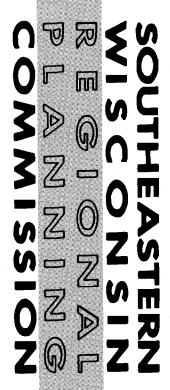
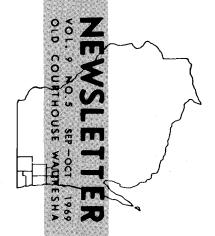
# VOLUME 1 OF FOX RIVER WATERSHED STUDY PLANNING REPORT PUBLISHED

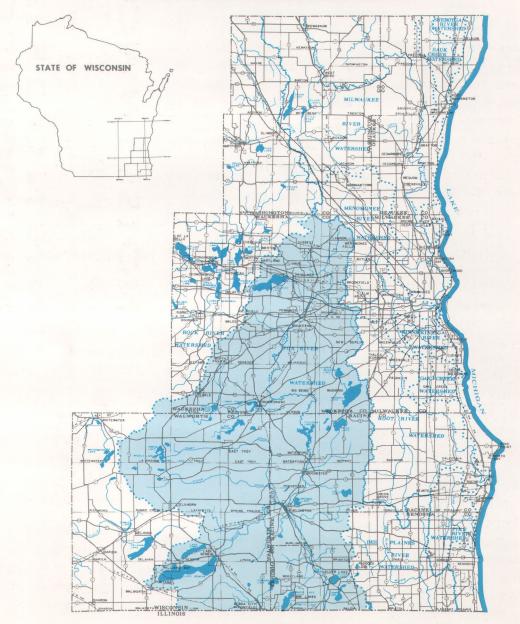
The first volume of a two-volume planning report documenting the findings and recommendations of the comprehensive Fox River Watershed Study has been published by the Commission. This first volume, SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed, Volume 1, Inventory Findings and Forecasts, sets forth the basic concepts underlying the comprehensive watershed study and presents in summary form the factual findings of the extensive inventories conducted under the study. It also identifies and, to the extent possible, quantifies the developmental and environmental problems of the watershed and sets forth forecasts of economic activity, population growth, and resultant demands for land use and natural resources. The Fox River watershed, with an area of 942 square miles, is the largest natural surface water drainage unit in the Region and comprises 35 percent of the total regional area. The watershed occupies portions of six of the seven counties comprising the Region and portions or all of nine cities, 19 villages, and 36 towns. The location of the Fox River watershed in the Region is shown on Map 1.

The second volume of the report will present the watershed development objectives and standards; alternative land use, natural resource protection, recreation-related resource development, flood control, water pollution abatement, and water supply plan elements; a recommended comprehensive watershed development plan; and plan implementation recommendations. The final volume





Map I LOCATION OF THE FOX RIVER WATERSHED IN THE SOUTHEASTERN WISCONSIN REGION



will be issued upon completion of public hearings on the alternative plan elements, as well as on the recommended plan, to be held in each of the four counties which contain major portions of the Fox River watershed—Kenosha, Racine, Walworth, and Waukesha.

### STUDY ORGANIZATION

The Fox River Watershed Study has been conducted under the guidance of the Fox River Watershed Committee, an advisory committee to the Commission, composed of 39 elected and appointed public officials, technicians, and citizen leaders from throughout the watershed. The technical work has been carried out jointly by the Commission staff; cooperating governmental agencies, including the U.S. Department of Agriculture, Soil Conservation Service; the U.S. Department of Interior, Geological Survey; and the Wisconsin Conservation Commission (now the Wisconsin Department of Natural Resources); and by private consultants engaged by the Commission, including the Harza Engineering Company of Chicago, Illinois, and Alster & Associates, Inc., of Madison, Wisconsin. While the Fox River Watershed Committee has been meeting since 1962 in efforts to study the problems of the watershed and to formulate recommendations concerning their resolution, the actual planning program was carried out over a four-year period, beginning in 1965.

