

CHANNEL, BED, AND BANKS

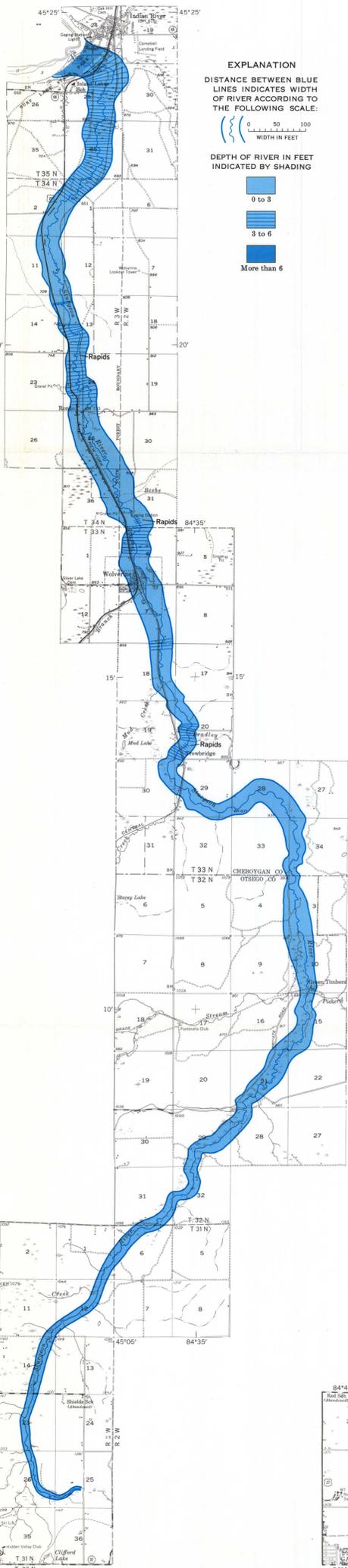
The character of bed, banks and channel of a river strongly influence streamflow characteristics, quality of water, and recreational values. The three maps at right illustrate the physical features of the Sturgeon River determined by field reconnaissance in 1966. During this reconnaissance the gauge height (stage) near Wolverine varied from about 2.1 to 2.3. The depth and width of stream and apparent height of banks vary with stage. Each of these maps is generalized, showing the predominant character of bed and banks. Small segments of unlike character are not shown. In reaches marked predominantly gravel, small segments of sand bottom are common, especially in the deeper pools. Conversely, reaches marked predominantly sand may include small segments of gravel in riffles. The character of bed and banks may change with time as a result of both natural and man-made events. For example, normal spring floods may remove sand from one part of the river bed and deposit it over gravel beds downstream. The character of the bed, banks, and channel of the Sturgeon and the effects on recreational use are summarized below.

