

Trip Generation Characteristics of Outdoor Recreation Areas

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If you and your family made one of the more than 250,000 annual visits recorded at Indiana state parks last year, then you are part of the pattern which shows that Americans are seeking the outdoors as never before. And outdoor recreational activity is expected to triple by the year 2000. This projection was published in *Outdoor Recreation for America*,¹ a report presented to the President and Congress by the Outdoor Recreation Resources Review Commission in 1962. The summary and the 27 individual reports which resulted from the Commission's study is, perhaps, the most thorough examination of outdoor recreation needs and resources ever made in this country. Here are some of the disclosures and projections presented in this report.

The study showed that simple activities are the most popular. Driving and walking for pleasure, swimming, and picnicking lead the list, with pleasure driving the most popular. This is generally true regardless of income, education, age, or occupation.

About 90 per cent of all Americans participated in some form of outdoor recreation during the summer of 1960. In all, they participated in one activity or another on 4.4 billion separate occasions. It is anticipated that by 1976 the total will be 6.9 billion and by the year 2000 will rise to 12.4 billion—a three-fold increase by the turn of the century.

The increased mobility of our population has accelerated the need for recreational facilities. The percentage distribution of all vacation trips by distance traveled in 1959 and 1960 discloses that 10 per cent covered over 2,000 miles; 17 per cent were for 1,000 to 2,000 miles; and 6 per cent spanned 750 to 1,000 miles. This means that 33 per cent—or one third of vacation-bound motorists—drove more than 750 miles from place of origin.

How great will the demand be for outdoor recreational facilities in the future? The most basic factor, of course, will be the number of

¹ *Outdoor Recreation for America*, a report to the President and to the Congress by the Outdoor Recreation Resources Review Commission, January 1962, Washington, D. C.

people. Authoritative sources predict that the population will virtually double from about 180 million today to approximately 230 million by 1976, reaching 350 million by the year 2000.

Our population will be more concentrated in the years ahead. Compared to 63 per cent in 1960, about three-fourths of our population will be living in metropolitan areas by the year 2000. There will, also, be more young people. The proportion of those in the 15-24 age bracket (the most active of all) will go from the current 13 per cent of the total to about 17 per cent by 1976. And as these population changes occur, there will be corresponding changes in personal incomes. For example, in 1957, about 14 per cent of the consumer units had incomes of \$10,000 and over. By 1976, it is estimated that the proportion will be up to 40 per cent, and by 2000, 60 per cent. Another factor which will directly affect recreational facilities is the additional leisure time which will be available to American families. It is estimated that by 1976 the standard work week will average 36 hours for the entire industrial work force, three hours less than in 1960. By 2000 it may be down to 32 hours and much of the extra time will go to recreation. At least one-fifth of free time goes into outdoor recreation today, and we may expect at least this much in the future.

Adaptability of Vehicles for Outdoor Recreation

Automobiles are adaptable to recreation travel and camping. This adaptability has contributed to the fast growth of visits to, and camping in, national parks, and is important in considering long-distance travel. Estimates of future travel by purpose of trip were made for the Outdoor Recreation Resources Review Commission by A. J. Goldenthal of Wilbur Smith and Associates.²

These travel forecasts suggest enormous expansion. The number of passenger cars is projected at 100 million by 1976—an increase of nearly 80 per cent above the number registered in 1959—and by 2000 the number is expected to grow as much again.

Goldenthal's estimates for the Commission show that by 1976 we can expect the total number of overnight trips, or trips of 100 miles or more, will double to 485 million. Trips to visit friends and relatives account for nearly half of this total and many of these trips, as well as business or other personal travel, include stops at recreation areas or sightseeing activities.

² *Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force and Leisure, and Transportation*, Outdoor Recreation Resources Review Commission Study Report 23, Part III, "The Future of Travel in the United States," by A. James Goldenthal, Washington, D. C., 1962.

The Increase in Mobility

Probably the strongest impression produced by the review of the future development of travel volume and travel systems is the further rise in mobility that is in prospect. The average person is expected to exceed the 4,170 intercity mile total established in 1960 by traveling an additional 2,600 miles per year by 1976. Many will find the 11,000-mile average, suggested as a conservative possibility for the year 2000, difficult to comprehend.