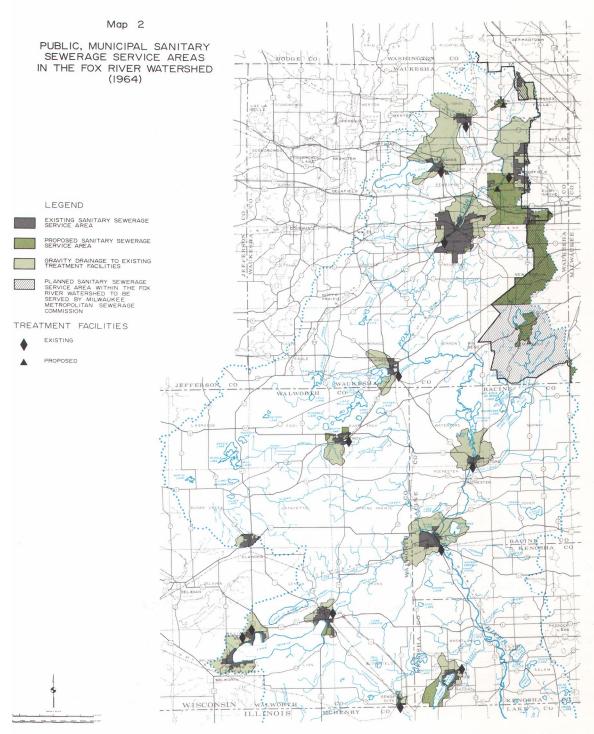
HIGHLIGHTS OF INVENTORY, ANALYSIS, AND FORECAST FINDINGS

Some of the more salient findings contained in the planning report are summarized as follows:

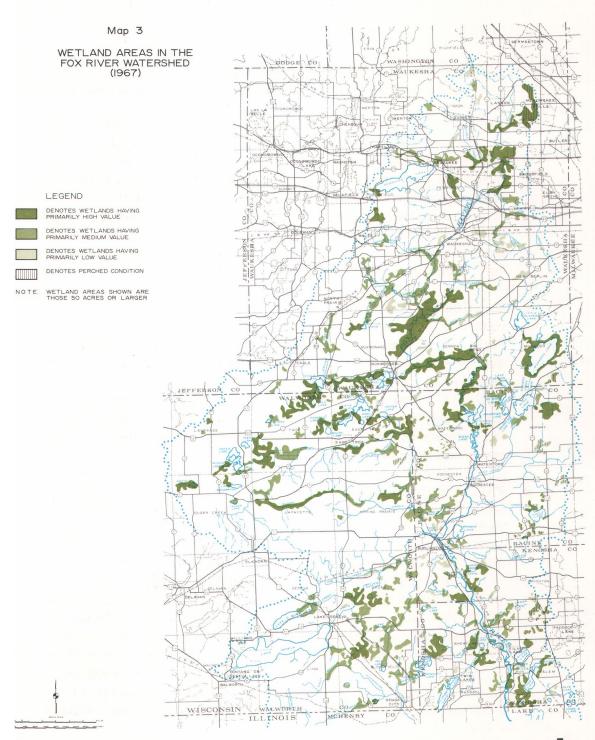
The resident population of the watershed is anticipated to increase to 359,000 persons by 1990, an increase of 199,000 persons, or about 125 percent, over the present population of about 160,000 persons in approximately 25 years. The water-

shed is expected to account for an increasing proportion of the regional population, increasing from about 9 percent at the present time to over 13 percent by 1990.

- Land within the watershed is undergoing a rapid transition from rural to urban use, with urbanization being particularly rapid in the headwater areas and adjacent to the major lakes and streams. Forty percent of the watershed residents live within the headwater area above Waukesha, which area, however, comprises only 14 percent of the total watershed area. The concentration of population and urban land uses in the headwater reaches and surrounding the major lakes is a major factor contributing to the serious environmental problems of the watershed.
- Continuation of present development trends in the watershed may be expected to result in an increase in urban land use from 105 square miles at present to 201 square miles by 1990. This demand for urban land would have to be satisfied primarily by the conversion of agricultural lands, woodlands, and wetlands, which collectively may be expected to decline from 833 square miles at present to 737 square miles by 1990.
- The construction of public sanitary sewer and water supply facilities has not kept pace with the rapid urbanization occurring in the watershed. Only 32 percent of the developed area of the watershed and 41 percent of the watershed population are currently served by public sanitary sewerage facilities (see Map 2). Only 34 percent of the developed area and 45 percent of the population are served by public water supply facilities. About 56 percent of the total area of the watershed is covered by soils poorly suited for intensive urban development without public sanitary sewer service.



