voluntarily and then re-entered the structure. All the fish were released into the lake near the spillway because it was thought that the fish should still be under the influence of a water current when they were released from the trap. The percentage of retraps is comparable with retraps reported by Schafer and Geagan (1958) in Lake Chicot, Louisiana.

It is interesting to note that the ratio of game fish—rough fish which is approximately 1 to 3 is directly opposite to that reported by Schafer and Geagan (1958) for Lake Chicot, Louisiana, which was approximately 4 to 1. However, the percentage (6.5%) of the available game fish was lower in Chicot Lake than the 37% available size game fish using the Lake Bistineau structure.

This reversal in game fish-rough fish ratio could be due to the difference in slope of the structures. While the Lake Bistineau slope is 1 to 5, the fishway on Lake Chicot has a slope of 1 to 10, which would tend to permit smaller fish to utilize the structure. This is substantiated by the results which show that only 6.5% of the game fish using the Lake Chicot structure were available size, while 37% of the game fish using the Lake Bistineau structure were available size.

It is the opinion of the authors that the fishway on Lake Bistineau is not a desirable structure as it provides little harvest for the angler and permits access into the lake of many undesirable fish.

Literature Cited

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ACCESS NEEDS—A CONTRIBUTION TO A PANEL ON ACCESS AREAS

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To those of us who have been engaged in water resource planning it has long been apparent that the economic growth of the country would place demands upon the resource that would not be satisfied by single-purpose, single-project type of solutions. In this connection and along with all the other uses people make of water, it has been equally apparent that public use of these waters for outdoor recreation would come to occupy a place of substantial purpose in the planning process. It really has not mattered what our personal beliefs might be as to the relative importance of recreation, or whether the Federal Government has responsibility in the field—the fact is, that the overwhelming magnitude of public demand upon public waters is such as to make the recreation purpose inevitable.

Nation-wise I believe we can state that recreation does now occupy a place of substantial purpose in water resource planning. Not only are comprehensive, basin-wide, all-purpose studies being authorized and embarked upon with increasing frequency, but Federal law and policy and the policies of certain States now define a positive position for recreation in water resource development.

Furthermore, as we look at our best economic predictions of the future, and as we look at the record of increasing participation in water-connected recreation, I don't think we need to be particularly far-sighted to state that not only will single-purpose, single-project developments for water use become more rare, but that the position of recreation will be strengthened as time goes by.

So it seems to me that the basic problem we are faced with now that the position of recreation has been sketched out for us, is to develop a methodology that will fully support and defend the position of recreation as a purpose in the planning process. Professional people in outdoor recreation fields have been

somewhat indifferent to the need for serious attention in this important aspect of recreation planning. In the technical aspects of our problem we, in recreation, are as competent and as skilled as those engaged in any other water-use purpose. Biologists know as much about the habitat requirements, of water fowl, for example, as engineers do about curing concrete or use of steel in construction—Park people know as much about proper layout and spacing of Park facilities as agronomists and engineers do about water requirements of crops and field layout for irrigation. When I say our methodology is inadequate, I mean that we are inadequate in those steps of multiple-purpose planning called project formulation—where we measure the demand against the supply of our particular product, prove needs and project needs in the future, and then organize the physical and financial means of meeting them. This general area of planning—the area of fitting recreational use of water into the physical and economic make-up of projects and programs—is one of the least explored and at the same time one of the most challenging fields open to our interest today. I am certain it is going to become more and more important as time goes by.

Now I apologize for this seeming departure from my assigned topic on the argument that it is not actually a departure—but that it is a proper introduction to a discussion of access needs.

