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TECHNICAL REPORT NUMBER 20

CARPOOLING IN THE METROPOLITAN MILWAUKEE AREA

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CARPOOLING IN THE METROPOLITAN MILWAUKEE AREA

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March 1977

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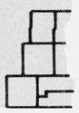

March 16, 1977

STATEMENT OF THE EXECUTIVE DIRECTOR

On April 29, 1975, Milwaukee County, in cooperation with the Federal Highway Administration, the Wisconsin Department of Transportation, and the Southeastern Wisconsin Regional Planning Commission, undertook a carpooling promotional effort in the four-county Milwaukee Standard Metropolitan Statistical Area. The program was designed to encourage higher vehicle occupancy and thereby, to effect savings in motor fuel use and to reduce traffic congestion and automobile parking requirements.

In order to permit a thorough and objective evaluation to be made of the effectiveness of the Metropolitan Milwaukee Area Carpooling Program in achieving the stated objectives, the Southeastern Wisconsin Regional Planning Commission, in cooperation with the University of Wisconsin-Milwaukee, undertook in April 1976 a survey to provide definitive information on the effectiveness of the program, an effectiveness which otherwise could only be the subject of speculation. The survey was intended to measure the extent of carpool use within the four-county study area; the proportion of such use which could be attributed to the public carpool promotional program; and corresponding changes in automobile traffic and motor fuel consumption. The survey also was designed to provide data on the socioeconomic characteristics of both carpoolers and noncarpoolers, and on their attitudes toward carpooling in order to assist in the design of future carpool promotional campaign strategies. This Technical Report presents the findings of this survey. The report deserves the careful consideration of all those concerned within the Region not only with the initiation, continuation, or expansion of carpooling programs but also with transportation system planning and development.

The survey data indicated that carpooling within the four-county study area did provide substantial motor fuel as well as cost savings as a result of reduced work trip-related vehicular travel. Of the 505,000 employed persons living in the study area, over 18 percent, or about 92,000, were found to carpool on a regular basis in almost 39,000 carpools. These carpools result in over a 9 percent reduction of work trip vehicle miles of travel per average weekday within the four-county area and a savings of 38,000 gallons of motor fuel per weekday. During the 11 months following the initiation of the Metropolitan Milwaukee Area Carpooling Program, over 35,000 persons, or 38 percent of the total carpoolers, began to carpool, thus indicating that during its first year of operation the carpooling program was successful in fulfilling its primary objective. The survey findings also disclose a significant latent demand for carpooling, an indication that further efforts in carpool promotion should continue to be successful.

The survey also indicates, however, that the process of diverting auto drivers to carpool participants is an arduous task requiring perseverance in a consistent long-range program; that the promotion of carpooling may to a certain extent conflict with the promotion of increased mass transit use within the four-county area; and that, even with successful program implementation, heavy reliance on the auto driver mode of travel can be expected to continue within the study area.

Respectfully submitted,

Kurt W. Bauer
Executive Director

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Chapter I

INTRODUCTION

BACKGROUND

The heavy dependence of contemporary life styles on petroleum products was "brought home" to the American public by the "energy crisis" of the fall of 1973. As a result, the dwindling of national petroleum reserves became a matter of public concern. The period immediately following 1973 saw the development of new governmental programs to promote energy conservation which were directed at reducing pressure on petroleum resources as well as relieving the financial impact of higher fuel prices on the consumer. Under these circumstances on April 29, 1975, the Metropolitan Milwaukee Area Carpooling Program (MMACP) began formal operation as a 12-month demonstration project under provisions of the Federal Emergency Highway Energy Conservation Act. This program was mounted as a cooperative effort of Milwaukee County, the Southeastern Wisconsin Regional Planning Commission, the Wisconsin Department of Transportation, and the U. S. Department of Transportation, Federal Highway Administration.

The program was designed to consist of two phases: 1) an initial phase in which a multimedia carpooling promotional campaign was to be designed and conducted and 2) an evaluation phase in which the initial campaign results and overall effectiveness were to be assessed and recommendations for future actions formulated. During the initial phase which was begun in April 1975 an intensive promotional campaign was implemented to stimulate interest in carpooling among major employers in the area, representatives of community service and employer organizations, labor unions, governmental agencies, and members of the news media. Direct personal contacts were made with major employers while radio, television, newspaper, and billboard advertisements were used to inform employees of small companies, self-employed persons, students, and the public in general, about the advantages of carpooling. The dual approach of direct employer contact and mass media advertising when undertaken jointly was considered to be the most efficient way to reach the greatest number of potential carpoolers. The MMACP also provided assistance to firms and agencies in initiating and maintaining company carpool programs, as well as providing a matching service for persons in search of a carpool partner.

In April 1976, the second phase of the program began with the initiation of an evaluation procedure designed to determine if the MMACP efforts had been effective. The thrust of the program evaluation was twofold. First, the advertising methods and employer contacts maintained by the MMACP were analyzed for effectiveness.[1] Second, both applicants to the carpooling match service and the general population of the four-county area, including Milwaukee, Ozaukee, Washington, and Waukesha Counties, were surveyed to determine the extent of carpooling within the area and the impact of the MMACP on carpool formation.

This report documents findings of this special survey conducted to determine the effectiveness of the MMACP. The procedures used in the conduct of the survey are described briefly in the remainder of this chapter. Subsequent chapters present the analyses of the survey data, namely: the findings of the applicant survey; the findings of the household survey; and an evaluation of the impact of the MMACP as indicated by survey data.

CONDUCT OF THE SURVEY

The survey consisted of six principal elements: 1) development and clarification of survey objectives; 2) survey design and questionnaire development; 3) determination of sample size; 4) data collection; 5) data reduction, conversion, and retrieval; and 6) analysis of survey results.

Definition of Carpool

For the purposes of the survey a "carpool" was defined as two or more persons over the age of 18 riding to work or school on a regular basis in the same automobile, van, or light truck. "Regular basis" means recurring use of the carpool in conformity with an established, although not necessarily uniform, pattern. This definition eliminates anomalous ride-sharing on the trip to work or school while incorporating those carpools which are customarily utilized for only a portion of the total number of work or school trips made by the participants. Under the definition of carpooling the driving need not be shared. This definition includes family carpools thus creating a distinction between a family carpool member and a family passenger in the family car. In the latter case, the trip being made by the auto driver is specifically for the purpose of serving the passenger. In the former, the family carpool consists of both an auto driver and an auto passenger who are making the trip for the purpose of attending work or school. The definition of carpool utilized in the conduct of the surveys and in this report

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[1] *See Carpool: A Staff Evaluation of the Metropolitan Milwaukee Area Carpooling Program, Status Report, March 1977.*

also eliminates ride-sharing for purposes other than work or school, such as shopping, social-recreational, or personal business trips.

Survey Objectives

The prime objective of the survey was to provide the data necessary to permit an evaluation of the effectiveness of the MMACP. More specifically, the purposes of the survey were to:

1. Determine the number of carpools being used in trips to and from work or school within the Counties of Milwaukee, Ozaukee, Washington, and Waukesha.

2. Determine the characteristics of carpools—the size, driving arrangements, arrival and departure times, trip length, spatial distribution, and date of carpool formation—and the socioeconomic characteristics of carpool participants.

3. Determine what factors influence persons to choose a carpool over other modes of transportation to and from work or school.

4. Determine what factors prevent or discourage persons from choosing carpools as a means of transportation to and from work or school.

5. Determine the extent to which carpool use promotes energy conservation by quantifying the reduction of vehicle miles traveled in the four-county area.

6. Determine the percent of workers in the four-county area who know of and understand the services provided by the MMACP.

7. Determine temporal distribution of carpool formation and its relationship to the recent energy shortage and the formation of the MMACP.

8. Derive an estimate of the latent demand for carpooling in the four-county area and the characteristics of this demand.

9. Review information obtained in the carpool study within the context of transportation system planning and development.

To fulfill these objectives would help determine the potential as well as existing status of carpooling, and would thus be of use in the long-term regional transportation planning effort as well as in the short-term MMACP evaluation effort.

Survey Design and Questionnaire Development

Two independent but related surveys, the applicant survey and the household survey, were undertaken during the program evaluation. The applicant survey, which consisted of a 100 percent sampling of persons who had applied to the MMACP program to be matched with other applicants into carpools, provided data on the socioeconomic and travel characteristics of persons with an active interest in carpooling, as well as data required for determining the successful match rate of carpool program applicants. The household survey, which consisted of a small representative sampling of occupied housing units within the four county Metropolitan Milwaukee Area, provided data concerning the existing nature and extent of carpooling activities by persons in the area's general population. Both surveys collected data pertaining to the socioeconomic characteristics, the time and distance of work or school trips, the spatial distribution of work and home locations, the mode of travel of noncarpoolers and of carpoolers prior to joining a carpool, the size of carpool, the type of carpool, the frequency of carpool use by participants, the vehicle type used by the carpool, cost and energy savings, factors influencing decisions to carpool or not to carpool, future intent, and the quantification of indirect carpool formation resulting from promotional efforts of the MMACP and other agencies. (See Appendix B for copies of survey forms.) First drafts of the survey forms were reviewed by SEWRPC and University of Wisconsin-Milwaukee staff and by the MMACP Technical Review Committee,[2] and, based upon these reviews, final versions of the forms were prepared for use in the survey by the SEWRPC.

Determination of Sample Size

The determination of sample size for the two surveys occurred concurrently with questionnaire development. The initial applicant survey consisted of 100 percent of the carpool applicants that were on file with the SEWRPC data processing section and those applicants that were being manually matched by the MMACP staff, resulting in a survey universe of 1,359 applicants.

The household survey utilized a random sample of occupied housing units in the Counties of Milwaukee, Ozaukee, Washington, and Waukesha as estimated under the 1972 SEWRPC home interview survey. A first approximation of the sample size for the household survey was determined by the following formula:

$$S = \sqrt{\frac{PQ}{n}}$$

or, rearranging,

$$n = \frac{PQ}{S^2}$$

Where:

P = the proportion of units in the population with a given characteristic, such as households with at least one carpool member.

[2] *The MMACP Technical Review Committee consists of representatives of the Federal Highway Administration, State of Wisconsin Department of Transportation, Milwaukee County, and the Southeastern Wisconsin Regional Planning Commission (see Appendix A).*

Q = The proportion of units in the population without the given characteristic, such as households with no members that carpool.

S = the standard error.

n = the number of samples.

In order to determine the sample size, certain assumptions must be made on the basis of available preliminary information. To assume the values for P and Q, data obtained in similar surveys in other areas of the country, as well as preliminary data relevant to carpooling recently obtained within the Southeastern Wisconsin Region, were reviewed. This investigation indicated that the values for P and Q which would best ensure obtaining a representative sample were approximately 19 and 81 percent, respectively. The value for S, the standard error, was set equal to one in the computation of n, the sample size.

Substituting these values into the equation for n yields the following result:

$$n = \frac{PQ}{S^2} = \frac{(19)(81)}{1^2} = 1539$$

If 60 percent of the questionnaires are completed and usable, the minimum sample size required is:

$$0.60\,x = 1539$$

$$x = 1539/0.60$$

$$x = 2365$$

Based upon this analysis, a sample of approximately 2,500 households was randomly selected from a telephone company reverse directory, and telephone books in the rural sections of the four-county study area. Geographic codes were assigned to each sample and summaries prepared both by planning analysis areas[3] and civil division to assure a reasonable geographic distribution of samples (see Map 1). The number of samples, and sample rates for each county were as follows:

County	Sample Size	Sampling Rate
Milwaukee	1601	0.459 percent
Ozaukee	179	1.062 percent
Washington	217	1.103 percent
Waukesha	506	0.752 percent

[3] *Planning analysis areas comprise rational subareas for planning analysis purposes, and as such are generally intended to be composed of a number of "neighborhoods" which together form a "community for physical planning purposes" and which, accordingly, consist of groups of minor civil divisions—cities, villages, and towns—and in some cases subareas of minor civil divisions throughout the Southeastern Wisconsin Region.*

This represents a total of 2,503 sampling units or a 0.553 percent overall sampling rate.

Data Collection

A dual approach utilized in the data collection processes incorporated both mail/back survey and telephone interview survey techniques. Each sampled household was mailed a survey questionnaire accompanied by a cover letter which requested that the questionnaire be reviewed by the household members so that the information could be made readily available to the telephone interviewer. In addition, if the household preferred, the questionnaire could be filled out and returned in an attached envelope, in which case no contact would be made by telephone. It was found that this procedure minimized objections of households in responding to a telephone survey; helped to organize and collect the requested data from the various family members; provided the households with an opportunity to answer the questionnaire by mail if the household so preferred or could not be reached by telephone; and decreased the amount of time and number of callbacks required of the telephone interviewers, thereby increasing the rate of return and the quality of the data.

On March 22, 1976, 1,249 household questionnaires were mailed, and on March 30, 1976, the remaining 1,254 household questionnaires plus the 1,359 applicant survey instruments were mailed. The telephone interviews began on March 30 and continued through April 30, 1976, with appropriate quality control procedures employed to assure accuracy and efficiency. Of the 2,503 household sampling units, 45 were returned as undeliverable, reducing the household survey universe to 2,458. For the same reason the applicant survey universe was reduced by 14, from 1,359 to 1,345. Of the 1,935 usable household survey questionnaires, 27.3 percent were received by mail and 72.7 percent were obtained by telephone. These 1,935 units represent a 78.7 percent return on the household survey. For the applicant survey 593, or 73.7 percent, of the questionnaires were received by mail and 212, or 26.3 percent, were obtained by telephone interviews. These 805 usable questionnaires resulted in a sampling rate of 59.8 percent on the applicant survey.

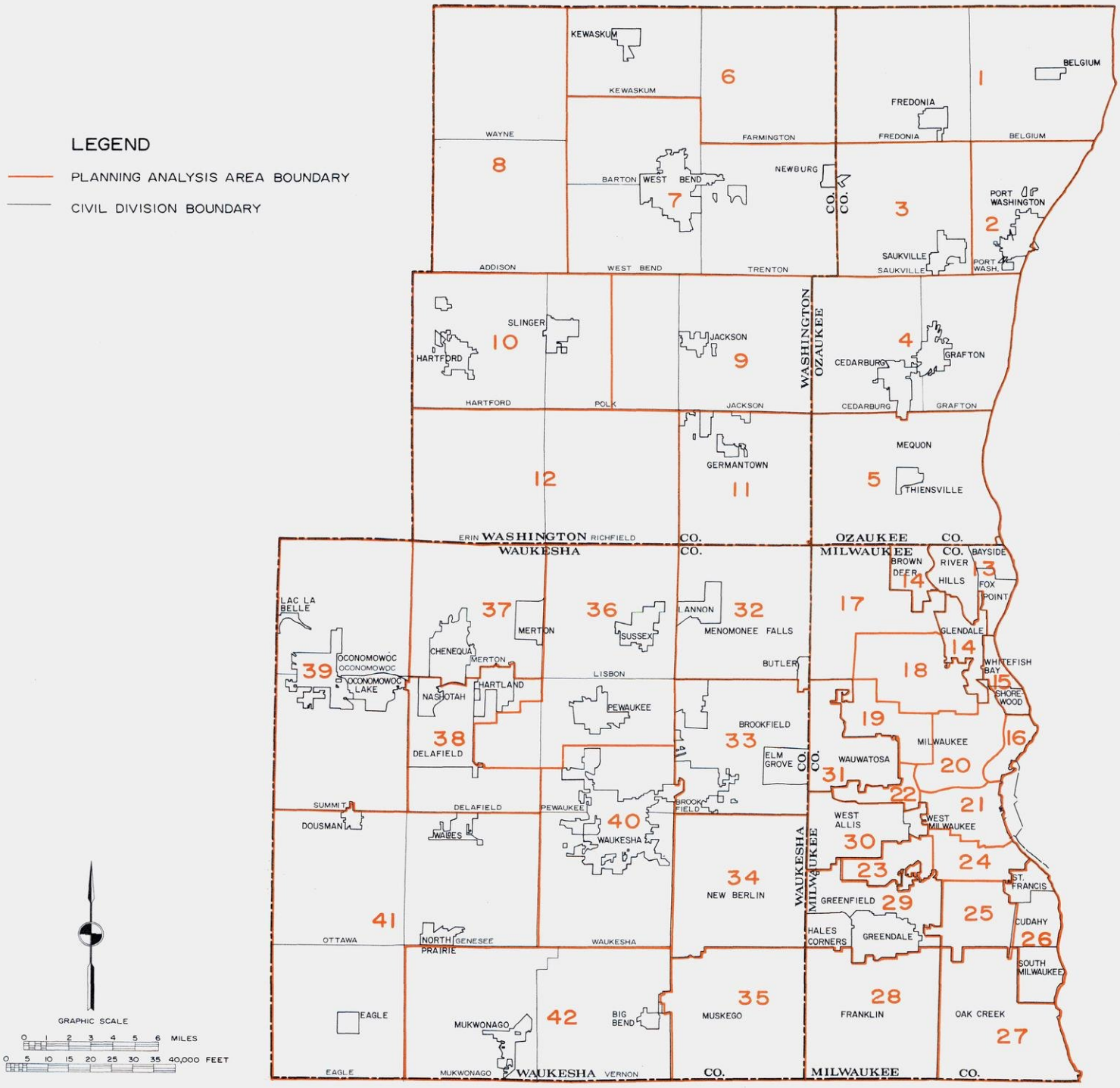
Data Reduction, Conversion, and Retrieval

The data collected from the two surveys were compiled and analyzed by personnel at UWM. Completed survey forms were first checked for inadequacies and then transmitted to UWM by the SEWRPC. Upon receipt of the completed survey forms, the survey responses were coded and the resultant data were keypunched on computer cards by the Social Science Research Facility at UWM to establish an applicant survey data file and a household survey data file.

Responses to each survey question on both data files were then subjected to extensive examination via a specialized computer program to determine if any errors or invalid codes existed on either data file. Next, contingency and logic checks were carried out to further purge the files of erroneous information. Finally, county

Map 1

PLANNING ANALYSIS AREA AND CIVIL DIVISION BOUNDARIES WITHIN THE FOUR-COUNTY METROPOLITAN MILWAUKEE AREA



Source: SEWRPC.

and civil division codes were added to the household survey data by the SEWRPC and the data were expanded to represent the universe.

The sampling plan for the household survey was designed to ensure that a representative sample would be obtained for each of the four counties. Verification of the appropriateness of the sample was accomplished by comparing the distribution of selected variables from expanded survey data with similar data on households within the four counties. The comparisons were made between the expanded household survey data and data collected in a home interview survey conducted by the Southeastern Wisconsin Regional Planning Commission in 1972 as a part of its continuing regional land use-transportation study. The SEWRPC home interview survey provided a good standard of comparison since this data had been demonstrated to exhibit a high degree of accuracy and completeness.[4] The variables used for comparisons between the MMACP household survey and the SEWRPC home interview survey were household size by county as shown in Table 1 and employed persons by county as shown in Table 2. In these two tables a relatively high correspondence can be found between the two surveys in terms of the percentage distributions within county by household size and the percentage distributions within county of employed persons.

