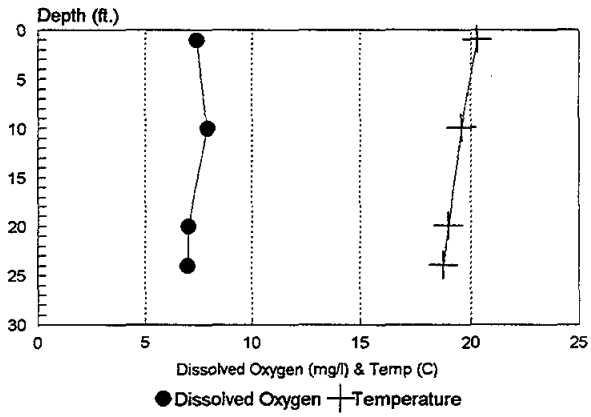
NEWELL LAKE 8/15/92
Dissolved Oxygen & Temperature Profile



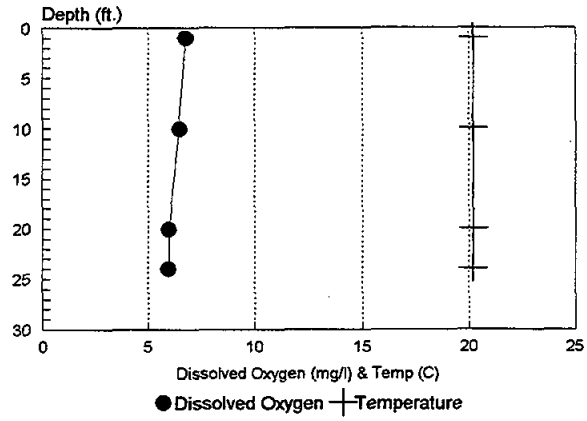
NEWELL LAKE 6/14/93
Dissolved Oxygen & Temperature Profile



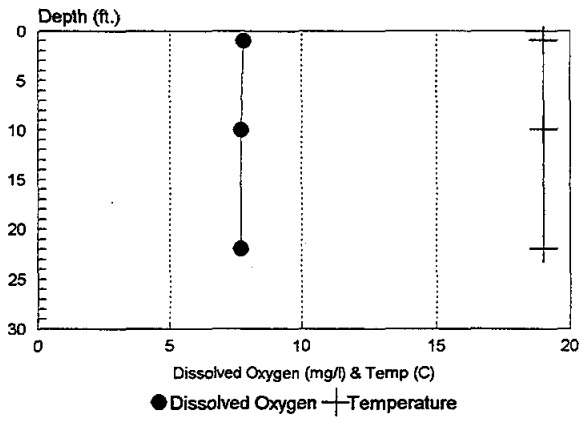
NEWELL LAKE 7/22/93
Dissolved Oxygen & Temperature Profile



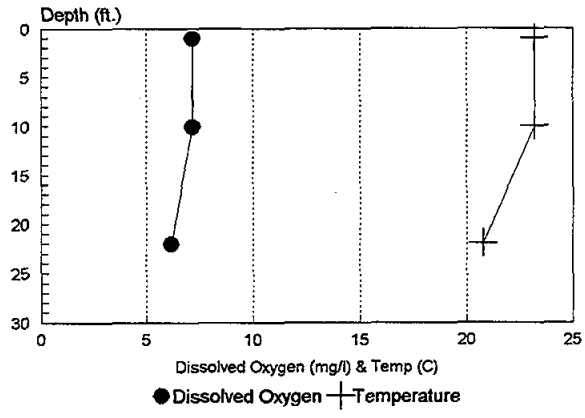
NEWELL LAKE 8/20/93
Dissolved Oxygen & Temperature Profile



NEWELL LAKE 6/13/94
Dissolved Oxygen & Temperature Profile

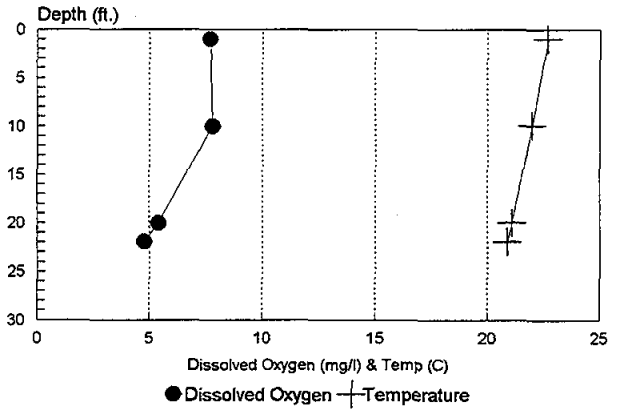


NEWELL LAKE 7/15/94
Dissolved Oxygen & Temperature Profile



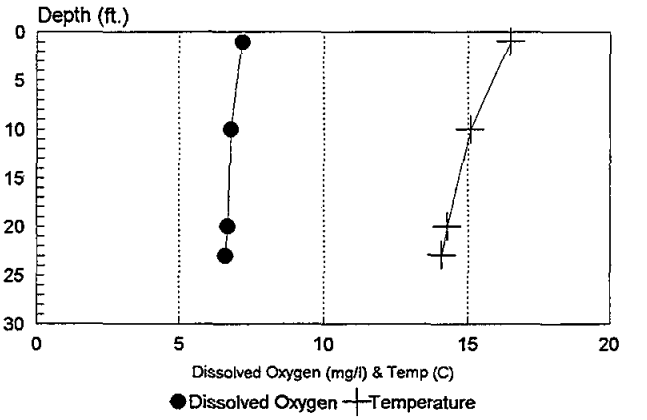
NEWELL LAKE 8/15/94

Dissolved Oxygen & Temperature Profile



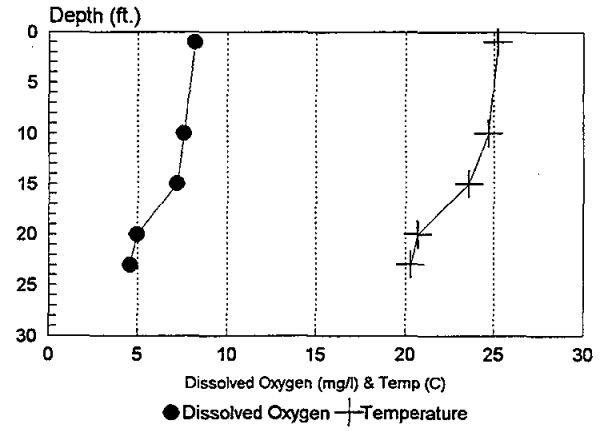
NEWELL LAKE 6/15/95

Dissolved Oxygen & Temperature Profile



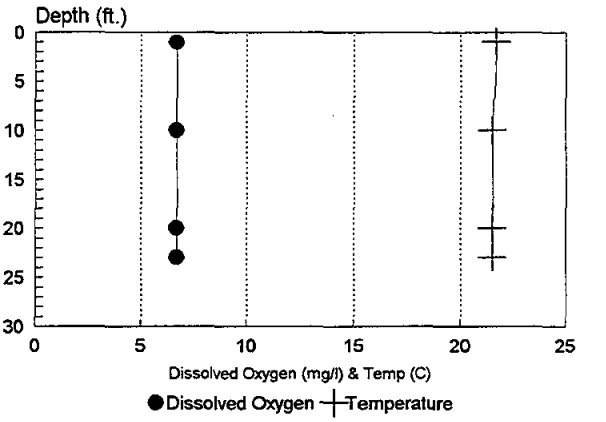
NEWELL LAKE 7/14/95

Dissolved Oxygen & Temperature Profile

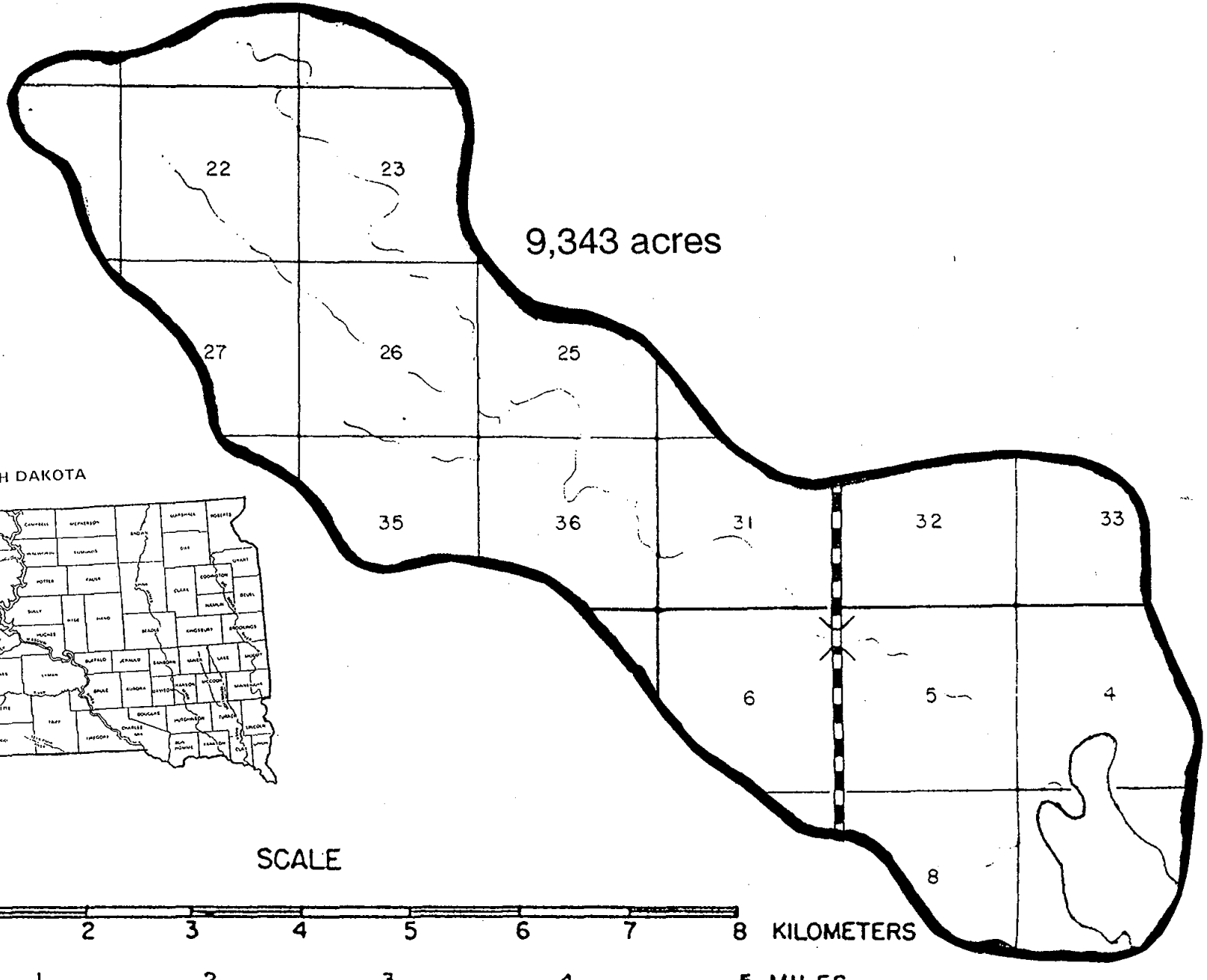


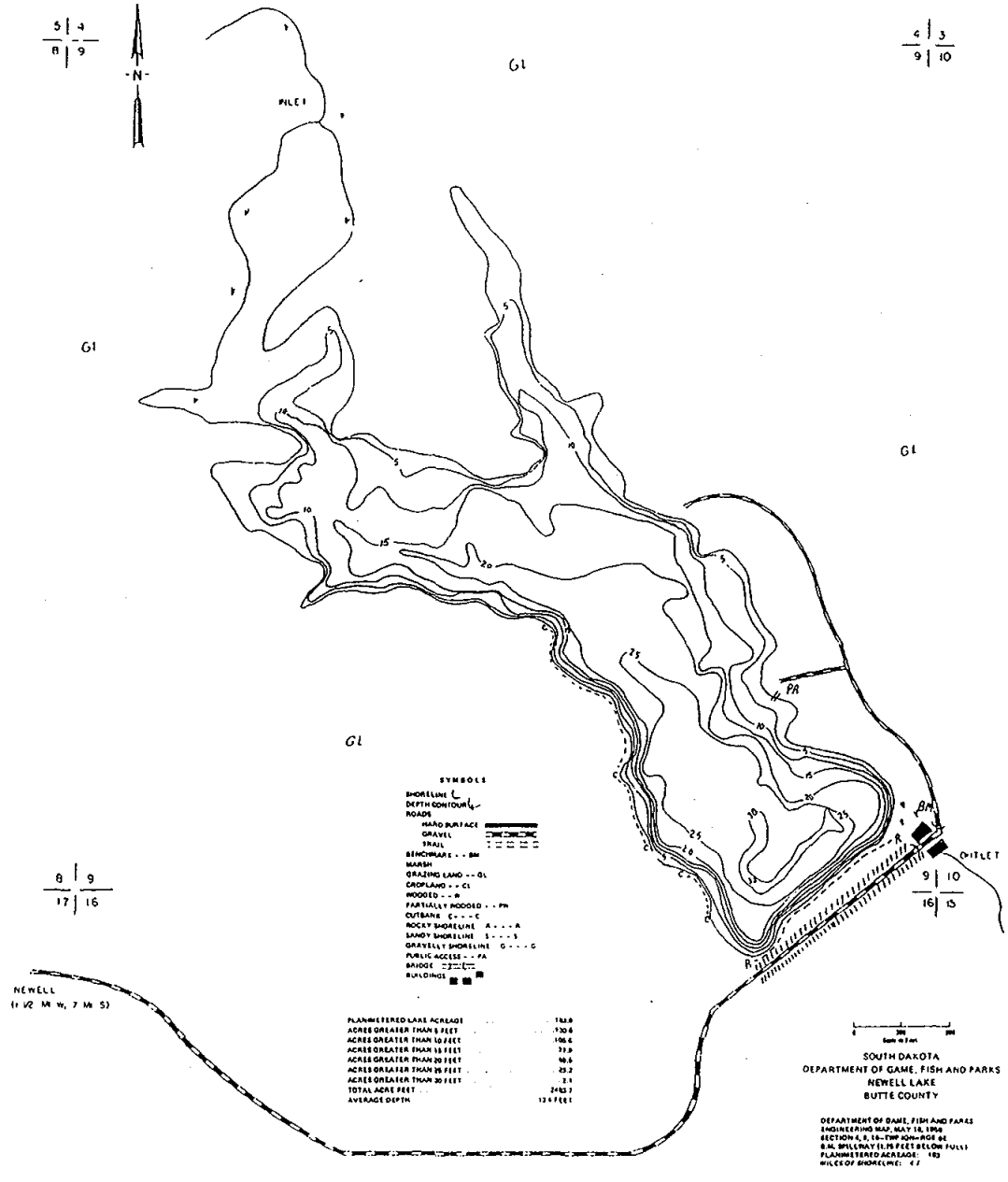
NEWELL LAKE 8/14/95

Dissolved Oxygen & Temperature Profile



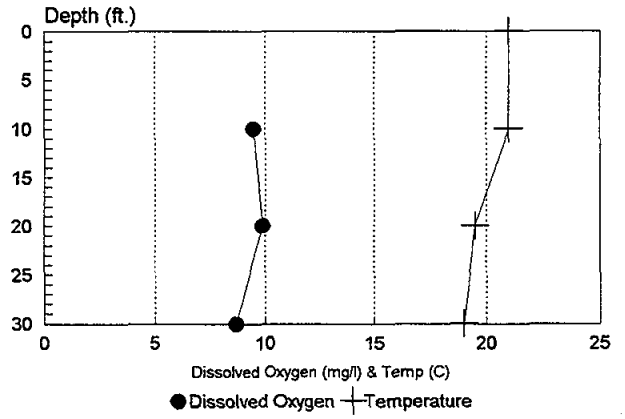
Newell Lake


9,343 acres
22
23
27
26
25
35
36
31
32
33
6
5
4
8
SOUTH DAKOTA
482
SCALE
0 1 2 3 4 5 6 7 8 KILOMETERS
0 1 2 3 4 5 MILES

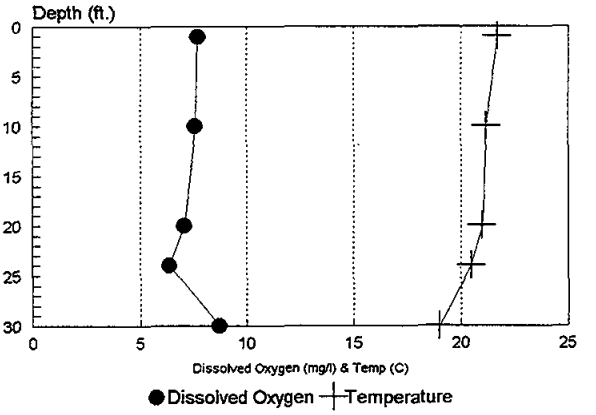


5 | 4
8 | 9
N
INLET
Gl
4 | 3
9 | 10
Gl
Gl
Gl
PR
BM
OUTLET
8 | 9
17 | 16
9 | 10
16 | 15
NEWELL
(1 1/2 MI W, 7 MI S)
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK - - BM
MARSH
GRAZING LAND - - GL
CROPLAND - - CL
WOODED - - W
PARTIALLY WOODED - - PW
CUTBANK C - - - C
ROCKY SHORELINE R - - - R
SANDY SHORELINE S - - - S
GRAVELLY SHORELINE G - - - G
PUBLIC ACCESS - - PA
BRIDGE
BUILDINGS
PLANIMETERED LAKE ACREAGE
ACRES GREATER THAN 5 FEET
ACRES GREATER THAN 10 FEET
ACRES GREATER THAN 15 FEET
ACRES GREATER THAN 20 FEET
ACRES GREATER THAN 25 FEET
ACRES GREATER THAN 30 FEET
TOTAL ACRE FEET
AVERAGE DEPTH
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
NEWELL LAKE
BUTTE COUNTY
DEPARTMENT OF GAME, FISH AND PARKS
ENGINEERING MAP, MAY 18, 1956
SECTION 4, 5, 16—TWP 30N—RGE 6E
B.M. SPILLWAY (1.75 FEET BELOW FULL)
PLANIMETERED ACREAGE:
MILES OF SHORELINE:

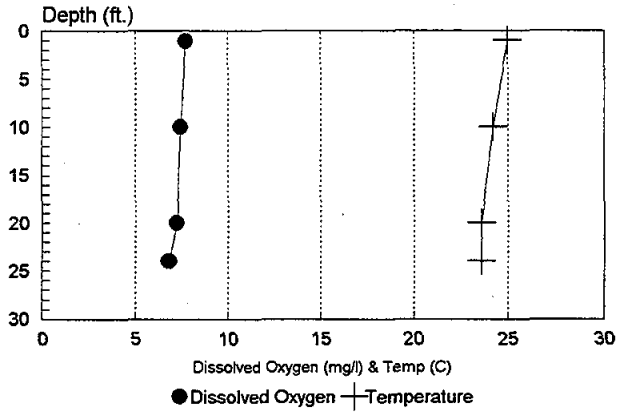
NEWELL LAKE 8/24/79
Dissolved Oxygen & Temperature Profile



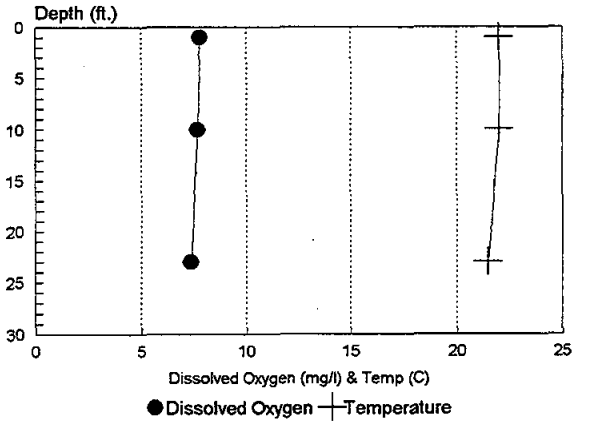
NEWELL LAKE 6/17/91
Dissolved Oxygen & Temperature Profile



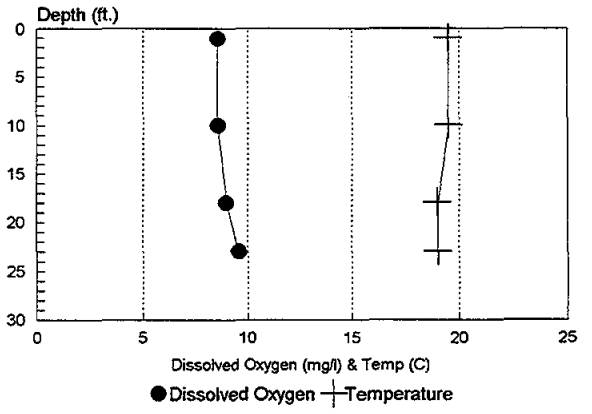
NEWELL LAKE 7/18/91
Dissolved Oxygen & Temperature Profile



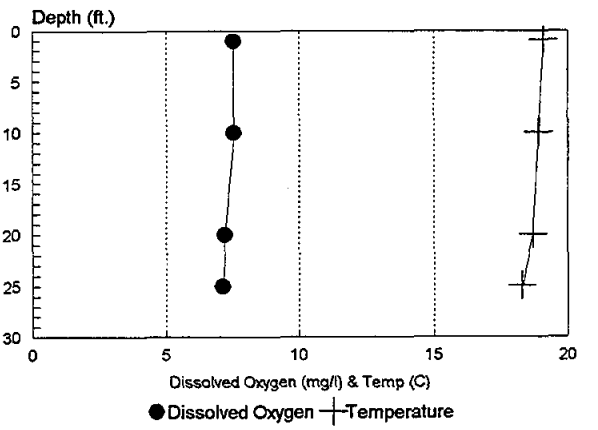
NEWELL LAKE 8/17/91
Dissolved Oxygen & Temperature Profile

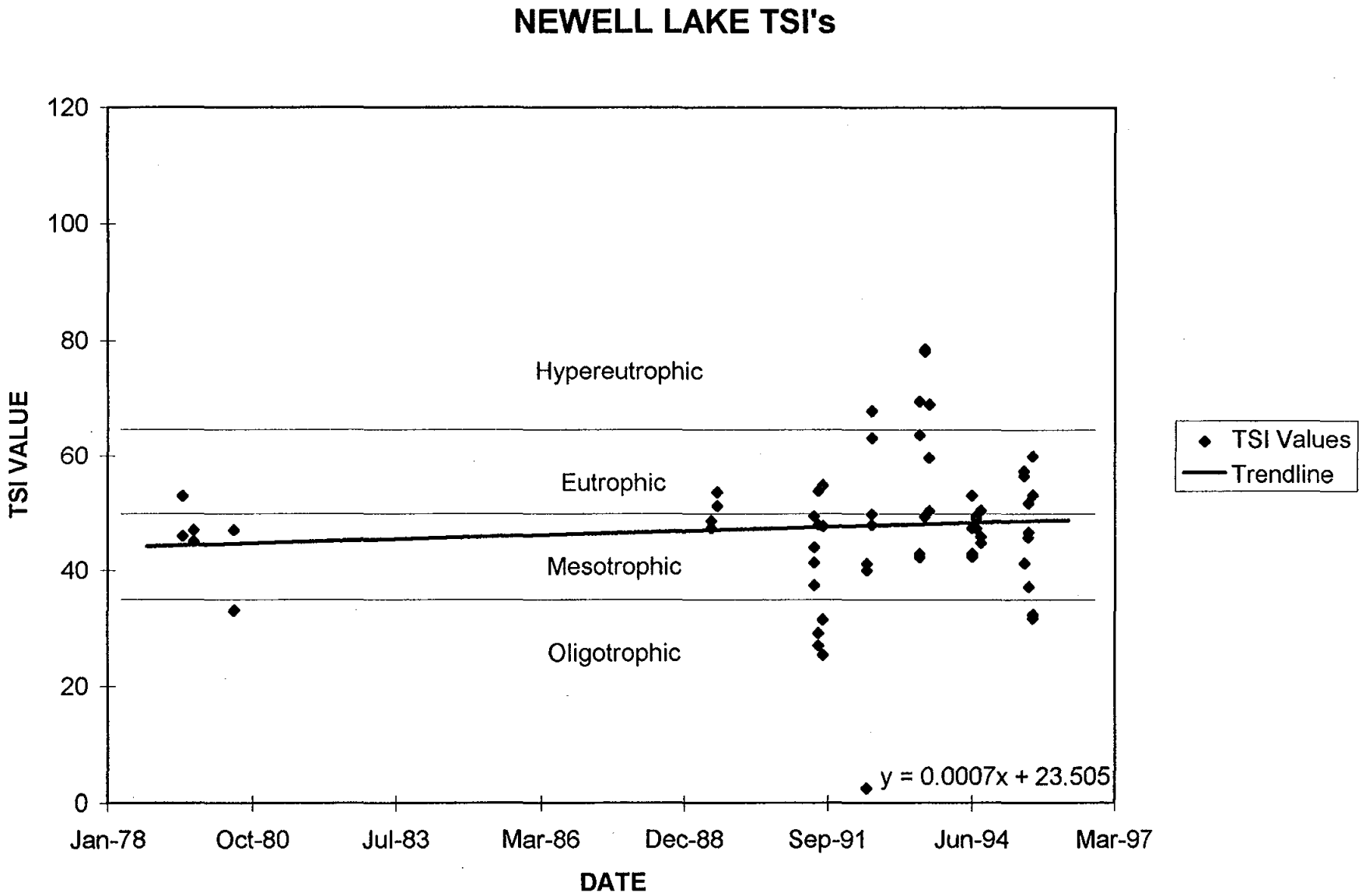


NEWELL LAKE 6/13/92
Dissolved Oxygen & Temperature Profile



NEWELL LAKE 7/17/92
Dissolved Oxygen & Temperature Profile




NEWELL LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0007x + 23.505
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

NINE MILE LAKE

County: Marshall
Latitude: 45 deg. 46 min. 04 sec. N
Longitude: 97 deg. 29 min. 26 sec. W
Area: 282 A (114.2 ha)
Maximum Depth: 10 ft (3 m)
Volume: 2093 acre-ft ($2.58x10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 126-127N
Range: 55W
Section(s): 5, 31-32
Shoreline L: 4.5 mi (7 km)
Mean Depth: 6.6 ft (2 m)
Watershed/Lake Area: NA
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	1	22.00	4	21.29	4	20.45
Air Temperature (°C)	2	26.67	4	23.00	4	23.00
Secchi Disk Depth (meters)	1	1.46	2	0.75	2	0.91
Conductivity (cond/25° C)	2	650	2	717	-	-
Turbidity (NTU)	-	-	-	-	4	7.34
Lab pH (su)	2	8.96	-	-	-	-
Field pH (su)	-	-	4	8.39	4	8.52
Total Alkalinity (mg/l)	2	115	4	161	4	175
Total Solids (mg/l)	2	515	4	567	4	508
Dissolved Solids (mg/l)	2	503	4	562	4	503
Suspended Solids (mg/l)	2	12	4	5	4	5
Volatile Suspended Solids (mg/l)	-	-	2	3	-	-
Ammonia Nitrogen (mg/l)	2	0.04	4	0.21	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	2	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	2	1.59	4	1.66	4	1.63
Total Phosphorus (mg/l)	2	0.087	4	0.097	4	0.070
Total Dissolved Phosphorus (mg/l)	-	-	4	0.031	4	0.026
Ortho Phosphate as P (mg/l)	2	0.016	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	28.14	1	34.17

Year	1989	1991	1993
TSI Values -- Mean:	60.08	66.11	63.87
Secchi Disk	54.51	64.21	61.36
Total Phosphorus	65.65	70.80	65.03
Chlorophyll *a*		63.31	65.21

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 80%
Type of Vegetation: horsetail and cattail

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities
June 28, 1989

Taxa	Number	Units/ml
Aphanizomenon flos-aquae	273	3,641
Algae (other)	16	213
Aphanothece	3	40
Synedra	3	40
Nitzschia	2	27
Diatom (centric)	2	27
Algae (flagellate)	1	13
Diatom (pennate)	1	13
Total	301	4,015

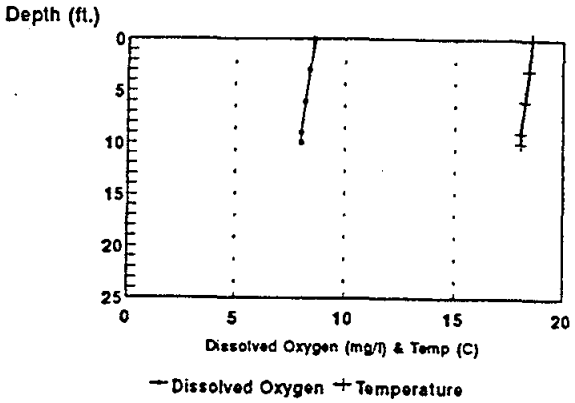
Watershed Description

Watershed Area: NA

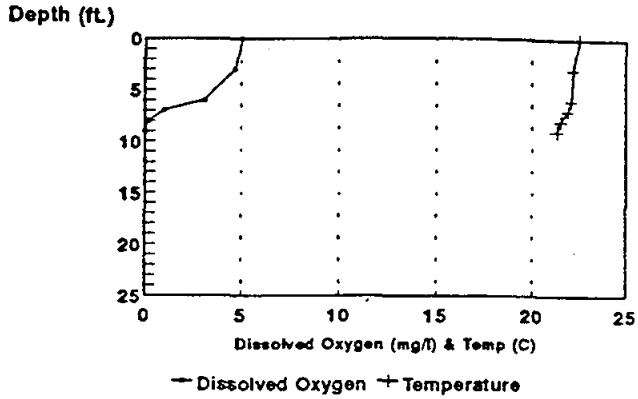
Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

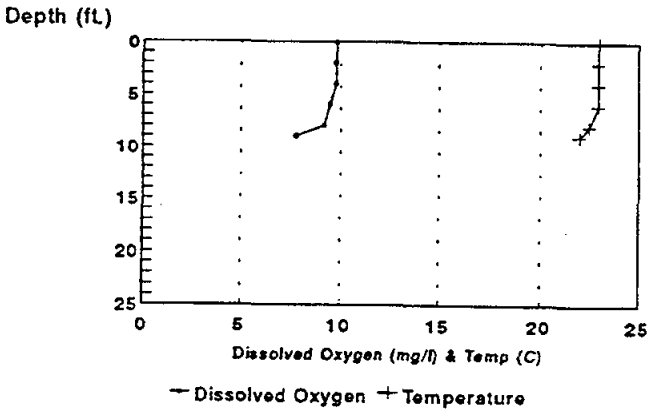
NINE MILE LAKE 7/7/93
Dissolved Oxygen & Temperature Profile



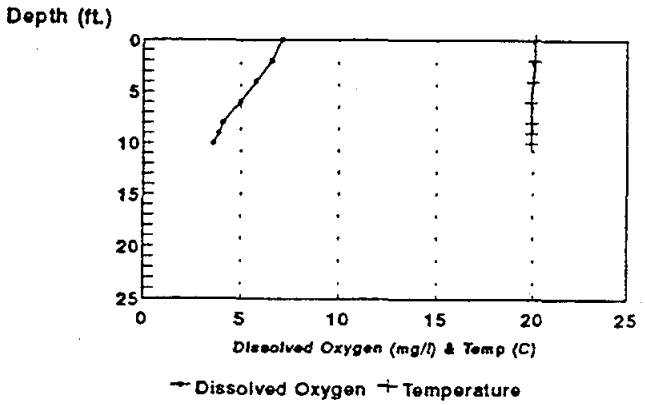
NINE MILE LAKE 8/17/93
Dissolved Oxygen & Temperature Profile



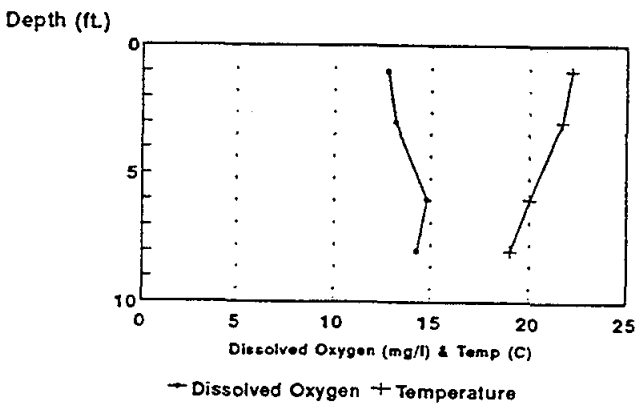
NINE MILE LAKE 6/26/91
Dissolved Oxygen & Temperature Profile



NINE MILE LAKE 9/10/91
Dissolved Oxygen & Temperature Profile



Nine Mile Lake, 6/28/89
Dissolved Oxygen & Temperature Profile



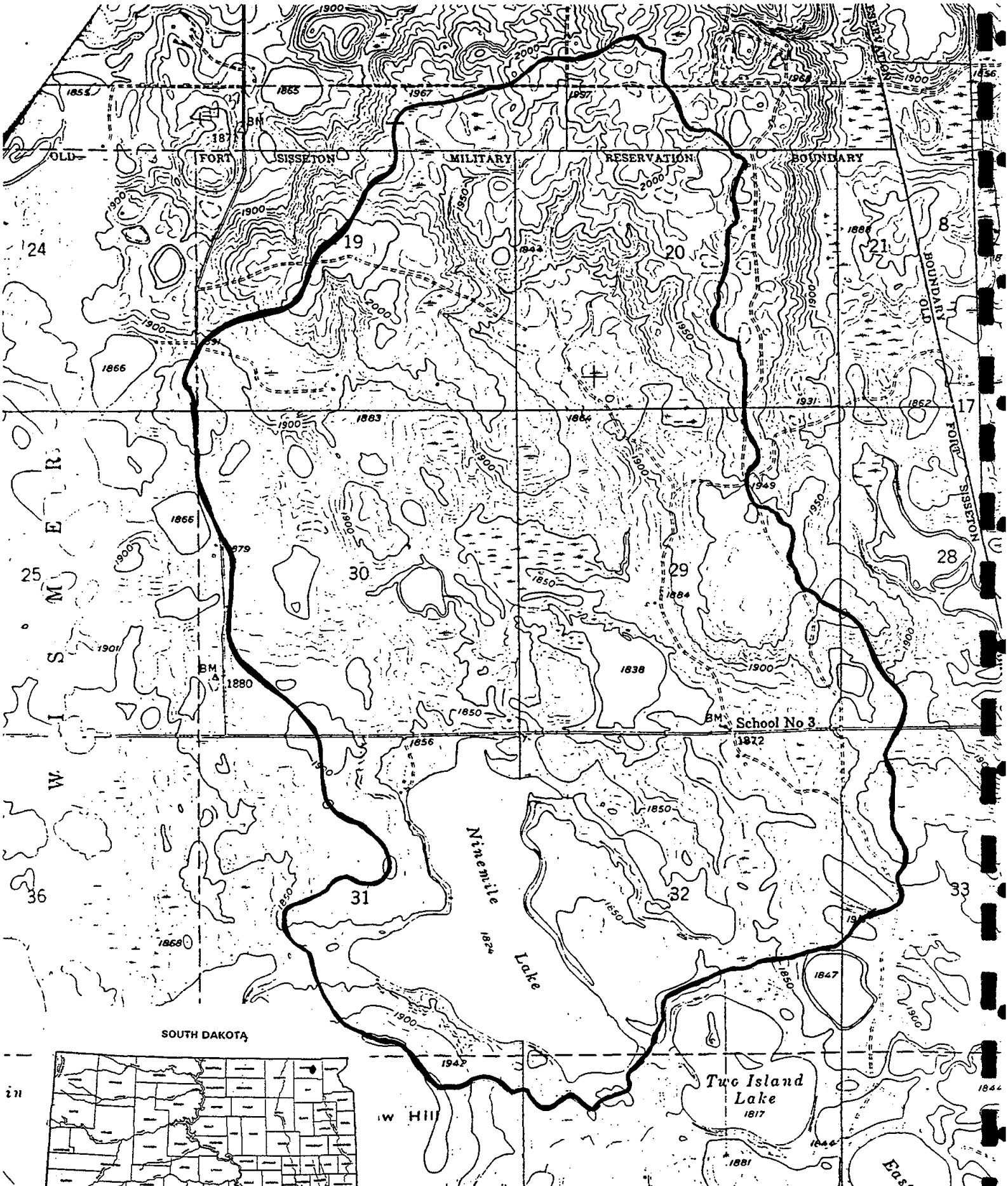
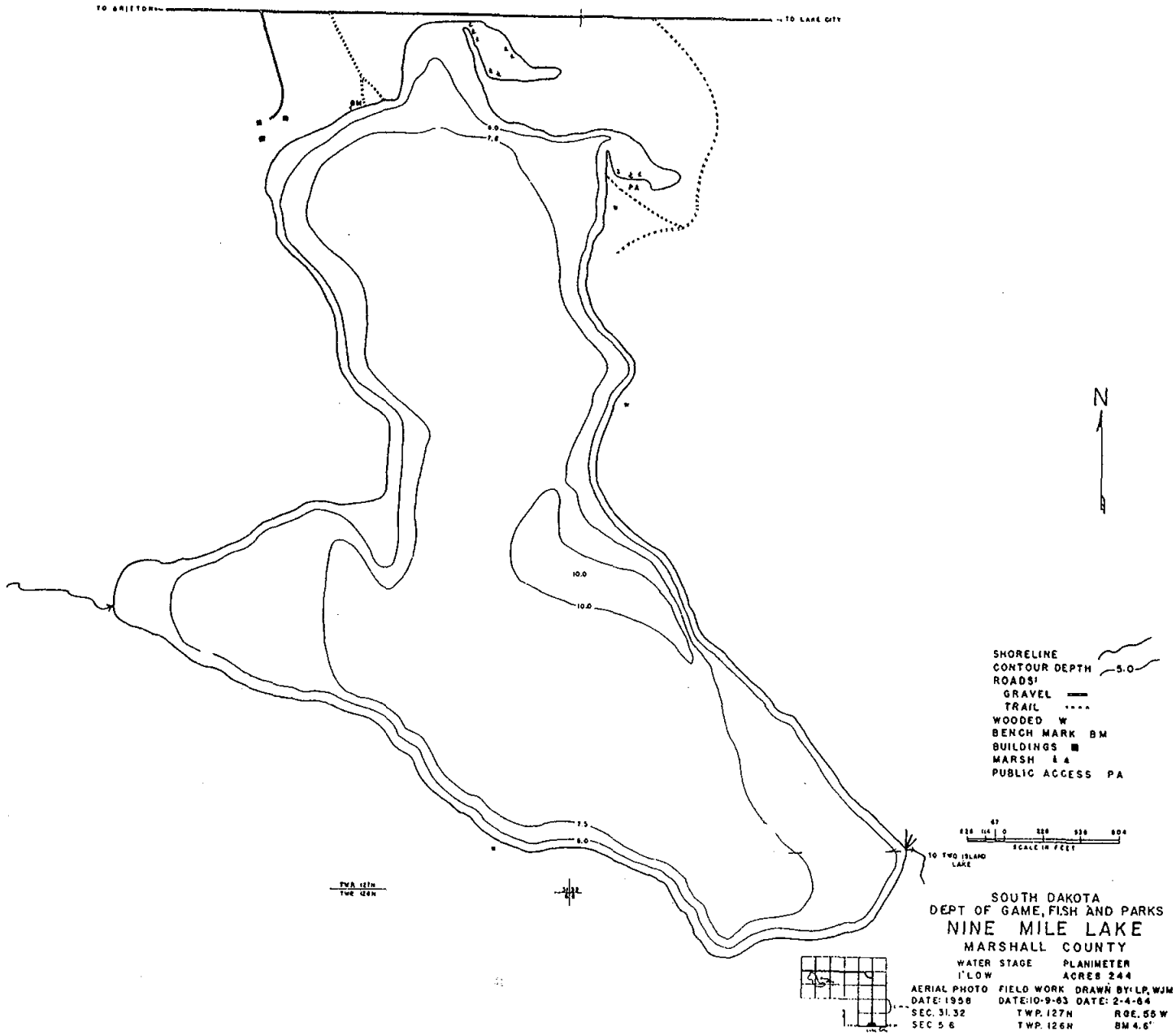
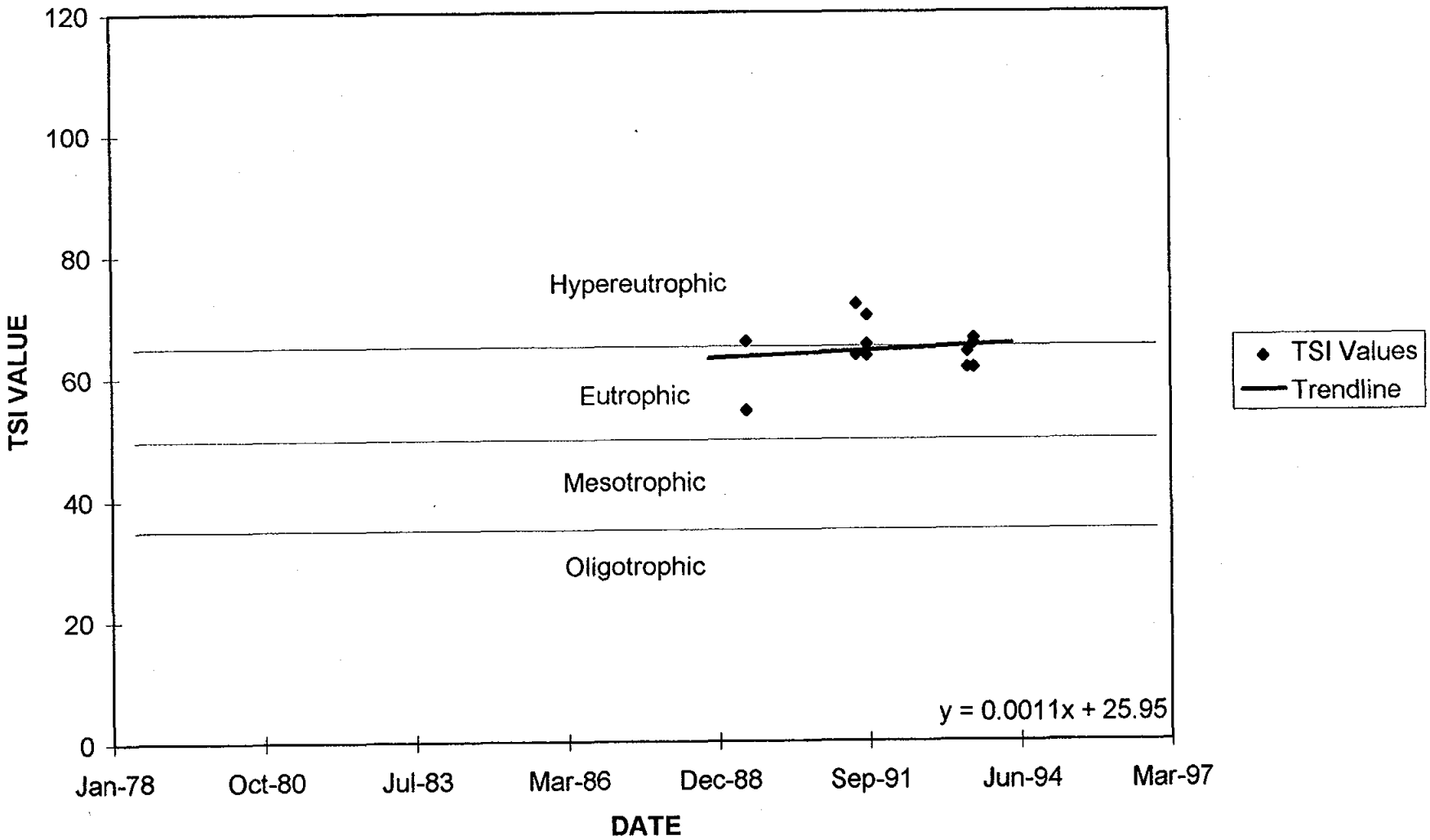


Figure 3 a

NINE MILE LAKE DRAINAGE BASIN


TO GRIETON
TO LAKE CITY
N
SHORELINE
CONTOUR DEPTH 5.0
ROADS:
GRAVEL
TRAIL
WOODED W
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA
SCALE IN FEET
TO TWO ISLAND LAKE
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
NINE MILE LAKE
MARSHALL COUNTY
WATER STAGE
1' LOW
PLANIMETER
ACRES 244
AERIAL PHOTO
DATE: 1958
SEC. 31, 32
SEC 5 6
FIELD WORK
DATE: 10-9-63
TWP. 127N
TWP. 126N
DRAWN BY: LP, WJM
DATE: 2-4-64
RGE. 55 W
BM 4.6'

NINE MILE LAKE TSI's



LAKE NORDEN

County: Hamlin
Latitude: 44 deg. 35 min. 42 sec. N
Longitude: 97 deg. 11 min. 48 sec. W
Area: 746.5 A (302.1 ha)
Maximum Depth: 15 ft (4.6 m)
Volume: 5225 acre-ft ($6.446 \times 10^6 m^3$)
Origin of Basin: natural
Major inflows (named or permanent streams): Dolph Creek
Outlet: unnamed

Township: 113N
Range: 53W
Section(s): 9, 15-17, 21
Shoreline L: 5.6 mi (9 km)
Mean Depth: 7 ft (2.1 m)
Watershed/Lake Area: 102
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.90	4	23.00	4	21.60
Air Temperature (°C)	4	27.50	4	23.50	4	29.50
Secchi Disk Depth (meters)	2	0.44	2	0.99	2	1.27
Conductivity (cond/25° C)	4	1,291	2	731	-	-
Turbidity (NTU)	-	-	-	-	4	12.45
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.53	4	8.59	4	8.24
Total Alkalinity (mg/l)	4	174	4	195	4	269
Total Solids (mg/l)	4	1,207	4	562	4	1,037
Dissolved Solids (mg/l)	4	1,172	4	547	4	1,025
Suspended Solids (mg/l)	4	35	4	15	4	12
Volatile Suspended Solids (mg/l)	-	-	2	7	-	-
Ammonia Nitrogen (mg/l)	4	0.54	4	0.12	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.20	4	0.30	4	0.28
Total Kjeldahl Nitrogen (mg/l)	4	2.27	4	1.48	4	1.55
Total Phosphorus (mg/l)	4	0.278	4	0.360	4	0.307
Total Dissolved Phosphorus (mg/l)	-	-	4	0.274	3	0.296
Ortho Phosphate as P (mg/l)	4	0.092	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	54.50	2	9.05

Year	1989	1991	1993
TSI Values -- Mean:	78.20	72.76	65.06
Secchi Disk	71.78	60.19	56.55
Total Phosphorus	84.62	88.29	86.46
Chlorophyll *a*		69.79	52.17

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 30%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton richardsonii and P. pectinatus

Algal Species and Densities

	June 21, 1989		July 25, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanocapsa	294	76,682	58	4,059
Algae (other)	4	1,043	1	70
Green Algae (other)	1	261	-	-
Cryptomonas sp. #1	1	261	3	210
Aphanizomenon flos-aquae	-	-	238	16,656
Total	300	78,247	300	20,995

Watershed Description

Watershed Area: 75,830 A (30,688 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
PN-WG	46,256	61
PN-BY	21,991	29
RL-FS	2,275	3
FS-ES	2,275	3
VS-LP	2,275	3
LD	758	1

PN-WG Poinsett-Waubay: Well drained and moderately well drained, nearly level to sloping silty soils.

PN-BY Poinsett-Buse: Well drained, undulating to rolling silty and loamy soils.

RL-FS Renshaw-Fordville: Loamy and sandy soils with gravelly and sandy subsoils.

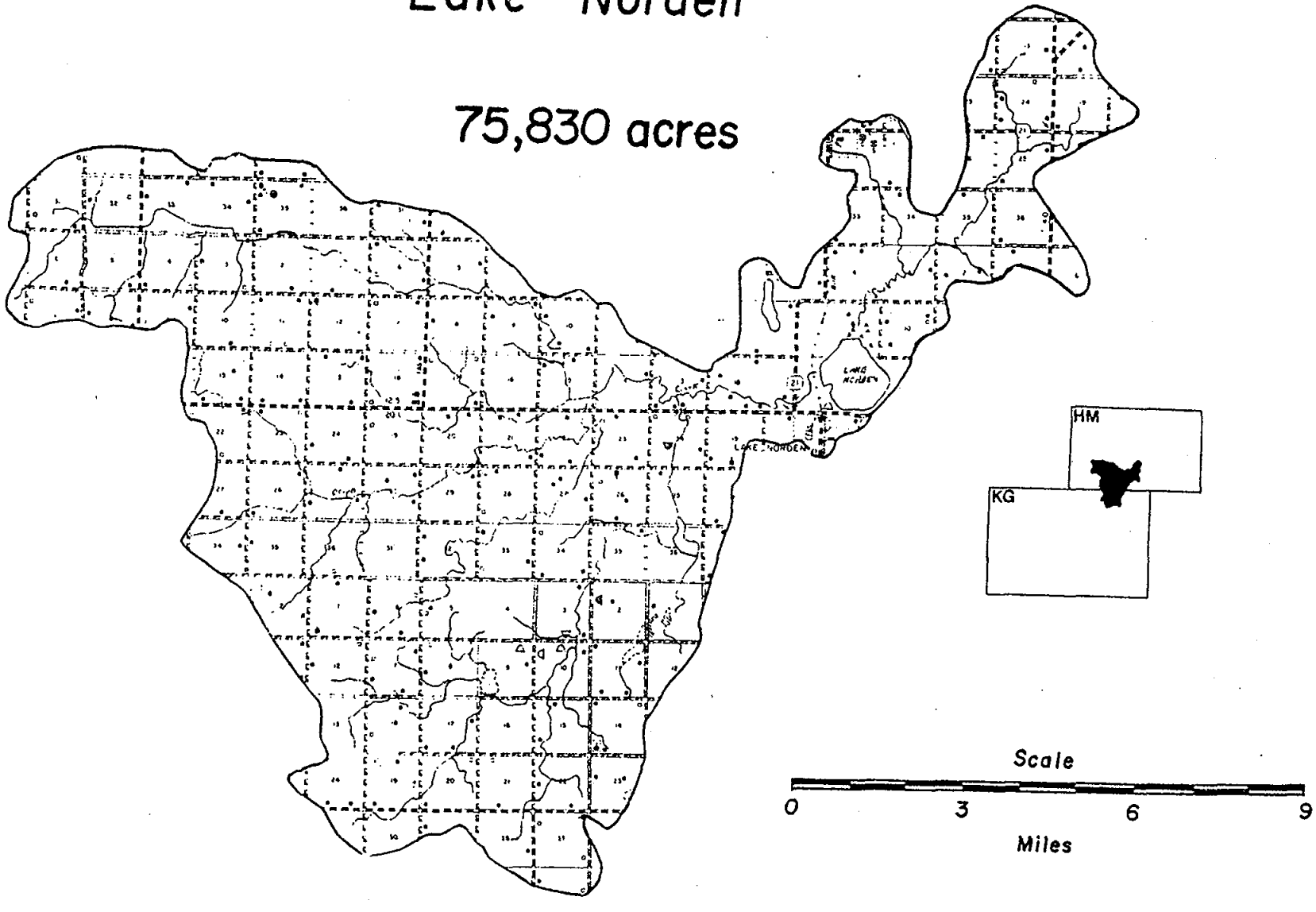
FS-ES Fordville-Estelline: Loamy and silty soils with gravelly and sandy subsoils on terraces and uplands.

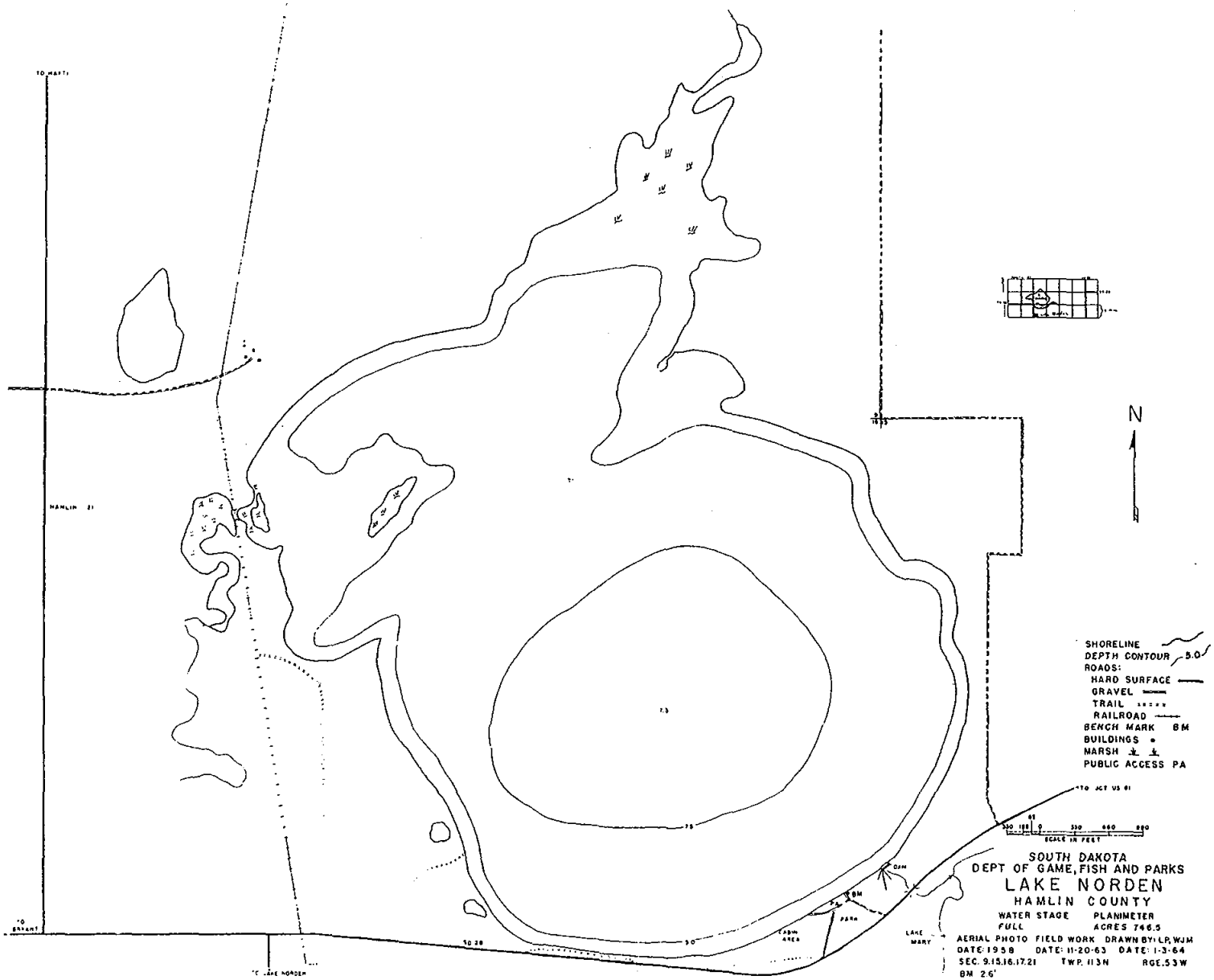
VS-LPV Vienna-Lismore: Deep, nearly level to undulating silty soils on uplands and in shallow swales.

LD Lamoure: Loamy to clayey soils on moderately well to poorly drained bottom lands.

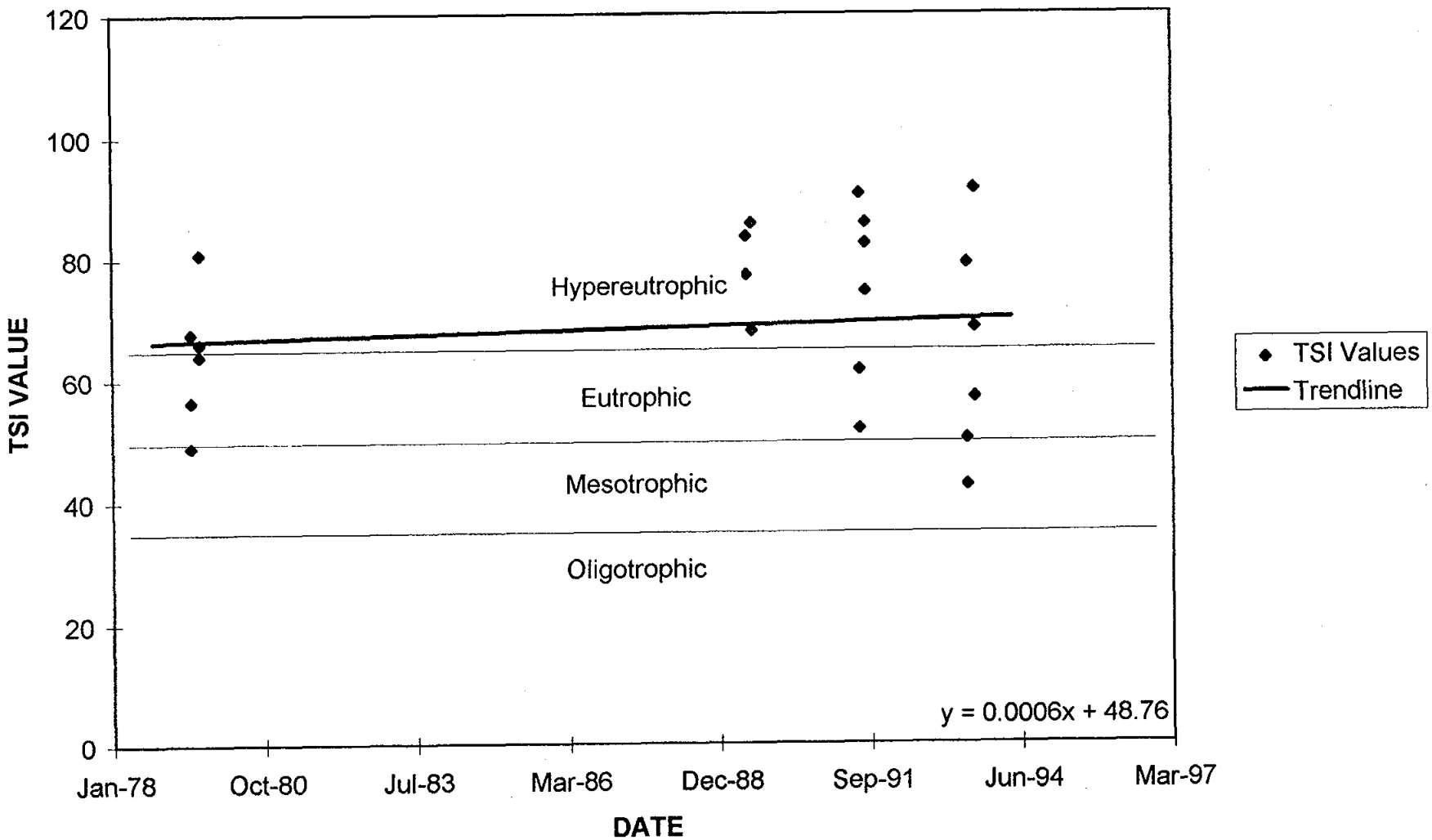
Lake Norden

75,830 acres




N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
TRAIL
RAILROAD
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
LAKE NORDEN
HAMLIN COUNTY
WATER STAGE PLANIMETER
FULL ACRES 746.5
AERIAL PHOTO FIELD WORK DRAWN BY: LP, WJM
DATE: 1958 DATE: 11-20-63 DATE: 1-3-64
SEC. 9,15,16,17,21 TWP. 113N RGE. 53W
BM 2.6'

LAKE NORDEN TSI's



LAKE OLIVER

County: Deuel
Latitude: 44. deg. 43 min. 10 sec. N
Longitude: 96 deg. 28 min. 23 sec. W
Area: 172 A (69.6 ha)
Maximum Depth: 12.5 ft (3.81 m)
Volume: 1500 acre-ft ($6.07 \times 10^6 m^3$)
Origin of Basin: Natural
Major Inflows (named or permanent streams): none defined
Outlet: Lake Cochrane

Township: 114, 115N
Range: 47W
Section(s): 4, 32, 33
Shoreline L: 2.75 mi (4.42 km)
Mean Depth: 8.7 ft (2.65 m)
Watershed/Lake Area: 1.87
Thermal Stratification: No

6.07 x10^6

6,070,000.

Lake Use
Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State
Public Interest: Deuel County Lakes and Stream Association

	1995	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	21.85
Air Temperature (°C)	-	-
Secchi Disk Depth (meters)	2	2.47
Conductivity (cond/25° C)	4	1,513
Turbidity (NTU)	4	9.42
Lab pH (su)	-	-
Field pH (su)	4	8.62
Total Alkalinity (mg/l)	-	-
Total Solids (mg/l)	4	1,567
Dissolved Solids (mg/l)	4	1,560
Suspended Solids (mg/l)	4	7
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.01
Nitrate + Nitrite Nitrogen (mg/l)	4	0.09
Total Kjeldahl Nitrogen (mg/l)	4	1.34
Total Phosphorus (mg/l)	4	0.129
Total Dissolved Phosphorus (mg/l)	4	0.029
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	6	22.58

Year	1995
TSI Values -- Mean:	56.99
Secchi Disk	46.96
Total Phosphorus	62.85
Chlorophyll *a*	61.15

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

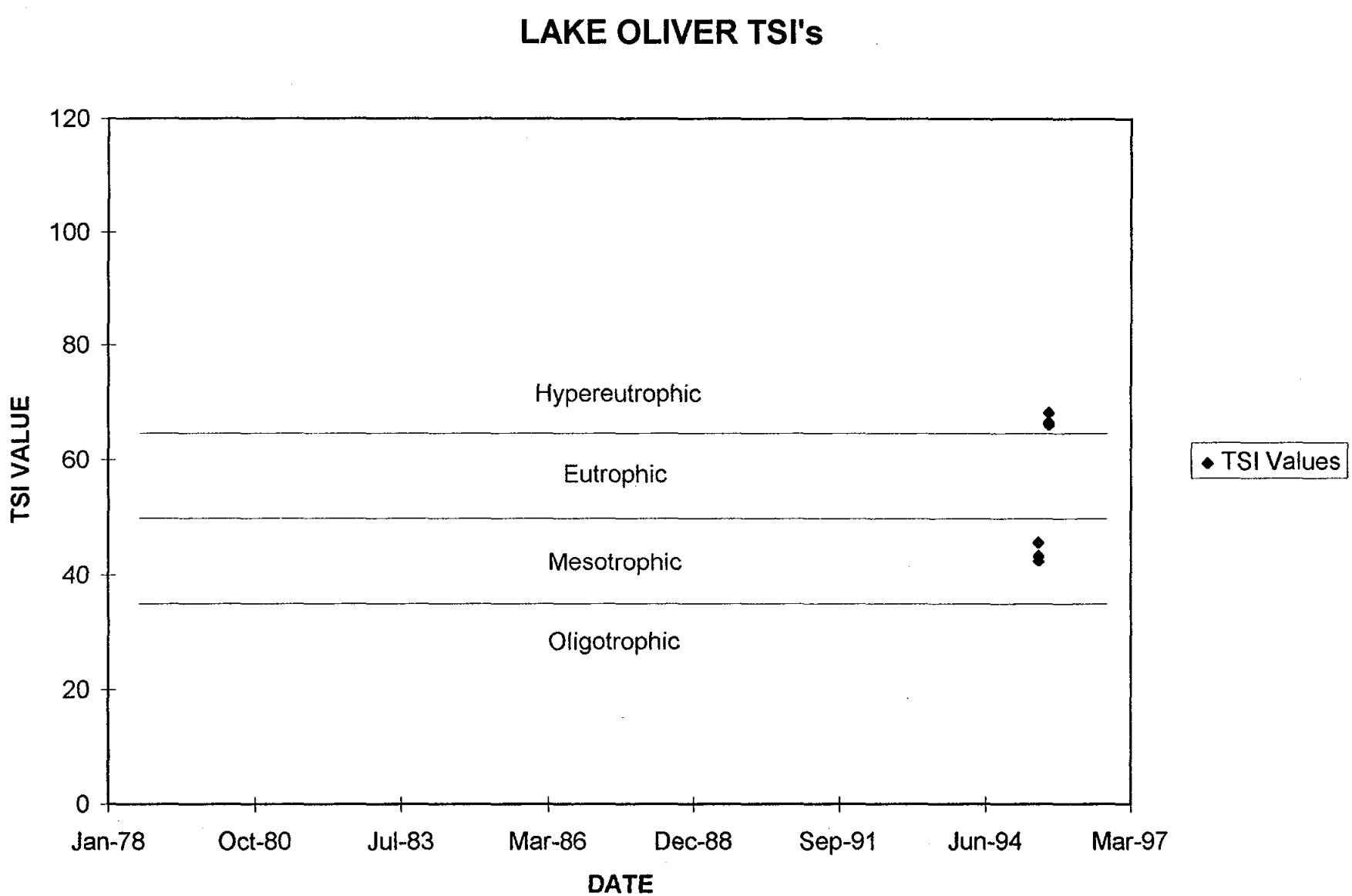
Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

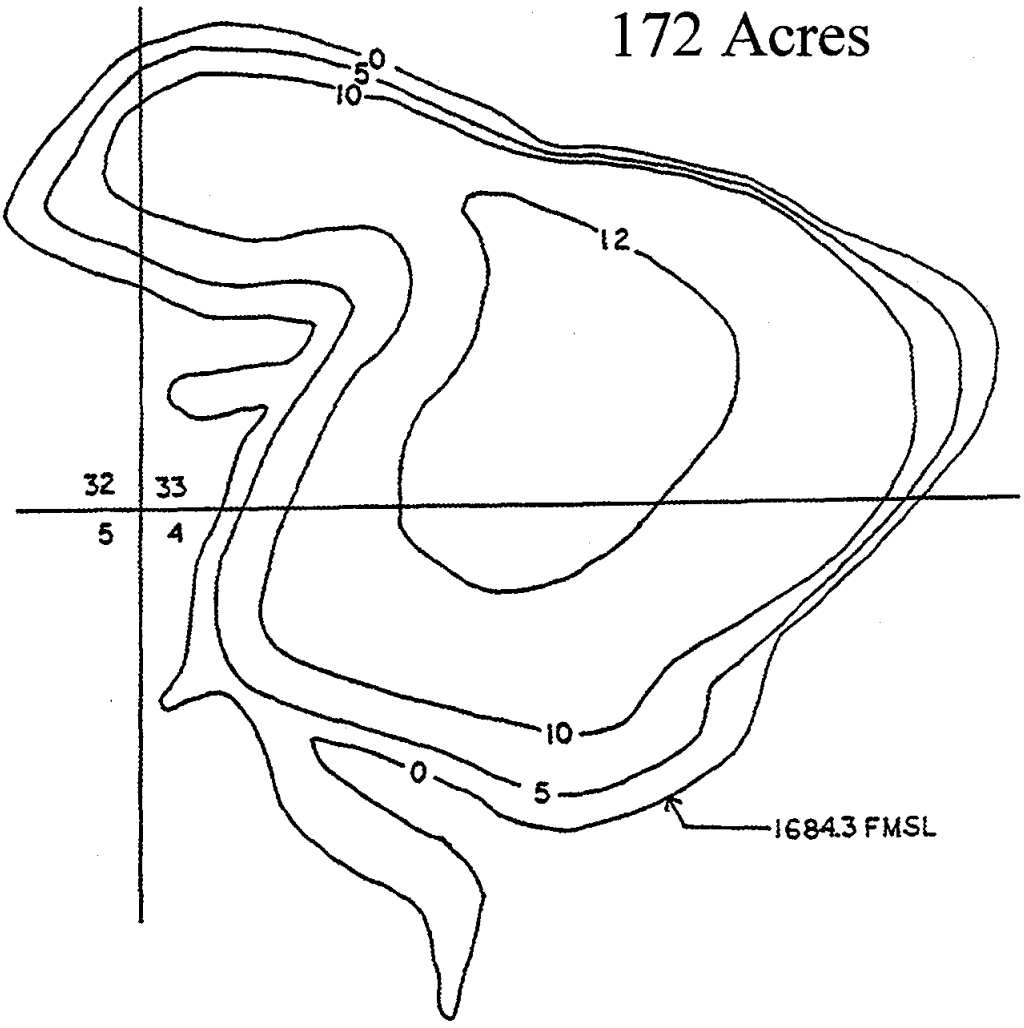
Watershed Area: 322 A (130 ha)

Association	Area (A)	% of Total
FU-AA-PA	322	100

FU-AA-PA Forman-Aastad-Parnell: Well drained and moderately well drained loamy soils formed in loamy glacial till; and very poorly drained silty soils in depressions.

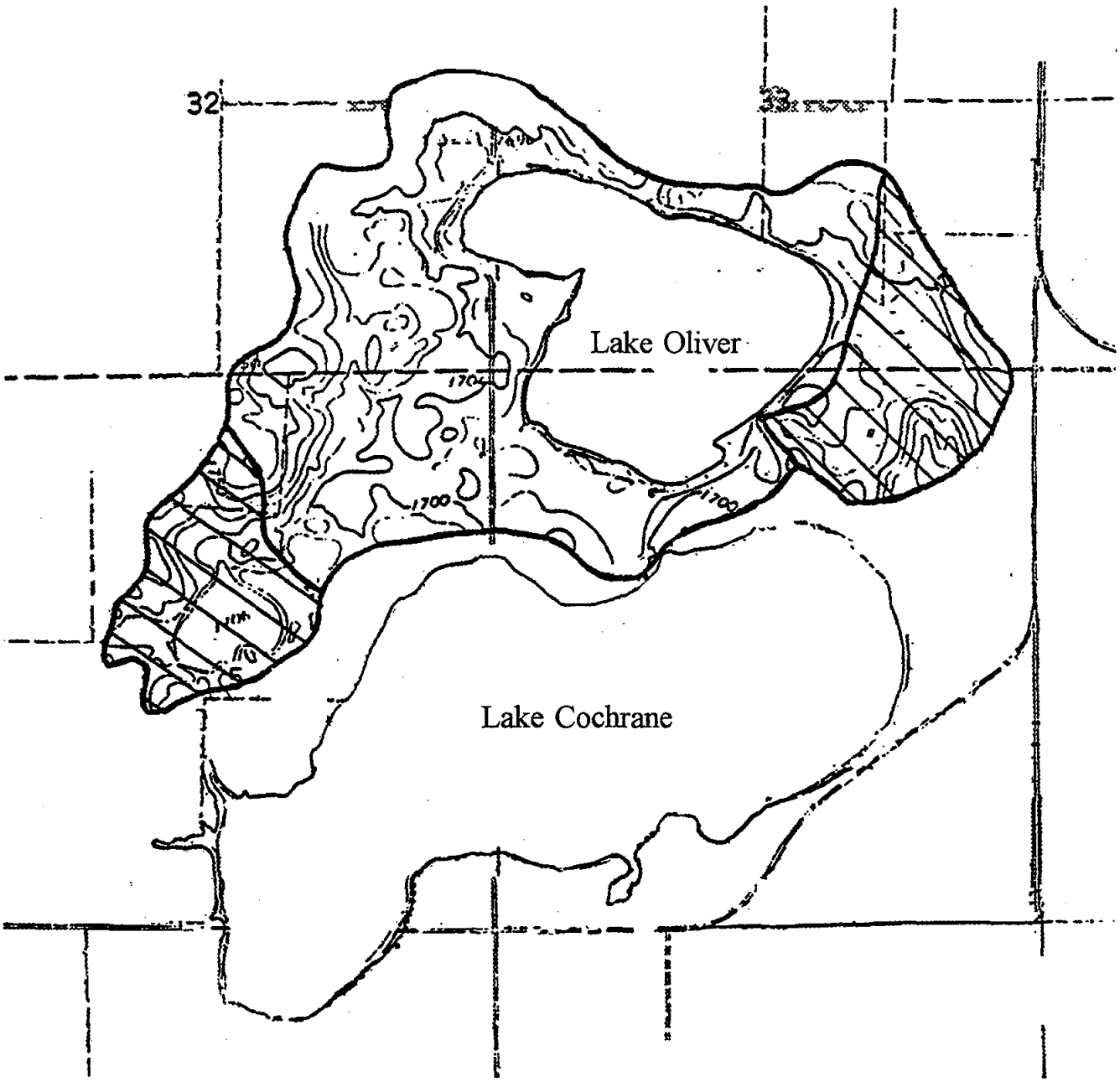

LAKE OLIVER TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values

Lake Oliver



Lake Oliver

322 Acres



ORMAN DAM (Belle Fourche Reservoir)

County: Butte
Latitude: 44 deg. 43 min. 48 sec. N
Longitude: 103 deg. 40 min. 33 sec. W
Area: 8,063 A (3263 ha)
Maximum Depth: 55 ft (16.8 m)
Volume: 102,907 acre-ft ($1.26x10^8 m^3$)
Origin of Basin: impoundment
Township: 9N
Range: 4E
Section(s): 19
Shoreline L: 49.7 mi (80 km)
Mean Depth: 12.7 ft (3.9 m)
Watershed/Lake Area: 356
Thermal Stratification:yes
Major Inflows (named or permanent streams): Belle Fourche River
Outlet: Belle Fourche River & Owl Creek

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
10) Irrigation

Estimated Population within 65-mile Radius: 126,883
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.53	6	22.45	4	17.96
Air Temperature (°C)	4	26.67	6	25.83	4	25.28
Secchi Disk Depth (meters)	2	0.70	3	1.14	2	1.15
Conductivity (cond/25° C)	4	1,319	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	8.03	-	-	-	-
Field pH (su)	4	8.23	6	8.21	4	8.12
Total Alkalinity (mg/l)	4	111	-	-	-	-
Total Solids (mg/l)	4	1,201	-	-	-	-
Dissolved Solids (mg/l)	4	1,177	-	-	-	-
Suspended Solids (mg/l)	4	24	6	18	4	13
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.03	6	0.03	4	0.08
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.02	4	0.04
Total Kjeldahl Nitrogen (mg/l)	4	0.53	6	0.46	4	0.24
Total Phosphorus (mg/l)	4	0.057	6	0.055	4	0.025
Total Dissolved Phosphorus (mg/l)	-	-	6	0.009	4	0.005
Ortho Phosphate as P (mg/l)	4	0.013	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	1.64	4	1.50

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	18.39	6	20.46	6	20.11
Air Temperature (°C)	6	21.61	6	23.57	6	20.67
Secchi Disk Depth (meters)	3	1.29	9	1.96	9	2.31
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.12	6	8.04	6	7.66
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	11	6	9	6	7
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.09	6	0.04	6	0.01
Nitrate + Nitrite Nitrogen (mg/l)	6	0.09	6	0.64	6	0.09
Total Kjeldahl Nitrogen (mg/l)	6	0.23	6	0.21	6	0.29
Total Phosphorus (mg/l)	6	0.026	6	0.029	6	0.018
Total Dissolved Phosphorus (mg/l)	5	0.009	6	0.008	6	0.006
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	1.55	6	1.55	6	0.50

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	61.06	46.04	45.56	46.82	44.72	38.40
Secchi Disk	65.12	52.99	58.01	57.06	50.31	47.94
Total Phosphorus	57.00	49.74	44.15	48.52	48.96	43.54
Chlorophyll *a*		35.40	34.52	34.87	34.90	23.71

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

Taxa	June 27, 1989 Number	June 27, 1989 Units/ml	No Date Number	No Date Units/ml
Cryptomonas sp. #1	4	149	-	-
Green Algae (other)	1	37	-	-
Algae (other)	1	37	-	-
Aphanizomenon flos-aquae	-	-	2	213
Total	6	223	2	213

Watershed Description

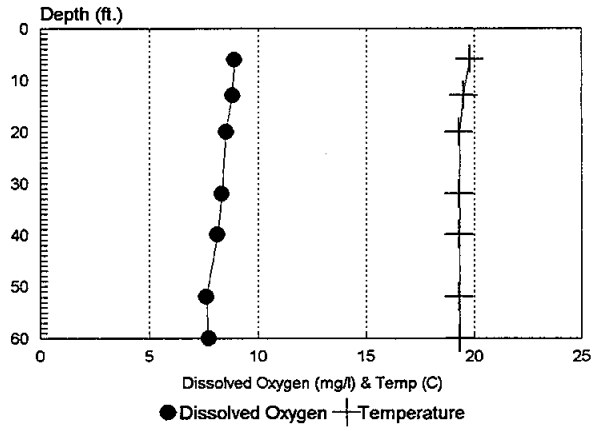
Watershed Area: 2,867,200 A (1,160,356 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
Midway-Penrose	NA	NA
Arvada-Stetter	NA	NA
Grummit-Shale	NA	NA
Butche-Colby	NA	NA
Lohmiller-Glenberg	NA	NA
Haverson	NA	NA
Caputa-Satanta	NA	NA

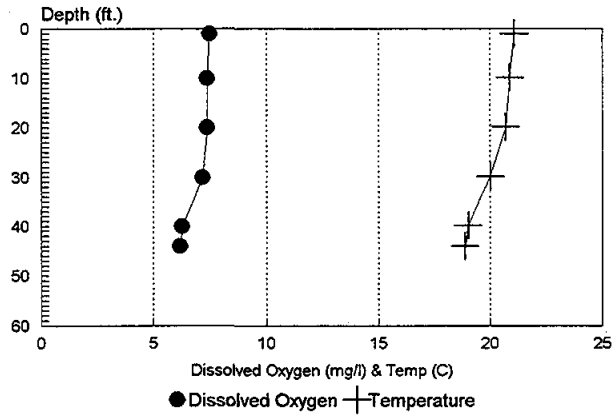
ORMAN DAM 8/24/79

Dissolved Oxygen & Temperature Profile



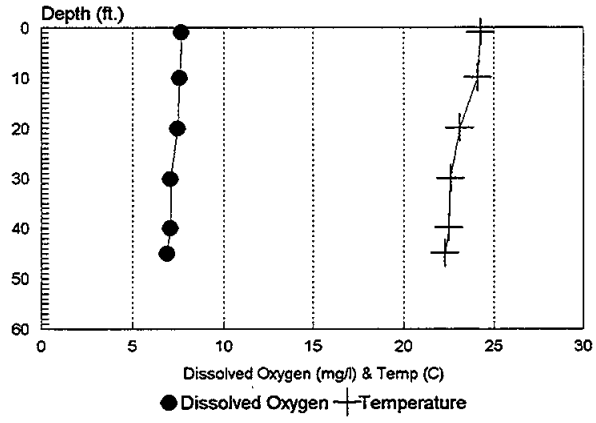
ORMAN DAM 6/17/91

Dissolved Oxygen & Temperature Profile



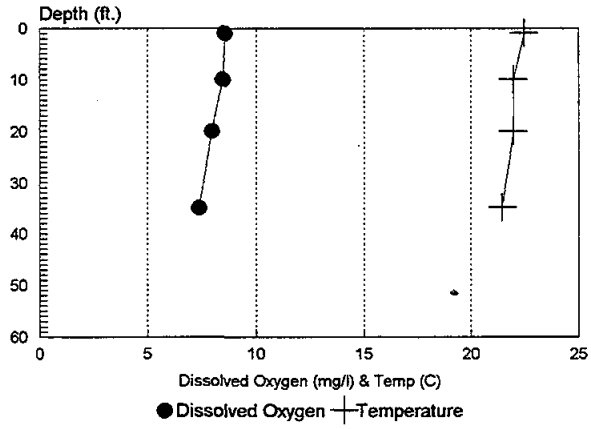
ORMAN DAM 7/18/91

Dissolved Oxygen & Temperature Profile



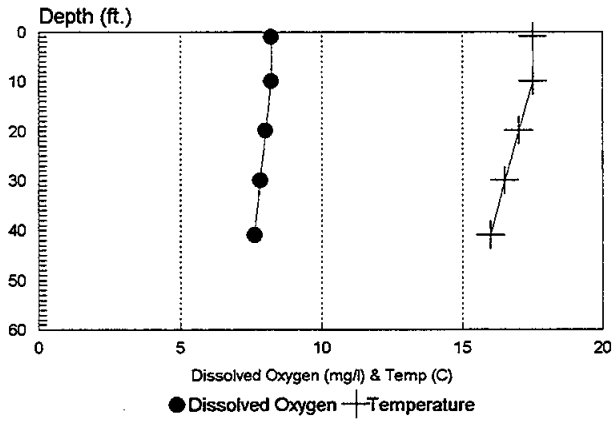
ORMAN DAM 8/17/91

Dissolved Oxygen & Temperature Profile



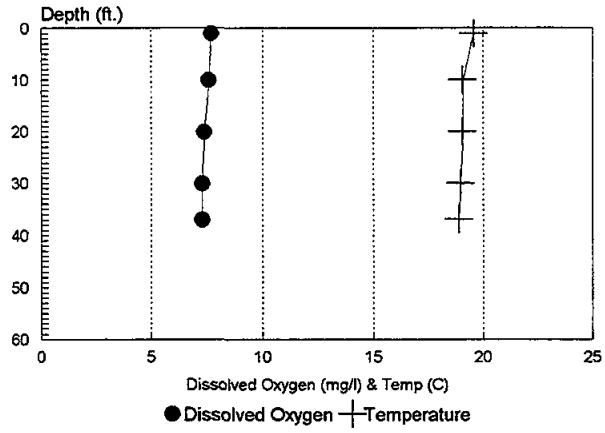
ORMAN DAM 6/13/92

Dissolved Oxygen & Temperature Profile



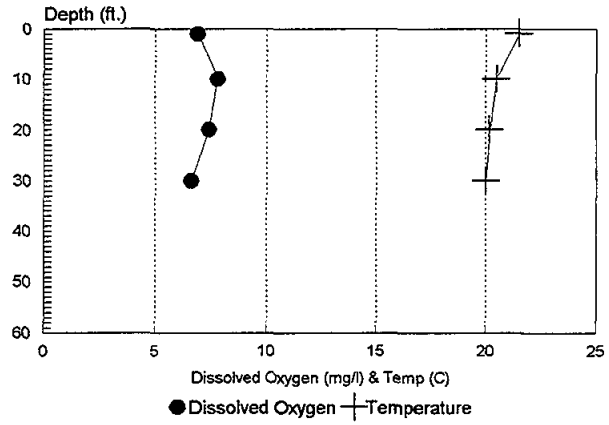
ORMAN DAM 7/17/92

Dissolved Oxygen & Temperature Profile



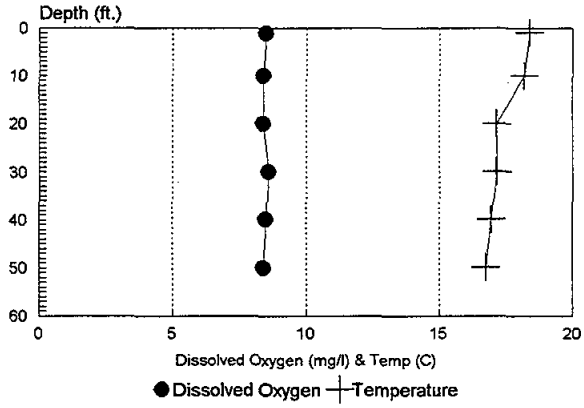
ORMAN DAM 8/15/92

Dissolved Oxygen & Temperature Profile



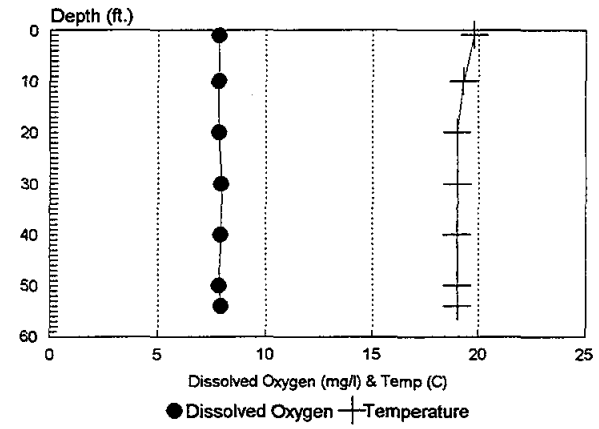
ORMAN DAM 6/14/93

Dissolved Oxygen & Temperature Profile



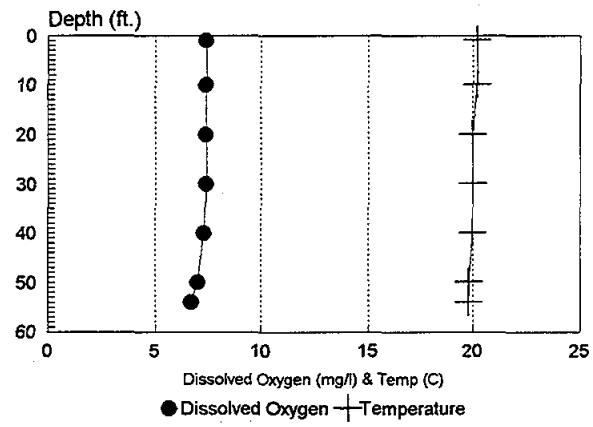
ORMAN DAM 7/22/93

Dissolved Oxygen & Temperature Profile



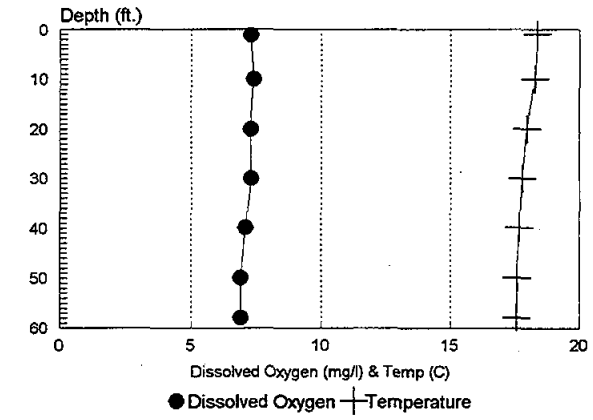
ORMAN DAM 8/20/93

Dissolved Oxygen & Temperature Profile



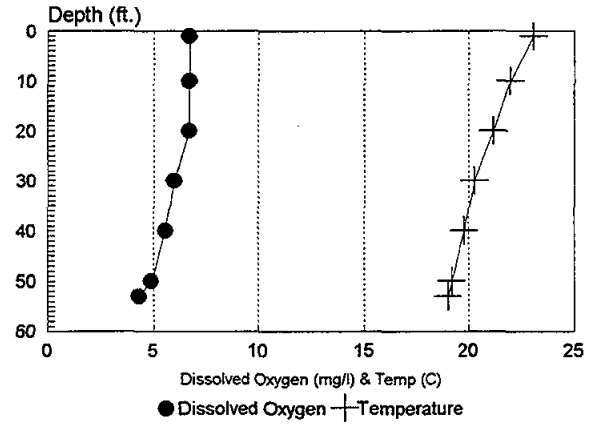
ORMAN DAM 6/13/94

Dissolved Oxygen & Temperature Profile



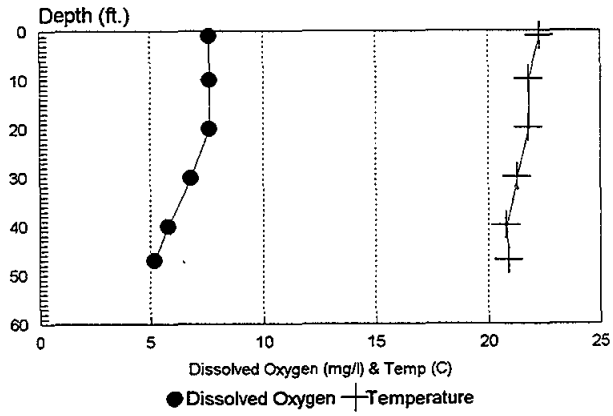
ORMAN DAM 7/15/94

Dissolved Oxygen & Temperature Profile



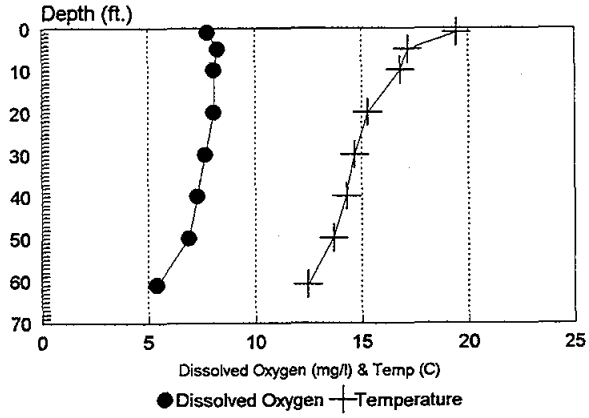
ORMAN DAM 8/15/94

Dissolved Oxygen & Temperature Profile



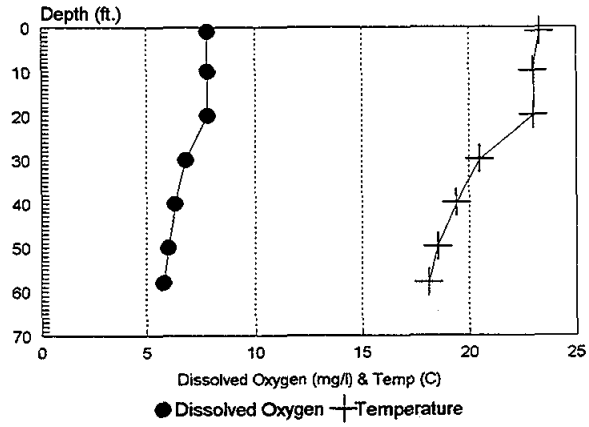
ORMAN DAM 6/15/95

Dissolved Oxygen & Temperature Profile



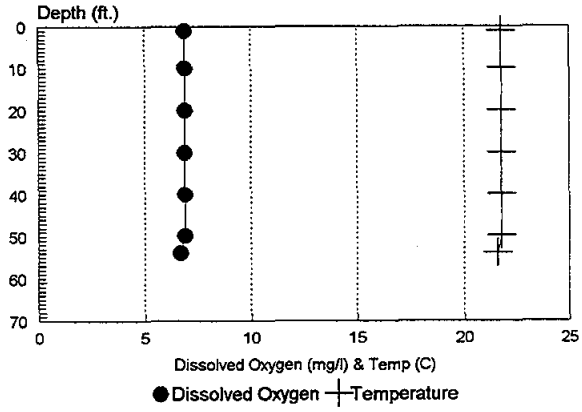
ORMAN DAM 7/14/95

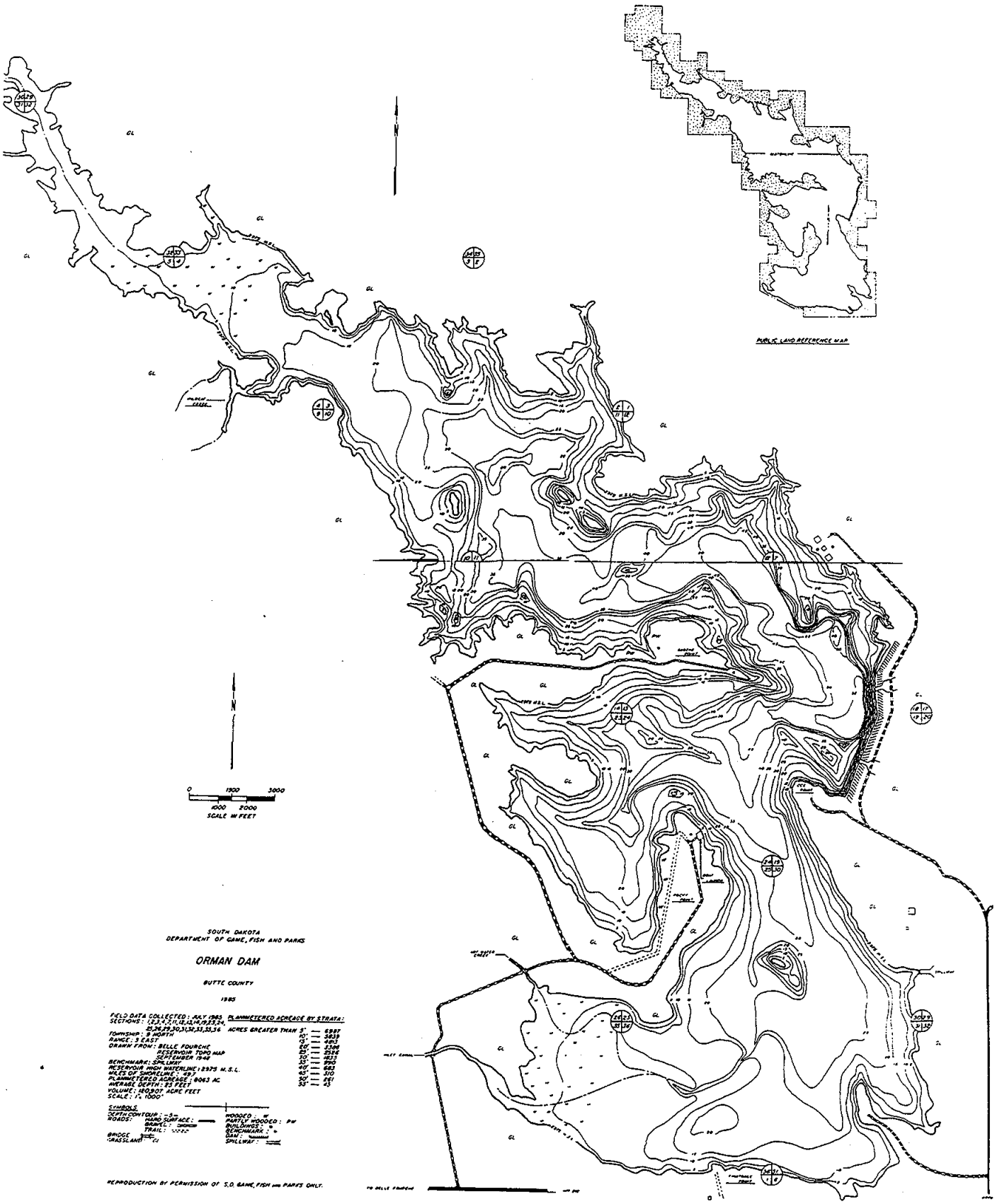
Dissolved Oxygen & Temperature Profile



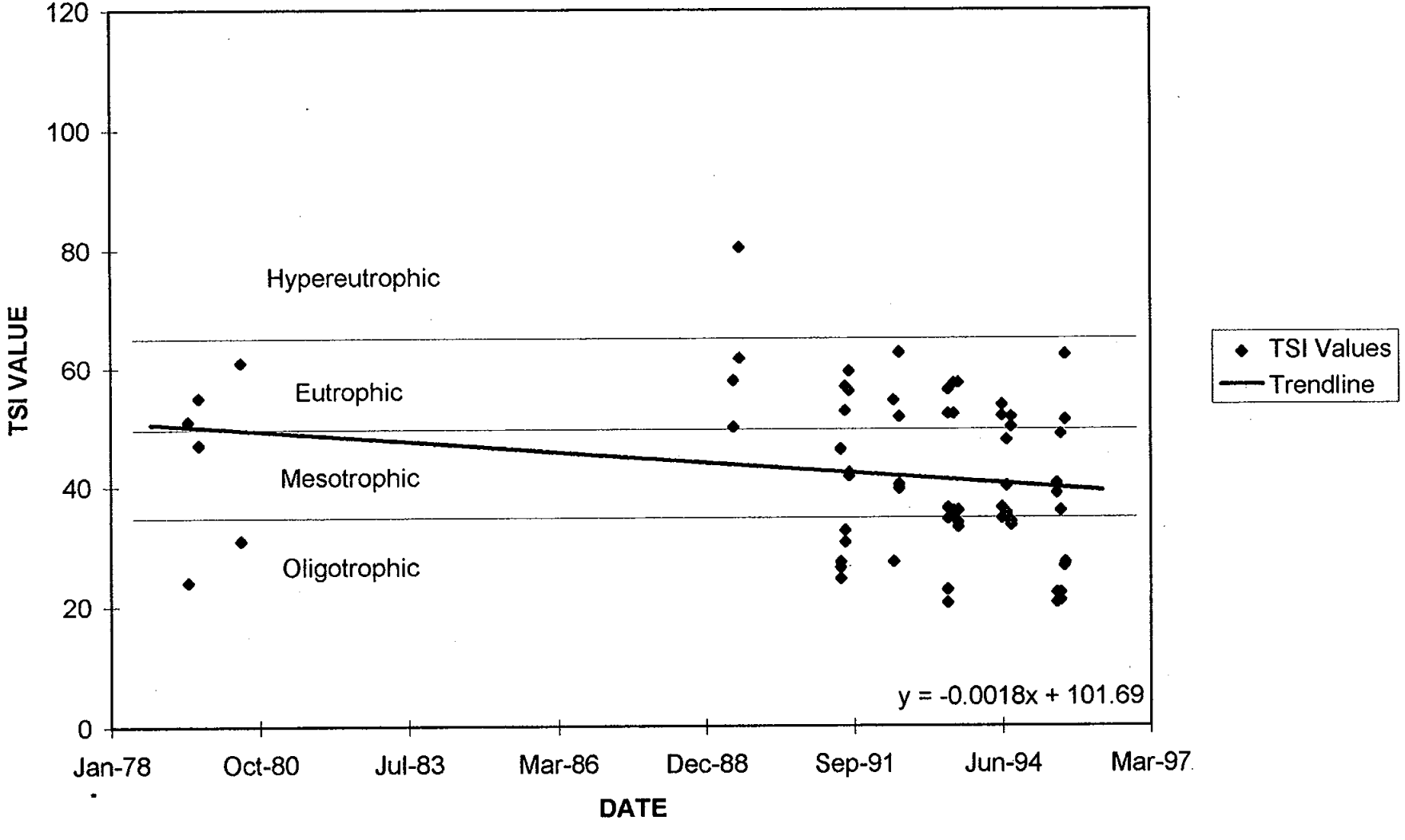
ORMAN DAM 8/14/95

Dissolved Oxygen & Temperature Profile




PUBLIC LAND REFERENCE MAP
0 1500 3000
1000 2000
SCALE IN FEET
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
ORMAN DAM
BUTTE COUNTY
1985
FIELD DATA COLLECTED: JULY 1985
SECTIONS: 1,2,3,4,7,11,12,13,14,19,23,24, 25,26,29,30,31,32,33,35,36
TOWNSHIP: 9 NORTH
RANGE: 3 EAST
DRAWN FROM: BELLE FOURCHE RESERVOIR TOPO MAP SEPTEMBER 1948
BENCHMARK: SPILLWAY
RESERVOIR HIGH WATERLINE: 2975 M.S.L.
MILES OF SHORELINE: 497
PLANIMETERED ACREAGE: 8063 AC
AVERAGE DEPTH: 25 FEET
VOLUME: 120,907 ACRE FEET
SCALE: 1" = 1000'
PLANIMETERED ACREAGE BY STRATA:
ACRES GREATER THAN 5' — 6987
10' — 3839
15' — 4813
20' — 3304
25' — 2526
30' — 1835
35' — 990
40' — 683
45' — 510
50' — 261
55' — 43
SYMBOLS
DEPTH CONTOUR: 5
ROADS: HARD SURFACE:
GRAVEL:
TRAIL:
BRIDGE
GRASSLAND
WOODED:
PARTLY WOODED: PW
BUILDINGS:
BENCHMARK:
DAM:
SPILLWAY:
REPRODUCTION BY PERMISSION OF S.D. GAME, FISH AND PARKS ONLY.

ORMAN DAM TSI's
(BELLE FOUCHE RESERVOIR)



PACTOLA RESERVOIR

County: Pennington
Latitude: 44 deg. 04 min. 00 sec. N
Longitude: 103 deg. 30 min. 00 sec. W
Area: 785.3 A (318 ha)
Maximum Depth: 150 ft (46 m)
Volume: 47,933 acre-ft (5.91 x $10^7 m^3$)
Origin of Basin: impoundment
Township: 1N
Range: 5E
Section(s): 1-4, 11
Shoreline L: 16.3 mi (26 km)
Mean Depth: 56 ft (17.1 km)
Watershed/Lake Area: 261
Thermal Stratification: yes
Major Inflows (named or permanent streams): Rapid, Castle, & Slate Creeks
Outlet: Rapid Creek

Lake Use
Beneficial Use Classification:
(1) Domestic water supply
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
(10) Irrigation

Estimated Population within 65-mile Radius: 146,392
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	18.45	6	14.73	4	12.28
Air Temperature (°C)	4	25.28	6	25.56	4	27.22
Secchi Disk Depth (meters)	2	3.89	3	6.46	2	8.55
Conductivity (cond/25° C)	4	379	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.45	6	8.42	4	8.08
Total Alkalinity (mg/l)	4	154	-	-	-	-
Total Solids (mg/l)	4	242	-	-	-	-
Dissolved Solids (mg/l)	4	237	-	-	-	-
Suspended Solids (mg/l)	4	5	6	1	4	2
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.04	6	0.01	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.03	4	0.01
Total Kjeldahl Nitrogen (mg/l)	4	0.33	6	0.15	4	0.13
Total Phosphorus (mg/l)	4	0.057	6	0.017	4	0.006
Total Dissolved Phosphorus (mg/l)	-	-	6	0.012	4	0.003
Ortho Phosphate as P (mg/l)	-	0.037	-	-	-	
Chlorophyll (mg/m^3)	-	-	6	1.55	4	0.32

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	14.00	6	13.24	6	16.33
Air Temperature (°C)	6	22.00	6	22.95	6	25.07
Secchi Disk Depth (meters)	3	5.98	7	8.72	9	6.55
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.32	6	8.36	6	7.78
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	2	6	2	6	1
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.02	6	0.02	6	0.06
Nitrate + Nitrite Nitrogen (mg/l)	6	0.02	6	0.08	6	0.05
Total Kjeldahl Nitrogen (mg/l)	6	.010	6	0.05	6	0.36
Total Phosphorus (mg/l)	6	0.009	6	0.007	6	0.018
Total Dissolved Phosphorus (mg/l)	6	0.007	6	0.003	6	0.011
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	1.76	6	1.79	6	0.56

	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	53.03	37.51	25.73	36.03	34.30	33.21
Secchi Disk	40.42	35.28	29.04	35.59	28.75	32.89
Total Phosphorus	65.65	42.36	28.74	36.37	37.84	41.88
Chlorophyll *a*		34.89	19.41	36.13	36.31	24.86

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

July 10, 1989

Taxa	Number	Units/ml
Algae (flagellate)	5	133
Dinobryon	4	106
Algae (other)	3	80
Cryptomonas sp. #1	3	80
Characium	2	53
Synedra	2	53
Diatom (pennate)	1	27
Total	20	531

Watershed Description

Watershed Area: 204,800 A (82,883 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#5	120,832	59
#4	63,488	31
#7	12,288	6
#8	8,192	4

#5 Pactola-Rock Outcrop-Virkul: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from steeply tilted metamorphic rock; on mountains.

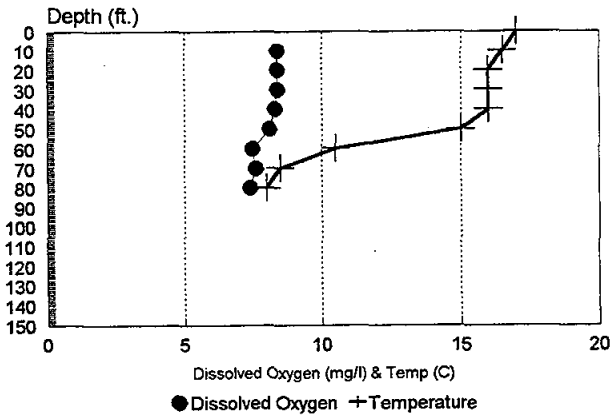
#4 Stovho-Trebor: Deep and moderately deep, well drained, gently sloping to very steep, silty soils formed in material weathered from limestone and calcareous sandstone; on mountains.

#7 Heely-Cordeston: Moderately deep and deep, well drained, nearly level to steep, loamy soils formed in material weathered from steeply tilted metamorphic rock and in alluvium; on mountain prairies.

#8 Citadel-Vanocker-Grizzly (Lawrence County): Deep, well drained, moderately sloping to very steep loamy soils; on uplands.

