A BIOLOGICAL RECONNAISSANCE OF THE RUM RIVER

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
SECTION OF ECOLOGICAL SERVICES

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TYPOGRAPHICAL CORRECTIONS FOR SPECIAL PUBLICATION NUMBER 124

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Page iv — Table 29 - ....The 1974 Rum River fisheries survey....

Page 5 — Line 19 - ....of the river corridor (primarily....

Page 8 — Bottom picture caption - ....THE LOWER PORTION OF THE RIVER

Page 11 — Lines 21-22 - ....Table 4 are (M) mud, (S) sand, (G) gravel, (R) rubble, and (B) boulder....

Page 14 — Line 18 - ....included water milfoil, coontail, Canada

Page 15 — Line 9 - ....and aquatic flies and midges) were

Page 23 — Line 2 - ....of 1948-49 when....

Page 30 — Line 19 - ....the high water levels occurring between

Page 31 — Line 4 - ....is wooded and the species

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Rum River near St. Francis, Minnesota

A BIOLOGICAL RECONNAISSANCE OF THE RUM RIVER

by:

Thomas Kucera

Biologist

Special Publication Number 124

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ACKNOWLEDGEMENTS

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Pictures on the title page, page 8 (top and bottom), and pages 12 and 25 (bottom) are credited to the Rivers Survey Project. Earl H. Huber of the Section of Ecological Services is credited for the pictures on pages 12 and 25 (top).

ABSTRACT

The entire Rum River (148.4 miles) was surveyed during June, July, and August, 1974. Various physical features of the stream include gradients ranging from 0.3 - 9.1 ft./mile (average - 2.7 ft./mile), sinuosity values ranging from 1.1 to 3.1, median stream widths ranging from 70 to 120 feet, median stream depths ranging from 2.5 to 4.0 feet, and secchi disc readings ranging from 1.5 to 6.0 feet. Mean values for various water quality parameters include total alkalinity (130 ppm), dissolved phosphorus (0.08 ppm), total nitrogen (1.23 ppm), BOD (2.2 ppm), dissolved oxygen (8.9 ppm), and total dissolved solids (173 ppm).

Twenty-eight (28) species of aquatic plants and 7 orders of aquatic insects were noted. Thirty-eight (38) species of fish were caught. Sport and game fish comprised 30 percent of the total large sized fish species catch and smallmouth bass comprised 22 percent of the total catch. Carp comprised 38 percent of the total biomass of the large sized fish species catch. The composition and distribution of the large sized fish species catch indicates a relationship between the number of abundant species present in a particular area, the stream gradient of this area, and the number of abundant species present in upstream areas. Thirty-seven (37) species of trees and shrubs, and 89 species of birds, mammals, amphibians, and reptiles were noted during the survey.

INTRODUCTION

The Rum River and its watershed is located in central Minnesota, and flows southward 148.4 miles through Mille Lacs, Sherburne, Isanti, and Anoka Counties to its outlet in the Mississippi River at Anoka. The flow is 597 cfs (St. Francis gauging station). The river originates in Mille Lacs Lake at an elevation of 1,251 feet and flows through three impounded lakes to Onamia. From Onamia the river flows southward, first through a forested area of hilly topography and steep stream gradient to Milaca, and then through a generally flat agricultural area to the vicinity of Princeton. At this point the river meanders eastward through a broad sandy plain to the vicinity of Cambridge. Here the river turns and flows southward through the undulating hills of the forested Anoka Sand Plain before entering the Mississippi River at an elevation of 845 feet. This topographic diversity is associated with the diversity of plants and animals noted during the survey.

GENERAL RIVER INFORMATION

Stream Name(s): Rum River

Alternate Name(s): None

Tributary Number: M-63

Counties: Mille Lacs, Sherburne, Isanti, and Anoka

Watershed Name and Number: Rum River Watershed (XVIII)

Sequence of Waterways to Basin: Rum River to Mississippi River to Gulf of Mexico

Map(s) Used: USGS topographic (7.5 and 15 minute series), blueline aerial photo maps, and county highway maps

Length of River: Approximately 148 miles (mouth of the Rum River to the Mille Lacs Lake outlet)

Location of Mouth: T. 31N., R. 25W., Sec. 12

Average Flow at Gauging Station: 597 cfs (mean annual discharge from 1930-31 and 1933-75)

Location of Gauging Station: T. 33N., R. 24W., Sec. 19 (below St. Francis - river mile 15.8)

Initial Source of Sustained Flow: Mille Lacs Lake, Mille Lacs County - outlet located in T. 43N., R. 27W., Sec. 33

Gradient: Mean gradient over the entire 148 miles = 2.7 ft./mile

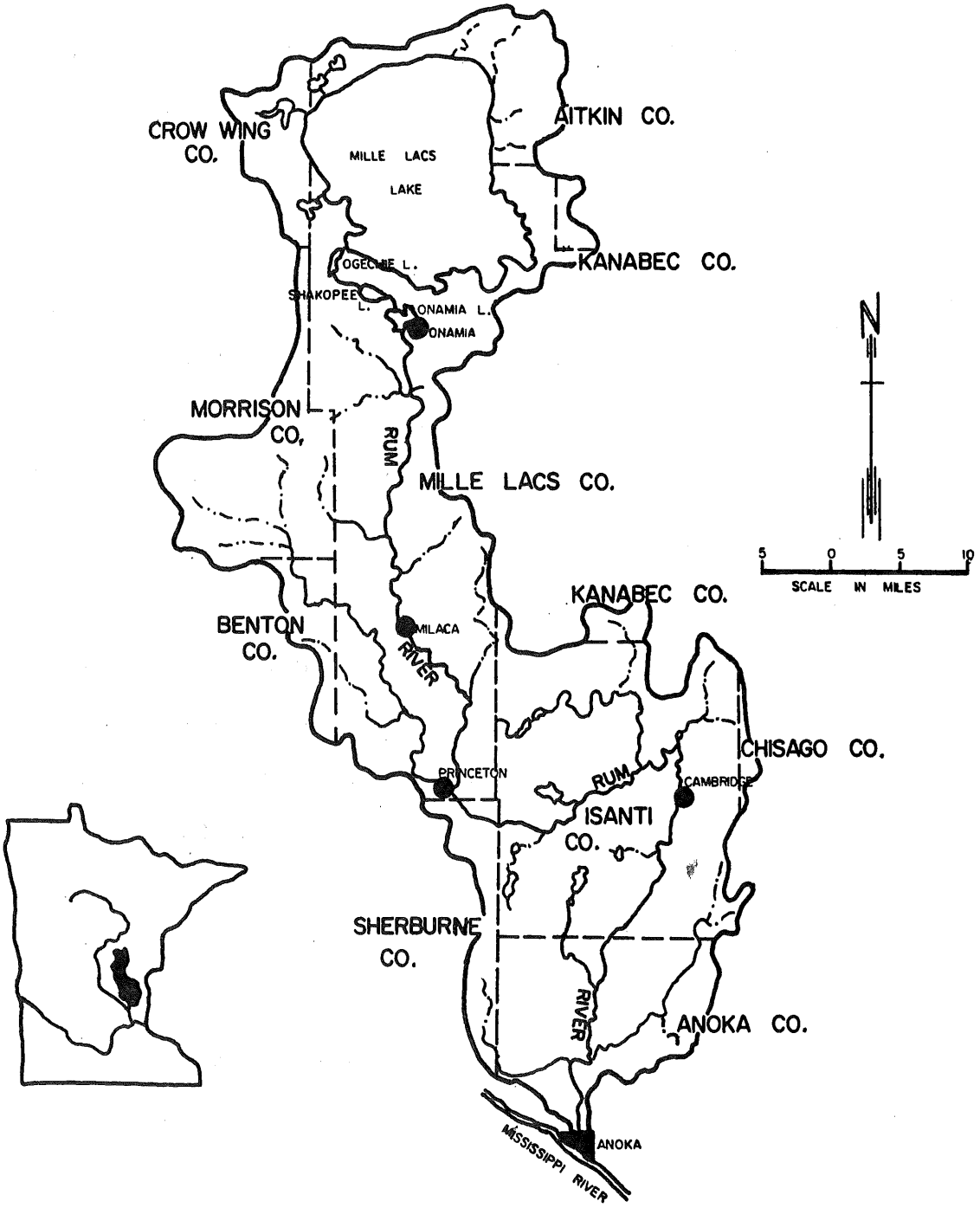
Sinuosity: Sinuosity values for 13 stations of the river ranged from 1.1 to 3.1 and averaged 1.8

Description of Watershed

The Rum River watershed encompasses an area of 1,552 square miles. The river flows southward from its source at Mille Lacs Lake through 3 impounded headwaters lakes (Ogechie, Shakopee, and Onamia Lakes) and the communities of Onamia and Milaca, and then to Princeton. At Princeton the river swings eastward to the vicinity of Cambridge where it swings and again flows southward to its mouth at Anoka (Figure 1). The northern one-third of the watershed is primarily forested, while the dominant land use within the lower two-thirds of the watershed is agricultural, generally being a mixture of both cultivated and pastured land. Land ownership throughout the watershed is mainly private. Exceptions are the state-owned Mille Lacs - Kathio State Park, Rum River State Forest, Mille Lacs Wildlife Management Area, and several smaller state, county, and municipal wildlife areas or parks.

The nothern portion of the watershed is an undulating glacial till plain which is traversed by several morainal ridges, and the southern portion of the watershed consists of hills that rise above a glacial outwash plain known as the Anoka Sand Plain. Red-brown drift (mostly sandy till) covers the northern portion of the watershed, while gray drift composed mostly of silty till covers the southern portion of the watershed. These soils are generally light colored loamy sands to sandy loams, acid, drouthy, and of moderate to low productivity.

FIGURE 1: RUM RIVER WATERSHED



The upper 15 miles of the Rum River flows through a shallow valley which increases to a depth of 10 to 30 feet at Princeton. The river valley between Princeton and Cambridge becomes shallower and wider, and increases in depth to 20 feet or more from Cambridge to Anoka. Except for several areas of rock outcroppings in the headwaters area of the watershed, bedrock throughout the watershed is covered by glacial deposits exceeding 100 feet in thickness.

BACKGROUND INFORMATION

Reasons for Survey

The 1974 survey was initiated to document current physical and biological characteristics of the Rum River and its adjacent corridor. Basic resource information of this type is necessary for programs such as the Wild and Scenic Rivers and fish and wildlife management.

Previous Investigations and Surveys

No complete survey of the Rum River had been made prior to the present survey. Survey information concerning the physical and biological characteristics of the Rum River is available in Moyle's 1940 report, from a 1958 stream survey report which covers the 14 miles of the Rum River from Princeton downstream to the mouth of Spencer Brook, from game lake survey reports (various dates) for Ogechie, Shakopee, and Onamia Lakes, and from a 1958 Rum River oxbow survey in Anoka County. Limited information is also available from stream survey files, USGS and DNR hydrologic investigations, and a preliminary draft Wild and Scenic River Management Plan.

Present Survey

The present survey was conducted in 2 parts. The initial part consisted of a general reconnaissance during which the physical and wildlife characteristics of the river and its adjacent corridor were noted, and also during which the river

was divided into 13 sampling stations. The second part of the survey consisted of electrofishing portions of each sampling station to determine the fishery characteristics. Electrofishing was done with a 14 foot boom shocking boat equipped with a 230 volt gas operated generator and a Smith-Root Type IV control panel, and utilizing pulsed DC current.

Table 1 in Appendix A gives the upstream location (legal description and miles from mouth) and length of each of the 13 sampling stations. The Rum River maps (Plates 1-18 Appendix B) show the location of each of the 13 sampling stations. Other pertinent information such as land ownership and toporgraphic characteristic, and the locations of river miles, dams, access points, tributaries and electrofishing sampling areas is also shown on these maps.

Special Problems or Conditions

Wind erosion may be a problem in open farmland throughout the area. Stream bank scour and undercutting along the Rum River and some of its tributary streams and ditches are primary sources of turbidity and siltation. Gully erosion occurs in places where the river banks are steep. Spring flooding can be a problem along the lower reaches of the river. Fluctuating water levels in the headwaters lakes area (station 1), and occasional drought conditions throughout the river can cause stress in fish and wildlife populations and hinder recreational use. Increasing residential development of the river ocrridor (primarily along the lower river reaches) can cause degradation of the existing aquatic and terrestrial environments if not properly regulated.

Erosion and Pollution

Stream bank erosion noted during the survey ranged from zero to 10 percent (Table 4). The 1958 survey report (corresponding to station 8) estimated bank erosion to be 40 percent. Primary causes of bank erosion were improper agricultural practices (mainly over-grazing) and high water levels. High water levels

resulted in stream bank undercutting and slumping and the uprooting of stream bank trees.

Sources of pollution noted during the survey were the Onamia and Cambridge wastewater treatment facilities, a power plant located downstream from the Cambridge wastewater treatment facility, and storm sewer entering the river in Anoka. No serious impacts resulting from these pollution sources were apparent.

Stream Alterations

According to permits issued by the DNR Division of Waters, the only major stream alteration was a 1972 channel dredging project. Debris from an old logging dam located approximately 0.5 miles downstream from the present Onamia Lake Dam (station 2) had apparently decreased the outflow capacity of the river channel below that required to adequately discharge the large volumes of water which occurred in 1972. Project design was to increase the Mille Lacs Lake outflow 10 percent by deepening, widening, and clearing 3 miles of the river channel beginning below the Onamia Lake Dam.

Dams and Other Obstructions

Four (4) dams are presently located on the Rum River. More dams were formerly situated on the river either for the maintenance of navigable water levels during early logging operations, or to provide the waterpower necessary for the early lumbering or milling operations.

The furthest upstream dam (river mile - 145.7) is the Ogechie Lake Dam located at the river outlet from this lake. This state-owned (DNR-Fish and Wildlife) dam was completed in April 1952, replacing an older dam at the same location. The fixed crest (crest elevation 1,250 ft.) provides a minimum outlet level for Mille Lacs and Ogechie Lakes. This dam was found to be in good condition when last inspected in 1972.

The Onamia Lake Dam (river mile - 136.9) is a state-owned, new type "C" stop log structure with a maximum crest elevation of 1,247.6 ft. (gauge height 3.8 ft.) and was completed in October, 1958. This dam provides water level control for both Shakopee and Onamia Lakes. The crest elevation has been maintained at 1,244.4 ft. (3.2 ft. below maximum) by removing some stop logs during the 1972 high water levels.

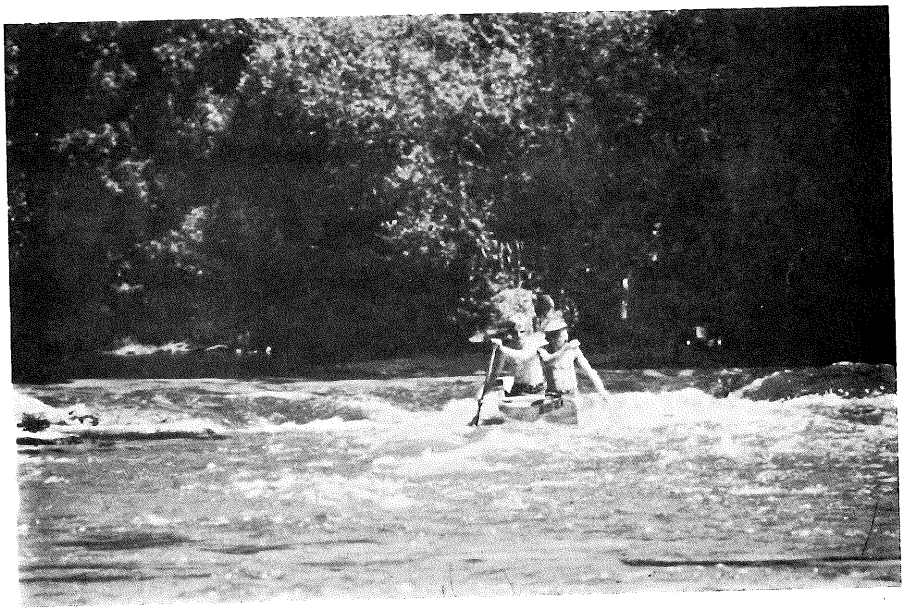
The Milaca Dam (river mile - 106.8) is a stop log structure capable of providing 5 feet of water level control. This dam was built in 1938 to provide a recreational reservoir within the community of Milaca. Currently the dam is operated so that a 0.4 mile long impoundment with a maximum depth of 5 feet is maintained.

The city-owned Rum River Dam at Anoka (river mile - 0.8) has a fixed crest (crest elevation 841.35 ft.), a 12.5 ft. head, an emergency spillway, and flashboards. This dam was rebuilt in 1971 to maintain existing conditions. The impoundment extends 5.7 miles upstream and has an average depth of 8 feet (maximum 12 feet).

Use of Water

Rum River water is used for various consumptive and non-consumptive purposes. The main consumptive use is irrigation (agricultural and residential lawn and garden watering). Anoka County appropriates 70 percent of the water used for irrigation. The Mille Lacs Lake Sand & Gravel Company is the only industrial user of Rum River surface water. Recreation and discharging municipal effluents are the primary non-consumptive uses. Recreational uses of the river and adjacent corridor include canoeing, tubing, some boating, swimming, fishing, hunting, and trapping. Winter recreational uses include limited ice fishing, cross-county skiing, snow-shoeing, and snowmobiling. Municipalities discharging directly into the Rum River or its tributaries are:

RECREATIONAL USE



CANOEING THROUGH A SMALL RAPIDS AREA
IN
THE LOWER PORTION OF THE RIVER

TUBING THROUGH A LONG RIFFLE AREA
IN
THE LOWER PROTION OF THE LAKE

Mille Lacs Co.	Isanti Co.	Anoka Co.
Onamia	Braham	St. Francis
Milaca	Cambridge State School & Hospital	St. Francis School District #15 - Anoka
Princeton	Isanti	
Bock		

Access (Location and Ownership)

Developed public access sites are located at the Mille Lacs - Kathio State Park, Mille Lacs CSAH 26 bridge crossing, and the Onamia Lake Dam. Privately owned access sites are located at the Vineland Resort near the Rum River outlet from Mille Lacs Lake, and the Crazyhorse Campgrounds (station 5, river mile-110.2). Additional boat and canoe access sites are located above the Milaca Dam (over the river bank within the municipal park), at the Princeton Park near the mouth of the West Branch Rum River, below the Highway 95 bridge (west bank) at Cambridge, at the northwest side of the Isanti bridge, at the Anoka County Highway 55 bridge (private land on northeast side), and at the Anoka park along the southeast side of the river. Plates 1-18 show the location of these access sites. Additional canoe access (undeveloped) is also available at some bridge crossings along the river.

Shoreline Developments

Shoreline development is minimal throughout the river's length but is increasing, especially in Anoka and Isanti Counties. Numerous shoreline residental developments are located in and near the several communities through which the river flows.

Recreational Boating

At normal stream stages the entire river can be navigated by canoe, except for a few areas of boulders and snags between Princeton and Cambridge and below St. Francis (stations 8, 9, and 11). At low stages numerous riffle areas in the

upper river reaches inhibit navigation by canoe. Navigation with small motorized watercraft is generally very limited. Dense growths of submerged aquatic vegetation in the headwaters lakes (station 1), large boulders in station 2, and numerous rapids in the river below Onamia (station 3) limit the use of motorized watercraft. Beginning 11 miles above Milaca and extending downstream to Princeton (37 river miles), limited use of motorized watercraft is possible (stations 4-7). The best area is station 7 (near Princeton) where the river becomes deeper and wider. Areas of boulders and snags between Princeton and Cambridge and near St. Francis also limit the use of motorized boats. The impoundment at Anoka and the tailwaters below the Rum River Dam (stations 12 and 13) are navigable with small motorized watercraft.

Tributaries and Springs

There are 87 tributaries to the Rum River (listed in Table 2). Many tributaries are small unnamed creeks, and no tributaries are found in the headwaters lakes area (station 1). The largest tributary is the West Branch Rum River. Table 3 summarizes flow measurements of several tributaries made during the survey. Flows were estimated at the stream mouths using the floating chip method.

PHYSICAL CHARACTERISTICS

The stream physical characteristics summarized in Table 4 generally indicate the Rum River to have variable features. Variations in physical features include stream widths ranging from 50 feet below the Onamia Lake Dam to 200 feet above the Rum River Dam's impoundment at Anoka, and maximum stream depths ranging from 2.5 to 4.0 feet respectively. Stream sinuosity is related to the gradient of the stream. Where stream gradients are highest (6.9 - 9.1 ft./mile) above Milaca, the sinuosity is about 1.4. Where stream gradients are low the sinuosity increases. Between Princeton and Cambridge where the stream is very meandered,

the stream gradient averages 0.9 ft./mile and the sinuosity is about 2. Gradients and sinuosity values throughout the river ranged from 0.3 - 9.1 ft./mile and 1.1 - 3.1 respectively.

Stream widths in the steep gradient area above Milaca ranged from 50 - 180 feet. Stream widths in the shallow, meandered reach of river between Princeton and Cambridge ranged from 25 - 130 feet. The impoundments at Milaca and Anoka averaged about 110 and 120 feet in width respectively.

Starting at the Onamia Lake Dam the occurrence of rock and gravel bottom substrates decreases downstream, and the occurrence of sand and silt substrates increases significantly, especially below Milaca. Except for the river area near St. Francis (station 11) coarse bottom substrates are restricted to the portion of river upstream from Milaca, and fine substrates such as sand dominate the river bottom downstream from Milaca. Secchi disc readings are highest in the upstream part of the river and decrease downstream. The decreased downstream readings are associated with the finer substrates found in the lower reaches of the river. Sand dominates the stream coarse where the river meanders, but where gradients are higher such as between Onamia and Milaca and near St. Francis, substantial amounts of gravel, rubble, and boulder are present.

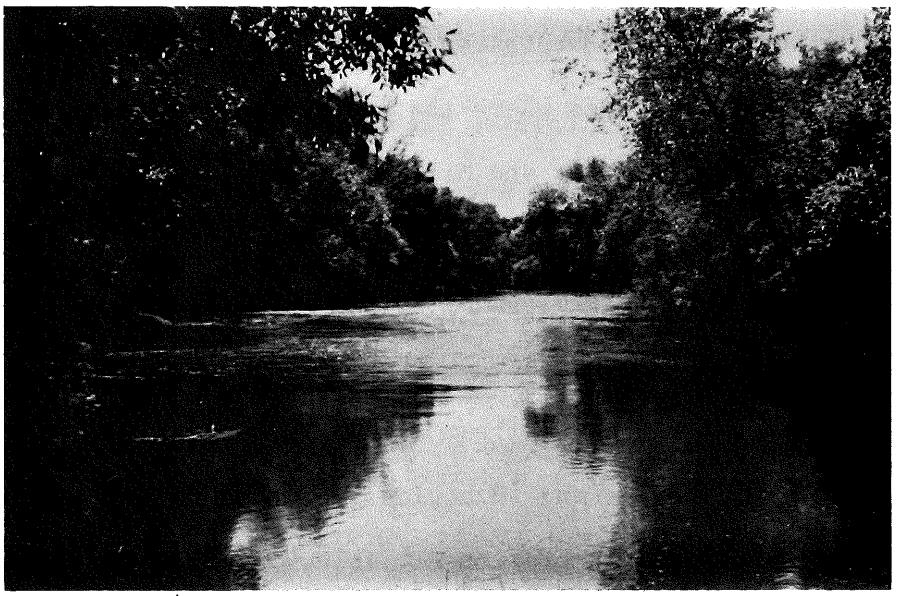
Sinuosity values were determined by dividing the river length by the straight line distance between beginning and ending points of each station. The letter designations used for the various stream substrate types in Table 4 are M(mud), (S)sand, (G)gravel, R(rubble), and (B)boulder. The 10 percent figure given for the percent of banks ditched in station 2 (Table 4) represents bank alteration resulting from the 1972 dredging project previously mentioned.

