

II. AU SABLE RIVER WATERSHED

A. General Characteristics

The Au Sable is a major tributary to Lake Huron. It drains a north-south basin that includes 1,932 square miles in north-central lower Michigan. The basin is approximately 90 miles long and 10 to 30 miles wide. The river basin is partially within the Huron National Forest and includes parts of Otsego, Montmorency, Crawford, Osco, Alcona, Roscommon, Ogemaw, and Iosco counties.

While technically a part of the Au Sable River Basin, many observers view the Pine and Van Etten Creek Watershed in Iosco and Alcona counties as a separate, distinct river basin. This is due to the fact that the Pine River system drains into the large Van Etten Lake before entering the Au Sable River less than two miles from where the main river drains into Lake Huron. For the purpose of this study, the Pine and Van Etten creeks will not be considered a part of the Au Sable River system.

B. Accessibility

The river basin is readily accessible by all major forms of transportation. Interstate highway 75 is a major Michigan north-south artery. It provides ready access to the Grayling area from all of southern Michigan. Highway 23 is a major Lake Huron shore route serving the Oscoda area and providing access from all of southeastern Michigan. State highways 72, 33, and 65 are intermediate routes serving the entire river basin. Aside from several very small areas with difficult access, the basin has a heavily developed system of federal, state, county and Forest Service roads.

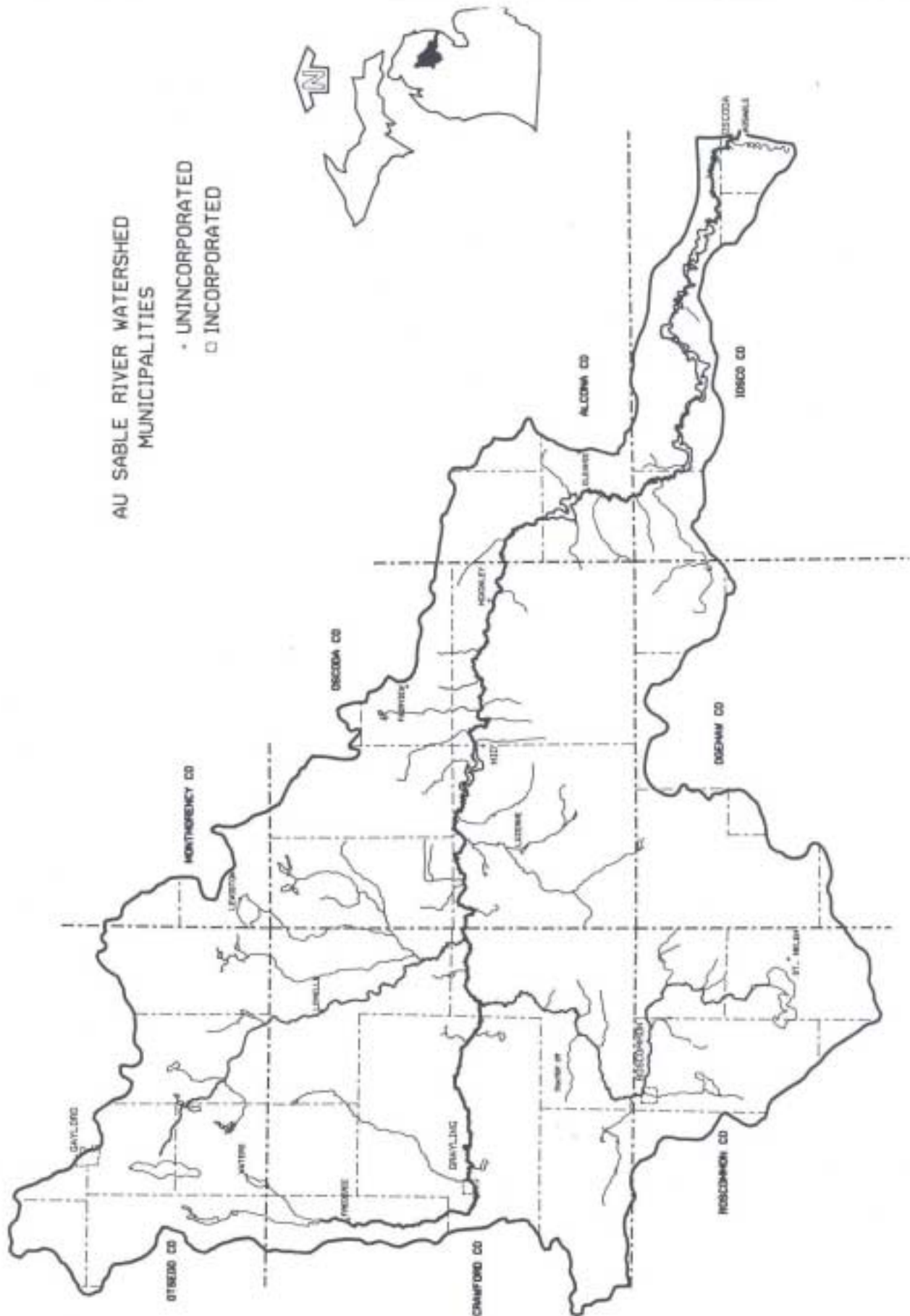
C. Area Government

The watershed is located within parts of the following eight counties: Otsego, Crawford, Roscommon, Montmorency, Oscoda, Ogemaw, Iosco and Alcona. The area includes some 30 administrative townships. The incorporated cities of Grayling and Roscommon are within the watershed, as are numerous unincorporated villages, including Mio, the seat of Oscoda County, and Oscoda. Gaylord, a major community, sits at the headwaters of both the Sturgeon and Au Sable rivers. Drainage to the south out of Gaylord makes its way to Lake Huron through the Au Sable River system.

D. Stream Characteristics

The Au Sable River drains an area of 1,932 square miles and drops approximately 650 feet from its point-of-origin. The average discharge at the Mio Dam from a drainage area of 1,100 square miles equals 990 cubic feet per second (cfs). On a direct drainage area ratio, the average discharge at the mouth is estimated to be 1,600 cfs.

There are approximately 476 miles of streams in the Au Sable River system. The mainstream is about 129 miles long and includes 37 miles of impoundments. The table on page 6 is a list of streams within the watershed (a few small unnamed streams are not included). Lengths are shown in miles.



AU SABLE RIVER WATERSHED
MUNICIPALITIES

- UNINCORPORATED
- INCORPORATED

AU SABLE RIVER SYSTEM

	Miles
Au Sable River (Mainstream)	129
Bradford Creek	5
Kolka Creek	8
East Branch Au Sable	17
Barker Creek	3
Wakely Creek	2
South Branch Au Sable	37
Sauger Creek	2
Douglas Creek	3
Thayer Creek	5
Hickey Creek	4
Beaver Creek	10
Robinson Creek	5
Hudson Creek	6
East Creek	5
South Creek	2
Connors Creek	2
North Branch Au Sable	36
Turtle Creek	4
Chub Creek	5
Big Creek	1
West Branch Big Creek	18
Middle Branch Big Creek	9
East Branch Creek	14
Wright Creek	7
Whitewater Creek	2
Sohn Creek	4
Beaver Creek	5
Big Creek	4
Red Creek	2
West Branch Big Creek	14
Hunt Creek	3
East Branch Big Creek	11
Lost Creek	8
Honeywell Creek	6
Wolf Creek	3
Cherry Creek	7
Loud Creek	2
Perry Creek	9
Couchy Creek	2
Comins Creek	4
Glennie Creek	3
Nine Mile Creek	3
Blockhouse Creek	6
Wilbur Creek	5
Bamfield Creek	5
Smith Creek	5
Stewart Creek	4
Hoppy Creek	3
South Branch Creek	7
Harper Creek	4
Baker Creek	3
Wildcat Creek	2
TOTAL	476 Miles

There are six existing hydro-electric power plants in the Au Sable River basin, with a total installed capacity of 41,000 kilowatts and an average annual energy output of 139,000 megawatt hours (MWH). All the power plants are operated by an investor owned utility company - Consumers Energy Company of Jackson, Michigan. The six reservoirs were constructed during the period of 1911 through 1924.

