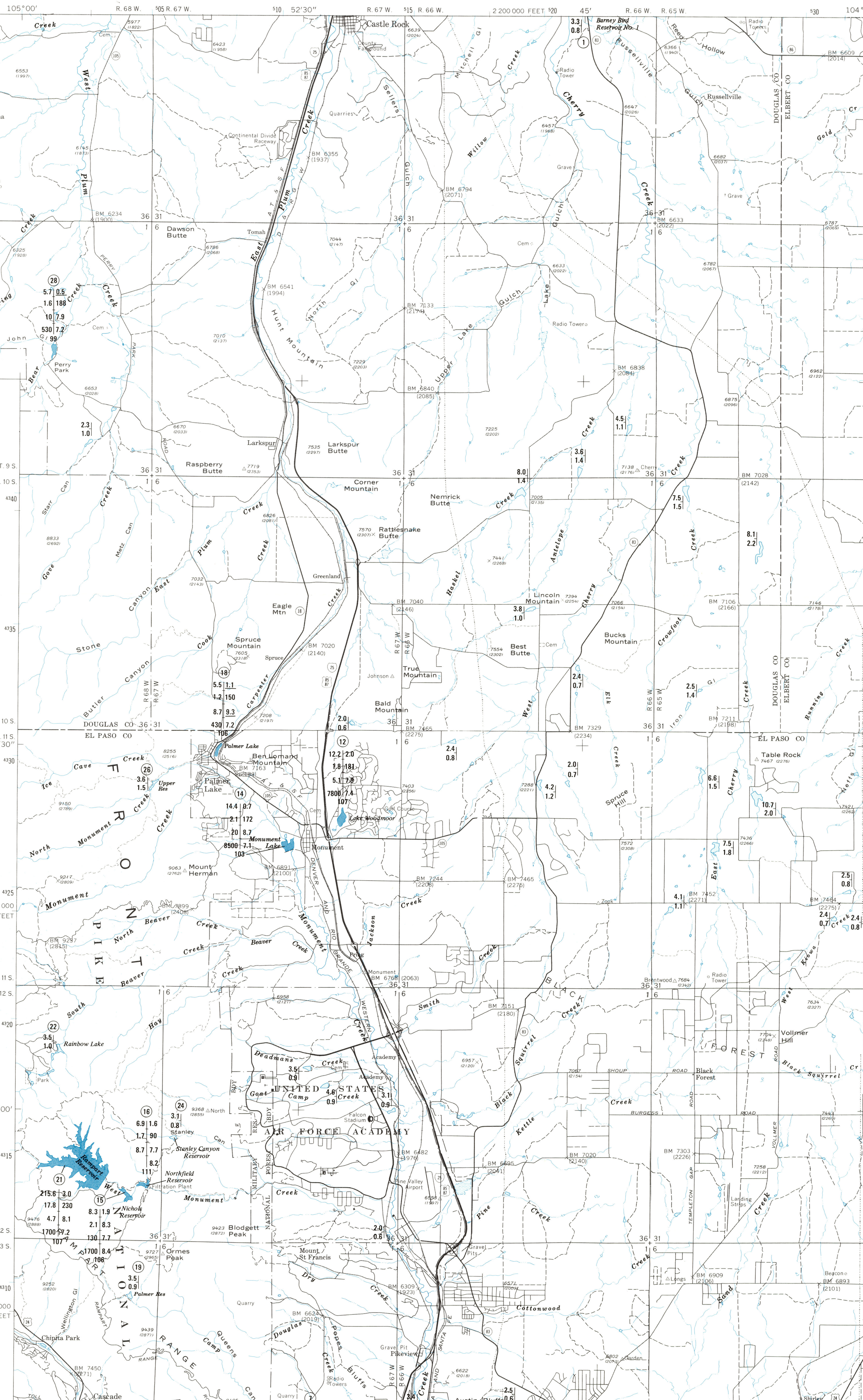
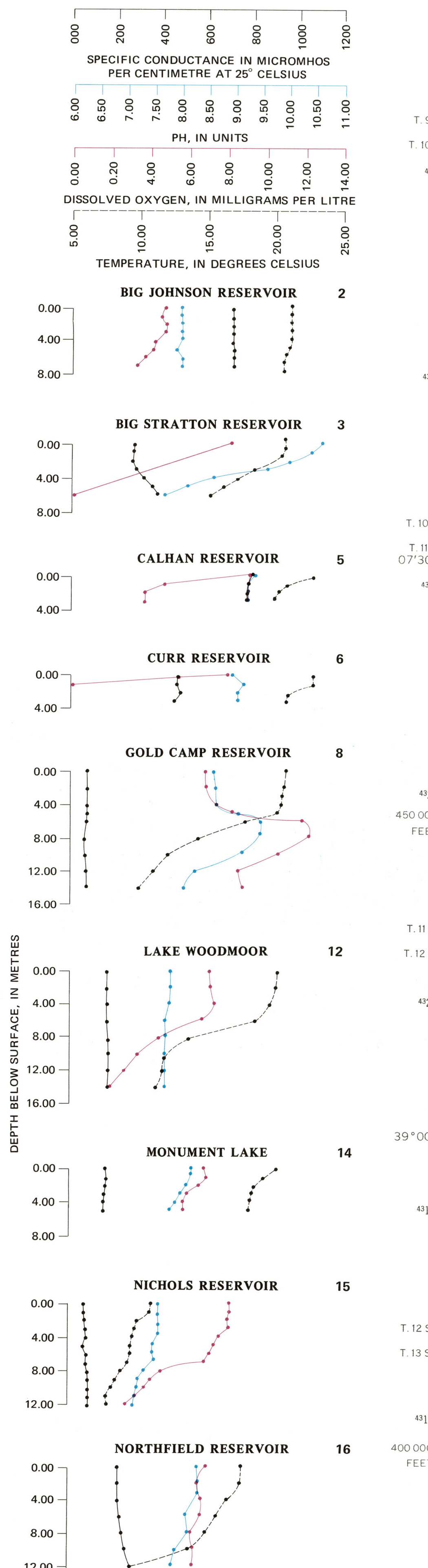
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATION SERIES
COLORADO SPRINGS–CASTLE ROCK AREA
MAP I–857–E



