PHASE I - LAKE CLASSIFICATION

AND

MANAGEMENT RANKING PROJECT

MINNESOTA
POLLUTION CONTROL
AGENCY

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Division of Water Quality
Monitoring and Analysis Section

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INDEX OF DEFINITIONS

Mg/l	= Milligrams per liter
Ug/l	= Micrograms per liter
PT-CO Units	= Platinum/cobalt units
Phosphorus TSI (TSIP)	= Phosphorus Tropic State Index
Chlorophyll TSI (TSIC)	= Chorlophyll Trophic State Index
Secchi Disc TSI (TSIS)	= Secchi Disc Trophic State Index
Average TSI (AVTSI)	= Average Trophic State Index
TP	= Total Phosphorus
SD	= Secchi Disc
TN	= Total Nitrogen
Alk	= Alkalinity
LGPT	= Log of Total Phosphorus (Base 10)
LGSD	= Log of Secchi Disc (Base 10)
LGCHLA	= Log of Chlorophyll (Base 10)
Oligotrophic Lake	= Low fertility lake
Eutrophic Lake	= High fertility lake
Hypolimnion	= Bottom layer of a lake
Epilimnion	= Surface layer of a lake
Metalimnion	= Stratum between the hypolimnion and epilmnion
STORET	= Data Storage and Retrieval System

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MPCA personnel contributing to the project included Bruce Wilson, Patricia Fredrick, Bennett Davis, Mike Sommer, William Regan, Kris Satre, and Joel Schilling.

PROJECT SUMMARY

1. The project was established to provide methods for classification of Minnesota lake water quality and criteria for estimating lake management priorities.

2. Water chemistry, watershed characteristics and public benefit data were collected and analyzed for 154 lakes.

3. All data collected for this project were entered into the U.S. EPA Data Storage and Retrieval System (STORET), with all methods and procedures documented for future use.

4. The Carlson Trophic State Index (TSI) was adopted as the method of classifying lake water quality in Minnesota and was employed to classify 543 Minnesota lakes.

5. A lake management ranking was established to aid in the development of lake management strategies. The ranking system incorporates the water quality classification, watershed characteristics, and public benefit criteria to define restoration priority.

6. A detailed analysis of the use of LANDSAT in lake classification was undertaken by the Remote Sensing Laboratory of the University of Minnesota. Secchi disc and chlorophyll a were identified as reliable parameters to be used in the prediction of lake water quality.

RECOMMENDATIONS

1. Additional lake classification efforts should be undertaken as MPCA resources allow.

2. Efforts should be continued to enter as much accurate historical lake data as possible and all future lake water quality data into the MPCA STORET lake data computer file.

3. Lake management ranking should be continued only if specific funding is available to continue it, and there are state or federal resources available for lake restoration.

4. LANDSAT remote sensing should be utilized in future classification efforts due to its cost-effectiveness, utility and accuracy.

PROJECT SCOPE

Minnesota has approximately 12,000 publicly-owned freshwater lakes. The objective of this study was to quantify lake water quality in 150 selected lakes so that a base for establishment of a statewide lake classification index and management system could be developed. The goals of the study were:

1. To select pilot study lakes representative of Minnesota lake water quality;
2. To investigate the utility of using NASA satellites for remote sensing of Minneosta lake water quality.
3. To integrate data sources so as to maximize efforts, and to provide a complete data base;
4. To establish lake data storage and analysis procedures; and
5. To develop a statewide lake water quality classification and management system based on lake trophic status and public benefit.

INTRODUCTION

The Federal Water Pollution Control Act Amendments of 1972 (33 USC 1151, et seq.), Section 314(a), required each state to prepare and submit to the Administrator of the United States Environmental Protection Agency (USEPA) an identification and classification according to the trophic condition of all publicly-owned freshwater lakes. In addition, Section 314(b) allowed the Administrator to provide financial assistance to the states to carry out this mandate. Subsequent to this legislation, Congress enacted the Clean Water Act of 1977 (33 USC 1251, et seq.), which in part amended Section 314(b) and specifically mandated the Administrator to provide financial assistance to the states for the preparation of classification surveys. The USEPA recognized this requirement by notifying the states of the availability of grants for the purpose of satisfying Section 314(a) of the Clean Water Act (33 USC 466).

The Minnesota Pollution Control Agency (MPCA) responded to the Federal announcement of the availability of grants assistance to states (Federal Register, Volume 43, No. 132, Monday, July 10, 1978) by making application to USEPA on August 7, 1978 (amended January 1979) for a matching $100,000 grant. On May 17, 1979, the MPCA received the grant from the USEPA, which was matched with $42,900 from the Legislative Commission of Minnesota Resources (LCMR) through the Legislative Advisory Commission (LAC).

The application detailed that the State's effort would be designated as the first phase of a three-part effort to classify and determine the need for restoration of the State's approximately 12,000

publicly-owned freshwater lakes. Phase I was a pilot study intended to examine 150 lakes within two target LANDSAT satellite scenes within the State. Phase II would examine an estimated 1000-2000 lakes which have a public access or are of special interest.

This report covers the classification and management ranking of 154 lakes in Minnesota. The basis was established for adding and examining additional lakes in subsequent efforts. In addition, during this period, the MPCA initiated an extensive inter-agency effort to assess the susceptibility of lakes to acid precipitation to lakes in Minnesota. This effort, while not made an integral part of Phase I, has been incorporated into our computerized lake classification and data storage system.

LAKE CLASSIFICATION

In order to describe patterns of lake water quality trends observed in Minnesota, it is necessary to organize the data for facilitation of interpretation. One of the project's primary goals was to establish methods for the determination of lake quality which required the organization or classification of lake types for an understanding of lake eutrophication.

The Process of Lake Eutrophication

Historically, the term oligotrophic has meant clear, clean lakes with many desirable recreational characteristics, including cold water fisheries, such as trout. Eutrophic lakes on the other hand are over-nourished lakes exhibiting higher nutrient concentrations which in turn support greater amounts of rooted weeds and algal production. Fisheries production in eutrophic lakes is usually more warm-water oriented, with the appearance of "rough" species to be a potentially common occurrence.

Eutrophication then is a term to describe a natural process whereby lakes receive water income from the watershed, which in turn carries sediment and nutrients, and which over the course of long periods of time (hundreds or thousands of years) causes lakes to change from pristine-clear lakes to productive lakes and then finally sediment filled depressions or areas reclaimed by the land. Many of our urban agricultural, and recreational activities greatly accelerate this process and compress the time scale or the longevity of our lakes so as to cause premature aging over a relatively short time period.

However, the accelerated aging caused by our activities is not always irreversible; reducing nutrient and sediment supply rates to lakes, particularly phosphorus supply rates, can in many instances improve lake water quality to more desirable conditions.

Materials and Methods

The lake classification effort combined the use of several data sources (state agencies, regional and local units of government, and academic institutions) into an overall data base for future lake study efforts. Each of the data sources was painstakingly scrutinized for data accuracy and methodology before entry into the computerized lake data base (Appendixes A and B).

A major sampling effort was conducted during the summer of 1980 for the purpose of assessing the degree of lake eutrophication. Lakes sampled in 1980 are identified by lake identification number and surface area in Table 1. Criteria generally used for the selection of the lakes were:

1. Lake surface area greater than 100 acres;
2. Approximately one-half of the study lakes in the Twin Cities Seven-County Area;
3. Lakes without known heavy sediment loadings;
4. Availability of watershed information;
5. Restrictions imposed by LANDSAT satellite remote sensing;
6. Lakes without severe coloration; and
7. Areas not demonstrating lake acidification (the acid rain study results would be later combined to avoid duplication of effort).

TABLE I - PHASE I LAKES

County	Lake I.D. Number	Lake Name	Target Area*	Surface Area Acres	Surface Area Hectares
Anoka	02-042	Coon	II	1,465	593
	02-045	Golden	II	57	23
	02-075	Moore	II	91	37
Becker	03-359	Sallie	I	1,268	513
	03-381	Detroit	I	2,345	949
	03-382	St. Clair	I	141	57
	03-576	Big Cormorant	I	3,380	1,368
Big Stone	06-152	Big Stone	I	12,609	5,103
Blue Earth	07-044	Madison	II	1,171	474
	07-047	George	II	141	57
	07-053	Duck	II	287	116
	07-054	Ballantyne	II	353	143
Brown	08-026	Hanska	II	1,843	746
Carver	10-009	Minnewashta	II	746	302
	10-019	Bavaria	II	188	76
	10-059	Waconia	II	3,195	1,293

Dakota	19-005	Spring	II	5,911	2,392
	19-021	Alimagnet	II	109	44
	19-026	Marion	II	506	205
	19-027	Crystal	II	292	118
	19-057	Fish	II	25	10
	19-065	Holland	II	32	13
Douglas	21-051	Henry	I	158	64
	21-053	Agnes	I	141	57
	21-054	Victoria	I	420	170
	21-056	Le Homme Dieu	I	1,893	766
	21-057	Carlos	I	2,520	1,020
	21-076	Irene	I	635	257
	21-080	Darling	I	983	398
	21-081	Winona	I	200	81
	21-083	Miltona	I	6,158	2,492
	21-092	Mary	I	2,394	969
	21-123	Ida	I	4,505	1,823
	21-216	Whiskey	I	163	66
Freeborn	24-014	Albert Lea	II	2,454	993
	24-018	Foutain	II	534	216
	24-044	Freeborn	II	2,221	899
Goodhue	25-001	Pepin	II	24,999	10,117
Grant	26-002	Pelican	I	3,729	1,509

	26-097	Pomme de Terre	I	1,794	726
lennepin	27-004	Penn	II	32	13
	27-014	Powderhorn	II	10	4
	27-016	Harriet	II	353	143
	27-019	Nokomis	II	205	83
	27-031	Calhoun	II	420	170
	27-035	Sweeney-Twin	II	94	38
	27-037	Wirth	II	37	15
	27-038	Brownie	II	17	7
	27-039	Cedar	II	170	69
	27-040	Lake of the Isles	II	104	42
	27-042	Twin	II	200	81
	27-047	Bush	II	208	84
	27-048	Hyland	II	104	42
	27-062	Anderson	II	430	174
	27-067	Bryant	II	166	67
	27-071	Round	II	32	13
	27-089	Shady Oak	II	79	32
	27-104	Medicine	II	949	384
	27-111	Eagle	II	469	190
	27-118	Fish	II	220	89
	27-133	Minnetonka	II	14,475	5,858
	27-137	Christmas	II	264	107
Kandiyohi	34-079	Green	I	5,406	2,188
	34-142	George	I	247	100

	34-154	Nest	I	988	400
	34-169	Wagonga	I	1,791	725
	34-171	Eagle	I	845	342
	34-217	Florida	I	662	268
	34-251	Norway	I	2,496	1,010
Le Sueur	40-002	Upper Sakatah	II	880	356
	40-020	Greenleaf	II	306	124
	40-031	Tetonka	II	1,208	489
	40-057	Frances	II	894	362
	40-063	German	II	988	400
	40-092	Jefferson	II	2,291	927
	40-117	Washington	II	1,505	609
McLeod	43-012	Winsted	II	408	165
	43-034	Silver	II	499	202
	43-084	Marion	II	586	237
Morrison	49-079	Alexander	I	2,990	1,210
	49-127	Shamineau	I	1,680	680
Otter Tail	56-138	Big Pine	I	5,068	2,051
	56-138	East Battle	I	2,041	826
	56-141	Rush	I	5,337	2,160
	56-142	Little Pine	I	2,036	824
	56-239	West Battle	I	5,663	2,292
	56-240	Blanch	I	1,312	531

	56-242	Ottertail	I	14,752	5,970
	56-243	Marion	I	1,611	652
	56-253	Eagle	I	838	339
	56-302	First Silver	I	546	221
	56-306	Elbow	I	188	76
	56-475	Pickerel	I	828	335
	56-658	Wall	I	682	276
	56-760	Lizzie	I	3,904	1,580
	56-786	Pelican	I	3,924	1,588
'ope	61-064	Amelia	I	932	377
	61-067	Villard	I	536	217
	61-072	Gilchrist	I	329	133
	61-130	Minnewaska	I	7,109	2,877
:amsey	62-001	Silver	II	67	27
	62-002	Bald Eagle	II	1,011	409
	62-006	Kohlman	II	84	34
	62-007	Gervais	II	208	84
	62-010	Keller	II	74	30
	62-013	Phalen	II	193	78
	62-016	Beaver	II	84	34
	62-054	McCarron	II	72	29
	62-055	Como	II	69	28
	62-056	Owasso	II	356	144
	62-057	Josephine	II	119	48
	62-067	Long	II	183	74

	62-069	Pike	II	37	15
	62-071	Valentine	II	59	24
	62-073	Snail	II	161	65
	62-078	Johanna	II	210	85
	62-082	Wabasso	II	47	19
	62-083	Silver	II	69	28
Rice	66-029	Fox	II	309	125
	66-039	Mazaska	II	684	277
Scott	70-026	Lower Prior	II	828	335
	70-054	Spring	II	689	279
	70-072	Upper Prior	II	341	138
	70-091	Cedar	II	749	303
Stearns	73-014	Marie	II	114	46
	73-196	Rice	I	1,569	635
	73-200	Koronis	I	3,108	1,258
Todd	77-023	Big Swan	I	857	347
	77-084	Big Birch	I	1,979	801
	77-089	Little Birch	I	793	321
	77-150	Sauk	I	2,110	854
	77-181	Maple	I	368	149
	77-215	Osakis	I	6,758	2,735
Traverse	78-025	Traverse	I	11,527	4,665

/aseca	81-014	Clear	II	652	264
	81-095	Elysian	II	2,288	926
/ashington	82-023	Lily	II	52	21
	82-046	Square	II	195	79
	82-049	Big Carnelian	II	445	180
	82-052	Big Marine	II	1,576	638
	82-054	Bone	II	206	83
	82-101	De Montreville	II	141	57
	82-104	Jane	II	158	64
	82-106	Elmo	II	316	128
	82-167	White Bear	II	2,585	1,046
'right	86-090	Buffalo	II	1,510	611
	86-134	Maple	II	776	314
	86-233	Sugar	II	919	372
	86-252	Clearwater	II	3,183	1,288
	86-263	Cokato	II	544	220
	86-281	Caroline	II	116	47
	86-282	Louisa	II	264	60
	86-297	Scott	II	91	37

Target Area I is within LANDSAT Path 31, Row 28

Target Area II is within LANDSAT Path 29, Row 29

The water quality data gathered by the MPCA for this study was largely collected by means of amphibious aircraft, which resulted in lower sampling expense per lake and more lakes being sampled during the relatively short summer sampling periods. Car-boat sampling was accomplished for lakes below 150 acres or with high recreation usages. This method was minimized due to the high costs involved as compared with the amphibious aircraft sampling method.

Lake samples were obtained between the hours of 0900 and 1500 with a flexible two-meter tygon tube and combined in two-gallon carboys for mixing. Aliquots were segregated for chlorophyll a filtration at the time of the sampling and for chemical analyses, which included: turbidity, color, alkalinity, pH, organic nitrogen, ammonia nitrogen, nitrate-nitrite nitrogen, and total phosphorus. Secchi disc transparency was measured and temperature/dissolved oxygen profiles were obtained at each lake station. Generally, one representative station location was obtained per lake, unless morphometric (basin shape) and tributary influences suggested that additional stations may be necessary. Laboratory and field analyses were conducted utilizing standard methods, (U.S. EPA, 1979).

Following the compilation of lake information from all available sources, data were entered into the Federal Data Storage and Retrieval System (STORET) housed in the National Computer Center at Research Triangle Park, North Carolina. Statistical analysis methods available on that system, such as the Bio-statistical Computer Program

and Statistical Analysis System, were used in the evaluation of the lake data. Additional lake management information was obtained from the Minnesota Department of Natural Resources (MDNR) and the computerized Minnesota Land Management Information System (MLMIS) of the State Planning Agency.

Lake Water Quality Relationships

In attempting to quantify lake water quality, numerous studies over the past decade have defined lake biotic and abiotic inter-relationships. Biological processes in lakes are incredibly complex, and yet several basic trends have been repeatedly demonstrated, which are:

1. The greater the lake basin mean (average) depth, the more likely the lake will possess high water quality.
2. The depth at which a secchi disc disappears (secchi disc depth) is a direct and inexpensive measure of water quality.
3. Secchi disc depth and the concentration of floating microscopic plant growth (open water or pelagic algae) are usually inversely related in the temperate regions of the United States.
4. The greater the amount of algal plant growth, the lower the water quality (indirect relationship).
5. Algal concentrations estimated by the most scientifically accepted methods are directly related to lake nutrient concentrations. In particular, total phosphorus concentrations have been repeatedly directly correlated to lake algal concentrations.
6. Lake nutrient concentrations are in turn directly related to

watershed phenomena. For example, the percentage of watershed land that is used for urban activities most commonly is directly related to lake total phosphorus concentrations. Expressed in other terms, the concentration of nutrients in a lake is a result of the supply of nutrients to the lake, which is moderated by lake volume and water flow-through characteristics, and biological nutrient cycling.

Several predictive nutrient models are based upon the above empirical relationships. Not all of the questions have been answered as to the mechanics of the intricate processes but these general relationships are reliable, general trend observations of lake water quality. There are, however, major lake problems which may cause lakes not to follow these relationships, such as lake acidification and toxic conditions which will not be discussed further in this paper. The majority of lakes in Minnesota, however, may be expected to exhibit traits consistent with empirical evidence of previous investigations.

From the empirical evidence, many mathematical models have been derived in order to: 1) Measure the current in-lake summer water quality; and 2) Predict the consequences of altering the nutrient supplies rates upon lake water quality patterns.

Water Quality Predictive Models: Limitations and Strengths

Lake water quality can therefore be predicted or analyzed with different levels of accuracy, depending upon the degree of fine tuning allowed by data collection and analysis restraints. Relationships

observed for the northern latitudes of the continental United States are not as specific as the relationships observed for Minnesota lakes, which are not as precise as relationships observed specific to the Boundary Waters Canoe Area or to the Twin Cities Metropolitan area lakes.

Lake water quality models can, through proper application, provide good estimates of average summer aquatic plant growing-season conditions. They cannot provide estimates, however, of what will happen in near-shore areas (littoral plant growth, or rooted plant zones), what the seasonal effects will be (spring versus summer), or how many algal blooms can be expected (Reckhow, 1979). In short, it is possible to quantify and to predict average summer lake quality conditions considering that fluctuations in climate (cloud cover, temperature and rainfall), biological effects (zooplanton, littoral zone, and algal species), and nutrient supply rates exert day-to-day variations and in-lake gradients.

Lake Classification Index

The first priority of the project was to define the extent of lake water quality degradation patterns in selected portions of the State. To accomplish this, current (summer of 1980) lake water quality had to be quantified and organized to facilitate interpretation. The MPCA chose several criteria for selection of a data organization, or a lake classification index, which were:

1. The index should be applicable to the wide variety of lake types found in Minneosota (e.g., from the rich prairie lakes to the pristine Boundary Water lakes);

2. The index should employ data that is relatively easy to collect and analyze.
3. The index should be scientifically valid and well tested or verified; and
4. The index should be communicative to the public as well as the scientist (for example, the Richter scale may describe earthquakes even though the mechanics of the scale may not be understood by the layman).

For the purpose of defining current lake water quality, the Carlson Trophic State Index (TSI) (Carson, 1977) was adopted for this effort. The TSI was developed from the interrelationships of summer secchi disc transparency and the concentrations of surface water chlorophyll a and total phosphorus. The index was developed from Minnesota lake data so that one, two, or all three variables could be used to estimate lake water quality on a scale usually ranging from 0 to 100 units, with the best possible water quality represented by 0. The individual measurement (secchi disc, chlorophyll a or total phosphorus) values were derived from the following equations:

Secchi Disc TSI (TSIS) = 60 - 14.41 ln (SD)

Chlrophyll a TSI (TSIC) = 9.81 ln (Chl a) + 30.6

Total Phosphorus TSI (TSIP)= 14.42 ln (TP) + 4.15

where SD = Secchi disc transparency in meters

Chl a = Chlorophyll a concentration in ug/L

TP = Total Phosphorus concentration in ug/1

Each increase of ten (10) units would represent nearly a doubling of the lake fertility or algal productivity and halving of the water transparency. The separate index values derived for a given lake will

tend to coincide due to the interrelationships between the values (Figure 1). However, substantial differences between the indexes may occur due to the presence of factors such as algal population cycles, the grazing of algae by zooplankton, and the attenuation of light by water coloration and soil suspensions (Megard et al, 1980). Several authors have quantified the regional effects of non-algal attenuation of light for correction of the TSI (Brezoniks, 1978; Walker, 1979). It is anticipated that the TSI will be adapted in a similar fashion for Minnesota lakes in subsequent efforts.

Phase I lakes have been classified by averaging of the available TSI values in the following equation:

$$\text{Average TSI(AVTSI)} = \frac{TSIS + TSIC + TSIP}{n}$$

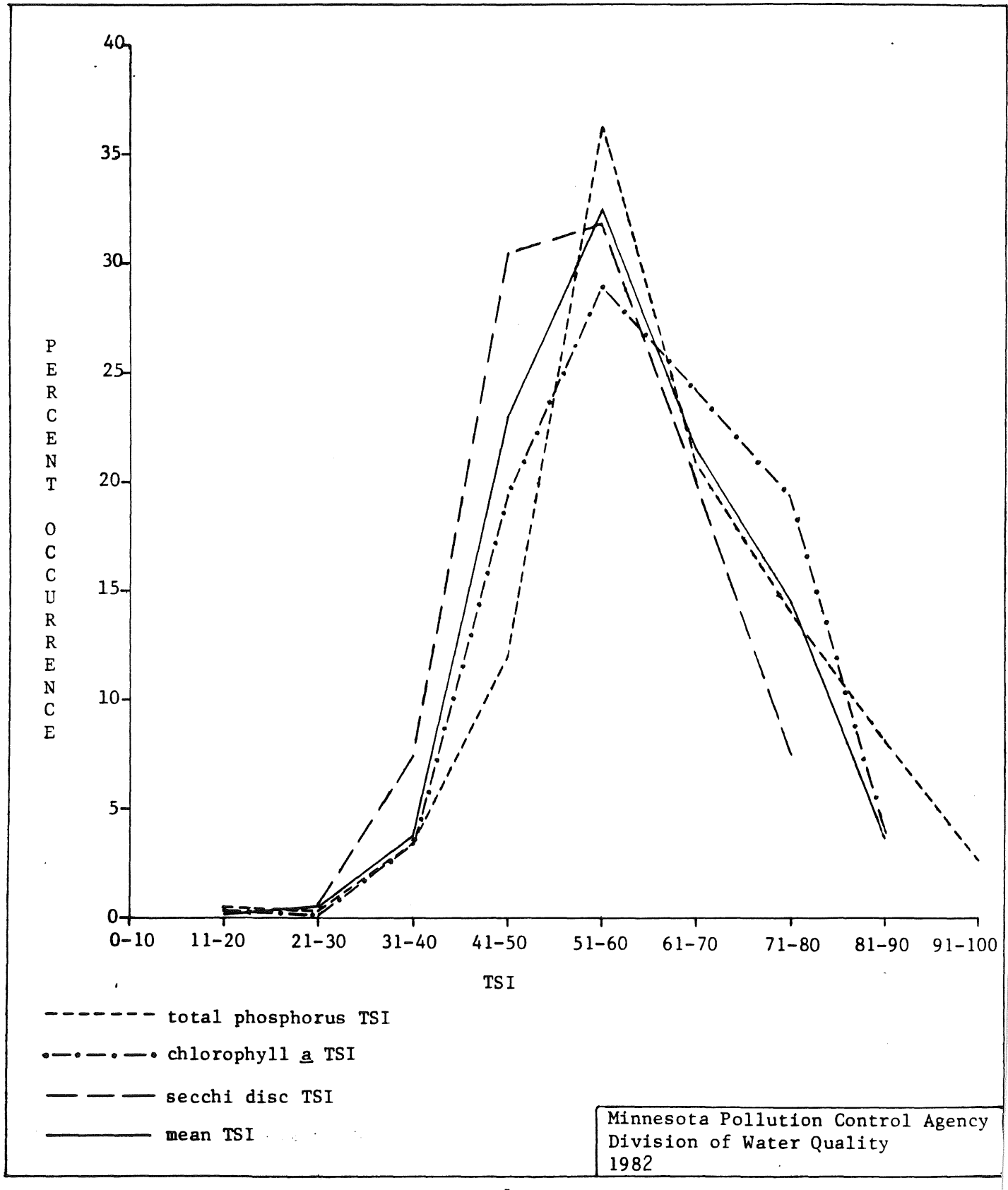
Where n = the number of summer TSI values which can be computed from the available data. Averaging of the index values provides a means of reducing the effects of the individual sampling and measurement errors (in lake gradients and laboratory analysis variability) and provides a more robust estimate of the index (Walker 1979). Mean TSI values are presented in Appendix C for all Phase I study lakes.

TSI Strengths and Limitations

The Carlson TSI has utility for lake management purposes for several reasons. First, the index is based upon three variables which are cost-effective to measure and are easily translated into index values. The index is also convertible back to the data by the same route.

Secondly, the relative ease of data measurement, collection, and analysis provides the basis for an easily expandable data base.

FIGURE 1. TSI DISTRIBUTIONS AND COINCIDENCE. Mean summer values for approximately 500 Minnesota lakes.



Ancillary data sources include:

1) LANDSAT satellite remote sensing;

2) Citizens Lake Monitoring Program;

3) MPCA acid rain surveys;

4) MPCA routine lake monitoring;

5) Metropolitan Council lake surveys;

6) Minnesota Department of Natural Resources; and

7) Federal programs (Park Service and USGS).

A third benefit from using the TSI is that other agencies have employed this index, such as the Minnesota Department of Natural Resources, the Wisconsin Department of Natural Resources, and the Metropolitan Council of the Twin Cities. Due to the magnitude of the index information (for several thousand lakes), comparisons and information exchange will be facilitated.

Additional consideration for the index was given due to the large number of lakes in Minnesota and the low probability that the MPCA and other agencies will be able to sample even a majority of the lakes. However, concerned citizens may be willing to provide lake quality data if it isn't too expensive. It is anticipated that even one or two measurements of summer (July and August) conditions will allow the generation of a TSI for those lakes from secchi disc, total phosphorus, or chlorophyll a values.

Another consideration of the index is that it should be communicable to the taxpayer who may not have a limnological background as well as the scientists who have created the mathematical models. A scale of 0 to 100 provides an easily understood range, and each increase of 10 units represents a near doubling of the algal

productivity or a halving of the apparent water transparency. The index can be easily translated into water transparency values, which is a more easily understood phenomenon.

There are limitations to the index, as there are for all mathmatical models, which should be given consideration to temper the application of the classification results. The results of the classification are by necessity the end product of limited sampling. The greater the number of samples obtained for individual lakes, the greater the accuracy of the calculations.

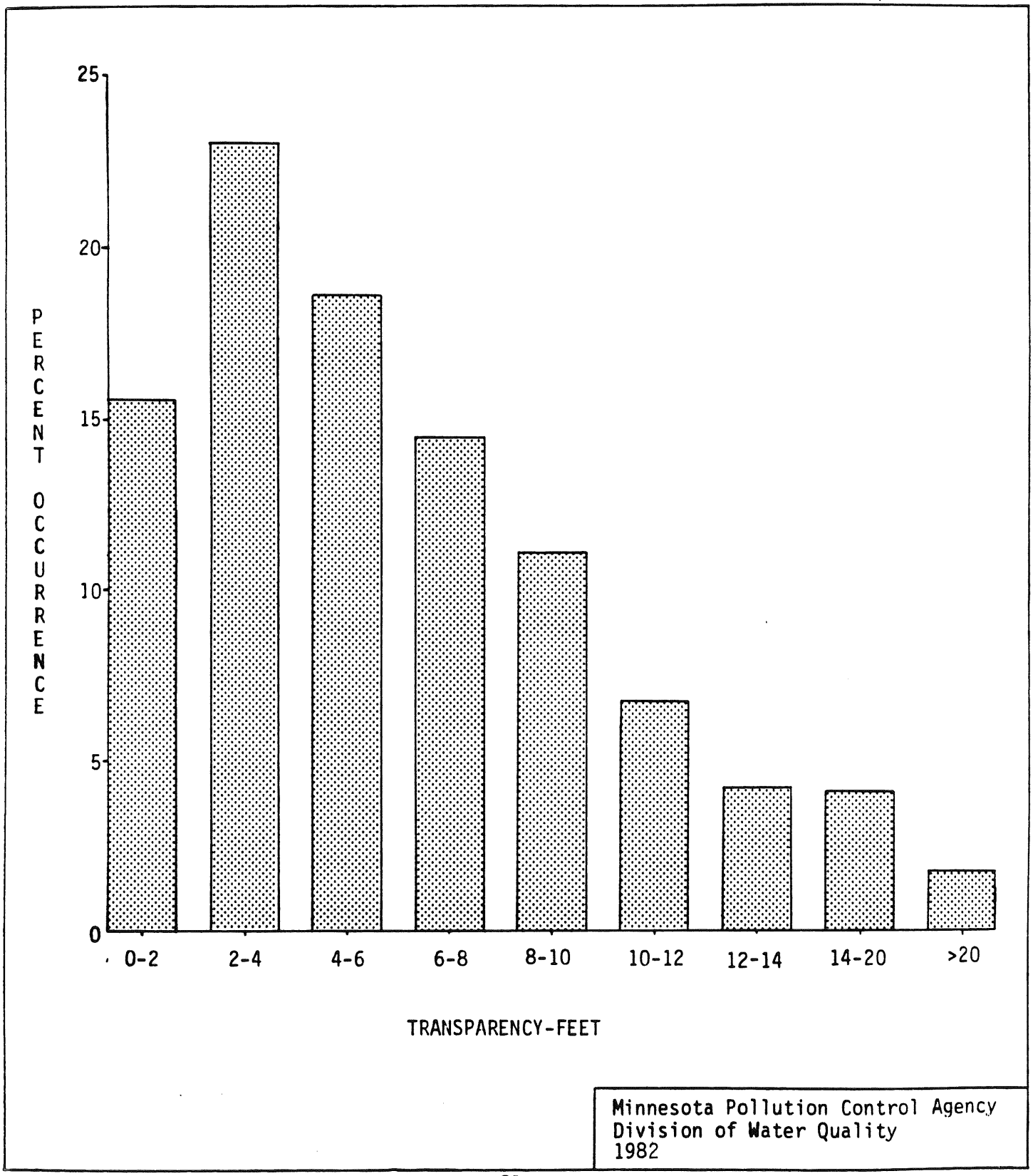
Therefore more reliable information is accurately conveyed by performing error analyses upon the index results. Preliminary calculations were performed in this regard and indicate that the individual lake average TSI values must be interpreted plus or minus (±) 5 units. Further refinement will be possible with additional lake data and analysis of regional lake water quality patterns.

Minnesota Lake Water Quality Overview

Due to the elimination of the lake classification project funding, available water quality data has been summarized to define observable patterns and to aid future investigations. Water quality patterns will be described from data obtained from 543 lakes from across the State. For this purpose, mean summer surface data and secchi disc water transparency information were reviewed from the MPCA lake classification program (about 300 lakes), the National Forest Service, the U. S. Geological Survey, and the Metropolitan Council.

The ranges of summer secchi disc transparency for 525 Minnesota lakes are displayed in Figure 2. It is apparent that the majority of lakes have water transparency less than or equal to six feet. These

FIGURE 2. SECCHI DISC TRANSPARENCY DISTRIBUTIONS. Mean summer readings from 525 Minnesota lakes.



lower secchi disc transparency values can be associated with occurrences of occasional algal blooms and reduced value for fisheries and primary-contact recreation. The MDNR (MDNR, 1979) has related reduced water transparency and TSI values to trout, warm water and rough fisheries production (Table 2).

The degree of light transparency in lake water is a function of the magnitude of dissolved and colloidal materials in the water that reflect and attenuate light. Most commonly, it has been demonstrated that the concentration of algal cells, the coloration of the water, and inorganic suspensions have the greatest influence on reduction of water transparency. Efforts were made to not examine lakes (or reservoirs) having soil suspension-related problems. The relative importance of algal and color concentrations were then investigated.

The quantity of algal biomass in lakes is most commonly approximated by the micrograms of chlorophyll a pigments per liter (ug/l) of lake water. Figure 3 represents chlorophyll a concentration distribution for the surveys. From the work of the MDNR and the U. S. Department of Agriculture (Garn and Parrott. 1977), approximate levels of water quality as related to fisheries and hypolimnetic (bottom waters) oxygen depletion reveal that over 48% of the lakes exceed a level of 20 ug/l chlorophyll a. This in turn indicates a higher probability of warm water and rough fisheries production along with a tendency for these lakes to have periodic algae blooms. Summer and winter fish-kills are possible for these lakes.

The relationship of secchi disc transparency to chlorophyll a concentrations was observed to be consistent with results of other investigators (Sakamoto, 1966; Barica, 1975; Brezonik, 1978; and

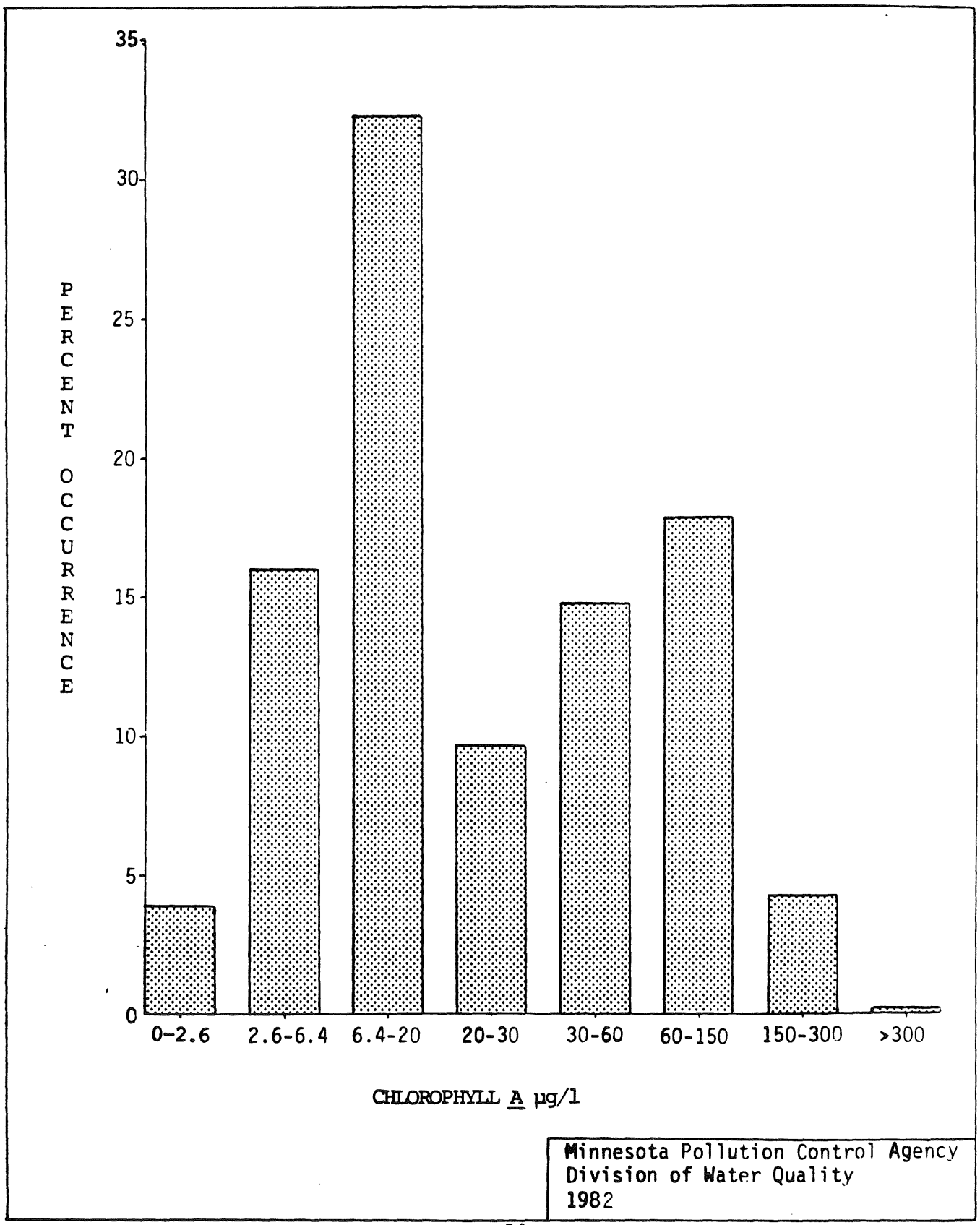
TABLE 2. FISHERIES SUMMARIES FOR 15 MINNESOTA LAKES*

Mean Values

ategory	T P ug/l	Chlorophyll a (ug/l)	Secchi Disc (Feet)
rout Lakes Oligotropic soft water)	30 ± 6	3.8 ± 2.5	17.7 ± 1.4
oftwater Walleye (Mesotrophic)	38 ± 6	4.8 ± 0.9	6.6 ± 1.5
arm Water Fisheries alleye-Centrachid (Mesotrophic)	43 ± 4	12.5 ± 2.5	5.8 ± 0.6
lankton Bloom Lakes	154 ± 50	113.8 ± 42	2.1 ± 0.6

Adapted from MDNR, 1979

FIGURE 3. CHLOROPHYLL A DISTRIBUTIONS. Mean summer epilimnetic concentrations for 412 Minnesota lakes.



Carlson, 1977) in that the plotting of secchi disc transparency and chlorophyll a concentrations for 412 individual lakes produced a hyperbolic curve (Figure 4). Logarithmic transformation of the data defined a statistically significant relationship as represented in Figure 5 (r^2 = 0.72 at the 99% confidence limit). The amount of variability not accounted for by the statistical relationships may be an expression of the effects of color and other light attenuation causes.

The relative magnitude of mean surface water coloration, commonly referred to as bog stain due to dissolved organic matter, for the study lakes ranged from 2.5 to 250 platinum/cobalt (PT-CO) units for 476 lakes. The median value was 20 units. Previous research for lake acidification in Minnesota (MPCA, 1980) summarized relative subdivisions of color expressed as PT-CO unit ranges of 0-20 (clear), 21-49 (moderate), and ≥50 (dark) to serve as a comparative scale.

Mean PT.-CO. Units	Number of Study Lakes
0-10	150
11-20	114
21-49	165
≥ 50	47
	476

Of the 476 lakes, 55% could be considered clear, while the remaining demonstrate coloration which is suggestive of bog drainage into the lakes. About 10% of the study lakes have pronounced coloration.

The effect of color upon transparency is to reduce the depth of light penetration. Brezonik (1978) calculated that the maximum secchi disc transparency for Florida lakes with 100 PT-CO units of color is about 2.4 - 2.8 meters (7.7 to 9.0 feet) and that deviations in secchi

FIGURE 4. PLOT OF SECCHI DISC VERSUS CHLOROPHYLL A. Legend: A = 1 observation, B = 2 observations, ect.

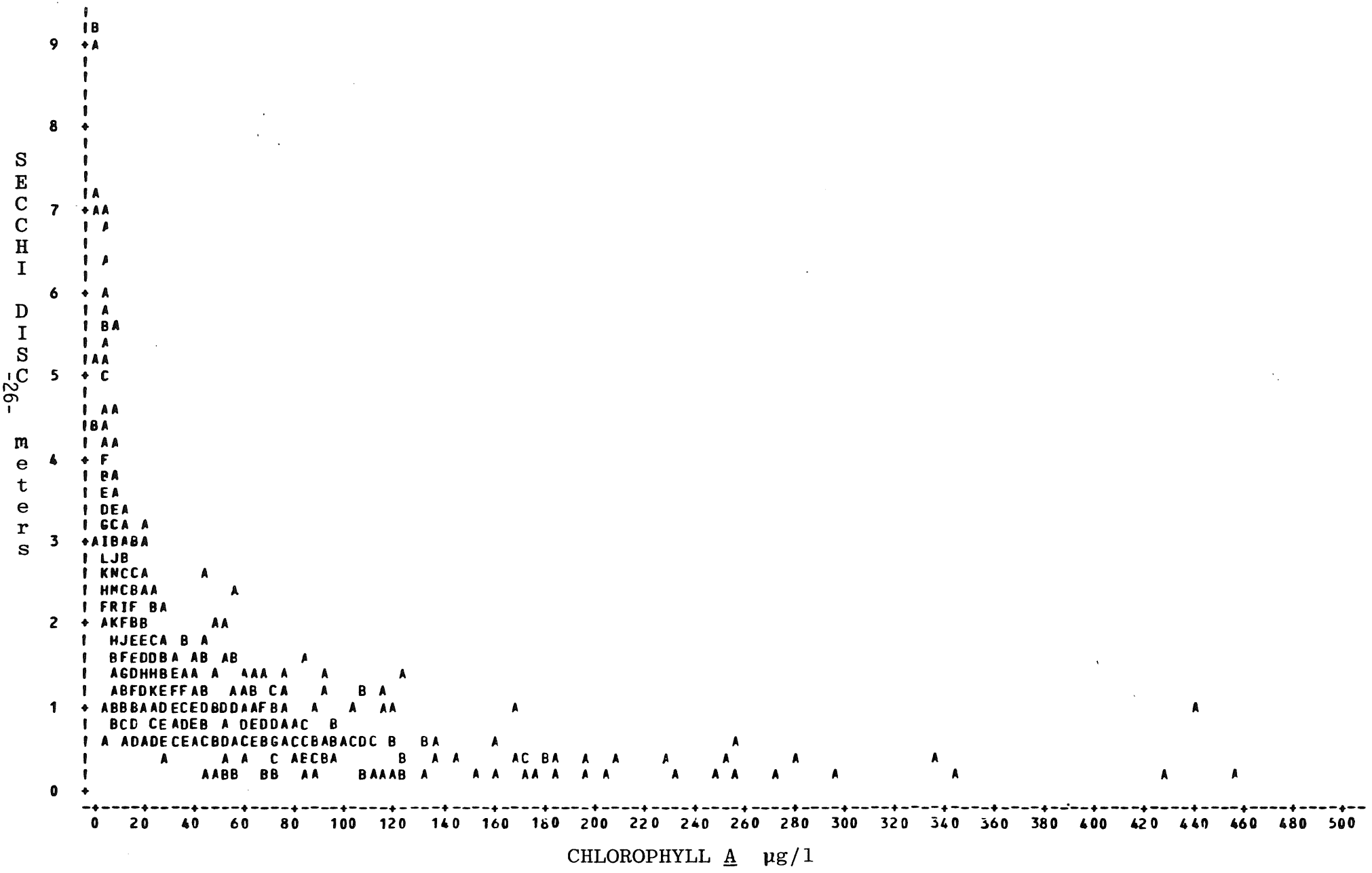
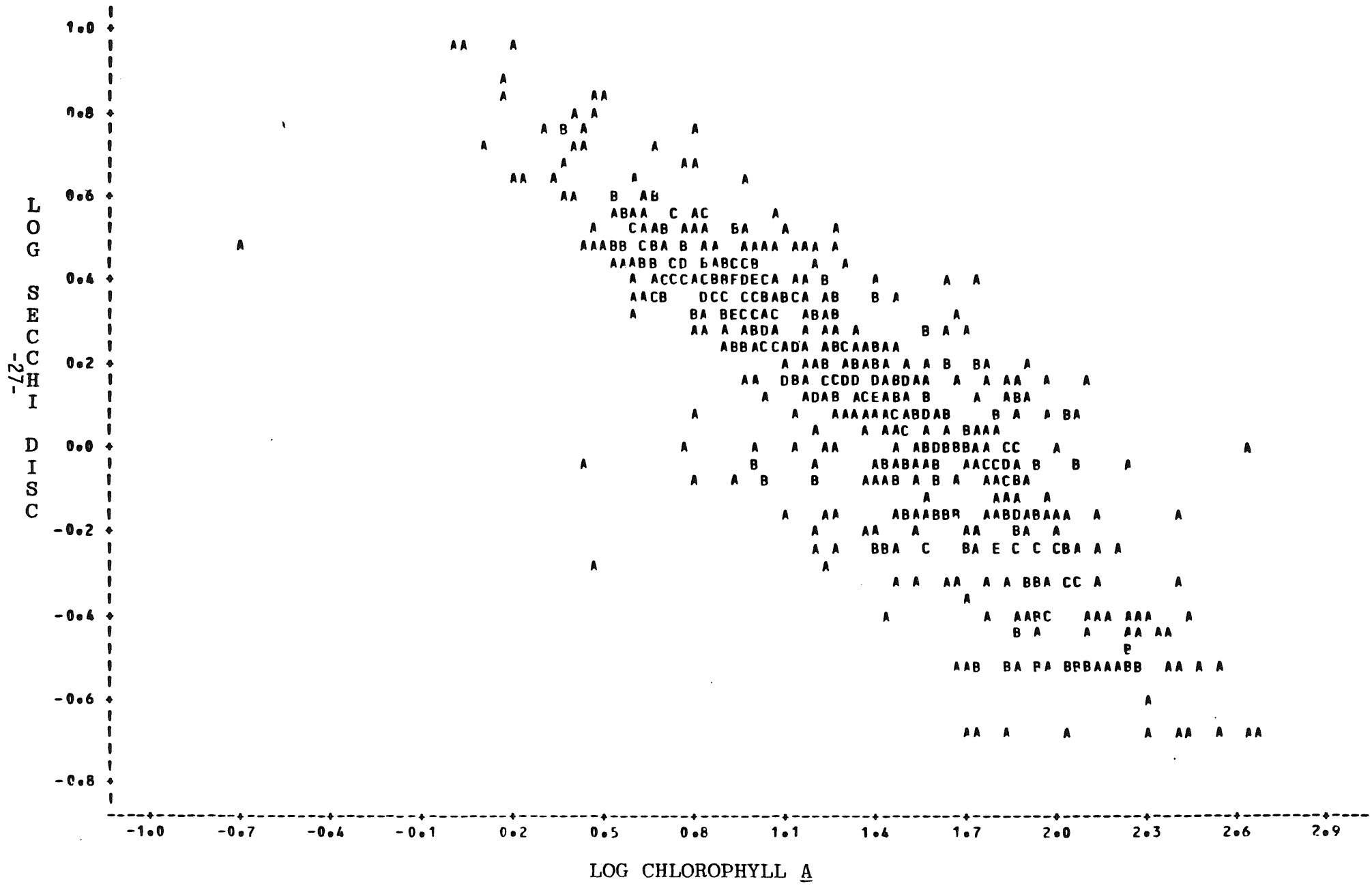


FIGURE 5. PLOT OF LOG SECCHI DISC VERSUS LOG CHLOROPHYLL A.
Legend: A = 1 observation, B = 2 observations, ect.



disc and chlorophyll a relationships may be caused by color, particularily for lakes of high and low secchi disc tranparency extremes.

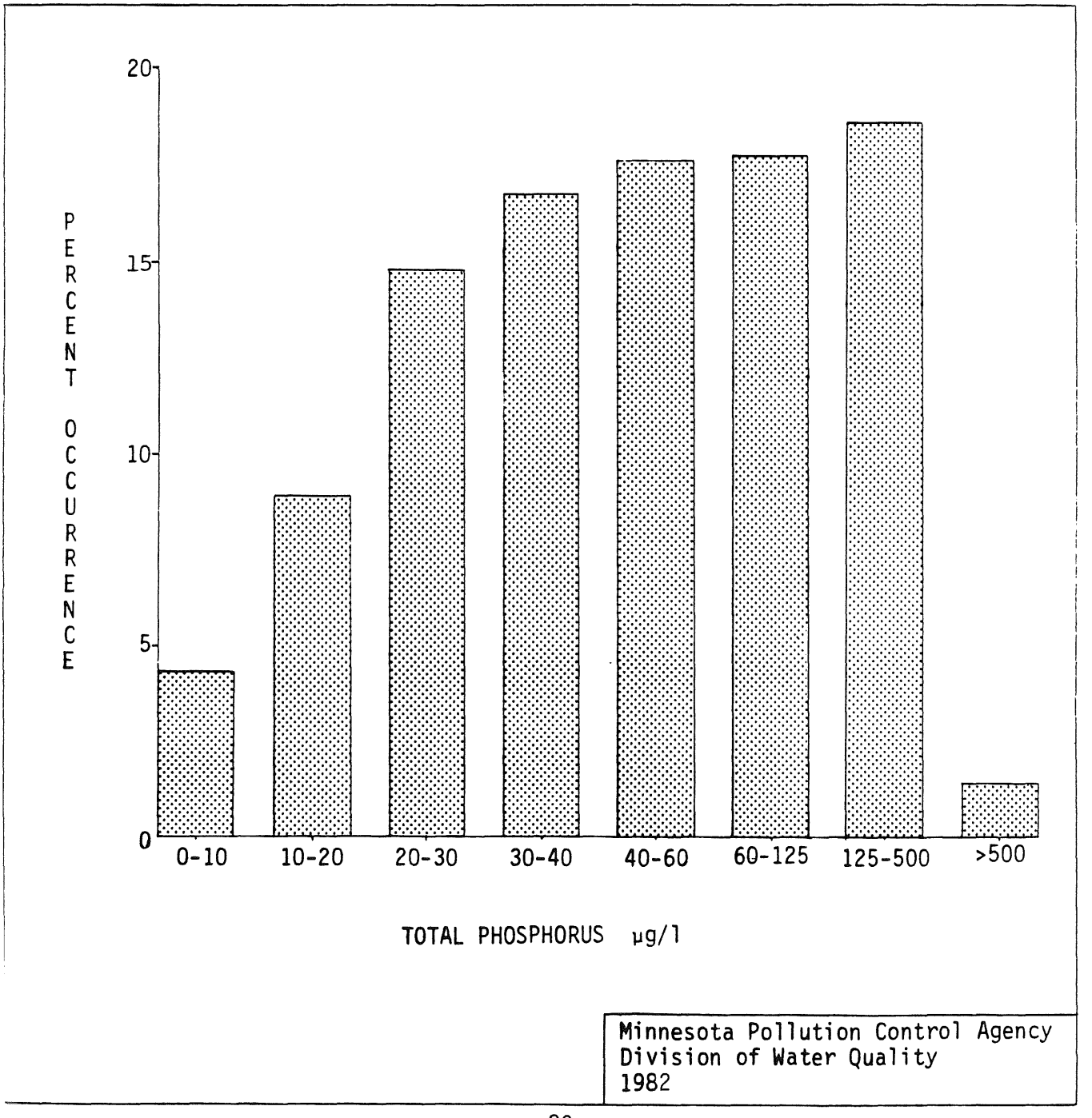
Phosphorus serves as an indicator of water fertility in that phosphorus has been observed in the majority of cases to be growth limiting to algae. Additionally, the relative abundance of this element in lakes has been directly related to the magnitude of man's activities in the watershed (lawn fertilizing, street runoff, agricuture, sewage effluent, septic tanks, and other urban activities). This nutrient usually is the most amenable to cost-effective reduction techniques.

Figure 6 represents the distribution of measured summer surface total phosphorus (TP) concentrations. Over 72% of the 514 lakes that were analyzed had concentrations exceeding 30 ug TP/l, which has been suggested as the lower threshhold of lake TP concentrations that may result in detrimental lake impacts (Sawyer, 1947; Vollenweider, 1968; Carlson, 1977; and Dillon and Rigler, 1975). Accordingly, the median summer surface concentration was 40 ug TP, which exceeds this threshhold suggested by numerous studies.

The relationship between the mean epilimnetic total phosphorus and chlorophyll a was observed to be similar to other study results. Log/log transformation of the data and regressions of the dependence of chlorophyll a concentrations upon total phosphorus concentrations provided a significant relationship ($R^2 = 0.55$). These equations were not, however, as reliable as several previous investigations had suggested, which was probably due to a variety of conditions. These conditions may include:

1) Light limitation caused by color concentrations. Nearly 7% of

FIGURE 6. TOTAL PHOSPHORUS DISTRIBUTIONS. Mean summer epilimnetic concentrations for 514 Minnesota lakes.



the data set had color exceeding 50 point color units.

2) Macronutrient and micronutrient limitations. Macronutrient limitation may include a lack of available phosphorus per unit of nitrogen and temporal limitations of nitrogen. Additionally, the lack of micronutrients may exert algal population control in specific cases so that maximum development which would normally occur, may not in fact occur. Lakes known to be maximally impacted by sewage effluent were included in the data set, which may have influenced statistical summaries. The lake classification index should offer information as to the nature of limiting conditions, and be able to distinguish light and nutrient limitations.

The Trophic State Index has been utilized for all available data in an attempt to define the extent of lake problems in Minnesota. Included in this effort are 154 lakes sampled during the summer of 1980 and about 400 lakes sampled in other summers. The available data were pooled to provide statistical summaries for the lake classification efforts which are summarized in Tables 3 and 4.

The three TSI measurements have been summarized in Figure 1 with the chlorophyll a TSI and total phosphorus TSI value ranges, distributions, and medians similar in appearance. The secchi disc TSI values calculated for the same lakes do differ somewhat in distribution, as seen in Figure 1 displaying a smaller range and a slightly lower median, which indicates that the secchi disc TSI implies somewhat better water quality than otherwise measured.

TABLE 3. STATISTICAL SUMMARY FOR 543 MINNESOTA LAKES

	Number of Values	Maximum	Minimum	Standard Deviation	Mean	Median
Total Phosphorus (mg/l)	514	1.6	.002	.14	.09	.04
Total Nitrogen (mg/l)	379	8.7	.3	1.1	1.5	1.1
Chlorophyll a (ug/l)	412	455	.2	54.	40	19
Secchi Disc (ft)	525	30.0	.5	4.5	6.0	5.0
Color (Pt-Co Units)	476	250	2.5	25	25	20
Alkalinity (mg/l)	391	270	8	47	128	130
Phosphorus TSI	514	111	14	15	61	59
Chlorophyll TSI	412	90	14	12	60	59
Secchi Disc TSI	525	85	28	11	55	53
Average TSI	543	92	17	12	58	57

TABLE 4. STATISTICAL SUMMARY FOR 154 PHASE I LAKES

	Number of Values	Maximum	Minimum	Standard Deviation	Mean	Median
Total Phosphorus (mg/l)	152	2.495	.015	.26	.130	.058
Total Nitrogen (mg/l)	142	10.22	.53	1.19	1.66	1.37
Chlorophyll a (ug/l)	148	361	1	62	45	20
Secchi Disc (ft)	153	25	.5	4	6	5
Color (PT-CO Units)	126	142	2	16	19	20
Alkalinity	148	310	58	50	153	155
Phosphorus TSI	152	117	43	13	65	62
Chlorophyll TSI	148	88	31	12	61	60
Secchi Disc TSI	153	83	31	10	55	54
Average TSI	154	91	37	11	61	60

The secchi disc transparency is influenced by factors other than algal biomass, as stated previously. Specifically, the lakes with TSI values ranging from 40 to 60 units were observed to have mean color values ranging from 5 to 250 PT-CO units. For the lakes with color above 100 PT-CO units, there will be an attenuation of light that may inhibit algal production. The methods of Megard, et al (1979), could better define the attenuation of light due to algal, color, and mineral turbidity. There is strong evidence, even without the benefit of these analyses, to implicate water coloration as causing substantial light reduction and thereby reducing the secchi disc transparency and TSI distribution.