1. Mainstream

a. Source to Mio

The Au Sable River mainstream originates at the junction of Kolka and Bradford creeks, approximately 2 1/2 miles north of the town of Frederick in northwestern Crawford County. The mainstream above Grayling has a narrow winding channel with occasional beaver dams and debris clogged passages. Although safely floatable from Cameron Road Bridge, it is arduous canoeing and not popular. Shallow water and partly submerged debris also discourages canoe use. The stream gradient averages 4.0 feet per mile. The stream gauging station at Grayling indicates an average discharge of 73.5 cfs -- or approximately four percent of the total discharge at Oscoda.



LEFT - MAINSTREAM NEAR
BURTON'S LANDING
BELOW - MAINSTREAM NORTH
OF GRAYLING



Discharge increases rapidly between Grayling and Mio. Stream flow measurements in July 1972 indicate: a discharge of 76 cfs at Grayling; 141 cfs at I-75; 230 cfs at Stephan's Bridge; 511 cfs at Beaver Bend; and 862 cfs at Mio. The increase reflects East, North, and South Branch inflow as well as groundwater flow. Current speed below Grayling varies from 2 to 4 mph depending on depth, bottom conditions, and gradient. The gradient is 4.71 feet per mile below Grayling.

The river follows an occasionally narrow, sinuous course before straightening at McMaster's Bridge. It has sufficient depth for canoeing at all seasons, but heavy ice may be encountered above this area during severe winters. There are many short sections of fast riffle current, sharp turns, and occasional sweepers and down debris which constitute challenging and relatively safe floating for the novice and beginner canoeists.





AU SABLE RIVER NEARSTOWN
 ABOVE - BURTON'S LANDING
 RIGHT - WICKELT BRIDGE AREA



b. Mio to Alcona

This 23 mile segment was the only portion of the Au Sable River system designated by the U.S. Congress as a component of the Federal Wild and Scenic River system.

From Mio to Alcona Pond, the river has occasional large curves and many short relatively straight stretches. The river is wide, flows at a moderate speed, and has sufficient depth for safe, pleasant canoeing by beginner-novice level canoeists. It is free of all debris and sweepers but may be iced over below McKinley during severely cold winters. There are occasional short stretches of riffle.

Current velocity may average 2 to 4 mph depending on channel configuration and discharge increases from 982 cfs (average-1966) at Mio to 1,350 cfs (average 1909-1914) at Alcona. The increase is attributable to inflow from Cherry, Perry, Comins, Wolfe and Loud creeks, plus groundwater sources.

Although the Mio Dam is still used by Consumers Energy Company for power generation, an agreement between the DNR and Consumers Energy in 1966 set Mio Dam discharge equal to pond inflow. Therefore, river discharge above and below the pond are equal and power generation should not affect the lower river flow rates.

c. Alcona to Mouth at Oscoda

Below Alcona Dam, the Au Sable flows through many large gradual curves with few straight stretches over 1/4 mile long. It is a large river at this point and has sufficient depth and width for easy canoeing. However, during power generation discharge at Alcona, the water level may rise up to four feet and create somewhat hazardous conditions for inexperienced canoeists. Although this section is relatively free of debris, the current becomes quite strong forming deep eddies and some turbulence.



AU SABLE RIVER UPSTREAM OF MIO

The power generating schedule at Alcona and Foote dams, being dependent on waterflow, season, and power demand, is somewhat unpredictable. Therefore, water levels are also unpredictable. They maintain a partial flow of 14 cfs or 30 percent of full throttle 24 hours per day to provide water for the river below. This flow rate is something less than the inflow into the reservoir above. Twice per day at approximately 10:00 AM and 3:00 PM, the discharge is increased considerably to meet power demands and may run until noon and 9:00 PM respectively.

Average discharge at Alcona between 1909 and 1913 was 1,444 cfs without the influence of Alcona Reservoir. Discharge extremes during that same period were 4,800 cfs and 850 cfs. Discharge can be expected to range from 1,480 cfs to 3,650 cfs.



LEFT - LOW DAM BACKWATERS

BELOW - CANOE MEMORIAL NEAR THE
LINSERMAN'S MONUMENT





SOUTH BRANCH AT NEAD'S LANDING

Conditions similar to those below Alcona also prevail below Foote Dam. However, the lower river has considerable amounts of sunken and partly submerged debris which is largely covered during high water.

Average annual discharge at Oscoda in 1966 was 1,937 cfs. Discharge at Foote Dam during power generation ranges from 1,480 to 3,650 cfs.

2. South Branch

The South Branch above Roscommon follows a slow sinuous course through lowlands. The channel is narrow and frequently choked with downed trees, debris, and overhanging shoreline vegetation. Although safe, it is arduous, slow and unattractive to most canoeists.

Below Roscommon, the river has adequate depth and width to provide safe, pleasant canoeing experiences. It has many gentle bends, several narrow channels and many short interesting stretches of riffle. It is relatively free of debris that would hinder canoeing, but may have several shallow stretches with exposed rock during very dry seasons.

August 1972, stream discharge at Chase Bridge, six miles below Roscommon was 91 cfs; Smith Bridge 136 cfs, Oxbow 178 cfs, and at the mouth, 133 cfs. The lower river below Oxbow actually loses flow from infiltration and evaporation. An average annual discharge at Smith Bridge and the mouth would be 229 cfs and 252 cfs respectively. The stream gradient from Roscommon to the mouth is 4.4 feet per mile.