Base compiled by U.S. Geological Survey in 1972 from 1:24,000 quadrangles dated 1956–1966. Limited revision from aerial photographs taken 1969
50,000-foot grid based on Colorado coordinate system, central zone
5000-metre Universal Transverse Mercator grid ticks, zone 13, shown in blue
Metric elevations are shown in parentheses

SCALE 1:100 000
DATUM IS MEAN SEA LEVEL



PROFILES OF FIELD DATA FOR SELECTED LAKES AND RESERVOIRS

EXPLANATION

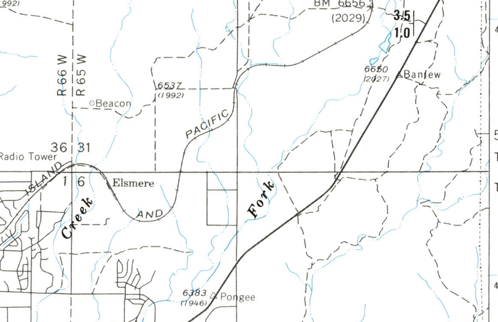
Temperature
Dissolved oxygen
pH
Specific conductance
Data points

EXPLANATION

FOR MOST LAKES SMALLER THAN 5 HECTARES IN SURFACE AREA
Surface area, in hectares
Shoreline length, in kilometres

FOR MOST LAKES LARGER THAN 5 HECTARES IN SURFACE AREA
Identification number
Surface area, in hectares
Shoreline length, in kilometres
Secchi disk transparency, in metres (underscored when less than 1.2 m)
Chlorophyll-*a* concentration in micrograms per litre
Specific conductance, in micromhos per centimetre
Algal concentration, in cells per millilitre
pH (underscored when greater than 8.3)
Dissolved oxygen as percent of saturation value
Dissolved oxygen in milligrams per litre