In addition, vehicle availability figures as obtained from the MMACP household survey were compared to vehicle availability estimates based on vehicle registrations for fiscal 1976. The two estimates are not entirely compatible—the MMACP household survey data being an estimate based on the number of vehicles available to the household for personal use regardless of area

Table 1

PERCENTAGE DISTRIBUTION OF HOUSEHOLD SIZE BY COUNTY IN METROPOLITAN MILWAUKEE AREA
MMACP HOUSEHOLD SURVEY AND 1972 SEWRPC HOME INTERVIEW SURVEY

Household Size	Percent of Households									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	MMACP Household Survey	SEWRPC Home Interview Survey	MMACP Household Survey	SEWRPC Home Interview Survey	MMACP Household Survey	SEWRPC Home Interview Survey	MMACP Household Survey	SEWRPC Home Interview Survey	MMACP Household Survey	SEWRPC Home Interview Survey
1	18.33	19.86	7.19	9.92	10.53	11.88	8.97	9.56	16.19	17.62
2	34.89	29.89	30.22	25.11	28.65	25.53	25.00	24.94	32.99	28.78
3	15.11	16.47	17.27	16.42	13.45	16.25	17.93	16.24	15.54	16.42
4	14.31	14.29	22.30	18.31	22.81	16.84	21.47	19.35	16.03	15.31
5+	17.36	19.49	23.02	30.24	24.56	29.50	26.63	29.91	19.25	21.87
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total Households as a Percent of Four-County Total	77.34	77.05	3.74	3.73	4.38	4.35	14.54	14.87	100.00	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 2

DISTRIBUTION OF EMPLOYED PERSONS BY
COUNTY IN METROPOLITAN MILWAUKEE AREA
MMACP HOUSEHOLD SURVEY AND
1972 SEWRPC HOME INTERVIEW SURVEY

County	Employed Persons			
	MMACP Household Survey		SEWRPC Home Interview Survey	
	Number	Percent	Number	Percent
Milwaukee . . .	377,646	74.73	387,263	74.42
Ozaukee	20,362	4.03	21,415	4.11
Washington . .	21,868	4.33	25,237	4.85
Waukesha. . . .	85,441	16.91	86,468	16.62
Total	505,317	100.00	520,383	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

[4] *For a comprehensive discussion of accuracy levels of the 1972 SEWRPC home interview survey see A Regional Land Use Plan and a Regional Transportation Plan for Southeastern Wisconsin—2000, Planning Report No. 25, Volume I, SEWRPC, p. 313; and Benchmark Report No. 3, "Origin-Destination Survey Accuracy Checks," on file at the SEWRPC.*

Table 3

VEHICLE AVAILABILITY BY COUNTY FOR FISCAL YEAR 1976 AND THE MMACP HOUSEHOLD SURVEY

County	Vehicles Available[a]			
	Estimate for Fiscal 1976	MMACP Household Survey	Estimate-Survey Difference	Percent Difference
Milwaukee	441,755	476,512	34,757	7.9
Ozaukee	32,748	29,938	- 2,810	- 8.6
Washington	38,038	33,035	- 5,003	- 13.2
Waukesha.	133,641	126,905	- 6,736	- 5.0
Total	646,182	666,390	20,208	3.1

[a] *Estimated numbers of vehicles available include light trucks.*

Source: Wisconsin Department of Transportation, University of Wisconsin-Milwaukee, and SEWRPC.

of registration while the estimate for fiscal 1976 represents a simple percent reduction applied to the number of non-municipal vehicles reported by the Wisconsin Department of Motor Vehicles to be registered within each of the four counties. Nevertheless, the comparisons indicate that the MMACP household survey adequately represents vehicle availability within the four-county area (see Table 3).

Data Analysis

The analysis of survey results was conducted with the assistance of the Univac 1106 computer at the University of Wisconsin-Milwaukee in two computer programs: 1) the Social Science Research Facility's UNIVAR program that computes descriptive statistics for each analysis variable and 2) CROSTAB2, a program that produces cross-classification tables of the values of selected variables. CROSTAB2 is a STATJOB series program supported by the Madison Academic Computing Center, University of Wisconsin-Madison. In the following discussion Chapter II presents the analysis of the applicant survey data; Chapter III, the household survey data; Chapter IV, an evaluation of the impact of the MMACP; and Chapter V, an overall summary of the text.

Chapter II

INVENTORY FINDINGS—APPLICANT SURVEY

INTRODUCTION

The applicant survey sample consisted solely of persons who had applied to the MMACP match program for the purpose of finding a carpool partner. Once an individual forwarded a completed application to the MMACP, a potential carpool partner was located if one was present among those already on file. If a match based upon proximity of work and home locations was found, the persons involved were notified by a letter which indicated the names of potential carpool partners, the home address, phone number, hours of work, and preference of driving arrangements. Also notified by mail were persons who could not be matched with anyone currently on file. The applicant survey was designed to provide a means for determining the number of carpools formed as a result of the applicant matches, as well as to provide a data base consisting entirely of a subset of persons actively interested in carpooling.

The following discussion examines the extent of carpool use among the MMACP match program applicants; the socioeconomic characteristics of match program applicants; the factors that prompted applicants to join a carpool; the level of applicant awareness of MMACP services; the characteristics of applicant carpools; and carpool related savings as perceived by applicants. It should be noted that the findings presented below are based on unexpanded survey data. It was determined not to expand the applicant survey data, since response patterns to the survey may have been influenced to some degree by one of the primary variables within the data itself, namely, the successful formation of a carpool. Since the degree of this influence cannot be defined, the representativeness of the applicant survey if expanded to the universe of total applicants could not be established and expanded estimates would be subject to a possibly wide margin of error.

EXTENT OF CARPOOL USE—APPLICANT SURVEY

Of the 804 applicants who responded to the survey, 339, or 42 percent, were carpoolers. If this percentage were extended to the universe of 1,345 match program applicants, a maximum of approximately 570 applicants would be shown to have successfully formed carpools by March of 1976. However, as noted above, since the representativeness of the applicant survey is not known, the best estimate of the number of applicants that are carpoolers would probably lie between 339 and 570 persons.

Of the 339 match program carpoolers, 94 percent indicated that they intended to continue carpooling; 6 percent indicated that they did not intend to continue. About 10 carpoolers—50 percent of the carpoolers who indicated that they did not intend to continue carpooling—reported changes in residential or working situations as the predominant reason preventing carpooling; the remaining 50 percent reported a variety of reasons.

Applicants to the MMACP were asked to supply information about other members of the household who carpool on a regular basis. Sixty-four respondents, or 19 percent, reported a second carpooler; and eight, or 2 percent, reported a third carpooler. Of the 64 second carpooler households, 38, or 59 percent, were formed since May 1975, the first full month of MMACP operation. Six of the eight households, or 75 percent, with a third carpooler indicated that they began carpooling after May 1975.

Of the 804 applicant survey respondents, 465, or 58 percent, indicated that as of March 1976 they were not participating in a carpool. Of these 465 persons, 289, or 62 percent, stated that they had not joined a carpool because a carpool match could not be achieved by the MMACP. Another 88 persons, or 19 percent, indicated that although they were matched, they were unable to make satisfactory arrangements with the matched persons. The remainder of the non-carpoolers were prevented by a variety of reasons from joining a carpool. These reasons included a change in job or school location, preventing 4 percent of the non-carpoolers from joining a carpool; the need for free use of an auto, somewhat less than 4 percent; a change in work or school hours, 2 percent; a residential move, slightly less than 2 percent, and, other miscellaneous reasons, 8 percent. It is noteworthy that the 289 non-carpooling applicants who were not matched by the MMACP represent about 36 percent of the total 804 applicants that responded to the survey. Given the relatively small size of the file—1,345 match program applicants at the time of the survey—combined with the rather large geographic area covered by the file—home addresses from anywhere in the four-county area as well as within several contiguous counties and the State of Illinois—a no-match rate of 36 percent is relatively small and provides an indication that the matching process itself is a practical procedure which may be further enhanced by increased file size.

SOCIOECONOMIC CHARACTERISTICS OF MMACP MATCH PROGRAM APPLICANTS

The applicant survey, by design, established a rather unique data base, in that the survey universe consisted entirely of persons who were interested in carpooling to the extent of taking affirmative action by participating in the MMACP match program. Consequently, the socioeconomic profile of the applicants as obtained from the survey data is of significance as a profile of a unique subset of the general population.

As shown in Table 4, approximately 56 percent of the carpool applicants are male, and 44 percent are female. In addition, these percentages were found to reflect the relative proportion of males and females who were able to join a carpool as a result of the match program.

The younger segments of the employed population exhibited the greatest interest in the MMACP match program. As shown in Table 5, 42 percent of the match program applicants were concentrated in the 25 through 34 year age group in contrast to only 25 percent of the employed population in the four-county area.[1] About 18 percent of the applicants were 35 through 44 years of age, and 16 percent were 45 through 54 years of age in comparison to 20 and 22 percent, respectively, of the employed population. The younger age group of 20 through 24 years represents 13 percent of the applicants, whereas the older age group of 55 through 64 years represents less than 10 percent. These groups constitute 14 and 13 percent, respectively, of the employed population in the four-county area.

The distribution of carpool applicants by occupational group (see Table 6) reveals that the largest concentration is found among professional, technical, and kindred workers, a group that accounts for 37 percent of the applicants. The second largest percentage, 30 percent, is in the clerical and kindred workers' group. The managers, officials, and proprietors' group accounts for 12 percent of the applicants. Members of the professional and clerical occupational groups appear to have three characteristics that enhance the attractiveness of carpooling: fixed, regular working schedules; work in high employment density locations; and no need for a personal auto during working hours.

[1] *Data pertaining to age distribution of the employed population in the four-county area were obtained in the household survey. For display of employed population by age group, see Table 22.*

Table 4

DISTRIBUTION BY SEX OF APPLICANTS TO THE MMACP MATCH PROGRAM–MMACP APPLICANT SURVEY

Sex	Applicants	
	Number	Percent Reported
Male	451	56.45
Female	348	43.55
Total reported	799	100.00
Not reported	5	--
Total	804	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

The income characteristics displayed in Table 7 reflect a rather high percentage, 46 percent, of carpool applicants in the $15,000-24,999 income group. An additional 18 percent is in the $25,000-49,999 income group. Information contained in this table suggests a positive relationship between income and carpool application; that is, as income increases, the number of carpool applicants also increases up to and including the $15,000-24,999 income category. There were no applicants reporting incomes of $50,000 or more.

As revealed in Table 8, carpool program applicants are generally well-educated. Approximately 32 percent of the applicants have attended college without obtaining a degree; 28 percent were college graduates; and 12 percent had at least some postgraduate education. In total, 98 percent of the applicants have obtained a high school diploma or above. In comparison, as reported by the 1970 U. S. Census, 58 percent of the four-county population 25 years of age or older has attained an equivalent educational level.[2] These relatively high educational levels among applicants are reflected, in part, by the concentration of carpool applicants in the professional, technical, and kindred workers occupational category.

FACTORS WHICH INFLUENCE PERSONS TO CARPOOL—APPLICANT SURVEY

The applicant survey respondents indicated their first, second, and third reasons for joining a carpool, as shown in Table 9. The primary reason for joining a carpool was to save money, according to 47 percent of the responses.

[2] *SEWRPC, The Population of Southeastern Wisconsin, Technical Report No. 11, December 1972, p. 35.*

Table 5

DISTRIBUTION BY AGE GROUP OF APPLICANTS TO THE MMACP MATCH PROGRAM MMACP APPLICANT SURVEY

Age Group (by years)	Applicants	
	Number	Percent Reported
19 and under	14	1.76
20-24	101	12.70
25-34	331	41.64
35-44	141	17.74
45-54	130	16.35
55-64	76	9.56
65 and over	2	0.25
Total reported	795	100.00
Not reported	9	--
Total	804	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 6

DISTRIBUTION BY OCCUPATION OF APPLICANTS TO THE MMACP MATCH PROGRAM–MMACP APPLICANT SURVEY

Occupation	Applicants	
	Number	Percent Reported
Professional, technical, and kindred workers. . .	291	37.45
Farmers and farm managers	1	0.13
Managers, officials, and proprietors	96	12.36
Clerical and kindred workers	236	30.37
Salesworkers.	26	3.35
Craftsmen, foremen, and kindred workers.	55	7.08
Operatives and kindred workers.	37	4.76
Private household workers	--	--
Service workers (except private household)	20	2.57
Laborers and farm workers.	15	1.93
Total reported	777	100.00
Not reported	27	--
Total	804	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 7

DISTRIBUTION BY HOUSEHOLD ANNUAL INCOME OF APPLICANTS TO THE MMACP MATCH PROGRAM MMACP APPLICANT SURVEY

Household Annual Income	Applicants	
	Number	Percent Reported
$ 2,000-3,999	5	0.74
4,000-5,999	7	1.03
6,000-7,999	29	4.28
8,000-9,999	40	5.90
10,000-11,999	67	9.88
12,000-14,999	95	14.01
15,000-24,999	314	46.31
25,000-49,999	121	17.85
Total reported	678	100.00
Not reported	126	--
Total	804	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 8

DISTRIBUTION BY EDUCATIONAL LEVEL OF APPLICANTS TO THE MMACP MATCH PROGRAM MMACP APPLICANT SURVEY

Educational Level	Applicants	
	Number	Percent Reported
Grade School Graduate. . .	3	0.37
Some High School	17	2.11
High School Graduate . . .	215	26.74
Some College	253	31.47
College Graduate.	221	27.49
Post-Graduate Studies . . .	95	11.82
Total reported	804	100.00
Not reported	0	--
Total	804	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Another 12 percent of the responses listed energy conservation as a primary reason, and 11 percent were indications that carpooling was more convenient than the bus. These three reasons were chosen by approximately 70 percent of the respondents.

The most important secondary reasons for carpooling were energy conservation, mentioned by 19 percent of the respondents who chose a second reason, and a desire to save money, also 19 percent. The avoidance of driving stress was listed as an important secondary reason to carpool in 17 percent of the responses. An additional 12 percent of the second choice responses stated that carpools were more convenient than the bus.

Tertiary reasons for joining a carpool exhibit greater variation than the first two choices of respondents. The five most important third choice reasons in rank order are energy conservation, 17 percent; the desire to save money, 12 percent; companionship, 12 percent; concern for the environment, 10 percent; and the desire to avoid the stress of driving, also 10 percent. Clearly, considering all motivations for carpooling, the two most important motives are to save money and to conserve energy. These two reasons played an important part in the MMACP promotional campaign as advertised benefits associated with carpooling.

APPLICANT AWARENESS OF MMACP

The sources that informed applicants about the MMACP are displayed in Table 10. The percentages listed in this table are based on the total number of applicants (804) who answered this set of questions. Multiple responses were permitted. Most of the applicants heard about the MMACP through employer contact or television advertisements. Overall, the impact of the MMACP promotional efforts may be ranked from high to low as follows:

Table 9

PERCENTAGE DISTRIBUTION OF FACTORS MOTIVATING CARPOOL FORMATION AS REPORTED BY CARPOOLERS–MMACP APPLICANT SURVEY

Motivation for Carpool Formation	Percent of Carpooler Responses			
	First Reason	Second Reason	Third Reason	All Reasons
Save money	46.9	18.6	12.2	27.5
Energy conservation	11.8	18.8	17.4	15.8
More convenient than bus	11.4	11.8	8.1	10.6
Avoid stress of driving	4.2	16.9	9.7	10.0
Make auto available to family	7.4	8.8	3.6	6.8
Companionship	1.2	6.4	12.2	6.1
Concern for environment	1.8	1.7	10.2	4.1
Help a friend	3.6	4.4	4.0	4.0
No other mode available	3.9	2.4	5.7	3.9
Eliminate need for second auto	1.5	5.1	3.2	3.2
Keep U. S. oil dollars at home	--	1.4	9.3	3.1
Employer incentives	2.4	0.7	1.6	1.6
More convenient than passenger in family auto	0.3	0.3	1.2	0.6
Other miscellaneous	3.6	2.7	1.6	2.7
Total	100.0	100.0	100.0	100.0
Total responses	333	296	247	876
Percent of the 339 carpoolers that indicated motivation	98.2	87.3	72.9	98.2

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 10

APPLICANT SOURCES OF INFORMATION ON THE CARPOOLING PROGRAM–MMACP APPLICANT SURVEY

Informational Efforts Responsible for Applicant Awareness	Applicants Aware of Informational Effort	
	Number	Percent of Total Applicants
Employer contacts	427	53.11
Television advertisements	349	43.41
Billboards	329	40.92
Radio advertisements	278	34.58
Newspaper advertisements	189	23.51
Public speakers	1	0.12
Unaware of any of above	3	0.37
Relative or friend	53	6.59
Other	27	3.36

Source: University of Wisconsin-Milwaukee and SEWRPC.

53 percent of the applicants were aware of employer contact; 43 percent were aware of television advertisements; 41 percent, billboards; 35 percent, radio advertisements; and 24 percent, ads in newspapers. The remaining sources of information were relatively unimportant.

The percentage of carpool applicants who knew about the various services of the MMACP are given in Table 11. Again, multiple responses to this set of questions were permitted. Examination of this information demonstrates a relatively high level of knowledge about all MMACP services except the provision of speakers to interested groups; only 34 percent of the respondents knew about this service of the MMACP.

CHARACTERISTICS OF CARPOOLS FORMED BY MATCH PROGRAM APPLICANTS

The major characteristics of carpools formed by MMACP match program applicants that are considered in this section are size, driving arrangements, frequency of use and purpose, time of day, trip length, and previous mode. The distribution of the number of persons per carpool is given in Table 12. Approximately 52 percent of the carpools reported by respondents to the applicant survey are two-person carpools. Another 27 percent are three-person carpools, while the remaining 21 percent are four-person

and five-or-more-person carpools. The overall auto occupancy rate for these match program carpools is 2.76. This auto occupancy rate, however, is based on the assumption of no double counting. That is, it assumes that all respondents belong to separate carpools, and that there are 928 carpoolers riding in 336 carpools resulting in an auto occupancy rate of 2.76. A minimum estimate of the number of carpools and auto occupancy may be found in Table 13. Here the assumption is that members of the same carpool responded to the survey, resulting in double counting. These data (Table 13) yield 336 match program carpoolers riding in 134 carpools for an average auto occupancy rate of 2.51. Both of these values compare favorably with national carpool occupancy rates of 2.41 in December 1973 and 2.49 in February 1974.[3]

[3] *D. C. Kendall, Carpooling: Status and Change, Office of Research and Development Policy, U. S. Department of Transportation, 1975, p. 16.*

Table 11

DEGREE OF APPLICANT AWARENESS OF MMACP SERVICES MMACP APPLICANT SURVEY

Services Offered by the MMACP	Applicants Indicating Awareness of Services	
	Number	Percent of Total Applicants
The MMACP:		
Can be joined by submitting application	775	96.39
Can match potential carpoolers	773	96.14
Assists firms/agencies in initiating and maintaining carpooling programs	687	85.45
Can be used by anyone in the four-county area	669	83.21
Does not charge for these services	659	81.97
Furnishes information to press, television, radio, and company newsletters	651	80.97
Provides speakers to interested groups	268	33.33

Source: University of Wisconsin-Milwaukee and SEWRPC.

There are three basic traveling arrangements associated with carpools—driver only, passenger only, and shared driving with one or more persons. Approximately 56 percent of the match program carpoolers share the driving with one or more persons, another 25 percent travel as passengers only, and the remaining 19 percent are drivers only.

Examination of Table 14 shows that approximately 86 percent of the match program carpoolers travel to work by carpool five times per week. All but six of these also return home from work by carpool. On a weekly basis, the match program carpoolers account for 1,567 person trips to work and 1,540 person trips from work for a weekly total of 3,107 person trips or a daily average of 621 carpooler person trips.

The arrival and departure times of match program carpoolers are displayed in Figures 1 and 2. Arrival times tend to be slightly more concentrated than departure times. Between the hours of 7:00 a.m. and 8:59 a.m., 93 percent of the carpoolers arrive at their destinations, and 87 percent have departure times between the hours of 4:00 p.m. and 5:59 p.m. This pattern of trip arrivals and departures is similar to the corresponding pattern for the average weekday internal person trips in the seven-county Southeastern Wisconsin Region as established under the 1972 SEWRPC home interview survey. The only difference worthy of note is that the carpool departures take place at slightly later times, perhaps reflecting the necessity for assembling carpool members for the trip home.

It is well known that work trips by carpool are longer than non-carpool work trips. The mean and median one-way work trip lengths for carpools reported by the applicant survey were 15.9 and 12.0 miles, respectively. In contrast, model distributions of 1972 SEWRPC home interview survey data indicated a mean one-way work trip length of 7.5 miles and a median of 5.3 miles for the seven-county Southeastern Wisconsin Region.