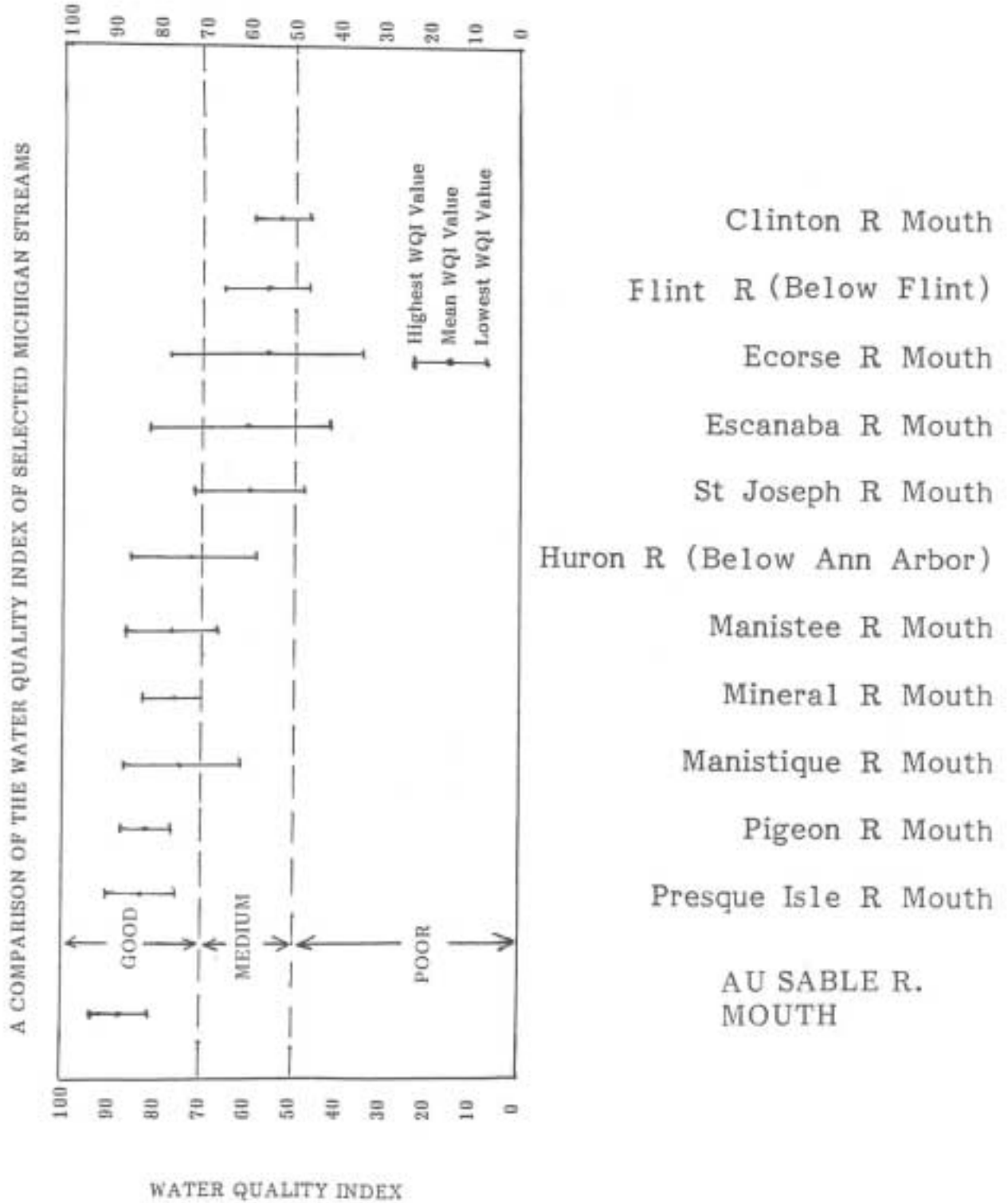
3. North Branch

The North Branch above Lovells progresses from a slow, narrow meandering stream, clogged with shoreline vegetation, to a much wider shallow river at Lovells. The vegetation, debris and shallow water make this section very difficult to navigate with a canoe. Below Lovells, the first 1/2 mile may be shallow and difficult during normal seasons but can be floated safely. The lower river has adequate depth and width for canoe use.

Streamflow measurements taken in July 1971, indicate discharges of 16 cfs at Old State Road; 79 cfs at the Ford; 125 CFAs at Blackhole; 161 cfs at Lovells; 204 cfs at Kellogg; and 344 cfs at the mouth. Stream gradient from Dam #2 to the mouth is 8.7 feet per mile.



FIGURE 1



E. Water Quality

Highly stable water flows of very high quality water may be the single most significant trait of the Au Sable River. The coarse sand-gravel composition of the watershed allows rapid infiltration of water and tends to level precipitation into a steady groundwater contribution to stream flow. Water flows vary insignificantly throughout the season because most inflow is from groundwater sources. This spring seepage is also an important factor to help maintain lower stream temperature during the summer months. However, river flow rates may respond to very rapid snowmelts and some sections will experience increases in water level and turbidity. High or dangerous water conditions are rare.

The greatest river discharge occurs during April following snowmelt with an average discharge at Mio from 1961 to 1965 of 1286 cfs. The average discharge drops to 1,163 cfs in May; 864 in June and 746 in July as compared to annual average of 990 cfs.

In addition to a stable flow, the water quality of the Au Sable River system is very high when compared to other rivers in the state. Using the standardized Water Quality Index, the Au Sable River at its mouth is shown to average 85.9. Water quality index consists of averaging numerical values from chemical, physical and biological parameters collected from monitoring stations on the river. Parameters used in establishing the WQI are: dissolved oxygen (D.O.), Fecal Coliforms, PH, Biochemical oxygen demand (BOD5), NO₃-N (nitrogen), PO₄-P (phosphates, temperature, turbidity and dissolved solids. Figure I shows this average compares very favorably with other rivers in Michigan.

Water quality of the Au Sable river system is protected for the following uses: (a) total body contact recreation; (b) agriculture; (c) industrial water supply; (d) navigation; and (e) public water supply. Most of the mainstream and tributaries, at least above Loud Dam are classed as cold water trout streams. Any designated stretches of the river system will governed by the "nondegradation" rule of the Water Resources Commission's water quality standards.

F. Physiography

The topography of the Au Sable river basin is rolling to flat. Maximum elevation above sea level is approximately 1,447 feet in the extreme western portion and the minimum elevation is approximately 600 feet on the extreme eastern end. The river basin has an approximate fall of 669 feet. The western half of the river basin is generally flat to slightly rolling and the eastern half is flat--broken only by stream channels.

Low swamps and marshes are common throughout the western half of the river basin--particularly in the river headwaters and margins. The eastern half is comparatively well drained and has relatively few lowland areas.

The Au Sable's outstanding scenery is presented in dramatic fashion by constantly changing topography. Each landform situation offers an attractive and varying display of geologic and vegetative conditions. High bluffs, lowland swamps, gentle slopes, river banks, upland plateaus and marshland often fluctuate over relatively short distances and provide background for the river's outstanding scenic resources.

The watershed, like all others in the State of Michigan, shows the effects of glacial action. It lies in an area once covered by the Michigan Lake of the Pleistocene glacier and is characterized by glacial moraines and outwash plains. The basin is underlain by glacial drift up to several hundred feet deep with no outcroppings of bedrock material.

The morainal areas are hilly with bold detached ridges. Outwash areas are relatively flat undulating plains except where cut by stream channels. The ancient lake bed area west of Oscoda is extremely flat and was covered during ancient glacial periods by the waters of Lake Huron.

There are excellent examples of the effects of the ice, water, and wind on the landscape. Kettle lakes, oxbow lakes, eskers, drumlins, kames, terraces, sandblows, and deltas can be observed in the watershed.

