New Castle County
Department of Parks and Recreation
in cooperation with
The Delaware River Shoreline Committee

Delaware River SHORELINE STUDY

UNIVERSITY OF DELAWARE
Sea Grant College Program

Department of Economics and College of Marine Studies

FINAL REPORT
NEW CASTLE COUNTY DELAWARE RIVER SHORELINE STUDY

prepared for
New Castle County Department of Parks and Recreation

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FOREWORD

The final report of the Delaware River Shoreline Study is made up of six sections. These present the findings from the study of each task defined in the contract proposal which resulted in policy recommendations. A brief summary and the recommendations are included at the beginning of the report.

Task I is a review and analysis of water-based recreation demand based on existing studies.

Task II is a literature survey of water-based recreation facilities in other urban areas of the nation.

Task III is an evaluation of shoreline locations for their suitability as water-based recreation sites.

Task IV is a synthesis of the results of the three previous tasks into a set of five recreation development scenarios. These scenarios are not recommendations but are alternatives to be evaluated in a public survey.

Task V is a report on the workshop held to discuss progress on Tasks I - IV.

Task VI presents and analyzes the survey results.

SUMMARY AND POLICY RECOMMENDATIONS

After 1) reviewing existing studies of recreation demand, 2) citing experiences of other urban areas in the nation, and 3) evaluating the Delaware River shoreline for recreation suitability, five water-based recreation scenarios were developed. These proposals include:

1. Establishing a system of bike trails originating in urban areas and moving along the Delaware River coastline whenever possible. The bike trails could be extended by tying into the bike trails along the C&D Canal.
2. Preserving the woods, marshland, and unusual plants at the Ommelanden site owned by New Castle County. A nature study center would be constructed along with a network of trails into the site. Separated from the nature study area, picnic and ballfield facilities would be provided.
3. Providing an excursion boat for rides on the Delaware River, stopping at points of historical and cultural significance along the shore, such as Philadelphia, Wilmington, the City of New Castle, Fort Delaware, and Delaware City.
4. Constructing a marina, to provide New Castle County boat owners with slip facilities without having to travel great distances. Based on shoreline characteristics and location, the best site for the marina is in the vicinity of Delaware City.
5. Locating a large multiple activity center in the vicinity of Delaware City and the C&D Canal. The center would incorporate a

broad range of activities including ballfields, picnic areas, swimming, hiking, camping, horseback riding, and marina facilities.

A survey was developed to explore public attitudes on the specific proposals as well as general feelings toward recreation along the Delaware River. In-person interviews were undertaken in the fall of 1976 on a random sample of 399 households in New Castle County. The survey results yield a wealth of information on public attitudes toward water-based recreation. Highlights of the survey include:

1) Most people have some familiarity with the shoreline and consider environmental problems to be present but controllable.
2) A great deal of general support exists for the nature study center, multiple activity center and tour boats; little general support exists for coastal bikeways and a marina.
3) User fees are the most preferred means of financing the proposals, especially for the marina and tour boat proposals.
4) Little desire for county involvement was expressed for the marina and tour boat proposals.
5) Residents in the northern part of New Castle County are more enthusiastic about the proposals than residents in the southern part of the county.

Recommendations

I. Survey results indicate that in general the residents of New Castle County consider the Delaware River and adjacent land areas suitable for recreational development. Obviously, environmental problems would prevent successful development of certain activities such as swimming. However, a well designed recreational development

which takes advantage of the aesthetic values of the Delaware River is likely to meet with success.

Ommelanden

On the basis of survey evaluations of the alternative proposals and with the above-stated consideration in mind, we recommend that New Castle County proceed in the planning of a nature study center, hiking trails and a multiple-activity recreation unit on the County-owned property known as Ommelanden.

Ommelanden is quite suitable for this type of activity in that it is a relatively secluded parcel of land and affords an overview of a large segment of the River.

The development of Ommelanden might wisely proceed in two phases. The first phase could consist of the nature study center and accompanying hiking trails on that part of Ommelanden east of Route 9. The second phase of the development (including active forms of recreation) would be located west of Route 9 and could be post-poned to some future time. One benefit of this strategy is to await an increased population concentration in the immediate area of Ommelanden before incurring the relatively higher costs associated with developing facilities for active recreation.

Consideration should also be given to developing picnic areas as part of the program. Court games and ballfields should be included as part of the multiple activity center.

II. The survey results indicate less support for New Castle County involvement in the provision of tour boat, marina, and bicycling facilities along the Delaware River shoreline. Where strong interest exists, as in the case of a tour boat, there is, nevertheless, the

feeling that New Castle County need not be directly involved, and that user fees finance the entire cost of the project. These activities do have some support, however, and certainly represent reasonable uses of the Delaware River towards which respondents generally expressed a very positive attitude. There are other reasons to support tour boating, marina and bicycling activities in New Castle County. These include the large population base of the County, the present concentration and congestion of boating in Sussex County waters and the travel costs and congestion on north-south highways which could be somewhat reduced by additional water-based recreation facilities in New Castle County. In addition, there is the potential (albeit difficult to define) that these activities, once begun, would encourage other water-based recreation projects in the private sector resulting in a more even statewide distribution of such facilities.

Given the general considerations mentioned above, we recommend that New Castle County not actively develop, but, nevertheless, encourage tour boat, marina, and bicycling activity along the Delaware River. This encouragement can take the form of cooperative efforts between the County and State agencies, local governments, private firms, and special interest groups. These agencies and programs include the Delaware Divisions of Parks and Recreation and Fish and Wildlife, the Delaware Coastal Management Program, the State Comprehensive Outdoor Recreation Planning Program, the State Department of Highways and Transportation, the Resource Conservation and Development Program, and private boating, nature study (e.g., DNES) and bicycling groups. In this way, rational use of the Delaware's marine recreation resources can be assured as well as

special needs served.

Marina

Survey results indicating small general public (but large boater public) demand for marina facilities would indicate that New Castle County Parks and Recreation should not enter the marina business.

At the same time there are reasons to support development of boating facilities in New Castle County and a large percentage of New Castle County boaters indicate a willingness to use a New Castle County marina. This suggests a legitimate statewide concern and interest in the development of additional New Castle County marina facilities.

Additional marina facilities should ideally be provided by the private sector. If this does not prove practical (primarily due to high private sector capital costs) the public sector should consider seriously participating in this project. In any case, the question of providing improved boating facilities should be addressed on a statewide basis through an appropriate agency (e.g., SCORP, DCMP, DNREC or RC&D). The goal of this effort would be to assure rational development of Delaware's marine recreation resources.

Tour Boat

Survey results indicate widespread support for the tour boat. However, recent commercial ventures with tour boats on the Delaware River have not met with commercial success. Also of importance is the survey result supporting the view that New Castle County should not be involved in an excursion vessel's operation. With these considerations in mind, we recommend that county development of the

tour boat not be undertaken, at least not in the short term. Further study is required to discover reasons for previous lack of commercial success.

New Castle County should, however, actively support the State's Delaware City-Pea Patch Island Ferry service. This service could fill, in part, demands for boat tours on the Delaware River if a suitable vessel were available. This strategy would also increase the likelihood of success of the State's activities. Consideration should be given to connecting the recommended nature center at Ommelanden with the State's ferry service between Delaware City and Pea Patch Island. It should be noted that this recommendation will require dredging as well as the construction of docking facilities at Ommelanden. In addition, the ferry service could include points such as the City of New Castle and Wilmington.

Bikeways

While considerable support for the bikeway proposal was evidenced by bikers both in the survey and in the public meeting, general public support was not strong. In view of the fact that there are already extensive, usable bikeways in the C&D Canal area, the expense involved in creating a shoreline bikeway (land acquisition, construction, maintenance) and the small revenues that could reasonably be generated through user fees, the only practical option available appears to be upgrading Delaware Rt. 9 to include a continuous bicycle path on the shoulder. Since Rt. 9 is a state-owned and maintained roadway, this option would be primarily a state responsibility. New Castle County Parks and Recreation should encourage strongly this upgrading.

III. The above recommendations deal only with proposals evaluated in

the survey. However, the shoreline has many other recreation options and potentials which for a number of reasons were not selected as prime candidates for the survey. These will be reviewed here.

The Governor Bacon Health Center has a great deal of potential as indicated by survey results which reflect broad public support for a multiple activity center at this site. It possesses several under-utilized structures which would be suitable for a youth hostel, and deep water near shore suitable for recreational boat docking. The bicycle and hiking paths along the adjacent C&D Canal provide a tie-in with Lums Pond State Park and its proximity to the Delaware City-Pea Patch Island complex offers a varied recreational experience including historical appreciation. Another potential advantage, public ownership, is also its chief current disadvantage. At this time the property is administered by the Delaware Department of Health and Social Services. Attempts to determine what plans there are, if any, for this property have met with little success. A clarification of this situation would be highly desirable since the site appears to have the best set of natural and man-made attributes of any along the New Castle County shoreline.

As noted in the earlier site examinations, there is a system of semi-abandoned dikes which, at one time, formed a roadway as well as a means to control marsh salinity for salt hay production. This dike-road has some potential as a shoreline bikeway-hiking path, but private property along the shore, and lack of maintenance of the dike make this option appear costly. Nevertheless, it might be possible to use significant portions of this route if private owners as well as public could be convinced of the desirability to make access available. Obstacles that must be overcome with this approach include:

establishing the overall feasibility of the idea, determining who has responsibility, if anyone, for maintenance of the dikes, and establishing the ownership and receptivity of private owners.

Finally, although natural area preservation was not a primary goal of this study, the committee felt that more consideration was needed of these resources, and that undeveloped areas should be inventoried and their potential value assessed.

IV. At the conclusion of the study, the Shoreline Committee felt that the next step in the overall development of the water based recreation potential of the shoreline was to develop a set of longer range goals and priorities for future actions. This set of goals and priorities, termed a "concept plan" would ultimately serve to coordinate activities of the various agencies, but would also serve through its conceptual development, to focus agency attention on the needs of the New Castle County Shoreline. Because of these goals, it was felt that the concept would best be developed with the in-house resources of the Shoreline Committee (composed of representatives of all involved agencies). Through this mechanism, all interested parties, including the public, will be able to participate in the setting of goals and priorities for future recreational development of the New Castle County Delaware River Shoreline.