Discharge Flows

Mean monthly discharge flows (Table 5) recorded from October, 1973 to September, 1975 ranged from 261 to 3,017 cfs and averaged 754 cfs. Minumum flows

AQUATIC HABITAT

ROCKY STREAM SUBSTRATE AND INTERMITTENT POOLS AND
RIFFLES CHARACTERISTIC OF THE UPPER PORTIONS OF THE RIVER



SANDY STREAM SUBSTRATE AND LOW GRADIENT, MEANDERED CHANNEL
AREA CHARACTERISTIC OF THE MIDDLE PORTIONS OF THE RIVER

were recorded during the winter months (December - February) while maximum flows occurred during the spring months (April - June). The 1973 and 1974 mean monthly discharge flows (867 and 640 cfs respectively) both exceeded the 44 year average discharge flow of 597 cfs (Table 5). However, compared to the 1974 mean monthly discharge (640 cfs), river flows observed during the survey (June - August, 1974) exceeded this average only during the month of June. Discharge flows were recorded at the USGS gauging station.

Water Temperatures

Water temperatures recorded during the survey generally indicate surface water temperatures fluctuate with ambient air temperatures. Table 6 shows the water temperature data collected at various stations and dates along the river. Water temperatures are correlated with air temperatures ($r = 0.82$) and are about $3^{\circ}F$ lower than air temperatures. Mean air and water temperatures were 75 and 72 $^{\circ}F$ respectively. Where y = water temperature and x = air temperature, $y = 0.66 x + 2.05$.

CHEMICAL CHARACTERISTICS

Water Quality

Good water quality is characteristic of the Rum River, but there is a general deterioration of the water quality downstream. The Rum River is a 2B intrastate water according to Minnesota Pollution Control Agency water quality standards. A 2B classification indicates water of sufficient quality to permit the propagation and maintenance of cool or warm water sport or commercial fishing and be suitable for aquatic recreation of all kinds, including bathing, for which the water may be usable.

Water quality data summarized in Table 7 indicates the water to be hard and have good fertility. Water hardness ranges from moderately hard to hard (53-167 ppm total alkalinity). Alkalinity values are generally inversely related to discharge flows. The alkaline pH values (range 7.3 - 8.4) are also indicative

of hard water. Good water fertility is indicated by mean values for such water quality parameters as chlorides (4.6 ppm), dissolved phosphorus (0.08 ppm), total nitrogen (1.23 ppm), and total dissolved solids (173 ppm). Table 8 shows the individual water quality parameter values for monthly samples collected from October, 1973 to September, 1975. Fecal colliform counts near St. Francis and downstream have occasionally exceeded the standard for a 2B classification (200 fecal colliform per 100 ml. of water). Samples used for the water quality data were obtained from the USGS gauging station.

AQUATIC PLANTS, ALGAE, AND BOTTOM FAUNA

Aquatic Plants

Sixteen (16) species of emergent and 12 species of submerged or floating-leaved aquatic plants were noted during the survey (Table 31).

Aquatic plants were generally sparse and poorly distributed throughout the Rum River, being limited by such factors as turbidity, siltation, water velocity, and substrate instability. The only station containing appreciable amounts of aquatic vegetation was the headwaters lakes (station 1) where good water clarity, shallow depth, low gradient, and a stable mud bottom provided a suitable substrate for the growth of aquatic plants. Good stands of cattail, sedge, reed canary grass, cane grass, wild rice, and giant burreed were present. Species of submerged or floating-leaved aquatic plants included water milfoil, coontial, Canada waterweed, duckweed, and several species of pondweeds. Downstream from the headwaters lakes, stream physical characteristics such as increased gradient, unstable substrate, and increased turbidity restricted aquatic plant distribution to side channels, small tributaries, and oxbows.

Algal Distribution

Filamentous green algae was noted in several of the Rum River stations and in some of its tributaries. This type of algae was noted to grow prolifically

on rubble substrate in the shallow, sunlit areas of the reach of river extending from the mouth of Tibbets Creek to 7 miles above Milaca (station 5).

Bottom Fauna Distribution

Seven (7) orders of aquatic insects were noted during the survey (Table 31). The most commonly occurring orders were the mayflies (Ephemeroptera), caddisflies (Trichoptera) and the aquatic flies and midges (Diptera). Other aquatic invertebrates noted were snails (Gastropoda), clams (Pelecypoda), and freshwater oligochaetes (Oligochaeta). Moyle (1940) also noted the occurrence of 7 orders of aquatic insects in the Rum River, and the 3 most commonly occurring orders noted during the 1974 survey (mayflies, caddisflies, and aquatic flies and mdiges) were also the 3 most commonly occurring orders noted by Moyle in 1940. Moyle also found aquatic earthworms, leeches (Hirudinea), snails, and fingernail clams to be common.

Four (4) sites within station 2 were quantitatively sampled for aquatic invertebrates in October in 1970 and 1974. Samples were collected before and after the 1972 dredging project had deepened, widened, and cleared the upper 3 miles of station 2. Table 9 gives the location and physical characteristics of the 1974 sampling sites. Sites 1 and 2 were located within the dredged portion, and sites 3 and 4 were located downstream from the dredged portion of station 2.

A comparison of the total average numbers per sample of aquatic invertebrates sampled at sites 1 and 2 (Tables 10 and 11) shows a slight decrease from 1970 to 1974 at site 1, and a moderate increase from 1970 to 1974 at site 2. Although the substrate disturbance resulting from the dredging project produced little change in the total average number of organisms per sample, the growth rates of organisms appeared to increase after disturbance, thus resulting in much higher total average volumes.

Except for a decrease in the average volume of molluscs noted in 1974 at site 1, the average volumes per sample of molluscs and other invertebrates increased within the dredged area after dredging (Table 12). Table 12 also shows increases in the average volumes of molluscs and other invertebrates downstream from the project area after dredging had been completed.

FISHERY CHARACTERISTICS

Species Composition and Length-Frequency Distributions of Catch

The 6 most numerous large sized fish species caught (smallmouth bass, northern redhorse, carp, white sucker, black bullhead, and yellow perch) collectively comprised 74 percent of the catch by number and 82 percent by weight. Smallmouth bass was the most abundant large sized species caught, comprising 22 percent of the total catch by number, but only 4 percent by weight. Carp provided the greatest biomass (38%) of the total catch by weight, but only 11 percent by number. Length-frequency distributions of the large sized fish species show a high percentage of adult sized carp, sucker and bullhead species, and northern pike. Yellow perch and the sunfishes were primarily young-of-the-year or juvenile sized fish.

Thirty-eight (38) species of fishes (19 species each of large sized fish and small sized forage fish) were caught in the Rum River. Of the 19 species of forage fish caught, common shiners were the most abundant, comprising 27 percent of the catch. The 6 species of the genus Notropis collectively comprised 62 percent of the catch.

Table 13 and Plates 1-18 show the location and length of electrofishing runs within each station. Table 14 summarizes the species composition by numbers and weight (lbs.), the catch per unit of effort or CPE (fish/hr.), the median length interval in inches of each large sized fish species, and the species composition (by number) and CPE of each small sized forage fish species. Table 14a summarizes

the length-frequency distributions of each large sized fish species. Tables 15 - 27 and 15a - 27a are station summarizations of the fisheries survey data shown in Tables 14 and 14a respectively.

Distribution and Characteristics of the Fishery

Ten (10) of the 19 species of large sized fish caught during the survey were caught at more than half (7) of the 13 sampling stations. The 10 species of large sized fish caught at more than half of the sampling stations were white sucker, northern redhorse, smallmouth bass, black bullhead, silver redhorse, northern pike, walleye, carp, rock bass, and yellow bullhead. Only 2 (white sucker and northern redhorse) of these 10 species were caught at all 13 sampling stations, and only 3 (smallmouth bass, white sucker, and northern redhorse) of these 10 species were considered abundant (a catch of more than 8.5 fish/hour) at a majority of the sampling stations. The 9 remaining species of large sized fish caught (yellow perch, brown bullhead, pumpkinseed, largemouth bass, burbot, bowfin, bluegill, white crappie, and black crappie) were more locally distributed, and the latter 3 of these species were caught only at 1 sampling station each.

The 19 species of small sized forage fish caught during the survey were neither as widely distributed or abundant as the large sized fish species. None of the 19 forage fish species were caught at all 13 stations, and only 3 of these species (common shiner, hornyhead chub, and bluntnose minnow) were caught at more than half of the sampling stations. Twelve (12) species of forage fishes (spottail shiner, golden shiner, fathead minnow, central mudminnow, creek chub, mimic shiner, brassy minnow, tadpole madtom, Iowa darter, blacknose shiner, trout-perch, and mottled sculpin) were caught at fewer than 5 of the sampling stations, and the latter 3 of these species were caught only at 1 sampling station each.

Five(5) distinct aquatic habitat areas, each differing in several basic physical characteristics are: (1) The headwaters lakes area (station 1);

(2) the high gradient area (stations 2-7); (3) the low gradient area (stations 8-11); (4) the impoundment area at Anoka (station 12) and; (5) the tailwaters area below the Rum River Dam (station 13). Data shown in Tables 15-27 and the comparative CPE data for the 12 most abundant large sized fish species (Table 28) are used for the following discussion of the fishery.

Important characteristics of the impounded headwaters lakes area were its low gradient (0.4 ft./mile), predominantly muck substrate, and dense growths of aquatic vegetation. The electrofishing sample was dominated by yellow perch and brown bullheads which collectively comprised 70 percent of the total catch. White suckers and black bullheads comprised an additional 17 percent of the total catch in this area. The limited distributions of yellow perch and brown bullheads outside of this area indicate they utilize this type of habitat effectively. The blacknose and spottail shiners were the 2 most abundant forage fish species caught in this area.

Stream gradients within the high gradient area ranged from 2.8 - 9.1 ft./mile and averaged 5.7 ft./mile. Other important characteristics were the dominance of coarse bottom substrates (gravel and rubble) and a good pool-riffle relationship. The most abundant species comprising the large fish species catch was the smallmouth bass (32% of the total catch). Other commonly occurring large fish species were white sucker, yellow bullhead, black bullhead, and northern redhorse. The occurrence of yellow perch and brown bullheads, primarily in the upper end of the high gradient area (station 2), indicates the influence of the high upstream lake populations. Black bullheads were frequently caught in the vicinity of the dam's tailwaters. The 2 most commonly caught and widely distributed forage fish species were the common shiner and hornyhead chub. Johnny darters and longnose dace were less frequently caught but occurred commonly. The abundance of both spottail and mimic shiners at station 2, as compared to the remaining stations within the area, indicates the influence of the upstream areas.

Stream gradients in the low gradient area ranged from 0.3 - 3.8 ft./mile and averaged 1.6 ft./mile. Except for station 11 where the gradient was moderate and the substrate was gravel and rubble, the gradient throughout this area averaged only 0.9 ft./mile and the substrate was predominantly sand. Fewer fish were sampled in this area than in the high gradient area. Two (2) large fish species (northern redhorse and carp) comprised 67 percent of the total large fish catch, and a high percentage of the northern redhorse were caught at station 11. Game fish comprised 12 percent of the area catch. The 2 most commonly occurring forage fish species were the spotfin and common shiners, but small forage fishes were neither abundant or well distributed. No forage fish were caught at station 10, and only a single trout-perch was caught at station 9.

The impoundment at Anoka was characterized by a low gradient (0.4 ft./mile), increased depth, and a predominantly sand substrate. Fewer large sized fish species were caught in the impoundment than in the low gradient area upstream. White sucker, silver redhorse, and northern redhorse comprised 77 percent of the total large fish species catch in the impoundment, and the remaining 28 percent of the catch was carp and smallmouth bass. Only 3 smallmouth bass were caught in the impoundment. Three (3) forage fish species were caught in this area, but none were abundant.

The tailwaters area below the Rum River Dam at Anoka is characterized by a low gradient and a sand substrate. Sixty-eight (68) percent of the large fish species catch consisted of carp and black bullheads. The high carp density appears to be related to the influence of the nearby Mississippi River. The tailwaters habitat is similar to many small dams in southern Minnesota in that black bullheads are frequently abundant. Smallmouth bass and walleye comprised 11 percent of the catch. Common and spotfin shiners were the 2 most abundant forage fish species caught in this area.

The Catostomids (white sucker, silver redhorse, and northern redhorse) as a group were both the most abundant and widely distributed species caught. White sucker and northern redhorse were generally caught most frequently where moderate stream gradients and coarse substrates occurred.

Carp were caught at 10 of the 13 stations, and were not caught where high stream gradients and coarse bottom substrates occurred (stations 2-5). The highest carp catch rate (88.10/hour) was in the tailwaters area below the Rum River Dam at Anoka.

Catch data (Table 28) indicates some distribution differences among the 3 bullhead species. Black bullheads were the more abundant and widely distributed, being caught at 11 of the 13 stations. Highest black bullhead catches were in the tailwaters areas of stations 2 and 13. Yellow bullheads were caught more frequently in the steeper gradient stations, and the high gradient area provided 82 percent of the total catch. Brown bullheads were the least widely distributed of the 3 species, occurring mainly in and below the headwaters lakes.

Northern pike were caught between Mille Lacs Lake and Cambridge (stations 1-10), and the catch rates indicate a low abundance and uniform distribution. Northern pike spawning habitat was limited to backwater areas and tributaries where suitable spawning conditions were present.

Neither walleyes or yellow perch (except perch in the headwaters lakes) were abundant. Walleyes were caught at 10 of the 13 stations, but their distribution within these stations appeared limited to the few deep holes. Yellow perch below the headwaters lakes were not abundant or well distributed.

Smallmouth bass was the most abundant of the widely distributed large fish species, and were caught at all locations but station 1. Smallmouth bass were caught most frequently where stream gradients were high or moderately high and where boulder, rubble, and gravel substrates were present. Natural reproduction during the previous 2 years appeared to be good since many young fish were caught.

Rock bass were caught at similar locations, but less frequently and at fewer locations than smallmouth bass.

From the headwaters lakes going downstream there was a decreased number of large sized fish species present. There was a positive correlation ($r = 0.67$) between stream gradient and the number of species above average abundance at a sampling station. This partially explains why the number of abundant species between sampling stations declined from a high number of 8 at station 2 (near Onamia) to a low number of 1-2 per station between Milaca and the impoundment at Anoka ($r = -0.87$). The equation ($z = 0.83x - 0.04y + 0.47$) for the regression line, where z equals the number of abundant species at a station, x equals the gradient at the sampling station, and y = the sampling station number also takes into account the number of upstream abundant species on the downstream populations. The correlation coefficient between upstream and downstream fish species abundance is $r = 0.79$.

Species Composition Comparison With Statewide Average

A diversity of aquatic habitats in the Rum River is indicated by the generally high diversity index values calculated from the fish species composition. Station diversity index values (Table 29) range from 1.32 - 3.02, with a median value of 2.42. Electrofishing data summarized by Peterson (1975) indicates that for large warmwater rivers, diversity index values for the large fish species composition range from 1.8 - 2.6 (mean -2.23). The average species composition of these large warmwater rivers was calculated to be: 71 percent Catostomids and carp, 14 percent game fish (smallmouth bass, walleye, channel catfish, and white bass), 4 percent sport fish (Centrarchids), 9 percent other fish (bullheads, yellow perch, bowfin, and sheepshead), and a trace was small fishes. The Rum River species composition was 40 percent large rough fish, 24 percent gamefish, 6 percent sport fish, and 30 percent others, thus indicating less environmental stress than is

present in other rivers.

Fishing Conditions

Area conservation officers report fishing to be good to excellent particularily for smallmouth bass, but fishing pressure is light. The Rum River from Ogechie Lake to Milaca usually has excellent smallmouth bass fishing, and some northern pike and a few walleyes are caught. Fishing pressure along this reach of river is light. Sometimes fishing pressure is heavier at Shakopee Lake and at bridge crossings further downstream. From Milaca to Princeton some fishing pressure is reported for smallmouth bass and walleye. Fishing pressure is generally light along the river in Isanti County, but appears to get heavier each year. Below Isanti there usually is good walleye, smallmouth bass, and northern pike fishing early in the season. The river in Anoka County is not heavily fished, but does get light fishing pressure for smallmouth bass. Much of this fishing pressure occurs during the fall. The 1958 Rum River report noted that the river between Cambridge and Princeton is fished for walleyes, smallmouth bass, and northern pike, but mostly walleyes. The 1958 report also noted that the river below Princeton had moderately heavy fishing pressure.

Moyle (1940) noted that because of drought conditions, the upper reaches of the Rum River had carried little water the 5 preceeding years. Moyle also noted that of the non-impounded portions of the river, only the reach between St. Francis and the mouth was suitable for game fish. Apparently only the lower portion of the river contained adequate water to sustain fish life, and the upper portion of the river is dependent on the outflow from the headwaters lakes as its primary sources of water.

Records of Past Management

The bulk of the fish management (stocking and removal) has been concentrated on the headwaters lakes. Table 30 summarizes the fish management records since

1960. Special fishing regulations were imposed on Shakopee Lake during the winter or 1948-49 when it was opened to promiscuous fishing. In the winter of 1949-50 all 3 headwaters lakes were closed to dark house spearing. The northern pike angling season on portions of Ogechie Lake was delayed in the spring from 1953-58 to protect their spawning areas. The are no records of fish habitat improvements for the Rum River.

DISCUSSION OF FISHERY RESOURCE

General

The Rum River is a very good smallmouth bass stream. Sport and game fish species comprised 30 percent of the large sized fish catch. This compares favorably with a statewide average for sport and game fish of 18 percent. Smallmouth bass comprised 22 percent of the catch. Past utilization of the fishery has generally been light, but does appear to be increasing.

Management Problems

The high percentage of sport and game fish and the diverse fish species composition would appear to preclude the existence of a major fisheries management problem, except during drouthy years. Flow augmentation is not necessary in a year of normal precipitation, but discharges from Mille Lacs and the other headwaters lakes are not controlled so water for low flow augmentation is not available in a drouthy year. Both induced and natural erosion are primary sources of turbidity and siltation and are particularily evident in the lower river reaches. Fluctuating water levels within the headwaters lakes and periodic drought conditions (such as occurred during the 1976-77 winter) may be factors causing stress to the game fishery, expecially within the upper river reaches. Increasing residential developments along the lower river reaches may pose future management problems for the sport and game fishery.

TERRESTRIAL VEGETATION

Dominant terrestrial vegetation adjacent to the headwaters lakes area consisted of an alder bog with numerous tamarack and black spruce trees, and a few scattered areas of hardwoods (primarily aspen). Mixed hardwood and conifer woodlands, mainly red and bur oaks and containing some white pine and white spruce dominated the dryer undulating hilly uplands of the headwaters lakes area.

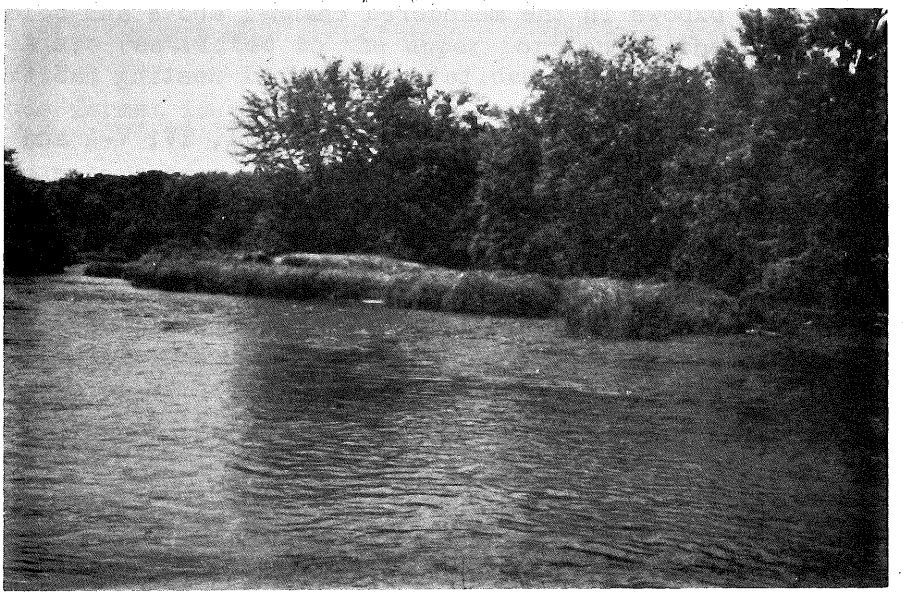
Bottomland woodlands containing silver maple, American elm, green ash, and willows dominated the narrow floodplain corridor between Onamia and Milaca. In the undulating upland woodlands between Onamia and Milaca, mixed stands of oak, birch, and aspen occurred. Some pine was also present in these woodlands. Understory vegetation consisted of hazel, dogwoods, and grasses. Old fields and pastures were interspersed among these upland woodlands, indicating decreased land use for crop production.

The river corridor below Milaca is characterized by increased floodplain width and decreased topographic relief than which exists further upstream. Understory vegetation of the bottomland woodlands is sparse. Beginning below Milaca increased agricultural land use was associated with a decreased amount of upland woodlands, and bottomland woodlands which were generally restricted to a narrow fringe along the river banks. Starting several miles above Princeton to the vicinity of Cambridge, numerous oxbows occur as a result of the river meandering through a generally flat region of sandy soil.

Fewer meanders and oxbows are present downstream from Cambridge where the hilly topography restricts the river to a narrow floodplain corridor. Silver maple is the most abundant bottomland species, and green ash and American elm are important components of the wooded bottomlands. Agricultural land use below Cambridge is less intensive than between Milaca and Cambridge. The adjacent

WILDLIFE HABITAT

HABITAT CHARACTERISTIC OF THE RIVER'S CORRIDOR ALONG
THE
UPPER PORTIONS OF THE RIVER



ISLANDS OF AQUATIC VEGETATION FOUND SCATTERED ALONG
THE
LENGTH OF THE RIVER

upland sandy soils below Cambridge are primarily wooded with stands of hardwoods containing oak, birch, and aspen, and also some pure stands of bur oak. Beginning several miles upstream from Anoka, residential land use dominates the river's corridor. A listing of the species of terrestrial vegetation noted during the survey is included in Table 31.

