THE WATERSHED AND THE STUDY AREA

A. General Description

1) The Watershed. The Huron River system drains an area of approximately 900 square miles as it flows through the southeast Michigan counties of Oakland, Ingham, Livingston, Washtenaw, Monroe and Wayne. The mainstream originates in Big Lake and the Huron Swamp northwest of Pontiac and flows roughly 125 miles to its mouth in the marshlands of Pt. Mouilee on Lake Erie.

2) The Study Area. The Huron River system contains approximately 367 linear miles of streams and drains. Although the mainstream is roughly 125 miles long, only the 27.5 mile stretch between Kent Lake Dam and Barton Pond will be considered in the study area at this time. Tributaries and lakes in this section are also a part of the study. This section received the greatest amount of support and concern from local governments and interested citizens, and generally offers the greatest recreational and scenic opportunities. Other sections of the river may be added in the future.

B. Physiography and Soils

The surface topography of the watershed was determined by the last continental glacial period, the Wisconsin. Above Ann Arbor and encompassing the study area, the Huron River watershed widens out from a relatively flat narrow strip into a region of rolling hills interspersed with flat areas. This “upper basin” of approximately 750 square miles

contains a dendritic pattern of tributaries, numerous pothole lakes, and a number of swampy areas.

The watershed is largely a region of end (or recessional) moraines, with associated till plains and outwash deposits. The moraines of the upper basin were formed by the ice being pushed forward while, at the same time its front was melting resulting in the build-up of deposits into ridges or moraines. This occurred during the period of its final retreat (approximately 10,000 years ago) from what we now know as Michigan. As the ice melted during its final retreat, the drainage patterns changed the Huron, which formerly drained to the Mississippi and the Gulf of Mexico, gradually altered its course to essentially its present day configuration. At the same time, outwash plains formed with the deposition of coarse sand and gravel materials from water emanating from the melting glacier. The upper basin today contains extensive permeable deposits of this type capable of retaining large amounts of water.

The Huron River originates at Big Lake, Oakland County, at an elevation of 1,018 feet above sea level and drops to an elevation of 572 feet at Lake Erie.

The majority of soils in the upper watershed above Ann Arbor are sandy loams or friable sand-clay mixtures. Soils of the Fox-Oshtemo-Plainfield association are located mostly near the river and streams in upland plains, broken by larger basin depressions and valleys containing lakes, swamp and marsh. Areas away from the river and streams become more rolling and hilly highlands and contain soils of the Bellefontaine-Hillsdale-Coloma association. An area around Ann Arbor contains soils of the Miami-Hillsdale-Conover association. The principle soil is the Miami type including both the loam, underlaid by the more friable clay, and the more silty loam, underlaid by tight low permeable clay.

The watershed below Ann Arbor narrows considerably and the river passes through a variety of soil associations. From Ann Arbor to Belleville, soils are generally clay to clay loam types of the Conover-Napance-Brookston association. These soils include the highest proportion of naturally better drained land when considering clay soils in southeast Michigan. From Belleville to New Boston, the soils consist of the Berrien-Plainfield association which are mostly dry sands in relatively thin layers over pebbly and bouldery till clay. The sands in this type are finer in texture, and more loamy and moist than those of other divisions. Soils in the lower river area are of the Macomb-Brookston-Berrien association which vary from wet, clay soils in close association with wet and dry sands.

C. Stream Characteristics

The table below summarizes the Huron River system. Lengths are shown in miles.

Stream			
Mainstream	12.50	*Mill Creek	15.0
Norton Creek	6.0	*Portage Creek	18.0
*Woodruff-Mann Creek	12.0	Fleming Creek	11.0

*Davis Creek	10.0	*Honey Creek (Washtenaw Co.)	8.0
*Ore Creek	9.0	Griggs Drain	3.0
*Spring Mill Creek	3.0	Port Creek	5.0
*Whitmore Lake Outlet	4.0	Smith Creek	8.0
*Hay Creek	5.0	Silver Creek	10.0
*Honey Creek (Livingston Co.)	10.0	Unnamed creeks and drains	83.0
*Livermore Creek	4.0		
*Arms Creek	8.0	TOTAL	367.0

*Tributaries draining into mainstream within study area.