TASK I

NEW CASTLE COUNTY SHORELINE RECREATION STUDY

WATER-BASED RECREATION DEMAND

INTRODUCTION

Several studies currently exist which have attempted to estimate present recreation demand as well as project future recreation demand in Delaware. It is necessary to review the methodology of these studies, and compare their results before a viable demand estimate for water-based and related recreation activities can be obtained. The purpose of this task is to review past studies and obtain a demand estimate which will result in a ranking of new and traditional activities according to potential demand. It will also provide rough indications of potential usage of facilities related to and necessary for participation in these recreation activities. This list of activities, when coupled with the results of the literature survey of Task II and the potential shoreline site evaluation of Task III will result in a preliminary selection of potential activities and sites.

The review of each study will follow this basic pattern: (1) introduction, (2) review of methodology, (3) analysis of results. Following the review of the last study a comparison of results will be made. From this comparison the ranking of new and traditional activities along with indications of potential usage will result.

The studies to be reviewed are: (1) OUTDOOR RECREATION: AN ECONOMIC ANALYSIS, 1972, published by the Bureau of Outdoor Recreation (BOR) of the Department of the Interior. (2) THE MARKET FOR WATER BASED OUTDOOR RECREATION SERVICES IN NEW CASTLE COUNTY, Delaware, 1966, Paul Seidenstat. (3) 1976 DELAWARE STATE COMPREHENSIVE

OUTDOOR RECREATION PLAN (SCORP). (4) OUTDOOR RECREATION CHESAPEAKE BAY DEMAND AND SUPPLY NEEDS, 1974, AND (5) R/SE-3, 1975 SEA GRANT PROJECT SURVEY.

BOR STUDY, 1972

INTRODUCTION:

For the benefit of the reader who is unfamiliar with recreation demand analysis, the BOR Study will be reviewed first. This study contains an explanation of how demand is estimated through participation rates and how these rates are measured. It also defines average activity days, and how this measure of recreation participation is used to calculate total demand. Finally, it reveals how socio-economic characteristics affect demand, and how these characteristics are projected in order to obtain measures of future demand. Therefore, discussion of this study will primarily be used to define some basic concepts concerning the measurement of recreation demand. The importance of the review of this methodology will become obvious when other recreation studies which have attempted to measure recreation demand in Delaware and New Castle County are analyzed since the methodology of these local estimates depends very heavily upon the methods discussed in the 1972 BOR Study.

METHODOLOGY:

There are two basic steps involved in the measurement of demand for recreation activity. First, the demand for outdoor recreation must be defined and measured in some meaningful manner. Second, total recreation demand must be estimated for the current year and

then projected for some future year.[1] In the BOR report demand was estimated for 1972 and projected for 1978.

In order to obtain information on participation in outdoor recreation activity a National Recreation Survey was conducted in September, 1972. Interviews were held with 4029 households and were conducted by an independent interview agency. These households were randomly chosen from a multi-stage area probability sample with clustering. Individuals were randomly sampled from each household selected. Thus, the respondent reported only activities in which he participated rather than reporting for the household.[2]

Thorough economic analysis required that three types of information be made available through the survey: (1) number of days of participation in the various activities as well as percentages of the sample who participated, (2) travel information about these activities, and (3) socio-economic characteristics of the respondent.[3] Table I shows the results of the survey with respect to participation rates (percent of those who participated in a given activity) as well as total U.S. demand in activity days.

Column one is the participation rate and column two is the total demand in activity days. But this table does not reveal the critical data necessary to calculate total demand in activity days.

In the survey, those who indicated that they had participated

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[1]U.S. Bureau of Outdoor Recreation, Outdoor Recreation: A Legacy for America, Appendix 'A'. Nationwide Outdoor Recreation Plan. U.S. Department of the Interior, 1972, p. I-2.

[2]Ibid., p. I-4.

[3]Ibid., p. I-5.

Table 1

The Percentage of the National Recreation Survey Respondents who Participated and the Estimated Total U. S. Participation by Activity

Activity	Percent of NRS Respondents who Participated	Estimated Total U.S. Participation for the Summer Quarter of 1972 (Millions of act. days)
Picnicking	47	405.1
Sightseeing	37	362.8
Driving for pleasure	34	404.9
Walking for pleasure	34	496.3
Other swimming outdoors	34	487.1
Visiting zoos, fairs, amuse. parks	24	122.5
Other activities	24	242.9
Fishing	24	278.2
Playing other outdoor games or sports	22	339.9
Outdoor pool swimming	18	257.0
Nature walks	17	148.9
Other boating	15	126.1
Going to outdoor sports events	12	96.9
Camping in developed camp grounds	11	153.3
Bicycling	10	214.2
Going to outdoor concerts, plays, etc.	7	26.5
Horseback riding	5	51.5
Hiking with a pack/mount/rock climb	5	45.0
Tennis	5	81.2
Water skiing	5	54.1
Golf	5	63.4
Camping in remote or wilderness areas	5	57.5
Riding motorcycles off the road	5	58.2
Bird watching	4	42.0
Canoeing	3	18.3
Sailing	3	32.5
Hunting	3	17.5
Wildlife and bird photography	2	19.6
Driving 4-wheel vehicles off the road	2	26.6

Source: BOR, Table 2-1, p. 39

in a given activity were asked how often they participated. These data were averaged among all participants to yield average number of activity days per participant. An activity day is defined as one person participating in an activity for any part of one calendar day.[1] Only when these data are obtained can column 2 of Table 1 be calculated. It is done in the following manner:

STEP (1) [Participation Rate (Col. 1)] x [Total Population, U.S. 1972] = Total Participants

STEP (2) [Total Participants] x [Average # of Activity Days Per Participant] = [Estimated Total U.S. Participation in Activity Days (Col. 2)] or estimated 1972 Demand.

The participation rate and estimated total participation represent two different levels of demand. TABLE 1 is listed in order, starting with the highest participation rate. But Col. 2 does not reflect the same order. Picnicking has the highest participation rate but walking for pleasure has the highest total participation in activity days. This is caused by a higher average number of activity days per participant in pleasure walking than in picnicking.

Very briefly, this is how the concepts of participation rates and total activity days are used to estimate present participation or present demand for outdoor recreation. More precisely, the methodology used to estimate demand consists of statistical procedures that estimate the relationship between the quantity of each activity demanded at alternate price levels and the socio-economic characteristics of the population.

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[1] Ibid., p. I-4.

Demand is a function of price. The price of a recreation activity is not usually reflected merely by an admission charge but mainly by the cost of transportation to and from the recreation site as well as the cost of any equipment involved. The BOR Study attempted to measure all of these costs but insufficient data made this impossible. The next best alternative was the use of transportation cost since the data were readily available. Therefore, in this study the price of recreation activity is equal to the transportation costs to and from the recreation site. The effect of this cost upon demand for recreation could not be measured for non-participants since they incurred no costs, so the results of this portion of the analysis reveal the effect of price upon the demand of participants only. Effect of price upon demand was obtained by measuring the price elasticities of demand for each activity, that is, the percent change in quantity of that activity demanded caused by a 1% change in the price of that activity. The results show relatively low elasticities of demand, ranging in absolute value form .06 to .35, meaning that price increases have little effect on quantity demanded. This leads one to believe that for those already participating, limitations on participation are not mainly financial considerations but are possibly leisure time constraints.[1] Again, this analysis does not consider the price elasticities of outdoor recreation demand for those who did not participate. Therefore, only a portion of the total population is represented in the results.

The socio-economic/demographic characteristics of the population also have an effect upon demand. Some of these characteristics

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[1]Ibid., p. 12.

include income, race, sex, educational level, residence in an urban or rural environment, and geographical area of the residence. The BOR study reveals some interesting effects due to these socio-economic characteristics. First of all, income is a constraint to participation for lower income groups. Also, most activities are dominated by college educated participants. Race has a definite effect upon participation. Non-whites prefer going to outdoor sports events and playing outdoor games while whites dominate all other activities. Finally, geographic residence has its effect. Those residing in the Northeast and South prefer water-based activities such as outdoor pool swimming, canoeing, fishing, and water-skiing.

The effects of price and socio-economic characteristics reveal the complexity involved in attempting to estimate present demand and, especially, in attempting to project future demand. In order to project demand accurately it is necessary to project the changes in price and in socio-economic/demographic characteristics of the population. BOR attempted to project recreation demand into 1978 by using socio-economic projections furnished by the U.S. Census. These projections assumed that the national average real price paid per activity day would remain unchanged. This, of course, may not be reasonable since price per activity day is measured by the transportation cost involved in travelling to and from recreation facilities. But transportation costs have risen faster than incomes in recent years. Therefore, in order that the price per activity day remain constant, the travel patterns of those participating in recreation activity would have to change severely. In 1972, the survey reported that 92.8% of the vacations and 61% of the overnight

recreation trips had round trip mileage greater than 400 miles while 30% of the day outings involve round trip travel of 150 miles or more.[1] This pattern would have to change severely if the assumption of constant price per activity day is to remain valid. This analysis suggests that, because of increased transportation costs, development needs will shift to within a smaller radius of population centers.

The results of the 1978 recreation projections are listed in Table 2. The table reveals something that is of interest to the subject currently under consideration. Three of the five activities that will see the greatest projected percent change in demand are water-based activities.

RESULTS OF LOCAL INTEREST

The 1972 BOR Study provides a useful review of methodology and also reveals some results on a fairly localized level. The study reports projected increases in demand for recreation activity for 171 Economic Areas throughout the U.S. One of these areas is comprised of S.E. Pennsylvania, South Jersey, and New Castle County, Delaware. Some of the results are listed below:

Percent Change Between 1972 and 1978 in
Quantities of Outdoor Recreation Activities Demanded
In Area Specified Above

Water Skiing	+23%
Boating (Other than Canoeing)	+21%
Outdoor Pool Swimming	+18%
Nature Walks	+16%
Camping in Developed Campground	+14%
Other Swimming Outdoors	+13%
Sightseeing	+12%

[1] Ibid., p. 73.