RELATION OF BED, BANKS, AND CHANNEL OF RIVER TO STREAMFLOW, WATER QUALITY, AND RECREATIONAL USE

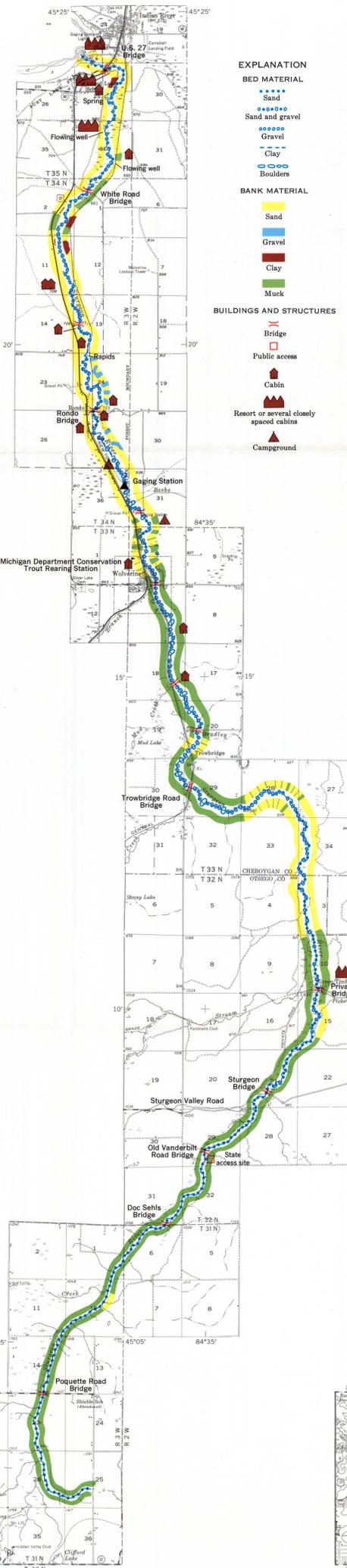
Recreational use	Relation of physical and hydrologic characteristics to recreational use (Prepared by Michigan Department of Conservation)	Characteristics of Sturgeon River
Trout fishing	Broad open water makes fly casting easier, but tends to warm the water. Warm water can have adverse effects on trout propagation and population.	Too narrow for easy fly casting upstream from Old Vanderbilt Road Bridge and in some downstream reaches. Broad open areas limited to first few miles above Wolverine.
	Variability in depth, usually related to variability in velocity and affects wading. Predominantly shallow depth makes wading easier.	Variable depths, but deep holes and high velocity makes wading difficult in most of river below Wolverine.
	Gravel beds provide spawning opportunity and produce fish food. Sand fills deeper holes; buries escape cover, food organisms, and gravel beds.	Mostly sand beds above Old Vanderbilt Road Bridge. Mostly gravel below this bridge.
	Overhanging banks, logs, fallen trees, and boulders provide trout cover.	Good cover in most reaches. Some relatively barren reaches above Wolverine.
	Streamside trees and shrubs shade water and keep water temperature low. This shade may reduce food production, and the plants may intercept part of ground-water discharge to stream.	Good tree cover along most of river length. Some open reaches near Wolverine.
	Clay banks and bottoms produce turbidity, reducing photosynthesis and hence food production. Turbidity also interferes with sight feeding by trout. Sand, gravel, and muck banks more desirable in this respect.	Clay banks and bottoms are very minor on the Sturgeon. Banks are chiefly muck in upper reaches; chiefly sand and gravel in lower reaches.
	Banks devastated by erosion, undercutting, cattle crossing, and boat landing traffic may add undesirable quantities of sand, silt, and clay to the water.	Erosion of banks chiefly limited to public access sites and bridges.
	Variability in gradient is related to variability in velocity and affects wading.	Gradient is variable. Relatively steep in most reaches.
	Bottom vegetation adequate to contribute to food production is desirable, but when excessive it chokes stream and produces extreme daily fluctuations in dissolved oxygen and temperature.	Bottom vegetation is sparse in most of river.
Boating	Boatability increases as width and depth increase.	River is wide and deep enough for boating below Vanderbilt. Too narrow and shallow for easy boating above Vanderbilt.
	On smaller streams sweepers and log jams decrease boatability. Obstructions, shallow, boulders objected to by some canoeists, welcomed by others. If present in excessive amounts, may eliminate boating.	Log jams and sweepers require frequent portages above Vanderbilt. Only occasional portages below Vanderbilt.
	A meandering stream is more attractive and interesting than a straight stream.	Sturgeon River is meandering most of its length.
	Variety of streamside vegetation adds to interest.	Mostly coniferous swamp in upper reaches; hardwood upland and swamp in lower reaches.
	Alternating high and low banks add to interest.	Mostly low banks in upper reaches; alternating high and low banks in lower.
	Undeveloped river banks add to enjoyment of most canoeists.	River banks mostly undeveloped except near Indian River.
	Frequency and suitability of boat launching and take-out points, as determined by bank characteristics and vegetation, influence usability.	Bridges and public access sites provide convenient launching and take-out sites.
Camping and cabin living	Characteristics favorable to fishing and boating generally also desirable for camping and cabin living.	See above.
	Moderately high sandy slopes provide good drainage and easy access to river.	About one-third of river frontage is moderately high and sandy; remainder is low muck land or too high for easy access.