G. Soils

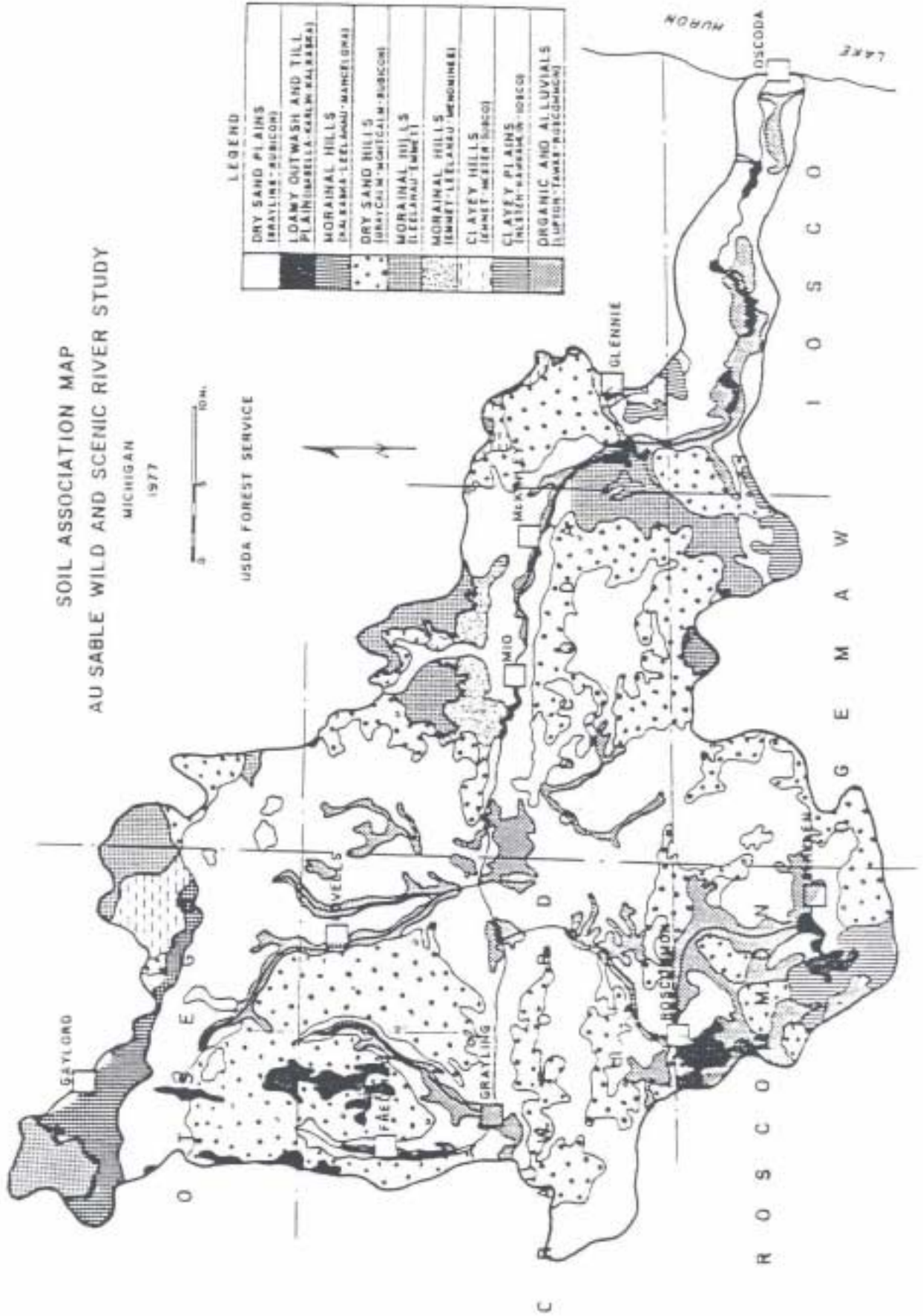
The soils of the Au Sable River are situated on three main levels--the flood plains, at the terrace level, and the outwash plain. The outwash plain was deposited as the glaciers started to recede. As the glaciers receded further and the amount of water increased, the Au Sable began to downcut through its own outwash plain, thus producing the terrace level and the present level of the river.

The outwash plain is primarily a deep medium sand soil with very little organic soil development. Because of its sandy nature, water percolates through it rapidly, thus causing a water scarcity for plant life. The principle vegetation is jack pine and oak. There are some areas that have more nutrient and moisture status that support quaking aspen, red pine, and higher site oak and jack pine.

On the terrace level, gravel predominates most of the soils. This gravel is found, in many cases, throughout the soil profile, ranging from 5 to 30 percent of the soil material; often it starts at 18 to 24 inches and continues throughout the profile. The texture of the layer above the gravel is sand, resembling the weakly developed soil of the outwash plain. The vegetation of this soil is jack pine and oak. Along this terrace there are many areas of well-drained, heavy textured soils and more strongly

developed sands that support quaking aspen, white pine, and more productive red pine.

The soils in the flood plain are mostly poorly drained organics. The organic layer varies from about 6 inches to 5 feet deep. The mineral layers below are usually sand with a few having sands of finer textured materials just below the organic layer. White and black spruce, balsam fir, northern white cedar, and tag alder occur on these soils. In draws and potholes on the terrace, similar soils also occur with lowland hardwoods such as elm, ash, and paper birch. Between the flood plain and terrace, there is often a transition zone containing the moderately well-drained and somewhat poorly drained soils which are sand or heavy textured. Quaking aspen, paper birch, and balsam fir dominate on these areas.



AU SABLE RIVER WATERSHED SOIL ASSOCIATIONS AND USE LIMITATIONS

DEGREE OF LIMITATIONS FOR SELECTED USES

NAME	DONNANT RESIDENTIAL WITH- SLOPE OUT PUBLIC SEWER	COTTAGES & UTIL. BLDGS.	CAMP SITES & FACTORS LIMITING USE	PERCENT OF WATERSHED	PATHS & STREETS & TRAILS HIGHWAYS
GRAYLING-RUBICON ASSOC. SANDY SOILS OF JACK PINE PLAINS	1-3% SLIGHT	SLIGHT	MODERATE BLOWING SOIL	44	MODERATE SLIGHT
ISABELLA-KARLIN KALKASKA ASSOC. SANDY & LOAMY SOILS OF THE HND PLAINS	1-3% SLIGHT	SLIGHT	BLOWING SOIL	2	SLIGHT SLIGHT
KALKASKA-LEELANAU-MANCFLOWA ASSOC. DEEP SANDY & GRAVELLY SOILS OF HND PLAINS	1-3% SLIGHT	SLIGHT	BLOWING SOIL	3	SLIGHT SLIGHT
GRAYCALM-MONTCALM RUBICON ASSOC. GENTLY ROLLING TO HILLY SANDY UPLANDS	8-15% MODERATE TO SEVERE	MODERATE TO SEVERE	SLOPE, BLOWING SOIL	27	SLIGHT TO MODERATE MODERATE
LEELANAU-EMMETT ASSOC. LOAMY SANDY SOILS ON THE ROLLING TO HILLY UPLANDS	8-15% MODERATE TO SEVERE	MODERATE TO SEVERE	SLOPE, BLOWING SOIL, SMALL STONES	7	SLIGHT TO MODERATE MODERATE
EMMETT-LEELANAU MEMMINEZ SANDY AND LOAMY SOILS ON THE UNDULATING TO ROLLING UPLANDS	3-8% SLIGHT	SLIGHT	SLOPE, BLOWING SOIL, SMALL STONES, SLOW PERCOLATION	3	SLIGHT SLIGHT
EMMETT-NESTER-IOSCO ASSOC. WELL DRAINED TO SOMEWHAT POORLY DRAINED SANDY & LOAMY SOILS OF THE UNDULATING TILL PLAINS	3-8% MODERATE TO SEVERE	MODERATE TO SEVERE	SMALL STONES, SLOW PERCOLATION SHRINK- SWELL, FROST ACTION, LOW STRENGTH	2	SLIGHT TO MODERATE MODERATE
NESTER-KAWKAWLIN-IOSCO ASSOC. WELL DRAINED TO SOMEWHAT POORLY DRAINED HEAVY LOAMY SOILS OF THE UNDULATING TILL PLAINS	3-8% SEVERE	MODERATE TO SEVERE	WET, SLOW PERCOLA- TION, SHRINK- SWELL, FROST AC- TION, LOW STRENGTH	2	SLIGHT TO MODERATE MODERATE TO SEVERE
LUPTON-TANAS-ROSCOWNON, ORGANIC SOILS & WET SANDY SOILS OF THE MARSHLANDS & THE SWAMPS	0-2% VERY SEVERE	VERY SEVERE	WET, FLOODS, LOW STRENGTH, EXCESS HUMUS	9	VERY SEVERE