Table 2

Quantities of Outdoor Recreation Activities
Demanded for the United States During
June, July, and August of 1972 and 1978

Activity	Projected Percentage Change in Demand	Estimated 1972 Participation (millions of activity days)	Estimated 1978 Participation (millions of activity days)
Golf	24	63.4	78.4
Going to outdoor sports events	20	96.9	116.6
Other boating	18	126.1	149.0
Outdoor pool swimming	15	257.0	296.6
Water skiing	15	54.1	62.1
Nature walks	15	148.9	170.8
Going to outdoor concerts, plays, etc.	14	26.5	30.2
Camping in developed campground	13	153.3	173.5
Other swimming outdoors	13	487.1	549.9
Walking for pleasure	12	496.3	554.7
Riding motorcycles off the road	12	58.2	65.0
Fishing	11	278.2	307.5
Sightseeing	11	362.8	404.5
Picnicking	11	405.1	449.0
Bicycling	10	214.2	235.3
Visiting zoos, fairs, amusement parks	10	122.5	134.5
Playing other outdoor games or sports	5	338.8	354.3

Source: BOR, Table 1-5, p. 17

Walk for Pleasure	+12%
Fishing	+11%
Picnicking	+11%

These projections are based upon several critical assumptions including: (1) that the percent change in population in the area will increase by 8%, (2) that family income will increase by 15%, and (3) that fuel costs are constant in real terms. As was the case earlier, water based recreation activities are among those which expect the greatest increases in demand.

CONCLUSIONS:

This study is useful in several ways. First of all, it provides the reader with a good discussion of how a participation rate is measured and how it is used for demand analysis, the activity day concept, and how total activity days are calculated. The complexity of the parameters behind the estimation of recreation demand is also clearly stated. Finally, some of the results of the study are useful for observing projected rates of increased demand for water-based activities. The background gained from this national study will be useful in understanding other reports that have attempted to estimate recreation demand in Delaware and New Castle County.

THE MARKET FOR WATER BASED OUTDOOR RECREATION SERVICES IN NEW CASTLE COUNTY, DELAWARE: Paul Seidenstat, 1966

INTRODUCTION:

Since this study uses New Castle County as its basis, the reader will see how the techniques of demand estimation discussed

in the BOR review can be applied to our local area with its specific socio-economic and demographic characteristics.

In the Seidenstat report, demand is defined in the terms of activity days. A day of recreation is a day of participation in a collection of recreation activities. This unit of measure is used even though the individual may stay an entire day or only 10 minutes.

Great emphasis is placed upon the socio-economic/demographic characteristics of the area. Some of the factors listed in the Seidenstat study are level of income, age distribution, sex, race, place of residence, and quantity of leisure time available. Since New Castle County has a high level of income compared to the nation, we would expect to observe greater demand for those water based activities which require greater outlay of funds (e.g., boating). Younger people typically participate more than older people so an age distribution with a relatively great number of young people will increase demand for most activities. Men, it has been shown, participate in most activities more than women. The availability of leisure time is assumed by the author to be "liberal" when compared to the rest of the Northeast. Therefore, higher demand would be expected in New Castle County. Race is important since non-white participation tends to be less due to some combination of lower incomes, less mobility, cultural patterns, and discrimination. The degree of urbanization is the final critical factor to be considered with reference to impact upon demand for recreation activities. New Castle County is defined as an urban area.

There are several other factors which influence demand. Educational level and occupation are important factors but are

highly related to income. Thus the parameters of demand to be considered as critical in the study are population, family income, age distribution, sex distribution, race, and place of residence (urban-rural).[1]

METHODOLOGY:

The measure of demand in terms of activity days as defined earlier is arrived at by using participation rates and preference data from an Outdoor Recreation Resources Review Commission(ORRRC) Study, National Recreation Survey, 1960. The data were obtained by using a survey conducted quarterly for four quarters. The objective of the survey was to determine rates of participation in various types of outdoor recreation and relate the participation to socio-economic characteristics. Also, the survey determined preferences in the use of leisure time and outdoor recreation activity. Although several measures of participation were arrived at in the survey, the Seidenstat study used the number of activity days per participant for the various activities along with various socio-economic characteristics as the principal measure.

PARTICIPATION VS. PREFERENCE:

As mentioned above, the ORRRC study determined a rate of participation in various types of activities as well as a pattern of preference for each activity. The rate of participation was defined earlier but the pattern of preference was not. The pattern was determined by asking the respondent in the survey which activity he or she preferred to participate in. This pattern can be used to estimate unsatisfied demand. For example, the ORRRC study

[1]Paul Seidenstat, The Market For Water-Based Outdoor Recreation Services in New Castle County, Delaware. University of Delaware Water Resources Contribution No. 2., 1966, p. 16.

discovered that of those who preferred boating as a general form of activity, only 27% participated freely. The other 73% stated various costs such as price of equipment, time constraint, or distance to facility as reasons for not participating. This concept of unsatisfied demand plays a significant role in the Seidenstat study.

The ORRRC study was not only divided among socio-economic characteristics, but also among various regions of the U.S., Northeast, Northcentral, South, etc. Participation and preference data are given for each region of the country. Since no participation rates were available for New Castle County, Seidenstat used data determined by the ORRRC study for the Northeast U.S. and applied these data to the population of New Castle County. Therefore, the data for New Castle County obtained in this study reflect the author's assumption that Delaware is similar to the Northeast U.S. in most major respects. No support data or discussion of this assumption are included in the study.

Column 1, Table 3 yields results based upon age distribution in New Castle County and 1960 participation rates from the ORRRC study. The following calculations were made in order to arrive at the results in Table III for New Castle County.

First of all, a participation rate was determined by the ORRRC study for all males or all females in a specific age group. (For example, the rate of participation for all males aged 21 to 25, for kite-flying might be .2 activity days per capita.) The male rate was multiplied by the number of males in that age group in New Castle County according to the 1960 Census. That calculation resulted in the number of activity days of participation among

Table 3

Annual Activity Days, for Other than Vacation Trips Away from Home
New Castle County Population Aged 12 and Over
By Age, Income, Standard Metropolitan Area, and Race
For 1960
(Based on ORRRC Participation Data)

	Annual Activity Days			
	By Age (Using New Castle County Census Figures For Age Groups)	By Income	By Standard Metropolitan Area (Urban, under 1,000,000)	By Race
Boating	304,289	370,608	313,619	286,098
Camping	73,892	81,741	92,265	68,399
Fishing	513,917	480,233	559,522	483,665
Picnicking	816,736	802,394	676,966	786,423
Swimming	1,162,232	1,241,979	907,942	1,098,274
Total	2,871,066	2,976,955	2,550,314	2,722,859

Sources:

Seidenstat, Table 3, p. 19 taken from

ORRRC Study Report 19, op. cit.,

Table 1.02.05, p. 125	Table 2.02.05, p. 203	Table 3.02.05, p. 253	Table 4.02.05, p. 310
1.02.06, p. 126	2.02.05, p. 204	3.02.06, p. 254	4.02.06, p. 311
1.02.08, p. 128	2.02.08, p. 206	3.02.08, p. 256	4.02.08, p. 313
1.02.13, p. 133	2.02.13, p. 211	3.02.13, p. 261	4.02.13, p. 318
1.02.16, p. 136	2.02.16, p. 214	3.02.16, p. 264	4.02.16, p. 321
1.22, p. 185			

U. S. Bureau of the Census, Final Report PHC (1)-173, op. cit., Table P-2, p. 23

males in that age group. The calculation was repeated for all age groups using the appropriate participation rate and county population. The number of male activity days was summed for all age groups, yielding total male participation. These calculations were repeated using female data thus obtaining total female participation. Both the male and female total participation were summed, yielding total county participation, which is listed in Column 1, Table 3. The same procedure is used in the following columns substituting the appropriate participation rate and census data as indicated by the column headings.

The study then proceeds to estimate what can be referred to as unsatisfied demand. The calculations described earlier are repeated, but this time preference data are substituted for participation data. The results of these calculations (total activity days preferred), less actual participation, will determine to what extent recreation activity demands are or are not being satisfied.

RESULTS:

Table 3 of the study discussed earlier reflects what was considered to be an estimate of the demand for various activities in 1960 based upon actual participation data. Table 4 shows the estimated increase in demand between 1960 and 1965 for water-based recreation activities. Obviously the rate of growth is quite dramatic. Boating increased in demand at a rate greater than other activities when the "by age" distribution is considered especially, but all saw great increases in estimated demand.

Tables 5 and 6 are based on preference data. As stated earlier the difference between activity days based on preference and activity

Table 4

Projected Annual Activity Days
New Castle County Population Aged 12 and Over
By Age and Income
For 1965*
(Based on ORRRC Participation Data)

By Age

Activity	Annual Activity Days 1965	Percent Change Over 1960
Boating	351,715	+15.59
Camping	84,680	14.60
Fishing	592,167	15.23
Picnicking	914,673	11.99
Swimming	1,336,829	15.02
Total	3,280,064	14.25

*Vacation days not included.

Sources: Seindenstat, Table 4, p. 215 taken from

Brown and O'Conner, op. cit., pp. 138-139.

ORRRC Study Report 19, op. cit., same reference as for Table 4-3.

Sales Management: Survey of Buying Power, July 10, 1960, p. 112; June 10, 1965, p. 276.

Lawrence Schein, The People of Metropolitan Delaware, Community Services Council of Delaware, Inc., Wilmington, Delaware, July, 1964, p. 25.

U. S. Bureau of the Census, Final Report PHC (1)-173, op. cit., Table P-1, p. 13.

Table 5

Annual Activity Days
New Castle County Population Aged 12 and Over
By Age
1960
(Based on ORRRC Preference Data)

Activity	Annual Activity Days
Boating	175,630
Camping	102,439
Fishing	1,733,017
Picnicking	1,070,976
Swimming	1,985,707
Total	5,067,769

Sources: Seidenstat taken from

ORRRC Study Report 19, op. cit.,

Table 1.01, p. 120
1.25, p. 188
1.28, p. 191
1.31, p. 194
2.01, p. 198
3.01, p. 248
4.01, p. 305

U.S. Bureau of the Census, Final Report PHC (1)-173, op. cit., Table P-2, p. 23.