COLORS SHOW RANGE OF SPECIFIC CONDUCTANCE, IN MICROMHOS PER CENTIMETRE AT 25° C
No conductance data
Less than 750
751–1500



MAP SHOWING AREA OF FRONT RANGE URBAN CORRIDOR

INTRODUCTION

The many lakes in Colorado's semiarid Front Range Urban Corridor are highly valued by the areas' residents. In the past they were used primarily to store water for irrigation and domestic uses. Today, rapid suburban development in the Front Range Urban Corridor is accompanied by a shift in the principal use of many lakes to recreation and centers of real estate development. These same lakes are threatened with a general deterioration of chemical and biological quality caused by changing land and lake use in the area.

This report presents the results of an inventory of the lakes in the southern one-third of the Colorado Front Range Urban Corridor. Data on physical size are included for most lakes of 2 hectares (20,000 square metres, about 5 acres) or greater, and water-quality data are provided for most lakes larger than 5 hectares (about 12 acres).

Most of the lakes described in this report are owned by individuals, partnerships, or irrigation and ditch companies. Others are owned by municipalities and are used for public water supply. Many of these lakes are not normally accessible to the public. The U.S. Geological Survey acknowledges the cooperation of lake owners or lessees for granting access to the field parties who sampled the lakes. The author also thanks Thomas G. Devenish, who assisted in the collection of data presented here. Assistance in map planimetry was provided by the Department of Civil Engineering, Colorado State University.

TYPES OF DATA INCLUDED

Data collected from map measurements and during mid-summer field work in 1974 are summarized on the map. A two-position symbol is used to show surface area and length of shoreline for the smaller lakes. Data for 17 lakes larger than 5 hectares (about 12 acres) are shown by nine-position symbols. As shown by the map explanation, data presented include surface area, shoreline length, chlorophyll-*a* and algal concentrations, Secchi disk transparency, specific conductance, pH, dissolved oxygen, and dissolved oxygen as percent of saturation. The number in the circle near the lake or reservoir and graphs of field parameters are identification numbers. Samples for chemical and biological analyses were collected at a depth of 0.5 metre (1.6 ft) near the center of the lake and results are plotted on the map. The significance of these data is explained below.

Area and shoreline length. – U.S. Geological Survey topographic maps at the scale 1:24,000 were used to determine most of the surface areas and shoreline lengths reported here. Measurements were made by means of a computer-linked planimetry device owned by Colorado State University. Special maps or field observations of the lake configurations were used for the few lakes that obviously had been modified since the topographic maps were published.

Owners may find that lake sizes reported here differ from sizes obtained in their own surveys. Most owners' surveys report maximum sizes, whereas U.S. Geological Survey maps show the outline of the lake at the time the map was made. Shoreline lengths reported represent total shoreline lengths, including the shoreline along roads or land-fills that cross some lakes.

Area and perimeter are expressed in metric units. A user interested in converting areas to English units can convert hectares to acres by multiplying by 2.47. Shoreline lengths given in kilometres can be converted to feet by multiplying by 3,281, or to miles by multiplying by 0.6214.

Temperature. – One of the most biologically significant properties of lake water is temperature and the processes it controls. Assume that a lake is thoroughly mixed and has a uniform temperature in the spring. If the lake is deep enough that the wind cannot mix the entire body of water, thermal stratification takes place during the summer. The primary causes are the low thermal conductivity of water, and the limited penetration of radiant heat and light. Virtually all heat, apart from the advected heat, enters the body of water through the surface in the form of radiant energy. A large percentage of radiant energy is absorbed in the first few metres, and thus the water near the surface is heated more quickly than that in the lower layers. The warmer water, being less dense, remains at the surface, absorbs more heat and a stable condition of thermal stratification is established. This heated surface layer is mixed, by wind action and circulation caused by convective heating and cooling, to a nearly uniform temperature in the upper zone and is called the epilimnion. The middle temperature zone (metalimnion) or plane of maximum decrease in temperature with depth is known as the thermocline. It forms a barrier between the epilimnion and the lower, colder zone, known as the hypolimnion. This barrier results because of the rapid increase of the density of water in the thermocline. Temperature stratification phenomena are demonstrated by data for Rampart Reservoir (profile 21).