The degree of eutrophication or water fertility of 543 Minnesota lakes has been measured by standard limnological techniques and methodology. As mentioned previously, excessive concentrations of nutrients such as phosphorus, are the driving force for the premature aging of lakes. In an effort to provide a more thorough review, the limitation of lake fertility caused by nitrogen availability was also investigated.

From the research of Schindler (1977), Smith and Shapiro (1978), nitrogen may be relatively limiting to algal production if the ratio of total nitrogen to total phosphorus (TN:TP) is less than 15:1. The significance of these observations is two fold: 1) Periodic nitrogen limitation may cause deviation of algal production other than implied or predicted by phosphorus concentrations; and 2) decreased TN:TP ratios in lake water may encourage the growth of noxious blue-green algae which may tend to dominate the lakes in late summer (Shapiro, et al 1975).

Phase I Lakes TSI

Lake classification values for 154 lakes analyzed in Phase I are tabulated in Appendix C with individual TSI values for secchi disc transparency (SD), chlorophyll a (Chl a), and total phosphorus (TP), listed along with the average of the TSI values. The individual TSI values may be compared to the average TSI value for indications of dominant lake conditions:

1. If the average TSI is in agreement with TSI values calculated for TP, SD, and Chl a, then nutrient availability accurately estimates lake water quality.
2. If the secchi disc transparency TSI underestimates the TSI values obtained for TP and Chl a, than the amount of water color should be reviewed in this table. Water color in excess of 25 units may strongly influence Secchi disc transparency.
3. If the TP determined TSI is greater than the TSIS and TSIC values, then the lake may have the potential for a worsening of lake water quality. It is not possible to determine from these analyses what the probability of the lake degradation may be due to moderating influences, such as water coloration and lake basin characteristics of water flow through and basin mean depth.
4. Instances of TSIC values significantly greater than the TSIS and TSIP measurements may indicate nitrogen limitation or the formation of blue-green algal blooms that may tend to float on the lake surface.

Due to the variety of potential lake conditions, the average TSI value is presented as an estimate of the average summer water quality.

Additional Lake Classifications

Approximately 1200 lakes have monitoring data that has been entered in the STORET computer system by the MPCA. Of this number, about 400 lakes were classified in addition to the Phase I study lakes (154) for this final report. These classifications are included in Appendix D for all interested parties and in an effort to further define Minnesota lake water quality patterns. The TSI classifications for these lakes were generated from data supplied by many sources. (In some cases, it should be cautioned, classifications may differ from previously presented TSI values due to the merging of all available data.)

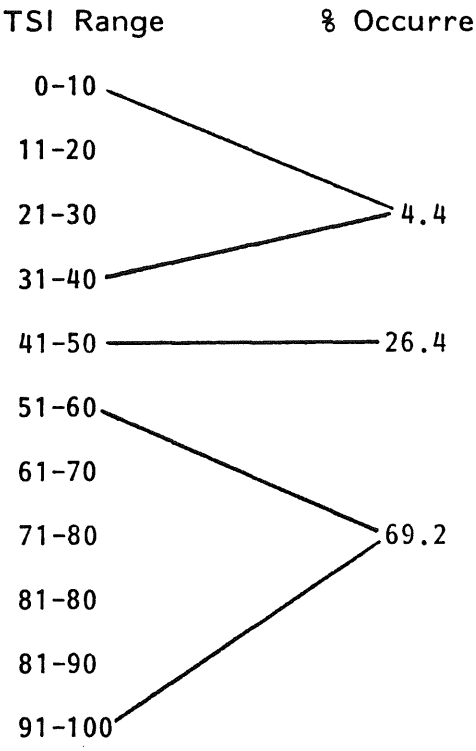
Current Minnesota Lake Water Quality Conditions

Data from over 500 lakes were summarized and indicated the following:

1. Over 38% of the study lakes had average secchi disc transparency less than 4 feet in depth, which may present direct contact recreation safety concerns (diving, skiing, swimming).
2. Over 48% of the study lakes had average summer chlorophyll a concentrations in excess of 20 ug/l. A level of 20 ug/l has been observed to indicate lake conditions that may be suitable for warm water fisheries and rough fisheries. Hypolimnetic oxygen depletions may begin in the early summer, and there is a danger of winterkills of fish for these lakes, particularly if they are smaller in area or have lower mean depths.

3. Approximately 44% of the study lakes also have mean surface total phosphorus concentrations in excess of 50 ug TP/l, which is suggested as defining lakes where algal productivity may be pronounced. Summer occurrences of algal blooms may be expected along with possible depletions of oxygen from the bottom waters. Winterkills of fish may occur especially in lakes with small surface areas or lower average depths.
4. Water coloration in excess of 50 PT-CO units, which is suggestive of significantly colored water, was encountered in about 7% of the study lakes.
5. Total phosphorus concentrations tended to explain about 55% of the algal production variance as estimated by statistical analyses.
6. From preliminary calculations, about 13% of the study lakes could be nitrogen limited at times instead of phosphorus limited. Nitrogen limitation may cause the occurrence of noxious blue-green algae which tend to dominate algal specication in late summer. The occurrence of toxic algal blooms in Minnesota was not tabulated in this report.
7. The Carlson Trophic State Index (TSI) was used to classify lake water quality. The distrubution of mean TSI

occurrence for 543 lakes was:



In general terms, oligotrophic lakes with cold water fisheries could be associated with at least 4.4% of the lakes. Approximately 70% of the lakes have mean TSI values greater than 50 TSI units, and these lakes may exhibit characteristics symptomatic of over-fertility or eutrophication. Continued degradation of these lakes may be expected to result in periodic algal blooms and, in some instances, dense algal blooms of blue-green algae. These occurrences will likely have significant, adverse consequences for recreational and other water uses. Reduction of sediment and nutrient loading will produce immediate, beneficial results in the majority of instances. Secondarily, reducing the phosphorus supply rate may increase the in-lake ratio of total nitrogen to total phosphorus, which will tend to discourage noxious blue-green algae from dominating in the late summer.

LANDSAT SATELLITE SENSING OF WATER QUALITY

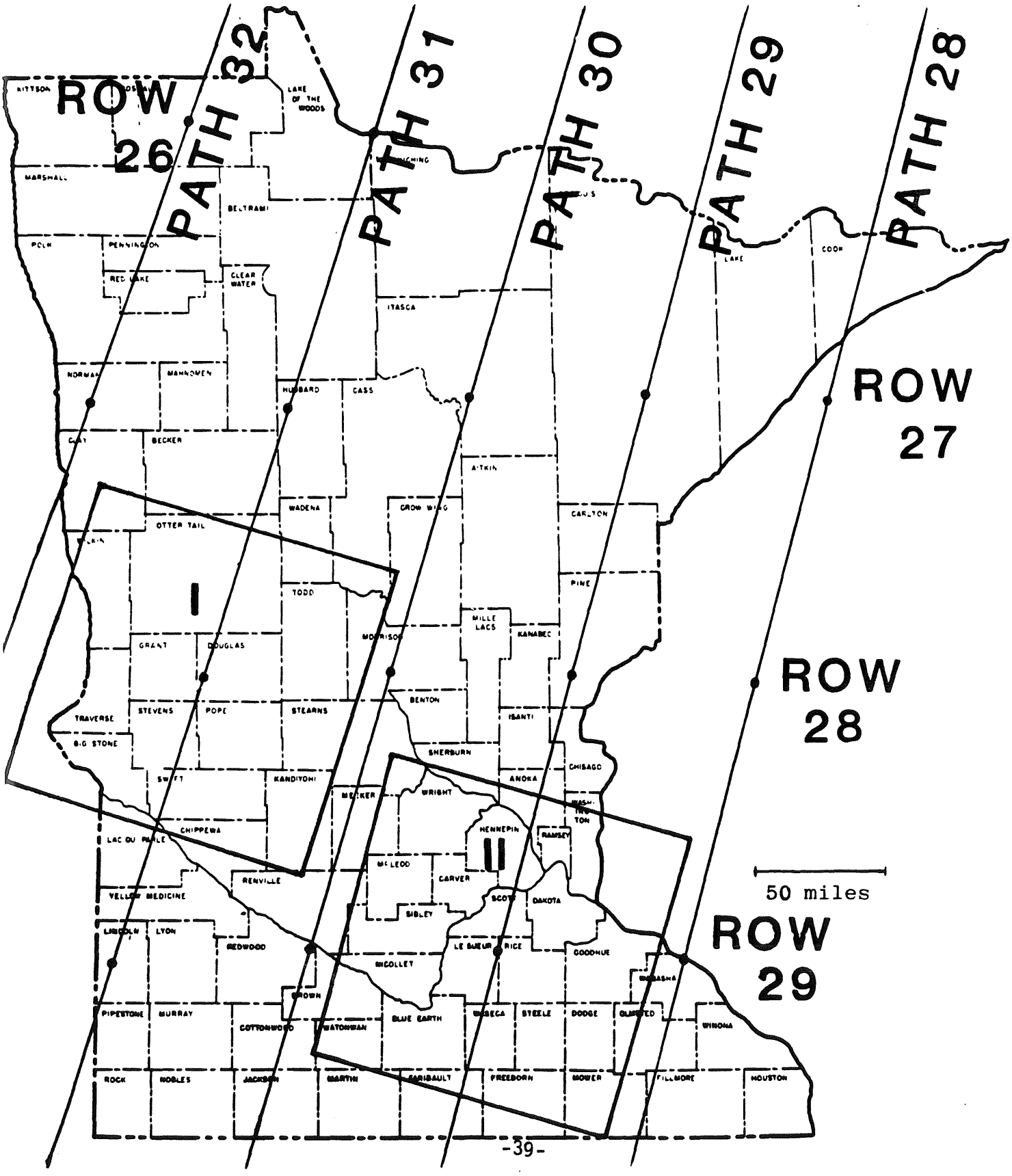
Satellite surveillance of lake water quality was investigated by the Remote Sensing Laboratory (RSL) of the University of Minnesota in conjunction with the MPCA lake sampling program conducted over the summer of 1980. Extensive efforts were devoted to planning and execution of the lake sampling as data had to be obtained within 1½ days of satellite overflight for reliable mathematical modeling efforts.

The first step in the coordination of the projects was the choice of target lakes for analysis. Various criteria were used in the choice of two satellite viewing areas, which were approximately 100 nautical miles on a side. These selection criteria were:

1. The historical availability of satellite multispectral scanner (MSS) data;
2. The satellite viewing windows were required to contain as many lakes as possible with diverse water quality;
3. Avoiding areas of the State that had excessively colored lakes or potential lake acidification;
4. Logistical considerations (travel, timing, and aircraft refueling); and
5. Providing the most information for the expense.

The two LANDSAT scene areas chosen are represented in Figure 7. Sixty (60) lakes were sampled concurrently with satellite overflight (± 1½ days), providing 1675 laboratory analyses.

FIGURE 7. LANDSAT SCENES AND PATHS



From these sampling results, the RSL developed predictive models for the calculation of whole lake mean secchi disc transparency, chlorophyll a, and total phosphorus concentrations. Statistically, these models were not as reliable as might be expected due to in-lake gradients and other unaccounted-for variability.

Additional mathematical models were then developed to calculate whole lake mean TSI values which were observed to have greater statistical accuracy. Secchi disc transparency and chlorophyll a TSI values were observed to correlate well with LANDSAT MSS data (R^2 values ranged from 0.84 thru 0.94).

The lake classification effort was to be based upon mean TSI values. As was to be expected, the satellite data poorly predicted total phosphorus concentrations and TSIP values as the satellite can only "see" the results of nutrient concentrations that generate reflectance differences such as algal biomass (pea soup green versus the black lakes that can be seen, for example, from aircraft).

Mean secchi disc and chlorophyll a indexes predicted by the RSL were the desired end product for the lake classification efforts. The MPCA verified the accuracy of the LANDSAT derived mean TSI values for 56 of the 68 lakes from historical data. Quite probably, the satellite may be more accurate because of estimating whole lake mean values versus the one-point (discrete) sampling-derived estimates generated by MPCA sampling efforts.

For a more complete review of the RSL effort, please consult Appendix E for a copy of the report submitted to the MPCA.

LAKE MANAGEMENT RANKING

Lake management ranking involves lake classification as well as watershed typology, fishery, and public benefit. The goal of the lake management ranking is to initially screen and analyze possible Minnesota lake candidates to determine equitable distribution of public funds for restoration programs. The higher the lake management number, on a scale of 0 to 100, the greater the perceived lake water quality problems and the more the public will benefit from a restoration program. (Table 5). A brief explanation of the categories follows:

Lake Water Quality Index - The lake quality index is represented by the average TSI value. The lake quality index was constructed so that the lakes with poorest water quality receive the greatest number of points. Segmentation of priority points in this manner does not place emphasis upon those lakes which may have good water quality but are undergoing accelerated nutrient enrichment. Ranking in that situation must include efforts to accurately assess a lake's sensitivity to nutrient enrichment as well as estimating the nutrient loading, both of which were beyond the scope of the Phase I effort.

Lake Public Access - The USEPA has required (Title 40, Code of Federal Regulations, Subpart H, Part 35.1603 and 35.1605-3) that only publicly owned freshwater lakes are eligible for assistance under the Section 314 grants program. Publicly owned freshwater lake has been defined in part as:

> "a lake that offers public access to the lake through publicly owned contiguous land so that any person has the same opportunity to enjoy non-consumptive privileges and benefits of the lake as any other person."

TABLE 5. LAKE MANAGEMENT RANKING

	Category	Points
1.	Lake Water Quality Index (AVTSI)	0-100
2.	Public Access Present	100
3.	Lake Surface Area >150 acres	50
4.	Lake Mean Depth >10 feet	10
5.	Lake Development meets Shoreland Act Standards	10
6.	Watershed to Lake Surface Area <100	10
7.	Managed For Warm or Cold Water Fisheries	10
8.	Toxic Conditions Present	10
	TOTAL	300

$$\text{Lake Rank} = \frac{\text{Total Number of Points Received}}{3}$$

In addition, the Federal government has elaborated on this definition to state:

> "If user fees are charged for public use and access through state or substate operated facilities, the fees must be used for maintaining the public access and recreational facilities of this lake or other publicly owned freshwater lakes in the state, or for improving the quality of these lakes."

The MDNR has adopted a similar provision in their public access policy. Lakes that have public access for recreation and other uses have more public benefit than those that do not have public access. If a lake has one or more public accesses it receives 100 points. If a lake has no public access it receives no points.

Lake Surface Area - There is a direct relationship between the size of a lake and the extent of public use possible. The larger lakes can accommodate more and varied recreational uses than can small lakes (Ottertail Lake versus Como Lake). The Minnesota Department of Natural Resources (MDNR) has recognized this factor in their State Water Access Policy promulgated on December 13, 1979 by Commissioner's Order Number 1828. Lake size was identified as one of the criteria used by MDNR in the selection and location of water access sites. Lakes over 150 acres receive 50 points in the MPCA system. Lakes of less than 150 acres are of lesser importance and receive no points. Emphasizing the large lakes is not without precedent as the state of Illinois has adopted similar criteria pursuant to the Illinois Outdoor Recreation Plan (1974).

Lake Mean Depth - A lake's mean (average) depth is directly related to the potential for permanent fisheries development; development of

seasonal thermal stratification; and determining the magnitude of nutrient loading from the lake basin sediments. Lakes with mean depths less than ten feet may not thermally stratify and have significant potential for the occurence of fisheries winterkills. Shallow lakes receive no points where as deeper lakes receive 10 points.

Lake Shoreland Development - With passage of the Shoreland Act of 1969, the Minnesota Legislature recognized the problem of uncontrolled shoreland development. The Act directed the MDNR to promulgate standards to be given to the counties which would in part determine the future density of development of the state's lakeshore. The MDNR divided Minnesota's lakes into four classifications: Natural Environment, Critical, Recreational Development, and General Development. Each class has standards for lot size, setbacks, and area. The criteria for lot width are as follows:

1. Natural Environment and Critical - 200 feet (26.4 dwellings/mile)
2. Recreational Development - 150 feet (35.2 dwellings/mile)
3. General Development - 100 feet (52.8 dwellings/mile)

If the shoreline development meets the lot width criteria then 10 points were awarded to the lake. Overdevelopment on a lake may complicate and reduce the effectiveness of a restoration program.

Watershed to Surface Area Ratio - The lake watershed area to lake surface area ratio may define the relative importance of non-point source pollutant contributions. If a watershed to surface area ratio is greater than 100, non-point source pollution can be a very significant portion of the nutrient inputs to a lake. Non-point source pollution is

more difficult to control than point source pollution. If the watershed to surface area ratio is less than 100 it receives 10 points.

Warm or Cold Water Fisheries - This category reflects the current MDNR fisheries management policy for a given lake. The ranking provides emphasis on cold water fishery lakes which are recognized as the most sensitive to pollutant input and warm water fishery lakes which may receive the greatest fishing pressure of all lake types by awarding them 10 points. A lake must have suitable chemical and physical characteristics as well as habitat to be managed for a specific fishery.

Toxic Conditions Present - Toxic algae blooms and fishkills due to winterkill or summerkill conditions are two examples of toxic conditions which may be present in a lake. If toxic conditions occur the public use of the lake is reduced. A lake which has had toxic conditions present received 10 points.

Final Ranking

Final ranking of a lake will be based on the total number of points received by the lake divided by three

$$\text{Final Lake Rank} = \frac{\text{Total No. Points Received}}{3}$$

The 1980 census indicated that Minnesota had an estimated population of 4,077,148. The population was nearly evenly distributed between the Seven County Metropolitan Area (SCMA) - 1,980,918 (48.6%) and the Outstate Area (OSA) - 2,096,230 (51.4%). It is proposed that future grant funds allocated to Minnesota be available on a formula which as close as possible represents this SCMA-OSA population distribution (48.6% - 51.6%). Results of ranking Phase I lakes are shown in

Tables 6 and 7. The results are subject to revision as further information is obtained. The management ranking process will continue to evolve and improve as efforts continue.

TABLE 6. MANAGEMENT RANKING - OUTSTATE LAKES

Lake	Lake Number	Points	Lake	Lake Number	Points
Buffalo	86-0090	91.0	Ottertail	56-0242	80.3
Greenleaf	40-0020	90.0	Alexander	49-0079	80.3
Pepin	25-0001	89.7	Florida	34-0217	80.3
Clear	81-0014	89.7	Miltona	21-0083	80.3
Wagonga	34-0169	89.3	Shamineau	49-0127	80.0
Elysian	81-0095	89.0	Green	34-0079	80.0
Big Stone	06-0152	88.7	Le Home Dieu	21-0056	80.0
Sallie	03-0359	88.0	East Battle	56-0138	79.7
Nest	34-0154	87.7	Lizze	56-0760	79.3
Clearwater	86-0252	87.3	Wall	56-0658	79.3
Jefferson	40-0092	87.3	Little Birch	77-0089	79.3
Koronis	73-0200	86.0	Big Cormorant	03-0576	78.3
Sauk	77-0150	85.7	Eagle	56-0253	77.7
Big Pine	56-0130	85.7	Blanch	56-0240	77.3
Gilchrist	61-0072	85.7	Rush	56-0141	77.3
Mazaska	66-0039	85.7	George	34-0142	77.0
Maple	77-0181	85.3	Elbow	56-0306	76.3
Tetonka	40-0031	85.3	Pelican	56-0786	76.3
Marion	43-0084	85.3	West Battle	56-0239	75.7
Cokato	86-0263	85.0	Ballantyne	07-0054	75.7
Madison	07-0044	84.7	Pickerel	56-0475	73.7
Irene	21-0076	84.3	Marie	73-0014	69.0
Freeborn	24-0044	84.0	George	07-0047	65.3
German	40-0063	84.0	Albert Lea	24-0014	57.0
Washington	40-1117	84.0	Henry	21-0051	56.7
Waconia	10-0059	83.7	Winsted	43-0012	55.7
Traverse	78-0025	83.3	Upper Sakatah	40-0002	54.3
Norway	34-0251	83.3	Silver	43-0034	54.3
Villard	61-0067	83.3	Osakis	77-0215	52.3
Duck	07-0053	83.3	Whiskey	77-0216	52.3
Big Swan	77-0023	82.7	Winona	21-0081	52.0
Frances	40-0057	82.7	Rice	73-0196	49.0
Carlos	21-0057	82.7	Fountain	24-0018	47.3
Bavaria	10-0019	82.7	Marion	56-0243	46.3
Hanska	08-0026	82.7	Big Birch	77-0084	46.0
Pomme De Terre	26-0097	82.0	Ida	21-0123	45.7
Mary	21-0092	82.0	Minnewashta	10-0009	45.3
Sugar	86-0233	81.7	Pelican	26-0002	44.7
Minnewaska	61-0130	81.7	Agnes	21-0053	43.0
Fox	66-0029	81.3	Darling	21-0080	42.7
Maple	86-0134	81.3	Louisa	86-0282	42.0
Amelia	61-0064	81.3	Caroline	86-0281	36.7
Silver	56-0302	80.7	Scott	86-0297	36.3
Eagle	34-0171	80.7	St. Clair	03-0382	34.3
Victoria	21-0054	80.7	Little Pine	56-0141	32.5
Detroit	03-0381	80.7			

TABLE 7. MANAGEMENT RANKING - SEVEN-COUNTY METRO AREA

Lake	Lake Number	Points	Lake	Lake Number	Points
Cedar	70-0091	92.3	Demontreville	82-0101	65.7
Spring	19-0005	89.7	Penn	27-0004	64.0
Bone	82-0054	89.0	Wabasso	62-0082	63.7
Spring	70-0054	88.3	Silver	62-0083	63.3
Independence	27-0176	88.3	Holland	19-0065	62.3
Johanna	62-0078	86.7	Golden	02-0045	62.0
Nokomis	27-0019	85.0	Keller	62-0010	61.0
Coon	02-0042	84.7	Shady Oak	27-0089	56.7
Bryant	27-0067	84.0	Medicine	27-0104	55.0
Elmo	82-0106	83.7	Calhoun	27-0031	52.0
Minnetonka	27-0133	83.3	Long	62-0067	49.6
Fish	27-0118	82.7	Jane	82-0104	49.0
Upper Prior	70-0072	81.7	Lower Prior	70-0026	47.0
Phalen	62-0013	81.7	Twin	27-0042	46.3
Bald Eagle	62-0002	81.7	Gervais	62-0007	46.0
Cedar	27-0039	81.7	Anderson	27-0062	46.0
Crystal	19-0027	81.3	Christmas	27-0137	40.3
Snail	62-0073	81.0	Kohlman	62-0006	38.7
Eagle	27-0111	80.7	Josephine	62-0057	37.7
Big Marine	82-0052	80.3	Como	62-0052	36.3
Harriet	27-0016	80.3	Silver	62-0001	34.7
Marion	19-0026	80.3	Lake of the Isles	27-0040	32.3
Owasso	62-0056	80.0	Sweeny-Twin	27-0035	32.3
White Bear	82-0167	79.0	Beaver	62-0016	32.0
Bush	27-0047	77.0	Brownie	27-0038	32.0
Square	82-0046	75.7	Valentine	62-0071	29.7
Big Carnelian	82-0049	75.3	Powderhorn	27-0014	27.7
Wirth	27-0037	68.7	Hyland	27-0048	27.0
McCarron	62-0054	68.3	Pike	62-0069	25.7
Round	27-0071	68.0	Alimagnet	19-0021	25.7
Moore	02-0075	68.0	Fish	19-0057	22.0
Lily	82-0023	66.0			

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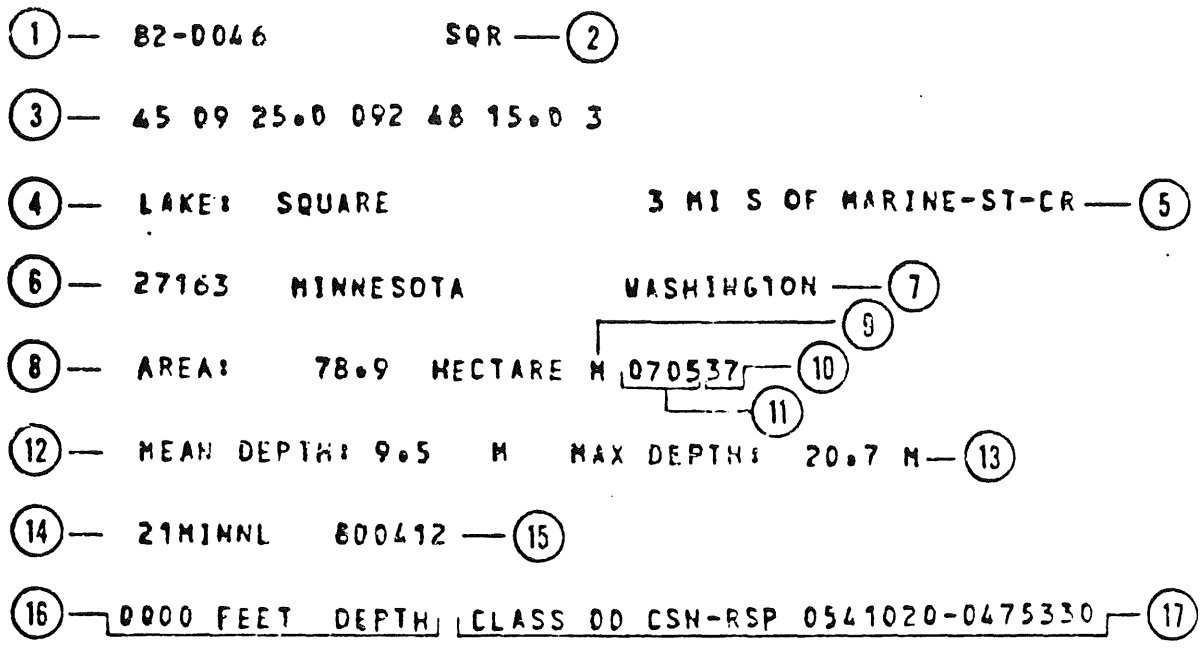
APPENDIX A

STORET HEADER



1. Lake identification number (Department of Natural Resources Bulletin 25)
2. Secondary station identification (used in Minnesota Pollution Control sampling)
3. Latitude and longitude co-ordinates
4. Lake name
5. Distance of lake from the nearest town
6. Federal Information Processing Standard Code for State and County
7. County in which lake is located
8. Lake area (in hectares)
9. Origin of lake area: B=Department of Natural Resources Bulletin 25
   M=Department of Natural Resources Lake Map
10. State Planning Agency Major Basin Code
11. STORET Major and Minor Basin Code
12. Mean depth (in meters)
13. Maximum depth (in meters)
14. STORET Agency Code
15. Date on which the station was established
16. Unused
17. Archive Class (00=on line)

STORET DESCRIPTIVE PARAGRAPH

(18) — AREA: 79 HA

(19) — AV DEPTH: 9.5 M

(20) — MX DEPTH: 21 M

(21) — VOL: 7.49E06 M3

(22) — LITTORAL: 33 %

(23) — DEPTH ROOTED VEG: 9 M

(24) — DOM SHOL SOIL: SAND-

(25) — PUB ACC #: 1

(26) — ADMIN: CNTY

(27) — POPULATION

1 MI: 0

5 MI: 1811

10 MI: 21480

(28) — SHORE L: 2.32 MI

(29) — USE OF SHORELINE:

FOR 30% AGR 5%

NUN 65% MRSH 0%

(30) — # DWELL: 40-1979

(31) — # RESORTS: 1-1979

(32) — AC/MI: 84

(33) — DWELL/MI: 20

(34) — AC/DWELL: 4

(35) — WTRSHED AREA: 4.9 SQ MI

(36) — GEOM REG: - - - -

(37) — SLU: - - - -

(38) — LAND USE: WTR 9% MRSH 0%

FOR 46% CUL 13% RES 3%

URB 1% PASTURE/OPEN 29%

(39) — ECOL CLASS: 5-1979 -

(40) — MGMT CLASS: 1-1979 4-1952 -

(41) — ROUGHFISH: 1

(42) — WQ INDEX: -

(43) — SENS IND: -

(44) — RANK IND: -

(45) — PROBLEMS: -

(48) — LANDSAT TYPE: -

(49) — CHLOR IND: -

(50) — SECCHI IND: -

(51) — T-PHOS IND: -

(46) — LKMAP: C1441

(47) — QUAD1: MARINE ON ST. CR

DESCRIPTIVE PARAGRAPH

18. Area - The surface area determined from planimetry of the lake map. Most commonly this area is from bathymetric maps supplied by DNR. Occasionally, recent aerial photography was used to verify data within DNR-DOW Bulletin #25. Areas were converted to metric units of hectares (2.47 acres = 1 hectare)

19. Average Depth - The average depth determined from the formula $\bar{z} = V/A$, where V is the volume of the lake and A is lake surface area. Volumes were planimetricall determined from DNR bathymetric maps. Average depths were converted to metric units of meters (3.28 feet = 1 meter).

20. Maximum Depth - The maximum depth of the lake determined from bathymetric map. Maximum depths were converted to metric units of meters.

21. Volume - A lake volume was determined from a DNR bathymetric map by summing the partial volumes contained between contours, where a partial volume was calculated from the formula: $V = h/3 (a1 + a2 + \sqrt{a1a2})$, given that h = the depth incremen in feet; a1 and a2 are the surface areas of the given contours. All volumes were converted to metric units of cubic meters (1,230 cubic meters = 1 acre-foo

22. Littoral % - The percentage of the total lake area which is shallower than 15 feet (4.6 meters). The majority of the data has been supplied by the DNR fisheries surveys.

23. Depth of Rooted Vegetation - The maximum depth of rooted vegetation growth in the littoral zone as determined from DNR fisheries surveys for the lake. Units are metric (meters).

24. Dominant Shoal Soils - An approximation of the dominant shore soils estimated by DNR fisheries survey in terms of: ledge rock, boulder, rubble, gravel, sand, clay or muck.

25. Number of Public Accesses - The presence of boat launching facility on a lake incuding non-paved ramps which may be free or require a nominal fee. The number mayalso be associated with multirecreational uses.

26. Access Administration - The unit of government which maintains the public access facility.

27. Population - The estimated population located within the following radii of the center of the lake: 1 mile, 5 miles, 10 miles (lakes in the Seven County Metro Area) and 5 miles, 10 miles, 50 miles (lakes in the Outstate Area).

28. Shore Length - The length of the shoreline determined from the DNR fisheries survey Units are in miles.

29. Use of Shoreline - The nature or use of the immediate area of the shoreline. The information was taken from DNR fisheries surveys and was categorized into four groups: Forest, Municipal, Agriculture, and Marsh. The Municipal category included the following uses: residential, park or campground, transportation, resorts, golf courses, highways, railroad tracks, and commerical/industrial. The Agriculture category included pasture, grasslands, cultivated land, fallow areas. All values were recorded to equal a total of 100 percent.

30. Number of Dwellings - The number of private residences including farms, cabins, homes or cottages within 1,000 feet of the high water mark of a lake. The total number of dwellings are reported along with the data of the DNR fisheries survey from which the data was taken. Only the most recent information was provided.

31. Number of Resorts - The total number of resorts within 1,000 feet of the high water mark of the lake. The value does not include the number of units within a given resort. Only the most recent information was provided from the DNR fisheries survey reports.

32. Acres per Mile of Shoreline - The amount of lake surface area in acres with respect to the total miles of shoreline. The resultant value is an indicator or crowding potential.

33. Dwellings per Mile of Shoreline - The value was calculated based upon the total number of seasonal and permanent residences along with resort units divided by the total shoreline length of the lake.

34. Acres per Dwelling - This ratio represents the acres of lake surface per lakeshore residence obtained by dividing the total number of seasonal and permanent residences and resort cabins on each lake by the lake's surface area.

35. Lake Watershed Area - The data was derived from the Minnesota Land Management Information System (MLMIS). Each watershed area is total number of 40 acre parcels contained within the lake watershed boundary as defined by the DNR in conjunction with this project. Fifty percent (50%) or more of the parcel must fall within the watershed boundary to be included within the watershed area. The data is expressed in square miles.

36. Geomorphic Region - The physiographic area defined by the topographic relief and soil parent material of the lake's watershed. The data was retrieved from the MLMIS system which is based on a 40 acre parcel grid system.

37. Soil Landscape Unit - The unit represents a group of soils generalized into a homogeneous unit based on sub-surface soil texture, surface soil texture, drainage characteristics and surface color. Combinations of these four characteristics describe the soil landscape unit which is identified as a four-letter soil code. The data was retrieved from the MLMIS system and is based upon the 40 acre parcel.

38. Land Use - The land use percentages are based upon nine land use/land cover classes which were recorded for each 40 acre parcel in the state. The data was retrieved from the MLMIS system with the separate land use percentages equalling 100. The nine land use/land cover classes can be found within ghe MLMIS documentation.

39. Ecological Class - This descriptor is the DNR fisheries classification described in terms of natural fish populations which are best adapted to the physical, chemical and biologic characteristics of a lake and which the lake could be expected to support if it were left alone and no special management applied to it. The principal ecological types are as follows:

1) Trout
2) Soft-water walleye
3) Hard-water walleye
4) Centrachid-walleye
5) Centrachid
6) Rough fish-game fish
7) Bullhead
8) Non-classified

The numerical classification along with the year it was assigned by the DNR for the most recent two years is given.

40. Management Class - This descriptor is the management classification attached by the DNR fisheries staff for the most important species, or combination of species on which a management effort is to be directed. The following six classes are used.

1) Trout	4) Centrarchid (largemouth/smallmouth)
2) Walleye	5) Warm-water gamefish
3) Walleye-centrachid	6) Regular winterkill

Only the most recent classifications with the numberical code and year(s) are shown.

41. Roughfish - This is a number reflecting the relative potential problem of carp for a given lake with one indicating the lowest potential and three a high probability. The value was derived from DNR fisheries surveys.

42. Water Quality Index - The overall value of water quality attributed to a lake based upon the chlorophyll a, secchi disc and total phosphorus indices or the LANDSAT type.

43. Sensitivity Index - probably to be deleted.

44. Ranking Index - The relative ranking of a lake in terms of need for protection or restoration.

45. Lake Problems - This section lists those problems recorded within DNR fisheries survey reports as having occurred for a particular lake. Abbreviations for certain problems were used as follows:

Wtrkl (winterkill)	Swim itch (swimmer's itch)
Smrkl (summerkill)	Algae blms (algae blooms)
Fshkl (fishkill)	Ag Veg (aquatic vegetation)

If no problems were indicated, None, was recorded.

46. Lake Map - The code provided for the particular DNR bathymetric lake map from Documents Section, Department of Administration.

47. Quad Map - The particular U.S. Geological Survey quadrangle map in which the lake or major portion thereof is situated.

48. LANDSAT Type - The lake classification predicted through the use of satellite imagery

49. Chlorophyll Index - An index representing the logarithmic transformation of chlorophyll a lake data on a scale of 0-100.

50. Secchi Disc Index - An index representing the logarithmic transformation of lake secchi disc transparency data on a scale of 0-100.

51. Total Phosphorus Index - An index representing the logarithmic transformation of lake total phosphorus data on a scale of 0-100.

APPENDIX B

MPCA LAKE CLASSIFICATION PROJECT (314A)

02-0042 COON
45 18 35.0 093 09 45.0 3
LAKE: COON AT COON LAKE BEACH
27003 MINNESOTA ANOKA
AREA: 593.4 HECTARE M 070537
MEAN DEPTH: 2.2 M MAX DEPTH: 8.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 593 HA
AV DEPTH: 2.2 M
MX DEPTH: 8 M
VOL: 1.33E07 M3
LITTORAL: 80 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: SAND-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
1 MI: 0
5 MI: 2586
10 MI: 18633

SHORE L: 12.06 MI
USE OF SHORELINE: FOR 20% AGR 20% MUN 60% MRSH 0%
DWELL: 400-1973
RESORTS: 0-1973
AC/MI: 122
DWELL/MI: 33
AC/DWELL: 4
WTRSHED AREA: 10.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 20% MRSH 7%
FOR 15% CUL 12% RES 20%
URB 1% PASTURE/OPEN 25%

ECOL CLASS: -
MGMT CLASS: 4-1973 3-1954 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1973
WTRKL 1947,73

LKMAP: B4
QUAD1: COON LAKE BEACH

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.083	0.8	22	1.744	81	38	21.0	68	63	61	64

MPCA LAKE CLASSIFICATION PROJECT (314A)

02-0045
45 08 23.0 093 09 12.0 3
LAKE: GOLDEN AT CIRCLE PINES
27003 MINNESOTA ANOKA
AREA: 23.1 HECTARE M 070320
MEAN DEPTH: 2.4 M MAX DEPTH: 7.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 23 HA
AV DEPTH: 2.4 M
MX DEPTH: 7 M
VOL: 5.63E05 M3
LITTORAL: 90 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SILT--
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 16769
10 MI: 291259

SHORE L: 1.5 MI
USE OF SHORELINE: FOR - % AGR - % MUN - % MRSH - %
DWELL: 15-1959
RESORTS: 0-1959
AC/MI: 38
DWELL/MI: 10
AC/DWELL: 4
WTRSHED AREA: 10.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 13%
FOR 23% CUL 8% RES 11%
URB 4% PASTURE/OPEN 40%

ECOL CLASS: 5-1959 -
MGMT CLASS: 4-1959 -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1959

LKMAP: C1046
QUAD1: CIRCLE PINES

MPCA LAKE CLASSIFICATION PROJECT (314A)

02-0075
45 04 36.0 093 14 50.0 3
LAKE: MOORE AT FRIDLEY
27003 MINNESOTA ANOKA
AREA: 36.6 HECTARE M 070320
MEAN DEPTH: 1.1 M MAX DEPTH: 22.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 37 HA
AV DEPTH: 1.1 M
MX DEPTH: 23 M
VOL: 3.97E05 M3
LITTORAL: 97 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND
PUB ACC #: -
ADMIN: -
POPULATION
1 MI: 0
5 MI: 128299
10 MI: 821453

SHORE L: 2.5 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 30-1978
RESORTS: 0-1959
AC/MI: 36
DWELL/MI: 12
AC/DWELL: 3
WTRSHED AREA: 1.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 0%
FOR 0% CUL 0% RES 48%
URB 43% PASTURE/OPEN 0%

ECOL CLASS: 7-1959 -
MGMT CLASS: 4-1959 -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL 1959

LKMAP: C1106
QUAD1: MINNEAPOLIS NORT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.108	0.6	12	1.613	67	-	14.9	72	67	55	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

03-0359 SAL
46 46 15.0 095 53 15.0 3
LAKE: SALLIE AT SHOREHAM
27005 MINNESOTA BECKER
AREA: 512.6 HECTARE M 230156
MEAN DEPTH: 5.3 M MAX DEPTH: 17.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 513 HA
AV DEPTH: 5.3 M
MX DEPTH: 18 M
VOL: 2.70E07 M3
LITTORAL: 43 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
SAND-
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 7653
10 MI: 13728
50 MI: 155419

SHORE L: 5.60 MI
USE OF SHORELINE:
FOR 85% AGR 15%
MUN 0% MRSH 0%
DWELL: 157-1975
RESORTS: 5-1975
AC/MI: 226
DWELL/MI: 33
AC/DWELL: 7
WTRSHED AREA: 94.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 4%
FOR 25% CUL 20% RES 8%
URB 5% PASTURE/OPEN 24%

ECOL CLASS: 4-1975 4-1968 -
MGMT CLASS: 3-1975 3-1968 2-1949
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: TURKEY FARMS
DET LKS DISPOSAL PLANT
AQ WEEDS 1968
SMRKL 1947
ALGAE 1949,68,75

LKMAP: B360
QUAD1: AUDUBON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.126	2.3	55	1.490	185	25	11.8	74	48	70	64

MPCA LAKE CLASSIFICATION PROJECT (314A)

03-0381 DET
46 47 30.0 095 52 30.0 3
LAKE: DETROIT AT DETROIT LAKES
27005 MINNESOTA BECKER
AREA: 1260.6 HECTARE M 230156
MEAN DEPTH: 4.8 M MAX DEPTH: 25.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1261 HA
AV DEPTH: 4.8 M
MX DEPTH: 25 M
VOL: 6.01E07 M3
LITTORAL: 67 %
DEPTH ROOTED
VEG: 6 M
DOM SHOL SOIL:
SAND
PUB ACC #:>1
ADMIN: MNDOT
POPULATION
5 MI: 213
10 MI: 4140
50 MI: 70047

SHORE L: 12.40 MI
USE OF SHORELINE:
FOR 65% AGR 10%
MUN 25% MRSH 0%
DWELL: 492-1979
RESORTS: 23-1979
AC/MI: 251
DWELL/MI: 51
AC/DWELL: 5
WTRSHED AREA: 69.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 4%
FOR 30% CUL 20% RES 5%
URB 4% PASTURE/OPEN 26%

ECOL CLASS: 4-1979 -
MGMT CLASS: 2-1979 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: BULLHEAD REMOVAL 1979

LKMAP: B9
QUAD1: DETROIT LAKES

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.035	2.4	10	0.842	183	10	24.1	55	47	53	52

MPCA LAKE CLASSIFICATION PROJECT (314A)

03-0382
46 48 10.0 095 52 50.0 3
LAKE: ST. CLAIR 1 MI W OF DETROITLAKES
27005 MINNESOTA BECKER
AREA: 56.7 HECTARE B 230156
MEAN DEPTH: 1.3 M MAX DEPTH: 2.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 57 HA
AV DEPTH: 1.3 M
MX DEPTH: 2.2 M
VOL: 7.24E05 M3
LITTORAL: 88 %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
MUCK
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 9993
10 MI: 13518
50 MI: 150533

SHORE L: 2.1 MI
USE OF SHORELINE:
FOR 32% AGR 8%
MUN 0% MRSH 60%
DWELL:0 -1964
RESORTS: 0-1964
AC/MI: 67
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 13.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 4%
FOR 10% CUL 25% RES 10%
URB 9% PASTURE/OPEN 26%

ECOL CLASS: 7-1964 -
MGMT CLASS: 6-1964 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: OCC WTRKL

LKMAP: ?
QUAD1: AUDUBON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.552	1.0	31	-	168	-	-	95	69	61	73

MPCA LAKE CLASSIFICATION PROJECT (314A)

03-0475
46 44 10.0 095 53 40.0 3
LAKE: MELISSA AT SHOREHAM
27005 MINNESOTA BECKER
AREA: 750.6 HECTARE M 230156
MEAN DEPTH: 5.6 M MAX DEPTH: 13.1 M
/TYPA/AMBNT/LAKE - 21MINNL 800412

DESCRIPTION

AREA: 751 HA
AV DEPTH: 5.6 M
MX DEPTH: 13 M
VOL: 4.18E07 M3
LITTORAL: 51 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND-SAND
PUB ACC #: 3
ADMIN: CITY
POPULATION
5 MI: 1856
10 MI: 14155
50 MI: 157722

SHORE L: 9.75 MI
USE OF SHORELINE:
FOR 8% AGR 0%
MUN 92% MRSH 0%
DWELL: 326-1976
RESORTS: 5-1976
AC/MI: 190
DWELL/MI: 37
AC/DWELL: 5
WTRSHED AREA: 105.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 4%
FOR 27% CUL 20% RES 7%
URB 4% PASTURE/OPEN 23%

ECOL CLASS: 3-1976 -
MGMT CLASS: 2-1976 3-1968 2-1949
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: HVY WEED GROWTH 1968

LKMAP: B11
QUAD1: AUDUBON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
-	-	-	-	-	-	-	-	-	-	-

MPCA LAKE CLASSIFICATION PROJECT (314A)

03-0576 BCMT
46 46 15.0 096 03 45.0 3
LAKE: BIG CORMORANT 1 MI N OF CORMORANT
27005 MINNESOTA BECKER
AREA: 1367.8 HECTARE B 230156
MEAN DEPTH: 7.7 M MAX DEPTH: 18.3 M
/TYPA/AMBNT/LAKE 21MINNL 800816

DESCRIPTION

AREA: 1368 HA
AV DEPTH: 7.7 M
MX DEPTH: 18 M
VOL: 1.04E08 M3
LITTORAL: 10 %
DEPTH ROOTED VEG: 8 M
DOM SHOL SOIL: RUBBLE-GRAVEL
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1029
10 MI: 5766
50 MI: 150578

SHORE L: 9.10 MI
USE OF SHORELINE:
FOR 50% AGR 0%
MUN 50% MRSH 0%
DWELL: 236-1972
RESORTS: 6-1972
AC/MI: 371
DWELL/MI: 30
AC/DWELL: 12
WTRSHED AREA: 26.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 39% MRSH 2%
FOR 11% CUL 20% RES 10%
URB 1% PASTURE/OPEN 18%

ECOL CLASS: 3-1972 3-1954 -
MGMT CLASS: 2-1972 2-1954 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: HIGH WATER 1972

LKMAP: B462
QUAD1: BIG CORMORANT LA

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.023	3.3	4	0.958	257	2	41.7	49	43	44	45

MPCA LAKE CLASSIFICATION PROJECT (314A)

06-0152
45 16 10.0 096 27 15.0 3
LAKE: BIG STONE AT ORTONVILLE
27011 MINNESOTA BIG STONE
AREA: 5103.1 HECTARE B 070422
MEAN DEPTH: 3.4 M MAX DEPTH: 4.6 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 5103 HA
AV DEPTH: 3.4 M
MX DEPTH: 5 M
VOL: 1.71E08 M3
LITTORAL: 99 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: BOULDE-MUCK
PUB ACC #: 14
ADMIN: DNR-E
POPULATION
5 MI: 2841
10 MI: 4152
50 MI: 71785

SHORE L: 61.85 MI
USE OF SHORELINE:
FOR 30% AGR 65%
MUN 5% MRSH 0%
DWELL: 605-1971
RESORTS: 15-1971
AC/MI: 204
DWELL/MI: 11
AC/DWELL: 18
WTRSHED AREA: - SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR -% MRSH -%
FOR -% CUL -% RES -%
URB -% PASTURE/OPEN -%

ECOL CLASS: 6-1971 -
MGMT CLASS: 5-1971 2-1947 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SWIM ITCH 1971
AQ VEG 1971
HVY ALGAL BLMS:MAY-OCT
WTRKL:1947-48

LKMAP: B37
QUAD1: BROWNS VALLEY

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.168	1.1	25	1.755	169	-	10.4	78	59	62	66

MPCA LAKE CLASSIFICATION PROJECT (314A)

07-0044
44 11 25.0 093 48 40.0 3
LAKE: MADISON AT MADISON LAKE
27013 MINNESOTA BLUE EARTH
AREA: 473.7 HECTARE M 070428
MEAN DEPTH: 3.9 M MAX DEPTH: 18.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 474 HA
AV DEPTH: 3.9 M
MX DEPTH: 18 M
VOL: 1.81E07 M3
LITTORAL: 65 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND--SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1739
10 MI: 10245
50 MI: 442363

SHORE L: 11.37 MI
USE OF SHORELINE:
FOR 55% AGR 0%
MUN 45% MRSH 0%
DWELL: 126-1974
RESORTS: 3-1974
AC/MI: 103
DWELL/MI: 13
AC/DWELL: 8
WTRSHED AREA: 15.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 5%
FOR 1% CUL 60% RES 4%
URB 1% PASTURE/OPEN 11%

ECOL CLASS: 5-1974 5-1970 5-1955
MGMT CLASS: 3-1974 3-1970 3-1955
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: DEAD TREES 1974
ALGAE 1974
HVY ALGAL GROWTH 1970

LKMAP: C1965
QUAD1: MADISON LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.067	0.8	33	1.762	170	24	26.3	65	63	65	64

MPCA LAKE CLASSIFICATION PROJECT (314A)

07-0047
44 14 00.0 093 52 10.0 3
LAKE: GEORGE 3 MI NW OF MADISON LK
27013 MINNESOTA BLUE EARTH
AREA: 57.1 HECTARE B 070432
MEAN DEPTH: 2.9 M MAX DEPTH: 8.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 57 HA
AV DEPTH: 2.9 M
MX DEPTH: 9 M
VOL: 1.64E06 M3
LITTORAL: - %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: MUCK-SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
5 MI: 3106
10 MI: 56486
50 MI: 450474

SHORE L: 1.5 MI
USE OF SHORELINE:
FOR 75% AGR 0%
MUN 5% MRSH 20%
DWELL: 3-1970
RESORTS: 0-1970
AC/MI: 94
DWELL/MI: 2
AC/DWELL: 47
WTRSHED AREA: 1.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 15% MRSH 0%
FOR 5% CUL 75% RES 0%
URB 0% PASTURE/OPEN 5%

ECOL CLASS: 4-1970 -
MGMT CLASS: 5-1970 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C2062
QUAD1: MANKATO EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.078	0.5	-	2.895	95	-	37.1	67	70	-	68

MPCA LAKE CLASSIFICATION PROJECT (314A)

07-0053 DUCK
44 13 05.0 093 48 55.0 3
LAKE: DUCK 1 MI N OF MADISON LAKE
27013 MINNESOTA BLUE EARTH
AREA: 116.5 HECTARE B 070432
MEAN DEPTH: 3.0 M MAX DEPTH: 7.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 117 HA
AV DEPTH: 3.0 M
MX DEPTH: 8 M
VOL: 3.44E06 M3
LITTORAL: 82 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND---SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
5 MI: 2028
10 MI: 12441
50 MI: 534644

SHORE L: 2.84 MI
USE OF SHORELINE:
FOR 80% AGR 0%
MUN 0% MRSH 20%
DWELL: 121-1974
RESORTS: 0-1974
AC/MI: 101
DWELL/MI: 43
AC/DWELL: 2
WTRSHED AREA: 1.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 24% MRSH 0%
FOR 0% CUL 56% RES 16%
URB 4% PASTURE/OPEN 0%

ECOL CLASS: 5-1974 5-1970 5-1956
MGMT CLASS: 3-1974 3-1970 3-1956
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: PART WTRKL:1955-56

LKMAP: D21
QUAD1: MADISON LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.050	0.9	15	1.515	163	20	30.3	61	62	57	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

07-0054 BLT
44 12 45.0 093 50 15.0 3
LAKE: BALLANTYNE 1 MI NW OF MADISON LK
27013 MINNESOTA BLUE EARTH
AREA: 142.7 HECTARE M 070437
MEAN DEPTH: 2.4 M MAX DEPTH: 17.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 143 HA
AV DEPTH: 2.4 M
MX DEPTH: 18 M
VOL: 3.45E06 M3
LITTORAL: 89 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND--SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 2028
10 MI: 50637
50 MI: 448715

SHORE L: 3.42 MI
USE OF SHORELINE:
FOR 20% AGR 80%
MUN 0% MRSH 0%
DWELL: 46-1974
RESORTS: 0-1974
AC/MI: 103
DWELL/MI: 13
AC/DWELL: 8
WTRSHED AREA: 5.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 5%
FOR 0% CUL 59% RES 9%
URB 2% PASTURE/OPEN 8%

ECOL CLASS: 5-1974 5-1970 6-1955
MGMT CLASS: 3-1974 3-1970 3-1955
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C2407
QUAD1: MADISON LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.040	1.5	20	1.565	140	20	39.1	57	54	60	57

MPCA LAKE CLASSIFICATION PROJECT (314A)

08-0026 HSK
44 08 00.0 094 35 45.0 3
LAKE: HANSKA 3 MI SW OF HANSKA
27015 MINNESOTA BROWN
AREA: 746.2 HECTARE B 070431
MEAN DEPTH: 1.4 M MAX DEPTH: 1.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 746 HA
AV DEPTH: 1.4 M
MX DEPTH: 2 M
VOL: 1.02E07 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
MUCK
PUB ACC #: 5
ADMIN: DNR-E
POPULATION
5 MI: 528
10 MI: 4555
50 MI: 264118

SHORE L: 20.87 MI
USE OF SHORELINE:
FOR 40% AGR 50%
MUN 0% MRSH 10%
DWELL: 17-1976
RESORTS: 0-1976
AC/MI: 88
DWELL/MI: 1
AC/DWELL: 108
WTRSHED AREA: 32.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 0%
FOR 0% CUL 85% RES 0%
URB 0% PASTURE/OPEN 5%

ECOL CLASS: 6-1976 -
MGMT CLASS: -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: ?
QUAD1: LAKE HANSKA WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.134	0.7	35	2.333	112	21	39.1	75	65	65	68

MPCA LAKE CLASSIFICATION PROJECT (314A)

10-0009 MSH
44 52 50.0 093 36 30.0 3
LAKE: MINNEWASHTA 2 MI E OF ZUMBRO HGHTS
27019 . MINNESOTA CARVER
AREA: 302.1 HECTARE M 070320
MEAN DEPTH: 5.1 M MAX DEPTH: 21.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 302 HA
AV DEPTH: 5.1 M
MX DEPTH: 21 M
VOL: 1.54E07 M3
LITTORAL: 50 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
MUCK
PUB ACC #:0
ADMIN: LOCAL
POPULATION
1 MI: 0
5 MI: 14459
10 MI: 106516

SHORE L: 7.60 MI
USE OF SHORELINE:
FOR 40% AGR 20%
MUN 40% MRSH 0%
DWELL: 85-1974
RESORTS: 1-1974
AC/MI: 98
DWELL/MI: 12
AC/DWELL: 8
WTRSHED AREA: 5.2 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 16% MRSH 6%
FOR 13% CUL 24% RES 22%
URB 2% PASTURE/OPEN 14%

ECOL CLASS: 5-1957 -
MGMT CLASS: 4-1957 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C91
QUAD1: EXCELSIOR

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.034	2.8	4	0.975	135	8	28.7	55	45	44	46

MPCA LAKE CLASSIFICATION PROJECT (314A)

10-0019
44 50 15.0 093 38 25.0 3
LAKE: BAVARIA 2 MI SE OF VICTORIA
27019 . MINNESOTA CARVER
AREA: 75.9 HECTARE B 070433
MEAN DEPTH: 5.6 M MAX DEPTH: 18.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 76 HA
AV DEPTH: 5.6 M
MX DEPTH: 18 M
VOL: 4.24E06 M3
LITTORAL: 47 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
MUCK
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 7071
10 MI: 66247