Table 6

Projected Annual Activity Days
New Castle County Population Aged 12 and Over
By Age
1965-1980
(Based on ORRRC Preference Data)

Activity	Annual Activity Days			
	1965	1970	1975	1980
Boating	191,759	226,798	265,280	309,733
Camping	114,231	136,143	159,106	184,939
Fishing	1,909,241	2,252,654	2,626,560	3,018,863
Picnicking	1,156,140	1,350,372	1,577,364	1,835,160
Swimming	2,214,758	2,657,670	3,107,675	3,624,668
Total	5,586,119	6,623,637	7,735,985	8,973,363

Sources:

Seidenstat, Table 8, p. 275

Brown and O'Conner, op. cit., pp. 138-139

ORRRC Study Report 19, op. cit.

Table 1.25, p. 188
1.28, p. 191
1.31, p. 194
1.01, p. 120
2.01, p. 198
3.01, p. 248
4.01, p. 305

U. S. Bureau of the Census, Final Report PHC (1)-173, op. cit., Table P-2, p. 23.

days based on participation yields an estimate of unsatisfied demand. Comparing Table 5 with the first column of Table 3, the largest areas of unsatisfied demand are swimming and fishing while camping also suffers from a high level of unsatisfied demand. This unsatisfied demand exists because of the effects of various costs upon the potential participant. Therefore, reduction of these costs is necessary and can be accomplished by reducing transportation costs, which depend on the distance between the participant or potential participant and the facility, and by improving the quality and capacity of existing facilities. Table 6 projects that unsatisfied demand will continue to grow at dramatic rates in all types of water-based activities.

In conclusion, by focusing on the market for water-based recreation services in New Castle County, Seidenstat shows rather clearly that there exists unsatisfied demand in many water-based activities. This unsatisfied demand is the result of "... insufficient supply to meet a desired level of recreation service and that the higher price of going outside the area to recreate chokes off part of the amount demanded as does reduced product quality since present facilities' capacities are pressed."[1]

DELAWARE STATE COMPREHENSIVE OUTDOOR RECREATION PLAN, 1976

INTRODUCTION:

As the title implies this is a study designed for application to the entire state. Unfortunately, since cross-country travel data were not available, results for New Castle County were not

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[1]Ibid., p. 42.

given in the study. Therefore, only state-wide results can be used in eventual comparison of results and ranking of activities.

The Delaware SCORP study states that "the demand for outdoor recreation opportunities has been increasing as a result of the greater mobility of the people, increased amounts of leisure time, more disposable income, greater national emphasis on outdoor recreational activities, the urbanizing trend of the State, and a growing recognition of the importance of family recreation."[1] The factors listed in this excerpt, then, are the principal factors effecting demand for recreation activity. SCORP discusses at length how participation is a function of these factors and why recreation demand will be increasing in the future. The discussion is summarized below.

(1) Delaware's median family income is expected to increase 59.2% during the period 1973 to 1990, based on projections of the U.S. Department of Commerce.[2]

(2) The transportation network in and around Delaware is improving with the development of the Interstate Highway System so that mobility is improving.

(3) Age distribution is an important factor affecting demand. As the median age increases or decreases, the demand for certain types of recreational facilities are affected.

(4) Degree of urbanization affects demand. Delaware's population is 72.3% urban and SCORP states that the statistics reveal that recreation facilities need to be located relatively near urban development.[3]

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[1] 1976 Delaware SCORP, p. 5-2.
[2] Ibid., p. 5-7.
[3] Ibid., p. 5-6.

The project of estimating present and future demand is a difficult one due to these and other more subtle factors influencing demand. SCORP has attempted to take the major factors into consideration when making demand estimates.

PARTICIPATION RATES:

As with the Seidenstat study there were no available participation rates for Delaware recreation at the time of the SCORP study. Therefore, 1974 Pennsylvania participation rates, published in 1975 Pennsylvania SCORP, were used in order to estimate present and future recreation demand in Delaware. These rates (in Table 7) are similar to those used by Seidenstat except that individual rates are not broken down by age, sex, or income. Rather, an individual weighted participation rate is given, already taking into consideration the impact of age, sex, and income. SCORP justifies its use of these data by discussing the homogeneity of the Pennsylvania-Delaware-Maryland area with respect to the major factors that effect outdoor recreation demand.

The homogeneity of the Pennsylvania, Delaware, Maryland area is used as justification by SCORP for the use of the 1974 Pennsylvania participation rates.

METHODOLOGY:

Demand is defined in the study as the estimated participation of people in various outdoor recreation activities.[1] Two relevant sets of data are used in the calculation of demand in terms of activity days: first, the Pennsylvania participation rates and, second, current and projected state and county populations. When

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[1]Ibid., p. 5-17.

TABLE 7

Outdoor Recreation Participation Rates, Pennsylvania, 1974.

	Participants 5 and over			
	Summer peak day	Anytime during year	Annual activity days	
	% of pop. 5 and over	% of pop. 5 and over	Per capita	Per participant
Bicycling	22.4	49.2	31.1	63.3
Swimming	36.8	69.1	23.2	33.6
Sightseeing or driving for pleasure	30.0	72.5	16.9	23.3
Basketball	5.7	22.4	8.8	39.4
Baseball, softball	10.1	32.4	7.9	24.5
Hiking or nature walks	11.4	40.6	7.2	17.8
Tennis	9.7	29.4	6.2	21.2
Picnicking	27.9	70.0	6.0	8.6
Fishing	7.7	32.0	4.7	14.8
Golf or miniature golf	8.3	32.4	4.2	13.1
Football	2.5	17.2	3.5	20.4
Boating, canoeing, waterskiing	7.5	33.9	3.0	8.8
Off-road motorcycling	1.8	12.2	3.0	24.9
Camping	5.1	26.3	2.9	11.1
Hunting, sport shooting	1.3	14.2	.79	14.8
Horseback riding	2.0	11.2	2.0	18.0
Ice Skating	0.0	22.1	1.9	8.6
Street Hockey	0.6	4.9	1.1	23.4
Snow Skiing	0.0	6.2	0.4	5.7

Source: Scorp, Table 5-2, P. 5-26.

the relevant rate is multiplied by the relevant population data a measure of demand in activity days results for a given activity.

Four measures of participation were stressed in the Pennsylvania statistics:

1) Peak-day-percent: the percent of persons 5 or over nominally participating on a good weather Sunday.
2) Anytime-during-the-year-percent: the percent of the population 5 and over who participated in a given activity any time during the year.
3) Annual days per person 5 and over: average number of annual activity days per person.
4) Annual days per participant: average number of annual activity days per participant.

The third measure is useful when calculating the total number of activity days likely to occur for a given area with a given population.[1] It can be multiplied by a given area's population, and will yield a measure of demand in activity days for residents within that area. The visitor population must also be considered. The SCORP study went to the U.S. Census of Transportation to obtain an estimate of visitor population. This population was then multiplied by the per capita participation rate (#3 above), yielding visitor activity days. Resident and visitor activity days were summed to obtain total activity days.

In summary, SCORP used the following formula to estimate demand for recreation activity in the form of activity days:

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[1]U.S. Department of the Interior, Bureau of Outdoor Recreation, Outdoor Recreation Chesapeake Bay Demand Supply Needs, 1974, p. 58.

[Per Capita Participation Rates (Col. 3: Table 7)]
x [Present Area Population + Estimate Visitor Population]
= Total Activity Days Demanded.

RESULTS:

The results of the above analysis are represented in Table 8. The reader can see that columns 2, 4, 6, and 7 are identical to the four columns of the 1974 Pennsylvania participation rates of Table 7. Columns 1, 3, and 5 are merely functions of the appropriate participation rate and county population.

Using a population projection for New Castle County of 405,778 for the year 1980, the study estimated recreation demand for that year also. Table 9 shows the results.

After demand for particular activities is estimated for both the present and the future, SCORP attempts to measure the optimal capacity of existing facilities. This is done by compiling an extensive inventory of state and county recreation areas. The capacity of these areas is computed by using state planning standards. Then this supply of recreational facilities is compared to the demand estimated earlier. The results shown in Table 10 are for the entire state since the County comparison was severely limited due to the lack of cross-county travel data.

The results of this comparison show a deficiency in the supply of recreational facilities in many areas including water based and related activities. The additional number of picnic tables, bike trail miles, camp sites, hiking trail miles, boat ramps, horseback riding trails, and swimming pools that are necessary to meet current demand is, in some cases, very great.

Table 8

Recreation Participation and Participation Rates; New Castle 1974
Population Projection: 393,648

Activity	Summer Peak Day (persons)	% of pop. 5 and over	Anytime During Year (persons)	% of pop. 5 and over	Annual Activity Days	Per Capita	Per Participant
Bicycling	88,177	22.4	193,675	49.2	12,242,453	31.1	63.3
Swimming	144,862	36.8	272,010	69.1	9,132,634	23.2	33.6
Sightseeing or Driving for Pleasure	118,094	20.0	285,395	72.5	6,652,651	16.9	23.3
Basketball	22,438	5.7	88,177	22.4	3,464,102	8.8	29.4
Baseball, Softball	39,759	10.1	127,542	32.4	3,109,819	7.9	24.5
Hiking or Nature Walks	44,877	11.4	159,821	40.6	2.834,265	7.2	17.8
Tennis	38,184	9.7	115,732	29.4	2,440,617	6.2	21.2
Picnicking	109,828	27.9	275,554	70.0	2,361,888	6.0	8.6
Fishing	30,311	7.7	125,967	32.0	1,850,146	4.7	14.8
Golf or Miniature Golf	32,673	8.3	127,542	32.4	1,653,322	4.2	13.1
Football	9,841	2.5	67,707	17.2	1,377,768	3.5	20.4
Boating, Canoeing, Waterskiing	29,524	7.5	133,446	33.9	1,180,944	3.0	8.8
Off-road Motorcycling	7,086	1.8	48,025	12.2	1,180,944	3.0	24.9
Camping	20,076	5.1	103,529	26.3	1,141,579	2.9	11.1
Hunting, Sportshooting	5,118	1.3	55,898	14.2	310,982	.79	14.8
Horseback Riding	7,873	2.0	44,089	11.2	787,296	2.0	18.0
Ice Skating	0	0.0	86,996	22.1	747,931	1.9	8.6
Street Hockey	2,362	0.6	19,289	4.9	433,013	1.1	23.4
Snow Skiing	0	0.0	24,406	6.2	157,459	0.4	5.7

Source: SCORP, Table 5-7, p. 5-43.