During the fall the epilmnetic water begins to cool and, becoming more dense, sinks until the lake is again at a uniform temperature. Upon further cooling to approximately 4°C (Celsius), this cooled water—being at maximum density—sinks to the bottom of the reservoir and produces what is known as autumn overturn. Further cooling results in freezing of the surface of the water body at 0° C with a steep temperature gradient from 0° to 4° C within a short distance below the ice. In the spring the ice begins to melt; and as the water warms to 4°C, it again begins to sink. This is known as spring overturn. Each time the water in a reservoir overturns, nutrients, which have been released by decomposition in the bottom of the reservoir, are circulated throughout the lake. This provides a vast reservoir of food for algae and can result in an algal "bloom" (rapid growth of algae).

Shallow reservoirs may experience temporary stratification on calm days. Generally, however, they are mixed thoroughly by wind and by convective heating and cooling, and have a uniform temperature, as exhibited by Palmer Lake (profile 18). In the shallow lakes, biological productivity generally occurs at all depths. Almost all biological productivity in a deep stratified lake occurs in the epilimnion. The term biological productivity, as used here, refers to the primary productivity of biomass by the green plants—primarily phytoplankton—and does not include any bacterial action.

Dissolved Oxygen. – Next to temperature, DO (dissolved oxygen) is probably the most significant factor affecting life in water. Maximum DO concentrations are physically controlled by the temperature of the water and by the altitude of the surface of the water body. Both are inverse relationships; that is, as temperature or altitude increases, the maximum possible DO concentration decreases. These maximum DO concentrations are "saturation concentrations" and not necessarily the actual measured concentrations. Either "supersaturated" or "depleted" conditions may exist.

There are generally two mechanisms by which oxygen enters the water: by direct physical interaction of water with the atmosphere and by biological productivity. Supersaturation occurs when phytoplankton or macrophytes, in the process of photosynthesis, produce biomass, and oxygen is a byproduct. Depletion (less than saturation) of DO usually occurs when aerobic bacteria use DO in the oxidation of organic matter at a greater rate than DO is replaced by physical or biological action.

Extreme depletion of DO causes death of the aquatic life, such as fish, which are dependent upon it. Different species of fish require different DO concentration levels to survive, with the "cold-water fish" such as trout requiring higher levels of DO than "warm-water fish" such as catfish and carp, the minimum recommended levels being 7 and 5 mg/l (milligrams per litre), respectively (U.S. Federal Water Pollution Control Administration, 1968, p. 44).

Specific conductance. – An estimate of dissolved solids in water is provided by measurements of its electrical conductance. Dissolved solids, in milligrams per litre, of most waters can be estimated by multiplying the specific conductance, in micromhos per centimetre (μmhos/cm), by about two-thirds. For example, water with a specific conductance of 1,200 μmhos/cm will contain about 800 mg/l dissolved solids. On the map, color codes have been used to designate waters having differing ranges of specific conductance. Specific-conductance profiles in a lake or reservoir generally show small top-to-bottom differences whether the body stratifies or not. Generally, any higher conductance water will be observed near the bottom of the reservoir due to the increased density resulting from increased dissolved solids.

The factors that affect the specific conductance in a reservoir are evaporation, chemical reactions, and flow to and from the reservoir. Evaporation has the effect of concentrating the dissolved solids in the water remaining, thereby increasing its specific conductance. Chemical reactions forming new compounds or solids decrease specific conductance, whereas dissolution of minerals will increase conductivity. Although not verified in this study, in a stratified reservoir inflowing water of a different specific conductance will seek its own density level and flow through the reservoir at this level and a deviation in specific conductance will be observed.

Water with specific-conductance values less than 750 μmhos/cm at 25° C (about 500 mg/l dissolved solids) satisfies the recommended limits for maximum dissolved solids in drinking water (U.S. Public Health Service, 1962). Water with specific conductance ranging between about 750 and 1,500 μmhos/cm (dissolved solids from about 500 to 1,000 mg/l) is regarded as marginal for drinking, and can have detrimental effects on sensitive crops (U.S. Federal Water Pollution Control Administration, 1968).