SHORE L: 2.30 MI
USE OF SHORELINE:
FOR 50% AGR 10%
MUN 40% MRSH 0%
DWELL: 30-1975
RESORTS: 0-1975
AC/MI: 82
DWELL/MI: 13
AC/DWELL: 6
WTRSHED AREA: 1.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 0%
FOR 10% CUL 57% RES 7%
URB 3% PASTURE/OPEN 13%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS:

LKMAP: D32
QUAD1: VICTORIA

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.039	1.0	-	-	87	-	-	57	60	-	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

10-0059 WCA
44 52 20.0 093 47 00.0 3
LAKE: WACONIA AT WACONIA
27019 MINNESOTA CARVER
AREA: 1292.7 HECTARE M 070433
MEAN DEPTH: 4.1 M MAX DEPTH: 11.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1293 HA
AV DEPTH: 4.1 M
MX DEPTH: 11 M
VOL: 5.21E07 M3
LITTORAL: 53 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: CLAY-GRAVEL
PUB ACC #: 2
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 4519
10 MI: 30651

SHORE L: 6.80 MI
USE OF SHORELINE:
FOR 90% AGR 10%
MUN 0% MRSH 0%
DWELL: 210-1973
RESORTS: 5-1973
AC/MI: 470
DWELL/MI: 35
AC/DWELL: 13
WTRSHED AREA: 9.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 16%
FOR 4% CUL 61% RES 0%
URB 1% PASTURE/OPEN 9%

ECOL CLASS: 4-1973 -
MGMT CLASS: 3-1973 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: AQ VEG 1973

LKMAP: B226
QUAD1: WACONIA-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.048	1.1	32	1.662	162	11	34.6	60	59	65	61

MPCA LAKE CLASSIFICATION PROJECT (314A)

19-0005
44 46 00.0 092 59 15.0 3
LAKE: SPRING 2 MI W OF NININGER
27037 MINNESOTA DAKOTA
AREA: 2391.7 HECTARE M 070320
MEAN DEPTH: 2.4 M MAX DEPTH: 6.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2392 HA
AV DEPTH: 2.4 M
MX DEPTH: 6 M
VOL: 5.83E07 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: DNR-E
POPULATION
5 MI: 943
10 MI: 80205
50 MI: 2029243

SHORE L: 23.8 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 10-1956
RESORTS: 1-1956
AC/MI: 248
DWELL/MI: 1
AC/DWELL: 369
WTRSHED AREA: - SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR -% MRSH -%
FOR -% CUL -% RES -%
URB -% PASTURE/OPEN -%

ECOL CLASS: 6-1956 -
MGMT CLASS: 5-1956 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: ?
QUAD1: INVER GROVE HEIG

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.329	0.5	103	3.813	183	25	10.1	90	70	76	79

MPCA LAKE CLASSIFICATION PROJECT (314A)

19-0021
44 45 00.0 093 15 00.0 3
LAKE: ALIMAGNET IN BURNSVILLE
27037 MINNESOTA DAKOTA
AREA: 44.3 HECTARE M 070433
MEAN DEPTH: 1.4 M MAX DEPTH: 2.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 44 HA	SHORE L: 2.6 MI	ECOL CLASS: -					
AV DEPTH: 1.4 M	USE OF SHORELINE:	MGMT CLASS: -					
MX DEPTH: 3 M	FOR - % AGR - %	ROUGHFISH: -	LANDSAT TYPE: -				
VOL: 6.24E05 M3	MUN - % MRSH - %	WQ INDEX: -	CHLOR IND: -				
LITTORAL: - %	# DWELL: 50-1980	SENS IND: -	SECCHI IND: -				
DEPTH ROOTED	# RESORTS: -	RANK IND: -	T-PHOS IND: -				
VEG: - M	AC/MI: 42	PROBLEMS: -					
DOM SHOL SOIL:	DWELL/MI: 19						
-	AC/DWELL: 2						
PUB ACC #: -	WTRSHED AREA: 2.4 SQ MI						
ADMIN: -	GEOM REG: - - - -						
POPULATION	SLU: - - - -						
1 MI: 0	LAND USE: WTR 10% MRSH 0%						
5 MI: 28442	FOR 38% CUL 13% RES 8%	LKMAP: C1092					
10 MI: 189271	URB 3% PASTURE/OPEN 28%	QUAD1: BLOOMINGTON					

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.156	0.7	19	1.610	70	26	10.3	77	65	59	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

19-0026
44 40 10.0 093 17 05.0 3
LAKE: MARION-WHOLE LAKE IN LAKEVILLE
27037 MINNESOTA DAKOTA
AREA: 205 HECTARE M 070638
MEAN DEPTH: 2.7 M MAX DEPTH: 5.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 205 HA	SHORE L: 7.50 MI	ECOL CLASS: -					
AV DEPTH: 2.7 M	USE OF SHORELINE:	MGMT CLASS: -					
MX DEPTH: 5 M	FOR 20% AGR 20%	ROUGHFISH: 1	LANDSAT TYPE: -				
VOL: 4.41E06 M3	MUN 60% MRSH 0%	WQ INDEX: -	CHLOR IND: -				
LITTORAL: 82 %	# DWELL: 70-1969	SENS IND: -	SECCHI IND: -				
DEPTH ROOTED	# RESORTS: 0-1969	RANK IND: -	T-PHOS IND: -				
VEG: - M	AC/MI: 55	PROBLEMS: WTRKL 1946					
DOM SHOL SOIL:	DWELL/MI: 9						
SAND-SAND	AC/DWELL: 6						
PUB ACC #: 1	WTRSHED AREA: 8.4 SQ MI						
ADMIN: CITY	GEOM REG: - - - -						
POPULATION	SLU: - - - -						
1 MI: 0	LAND USE: WTR 7% MRSH 1%						
5 MI: 7556	FOR 23% CUL 22% RES 7%	LKMAP: B117					
10 MI: 52560	URB 5% PASTURE/OPEN 33%	QUAD1: ORCHARD LAKE					

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.050	1.4	43	1.087	132	-	21.7	61	55	67	61

MPCA LAKE CLASSIFICATION PROJECT (314A)

19-0027 CRY
44 43 20.0 093 15 55.0 3
LAKE: CRYSTAL IN BURNSVILLE
27037 MINNESOTA DAKOTA
AREA: 118.1 HECTARE M 070320
MEAN DEPTH: 3.2 M MAX DEPTH: 11.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 118 HA
AV DEPTH: 3.2 M
MX DEPTH: 11 M
VOL: 3.73E06 M3
LITTORAL: 74 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND--MUCK
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 35998
10 MI: 146059

SHORE L: 5.25 MI
USE OF SHORELINE:
FOR 0% AGR 40%
MUN 60% MRSH 0%
DWELL: 165-1975
RESORTS: 0-1975
AC/MI: 56
DWELL/MI: 31
AC/DWELL: 2
WTRSHED AREA: 3.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 15% MRSH 0%
FOR 16% CUL 18% RES 16%
URB 5% PASTURE/OPEN 27%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: HVY BULLHEAD POP 1975

LKMAP: C988
QUAD1: ORCHARD LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.037	1.7	11	1.375	140	9	37.2	56	52	54	54

MPCA LAKE CLASSIFICATION PROJECT (314A)

19-0057 DFSH
44 49 20.0 093 09 50.0 3
LAKE: FISH IN EAGAN
27037 MINNESOTA DAKOTA
AREA: 10 HECTARE M 070320
MEAN DEPTH: 1.9 M MAX DEPTH: 7.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 10 HA
AV DEPTH: 1.9 M
MX DEPTH: 8 M
VOL: 1.41E05 M3
LITTORAL: 88 %
DEPTH ROOTED VEG: 6 M
DOM SHOL SOIL: GRAVEL--
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 10398
10 MI: 242063

SHORE L: 1.00 MI
USE OF SHORELINE:
FOR 75% AGR 0%
MUN 25% MRSH 0%
DWELL: 8-1978
RESORTS: 0-1978
AC/MI: 18
DWELL/MI: 8
AC/DWELL: 2
WTRSHED AREA: 2.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 13% CUL 33% RES 8%
URB 3% PASTURE/OPEN 45%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1368
QUAD1: ST. PAUL SW

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.032	3.7	4	1.547	95	21	48.3	54	41	44	46

MPCA LAKE CLASSIFICATION PROJECT (314A)

19-0065 HLD
44 47 20.0 093 08 30.0 3
LAKE: HOLLAND IN EAGAN
27037 MINNESOTA DAKOTA
AREA: 13.5 HECTARE M 070638
MEAN DEPTH: 3.9 M MAX DEPTH: 16.8 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 13 HA	SHORE L: 1.25 MI	ECOL CLASS: 5-1975 -			
AV DEPTH: 3.9 M	USE OF SHORELINE:	MGMT CLASS: 4-1975 -			
MX DEPTH: 17 M	FOR 10% AGR 90%	ROUGHFISH: 1	LANDSAT TYPE: -		
VOL: 5.20E05 M3	MUN 0% MRSH 0%	WQ INDEX: -	CHLOR IND: -		
LITTORAL: 69 %	# DWELL: 1-1975	SENS IND: -	SECCHI IND: -		
DEPTH ROOTED	# RESORTS: 0-1975	RANK IND: -	T-PHOS IND: -		
VEG: - M	AC/MI: 27	PROBLEMS: -			
DOM SHOL SOIL:	DWELL/MI: 1				
MUCK-SAND	AC/DWELL: 33				
PUB ACC #: 1	WTRSHED AREA: 0.4 SQ MI				
ADMIN: CNTY	GEOM REG: - - - -				
POPULATION	SLU: - - - -				
1 MI: 0	LAND USE: WTR 14% MRSH 0%				
5 MI: 14432	FOR 43% CUL 14% RES 0%	LKMAP: C1369			
10 MI: 264386	URB 0% PASTURE/OPEN 29%	QUAD1: SAINT PAUL SW			

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.029	3.0	4	0.907	88	22	31.3	53	44	44	47

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0051
45 54 05.0 095 22 30.0 3
LAKE: HENRY AT ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 64.2 HECTARE M 070314
MEAN DEPTH: 4.2 M MAX DEPTH: 9.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 64 HA	SHORE L: 2.00 MI	ECOL CLASS: -			
AV DEPTH: 4.2 M	USE OF SHORELINE:	MGMT CLASS: 4-1948 -			
MX DEPTH: 10 M	FOR 40% AGR 5%	ROUGHFISH: 1	LANDSAT TYPE: -		
VOL: 2.72E06 M3	MUN 55% MRSH 0%	WQ INDEX: -	CHLOR IND: -		
LITTORAL: 61 %	# DWELL: 55-1970	SENS IND: -	SECCHI IND: -		
DEPTH ROOTED	# RESORTS: 0-1948	RANK IND: -	T-PHOS IND: -		
VEG: - M	AC/MI: 79	PROBLEMS: ALGAE BLM 1950			
DOM SHOL SOIL:	DWELL/MI: 28				
SAND-	AC/DWELL: 3				
PUB ACC #:0	WTRSHED AREA: 7.3 SQ MI				
ADMIN: -	GEOM REG: - - - -				
POPULATION	SLU: - - - -				
5 MI: 11348	LAND USE: WTR 7% MRSH 4%				
10 MI: 15537	FOR 3% CUL 27% RES 15%	LKMAP: C1781			
50 MI: 184005	URB 27% PASTURE/OPEN 11%	QUAD1: ALEXANDRIA WEST			

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.306	0.4	150	3.294	210	25	10.8	67	73	80	80

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0053
45 53 40.0 095 22 30.0 3
LAKE: AGNES IN ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 57.0 HECTARE M 070314
MEAN DEPTH: 5.0 M MAX DEPTH: 9.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 57 HA
AV DEPTH: 5.0 M
MX DEPTH: 9 M
VOL: 2.85E06 M3
LITTORAL: 43 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
SAND--SAND
PUB ACC #:0
ADMIN: CITY
POPULATION
5 MI: 11348
10 MI: 15537
50 MI: 184158

SHORE L: 1.70 MI
USE OF SHORELINE:
FOR 70% AGR 0%
MUN 30% MRSH 0%
DWELL: 6-1966
RESORTS: 0-1966
AC/MI: 83
DWELL/MI: 4
AC/DWELL: 23
WTRSHED AREA: 6.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 5% MRSH 4%
FOR 4% CUL 21% RES 12%
URB 32% PASTURE/OPEN 13%

ECOL CLASS: 6-1966 -
MGMT CLASS: 5-1966 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WNTR FREEZE OUT 1966
ALGAE BLMS 1966

LKMAP: C1781
QUAD1: ALEXANDRIA WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.252	0.4	153	3.140	180	20	12.5	84	73	80	79

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0054 VIC
45 52 55.0 095 19 45.0 3
LAKE: VICTORIA AT ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 170.0 HECTARE M 070314
MEAN DEPTH: 9.3 M MAX DEPTH: 18.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 170 HA
AV DEPTH: 9.3 M
MX DEPTH: 18 M
VOL: 1.58E07 M3
LITTORAL: 29 %
DEPTH ROOTED
VEG: 4 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: -
POPULATION
5 MI: 9660
10 MI: 16673
50 MI: 187013

SHORE L: 6.60 MI
USE OF SHORELINE:
FOR 5% AGR 68%
MUN 27% MRSH 0%
DWELL: 64-1966
RESORTS: 2-1966
AC/MI: 64
DWELL/MI: 12
AC/DWELL: 6
WTRSHED AREA: 23.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 4%
FOR 7% CUL 48% RES 2%
URB 0% PASTURE/OPEN 31%

ECOL CLASS: 5-1966 -
MGMT CLASS: 4-1966 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1778
QUAD1: ALEXANDRIA EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.025	1.8	11	0.857	170	10	34.3	51	52	54	52

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0056
45 55 50.0 095 20 40.0 3
LAKE: LE HOMME DIEU AT ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 765.7 HECTARE B 070314
MEAN DEPTH: 6.2 M MAX DEPTH: 25.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 766 HA
AV DEPTH: 6.2 M
MX DEPTH: 26 M
VOL: 4.78E07 M3
LITTORAL: 44 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND---SAND
PUB ACC #: 3
ADMIN: DNR-E
POPULATION
5 MI: 9763
10 MI: 15403
50 MI: 183662

SHORE L: 9.00 MI
USE OF SHORELINE:
FOR 16% AGR 0%
MUN 84% MRSH 0%
DWELL: 196-1966
RESORTS: 5-1966
AC/MI: 210
DWELL/MI: 25
AC/DWELL: 8
WTRSHED AREA: 50.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 11% MRSH 3%
FOR 7% CUL 37% RES 8%
URB 7% PASTURE/OPEN 25%

ECOL CLASS: 4-1966 -
MGMT CLASS: 3-1966 5-1948 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C787
QUAD1: ALEXANDRIA EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.025	2.1	8	0.680	167	7	27.2	51	49	51	50

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0057
45 57 30.0 095 21 45.0 3
LAKE: CARLOS 2 MI W OF CARLOS
27041 MINNESOTA DOUGLAS
AREA: 1019.8 HECTARE M 070314
MEAN DEPTH: 13.3 M MAX DEPTH: 49.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1020 HA
AV DEPTH: 13.3 M
MX DEPTH: 50 M
VOL: 1.36E08 M3
LITTORAL: 36 %
DEPTH ROOTED VEG: 6 M
DOM SHOL SOIL: SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1190
10 MI: 15448
50 MI: 179458

SHORE L: 14.06 MI
USE OF SHORELINE:
FOR 35% AGR 0%
MUN 65% MRSH 0%
DWELL: 310-1973
RESORTS: 9-1973
AC/MI: 179
DWELL/MI: 26
AC/DWELL: 7
WTRSHED AREA: 222.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 20% MRSH 2%
FOR 13% CUL 35% RES 5%
URB 2% PASTURE/OPEN 22%

ECOL CLASS: 3-1973 4-1954 -
MGMT CLASS: 2-1973 3-1954 2-1948
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: TULLIBEE SMRKL 1973
ALGAE RLM 1973

LKMAP: B118
QUAD1: ALEXANDRIA WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.019	2.3	6	0.784	183	6	41.3	47	46	48	48

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0076 IRN
46 03 40.0 095 18 30.0 3
LAKE: IRENE 1 MI NW OF MILTONA
27041 MINNESOTA DOUGLAS
AREA: 257.3 HECTARE M 070314
MEAN DEPTH: 6.0 M MAX DEPTH: 13.4 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 257 HA
AV DEPTH: 6.0 M
MX DEPTH: 13 M
VOL: 1.54E07 M3
LITTORAL: 36 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: BOULDE-RUBBLE
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1094
10 MI: 4980
50 MI: 175624

SHORE L: 4.10 MI
USE OF SHORELINE:
FOR 50% AGR 45%
MUN 5% MRSH 0%
DWELL: 78-1974
RESORTS: 2-1974
AC/MI: 155
DWELL/MI: 22
AC/DWELL: 7
WTRSHED AREA: 9.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 11% MRSH 4%
FOR 24% CUL 40% RES 3%
URB 1% PASTURE/OPEN 18%

ECOL CLASS: 4-1974 4-1956 4-1954
MGMT CLASS: 3-1974 3-1956 2-1954
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: AQ WEED CONTROL 1956,74
HVY ALGAE 1974
SMR TULLIBEE KILL 1974

LKMAP: C1210
QUAD1: LAKE MILTONA EAS

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.028	2.7	20	0.833	167	7	29.7	52	46	60	53

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0080 DLG
45 55 00.0 095 23 45.0 3
LAKE: DARLING 1 MI NW OF ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 398.2 HECTARE M 070314
MEAN DEPTH: 5.9 M MAX DEPTH: 18.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 398 HA
AV DEPTH: 5.9 M
MX DEPTH: 19 M
VOL: 2.37E07 M3
LITTORAL: 20 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: SAND-
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 11348
10 MI: 15909
50 MI: 173149

SHORE L: 6.50 MI
USE OF SHORELINE:
FOR 5% AGR 0%
MUN 80% MRSH 15%
DWELL: 194-1974
RESORTS: 7-1974
AC/MI: 151
DWELL/MI: 36
AC/DWELL: 4
WTRSHED AREA: 157.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 23% MRSH 2%
FOR 13% CUL 37% RES 4%
URB 1% PASTURE/OPEN 21%

ECOL CLASS: 4-1974 4-1954 -
MGMT CLASS: 3-1974 3-1954 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SWIM ITCH 1974
WEEDS 1974

LKMAP: C1314
QUAD1: ALEXANDRIA WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.025	2.8	6	0.857	190	7	34.3	51	45	48	48

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0081
45 52 30.0 095 23 30.0 3
LAKE: WINONA AT ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 81.5 HECTARE B 070314
MEAN DEPTH: 1.5 M MAX DEPTH: 2.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 82 HA
AV DEPTH: 1.5 M
MX DEPTH: 2 M
VOL: 1.10E06 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SILT
PUB ACC #: 0
ADMIN: -
POPULATION
5 MI: 11348
10 MI: 15463
50 MI: 175101

SHORE L: 1.12 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 1-1966
RESORTS: 0-1966
AC/MI: 180
DWELL/MI: 1
AC/DWELL: 201
WTRSHED AREA: 4.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 5%
FOR 5% CUL 27% RES 13%
URB 19% PASTURE/OPEN 16%

ECOL CLASS: 8-1966 -
MGMT CLASS: -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE BLM 1966

LKMAP: ?
QUAD1: ALEXANDRIA WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.385	0.2	250	4.513	140	22	11.7	90	83	85	86

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0083 MLT
46 02 30.0 095 22 30.0 3
LAKE: MILTONA 1 MI W OF MILTONA
27041 MINNESOTA DOUGLAS
AREA: 2492.3 HECTARE M 070314
MEAN DEPTH: 7.3 M MAX DEPTH: 32.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2492 HA
AV DEPTH: 7.3 M
MX DEPTH: 32 M
VOL: 1.82E08 M3
LITTORAL: 48 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: BOULDE-SAND
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 635
10 MI: 5608
50 MI: 174353

SHORE L: 16.80 MI
USE OF SHORELINE:
FOR 60% AGR 10%
MUN 30% MRSH 0%
DWELL: 325-1975
RESORTS: 18-1975
AC/MI: 367
DWELL/MI: 26
AC/DWELL: 14
WTRSHED AREA: 47.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 21% MRSH 2%
FOR 18% CUL 42% RES 4%
URB 0% PASTURE/OPEN 12%

ECOL CLASS: 4-1975 -
MGMT CLASS: 3-1975 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ODORS 750725
ALGAE BLMS 1975

LKMAP: B308
QUAD1: MILTONA EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.037	2.6	8	0.769	185	2	20.8	56	46	51	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0092 MRY
45 49 50.0 095 28 30.0 3
LAKE: MARY 7 MI SW OF ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 969.4 HECTARE B 070314
MEAN DEPTH: 4.1 M MAX DEPTH: 10.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 969 HA
AV DEPTH: 4.1 M
MX DEPTH: 10 M
VOL: 3.98E07 M3
LITTORAL: 43 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: SILT
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 611
10 MI: 14267
50 MI: 171979

SHORE L: 24.00 MI
USE OF SHORELINE:
FOR 15% AGR 70%
MUN 15% MRSH 0%
DWELL: 105-1974
RESORTS: 13-1974
AC/MI: 100
DWELL/MI: 8
AC/DWELL: 13
WTRSHED AREA: 28.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 22% MRSH 1%
FOR 10% CUL 45% RES 3%
URB 1% PASTURE/OPEN 17%

ECOL CLASS: 4-1974 4-1955 -
MGMT CLASS: 3-1974 3-1955 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B120
QUAD1: FARWELL

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.058	1.8	11	1.132	193	7	19.5	63	52	54	56

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0123 IDA
46 00 00.0 095 25 00.0 3
LAKE: IDA 4 MI N OF ALEXANDRIA
27041 MINNESOTA DOUGLAS
AREA: 1823.5 HECTARE M 070314
MEAN DEPTH: 8.6 M MAX DEPTH: 31.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1824 HA
AV DEPTH: 8.6 M
MX DEPTH: 32 M
VOL: 1.56E08 M3
LITTORAL: 40 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: SAND---SAND
PUB ACC #:0
ADMIN: DNR-E
POPULATION
5 MI: 490
10 MI: 16101
50 MI: 166996

SHORE L: 21.20 MI
USE OF SHORELINE:
FOR 70% AGR 27%
MUN 0% MRSH 3%
DWELL: 192-1966
RESORTS: 19-1966
AC/MI: 213
DWELL/MI: 14
AC/DWELL: 15
WTRSHED AREA: 81.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 21% MRSH 2%
FOR 14% CUL 41% RES 4%
URB 0% PASTURE/OPEN 16%

ECOL CLASS: 4-1966 -
MGMT CLASS: 3-1966 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B312
QUAD1: LAKE MILTONA WES

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.031	3.5	5	0.792	200	6	25.5	54	42	46	47

MPCA LAKE CLASSIFICATION PROJECT (314A)

21-0216
45 58 25.0 095 34 30.0 3
LAKE: WHISKEY AT BRANDON
27041 MINNESOTA DOUGLAS
AREA: 65.7 HECTARE M 070314
MEAN DEPTH: 5.5 M MAX DEPTH: 14.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 66 HA
AV DEPTH: 5.5 M
MX DEPTH: 14 M
VOL: 3.60E06 M3
LITTORAL: 55 %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
SAND-----
PUB ACC #: -
ADMIN: DNR-E
POPULATION
5 MI: 859
10 MI: 6151
50 MI: 162928

SHORE L: 2.37 MI
USE OF SHCRELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 0 3-1970
RESORTS: 0-1958
AC/MI: 68
DWELL/MI: 1
AC/DWELL: 54
WTRSHED AREA: 2.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 0%
FOR 9% CUL 44% RES 2%
URB 5% PASTURE/OPEN 23%

ECOL CLASS: 5-1958 -
MGMT CLASS: 4-1958 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C2405
QUAD1: BRANDON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.100	1.3	89	2.611	212	25	26.1	71	56	75	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

24-0014
43 37 30.0 093 18 20.0 3
LAKE: ALBERT LEA AT ALBERT LEA
27047 MINNESOTA FREEBORN
AREA: 992.7 HECTARE M 071049
MEAN DEPTH: 1.1 M MAX DEPTH: 1.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 993 HA
AV DEPTH: 1.1 M
MX DEPTH: 2 M
VOL: 1.18E07 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
-
PUB ACC #: -
ADMIN: DNR-P
POPULATION
5 MI: 2327
10 MI: 27760
50 MI: 222369

SHORE L: 25.0 MI
USE OF SHCRELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 76-1970
RESORTS: 0-1970
AC/MI: 98
DWELL/MI: 3
AC/DWELL: 86
WTRSHED AREA: 147.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 1%
FOR 1% CUL 69% RES 3%
URB 4% PASTURE/OPEN 17%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: FSHKL 1949
SEWAGE 1945
ALGAE 1945

LKMAP: C1001
QUAD1: ALBERT LEA-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
1.600	0.4	361	10.216	189	-	6.4	111	73	88	91

MPCA LAKE CLASSIFICATION PROJECT (314A)

24-0018
43 39 00.0 093 22 30.0 3
LAKE: FOUNTAIN-WHOLE LK IN ALBERT LEA
27047 MINNESOTA FREEBORN
AREA: 216.1 HECTARE M 071049
MEAN DEPTH: 1.7 M MAX DEPTH: 4.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 216 HA
AV DEPTH: 1.7 M
MX DEPTH: ? M
VOL: 3.62E06 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: CITY
POPULATION
5 MI: 21745
10 MI: 28319
50 MI: 258442

SHORE L: 16.3 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 50-1970
RESORTS: 0-1970
AC/MI: 33
DWELL/MI: 3
AC/DWELL: 11
WTRSHED AREA: 126.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 2% MRSH 1%
FOR 1% CUL 73% RES 2%
URB 4% PASTURE/OPEN 17%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B405
QUAD1: ALBERT LEA-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.309	0.3	192	6.800	183	-	22.0	87	77	82	82

MPCA LAKE CLASSIFICATION PROJECT (314A)

24-0044 FRB
43 45 00.0 093 34 00.0 3
LAKE: FREEBORN AT FREEBORN
27047 MINNESOTA FREEBORN
AREA: 899.2 HECTARE B 070432
MEAN DEPTH: 0.7 M MAX DEPTH: 0.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 899 HA
AV DEPTH: 0.7 M
MX DEPTH: 1 M
VOL: 5.95E06 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 742
10 MI: 5116
50 MI: 298659

SHORE L: 12.0 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 14-1970
RESORTS: 0-1968
AC/MI: 185
DWELL/MI: 1
AC/DWELL: 159
WTRSHED AREA: 12.2 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 27% MRSH 2%
FOR 2% CUL 58% RES 1%
URB 2% PASTURE/OPEN 8%

ECOL CLASS: 7-1956 -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: ?
QUAD1: FREEBORN

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.176	0.2	231	4.185	140	30	23.8	79	83	84	82

MPCA LAKE CLASSIFICATION PROJECT (314A)

25-0001 PP
44 27 00.0 092 15 00.0 3
LAKE: PEPIN AT LAKE CITY
27049 MINNESOTA GOODHUE
AREA: 10117.1 HECTARE M 070638
MEAN DEPTH: 5.1 M MAX DEPTH: 17.1 M
21MINNL 800830

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 10117 HA
AV DEPTH: 5.1 M
MX DEPTH: 17 M
VOL: 5.15E08 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: MNDOT
POPULATION
5 MI: 417
10 MI: 8056
50 MI: 225078

SHORE L: 60.5 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 329-1970
RESORTS: 1-1970
AC/MI: 413
DWELL/MI: 6
AC/DWELL: 75
WTRSHED AREA: - SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR -% MRSH -%
FOR -% CUL -% RES -%
URB -% PASTURE/OPEN -%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: AQ VEG 1965
FSHKL 6/10/63

LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -

LKMAP: B303
QUAD1: BAY CITY

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.220	0.9	29	3.190	143	51	14.5	82	62	64	69

MPCA LAKE CLASSIFICATION PROJECT (314A)

26-0002 GPEL
46 03 15.0 095 48 10.0 3
LAKE: PELICAN AT ASHBY
27051 MINNESOTA GRANT
AREA: 1508.7 HECTARE M 070423
MEAN DEPTH: 2.9 M MAX DEPTH: 6.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1509 HA
AV DEPTH: 2.9 M
MX DEPTH: 6 M
VOL: 4.43E07 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: DNR-E
POPULATION
5 MI: 724
10 MI: 4782
50 MI: 149506

SHORE L: 26.3 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 109-1970
RESORTS: 0-1970
AC/MI: 142
DWELL/MI: 4
AC/DWELL: 34
WTRSHED AREA: 15.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 43% MRSH 0%
FOR 5% CUL 33% RES 6%
URB 1% PASTURE/OPEN 12%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: -
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -

LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -

LKMAP: C976
QUAD1: ASHBY

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.053	0.6	24	1.837	291	20	34.7	61	67	62	64

MPCA LAKE CLASSIFICATION PROJECT (314A)

26-0097 PDT
46 01 35.0 095 52 50.0 3
LAKE: POMME DE TERRE 3 MI NE ELBOW LAKE
27051 MINNESOTA GRANT
AREA: 726.0 HECTARE B 070423
MEAN DEPTH: 2.2 M MAX DEPTH: 7.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 726 HA
AV DEPTH: 2.2 M
MX DEPTH: 7 M
VOL: 1.63E07 M3
LITTORAL: 85 %
DEPTH ROOTED
VEG: 4 M
DOM SHOL SOIL:
BOULDE-RUBBLE
PUB ACC #: 2
ADMIN: DNR-W
POPULATION
5 MI: 0
10 MI: 4323
50 MI: 142897

SHORE L: 13.75 MI
USE OF SHORELINE:
FOR 33% AGR 23%
MUN 44% MRSH 0%
DWELL: 37-1973
RESORTS: 1-1973
AC/MI: 130
DWELL/MI: 3
AC/DWELL: 42
WTRSHED AREA: 78.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 15% MRSH 3%
FOR 2% CUL 68% RES 2%
URB 0% PASTURE/OPEN 9%

ECOL CLASS: 6-1973 -
MGMT CLASS: 5-1973 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: PARTIAL WTRKL MOST YRS

LKMAP: B109
QUAD1: FOUR MILE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.029	0.8	9	0.920	201	6	31.7	53	63	52	56

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0004
44 50 45.0 093 18 20.0 3
LAKE: PENN IN BLOOMINGTON
27053 MINNESOTA HENNEPIN
AREA: 12.9 HECTARE B 070433
MEAN DEPTH: 1.0 M MAX DEPTH: 1.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 13 HA
AV DEPTH: 1.0 M
MX DEPTH: 2 M
VOL: 1.32E05 M3
LITTORAL: 100 %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
MUCK-SAND
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 12901
10 MI: 727124

SHORE L: 0.9 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 30-1980
RESORTS: 0-1974
AC/MI: 35
DWELL/MI: 33
AC/DWELL: 1
WTRSHED AREA: 0.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 0% CUL 0% RES 64%
URB 36% PASTURE/OPEN 0%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL 1974

LKMAP: ?
QUAD1: BLOOMINGTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.053	0.8	16	0.715	84	20	13.4	62	63	59	62

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0014
44 56 30.0 093 15 25.0 3
LAKE: POWDERHORN IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 4.5 HECTARE M 070320
MEAN DEPTH: 1.1 M MAX DEPTH: 6.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 4 HA
AV DEPTH: 1.1 M
MX DEPTH: 6 M
VOL: 4.74E04 M3
LITTORAL: 92 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: -
POPULATION
1 MI: 0
5 MI: 434400
10 MI: 1238623

SHORE L: 0.7 MI
USE OF SHCRELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 0-1975
RESORTS: 0-1975
AC/MI: 16
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 1.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 0% CUL 0% RES 24%
URB 76% PASTURE/OPEN 0%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL

LKMAP: C1570
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
-	1.6	-	-	-	-	-	-	53	-	53

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0016
44 55 20.0 093 18 15.0 3
LAKE: HARRIET IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 142.9 HECTARE M 070320
MEAN DEPTH: 8.7 M MAX DEPTH: 25.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 143 HA
AV DEPTH: 8.7 M
MX DEPTH: 25 M
VOL: 1.25E07 M3
LITTORAL: 31 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND-GRAVEL
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 574560
10 MI: 1185330

SHORE L: 2.70 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL:0 -1974
RESORTS: 0-1974
AC/MI: 140
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 6.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 0%
FOR 0% CUL 0% RES 29%
URB 50% PASTURE/OPEN 3%

ECOL CLASS: 5-1974 5-1958 -
MGMT CLASS: 4-1974 4-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C964
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.042	2.3	5	1.370	111	5	32.6	58	48	46	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0019
44 54 30.0 093 14 30.0 3
LAKE: NOKOMIS IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 82.6 HECTARE M 070320
MEAN DEPTH: 4.2 M MAX DEPTH: 10.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 83 HA
AV DEPTH: 4.2 M
MX DEPTH: 10 M
VOL: 3.44E06 M3
LITTORAL: 51 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND-SAND
PUB ACC #: 2
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 482255
10 MI: 1109898

SHORE L: 3.80 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL:0 -1972
RESORTS: 0-1972
AC/MI: 54
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 1.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 24% MRSH 0%
FOR 0% CUL 0% RES 48%
URB 24% PASTURE/OPEN 5%

ECOL CLASS: 6-1972 5-1958 -
MGMT CLASS: 4-1972 4-1958 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: AQ VEG 1972

LKMAP: C958
QUAD1: ST. PAUL WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.062	1.0	65	1.810	94	-	29.2	64	60	72	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0031
44 56 35.0 093 18 40.0 3
LAKE: CALHOUN IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 170.4 HECTARE B 070320
MEAN DEPTH:10.6 M MAX DEPTH: 27.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 170 HA
AV DEPTH:10.6 M
MX DEPTH: 27 M
VOL: 1.80E07 M3
LITTORAL: 15 %
DEPTH ROOTED
VEG: 8 M
DOM SHOL SOIL:
SAND-SAND
PUB ACC #: -
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 551575
10 MI: 939525

SHORE L: 3.17 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL:0 -1972
RESORTS: 0-1972
AC/MI: 133
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 4.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 0%
FOR 0% CUL 0% RES 32%
URB 49% PASTURE/OPEN 1%

ECOL CLASS: 5-1953 -
MGMT CLASS: 4-1953 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: LT SMRKL

LKMAP: D94
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.055	2.1	13	1.320	112	-	24.0	62	49	56	56

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0035
44 59 40.0 093 25 15.0 3
LAKE: SWEENEY-TWIN-WHOLE IN GOLDEN VALLEY
27053 MINNESOTA HENNEPIN
AREA: 26.6 HECTARE M 070320
MEAN DEPTH: - M MAX DEPTH: 7.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 38 HA
AV DEPTH: 4 M
MX DEPTH: 8 M
VOL: - S
LITTORAL: 52 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: MUCK--
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 145757
10 MI: 820930

SHORE L: - MI
USE OF SHORELINE: FOR 0% AGR 0% MUN 100% MRSH 0%
DWELL: 25-1960
RESORTS: 0-1960
AC/MI: -
DWELL/MI: -
AC/DWELL: -
WTRSHED AREA: 4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 2% MRSH 0% FOR 2% CUL 0% RES 49% URB 48% PASTURE/OPEN0 %

ECOL CLASS: -
MGMT CLASS: 4-1960 -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -
LKMAP: C1143
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.065	2.5	19	-	-	-	-	64	47	59	57

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0037
44 58 55.0 093 19 20.0 3
LAKE: WIRTH IN GOLDEN VALLEY
27053 MINNESOTA HENNEPIN
AREA: 15.0 HECTARE M 070320
MEAN DEPTH: 3.8 M MAX DEPTH: 7.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 15 HA
AV DEPTH: 3.8 M
MX DEPTH: 8 M
VOL: 5.72E05 M3
LITTORAL: 61 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: MUCK-MUCK
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 524374
10 MI: 933848

SHORE L: 1.25 MI
USE OF SHORELINE: FOR 0% AGR 0% MUN 100% MRSH 0%
DWELL:0 -1977
RESORTS: 0-1977
AC/MI: 30
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 0.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0% FOR 30% CUL 0% RES 40% URB 20% PASTURE/OPEN 10%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1975
LKMAP: C1545
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.075	0.9	51	1.640	127	32	21.9	66	62	69	66

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0038
44 58 00.0 093 19 25.0 3
LAKE: BROWNIE IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 7.3 HECTARE B 070320
MEAN DEPTH: 6.8 M MAX DEPTH: 15.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 7 HA
AV DEPTH: 6.8 M
MX DEPTH: 15 M
VOL: 4.98E05 M3
LITTORAL: 63 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
MUCK--SAND
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 507529
10 MI: 1017607

SHORE L: 0.58 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL:0 -1978
RESORTS: 0-1978
AC/MI: 31
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 0.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 0% CUL 0% RES 0%
URB100% PASTURE/OPEN 0%

ECOL CLASS: 5-1978 5-1958 -
MGMT CLASS: 4-1978 4-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C970
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.038	1.3	13	-	135	14	-	57	56	56	56

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0039
44 57 35.0 093 19 15.0 3
LAKE: CEDAR IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 68.8 HECTARE M 070320
MEAN DEPTH: 6.1 M MAX DEPTH: 15.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 69 HA
AV DEPTH: 6.1 M
MX DEPTH: 16 M
VOL: 4.22E06 M3
LITTORAL: 37 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 507529
10 MI: 1018417

SHORE L: 2.70 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 16-1972
RESORTS: 0-1972
AC/MI: 63
DWELL/MI: 6
AC/DWELL: 11
WTRSHED AREA: 1.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 0%
FOR 0% CUL 0% RES 59%
URB 18% PASTURE/OPEN 6%

ECOL CLASS: 5-1972 5-1958 -
MGMT CLASS: 4-1972 4-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C968
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.037	1.9	16	-	112	11	-	56	51	58	55

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0040
44 57 20.0 093 18 25.0 3
LAKE: LAKE OF THE ISLES IN MINNEAPOLIS
27053 MINNESOTA HENNEPIN
AREA: 41.7 HECTARE M 070320
MEAN DEPTH: 2.7 M MAX DEPTH: 9.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 42 HA
AV DEPTH: 2.7 M
MX DEPTH: 9 M
VOL: 1.12E06 M3
LITTORAL: 62 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SILT-SAND
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 507529
10 MI: 1324361

SHORE L: 2.50 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL:0 -1975
RESORTS: 0-1975
AC/MI: 41
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 2.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 11% MRSH 0%
FOR 0% CUL 0% RES 50%
URB 36% PASTURE/OPEN 3%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE BLM 1975

LKMAP: C961
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.085	0.8	48	-	104	-	-	68	63	69	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0042 TWN
45 02 50.0 093 20 15.0 3
LAKE: TWIN - WHOLE LAKE IN BRKLYN CN-CRYS-ROB
27053 MINNESOTA HENNEPIN
AREA: 81.3 HECTARE B 070320
MEAN DEPTH: 3.0 M MAX DEPTH: 13.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 81 HA
AV DEPTH: 3.0 M
MX DEPTH: 14 M
VOL: 2.47E06 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
-
PUB ACC #: -
ADMIN: MNDOT
POPULATION
1 MI: 0
5 MI: 156599
10 MI: 882177

SHORE L: 5.3 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 119-1980
RESORTS: -
AC/MI: 38
DWELL/MI: 22
AC/DWELL: 2
WTRSHED AREA: 9.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 1% MRSH 1%
FOR 0% CUL 0% RES 44%
URB 49% PASTURE/OPEN 1%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: D99
QUAD1: MINNEAPOLIS SOUT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.137	0.9	57	1.440	90	27	10.5	75	62	70	69

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0047 BUSH
44 50 15.0 093 22 55.0 3
LAKE: BUSH IN BLOOMINGTON
27053 MINNESOTA HENNEPIN
AREA: 83.8 HECTARE B 070433
MEAN DEPTH: 2.4 M MAX DEPTH: 7.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 84 HA
AV DEPTH: 2.4 M
MX DEPTH: 7 M
VOL: 2.03E06 M3
LITTORAL: 83 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: MUCK
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 50984
10 MI: 320270

SHORE L: 3.50 MI
USE OF SHORELINE: FOR 60% AGR 0% MUN 40% MRSH 0%
DWELL: 21-1975
RESORTS: 0-1975
AC/MI: 59
DWELL/MI: 6
AC/DWELL: 10
WTRSHED AREA: 1.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 0% FOR 24% CUL 17% RES 7% URB 0% PASTURE/OPEN 34%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: STUNTED SUNFISH 1975

LKMAP: C431
QUAD1: EDEN PRAIRIE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.089	4.1	4	0.527	87	10	5.9	69	40	44	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0048
44 49 20.0 093 22 05.0 3
LAKE: HYLAND IN BLOOMINGTON
27053 MINNESOTA HENNEPIN
AREA: 42.0 HECTARE B 070433
MEAN DEPTH: 1.6 M MAX DEPTH: 2.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 42 HA
AV DEPTH: 1.6 M
MX DEPTH: 2 M
VOL: 6.87E05 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: -
POPULATION
1 MI: 0
5 MI: 81970
10 MI: 330478

SHORE L: 1.81 MI
USE OF SHORELINE: FOR - % AGR - % MUN - % MRSH - %
DWELL: 0-1979
RESORTS: 0-1979
AC/MI: 57
DWELL/MI: 0
AC/DWELL: 999
WTRSHED AREA: 1.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 0% FOR 14% CUL 14% RES 14% URB 10% PASTURE/OPEN 38%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: RECLAIMED: 1976-80

LKMAP: ?
QUAD1: EDEN PRAIRIE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.095	1.8	22	0.645	166	12	6.8	70	52	61	61

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0062
44 50 50.0 093 24 20.0 3
LAKE: ANDERSON-WHOLE LK IN EDEN PRAIRIE
27053 MINNESOTA HENNEPIN
AREA: 174.4 HECTARE B 070433
MEAN DEPTH: 1.1 M MAX DEPTH: 2.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 174 HA
AV DEPTH: 1.1 M
MX DEPTH: 2 M
VOL: 1.99E06 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
-
PUB ACC #: -
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 50984
10 MI: 329141

SHORE L: 7.3 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 41-1980
RESORTS: -
AC/MI: 59
DWELL/MI: 6
AC/DWELL: 11
WTRSHED AREA: 2.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 22% MRSH 6%
FOR 17% CUL 19% RES 17%
URB 0% PASTURE/OPEN 19%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: ?
QUAD1: EDEN PRAIRIE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.192	3.0	159	-	119	-	-	80	44	80	68

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0067 PRT
44 52 40.0 093 25 40.0 3
LAKE: BRYANT IN EDEN PRAIRIE
27053 MINNESOTA HENNEPIN
AREA: 66.7 HECTARE M 070433
MEAN DEPTH: 4.8 M MAX DEPTH: 13.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 67 HA
AV DEPTH: 4.8 M
MX DEPTH: 14 M
VOL: 3.20E06 M3
LITTORAL: 44 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND-
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 100228
10 MI: 792053

SHORE L: 2.91 MI
USE OF SHORELINE:
FOR 25% AGR 40%
MUN 20% MRSH 15%
DWELL: 23-1974
RESORTS: 0-1974
AC/MI: 57
DWELL/MI: 8
AC/DWELL: 7
WTRSHED AREA: 8.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 4%
FOR 10% CUL 2% RES 36%
URB 11% PASTURE/OPEN 27%

ECOL CLASS: 5-1974 5-1958 -
MGMT CLASS: 4-1974 4-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1108
QUAD1: HOPKINS

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.107	1.4	20	1.577	155	22	14.7	72	55	60	62

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0071
44 52 07.0 093 29 33.0 3
LAKE: ROUND IN EDEN PRAIRIE
27053 MINNESOTA HENNEPIN
AREA: 13.4 HECTARE M 070433
MEAN DEPTH: 3.3 M MAX DEPTH: 11.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 13 HA
AV DEPTH: 3.3 M
MX DEPTH: 11 M
VOL: 4.37E05 M3
LITTORAL: 70 %
DEPTH ROOTED VEG: 3 M
DOM SHOL SOIL: SAND--SAND
PUB ACC #: 1
ADMIN: -
POP. DENSITY
1 MI: -
10 MI: -
50 MI: -

SHORE L: 0.95 MI
USE OF SHORELINE:
FOR 30% AGR 40%
MUN 30% MRSH 0%
DWELL: 0 -1978
RESORTS: 0-1978
AC/MI: -
DWELL/MI: -
AC/DWELL: -
WTRSHED AREA: 0.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 0%
FOR 0% CUL 54% RES 8%
URB 8% PASTURE/OPEN 23%

ECOL CLASS: 5-1978 -
MGMT CLASS: 4-1978 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
LAKE PROBLEMS: STUNTED BLUEGILL
WTRKL: 1955-56 78
LKMAP: C1345
QUAD1: EDEN PRAIRIE

LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.049	2.9	13	-	-	-	-	60	45	56	54

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0089 SHO
44 54 40.0 093 25 55.0 3
LAKE: SHADY OAK-WHOLE LK IN MINNETONKA
27053 MINNESOTA HENNEPIN
AREA: 32.4 HECTARE B 070433
MEAN DEPTH: 2.9 M MAX DEPTH: 10.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 32 HA
AV DEPTH: 2.9 M
MX DEPTH: 10 M
VOL: 9.55E05 M3
LITTORAL: 66 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND-
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 56142
10 MI: 863892

SHORE L: 2.4 MI
USE OF SHORELINE:
FOR 55% AGR 0%
MUN 45% MRSH 0%
DWELL: 19-1976
RESORTS: 0-1976
AC/MI: 33
DWELL/MI: 8
AC/DWELL: 4
WTRSHED AREA: 0.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 29% MRSH 0%
FOR 0% CUL 0% RES 71%
URB 0% PASTURE/OPEN 0%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -
LKMAP: C1134
QUAD1: HOPKINS

LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.040	3.2	6	0.785	140	7	19.6	57	43	48	50

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0104 MED
45 00 25.0 093 25 10.0 3
LAKE: MEDICINE IN MEDICINE LAKE
27053 MINNESOTA HENNEPIN
AREA: 383.8 HECTARE M 070320
MEAN DEPTH: 5.1 M MAX DEPTH: 14.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 384 HA
AV DEPTH: 5.1 M
MX DEPTH: 15 M
VOL: 1.96E07 M3
LITTORAL: 45 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SILT-SAND
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 96874
10 MI: 805223

SHORE L: 8.90 MI
USE OF SHORELINE:
FOR 15% AGR 0%
MUN 85% MRSH 0%
DWELL: 252-1976
RESORTS: 3-1976
AC/MI: 107
DWELL/MI: 30
AC/DWELL: 4
WTRSHED AREA: 18.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 7% MRSH 1%
FOR 6% CUL 18% RES 32%
URB 14% PASTURE/OPEN 23%

ECOL CLASS: 5-1966 -
MGMT CLASS: 4-1966 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: FSHKL 1946,65,67
ALGAE 1966

LKMAP: B310
QUAD1: OSSEO

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.076	1.4	67	1.612	114	19	21.2	67	55	72	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0111 HEGL
45 04 30.0 093 24 45.0 3
LAKE: EAGLE-WHOLE LAKE IN MAPLE GROVE
27053 MINNESOTA HENNEPIN
AREA: 190.2 HECTARE B 070320
MEAN DEPTH: 3.8 M MAX DEPTH: 10.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 190 HA
AV DEPTH: 3.8 M
MX DEPTH: 5 M
VOL: 7.15E06 M3
LITTORAL: 67 %
DEPTH ROOTED VEG: 3 M
DOM SHOL SOIL: SAND-
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 52318
10 MI: 352173

SHORE L: 4.80 MI
USE OF SHORELINE:
FOR 20% AGR 40%
MUN 40% MRSH 0%
DWELL: 73-1973
RESORTS: 1-1973
AC/MI: 98
DWELL/MI: 16
AC/DWELL: 6
WTRSHED AREA: 5.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 3%
FOR 10% CUL 24% RES 11%
URB 2% PASTURE/OPEN 35%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: D95
QUAD1: OSSEO

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.052	1.3	43	1.539	157	20	29.6	61	56	67	62

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0118
45 05 35.0 093 27 45.0 3
LAKE: FISH IN MAPLE GROVE
27053 MINNESOTA HENNEPIN
AREA: 89.4 HECTARE M 070320
MEAN DEPTH: 5.6 M MAX DEPTH: 14.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 89 HA	SHORE L: 3.10 MI	ECOL CLASS: 6-1972 -			
AV DEPTH: 5.6 M	USE OF SHORELINE:	MGMT CLASS: 4-1972 -			
MX DEPTH: 15 M	FOR 10% AGR 30%	ROUGHFISH: 3	LANDSAT TYPE: -		
VOL: 4.98E06 M3	MUN 60% MRSH 0%	WQ INDEX: -	CHLOR IND: -		
LITTORAL: 20 %	# DWELL: 60-1972	SENS IND: -	SECCHI IND: -		
DEPTH ROOTED	# RESORTS: 1-1972	RANK IND: -	T-PHOS IND: -		
VEG: 3 M	AC/MI: 71	PROBLEMS: -			
DOM SHOL SOIL:	DWELL/MI: 21				
MUCK	AC/DWELL: 3				
PUB ACC #: 1	WTRSHED AREA: 3.9 SQ MI				
ADMIN: DNR-E	GEOM REG: - - - -				
POPULATION	SLU: - - - -				
1 MI: 0	LAND USE: WTR 13% MRSH 2%				
5 MI: 9183	FOR 11% CUL 16% RES 22%	LKMAP: D96			
10 MI: 246033	URB 3% PASTURE/OPEN 33%	QUAD1: OSSEO			

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.045	1.0	13	1.715	154	21	38.1	59	60	56	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0133
44 55 55.0 093 34 45.0 3
LAKE: MINNETONKA 15 MI W OF MINNEAPOLIS, MN
27053 MINNESOTA HENNEPIN
AREA: 5857.8 HECTARE B 070320
MEAN DEPTH: 6.9 M MAX DEPTH: 91 FT
21MINNL 791020

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 5858 HA	SHORE L: 114 MI	ECOL CLASS: 4-1977 -			
AV DEPTH: 6.9 M	USE OF SHORELINE:	MGMT CLASS: 3-1977 -			
MX DEPTH: 24 M	FOR 10% AGR 0%	ROUGHFISH: 2	LANDSAT TYPE: -		
VOL: 4.02E08 M3	MUN 90% MRSH 0%	WQ INDEX: -	CHLOR IND: -		
LITTORAL: 39 %	# DWELL: 3006-1980	SENS IND: -	SECCHI IND: -		
DEPTH ROOTED	# RESORTS: -	RANK IND: -	T-PHOS IND: -		
VEG: 4 M	AC/MI: 127	PROBLEMS: AQ PLANTS 1977			
DOM SHOL SOIL:	DWELL/MI: 26	ALGAE 1977			
SAND-SAND	AC/DWELL: 5				
PUB ACC #: 13	WTRSHED AREA: 95.3 SQ MI				
ADMIN: CITY	GEOM REG: - - - -				
POPULATION	SLU: - - - -				
1 MI: 0	LAND USE: WTR 19% MRSH 6%				
5 MI: 21083	FOR 9% CUL 16% RES 25%	LKMAP: B122			
10 MI: 129916	URB 9% PASTURE/OPEN 15%	QUAD1: MOUND			

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.055	1.4	29	1.486	125	15	27.0	62	55	64	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0137
44 53 50.0 093 32 35.0 3
LAKE: CHRISTMAS IN SHOREWOOD
27053 MINNESOTA HENNEPIN
AREA: 107.1 HECTARE M 070320
MEAN DEPTH:10.3 M MAX DEPTH: 25.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 107 HA
AV DEPTH:10.3 M
MX DEPTH: 25 M
VOL: 1.10E07 M3
LITTORAL: 30 %
DEPTH ROOTED
VEG: 7 M
DOM SHOL SOIL:
SAND----SAND
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 17502
10 MI: 224835

SHORE L: 3.60 MI
USE OF SHORELINE:
FOR 20% AGR 0%
MUN 80% MRSH 0%
DWELL: 95-1976
RESORTS: 1-1976
AC/MI: 74
DWELL/MI: 28
AC/DWELL: 3
WTRSHED AREA: 0.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 27% MRSH 0%
FOR 0% CUL 0% RES 60%
URB 13% PASTURE/OPEN 0%

ECOL CLASS: 5-1959 -
MGMT CLASS: 4-1959 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C967
QUAD1: EXCELSIOR

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.015	5.4	4	0.799	133	-	53.3	43	36	44	41

MPCA LAKE CLASSIFICATION PROJECT (314A)

27-0176 IND
45 02 00.0 093 38 50.0 3
LAKE: INDEPENDENCE 1 MI N OF MAPLE PLAIN
27053 MINNESOTA HENNEPIN
AREA: 344.2 HECTARE M 070319
MEAN DEPTH: 5.6 M MAX DEPTH: 17.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 344 HA
AV DEPTH: 5.6 M
MX DEPTH: 18 M
VOL: 1.81E07 M3
LITTORAL: 50 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND
PUB ACC #: 3
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 5898
10 MI: 61642

SHORE L: 5.80 MI
USE OF SHORELINE:
FOR 30% AGR 20%
MUN 50% MRSH 0%
DWELL: 86-1974
RESORTS: 1-1974
AC/MI: 147
DWELL/MI: 16
AC/DWELL: 9
WTRSHED AREA: 13.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 6%
FOR 11% CUL 41% RES 5%
URB 2% PASTURE/OPEN 24%

ECOL CLASS: 5-1974 5-1956 -
MGMT CLASS: 4-1974 4-1956 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SHRKL:1973
AQ VEG: 1974

LKMAP: B31
QUAD1: ROCKFORD

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.075	1.1	51	2.166	119	26	28.9	66	59	69	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0079 GR
45 15 20.0 094 53 30.0 3
LAKE: GREEN AT SPICER
27067 MINNESOTA KANDIYOHI
AREA: 2187.7 HECTARE M 070318
MEAN DEPTH: 6.4 M MAX DEPTH: 33.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2188 HA
AV DEPTH: 6.4 M
MX DEPTH: 34 M
VOL: 1.40E08 M3
LITTORAL: 38 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND
PUB ACC #: 5
ADMIN: CNTY
POPULATION
5 MI: 3147
10 MI: 6693
50 MI: 300795
SHORE L: 12.30 MI
USE OF SHORELINE:
FOR 95% AGR 0%
MUN 3% MRSH 2%
DWELL: 667-1979
RESORTS: 7-1979
AC/MI: 439
DWELL/MI: 58
AC/DWELL: 8
WTRSHED AREA: 115.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 9%
FOR 15% CUL 34% RES 4%
URB 2% PASTURE/OPEN 22%
ECOL CLASS: 4-1979 3-1946 -
MGMT CLASS: 3-1979 2-1946 -
ROUGHFISH: 2
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: OCC LT TULLIBEE SMRKL
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: B178
QUAD1: NEW LONDON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.027	2.5	8	1.121	168	6	41.5	52	47	51	50