In going through the literature available to me in preparation of this material I found a wealth of information that expressed alarm at the rate which lakes and streams of the country are being acquired and developed for private use. I found information on the percentage of streams and lakes in various States that are privately controlled or closed to public use. I found considerable objection to Federal land acquisition policies relative to impoundments, where it seems that more private than public interests are being served. Extensive surveys have been published on the vanishing seashore as a public resource. The farmer-sportsman problem is an old one and much has been written about it. This all has to do with access. That we would one day be short of public access to and use of desirable recreation resources by the public is not a new thought by any means. In this respect, concern about recreation opportunity is very much like concern that has been expressed by others for future needs for hydro-power, irrigation, flood control, navigation, and municipal and industrial water supply. The main difference, however, it that we in recreation have never been able to present a really good quantitative case for recreation needs. While others talk about annual increases in the need for cubic feet of storage, or surface acres of land, or of kilowatts of electricity, and while they present studies showing relationships between manufactured goods and gallons of water—generally we in recreation seem to have contented ourselves with expressing alarm over how fast the present is slipping into the past. So, while we know we are short in access to and use of recreation resources, we cannot say exactly how short we are, nor can we say exactly how rapidly we are getting shorter—we have no good tools with which to measure the need for our proposals.

I am convinced that we must devise methods of measurements for recreation use of water resources. But as a prerequisite to measurement I am equally convinced, is the need for us all to develop a bit of "togetherness" in our philosophy. Much of this alarm I spoke of reflects competition not only among recreation and non-recreation uses of the water resource, but even competition among kinds of recreation itself. We find interests representing fishermen insisting upon launching ramps and access sites being reserved for fishermen only. We find conflict between those who prefer wilderness areas and those who want ready access and developed use of wilderness areas. In fact there would seem to be a good deal of resistance on the part of the many recreation interests to approach the use of the water resource on a comprehensive, multiple-purpose basis. We need to recognize, before we can talk much about *access needs,* that all these kinds of outdoor activities we are concerned with that relate to water—hunting, camping, picnicking, fishing, boating, swimming, sightseeing, and the rest—all go to make up outdoor recreation. In short, fishing as we are concerned with it here, is a form of outdoor recreation, just as is picnicking and boating. Furthermore, there is all kinds of evidence about to indicate that the demand on us can be defined as "multiple-

purpose" recreation. The common unit seeking outdoor recreation is the family unit seeking areas having facilities to support varied activities. This kind of the varied or multiple-recreation demand and the growing scarcity of opportunities combine to force us to think in terms of multiple-recreation access and use of desirable outdoor resources.

So when we speak of access here we mean the opportunity for the general public to enter and to make the full recreation use that can be afforded by the balanced development of a particular lake or stream or other publicly owned water resource. I offer this as a general planning principle in recognition of the fact that we have already or are rapidly reaching a point of excess demand over developed supply, and that full consideration must now be given to the entire recreation potential of each recreation resource.

This means that access as a recreation problem implies much more than a public road that ends at a river bank or lake shore. The general public cannot be said to have been provided access to the recreation opportunity inherent in a particular water resource unless the development in connection with the resource is such as to make it usable to the general public. The term "general public" is used here in order to distinguish between what is essentially private or commercial and what is public. The opportunity to build private homes, cottages, resorts, clubs, youth camps, and the like do not satisfy the demands for general public access and use. In proper balance of course these private, commercial, and quasi-public uses of public water resources may enhance the general public value received, but the danger is in imbalance. I am certain most of us recognize that in such imbalance, the general public may derive but a relatively small use of the water, even though the basic resource is publicly owned.

In this context I believe we might well consider general public access to and use of the public water resource to constitute one of the fundamental problems facing those of us who must plan, administer, and manage recreation resources today.

If we have succeeded now in defining the problem of access, and I confess it might be benefited by more thoughtful consideration—how are we going to measure its magnitude and rate of growth and interpret those in terms of needs? What are our units of measurement, and how many such units must we provide each year to keep up with the increasing population and associated expected economic growth?

Now I don't propose a nice clean-cut solution to this problem here by any means. All I propose to do is to examine it a bit—to see if we can organize our approach in some manner wherein a solution might prove possible.