Approximately 162 lakes ranging in size from an acre or two to 644 acres drain into the Huron River. The mainstream is dammed in 11 locations. The majority of the dams were constructed for generating electric power, however, Kent Lake Dam provides a recreational lake and two dams are water control structures to maintain lake levels in the Chair-of-Lakes and Proud Lake areas.

Water quality in the section of river under study is designated for the following uses: industrial water supply, partial body contact, recreation, warm water fish, agricultural water use, and navigation. The reach of river from Kent lake to the Village of Dexter is classified as an "effluent limitation segment"[1], while that from Dexter to Barton Road constitutes part of a "water quality segment"[2].

Water quality in the upper reach of the study area is generally good from a visibility standpoint. From Kent Lake Dam to Ore Lake, the river flows generally southwesterly except for one large meander in the vicinity of U.S. 23. Width varies, from roughly 30' to 100', and widening out to closer to 200' at Ore Lake. Water is very clear in this section, enabling one to see the bottom which is primarily sand/silt and gravel. Depth varies by season, reaching 5' to 6' in some areas and dropping to as low as ½' in others. The bottom type tends toward muck in some areas where it appears that deposition of organic material is heavy. Narrow leaf potamogetan and elodea are visible in some areas, and the incidence of both aquatic weeds and algae increases markedly as one reached Ore Lake. Turbidity also increased in this area.

[1]"Effluent limitation segment" exists where quality is meeting and will continue to meet applicable water quality standards, or where there is adequate demonstration that water quality will meet applicable water quality standards after application of effluent limitations required by the Federal Water Pollution Control Act Amendments of 1972 (FWPCAA).

[2]"Water quality segment" is any segment where it is known that water quality does not meet applicable water quality standards, and which is not expected to meet water quality even after the application of the effluent limitations required by the FWPCCA Amendments of 1972.

Currents in this reach are slow to moderate, slowing in areas where amounts of deadfall have reduced the flow rate. Several old wooden and concrete fish habitat improvement structures are visible in several areas. Three tributaries enter the river between Kent Lake Dam and Ore Lake. Woodruff-Man and Davis creeks are considered 2nd quality warm water fish habitat, while Spring Mill Creek shows evidence of containing pike spawning areas. Three additional tributaries enter the river in that portion of the Chain-of-Lakes lying in Livingston County. South Ore Creek, Horseshoe Lake Drain and Chilson-Hay Creeks are all considered 2nd quality warm water fish habitat.

Data collected by the U.S. Geological Survey over a two-year period from 1971-1973 shows generally good to high levels of dissolved oxygen in the lower reach of the study area, from Baseline Lake to Ann Arbor.

The reach from Dexter Village to Tubbs Road (and beyond the study area to Ford Lake) has been classified by the state as a water quality segment due to localized low dissolved oxygen conditions in this area. Gannon, in a short intensive survey (University of Michigan, 1971) noted that the water showed a progressive reduction in quality as it flowed from the Dexter sampling point to the Barton Impoundment. The Dexter and Loch Alpine wastewater treatment plants are the most significant point sources of pollution in this section of the river. Other principal discharges are Chrysler Corporation and Xerox University Microfilms.

Water quality reports reach unanimity on the presence of high nutrient concentrations, primarily phosphorus, in some areas. The results of over-fertilization are obvious in the algae and weed growth present in some cases. Contributing sources include: natural leaching processes from minerals, drainage from fertilized agricultural lands, septic tank/drain field systems, (especially on some lakes), and sewage treatment plant effluent. Upgrading of existing treatment plants under the Federal Water Pollution Control Act Amendments affecting local units of government and by inadequate funding of grants for planning and construction of treatment plants.

