A WATER POLLUTION INVESTIGATION

OF THE

DETROIT RIVER

AND THE

MICHIGAN WATERS OF LAKE ERIE

SECTION II

WATER USE INVENTORY

U.S. Department of Health, Education, and Welfare
Public Health Service

Division of Water Supply and Pollution Control - Region V
Detroit River-Lake Erie Project

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INTRODUCTION

In an area as diversified and complex as the study area of the Detroit River-Lake Erie Project, one must consider all aspects of the existing situation before applying engineering judgment to obtain a logical, impartial and feasible plan for the improvement of water quality. Consequently, all water uses must be examined before one can adequately judge the extent of improvements needed to arrive at the best plan for maximum potential use of the waters. This report is one of the means to such an end, and, as such, contains a summary of the many and varied water uses in the study area.

Water uses have been divided into a number of categories; namely, commercial shipping, dredging operations, fish and wildlife, recreational uses, municipal and industrial water supply, industrial and domestic waste disposal, and combined sewer overflows. No one use is necessarily being presented as more important than another.

COMMERCIAL SHIPPING

Because of a strategic geographical location, the Detroit River has become an important artery of commercial shipping between the upper and lower Great Lakes. Millions of tons of iron ore from the Minnesota ranges pass through the river on their way to the steel mills of Cleveland and Pittsburgh. Coal is transported up the river from the Appalachian fields to the industries along Lakes Michigan and Superior. The opening of the St. Lawrence Seaway in the last few years has also contributed significantly to the traffic in the river. Tonnage shipped through the Detroit River is so great that during a recent eight-month season, 130,560,000 tons of total commerce were shipped through the river. This exceeds the entire combined tonnage shipped through

the Panama and Suez Canals in one year.

Records for the 1963 shipping season are not yet available; therefore, the shipping information for the 1961 and 1962 seasons is presented in Table 1-II. All of the following information is taken from the U.S. Army Corps of Engineers publications entitled, "Waterborne Commerce of the United States, Calendar Year 1961 and 1962." All records include Port of Detroit traffic and Windsor-Detroit traffic. This data would therefore include barge, ferry, and tugboat traffic. An explanation of the terminology follows the tables.

TABLE 1-II. WATERBORNE COMMERCE OF THE DETROIT RIVER

TOTAL PASSAGES	1961	1962
Upbound	10,891	10,191
Downbound	11,098	10,390
TONNAGE SUMMARIES		
Upbound	33,091,926 +	35,375,199
Downbound	63,090,136	64,663,909
Dept. of Defense Controlled and Special Cargo	3,933	-
Total	96,185,995	100,039,108
TONNAGE BREAKDOWN		
Overseas Imports (upbound)	669,341	773,065
Overseas Exports (downbound)	3,807,891	4,166,334
Canadian Imports (upbound)	1,128,032	2,149,157
Canadian Imports (downbound)	2,981,227	2,883,829
Canadian Exports (upbound)	4,267,650	3,707,134
Canadian Exports (downbound)	4,986,691	6,249,152
Coastwise Shipping (upbound)	75,650	119,941
Coastwise Shipping (downbound)	14,616	24,523
Lakewise Shipping (upbound)	26,865,236	28,510,856
Lakewise Shipping (downbound)	51,072,866	51,134,844
Internal Shipping (upbound)	33,856	55,791
Internal Shipping (downbound)	73,927	171,952
Local (upbound)	52,161	59,255
Local (downbound)	152,918	33,275
PASSENGER TRAFFIC		
Upbound	528,392	557,910
Downbound	523,834	562,005
Local Traffic	1,051,065	1,119,319
Through Traffic	1,161	596
Total	1,052,226	1,119,915

+ Tonnage figures for the Detroit River, as given by the Corps of Engineers, do not include Canadian-Canadian or Canadian-Foreign trade. Figures for this type of trade are kept at Sault Ste. Marie, and in 1961, 9,998,357 tons of such commerce are recorded at that point. A figure of 9,157,790 tons of eastbound commerce is recorded, and based on this, it is estimated that about 7,500,000 tons of this foreign commerce passes through the Detroit River unrecorded by the Corps of Engineers or by Canada.

TABLE 1-II (CONTINUED). WATERBORNE COMMERCE OF THE DETROIT RIVER

COMPARATIVE TRAFFIC

Year	Tons	Passengers
1962	100,039,108	1,119,915
1961	96,185,995	1,052,226
1960	111,165,158	1,092,975
1959	92,618,415	1,140,929
1958	87,878,763	979,021
1957	130,515,923	873,420
1956	124,849,617	1,078,452
1955	132,507,367	1,100,474

TRANSACTIONS OF PORTS ON THE DETROIT RIVER	1961	1962
U.S. Overseas Imports	171,131	233,486
U.S. Overseas Exports	526,087	303,109
U.S. Receipts of Canadian Shipments	1,587,045	2,478,221
U.S. Shipments to Canadian Ports	210,914	182,826
U.S. Coastwise Receipts	64,080	81,146
U.S. Coastwise Shipments	14,616	13,173
U.S. Lakewise Receipts	20,958,960	22,337,730
U.S. Lakewise Shipments	1,074,196	1,060,533
U.S. Internal Shipping Receipts	30,707	55,791
U.S. Internal Shipping Shipments	68,147	135,521

EXPLANATION OF TERMINOLOGY

Overseas Exports and Imports refers to tonnage shipped through the Detroit River by the United States to and from foreign ports, including the Canal Zone.

Canadian Exports and Imports refers to the shipping trade between the United States and Canada.

Coastwise Shipping refers to domestic traffic involving transportation over the ocean, e.g., Chicago to Boston.

Lakewise Shipping refers to traffic between U.S. ports on the Great Lakes System.

Internal Shipping refers to traffic involving carriage on both inland waterways and the waters of the Great Lakes System.

Local commerce includes movement of freight within the confines of a single arm or channel of a port, or within the limits of a port having only one project, arm, or channel, except ferries. The term is also applied to marine products, sand, and gravel taken from the Great Lakes.

Over 150 different types of cargo were transported through the river during the 1961 and 1962 seasons. These varied from bulk products like iron ore to highly developed products such as steam turbines. The largest cargo to be shipped overseas was scrap iron and steel with 1,064,828 tons passing down the river during the year 1961. Rolled and finished steel mill products constituted the largest foreign import with 188,768 tons passing through the river or being unloaded in the Detroit port area during the 1962 season. In the domestic and U.S.-Canadian trade categories, the largest downbound tonnage consisted of iron ore and concentrates with 34,986,741 tons of the material being recorded in 1962. The largest upbound cargo was bituminous coal and lignite, with 26,446,249 tons passing up the river during the 1962 season.

The ships traversing the river varied from tugboats and great lakes freighters to the latest ocean vessels. One downbound vessel had a maximum draft of 28 feet while 8,825 of the vessels over the two year period had a draft of 12 feet or less.

A glance at the passenger traffic figures will show that the majority of the passenger traffic is confined to the Detroit area. The primary cause of the excessive local traffic is the Bob-Lo Excursion Company's pleasure boats, the S.S. St. Claire and S.S. Columbia, which run frequent excursion trips to Bois Blanc Island off the southern tip of Grosse Ile.

DREDGING OPERATIONS

The dredging operations in the Project's study area come under the jurisdiction of the U.S. Army Engineer District, Detroit, Corps of Engineers. These operations of the Corps are divided into the major categories of New Work and Maintenance Work, consisting of items discussed below. All of the work under their direction is handled either by their own equipment and person-

nel or is contracted out to low bidders. Figures 1-II and 2-II show the areas of new work and maintenance dredging operations along with the designated disposal sites.

New Work

1. Trenton Channel

The Trenton Channel, on the westerly side of the Detroit River and nine miles in lenth, flows in a southerly direction between the Michigan mainland on one side and Grassy Island, Michigan and Grosse Ile, Michigan on the other side. The Wyandotte Reach of the Trenton Channel extends from the junction with the Detroit River at the head of Fighting Island; downstream to the Grosse Ile toll bridge. The Trenton Reach extends further downstream in the natural channel on the westerly side of Grosse Ile to the turning basin at the City of Trenton.