Table 12

DISTRIBUTION OF CARPOOL SIZE AND AUTO OCCUPANCY BY MAXIMUM ESTIMATE—MMACP APPLICANT SURVEY

Maximum Estimate of Carpool Occupancy					
Carpool Size	Number of Carpools	Percent of Total Reported	Number of Carpoolers	Percent of Total Carpoolers	Carpool Occupancy
2 persons	175	52.1	350	37.7	2
3 persons	91	27.1	273	29.4	3
4 persons	45	13.4	180	19.4	4
5 or more persons	25	7.4	125	13.5	5 +
Not reported	3	--	--	--	--
Total	339	100.0	928	100.0	2.76

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 13

DISTRIBUTION OF CARPOOL SIZE AND AUTO OCCUPANCY BY MINIMUM ESTIMATE—MMACP APPLICANT SURVEY

Minimum Estimate of Carpool Occupancy					
Carpool Size	Number of Carpoolers	Percent Reported	Number of Carpools	Percent of Total Carpools	Carpool Occupancy
2 persons	175	52.1	88	65.7	2
3 persons	91	27.1	30	22.4	3
4 persons	45	13.4	11	8.2	4
5 or more persons	25	7.4	5	3.7	5 +
Not reported . .	3	--	--	--	--
Total	339	100.0	134	100.0	2.51

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 14

FREQUENCY OF CARPOOL USE DURING AN AVERAGE WEEK FOR TRAVEL TO WORK OR SCHOOL MMACP APPLICANT SURVEY

Number of Days Per Week the Carpool Is Used	Number of Carpoolers	Percent Reported
1	2	0.6
2	5	1.5
3	12	3.6
4	28	8.5
5	284	85.8
Total reported	331	100.0
Not reported	8	--
Total	339	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 15

DISTRIBUTION OF PREVIOUS MODE OF TRAVEL FOR MATCH PROGRAM CARPOOLERS MMACP APPLICANT SURVEY

Previous Mode of Travel	Carpoolers	
	Number	Percent
Auto driver	235	69.3
Passenger in family car	12	3.5
Auto part way; bus part way . .	14	4.1
Bus	43	12.7
Motorcycle	0	0.0
Walk or bicycle	2	0.6
Other	4	1.2
Always carpooled	29	8.6
Total	339	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

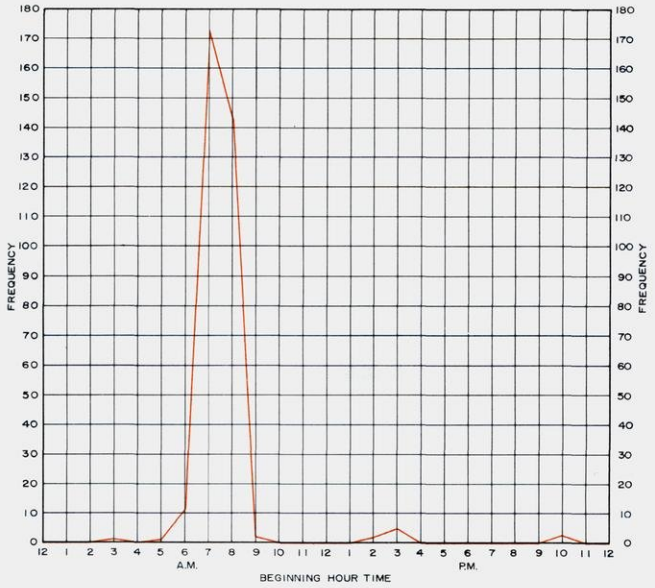
The majority of match program carpoolers, 69 percent, made the work trip as auto drivers before joining the carpool; 13 percent used the bus; 4 percent used an auto part way and a bus part way; another 4 percent were passengers in family cars; and 2 percent used a variety of other modes (see Table 15). Nine percent of the match program carpoolers indicated that they had always used a carpool on the trip to work. This category consists of applicants to the program who were already participating in carpools and looking for additional members, as well as some applicants who applied to the program in anticipation of joining a carpool in conjunction with beginning new employment. It is notable that only 13 percent of the carpoolers previously were bus passengers since 172, or 51 percent, of the match program carpoolers indicated that they could make the trip to work or school by bus.

PERCEIVED SAVINGS DUE TO CARPOOLING—APPLICANT SURVEY

Across the nation carpooling program promotional campaigns have stressed that carpooling saves motor fuel and parking costs, consequently reducing the cost of the work trip for the carpooler. Although carpoolers are generally aware of parking costs, they may be unaware of the exact amount of mileage or motor fuel savings. A carpooler must sense sufficient personal benefit from carpooling to justify the possibility of extended travel time and loss of free use of a private auto. The carpooler's perception of the degree of savings experienced may be instrumental not only in determining participation or nonparticipation in a carpool, but also the longevity of such participation.

Figure 1

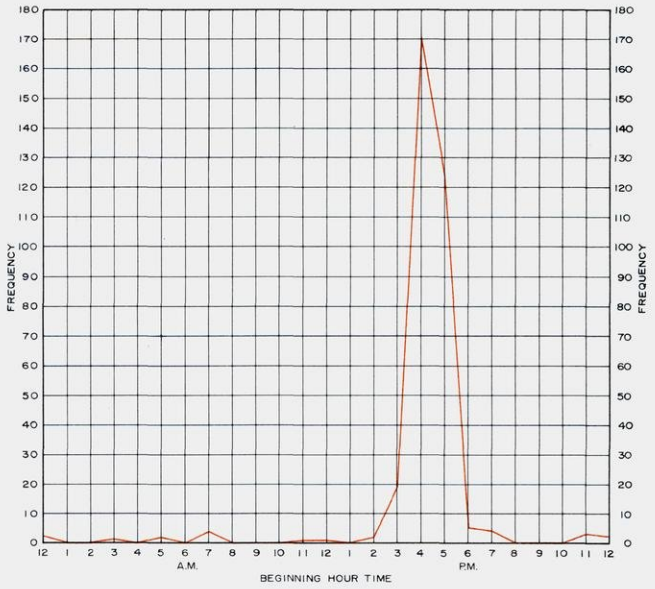
TIME OF ARRIVAL OF CARPOOLERS AT WORK OR SCHOOL LOCATIONS–MMACP APPLICANT SURVEY



Source: University of Wisconsin-Milwaukee and SEWRPC.

Figure 2

TIME OF DEPARTURE OF CARPOOLERS FROM WORK OR SCHOOL LOCATIONS–MMACP APPLICANT SURVEY



Source: University of Wisconsin-Milwaukee and SEWRPC.

Response to a question concerning the amount of parking cost savings perceived by carpoolers was requested from those match program carpoolers who had used paid parking. About 56 percent, or 189 of the match program carpoolers responded to the item. Of those carpoolers using paid parking, 58 percent indicated that they experienced no savings in parking costs as a result of carpooling, while the remaining 42 percent did. Of those reporting parking cost savings, 95 percent indicated the dollar value of those savings. As shown in Table 16, parking cost savings ranging from $2.00 to $5.99 a week were reported by about 49 percent of the carpoolers that experienced savings; almost 18 percent reported savings of less than $2.00; almost 15 percent reported savings of from $6.00 to $9.99; and 8 percent reported savings from $10.00 to $13.99. The remaining 11 percent of the respondents reported savings of $14.00 or more.

Table 16

WEEKLY SAVINGS IN PARKING COSTS MMACP APPLICANT SURVEY

Parking Cost Savings Per Week	Applicants Reporting Savings	
	Number	Percent
Less than $2.00	14	18.4
$ 2.00-3.99	19	25.0
4.00-5.99	18	23.7
6.00-7.99	7	9.2
8.00-9.99	4	5.3
10.00-11.99	4	5.3
12.00-13.99	2	2.6
14.00 or more	8	10.5
Total	76	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

Although individuals who carpool as passengers or share the driving with other carpool members should experience a decline in vehicle miles operated, those carpool members who are drivers only may experience an increase in vehicle miles traveled between work and home as a direct result of picking up and delivering passengers. Also affecting the carpooler's assessment of mileage saving is the degree of use of the automobile left available to other family members during the work or school day as a result of carpooling. Accordingly, the data in the applicant survey on perceived mileage savings were obtained through a three-part question:

1. If, since joining a carpool, the total miles driven on all vehicles available to the household had increased, decreased, or remained substantially unchanged;
2. How many miles per year the mileage was estimated to have increased or decreased; and
3. If this change was believed to be due to carpooling.

In an additional question, the carpoolers were asked whether or not the automobile left available to other family members during the work or school day was used and, if so, how much.

Only 176 of the 339 carpoolers completely answered the initial set of three questions. As shown in Table 17, of the 176 carpoolers, 94 carpoolers, or 53 percent, reported a decrease in mileage as a direct result of carpooling; 66 carpoolers, or 38 percent, reported no change in mileage as a result of carpooling; and 16 carpoolers, or 9 percent, reported increased mileage on vehicles as a result of carpooling. Despite the relatively low rate of response to this item, some values may be obtained which are believed to generally reflect mileage savings perceived by MMACP match program carpoolers. The magnitude of mileage change per year recognized by the typical match program carpooler may be estimated by selecting the midpoint of each miles per year category shown in Table 15, assigning the median value of 7,700 miles for the values listed in the "5,050 Miles and Over" category and then multiplying these values by the number of carpoolers in each corresponding column cell of the table. Using this procedure, the 94 carpoolers recognizing a decline in mileage would account for a decrease of a total of 217,000 vehicle miles of travel per year while the 16 carpoolers noting an increase in mileage would account for an additional 14,000 vehicle miles of travel per year. Therefore, the overall change in mileage recognized by match program carpoolers, a net decrease of 203,000 miles per year, represents an average saving in miles traveled of about 1,160 miles per year for each of the 176 carpoolers. With a range in auto occupancy between 2.51 and 2.76 persons per car, an average net saving of a minimum of about 2,900 miles per year to a maximum of about 3,190 miles per year would be perceived by the typical match program carpool.

On the question relating to use of the automobile left at home, 176 carpoolers, or 67 percent of the 262 carpoolers responding to the question, indicated that the auto was not used by other family members and 86 carpoolers, or 33 percent, indicated that their auto did receive such use. The mileage and frequency of use estimates of autos left at home, as obtained from 71 carpool applicants, are summarized in Table 18. The sum of these responses indicated that the mileage on the 71 autos left at home was estimated by the carpoolers to be about 3,000 miles per week, or approximately 42 miles per week per auto. Because direct use of the data reported by 71 carpoolers may be heavily influenced by five match program carpoolers who indicated that the auto left at home was driven more than 32 miles per day, further analysis of mileage attributed to vehicles left at home was undertaken by using the median value of mileage driven of 10 miles per day. This analysis indicated that about 1,900 miles per week or about 27 miles per week per

Table 17

ESTIMATES OF ANNUAL MILEAGE CHANGE DUE TO CARPOOLING–MMACP APPLICANT SURVEY

Mileage Change	Number of Miles Per Year													
	100-1,049		1,050-2,049		2,050-3,049		3,050-4,049		4,050-5,049		5,050 and Over		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Decreased mileage due to carpooling	27	28.7	20	21.3	20	21.3	13	13.8	10	10.6	4	4.3	94	100.0
Increased mileage due to carpooling	12	75.0	2	12.5	2	12.5	--	--	--	--	--	--	16	100.0
No change	--	--	--	--	--	--	--	--	--	--	--	--	66	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 18

AMOUNT OF USE BY DAYS PER WEEK AND MILES PER DAY OF AUTO LEFT AT HOME BY CARPOOLER–MMACP APPLICANT SURVEY

Number of Days Per Week Auto Left At Home Is Used	Number of Miles Per Day Auto Left at Home Is Driven									
	1-3	4-6	7-9	10-12	13-15	19-21	22-26	27-31	32 and Over	Total Number
1 day	--	6	1	--	1	--	--	1	--	9
2 days	1	9	2	11	5	1	1	1	1	32
3 days	1	5	--	6	--	1	--	1	--	14
4 days	1	--	--	--	--	--	--	--	--	1
5 or more days	1	--	--	5	1	3	--	1	4	15
Total	4	20	3	22	7	5	1	4	5	71

Source: University of Wisconsin-Milwaukee and SEWRPC.

auto would be logged on vehicles left at home. Application of the mileage values obtained from these two approaches to the total carpoolers responding to the question provides a range of mileage values between 1.5 and 2.3 miles per day per carpooler estimated to be logged on vehicles left at home as a result of carpooling. It should be noted, however, that these mileage estimates may include mileage for trips which would have been made regardless of the carpooling status of the household member, such as shopping trips, which, prior to carpooling, would have been made at night or on the weekend.

Lastly, as shown in Table 19, only five of 223 carpoolers, or about 2 percent, indicated that carpooling resulted in cost increases with the remaining 218 carpoolers, or 98 percent, indicating a cost saving due to carpooling. Of carpoolers indicating decreased costs, 26 percent perceived a savings of less than $4.00 per week; 30 percent between $4.00 and $6.00 per week; 15 percent between $6.00 and $10.00 per week; and 29 percent $10.00 or more per week. The typical match program carpooler would recognize an average monetary savings of approximately $7.00 per week.

The above estimates of various types of savings are based on the subjective evaluation of the respondents. While subjective estimates are beneficial in assessing perceived savings by carpool members, the quantification of energy conservation obtained by carpooling is best achieved through objective data, such as work-trip vehicle miles of travel, and delineation of the various mode shifts shown to result from carpooling. Such data, as it pertains to both carpoolers and non-carpoolers in the general population, is provided by the household survey.

Table 19

DOLLAR SAVINGS AND COSTS FOR AN AVERAGE WEEK DUE TO CARPOOLING–MMACP APPLICANT SURVEY

Dollars Per Week	Change in Cost			
	Decreased Cost		Increased Cost	
	Number	Percent	Number	Percent
$ 0.01-1.99	13	6.0	--	--
2.00-3.99	44	20.2	2	40.0
4.00-5.99	65	29.8	2	40.0
6.00-7.99	18	8.2	--	--
8.00-9.99	14	6.4	--	--
10.00-10.99	35	16.0	1	20.0
11.00-12.99	5	2.3	--	--
13.00-14.99	1	0.5	--	--
15.00 and over	23	10.6	--	--
Total	218	100.0	5	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

Chapter III

INVENTORY FINDINGS—HOUSEHOLD SURVEY

INTRODUCTION

The household survey, which consisted of a representative sampling of occupied housing units in the Metropolitan Milwaukee area, provided the data necessary to estimate the extent and effects of carpooling in the four-county area served by the MMACP. The following discussion examines: the extent of carpool use among the general population of the four-county Metropolitan Milwaukee area; socioeconomic characteristics of carpoolers and noncarpoolers; the level of awareness of MMACP services within the general population; factors which either generate or prevent carpool formation; travel characteristics of area carpools; and the benefits and savings derived from carpooling. It should be emphasized that the findings discussed in this chapter concern total Metropolitan Milwaukee area carpools in operation at the time of the survey regardless of the date of carpool formation. Household survey findings as they relate to carpools formed since May of 1975, the inception of the MMACP, are discussed in a separate chapter.

EXTENT OF CARPOOL USE WITHIN THE FOUR-COUNTY AREA—HOUSEHOLD SURVEY

As shown in Table 20, about 11 percent of area households contained one carpool member, accounting for 49,475 carpoolers in the four-county area; 4 percent of area households contained two carpool members, accounting for 37,178 carpoolers; and somewhat less than one-half of 1 percent of area households contained three or more carpool members, accounting for 5,390 carpoolers. In total, 92,043 carpoolers were estimated to be living within the four-county area at the time of the survey. The survey instrument was designed to obtain detailed information for two carpoolers per household. As a result, specific information concerning carpooling activities exists for 89,973 of the total 92,043 carpoolers living in the area.

As would be expected, the largest numbers of carpoolers live in the counties with the largest populations in the four-county area, namely, Milwaukee and Waukesha Counties.[1] As shown in Table 21, of the 92,043 carpoolers, 69,068 carpoolers, or 75 percent, reside in Milwaukee County; 12,027 carpoolers, or 13 percent, reside in Waukesha County; 6,100 carpoolers, or almost 7 percent, reside in Washington County; and 4,848 carpoolers, or 5 percent, reside in Ozaukee County.

The relative importance of carpooling as an alternative mode of travel is best illustrated, however, by the distribution of carpoolers as a percent of the employed persons residing in the county. Although the area average shows that 18 percent of employed persons are carpoolers, there is wide variation from this average within counties. Carpooling maintains the greatest relative importance in Washington County where 28 percent of the employed persons are carpoolers and in Ozaukee County where 24 percent are carpoolers. Milwaukee County with 18 percent of the employed persons as carpoolers maintains a ratio which is very similar to that of the four-county metropolitan area; whereas, in Waukesha County the carpool as an alternative mode

[1] *SEWRPC, A Regional Land Use Plan and A Regional Transportation Plan for Southeastern Wisconsin—2000, Planning Report No. 25, Volume 1, Table 7, p. 55.*

Table 20

DISTRIBUTION OF HOUSEHOLDS IN THE FOUR-COUNTY METROPOLITAN MILWAUKEE AREA BY NUMBER OF CARPOOLERS PER HOUSEHOLD–MMACP HOUSEHOLD SURVEY

Carpoolers Per Household	Metropolitan Milwaukee Area Households									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0	294,373	84.56	13,211	78.42	15,423	78.36	59,235	88.00	382,242	84.57
1	39,269	11.28	2,545	15.11	2,993	15.21	4,668	6.94	49,475	10.95
2	13,647	3.92	970	5.75	921	4.68	3,051	4.53	18,589	4.11
3 or More	835	0.24	121	0.72	345	1.75	359	0.53	1,660	0.37
Total	348,124	100.00	16,847	100.00	19,682	100.00	67,313	100.00	451,966	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

is of least importance with carpoolers representing only 14 percent of the employed persons residing in the County.

Household survey data indicates that the vast majority of carpoolers, 95 percent, intend to continue carpooling. Although various factors were cited ranging from a need for free use of an auto to incompatibilities with carpool partners, only two primary reasons prevented continuation of carpooling for the remaining 5 percent: a change in work or school location and a change in residential location.

SOCIOECONOMIC CHARACTERISTICS OF CARPOOLERS AND NONCARPOOLERS—HOUSEHOLD SURVEY

Data was collected on the age, sex, and educational level of carpoolers and noncarpoolers in the general population in an effort to provide information useful in the design or modification of promotional campaigns to encourage further carpooling. Presented below are comparisons of the socioeconomic characteristics of carpoolers and noncarpoolers as reported by the household survey.

As shown in Table 22, the percentage distribution by age group of noncarpoolers is almost identical to the distribution by age of total employed persons in the four-county area. The percentage distribution by age group of carpoolers is also quite similar to that of total employed persons with only a few subtle differences which, may, nevertheless, be indicative of a trend. Almost 49 percent of carpoolers are less than 35 years old, whereas 44 percent of employed persons and of noncarpoolers are under 35 years of age. Seventeen percent of the carpoolers are in the 20 to 24 year age group in comparison to 14 percent of the noncarpoolers and of the total employed persons. In contrast, in each age category 35 years or older the percent distribution among carpoolers is smaller than the distribution for noncarpoolers and total employed persons. This data may indicate that the tendency toward carpooling is slightly more prevalent within the younger segments of the employed population.

The experience of carpool programs in other cities has shown that females tend to exhibit a greater interest in carpooling than males.[2] The distribution of employed persons by carpooling status by sex, as reported in the household survey, is set forth in Table 23. Females comprise about 37 percent of the population of employed persons, but account for 43 percent of the carpoolers. On the other hand, males constitute approximately 63 percent of the employed persons, but only 57 percent of the carpoolers. In a relative sense, then, females in the four-county area also exhibit a greater tendency to participate in carpools than do males.

The percentage distribution of carpoolers by educational level is displayed in Table 24. Over 40 percent of the carpoolers in the four-county area have attained a high school diploma; 23 percent have attended college without receiving a degree; 13 percent are college graduates; and 9 percent have pursued postgraduate studies. In total, 86 percent of the carpoolers in the four-county area have obtained an educational level of high school graduate or above—an indication that carpoolers may tend to be better educated than the general population. In comparison, data obtained in 1970 by the U. S. Census about educational attainment levels[3] indicate that only 58 percent of the persons 25 years of age and older in the four-county area have obtained an educational level of high school graduate or above.

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[2] *Transportation Development Associates, Inc., Evaluation of Seattle-Everett SMSA Carpooling Program, May 1975, p. 8.*

[3] *SEWRPC, The Population of Southeastern Wisconsin, Technical Report No. 11, December 1972, p. 35.*

Table 21

DISTRIBUTION OF EMPLOYED PERSONS LIVING IN THE FOUR-COUNTY METROPOLITAN AREA BY CARPOOLING STATUS—MMACP HOUSEHOLD SURVEY

County	Employed Persons						
	Carpoolers		Noncarpoolers		Total		Carpoolers as Percent of Total Employed
	Number	Percent	Number	Percent	Number	Percent	
Milwaukee	69,068	75.04	308,578	74.67	377,646	74.73	18.29
Ozaukee	4,848	5.27	15,514	3.75	20,362	4.03	23.81
Washington . . .	6,100	6.63	15,768	3.82	21,868	4.33	27.89
Waukesha.	12,027	13.06	73,414	17.76	85,441	16.91	14.08
Total	92,043	100.00	413,274	100.00	505,317	100.00	18.21

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 22

DISTRIBUTION OF EMPLOYED PERSONS LIVING IN THE METROPOLITAN MILWAUKEE AREA BY CARPOOLING STATUS AND AGE–MMACP HOUSEHOLD SURVEY

Age (years)	Employed Persons					
	Carpoolers		Noncarpoolers		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
19 and under	4,860	5.51	19,044	4.68	23,904	4.83
20-24	15,081	17.11	55,941	13.74	71,022	14.34
25-34	22,751	25.81	102,449	25.16	125,200	25.27
35-44	16,468	18.69	81,555	20.03	98,023	19.79
45-54	18,062	20.49	88,964	21.84	107,026	21.61
55-64	10,794	12.25	53,274	13.08	64,068	12.93
65 and over	121	0.14	5,982	1.47	6,103	1.23
Total reported	88,137	100.00	407,209	100.00	495,346	100.00
Not reported	1,836	--	6,065	--	7,901	--
Total	89,973	100.00	413,274	100.00	503,247	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 23

DISTRIBUTION OF EMPLOYED PERSONS LIVING IN THE METROPOLITAN MILWAUKEE AREA BY CARPOOLING STATUS AND SEX–MMACP HOUSEHOLD SURVEY

Sex	Employed Persons					
	Carpoolers		Noncarpoolers		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
Male	50,697	56.88	267,533	64.85	318,230	63.44
Female	38,434	43.12	144,990	35.15	183,424	36.56
Total reported	89,131	100.00	412,523	100.00	501,654	100.00
Not reported	842	--	751	--	1,593	--
Total	89,973	100.00	413,274	100.00	503,247	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 25 indicates the effectiveness of the MMACP promotional campaign to inform the public of carpooling program services. As shown at the bottom of this table, well over 65 percent of the households in the four-county area were aware of the existence of the MMACP. About 50 percent of the study area households were aware that the MMACP both furnishes information to press, television, radio, and company newsletters and provides a matching service for potential carpoolers. Almost 45 percent of the study area households were aware that the MMACP assists firms and agencies in initiating and maintaining carpool programs; 44 percent knew that the MMACP can be used by anyone living in the four-county area; and 43 percent recognized that the MMACP match program could be joined by submitting an application. Only two aspects of the services offered by the MMACP were not widely known. Less than 17 percent of the area households were aware that the MMACP provides speakers to interested groups and, surprisingly, only 30 percent of the surveyed households realized that the MMACP did not charge a fee for any of its services.