WILDLIFE CHARACTERISTICS

Species Present

The variety of terrestrial and aquatic habitats encourages a diversity of wildlife species. Seventy (70) species of brids, 11 species of mammals, and 8 species of amphibians and reptiles were observed during the survey (Table 31). Much of the Rum River's main channel has marginal waterfowl habitat, particularly the high gradient areas. Suitable waterfowl nesting habitat for wood ducks, mallards, and blue-winged teal is found in the headwaters lakes. These lakes are also utilized as waterfowl resting areas during spring and fall migration periods. Numerous oxbows in the meandered channel above and below Princeton provide good wood duck nesting habitat. Waterfowl nesting habitat is generally less suitable below Cambridge. Scattered Types III, IV, V-A and Vwetlands near the river are utilized by waterfowl. These wetlands occur less frequently in areas of high stream gradients.

Furbearers of primary importance are beaver, muskrat, raccoon, mink, and red fox. Habitat utilized by waterfowl also appeared to be suitable for furbearers. The headwaters lakes provide good habitat for muskrat and mink. Beaver were reported to be quite common, and otter were reported to be occasionally seen in the headwaters lakes. The oxbows above and below Princeton provide habitat for muskrat, beaver, and mink. Woodlands throughout the river's corridor generally provide habitat for raccoon, with the best habitat being

located in woodland areas adjacent to the headwaters lakes. Red fox occurred throughout the area.

Upland game birds (ruffed grouse, woodcock, and ring-necked pheasant) occur along the river's corridor. The stands of upland hardwoods containing aspen and other species found in the corridor along the upper river reaches provide ruffed grouse habitat. Woodcock occur mainly from Milaca upstream where pastured areas are interspersed among the upland woodlands. Suitable habitat for ring-necked pheasants occurs along the lower portion of the river's corridor where agricultural land use predominates but is not intensive.

Upland game mammals found in the area are gray and fox squirrels, cottontail rabbit, varying hare, and white-tailed deer. Areas in which oaks are an important component of the woodlands provide habitat for both species of squirrels. Gray squirrels prefer large blocks of mature hardwoods which have not been grazed, and fox squirrels prefer smaller woodlots, particularly where interspersed among agricultural areas (Gunderson and Beer, 1953). Cottontail rabbits are found throughout the river's corridor in areas with small woodlots and/or fields. Snowshoe hares are restricted to the upper portion of the river's corridor where some coniferous forest is present. White-tailed deer occur in varying numbers throughout the entire area.

A wide variety of non-game wildlife species was noted during the survey, including 61 non-game bird species. Birds present included the common loon, great blue heron, and common crow. Smaller birds such as the green heron, ruby-throated hummingbird, eastern bluebird, and scarlet tanager were present. Four (4) species of non-game mammals, and 8 species of amphibians and reptiles were also noted. Reptiles included the spiny soft-shelled and the map turtles.

Hunting Conditions

Area conservation officers and wildlife managers report that during years of normal fall water levels, the headwaters lakes (particularly Onamia Lake) can

provide good early season waterfowling and late season bluebill hunting, and that early in the season hunting pressure is heavy. Some floating and jump shooting of ducks (primarily wood ducks) occurs in the fall when the river is navigable. The numerous oxbows above and below Princeton provide little public waterfowl hunting opportunity because the land is privately owned.

Squirrels (mostly gray) are hunted throughout the watershed and some float hunting for squirrels occurs along the river. The best grouse hunting is limited to the northern areas. Private land ownership limits access to hunting in some areas. Mink and muskrats are trapped along some portions of the river.

The most recent game lake surveys of Ogechie and Onamia Lakes (1966) and Shakopee Lake (1964), and a 1958 survey of an oxbow area in Anoka County, indicated that at times these areas are heavily utilized by waterfowl and aquatic furbearers, and that hunting for waterfowl and trapping for furbearers is good. Water stages were listed as high for Ogechie and Onamia Lakes in 1966 and three inches below normal in Shakopee Lake in 1964.

In 1966 Ogechie Lake was covered with dense growths of submerged aquatic vegetation, but emergent vegetation was scarce. The primary reason given for the scarcity of emergent vegetation was the instability of water levels. Habitat quality for waterfowl was poor to fair at Ogechie Lake in 1966. Aquatic furbear habitat was good, and deer and raccoon habitat was also indicated to be good. The Onamia Lake survey indicated waterfowl habitat to be poor because of insufficient brood and nesting cover, and also the lack of muskrat houses which are used as loafing sites. Aquatic furbearer habitat in Lake Onamia was fair, being limited by inadequate emergent vegetation for house building. The areas adjacent to Onamia Lake provided fair habitat conditions for waterfowl, poor conditions for muskrats, fair conditions for beaver, and good condiitions for deer and ruffed grouse in 1966.

The Rum River oxbow survey reported waterfowl habitat to be fair in quality (insufficient nesting and brood cover, and loafing sites), and muskrat habitat to be poor (insufficient water depth and food). This survey also reported other oxbows in the vicinity to have limited value for waterfowl.

Records of Past Management

No special hunting regulations have been imposed in the Rum River area. A considerable amount of wildlife habitat improvement has occurred in the Mille Lacs Wildlife Management Area located east of the main river channel in the upper portion of the watershed.

DISCUSSION OF WILDLIFE RESOURCE

Management Problems

Some wildlife species are more abundant and widely distributed than other species. Access for utilization of the wildlife resource is restricted by the extent of privately owned lands. Increasing Rum River shoreline development will further restrict lands available for hunting and destroy the wild character of the shoreline. The primary waterfowl-muskrat management problem of Ogechie, Shakopee, and Onamia Lakes is related to water level instability and its affect on emergent aquatic vegetation. Fluctuating water levels in Ogechie Lake result from easterly winds blowing across Mille Lacs Lake. These winds are reported to raise the water level along the west side of Mille Lacs Lake by a maximum of 8 inches and this causes increased flow through the river channel into Ogechie Lake. Water levels on Shakopee and Onamia Lakes can be controlled by the Onamia Lake Dam and have been maintained 3.2 feet below maximum since 1972. Lower water levels, particularly on Onamia Lake, encourage the growth of wild rice and other aquatic vegetation which encourages better waterfowl-furbearer utilization. Increased aquatic plant density in Onamia Lake has caused some local complaints

(primarily for aesthetic purposes) and appeal for increased water depth to suppress the vegetation.

Since a range of water levels is available on Onamia Lake, the problem is to choose the optimum level for fish and wildlife. A summary of the considerations to determine the optimum level is as follows:

(1) The lake classification system summarized by Peterson (1971) classifies fish lakes as those that do not winterkill and have maximum depths that are ordinarily more than 20 feet and average depths that are 10 feet or more. In 1966 the maximum depth of Onamia Lake was 13 feet and the median depth was 5 feet, and the water stage was indicated to be above normal. At these depths the lake could only provide marginal conditions for fish.

(2) There is a history of good wild rice production on Onamia Lake prior to 1938 when construction of a dam at the lake outlet raised the water level 5.5 feet above June, 1931 levels. Wild rice production has increased since 1972 after the water level had been reduced 3.2 feet.

(3) On Onamia Lake a primary recreational value is duck hunting and wild rice harvesting, and the present water level (3.2 feet below maximum) is more statisfactory than the high water levles occurring between 1938 and 1972.

(4) Apparently Onamia Lake is a good northern pike spawning area at the present level.

It is apparent that an optimum water level for a quality fishery is unattainable, and the present level is better for wild rice, waterfowl, and furbearers. There is no reason to alter the present water level until a study of this problem suggests a suitable alternate.

DISCUSSION AND SUMMARY

A diversity of physical, chemical and biological resources characterize the aquatic and terrestrial environments of the Rum River and its corridor. Not only are the resources diverse, but their quality has not been seriously degraded. Much of the river corridor is wooded and the specie composition and distribution of the woodlands is quite diverse. Bottomland woodlands consist mainly of silver maple, American elm, green ash, and willows. Upland woodlands along the upper river reaches are mixed hardwoods or mixed hardwoods and conifers, and along the lower river reaches woodlands are nearly exclusively hardwoods. Woodlands generally decrease further downstream. The majority of public owned lands are located in the wooded uplands of the northern portion of the watershed.

Greatest topographic relief exists upstream from Milaca where the undulating glacial till plain is traversed by several morainal ridges. This plain is primarily forested and the hills rise to an elevation of about 1,350 feet (about 100 feet above the level of Mille Lacs Lake). The landscape is quite flat below Milaca where the river meanders across the bed of former Glacial Lake Grantsburg. The increased intensity of agricultural land use in this area is evidenced by the decreased amount of woodlands. Hilly topography extends downstream from the vicinity of Cambridge where the river enters the Anoka Sand Plain. Agricultural use of the sand plain below Cambridge is less intense than below Milaca. Soils in the northern portion of the watershed are sandy till of fair to good fertility, and soils in the southern portion are silty till of low fertility.

Coarse stream bottom substrates occur most frequently above Milaca where the stream is characterized by high gradients and where topographic relief is greatest. Sinuosity is greatest between Princeton and Cambridge

where the land is generally flat and the soils are sandy. There is a general progressive downstream increase in stream widths and stream depths (70 to 100 feet and 2.5 to 4.0 feet respectively).

The Rum River is classified as a 2B intrastate water according to Pollution Control Agency standards. Water quality data indicates the water is hard and has good fertility and that there is a general progressive downstream increase in water hardness and fertility.

During the survey 28 species of aquatic plants, 38 species of fish, and 89 species of wildlife were noted. Except for the headwaters lakes, the density of aquatic plants in the Rum River was very low and their distribution was poor. Mayflies, caddisflies, and aquatic flies and midges were the three most commonly occurring orders of insects noted by Moyle in 1940, and also during the 1974 survey. Smallmouth bass was the most important constituent of the fish population, especially in the higher gradient-coarser substrate upper river reaches, and suckers, redhorse and carp dominated the fish population in the poorer quality habitat of the lower river reaches. The better quality fishery in the upper river reaches is influenced by the quality of the upstream fish population, and there is a general downstream decrease in the numbers of fish species present which were abundant. Drought conditions occur more frequently and are more severe in the upper river reaches than in the lower river reaches. A variety of both game and non-game species of birds, mammals, and amphibians and reptiles were present. Except for the headwaters lakes, the better waterfowl habitat is in the meandered area between Princeton and Cambridge where numerous oxbows are present.

Several management problems concerning the fish and wildlife resources have been identified, and several general recommendations concerning these management problems are suggested.

FISH AND WILDLIFE RECOMMENDATIONS

Increasing development pressures make it apparent that unless the quality of the existing Rum River's environments is provided protection, problems which seriously degrade environmental quality will also degrade the quality of these environments. Following are some suggestions for protecting the quality of the existing environments:

(1) Land management practices and/or bank stabilization measures should be emphasized to minimize the effects of soil erosion.

(2) Adoption and implementation of adequate shoreland zoning regulations are necessary to minimize detrimental effects of residential, commercial, and agricultural developments and to protect the natural character of the river.

(3) Adherence to satisfactory water quality standards is necessary to protect water quality from the effects of residential, commercial, and agricultural developments.

(4) Improve access to the river to encourage increased but appropriate utilization of the river and its resources.

(5) Improve the fishery in those reaches of the river where the habitat quality is poor.

(6) Maintain the level of Lake Onamia at its present lower level until such time that a more suitable alternate level has been studied.

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APPENDIX A

Table 1. Upstream location (legal description and miles from mouth) and length of the 13 Rum River survey stations in 1974

Station	Legal Description	Miles from Mouth	Length (Miles)
1	T.43N., R.27W., Sec. 33	148.4	11.5
2	T.41N., R.26W., Sec. 6	136.9	5.5
3	T.41N., R.26W., Sec. 29	131.4	10.1
4	T.40N., R.27W., Sec. 35	121.3	5.1
5	T.39N., R.27W., Sec. 27	116.2	7.8
6	T.38N., R.27W., Sec. 14	108.9	13.1
7	T.37N., R.26W., Sec. 22	95.8	12.3
8	T.36N., R.26W., Sec. 28	83.5	22.8
9	T.36N., R.25W., Sec. 36	60.7	21.3
10	T.36N., R.23W., Sec. 32	39.4	15.7
11	T.34N., R.24W., Sec. 29	23.7	11.0
12	T.32N., R.24W., Sec. 6	12.7	11.9
13	T.31N., R.25W., Sec. 12	0.8	0.8

Table 2. Streams tributary to the Rum River in Mille Lacs, Sherburne, Isanti, and Anoka Counties

Station	Name	Tributary Number	Location of Mouth (T.,R.,S.)	County	Source	Flow
2	Black Brook	M-63-79	41,26,5	Mille Lacs		
2	Unnamed Cr.	M-63-78	41,26,5	"	Marsh	Intermitt.
2	Unnamed Cr.	M-63-77	41,26,7	"	"	"
2	Unnamed Cr.	M-63-76	41,26,7	"	"	"
2	Unnamed Cr.	M-63-75	41,26,9	"	"	"
2	Unnamed Cr.	M-63-74	41,26,9	"	"	"
3	Unnamed Cr.	M-63-73	41,26,29	"	"	"
3	Bradbury Br.	M-63-72	41,26,29	"	"	"
3	Unnamed Cr.	M-63-71	41,26,33	"	"	"
3	Unnamed Cr.	M-63-70	41,26,33	"	"	"
3	Unnamed Cr.	M-63-69	40,26,7	"	"	"
3	Unnamed Cr.	M-63-68	40,27,12	"	"	"
3	Unnamed Cr.	M-63-68	40,27,12	"	"	"
3	Unnamed Cr.	M-63-67	40,27,12	"	"	"
3	Robinson Br.	M-63-66	40,27,12	"	"	"
3	Unnamed Cr.	M-63-65	40,27,13	"	"	"
3	Unnamed Cr.	M-63-64	40,27,13	"	"	"
3	Burnt Lane Br.	M-63-63	40,27,24	"	"	"
3	Unnamed Cr.	M-63-62	40,27,24	"	"	"
3	Unnamed Cr.	M-63-61	40,27,25	"	"	"
3	Unnamed Cr.	M-63-60	40,27,26	"	"	"
3	Unnamed Cr.	M-63-59	40,27,26	"	"	"
3	Unnamed Cr.	M-63-58	40,27,35	"	"	"

Table 2. Streams tributary to the Rum River in Mille Lacs, Sherburne, Isanti, and Anoka Counties (Cont'd.)

Station	Name	Tributary Number	Location of Mouth (T.,R.,S.)	County	Source	Flow
3	Unnamed Cr.	M-63-57	40,27,35	Mille Lacs	Marsh	Intermitt.
4	Unnamed Cr.	M-63-56	39,27,2	"		
4	Unnamed Cr.	M-63-55	39,27,3	"		
4	Unnamed Cr.	M-63-54	39,27,10	"		
4	Unnamed Cr.	M-63-53	39,27,15	"		
4	Unnamed Cr.	M-63-52	39,27,15	"		
4	Unnamed Cr.	M-63-51	39,27,22	"	Marsh	Intermitt.
4	Unnamed Cr.	M-63-50	39,27,22	"	"	"
4	Whitney Brook	M-63-49	39,27,22	"	"	
4	Tibbett Brook	M-63-48	39,27,27	"	"	
5	Unnamed Cr.	M-63-47	39,27,26	"	"	Intermitt.
5	Unnamed Cr.	M-63-46	39,27,35	"	"	"
5	Unnamed Cr.	M-63-45	39,27,35	"	"	"
5	Mike Drew Br.	M-63-44	38,27,2	"	"	"
5	Unnamed Cr.	M-63-43	38,27,11	"	"	"
5	Unnamed Cr.	M-63-42	38,27,14	"	"	"
6	O'Neill Br.	M-63-41	38,27,23	"	"	"
6	Chase Br.	M-63-40	38,27,23	"	"	
6	Unnamed Cr.	M-63-39	38,27,36	"	"	"
6	Unnamed Cr.	M-63-38	37,26,6	"	"	"
6	Unnamed Cr.	M-63-37	37,26,5	"	"	"
6	Unnamed Cr.	M-63-36	37,26,7	"	"	"

Table 2. Streams tributary to the Rum River in Mille Lacs, Sherburne, Isanti, and Anoka Counties (Cont'd.)

Station	Name	Tributary Number	Location of Mouth (T.,R.,S.)	County	Source	Flow
6	Vondell Br.	M-63-35	37,26,9	Mille Lacs	Marsh	Intermitt.
6	Unnamed Cr.	M-63-34	37,26,22	"	"	"
6	Woodward Br.	M-63-33	37,26,22	"		
7	Bogus Br.	M-63-32	37,26,26	"		
7	Washburn Br.	M-63-31	37,26,26	"		
7	Co. Ditch #12	M-63-30	37,26,34	"	"	
7	Unnamed Cr.	M-63-29	37,26,34	"	"	"
7	Unnamed Cr.	M-63-28	36,26,16	"	"	"
7	Unnamed Cr.	M-63-27	36,26,15	"	"	"
8	W.Br.Rum River	M-63-26	36,26,33	"		
8	Co. Ditch #4	M-63-25	35,26,3	Sherburne	"	
8	Unnamed Cr.	M-63-24	35,26,3	"	Silver L.	
8	Unnamed Cr.	M-63-23	36,26,10	"	Marsh	"
8	Spencer Br.	M-63-22	35,25,15	Isanti	Tennyson L.	
8	Unnamed Cr.	M-63-21	35,25,12	"	Marsh	
9	Green Br.	M-63-20	36,24,31	"		
9	Unnamed Cr.	M-63-19	36,24,31	"	Green L.	
9	Unnamed Cr.	M-63-18	36,24,27	"	Elizabeth L.	
9	Unnamed Cr.	M-63-17	36,24,27	"		
9	Stanchfield Cr.	M-63-16	36,24,14	"	Marsh	
9	Unnamed Cr.	M-63-15.5	36,24,24	"	"	Intermitt.
9	Unnamed Cr.	M-63-15	36,23,8	"	Lt.Stanchfield L.	
9	Beckins Cr.	M-63-14	36,23,20	"	Marsh	
10	Isanti Br.	M-63-13	35,24,24	"		

Table 2. Streams tributary to the Rum River in Mille Lacs, Sherburne, Isanti, and Anoka Counties (Cont'd.)

Station	Name	Tributary Number	Location of Mouth (T.,R.,S.)	County	Source	Flow
10	Unnamed Cr.	M-63-12	35,24,24	Isanti		
10	" "	M-63-11	35,24,25	"	Marsh	
10	" "	M-63-10	34,24,11	"	Margaret	Intermitt.
10	" "	M-63-9	34,24,15	"	Marsh	
10	" "	M-63-8	34,24,15	"	Long L.	
10	" "	M-63-7.5	34,24,22	"	Smith L.	
10	" "	M-63-7	34,24,21	"	Marsh	Intermitt.
10	" "	M-63-6	34,24,21	"	"	"
11	" "	M-63-5.7	34,24,29	Anoka	"	"
11	" "	M-63.5.5	33,24,5	"	"	"
11	Seelye Br.	M-63-5	33,24,8	"	"	
11	Unnamed Cr.	M-63-4.7	33,24,17	"	L.George	
11	" "	M-63-4.5	33,24,7	"	Marsh	
11	" "	M-63-4	33,24,20	"	Hickey L.	
12	Cedar Cr.	M-63-3	32,24,6	"	Marsh	
12	Unnamed Cr.	M-63-2	32,24,7	"	"	Intermitt.
12	" "	M-63-1.7	32,24,6	"	"	
12	Trott Br.	M-63-1.5	32,25,1	"	"	
12	Unnamed Cr.	M-63-1	32,25,13	"	"	Intermitt.

Table 3. 1974 Flow measurements on several Rum River tributary streams

Name	Tributary Number	Flow (CFS)	Stream Stage	Date
Black Brook	M-63-79	11.2	Slightly above normal	6-21-74
Unnamed Cr.	M-63-74	10.5	" " "	6-25-74
Burnt Lane Brook	M-63-63	1.7	" " "	6-25-74
Whitney Brook	M-63-49	3-4	" " "	6-26-74
Tibbett Brook	M-63-48	3-4	" " "	6-26-74
Mike Drew Brook	M-63-44	4	" " "	6-27-74
Vondell Br.	M-63-35	3	" " "	6-28-74
Co. Ditch #12	M-63-30	2	Normal	7-9-74
Co. Ditch #4	M-63-25	-	"	7-9-74
Unnamed Cr.	M-63-15.5	1.4	"	7-10-74
Beckins Cr.	M-63-14	2	"	7-10-74
Seelye Br.	M-63-5	3	"	7-12-74
Cedar Cr.	M-63-3	27.4	"	7-15-74

Table 4. Physical characteristics of the Rum River noted during the 1974 survey

Station No.	1	2	3	4	5	6	7
Date(s) surveyed	6/19,20	6/21	6/25	6/26	6/27	6/28	6/29
Upstream end of station (miles from mouth)	148.4	136.9	131.4	121.3	116.2	108.9	95.8
Length of station (miles)	11.5	5.5	10.1	5.1	7.8	13.1	12.3
Sinuosity value	1.5	1.3	1.4	1.2	1.4	1.5	1.7
Stream width (ft.) - median (range)		70 (50-90)	80 (50-140)	90 (60-150)	105 (70-180)	110 (70-150)	65 (25-100)
Stream depth - median (ft.)		3.5	2.5	2.5	2.5	2.5	4.0
Gradient (ft./mile)	0.4	2.8	6.9	7.2	9.1	5.1	3.4
Flow (cfs)	243						
Stream stage	Normal	High	High	High	Normal	High	Normal
Percent of station in riffles		50	65	55	35	20	
Relative abundance of stream substrate types	M-S-G	S-G-R	G-S-R	G-R-B	G-R-B	S-G-R	S-G-B
Bank height (ft.) - median (range)	1(0-20)	2(0.5-5)	2(1-15)	3(1-25)	4(1-35)	3(1-40)	3(1-60)
Percent banks eroded	0	0	<2	<1	2	15	3
Percent banks ditched	0	10	0	0	0	0	0
Silt load	None	Light	Light	Light	Light	Light-Mod.	Light-Mod.
Secchi disc reading (ft.)	6.0	4.5	4.3			3.8	3.0
Percent of bank cover types							
Wooded	10	65	85	85	45	90	95
Marsh	90		1	<1	<1		
Cropland						1	
Grassland		35	13	13	53	5	5
Other			1	1	<1	4	

Table 4. Physical characteristics of the Rum River noted during the 1974 survey (cont'd)