The work scheduled by the Corps of Engineers for improvement of the Trenton Channel provided for the following:

a. A channel 300 ft. wide and 27 ft. deep in the Wyandotte Reach, extending for a distance of about six miles from the Detroit River through channel to a point just downstream of the Grosse Ile toll bridge.

b. A channel 300 ft. wide and 28 ft. deep in Trenton Reach, extending for a distance of about one mile from the 27-foot deep channel just downstream of the Upper Grosse Ile Bridge to, and including, a turning basin 28 feet in depth and about 15 acres in area outside the dredging project channel limits at the McLouth Steel Corporation dock.

The Corps of Engineers divided this work into three sections for purposes of bidding and awarding of contracts. These sections are as follows:

Section A - Comprising all of the work required in 6,450 feet of the

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Wyandotte Reach. The materials in this section to be excavated consist principally of sand, clay and gravel, which are being pumped into the Mud Island dike by a 20-inch hydraulic pipeline dredge. The pay quantity for this section was calculated as 180,000 cubic yards and a contract amounting to $299,810 awarded to Price Brothers - McClung Division, Price Brothers Company, Dayton, Ohio. Work began around mid-April 1963 and was completed during the month of June 1963.

Section B - Comprising all of the work in the lower 22,450 feet of the Wyandotte Reach between the lower end of the Upper Wyandotte Reach and a point approximately 700 feet downstream of the Grosse Ile toll bridge. The excavated material in this section also consists principally of sand, clay and gravel and comprises a pay quantity of 124,600 cubic yards. This material was deposited in a dump area located in Lake Erie south of the Detroit River Light between the West Outer Channel and East Outer Channel. This work was contracted to Peter Kiewit Sons Company, Omaha, Nebraska.

Section C - Comprising all of the work required between a point approximately 700 feet downstream of the Grosse Ile toll bridge and a point approximately 5,800 feet downstream of the bridge, including the turning basin. This section consists principally of a limestone ledge rock with a sand, gravel, clay and silt overburden. A portion of the material, 100,000 cubic yards was hauled by dump and/or deck scows to Mud Island where it was rehandled by a land-based plant in the construction of the Mud Island dike. The remaining 342,700 cubic yards of pay quantity was hauled to the Lake Erie Disposal area in dump scows. The contract for this section was awarded to the Dunbar and Sullivan Dredging Company, Detroit, Michigan. The cost of sections B and C together amounted to $4,491,036.

2. East Outer Channel

Dredging operations in the East Outer Channel were confined to an area 35,000 feet in length beginning about 6,000 feet down channel from the Detroit River Lighthouse. The pay quantity of excavated material in the channel was 2,769,000 cubic yards of clay with some sand and gravel. Disposal was in the dump ground located between the East and West Outer Channels. Work was under contract in September 1962 and completed in October 1962.

Maintenance Work

1. Rouge River

The dredging of the channels of the Main Rouge, Old Rouge and Short Cut Canal commencing at the Ford Motor Company turning basin and extending to the Detroit River are classified as maintenance work. Dredging operations are annual and commence about the middle of September and continue until just before Christmas. In 1962,approximately 174,000 cubic yards of silt, industrial waste and clay was removed and hauled by the U.S. Hopper Dredge Hains to Grassy Island and pumped within the diked area. In 1963, 255,000 cubic yards were removed. Table 2-II represents a summary of the average chemical constituents of the Rouge River shoal material as reported by the Corps of Engineers.

TABLE 2-II. CHEMICAL CONSTITUENTS ROUGE RIVER SHOAL MATERIAL

RESULTS EXPRESSED IN PERCENT OF SAMPLE

Location No.[2]	1962 Fe_2O_3	CaO	MgO	Al_2O_3	Carbon & Organic Loss on Ignition	Insol. Sil.Mat.	1963 Fe_2O_3	CaO	NgO	Al_2O_3	Carbon & Organic Loss on Ignition	Insol. Sil. Mat.
1	17.4	3.4	4.1	1.1	16.8	55.4	13.9	10.6	1.5	5.9	18.6	47.2
2	11.6	4.6	5.2	6.8	20.9	49.2	13.5	7.0	1.2	5.3	19.6	51.9
3	21.9	2.5	2.7	1.7	19.0	52.0	13.7	8.3	1.1	6.3	19.7	49.3
4	13.8	1.1	4.3	6.1	17.7	55.3	20.4	4.3	1.6	4.7	20.0	46.5
5	16.1	4.8	2.1	3.8	21.2	51.8	22.9	3.4	1.3	4.9	22.0	42.8
6	15.7	4.5	1.8	6.8	21.1	49.8	10.5	4.3	1.7	1.8	18.3	63.1
7	18.6	3.3	3.9	3.1	21.6	49.2	16.6	4.1	1.2	4.2	21.4	51.2
8	16.2	6.1	Tr	2.7	20.6	52.3	17.9	3.8	1.5	9.1	18.4	47.1
9	12.5	5.0	1.3	2.2	17.4	61.1	10.0	8.1	1.0	1.4	12.8	64.8
10	17.4	4.9	3.6	1.3	22.8	48.3	9.0	5.5	1.0	1.7	15.3	66.8
11	12.3	6.0	Tr	4.1	22.0	55.3	10.2	5.1	1.1	1.8	20.8	60.0
12	6.1	13.2	Tr	0.1	42.7	37.5	7.6	7.0	Tr	1.3	35.9	47.8
13	2.6	10.3	2.1	2.1	42.3	40.0	9.6	6.7	1.7	1.8	39.6	39.9
14	8.4	8.0	7.6	4.4	22.9	48.1	5.9	8.7	Tr	3.4	31.5	49.2
15	5.1	4.2	7.3	10.7	22.0	50.5	12.0	9.2	1.0	1.2	33.1	40.0
16	3.4	11.2	2.1	0.8	29.0	53.1	10.1	8.6	1.6	1.5	42.9	34.2
17	4.9	11.7	2.6	3.0	21.7	55.7	8.0	6.8	1.0	1.0	30.3	52.2
18	5.5	6.6	1.7	4.2	22.3	59.1	6.2	8.3	1.1	1.8	22.2	59.5
19	5.4	6.8	1.0	4.4	17.0	64.7	2.5	6.6	1.3	1.9	17.8	69.1
20	6.7	8.1	1.0	5.9	9.1	69.0	7.6	10.2	1.8	1.8	26.0	52.0
21	5.5	10.0	2.3	5.6	14.5	61.7	10.5	20.2	1.6	0.7	29.2	37.2
22	6.9	7.2	2.7	3.1	17.9	61.7	7.9	12.6	1.2	1.4	23.3	52.8

1. Data furnished by the Corps of Engineers
2. See Figure 1-II

The costs of maintenance dredging by the Corps of Engineers in the Rouge were $206,288 in 1962 and $258,524 in 1963. To help defray the cost of dredging various industries were charged an amount (see Table 3-II) commensurate with the cost of removing that portion of the dredged material deposited by industrial waste discharges.

1a. Detroit River

The Corps of Engineers removes some 100,000 cubic yards annually from the Livingstone Channel and 200,000 cubic yards annually from the East Outer Channel. The upper Livingstone Channel annual maintenance dredging is primarily carried out to remove diked material (rocks and boulders) which wave action has caused to topple into the channel. The lower Livingstone Channel and the East Outer Channel operation consists of removal of solids originating upstream and deposited in areas where the velocity decreases as the river approaches and enters Lake Erie.

TABLE 3-II. PARTICIPATING COSTS - ROUGE RIVER MAINTENANCE DREDGING

Industry	Year	Amount
Ford Motor Company	1962	17,051.11
	1963	35,671.83
Scott Paper Company	1962	1,836.54
	1963	8,701.66
Allied Chemical Corporation-Solvay Process Division	1962	4,469.49
	1963	5,379.53
American Cement Corporation-Peerless Cement Division	Fixed Annual Charge	3,500.00

2. Raisin River

Monroe Harbor dredging is classified as maintenance work and in 1962 and 1963 consisted of dredging from the Monroe Harbor terminal turning basin to a point about 8,000 feet into Lake Erie. This is an annual operation and usually takes place during the month of October. Two hundred and seventy one thousand cubic yards of excavated material consisting principally of silt, paper pulp and clay was hauled by the U.S. Hopper Dredge Hoffman to a disposal area in Lake Erie in 1962. Similar operations were repeated in 1963 with 390,000 cubic yards of material being removed by the U.S. Hopper Dredge Lyman.

The costs of maintenance dredging by the Corps of Engineers in the Raisin River were $58,774 in 1962 and $128,536 in 1963.