The heavier textured soils that are better drained that might be used for farming occur only in small areas, and on steep slopes not conducive to farming. There is some evidence of small gravel pits, but apparently none have been commercially developed.

H. Vegetation

Vegetation is the primary contribution toward providing and protecting the Au Sable's outstanding values. The river's high scenic quality results from constantly changing vegetative types and conditions--all remaining in a relatively natural condition and in apparent harmony with other natural elements. Vegetation shades the water thereby helping maintain low water temperatures. Vegetation softens incongruities and provides habitat and food for wildlife. Soils are stabilized and developed by vegetation. The great diversity of trees, shrubs, ferns, small flowering plants, lichens, mosses and mushrooms offer an interesting variety of form, color and texture--often changing with each season.

MAINSTREAM IN THE
PARKLEY BRIDGE AREA



MAINSTREAM ABOVE GRAYLING

Vegetation along the Au Sable River is generally typical of east central Michigan. However, two features combine to produce distinctive local plant communities within the river zone. First on the stream terraces, water from the river and local aquifers permit a greater variety of growth than that found on the surrounding plains. There is also a preponderance of silty and organic soils found on the river terraces with their associated different vegetative types. Secondly, the river winds through a variety of landforms and soil types--each having its own distinct vegetative cover.

This vegetative description is not all encompassing, but describes dominant plants in either the superstory or substory for the various landforms.

Over 80 percent of the watershed is forested. Major vegetative types include aspen, jack pine, red pine, oak, maple, beech, birch, and pine plantations. Lowland conifers include white cedar, balsam fir, tamarack and spruce. Original cover on the better-drained sites was predominantly red and white pine and northern hardwoods which were virtually eliminated during the early logging era. Nearly all stands are now in second or third growth cover.

Vegetative types are predictable and ecologically diverse, depending on topographic situations, particularly in the river zone.

The well-drained sites support stands of northern hardwood, aspen or red, jack, and white pine. They often cover extensive upland areas, are productive and generally even-aged. They provide good summer range for wildlife and support many varied forms of ground vegetation.

Lowland areas have higher water tables and poor drainage. Lowland conifers, hardwoods and shrubs dominate these sites. These lowland areas tend to be less extensive, are spotty, follow stream courses and are densely vegetated. They tend to be excellent deer winter range and have rich variety of ground vegetation.

I. Climate

The Au Sable River basin offers a climate typical of the state's "north country". The warm days and cool nights offer a pleasant haven for vacationers. The winters provide an excellent climate for skiers, snowmobiling, and other winter sports.

Weather data for the Au Sable basin indicates a record high of 112 degrees F with the record low of -47 degrees F, both recorded at Mio. A temperature of 100 is reached on an average of once in 10 years. At the other extreme, one can expect temperatures to fall below zero an average of 25 days per year. The average yearly temperature for the basin is 43.1 degrees F.

Precipitation is heaviest during the summer season averaging 63 percent of the annual total during the six month period, April through September. Heaviest rainfall for the basin is in September which shows an average of 3.38 inches. Lowest rainfall occurs in February with an average of 1.30 inches. Annual precipitation averages 28.30 for the 24 years of record.

Summer skies tend to be generally free of cloud cover and westerly breezes are nearly constant. Winter skies are generally cloud covered and windy.

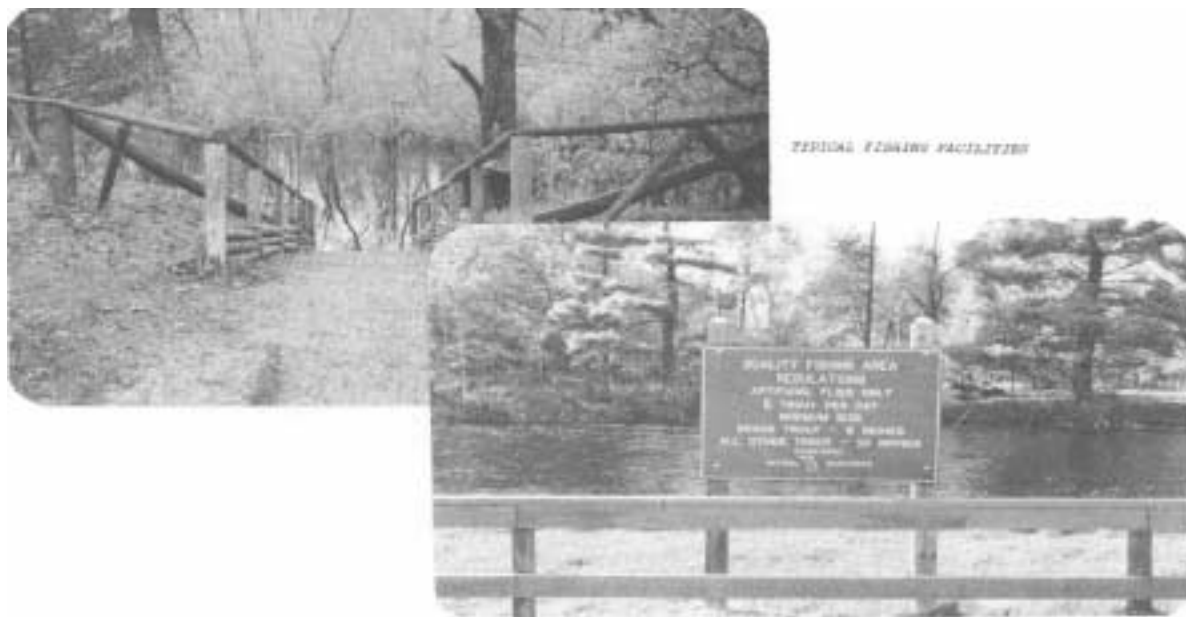
J. Fisheries

Au Sable River Mainstream

Michigan's Au Sable River probably is the best brown trout water in the Great Lakes region, and it may be the best east of the Rockies. The flies-only section of the river, sometimes called the "Holy Water", is ideal fly water, with good insect hatches and excellent trout populations--all stream bred. Most of it is shallow enough for easy wading, has a firm gravel bottom, and is wide enough that you can cast a fly without hanging up on streamside vegetation. The velocity of flow is only moderate, so you can wade upstream or down, depending on your energy and inclination.