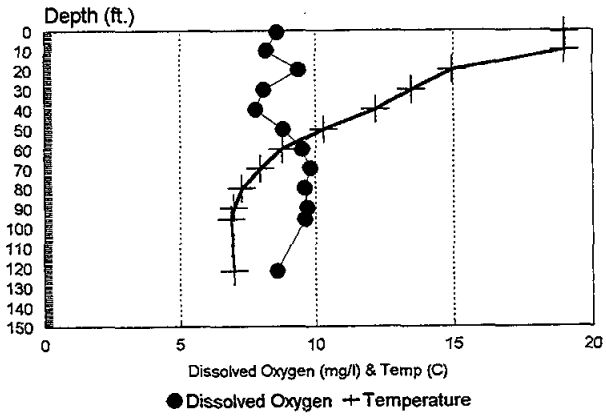
PACTOLA RESERVOIR 8/15/79

Dissolved Oxygen & Temperature Profile



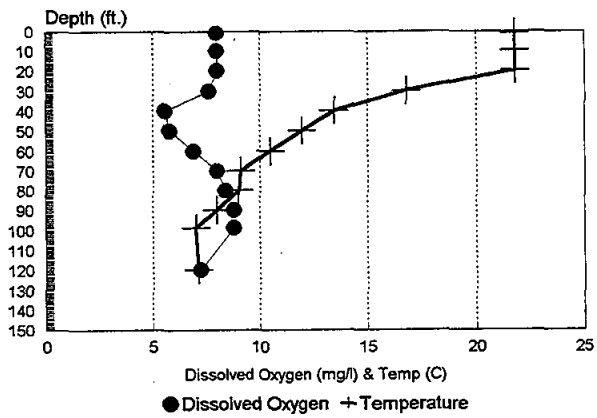
PACTOLA RESERVOIR 6/16/91

Dissolved Oxygen & Temperature Profile



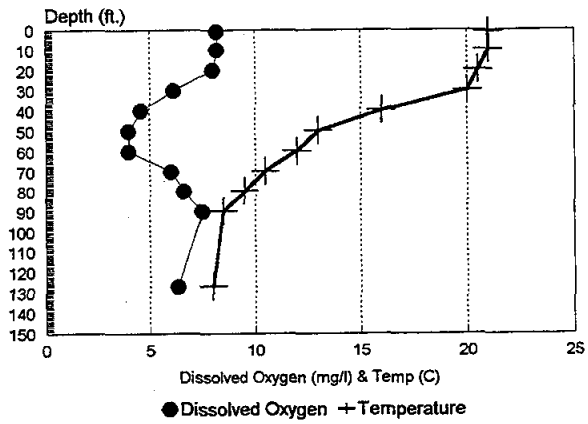
PACTOLA RESERVOIR 7/18/91

Dissolved Oxygen & Temperature Profile



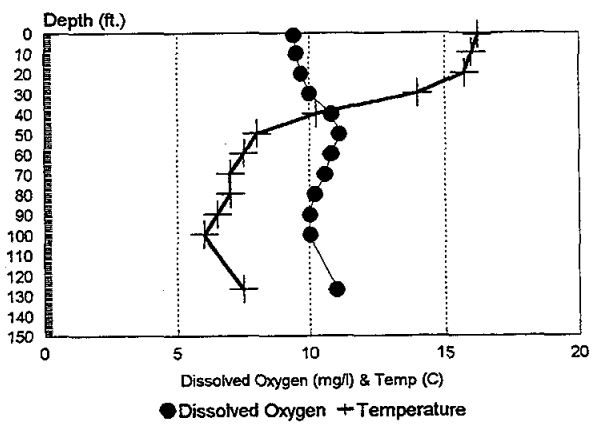
PACTOLA RESERVOIR 8/17/91

Dissolved Oxygen & Temperature Profile



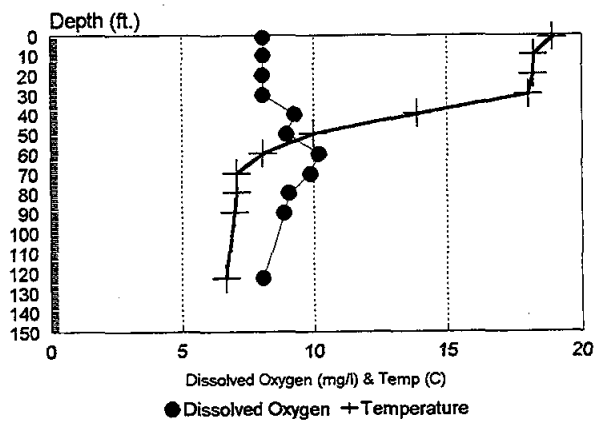
PACTOLA RESERVOIR 6/13/92

Dissolved Oxygen & Temperature Profile

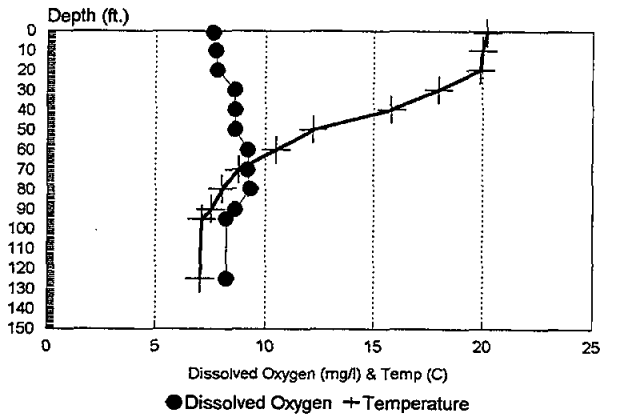


PACTOLA RESERVOIR 7/16/92

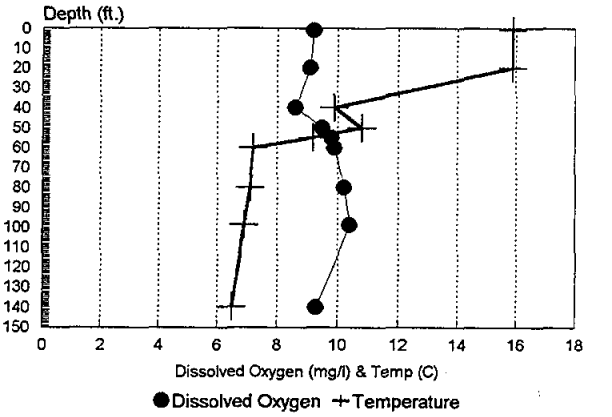
Dissolved Oxygen & Temperature Profile



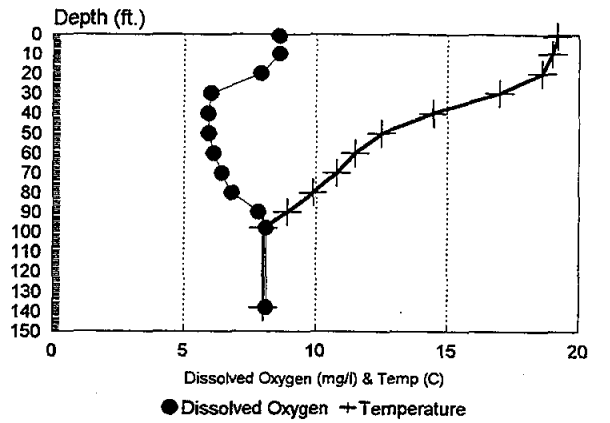
PACTOLA RESERVOIR 8/14/92
Dissolved Oxygen & Temperature Profile



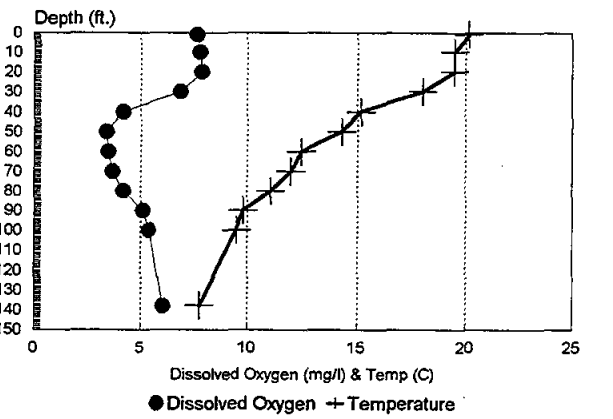
PACTOLA RESERVOIR 6/13/93
Dissolved Oxygen & Temperature Profile



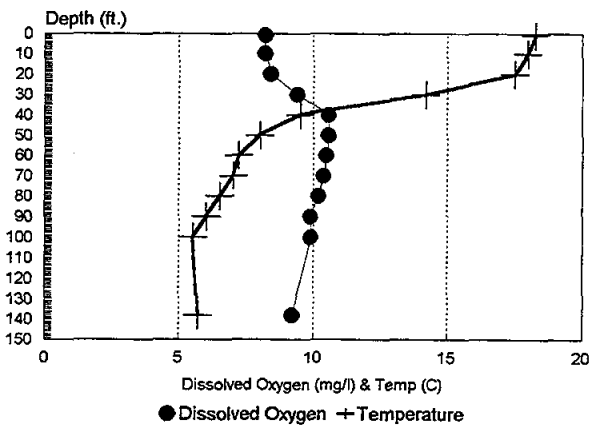
PACTOLA RESERVOIR 7/21/93
Dissolved Oxygen & Temperature Profile



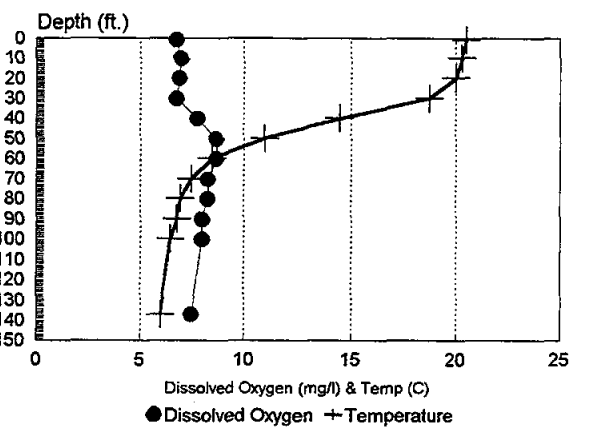
PACTOLA RESERVOIR 8/19/93
Dissolved Oxygen & Temperature Profile



PACTOLA RESERVOIR 6/12/94
Dissolved Oxygen & Temperature Profile

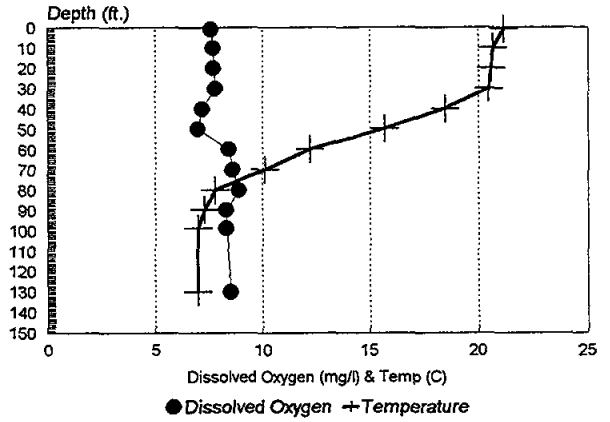


PACTOLA RESERVOIR 7/14/94
Dissolved Oxygen & Temperature Profile



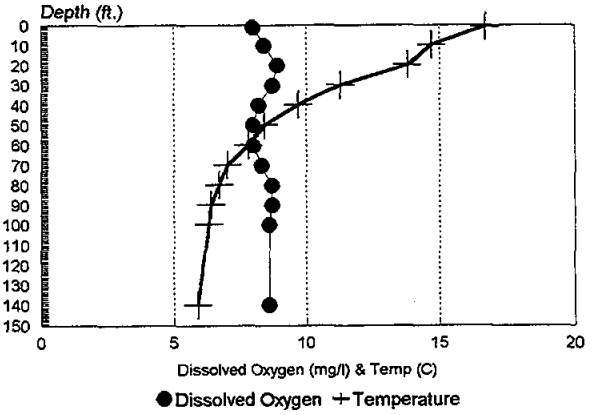
PACTOLA RESERVOIR 8/14/94

Dissolved Oxygen & Temperature Profile



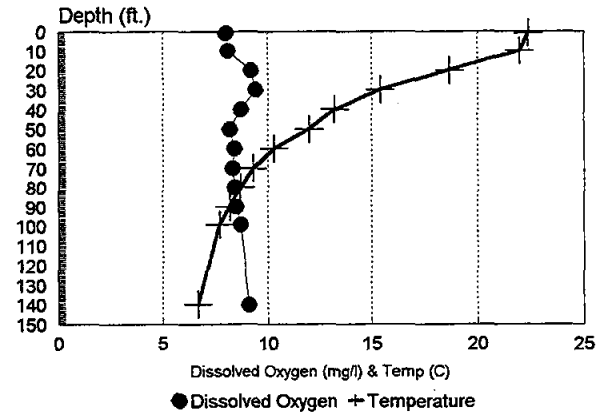
PACTOLA RESERVOIR 6/14/95

Dissolved Oxygen & Temperature Profile



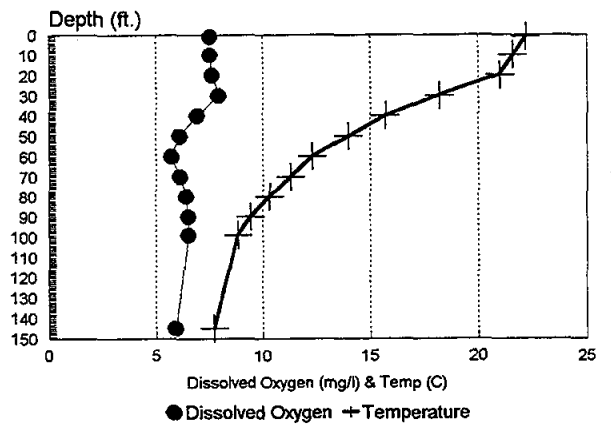
PACTOLA RESERVOIR 7/14/95

Dissolved Oxygen & Temperature Profile



PACTOLA RESERVOIR 8/12/95

Dissolved Oxygen & Temperature Profile



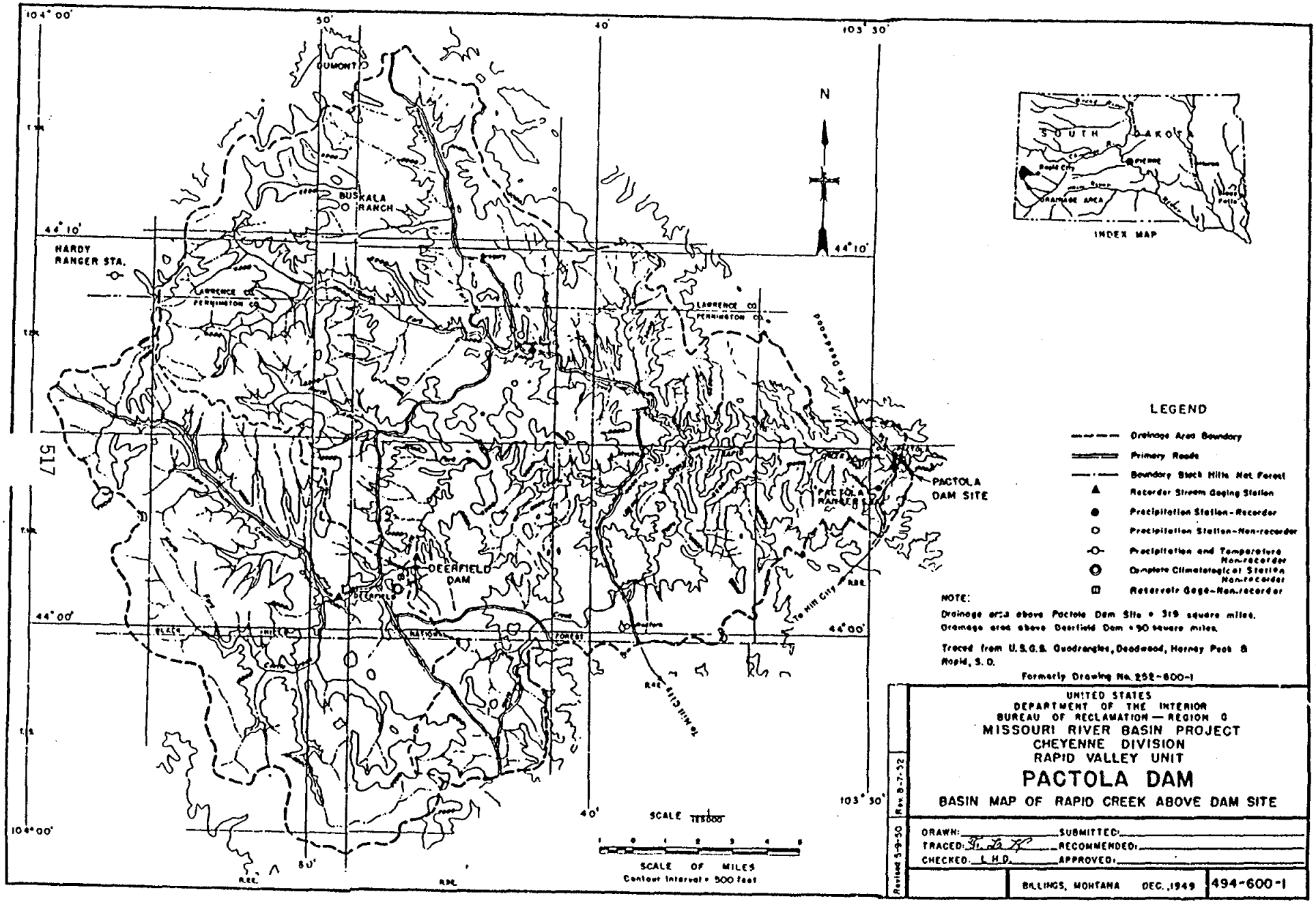
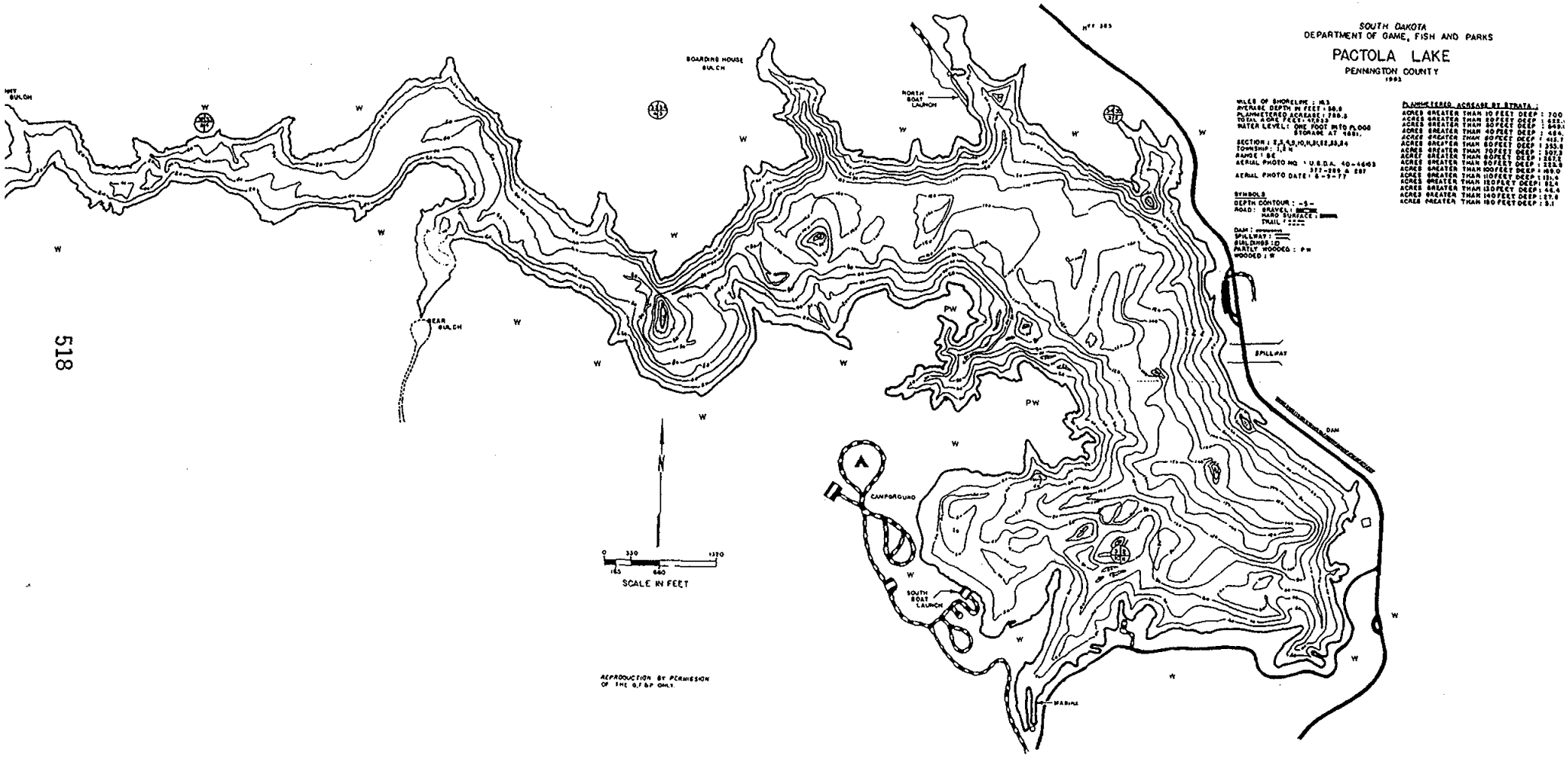
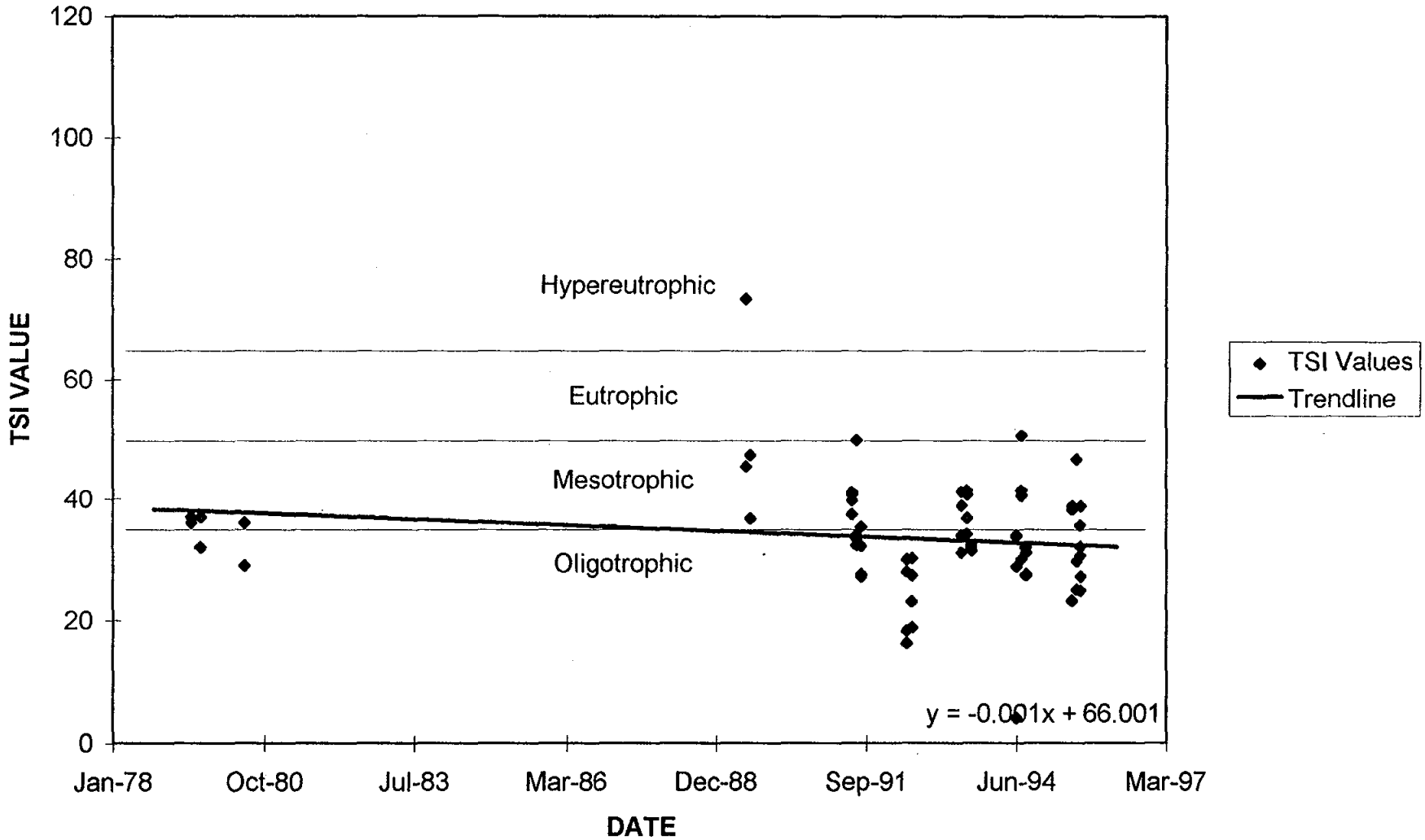

104° 00'
50'
40'
103° 30'
44° 10'
44° 00'
DUMONT
BUSKALA RANCH
HARDY RANGER STA.
LAWRENCE CO.
PENNINGTON CO.
DEERFIELD DAM
PACTOLA DAM SITE
PACTOLA RANGER STA.
To Deadwood
To Hill City
BLACK HILLS NATIONAL FOREST
N
SCALE 1/125000
SCALE OF MILES
Contour Interval = 500 feet
SOUTH DAKOTA
PIERRE
Rapid City
DRAINAGE AREA
INDEX MAP
LEGEND
Drainage Area Boundary
Primary Roads
Boundary Black Hills Nat. Forest
Recorder Stream Gaging Station
Precipitation Station-Recorder
Precipitation Station-Non-recorder
Precipitation and Temperature Non-recorder
Complete Climatological Station Non-recorder
Reservoir Gage-Non-recorder
NOTE:
Drainage area above Pactola Dam Site = 319 square miles.
Drainage area above Deerfield Dam = 90 square miles.
Traced from U.S.G.S. Quadrangles, Deadwood, Harney Peak & Rapid, S. D.
Formerly Drawing No. 252-600-1
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION — REGION 6
MISSOURI RIVER BASIN PROJECT
CHEYENNE DIVISION
RAPID VALLEY UNIT
PACTOLA DAM
BASIN MAP OF RAPID CREEK ABOVE DAM SITE
Rev. 8-7-52
Revised 5-9-50
DRAWN:
SUBMITTED:
TRACED:
RECOMMENDED:
CHECKED: L.H.D.
APPROVED:
BILLINGS, MONTANA DEC., 1949
494-600-1
MAR 13 1984

PLATE 1

517


SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
PACTOLA LAKE
PENNINGTON COUNTY
1993
BOARDING HOUSE GULCH
NORTH BOAT LAUNCH
BEAR GULCH
CAMPGROUND
SOUTH BOAT LAUNCH
MARINA
SPILLWAY
DAM
SCALE IN FEET
REPRODUCTION BY PERMISSION OF THE G.F.&P. ONLY.

PACTOLA RESEVOIR TSI's



PELICAN LAKE

County: Codington
Latitude: 44 deg. 52 min. 12 sec. N
Longitude: 97 deg. 10 min. 24 sec. W
Area: 2,796 A (1131 ha)
Maximum Depth: 8 ft (2.4 m)
Volume: 15,377 acre-ft (1.897 x $10^7 m^3$)
Origin of Basin: natural (glacial)
Township: 116N
Range: 53W
Section(s): 1-3,8-12,15-17
Shoreline L: 12.7 mi (20 km)
Mean Depth: 5 ft (1.7 m)
Watershed/Lake Area: 6
Thermal Stratification: no
Major Inflows (named or permanent streams): Big Sioux River
Outlet: Big Sioux River

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Lake Pelican Association

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.50	4	22.23	4	18.38
Air Temperature (°C)	4	22.50	4	24.00	4	18.00
Secchi Disk Depth (meters)	2	0.46	2	0.47	2	1.22
Conductivity (cond/25° C)	4	786	2	739	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.66	-	-	-	-
Field pH (su)	-	-	4	9.06	4	8.64
Total Alkalinity (mg/l)	4	256	4	210	4	216
Total Solids (mg/l)	4	616	4	528	4	651
Dissolved Solids (mg/l)	4	588	4	509	4	641
Suspended Solids (mg/l)	4	29	4	19	4	10
Volatile Suspended Solids (mg/l)	-	-	2	6	-	-
Ammonia Nitrogen (mg/l)	4	0.24	4	0.09	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	3	0.13
Total Kjeldahl Nitrogen (mg/l)	4	2.42	4	1.60	4	1.39
Total Phosphorus (mg/l)	4	0.162	4	0.107	4	0.093
Total Dissolved Phosphorus (mg/l)	-	-	4	0.061	4	0.044
Ortho Phosphate as P (mg/l)	4	0.017	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	56.28	4	42.88

	1994	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	22.00
Air Temperature (°C)	4	24.25
Secchi Disk Depth (meters)	4	0.97
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	-	-
Lab pH (su)	-	-
Field pH (su)	4	8.49
Total Alkalinity (mg/l)	4	222
Total Solids (mg/l)	4	438
Dissolved Solids (mg/l)	4	418
Suspended Solids (mg/l)	4	20
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.72
Total Phosphorus (mg/l)	4	0.159
Total Dissolved Phosphorus (mg/l)	4	0.067
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	2	30.15

Year	1989	1991	1992	1994
TSI Values -- Mean:	74.60	70.77	64.98	70.02
Secchi Disk	71.29	70.91	57.19	70.30
Total Phosphorus	77.29	71.29	70.30	77.17
Chlorophyll *a*		70.11	67.44	72.31

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

July 6, 1989

Taxa	Number	Units/ml
Melosira granulata	112	2421
Characium	51	1102
Melosira ambigua	38	821
Aphanizomenon flos-aquae	36	778
Diatom (pennate)	14	303
Algae (other)	11	238
Algae (flagellate)	8	173
Anabaena	7	151
Chroococcus	7	151
Nitzschia	6	130
Blue-green (other)	2	43
Nitzschia acicularis	2	43
Cryptomonas	2	43
Stephanodiscus niagarae	1	22
Merismopedia	1	22
Green Algae (other)	1	22
Diatom (centric)	1	22
Total	300	6485

Watershed Description

Watershed Area: 15,686 acres (6,348 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
KN-BW-VS	8,157	52
PN-BY	5,647	36
FS-ES	1,255	8
BY	627	4

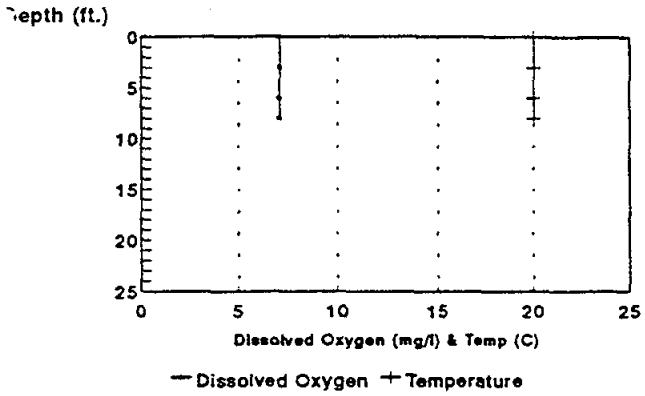
KN-BW-VS Kranzburg-Brookings-Vienna: Well drained and moderately well drained, nearly level to gently rolling silty soils formed 1n loess over glacial till.

PN-BY Poinsett-Buse: Well drained, undulating to rolling silty and loamy soils.

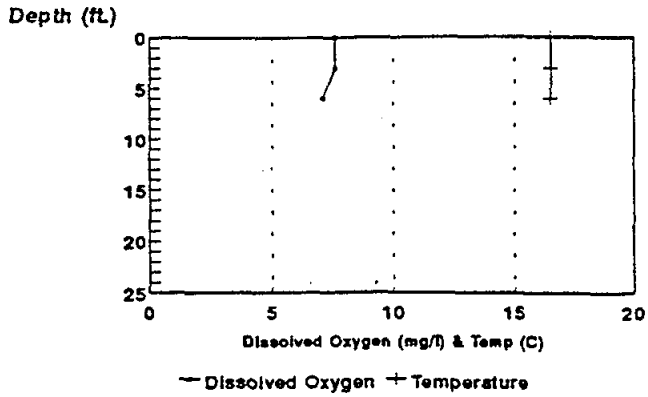
FS-ES Fordville-Estelline: Well drained, nearly level to gently undulating to hilly, loamy soils.

BY Buse: Well drained, undulating to hilly, loamy soils.

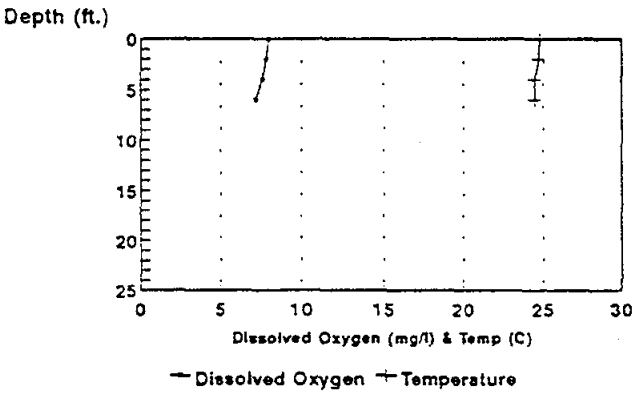
LAKE PELICAN 8/5/92
Dissolved Oxygen & Temperature Profile



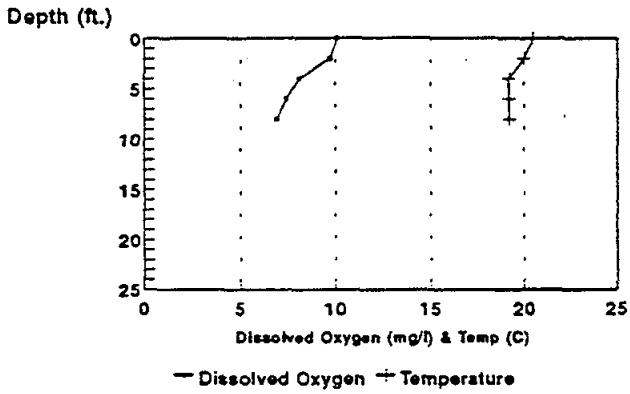
LAKE PELICAN 9/1/92
Dissolved Oxygen & Temperature Profile



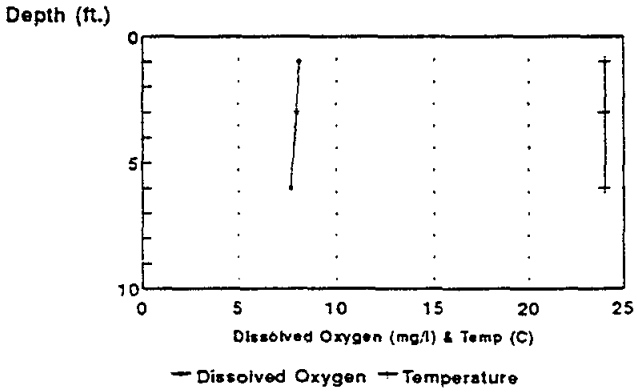
LAKE PELICAN 7/23/91
Dissolved Oxygen & Temperature Profile



LAKE PELICAN 9/12/91
Dissolved Oxygen & Temperature Profile

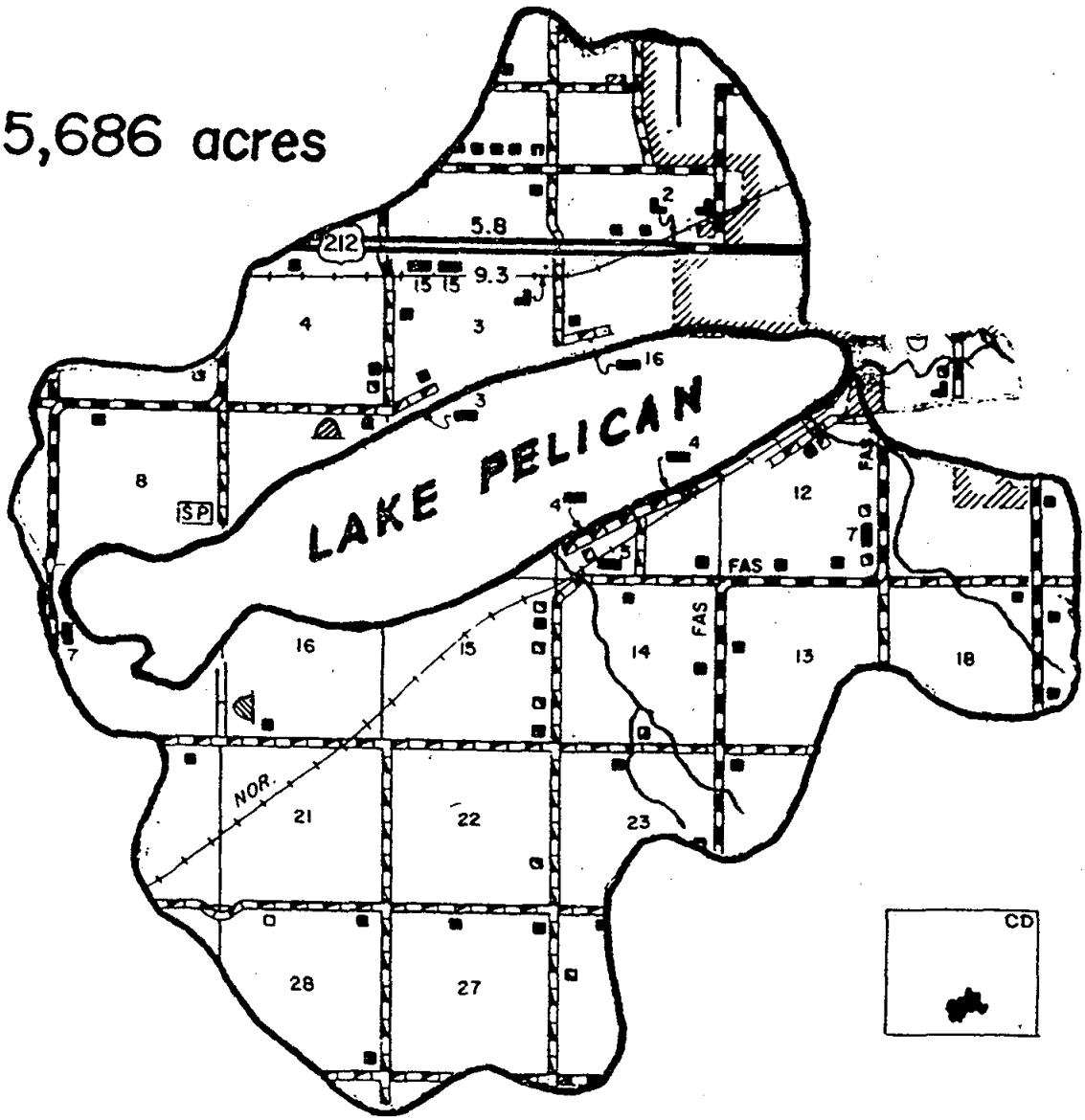


Lake Pelican 8/2/89
Dissolved Oxygen & Temperature Profile



Lake Pelican

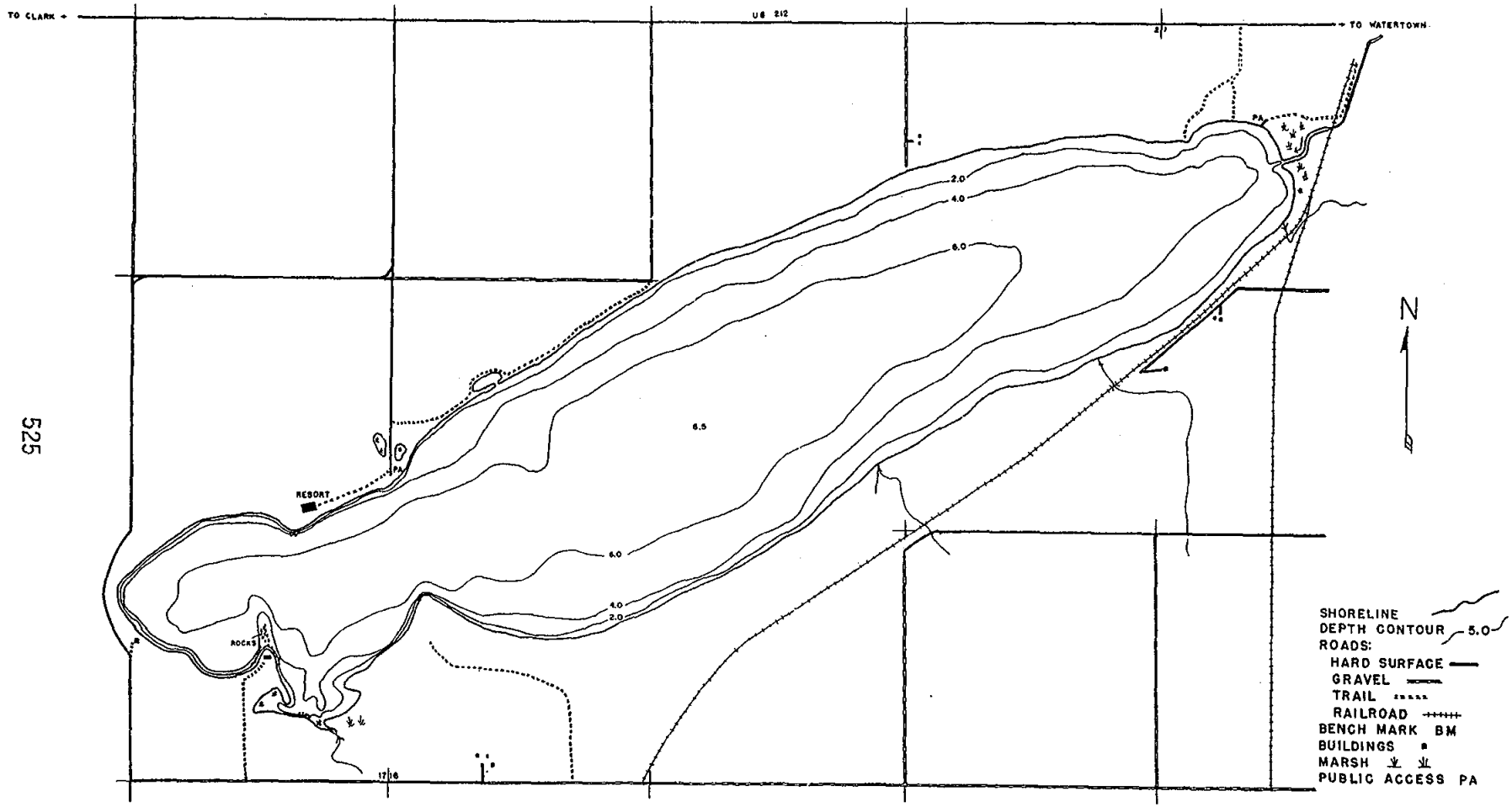
15,686 acres



Scale

0 1 2 3 4 5 6

Miles



SCALE IN FEET

SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS

PELICAN LAKE

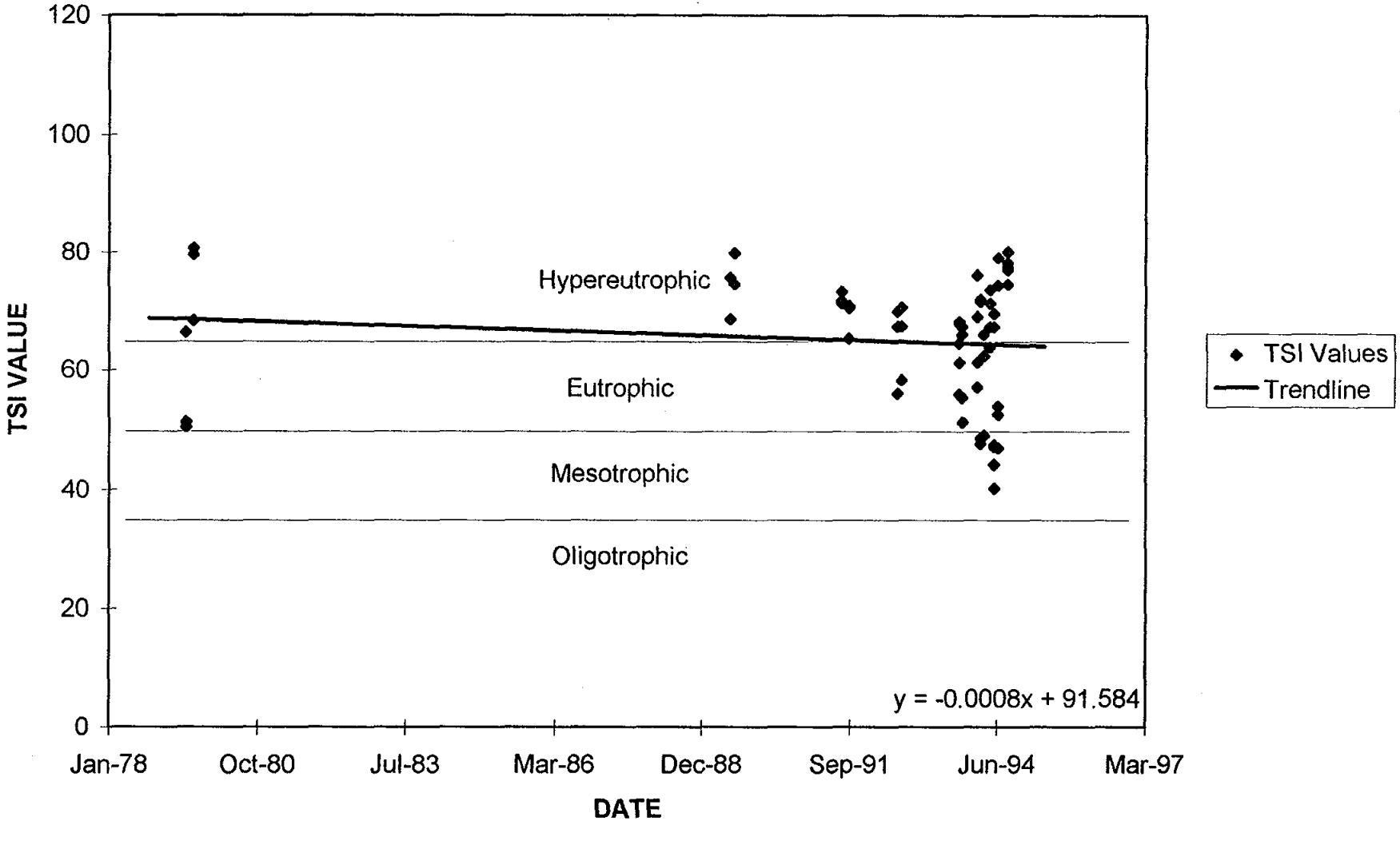
CODINGTON COUNTY

WATER STAGE 1.5' LOW
PLANIMETER ACRES 2796.8

AERIAL PHOTO DATE: 1939
FIELD WORK DATE: FEB.'51
DRAWN BY: LP, MOH DATE: 1-15-64

SEC. 1,2,3,8,9,10,11, 17 TWP. 116 N RGE. 53 W

LAKE PELICAN TSI's



PICKEREL LAKE

County: Day
Latitude: 45 deg. 30 min. 24 sec. N
Longitude: 97 deg. 16 min. 24 sec. W
Area: 931 A (376.7 ha)
Maximum Depth: 43.3 ft (13.2 m)
Volume: 15,010 acre-ft ($1.85x10^7 m^3$)
Origin of Basin: natural (glacial)
Township: 124N
Range: 53W
Section(s): 15, 22-23, 26-27, 34-35
Shoreline L: 9.7 mi (15.6 km)
Mean Depth: 16.1 ft (4.9 m)
Watershed/Lake Area: 18
Thermal Stratification: no
Major Inflows (named or permanent streams): Dry & Chekepa Creeks
Outlet: unnamed

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: Pickerel Lake Outlet Association

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	21.13	6	23.43	4	19.08
Air Temperature (°C)	4	28.89	6	26.67	4	24.44
Secchi Disk Depth (meters)	2	1.40	3	1.60	2	3.00
Conductivity (cond/25° C)	4	474	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.63	-	-	-	-
Field pH (su)	2	8.70	6	8.50	4	8.15
Total Alkalinity (mg/l)	4	170	-	-	-	-
Total Solids (mg/l)	4	354	-	-	-	-
Dissolved Solids (mg/l)	4	345	-	-	-	-
Suspended Solids (mg/l)	4	9	6	9	4	4
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.04	6	0.09	4	0.11
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.03
Total Kjeldahl Nitrogen (mg/l)	4	0.69	6	1.04	4	0.73
Total Phosphorus (mg/l)	4	0.056	6	0.062	4	0.032
Total Dissolved Phosphorus (mg/l)	-	-	6	0.030	4	0.013
Ortho Phosphate as P (mg/l)	4	0.010	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	10.02	4	3.28

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	20.93	6	20.74	6	22.90
Air Temperature (°C)	6	23.00	6	20.90	6	26.27
Secchi Disk Depth (meters)	3	1.93	9	1.96	9	2.17
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.12	6	8.34	6	7.88
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	5	6	9	6	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	5	0.01	6	0.03	6	0.02
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	6	0.01	6	0.03
Total Kjeldahl Nitrogen (mg/l)	6	0.61	6	0.72	6	0.77
Total Phosphorus (mg/l)	6	0.035	6	0.044	6	0.032
Total Dissolved Phosphorus (mg/l)	6	0.010	6	0.014	6	0.009
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	6.07	6	6.06	6	4.80

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	58.00	53.76	47.06	48.24	50.36	48.77
Secchi Disk	55.12	51.18	44.16	45.30	50.26	48.79
Total Phosphorus	60.87	56.92	54.81	51.15	52.56	51.57
Chlorophyll *a*		53.18	42.21	48.26	48.25	45.96

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Myriophyllum spicatum, Elodea canadensis, Chara sp., Heteranthera dubia, Potamogeton richardsonii, P. pectinatus, P. foliosus, Juncus balticus, Eleocharis smallii, Scirpus validus, Najas flexilis, and Ceratophyllum demersum

Algal Species and Densities

Taxa	June 21, 1989 Number	June 21, 1989 Units/ml	July 26, 1989 Number	July 26, 1989 Units/ml
Aphanocapsa	41	2,035	119	2,504
Algae (other)	35	1737	29	610
Cryptomonas sp. #1	13	645	-	-
Melosira granulata	5	248	55	1,157
Algae (flagellate)	5	248	2	42
Anabaena	2	99	15	316
Fragilaria crotonensis	2	99	-	-
Diatom (centric)	1	50	14	295
Pediastrum	1	50	-	-
Green Algae (other)	1	50	8	168
Aphanothece	1	50	2	42
Merismopedia	-	-	16	337
Chroococcus	-	-	9	189
Lyngbya	-	-	7	147
Aphanizomenon flos-aquae	-	-	7	147
Blue-green (other)	-	-	6	126
Dactylococcopsis	-	-	4	84
Fragilaria crotonensis	-	-	2	42
Cryptomonas	-	-	2	42
Gomphosphaeria	-	-	2	42
Synedra	-	-	1	21
Staurastrum	-	-	1	21
Total	107	5,310	301	6,333

Watershed Description

Watershed Area: 17,165 A (6,947 ha)

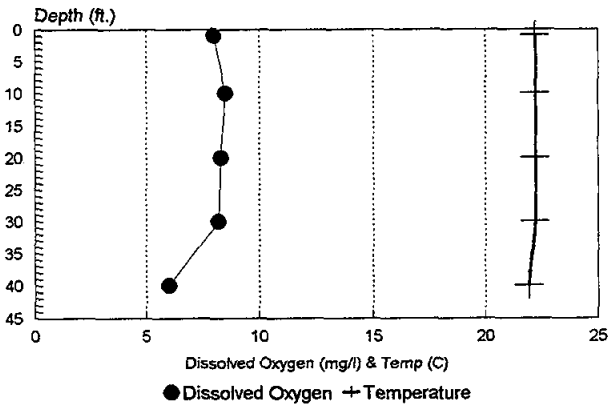
Soil Associations within Watershed

Association	Area (A)	% of Total
FU-BY-AA-PA	12,702	74
RL-FS-SK	4,463	26

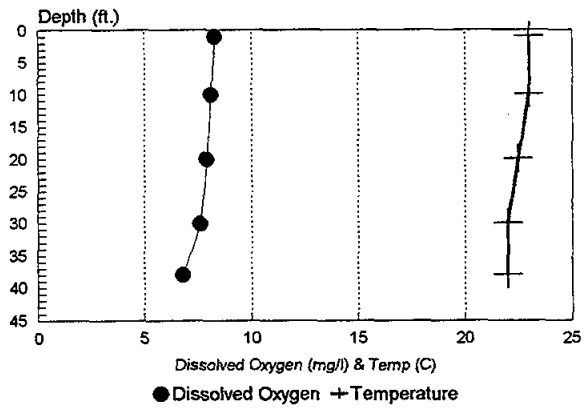
FU-BY-AA-PA Forman-Buse-Aastad-Parnell: Well drained and moderately well drained, nearly level to steep loamy soils and very poorly drained soils that formed in alluvium in depressions.

RL-FS-SK Renshaw-Fordville-Sioux: Well drained to excessively drained, nearly level to steep loamy soils that are shallow, moderately deep and very shallow over sand and gravel.

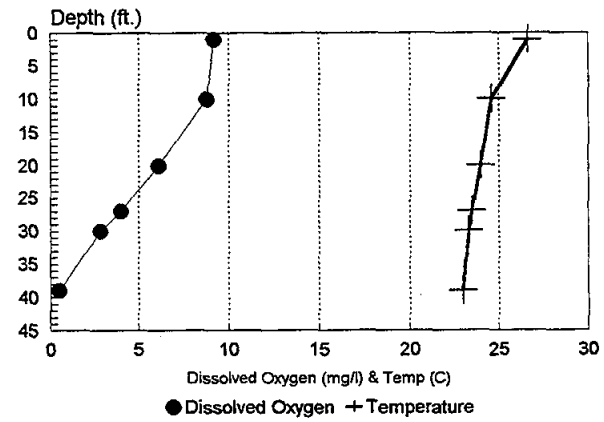
PICKEREL LAKE 8/12/79
Dissolved Oxygen & Temperature Profile



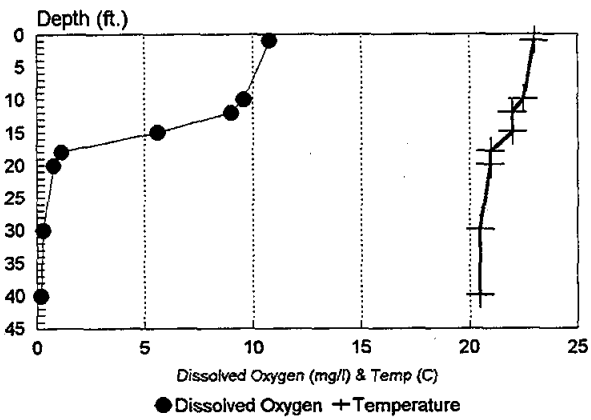
PICKEREL LAKE 6/18/91
Dissolved Oxygen & Temperature Profile



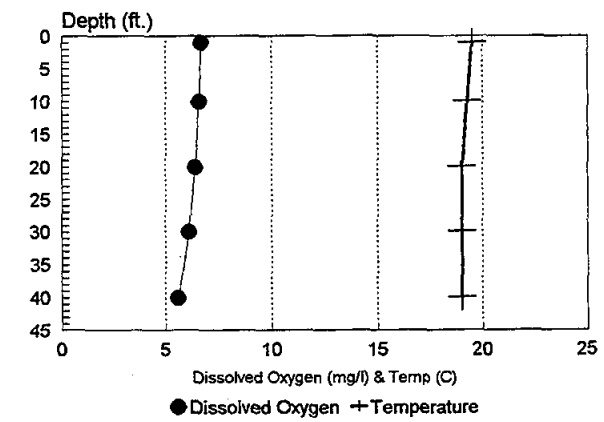
PICKEREL LAKE 7/19/91
Dissolved Oxygen & Temperature Profile



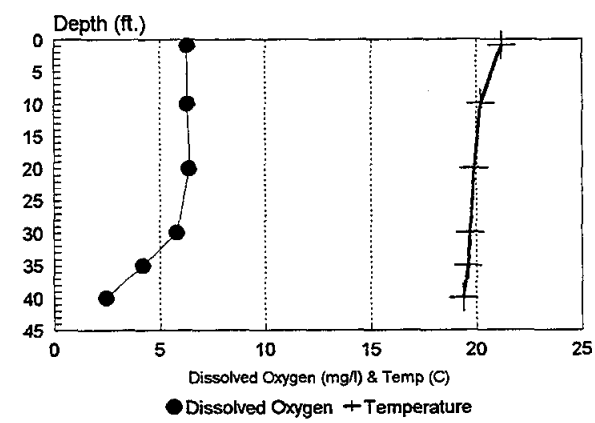
PICKEREL LAKE 8/18/91
Dissolved Oxygen & Temperature Profile



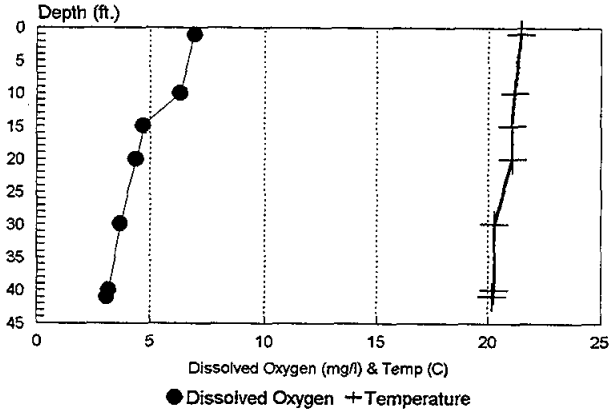
PICKEREL LAKE 6/18/92
Dissolved Oxygen & Temperature Profile



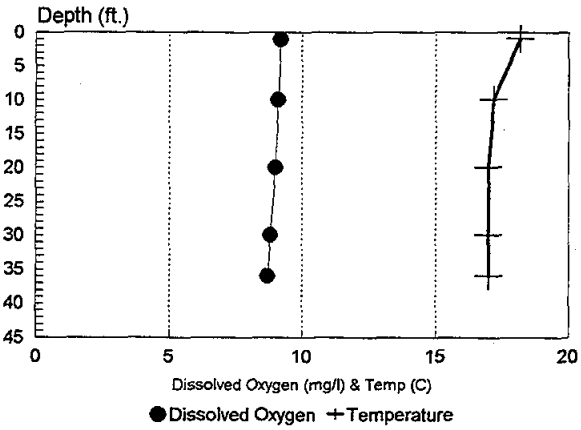
PICKEREL LAKE 7/18/92
Dissolved Oxygen & Temperature Profile



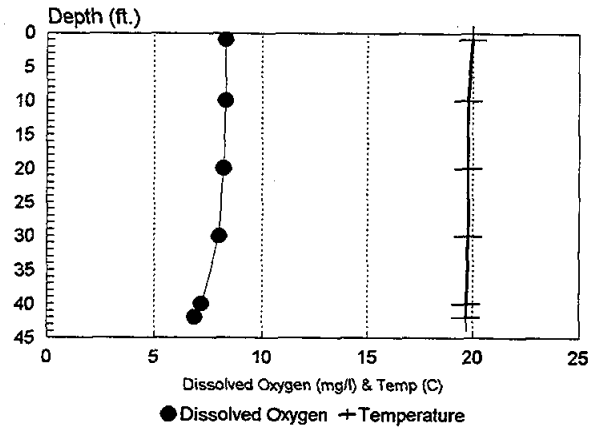
PICKEREL LAKE 8/16/92
Dissolved Oxygen & Temperature Profile



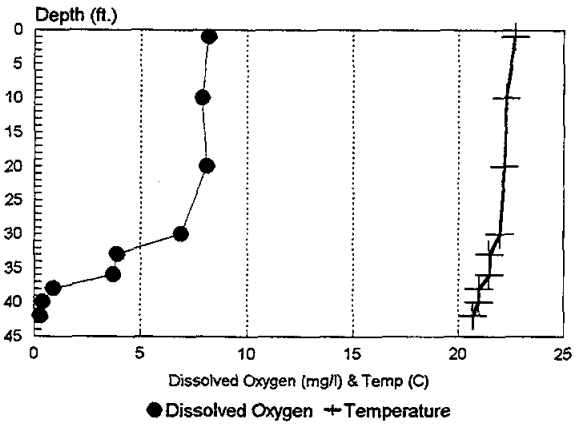
PICKEREL LAKE 6/16/93
Dissolved Oxygen & Temperature Profile



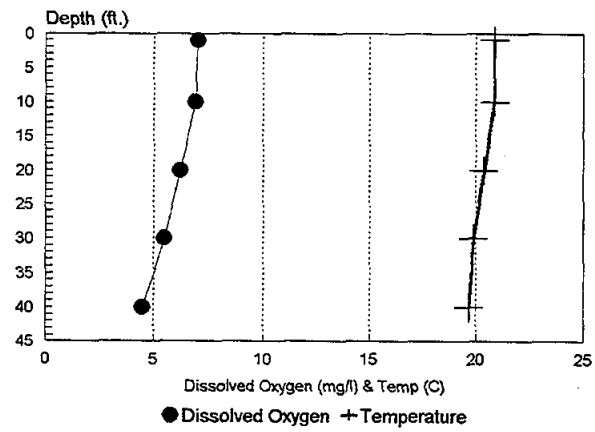
PICKEREL LAKE 7/23/93
Dissolved Oxygen & Temperature Profile



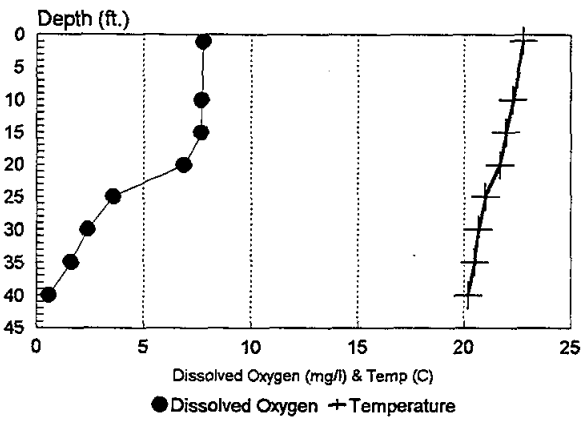
PICKEREL LAKE 8/22/93
Dissolved Oxygen & Temperature Profile



PICKEREL LAKE 6/15/94
Dissolved Oxygen & Temperature Profile

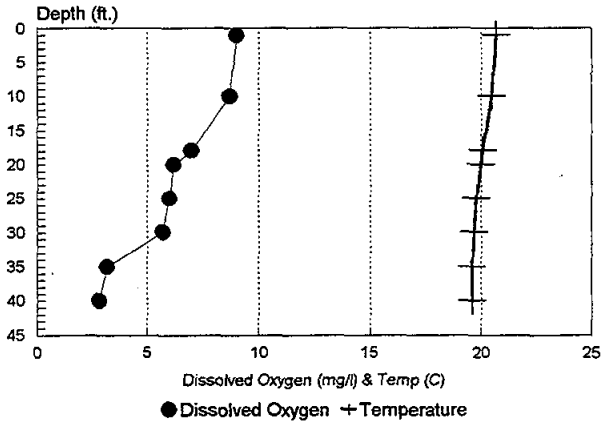


PICKEREL LAKE 7/17/94
Dissolved Oxygen & Temperature Profile



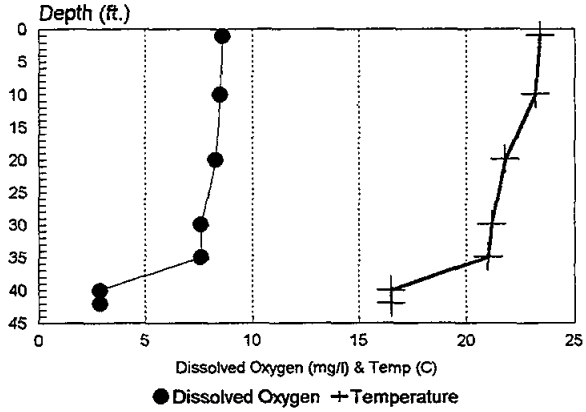
PICKEREL LAKE 8/17/94

Dissolved Oxygen & Temperature Profile



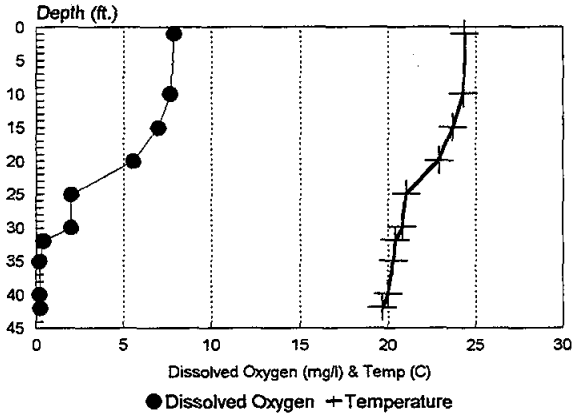
PICKEREL LAKE 6/19/95

Dissolved Oxygen & Temperature Profile



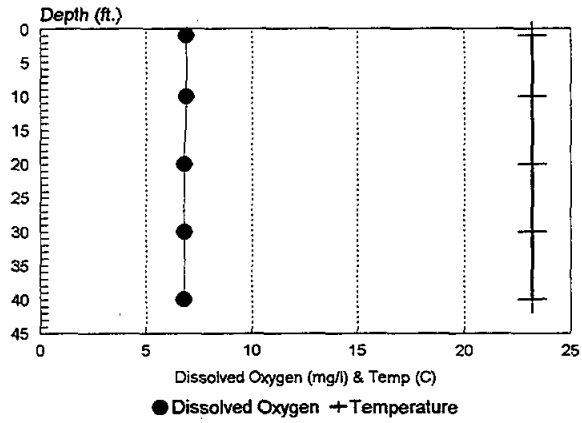
PICKEREL LAKE 7/15/95

Dissolved Oxygen & Temperature Profile



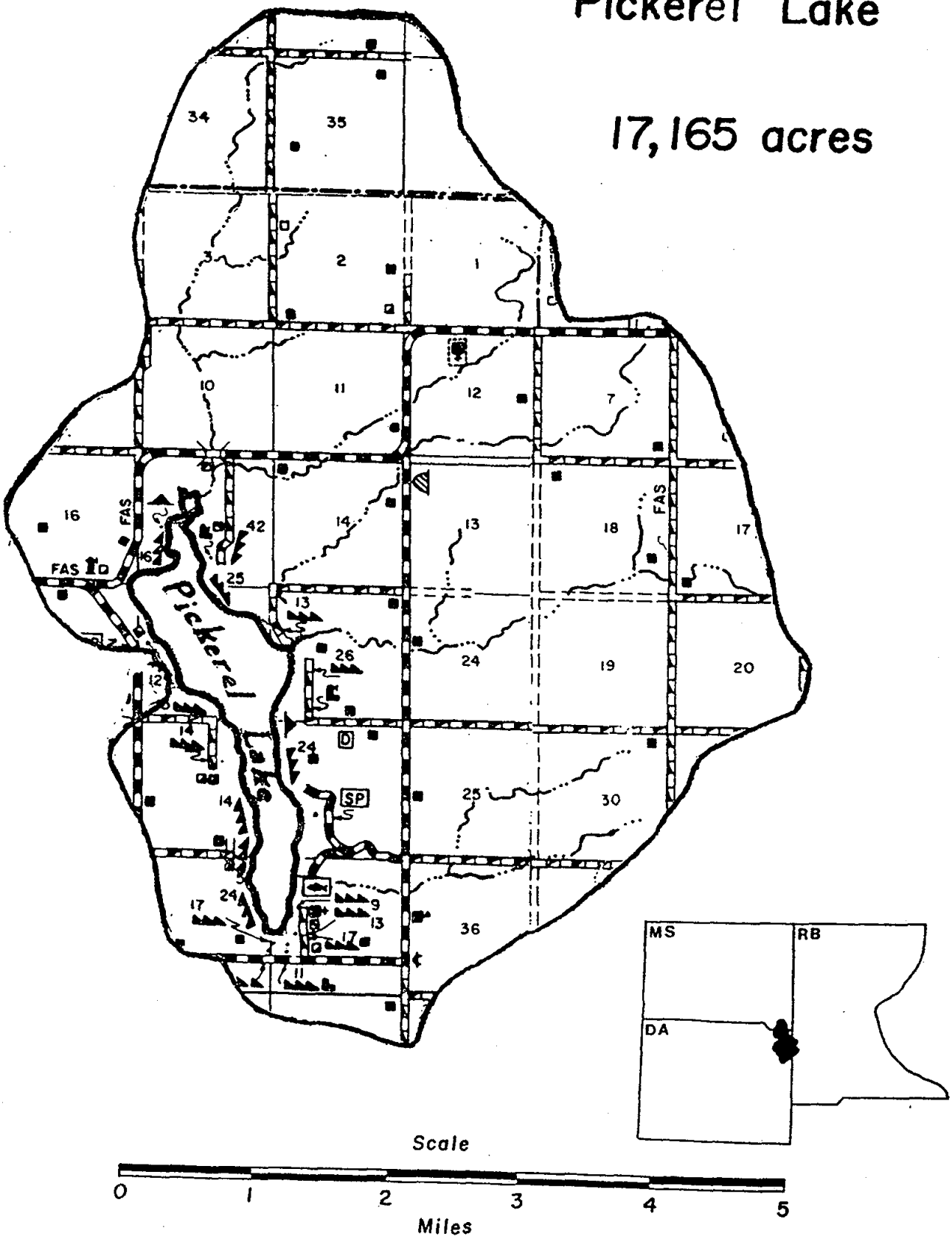
PICKEREL LAKE 8/15/95

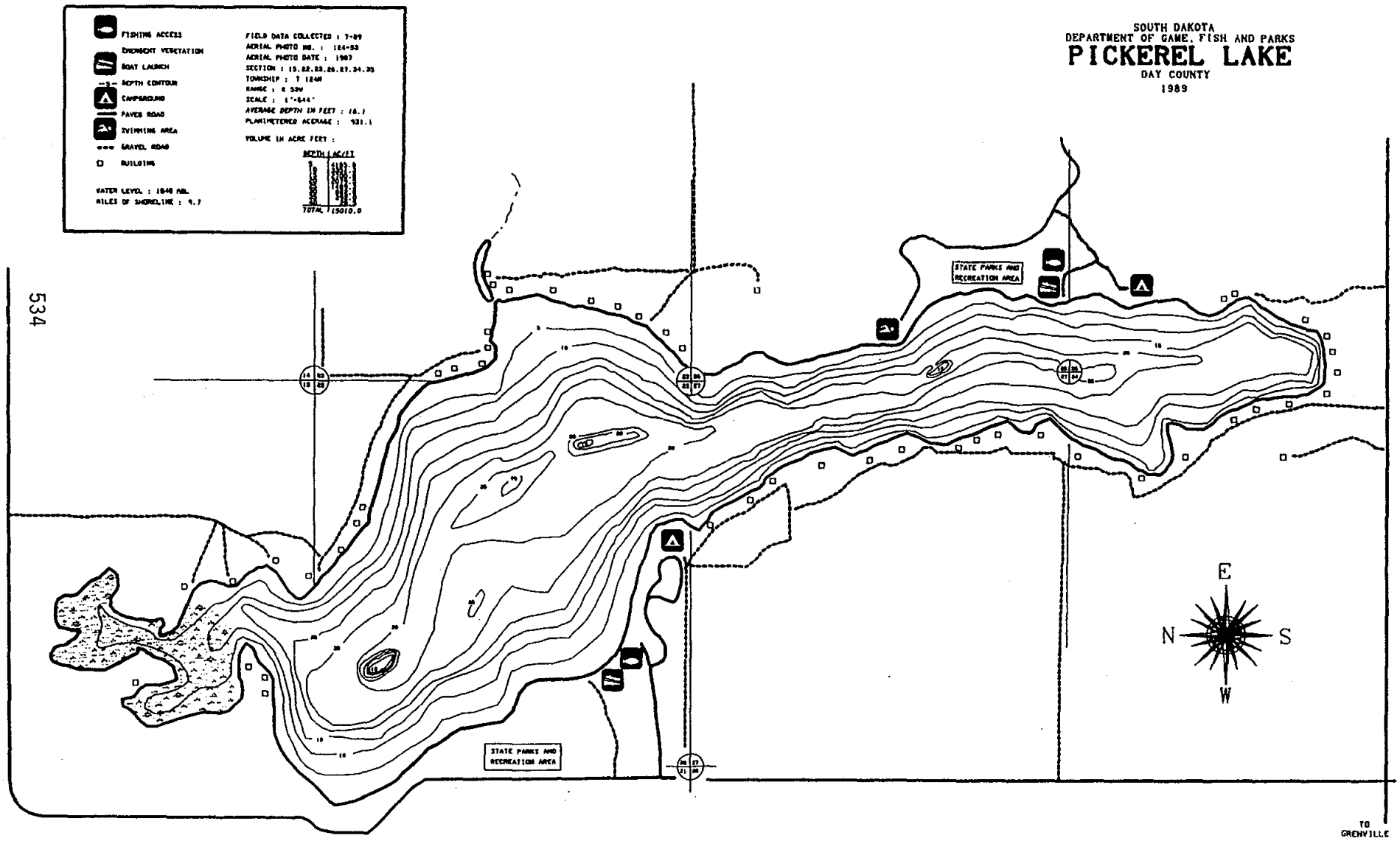
Dissolved Oxygen & Temperature Profile

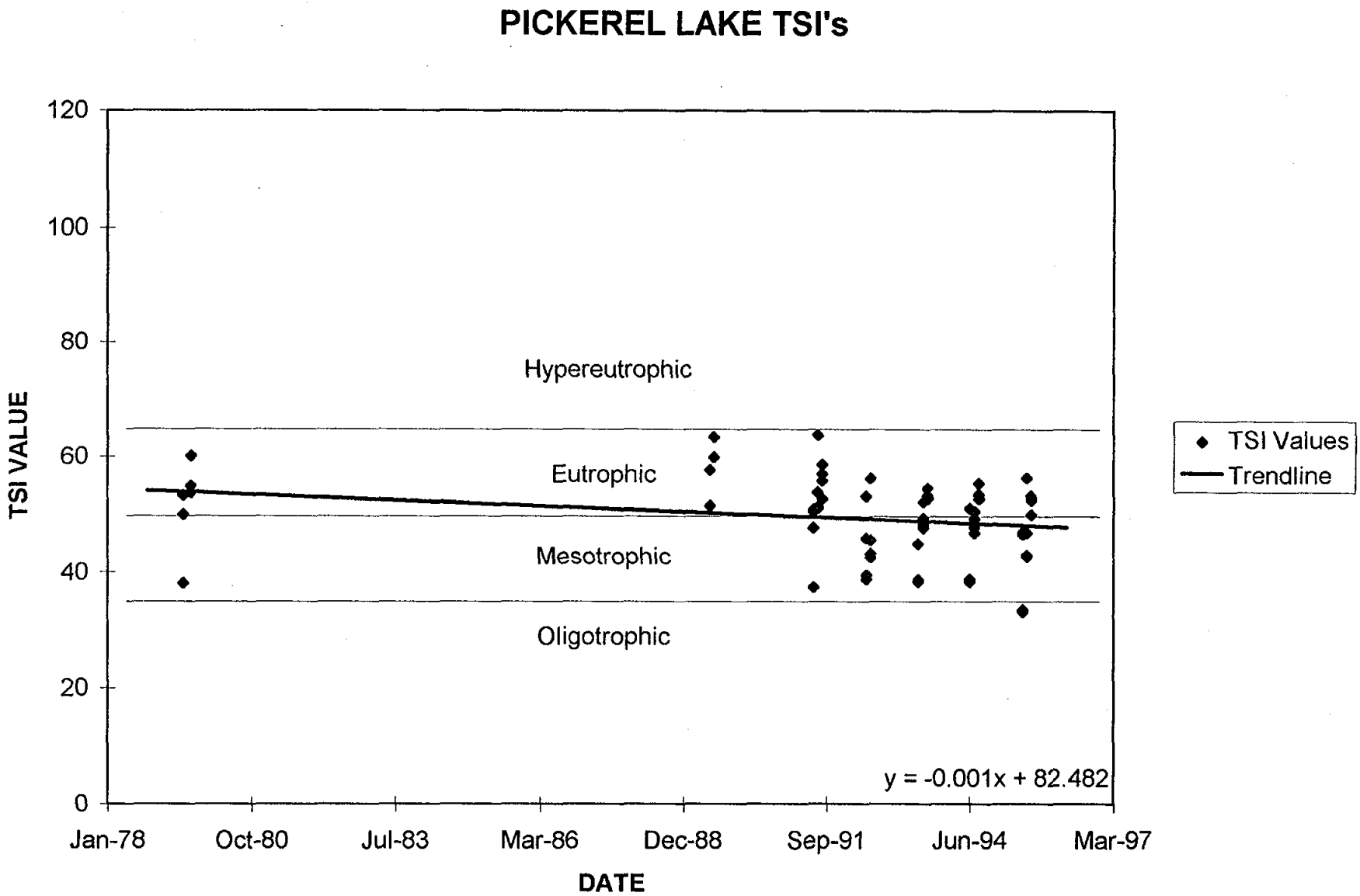


Pickerel Lake

17,165 acres




FISHING ACCESS
EMERGENT VEGETATION
BOAT LAUNCH
DEPTH CONTOUR
CAMPGROUND
PAVED ROAD
SWIMMING AREA
GRAVEL ROAD
BUILDING
WATER LEVEL : 1848 MSL
MILES OF SHORELINE : 9.7
FIELD DATA COLLECTED : 7-89
AERIAL PHOTO NO. : 184-53
AERIAL PHOTO DATE : 1987
SECTION : 15,22,23,26,27,34,35
TOWNSHIP : T 124N
RANGE : R 53W
SCALE : 1"=844'
AVERAGE DEPTH IN FEET : 16.1
PLANIMETERED ACREAGE : 931.1
VOLUME IN ACRE FEET :
DEPTH | AC/FT
TOTAL | 15010.0
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
PICKEREL LAKE
DAY COUNTY
1989
STATE PARKS AND RECREATION AREA
STATE PARKS AND RECREATION AREA
E
N
S
W
TO GRENVILLE


PICKEREL LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.001x + 82.482
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

PIERPONT LAKE

County: Day
Latitude: 45 deg. 27 min. 42 sec. N
Longitude: 97 deg. 49 min. 48 sec. W
Area: 77.3 A (31.3 ha)
Maximum Depth: 16 ft (4.9 m)
Volume: 6,002 acre-ft (7.404 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Mud Creek
Outlet: Mud Creek

Township: 123 N
Range: 58W
Section(s): 17
Shoreline L: 2.2 mi (3.5 km)
Mean Depth: 7.8 ft (2.4 m)
Watershed/Lake Area: 76
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: City owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.63	4	23.70	4	21.48
Air Temperature (°C)	4	27.50	4	25.80	4	16.75
Secchi Disk Depth (meters)	2	1.05	2	0.93	2	1.68
Conductivity (cond/25° C)	4	1,066	2	1,497	-	-
Turbidity (NTU)	-	-	-	-	4	4.99
Lab pH (su)	4	8.28	-	-	-	-
Field pH (su)	2	8.20	4	8.51	4	8.18
Total Alkalinity (mg/l)	4	129	4	158	4	136
Total Solids (mg/l)	4	862	4	1,175	4	786
Dissolved Solids (mg/l)	4	848	4	1,141	4	782
Suspended Solids (mg/l)	4	14	4	34	4	5
Volatile Suspended Solids (mg/l)	-	-	2	9	-	-
Ammonia Nitrogen (mg/l)	4	0.05	4	0.03	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.63	4	1.10	4	1.12
Total Phosphorus (mg/l)	4	0.078	4	0.121	4	0.090
Total Dissolved Phosphorus (mg/l)	-	-	4	0.049	4	0.042
Ortho Phosphate as P (mg/l)	4	0.010	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	40.20	2	50.59

Year	1989	1991	1993
TSI Values -- Mean:	61.93	67.92	63.26
Secchi Disk	59.27	61.10	52.56
Total Phosphorus	64.59	75.85	68.16
Chlorophyll *a*		66.81	69.06

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus, and Ceratophyllum demersum

Algal Species and Densities

	June 27,1989		July 27, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Algae (flagellate)	140	2,106	10	398
Cryptomonas sp. #1	28	421	26	1,034
Algae (other)	23	346	173	6,878
Cryptomonas	17	256	9	358
Aphanocapsa	16	241	12	477
Euglena	15	226	-	-
Aphanizomenon flos-aquae	14	211	9	358
Merismopedia	11	165	-	-
Diatom (centric)	9	135	-	-
Lyngbya Diguetii	8	120	-	-
Scenedesmus	6	90	-	-
Cryptomonas ovata	4	60	-	-
Mallomonas	2	30	-	-
Blue-green (other)	2	30	18	716
Anabaena	2	30	6	239
Tetrastrum	1	15	-	-
Diatom (pennate)	1	15	1	40
Green Algae (other)	1	15	3	119
Loefgrenia anomala	1	15	-	-
Chroococcus	-	-	3	119
Lyngbya	-	-	3	119
Dactylococcopsis	-	-	3	119
Total	301	4,527	300	11,927

Watershed Description

Watershed Area: 5,885 A (2382 ha)

Soil Associations within Watershed

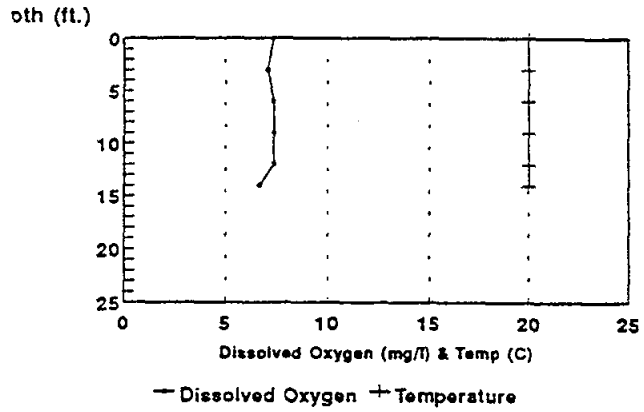
Association	Area (A)	% of Total
FU-AA-PA	3,272.0	55.6
KN	1,306.5	22.2
PN-WG	1,306.5	22.2

FU-AA-PA Forman-Aastad-Parnell: Well drained and moderately well drained, gently undulating to moderately steep loamy soils and very poorly drained soils that formed in alluvium in depressions.

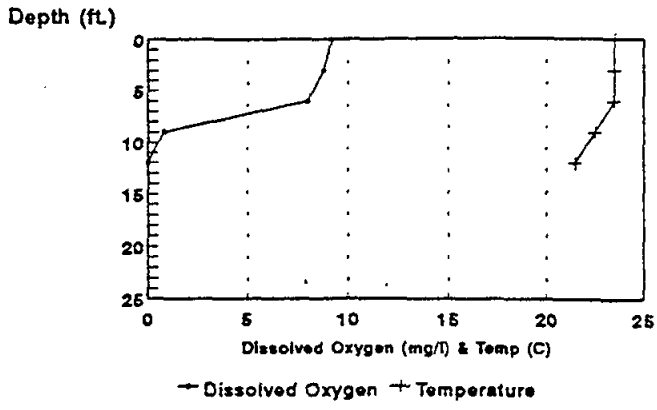
KN Kranzburg: Well drained, nearly level to sloping silty soils that formed in loess over glacial till.

PN-WG Poinsett-Waubay: Well drained and moderately well drained, nearly level to sloping silty soils that formed in glacial drift.

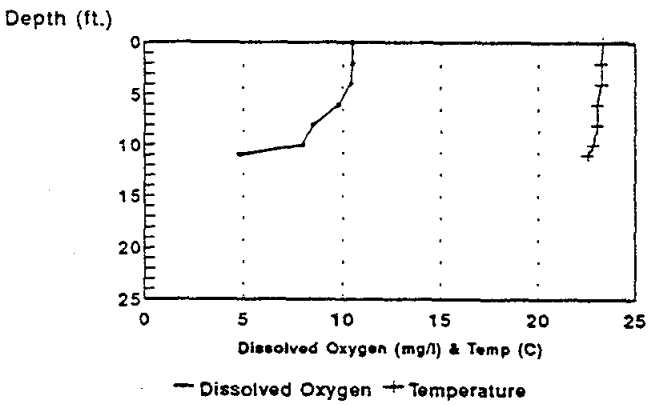
LAKE PIERPONT 7/7/93
Dissolved Oxygen & Temperature Profile



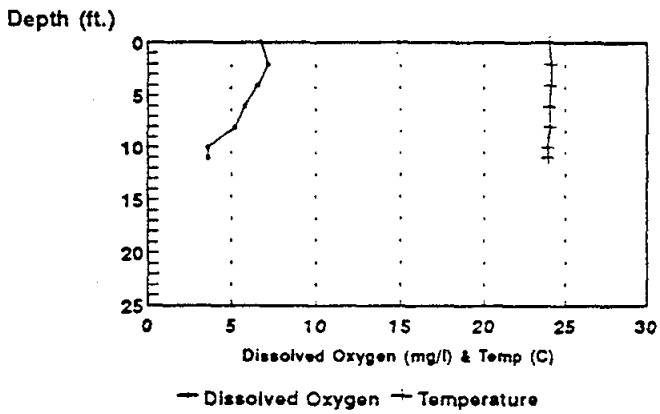
LAKE PIERPONT 8/18/93
Dissolved Oxygen & Temperature Profile



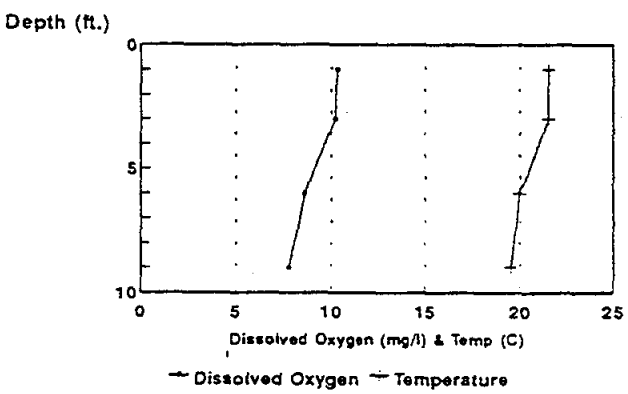
LAKE PIERPONT 6/26/91
Dissolved Oxygen & Temperature Profile



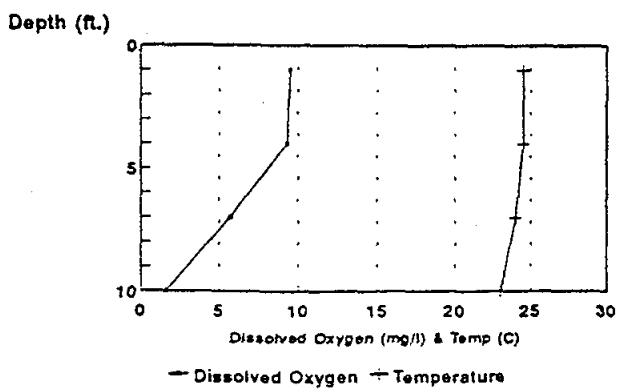
LAKE PIERPONT 8/29/91
Dissolved Oxygen & Temperature Profile



Lake Pierpont 6/27/89
Dissolved Oxygen & Temperature Profile

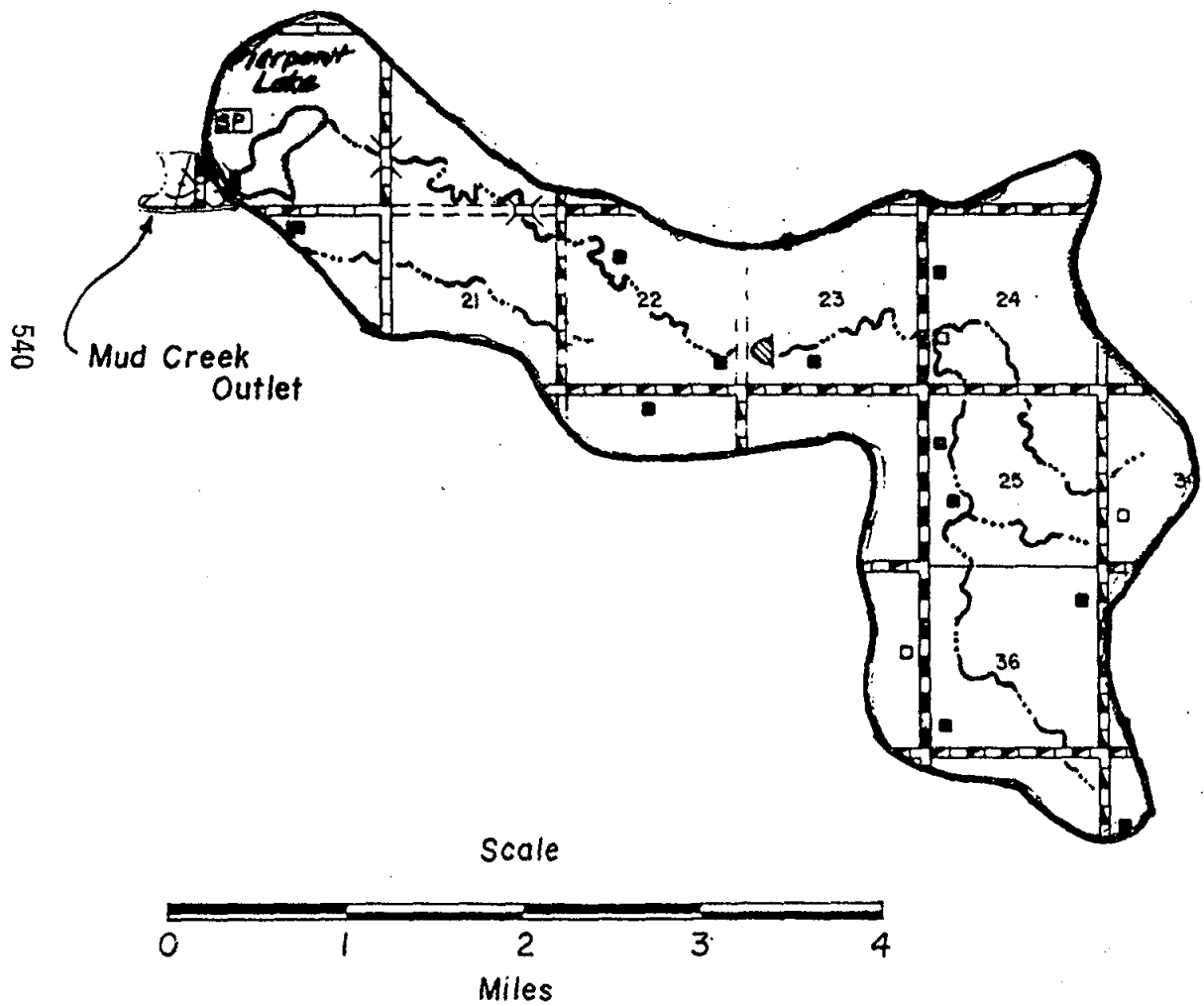


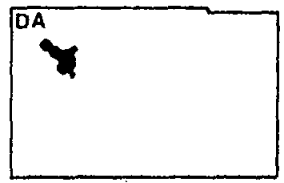
Lake Pierpont 7/27/89
Dissolved Oxygen & Temperature Profile



Pierpont Lake

5885 acres

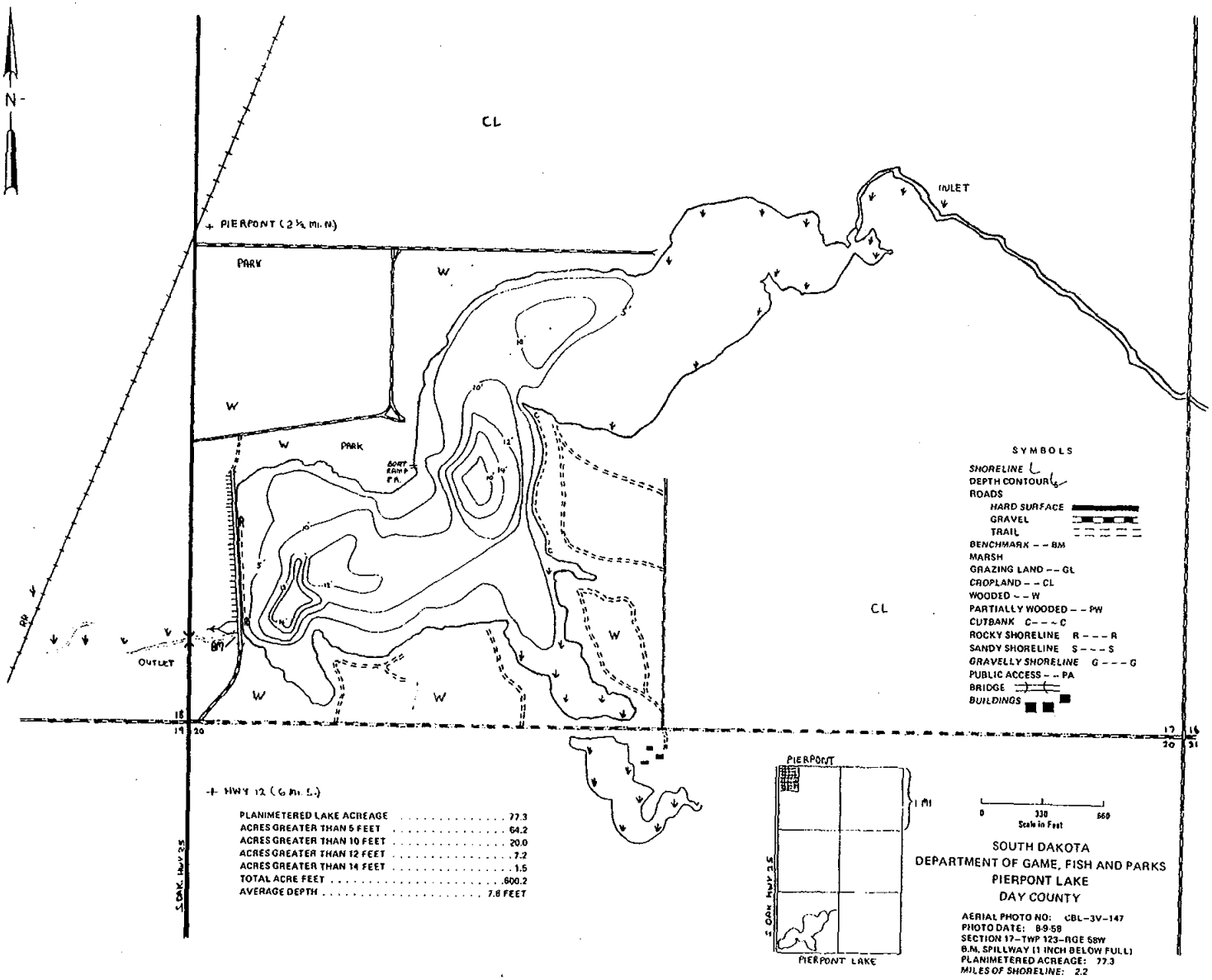


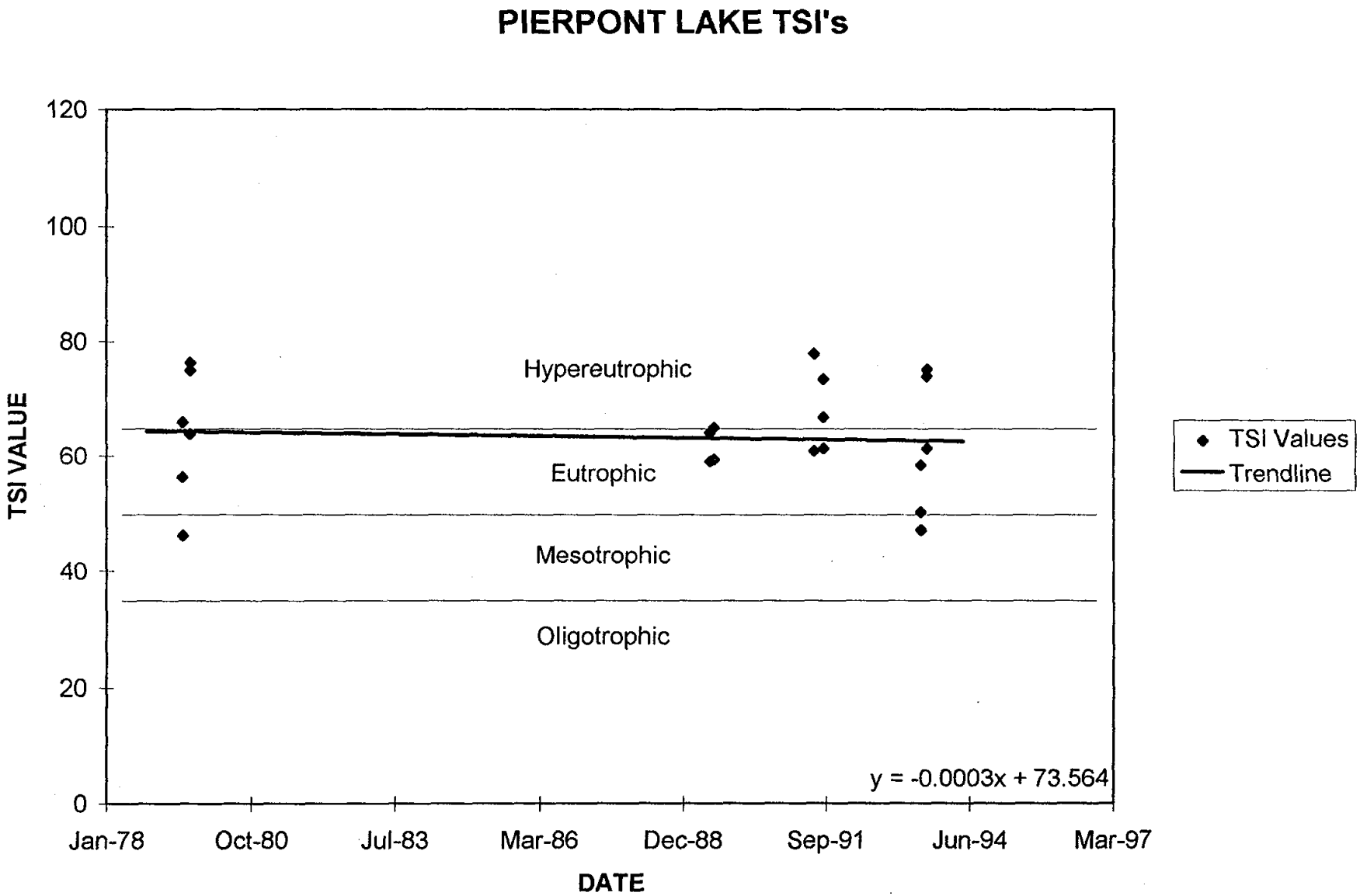


Scale

0 1 2 3 4

Miles


-N-
CL
INLET
+ PIERPONT (2½ mi. N)
PARK
W
PARK
BOAT RAMP P.A.
OUTLET
CL
SYMBOLS
SHORELINE
DEPTH CONTOURS
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK -- BM
MARSH
GRAZING LAND -- GL
CROPLAND -- CL
WOODED -- W
PARTIALLY WOODED -- PW
CUTBANK C--- C
ROCKY SHORELINE R--- R
SANDY SHORELINE S--- S
GRAVELLY SHORELINE G--- G
PUBLIC ACCESS -- PA
BRIDGE
BUILDINGS
+ HWY 12 (6 mi. E.)
S. DAK. HWY 25
PLANIMETERED LAKE ACREAGE 77.3
ACRES GREATER THAN 5 FEET 64.2
ACRES GREATER THAN 10 FEET 20.0
ACRES GREATER THAN 12 FEET 7.2
ACRES GREATER THAN 14 FEET 1.5
TOTAL ACRE FEET 600.2
AVERAGE DEPTH . . . . . 7.8 FEET
PIERPONT
1 MI
S. DAK. HWY 25
PIERPONT LAKE
0 330 660
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
PIERPONT LAKE
DAY COUNTY
AERIAL PHOTO NO: CBL-3V-147
PHOTO DATE: 8-9-58
SECTION 17-TWP 123-RGE 58W
B.M. SPILLWAY (1 INCH BELOW FULL)
PLANIMETERED ACREAGE: 77.3
MILES OF SHORELINE: 2.2


PIERPONT LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0003x + 73.564
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE PLATTE

County: Charles Mix
Latitude: 43 deg. 23 min. 21 sec. N
Longitude: 98 deg. 53 min. 38 sec. W
Area: 140 A (56.7 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Platte Creek
Outlet: Platte Creek

Township: 99N
Range: 68W
Section(s): 16, 21
Shoreline L: 5.7 mi (9.1 km)
Mean Depth: NA
Watershed/Lake Area: 2,225
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 97,246
Ownership Status: City owned
Public Interest: City of Platte

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.50	2	24.50	4	20.67
Air Temperature (°C)	4	19.50	2	27.00	4	19.25
Secchi Disk Depth (meters)	2	0.29	1	0.30	2	1.74
Conductivity (cond/25° C)	4	993	-	-	-	
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.40	-	-	-	-
Field pH (su)	2	8.60	2	8.58	4	8.34
Total Alkalinity (mg/l)	4	173	2	185	4	157
Total Solids (mg/l)	4	827	2	408	4	810
Dissolved Solids (mg/l)	4	750	2	351	4	760
Suspended Solids (mg/l)	4	77	2	57	4	50
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.13	2	0.21	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	2	0.70	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.33	2	1.24	4	1.27
Total Phosphorus (mg/l)	4	0.315	2	0.249	4	0.259
Total Dissolved Phosphorus (mg/l)	-	-	2	0.129	4	0.051
Ortho Phosphate as P (mg/l)	4	0.063	-	-	-	
Chlorophyll (mg/m^3)	-	-	-	-	2	18.76

Year	1989	1991	1992
TSI Values -- Mean:	81.92	80.09	65.15
Secchi Disk	77.88	77.14	52.01
Total Phosphorus	85.95	83.04	84.12
Chlorophyll *a*			59.33

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 65%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

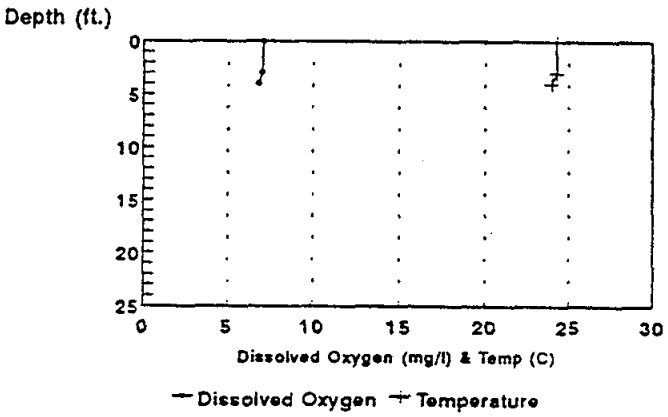
	June 14, 1989			
Taxa	Number	Units/ml	Number	Units/ml
Green Algae (other)	115	2460	12	1723
Cyclotella meneghiniana	68	1455	15	2153
Closterium	37	791	-	-
Oocystis	23	492	-	-
Algae (other)	16	342	38	5455
Melosira granulata	9	193	-	-
Scenedesmus	9	193	3	431
Staurastrum	8	171	-	-
Pediastrum	7	150	-	-
Phacus	3	64	-	-
Aphanizomenon flos-aquae	3	64	7	1005
Cryptomonas	2	43	3	431
Cryptomonas sp. #1	2	43	8	1148
Cryptomonas ovata	2	43	-	-
Aphanocapsa	-	-	197	28280
Dactylococcopsis	-	-	8	1148
Algae (flagellate)	-	-	4	574
Microcystis	-	-	3	431
Melosira ambigua	-	-	2	287
Diatom (centric)	-	-	1	144
Total	304	6503	301	43210

Watershed Description
Watershed Area: 311,568 A (126,092 ha)

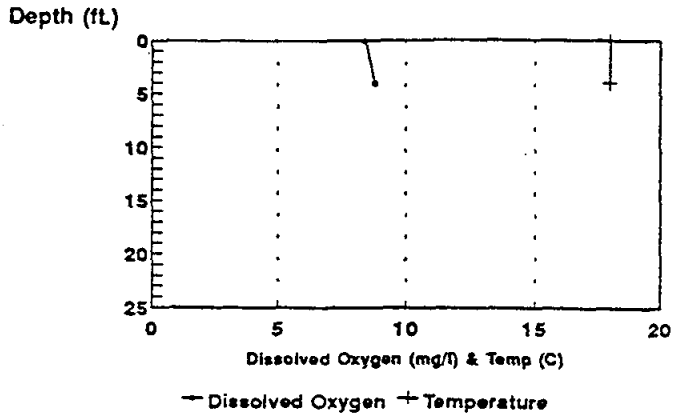
Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

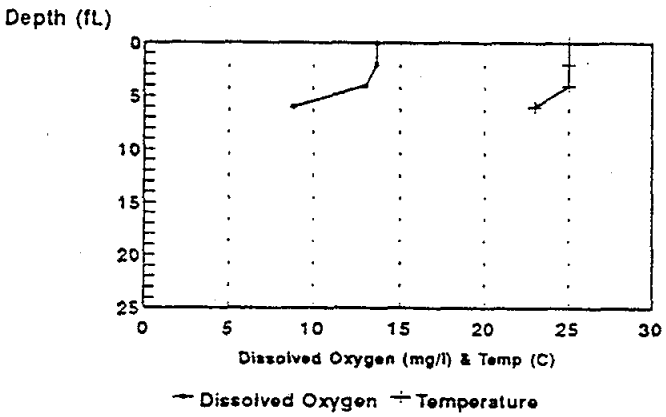
LAKE PLATTE 7/28/92
Dissolved Oxygen & Temperature Profile



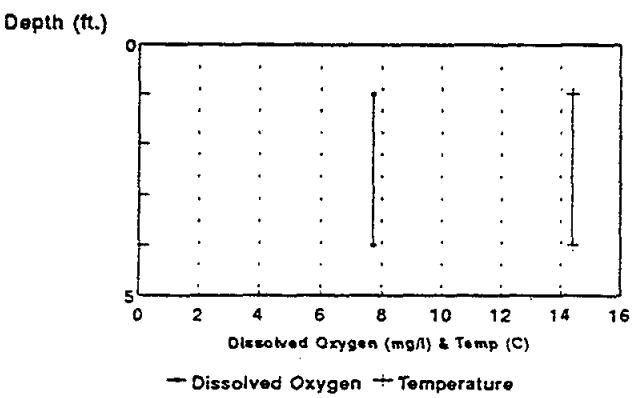
LAKE PLATTE 8/25/92
Dissolved Oxygen & Temperature Profile



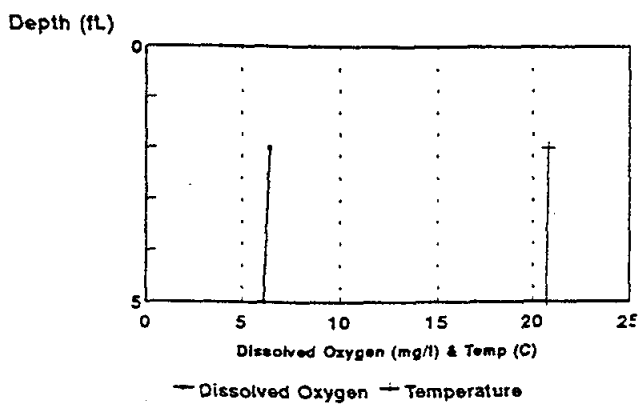
LAKE PLATTE 8/14/91
Dissolved Oxygen & Temperature Profile



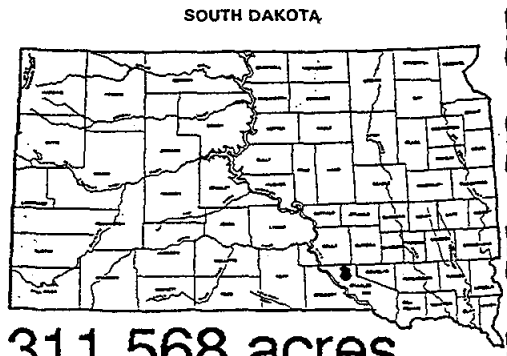
Lake Platte, 6/14/89
Dissolved Oxygen & Temperature Profile



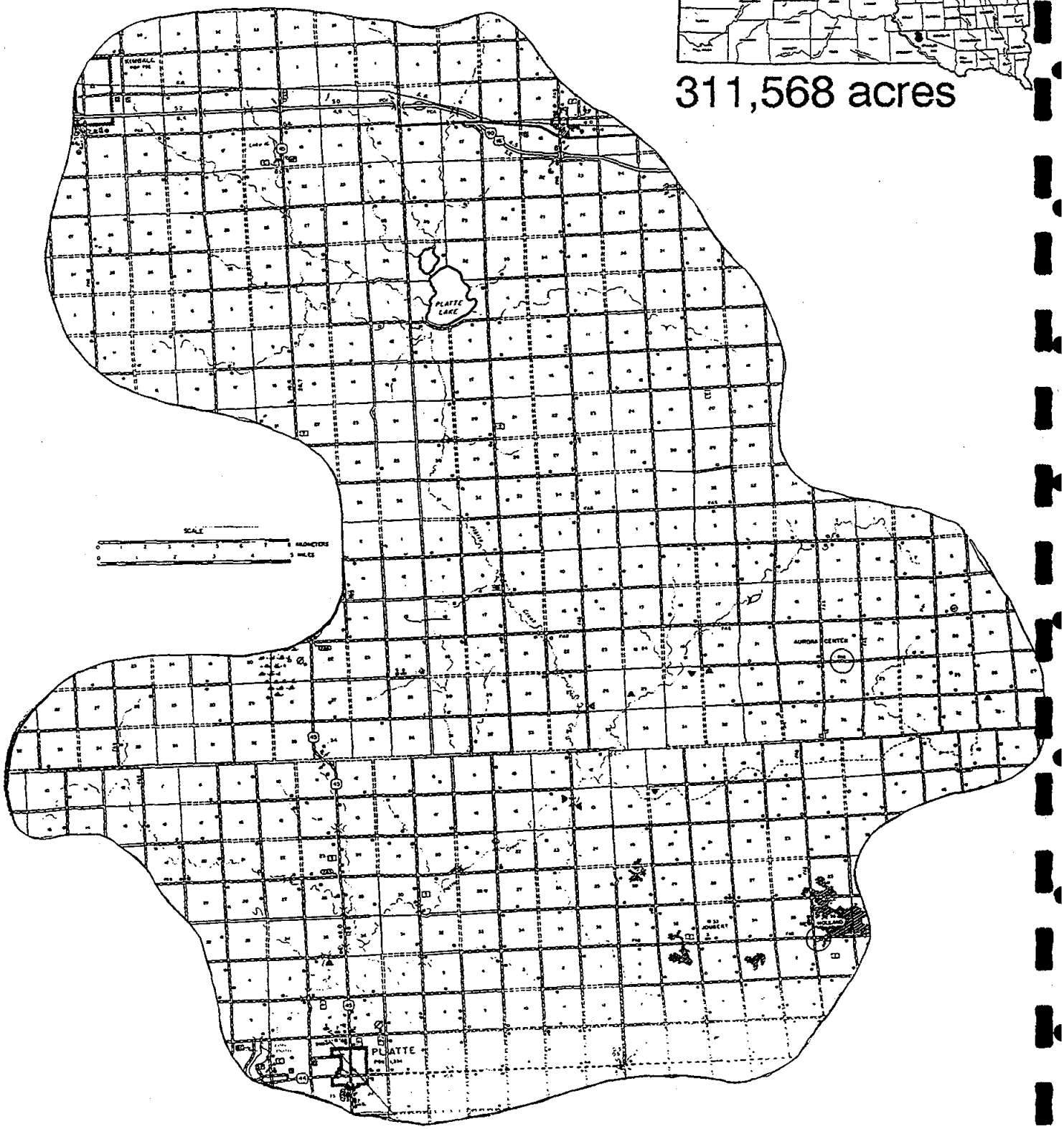
Lake Platte, 7/17/89
Dissolved Oxygen & Temperature Profile

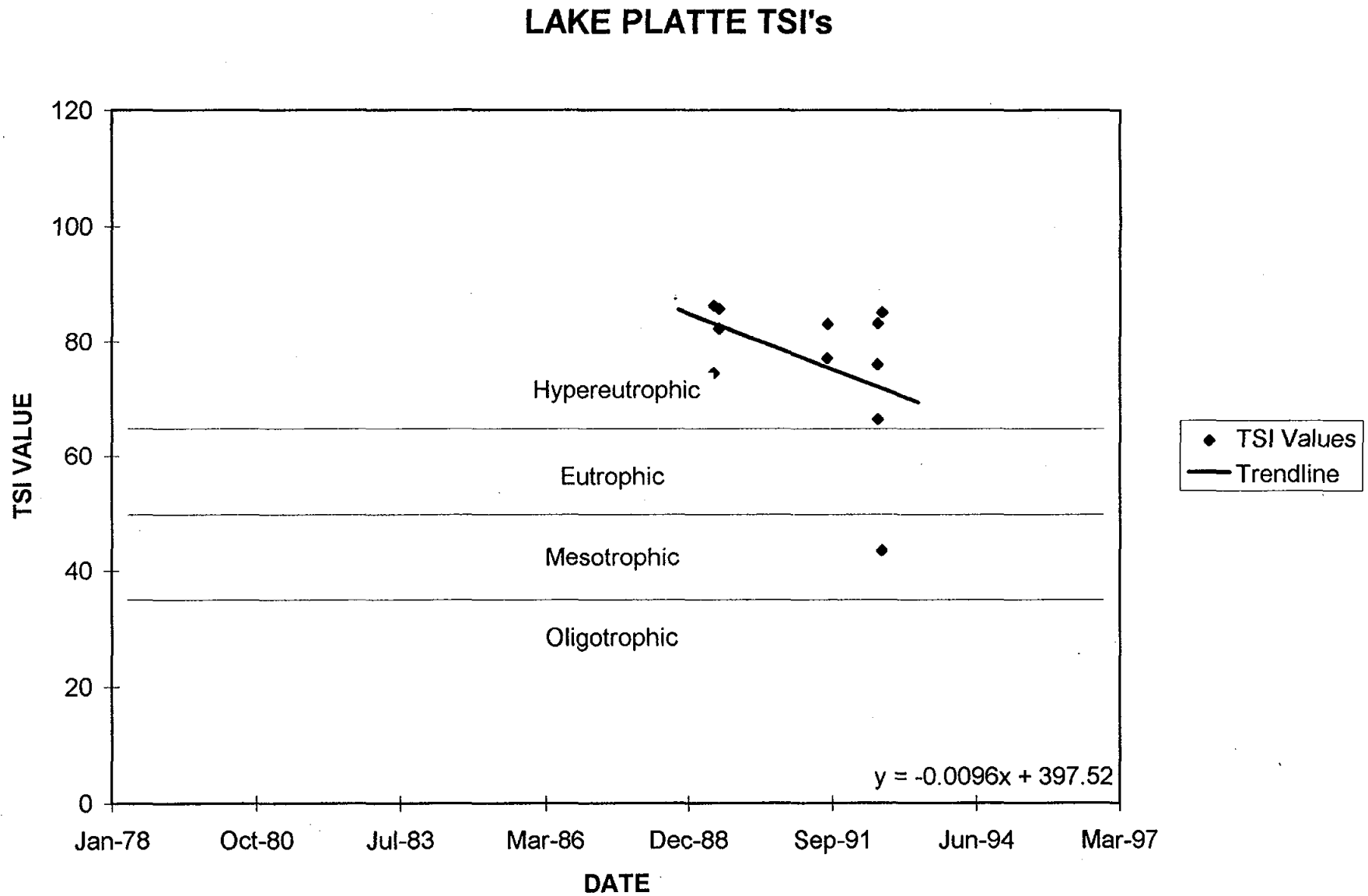


Lake Platte



311,568 acres




LAKE PLATTE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0096x + 397.52
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE POCASSE

County: Campbell
N Latitude: 45 deg. 54 min. 18 sec. N
Longitude: 100 deg. 16 min. 00 sec. W

Township: 128N
Range: 78W
Section(s): 9-10, 15-16, 22-23, 25-26

Area: 1378 A (557.7 ha)
Maximum Depth: 20 ft (6.1 m)
Volume: 18,000 acre-ft (2.22 x $10^7 m^3$)
Origin of Basin: impoundment
Shoreline L: 15.8 mi (25 km)
Mean Depth: 10 ft (3.0 m)
Watershed/Lake Area: 230
Thermal Stratification: no
Major Inflows (named or permanent streams): Spring Creek
Outlet: Lake Oahe

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 42,297
Ownership Status: Federal and State owned
Public Interest: NA

	1989		1993	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.38	2	22.65
Air Temperature (°C)	4	18.61	2	26.00
Secchi Disk Depth (meters)	2	0.35	1	1.14
Conductivity (cond/25° C)	4	523	-	-
Turbidity (NTU)	-	-	2	3.06
Lab pH (su)	4	8.45	-	-
Field pH (su)	-	-	2	7.28
Total Alkalinity (mg/l)	4	158	2	132
Total Solids (mg/l)	4	417	2	231
Dissolved Solids (mg/l)	4	385	2	228
Suspended Solids (mg/l)	4	32	2	4
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.20	2	0.12
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	2	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.10	2	1.47
Total Phosphorus (mg/l)	4	0.480	2	0.893
Total Dissolved Phosphorus (mg/l)	-	-	2	0.838
Ortho Phosphate as P (mg/l)	4	0.321	-	-
Chlorophyll (mg/m^3)	-	-	1	14.74

Year	1989	1993
TSI Values -- Mean:	84.19	72.38
Secchi Disk	75.12	58.11
Total Phosphorus	93.25	102.06
Chlorophyll *a*		56.96

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 100% for east arm
Type of Vegetation: Various species
Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities
July 18, 1989

Taxa	Number	Units/ml
Aphanizomenon flos-aquae	30	998
Chroococcus	7	233
Characium	7	233
Anabaena	6	200
Algae (other)	3	100
Algae (flagellate)	2	67
Blue-green (other)	1	33
Scenedesmus	1	33
Green Algae (other)	1	33
Total	58	1,929

Watershed Description

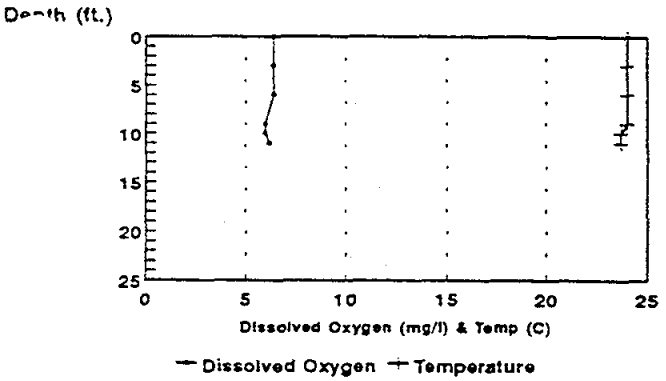
Watershed Area: 317,440 A (128,468 ha)

Soil Associations within Watershed

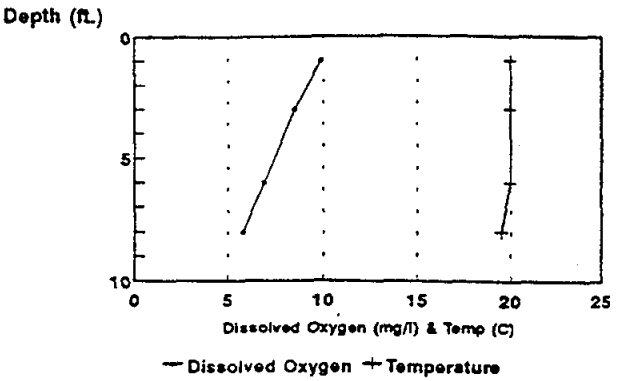
Association	Area (A)	% of Total
ZD	104,755	33
WJ-B1	82,534	26
L4-WD	41,267	13
L5-M4	34,918	11
HE	22,220	7
VV-WJ	19,046	6
JV-L4	6,348	2
Z3-NT	3,174	1

ZD	Bearpaw: Deep, well drained, nearly level to strongly sloping loamy soils that formed in firm clay loam glacial till; on uplands.
WJ-B1	Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating, loamy soils that formed in glacial till; on uplands.
L4-WD	Lehr-Wabek: Well drained to excessively drained, gently undulating to rolling loamy soils that are shallow and very shallow over sand and gravel; on outwash plains.
L5-M4	Linton-Mandan: Deep, well drained, nearly level to moderately steep soils that formed in loess; on uplands.
HE	Harriet: Deep, poorly drained, nearly level loamy soils that have claypan subsoils; on bottom land.
VV-WJ	Vida-Williams: Deep, well drained, gently undulating to strongly sloping, loamy soils that formed in glacial till; on uplands.
JV-L4	Bowdle-Lehr: Well drained and somewhat excessively drained, nearly level to rolling, loamy soils that are moderately deep and shallow over outwash sand and gravel, on terraces and outwash plains.
Z3-NT	Sansarc-Opal: Shallow and moderately deep, well drained to excessively drained, sloping to steep, clayey sooils that formed in materials weathered from shale; on uplands.