It is interesting to note that examination of the percentage distributions within county, as applied to specific services discloses that, generally, Waukesha County residents maintained the highest level of awareness of MMACP services and Washington County residents the lowest. Such a response pattern is unexpected since, as discussed previously, within the four counties carpooling

as an alternative mode of travel assumes the most relative importance in Washington County and the least in Waukesha County.

Indicated in Table 26 is the relative effectiveness of the information dissemination channels utilized by the MMACP. In order of importance, 48 percent of the carpoolers in the four-county area had heard about the MMACP through television promotions; 28 percent through ads in newspapers; 23 percent through radio advertisements; and 22 percent through billboards. With the exception of television, the impact of these media varied within individual counties. In Ozaukee, Washington, and Waukesha Counties, billboards were more important sources of information than radio advertisements, and radio was more important than ads in newspapers in Ozaukee and Waukesha Counties. Although a lower level of expenditure was devoted to television vis-a-vis other media,[4] within each county more carpoolers had heard of the MMACP through televised promotions than through any other media.

It is noteworthy that relatively small percentages of carpooling respondents had heard of the Metropolitan Milwaukee Area Carpooling Program through employer contacts despite this major promotional effort of the MMACP in the initial phases of the campaign. The highest percentage response for this source of information was 24 percent for Milwaukee County followed by Waukesha County with 12 percent, Washington County with 11 percent, and Ozaukee County with 8 percent. Employer contacts ranked fifth in importance as a source of information for carpooler respondents in the four-county area. In contrast, employer contacts were the most frequently cited source of information among match program applicants with 53 percent of the applicants surveyed indicating that they had heard of the MMACP through employers. The difference between these two sets of responses would indicate that, although employer contact may have had a relatively small effect on the general population, such contact may have had significant impact upon employees of the specific companies cooperating with the MMACP in promoting carpool formation. This conclusion is further supported

[4] *See Carpool: A Staff Evaluation of the Metropolitan Milwaukee Area Carpooling Program, Cost Summary.*

Table 24

DISTRIBUTION OF CARPOOLERS LIVING IN THE METROPOLITAN MILWAUKEE AREA BY EDUCATIONAL LEVEL–MMACP HOUSEHOLD SURVEY

Educational Level	Carpoolers	
	Number	Percent Reported
Some grade school	1,392	1.59
Grade school graduate	3,911	4.48
Some high school	7,097	8.13
High school graduate	34,963	40.03
Some college	20,473	23.44
College graduate	11,673	13.37
Post-graduate studies	7,830	8.96
Total reported	87,339	100.00
Not reported	2,634	--
Total	89,973	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 25

PERCENTAGE DISTRIBUTION OF HOUSEHOLDS IN THE METROPOLITAN MILWAUKEE AREA BY AWARENESS OF MMACP SERVICES–MMACP HOUSEHOLD SURVEY

Services Offered by the MMAPC	Percent of Households Indicating Awareness of Services				
	Milwaukee County	Ozaukee County	Washington County	Waukesha County	Total
The MMACP:					
Can be used by anyone in the four-county area	43.5	48.9	38.9	47.0	44.0
Can match potential carpoolers	48.7	53.3	44.8	51.4	49.1
Can be joined by submitting application	42.2	41.5	41.0	45.6	42.8
Furnishes information to press, television, radio, and company newsletters	49.5	45.2	47.9	55.6	50.2
Assists firms/agencies in initiating and maintaining carpooling programs	44.0	43.7	41.5	50.7	44.9
Provides speakers to interested groups	15.6	15.6	12.1	22.5	16.5
Does not charge for these services	29.3	32.1	18.8	33.9	29.6
Households aware of existence of MMACP	67.7	65.5	68.8	71.0	68.2

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 26

SOURCES OF INFORMATION ON THE CARPOOLING PROGRAM—MMACP HOUSEHOLD SURVEY

Informational Efforts Responsible for Carpooler Awareness	Percent of Total Carpoolers[a]				
	Milwaukee County	Ozaukee County	Washington County	Waukesha County	Total
Television advertisements	49.4	35.0	51.0	41.5	47.7
Newspaper advertisements	33.5	15.0	18.9	7.7	28.2
Radio advertisements	24.5	22.5	13.2	16.9	22.6
Billboards	22.9	25.0	18.9	20.0	22.3
Employer contacts	24.4	7.5	11.3	12.3	19.6
Unaware of any of above	15.1	22.5	18.9	13.8	15.6
Relative or friend	8.6	12.5	5.7	6.1	8.3
Other	0.8	--	3.8	1.5	1.1

[a] *Percentages based on the total number of carpoolers in each county. Multiple responses were permitted.*

Source: University of Wisconsin-Milwaukee and SEWRPC.

by the findings of a study[5] on carpooling recently released by the Federal Energy Administration which indicated that when strategies to increase both carpooling and fuel conservation were applied within well-defined target groups—as are employer-based promotions—significant increases in carpooling can be achieved within those groups.

FACTORS INFLUENCING CARPOOL FORMATION—HOUSEHOLD SURVEY

Household survey respondents who were carpoolers indicated their first, second, and third most important reasons for joining a carpool as shown in Table 27. As in the applicant survey, the first choice reason for carpooling which was most frequently mentioned, was to save money, as indicated by 39 percent of the respondents to the household survey. Other important primary reasons were to help a friend, 11 percent; more convenient than bus, 10 percent; energy conservation, 8 percent; and to eliminate the need for a second auto, 7 percent. The most important secondary reasons for carpooling were to save money, 19 percent; companionship, 13 percent; energy conservation, 12 percent; more convenient than the bus, 10 percent; and to eliminate the need for a second auto, 10 percent. Companionship, 18 percent, was the most frequently mentioned tertiary reason for carpooling followed by the desire to save money, 16 percent; more convenient than bus, 15 percent; energy conservation, 14 percent; and elimination of the need for a second auto, 6 percent. It should be noted that the importance of the reason "more convenient than the bus" was heavily influenced by responses from Milwaukee County since the majority of residents in the other three counties do not have access to a local bus service. Examination of Table 27 reveals that conspicuously few employed persons joined carpools in order to "keep U. S. oil dollars at home."

Overall, the most important reasons motivating carpool formation are to save money, more convenient than bus, energy conservation, and companionship. It should be pointed out that the MMACP promotional effort emphasized money savings and energy conservation as important benefits associated with carpooling.

FACTORS PREVENTING CARPOOL FORMATION

The factors which prevent carpool formation as reported in the household survey are displayed in Table 28. Approximately one-third of the noncarpoolers in each of the four counties do not carpool because their work times and/or locations change too much. The second most frequently mentioned reason for not carpooling is simply that there is no carpool partner available, reported by 21 percent of the noncarpooling employed persons in Milwaukee County, 26 percent in Ozaukee County, 27 percent in Washington County, and 20 percent in Waukesha County. In total, 21 percent, or 82,354, of the noncarpooling employed persons in the urbanized area do not know of anyone who would be interested in carpooling with them. Presumably these persons are at least marginally interested in carpooling. With the exception of Milwaukee County the third reason preventing carpool formation is the need for the free use of an auto. Persons in this category generally require the use of an auto on a regular basis in their work and therefore would either not be able to share driving in a carpool or would find it difficult to adjust departure and arrival times to accommodate carpool partners.

[5] *Federal Energy Administration, Office of Energy Conservation and Environment, Carpool Incentives: Analysis of Transportation and Energy Impacts, June 1976.*

Table 27

PERCENTAGE DISTRIBUTION OF FACTORS MOTIVATING CARPOOL FORMATION AS REPORTED BY CARPOOLERS–MMACP HOUSEHOLD SURVEY

Motivation for Carpool Formation	Percent of Carpooler Responses			
	First Reason	Second Reason	Third Reason	All Reasons
Save money	39.3	19.1	15.8	27.3
More convenient than bus	10.0	9.9	15.3	11.2
Energy conservation	8.0	11.9	14.0	10.6
Companionship	4.0	12.7	18.3	10.1
Help a friend	10.6	5.3	5.4	7.7
Eliminate need for a second auto	6.8	9.8	6.3	7.6
Make auto available to family	3.9	8.9	5.3	5.9
No other mode available	6.5	4.9	6.0	5.9
Avoid stress of driving	2.9	7.4	5.2	4.9
Concern for environment	0.2	5.4	3.1	2.6
More convenient than passenger in family auto	1.1	2.1	1.9	1.6
Employer incentives	1.0	--	0.6	0.6
Keep U. S. oil dollars at home	--	--	1.6	0.4
Other	5.7	2.6	1.2	3.6
Total	100.0	100.0	100.0	100.0
Total responses	85,273	61,583	44,208	191,064
Percent of 89,973 carpoolers that indicated motivation	94.8	68.5	49.1	94.8

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 28

DISTRIBUTION OF REASONS PREVENTING EMPLOYED PERSONS FROM CARPOOLING–MMACP HOUSEHOLD SURVEY

Reasons Preventing Carpool Formation	Noncarpooling Employed Persons									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
Work times and/or locations change too much	102,767	35.2	4,726	32.5	5,755	37.9	25,489	37.2	138,737	35.5
No one to carpool with	60,991	20.8	3,757	25.9	4,144	27.3	13,462	19.6	82,354	21.1
Need free use of auto	32,027	11.0	2,666	18.3	2,187	14.4	12,026	17.5	48,906	12.5
Satisfied with present mode	32,306	11.1	1,212	8.3	345	2.3	5,205	7.6	39,068	10.0
Not willing to give up auto	12,253	4.1	727	5.0	230	1.5	2,872	4.2	16,082	4.1
Like to ride alone	8,911	3.1	242	1.7	345	2.3	1,615	2.4	11,113	2.9
Carpooling would increase travel time too much	5,291	1.8	727	5.0	805	5.3	1,615	2.4	8,438	2.2
Other	37,597	12.9	485	3.3	1,381	9.0	6,283	9.1	45,746	11.7
Total reported	292,143	100.0	14,542	100.0	15,192	100.0	68,567	100.0	390,444	100.0
Not reported	16,435	--	972	--	576	--	4,847	--	22,830	--
Total	308,578	100.0	15,514	100.0	15,768	100.0	73,414	100.0	413,274	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

As shown in Table 29, almost 9 percent of the non-carpooling respondents stated that they intend to carpool in the future—an indication that about 35,000 non-carpooling employed persons in the four-county area may be considered as potential carpool participants. If these persons were to join carpools, the carpooling rate would increase from the current 18 percent of the employed persons to 25 percent. If the number of persons intending to form carpools in each of the four counties exhibited the same modal shifts and auto occupancy rates after carpool formation as current carpoolers, they would contribute to a reduction of about 7,200 vehicles used for work trips.

Those respondents who said they did not intend to carpool in the future were asked under what circumstances they would decide to carpool (see Table 30). Approximately 16 percent of the respondents, or 57,536, said they would carpool if a carpool partner could be found; 22 percent would consider carpooling if there was a change in job or school hours; and 20 percent would not carpool under any circumstances. Only 3 percent indicated that they would carpool only if gasoline is rationed and another 2 percent would carpool only if gasoline becomes too costly. If gasoline were rationed or its cost increased substantially, it is likely that some of the respondents who indicated that they would

Table 29

DISTRIBUTION OF ANTICIPATED CARPOOL FORMATION BY EMPLOYED NONCARPOOLERS LIVING IN THE FOUR-COUNTY METROPOLITAN MILWAUKEE AREA—MMACP HOUSEHOLD SURVEY

Intent	Employed Noncarpoolers									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
Intend to form carpool	25,343	8.44	1,454	9.52	1,151	7.63	6,821	9.72	34,769	8.68
Do not intend to form carpool	274,879	91.56	13,817	90.48	13,927	92.37	63,363	90.28	365,986	91.32
Total reported	300,222	100.00	15,271	100.00	15,078	100.00	70,184	100.00	400,755	100.00
Not reported	8,356	--	243	--	690	--	3,230	--	12,519	--
Total	308,578	100.00	15,514	100.00	15,768	100.00	73,414	100.00	413,274	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 30

DISTRIBUTION OF CIRCUMSTANCES UNDER WHICH NONCARPOOLERS WOULD DECIDE TO CARPOOL—MMACP HOUSEHOLD SURVEY

Circumstances Which Would Influence Decisions to Carpool	Noncarpooling Employed Persons									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
Change in job or school hours	59,043	22.2	1,697	12.7	3,914	29.8	11,666	20.3	76,320	21.8
Would carpool under no circumstances	53,471	20.1	2,909	21.8	3,338	25.4	9,154	15.9	68,872	19.7
Find a carpool partner	44,282	16.7	2,424	18.2	1,496	11.4	9,334	16.3	57,536	16.4
Change in work or school location	28,129	10.6	2,061	15.5	2,302	17.5	6,283	10.9	38,775	11.1
Not need free use of auto	26,458	9.9	1,212	9.1	1,036	7.9	9,334	16.3	38,040	10.9
Only if no other mode available	19,217	7.2	1,818	13.6	230	1.8	5,206	9.1	26,471	7.6
Only if gasoline is rationed	8,077	3.0	242	1.8	--	--	1,257	2.2	9,576	2.7
Only if gasoline becomes too costly	3,620	1.4	242	1.8	115	0.9	1,616	2.8	5,593	1.6
Other	23,627	8.9	727	5.5	691	5.3	3,589	6.2	28,634	8.2
Total reported	265,924	100.0	13,332	100.0	13,122	100.0	57,439	100.0	349,817	100.0
Not reported	42,654	--	2,182	--	2,646	--	15,975	--	63,457	--
Total	308,578	100.0	15,514	100.0	15,768	100.0	73,414	100.0	413,274	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

carpool upon finding a carpool partner would engage in a more active search for someone to carpool with.

CHARACTERISTICS OF CARPOOLS—HOUSEHOLD SURVEY

The major characteristics of Metropolitan Milwaukee area carpools considered in this section are size, frequency of use and purpose, driving arrangements, time of day, trip length, and mode shifts due to carpooling.

About 88 percent of the carpoolers in the four-county area belong to carpools which transport no more than three persons: almost 61 percent of the carpoolers participate in two person carpools; 27 percent in three person carpools; 8 percent, in four person carpools; and 4 percent in five or more person carpools. As shown in Table 31, the county distributions of carpoolers by carpool size within Milwaukee, Ozaukee, and Washington Counties are very similar to the distribution for the four-county metropolitan area. The distribution within Waukesha County differs substantially, however, with 75 percent of the carpoolers participating in two person carpools; 14 percent in three person carpools; 11 percent in four person carpools; and no persons reported in five or more person carpools. Consequently, although 89 percent of carpoolers in this County are members of carpools which consist of no more than two or three persons, the preponderance of two person carpools substantially lowers the carpool occupancy rate within Waukesha County. Ozaukee County carpools have the highest carpool occupancy rate with 2.44 persons per carpool followed by Milwaukee County, 2.39 persons per carpool; Washington County, 2.37 persons per carpool; and Waukesha County, 2.23 persons per carpool. The overall carpool occupancy rate for the Metropolitan Milwaukee area is 2.37 persons per carpool auto. This occupancy rate compares favorably with an auto occupancy of 2.32 for multiple occupancy vehicles as determined for the PM peak period in an auto occupancy study conducted by the Division of Highways, Milwaukee Metropolitan District Planning Section. In addition, this study reported an overall auto occupancy of 1.32 for the PM peak period while the household survey recorded an overall occupancy of 1.33.

The frequency of travel to work or school by carpoolers by county is displayed in Table 32. Over 82 percent of the carpoolers in the four-county area carpool to work or school at least five days a week and approximately 89 percent utilize carpools at least four days per week. The carpool is used five or more days per week by 86 percent of the carpoolers in Waukesha County, 82 percent in Milwaukee and Washington Counties, and 78 percent in Ozaukee County. In addition, survey results indicate that 96 percent of the carpoolers travel to work in carpools while the remaining 4 percent use carpools for travel to school. Hereafter, for the purpose of ease in discussion, all carpool trips made to attend work or school will be referred to as work-purpose carpool trips.

As shown in Table 33, approximately 23 percent of the carpoolers drive only; another 34 percent ride as passengers only; and 43 percent share driving with other carpool members. These arrangements often reflect auto availability to carpoolers and agreements for sharing the cost of travel. The largest percentage of carpoolers, 43 percent, apparently prefer to share costs by alternating driving responsibilities. This sharing arrangement has at least two important advantages to the carpooler. First, there are no direct cash payments to other carpool members and, second, the auto previously used for the work trip can be made available to other household members on a periodic basis.

The pickup and distribution of carpool members often results in an increase in total trip time. Therefore, the patterns of carpooler and noncarpooler arrival and departure times, as shown in Figures 3 and 4, differ slightly. Peak arrival time for carpoolers (Figure 3) is

Table 31

DISTRIBUTION BY CARPOOL SIZE OF CARPOOLERS LIVING IN THE FOUR-COUNTY METROPOLITAN MILWAUKEE AREA—MMACP HOUSEHOLD SURVEY

Carpool Size	Metropolitan Milwaukee Area Carpoolers									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
2 persons	39,268	58.51	2,666	56.40	3,223	59.57	8,437	74.61	53,594	60.52
3 persons	19,773	29.46	1,333	28.20	1,611	29.78	1,615	14.28	24,332	27.47
4 persons	5,292	7.88	364	7.70	461	8.52	1,256	11.11	7,373	8.32
5 or more persons	2,785	4.15	364	7.70	115	2.13	0	0.00	3,264	3.69
Total reported	67,118	100.00	4,727	100.00	5,410	100.00	11,308	100.00	88,563	100.00
Not reported	1,115	--	0	--	115	--	180	--	1,410	--
Total	68,233	100.00	4,727	100.00	5,525	100.00	11,488	100.00	89,973	100.00
Average carpool occupancy	2.39	--	2.44	--	2.37	--	2.23	--	2.37	--

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 32

FREQUENCY OF CARPOOL USE DURING AN AVERAGE WEEK FOR TRAVEL TO WORK OR SCHOOL–MMACP HOUSEHOLD SURVEY

Number of Days per Week the Carpool is Used	Metropolitan Milwaukee Area Carpoolers									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
1	557	0.84	242	5.55	115	2.22	538	4.83	1,452	1.68
2	3,063	4.64	121	2.77	115	2.22	359	3.23	3,658	4.22
3	4,177	6.33	0	0.00	345	6.66	179	1.61	4,701	5.42
4	4,177	6.33	606	13.89	345	6.66	538	4.83	5,666	6.54
5	54,029	81.86	3,393	77.79	4,259	82.24	9,514	85.50	71,195	82.14
Total reported	66,003	100.00	4,362	100.00	5,179	100.00	11,128	100.00	86,672	100.00
Not reported	2,230	--	365	--	346	--	360	--	3,301	--
Total	68,233	100.00	4,727	100.00	5,525	100.00	11,488	100.00	89,973	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 33

DISTRIBUTION OF CARPOOLERS LIVING IN THE METROPOLITAN MILWAUKEE AREA BY CARPOOL DRIVING ARRANGEMENTS–MMACP HOUSEHOLD SURVEY

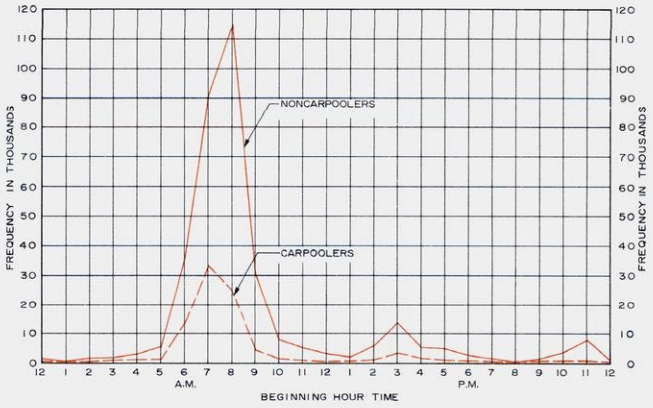
Driving Arrangement	Metropolitan Milwaukee Area Carpoolers	
	Number	Percent Reported
Drive only	20,556	23.07
Passenger only . . .	30,192	33.88
Share driving	38,366	43.05
Total reported . . .	89,114	100.00
Not reported	859	--
Total	89,973	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

during the hour beginning at 7:00 AM while the corresponding time for noncarpoolers is the hour beginning at 8:00 AM. This could result from the need to distribute carpool members at their work locations, causing earlier arrival times. Carpoolers also exhibit one secondary peak at the hour beginning at 3:00 PM, while arrival times for noncarpoolers have two secondary peaks: one at the hour beginning at 3:00 PM, and another smaller one at the hour beginning at 11:00 PM. Departure times for both carpoolers and noncarpoolers peak during the hour beginning at 4:00 PM (see Figure 4). However, noncarpoolers departures have two prominent secondary peaks; one at 7:00 AM and another at 11:00 PM-12:00 AM. Carpooler departure times show a moderately strong peak at midnight and a barely perceptible rise at 6:00 AM.