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0142 KGEO
45 14 00.0 094 59 00.0 3
LAKE: GEORGE 1 MI W OF SPICER
27067 MINNESOTA KANDIYOHI
AREA: 100.4 HECTARE B 070318
MEAN DEPTH: 4.9 M MAX DEPTH: 9.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 100 HA
AV DEPTH: 4.9 M
MX DEPTH: 10 M
VOL: 4.89E06 M3
LITTORAL: 49 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: SAND-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1789
10 MI: 3857
50 MI: 119727
SHORE L: 1.40 MI
USE OF SHORELINE:
FOR 30% AGR 25%
MUN 45% MRSH 0%
DWELL: 87-1975
RESORTS: 1-1975
AC/MI: 177
DWELL/MI: 66
AC/DWELL: 3
WTRSHED AREA: 0.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 27% MRSH 0%
FOR 9% CUL 0% RES 45%
URB 0% PASTURE/OPEN 18%
ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: C2046
QUAD1: ATWATER-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.031	2.8	10	1.202	310	5	38.8	54	45	53	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0154 NE
45 15 35.0 094 57 50.0 3
LAKE: NEST 1 MI NW OF SPICER
27067 MINNESOTA KANDIYOHI
AREA: 400.5 HECTARE B 070318
MEAN DEPTH: 4.4 M MAX DEPTH: 12.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 401 HA
AV DEPTH: 4.4 M
MX DEPTH: 12 M
VOL: 1.74E07 M3
LITTORAL: 55 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: GRAVEL-RUBBLE
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 2669
10 MI: 6928
50 MI: 290549

SHORE L: 5.50 MI
USE OF SHORELINE:
FOR 75% AGR 20%
MUN 0% MRSH 5%
DWELL: 193-1979
RESORTS: 4-1979
AC/MI: 180
DWELL/MI: 39
AC/DWELL: 5
WTRSHED AREA: 115.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 9%
FOR 15% CUL 34% RES 4%
URB 2% PASTURE/OPEN 22%

ECOL CLASS: 4-1979 4-1954 -
MGMT CLASS: 3-1979 3-1954 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SMRKLS 1979
SEPTIC TANKS 1979
EROSION 1954,79

LKMAP: B175
QUAD1: NEW LONDON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.080	1.5	38	1.686	176	28	21.1	67	54	66	63

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0169 WA
45 03 30.0 094 59 10.0 3
LAKE: WAGONGA 2 MI N OF SVEA
27067 MINNESOTA KANDIYOHI
AREA: 725.2 HECTARE M 070319
MEAN DEPTH: 1.8 M MAX DEPTH: 4.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 725 HA
AV DEPTH: 1.8 M
MX DEPTH: 5 M
VOL: 1.34E07 M3
LITTORAL: - %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SILT-MUCK
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI:0
10 MI: 17930
50 MI: 223584

SHORE L: 13.00 MI
USE OF SHORELINE:
FOR 75% AGR 25%
MUN 0% MRSH 0%
DWELL: 13-1965
RESORTS: 0-1965
AC/MI: 138
DWELL/MI: 1
AC/DWELL: 138
WTRSHED AREA: 78.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 1%
FOR 2% CUL 68% RES 1%
URB 4% PASTURE/OPEN 15%

ECOL CLASS: 5-1965 -
MGMT CLASS: -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: FREQ WTRKLS

LKMAP: ?
QUAD1: WILLMAR

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
2.495	0.5	121	2.961	248	58	1.2	117	70	78	88

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0171 KEGL
45 11 15.9 095 00 00.0 3
LAKE: EAGLE 1 MI N OF WILLMAR
27067 . MINNESOTA KANDIYOHI
AREA: 342.0 HECTARE M 070425
MEAN DEPTH: 7.6 M MAX DEPTH: 18.3 M
/TYPA/AMBNT/LAKE 21MINNL 800412

DESCRIPTION

AREA: 342 HA
AV DEPTH: 7.6 M
MX DEPTH: 18 M
VOL: 2.59E07 M3
LITTORAL: 50 %
DEPTH ROOTED
VEG: 4 M
DOM SHOL SOIL:
GRAVEL-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 2295
10 MI: 21217
50 MI: 281037

SHORE L: 4.90 MI
USE OF SHORELINE:
FOR 95% AGR 5%
MUN 0% MRSH 0%
DWELL: 253-1976
RESORTS: 0-1978
AC/MI: 172
DWELL/MI: 51
AC/DWELL: 3
WTRSHED AREA: 16.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 7% MRSH 5%
FOR 0% CUL 67% RES 5%
URB 1% PASTURE/OPEN 14%

ECOL CLASS: 4-1978 6-1954 -
MGMT CLASS: 2-1954 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C518
QUAD1: SOLOMON LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.039	2.3	9	1.238	160	12	31.7	57	48	52	52

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0217 FLA
45 15 00.0 095 03 15.0 3
LAKE: FLORIDA 4 MI SE OF NORWAY LAKE
27067 . MINNESOTA KANDIYOHI
AREA: 268.1 HECTARE M 070319
MEAN DEPTH: 5.1 M MAX DEPTH: 12.2 M
/TYPA/AMBNT/LAKE 21MINNL 800412

DESCRIPTION

AREA: 268 HA
AV DEPTH: 5.1 M
MX DEPTH: 12 M
VOL: 1.37E07 M3
LITTORAL: 34 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
GRAVEL-SAND
PUB ACC #: 2
ADMIN: TNSHP
POPULATION
5 MI: 503
10 MI: 7715
50 MI: 288922

SHORE L: 4.23 MI
USE OF SHORELINE:
FOR 45% AGR 35%
MUN 0% MRSH 20%
DWELL: 191-1978
RESORTS: 1-1978
AC/MI: 157
DWELL/MI: 47
AC/DWELL: 3
WTRSHED AREA: 56.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 15% MRSH 2%
FOR 9% CUL 56% RES 3%
URB 0% PASTURE/OPEN 15%

ECOL CLASS: 4-1978 6-1957 -
MGMT CLASS: 3-1978 3-1957 2-1950
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: EROSION

LKMAP: C1398
QUAD1: MOUNT TOM

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.040	3.7	12	1.069	211	9	26.7	57	41	55	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

34-0251 NRY
45 18 40.0 095 06 30.0 3
LAKE: NORWAY 2 MI N OF NORWAY LAKE
27067 . MINNESOTA KANDIYOHI
AREA: 1010.1 HECTARE B 070319
MEAN DEPTH: 3.0 M MAX DEPTH: 9.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1010 HA	SHORE L: 17.60 MI	ECOL CLASS: 5-1978 4-1953 -			
AV DEPTH: 3.0 M	USE OF SHORELINE:	MGMT CLASS: 3-1978 3-1953 -			
MX DEPTH: 9 M	FOR 55% AGR 45%	ROUGHFISH: 2	LANDSAT TYPE: -		
VOL: 3.04E07 M3	MUN 0% MRSH 0%	WQ INDEX: -	CHLOR IND: -		
LITTORAL: 92 %	# DWELL: 267-1978	SENS IND: -	SECCHI IND: -		
DEPTH ROOTED	# RESORTS: 6-1978	RANK IND: -	T-PHOS IND: -		
VEG: 4 M	AC/MI: 142	PROBLEMS: PART WTRKL:1975-77			
DOM SHOL SOIL:	DWELL/MI: 17				
SAND---SAND	AC/DWELL: 8				
PUB ACC #: 2	WTRSHED AREA: 32.6 SQ MI				
ADMIN: DNR-E	GEOM REG: - - - -				
POPULATION	SLU: - - - -				
5 MI: 503	LAND USE: WTR 13% MRSH 2%				
10 MI: 5390	FOR 5% CUL 66% RES 2%	LKMAP: C521			
50 MI: 277714	URB 0% PASTURE/OPEN 12%	QUAD1: SUNBURG			

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.049	1.2	23	1.537	174	17	31.4	60	57	61	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0002 USK
44 15 45.0 093 31 50.0 3
LAKE: UPPER SAKATAH AT WATERVILLE
27079 MINNESOTA LE SUEUR
AREA: 356.5 HECTARE B 070639
MEAN DEPTH: 2.2 M MAX DEPTH: 3.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 357 HA	SHORE L: 7.29 MI	ECOL CLASS: -			
AV DEPTH: 2.2 M	USE OF SHORELINE:	MGMT CLASS: 5-1958 -			
MX DEPTH: 3 M	FOR 90% AGR 10%	ROUGHFISH: 3	LANDSAT TYPE: -		
VOL: 7.46E06 M3	MUN 0% MRSH 0%	WQ INDEX: -	CHLOR IND: -		
LITTORAL:100 %	# DWELL: 39-1958	SENS IND: -	SECCHI IND: -		
DEPTH ROOTED	# RESORTS: 3-1958	RANK IND: -	T-PHOS IND: -		
VEG: 1 M	AC/MI: 121	PROBLEMS: FSHKL 07/18/55			
DOM SHOL SOIL:	DWELL/MI: 8				
GRAVEL-RUBBLE	AC/DWELL: 15				
PUB ACC #:0	WTRSHED AREA: 136.8 SQ MI				
ADMIN: DNR-P	GEOM REG: - - - -				
POPULATION	SLU: - - - -				
5 MI: 2852	LAND USE: WTR 10% MRSH 4%				
10 MI: 7907	FOR 4% CUL 66% RES 3%	LKMAP: C434			
50 MI: 756202	URB 1% PASTURE/OPEN 13%	QUAD1: WATERVILLE			

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.412	1.2	52	2.384	177	30	5.8	91	57	69	73

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0020 GRL
44 23 50.0 093 37 35.0 3
LAKE: GREENLEAF 2 MI SW OF MONTGOMERY
27079 MINNESOTA LE SUEUR
AREA: 123.8 HECTARE M 070433
MEAN DEPTH: 2.5 M MAX DEPTH: 5.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 124 HA
AV DEPTH: 2.5 M
MX DEPTH: 5 M
VOL: 3.04E06 M3
LITTORAL: 88 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: GRAVEL-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 3810
10 MI: 10050
50 MI: 1835028

SHORE L: 3.05 MI
USE OF SHORELINE:
FOR 10% AGR 90%
MUN 0% MRSH 0%
DWELL: 3-1971
RESORTS: 1-1971
AC/MI: 100
DWELL/MI: 3
AC/DWELL: 34
WTRSHED AREA: 1.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 23% MRSH 7%
FOR 0% CUL 53% RES 0%
URB 0% PASTURE/OPEN 17%

ECOL CLASS: 5-1971 6-1956 -
MGMT CLASS: 3-1971 5-1956 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL 1969-70
ALGAE 1971
WTRKL 1955-56

LKMAP: C2409
QUAD1: LE CENTER

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.201	0.4	295	3.630	100	30	18.1	81	73	86	80

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0031 TKA
44 13 45.0 093 35 45.0 3
LAKE: TETONKA AT WATERVILLE
27079 MINNESOTA LE SUEUR
AREA: 489.3 HECTARE M 070639
MEAN DEPTH: 4.9 M MAX DEPTH: 10.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 489 HA
AV DEPTH: 4.9 M
MX DEPTH: 11 M
VOL: 2.39E07 M3
LITTORAL: 41 %
DEPTH ROOTED VEG: 3 M
DOM SHOL SOIL: SAND-GRAVEL
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 2171
10 MI: 9609
50 MI: 722676

SHORE L: 9.60 MI
USE OF SHORELINE:
FOR 40% AGR 35%
MUN 25% MRSH 0%
DWELL: 214-1969
RESORTS: 9-1969
AC/MI: 126
DWELL/MI: 28
AC/DWELL: 5
WTRSHED AREA: 127.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 4%
FOR 3% CUL 67% RES 3%
URB 1% PASTURE/OPEN 13%

ECOL CLASS: 5-1969 4-1955 -
MGMT CLASS: 3-1969 3-1955 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE BLM.

LKMAP: B201
QUAD1: ELYSIAN

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.367	1.5	256	3.321	185	35	9.0	89	54	85	76

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0057 FRN
44 12 40.0 093 42 10.0 3
LAKE: FRANCES 1 MI NW OF ELYSIAN
27079 MINNESOTA LE SUEUR
AREA: 362.3 HECTARE B 070639
MEAN DEPTH: 4.1 M MAX DEPTH: 15.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 362 HA
AV DEPTH: 4.1 M
MX DEPTH: 15 M
VOL: 1.47E07 M3
LITTORAL: - %
DEPTH ROOTED VEG: 3 M
DOM SHOL SOIL: SAND--
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 1119
10 MI: 8561
50 MI: 550180

SHORE L: 7.89 MI
USE OF SHORELINE:
FOR 20% AGR 20%
MUN 50% MRSH 10%
DWELL: 153-1969
RESORTS: 3-1969
AC/MI: 113
DWELL/MI: 22
AC/DWELL: 5
WTRSHED AREA: 5.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 3%
FOR 4% CUL 52% RES 14%
URB 1% PASTURE/OPEN 8%

ECOL CLASS: 5-1969 -
MGMT CLASS: 3-1969 4-1951 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -
-
LKMAP: B384
QUAD1: ELYSIAN

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.048	1.5	19	1.145	130	20	23.9	60	54	59	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0063 GRM
44 16 35.0 093 43 30.0 3
LAKE: GERMAN 4 MI NW OF ELYSIAN
27079 MINNESOTA LE SUEUR
AREA: 400.0 HECTARE B 070639
MEAN DEPTH: 4.1 M MAX DEPTH: 15.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 400 HA
AV DEPTH: 4.1 M
MX DEPTH: 15 M
VOL: 1.65E07 M3
LITTORAL: 58 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND---SILT
PUB ACC #: 1
ADMIN: CNTY
POPULATION
5 MI: 674
10 MI: 10070
50 MI: 756748

SHORE L: 5.50 MI
USE OF SHORELINE:
FOR 70% AGR 10%
MUN 20% MRSH 0%
DWELL: 78-1975
RESORTS: 1-1975
AC/MI: 180
DWELL/MI: 15
AC/DWELL: 12
WTRSHED AREA: 27.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 21% MRSH 5%
FOR 3% CUL 58% RES 5%
URB 0% PASTURE/OPEN 5%

ECOL CLASS: 6-1975 6-1956 5-1951
MGMT CLASS: 3-1975 3-1956 3-1951
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -
ALGAE BLMS
LKMAP: C432
QUAD1: CORDOVA

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.050	1.0	31	1.710	110	20	34.2	61	60	64	62

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0092 JEFF
44 16 30.0 093 45 35.0 3,
LAKE: JEFFERSON 2 MI N OF MARYSBURG
27079 MINNESOTA LE SUEUR
AREA: 926.7 HECTARE B 070639
MEAN DEPTH: 2.7 M MAX DEPTH: 11.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 927 HA
AV DEPTH: 2.7 M
MX DEPTH: 12 M
VOL: 2.44E07 M3
LITTORAL: 49 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 963
10 MI: 8173
50 MI: 705583

SHORE L: 5.60 MI
USE OF SHORELINE:
FOR 75% AGR 25%
MUN 0% MRSH 0%
DWELL: 165-1974
RESORTS: 3-1974
AC/MI: 409
DWELL/MI: 33
AC/DWELL: 13
WTRSHED AREA: 13.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 26% MRSH 2%
FOR 2% CUL 55% RES 8%
URB 0% PASTURE/OPEN 7%

ECOL CLASS: 6-1974 6-1956 -
MGMT CLASS: 5-1974 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1974
FSHKL 1968

LKMAP: B200
QUAD1: CLEVELAND

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.168	0.5	40	2.005	140	48	11.9	78	70	67	72

MPCA LAKE CLASSIFICATION PROJECT (314A)

40-0117 WSH
44 15 20.0 093 51 35.0 3
LAKE: WASHINGTON 3 MI SE OF KASOTA
27079 MINNESOTA LE SUEUR
AREA: 609.1 HECTARE M 070639
MEAN DEPTH: 3.6 M MAX DEPTH: 15.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 609 HA
AV DEPTH: 3.6 M
MX DEPTH: 16 M
VOL: 2.19E07 M3
LITTORAL: 50 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 2028
10 MI: 17634
50 MI: 537345

SHORE L: 11.96 MI
USE OF SHORELINE:
FOR 5% AGR 15%
MUN 80% MRSH 0%
DWELL: 388-1970
RESORTS: 3-1970
AC/MI: 126
DWELL/MI: 34
AC/DWELL: 4
WTRSHED AREA: 12.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 14% MRSH 4%
FOR 1% CUL 57% RES 11%
URB 2% PASTURE/OPEN 12%

ECOL CLASS: 5-1970 5-1969 5-1955
MGMT CLASS: 3-1970 3-1969 3-1955
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B202
QUAD1: ST. PETER

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.048	0.8	27	1.660	153	25	34.6	60	63	63	62

MPCA LAKE CLASSIFICATION PROJECT (314A)

43-0012 WST
44 57 50.0 094 02 20.0 3
LAKE: WINSTED AT WINSTED
27085 MINNESOTA MCLEOD
AREA: 164.7 HECTARE B 070319
MEAN DEPTH: 1.9 M MAX DEPTH: 3.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 165 HA
AV DEPTH: 1.9 M
MX DEPTH: 4 M
VOL: 3.09E06 M3
LITTORAL:100 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: SAND
PUB ACC #:0
ADMIN: DNR-E
POPULATION
5 MI: 2421
10 MI: 14551
50 MI: 2024535

SHORE L: 3.80 MI
USE OF SHORELINE:
FOR 65% AGR 20%
MUN 10% MRSH 5%
DWELL: 23-1974
RESORTS: 0-1974
AC/MI: 107
DWELL/MI: 6
AC/DWELL: 18
WTRSHED AREA: 20.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 1%
FOR 2% CUL 76% RES 2%
URB 3% PASTURE/OPEN 11%

ECOL CLASS: 7-1974 7-1946 -
MGMT CLASS: 6-1974 6-1946 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: TURBIDITY 1974
ALGAE BLMS 1974
REGULAR WTRKL
CREAMERY SEWAGE 1946

LKMAP: C2452
QUAD1: GLENCOE-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.759	0.3	247	4.262	217	39	5.6	100	77	85	87

MPCA LAKE CLASSIFICATION PROJECT (314A)

43-0034
44 53 50.0 094 12 00.0 3
LAKE: SILVER AT SILVER LAKE
27085 MINNESOTA MCLEOD
AREA: 202.3 HECTARE M 070319
MEAN DEPTH: 1.3 M MAX DEPTH: 2.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 202 HA
AV DEPTH: 1.3 M
MX DEPTH: 2 M
VOL: 2.58E06 M3
LITTORAL:100 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: DNR-E
POPULATION
5 MI: 2531
10 MI: 22454
50 MI: 1496511

SHORE L: 4.60 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 29-1970
RESORTS: 0-1970
AC/MI: 109
DWELL/MI: 6
AC/DWELL: 17
WTRSHED AREA: 2.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 29% MRSH 0%
FOR 2% CUL 31% RES 5%
URB 17% PASTURE/OPEN 17%

ECOL CLASS: 7-1951 -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL 1968-69

LKMAP: C2593
QUAD1: GLENCOE-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.645	0.5	163	-	177	-	-	97	70	81	83

MPCA LAKE CLASSIFICATION PROJECT (314A)

43-0084
44 47 00.0 094 23 10.0 3
LAKE: MARION 3 MI NW OF BROWNTON
27085 . MINNESOTA MCLEOD
AREA: 237.1 HECTARE M 070319
MEAN DEPTH: 1.8 M MAX DEPTH: 4.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 237 HA
AV DEPTH: 1.8 M
MX DEPTH: 4 M
VOL: 4.36E06 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: CLAY--MUCK
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1659
10 MI: 14536
50 MI: 471643

SHORE L: 6.40 MI
USE OF SHORELINE:
FOR 12% AGR 20%
MUN 40% MRSH 28%
DWELL: 63-1977
RESORTS: 0-1977
AC/MI: 92
DWELL/MI: 10
AC/DWELL: 9
WTRSHED AREA: 7.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 2%
FOR 1% CUL 79% RES 2%
URB 2% PASTURE/OPEN 5%

ECOL CLASS: 7-1977 -
MGMT CLASS: 5-1977 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: FREQ WTRKL

LKMAP: B27
QUAD1: HUTCHINSON-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.090	0.6	25	2.001	156	42	22.2	69	67	62	66

MPCA LAKE CLASSIFICATION PROJECT (314A)

49-0079 ALX
46 12 30.0 094 32 30.0 3
LAKE: ALEXANDER 2 MI SE OF SHAMINEAU P
27097 . MINNESOTA MORRISON
AREA: 1210.0 HECTARE M 070314
MEAN DEPTH: 8.4 M MAX DEPTH: 19.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1210 HA
AV DEPTH: 8.4 M
MX DEPTH: 20 M
VOL: 1.01E08 M3
LITTORAL: 31 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: RUBBLE-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 539
10 MI: 3018
50 MI: 239703

SHORE L: 14.91 MI
USE OF SHORELINE:
FOR 25% AGR 0%
MUN 75% MRSH 0%
DWELL: 289-1970
RESORTS: 6-1970
AC/MI: 201
DWELL/MI: 22
AC/DWELL: 9
WTRSHED AREA: 31.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 13% MRSH 1%
FOR 60% CUL 12% RES 5%
URB 0% PASTURE/OPEN 9%

ECOL CLASS: 4-1970 4-1957 -
MGMT CLASS: 3-1970 3-1957 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C470
QUAD1: CUSHING-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.029	2.6	12	0.745	107	5	25.7	53	46	55	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

49-0127 SHM
46 15 20.0 094 36 25.0 3
LAKE: SHAMINEAU AT SHAMINEAU PARK
27097 MINNESOTA MORRISON
AREA: 680.2 HECTARE M 070314
MEAN DEPTH: 5.8 M MAX DEPTH: 15.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 680 HA
AV DEPTH: 5.8 M
MX DEPTH: 16 M
VOL: 3.93E07 M3
LITTORAL: 46 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND--
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 539
10 MI: 2758
50 MI: 180175

SHORE L: 11.28 MI
USE OF SHORELINE: FOR 40% AGR 50% MUN 10% MRSH 0%
DWELL: 127-1957
RESORTS: 6-1957
AC/MI: 149
DWELL/MI: 14
AC/DWELL: 10
WTRSHED AREA: 10.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 1% FOR 47% CUL 18% RES 12% URB 0% PASTURE/OPEN 5%

ECOL CLASS: 4-1957 -
MGMT CLASS: 3-1957 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS:
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: B214
QUAD1: MOTLEY

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.028	3.5	15	0.745	95	5	26.6	52	42	57	50

MPCA LAKE CLASSIFICATION PROJECT (314A)

52-0034
44 18 20.0 094 15 00.0 3
LAKE: SWAN 1 MI NW OF NICOLLET
27103 MINNESOTA NICOLLET
AREA: 2630.5 HECTARE B 070428
MEAN DEPTH: 1.3 M MAX DEPTH: 1.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2630 HA
AV DEPTH: 1.3 M
MX DEPTH: 2 M
VOL: 3.53E07 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: CLAY
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1633
10 MI: 3970
50 MI: 348960

SHORE L: 70.00 MI
USE OF SHORELINE: FOR 30% AGR 65% MUN 5% MRSH 0%
DWELL: 25-1967
RESORTS: 0-1967
AC/MI: 93
DWELL/MI: 0
AC/DWELL: 260
WTRSHED AREA: 43.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 33% MRSH 3% FOR 4% CUL 54% RES 0% URB 0% PASTURE/OPEN 5%

ECOL CLASS: 7-1967 -
MGMT CLASS: -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: FLUC. WATER LEVELS '67 TURBIDITY 1967
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: C0000
QUAD1: CORTLAND

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
-	-	-	-	-	-	-	-	-	-	-

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0130
46 36 40.0 095 30 00.0 3
LAKE: BIG PINE 2 MI E OF PERHAM
27111 . MINNESOTA OTTER TAIL
AREA: 2050.5 HECTARE M 230156
MEAN DEPTH: 5.4 M MAX DEPTH: 22.9 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2051 HA
AV DEPTH: 5.4 M
MX DEPTH: 23 M
VOL: 1.12E08 M3
LITTORAL: 50 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: RUBBLE-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 294
10 MI: 5134
50 MI: 133403

SHORE L: 14.00 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 516-1979
RESORTS: -
AC/MI: 362
DWELL/MI: 37
AC/DWELL: 10
WTRSHED AREA: 538.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 16% MRSH 2%
FOR 20% CUL 51% RES 2%
URB 1% PASTURE/OPEN 8%

ECOL CLASS: 3-1958 -
MGMT CLASS: 2-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B227
QUAD1: LITTLE PINE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.071	-	47	0.909	183	30	12.8	66	-	68	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0138 EBL
46 17 45.0 095 32 55.0 3
LAKE: EAST BATTLE AT VINING
27111 MINNESOTA OTTER TAIL
AREA: 825.6 HECTARE B 230156
MEAN DEPTH: 7.1 M MAX DEPTH: 23.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 826 HA
AV DEPTH: 7.1 M
MX DEPTH: 23 M
VOL: 5.89E07 M3
LITTORAL: - %
DEPTH ROOTED VEG: 6 M
DOM SHOL SOIL: SAND-
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 121
10 MI: 4093
50 MI: 164826

SHORE L: 13.13 MI
USE OF SHORELINE:
FOR 15% AGR 60%
MUN 20% MRSH 5%
DWELL: 328-1979
RESORTS: -
AC/MI: 155
DWELL/MI: 290
AC/DWELL: 6
WTRSHED AREA: 72.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 2%
FOR 19% CUL 54% RES 2%
URB 0% PASTURE/OPEN 14%

ECOL CLASS: 4-1976 -
MGMT CLASS: 3-1976 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B217
QUAD1: VINING

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.055	3.3	3	1.095	230	15	19.9	62	43	41	49

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0141 RUS
46 29 25.0 095 31 50.0 3
LAKE: RUSH 2 MI N OF OTTERTAIL
27111 MINNESOTA OTTER TAIL
AREA: 2160.1 HECTARE B 230156
MEAN DEPTH: 4.0 M MAX DEPTH: 20.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 2160 HA
AV DEPTH: 4.0 M
MX DEPTH: 20 M
VOL: 8.56E07 M3
LITTORAL: 62 %
DEPTH ROOTED
VEG: 4 M
DOM SHOL SOIL:
GRAVEL-SAND
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 765
10 MI: 5558
50 MI: 149057

SHORE L: 11.80 MI
USE OF SHORELINE:
FOR 35% AGR 15%
MUN 50% MRSH 0%
DWELL: 498-1979
RESORTS: -
AC/MI: 452
DWELL/MI: 42
AC/DWELL: 11
WTRSHED AREA: - SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR -% MRSH -%
FOR -% CUL -% RES -%
URB -% PASTURE/OPEN -%

ECOL CLASS: 3-1971 3-1956 -
MGMT CLASS: 2-1971 2-1956 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B229
QUAD1: PERHAM

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.026	2.1	11	0.831	125	21	32.0	51	49	54	52

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0142 LPN
46 37 45.0 095 32 25.0 3
LAKE: LITTLE PINE AT PERHAM
27111 MINNESOTA OTTER TAIL
AREA: 823.9 HECTARE B 230156
MEAN DEPTH: 7.9 M MAX DEPTH: 23.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 824 HA
AV DEPTH: 7.9 M
MX DEPTH: 24 M
VOL: 6.51E07 M3
LITTORAL: 30 %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
GRAVEL-SAND
PUB ACC #:0
ADMIN: CITY
POPULATION
5 MI: 2335
10 MI: 5458
50 MI: 127503

SHORE L: 7.4 MI
USE OF SHORELINE:
FOR 0% AGR 80%
MUN 20% MRSH 0%
DWELL: 208-1958
RESORTS: 4-1958
AC/MI: 275
DWELL/MI: 31
AC/DWELL: 9
WTRSHED AREA: 347.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 15% MRSH 2%
FOR 19% CUL 53% RES 2%
URB 1% PASTURE/OPEN 8%

ECOL CLASS: 3-1958 -
MGMT CLASS: 2-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B395
QUAD1: LITTLE PINE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.068	1.7	23	1.178	183	20	17.3	65	52	61	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0239
46 17 30.0 095 40 00.0 3
LAKE: WEST BATTLE AT BATTLE LAKE
27111 MINNESOTA OTTER TAIL
AREA: 2291.7 HECTARE M 230156
MEAN DEPTH: 7.3 M MAX DEPTH: 34.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2292 HA
AV DEPTH: 7.3 M
MX DEPTH: 34 M
VOL: 1.67E08 M3
LITTORAL: 41 %
DEPTH ROOTED
VEG: 6 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
5 MI: 903
10 MI: 3290
50 MI: 154675

SHORE L: 16.50 MI
USE OF SHORELINE:
FOR 0% AGR 10%
MUN 90% MRSH 0%
DWELL: 1129-1979
RESORTS: -
AC/MI: 343
DWELL/MI: 68
AC/DWELL: 5
WTRSHED AREA: 127.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 1%
FOR 15% CUL 52% RES 3%
URB 0% PASTURE/OPEN 12%

ECOL CLASS: 4-1976 4-1955 -
MGMT CLASS: 3-1976 3-1955 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B218
QUAD1: BATTLE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.027	2.8	4	0.750	175	5	27.8	52	45	44	47

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0240 BCH
46 20 55.0 095 39 30.0 3
LAKE: BLANCHE 1 MI S OF BALMORAL
27111 MINNESOTA OTTER TAIL
AREA: 530.9 HECTARE M 230156
MEAN DEPTH: 3.2 M MAX DEPTH: 19.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 531 HA
AV DEPTH: 3.2 M
MX DEPTH: 20 M
VOL: 1.69E07 M3
LITTORAL: 74 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
SAND---SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 774
10 MI: 3861
50 MI: 157738

SHORE L: 2.02 MI
USE OF SHORELINE:
FOR 35% AGR 40%
MUN 25% MRSH 0%
DWELL: 161-1979
RESORTS: -
AC/MI: 649
DWELL/MI: 80
AC/DWELL: 8
WTRSHED AREA: 141.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 1%
FOR 16% CUL 50% RES 3%
URB 0% PASTURE/OPEN 11%

ECOL CLASS: 4-1972 -
MGMT CLASS: 3-1972 4-1951 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C2337
QUAD1: BATTLE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.027	2.0	11	0.945	208	13	35.7	52	50	54	52

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0242 OTT
46 23 30.0 095 40 00.0 3
LAKE: OTTER TAIL AT OTTERTAIL
27111 MINNESOTA OTTER TAIL
AREA: 5970.3 HECTARE M 230156
MEAN DEPTH: 7.1 M MAX DEPTH: 36.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 5970 HA
AV DEPTH: 7.1 M
MX DEPTH: 37 M
VOL: 4.21E08 M3
LITTORAL: 57 %
DEPTH ROOTED VEG: 6 M
DOM SHOL SOIL: SAND
PUB ACC #: 3
ADMIN: DNR-E
POPULATION
5 MI:0
10 MI: 3812
50 MI: 155639

SHORE L: 21.98 MI
USE OF SHORELINE:
FOR 30% AGR 50%
MUN 20% MRSH 0%
DWELL: 1359-1979
RESORTS: -
AC/MI: 671
DWELL/MI: 62
AC/DWELL: 11
WTRSHED AREA: 675.0 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 20% MRSH 2%
FOR 18% CUL 49% RES 3%
URB 1% PASTURE/OPEN 8%

ECOL CLASS: 3-1979 -
MGMT CLASS: 2-1979 2-1951 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SEPTIC TANK SEEPAGE '79
ANNUAL TROUT/PERCH KLS

LKMAP: B225
QUAD1: WALKER LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.032	2.7	10	0.845	177	8	26.4	54	46	53	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0243 OMRN
46 31 45.0 095 39 00.0 3
LAKE: MARION 1 MI N OF RICHVILLE
27111 MINNESOTA OTTER TAIL
AREA: 651.5 HECTARE B 230156
MEAN DEPTH: 6.9 M MAX DEPTH: 18.3 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 652 HA
AV DEPTH: 6.9 M
MX DEPTH: 18 M
VOL: 4.48E07 M3
LITTORAL: 41 %
DEPTH ROOTED VEG: 6 M
DOM SHOL SOIL: RUBBLE-BOULDE
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 505
10 MI: 5424
50 MI: 147985

SHORE L: 8.59 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 213-1979
RESORTS: -
AC/MI: 187
DWELL/MI: 25
AC/DWELL: 8
WTRSHED AREA: 10.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 21% MRSH 0%
FOR 12% CUL 61% RES 4%
URB 0% PASTURE/OPEN 2%

ECOL CLASS: 4-1979 4-1956 -
MGMT CLASS: 3-1979 3-1956 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: NO PUBLIC ACCESS

LKMAP: B223
QUAD1: DENT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.035	3.3	7	0.892	177	6	25.5	55	43	50	49

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0253 OFGL
46 10 15.0 095 41 30.0 3
LAKE: EAGLE 7 MI S OF BATTLE LAKE
27111 MINNESOTA OTTER TAIL
AREA: 339.0 HECTARE B 070423
MEAN DEPTH: 9.0 M MAX DEPTH: - M
21MINNL 800906

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 339 HA
AV DEPTH: 9.0 M
MX DEPTH: - M
VOL: 3.07E07 M3
LITTORAL: 19 %
DEPTH ROOTED VEG: 8 M
DOM SHOL SOIL: SAND--SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 277
10 MI: 3523
50 MI: 167944

SHORE L: 4.30 MI
USE OF SHORELINE:
FOR 50% AGR 50%
MUN 0% MRSH 0%
DWELL: 164-1979
RESORTS: -
AC/MI: 195
DWELL/MI: 38
AC/DWELL: 5
WTRSHED AREA: 2.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 42% MRSH 0%
FOR 4% CUL 27% RES 20%
URB 0% PASTURE/OPEN 7%

ECOL CLASS: 5-1970 -
MGMT CLASS: 3-1970 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1331
QUAD1: EAGLE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.021	5.5	4	0.540	257	6	25.7	48	35	44	43

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0302
46 41 55.0 095 39 30.0 3
LAKE: SILVER 1 MI NW OF BATTLE LAKE
27111 MINNESOTA OTTER TAIL
AREA: 221.4 HECTARE M 230156
MEAN DEPTH: 4.8 M MAX DEPTH: 13.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 221 HA
AV DEPTH: 4.8 M
MX DEPTH: 13 M
VOL: 1.07E07 M3
LITTORAL: 42 %
DEPTH ROOTED VEG: 6 M
DOM SHOL SOIL: SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1915
10 MI: 7388
50 MI: 125543

SHORE L: 4.20 MI
USE OF SHORELINE:
FOR 9% AGR 50%
MUN 41% MRSH 0%
DWELL: 98-1979
RESORTS: -
AC/MI: 130
DWELL/MI: 23
AC/DWELL: 6
WTRSHED AREA: 2.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 30% MRSH 15%
FOR 0% CUL 52% RES 0%
URB 0% PASTURE/OPEN 3%

ECOL CLASS: 4-1969 4-1962 -
MGMT CLASS: 3-1969 3-1962 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1308
QUAD1: BATTLE LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.040	2.6	9	1.040	275	7	26.0	57	46	52	52

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0306
46 17 30.0 095 45 00.0 3
LAKE: ELBOW 1 MI W OF BATTLE LAKE
27111 MINNESOTA OTTER TAIL
AREA: 76.5 HECTARE M 230156
MEAN DEPTH: 6.3 M MAX DEPTH: 14.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 76 HA
AV DEPTH: 6.3 M
MX DEPTH: 14 M
VOL: 4.79E06 M3
LITTORAL: 42 %
DEPTH ROOTED VEG: 8 M
DOM SHOL SOIL: GRAVEL-
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1201
10 MI: 3102
50 MI: 161739

SHORE L: 3.27 MI
USE OF SHORELINE:
FOR 60% AGR 30%
MUN 10% MRSH 0%
DWELL: 10-1979
RESORTS: -
AC/MI: 58
DWELL/MI: 3
AC/DWELL: 19
WTRSHED AREA: 3.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 20% MRSH 0%
FOR 10% CUL 49% RES 0%
URB 0% PASTURE/OPEN 21%

ECOL CLASS: 5-1979 -
MGMT CLASS: 3-1979 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1521
QUAD1: UNDERWOOD

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.018	6.1	2	0.748	185	5	41.6	46	34	37	39

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0475 PKL
46 25 40.0 095 48 10.0 3
LAKE: PICKEREL AT MAINE
27111 MINNESOTA OTTER TAIL
AREA: 335.5 HECTARE M 230156
MEAN DEPTH: 8.5 M MAX DEPTH: 23.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 335 HA
AV DEPTH: 8.5 M
MX DEPTH: 24 M
VOL: 2.85E07 M3
LITTORAL: 33 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 434
10 MI: 3242
50 MI: 149587

SHORE L: 6.30 MI
USE OF SHORELINE:
FOR 30% AGR 35%
MUN 35% MRSH 0%
DWELL: 272-1979
RESORTS: -
AC/MI: 132
DWELL/MI: 43
AC/DWELL: 3
WTRSHED AREA: 7.2 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 19% MRSH 0%
FOR 15% CUL 57% RES 8%
URB 0% PASTURE/OPEN 2%

ECOL CLASS: 4-1961 -
MGMT CLASS: 3-1961 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B297
QUAD1: PHELPS

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.019	5.2	3	0.655	170	2	34.5	47	36	41	41

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0658 WALL
46 16 20.0 095 57 50.0 3
LAKE: WALL AT WALL LAKE
27111 MINNESOTA OTTER TAIL
AREA: 276.3 HECTARE M 230156
MEAN DEPTH: 4.2 M MAX DEPTH: 8.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 276 HA
AV DEPTH: 4.2 M
MX DEPTH: 8 M
VOL: 1.17E07 M3
LITTORAL: 34 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1357
10 MI: 16919
50 MI: 146935

SHORE L: 7.00 MI
USE OF SHORELINE:
FOR 0% AGR 11%
MUN 64% MRSH 25%
DWELL: 236-1979
RESORTS: 0-1976
AC/MI: 98
DWELL/MI: 34
AC/DWELL: 3
WTRSHED AREA: 13.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 11% MRSH 2%
FOR 10% CUL 61% RES 5%
URB 0% PASTURE/OPEN 10%

ECOL CLASS: 4-1976 -
MGMT CLASS: 3-1976 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1976

LKMAP: C2286
QUAD1: WALL LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.034	2.7	4	0.945	225	15	27.8	55	46	44	48

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0760 LIZE
46 38 25.0 096 00 30.0 3
LAKE: LIZZIE AT DUNVILLA
27111 MINNESOTA OTTER TAIL
AREA: 1579.9 HECTARE M 230156
MEAN DEPTH: 3.3 M MAX DEPTH: 16.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1580 HA
AV DEPTH: 3.3 M
MX DEPTH: 16 M
VOL: 5.20E07 M3
LITTORAL: 71 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: MUCK--SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 405
10 MI: 4672
50 MI: 154030

SHORE L: 16.70 MI
USE OF SHORELINE:
FOR 0% AGR 100%
MUN 0% MRSH 0%
DWELL: 334-1979
RESORTS: -
AC/MI: 234
DWELL/MI: 20
AC/DWELL: 12
WTRSHED AREA: 290.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 24% MRSH 1%
FOR 20% CUL 40% RES 5%
URB 0% PASTURE/OPEN 10%

ECOL CLASS: 4-1979 3-1961 -
MGMT CLASS: 3-1979 2-1961 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B222
QUAD1: CORMORANT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
					5	32.1	51	46	48	48

MPCA LAKE CLASSIFICATION PROJECT (314A)

56-0786 OPEL
46 42 05.0 096 01 40.0 3
LAKE: PELICAN 1 MI S OF CORMORANT
27111 . MINNESOTA OTTER TAIL
AREA: 1588.4 HECTARE M 230156
MEAN DEPTH: 7.0 M MAX DEPTH: 16.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1588 HA
AV DEPTH: 7.0 M
MX DEPTH: 17 M
VOL: 1.11E08 M3
LITTORAL: 41 %
DEPTH ROOTED VEG: 7 M
DOM SHOL SOIL: SAND-
PUB ACC #:>1
ADMIN: CNTY
POPULATION
5 MI: 405
10 MI: 6567
50 MI: 153450

SHORE L: 16.80 MI
USE OF SHORELINE:
FOR 20% AGR 0%
MUN 80% MRSH 0%
DWELL: 1226-1979
RESORTS: -
AC/MI: 234
DWELL/MI: 73
AC/DWELL: 3
WTRSHED AREA: 257.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 24% MRSH 1%
FOR 18% CUL 42% RES 5%
URB 0% PASTURE/OPEN 10%

ECOL CLASS: 4-1972 -
MGMT CLASS: 3-1972 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -
LKMAP: C1847
QUAD1: CORMORANT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.026	2.8	7	0.735	190	2	28.3	51	45	50	49

MPCA LAKE CLASSIFICATION PROJECT (314A)

61-0064 AMA
45 41 05.0 095 17 15.0 3
LAKE: AMELIA 1 MI SW OF VILLARD
27121 . MINNESOTA POPE
AREA: 377.3 HECTARE M 070426
MEAN DEPTH: 7.4 M MAX DEPTH: 21.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 377 HA
AV DEPTH: 7.4 M
MX DEPTH: 22 M
VOL: 2.78E07 M3
LITTORAL: 42 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: GRAVEL-RUBBLE
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 681
10 MI: 6151
50 MI: 193184

SHORE L: 7.4 MI
USE OF SHORELINE:
FOR 30% AGR 30%
MUN 40% MRSH 0%
DWELL: 23-1975
RESORTS: 2-1975
AC/MI: 126
DWELL/MI: 5
AC/DWELL: 27
WTRSHED AREA: 34.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 3%
FOR 1% CUL 62% RES 3%
URB 1% PASTURE/OPEN 22%

ECOL CLASS: 4-1975 4-1959 -
MGMT CLASS: 3-1975 3-1959 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SWIM ITCH 1975
FEEDLOT 1975
LKMAP: C489
QUAD1: VILLARD

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.045	3.2	21	0.972	176	7	21.6	59	43	60	54

MPCA LAKE CLASSIFICATION PROJECT (314A)

61-0067 VIL
45 42 45.0 095 17 30.0 3
LAKE: VILLARD AT VILLARD
27121 MINNESOTA POPE
AREA: 217.1 HECTARE M 070426
MEAN DEPTH: 3.0 M MAX DEPTH: 4.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 217 HA
AV DEPTH: 3.0 M
MX DEPTH: 5 M
VOL: 6.55E06 M3
LITTORAL: 91 %
DEPTH ROOTED
VEG: 4 M
DOM SHOL SOIL:
SAND---MUCK
PUB ACC #: 2
ADMIN: CNTY
POPULATION
5 MI: 1083
10 MI: 6151
50 MI: 190399

SHORE L: 3.60 MI
USE OF SHORELINE:
FOR 40% AGR 0%
MUN 60% MRSH 0%
DWELL: 66-1975
RESORTS: 2-1975
AC/MI: 149
DWELL/MI: 22
AC/DWELL: 7
WTRSHED AREA: 22.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 5%
FOR 1% CUL 57% RES 1%
URB 1% PASTURE/OPEN 28%

ECOL CLASS: 4-1975 4-1960 4-1953
MGMT CLASS: 3-1975 3-1953 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WNTRKL 1955

LKMAP: D176
QUAD1: VILLARD

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.058	1.3	21	1.225	143	27	21.1	63	56	60	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

61-0072 GIL
45 28 30.0 095 22 00.0 3
LAKE: GILCHRIST 1 MI NW OF GILCHRIST
27121 MINNESOTA POPE
AREA: 133.5 HECTARE M 070426
MEAN DEPTH: 3.2 M MAX DEPTH: 7.3 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 134 HA
AV DEPTH: 3.2 M
MX DEPTH: 7 M
VOL: 4.21E06 M3
LITTORAL: 62 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
MARL-
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 0
10 MI: 1745
50 MI: 191323

SHORE L: 4.90 MI
USE OF SHORELINE:
FOR 45% AGR 40%
MUN 15% MRSH 0%
DWELL: 36-1977
RESORTS: 0-1977
AC/MI: 67
DWELL/MI: 7
AC/DWELL: 9
WTRSHED AREA: 45.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 2%
FOR 4% CUL 52% RES 3%
URB 1% PASTURE/OPEN 30%

ECOL CLASS: 5-1977 4-1955 -
MGMT CLASS: 3-1977 3-1955 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ROTENONE KILL FALL 1968

LKMAP: C490
QUAD1: LAKE SIMON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI

MPCA LAKE CLASSIFICATION PROJECT (314A)

61-0130 MW
45 36 40.0 095 26 50.0 3
LAKE: MINNEWASKA AT GLENWOOD
27121 MINNESOTA POPE
AREA: 2877.3 HECTARE M 070426
MEAN DEPTH: 4.8 M MAX DEPTH: 9.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2877 HA
AV DEPTH: 4.8 M
MX DEPTH: 10 M
VOL: 1.39E08 M3
LITTORAL: 30 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
SAND-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 446
10 MI: 6711
50 MI: 180188

SHORE L: 18.13 MI
USE OF SHORELINE:
FOR 20% AGR 20%
MUN 60% MRSH 0%
DWELL: 566-1976
RESORTS: 11-1976
AC/MI: 392
DWELL/MI: 35
AC/DWELL: 11
WTRSHED AREA: 89.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 1%
FOR 4% CUL 57% RES 3%
URB 2% PASTURE/OPEN 15%

ECOL CLASS: 4-1976 4-1963 -
MGMT CLASS: 3-1976 3-1963 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: EFFLUENT DISCHARGE 1976
ALGAE 1976

LKMAP: B328
QUAD1: STARBUCK

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.043	2.0	13	1.246	219	8	29.0	58	50	56	55

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0001
45 01 35.0 092 59 15.0 3
LAKE: SILVER IN NORTH ST. PAUL
27123 MINNESOTA RAMSEY
AREA: 27.5 HECTARE B 070320
MEAN DEPTH: 2.0 M MAX DEPTH: 5.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 28 HA
AV DEPTH: 2.0 M
MX DEPTH: 5 M
VOL: 5.53E05 M3
LITTORAL: 98 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND-GRAVEL
PUB ACC #:0
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 74170
10 MI: 501495

SHORE L: 2.10 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN 100% MRSH - %
DWELL: 32-1961
RESORTS: 0-1961
AC/MI: 32
DWELL/MI: 15
AC/DWELL: 2
WTRSHED AREA: 0.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 7% CUL 0% RES 64%
URB 7% PASTURE/OPEN 21%

ECOL CLASS: 5-1961 -
MGMT CLASS: 4-1961 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: OCC WTRKL:1939-56

LKMAP: C757
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.074	0.9	32	1.430	125	-	19.3	66	62	65	64

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0002 BEG
45 06 45.0 093 01 00.0 3
LAKE: BALD EAGLE AT WHITE BEAR LAKE
27123 MINNESOTA RAMSEY
AREA: 409.5 HECTARE M 070320
MEAN DEPTH: 3.8 M MAX DEPTH: 11.9 M
/TYPA/AMBNT/LAKE 21MINNL 800412

DESCRIPTION

AREA: 410 HA
AV DEPTH: 3.8 M
MX DEPTH: 12 M
VOL: 1.55E07 M3
LITTORAL: 61 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: SAND-GRAVEL
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 32983
10 MI: 158401

SHORE L: 7.40 MI
USE OF SHORELINE:
FOR 12% AGR 5%
MUN 80% MRSH 3%
DWELL: 249-1972
RESORTS: 2-1972
AC/MI: 137
DWELL/MI: 35
AC/DWELL: 4
WTRSHED AREA: 9.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 23% MRSH 0%
FOR 2% CUL 4% RES 46%
URB 11% PASTURE/OPEN 11%

ECOL CLASS: 6-1972 5-1957 -
MGMT CLASS: 4-1972 4-1957 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: DEBRIS/LITTER ON BTM '7
HVY ALGAE 1972

LKMAP: B325
QUAD1: CENTERVILLE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.068	0.9	41	1.902	131	30	28.0	65	62	67	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0006
45 01 30.0 093 03 25.0 3
LAKE: KOHLMAN IN MAPLEWOOD
27123 MINNESOTA RAMSEY
AREA: 34.0 HECTARE M 070320
MEAN DEPTH: 1.4 M MAX DEPTH: 2.7 M
/TYPA/AMBNT/LAKE 21MINNL 800412

DESCRIPTION

AREA: 34 HA
AV DEPTH: 1.4 M
MX DEPTH: 3 M
VOL: 4.83E05 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: SAND-MUCK
PUB ACC #: 0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 40617
10 MI: 515160

SHORE L: 1.60 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 60% MRSH 40%
DWELL: 22-1961
RESORTS: 0-1961
AC/MI: 52
DWELL/MI: 14
AC/DWELL: 4
WTRSHED AREA: 12.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 1% MRSH 1%
FOR 1% CUL 7% RES 46%
URB 28% PASTURE/OPEN 17%

ECOL CLASS: 5-1961 -
MGMT CLASS: 4-1961 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: HVY ALGAE BLMS 1961
OCC. WNTRKL 1961

LKMAP: C1224
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.167	0.3	79	1.550	115	35	9.3	78	77	73	76

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0007
45 01 15.0 093 04 20.0 3
LAKE: GERVAIS IN LITTLE CANADA
27123 MINNESOTA RAMSEY
AREA: 83.9 HECTARE B 070320
MEAN DEPTH: 5.2 M MAX DEPTH: 12.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 84 HA
AV DEPTH: 5.2 M
MX DEPTH: 12 M
VOL: 4.33E06 M3
LITTORAL: 44 %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
SAND-MUCK
PUB ACC #:0
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 78466
10 MI: 588844

SHORE L: 3.2 MI
USE OF SHORELINE:
FOR 0% AGR 15%
MUN 85% MRSH 0%
DWELL: 32-1975
RESORTS: -
AC/MI: 65
DWELL/MI: 10
AC/DWELL: 6
WTRSHED AREA: 43.0 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 7% MRSH 2%
FOR 9% CUL 6% RES 39%
URB 14% PASTURE/OPEN 22%

ECOL CLASS: 5-1958 -
MGMT CLASS: 4-1958 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: EXCESSIVE ALGAL BLMS '5

LKMAP: C496
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.045	1.5	21	2.175	100	-	48.3	59	54	60	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0010
45 00 30.0 093 03 45.0 3
LAKE: KELLER IN MAPLEWOOD
27123 MINNESOTA RAMSEY
AREA: 29.9 HECTARE B 070320
MEAN DEPTH: 1.8 M MAX DEPTH: 12.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 30 HA
AV DEPTH: 1.8 M
MX DEPTH: 12 M
VOL: 5.23E05 M3
LITTORAL: 100 %
DEPTH ROOTED
VEG: 1 M
DOM SHOL SOIL:
MUCK--MUCK
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 40617
10 MI: 548454

SHORE L: 1.90 MI
USE OF SHORELINE:
FOR 20% AGR 0%
MUN 80% MRSH 0%
DWELL: 17-1976
RESORTS: 0-1976
AC/MI: 39
DWELL/MI: 9
AC/DWELL: 4
WTRSHED AREA: 44.2 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 7% MRSH 2%
FOR 9% CUL 6% RES 39%
URB 16% PASTURE/OPEN 22%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C498
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.134	0.4	54	2.205	-	-	16.5	75	73	70	73

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0013
44 59 15.0 093 03 10.0 3
LAKE: PHALEN IN ST. PAUL
27123 MINNESOTA RAMSEY
AREA: 78.1 HECTARE B 070320
MEAN DEPTH: 7.3 M MAX DEPTH: 21.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 78 HA
AV DEPTH: 7.3 M
MX DEPTH: 21 M
VOL: 5.71E06 M3
LITTORAL: 40 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
SAND--
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 350483
10 MI: 548723

SHORE L: 3.00 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL:0 -1974
RESORTS: 0-1974
AC/MI: 64
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 49.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 2%
FOR 8% CUL 5% RES 38%
URB 21% PASTURE/OPEN 20%

ECOL CLASS: 5-1974 5-1958 -
MGMT CLASS: 4-1974 4-1958 4-1951
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: EROSION:STORM SEWERS '7
SMRKL:1971-72
CARP 1974

LKMAP: C499
QUAD1: ST. PAUL EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.036	1.6	14	1.248	91	22	34.7	56	53	56	55

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0016
44 58 25.0 093 00 15.0 3
LAKE: BEAVER IN MAPLEWOOD
27123 MINNESOTA RAMSEY
AREA: 34.0 HECTARE M 070320
MEAN DEPTH: 1.8 M MAX DEPTH: 2.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 34 HA
AV DEPTH: 1.8 M
MX DEPTH: 2 M
VOL: 6.03E05 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
-
PUB ACC #: -
ADMIN: -
POPULATION
1 MI: 0
5 MI: 45602
10 MI: 532602

SHORE L: 1.7 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 14-1980
RESORTS: -
AC/MI: 49
DWELL/MI: 8
AC/DWELL: 6
WTRSHED AREA: 2.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 0%
FOR 6% CUL 8% RES 39%
URB 25% PASTURE/OPEN 17%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: ?
QUAD1: ST. PAUL EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.185	0.5	117	-	-	-	-	79	70	77	76

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0054
44 59 55.0 093 06 45.0 3
LAKE: MC CARRON IN ROSEVILLE
27123 MINNESOTA RAMSEY
AREA: 29.1 HECTARE M 070320
MEAN DEPTH: 7.9 M MAX DEPTH: 17.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 29 HA
AV DEPTH: 7.9 M
MX DEPTH: 17 M
VOL: 2.30E06 M3
LITTORAL: 36 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
SAND----
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 378501
10 MI: 1043666

SHORE L: 1.40 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 38-1973
RESORTS: 0-1973
AC/MI: 51
DWELL/MI: 27
AC/DWELL: 2
WTRSHED AREA: 1.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 0% CUL 0% RES 57%
URB 37% PASTURE/OPEN 7%

ECOL CLASS: 5-1973 5-1958 -
MGMT CLASS: 4-1973 4-1958 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: STORM SEWERS 1973
BL GREEN ALGAE 1973
LT SMRKL 1959-60

LKMAP: C1773
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.040	1.7	12	1.119	89	13	28.0	57	52	55	55

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0055
44 58 45.0 093 08 25.0 3
LAKE: COMO IN ST. PAUL
27123 MINNESOTA RAMSEY
AREA: 28.5 HECTARE M 070320
MEAN DEPTH: 1.9 M MAX DEPTH: 4.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 29 HA
AV DEPTH: 1.9 M
MX DEPTH: 5 M
VOL: 5.53E05 M3
LITTORAL: 97 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND--SAND
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 355845
10 MI: 1035476