Although the previous paragraph discusses suitability of water use based on specific conductance and dissolved solids, one cannot assume that waters with low dissolved solids are suitable for drinking or other uses. Water-quality standards for drinking water and other uses list many chemical and biological characteristics that must be met. The reconnaissance data reported here are not sufficient to totally evaluate the lake waters for drinking and other uses.

pH. – Numbers on the pH scale describe whether water is acidic or basic (alkaline) in its chemical nature. Water with a pH of 7.0 is said to be neutral, water with a pH value less than 7.0 is termed acidic, and water with a pH value greater than 7.0 is called basic or alkaline. The pH of lake water is important because it affects the chemical reactions and biological activity in the lake, and may influence the suitability of the lake for swimming and water skiing. Values of pH greater than 8.3 are underscored to indicate that they are outside the desirable range for water-contact sports (U.S. Federal Water Pollution Control Administration, 1968).

DO and pH are used as biological indicators. In the process of photosynthesis,

$$light + CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2,$$

carbon dioxide is consumed (increasing pH) and DO is produced. This process is illustrated by the pH and DO in Gold Camp Reservoir (profile 8), which shows pH and DO maxima due to photosynthesis at the position of the thermocline (about 8 metres or 26 ft depth). The reverse of this reaction (respiration) is continually occurring and is the only process that occurs during the nighttime hours. It may sometimes be observed that a minimum DO occurs at the thermocline. This may be explained by dead algae sinking to, accumulating in, and being decomposed at this density barrier.

Secchi disk transparency. – A Secchi disk is a black and white flat circular disk about 200 millimetres (8 in.) in diameter. The depth to which it is visible in a lake is a measure of the transparency or visibility of the water. In most cases, transparency is decreased either by suspended sediment or by algae. Low transparency due to suspended sediment can limit biological activity by reducing light penetration whereas low transparency due to high algal concentrations are the result of high biological activity. Low transparency, regardless of cause, makes the water undesirable for swimming. Values of Secchi disk transparency measured near the lake center are expressed in metres, but can be converted to feet by multiplying by 3.281. Values less than 1.2 metres (about 4 ft) are underscored because such waters do not meet recommended standards for use for water-contact sports (U.S. Federal Water Pollution Control Administration, 1968).

Chlorophyll-a and Algal Concentrations. – Concentrations of chlorophyll-*a* and algal cells are directly related and indicate the biological condition of a lake. Generally a lake that is rich in nutrients will contain higher concentrations of algae than will a lake poor in nutrients. Data on chlorophyll-*a* are shown for 17 lakes, and algal concentrations are shown for 13 lakes. The reader should remember that these data represent conditions during a single sampling of the lakes. Algal populations are dynamic; therefore, samples taken at another time may yield different interpretations.

SUMMARY OF LAKE CHARACTERISTICS

Size. – Eight lakes in the study area have surface areas greater than 10 hectares (about 25 acres) and contained water when visited. These lakes have a combined area of 433 hectares (1,069 acres), and a total shoreline of 35 kilometres (22 miles). The largest reservoirs are Rampart Reservoir, 215 hectares (531 acres); Big Johnson Reservoir, 111 hectares (274 acres); and Lake Moraine, 25 hectares (62 acres). Rampart Reservoir also has the longest shoreline—17.8 kilometres (11.0 miles); Big Johnson Reservoir, with a shoreline of 4.5 kilometres (2.8 miles), is second.

In addition, lakes ranging in size from 2 to 10 hectares (5 to 25 acres) and intermittent lakes with surface areas greater than 10 hectares (25 acres), total 68. Total area of these lakes is 300 hectares (741 acres) and total shoreline length is 84 kilometres (52 miles).