From Grayling to Burton's Landing, about 6 river miles, much of the river bottom is sand, and some parts are too deep to wade. Trout populations are low in this part of the river, and fishing pressure is light most of the season. However, during the so-called caddis hatch (Hexagenia limbata), some very large trout are caught in this section.

The "Holy Water" section of the river begins at Burton's Lansing and continues downstream about 8 river miles to Wakeley Bridge. In this section, the river gradient is steeper, the flow a little faster, and trout populations much greater than in the upstream reaches. This section is fished more than any other part of the river. Nevertheless, it continues to yield excellent fishing, year after year.



From Wakeley Bridge downstream to McMasters Bridge is a nine-mile stretch of extremely variable character. It begins with fast water and gravel and clay bottom, then flows slowly through the "Stillwater" where the bottom is mostly sand and banks are low. The South Branch enters the Au Sable in the upper part of the Stillwater. Below the Stillwater the river picks up speed again and flows in gravel riffles to McMasters Bridge. Fishing from boats is popular in this part of the river between Wakeley and McMasters Bridge because much of it cannot be safely waded. Fishing pressure generally is relatively light.

Below McMasters Bridge, the Au Sable takes on a "big river" character, flowing alternately in deep sandy pools and shallow gravel riffles. Although some of the riffles can be waded, most of the fishing here is done by boat.



Canoe traffic on the Au Sable is heavy, especially on weekends, but the fisherman who is on the river early in the morning or late in the evening usually will see few canoes. He will also see relatively few other fishermen. Canoe traffic drops off at every takeout point below Grayling. Less than half the canoes leaving the liveries in Grayling continue beyond the takeout point at Stephan Bridge. The few who continue beyond Wakeley Bridge are mostly campers--Boy Scouts and Girl Scouts and other similar groups.

Although best known as a brown trout stream, the Au Sable also supports a substantial population of brook trout. They are especially eager to take a fly but are mostly small fish. An occasional rainbow is caught, and recent surveys show these are on the increase, particularly in the Stephan Bridge area.

The Au Sable was not always a trout stream. Before about 1890, grayling were the sport fish of the Au Sable system. Early lumbermen called the grayling "white trout" or "Crawford County trout", but in 1874 the fish were identified as grayling. Local residents then changed the name of their town from Crawford to Grayling. The first brook trout to enter the Au

Sable system reportedly were taken from the Jordan River and planted in the East Branch of the Au Sable by Rube Babbit in the 1880's. Rainbow trout had been planted somewhat earlier and browns came shortly after. Grayling became scarce soon after the trout appeared, but few of the old-time residents blame the trout for this. Apparently the grayling was less tolerant to changing conditions than the trout, and it is doubtful if the grayling could have survived even if trout had not entered the river. The last grayling reported caught in the Au Sable mainstream was taken by Dan Stephan in 1908 about three miles above McMasters Bridge.

Recently, however, grayling have been reintroduced by the Department. In April 1987, 40,000 seven-inch fish were released into the mainstream near Mio. If successful, the grayling may be caught and kept within 1-2 years.

The Au Sable is excellent trout habitat because it is relatively steady in flow, has generally cool summer water temperatures, and, in most of the upper river, ample clean gravel spawning beds. About 85 percent of the flow of the upper Au Sable is from groundwater discharge, so the stream is not subject to large changes in stage or velocity. In an average year it is only about one foot higher at high water than at normal low flow. Unusually great snow melt or heavy rains can bring this up a bit, but the Au Sable is generally a remarkably steady stream. As pointed out earlier, however, a rise of even six inches can make wading much more difficult.

The groundwater inflow also helps to keep the Au Sable cool in summer. Water temperatures sometimes go higher than 75 degrees F in the sandy area below Grayling, but the water rarely gets that warm in the flies-only section. Brook trout, the least tolerant of warm water, seem to thrive in this section of the river.

There are excellent hatches of almost all Michigan flies on the Au Sable. Hatches are especially good on the flies-only section, except for the drake and Hexagenia hatches. These hatches are better in the sand and silt sections of the river, both above and below the flies-only water.

For the fisherman who wants to fish the lower unswadable waters, there are expert guides with Au Sable riverboats at your service. The Au Sable riverboat was designed expressly for trout fishermen on the Au Sable, but it is now used on many Michigan streams. You can cover a lot of water in a day's fishing in one of these. Float fishing is especially helpful to those fishermen whose physical condition no longer permits them to wade the stream.

South Branch - Au Sable River

The South Branch of the Au Sable is the favorite of many anglers who are especially interested in catching big browns. It is not always an easy river to fish, however. In the early season, and after heavy rains at any season,

the river flows fast, high, and murky, and the rounded cobbles and boulders are slippery.

The flow of the South Branch is much more variable than that of either the mainstream or the North Branch. Consequently, wading and fishing conditions change greatly from day to day. The reach you waded with ease one day may be totally unwadable another, and the cover that harbored some huge trout on one day may be left high and dry after a long drought. The water is clear at normal low flows but becomes so cloudy after heavy rains that you may not be able to see the deep holes that will overtop your waders.

Trout populations generally are lower on the South Branch than on the mainstream or North Branch (Gowing and Alexander 1980), but fishermen who know the river do well on the South Branch. Fishing pressure is heavy on the South Branch during the drake hatch and even heavier during the Hexagenia hatch. A survey by Gaylord Alexander (1974) showed that evening fishing in the Mason Tract of the South Branch increased from about 75 angler hours per day in the first week of June to about 375 angler hours per day in the fourth week of that month. In the first week in July fishing had dropped to about 270 angler hours per day. Before and after these hatches of the large mayflies, fishing pressure is light to moderate. In general, the farther you walk from the access roads, the better your chances of fishing alone on the river. But you also run a better chance of getting lost going to and from these remote spots.