- Significant wetlands cover an aggregate area of 83 square miles, or about 8.6 percent of the watershed area (see Map 3); 10 percent of this total is currently in public ownership. Such wetlands, which are very important to maintaining the overall quality of the environment within the watershed, are being destroyed at the rate of about two square miles per year. At the time of settlement by Europeans, there were about 217 square miles of wetlands within the watershed; thus, over half of these wetlands have been destroyed.
- Significant woodlands cover an aggregate original area of 105 square miles, or about 11 percent of the watershed area; 11 percent of this total is currently in public ownership. The loss of woodlands, presently estimated at about 350 acres per year, is expected to accelerate sharply in the future as many of the evenaged woodlands mature and die. At the time of settlement by Europeans, there were about 490 square miles of woodlands in the watershed; thus, almost 80 percent of this original woodland cover has been destroyed.
- The participant demand for water-based outdoor recreational activities in the watershed, such as swimming, fishing, and boating, may be expected to increase from 100,286 to 285,091 participants on an average seasonal Sunday by 1990, almost tripling.
- The Fox River is a naturally well-regulated hydraulic system with a profusion of natural surface water storage areas that decrease peak stream discharges during flood times and increase the duration of runoff. This is illustrated by the fact that the peak discharge of the 100-year recurrence interval flood on the Fox River watershed is 9,400 cubic feet per second (cfs), or only 10.8 cfs per square mile of tributary watershed area. Compa-



rable flows of the Milwaukee River are 17,500 cfs, or 25.5 cfs per square mile; and on the Root River, 9,900 cfs, or 53 cfs per square mile. This highly desirable river characteristic should be maintained through the preservation of these natural surface water storage areas, such as the Menomonee Falls-Tamarac Swamp, the Brookfield-Capitol Drive Marsh, and the Vernon Marsh, if future increases in flooding are to be avoided. The floodplains of the perennial stream network together comprise less than 7 percent of the total area of the watershed. At this time about 2.8 square miles, or 4 percent, of the floodplains have been developed for urban use.

While the March-April 1960 flood event on the Fox River was the most damaging flood within the watershed on record, its recurrence interval was calculated to be only 37 years; that is, a flood of this magnitude has about a 3 percent chance of occurrence in any year. The 1960 flood caused total monetary damages of about \$500,000 within the watershed, of which about 18 percent were inflicted upon public property, and 78 percent upon private, nonagricultural property. About 62 percent of the damages occurred to residences located in the floodplains. Reaches of particularly heavy damages included the City of Waukesha, with total damages exceeding \$128,000; the City of Burlington, with total damages exceeding \$29,000; the Town of Wheatland, with total damages exceeding \$146,000; the Town of Salem, with total damages exceeding \$57,000; and the Village of Silver Lake, with total damages exceeding \$32,000. If urban development continues unregulated within the riverine areas, additional floodplain land will be developed; and the average annual flood damage risk may be expected to increase from the current level of \$77,000 per year to about \$112,000 per year in 1990, while damages resulting from a single 100-year recurrence interval flood may be expected to increase from the present level of \$857,000 to \$1,500,000.

- The activities of man within the watershed have created serious water pollution problems. If existing development trends in the upper Fox River watershed continue and if the level of sewage treatment is not substantially improved, future water quality conditions in the upper watershed area may be expected to be unsuitable for all uses except the assimilation of waste.
- Twelve major municipal sewage treatment plants and 19 industries discharge partially treated wastes to the surface waters of the watershed. Almost 75 percent of the total pollution load is discharged in and above the City of Waukesha. This area of the watershed also contains the reaches of lowest streamflow. Presently, about 75 percent of the low flow of the Fox River just below Waukesha consists of sewage treatment plant effluent. Waste discharges above Waukesha include the sewage treatment plants at Brookfield, Sussex, and Pewaukee, serving a combined population of 6,500 persons and discharging effluent at an average rate of 1.3 cubic feet per second (cfs). If existing development trends continue, these plants will serve a combined population of 98,000 persons by 1990 and will discharge effluent at an average rate of 27.5 cfs, over 20 times the present rate. Approximately 90 percent of the low flow of the Fox River below Waukesha may then be expected to consist of sewage treatment plant effluent; anaerobic conditions may be expected to develop in the stream; and the impoundment in Waukesha may be expected to function essentially as a large oxidation pond.
- Ground water is presently the principal source of domestic, municipal, agricultural, and industrial water supply within the watershed. Water use within the watershed presently totals 24.5 million gallons per day (mgd), averaging 150 gallons per capita per day (gpcd) but ranging from a high of 180 gpcd in highly industrialized Waukesha to 60 gpcd in rural-urban fringe