FISH AND WILDLIFE

Commercial Fish Catches

Records of the Michigan Department of Conservation over the last 18 years show significant variations in the amount of catch of various species of fish. Catches from Lake Erie by Michigan fishermen for 5 scattered years in the last two decades expressed in pounds of fish presented in Table 4-II.

TABLE 4-II. COMMERCIAL FISH CATCHES IN LAKE ERIE BY MICHIGAN FISHERMEN

Fish	1944	1948	1952	1957	1961	1962	1963
Blue Pike		19,651	248				
Bowfin	8,345	8,076	1,200		10		
Buffalo					803	4,097	13,934
Bullheads	47,422	51,154	16,153	52,288	8,983	7,132	3,545
Burbot	31	146		50			
Carp	599,265	533,885	893,325	620,354	1,297,792	1,275,626	833,241
Catfish	35,397	27,111	27,686	56,536	85,557	51,646	40,533
Chubs							
Garfish							
Gizzard Shad			1,080		1,489		
Goldfish	1,482	699	50				
Lake Herring							
Lake Trout							
Lake Whitefish	669	9,491	729				
Mooneyes			442				
Menominee Whitefish							
Northern Pike		10,439	2,014	2,161	1,190	79	71
Rock Bass	2,920	7,902	520	520	654	251	3
Round Whitefish							
Saugers	5,898	4,419	802	145			
Sheepshead	120,828	80,327	32,388	64,637	94,494	82,292	71,321
Smelt					12		
Sturgeon					68	61	42
Suckers					62,259	56,471	60,905
White Bass	54,668	32,865	65,488	45,029	159,341	210,201	126,121
White & Red-Horse Suckers	35,194	41,733	27,496	19,128			
Yellow Perch	19,775	17,480	40,522	109,204	103,608	96,875	89,701
Yellow Pike	225,878	402,908	285,130	288,509	105,094	52,912	93,047
Total	1,157,772	1,248,286	1,395,273	1,258,561	1,921,354	1,837,643	1,332,464
Value			$122,078.45	$109,032.95	$145,159.68	$101,618.13	$94,594.3

The fish are not necessarily caught in the Michigan waters of Lake Erie since the fishermen living in the State of Michigan may enter into Lake Erie waters of other States.

Records obtained from the Michigan Department of Conservation date back through 1944.

The figures show interesting rises and declines in the fish catches. Fish showing a definite decline through the years are the bowfin, northern pike and the sauger. Others such as the bullhead, catfish, sheepshead, white bass, and yellow pike exhibit fluctuations in catch through the years, while the yellow perch and carp show a definite rising trend in the catch. Lake Erie also yielded good catches of whitefish, lake herring, and ciscoe until the turn of the century when their population was decimated.

Waterfowl

The Detroit River is known as a major staging area for migrations of canvasbacks, redheads, scaups, and black ducks, using the Atlantic and Mississippi flyways. As a canvasback feeding area, the Detroit River is in a class with the famous marshes of Chesapeake Bay. In the Great Lakes region, the area is considered among the few remaining areas providing habitat significant to waterfowl. The principal reason for this notability is the estimated 6,000 acres of shoal water on the American side of the Detroit River between the Ambassador Bridge and the head of Lake Erie. These shoal areas contain wild celery, coontail, water milfoil, various pondweeds, and waterweed, all preferred natural waterfowl foods. The celery beds constitute one of the few good winter feeding grounds for the canvasbacks in the Great Lakes region. Associated with these plant beds are snails and other crustaceans which are important animal foods for the diving ducks.

The biologists from the Department of Interior's Bureau of Sport Fisheries and Wildlife and the Michigan Conservation Department have conducted serial surveys of waterfowl use in the Detroit River between the Ambassador Bridge and Lake Erie during various seasons. Since 1950, the minimum winter duck population was 5,000 in the 1961-62 period and the maximum population of approximately 100,000 in the winter of 1963-64. Approximately 24,000 were observed during the 1962-63 season. The minimum spring population of 14,000 was found in 1949-50 and the maximum of 70,000 in 1954-55. The fall season is divided into the three periods of pre-waterfowl, mid-waterfowl and post-waterfowl seasons. The minimums and maximum along with their respective years are as follows:

Pre-waterfowl season - 4,400 (1952-53) to 12,200 (1949-50)

Mid-waterfowl season - 5,500 (1959-60) to 293,000 (1953-54)

Post-waterfowl season - 25,500 (1954-55) to 95,000 (1952-53)

During the last few years, the canvasback variety has accounted for approximately 65 percent of the waterfowl using the area.

The Wyandotte National Wildlife Refuge was established by Public Law 87-119, dated August 3, 1961. This game refuge is located on Grassy and Mamajuda Islands in the lower Detroit River. This refuge is in addition to the 2600-acre game preserve at Pointe Mouillee.

The Public Health Service report presented at the first session of the Conference in 1962 referred to a major duck kill due to pollution in the Detroit River in 1960 which involved approximately 12,000 birds. The Michigan Department of Conservation records contain no report of duck kills attributable to pollution during the past three years.

RECREATIONAL USES

Recreational Areas

The majority of the recreational areas within the Project's limits are tabulated in Table 5-II and presented in Figures 3-II and 4-II.

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Facilities are divided into five geographical areas, numbered Area I - V, with approximate boundaries as follows:

Area I The shoreline between Windmill Point and confluence of the Detroit River with the Rouge River.

Area II The shoreline of the Detroit River between the Rouge and Ecorse Rivers.

Area III The shoreline of the Detroit River and Lake Erie between the Ecorse and Huron Rivers.

Area IV The Lake Erie shoreline between the Huron and Raisin Rivers.

Area V The Lake Erie shoreline between the Raisin River and the Michigan-Ohio line.

The facilities listed in column 5 are general, and in some cases may not be complete. The code explanation is as follows:

A - Athletic facilities (tennis, baseball, etc.)

Am - Amusement facilities (ferris wheel rides, etc.)

Bh - Bathhouse

C - Concession stand

D - Dance pavilion

F - Fishing area

G - Golf course and/or driving range

L - Extensive landscaping

M - Marina facilities and boat rentals

Mu - Music facilities (bandstand, music shell)

Pa - Picnic areas

Pg - Playground (children's equipment, etc.)

R - Boat Ramp

Sb - Swimming (beach)

Sp - Swimming (pool)

Wp - Wading pool or spray pool

TABLE 5-II. RECREATIONAL AREAS

AREA I

PARK AREA	OWNERSHIP	WATER FRONTAGE	AREA (ac)	FACILITIES	ATTENDANCE (Year)	ESTIMATED (1) VALUE ($)
Riverside Playfield	City of Detroit	870 ft.	10.2	R PG		474,000.00
Gabriel Richard Park	City of Detroit	1,638 ft.	21.9	Pg A L		G8,000,000.00
Owen Park	City of Detroit	427 ft.	8.2	Pg L		G100,000.00
Detroit Memorial Park	City of Detroit	1,181 ft.	33.3	M a Wp		1,570,500.00
Stockton Park	City of Detroit	300 ft.	2.75	L		G10,000.00
Engel Park	City of Detroit	663 ft.	34.32	A Pa R L		G857,000.00
Peter Maheras Playfield	City of Detroit	1,232 ft.	53	A Pa		G420,000.00
Brush Ford Park	City of Detroit	2,928 ft.	33.3	Pa Pg		650,000.00
Lakewood East Park	City of Detroit	Included in Above	28.0	M		Included in above
Belle Isle	City of Detroit	Island	927	Sb Mu A G C Pa Pg M	12,000,000 (1959)	G55,000,000.00

TABLE 5-II. RECREATIONAL AREAS (CONTINUED)

PARK AREA	OWNERSHIP	WATER FRONTAGE	AREA (ac)	FACILITIES	ATTENDANCE (Year)	ESTIMATED VALUE ($)
AREA II						
Henry Belanger Park	City of River Rouge	644 ft.	10	R C Pg	75,000	600,000.00
Ecorse Park	Wayne County		3	L	200,000	
AREA III						
Bishop Park	City of Wyandotte	1260 ft.	9.2	A Wp Mu		7,500.00
Riverview Municipal Marina	City of Riverview	85 ft.		R		
Elizabeth Park	Wayne County	3600 ft.	162	Pa Pg A R	750,000	
AREA IV						
Sterling State Park	State of Michigan	7800 ft.	624	Sb C Bh Pa	911,246('60) 1239,216('59)	
Kress Park	Private	400 ft.		Pa Bh Pg		
AREA V						
Toledo Beach	Private	600 ft.		Pa Sb Am		

Marina Facilities

One of the fastest growing recreational uses of water in the Detroit area as well as the entire United States is pleasure boating. Figures presented by the Outboard Boating Club of America show that over $2,500,000,000 was spent on recreational boating in the United States in 1962 as compared with $720,000,000 a decade earlier.