The flows due south from Portage-Baseline Lakes and then turns southeasterly in Dexter Township. Width in this area is from 40’ to 100’. Bottom type is primarily sand/silt and gravel; and depth ranges from ½’ to 8’. Water clarity is good above the Village of Dexter, but declines markedly as treatment plant effluent and Mill Creek enter the river at Dexter. The current is noticeably stronger from Portage Lake downstream and significant rapids providing a test for the canoeist are located at Hudson Mills and Delhi. Smaller rapids and some low-head rock dams are also present in this section. Several islands are located along this stretch.

A number of significant tributaries enter the river in this reach beginning with Arms Creek which is listed as 2nd quality coldwater (trout) habitat. Honey Creek (Putman Township) and Portage River are both considered warm water fish habitat. Parks Lake Creek (name uncertain, creeks flows westerly from Parks Lake and enters Huron below

Bell Road) and an unnamed tributary entering farther south, from the west, are both considered 2nd quality coldwater (trout) habitat. Mill Creek, the largest tributary to the Huron, enters at Dexter and is considered top quality warm water as is Honey Creek in Scio Township.

In the entire study area, erosion and sedimentation processes can become a major pollution problem. Sediment is most visibly noticeable at the confluence of Mill Creek with the Huron. Such sediment may carry with it nutrients, pesticides, bacteria and other contaminants. Silt is also noticeable in the river adjacent to the sand and gravel put across from the Chrysler plant. Land use changes involving earth moving, and stream bank erosion as a result of a variety of factors, also contribute sediment on an irregular basis. Programs such as the Soil Erosion and Sedimentation Control Act (Part 91,P.A. 451 of 1994) and the Natural Rivers Act should serve to mitigate sedimentation resulting from these sources.

From a long-range standpoint, the utilization of the river as a receiving body for increasing volumes of municipal and industrial waste effluents will have to be reassessed in terms of the assimilative capacity of the river and the demands for recreational uses of the river and its associated lakes and streams. Total water quality improvement will have to evaluate and deal with questions of land use and stormwater runoff as well.

The Huron River has a comparatively stable flow, due largely to the natural storage system in the upper basin. In addition to geological factors and the rapidly urbanizing pattern in the watershed, lake level control efforts have some effect on flow. It has been estimated that on the average nearly ¾ of the total precipitation falling on the basin is lost through evapo-transpiration. The generally porous soils and conditions of surface terrain, however, have been favorable to the establishment and maintenance of a large body of ground water. The Huron River has cut its channel through the most permeable of these sand and gravel deposits, and the availability of bank storage and connection with the groundwater reservoir tends to stabilize the base flow of the river during both low flow periods and high flow periods. In addition, the abundance of pothole lakes, swamp areas and a dendritic stream pattern all combine to regulate stream flow.

As one moves downstream from New Hudson there is a gradual increase in the percentage of morainic material making up the soil types, and a gradual decrease in the permeability of soils. As groundwater storage is reduced, the potential for more variable flow patterns based on precipitation and runoff increase. The following chart indicates basic flow data for the study area.

Station	Period Of Record	Drainage Area (sq. Miles)	Average Discharge (cfs)	Annual Mean Discharge (cfs) Max.	Min.	Low Flow Of Record 7-day (cfs)	Instantaneous Flows of Record (cfs) Max.	Min.	Discharge Frequency (cfs) 100 – Year
Huron River near New Hudson (150' below Kent Lake Dam)	1948-70	152	106	169	52		1,080	26	965
Huron River near Hamburg (Bridge at Hamburg Road)	1951-70	313	197	302	97		1,560	32	1,580
Huron River near Dexter (Below Bridge on N. Territorial, east of Hudson Mills)	1946-70	527	351	591	142	47	3,120	38	3,350

The Huron River has a relatively slow to moderate stream gradient dropping 445 feet in elevation from its source at Big Lake to Lake Erie. Although there are a few areas where the gradient is greater, the average drop in elevation over the 125 miles of river is just under four feet per mile.