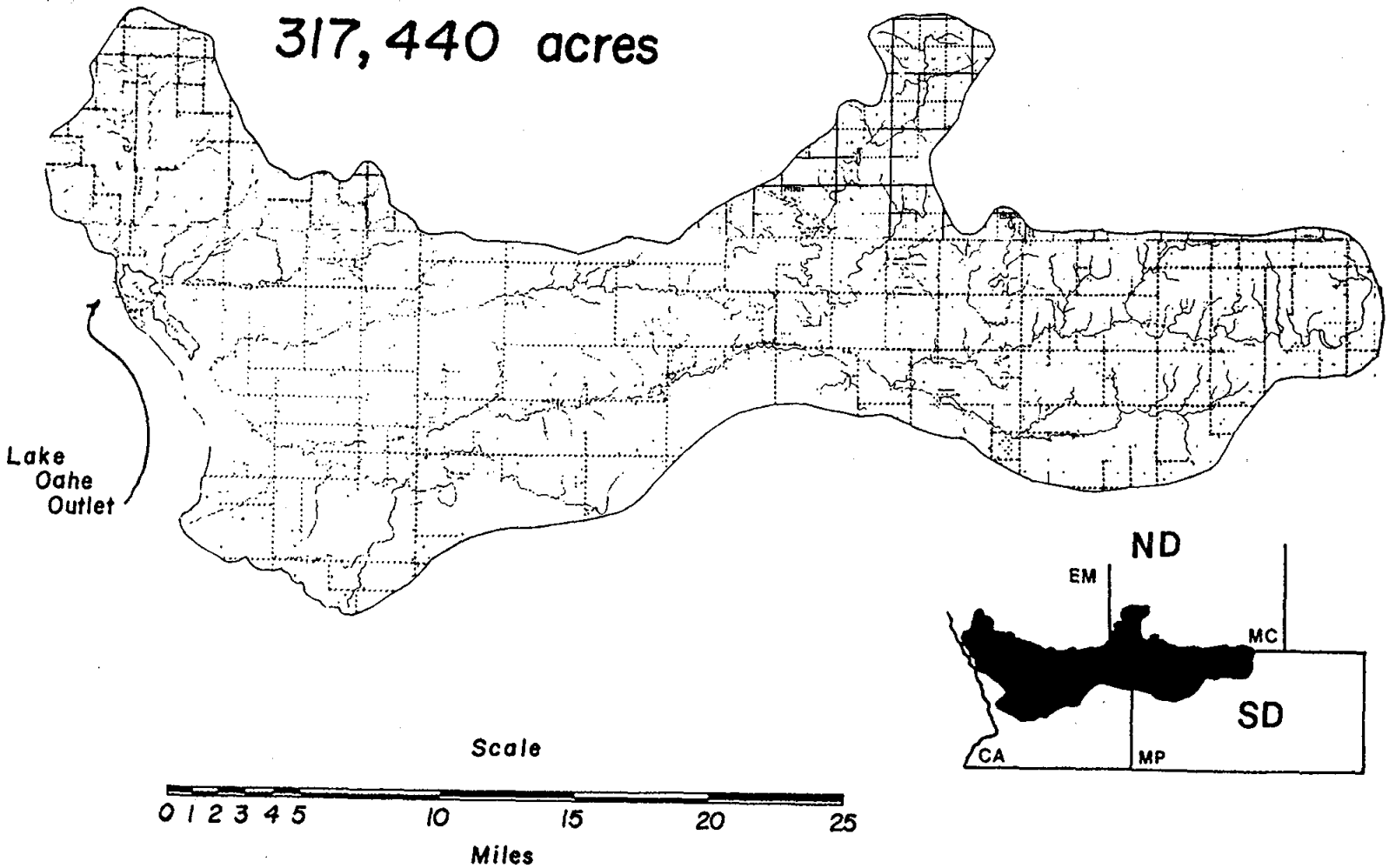
LAKE POCASSE 8/16/93
Dissolved Oxygen & Temperature Profile

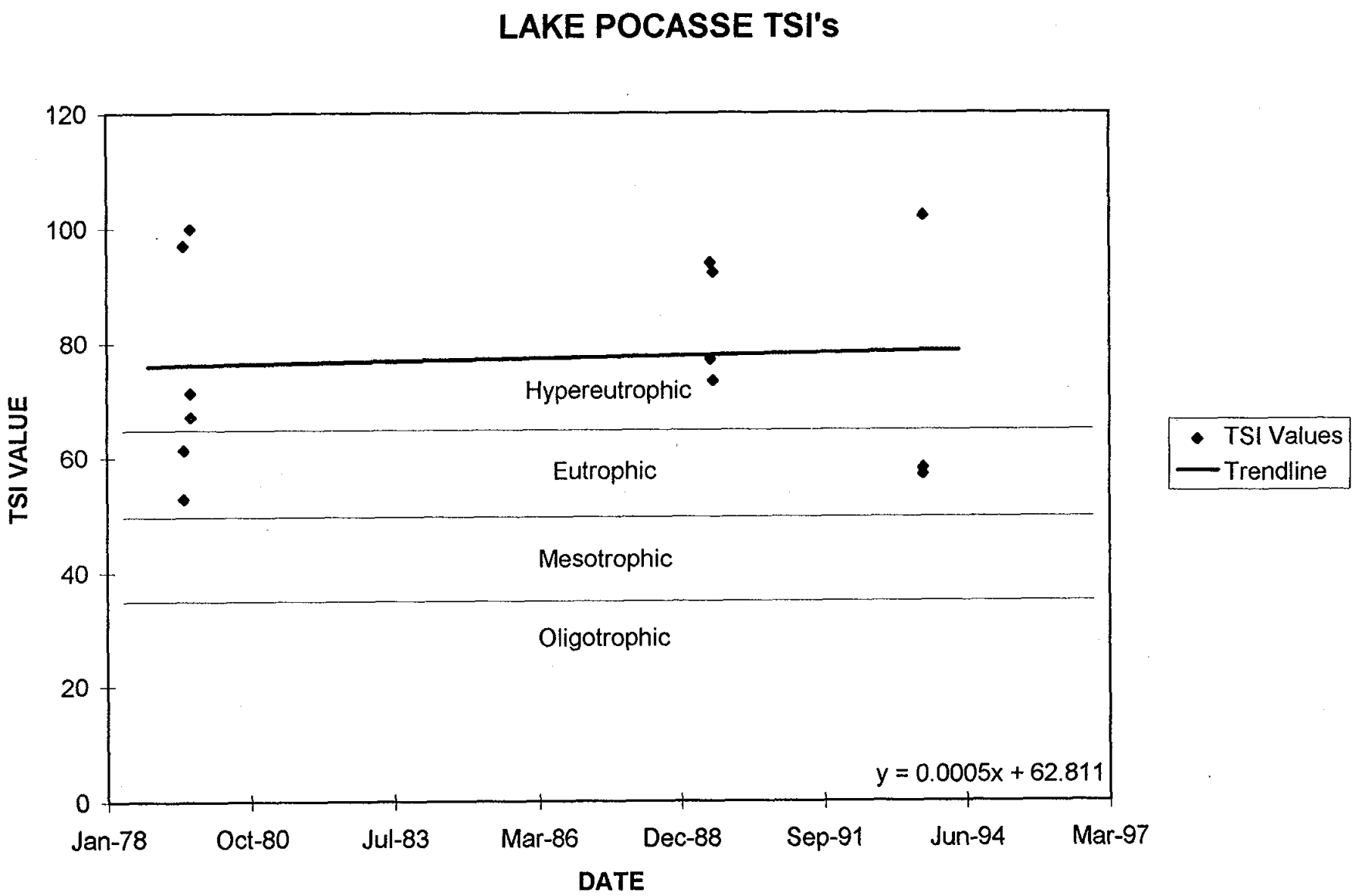


Lake Pocasse, 8/8/89
Dissolved Oxygen & Temperature Profile



Lake Pocasse




LAKE POCASSE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0005x + 62.811
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE POINSETT

County: Hamlin
Latitude: 44 deg. 33 min. 42 sec. N
Longitude: 97 deg. 04 min. 42 sec. W
Area: 7868 A (3184.1 ha)
Maximum Depth: 19.5 ft (5.9 m)
Volume: 74746 acre-ft (9.221 x $10^7 m^3$)
Origin of Basin: natural (glacial)
Township: 113N
Range: 52W
Section(s): 14-16,20-23,26-33
Shoreline L: 14.9 mi (24 km)
Mean Depth: 9.5 ft (2.9 m)
Watershed/Lake Area: 37
Thermal Stratification: no
Major Inflows (named or permanent streams): Big Sioux River
Outlet: Big Sioux River

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Lake Poinsett Area Development Association

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.60	4	22.75	4	18.83
Air Temperature (°C)	4	25.50	4	25.00	4	18.00
Secchi Disk Depth (meters)	2	0.88	2	1.16	2	0.77
Conductivity (cond/25° C)	4	1,164	2	1,374	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	8.60	-	-
Field pH (su)	4	8.43	4	8.39	4	8.64
Total Alkalinity (mg/l)	4	177	4	179	4	206
Total Solids (mg/l)	4	1,035	4	1,198	4	1,105
Dissolved Solids (mg/l)	4	1,013	4	1,181	4	1,086
Suspended Solids (mg/l)	4	22	4	17	4	20
Volatile Suspended Solids (mg/l)	-	-	2	4	-	-
Ammonia Nitrogen (mg/l)	4	0.63	4	0.08	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.33	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	2.25	4	1.39	4	1.31
Total Phosphorus (mg/l)	4	0.199	4	0.156	4	0.069
Total Dissolved Phosphorus (mg/l)	-	-	4	0.125	4	0.044
Ortho Phosphate as P (mg/l)	4	0.084	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	44.22	1	10.72

Year	1989	1991	1992
TSI Values -- Mean:	70.93	68.40	60.55
Secchi Disk	61.78	57.88	63.77
Total Phosphorus	80.07	79.58	64.04
Chlorophyll *a*		67.74	53.84

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

	June 21, 1989		July 25, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Cryptomonas sp. #1	45	1,125	4	153
Aphanizomenon flos-aquae	29	725	239	9,156
Diatom (pennate)	17	425	-	-
Characium	11	275	-	-
Algae (other)	5	125	1	38
Lyngbya	1	25	4	153
Algae (flagellate)	1	25	1	38
Green Algae (other)	1	25	-	-
Aphanocapsa	-	-	49	1,877
Chroococcus	-	-	5	192
Total	110	2,750	303	11,608

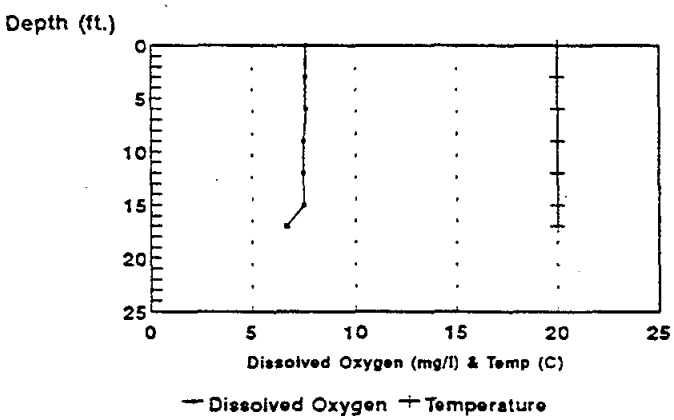
Watershed Description
Watershed Area: 292,197 A (118,252 ha)

Soil Associations within Watershed

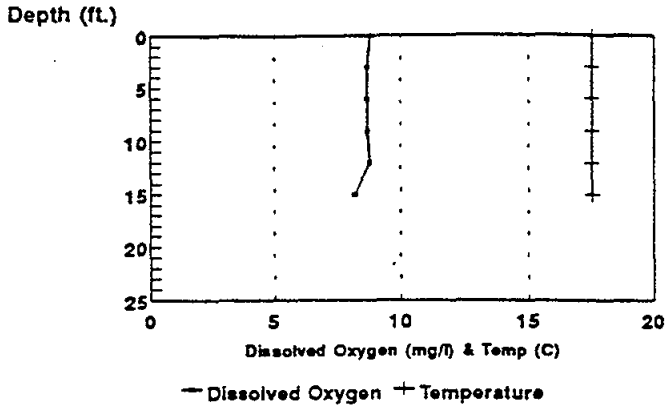
Association	Area (A)	% of Total
KN-BN-VS	213,304	73
BY	20,454	7
VS-LP	20,454	7
LD	14,610	5
FS-ES	14,610	5
PN-BY	5,844	2
RL-FS	2,133	1

KN-BN-VS	Kranzburg-Brookings-Vienna: Deep, nearly level to gently undulating silty soils on uplands and in slight swales.
BY	Buse: Well drained, undulating to hilly, loamy soils.
VS-LP	Vienna-Lismore: Well drained through somewhat poorly drained nearly level to undulating, silty soils.
LD	Lamour: Loamy to clayey soils on moderately well to poorly drained bottom lands.
FS-ES	Fordville-Estelline: Loamy and silty soils with gravelly and sandy subsoils on terraces and uplands.
PN-BY	Poinsett-Buse: Deep, undulating to rolling silty and loamy soils on uplands.
RL-FS	Renshaw-Fordville: Loamy and sandy soils with gravelly and sandy subsoils.

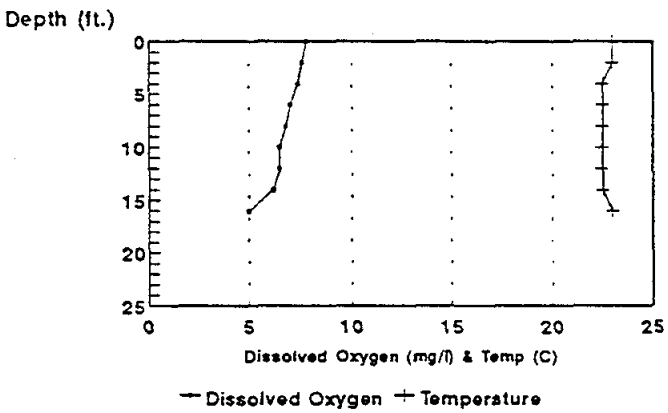
LAKE POINSETT 8/5/92
Dissolved Oxygen & Temperature Profile



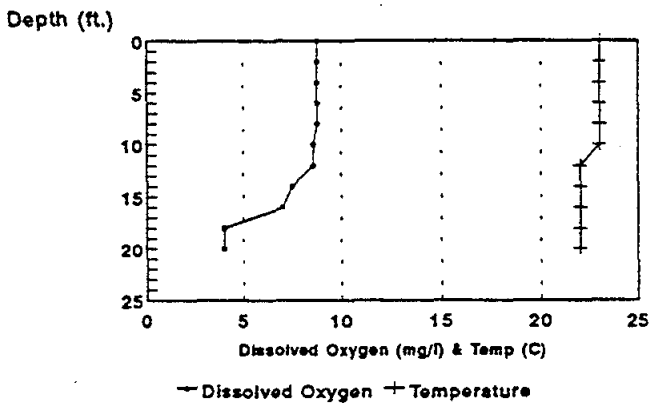
LAKE POINSETT 9/1/92
Dissolved Oxygen & Temperature Profile



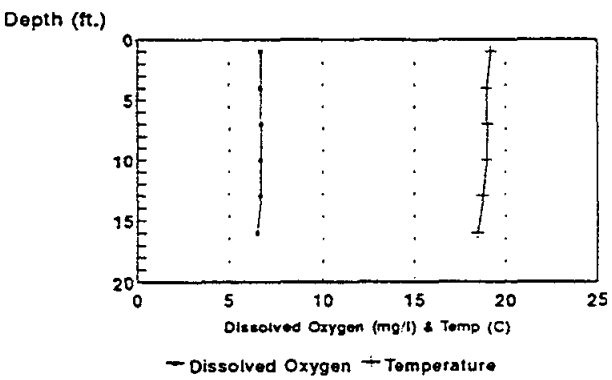
LAKE POINSETT 7/9/91
Dissolved Oxygen & Temperature Profile



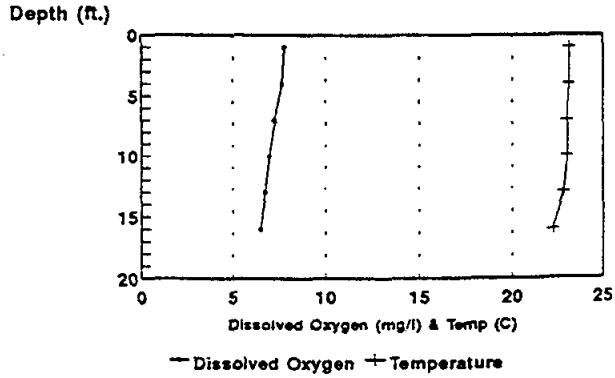
LAKE POINSETT 8/21/91
Dissolved Oxygen & Temperature Profile



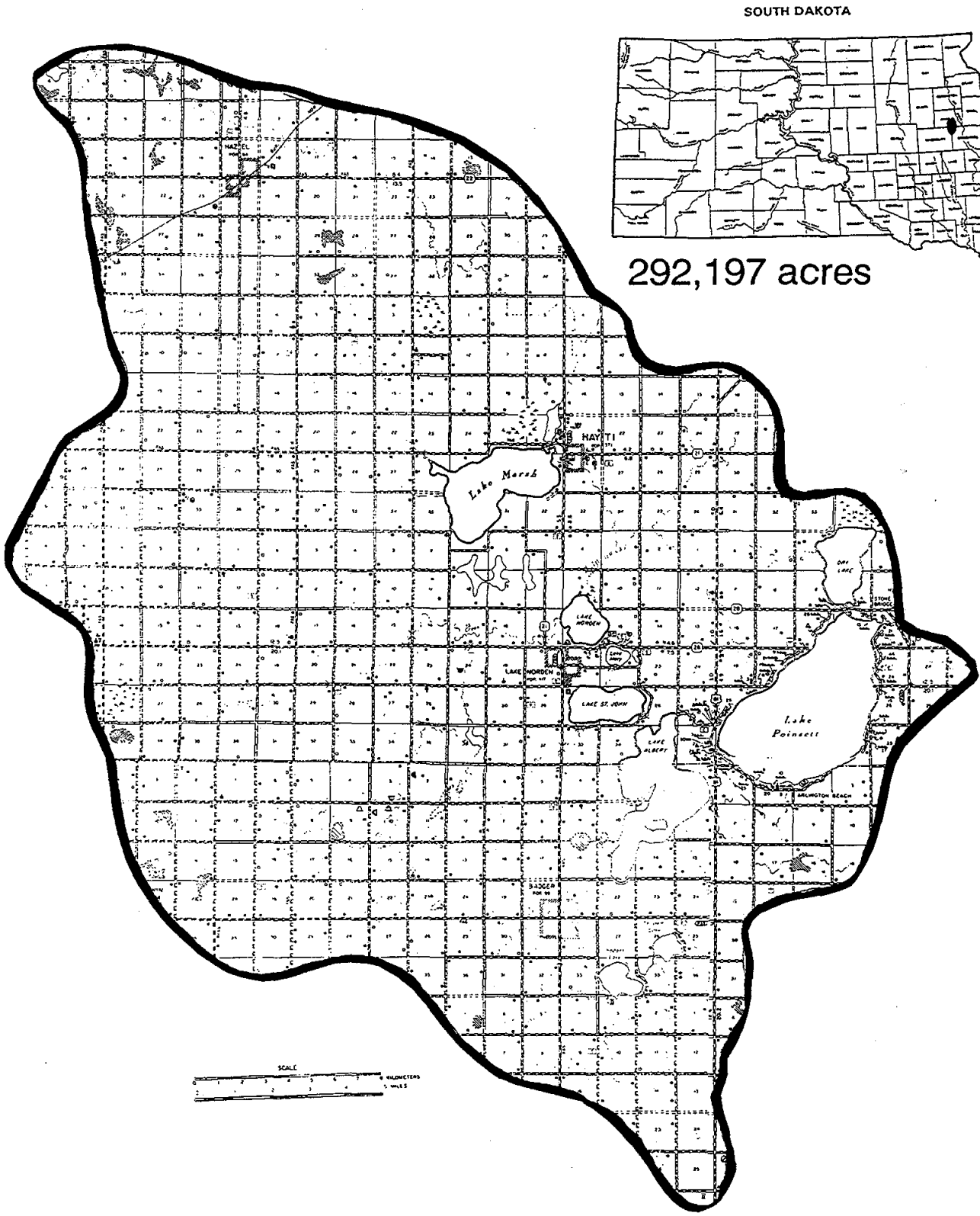
Lake Poinsett, 6/21/89
Dissolved Oxygen & Temperature Profile

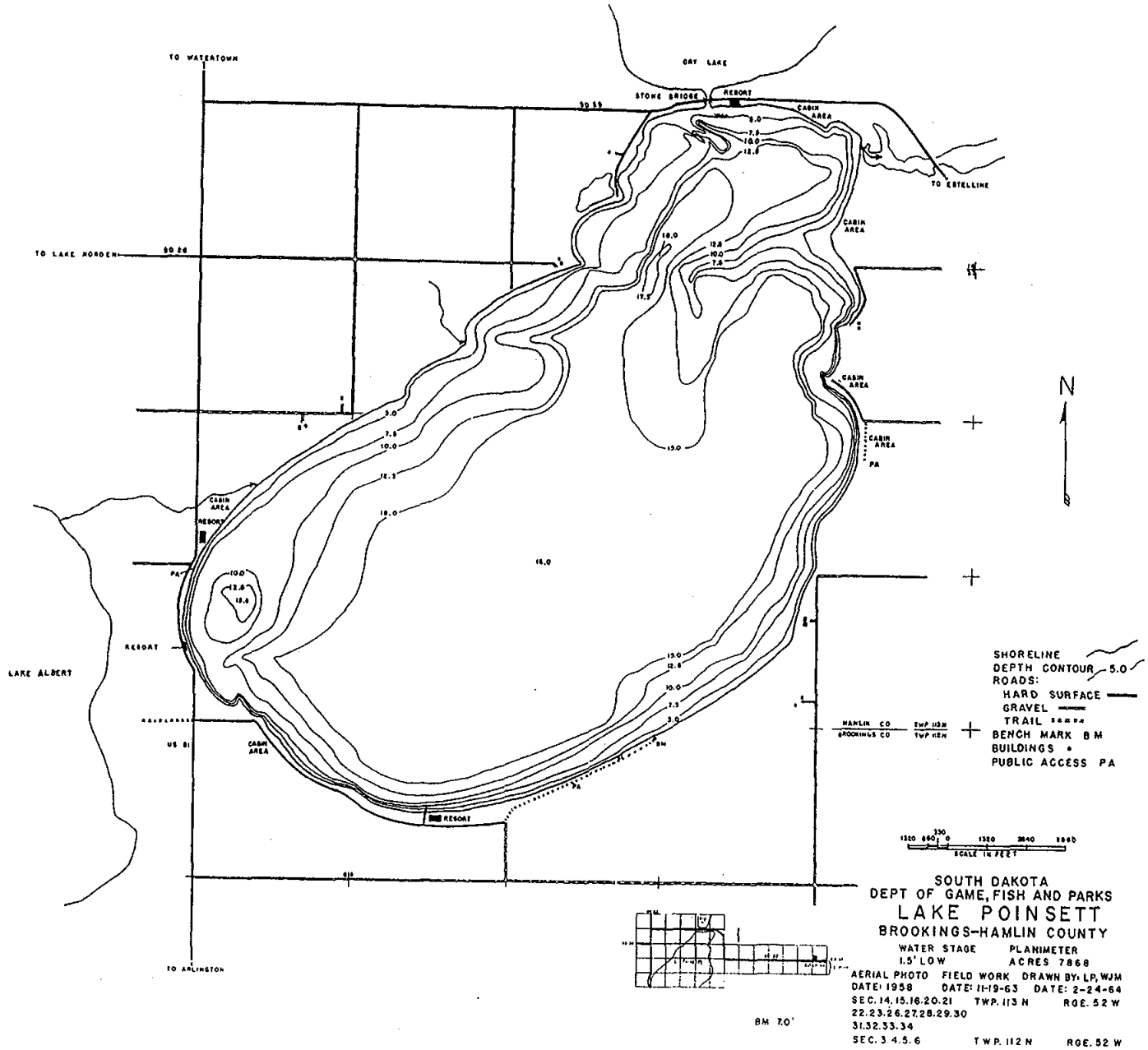


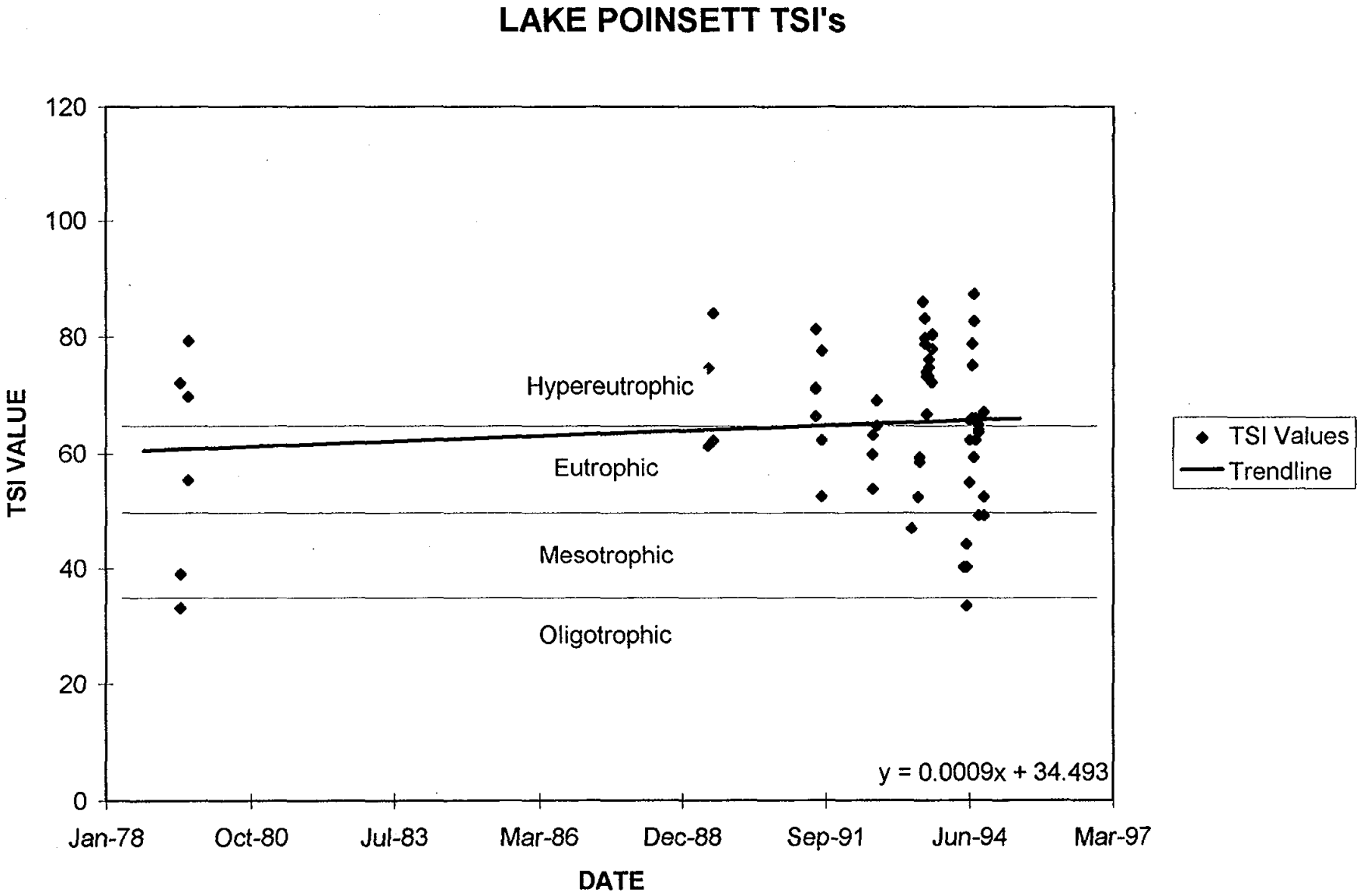
Lake Poinsett, 7/25/89
Dissolved Oxygen & Temperature Profile



Lake Poinsett




TO WATERTOWN
GAY LAKE
STONE BRIDGE
RESORT
CABIN AREA
TO ESTELLINE
TO LAKE ROBDEN
CABIN AREA
CABIN AREA
CABIN AREA
PA
CABIN AREA
RESORT
PA
LAKE ALBERT
RESORT
US 81
CABIN AREA
RESORT
PA
TO ARLINGTON
N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
TRAIL
BENCH MARK BM
BUILDINGS
PUBLIC ACCESS PA
HAMLIN CO
BROOKINGS CO
TWP 113N
TWP 112N
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
LAKE POINSETT
BROOKINGS-HAMLIN COUNTY
WATER STAGE
1.5' LOW
PLANIMETER
ACRES 7868
AERIAL PHOTO DATE: 1958
FIELD WORK DATE: 11-19-63
DRAWN BY: LP, WJM
DATE: 2-24-64
SEC. 14.15.16.20.21 TWP. 113 N RGE. 52 W
22.23.26.27.28.29.30
31.32.33.34
SEC. 3.4.5.6 TWP. 112 N RGE. 52 W
BM 7.0'


LAKE POINSETT TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0009x + 34.493
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

LAKE PRESTON

County: Kingsbury
Latitude: 44 deg. 22 min. 49 sec. N
Longitude: 97 deg. 18 min. 14 sec. W
Area: 5,222 A (2,114.2 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 110, 111N
Range: 54, 55W
Section(s): 3-4,25-28,31-36
Shoreline L: 19.4 mi (31.3 km)
Mean Depth: NA
Watershed/Lake Area: 11
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
None Designated

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: NA

	1989	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	21.10
Air Temperature (°C)	4	23.40
Secchi Disk Depth (meters)	2	0.20
Conductivity (cond/25° C)	4	937
Turbidity (NTU)	-	-
Lab pH (su)	-	-
Field pH (su)	4	8.75
Total Alkalinity (mg/l)	4	260
Total Solids (mg/l)	4	772
Dissolved Solids (mg/l)	4	680
Suspended Solids (mg/l)	4	92
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.41
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.00
Total Phosphorus (mg/l)	4	0.608
Total Dissolved Phosphorus (mg/l)	-	-
Ortho Phosphate as P (mg/l)	4	0.255
Chlorophyll (mg/m^3)	-	-

Year	1989
TSI Values -- Mean:	88.73
Secchi Disk	83.36
Total Phosphorus	94.11
Chlorophyll *a*	

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 8% Type of Vegetation: bulrush

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

	July 24, 1989	
Taxa	Number	Units/ml
Aphanocapsa	87	77,845
Merismopedia	73	65,319
Algae (other)	45	40,265
Chroococcus	20	17,895
Green Algae (other)	19	17,001
Kirchneriella	16	14,316
Ankistrodesmus	12	10,737
Algae (flagellate)	6	5,369
Lyngbya	6	5,369
Dactylococcopsis	4	3,579
Diatom (centric)	3	2,684
Nitzschia	2	1,790
Blue-green (other)	1	895
Diatom (pennate)	1	895
Nitzschia reversa	1	895
Aphanizomenon flos-aquae	1	895
Anabaena	1	895
Tetrastrum	1	895
Cryptomonas	1	895
Total	300	268,432

Watershed Description

Watershed Area: 58,687 A (23,751 ha)

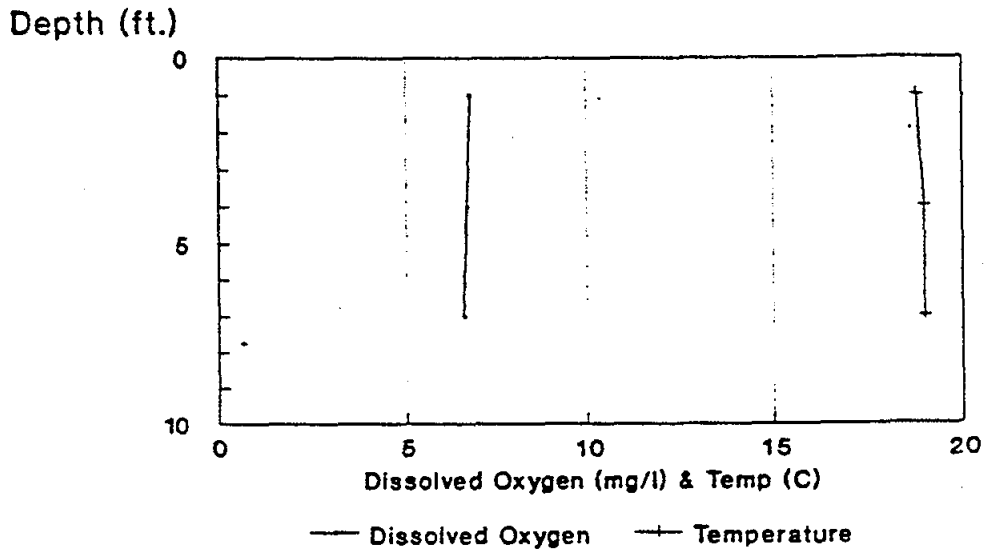
Soil Associations within Watershed

Association	Area (A)	% of Total
EF-WF	NA	NA
DX	NA	NA

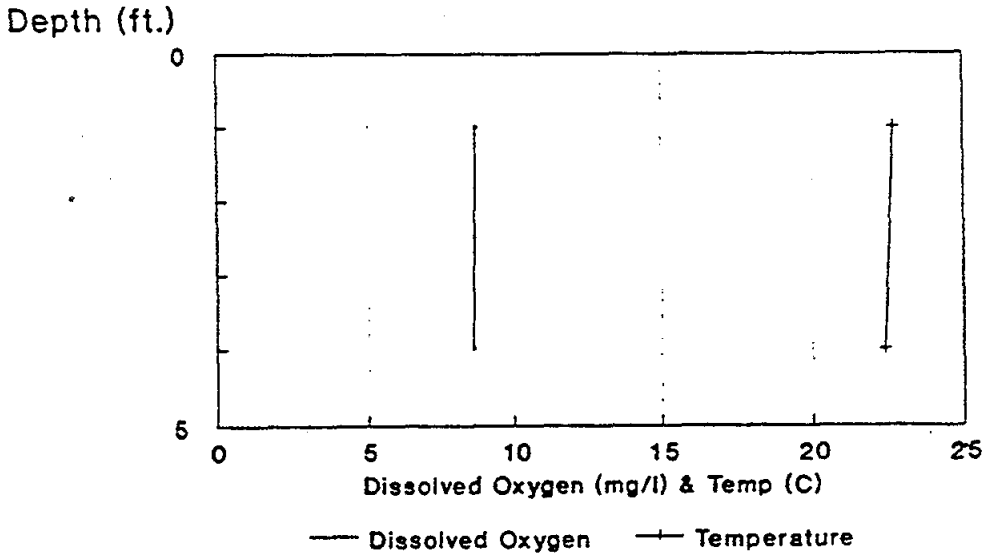
EF-WF Egan-Wentworth: Gently undulating to rolling, well drained, silty soils formed in glacial drift; on uplands.

DX Dempster: Nearly level to sloping, well drained, silty soils formed in alluvium over sand and gravel; on stream terraces and uplands.

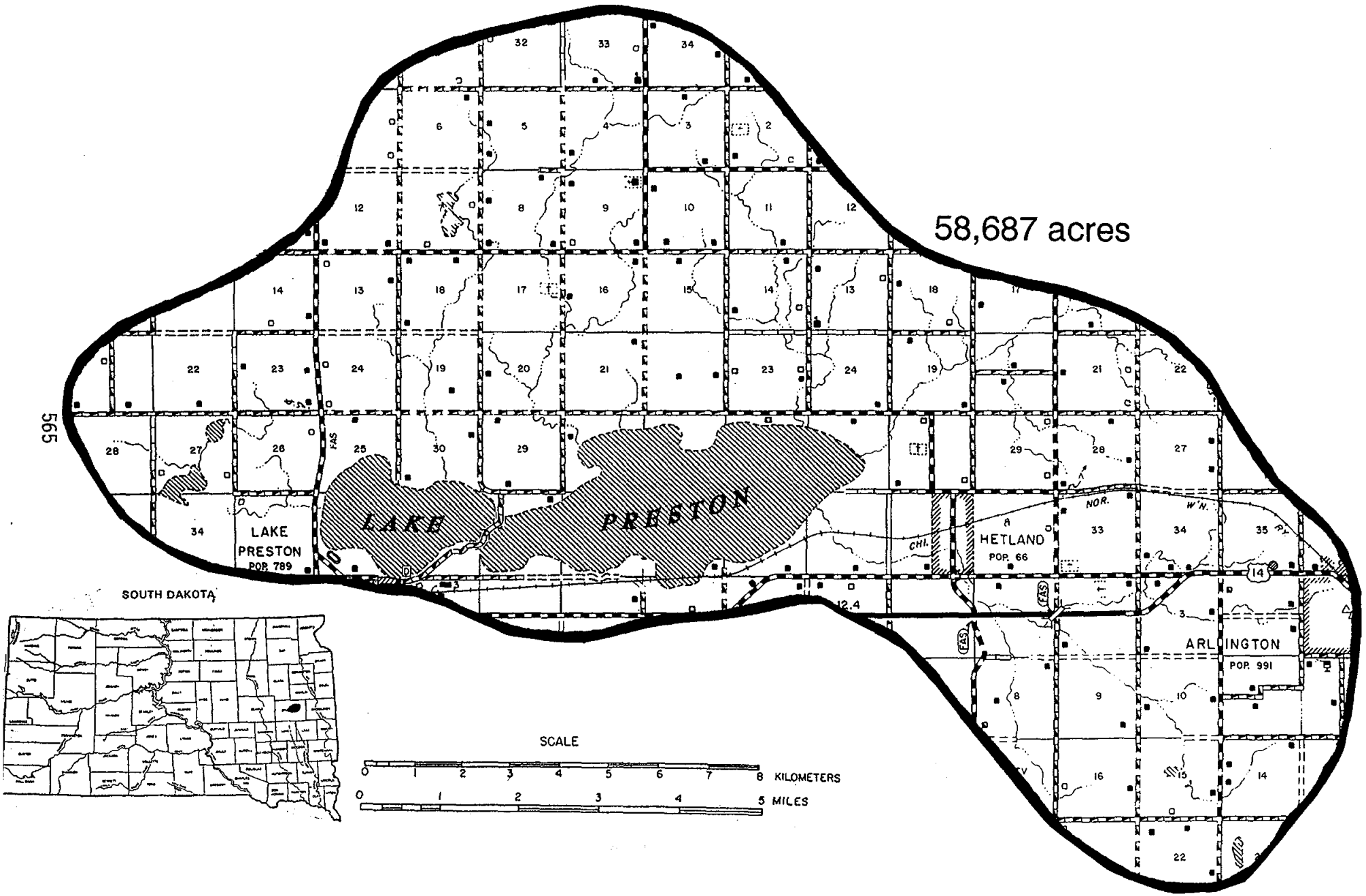
Lake Preston, 6/20/89
Dissolved Oxygen & Temperature Profile

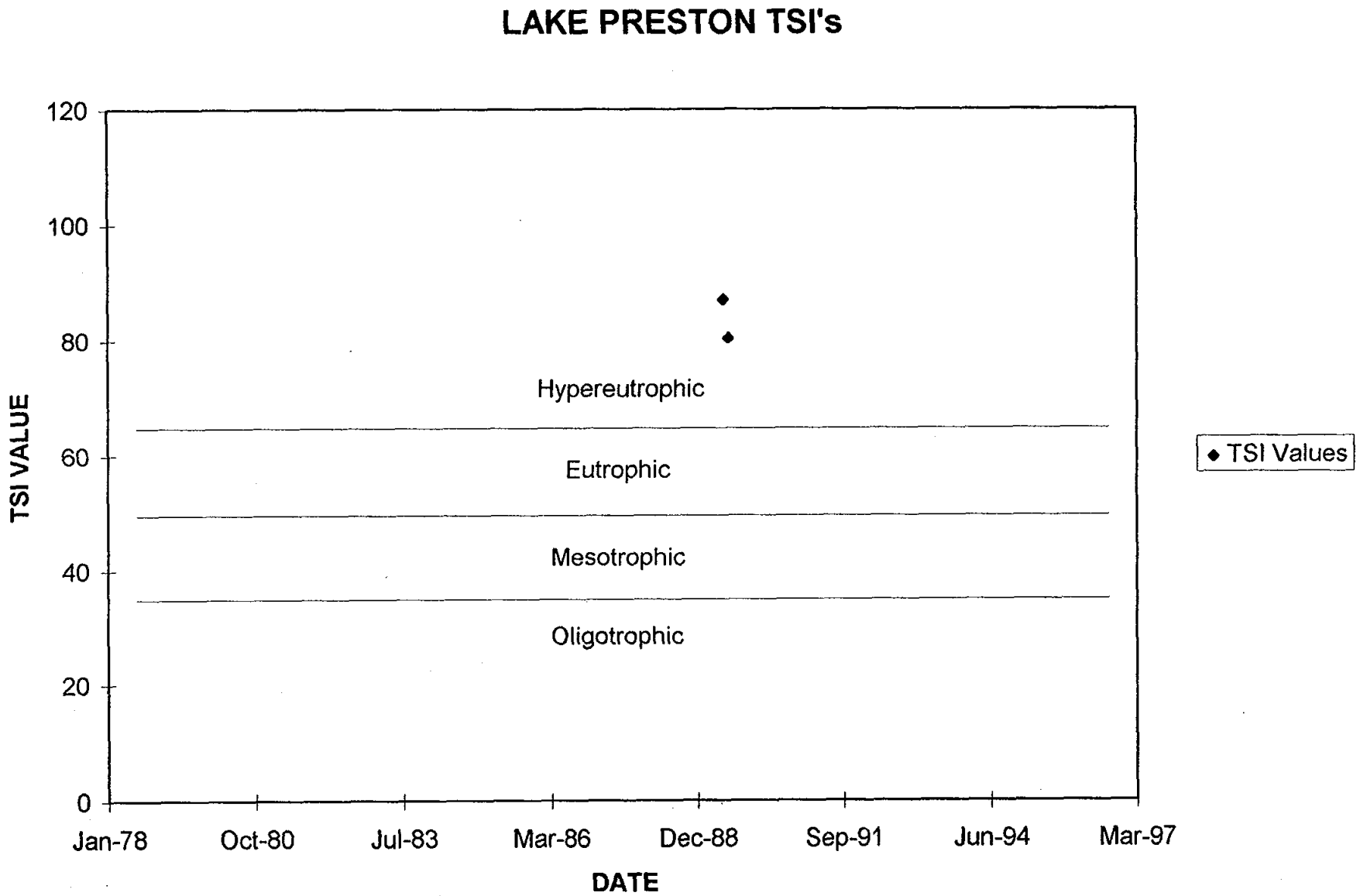


Lake Preston, 7/24/89
Dissolved Oxygen & Temperature Profile



Lake Preston




LAKE PRESTON TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
TSI Values
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

PUNISHED WOMAN LAKE

County: Codington
Latitude: 45 deg. 06 min. 45 sec.
Longitude: 96 deg. 56 min. 10 sec.
Area: 477 A (193.2 ha)
Maximum Depth: 8 ft (2.4 m)
Volume: 2572 acre-ft (3.173 x $10^6 m^3$)
Origin of Basin: natural (glacial)
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 119N
Range: 51W
Section(s): 14-16, 21-22
Shoreline L: 4.0mi (6.4km)
Mean Depth: 5.4 ft (1.6 m)
Watershed/Lake Area: 25
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Punished Woman Lake Association

	1988		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	16	15.93	32	16.65	4	19.28
Air Temperature (°C)	16	16.87	32	15.17	4	16.90
Secchi Disk Depth (meters)	8	0.51	16	0.69	2	0.73
Conductivity (cond/25° C)	-	-	32	432	-	-
Turbidity (NTU)	-	-	-	-	4	11.71
Lab pH (su)	4	8.62	32	8.94	-	-
Field pH (su)	12	6.43	-	-	4	8.67
Total Alkalinity (mg/l)	16	160	32	126	4	133
Total Solids (mg/l)	16	443	32	358	4	359
Dissolved Solids (mg/l)	16	369	32	302	4	348
Suspended Solids (mg/l)	16	74	32	56	4	11
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	16	0.02	32	0.07	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	16	0.10	32	0.10	4	0.10
Total Kjeldahl Nitrogen (mg/l)	16	1.07	32	1.15	4	0.98
Total Phosphorus (mg/l)	16	0.135	32	0.097	4	0.052
Total Dissolved Phosphorus (mg/l)	-	-	-	-	-	0.031
Ortho Phosphate as P (mg/l)	16	-	-	-	4	-
Chlorophyll (mg/m^3)	-	-	-	-	2	18.26

Year	1988	1989	1994
TSI Values -- Mean:	71.89	67.46	61.40
Secchi Disk	69.82	65.26	64.54
Total Phosphorus	73.95	69.66	60.59
Chlorophyll *a*			59.06

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: Potamogeton richardsonii, P. friesii, P. pectinatus, Myriophyllum spicatum and M. verticillatum

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area (excluding lake surface): 11,920 A (4,824 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
BY	3,814	32
RL-FS	3,814	32
VS-LP	3,099	26
FU-AA-BY	1,311	11

BY — Buse: Well drained, undulating to hilly loamy soils.

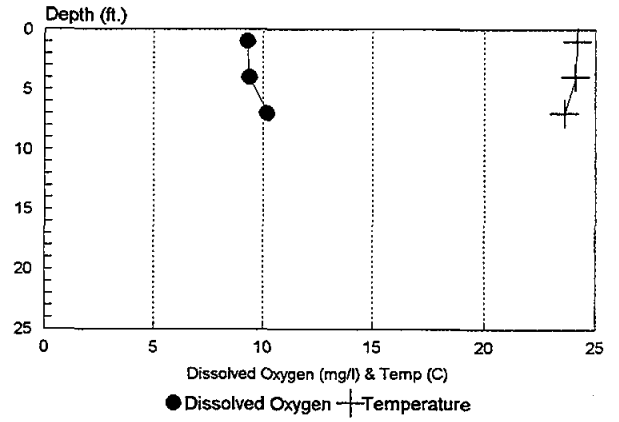
RL-FS — Renshaw-Fordville: Somewhat excessively drained and well drained, nearly level to moderately steep, loamy soils that are shallow and moderately deep over sand and gravel.

VS-LP — Vienna-Lismore: Well drained through somewhat poorly drained nearly level to undulating silty soils.

FU-AA-BY — Forman-Aastad-Buse: Well drained and moderately well drained, undulating to hilly, loamy soils.

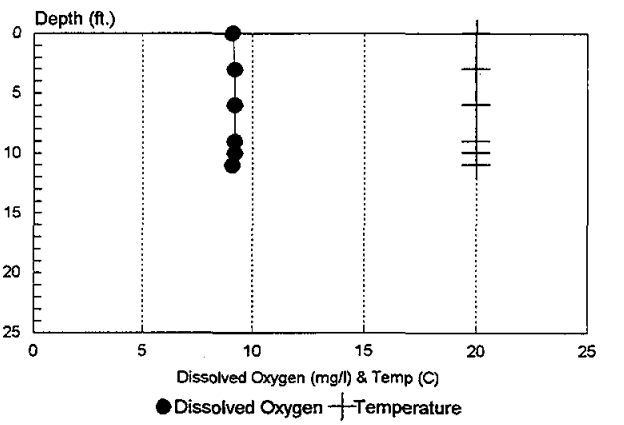
PUNISHED WOMAN LAKE 8/5/79

Dissolved Oxygen & Temperature Profile



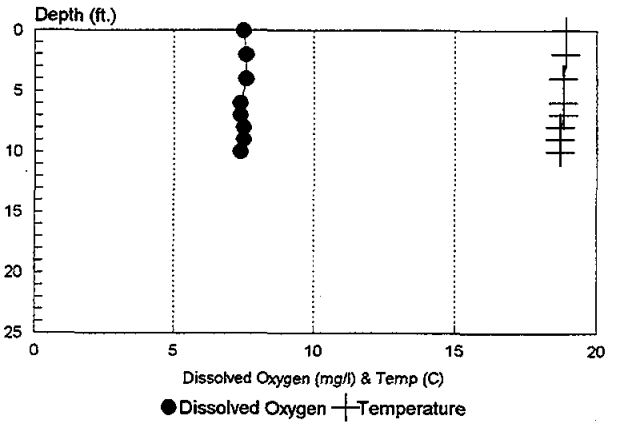
PUNISHED WOMAN LAKE 6/30/94

Dissolved Oxygen & Temperature Profile

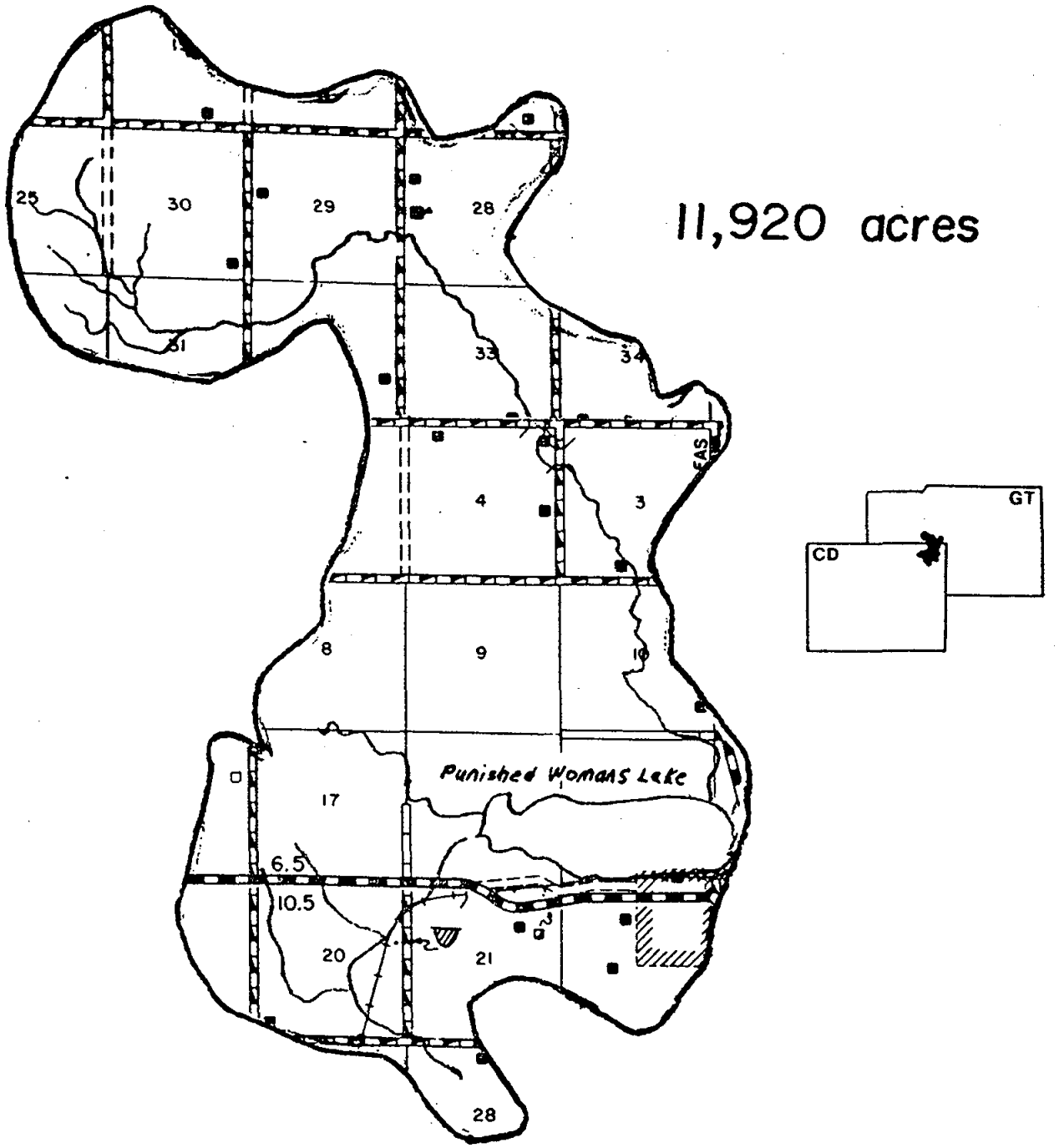


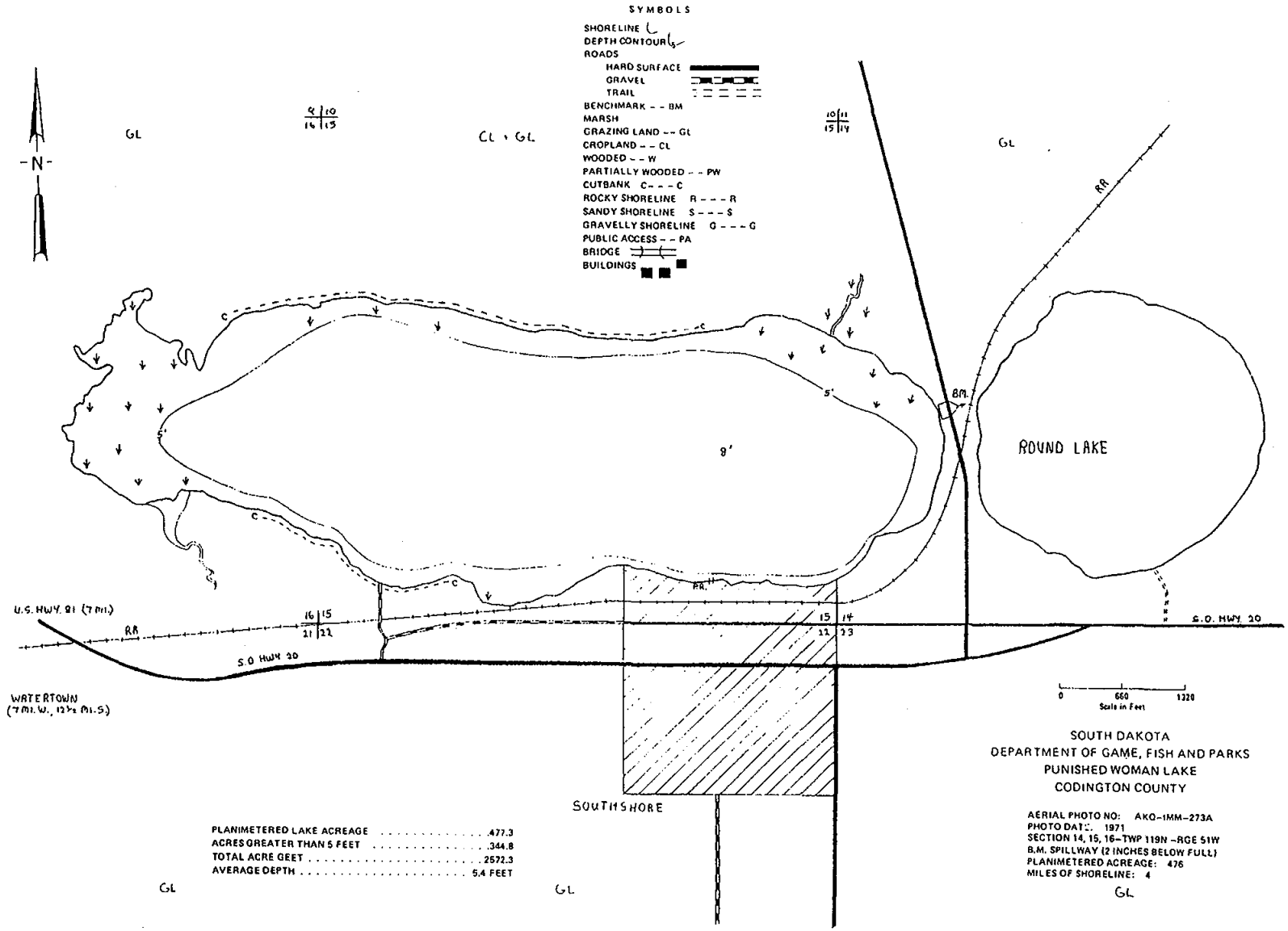
PUNISHED WOMAN LAKE 8/31/94

Dissolved Oxygen & Temperature Profile

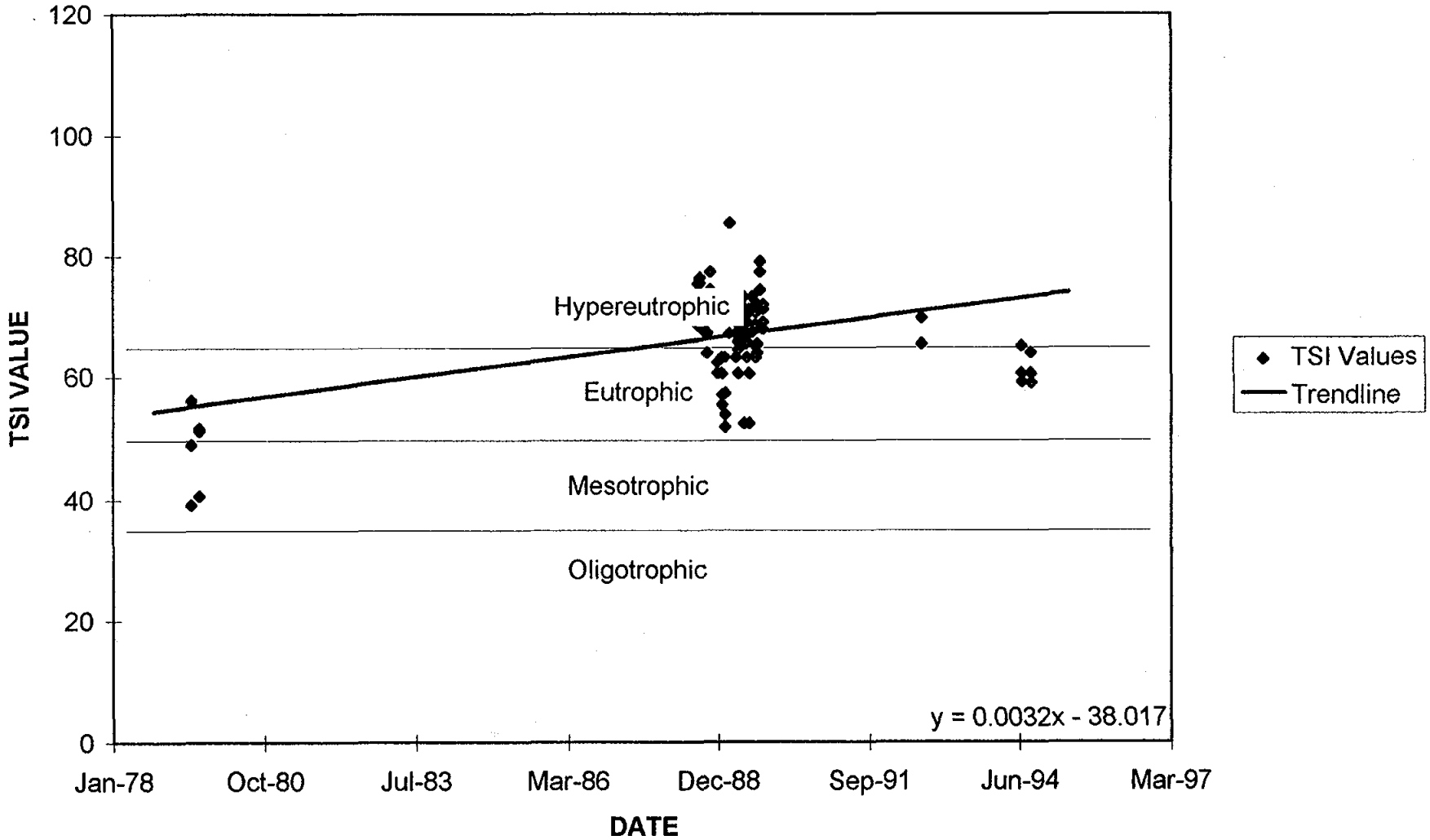


Punished Woman Lake




SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK - - BM
MARSH
GRAZING LAND - - GL
CROPLAND - - CL
WOODED - - W
PARTIALLY WOODED - - PW
CUTBANK C - - - C
ROCKY SHORELINE R - - - R
SANDY SHORELINE S - - - S
GRAVELLY SHORELINE G - - - G
PUBLIC ACCESS - - PA
BRIDGE
BUILDINGS
N
GL
CL + GL
GL
RR
BM.
ROUND LAKE
U.S. HWY. 81 (7 MI.)
RR
S.O. HWY. 20
S.O. HWY. 20
WATERTOWN
(7 MI. W., 12½ MI. S.)
SOUTHSHORE
0
660
1320
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
PUNISHED WOMAN LAKE
CODINGTON COUNTY
AERIAL PHOTO NO: AKO-1MM-273A
PHOTO DATE: 1971
SECTION 14, 15, 16-TWP 119N -RGE 51W
B.M. SPILLWAY (2 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 476
MILES OF SHORELINE: 4
PLANIMETERED LAKE ACREAGE 477.3
ACRES GREATER THAN 5 FEET 344.8
TOTAL ACRE GEET 2572.3
AVERAGE DEPTH . . . . . 5.4 FEET
GL
GL
GL

PUNISHED WOMANS TSI's



RAHN DAM

County: Tripp
Latitude: 43 deg. 06 min. 24 sec. N
Longitude: 99 deg. 49 min. 54 sec. W
Area: 13.6 A (5.5 ha)
Maximum Depth: 18 ft (5.5 m)
Volume: 85.3 acre-ft (1.052 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 96N
Range: 76W
Section(s): 28
Shoreline L: 1.4 mi (2.3 km)
Mean Depth: 6.3 ft (1.9 m)
Watershed/Lake Area: 1356
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 50,496
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	26.78	4	17.67	4	18.75
Air Temperature (°C)	4	32.50	4	21.25	4	22.00
Secchi Disk Depth (meters)	2	0.50	2	0.57	2	0.85
Conductivity (cond/25° C)	4	545	2	544	-	-
Turbidity (NTU)	-	-	-	-	2	8.69
Lab pH (su)	4	8.31	-	-	-	-
Field pH (su)	2	8.30	4	7.96	4	8.07
Total Alkalinity (mg/l)	4	206	4	209	4	301
Total Solids (mg/l)	4	404	4	343	4	426
Dissolved Solids (mg/l)	4	385	4	324	4	420
Suspended Solids (mg/l)	4	19	4	19	4	6
Volatile Suspended Solids (mg/l)	-	-	2	4	-	-
Ammonia Nitrogen (mg/l)	4	0.26	4	1.14	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.17	4	3.09	4	2.26
Total Phosphorus (mg/l)	4	0.199	4	0.679	4	0.436
Total Dissolved Phosphorus (mg/l)	-	-	4	0.560	3	0.313
Ortho Phosphate as P (mg/l)	4	0.027	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	64.99	3	43.44

	1989	1991	1994
TSI Values -- Mean:	73.99	75.29	73.02
Secchi Disk	69.92	68.07	62.43
Total Phosphorus	78.07	86.27	89.07
Chlorophyll *a*		71.52	67.57

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 100%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton sp.

Algal Species and Densities

July 6, 1989

Taxa	Number	Units/ml
Algae (other)	124	9,579
Lyngbya Diguetii	31	2,395
Algae (flagellate)	30	2,318
Green Algae (other)	24	1,854
Scenedesmus	20	1,545
Cryptomonas	20	1,545
Aphanizomenon flos-aquae	12	927
Dactylococcopsis	10	773
Schizothrix	8	618
Cryptomonas sp. #1	6	464
Tetrahedron	5	386
Nitzschia acicularis	4	309
Aphanocapsa	2	155
Cryptomonas ovata	2	155
Diatom (pennate)	1	77
Ceratium hirundinella	1	77
Blue-green (other)	1	77
Total	301	23,253

Watershed Description

Watershed Area: 18,445 A (7,465 ha)

Soil Associations within Watershed

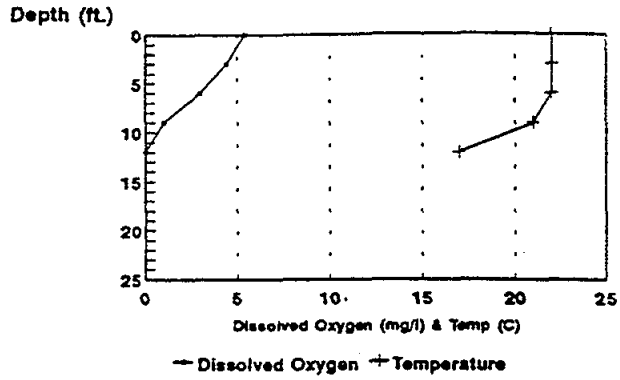
Association	Area (A)	% of Total
PP-EL	8,300	45
AN-HP	5,718	31
AN-TE-VJ	4,427	24

DP-EL Doger-Elsmere: Deep, nearly level to undulating well drained and somewhat poorly drained, sandy and loamy soils.

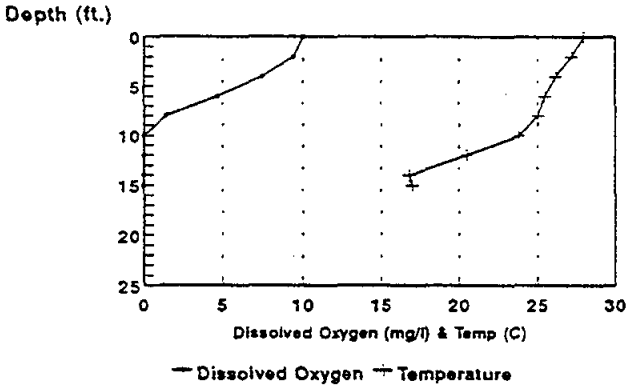
AN-HP Anselmo-Holt: Deep and moderately deep nearly level to moderately steep, well drained, loamy soils.

AN-TE-VJ Anselmo-Tassel-Valentine: Deep and shallows nearly level to steep well drained and excessively drained loamy and sandy soils.

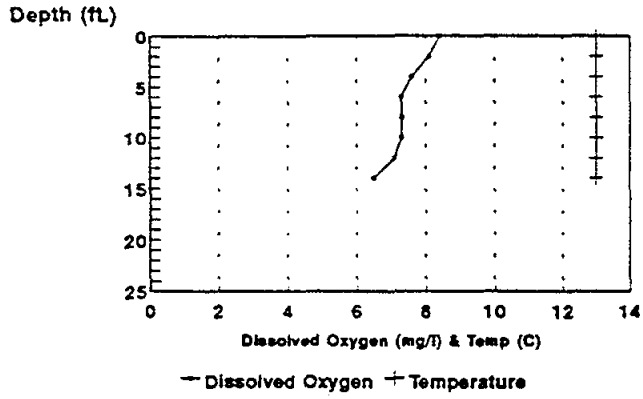
RAHN DAM 8/4/93
Dissolved Oxygen & Temperature Profile



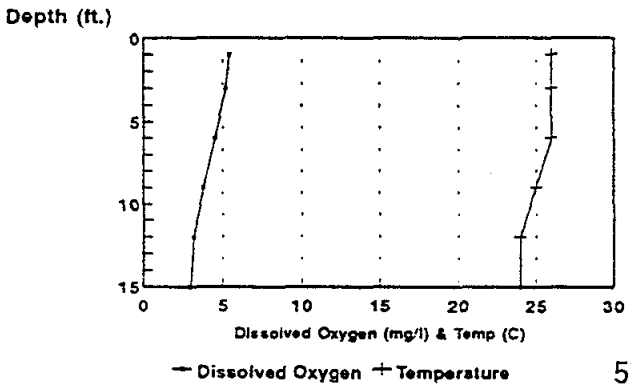
RAHN DAM 7/17/91
Dissolved Oxygen & Temperature Profile



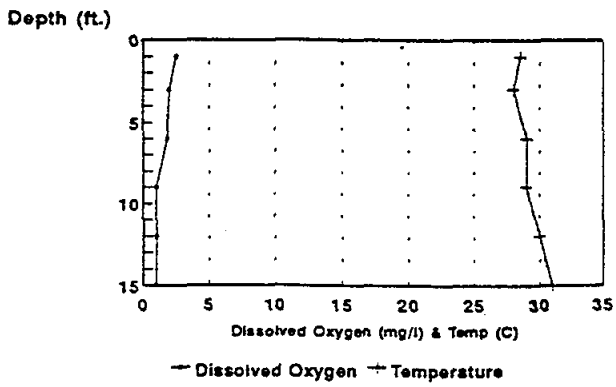
RAHN DAM 9/24/91
Dissolved Oxygen & Temperature Profile



Rahn Dam, 7/6/89
Dissolved Oxygen & Temperature Profile

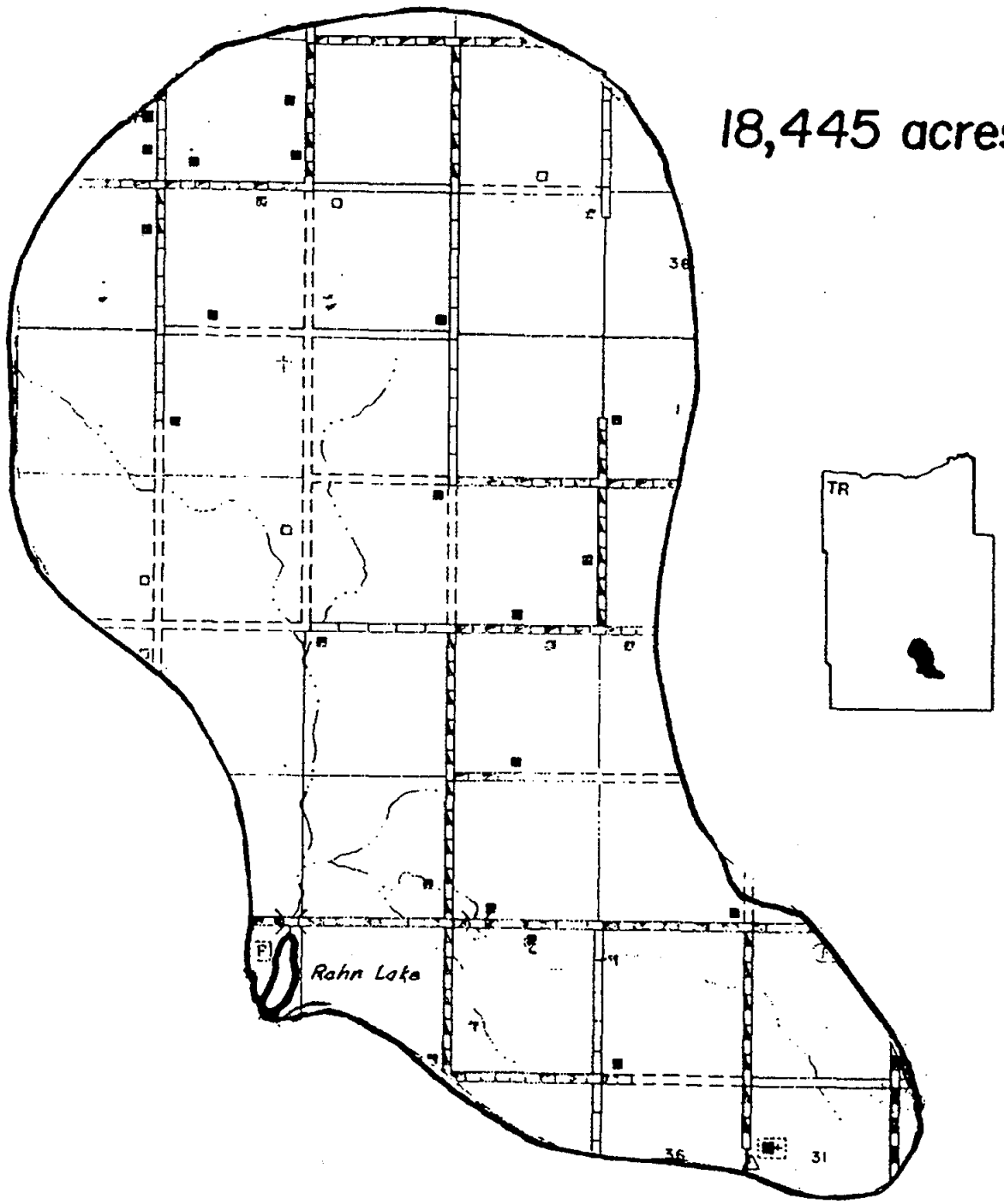


Rahn Dam, 8/3/89
Dissolved Oxygen & Temperature Profile



Rahn Lake

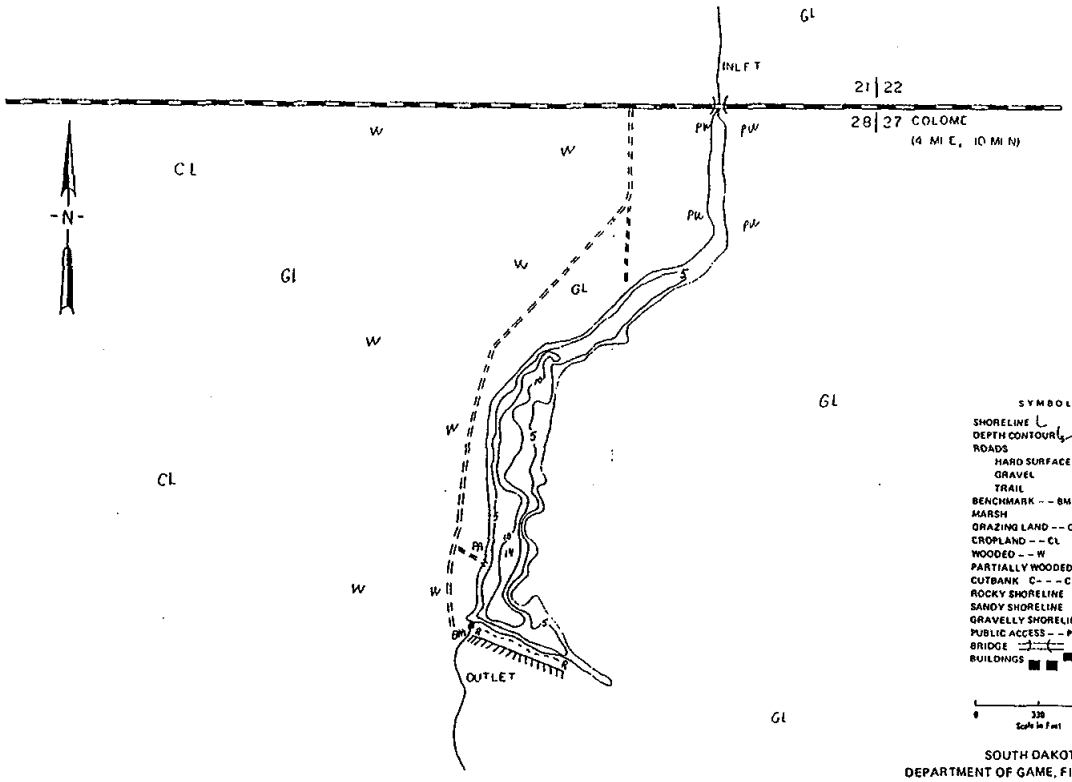
18,445 acres



Scale

0 1 2 3 4 5 6

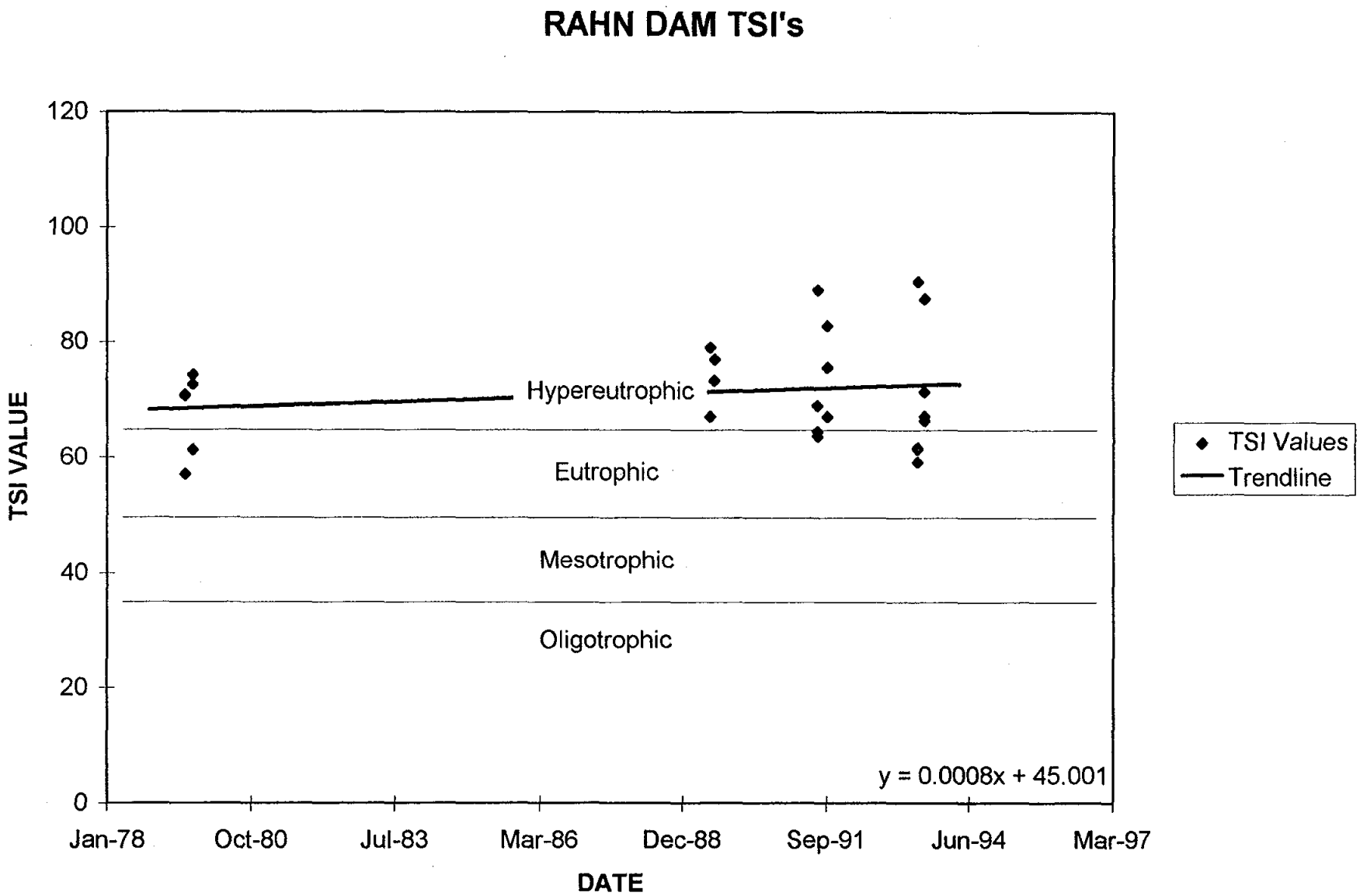
Miles



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
RAHN LAKE
TRIPP COUNTY

AERIAL PHOTO NO: 3KK-45
AERIAL PHOTO DATE: 7-24-69
SECTION 28-TWP 96N-RGE 76W
B.M. SPILLWAY (0.8 FEET BELOW FULL)
PLANIMETERED ACREAGE: 13.6
MILES OF SHORELINE: 1.4

PLANIMETERED LAKE ACREAGE	13.6
ACRES GREATER THAN 6 FEET	8.0
ACRES GREATER THAN 10 FEET	2.3
TOTAL ACRE FEET	85.3
AVERAGE DEPTH	6.3 FEET


RAHN DAM TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0008x + 45.001
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

RAVINE LAKE

County: Beadle
Latitude: 44 deg. 22 min. 30 sec. N
Longitude: 98 deg. 12 min. 18 sec.
Area: 72.2 A (29.2 ha)
Maximum Depth: 14 ft (4.3 m)
Volume: 459.5 acre-ft ($5.67x10^5 m^3$)
Origin of Basin: impoundment
Township: 110N
Range: 61W
Section(s): 6, 30, 31
Shoreline L: 3.5 mi (5.6 km)
Mean Depth: 6.4 ft (1.9 m)
Watershed/Lake Area: 1,069
Thermal Stratification: yes
Major Inflows (named or permanent streams): Broadland Creek
Outlet: James River

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 76,042
Ownership Status: City owned
Public Interest: City of Huron

	1988		1989		1991	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	12	18.10	2	15.25	4	24.08
Air Temperature (°C)	12	18.40	2	18.06	4	22.00
Secchi Disk Depth (meters)	6	0.51	1	0.55	2	0.50
Conductivity (cond/25° C)	14	1,462	2	830	2	542
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	14	8.90	2	8.37	-	-
Field pH (su)	-	-	-	-	4	8.48
Total Alkalinity (mg/l)	14	240	2	153	4	187
Total Solids (mg/l)	14	1,189	2	629	4	408
Dissolved Solids (mg/l)	14	1,011	2	903	4	379
Suspended Solids (mg/l)	14	177	2	26	4	30
Volatile Suspended Solids (mg/l)	-	-	-	-	2	9
Ammonia Nitrogen (mg/l)	14	0.04	2	0.07	4	0.30
Nitrate + Nitrite Nitrogen (mg/l)	14	0.09	2	0.10	4	0.60
Total Kjeldahl Nitrogen (mg/l)	14	1.94	2	1.28	4	1.49
Total Phosphorus (mg/l)	14	0.810	2	0.525	4	0.792
Total Dissolved Phosphorus (mg/l)	-	-	-	-	4	0.612
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	-	-	-	-	2	67.23

Chemical Parameters	1992 Samples	Results
Water Temperature (°C)	4	20.71
Air Temperature (°C)	4	20.60
Secchi Disk Depth (meters)	2	0.47
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	-	-
Lab pH (su)	-	-
Field pH (su)	4	8.51
Total Alkalinity (mg/l)	4	206
Total Solids (mg/l)	4	808
Dissolved Solids (mg/l)	4	786
Suspended Solids (mg/l)	4	22
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.51
Total Phosphorus (mg/l)	4	0.383
Total Dissolved Phosphorus (mg/l)	4	0.221
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	2	41.54

Year	1988	1989	1991	1992
TSI Values -- Mean:	85.55	82.03	80.71	76.08
Secchi Disk	69.58	68.62	69.92	70.89
Total Phosphorus	101.53	95.44	100.37	90.22
Chlorophyll *a*			71.85	67.13

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 10%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: None Identified.

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 77,178 A (31,234 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
HC-BP	30,717	39.8
CZ-HC	17,211	22.3
HR-PR	14,201	18.4
CZ-EN	9,724	12.6
HR-PR-DV	6,714	8.7

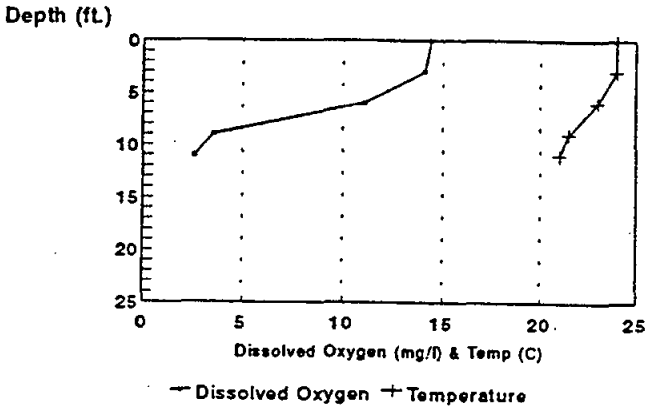
HC-BP Hand-Bonilla: Deep, well drained and moderately well drained, nearly level to gently rolling, loamy soils formed in glacial till.

CZ-HC Carthage-Hand: Deep, moderately well drained and well drained, nearly level to gently rolling, loamy soils formed in glacial outwash and glacial drift; on uplands.

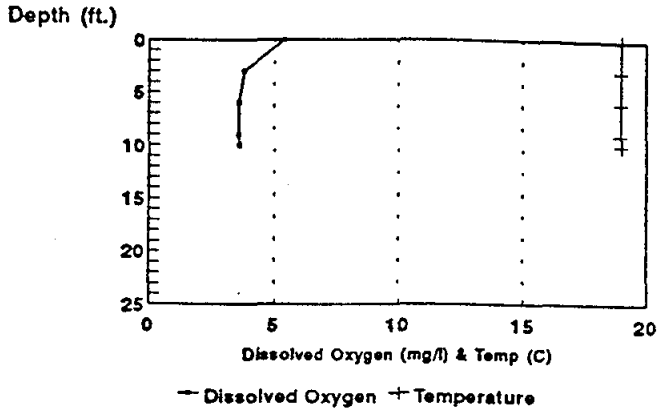
HR-PR Houdek-Prosper: Deep, well drained and moderately well drained, nearly level to gently rolling, loamy soils formed in glacial till; on uplands.

CZ-EN Carthage-Enet: Deep, moderately well drained and well drained, nearly level to undulating, loamy soils formed in glacial outwash; on uplands and upland terraces.