Estimation of the actual amount of usage of a water resource for pleasure boating is a difficult task, but a fair evaluation can be obtained by tabulating the various indicators of boating popularity such as marina facilities, boat registrations and boat launchings.

The major marinas and the number of boat wells they represent are tabulated in Table 6-II and presented in Figures 3-II and 4-II. The areas into which the facilities are located contain the same boundaries as those areas in the preceding section.

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA I

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facilities	Type of Treatment	# of Rental Boats
Bayview Yacht Club	Ft. of Clairpoint Detroit	69	65	0	0	City	5	Det. STP	0
Browns Marina	14455 Riverside Detroit	16	16	0	0	City	2	Det STP	0
Detroit Boat Basin	9666 E. Jefferson Detroit	200	200	0	3	City	4	Det STP	0
Detroit Boat Club	Belle Isle	72	72	0	0	City	17	Det STP	0
Detroit Yacht Club	Belle Isle	284	284	15	N.A.	City	14	Det STP	0
Edison Boat Club		25-40	25-40	0	N.A.	City	3	Det STP	0
Gregory Marina		129	129	0	N.A.	City	4	Det STP	0
Keans Detroit Yacht Harbor	100 Meadowbrook Detroit	300	250	0	5-10	City	2	Det STP	0
Memorial Park Marina		274	274	6-30	some	City	1	Det STP	0
Harbor Hill Marina		60	35	0	0	City	1	Det STP	0
Roostertail Marina	100 Marquette Detroit	88	88	0	1	City	3	Det STP	0
Sinbads Marina	100 St. Clair Detroit	104	100	0	0	City	2	Det STP	0
Sinbads Marina Inc.	11200 Freud Detroit	226	226	2	0	City	2	Det STP	0

TABLE 6-II. MARINA FACILITIES SUMMARY (CONTINUED)

AREA I

Marina Name	Address	#of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facili-ties	Type of Treatment	# of Rental Boats
St. Clair Sail Club	Just North of Gregorys	30	24	0	0	City	2	Det STP	0
Windmill Point Boat Co.	14301 Riverside Detroit	62	62	0	NA	City	0	Det STP	0
Woodhaven Area (Private Homes)		79	79	0	NA	City	0	Det STP	0
Windmill Pt. Area (Private Homes)		130	130	0	NA	City	0	Det STP	0

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA II

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type Water Supply	# of Toilet Facil-ities	Type of Treatment	# of Rental Boats
Ecorse Boat Basin	4685 W. Jefferson Ecorse	68	68	0	0	City	1	Septic Tank	0
Nicks Marina	4409 W.Jefferson Ecorse	53	53	0	0	City	1	Septic Tank	0

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA III

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facil-ities	Type of Treatment	# of Boat Rentals
Andy's Boat Harbor	St. John & Perry Pl, Wyan.	85	70	0	10	City	0	Wyan STP	0
Hidden Boat Harbor	693 Biddle Wyandotte	100	100	0	0	Wyan	2	Wyan STP	0
Johnsons Marina	Wyandotte	54	54	0	0	Wyan	20	Wyan STP	0
Mellins Marina	653 Biddle Wyandotte	75	45	0	NA	Wyan	2	Wyan STP	0
Pier 500	507 Biddle Wyandotte	75	75	0	0	Wyan	4	Wyan STP	0
Holdens Boat Works	2775 Riverside Trenton	15	14	0	0	Det	0	None	0
Howey's Boat Works	2751 Riverside Trenton	40	40	0	0	Det	2	None	0
Liggett Boat Works	2965 Riverside Trenton	45	45	0	0	Det	1	Tren STP	0
Humbug Marina	N. Adams Drive Gibraltar	200	200	0	0	City	2	Tren STP	0
Gibraltar Boat Yard	13770 Blakeley Gibraltar	70	70	0	0	City	2	Tren STP	0
Vicks Boat Livery		9	9	0	0	City	1	Wyan	0
Elba Mar Yacht Club	28117 E. River Grosse Ile	268	268	0	0	City	2	Septic T	0
Ford Yacht Club	29500 S.Pointe Grosse Ile	185	185	0	100	City	5	Septic T-	0

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA III (CONTINUED)

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facil-ities	Type of Treatment	# of Boat Rentals
Naval Air Station	Grosse Ile	50	65	0	2	City	2	Cesspool	8
Grosse Ile Yacht Club	29677 Hickory Grosse Ile	121	120	0	80	City	7	Septic T	0
Hoovers	28821 E. River Grosse Ile	50	50	0	NA	Well	3	Septic T	40
Island Boat & Country Club	25215 W. River Grosse Ile	60	60	0	0	City	10	Septic T	0

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA IV

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facilities	Type of Treatment	# of Rental Boats
Bellinos Marina		100	50	0	0	Well	2	Septic T	52
Detroit Beach Boat Club		105	31	0	NA	Well	2	Septic T	0
Lezotte Boat Livery	Pointe Mouillee	10	10	0	0	Well	1	Septic T	6
Pointe Mouillee Marina	37245 Pt. Mouillee, Rockwood	36	25	0	0	Well	2	Septic T	26
Swan Boat Club		38	30	2	0	Well	2	Septic T	0

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA V

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facil-ities	Type of Treatment	# of Rental Boats
Andrew's Boat Dock	2937 E. Sterns N. Maumee Bay	50	50	0	NA	Pump	1	Privy	0
Bloome's Livery	Luna Pier	0							12
Bolles Harbor Boat Livery	7970 Harbor Rd. Bolles Harbor	108	108	Boats 12	0	Creek	1	Septic T	0
Brewers Boat Livery	2881 E. Sterns N. Maumee Bay	Docks 134	50-75			Pump	1	Privy	2
Callahans Boat Livery	7976 Harbor Rd. La Plaisance Cr.	30	20	0	0	Pump	1	Septic T	5
Du Valle Livery	4346 LaPointe Dr. Luna Pier								20
Harbor Marine	13951 Bridge Dr. La Plaisance Cr.	25	25			Pump	None		0
Joe's Boat & Bait	13468 N. La Plaisance	14	10	0	0	Pump	1	Septic T	15
John's Marina	7330 Perch Drive N. Maumee Bay	125	100	0		Pump	1	Septic T	3
L & E Boat Livery	13961 N. La Plaisance	Docks 22	22	0	0	None	None		6
Lost Peninsula Marina		124				None	None		
Lotus Harbor Sales & Service	7120 Summit St. Halfway Creek	275	275	0		Pump	1	Septic T	10
Macks Boat Dock	2941 E. Sterns N. Maumee Bay	5 20 at Docks	5	0		Pump	1	Privy	0

TABLE 6-II. MARINA FACILITIES SUMMARY

AREA V (CONTINUED)

Marina Name	Address	# of Boat Wells	# of Boats in Summer	Living Aboard	# Boats with Treat. Devices	Type of Water Supply	# of Toilet Facilities	Type of Treatment	# of Rental Boats
Meaders Band	10712 Lakeside Luna Pier								14
Monroe Boat Club	La Plaisance Creek	75	75	25 Boats	1	Pump	1	Septic T	0
Monroe Marina	6647 La Plaisance Rd.	50	50	5 Boats	0	Pump	1	Septic T	0
North Cape Yacht Club	Near Toledo Beach	70 und. constr.				Pump	1	Septic T?	
Otter Creek Marina	Otter Creek	34				Pump	1	Privy	
Shoe String Marina	5800 S. Otter Creek	14 26 by 1964		0	0	Pump	1	Septic T	0
Stanley's Boats	2947 E. Sterns N. Maumee Bay	45	45	0		Pump	1	Privy	0
Straits Boat Livery	8528 E. Dunbar Plum Creek	12	12	0		Pump	1	Chemical T.	14
Toledo Beach Marina	North of Toledo Beach	150 600 ultimately				Pump	1	Septic T.	30

Boat Registrations and Launchings

Of the five counties chosen for the boat registration figures, all but Oakland County have shorelines on Lake St. Clair, the Detroit River, or Western Lake Erie. The northwest suburbs of Detroit are in Oakland County, and for this reason the boat registrations for this county are also included in the list.