First, the increasing demand on outdoor resources we have witnessed throughout our period of record, and particularly since World War II, is in excess of population growth. For example, attendance at State Parks in the United States increased from about 92½ million visits to almost 237½ million visits between 1946 and 1958. The population during that period increased from 141½ million to about 174 million people. Had these people used State Parks at a constant rate per capita per year, the 1958 State Park attendance would have been 155 million instead of 237½ million visitors. What happened was that the rate of visits per capita per year increased from 0.65 visits in 1946 to 1.36 visits in 1958 for the nation. Fishing and hunting activity, even though deflected in areas in recent years, show similar long range trends. Records of recreation use on National Forest lands, Bureau of Reclamation, Corps of Engineers, and T.V.A. waters and other agencies all show increased activity in excess of population increase.

In attempting to boil this magnitude and rate of growth down to something more tangible, I believe we might be permitted to make certain basic assumptions. For example, it seems reasonable to assume that the amount of participation in outdoor rcreation that is in excess of that contributed directly by population growth can be said to reflect the willingness of people to convert economic gains to outdoor recreation. As to how these converted economic gains are distributed among fishing, boating, going to the races, swimming, and the like would, of course, appear to be dependent upon many factors among which, many people believe, the availability of public recreation access and facilities rank very high. In any case, if we recognize the economic factor in

the growth of recreation, then it would seem that what we have to examine is the rate of growth or increase in participation per capita per year. By such an index we need not concern ourselves with attempting to project incomes, miles of new highways, and leisure time. These factors are generally inherent in past growth rates of per capita participation. Primarily what we and others who are so lacking in good judgment as to attempt projections have to do is to be careful we do not project more days of demand for the year 2000 than there will be people in the population, or require more days per person than there are in a 365-day year. No one person is likely to exceed recreating 365 days in any one year.

From some studies conducted in connection with the highly urbanized Delaware River Water Service Area it was concluded that the participation in away-from-home recreation in 1955 amounted to about 16 days per capita. For one day outings the rate was 6.4 days per capita; for overnight outings it was 3.5 days per capita, and for vacations 6.1 days per capita—totaling 137,000,000; 75,000,000 and 132,000,000 visitor days respectively for 1955. It will interest you to know that visiting friends and relatives ranked number one in activities participated in by people on one-day outings, and overnight outings, and that it ranked no less than three or four as a preference in any of the categories. By an admittedly questionable method of selecting from these activities only the major ones with which we are concerned here, and for which access presents a major problem, we conclude that about 55%, or a total of 187,720,000 visitor days, constituted the annual demand on public access and facilities for this population of 21,589,000 people. This constitutes a rate of 8.7 visits per capita of population per year for such activities as picnicking, swimming, fishing, boating, hiking, and nature study. Since this is the only data we have, we will for the purpose here apply this to the 1955 population of the United States of 165,000,000 for 1955. This indicates an annual use amounting to about 1,522,000,000 visitor days in 1955. From some preliminary studies regarding these relationships it appears that for a generalized picture we may conclude that about 50% of this activity may occur during a 14-week summer season, and that about 45% of the weekly load may be on a normal summer Sunday. Assuming a daily turnover of use on facilities of 1.5 we conclude that the total design load equivalent of demand on access and facilities in 1955 was for about 15½ million people for the country. There is some meager evidence that about ¼ of this use is in excess of the capacity of facilities existing in 1955. Thus, we might say that there was a need in 1955 for additional outdoor capacity to serve about four million visitors at any one time. The hazard associated with lumping all regions and types of activities is apparent here. However, data to support studies of this nature for regions and for many separate activities are not too difficult to come by and such an approach would lend itself readily to refinement as such data are accumulated.

For the purpose of completing this series of appraisals we selected the rate of increase of visits per 1,000 population to the National Park system as an index to the rate of increase in the per capita per year participation in outdoor recreation in general. It is recognized that a better index might be obtained from use of other data, but National Park system data provide 45 years of record to work from.