Figure 3

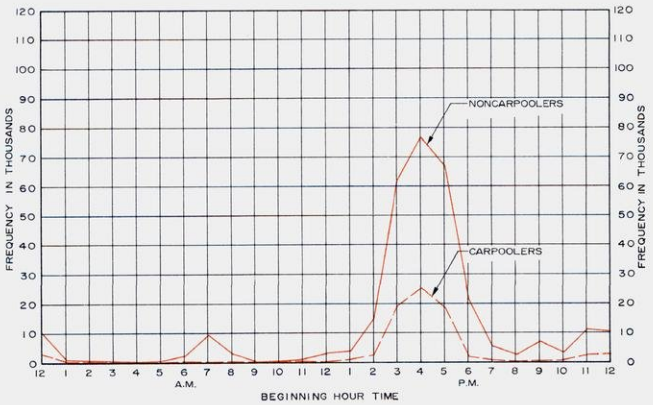
ARRIVAL TIME OF CARPOOLERS AND NONCARPOOLERS AT WORK AND SCHOOL LOCATIONS MMACP HOUSEHOLD SURVEY



Source: University of Wisconsin-Milwaukee and SEWRPC.

Figure 4

DEPARTURE TIME OF CARPOOLERS AND NONCARPOOLERS FROM WORK AND SCHOOL LOCATIONS MMACP HOUSEHOLD SURVEY



Source: University of Wisconsin-Milwaukee and SEWRPC.

These figures demonstrate that carpooling is a peak period phenomenon with 68 percent of the carpools arriving at their destination between the hours of 7:00 AM to 9:00 AM. In contrast, only 60 percent of the noncarpoolers arrive at their destinations during this same time period. Similarly, departures are concentrated in the typically longer afternoon peak periods from 3:00 PM until 6:00 PM; 80 percent of the carpoolers and 67 percent of the noncarpoolers have departures during this period.

The distribution of carpoolers in the four-county area by one-way trip length, as shown in Table 34, indicates that as trip length increases the number of carpoolers making trips of successively longer lengths generally tends to decrease. However, between counties the arrays of carpoolers by trip length show significant variations. For example, about 84 percent of Milwaukee County carpoolers travel less than 13 miles to their place of work while within the remaining three counties less than 50 percent of the carpoolers travel only this distance. In Milwaukee County the pattern of the distribution of carpoolers by miles traveled is most like the area total with 65 percent of the carpoolers traveling less than 10 miles; 30 percent, between 10 and 18 miles; 3 percent, between 19 and 26 miles; and 2 percent, 27 or more miles. In Ozaukee County 38 percent of the carpoolers travel less than 10 miles; 43 percent, between 10 and 18 miles; 16 percent, between 19 and 26 miles, and 3 percent, 27 or more miles. Similarly, in Washington County 38 percent of the carpoolers travel less than 10 miles; however, only 11 percent travel between 10 and 18 miles; 38 percent, between 19 and 26 miles; and 13 percent, 27 or more miles. The overall pattern in Waukesha County was fairly similar to that in Ozaukee County with 31 percent of the carpoolers traveling less than 10 miles; 40 percent, between 10 and 18 miles; 25 percent, between 19 and 26 miles; and 4 percent, 27 or more miles.

The median one-way trip length for the four-county area carpoolers is 8.0 miles. Across counties, the median trip length varies from seven miles in Milwaukee to 19 miles for Washington County while Ozaukee and Waukesha Counties have carpooler trip lengths of 14 miles and 15 miles, respectively. Noncarpooler trip lengths are five miles for Milwaukee County, six miles for Washington County, 10 miles in Ozaukee County, and 10 miles in Waukesha County. Comparison of carpooler and noncarpooler trip lengths suggests that carpoolers travel longer distances to work than noncarpoolers. Carpooling probably appeals to the long distance commuter because, in addition to substantial savings, the increased travel time and/or distance due to carpooling would account for a relatively small percentage increase in total trip length.

Summarizing information obtained in the household survey, it was determined that 505,317 persons 18 years of age and older living in the four-county area traveled to work and/or school on a regular basis. Of these persons 18 percent, or 92,043, traveled by carpool. By contrast, only 30,956 persons, or 6 percent, traveled by bus for the entire length of the work trip, and 28,375 persons, or 5 percent used the bus part way and an auto part way. As expected, the primary mode of travel to work and school was as an auto driver, represented by about

Table 34

DISTRIBUTION OF CARPOOLERS LIVING IN THE FOUR-COUNTY METROPOLITAN MILWAUKEE AREA BY ONE-WAY DISTANCE TRAVELED IN THE CARPOOL–MMACP HOUSEHOLD SURVEY

One-Way Trip Length (miles)	Metropolitan Milwaukee Area Carpoolers									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
1-3	13,646	21.78	606	13.51	1,842	34.06	1,256	12.73	17,350	21.05
4-6	14,760	23.55	848	18.91	--	--	897	9.09	16,505	20.03
7-9	12,254	19.56	242	5.39	230	4.25	897	9.09	13,623	16.53
10-12	11,697	18.67	364	8.12	115	2.13	1,077	10.92	13,253	16.08
13-15	4,456	7.11	1,212	27.02	345	6.38	1,615	16.37	7,628	9.25
16-18	2,784	4.44	364	8.12	115	2.13	1,256	12.73	4,519	5.48
19-21	556	0.89	364	8.12	805	14.88	717	7.27	2,442	2.96
22-26	1,114	1.78	364	8.12	1,266	23.41	1,794	18.18	4,538	5.51
27-31	557	0.89	--	--	460	8.51	179	1.81	1,196	1.45
32 and over	835	1.33	121	2.69	230	4.25	179	1.81	1,365	1.66
Total reported	62,659	100.00	4,485	100.00	5,408	100.00	9,867	100.00	82,419	100.00
Not reported	5,574	--	242	--	117	--	1,621	--	7,554	--
Total	68,233	100.00	4,727	100.00	5,525	100.00	11,488	100.00	89,973	100.00
Median Miles	7	--	14	--	19	--	15	--	8	--

Source: University of Wisconsin-Milwaukee and SEWRPC.

341,664 persons, or 68 percent of total person trips to work. The remaining 12,279 employed persons, or 3 percent, used alternative modes such as bicycles, motorcycles, and walking.

The major purpose of the MMACP was to encourage auto drivers to form carpools, thus producing a shift in mode of travel which would reduce vehicles on the road, miles driven in the area, and motor fuel consumption. The data obtained by the household survey on previous mode of travel for area carpoolers is shown in Table 35. Approximately 63 percent of the carpoolers previously were auto drivers, 5 percent previously were passengers in a family car, 10 percent previously traveled by bus, and over 17 percent always used a carpool for the work trip. The proportion of previous auto drivers by county is 62 percent for Milwaukee, 66 percent for Ozaukee, 69 percent for Washington, and 67 percent for Waukesha County.

Table 35

DISTRIBUTION OF PREVIOUS MODE OF TRAVEL FOR CARPOOLERS–MMACP HOUSEHOLD SURVEY

Previous Mode of Travel	Carpoolers	
	Number	Percent Reported
Auto driver	55,586	62.96
Passenger in family car	4,376	4.96
Auto part way; bus part way	678	0.77
Bus	8,608	9.75
Motorcycle	359	0.41
Walk or bicycle	1,545	1.75
Other	1,750	1.98
Always carpooled	15,378	17.42
Total reported	88,280	100.00
Not reported	1,693	--
Total	89,973	100.00

Source: University of Wisconsin-Milwaukee and SEWRPC.

It is noticeable that although only 10 percent of the area carpoolers previously made the trip to work by bus, 50 percent of the carpoolers reported that they could have used the bus for the work trip (see Table 36). Most of these carpoolers are located in Milwaukee County where 64 percent could have traveled to work by bus, reflecting the rather extensive network of bus routes in this County. The percentages for the remaining counties are much lower since local bus service is generally not available in these areas.

In addition to creating a shift in mode of travel, joining a carpool can also result in the postponement of purchasing an additional auto. Household survey findings presented in Table 37 indicate that 16 percent of the carpoolers in the four-county Metropolitan Milwaukee area would have found it necessary to obtain another auto if they had not joined a carpool, resulting in the purchase of an additional 13,039 autos. Without carpooling as a viable alternative mode of travel, an additional auto would have been purchased by 24 percent of the carpoolers in Washington and Waukesha Counties, 16 percent of the carpoolers in Ozaukee County, and 13 percent of the carpoolers in Milwaukee County.

BENEFITS AND SAVINGS FROM CARPOOLING–HOUSEHOLD SURVEY

To estimate the amount of energy conservation achieved by carpooling in the four-county area, it is necessary to estimate the number of vehicle miles traveled to and from work by both carpoolers and noncarpoolers living in the area. The mode shifts created by carpool formation from bus to auto or from auto driver to auto passenger, as well as the influence of those persons who have always carpooled and have no impact on actual changes in mileage values, are integral parts of the calculations needed to determine reduced vehicle miles of travel (VMT) resulting from carpools. Table 38 presents, by county, selected carpool and carpooler characteristics which provide the basis of estimates developed in this section.

Table 36

DISTRIBUTION OF CARPOOLERS WHO COULD USE BUS FOR WORK OR SCHOOL TRIP–MMACP HOUSEHOLD SURVEY

Could bus be used for work or school trip?	Metropolitan Milwaukee Area Carpoolers									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
Yes	40,104	64.3	364	7.7	230	4.2	1,076	9.4	41,774	49.7
No	22,280	35.7	4,363	92.3	5,295	95.8	10,412	90.6	42,350	50.3
Total reported	62,384	100.0	4,727	100.0	5,525	100.0	11,488	100.0	84,124	100.0
Not reported	5,849	--	--	--	--	--	--	--	5,849	--
Total	68,233	100.0	4,727	100.0	5,525	100.0	11,488	100.0	89,973	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 37

NECESSITY FOR ADDITIONAL AUTO PURCHASE BY CARPOOLERS IN ABSENCE OF CARPOOL–MMACP HOUSEHOLD SURVEY

Would additional auto purchase be necessary?	Metropolitan Milwaukee Area Carpoolers									
	Milwaukee County		Ozaukee County		Washington County		Waukesha County		Total	
	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported	Number	Percent Reported
Yes	8,354	13.3	727	15.8	1,266	24.4	2,692	24.2	13,039	15.6
No	54,307	86.7	3,878	84.2	3,914	75.6	8,436	75.8	70,535	84.4
Total reported	62,661	100.0	4,605	100.0	5,180	100.0	11,128	100.0	83,574	100.0
Not reported	5,572	--	122	--	345	--	360	--	6,399	--
Total	68,233	100.0	4,727	100.0	5,525	100.0	11,488	100.0	89,973	100.0

Source: University of Wisconsin-Milwaukee and SEWRPC.

Table 38

SELECTED CHARACTERISTICS OF CARPOOLERS AND CARPOOLS–MMACP HOUSEHOLD SURVEY

Characteristics	Milwaukee County	Ozaukee County	Washington County	Waukesha County	Total
Estimated number of carpoolers	69,068	4,848	6,100	12,027	92,043
Number of carpools	28,899	1,987	2,574	5,393	38,853
Auto occupancy rate	2.39	2.44	2.37	2.23	2.37
Median one-way trip length	7	14	19	15	8
Percent previous auto drivers	61.67	65.80	68.76	66.67	62.96
Vehicle miles traveled per day before carpooling	596,319	89,320	159,385	240,552	1,085,576
Number of autos used by carpoolers prior to carpooling	42,594	3,190	4,194	8,018	57,996
Percent of carpoolers that always carpooled	17.50	18.44	18.75	15.87	17.42
Number of carpool vehicles adjusted for always carpooled vehicles	23,841	1,620	2,091	4,537	32,089
Number of vehicles removed from the road as a result of carpooling	18,753	1,570	2,103	3,481	25,907
Daily carpool vehicle miles traveled excluding always carpooled vehicle miles traveled	333,780	45,374	79,467	136,121	594,742
Vehicle miles of travel saved per day by carpooling	262,539	43,946	79,918	104,431	490,834

Source: University of Wisconsin-Milwaukee and SEWRPC.

An estimate of the reduction in work trip vehicle miles of travel (VMT) is provided by first estimating the VMT for carpoolers prior to carpooling and then subtracting from this value the VMT by carpools adjusted for the percent of carpoolers who always carpooled (see Appendix C). As previously noted, although detailed information was obtained for 89,973 carpoolers, the estimated total number of carpoolers in the four-county area is 92,043. By applying the carpool occupancy rates for each county as found by the household survey, it is estimated that these 92,043 carpoolers would travel to work or school in 38,853 carpools. One-way vehicle miles traveled by these carpoolers prior to carpooling was estimated to be 542,788 miles, resulting in a daily total of 1,085,576 miles of travel. The vehicle miles of travel for carpools excluding always-carpooled at the time of the survey

was estimated to be 297,371 miles for one-way trips, or 594,742 miles per day. On the basis of this information the reduction in work trip vehicle miles traveled is 490,834 miles per day, 2,454,170 miles per week, and, assuming 48 work weeks to the year, over 117 million miles per year.

If there were no carpools in operation in the four-county area, the estimated total work trip VMT by auto would be 5,340,325. However, persons presently carpooling account for a reduction of 490,834 miles, or a 9.2 percent reduction, in vehicle miles traveled for work trip purposes.

In addition, it was estimated that carpooling activities result in 25,907 fewer autos on area roads, especially during peak travel periods. This represents a 6.5 percent reduction in autos used for work trip purposes prior to carpooling. Of the approximately 380,517 autos used in the work trip on a typical day, 10.2 percent, or 38,853, are occupied by carpoolers.

Savings from carpooling can now be calculated from the previously stated mileage estimates.[6] Assuming, conservatively, that the typical carpool vehicle averages 13 miles per gallon of gasoline, area carpoolers realize a savings of 37,756 gallons per day. The associated dollar savings for gasoline (at $0.55 per gallon) amount to $20,766 per day, $103,830 per week and $4,983,840 per year.

The amount of energy conservation described hitherto may be reduced somewhat by use of the auto left available to other family members as a result of carpooling—although such mileage does not contribute to work trip VMT changes since work trip data was recorded for all members of the surveyed households. The household survey data indicated that about 91,100 miles—an average of less than one mile per carpooler—are logged per day on such autos. It should be noted that mileage on autos left at home may be the product of trips which would have been made regardless of the carpooling status of the household members. For example, an auto left at home may be used for a daytime shopping trip that, prior to carpooling, would have been made at night or during the weekend. The incorporation of such trips, coupled with the possible double counting of work trips, implies that the mileage reported above may be an inflated figure; although no lower limit can be obtained for this item, the data clearly indicate that the degree to which total carpool savings may be reduced by the additional use of autos left at home would not exceed 91,100 miles per day.

In summary, the major benefits associated with carpooling accrue to the carpooler in the form of reduced costs of travel to work. However, carpooling produces other benefits both for carpoolers and the general public. Increased auto occupancies and the corresponding decrease in vehicles on the road reduce air pollution, and congestion during peak travel periods. Lower congestion levels provide for a reduction in gasoline consumption for all tripmakers through reduced travel time and alleviation of stop and go driving during peak travel periods.

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[6] *Other data necessary to the calculations obtained from "Cost of Operating an Automobile," U. S. Department of Transportation, Federal Highway Administration, April 1974.*

Chapter IV

IMPACT AND EVALUATION OF THE CARPOOLING PROGRAM

INTRODUCTION

The household survey provided data essential to a proper assessment of the impact of the MMACP on area carpooling. To evaluate this impact, the date of carpool formation, the characteristics of past-MMACP carpools, and the savings generated by past-MMACP carpools are examined in this chapter. Recognizing that carpooling should not be viewed in isolation but as an important component of the overall regional transportation system, this chapter also addresses the implications of carpooling for the transportation planning process. Finally, an overview is provided of both applicant and household inventory findings which are pertinent indicators of the success or failure of MMACP matching and promotional efforts, followed by a series of recommendations for future MMACP efforts as formulated from analyses of these survey findings.

IMPACT OF THE MMACP ON AREA CARPOOLING

Date of Carpool Formation

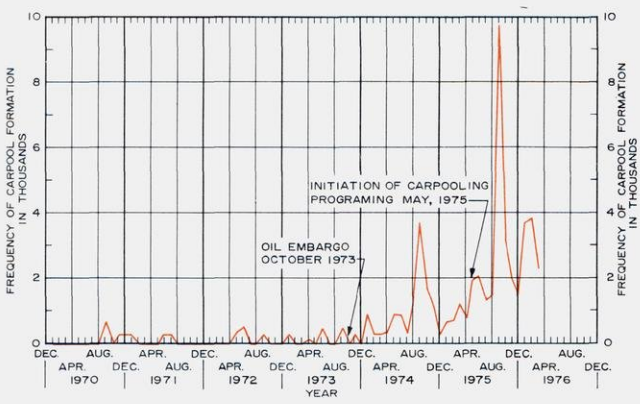
The household survey data indicate both the month and year of carpool formation for approximately 54,500 carpoolers who joined carpools after 1969. As shown in Figure 5, the pattern of carpool formation by date clearly demonstrates the impact of both the oil embargo and the formation of the MMACP. The Arab oil embargo was placed in effect in October of 1973 and substantial increases in carpooling occurred in September of the following year. There is a similar lag in carpool formation during the first few months of MMACP operation, possibly because the carpool promotional campaign which was begun in May 1975 was curtailed during the summer months and reemphasized in September of 1975. Consequently, although partially the result of seasonal variation, the majority of the prominent increase in carpooling during September of 1975 is believed to reflect the impact of the MMACP campaign. The cumulative percent of carpool formation of all carpoolers by month and year from 1970 until March 1976 is shown in Figure 6. This figure also indicates that the rate of increase in carpooling was substantially higher after introduction of the MMACP than after the oil embargo.

Characteristics of Post-MMACP Carpools

Extrapolation of the household survey data on date of carpool formation indicates that at least 35,086 carpoolers began carpooling after April 1975. Selected characteristics of these post-MMACP carpoolers are displayed in Table 39. Due to slightly lower occupancy rates among post-MMACP carpools, these 35,086 persons who represent 38 percent of total area carpoolers formed 15,424 carpools, or 40 percent of the total carpools in the four-county area. Median one-way trip length for post-MMACP carpools by county is markedly similar to the medians found among total area carpools. In contrast, substantially more post-MMACP carpoolers were previously auto drivers, 71 percent, than total area carpoolers, 63 percent. Prior to carpooling, only 6 percent of post-MMACP carpoolers made the trip to work as bus passengers as opposed to 10 percent of total carpoolers. Whereas 17 percent of the four-county area carpoolers indicated that a carpool was the only principal

Figure 5

FREQUENCY DISTRIBUTION OF CARPOOLING BY DATE OF JOINING CARPOOL FOR THE FOUR-COUNTY AREA MMACP HOUSEHOLD SURVEY



Source: University of Wisconsin-Milwaukee and SEWRPC.

Figure 6

CUMULATIVE PERCENT OF CARPOOLERS BY MONTH AND YEAR OF CARPOOL FORMATION MMACP HOUSEHOLD SURVEY

Source: University of Wisconsin-Milwaukee and SEWRPC.

mode ever used for the work trip, only 10 percent of the post-MMACP carpoolers had "always" carpooled on the work trip.