area residential subdivisions. About 65 percent of the total municipal supply is obtained from the deep sandstone aquifer and 35 percent from the shallow aquifer underlying the watershed. Total water use within the watershed may be expected to more than double within the watershed by 1990, reaching an approximate total pumping rate of 65 million gallons per day, or 23.7 billion gallons per year. Municipal use, dependent almost entirely on the deep aquifer, may be expected to comprise almost 80 percent of this future total water use.

- Of the 12 major lakes in the watershed sampled, all but two-Eagle and Long Lakes-were found to have coliform bacterial levels exceeding 1,000 MFCC/100 ml, the maximum concentration permitted by the Wisconsin water quality standards for whole-body-contact recreation use. Only eight contain dissolved phosphorus concentrations in the spring that are below the 0.015 mg/l threshold concentration for algal blooms. An additional 27 lakes are characterized by spring phosphorus concentrations that exceed the threshold concentration of 0.015 mg/l but are less than the average regional dissolved phosphorus level of 0.05 mg/l. These lakes may be classified as moderately fertile, and problems of algae and weed growth may be expected in many of these lakes. The remaining 10 lakes contain dissolved phosphorus concentrations substantially in excess of the average regional level of 0.05 mg/l and may be classified as highly fertile. Frequent problems from nuisance growths of algae and aquatic weeds may be expected in these lakes. Of these 10 excessively fertile lakes, seven, including Wind, Tichigan, Pewaukee, Buena, Long, Little Muskego, and Browns, also contain levels of chloride ions indicative of pollution.
- Three-fourths of the phosphorus and slightly less than one-half of the nitrogen presently entering the lakes are estimated to be derived from human activities in the watershed. Major artificial

sources of nutrient contributions to lakes in the watershed are drainage from septic tanks and runoff from agricultural lands on which artificial fertilizer and manure have been spread while the soil is frozen. Unless effective water quality management programs are mounted, the rapid rate of eutrophication of the lakes within the watershed can be expected to continue; and the number of lakes suitable for recreation and aesthetic enjoyment will continue to decrease in the future.

### REPORT AVAILABILITY

SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed, Volume 1, Inventory Findings and Forecasts, set forth in 445 pages of text and illustrations, is now available from the Commission offices at a price of \$10.00 inside the Southeastern Wisconsin Region and \$15.00 outside the Region. Pursuant to Commission policy, all local units of government within the Fox River watershed will receive copies of this report in the very near future.

### SEWRPC NOTES

## REGIONAL AIRPORT PLANNING PROGRAM PROSPECTUS PUBLISHED

The Commission has completed and published a Comprehensive Regional Airport Planning Program Prospectus. As noted in an earlier issue of this Newsletter, the Commission had received requests from Milwaukee County and the Wisconsin Department of Transportation to undertake a comprehensive airport system planning program for the Region. Acting on these requests, an eleven-member Technical Coordinating and Advisory Committee on Regional Airport Planning was established and given

the charge of preparing a Prospectus which would establish the need for a regional airport planning program; outline the scope, content, and timing of such a program; and recommend the means for establishing, organizing, and accomplishing the program. This Committee has now completed its initial work with the publication of the Prospectus.

The Committee found that five factors require the preparation of a comprehensive regional airport system plan for the Southeastern Wisconsin Region at this time. These are:

- Rapid population growth and concomitant massive conversion of land within the Region from rural to urban use and the consequent need to coordinate airport facility development with land use development.
- Rapid changes in surface transportation system development and the consequent need to coordinate airport facility development with surface transportation facility development.
- Rapid growth and change in air traffic demand.
- Rapid change in aircraft size, type, and performance and in related airport facility requirements.
- The need to coordinate individual airport facility development on an areawide basis in order to provide an integrated air transportation system for the Region and thereby meet the planning prerequisites of federal grant-in-aid programs for airport facility development.