The increased mobility will be evidenced in the wide choices open to travelers virtually everywhere. Recreation trips of long and short duration and covering thousands of miles will become frequent, rather than occasional, as is the case today. For example, trips over long weekends to such places as Florida, will become popular for residents of the northeastern and midwestern parts of the nation in the decades ahead.

With the summer months approaching, recreation travel will soon be at its peak. Residents of urban areas will soon be on the highway traveling far and near to take advantage of the state parks, historical sights, resort areas, and other outdoor recreational facilities.

The monthly variation of traffic volumes on the Indiana Toll Road for example show that the greatest amount of travel is done during the month of August with a sharp decline in September, which marks the beginning of school.³

This seasonal variation is typical of highways surrounding urban areas. This recreational travel, unlike other types of travel, reaches its peak on Sunday when most of the recreation trips are either of a day's duration or the return trip of weekend travel. This is unlike urban peak-hour movements which occur mainly on a weekday and normally in the morning or afternoon when workers are going to or returning from work.

The proximity of population centers to recreational areas generally determines the usage that will be made of these facilities. For instance, most of the people attracted to the Smoky Mountain National Park live within a 500-mile radius.⁴ This is understandable, since fully half of the population in the United States lives within that distance of the Great Smokies. Of the total travel in the park, more than 41 per

³ *Revenue Analysis, Indiana East West Toll Road*, Wilbur Smith and Associates, 1958.

⁴ *Great Smoky Mountains National Park Travel Study*, conducted by North Carolina State Highway and Public Works Commission, Tennessee State Department of Highways and Public Works and United States Bureau of Public Roads.

cent originated in the adjoining states of North Carolina and Tennessee. An interesting aspect about the growth rate of travel is that the total growth rate of North Carolina traffic over the years from 1945 to 1956 was 88 per cent, whereas the increase in travel to the Great Smokies was 140 per cent. Of this travel to the park, 64 per cent of the visitors came during the three summer months.

In an intercity travel survey, conducted by our firm in a state noted for its recreational facilities, a composite of 18 permanent recorder stations showed variations in daily traffic volumes for the year. These, of course, reflect the various national holidays, such as Memorial Day, Labor Day, Thanksgiving Day, and Christmas. Once again, the major volumes of traffic begin on Memorial Day, May 30, and drop off sharply after the end of August. Another interesting aspect of this monthly variation is that the occupancy rate of cars tends to increase during the summer since there is more family participation on recreational trips.

The survey of travel in this state also disclosed that in 1960 80 per cent of summer Sunday traffic volumes was recreational, as compared to 30 per cent of annual average daily traffic on intercity trips. The summer Sunday volumes averaged 1.7 times the normal average daily traffic.

In 1960, 400,000 auto driver trips were made for recreational purposes on an average Sunday in summer on the highways of this state. We have estimated that summer Sunday recreation trips will reach 830,000 by 1980 and over 1,500,000 by the year 2000.

These statistics are interesting, but what is the import of variations in traffic volumes as related to recreation travel? The answer to this question is that since urban roads are designed to handle peak-hour movements, so also should peak volumes of recreational travel govern the design of many rural highways. As in the state study previously mentioned, recreational traffic is sometimes found to be as high as 85 per cent of the total traffic utilizing a particular highway. Convenience of access and capacity of highways linking urban centers with recreational facilities is directly related to the usage that can be made of the recreational facilities provided by federal, state, or private interests.

Recreation Travel and Toll Facilities

Recreational travel is extremely important in many projections involving toll bridges which tie recreational facilities with the existing network of highways. St. George Island bridge causeway in Florida

is an example of one of these facilities.⁵ St. George Island is located in the Gulf of Mexico, off the west coast of Florida, and is near Apalachicola in Franklin County. It is 70 miles from Tallahassee and 65 miles from Panama City, off U. S. Route 98, which is a scenic highway paralleling northwest Florida's Gulf shore. St. George Island is about four miles from the mainland and is accessible by ferry which docks near the town of East Point.