Table 9

Recreation Participation and Participation Rates; New Castle 1980
Population Projection: 405,778

Activity	Summer Peak Day (persons)	% of pop. 5 and over	Anytime During Year (persons)	% of pop. 5 and over	Annual Activity Days	Per Capita	Per Participant
Bicycling	90,894	22.4	199,643	49.2	12,619,697	31.1	63.3
Swimming	149,326	36.8	280,393	69.1	9,414,050	23.2	33.6
Sightseeing or Driving for Pleasure	121,733	30.0	294,189	72.5	6,857,648	16,9	23.3
Basketball	23,129	5.7	90,894	22.4	3,570,846	8.8	39.4
Baseball, Softball	40,984	10.1	131,472	32.4	3,205,646	7.9	24.5
Hiking or Nature Walks	46,259	11.4	164,746	40.6	2,921,602	7.2	17.8
Tennis	39,360	9.7	119,299	29.4	2,515,824	6.2	21.2
Picnicking	113,212	27.9	284,045	70.0	2,434,668	6.0	8.6
Fishing	31,245	7.7	129,849	32.0	1,907,157	4.7	14.8
Golf or Miniature Golf	33,679	8.3	131,472	32.4	1,704,268	4.2	13.1
Football	10,144	2.5	69,794	17.2	1,420,223	3.5	20.4
Boating, Canoeing, Waterskiing	30,433	7.5	137,559	33.9	1,217,334	3.0	8.8
Off-road Motorcycling	7,304	1.8	49,505	12.2	1,217,334	3.0	24.9
Camping	20,695	5.1	106,720	26.3	1,176,756	2.9	11.1
Hunting, Sportshooting	5,275	1.3	57,620	14.2	320,565	.79	14.8
Horseback Riding	8,116	2.0	45,447	11.2	811,556	2.0	18.0
Ice Skating	0	0.0	89,677	22.1	770,978	1.9	8.6
Street Hockey	2,435	0.6	19,883	4.9	446,356	1.1	23.4
Snow Skiing	0	0.0	25,158	6.2	162,311	0.4	5.7

Source: SCORP, Table 5-11, p. 5-49.

Table 10

Outdoor Recreation Facility Needs, Delaware - 1975

Activity	Total Capacity[a] (persons)	Total Participation[b] (persons)	Difference (persons)	Surplus or Deficit in Facilities
Picnicking	182,254	221,463	- 39,209	-936 picnic tables
Swimming:				(assumes taking all public beaches
Natural areas	315,000	209,913	+105,087	and making available for swimming)
Bicycling	1,250	128,731	-127,481	-510 miles
Camping	26,180	89,630	- 63,450	-15,862 sites
Hiking or nature walks	7,200	81,284	- 74,084	-185 miles of trail
Boating, canoeing,[c] waterskiing	25,000	70,313	- 45,313	-145 ramps
Hunting	4,948	43,503	- 37,555	-300,444 acres
Fishing (fresh water)	32,770	29,877	+ 2,893	+90 acres of fresh water
Horseback riding	90	11,494	- 11,404	-1,140 miles of trail
Swimming: Pools	470,000	574,692	-104,692	-10 pools
Baseball/Softball[e]	740,000	574,692	+165,308	+83 fields
Basketball	626,000	574,692	+ 51,308	+26 courts
Tennis	688,000	574,692	+113,308	+57 courts
Golf	612,500	574,692	+ 37,808	+ 2 courts
Football/Soccer[f]	702,500	574,692	+127,808	+26 fields

[a] Total Capacity = [Total no. of facility (Table 4-14) x Standard (Table 6-1) x Turnover factors (Table 6-1)].
[b] Total participation from Table 5-5 and Table 6-2.
[c] Deficit computed according to Standards Division of Fish and Wildlife Data included in narrative.
[d] Total population is of area served.
[e] Baseeball/Softball 1 field/2000 population.
[f] Football/Soccer 1 field/5000 population.

Source: SCORP, Table 6-3, p. 6-5.

OUTDOOR RECREATION CHESAPEAKE BAY DEMAND SUPPLY NEEDS, 1974

INTRODUCTION:

Although the Chesapeake Bay study, published in February 1974, does not focus directly upon New Castle County, it does estimate water-based recreation demand for the entire state so that Delaware's impact upon the Bay area is known. The state was treated as one of 12 separate zones distributed around the Bay. Recreation demand for five general activities (swimming, boating, camping, picnicking, and sailing) was estimated using participation rates and area population figures in a manner similar to the studies previously reviewed. This demand estimate for each activity was converted into site requirements necessary to meet the estimated level of demand. These requirements were compared to the existing supply of facilities resulting in a measure of deficiency or surplus of recreation facilities for each zone.

The most interesting segment of the demand methodology involves the concept of "distribution of demand." It is defined as "... a projected pattern of how far and to what areas the population will go from a point of origin in order to satisfy its recreation desires. The demand distribution referred to in this report is based on distribution rings of 5, 10, 25, 50, 100, and 250 miles from the region center."[1] An explanation of the method in which this concept is used quantitatively will be discussed later.

Although the conclusions and recommendations of the entire study do not apply specifically to Delaware, some of the recommendations which refer to urban and developed areas near the coast

[1]U.S. Department of the Interior, Bureau of Outdoor Recreation, Outdoor Recreation Chesapeake Bay Demand Supply Needs, 1974, p. 58.

of the Bay are worth consideration because of certain similarities to New Castle County. A brief summary of these recommendations will be included in the conclusion.

METHODOLOGY:

First of all, an estimate of present demand in terms of annual activity days for each activity is calculated using identical methods as the previous studies reviewed. A participation rate for each activity is taken from the Bureau of Outdoor Recreation's 1965 Survey of Outdoor Recreation Activity, multiplied by the population of each zone yielding an estimate of demand originating in each zone.

Projections of future demand are calculated using projected participation rates derived by the North Atlantic Regional Water Resources Study (NAR), Appendix M, Outdoor Recreation. The projected rates are based upon the expected percent change in these socio-economic/demographic variables: education, occupation, age/sex, family income, residence, and available leisure time. The present and future participation rates used to calculate total demand are listed below:

Participation Rates For Demand, Supply, Needs
For Outdoor Recreation in the Chesapeake Bay Study Area
(Activity Days Per Person)

Activity	1970	1980	2000	2020
Boating	1.15	1.56	2.06	2.63
Sailing	.15	.24	.27	.53
Swimming	6.02	8.05	10.55	12.46
Camping	.37	.53	.74	1.00
Picnicking	2.55	2.91	3.26	4.32

Source: Outdoor Recreation Chesapeake Bay Demand Supply Needs

As mentioned earlier the most interesting segment of the demand analysis concerns, for our purposes, the concept of distribution of demand as defined earlier. In order to calculate this distribution and estimate its impact, the following methodology was employed. The study area was divided into 12 zones surrounding the Bay. Total demand for each activity originating in each zone was then calculated using the methods already discussed. But the estimate of total demand that results from these calculations does not reflect the participation in a given activity which actually takes place in a given zone. It merely yields estimates of demand originating in that zone. A large percentage of participation takes place at various distances from the point at which demand originates. In order to calculate the effect of this demand which originated in one zone but actually took place in another, distribution rings with radii varying from 5 to 250 miles, concentric around the population center of each zone, were drawn.

The next step was the calculation of the percent of each activity which took place in each distribution ring. This task was accomplished through the utilization of data from the 1965 BOR Survey. First, the percent of each activity which took place on three different types of occasions (vacations, overnight trips, and day outings) was extracted from the survey results. For example, 19% of all sailing took place on vacations, 19% on overnight trips, and 62% on day outings. Next, the percent distribution of activities by mileage increments was used to calculate the percent of each activity which took place within each distribution ring. For example, 1.75% of all vacations, 9.25% of all overnight trips, and 19% of all outings were spent within

the 0-5 mile distribution ring. The distribution of activity by type of occasion and the distribution of activity by mileage increments were used to calculate the distribution of demand. For example:

1.75 (% of all vacations spent in 0-5 mile distribution ring) x 19 (% of all vacation sailing)/100 = .2325 (% of all vacation sailing which took place in 0-5 mile distribution ring). This calculation was repeated substituting data for overnight trips and day outings for the 0-5 mile ring. The results of the 3 calculations are summed yielding the percent of all sailing which took place within the 0-5 mile ring. This was done for each distribution ring, yielding the following results for sailing:

Distribution Ring	Sailing % Participation in Distribution Ring
0 - 5	13.9
5 - 10	11.4
10 - 25	20.1
25 - 50	15.7
50 - 100	14.7
100 - 250	11.3

This approach was applied to all five activities resulting in percent distribution tables for all activities.

Next, the impact of one zone upon another was calculated in terms of area influence. For example, assume a zone, say Zone I, has the appropriate distribution rings drawn around its population center. Then, focus upon the 0 - 5 mile distribution ring. If the entire area of that ring is made up of area from Zone I only,

then Zone I, within this ring, has no influence upon any other zone in terms of area and demand distribution. All the demand for an activity originating in Zone I and expected to take place in the 0-5 mile ring will actually take place in Zone I. Now focus on the 5-10 mile distribution ring and assume that the entire area of that ring is not made up of area from Zone I but is partly made up of area from Zone II, the adjoining zone. If the percent area in the 5-10 mile ring from Zone II is 10%, then 10% of the recreation demand originating in Zone I and expected to take place in the 5-10 mile ring will actually take place in Zone II. Therefore, the influence of Zone I upon Zone II in this distribution ring is 10% of the total demand for each activity originating in Zone I and expected to take place in the 5-10 mile distribution ring. Total demand upon the facilities of each zone was calculated by summing the influence of each zone upon itself along with the influence of every other zone upon it for each distribution ring.[1]

The above analysis does not take into consideration the effects of demand generated by residents outside the Chesapeake Bay study area. Based upon the results of the NAR Study and the Virginia and Maryland SCORPs, it was decided that 21.8% of all demand is non-resident demand. This figure is probably an underestimate rather than an overestimate.[2] Therefore, the demand estimates generated using the above methodology based upon resident population reflect only 78.2% of total demand.