SHORE L: 2.00 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN 100% MRSH 0%
DWELL:0 -1976
RESORTS: 0-1976
AC/MI: 35
DWELL/MI:0
AC/DWELL: 999
WTRSHED AREA: 2.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 0% MRSH 0%
FOR 0% CUL 0% RES 36%
URB 64% PASTURE/OPEN 0%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: FREQ. WNTRKLS
STORM SEWERS 1976

LKMAP: C1533
QUAD1: ST. PAUL WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.287	0.3	86	1.786	70	142	6.2	86	77	74	79

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0056 OWO
45 02 15.0 093 07 15.0 3
LAKE: OWASSO IN SHOREVIEW
27123 MINNESOTA RAMSEY
AREA: 144.5 HECTARE B 070320
MEAN DEPTH: 2.8 M MAX DEPTH: 12.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 144 HA
AV DEPTH: 2.8 M
MX DEPTH: 12 M
VOL: 4.07E06 M3
LITTORAL: 79 %
DEPTH ROOTED VEG: 3 M
DOM SHOL SOIL: SAND---SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 57457
10 MI: 1018231

SHORE L: 4.90 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 95% MRSH 5%
DWELL: 260-1971
RESORTS: 0-1971
AC/MI: 73
DWELL/MI: 53
AC/DWELL: 1
WTRSHED AREA: 4.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 0%
FOR 1% CUL 0% RES 65%
URB 27% PASTURE/OPEN 3%

ECOL CLASS: 5-1971 -
MGMT CLASS: 4-1971 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SMRKL 1962
AQ VEG 1971
SMRKL 1962

LKMAP: C498
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.103	1.4	10	1.224	125	9	11.9	71	55	53	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0057
45 02 10.0 093 09 10.0 3
LAKE: JOSEPHINE IN ROSEVILLE
27123 MINNESOTA RAMSEY
AREA: 47.8 HECTARE M 070320
MEAN DEPTH: 3.3 M MAX DEPTH: 13.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 48 HA
AV DEPTH: 3.3 M
MX DEPTH: 13 M
VOL: 1.56E06 M3
LITTORAL: 69 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: SILT-SAND
PUB ACC #:0
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 94263
10 MI: 1055941

SHORE L: 1.63 MI
USE OF SHCRELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 51-1971
RESORTS: 0-1971
AC/MI: 72
DWELL/MI: 31
AC/DWELL: 2
WTRSHED AREA: 1.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 0%
FOR 0% CUL 0% RES 60%
URB 32% PASTURE/OPEN 4%

ECOL CLASS: 5-1971 -
MGMT CLASS: 4-1971 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WEED CONTROL
WTRKL 1969-70

LKMAP: C1393
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.070	0.9	22	1.009	111	-	14.4	65	62	61	63

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0067
45 04 25.0 093 12 00.0 3
LAKE: LONG IN NEW BRIGHTON
27123 MINNESOTA RAMSEY
AREA: 74.5 HECTARE B 070320
MEAN DEPTH: 4.5 M MAX DEPTH: 9.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 74 HA
AV DEPTH: 4.5 M
MX DEPTH: 9 M
VOL: 3.35E06 M3
LITTORAL: 40 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
SAND
PUB ACC #:0
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 116139
10 MI: 1196070

SHORE L: 4.02 MI
USE OF SHORELINE:
FOR 5% AGR 0%
MUN 95% MRSH 0%
DWELL: 92-1973
RESORTS: 0-1973
AC/MI: 46
DWELL/MI: 23
AC/DWELL: 2
WTRSHED AREA: 43.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 1%
FOR 4% CUL 2% RES 33%
URB 32% PASTURE/OPEN 19%

ECOL CLASS: 4-1953 -
MGMT CLASS: 3-1953 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: HVY BL GR ALGAE BLMS'53

LKMAP: D178
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.134	0.8	49	1.834	123	-	13.7	75	63	69	69

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0069
45 04 05.0 093 12 30.0 3
LAKE: PIKE IN NEW BRIGHTON
27123 MINNESOTA RAMSEY
AREA: 14.6 HECTARE M 070320
MEAN DEPTH: 2.2 M MAX DEPTH: 4.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 15 HA
AV DEPTH: 2.2 M
MX DEPTH: 5 M
VOL: 3.28E05 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
-
PUB ACC #: -
ADMIN: -
POPULATION
1 MI: 0
5 MI: 116139
10 MI: 1177920

SHORE L: 0.9 MI
USE OF SHCRELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 37-1980
RESORTS: 0-1975
AC/MI: 40
DWELL/MI: 41
AC/DWELL: 1
WTRSHED AREA: 7.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 1% MRSH 0%
FOR 4% CUL 0% RES 32%
URB 60% PASTURE/OPEN 4%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1391
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.089	0.6	31	1.372	86	-	15.4	69	67	64	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0071 VAL
45 03 35.0 093 10 05.0 3
LAKE: VALENTINE IN ARDEN HILLS
27123 MINNESOTA RAMSEY
AREA: 24.1 HECTARE M 070320
MEAN DEPTH: 1.4 M MAX DEPTH: 4.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 24 HA
AV DEPTH: 1.4 M
MX DEPTH: 4 M
VOL: 3.30E05 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: -
PUB ACC #: -
ADMIN: -
POPULATION
1 MI: 0
5 MI: 93321
10 MI: 1118139

SHORE L: 1.6 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 0-1980
RESORTS: 0-1975
AC/MI: 37
DWELL/MI: 0
AC/DWELL: 999
WTRSHED AREA: 3.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 5% MRSH 0%
FOR 3% CUL 0% RES 21%
URB 34% PASTURE/OPEN 34%

ECOL CLASS: -
MGMT CLASS: -
ROUGHFISH: - LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1440
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.084	0.4	33	1.421	88	22	16.9	68	73	65	69

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0073
45 04 25.0 093 07 30.0 3
LAKE: SNAIL IN SHOREVIEW
27123 MINNESOTA RAMSEY
AREA: 65 HECTARE B 070320
MEAN DEPTH: 1.5 M MAX DEPTH: 7.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 65 HA
AV DEPTH: 1.5 M
MX DEPTH: 8 M
VOL: 1.21E06 M3
LITTORAL: 92 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: MUCK-
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 78966
10 MI: 616747

SHORE L: 2.44 MI
USE OF SHORELINE:
FOR 10% AGR 5%
MUN 85% MRSH 0%
DWELL: 61-1974
RESORTS: 0-1974
AC/MI: 80
DWELL/MI: 25
AC/DWELL: 3
WTRSHED AREA: 2.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 0%
FOR 8% CUL 5% RES 36%
URB 10% PASTURE/OPEN 31%

ECOL CLASS: 5-1974 5-1938 -
MGMT CLASS: 5-1974 4-1938 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL 1978-79
WEED CONTROL 1974

LKMAP: C502
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.024	2.1	17	1.218	107	8	50.7	50	49	58	53

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0076
45 02 40.0 093 10 15.0 3
LAKE: JOHANNA IN ARDEN HILLS
27123 MINNESOTA RAMSEY
AREA: 85.4 HECTARE 6 070320
MEAN DEPTH: 5.4 M MAX DEPTH: 10.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 85 HA
AV DEPTH: 5.4 M
MX DEPTH: 11 M
VOL: 4.64E06 M3
LITTORAL: 36 %
DEPTH ROOTED
VEG: 24 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 81841
10 MI: 1113913

SHORE L: 2.9 MI
USE OF SHORELINE:
FOR 15% AGR 0%
MUN 85% MRSH 0%
DWELL: 71-1972
RESORTS: 0-1972
AC/MI: 73
DWELL/MI: 24
AC/DWELL: 3
WTRSHED AREA: 5.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 0%
FOR 2% CUL 0% RES 44%
URB 39% PASTURE/OPEN 8%

ECOL CLASS: 5-1972 -
MGMT CLASS: 4-1972 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: COLUMNARIS FSHKL:1956

LKMAP: D177
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.059	1.3	22	0.920	90	-	15.6	63	56	61	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0082
45 02 40.0 093 06 55.0 3
LAKE: WABASSO IN SHOREVIEW
27123 MINNESOTA RAMSEY
AREA: 18.8 HECTARE M 070320
MEAN DEPTH: 5.0 M MAX DEPTH: 20.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 19 HA
AV DEPTH: 5.0 M
MX DEPTH: 20 M
VOL: 9.31E05 M3
LITTORAL: 60 %
DEPTH ROOTED
VEG: 3 M
DOM SHOL SOIL:
MUCK
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 59459
10 MI: 1021923

SHORE L: 2.55 MI
USE OF SHORELINE:
FOR 0% AGR 0%
MUN 100% MRSH 0%
DWELL: 17-1975
RESORTS: 0-1975
AC/MI: 18
DWELL/MI: 7
AC/DWELL: 3
WTRSHED AREA: 5.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 5% MRSH 0%
FOR 1% CUL 0% RES 60%
URB 27% PASTURE/OPEN 7%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1100
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.032	3.1	12	1.220	83	6	38.1	54	44	55	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

62-0083 RSLV
45 02 40.0 093 13 30.0 3
LAKE: SILVER IN NEW BRIGHTON
27123 MINNESOTA RAMSEY
AREA: 28.1 HECTARE M 070320
MEAN DEPTH: 2.2 M MAX DEPTH: 14.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 28 HA
AV DEPTH: 2.2 M
MX DEPTH: 14 M
VOL: 5.91E05 M3
LITTORAL: 90 %
DEPTH ROOTED
VEG: 1 M
DOM SHOL SOIL:
SAND-
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 90670
10 MI: 1095031

SHORE L: 1.90 MI
USE OF SHORELINE:
FOR 5% AGR - %
MUN 95% MRSH 0%
DWELL: 44-1976
RESORTS: 1-1976
AC/MI: 36
DWELL/MI: 26
AC/DWELL: 1
WTRSHED AREA: 0.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 0%
FOR 20% CUL 0% RES 20%
URB 50% PASTURE/OPEN 0%

ECOL CLASS: 7-1961 -
MGMT CLASS: 6-1961 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: PART WTRKL:1961-62
WTRKL 1939,50-51,54-55

LKMAP: C1237
QUAD1: NEW BRIGHTON

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.063	0.9	12	1.306	71	12	20.7	64	62	55	60

MPCA LAKE CLASSIFICATION PROJECT (314A)

66-0029 FOX
44 23 35.0 093 19 25.0 3
LAKE: FOX 2 MI S OF MILLERSBURG
27131 MINNESOTA RICE
AREA: 124.6 HECTARE M 070639
MEAN DEPTH: 6.1 M MAX DEPTH: 14.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 125 HA
AV DEPTH: 6.1 M
MX DEPTH: 14 M
VOL: 7.65E06 M3
LITTORAL: 40 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND---SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 764
10 MI: 34864
50 MI: 2038686

SHORE L: 2.75 MI
USE OF SHORELINE:
FOR 40% AGR 60%
MUN 0% MRSH 0%
DWELL: 24-1974
RESORTS: 0-1974
AC/MI: 112
DWELL/MI: 9
AC/DWELL: 13
WTRSHED AREA: 12.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 10% MRSH 3%
FOR 6% CUL 61% RES 6%
URB 0% PASTURE/OPEN 13%

ECOL CLASS: 5-1974 5-1971 5-1970 5
MGMT CLASS: 3-1974 3-1971 3-1970 3
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: MOD ALGAL BLM 1974

LKMAP: C2568
QUAD1: LITTLE CHICAGO

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.042	2.0	12	1.530	120	27	36.4	58	50	55	54

MPCA LAKE CLASSIFICATION PROJECT (314A)

66-0039 MZK
44 22 30.0 093 24 00.0 3
LAKE: MAZASKA AT SHIELDSVILLE
27131 MINNESOTA RICE
AREA: 277.2 HECTARE M 070639
MEAN DEPTH: 5.3 M MAX DEPTH: 15.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 277 HA
AV DEPTH: 5.3 M
MX DEPTH: 15 M
VOL: 1.46E07 M3
LITTORAL: 49 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: MNDOT
POPULATION
5 MI: 0
10 MI: 27244
50 MI: 1942715

SHORE L: 4.81 MI
USE OF SHORELINE:
FOR 0% AGR 100%
MUN 0% MRSH 0%
DWELL: 54-1955
RESORTS: 3-1955
AC/MI: 142
DWELL/MI: 15
AC/DWELL: 10
WTRSHED AREA: 4.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 3%
FOR 10% CUL 42% RES 14%
URB 0% PASTURE/OPEN 14%

ECOL CLASS: 4-1955 -
MGMT CLASS: 3-1955 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1915
QUAD1: LONSDALE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.078	1.2	102	1.685	120	14	21.6	67	57	76	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

70-0026 LPR
44 44 05.0 093 24 25.0 3
LAKE: LOWER PRIOR IN PRIOR LAKE
27139 MINNESOTA SCOTT
AREA: 334.8 HECTARE M 070433
MEAN DEPTH: 4.1 M MAX DEPTH: 17.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 335 HA
AV DEPTH: 4.1 M
MX DEPTH: 17 M
VOL: 1.39E07 M3
LITTORAL: 46 %
DEPTH ROOTED
VEG: 7 M
DOM SHOL SOIL:
SAND
PUB ACC #:0
ADMIN: DNR-E
POPULATION
1 MI: 0
5 MI: 2215
10 MI: 130463

SHORE L: 13.02 MI
USE OF SHORELINE:
FOR 10% AGR 3%
MUN 87% MRSH 0%
DWELL: 470-1972
RESORTS: 4-1972
AC/MI: 64
DWELL/MI: 38
AC/DWELL: 2
WTRSHED AREA: 28.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 8% MRSH 4%
FOR 7% CUL 47% RES 15%
URB 3% PASTURE/OPEN 15%

ECOL CLASS: 6-1972 -
MGMT CLASS: 3-1972 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1972

LKMAP: B291
QUAD1: PRIOR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.026	2.3	10	1.087	129	10	41.8	51	48	53	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

70-0054
44 42 05.0 093 28 20.0 3
LAKE: SPRING AT PRIOR LAKE
27139 MINNESOTA SCOTT
AREA: 279.2 HECTARE M 070433
MEAN DEPTH: 4.9 M MAX DEPTH: 11.9 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 279 HA
AV DEPTH: 4.9 M
MX DEPTH: 12 M
VOL: 1.37E07 M3
LITTORAL: 55 %
DEPTH ROOTED
VEG: 4 M
DOM SHOL SOIL:
SAND-SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
1 MI: 0
5 MI: 5998
10 MI: 24553

SHORE L: 4.70 MI
USE OF SHORELINE:
FOR 30% AGR 5%
MUN 65% MRSH 0%
DWELL: 36-1980
RESORTS: -
AC/MI: 147
DWELL/MI: 8
AC/DWELL: 19
WTRSHED AREA: 18.0 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 5% MRSH 5%
FOR 6% CUL 59% RES 6%
URB 1% PASTURE/OPEN 18%

ECOL CLASS: 4-1973 -
MGMT CLASS: 3-1973 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SOME SMRKL 1973
HVY ALGAE BLMS 1973

LKMAP: C796
QUAD1: PRIOR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.163	1.2	19	1.950	196	35	12.0	78	57	59	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

70-0072
44 42 55.0 093 26 40.0 3
LAKE: UPPER PRIOR IN PRIOR LAKE
27139 MINNESOTA SCOTT
AREA: 137.6 HECTARE M 070433
MEAN DEPTH: 2.4 M MAX DEPTH: 13.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 138 HA
AV DEPTH: 2.4 M
MX DEPTH: 13 M
VOL: 3.33E06 M3
LITTORAL: 94 %
DEPTH ROOTED
VEG: 2 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
1 MI: 0
5 MI: 5998
10 MI: 43824

SHORE L: 6.20 MI
USE OF SHORELINE:
FOR 10% AGR 20%
MUN 70% MRSH 0%
DWELL: 194-1972
RESORTS: 3-1972
AC/MI: 55
DWELL/MI: 34
AC/DWELL: 2
WTRSHED AREA: 23.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 5%
FOR 6% CUL 54% RES 10%
URB 2% PASTURE/OPEN 16%

ECOL CLASS: 6-1972 -
MGMT CLASS: 3-1972 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE 1972

LKMAP: B291
QUAD1: PRIOR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.055	0.8	51	2.236	163	20	40.7	62	63	69	65

MPCA LAKE CLASSIFICATION PROJECT (314A)

70-0091 SCDR
44 35 20.0 093 32 00.0 3
LAKE: CEDAR 1 MI W OF ST PATRICK
27139 MINNESOTA SCOTT
AREA: 303.1 HECTARE B 070433
MEAN DEPTH: 4.0 M MAX DEPTH: 4.6 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 303 HA
AV DEPTH: 4.0 M
MX DEPTH: 5 M
VOL: 1.20E07 M3
LITTORAL: 80 %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
SAND--SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 3836
10 MI: 15693

SHORE L: 7.0 MI
USE OF SHORELINE:
FOR 30% AGR 70%
MUN 0% MRSH 0%
DWELL: 167-1981
RESORTS: 1-1981
AC/MI: 107
DWELL/MI: 25
AC/DWELL: 4
WTRSHED AREA: 4.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 3%
FOR 5% CUL 57% RES 16%
URB 0% PASTURE/OPEN 3%

ECOL CLASS: 4-1954 -
MGMT CLASS: 3-1954 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKLS PREVIOUS TO 1950

LKMAP: ?
QUAD1: NEW PRAGUE-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.419	1.3	215	3.407	197	31	8.1	91	56	83	77

MPCA LAKE CLASSIFICATION PROJECT (314A)

73-0014
45 18 30.0 094 14 40.0 3
LAKE: MARIE 1 MI N OF SOUTH HAVEN
27145 MINNESOTA STEARNS
AREA: 46.2 HECTARE M 070317
MEAN DEPTH: 3.0 M MAX DEPTH: 9.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 46 HA
AV DEPTH: 3.0 M
MX DEPTH: 10 M
VOL: 1.39E06 M3
LITTORAL: 76 %
DEPTH ROOTED
VEG: 1 M
DOM SHOL SOIL:
SAND---SAND
PUB ACC #: 1
ADMIN: -
POPULATION
5 MI: 1723
10 MI: 8857
50 MI: 737723

SHORE L: 2.90 MI
USE OF SHORELINE:
FOR 80% AGR 20%
MUN - % MRSH - %
DWELL: 82-1976
RESORTS: 0-1976
AC/MI: 39
DWELL/MI: 28
AC/DWELL: 1
WTRSHED AREA: 35.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 3% MRSH 2%
FOR 12% CUL 41% RES 1%
URB 2% PASTURE/OPEN 39%

ECOL CLASS: 6-1976 4-1958 -
MGMT CLASS: 5-1976 3-1958 -
ROUGHFISH:HIGH LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL:1965,77

LKMAP: C774
QUAD1: SOUTH HAVEN

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.327	0.8	138	1.970	198	31	6.0	88	63	79	77

MPCA LAKE CLASSIFICATION PROJECT (314A)

73-0196 RICE
45 22 30.0 094 37 30.0 3
LAKE: RICE 2 MI E OF PAYNESVILLE
27145 MINNESOTA STEARNS
AREA: 634.5 HECTARE M 070318
MEAN DEPTH: 4.5 M MAX DEPTH: 12.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 635 HA
AV DEPTH: 4.5 M
MX DEPTH: 12 M
VOL: 2.89E07 M3
LITTORAL: - %
DEPTH ROOTED
VEG: - M
DOM SHOL SOIL:
SAND-RUBBLE
PUB ACC #: -
ADMIN: DNR-E
POPULATION
5 MI: 922
10 MI: 9143
50 MI: 320348

SHORE L: 14.2 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 146-1970
RESORTS: 12-1970
AC/MI: 110
DWELL/MI: 15
AC/DWELL: 7
WTRSHED AREA: 209.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 2% MRSH 2%
FOR 3% CUL 55% RES 1%
URB 1% PASTURE/OPEN 37%

ECOL CLASS: 6-1958 -
MGMT CLASS: 3-1958 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B279
QUAD1: PAYNESVILLE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.080	1.4	7	1.090	180	22	13.6	67	55	50	57

MPCA LAKE CLASSIFICATION PROJECT (314A)

73-0200 KOR
45 20 00.0 094 42 30.0 3
LAKE: KORONIS 1 MI S OF PAYNESVILLE
27145 MINNESOTA STEARNS
AREA: 1258.2 HECTARE B 070318
MEAN DEPTH: 8.6 M MAX DEPTH: 40.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1258 HA
AV DEPTH: 8.6 M
MX DEPTH: 40 M
VOL: 1.09E08 M3
LITTORAL: 39 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
RUBBLE
PUB ACC #: 2
ADMIN: TNSHP
POPULATION
5 MI: 3336
10 MI: 7792
50 MI: 318126

SHORE L: 13.60 MI
USE OF SHORELINE:
FOR 17% AGR 3%
MUN 75% MRSH 5%
DWELL: 439-1977
RESORTS: 7-1977
AC/MI: 229
DWELL/MI: 35
AC/DWELL: 6
WTRSHED AREA: 224.0 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 3% MRSH 2%
FOR 4% CUL 52% RES 2%
URB 1% PASTURE/OPEN 36%

ECOL CLASS: 4-1977 -
MGMT CLASS: 3-1977 2-1950 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ANN WHT FSHKL
INLET BASIN SILTATION
TULLIBEE SMRKLS 1950
CROW RIVER SILT DEPOSIT

LKMAP: B372
QUAD1: HAWICK

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.076	2.0	16	1.709	177	15	22.5	67	50	58	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0023 BSW
45 52 30.0 094 45 00.0 3
LAKE: BIG SWAN 2 MI W OF BURTRUM
27153 MINNESOTA TODD
AREA: 347.5 HECTARE M 070319
MEAN DEPTH: 5.2 M MAX DEPTH: 13.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 347 HA
AV DEPTH: 5.2 M
MX DEPTH: 14 M
VOL: 1.79E07 M3
LITTORAL: 44 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 979
10 MI: 7187
50 MI: 262586

SHORE L: 7.24 MI
USE OF SHCRELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 12-1958
RESORTS: 1-1958
AC/MI: 119
DWELL/MI: 2
AC/DWELL: 48
WTRSHED AREA: 33.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 11% MRSH 1%
FOR 15% CUL 42% RES 3%
URB 1% PASTURE/OPEN 26%

ECOL CLASS: 4-1958 -
MGMT CLASS: 3-1958 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: B283
QUAD1: LONG PRAIRIE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.064	1.7	14	0.982	177	20	15.3	64	52	56	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0084 BBR
45 46 30.0 094 45 00.0 3
LAKE: BIG BIRCH 1 MI S OF GREY EAGLE
27153 MINNESOTA TODD
AREA: 801.4 HECTARE B 070316
MEAN DEPTH: 8.6 M MAX DEPTH: 23.5 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 801 HA
AV DEPTH: 8.6 M
MX DEPTH: 23 M
VOL: 6.70E07 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: RUBBLE
PUB ACC #:0
ADMIN: DNR-E
POPULATION
5 MI: 847
10 MI: 8635
50 MI: 285323

SHORE L: 12.90 MI
USE OF SHORELINE:
FOR 100% AGR 0%
MUN 0% MRSH 0%
DWELL: 229-1949
RESORTS: 10-1949
AC/MI: 154
DWELL/MI: 22
AC/DWELL: 7
WTRSHED AREA: 14.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 20% MRSH 2%
FOR 22% CUL 30% RES 7%
URB 2% PASTURE/OPEN 17%

ECOL CLASS: -
MGMT CLASS: 2-1949 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: B277
QUAD1: WARD SPRINGS

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.030	3.3	6	0.876	164	8	29.2	53	43	48	48

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0089 LBR
45 47 15.0 094 47 10.0 3
LAKE: LITTLE BIRCH 1 MI E OF WARD SPRINGS
27153 MINNESOTA TODD
AREA: 320.9 HECTARE B 070316
MEAN DEPTH:10.6 M MAX DEPTH: 26.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE -

DESCRIPTION

AREA: 321 HA
AV DEPTH:10.6 M
MX DEPTH: 27 M
VOL: 3.41E07 M3
LITTORAL: 21 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: BOULDE
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 902
10 MI: 10881
50 MI: 285626

SHORE L: 5.60 MI
USE OF SHORELINE:
FOR 70% AGR 5%
MUN 25% MRSH 0%
DWELL: 114-1969
RESORTS: 2-1969
AC/MI: 142
DWELL/MI: 23
AC/DWELL: 6
WTRSHED AREA: 56.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 1%
FOR 25% CUL 37% RES 2%
URB 1% PASTURE/OPEN 26%

ECOL CLASS: 4-1969 -
MGMT CLASS: 2-1969 2-1949 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B278
QUAD1: WARD SPRINGS

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.025	3.1	8	0.751	170	15	30.0	51	44	51	48

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0150
45 47 05.0 094 55 50.0 3
LAKE: SAUK - WHOLE LAKE AT SAUK CENTRE
27153 MINNESOTA TODD
AREA: 854.3 HECTARE B 070316
MEAN DEPTH: 4.9 M MAX DEPTH: 15.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 854 HA
AV DEPTH: 4.9 M
MX DEPTH: 15 M
VOL: 4.19E07 M3
LITTORAL: 66 %
DEPTH ROOTED VEG: 4 M
DOM SHOL SOIL: SAND-MUCK
PUB ACC #: 3
ADMIN: DNR-E
POPULATION
5 MI: 4129
10 MI: 11545
50 MI: 277765

SHORE L: 19.60 MI
USE OF SHORELINE:
FOR 30% AGR 30%
MUN 40% MRSH 0%
DWELL: 292-1972
RESORTS: 9-1972
AC/MI: 108
DWELL/MI: 18
AC/DWELL: 6
WTRSHED AREA: 159.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 2%
FOR 13% CUL 49% RES 1%
URB 0% PASTURE/OPEN 24%

ECOL CLASS: 5-1972 -
MGMT CLASS: 5-1972 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: EXCESSIVE VEG 1972
ALGAE 1972
BULLHEADS 1972

LKMAP: B280
QUAD1: SAUK LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.101	1.5	94	1.606	187	20	15.9	71	54	75	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0154
45 47 20.0 094 59 00.0 3
LAKE: FAIRY 2 MI N OF SAUK CENTER
27153 MINNESOTA TODD
AREA: 228.6 HECTARE M 070316
MEAN DEPTH: 3.8 M MAX DEPTH: 10.1 M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 229 HA
AV DEPTH: 3.8 M
MX DEPTH: 10 M
VOL: 8.76E06 M3
LITTORAL: 51 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: SAND
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 4129
10 MI: 8446
50 MI: 271329

SHORE L: 4.12 MI
USE OF SHORELINE: FOR 50% AGR 50% MUN 0% MRSH 0%
DWELL: 19-1956
RESORTS: 1-1956
AC/MI: 137
DWELL/MI: 6
AC/DWELL: 23
WTRSHED AREA: 5.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 0% FOR 9% CUL 44% RES 2% URB 0% PASTURE/OPEN 26%

ECOL CLASS: 5-1956 -
MGMT CLASS: 4-1956 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: B282
QUAD1: SAUK LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
-	-	-	-	-	-	-	-	-	-	-

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0181 TMPL
45 54 20.0 095 00 15.0 3
LAKE: MAPLE 3 MI SW OF GUTCHES GRV
27153 MINNESOTA TODD
AREA: 148.7 HECTARE M 070316
MEAN DEPTH: 4.0 M MAX DEPTH: 6.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 149 HA
AV DEPTH: 4.0 M
MX DEPTH: 6 M
VOL: 5.87E06 M3
LITTORAL: 46 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
5 MI: 1032
10 MI: 7183
50 MI: 249083

SHORE L: 3.56 MI
USE OF SHORELINE: FOR - % AGR - % MUN - % MRSH - %
DWELL: 14-1956
RESORTS: 2-1956
AC/MI: 103
DWELL/MI: 7
AC/DWELL: 14
WTRSHED AREA: 18.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 4% FOR 16% CUL 53% RES 2% URB 0% PASTURE/OPEN 22%

ECOL CLASS: 4-1956 -
MGMT CLASS: 3-1956 -
ROUGHFISH: 1
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: -
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -
LKMAP: C761
QUAD1: LAKE OSAKIS EAST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.089	1.0	49	1.600	147	25	18.0	69	60	69	66

MPCA LAKE CLASSIFICATION PROJECT (314A)

77-0215 OSK
45 52 30.0 095 07 30.0 3
LAKE: OSAKIS AT OSAKIS
27153 MINNESOTA TODD
AREA: 2734.9 HECTARE M 070316
MEAN DEPTH: 5.1 M MAX DEPTH: 20.4 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 2735 HA
AV DEPTH: 5.1 M
MX DEPTH: 20 M
VOL: 1.39E08 M3
LITTORAL: - %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: GRAVEL-SAND
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 1828
10 MI: 5112
50 MI: 196543

SHORE L: 21.25 MI
USE OF SHCRELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 40-1950
RESORTS: 14-1950
AC/MI: 318
DWELL/MI: 6
AC/DWELL: 54
WTRSHED AREA: 58.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 16% MRSH 3%
FOR 12% CUL 45% RES 3%
URB 0% PASTURE/OPEN 21%

ECOL CLASS: -
MGMT CLASS: 3-1950 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: AQ WEEDS 1950
FSHKL 1963

LKMAP: B160
QUAD1: LAKE OSAKIS WEST

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.056	1.7	15	1.245	155	15	22.2	62	52	57	57

MPCA LAKE CLASSIFICATION PROJECT (314A)

78-0025
45 46 00.0 096 38 00.0 3
LAKE: TRAVERSE 1 MI NW BROWNS VALLEY
27155 MINNESOTA TRAVERSE
AREA: 4665.2 HECTARE B 230154
MEAN DEPTH: 2.3 M MAX DEPTH: - M
21MINNL 800816

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 4665 HA
AV DEPTH: 2.3 M
MX DEPTH: 4 M
VOL: 1.05E08 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: 1 M
DOM SHOL SOIL: SILT--MUCK
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 0
10 MI: 2662
50 MI: 65924

SHORE L: 43.10 MI
USE OF SHORELINE:
FOR 50% AGR 50%
MUN 0% MRSH 0%
DWELL: 167-1971
RESORTS: 10-1971
AC/MI: 267
DWELL/MI: 5
AC/DWELL: 51
WTRSHED AREA: - SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR -% MRSH -%
FOR -% CUL -% RES -%
URB -% PASTURE/OPEN -%

ECOL CLASS: 6-1971 5-1962 7-1950 4
MGMT CLASS: 5-1971 3-1946 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: PARTIAL WTRKLS 1971
TURBIDITY 1962
BL. GREEN ALGAE 1962
WTRKL 1947-48

LKMAP: B284
QUAD1: ROSHOLT

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
-	0.5	-	-	-	-	-	-	70	-	70

MPCA LAKE CLASSIFICATION PROJECT (314A)

81-0014 CLR
44 05 15.0 093 29 05.0 3
LAKE: CLEAR AT WASECA
27161 MINNESOTA WASECA
AREA: 263.9 HECTARE M 070639
MEAN DEPTH: 4.6 M MAX DEPTH: 9.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 264 HA
AV DEPTH: 4.6 M
MX DEPTH: 9 M
VOL: 1.13E07 M3
LITTORAL: 58 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND---SAND
PUB ACC #: 1
ADMIN: CITY
POPULATION
5 MI: 7785
10 MI: 12578
50 MI: 423157

SHORE L: 4.28 MI
USE OF SHORELINE:
FOR 10% AGR 5%
MUN 70% MRSH 15%
DWELL: 61-1979
RESORTS: 1-1979
AC/MI: 152
DWELL/MI: 16
AC/DWELL: 10
WTRSHED AREA: 6.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 18% MRSH 4%
FOR 1% CUL 28% RES 10%
URB 28% PASTURE/OPEN 11%

ECOL CLASS: 5-1979 6-1960 -
MGMT CLASS: 3-1979 5-1960 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SWIM ITCH 1979
ALGAE & VEG 1979
FSHKL (COLUMNARIS) '79
STORM & SANITARY SEWERS
ODOR IN SUMMER 1960
ALGAE 1960

LKMAP: C2540
QUAD1: MERIDEN

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.149	1.0	59	1.579	171	20	10.6	76	60	71	69

MPCA LAKE CLASSIFICATION PROJECT (314A)

81-0095 ELY
44 10 30.0 093 41 45.0 3
LAKE: ELYSIAN AT ELYSIAN
27161 MINNESOTA WASECA
AREA: 926.3 HECTARE B 070432
MEAN DEPTH: 1.9 M MAX DEPTH: 3.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 926 HA
AV DEPTH: 1.9 M
MX DEPTH: 3 M
VOL: 1.74E07 M3
LITTORAL: 100 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: GRAVEL-SAND
PUB ACC #: 2
ADMIN: CITY
POPULATION
5 MI: 1055
10 MI: 8569
50 MI: 517944

SHORE L: 12.91 MI
USE OF SHORELINE:
FOR 100% AGR 0%
MUN 0% MRSH 0%
DWELL: 37-1970
RESORTS: 0-1958
AC/MI: 177
DWELL/MI: 3
AC/DWELL: 62
WTRSHED AREA: 45.8 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 4%
FOR 3% CUL 74% RES 1%
URB 1% PASTURE/OPEN 8%

ECOL CLASS: 6-1958 -
MGMT CLASS: 5-1958 4-1945 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: REGULAR WTRKLS

LKMAP: B430
QUAD1: ELYSIAN

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.252	0.5	113	2.395	162	30	9.5	84	70	77	77

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0023
45 02 55.0 092 49 25.0 3
LAKE: LILY IN STILLWATER
27163 MINNESOTA WASHINGTON
AREA: 21.0 HECTARE M 070537
MEAN DEPTH: 4.7 M MAX DEPTH: 13.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 21 HA
AV DEPTH: 4.7 M
MX DEPTH: 14 M
VOL: 9.95E05 M3
LITTORAL: 73 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: -
PUB ACC #: 1
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 16153
10 MI: 37648

SHORE L: 1.30 MI
USE OF SHORELINE:
FOR 20% AGR 0%
MUN 80% MRSH 0%
DWELL: 21-1975
RESORTS: 0-1975
AC/MI: 40
DWELL/MI: 16
AC/DWELL: 2
WTRSHED AREA: 1.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 0%
FOR 6% CUL 22% RES 17%
URB 44% PASTURE/OPEN 6%

ECOL CLASS: 5-1975 -
MGMT CLASS: 4-1975 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1574
QUAD1: STILLWATER

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.053	1.5	-	1.160	58	17	21.9	61	54	-	58

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0046 SOR
45 09 2>.0 092 48 15.0 3
LAKE: SQUARE 3 MI S OF MARINE-ST-CR
27163 MINNESOTA WASHINGTON
AREA: 78.9 HECTARE M 070537
MEAN DEPTH: 9.5 M MAX DEPTH: 20.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 79 HA
AV DEPTH: 9.5 M
MX DEPTH: 21 M
VOL: 7.49E06 M3
LITTORAL: 33 %
DEPTH ROOTED VEG: 9 M
DOM SHOL SOIL: SAND-
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 1811
10 MI: 21480

SHORE L: 2.32 MI
USE OF SHORELINE:
FOR 30% AGR 5%
MUN 65% MRSH 0%
DWELL: 40-1979
RESORTS: 1-1979
AC/MI: 84
DWELL/MI: 20
AC/DWELL: 4
WTRSHED AREA: 4.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 9% MRSH 0%
FOR 46% CUL 13% RES 3%
URB 1% PASTURE/OPEN 29%

ECOL CLASS: 5-1979 -
MGMT CLASS: 1-1979 4-19>2 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1441
QUAD1: MARINE ON ST. CR

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.025	7.6	1	0.568	121	2	22.7	51	31	31	37

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0049 BCN
45 08 05.0 092 48 30.0 3
LAKE: BIG CARNELIAN 4 MI S OF MARIN-ST-CR
27163 MINNESOTA WASHINGTON
AREA: 179.7 HECTARE B 070537
MEAN DEPTH: 7.8 M MAX DEPTH: 21.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 180 HA
AV DEPTH: 7.8 M
MX DEPTH: 21 M
VOL: 1.40E07 M3
LITTORAL: 45 %
DEPTH ROOTED
VEG: 8 M
DOM SHOL SOIL:
SAND
PUB ACC #: 1
ADMIN: DNR-E
POPULATION
1 MI: 0
5 MI: 2312
10 MI: 29251

SHORE L: 4.60 MI
USE OF SHORELINE:
FOR 5% AGR 10%
MUN 85% MRSH 0%
DWELL: 182-1973
RESORTS: 2-1973
AC/MI: 97
DWELL/MI: 42
AC/DWELL: 2
WTRSHED AREA: 29.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 11% MRSH 3%
FOR 24% CUL 29% RES 7%
URB 0% PASTURE/OPEN 27%

ECOL CLASS: 5-1973 -
MGMT CLASS: 4-1973 4-1952 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: D230
QUAD1: MARINE ON ST. CR

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.019	3.1	6	0.557	110	2	29.3	47	44	48	46

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0052 BMR
45 13 10.0 092 52 05.0 3
LAKE: BIG MARINE 3 MI W OF MARINE-ST-CR
27163 MINNESOTA WASHINGTON
AREA: 638.2 HECTARE M 070537
MEAN DEPTH: 4.1 M MAX DEPTH: 17.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 638 HA
AV DEPTH: 4.1 M
MX DEPTH: 17 M
VOL: 2.59E07 M3
LITTORAL: 67 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
SAND--SAND
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
1 MI: 0
5 MI: 2811
10 MI: 13452

SHORE L: 12.50 MI
USE OF SHORELINE:
FOR 60% AGR 10%
MUN 30% MRSH 0%
DWELL: 227-1979
RESORTS: 4-1979
AC/MI: 126
DWELL/MI: 20
AC/DWELL: 6
WTRSHED AREA: 14.1 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 2%
FOR 28% CUL 33% RES 7%
URB 0% PASTURE/OPEN 14%

ECOL CLASS: 4-1979 -
MGMT CLASS: 3-1979 3-1951 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: EXTREME WATER LEVEL FLU

LKMAP: B379
QUAD1: HUGO

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.033	2.8	9	0.903	83	7	27.4	55	45	52	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0054
45 17 10.0 092 51 35.0 3
LAKE: BONE 6 MI S OF CHISAGO CITY
27163 MINNESOTA WASHINGTON
AREA: 83.4 HECTARE M 070537
MEAN DEPTH: 4.2 M MAX DEPTH: 9.8 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 83 HA
AV DEPTH: 4.2 M
MX DEPTH: 10 M
VOL: 3.46E06 M3
LITTORAL: 58 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND--SAND
PUB ACC #: 1
ADMIN: CNTY
POPULATION
1 MI: 0
5 MI: 1513
10 MI: 17248

SHORE L: 2.90 MI
USE OF SHORELINE:
FOR 0% AGR 70%
MUN 30% MRSH 0%
DWELL: 60-1976
RESORTS: 0-1976
AC/MI: 71
DWELL/MI: 21
AC/DWELL: 3
WTRSHED AREA: 9.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 1%
FOR 7% CUL 61% RES 2%
URB 0% PASTURE/OPEN 24%

ECOL CLASS: 5-1975 5-1960 -
MGMT CLASS: 4-1975 3-1960 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: HVY ALGAE LATE IN SMR
LT COLUMNARIS KILLS '75

LKMAP: C756
QUAD1: FOREST LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.106	1.3	80	0.956	105	-	9.0	71	56	74	67

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0101
45 01 15.0 092 56 25.0 3
LAKE: DEMONTREVILLE 1 MI SW OF PINE SPRNGS
27163 MINNESOTA WASHINGTON
AREA: 56.8 HECTARE M 070320
MEAN DEPTH: 2.5 M MAX DEPTH: 7.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 57 HA
AV DEPTH: 2.5 M
MX DEPTH: 7 M
VOL: 1.44E06 M3
LITTORAL: 90 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND--SAND
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 26693
10 MI: 429796

SHORE L: 3.30 MI
USE OF SHORELINE:
FOR 20% AGR 0%
MUN 80% MRSH 0%
DWELL: 47-1979
RESORTS: 0-1979
AC/MI: 43
DWELL/MI: 14
AC/DWELL: 3
WTRSHED AREA: 8.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 4% MRSH 0%
FOR 12% CUL 19% RES 20%
URB 1% PASTURE/OPEN 43%

ECOL CLASS: 5-1979 7-1961 -
MGMT CLASS: 4-1979 6-1961 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKLS & SMRKLS 1979

LKMAP: C1095
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.040	1.7	21	1.312	80	22	32.8	57	52	60	57

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0104
45 00 55.0 092 55 25.0 3
LAKE: JANE 3 MI SW OF PINE SPRNGS
27163 MINNESOTA WASHINGTON
AREA: 64.3 HECTARE B 070320
MEAN DEPTH: 3.3 M MAX DEPTH: 9.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 64 HA
AV DEPTH: 3.3 M
MX DEPTH: 9 M
VOL: 2.10E06 M3
LITTORAL: 69 %
DEPTH ROOTED
VEG: 6 M
DOM SHOL SOIL:
SILT-SAND
PUB ACC #:0
ADMIN: -
POPULATION
1 MI: 0
5 MI: 3382
10 MI: 116334

SHORE L: 2.25 MI
USE OF SHORELINE:
FOR 10% AGR 70%
MUN 20% MRSH 0%
DWELL: 43-1975
RESORTS: 0-1975
AC/MI: 71
DWELL/MI: 19
AC/DWELL: 4
WTRSHED AREA: 9.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 6% MRSH 0%
FOR 10% CUL 25% RES 18%
URB 1% PASTURE/OPEN 39%

ECOL CLASS: 5-1975 5-1956 -
MGMT CLASS: 4-1975 4-1956 4-1950
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: COLUMNARIS FSHKL '67

LKMAP: D233
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.027	3.8	6	0.700	80	10	25.9	52	41	48	47

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0106 ELMO
44 59 05.0 092 53 00.0 3
LAKE: ELMO IN LAKE ELMO
27163 MINNESOTA WASHINGTON
AREA: 127.9 HECTARE M 070320
MEAN DEPTH:15.9 M MAX DEPTH: 38.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 128 HA
AV DEPTH:15.9 M
MX DEPTH: 39 M
VOL: 2.03E07 M3
LITTORAL: 21 %
DEPTH ROOTED
VEG: 5 M
DOM SHOL SOIL:
MARL-MARL
PUB ACC #: 1
ADMIN: -
POPULATION
1 MI: 0
5 MI: 1987
10 MI: 114531

SHORE L: 3.20 MI
USE OF SHORELINE:
FOR 50% AGR 20%
MUN 30% MRSH 0%
DWELL: 71-1971
RESORTS: 1-1971
AC/MI: 99
DWELL/MI: 24
AC/DWELL: 4
WTRSHED AREA: 13.5 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 3% MRSH 0%
FOR 6% CUL 42% RES 12%
URB 5% PASTURE/OPEN 31%

ECOL CLASS: 5-1971 5-1957 -
MGMT CLASS: 4-1971 3-1957 2-1948
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: SMRKL 1950

LKMAP: C1390
QUAD1: LAKE ELMO

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.034	2.6	10	1.088	106	2	32.0	55	46	53	51

MPCA LAKE CLASSIFICATION PROJECT (314A)

82-0167 WBR
45 04 40.0 092 59 00.0 3
LAKE: WHITE BEAR IN WHITE BEAR LAKE
27163 MINNESOTA WASHINGTON
AREA: 1046.0 HECTARE M 070320
MEAN DEPTH: 5.4 M MAX DEPTH: 25.3 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 1046 HA
AV DEPTH: 5.4 M
MX DEPTH: 25 M
VOL: 5.50E07 M3
LITTORAL: 54 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SAND-SAND
PUB ACC #: 2
ADMIN: CITY
POPULATION
1 MI: 0
5 MI: 37226
10 MI: 125341

SHORE L: 11.10 MI
USE OF SHORELINE:
FOR 3% AGR 0%
MUN 97% MRSH 0%
DWELL: 486-1969
RESORTS: 0-1969
AC/MI: 233
DWELL/MI: 44
AC/DWELL: 5
WTRSHED AREA: 10.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 17% MRSH 0%
FOR 16% CUL 9% RES 28%
URB 10% PASTURE/OPEN 21%

ECOL CLASS: 4-1979 4-1969 4-1954
MGMT CLASS: 3-1979 3-1969 3-1954
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B469
QUAD1: WHITE BEAR LAKE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.022	2.9	6	0.879	101	7	40.0	49	45	48	47

MPCA LAKE CLASSIFICATION PROJECT (314A)

86-0090 BF
45 10 00.0 093 53 00.0 3
LAKE: BUFFALO AT BUFFALO
27171 MINNESOTA WRIGHT
AREA: 611.1 HECTARE B 070318
MEAN DEPTH: 4.4 M MAX DEPTH: 10.1 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 611 HA
AV DEPTH: 4.4 M
MX DEPTH: 10 M
VOL: 2.70E07 M3
LITTORAL: 50 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND-GRAVEL
PUB ACC #: 2
ADMIN: CNTY
POPULATION
5 MI: 5401
10 MI: 14780
50 MI: 2071413

SHORE L: 6.00 MI
USE OF SHORELINE:
FOR 60% AGR 0%
MUN 40% MRSH 0%
DWELL: 83-1976
RESORTS: 0-1976
AC/MI: 252
DWELL/MI: 14
AC/DWELL: 18
WTRSHED AREA: 42.7 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 13% MRSH 5%
FOR 7% CUL 52% RES 4%
URB 4% PASTURE/OPEN 14%

ECOL CLASS: 6-1976 5-1953 -
MGMT CLASS: 5-1976 4-1953 -
ROUGHFISH: 69-7 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: WTRKL: 1964-65,69-70
ALGAE BLMS

LKMAP: B127
QUAD1: BUFFALO-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.353	1.2	66	2.646	180	25	7.5	89	57	72	73

MPCA LAKE CLASSIFICATION PROJECT (314A)

86-0134 WMPL
45 13 40.0 093 57 30.0 3
LAKE: MAPLE AT MAPLE LAKE
27171 MINNESOTA WRIGHT
AREA: 314.4 HECTARE M 070318
MEAN DEPTH: 5.7 M MAX DEPTH: 23.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 314 HA
AV DEPTH: 5.7 M
MX DEPTH: 23 M
VOL: 1.79E07 M3
LITTORAL: 51 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: SILT---MUCK
PUB ACC #: 1
ADMIN: MNDOT
POPULATION
5 MI: 3240
10 MI: 15886
50 MI: 1989406

SHORE L: 9.10 MI
USE OF SHORELINE:
FOR 10% AGR 5%
MUN 85% MRSH 0%
DWELL: 300-1979
RESORTS: 0-1979
AC/MI: 85
DWELL/MI: 33
AC/DWELL: 3
WTRSHED AREA: 4.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 20% MRSH 5%
FOR 1% CUL 44% RES 16%
URB 4% PASTURE/OPEN 8%

ECOL CLASS: 4-1979 -
MGMT CLASS: 3-1979 -
ROUGHFISH: 2 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: ALGAE BLMS 1979

LKMAP: B100
QUAD1: BUFFALO-15

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.073	1.9	5	1.593	137	2	21.8	66	51	46	54

MPCA LAKE CLASSIFICATION PROJECT (314A)

86-0233
45 19 10.0 094 02 15.0 3
LAKE: SUGAR 2 MI NW OF SILVER CRK
27171 MINNESOTA WRIGHT
AREA: 372.3 HECTARE M 070317
MEAN DEPTH: 7.3 M MAX DEPTH: 19.2 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 372 HA
AV DEPTH: 7.3 M
MX DEPTH: 19 M
VOL: 2.70E07 M3
LITTORAL: 43 %
DEPTH ROOTED VEG: 5 M
DOM SHOL SOIL: MUCK-GRAVEL
PUB ACC #: 2
ADMIN: DNR-E
POPULATION
5 MI: 1109
10 MI: 11008
50 MI: 1532346

SHORE L: 13.70 MI
USE OF SHORELINE:
FOR 80% AGR 20%
MUN 0% MRSH 0%
DWELL: 298-1976
RESORTS: 3-1976
AC/MI: 67
DWELL/MI: 23
AC/DWELL: 3
WTRSHED AREA: 9.3 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 13% MRSH 5%
FOR 10% CUL 42% RES 18%
URB 0% PASTURE/OPEN 11%

ECOL CLASS: 4-1976 -
MGMT CLASS: 2-1976 -
ROUGHFISH: 1 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: B327
QUAD1: ANNANDALE

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.070	2.9	-	0.700	173	-	10.0	65	45	-	55

```
MPCA LAKE CLASSIFICATION PROJECT (314A)                      86-0252          CL
                                                            45 18 50.0 094 07 30.0 3
                                                            LAKE: CLEARWATER-WHOL LK 1 MI N OF ANNANDALE
                                                            27171   MINNESOTA         WRIGHT
                                                            AREA:  1287.7  HECTARE M 070317
                                                            MEAN DEPTH: 6.1    M   MAX DEPTH:  22.3 M
/TYPA/AMBNT/LAKE                                            21MINNL   800412
```

DESCRIPTION

```
AREA:  1288  HA   SHORE L:   17.25 MI  ECOL CLASS: 4-1974 4-1962  -
AV DEPTH: 6.1 M   USE OF SHORELINE:    MGMT CLASS: 3-1974 3-1962  -
MX DEPTH:  15 M    FOR  15%  AGR   0%  ROUGHFISH:   1   LANDSAT TYPE: -
VOL: 7.72E07 M3    MUN  75% MRSH  10%  WQ INDEX:    -   CHLOR IND:    -
LITTORAL: 46 %    # DWELL:  343-1974   SENS IND:    -   SECCHI IND:   -
DEPTH ROOTED      # RESORTS:  4-1974   RANK IND:    -   T-PHOS IND:   -
     VEG:  3 M    AC/MI:    184        PROBLEMS:  SUM TULLIBEE KILL 1974
DOM SHOL SOIL:    DWELL/MI:  21
  SAND-GRAVEL     AC/DWELL:   9
PUB ACC #:   1    WTRSHED AREA:    51.8 SQ MI
ADMIN:       -    GEOM REG:      -   -   -   -
POPULATION        SLU:           -   -   -   -
  5 MI:    2343   LAND USE:  WTR 14% MRSH  3%
 10 MI:   10281     FOR 16%  CUL 44%  RES  7%  LKMAP:  C779
 50 MI: 1354883     URB  2%  PASTURE/OPEN 14%  QUAD1:  SOUTH HAVEN
```

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.065	1.7	53	1.636	142	21	25.2	64	52	70	62

```
MPCA LAKE CLASSIFICATION PROJECT (314A)                      86-0263          COK
                                                            45 07 00.0 094 10 00.0 3
                                                            LAKE: ICCKATO               1 MI N OF COKATO
                                                            27171   MINNESOTA         WRIGHT
                                                            AREA:   220.1  HECTARE M 070318
                                                            MEAN DEPTH: 7.6    M   MAX DEPTH:  15.8 M
/TYPA/AMBNT/LAKE                                            21MINNL   800412
```

DESCRIPTION

```
AREA:   220  HA   SHORE L:    4.25 MI  ECOL CLASS:  -
AV DEPTH: 7.6 M   USE OF SHORELINE:    MGMT CLASS: 3-1951  -
MX DEPTH:  16 M    FOR  10%  AGR  75%  ROUGHFISH:   2   LANDSAT TYPE: -
VOL: 1.68E07 M3    MUN  15% MRSH   0%  WQ INDEX:    -   CHLOR IND:    -
LITTORAL: 74 %    # DWELL:   42-1971   SENS IND:    -   SECCHI IND:   -
DEPTH ROOTED      # RESORTS:  2-1971   RANK IND:    -   T-PHOS IND:   -
     VEG:  2 M    AC/MI:    128        PROBLEMS:  ALGAE BLMS 1971
DOM SHOL SOIL:    DWELL/MI:  13
  SAND--MUCK      AC/DWELL:  10
PUB ACC #:   1    WTRSHED AREA:    41.2 SQ MI
ADMIN:  CNTY      GEOM REG:      -   -   -   -
POPULATION        SLU:           -   -   -   -
  5 MI:    2489   LAND USE:  WTR  5% MRSH  1%
 10 MI:   10294     FOR  1%  CUL 78%  RES  2%  LKMAP:  C2539
 50 MI: 1519336     URB  3%  PASTURE/OPEN 10%  QUAD1:  COKATO-15
```

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MPCA LAKE CLASSIFICATION PROJECT (314A)

86-0282
45 20 00.0 094 10 00.0 3
LAKE: CAROLINE 1 MI N OF SOUTH HAVEN
27171 MINNESOTA WRIGHT
AREA: 47.1 HECTARE M 070317
MEAN DEPTH: 5.0 M MAX DEPTH: 13.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 47 HA
AV DEPTH: 5.0 M
MX DEPTH: 14 M
VOL: 2.36E06 M3
LITTORAL: 49 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: MUCK---
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 1974
10 MI: 9335
50 MI: 823520

SHORE L: 3.20 MI
USE OF SHORELINE:
FOR - % AGR - %
MUN - % MRSH - %
DWELL: 13-1980
RESORTS: 0-1957
AC/MI: 36
DWELL/MI: 4
AC/DWELL: 9
WTRSHED AREA: 10.9 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 5% MRSH 2%
FOR 34% CUL 34% RES 4%
URB 1% PASTURE/OPEN 21%

ECOL CLASS: 4-1957 -
MGMT CLASS: 3-1957 -
ROUGHFISH: 3
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS:
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -

LKMAP: C780
QUAD1: CLEARWATER

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.117	0.8	77	3.050	250	25	26.1	73	63	73	70

MPCA LAKE CLASSIFICATION PROJECT (314A)

86-0282
45 18 30.0 094 14 40.0 3
LAKE: LOUISA 1 MI E OF KIMBALL PIE
27171 MINNESOTA WRIGHT
AREA: 60.1 HECTARE M 070317
MEAN DEPTH: 3.8 M MAX DEPTH: 13.7 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 60 HA
AV DEPTH: 3.8 M
MX DEPTH: 14 M
VOL: 2.29E06 M3
LITTORAL: 67 %
DEPTH ROOTED VEG: 2 M
DOM SHOL SOIL: SAND---SAND
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 1723
10 MI: 8857
50 MI: 737723

SHORE L: 3.56 MI
USE OF SHORELINE:
FOR 80% AGR 20%
MUN 0% MRSH 0%
DWELL: 48-1976
RESORTS: 2-1976
AC/MI: 42
DWELL/MI: 17
AC/DWELL: 2
WTRSHED AREA: 9.6 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 5% MRSH 2%
FOR 33% CUL 32% RES 5%
URB 1% PASTURE/OPEN 22%

ECOL CLASS: 6-1976 4-1958 -
MGMT CLASS: 5-1976 3-1958 -
ROUGHFISH: 2
WQ INDEX: -
SENS IND: -
RANK IND: -
PROBLEMS: WTRKL 1976
ALGAE BLMS 1976
LANDSAT TYPE: -
CHLOR IND: -
SECCHI IND: -
T-PHOS IND: -