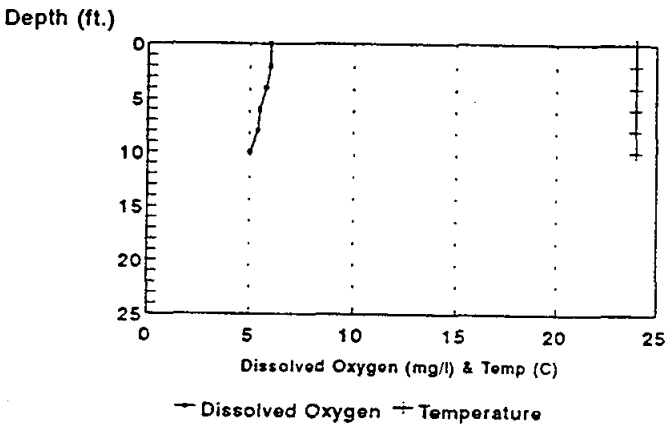
RAVINE LAKE 7/28/92
Dissolved Oxygen & Temperature Profile



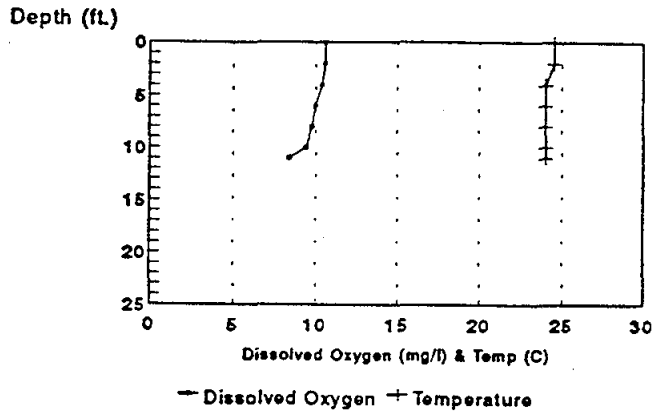
RAVINE LAKE 8/26/92
Dissolved Oxygen & Temperature Profile



RAVINE LAKE 7/8/91
Dissolved Oxygen & Temperature Profile

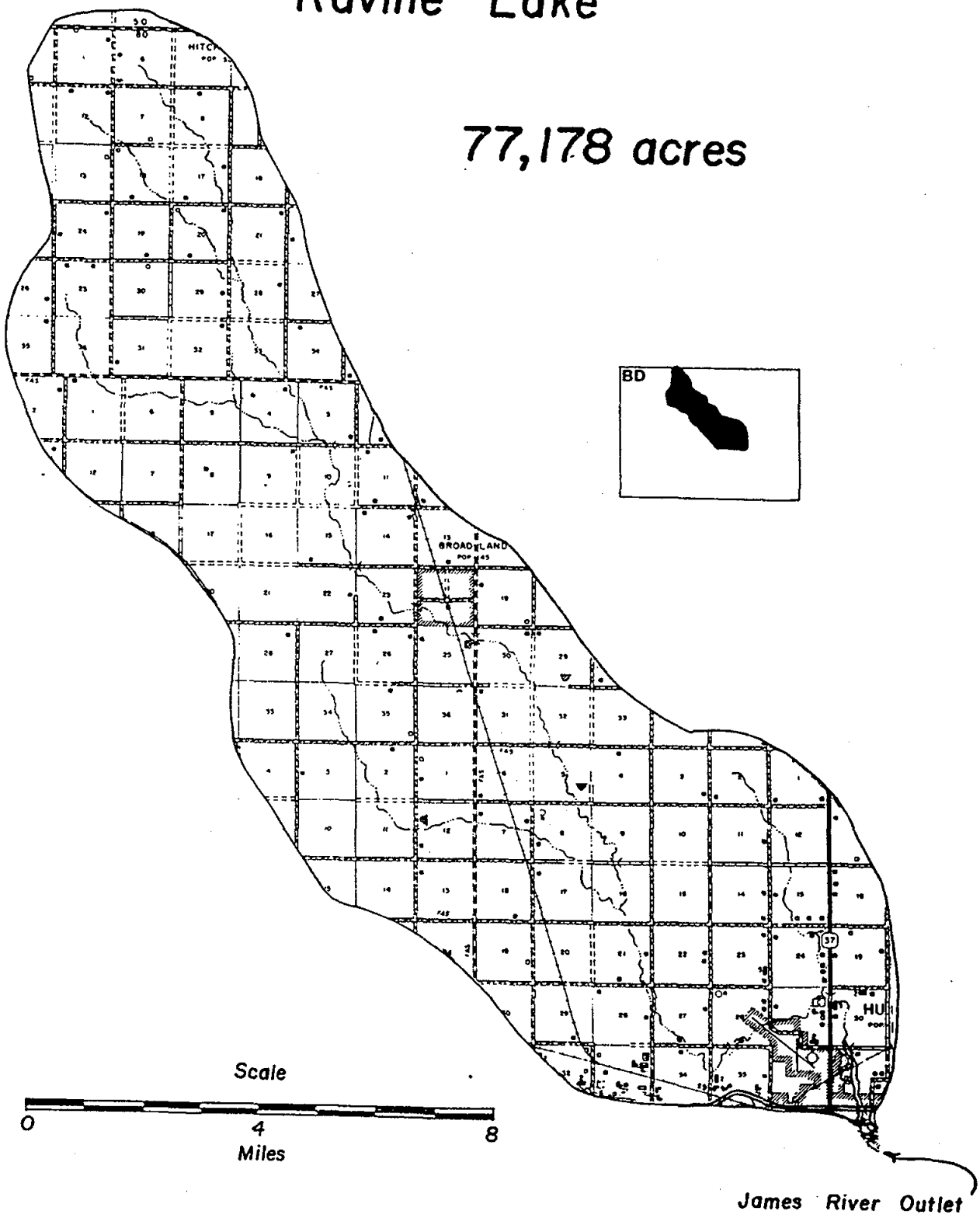


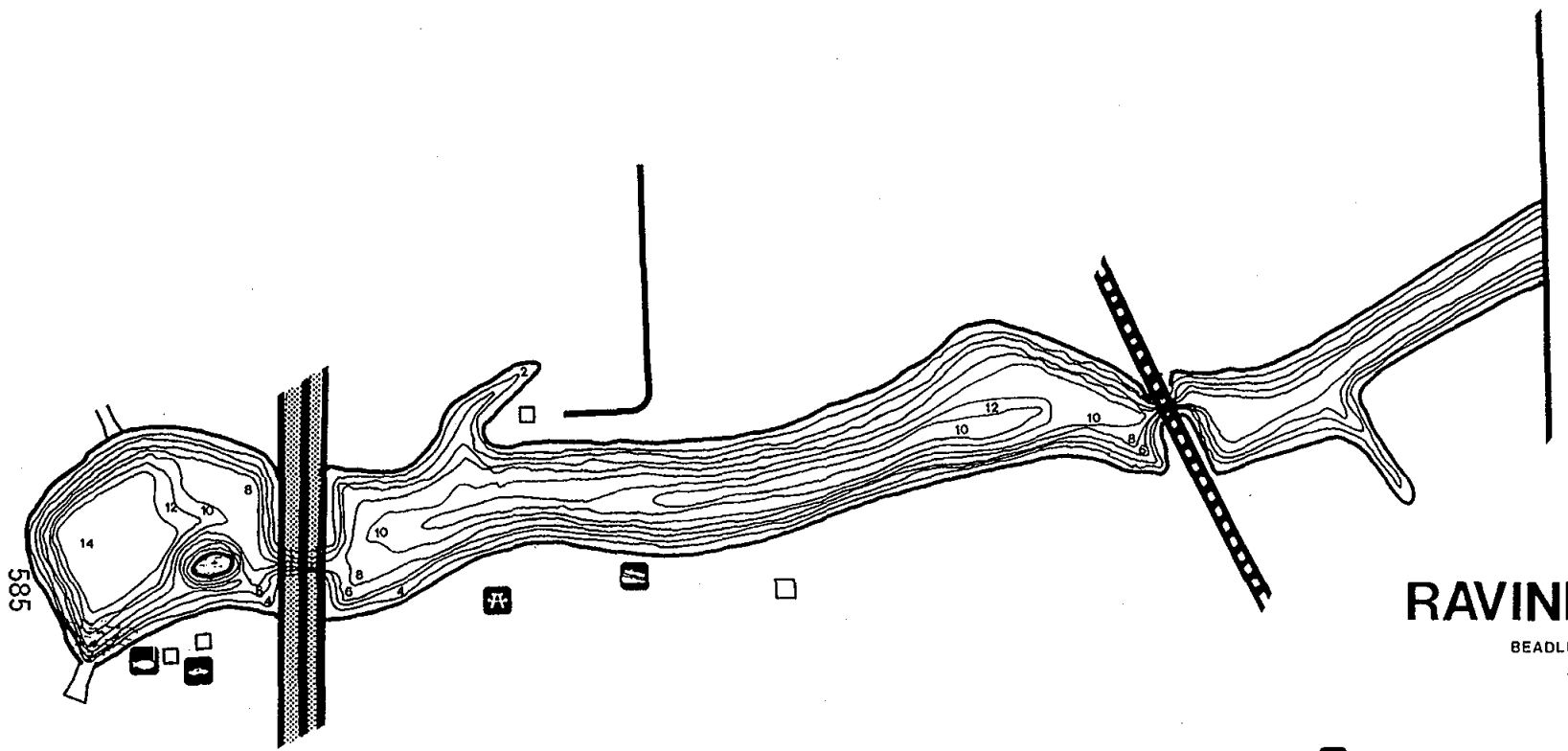
RAVINE LAKE 8/19/91
Dissolved Oxygen & Temperature Profile



Ravine Lake

77,178 acres

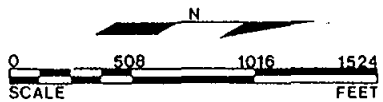




RAVINE LAKE

BEADLE COUNTY

1988



FISHING ACCESS

BOAT LAUNCH

PICNIC AREA

PARKING

SPILLWAY

2 DEPTH CONTOUR

DIVIDED HIWAY

COUNTY ROAD

EMERGED VEGETATION

FIELD DATA COLLECTED: 5/88

AERIAL PHOTO NO.: 111-61

AERIAL PHOTO DATE: 1978

LEGAL DISCRIPTION: HURON

SCALE: 1": 508'

WATER LEVEL: FULL

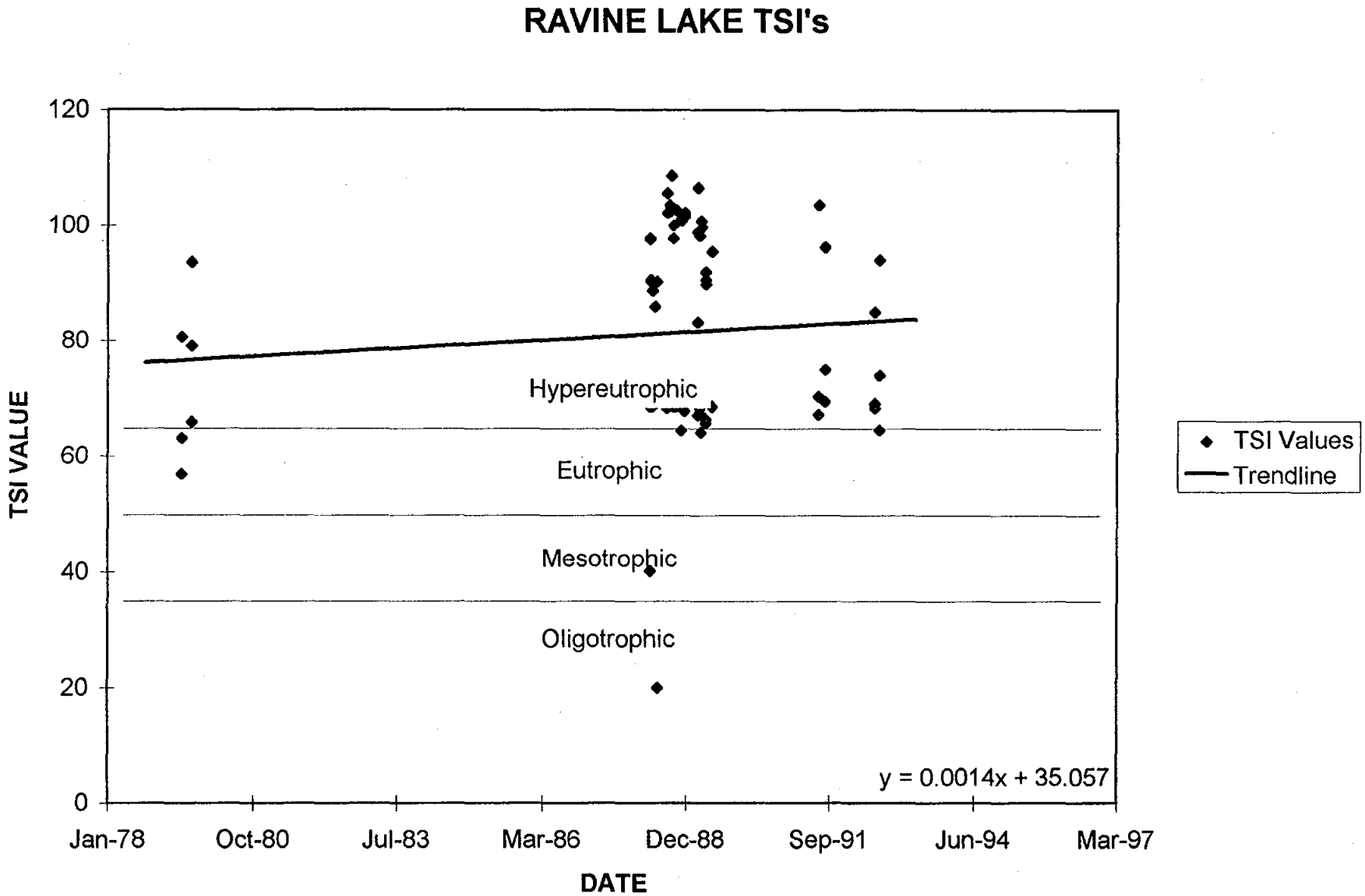
MILES OF SHORELINE: 3.5

AVERAGE DEPTH IN FEET: 6.4

VOLUME:

depth	ac/ft
2	141.1
4	126.3
6	104.5
8	62.2
10	19.6
12	4.7
14	1.1
total	459.5

PLANIMETERED ACREAGE: 72.2


RAVINE LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0014x + 35.057
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

REDFIELD LAKE

County: Spink
Latitude: 44 deg. 52 min. 17 sec. N
Longitude: 98 deg. 32 min. 14 sec. W
Area: 170 A (68.7 ha)
Maximum Depth: 12.1 ft (3.7 m)
Volume: 1300 acre-ft ($1.60x10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Turtle Creek
Outlet: Turtle Creek

Township: 116N
Range: 64W
Section(s): 4-9
Shoreline L: 14.4 mi(23.1 km)
Mean Depth: 7.6 ft (2.3 m)
Watershed/Lake Area: 5,323
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreaton
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 62,644
Ownership Status: State owned
Public Interest: City of Redfield

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.88	11	22.12	4	19.75
Air Temperature (°C)	4	24.66	11	23.18	4	20.25
Secchi Disk Depth (meters)	1	1.37	9	0.51	4	0.55
Conductivity (cond/25° C)	4	1,487	11	788	4	1,582
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.55	11	8.57	4	8.58
Field pH (su)	2	8.80	-	-	-	-
Total Alkalinity (mg/l)	4	339	11	241	4	290
Total Solids (mg/l)	4	1,061	11	517	4	1,062
Dissolved Solids (mg/l)	4	1,038	11	495	4	1,032
Suspended Solids (mg/l)	4	23	11	21	4	30
Volatile Suspended Solids (mg/l)	-	-	8	6	-	-
Ammonia Nitrogen (mg/l)	4	0.54	11	0.06	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	11	0.45	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.06	11	1.31	4	1.48
Total Phosphorus (mg/l)	4	0.557	11	0.785	4	0.675
Total Dissolved Phosphorus (mg/l)	-	-	11	0.691	4	0.480
Ortho Phosphate as P (mg/l)	4	0.419	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	69.01	-	-

	1994	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	22.65
Air Temperature (°C)	4	27.50
Secchi Disk Depth (meters)	2	0.46
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	4	16.95
Lab pH (su)	-	-
Field pH (su)	4	8.42
Total Alkalinity (mg/l)	4	381
Total Solids (mg/l)	4	1,080
Dissolved Solids (mg/l)	4	1,061
Suspended Solids (mg/l)	4	19
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.96
Total Phosphorus (mg/l)	4	0.487
Total Dissolved Phosphorus (mg/l)	4	0.433
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	2	39.36

Year	1989	1991	1992	1994
TSI Values -- Mean:	75.40	80.16	83.38	77.02
Secchi Disk	55.44	67.88	68.62	71.20
Total Phosphorus	95.35	100.48	98.14	93.26
Chlorophyll *a*		72.11		66.60

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Ceratophyllum demersum, Potamogeton pectinatus, P. foliosus, Lemna spp., Spirodella polyrhiza

Algal Species and Densities

NO DATE

Taxa	Number	Units/ml
Algae (other)	74	3,326
Diatom (centric)	23	1,034
Green Algae (other)	21	944
Scenedesmus	10	450
Cryptomonas sp. #1	10	450
Aphanizomenon flos-aquae	10	450
Euglena	8	360
Tetrastrum	6	270
Cryptomonas	6	270
Dactylococcopsis	6	270
Nitzschia	5	225
Chroococcus	4	180
Chaetoceros	4	180
Blue-green (other)	3	135
Diatom (pennate)	3	135
Phacus	3	135
Characium	2	90
Staurastrum	2	90
Oocystis	2	90
Merismopedia	2	90
Closterium	1	45
Algae (flagellate)	1	45
Schizothrix	1	45
Nitzschia reversa	1	45
Total	208	9,350

Watershed Description

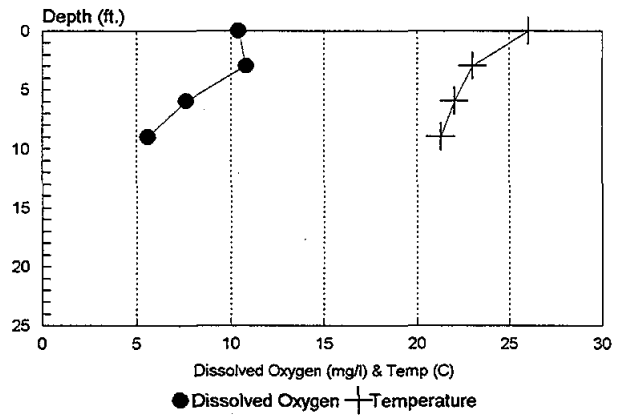
Watershed Area: 904,960 A (366,237 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
NA	NA	NA

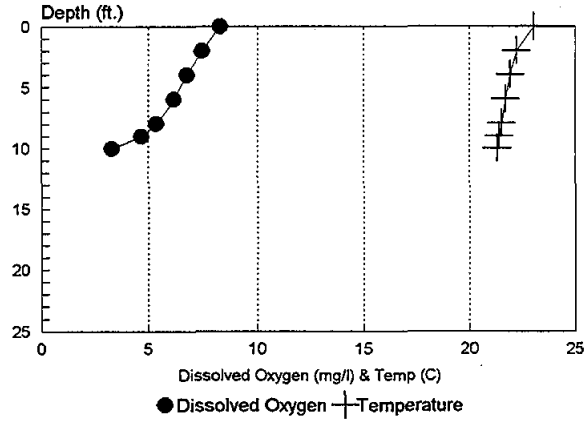
REDFIELD LAKE 6/29/94

Dissolved Oxygen & Temperature Profile

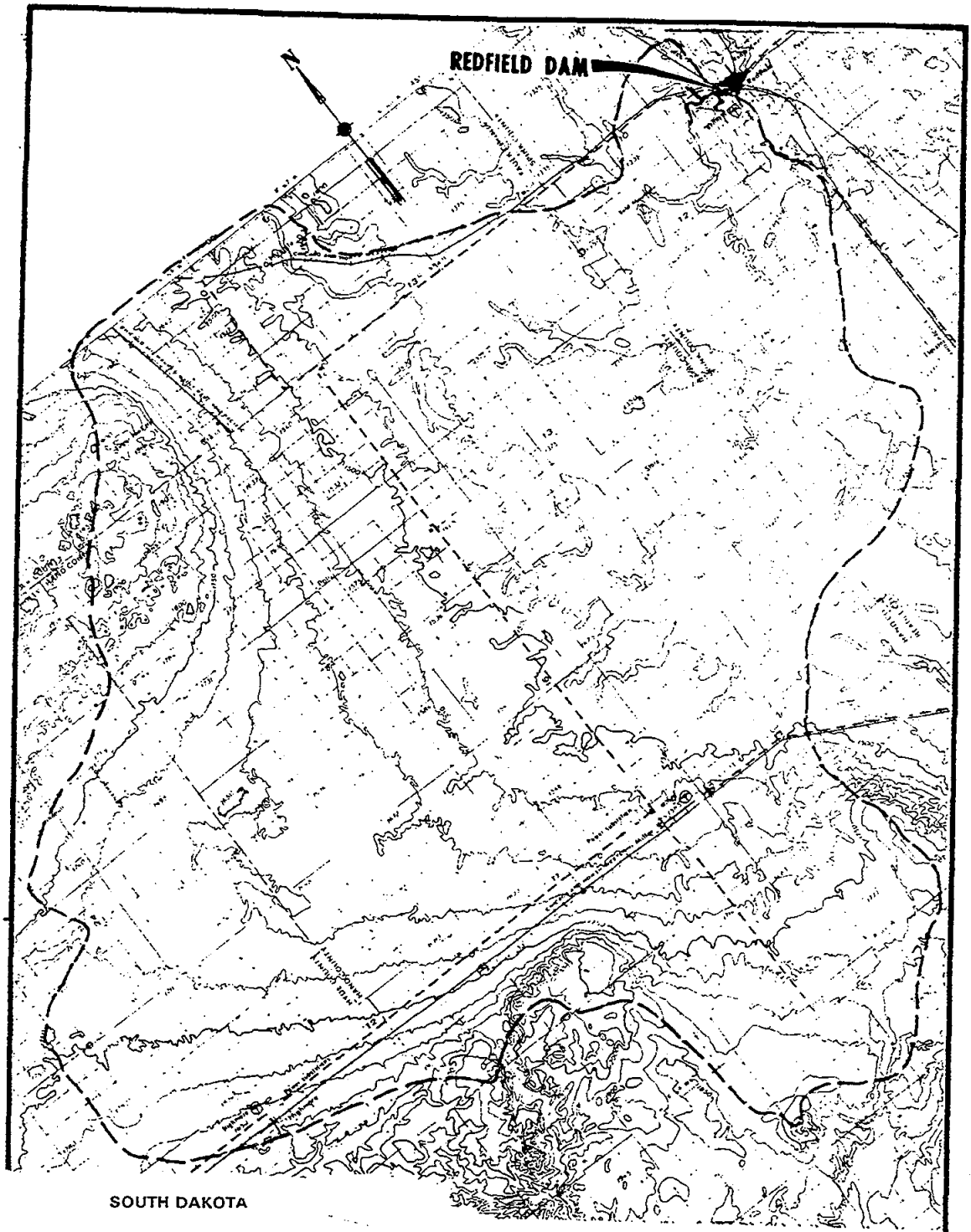


REDFIELD LAKE 8/29/94

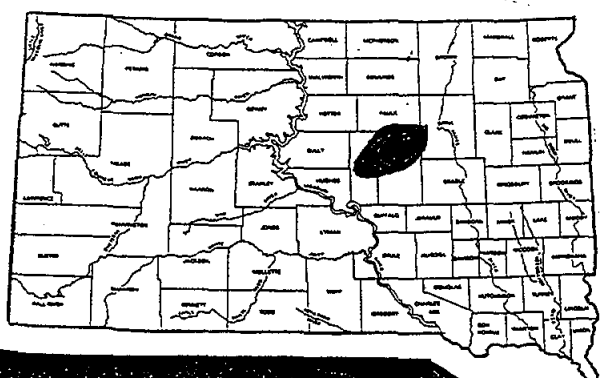
Dissolved Oxygen & Temperature Profile



1414 sq. mi.



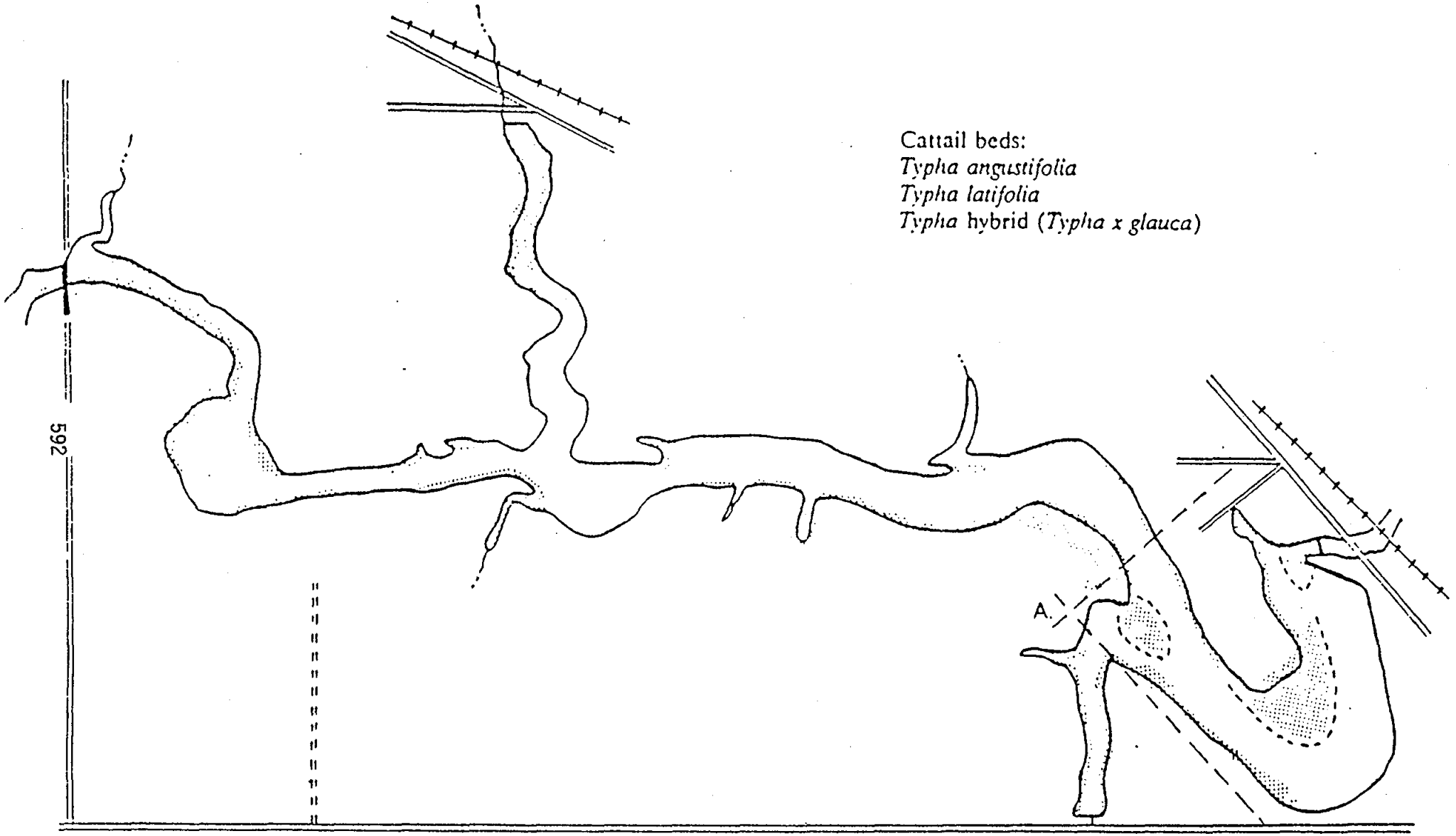
SOUTH DAKOTA



SCALE IN MILES
5 0 5

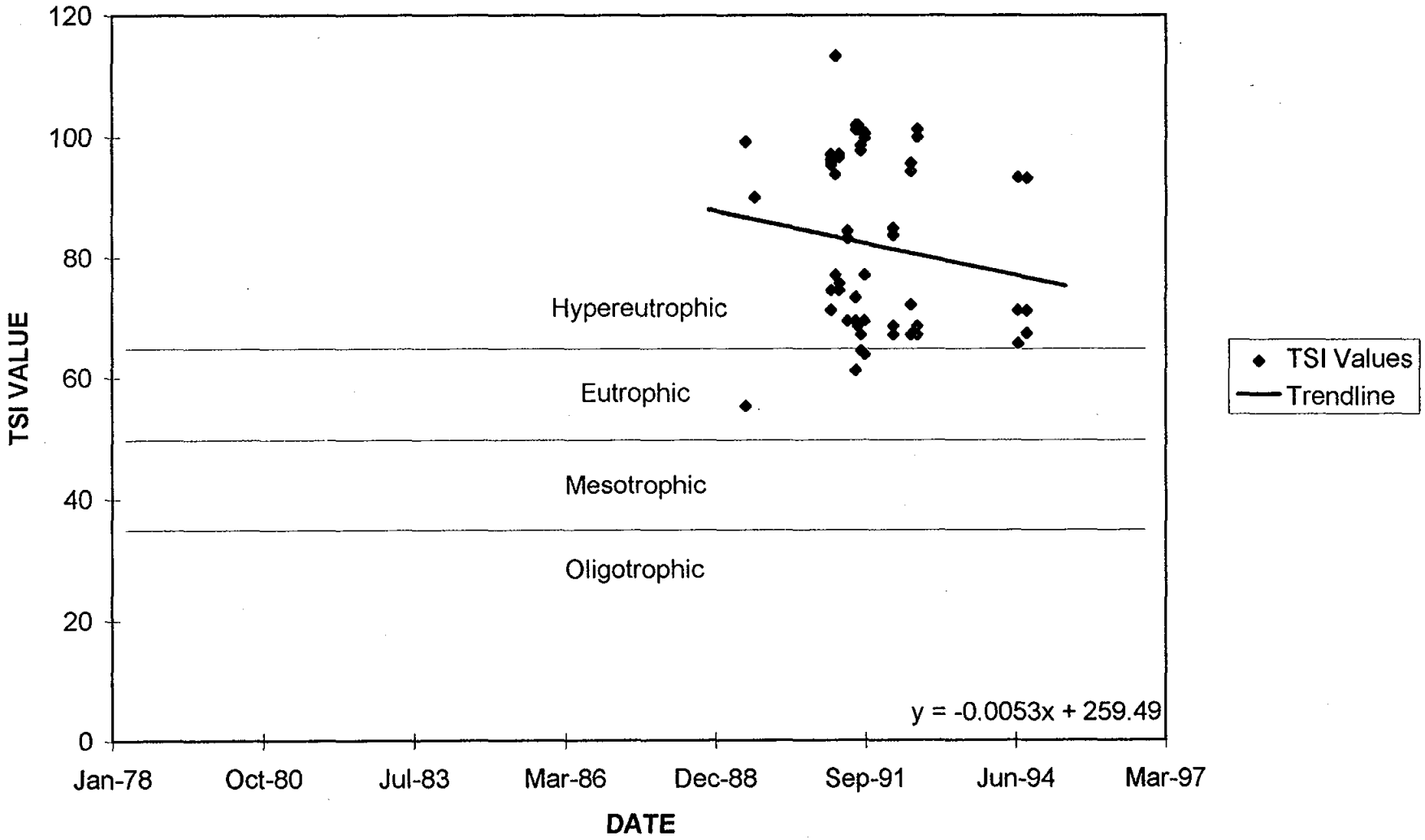
NATIONAL DAM SAFETY PROGRAM
REDFIELD DAM
SD 00699
DRAINAGE AREA MAP
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

PLATE C-6



Lake Redfield (1991).

LAKE REDFIELD TSI's



RICHMOND LAKE

County: Brown
Latitude: 45 deg. 32 min. 30 sec.
Longitude: 97 deg. 38 min. 30 sec

Township: 124, 125N
Range: 64, 65W
Section(s): 1, 12-14, 23-25 30-31, 36

Area: 829 (335.5 ha)
Maximum Depth: 29 ft (8.8 m)
Volume: 12435 acre-ft (1.534 x $10^7 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Foot Creek
Outlet: Foot Creek

Shoreline L: 23.8 mi (38 km)
Mean Depth: 15 ft (4.6 m)
Watershed/Lake Area: 124
Thermal Stratification: no

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 83,538
Ownership Status: State owned A state recreation area is maintained by the South Dakota Game, Fish, and Parks Department.
Public Interest: Richmond Lake Association.

	1991		1992		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	23.48	4	20.56	6	21.29
Air Temperature (°C)	6	30.00	4	24.44	6	20.00
Secchi Disk Depth (meters)	3	0.72	2	1.25	3	0.57
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.59	4	8.30	6	7.91
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	16	4	15	6	23
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.42	4	0.08	6	0.16
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	4	0.01	6	0.28
Total Kjeldahl Nitrogen (mg/l)	6	2.00	4	1.25	6	1.13
Total Phosphorus (mg/l)	6	0.279	4	0.111	6	0.342
Total Dissolved Phosphorus (mg/l)	6	0.231	4	0.058	6	0.270
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	43.70	4	23.84	6	5.40

	1994		1995	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	6	21.71	6	22.28
Air Temperature (°C)	6	24.48	6	21.73
Secchi Disk Depth (meters)	9	0.92	9	0.82
Conductivity (cond/25° C)	-	-	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su)	6	8.33	6	8.35
Total Alkalinity (mg/l)	-	-	-	-
Total Solids (mg/l)	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-
Suspended Solids (mg/l)	6	12	6	18
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.24	6	0.24
Nitrate + Nitrite Nitrogen (mg/l)	6	1.25	6	0.19
Total Kjeldahl Nitrogen (mg/l)	6	1.03	6	1.36
Total Phosphorus (mg/l)	6	0.353	6	0.304
Total Dissolved Phosphorus (mg/l)	6	0.322	6	0.261
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	6	5.41	6	9.68

Year	1991	1992	1993	1994	1995
TSI Values -- Mean:	70.44	63.15	66.55	65.56	66.86
Secchi Disk	63.60	56.78	68.66	61.13	62.87
Total Phosphorus	80.08	70.98	83.88	88.43	84.86
Chlorophyll *a*	67.63	61.68	47.11	47.13	52.84

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: None Identified

Algal Species and Densities
NO DATE

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 103,128 A (41,736 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
NM-NX	56,720	55
WJ-B1	29,907	29
BD-WJ	14,438	14
JW	2,063	2

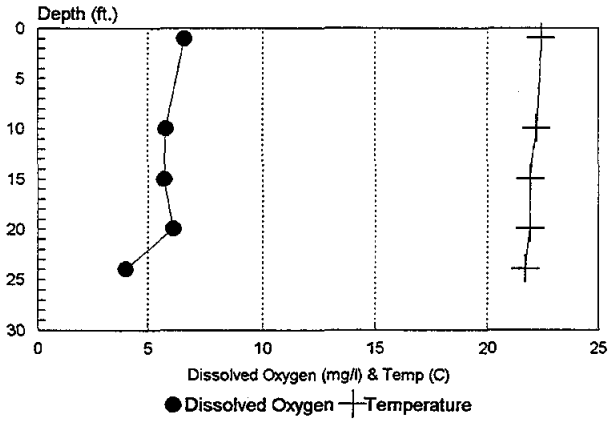
NM-NX Niobell-Noonan: Deep, well drained and moderately well drained, nearly level to gently sloping loamy soils with claypan subsoils that formed in glacial till on uplands.

WJ-B1 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating loamy soils that formed in glacial till on uplands.

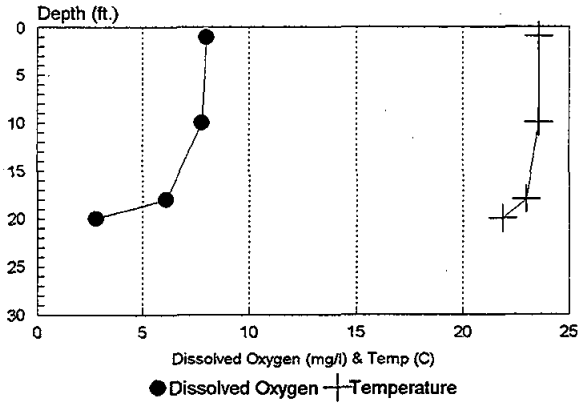
BD-WJBarnes-Williams: Well drained, gently undulating to undulating loamy soils.

JW Bryant: Deep, well drained, nearly level to gently sloping silty soils that formed in glacial drift on uplands.

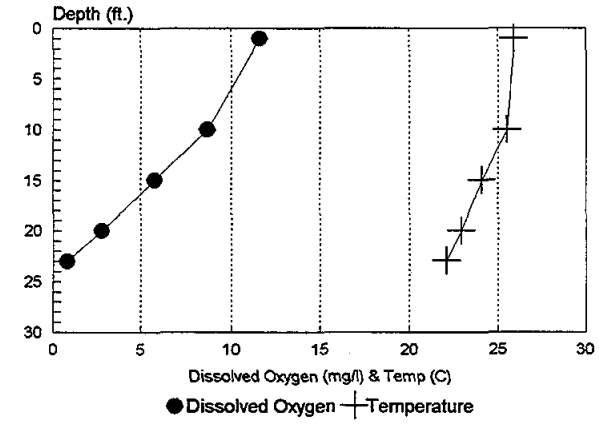
RICHMOND LAKE 8/14/79
Dissolved Oxygen & Temperature Profile



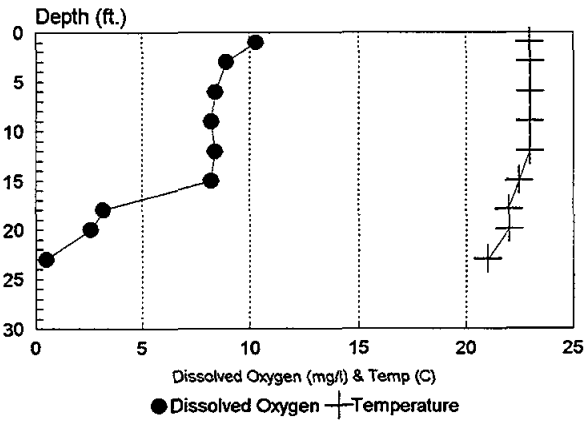
RICHMOND LAKE 6/18/91
Dissolved Oxygen & Temperature Profile



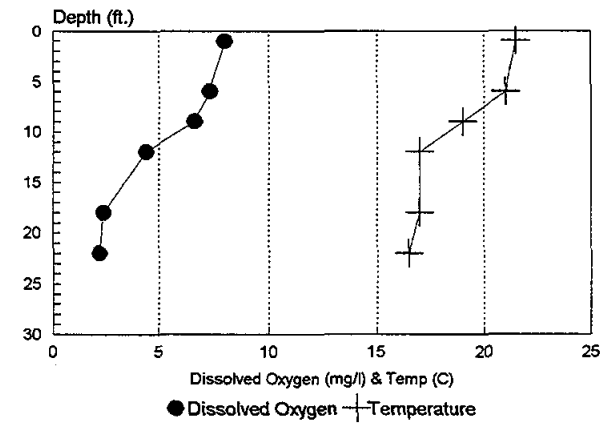
RICHMOND LAKE 7/19/91
Dissolved Oxygen & Temperature Profile



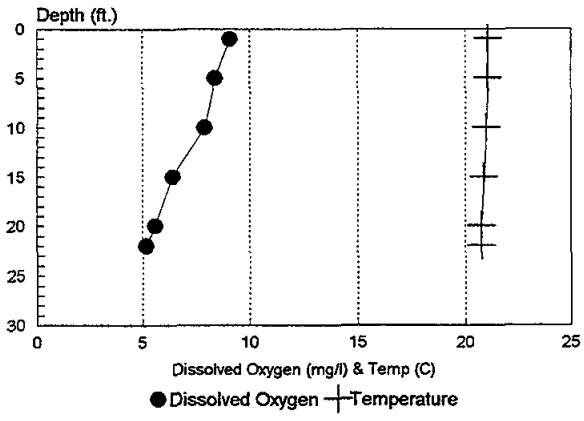
RICHMOND LAKE 8/18/91
Dissolved Oxygen & Temperature Profile



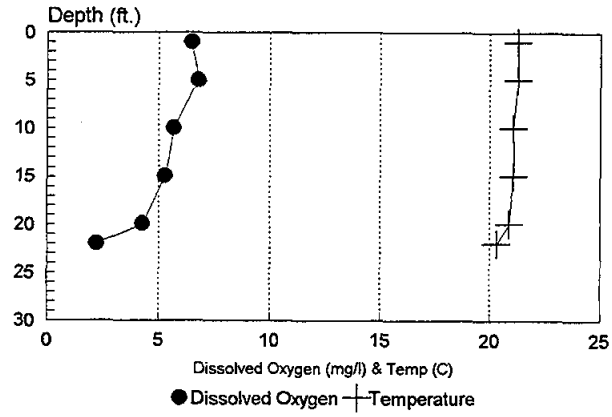
RICHMOND LAKE 6/14/92
Dissolved Oxygen & Temperature Profile



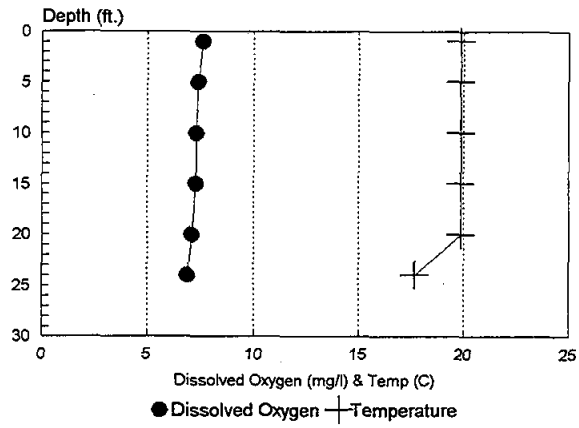
RICHMOND LAKE 7/18/92
Dissolved Oxygen & Temperature Profile



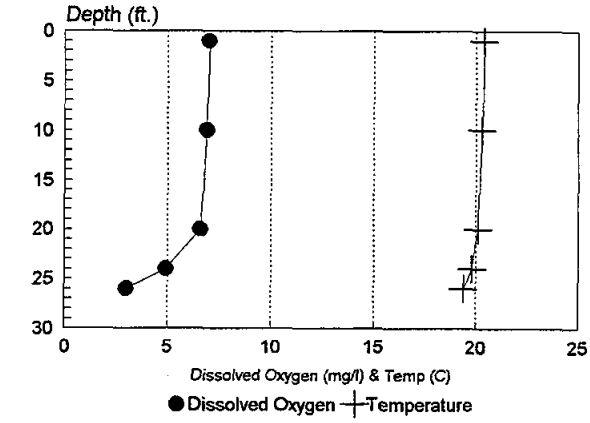
RICHMOND LAKE 8/16/92
Dissolved Oxygen & Temperature Profile



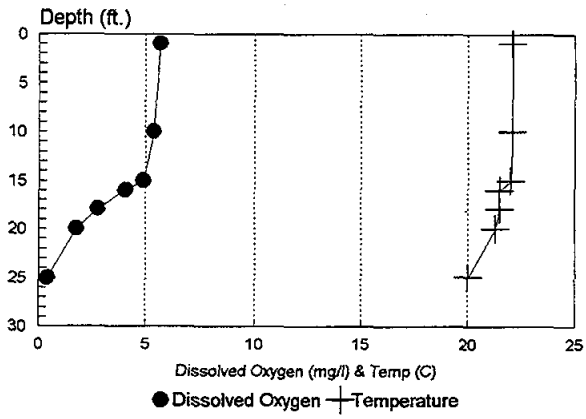
RICHMOND LAKE 6/15/93
Dissolved Oxygen & Temperature Profile



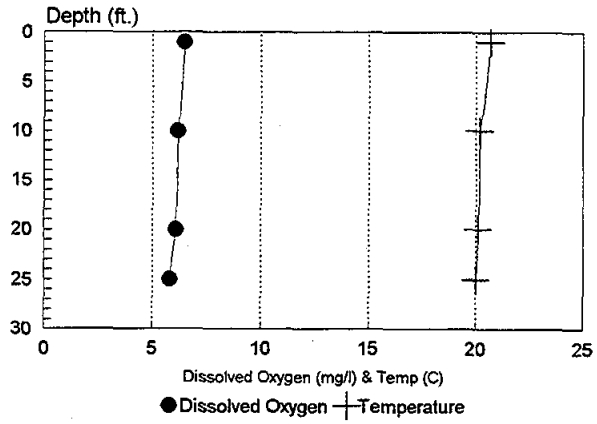
RICHMOND LAKE 7/23/93
Dissolved Oxygen & Temperature Profile



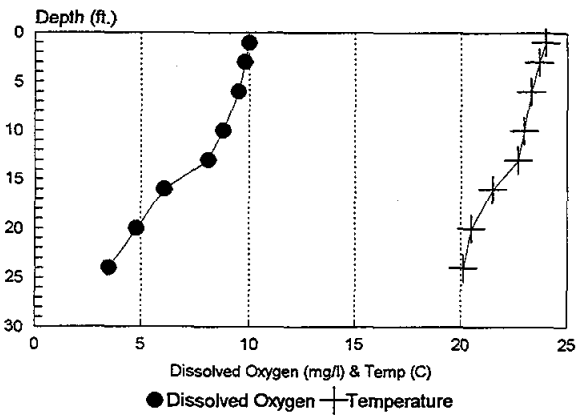
RICHMOND LAKE 8/21/93
Dissolved Oxygen & Temperature Profile



RICHMOND LAKE 6/14/94
Dissolved Oxygen & Temperature Profile

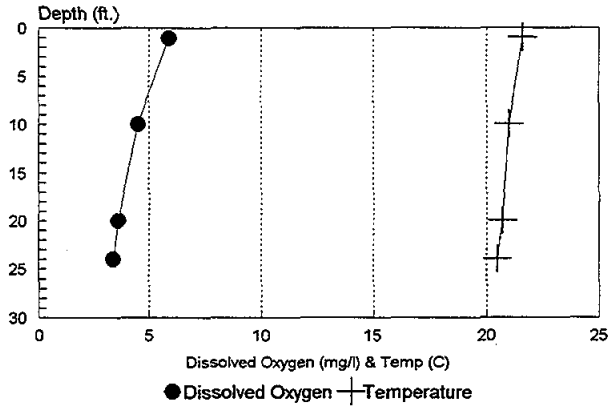


RICHMOND LAKE 7/16/94
Dissolved Oxygen & Temperature Profile



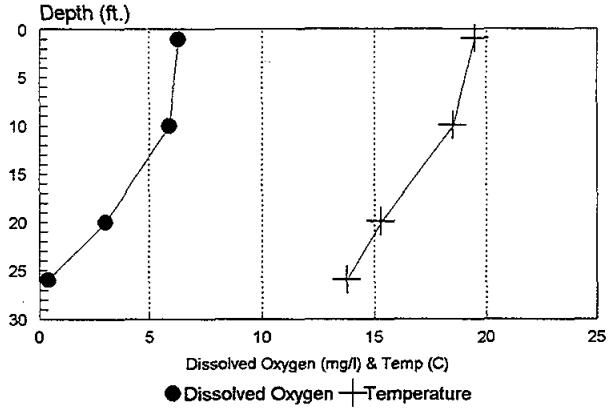
RICHMOND LAKE 8/16/94

Dissolved Oxygen & Temperature Profile



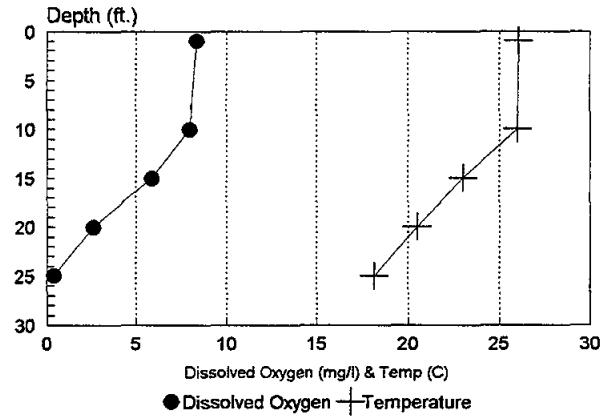
RICHMOND LAKE 6/16/95

Dissolved Oxygen & Temperature Profile



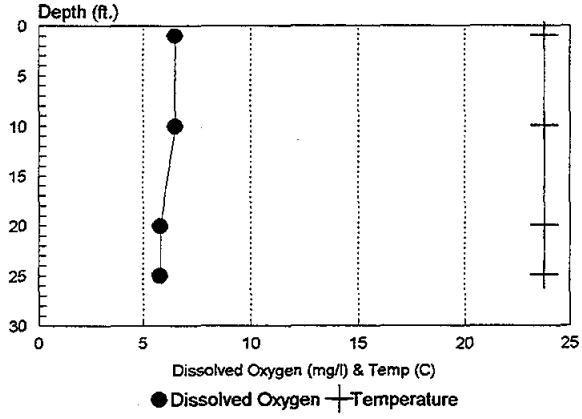
RICHMOND LAKE 7/15/95

Dissolved Oxygen & Temperature Profile

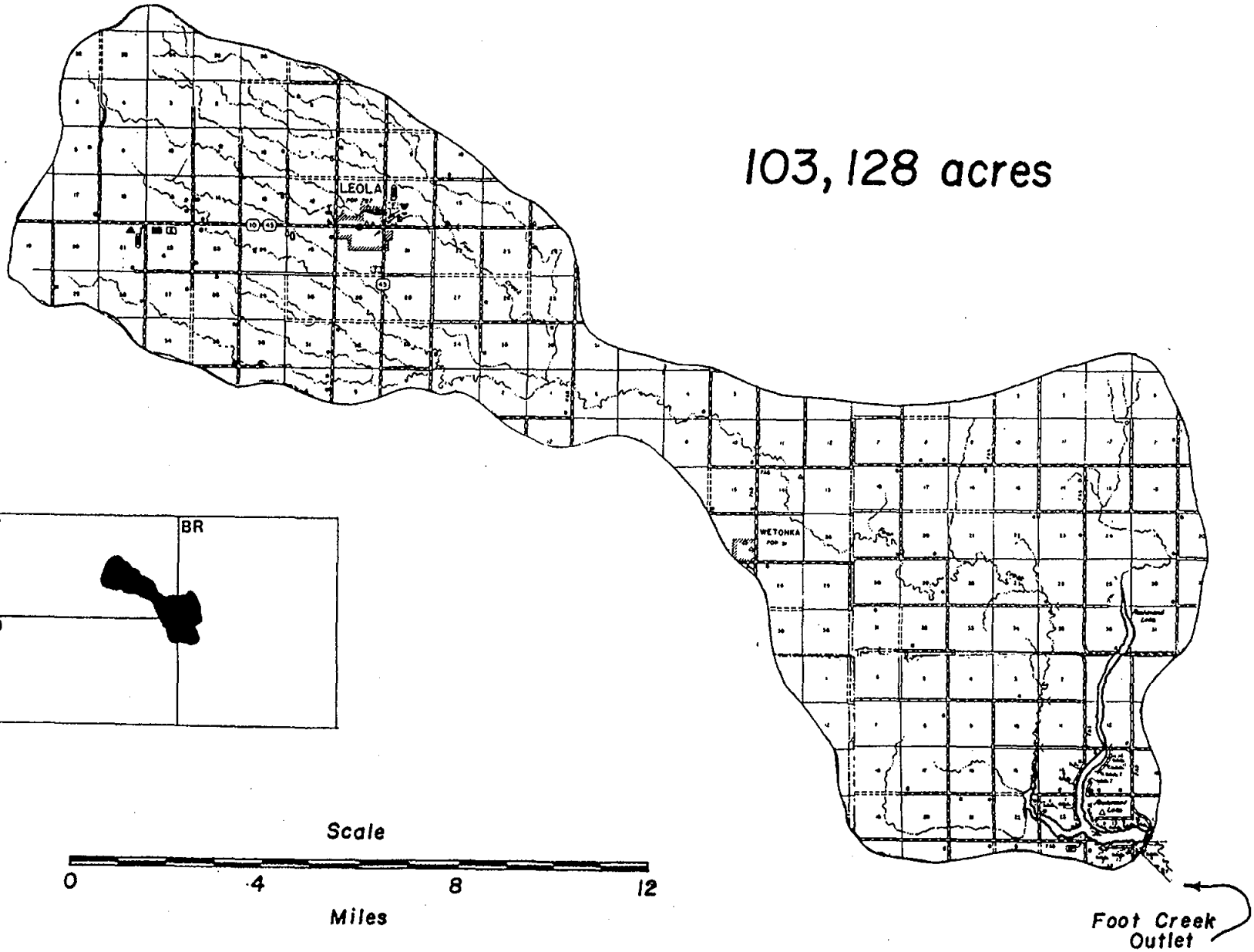


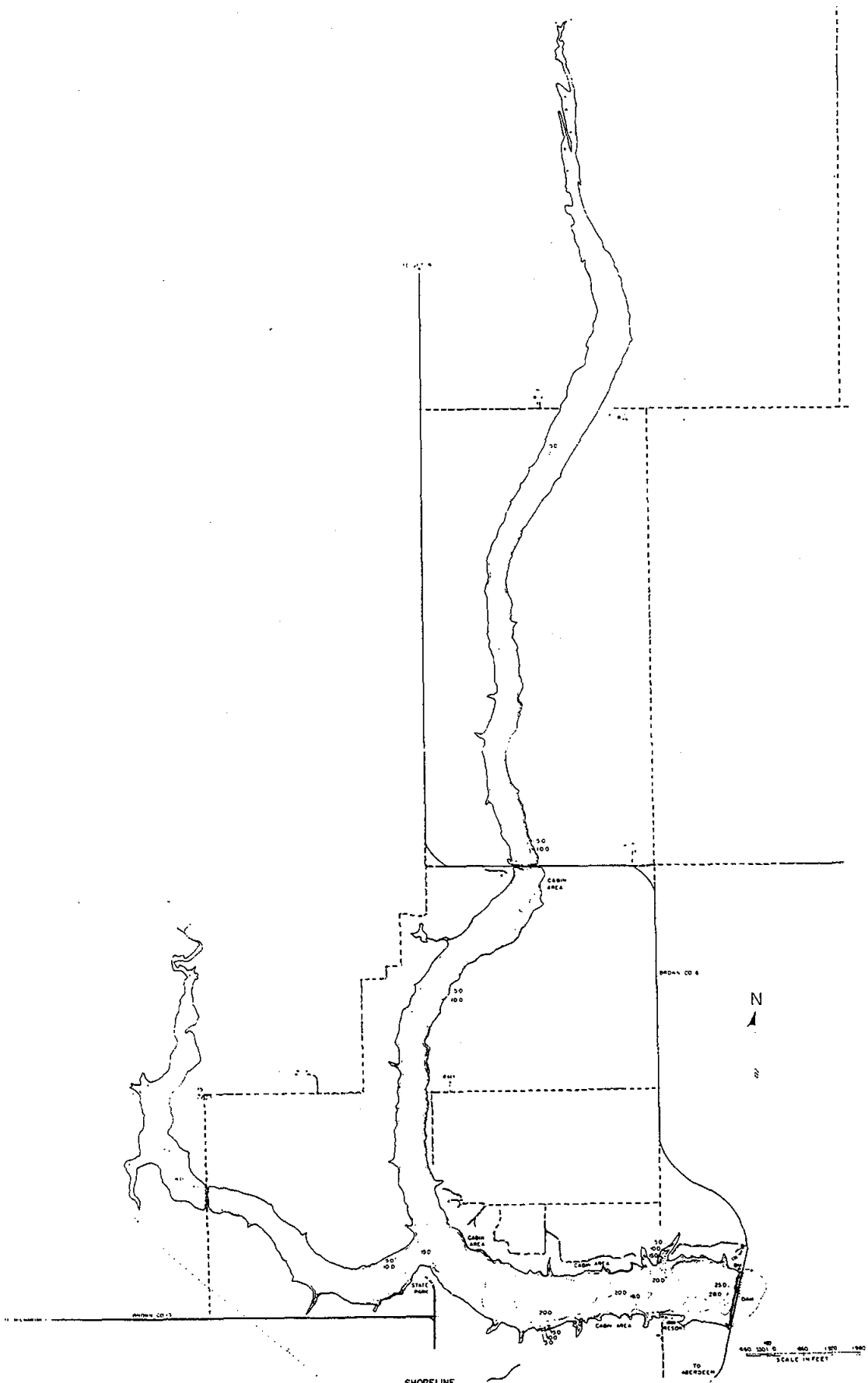
RICHMOND LAKE 8/15/95

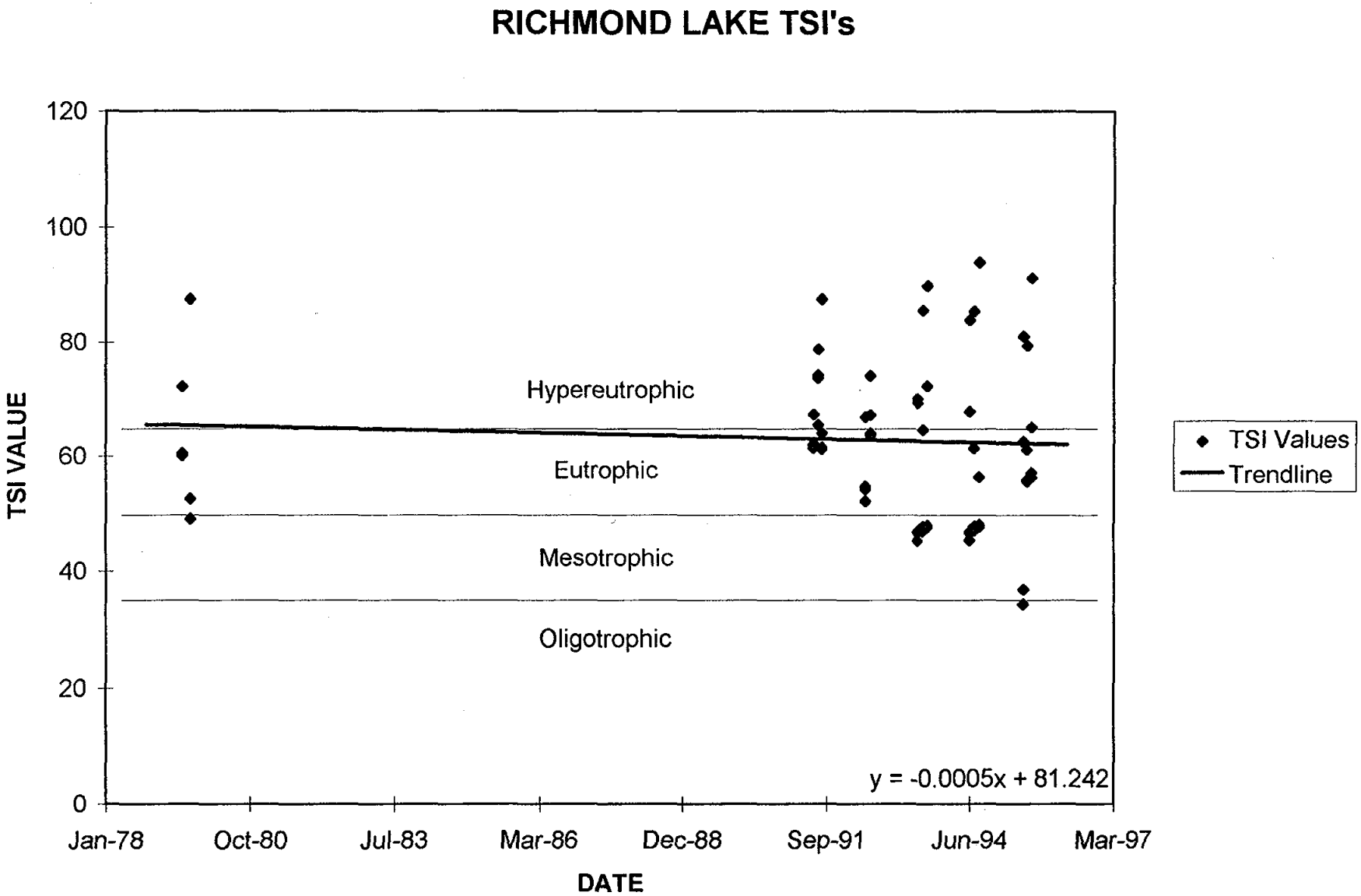
Dissolved Oxygen & Temperature Profile



Richmond Lake




N
SCALE IN FEET
SHORELINE
DEPTH CONTOUR 50
ROADS:
HARD SURFACE
GRAVEL
TRAIL
BENCH MARK BM
PUBLIC ACCESS PA
MARSH
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
RICHMOND LAKE
BROWN COUNTY
WATER STAGE
PLANIMETER
ACRES 829
AERIAL PHOTO
DATE: 1958
SEC. 25,36
SEC. 1,12,13,14,22,23,24,25
TWP. 125 N
RGE. 65 W
FIELD WORK
DATE 11-6-63
DATE 1-7-64
TWP. 124 N
DRAWN BY: LP, WJM


RICHMOND LAKE TSI's
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0005x + 81.242
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

ROOSEVELT LAKE

County: Tripp
Latitude: 43 deg. 12 min. 06 sec. N
Longitude: 99 deg. 37 min. 06 sec. W
Area: 85.7 A (34.7 ha)
Maximum Depth: 21 ft (6.4 m)
Volume: 739.5 acre-ft ($9.122 \times 10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: Ponca Creek Outlet

Township: 97N
Range: 74W
Section(s): 20
Shoreline L: 3.0 mi (4.8 km)
Mean Depth: 8.6 ft (2.6 m)
Watershed/Lake Area: 82
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 57,327
Ownership Status: State owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	26.40	4	16.32	4	21.75
Air Temperature (°C)	4	33.89	4	16.95	4	21.00
Secchi Disk Depth (meters)	2	0.91	2	1.22	2	1.65
Conductivity (cond/25° C)	4	549	2	594	-	-
Turbidity (NTU)	-	-	-	-	2	6.00
Lab pH (su)	4	8.63	-	-	-	-
Field pH (su)	2	8.70	4	8.83	4	8.26
Total Alkalinity (mg/l)	4	219	4	255	4	248
Total Solids (mg/l)	4	382	4	420	4	380
Dissolved Solids (mg/l)	4	373	4	403	4	377
Suspended Solids (mg/l)	4	9	4	17	4	4
Volatile Suspended Solids (mg/l)	-	-	1	2	-	-
Ammonia Nitrogen (mg/l)	4	0.09	4	0.03	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.43	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.60	4	1.31	4	1.62
Total Phosphorus (mg/l)	4	0.423	4	0.538	4	0.495
Total Dissolved Phosphorus (mg/l)	-	-	4	0.486	4	0.413
Ortho Phosphate as P (mg/l)	4	0.329	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	12.06	2	14.41

Year	1989	1991	1994
TSI Values -- Mean:	76.30	69.00	67.25
Secchi Disk	61.29	57.14	52.78
Total Phosphorus	91.31	94.85	92.22
Chlorophyll *a*		55.00	56.74

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

	July 6, 1989		August 3, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aque	75	2,025	1	58
Cryptomonas sp. #1	16	432	1	58
Characium	5	135	-	-
Green Algae (other)	4	108	7	407
Algae (other)	4	108	36	2,092
Anabaena	4	108	1	58
Glenodinium Gymnodinium	1	27	-	-
Green Algae (flagellate)	1	27	-	-
Diatom (centric)	-	-	116	6,740
Dactylococcopsis	-	-	59	3,428
Nitzschia acicularis	-	-	24	1,394
Cryptomonas	-	-	19	1,104
Cryptomonas ovata	-	-	15	872
Aphanocapsa	-	-	6	349
Chroococcus	-	-	3	174
Synedra	-	-	3	174
Algae (flagellate)	-	-	3	174
Actinastrum	-	-	2	116
Scenedesmus	-	-	1	58
Blue-green (other)	-	-	1	58
Diatom (pennate)	-	-	1	58
Ceratium hirundinella	-	-	1	58
Phacus	-	-	1	58
Total	110	2,970	301	17,489

Watershed Description

Watershed Area: 7,045 A (2,851 ha)

Soil Associations within Watershed

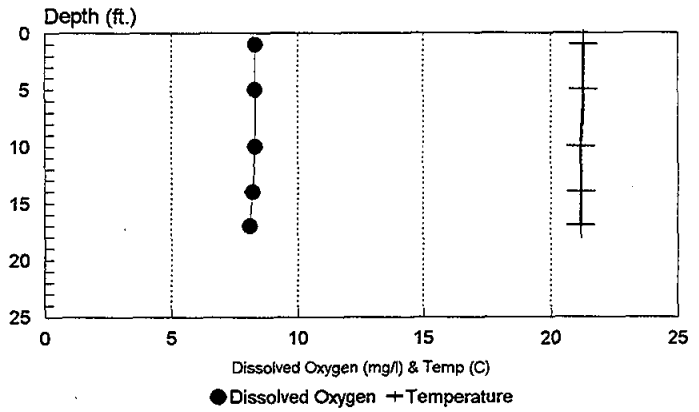
Association	Area (A)	% of Total
DP-EL	3,170	45
AN-HP	2,536	36
RJ	1,339	19

DP-EL Doger-Elsmere: Deep, nearly level to undulating, well drained and somewhat poorly drained, sandy and loamy soils.

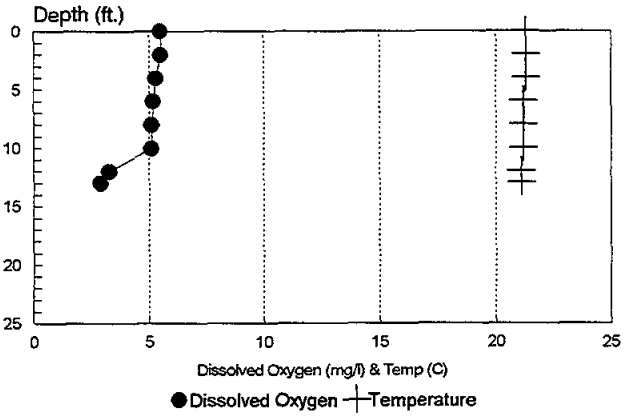
AN-HP Anselmo-Holt: Deep and moderately deep, nearly level to moderately steep, well drained, loamy soils.

RJ Reliance: Deep, nearly level to moderately sloping, well drained silty soils.

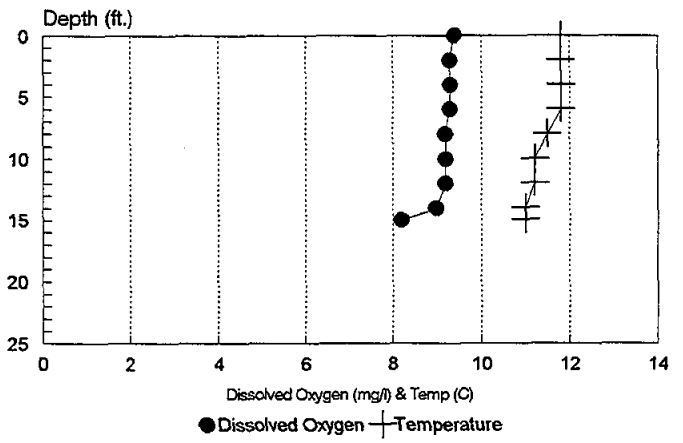
ROSEVELT LAKE 8/27/79
Dissolved Oxygen & Temperature Profile



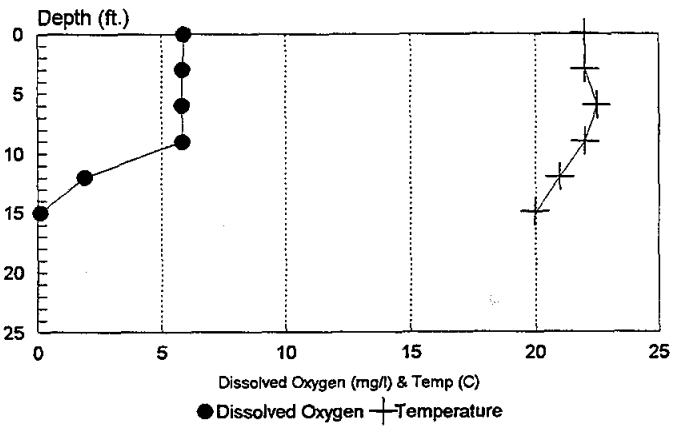
ROOSEVELT LAKE 8/7/91
Dissolved Oxygen & Temperature Profile



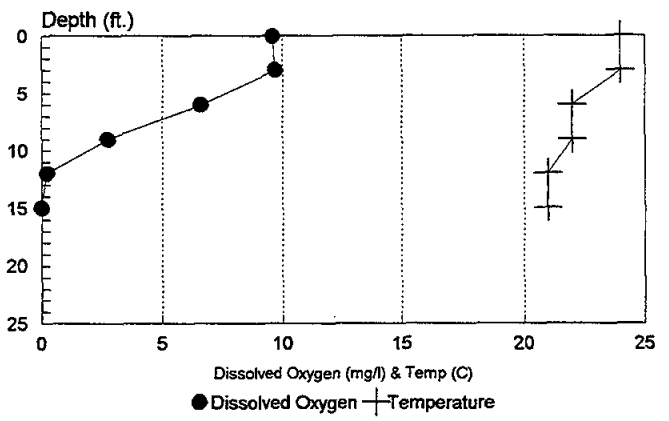
ROOSEVELT LAKE 9/24/91
Dissolved Oxygen & Temperature Profile



ROOSEVELT LAKE 6/15/94
Dissolved Oxygen & Temperature Profile

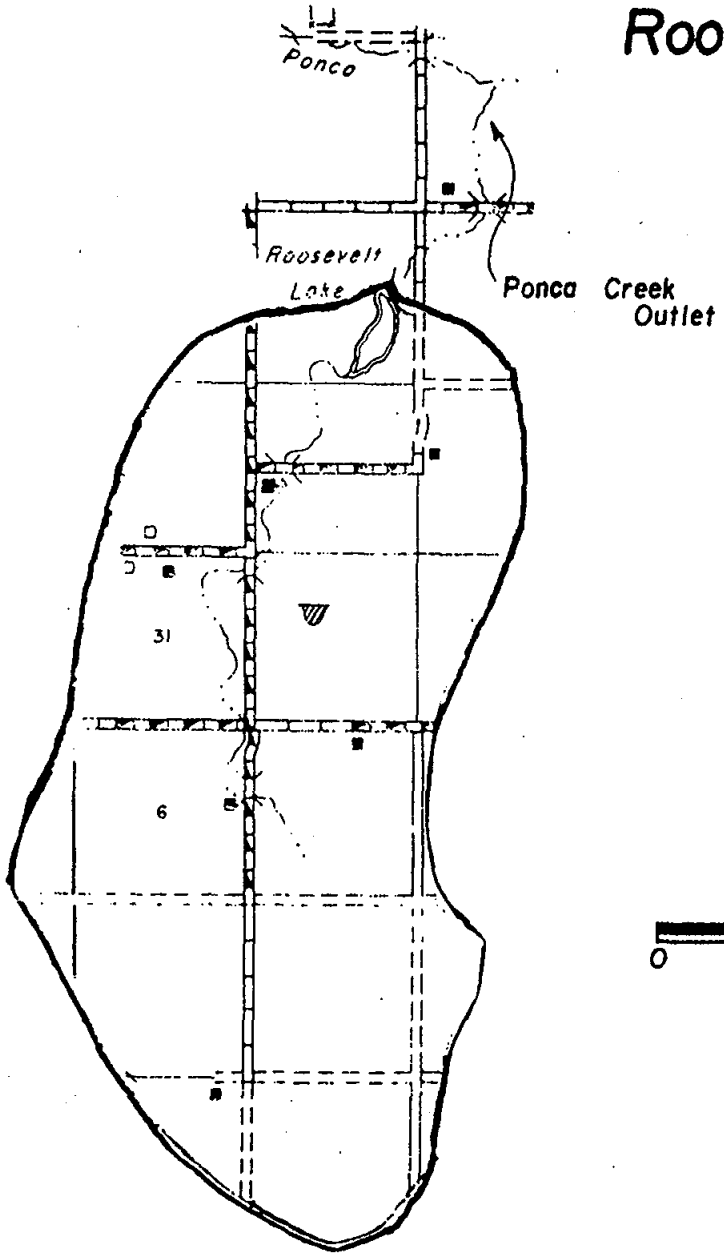


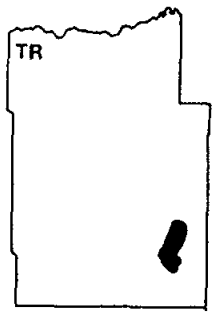
ROOSEVELT LAKE 8/15/94
Dissolved Oxygen & Temperature Profile



Roosevelt Lake

7045 acres



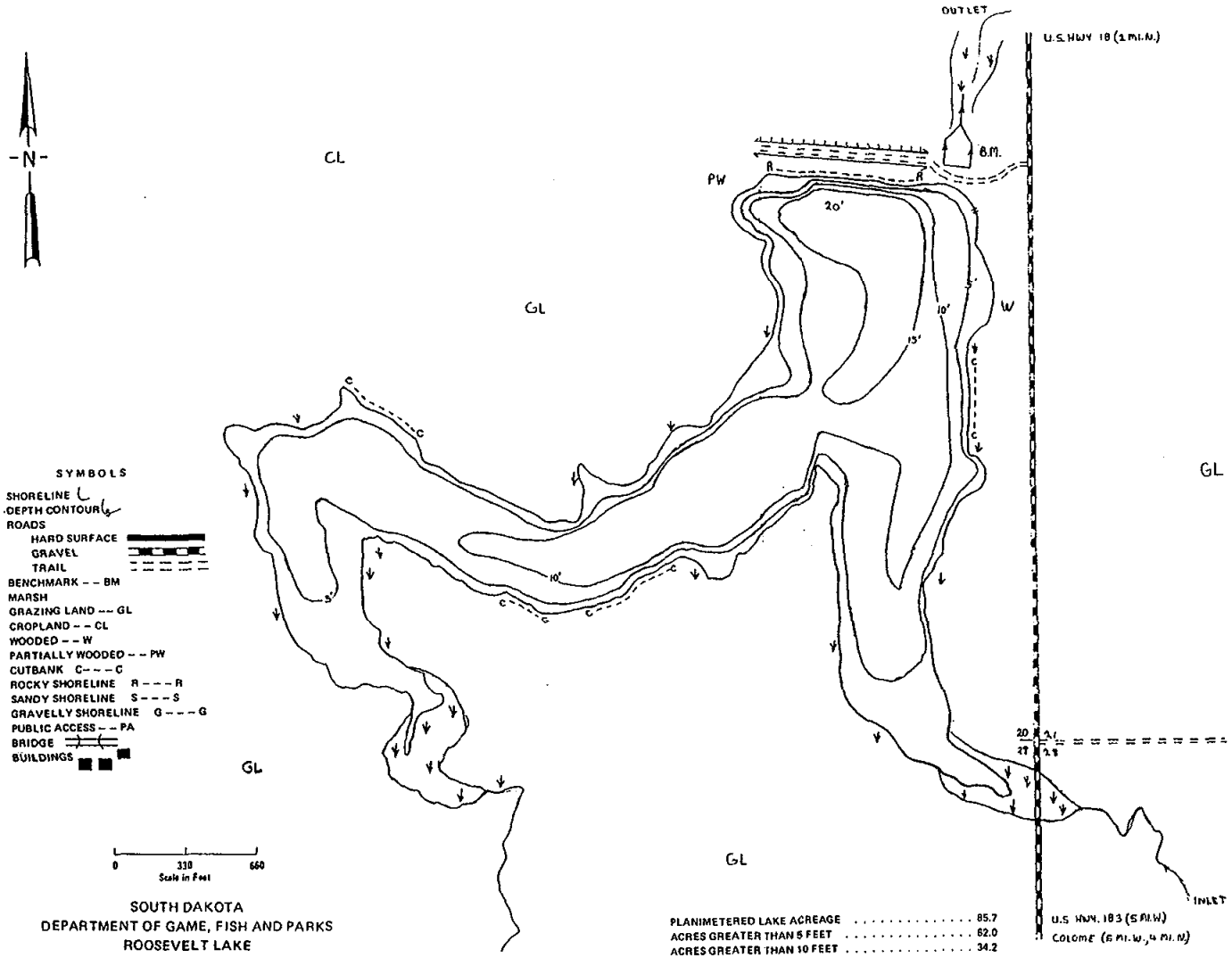


Scale

0 1 2 3 4 5

Miles

607



SYMBOLS

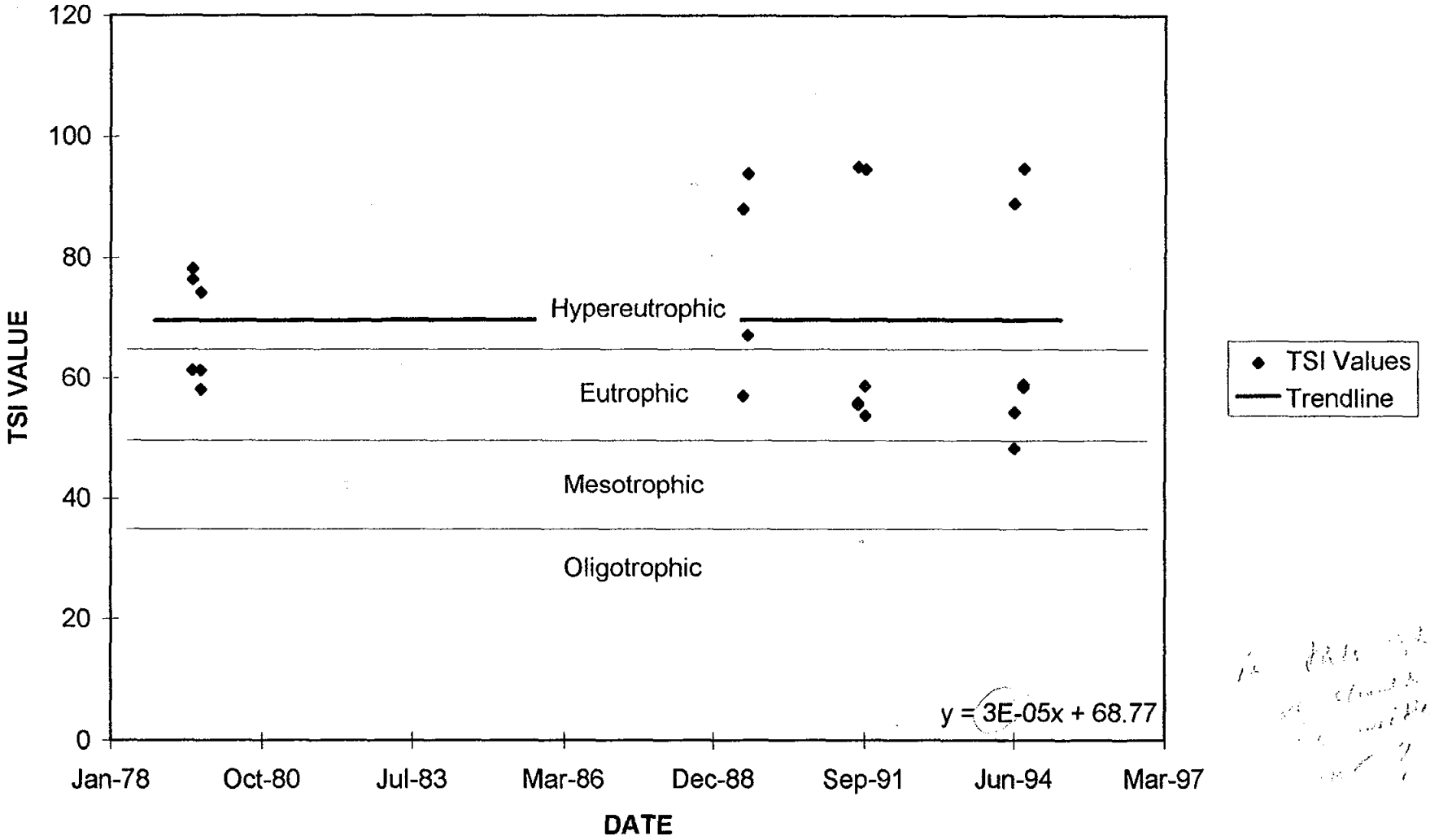
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK – – BM
MARSH
GRAZING LAND ––– GL
CROPLAND – – CL
WOODED – – W
PARTIALLY WOODED – – PW
CUTBANK C– – – C
ROCKY SHORELINE R– – – R
SANDY SHORELINE S– – – S
GRAVELLY SHORELINE G– – – G
PUBLIC ACCESS – – PA
BRIDGE
BUILDINGS

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
ROOSEVELT LAKE
TRIPP COUNTY

SECTION 20–TWP 97N–RGE 74N
B.M. SPILLWAY (9 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 85.7
MILES OF SHORELINE: 3

PLANIMETERED LAKE ACREAGE	85.7
ACRES GREATER THAN 5 FEET	62.0
ACRES GREATER THAN 10 FEET	34.2
ACRES GREATER THAN 15 FEET	8.1
TOTAL ACRE FEET	739.5
AVERAGE DEPTH	8.6 FEET

ROOSEVELT LAKE TSI's



ROSEHILL LAKE

County: Hand
Latitude: 44 deg. 18 min. 42 sec. N
Longitude: 98 deg. 46 min. 18 sec. W
Area: 33.8 A (13.6 ha)
Maximum Depth: 25 ft (7.6 m)
Volume: 315.9 acre-ft ($3.89x10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Sand Creek
Outlet: Sand Creek

Township: 110N
Range: 66W
Section(s): 21, 28
Shoreline L: 2.1 mi (3.4 km)
Mean Depth: 9.3 ft (2.8 m)
Watershed/Lake Area: 632
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 81,519
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	17.80	4	19.16	4	20.24
Air Temperature (°C)	4	22.50	4	23.50	4	25.09
Secchi Disk Depth (meters)	2	1.42	2	1.23	2	2.21
Conductivity (cond/25° C)	4	587	2	475	-	-
Turbidity (NTU)	-	-	-	-	4	5.99
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.78	4	8.54	4	7.95
Total Alkalinity (mg/l)	4	146	4	154	4	177
Total Solids (mg/l)	4	432	4	338	4	339
Dissolved Solids (mg/l)	4	417	4	323	4	336
Suspended Solids (mg/l)	4	15	4	15	4	4
Volatile Suspended Solids (mg/l)	-	-	2	5	-	-
Ammonia Nitrogen (mg/l)	4	0.27	4	0.30	4	0.26
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.70	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.11	4	1.33	4	1.63
Total Phosphorus (mg/l)	4	0.401	4	0.553	4	0.696
Total Dissolved Phosphorus (mg/l)	-	-	4	0.495	4	0.657
Ortho Phosphate as P (mg/l)	4	0.300	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	21.44	2	51.09

Year	1989	1991	1993
TSI Values -- Mean:	69.56	68.38	70.24
Secchi Disk	54.97	56.96	48.56
Total Phosphorus	84.15	87.53	93.01
Chlorophyll *a*		60.64	69.16

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton foliosus, P. pectinatus, Najas flexilis, and Elodea canadensis

Algal Species and Densities

	June 12, 1989		July 10, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Diatom (centric)	216	4,269	-	-
Aphanizomenon flos-aquae	23	455	7	606
Melosira granulata	21	415	58	5,019
Cryptomonas sp. #1	14	277	17	1,471
Algae (other)	10	198	60	5,192
Green Algae (other)	9	178	-	-
Characium	6	119	-	-
Fragilaria	4	79	-	-
Algae (flagellate)	1	20	2	173
Diatom (pennate)	1	20	1	87
Cryptomonas ovata	1	20	-	-
Oocystis	1	20	-	-
Pediastrum	1	20	-	-
Micractinium	-	-	39	3,375
Actinastrum	-	-	11	952
Nitzschia acicularis	-	-	8	692
Cryptomonas	-	-	3	260
Nitzschia	-	-	2	173
Scenedesmus	-	-	2	173
Dactylococcopsis	-	-	2	173
Total	308	6,087	300	25,962

Watershed Description

Watershed Area: 21,362 A (8,645 ha)

Soil Associations within Watershed

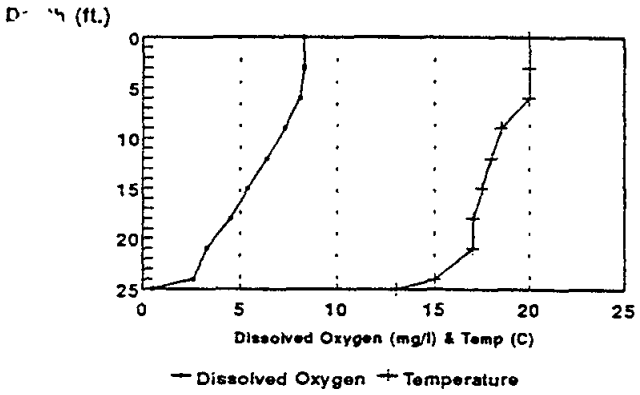
Association	Area (A)	% of Total
RA-H3	14,953	70
RA-CE	5,127	24
GL-KB	1,282	6

RA-H3 Raber-Highmore: Deep, gently undulating to undulating well drained, loamy and silty soils that formed in firm clay loam glacial till and glacial drift

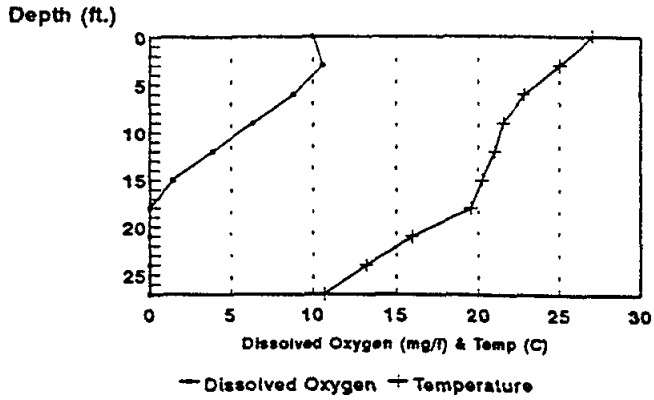
RA-CE Raber-Cavo: Deep, nearly level and undulating, well drained loamy soils and soils with claypan subsoils that formed in firm clay loam glacial till.

GL-KB Glenham-Java: Deep, nearly level to undulating, well drained loamy soils that formed in glacial till.

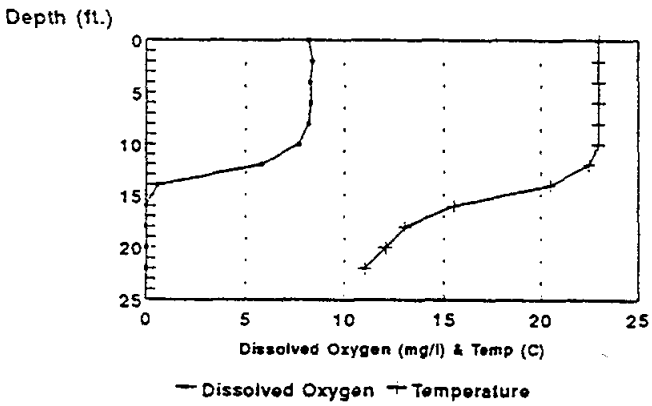
ROSE HILL LAKE 6/22/93
Dissolved Oxygen & Temperature Profile



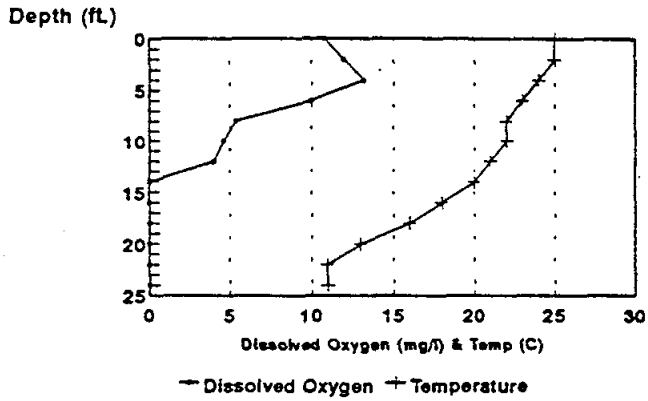
ROSE HILL LAKE 8/9/93
Dissolved Oxygen & Temperature Profile



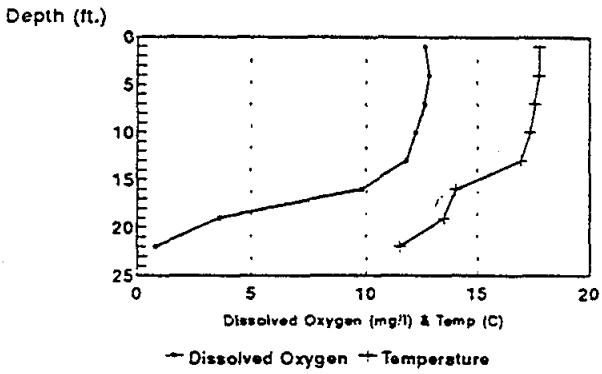
ROSE HILL LAKE 7/8/91
Dissolved Oxygen & Temperature Profile



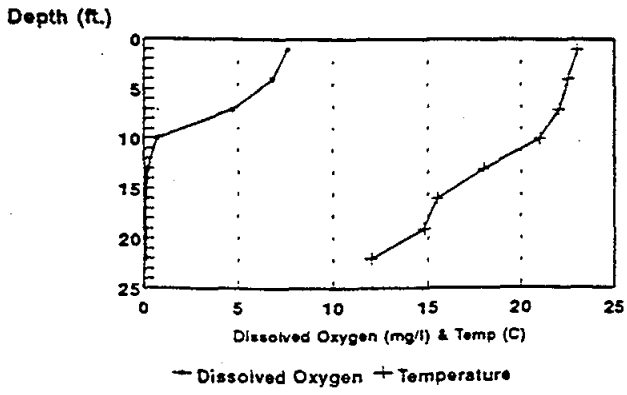
ROSE HILL LAKE 8/20/91
Dissolved Oxygen & Temperature Profile



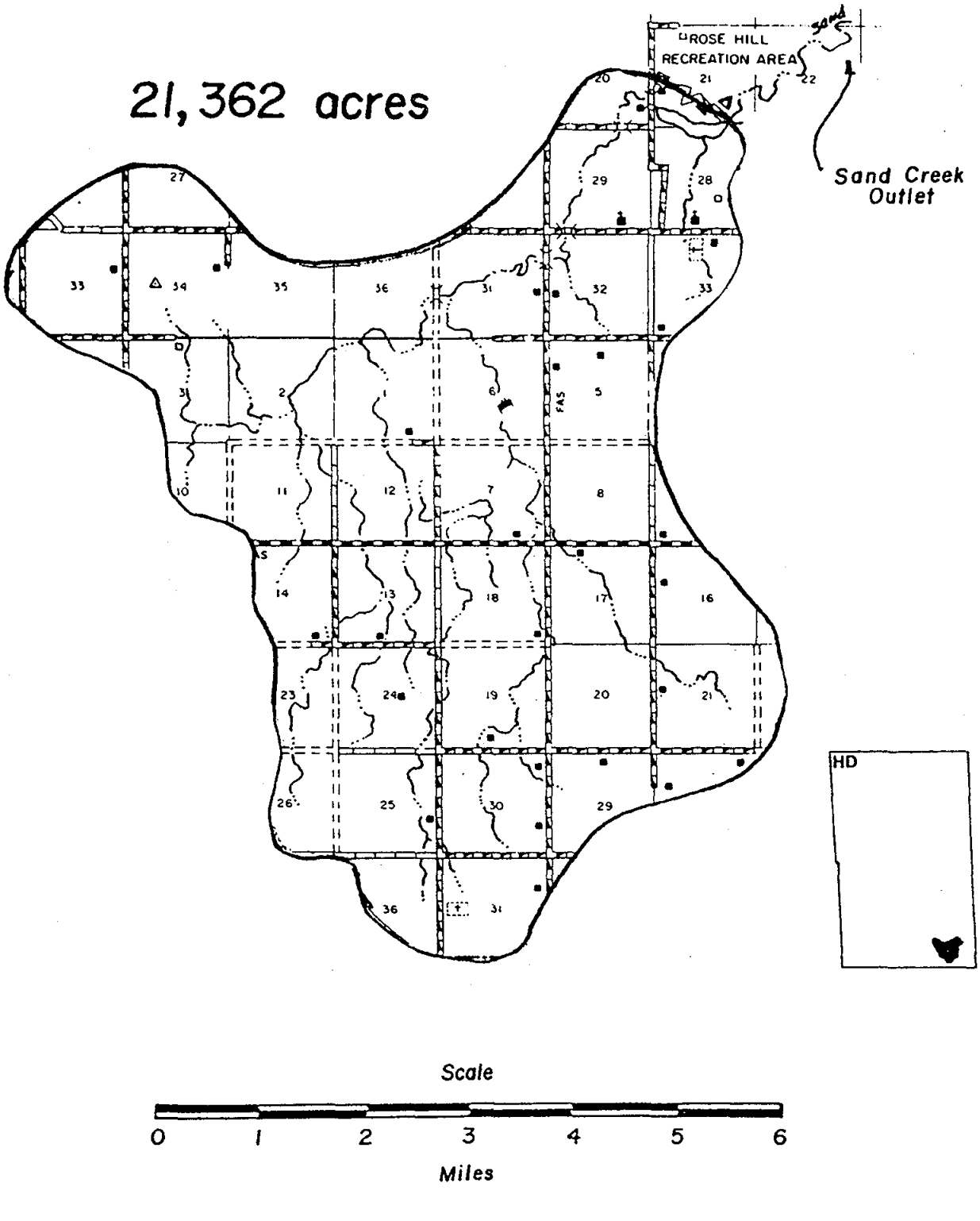
Rosehill Lake, 6/12/89
Dissolved Oxygen & Temperature Profile



Rosehill Lake, 7/10/89
Dissolved Oxygen & Temperature Profile



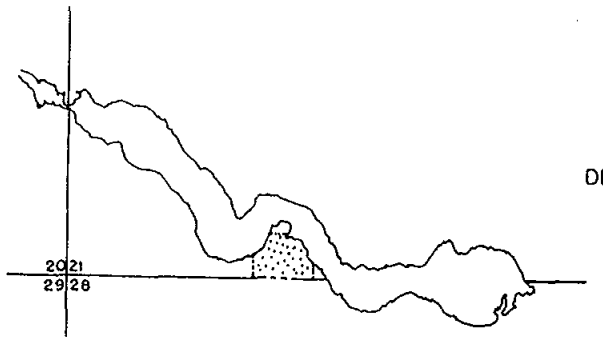
Rose Hill Lake



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

ROSEHILL LAKE

HAND COUNTY
1985

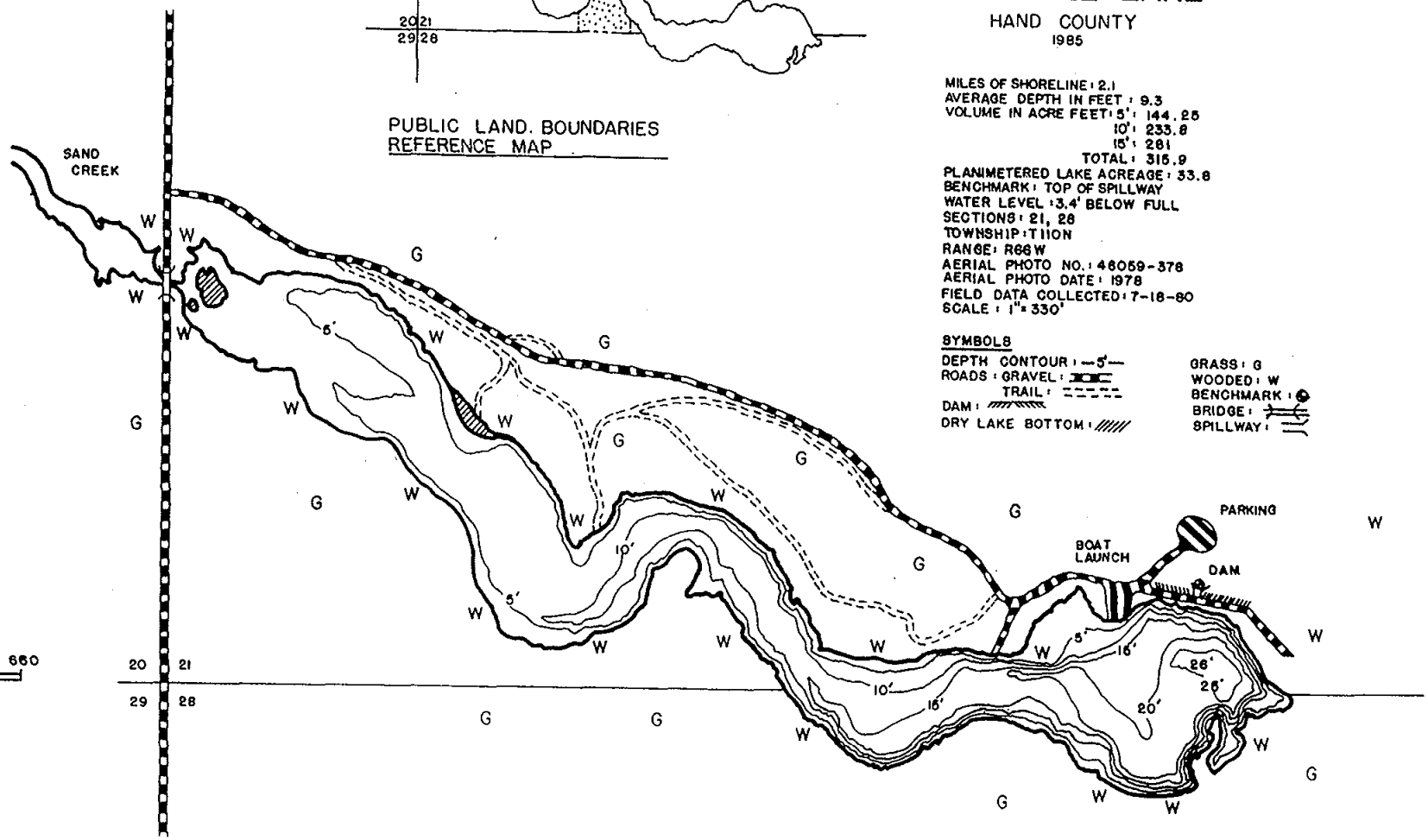


PUBLIC LAND. BOUNDARIES
REFERENCE MAP

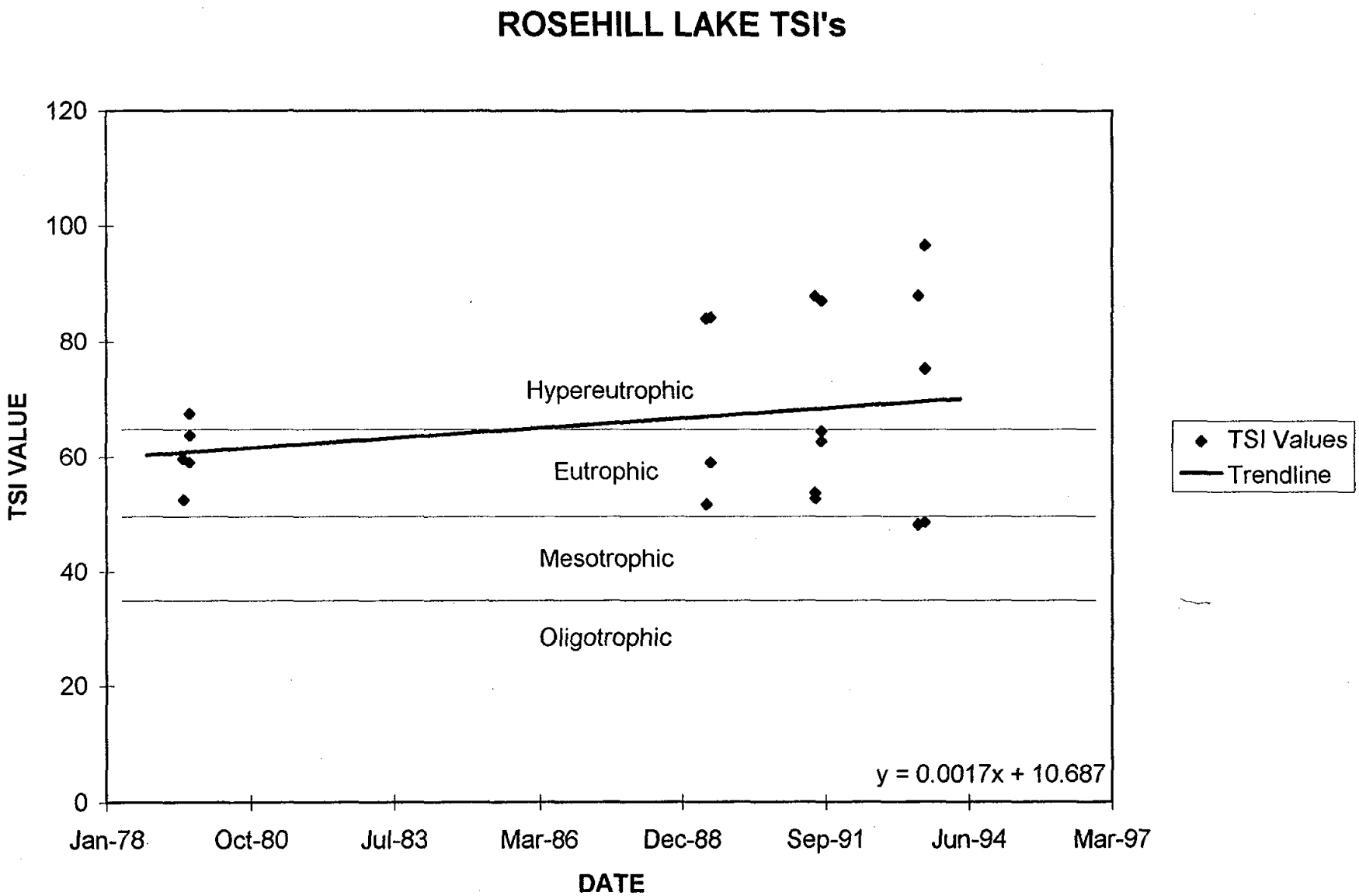
MILES OF SHORELINE : 2.1
AVERAGE DEPTH IN FEET : 9.3
VOLUME IN ACRE FEET : 5' : 144.25
10' : 233.8
15' : 261
TOTAL : 315.9
PLANIMETERED LAKE ACREAGE : 33.8
BENCHMARK : TOP OF SPILLWAY
WATER LEVEL : 3.4' BELOW FULL
SECTIONS : 21, 28
TOWNSHIP : T110N
RANGE : R66W
AERIAL PHOTO NO. : 46059-378
AERIAL PHOTO DATE : 1978
FIELD DATA COLLECTED : 7-18-80
SCALE : 1" = 330'

SYMBOLS
DEPTH CONTOUR : —5'—
ROADS : GRAVEL :
TRAIL :
DAM :
DRY LAKE BOTTOM :

GRASS : G
WOODED : W
BENCHMARK :
BRIDGE :
SPILLWAY :



REPRODUCTION BY PERMISSION
OF THE G,F & P ONLY.


ROSEHILL LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0017x + 10.687
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

ROSETTE LAKE

County: Edmunds
Latitude: 45 deg. 33 min. 26 sec. N
Longitude: 99 deg. 02 min. 06 sec. W
Area: 14.5 A (5.9 ha)
Maximum Depth: 18 ft (5.49 m)
Volume: 169 acre-ft (2.085 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 124N
Range: 68W
Section(s): 16
Shoreline L: 1.19 mi (1.91 km)
Mean Depth: 13 ft (3.96 m)
Watershed/Lake Area: 367
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 83,400
Ownership Status: State owned
Public Interest: NA

	1991	
Chemical Parameters	Samples	Results
Water Temperature (°C)	3	23.13
Air Temperature (°C)	3	28.33
Secchi Disk Depth (meters)	2	0.53
Conductivity (cond/25° C)	2	1,446
Turbidity (NTU)	-	-
Lab pH (su)	-	-
Field pH (su)	3	7.97
Total Alkalinity (mg/l)	3	236
Total Solids (mg/l)	3	1,029
Dissolved Solids (mg/l)	3	1,014
Suspended Solids (mg/l)	3	15
Volatile Suspended Solids (mg/l)	2	6
Ammonia Nitrogen (mg/l)	2	0.06
Nitrate + Nitrite Nitrogen (mg/l)	2	0.43
Total Kjeldahl Nitrogen (mg/l)	2	1.51
Total Phosphorus (mg/l)	2	0.834
Total Dissolved Phosphorus (mg/l)	2	0.698
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	1	96.15

Watershed Description

Watershed Area: 21,362 A (8,645 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
RA-H3	14,953	70
RA-CE	5,127	24
GL-KB	1,282	6

RA-H3 Raber-Highmore: Deep, gently undulating to undulating well drained, loamy and silty soils that formed in firm clay loam glacial till and glacial drift

RA-CE Raber-Cavo: Deep, nearly level and undulating, well drained loamy soils and soils with claypan subsoils that formed in firm clay loam glacial till.

GL-KB Glenham-Java: Deep, nearly level to undulating, well drained loamy soils that formed in glacial till.

Year	1991
TSI Values -- Mean:	78.96
Secchi Disk	69.07
Total Phosphorus	102.05
Chlorophyll *a*	65.77

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Watershed Description

Watershed Area: 5,321 A (2,153 ha)

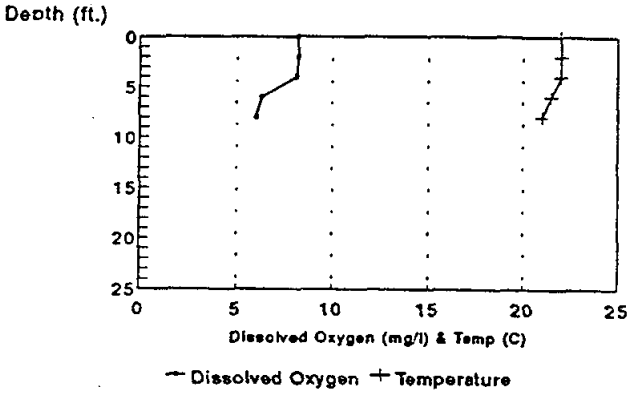
Soil Associations within Watershed

Association	Area (A)	% of Total
#3	4,436	83.4
#4	885	16.6

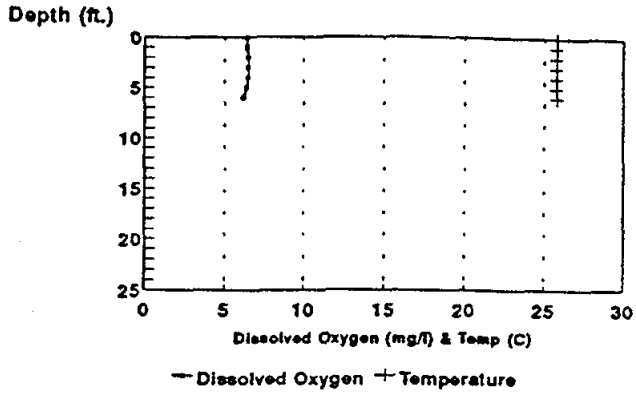
#3 Williams-Bowbells: Deep, well drained and moderately well drained, nearly level to undulating loamy soils formed in glacial till.

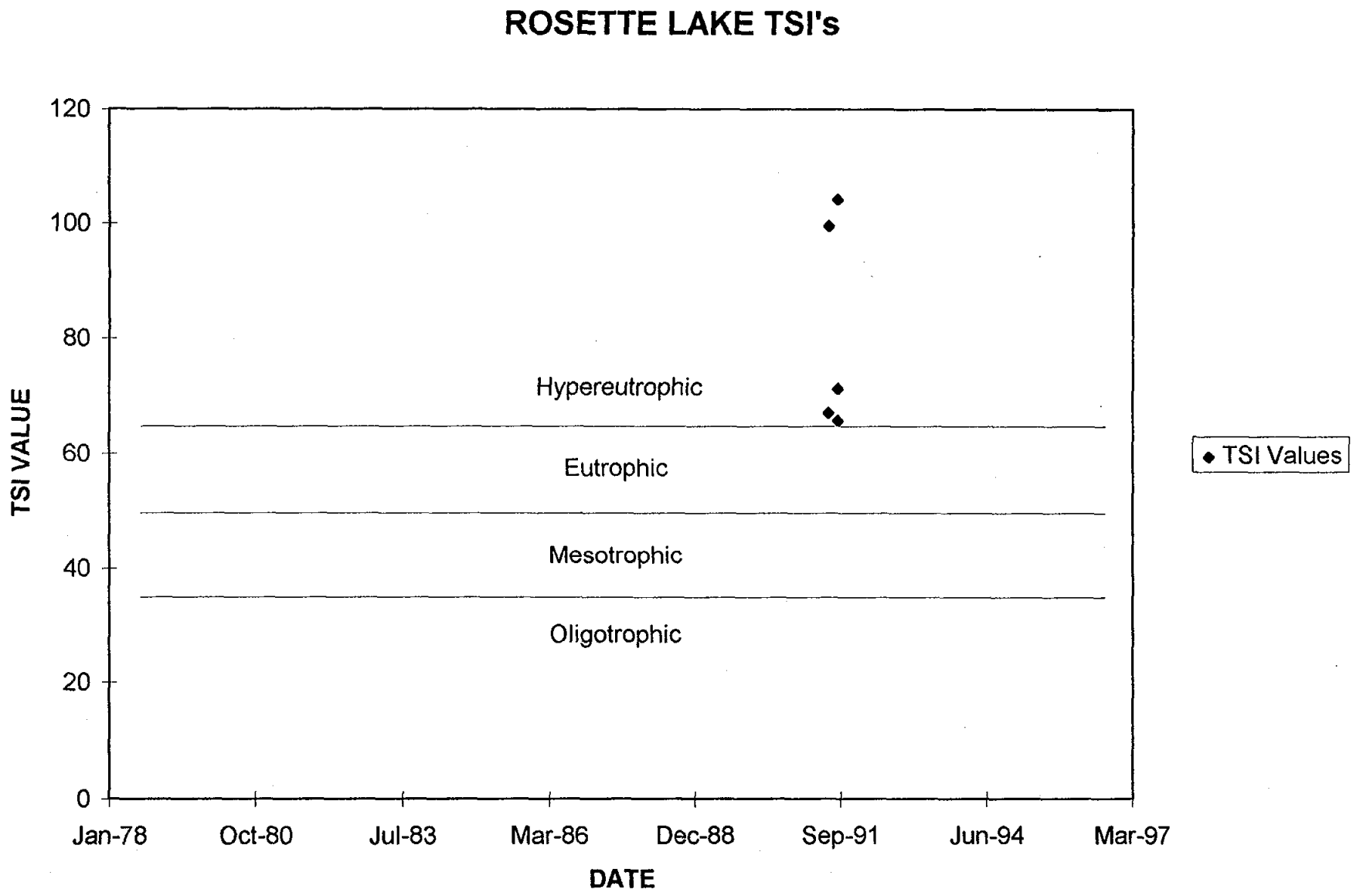
#4 Bryant Association: Deep, well drained, nearly level to sloping loamy soils formed in glacial drift.

ROSETTE LAKE 6/25/91
Dissolved Oxygen & Temperature Profile



ROSETTE LAKE 8/27/91
Dissolved Oxygen & Temperature Profile




ROSETTE LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values

ROY LAKE

County: Marshall
Latitude: 45 deg. 42 min. 06 sec. N
Longitude: 97 deg. 26 min. 06 sec. W
Area: 1693.5 A (685.4 ha)
Maximum Depth: 18.5 ft (5.6 m)
Volume: 17642 acre-ft (2.17 x $10^7 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 126N
Range: 55W
Section(s): 20-21, 27-28, 33-34
Shoreline L: 14.5 mi (23 km)
Mean Depth: 10.8 ft (3.3 m)
Watershed/Lake Area: 6
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	22.83	6	24.53	4	19.59
Air Temperature (°C)	4	26.67	6	28.06	4	22.50
Secchi Disk Depth (meters)	2	0.82	3	0.99	2	0.82
Conductivity (cond/25° C)	4	1,924	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.73	-	-	-	-
Field pH (su)	-	-	6	8.83	4	8.70
Total Alkalinity (mg/l)	4	332	-	-	-	-
Total Solids (mg/l)	4	1,784	-	-	-	-
Dissolved Solids (mg/l)	4	1,768	-	-	-	-
Suspended Solids (mg/l)	4	16	6	14	4	20
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.30	6	0.16	4	0.37
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	4	0.02
Total Kjeldahl Nitrogen (mg/l)	4	2.25	6	2.74	4	3.08
Total Phosphorus (mg/l)	4	0.064	6	0.148	4	0.065
Total Dissolved Phosphorus (mg/l)	-	-	6	0.028	4	0.026
Ortho Phosphate as P (mg/l)	4	0.026	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	13.38	4	19.03

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	20.93	6	21.14	6	23.19
Air Temperature (°C)	6	20.00	6	24.67	6	23.27
Secchi Disk Depth (meters)	3	1.38	8	2.47	9	3.39
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.77	6	8.44	6	8.24
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	15	6	7	6	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.13	6	0.04	6	0.03
Nitrate + Nitrite Nitrogen (mg/l)	6	0.00	6	0.04	6	0.05
Total Kjeldahl Nitrogen (mg/l)	6	2.38	6	1.43	6	1.36
Total Phosphorus (mg/l)	6	0.070	6	0.038	6	0.033
Total Dissolved Phosphorus (mg/l)	6	0.018	6	0.028	6	0.013
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	19.73	5	18.91	6	8.73

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	62.95	65.01	62.17	60.88	53.26	49.60
Secchi Disk	62.81	60.56	62.90	57.65	46.98	42.37
Total Phosphorus	63.10	78.46	64.15	65.17	53.38	54.59
Chlorophyll *a*		56.02	59.47	59.83	59.41	51.83

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Ruppia maritima, Chara sp., and Potamogeton pectinatus

Algal Species and Densities

Taxa	June 21, 1989 Number	June 21, 1989 Units/ml	July 27, 1989 Number	July 27, 1989 Units/ml
Oocystis	98	945	223	4,474
Cryptomonas sp. #1	61	588	1	40
Aphanocapsa	57	549	22	441
Algae (other)	15	145	7	140
Fragilaria crotonensis	14	135	10	201
Characium	12	116	-	-
Green Algae (other)	12	116	-	-
Chroococcus	9	87	15	301
Sphaerocytis Schroeteri	6	58	-	-
Nephrocytium	5	48	-	-
Diatom (pennate)	4	39	-	-
Blue-green (other)	4	39	-	-
Algae (flagellate)	3	29	-	-
Lyngbya Diguetii	2	19	-	-
Dactylococcopsis	1	10	-	-
Gomphosphaeria	-	-	11	221
Merismopedia	-	-	3	60
Cosmarium	-	-	2	40
Stephanodiscus	-	-	2	40
Scenedesmus	-	-	2	40
Diatom (centric)	-	-	2	40
Total	303	2,921	300	6,019

Watershed Description

Watershed Area: 9,614 A (3,891 ha)

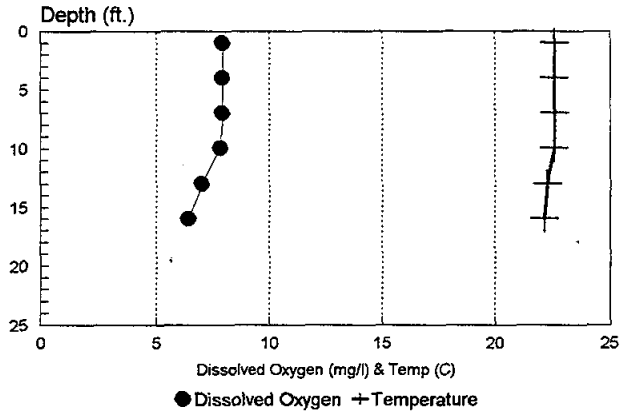
Soil Associations within Watershed

Association	Area (A)	% of Total
FU-PN	9,614	100

FU-PN Forman-Poinsett: Nearly level to sloping, well drained, loamy and silty soils formed in glacial drift.