Station No.	8	9	10	11	12	13
Date(s) surveyed	7/9	7/10	7/11	7/12	7/15	7/16
Upstream end of station (miles from mouth)	83.5	60.7	39.4	23.7	12.7	0.8
Length of station (miles)	22.8	21.3	15.7	11.0	11.9	0.8
Sinuosity value	2.3	3.1	1.7	1.5	1.9	1.1
Stream width (ft.) - median (range)	75 (50-100)	90 (60-130)	90 (50-140)	100 (40-220)	120 (50-250)	110 (50-275)
Stream depth - median (ft.)	3.0					4.0
Gradient (ft./mile)	1.4	0.9	0.3	3.8	0.4	1.2
Flow (cfs)						
Stream stage	Normal	Normal	Normal	Normal	Normal	Normal
Percent of station in riffles						
Relative abundance of stream substrate types	S-M	S-G-M	S-G	G-R	S-G-R	S-G-R
Bank height (ft.) - median (range)	5 (1-85)	5 (1-40)	7 (1-50)	7 (1-50)	4 (1-25)	8 (2-30)
Percent banks eroded	5	2	1	1		<1
Percent banks ditched	0	0	0	0		0
Silt load	Mod.	Mod.-Heavy	Heavy	Mod.-Heavy	Mod.	Mod.
Secchi disc reading (ft.)	1.8-2.2	1.5	1.6-2.0	1.9		2.5
Percent of bank cover types						
Wooded	60	75	90	95	95	25
Marsh		2	<1		3	
Cropland	10	8				
Grassland	25	15	8	4		
Other		<1	1	1	2	75

Table 5. Mean monthly discharge flows from the Rum River near St. Francis (Station 11), October, 1973 - September, 1975

Month	Monthly Discharge Flow (cfs) 1973-74	1974-75
October	875	286
November	751	425
December	529	261
January	361	261
February	360	295
March	556	313
April	1,366	2,708
May	1,257	3,017
June	1,477	1,345
July	510	1,692
August	469	586
September	356	576

Mean annual discharge (1930-31, 1933-75) = 597 cfs

1973 calendar year mean monthly discharge - 867 cfs

1974 claendar year mean monthly discharge = 640 cfs

Table 6. Water temperature data collected during the Rum River survey (June through August, 1974)

Station	Date	Time	Percent Cloud Cover	Air Temp. (°F)	Water Temp. (°F)	Water Stage
1	6/19	-			63	Normal
1	8/13	1400		79	71	Normal
1	8/14	0900	25	77	71	Normal
2	6/21			68	69	Slightly above normal
2	8/14	1415	50	77	75	Slightly above normal
3	6/25			82	77	Slightly above normal
3	8/15	1000	100	76	73	Slightly above normal
3	8/15	1300	100	76	73	Slightly above normal
5	6/27			72	71	Normal
5	8/28	0930	50	70	64	Normal
6	6/28			72	71	Slightly above normal
6	8/16	1030	20	72	71	Slightly above normal
8	8/29	1100	10	65	65	Normal
9	8/9	0930	90	72	71	Normal
10	8/8	1430	20	80	73	Normal
11	7/18	1100	100	80	78	Normal
12	7/18	1700		84	78	Normal
13	7/19	0800	0	77	78	Normal

Table 7. Summary of water quality data from station 11 (near St. Francis) of the Rum River from October, 1973 to September, 1975

Water Quality Parameter	Range of Values	Mean Values
Air Temp. (^{o}C)	18.0 - 31.0	8.8
Water Temp. (^{o}C)	0.0 - 23.0	8.6
Color (Pt-Co Units)	5 - 80	33
T. Alkalinity (ppm)	53 - 167	130
Chlorides (ppm)	3.1 - 7.0	4.6
Turbidity (JTU)	1 - 21	5
Dissolved Phosphorus (ppm)	0.01 - 0.37	0.08
Nitrogen (ppm)		
TN	0.82 - 2.40	1.23
NO_2-N	0.00 - 0.02	0.01
NO_3-N	0.00 - 0.97	0.27
TKN-N	0.53 - 1.56	0.95
NH_3N	0.00 - 0.23	0.10
BOD (ppm-5 day)	0.4 - 6.6	2.2
Dissolved Oxygen (ppm)	3.5 - 12.9	8.9
Carbon Dioxide (ppm)	1.0 - 15.0	4.5
PH	7.3 - 8.4	7.9
Total Dissolved Solids (ppm)	108 - 224	173

Table 8. Water quality data from the Rum River (near St. Francis) from October, 1973 - September, 1975

Date	10/16/73	11/13/73	12/12/73	1/10/74	2/20/74	3/25/74	5/01/74	5/30/74
Air Temp. (^{o}C)		12.0			-1.0	-7.0	13.0	16.0
Water Temp. (^{o}C)	11.0	3.0	0.0	0.0	0.5	0.0	13.5	17.0
Instantaneous Discharge (cfs)	1,480	580	518	355	378	482	1,370	1,000
Color (Pt-Co units)	80	20	20	20	30	30	50	50
T. Alkalinity (ppm)	98	143	167	162	144	153	107	124
Chlorides (ppm)	4.6	5.4	5.9	6.2	3.4	5.6	3.9	4.0
Turbidity (JTU)	9	2	3	4	3	3	5	7
Dissolved Phosphorus (ppm)	0.08	0.37	0.05	0.06	0.04	0.07	0.08	0.02
TN (ppm)		0.90	1.40	1.30	0.99	1.20	1.00	1.40
NO_2-N (ppm)	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00
NO_3-N (ppm)	0.43	0.21	0.41	0.52	0.42	0.40	0.05	0.05
TKN-N (ppm)		0.68	0.99	0.77	0.56	0.80	0.94	1.35
NH_3N (ppm)	0.03	0.05	0.18	0.21	0.18	0.12	0.05	0.06
BOD (ppm - 5 day)	2.2	1.1	<1.0	1.8	1.4	1.1	1.9	2.2
Dissolved Oxygen (ppm)	8.6	12.5	10.4		6.8	8.4	9.0	8.6
Carbon Dioxide (ppm)	6.1	2.8	5.2	13.0	11.0	7.5	1.7	2.4
PH	7.5	8.0	7.8	7.4	7.4	7.6	8.1	8.0
T. Dissolved Solids (ppm)	169	177	224	222	280	203	151	155

Table 8. Water quality data from the Rum River (near St. Francis) from October, 1973 - September, 1975 (Continued)

Date	7/01/74	7/30/74	9/03/74	10/07/74	11/15/74	12/23/74	1/22/75	2/18/75
Air Temp. (°C)	25.0	18.0	14.0	3.5	0.5	-8.0	-18.0	0.0
Water Temp. (°C)	22.0	21.0	12.5	7.0	1.0	0.0	0.0	0.0
Instantaneous Discharge (cfs)	687	396	318	299	372	259	256	297
Color (Pt-Co Units)	30	30	8	10	20	20	5	20
T. Alkalinity (ppm)	125	124	127	139	137	155	166	153
Chlorides (ppm)	4.0	3.1	5.1	4.4	4.8	5.0	5.1	4.3
Turbidity (JTU)	8	3	3	1	3	2	3	2
Dissolved Phosphorus (ppm)	0.01	0.04	0.05	0.08	0.09	0.03	0.07	0.28
TN (ppm)	1.60	1.10	1.50	0.94	0.82	0.92	1.30	1.20
NO_2-N (ppm)	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
NO_3-N (ppm)	0.04	0.00	0.13	0.17	0.28	0.37	0.40	0.36
TKN-N (ppm)	0.73	0.54	0.53	0.73	0.54	0.53	0.85	0.73
NH_3N (ppm)	0.02	0.09	0.10	0.02	0.07	0.17	0.30	0.21
BOD (ppm - 5 day)		2.7	2.2	6.5	1.0	0.4	1.1	1.3
Dissolved Oxygen (ppm)	9.0	8.6	10.8	10.4	12.9	11.8	3.5	3.9
Carbon Dioxide (ppm)	1.2	1.0	1.0	1.7	4.2	3.8	6.5	15.0
PH	8.3	8.4	8.4	8.2	7.8	7.9	7.7	7.3
T. Dissolved Solids (ppm)	162	153	147	166	178	206	214	185

Table 8. Water quality data from the Rum River (near St. Francis) from Oct., 1973 - Sept., 1975 (Continued)

Date	3/18/75	4/21/75	5/13/75	6/18/75	7/16/75	8/20/75	9/22/75
Air Temp. (^{o}C)	3.0	7.0	20.0	18.0	31.0	14.5	15.5
Water Temp. (^{o}C)	0.0	3.0	15.5	18.0	23.0	18.0	12.0
Instantaneous Discharge (cfs)	313	3,420	2,360	1,320	1,350	506	631
Color (Pt-Co Units)	10	65	70	60	65	30	24
T. Alkalinity (ppm)	153	53	90	112	123	112	122
Chlorides (ppm)	7.0	3.5	4.3	4.0	4.0	5.3	4.0
Turbidity (JTU)	3	21	4	14	5	11	2
Dissolved Phosphorus (ppm)	0.02	0.06	0.03	0.03	0.14	0.12	0.02
TN (ppm)	1.00	2.40	1.00	1.30	1.60	0.95	1.30
NO_2-N (ppm)	0.00	0.00	0.00	0.00	0.02	0.01	0.01
NO_3-N (ppm)	0.44	0.97	0.03	0.06	0.12	0.11	0.14
TKN-N (ppm)	0.55	1.40	1.00	1.20	1.40	0.81	1.10
NH_3N (ppm)	0.12	0.23	0.00	0.01	0.00	0.00	0.00
BOD (ppm - 5 day)	0.6	3.5	2.7	2.1	3.0	3.0	6.6
Dissolved Oxygen (ppm)	5.9	11.0	8.7	10.0	6.4	8.2	10.2
Carbon Dioxide (ppm)	9.4	2.0	2.2	1.4	2.4	1.1	1.9
PH	7.5	7.7	7.9	8.2	8.0	8.3	8.1
T. Dissolved Solids (ppm)	195	108	142	157	181	142	157

Table 9. Location and physical characteristics of the 1970 and 1974 Rum River aquatic invertebrate sampling sites

Site	Location		Physical Characteristics		
	Legal Description	Physical	Gradient	Ave. Depth(ft.)	Predominant Substrate Types
1	T. 41N., R. 26W., S. 6	120 ft. upstream from CSAH 25 bridge	fast-moderate	1.2	rubble, gravel
2	T. 41N., R. 26W., S. 8	adjacent to US 169 in the SW 1/4 of NE 1/4 of S. 8	slow	1.8	sand, gravel
3	T. 41N., R. 26W., S. 18	at abandoned farm in the SW 1/4 of NE 1/4 of S. 18	moderate-slow	1.8	sand, gravel-rubble, boulder
4	T. 41N., R. 26W., S. 18	1 block upstream from the Co. Rd. 3 bridge	moderate-fast	2.1	sand, gravle

Table 10. The average number/sample and percentages of aquatic invertebrates sampled at 4 sites of the Rum River in 1970

Taxon	Site 1		2		3		4	
	No. of Org.	% by No.	No. of Org.	% by No.	No. of Org.	% by No.	No. of Org.	% by No.
Porifera							0.2	0.12
Coelenterata	0.8	0.05					0.3	0.23
Turbellaria	0.4	0.02						
Nematoda							0.2	0.12
Tardigarda			0.1	0.02				
Annelida								
Oigoehaeta	1.0	0.06	2.7	0.44	0.4	0.15	9.8	6.85
Hirundinea								
Helobdella								
Placobdella								
Mollusca								
Gastropoda								
Ferrissia	14.0	0.89	16.9	2.71	12.0	4.54	2.7	1.86
Compeloma			0.4	0.07				
Planorbula	0.2	0.01						
Amnicola			0.7	0.11	0.2	0.08		
Physa					1.4	0.53	0.2	0.12
Pelecypoda								
Spharium	37.6	2.39	85.0	13.67	76.2	28.86	41.3	28.80
Arthropoda								
Crustacea								
Amphipoda								
Gammarus	1.2	0.08	9.9	1.58	3.6	1.36	24.3	16.96
Aranea								
Pholcidae	0.2	0.01						
Insecta								
Collembola	0.4	0.02	0.3	0.04				
Pleoeoptera			0.4	0.07			0.2	0.12
Perlidae	1.2	0.08			2.0	0.76		
Chloroperlidae			0.1	0.02				
Ephemeroptera								
Heptagenidae	7.8	0.50	37.7	6.06	26.2	9.92	5.0	3.48
Baetidae	5.6	0.36	3.3	0.53	3.8	1.44	1.3	0.93
Ephemeridae	0.2	0.01	0.1	0.02			1.2	0.81
Odonata								
Anisoptera			0.3	0.04				
Libellulidae							0.2	0.12
Hemiptera								
Mesovelidae	0.2	0.01						
Velidae	0.2	0.01						
Corixidae			0.1	0.02			0.3	0.23
Hebridae			0.1	0.02				

Table 10. The average number/sample and percentages of aquatic invertebrates sampled at 4 sites of the Rum River in 1970 (Continued)

Taxon	Site 1		Site 2		Site 3		Site 4	
	No. of Org.	% by No.	No. of Org.	% by No.	No. of Org.	% by No.	No. of Org.	% by No.
Tricoptera								
Hydropsychidae	1,187.4	75.57	298.6	48.00	54.0	20.45	3.5	2.44
Molannidae	1.4	0.09	0.7	0.11	2.0	0.76	5.5	3.83
Helicopsychidae	77.0	4.90	39.0	6.27	30.8	11.67	33.2	23.11
Ryachophilidae	0.2	0.01	5.0	0.80	1.2	0.45		
Leptoceridae	5.3	0.36	1.0	0.16	0.8	3.03	0.5	0.35
Philopotamidae	2.0	0.13			0.2	0.08		
Lepidostomatidae	0.4	0.02	0.1	0.02				
Psychomyidae			0.9	0.14				
Hydroptilidae			1.7	0.28				
Coleoptera	33.6	2.14	3.7	0.60	21.4	8.11	1.0	0.70
Chrysomalidae	0.4	0.02						
Ptilodactylidae	0.2	0.01	0.4	0.07				
Hydraenidae			0.1	0.02				
Gyrinidae			0.1	0.02			1.0	0.70
Diptera								
Simulidae	20.0	1.27	31.9	5.12	9.0	3.41	0.2	0.12
Tendipedidae	171.6	10.92	75.3	12.10	16.8	6.36	4.5	3.14
Empididae	0.4	0.02	0.6	0.09				
Ephydridae			0.1	0.02				
Phoridae							0.2	0.12
Heleidae							4.2	2.90
Tipulidae							0.3	0.23
Tabanidae							0.5	0.35
Total Ave. No./Sample	1,571.2	100.00	622.0	100.00	264.0	100.00	143.5	100.00

Table 11. The average number/sample and percentages of aquatic invertebrates samples at 2 sites of the Rum River in 1974

Taxon	Site 1		Site 2	
	No. of Org.	% by No.	No. of Org.	% by No.
Turbellaria	1.7	0.11	3.3	0.44
Nematoda	5.7	0.38		
Nematomorpha	2.7	0.18		
Annelida				
Oligochaeta	8.7	0.57	8.7	1.14
Hirudinea				
Placobdella	0.3	0.02	4.0	0.53
Helobdella	0.3	0.02		
Erpobdella	0.3	0.02		
Mollusca				
Gastropoda				
Amnicola			40.0	5.30
Pelecypoda				
Sphaeridae	15.0	0.99	70.0	9.23
Unionidae			1.0	0.13
Arthropoda				
Crustacea				
Amphipoda				
Hyalella	16.0	1.06	256.7	33.86
Insecta				
Pleocoptera				
Chloroperlidae	2.7	0.18	1.0	0.13
Pteronareidae			0.3	0.04
Perlodidae	0.3	0.02		
Perlidae	0.3	0.02		
Ephemeroptera				
Heptagenidae	20.7	1.37	3.3	0.44
Baetidae	7.3	0.49		
Ephemeridae			0.3	0.04
Potamanthidae	60.3	4.00	11.0	1.45
Siphonuridae	0.3	0.02	0.7	0.09
Tricorythidae	0.3	0.02	0.7	0.09
Caenidae			0.7	0.09
Lepthophlebidae			1.3	0.18
Odonata				
Anisoptera				
Gomphidae			0.3	0.04
Zygoptera				
Coenagrionidae			5.7	0.75
Tricoptera				
Hydropsychidae	1,157.3	76.76	102.7	13.54
Helicopsychidae	0.3	0.02		
Leptocreidae	1.0	0.06	0.7	0.09

Table 11. The average number/sample and percentages of aquatic invertebrates sampled at 2 sites of the Rum River in 1974 (Continued)

Taxon	Site 1		Site 2	
	No. of Org.	% by No.	No. of Org.	% by No.
Philopotamidae	0.3	0.02		
Hydroptilidae	12.7	0.84	0.7	0.09
Polycentropodidae			1.7	0.22
Coleoptera				
Elmidae	14.7	0.97	9.3	1.23
Diptera				
Simulidae	0.3	0.02		
Chironoimdae	169.3	11.23	232.0	30.61
Empididae	8.7	0.57	0.7	0.09
Ptychopteridae			1.3	0.18
Total Ave. No./Sample	1,507.7	100.00	758.0	100.00

Table 12. The average volume/sample of molluscs and other aquatic invertebrates sampled in the Rum River in 1970 and 1974*

Site	No. of Samples		Average Vol. of Molluscs (ml.)		Average Vol. of Other Invertebrates (ml.)		Average Total Vol. (ml.)	
	1970	1974	1970	1974	1970	1974	1970	1974
1	5	3	0.6	Tr.	8.8	24.4	9.4	24.4
2	7	3	1.4	6.3	2.5	3.2	3.9	9.5
3	5	3	1.3	15.0	0.9	2.8	2.2	17.8
4	6	3	0.7	6.7	0.1	2.1	0.8	8.8

* The 1970 volumes of molluscs are estimated by converting the number of molluscscs (1970) to the 1974 estimate of 0.0172 ml./mollusc.

Table 13. Location and length of electrofishing (shocking) runs during the 1974 Rum River fisheries survey

Station Number	Electrofishing Run	
1	1A	T.43N., R.27W., S.33 (outlet from L. Mille Lacs to L. Ogechie) - 0.3 mi.
1	1B	T.42N., R.27W., S.8 (just below L. Ogechie Dam-downstream) - 1.2 mi.
2	2	T.41N., R.26W., S.6 (outlet from L. Onamia-downstream) 0.9 mi.
3	3A	T.41N., R.26W., S.29 - 0.4 mi.
3	3B	T.40N., R.26W., S.24 - 0.3 mi.
4	4	T.39N., R.27W., S.22 - 1.0 mi.
5	5	T.39N., R.27W., S.35 - 1.1 mi.
6	6	T.38N., R.27W., S.23 - 1.0 mi.
7	7	T.37N., R.26W., S.27 - 0.9 mi.
8	8	T.35N., R.25W., S.9 - 0.8 mi.
9	9	T.36N., R.23W., S.29 - 0.8 mi.
10	10	T.35N., R.23W., S.25 - 0.5 mi.
11	11A	T.33N., R.24W., S.20 - 0.5 mi.
11	11B	T.33N., R.24W., S.30 - 0.5 mi.
12	12	T.33N., R.24W., S.6 - 0.9 mi.
13	13	T.31N., R.25W., S.12 (Main St. Bridge to mouth) - 0.6 mi.

Table 14. A summary of the species composition, CPE, and median size of fishes sampled from the Rum River during 1974 (11.7 miles shocked, 10.9 hours fished, 16 electrofishing runs)

Species		No.	% of Catch	Wt.(lb.)	% by Wt.	CPE in fish/hr.	Median Size in Inches
Amia calva	Bowfin	3	0.2	8.7	0.5	0.3	20.0-20.9
Catostomus commersoni	White sucker	159	9.0	236.6	13.3	14.6	15.0-15.9
Moxostoma anisurum	Silver redhorse	55	3.1	114.3	6.4	5.0	16.0-16.9
Moxostoma macrolepidotum	Northern redhorse	267	15.1	430.7	24.1	24.5	16.0-16.9
Cyprinus carpio	Carp	195	11.0	679.5	38.1	17.9	18.0-18.9
Ictalurus melas	Black bullhead	165	9.3	35.8	2.0	15.1	7.0-7.4
Ictalurus nebulosus	Brown bullhead	98	5.6	41.5	2.3	9.0	9.0-9.4
Ictalurus natalis	Yellow bullhead	103	5.8	36.6	2.1	9.4	8.0-8.4
Esox lucius	Northern pike	39	2.2	72.4	4.1	3.6	19.0-19.9
Perca flavescens	Yellow perch	138	7.8	6.3	0.4	12.7	<2.9
Stizostedion vitreum	Walleye	24	1.4	25.7	1.4	2.2	12.0-12.9
Micropterus dolomieui	Smallmouth bass	381	21.6	67.7	3.8	34.9	4.5-4.9
Micropterus salmoides	Largemouth bass	30	1.7	1.1	0.1	2.7	3.0-3.4
Lepomis gibbosus	Pumpkinseed	33	1.9	4.2	0.2	3.0	3.0-3.4
Lepomis macrochirus	Bluegill	1	0.1	0.1	Tr.	0.1	-
Amblopites rupestris	Rock bass	68	3.8	18.7	1.0	6.2	7.0-7.4
Pomoxis annularis	White crappie	1	0.1	0.2	Tr.	0.1	-
Pomoxis nigromaculata	Black crappie	1	0.1	0.5	Tr.	0.1	-
Lota lota	Burbot	4	0.2	4.0	0.2	0.4	16.0-16.9
	Subtotals	1,765	59.8	1,784.6	100.0	161.9	
Hybopsis biguttata	Hornyhead chub	164	13.8			15.0	
Semotilus atromoculatus	Creek chub	4	0.3			0.4	
Notropis dorsalis	Bigmouth shiner	40	3.4			3.7	
Notropis hudsonius	Spottail shiner	86	7.2			7.9	
Notropis spilopterus	Spotfin shiner	209	17.6			19.2	
Notropis cornutus	Common shiner	319	27.4			29.3	
Notropis heterolepis	Blacknose shiner	39	3.3			3.6	
Notropis volucellus	Mimic shiner	38	3.2			3.5	
Notegimonus crysoleucas	Golden shiner	22	1.8			2.0	
Rhinicthys cataractae	Longnose dace	64	5.4			5.9	
Hybognoathus hankinsoni	Brassy minnow	7	0.6			0.6	
Pimephales notatus	Bluntnose minnow	21	1.8			1.9	

Table 14. A summary of the species composition, CPE, and median size of fishes sampled from the Rum River during 1974 (11.7 miles shocked, 10.9 hours fished, 16 electrofishing runs) - continued

Species		No.	% of Catch	Wt.(lb.)	% by Wt.	CPE in fish/hr.	Median Size in Inches
Pimephales promelas	Fathead minnow	10	0.8			0.9	
Noturus gyrinus	Tadpole madtom	8	0.7			0.7	
Umbra limi	Central mudminnow	19	1.6			1.7	
Percopsis omiscomagcus	Trout-perch	1	0.1			0.1	
Etheostoma nigrum	Johnny darter	101	8.5			9.3	
Etheostoma exile	Iowa darter	6	0.5			0.5	
Percina caprodes	Log perch	26	2.2			2.4	
Cottus bairdi	Mottled sculpin	1	0.1			0.1	
	Subtotals	1185	40.2			108.7	
	Totals	2950	100.0			270.6	

Table 14a. A summary of the length-frequency distributions of the major fish species sampled from 16 runs on the Rum River during 1974 electrofishing