These five factors, the Committee concluded, apply specifically to the Southeastern Wisconsin Region and are in addition to, and support the general need for, an airport system plan in any urbanizing region, which general need derives from sound planning and engineering practice.

The Prospectus recommends the establishment of a three-year regional airport system planning program, with the work to be carried out jointly by the Commission staff, interagency assigned staff, and one or more specialized consulting firms. The total cost of the program is estimated to be \$396,000. The Prospectus recommends that this cost be shared on the following basis: U. S. Department of Housing and Urban Development, 25 percent; U. S. Department of Transportation and Wisconsin Department of Transportation, 65 percent; and the seven constituent counties, 10 percent. It is proposed that the program begin in 1970, subject to completion of funding arrangements. The Prospectus calls for the establishment of two advisory committees to guide and monitor the progress of the program—an Intergovernmental and Citizens Advisory Committee and a Technical Coordinating and Advisory Committee. A limited number of copies of the Prospectus are available from the Commission offices at a price of \$1.50 within the Region and \$3.00 outside the Region.

### REGIONAL LIBRARY PLANNING PROGRAM PROGRESS REPORT

The inventory and analyses phases of the two-year regional library facilities and services planning program are rapidly nearing completion. Data has been collected regarding the facilities of, and services provided by, the Region's 49 general public libraries, 42 higher educational institution libraries, and 646 public and private school libraries. Data has also been obtained from approximately 325 business firms, churches, and other private organizations that were found to have organized library collections. Analysis of the information collected during the public library user survey, conducted in April 1969, and of information concerning physical facilities and services extended is currently underway. This comprehensive regional library facilities and services planning program is scheduled for completion in July 1970 and is intended to provide a recommended comprehensive plan for the future development of library facilities and the future extension of library services within the Region.

### LAWCON FUND 1970 ALLOCATIONS ANNOUNCED

The State Natural Resources Board, acting upon the recommendations of its Outdoor Recreation Advisory Council, has adopted revised guidelines for the distribution of federal grants-in-aid under the Land and Water Conservation Act fund program (LAWCON). This federal grant program is designed to assist states and local units of government to acquire and develop land for outdoor recreation and conservation purposes. The total state allocation of funds for a fiscal year will continue to be divided three ways, with 40 percent allocated to county and local units of government; 40 percent to state agencies; and 20 percent to a contingency fund designed to provide for special or high-value projects at the state or local level having areawide significance.

The basis of allocating the 40 percent local share by county will change slightly, however, to reflect an increasing emphasis on population density. The local share will now be allocated to counties in the state on a formula that is weighted on a basis of 70 percent population and 30 percent equality. The previous formula had been 60 percent population, 30 percent equality, and 10 percent for counties not eligible for funds under the State Outdoor Recreation Act Program (ORAP). The result of these changes is that the more populous counties will be allocated a somewhat larger portion of the LAWCON funds apportioned to Wisconsin.

In a related change, any unused monies allocated to counties will be transferred to a planning area fund on January 1 instead of on March 1 of the fiscal year. This will enable counties in a planning area to draw upon funds not used by other counties in the same planning area. It is important, therefore, for counties and local units of government to file project applications with the State Department of Natural Resources before the January 1 deadline. All other LAWCON program eligibility requirements are still in effect, especially the fulfillment of the planning requirements.

The total state allocation of LAWCON funds for fiscal year 1970 is \$1,256,722. Estimates of the amounts available for the seven counties in the Southeastern Wisconsin Region are as follows: Kenosha County, \$11,180; Milwaukee County, \$92,281; Ozaukee County, \$5,650; Racine County, \$14,695; Walworth County, \$6,673; Washington County, \$6,230; and Waukesha County, \$17,904. Applications for recreation land acquisition and development must be made by counties or local units of government within each of the counties prior to January 1, 1970, or these funds may be allocated to other projects in other areas.

### GREAT LAKES SHORELINE DAMAGE PAMPHLET PUBLISHED

The U. S. Army Corps of Engineers has recently published a general information pamphlet entitled "Great Lakes Shoreline Damage—Causes and Protective Measures." This 21-page report is primarily intended to furnish concerned local government officials and property owners with information of a nature that will provide them with an understanding of the shoreline erosion problem and a basis for determining a course of action with respect thereto. The pamphlet discusses the causes of lake level fluctuations on the shorelines and defines the role of the federal and state governments in the activities on the Great Lakes that are related to water and shore areas. The pamphlet also contains information on a number of emergency-type remedial measures and a discussion of their use and effectiveness in different situations.