Florida is generally regarded as a resort area experiencing peak traffic during the winter season. However, there are a number of areas of the state where the summer volumes approach or exceed the winter volumes. Seasonal variations for 1957-1958 and 1959, taken from the Florida State Road Department's permanent counter, which is located about 8.5 miles northeast of Carabel on U. S. Route 98, revealed that the lowest seasonal volumes occur in the fall. In 1959, for example, summer volumes amounted to about 109,000, whereas winter volumes amounted to approximately 77,000.

In estimating annual vehicular usage for the St. George Island bridge causeway development, traffic was estimated by individually analyzing the major sources of traffic generation by trip purpose. The major generators are swimming and picnicking, sight-seeing, seasonal and permanent residents and their guests, fishing and hunting, commercial trucks, and construction workers. Trips due to retail and other business activities were also included in other categories.

Annual traffic growth curves were formulated for each traffic generator and monthly variations in the traffic level which may be expected for each of the activities were carefully estimated. For example, in this area of Florida, much of the traffic generated by recreational purposes will occur during summer months, as we have stated previously. This factor was considered in developing annual traffic usage.

Traffic estimates were calculated by weighing seasonal variations in traffic usage independently for each trip purpose. This was done for each year of the 15-year projection period, assuming the first full year of operation to be 1963. In effect, a separate growth curve was developed for each traffic generator over the 15-year period. The magnitude of recreational traffic is illustrated in the projection for 1975. By that year it is expected that total annual traffic will be about 170,000. Approximately 100,000 of these will be recreational trips.

⁵*Traffic and Revenues—Proposed St. George Island Bridge—Causeway*; prepared for the Florida State Road Department, Wilbur Smith and Associates, New Haven, Connecticut, March, 1960.

Another interesting facility which generates traffic is the subtropical islands of Sanibel and Captiva in the Gulf of Mexico. Off the west coast of Florida near Fort Myers, these islands possess what is said to be one of the three most famous beaches in the world for shell collecting. Each high tide brings new shells to the beach and new possibilities for conchologists. A shell fair has been held in the spring for nearly 20 years and is now world famous. Visitation in each of the last two years has exceeded 3,000.

Our firm conducted a study to determine the feasibility of a bridge and causeway system connecting Sanibel Island and the mainland.⁶

Field investigations were conducted to determine the magnitude and characteristics of traffic utilizing the ferry connecting Sanibel Island and the mainland, the principal means of access. The survey showed that almost 70 per cent of the trips were for recreational purposes. Also, slightly more than half of the trips were for one-day duration.

It is expected that average annual daily traffic over the bridge will increase from 250 to more than 1,400 with a projected 20-year period.

Far from the beaches of Florida, similar seasonal travel patterns were observed in a study of the Montreal-Laurentian Autoroute Extension in Canada.⁷ The Montreal-Laurentian Autoroute is the principal access route from Montreal to Laurentian Ski resorts.

Previous to construction of the Autoroute, Route 11 was the principal highway link to the Laurentian foothills from Montreal. The journey from Montreal required two and one half to three hours and ski trips were mainly of weekend duration. Now, with 30 to 40-minute access by the Autoroute, ski trips can easily be made in one day from Montreal.

Peak daily travel occurs on weekends. A survey of traffic about two miles beyond the present terminus of the Autoroute, about 33 miles from Montreal, showed that recreation trips accounted for 71 per cent of weekend day travel.

But, in spite of the heavy winter travel to ski resorts, peak seasonal travel occurs during the summer months. On Route 11, some 15 miles from Montreal, peak travel was in July, when it was 146 per cent of average monthly travel. Seasonal travel was higher at a survey point 45 miles from Montreal, beyond most of the commuter traffic. At that

⁶ *Traffic and Earnings—Proposed Sanibel Island Bridge and Causeway, Lee County, Florida*, Wilbur Smith and Associates, New Haven, Connecticut, December, 1960.