Species and Numbers of Fish in Length Groups

Total Length in Inches	Bowfin	White sucker	Silver red-horse	Northern red-horse	Carp	Black bull-head	Brown bull-head	Yellow bull-head	Northern pike
<2.9		9	1	2		3		17	
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4		4							
4.5 - 4.9				2				1	
5.0 - 5.4		2		3		13			
5.5 - 5.9			4	5		14		1	
6.0 - 6.4		1	2			18		1	
6.5 - 6.9		1		2		20	1	3	
7.0 - 7.4						30	1	5	1
7.5 - 7.9						36	2	11	
8.0 - 8.4				2		18	8	15	1
8.5 - 8.9		1		4		6	35	13	
9.0 - 9.4		1		12		5	35	17	
9.5 - 9.9		1		9		2	9	9	1
10.0 - 10.4		1		1	2		3	4	
10.5 - 10.9							2		
11.0 - 11.4		4	2	1	1		1		
11.5 - 11.9		4			1			1	
12.0 - 12.9		5	2	7	1			1	
13.0 - 13.9		10	2	7	3		1		
14.0 - 14.9		21	5	26	4				
15.0 - 15.9		31	6	52	5				1
16.0 - 16.9		34	6	61	17			1	5
17.0 - 17.9		23	3	39	36			3	8
18.0 - 18.9		6	9	20	37				5
19.0 - 19.9			7	5	27				5
20.0 - 20.9	2		6	3	17				4
21.0 - 21.9	1				14				
22.0 - 22.9				2	18				
23.0 - 23.9					1				1
24.0 - 24.9				1	5				1
25.0 - 25.9				1	3				
26.0 - 26.9					2				1
27.0 - 27.9					1				2
28.0 - 28.9									2
29.0 - 29.9									1
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3	159	55	267	195	165	98	103	39

Table 14a. A summary of the length-frequency distributions of the major fish species sampled from 16 runs on the Rum River during 1974 electrofishing (cont'd)

Species and Numbers of Fish in Length Groups

Total Length in Inches	Yellow perch	Walleye	Small-mouth bass	Large-mouth bass	Pumpkin seed	Blue-gill	Rock bass	White crappie	Black crappie
<2.9	97		159	16	8	1	10		
3.0 - 3.4			48	10	9		2		
3.5 - 3.9	9		22	1	2				
4.0 - 4.4	7		4	3	1		2		
4.5 - 4.9	4		2		2				
5.0 - 5.4	3		4		4		4		
5.5 - 5.9	2		3		1		5	1	
6.0 - 6.4	5		9		2		2		
6.5 - 6.9	5		27		1		1		
7.0 - 7.4	2		34		1		11		
7.5 - 7.9	2		18		1		14		
8.0 - 8.4	1		2		1		6		
8.5 - 8.9			3				4		
9.0 - 9.4	1						2		1
9.5 - 9.9		1	5				2		
10.0 - 10.4		2	6				3		
10.5 - 10.9		1	3						
11.0 - 11.4		5	6						
11.5 - 11.9		1	5						
12.0 - 12.9		2	7						
13.0 - 13.9			6						
14.0 - 14.9		6	3						
15.0 - 15.9		2							
16.0 - 16.9		1	1						
17.0 - 17.9			1						
18.0 - 18.9		2	2						
19.0 - 19.9			1						
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9		1							
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	138	24	381	30	33	1	68	1	1

Table 14a. A summary of the length-frequency distributions of the major fish species sampled from 16 runs on the Rum River during 1974 electrofishing (cont'd)

Species and Numbers of Fish in Length Groups

Total Length in Inches	Burbot								
<2.9									
3.0 - 3.4									
3.5 - 3.9	1								
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9									
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9									
8.0 - 8.4									
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9	1								
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9	1								
19.0 - 19.9									
20.0 - 20.9	1								
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	4								

Table 15.- The species composition and CPE of fishes sampled from station 1 of the Rum River during 1974 (1.5 miles shocked, 1.42 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr
Amia calva	Bowfin	2	0.6	5.1	4.0	1.4
Catostomus commersoni	White sucker	28	9.0	45.4	35.8	19.7
Moxostoma macrolepidotum	Northern redhorse	1	0.3	2.5	2.0	0.7
Cyprinus carpio	Carp	1	0.3	2.5	2.0	0.7
Ictalurus melas	Black bullhead	26	8.4	6.2	4.9	18.3
Ictalurus nubulosus	Brown bullhead	81	26.0	33.1	26.1	57.0
Ictalurus natalis	Yellow bullhead	6	1.9	3.0	2.4	4.2
Esox lucius	Northern pike	5	1.6	10.6	8.4	3.5
Perca flavescens	Yellow perch	107	34.4	3.5	2.8	75.3
Stizostedion vitreum	Walleye	4	1.3	10.1	8.0	2.8
Micropterus salmoides	Largemouth bass	15	4.8	0.4	0.3	10.6
Lepomis gibbosus	Pumpkinseed	26	8.4	3.5	2.8	18.3
Lepomis macrochirus	Bluegill	1	0.3	0.1	0.1	0.7
Amblopites rupestris	Rock bass	8	2.6	0.4	0.3	5.6
	Subtotals	311	65.7	126.9		219.0
Semotilus atromaculatus	Creek chub	2	1.2			1.4
Hybopsis biguttata	Hornyhead chub	4	2.5			2.8
Notropis dorsalis	Bigmouth shiner	9	5.5			6.3
Notropis hudsonius	Spottail shiner	33	20.4			23.2
Notemigonus crysoleucas	Golden shiner	18	11.1			12.7
Notropis cornutus	Common shiner	18	11.1			12.7
Notropis heterolepis	Blacknose shiner	39	24.1			27.5
Pimephales notatus	Bluntnose minnow	15	9.3			10.6
Umbra limi	Central mudminnow	16	9.9			11.3
Percina caprodes	Log perch	1	0.6			0.7
Etheostoma nigrum	Johnny darter	1	0.6			0.7
Etheostoma exile	Iowa darter	5	3.1			3.5
Cottus bairdi	Mottled sculpin	1	0.6			0.7
	Subtotals	162	34.3			114.1
	Totals	473	100.0			333.1

Table 15a. The length-frequency distributions of the major fish species sampled from Station 1 of the Rum River during 1974

Total Length in Inches	Bowfin	White sucker	Northern red-horse	Carp	Black bull-head	Brown bull-head	Yellow bull-head	Northern pike	Yellow perch
< 2.9		1			1				86
3.0 - 3.4									
3.5 - 3.9									4
4.0 - 4.4		1							7
4.5 - 4.9									3
5.0 - 5.4									1
5.5 - 5.9									1
6.0 - 6.4		1							3
6.5 - 6.9		1				1			
7.0 - 7.4					8	1			
7.5 - 7.9					13	2			1
8.0 - 8.4					3	6	1		1
8.5 - 8.9						30	2		
9.0 - 9.4						30			
9.5 - 9.9					1	7	2		
10.0 - 10.4						1	1		
10.5 - 10.9						2			
11.0 - 11.4						1			
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9		1							
14.0 - 14.9		3							
15.0 - 15.9		4							
16.0 - 16.9		5						1	
17.0 - 17.9		7						1	
18.0 - 18.9		4	1	1					
19.0 - 19.9									
20.0 - 20.9	2							1	
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9								1	
27.0 - 27.9									
28.0 - 28.9								1	
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	2	28	1	1	26	81	6	5	107

Table 15a. The length-frequency distributions of the major fish species sampled from station 1 of the Rum River during 1974 (Cont'd.)

Total Length in Inches	Walleye	Pumpkin-seed	Blue-gill	Rock bass	Large-mouth bass				
< 2.9		8	1	6	15				
3.0 - 3.4		7		1					
3.5 - 3.9		1							
4.0 - 4.4				1					
4.5 - 4.9		1							
5.0 - 5.4		3							
5.5 - 5.9		1							
6.0 - 6.4		3							
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9		1							
8.0 - 8.4		1							
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9	1								
16.0 - 16.9	1								
17.0 - 17.9									
18.0 - 18.9	1								
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9	1								
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	4	26	1	8	15				

Table 16. The species composition and CPE of fishes sampled from station 2 of the Rum River during 1974 (0.9 miles shocked, 0.58 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	27	15.0	38.2	32.3	46.5
Moxostoma macrolepidotum	Northern redhorse	20	11.1	46.0	38.9	34.4
Ictalurus melas	Black bullhead	54	30.0	11.0	9.3	93.1
Ictalurus nebulosus	Brown bullhead	10	5.6	3.5	3.0	17.2
Ictalurus natalis	Yellow bullhead	13	7.2	2.0	1.7	22.4
Esox lucius	Northern pike	3	1.7	3.7	3.1	5.2
Perca flavescens	Yellow perch	18	10.0	1.9	1.6	31.0
Stizostedion vitreum	Walleye	3	1.7	1.0	0.9	5.2
Micropterus dolomieui	Smallmouth bass	20	11.1	2.8	2.4	34.5
Micropterus salmoides	Largemouth bass	3	1.7	0.2	0.2	5.2
Lepomis gibbosus	Pumpkinseed	2	1.1	0.3	0.3	3.4
Amblopites rupestris	Rock bass	7	3.9	3.9	3.3	12.2
	Subtotals	180	53.9	118.2		310.3
Hybopsis biguttata	Hornyhead chub	4	2.6			6.9
Notropis hudsonius	Spottail shiner	48	31.2			82.8
Notropis cornutus	Common shiner	46	29.9			79.3
Notropis volucellus	Mimic shiner	33	21.4			56.9
Notemigonus crysoleucas	Golden shiner	2	1.3			3.4
Pimephales promelas	Fathead minnow	1	0.6			1.7
Umbra limi	Central mudminnow	2	1.3			3.4
Etheostoma nigrum	Johnny darter	17	11.0			29.3
Etheostoma exile	Iowa darter	1	0.6			1.7
	Subtotals	154	46.1			265.5
	Totals	334	100.0			575.9

Table 16a. The length-frequency distributions of the major fish species sampled from station 2 of the Rum River during 1974

Total Length in Inches	White sucker	Northern redhorse	Black bullhead	Brown bullhead	Yellow bullhead	Northern pike	Yellow perch	Walleye	Smallmouth bass
< 2.9	4						8		18
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9							1		
5.0 - 5.4							2		
5.5 - 5.9			1				1		
6.0 - 6.4			9		1		1		
6.5 - 6.9			12		3		2		
7.0 - 7.4			14		5		1		1
7.5 - 7.9			13		2		1		
8.0 - 8.4			4		1				
8.5 - 8.9				4	1				
9.0 - 9.4				6			1		
9.5 - 9.9			1			1		1	
10.0 - 10.4									
10.5 - 10.9								1	
11.0 - 11.4								1	
11.5 - 11.9	2								
12.0 - 12.9									1
13.0 - 13.9	1								
14.0 - 14.9	3	3							
15.0 - 15.9	3	2							
16.0 - 16.9	8	1							
17.0 - 17.9	6	8							
18.0 - 18.9		6				1			
19.0 - 19.9						1			
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	27	20	54	10	13	3	18	3	20

Table 16a. The length-frequency distributions of the major fish species sampled from station 2 of the Rum River during 1974 (Cont'd.)

Total Length in Inches	Large-mouth bass	Pumpkin-seed	Rock bass						
< 2.9	3		2						
3.0 - 3.4									
3.5 - 3.9		1							
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9									
6.0 - 6.4									
6.5 - 6.9		1							
7.0 - 7.4			1						
7.5 - 7.9			1						
8.0 - 8.4			1						
8.5 - 8.9									
9.0 - 9.4			1						
9.5 - 9.9									
10.0 - 10.4			1						
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3	2	7						

Table 17. The species composition and CPE of fishes sampled from station 3 of the Rum River during 1974 (0.7 miles shocked, 0.33 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	18	13.6	32.5	39.8	54.5
Moxostoma macrolepidotum	Northern redhorse	4	3.1	8.5	10.4	12.1
Ictalurus melas	Black bullhead	10	7.6	2.7	3.3	30.3
Ictalurus natalis	Yellow bullhead	27	20.5	11.8	14.5	81.8
Esox lucius	Northern pike	4	3.0	7.9	9.7	12.1
Stizostedion vitreum	Walleye	1	0.8	1.1	1.3	3.0
Micropterus dolomieui	Smallmouth bass	61	46.2	11.8	14.5	184.8
Amblopites rupestris	Rock bass	6	4.5	3.5	4.3	18.2
Lota lota	Burbot	1	0.8	1.8	2.2	3.0
	Subtotals	132	69.5	81.6		400.0
Hybopsis biguttata	Hornyhead chub	41	70.7			124.2
Rhinichthys cataractae	Longnose dace	3	5.2			9.1
Notropis cornutus	Common shiner	14	24.1			42.4
	Subtotals	58	30.5			175.8
	Totals	190	100.0			575.8

Table 17a. The length-frequency distributions of the major fish species sampled from station 3 of the Rum River during 1974

Total Length in Inches	White sucker	Northern redhorse	Black bullhead	Yellow bullhead	Northern pike	Walleye	Smallmouth bass	Rock bass	Burbot
< 2.9			1				14		
3.0 - 3.4							1		
3.5 - 3.9							1		
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4								1	
5.5 - 5.9							2		
6.0 - 6.4							7		
6.5 - 6.9							15	2	
7.0 - 7.4			2				11		
7.5 - 7.9			2	5			6		
8.0 - 8.4			2	6			1		
8.5 - 8.9			1	2				2	
9.0 - 9.4			2	7					
9.5 - 9.9				5			2	1	
10.0 - 10.4				1					
10.5 - 10.9							1		
11.0 - 11.4	1								
11.5 - 11.9									
12.0 - 12.9				1					
13.0 - 13.9									
14.0 - 14.9	2					1			
15.0 - 15.9	7								
16.0 - 16.9	5	2			1				
17.0 - 17.9	2	1			1				
18.0 - 18.9	1	1							
19.0 - 19.9									
20.0 - 20.9					1				1
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9					1				
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	18	4	10	27	4	1	61	6	1

Table 18. The species composition and CPE of fishes sampled from station 4 of the Rum River during 1974 (1.0 miles shocked, 1.00 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	11	6.8	19.0	25.7	11.0
Moxostoma anisurum	Silver redhorse	2	1.2	0.2	0.3	2.0
Moxostoma macrolepidotum	Northern redhorse	10	6.2	17.0	23.0	10.0
Ictalurus melas	Black bullhead	3	1.9	2.0	2.7	3.0
Ictalurus nebulosus	Brown bullhead	6	3.7	4.5	6.1	6.0
Ictalurus natalis	Yellow bullhead	21	13.0	8.9	12.0	21.0
Esox lucius	Northern pike	1	0.6	1.3	1.8	1.0
Perca flavescens	Yellow perch	3	1.9	0.2	0.3	3.0
Stizostedion vitreum	Walleye	1	0.6	0.5	0.7	1.0
Micropterus salmoides	Largemouth bass	4	2.5	0.2	0.3	4.0
Micropterus dolomieui	Smallmouth bass	74	46.0	16.5	22.3	74.0
Lepomis gibbosus	Pumpkinseed	3	1.9	0.2	0.3	3.0
Amblopites rupestris	Rock bass	21	13.0	3.0	4.1	21.0
Lota lota	Burbot	1	0.6	0.7	1.0	1.0
	Subtotals	161	50.8	74.0		161.0
Hybopsis biguttata	Hornyhead chub	27	17.3			27.0
Notropis cornutus	Common shiner	108	69.2			108.0
Notropis dorsalis	Bigmouth shiner	2	1.3			2.0
Rhinichthys cataractae	Longnose dace	12	7.7			12.0
Pimephales notatus	Bluntnose minnow	1	0.6			1.0
Etheostoma ngrium	Johnny darter	3	1.9			3.0
Percina caprodes	Log perch	3	1.9			3.0
	Subtotals	156	49.2			156.0
	Totals	317	100.0			317.0

Table 18a. The length-frequency distributions of the major fish species sampled from station 4 of the Rum River during 1974

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Black bullhead	Brown bullhead	Yellow bullhead	Northern pike	Yellow perch	Walleye
< 2.9									
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9		1							
6.0 - 6.4		1							
6.5 - 6.9								2	
7.0 - 7.4								1	
7.5 - 7.9				1		2			
8.0 - 8.4						5			
8.5 - 8.9				1		5			
9.0 - 9.4				1	1	8			
9.5 - 9.9					2	1			
10.0 - 10.4					2				
10.5 - 10.9									
11.0 - 11.4									1
11.5 - 11.9									
12.0 - 12.9	2								
13.0 - 13.9					1				
14.0 - 14.9	3		2						
15.0 - 15.9	3		4						
16.0 - 16.9	3		2						
17.0 - 17.9			2						
18.0 - 18.9									
19.0 - 19.9							1		
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	11	2	10	3	6	21	1	3	1

Table 18a. The length-frequency distributions of the major fish species sampled from station 4 of the Rum River during 1974 (Cont'd)

Total Length in Inches	Large-mouth bass	Small-mouth bass	Pumpkin-seed	Rock bass	Burbot				
< 2.9		13							
3.0 - 3.4	1	20	1						
3.5 - 3.9		3							
4.0 - 4.4	3			1					
4.5 - 4.9			1						
5.0 - 5.4			1	1					
5.5 - 5.9				4					
6.0 - 6.4		2							
6.5 - 6.9		7							
7.0 - 7.4		9		5					
7.5 - 7.9		8		7					
8.0 - 8.4				1					
8.5 - 8.9		2		1					
9.0 - 9.4				1					
9.5 - 9.9									
10.0 - 10.4		3							
10.5 - 10.9									
11.0 - 11.4		2							
11.5 - 11.9		1							
12.0 - 12.9		2							
13.0 - 13.9		2			1				
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	4	74	3	21	1				

Table 19. The species composition and CPE of fishes sampled from station 5 of the Rum River during 1974 (1.1 miles shocked, 0.92 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	22	13.6	31.5	46.7	23.9
Moxostoma anisurum	Silver redhorse	3	1.8	0.2	0.3	3.3
Moxostoma macrolepidotum	Northern redhorse	4	2.5	4.0	5.9	4.3
Ictalurus melas	Black bullhead	1	0.6	0.2	0.3	1.1
Ictalurus natalis	Yellow bullhead	26	16.0	5.6	8.3	28.3
Esox lucius	Northern pike	4	2.5	5.8	8.6	4.3
Perca flavescens	Yellow perch	1	0.6	0.2	0.3	1.1
Stizostedion vitreum	Walleye	2	1.2	2.5	3.7	2.2
Micropterus dolomieui	Smallmouth bass	83	51.2	13.5	20.0	90.2
Micropterus salmoides	Largemouth bass	1	0.6	0.1	0.2	1.1
Amblopites rupestris	Rock bass	15	9.2	3.8	5.6	16.3
	Subtotals	162	65.6	67.4		176.1
Hybopsis biguttata	Hornyhead chub	49	57.6			53.3
Semotilus atromaculatus	Creek chub	2	2.3			2.2
Rhinichthys cataractae	Longnose dace	7	8.2			7.6
Notropis dorsalis	Bigmouth shiner	22	25.9			23.9
Pimephales promelas	Fathead minnow	1	1.2			1.1
Noturus gyrinus	Tadpole madtom	4	4.7			4.3
	Subtotals	85	34.4			92.4
	Totals	247	100.0			268.5

Table 19a. The length-frequency distributions of the major fish species sampled from station 5 of the Rum River during 1974.

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Black bull-head	Yellow bull-head	Northern pike	Yellow perch	Walleye	Small-mouth bass
< 2.9	1		2		17				35
3.0 - 3.4									23
3.5 - 3.9									7
4.0 - 4.4									3
4.5 - 4.9									1
5.0 - 5.4									
5.5 - 5.9		2			1				
6.0 - 6.4		1					1		
6.5 - 6.9									1
7.0 - 7.4									3
7.5 - 7.9									3
8.0 - 8.4				1					1
8.5 - 8.9					2				
9.0 - 9.4					2				
9.5 - 9.9	1				2				
10.0 - 10.4					2				
10.5 - 10.9									
11.0 - 11.4	2								2
11.5 - 11.9	1								
12.0 - 12.9	1								1
13.0 - 13.9	3								1
14.0 - 14.9	4							1	2
15.0 - 15.9	3		1					1	
16.0 - 16.9	4		1						
17.0 - 17.9	2					1			
18.0 - 18.9									
19.0 - 19.9						2			
20.0 - 20.9						1			
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	22	3	4	1	26	4	1	2	83

Table 19a. The length-frequency distributions of the major fish species sampled from station 5 of the Rum River during 1974 (Cont'd.)

Total Length in Inches	Large-mouth bass	Rock bass							
< 2.9		3							
3.0 - 3.4									
3.5 - 3.9	1								
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9		1							
6.0 - 6.4		2							
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9		5							
8.0 - 8.4		4							
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	1	15							

Table 20. The species composition and CPE of fishes sampled from station 6 of the Rum River during 1974 (1.0 miles shocked, 0.83 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	16	8.3	22.0	13.4	19.3
Moxostoma anisurum	Silver redhorse	1	0.5	4.2	2.6	1.2
Moxostoma macrolepidotum	Northern redhorse	58	30.1	106.2	64.6	69.9
Cyprinus carpio	Carp	1	0.5	6.0	3.7	1.2
Ictalurus melas	Black bullhead	3	1.6	0.4	0.2	3.6
Ictalurus nebulosus	Brown bullhead	1	0.5	0.4	0.2	1.2
Ictalurus natalis	Yellow bullhead	4	2.1	1.9	1.2	4.8
Esox lucius	Northern pike	1	0.5	1.0	0.6	1.2
Stizostedion vitreum	Walleye	3	1.6	2.8	1.7	3.6
Micropterus dolomieui	Smallmouth bass	92	48.2	17.8	10.8	110.8
Micropterus salmoides	Largemouth bass	6	3.1	0.3	0.2	7.2
Lepomis gibbosus	Pumpkinseed	1	0.5	0.1	0.1	1.2
Amblopites rupestris	Rock bass	4	2.1	1.2	0.7	4.8
	Subtotals	191	54.6	164.3		230.1
Hybopsis biguttata	Hornyhead chub	27	17.0			32.5
Rhinichthys cataractae	Longnose dace	38	23.9			45.8
Notropis volucellus	Mimic shiner	5	3.1			6.0
Notropis hudsonius	Spottail shiner	1	0.6			1.2
Notropis cornutus	Common shiner	5	3.1			6.0
Noturus gyrinus	Tadpole madtom	4	2.5			4.8
Umbra limi	Central mudminnow	1	0.6			1.2
Etheostoma nigrum	Johnny darter	71	44.6			85.5
Percina caprodes	Log perch	7	4.4			8.4
	Subtotals	159	45.4			191.6
	Totals	350	100.0			421.7

Table 20a. The length-frequency distributions of the major fish species sampled from station 6 of the Rum River during 1974

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Carp	Black bull-head	Brown bull-head	Yellow bull-head	Northern pike	Walleye
< 2.9					2				
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9							1		
5.0 - 5.4									
5.5 - 5.9									
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9							1		
8.0 - 8.4									
8.5 - 8.9							1		
9.0 - 9.4					1	1	1		
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									1
11.5 - 11.9	1								
12.0 - 12.9	1								
13.0 - 13.9	2		1						
14.0 - 14.9	3		9						2
15.0 - 15.9	5		8					1	
16.0 - 16.9	3		15						
17.0 - 17.9	1		16						
18.0 - 18.9			7						
19.0 - 19.9			2						
20.0 - 20.9		1							
21.0 - 21.9									
22.0 - 22.9				1					
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	16	1	58	1	3	1	4	1	3

Table 20a. The length-frequency distributions of the major fish species sampled from station 6 of the Rum River during 1974 (Cont'd.)