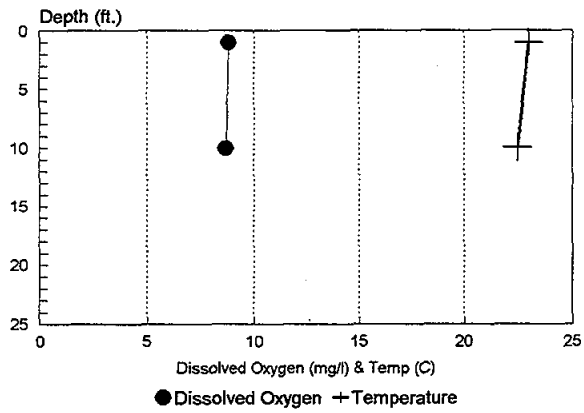
ROY LAKE 8/10/79

Dissolved Oxygen & Temperature Profile



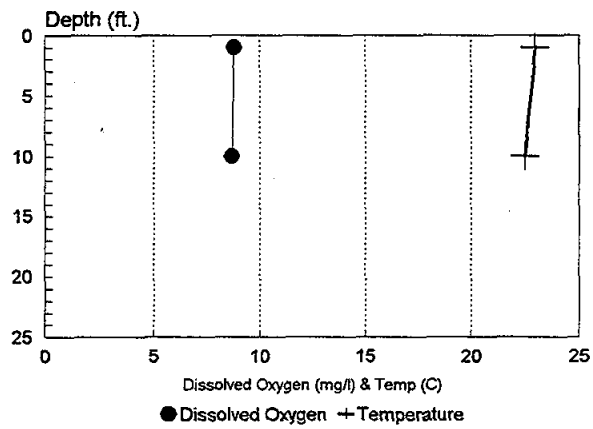
ROY LAKE 6/18/91

Dissolved Oxygen & Temperature Profile



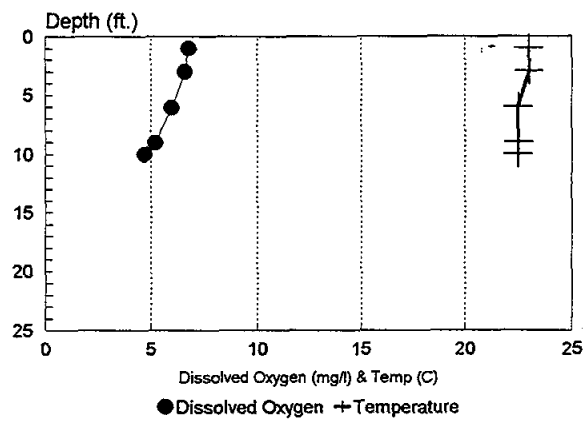
ROY LAKE 6/18/91

Dissolved Oxygen & Temperature Profile



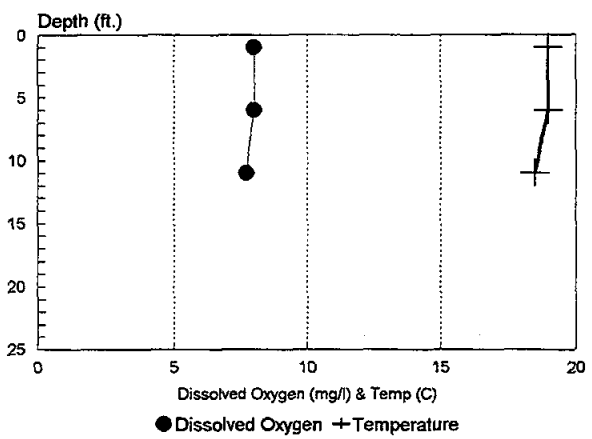
ROY LAKE 8/18/91

Dissolved Oxygen & Temperature Profile



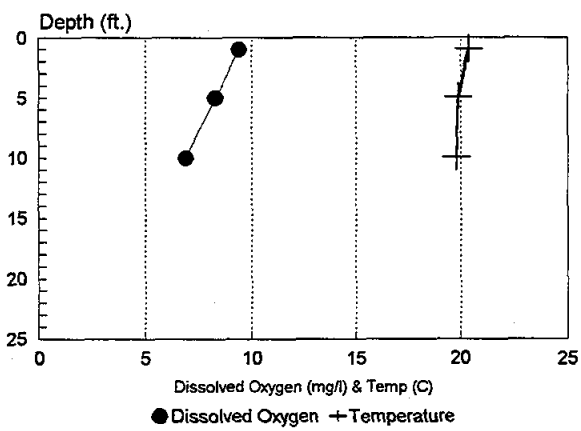
ROY LAKE 6/18/92

Dissolved Oxygen & Temperature Profile



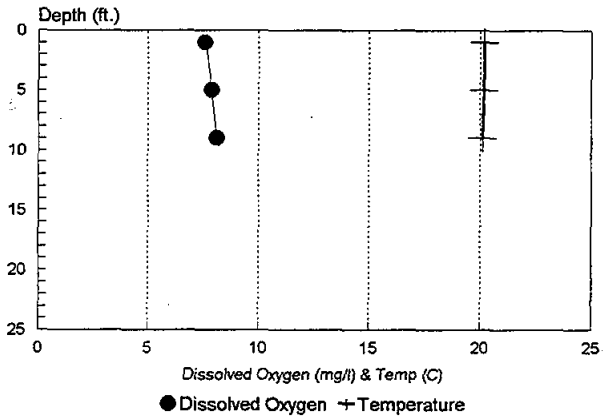
ROY LAKE 7/18/92

Dissolved Oxygen & Temperature Profile



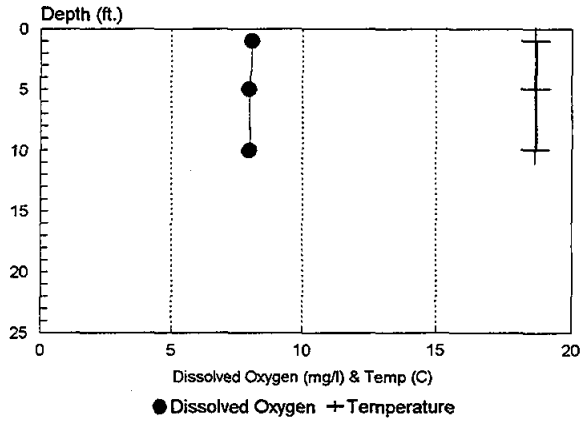
ROY LAKE 8/16/92

Dissolved Oxygen & Temperature Profile



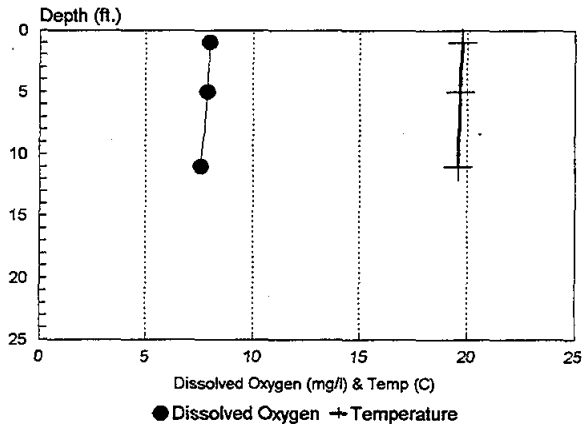
ROY LAKE 6/15/93

Dissolved Oxygen & Temperature Profile



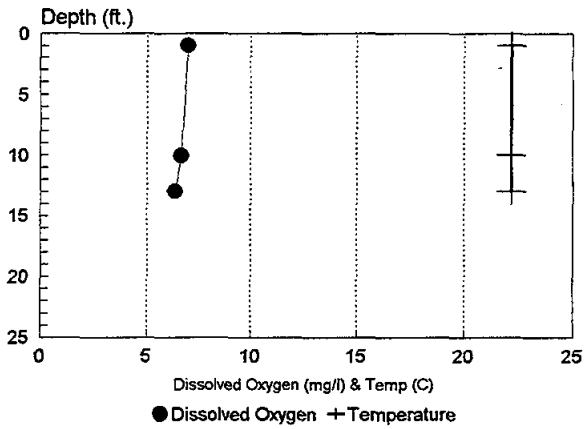
ROY LAKE 7/23/93

Dissolved Oxygen & Temperature Profile



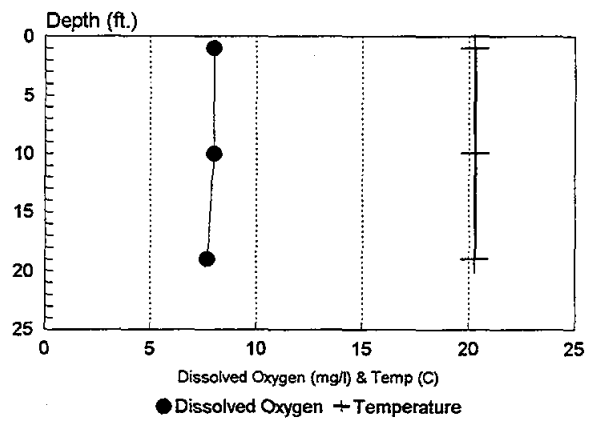
ROY LAKE 8/22/93

Dissolved Oxygen & Temperature Profile



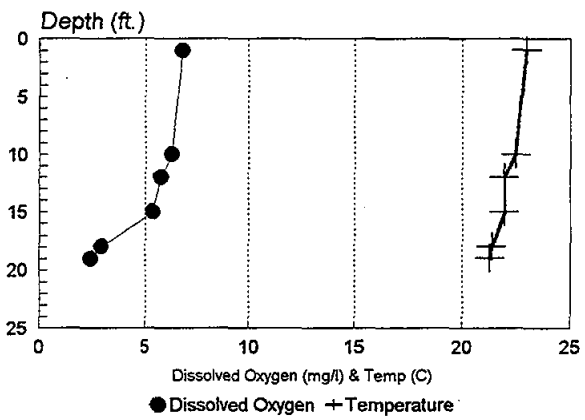
ROY LAKE 6/14/94

Dissolved Oxygen & Temperature Profile



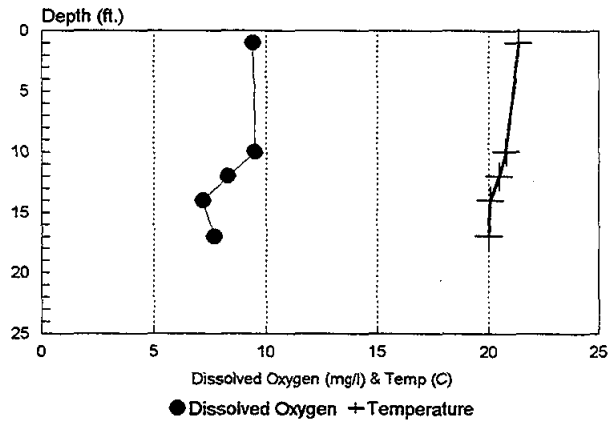
ROY LAKE 7/16/94

Dissolved Oxygen & Temperature Profile



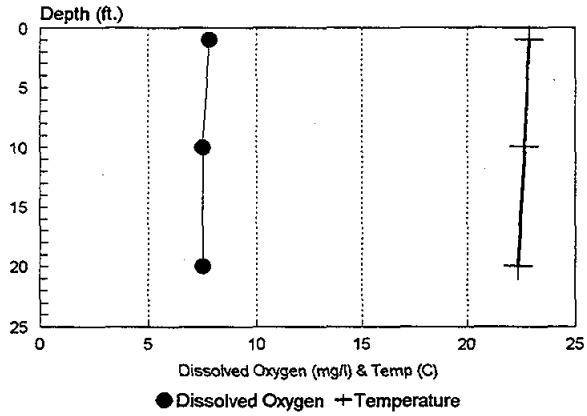
ROY LAKE 8/16/94

Dissolved Oxygen & Temperature Profile



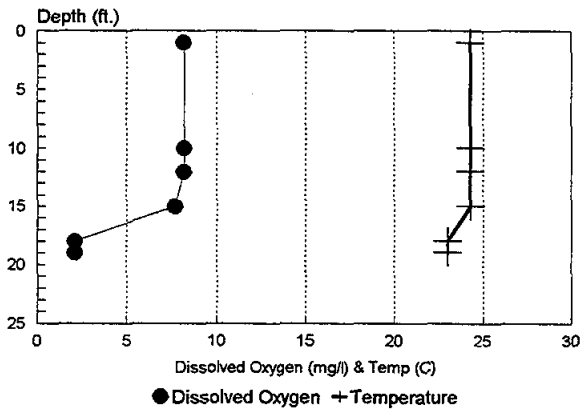
ROY LAKE 6/19/95

Dissolved Oxygen & Temperature Profile



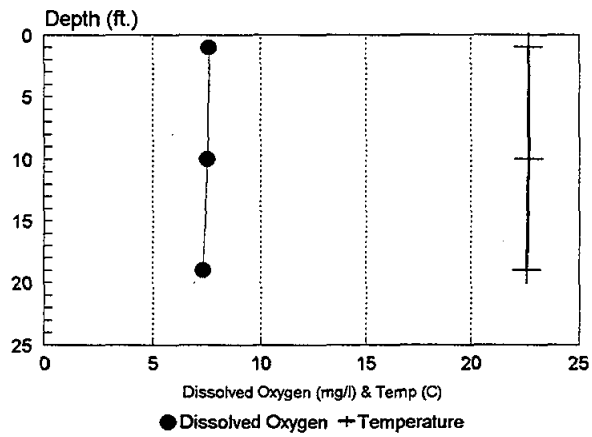
ROY LAKE 7/16/95

Dissolved Oxygen & Temperature Profile



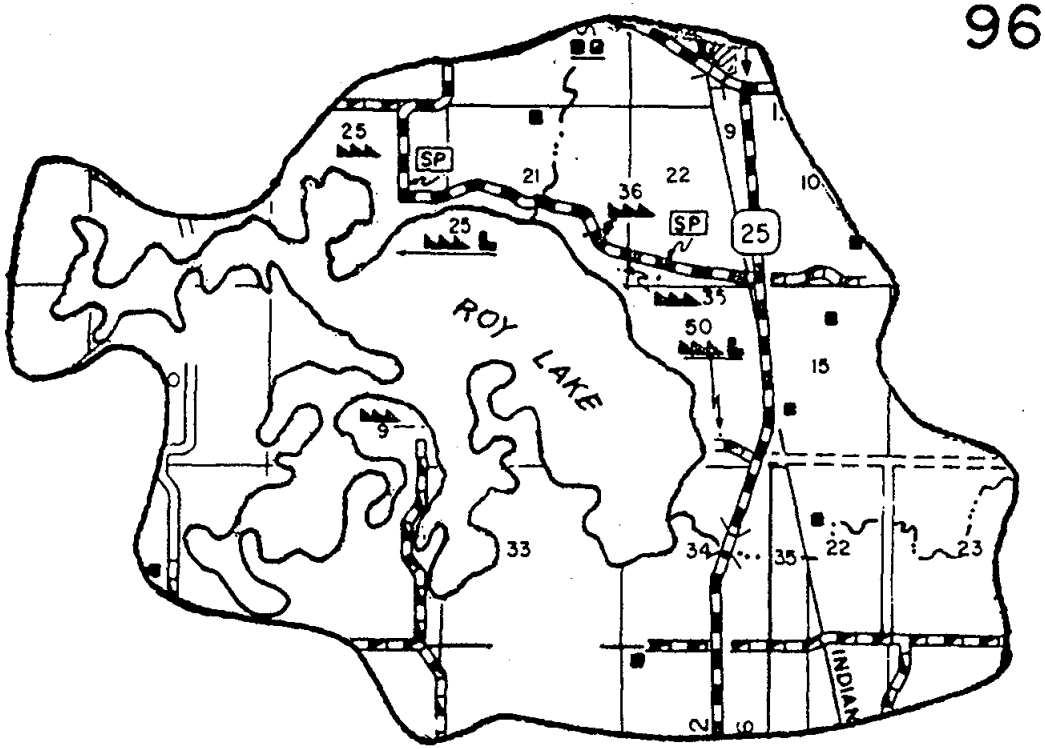
ROY LAKE 8/15/95

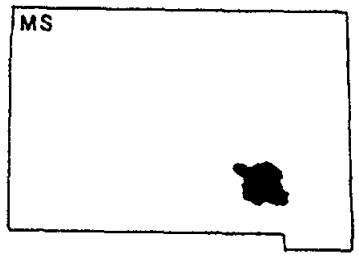
Dissolved Oxygen & Temperature Profile



Roy Lake

9614 acres



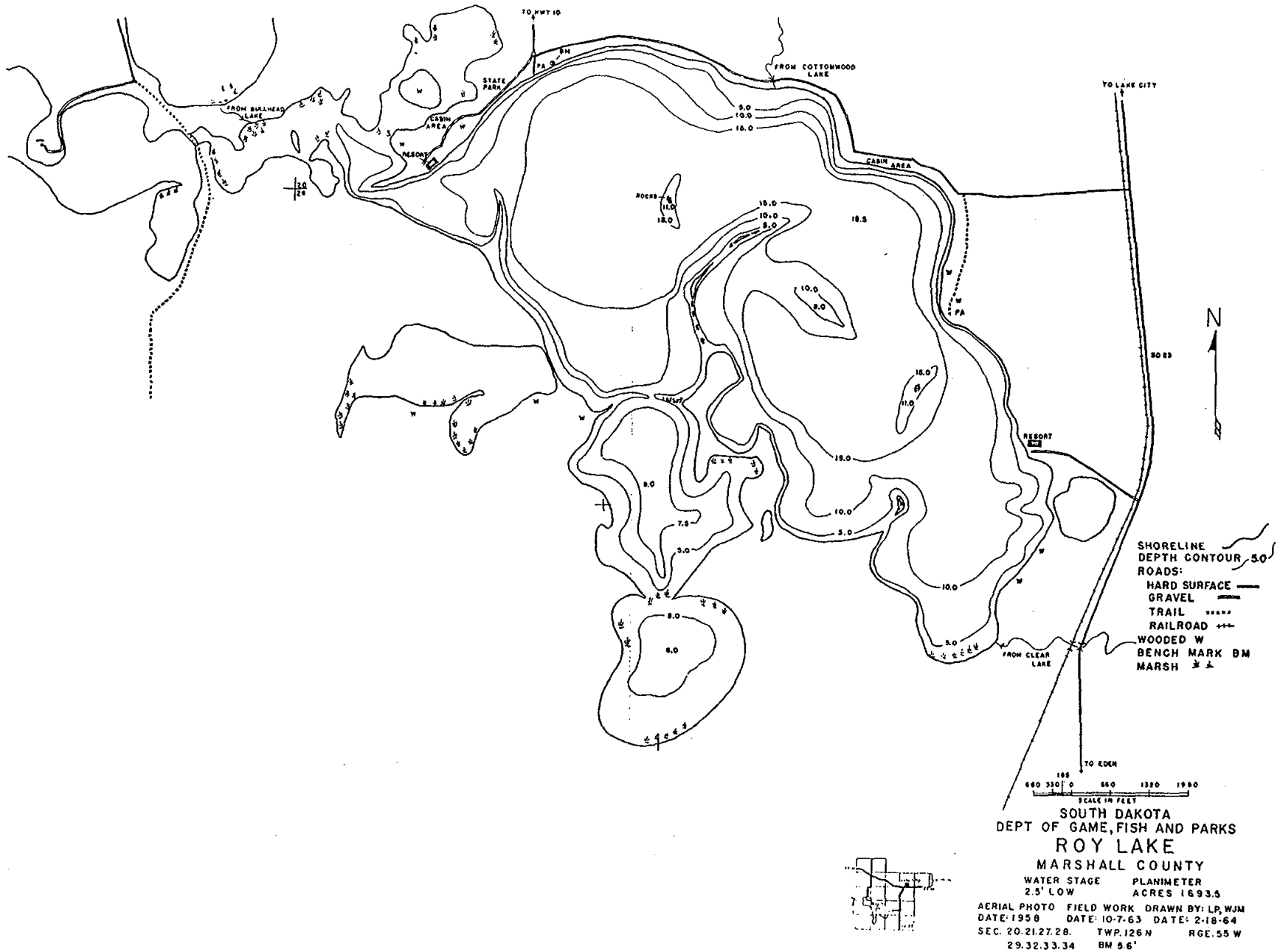


Scale

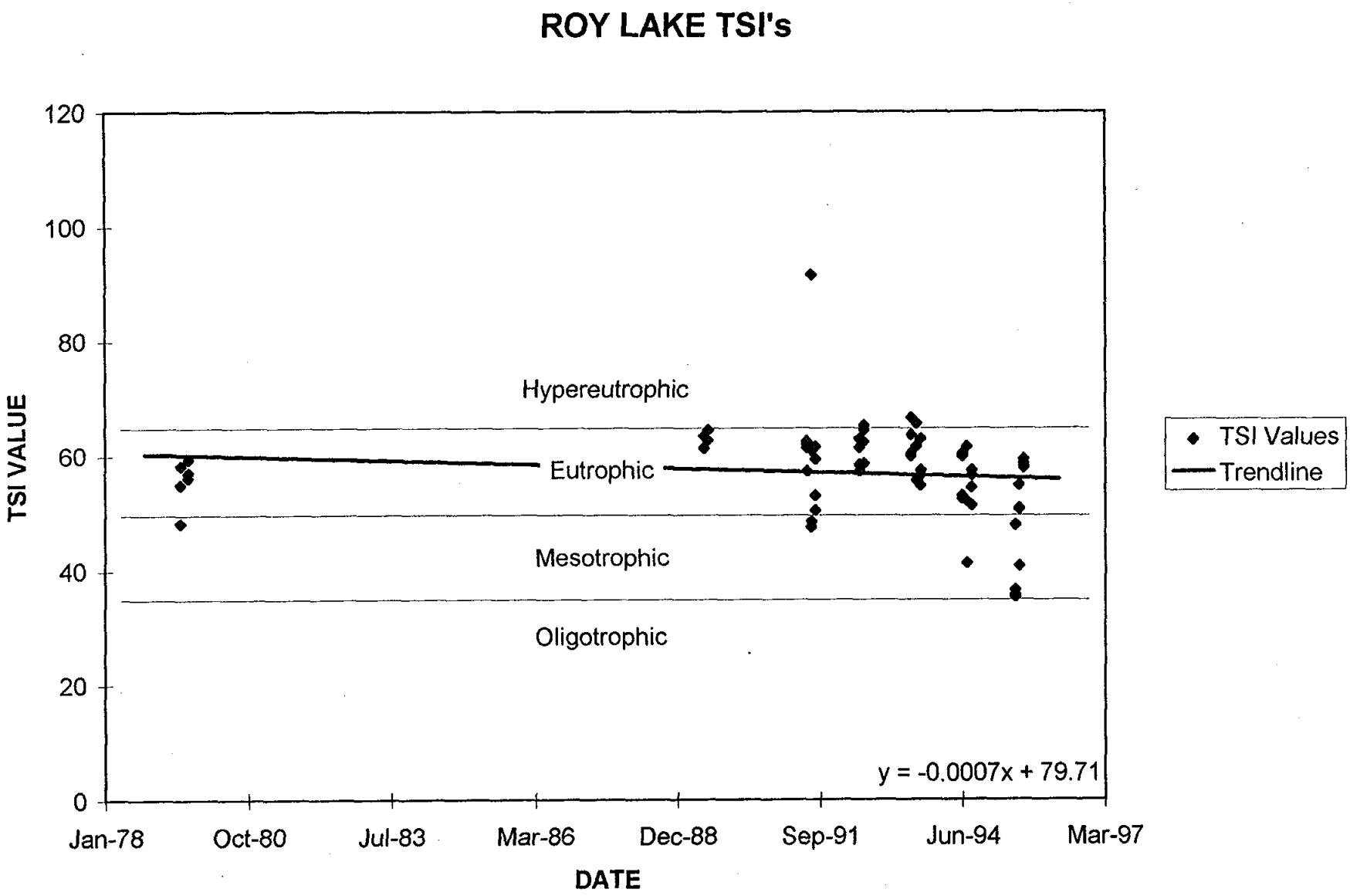
0 1 2 3 4 5

Miles

628


TO HWY 10
FROM BULLHEAD LAKE
STATE PARK
CABIN AREA
RESORT
FROM COTTONWOOD LAKE
TO LAKE CITY
CABIN AREA
ROCKS
RESORT
FROM CLEAR LAKE
TO ROCK
N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
TRAIL
RAILROAD
WOODED W
BENCH MARK BM
MARSH
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
ROY LAKE
MARSHALL COUNTY
WATER STAGE
2.5' LOW
PLANIMETER
ACRES 1693.5
AERIAL PHOTO
DATE: 1958
FIELD WORK
DATE: 10-7-63
DRAWN BY: LP, WJM
DATE: 2-18-64
SEC. 20.21.27.28.
29.32.33.34
TWP. 126 N
RGE. 55 W
BM 5.6'

629


ROY LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0007x + 79.71
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

SCHOOL LAKE

County: Deuel
Latitude: 44 deg. 56 min. 29 sec. N
Longitude: 96 deg. 48 min. 03 sec. W
Area: 324 A (131.2 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 117N
Range: 50W
Section(s): 15, 16
Shoreline L: 3.5 mi (5.6 km)
Mean Depth: NA
Watershed/Lake Area: 34
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: Deuel County Lakes and Streams Association

	1989		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	24.00	4	19.88
Air Temperature (°C)	4	24.72	4	15.00
Secchi Disk Depth (meters)	2	0.12	2	0.38
Conductivity (cond/25° C)	4	574	-	-
Turbidity (NTU)	-	-	4	25.34
Lab pH (su)	4	8.16	-	-
Field pH (su)	-	-	4	8.37
Total Alkalinity (mg/l)	4	168	4	204
Total Solids (mg/l)	4	520	4	412
Dissolved Solids (mg/l)	4	455	4	375
Suspended Solids (mg/l)	4	65	4	37
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.15	4	0.03
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.10	4	1.84
Total Phosphorus (mg/l)	4	0.247	4	0.113
Total Dissolved Phosphorus (mg/l)	-	-	4	0.034
Ortho Phosphate as P (mg/l)	4	0.011	-	-
Chlorophyll (mg/m^3)	-	-	2	71.69

Year	1989	1994
TSI Values -- Mean:	86.55	72.99
Secchi Disk	90.36	73.96
Total Phosphorus	82.73	72.54
Chlorophyll *a*		72.48

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

July 10, 1989

Taxa	Number	Units/ml
Aphanocapsa	242	46,972
Aphanizomenon flos-aquae	17	3,300
Algae (other)	8	1,553
Melosira granulata	8	1,553
Crucigenia	6	1,165
Scenedesmus	5	970
Merismopedia	3	582
Algae (flagellate)	2	388
Nitzschia acicularis	2	388
Diatom (pennate)	2	388
Chroococcus	2	388
Melosira ambigua	2	388
Blue-green (other)	1	194
Phacus	1	194
Diatom (centric)	1	194
Dactylococcopsis	1	194
Characium	1	194
Oocystis	1	194
Total	242	59,200

Watershed Description

Watershed Area (excluding lake surface): 10,692 A (4,327 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#10	6,714	62.8
#6	1,989	18.6
#4	1,379	12.9
#2	353	3.3
#12	257	2.4

#10 Vienna-Kranzburg-Barnes: Well drained, nearly level to moderately sloping, silty and loamy soils on till plains and moraines.

#6 Arvilla-Renshaw-Fordville: Somewhat excessively drained and well drained, nearly level to strongly sloping, loamy soils over gravelly material on outwash plains.

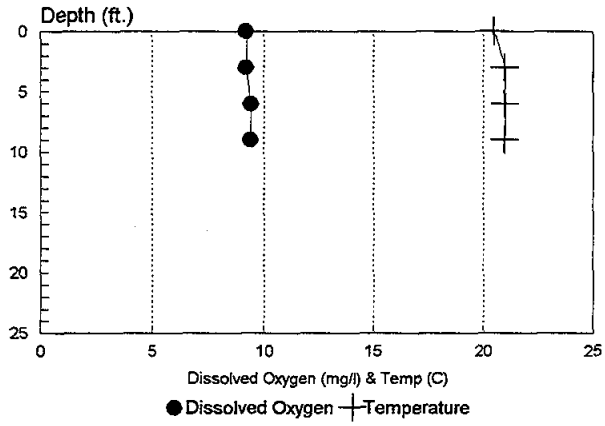
#4 Barnes-Buse-Svea: Well drained and moderately well drained, nearly level to moderately steep and hilly, loamy soils on till plains and moraines.

#2 Barnes-Buse-Southam: Well drained and very poorly drained, nearly level to steep, loamy and silty soils on till plains and moraines.

#12 Sinai-Poinsett: Well drained and moderately well drained, nearly level to strongly sloping, silty and clayey soils in ice-walled lake plains, till plains, and moraines.

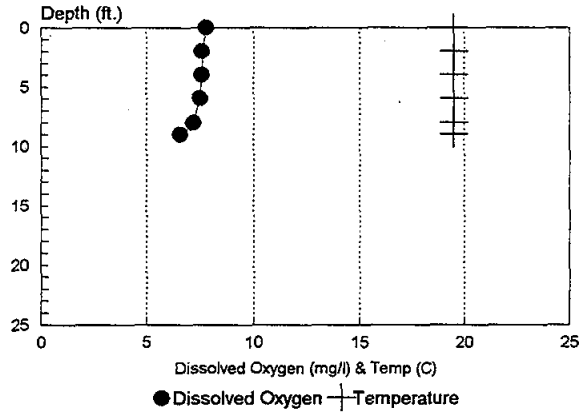
SCHOOL LAKE 6/30/94

Dissolved Oxygen & Temperature Profile

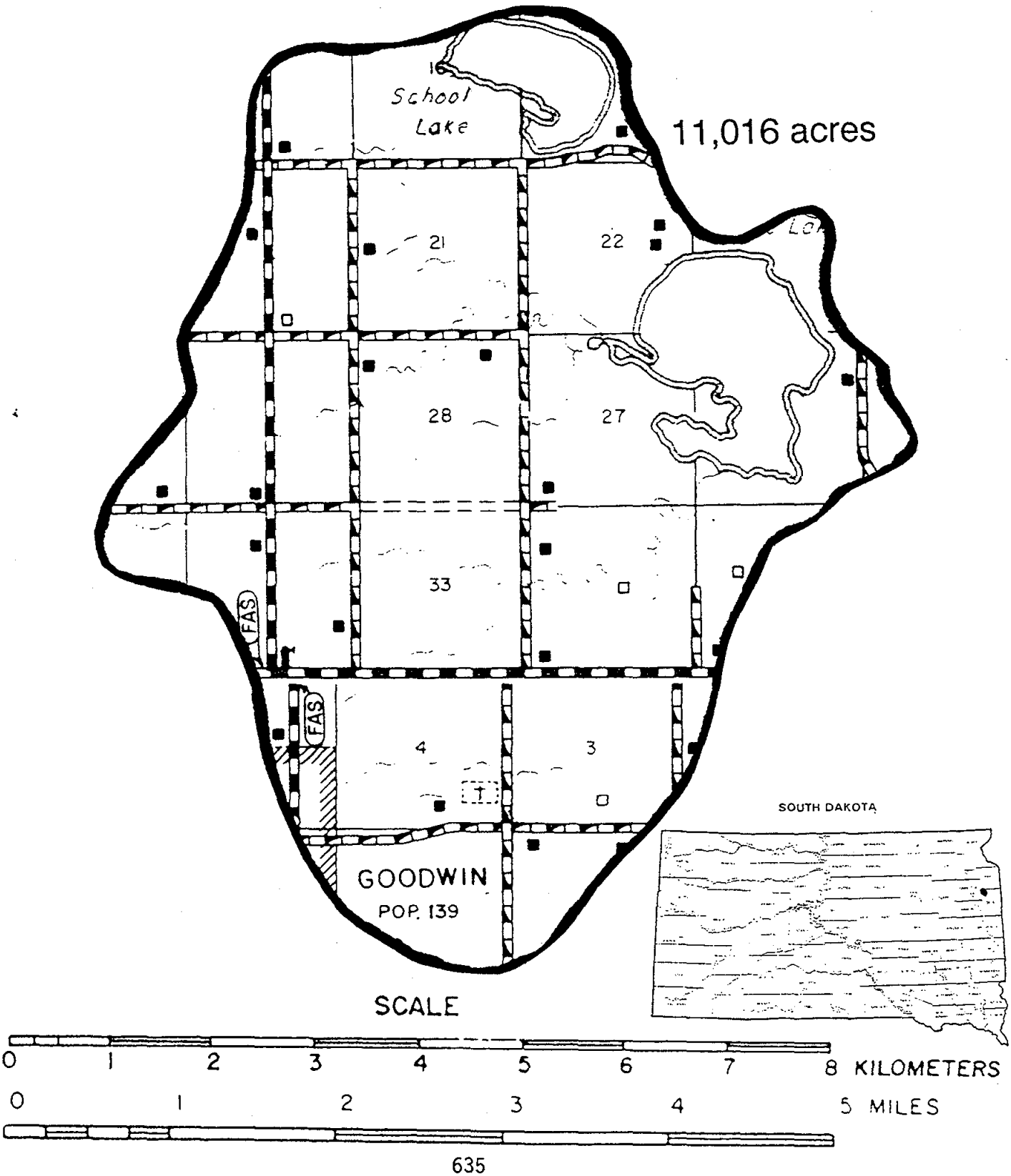


SCHOOL LAKE 8/31/94

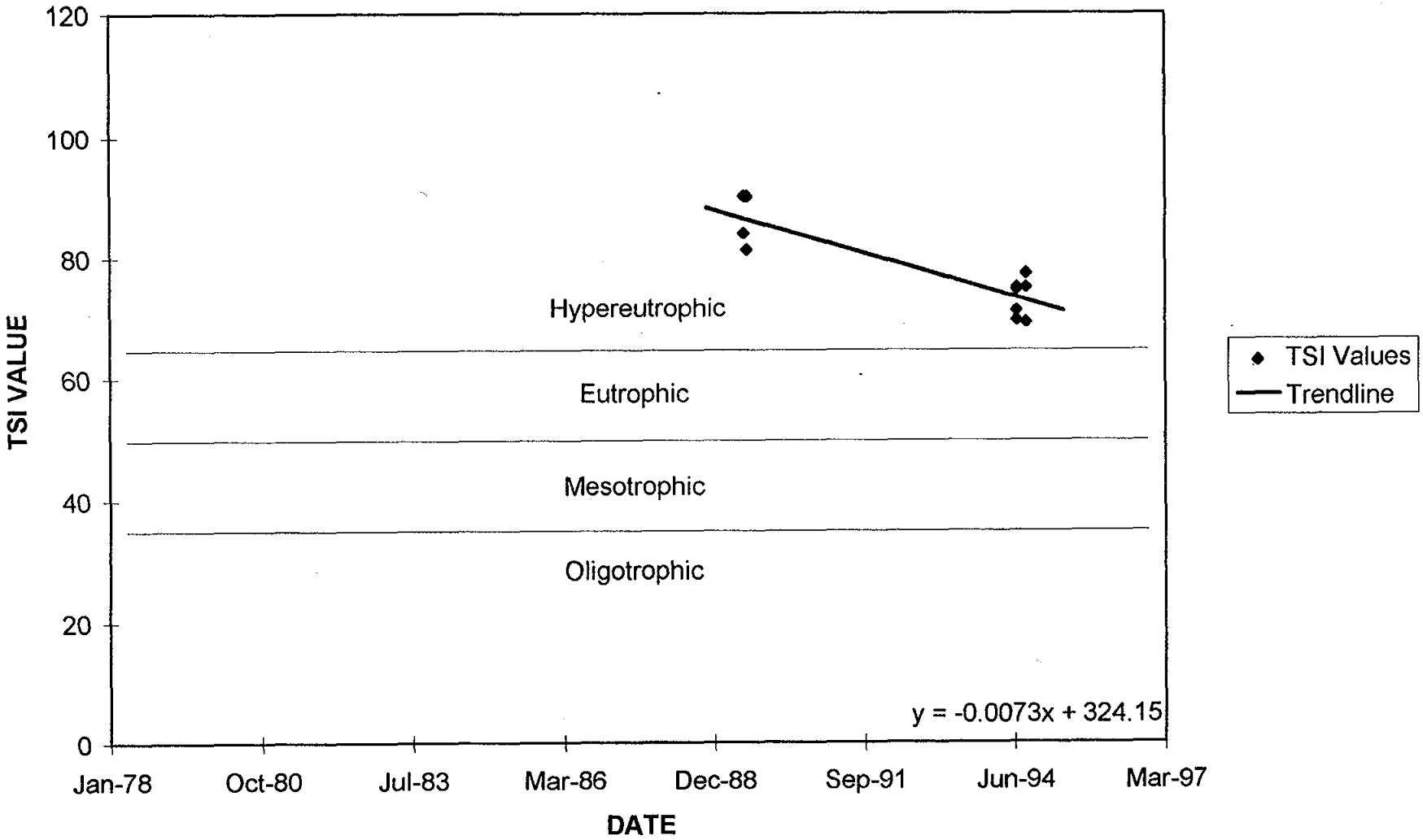
Dissolved Oxygen & Temperature Profile



School Lake


School Lake
11,016 acres
21
22
28
27
33
4
3
FAS
FAS
GOODWIN
POP. 139
SOUTH DAKOTA
SCALE
0 1 2 3 4 5 6 7 8 KILOMETERS
0 1 2 3 4 5 MILES

SCHOOL LAKE TSI's



SHADEHILL RESERVOIR

County: Perkins
Latitude: 45 deg. 40 min. 30 sec. N
Longitude: 102 deg. 10 min. 10 sec. W

Township: 20, 21N
Range: 15E
Section(s): 2-5,8-10,16-18, 20-23, 25-26, 33, 35-36

Area: 4,693 A (1,899 ha)
Maximum Depth: 60 ft (18.3 m)
Volume: 102,488 acre-ft ($1.26x10^8 m^3$)
Origin of Basin: impoundment

Shoreline L: 50 mi (80.5 km)
Mean Depth: 22 ft (6.7 km)
Watershed/Lake Area: 425
Thermal Stratification: yes

Major Inflows (named or permanent streams): North & South Fork
Outlet: Grand River , Grand River, Lodge Pole Creek.

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
10) Irrigation

Estimated Population within 65-mile Radius: 24,047
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	18.35	6	22.00	4	16.14
Air Temperature (°C)	4	17.44	6	34.44	4	24.44
Secchi Disk Depth (meters)	2	1.98	3	1.81	2	2.20
Conductivity (cond/25° C)	4	1,788	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.70	6	8.80	4	8.77
Total Alkalinity (mg/l)	4	330	-	-	-	-
Total Solids (mg/l)	4	1,309	-	-	-	-
Dissolved Solids (mg/l)	4	1,304	-	-	-	-
Suspended Solids (mg/l)	4	5	6	6	4	9
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.05	6	0.02	4	0.01
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.06	4	0.04
Total Kjeldahl Nitrogen (mg/l)	4	0.58	6	0.54	4	0.50
Total Phosphorus (mg/l)	4	0.026	6	0.044	4	0.026
Total Dissolved Phosphorus (mg/l)	-	-	6	0.014	4	0.015
Ortho Phosphate as P (mg/l)	4	0.009	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	1.06	4	1.06

Chemical Parameters	1993 Samples	1993 Results	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	19.58	6	20.50	6	20.68
Air Temperature (°C)	6	22.00	6	25.87	6	24.80
Secchi Disk Depth (meters)	3	1.68	9	1.84	9	1.94
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.76	6	8.47	6	8.00
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	14	6	7	6	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.06	6	0.05	6	0.04
Nitrate + Nitrite Nitrogen (mg/l)	6	0.10	6	1.81	6	0.25
Total Kjeldahl Nitrogen (mg/l)	6	0.73	6	0.60	6	0.76
Total Phosphorus (mg/l)	6	0.085	6	0.037	6	0.033
Total Dissolved Phosphorus (mg/l)	6	0.036	6	0.018	6	0.017
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	19.22	6	19.22	6	0.84

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	49.44	45.62	42.39	60.79	55.16	42.97
Secchi Disk	50.14	48.37	48.63	55.55	51.18	50.44
Total Phosphorus	48.36	57.35	47.37	67.25	54.74	49.59
Chlorophyll *a*		31.15	31.17	59.57	59.57	28.87

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA

Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

Taxa	June 21, 1989 Number	June 21, 1989 Units/ml	No Date Number	No Date Units/ml
Cryptomonas sp. #1	10	379	6	201
Algae (other)	9	341	3	101
Aphanizomenon flos-aquae	3	114	-	-
Diatom (centric)	1	38	-	-
Lyngbya	1	38	-	-
Merismopedia	-	-	3	101
Algae (flagellate)	-	-	2	67
Aphanocapsa	-	-	2	67
Oocystis	-	-	1	34
Cryptomonas ovata	-	-	1	34
Total	24	910	18	604

Watershed Description

Watershed Area: 1,996,800 A (808,105 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
# 1	698,880	35
# 2	599,040	30
#10	199,680	10
#12	199,680	10
# 3	99,840	5
# 4	99,840	5
# 5	99,840	5

1 Vebar-Reeder-Cohagen: Moderately deep and shallow, well drained to excessively drained, gently sloping to steep loamy and sandy soils underlain by sandstone; on uplands.

2 Cabba-Lantry-Amor: Shallow and moderately deep, well drained, moderately sloping to steep loamy soils underlain by siltstone; on uplands.

#10 Banks-Trembles-Shambo: Deep, well drained to excessively drained, nearly level and gently sloping sandy and loamy soils formed in alluvium on bottom land and terraces.

#12 Shambo-Farmuf-Stady: Deep, well drained, nearly level and gently sloping loamy soils and well drained, nearly level loamy soils that are moderately deep over sand and gravel; formed in alluvium on terraces.

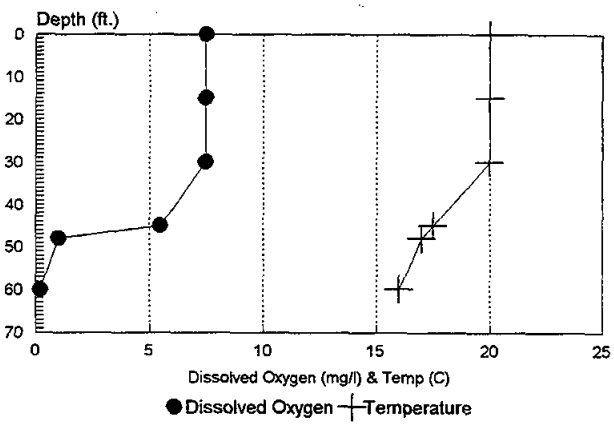
3 Regent-Reeder-Amor: Moderately deep, well drained, gently sloping to strongly sloping silty and loamy soils underlain by siltstone, sandstone, and shale; on uplands.

4 Savage-Regent: Deep and moderately deep, well drained, nearly level and gently sloping silty soils formed in alluvium and in material weathered from siltstone and shale; on uplands.

5 Morton-Landry: Moderately deep, well drained, nearly level to strongly sloping loamy soils underlain by siltstone and sandstone; on uplands.

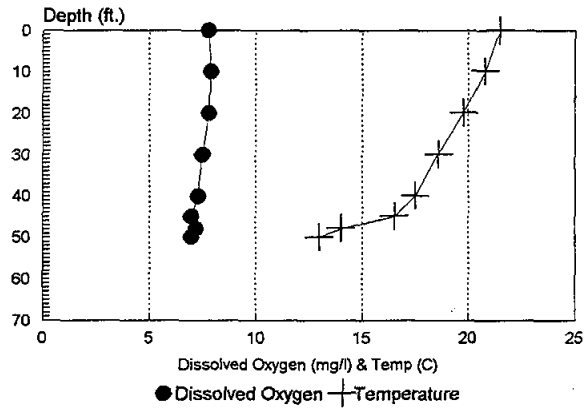
SHADEHILL RESERVOIR 8/22/79

Dissolved Oxygen & Temperature Profile



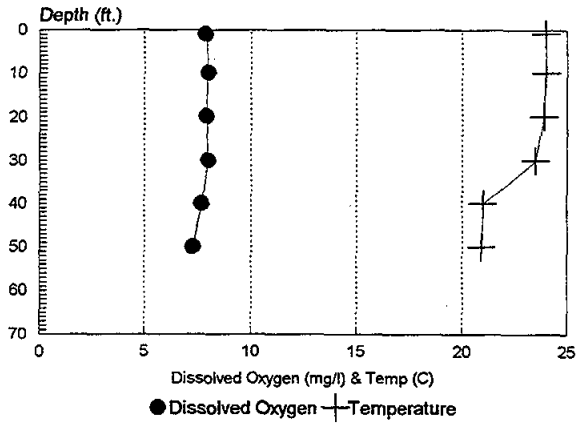
SHADEHILL RESERVOIR 6/17/91

Dissolved Oxygen & Temperature Profile



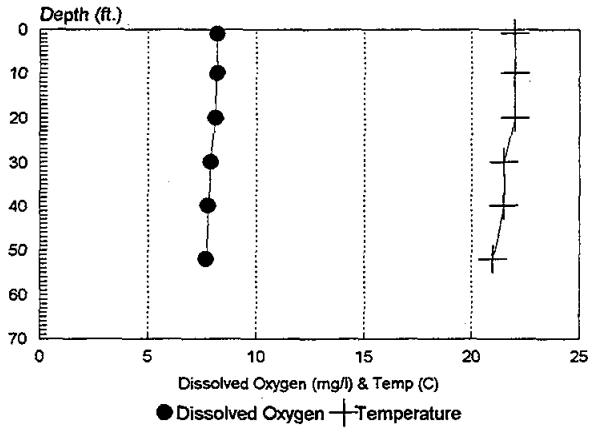
SHADEHILL RESERVOIR 7/18/91

Dissolved Oxygen & Temperature Profile



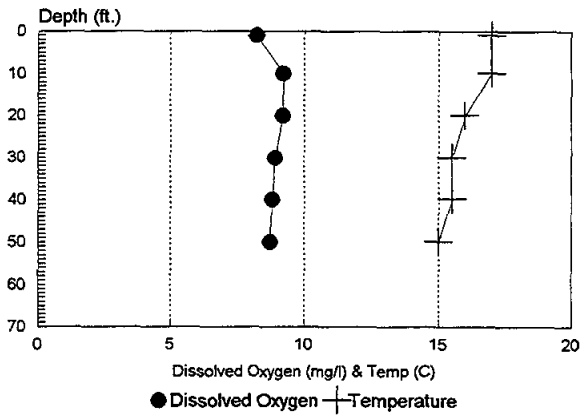
SHADEHILL RESERVOIR 8/17/91

Dissolved Oxygen & Temperature Profile



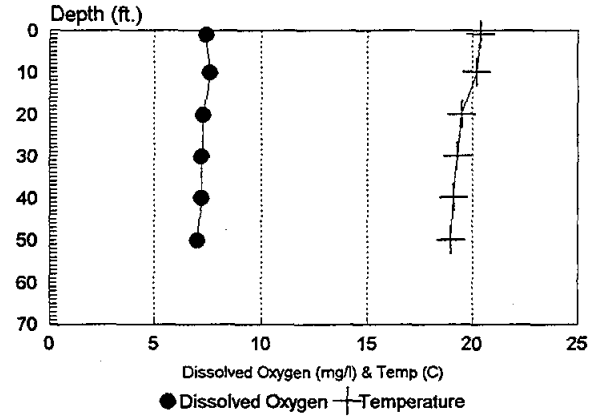
SHADEHILL RESERVOIR 6/13/92

Dissolved Oxygen & Temperature Profile



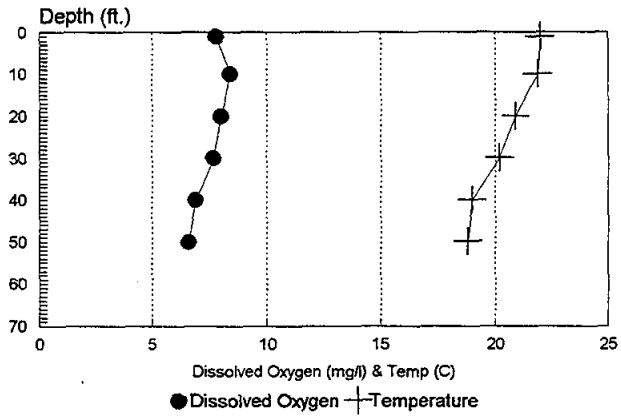
SHADEHILL RESERVOIR 7/17/92

Dissolved Oxygen & Temperature Profile



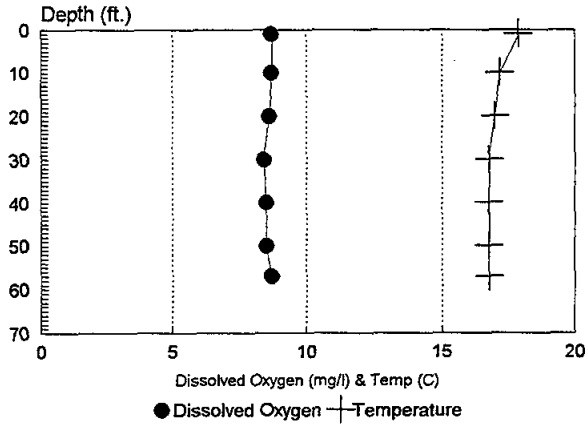
SHADEHILL RESERVOIR 8/15/92

Dissolved Oxygen & Temperature Profile



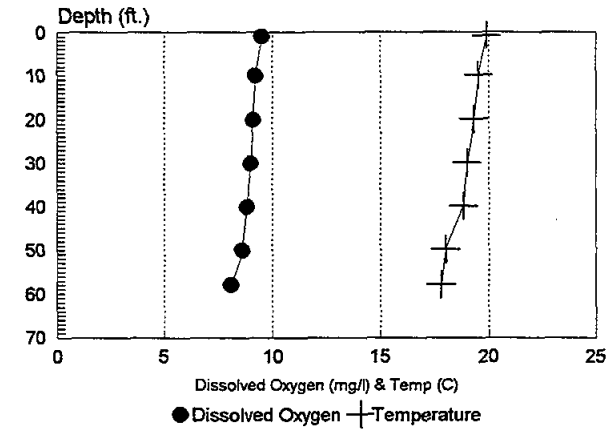
SHADEHILL RESERVOIR 6/14/93

Dissolved Oxygen & Temperature Profile



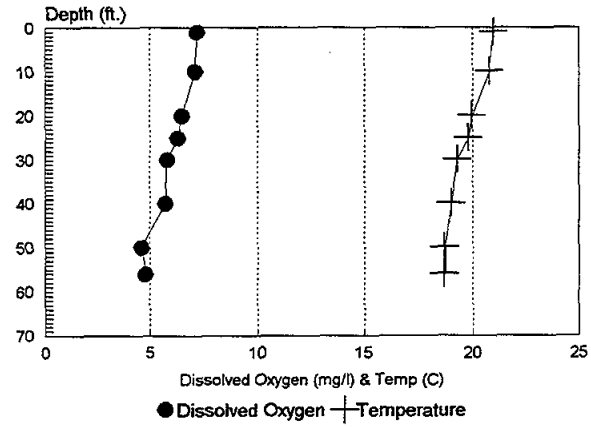
SHADEHILL RESERVOIR 7/22/93

Dissolved Oxygen & Temperature Profile



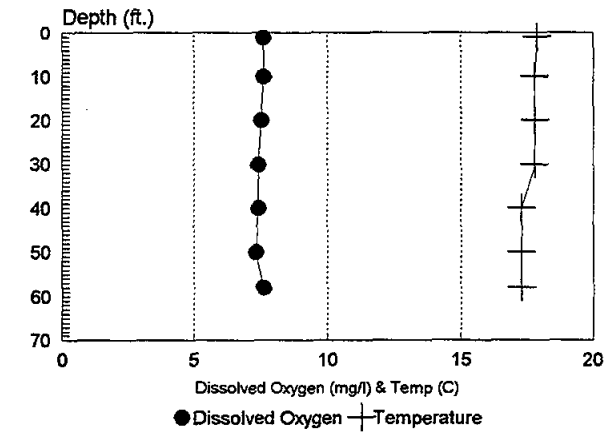
SHADEHILL RESERVOIR 8/20/93

Dissolved Oxygen & Temperature Profile



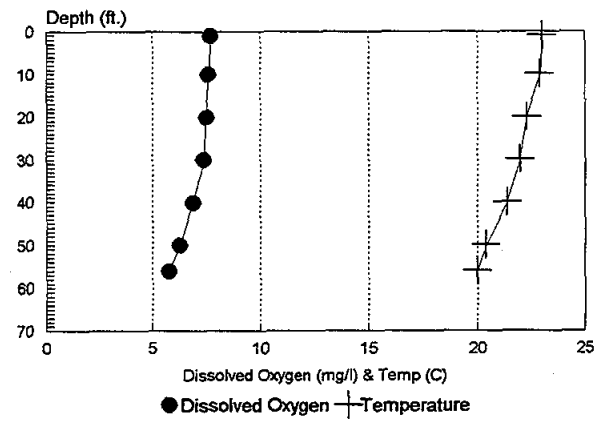
SHADEHILL RESERVOIR 6/13/94

Dissolved Oxygen & Temperature Profile



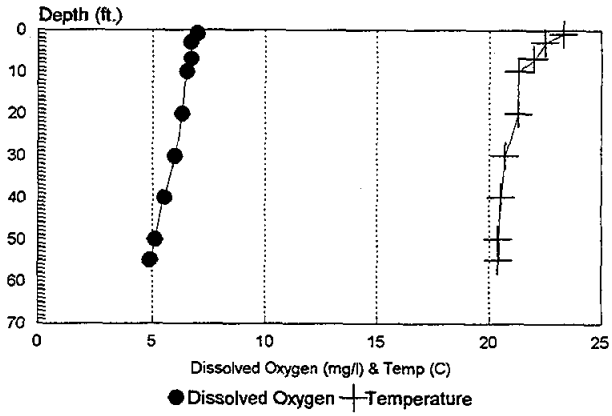
SHADEHILL RESERVOIR 7/15/94

Dissolved Oxygen & Temperature Profile



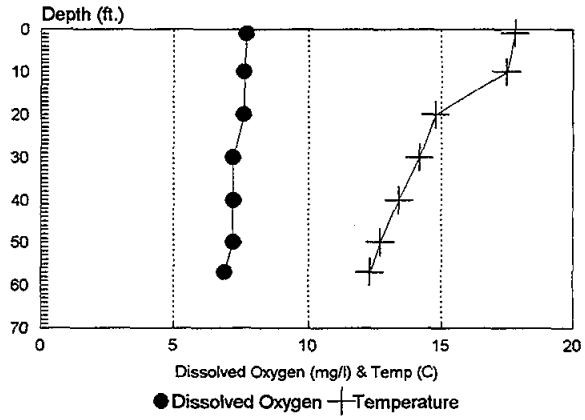
SHADEHILL RESERVOIR 8/15/94

Dissolved Oxygen & Temperature Profile



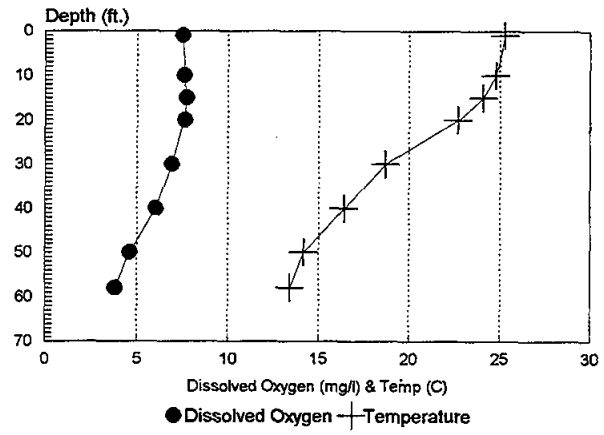
SHADEHILL RESERVOIR 6/15/95

Dissolved Oxygen & Temperature Profile



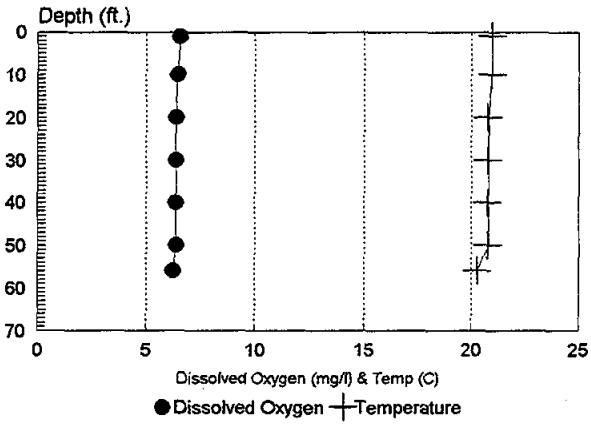
SHADEHILL RESERVOIR 7/14/95

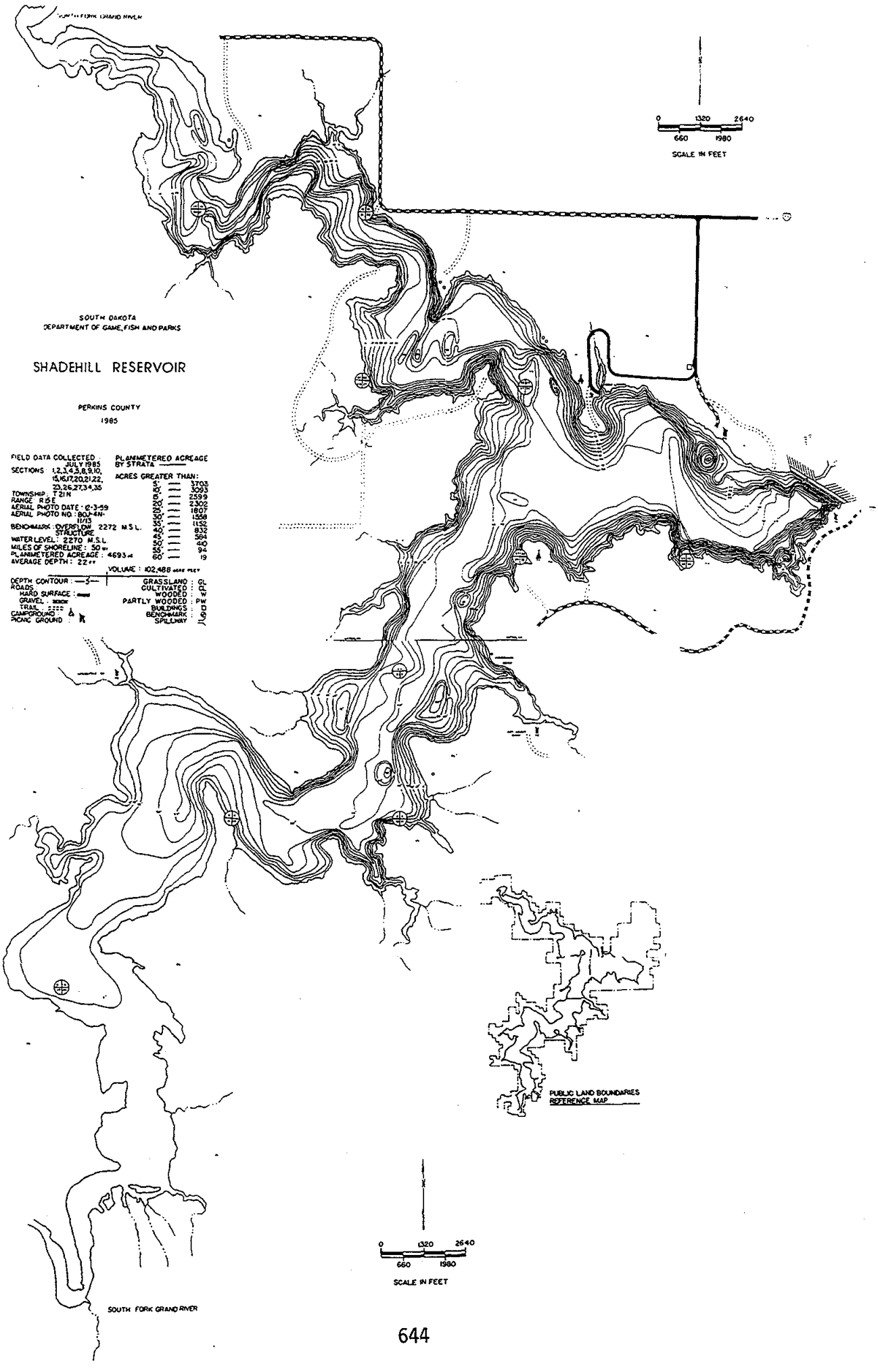
Dissolved Oxygen & Temperature Profile



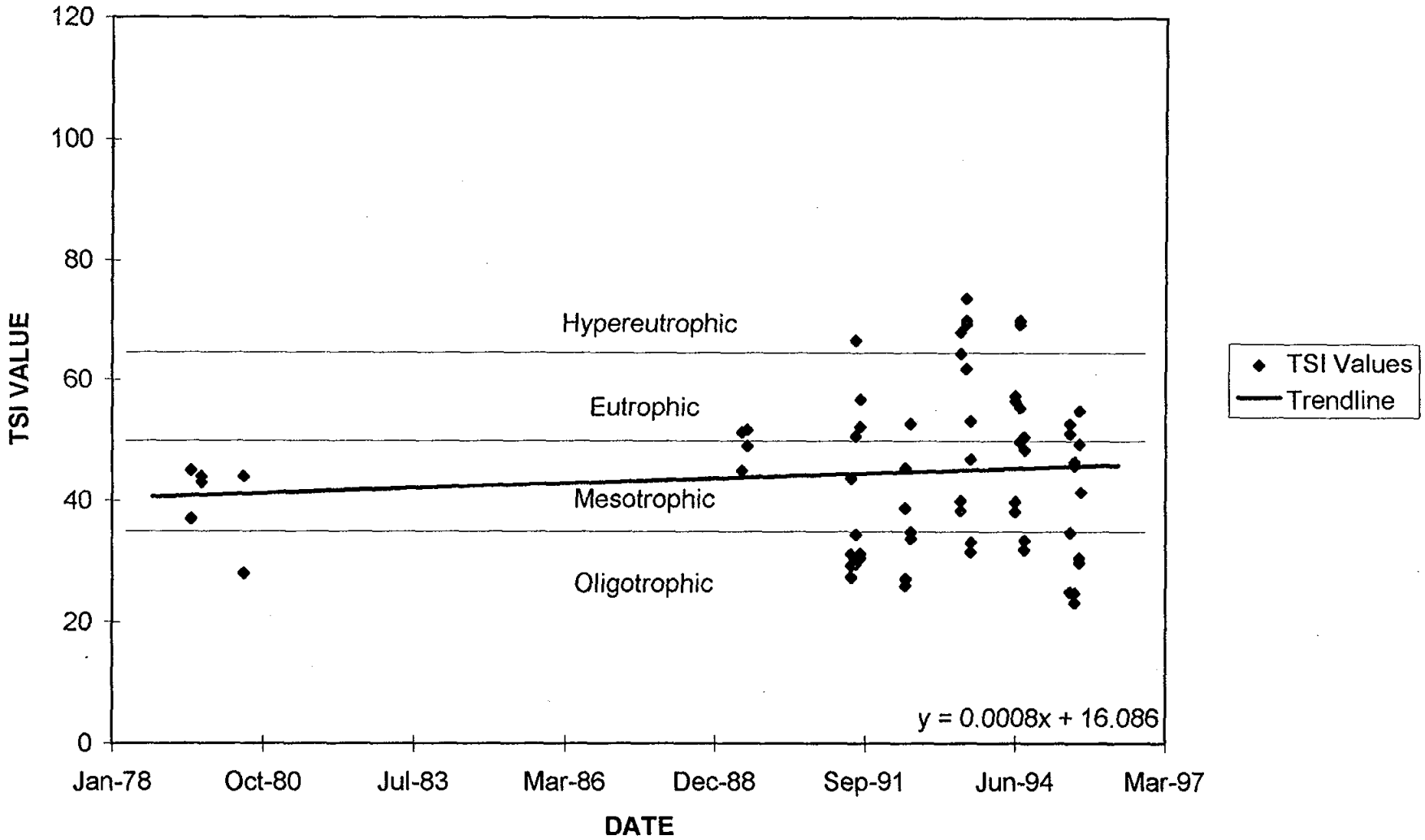
SHADEHILL RESERVOIR 8/14/95

Dissolved Oxygen & Temperature Profile




SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
SHADEHILL RESERVOIR
PERKINS COUNTY
1985
FIELD DATA COLLECTED : JULY 1985
SECTIONS 1,2,3,4,5,8,9,10, 15,16,17,20,21,22, 23,26,27,34,35
TOWNSHIP T 21 N
RANGE R 5 E
AERIAL PHOTO DATE : 6-3-59
AERIAL PHOTO NO : BOU-4N- 11-13
BENCHMARK : OVERFLOW STRUCTURE 2272 M.S.L.
WATER LEVEL : 2270 M.S.L.
MILES OF SHORELINE : 50 mi
PLANIMETERED ACREAGE : 4693 ac
AVERAGE DEPTH : 22 ft
VOLUME : 102,488 acre feet
PLANIMETERED ACREAGE BY STRATA
ACRES GREATER THAN:
5' 3703
10' 3093
15' 2599
20' 2302
25' 1807
30' 1558
35' 1152
40' 832
45' 564
50' 410
55' 94
60' 19
DEPTH CONTOUR : —5—
ROADS
HARD SURFACE :
GRAVEL :
TRAIL :
CAMPGROUND :
SCENIC GROUND :
GRASSLAND : GL
CULTIVATED : CL
WOODED : W
PARTLY WOODED : PW
BUILDINGS :
BENCHMARK :
SPILLWAY
0 1320 2640
660 1980
SCALE IN FEET
PUBLIC LAND BOUNDARIES
REFERENCE MAP
SOUTH FORK GRAND RIVER

SHADEHILL RESERVOIR TSI's



SHERIDAN LAKE

County: Pennington
Latitude: 43 deg. 58 min. 32 sec. N
Longitude: 103 deg. 28 min. 09 sec. W
Area: 383 A (155 ha)
Maximum Depth: 96 ft (29.3 m)
Volume: 11,326 acre-ft ($1.39x10^7 m^3$)
Origin of Basin: impoundment
Township: 1S
Range: 6E
Section(s): 7
Shoreline L: 7.8 mi (12.6 km)
Mean Depth: 29.6 ft (9.0 m)
Watershed/Lake Area: 166
Thermal Stratification: yes
Major Inflows (named or permanent streams): Spring, Newton, Horse, and Palmer Creeks
Outlet: Spring Creek Outlet

Lake Use

Beneficial Use Classification:
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 147,558
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.55	6	16.48	8	13.94
Air Temperature (°C)	4	24.72	6	30.00	8	23.81
Secchi Disk Depth (meters)	2	2.41	3	2.02	4	3.07
Conductivity (cond/25° C)	4	293	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.15	6	8.02	8	8.11
Total Alkalinity (mg/l)	4	114	-	-	4	111
Total Solids (mg/l)	4	177	-	-	4	179
Dissolved Solids (mg/l)	4	173	-	-	4	177
Suspended Solids (mg/l)	4	5	6	4	8	2
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.08	6	0.39	8	0.17
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	6	0.00	8	0.03
Total Kjeldahl Nitrogen (mg/l)	4	0.80	6	0.90	8	0.67
Total Phosphorus (mg/l)	4	0.065	6	0.133	8	0.100
Total Dissolved Phosphorus (mg/l)	-	-	6	0.111	8	0.090
Ortho Phosphate as P (mg/l)	4	0.018	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	11.10	6	13.44

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	16.37	6	14.14	6	13.93
Air Temperature (°C)	6	21.00	6	24.17	6	21.83
Secchi Disk Depth (meters)	3	1.79	8	2.78	9	2.62
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.20	6	8.32	6	7.61
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	4	6	2	6	3
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.33	6	0.24	6	0.11
Nitrate + Nitrite Nitrogen (mg/l)	6	<0.01	6	0.01	6	0.04
Total Kjeldahl Nitrogen (mg/l)	6	0.68	6	0.52	6	0.51
Total Phosphorus (mg/l)	6	0.115	6	0.063	6	0.031
Total Dissolved Phosphorus (mg/l)	6	0.125	6	0.052	6	0.022
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	12.03	6	12.04	6	3.77

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	54.10	54.25	49.92	52.89	49.58	46.13
Secchi Disk	47.32	50.41	43.84	51.29	45.24	46.08
Total Phosphorus	60.87	58.51	49.85	52.39	48.52	48.74
Chlorophyll *a*		54.19	56.06	54.97	54.98	43.58

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 15%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

Taxa	July 10, 1989 Number	July 10, 1989 Units/ml	NO DATE Number	NO DATE Units/ml
Algae (flagellate)	14	415	1	95
Cryptomonas sp. #1	9	267	-	-
Dinobryon	4	119	-	-
Aphanocapsa	4	119	16	1,527
Lyngbya	2	59	-	-
Aphanizomenon flos-aquae	2	59	-	-
Algae (other)	1	30	2	191
Cryptomonas	1	30	-	-
Diatom (pennate)	1	30	-	-
Green Algae (other)	1	30	1	95
Characium	1	30	1	95
Cosmarium	1	30	-	-
Chroococcus	1	30	3	286
Fragilaria crotonensis	-	-	11	1,050
Tabellaria fenestrata	-	-	3	286
Oocystis	-	-	1	95
Diatom (centric)	-	-	1	95
Anabaena	-	-	1	95
Total	42	1,245	41	3,912

Watershed Description

Watershed Area: 63,404 A (25,660 ha)

Soil Associations within Watershed

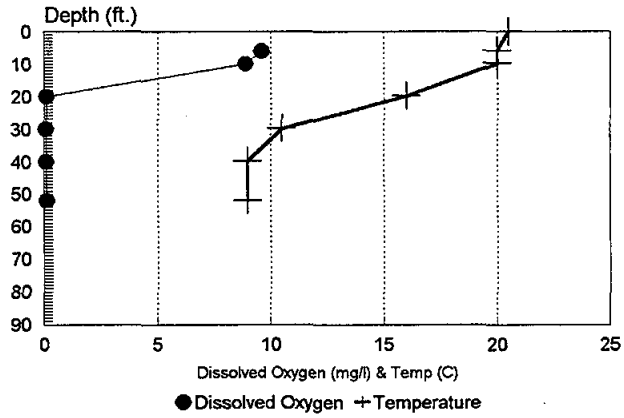
Association	Area (A)	% of Total
#5	52,625	83
#6	10,779	17

#5 Pactola-Rock Outcrop-Virkul: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from steeply tilted metamorphic rock; on mountains.

#6 Buska-Mocmont-Rock Outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

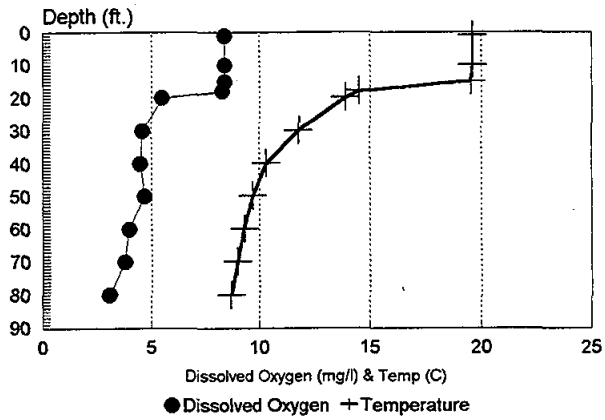
SHERIDAN LAKE 8/18/79

Dissolved Oxygen & Temperature Profile



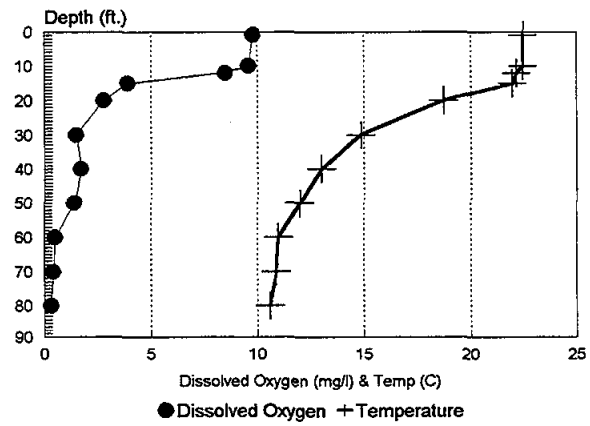
SHERIDAN LAKE 6/16/91

Dissolved Oxygen & Temperature Profile



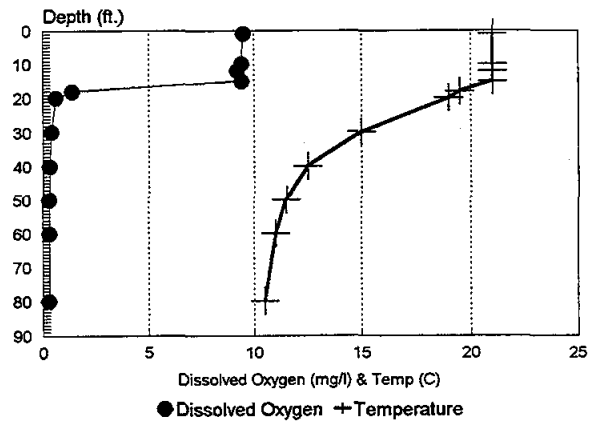
SHERIDAN LAKE 7/18/91

Dissolved Oxygen & Temperature Profile



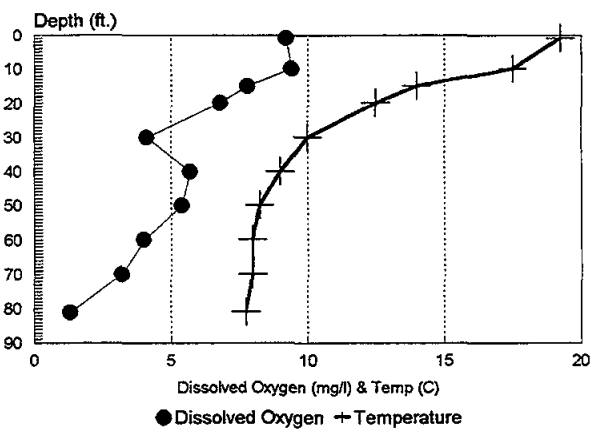
SHERIDAN LAKE 8/17/91

Dissolved Oxygen & Temperature Profile



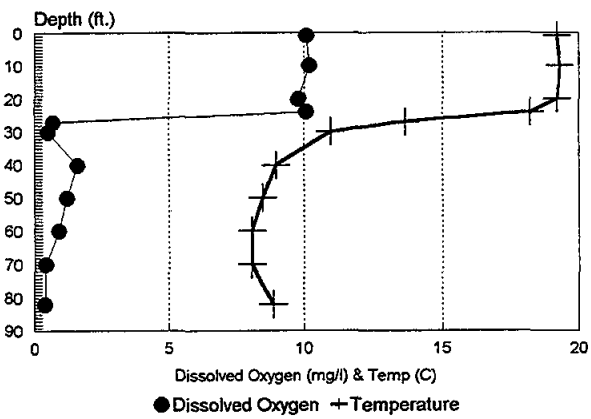
SHERIDAN LAKE 6/12/92

Dissolved Oxygen & Temperature Profile



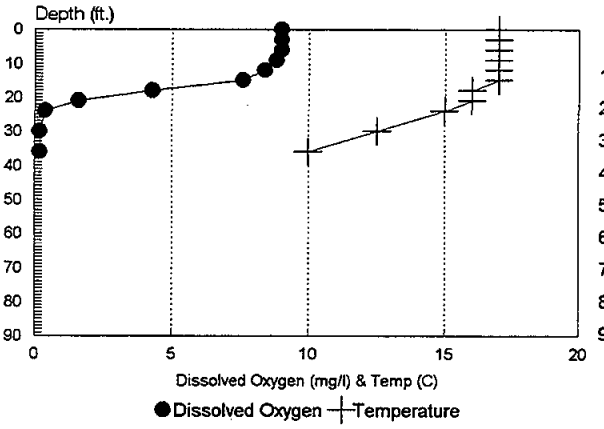
SHERIDAN LAKE 7/16/92

Dissolved Oxygen & Temperature Profile



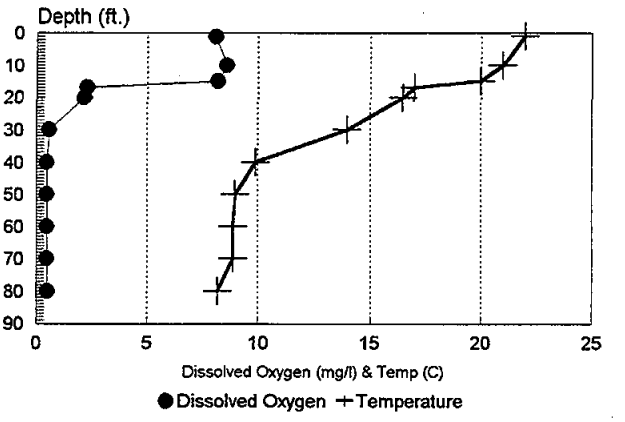
SHERIDAN LAKE 7/22/92

Dissolved Oxygen & Temperature Profile



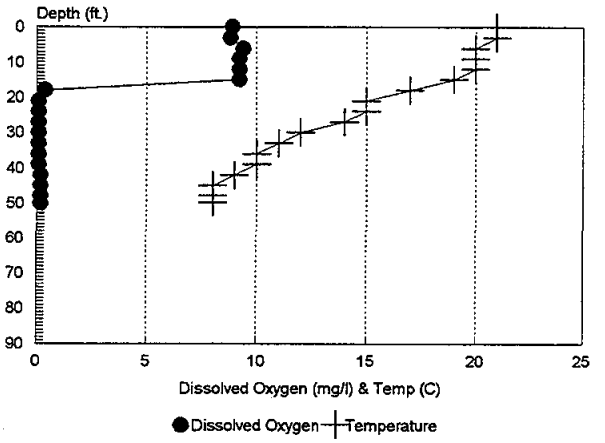
SHERIDAN LAKE 8/14/92

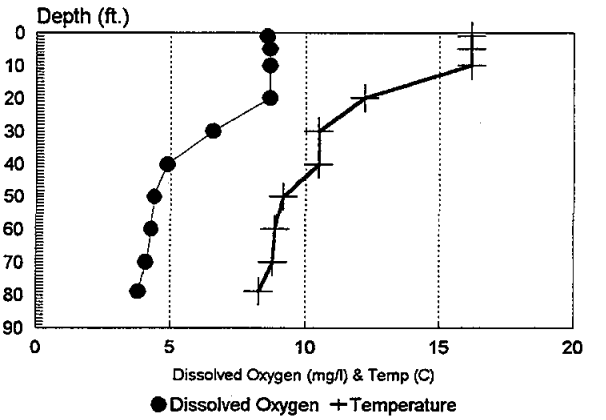
Dissolved Oxygen & Temperature Profile



SHERIDAN LAKE 6/13/93

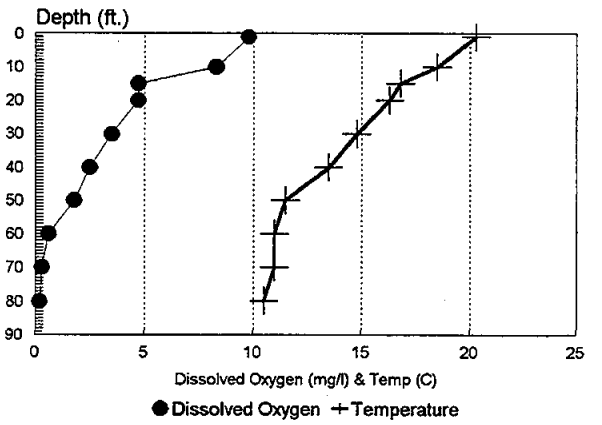
Dissolved Oxygen & Temperature Profile





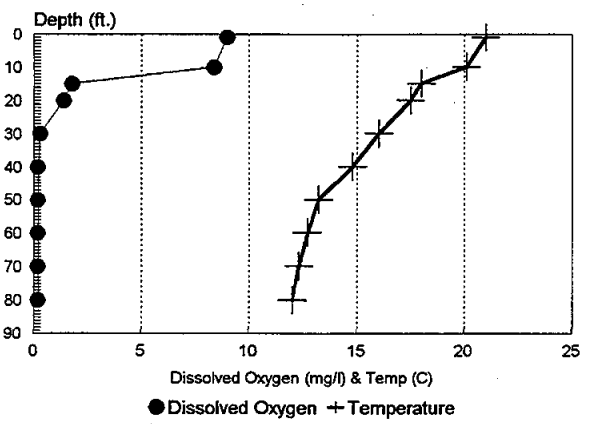
SHERIDAN LAKE 7/21/93

Dissolved Oxygen & Temperature Profile

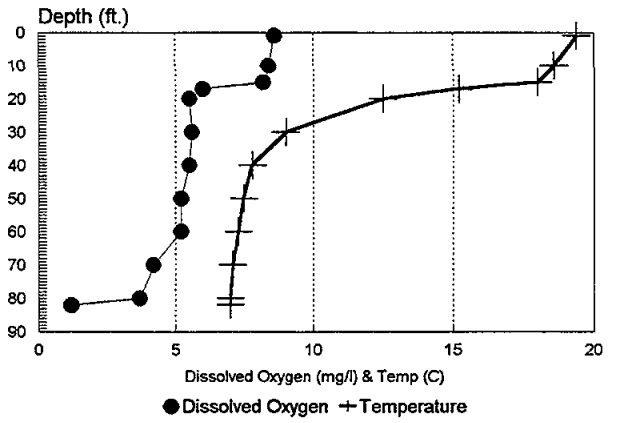


SHERIDAN LAKE 8/19/93

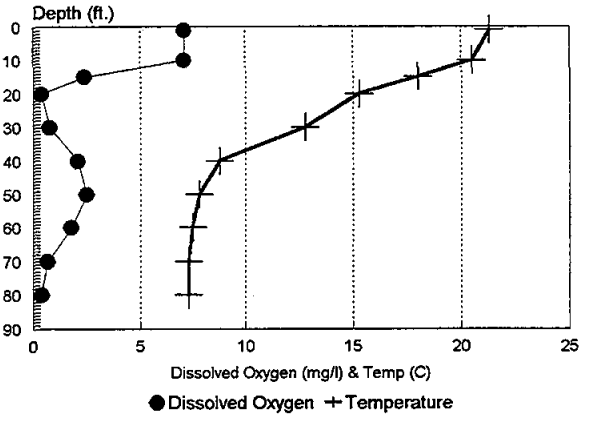
Dissolved Oxygen & Temperature Profile



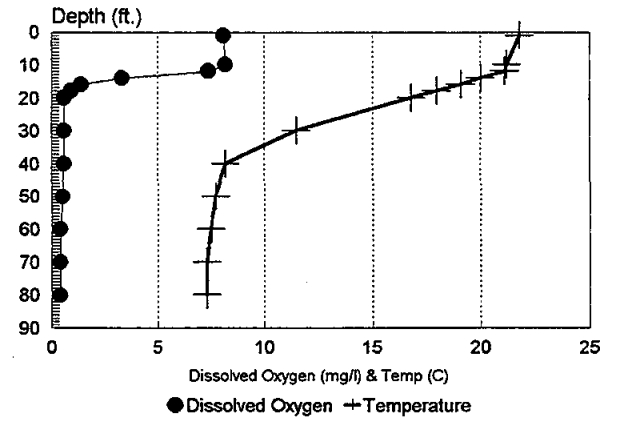
SHERIDAN LAKE 6/12/94
Dissolved Oxygen & Temperature Profile



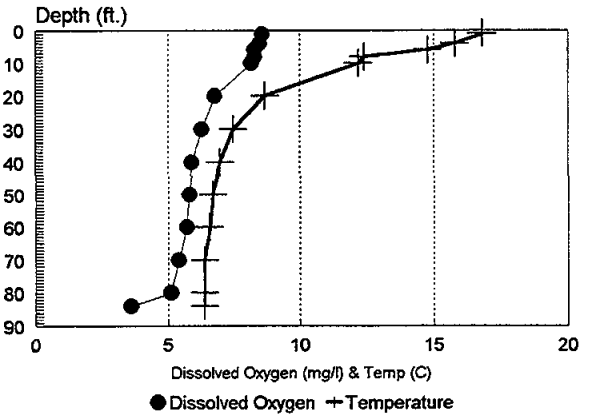
SHERIDAN LAKE 7/14/94
Dissolved Oxygen & Temperature Profile



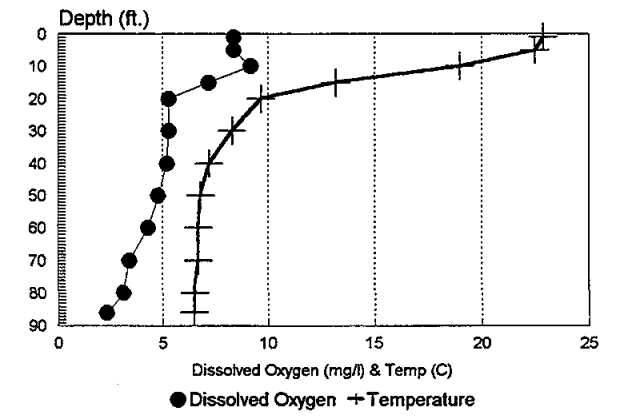
SHERIDAN LAKE 8/14/94
Dissolved Oxygen & Temperature Profile



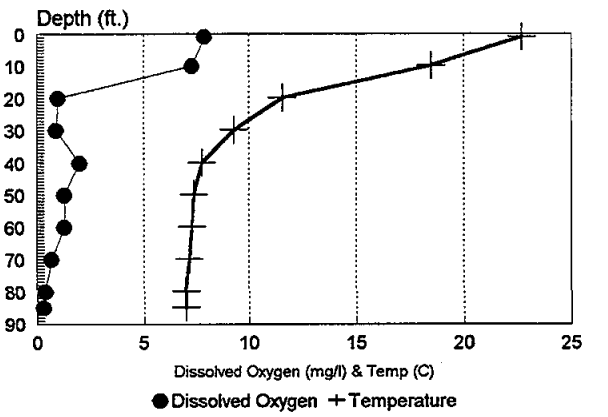
SHERIDAN LAKE 6/14/95
Dissolved Oxygen & Temperature Profile



SHERIDAN LAKE 7/14/95
Dissolved Oxygen & Temperature Profile

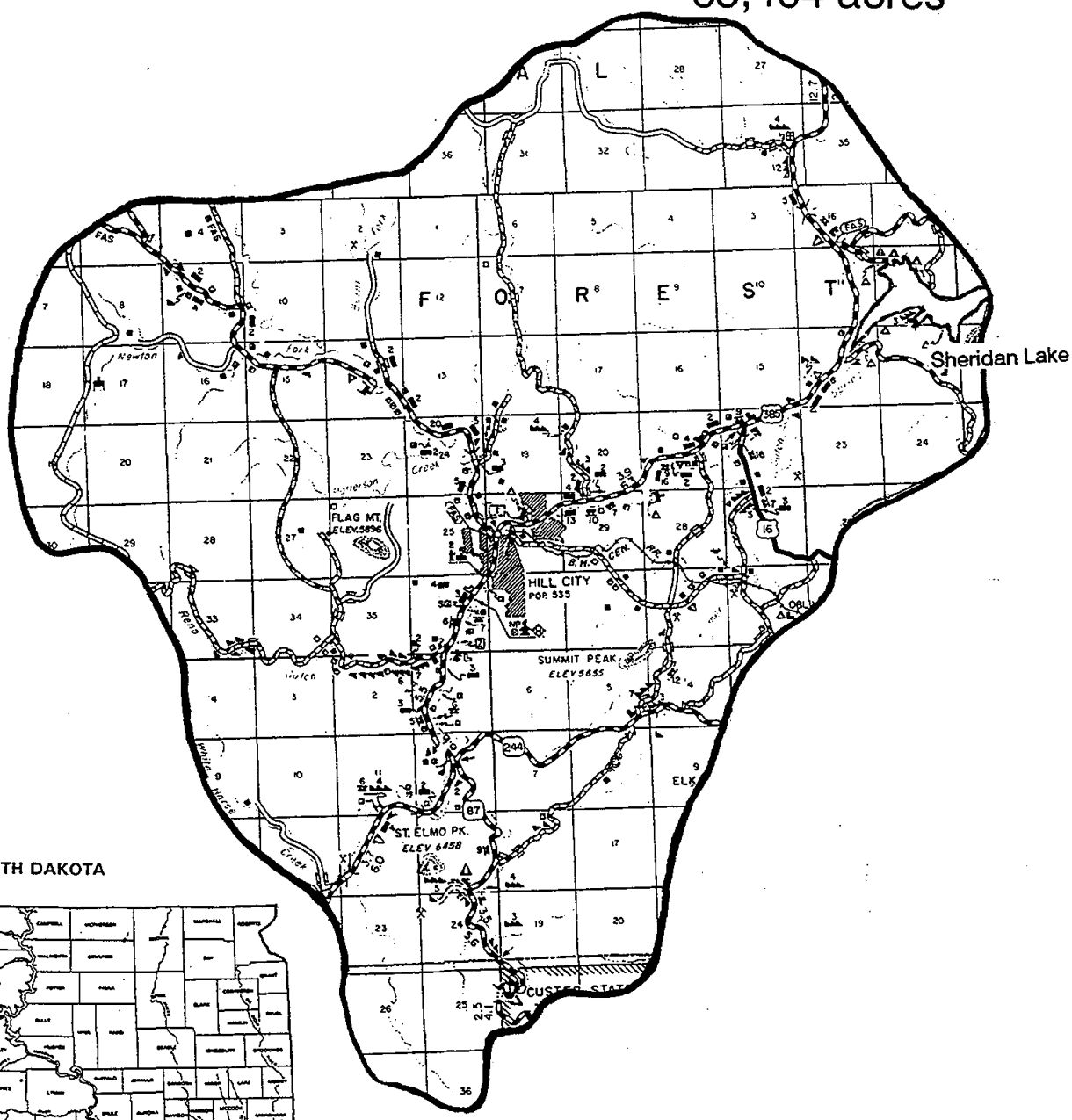


SHERIDAN LAKE 8/12/95
Dissolved Oxygen & Temperature Profile

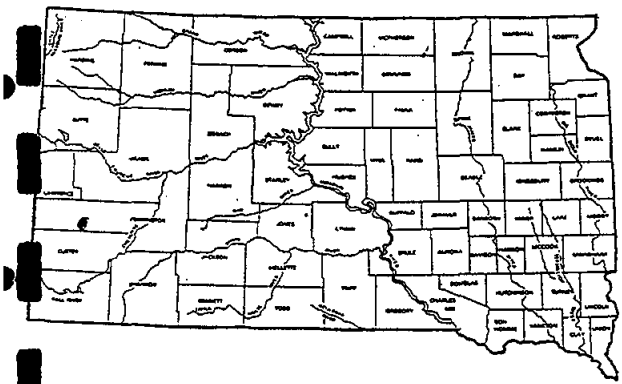


Sheridan Lake

63,404 acres



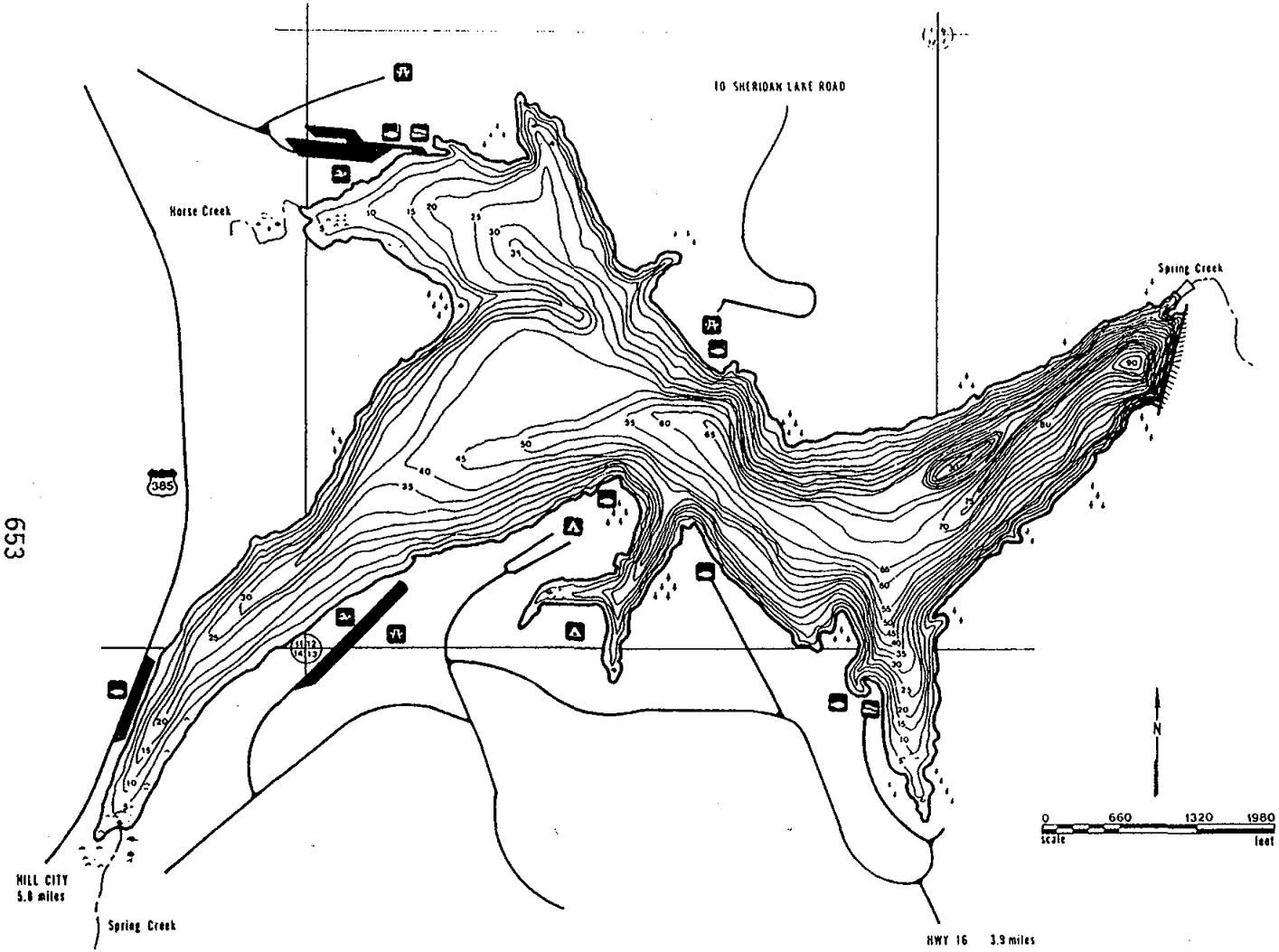
SOUTH DAKOTA



SCALE

0 1 2 3 4 5 6 7 8 KILOMETERS

0 1 2 3 4 5 MILES



653

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

SHERIDAN LAKE

PENNINGTON COUNTY

1987

SYMBOLS

- FISHING ACCESS
- BOAT LAUNCH
- PICNIC AREA
- SWIMMING AREA
- CAMPGROUND
- DAM
- SPILLWAY
- DEPTH CONTOUR
- EMERGENT VEGETATION
- PAVED ROAD
- FOREST

MAP DATA

FIELD DATA COLLECTED : 6/86
AERIAL PHOTO NO. : 478-243
AERIAL PHOTO DATE : 7-27-76
SECTION : 7,11,12,13,14
TOWNSHIP : 1 south
RANGE : 5 east
SCALE : 1:660
AVERAGE DEPTH IN FEET : 29.5 ft
PLANIMETERED LAKE ACREAGE : 383 ac

VOLUME IN ACRE FEET :

depth	ac/ft	depth	ac/ft
5	1808	60	348
10	1614	65	297
15	1443	70	230
20	1277	75	137
25	1107	78	66
30	949	78	33
35	815	80	21
40	645	83	11
43	481	85	4
		TOTAL	11326

WATER LEVEL : 4624 msl
MILES OF SHORELINE : 7.8 miles

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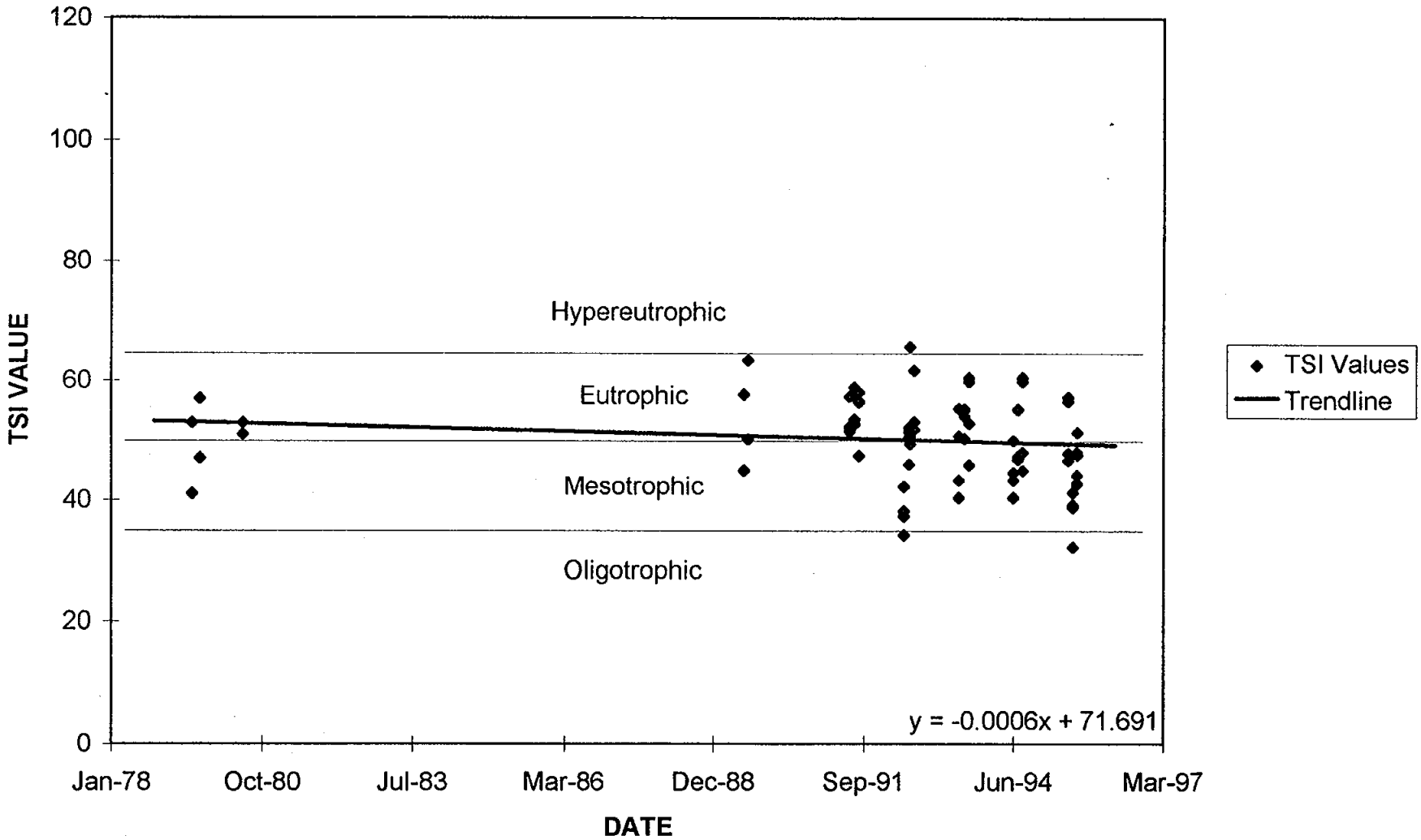
SHERIDAN LAKE TSI's



SILVER LAKE

County: Hutchinson, Turner
Latitude: 43 deg. 26 min. 59 sec. N
Longitude: 97 deg. 24 min. 35 sec. W
Area: 393 A (159 ha)
Maximum Depth: 7 ft (2.13 m)
Volume: 1,375.5 acre-ft (1.7 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 100N
Range: 55W, 56W
Section(s): 25,36; 30
Shoreline L: 3.85 mi (6.20 km)
Mean Depth: 3.5 ft (1.07 m)
Watershed/Lake Area: 42.5
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: NA
Ownership Status: State owned
Public Interest: Local Sportsman's Club

	1993	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	21.78
Air Temperature (°C)	4	26.00
Secchi Disk Depth (meters)	2	1.35
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	4	5.25
Lab pH (su)	-	-
Field pH (su)	4	8.37
Total Alkalinity (mg/l)	4	175
Total Solids (mg/l)	4	421
Dissolved Solids (mg/l)	4	419
Suspended Solids (mg/l)	4	3
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.35
Total Kjeldahl Nitrogen (mg/l)	4	1.49
Total Phosphorus (mg/l)	4	0.991
Total Dissolved Phosphorus (mg/l)	4	0.969
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	2	14.07

Year	1993
TSI Values -- Mean:	72.30
Secchi Disk	55.72
Total Phosphorus	103.78
Chlorophyll *a*	57.40

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA

Floating Leaved and Submergent Plant Species Identified: NA

Watershed Description

Watershed Area: 16,701 A (6,759 ha)

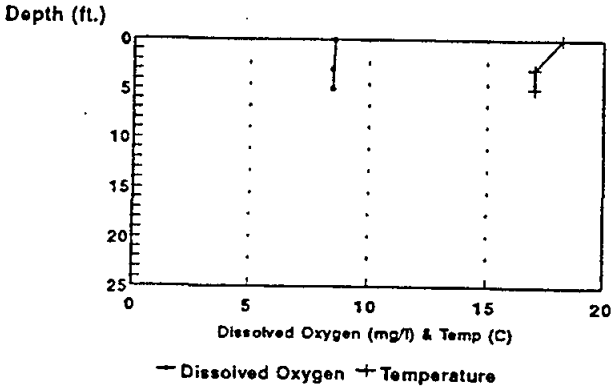
Soil Associations within Watershed

Association	Area (A)	% of Total
#8	16,701	100

#8 Crossplain-Clarno-Tetonka: Well Drained and moderately well drained, nearly level to gently rolling, loamy soils that formed in glacial melt water deposits and glacial till on uplands.