Savings of Post-MMACP Carpools

To further assess the impact of the MMACP, calculations of estimated mileage, gasoline, and dollar savings can be made for carpoolers who began carpooling after April 1975, the beginning date of the MMACP. As in previous analyses, the calculations are performed at the county level and then summed to the four-county total. The 35,086 carpoolers who started to carpool after April 1975 accounted for a reduction of 198,156 work trip vehicle miles of travel per day or a 3.7 percent reduction in total work trip vehicle miles traveled. On a weekly basis the reduction in travel amounts to 990,780 miles; on a yearly basis the reduction is 47,557,440 miles. Savings of gasoline, assuming a conservative 13 miles to the gallon, are estimated at 15,243 gallons per day, 76,215 gallons per week, and 3,658,320 gallons per year. Post-MMACP carpools account for 40 percent of the total estimated gasoline savings for all carpools. Likewise, the gasoline dollar savings due to carpooling are estimated at $8,384 per day, $41,920 per week, and $2,012,160 per year. Carpool formation since the beginning of the MMACP resulted in the removal of 11,094 vehicles from area roads, representing 43 percent of the total vehicle reduction created by carpooling (see Appendix C for methodology).

The various estimates of carpooling activities and associated savings accounted for by post-MMACP carpoolers provide the primary basis for assessing the impacts of the program. The purpose of the program was to increase the number of carpools in the metropolitan area and not to promote the MMACP as a program per se. Whether persons joined carpools through the matching service or through their own efforts, the end result, the formation of carpools and reduction of vehicles on the road, is of major importance. However, the household survey did request respondents to indicate if they felt that the decision to carpool was directly influenced by the MMACP promotional campaign.

Approximately 8,100 persons, or 23 percent of the 35,100 post-MMACP carpoolers, were aware of being directly influenced by the program. These persons traveled in 3,400 carpools with an auto occupancy rate

Table 39

SELECTED CHARACTERISTICS OF CARPOOLERS AND CARPOOLS SINCE APRIL 1975—MMACP HOUSEHOLD SURVEY

Characteristics	Milwaukee County	Ozaukee County	Washington County	Waukesha County	Total
Estimated number of carpoolers	28,191	1,648	1,316	3,931	35,086
Number of carpools	12,310	659	609	1,846	15,424
Auto occupancy rate	2.29	2.50	2.16	2.13	2.28
Median one-way trip length	7	15	19	16	8
Percent previous auto drivers	70.97	66.69	100.00	66.61	71.00
Vehicle miles traveled per day before carpooling	280,100	32,972	50,008	83,790	446,870
Number of autos used by carpoolers prior to carpooling	20,007	1,099	1,316	2,618	25,040
Percent of carpoolers that always carpooled	9.68	16.66	0.00	9.55	9.63
Number of carpool vehicles adjusted for always carpooled vehicles	11,119	549	609	1,669	13,946
Number of vehicles removed from the road as a result of carpooling	8,888	550	707	949	11,094
Daily carpool vehicle miles traveled excluding always carpooled vehicle miles traveled	155,664	16,481	23,152	53,417	248,714
Vehicle miles of travel saved per day by carpooling	124,436	16,491	26,856	30,373	198,156

Source: University of Wisconsin-Milwaukee and SEWRPC.

of 2.38. Total expenditures for the Milwaukee program for the first 11 months of operation were approximately $200,000, resulting in a per carpool cost of $58.82. It is important to note that the formation of the 3,400 carpools is a direct effect of the MMACP and does not take into account any indirect effects associated with the areawide promotional campaign. However, information from the household survey (Figures 5 and 6) and data from the Milwaukee County Peak Hour Auto Occupancy Study suggest that the indirect effects were substantial.

IMPLICATIONS OF CARPOOLING FOR TRANSPORTATION PLANNING

In addition to providing material related to evaluation of the Metropolitan Milwaukee Area Carpooling Program, the analysis of the data obtained from the applicant and the household carpool surveys provides useful information for the transportation planning process. In preparation for a major reevaluation of its adopted regional land use and transportation plans, the Southeastern Wisconsin Regional Planning Commission in 1972 undertook new inventories of travel and of personal opinions concerning land use and transportation system development within the Region. These behavioral and attitudinal surveys were undertaken shortly before the motor fuel shortages of 1973 made the public aware that an era of cheap motor fuel was coming to an end and before the efforts of the Metropolitan Milwaukee Area Carpooling Program were initiated in 1975.

Short-range effects of the energy shortage involved reduced travel by residents in the Region largely with respect to shopping trip frequency and recreational travel.[1] Much of this reduction in discretionary trips was of short duration. By contrast, the most significant long-range effect of the energy shortage was the increase in the price of gasoline. While this increase contributed to a temporary reduction in travel it appears that another important byproduct of the energy shortage was the establishment and solidification of carpooling as a viable alternative work trip choice for a significant segment of the employed population. By the time the MMACP was established, there was considerable latent demand for carpooling in the area. A portion of this latent demand was realized during the 1975-1976 period. A sample survey of auto occupancy conducted in the Milwaukee area in March of 1976 by the Wisconsin Department of Transportation indicated that an increase in carpooling could indeed have occurred in the peak hour periods in the Milwaukee area between October 1974 and March 1976, as evidenced by an increase in auto occupancies.[2]

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[1] *Thomas M. Corsi, Household Response to Motor Fuel Shortages and Higher Prices in Southeastern Wisconsin, Technical Report No. 15, Southeastern Wisconsin Regional Planning Commission, August 1976.*

[2] *"Milwaukee County Peak Hour Auto Occupancy Study," Continuation Report, Division of Highways, Milwaukee Metropolitan District Planning Section, March 1976.*

On the basis of the household survey, it was estimated that the present latent demand for carpooling involves approximately 92,000 employed persons including about 35,000 persons who intend to join carpools in the future and an additional 57,000 persons who indicated they would carpool if they could find a carpool partner. If the 92,000 persons constituting this latent demand were to join carpools and if current carpoolers continued carpooling, then 36 percent of the current number of employed persons in the area would be carpooling. Under present conditions it is unlikely that all of this latent demand will be realized or that all of the current carpoolers will continue carpooling. Nevertheless, the observation that the latent demand for carpooling is equal to the number of current carpoolers indicates that continued efforts by the MMACP should be successful.

If the potential for increased levels of carpooling were realized, the subsequent effects on auto occupancy rates would have significant impact on traffic projections and other related output of the transportation planning process. While the basic transportation planning models would remain valid and applicable in situations of higher auto occupancies, the results of their application, in terms of the number of auto driver trips, would change with increased carpooling. The Commission attempted to develop a three mode—auto, transit, carpool—modal split model but found that the limited data available at the time did not permit such development and chose, instead, to use an auto occupancy model to determine the number of autos required to serve the auto mode trips. The Commission can continue to use the auto occupancy model to reflect the potential impact of carpooling in the simulation of future travel conditions.

If, as is often the case, modal split is applied prior to trip distribution and traffic assignment, increased levels of carpooling would affect the resulting patterns of trip distribution and assignment. The trip pattern changes are primarily produced by the tendency of carpool trips to be longer than noncarpool trips. Under these circumstances, significant levels of carpooling would require that model predictions be evaluated under differing initial conditions and appropriate contingency plans developed. However, under Commission procedures, modal split and auto occupancy are applied after person trip distribution. Therefore, the numbers of vehicle trips change as a function of changing auto occupancy and it is not necessary to effect a change in the distributional pattern.

The results of the 1972 SEWRPC home interview survey, the energy use survey, and the carpooling surveys present the opportunity for detailed review and evaluation by transportation planners of the expressed and exhibited behavioral patterns of tripmakers under varying conditions of motor fuel availability and operating costs. Such a review and evaluation form a basic component of an ongoing program of model sensitivity research at the SEWRPC.

PROGRAM EVALUATION

In overview, the data from the household survey and the applicant survey both indicate that the MMACP was successful during its first year of operation. The primary

objective of the MMACP was fulfilled by the increased levels of carpooling within the general population as shown by the household survey and indicated by the peak hour auto occupancy study. The household survey data indicated that these increased levels of carpooling did effect substantial savings in motor fuel consumption arising from reductions in both the number of vehicles on the road and the vehicle miles of travel by those vehicles. The dual approach utilized by the MMACP to promote the program was an asset. While the general population was highly aware of mass media advertisements but relatively unaware of employer contact, the applicants to the match program ranked employer contact as their most important source of information on the MMACP. Finally, indicative of the success of the program in stimulating interest in carpooling within the four-county area is the remarkable amount of latent demand found by the household survey to be present among noncarpoolers. In view of the interest stimulated within the four-county area, continued efforts should be successful.

RECOMMENDATIONS FOR FUTURE MMACP ACTIVITIES

The following sets of recommendations are formulated on the basis of the applicant and household survey analyses. Presented first are those recommendations which concern continuation or modification of existing procedures, services, or promotional efforts which already are part of the carpooling program. The second set of recommendations provides a series of new alternatives, some of which, upon consideration, the MMACP may choose to implement.

Existing Efforts of the MMACP

- The MMACP should be continued for at least another year so that the momentum produced through first-year activities can be maintained. It is important to develop a focused approach for continued promotion during this second year. At the end of this time, the program should be reevaluated to determine its performance in carpool formation.

- The MMACP Technical Review Committee should continue to take an active role in planning and developing new strategies for possible program expansion.

- Efforts should be made to prevent public officials and agencies from viewing the carpool program in isolation. Rather, public officials and agencies should be helped to recognize that the carpooling program is a significant component in an overall plan of traffic management for the Region.

- Every effort should continue to be made to increase the size of the carpooler match list, thereby increasing the probability of obtaining a higher proportion of successful matches. Since applicant survey data indicate that employer contact was an important source of information among match program applicants, efforts to stimulate employer interest and provide promotional material at places of work should be continued.

- Future marketing efforts should concentrate more heavily on television advertising and less on radio. The promotional approaches should emphasize the importance of carpooling in energy conservation and the financial benefits associated with carpooling.

- While maintaining promotional approaches which apparently attract better educated and higher salaried employees to carpooling, efforts should be directed at stimulating interest in carpooling among those persons who are not so well educated or highly paid. Not only has the carpooling promotional campaign failed to interest a significantly large portion of this group, but this is the very segment of the population which would receive the greatest monetary benefit from carpooling.

- The benefits of carpooling should be more highly emphasized and promoted than previously among persons traveling on major highways in areas not served by transit.

- MMACP promotional efforts which should be maintained at relatively high levels need to be modified to communicate to the public that the MMACP does not charge for its services.

New Alternatives

- Efforts should be made to encourage all levels of government in the area to establish carpooling programs using past experiences of the MMACP as a guide to the development of new strategies.

- The MMACP should, if possible, expand its services to offer incentives of its own such as free parking in appropriate locations and carpooler use of park and ride lots.

- The MMACP should promote vanpooling among major employers in the area using Federal Aid Highway Funds. This would include encouraging the establishment of employer sponsored vanpooling activities as well as activities organized by the MMACP.

- Additional marketing approaches should be explored. For example, promotional information on carpooling could be distributed in local schools through a traveling lecture series sponsored by the MMACP; match program application forms could be distributed through elementary schools for delivery to parents in a mass promotional effort; and discussion of the benefits of carpooling could be incorporated in the study designs of driver education courses provided by the area high schools.

- Evidence from other carpooling studies as well as the household survey suggests that matched persons are somewhat reluctant to contact strangers. In many situations it may be possible for the MMACP staff to make the initial contact thereby increasing the successful match rate.

- Should match program demand become sufficient to justify the expense, a transfer to updated or new versions of computer programs for matching purposes should be considered. Some such programs include, for example, the second generation FHWA Carpool Matching Program which has the capacity for searching surrounding work grids as well as home grids, and the U. S. Bureau of the Census CARPOL matching program which utilizes the Dual Independent Map Encoded Geographic Base Files (DIME/GBF) system which automatically encodes the work and home geographic locations and matches on the basis of census tracts.

- The MMACP should recognize the possibility of another motor fuel shortage and develop contingency plans for immediately increasing applicant matching capability in the event of precipitant heavy demand.

- Since Federal Aid Highway funds for ride-sharing activities are limited, the MMACP should attempt to incorporate program costs into the appropriate operating budget as soon as possible.

Chapter V

SUMMARY

On April 29, 1975, the Metropolitan Milwaukee Area Carpooling Program began formal operation as a 12 month demonstration project under provision of the Federal Emergency Highway Energy Conservation Act. The program design consisted of two phases: 1) an initial phase in which a multimedia carpooling promotional campaign was to be designed and conducted and 2) an evaluation phase in which the initial campaign results and overall effectiveness were to be assessed and recommendations for future actions formulated. In the second, or evaluation, phase of the program, surveys of both applicants to the carpooling match service and the general population of the four-county area—the applicant survey and the household survey—were conducted and analyzed to determine the extent of carpooling within the area and the impact of the MMACP on carpool formation. Summarized below are the salient findings of the applicant survey, the household survey, the analysis of the impact of the MMACP, and the program evaluation and recommendations.

THE APPLICANT SURVEY

The applicant survey sample consisted of persons who had applied to the MMACP for a carpool match between May 1975 and April 1976. Of the 1,345 survey instruments delivered, about 60 percent, or 804, completed questionnaires were returned.

Applicant survey data indicated that of the 804 survey respondents who had applied for a carpool match over the previous year, 339 or 42 percent had been satisfactorily matched and were carpooling. Of the 465 noncarpooling applicants 289 applicants, or 62 percent, had not formed a carpool at the time of the survey since they were not matched by the MMACP. Another 19 percent were successfully matched but were unable to make satisfactory arrangements with other matched persons.

Noncarpooling applicants who were not matched by the MMACP represented about 36 percent of the total 804 applicants who responded to the survey. Given the relatively small size of the file—1,345 match program applicants at the time of the survey—combined with the rather large geographic area covered by the file—home addresses from anywhere in the four-county area as well as within several contiguous counties and the State of Illinois—a no-match rate of 36 percent is relatively small and provides an indication that the matching process itself is a practical procedure which may be further enhanced by increased file size.

Survey findings indicate that carpool applicants tend to be better educated—98 percent having completed the high school level or above—and in higher income brackets—64 percent making more than $15,000 a year—than the general population. Over half of the applicants are under 35 years of age with 42 percent of the applicants between 25 to 34 years of age.

Almost 47 percent of the match program carpoolers indicated that their primary reason for joining a carpool was to save money. Another 12 percent listed energy conservation as their principal reason, and 11 percent were influenced primarily by the belief that carpooling was more convenient than the bus. It should be noted that the two most important reasons for carpooling, money savings and energy conservation, played an important part in the MMACP promotional campaign as benefits associated with carpooling.

All applicants surveyed were asked to provide information on how they heard about the MMACP. Most applicants, 53 percent, heard about the MMACP through employer contact followed by television advertisements, 43 percent. The next most important sources of information were billboards, 41 percent; radio advertisements, 35 percent; and ads in newspapers, 24 percent.

Over 80 percent of the respondents were familiar with the major services offered by the MMACP, the single exception being that only 34 percent knew that the MMACP provides speakers to interested groups. The high level of knowledge of MMACP services exhibited by carpool applicants suggests that the information dissemination efforts of the program were successful.

The average auto occupancy for MMACP carpools ranged between 2.51 and 2.76. These occupancy rates compare favorably with national carpool occupancy rates of 2.41 in December 1973 and 2.49 in February 1974.

There are three basic traveling arrangements associated with carpools -driving only, passenger only, and share driving with one or more persons. Over 56 percent of the match program carpoolers shared driving with one or more persons, another 25 percent traveled as passengers only, and 19 percent traveled as drivers only.

On a weekly basis match program carpoolers account for over 3,100 person trips to and from work or school—a daily average of approximately 620 carpooler person trips. These trips are concentrated in the two peak periods of daily travel in the area, with over 93 percent of the carpools arriving at their destinations during the hours beginning at 7:00 AM and 8:00 AM. Similarly, 87 percent of the departures are concentrated in the period between 4:00 PM and 6:00 PM.

The carpooler's perception of the degree of savings experienced may be instrumental not only in determining participation or nonparticipation in a carpool but also

the longevity of such participation. Of the 189 match program carpoolers who used paid parking, 42 percent reported parking cost savings as a result of carpooling while 58 percent experienced no savings in this area. Estimates based on reported mileage savings indicate that an average net savings of a minimum of about 2,900 miles per year to a maximum of about 3,190 miles per year would be perceived by the typical match program carpooler. In contrast, between 1.5 and 2.3 miles per day per carpooler was estimated to be logged on vehicles left at home as a result of carpooling.

Of 218 match program carpoolers who indicated decreased costs as a result of carpooling, 26 percent perceived a savings of less than $4.00 per week; 30 percent between $4.00 and $6.00 per week; 15 percent between $6.00 and $10.00 per week; and 29 percent $10.00 or more per week. The typical match program carpooler would recognize an average monetary savings of approximately $7.00 per week.

THE HOUSEHOLD SURVEY

The household survey consisted of a random sampling of occupied housing units in Milwaukee, Ozaukee, Washington, and Waukesha Counties. Of the 2,458 survey instruments delivered, 1,935 completed questionnaires, or 79 percent, were returned, resulting in an overall sampling rate of 0.43 percent of the households in the four-county area.

The household survey was carefully controlled so that it could be used to estimate the extent and effects of carpooling in the four-county area served by the MMACP. To establish the representativeness of the household survey, distributions of household size by county and employed persons by county obtained from the survey were compared with the 1972 SEWRPC home interview survey. In addition, vehicle availability figures as obtained from the household survey were compared to vehicle availability estimates based on vehicle registrations for fiscal year 1976. Examination of these data revealed an acceptable degree of correspondence between the comparisons, indicative of a high level of representativeness in the household survey.

From information obtained in the household survey, it was determined that 505,317 persons 18 years of age and older living in the four-county area traveled to work and/or school on a regular basis. Of these persons, 92,043, or 18 percent, traveled by carpool. By contrast, only 30,956 persons, or 6 percent, travel by bus for the entire length of the work trip, and 28,375 persons, or 5 percent, use the bus part-way and an auto part-way. As expected, the primary mode of travel to work and school was as an auto driver represented by about 341,664 persons, or 68 percent of total person trips to work. The remaining 12,279 employed persons, or 3 percent, use alternative modes such as bicycles, motorcycles, and walking.

Although the area average shows that 18 percent of employed persons are carpoolers, there is wide variation from this average within counties. Carpooling maintains the most relative importance in Washington County where 28 percent of the employed persons are carpoolers and in Ozaukee County where 24 percent are carpoolers. Milwaukee County with 18 percent of the employed persons as carpoolers maintains a ratio which is very similar to that for the whole four-county area; whereas, in Waukesha the carpool as an alternative mode is of lesser importance with carpoolers representing only 14 percent of the employed persons residing in the County.

Household survey data indicate that the carpoolers tend to be younger than the general population: 17 percent in the 20 to 24 year age group in comparison to 14 percent of the noncarpoolers and of the total employed persons. Carpoolers also tend to be better educated than the general population: 86 percent obtaining a high school diploma or above in comparison to 58 percent of the population 25 years of age or older. In addition, females tend to exhibit a greater relative interest in carpooling than males, with females comprising about 37 percent of the employed persons but accounting for 43 percent of the carpoolers.

The household survey data indicated that the primary reasons for initiating carpool activities were to save money and conserve energy. Other important reasons mentioned were to help friends, make the automobile available to other family members, and eliminate the need for a second car.

As a result of the promotional campaign, it was estimated that approximately 68 percent of the households in the four-county area had at least one member who had heard about the MMACP at the time of the survey. Of the 92,000 carpoolers, 48 percent had heard about the MMACP through television advertisements, 28 percent through newspaper advertisements, 23 percent through radio advertisements, and 22 percent through billboards. Over 42 percent of household respondents knew of each of the various services provided by the MMACP with two exceptions. Only 30 percent knew that the MMACP does not charge for any of its services, and only 17 percent knew that the MMACP provides speakers to interested groups.

Although employer contacts were the most frequently cited source of information among match program applicants with 53 percent of the applicants surveyed indicating that they had heard of the MMACP through employers, only 20 percent of the carpoolers in the general population were aware of such employer efforts. The difference between these two sets of responses would indicate that although employer contact may have had a relatively small effect on the general population, such contact may have had significant impact upon the employees of the specific companies cooperating with the MMACP in promoting carpool formation.