LKMAP: C775
QUAD1: KIMBALL

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.378	0.8	98	3.737	226	30	9.9	90	63	76	76

MPCA LAKE CLASSIFICATION PROJECT (314A)

86-0297
45 16 30.0 094 15 25.0 3
LAKE: SCOTT 2 MI SW OF SOUTH HAVEN
27171 MINNESOTA WRIGHT
AREA: 37.2 HECTARE B 070317
MEAN DEPTH: 3.2 M MAX DEPTH: 7.0 M
21MINNL 800412

/TYPA/AMBNT/LAKE

DESCRIPTION

AREA: 37 HA
AV DEPTH: 3.2 M
MX DEPTH: 7 M
VOL: 1.03E06 M3
LITTORAL: 64 %
DEPTH ROOTED VEG: - M
DOM SHOL SOIL: SILT-SAND
PUB ACC #:0
ADMIN: -
POPULATION
5 MI: 1723
10 MI: 8857
50 MI: 740568

SHORE L: 1.7 MI
USE OF SHORELINE:
FOR 60% AGR 20%
MUN 0% MRSH 20%
DWELL: 10-1980
RESORTS: 0-1976
AC/MI: 54
DWELL/MI: 6
AC/DWELL: 9
WTRSHED AREA: 4.4 SQ MI
GEOM REG: - - - -
SLU: - - - -
LAND USE: WTR 7% MRSH 4%
FOR 50% CUL 13% RES 1%
URB 0% PASTURE/OPEN 23%

ECOL CLASS: 6-1976 -
MGMT CLASS: 5-1976 -
ROUGHFISH: 3 LANDSAT TYPE: -
WQ INDEX: - CHLOR IND: -
SENS IND: - SECCHI IND: -
RANK IND: - T-PHOS IND: -
PROBLEMS: -

LKMAP: C1246
QUAD1: KIMBALL

PHOS-T MG/L	SECCHI METERS	CHLA UG/L	NITRO-T MG/L	ALK-T MG/L	COLOR PT-CO	N/P	TSIP	TSIS	TSIC	AVTSI
0.486	1.1	12	2.050	310	33	4.2	93	59	55	69

APPENDIX C

MPCA LAKE CLASSIFICATION PROJECT (314A)

PHASE I 157 LAKES (1970-1980)

OBS	LAKE ID	PT	SD	CHLA	NT	ALK	COLOR	LGPT	LGSD	LGCHLA	NT_P1	C	TSIP	TSIS	TSIC	AVTSI
1	02-0042	0.083	0.8	22	1.744	61	38	-1.0809	-0.09691	1.34242	21.0120	P	67.870	63.2155	60.9231	64.6928
2	02-0045	0.062	0.9	70	2.482	154	48	-1.2076	-0.04576	1.84510	40.0323	P	63.663	61.5182	72.2777	65.8196
3	02-0075	0.108	0.6	12	1.613	67	-	-0.9666	-0.22185	1.07918	14.9352	T	71.666	67.3610	54.6769	64.6681
4	03-0359	0.126	2.3	55	1.490	185	25	-0.8996	0.36173	1.74036	11.8254	T	73.889	47.9978	69.9119	63.9330
5	03-0381	0.035	2.4	10	0.842	183	10	-1.4559	0.38021	1.00000	24.0571	P	55.418	47.3645	53.1884	51.9970
6	03-0382	0.552	1.0	31	-	168	-	-0.2581	0.00000	1.49136	-	N	95.191	60.0000	64.2874	73.1596
7	03-0475	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-
8	03-0576	0.023	3.3	4	0.958	257	2	-1.6383	0.51851	0.60206	41.6522	P	49.364	42.7956	44.1995	45.4530
9	06-0152	0.168	1.1	25	1.755	169	-	-0.7747	0.04139	1.39794	10.4464	T	78.038	58.6266	62.1772	66.2804
10	07-0044	0.067	0.8	33	1.762	170	24	-1.1739	-0.09691	1.51851	26.2985	P	64.782	63.2155	64.9007	64.2993
11	07-0047	0.078	0.5	-	2.895	95	-	-1.1079	-0.30103	-	37.1154	P	66.974	69.9883	-	68.4810
12	07-0053	0.050	0.9	15	1.515	163	20	-1.3010	-0.04576	1.17609	30.3000	P	60.561	61.5182	57.1660	59.7485
13	07-0054	0.040	1.5	20	1.565	140	20	-1.3979	0.17609	1.30103	39.1250	P	57.344	54.1572	59.9881	57.1630
14	08-0026	0.134	0.7	35	2.733	142	21	-0.8729	-0.15490	1.54407	20.3955	P	74.777	65.1397	65.4780	68.4648
15	10-0009	0.034	2.8	4	0.975	135	8	-1.4685	0.44716	0.60206	28.6765	P	55.000	45.1632	44.1995	48.1210
16	10-0019	0.039	1.0	-	-	87	-	-1.4089	0.00000	-	-	N	56.979	60.0000	-	58.4893
17	10-0059	0.048	1.1	32	1.662	162	11	-1.3188	0.04139	1.50515	34.6250	P	59.973	58.6266	64.5989	61.0661
18	15-0005	0.379	0.5	103	3.813	183	25	-0.4214	-0.30103	2.01284	10.0607	T	89.769	69.9883	76.0667	78.6081
19	19-0021	0.156	0.7	19	1.610	70	26	-0.8069	-0.15490	1.27875	10.3205	T	76.969	65.1397	59.4849	67.1975
20	19-0026	0.050	1.4	43	1.087	132	-	-1.3010	0.14613	1.63347	21.7400	P	60.561	55.1514	67.4974	61.0701
21	19-0027	0.037	1.7	11	1.375	140	9	-1.4316	0.23045	1.04139	37.1622	P	56.219	52.3536	54.1234	54.2321
22	19-0057	0.032	3.7	4	1.547	95	21	-1.4949	0.56820	0.60206	48.3437	P	54.126	41.1469	44.1995	46.4906
23	19-0065	0.029	3.0	4	0.907	88	22	-1.5376	0.47712	0.60206	31.2759	P	52.706	44.1690	44.1995	47.0250
24	21-0051	0.306	0.4	150	3.294	210	45	-0.5143	-0.39794	2.17609	10.7647	T	86.684	73.2037	79.7543	79.8807
25	21-0053	0.252	0.4	153	3.140	180	20	-0.5986	-0.39794	2.18469	12.4603	T	83.884	73.2037	79.6486	79.0122
26	21-0054	0.025	1.8	11	0.857	170	10	-1.6021	0.25527	1.04139	34.2800	P	50.566	51.5300	54.1234	52.0732
27	21-0056	0.025	2.1	8	0.680	167	7	-1.6021	0.32222	0.90309	27.2000	P	50.566	49.3087	50.9993	50.2914
28	21-0057	0.019	2.3	6	0.784	183	6	-1.7212	0.36173	0.77815	41.2632	P	46.609	47.9978	48.1772	47.5946
29	21-0076	0.028	2.7	20	0.835	167	7	-1.5528	0.43136	1.30103	29.7500	P	52.200	45.6872	59.9881	52.6253
30	21-0080	0.025	2.8	6	0.857	190	7	-1.6021	0.44716	0.77815	34.2800	P	50.566	45.1632	48.1772	47.9688
31	21-0081	0.385	0.2	250	4.513	140	22	-0.4145	-0.69897	2.39794	11.7221	T	89.996	83.1920	84.7655	85.9844
32	21-0083	0.037	2.6	8	0.769	185	2	-1.4318	0.41497	0.90309	20.7838	P	56.219	46.2311	50.9993	51.1499
33	21-0092	0.058	1.8	11	1.132	193	7	-1.2366	0.25527	1.04139	19.5172	T	62.702	51.5300	54.1234	56.1183
34	21-0123	0.031	3.5	5	0.792	200	6	-1.5086	0.54407	0.69897	25.5484	P	53.668	41.9477	46.3886	47.3346
35	21-0216	0.100	1.3	89	2.611	212	25	-1.0000	0.11394	1.94939	26.1100	P	70.557	56.2193	74.6335	67.1365
36	24-0014	1.600	0.4	361	10.216	189	-	0.2041	-0.39794	2.55751	6.3850	N	110.537	73.2037	88.3699	90.7036
37	24-0018	0.309	0.3	192	6.800	183	-	-0.5100	-0.52288	2.28330	22.0065	P	86.825	77.3492	82.1760	82.1167
38	24-0044	0.176	0.2	231	4.185	140	30	-0.7545	-0.69897	2.36361	23.7784	P	78.708	83.1920	83.9901	81.9635
39	25-0001	0.220	0.9	29	3.190	142	51	-0.6576	-0.04576	1.46240	14.5000	T	81.926	61.5182	63.6332	69.0256
40	26-0002	0.053	0.6	24	1.837	291	20	-1.2757	-0.22185	1.38021	34.6604	P	61.402	67.3610	61.7767	63.5131
41	26-0097	0.029	0.8	9	0.920	201	6	-1.5376	-0.09691	0.95424	31.7241	P	52.706	63.2155	52.1548	56.0256
42	27-0004	0.057	0.8	19	0.715	94	20	-1.2441	-0.09691	1.27875	12.5436	T	62.451	63.2155	59.4849	61.7171
43	27-0014	-	1.6	-	-	-	-	-	0.20412	-	-	N	-	53.2272	-	53.2272
44	27-0016	0.042	2.3	5	1.370	111	5	-1.3768	0.36173	0.69897	32.6190	P	58.047	47.9978	46.3886	50.8112
45	27-0019	0.062	1.0	65	1.810	194	-	-1.2076	0.00000	1.81291	29.1935	P	63.663	60.0000	71.5507	65.0713
46	27-0031	0.055	2.1	13	1.320	112	-	-1.2596	0.32222	1.11394	24.0000	P	61.936	49.3087	55.7622	55.6689
47	27-0035	0.065	2.5	19	-	-	-	-1.1871	0.39794	1.27875	-	N	64.345	46.7963	59.4849	56.8753
48	27-0037	0.075	0.9	51	1.640	127	32	-1.1249	-0.04576	1.70757	21.8667	P	66.408	61.5182	69.1712	65.6992
49	27-0038	0.038	1.3	13	-	135	14	-1.4202	0.11394	1.11394	-	N	56.604	56.2193	55.7022	56.1952
50	27-0039	0.037	1.9	16	-	112	11	-1.4318	0.27875	1.20412	-	N	56.219	50.7509	57.7591	54.9231
51	27-0040	0.085	0.8	48	-	104	-	-1.0706	-0.09691	1.68124	-	N	68.213	63.2155	68.5745	66.6683
52	27-0042	0.137	0.9	57	1.440	90	27	-0.8633	-0.04576	1.75587	10.5109	T	75.096	61.5182	70.2623	68.9586
53	27-0047	0.089	4.1	4	0.527	67	10	-1.0506	0.61278	0.60206	5.9213	N	68.876	39.6677	44.1995	50.9145
54	27-0048	0.095	1.8	22	0.645	166	12	-1.0223	0.25527	1.34242	6.7895	N	69.817	51.5300	60.9231	60.7567

MPCA LAKE CLASSIFICATION PROJECT (3148)
PHASE I 157 LAKES (1970-1980)

OBS	LAKE ID	PT	SD	CHLA	NT	ALK	COLOR	LGPT	LGSD	LGCHLA	NT_PT	C	TSIP	TSIS	TSIC	AVTSI
55	27-0062	0.192	3.0	159	-	119	-	-0.7167	0.47712	2.20140	-	N	79.963	66.1650	80.3269	68.1527
56	27-0067	0.107	1.4	20	1.577	155	22	-0.9706	0.14613	1.30103	14.7383	T	71.532	55.1514	54.9881	62.2239
57	27-0071	0.049	2.9	13	-	-	-	-1.3098	0.46240	1.11394	-	N	60.270	44.6575	55.7622	53.5632
58	27-0089	0.040	3.2	6	0.785	140	7	-1.3979	0.50515	0.77815	19.6250	T	57.344	43.2390	48.1772	49.5866
59	27-0104	0.076	1.4	67	1.612	114	19	-1.1192	0.14613	1.82607	21.2105	P	66.599	55.1514	71.8489	64.5329
60	27-0111	0.052	1.3	43	1.539	157	20	-1.2840	0.11394	1.63347	29.5962	P	61.127	56.2193	67.4974	61.6145
61	27-0118	0.045	1.0	13	1.715	154	21	-1.3468	0.00000	1.11394	38.1111	P	59.042	60.0000	55.7622	58.2681
62	27-0133	0.055	1.4	29	1.486	125	15	-1.2596	0.14613	1.46240	27.0182	P	61.936	55.1514	63.6332	60.2401
63	27-0137	0.015	5.4	4	0.799	133	-	-1.8239	0.73239	0.60206	53.2667	P	43.200	35.6990	44.1995	41.0329
64	27-0176	0.075	1.1	51	2.166	115	26	-1.1249	0.04139	1.70757	28.8800	P	66.408	58.6266	69.1712	64.7353
65	34-0079	0.027	2.5	8	1.121	166	6	-1.5686	0.39794	0.90309	41.5185	P	51.676	46.7963	58.9543	49.0238
66	34-0142	0.031	2.8	10	1.202	310	5	-1.5086	0.44716	1.00000	38.7742	P	53.668	45.1632	53.1884	50.6732
67	34-0154	0.060	1.5	38	1.686	176	28	-1.0969	0.17609	1.57978	21.0750	P	67.339	54.1572	66.2847	62.5936
68	34-0169	2.495	0.5	121	2.961	248	58	0.3971	-0.30103	2.08279	1.1868	N	116.944	69.9883	77.6467	88.1929
69	34-0171	0.039	2.3	9	1.238	160	12	-1.4089	0.36173	0.95424	31.7436	P	56.979	47.9078	52.1568	52.3778
70	34-0217	0.040	3.7	12	1.069	211	9	-1.3979	0.56820	1.07918	26.7250	P	57.344	41.1469	54.9769	51.1558
71	34-0251	0.049	1.2	23	1.537	174	17	-1.3098	0.07918	1.36173	31.3673	P	60.270	57.3727	61.3592	59.6673
72	40-0002	0.412	1.2	52	2.384	177	30	-0.3851	0.07918	1.71600	5.7864	N	90.973	57.3727	69.3617	72.5692
73	40-0020	0.201	0.4	295	3.630	190	30	-0.6968	-0.39794	2.46982	18.0597	T	80.624	73.2037	86.3892	80.0722
74	40-0031	0.367	1.5	256	3.321	185	35	-0.4353	0.17609	2.40824	9.0490	N	89.305	54.1572	84.9982	76.1536
75	40-0057	0.048	1.5	19	1.145	130	20	-1.3188	0.17609	1.27875	23.8542	P	59.973	54.1572	59.4889	57.8716
76	40-0063	0.050	1.0	31	1.710	110	20	-1.3010	0.00000	1.49136	34.2000	P	60.561	60.0000	64.2874	61.6163
77	40-0092	0.168	0.5	40	2.005	140	48	-0.7747	-0.30103	1.60206	11.9345	T	78.038	69.9883	66.7879	71.6846
78	40-0117	0.048	0.8	27	1.660	153	25	-1.3188	-0.09691	1.43136	34.5833	P	59.973	63.2155	62.9322	62.0401
79	43-0012	0.759	0.3	247	4.262	217	39	-0.1196	-0.52288	2.39270	5.6153	N	99.783	77.3492	86.6471	87.2599
80	43-0034	0.645	0.5	163	-	177	-	-0.1904	-0.30103	2.21219	-	N	97.437	69.9883	80.5697	82.6648
81	43-0084	0.090	0.6	25	2.001	156	42	-1.0458	-0.22185	1.39794	22.2333	P	69.037	67.3610	62.1772	66.1918
82	49-0079	0.029	2.6	12	0.745	107	5	-1.5376	0.41497	1.07918	25.6897	P	52.706	46.2311	54.9769	51.3048
83	49-0127	0.028	3.5	15	0.745	95	5	-1.5528	0.54407	1.17609	26.6071	P	52.200	41.9477	57.1660	50.4380
84	52-0036	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-
85	56-0130	0.071	-	47	0.909	183	30	-1.1487	-	1.67210	12.8028	T	65.618	-	68.3699	66.9939
86	56-0138	0.055	3.3	3	1.095	230	15	-1.2596	0.51851	0.47712	19.9091	T	61.936	42.7956	41.3774	48.7029
87	56-0141	0.026	2.1	11	0.831	125	21	-1.5850	0.32222	1.04139	31.9615	P	51.132	49.3087	54.1234	51.5213
88	56-0142	0.068	1.7	23	1.178	183	20	-1.1675	0.23045	1.36173	17.3235	T	64.995	52.3536	61.3592	59.5694
89	56-0239	0.027	2.8	4	0.750	175	5	-1.5686	0.44716	0.60206	27.7778	P	51.676	45.1632	44.1995	47.0129
90	56-0240	0.027	2.0	11	0.965	208	13	-1.5686	0.30103	1.04139	35.7407	P	51.676	50.0117	54.1234	51.9370
91	56-0242	0.032	2.7	10	0.845	177	8	-1.4949	0.43136	1.00000	26.4062	P	54.126	45.6872	53.1884	51.0005
92	56-0243	0.035	3.3	7	0.892	177	6	-1.4559	0.51851	0.84510	25.4857	P	55.418	42.7956	49.6894	49.3010
93	56-0253	0.021	5.5	4	0.540	257	6	-1.6778	0.74036	0.60206	25.7143	P	48.052	35.4346	44.1995	42.5620
94	56-0302	0.040	2.6	9	1.040	275	7	-1.3979	0.41497	0.95424	26.0000	P	57.344	46.2311	52.1568	51.9098
95	56-0304	0.018	6.1	2	0.748	185	5	-1.7447	0.78533	0.30103	41.5556	P	45.829	33.9426	37.3995	39.0572
96	56-0475	0.019	5.2	3	0.655	170	2	-1.7212	0.71600	0.47712	34.4737	P	46.609	36.2428	41.3774	41.4097
97	56-0658	0.034	2.7	4	0.945	225	15	-1.4685	0.43136	0.60206	27.7941	P	55.000	45.6872	44.1995	48.2956
98	56-0760	0.025	2.7	6	0.892	196	5	-1.6021	0.43136	0.77815	32.0800	P	50.566	45.6872	48.1772	48.1435
99	56-0786	0.026	2.8	7	0.735	190	2	-1.5850	0.44716	0.84510	28.2692	P	51.132	45.1632	49.6894	48.6614
100	61-0064	0.045	3.2	21	0.972	176	7	-1.3468	0.50515	1.32222	21.6000	P	59.042	43.2390	60.4668	54.2493
101	61-0067	0.058	1.3	21	1.225	143	27	-1.2366	0.11394	1.32222	21.1207	P	62.702	56.2193	60.4668	59.7959
102	61-0072	0.078	0.9	64	2.299	173	32	-1.1079	-0.04576	1.80618	29.4744	P	66.974	61.5182	71.3986	66.6302
103	61-0130	0.043	2.0	13	1.246	219	8	-1.3665	0.30103	1.11394	28.9767	P	58.387	50.0117	55.7622	54.7201
104	62-0001	0.074	0.9	32	1.430	125	-	-1.1308	-0.04576	1.50515	19.3243	T	66.215	61.5182	64.5989	64.1106
105	62-0002	0.066	0.9	41	1.992	131	30	-1.1675	-0.04576	1.61278	27.9706	P	64.995	61.5182	67.0301	64.5146
106	62-0006	0.167	0.3	79	1.550	115	35	-0.7773	-0.52288	1.89763	9.2814	N	77.951	77.3492	73.4643	76.2550
107	62-0007	0.045	1.5	21	2.175	190	-	-1.3468	0.17609	1.32222	48.3333	P	59.042	54.1572	60.4668	57.8887
108	62-0010	0.134	0.4	54	2.205	-	-	-0.8729	-0.39794	1.73239	16.4552	T	74.777	73.2037	69.7319	72.5708

MPCA LAKE CLASSIFICATION PROJECT (314A)

PHASE I 157 LAKES (1970-1980)

OBS	LAKE ID	PT	SD	CHLA	NT	ALK	COLOR	LGPT	LGSD	LGCHLA	NT_PT	C	TSIP	TSIS	TSIC	AVTSI
109	62-0013	0.036	1.6	14	1.248	91	22	-1.4437	0.20412	1.14613	34.6667	P	55.8243	53.2272	56.4852	55.1802
110	62-0016	0.185	0.5	117	-	-	-	-0.7328	-0.30103	2.06819	-	N	79.4275	69.9883	77.3169	75.5776
111	62-0054	0.040	1.7	12	1.119	89	13	-1.3979	0.23045	1.07918	27.9750	P	57.3436	52.3536	54.9769	54.6914
112	62-0055	0.287	0.3	86	1.786	70	142	-0.5421	-0.52288	1.93450	6.2230	N	85.7597	77.3492	74.2971	79.1354
113	62-0056	0.103	1.4	10	1.224	125	9	-0.9872	0.14613	1.00000	11.8835	T	70.9828	55.1514	53.1804	59.7742
114	62-0057	0.078	0.9	22	1.009	111	-	-1.1549	-0.04576	1.34242	14.4143	T	65.4133	61.5182	60.9231	62.6182
115	62-0067	0.134	0.8	49	1.834	123	-	-0.8729	-0.09691	1.69020	13.6866	T	74.7768	63.2155	68.7786	68.9237
116	62-0069	0.084	0.6	31	1.372	86	-	-1.0506	-0.22185	1.49136	15.4157	T	68.8761	67.3610	64.2674	66.8415
117	62-0071	0.084	0.4	33	1.421	88	22	-1.0757	-0.39794	1.51851	16.9167	T	68.0424	73.2037	64.9007	68.7156
118	62-0073	0.024	2.1	17	1.218	107	8	-1.6198	0.32222	1.23045	50.7500	P	49.9775	49.3087	58.3938	52.5600
119	62-0078	0.059	1.3	22	0.920	90	-	-1.2291	0.11394	1.34242	15.5932	T	62.9481	56.2193	60.9231	60.0302
120	62-0082	0.032	3.1	12	1.220	85	6	-1.4949	0.49136	1.07918	38.1250	P	54.1259	43.6965	54.9769	50.9331
121	62-0083	0.063	0.9	12	1.306	71	12	-1.2007	-0.04576	1.07918	20.7302	P	63.8940	61.5182	54.9769	60.1297
122	66-0029	0.042	2.0	12	1.530	120	27	-1.3768	0.30103	1.07918	36.4286	P	58.0472	50.0117	54.9769	54.3453
123	66-0039	0.078	1.2	102	1.685	120	14	-1.1079	0.07918	2.00860	21.6026	P	66.9737	57.3727	75.9710	66.7725
124	70-0026	0.026	2.3	10	1.087	129	10	-1.5850	0.36173	1.00000	41.8077	P	51.1318	47.9978	53.1884	50.7726
125	70-0054	0.163	1.2	19	1.959	196	35	-0.7878	0.07918	1.27875	11.9632	T	77.6019	57.3727	69.4849	64.8199
126	70-0072	0.055	0.8	51	2.236	163	20	-1.2596	-0.09691	1.70757	40.6545	P	61.9357	63.2155	69.1712	64.7742
127	70-0091	0.419	1.3	215	3.407	197	31	-0.3778	0.11394	2.33244	8.1313	N	91.2161	56.2193	83.2860	76.9071
128	73-0014	0.327	0.8	138	1.970	198	31	-0.4855	-0.09691	2.13988	6.0245	N	87.6412	63.2155	78.9364	76.5977
129	73-0196	0.080	1.4	7	1.090	180	22	-1.0969	0.14613	0.84510	13.6250	T	67.3388	55.1514	49.6894	57.3932
130	73-0200	0.076	2.0	16	1.709	177	15	-1.1192	0.30103	1.20412	22.4868	P	66.5992	50.0117	57.7991	58.1367
131	77-0023	0.064	1.7	14	0.982	177	20	-1.1938	0.23045	1.14613	15.3438	T	64.1211	52.3536	56.4692	57.6546
132	77-0084	0.030	3.3	6	0.876	164	8	-1.5229	0.51851	0.77815	29.2000	P	53.1953	42.7956	48.1772	48.0560
133	77-0089	0.025	3.1	8	0.751	170	15	-1.6021	0.49136	0.90309	30.0400	P	50.5662	43.6965	50.9993	48.4207
134	77-0159	0.101	1.5	94	1.606	187	20	-0.9957	0.17609	1.97313	15.9010	T	70.7000	54.1572	75.1697	66.6757
135	77-0154	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-
136	77-0181	0.089	1.0	49	1.600	147	25	-1.0506	0.00000	1.69020	17.9775	T	68.8761	60.0000	68.7788	65.8850
137	77-0215	0.056	1.7	15	1.245	155	15	-1.2518	0.23045	1.17609	22.2321	P	62.1956	52.3536	57.1660	57.2384
138	78-0025	-	0.5	-	-	-	-	-	-0.30103	-	-	N	-	69.9883	-	69.9883
139	81-0014	0.149	1.0	59	1.579	171	20	-0.8268	0.00000	1.77085	10.5973	T	76.3069	60.0000	70.6006	68.9692
140	81-0095	0.252	0.5	113	2.395	162	50	-0.5986	-0.30103	2.05308	9.5040	N	83.8844	69.9883	76.9757	76.9494
141	82-0023	0.053	1.5	-	1.160	58	17	-1.2757	0.17609	-	21.8868	P	61.4016	54.1572	-	57.7794
142	82-0046	0.025	7.6	1	0.568	121	2	-1.6021	0.88081	0.00000	22.7200	P	50.5662	30.7744	30.6000	37.3135
143	82-0049	0.019	3.1	6	0.557	110	2	-1.7212	0.49136	0.77815	29.3158	P	46.6088	43.6965	48.1772	46.1608
144	82-0052	0.033	2.8	9	0.903	83	7	-1.4815	0.44716	0.95424	27.3636	P	54.5696	45.1632	52.1548	50.6292
145	82-0054	0.106	1.3	80	0.956	105	-	-0.9747	0.11394	1.90309	9.0189	N	71.3968	56.2193	75.5877	67.0679
146	82-0101	0.040	1.7	21	1.312	80	22	-1.3979	0.23045	1.32222	32.8000	P	57.3436	52.3536	60.4668	56.7214
147	82-0104	0.027	3.8	6	0.710	80	10	-1.5686	0.57978	0.77815	25.9259	P	51.6760	40.7626	48.1772	46.8719
148	82-0106	0.034	2.6	10	1.088	106	2	-1.4685	0.41497	1.00000	32.0000	P	55.0001	46.2311	53.1884	51.4732
149	82-0167	0.022	2.9	6	0.879	101	7	-1.6576	0.46240	0.77815	39.9545	P	48.7228	44.6575	48.1772	47.1858
150	86-0090	0.353	1.2	66	2.646	180	25	-0.4522	0.07918	1.81954	7.4958	N	88.7445	57.3727	71.7005	72.6059
151	86-0134	0.073	1.9	5	1.593	137	2	-1.1367	0.27875	0.69897	21.8219	P	66.0184	50.7509	46.3886	54.3860
152	86-0233	0.070	2.9	-	0.700	173	-	-1.1549	0.46240	-	10.0000	T	65.4133	44.6575	-	55.0354
153	86-0252	0.065	1.7	53	1.636	142	21	-1.1871	0.23045	1.72428	25.1692	P	64.3447	52.3536	69.5466	62.0823
154	86-0263	0.180	2.2	39	3.266	197	26	-0.7447	0.34242	1.59106	18.1444	T	79.0324	48.6303	66.5395	64.7368
155	86-0281	0.117	0.8	77	3.050	250	25	-0.9318	-0.09691	1.88649	26.0684	P	72.8205	63.2155	73.2147	69.7496
156	86-0282	0.378	0.8	98	3.737	226	30	-0.4225	-0.09691	1.99123	9.8862	N	89.7312	63.2155	75.5785	76.1751
157	86-0297	0.486	1.1	12	2.050	310	33	-0.3134	0.04139	1.07918	4.2181	N	93.3551	58.6266	54.9769	68.9862

APPENDIX D

MPCA LAKE CLASSIFICATION PROJECT (314A)

21MINNL LAKES, BD=1975, "SUMMER", PCA,METC,CLMP

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
1	01-0033	0.053000	1.26047	-	-	0.69667	-	-	30.8333	-	61.4016	56.6642	-	59.0329
2	01-0059	0.009000	2.00000	6.200	0.52500	-	-	-	50.0000	96.000	35.8340	50.0117	48.4988	44.7815
3	01-0072	0.034000	0.90000	29.200	0.98500	-	-	-	75.0000	48.000	55.0001	61.5182	63.7006	60.0730
4	01-0077	0.023000	1.50000	13.700	0.70500	-	-	-	40.0000	80.000	49.3638	54.1572	56.2767	53.2659
5	01-0087	0.013000	4.40000	1.600	0.54500	-	-	-	15.0000	44.000	41.1366	38.6501	35.2107	38.3325
6	01-0089	0.033000	2.70000	5.800	0.81200	-	-	-	37.0000	76.000	54.5696	45.6872	47.8446	49.3672
7	01-0096	0.031000	1.40000	18.600	0.94500	-	-	-	5.0000	80.000	53.6681	55.1514	59.2762	56.0319
8	01-0099	0.055000	2.28600	-	-	1.08000	-	-	50.0000	-	61.9357	48.0858	-	55.0108
9	01-0102	0.029250	3.59495	-	-	0.53750	-	-	16.5625	-	52.8302	41.5620	-	47.1961
10	01-0104	0.039000	1.50000	16.700	0.69500	-	-	-	20.0000	120.000	56.9786	54.1572	58.2192	56.4517
11	01-0117	0.014000	2.30000	7.000	0.79500	-	-	-	20.0000	22.000	42.2052	47.9978	49.6894	46.6308
12	01-0123	0.042000	0.90000	32.000	1.51000	-	-	-	10.0000	84.000	58.0472	61.5182	64.5989	61.3881
13	01-0129	0.038000	1.40000	17.300	1.02500	-	-	-	10.0000	56.000	56.6040	55.1514	58.5654	56.7736
14	01-0136	0.050000	1.20000	36.800	0.89500	-	-	-	30.0000	110.000	60.5614	57.3727	65.9699	61.3014
15	01-0137	0.002000	4.00000	3.400	0.59500	-	-	-	10.0000	84.000	14.1452	40.0235	42.6052	32.2580
16	01-0142	0.029000	1.90000	21.600	0.60800	-	-	-	27.0000	137.000	52.7064	50.7509	60.7431	54.7335
17	01-0157	0.013000	3.10000	4.800	0.57000	-	-	-	5.0000	98.000	41.1366	43.6965	45.9381	43.6071
18	01-0159	0.020000	2.79400	-	-	0.44667	-	-	5.0000	-	47.3485	45.1941	-	46.2713
19	01-0178	0.015000	2.10000	9.400	0.57500	-	-	-	5.0000	82.000	43.2001	49.3087	52.5814	48.3634
20	01-0188	0.019000	0.90000	31.400	1.32500	-	-	-	45.0000	80.000	46.6088	61.5182	64.4132	57.5134
21	01-0209	0.013000	2.10000	8.500	0.75100	-	-	-	13.0000	108.000	41.1366	49.3087	51.5940	47.3466
22	01-0212	0.002000	1.40000	9.300	0.79500	-	-	-	85.0000	8.000	14.1452	55.1514	52.4764	40.5910
23	02-0003	0.060000	0.80000	39.000	1.64500	1.44000	0.180000	0.0250000	-	112.000	63.1904	63.2155	66.5395	64.3152
24	02-0006	0.135000	1.45000	58.000	-	1.59000	-	0.0250000	-	159.000	74.8841	54.6458	70.4329	66.6543
25	02-0009	0.040000	0.30000	53.000	2.16500	2.08000	0.060000	0.0250000	-	104.000	57.3436	77.3493	69.5486	68.0805
26	02-0026	0.040000	0.90000	27.000	-	0.01000	0.020000	0.0250000	-	97.000	57.3436	61.5182	62.9322	60.5980
27	02-0042	0.058000	1.06667	21.167	1.06500	0.64000	0.090000	0.0241667	20.0000	87.333	62.7016	59.0700	60.5443	60.7720
28	02-0045	0.061417	1.04001	41.000	-	1.63000	-	0.0250000	42.0833	154.000	63.5270	59.4346	67.0301	63.3306
29	02-0072	0.075000	0.70000	44.200	-	2.02000	-	0.0250000	-	58.000	66.4082	65.1397	67.7674	66.4384
30	02-0084	0.046500	1.18427	-	-	0.81000	-	-	15.0000	-	59.5149	57.5628	-	58.5389
31	02-0091	0.020000	2.70000	8.200	-	0.86000	-	0.0250000	-	66.000	47.3485	45.6872	51.2416	48.0924
32	02-0130	0.040000	0.70000	29.000	1.99500	1.94000	0.030000	0.0250000	-	99.000	57.3436	65.1397	63.6332	62.0388
33	02-0133	0.030000	2.50000	17.200	-	1.28000	-	0.0250000	-	92.000	53.1953	46.7963	58.5086	52.8334
34	03-0030	0.025500	4.57200	-	-	0.24000	-	-	5.0000	-	50.8517	38.0975	-	44.4746
35	03-0085	0.018333	7.23646	-	-	0.45083	-	-	5.4167	-	46.0938	31.4807	-	38.7872
36	03-0134	0.019000	4.06400	-	-	0.57500	-	-	2.5000	-	46.6088	39.7948	-	43.2018
37	03-0359	0.130000	1.30000	71.000	1.65500	1.54000	0.110000	0.0050000	30.0000	190.000	74.3398	56.2193	72.4169	67.6587
38	03-0381	0.026500	2.50000	8.950	0.92000	0.84500	0.070000	0.0050000	10.0000	185.000	51.4064	46.7963	52.1001	50.1009
39	03-0387	0.034667	3.62458	-	-	0.84521	-	-	10.0000	-	55.2801	41.4437	-	48.3619
40	03-0475	-	2.28600	-	-	-	-	-	-	-	-	48.0858	-	48.0858
41	03-0576	0.016500	4.10000	4.250	1.01500	0.92500	0.085000	0.0050000	2.5000	255.000	44.5745	39.6677	44.7943	43.0121
42	04-0030	0.027250	3.09771	19.275	-	-	0.072500	0.0075000	13.7500	122.500	51.8089	43.7072	59.6259	51.7140
43	04-0038	0.044833	1.65130	30.358	-	-	0.183333	0.0170833	20.0000	136.667	58.9886	52.7725	64.0822	58.6144
44	04-0069	0.079000	1.07327	46.775	-	1.45500	0.223750	0.0162500	27.1875	126.667	67.1574	58.9810	68.3229	64.8204
45	04-0079	0.045278	1.61061	42.456	-	-	0.144722	0.0108333	28.0556	140.000	59.1308	53.1320	67.3724	59.8784
46	04-0130	0.064750	2.25407	25.600	-	-	0.086250	0.0150000	14.3750	155.000	64.2891	48.2884	62.4098	58.3291
47	05-0013	0.151375	0.44577	-	-	1.56125	-	-	33.1250	-	76.5349	71.6426	-	74.0886
48	07-0044	0.072028	0.85758	33.225	1.92167	1.68167	0.187500	0.0368750	23.6111	-	65.8251	62.2139	64.9674	64.3355
49	07-0053	0.050000	1.30000	14.700	1.65500	1.51000	0.140000	0.0050000	20.0000	170.000	60.5614	56.2193	56.9678	57.9162
50	07-0054	0.040000	1.50000	20.200	1.68500	1.56000	0.120000	0.0050000	20.0000	140.000	57.3436	54.1572	60.0857	57.1955
51	07-0060	0.167000	3.20000	3.900	3.22000	-	-	-	45.0000	180.000	77.9515	43.2390	43.9512	55.0472
52	07-0079	0.242000	0.30000	122.000	2.90500	-	-	-	45.0000	180.000	83.3005	77.3492	77.7274	79.4591
53	08-0018	0.255000	0.20000	271.000	5.35000	-	-	-	50.0000	130.000	84.0550	83.1920	85.5568	84.2679

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
55	09-0032	0.028000	2.50613	-	-	0.53500	-	-	10.0000	-	52.2004	46.7609	-	49.4807
56	09-0057	0.027000	2.60000	-	0.4600	-	-	-	15.0000	60.0	51.6760	46.2311	-	48.9535
57	09-0060	0.039000	1.30000	27.200	0.8250	-	-	-	20.0000	60.0	56.9786	56.2193	63.0046	58.7341
58	09-0068	0.048000	2.30000	7.800	0.8950	-	-	-	20.0000	20.0	59.9727	47.9978	50.7510	52.9072
59	10-0002	0.049333	1.21066	34.000	2.1700	1.51083	0.04000	0.050000	13.3333	98.0	60.3678	57.2453	65.1936	60.9356
60	10-0006	0.054667	0.90714	-	-	1.66000	-	-	20.8333	-	61.8481	61.4043	-	61.6262
61	10-0009	0.030667	3.15253	3.600	1.0700	0.96500	0.09500	0.005000	8.7500	135.0	53.5122	43.4543	43.1660	46.7108
62	10-0044-01	-	1.80975	-	-	-	-	-	-	-	-	51.4522	-	51.4522
63	10-0044-02	0.090333	1.75260	-	-	1.76083	-	-	30.8333	-	69.0906	51.9145	-	60.5026
64	10-0053	0.024625	1.90000	12.000	1.2200	0.78500	0.04000	0.100000	11.2500	116.0	50.3482	50.7509	54.9769	52.0254
65	10-0059	0.048096	1.18181	30.750	1.8000	1.32117	0.10000	0.015000	11.3368	162.0	59.9744	57.5929	64.2080	60.5917
66	10-0069	0.157000	0.90000	15.750	-	1.93500	-	0.097500	-	-	77.0611	61.5182	57.6446	65.4080
67	10-0070	0.355500	0.60000	25.900	-	2.14000	-	0.042500	-	-	88.8462	67.3610	62.5241	72.9105
68	10-0078	0.330000	0.20000	205.000	7.2350	7.20000	0.01000	0.025000	-	105.0	87.7729	83.1920	82.8187	84.5945
69	10-0088	0.456333	-	-	-	3.37333	-	-	43.3333	-	92.4469	-	-	92.4469
70	10-0089	0.173500	0.59055	-	-	2.37000	-	-	40.0000	-	78.5021	67.5898	-	73.0459
71	10-0095	0.160000	0.30000	170.600	4.4300	4.30000	0.03000	0.100000	-	125.0	77.3340	77.3493	80.9822	78.5251
72	10-0121	0.393000	1.45000	124.000	4.2850	2.90750	1.08000	0.025000	37.5000	203.0	90.2923	54.6458	77.8870	74.2750
73	11-0009	0.006000	2.80000	7.200	0.9200	-	-	-	55.0000	140.0	29.9872	45.1632	49.9657	41.7054
74	11-0029	0.015000	1.30000	24.000	1.0650	-	-	-	45.0000	150.0	43.2001	56.2193	61.7767	53.7320
75	11-0069	0.037000	4.60248	-	-	0.41667	-	-	5.0000	-	56.2194	38.0018	-	47.1106
76	11-0073	0.014000	-	4.800	1.0650	-	-	-	25.0000	140.0	42.2052	-	45.9881	44.0967
77	11-0092	0.028000	0.60000	27.800	1.3150	-	-	-	25.0000	18.0	52.2004	67.3610	63.2186	60.9267
78	11-0102	0.028000	2.60000	10.200	0.7150	-	-	-	25.0000	42.0	52.2004	46.2311	53.3826	50.6047
79	11-0104	0.039000	-	4.400	1.1150	-	-	-	50.0000	76.0	56.9786	-	45.1345	51.0565
80	11-0105	0.002000	2.70000	5.700	0.5850	-	-	-	10.0000	120.0	14.1452	45.6872	47.6740	35.8355
81	11-0121	0.011000	2.80000	6.600	1.0050	-	-	-	15.0000	38.0	38.7276	45.1632	49.1122	44.3343
82	11-0129	0.031000	1.40000	26.900	0.9250	-	-	-	30.0000	140.0	53.6681	55.1514	62.8958	57.2384
83	11-0162	0.034500	1.81250	5.945	0.6175	0.54250	0.07000	0.005000	18.7500	-	55.2106	51.4303	48.0868	51.5759
84	11-0171-01	0.025750	3.15807	-	-	0.61250	-	-	24.1667	-	50.9924	43.4291	-	47.2108
85	11-0203	0.042667	2.74891	-	-	0.21000	-	-	15.0000	-	58.2743	45.4285	-	51.8514
86	11-0203-04	0.040500	-	-	-	0.83000	-	-	6.2500	-	57.5228	-	-	57.5228
87	11-0234	0.002000	9.20000	1.600	0.3900	-	-	-	5.0000	60.0	14.1452	28.0213	35.2107	25.7924
88	11-0304	0.008000	5.60000	2.400	0.6150	-	-	-	5.0000	105.0	34.1355	35.1749	39.1883	36.1663
89	11-0305	0.021033	2.80043	9.275	-	0.50250	0.13375	0.036667	13.7500	104.0	48.0749	45.1610	52.4500	48.5620
90	11-0307	0.058000	1.70000	9.400	0.8150	-	-	-	15.0000	130.0	62.7016	52.3536	52.5814	55.8789
91	11-0308	0.012000	1.90000	9.100	0.5000	-	-	-	10.0000	120.0	39.9824	50.7509	52.2632	47.6655
92	11-0311	0.002000	5.00000	2.300	0.4450	-	-	-	5.0000	110.0	14.1452	36.8080	38.7708	29.9080
93	11-0314	0.033500	4.03860	-	-	0.59250	-	-	10.6250	-	54.7865	39.8851	-	47.3358
94	11-0351	0.040000	2.10000	8.000	0.5150	-	-	-	5.0000	140.0	57.3436	49.3087	50.9993	52.5505
95	11-0355	0.037000	4.00000	2.600	0.5250	-	-	-	5.0000	110.0	56.2194	40.0235	39.9736	45.4055
96	11-0358	0.030000	2.90000	3.400	0.6050	-	-	-	5.0000	100.0	53.1953	44.6575	42.6052	46.8193
97	11-0361	0.030000	3.70000	3.300	0.5850	-	-	-	5.0000	90.0	53.1953	41.1469	42.3124	45.5515
98	11-0367	0.058000	1.80000	25.900	0.8950	-	-	-	5.0000	140.0	62.7016	51.5300	62.5241	58.9186
99	11-0381	0.050250	1.57500	20.850	1.0750	0.93000	0.14000	0.005000	13.7500	-	60.6333	53.4542	60.3964	58.1613
100	11-0383	0.039500	3.94207	5.425	0.7650	0.49750	0.05000	0.005000	5.6250	-	57.1623	40.2337	47.1889	48.1950
101	11-0411	0.026500	2.06587	-	-	0.44167	-	-	11.6667	-	51.4064	49.5448	-	50.4756
102	11-0412	0.019000	2.60000	17.400	0.6050	-	-	-	10.0000	103.0	46.6088	46.2311	58.6220	50.4873
103	11-0413	0.014833	5.09270	-	-	0.31167	-	-	5.6250	-	43.0390	36.5433	-	39.7911
104	11-0415	0.020833	2.60833	6.717	-	-	0.09458	0.007917	6.8750	137.5	47.9371	46.1850	49.2840	47.8020
105	13-0068	0.062000	1.70000	20.400	0.9050	-	-	-	15.0000	120.0	63.6633	52.3536	60.1824	58.7331
106	13-0069-01	0.083000	0.67125	-	-	1.75417	-	-	27.5000	-	67.8697	65.7433	-	66.8065
107	14-0080	-	2.28600	-	-	-	-	-	-	-	-	48.0858	-	48.0858
108	16-0228	0.023833	6.46853	-	-	0.25833	-	-	8.5417	-	49.8770	33.0973	-	41.4872

MPCA LAKE CLASSIFICATION PROJECT (314A)

21MINNL LAKES, BD=1975, "SUMMER", PCA,METC,CLMP

OBS	S	PT	SD	CHLA	N1	NTK	ANH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
109	16-0360	0.033583	1.98120	-	-	0.52000	-	-	28.3333	-	54.8223	50.1478	-	52.4851
110	16-0632	-	4.61772	-	-	-	-	-	-	-	-	37.9541	-	37.9541
111	16-0632-01	0.002500	-	-	-	0.51500	-	-	10.0000	-	17.3629	-	-	17.3629
112	17-0003	0.186000	-	14.800	1.38500	-	-	-	25.0000	140.000	79.5053	-	57.0343	68.2698
113	17-0022	0.087000	0.50000	29.900	1.56500	-	-	-	40.0000	140.000	68.5484	69.9883	63.9339	67.4899
114	18-0009	0.027000	1.70000	13.700	1.01500	-	-	-	15.0000	120.000	51.6760	52.3536	56.2767	53.4354
115	18-0038	0.030333	4.57200	-	-	0.47917	-	-	6.4583	-	53.3546	38.0975	-	45.7261
116	18-0041	0.024542	4.14625	-	-	0.44896	-	-	8.5417	-	50.2994	39.5060	-	44.9027
117	18-0050	0.034000	3.19314	-	-	0.49917	-	-	8.9583	-	55.0001	43.2699	-	49.1350
118	18-0088	0.040000	1.00000	19.200	0.99500	-	-	-	15.0000	92.000	57.3436	60.0000	59.5877	58.9771
119	18-0090	0.041250	6.03205	-	-	0.41250	-	-	6.8750	-	57.7874	34.1040	-	45.9457
120	18-0096	0.032833	2.14449	-	-	0.65958	-	-	21.0417	-	54.4966	49.0066	-	51.7516
121	18-0104	0.020000	1.70000	11.900	0.65500	-	-	-	10.0000	110.000	47.3485	52.3536	54.6948	51.5323
122	18-0117	0.036917	1.44490	26.383	-	-	0.140833	0.00875	22.5000	98.500	56.1869	54.6965	62.7055	57.8630
123	18-0136	0.030167	1.58024	-	-	0.67833	-	-	14.1667	-	53.2752	53.4063	-	53.3407
124	18-0140	0.021000	3.10000	5.700	0.59500	-	-	-	10.0000	120.000	48.0520	43.6965	47.6740	46.4742
125	18-0212	0.016917	4.31800	-	-	0.46333	-	-	3.7500	-	44.9341	38.9212	-	41.9276
126	18-0242	0.040000	2.20000	13.200	0.78500	-	-	-	10.0000	100.000	57.3436	48.6383	55.9119	53.9646
127	18-0243	0.023000	2.50000	9.000	0.63500	-	-	-	10.0000	120.000	49.3638	46.7963	52.1548	49.4383
128	18-0287	0.041000	1.70000	29.800	0.80500	-	-	-	10.0000	70.000	57.6997	52.3536	63.9001	57.9845
129	18-0294	0.025000	1.50000	14.800	0.77500	-	-	-	30.0000	110.000	50.5662	54.1572	57.0343	53.9192
130	18-0305	0.017000	3.30000	4.100	0.60500	-	-	-	5.0000	120.000	45.0049	42.7956	44.4418	44.0808
131	18-0311	-	3.04147	-	-	-	-	-	-	-	-	43.9712	-	43.9712
132	18-0320	0.013000	3.90000	4.500	0.67500	-	-	-	12.0000	106.000	41.1366	40.3883	45.3550	42.2933
133	18-0364	0.013750	3.14869	-	-	0.39500	-	-	3.3333	-	41.9454	43.4719	-	42.7086
134	18-0372	0.007000	3.20000	4.400	0.55500	-	-	-	5.0000	120.000	32.2100	43.2390	45.1345	40.1945
135	18-0374	-	2.31648	-	-	-	-	-	-	-	-	47.8949	-	47.8949
136	18-0376	0.047667	2.13360	-	-	0.65667	-	-	8.3333	-	59.8722	49.0799	-	54.4761
137	18-0377	0.002000	2.90000	4.200	0.48500	-	-	-	10.0000	120.000	14.1452	44.6575	44.6782	34.4936
138	18-0378	0.008000	2.90000	3.200	0.42500	-	-	-	5.0000	110.000	34.1355	44.6575	42.9105	40.2679
139	18-0412	0.025000	1.30000	24.700	0.92500	-	-	-	15.0000	110.000	50.5662	56.2193	62.0587	56.2814
140	18-0416	0.032000	1.40000	13.100	0.86500	-	-	-	30.0000	100.000	54.1259	55.1514	55.8373	55.0382
141	19-0020	0.140000	0.50000	105.000	2.49500	2.40000	0.070000	0.02500	-	89.000	75.4085	69.9883	76.2554	73.8840
142	19-0021	0.170667	0.49107	-	-	1.52583	-	-	21.6667	-	78.2646	70.2480	-	74.2563
143	19-0023	0.160000	0.55000	107.000	2.06500	2.35000	0.080000	0.02500	-	70.000	77.3340	68.6148	76.4405	74.1298
144	19-0026-01	0.050000	1.80000	25.000	1.44500	1.38000	0.040000	0.02500	-	143.000	60.5614	51.5300	62.1776	58.0895
145	19-0027	0.029778	2.98145	11.500	1.44000	0.93500	0.065000	0.01500	9.7917	124.500	53.0881	44.2584	54.5594	50.6353
146	19-0031	0.040000	1.80000	13.500	1.88500	1.43000	0.120000	0.02500	-	153.000	57.3436	51.5300	56.1324	55.0020
147	19-0067	0.380000	0.20000	50.500	5.68500	5.60000	0.060000	0.02500	-	70.000	89.8073	83.1920	69.0746	80.6913
148	21-0051	0.306972	0.46410	150.750	3.85525	3.20306	0.557750	0.00625	24.7222	-	86.7298	71.0619	79.8033	79.1983
149	21-0053	0.275528	0.47660	153.875	3.39087	3.15917	0.250250	0.00937	20.5556	-	85.1715	70.6789	80.0045	78.6183
150	21-0056	0.025375	2.17500	9.037	0.74237	0.67500	0.061750	0.00562	7.5000	-	50.7809	48.8030	52.1956	50.5932
151	21-0057	0.020125	2.41250	6.284	0.85937	0.77875	0.073750	0.00687	6.8750	-	47.4383	47.3096	48.6305	47.7928
152	21-0076	0.034000	2.20000	7.725	0.87250	0.76000	0.100000	0.01250	10.0000	165.000	55.0001	48.6383	50.6562	51.4315
153	21-0080	0.033000	1.70000	8.100	0.93500	0.82000	0.110000	0.00500	6.2500	192.500	54.5696	52.3536	51.1212	52.6815
154	21-0081-02	0.365500	0.26250	250.875	4.85437	4.49125	0.341250	0.02187	22.5000	-	90.0145	79.2734	84.7998	84.6959
155	21-0083	0.049500	2.45000	4.500	0.81000	0.73500	0.070000	0.00500	2.5000	190.000	60.4164	47.0874	45.3550	50.9529
156	21-0092	0.041000	1.90000	11.150	1.20000	1.09000	0.105000	0.00500	10.0000	195.000	57.6997	50.7509	54.2562	54.2356
157	21-0123	0.035167	3.68373	-	-	0.68500	-	-	4.1667	-	55.4866	41.2104	-	48.3485
158	21-0216	0.159500	1.23750	89.875	2.97962	2.60500	0.368375	0.00625	25.6250	-	77.2889	56.9293	74.7295	69.6492
159	22-0074	0.112000	0.50000	108.000	2.35500	-	-	-	40.0000	150.000	72.1908	69.9883	76.5317	72.9036
160	24-0030	0.239667	0.66040	-	-	2.43667	-	-	50.0000	-	83.1608	65.9788	-	74.5698
161	25-0001	0.211548	0.68212	35.564	3.49904	1.33240	0.242786	1.74718	51.2599	141.464	81.3612	65.5126	65.6349	70.8362
162	27-0014	-	1.23006	-	-	-	-	-	-	-	-	56.5558	-	56.5558