Chemical and physical quality. – Based on values of specific conductance, most of the lakes sampled contain water of good quality. Specific conductance was 750 μmhos/cm or less in 15 of the 17 lakes measured; it ranged from 100 to 750 μmhos/cm in 9 lakes, and was less than 100 μmhos/cm in 6 lakes. Water in Lake Moraine, Big Tooth Reservoir, South Suburban Reservoir, and Gold Camp Reservoir had specific conductance less than 50 μmhos/cm. The highest specific conductances were in an unnamed lake (No. 29) (1,070 μmhos/cm), Calhan Reservoir (811 μmhos/cm), and Big Johnson Reservoir (734 μmhos/cm).

All the lakes sampled in the corridor contained water that is alkaline. The highest pH (10.6) was measured in water from Big Stratton Reservoir south of Colorado Springs, followed by Calhan Reservoir with 9.4, and also an unnamed lake (No. 29) and Palmer Lake with pH 9.3. Values of pH 8.3 or less occurred in 9 of the 17 lakes measured. Values of pH ranged from 10.6 in Big Stratton Reservoir to 7.6 in Big Tooth Reservoir.

Transparency, as measured by a Secchi disk, was less than 1.2 metres (3.9 ft) in 6 of 17 lakes. It ranged from 1.2 to 5.0 metres (3.9 to 16.4 ft) in the other 11 lakes. Transparency was 5.0 metres (16.4 ft) in South Suburban Reservoir, and was 0.5 metre (1.6 ft) or less in three of the lakes measured.

DO concentrations ranged from 13.2 mg/l at the surface of an unnamed lake (No. 29) to zero at the bottom of Big Stratton Reservoir. For the 17 lakes sampled, all but Big Johnson Reservoir were near saturation or supersaturated at the surface. Big Johnson Reservoir, at 68 percent of DO saturation, was the only reservoir greatly depleted at the surface. The highest supersaturation value was 186 percent and occurred in an unnamed lake (No. 29). Such a high value indicates high biological productivity by the phytoplankton. This lake was probably sampled during a "bloom"; later in the season the dying algae may cause depletion of oxygen as was observed in Big Johnson Reservoir. Anaerobic conditions (zero DO) were observed only at the bottom of Big Stratton Reservoir (profile 3) and are probably the result of the decomposing dead algae that have sunk to the bottom.

Temperatures ranged from 24° C at the surface of Prospect Lake to 6° C at the bottom of Rampart Reservoir. The smallest ranges in temperature within one lake were Palmer Lake, 0.2° C; and Big Johnson Reservoir, 0.5° C. These temperature ranges indicate that Palmer Lake and Big Johnson Reservoir waters were well mixed. The largest ranges in temperatures are observed in Rampart Reservoir, 12° C; and Gold Camp Reservoir, 11° C. These two lakes were stably stratified.

Biological factors. – Algal concentrations ranged from 380 to 57,000 cells/ml (cells per millilitre) in the samples collected from 13 lakes. Concentrations were greater than 1,000 cells/ml in only nine lakes: South Suburban Reservoir and Lake Moraine, 1,500 cells/ml; Rampart Reservoir and Nichols Reservoir, 1,700 cells/ml; Curr Reservoir, 5,400 cells/ml; Prospect Lake, 7,200 cells/ml; Lake Woodmoor, 7,800 cells/ml; Monument Lake, 8,500 cells/ml; and Calhan Reservoir, 57,000 cells/ml. Smallest algal concentrations were found in samples from Big Tooth Reservoir, 380 cells/ml; and from Palmer Lake, 430 cells/ml.

Sixteen different genera of algae were dominants or codominants (comprised more than 15 percent of the algal population), in samples from the 13 lakes sampled. Table 1 lists the algae genera found, the major taxonomic group to which each belongs, the type of water-quality problem each genus indicates (according to Palmer, 1962), possible indicator effects, and those lakes and reservoirs in which each genus was found. The most common dominant or codominant were *Anacystis, Synedra, Cyclotella, Oocystis,* and *Dinobryon.*

Table 1. – *Algae identified in lakes of Colorado Springs–Castle Rock area, Front Range Urban Corridor, Colo.*