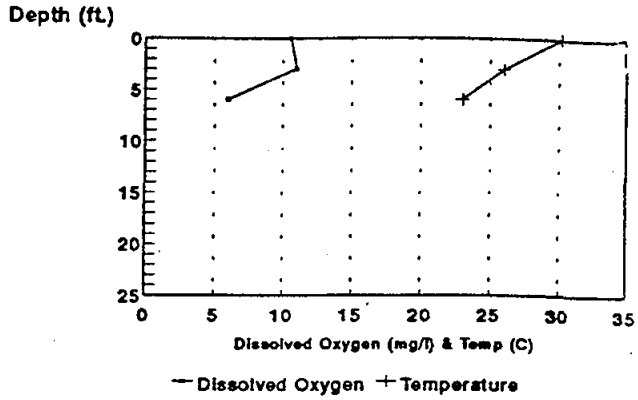
SILVER LAKE 6/21/93

Dissolved Oxygen & Temperature Profile



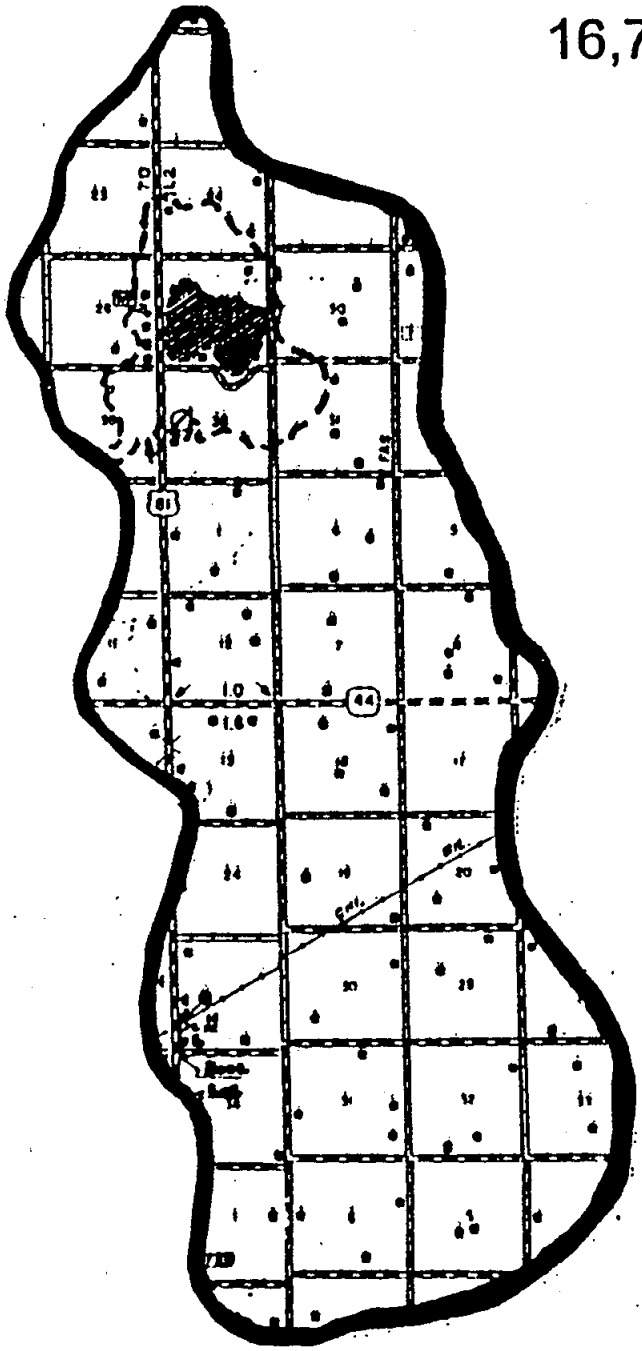
SILVER LAKE 8/10/93

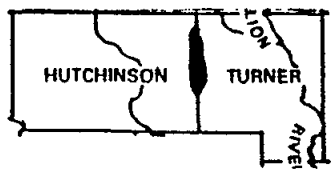
Dissolved Oxygen & Temperature Profile



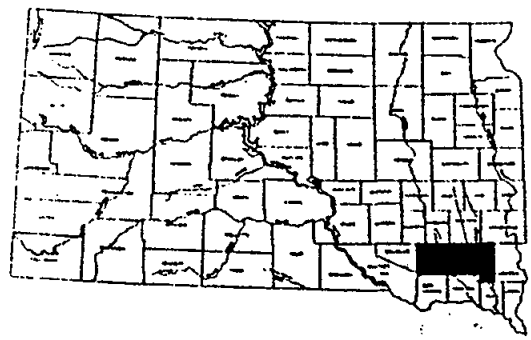
Silver Lake

16,701 acres





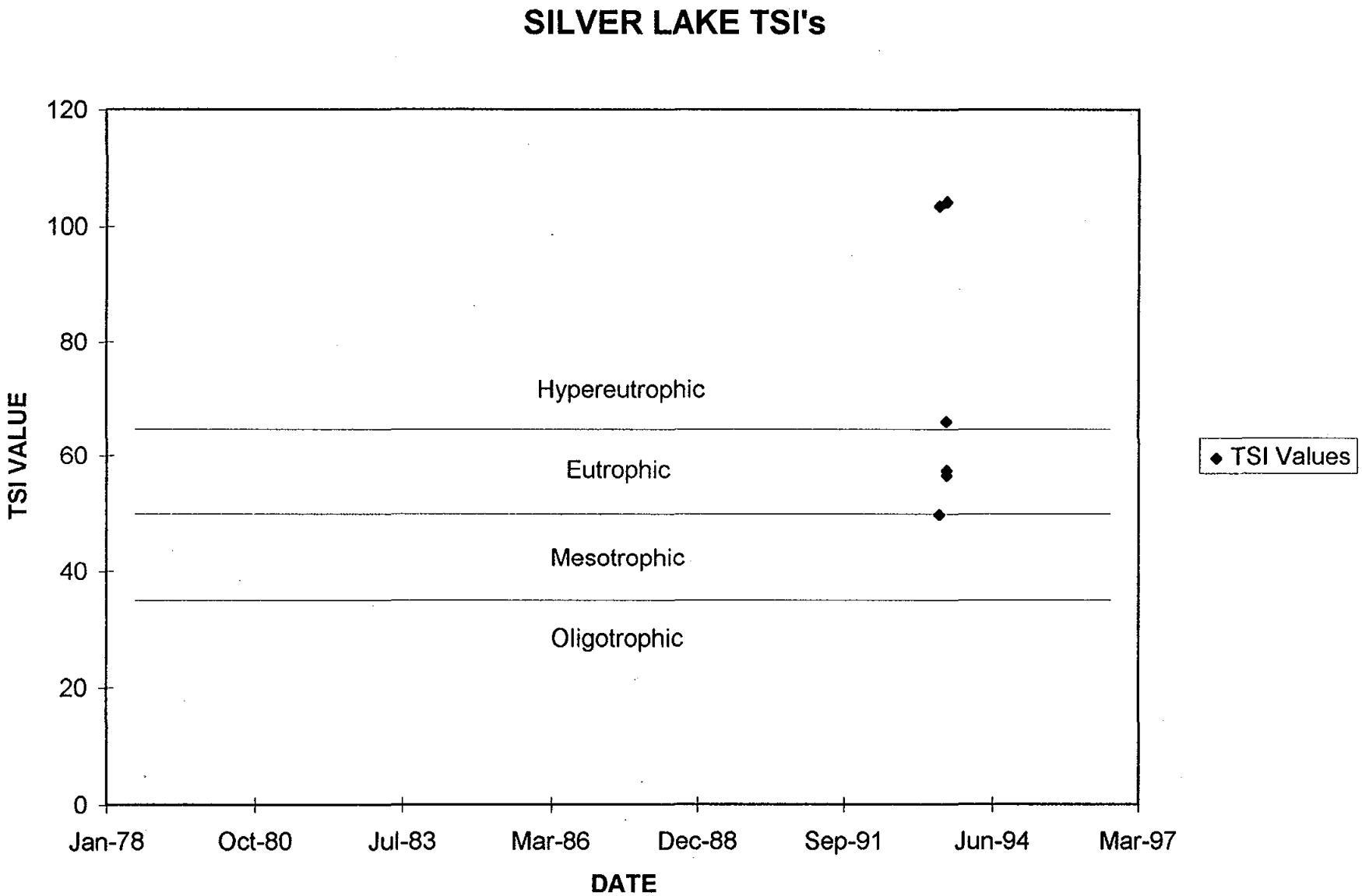
SOUTH DAKOTA



SCALE

0 1 2 3 4 5 6 7 8 KILOMETERS

0 1 2 3 4 5 MILES


SILVER LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
TSI Values
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

SOUTH BUFFALO LAKE

County: Marshall
Latitude: 45 deg. 37 min. 00 sec. N
Longitude: 97 deg. 16 min. 48 sec. W
Area: 1780 A (720.4 ha)
Maximum Depth: 12 ft (3.7 m)
Volume: 10680 acre-ft (1.317 x $10^7 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 125N
Range: 53W
Section(s): 2, 10-11, 14-17
Shoreline L: 27.8 mi (45 km)
Mean Depth: 6 ft (1.8 m)
Watershed/Lake Area: 9
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	22.67	4	20.63	4	18.63
Air Temperature (°C)	4	19.72	4	22.35	4	20.40
Secchi Disk Depth (meters)	2	1.75	2	0.53	2	0.65
Conductivity (cond/25° C)	3	722	2	739	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	3	8.89	-	-	-	-
Field pH (su)	-	-	4	8.41	4	8.88
Total Alkalinity (mg/l)	3	205	4	241	4	266
Total Solids (mg/l)	3	568	4	591	4	650
Dissolved Solids (mg/l)	3	564	4	584	4	640
Suspended Solids (mg/l)	3	4	4	8	4	10
Volatile Suspended Solids (mg/l)	-	-	1	2	-	-
Ammonia Nitrogen (mg/l)	4	0.08	4	0.18	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.08
Total Kjeldahl Nitrogen (mg/l)	4	1.39	4	2.09	4	1.42
Total Phosphorus (mg/l)	4	0.054	4	0.108	4	0.072
Total Dissolved Phosphorus (mg/l)	-	-	4	0.026	4	0.024
Ortho Phosphate as P (mg/l)	4	0.019	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	48.24	2	22.11

Year	1989	1991	1992
TSI Values -- Mean:	54.17	70.09	64.24
Secchi Disk	51.91	69.07	66.33
Total Phosphorus	556.44	72.61	65.44
Chlorophyll *a*		68.60	60.94

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Myriophyllum spicatum, M. spicatum, Ceratophyllum demersum, Potamogeton richardsonii, P. friesii, P. pectinatus, and Najas flexilis

Algal Species and Densities

	June 29, 1989		July 27, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aaphanocapsa	63	1,482	111	4,761
Algae (other)	11	259	37	1,587
Merismopedia	6	141	6	257
Fragilaria crotonensis	4	94	-	-
Lyngbya Diguetii	4	94	20	858
Ankistrodesmus	3	71	-	-
Nitzschia	3	71	-	-
Blue-green (other)	2	47	3	129
Mallomonas	2	47	-	-
Green Algae (other)	2	47	4	172
Scenedesmus	2	47	-	-
Lyngbya contorta	2	47	-	-
Dactylococcopsis	2	47	13	558
Lyngbya	2	47	-	-
Tetrastrum	1	24	-	-
Cryptomonas	1	24	-	-
Dinobryon	1	24	-	-
Tetrahedron	1	24	-	-
Fragilaria	1	24	-	-
Cryptomonas sp. #1	1	24	-	-
Aphanizomenon flos-aquae	-	-	27	1,158
Cosmarium	-	-	21	901
Melosira granulata	-	-	17	729
Chroococcus	-	-	8	343
Diatom (pennate)	-	-	8	343
Algae (flagellate)	-	-	7	300

Diatom (centric)	-	-	4	172
Synedra	-	-	4	172
Cryptomonas	-	-	1	43
Pediastrum	-	-	1	43
Anabaena	-	-	1	43
Total	300	7,056	304	13,040

Watershed Description

Watershed Area: 16,781 A (6791 ha)

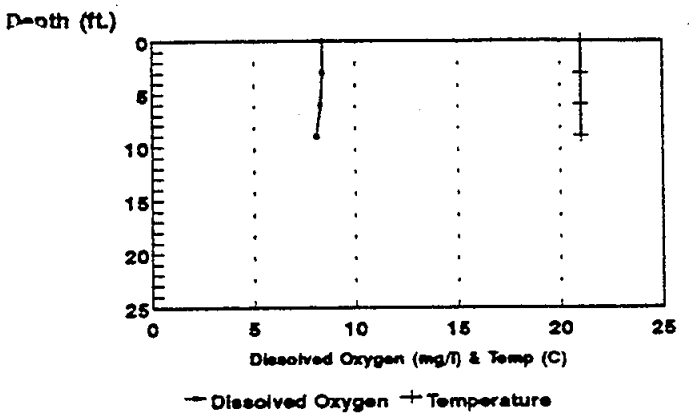
Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA-BY	14,767	88
RL-FS-SK	2,014	12

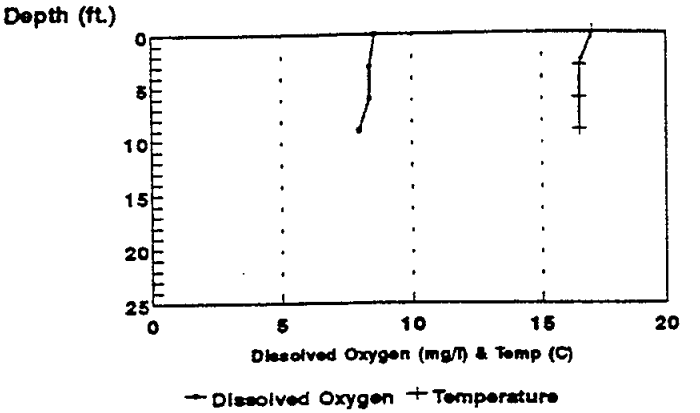
FU-AA-BY Forman-Aastad-Buse: Nearly level to steep, well drained and moderately well drained, loamy soils formed in glacial till.

RL-FS-SK Renshaw-Fordville-Sioux: Nearly level to steep, well drained to excessively drained, loamy soils underlain by sand and gravel.

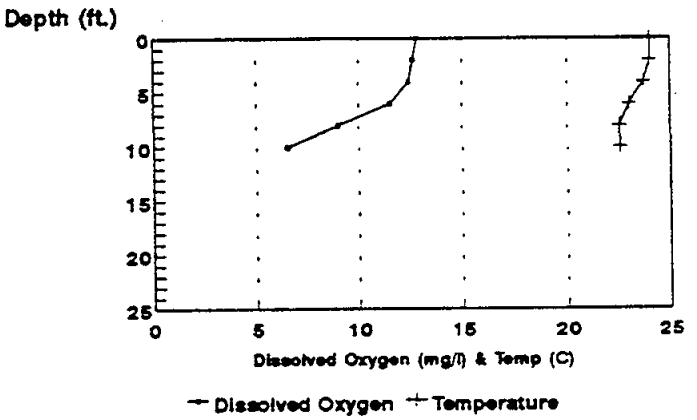
SOUTH BUFFALO LAKE 8/3/92
Dissolved Oxygen & Temperature Profile



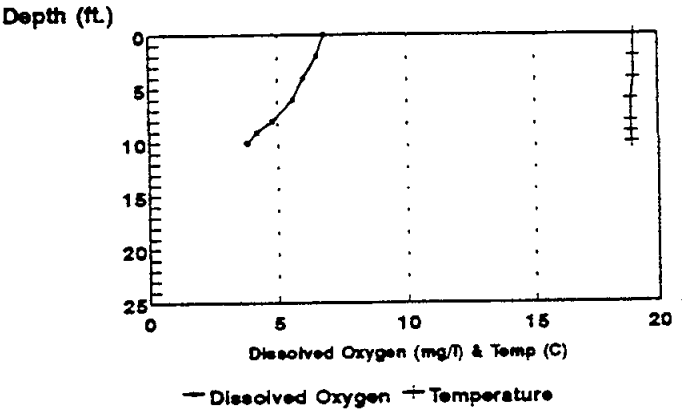
SOUTH BUFFALO LAKE 9/2/92
Dissolved Oxygen & Temperature Profile



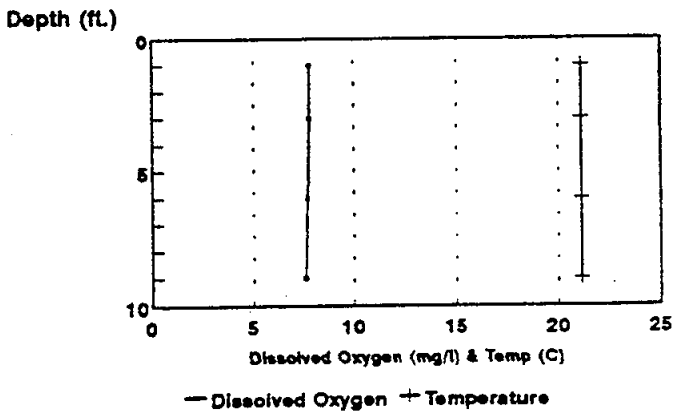
SOUTH BUFFALO LAKE 6/26/91
Dissolved Oxygen & Temperature Profile



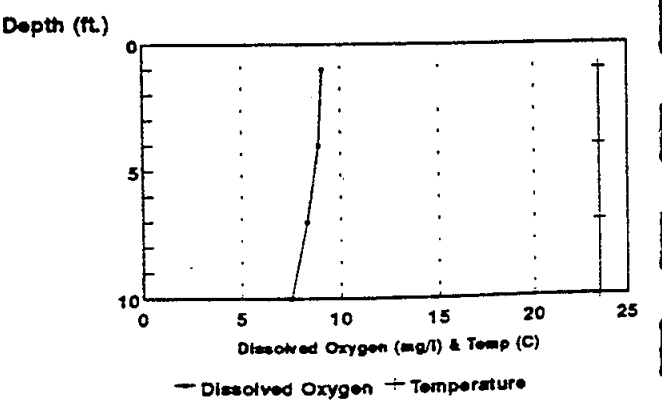
SOUTH BUFFALO LAKE 9/11/91
Dissolved Oxygen & Temperature Profile



South Buffalo Lake, 6/29/89
Dissolved Oxygen & Temperature Profile

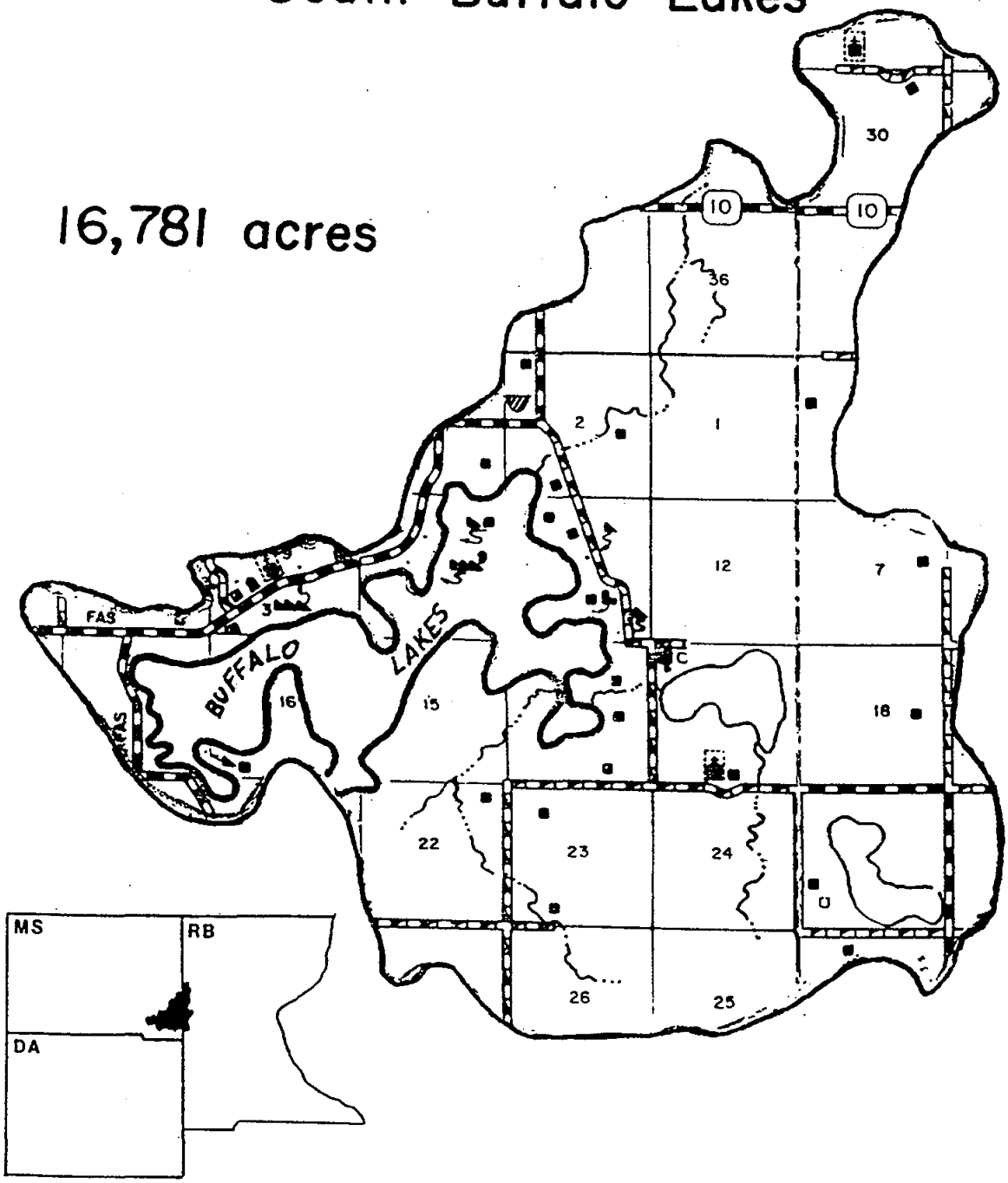


South Buffalo Lake, 7/27/89
Dissolved Oxygen & Temperature Profile



South Buffalo Lakes

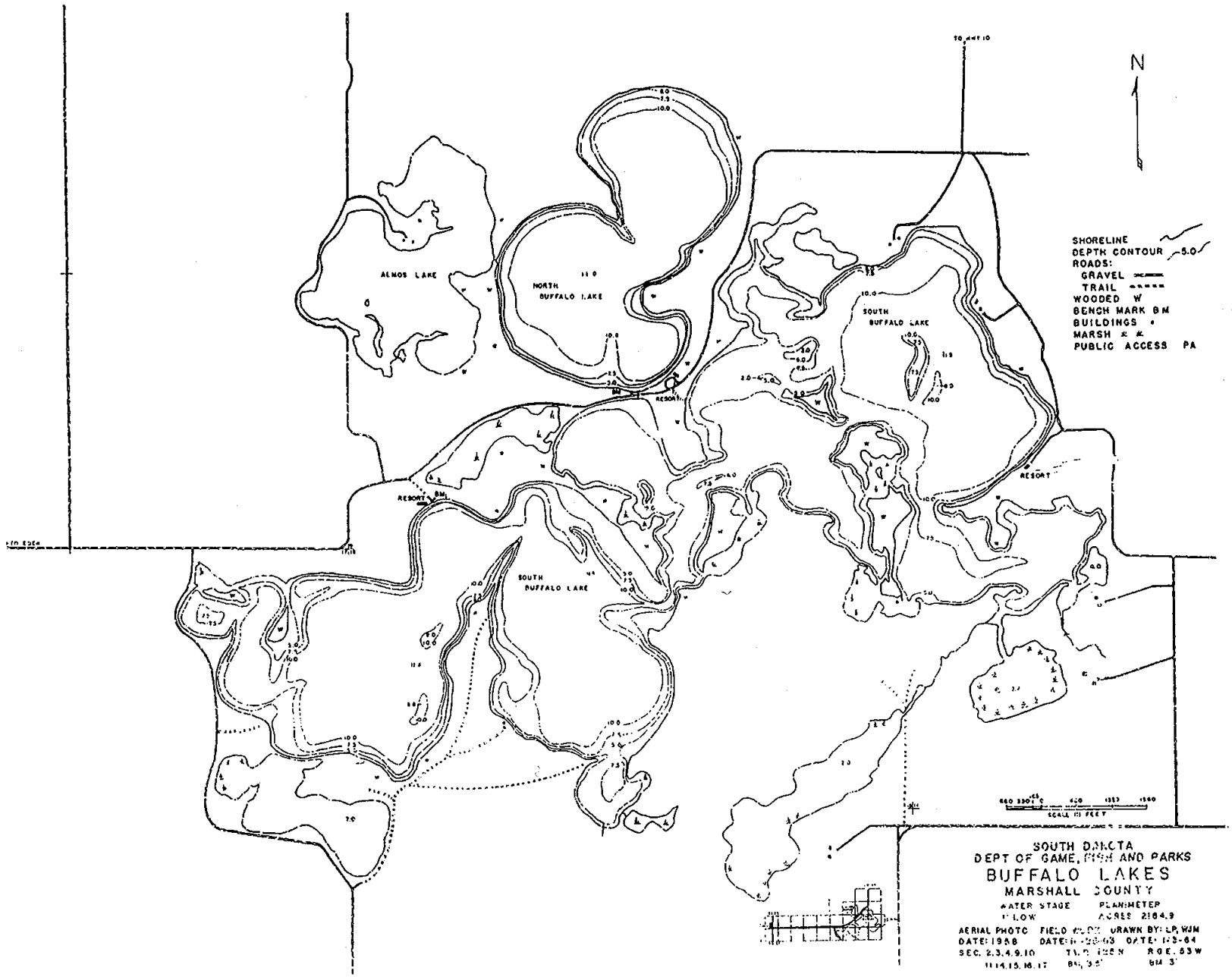
16,781 acres

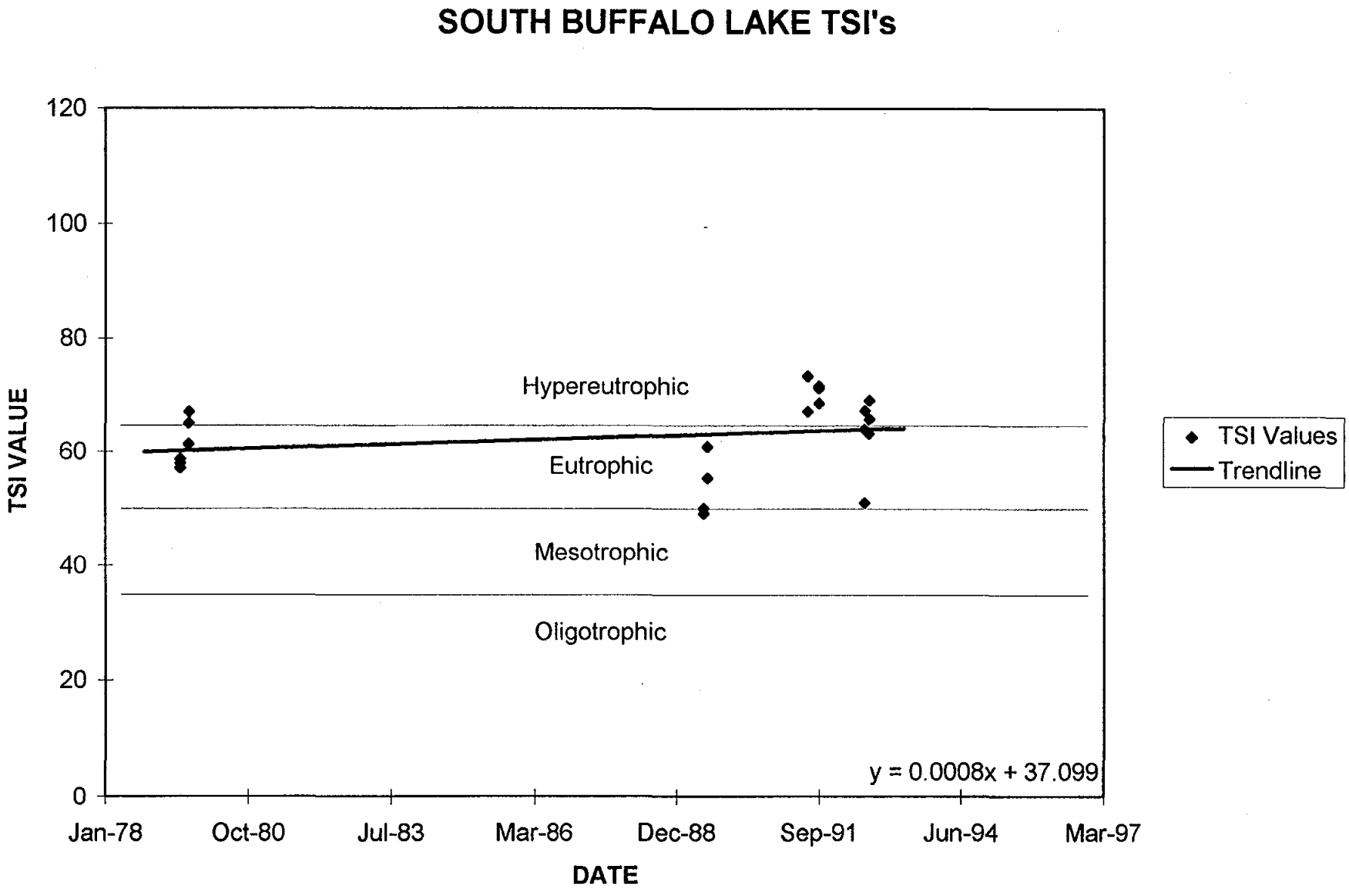


Scale

0 1 2 3 4 5

Miles


N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
GRAVEL
TRAIL
WOODED W
BENCH MARK BM
BUILDINGS
MARSH
PUBLIC ACCESS PA
ALMOS LAKE
NORTH BUFFALO LAKE
SOUTH BUFFALO LAKE
RESORT
RESORT BM
SOUTH BUFFALO LAKE
RESORT
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
BUFFALO LAKES
MARSHALL COUNTY
WATER STAGE
PLANIMETER
ACRES 2184.9
AERIAL PHOTO
DRAWN BY: LP, WJM
SEC. 2,3,4,9,10
R.9E. 63W


SOUTH BUFFALO LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0008x + 37.099
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

SOUTH RED IRON LAKE

County: Marshall
Latitude: 45 deg. 40 min. 12 sec. N
Longitude: 97 deg. 19 min. 06 sec. W
Area: 610.2 A (246.9 ha)
Maximum Depth: 15 ft (4.6 m)
Volume: 5,057.1 acre-ft ($6.238x10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 126N
Range: 53W
Section(s): 20, 29, 32
Shoreline L: 7.5 mi (12.1 km)
Mean Depth: 8.3 ft (2.5 m)
Watershed/Lake Area: 16
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	23.33	4	21.48	4	20.48
Air Temperature (°C)	4	26.11	4	19.88	4	22.50
Secchi Disk Depth (meters)	2	2.16	2	0.86	2	1.07
Conductivity (cond/25° C)	4	422	2	510	-	-
Turbidity (NTU)	-	-	-	-	4	5.94
Lab pH (su)	4	9.37	-	-	-	-
Field pH (su)	-	-	4	8.86	4	8.32
Total Alkalinity (mg/l)	4	168	4	201	4	226
Total Solids (mg/l)	4	331	4	359	4	356
Dissolved Solids (mg/l)	4	329	4	355	4	351
Suspended Solids (mg/l)	4	2	4	5	4	5
Volatile Suspended Solids (mg/l)	-	-	2	4	-	-
Ammonia Nitrogen (mg/l)	4	0.04	4	0.08	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.35	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.92	4	1.26	4	1.26
Total Phosphorus (mg/l)	4	0.036	4	0.066	4	0.039
Total Dissolved Phosphorus (mg/l)	-	-	4	0.026	4	0.011
Ortho Phosphate as P (mg/l)	4	0.007	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	17.42	1	24.79

Year	1989	1991	1993
TSI Values -- Mean:	51.28	62.02	59.07
Secchi Disk	48.86	62.11	59.09
Total Phosphorus	53.69	65.34	56.05
Chlorophyll *a*		58.60	62.06

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus, P. richardsonii, Ceratophyllum demersum, Ruppia maritima, Heteranthera dubia, and Myriophyllum spicatum

Algal Species and Densities

	June 29, 1989		July 27, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Characium	3	38	-	-
Green Algae (flagellate)	3	38	1	23
Cryptomonas sp. #1	2	26	25	569
Diatom (pennate)	2	26	3	68
Algae (flagellate)	2	26	45	1,024
Cryptomonas ovata	1	13	-	-
Cryptomonas	-	-	7	159
Algae (other)	-	-	3	68
Nitzschia	-	-	1	23
Lyngbya	-	-	1	23
Aphanizomenon flos-aqae	-	-	1	23
Total	13	166	87	1,980

Watershed Description

Watershed Area: 9,862 A (3,991 ha)

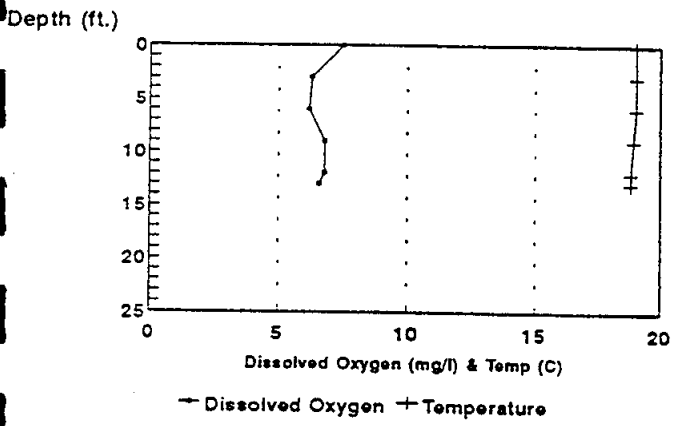
Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA-BY	6,608	67
RL-FS-SK	3,254	33

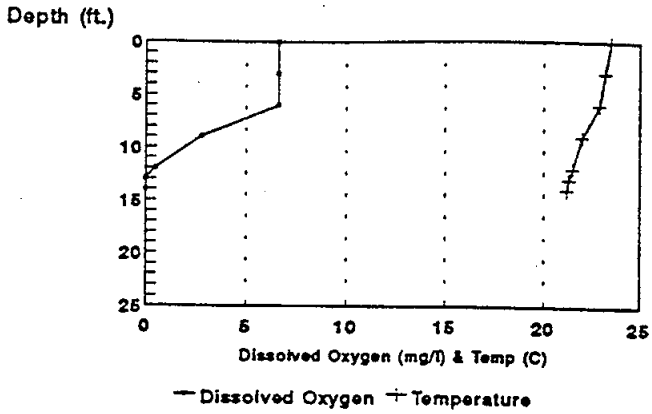
FU-AA-BY Forman-Aastad-Buse: Nearly level to steep, well drained and moderately well drained, loamy soils formed in glacial till.

RL-FS-SK Renshaw-Fordville-Sioux: Nearly level to steep, well drained to excessively drained, loamy soils underlain by sand and gravel.

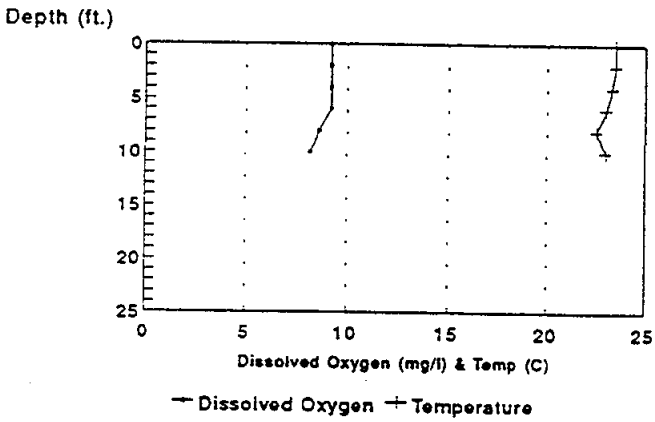
SOUTH RED IRON LAKE 7/7/93
Dissolved Oxygen & Temperature Profile



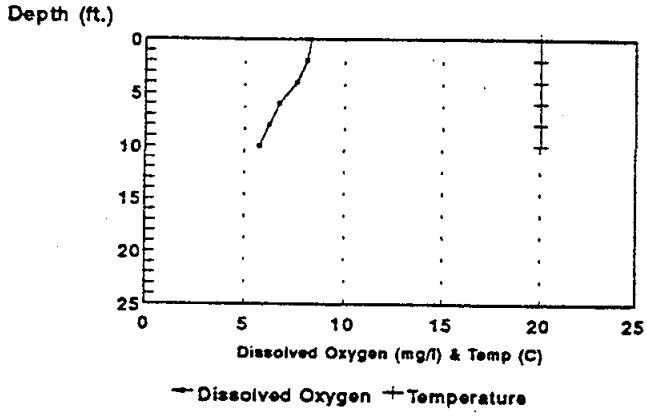
SOUTH RED IRON LAKE 8/17/93
Dissolved Oxygen & Temperature Profile



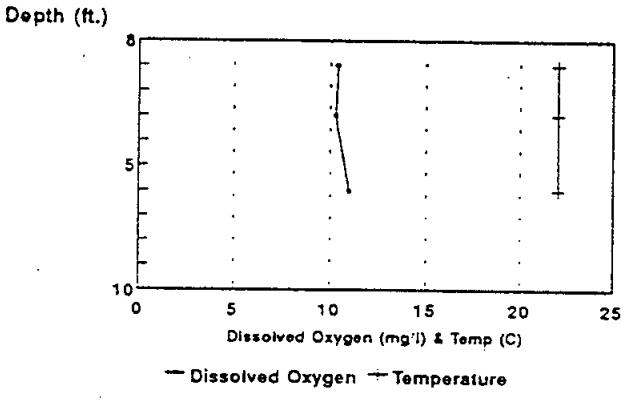
SOUTH RED IRON LAKE 6/26/91
Dissolved Oxygen & Temperature Profile



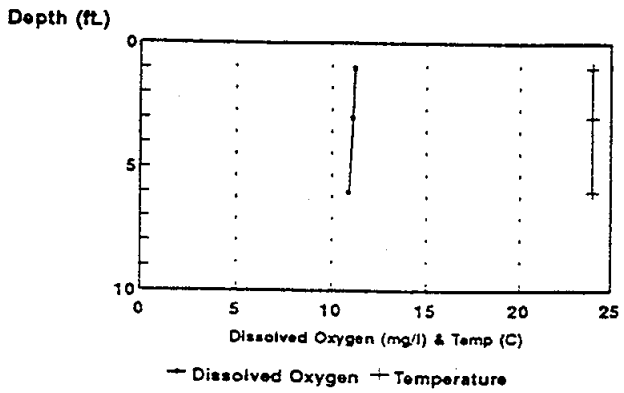
SOUTH RED IRON LAKE 9/10/91
Dissolved Oxygen & Temperature Profile



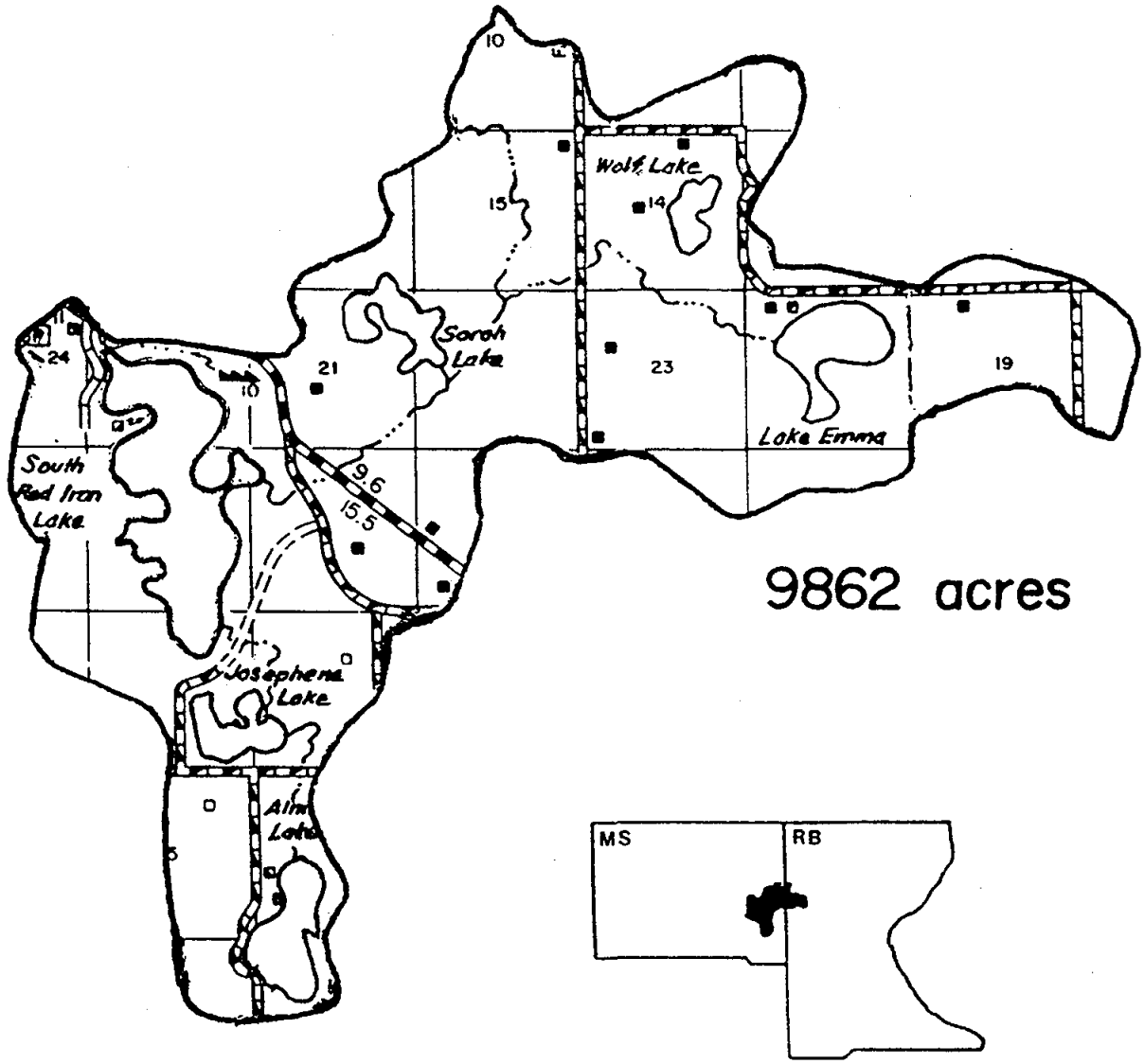
South Red Iron Lake, 6/29/89
Dissolved Oxygen & Temperature Profile



South Red Iron Lake, 7/27/89
Dissolved Oxygen & Temperature Profile



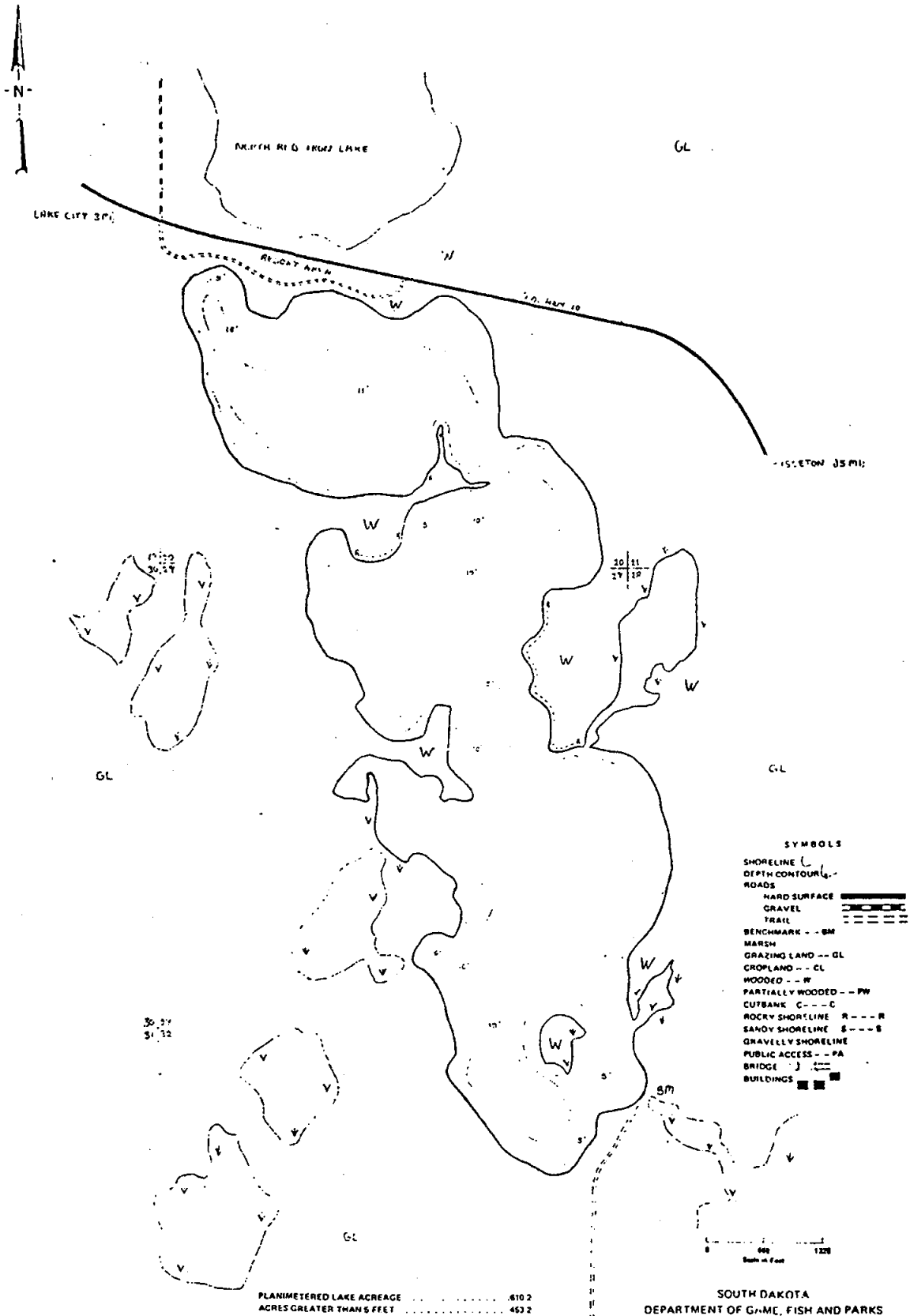
South Red Iron Lake



Scale

0 1 2 3 4 5

Miles

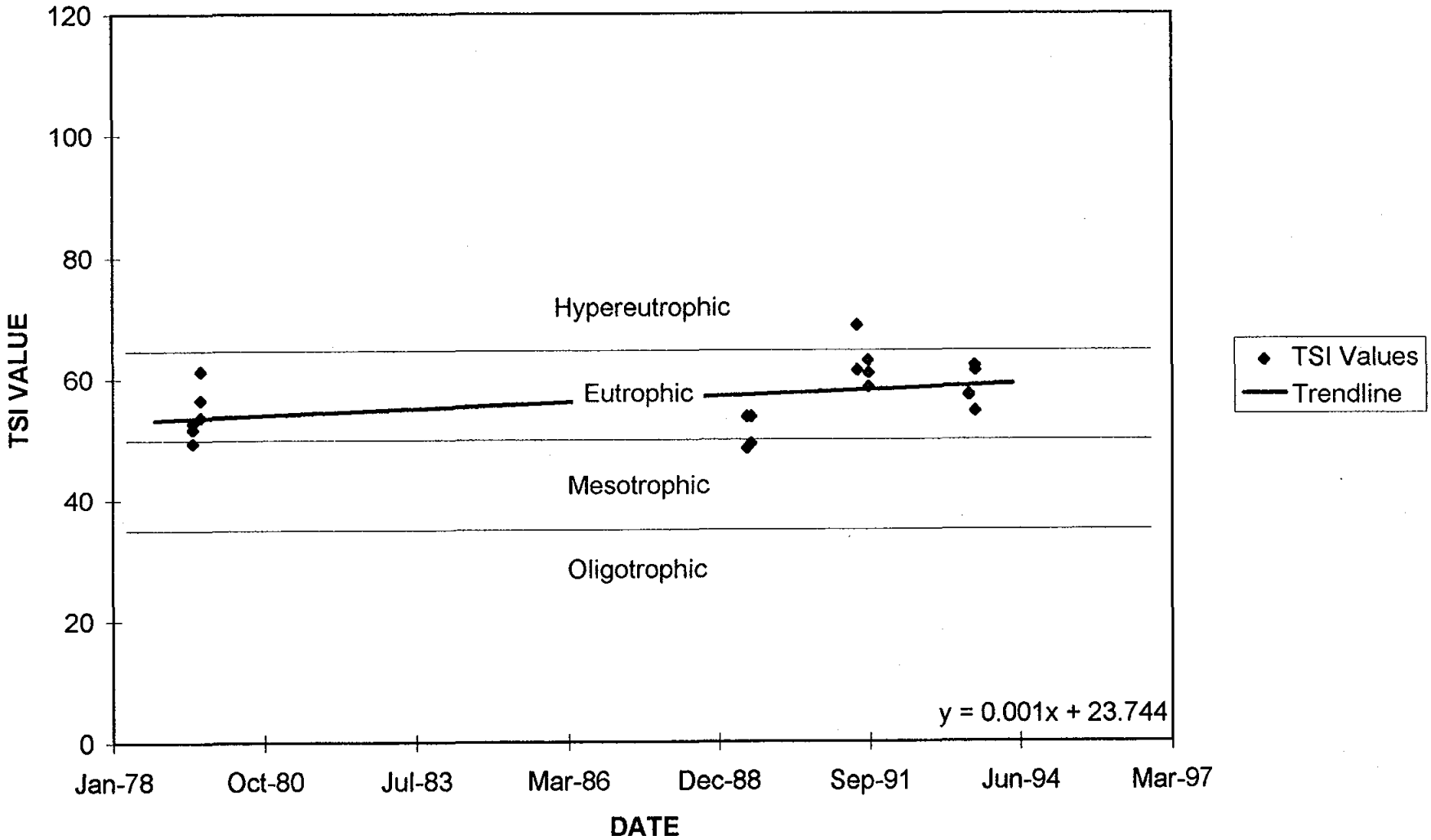


PLANIMETERED LAKE ACREAGE	610.2
ACRES GREATER THAN 5 FEET	453.2
ACRES GREATER THAN 10 FEET	248.9
ACRES GREATER THAN 15 FEET	0.0
TOTAL ACRE FEET	5057.1
AVERAGE DEPTH	8.3 FEET

SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
SOUTH RED IRON LAKE
MARSHALL COUNTY

AERIAL PHOTO NO: CBU-5M-37
PHOTO DATE: 8-16-63
SECTION 29, 29, 30 - TWP 129N - RGE 53W
BM: CULVERT (WATER 18 INCHES BELOW TOP OF CULVERT)
PLANIMETERED ACREAGE: 610.2
MILES OF SHORELINE: 7.5

SOUTH RED IRON TSI's



STOCKADE LAKE

County: Custer
Latitude: NA
Longitude: NA
Area: 120 A (52.6 ha)
Maximum Depth: 42 ft (12.8 m)
Volume: 1901 acre-ft (2.35 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): French Creek
Outlet: French Creek

Township: 3S
Range: 5E
Section(s): 21, 22, 27
Shoreline L: 3.7 mi (6 km)
Mean Depth: 15.8 ft (4.8 m)
Watershed/Lake Area: 396
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(3) Coldwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 140,618
Ownership Status: State owned
Public Interest: NA

	1991		1992		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	16.93	4	15.43	6	15.06
Air Temperature (°C)	6	28.06	4	21.11	6	21.00
Secchi Disk Depth (meters)	3	1.42	2	2.80	3	2.73
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	8.60	4	7.96	6	7.93
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	6	4	6	6	3
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.52	4	0.58	6	0.52
Nitrate + Nitrite Nitrogen (mg/l)	6	0.00	4	0.00	6	0.01
Total Kjeldahl Nitrogen (mg/l)	6	1.48	4	0.95	6	1.13
Total Phosphorus (mg/l)	6	0.352	4	0.129	6	0.235
Total Dissolved Phosphorus (mg/l)	6	0.343	4	0.116	6	0.204
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	17.71	4	2.64	6	14.05

Chemical Parameters	1994 Samples	1994 Results	1995 Samples	1995 Results
Water Temperature (°C)	6	14.91	6	14.99
Air Temperature (°C)	6	22.17	6	21.77
Secchi Disk Depth (meters)	9	3.88	9	1.45
Conductivity (cond/25° C)	-	-	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su)	6	7.87	6	7.61
Total Alkalinity (mg/l)	-	-	-	-
Total Solids (mg/l)	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-
Suspended Solids (mg/l)	6	4	6	5
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.36	6	0.19
Nitrate + Nitrite Nitrogen (mg/l)	6	0.01	6	0.05
Total Kjeldahl Nitrogen (mg/l)	6	0.86	6	1.10
Total Phosphorus (mg/l)	6	0.195	6	0.142
Total Dissolved Phosphorus (mg/l)	6	0.152	6	0.098
Ortho Phosphate as P (mg/l)	-	-	-	-
Chlorophyll (mg/m^3)	6	6.24	6	6.17

Year	1991	1992	1993	1994	1995
TSI Values -- Mean:	58.65	45.28	57.36	49.74	55.38
Secchi Disk	54.02	45.15	48.59	40.45	54.64
Total Phosphorus	63.16	50.59	67.00	52.26	61.88
Chlorophyll *a*	58.77	40.10	56.49	56.50	49.61

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: None identified

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 47,509 A (19,227 ha)

Soil Associations within Watershed

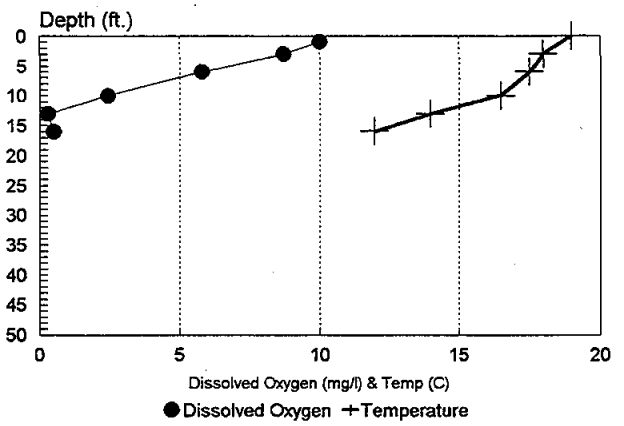
Association	Area (A)	% of Total
#6	42,283	89
#7	3,326	7
#4	1,900	4

#6 Buska-Mocmont-Rock Outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

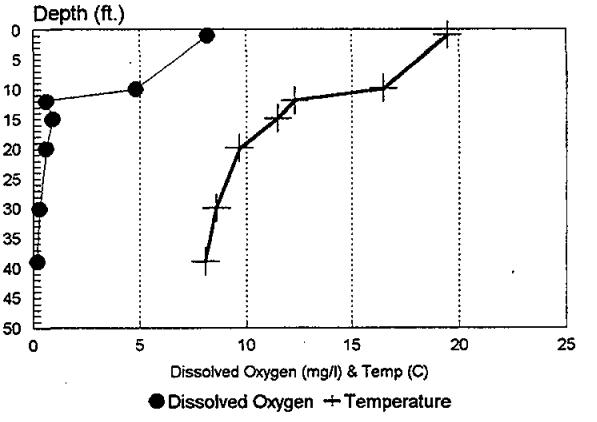
#7 Heely-Cordeston: Moderately deep and deep, well drained, nearly level to steep, loamy soils formed in material weathered from steeply tilted metamorphic rock and in alluvium; on mountain prairies.

#4 Stovho-Trebor: Deep and moderately deep, well drained, gently sloping to very steep, silty soils formed in material weathered from limestone and calcareous sandstone; on mountains.

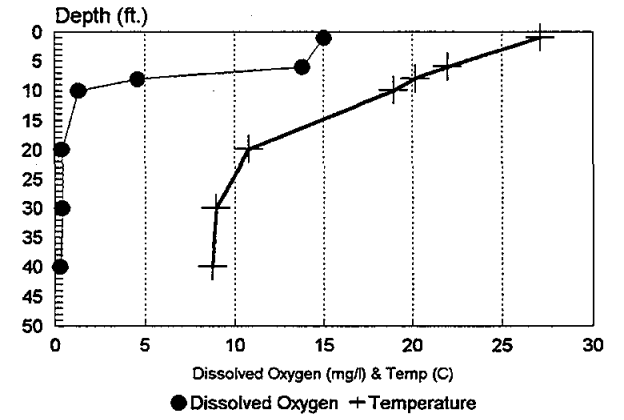
STOCKADE LAKE 8/17/79
Dissolved Oxygen & Temperature Profile



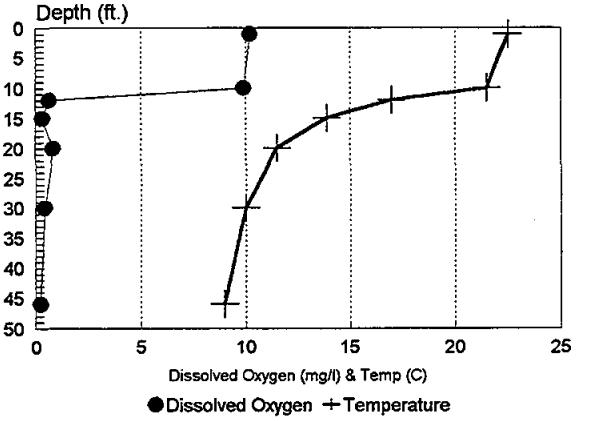
STOCKADE LAKE 6/16/91
Dissolved Oxygen & Temperature Profile



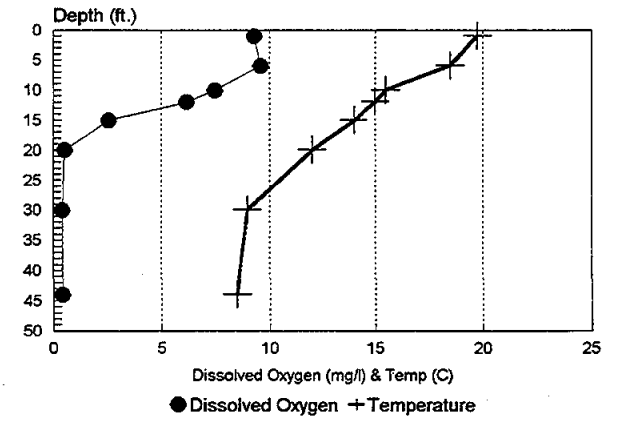
STOCKADE LAKE 7/17/91
Dissolved Oxygen & Temperature Profile



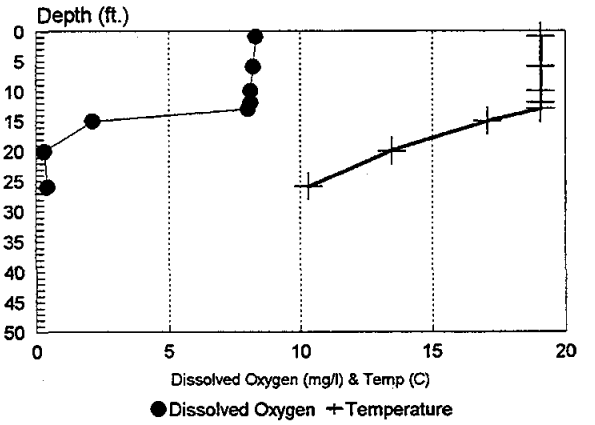
STOCKADE LAKE 8/16/91
Dissolved Oxygen & Temperature Profile



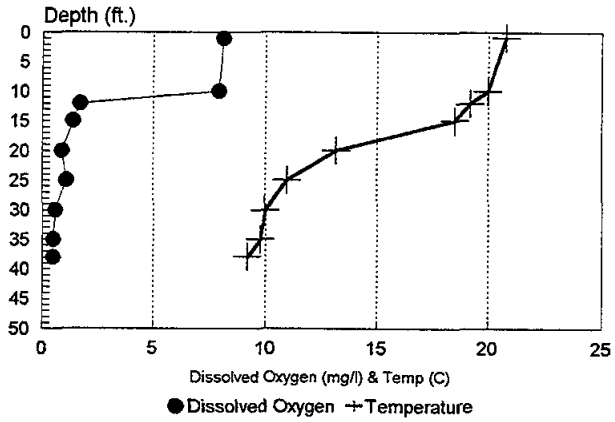
STOCKADE LAKE 6/12/92
Dissolved Oxygen & Temperature Profile



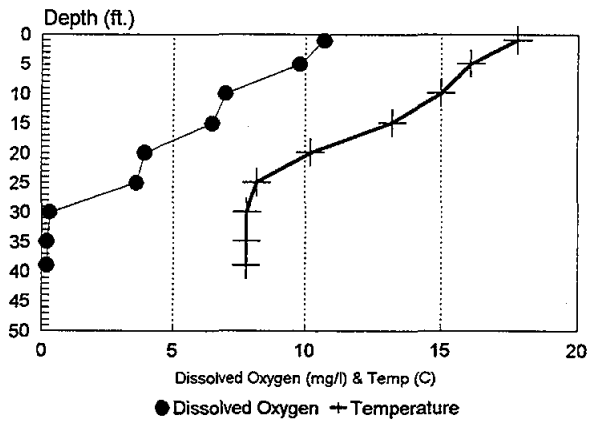
STOCKADE LAKE 7/16/92
Dissolved Oxygen & Temperature Profile



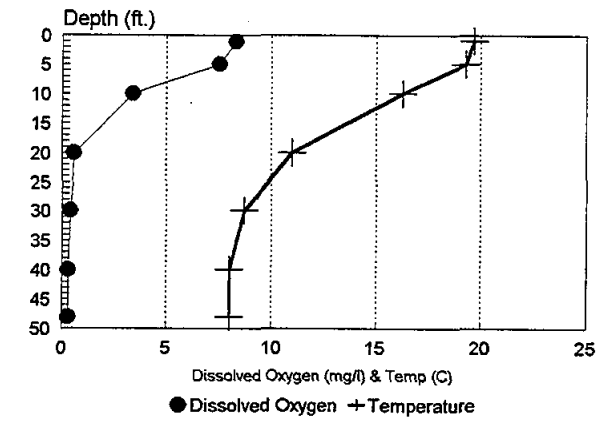
STOCKADE LAKE 8/14/92
Dissolved Oxygen & Temperature Profile



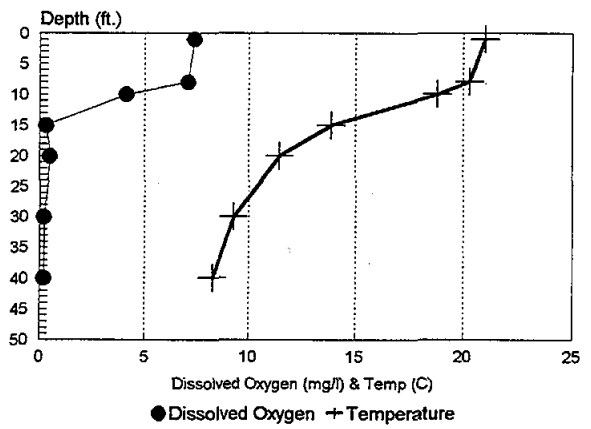
STOCKADE LAKE 6/13/93
Dissolved Oxygen & Temperature Profile



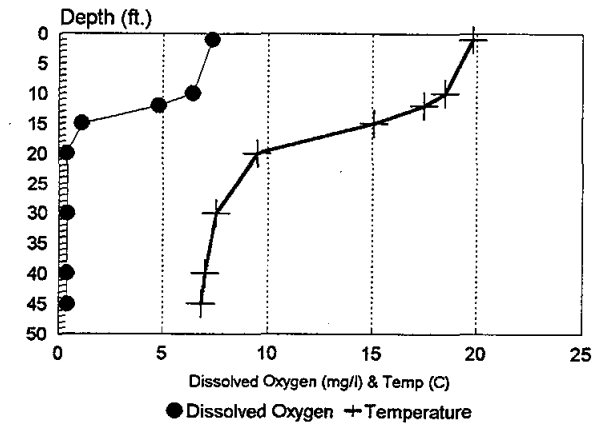
STOCKADE LAKE 7/21/93
Dissolved Oxygen & Temperature Profile



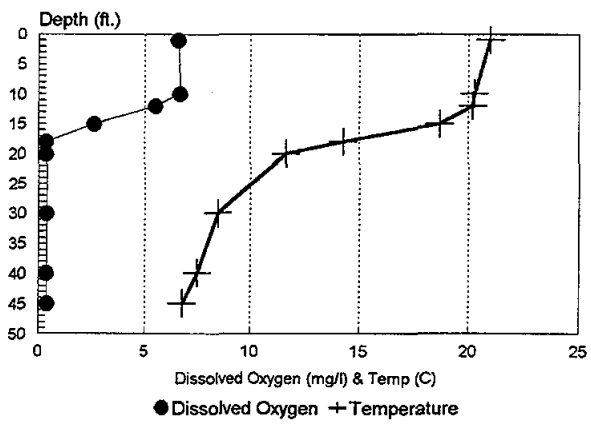
STOCKADE LAKE 8/19/93
Dissolved Oxygen & Temperature Profile



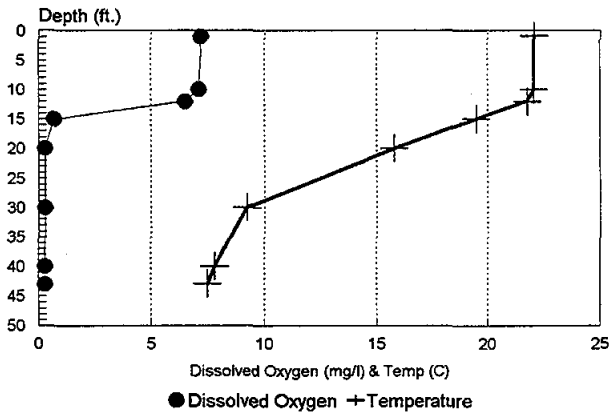
STOCKADE LAKE 6/12/94
Dissolved Oxygen & Temperature Profile



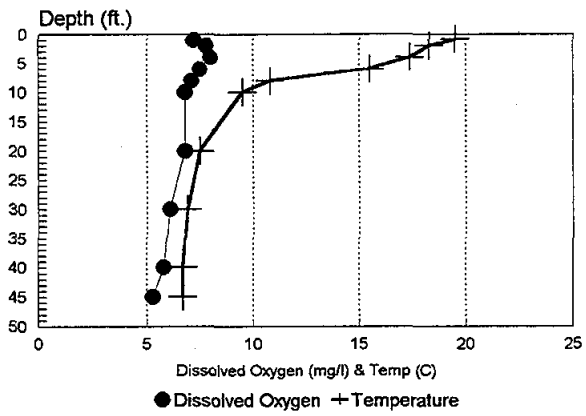
STOCKADE LAKE 7/14/94
Dissolved Oxygen & Temperature Profile



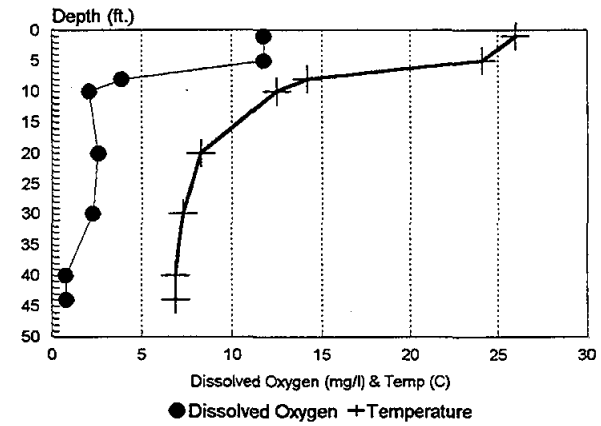
STOCKADE LAKE 8/14/94
Dissolved Oxygen & Temperature Profile



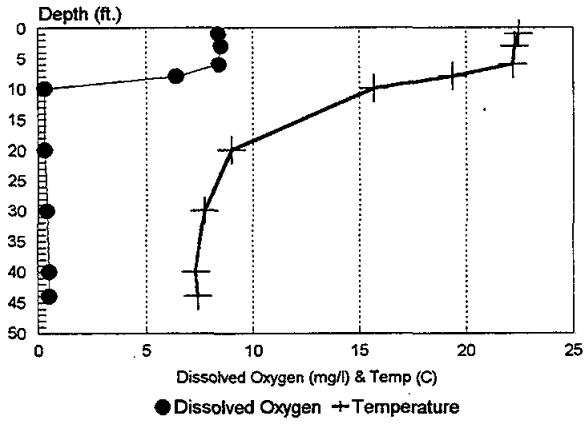
STOCKADE LAKE 6/14/95
Dissolved Oxygen & Temperature Profile



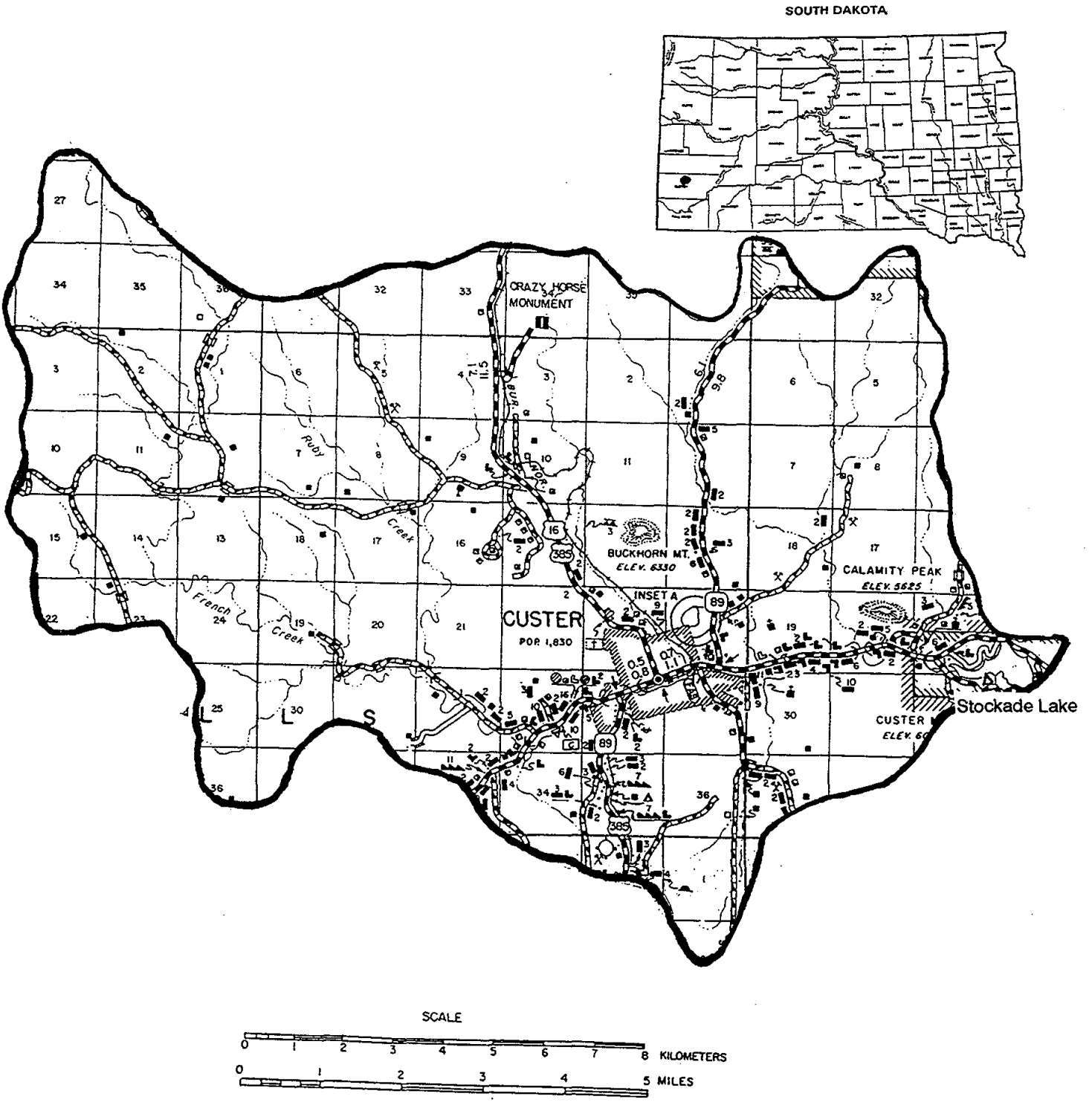
STOCKADE LAKE 7/13/95
Dissolved Oxygen & Temperature Profile

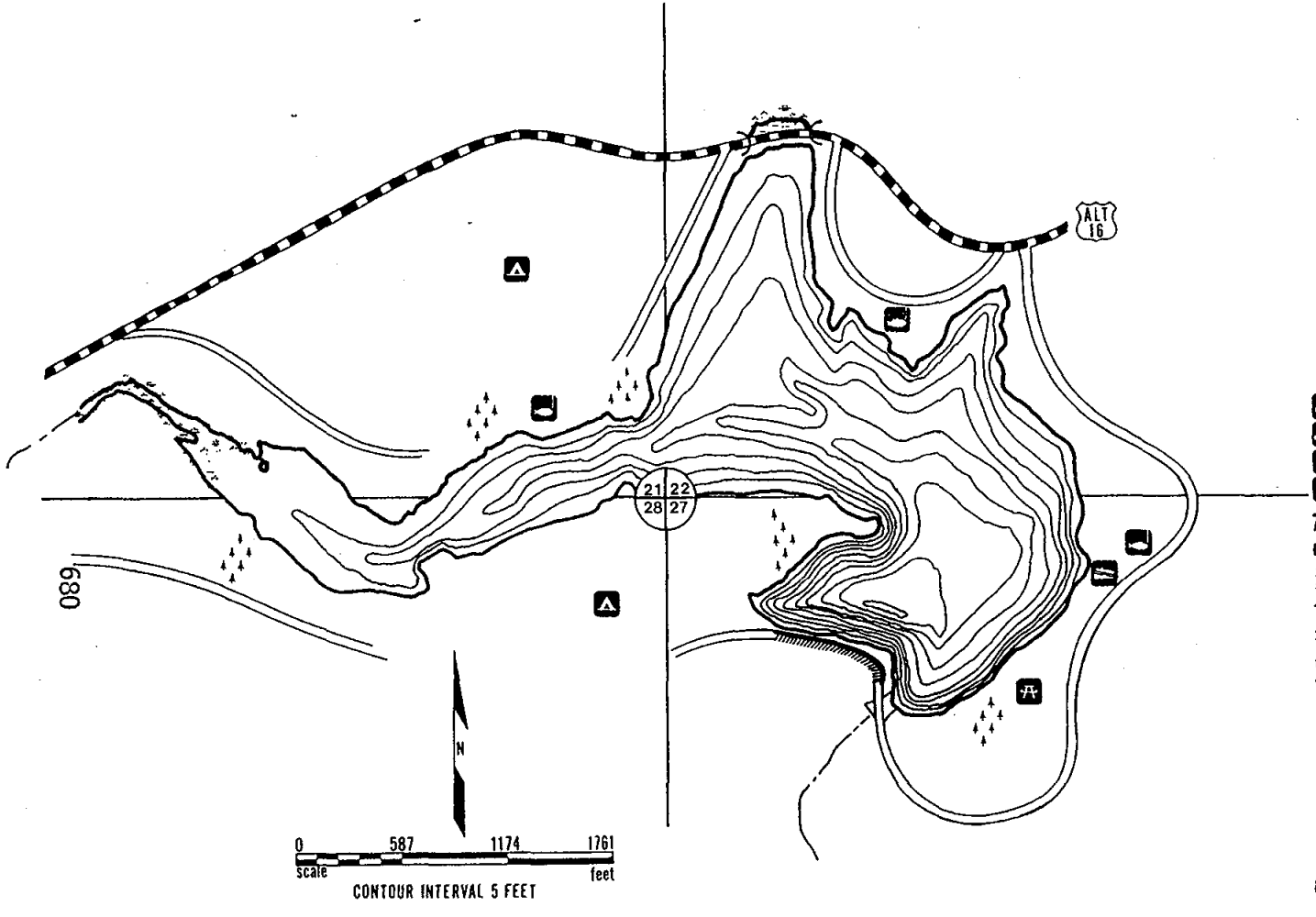


STOCKADE LAKE 8/12/95
Dissolved Oxygen & Temperature Profile



Stockade Lake





SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

STOCKADE LAKE

CUSTER COUNTY
1987

- FISHING ACCESS
- BOAT LAUNCH
- PICNIC AREA
- CAMPING AREA
- DAM
- SPILLWAY
- BRIDGE
- DEPTH CONTOUR
- IMPROVED LIGHT DUTY
- SECONDARY HIGHWAY
- FOREST
- EMERGED VEGETATION

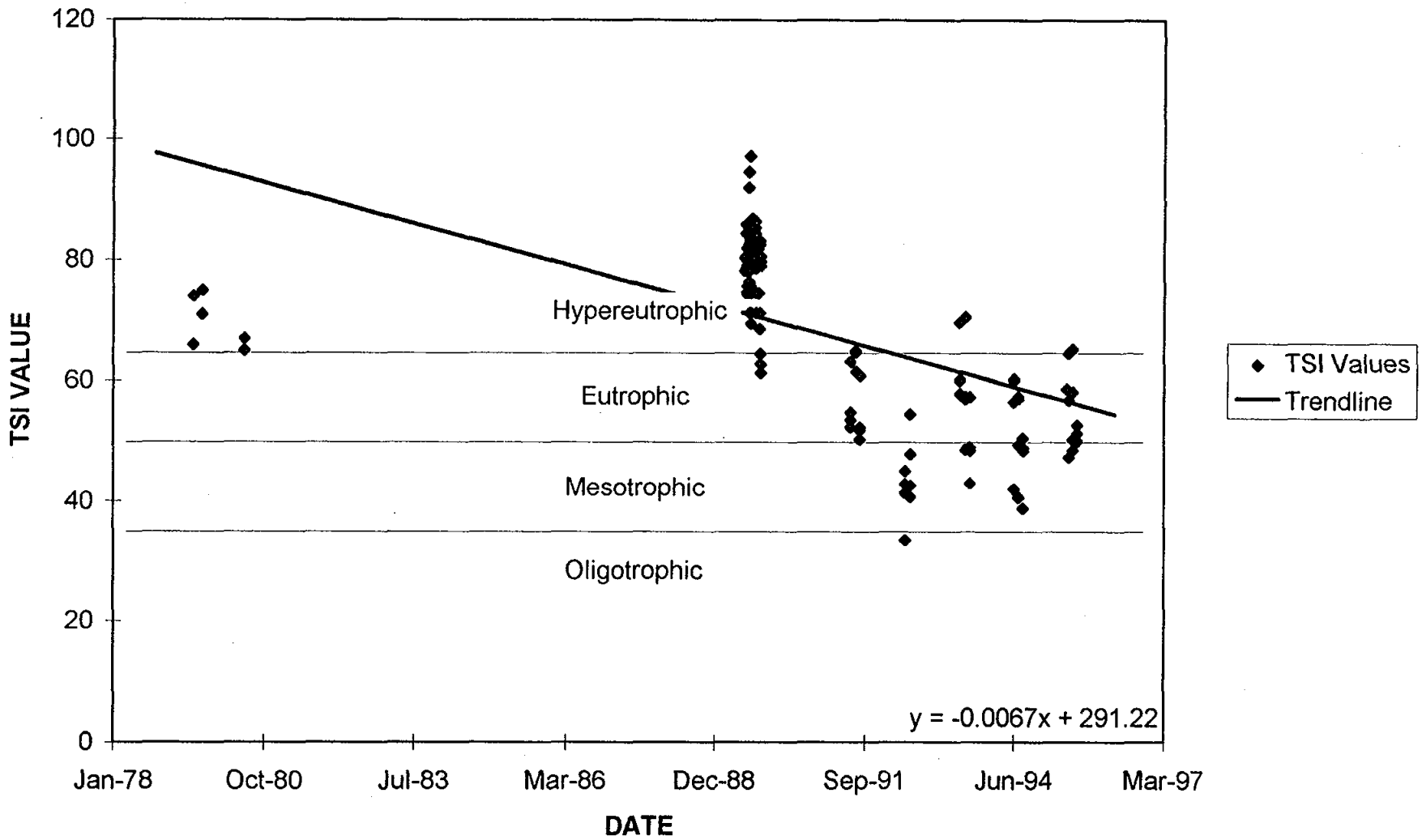
FIELD DATA COLLECTED : 6/87
AERIAL PHOTO NO.: 378-94
AERIAL PHOTO DATE : 7/30/78
LEGAL DISCRIPTION : T3S, R5E, SEC. 21, 22, 27
SCALE : 1" = 587'
WATER LEVEL : 5169 msl
MILES OF SHORELINE : 3.7 mi
AVERAGE DEPTH IN FEET : 15.8 ft
PLANIMETERED LAKE ACREAGE : 120 ac

VOLUME :

depth	ac/ft
5	531
10	415
15	324
20	237
25	166
30	113
35	72
40	35
45	9
total	1901

Reproduction of this material requires permisson from S.D. Game, Fish & Parks

STOCKADE LAKE TSI's



SULLY DAM

County: Tripp
Latitude: 43 deg. 22 min. 44 sec. N
Longitude: 99 deg. 35 min. 30 sec. W
Area: 92 A (37.2 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: Bull Creek

Township: 99N
Range: 74W
Section(s): 21, 22
Shoreline L: 2.0 mi (3.3 km)
Mean Depth: NA
Watershed/Lake Area: 137
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 55,066
Ownership Status: NA
Public Interest: NA

	1989	
Chemical Parameters	Samples	Results
Water Temperature (°C)	2	25.00
Air Temperature (°C)	2	30.00
Secchi Disk Depth (meters)	1	0.30
Conductivity (cond/25° C)	2	1,346
Turbidity (NTU)	-	-
Lab pH (su)	-	-
Field pH (su)	2	8.95
Total Alkalinity (mg/l)	2	161
Total Solids (mg/l)	2	1,069
Dissolved Solids (mg/l)	2	1,048
Suspended Solids (mg/l)	2	21
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	2	0.10
Nitrate + Nitrite Nitrogen (mg/l)	2	0.10
Total Kjeldahl Nitrogen (mg/l)	2	2.81
Total Phosphorus (mg/l)	2	0.720
Total Dissolved Phosphorus (mg/l)	-	-
Ortho Phosphate as P (mg/l)	2	0.321
Chlorophyll (mg/m^3)	-	-

Year	1989
TSI Values -- Mean:	87.14
Secchi Disk	77.14
Total Phosphorus	97.68
Chlorophyll *a*	

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 100%
Type of Vegetation: cattail

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area (excluding lake surface): 12,629 A (5,111 ha)

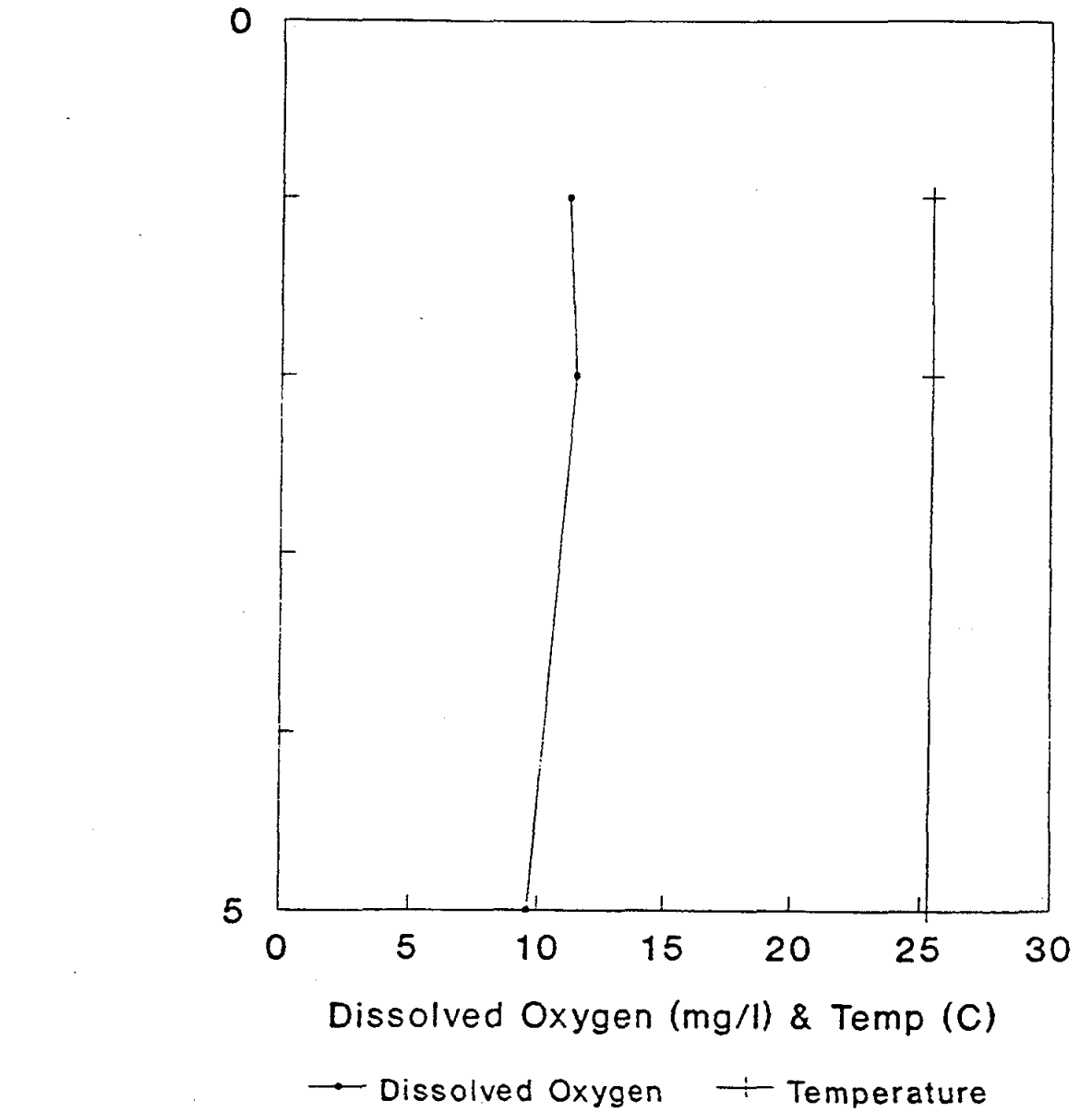
Soil Associations within Watershed

Association	Area (A)	% of Total
#11	12,629	100

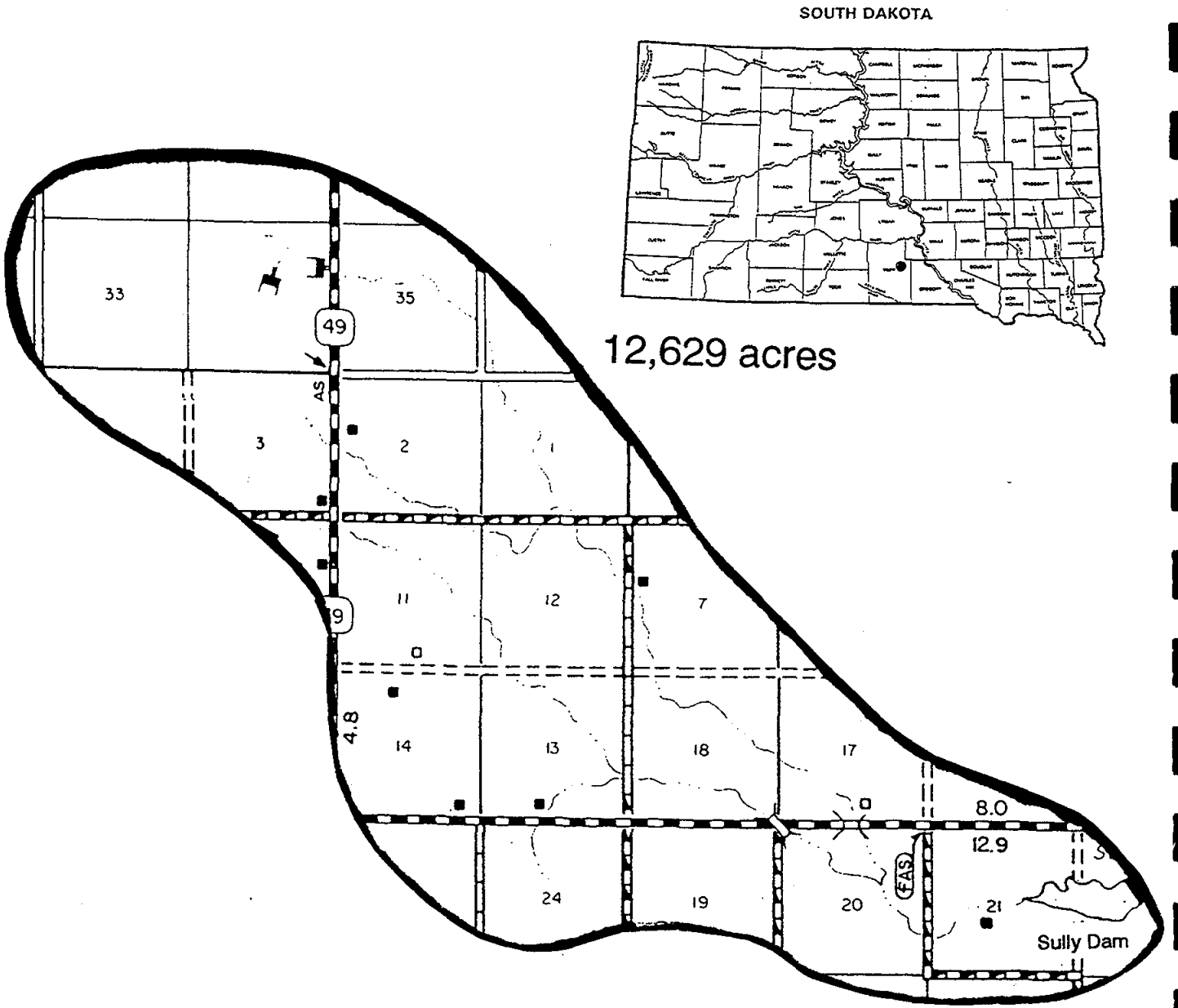
#11 Millboro-Lakoma: Deep and moderately deep, nearly level to strongly sloping, well drained, clayey soils.

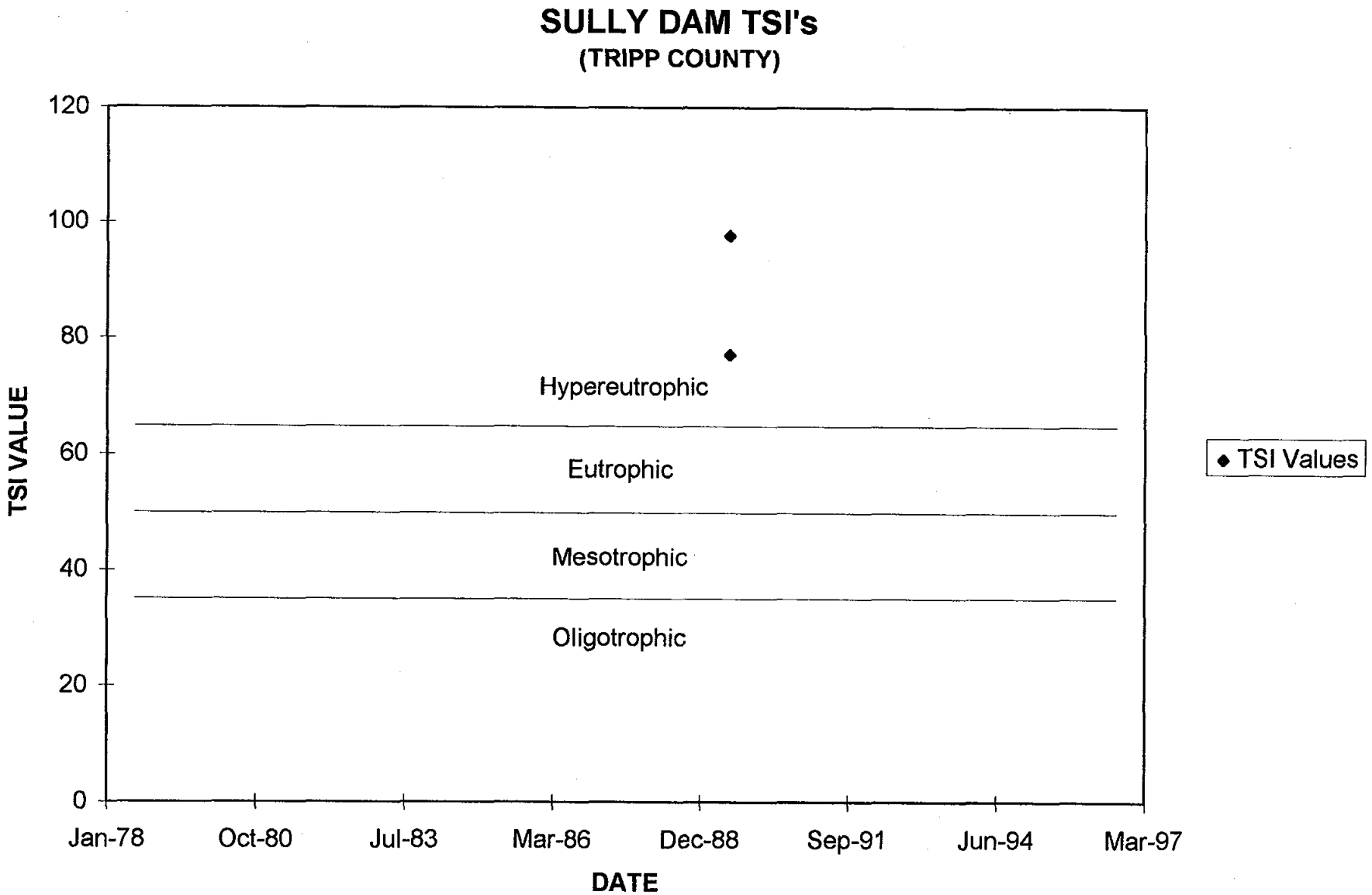
Sully Dam, 7/6/89

Dissolved Oxygen & Temperature Profile



Sully Dam


SOUTH DAKOTA
12,629 acres
33
35
49
AS
3
2
1
11
12
7
9
14
13
18
17
4.8
8.0
12.9
24
19
20
21
FAS
Sully Dam
SCALE
0 1 2 3 4 5 6 7 8 KILOMETERS
0 1 2 3 4 5 MILES


SULLY DAM TSI's
(TRIPP COUNTY)
TSI VALUE
120
100
80
60
40
20
0
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values

SULLY LAKE

County: Sully
Latitude: 44 deg. 43 min. 06 sec. N
Longitude: 100 deg. 11 min. 18 sec. W
Area: 205 A (83.0 ha)
Maximum Depth: 10 ft (3.0 m)
Volume: 1127.5 acre-ft (1.391 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Okobojo Creek
Outlet: Okobojo Creek

Township: 114, 115N
Range: 78W
Section(s): 2, 35, 36
Shoreline L: 4.3 mi (6.9 km)
Mean Depth: 5.5 ft (1.7 m)
Watershed/Lake Area: 270
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 46,731
Ownership Status: State owned
Public Interest: NA

	1989		1994	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.88	4	21.18
Air Temperature (°C)	4	27.50	4	17.48
Secchi Disk Depth (meters)	2	0.53	2	0.67
Conductivity (cond/25° C)	4	428	-	
Turbidity (NTU)	-	-	2	11.68
Lab pH (su)	4	9.06	-	-
Field pH (su)	-	-	4	8.60
Total Alkalinity (mg/l)	4	161	4	137
Total Solids (mg/l)	4	325	4	328
Dissolved Solids (mg/l)	4	307	4	317
Suspended Solids (mg/l)	4	18	4	12
Volatile Suspended Solids (mg/l)	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.30	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.12	4	1.45
Total Phosphorus (mg/l)	4	0.671	4	0.783
Total Dissolved Phosphorus (mg/l)	-	-	4	0.659
Ortho Phosphate as P (mg/l)	4	0.573	-	-
Chlorophyll (mg/m^3)	-	-	2	61.57

Year	1989	1994
TSI Values -- Mean:	83.50	78.99
Secchi Disk	69.07	65.78
Total Phosphorus	97.93	100.21
Chlorophyll *a*		70.99

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description
Watershed Area (excluding lake surface): 55,430 A (22,433 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
AE-NE	23,835	43
H3-EA	14,412	26
NG-OKO	7,760	14
B3-DW	3,880	7
NJ-TD	3,880	7
H3	1,663	3

AE-NE Agar-Onida: Deep, nearly level to sloping well and moderately well drained, silty soils formed in loess, on uplands.

H3-EA Highmore-Eakins: Deep, well drained, nearly level to undulating silty soils from silty drift and loamy glacial fill on uplands.

NG-OKO Oko Association: Deep, nearly level to hilly, well drained loamy soils that have clayey subsoils from glacial fill on uplands.

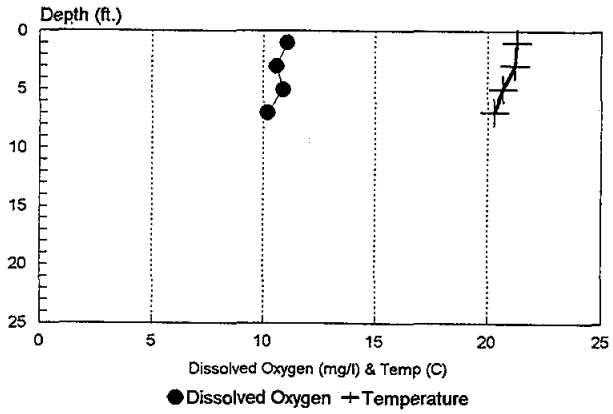
B3-DW Betts-Dorrstein: Deep, undulating to hilly excessively drained hilly soils and deep, level poorly drained claypan soils on uplands and bottom lands.

NJ-TD Oahe-Talmo: Well to excessively drained, nearly level to hilly loamy soils over sand and gravel on terraces and uplands.

H3 Highmore: Deep, nearly level to undulating, well drained silty soils that formed dominantly in silty glacial drift on uplands.

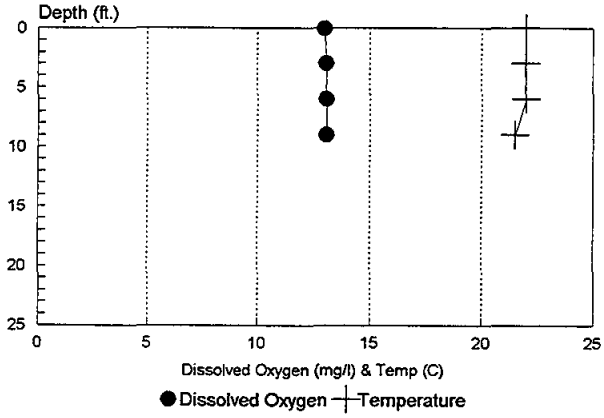
SULLY LAKE 8/23/79

Dissolved Oxygen & Temperature Profile



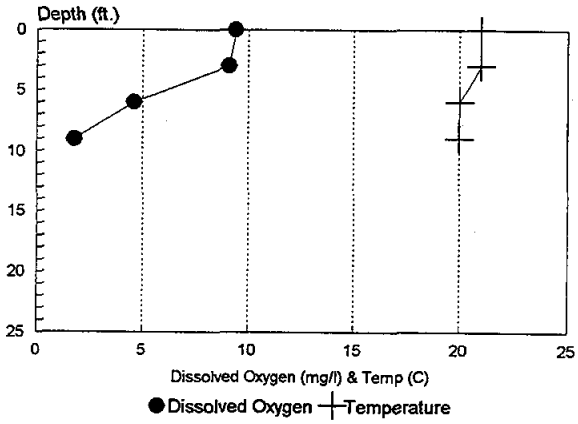
SULLY LAKE 6/15/94

Dissolved Oxygen & Temperature Profile



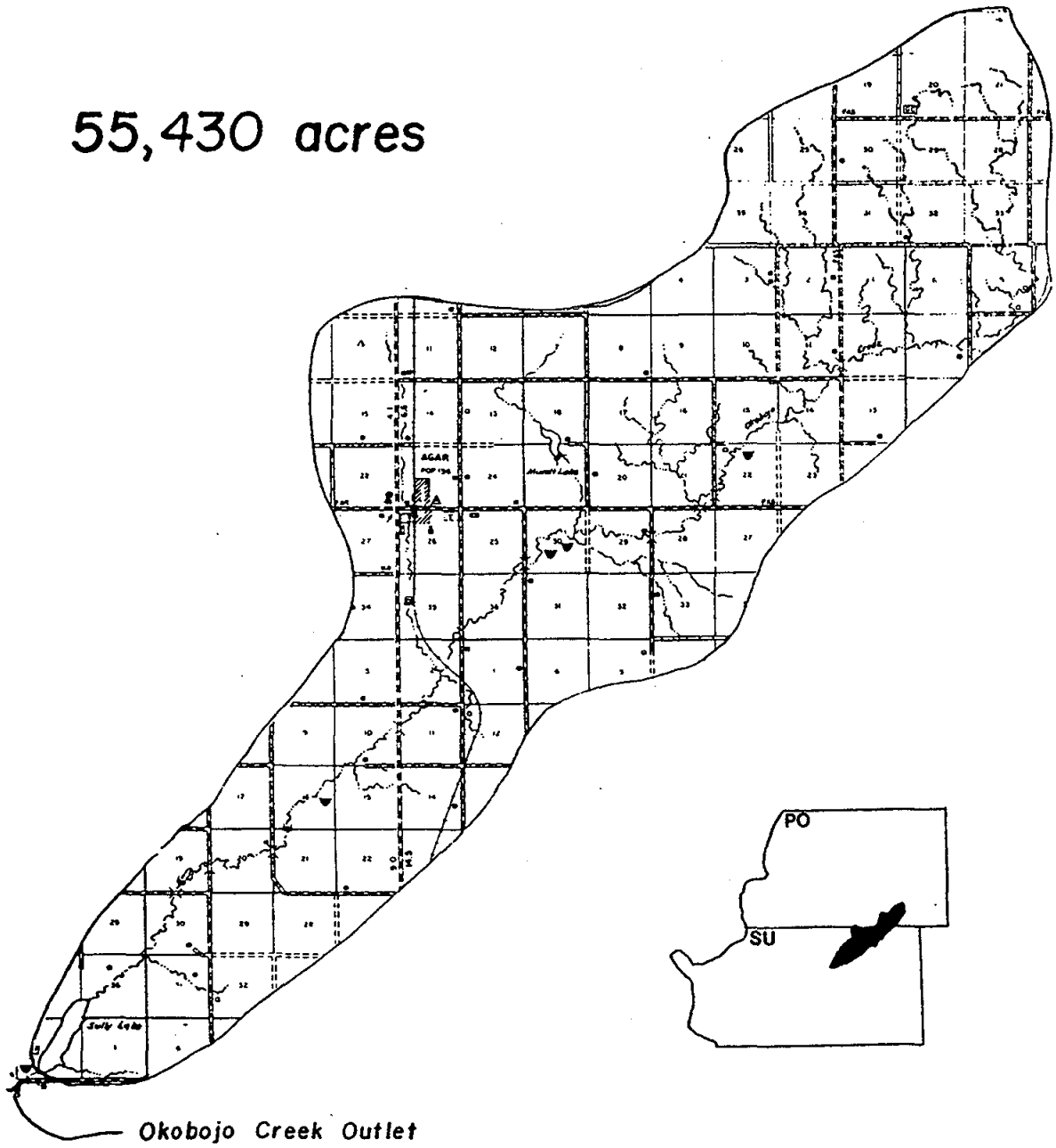
SULLY LAKE 8/15/94

Dissolved Oxygen & Temperature Profile



Sully Lake

55,430 acres

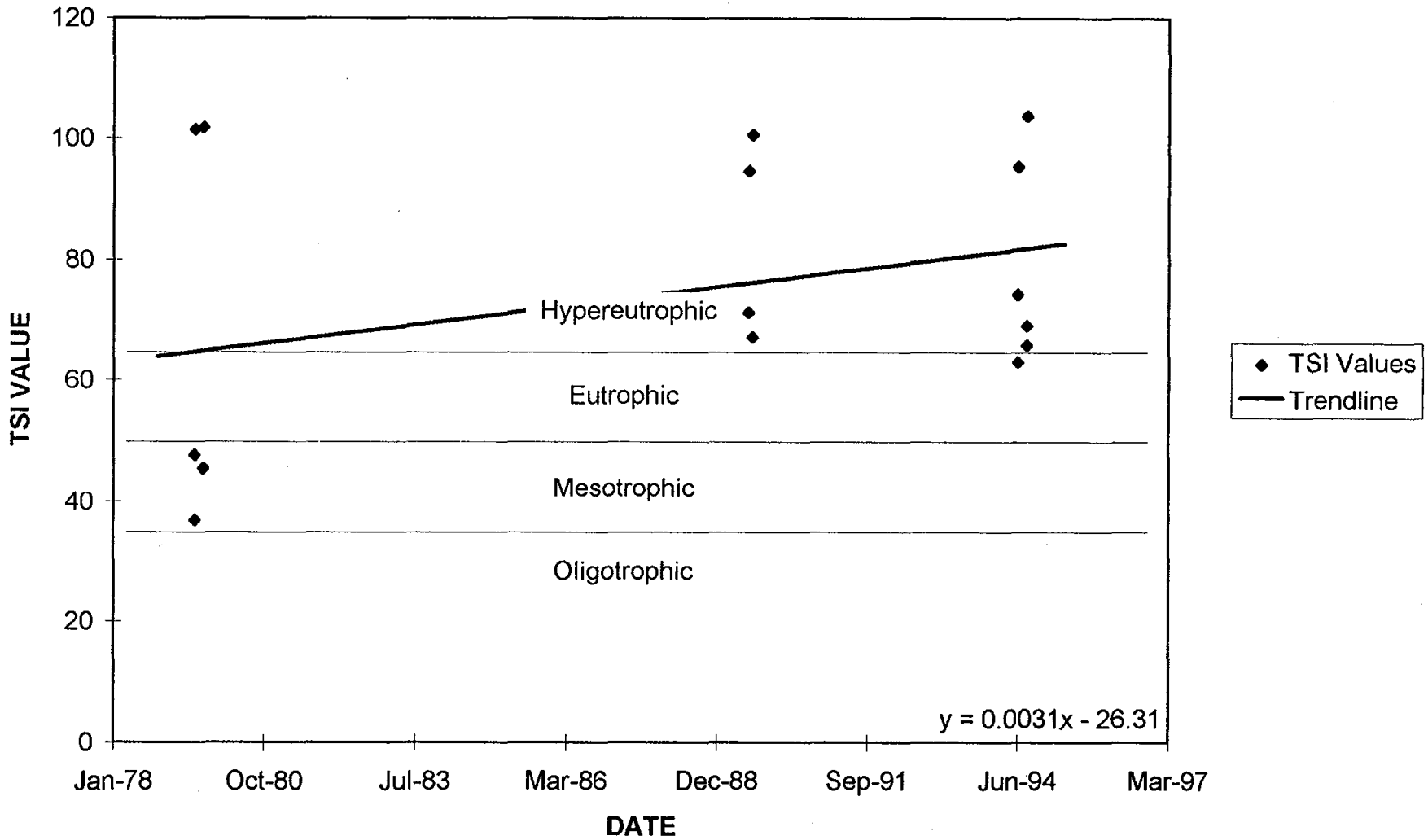


Scale

0 4 8 12

Miles

SULLY LAKE TSI's



SWAN LAKE

County: Turner
Latitude: 43 deg. 13 min. 18 sec. N
Longitude: 97 deg. 06 min. 00 sec. W
Area: 208 A (84.2 ha)
Maximum Depth: 6 ft (1.8 m)
Volume: 719 acre-ft (8.87 x $10^5 m^3$)
Origin of Basin: natural
Township: 97N
Range: 53W
Section(s): 15, 16
Shoreline L: 3.8 mi (6.1 km)
Mean Depth: 3.5 ft (1.1 m)
Watershed/Lake Area: 394
Thermal Stratification: no
Major Inflows (named or permanent streams): Turkey Ridge Creek
Outlet: Turkey Ridge Creek

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 259,830
Ownership Status: State owned
Public Interest: Swan Lake Improvement Association.