OBS	$	PT	SD	CHLA	N1	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
163	27-0016	0.023000	1.50223	-	-	0.78000	-	-	2.500	-	49.3638	54.1359	-	51.7498
164	27-0019	0.070000	0.99530	67.000	1.4850	1.72000	0.120000	0.025000	-	99.000	65.4133	60.0679	71.8480	65.7764
165	27-0026	0.176583	0.45402	-	-	1.81000	-	-	37.500	-	78.7561	71.3782	-	75.0671
166	27-0037	0.095500	0.95000	34.450	-	-	0.465000	0.020000	35.000	130.000	69.8926	60.7391	65.3226	65.3181
167	27-0038	0.044667	1.43147	-	-	0.66667	-	-	15.000	-	58.9349	54.8311	-	56.8830
168	27-0039	0.032750	2.14040	-	-	0.81333	-	-	10.833	-	54.4600	49.0341	-	51.7470
169	27-0058	0.080167	0.83820	-	-	1.50500	-	-	25.833	-	67.3688	62.5433	-	64.9561
170	27-0067	0.060000	1.08340	16.000	1.6450	1.56000	0.060000	0.025000	-	151.000	63.1904	58.8457	57.7991	59.9451
171	27-0078	0.075000	0.54170	28.500	2.1250	2.40000	0.080000	0.025000	-	194.000	66.4082	68.8339	63.4626	66.2349
172	27-0098	0.095000	0.62173	63.500	2.7250	2.26000	0.100000	0.062500	-	81.000	69.8169	66.8483	71.3217	69.3290
173	27-0104	0.083000	1.18973	98.500	1.7050	1.65500	0.080000	0.015000	20.000	106.000	67.8697	57.4966	75.6285	66.9982
174	27-0107	0.055000	2.65850	16.000	1.8650	1.27000	0.140000	0.025000	-	151.000	61.9357	45.9104	57.7991	55.2151
175	27-0111	-	1.03293	-	-	-	-	-	-	-	-	59.5331	-	59.5331
176	27-0111-01	0.037000	1.12500	43.750	1.5850	1.39500	0.090000	0.096250	20.000	157.500	56.2194	58.3028	67.6670	60.7297
177	27-0118	0.030000	1.79263	11.500	1.7450	1.58000	0.060000	0.025000	-	119.000	53.1953	51.5891	54.5594	53.1146
178	27-0125	0.380000	0.17620	455.000	8.6950	8.40000	0.270000	0.025000	-	8.500	89.8073	85.0177	90.6401	88.4884
179	27-0133	-	1.37636	-	-	-	-	-	-	-	-	55.3968	-	55.3968
180	27-0133-02	0.040000	1.90000	16.350	1.4500	1.24500	0.090000	0.015000	10.000	139.500	57.3436	50.7509	58.0114	55.3666
181	27-0133-05	0.030000	0.90000	10.000	1.4750	1.40000	0.050000	0.025000	-	128.000	53.1953	61.5182	53.1884	55.9673
182	27-0133-09	0.100000	0.60000	53.000	2.3450	2.18000	0.160000	0.005000	20.000	130.000	70.5565	67.3610	69.5486	69.1554
183	27-0133-14	0.136683	0.67167	70.235	-	-	0.598167	0.016417	45.750	130.267	75.0628	65.7351	72.3106	71.0362
184	27-0133-15	0.206437	0.51250	106.236	2.6950	2.54000	0.309219	0.008698	47.240	143.229	81.0086	69.6324	76.3702	75.6704
185	27-0137	0.030000	6.30727	2.550	1.4650	0.70500	0.040000	0.025000	-	136.000	53.1953	33.4611	39.7831	42.1465
186	27-0141	-	0.62653	-	-	-	-	-	-	-	-	66.7374	-	66.7374
187	27-0157	0.065000	0.58575	64.500	2.7300	2.41000	0.140000	0.037500	-	152.000	64.3447	67.7074	71.4750	67.8423
188	27-0176	0.071750	0.97162	52.000	1.9625	1.89500	0.065000	0.017500	26.250	119.500	65.7694	60.4149	69.3617	65.1820
189	27-0179	0.020000	5.03960	2.500	0.7850	0.71000	0.040000	0.025000	-	92.000	47.3485	36.6943	39.5888	41.2105
190	27-0184	0.060000	0.62980	54.000	2.6850	2.62000	0.120000	0.025000	-	132.000	63.1904	66.6625	69.7319	66.5783
191	27-0191	0.060000	0.71790	63.000	2.0550	2.23500	0.030000	0.025000	-	112.000	63.1904	64.7758	71.2442	66.4055
192	27-0192	-	2.54726	-	-	-	-	-	-	-	-	46.5264	-	46.5264
193	29-0066	0.042167	1.41393	-	-	1.18667	-	-	9.167	-	58.1043	55.0087	-	56.5565
194	29-0077	-	1.89956	-	-	-	-	-	-	-	-	50.7542	-	50.7542
195	29-0117-02	0.030750	3.07340	-	-	0.73500	-	-	3.750	-	53.5513	43.8207	-	48.6860
196	29-0151	-	3.63728	-	-	-	-	-	-	-	-	41.3933	-	41.3933
197	29-0157	0.052375	2.15132	14.100	0.8475	0.52375	0.140000	0.185000	22.500	-	61.2305	48.9607	56.5560	55.5834
198	29-0239	0.002500	4.64820	-	-	0.41000	-	-	2.500	-	17.3629	37.8593	-	27.6111
199	30-0022	0.073000	0.80000	71.500	2.4450	-	-	-	22.000	110.000	66.0184	63.2155	72.4857	67.2399
200	30-0043	0.061000	0.80000	73.400	1.6950	-	-	-	17.000	110.000	63.4288	63.2155	72.7430	66.4624
201	30-0044	0.124000	0.30000	126.500	3.0700	2.77500	0.290000	0.005000	55.000	-	73.6585	77.3493	78.0828	76.3635
202	30-0072	-	0.63500	-	-	-	-	-	-	-	-	66.5440	-	66.5440
203	30-0080	0.110250	0.70273	-	-	1.72250	-	-	39.375	-	71.9637	65.0835	-	68.5236
204	30-0096	0.074000	0.80000	65.700	1.7650	-	-	-	30.000	68.000	66.2146	63.2155	71.6558	67.0286
205	30-0107	0.046000	1.30000	22.200	1.0700	-	-	-	15.000	135.000	59.3590	56.2193	61.0119	58.8634
206	30-0138	0.164000	0.40000	91.300	2.4150	-	-	-	15.000	130.000	77.6901	73.2037	74.8838	75.2592
207	31-0001	0.030000	3.70000	7.000	0.6100	-	-	-	35.000	88.000	53.1953	41.1469	49.6894	48.0105
208	31-0003	0.020000	0.80000	11.000	1.0050	-	-	-	250.000	24.000	47.3485	63.2155	54.1234	54.8958
209	31-0020	0.019000	3.00000	3.800	0.4650	-	-	-	15.000	91.000	46.6088	44.1690	43.6964	44.8247
210	31-0026	0.021000	2.20000	4.500	0.5750	-	-	-	10.000	16.000	48.0520	48.6383	45.3550	47.3484
211	31-0028	0.039000	2.10000	8.800	0.6850	-	-	-	25.000	24.000	56.9786	49.3087	51.9343	52.7405
212	31-0051	0.049000	1.20000	21.300	0.9250	-	-	-	35.000	30.000	60.2700	57.3727	62.2942	59.9790
213	31-0057	0.045000	1.00000	13.800	1.1050	-	-	-	120.000	28.000	59.0421	60.0000	56.3480	58.4634
214	31-0058	0.015000	2.70000	3.500	0.5050	-	-	-	15.000	10.000	43.2001	45.6872	42.8896	43.9256
215	31-0067	0.020278	2.90724	9.633	-	-	0.126889	0.010833	22.778	104.444	47.5474	44.6216	52.8219	48.3303
216	31-0069	0.038000	2.00000	10.900	0.7050	-	-	-	10.000	44.000	56.6040	50.0117	54.0338	53.5498

MPCA LAKE CLASSIFICATION PROJECT (314A)

21MINNL LAKES, BD=1975, "SUMMER", PCA,METC,CLMP

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
217	31-0093	0.026000	2.20000	6.900	0.590	-	-	-	45.000	70.000	51.1318	48.6383	49.5482	49.7726
218	31-0141	0.032000	3.00000	4.200	0.745	-	-	-	20.000	45.000	54.1259	44.1690	44.6782	47.6577
219	31-0152	0.052000	1.00000	9.900	1.245	-	-	-	225.000	50.000	61.1269	60.0000	53.0898	58.0722
220	31-0154	0.032000	2.20000	8.000	0.675	-	-	-	25.000	78.000	54.1259	48.6383	50.6993	51.2545
221	31-0157	0.023000	0.90000	10.100	0.815	-	-	-	250.000	40.000	49.3638	61.5182	53.2660	54.7227
222	31-0158	0.033000	4.10000	2.300	0.405	-	-	-	15.000	88.000	54.5696	39.6677	38.7708	44.3361
223	31-0190	0.027000	2.80000	8.500	0.495	-	-	-	10.000	120.000	51.6760	45.1632	51.5940	49.4777
224	31-0193	0.039000	1.60000	12.500	0.860	-	-	-	75.000	68.000	56.9786	53.2272	55.3774	55.1944
225	31-0198	0.058000	0.60000	36.300	1.205	-	-	-	25.000	110.000	62.7016	67.3610	65.8357	65.2994
226	31-0216	0.036167	2.25124	17.517	-	-	0.133611	0.0147222	9.583	105.778	55.8909	48.3065	58.6875	54.2950
227	31-0220	0.028000	2.60000	4.900	0.490	-	-	-	12.000	140.000	52.2004	46.2311	46.1904	48.2073
228	31-0231	0.061000	1.80000	20.800	0.985	-	-	-	75.000	66.000	63.4288	51.5300	60.3729	58.4439
229	31-0258	0.039000	1.00000	28.200	0.765	-	-	-	10.000	96.000	56.9786	60.0000	63.3587	60.1124
230	31-0292	0.030000	2.70000	9.100	0.625	-	-	-	15.000	16.000	53.1953	45.6872	52.2632	50.3819
231	31-0317	0.010000	5.20000	1.300	0.380	-	-	-	10.000	160.000	37.3533	36.2428	33.1738	35.5900
232	31-0334	0.041000	2.30000	14.900	0.625	-	-	-	20.000	100.000	57.6997	47.9978	57.1004	54.2659
233	31-0339	0.040000	3.30000	4.100	0.535	-	-	-	30.000	110.000	57.3436	42.7956	44.4418	48.1937
234	31-0341	0.058000	1.00000	40.600	1.085	-	-	-	20.000	96.000	62.7016	60.0000	66.9349	63.2119
235	31-0353	0.038000	1.00000	39.000	1.005	-	-	-	25.000	92.000	56.6040	60.0000	66.5395	61.0478
236	31-0373	0.029000	4.00000	3.300	0.645	-	-	-	10.000	140.000	52.7064	40.0235	42.3124	45.0141
237	31-0384	0.040000	1.20000	13.600	0.765	-	-	-	67.000	78.000	57.3436	57.3727	56.2048	56.9737
238	31-0413	0.039000	2.00000	11.400	0.645	-	-	-	20.000	14.000	56.9786	50.0117	54.4737	53.8214
239	31-0438	0.031000	5.10000	4.800	0.605	-	-	-	10.000	74.000	53.6681	36.5226	45.9881	45.3930
240	31-0454	0.030000	2.00000	6.700	0.670	-	-	-	30.000	52.000	53.1953	50.0117	49.2597	50.8222
241	31-0480	0.054000	3.20000	3.000	0.530	-	-	-	10.000	120.000	61.6711	43.2390	41.3774	48.7625
242	31-0524	0.022000	2.20000	4.200	0.630	-	-	-	25.000	52.000	48.7228	48.6383	44.6782	47.3464
243	31-0530	0.036000	1.90000	10.400	0.765	-	-	-	35.000	80.000	55.8243	50.7509	53.5731	53.3828
244	31-0533	0.038000	2.00000	3.900	0.915	-	-	-	47.000	140.000	56.6040	50.0117	43.9512	50.1890
245	31-0540	0.016000	4.40000	1.700	0.370	-	-	-	10.000	110.000	44.1307	38.6501	35.8055	39.5288
246	31-0554	0.010000	4.30000	2.100	0.295	-	-	-	5.000	110.000	37.3533	38.9814	37.8784	38.0710
247	31-0576	0.036000	2.10000	11.800	0.678	-	-	-	20.000	120.000	55.8243	49.3087	54.8121	53.3150
248	31-0610	0.050000	1.60000	15.100	0.695	-	-	-	10.000	150.000	60.5614	53.2272	57.2312	57.0066
249	31-0620	0.008000	9.10000	1.100	0.325	-	-	-	2.500	24.000	34.1355	28.1788	31.5350	31.2831
250	31-0624	0.021000	2.10000	8.900	0.610	-	-	-	10.000	120.000	48.0520	49.3087	52.0452	49.8020
251	31-0653	0.018000	2.30000	4.100	0.570	-	-	-	5.000	110.000	45.8292	47.9978	44.4418	46.0896
252	31-0718	0.041000	0.90000	2.700	1.105	-	-	-	100.000	76.000	57.6997	61.5182	50.3438	53.1873
253	31-0719	-	3.23088	-	-	-	-	-	-	-	-	43.1006	-	43.1006
254	31-0722	0.028000	3.40000	8.700	0.600	-	-	-	15.000	120.000	52.2004	42.3654	51.8222	48.7960
255	31-0733	0.035000	1.00000	6.000	0.945	-	-	-	20.000	96.000	55.4181	60.0000	48.1772	54.5318
256	31-0775	0.009000	3.30000	4.500	0.645	-	-	-	25.000	96.000	35.8340	42.7956	45.3550	41.3282
257	31-0786	0.040000	1.30000	25.000	0.885	-	-	-	15.000	140.000	57.3436	56.2193	62.1772	58.5800
258	31-0812	0.036000	3.00000	4.200	0.720	-	-	-	17.000	135.000	55.8243	44.1690	44.6782	48.2238
259	31-0813	0.052000	1.00000	51.900	1.245	-	-	-	30.000	110.000	61.1269	60.0000	69.5428	63.4899
260	31-0826	0.032000	1.80000	15.200	0.835	-	-	-	17.000	115.000	54.1259	51.5300	57.2959	54.3173
261	31-0850	0.052000	1.50000	30.400	0.885	-	-	-	5.000	150.000	61.1269	54.1572	64.0957	59.7933
262	31-0857	0.046000	1.10000	26.700	0.920	-	-	-	20.000	140.000	59.3590	58.6266	62.8225	60.2694
263	31-0877	0.028000	-	6.800	1.015	-	-	-	40.000	120.000	52.2004	-	49.4050	50.8027
264	31-0882	0.044000	1.70000	11.200	1.135	-	-	-	70.000	120.000	58.7180	52.3536	54.3001	55.1239
265	31-0896	0.082000	0.70000	65.700	1.505	-	-	-	40.000	120.000	67.6949	65.1397	71.6558	68.1635
266	31-0921	0.065000	1.00000	36.500	1.345	-	-	-	70.000	100.000	64.3447	60.0000	65.9699	63.4382
267	32-0018	0.118000	0.40000	143.000	2.395	-	-	-	45.000	160.000	72.9433	73.2037	79.2855	75.1442
268	32-0020	0.160000	0.30000	68.400	2.315	-	-	-	45.000	140.000	77.3340	77.3492	72.0509	75.5781
										-	-	57.1183	-	57.1183

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
271	32-0069	0.15900	0.20000	68.900	2.02500	-	-	-	40.0000	160.000	77.244	83.1920	72.1224	77.5193
272	33-0001	0.03200	-	8.500	0.98500	-	-	-	30.0000	8.000	54.126	-	51.5940	52.8600
273	33-0009	0.03200	-	8.500	0.98500	-	-	-	60.0000	8.000	54.126	-	51.5940	52.8600
274	33-0015	0.10725	0.67310	-	-	1.54750	-	-	87.5000	-	71.566	65.7044	-	68.6351
275	33-0032	0.04700	2.50000	9.500	1.14500	-	-	-	10.0000	100.000	59.669	46.7963	52.6852	53.0502
276	33-0033	0.03700	2.28600	-	-	0.89000	-	-	15.0000	-	56.219	48.0858	-	52.1526
277	33-0040	0.10700	0.80000	59.800	1.81500	-	-	-	90.0000	68.000	71.532	63.2155	70.7328	68.4935
278	34-0044	0.04117	1.11760	-	-	1.08000	-	-	14.1667	-	57.758	58.3978	-	58.0780
279	34-0079	0.02657	2.49495	8.300	-	0.66833	0.112500	0.014167	6.1667	168.333	51.443	46.8254	51.3605	49.8762
280	34-0086	0.09825	0.62500	32.625	-	-	0.302500	0.025000	20.0000	177.500	70.302	66.7728	64.7886	67.2878
281	34-0116	0.03492	3.63583	-	-	0.92917	-	-	8.9583	-	55.384	41.3990	-	48.3914
282	34-0142	0.03525	3.07967	-	-	0.75750	-	-	6.8750	-	55.521	43.7913	-	49.6560
283	34-0154	0.09306	1.23048	43.950	-	1.17750	0.295000	0.022500	28.1250	170.833	69.520	57.0113	67.7117	64.7476
284	34-0169	1.60233	0.61245	134.333	-	-	0.257500	0.508333	57.9167	253.333	110.558	67.0651	78.6722	85.4318
285	34-0171	0.03867	2.40000	10.033	1.35167	1.15333	0.193333	0.005000	13.3333	163.667	56.855	47.3845	53.2210	52.4868
286	34-0206	0.03033	2.55693	-	-	1.03708	-	-	8.0208	-	53.355	46.4718	-	49.9132
287	34-0217	0.04142	3.23763	9.260	1.21833	0.82250	0.160000	0.005000	8.9583	206.667	57.846	43.0705	52.4342	51.1167
288	34-0251	0.04533	1.26667	17.600	1.75833	1.54333	0.210000	0.005000	16.6667	175.667	59.148	56.5936	58.7341	58.1587
289	36-0018	0.14217	0.78507	118.925	-	-	0.466667	0.023333	47.5000	111.500	75.630	63.4870	77.4770	72.1980
290	37-0046	-	0.76200	-	-	-	-	-	-	-	-	63.9168	-	63.9168
291	38-0744	0.02637	3.10515	-	-	0.38458	-	-	24.5833	-	51.338	43.6726	-	47.5054
292	40-0001	0.08800	0.50000	83.700	1.92000	-	-	-	40.0000	130.000	68.713	69.9883	74.0312	70.9109
293	40-0002	0.41900	1.50000	90.000	2.47500	2.22000	0.250000	0.005000	30.0000	190.000	91.216	54.1572	74.7431	73.3722
294	40-0009	0.11800	0.40000	171.000	2.68000	-	-	-	30.0000	120.000	72.943	73.2037	81.0397	75.7289
295	40-0020	0.20100	0.30000	295.000	3.77000	3.62000	0.140000	0.010000	30.0000	100.000	80.624	77.3493	86.3892	81.4540
296	40-0031	0.42700	1.64540	256.000	4.57500	4.17000	0.400000	0.005000	40.0000	190.000	91.489	52.8241	84.9982	76.4370
297	40-0033	0.08500	1.00000	72.500	1.88000	-	-	-	30.0000	130.000	68.213	60.0000	72.6220	66.9450
298	40-0057	0.04800	1.30000	19.200	1.22500	1.14000	0.080000	0.005000	20.0000	130.000	59.973	56.2193	59.5877	58.5932
299	40-0063	0.05000	1.20000	31.000	1.84000	1.70000	0.130000	0.010000	20.0000	110.000	60.561	57.3727	64.2874	60.7405
300	40-0079	0.45400	0.30000	159.000	2.59500	-	-	-	50.0000	170.000	92.373	77.3492	80.3260	83.3494
301	40-0092	0.11800	0.52012	40.000	2.16500	2.23000	0.160000	0.005000	52.5000	140.000	72.943	69.4197	66.7879	69.7169
302	40-0092-03	0.28900	-	-	-	3.68000	-	-	35.0000	-	85.860	-	-	85.8599
303	40-0117	0.04800	1.10000	27.400	1.78000	1.65500	0.120000	0.005000	25.0000	153.000	59.973	58.6266	63.0764	60.5586
304	40-0119	0.20000	0.40000	71.600	3.59000	-	-	-	75.0000	170.000	80.552	73.2037	72.5268	75.4274
305	40-0124	0.05800	1.00000	53.300	2.15000	-	-	-	25.0000	140.000	62.702	60.0000	69.6039	64.1016
306	43-0012	0.45000	0.30000	247.000	5.35500	5.18000	0.170000	0.005000	40.0000	200.000	92.245	77.3493	84.6471	84.7472
307	43-0073	0.26800	0.90000	114.000	2.57000	-	-	-	40.0000	150.000	84.772	61.5182	77.0621	74.4508
308	43-0085	0.20800	0.30000	122.000	5.16500	-	-	-	52.0000	240.000	81.117	77.3492	77.7274	78.7313
309	43-0104	0.10000	1.50000	31.200	1.69000	-	-	-	30.0000	150.000	70.557	54.1572	64.3505	63.0214
310	43-0115	0.09900	0.30000	54.500	2.62500	-	-	-	60.0000	190.000	70.412	77.3492	69.8223	72.5277
311	46-0020	0.28100	0.30000	232.000	4.70500	-	-	-	50.0000	140.000	85.455	77.3492	84.0325	82.2789
312	46-0046	0.13500	0.30000	45.900	2.18500	-	-	-	40.0000	160.000	74.884	77.3492	68.1376	73.4570
313	46-0052	0.14300	0.20000	54.900	2.09500	-	-	-	45.0000	140.000	75.714	83.1920	69.8941	76.2666
314	46-0096	0.10800	0.30000	49.100	2.10500	-	-	-	45.0000	170.000	71.666	77.3492	68.7988	72.6048
315	47-0002	0.05400	1.30000	16.300	1.03000	-	-	-	10.0000	150.000	61.671	56.2193	57.9813	58.6239
316	47-0015	0.09400	2.00000	9.200	1.54500	-	-	-	25.0000	150.000	69.664	50.0117	52.3704	57.3488
317	47-0026	0.03300	1.20000	19.800	1.15500	-	-	-	7.0000	155.000	54.570	57.3727	59.8895	57.2773
318	47-0032	1.22267	0.51287	108.017	-	-	0.556667	0.018750	42.0833	209.167	106.659	69.6221	76.5332	84.2714
319	47-0038	0.11800	0.70000	75.500	2.64000	-	-	-	35.0000	180.000	72.943	65.1397	73.0197	70.3676
320	47-0042	0.72283	1.38007	-	-	1.48917	-	-	41.6667	-	99.079	55.3581	-	77.2188
321	47-0046	0.04200	0.70000	30.800	1.83000	-	-	-	15.0000	160.000	58.047	65.1397	64.2239	62.4703
322	47-0049	0.05900	0.70000	42.000	1.83500	-	-	-	15.0000	200.000	62.948	65.1397	67.2665	65.1181
323	47-0050	0.02600	1.50000	12.200	1.13000	-	-	-	10.0000	190.000	51.132	54.1572	55.1391	53.4760
324	47-0060	0.17200	0.30000	89.700	3.44500	-	-	-	40.0000	170.000	78.377	77.3492	74.7104	76.8122

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
325	47-0061	0.097000	0.80000	6.300	2.06500	-	-	-	40.0000	190.000	70.1173	63.2155	48.6556	60.6629
326	47-0062	0.074000	0.80000	22.400	1.90500	-	-	-	25.0000	160.000	66.2146	63.2155	61.0999	63.5100
327	47-0064	0.028000	1.80000	12.500	1.08500	-	-	-	10.0000	150.000	52.2004	51.5300	55.3774	53.0359
328	47-0068	0.032000	2.10000	15.700	0.93500	-	-	-	15.0000	170.000	54.1259	49.3087	57.6134	53.6827
329	47-0082	0.128000	0.60000	65.000	2.42000	-	-	-	20.0000	140.000	74.1163	67.3610	71.5507	71.0093
330	47-0095	0.111000	1.80000	17.900	1.20500	-	-	-	20.0000	160.000	72.0614	51.5300	58.8999	60.8304
331	47-0102	0.107000	0.50000	48.100	2.04500	-	-	-	15.0000	130.000	71.5322	69.9883	68.5969	70.0391
332	47-0119	0.059000	4.20900	9.200	0.79500	-	-	-	5.0000	140.000	62.9481	39.3204	52.3704	51.5463
333	47-0134	0.110000	3.00000	0.200	1.21000	-	-	-	25.0000	140.000	71.9309	44.1690	14.8114	43.6371
334	47-0177	0.234000	0.20000	109.000	3.20500	-	-	-	80.0000	160.000	82.8157	83.1920	76.6221	80.8766
335	48-0002	0.026727	2.37273	6.536	0.78536	0.72900	0.060900	0.00500	13.6364	89.455	51.5296	47.5492	49.0171	49.3653
336	49-0015	0.013000	2.60000	6.400	0.69500	-	-	-	15.0000	110.000	41.1366	46.2311	48.8103	45.3926
337	49-0016	-	2.12725	-	-	-	-	-	-	-	-	49.1229	-	49.1229
338	49-0019	0.050000	2.98704	-	-	0.83500	-	-	25.0000	-	60.5614	44.2314	-	52.3964
339	49-0024	0.016000	3.70000	5.600	0.60800	-	-	-	5.0000	110.000	44.1307	41.1469	47.5003	44.2593
340	49-0035	0.035000	1.70000	20.700	1.00500	-	-	-	15.0000	80.000	55.4181	52.3536	60.3256	56.0325
341	49-0079	0.018000	2.55000	7.800	0.80500	0.74000	0.060000	0.00500	6.2500	105.000	45.8292	46.5109	50.7510	47.6970
342	49-0081	0.012000	2.70000	3.700	0.80500	-	-	-	5.0000	100.000	39.9824	45.6872	43.4347	43.0348
343	49-0127	0.017500	2.90000	13.900	0.78000	0.72000	0.055000	0.00500	6.2500	97.500	45.4229	44.6575	56.4188	48.8331
344	49-0137	0.029917	2.36220	-	-	0.55333	-	-	8.5417	-	53.1552	47.6133	-	50.3842
345	52-0034	0.086000	0.50000	43.300	2.77000	-	-	-	45.0000	165.000	68.3817	69.9883	67.5656	68.6452
346	55-0004	0.417528	0.96243	78.025	-	1.02625	0.217083	1.20125	15.4167	211.607	91.1653	60.5518	73.3425	75.0199
347	56-0141	0.026875	2.02500	10.787	0.92000	0.86000	0.073750	0.01500	21.8750	130.000	51.6091	49.8327	53.9320	51.7913
348	56-0142	0.068500	1.75000	20.100	1.40000	1.29000	0.105000	0.00500	20.0000	185.000	65.1009	51.9359	60.0371	59.0246
349	56-0191	-	2.77368	-	-	-	-	-	-	-	-	45.2993	-	45.2993
350	56-0239	0.027625	2.67500	4.514	0.81125	0.74500	0.061250	0.00500	5.0000	-	52.0060	45.8213	45.3849	47.7374
351	56-0240	0.021000	1.95000	11.050	1.05000	0.98500	0.060000	0.00500	15.0000	210.000	48.0520	50.3766	54.1678	50.8655
352	56-0242	0.031479	2.65820	9.275	0.97000	0.86729	0.105000	0.00500	8.2813	180.000	53.8893	45.9121	52.4500	50.7505
353	56-0243	0.023750	2.62500	6.850	0.96000	0.89000	0.065000	0.00500	8.1250	180.000	49.8265	46.0932	49.4769	48.4655
354	56-0253	0.011500	7.10000	2.920	0.55000	0.49500	0.050000	0.00500	6.2500	255.000	39.3686	31.7550	41.1122	37.4120
355	56-0297	0.163000	-	-	-	0.64000	-	-	5.0000	-	77.6019	-	-	77.6019
356	56-0302-01	0.040000	2.65000	8.929	1.14437	1.03500	0.103750	0.00562	7.5000	-	57.3436	45.9566	52.0768	51.7923
357	56-0306	0.019000	6.10000	2.720	0.80650	0.74000	0.057750	0.00875	5.6250	-	46.6088	33.9426	40.4162	40.3225
358	56-0310	-	1.67640	-	-	-	-	-	-	-	-	52.5551	-	52.5551
359	56-0358	-	5.82930	-	-	-	-	-	-	-	-	34.5967	-	34.5967
360	56-0369	-	3.55358	-	-	-	-	-	-	-	-	41.7288	-	41.7288
361	56-0475	0.012500	5.15000	2.640	0.67500	0.61500	0.055000	0.00500	2.5000	170.000	40.5710	36.3821	40.1233	39.0255
362	56-0476	0.043000	-	-	-	0.76000	-	-	2.5000	-	58.3865	-	-	58.3865
363	56-0760	0.017750	2.65000	6.325	0.82750	0.81000	0.062500	0.00500	4.3750	198.750	45.6275	45.9566	48.6946	46.7596
364	56-0786	0.010000	2.90000	5.900	0.74500	0.68000	0.060000	0.00500	2.5000	190.000	37.3533	44.6575	46.0123	43.3410
365	58-0062	-	1.30387	-	-	-	-	-	-	-	-	56.1765	-	56.1765
366	58-0119	0.073000	-	-	-	1.10000	-	-	50.0000	-	66.0184	-	-	66.0184
367	58-0123	0.028333	3.92430	-	-	0.54667	-	-	32.5000	-	52.3710	40.2988	-	46.3349
368	58-0137	0.031000	2.00000	18.900	0.79500	-	-	-	15.0000	16.000	53.6681	50.0117	59.4332	54.3710
369	58-0138	0.039000	1.20000	36.000	1.08500	-	-	-	15.0000	88.000	56.9786	57.3727	65.7543	60.0352
370	58-0142	0.142000	0.70000	79.300	2.44500	-	-	-	50.0000	100.000	75.6130	65.1397	73.5015	71.4181
371	60-0305	0.033250	0.94615	-	-	1.43000	-	-	13.7500	-	54.6785	60.7977	-	57.7381
372	61-0064	0.043500	2.32500	26.250	1.14250	1.02250	0.115000	0.00500	6.2500	143.750	58.5532	47.8420	62.6558	56.3503
373	61-0067	0.060000	1.40000	18.950	1.27500	1.15500	0.115000	0.00500	25.0000	145.000	63.1904	55.1514	59.4591	59.2670
374	61-0072	0.075333	0.73333	67.667	1.93833	1.07333	0.260000	0.00500	33.3333	181.667	66.4721	64.4693	71.9452	67.6289
375	61-0130	0.045750	1.71186	14.777	-	0.85917	0.137083	0.01417	7.6042	215.000	59.2804	52.2533	57.0194	56.1844
376	62-0002	0.073000	0.70000	58.600	1.65250	1.75750	0.102500	0.02125	25.0000	131.500	66.0184	65.1397	70.5359	67.2307
377	62-0004	0.286500	0.39370	-	-	1.65000	-	-	62.5000	-	85.7346	73.4325	-	79.5836
378	62-0006	0.156333	0.36947	-	-	1.54500	-	-	34.1667	-	76.9997	73.5863	-	75.2940

21MINNL LAKES, BD=1975, "SUMMER", PCA,METC,CLMP

OBS	S	PT	SD	CHLA	N1	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
379	62-0011	0.592000	0.45720	-	-	5.8200	-	-	20.0000	-	96.200	71.2778	-	83.7390
380	62-0013	0.030000	1.70000	14.000	1.5859	1.2800	0.080000	0.025000	-	87.000	53.195	52.3536	56.4892	54.0127
381	62-0024	0.030000	1.00000	17.000	1.3950	1.2800	0.090000	0.025000	-	47.000	53.195	60.0000	58.3938	57.1964
382	62-0046	0.094000	1.39065	-	-	1.1225	-	-	35.0000	-	69.664	55.2460	-	62.4562
383	62-0056	0.043292	2.17228	9.375	1.2859	1.0029	0.052500	0.015000	10.0000	89.000	58.484	48.8210	52.5552	53.2868
384	62-0061	0.022500	2.21447	10.000	1.3900	0.9267	0.010000	0.062500	2.9167	119.000	49.047	48.5439	53.1884	50.2597
385	62-0073	0.025333	1.96737	10.450	1.7950	1.0533	0.010000	0.025000	10.0000	110.000	50.757	50.2486	53.6202	51.5421
386	62-0075	-	1.24097	-	-	-	-	-	-	-	-	56.8890	-	56.8890
387	62-0075-01	0.159000	-	-	-	2.5800	-	-	30.0000	-	77.244	-	-	77.2436
388	62-0075-02	0.233000	-	-	-	2.4400	-	-	40.0000	-	82.754	-	-	82.7540
389	62-0080	0.027000	1.23825	-	-	0.6700	-	-	10.0000	-	51.676	56.9206	-	54.2983
390	62-0081	0.914000	0.22860	-	-	11.1050	-	-	40.0000	-	102.463	81.2660	-	91.8646
391	62-0082	0.035000	2.59080	-	-	0.7450	-	-	6.2500	-	55.418	46.2822	-	50.8501
392	65-0006	0.188000	0.55245	-	-	1.5050	-	-	22.5000	-	79.659	68.5508	-	74.1051
393	66-0008	-	0.30480	-	-	-	-	-	-	-	-	77.1205	-	77.1205
394	66-0014	-	2.70510	-	-	-	-	-	-	-	-	45.6600	-	45.6600
395	66-0015	0.053250	2.05740	-	-	1.0950	-	-	17.5000	-	61.469	49.6040	-	55.5367
396	66-0018	0.274500	1.06680	-	-	2.2925	-	-	36.2500	-	85.118	59.0682	-	72.0929
397	66-0027	0.287500	0.34290	-	-	3.2475	-	-	40.0000	-	85.785	75.4233	-	80.6040
398	66-0029	0.042750	1.99303	11.700	1.6900	1.4012	0.160700	0.010000	28.7500	120.000	58.302	50.0620	54.7286	54.3643
399	66-0032	-	0.22860	-	-	-	-	-	-	-	-	81.2660	-	81.2660
400	66-0038	0.073500	0.99060	-	-	1.3250	-	-	22.5000	-	66.117	60.1361	-	63.1265
401	66-0039	0.075875	1.14770	102.000	1.7750	1.4950	0.090000	0.005000	16.2500	120.000	66.575	58.0149	75.9710	66.8538
402	66-0047	-	0.91440	-	-	-	-	-	-	-	-	61.2895	-	61.2895
403	66-0052	0.074000	0.68580	-	-	1.6575	-	-	18.7500	-	66.215	65.4250	-	65.8248
404	66-0055	0.081250	0.87630	-	-	1.7625	-	-	25.0000	-	67.562	61.9028	-	64.7326
405	69-0069	0.056146	1.72879	-	-	0.5523	-	-	19.0625	-	62.233	52.1117	-	57.1724
406	69-0118	0.009000	6.78180	-	-	0.3350	-	-	17.5000	-	35.834	32.6158	-	34.1249
407	69-0378	0.040167	1.98120	-	-	0.8233	-	-	45.0000	-	57.404	50.1478	-	53.7757
408	69-0553	0.022000	3.86080	-	-	0.3875	-	-	30.0000	-	48.723	40.5339	-	44.6284
409	69-0725	0.228667	0.80373	69.358	-	-	0.168333	0.010833	61.6667	88.750	82.483	63.1484	72.1874	72.6064
410	69-0775	0.075250	0.96803	47.300	-	-	0.124167	0.022083	74.1667	64.333	66.456	60.4682	68.4324	65.1189
411	69-0848	-	1.20396	-	-	-	-	-	-	-	-	57.3253	-	57.3253
412	70-0026	0.027875	2.40568	3.000	0.7750	0.8387	0.090000	0.005000	11.8750	140.000	52.136	47.3504	41.3774	46.9546
413	70-0050	0.190000	2.40000	5.400	2.7600	2.5200	0.140000	0.100000	-	47.000	79.812	47.3845	47.1436	58.1134
414	70-0052	0.600000	0.40000	280.000	4.1250	4.0000	0.100000	0.025000	-	145.000	96.394	73.2038	85.8773	85.1583
415	70-0054	0.175750	1.58180	16.500	2.7700	1.8775	0.540000	0.037500	37.5000	196.000	78.688	53.3921	58.1010	63.3936
416	70-0069	0.040000	1.10000	23.000	1.8650	1.5400	0.080000	0.025000	-	143.000	57.344	58.6266	61.7592	59.1098
417	70-0072	0.059000	0.70000	69.500	2.2650	1.6325	0.080000	0.025000	20.0000	163.000	62.948	65.1397	72.2074	66.7651
418	70-0091	0.447667	1.62070	227.000	4.9975	2.7842	0.165000	0.021250	32.5000	197.500	92.170	53.0420	83.8188	76.3437
419	71-0013	0.130000	0.70000	17.900	1.5800	-	-	-	50.0000	110.000	74.340	65.1397	58.8999	66.1265
420	71-0040	0.010000	-	-	-	0.5900	-	-	10.0000	-	37.353	-	-	37.3533
421	71-0055	0.088000	0.40000	96.100	1.6850	-	-	-	30.0000	110.000	68.713	73.2037	75.3865	72.4345
422	71-0057	0.049000	1.63286	-	-	1.1250	-	-	25.0000	-	60.270	52.9343	-	56.6022
423	71-0067	0.077500	1.00000	38.300	1.0750	0.5000	-	-	12.5000	110.000	66.881	60.0000	66.3619	64.4143
424	71-0069	0.062000	2.30000	24.500	1.0450	-	-	-	10.0000	80.000	63.663	47.9976	61.9790	57.8800
425	71-0081	0.036000	3.50000	7.000	0.5950	-	-	-	5.0000	150.000	55.824	41.9477	49.6894	49.1538
426	71-0082	0.032000	4.60000	5.900	0.5650	-	-	-	5.0000	170.000	54.126	38.0095	48.0123	46.7159
427	71-0141	0.181000	0.50000	59.300	2.1200	-	-	-	80.0000	140.000	79.112	69.9883	70.6504	73.2503
428	71-0146	0.100000	0.90000	66.000	1.3050	-	-	-	20.0000	110.000	70.557	61.5182	71.7005	67.9251
429	71-0147	0.138000	0.50000	78.500	1.6650	-	-	-	25.0000	110.000	75.201	69.9883	73.4020	72.8637
430	71-0158	0.098000	1.80000	13.400	1.0400	-	-	-	10.0000	120.000	70.265	51.5300	56.0594	59.2849
431	71-0159	0.067000	3.40000	5.700	0.8700	-	-	-	10.0000	115.000	64.782	42.3654	47.6740	51.6070
432	72-0013	0.130000	0.40000	123.000	3.8100	-	-	-	50.0000	130.000	74.340	73.2037	77.8075	75.1170

OBS	S	PT	SD	CHLA	NT	NTK	NMH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
433	72-0017	0.469000	0.50000	68.800	2.43500	-	-	-	80.0000	210.000	92.8417	69.9883	72.1081	78.3127
434	72-0049	0.201000	0.30000	83.300	3.70500	-	-	-	55.0000	200.000	80.6237	77.3492	73.9842	77.3190
435	72-0050	0.205000	0.30000	73.700	2.78000	-	-	-	47.0000	135.000	80.9078	77.3492	72.7830	77.0134
436	73-0014	0.242292	0.67627	-	-	1.63542	-	-	35.6250	-	83.3178	65.6366	-	74.4772
437	73-0023	0.047000	2.70000	9.900	0.70500	-	-	-	10.0000	150.000	59.6691	45.6872	53.0898	52.8154
438	73-0035	0.076000	1.60000	17.600	1.18500	-	-	-	10.0000	140.000	66.5992	53.2272	58.7341	59.5202
439	73-0037	0.020000	2.30000	6.600	0.70500	-	-	-	15.0000	160.000	47.3485	47.9978	49.1122	48.1528
440	73-0038	0.021000	3.50000	3.800	0.58500	-	-	-	10.0000	140.000	48.0520	41.9477	43.6964	44.5654
441	73-0051	0.012000	2.60000	9.900	0.82500	-	-	-	10.0000	150.000	39.9824	46.2311	53.0898	46.4344
442	73-0055	0.006000	1.74773	5.100	0.59500	-	-	-	5.0000	170.000	34.1355	51.9546	46.5828	44.2243
443	73-0070	0.075500	2.13056	9.592	1.13722	0.99167	0.156111	0.014167	42.7778	176.667	66.5040	49.1005	53.1802	56.2616
444	73-0072	0.114125	1.63750	34.600	1.46000	1.26500	0.175000	0.067500	48.1250	202.500	72.4618	52.8934	65.4217	63.5923
445	73-0076	0.013000	3.40000	5.200	0.71000	-	-	-	10.0000	160.000	41.1366	42.3654	46.7733	43.4251
446	73-0083	0.304500	0.55000	74.350	2.42000	2.13000	0.310000	0.080000	50.0000	180.000	86.6132	66.6148	72.8692	76.0324
447	73-0086	0.274000	0.75000	66.500	1.94000	1.67000	0.355000	0.030000	60.0000	180.000	85.0913	64.1455	71.7746	73.6705
448	73-0087	0.328000	0.70000	83.000	2.05000	1.80000	0.210000	0.040000	40.0000	180.000	87.6853	65.1397	73.9488	75.5913
449	73-0088	0.223000	0.40000	194.000	3.03500	2.62000	0.410000	0.005000	40.0000	150.000	82.1214	73.2038	82.2777	79.2010
450	73-0089	0.299000	0.60000	74.500	2.00000	1.80000	0.285000	0.110000	45.0000	180.000	86.3504	67.3610	72.8889	75.5334
451	73-0092	0.006000	3.50000	6.400	0.78000	-	-	-	10.0000	90.000	29.9872	41.9477	48.8103	40.2484
452	73-0102	0.014375	7.30000	1.500	0.67000	0.56750	-	-	3.7500	145.000	42.5864	31.3547	34.5776	36.1729
453	73-0106	0.028000	3.80000	7.000	0.79000	-	-	-	15.0000	210.000	52.2004	40.7626	49.6894	47.5508
454	73-0107	0.044000	2.60000	11.500	1.03500	-	-	-	20.0000	130.000	58.7180	46.2311	54.5594	53.1695
455	73-0117	0.015000	2.70000	7.700	0.99500	-	-	-	10.0000	180.000	43.2001	45.6872	50.6244	46.5039
456	73-0118	0.020389	3.83811	4.100	0.70500	0.56250	-	-	8.8889	150.000	47.6262	40.6188	44.4418	44.2289
457	73-0123	0.014000	2.30000	4.500	0.92000	-	-	-	5.0000	180.000	42.2052	47.9978	45.3550	45.1860
458	73-0128	0.017000	3.50000	4.300	0.87700	-	-	-	7.0000	185.000	45.0049	41.9477	44.9090	43.9539
459	73-0133-01	0.181233	0.80000	80.433	2.40000	1.96667	0.447333	0.032333	45.3333	156.667	79.1309	63.2155	73.6407	71.9957
460	73-0133-02	0.135000	0.55000	107.500	3.09500	2.84000	0.435000	0.007500	30.0000	130.000	74.8841	68.6148	76.4862	73.3284
461	73-0133-03	0.300500	0.50000	72.500	2.33000	1.97000	0.395000	0.115000	50.0000	180.000	86.4226	69.9883	72.6220	76.3443
462	73-0133-04	0.297500	0.50000	83.000	2.30000	1.98000	0.380000	0.145000	45.0000	180.000	86.2779	69.9883	73.9488	76.7383
463	73-0138	0.084625	2.05000	37.600	1.72750	1.58500	0.180625	0.048750	40.6250	172.500	68.1493	49.6559	66.1809	61.3287
464	73-0139	0.200000	1.60000	42.100	1.67000	-	-	-	25.0000	150.000	80.5517	53.2272	67.2899	67.0230
465	73-0147	0.120000	3.30000	19.200	1.21000	-	-	-	20.0000	190.000	73.1856	42.7956	59.5877	58.5230
466	73-0150	0.109875	2.38750	32.062	1.83375	1.47750	0.245000	0.111250	30.6250	-	71.9145	47.4597	64.6180	61.3308
467	73-0156	0.049000	3.00000	2.800	0.87500	-	-	-	30.0000	220.000	60.2700	44.1690	40.7006	48.3799
468	73-0157	0.218417	0.90833	82.625	2.41833	1.98667	0.451667	0.071667	72.0833	153.333	81.8220	61.3854	73.9044	72.3706
469	73-0159	0.039333	1.35907	23.592	-	-	0.209167	0.015000	19.5833	163.333	57.1013	55.5790	61.6084	58.0962
470	73-0196	0.083667	1.06680	-	-	1.11833	-	-	21.6667	-	67.9850	59.0682	-	63.5266
471	73-0199	0.110000	0.30000	70.500	2.29500	-	-	-	20.0000	150.000	71.9309	77.3492	72.3476	73.8759
472	73-0233	0.035000	2.40000	10.700	1.19500	-	-	-	10.0000	180.000	55.4181	47.3845	53.8521	52.2182
473	73-0273	0.056000	0.80000	28.500	1.78500	-	-	-	20.0000	170.000	62.1956	63.2155	63.4626	62.9579
474	77-0009	0.180750	0.29845	177.750	-	-	0.315000	0.015000	57.5000	122.500	79.0924	77.4239	81.4195	79.3119
475	77-0023	0.059500	1.85000	18.950	1.08500	0.92000	0.160000	0.005000	20.0000	180.000	63.0698	51.1352	59.4591	57.8880
476	77-0084	0.028104	2.69387	8.500	0.99000	0.82167	0.090000	0.005000	9.5312	165.000	52.2539	45.7200	51.5940	49.8560
477	77-0089	0.015000	-	7.600	0.79000	0.69000	0.095000	0.005000	20.0000	170.000	43.2001	-	50.4961	46.8481
478	77-0150	0.101500	0.85000	94.000	1.85375	1.59750	0.247500	0.008750	20.0000	-	70.7712	62.3419	75.1697	69.4276
479	77-0181	0.086000	1.00000	67.600	1.82750	1.54000	0.280000	0.007500	27.5000	150.000	68.3817	60.0000	71.9355	66.7724
480	77-0215	0.093000	1.64961	24.000	1.41500	1.29000	0.120000	0.005000	20.0000	160.000	69.5101	52.7872	61.7767	61.3580
481	80-0030	0.044750	1.86519	26.050	0.68625	0.59000	0.117500	0.013750	21.2500	-	58.9617	51.0174	62.5808	57.5200
482	80-0037	0.050667	1.00965	-	-	0.61000	-	-	13.3333	-	60.7524	59.8616	-	60.3070
483	81-0014	0.139000	1.30000	24.000	1.42500	1.32000	0.100000	0.005000	20.0000	210.000	75.3051	56.2193	61.7767	64.4337
484	81-0055	0.044000	1.40000	17.200	1.38000	-	-	-	25.0000	110.000	58.7180	55.1514	58.5654	57.4783
485	81-0095	0.252000	0.50000	113.000	2.55500	2.39000	0.160000	0.005000	30.0000	162.000	83.8844	69.9883	76.9757	76.9494

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
487	82-0049	0.026500	3.70000	3.800	0.56000	0.50000	0.055000	0.00500	2.5000	110.000	51.406	41.1469	43.6964	45.4166
488	82-0052	0.031875	2.90000	8.500	1.07000	0.87000	0.050000	0.05875	6.2500	82.125	54.069	44.6575	51.5940	50.1070
489	82-0080	0.024667	3.11694	-	-	0.52333	-	-	9.5833	-	50.373	43.6180	-	46.9953
490	82-0101	0.041250	2.00067	28.000	1.69500	1.10750	0.070000	0.02500	22.5000	80.000	57.787	50.0069	63.2889	57.0277
491	82-0103	0.039500	2.15053	-	-	0.97000	-	-	17.5000	-	57.162	48.9660	-	53.0641
492	82-0104	0.030500	4.26720	-	-	0.65500	-	-	10.0000	-	53.434	39.0917	-	46.2627
493	82-0106	0.020625	1.27500	9.750	1.26250	1.10250	0.095000	0.01500	2.5000	105.000	47.792	56.4991	52.9400	52.4104
494	82-0115	0.040000	1.50000	10.000	1.93000	1.74000	0.140000	0.05000	-	76.000	57.344	54.1572	53.1884	54.8964
495	82-0159	0.040000	1.05000	46.500	2.00500	1.77000	0.080000	0.02500	-	-	57.344	59.2969	68.6781	61.7729
496	82-0163	0.030000	1.55000	20.800	1.39500	1.32000	0.050000	0.02500	-	136.000	53.195	53.6847	60.3729	55.7510
497	82-0167	0.026750	2.90000	7.150	0.79375	0.71750	0.042500	0.02375	6.2500	102.000	51.542	44.6575	49.8974	48.6989
498	82-2001	0.045500	1.90500	-	-	0.51500	-	-	2.5000	-	59.201	50.7130	-	54.9572
499	83-0060	0.085000	0.70000	40.500	1.78500	-	-	-	25.0000	130.000	66.213	65.1397	66.9994	66.7542
500	86-0009	0.061667	-	-	-	1.08333	-	-	28.3333	-	63.586	-	-	63.5855
501	86-0011	0.019000	5.70000	6.100	0.53000	-	-	-	10.0000	100.000	46.609	34.9199	48.3393	43.2893
502	86-0023	0.076333	0.70000	82.700	1.65500	1.54500	-	-	12.7778	140.000	66.662	65.1397	73.9133	68.5718
503	86-0041	0.195500	0.82282	66.100	2.04500	2.60000	-	-	25.0000	130.000	80.224	62.8103	71.7154	71.5831
504	86-0051	0.071500	1.28580	27.900	1.32000	1.16667	-	-	23.3333	270.000	65.719	56.3776	63.2538	61.7835
505	86-0053	0.036333	4.11187	6.200	0.69500	0.74000	-	-	5.8333	130.000	55.957	39.6260	48.4988	48.0274
506	86-0069	0.044000	1.30000	15.700	1.07000	-	-	-	25.0000	240.000	58.718	56.2193	57.6134	57.5169
507	86-0089	0.128000	0.40000	88.000	2.70500	-	-	-	40.0000	140.000	74.116	73.2037	74.5227	73.9476
508	86-0090	0.356000	0.85980	87.212	-	-	0.338750	0.03125	28.1250	171.250	88.867	62.1767	74.4345	75.1592
509	86-0106	0.445000	1.30000	10.800	4.18000	-	-	-	25.0000	180.000	92.084	56.2193	53.9433	67.4156
510	86-0114	0.131000	1.00000	73.300	2.49500	-	-	-	20.0000	150.000	74.450	60.0000	72.7296	69.0600
511	86-0120	0.124333	1.10957	75.600	2.62000	1.74667	-	-	28.3333	150.000	73.697	58.5017	73.0327	68.4105
512	86-0134	0.050000	3.30000	5.000	1.50000	1.37000	0.090000	0.04000	2.5000	130.000	60.561	42.7956	46.3886	49.9152
513	86-0146	0.026500	3.46693	4.800	0.86500	0.71250	-	-	11.5625	140.000	51.406	42.0845	45.9881	46.4930
514	86-0148	0.066000	1.40000	31.100	1.08500	-	-	-	10.0000	110.000	64.565	55.1514	64.3190	61.3451
515	86-0156	0.050000	1.50000	32.400	1.60000	-	-	-	20.0000	130.000	60.561	54.1572	64.7207	59.8131
516	86-0163	0.055000	3.30000	12.400	0.75000	-	-	-	12.0000	160.000	61.936	42.7956	55.2986	53.3433
517	86-0178	0.083000	0.60000	87.300	1.95800	-	-	-	20.0000	110.000	67.870	67.3610	74.4443	69.8917
518	86-0184	0.841000	0.30000	113.500	3.19500	2.77500	0.415000	0.00500	30.0000	-	101.263	77.3493	77.0190	85.2103
519	86-0188	0.363000	0.20000	256.000	4.57500	-	-	-	40.0000	180.000	89.147	83.1920	84.9982	85.7792
520	86-0190	0.221000	0.50000	80.900	3.31000	-	-	-	40.0000	190.000	81.992	69.9883	73.6974	75.2257
521	86-0193	0.043000	1.30000	30.400	1.19000	-	-	-	5.0000	140.000	58.387	56.2193	64.0957	59.5672
522	86-0199	0.047000	1.50000	28.800	1.33000	-	-	-	10.0000	160.000	59.669	54.1572	63.5653	59.1306
523	86-0208	0.139000	0.70000	95.600	2.59000	-	-	-	35.0000	150.000	75.305	65.1397	75.3353	71.9267
524	86-0217	0.122000	1.40000	25.600	2.42000	-	-	-	15.0000	140.000	73.424	55.1514	62.4098	63.6617
525	86-0227	0.048833	1.68740	16.700	1.12200	1.00333	-	-	11.6667	145.000	60.221	52.4608	58.2192	56.9670
526	86-0229	0.152000	0.50000	131.000	2.62500	-	-	-	40.0000	100.000	76.594	69.9883	78.4257	75.0028
527	86-0230	0.114000	1.10000	56.900	2.13000	-	-	-	25.0000	100.000	72.446	58.6266	70.2451	67.1059
528	86-0234	0.048000	5.50000	2.400	0.62500	-	-	-	10.0000	150.000	59.973	35.4346	39.1883	44.8652
529	86-0251	0.047000	2.30000	11.800	0.74500	0.46500	-	-	12.5000	150.000	59.669	47.9978	54.8121	54.1597
530	86-0252	0.061208	1.35634	53.398	-	1.05667	0.202063	0.01125	19.8958	142.500	63.478	55.6080	69.6055	62.8971
531	86-0252-01	0.084500	1.32080	-	-	0.95000	-	-	30.0000	-	68.128	55.9906	-	62.0593
532	86-0252-02	0.087000	1.42240	-	-	0.82000	-	-	25.0000	-	68.548	54.9227	-	61.7355
533	86-0263	0.131833	2.22500	38.942	3.02000	1.07750	0.363333	1.70333	26.2500	210.000	74.542	48.4755	66.5251	63.1806
534	86-0273	0.043000	0.80000	24.800	1.06000	-	-	-	17.0000	190.000	58.387	63.2155	62.0984	61.2335
535	86-0279	0.028167	3.89340	4.100	0.73200	0.50417	-	-	7.0556	160.000	52.286	40.4127	44.4418	45.7135
536	86-0281	0.119000	0.71543	-	-	1.33417	-	-	28.7500	-	73.065	64.8254	-	68.9452
537	86-0282	0.343083	0.79798	-	-	1.56667	-	-	33.7500	-	88.334	63.2519	-	75.7927
538	86-0284	0.090667	1.04140	-	-	1.30900	-	-	30.0000	-	69.144	59.4154	-	64.2796
539	86-0288	0.038000	2.20000	17.900	0.85000	-	-	-	10.0000	145.000	56.604	48.6383	58.8999	54.7141
540	86-0289	0.022667	2.76462	-	-	0.60667	-	-	5.0000	-	49.153	45.3464	-	47.2499

MPCA LAKE CLASSIFICATION PROJECT (314A)
21PINNL LAKES, BD=1575, "SUMMER", PCA,METC,CLMP

OBS	S	PT	SD	CHLA	NT	NTK	NNH3	N23	COLOR	ALK	TSIP	TSIS	TSIC	AVTSI
541	86-0293	0.0620	1.20000	37.5	2.36	-	-	-	20.0	180	63.6633	57.3727	66.1548	62.3969
542	86-0297	0.4515	1.08373	-	-	1.35	-	-	42.5	-	92.2933	58.8413	-	75.5473
543	86-0298	0.0790	0.84667	-	-	1.44	-	-	47.5	-	67.1574	62.3985	-	64.7780

APPENDIX E

REMOTE SENSING APPLICATIONS IN AGRICULTURE AND FORESTRY

RSL RESEARCH REPORT 81-1 June 30, 1981

ASSESSMENT OF THE TROPHIC CONDITION OF SELECTED MINNESOTA LAKES THROUGH ANALYSIS OF LANDSAT DIGITAL MULTISPECTRAL SCANNER DATA

by

T.M. Lillesand, W.L. Johnson, R.L. Deuell, O.M. Lindstrom and D.E. Meisner

Final Report - Research sponsored by the Minnesota Pollution Control Agency (MPCA) under Contract No. 32100-07621/32100-07622.

A REPORT OF RESEARCH
by the
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of the
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Institute of Agriculture, Forestry and Home Economics
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St. Paul, Minnesota

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B. Classification of Lakes in the Ottertail Lakes Study Area
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ASSESSMENT OF THE TROPHIC CONDITION OF SELECTED MINNESOTA LAKES THROUGH ANALYSIS OF LANDSAT DIGITAL MULTISPECTRAL SCANNER DATA[1]

by

Thomas M. Lillesand, William L. Johnson, Richard L. Deuell,
Orville M. Lindstrom, and Douglas E. Meisner

ABSTRACT

Concurrent Landsat Multispectral Scanner (MSS) and ground data were obtained for 60 Minnesota lakes distributed in two Landsat scene areas. The ground data included measurement of secchi disk depth, chlorophyll-a, total phosphorous, turbidity, color, and total nitrogen; as well as Carlson Trophic State Index (TSI) values derived from the first three parameters. The Landsat data best correlated with the TSI values. Prediction models were developed to estimate the TSI's of some 100 lakes appearing in the two analysis scenes. Clouds, poor image data, small lake size, and shallow lake depth caused some problems in lake TSI prediction. Overall, however, the Landsat-predicted TSI estimates were judged to be very reliable for the secchi-derived TSI estimation, moderately reliable for prediction of the chlorophyll-a TSI, and unreliable for the phosphorous value.