When an estimate of total demand was determined, it had to be converted into a form that could be compared with the existing supply of facilities. This conversion, based upon the formula

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[1] Ibid., p. 62.
[2] Ibid., p. 25.

below, resulted in a measure called "facility requirements" (R) necessary to meet existing demand.

$$R = \frac{D}{C \cdot T \cdot U} \cdot S$$

D = demand, in activity days

C = capacity utilization days (39 for the year 1970)

T = turnover rate

U = unit capacity

S = standards assigned by the NAR Study

Activity	T	U	S
Boating	4 parties/boat	4 persons	1.44 acres/boat
Sailing	4 parties/boat	2 persons	3 acres/boat
Swimming(Beach)	3 people/space	1 person	50 sq ft/person
Picnicking	2 parties/site	5 persons	12 tables/acre
Camping	1 party/site	x	12 sites/acre

The facility requirements which resulted from this calculation were compared to the existing inventory of facilities yielding a surplus or deficit of facilities for each zone and activity.

RESULTS:

The quantitative results which apply specifically to Delaware will be discussed here. Also some of the recommendations which were directed toward the urban areas adjacent to the Bay will be discussed because of the similarity of development of that area with New Castle County's Delaware River shore development.

The results of the calculations for total demand upon facilities in Delaware are listed below:

Total Annual Demand, Delaware (Thousands of Activity Days)

Activity	1970	1980	2000	2020
Boating	231	338	611	1210
Sailing	29	58	90	230
Swimming	1330	2181	3957	6105
Picnicking	584	816	1315	2190
Camping	44	78	152	267

Source: Outdoor Recreation Chesapeake Bay Demand Supply Needs.

The facility requirements necessary to meet this level of demand are as follows:

Facility Requirements, Delaware (Acres)

Activity	1970	1980	2000	2020
Boating & Sailing	1049	1419	2174	4220
Swimming	17	23	37	50
Picnicking	1918	2225	3197	4731
Camping	358	524	895	1407

Source: Outdoor Recreation Chesapeake Bay Demand Supply Needs

The supply of facilities which existed at the time of the study:

Existing Supply, Delaware 1974 (Acres)

Activity	Supply
Boating & Sailing	48,000
Swimming	2,230
Picnicking	770
Camping	610

Source: Outdoor Recreation Chesapeake Bay Demand Supply Needs

This supply was subtracted from the requirements necessary to meet existing demand, yielding an estimate of NEEDS:

	Needs, Delaware (Acres)			
Activity	1970	1980	2000	2020
Sailing & Boating	46,951+	46,581+	45,826+	43,780+
Swimming	206+	200+	186+	173+
Picnicking	1,148-	1,455-	1,467-	3,961-
Camping	252+	86+	285-	797-

+ = Surplus
Source: Outdoor Recreation Chesapeake Bay Demand Supply Needs

This table shows that the methodology employed in this study resulted in an estimated surplus of water based recreation facilities in Delaware for all activities with the exception of picnicking through 1980. But those familiar with Delaware know that any surplus of resources is distributed away from the state's urban area.

The recommendations and conclusions of the Chesapeake Bay Study are of interest to anyone concerned about water based recreation activity in or near urban areas. It was concluded in the study that the greatest need for water-based facilities is near urban areas.[1] Although the study area provides an overwhelming abundance of water area it is virtually untapped for recreational use for several reasons. First, areas presently developed for swimming are not within easy access to the greatest portion of the area's population. Second, several swimming areas have been closed due to water pollution. Third, much of the coastal land has been developed for purposes other than recreation. This

[1] Ibid., p. 10.

destroys the physical and visual access. Fourth, boating demand in these areas is unfilled not because of the lack of water area, but because of insufficient access in terms of ramps and slips.[1]

The shortage of water-based recreational facilities in urban areas along the Chesapeake, and subsequent reasons for this shortage as described above, correspond in every respect with the experience and conditions along New Castle County's Delaware River shoreline. Because of this the recommendations included in the Chesapeake Bay study apply to New Castle County also.

Urban recreation demand for water based activities can be satisfied more fully by correcting access problems through the availability of low cost transportation to existing sites or through the development of new sites closer to urban areas, by eliminating pollution problems that inevitably arise in urban waterways, by acquiring coastal land not already developed industrially and preserving it for recreational use, and by providing sufficient access to the water resource through ramp and slip construction.

SEA GRANT R/SE-3 SURVEY, 1975

INTRODUCTION:

The major accomplishment of the R/SE-3 survey was the establishment of rates of participation for various recreation activities in the State of Delaware and its individual counties. Therefore, any doubt that was cast upon the results of previous studies because of the use of regional or other state participation rates

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[1] Ibid., p. 10.

can be set aside here. But mere participation rates cannot accurately forecast demand for new and or improved recreational facilities. Therefore included in the survey were questions which made it possible to discuss the potential increase in demand caused by various improvements and innovative changes in facilities. The data were collected on a state and county-wide basis so the results of the survey are readily adaptable to a discussion of the New Castle County area alone.

METHODOLOGY:

A state-wide survey was conducted in order to obtain current information concerning recreation in the State of Delaware. The state was divided into four subdivisions: the City of Wilmington, New Castle County outside of Wilmington, Kent County, and Sussex County. Approximately 200 households from each of the subdivisions participated in the survey so that a cross-section of the state population would be represented. From these samples a participation rate or other measure, depending upon the nature of the question, was obtained for each of the four subdivisions. Weighted state data were then calculated from the results of the 4 subdivisions.

Since approximately equal proportions of males and females were included in the survey, and, since the ethnic-racial characteristics of the sample approximate the proportion of the total populations in each of the subdivisions samples, the data for each of those geographical areas is a probability sample for that area.[1]

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[1] Report on the Sea Grant Survey.

The survey was constructed in the following manner. First, twenty of the most popular leisure time activities were listed. The respondent was asked if there was any active participation in any activity by any member of the household. Therefore, the participation rates measure recreation utilization on a household rather than individual basis. Next, the respondent was asked to specify how often a given activity was participated in by any member of the family. From this, a measure of average activity days per participant was obtained. From these two sets of data, percent participation rate and frequency of participation, total present demand can be calculated in the form of activity days.

Measuring present utilization is not sufficient. The survey included several questions which were designed to measure potential or unsatisfied demand along with factors having the greatest impact upon converting this potential participation into actual participation. This is necessary so that the demand for new and/or improved facilities can be measured more accurately since it is assumed that better facilities will convert potential participants and non-participants into actual participants. The following are important sections of the survey that attempts to derive potential participation. Table 11 presents the findings.

First of all, it is necessary to estimate what Seidenstat called unsatisfied demand or potential participation. Those households represented in these data expressed some preference for an activity but did not participate because of some extraneous factor such as cost, access, time constraint, etc. If these costs are reduced by construction of new facilities or the improvement of old, the impact of the introduction of these potential users into the

Table 11

Results of Sea Grant Survey for Two Subdivisions of New Castle County

	City of Wilmington			N.C.C. Outside Wilmington		
	% Actual Part.	Ave. Annual Rate of Part.	% Potential Part.	Actual % Part.	Ave. Annual Rate of Part.	% Potential Part.
Ocean/pond swimming	35.5	6.9	27.5	59.5	12.7	11.5
Picnicking	45.0	3.7	20.5	57.0	11.4	8.5
Pool swimming	41.5	47.5	28.5	54.0	56.9	16.0
Boat fishing	18.5	10.3	28.5	31.5	12.2	19.0
River/stream fishing	20.5	28.7	28.5	21.0	9.5	18.5
Bicycling	17.0	69.5	25.5	16.5	55.0	13.0
Nature walks	10.5	157.3	25.0	26.0	100.2	11.0
Motor boating	7.5	5.1	37.0	16.5	12.9	30.0
Trailer/tent camping	6.0	4.0	30.0	24.5	3.6	18.5
Rabbit/squirrel hunting	10.0	3.5	20.5	12.0	.6	12.0
Surf fishing	10.0	9.0	30.0	17.0	10.5	29.5
Deer hunting	6.5	.27	21.0	10.0	3.2	12.0
Duck hunting	4.0	5.4	22.0	9.5	2.5	13.0
Horseback riding	9.5	10.8	27.5	15.5	38.7	13.0
Goose hunting	3.5	3.7	22.0	9.5	2.5	23.5
Pheasant hunting	4.5	4.8	22.0	10.0	2.0	13.0
Waterskiing	1.0	6.0	33.0	8.5	17.8	22.5
Canoeing	5.5	5.0	31.5	11.0	12.8	20.0
Sailing	3.5	5.8	32.5	7.5	18.8	22.5
Overnight hiking	4.5	2.9	25.0	3.0	5.7	13.5

Source: Sea Grant Survey (R/SE-3), 1975

market must be considered in planning for better facilities. Also, those who neither participated nor expressed a preference for the activity must be considered to some extent since the existence of better facilities will be likely to create some new interest among that group.

The survey asked each respondent how much vacation time was available in the household as well as where that vacation time was spent. It was discovered that only one family in 10 spent its vacation time recreating in Delaware. Approximately 50% of the sample used their vacation time to engage in some specific activity such as visiting friends or family or visiting some specific out-of-state tourist attraction. The remaining percentage represent potential Delaware participants who might be encouraged to spend their vacation time in Delaware if more facilities were available.

The survey attempted to determine willingness to utilize recreation facilities in Delaware by asking the respondent the distance the family was willing to travel for a day or a weekend trip. For day trips, only 15% of the population sample of the City of Wilmington said they would be willing to travel a distance great enough to reach every point in the state. Therefore, recreational facilities constructed within a short distance of Wilmington will have the potential of creating more actual participants.