Exact boat launching figures for the Wyandotte Municipal Ramp and the Elizabeth Park ramp are available because a charge is levied at these ramps which necessitates the keeping of launching records. There are other free public launching ramps along the river for which usage figures are not available.

Boat Registrations (1)

Macomb County	18,057
Monroe County	5,399
Oakland County	37,302
St. Clair County	7,744
Wayne County	74,842
Total	143,844

Boat Launchings - Wyandotte Municipal Boat Ramp (2)

1961	5,847
1962	5,382

Boat Launchings - Elizabeth Park Marina Trenton (3)

1961	8,974
1962	8,418

Boat Launchings - Detroit Engel Parks Ramps (4)

1962 Season	18,000 (estimate)

(1) Michigan Department of State, through September 30, 1962.
(2) City of Wyandotte, 1962 figures are through October 15, 1962.
(3) Wayne County Board of Road Commissioners, through October 6, 1962.
(4) City of Detroit Department of Parks and Recreation.

INDUSTRIAL WATER USES

The information summarized in Table 7-II is a compilation on the use of water by Michigan industries in the study area. Figures 5-II and 6-II locate the points of waste discharge from each industry. The order of presentation is basically geographical, with data given first for plants on the Detroit River beginning at the headwaters and proceeding downstream, then the industries on the River Rouge followed by those on the Raisin River. The columns in the summaries contain some data which are general and, in some cases, flexible. Space requirements have dictated the following coded information:

Columns 2 and 8 - Source and Discharge Point

Det Riv	-	Detroit
Riv Rouge	-	Main stem of River Rouge
Rouge SC	-	Short cut canal of River Rouge
Rouge OC	-	Old channel of River Rouge
UG	-	Underground
City or City Sewer	-	The water supply or treatment facilities of the muncipality in which the plant is located.
Rais Riv	-	Raisin River

Column 3 - Amount

gpm	-	gallons per minute
gph	-	gallons per hour
gpd	-	gallons per day
mgd	-	million gallons per day
mgy	-	million gallons per year

Column 4 - Pre-treatment (treatment of water by the industry prior to use)

Scr	-	Screening either course or fine
F	-	Filtered
A	-	Addition of alum
SA	-	Addition of sodium aluminate
Chl	-	Chlorination

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Column 6 - Final Treatment (general treatment given wastewater prior to discharge into receiving waters)

AF - Air Floatation
CC - Chemical coagulation
Chl - Chlorination
Cl - Clarifier
DF - Drum filter
Dis - Distillation
Dp - Dephenolizing equipment
E - Excelsior filtration
GC - Grit chamber
N - Neutralization
OC - Oil centrifuging
OWS - Oil water separating apparatus
P - Ponds
PS - Primary settling
SS - Sludge sintering
SSP - Sub-surface percolation
St - Sludge thickening

Column 7 - Major Constituents

A - Acidity as $CaCO_3$
B - Biochemical Oxygen Demand
C - Chlorides
Cn - Cyanide compounds
Cr - Chromium compounds
Fe - Soluble iron
Fl - Fluorides
N - Nitrogen compounds
O - Oil
P - Phenols
pH - High or low pH values
S - Sulfur compounds
SS - Settleable solids
SusS- Suspended solids
T - High temperatures
X - Ether extractables
Bact- Coliform Bacteria

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL

DETROIT RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Detroit Edison Conners Cr.	Det Riv	208,000 gpm (Max.)	Scr Chl	Cooling	None	T	Det Riv
	City			Potable & Sanitary			City Sewers
U.S. Rubber Co.	Det Riv	42 mgd		Process & Cooling	CWS		Det Riv
	City	0.5 mgd		Potable & Sanitary			City Sewers
Parke Davis & Co.	Det Riv	17.3 mgd		Cooling	None		Det Riv
	Det Riv	0.63 mgd		Process		SusS pH	City Sewers
	City	0.45 mgd		Potable & Sanitary			City Sewers
Anaconda American Brass Co.	Det Riv	5.3 mgd		Cooling & Process	N PS	pH O	Det Riv
	City	0.0625 mgd		Potable & Sanitary		Cn	City Sewers

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

DETROIT RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Mistersky Power Station	Det Riv			Cooling	None	T	Det Riv
	City			Potable & Sanitary			City Sewers
Revere Copper & Brass	Det Riv	2.9 mgd		Process	OWS	O Cu	Det Riv
	City	0.36 mgd		Potable & Sanitary			City Sewers
Detroit Edison Delray	Det Riv	190,000 gpm (Max.)	Scr Chl	Cooling	None	T	Det Riv
	City			Potable & Sanitary			City Sewers
Great Lakes Steel Blast Furnace	Det Riv	90 mgd	Chl	Process & Cooling	CC DF SC Dis Dp	P Fe SusS	Det Riv
	City	38,000 gpd		Potable & Sanitary	PS Chl		Det Riv
Allied Chem. Solvay Process	Det Riv	21.6 mgd		Process & Cooling	Cl P	SusS P N	Rouge OC & Det Riv
	City			Sanitary			City Sewers

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

Detroit River

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Detroit Edison River Rouge	Det Riv	480,000 gpm (Max.)	Scr Chl	Cooling	None	T	Det Riv
	City			Potable & Sanitary			City Sewers
Great Lakes Steel Strip Mill		42.13 mgd		Process	Cl SS PS	SS O T	Det Riv
		30.27 mgd		Cooling & Condens.	None		Det Riv
		100,000 gpd		Potable & Sanitary			County Sewers
Fuel Oil Corp.	City	12,240 gph		Vessel washing Batch operation	OWS & E	O SusS	Det Riv
Dana Corp.	City	0.384 mgd		Process & Cooling Sanitary & Potable	None	A pH Fe P	City Sewers Det Riv
Great Lakes Steel Ecorse	Det Riv	72 mgd	Chl	Cooling & Process	OWS P	A Fe SusS O	Det Riv
	City	1.1 mgd		Potable & Sanitary			County Sew Det Riv

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

DETROIT RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pts.
E. I. DuPont	Det Riv	1.4 mgd		Process & Cooling	None	Ph C	Det Riv
	City			Sanitary & Potable	Soil Absorption		
Wyandotte Chem. North Plt.	Det Riv	57 mgd		Process & Cooling	P on Fighting Island OWS	SusS O P N Cn	Det Riv
	City of Wyandotte			Sanitary & Potable			County Sewers
Wyandotte Chem. South Plt.	Det Riv	54.7 mgd		Process & Cooling	P OWS	C SS P O	Det Riv
	City			Potable & Sanitary			County Sewers
Koppers Co. Inc. Tar Prod. Div.	Det Riv	0.802 mgd		Cooling & Process	None	pH A P	County Sewer Det Riv
	City of Wyandotte	4500 gpd		Potable & Sanitary			County Sewers
Pennsalt Chem.Corp. Industrial Div.	Det Riv	97 mgd		Process & Cooling	None	N C SusS	Det Riv
	City of Wyandotte			Potable & Sanitary			County Sewers

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

DETROIT RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Pennsalt Chem.Corp. Organic Chem. Div.	Det Riv	6.77 mgd		Process & Cooling	CC OWS P	N S P pH O X	Monguagon Cr.
	City of Wyandotte			Potable & Sanitary			County sewers
Firestone Tire & Rubber Co.	Det Riv & City	1.03 mgd	A SA F	Process & Cooling	OWS P	A pH O Fe SusS	Det Riv
	City of Wyandotte	12,000 gpd (est)		Potable & Sanitary			County Sewers
McLouth Steel Trenton	Det Riv	65.67 mgd		Process & Cooling	GC CC Cl St OC SS	SusS O Fe T	Det Riv
	City	(1962) 2.282 mgy		Potable & Sanitary	2.06 mgd to Wayne Co		County Sewers
Mobil Oil Co.	Det Riv	1.12 mgd		Process & Cooling	Ps P OWS CC AF DF Dp	Salt P X O	Det Riv
	City			Potable & Sanitary			County Sewers
Chrysler Corp. Engine Plt.	City	75,000 gpd		Potable & Sanitary	Wayne Co		County Sewers
	City	1.1 mgd		Process & Cooling	OWS AF CC	O	Elizabeth Park Cr.