Numerous Landsat data extraction procedures were compared and the integrity of the Landsat prediction models was a strong function of the procedure employed. Multidate Landsat and ground data were unavailable to perform a multitemporal analysis.

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INTRODUCTION

This report summarizes a one year pilot project aimed at assessing if, and how, Landsat satellite data might assist the Minnesota Pollution Control Agency (MPCA) in complying with Section 314(a) of the Clean Water Act of 1977 (PL95-217). Section 314(a) mandates that each state identify and classify its public freshwater lakes according to their trophic condition. In Minnesota, this involves classifying some 3,000 to 4,000 lakes (depending upon the definition of "public lake"). The data collection and analysis necessary for such a classification entails numerous logistical problems and substantial costs. Faced with these problems, the MPCA contracted with the University of Minnesota Remote Sensing Laboratory (RSL) to perform the pilot project reported herein. The basic approach taken in the study was to compare MPCA-supplied ground data collected during 1980 on some 60 lakes to the digital multispectral image values measured by Landsat on the same lakes. Statistical models relating the two data sets were developed and they were subsequently used to estimate the trophic state of approximately 100 additional lakes on the basis of the Landsat data alone.

This report summarizes the pilot project in the following manner. First, the geographical areas of investigation and the form of the Landsat and ground data made available for the study will be discussed. Second, the methods used to develop and calibrate the trophic status estimation models will be presented, along with a discussion of the overall statistical integrity of each model. Third, the methods used to classify the 104 "test" lakes with the Landsat data will be discussed. (A table listing the trophic state estimates for each of these lakes is presented in Appendix B and Appendix C of this report). Lastly, the conclusions and recommendations resulting from this effort will be summarized.

It should be noted that it is not our intention in this report to summarize the details of how the Landsat satellite multispectral scanner (MSS) works, nor how MSS data have been used to estimate water quality in a multitude of previous studies. These subjects are adequately treated elsewhere.[1,2] Our intention here is to summarize the work performed by the RSL in the pilot project and to comment on the apparent effectiveness of this approach. We intend to present the technical details of our effort in the scientific literature at a later time.

STUDY AREAS/AVAILABLE DATA

Figure 1 depicts the location of the lakes used to calibrate our trophic state estimation models. These lakes appear in two Landsat scene areas (path/row 29/29 and 31/28), one covering the Twin Cities metropolitan area and its surroundings, and the other covering the Ottertail Lakes region of West-Central Minnesota. These scene areas were chosen by MPCA as being typical of the range of lake conditions found throughout most of the state. In addition, the location of the study areas comparatively close to the Twin Cities enabled thorough field analysis within the limits of project funds.

Landsat Data

It was our original intention to analyze data from several dates within each scene area. Regrettably, adverse weather conditions and NASA data processing difficulties limited the availability of Landsat imagery to two dates in the Ottertail Lakes region (June 25 and August 18, 1980) and one date in the metropolitan region (July 29, 1980). One of these scenes, the June 25 Ottertail Lakes image, was omitted from full analysis due to insufficient concurrent ground data (only six lakes had been sampled). Thus, the analysis was

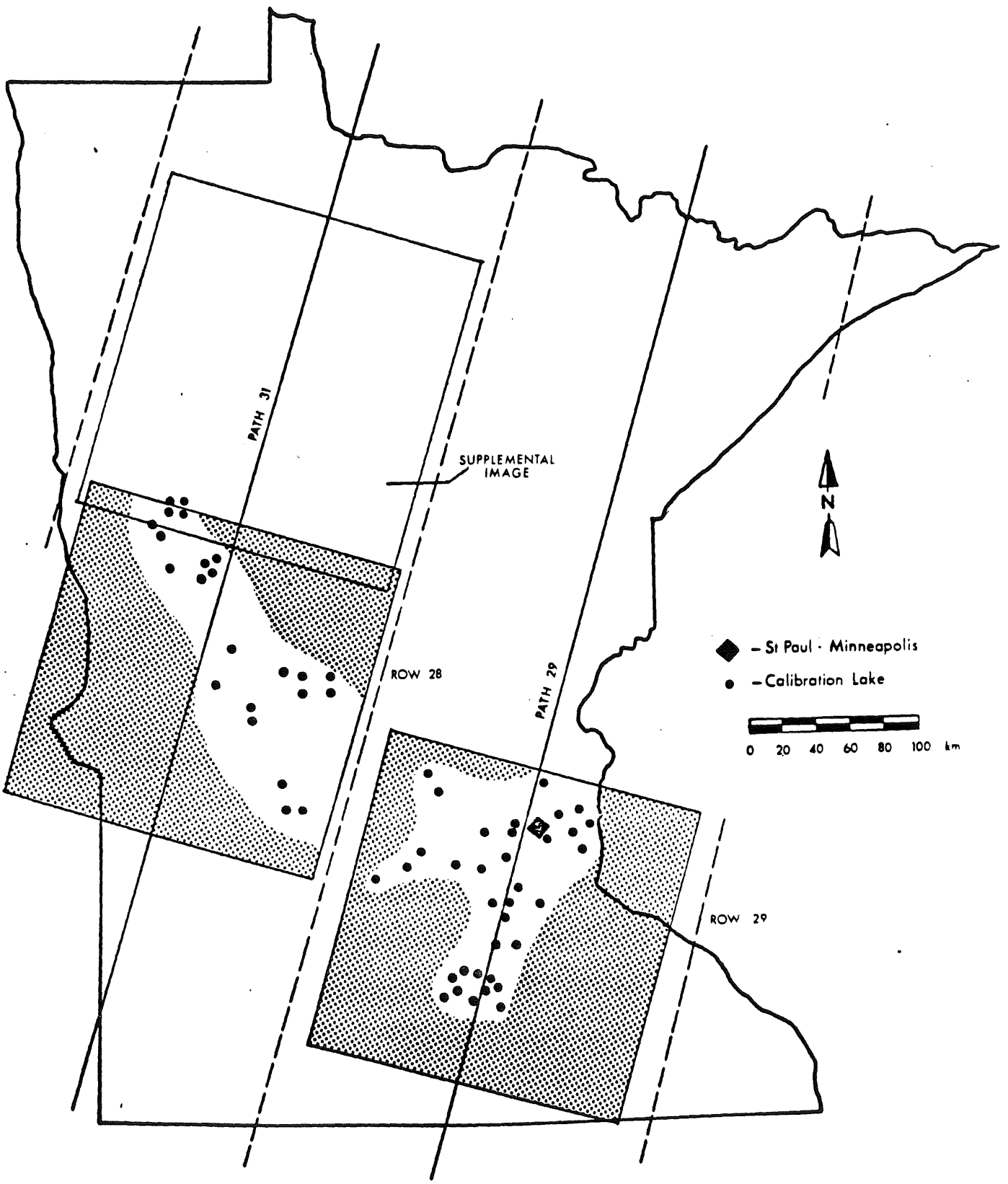


Figure 1. Study Areas

performed on one date within each area and no atmospheric normalization between scenes was necessary.

Figures 2, 3, and 4 are full-scene photographic prints of the Landsat scenes which were analyzed. Figures 2 and 3 show the two consecutive frames of imagery covering the Ottertail Lakes region for August 18, 1980. All of these images are from the Band 7 (near infrared, 0.8 - 1.1 μm) spectral channel of the Landsat Multispectral Scanner. This channel, one of four in the MSS, provides the maximum contrast between the lakes and surrounding land.

The Ottertail Lakes area appears in the top center through the lower right portion of Figure 2. Due to orbit-to-orbit variation in the scene center location, this image did not include the entire study area (as had been intended), necessitating the additional use of the next scene to the north (Figure 3). The quality of these images was very good except for the presence of clouds which obscured a number of the study lakes.

Figure 4 shows the Twin Cities Metropolitan area in the top center portion of scene 29/29. This scene was of marginal quality, included some cloud cover (center of left edge) and numerous bad data lines. Whereas the Ottertail Lakes images had been fully processed by NASA (including geometric correction and full-scene photographic generation), the Metropolitan area scene had been lost in the NASA processing stream. Fortunately, a pre-correction computer compatible tape of this scene was obtained, from which the full-scene print shown in Figure 4 was generated by the RSL on a Dicomed image recorder. Although this image is not geometrically corrected, it was still fully usable for the study.

Ground Data

The ground data supplied for each of the two study areas were of two forms. The first was MPCA-collected observations of secchi disk depth (in meters) chlorophyll-a concentration (μg/l), total phosphorous(μg/l), turbidity (FTU),

Figure 2. August 18, 1980, Landsat MSS Band 7 image of Ottertail Lakes study area (Path 31, Row 28).

Figure 3. August 18, 1980, Landsat MSS Band 7 image providing supplemental coverage of Ottertail Lakes study area (Path 31, Row 27).

Figure 4. July 29, 1980, Landsat MSS Band 7 image of Twin Cities metropolitan study area (Path 29, Row 29).

color (Pt-Co), and total nitrogen (µg/l). These samples were taken via float plane within 1-1/2 days of the Landsat overpass.

The second source of ground data was the Citizen Lake Monitoring Program (CLMP), coordinated by MPCA. The CLMP set contained data only for secchi disk depth and limited observations for total phosphorous and color. Because variations in sampling error between observers was anticipated, the CLMP data were not used in the modeling process, but were used as supplementary data to evaluate the model results. All model development was done using the MPCA-collected data only.

In the case of the Ottertail Lakes scene, ground data from a total of 32 sample points located on 25 "calibration" lakes were made available for modeling. Wind problems precluded the collection of secchi disk data at eight of these sampling points and clouds obscured the Landsat image of seven of the lakes. For the Metropolitan scene, data on 31 sample points located on 28 calibration lakes were used in the modeling process.

Supplemental Aerial Photographs/Bathymetric Charts

To assist in analyzing the Landsat data, the RSL acquired aerial photographs of all calibration lakes at the time of Landsat overflight. These images were recorded on color and color infrared film, at a scale of 1:65,000, using a motor-driven 35 mm Nikon F2 camera. Enlargements of the infrared photographs were assembled into mosaics depicting each calibration lake at a scale of 1:18,000. The resulting mosaics were valuable in documenting lake conditions in much finer detail than that available from the Landsat data and aiding the image analysts in interpreting the digital portrayal of the lakes. Such features as aquatic vegetation, bottom effects, algae blooms, sediment plumes, etc. could be clearly seen on the aerial imagery.

The aerial photographs were referenced in conjunction with MPCA-supplied bathymetric charts for each lake. In addition to the depth contours, the locations of all sampling points were indicated on these charts.

MODEL CALIBRATION

Parameters Modeled

Per mutual agreement between the MPCA and the RSL, two directions were pursued in the modeling effort. The first was to develop statistical models through which the Landsat data could be used to estimate the Carlson Trophic State Index (TSI).[3] The second was to investigate the development of models for estimating each of the six "raw" water quality measurements made on each lake. Accordingly, MPCA supplied four Carlson TSI values in addition to the six raw measurements for each calibration lake. The first three TSI values were computed from the secchi, chlorophyll-a, and total phosphorous readings, and the fourth was the average of the first three. Suspecting great variability in the phosphorous-derived TSI value, MPCA expressed an interest in modeling a fifth TSI value, which was the average of the TSI's computed from the secchi disk and chlorophyll-a parameters only. Thus, 11 parameters (five TSI's and six raw values) were modeled during the study. Statistical variates of the ground data (such as principal components) were not modeled in that MPCA wished to relate any final lake classification parameter directly back to corresponding raw field data.

Landsat Data Extraction Procedures

The Landsat data samples were extracted from the full scene digital data tapes obtained from NASA. To facilitate this process, segments of the full scene were displayed on an interactive image analysis system at the RSL. This equipment allows the analyst to view the Landsat data in contrast enhanced

color, automatically mask out land features in the scene, electronically magnify the image to observe the full detail in the data, and to outline ground areas over which digital data should be extracted. Some 37 image segments were analyzed in the Ottertail Lakes scene, and 46 in the Metropolitan scene. Each segment contained 240 rows and 240 columns of picture elements (pixels). Pixels in the Ottertail Lakes area were nominally 60m square at ground level. Those in the Metropolitan scene were 60m x 80m in size.

Five different sampling methods were used to collect the Landsat data on each calibration lake, enabling a comparison between techniques. Each of these methods is outlined below:

- single point: the single Landsat pixel corresponding to the water sample location was sampled. The sample position was located on the display by viewing the bathymetric chart for the lake under analysis. This type of sample avoids the potential problem of variation in the lake water condition away from the sample point.
- 3x3 and 5x5 neighborhoods: the computer also automatically sampled squares of 3x3 and 5x5 pixels surrounding the single point. Because the Landsat data contain a slight amount of electronic noise, these methods were intended to "smooth out" the spurious variations which may have occurred at the single pixel. Thus, the averaged value may be a more accurate indication of the ground radiance at the water sample point. When sampling very small or narrow lakes, the neighborhoods occasionally included some land pixels. These values were detected by their high variances and omitted from any subsequent analysis.
- interior sample: observing the bathymetric chart and aerial photographs, the analyst outlined a "deep water" region of depth greater than twice the secchi disk measurement for each calibration lake. This insured the

avoidance of "bottom effect," where the scanner views the lake bottom as well as the water. The analyst also avoided weedbeds, marinas, clouds, cloud shadows, and other anomalies observed either on the enhanced Landsat display or on the low altitude photography. This sampling approach further extends the "data smoothing" concept of the neighborhood samples, at the expense of possibly integrating over a variety of water quality zones within a lake.

- exterior sample: this approach involved outlining the entire lake, taking care not to include any other lakes within the outline. After collecting all of the Landsat data within the outline, a Band 7 threshold was used to discard all nonlake pixels. This approach provides no analyst intervention to avoid problems such as bottom effects. However, it is considerably more convenient operationally.

Each of the above techniques was employed on all of the calibration lakes by two image analysts working independently. This provided a means of cross-comparing variations between operators and methods, as well as providing checks on all data used in model development. The various sampling techniques were compared by computing correlation coefficients between the Landsat MSS and the TSI variables. The correlation coefficients for the Ottertail Lakes data consistently showed the interior samples to best fit all TSI's. This indicates that the smoothing effect of the larger sample was more important than the localized attribute of the point and neighborhood samples. Further suppporting this finding was the exterior data, which also provided significantly higher correlation coefficients than the point or neighborhood data. The Metropolitan scene data exhibited a much smaller range in correlation values but the sampling techniques were ranked in the same order as with the Ottertail data. Also,

significant differences between operators were observed for the point, 3x3 pixel and 5x5 pixel methods. Differences between operators were insignificant for the interior and exterior sampling methods. Based on these results, the modeling effort was focused on the interior and exterior Landsat samples only.

Modeling Results

The product of the data extraction process was a series of tables listing for each of the calibration lakes the mean radiance (digital number) and variance in each of the four Landsat MSS channels and the corresponding eleven MPCA water quality measurements. A separate table was generated for each of the two scene areas and two Landsat sampling techniques (interior and exterior).

All model development was performed using the Multreg Statistical Analysis Package developed at the University of Minnesota.[4] A series of regression models was derived, each estimating one of the 11 water quality variables using the Landsat data. In addition to the original Landsat variables, several transformed values were used. These included radiance squared and various ratios of two channels. A variable screening algorithm in Multreg was used to select the most effective combination of variables for each model. Several models were developed for each water quality variable. The statistical criteria used to select the "best" model for each parameter were many and varied. Suffice it to say here, the models chosen were those thought to have the best overall predictive accuracy when applied to the range of lakes to be classified in the two scenes. The interior models proved to be superior to the exterior models in this regard. Hence, we will provide additional details only on this final set of models.

TSI Models

Table 1 lists the Landsat variables used in each of the final models for estimating the Carlson TSI values. The numbers 4-7 refer to the Landsat MSS channels (channels 1-3 were for a different sensor system no longer operational). Band 4 represents green reflectance (0.5-0.6 μm wavelength), band 5 is red reflectance (0.6-0.7 μm) and 6 and 7 are near infrared reflectance (0.7-0.8 and 0.8-1.1 μm, respectively). The squared terms refer to the channel variables squared, and the 4/5 refers to the ratio computed between band 4 and 5 brightness values. Table 1 also lists the regression correlation coefficients (r^2), the standard errors of estimate (rms residuals), and a measure of percent inaccuracy for each model. The regression correlation coefficient is a measure of the fit of the regression equation to the data with a maximum possible value of 1.0. The more variables included in a model, the higher r^2 will be, so direct comparisons between models using this statistic can be made only when the models under analysis have equal numbers of variables. The standard error of estimate has the same units as the predicted quantity, and is the standard deviation. Approximately 68 percent of the measurements are expected to be within one standard deviation. The estimated percent inaccuracy is simply the ratio (expressed as a percentage) of the standard error to the mean of the observed values used to develop the model.

The results shown in Table 1 indicate that the total phosphorous variable could not be accurately fitted. This had been anticipated by MPCA personnel, due to the inherent variability in this parameter. In addition, Table 1 shows that a higher overall level of success was realized with the Ottertail Lakes area data. This was also anticipated by the MPCA personnel, due primarily to a much larger range of lake conditions across the Metropolitan scene. The

Table 1. Summary of prediction models for Carlson TSI values.

Ottertail Lakes Area (August 18, 1980)

Variables (MSS bands)	r^2	rms	rms/mean (%)
Secchi (a)			
5, 6, 7, $\overline{5^2}$	0.94	1.93	3.9
Chlor (b)			
5, 6, 7, 5^2	0.84	3.88	7.0
TP (c)			
6, 7, 4/5	0.43	8.25	15
Ave (a,b,c)			
6, 7^2, 4/5	0.87	3.51	6.4
Ave (a,b)			
6, 7, 4/5	0.92	2.72	5.1

Metropolitan Twin Cities Area (July 29, 1980)

Variables (MSS bands)	r^2	rms	rms/mean (%)
Secchi (a)			
4, 5, 6^2, 7^2, 4/5	0.88	4.13	7.5
Chlor (b)			
4, 5, 6, 7, 4/5	0.84	6.38	10
TP (c)			
6, 4^2, 5^2, 7^2, 4/5	0.69	8.79	14
Ave (a,b,c)			
4, 5, 6, 7^2, 4/5	0.87	4.82	8.0
Ave (a,b)			
4, 5, 6, 7, 4/5	0.90	4.35	7.5

number of variables required to obtain a suitable model was higher for the Metropolitan scene data, indicating the need for more complex models. As expressed by the rms residuals (a measure of the average error found when applying the model to the calibration lakes), the TSI estimates for the Ottertail Lakes area data was generally accurate to ±4 TSI units, whereas the Metropolitan scene accuracy ranged ±6 units (excluding the total phosphorous TSI variable). Appendix A lists the coefficients for each of the TSI models summarized in Table 1.

Models for "Raw" Data. Table 2 summarizes the results of modeling the raw data from the Landsat values. Among other things, this table illustrates the generally poor performance of the "raw" models in comparison to their TSI counterparts (in terms of the higher rms/mean values). In short, the transformation into TSI values generally improves the statistical integrity of the models. At the same time, the TSI transformation makes for less complex model forms. In general, the raw values were not modeled well enough to use them as a basis for subsequent classification of the test lakes. Accordingly, classification was undertaken using the TSI parameters only.

LAKE CLASSIFICATION

Data Extraction

The aforementioned models were used to predict the Carlson TSI values for a total of 32 lakes in the Ottertail scene and 72 in the Metropolitan scene. The data extraction procedure used to collect the Landsat values for these lakes varied only slightly from that used to develop the interior models. In the modeling effort, the secchi disk reading for each lake was available and it was used to define the sampling area to be used in the model. That is, the analyst avoided any areas of the lake having a depth less than twice the secchi

Table 2. Summary of prediction models for "raw" water quality parameters.

Ottertail Lakes Area (August 18, 1980) Variables (MSS bands)	r^2	rms	rms/mean (%)
Secchi			
$5, 6, 7, 5^2, 6^2, 7^2, 4/5$	0.98	0.16	6.4
Chlor			
$4, 5, 6, 4^2, 5^2, 6^2, 7^2, 4/5$	0.95	5.90	31
TP			
$4, 5, 7, 4^2, 5^2, 4/5$	0.73	20.2	47
Turbidity			
$4, 5, 7, 4^2, 5^2, 4/5$	0.87	0.89	37
Color			
$4, 6, 7, 4^2, 6^2$	0.75	4.76	33
Nitrogen			
$4, 5, 7, 4^2, 5^2, 7^2, 4/5$	0.79	186	19

Metropolitan Twin Cities Area (July 29, 1980) Variables (MSS bands)	r^2	rms	rms/mean (%)
Secchi			
$4, 6, 5^2, 6^2, 7^2, 4/5$	0.91	0.57	30
Chlor			
$6^2, 7^2$	0.77	38.2	67
TP			
$5, 6, 5^2, 7^2$	0.69	76.4	67
Turbidity			
$6, 6^2, 7$	0.90	2.27	37
Color			
$4, 5, 6, 7, 5^2, 6^2$	0.83	4.85	25
Nitrogen			
$4, 5^2, 6^2, 7^2, 4/5$	0.90	326	20

reading. In the classification process, the secchi depth reading was not known. Accordingly, Landsat pixel values were generally extracted from all areas of a lake having depths greater than 15'. It was felt that this criterion would minimize data degradation from such influences as bottom effect and submerged vegetation. In collecting the data, the image analyst again avoided any extraneous scene elements such as algae blooms. Any unique tonal qualities or other characteristics of the lakes were noted on a lake-by-lake basis.

When lakes contained several geographically distinct lobes or bays, and/or apparently distinct trophic zones, separate samples were taken in each sub-area. Where possible, lakes having multiple samples were divided geographically according to MPCA's bay identification system. In all cases, the sub-areas used were delineated on the bathymetric chart for the lakes.

Lakes with depth less than 15' were visually evaluated and samples were taken only if bottom effects were not evident to the analyst. In such cases, the sampling was performed within the confines of the 10' contour. In a limited number of cases, depths of less than 10' were sampled if bottom effects were not evident in the Landsat data. Again, notes were taken to document the particulars of the sampling process employed on each lake.

Classification Results

The predicted Carlson TSI values for the lakes in the Ottertail and Metropolitan scene comprise the tables in Appendix B and Appendix C, respectively. The tables are organized by county, using the MPCA lake identification numbering system, and the MPCA-supplied estimate of surface area. This information is followed by the predicted secchi, chlorophyll-a, and total phosphorous TSI values for each lake. The "TSI AVE. a, b, c" column contains the predicted values for the average of the secchi, chlorophyll-a, and total phosphorous

parameters. It should be noted that this column is not simply the arithmetic average of the previous three. Rather, it contains the results of a separate prediction model for the average. The "TSI AVE. a, b" column contains similar information for the predicted value of the average of the secchi and chlorophyll-a values. All values represent the average observation of two image analysts. The "Remarks" column states any qualification about the predictive values, such as depths used were less than 15', etc.

In cases where the predicted TSI was above the range used to develop the prediction model, no attempt was made to extrapolate beyond the upper model bound. These cases are indicated with "greater than" (>) symbols.

It can be seen from the classification tables that not all of the test lakes could be classified. This happened for various reasons. Some lakes were cloud covered in the Landsat image, or they simply were located outside the scene area. Some lakes were located in areas of inferior image data, or noise. Others were so shallow that bottom effects clearly precluded accurate model prediction. Others were so small that fewer than 20 pixels of reliable lake data could be collected. In such cases, there was great variation between the data obtained by the two image analysts--indicating inadequate sample size and extraneous pixel values.

Also deleted from the classification analysis were lakes that manifested dramatic tonal anomalies on the interactive display. Algae blooms, bottom effects, extensive weedbeds, among other things, could have been responsible for these anomalies. Reliable TSI predictions could not be made under these conditions.

Overall, approximately 85 percent of the lakes in the Ottertail scene and 60 percent of the lakes in the Metropolitan scene were classified. A number of lakes contained sub-areas in distinct trophic states. These areas are indicated by (01), (02), etc. Their location has been annotated on the appropriate bathymetric charts.

Reliability of Classification

Ideally, one could assess the reliability of the Landsat classification by comparing the Landsat vs. the MPCA data for a large random sample of the classified lakes. Regrettably, logistics and monetary constraints did not permit concurrent MPCA data collection for this purpose. Hence, historical MPCA data will have to be used to assess the overall reliability of the Landsat classification. However, it is possible to make some a priori judgements of classification comparative reliability for the various models by other means. Figures 5 and 6 are included for this purpose. They show graphs of the relative performance of the final prediction models for each scene. Plotted on these graphs are the model-predicted vs. ground-observed measurements for the calibration lakes. Where available, model-predicted vs. CLMP-supplied values have also been plotted on these graphs, with a separate symbol (x). These graphs permit a visual evaluation of the overall fit of the regression equations. If a given equation resulted in perfect correlation between the predicted and measured quantities, then all points would fall on the 1:1 line.

Considered in concert with the statistics in Tables 1 and 2, Figures 5 and 6 illustrate the comparatively high reliability of the Landsat-predicted TSI values (except the phosphorous predictions). The overall average discrepancy observed between the Landsat-predicted values and the available CLMP values was only 2.6 TSI units for the secchi measurements (3 Ottertail lakes and 12

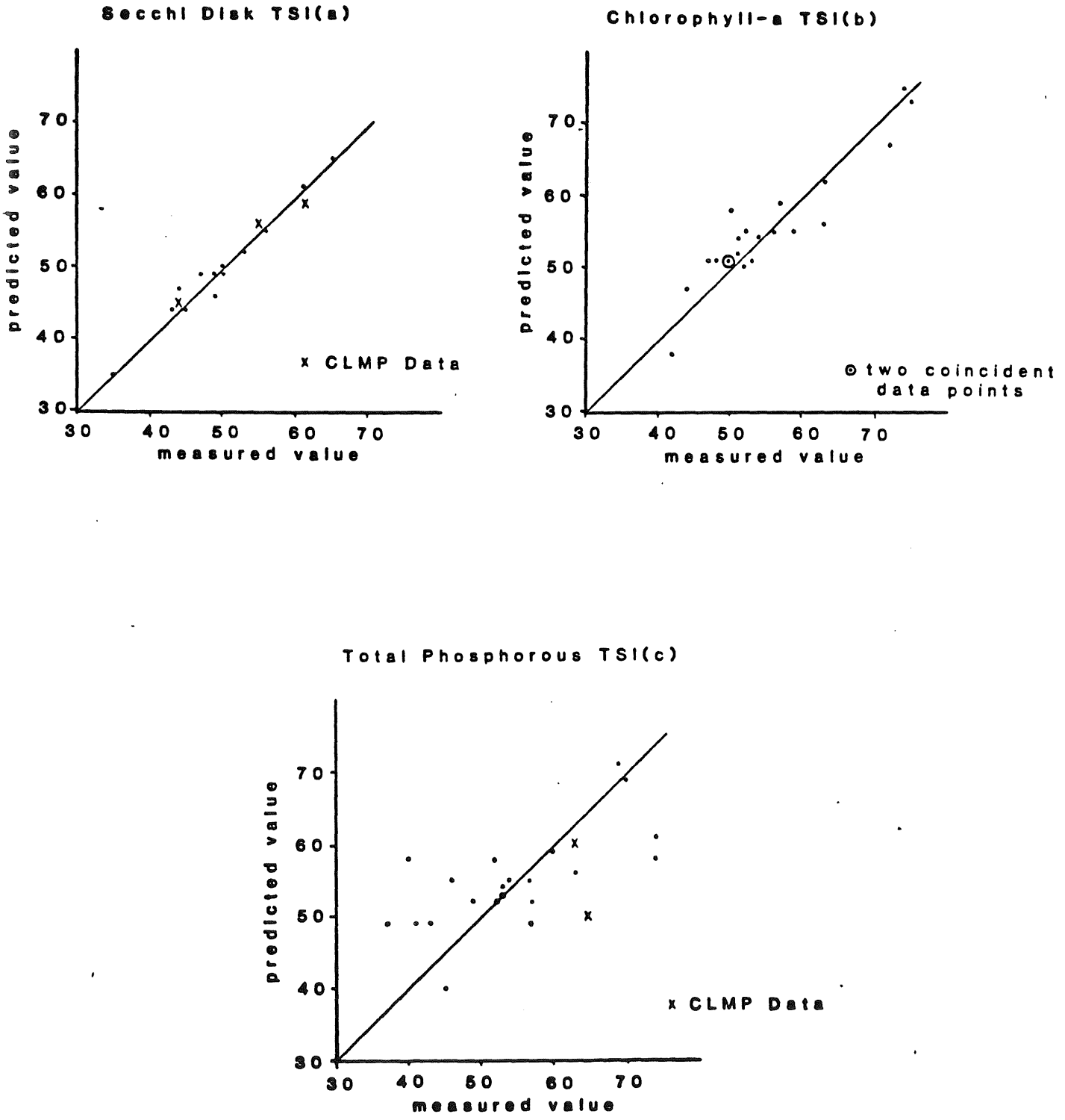


Figure 5(a). Measured vs. predicted values for Secchi, Chlorophyll-a, and Total Phosphorous TSI models for Ottertail Lakes Landsat scene.

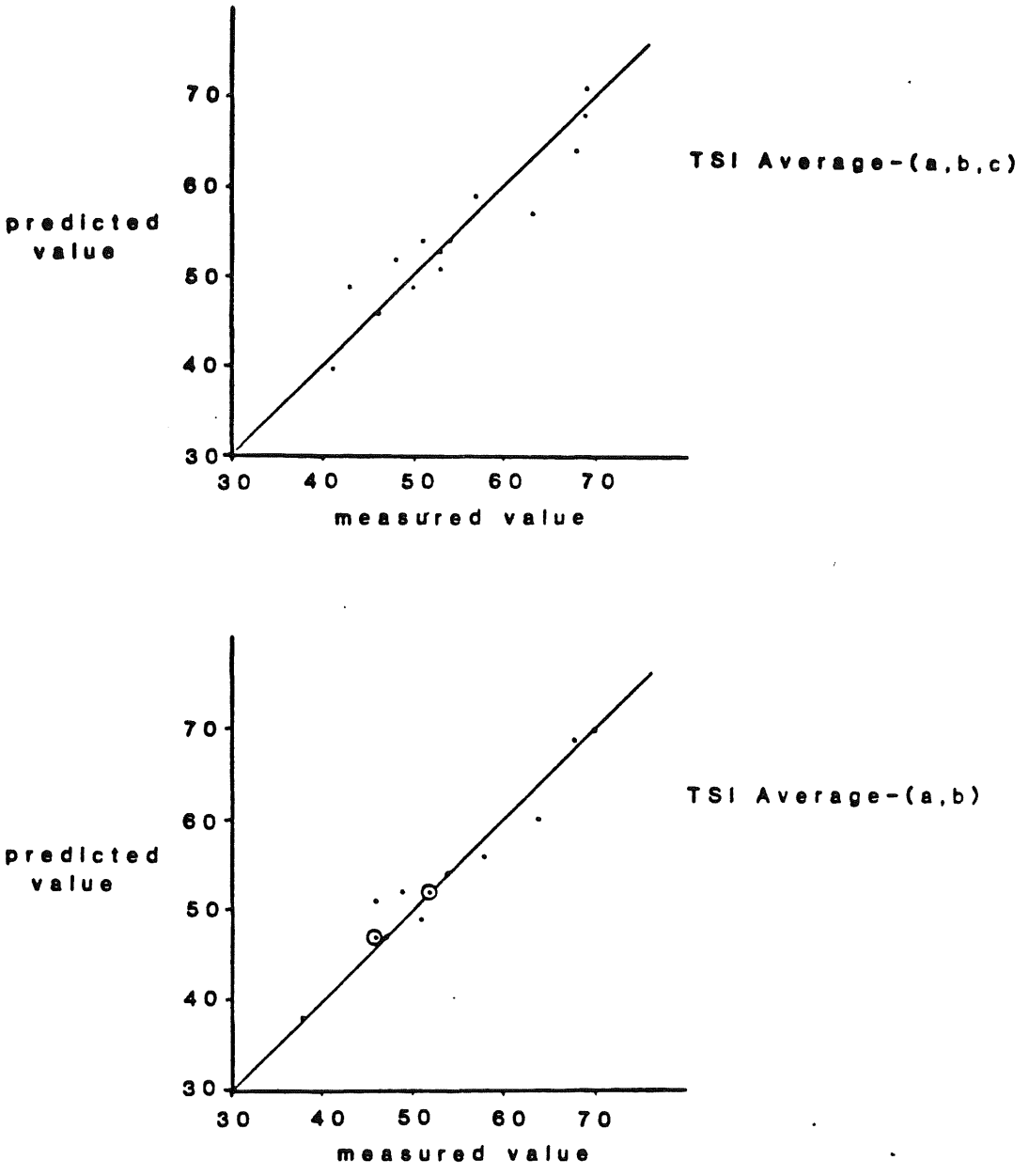


Figure 5(b). Measured vs. predicted value for average TSI models for Ottertail Lakes Landsat scene.

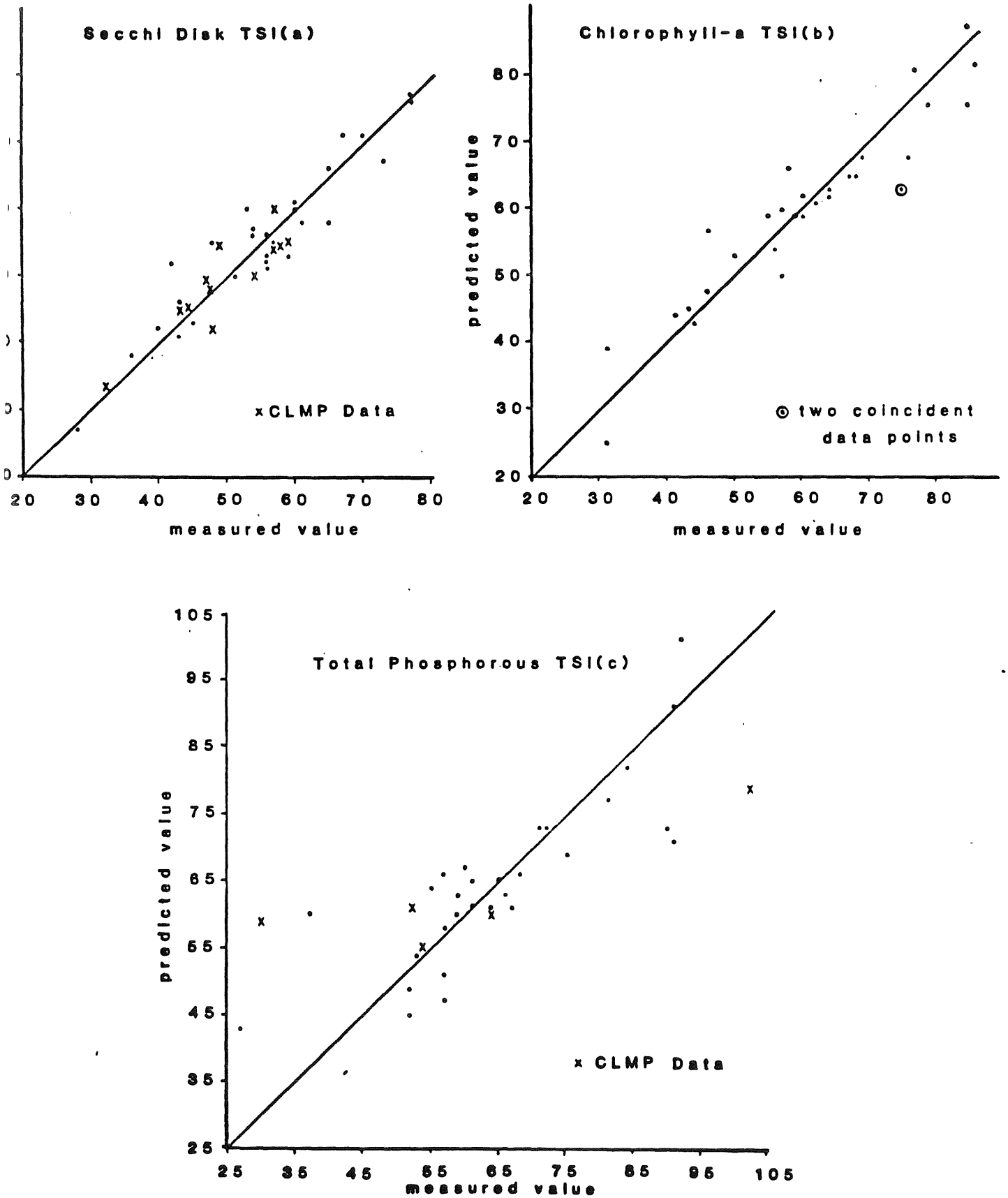
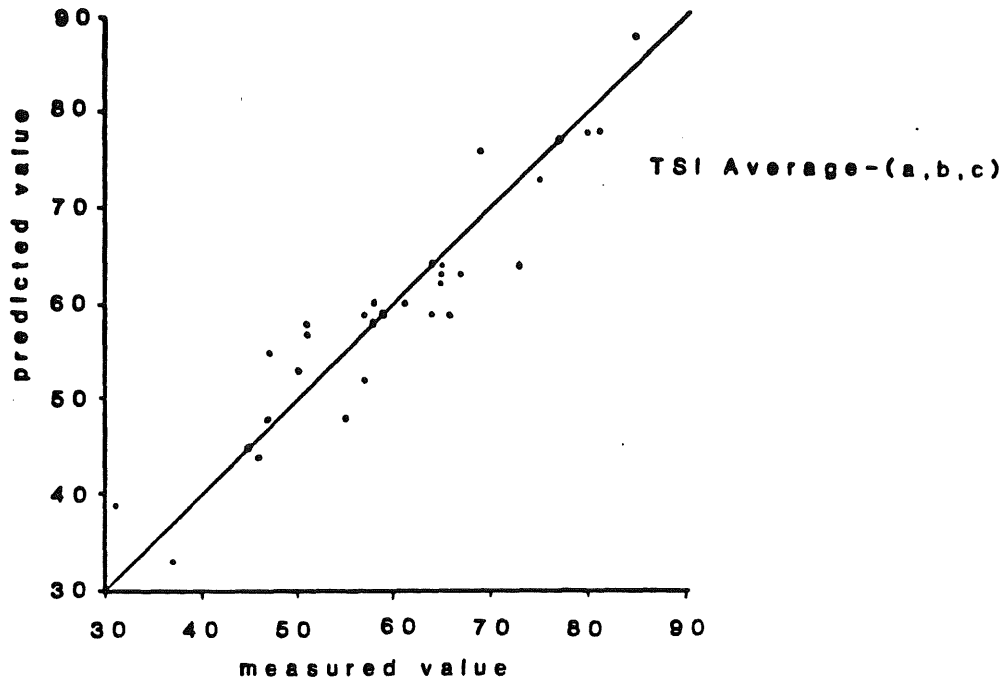


Figure 6(a). Measured vs. predicted values for Secchi, Chlorophyll-a, and Total Phosphorous TSI Models for Metropolitan Lakes Landsat scene.



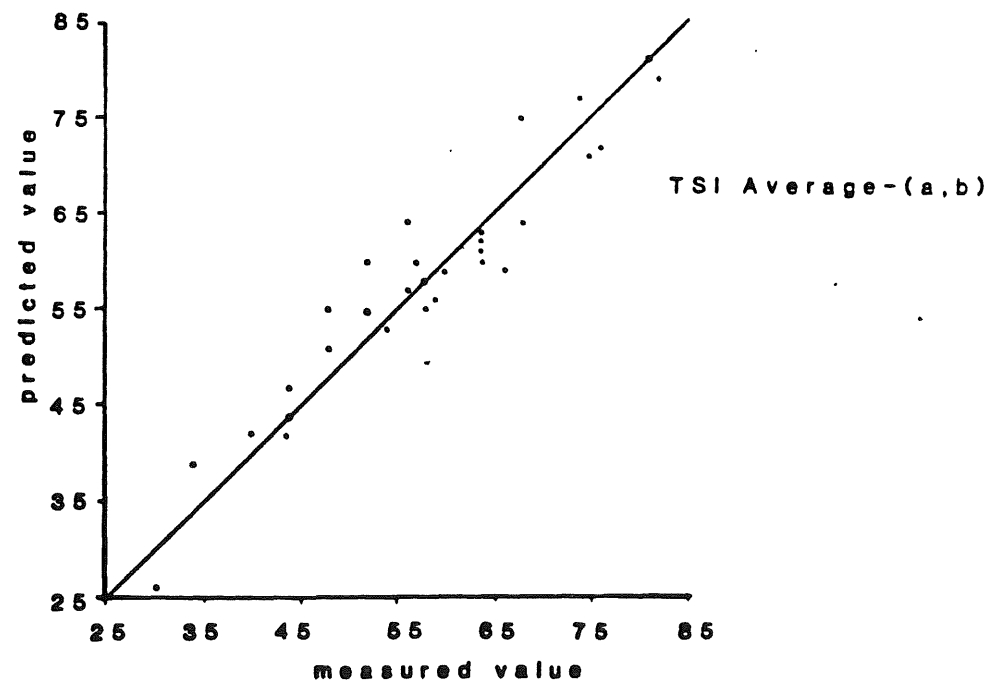


Figure 6(b). Measured vs. predicted value for average TSI models for Metropolitan Lakes Landsat scene.

Metropolitan lakes). The comparable value for total phosphorous was 10.4 TSI units (2 Ottertail lakes and 7 Metropolitan lakes).

CONCLUSIONS

Though of limited scope and duration, this one-year pilot project has indicated the following:

1) Landsat data appear to have great utility in assessing the trophic state of Minnesota lakes. In this study, Landsat MSS data were found to be particularly reliable predictors of secchi-derived Carlson TSI values, moderately reliable predictors of chlorophyll-derived values, and comparatively poor predictors of phosphorous-derived values. The Landsat models were also found to be reasonably reliable predictors of average TSI values.

2) The overall practical utility of the Landsat approach to trophic state prediction is a strong function of the quality of the Landsat data available, the range of lake conditions appearing in any given scene, and the manner in which the Landsat data are extracted. In this study, weather conditions, logistics, and NASA data processing problems precluded multitemporal analysis of the study lakes. Clouds and data of inferior quality caused problems in the single-date analyses performed in this study. Also, the entire methodology appears to be much more applicable to the Ottertail Lakes region than to the Metropolitan region. The principal problem in the Metropolitan scene was the comparatively small size of the lakes to be classified. For the conditions of this study, the interior lake sampling strategy appeared to significantly improve the quality of the Landsat predictions.

RECOMMENDATIONS

1) The procedures developed in this study should be tested in other geographical locations of the state.

2) Further application of the Landsat methodology should be done on a scene-by-scene calibration basis and separate models should be investigated for different lake types, time of year, etc.

3) The Landsat methodology should not be employed on extremely shallow lakes (circa 5'), nor small lakes (fewer than 30 acres of open water having a depth of more than 10').

4) Research should be initiated to define manners in which the Landsat classification methodology might be implemented on a more automated basis and on microprocessor-based hardware. The underlying object of these efforts should be the development of an operational monitoring procedure which MPCA could employ on a long-term in-house basis.

ACKNOWLEDGEMENTS

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Appendix A. Coefficients for Carlson TSI Prediction Models

Coefficients for Carlson TSI Prediction Models

ttertail akes Area 8-AUG-80	MODEL VARIABLES (MSS bands)									
	CONSTANT	4	5	6	7	4^2	5^2	6^2	7^2	4/5
ecchl(a)	55.40603		1.251824	7.733898	-13.90199		-40.21266			
hl. a (b)	-108.6349		18.94025	8.904933	-15.03513		-0.6758321			
P (c)	75.31036			9.731075	-16.50316					-48.70506
SI AVE. a,b,c)	39.76273			10.12104					-3.533835	-35.56183
SI AVE. (a,b)	57.25476			10.35393	-16.74187					-39.65946
etropolitan Area 9-JUL-80										
ecchl(a)	270.9353	15.57264	-18.72279					0.8700405E-1	-1.553990	-181.9944
hl. a (b)	420.9255	24.16596	-32.11311	4.616051	-13.50697					-289.5418
P (c)	287.0626			6.428936		0.4040416	-1.018016		-2.9977635	-174.8886
SI AVE. a,b,c)	390.1230	21.45709	-30.26651	3.907258					-1.913536	-255.4268
SI AVE. (a,b)	326.0379	18.67490	-23.88981	3.450994	-9.806076					-223.5438

Appendix B. Classification of Lakes in the Ottertail Lakes Study Area

Classification of Lakes in the Ottertail Lakes Study Area

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	SURFACE AREA Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS:
Becker	3-382	St. Clair	242	97.9	>65	>75	>74	>69	>70	<5', v. lt.tone
"	3-475	Melissa	1,827	739.4	49	59	53	53	52	
Big Stone	6-152	Big Stone	6,028	2,439.5	>65	>75	>74	>69	>70	Usage of mult.sam
Douglas	21-51	Henry	152	61.5	>65	75	>74	>69	>70	
"	21-53	Agnes	162	65.6	>65	>75	>74	>69	>70	
"	21-54	Victoria	447	180.9	48	57	53	57	51	
"	21-56	LeHommeDieu	1,892	765.7	46	52	51	54	49	
"	21-57	Carlos	3,017	1,221.0	43	56	47	51	46	
"	21-81	Winona	220	89.0	-	-	-	-	-	<5',tona anomaly
"	21-83	Miltona	5,924	2,397.4	46	54	50	53	48	
"	21-123	Ida	4,506	1,823.6	45	54	50	53	47	
"	21-216	Whiskey	165	66.0	46	50	52	54	50	
Grant	26-2	Pelican	3,680	1,489.3	61	71	64	68	63	
"	26-97	Pomme De Terre	1,794	726.0	-	-	-	-	-	Cloud Cover
Kandiyohi	34-79	Green	5,821	2,355.8	47	58	50	53	49	Portion c lake off image; clouds nearb

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	SURFACE AREA Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Kandiyohi	34-142	George	248	100.4	44	54	49	50	47	Clouds nearby
"	34-154	Nest	1,019	412.4	60	66	66	69	64	Clouds nearby
"	34-169	Wagonga	1,792	725.2	-	-	-	-	-	<5', tona anomal
Ottertail	56-130	Big Pine			56	64	62	62	59	
"	56-138	East Battle	2,360	955.1	44	46	50	51	48	
"	56-141	Rush	5,340	2,163.0	50	56	56	58	54	
"	56-239	West Battle	5,672	2,295.5	44	53	48	50	46	
"	56-302	Silver	894	361.8	50	58	55	58	53	
"	56-306	Elbow	193	78.1	44	47	50	52	48	
"	56-658	Wall	756	306.1						
		north (01)			54	64	60	63	57	
		south (02)			47	55	52	56	50	
Pope	61-130	Minnewaska	7,770	3,144.5	55	66	58	63	58	
Stearns	73-196	Rice	1,568	634.6	-	-	-	-	-	Off scen
"	73-200	Koronis	3,471	1,401.7	-	-	-	-	-	Off scen
Todd	77-23	Big Birch	2,025	819.5	46	52	52	55	49	
"	77-150	Sauk	2,111	854.3						
		north (01)			56	64	62	62	60	
		south (02)			64	75	72	>69	>70	depths <10'

Classification of Lakes in the Ottertail Lakes Study Area

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	SURFACE AREA Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Todd	77-215	Osakis	6,768	2,739.0						
		south (01)			50	57	55	58	53	
		north (02)			46	50	52	56	50	
Traverse	78-25	Traverse	11,600	4,694.5	>65	>75	>74	>69	>70	<10'

Appendix C. Classification of Lakes in the Twin Cities Metropolitan Study Area

Classification of Lakes in the Twin Cities Metropolitan Study Area

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Anoka	2-042	Coon	1,507	609.9	-	-	-	-	-	off scene
"	2-045	Golden	50	20.2	-	-	-	-	-	<20 pixel
"	2-075	Moore	110	44.5	-	-	-	-	-	<20 pixel
Blue Earth	7-044	Madison	1,345	544.3	-	-	-	-	-	Bad image data
"	7-047	George	141	57.1	62	70	75	70	66	
Brown	8-026	Hanska	1,844	746.3	-	-	-	-	-	<5'
Carver	10-19	Bavaria	201	81.3	54	57	59	58	56	
"	10-059	Waconia	3,196	1,293.4	54	60	59	56	57	
Dakota	19-005	Spring	5,910	2,391.0	56	62	57	55	60	Depth unknown
"	19-021	Allmagnet	113	45.7	-	-	-	-	-	Bad image data
"	19-026	Marion	489	197.9						
		east (01)			54	61	62	58	58	
		middle (02)			57	66	62	60	62	5' contou used
"	19-027	Crystal	290	117.4	47	50	58	51	48	
"	19-057	Fish	28	11.3	-	-	-	-	-	<20 pixel
"	19-065	Holland			-	-	-	-	-	<20 pixel
Freeborn	24-014	Albert Lea	2,654	1,074.1	-	-	-	-	-	Tonal ano <5'
"	24-018	Fountain	555	224.6	57	60	69	62	59	5' contou used

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Freeborn	24-044	Freeborn	2,222	899.2	-	-	-	-	-	<5'
Goodhue	25-001	Pepin	25,060	10,141.8	54	68	77	65	62	Portion lake of image (N end samp
Hennepin	27-004	Penn	47	19.0	1	-	-	-	-	<20 pixe
"	27-014	Powderhorn	11	4.5	-	-	-	-	-	<20 pixe
"	27-016	Harriet	337	136.4	50	52	54	51	50	
"	27-019	Nakomis	199	80.5	58	58	55	59	58	
"	27-031	Calhoun	416	168.4	48	51	51	49	50	
"	27-035	Sweeney-Twin	96	38.9	-	-	-	-	-	<20 pixe
"	27-037	Wirth	37	15.0	-	-	-	-	-	<20 pixe
"	27-038	Brownie	21	8.5	-	-	-	-	-	<20 pixe
"	27-039	Cedar	167	67.6	57	61	53	56	58	
"	27-040	Lake of the Isles	157	63.5	-	-	-	-	-	<20 pixe
"	27-042	Twin	201	81.3	-	-	-	-	-	<5'
"	27-047	Bush	207	83.8	46	49	59	52	47	10' co use
"	27-048	Hyland	87	35.2	60	68	65	64	65	5' co use
"	27-062	Anderson	431	174.4	-	-	-	-	-	<5';to anom;< pixe

Classification of Lakes in the Twin Cities Metropolitan Study Area

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	SURFACE AREA Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Hennepin	27-067	Bryant	199	80.5	53	59	62	58	56	
"	27-071	Round	34	13.5	-	-	-	-	-	<20 pixel
"	27-089	Shady Oak	90	36.4	-	-	-	-	-	<20 pixel
"	27-118	Fish	221	89.4	49	53	62	56	51	
"	27-133	Minnetonka	14,310	5,791.3						
		(01)			51	52	52	52	51	10' cont.
		(03)			50	49	52	51	49	" used
		(04)			45	49	56	50	48	
		(05a)			48	50	49	48	48	
		(05b)			57	61	54	56	59	
		(05c)			53	57	52	54	55	
		(06)			65	64	46	61	64	10' cont. used
		(07)			-	-	-	-	-	<20 pixel
		(08)			-	-	-	-	-	<20 pixel
		(10)			74	82	58	71	78	
		(11)			73	73	33	62	73	
		(12)			72	72	39	64	72	
		(13)			71	77	57	69	74	
		(14)			68	77	68	71	73	
		(16)			74	77	49	69	76	
"	27-137	Christmas	274	110.9	32	31	45	37	32	
McLeod	43-034	Silver	500	202.4	-	-	-	-	-	Bad Imag Data
"	43-084	Marion	616	249.3	-	-	-	-	-	Cloud Co\

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSOPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Nicollet	52-034	Swan	9,346	3,782.3						
		west (01)			64	69	56	62	68	5' cont. used
		east (02)			62	65	55	61	65	4' cont. used
Ramsey	62-01	Silver	68	27.5	59	65	56	59	62	5' cont. used
"	62-06	Kohlman	84	34.0	62	69	63	64	67	4' cont. used
"	62-07	Gervais	234	94.7	57	63	55	57	61	
"	62-10	Keller	72	29.1	-	-	-	-	-	<5'; <20 pixels
"	62-13	Phalen	193	78.1	53	56	53	53	54	
"	62-16	Beaver	65	26.3	60	70	76	68	66	5' cont. used
"	62-54	McCarron	71	28.7	63	66	52	61	64	
"	62-55	Como	69	27.9	64	74	85	75	69	5' cont. used
"	62-57	Josephine	110	44.5	53	58	60	56	56	10' cont used
"	62-67	Long	184	74.5	62	69	62	64	66	
"	62-69	Pike	34	13.8	-	-	-	-	-	<20 pixe
"	62-71	Valentine	58	23.5	-	-	-	-	-	<20 pixe
"	62-73	Snail	195	78.9	-	-	-	-	-	<20 pixe
"	62-78	Johanna	211	85.4	47	50	54	50	48	
"	62-82	Wabasso	47	19.0	-	-	-	-	-	<20 pixe

Classification of Lakes in the Twin Cities Metropolitan Study Area

COUNTY	LAKE I.D. NUMBER	LAKE NAME	SURFACE AREA Acres	Hectares	(a) SECCHI	(b) CHLOROPHYLL-a	(c) TOTAL PHOSPHOROUS	TSI AVE. a,b,c	TSI AVE. a,b	REMARKS
Ramsey	62-83	Silver	75	30.4	65	68	62	66	67	5' cont. used
Scott	70-26	Lower Prior	820	331.9	65	73	60	66	70	
"	70-54	Spring	690	279.2	54	61	67	60	58	
"	70-72	Upper Prior	326	131.9						
		(01)			44	45	50	46	44	
		(02)			43	50	51	46	48	
Stearns	73-14	Marie	145	58.7	>77	85	68	78	81	
Washington	82-23	Lily	52	21.0	-	-	-	-	-	<20 pixel
"	82-54	Bone	206	83.4	-	-	-	-	-	off scene
"	82-101	DeMontreville	156	63.1	58	64	63	62	62	Tonal anomaly
"	82-104	Jane	159	64.4	43	47	58	49	45	Willows near sam area
Wright	86-90	Buffalo	1,510	611.1						
		west (01)			54	61	61	58	58	
		east (02)			51	54	60	55	52	
"	86-233	Sugar	1,145	463.4	44	46	52	47	45	
"	86-252	Clearwater	3,704	1,499.0						
		north (01)			55	62	60	58	59	
		south (02)			48	54	58	53	50	
"	86-263	Cokato	544	220.2	52	54	66	59	52	
"	86-281	Caroline	138	55.9	-	-	-	-	-	Narrow lake
"	86-282	Lousia	183	74.1	-	-	-	-	-	"
"	86-297	Scott	101	40.9	56	63	77	67	60	