The pamphlet notes that records of lake levels on the Great Lakes have been kept by the U. S. Lake Survey, Corps of Engineers, since 1860 and points out that levels of the Great Lakes fluctuate from year to year and also from month to month during each year, depending upon the volume of water in the lakes. In addition, there are daily and even hourly fluctuations of levels resulting from unbalance or tilting of the lake surfaces caused by winds and barometric pressure differences. Seasonal fluctuations, caused by the annual weather pattern, are superimposed upon the long-term variations. Some of the pertinent data concerning Lake Michigan has been excerpted and is shown in Table 1 and in Figure 1.

The October 1969 level of Lake Michigan was above the average monthly elevation by 0.57 feet, but below the maximum recorded monthly elevation by 2.69 feet. Copies of the pamphlet may be obtained at no cost by addressing a letter request to: District Engineer, U. S. Army Engineer District-Chicago, 219 South Dearborn Street, Chicago, Illinois 60604.

Table |
SELECTED LAKE ELEVATION DATA FOR LAKE MICHIGAN: 1860-1969

	Monthly E		Seasonal Change Winter Low-To-Summer High (In Feet)			
Average	Maximum	Minimum	October 1969	Average	Maximum	Minimum
578.68	581-94	575.35	579.25	1-1	2. 2	0.1

a International Great Lakes Datum (1955 Adjustment).

Mean Sea Level Datum (1929 Adjustment) = International Great Lakes Datum (1955 Adjustment) + 1.3 feet.

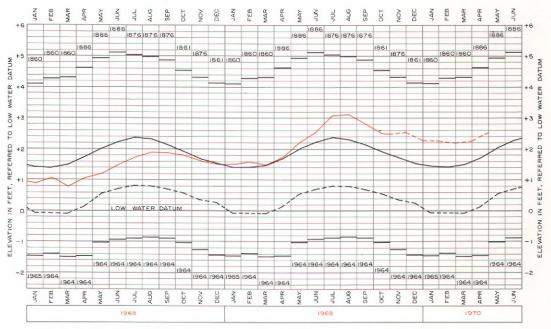
Lake Michigan Low Water Datum = International Great Lakes Datum (1955 Adjustment) + 2.45 feet.

Source: U. S. Army Corps of Engineers, Lake Survey District.

### COMMISSION STAFF CHANGES

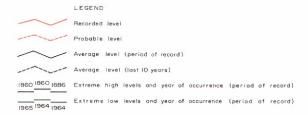
Several changes were made on November 1, 1969, in Commission staff assignments. Mr. Robert L. Fisher, formerly on the Commission staff during the initial regional land use-transportation study, has rejoined the staff as Chief Land Use Planner after several years on the staff of the Wisconsin Department of Natural Resources. Mr. Norbert S. Theine has assumed all of the community assistance functions, including neighborhood planning projects, as Chief Community Assistance Planner. Mr. James W. Engel has assumed broadened responsibilities as Chief of Systems Engineering and Data Processing. Mr. Philip C. Evenson, formerly Chief Community Assistance Planner, has assumed new duties in the position of Assistant to the Director.

Figure I LAKE MICHIGAN-HURON ELEVATION DATA PERIOD OF RECORD: 1860-1969



The solid orange line on the graph represents the recorded monthly mean level and the end-of-month level of the current month. The dashed arrange line represents the probable end-of-month level for November 1969 through April 1970. The black lines represent the monthly mean average and extreme levels recorded during the period of record.

International Great Lakes Datum (1955 Adjustment) \* Low Water Datum + 576.80 Feet. Mean Sea Level Datum (1929 Adjustment) = Low Water Datum + 578.1 Feet.



Source: U.S. Army Corps of Engineers, Lake Survey District.

HOW MUCH FEDERAL AID FOR PARK AND OPEN-SPACE LAND ACQUISITION AND DEVELOPMENT HAS BEEN APPROVED TO DATE FOR PROJECTS WITHIN THE REGION?