⁷ *Traffic and Revenues, Proposed Montreal-Laurentian Autoroute Extension*, Wilbur Smith and Associates, August, 1961.

distance, July traffic was 213 per cent of average monthly traffic while winter monthly volumes were well below average monthly volumes at both survey points on Route 11.

In a study of traffic and revenues for the Eastern Turnpike in Oklahoma, it was found that recreational facilities would be an important influence on future travel in the area.⁸ The Eufaula Reservoir area, for example, is expected to draw 10,000,000 visitors annually, based on estimates made by the U. S. Corps of Engineers. This is almost 2,000,000 more visitors than now visit the Lake Texoma area along the Oklahoma-Texas borders, and Lake Texoma now draws more visitors annually than any three national parks combined.⁹

Recreational Travel and Highway Locations

The impact of recreational travel on the highway system is clearly indicated in a study our firm has undertaken for the routing of an interstate highway through a rural area covering parts of several states.¹⁰ The data collected and analyzed in the survey included an area of 29,000 square miles, much of which has been undergoing population losses in rural areas, although moderate population gains have been made during the last decade by several small cities in the area.

Our study reveals that increases in population and employment represent the major impact the highway will have in the area. However, the highway will effect other changes, mainly on recreation travel. These factors were considered in deriving the influence of the highway on travel patterns within the study area.

To ascertain the effect of recreation travel on traffic patterns, estimates were made of the average daily traffic at various points, using official attendance figures as a basis. In projecting future recreation travel, population growth trends were reviewed in the local areas around each state park and within a 300-mile radius of the regional facilities. Further allowance was made for the expected increase in the number and usage of automobiles in the region.

Comparisons of these various highway alignments required an assignment of traffic to alternate networks for the selected future year 1975. To accomplish this, it was first necessary to develop synthetic 1960 traffic patterns for the area which were compared with state flow maps before the 1960 data were projected.

⁸ *Traffic and Revenues, Proposed Eastern Turnpike—Oklahoma, Henryetta to Hugo*, Wilbur Smith and Associates, 1962.

⁹ *Tulsa, America's Most Beautiful City*, Tulsa Chamber of Commerce, 1962.

¹⁰ The final report has not been released at this time.

Analysis and projection of trip generation and distribution factors in rural areas is a relatively new field in transportation planning. It was necessary, therefore, to develop formulas for both the generation and distribution of trips in the study area. These formulas were applied to all the alternate highway locations considered in the study.

All of the possible routes on one large segment of the proposed interstate will pass by or through an existing regional recreational facility and a proposed national park. The several alternates which were considered would be located at various distances from these facilities. One of the alternates would have passed 50 miles south of the area; one would have been constructed about 10 or 20 miles south; and another one would have passed almost directly through the area. It was found that the average daily traffic volumes for recreational purposes on the alternate nearest the proposed park would be approximately 2,000 greater than volumes on other route locations. This is a considerable difference, especially when compared with the 10,000 to 12,000 volumes projected for all trip purposes for those segments which will be most heavily traveled.

This survey points up the significant impact of recreation on rural highways. This is the one type of traffic that is not particularly population-oriented at its destination end. Many trips, such as work trips and others, can be related to population in rural areas. Outdoor recreational areas, however, are usually remote from population centers, and represent the destinations of trips which originated in metropolitan centers at varying distances from the recreational facility.

An Example of Coordinated Recreation and Highway Planning

With these illustrations, we have seen the impact of recreational developments on highway travel. At this point, it would be useful to examine a plan recently developed in North Carolina to illustrate the coordinated planning that can be accomplished with recreation areas and highways.

I refer to the General Development Plan for Lake Norman, a new feature which is being added to the landscape of Piedmont, North Carolina.¹¹ The lake is being created by Duke Power Company for the principal purpose of providing suitable sites for steam plants to generate electricity.

Covering 52 square miles, with approximately 500 miles of shoreline when completed, Lake Norman will be one of the major reservoirs in

¹¹ *General Development Plan, Lake Norman*, Prepared by Charlotte-Mecklenburg Planning Commission and Planning Boards of Catawba, Iredell and Lincoln Counties, 1961-1962.

the Southeast. At some places, the lake will be roughly eight miles wide and 26 miles in length.