The river system is conductive to a warm water fishery, although several tributaries are cool enough to support a second quality trout fishery. During normal summer flows, the water is relatively clear in the upper river areas. Below Dexter, the river becomes more turbid, a result of suspended silt. This is probably caused by the soils in the lower basin which tend to be heavier with clays and silt loams, and by discharge of agricultural drains into the river.

In general, the bottom above Barton Pond and through the study area, is made up of compact sediments. There is little downward cutting through this bottom, due both to its hardness and to a lack of sufficient current in the wide portions of the stream. In broad areas, deposits of silt form which give rise to luxuriant growths of aquatic vegetation. Where the current is swifter, a gravel bottom is usually exposed. Boulders are commonly found along the bottom below Portage Lake.

Island Lake Recreation Area, Livingston County

Delhi Rapids, upstream of Ann Arbor in Washtenaw County

D. Vegetation

Moderately broad floodplains are characteristic of the Huron River. Low banks one to two feet high are present on an estimated 70 percent of total bank mileage, especially in the study area, while steep hills make up the balance. About 80 percent of the floodplain is covered with swamp hardwood types, while the remaining 20 percent is made up of marsh type. Woody vegetation along the immediate river bank is composed of varying

mixtures of tag alder, red osier dogwood, willow, soft maple and ash. Marsh areas contain cattail, sedges and arrowleaf with an occasional stand of tamarack. Upland areas adjacent to the immediate river area contain oak, hickory, beech, basswood and maple.

One species of aquatic plant, the purple turtlehead (Chelone obliqua) is on the list of endangered plant species in Michigan. And according to Edward G. Voss, Curator of the University of Michigan Herbarium, it is currently known to grown only in the area below Dexter on the Huron River.

E. Climate

The Huron River watershed has a humid, continental climate common to much of the northeastern United States. The area is influenced by its location in the Great Lakes region, a mixing zone for tropical and polar air masses characterized by frequent and sometimes rapid weather changes. The Great Lakes tend also to modify temperatures, making summers cooler and winters warmer, than might otherwise be the case. The average annual daily temperature at Ann Arbor is 48.3°F with a maximum record of 105°F and a minimum of -21°F. Precipitation is fairly well distributed throughout the year with the average annual precipitation being 30.6" at Ann Arbor over a 57-year period. Snowfall generally averages 37" – 38" per year.

F. Ownership

The Huron River watershed contains roughly 576,000 acres of land. Of this total, 527,025 acres (85 percent) are in the private ownership. The remaining 48,975 acres are in public ownership as follows: state recreation areas and state parks – 32,428 acres; state game areas – 9,942 acres; and Huron-Clinton Metropolitan Parks – 6,595 acres.

Ownership along the mainstream of the Huron River and those tributaries selected for possible designation in the Natural Rivers Program is summarized as follows:

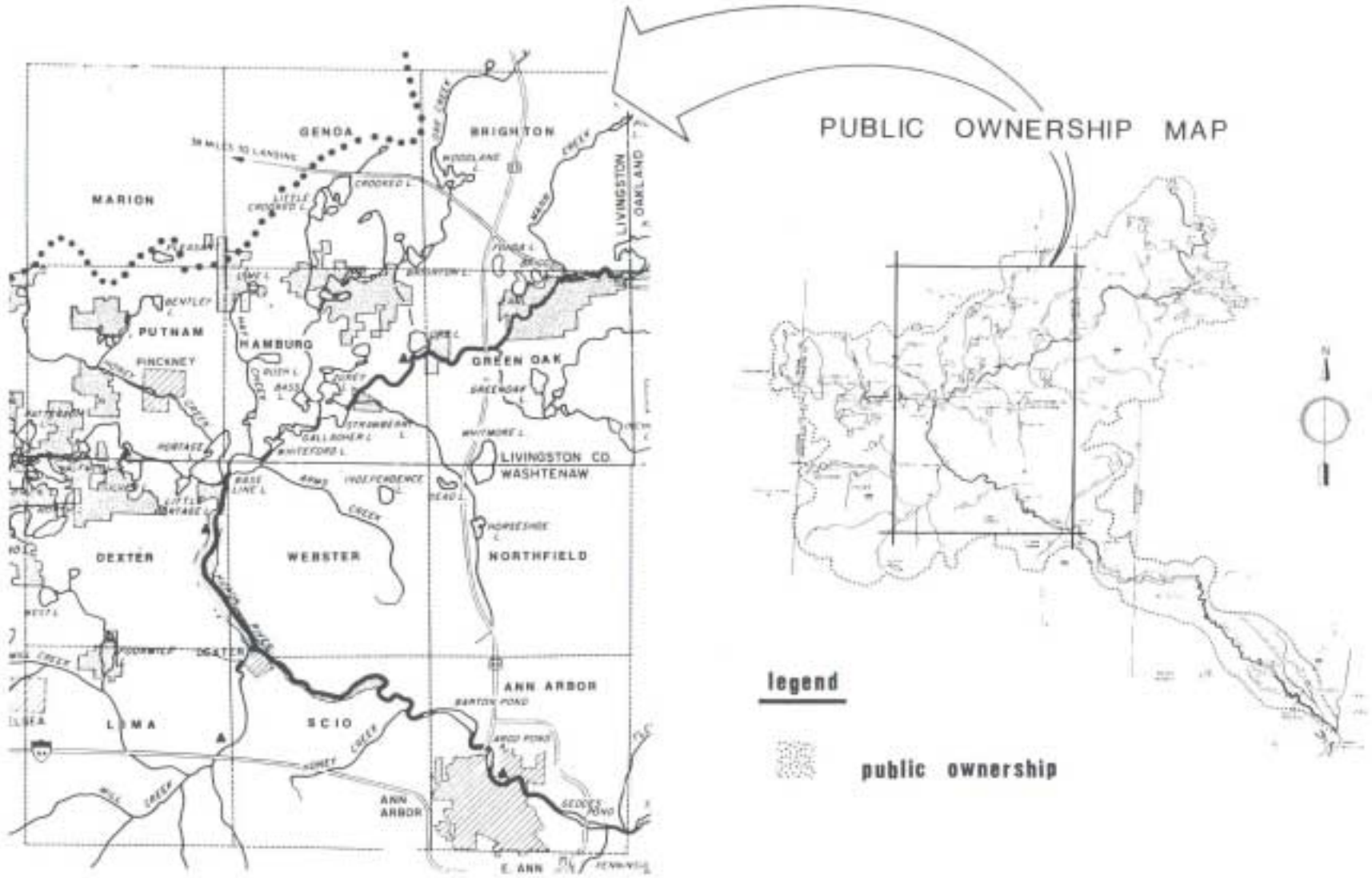
Ownership – Huron River (Study Area)

	Private		Public	
Stream	Linear Miles	Frontage	Linear Miles	Frontage
Mainstream	12.0	24.0	15.5	31.0
Davis Creek	3.5	7.0		
Arms Creek	3.5	7.0		
Mill Creek	3.5	7.0		
	22.5	45.0	15.5	31.0

Approximately 56 percent of the frontage on the mainstream in the study area is in public ownership. This includes the Island Lake Recreation Area, administered by the Parks Division of the Department of Natural Resources, as well as Hudson Mills, Dexter-Huron, and Delhi Metroparks of the Huron-Clinton Metropolitan Authority system.

G. Accessibility

Highway access to the Huron River is abundant with a number of major highways connecting the area to the Detroit Metropolitan area and other population centers. Major east-west roads crossing the watershed are M-59 which crosses the upper river area, I-96 which crosses near the upper limit of the study area, and I-94 which crosses near the lower limit of the study area. U.S.-23 bisects the watershed in a north-south direction, while the extreme lower portion of the Huron is crossed by U.S.-24 and I-75.



HURON RIVER BASIN, MICHIGAN