Total Length in Inches	Small-mouth bass	Large-mouth bass	Rock bass	Pumpkin-seed					
< 2.9	41								
3.0 - 3.4	27	6		1					
3.5 - 3.9	8								
4.0 - 4.4	2								
4.5 - 4.9									
5.0 - 5.4			1						
5.5 - 5.9									
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4	4		2						
7.5 - 7.9	1		1						
8.0 - 8.4									
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9	1								
10.0 - 10.4	1								
10.5 - 10.9	1								
11.0 - 11.4									
11.5 - 11.9	2								
12.0 - 12.9	1								
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9	1								
17.0 - 17.9	1								
18.0 - 18.9	1								
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	92	6	4	1					

Table 21. The species composition and CPE of fishes sampled from Station 7 of the Rum River during 1974 (0.9 miles shocked, 0.83 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	3	2.0	4.9	1.5	3.6
Moxostoma anisurum	Silver redhorse	4	2.7	7.5	2.4	4.8
Moxostoma macrolepidotum	Northern redhorse	21	13.9	10.5	3.3	25.3
Cyprinus carpio	Carp	66	43.7	267.2	84.2	79.5
Ictalurus melas	Black bullhead	21	13.9	6.7	2.1	25.3
Ictalurus natalis	Yellow bullhead	5	3.3	3.1	1.0	6.0
Esox lucius	Northern pike	3	2.0	2.3	0.7	3.6
Micropterus dolomieui	Smallmouth bass	24	15.9	13.3	4.2	28.9
Amblopites rupestris	Rock bass	3	2.0	1.4	0.4	3.6
Pomoxis nigromaculatus	Black crappie	1	0.7	0.5	0.2	1.2
	Subtotals	151	67.7	317.4		181.9
Hybopsis biguttata	Hornyhead chub	11	15.3			13.2
Rhinichthys cataractae	Longnose dace	3	4.2			3.6
Notropis cornutus	Common shiner	17	23.6			20.5
Notropis dorsalis	Bigmouth shiner	5	6.9			6.0
Notropis spilopterus	Spotfin shiner	13	18.0			15.7
Pimephales notatus	Bluntnose minnow	1	1.4			1.2
Etheostoma nigrum	Johnny darter	9	12.5			10.8
Percina caprodes	Log perch	13	18.1			15.7
	Subtotals	72	32.3			86.7
	Totals	223	100.0			268.7

Table 21a. The length-frequency distributions of the major fish species sampled from station 7 of the Rum River during 1974

Total Length in Inches	White sucker	Silver red-horse	Northern red-horse	Carp	Black bull-head	Yellow bull-head	Northern pike	Small mouth ball	Rock bass
< 2.9		1						4	
3.0 - 3.4								2	
3.5 - 3.9								7	
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9		1	1						
6.0 - 6.4									
6.5 - 6.9					2				1
7.0 - 7.4					3			2	
7.5 - 7.9					5	1			
8.0 - 8.4			1		6	1	1		
8.5 - 8.9			2		4	1			1
9.0 - 9.4			5		1	1			
9.5 - 9.9			6						1
10.0 - 10.4			1					1	
10.5 - 10.9								1	
11.0 - 11.4			1					2	
11.5 - 11.9				1		1			
12.0 - 12.9	1		2					2	
13.0 - 13.9	1							2	
14.0 - 14.9	1								
15.0 - 15.9			1	1					
16.0 - 16.9			1	6			1		
17.0 - 17.9				14					
18.0 - 18.9				14				1	
19.0 - 19.9		1		10					
20.0 - 20.9		1		6			1		
21.0 - 21.9				2					
22.0 - 22.9				6					
23.0 - 23.9									
24.0 - 24.9				2					
25.0 - 25.9				2					
26.0 - 26.9				2					
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3	4	21	66	21	5	3	24	3

Table 21a. The length-frequency distributions of the major fish species sampled from station 7 of the Rum River during 1974 (Cont'd)

Total Length in Inches	Black crappie								
< 2.9									
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9									
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9									
8.0 - 8.4									
8.5 - 8.9									
9.0 - 9.4	1								
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	1								

Table 22. The species composition and CPE of fishes sampled from station 8 of the Rum River during 1974 (0.8 miles shocked, 1.00 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Amia calva	Bowfin	1	0.9	3.6	1.5	1.0
Catostomus commersoni	White sucker	4	3.4	5.0	2.1	4.0
Moxostoma anisurum	Silver redhorse	19	16.1	35.2	14.6	19.0
Moxostoma macrolepidotum	Northern redhorse	34	28.8	52.6	21.8	34.0
Cyprinus carpio	Carp	38	32.2	113.2	46.9	38.0
Ictalurus melas	Black bullhead	2	1.7	0.4	0.2	2.0
Esox lucius	Northern pike	8	6.8	29.0	12.0	8.0
Perca flavescens	Yellow perch	2	1.7	0.2	0.1	2.0
Stizostedion vitreum	Walleye	2	1.7	3.0	1.2	2.0
Micropterus dolomieui	Smallmouth bass	3	2.5	0.6	0.2	3.0
Micropterus salmoides	Largemouth bass	1	0.9	0.1	-	1.0
Lepomis gibbosus	Pumpkinseed	1	0.9	0.1	-	1.0
Amblopites rupestris	Rock bass	3	2.5	1.3	0.5	3.0
	Subtotals	118	48.4	241.3		118.0
Hybognathus hankisoni	Brassy minnow	6	4.8			6.0
Notemigonus crysoleucas	Golden shiner	2	1.6			2.0
Notropis spilopterus	Spotfin shiner	94	74.6			94.0
Notropis hudsonius	Spottail shiner	3	2.4			3.0
Notropis cornutus	Common shiner	18	14.3			18.0
Notropis dorsalis	Bigmouth shiner	2	1.6			2.0
Pimephales notatus	Bluntnose minnow	1	0.8			1.0
	Subtotals	126	51.6			126.0
	Totals	244	100.0			244.0

Table 22a. The length-frequency distributions of the major fish species sampled from station 8 of the Rum River during 1974

Total Length in Inches	Bowfin	White sucker	Silver redhorse	Northern redhorse	Carp	Black bull-head	Northern pike	Yellow perch	Walleye
< 2.9		1						1	
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9				1					
6.0 - 6.4									
6.5 - 6.9						1		1	
7.0 - 7.4						1			
7.5 - 7.9									
8.0 - 8.4									
8.5 - 8.9									
9.0 - 9.4				4					
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4			1		1				1
11.5 - 11.9									
12.0 - 12.9			1	2	1				
13.0 - 13.9		1	1	2					
14.0 - 14.9			5	2					
15.0 - 15.9		1	2	8	1				
16.0 - 16.9		1	2	5	6				
17.0 - 17.9			1	6	14				
18.0 - 18.9			3		3		2		1
19.0 - 19.9			2	3	9		1		
20.0 - 20.9			1	1	2				
21.0 - 21.9	1				1				
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9							1		
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9							2		
28.0 - 28.9							1		
29.0 - 29.9							1		
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	1	4	19	34	38	2	8	2	2

Table 22a. The length-frequency distributions of the major fish species sampled from station 8 of the Rum River during 1974 (Cont'd.)

Total Length in Inches	Small-mouth bass	Large-mouth bass	Pumpkin-seed	Rock bass					
< 2.9		1							
3.0 - 3.4				1					
3.5 - 3.9									
4.0 - 4.4			1						
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9	1								
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4	1								
7.5 - 7.9									
8.0 - 8.4	1								
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9				2					
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3	1	1	3					

Table 23. The species composition and CPE of fishes sampled from station 9 of the Rum River during 1974 (0.8 miles shocked, 1.00 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr
Catostomus commersoni	White sucker	3	5.4	0.5	0.4	3.0
Moxostoma anisurum	Silver redhorse	4	7.1	9.0	7.4	4.0
Moxostoma macrolepidotum	Northern redhorse	6	10.7	8.5	7.0	6.0
Cyprinus carpio	Carp	23	41.1	95.1	78.2	23.0
Ictalurus melas	Black bullhead	3	5.4	0.5	0.4	3.0
Ictalurus natalis	Yellow bullhead	1	1.8	0.3	0.3	1.0
Esox lucius	Northern pike	5	8,9	4.6	3.8	5.0
Perca flavescens	Yellow perch	7	12.5	0.3	0.3	7.0
Stizostedion vitreum	Walleye	1	1.8	0.5	0.4	1.0
Micropterus dolomieui	Smallmouth bass	3	5.4	2.3	1.9	3.0
	Subtotals	56	98.3	121.6		56.0
Percopsis omiscomaycus	Trout-perch	1	100.0			1.0
	Subtotals	1	1.7			1.0
	Totals	57	100.0			57.0

Table 23a. The length-frequency distributions of the major fish species sampled from station 9 of the Rum River during 1974

Total Length in Inches	White sucker	Silver red-horse	Northern red-horse	Carp	Black bull-head	Yellow bull-head	Northern pike	Yellow perch	Walleye
<2.9								2	
3.0 - 3.4									
3.5 - 3.9								5	
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4	1								
5.5 - 5.9					1				
6.0 - 6.4					1				
6.5 - 6.9									
7.0 - 7.4							1		
7.5 - 7.9					1				
8.0 - 8.4						1			
8.5 - 8.9	1								
9.0 - 9.4	1								
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9			1						1
13.0 - 13.9			1						
14.0 - 14.9			1						
15.0 - 15.9		1							
16.0 - 16.9		1	2				1		
17.0 - 17.9		2		3			3		
18.0 - 18.9			1	5					
19.0 - 19.9				2					
20.0 - 20.9				4					
21.0 - 21.9				6					
22.0 - 22.9				3					
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3	4	6	23	3	1	5	7	1

Table 23a. The length-frequency distributions of the major fish species sampled from station 9 of the Rum River during 1974 (Cont'd)

Total Length in Inches	Small-mouth bass								
<2.9									
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4									
5.5 - 5.9									
6.0 - 6.4	1								
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9									
8.0 - 8.4									
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9	1								
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9	1								
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3								

Table 24. The species composition and CPE of fishes sampled from station 10 of the Rum River during 1974 (0.5 miles shocked, 1.10 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Castostomus commersoni	White sucker	3	4.8	3.9	2.9	2.7
Moxostoma anisurum	Silver redhorse	9	14.3	21.2	16.0	8.1
Moxostoma macrolepidotum	Northern redhorse	17	27.0	9.4	7.1	15.4
Cyprinus carpio	Carp	21	33.3	89.6	67.7	19.1
Ictalurus melas	Black bullhead	2	3.2	0.5	0.4	1.8
Esox lucius	Northern pike	5	7.9	6.2	4.7	4.5
Stizostedion vitreum	Walleye	2	3.2	1.0	0.8	1.8
Micropterus dolomieui	Smallmouth bass	4	6.3	0.5	0.4	3.6
	Totals	63	100.0	132.3		57.3

Table 24a. The length-frequency distributions of the major fish species sampled from station 10 of the Rum River during 1974

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Carp	Black bull-head	Northern pike	Walleye	Small-mouth bass	
< 2.9									
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9			1						
5.0 - 5.4			3						
5.5 - 5.9			3						
6.0 - 6.4					1				
6.5 - 6.9					1			3	
7.0 - 7.4								1	
7.5 - 7.9									
8.0 - 8.4			1						
8.5 - 8.9			2						
9.0 - 9.4			2						
9.5 - 9.9			1						
10.0 - 10.4	1								
10.5 - 10.9									
11.0 - 11.4							1		
11.5 - 11.9							1		
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9	1	1	1						
16.0 - 16.9	1	2	2			1			
17.0 - 17.9				2		2			
18.0 - 18.9		5	1	5		2			
19.0 - 19.9				2					
20.0 - 20.9		1		2					
21.0 - 21.9				2					
22.0 - 22.9				6					
23.0 - 23.9				1					
24.0 - 24.9				1					
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	3	9	17	21	2	5	2	4	

Table 25. The species composition and CPE of fishes sampled from station 11 of the Rum River during 1974 (1.0 miles shocked, 0.64 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	8	8.2	17.7	9.7	12.5
Moxostoma anisurum	Silver redhorse	4	4.1	11.8	6.5	6.2
Moxostoma macrolepidotum	Northern redhorse	73	75.2	130.7	71.9	114.1
Cyprinus carpio	Carp	4	4.1	19.7	10.8	6.2
Micropterus dolomieui	Smallmouth bass	7	7.2	1.8	1.0	11.3
Amblopites rupestris	Rock bass	1	1.0	0.2	0.1	1.6
	Subtotals	97	46.6	181.9		151.6
Hybopsis biguttata	Hornyhead chub	1	0.9			1.6
Rhinichthys cataractae	Longnose dace	1	0.9			1.6
Notropis cornutus	Common shiner	50	45.0			78.1
Notropis spilopterus	Spotfin shiner	58	52.3			90.6
Pimephales notatus	Bluntnose minnow	1	0.9			1.6
	Subtotals	111	53.4			173.4
	Totals	208	100.0			325.0

Table 25a. The length-frequency distributions of the major fish species sampled from station 11 of the Rum River during 1974

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Carp	Small-mouth bass	Rock bass			
< 2.9					1				
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4					1				
5.5 - 5.9					1				
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4						1			
7.5 - 7.9									
8.0 - 8.4					1				
8.5 - 8.9					1				
9.0 - 9.4			1						
9.5 - 9.9			2		1				
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9					1				
12.0 - 12.9			2						
13.0 - 13.9	1		2						
14.0 - 14.9			7						
15.0 - 15.9	1		23						
16.0 - 16.9	3	1	27						
17.0 - 17.9	3		5						
18.0 - 18.9			2						
19.0 - 19.9		2		1					
20.0 - 20.9		1	2						
21.0 - 21.9				1					
22.0 - 22.9				2					
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	8	4	73	4	7	1			

Table 26. The species composition and CPE of fishes sampled from station 12 of the Rum River during 1974 (0.9 miles shocked, 0.83 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	8	26.7	3.0	5.3	9.6
Moxostoma anisurum	Silver redhorse	7	23.3	19.6	34.4	8.4
Moxostoma macrolepidotum	Northern redhorse	8	26.7	17.6	30.9	9.6
Cyprinus carpio	Carp	4	13.3	16.3	28.7	4.8
Micropterus dolomieui	Smallmouth bass	3	10.0	0.4	0.7	3.6
	Subtotals	30	66.7	56.9		36.1
Notropis cornutus	Common shiner	6	40.0			7.2
Notropis spilopterus	Spotfin shiner	8	53.3			9.6
Pimephales notatus	Bluntnose minnow	1	6.7			1.2
	Subtotals	15	33.3			18.1
	Totals	45	100.0			54.2

Table 26a. The length-frequency distributions of the major fish species sampled from station 12 of the Rum River during 1974

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Carp	Small-mouth bass				
< 2.9	1								
3.0 - 3.4									
3.5 - 3.9									
4.0 - 4.4	4								
4.5 - 4.9					2				
5.0 - 5.4	1				1				
5.5 - 5.9									
6.0 - 6.4									
6.5 - 6.9									
7.0 - 7.4									
7.5 - 7.9									
8.0 - 8.4									
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9									
10.0 - 10.4									
10.5 - 10.9									
11.0 - 11.4									
11.5 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9	1		3						
15.0 - 15.9		1	2						
16.0 - 16.9	1								
17.0 - 17.9			1	1					
18.0 - 18.9		1		2					
19.0 - 19.9		4							
20.0 - 20.9		1							
21.0 - 21.9									
22.0 - 22.9			2						
23.0 - 23.9									
24.0 - 24.9				1					
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	8	7	8	4	3				

Table 27. The species composition and CPE of fishes sampled from station 13 of the Rum River during 1974 (0.6 miles shocked, 0.42 hours fished)

Species		No.	% of catch	wt.	% by wt.	CPE in fish/hr.
Catostomus commersoni	White sucker	8	7.1	13.0	11.0	19.0
Moxostoma anisurum	Silver redhorse	2	1.8	5.4	4.6	4.8
Moxostoma macrolepidotum	Northern redhorse	11	9.7	17.2	14.6	26.2
Cyprinus carpio	Carp	37	32.7	69.4	58.8	88.1
Ictalurus melas	Black bullhead	40	35.4	5.2	4.4	95.2
Stizostedion vitreum	Walleye	5	4.4	3.2	2.7	11.9
Micropterus dolomieui	Smallmouth bass	7	6.2	2.9	2.5	16.2
Pomoxis annularis	White crappie	1	0.9	0.2	0.2	2.4
Lota lota	Burbot	2	1.8	1.5	1.3	4.8
	Subtotals	113	56.8	118.0		269.0
Hybognathus hankinsoni	Brassy minnow	1	1.2			2.4
Notropis cornutus	Common shiner	37	43.0			88.1
Notropis spilopterus	Spotfin shiner	36	41.9			85.7
Notropis hudsonius	Spottail shiner	1	1.2			2.4
Pimephales notatus	Bluntnose minnow	1	1.2			2.4
Pimephales promelas	Fathead minnow	8	9.3			19.0
Percina caprodes	Log perch	2	2.3			4.8
	Subtotals	86	43.2			204.8
	Totals	199	100.0			473.8

Table 27a. The length-frequency distributions of the major fish species sampled from station 13 of the Rum River during 1974

Total Length in Inches	White sucker	Silver redhorse	Northern redhorse	Carp	Black bullhead	Walleye	Smallmouth bass	White Crappie	Burbot
< 2.9									
3.0 - 3.4									1
3.5 - 3.9									
4.0 - 4.4									
4.5 - 4.9									
5.0 - 5.4					5		2		
5.5 - 5.9					7			1	
6.0 - 6.4					16		1		
6.5 - 6.9			2		7				
7.0 - 7.4					3		2		
7.5 - 7.9					1				
8.0 - 8.4					1				
8.5 - 8.9									
9.0 - 9.4									
9.5 - 9.9									
10.0 - 10.4						2			
10.5 - 10.9				2					
11.0 - 11.4	1								
11.5 - 11.9							1		
12.0 - 12.9						1			
13.0 - 13.9				3			1		
14.0 - 14.9	2		1	4		2			
15.0 - 15.9	3	1		3					
16.0 - 16.9			3	5					
17.0 - 17.9	2		3	2					
18.0 - 18.9			2	7					
19.0 - 19.9				3					1
20.0 - 20.9		1		3					
21.0 - 21.9				2					
22.0 - 22.9									
23.0 - 23.9				1					
24.0 - 24.9									
25.0 - 25.9				1					
26.0 - 26.9									
27.0 - 27.9				1					
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	8	2	11	37	40	5	7	1	2

Table 28 Comparisons of the catch per effort of fishes (fish/hour) from the 1974 Rum River electrofishing survey

Station	1	2	3	4	5	6	7	8	9	10	11	12	13
Effort (Total Hrs.)	1.42	0.58	0.33	1.00	0.92	0.83	0.83	1.00	1.00	1.10	0.64	0.83	0.42
Species													
White sucker	19.72	46.55	55.45	11.0	23.91	19.28	3.61	4.00	3.00	2.73	12.50	9.64	19.05
Silver redhorse	-	-	-	2.00	3.26	1.20	4.82	19.00	4.00	8.18	6.25	8.43	4.76
Northern redhorse	0.70	34.48	12.12	10.00	4.35	69.88	25.30	34.00	6.00	15.45	114.06	9.64	26.19
Carp	0.70	-	-	-	-	1.20	79.52	38.00	23.00	19.09	6.25	4.82	88.10
Black bullhead	18.31	93.10	30.30	3.00	1.09	3.61	25.30	2.00	3.00	1.81	-	-	95.24
Brown bullhead	57.04	17.24	-	6.00	-	1.20	-	-	-	-	-	-	-
Yellow bullhead	4.23	22.41	81.82	21.00	28.26	4.82	6.02	-	1.00	-	-	-	-
Northern pike	3.52	5.17	12.12	1.00	4.35	1.20	3.61	8.00	5.00	4.55	-	-	-
Walleye	2.87	5.17	3.03	1.00	2.17	3.61	-	2.00	1.00	1.81	-	-	11.90
Yellow perch	75.35	31.03	-	3.00	1.09	-	-	2.00	7.00	-	-	-	-
Smallmouth bass	-	34.48	184.85	74.00	90.22	110.84	28.92	3.00	3.00	3.64	10.94	3.61	16.67
Rock bass	5.63	12.07	18.18	21.00	16.30	4.82	3.61	3.00	-	-	1.56	-	-
TOTAL CATCH RATES	188.07	301.70	396.97	153.00	175.01	221.66	180.71	115.00	56.00	57.26	151.56	36.14	261.91

Table 29. Station diversity index values calculated from species compositions during the 1974 Rum River fisheries survey

Station No.	*Diversity Index Value	Station No.	*Diversity Index Value
1	2.71	8	2.64
2	3.02	9	2.72
3	2.27	10	2.51
4	2.64	11	1.32
5	2.18	12	2.23
6	2.10	13	2.37
7	2.42		

* Median Index Value = 2.42

** Overall Index Value = 3.54

* The forage fish species are not included in this value.

** The forage fish species are included in this value.

Table 30. Records of fish stocking and removal activities on the Rum River since 1960.

Year	Species	Size	Number	Location and County
Fish Stocking				
1960	Largemouth bass	Fgl.	12,000	Shakopee L., Mille Lacs Co.
1969	Channel catfish	"	11,500	Rum River, Mille Lacs Co.
1971	Channel catfish	"	15,000	Rum River, Anoka Co.
Fish Removal				
1960	Northern pike	Yrl.	271	Rum River, Mille Lacs Co. (near Milaca)
1960	Smallmouth bass	Ad.	2	Rum River, Mille Lacs Co.
July, 1962 - June, 1963	Northern pike	Fgl.	84	Rum River, Mille Lacs Co.
1965-66	Bullheads	-	12,075 lbs.	Ogechie L., Mille Lacs Co.
"	Carp	-	245 lbs.	" " "
"	Burbot	-	1,070 lbs.	" " "
"	Perch	-	270 lbs.	" " "
"	Bowfin	-	8 lbs.	" " "
1966-67	Bullheads	-	12,100 lbs.	" " "
"	Bowfin	-	828 lbs.	" " "
"	Burbot	-	95 lbs.	" " "
"	Perch	-	51 lbs.	" " "
"	Carp	-	172 lbs.	" " "
1971-72	Burbot	-	47 lbs.	Shakopee L., Mille Lacs Co.
"	Perch	-	110 lbs.	" " "
"	Suckers	-	50 lbs.	" " "
"	Bowfin	-	294 lbs.	" " "
"	Bullheads	-	12,460 lbs.	" " "
"	Perch	-	45 lbs.	Onamia L., Mille Lacs Co.
"	Bullheads	-	280 lbs.	Onamia L., Mille Lacs, Co.

Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey

Common Name	Scientific Name	Station												
	Aquatic Plants	1	2	3	4	5	6	7	8	9	10	11	12	13
Common cattail	Typha latifolia	X	X	X					X	X	X		X	
Cane grass	Phragmites communis		X											
Reed canary grass	Phalaris arundinacea		X	X	X	X	X	X	X	X	X	X	X	
Cutgrass	Leersia oryzoides	X											X	
Wild rice	Zizania aquatica									X				
Sedge	Carex spp.	X			X		X		X	X	X		X	
Blue flag	Iris versicolor	X		X	X		X	X			X	X		
Arrowhead	Sagittaria spp.	X		X	X	X	X	X		X	X	X	X	
Giant burreed	Sparganium eurycarpum			X		X	X							
Floatingleaf burreed	Sparganium fluctuans						X							
Rush	Juncus balticus					X					X			
Needlerush	Eleocharis acicularis											X	X	
Softstem bulrush	Scirpus validus			X			X			X			X	
Water plantain	Alisma trivale						X	X						
Water arum	Calla palustris			X										
Horsetail	Equisteum spp.	X						X		X	X	X		
Claspingleaf pondweed	Potamogeton Richardsonii	X					X						X	
Floatingleaf pondweed	Potamogeton natans	X			X			X						
Narrowleaf pondweed	Potamogetan spp.	X		X			X	X		X	X	X	X	
River pondweed	Potamogetan nodosus		X				X	X		X		X	X	
Yellow waterlily	Nuphar variegatum	X		X	X		X			X			X	
White waterlily	Nymphaea tuberosa	X								X			X	
White water buttercups	Ranunculus spp.	X		X				X					X	
Coontail	Ceratophyllum demersum	X		X			X	X		X	X		X	
Water milfoil	Myriophyllum exalbescens	X	X					X						
Canada waterweed	Elodea canadensis	X	X				X	X		X	X	X	X	
Wild celery	Vallisneria americana			X	X		X	X					X	
Duckweed	Lemna spp.	X								X	X		X	

Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey (Cont'd)

Common Name	Scientific Name	Station												
Terrestrial Plants		1	2	3	4	5	6	7	8	9	10	11	12	13
Eastern white pine	Pinus strobus		X	X			X			X	X		X	
Red pine	Pinus resinosa							X	X		X	X		
Jack pine	Pinus Banksiana							X	X					
Tamarack	Larix laricina	X						X	X	X		X		
Black spruce	Picea mariana	X												
White spruce	Picea glauca	X										X		
Balsam fir	Abies balsamea	X												
Eastern cottonwood	Populus deltoides		X				X	X	X	X	X	X	X	
Quaking aspen	Populus tremuloides	X		X	X		X		X	X	X	X	X	
Bigtooth aspen	Populas grandidentata											X	X	
Paper birch	Betula papyrifera	X	X	X	X	X	X	X	X	X	X	X	X	
Ironwood	Ostrya virginiana	X		X										
White oak	Quercus alba	X	X	X	X		X		X	X	X	X	X	
Bur oak	Quercus macrocarpa	X	X							X				
Northern red oak	Quercus rubra	X	X	X	X		X				X	X	X	
Northern pin oak	Quercus ellipsoidaldis	X	X		X		X		X	X	X	X	X	
American elm	Ulmus americana	X	X	X	X	X	X	X	X	X	X	X	X	X
Sugar maple	Acer saccharum	X		X	X		X	X						
Red maple	Acer rubrum	X		X	X									
Silver maple	Acer saccharinum		X	X	X	X	X	X	X	X	X	X	X	X
Boxelder	Acer Negundo						X	X	X	X	X	X	X	
American basswood	Tilia americana	X	X	X	X		X	X	X	X	X	X	X	
Ash	Fraxinus spp.	X	X	X	X	X	X	X	X	X	X	X	X	
Hackberry	Celtis occidentalis	X												
Butternut	Juglans cinerea	X		X	X		X	X	X	X		X		
Red cedar	Juniperus virginiana								X		X	X	X	
Willow	Salix spp.	X		X	X	X	X	X	X	X	X	X	X	X
Gooseberry	Ribies spp.	X		X			X				X		X	
Dogwood	Cornus spp.	X								X	X	X	X	
Alder	Alnus spp.	X		X	X					X	X	X	X	
Hazelnut	Corylus spp.	X		X							X	X	X	

Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey (Cont'd)

Common Name	Scientific Name	Station												
Terrestrial Plants		1	2	3	4	5	6	7	8	9	10	11	12	13
Wild rose	Rosa spp.	X	X		X		X	X	X	X	X	X	X	
Sumac	Rhus spp.			X	X		X	X	X		X	X	X	
Poison ivy	Rhus radicans									X	X	X	X	
Raspberry	Rubus spp.			X			X				X	X	X	
Wild grape	Vitis spp.							X	X	X	X	X	X	
Common prickly ash	Zanthoxylum americannum						X	X	X	X	X	X	X	
Ostrich fern	Pteretis pensylvanica	X			X									
Jack-in-the-pulpit	Arisaema stewardsonii	X		X	X									
Asparagus	Asparagus officinalis							X	X		X	X	X	
Solomons seal	Polygonatum spp.	X		X							X	X	X	
Trilium	Trillium spp.	X		X	X		X							
Yellow lady slipper	Cyprepedium calceolus	X												
Stinging nettle	Urtica dioica	X					X	X				X		
Wood nette	Laportea canadensis							X	X		X	X	X	
Wild ginger	Asarum canadense	X		X										
Stitchwort	Stellaria spp.	X												
White campion	Lychnis alba					X	X	X		X	X	X		
Deptford ping	Dianthus Armeria								X					
Marsh marigold	Clatha palustris								X					
Columbine	Aquilegia canadensis	X												
Canada anemone	Anemone canadensis			X	X		X	X	X	X	X	X	X	
Wild strawberry	Fragaria spp.	X		X			X		X			X		
Bloodroot	Sanguinaria canadensis	X		X	X									
Shepherd's purse	Capsella Bursa-pastous	X												
Wormseed mustard	Erysimum cheiranthoides					X	X	X	X					
Yellow sweet clover	Melilotus officinalis					X		X			X	X	X	
Red clover	Trifolium pratense							X						
Purple vetch	Vicia americana	X			X		X	X	X		X	X	X	
Wild geranium	Geranium maculatum	X		X			X	X						
Violet	Viola spp.	X		X							X			
Milkweed	Asclepias spp.			X			X	X	X	X	X	X	X	
Morning glory	Convolvulus sepium								X	X	X	X		
Phlox	Phlox spp.			X							X			
Virginia water-leaf	Hydrophyllum virginianum	X		X			X	X			X			

Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey (Cont'd)

Common Name	Scientific Name	Station												
	Terrestrial Plants	1	2	3	4	5	6	7	8	9	10	11	12	13
Hoary puccoon	Lithospesmum canescens								X	X	X			
Scullcap	Scutellaria spp.							X		X	X	X		
Butter and eggs	Linaria vulgaris					X								
Harebell	Campanula rotundifolia						X					X		
Goat's-beard	Tragopogon spp.													
Sow thistle	Sonchus spp.					X			X	X	X	X		
Prickly lettuce	Lactuca Scariola						X							
Ragweed	Ambrosia spp.						X	X						
Black eyed susan	Rudbeckia hirta								X		X	X	X	
Canada thistle	Cirsium arvense			X					X	X			X	
Queen Anne's lace	Daucus Carota						X	X	X		X			
	Birds													
Common loon	Gavia immer	X								X				
Great blue heron	Ardea herodias	X			X	X	X	X						
Green heron	Butorides virescens			X		X	X		X	X	X		X	
American bittern	Botaurus lentiginosus										X			
Canada goose	Branta canadensis	X												
Mallard	Anas platyrhynichos	X					X			X			X	
Blue-winged teal	Anas discors	X					X						X	
Wood duck	Aix sponsa			X			X			X				
Ring-necked duck	Aythya collaris	X												
Turkey vulture	Cathartes aura	X												
Red-tailed hawk	Buteo jamaicensis			X				X	X					
Broad-winged hawk	Buteo platypterus										X			
Marsh hawk	Circus cyaneus										X			
American kestrel	Falco sparverius		X											
Ruffed grouse	Bonasa umbellus			X										
Ring-necked pheasant	Phasianus colchicus						X		X	X				

Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey (Cont'd)

Common Name	Scientific Name	Station												
Birds		1	2	3	4	5	6	7	8	9	10	11	12	13
Killdeer	Charadrius vociferus	X	X				X	X	X					
American woodcock	Philohela minor			X										
Common snipe	Capella gallinago									X				
Spotted sandpiper	Actitis macularia		X	X	X	X	X	X	X	X	X	X	X	
Herring gull	Larus argentatus	X												
Common tern	Sterna hirundo	X												
Black tern	Chlidonias niger	X	X				X		X	X	X		X	
Band-tailed pigeon	Columba fasciata						X						X	
Mourning dove	Zenaida macroura		X			X	X	X	X	X	X	X	X	
Great horned owl	Bubo virginianus							X		X	X			
Chimney swift	Chaetura pelagica												X	
Ruby-throated hummingbird	Archilochus colubris	X												
Belted kingfisher	Megaceryle alcyon		X				X	X	X	X	X	X	X	
Common flicker	Colaptes auratus						X		X		X	X	X	
Pileated woodpecker	Dryocopus pileatus											X	X	
Red-headed woodpecker	Melanerpes erythrocephalus				X		X	X	X		X			
Yellow-bellied sapsucker	Sphyrapicus varius	X								X	X	X		
Kingbird	Tyrannus spp.		X	X	X		X	X	X	X	X		X	
Great crested flycatcher	Myiarchus crinitus	X		X	X		X	X	X	X	X	X	X	
Eastern phoebe	Sayornis phoebe		X	X	X				X	X		X		
Eastern wood pewee	Contopus virens	X	X	X				X	X		X	X	X	
Tree swallow	Iridoprocne bicolor	X	X											
Bank swallow	Riparia riparia						X	X	X					
Rough-winged swallow	Stelgidopteryx ruficollis					X		X	X		X			
Barn swallow	Hirundo rustica	X				X	X	X	X	X	X		X	
Cliff swallow	Petrochelidon pyrrhonota			X	X	X	X		X			X		
Blue jay	Cyanocitta cristata			X		X	X	X	X	X	X	X	X	
Common raven	Corvus corax	X												
Common crow	Corvus brachyrhynchos			X				X		X	X	X	X	
Black-capped chickadee	Parus atricapillus								X	X	X	X	X	
White-breasted nuthatch	Sitta carolinensis			X					X	X		X	X	
House wren	Troglodytes aedon							X	X			X	X	

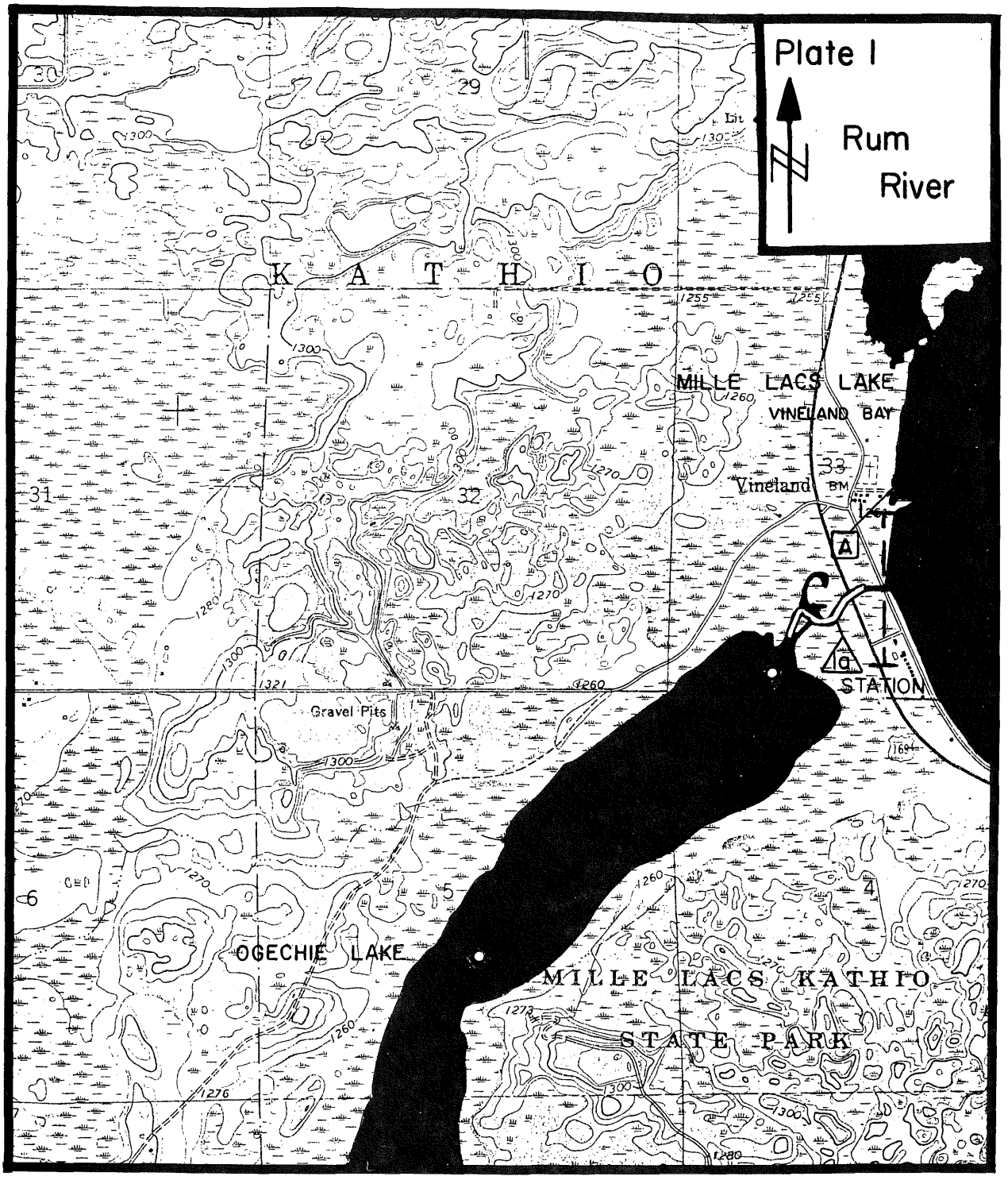
Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey (Cont'd)

Common Name	Scientific Name	Station												
	Birds	1	2	3	4	5	6	7	8	9	10	11	12	13
Gray catbird	Dumetella carolinensis	X		X	X	X		X	X	X	X	X	X	
Brown thrasher	Toxostoma rufum		X				X			X				
American robin	Turdus migratorius	X					X	X	X		X			
Eastern bluebird	Sialia sialis			X							X		X	
Cedar waxwing	Bombycilla cedrorum			X		X	X		X		X	X	X	
Starling	Sturnus vulgaris	X												
Red-eyed vireo	Vireo olivaceus	X								X	X	X	X	
Yellow warbler	Dendroica petechia			X	X	X	X	X	X					
Common yellowthroat	Geothlypis trichas			X						X		X	X	
American redstart	Setophaga ruticilla	X		X	X						X			
House sparrow	Passer domesticus	X												
Meadowlark	Sturnella spp.				X			X	X		X			
Yellow-headed blackbird	Xanthocephalus xanthocephalus	X												
Red-winged blackbird	Agelaius phoeniceus	X	X	X		X	X	X		X	X			
Northern oriole	Icterus galbula			X		X	X	X	X	X	X	X	X	
Common grackle	Quiscalus quiscula	X					X	X		X	X	X	X	
Brown-headed cowbird	Molothrus ater	X									X	X	X	
Scarlet tanager	Piranga olivacea			X	X				X					
Cardinal	Cardinalis cardinalis								X	X			X	
Rose-breasted grosbeak	Pheucticus ludovicianus			X		X		X						
American goldfinch	Spinus tristis	X		X					X			X	X	
Song sparrow	Melospiza melodia	X		X	X	X	X	X	X	X		X	X	
	Mammals													
Cottontail rabbit	Sylvilagus floridanus							X						
Woodchuck	Marmota monax								X					
Striped ground squirrel	Citella tridecemlineatus	X		X										
Eastern chipmunk	Tamias striatus	X			X	X	X				X	X	X	
Red squirrel	Tamiascuirus hudsonicus					X			X		X	X		
Gray squirrel	Sciurus carolinensis	X					X		X		X	X		
Fox squirrel	Scirus niger					X	X				X		X	
Beaver	Castor canadensis	X	X	X	X		X	X	X	X				
Muskrat	Ondatra zibethica	X	X				X	X			X		X	
Raccoon	Procyon lotor						X	X		X		X		
White-tailed deer	Odocoileus virginianus	X		X										

Table 31. Station occurrence of the species of flora and fauna noted during the 1974 Rum River survey (Cont'd)

Common Name	Scientific Name	Station												
Amphibians and Reptiles		1	2	3	4	5	6	7	8	9	10	11	12	13
Common tree frog	Hyla versicslor											X		
Leopard frog	Rana pipiens							X						
Wood frog	Rana sylvatica	X												
Snapping turtle	Chelydra serpentina					X		X				X		
Painted turtle	Chrysemys picta									X	X	X		
Spiny softshell turtle	Trionyx spiniferus							X		X				
Map turtle	Graptemys geographica											X		
Garter snake	Thamnophis spp.							X						
Aquatic Organisms														
Freshwater clams	Plecypoda			X										
Snails	Gastropoda		X	X				X						
Stoneflies	Pleocoptera			X			X					X		
Mayflies	Ephemeroptera (Heptageniidae, Baetidae)			X	X			X	X	X	X	X		
Dragonflies	Odonata	X						X	X	X	X	X		
Aquatic bugs	Hemiptera (Gerridae, Pleidae)	X	X										X	
Caddisflies	Trichoptera (Limnephilidae, Hydropschidae)	X	X	X								X	X	
Aquatic beetles	Coleoptera (Gyrinidae)	X											X	
Aquatic flies & midges	Diptera (Simulidae, Tabanidae, Culicidae, Dolichopodidae)		X	X					X	X	X	X		
Freshwater Oligochaetes	Oligochaeta			X										

APPENDIX B



LEGEND

1 2 — Station start and/or end

STATION

River mile

1a — Electrofishing run

A — Access point

Scale: 1" = 2,000'

North

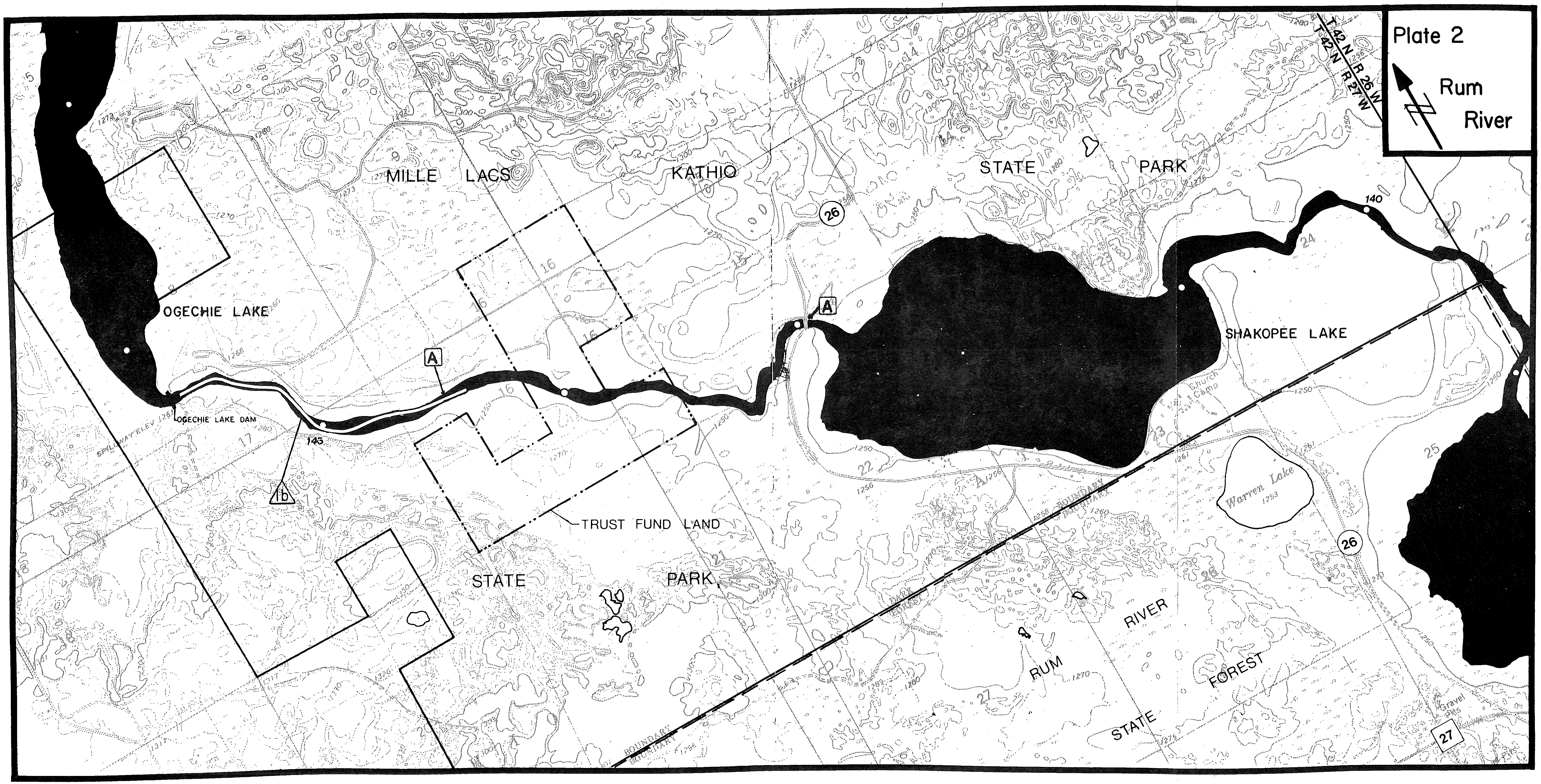


Plate 2
Rum
River
T 42 N R 26 W
T 42 N R 27 W
MILLE LACS
KATHIO
STATE
PARK
OGECHIE LAKE
OGECHIE LAKE DAM
SPILLWAY ELEV 1261
145
140
A
1b
26
TRUST FUND LAND
SHAKOPEE LAKE
Church Camp
Warren Lake
1253
STATE
PARK
RUM RIVER
STATE FOREST
BOUNDARY
Gravel Pits
27