The survey revealed that the major reasons families were unwilling to take more trips within the state were time constraints and lack of interest. But costs and traffic problems were also significant. As costs increase and traffic problems intensify, people in Delaware will apparently be willing to travel shorter distances to reach recreation facilities.

New activities have the potential of creating more interest and therefore greater levels of participation in recreation activities. The survey included seven new activities that were deemed feasible in the Delaware environment. The respondent was asked if he or she favored the development of the facilities by the State. The results are listed in Table 12.

It should be noted that residents of the city of Wilmington favor the development of almost all new activities, probably because of their distance from existing environmentally based activities such as natural swimming areas, boating facilities, nature walks, etc.[1]

CONCLUSION:

It is apparent that the Sea Grant survey has made a significant contribution to the measurement of demand and potential demand in the State of Delaware and New Castle County. There are several activities which receive high utilization by county residents. Those receiving the greatest utilization are boat fishing, picnicking, motorboating, camping, pool swimming, ocean/pond swimming, bicycling, nature walks, and river/stream fishing. These nine activities rereceived the greatest rates of participation and are all potentially applicable to the Delaware River shoreline.

The new activities listed mostly received overwhelming support from New Castle County residents, particularly a nature park for the handicapped and nature bicycle trails. Although it may not involve direct recreation activity, this question reveals public support for more rest stations. This aspect should be taken into consideration by planners.

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[1] Ibid.

Table 12

Percent Endorsing Development of
Selected Recreational Options

	Wilmington	New Castle County Outside Wilmington	New Castle County Weighted
Nature bicycle trails	90.4	86.6	87.4
Motorcycle trails	63.6	45.5	49.4
Primative camping areas	73.2	54.9	58.9
Dune buggy areas	43.0	25.7	29.5
Nature park for handicap	96.6	94.5	95.0
Hydroplaning on marshes	38.5	18.9	23.2
Boat landing areas	54.0	51.5	52.0
More rest stations	91.9	88.0	88.9

Source: Sea Grant Survey (R/SE-3), 1975.

Finally, the survey has considered the major barriers to participation and has made it possible to investigate planning options which will reduce the significance of these barriers.

SUMMARIZATION AND COMPARISON OF RESULTS:

The discussion above has attempted to extract the methodology unique to each particular study. Now the results of these studies will be compared in order to provide a rough indication of the potential usage of various activities along with a ranking of activities based upon demand estimates of the studies.

Two other issues will then be discussed that have a potential impact upon development and location of recreation facilities. The first involves the development of new recreation activities described in the Sea Grant Survey. These new activities will be ranked according to rate of endorsement of development in New Castle County. The second issue is the comparison of results from the 1972 Bureau of Outdoor Recreation survey and the 1975 Sea Grant Survey concerning round-trip miles traveled for participation in various recreation activities. Since the BOR survey was conducted in 1972 and the Sea Grant Survey was conducted in 1975, the results of the comparison of travel patterns from the two studies should give some insight into the impact of increases in transportation costs upon the future development of recreation facilities.

Finally the entire concept of estimating recreation demand based upon participation rates and population projections will be reviewed drawing upon information from a BOR report entitled Assessing Demand For Outdoor Recreation.

1) SEIDENSTAT STUDY, 1966.

The study was performed 10 years ago but because of the interesting

methodology employed and the attempt to measure the demand for water based activities, the results should prove more than useful. Actual participation rate (column 1, Table 4) subtracted from preferred participation (column 1, Table 6) yields an estimate of unsatisfied demand. The results for the activities included in the Seidenstat study are listed below:

Activity	# of Activity Days Unsatisfied (1965)	Rank of Amount of Unsatisfied Demand
Fishing	1,317,074	1
Swimming	877,919	2
Picnicking	241,467	3
Camping	29,551	4
Boating	- 159,956*	5

*Boating Demand was more than satisfied.

Demand went unsatisfied because of some extraneous factor such as time constraint, cost of equipment, access problems, etc. These costs can be reduced somewhat by the construction of new facilities that will minimize the facility-related costs and by improvement of existing facilities.

With the exception of boating the Siedenstat study discovered that there existed substantial amounts of unsatisfied demand for water-based activities in New Castle County.

2) DELAWARE SCORP, 1976.

An analysis of SCORP results concentrating only on New Castle County is more difficult. SCORP states that "since there are no existing data depicting cross-county travel, it is impossible to calculate needs on the county level for resource oriented activities."[1] Since there are no meaningful results on the county level,

[1] 1976 Delaware SCORP, p. 6-3.

it is necessary to use the results of Table 10, total state results, and attempt to interpret these results as they may effect New Castle County. Delaware SCORP estimated present demand, compared that estimated demand with the optimal capacity of currently existing recreation facilities, and then calculated a surplus or deficit of facilities based upon this comparison for each activity. The results are listed in Table 10 for the entire state of Delaware. Using the column marked "Difference (persons)" all activities can be compared on a common base. If the difference is a negative number it can be interpreted as demand that is not optimally satisfied by the existing facilities. If this difference is multiplied by column 4 of Table 7, the data will be converted into a measure of unsatisfied demand in activity days. This activity day measure will be used so that comparisons with other studies can be made. The results of the calculation are:

Activity	Difference (Persons)	# of Activity Days	Rank of Activity
Bicycling	-127,481	-8,069,547	1
Hiking: Nature Walks	- 74,084	-1,318,695	2
Camping	- 63,450	- 704,295	3
Hunting	- 37,555	- 555,814	4
Boating, Canoeing, Water Skiing	- 45,313	- 398,754	5
Picnicking	- 39,209	- 337,197	6
Horseback Riding	- 11,404	- 205,272	7
Fishing (Fresh Water)	+ 2,983	+ 42,816	8
Swimming (Pool and Natural Area)	-2,428,854 +(3,530,923)	+37,029,518 +1,102,069	9

A shortage of facilities in activity days is indicated by those results preceeded by a negative sign while an excess of facility is indicated by a positive sign. Since these results are for the entire state, they cannot be used to estimate potential usage for the County alone. However the rank of each activity will be useful in calculating a final ranking of activities.

3) OUTDOOR RECREATION CHESAPEAKE BAY DEMAND SUPPLY NEEDS

The results of the Chesapeake Bay study cannot be used to estimate potential usage of new water-based recreation facilities in New Castle County since the results generated by the study are based upon the state as a whole rather than the county in particular. Also, it is not possible to integrate the results of this study into the ranking of activities based upon unsatisfied demand. The Chesapeake Bay study concludes that there is no unsatisfied demand for three of the four activities considered through the year 1980 in Delaware. Because of these results it is difficult to integrate this study with the others. Comparing the results with the Delaware SCORP, which also gave results on a state basis, the difficulty of comparison becomes obvious. The boating data in the SCORP study is based upon accessibility, i.e., number of ramps and slips available. The Chesapeake Bay boating results are based upon acreage of water resource available. This can help explain the great difference in results of the two studies. SCORP estimated almost 400,000 unsatisfied activity days for boating while the Chesapeake Bay study estimated a huge surplus of water resources even into the year 2020. The difficulty of comparison between studies is apparent in this case and will be discussed further in the conclusion.

4) SEA GRANT SURVEY OF R/SE-3 PROJECT

The Sea Grant Survey has established an actual participation rate for Wilmington and the remainder of New Castle County as well as a potential (as yet unsatisfied) participation rate and average potential rate of participation in activity days. The potential participation rate provides an estimate of demand that goes unsatisfied because of some extraneous factor such as time constraint, cost of equipment, access problems, etc.

Since results for the entire county are desired, the Wilmington and remainder of N.C.C. data from Table 11 have been summed in a weighted fashion to obtain data for the county as a whole. Since the survey was conducted on a household basis, the weighting procedure is based on the number of households in the county. Each of the two county subdivisions is weighted according to its population relative to the total county population as follows:

	Occupied Housing	Weight
Wilmington	25,855	.2182
Remainder of New Castle County	92,630	.7818
County Total	118,485	1.0000

The raw data of Table 11 are multiplied by the weight to obtain weighted data. The 2 sets of weighted data are then summed to obtain county data. These county data are listed in Table 13.

The county potential participation rate was multiplied by the number of households in the county to obtain a projected number of potential participants. This number was then multiplied by the average rate of participation in activity days in order to obtain an estimate of potential demand that can be compared with the

Table 13

New Castle County Weighting Figures Based on Sea Grant Survey

	Actual Participation %	Average Rate of Participation Activity Days/Participant	Potential Participation %
Ocean/pond swimming	54.2	11.4	15
Picnicking	54.4	9.7	11.1
Pool swimming	41.2	54.8	18.7
Boat fishing	28.6	11.8	21.1
River/stream fishing	20.9	13.7	20.7
Bicycling	16.6	58.2	15.7
Nature walks	22.6	112.6	14.0
Motor boating	14.5	11.2	31.5
Trailer/tent camping	20.4	3.7	21.0
Rabbit/squirrel hunting	11.6	1.2	13.8
Surf fishing	15.5	10.2	29.6
Deer hunting	9.2	2.5	13.9
Duck hunting	8.3	3.1	14.9
Horseback riding	14.2	32.6	16.2
Goose hunting	8.2	2.8	23.2
Pheasant hunting	8.8	2.6	14.9
Water skiing	6.8	15.2	24.8
Canoeing	9.8	11.1	22.5
Saling	6.7	15.9	24.7
Overnight hiking	3.3	5.1	16.0

Weighting based on following household data

	Occupied Housing Units	Weight
Wilmington	25,855	.2182
New Castle County Outside Wilmington	92,630	.7818
New Castle County Total	118,485	1.0000

results of the Seidenstat study. The ranking of activities according to potential demand will be compared with both the Seidenstat and SCORP studies. Potential demand in activity days is listed in Table 14. For these calculations to be valid it must be assumed that potential participants would participate at the same level as present actual participants. Since the costs of removing all barriers to participation are probably prohibitive, total potential participation cannot be fully realized. Therefore, new participants would likely engage in the various activities at a somewhat lower level than present participants.