The average auto occupancy of carpools within the four-county area was 2.37, ranging from 2.44 persons per auto in Ozaukee County to 2.23 persons in Waukesha County. The median trip length for carpools in the household survey was estimated at eight miles. On

a county basis, median trip lengths ranged from seven miles for Milwaukee County carpoolers to 19 miles for Washington County carpoolers; both Ozaukee and Waukesha Counties had median trip lengths of 14 miles and 15 miles, respectively. In contrast, the median one-way trip length for noncarpooling household members was found to be five miles in Milwaukee County, six miles in Washington County, and 10 miles in Ozaukee and Waukesha Counties. This information suggests that the carpoolers in the four-county area travel longer distances to work than do noncarpoolers. Carpooling is probably more appealing to the longer-distance commuters because the dollar savings that result are substantial, while the additional time and/or distance that results from carpooling accounts for a relatively small percent of the total trip length that the members experienced prior to carpool formation.

As expected, carpooling is a peak period phenomena with 68 percent of the carpools arriving at their destinations between the hours of 7:00 AM and 9:00 AM. In contrast, only 60 percent of the noncarpoolers arrive at their destinations during this same time period. Departures are similarly concentrated in the typically longer afternoon peak periods from 3:00 PM until 6:00 PM; 80 percent of the carpoolers and 67 percent of the noncarpoolers depart during this period.

Substantial increases in carpooling create shifts in travel mode that may reduce peak-hour congestion. Approximately 63 percent of the carpoolers in the four-county area were previously auto drivers, 10 percent previously traveled by bus, and more than 17 percent always used a carpool for the trip to work.

Survey results indicate that there are approximately 92,043 carpoolers in the four-county area traveling to and from work in 38,853 carpools on a typical week day. Prior to carpooling these persons accounted for 1,085,576 work trip vehicle miles traveled (VMT) per day. As carpoolers, they account for 594,742 work trip vehicle miles of travel per day, resulting in a reduction of 490,834 vehicle miles traveled per day. Assuming conservatively that the typical carpool vehicle averages 13 miles per gallon of gasoline, area carpoolers realize a saving of 37,756 gallons per day. Dollar savings in fuel costs alone amount to $20,766 per day (at $0.55 per gallon) and to $4,983,840 per year.

If no carpools were currently in operation in the four-county area, the estimated total work trip vehicle miles of travel would be 5,340,325. However, carpoolers account for a reduction in work trip vehicle miles of travel of 9.2 percent. It has also been estimated that carpooling has resulted in the removal of some 25,907 vehicles from area roads—a 6.5 percent reduction in vehicles used for work-trip purposes.

IMPACT OF MMACP

Post-MMACP Carpools

Although carpooling has been in evidence within the area for some time—a few respondents indicated participation in carpools dating back to the mid-1940's with an increase in carpool formation since 1969—approximately 38 percent of the total number of estimated carpoolers in the four-county area began carpooling since April 1975, the beginning of the MMACP. Overall, an increase in the percentage of carpoolers, especially since 1973, indicates that carpooling is gaining popularity as a mode of travel in the area. The most notable increases in the percentage of carpoolers occurred after the oil embargo of October 1973 and 10 months later during the heightened promotional campaign launched by the MMACP.

The Metropolitan Milwaukee Area Carpooling Program was in operation for only 11 months when the household survey was conducted; yet 35,086, or 7 percent of the total workers in the four-county area, began carpooling during this time. These 35,086 persons, who represented 38 percent of all carpoolers, formed 15,424 carpools. Prior to carpooling, 71 percent of these persons made the trip to work as auto drivers, 6 percent as bus passengers, and 10 percent always carpooled.

Carpools formed since April of 1975, the beginning of the MMACP, accounted for a reduction of 198,156 vehicle miles traveled per day, representing a 3.7 percent reduction in total work trip vehicle miles traveled. Savings of gasoline, assuming 13 miles per gallon and 55 cents per mile, amounted to 15,243 gallons per day, 76,215 gallons per week and 3,658,320 gallons per year. The dollar savings due to carpooling were estimated at $8,384 per day, and $2,012,160 per year.

The formation of carpools since the initiation of the MMACP resulted in the removal of 11,094 vehicles from area roads. In other words, 43 percent of the vehicles removed from area roads as a result of carpooling can be attributed to post-MMACP carpoolers.

Latent Demand

Household survey results indicate that there are about 35,000 persons who intend to join carpools in the near future and an additional 57,000 employed persons who indicated that they would carpool if they could find a carpool partner. This information suggests that there is a latent demand for carpooling among approximately 92,000 employed persons in the four-county area. If the 92,000 persons who constitute the latent demand were to join carpools and if current carpoolers continued to carpool, then 36 percent of the employed persons in the four-county area would be carpooling to work. Nevertheless, the observation that the latent demand for carpooling approximately equals the number of current carpoolers indicates that continued efforts by the MMACP should be successful in the formation of future carpools—such carpools potentially becoming a significant mode of travel.

Implications for Planning

If, as is often the case, modal split is applied prior to trip distribution and traffic assignment, increased levels of carpooling would affect the resulting patterns of trip distribution and assignment. The trip pattern changes are primarily produced by the tendency of carpool trips to

be longer than noncarpool trips. Under these circumstances, significant levels of carpooling would require that model predictions be evaluated under differing initial conditions and appropriate contingency plans developed. However, under Commission procedures, modal split and auto occupancy are applied after person trip distribution. Consequently the numbers of vehicle trips change as a function of changing auto occupancy and it is not necessary to effect a change in the distributional pattern.

Therefore, the actual and potential increase in carpool use as a mode of travel can be reflected in applications of the battery of travel simulation models used by the Regional Planning Commission in the development and testing of alternative transportation system plans. The auto occupancy model can be adjusted to reflect the data obtained in the household survey to allocate auto person trips to vehicles which are then used in the traffic assignment model to determine simulated vehicle loadings on the network being tested.

PROGRAM EVALUATION AND RECOMMENDATIONS

The primary objective of the MMACP was fulfilled by the increased levels of carpooling within the employed population of the four-county area. Household survey data indicated that these increased levels of carpooling create substantial energy conservation arising from reductions both of work trip vehicle miles of travel and of the number of vehicles on the road during peak periods. In overview, the data from the household survey and the applicant survey both indicate that the MMACP was successful during its first year of operation.

Recommendations for Future MMACP Activities

The following sets of recommendations are formulated on the basis of the applicant and household surveys analyses. Presented first are those recommendations which concern continuation or modification of existing procedures, services, or promotional efforts which are already a part of the carpooling program. The second set of recommendations provides a series of new alternatives, some of which, upon consideration, the MMACP may choose to implement.

Existing Efforts of the MMACP: The MMACP should be continued for at least another year so that the momentum produced through first-year activities can be maintained. It is important to develop a focused approach for continued promotion during this second year. At the end of this time, the program should be reevaluated to determine its performance in carpool formation.

The MMACP Technical Review Committee should continue to take an active role in the planning and development of new strategies for possible program expansion.

Efforts should be made to prevent public officials and agencies from viewing the carpool program in isolation. Rather, public officials and agencies should be helped to recognize that the carpooling program is a significant component in an overall plan of traffic management for the Region.

Every effort should continue to be made to increase the size of the carpooler match list, thereby increasing the probability of obtaining a higher proportion of successful matches. Since applicant survey data indicate that employer contact was an important source of information among match program applicants, efforts to stimulate employer interest and provide promotional material at places of work should be continued.

Future marketing efforts should concentrate more heavily on television advertising and less on radio. The promotional approaches should emphasize the importance of carpooling in energy conservation and the financial benefits associated with carpooling.

While maintaining promotional approaches which apparently attract better educated and higher salaried employees to carpooling, efforts should be directed at stimulating interest in carpooling among those persons who are not so well educated or highly paid. In terms of this group, not only has the carpooling promotional campaign failed to interest a significantly large portion of the population, but this is also the very segment of the population which would receive the greatest relative benefit from carpooling in terms of monetary savings.

The benefits of carpooling should be more highly emphasized and promoted than previously among persons traveling on major highways in areas not served by transit.

MMACP promotional efforts which should be maintained at relatively high levels need to be modified to communicate to the public that the MMACP does not charge for its services.

New Alternatives: Efforts should be made to encourage all levels of government in the area to establish carpooling programs using past experiences of the MMACP as a guide to the development of new strategies.

The MMACP should, if possible, expand its services to offer incentives of its own such as free parking in appropriate locations and carpooler use of park and ride lots.

The MMACP should promote vanpooling among major employers in the area using Federal Aid Highway Funds. This would include encouraging the establishment of employer sponsored vanpooling activities as well as activities organized by the MMACP.

Additional marketing approaches should be explored. For example, promotional information on carpooling could be distributed in local schools through a traveling lecture series sponsored by the MMACP; match program application forms could be distributed through elementary schools for delivery to parents in a mass promotional effort; and discussion of the benefits of carpooling could be incorporated in the study designs of driver education courses provided by the area high schools.

Evidence from other carpooling studies as well as the household survey suggests that matched persons are somewhat reluctant to contact strangers. In many situations it

may be possible for the MMACP staff to make the initial contact thereby increasing the successful match rate.

Should match program demand become sufficient to justify the expense, a transfer to updated or new versions of computer programs for matching purposes should be considered. Some such programs include, for example, the second generation FHWA Carpool Matching Program, which has the capacity for searching surrounding work grids as well as home grids, and the U. S. Bureau of the Census CARPOL matching program which utilizes the Dual Independent Map Encoded Geographic Base Files (DIME/GBF) system which automatically encodes the work and home geographic locations and matches on the basis of census tracts.

The MMACP should recognize the possibility of another motor fuel shortage and develop contingency plans for immediately increasing applicant matching capability in the event of precipitant heavy demand.

Since Federal Aid Highway funds for ride-sharing activities are limited, the MMACP should attempt to incorporate program costs into the appropriate operating budget as soon as possible.

APPENDICES

Appendix A

MMACP TECHNICAL REVIEW COMMITTEE

A Technical Review Committee, consisting of representatives of the Federal Highway Administration, Milwaukee County, the Southeastern Wisconsin Regional Planning Commission, and the State of Wisconsin Department of Transportation was assembled at the outset of the MMACP.

Members and their respective agencies are:

Federal Highway Administration Wisconsin Division	Wesley S. C. Lum, Assistant to the Planning and Research Engineer Madison, Wisconsin (Since November 1976)
	Bruce Matzke, Assistant Planning and Research Engineer Madison, Wisconsin (From February 1975 to November 1976)
Milwaukee County	George L. McNamara Project Planning Engineer
	James R. Molitor Carpool Coordinator
	Donald Tarachow Carpool Administrator
Southeastern Wisconsin Regional Planning Commission	Sheldon W. Sullivan Chief of Data Collection (From February 1975 to August 1975)
	John L. Zastrow Senior Planner (Since August 1975)
	Keith W. Graham Assistant Director (From August 1975 to December 1976)
State of Wisconsin Department of Transportation Division of Planning	Donald V. Revello Chief of Planning Methods and Forecast Madison, Wisconsin
State of Wisconsin Department of Transportation Division of Highways	Neil R. Wienser District Planning Supervisor District 9 Milwaukee, Wisconsin
	Thomas A. Winkel District Chief Planning Engineer District 9 Milwaukee, Wisconsin

Appendix B-1

APPLICANT SURVEY QUESTIONNAIRE

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

916 NO. EAST AVENUE • P.O. BOX 769 • WAUKESHA, WISCONSIN 53186 • TELEPHONE (414) 547-6721

Serving the Counties of: KENOSHA
MILWAUKEE
OZAUKEE
RACINE
WALWORTH
WASHINGTON
WAUKESHA

March 19, 1976

Dear Carpool Applicant:

An important factor that presently concerns officials responsible for the planning and development of transportation facilities is the effect of carpooling on the travel habits and patterns of the public. The University of Wisconsin-Milwaukee, and the Southeastern Wisconsin Regional Planning Commission are conducting a survey, the results of which will aid the Milwaukee Area Carpooling Program (MACP) in the evaluation of carpooling activities in the four county area of Milwaukee, Ozaukee, Washington, and Waukesha Counties. By carefully answering the enclosed questionnaire, you will be making an important contribution to the planning of transportation facilities for this area, thereby, performing a valuable public service. The questionnaire is intended for completion only by the applicant to the Milwaukee Area Carpooling Program. Please answer the questions to the best of your ability.

Since a high rate of response by applicants to the MACP is essential for proper evaluation of program effectiveness it is anticipated that, if necessary, a follow-up by telephone may be utilized for all questionnaires which have not been returned in approximately two weeks.

When you have completed the questionnaire, please place it in the envelope provided and drop it in any U. S. mailbox. Your answers will be kept entirely confidential and will be compiled with others for planning purposes only.

Thank you for your cooperation in this matter.

Sincerely,

Kurt W. Bauer
Executive Director

APPLICANT EVALUATION OF THE MILWAUKEE AREA CARPOOLING PROGRAM

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SECTION I

6

1. Are you a carpooler?

☐ Yes ☐ No (If no, go to Question 20)

(You are a carpooler if you and one or more persons ride to work or school in the same vehicle, even if the driving is not shared–this includes members of the same household.)

7

2. When did you start carpooling?

Month _____ Year _____

3. What is the one-way distance and how long does it usually take you to travel to work or school?

_____ Miles _____ Minutes

4. At what time do you usually arrive at and leave work or school?

15

Time of Arrival		Time of Departure	
_____	:a.m. :p.m. (circle one)	_____	:a.m. :p.m. (circle one)

5. During an average week how often is a carpool used?

23

_____ Times for travel to work
_____ Times for travel to school

_____ Times for travel from work
_____ Times for travel from school

6. Including yourself, how many persons are usually in your carpool? (Circle one)

27

2 3 4 5 or more

7. Do you carpool as a:

Enter One

28

☐
1. Driver only
2. Passenger only
3. Share driving with one or more persons

29

8. The vehicle you usually drive in the carpool is? (answer only if you drive in the carpool)

	Vehicle Type	Make/Model	Year
Example:	Auto	Ford Torino	1972
	_____	_____	_____

9. Do all persons in your carpool have the same work or school destination?

32

☐ Yes ☐ No

10. Could you make the trip to work or school by bus?

33

☐ Yes ☐ No

11. Which mode of travel was usually used to travel to work or school before joining a carpool?

Enter One

34

☐
1. Auto driver (including truck)
2. Passenger in family car
3. Auto part-way; Bus part-way
4. Bus
5. Motorcycle
6. Walk or bicycle
7. Other (specify) _____
8. Always carpooled

NOTE: If response is other than 1 or 3, go to question 17

12. Is the auto you used for the trip to work or school before carpooling now being used during the work or school day by other household members?

35

☐ Yes ☐ No

If yes, how often is it being used by other household members?

_____ days per week
_____ average miles per day

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39

13. Since joining a carpool, do you estimate that the total miles driven on all vehicles available to your household have:

1. Increased approximately _____ miles per year
2. Decreased approximately _____ miles per year
3. Remained substantially unchanged _____

Has this change been due to carpooling?

☐ Yes ☐ No

14. If you had not joined a carpool would it have been necessary to purchase an additional automobile?

43

☐ Yes ☐ No

15. What is your estimate of savings due to carpooling for an average week?

$_____ ☐ No savings, costs have increased by an estimated $_____ per week.

44

49

16. What are your savings on parking costs? (answer only if you use paid parking)

$_____ ☐ No Savings

17. What are the reasons that you joined a carpool?

53

Choices

First ☐☐
Second ☐☐
Third ☐☐

01. Incentives offered by employer
02. Energy conservation
03. Concern for environment
04. Save money
05. Avoid the stress of driving every day
06. Make auto available to other family members
07. Eliminate need for second auto
08. No other practical mode of travel available
09. Help a friend
10. Companionship to and from work or school
11. More convenient than bus
12. More convenient than passenger in family auto
13. Help keep American oil dollars at home
14. Other (specify) _____

18. Do you intend to continue carpooling?

59

☐ Yes ☐ No

If no, why not?

60

Enter One ☐

1. Change of residence location
2. Change work or school location
3. Change work or school hours
4. Incompatible with carpooling partners
5. Increases travel time too much
6. Second job or other activity
7. Need to have free use of auto
8. Will not be working or attending school
9. Other (specify)

19. If you found that in the future for some reason (change in work location or work times of carpooling partners, etc.) you could no longer continue in the present carpool, would you wish to have the free services of the MACP available to help form a new carpool?

61

☐ Yes ☐ No If no, specify reason _____

GO TO QUESTION 21

20. Since you are not a carpooler now, what is the reason that you did not join a carpool?

62

Enter One ☐

1. Not matched by the Milwaukee Area Carpooling Program
2. Could not make satisfactory carpool arrangements with matched person(s)
3. Moved
4. Work or school hours changed
5. Changed job or school location
6. Need to have free use of auto
7. Other (specify) _____

FOR OFFICE USE ONLY

21. Do you know that the Milwaukee Area Carpooling Program (MACP): (check either yes or no for each item)

	Yes	No	
63	☐	☐	1. Can be used by anyone living or working in the four counties of Milwaukee, Ozaukee, Washington, or Waukesha.
	☐	☐	2. Can match potential carpoolers.
	☐	☐	3. Can be signed up for by simply asking for and submitting an application.
	☐	☐	4. Furnishes information on carpooling to the press, T.V., radio, and for company newsletters.
	☐	☐	5. Assists firms/agencies in initiating and maintaining carpool programs for their employees.
	☐	☐	6. Provides speakers to interested groups.
	☐	☐	7. Does not charge for any of these services.

22. How did you hear about the Milwaukee Area Carpooling Program? (check any that apply)

70

- ☐ 1. T.V. advertisements
- ☐ 2. Radio advertisements
- ☐ 3. Billboards
- ☐ 4. Ads in newspapers
- ☐ 5. Employer contact
- ☐ 6. Public speakers at interested groups
- ☐ 7. I was unaware of any of the above
- ☐ 8. Relative or friend
- ☐ 9. Other (specify)

23. Has your employer or school provided information on carpooling?

79 ☐ Yes ☐ No

24. What is your occupation and who is your employer?

80

Occupation _____ Employer _____

25. Do you have any suggestions on how the MACP promotional effort could be improved in order to keep the public better informed?

_____

_____

_____

26. Are there any other members of your household who carpool?

6 ☐ Yes ☐ No

27. When was their carpool formed?

Person 1	Person 2	Person 3
_____ Month ____ Year	_____ Month ____ Year	_____ Month ____ Year

7

28. What is your relationship to the head of the household?

19 Enter One ☐

1. Head
2. Spouse
3. Son
4. Daughter
5. Other relative
6. Roommate, partner
7. Boarder

FOR OFFICE USE ONLY

20

29. Age: _____ Sex: ☐ Male ☐ Female Are you a licensed driver? ☐ Yes ☐ No

30. What is your highest educational grade completed?

24 Enter One ☐

1. Some grade school
2. Grade school graduate
3. Some high school
4. High school graduate
5. Some college
6. College graduate
7. Post-graduate

SECTION II

Socioeconomic Section:

Since an understanding of the household characteristics of persons interested in carpools will aid the MACP in developing a more effective promotional campaign, it is desirable that we obtain the following information. This information will be used in statistical analyses only and will remain confidential.

25

1. What is the age of the head of the household? _____

What is the age of the spouse? _____

How many children 17 or younger are residing in the household? _____

How many children 18 or older are residing in the household? _____

How many other persons (other relatives, roommates, etc.) are residing in the household? _____

Total number of persons residing in the household _____

34

2. Is the head of household a licensed driver? _____

Is the spouse a licensed driver? _____

How many children 18 years or older are licensed drivers? _____

How many other persons residing in the household are licensed drivers? _____

Total number of licensed drivers residing in household? _____

39

3. How many vehicles (autos, trucks, motorcycles) are available for use in your household? _____

4. Please enter the number for the approximate gross family income (before taxes) in your household.

40 Enter One ☐

1. Under $1,999	6. $10,000 - $11,999
2. $2,000 - $3,999	7. $12,000 - $14,999
3. $4,000 - $5,999	8. $15,000 - $24,999
4. $6,000 - $7,999	9. $25,000 - $49,999
5. $8,000 - $9,999	10. $50,000 or More

5. What is the highest educational grade completed by the head of the household?

41 Enter One ☐

1. Some grade school
2. Grade school graduate
3. Some high school
4. High school graduate
5. Some college
6. College graduate
7. Post-graduate studies

Please offer any additional comments, criticisms, or suggestions you may have on this important transportation related issue.

_____

_____

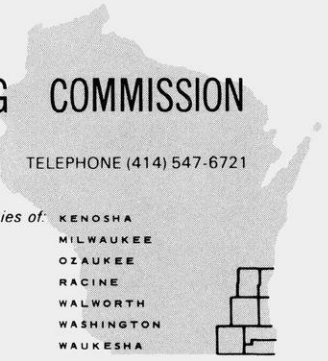
_____

_____

Thank you for your cooperation in completing this form. Please place in the enclosed envelope and deposit in any U. S. mailbox.