Two major federal aid programs-the Open Space Land Program, administered by the U.S. Department of Housing and Urban Development, and the Land and Water Conservation Fund Program, administered nationally by the U.S. Department of the Interior, Bureau of Outdoor Recreation and in Wisconsin by the State Department of Natural Resources—are available to assist local units of government in obtaining land for and developing park, outdoor recreation, and open-space sites. The Commission, acting in its areawide advisory review capacity, has reviewed since May 1964 eighty-five applications for federal aid under these two programs. The success that local governments within the Region have had in getting these applications approved by the relevant federal and state agencies is reflected in Table 2. Of the 85 grant applications reviewed by SEWRPC since May 1964, 68, or about 80 percent, have been approved. Such approvals have totaled nearly \$4.6 million. The remaining 17 applications have either been denied or are still pending. The actual amounts funded to the local units of government may differ slightly and are probably somewhat less than the figures shown in Table 2 because the grant applications contain only estimates of need and do not represent final grant amounts. Nevertheless, the amount of money that local governments within the Region have received to date through these two federal programs is substantial indeed and demonstrates the importance of these two aid programs to the implementation of the park, outdoor recreation, and open-space recommendations contained in regional and local development plans.

Table 2

GRANT APPLICATIONS UNDER THE OPEN SPACE LAND AND
LAWCON FEDERAL AID PROGRAMS REVIEWED BY SEWRPC AND
SUBSEQUENTLY APPROVED BY GRANTOR AGENCIES: MAY 1964 - OCTOBER 1969

	Open Space Land Program						
	Applications	Reviewed By SEWRPC	Applications Approved By HUD <sup>a</sup>				
County	Number	Amount Requested	Number	Amount Requested			
Kenosha	1	\$ 18,150	1	\$ 18,150			
Milwaukee	37	2,772,261	33	2,441,974			
0 zaukee	5	286, 150	4	283,900			
Racine	5	376, 441	3	199,311			
Walworth							
Washington	3	276,679	2	251,529			
Waukesha	9	507,740	6	354, 190			
Region Total	60	\$ 4,237,421	49	\$ 3,549,054			
	LAWCON Program						
	Applications	Reviewed By SEWRPC	Applications Approved by DNR <sup>b</sup>				
County	Number	Amount Requested	Number	Amount Requested			
Kenosha	3	\$ 160,195	3	\$ 160,195			
Milwaukee	6	57 2, 600	5	528,600			
0 zaukee							
Racine	6	349,868	5	264, 118			
Walworth	4	58,985	3	29,485			
Washington	I	15,000	1	15,000			
Waukesha	5	142,850	2	49,300			
Region Total	25	\$ 1,299,498	19	\$ 1,046,698			
	Total						
	Applications	Reviewed By SEWRPC	Applications Approved By HUD and DNR				
County	Number	Amount Requested	Number	Amount Requeste			
Kenosha	4	\$ 178,345	4	\$ 178,345			
Milwaukee	43	3,344,861	38	2,970,574			
Ozaukee	5	286,150	4	283,900			
Racine	11	726, 309	8	463, 429			
Walworth	4	58,985	3	29,485			
Washington	4	291,679	3	266,529			
Waukesha	14	650,590	8	403,490			
Region Total	85	\$ 5,536,919	68	\$ 4,595,752			

<sup>&</sup>lt;sup>a</sup>U.S. Department of Housing and Urban Development.

Source: SEWRPC.

 $<sup>\</sup>dot{b}_{Wisconsin\ Department\ of\ Natural\ Resources.}$ 

QUOTABLE QUOTE....

"In proportion as the structure of a government gives force to public opinion, it is essential that public opinion should be enlightened."

George Washington
"To the People
f the United States"
September 19, 1796

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The preparation of this publication was financed in part through a Federal urban planning grant from the U. S. Department of Housing and Urban Development under the provisions of Section 701(b) of the Housing

Executive Director

Bauer

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i.e. preparation of this publication was managed in part through a federal urban planning grant from the Li. S. Department of Housing and Urban Development under the provisions of Section 701(b) of the Housing Act of 1954, as amended, and through a Stato planning assistance grant from the Wisconsin Department of Local Affairs and Development, under the provisions of Section 22, 14 of the Wisconsin Statutes.