SELECTED REFERENCES

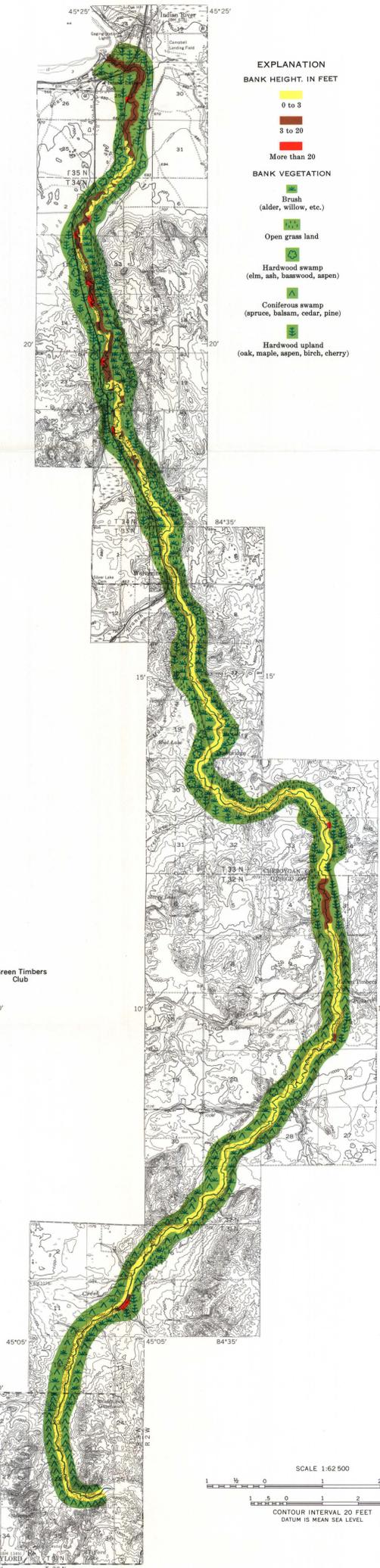
Koutilla, R.L., 1967. Flow characteristics of Michigan streams. U.S. Geol. Survey Open-file rept., p. 179-181.
 Leverett, Frank, and Taylor, F.B., 1916. Pleistocene of Indiana and Michigan and the history of the Great Lakes. U.S. Geol. Survey Mon. 53, 529 p.
 Tarzwell, C.M., 1957. Water quality criteria for aquatic life. U.S. Dept. of Health, Education, and Welfare, p. 246-272.
 U.S. Geological Survey, 1964. Compilation of records of surface waters of the United States, October 1850 to September 1960, Part 4, St. Lawrence River Basin. U.S. Geol. Survey Water-Supply Paper 1727, p. 146.
 1961. Surface Water Records of Michigan. U.S. Geol. Survey Annual Rept., p. 109.
 1962. Surface Water Records of Michigan. U.S. Geol. Survey Annual Rept., p. 117.
 1963. Surface Water Records of Michigan. U.S. Geol. Survey Annual Rept., p. 113.
 1964. Surface Water Records of Michigan. U.S. Geol. Survey Annual Rept., p. 113.
 1964. Water quality records in Michigan and Wisconsin. U.S. Geol. Survey Annual Rept., p. 28.
 1965. Water Resources data for Michigan. U.S. Geol. Survey Annual Rept., pt. 1, Surface Water Records, p. 128.
 1965. Water Resources data for Michigan. U.S. Geol. Survey Annual Rept., pt. 2, Water Quality Records, p. 34.
 1966. Water Resources Data for Michigan. U.S. Geol. Survey Annual Rept., pt. 1, Surface Water Records, p. 127.
 1966. Water Resources Data for Michigan. U.S. Geol. Survey Annual Rept., pt. 2, Water Quality Records, p. 30.
 Water Resources Commission, Department of Conservation, State of Michigan, 1968. Water Quality Standards for Michigan Intra-state Waters. January 31, 1968.



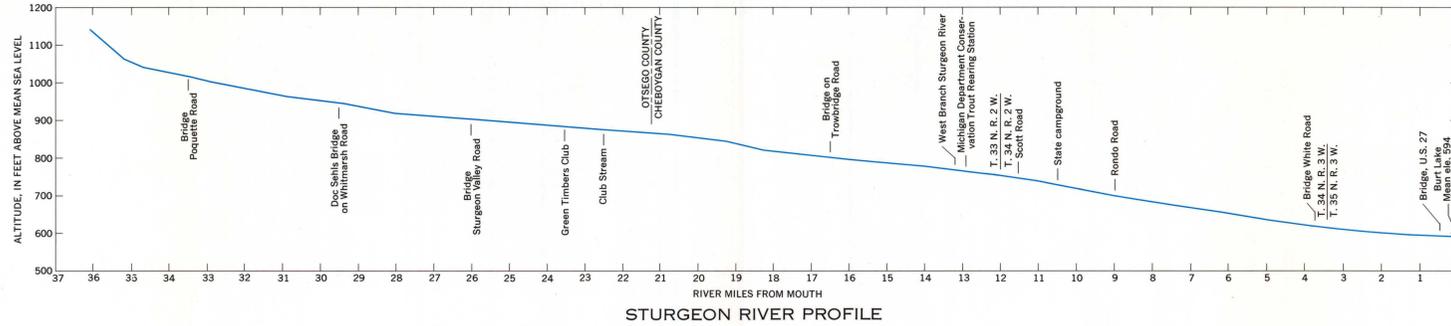
MAP 1—WIDTH AND DEPTH OF CHANNEL



MAP 2—BED AND BANK MATERIALS



MAP 3—HEIGHT OF BANKS AND BANK VEGETATION



STURGEON RIVER PROFILE

RECONNAISSANCE OF THE STURGEON RIVER, A COLD WATER RIVER IN THE
NORTHCENTRAL PART OF MICHIGAN'S SOUTHERN PENINSULA

By
G. E. Hendrickson and C. J. Doonan

1971

Base from U.S. Geological Survey Wolverine, 1957; Gaylord, 1954; Tower, 1957; Hebertson, 1954

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1971