	1989		1991	
Chemical Parameters	Samples	Results	Samples	Results
Water Temperature (°C)	4	23.45	24	23.29
Air Temperature (°C)	4	22.50	24	24.65
Secchi Disk Depth (meters)	2	0.25	24	0.66
Conductivity (cond/25° C)	4	2,159	-	-
Turbidity (NTU)	-	-	-	-
Lab pH (su)	-	-	-	-
Field pH (su)	4	8.30	24	8.27
Total Alkalinity (mg/l)	4	108	24	126
Total Solids (mg/l)	4	2,201	24	2,426
Dissolved Solids (mg/l)	4	2,132	24	2,385
Suspended Solids (mg/l)	4	69	24	51
Volatile Suspended Solids (mg/l)	-	-	15	16
Ammonia Nitrogen (mg/l)	4	0.06	24	0.14
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	24	0.42
Total Kjeldahl Nitrogen (mg/l)	4	1.67	24	1.39
Total Phosphorus (mg/l)	4	0.226	24	0.194
Total Dissolved Phosphorus (mg/l)	-	-	24	0.051
Ortho Phosphate as P (mg/l)	4	0.014	-	-
Chlorophyll (mg/m^3)	-	-	-	-

Year	1989	1991
TSI Values -- Mean:	81.32	73.02
Secchi Disk	80.09	65.92
Total Phosphorus	82.54	80.12
Chlorophyll *a*		

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 15%
Type of Vegetation: cattail and bulrush, and reed

Floating Leaved and Submergent Plant Species Identified: none observed

Algal Species and Densities

	June 26, 1989		July 31, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Merismopedia	88	34,037	6	2,500
Aphanocapsa	64	24,754	28	11,667
Lyngbya contorta	51	19,726	-	-
Algae (other)	23	8,896	22	9,167
Lyngbya Diguetii	17	6,575	17	7,083
Dactylococcopsis	16	6,189	-	-
Nitzschia reversa	11	4,255	3	1,250
Green Algae (other)	10	3,868	-	-
Cryptomonas	8	3,094	-	-
Tetrastrum	5	1,934	-	-
Scenedesmus	4	1,547	2	833
Nitzschia	4	1,547	29	12,083
Aphanizomenon flos-aquae	4	1,547	-	-
Blue-green (other)	3	1,160	2	833
Diatom (pennate)	3	1160	-	-
Phacus	1	1,160	-	-
Loefgrenia anomala	-	-	159	66,250
Lyngbya contorta	-	-	42	17,500
Algae (flagellate)	-	-	1	417
Total	312	120,678	311	129,583

Watershed Description

Watershed Area: 81,913 A (33,150 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#3	36,861	45
#6	14,744	18
#1	13,106	16
#9	9,829	12
#4	5,734	7
#5	1,639	2

#3 Clarno-Ethan: Well drained, gently undulating to strongly sloping, loamy soils on uplands.

#6 Egan-Ethan: Well drained, gently undulating to gently rolling, silty and loamy soils on uplands.

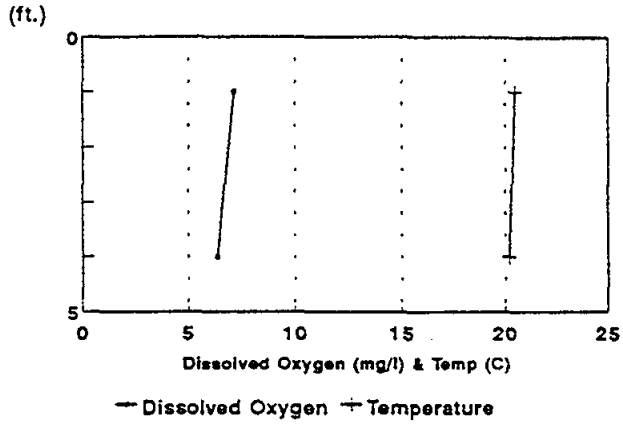
#1 Clarno-Bonilla: Well drained and moderately well drained, nearly level to gently rolling, loamy soils on uplands and in upland swales.

#9 Clarno-Lamo: Poorly drained and somewhat poorly drained, level and nearly level clayey and silty soils on flood plains.

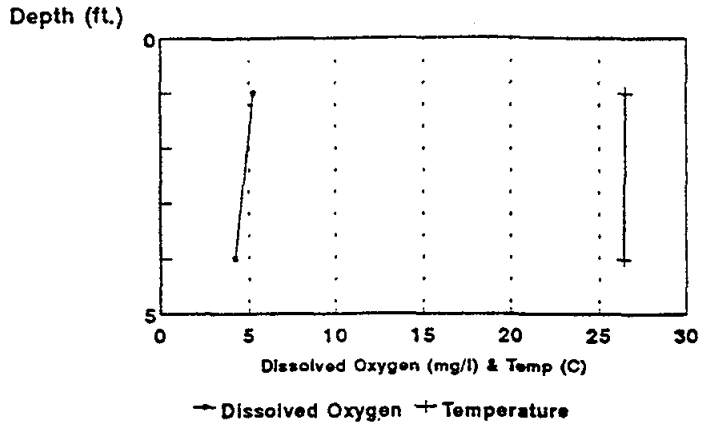
#4 Egan-Trent: Well drained and moderately well drained, nearly level to undulating, silty soils on uplands and in upland swales.

#5 Wentworth-Chancellor-Wakonda: Well drained to somewhat poorly drained, nearly level and gently undulating silty soils on uplands and in shallow drainage ways.

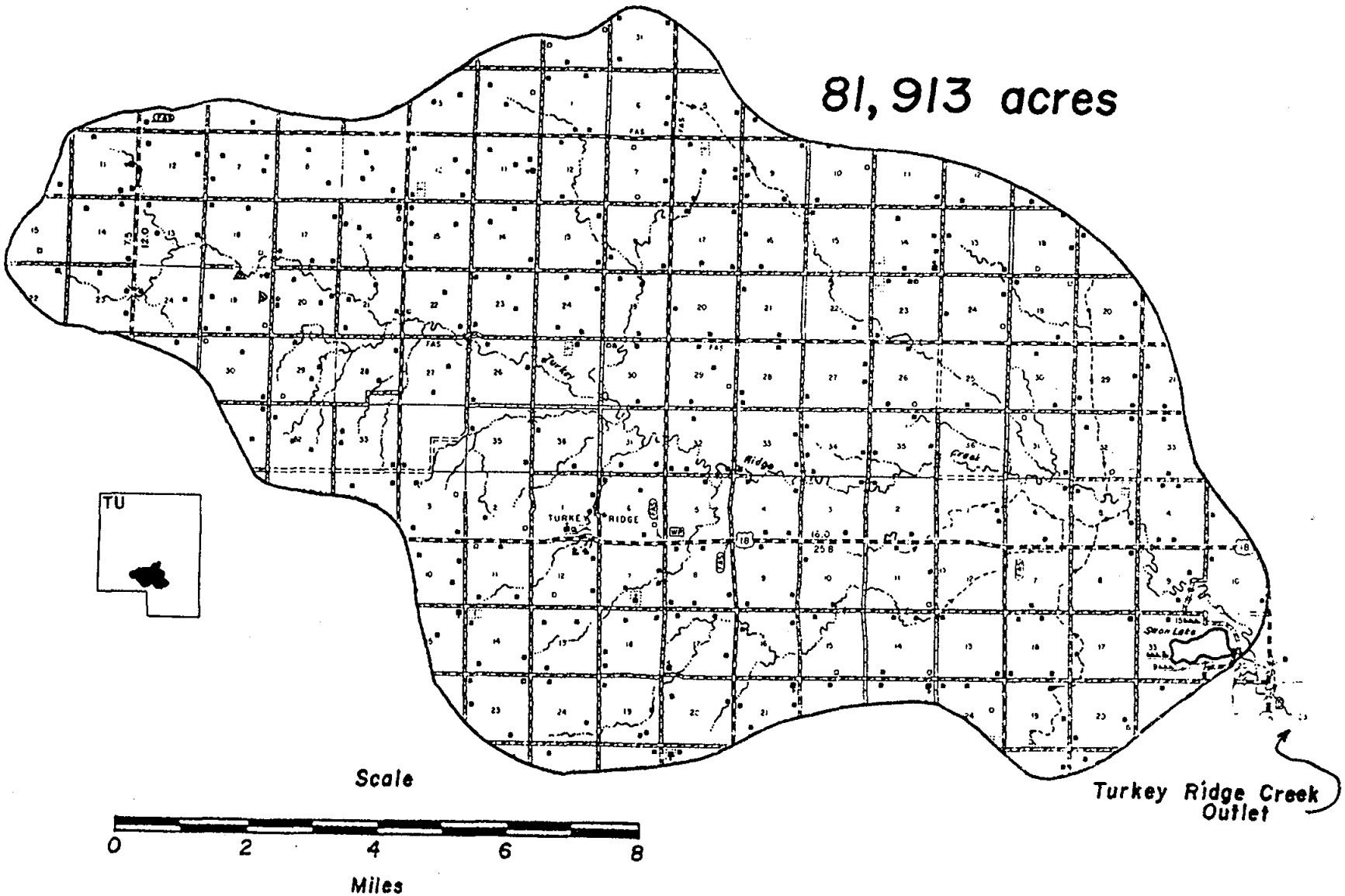
Swan Lake, 6/26/89
Dissolved Oxygen & Temperature Profile



Swan Lake, 7/31/89
Dissolved Oxygen & Temperature Profile

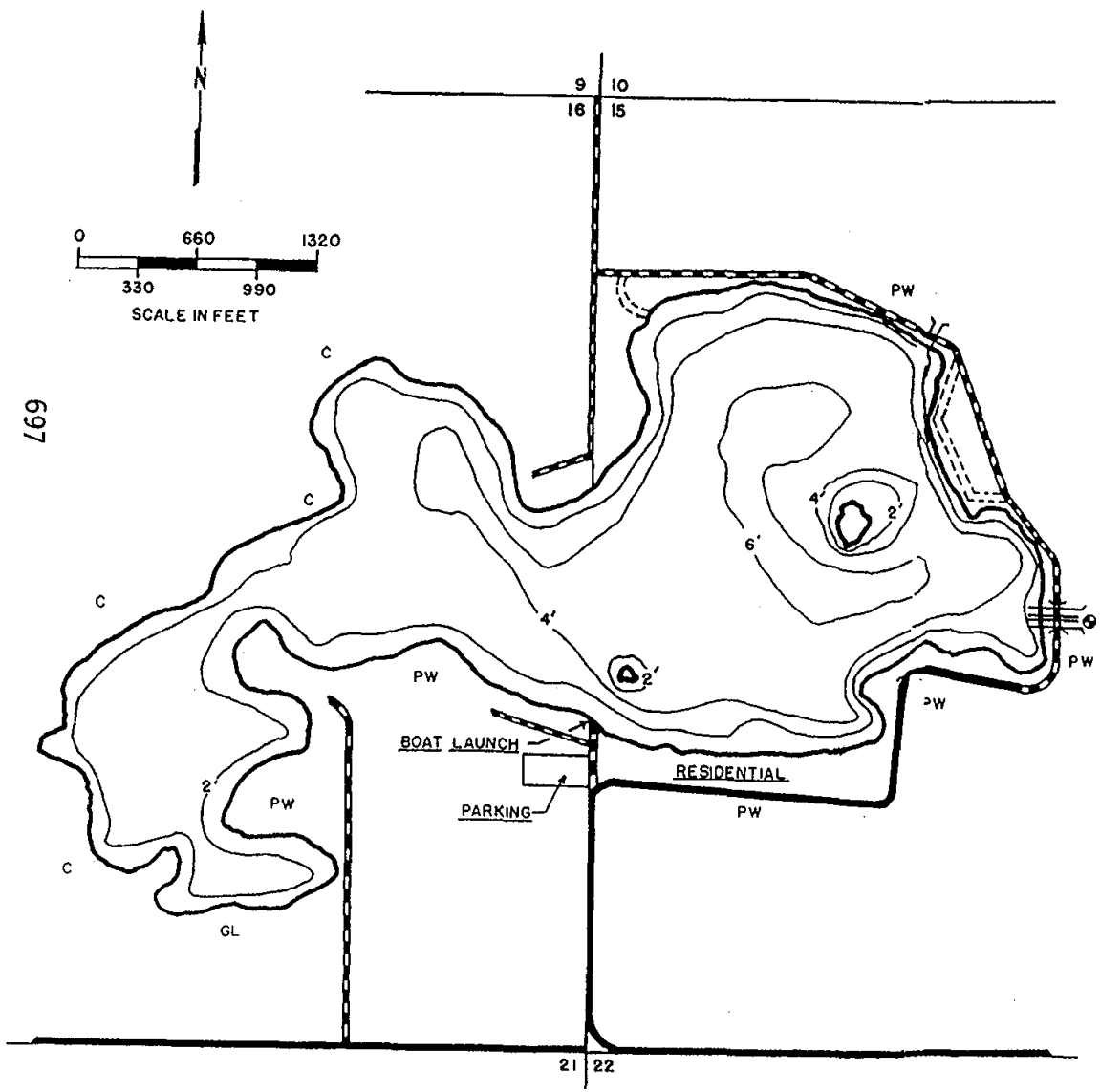


Swan Lake



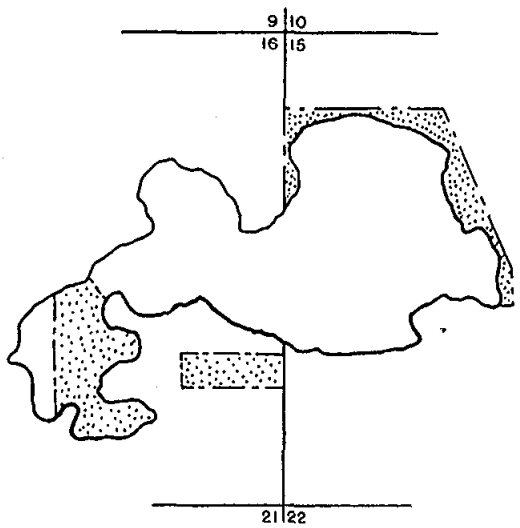
969

REPRODUCTION BY PERMISSION OF S.D. GAME, FISH AND PARKS ONLY



697

PUBLIC LAND BOUNDARIES
REFERENCE MAP



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

SWAN LAKE

TURNER COUNTY
1985

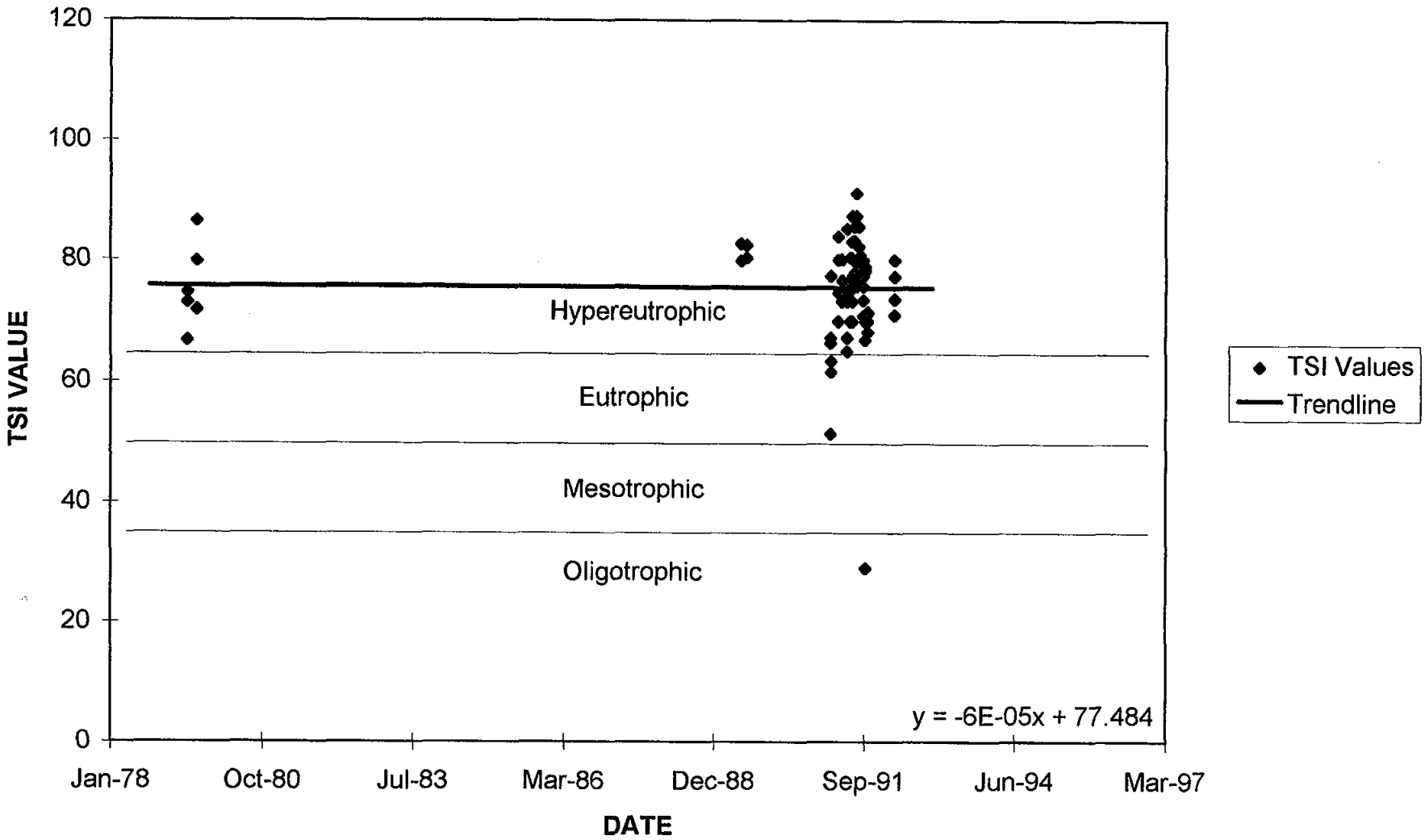
FIELD DATA COLLECTED : 6-11-85
AERIAL PHOTO NO. : 46125-178-220R
46125-178-221R
AERIAL PHOTO DATE : 1978
SECTIONS : 15,16
TOWNSHIP : T 97 N
RANGE : R 53 W
SCALE : 1" = 660'

DEPTH CONTOUR : —6—
GRASSLAND : GL
CROPLAND : CR
PARTLY WOODED : PW
BRIDGE :

WATER LEVEL : FULL
BENCHMARK : SPILLWAY
PLANIMETERED LAKE ACREAGE : 208
MILES OF SHORELINE : 3.8
AVERAGE DEPTH IN FEET : 3.5
VOLUME IN ACRE FEET : 2' : 370
4' : 249
6' : 100
TOTAL : 719

SYMBOLS

ROADS : PAVED :
GRAVEL :
TRAIL :
SPILLWAY :
BENCHMARK :


SWAN LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -6E-05x + 77.484
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

SYLVAN LAKE

County: Custer
Latitude: 43 deg. 50 min. 45 sec. N
Longitude: 103 deg. 33 min. 49 sec. W
Area: 17.3 A (7.00 ha)
Maximum Depth: 30 ft (9.1 m)
Volume: 222 acre-ft (2.73 x $10^5 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Spring Creek
Outlet: Spring Creek

Township: 2S
Range: 5E
Section(s): 30
Shoreline L: 1.04 mi (1.7 km)
Mean Depth: 12.8 ft (3.9m)
Watershed/Lake Area: 39
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(2) Coldwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 145,233
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	18.95	4	11.78	4	11.58
Air Temperature (°C)	4	26.67	4	16.25	4	16.25
Secchi Disk Depth (meters)	2	0.87	2	0.97	2	0.90
Conductivity (cond/25° C)	4	92	-	-	-	-
Turbidity (NTU)	-	-	-	-	2	8.50
Lab pH (su)	4	7.67	-	-	-	-
Field pH (su)	2	7.45	4	8.05	4	7.99
Total Alkalinity (mg/l)	4	39	4	30	4	30
Total Solids (mg/l)	4	96	4	73	4	76
Dissolved Solids (mg/l)	4	71	4	57	4	67
Suspended Solids (mg/l)	4	25	4	17	4	10
Volatile Suspended Solids (mg/l)	-	-	2	6	-	-
Ammonia Nitrogen (mg/l)	4	0.13	4	0.27	4	0.08
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.33	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.85	4	0.90	4	0.92
Total Phosphorus (mg/l)	4	0.119	4	0.191	4	0.097
Total Dissolved Phosphorus (mg/l)	-	-	4	0.127	3	0.057
Ortho Phosphate as P (mg/l)	4	0.005	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	25.46	2	33.33

	1989	1991	1993
TSI Values -- Mean:	63.47	64.65	63.94
Secchi Disk	62.03	60.43	61.52
Total Phosphorus	64.92	70.59	65.34
Chlorophyll *a*		62.33	64.97

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail, sedge, and bulrush

Floating Leaved and Submergent Plant Species Identified: Anacharis canadensis and Carex sp.

Algal Species and Densities

July 11, 1989

Taxa	Number	Units/ml
Sphaerocystis Schroeteri	131	1,820
Fragilaria crotonensis	46	639
Oocystis	28	389
Algae (other)	19	264
Cryptomonas sp. #1	17	236
Cryptomonas ovata	15	208
Characium	11	153
Cryptomonas	8	111
Aphanocapsa	6	83
Fragilaria	6	83
Asterionella formosa	3	42
Diatom (pennate)	2	28
Cosmarium	2	28
Trachelomonas	1	14
Anabaena	1	14
Total	300	4,167

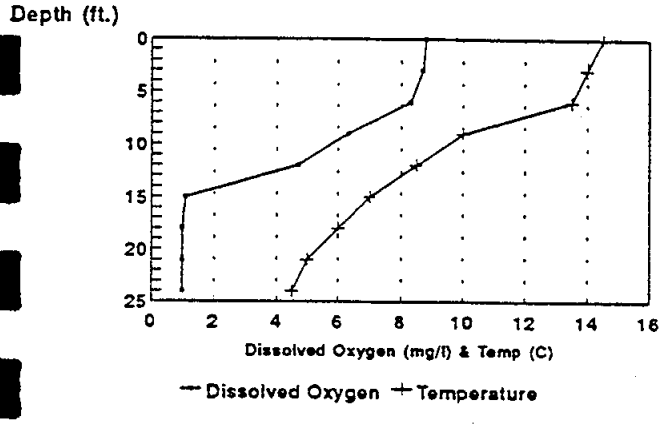
Watershed Description
Watershed Area: 681 A (276 ha)

Soil Associations within Watershed

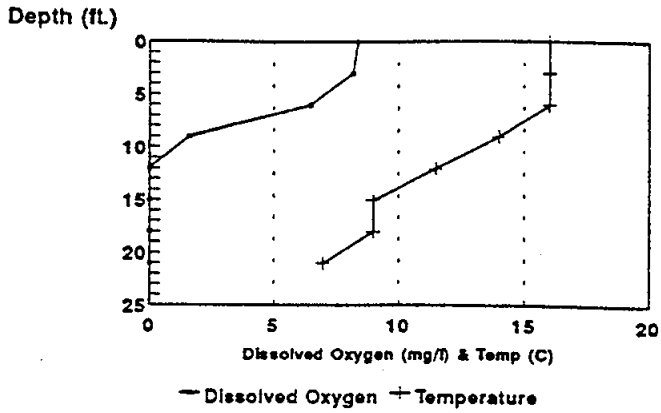
Association	Area (A)	% of Total
#6	681	100

#6 Buska-Mocmont-Rock Outcrop: Rock outcrop and deep, well drained, gently sloping to very steep, loamy soils formed in material weathered from micaceous schist and granite; on mountains.

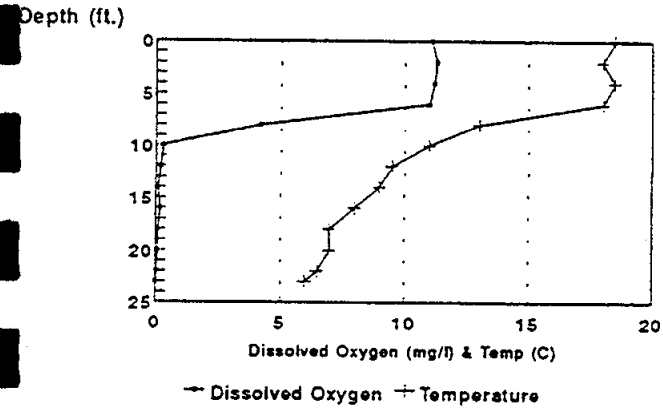
SYLVAN LAKE 6/15/93
Dissolved Oxygen & Temperature Profile



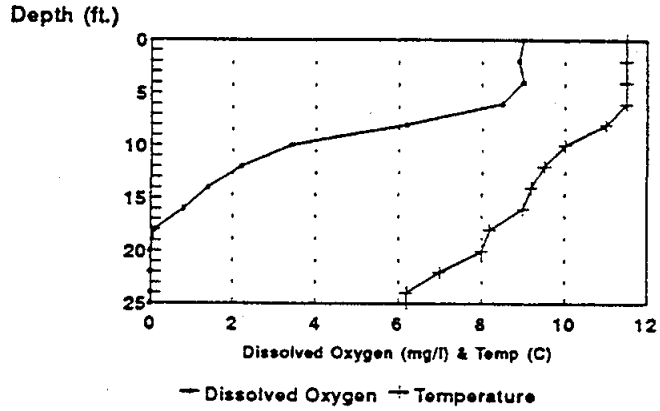
SYLVAN LAKE 8/3/93
Dissolved Oxygen & Temperature Profile



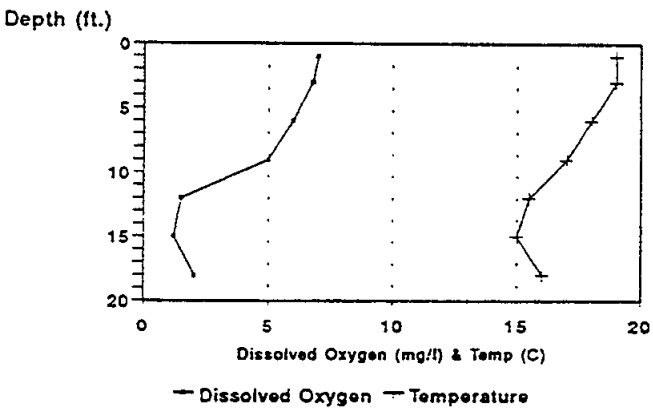
SYLVAN LAKE 6/19/91
Dissolved Oxygen & Temperature Profile



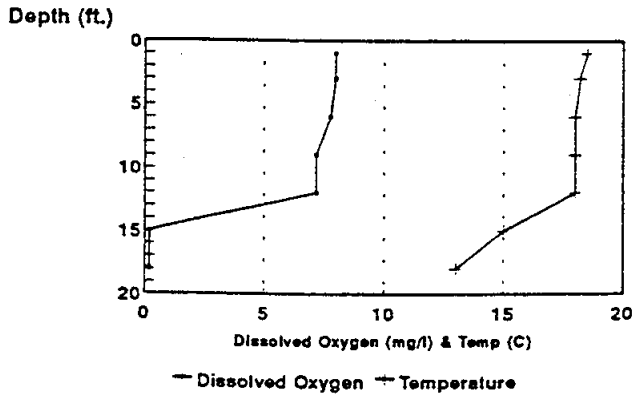
SYLVAN LAKE 10/2/91
Dissolved Oxygen & Temperature Profile



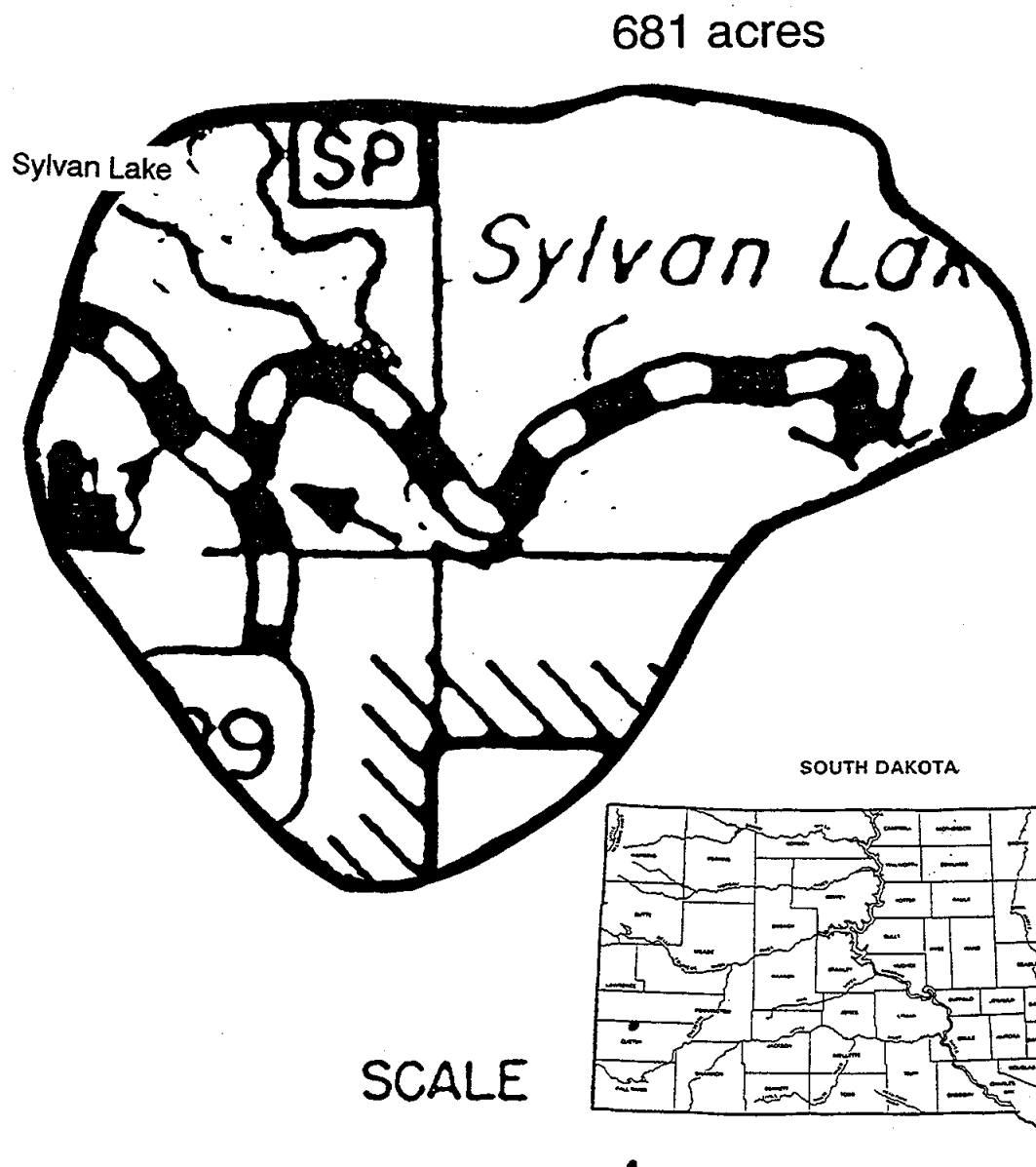
Sylvan Lake, 7/11/89
Dissolved Oxygen & Temperature Profile

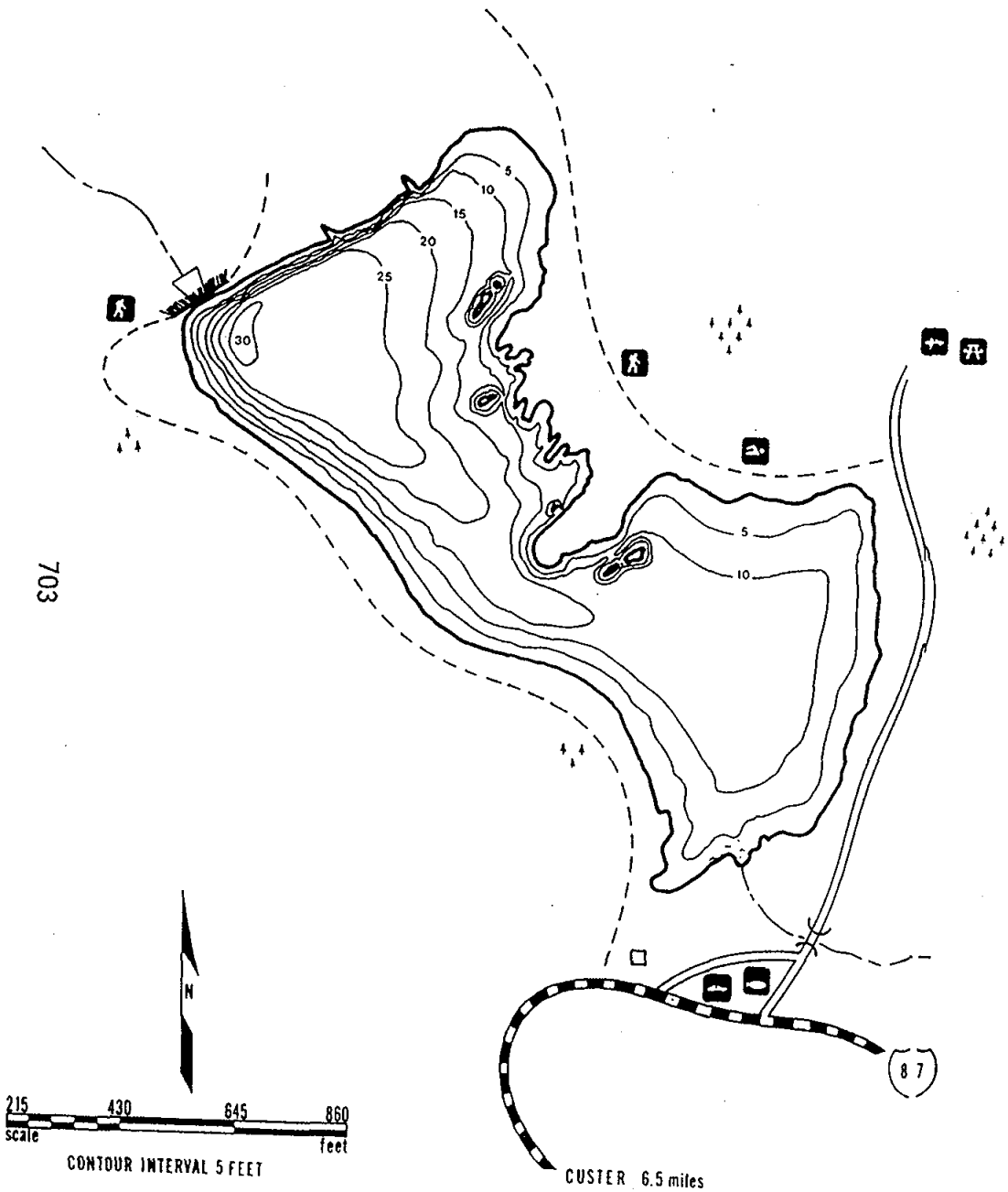


Sylvan Lake, 8/16/89
Dissolved Oxygen & Temperature Profile



Sylvan Lake


681 acres
Sylvan Lake
SP
Sylvan Lak
SOUTH DAKOTA
SCALE
0
1
MILES



SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS

SYLVAN LAKE

CUSTER COUNTY
1987

- FISHING ACCESS
- PARKING
- PICNIC AREA
- SWIMMING AREA
- HIKING TRAIL
- SPILLWAY
- BRIDGE
- —5— DEPTH CONTOUR
- IMPROVED LIGHT DUTY
- SECONDARY HIGHWAY
- DAM
- EMERGED VEGETATION
- FOREST

FIELD DATA COLLECTED : 7/87
AERIAL PHOTO NO. : 378-67
AERIAL PHOTO DATE : 7/30/78
LEGAL DISCRIPTION : T2S, R5E, SEC. 30
SCALE : 1" = 215'
WATER LEVEL : 6146 msl
MILES OF SHORELINE : 1.04 mi
AVERAGE DEPTH IN FEET : 12.8 ft
PLANIMETERED LAKE ACREAGE : 17.3 ac

VOLUME :

depth	ac/ft
5	79
10	61
15	39
20	23
25	14
30	6
total	222

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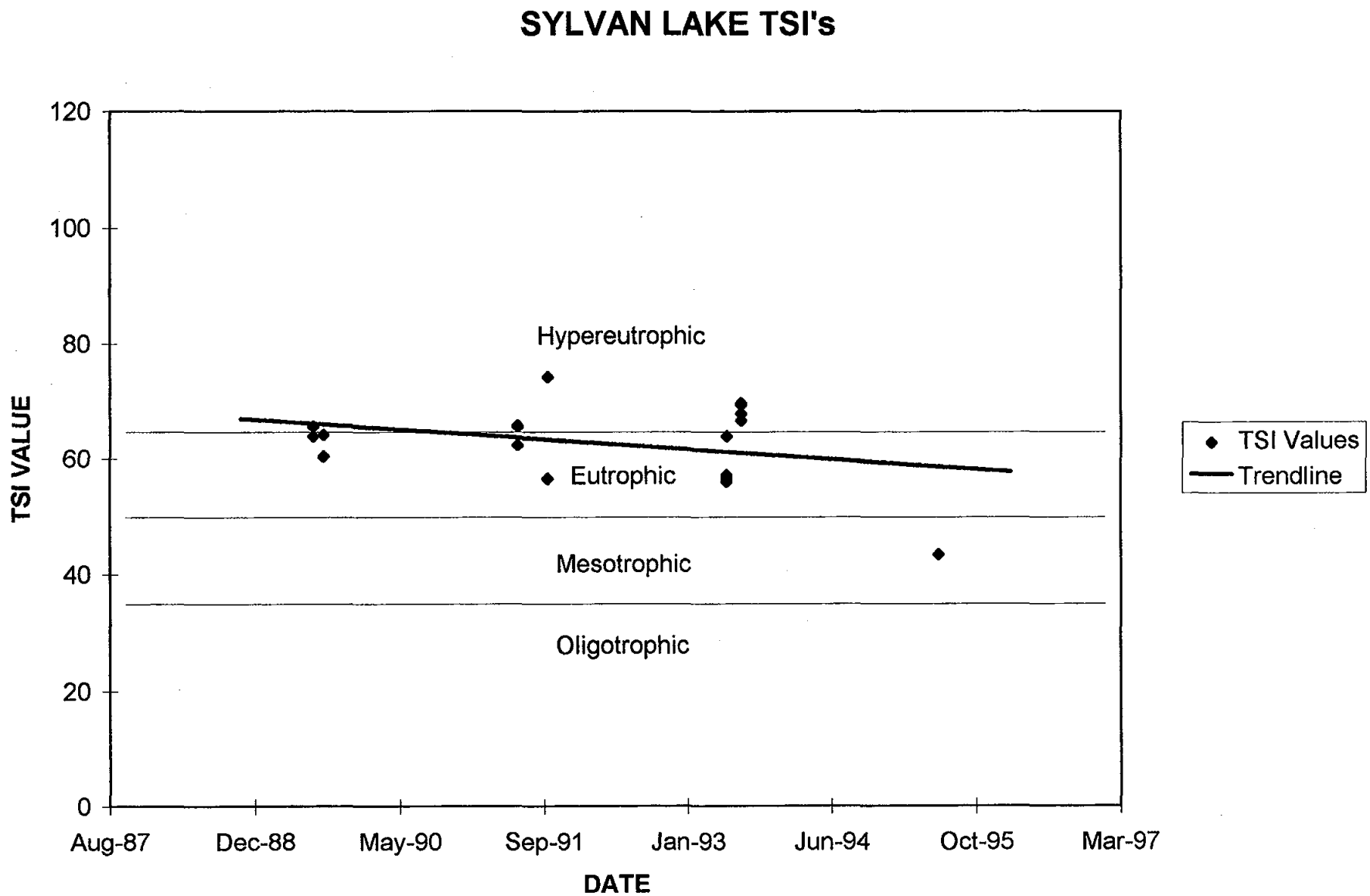

SYLVAN LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
DATE
TSI Values
Trendline

LAKE THOMPSON

County: Kingsbury
Latitude: 44 deg. 17 min. 09 sec. N
Longitude: 97 deg. 28 min. 17 sec. W

Township: 109, 110N
Range: 55, 56W
Section(s): 1, 4, 9, 16-17, 20-21, 28-33, 36

Area: 16,236 A (6,570 ha)
Maximum Depth: 18 ft (5.5 m)
Volume: 148,692 acre-ft ($1.83x10^8 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Shoreline L: 44. 6mi (71.7 km)
Mean Depth: 9.1 ft (2.8 km)
Watershed/Lake Area: 16
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.10	4	22.00	4	18.78
Air Temperature (°C)	4	23.50	4	20.50	4	15.65
Secchi Disk Depth (meters)	2	1.17	2	0.69	2	0.78
Conductivity (cond/25° C)	4	959	2	1,116	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)		-	-	-	-	-
Field pH (su)	4	8.70	4	8.50	4	8.72
Total Alkalinity (mg/l)	4	338	4	382	4	390
Total Solids (mg/l)	4	738	4	802	4	842
Dissolved Solids (mg/l)	4	729	4	786	4	831
Suspended Solids (mg/l)	4	10	4	16	4	11
Volatile Suspended Solids (mg/l)	-	-	2	15	-	-
Ammonia Nitrogen (mg/l)	4	0.42	4	0.07	4	0.04
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.65	4	0.13
Total Kjeldahl Nitrogen (mg/l)	4	2.17	4	2.40	4	1.85
Total Phosphorus (mg/l)	4	0.580	4	0.515	4	0.468
Total Dissolved Phosphorus (mg/l)	-	-	4	0.453	4	0.383
Ortho Phosphate as P (mg/l)	4	0.436	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	113.01	2	113.90

Year	1989	1991	1992
TSI Values -- Mean:	76.54	78.86	78.07
Secchi Disk	57.69	65.44	63.68
Total Phosphorus	95.39	94.19	93.52
Chlorophyll *a*		76.95	77.02

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: NA
Type of Vegetation: NA
Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

	June 22, 1989		July 24, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanizomenon flos-aquae	200	6,166	276	7,732
Stephanodiscus niagarae	21	647	-	-
Algae (other)	19	586	3	84
Algae (flagellate)	17	524	-	-
Anabaena	15	462	-	-
Cryptomonas sp. #1	11	339	4	112
Blue-green (other)	7	216	-	-
Chroococcus	4	123	4	112
Lyngbya	3	92	18	504
Diatom (pennate)	2	62	-	-
Cryptomonas	1	31	-	-
Total	300	9,249	305	8,545

Watershed Description

Watershed Area: 263,044 A (106,454 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
#1	194,390	73.9
#2	43,139	16.4
#4	18,413	7.0
#6	5,787	2.2
#3	1,578	0.6

#1 Poinsett-Waubay-Buse: Well drained and moderately well drained, nearly level to gently rolling, silty and loamy soils on till plains and moraines.

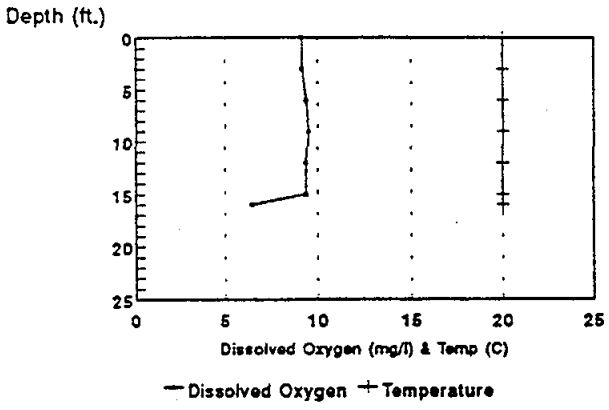
#2 Poinsett-Hetland: Well drained and moderately well drained, nearly level to gently rolling, silty soils on till plains, moraines, and ice-walled lake plains.

#4 Renshaw-Sioux-Marysland: Somewhat excessively drained, nearly level to strongly sloping, loamy soils on outwash plains and moraines.

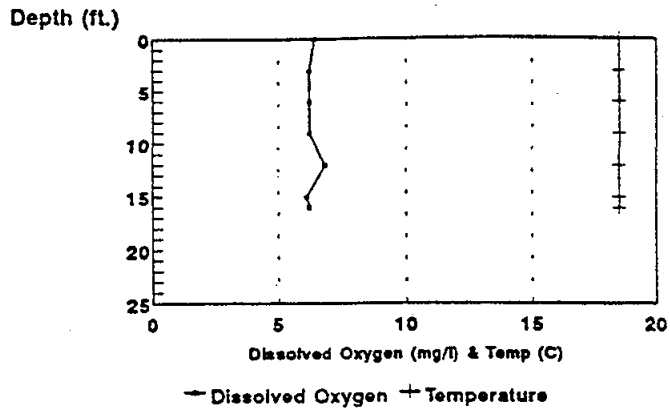
#6 Clarno-Ethan-Bonilla: Well drained and moderately well drained, nearly level to moderately steep, loamy soils on till plains and moraines.

#3 Vienna-Egeland: Well drained nearly level to moderately sloping, silty and loamy soils on till plains, outwash plains, and moraines.

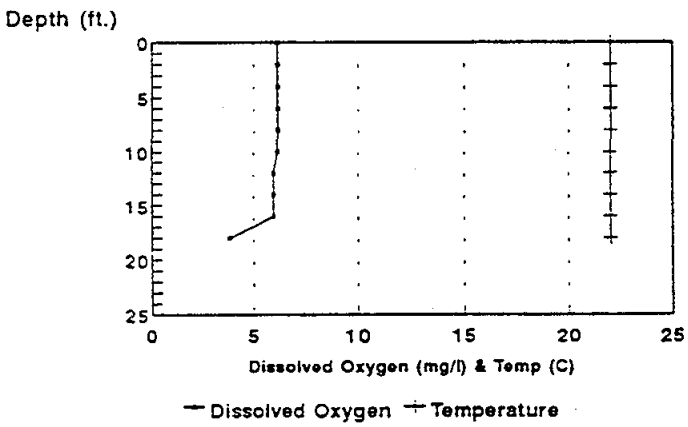
LAKE THOMPSON 7/29/92
Dissolved Oxygen & Temperature Profile



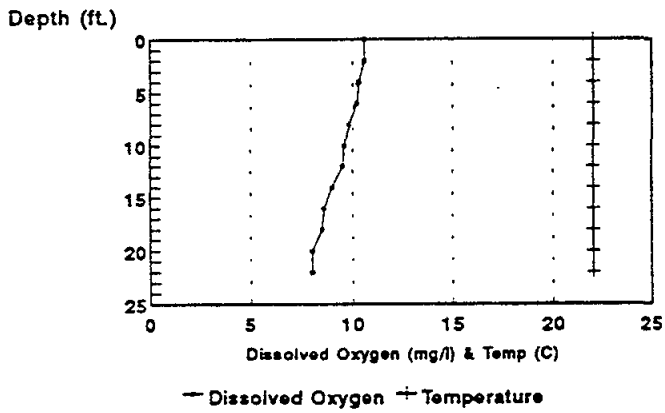
LAKE THOMPSON 8/26/92
Dissolved Oxygen & Temperature Profile



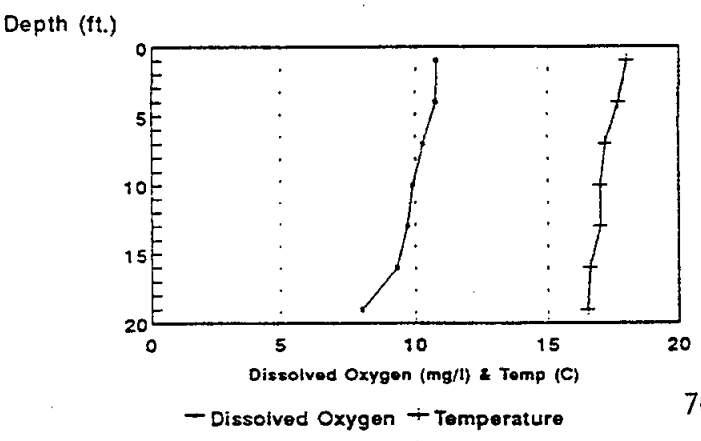
LAKE THOMPSON 7/9/91
Dissolved Oxygen & Temperature Profile



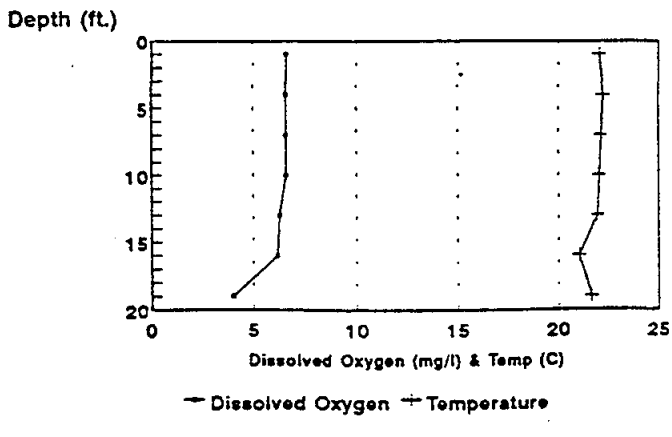
LAKE THOMPSON 8/19/91
Dissolved Oxygen & Temperature Profile



Lake Thompson, 6/22/89
Dissolved Oxygen & Temperature Profile

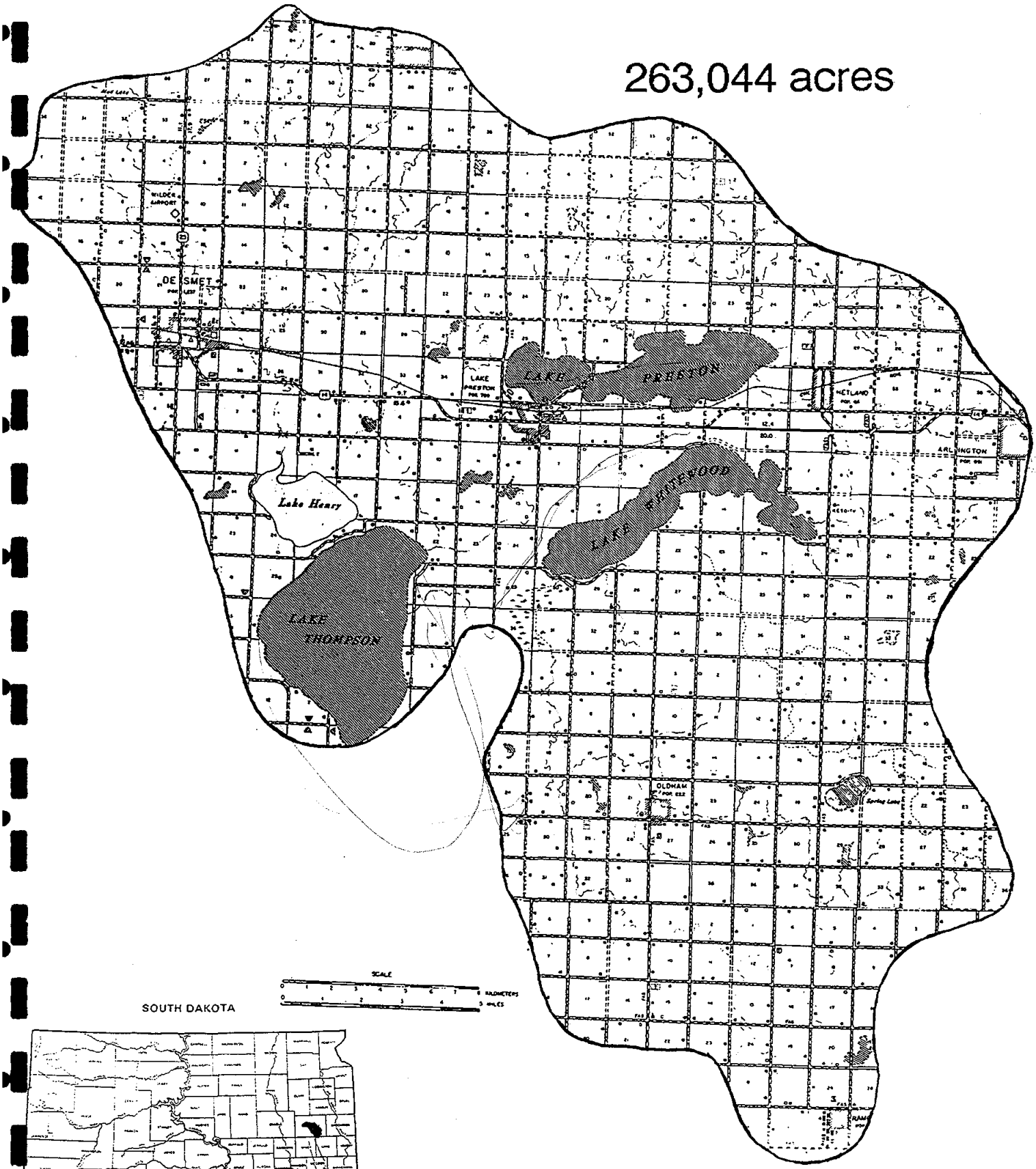


Lake Thompson, 7/24/89
Dissolved Oxygen & Temperature Profile

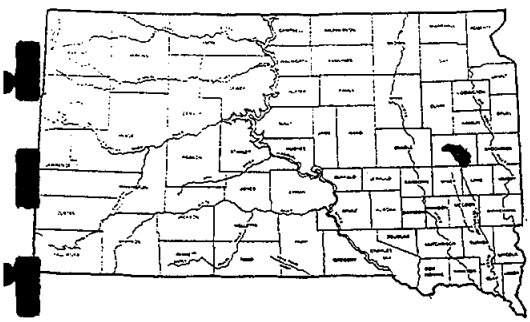


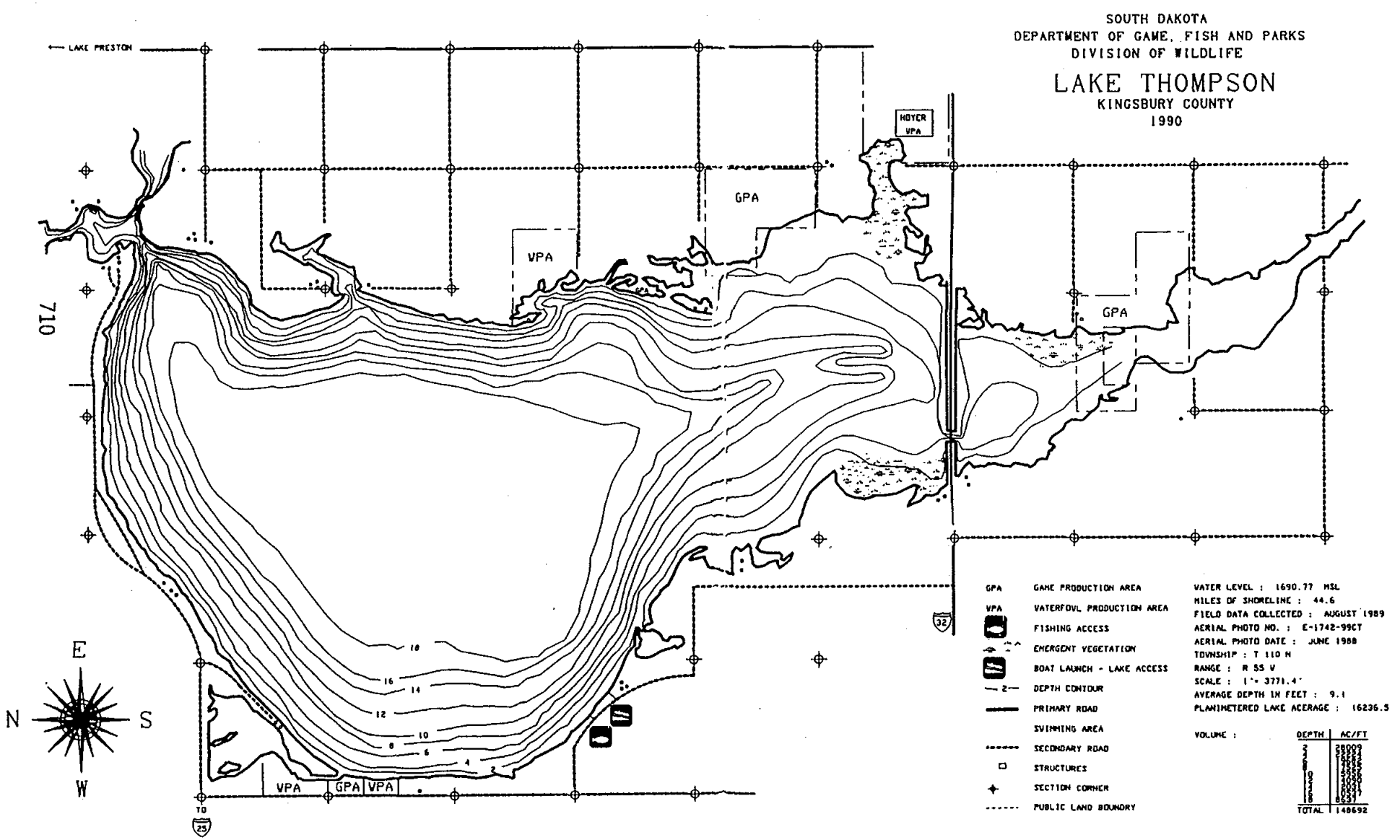
Lake Thompson

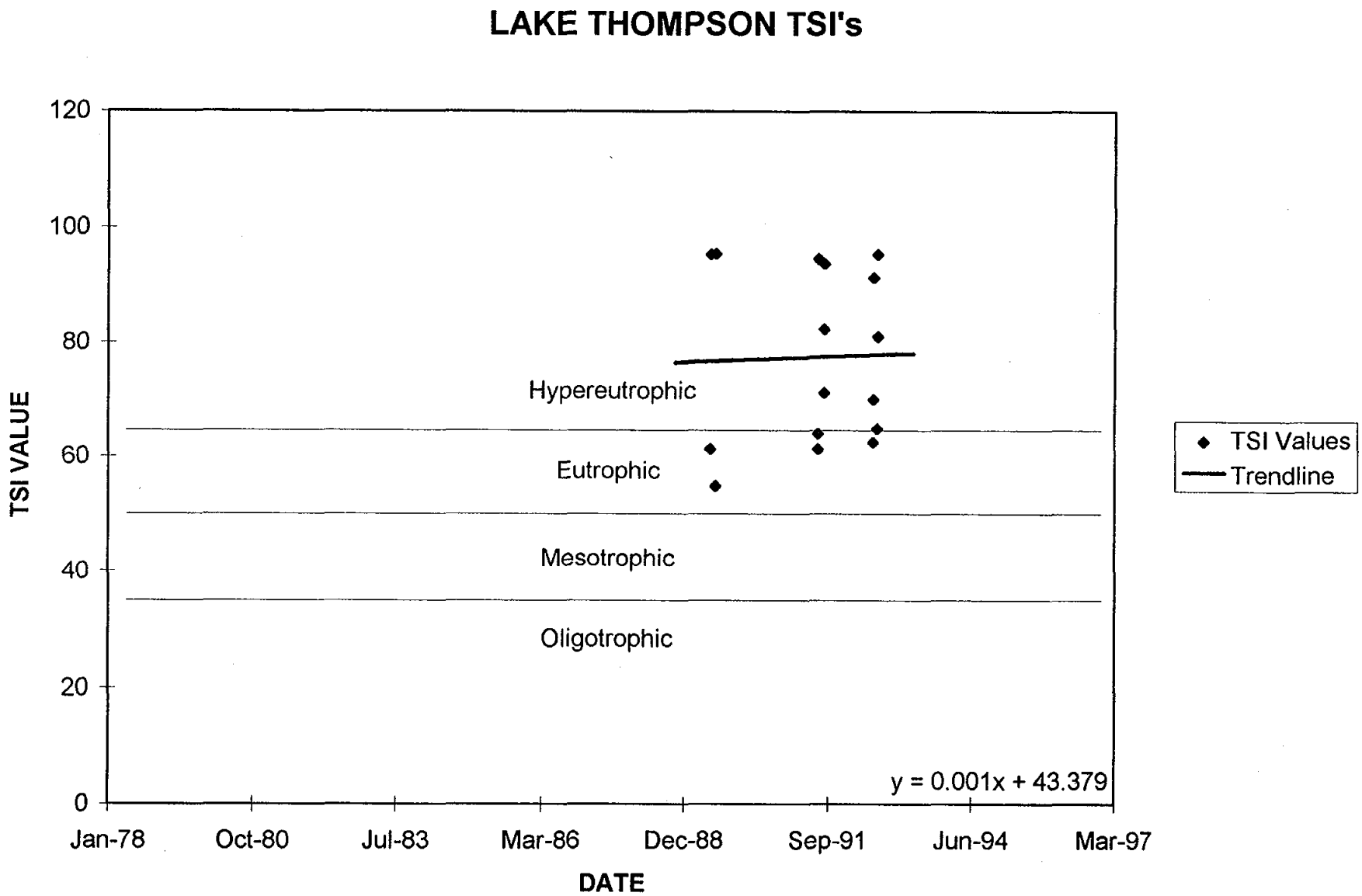
263,044 acres



SOUTH DAKOTA




SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
DIVISION OF WILDLIFE
LAKE THOMPSON
KINGSBURY COUNTY
1990
LAKE PRESTON
HOYER VPA
GPA
VPA
GPA
710
VPA
GPA
VPA
E
N
S
W
GPA GAME PRODUCTION AREA
VPA WATERFOVL PRODUCTION AREA
FISHING ACCESS
EMERGENT VEGETATION
BOAT LAUNCH - LAKE ACCESS
2 DEPTH CONTOUR
PRIMARY ROAD
SWIMMING AREA
SECONDARY ROAD
STRUCTURES
SECTION CORNER
PUBLIC LAND BOUNDRY
WATER LEVEL : 1690.77 MSL
MILES OF SHORELINE : 44.6
FIELD DATA COLLECTED : AUGUST 1989
AERIAL PHOTO NO. : E-1742-99CT
AERIAL PHOTO DATE : JUNE 1988
TOWNSHIP : T 110 N
RANGE : R 55 W
SCALE : 1" = 3771.4'
AVERAGE DEPTH IN FEET : 9.1
PLANIMETERED LAKE ACERAGE : 16236.5
VOLUME :
DEPTH AC/FT
TOTAL 148692


LAKE THOMPSON TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.001x + 43.379
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

LAKE TRAVERSE

County: Roberts
Latitude: 45 deg. 42 min. 12 sec. N
Longitude: 96 deg. 44 min. 06 sec. W

Township: 122-125N
Range: 47-49W
Section(s): 1-3, 5-7, 9-12, 14-16, 20-22, 28-33

Area: 11,530 A (4,666.1 ha)
Maximum Depth: 12 ft (3.7 m)
Volume: 15300 acre-ft (1.422 x $10^8 m^3$)
Origin of Basin: natural

Shoreline L: NA
Mean Depth: 10 ft (3.0 m)
Watershed/Lake Area: 63
Thermal Stratification: no

Major Inflows (named or permanent streams): Jim Creek, Mustinka Creek
Outlet: Bois de Sioux River

Lake Use
Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering
(10) Irrigation waters

Estimated Population within 65-mile Radius: 209,493
Ownership Status: Federally and State owned
Public Interest: Bois De Sioux Watershed District

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	22.83	4	22.45	4	19.70
Air Temperature (°C)	4	22.56	4	20.6	4	18.25
Secchi Disk Depth (meters)	2	1.17	2	0.9	2	0.52
Conductivity (cond/25° C)	4	1,165	2	1,660	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	7.84	-	-	-	-
Field pH (su)	1	8.20	4	8.56	4	8.64
Total Alkalinity (mg/l)	4	197	4	202	4	211
Total Solids (mg/l)	4	992	4	1,342	4	1,325
Dissolved Solids (mg/l)	4	980	4	1,329	4	1,303
Suspended Solids (mg/l)	4	12	4	13	4	22
Volatile Suspended Solids (mg/l)	-	-	2	3	-	-
Ammonia Nitrogen (mg/l)	4	0.53	4	0.10	4	0.04
Nitrate + Nitrite Nitrogen (mg/l)	4	0.30	4	0.40	4	0.08
Total Kjeldahl Nitrogen (mg/l)	4	1.91	4	1.34	4	1.55
Total Phosphorus (mg/l)	4	0.245	4	0.259	4	0.175
Total Dissolved Phosphorus (mg/l)	-	-	4	0.183	4	0.160
Ortho Phosphate as P (mg/l)	4	0.161	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	36.18	2	39.53

Year	1989	1991	1992
TSI Values -- Mean:	70.36	71.40	71.57
Secchi Disk	57.69	63.36	69.43
Total Phosphorus	83.04	85.08	78.62
Chlorophyll *a*		65.77	66.64

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: 5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus and Scirpus fluviatilis

Algal Species and Densities
No Date

Taxa	Number	Units/ml
Cryptomonas sp. #1	8	249
Lyngbya Diguetii	3	93
Cryptomonas	1	31
Total	12	373

Watershed Description
Watershed Area: 729,005 A (295,028 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
FU-AA	451,983.0	62
HY-SV-SL	87,481.0	12
PF	72,900.5	10
PN-EC-HY	72,900.5	10
LA-PL-LD	43,740.0	6

FU-AA Forman-Aastad: Well drained and moderately well drained, nearly level to rolling loamy soils formed in loamy glacial till.

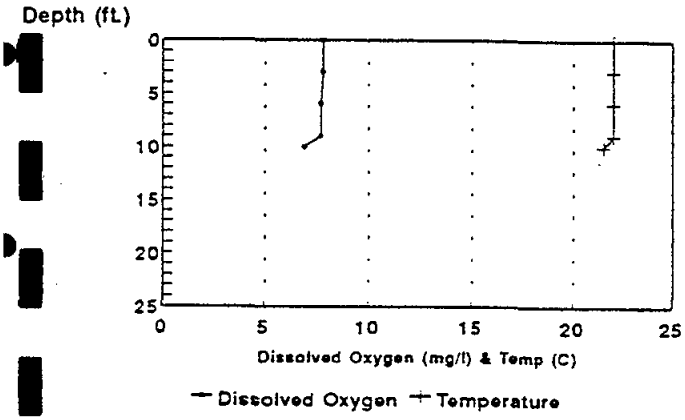
HY-SV-SL Heimdahl-Svea-Sisseton: Well drained and moderately well drained, nearly level to steep, loamy silt formed in glacial drift.

PF Peever: Well drained, nearly level to sloping, loamy soils formed in clayey glacial till.

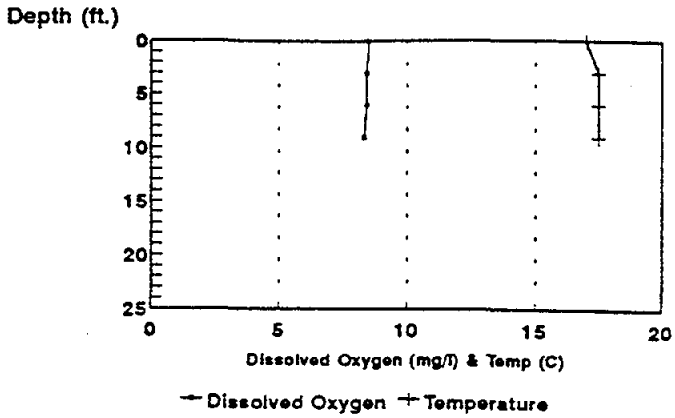
PN-EC-HY Poinsett-Eckman-Heimdahl: Well drained, nearly level to sloping silty and loamy soils formed in glacial drift and lacustrine silt.

LA-PL-LD LaDelle-Playmoor-Lamoure: Moderately well drained and poorly drained, nearly level, silty soils formed in alluvium.

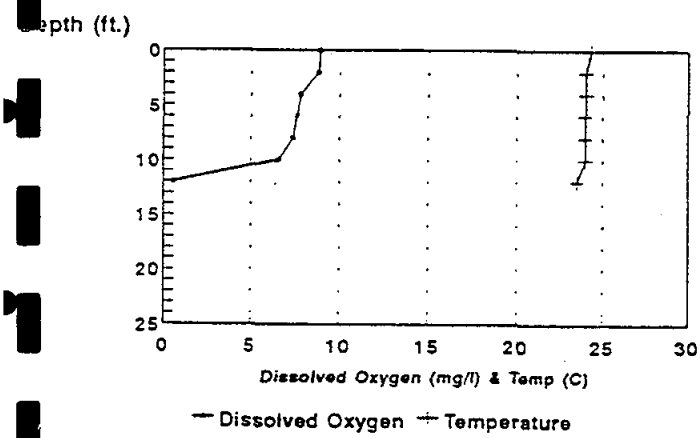
LAKE TRAVERSE 8/4/92
Dissolved Oxygen & Temperature Profile



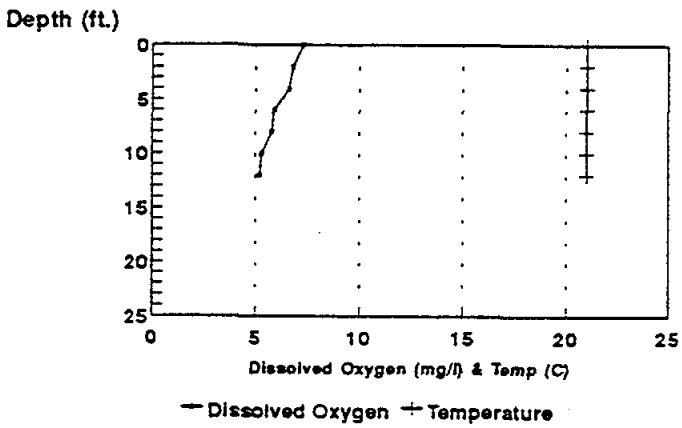
LAKE TRAVERSE 9/2/92
Dissolved Oxygen & Temperature Profile



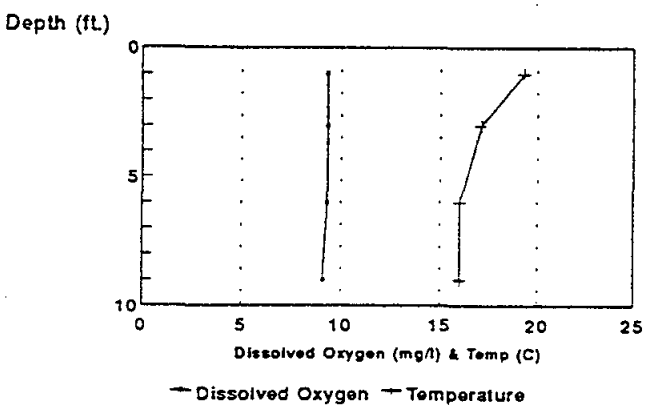
LAKE TRAVERSE 6/27/91
Dissolved Oxygen & Temperature Profile



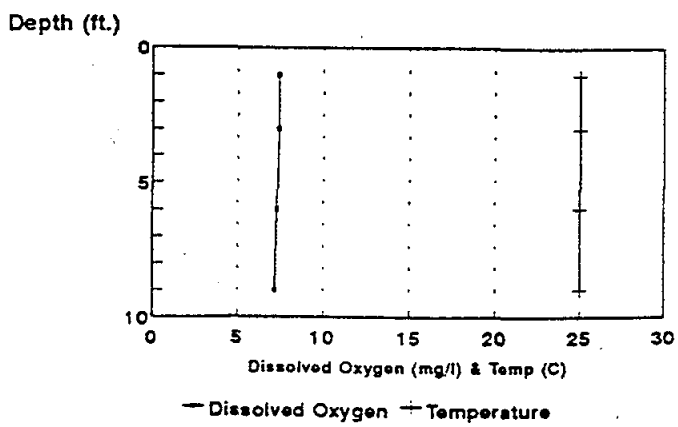
LAKE TRAVERSE 9/10/91
Dissolved Oxygen & Temperature Profile

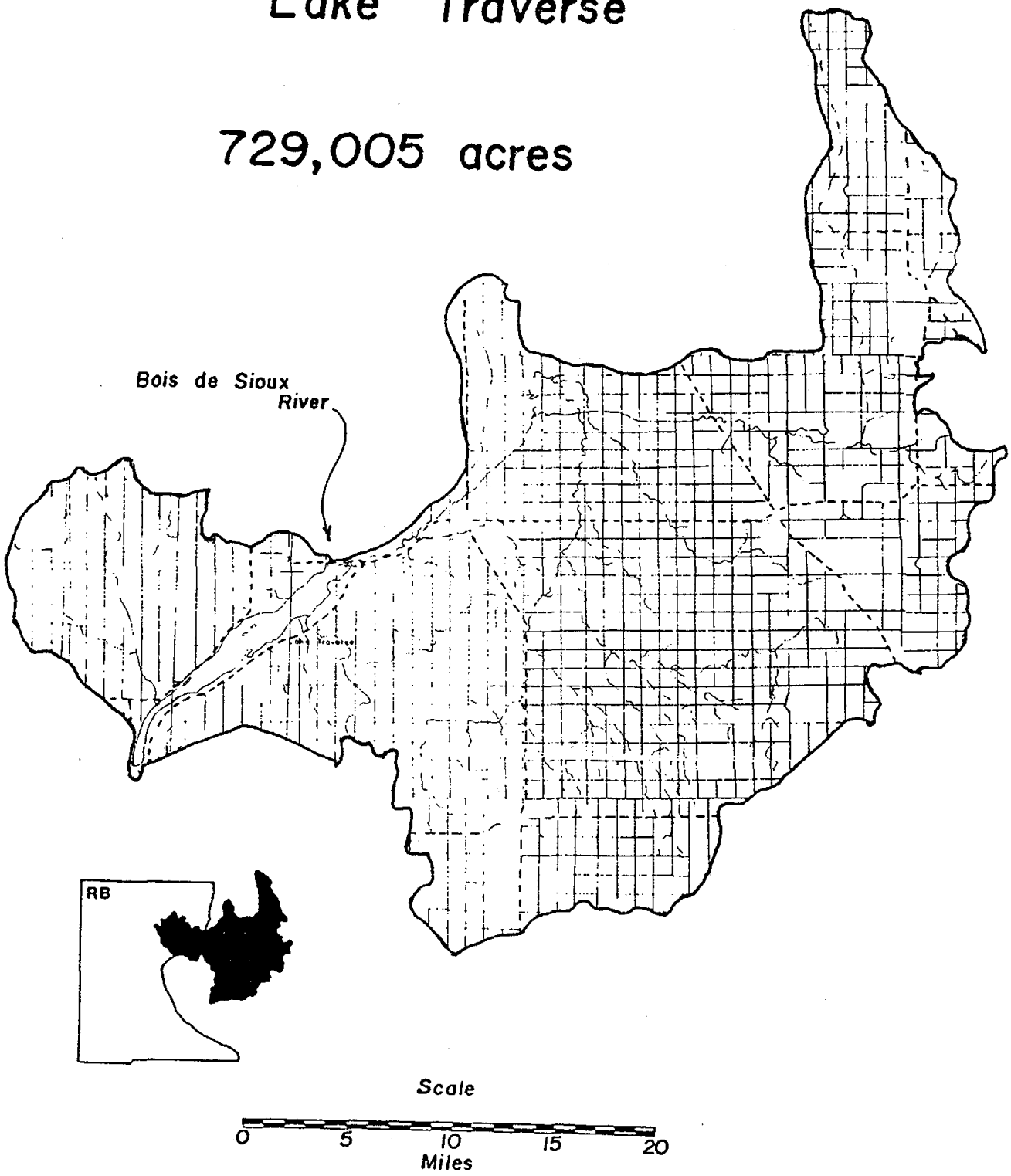


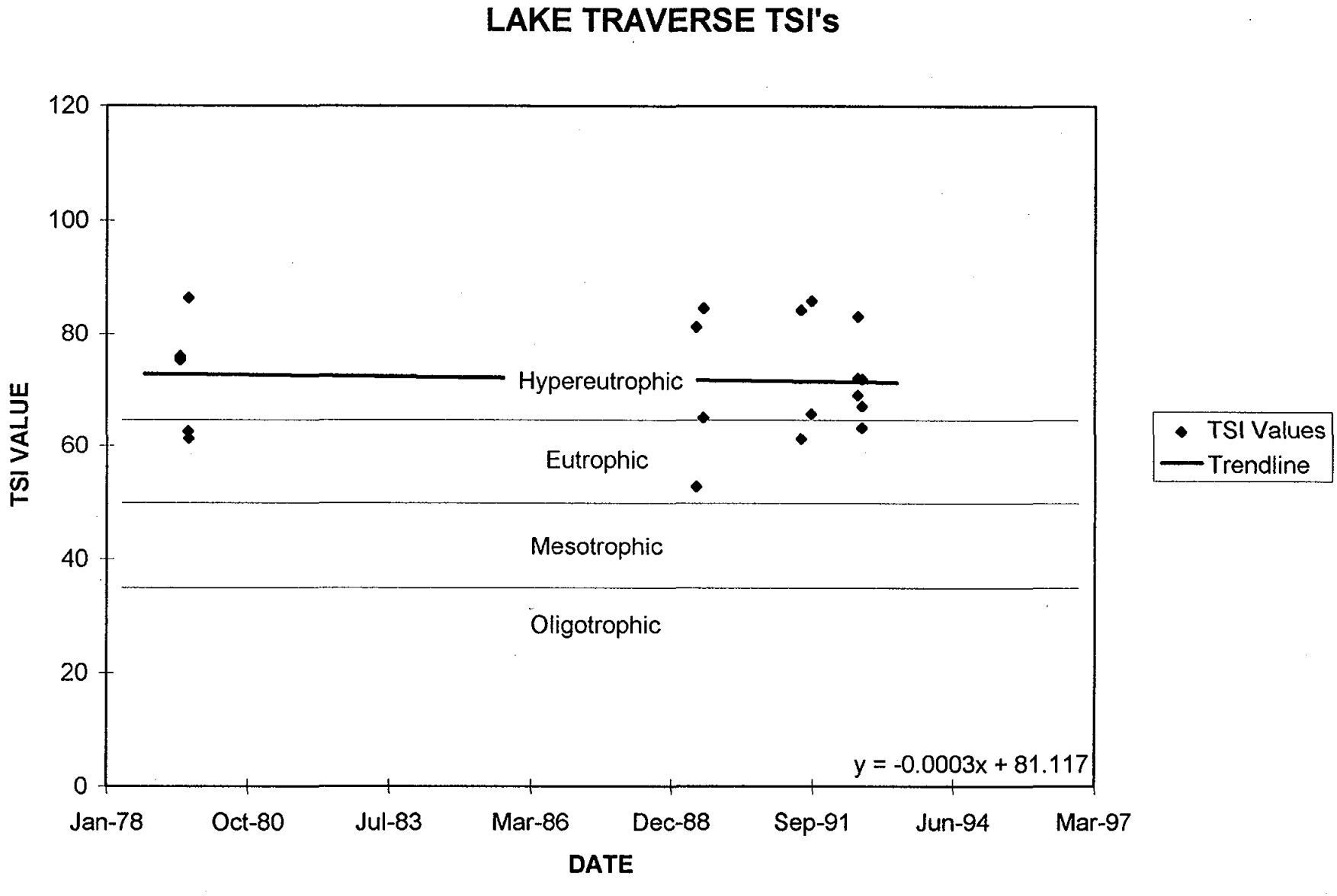
Lake Traverse, 6/15/89
Dissolved Oxygen & Temperature Profile



Lake Traverse, 8/3/89
Dissolved Oxygen & Temperature Profile




Lake Traverse
729,005 acres
Bois de Sioux River
RB
Scale
0
5
10
15
20
Miles


LAKE TRAVERSE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -0.0003x + 81.117
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

TWIN LAKES

County: Sanborn
Latitude: 43 deg. 57 min. 24 sec. N
Longitude: 98 deg. 19 min. 36 sec. W
Area: 252 A (102 ha)
Maximum Depth: 12.5 ft (3.8 m)
Volume: 1,512 acre-ft (1.865 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: Morris Creek

Township: 106N
Range: 62W
Section(s): 30, 31
Shoreline L: 13.1 mi (21 km)
Mean Depth: 6 ft (1.8 m)
Watershed/Lake Area: 4
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: NA
Ownership Status: State owned
Public Interest: Twin Lakes Improvement Association.

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	23.15	4	24.45	4	22.55
Air Temperature (°C)	4	26.50	4	27.50	4	25.50
Secchi Disk Depth (meters)	2	0.62	2	0.75	2	0.69
Conductivity (cond/25° C)	4	3,545	2	4,695	-	-
Turbidity (NTU)	-	-	-	-	4	8.27
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.15	4	8.16	4	7.98
Total Alkalinity (mg/l)	4	99	4	78	4	108
Total Solids (mg/l)	4	3,537	4	4,872	4	3,061
Dissolved Solids (mg/l)	4	3,511	4	4,825	4	3,045
Suspended Solids (mg/l)	4	26	4	47	4	16
Volatile Suspended Solids (mg/l)	-	-	2	10	-	-
Ammonia Nitrogen (mg/l)	4	0.94	4	0.48	4	0.19
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.60	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.79	4	2.80	4	2.04
Total Phosphorus (mg/l)	4	0.101	4	0.082	4	0.052
Total Dissolved Phosphorus (mg/l)	-	-	4	0.088	4	0.035
Ortho Phosphate as P (mg/l)	4	0.016	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	6.25	2	21.78

Year	1989	1991	1994
TSI Values -- Mean:	68.43	60.07	62.87
Secchi Disk	66.78	64.21	65.46
Total Phosphorus	70.07	67.46	62.35
Chlorophyll *a*		48.55	60.79

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 90%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Chara sp.

Algal Species and Densities

	July 6, 1989		August 7, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Aphanocapsa	127	25,197	39	3,181
Algae (other)	52	10,317	30	2,447
Scendesmus	45	8,928	2	163
Green Algae (other)	22	4,365	9	734
Attheya	20	3,968	-	-
Diatom (centric)	8	1,587	11	897
Chroococcus	8	1,587	56	4,568
Coelosphaerium	7	1,389	-	-
Merismopedia	4	794	30	2,447
Algae (flagellate)	3	595	17	1,794
Cryptomonas sp. #1	2	397	13	1,060
Pediastrum	1	198	-	-
Dactylococcopsis	1	198	4	326
Schizothrix	-	-	26	2,161
Aphanizomenon flos-aquae	-	-	20	1,631
Oocystis	-	-	17	1,387
Lyngbya	-	-	13	1,060
Cryptomonas	-	-	6	489
Stephanodiscus	-	-	3	245
Blue-green (other)	-	-	1	82
Aphanothece	-	-	1	82
Synedra	-	-	1	82
Total	300	59,521	304	24,796

Watershed Description

Watershed Area: 1,118 A (452 ha)

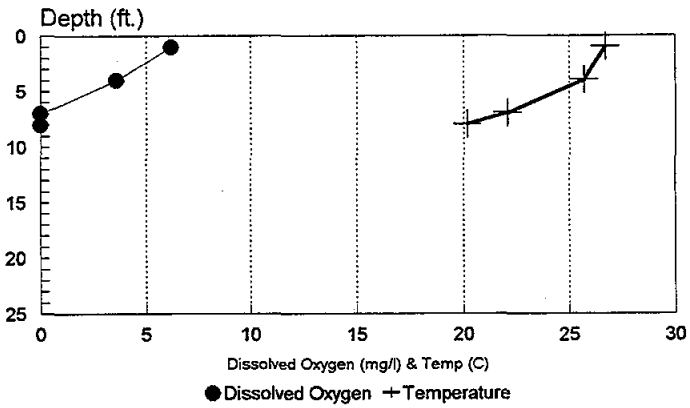
Soil Associations within Watershed

Association	Area (A)	% of Total
HR-PR	849.7	76
CBE	268.3	24

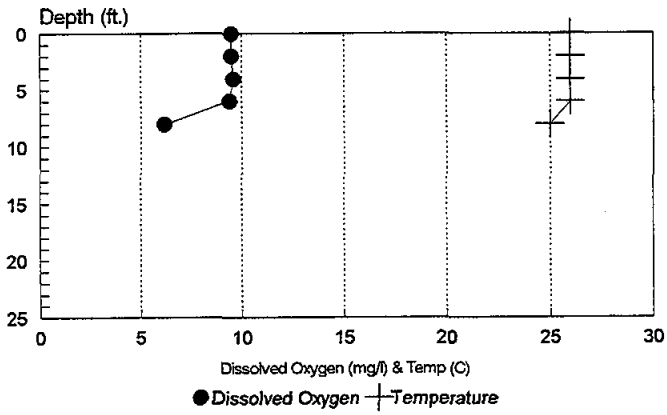
HR-PR Houdek-Prosper: Nearly level to gently undulating, well drained and moderately well drained soils.

CBE Clarno-Bonilla-Ethan: Well drained and moderately well drained, nearly level to moderately sloping, loamy soils in swales and other areas on uplands.

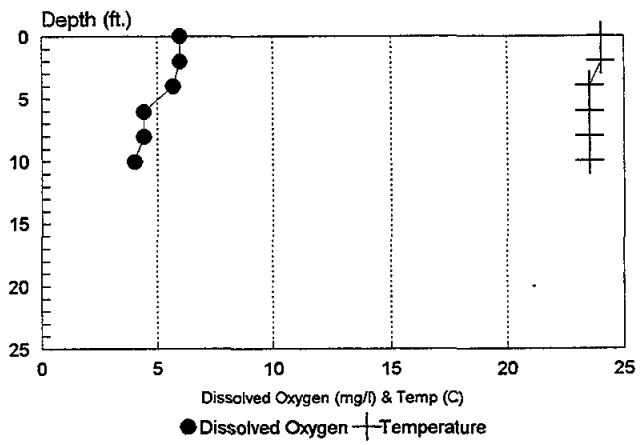
TWIN LAKES 7/29/79
Dissolved Oxygen & Temperature Profile



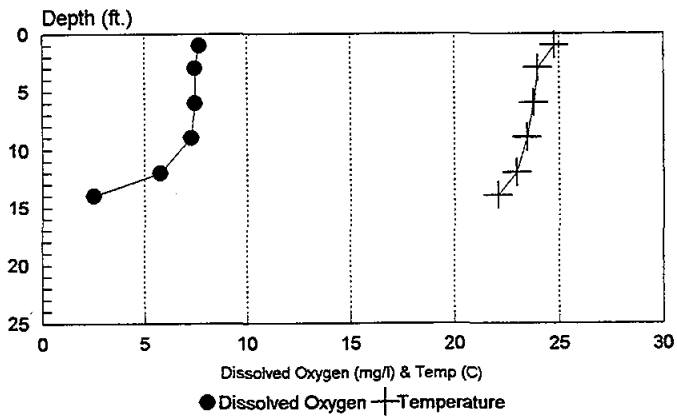
TWIN LAKE 7/11/91
Dissolved Oxygen & Temperature Profile



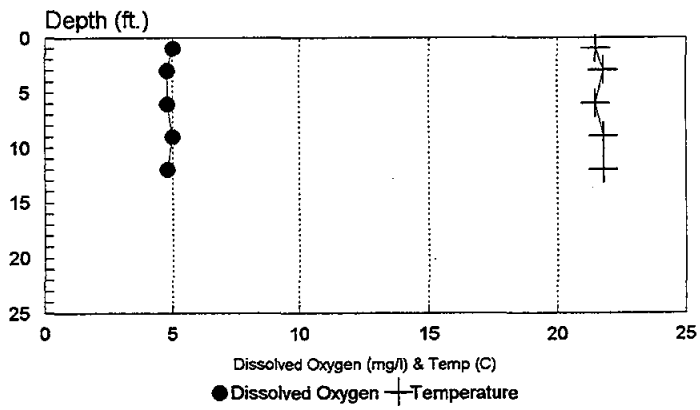
TWIN LAKE 8/15/91
Dissolved Oxygen & Temperature Profile



TWIN LAKES 6/20/94
Dissolved Oxygen & Temperature Profile

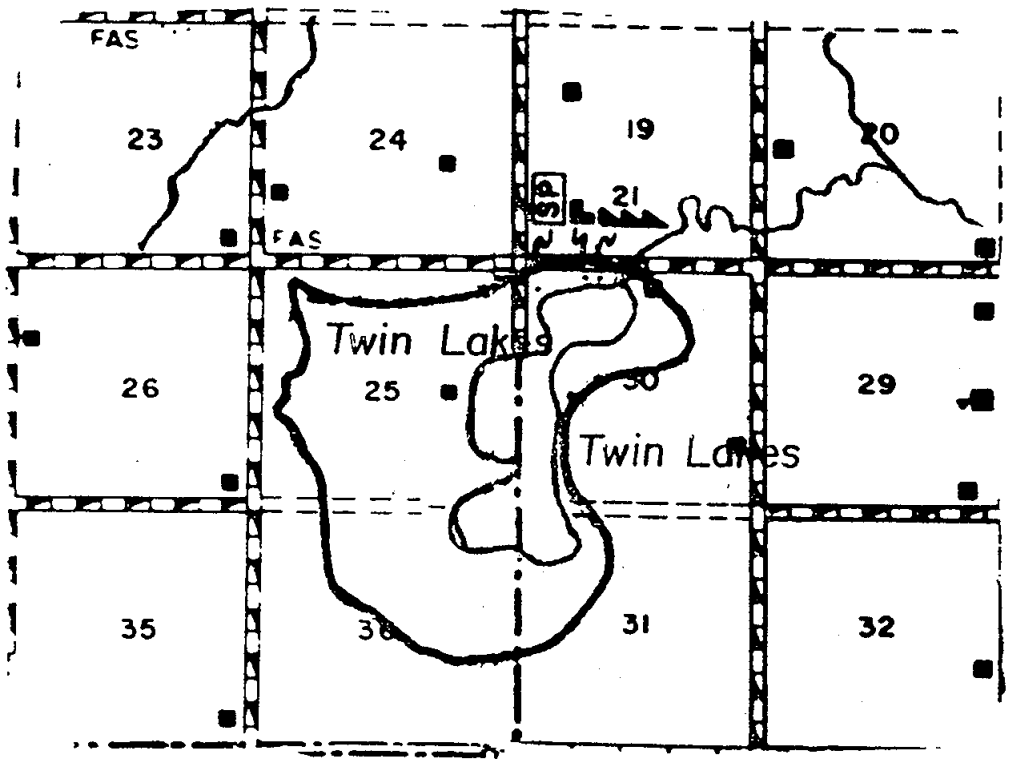


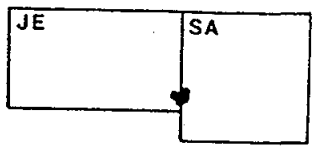
TWIN LAKES 8/23/94
Dissolved Oxygen & Temperature Profile



Twin Lakes

1,118 acres

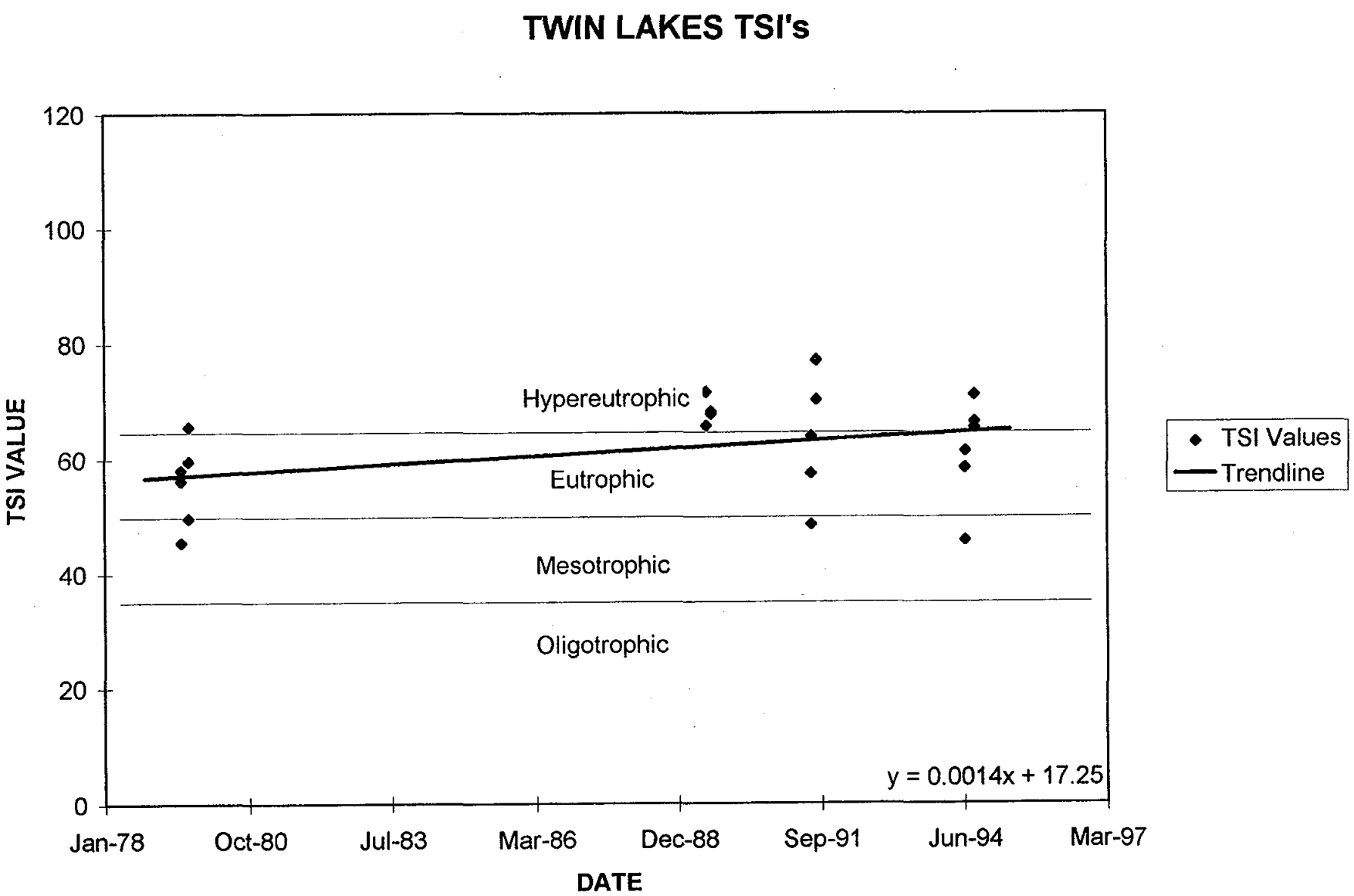




Scale

0 1 2 3

Miles


TWIN LAKES TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0014x + 17.25
TSI Values
Trendline
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE

WAGGONER LAKE

County: Haakon
Latitude: 44 deg. 04 min. 36 sec. N
Longitude: 101 deg. 39 min. 00 sec. W
Area: 98 A (39.7 ha)
Maximum Depth: 22 ft (6.7 m)
Volume: 665 acre-ft (8.203 x $10^5 m^3$)
Origin of Basin: impoundment
Township: 1, 2N
Range: 20, 21W
Section(s): 26, 36
Shoreline L: 4.3 mi (6.9 km)
Mean Depth: 6.8 ft (2.1 m)
Watershed/Lake Area: 376
Thermal Stratification: no
Major Inflows (named or permanent streams): Grindstone Creek
Outlet: Grindstone Creek

Lake Use

Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish lake propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 31,022
Ownership Status: City owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.98	4	18.85	4	20.00
Air Temperature (°C)	4	21.94	4	24.75	4	18.50
Secchi Disk Depth (meters)	2	1.71	2	2.29	2	1.56
Conductivity (cond/25° C)	4	1,719	2	1,885	-	-
Turbidity (NTU)	-	-	-	-	2	6.51
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.55	4	8.16	4	7.99
Total Alkalinity (mg/l)	4	65	4	120	4	133
Total Solids (mg/l)	4	1,739	4	1,753	4	715
Dissolved Solids (mg/l)	4	1,733	4	1,741	4	708
Suspended Solids (mg/l)	4	6	4	12	4	5
Volatile Suspended Solids (mg/l)	-	-	1	2	-	-
Ammonia Nitrogen (mg/l)	4	0.04	4	0.02	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	4	0.30	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.83	4	0.57	4	0.89
Total Phosphorus (mg/l)	4	0.278	4	0.070	4	0.271
Total Dissolved Phosphorus (mg/l)	-	-	4	0.037	4	0.238
Ortho Phosphate as P (mg/l)	4	0.227	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	25.46	4	9.83

Year	1989	1991	1993
TSI Values -- Mean:	72.65	55.80	63.93
Secchi Disk	52.29	48.07	53.58
Total Phosphorus	93.01	57.00	85.21
Chlorophyll *a*		62.33	52.99

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 50%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: None identified

Algal Species and Densities

No Date

Taxa	Number	Units/ml
Algae (flagellate)	5	139
Cryptomonas	1	28
Algae (other)	1	28
Green Algae (other)	1	28
Diatom (pennate)	1	28
Anabaena	1	28
Total	10	277

Watershed Description

Watershed Area: 36,809 A (14,897 ha)

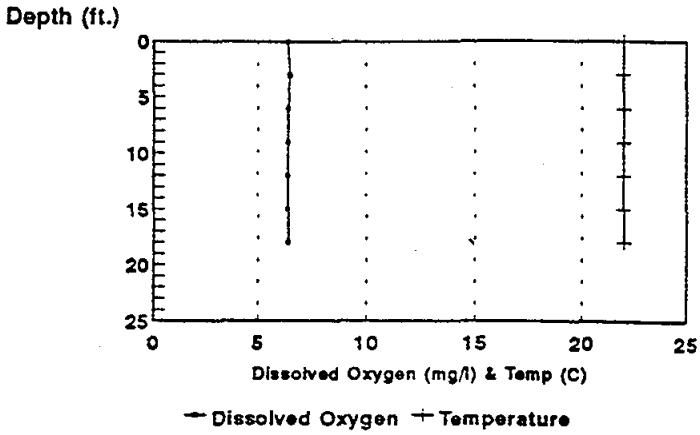
Soil Associations within Watershed

Association	Area (A)	% of Total
PK-KR	27,975	76
B8-KF-K1	8,834	24

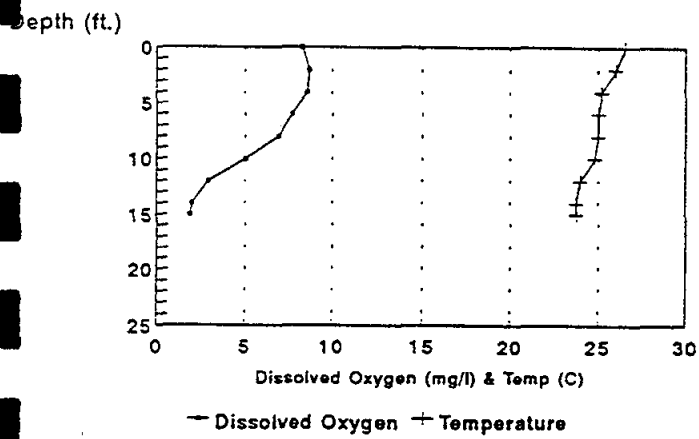
PK-KR Pierre-Kyle: Nearly level to strongly sloping clayey soils that are moderately deep and deep over shale.

B8-KF-K1 Blackpipe-Kadoka-Shingle: Silty and loamy soils that are moderately deep and shallow over soft siltstone or shale.