Appendix B-2

HOUSEHOLD SURVEY QUESTIONNAIRE



SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

916 NO. EAST AVENUE • P.O. BOX 769 • WAUKESHA, WISCONSIN 53186 • TELEPHONE (414) 547-6721

Serving the Counties of: KENOSHA
MILWAUKEE
OZAUKEE
RACINE
WALWORTH
WASHINGTON
WAUKESHA

March 19, 1976

Dear Householder:

An important factor that presently concerns officials responsible for the planning and development of transportation facilities is the effect of carpooling on the travel habits and patterns of the public. The University of Wisconsin-Milwaukee, and the Southeastern Wisconsin Regional Planning Commission are conducting a survey, the results of which will aid the Milwaukee Area Carpooling Program (MACP) in the evaluation of carpooling activities in the four county area of Milwaukee, Ozaukee, Washington, and Waukesha Counties. By carefully answering the enclosed questionnaire, you will be making an important contribution to the planning of transportation facilities for this area, thereby, performing a valuable public service.

The questionnaire is intended for completion by only the head of the household or spouse. Please answer the questions to the best of your ability.

A high rate of response from both carpoolers and non-carpoolers is essential for a proper evaluation, therefore, it is anticipated that a telephone follow-up will be utilized for all households which, after approximately one week, have not returned the questionnaire. In the event your household finds it difficult to answer any of the applicable questions, please answer those you can and await contact by phone. If you answer all applicable questions you may place the questionnaire in the self-addressed return envelope provided and drop it in any U. S. mailbox and by doing so you will not be contacted by phone.

Your answers will be kept entirely confidential and will be compiled with others for planning purposes only.

Thank you for your cooperation in this matter.

Sincerely,

Kurt W. Bauer
Executive Director

MILWAUKEE AREA CARPOOLING PROGRAM HOUSEHOLD SURVEY

SECTION I

FOR OFFICE USE ONLY 6 ☐

1. Have you or anyone in your household heard about the Milwaukee Area Carpooling Program before receiving this questionnaire?
   ☐ Yes ☐ No

2. Do you know that the Milwaukee Area Carpooling Program (MACP): (check either yes or no for each item)

	Yes	No	
7 ☐	☐	☐	1. Can be used by anyone living or working in the four counties of Milwaukee, Ozaukee, Washington, or Waukesha
☐	☐	☐	2. Can match potential carpoolers
☐	☐	☐	3. Can be signed up for by simply asking for and submitting an application.
☐	☐	☐	4. Furnishes information on carpooling to the press, T.V., radio, and for company newsletters.
☐	☐	☐	5. Assists firms/agencies in initiating and maintaining carpool programs for their employees.
☐	☐	☐	6. Provides speakers to interested groups
☐	☐	☐	7. Does not charge for any of these services.

14 ☐ 3. How many household members over the age of eighteen carpool on a regular basis to work or school?_____
(You are a carpooler if/you and one or more persons ride to work or school in the same vehicle even if the driving is not shared—this includes members of the same household.)

(IF RESPONSE IS ZERO, GO DIRECTLY TO SECTION II)

FOR OFFICE USE ONLY 15 ☐☐

4. What is the relationship of each carpooler to the head of household?
   Carpooler #1 ☐ Carpooler #2 ☐

   1. Head
   2. Spouse
   3. Son
   4. Daughter
   5. Other Relative
   6. Roomate or partner
   7. Boarder

5. What is the age, sex, and licensed driver status of each carpooler?

17 ☐☐ ☐☐

	Age	Sex: Male	Sex: Female	Licensed Driver
Carpooler #1	_____	☐	☐	☐ Yes ☐ No
Carpooler #2	_____	☐	☐	☐ Yes ☐ No

6. What is the highest educational grade completed by each carpooler? (Enter one)

25 ☐☐ Carpooler #1 ☐ Carpooler #2 ☐

1. Some grade school
2. Grade school graduate
3. Some high school
4. High school graduate
5. Some college
6. College graduate
7. Post-graduate studies

FOR OFFICE USE ONLY

7. What is the occupation and employer's name of each carpooler?

27

	Occupation	Employer
Carpooler #1		
Carpooler #2		

8. Has your employer or school provided information on carpooling?

33

Carpooler #1	Carpooler #2
☐ Yes ☐ No	☐ Yes ☐ No

9. During an average week how often is a carpool used?

35 Carpooler #1
____ Times for travel to work
____ Times for travel to school
____ Times for travel from work
____ Times for travel from school

37 Carpooler #2
____ Times for travel to work
____ Times for travel to school
____ Times for travel from work
____ Times for travel from school

10. At what times do the carpoolers usually arrive at and leave work or school?

39

	Time of Arrival	Time of Departure
Carpooler #1	____ a.m. (circle one) p.m.	____ a.m. (circle one) p.m.
Carpooler #2	____ a.m. (circle one) p.m.	____ a.m. (circle one) p.m.

11. What is the one-way distance and about how long does it usually take each carpooler to get to work or school?

47

	Miles	Minutes
Carpooler #1		
Carpooler #2		

12. When did each carpooler start carpooling?

55

	Month	Year
Carpooler #1		
Carpooler #2		

13. Including yourself how many persons are usually in each carpool? (Circle one)

63

Carpooler #1's carpool 2 3 4 5 or more
Carpooler #2's carpool 2 3 4 5 or more

14. In each carpool, do all persons have the same destination as the household member that carpools?

65

	Yes	No
Carpooler #1	☐	☐
Carpooler #2	☐	☐

15. What are the driving arrangements for each carpooler in the household?

67

Carpooler #1 ☐ Carpooler #2 ☐

1. driver only
2. passenger only
3. shares driving with one or more persons

If 1 or 3 above, what type of vehicle does the carpooler usually drive?

69

Example:	Type of Vehicle	Make/Model	Year
	Auto	Ford Torino	1972
Carpooler #1			
Carpooler #2			

FOR OFFICE USE ONLY

16. Could each carpooler in the household make the trip to their place of work or school by bus?

75

	Check
Carpooler #1	☐ Yes ☐ No
Carpooler #2	☐ Yes ☐ No

17. By what mode of travel did each carpooler in the household usually go to work or school before joining a carpool?

77

Carpooler #1 ☐ Carpooler #2 ☐

1. Auto driver (including truck)
2. Passenger in family car
3. Auto part-way; Bus part-way
4. Bus
5. Motorcycle
6. Walk or bicycle
7. Other (specify)
   Carpooler #1 _____
   Carpooler #2 _____
8. Always carpooled

(If response is other than 1 or 3, go to question 20)

18. Is the auto used in the trip to work or school before carpooling now being used during the work or school day by other household members?

79

Carpooler #1 ☐ Yes ☐ No Carpooler #2 ☐ Yes ☐ No

If yes, how often is it being used by other household members?

6

Carpooler #1	Carpooler #2
____ days per week	____ days per week
____ average miles per day	____ average miles per day

12

19. Since joining a carpool, do you estimate that the total miles driven on all vehicles available to your household have:

1. Increased approximately____ miles per year
2. Decreased approximately____ miles per year
3. Remained substantially unchanged _____

Has this change been due to carpooling?
☐ Yes ☐ No

20. If the carpooler had not joined the carpool would it have been necessary to purchase an additional automobile?

16

	Yes	No
Carpooler #1	☐	☐
Carpooler #2	☐	☐

21. What were the reasons that each carpooler joined a carpool?

Enter Three Choices

18

	Carpooler #1	Carpooler #2
First	☐☐	☐☐
Second	☐☐	☐☐
Third	☐☐	☐☐

01. Incentives offered by employer
02. Energy conservation
03. Concern for environment
04. Save money
05. Avoid the stress of driving every day
06. Make auto available to other family members
07. Eliminate need for second auto
08. No other practical mode of travel available
09. Help a friend
10. Companionship to and from work or school
11. More convenient than bus
12. More convenient than passenger in family auto
13. Help keep American oil dollars at home
14. Other (specify)

Carpooler #1 _____
Carpooler #2 _____

22. Do the carpoolers intend to continue carpooling? (check)

30

Carpooler #1 ☐ Yes ☐ No Carpooler #2 ☐ Yes ☐ No

If no, why not? (Enter one)

Carpooler #1 ☐ Carpooler #2 ☐

1. Change of residence location
2. Change of work or school location
3. Change of work or school hours
4. Incompatible with carpooling partners
5. Increases travel time too much
6. Second job or other activity
7. Need to have free use of auto
8. Will not be working or attending school
9. Other (specify)

Carpooler #1 _____
Carpooler #2 _____

FOR OFFICE USE ONLY

23. Does the carpooler feel that the decision to carpool was influenced by the promotional campaign for carpooling which was conducted by the Milwaukee Area Carpooling Program (MACP)?

34

	Yes	No
Carpooler #1	☐	☐
Carpooler #2	☐	☐

24. How did each carpooler hear about the Milwaukee Area Carpooling Program? (Check any that apply)

36

	Carpooler #1	Carpooler #2
1. T.V. advertisements	☐	☐
2. Radio advertisements	☐	☐
3. Billboards	☐	☐
4. Ads in newspapers	☐	☐
5. Employer contact	☐	☐
6. Public speakers at interested groups	☐	☐
7. I was unaware of any of the above	☐	☐
8. Relative or friend	☐	☐
9. Other (specify)	☐	☐

Carpooler #1 _____

Carpooler #2 _____

25. Did the carpooler apply to the MACP match program?

54

	Yes	No
Carpooler #1	☐	☐
Carpooler #2	☐	☐

26. If question 25 is answered no, why did the carpooler choose not to participate in the carpooling program?

56

Carpooler #1 ☐

Carpooler #2 ☐

1. Carpool already formed
2. Already knew of someone who would be able to carpool without going through program
3. Afraid that data provided would not remain confidential
4. Did not want to ride with strangers
5. Thought that it was only for residents of Milwaukee
6. Was unaware of existence of the program
7. Other (specify)

Carpooler #1 _____

Carpooler #2 _____

27. If the carpooler found that in the future for some reason (change in work location or work times of carpooling partners, etc.) he/she could no longer continue in the present carpool, would the carpooler wish to have the free services of the MACP available to help form a new carpool?

58

	Yes	No	If no, specify reason
Carpooler #1	☐	☐	_____
Carpooler #2	☐	☐	_____

28. Do the carpoolers have a suggestion of how the MACP promotional effort could be improved in order to keep the public better informed?

_____

_____

_____

_____

FOR OFFICE USE ONLY

SECTION II

60

1. How many household members are there over the age of eighteen that travel to work or school on a regular basis but do not carpool? _____

(If response is zero go to Section III)

2. What is the relationship of each of these household members to the head of household?

61

Household Member #1 ☐ Household Member #2 ☐ Household Member #3 ☐

1. Head
2. Spouse
3. Son
4. Daughter
5. Other Relative
6. Roommate or partner
7. Boarder

64

3. What is the age, sex, and licensed driver status of each of these household members?

	Age	Sex: Male	Sex: Female	Licensed Driver: Yes	Licensed Driver: No
Household Member #1	_____	☐	☐	☐	☐
Household Member #2	_____	☐	☐	☐	☐
Household Member #3	_____	☐	☐	☐	☐

7

4. What is the occupation of each of these household members?

Household Member #1 _____

Household Member #2 _____

Household Member #3 _____

79

6

5. At what times do these household members usually arrive at and leave work or school?

	Time of Arrival	Time of Departure
Household Member #1	_____ a.m. (circle one) p.m.	_____ a.m. (circle one) p.m.
Household Member #2	_____ a.m. (circle one) p.m.	_____ a.m. (circle one) p.m.
Household Member #3	_____ a.m. (circle one) p.m.	_____ a.m. (circle one) p.m.

16

6. What is the one way distance and how long does it usually take each of these household members to get to work or school?

	Miles	Minutes
Household Member #1	_____	_____
Household Member #2	_____	_____
Household Member #3	_____	_____

28

7. By what mode of travel do these household members usually go to work or school? (Enter one)

Household Member #1 ☐ Household Member #2 ☐ Household Member #3 ☐

1. Auto driver (including truck)
2. Passenger in family car
3. Auto part-way; Bus part-way
4. Bus
5. Motorcycle
6. Walk or bicycle
7. Other (Specify)

Household Member 1 _____

Household Member 2 _____

Household Member 3 _____

(If response is other than 1 or 3, go to Question II)

8. If 1 or 3 above, what type of vehicle does the household member usually drive?

31

	Type of Vehicle	Make/Model	Year
Example:	Auto	Ford Torino	1972
Household Member #1	_____	_____	_____
Household Member #2	_____	_____	_____
Household Member #3	_____	_____	_____

FOR OFFICE USE ONLY

9. Has your employer or school provided information on carpooling?

40

Household Member #1		Household Member #2		Household Member #3	
☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No

If yes, what is your employer's or school's name?

Household Member #1 _____

Household Member #2 _____

Household Member #3 _____

10. What factors have prevented these household members from joining a carpool?

43

Household Member #1 ☐

Household Member #2 ☐

Household Member #3 ☐

1. Not willing to give up the convenience of private auto
2. No one to carpool with
3. Need free use of auto before or after work or school
4. Satisfied with present mode of travel
5. Carpooling would increase travel time too much
6. Work times and/or locations change too frequently
7. Like to ride alone
8. Other (Specify)

Household Member 1 _____

Household Member 2 _____

Household Member 3 _____

46

11. Do these household members intend to carpool in the future? (Check one)

Household Member #1		Household Member #2		Household Member #3	
☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No

If no, under what circumstances would you decide to carpool? (One primary reason)

☐ Household Member #1 ☐ Household Member #2 ☐ Household Member #3

1. Finding carpool partner(s)
2. Only if no other practical mode available
3. Change in work or school location
4. Change in job or school hours
5. When free use of auto is not needed
6. Only if gasoline is rationed
7. Only if price of gasoline becomes too costly.
8. Under no circumstances would I carpool in the future.
9. Other (Specify)

Household Member #1 _____

Household Member #2 _____

Household Member #3 _____

12. If in the future the household members would wish to join a carpool, would they wish to have the free services of the MACP available to them in helping to form the carpool?

52

	Yes	No	If no, specify reason
Household Member #1	☐	☐	_____
Household Member #2	☐	☐	_____
Household Member #3	☐	☐	_____

13. Do you have a suggestion of how the MACP promotional effort could be improved in order to keep the public better informed?

_____

_____

_____

_____

_____

_____

_____

_____

SECTION III

Socioeconomic Section

In order to determine that the response we receive is representative of the population, it is desirable that we obtain the following information. This information will be used for statistical analysis only and will remain confidential.

FOR OFFICE USE ONLY

55

1. What is the age of the head of the household? _____

What is the age of the spouse? _____

How many children 17 or younger are residing in the household? _____

How many children 18 or older are residing in the household? _____

How many other persons (other relatives, roommates, etc.) are residing in the household? _____

Total number of persons residing in the household _____

64

2. Is the head of household a licensed driver? _____

Is the spouse a licensed driver? _____

How many children 18 years or older are licensed drivers? _____

How many other persons residing in the household are licensed drivers? _____

Total number of licensed drivers residing in household? _____

69

3. How many vehicles (autos, trucks, motorcycles) are available for use in your household? _____

4. Please enter the number for the approximate gross family income (before taxes) in your household.

70

Enter One ☐

1. Under $1,999
2. $2,000 - $3,999
3. $4,000 - $5,999
4. $6,000 - $7,999
5. $8,000 - $9,999
6. $10,000 - $11,999
7. $12,000 - $14,999
8. $15,000 - $24,999
9. $25,000 - $49,999
10. $50,000 or More

What is the highest educational grade completed by the head of the household?

71

Enter One ☐

1. Some grade school
2. Grade school graduate
3. Some high school
4. High school graduate
5. Some college
6. College graduate
7. Post-graduate studies

Please offer any additional comments, criticisms, or suggestions you may have on this important transportation related issue.

_____

_____

_____

_____

_____

_____

_____

_____

Thank you for your cooperation in completing this form. Please place in the enclosed envelope and deposit in any U. S. mailbox.

Appendix C

METHODOLOGY

The following discussion outlines the methodology developed for estimating savings achieved by carpools. This methodology was used to derive the estimates of savings generated by all carpools presently in operation as well as estimates of savings generated by carpools formed since the initiation of the MMACP. The calculations are performed for each county and summed to the four-county totals. It should be noted that, while detailed information was obtained for 89,973 carpoolers, the estimated total number of carpoolers in the four-county area is 92,043. The difference between these two values is attributed to households that contained three or more carpoolers. The methodology used in computing savings applies the averages developed from the data collected for the first two carpooling household members to incorporate the remaining carpoolers in the area.

The computation for determining the number of vehicles removed from the road as a result of carpooling was:

$$CP_d - \frac{C\text{-}CP_c}{O} = v$$

Where:

C = number of carpoolers
P_d = percent of carpoolers who previously made the trip to work (and school) as an auto driver
P_c = percent of carpoolers who always carpooled to work (and school)
O = average carpool auto occupancy
v = the number of vehicles removed from the road as a result of carpooling

NOTE: The vehicles utilized by those persons who always carpooled are not reflected in the quantity CP_d. Therefore those vehicles must also be removed in the computation of $\frac{C\text{-}CP_c}{O}$ to insure like terms. Those persons who "always" carpooled have no impact on the number of vehicles removed from the road as a result of carpooling.

The computation for determining miles per day saved by carpooling on the trips to and from work (and school) was:

$$2\left[CP_d M_w\right] - 2\left[M_w \frac{C\text{-}CP_c}{O}\right] = s_w$$

Where:

C = number of carpoolers
P_d = percent of carpoolers who previously made the trip to work (and school) as an auto driver
M_w = median trip length in miles of the one-way trips to work (and school) made by carpoolers
P_c = percent of carpoolers who always carpooled to work (and school)
O = average carpool auto occupancy
s_w = vehicle miles saved per day by carpoolers on their trips to and from work (and school);

or,

$2\left[CP_d\, M_w\right]$ = work (and school) trip vehicle miles of travel per day generated by present carpoolers prior to joining a carpool

and,

$2\left[M_w \frac{C\text{-}CP_c}{O}\right]$ = work (and school) trip vehicle miles of travel per day generated by carpoolers who previously utilized any mode other than carpool

NOTE: The vehicle miles of those persons who always carpooled are not reflected in the work (and school) trip VMT derived from $2\left[CP_d\ M_w\right]$. Therefore those carpools must also be removed in the computation of $2\left[M_w \frac{C\text{-}CP_c}{O}\right]$ to insure like terms in the calculation. These persons who always carpooled have no impact on change in work (and school) trip VMT.

Therefore, the difference between the work (and school) trip vehicle miles of travel per day of carpoolers prior to joining a carpool, $2\left[CP_d M_w\right]$, and the work (and school) trip vehicle miles of travel per day generated presently by those carpools excluding persons who always carpooled, $2\left[M_w \frac{C\text{-}CP_c}{O}\right]$, yields the vehicle miles of travel saved by carpoolers per day on their trips to and from work (and school).

The primary computation above provides the base for the following:

$5S_w$ = vehicle miles of travel saved per week by carpoolers on their trips to and from work (and school)

$48(5S_w)$ = vehicle miles of travel saved per year by carpoolers on their trips to and from work (and school) -- allowing a 48 week work year

Assuming a conservative average of 13 miles to the gallon:

$\frac{S_w}{13}$ = the savings of gallons of gasoline per day as a result of carpooling

$\frac{5S_w}{13}$ = the savings of gallons of gasoline per week as a result of carpooling

$48\left(\frac{5S_w}{13}\right)$ = the savings of gallons of gasoline per year as a result of carpooling

Assuming an average cost per gallon of 55 cents:

$\frac{.55S_w}{13}$ = the savings in dollars spent on gasoline per day as a result of carpooling

$5\left(\frac{.55S_w}{13}\right)$ = the savings in dollars spent on gasoline per week as a result of carpooling

$48\left[5\left(\frac{.55S_w}{13}\right)\right]$ = the savings in dollars spent on gasoline per year as a result of carpooling

To obtain the percent reduction in total work (and school) trip vehicle miles of travel created by carpooling:

$$\frac{S_w}{2\left[CP_d M_w\right] + 2\left[NP_d^n M_w^n\right]} = r$$

Where:

S_w = vehicle miles per day saved by carpoolers on the trips to and from work (and school)

$2\left[CP_d M_w\right]$ = vehicle miles of travel per day generated by present carpoolers prior to carpooling on their trips to and from work (and school)

N = the number of noncarpooling household members who travel to work (and school) on a regular basis

P_d^n = the percent of noncarpooling household members who travel to work (and school) on a regular basis as auto drivers

M_w^n = median trip length in miles of the one-way trip to work (and school) made by noncarpooling household members

r = the percent reduction in vehicle miles of travel to work (and school) generated by carpooling

The methodology described above was also applied to the subset of carpoolers that began carpooling since May of 1975, the initiation of the MMACP.