[Major taxonomic group: De, desmid; D, diatom; G, green; BG, blue green; Fl, flaggelate. Water-quality problem: T, taste and odor; F, filter clogger; C, clear; P, polluted; S, surface; A, attached. Underscore: Indicates dominant or codominant of sample (15 percent or greater)]

Genus	Major taxonomic classification	Possible indicator effect (depends on species)[1]	Lake identification number shown on map and in table 4
Achnanthes	D	A	5, 11, 20, 28
Actinastrum	G	S	6
Anacystis	BG	T, F, P, S	2, 11, 12, 18, 23, 28
Ankistrodesmus	G	C, S	5, 11, 14, 15, 20, 23
Asterionella	D	T, F	15, 20, 21
Chlamydomonas	Fl	T, P	6, 23
Chodatella			11
Closterium	De	F, S	5
Cocconesis	D	C, A	18
Cosmarium	De	T, S	11
Crucigenia	G	S	5, 23
Cryptomonas	Fl	T	2
Cyclotella	D	T, F, C, S	5, 6, 11, 12, 14, 18
Diatoma	D	F, T	4
Dinobryon	Fl	T, F, C, S	4, 15, 20, 21
Elakatothrix	G		11
Fragilaria	D	T, F, S	20
Gloeocystis	G	T, A	5
Gomphonema	D	P, A	11
Gymnodinium	Fl		20
Kirchneriella	G	S	2, 28
Lyngbya	BG	P, A, S	5, 23
Melosira	D	F, P, S	11, 14
Navicula	D	F, P, C, S	11, 12, 15, 20, 21, 23, 28
Nitzschia	D	F, P, C	5, 6, 15, 18, 28
Oocystis	G	S	2, 11, 18, 21
Oscillatoria	BG	T, F, P, S	6, 14
Pediastrum	G	T, S	5
Pinnularia	D	C	15
Scenedesmus	G	T, S	5, 6, 12, 15, 18, 20, 23
Selenastrum	G	S	6, 20
Sphaerocystis	G	S	5
Staurastrum	De	T, C, S	14, 21
Stauronesis	D	S	5
Synedra	D	T, F, C, S	2, 4, 11, 14, 15, 21
Trachelomonas	Fl	F	14, 28
Uroglenopsis	Fl	T	28

[1] Palmer (1962).

Phytoplankton can be used as indicators of water-quality characteristics. Palmer (1969) has compiled data from reports by 165 authors. He has listed the algae, by genus and species, as being most tolerant to organic loading in water and has assigned each alga a "Pollution Index." The "Pollution Index" as assigned by Palmer (1969) is an indicator of how often the alga was reported by the authors as being present in organically enriched waters. Because the algae collected as part of this study were classified only to genus, Palmer's genus rating is reproduced in table 2.

Table 2. – *Algal genus pollution index*

[Pollution index: 1 indicates least tolerant and 5 indicates most tolerant. Palmer (1969)]

	Pollution index		Pollution index
Anacystis	1	*Micractinium*	1
Ankistrodesmus	2	*Navicula*	3
Chlamydomonas	4	*Nitzschia*	3
Chlorella	3	*Oscillatoria*	5
Closterium	1	*Pandorina*	1
Cyclotella	1	*Phacus*	2
Euglena	5	*Phormidium*	1
Gomphonema	1	*Scenedesmus*	4
Lepocinclis	1	*Stigeoclonium*	2
Melosira	1	*Synedra*	2

Table 3. – *Palmer rating of lakes sampled for phytoplankton*

Lake number shown on map	Lake name	Palmer rating (Palmer, 1969)
2	Big Johnson Reservoir	1
4	Big Tooth Reservoir	2
5	Calhan Reservoir	10
6	Curr Reservoir	19
11	Lake Moraine	7
12	Lake Woodmoor	10
14	Monument Lake	11
15	Nichols Reservoir	8
18	Palmer Lake	6
20	Prospect Lake	9
21	Rampart Reservoir	2
23	South Suburban Reservoir	9
28	---------------------	1

All lakes sampled for phytoplankton were rated by the Palmer index method (see table 3). An alga was counted for the rating if 50 or more individual cells/ml were present in a sample. After the index was assigned for each alga present, the score was totaled. A score of 20 or more was taken as evidence of high organic pollution, whereas a score of 15 to 19 was taken as probable evidence of high organic pollution; a score of less than 15 was taken as an indicator of low organic pollution.