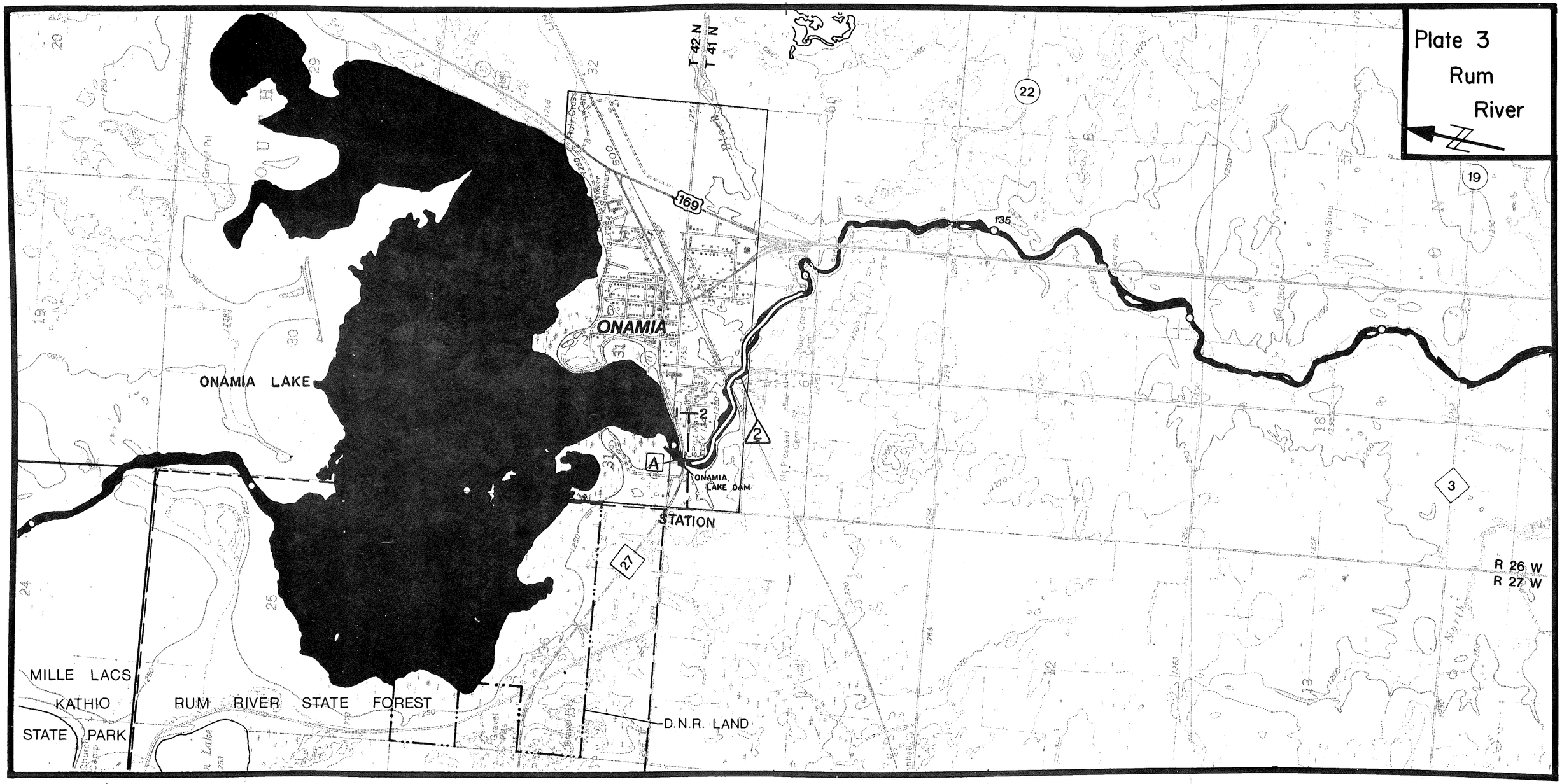


Plate 3
Rum
River
T 42 N
T 41 N
ONAMIA
ONAMIA LAKE
ONAMIA LAKE DAM
STATION
MILLE LACS
KATHIO
STATE PARK
RUM RIVER STATE FOREST
D.N.R. LAND
R 26 W
R 27 W
169
135
22
19
27
3
2
A

Plate 4

Rum River

R 26 W
R 27 W

T 41 N
T 40 N

STATION 2 — 3

3a

BRADBURY BROOK

North Branch

169

125

130

19

20

7

8

3

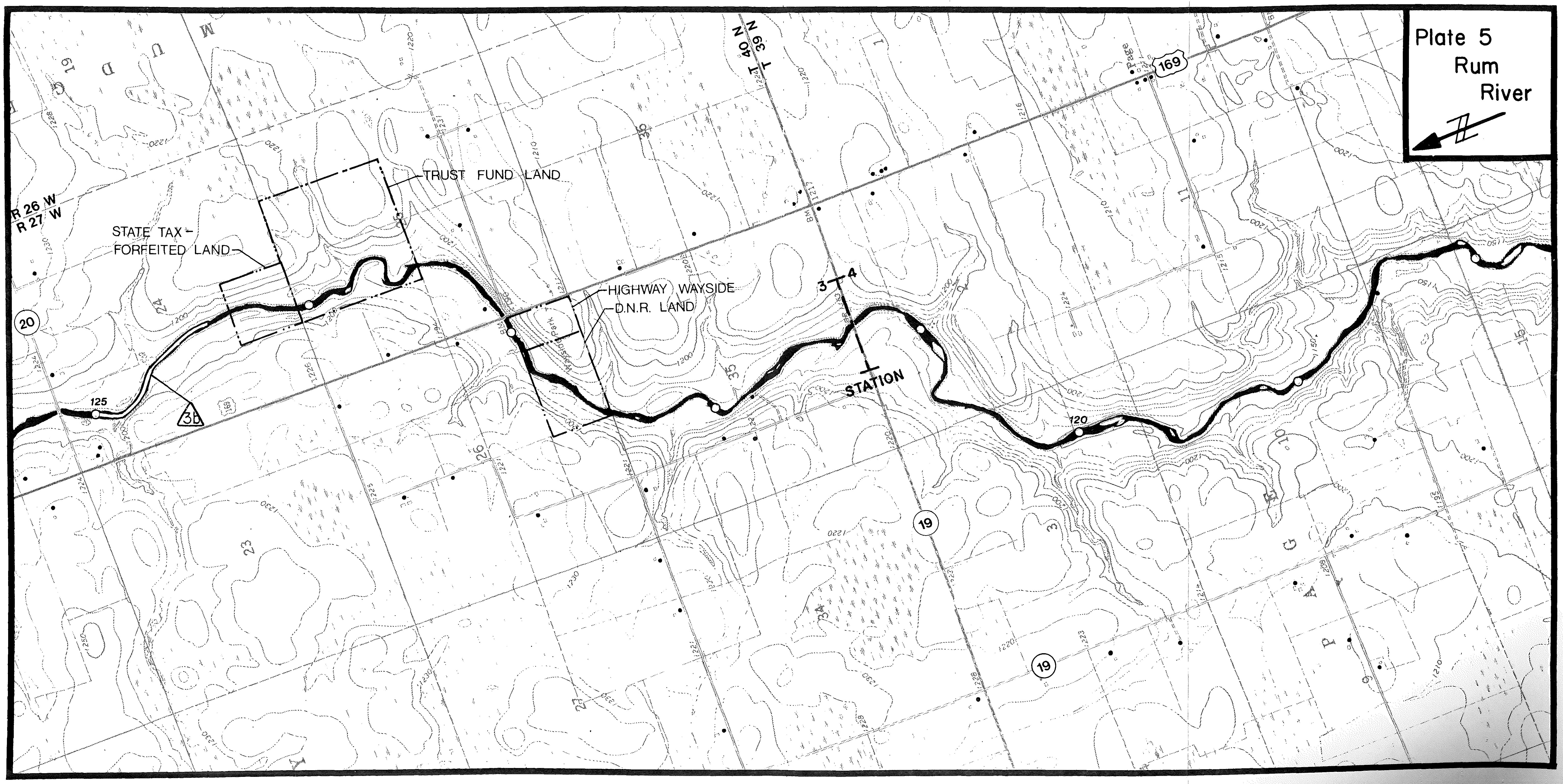


Plate 5
Rum
River
TRUST FUND LAND
STATE TAX-
FORFEITED LAND
HIGHWAY WAYSIDE
D.N.R. LAND
STATION
3
4
R 26 W
R 27 W
T 40 N
T 39 N
125
120
20
19
169
3b

Plate 6
Rum
River

T 39 N
T 38 N

169

11

16

115

4 T 5

4

STATION

5

12

TIBBETTS
BROOK

Plate 7
Rum
River

R 26 W
R 27 W

169

23

A

5 6

110

STATION

9

6

MILACA

CITY PARK

MILACA DAM

STATE HIGHWAY REST
STOP

105

Miller's Municipal Airport

Forest Hill Cemetery

Sewage Disposal Ponds

Rum River

Trout Brook

GREAT NORTHERN

PIPELINE

Radio Tower

T 38 N
T 37 N

Plate 8
Rum
River

VANDELL BROOK

BOGUS BROOK

PIPELINE

100

95

6 7

STATION

GUSSBROOK

Gravel Pit

Townhall

Woodward Brook

Washburn

R 26 W
R 27 W

T 37 N
T 36 N

Plate 9
Rum
River

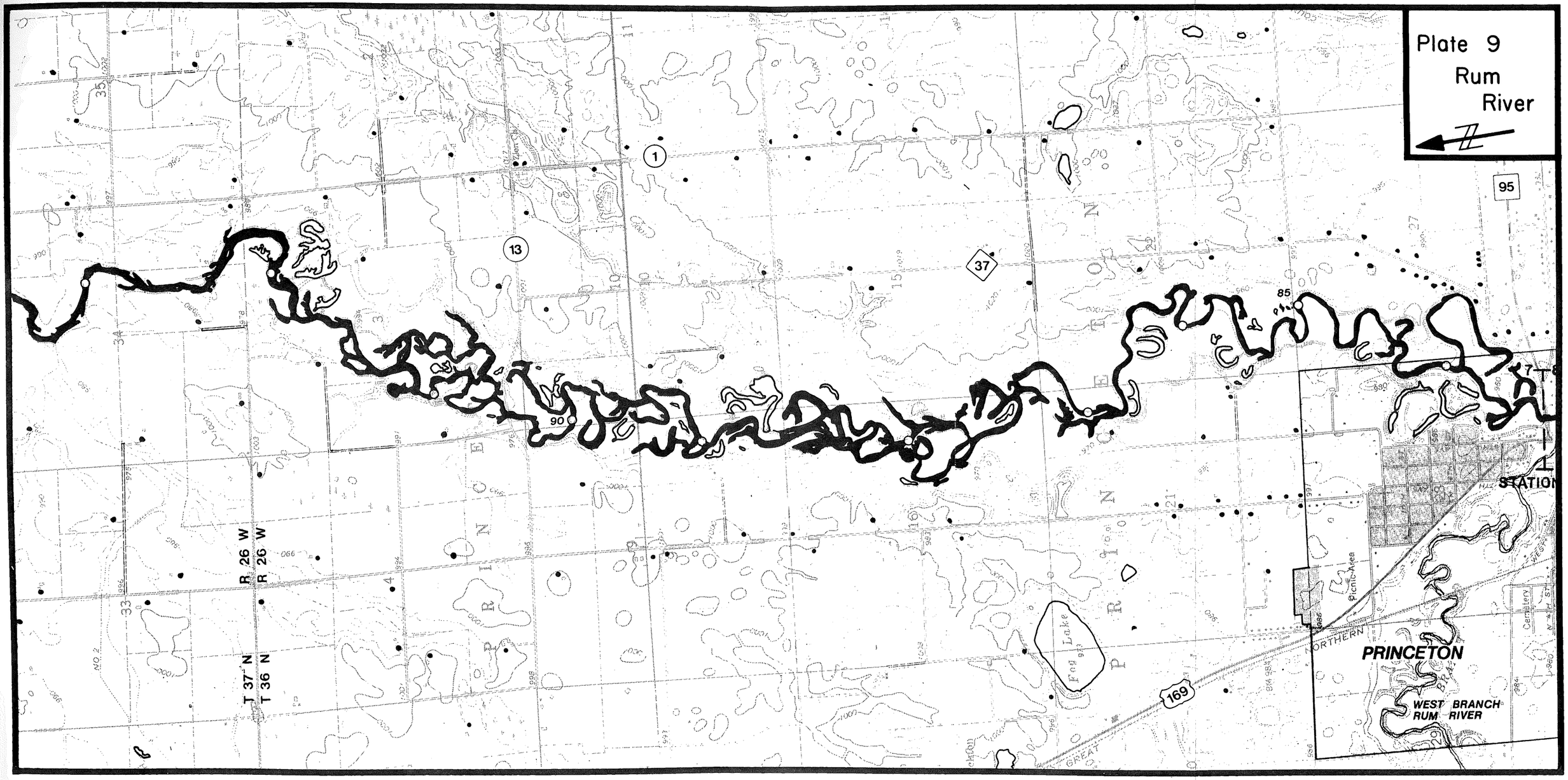


Plate 10

Rum River

RIVERSIDE PARK

PRINCETON

Rum River Golf Club

High Sch

Silver

MILLE LACS CO.
SHERBURNE CO.

ISANTI COUNTY

T 36 N
T 35 N

Radio Tower (WKPM)

Sewage Disposal Ponds

Townhall

ISANTI CO.
R 25 W
R 26 W
SHERBURNE CO.

18 11 2 5 169 75 80

Plate II

Rum River

T 36 N
T 35 N

GREEN LAKE BROOK

SPECTACLE LAKE STATE WILDLIFE MANAGEMENT AREA

STATION

SPENCER BROOK

Spencer Brook

Burton Lake

R 25 W
R 24 W

Plate 12

Rum River

STANCHFIELD CREEK

Pine Brook

Pine Br.

Brook

Lane

BM 963

936

95

50

BM

935

47

1

T 36 N

T 35 N

R 24 W

R 23 W

Plate 13
Rum
River

LOWER STANCHFIELD BROOK

CAMBRIDGE

STATE HOSPITAL

STATION

CITY LAND

EAST RUM RIVER DRIVE

65

45

40

9

14

95

9 — 10

A

R 23 W
R 24 W

T 36 N
T 35 N

Plate 14
Rum
River

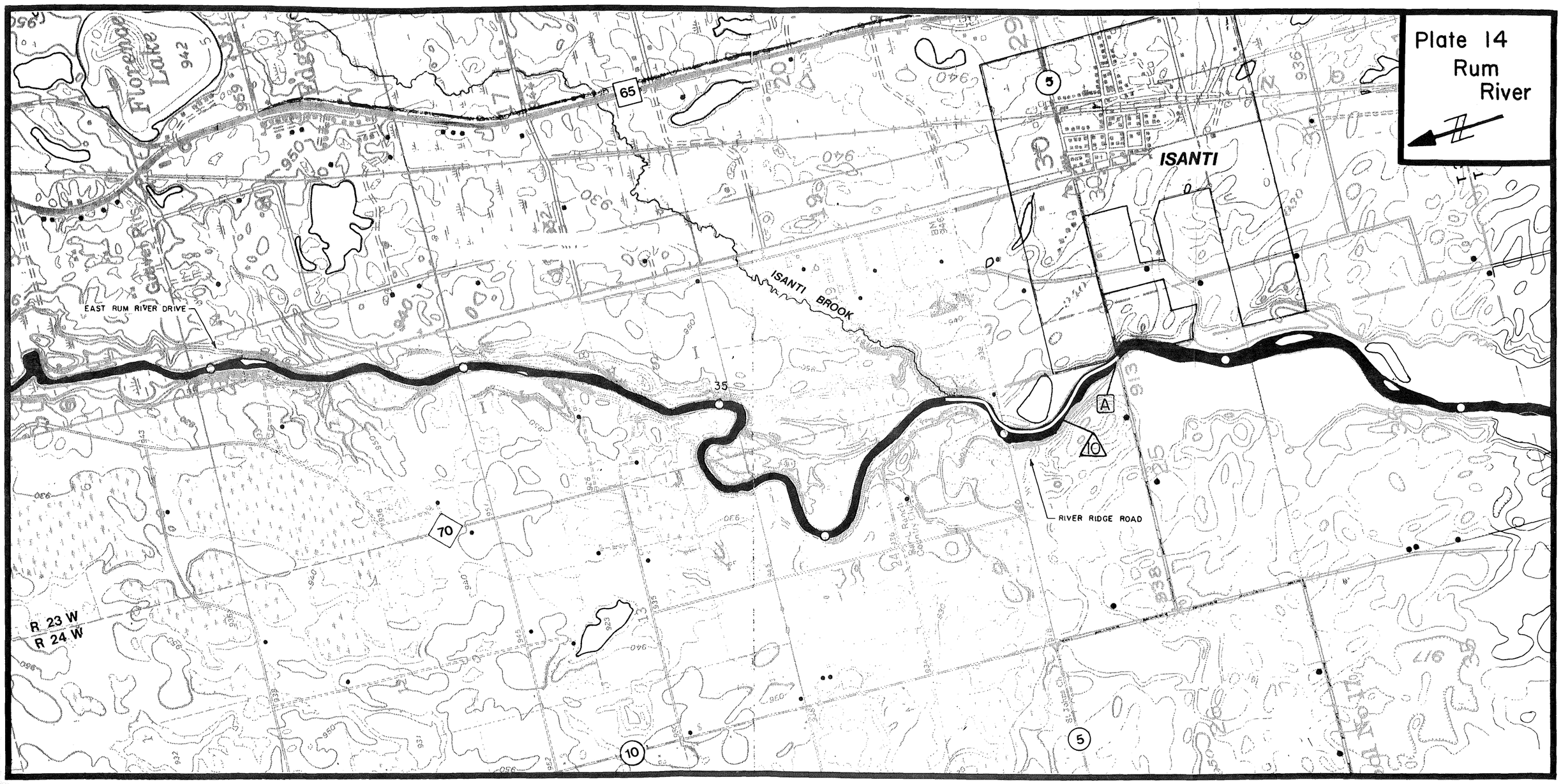


Plate 15

Rum River

R 23 W

R 24 W

ANOKA COUNTY

ISANTI COUNTY

ST P

T 34 N

T 35 N

WILDLIFE AREA

23

68

10

Plate 16

Rum River

T 34 N

T 33 N

LAKE GEORGE

COUNTY PARK LAND

RIVERBANK LANE

STATION

ST. FRANCIS

ISANTI COUNTY

ANOKA COUNTY

SEELYE BROOK

PARK LAND

R 24 W

R 25 W

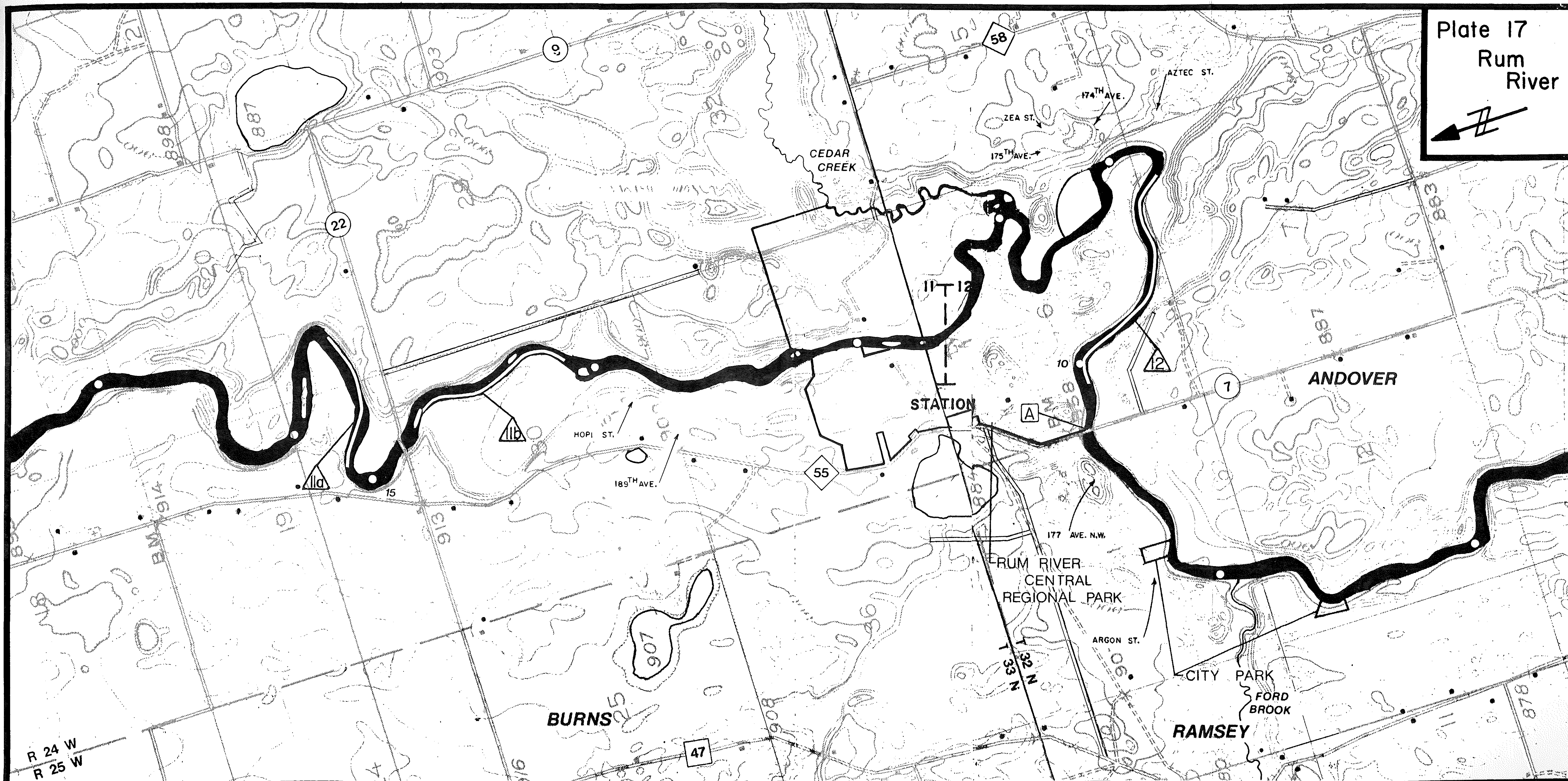


Plate 17
Rum River
CEDAR CREEK
AZTEC ST.
174TH AVE.
ZEA ST.
175TH AVE.
STATION
HOPI ST.
189TH AVE.
ANDOVER
177 AVE. N.W.
RUM RIVER CENTRAL REGIONAL PARK
ARGON ST.
CITY PARK
FORD BROOK
RAMSEY
BURNS
R 24 W
R 25 W
T 32 N
T 33 N

Plate 18
Rum
River

58

ANDOVER

T 31 N
T 32 N

COON

R 24 W
R 25 W

CITY PARK

CITY LAND

SCHOOL LAND

STATE HOSPITAL

7

142

RUM RIVER DAM

CITY PARK

A13

MADISON ST

RICE ST

12

13

ANOKA STATION

STATION

47

CITY PARK

JUNIPER RIDGE DRIVE

RUM RIVER SOUTH COUNTY PARK

RAMSEY

BURLINGTON NORTHERN

10

52

169

CHAMPLIN