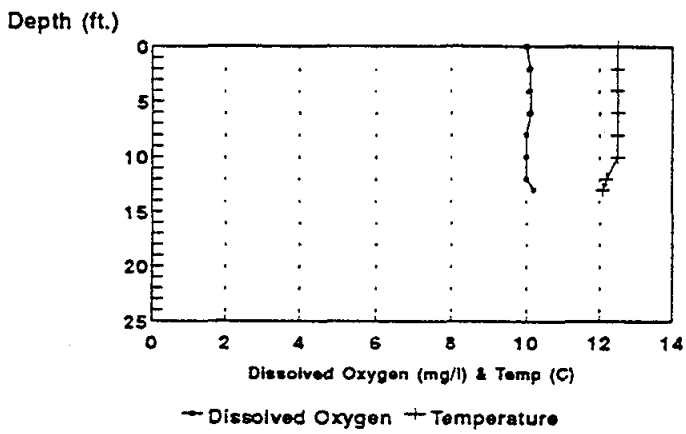
WAGGONER LAKE 8/3/92
Dissolved Oxygen & Temperature Profile



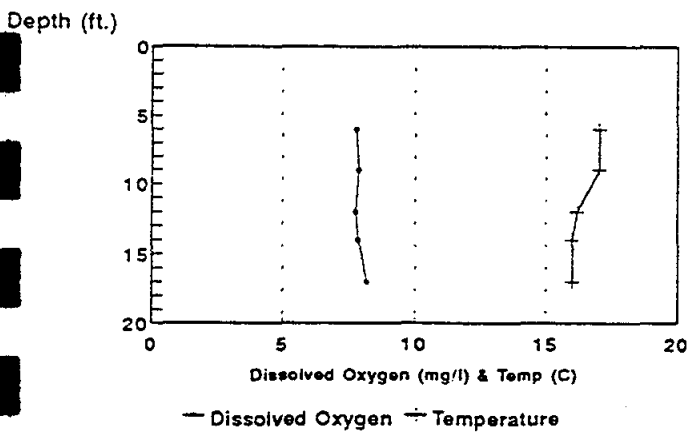
WAGGONER LAKE 7/16/91
Dissolved Oxygen & Temperature Profile



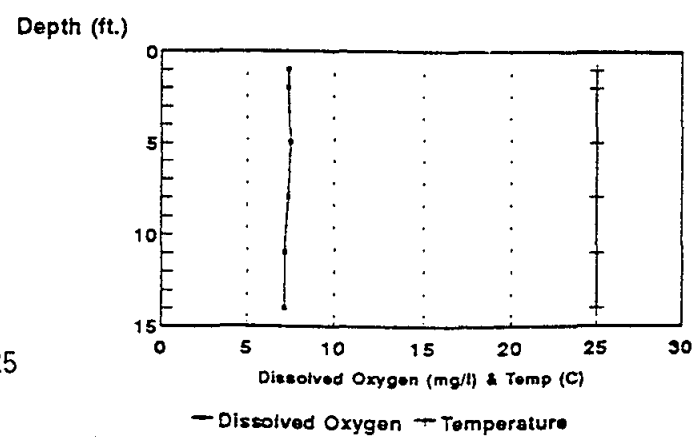
WAGGONER LAKE 10/9/91
Dissolved Oxygen & Temperature Profile



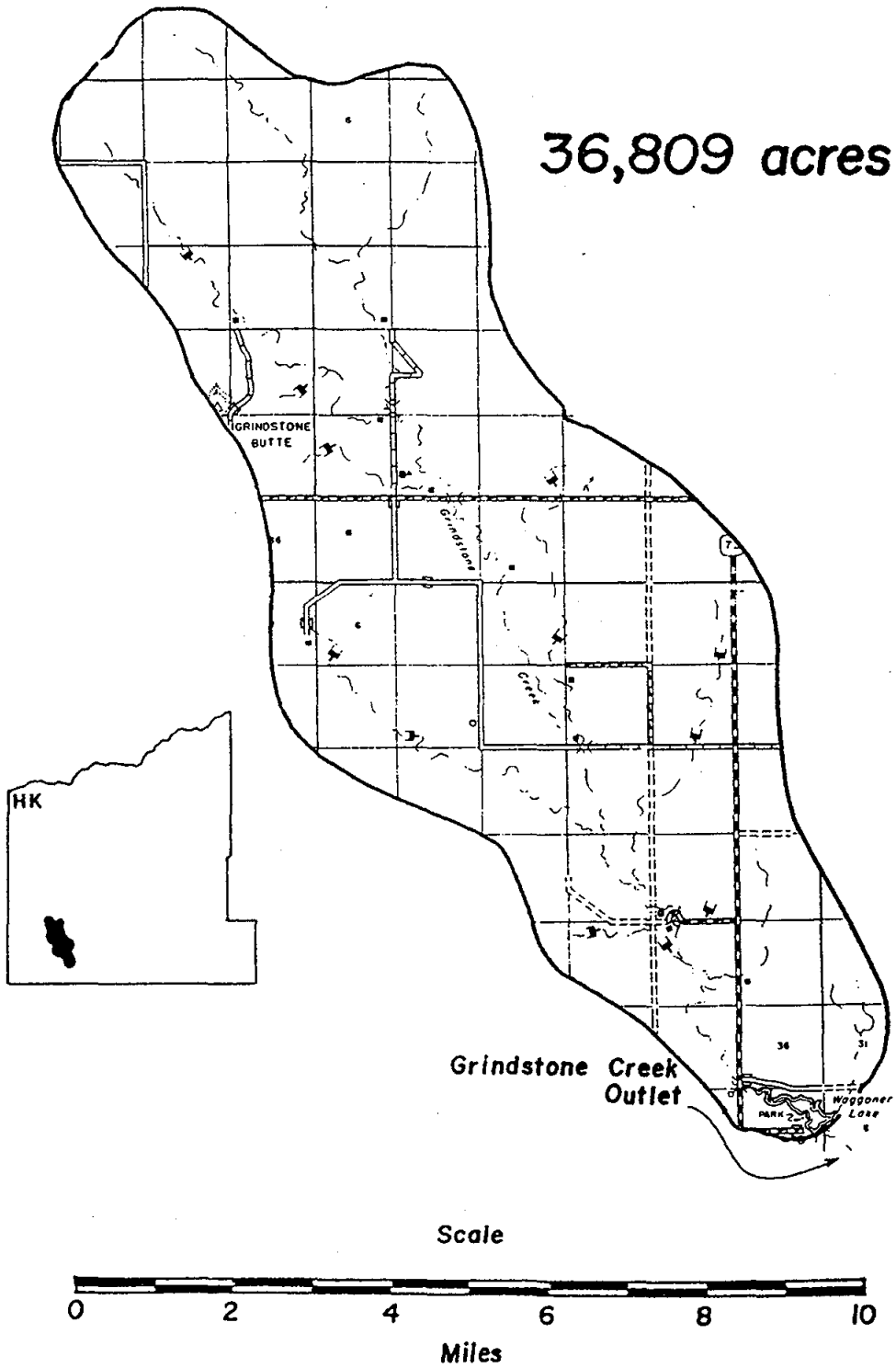
Waggoner Lake, 6/13/89
Dissovled Oxygen & Temperature Profile

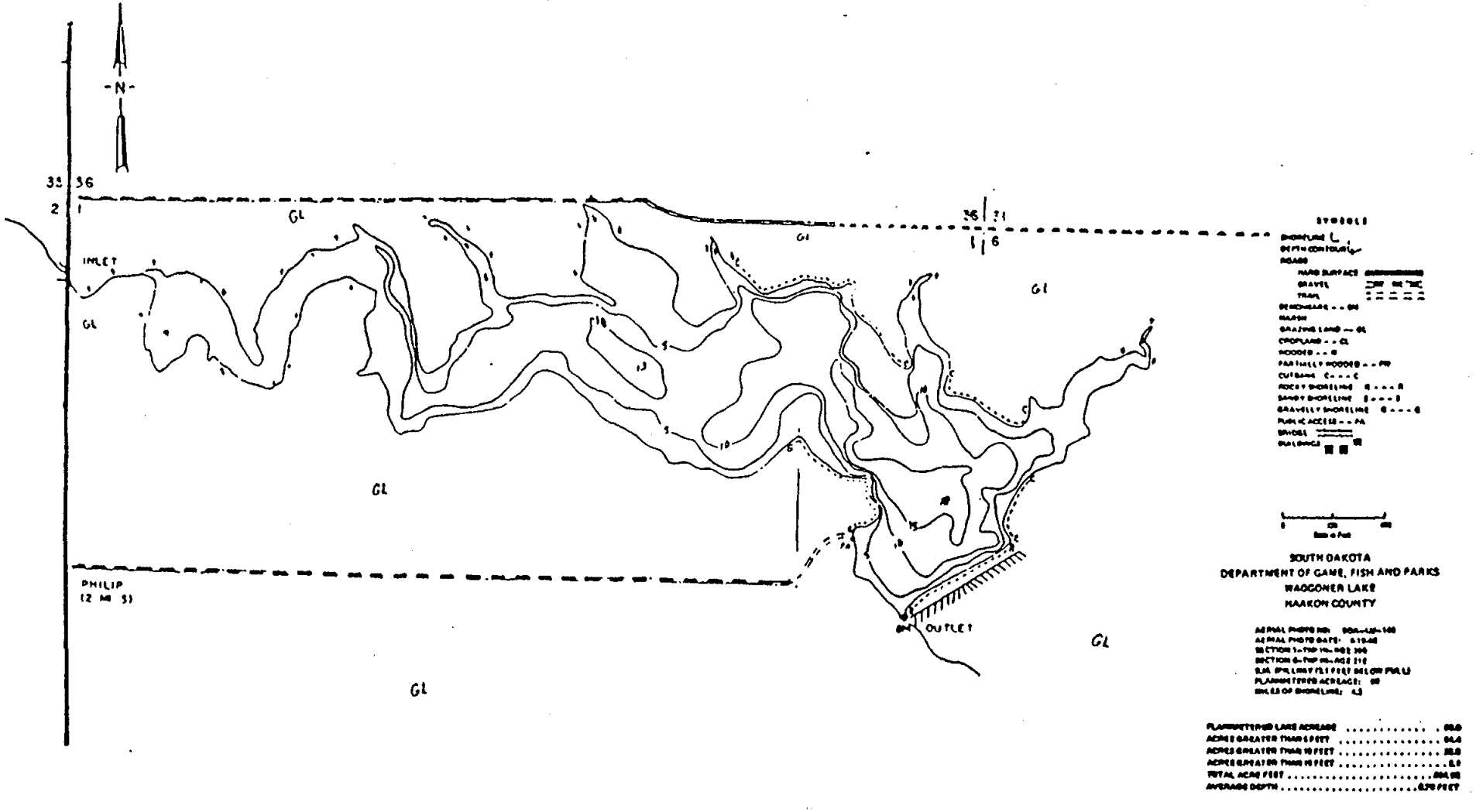


Waggoner Lake, 8/1/89
Dissovled Oxygen & Temperature Profile

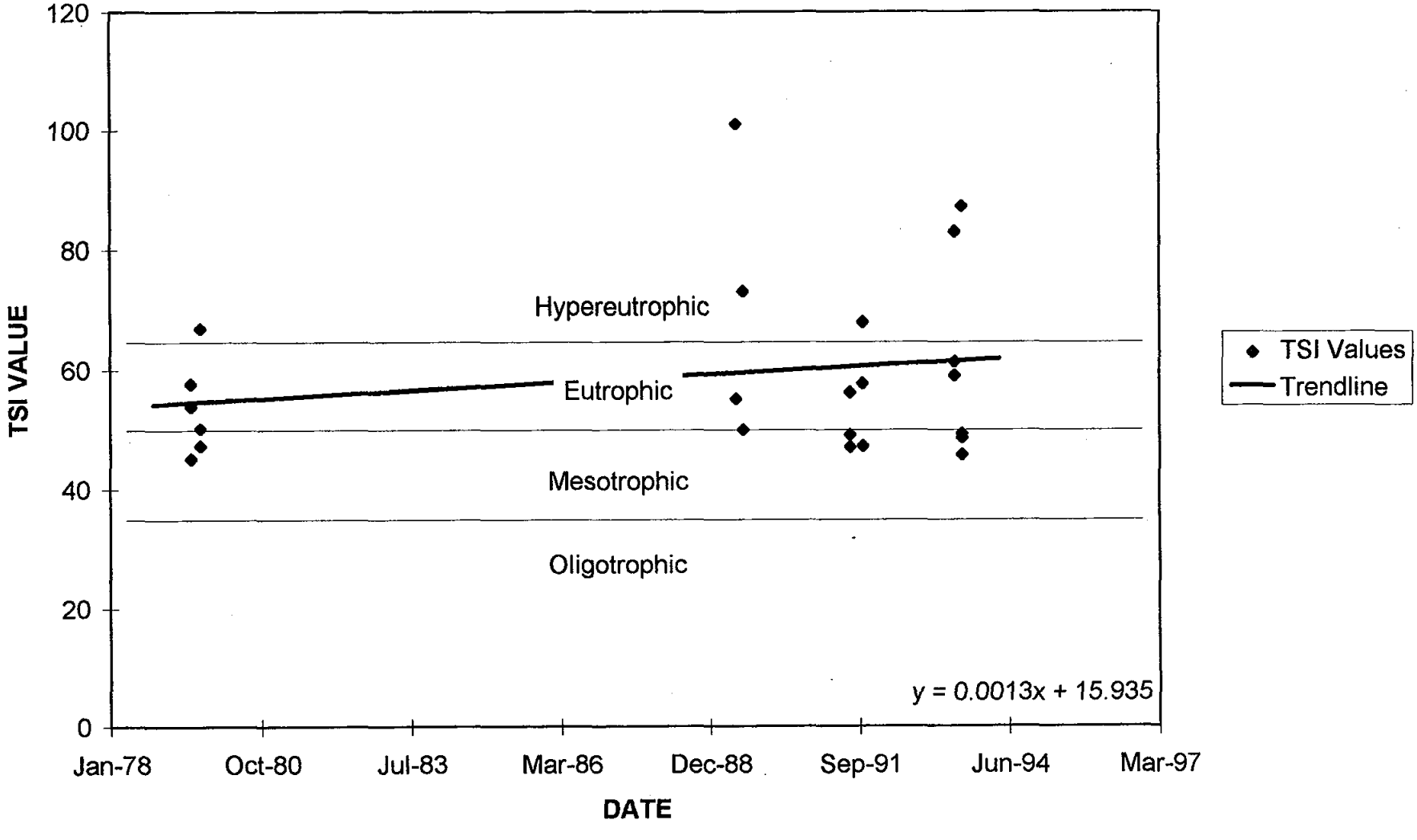


Waggoner Lake




N
35 36
2 1
36 31
1 6
INLET
OUTLET
GL
PHILIP
(2 MI S)
SYMBOLS
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
WAGGONER LAKE
HAAKON COUNTY

LAKE WAGGONER TSI's



WALL LAKE

County: Minnehaha
Latitude: 43 deg. 32 min. 00 sec.
Longitude: 96 deg. 57 min. 30 sec.
Area: 207.6 A (84.0 ha)
Maximum Depth: 12 ft (3.7 m)
Volume: 1785.1 acre-ft (2.02 x $10^6 m^3$)
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 101N
Range: 51W
Section(s): 21
Shoreline L: 2.5 mi (4.0 km)
Mean Depth: 8.6 ft (2.6 m)
Watershed/Lake Area: 13
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(5) Warmwater semipermanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 318,040
Ownership Status: State and Privately owned
Public Interest: Wall Lake Association

	1994	
Chemical Parameters	Samples	Results
Water Temperature (°C)	4	23.08
Air Temperature (°C)	4	24.25
Secchi Disk Depth (meters)	2	0.45
Conductivity (cond/25° C)	-	-
Turbidity (NTU)	4	12.25
Lab pH (su)	-	-
Field pH (su)	4	8.42
Total Alkalinity (mg/l)	4	158
Total Solids (mg/l)	4	1,311
Dissolved Solids (mg/l)	4	1,295
Suspended Solids (mg/l)	4	15
Volatile Suspended Solids (mg/l)	-	-
Ammonia Nitrogen (mg/l)	4	0.03
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.44
Total Phosphorus (mg/l)	4	0.135
Total Dissolved Phosphorus (mg/l)	4	0.069
Ortho Phosphate as P (mg/l)	-	-
Chlorophyll (mg/m^3)	2	22.78

Year	1994
TSI Values -- Mean:	68.72
Secchi Disk	71.52
Total Phosphorus	73.40
Chlorophyll *a*	61.23

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: <5%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submerged Plant Species Identified: Potamogeton pectinatus and Ceratophyllum demersum

Algal Species and Densities

Taxa	Number	Units/ml
NA	NA	NA

Watershed Description

Watershed Area: 2,600 A (1052 ha)

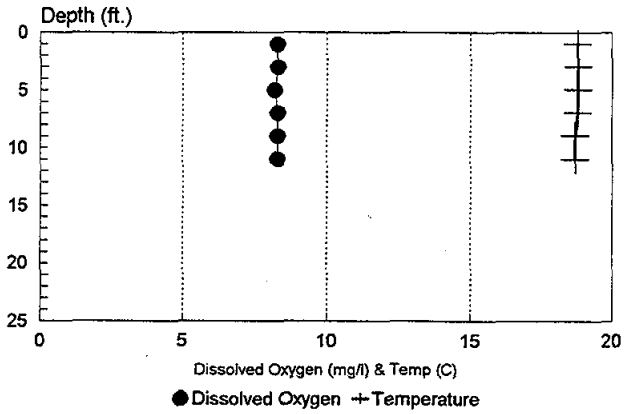
Soil Associations within Watershed

Association	Area (A)	% of Total
#1	2,600	100

#1 Kranzburg-Parnell: Moderately fine textured and fine soils in loess and till.

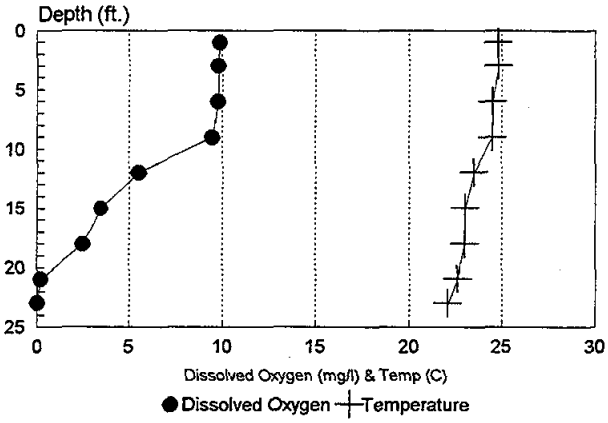
WALL LAKE 6/1/79

Dissolved Oxygen & Temperature Profile



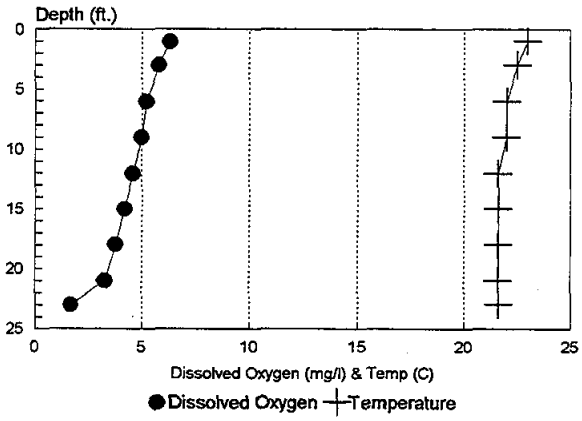
WALL LAKE 6/22/94

Dissolved Oxygen & Temperature Profile

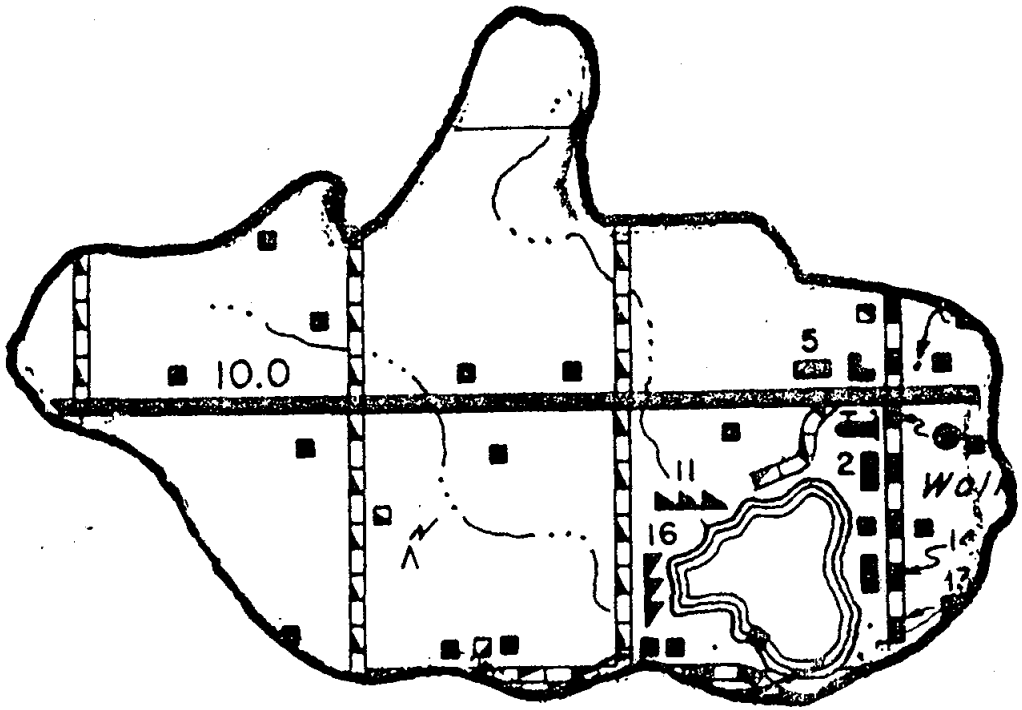


WALL LAKE 8/24/94

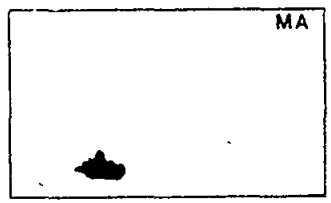
Dissolved Oxygen & Temperature Profile



Wall Lake



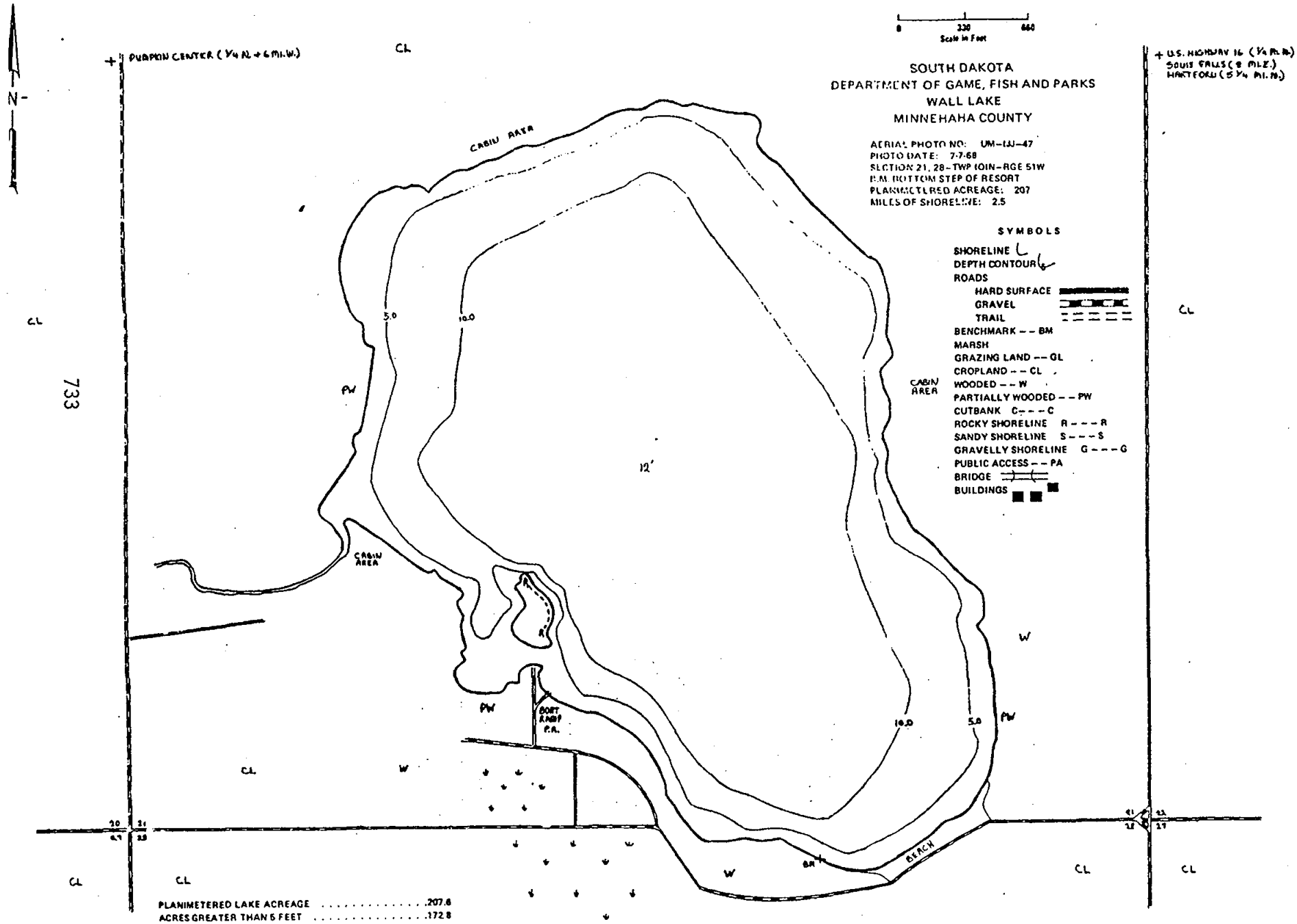
1,118 acres



Scale

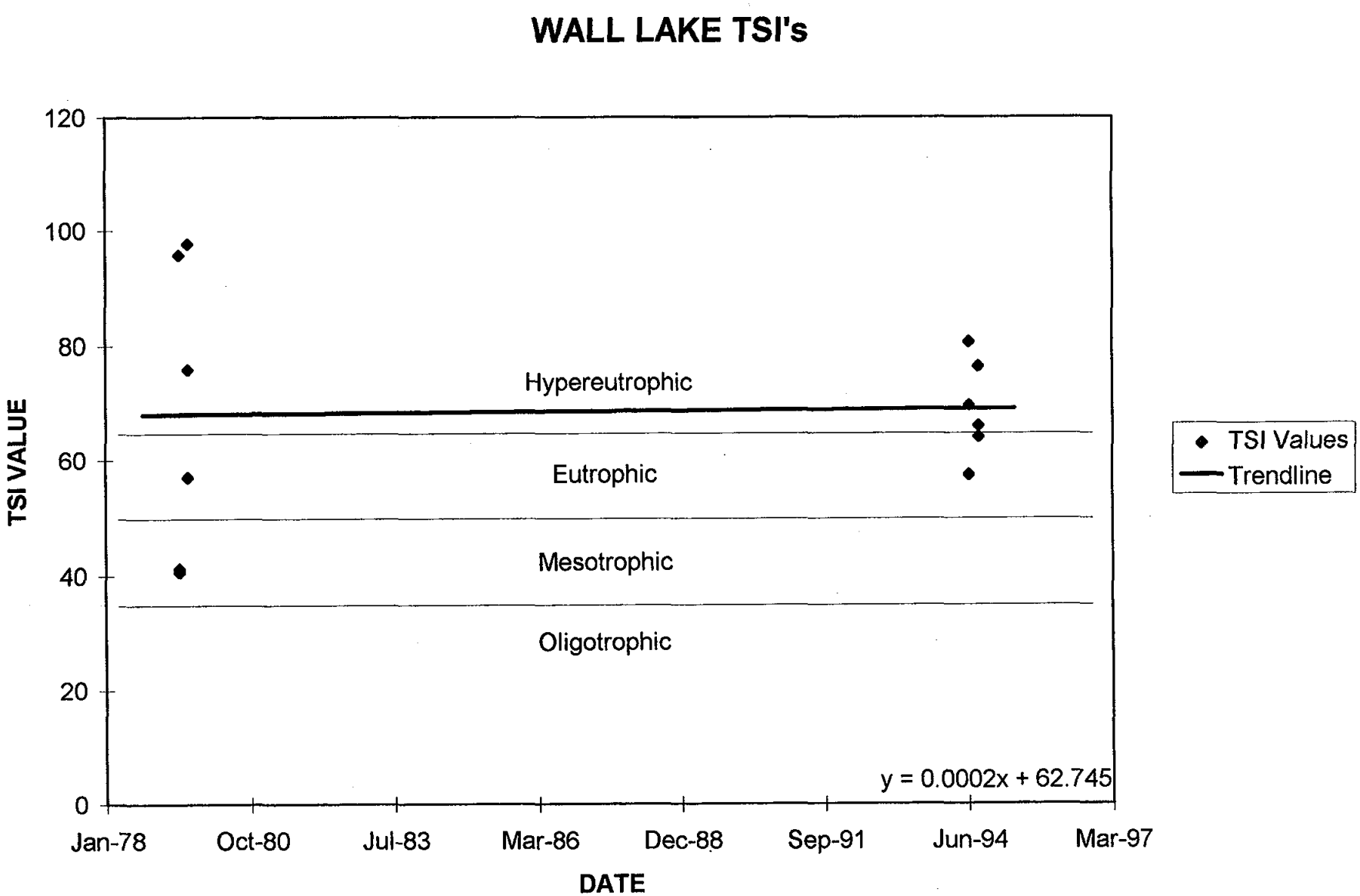
0 1 2 3 4 5

Miles



N
0 330 660
Scale in Feet
SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
WALL LAKE
MINNEHAHA COUNTY
AERIAL PHOTO NO: UM-IJJ-47
PHOTO DATE: 7-7-68
SECTION 21, 28-TWP 101N-RGE 51W
B.M. BOTTOM STEP OF RESORT
PLANIMETERED ACREAGE: 207
MILES OF SHORELINE: 2.5
SYMBOLS
SHORELINE
DEPTH CONTOUR
ROADS
HARD SURFACE
GRAVEL
TRAIL
BENCHMARK -- BM
MARSH
GRAZING LAND -- GL
CROPLAND -- CL
WOODED -- W
PARTIALLY WOODED -- PW
CUTBANK C--- C
ROCKY SHORELINE R --- R
SANDY SHORELINE S --- S
GRAVELLY SHORELINE G --- G
PUBLIC ACCESS -- PA
BRIDGE
BUILDINGS
PUMPKIN CENTER (1/4 N. + 6 MI. W.)
U.S. HIGHWAY 16 (1/4 MI. N.)
SOUIS FALLS (8 MI. E.)
HARTFORD (5 1/4 MI. N.)
CABIN AREA
CABIN AREA
CABIN AREA
BOAT RAMP P.A.
BEACH
5.0
10.0
12'
CL
PW
W
BM
PLANIMETERED LAKE ACREAGE 207.6
ACRES GREATER THAN 5 FEET 172.8
ACRES GREATER THAN 10 FEET 114.8

733


WALL LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = 0.0002x + 62.745
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

WHITE LAKE DAM

County: Marshall
Latitude: 45 deg. 51 min. 36 sec. N
Longitude: 97 deg. 36 min. 54 sec. W
Area: 186.8 A (75.6 ha)
Maximum Depth: 20 ft (6.1 m)
Volume: 1494.4 acre-ft (1.843 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 128N
Range: 57W
Section(s): 25, 36
Shoreline L: 6.3 mi (10 km)
Mean Depth: 8 ft (2.4 m)
Watershed/Lake Area: 113
Thermal Stratification: yes

Lake Use

Beneficial Use Classification:
(1) Domestic water supply
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 149,477
Ownership Status: State owned
Public Interest: NA

	1989		1991		1993	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	3	23.17	4	21.53	4	20.90
Air Temperature (°C)	4	30.83	4	21.50	4	22.75
Secchi Disk Depth (meters)	2	1.16	2	0.73	2	0.60
Conductivity (cond/25° C)	4	863	2	1,018	-	-
Turbidity (NTU)	-	-	-	-	4	13.30
Lab pH (su)	4	8.25	-		-	-
Field pH (su)	-	-	4	8.42	4	8.11
Total Alkalinity (mg/l)	4	171	4	191	4	239
Total Solids (mg/l)	4	691	4	817	4	781
Dissolved Solids (mg/l)	4	678	4	805	4	766
Suspended Solids (mg/l)	4	13	4	13	4	15
Volatile Suspended Solids (mg/l)	-	-	2	3	-	-
Ammonia Nitrogen (mg/l)	4	0.35	4	0.15	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.13	4	0.40	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	1.36	4	1.54	4	1.48
Total Phosphorus (mg/l)	4	0.215	4	0.204	4	0.154
Total Dissolved Phosphorus (mg/l)	-	-	4	0.150	4	0.091
Ortho Phosphate as P (mg/l)	4	0.121	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	49.58	1	33.50

Year	1989	1991	1993
TSI Values -- Mean:	69.05	71.74	69.59
Secchi Disk	57.88	64.51	67.37
Total Phosphorus	80.22	81.83	76.39
Chlorophyll *a*		68.86	65.02

Aquatic Plants and Algae
Estimate of Shoreline and Emergent Vegetation Coverage: 70%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton pectinatus

Algal Species and Densities

	June 28, 1989		July 26, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Diatom (pennate)	28	363	-	-
Schizothrix	8	104	-	-
Fragilaria	6	78	-	-
Aphanizomenon flos-aquae	5	65	299	5,805
Algae (flagellate)	4	52	-	-
Chroococcus	4	52	1	19
Algae (other)	3	39	1	19
Synedra	2	26	-	-
Blue-green (other)	1	13	-	-
Green Algae (other)	1	13	-	-
Cryptomonas sp. #1	-	-	2	39
Total	62	803	303	5,882

Watershed Description
Watershed Area: 21,184 A (8,573 ha)

Soil Associations within Watershed

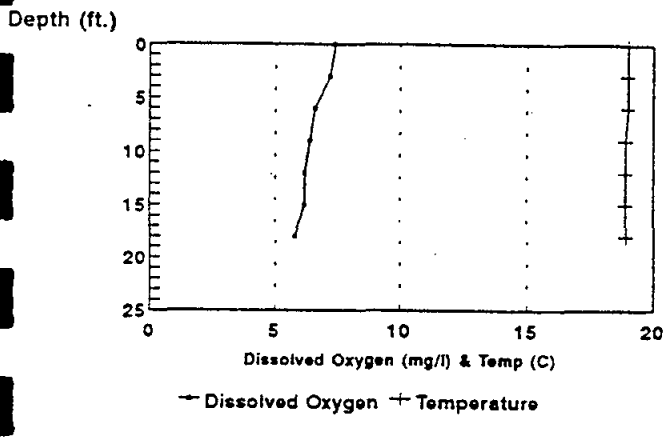
Association	Area (A)	% of Total
FU-AA-BY	18,006	85
FU-PN	1,907	9
KN	1,271	6

FU-AA-BY Forman-Aastad-Buse: Nearly level to steep, well drained and moderately well drained, loamy soils formed in glacial till.

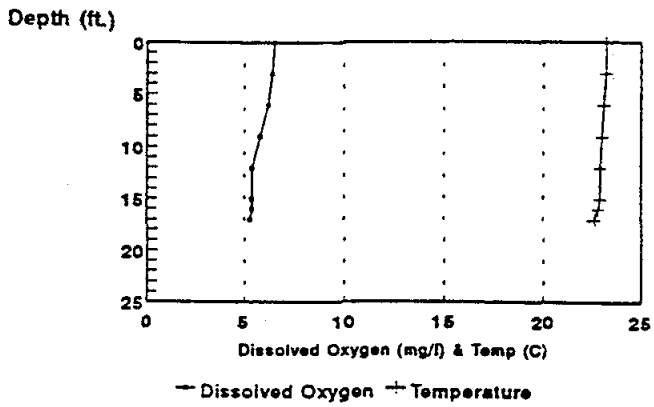
FU-PN Forman-Poinsett: Nearly level to rolling, well drained loamy silty soils formed in glacial drift.

KN Kransburg: Nearly level to sloping, well drained, silty soils formed in loess over glacial till.

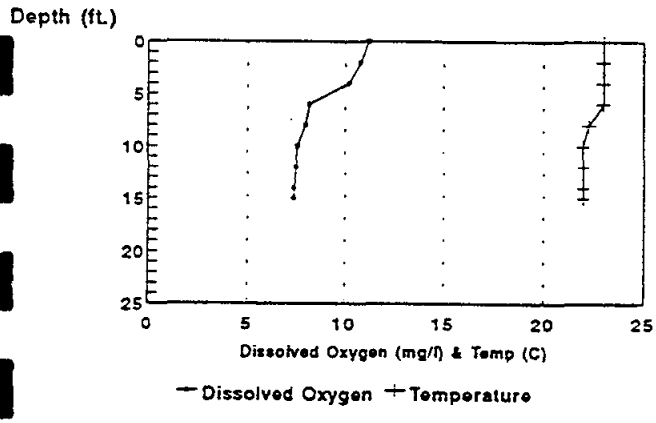
WHITE LAKE DAM 7/7/93
Dissolved Oxygen & Temperature Profile



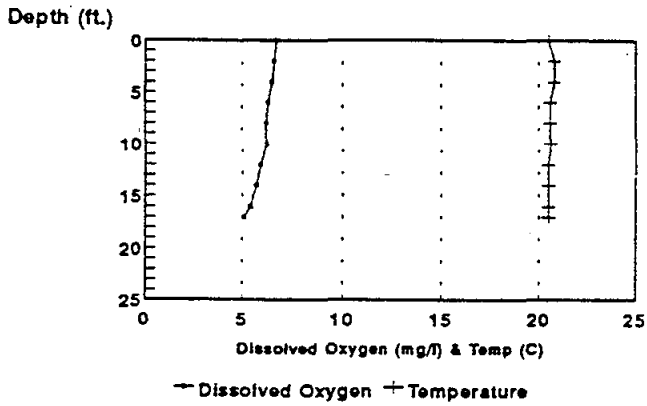
WHITE LAKE DAM 8/17/93
Dissolved Oxygen & Temperature Profile



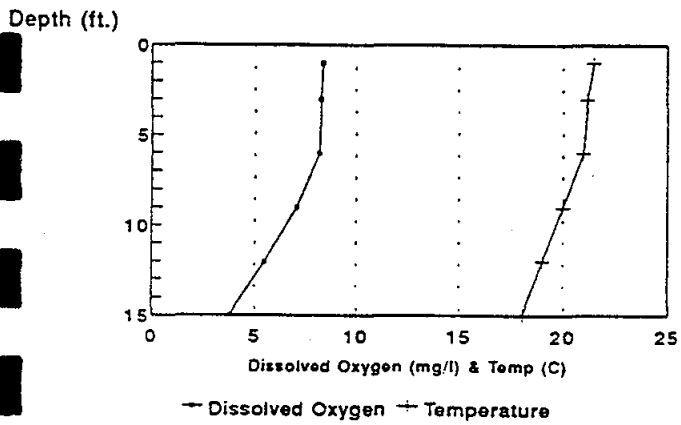
WHITE LAKE DAM 6/26/91
Dissolved Oxygen & Temperature Profile



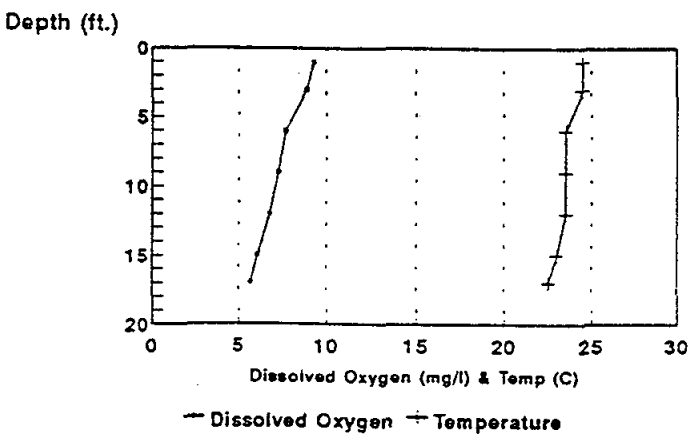
WHITE LAKE DAM 9/10/91
Dissolved Oxygen & Temperature Profile



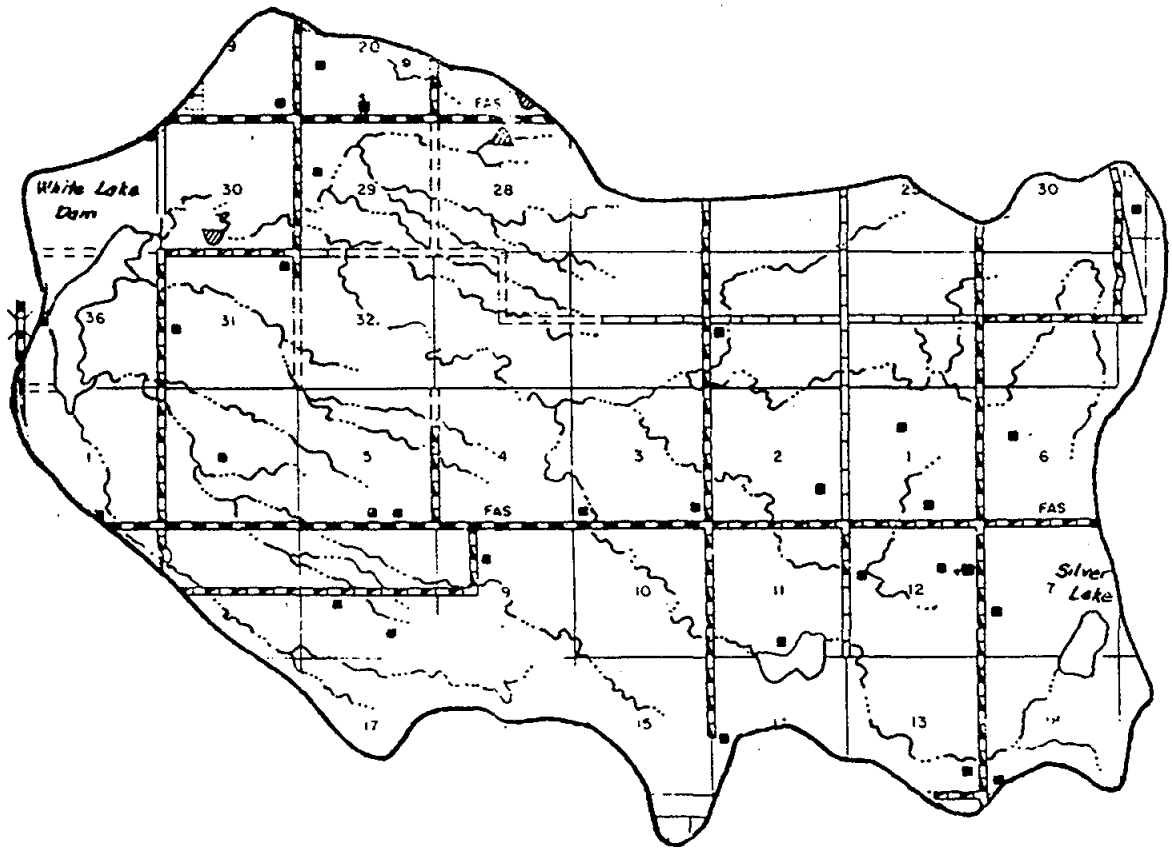
White Lake Dam 6/28/89
Dissolved Oxygen & Temperature Profile



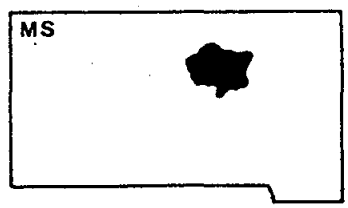
White Lake Dam 7/26/89
Dissolved Oxygen & Temperature Profile



White Lake



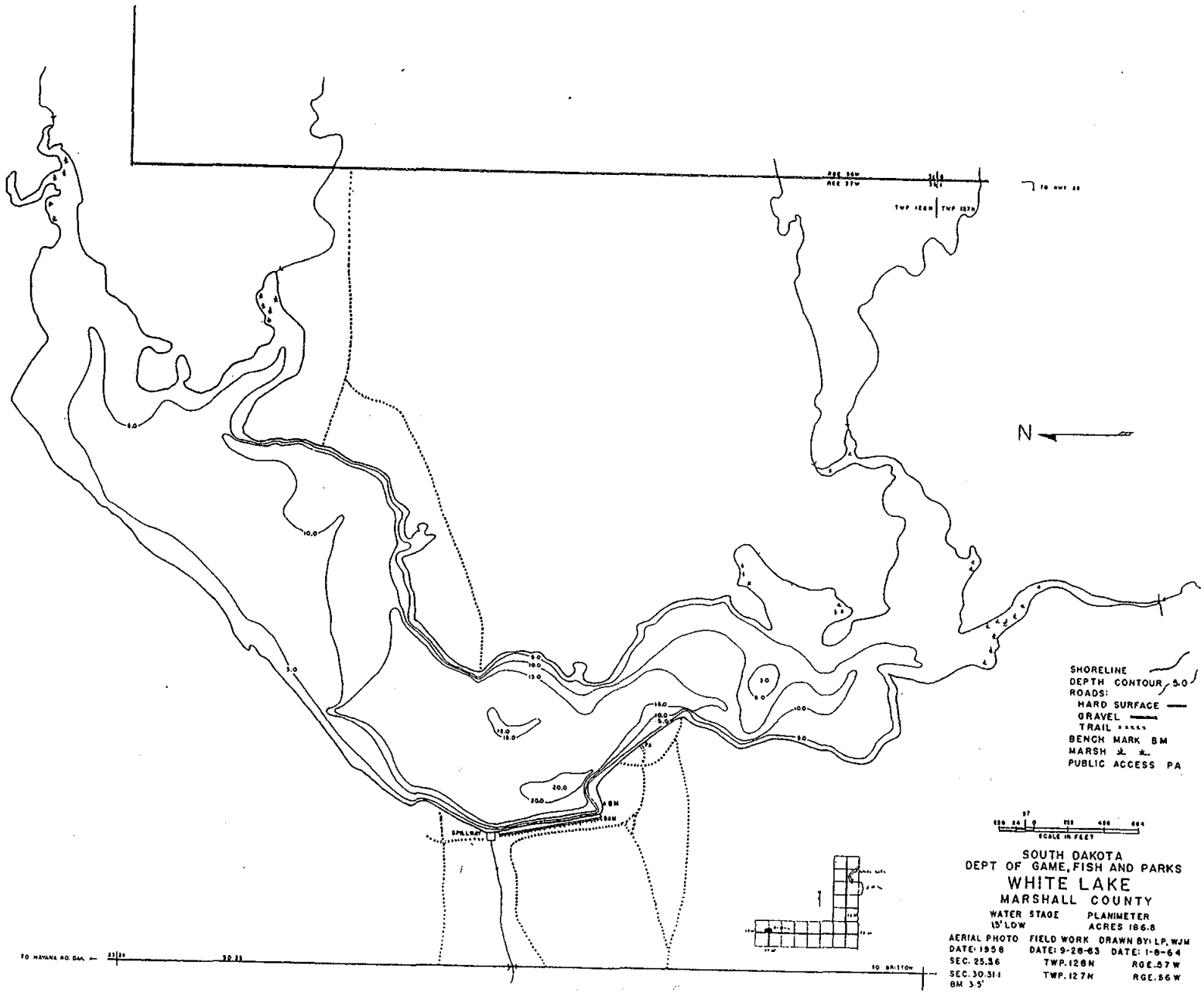
21,184 acres



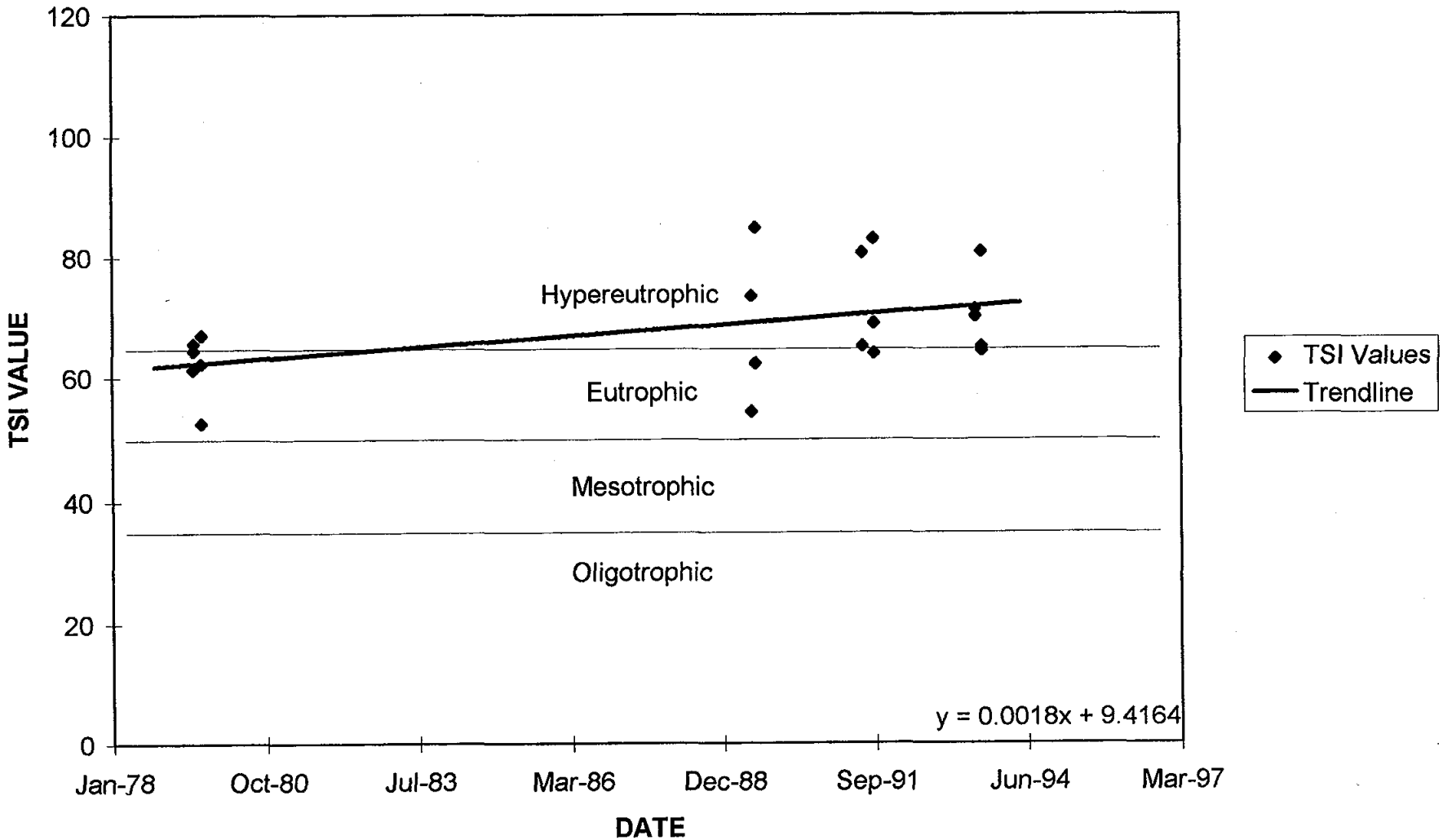
Scale

0 1 2 3 4 5 6 7

Miles


N
SHORELINE
DEPTH CONTOUR 5.0
ROADS:
HARD SURFACE
GRAVEL
TRAIL
BENCH MARK BM
MARSH
PUBLIC ACCESS PA
SPILLWAY
SCALE IN FEET
SOUTH DAKOTA
DEPT OF GAME, FISH AND PARKS
WHITE LAKE
MARSHALL COUNTY
WATER STAGE 15' LOW
PLANIMETER ACRES 186.8
AERIAL PHOTO DATE: 1958
FIELD WORK DATE: 9-26-63 DATE: 1-8-64
DRAWN BY: LP, WJM
SEC. 25,36 TWP. 128N RGE. 57W
SEC. 30,31 TWP. 127N RGE. 56W
BM 3.5'

WHITE LAKE DAM TSI's



WHITEWOOD LAKE

County: Kingsbury
Latitude: 44 deg. 20 min. 20 sec. N
Longitude: 97 deg. 18 min. 26 sec. W
Area: 4,967 A (2010.9 ha)
Maximum Depth: NA
Volume: NA
Origin of Basin: natural
Major Inflows (named or permanent streams): unnamed
Outlet: unnamed

Township: 110N
Range: 53, 54W
Section(s): 18,19,9-21, 29-30
Shoreline L: 18.6 mi (29.9 km)
Mean Depth: NA
Watershed/Lake Area: 21
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(6) Warmwater marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 196,590
Ownership Status: State owned
Public Interest: NA

	1989		1991		1991	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	19.85	4	22.00	4	21.45
Air Temperature (°C)	4	23.75	4	20.50	4	23.60
Secchi Disk Depth (meters)	2	0.91	2	0.34	2	0.27
Conductivity (cond/25° C)	4	1,068	2	1,110	-	-
Turbidity (NTU)	-	-	-	-	4	29.49
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	8.85	4	8.65	4	8.55
Total Alkalinity (mg/l)	4	307	4	315	4	278
Total Solids (mg/l)	4	849	4	784	4	800
Dissolved Solids (mg/l)	4	837	4	741	4	761
Suspended Solids (mg/l)	4	13	4	43	4	40
Volatile Suspended Solids (mg/l)	-	-	2	16	-	-
Ammonia Nitrogen (mg/l)	4	0.24	4	0.10	4	0.14
Nitrate + Nitrite Nitrogen (mg/l)	4	0.13	4	0.55	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	2.19	4	2.84	4	2.15
Total Phosphorus (mg/l)	4	0.672	4	0.725	4	0.361
Total Dissolved Phosphorus (mg/l)	-	-	4	0.525	4	0.278
Ortho Phosphate as P (mg/l)	4	0.499	-	-	-	-
Chlorophyll (mg/m^3)	-	-	2	80.40	2	65.66

Year	1989	1991	1994
TSI Values -- Mean:	79.38	82.84	79.90
Secchi Disk	61.29	75.76	78.89
Total Phosphorus	97.47	99.15	89.19
Chlorophyll *a*		73.61	71.62

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 13%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: NA

Algal Species and Densities

July 24, 1989

Taxa	Number	Units/ml
Aphanizomenon flos-aquae	241	6,745
Aphanocapsa	39	1,092
Lyngbya	5	140
Chroococcus	5	140
Blue-green (other)	4	112
Algae (other)	4	112
Merismopedia	2	56
Diatom (centric)	1	28
Total	301	8,425

Watershed Description

Watershed Area: 106,134 A (40,942 ha)

Soil Associations within Watershed

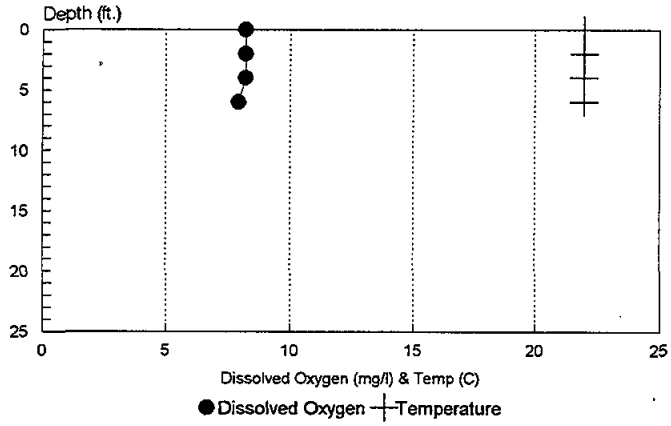
Association	Area (A)	% of Total
#1	61,307	61
#2	39,455	39

#1 Poinsett-Waubay-Buse: Well drained and moderately well drained, nearly level to gently rolling, silty and loamy soils on till plains and moraines.

#2 Poinsett-Hetland: Well drained and moderately well drained, nearly level to gently rolling, silty soils on till plains, moraines, and ice-walled lake plains.

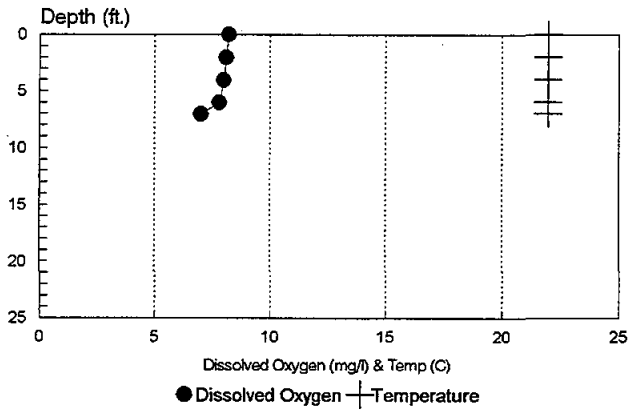
WHITEWOOD LAKE 7/9/91

Dissolved Oxygen & Temperature Profile



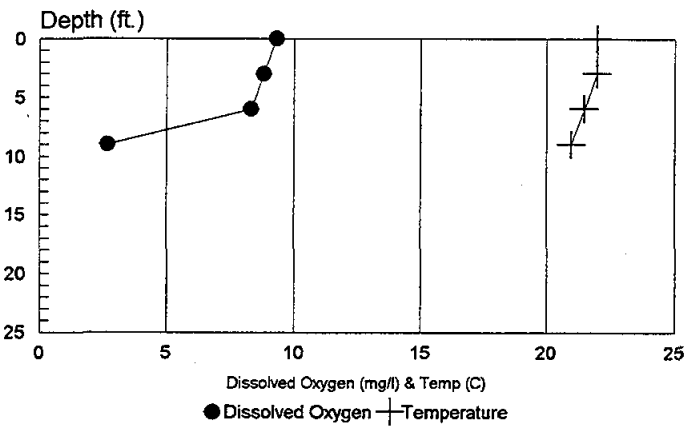
WHITEWOOD LAKE 8/19/91

Dissolved Oxygen & Temperature Profile



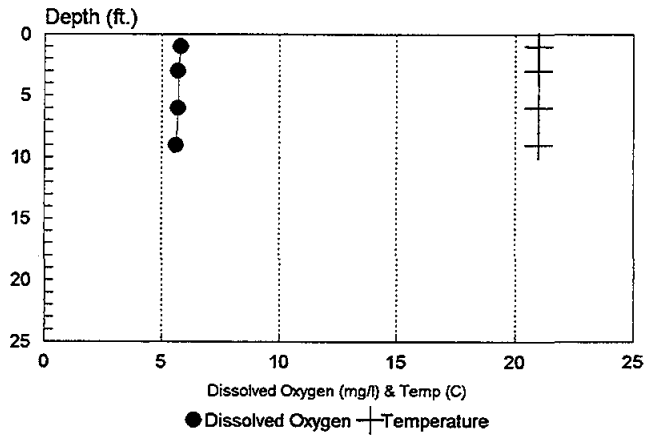
WHITEWOOD LAKE 6/21/94

Dissolved Oxygen & Temperature Profile

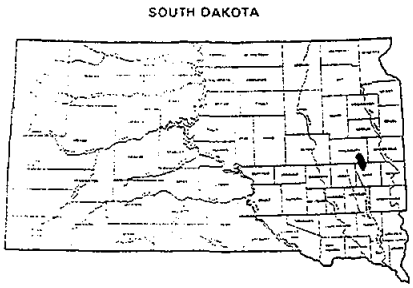


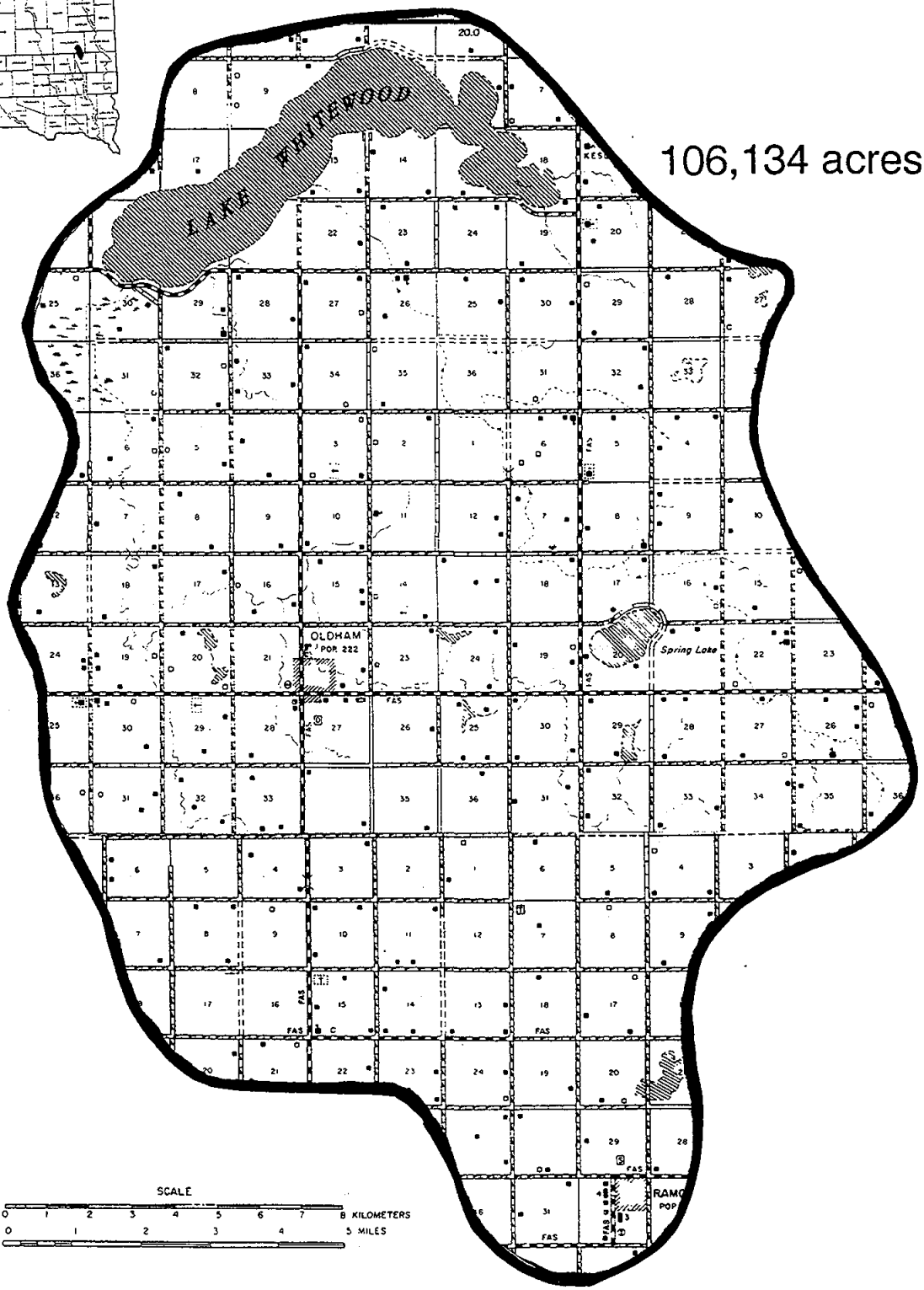
WHITEWOOD LAKE 8/23/94

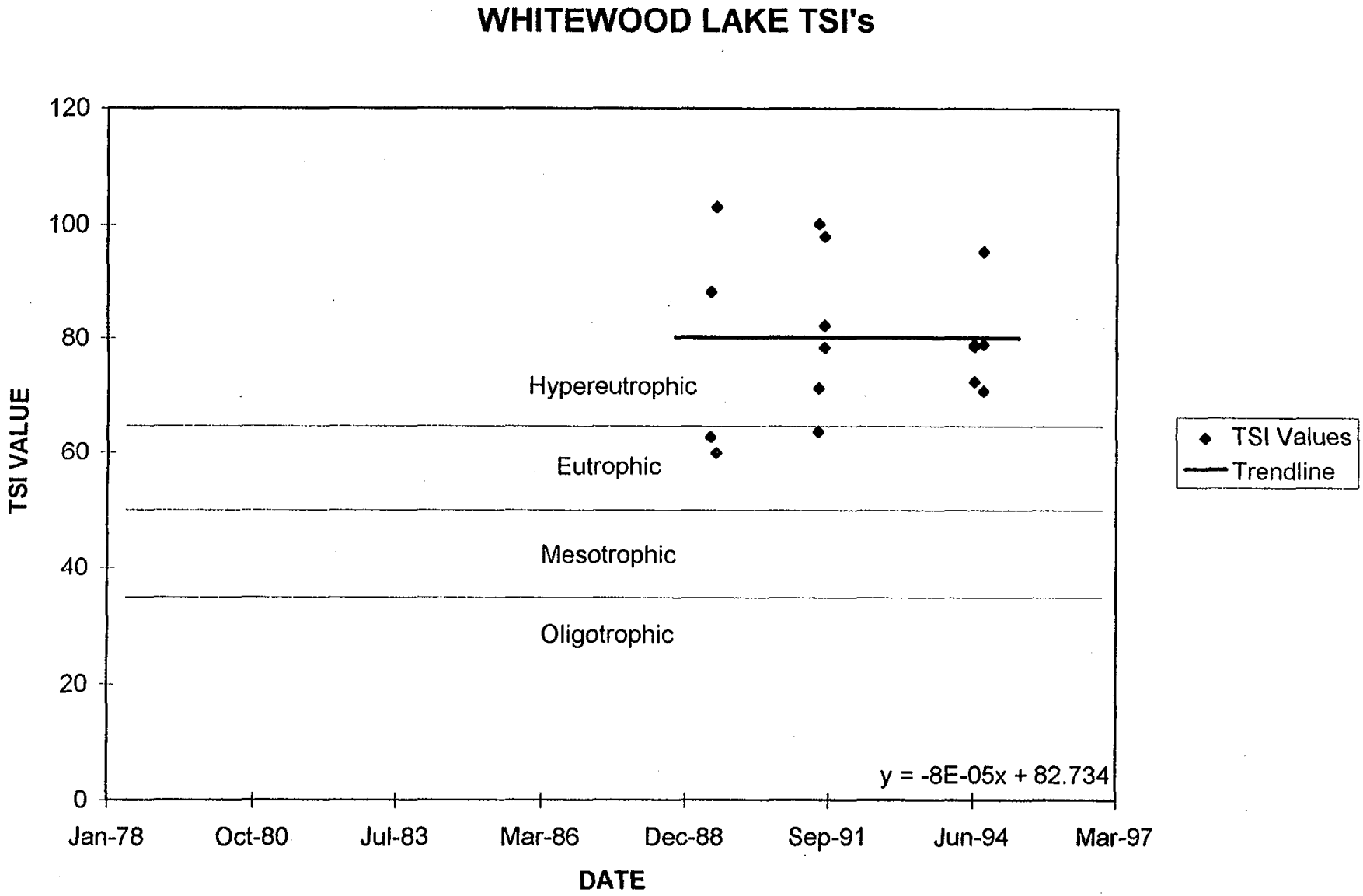
Dissolved Oxygen & Temperature Profile



Lake Whitewood






WHITEWOOD LAKE TSI's
120
100
80
60
40
20
0
TSI VALUE
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic
y = -8E-05x + 82.734
Jan-78
Oct-80
Jul-83
Mar-86
Dec-88
Sep-91
Jun-94
Mar-97
DATE
TSI Values
Trendline

WILMARTH LAKE

County: Aurora
Township: 105N
Latitude: 43 deg. 51 min. 30 sec. N
Range: 65W
Longitude: 98 deg. 34 min. 48 sec. W
Section(s): 35, 36
Area: 103.7 A (42.0 ha)
Shoreline L: 3.2 mi (5.1 km)
Maximum Depth: 26 ft (7.9 m)
Mean Depth: 11 ft (3.4 m)
Volume: 1026.7 acre-ft ($1.267 \times 10^6 m^3$)
Watershed/Lake Area: 336
Origin of Basin: impoundment
Thermal Stratification: yes
Major Inflows (named or permanent streams): West Fork & East Fork of Firesteel Creek
Outlet: Firesteel Creek

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 112,443
Ownership Status: State owned
Public Interest: NA

	1989		1991		1992	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	22.25	6	24.50	4	20.92
Air Temperature (°C)	4	24.50	6	34.44	4	26.94
Secchi Disk Depth (meters)	2	0.99	3	1.11	2	2.25
Conductivity (cond/25° C)	4	1,338	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	4	8.90	-	-	-	-
Field pH (su)	3	9.13	4	8.46	4	8.74
Total Alkalinity (mg/l)	4	229	-	-	-	-
Total Solids (mg/l)	4	1,099	-	-	-	-
Dissolved Solids (mg/l)	4	1,082	-	-	-	-
Suspended Solids (mg/l)	4	18	6	10	4	7
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	4	0.06	6	0.17	4	0.05
Nitrate + Nitrite Nitrogen (mg/l)	4	0.15	6	0.00	4	0.01
Total Kjeldahl Nitrogen (mg/l)	4	1.39	6	1.37	4	1.27
Total Phosphorus (mg/l)	4	0.787	6	1.065	4	0.947
Total Dissolved Phosphorus (mg/l)	-	-	6	0.996	4	0.862
Ortho Phosphate as P (mg/l)	4	0.547	-	-	-	-
Chlorophyll (mg/m^3)	-	-	6	16.40	3	7.74

	1993		1994		1995	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	6	22.86	6	22.33	6	23.39
Air Temperature (°C)	6	20.50	6	22.06	6	30.17
Secchi Disk Depth (meters)	3	1.18	9	2.00	8	1.19
Conductivity (cond/25° C)	-	-	-	-	-	-
Turbidity (NTU)	-	-	-	-	-	-
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	6	7.89	6	8.27	6	8.45
Total Alkalinity (mg/l)	-	-	-	-	-	-
Total Solids (mg/l)	-	-	-	-	-	-
Dissolved Solids (mg/l)	-	-	-	-	-	-
Suspended Solids (mg/l)	6	4	6	5	6	6
Volatile Suspended Solids (mg/l)	-	-	-	-	-	-
Ammonia Nitrogen (mg/l)	6	0.22	6	0.11	6	0.24
Nitrate + Nitrite Nitrogen (mg/l)	6	0.03	6	0.07	6	0.11
Total Kjeldahl Nitrogen (mg/l)	6	1.30	6	1.11	6	1.74
Total Phosphorus (mg/l)	6	1.182	6	0.764	6	0.746
Total Dissolved Phosphorus (mg/l)	6	1.123	6	0.739	6	0.692
Ortho Phosphate as P (mg/l)	-	-	-	-	-	-
Chlorophyll (mg/m^3)	6	15.97	6	15.97	6	22.39

Year	1989	1991	1992	1993	1994	1995
TSI Values -- Mean:	80.19	73.23	66.83	71.18	69.07	72.04
Secchi Disk	60.14	58.93	48.33	53.39	49.96	57.46
Total Phosphorus	100.25	102.75	101.51	102.39	99.49	97.60
Chlorophyll *a*		58.01	50.65	57.75	57.75	61.07

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 70%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton foliosus, P. zosteriformis, P. richardsonii, and P. pectinatus

Algal Species and Densities

Taxa	July 6, 1989 Number	July 6, 1989 Units/ml	August 7, 1989 Number	August 7, 1989 Units/ml
Aphanizomenon flos-aquae	71	2,181	4	133
Algae (other)	25	768	25	832
Melosira granulata	10	307	-	-
Glenodinium Gymnodinium	9	276	126	4,193
Cryptomonas sp. #1	8	246	28	932
Closterium	7	215	-	-
Characium	6	184	-	-
Chroococcus	5	154	3	100
Lyngbya	4	123	-	-
Oocystis	3	92	-	-
Anabaena	2	61	19	632
Pediastrum	1	31	-	-
Staurastrum	1	31	-	-
Aphanocapsa	1	31	-	-
Green Algae (other)	1	31	2	67
Cryptomonas	1	31	-	-
Aphanocapsa	-	-	68	2,263
Algae (flagellate)	-	-	8	266
Diatom (centric)	-	-	7	233
Dactylococcopsis	-	-	3	100
Blue-green (other)	-	-	2	67
Scenedesmus	-	-	2	67
Total	155	4,762	300	9,983

Watershed Description

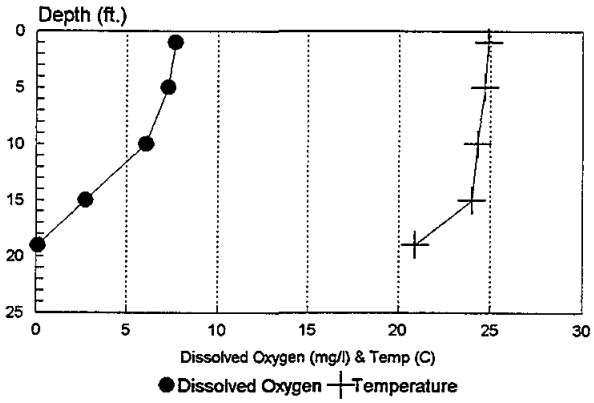
Watershed Area: 34,812 A (14,088 ha)

Soil Associations within Watershed

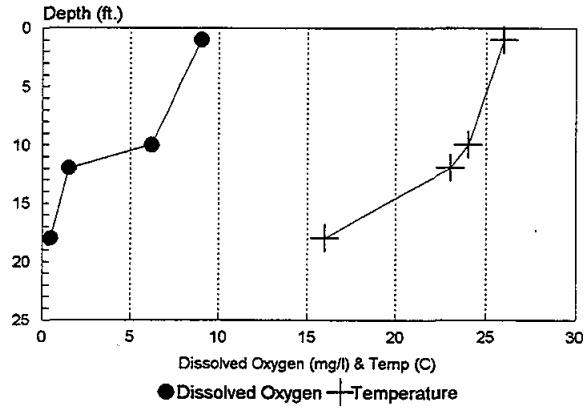
Association	Area (A)	% of Total
HR-S4	15,979	45.9
H3-EA	4,560	13.1
HR-PR	3,412	9.8
EV-CY-B3	3,412	9.8
CY-EU	3,412	9.8
EN-DB	2,820	8.1
CW-LC-B9	627	1.8

HR-S4	Houdek-Stickney: Nearly level, deep, well drained loamy soils and moderately well drained soils with compact clayey subsoils that formed on glacial till; on uplands.
H3-EA	Highmore-Eakin: Nearly level to sloping, deep, well drained silty soils that formed in glacial drift; on uplands.
HR-PR	Houdek-Prosper: Nearly level, deep, well drained and moderately well drained loamy soils that formed in glacial till; on uplands.
EU-CY-B3	Ethan-Clarno-Betts: Undulating to hilly, well drained to excessively drained soils.
CY-EU	Clarno-Ethan: Gently undulating to rolling, deep well drained loamy soils that formed in glacial till; on uplands.
EN-DB	Enet-Delmont: Nearly level to sloping, well drained and somewhat excessively drained loamy soils that are moderately deep and shallow over sand and gravel.
CW-LC-BO	Clamo-Lamo-Bon: Nearly level, deep, silty and loamy, moderately well drained to poorly drained soils that formed in alluvium; on bottom lands.

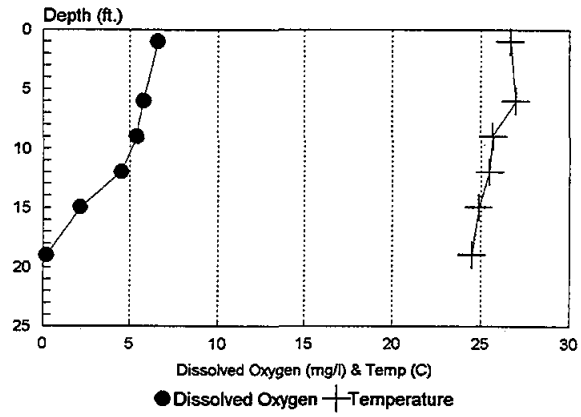
WILMARTH LAKE 7/29/79
Dissolved Oxygen & Temperature Profile



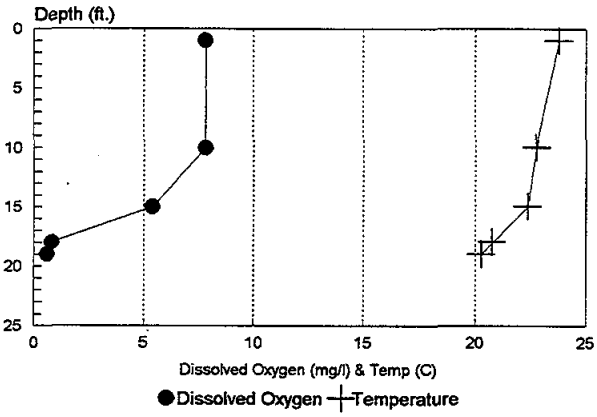
WILMARTH LAKE 6/20/91
Dissolved Oxygen & Temperature Profile



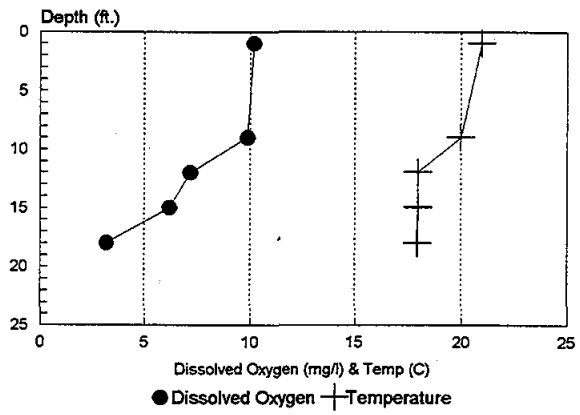
WILMARTH LAKE 7/20/91
Dissolved Oxygen & Temperature Profile



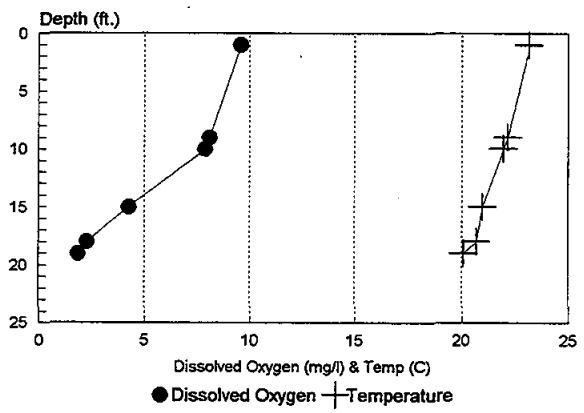
WILMARTH LAKE 8/19/91
Dissolved Oxygen & Temperature Profile



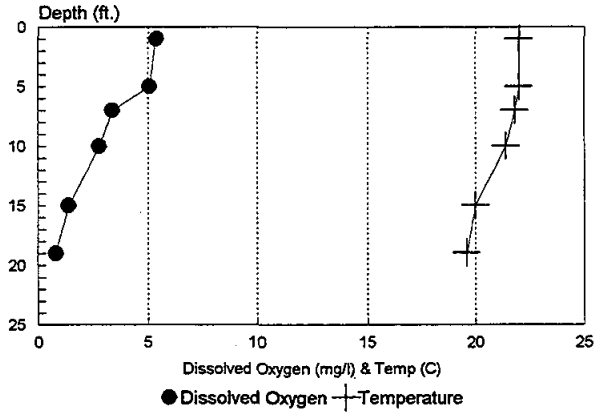
WILMARTH LAKE 6/11/92
Dissolved Oxygen & Temperature Profile



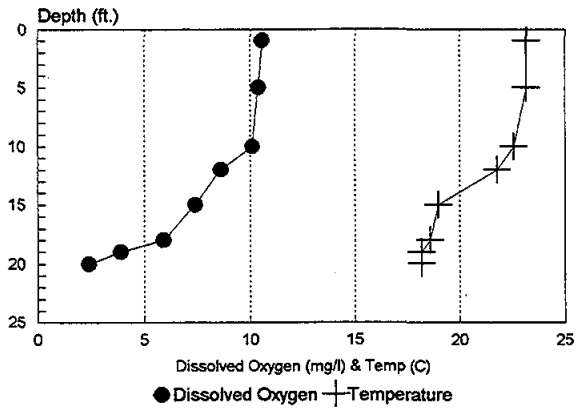
WILMARTH LAKE 7/15/92
Dissolved Oxygen & Temperature Profile



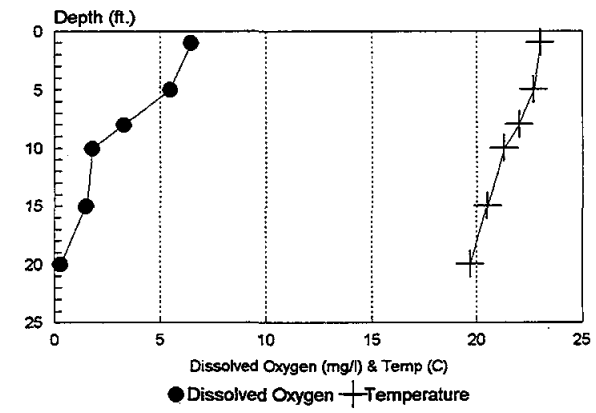
WILMARTH LAKE 8/13/92
Dissolved Oxygen & Temperature Profile



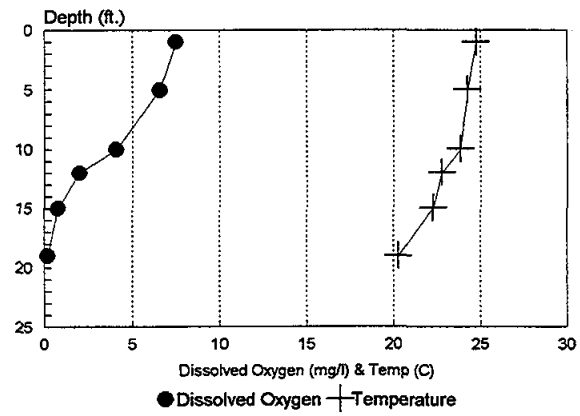
WILMARTH LAKE 6/12/93
Dissolved Oxygen & Temperature Profile



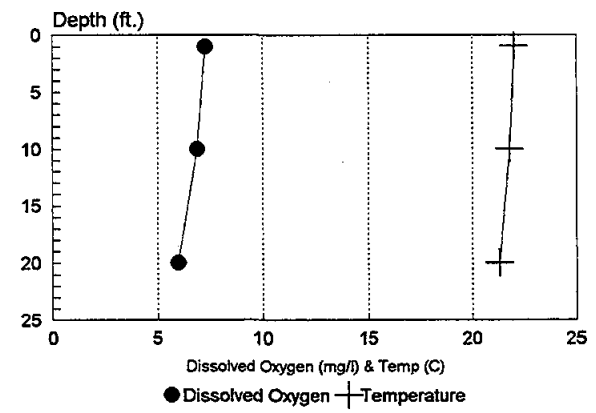
WILMARTH LAKE 7/20/93
Dissolved Oxygen & Temperature Profile



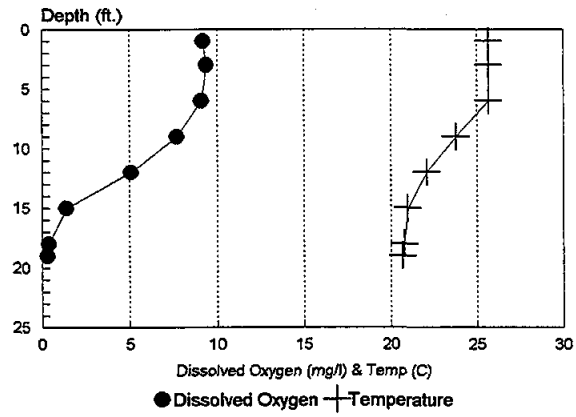
WILMARTH LAKE 8/18/93
Dissolved Oxygen & Temperature Profile



WILMARTH LAKE 6/11/94
Dissolved Oxygen & Temperature Profile

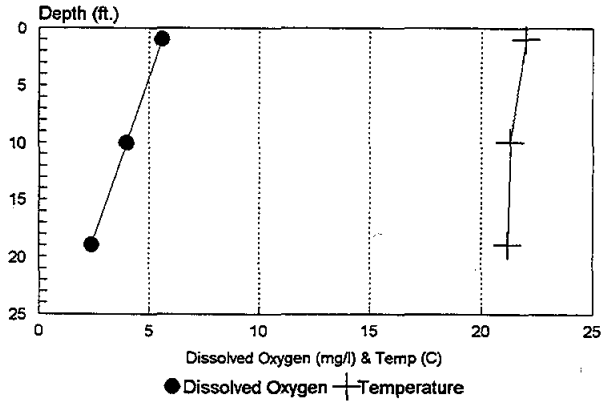


WILMARTH LAKE 7/13/94
Dissolved Oxygen & Temperature Profile



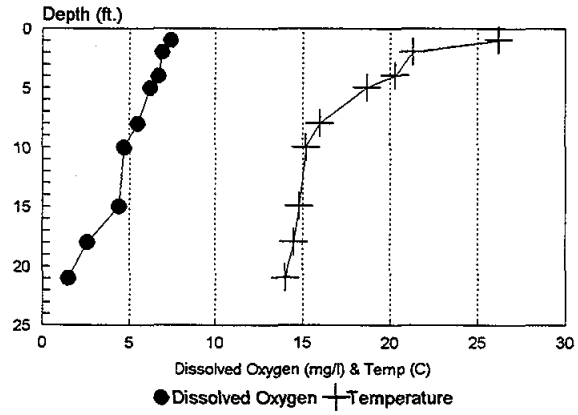
WILMARTH LAKE 8/13/94

Dissolved Oxygen & Temperature Profile



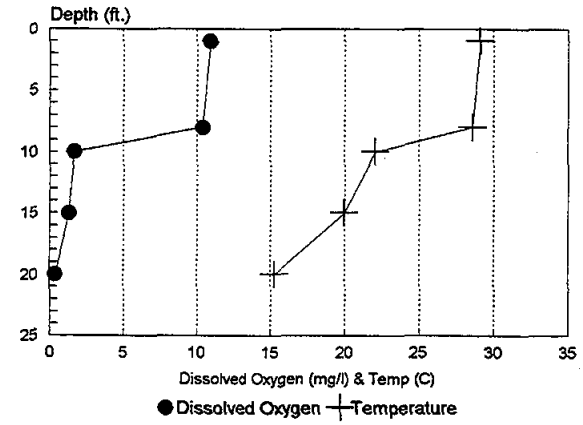
WILMARTH LAKE 6/13/95

Dissolved Oxygen & Temperature Profile



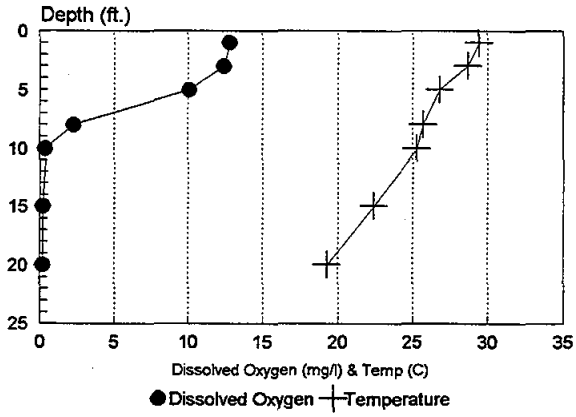
WILMARTH LAKE 7/13/95

Dissolved Oxygen & Temperature Profile



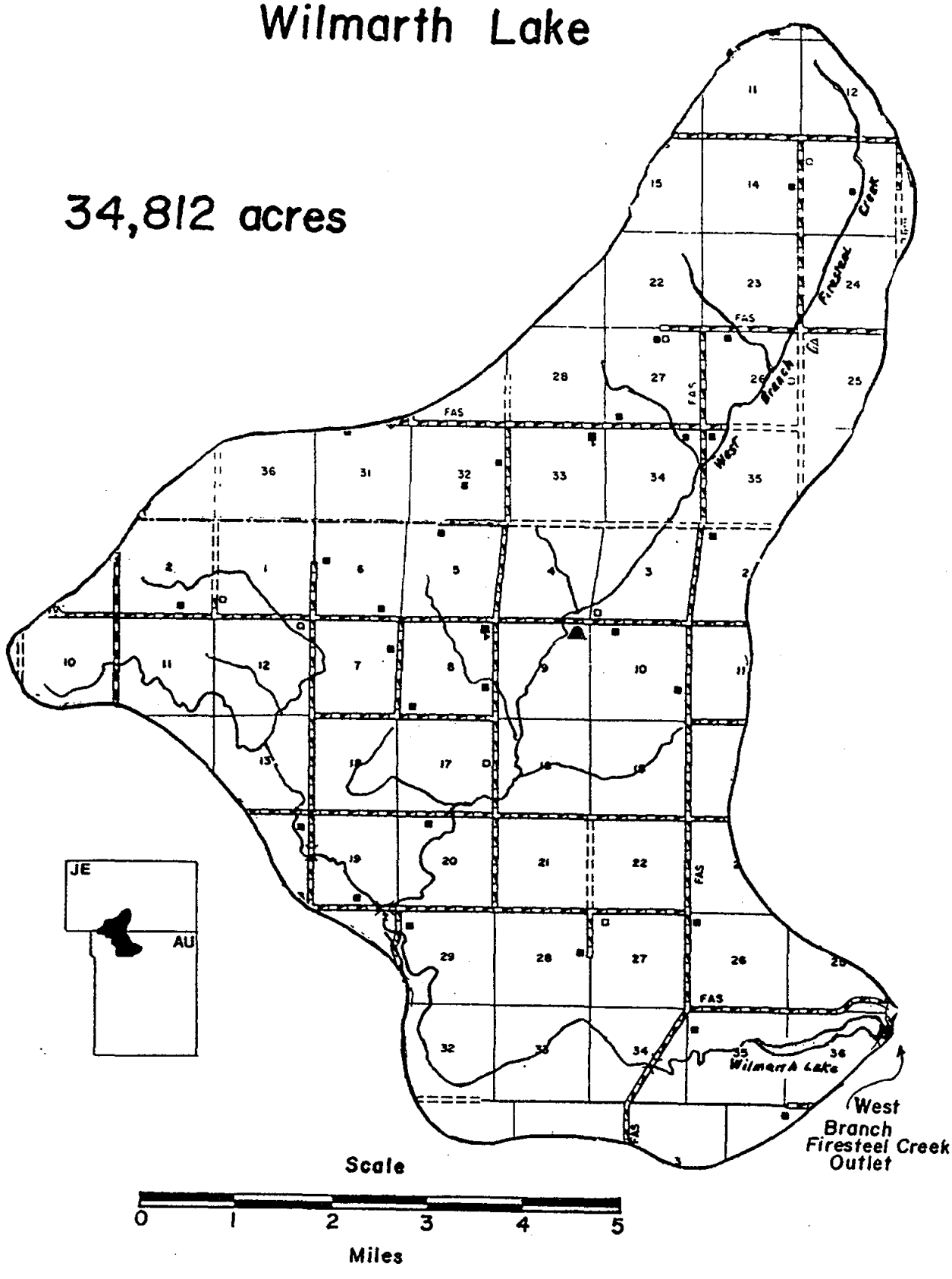
WILMARTH LAKE 8/11/95

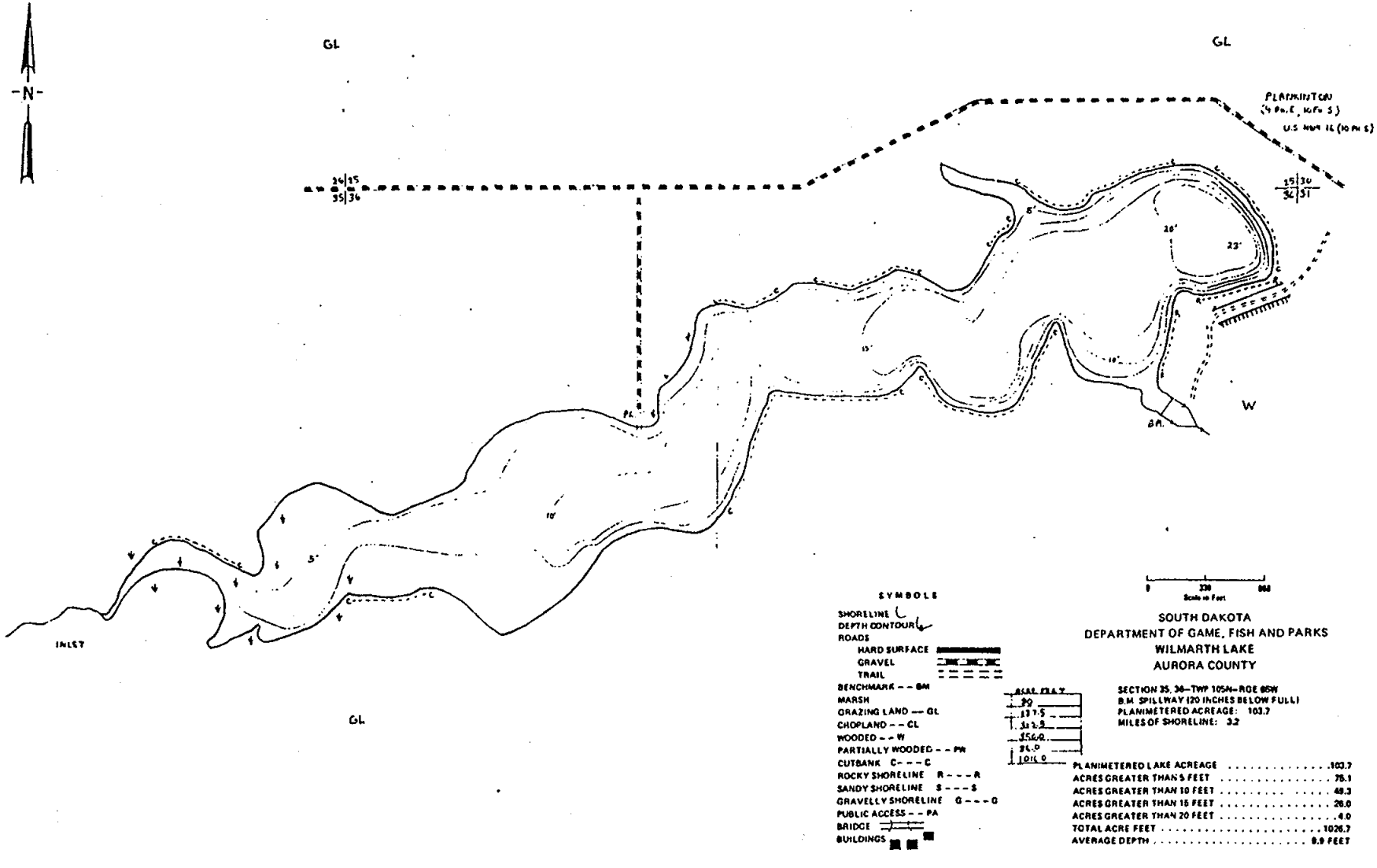
Dissolved Oxygen & Temperature Profile



Wilmarth Lake

34,812 acres



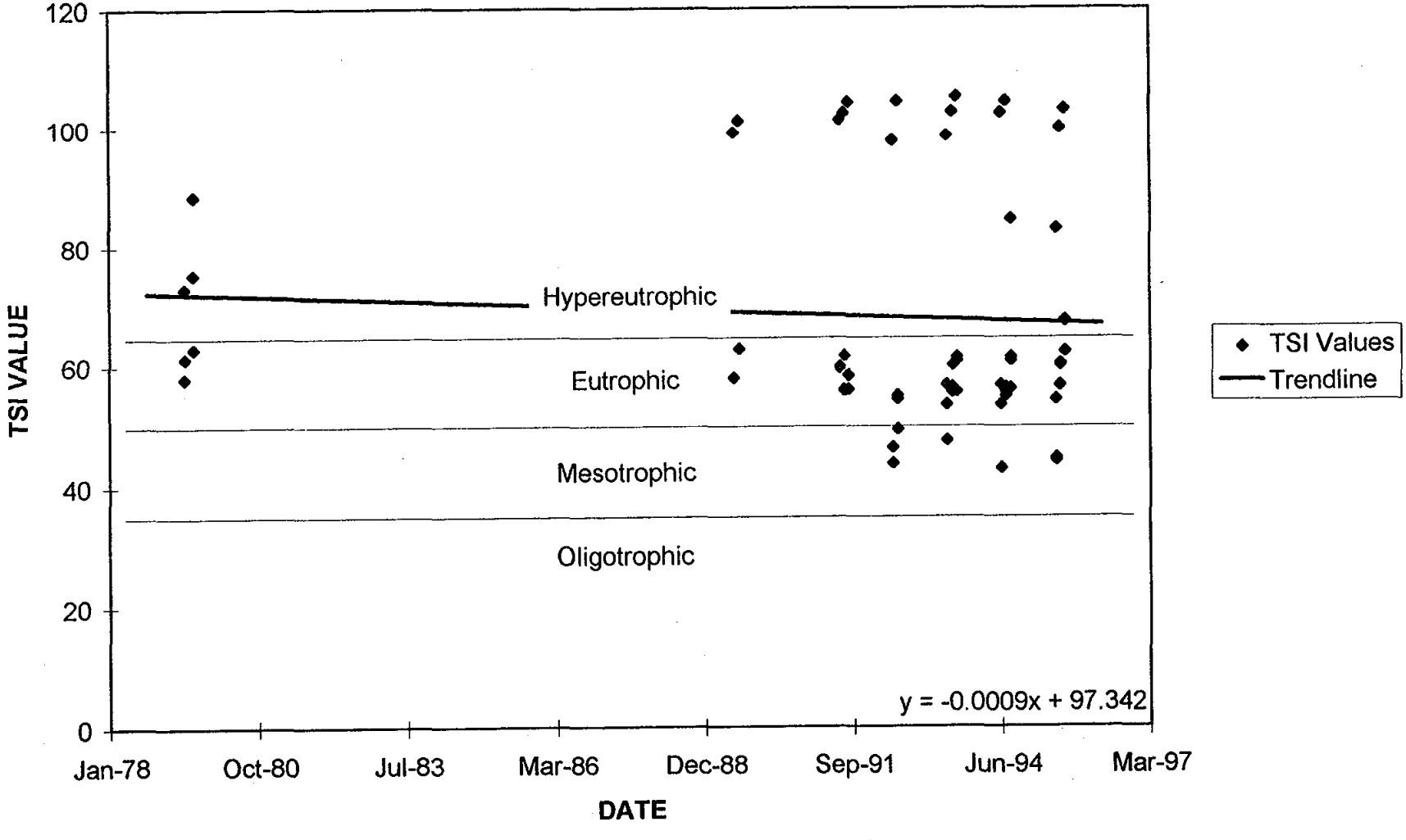


SOUTH DAKOTA
DEPARTMENT OF GAME, FISH AND PARKS
WILMARTH LAKE
AURORA COUNTY

SECTION 35, 36—TWP 105N—RGE 65W
B.M. SPILLWAY (20 INCHES BELOW FULL)
PLANIMETERED ACREAGE: 103.7
MILES OF SHORELINE: 3.2

PLANIMETERED LAKE ACREAGE	103.7
ACRES GREATER THAN 5 FEET	75.1
ACRES GREATER THAN 10 FEET	48.3
ACRES GREATER THAN 15 FEET	26.0
ACRES GREATER THAN 20 FEET	4.0
TOTAL ACRE FEET	1026.7
AVERAGE DEPTH	9.9 FEET

WILMARTH LAKE TSI's



LAKE YANKTON

County: Yankton
Latitude: 42 deg. 51 min. 36 sec. N
Longitude: 97 deg. 28 min. 42 sec. W
Area: 250 A (101.2 ha)
Maximum Depth: 12.1 ft (3.7 m)
Volume: 1750 acre-ft (2.159 x $10^6 m^3$)
Origin of Basin: impoundment
Major Inflows (named or permanent streams): Missouri River
Outlet: Missouri River

Township: 93N
Range: 56W
Section(s): 17
Shoreline L: 4.9 mi (8 km)
Mean Depth: 6.9 ft (2.1 m)
Watershed/lake Area: 19
Thermal Stratification: no

Lake Use

Beneficial Use Classification:
(4) Warmwater permanent fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Estimated Population within 65-mile Radius: 366,312
Ownership Status: Federally owned
Public Interest: NA

	1989		1991		1994	
Chemical Parameters	Samples	Results	Samples	Results	Samples	Results
Water Temperature (°C)	4	20.35	3	22.83	4	24.15
Air Temperature (°C)	4	26.75	3	19.33	4	30.00
Secchi Disk Depth (meters)	2	1.25	2	1.45	2	1.64
Conductivity (cond/25° C)	4	988	1	874	-	-
Turbidity (NTU)	-	-	-	-	4	2.83
Lab pH (su)	-	-	-	-	-	-
Field pH (su)	4	7.65	3	8.32	4	8.15
Total Alkalinity (mg/l)	4	154	3	124	4	118
Total Solids (mg/l)	4	779	3	705	4	706
Dissolved Solids (mg/l)	4	769	3	664	4	699
Suspended Solids (mg/l)	4	10	3	41	4	7
Volatile Suspended Solids (mg/l)	-	-	1	6	-	-
Ammonia Nitrogen (mg/l)	4	0.10	3	0.02	4	0.02
Nitrate + Nitrite Nitrogen (mg/l)	4	0.10	3	0.57	4	0.10
Total Kjeldahl Nitrogen (mg/l)	4	0.46	3	0.38	4	0.31
Total Phosphorus (mg/l)	4	0.057	3	0.029	4	0.02
Total Dissolved Phosphorus (mg/l)	-	-	3	0.037	4	0.011
Ortho Phosphate as P (mg/l)	4	0.019	-	-	-	-
Chlorophyll (mg/m^3)	-	-	1	3.57	2	4.52

Year	1989	1991	1994
TSI Values -- Mean:	56.89	46.65	47.62
Secchi Disk	56.78	54.66	52.91
Total Phosphorus	57.00	42.22	44.59
Chlorophyll *a*		43.05	45.37

Aquatic Plants and Algae

Estimate of Shoreline and Emergent Vegetation Coverage: 80%
Type of Vegetation: cattail and bulrush

Floating Leaved and Submergent Plant Species Identified: Potamogeton crispus, P. nodosus, and Ceratophyllum demersum

Algal Species and Densities

	June 27, 1989		August 1, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Cyclotella ocellata	196	13,799	-	-
Diatom (pennate)	28	1,971	-	-
Algae (flagellate)	28	1,971	4	235
Algae (other)	26	1,830	63	3,694
Cryptomonas sp. #1	16	1,126	2	117
Aphanocapsa	4	282	34	1,993
Green Algae (other)	1	70	8	469
Blue-green (other)	1	70	-	-
Cryptomonas	-	-	5	293
Cryptomonas ovata	-	-	1	59
Total	300	21,121	117	6,860

Watershed Description
Watershed Area: 4,653 A (1,883 ha)

Soil Associations within Watershed

Association	Area (A)	% of Total
# 3	3,397	73.0
# 1	628	13.5
# 8	628	13.5

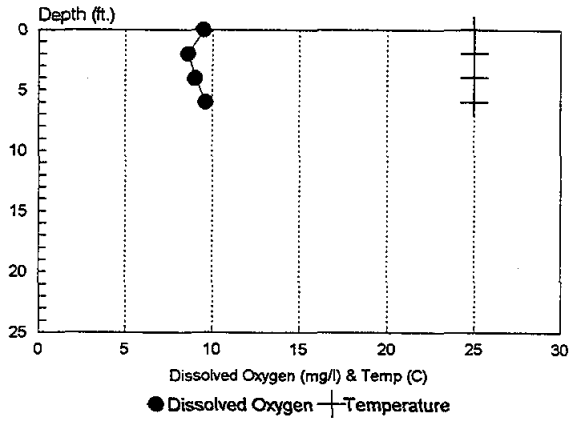
3 Ec — Egan-Wentworth: Deep, nearly level and gently sloping, well drained silty soils on uplands.

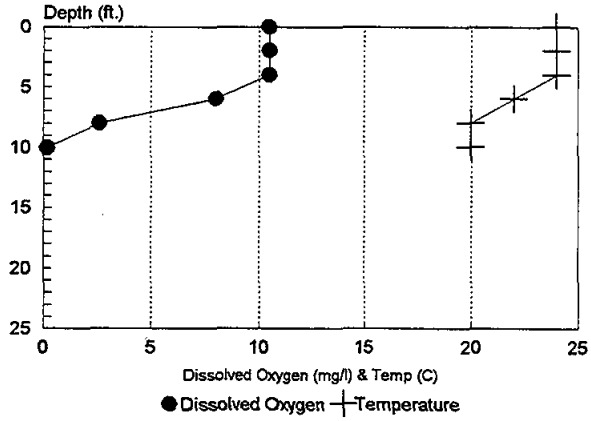
1 Ce-T — Clarno-Bonilla-Tetonka: Deep, nearly level to undulating, well drained, moderately well drained and poorly drained loamy and silty soils on uplands.

8 Fa-Ha-Sd — Forney-Haynie-Sarpy: Deep, nearly level and gently undulating, poorly drained to excessively drained silty and sandy soils on flood plains.

LAKE YANKTON 7/11/91

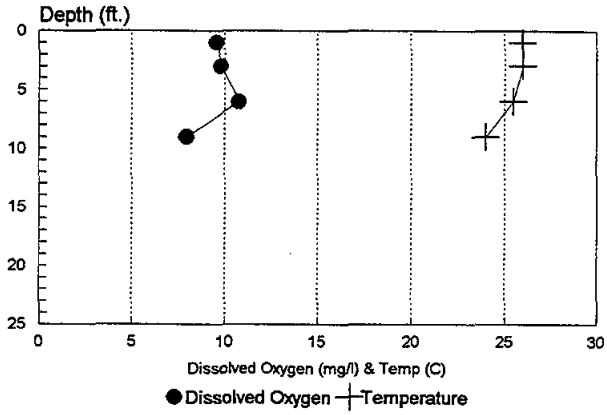
Dissolved Oxygen & Temperature Profile





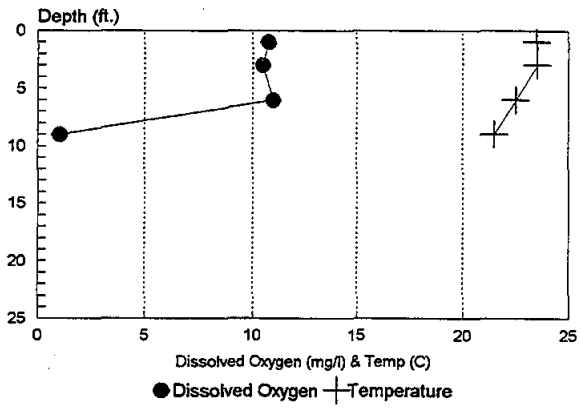
LAKE YANKTON 6/20/94

Dissolved Oxygen & Temperature Profile

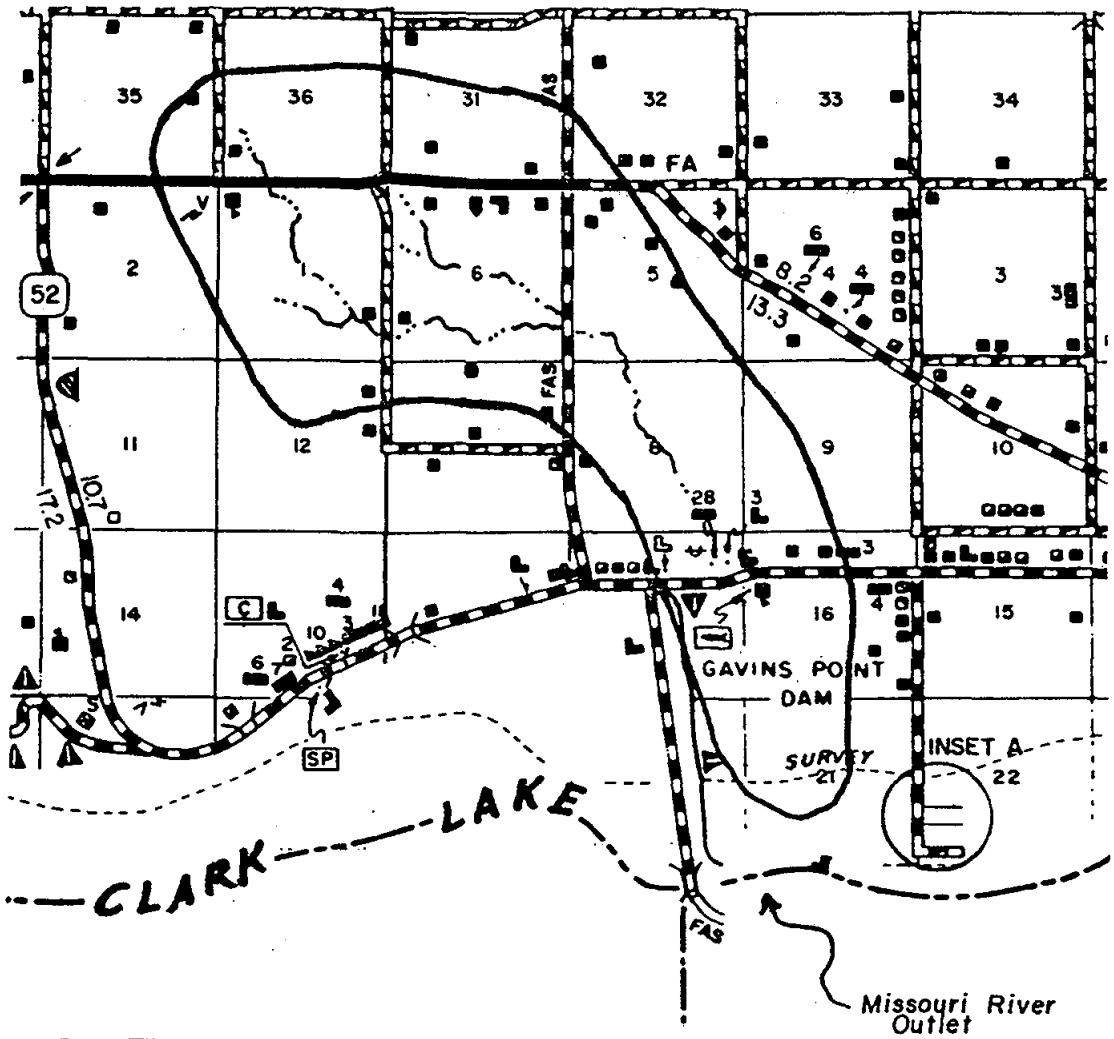


LAKE YANKTON 8/22/94

Dissolved Oxygen & Temperature Profile



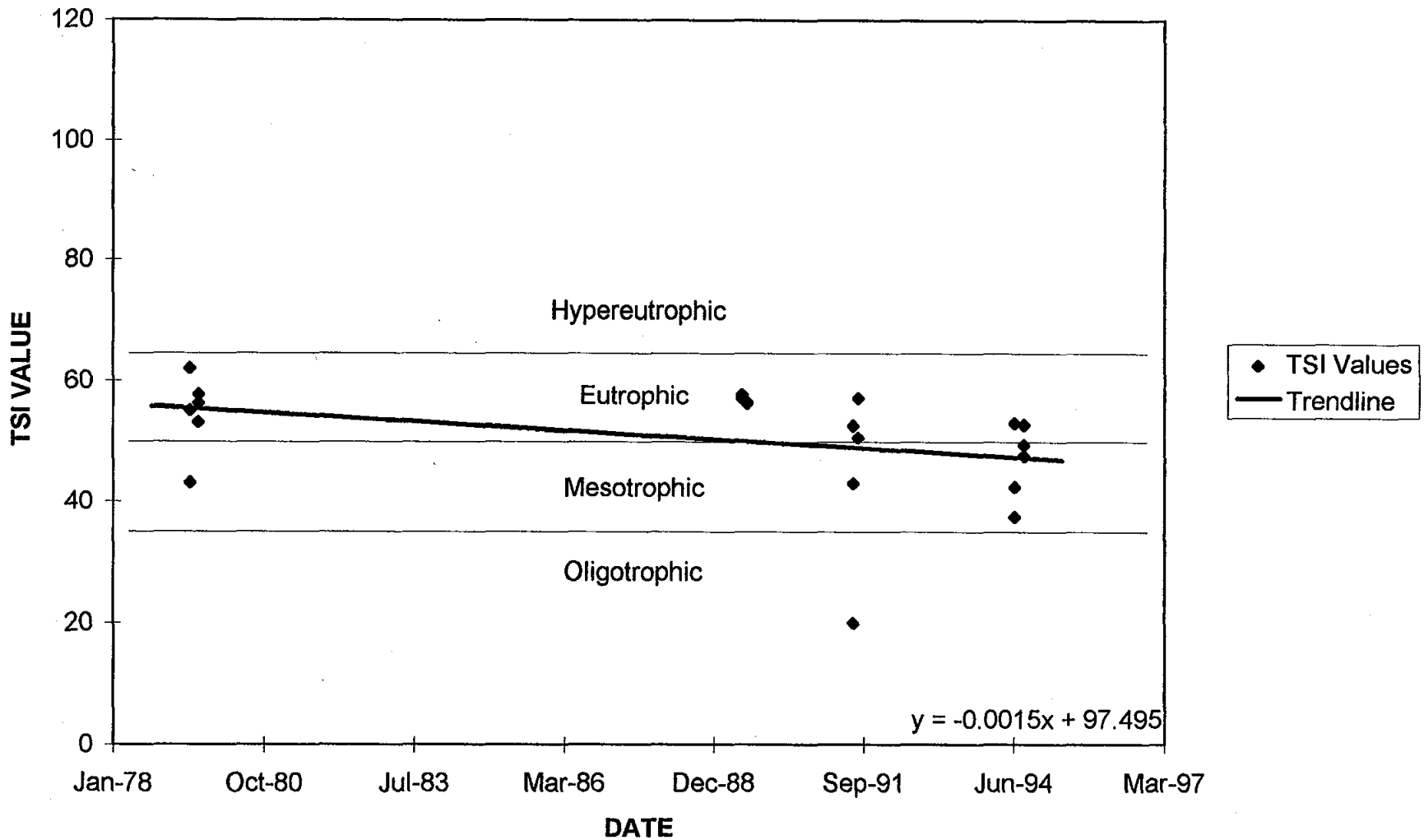
Lake Yankton



4653 acres

Scale

0 1 2 3 4 5

Miles

LAKE YANKTON TSI's