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

DETROIT RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Detroit Edison Trenton Channel	Det Riv	250,000 gpm (Max.)	Scr Chl	Cooling	None	T	Det Riv
	City			Potable & Sanitary			County Sewers
Monsanto Chemical	Det Riv	5.76 mgd		Cooling	P	T Phosphates	Det Riv
	City	12.5 mgd		Process			Det Riv
Shawinigan Resins Corp. & Monsanto Saflex Div.	Det Riv	383,000 gpd		Process & Cooling	P N	pH B SusS	Det Riv
	City	33,000 gpd		Potable & Sanitary			County Sewers
Chrysler Corp. Amplex Div.	Det Riv	0.317 mgd		Cooling	None		Det Riv
	City			Potable & Sanitary			County Sewers
Chrysler Corp. Cycleweld	Det Riv	0.265 mgd		Cooling	None		Det Riv
	City	5,000 gpd		Potable & Sanitary			County Sewers

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

DETROIT RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
McClouth Steel Gibraltar	Det Riv	1.64 mgd		Process & Cooling	OWS P	A Fe O pH SusS	Frank & Poet Drain
	City	55 gpm		Potable & Sanitary			County Sewer

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

ROUGE RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Allied Chem. Semet-Solvay Div.	Det Riv	6 mgd	Scr	Process	Dp OWS	O P	Rouge OC
	City			Boilers	None		Det Riv
		1.12 mgd		Process	Dp	P O	Det Riv
				Sanitary			City Sewers
(Plastics Div.) Allied Chem.	Det Riv	0.475 mgd		Cooling & Process	Dp PS E	P O	Rouge OC
	City			Potable & Sanitary			City Sewers
Peerless Cement Co. East Plant	Riv Rouge	7.93 mgd		Cooling & Process	None	SusS	Rouge OC
	City			Potable & Sanitary			City Sewers
Scott Paper Co.	Rouge Riv	50 mgd	Lime Soda Softening	Process	Cl	B SusS A pH P	Rouge OC
	City			Potable & Sanitary			City Sewer

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

ROUGE RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituent	Discharge Pt.
Allied Chem. General Chem. Div.	Rouge Riv	9.11 mgd	Chl	Process	P	A pH	Rouge SC
	City			Potable & Sanitary	SSP		County Sewers
American Agric. Chem. Co.	Rouge Riv	0.577 mgd		Cooling & Process Potable & Sanitary	None	Fl pH	Rouge Riv
Ford Motor Co. Rouge Complex	Rouge OC	350-600 mgd	Scr	Cooling Process	GC Cl OWS ST DF	SusS P Cn N O pH	Riv Rouge & UG
	All Sources	913 mgd (1963)					
	City			Potable & Sanitary			City Sewers
Darling & Co.	Rouge Riv	1.13 mgd		Process & Cooling	Chl P	Bact SusS B N O	Rouge Riv

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

LAKE ERIE

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge PT.
Detroit Edison Enrico Fermi	Lake Erie	135,000 gpm		Cooling & Condensing	N.A.	T	Swan Cr. & Lake Erie
	Lake Erie	16,100 gpd		Demineralizing Regenerating			Swan Cr. & Lake Erie
		200 gpm		Potable & Sanitary			Swan Cr. & Lake Erie

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

RAISIN RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Ford Motor Co. Monroe	Lake Erie	2.0 mgd	F Chl	Cooling & Process	CC Cl		Raisin Riv
	Lake Erie	126 mgd		Dilution		Cn O	Raisin Riv
	Lake Erie	0.168 mgd	F Chl	Potable & Sanitary	PS Chl	Bact	Raisin Riv
Consolidated Paper Southside Plant	Lake Erie & Wells	7 mgd		Process	Cl	Bact SusS B	Raisin Riv
	City			Sanitary & Potable			City Sewer
River Raisin Paper		4.573 mgd		Process	CC Cl	SusS B	Mason Run
	City			Potable & Sanitary			City Sewer
Consolidated Paper Northside Plant	Lake Erie	7.533 mgd		Process	CC Cl	SusS B Bact	Mason Run& Raisin Riv
	City			Sanitary & Potable			City Sewer

TABLE 7-II. INDUSTRIAL WATER SUPPLY AND WASTE DISPOSAL (CONTINUED)

RAISIN RIVER

Industry	Water				Waste		
	Source	Amount	Pre Treatment	Use	Final Treatment	Major Constituents	Discharge Pt.
Consolidated Paper Westside Plant	Raisin Riv	1.15 mgd		Process	CC Cl		
	City			Sanitary & Potable		B	City Sewer
Monroe Auto Equipment Co.	City	0.0157 mgd		Process		O	Raisin Riv & City
	City			Potable & Sanitary			City Sewer
Monroe Paper Products	Raisin Riv	2.21 mgd		Process	CC Cl	SusS B Bact	Raisin Riv
	City			Potable & Sanitary			City Sewer

MUNICIPAL WATER USES

The data presented in Table 8-II have been extracted from the State of Michigan, Municipal Water Facilities Inventory as of January 1, 1963. This inventory was recently updated by the Michigan Department of Health to reflect changes which have occurred since the last published inventory of 1958. Locations of municipal water intakes in the study area are shown in Figures 6-II.

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Detailed Notes for Columns:

Column 1 - Community

Communities which serve one or more additional communities are preceded by an asterisk.

Column 3 - Estimated Population Served (1963)

This is the estimated total number of people served by the facility shown in Column 6 - Source of Supply. The number enclosed in parentheses indicates the people are served by some other facility.

Column 4 - Number of Accounts

This number represents the total number of accounts served by the facility.

Column 5 - Number of Meters

This number represents the total number of meters used in the water system.

Column 6 - Source of Supply

The following are the abbreviations used and for what they stand:

W.C.M.W.A. - Wayne County Metropolitan Water Authority.

W.C.M.W.S. - Wayne County Metropolitan Water Supply.

Column 7 - Rated Capacity

This figure is the maximum rated capacity (MGD) on the basis of design, where possible.

Column 8 - Average Daily Output

This column contains the average daily output of the system during 1962 or the latest year of record if not otherwise noted.

Column 9 - Treatment

Where the treatment is at all extensive, one or more symbols identifying the general type or function of the plant precede those used to identify the particular treatment plant or method. In general, a plant is not classified

as a "purification plant" unless filters having fine granular material (sand or anthracite) are used.

Principal treatment features, identified by capitalized letters, are further described by lower case letters following them. In general, the symbols are arranged in the order in which treatment occurs. Combination units performing more than one function in a single structure are denoted by enclosing the appropriate symbols in parentheses. Enclosures in brackets indicate parallel or alternate operation.

Treatment methods are coded as follows:

Type of Plant

P - Purification
H - Softening
I - Iron or manganese removal

Treatment or Device

A - Aeration
  Ac .. contact beds or trays, coke or other material
  Am .. patented aerator
  As .. spray aerator
  At .. overflow trays cascade or other splash aerator
  Ao .. other type aerator
  Af .. forced draft aerator

C - Chemical dosage for coagulation or softening
  Ca .. alum
  Ci .. iron salts
  Cl .. lime
  Cs .. soda ash
  Ct .. activated silica
  Co .. other coagulant

D - Disinfection
  Dc .. chlorine gas
  Dd .. dechlorination
  Dh .. hypochlorites
  Ds .. free residual chlorine
  Dx .. chlorine dioxide
  Dz .. ozone
  Do .. other means

F - Filters
- Fa .. anthrafilt
- Fe .. roughing or contact
- Fd .. diatomaceous earth
- Fg .. gravity (slow)
- Fp .. pressure
- Fr .. gravity (rapid)
- Fs .. sand
- Fz .. zeolite
- Fm .. micro strainers

K - Chemical dosage for corrosion correction or water stabilization
- Kc .. phosphate compounds
- Kg .. chlorine gas
- Kh .. hypochlorite
- Ko .. sodium silicate
- Kp .. alkali feed for pH adjustment

M - Mixing device or tank
- Ma .. air agitation
- Mb .. baffle mix
- Mh .. hydraulic (standing wave flume)
- Mi .. injection or pump suction
- Mp .. slow mechanical mix
- Ms .. patented sludge blanket
- Mt .. rapid mechanical mix
- (MtpsSv) .. "Liquon Reactor"; "Accelator"; or "Precipitator"

N - Ammoniation
- Nc .. ammonium compound
- Ng .. ammonia gas

R - Recarbonation

S - Sedimentation
- Sb .. basins, baffled (other than inlet or outlet)
- Sc .. covered basins (other than housed)
- Sm .. mechanical sludge removal
- So .. open basin (may be in plant building)
- Sv .. upflow cylindrical tanks
- (MtpsSv) .. "Liquon Reactor"; "Accelator"; or "Precipitator"