These ratings are based upon a single sample taken during the summer months. Phytoplankton populations are dynamic, that is, always changing and a "bloom" of a particular species may appear and disappear within a few days. To be able to definitely state whether or not a particular water is polluted (based upon algal type), a study of the succession of algal species throughout the season must be made.

The type and sources of organic pollution are many, including sewage effluent, runoff from stock-feeding areas, and natural fertilizers applied to an area that drains to the water body. Pollutants can also include commercial fertilizers that supply essential nutrients such as nitrates and phosphates. These pollutant concentrations may be long term, as in the case of stock-feeding areas and sewage effluent, or short term, as from a single application of fertilizer. Only Curr Reservoir, with a Palmer rating of 19, showed evidence of probable high organic loadings.

LOCATIONS

Several systems of expressing geographic location have been devised, including: latitude and longitude; the public land survey system of townships, ranges, and sections; and the UTM (Universal Transverse Mercator) grid. Table 4 lists the locations of 29 lakes shown on the map by their UTM coordinates. The UTM "north" coordinate is the distance in metres north of the earth's equator; the "east" coordinate is the distance in metres east of the western boundary meridian of UTM Zone 13. The borders of the map show the 5,000–metre (5–kilometre) ticks of the UTM grid. In most cases, the last three zeros are not shown, and numerals representing hundred-thousand metres are in smaller type. For example, the tick representing 520,000 metres east is marked $^{5}20$, and the tick representing 4,355,000 metres north is marked $^{43}55$. Interpolation between ticks on the map is simplified by the 1:100,000 scale (1 cm=1 km). Interpolation can be done with a centimetre scale or with the kilometre scale printed at the bottom of the map.

Table 4. – *Locations of named and sampled lakes using Universal Transverse Mercator (UTM) Coordinates*

Lake number shown on map	Lake name	UTM Coordinates: North (metres)	UTM Coordinates: East (metres)
1	Barney Bird Reservoir No. 1	4,358,000	521,800
2	Big Johnson Reservoir	4,288,660	526,210
3	Big Stratton Reservoir	4,293,740	514,910
4	Big Tooth Reservoir	4,297,660	502,580
5	Calhan Reservoir	4,276,060	530,250
6	Curr Reservoir	4,291,715	515,430
7	Glen Eyrie Reservoir	4,304,390	511,320
8	Gold Camp Reservoir	4,293,690	511,380
9	Haymes Reservoir	4,279,050	519,200
10	Highline Reservoir	4,302,360	512,230
11	Lake Moraine	4,296,100	500,690
12	Lake Woodmoor	4,328,070	512,460
13	Little Johnson Reservoir	4,291,780	522,120
14	Monument Lake	4,326,500	510,550
15	Nichols Reservoir	4,313,300	504,480
16	Northfield Reservoir	4,313,590	505,080
17	North Side Reservoir	4,279,640	520,990
18	Palmer Lake	4,330,000	507,590
19	Palmer Reservoir	4,309,330	504,480
20	Prospect Lake	4,296,880	517,610
21	Rampart Reservoir	4,313,940	503,460
22	Rainbow Lake	4,318,990	501,690
23	South Suburban Reservoir	4,293,750	511,660
24	Stanley Canyon Reservoir	4,315,570	506,160
25	Stratton Reservoir	4,292,050	501,080
26	Upper Reservoir	4,329,120	505,410
27	Valley Reservoir No. 1	4,302,280	510,840
28	------------------------	4,345,650	501,365
29	------------------------	4,287,420	525,200

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LAKES IN THE COLORADO SPRINGS–CASTLE ROCK AREA, FRONT RANGE URBAN CORRIDOR, COLORADO

By

D. Briane Adams

1976

For sale by U.S. Geological Survey
Denver, Colo. 80225 and Reston, Va. 22092, price $1.00