Briefly what we did was to fit the visits per 1,000 population to the National Park system from 1910 to 1956 to the formula of a standard growth curve. The computed curve seems to provide a reasonably acceptable fit to the plotting of the original data for the purpose of projection. From these computed rates and projections we determined the percent of each increment of increase in visits per capita of population to the preceding year and applied these percentages to our 8.7 visits per capita rate noted above for the total outdoor activity for the nation. This gave us an increase in the visits per capita from 8.7 in 1955 to 14 in 1970; to 15.1 in 1980, and a leveling off thereafter. By applying these rates against populations provided in the series of publications by the Senate Select Committee on Water Resources we conclude that between 1955 and 1970 an added demand on access and facilities would amount to a design load equivalent of 15.7 million people, which, together with the over-use existing in 1955, would indicate a figure of about 19½ million. Between 1970 and 1980 the additional design load equivalent of demand would amount to 8.4 million people. Between

1980 and 1990 this increase would be 7.37 million, and 7.28 million for the decade ending at 2,000.

Needs then may be expressed in terms of specific types and units of facilities required to meet these demands. I believe it is apparent that if we can compute the number of people we can expect to be looking for access and facilities on a normal day during peak season, the number, types and costs of facilities can be readily determined. These would vary with the decisions as to what constitutes a balanced program in each case.

What these specific figures tell us is that the demand for access to and use of recreation resources for camping, fishing, picnicking, hiking, boating and nature study will in 2000 require almost four times the developed capacity than supported these activities in 1955. The design load equivalent of the addititonal capacity would appear to be in the neighborhood of facilities to support about 54 million people at any one time over the 1955 capacity.

Now I do not guarantee the accuracy of these projections. Time did not permit a full and through examination of the problem. My main concern here was to suggest a technique by which recreation use of water resources may be measured and projected. I do hold that this technique is particularly applicable to local and regional problems. With collection of appropriate data, each step can be refined to be used to support projects and programs in the planning process in a substantial manner.

Panel discussion on access areas presented at the fourteenth annual meeting of the Southern Division of the American Fisheries Society. Biloxi, Mississippi, October 26, 1960.

THE PROBLEM OF LOCATION AND MULTIPLE USE OF ACCESS AREAS

By F. G. BANKS
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The problem of location and multiple use of access areas is directly related to the source of funds available for construction and the primary purpose for which the area is to be developed. The types of usage depend on the owner, operators or agencies involved.

The responsibility of the State Game and Fish Department is to provide the fishermen and hunters access to the various bodies of water. But agencies, such as State Road Departments, Park Services and other state or federal agencies, rightfully devote a large part of their effort in developing multi-purpose areas near centers of populations or heavily used areas. These facilities may be located on both salt and fresh water in coastal states and may include launching ramps, shelters, picnic tables, rest rooms, showers, electric lights, water fountains, concessions, parking lots, beaches and other items that are so essential for a multi-purpose site. The funds which are used for construction of such facilities are usually derived from general revenue appropriations and no discrimination can be made as to usage.

State Game and Fish Commission funds however are usually derived from the sale of fishing and hunting licenses and their primary responsibility is to provide better fishing, hunting, and access areas for such sports.

It may be of interest to this group, today, to hear from one agency of admittedly limited interest in a specific narrow field of outdoor recreation in a southernmost state—the Florida Game and Fresh Water Fish Commission, which I represent.

The problem of locating access areas and launching facilities in Florida is probably somewhat different than in other states. It will be necessary to provide you with certain background material before the role of the Florida Game and Fresh Water Fish Commission in locating and constructing access sites can be readily understood.

Florida is a state of numerous lakes and streams. In fact, it has been estimated that the State has 30,000 named lakes, with 950 exceeding 150 acres in size, and 4,550 miles of navigable waters. Of the 30,000 lakes, not over 190 were meandered in the original incompleted surveys and many of the lake