T - Chemical taste and odor control
- Tc .. activated carbon
- Td .. chlorine dioxide
- Ts .. sulfur dioxide
- Tz .. ozone
- To .. other

V - Fluoride adjustment
- Va .. hydrofluosilicic acid
- Vs .. sodium silicofluoride
- Vt .. sodium fluoride
- Ve .. ammonium silicofluoride
- Vo .. other fluorides
- V .. fluoride reduction
- $V_{1.2}$ - 1.2 ppm natural fluoride

TABLE 8-II. MUNICIPAL WATER USE

Community	County	Estimated Population Served 1963	Number of Accounts	Number of Meters	Source of Supply	Rated Capacity (MGD)	Average Daily Output (MGD)	Treatment
Allen Park	Wayne	(37,800)	10,133	10,133	W.C.M.W.S.	-	-	-
Berkley	Oakland	(23,300)	6,618	6,618	S.E.O.W.A.	-	-	-
Beverly Hills	Oakland	(5,000)	x	x	S.E.O.W.A.	-	-	-
Birmingham	Oakland	(25,500)	7,716	7,716	S.E.O.W.A.	-	-	-
Brownstown Twp.	Wayne	(4,000)	364	364	Flat Rock W.C.M.W.S.	-	-	
Canton Twp.	Wayne	(300)	75	75	Detroit	-	-	
Centerline	Macomb	(10,200)	2,231	2,231	Detroit	-	-	
Clawson	Oakland	(14,900)	4,193	4,193	S.E.O.W.A.	-	-	
Dearborn	Wayne	(112,500)	32,366	32,366	Detroit	-	-	
Dearborn Twp.	Wayne	(79,800)	17,571	17,571	W.C.M.W.S.	-	-	
Detroit	Wayne	(3,211,600)	389,000	389,000	Detroit River	1114	487	P-Dc Ca Tc Mtbp Sc Frs Dc
Detroit Water Wks. Pk. Plt.		760,000 ('58)				320	191 ('58)	
Detroit Spring-wells Plt.		673,000 ('58)				452	163 ('58)	

TABLE 8-II. MUNICIPAL WATER USE (CONTINUED)

Community	County	Estimated Population Served 1963	Number of Accounts	Number of Meters	Source of Supply	Rated Capacity (MGD)	Average Daily Output (MGD)	Treatment
Detroit Northeast Plt.		477,000 ('58)				192 ('63)	115 ('58)	
Detroit Southwest Plt.		200,000			Detroit River	150	75 (est)	
East Detroit	Macomb	(45,800)	12,482	12,482	Detroit	-	-	
Ecorse	Wayne	(17,400)	4,505	4,505	Detroit			
Farmington	Oakland	(6,900)	2,137	2,137	Detroit			
Farmington Twp.	Oakland	(2,900)	780	780	Detroit			
Ferndale	Oakland	(31,400)	9,745	9,745	Detroit			
Flat Rock	Wayne	7,000			Huron River		1.0	P-Dc Calo (MtpsSV) Frs Dc Kc
Garden City	Wayne	(38,300)	9,506	9,506	W.C.M.W.S.	-	-	
Gibraltar	Wayne	(2,500)	835	835	W.C.M.W.S.	-	-	
Grosse Ile Twp.	Wayne	(6,700)	1,770	1,770	W.C.M.W.S.	-	-	
Grosse Pointe Pk.	Wayne	(15,400)	3,995	3,995	Detroit	-	-	
Grosse Pointe Shores	Wayne	(2,400)	725	725	Detroit	-	-	

TABLE 8-II. MUNICIPAL WATER USE (CONTINUED)

Community	County	Estimated Population Served 1963	Number of Accounts	Number of Meters	Source of Supply	Rated Capacity	Average Daily Output	Treatment
Grosse Pointe Woods	Wayne	(18,800)	5,563	5,563	Detroit	-	-	
Hamtramck	Wayne	(34,100)	7,867	7,867	Detroit			
Harper Woods	Wayne	(20,000)	5,318	5,318	Detroit			
Hazel Park	Oakland	(25,300)	7,526	7,526	Detroit via Royal Oak Twp.	-	-	
Huntington Woods	Oakland	(8,700)	2,413	2,413	S.E.O.W.A.	-	-	-
Huron Twp.	Wayne	(800)	222	222	Detroit			
Inkster	Wayne	(39,100)	9,959	9,959	Detroit	-	-	
Lathrup Village	Oakland	(3,600)	1,066	1,066	S.E.O.W.A.	-	-	
Lincoln Park	Wayne	(54,000)	14,751	14,751	Detroit	-	-	
Livonia	Wayne	(67,500)	18,125	18,125	Detroit	-	-	
Madison Heights	Oakland	(33,400)	8,975	8,975	Detroit via Royal Oak Twp.			
Melvindale	Wayne	(13,100)	3,648	3,648	Detroit			
Monroe	Monroe	24,500	8,000	8,000	Lake Erie	8.0	3.0	PDc Cal MSv Frs Ng Vs

TABLE 8-II. MUNICIPAL WATER USE (CONTINUED)

Community	County	Estimated Population Served 1963	Number of Accounts	Number of Meters	Source of Supply	Rated Capacity (MGD)	Average Daily Output (MGD)	Treatment
Nankin Twp.	Wayne	(43,600)	12,310	12,310	Detroit-Flat Rock			
Oak Park	Oakland	(36,700)	9,480	9,480	Detroit			
Pleasant Ridge	Oakland	(3,800)	1,236	1,236	S.E.O.W.A.			
Plymouth Twp.	Wayne	(3,000)	800	800	Detroit			
Pontiac	Oakland	(80,000)	21,088	19,319	From Wells to Detroit in 63		9.145	Wells-DcDhKc
Redford Twp.	Wayne	(71,600)	18,550	18,550	Detroit	-	-	-
River Rouge	Wayne	(18,200)	4,024	4,024	Detroit			
Riverview	Wayne	(6,800)	1,760	1,760	W.C.M.W.A.			
Rockwood	Wayne	(2,200)	-	-	Flat Rock			
Romulus Twp.	Wayne	(9,900)	2,679	2,679	W.C.M.W.A.			
Roseville	Macomb	(50,900)	12,800	12,800	Detroit			
Royal Oak	Oakland	(82,000)	21,720	21,720	Detroit			
S.E.O.W.A.	Oakland	-	-	-	Detroit			

TABLE 8-II. MUNICIPAL WATER USE (CONTINUED)

Community	County	Estimated Population Served 1963	Number of Accounts	Number of Meters	Source of Supply	Rated Capacity (MGD)	Average Daily Output (MGD)	Treatment
Southgate	Wayne	(29,500)	7,489	7,489	Detroit			
Southfield	Oakland	(28,500)	6,716	6,716	S.E.O.W.A.			
St. Clair Shores	Macomb	(76,900)	21,108	21,108	Detroit			
Sterling Twp.	Macomb	(8,100)	2,355	2,355	Detroit			
*Sycamore Beach	Monroe	200	50	x	Well			
Taylor Twp.	Wayne	(50,000)	13,875	13,875	Detroit			
Trenton	Wayne	(19,000)	5,036	5,036	W.C.M.W.A.			
Troy	Oakland	19,058	x	x	Detroit in 1963			
Utica	Macomb	1,400	696	687	Clinton Riv to Detroit '63			
W.C.M.W.A.	Wayne	-	-	-	Detroit			
W.C.M.W.S.	Wayne	-	-	-	Detroit			
Warren	Macomb	(95,300)	27,222	27,222	Detroit			
Wayne	Wayne	(16,400)	4,413	4,413	W.C.M.W.A.			

TABLE 8-II. MUNICIPAL WATER USE (CONTINUED)

Community	County	Estimated Population Served 1963	Number of Accounts	Number of Meters	Source of Supply	Rated Capacity (MGD)	Average Daily Output (MGD)	Treatment
Wyandotte	Wayne	43,900	12,523	12,523		10	6.0	P-DcS Cal MlpVs TcdSc Frs Kc

DOMESTIC WASTE TREATMENT AND DISPOSAL

The major municipal sewage treatment facilities discharging into waters within the Project's study area are tabulated in Table 9-II. Smaller public systems are operated for the express purpose of serving subdivisions or housing areas. The majority of these smaller facilities are located within Grosse Ile Township. Figures 6-II and 7-II represent the location of the municipal water intakes in relation to domestic waste treatment plants and outfalls in both the Detroit River and Lake Erie.