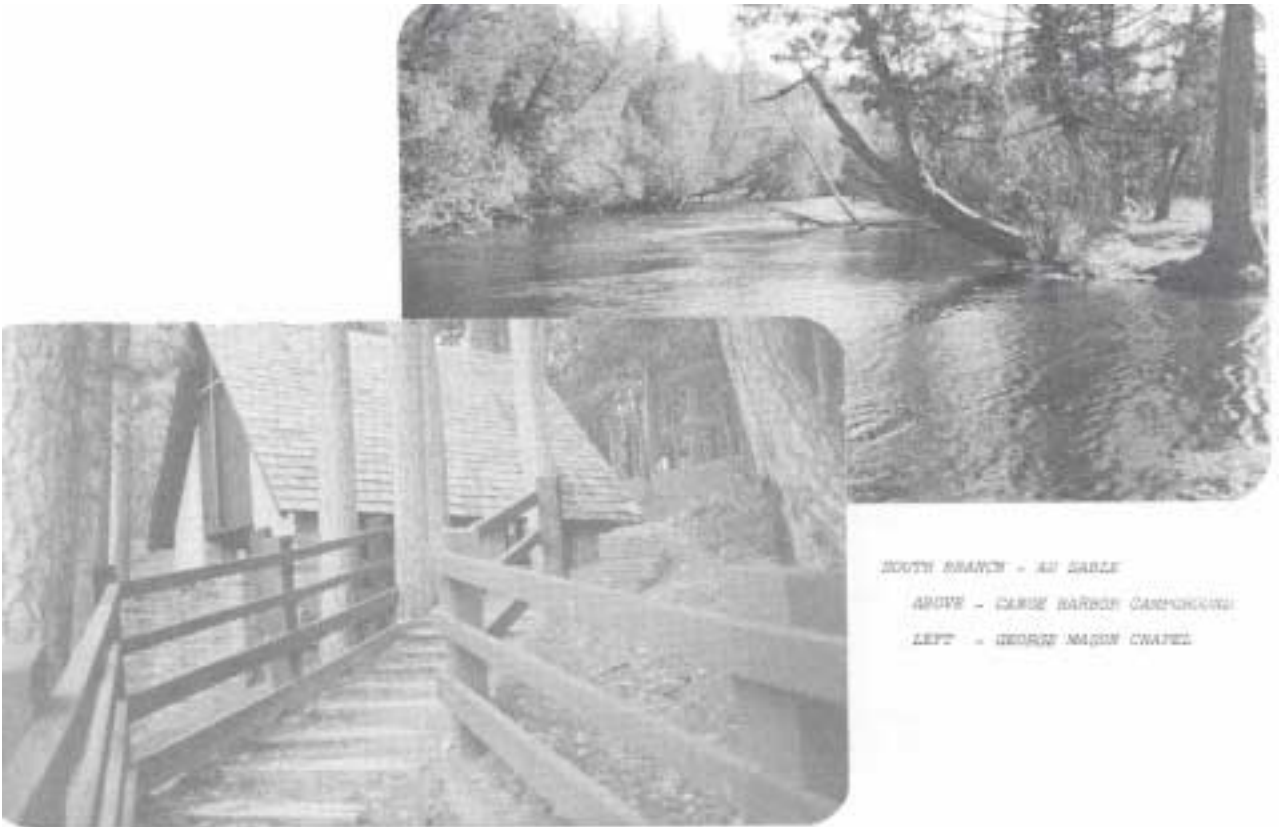
From its source in Lake St. Helen to Roscommon, the South Branch is too warm to support a good trout fishery, and it does not become a really first class troutwater until it reaches Chase Bridge, about six river miles below this city. From Chase Bridge all the way down to Smith Bridge, about 12 river miles, the South Branch is classic fly water.

This stretch of river, called the Mason Tract after the donor, George Mason, has an interesting history. According to Mrs. Margaret Jenson (1982), most of the Mason Tract was formerly a club property owned by a Mr. Downey and several others. When the club broke up, Mr. Downey purchased all the forties fronting the river. Mr. Downey died in 1921, and several years later his widow sold the property to her nephew, Mr. Durant, who built the ill-fated "castle" on the South Branch below Chase Bridge. Mr. Durant's widow in turn, sold the land to George Mason and D. B. Lee, and D. B. Lee's widow sold Lee's share to Mr. Mason.

In accordance with Mr. Mason's wishes, this tract, now state property, remains free of all development except for a simple log chapel and one campground. The river is 50 to 100 feet wide here and mostly two to four feet deep at mid-channel, with many holes over your wader tops and few over your head, even at low water. The streambed is mostly gravel, with sand and muck along the banks and in some of the deeper holes. There are large boulders in places and some patches of hard, slippery clay.

From Smith Bridge to the mouth, about five river miles, the riverbanks on both sides are mostly private property, and there is no improved public access to this part of the river. You can put in at Smith Bridge, float down to the mouth, and then continue on down the mainstream to Connors Flat Public Access Site or Rainbow Bend Campground. Much of this lower river is too deep to wade, and some of the holes are over your head. As you approach the Stillwater section of the mainstream, the South Branch flows more slowly and the bottom is more sandy.

Bait and spin fishing is permitted above Chase Bridge, but from Chase Bridge all the way to the mouth, about 17 river miles, the South Branch is designated quality fishing water limited to fly-fishing. In addition, the four river miles from Chase Bridge downstream to the Lower Highbanks are designated no-kill water. All fish caught here must be returned to the river.



SOUTH BRANCH - LU SABLE

ABOVE - CARSE BARBER CAMPGROUND

LEFT - GEORGE MASON CWAPEL

As a canoe trail, the South Branch is almost as popular as the mainstream. Liveries at Roscommon supply rental canoes and put-in and take-out service. The fisherman may find the canoes interrupt his fishing at midday, but there will be a few canoes on the river in the very early morning or late evening. Not much fishing is done from boats on the South Branch, but this is one way you can fish the more remote spots without fear of getting lost.

From Roscommon downstream to the mouth, the South Branch has enough groundwater inflow to keep the summer temperatures cool enough for trout. Like all streams in this part of Michigan, the water is hard and high in calcium and magnesium, and slightly alkaline. The supply of nutrients is adequate to support the species on which the trout feed.

The gravel bottom that predominates at mid-channel provides ample spawning beds, and the sand and muck along the banks and in the deeper holes give rise to excellent drake and Hexagenia hatches.

North Branch - Au Sable River

Although not so famous as the Au Sable mainstream, the North Branch is a top-quality stream for brook and brown trout. It is not so heavily fished as the mainstream and has practically no canoe traffic, so you have a better chance of fishing alone here. Much of the river frontage north of Lovells is state land, and there is ample public access here. Downstream (south) from Lovells there is relatively little public land, and access is limited.

The North Branch begins as an overflow from Otsego Lake in southern Otsego County and flows generally southeastward to the north Crawford County line. Here it turns out the village of Lovells, thence south and southeast to enter the mainstream about a mile below McMasters Bridge. Because it drains several lakes in the headwaters, the upper North Branch is too warm in summer for ideal trout water, but inflow of groundwater cools the stream so that it supports a good population of trout before it turns south into Crawford County.

From the north line of Crawford County all the way to the junction with the mainstream, the North Branch provides good fishing, but that part of the river upstream from Lovells (about five river miles) is the favorite of many anglers. The flies-only water of the North Branch begins at the Sheep Ranch Public Access Site above Twin Bridge and continues downstream about 21 river miles to the mouth. Much of the river in Otsego County and all the river in Crawford County is wide enough for fly-casting, but some parts are too deep to wade. The North Branch in the Lovells area has been dubbed "old man's fishing", because it is mostly only knee deep and

easy wading, but there are holes both upstream and down that will overtop your waders.

The width of the North Branch is much more variable than that of the mainstream or South Branch. From its confluence with Chub Creek in southern Otsego County all the way to the mouth, it varies in width from about 40 to more than 150 feet. The changes in width can be quite abrupt and should be a warning to wading fishermen. When the stream narrows the depth or velocity, or both, must increase, and wading will be more difficult, and, in places, impossible.

The National Guard Artillery Range borders the upper North Branch on the south in Otsego County and on the west in Crawford County. For obvious reasons, fishermen should avoid crossing over into the military reservation.

The North Branch can be canoed from the Pipe Springs Public Access Site near the north Crawford County line all the way to the mouth, but not many canoeists care to make the trip. There are logjams and in-stream structures to avoid, and gravel riffles and sandy shoals to pull through at low water.