Such a lake, by its very size, is bound to have a profound effect on the cities and counties that surround it in the populous and urbanized Piedmont area of North and South Carolina.

New opportunities will be created by the area for lakeside residences, water-using industries, water sports, and many other types of recreational facilities.

Recognizing the potential of this resource, the four counties surrounding the lake, through their respective planning commissions, have created a general development plan for land use, private and public recreational facilities, and highways in coordination with the North Carolina State Highway Department.

In developing the plan for Lake Norman, in which I participated, the planners analyzed the potential population and economic growth of areas surrounding the lake within a distance of 60 miles. The reasoning for this is that within a distance of 60 miles or so, a lake the size of Lake Norman may be expected to attract regular users.

This area lies within the Piedmont crescent of industrialization and urbanization which encompasses Greenville, South Carolina, and Raleigh, North Carolina, and is made up of many small-to-medium sized cities and clusters of development.

The Lake Norman region has virtually tripled in population between 1900 and 1960—from 900,000 to 2,333,000 and the area is ringed and crossed with major interstate, federal aid-primary, and state highways. These highways are of major importance for regional access, as well as for circulation around and across the lake, and for local access to the lakeshore areas. North of the lake is a major east-west Interstate Highway, I-40, which crosses the state and ultimately will extend to the West Coast. In this northern area there is also a major east-west federal-aid-primary route, U. S. Routes 64 and 70. East of the lake is Interstate 77 which will connect Canton, Ohio, to the southeastern states, connecting with Interstate 85 at Charlotte. Paralleling Interstate 77 is U. S. Highway 21, a major north-south federal-aid-primary route.

The major highways in the area will provide excellent access to the lake for the regional population, and the development plan has capitalized on this access. North Carolina Highways 115, 73, 16, and 150 also serve the lake area. Recommendations are included in the Lake Norman Development Plan to realign these highways where necessary

to provide better access between the primary highway system and land areas around the lake.

A secondary road system has been planned which will be of major importance in developing Lake Norman. These roads will not only provide important links in the major thoroughfare plan but will also provide for direct access to the lake.

The General Development Plan for Lake Norman includes allocations for a variety of land uses, properly located to best utilize this new, attractive facility. Three types of residential uses are established—resort-residential, urban-residential, and agricultural-residential. Access areas, public and commercial, are indicated, as well as commercial, industrial, and flood plain areas. A state park will be provided on the northern part of the lake.

Street planning has been studied in relation to standards recommended for lakeside residential development. These standards guarantee access from residential lots to the road network as well as to the lake itself. These standards will be enforced through subdivision regulations in each county surrounding the lake.

Interstate highways will further increase accessibility to resort areas, making longer and more varied vacations possible. Vacations to new areas, as a result of good highways, will enrich the culture and heritage of the nation.

All of us involved in one way or another, in the planning and construction of our transportation systems, have an enormous responsibility to the American public in the years ahead. All possible benefits must be considered in planning and locating highways to serve the public. Recreation travel is destined to become increasingly important in our efforts to improve highway planning techniques and to serve the variety of public purposes for which highways are constructed.

Conclusion

Numerous additional technical details could be mentioned in discussing the trip generation characteristics of outdoor recreational areas. We have cited only a few studies which illustrate the technical problems involved.

In addition, there are numerous examples of coordinated land use, recreation, and highway planning which would illustrate the possibilities of greater benefits the public can derive from coordinated planning.

Recreation travel will continue to reflect the national level of prosperity, greater leisure time, and improved accessibility to recreational

and historic centers. More than 70 million Americans take vacations by car each year, averaging over 1,000 miles per trip and spending over \$9 billion.¹²

Mobility is a key factor affecting outdoor recreation. Travel to reach outdoor recreation facilities is a major use of many of our highways, as we have seen in our discussions today.

¹² *Future Highways and Urban Growth*, Wilbur Smith and Associates, under commission from the Automobile Manufacturers Association, 1961.