TABLE 9-II. DOMESTIC WASTE TREATMENT AND DISPOSAL

Location of Plant	Population Served	Number of Political Subdivisions Served	Average Flow(MGD)	Treatment* Facilities	Point of Discharge
Belle Isle	450(est.)	1	0.3	Cp X Gh	Detroit River
Detroit	2,782,000	50	548	Sm Gm Eg (Dfrh Zy Zil)	Detroit River
Flat Rock	4,700	1	0.8	Sh Gm Eg X	Huron River
Grosse Ile (Wayne Co.)	700(est.)	1	0.35	Cm Eg C X	Detroit River
Monroe	22,000	1	6.0	Sc Gm Cm Eg C Dfrtsh Bo	Raisin River
Riverview (New)	8,000(est.)	1	1.0(est.)	Cp Egc Gm H Sm X	Detroit River (Trenton Channel)
Rockwood	2,000	1	0.26	Sh Cm Eg X	Huron River
Trenton (Wayne Co.)	20,000	3	2.25	Sm Cm Eg C	Detroit River (Trenton Channel) (Elizabeth Park Canal)
Trenton (New)	20,000	3	2.25(est.)	Cp Eg C Gm H Sch Vv Xn Zcil	Detroit River (Trenton Channel) (Elizabeth Park Canal)
Wyandotte (Wayne Co.)	275,000	10	25	Sc Gm Cm Eg C H Vv Xn Zil	Detroit River (Trenton Channel)

*See Key to Symbols which follows

Key to symbols Table 9-II:

B - Sludge beds
  Bo ..Open

C - Settling tanks
  Cm ..Mechanically equipped
  Cp ..Plain, hopper bottom or intermittently drained for cleaning

D - Digester, separate sludge
  Df ..With floating cover
  Dh ..Gas used in heating
  Dr ..Heated
  Ds ..Gas storage in separate holder
  Dt ..Stage digestion

E - Chlorination
  Ec ..With contact tank
  Eg ..By chlorine gas

G - Grit chambers
  Gl ..Without continuous removal mechanism
  Gm ..With continuous removal mechanism

H - Sludge storage tanks

S - Screens
  Sc ..Comminutor
  Sl ..Bar rack, hand cleaned
  Sm ..Mechanically cleaned

V - Mechanical sludge dewatering
  Vv ..Rotary vacuum filter

X - Sludge disposal
  Xn ..incinerated

Z - Sludge conditioning
  Zi ..Chemicals used, iron salt
  Zl ..Chemicals used, lime
  Zy ..Elutriation

STORMWATER OVERFLOWS

Table 10-II and Figure 7-II give the location of all the stormwater overflows which may have a significant effect on the Detroit River. In most cases the overflows are located by the names of the streets to which they are nearest. The outfalls are listed from upstream to downstream.

TABLE 10-II. STORMWATER OVERFLOW LOCATIONS

CITY OF DETROIT

Location	No. and Size	Receiving Water
Fox Creek	2 - 10'0"x10'0" 1 - 12'0"	Fox Creek
Conners Creek	3 - 18'6"x21'9" 3 - 14'0"x14'0"	Conners Creek
Fischer	1 - 13'9"	Detroit River
Iroquois	6 - 4'8"	"
E. Grand Blvd.	1 - 11'0"	"
Helen	1 - 9'0"	"
Mt. Elliott	4 - 5'0"	"
Lieb	2 - 10'0"x10'6"	"
Adair	1 - 5'0"	"
Jos. Campau	3 - 6'0"x8'8"	"
Chene	2 - 3'8"	"
Dubois	2 - 5'0"x4'9" 1 - 4'9"	"
St. Aubin	1 - 5'0"	"
Orleans	1 - 3'0"	"
Hastings	1 - 5'0"	"
St. Antoine	1 - 5'0"	"
Beaubien	1 - 3'0"	"
Brush	1 - 2'6"x3'0"	"
Randolph	1 - 8'0"	"
Bates	1 - 13'6"	"
Woodward	2 - 6'8" 1 - 8'0"	"

TABLE 10-II. STORMWATER OVERFLOW LOCATIONS (CONTINUED)

CITY OF DETROIT

Location	No. and Size	Receiving Water
Griswold	1 - 7'0"	Detroit River
Cass	2 - 4'0"x5'0'	"
First	2 - 10'0"x10'6"	"
Second	1 - 4'9½"x5'7" arch 1 - 5'0"x5'7" arch	"
Third	3 - 4'0" arches	"
Brooklyn	1 - 2'0"	"
S. of Tenth	2 - 5'0"	"
Twelfth	2 - 4'0	"
Fourteenth	2 - 4'3"	"
Eighteenth	2 - 5'3"	"
Twenty-first	1 - 4'6"x6'0" oval	"
Twenty-fourth	1 - 8'0"	"
W. Grand Blvd.	1 - 3'0"	"
Swain	1 - 3'0"	"
Scotten	2 - 4'8"	"
McKinstry	2 - 4'6"	"
Summit	3 - 7'6"x8'8"	"
Ferdinand	2 - 4'6"	"
Morrell	4 - 5'0"	"
Junction	1 - 13'0"	"
Campbell	1 - 6'6" 1 - 6'2" 1 - 6'3"	" " "

TABLE 10-II. STORMWATER OVERFLOW LOCATIONS (CONTINUED)

CITY OF DETROIT

Location	No. and Size	Receiving Water
Dragoon	1 - 10'6"	Detroit River
Schroeder	2 - 5'3" 1 - 6'10"	" "
Fort Cutoff & Dearborn Ave.	6 - 4'6" x 4'0" F. Gates	Rouge River
Flora & Reisener	2 - 1'0" F. Gates	"
Pulaski	1 - 5'0" 1 - 6'6"	"
Dearborn Ave.	1 - 5'9"	"
Gary	2 - 3'0"	"
Anderson	1 - 3'0"	"

CITY OF DEARBORN

Westwood	1 - 2'6"	L. Rouge River
Silvery Lane	1 - 3'0"	"
1000' W. of Telegraph	1 - 8'0"	"
Telegraph	1 - 8'0" 1 - 7'6"	"
1000' E. of Telegraph	1 - 1'0"	"
Outer Drive	1 - 4'0" 1 - 10'0"	"
Reginald	1 - 9'6"	"
Military	1 - 6'3"	"
Monroe	1 - 2'6"	"
Willoway	1 - 4'6"	"
750' E. of East End of Garrison	1 - 4'9"	"

TABLE 10-II. STORMWATER OVERFLOW LOCATIONS (CONTINUED)

CITY OF DEARBORN

Location	No. and Size	Receiving Water
2000' W. of Southfield Road	1 - 11'6"	Rouge River
2000' E. of Southfield Road	1 - 12'0"	"
2500' E. of Southfield Road	1 - 10'0"x12'9"	"
N. Dearborn Road & Rotunda Drive	1 - 5'0"x10'0"	"
Ford Motor Company Boat Slip	1 - 10'0"x12'6" 1 - 10'x0"x11'6" 1 - 10'0"x11'0"	" " "

CITY OF RIVER ROUGE

Jefferson	1 - 6'0"	Rouge River

CITY OF ECORSE

Southfield	1 - 4'0"	Detroit River

CITIES OF ALLEN PARK AND LINCOLN PARK

White	1 - 5'6"	Ecorse River
Farnham	1 - 5'6"	"
Near Junction of S. Branch	2 - 9'0"x9'0" 1 - 5'6"	"

CITY OF WYANDOTTE

Perry	1 - 3'6"	Detroit River
Superior Blvd.	1 - 3'0" 2 - 4'0"	"
Orange	1 - 3'0"	Trenton Channel
Ludington	1 - 3'0"	"

TABLE 10-II. STORMWATER OVERFLOW LOCATIONS (CONTINUED)

CITY OF RIVERVIEW

Location	No. and Size	Receiving Water
Pennsalt Chemical Company Property	1 - 4'0"x4'0"	Trenton Channel
Sibley	1 - 3'6"	"
	CITY OF TRENTON	
Elm	1 - 4'6"	Trenton Channel
Elizabeth	1 - 2'6"	Elizabeth Park Canal
S. of Detroit Edison Co.	Unknown	" " "

WATER USE AT FEDERAL INSTALLATIONS

A description of the efficiency of operation and needs for water pollution control at Federal installations within the Project area is given in a separate section of this report concerned with the evaluation of pollution problems presented by Federal operations.