The North Branch was considered even better than the mainstream for brook trout in the late 1800s, according to William B. Mershon (1923). The railroad had been extended from Grayling through Lovells, and this little village became famous as a center for trout fishermen. The North Branch is still a top-notch brookie stream today, although the catches are nothing like those of the old days. There are fewer browns than brookies in the upper North Branch, but the browns run to larger size.

The summer water temperatures on the upper North Branch occasionally go as high as 80 degrees F, higher than on the flies-only section of the mainstream and much higher than the optimum for brook trout. It is probable that the trout protect themselves from the high temperatures by seeking out the colder areas where large amounts of groundwater enter the stream. Large schools of brook trout also can be seen in springs areas in late summer.

The flow of the North Branch is remarkably stable, somewhat more stable than the mainstream and much more stable than the South Branch. Wading conditions do not change as drastically on the North Branch as on the South Branch, but caution is still advised when wading the deeper reaches. Because of the warmer water, fly hatches may occur earlier on the North Branch than on the mainstream or South Branch.



THE NORTH BRANCH ABOVE LOVELLS

Impounded areas of the Au Sable provide habitat for typical warm water species. Bass, crappie, and perch are found in these reservoirs. Northern pike and walleye are especially popular with anglers, with some excellent catches coming out of these backwater areas.

East Branch and other Tributaries

While not as large, or as well known, or as easy to fish as the Mainstream, South Branch or North Branch, other streams in the Au Sable River system do provide opportunities for the adventuresome angler. Of particular note are the East Branch, and the two Big Creek systems. Brook and brown trout are available in the streams, and the lakes in the system.

NOTE: Fisheries' descriptions of the Mainstream, South Branch and North Branch by Gerth E. Hendrickson in The Angler's Guide to Ten Classic Trout Streams in Michigan, the University of Michigan Press, 1985. Reprinted by permission of the University of Michigan Press.

K. Wildlife

Terrestrial Wildlife

The watershed contains an interesting variety of wildlife. Hunting for both large and small game and waterfowl are popular recreational activities, as are such nonconsumptive uses of wildlife as photography and observation. Most participants in these activities come from the southern metropolitan areas. Trapping of furbearers is popular with local residents.

In the big game category, white-tailed deer are the most important species. Deer benefited from plant succession following the logging and wildlife era in the late 1800's and early 1900's. Carrying capacity of the range and then subsequent deer populations rose dramatically about 1920. Populations exceeded the carrying capacity in the 1930's, leveled off in the 1940's, declined again in the 1950's and has again leveled off. A controlled harvest has helped to balance the population with habitat conditions. River bottomlands and adjacent uplands are used by deer as winter habitat. Black bear, bobcat and coyote can also be found in the watershed, but are infrequently seen.

The river basin area contains 35 percent of the huntable population of wild turkeys in Michigan and is one of three such areas in the state. Hunting is controlled by a permit system. The birds are the result of an intensive management and stocking program by the Department of Natural Resources in cooperation with the Forest Service. The presence of these magnificent birds adds much to the wildlife attraction of the area.

The river area is used extensively by waterfowl and shore birds for nesting and brood rearing during the spring and summer.

Upland game birds found in the area are ruffed grouse, woodcock, turkey, and, in farm areas, ring-necked pheasant. Small game species include cottontail rabbit, snowshoe hare, fox and gray squirrel.

At least 70 species of nongame birds are known to nest in the watershed. In addition, many other species migrate through the area. A complete list of nesting and migrating species would number well over 100.

Fur bearers open to trapping include beaver, muskrat, mink, otter, red fox, raccoon and skunk. Fur prices have increased so that trapping has become a commercial enterprise as well as a sport.

Other Animals

Many other creatures are indigenous to the area. In and along the river, several species of nonpoisonous reptiles such as the blue racer, common water snake, hog nose snake, snapping turtles, painted turtle, and soft-shelled turtle can be found. Various frogs, toads, lizards, and salamanders are also commonly observed.

Threatened and Endangered Species

The northern bald eagle (*Haliaeetus leucocephalus*, *washingtoniensis*) is currently being considered for listing as endangered in the "Lower 48" states except in the Great Lakes states where it is listed as threatened on the federal list.



KIRTLAND'S WARBLER
(*DENDROICA KIRTLANDII*)

Currently, there are five pair of northern bald eagles actively nesting along the Au Sable River. The results of their nesting attempts has been quite variable. In recent years, there has been a marked improvement in success with four of the five raising young in 1976. The eagles along the Au Sable have been able to continue nesting with better success than in other areas of lower Michigan. The probable reason for this is that their nests are in relatively inaccessible locations that prevents both inadvertent and intentional harassment by people; and, the relatively low amounts of persistent pesticide contamination in the fish eaten by eagles from the Au Sable.

If the bald eagle is to persist as a viable part of the fauna of the Au Sable, their nesting sites must not be intruded upon the river must remain free of the pollutants that adversely affect this and other life forms.

The Kirtland's Warbler (*Dendroica kirtlandii*) has been classed as an endangered species, and its status has become increasingly perilous since 1961. Its nesting population was 200 pairs in 1976, only 40 percent of the 502 pairs counted in 1961. The Au Sable watershed is the heart of the nesting range of this species.

It is noted that the first nest to be found of this species was in 1903. This rare warbler has been found nesting in several suitable sites located in close proximity to the river. Some of the jack pine stands on suitable sites

along the river are being considered for management as critical habitat as set forth in the "Recovery Plan for the Kirtland's Warbler".

L. Geology and Minerals

The watershed, like all others in the State of Michigan, shows the effects of glacial action. It lies in an area once covered by the Michigan Lake of the Pleistocene Glacier and is characterized by glacial moraines and outwash plains. The basin is underlain by glacial drift up to several hundred feet deep with no outcroppings of bedrock material.

The morainal areas are hilly with bold detached ridges. Outwash areas are relatively flat, undulating plains except where cut by stream channels. The ancient lake bed area west of Oscoda is extremely flat and was covered during ancient glacial periods by the waters of Lake Huron.

The streamflow and water temperature characteristics are strongly influenced by the geology of the basin. Permeable sand and gravel in the outwash areas contribute relatively large amounts of groundwater discharge to the river. This groundwater maintains the flow during drought periods and cools the stream during the hot summer months. These areas also buffer sudden changes in river levels, thus reducing the probability of flash flooding.

There are excellent examples of the effects of the ice, water, and wind on the landscape. Kettle lakes, oxbow lakes, eskers, drumlins, kames, terraces, sandblows, and deltas can be observed.

Sandstones, shales, and small amounts of limestone directly underlie the unconsolidated glacial deposits. The shales, in some instances, are suitable for use in manufacturing brick and tile.

Relatively shallow oil and gas fields are scattered over much of the watershed. In addition to oil and gas, bromine, calcium, chloride, and calcium magnesium chloride are either obtained directly from wells or produced from materials derived from the wells.

The general area, including all the lands contained in the watershed, is being subjected to a great amount of oil and gas lease activity and exploration. Geophysical work has been conducted over a large portion of the area. The present exploration activity is directed toward locating and testing coral reef developments in the older limestone formations. A few tests have been successful but the exploration activities in the deeper horizons are in an early stage.

Other than sand and gravel deposits, oil and gas are considered the only mineral resources with significant value in this area.