Of the four studies reviewed, only two yield results that are useful in obtaining an indication of potential usage of water-based and related activities in New Castle County. These are the Seidenstat study and the Sea Grant Survey. Because Seidenstat's categories are much more general, some aggregation of the Sea Grant Survey categories is necessary:

Boating = Motor Boating + Water Skiing + Canoeing + Sailing

Fishing = Boat Fishing + River/Stream Fishing + Surf Fishing

Swimming = Ocean/Pond Swimming + Pool Swimming

Comparison of the studies and the applicable activities based upon activity days measured as unsatisfied demand shows substantial agreement for most activities.

Table 14

Unsatisfied Demand: Potential Activity Days Based on Sea Grant Survey

	Number of Potential Participants (Household)[1]	Average Rate of Participation (Activity Days)	Potential Activity Days	Rank of Activity in Potential Activity Days
Ocean/Pond swimming	17,773	11.4	202,612	(12)
Picnicking	13,152	9.7	127,574	(13)
Pool swimming	22,157	54.8	1,214,204	(2)
Boat fishing	25,000	11.8	295,000	(11)
River/stream fishing	24,526	13.7	336,006	(9)
Bicycling	18,602	58.2	1,082,636	(3)
Nature walks	16,588	112.6	1,867,809	(1)
Motor boating	37,323	11.2	418,018	(7)
Tent/trailer camping	24,882	3.7	92,063	(15)
Rabbit/squirrel hunting	16,351	1.2	19,621	(20)
Surf fishing	35,072	10.2	375,734	(8)
Deer hunting	16,469	2.5	41,172	(18)
Duck hunting	17,654	3.1	54,727	(17)
Horseback riding	19,195	32.6	625,757	(4)
Goose hunting	27,488	2.8	76,966	(16)
Pheasant hunting	17,654	2.6	45,900	(19)
Water skiing	29,384	15.2	446,637	(6)
Canoeing	26,659	11.1	295,915	(10)
Sailing	29,266	15.9	465,392	(5)
Overnight hiking	18,958	5.1	96,686	(14)

Based on Total County Households: 118,485

[1]Calculated as follows: [New Castle County % Potential Participation] x [Total New Castle County Households].

Comparisons of Levels of Potential Demand

Activity	Seidenstat Study Unsatisfied Demand Total Activity Days	Sea Grant Survey Potential Demand Total Activity Days
Boating	- 159,956*	1,625,899
Camping	29,551	92,063
Fishing	1,317,074	988,740
Picnicking	241,467	127,574
Swimming	877,919	1,416,816

*Demand for Boating was more than satisfied.

Since the Sea Grant results are much more current and unsatisfied demand is greater in every category with the exception of fishing and picnicking, this comparison reveals that some water-based and related activities are being demanded in increasing amounts, and that these demands are not being met.

Because of the time lag involved in the Seidenstat study and the lack of information on a county basis from the SCORP study, a measure of potential activity days for each recreation activity must be based exclusively upon the results of the Sea Grant Survey. This indication of usage of the various activities is found under the "Potential Activity Days" column of Table 14. It must be realized that these levels of usage would be realized only if all barriers to participation were removed. This, of course, is not possible. But policy should be directed toward the minimization of existing barriers which are under the control of public officials. The results of the Sea Grant Survey reviewed earlier serve as useful indications of the impact of certain barriers.

In summary, the following activities should be considered for development because of evidence of the existence of unsatisfied

demand. These activities have been ranked using the results of the three Delaware Studies. The ranking procedure is shown in Table 15.

Rankings of Traditional Activities

1) Nature Walks	6) Hunting
2) Bicycling	7) Picnicking
3) Fishing	8) Camping
4) Swimming	9) Horseback Riding
5) Boating	10) Overnight Hiking

The practicality of these activities will be examined further when potential sites are evaluated. Also, the success of these or similar activities at existing water-based recreation sites in areas similar to New Castle County will be documented in a literature survey. With the completion of these tasks, a final list of potential activities will evolve.

The Sea Grant Survey chose seven environmentally feasible activities that have proven successful elsewhere, but have not been practiced here in Delaware. Respondents in the survey were asked if they favored development of these activities by the State of Delaware. Listed in Table 10 are the results of this portion of the survey. From the table a ranking of new activities has been obtained and is listed below.

Ranking of New Activities

New Activity	% Endorsing Development
1) Nature Park for Handicapped	95.0
2) Nature Bike Trails	87.4
3) Primitive Camping	58.9
4) Boat Landing Areas	52.0
5) Motorcycle Trails	49.4
6) Dune Buggie Areas	29.5
7) Hydroplaning on Marshes	23.2

Table 15

Ranking Procedure

Seidenstat	Weight	SCORP	Weight	Sea Grant	Weight
1) Fishing	(1.0)	1) Bicycling	(.99)	1) Nature walks	(1.0)
2) Swimming	(.8)	2) Nature walks	(.88)	2) Boating*	(.9)
3) Picnicking	(.6)	3) Camping	(.77)	3) Swimming	(.8)
4) Camping	(.4)	4) Hunting	(.66)	4) Bicycling	(.7)
5) Boating	(.2)	5) Boating	(.55)	5) Fishing *	(.6)
		6) Picnicking	(.44)	6) Horseback riding	(.5)
		7) Horseback riding	(.33)	7) Hunting*	(.4)
		8) Fishing	(.22)	8) Picnicking	(.3)
		9) Swimming	(.11)	9) Hiking overnight	(.2)
				10) Camping	(.1)

Activity	Seidenstat	SCORP	Sea Grant	Sum/# of Studies	Final Rank
Nature walking	--	.88	1.0	1.88/2 = .94	(1)
Boating	.2	.55	.9	1.65/3 = .55	(5)
Swimming	.8	.11	.8	1.71/3 = .57	(4)
Bicycling	--	.99	.7	1.69/2 = .845	(2)
Fishing	1.0	.22	.6	1.82/3 = .61	(3)
Horseback riding	--	.33	.5	.83/2 = .42	(8)
Hunting	--	.66	.4	1.06/2 = .53	(6)
Picnicking	.6	.44	.3	1.34/3 = .45	(7)
Hiking overnight	--	--	.2	.2 /1 = .20	(9)
Camping	.4	.77	.1	1.27/3 = .42	(8)

*These activities represent agregation of all related activities.

1) All activities were ranked for each study according to the measure of unsatisfied or potential demand.
2) Each activity was assigned a weight based upon the rank of the activity in each study and the number of activities included in the study.
3) The weights for each activity were summed. Since all activities were not included in each study, an average weight was calculated based upon the number of studies in which the activity was included.
4) Final ranking was obtained from the average weights.

These estimates of endorsement are probably overstated since no cost estimate was included in the survey question. When respondents in the Sea Grant Survey were asked how much additional money per family they would be willing to see allocated to recreational development, 45% indicated that they were unwilling to allocate any additional money at all. But the preferred method of financing recreational development among Delaware residents was through the imposition of user fees. Almost 57% of the state population surveyed preferred user fees as opposed to the alternatives of reallocation of existing revenues or the raising of new revenues through increased taxes, sale of bonds, or use of lottery proceeds.

The next topic to be considered involves the potential for a change in transportation patterns of participants in recreation activity caused by increasing transportation costs. The 1972 National Recreation Survey conducted for BOR estimated that 83% of the overnight trips taken in the summer of that year covered distances of 200 or more round trip miles. The Sea Grant Survey attempted to measure travel patterns for New Castle County in 1975. It was estimated that approximately 63% of the population sampled were willing to travel 200 or more round trip miles for a weekend trip.[1] Comparison of these two figures indicate the possibility that recreation participants are willing to travel shorter distances in order to engage in recreation. The most likely

[1]Some problems were encountered concerning the travel data from the Sea Grant Survey because of the structure of the question in the survey concerning travel patterns. When the respondent was asked how far he or she was willing to travel on a weekend trip or day outing it was not specified whether or not the response was in terms of one-way or round-trip mileage. The above analysis assumed the response was in terms of one-way miles so that the figure 63% is probably an overestimate rather than underestimate.

reason for a change in travel patterns is the increase in transportation costs incurred between the 2 periods of comparison along with increased congestion of transportation systems. It can be inferred that if travel costs increase further, fewer participants will be willing to travel great distances in order to gain access to existing recreation facilities.

This conclusion carries strong implications for the location of recreation facilities. There is a relatively new and growing need for recreation facilities located nearer the population centers. This need reinforces the desirability of development of water-based recreation in N.C.C., the center of Delaware's population. The future appears to hold no relief for increasing transportation costs. Therefore, even if all other factors contributing to recreation demand remain constant, the recreation needs of New Castle County are likely to grow in the future.

CONCLUSION: TASK I

A review of several recreation demand estimates and comparison of results yields one obvious conclusion: there exists no standard method for estimating recreation demand. There are several shortcomings connected with each methodology. Researchers have attempted to employ new techniques to eliminate these shortcomings, producing estimates which are difficult to compare and whose results differ, at times, greatly.

This problem has apparently plagued other recreation demand researchers. The Bureau of Outdoor Recreation, "... faced with increasing emphasis on demand estimation and increasing dissatisfaction with the results of demand studies" sought a determination

of where emphasis should be placed in future recreation demand studies.[1] Due to a growing unease among recreation planners concerning the application of analytic techniques of demand estimation, a committee representing a broad background of social sciences was chosen so that a wide range assessment of the role of demand estimation would be obtained.

The findings of that committee, of great significance to recreation planners, concluded that too much emphasis has been placed upon analytic demand estimates based upon participation rates and population estimates. The committee recommended that these analytic techniques not be eliminated but that the approach of planners take a broader perspective. A general outline of the recommendations of the committee follows:

1) Since recreation is a fundamental part of human and social behavior, the recreation planner should employ a multidisciplinary approach, including the input of the social and behavioral sciences.[2]

2) Data collection and participation surveys should be carefully evaluated. Their usefulness for policy decisions should be critically assessed and recognized as only one input to the decision-making process. Participation surveys can be especially useful in indicating trends in preferences. Opinion surveys can be useful in indicating relative efficiencies in and desires for recreation facilities.[3] As far as standardization of data collection is

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[1] U.S. Department of the Interior, Bureau of Outdoor Recreation and the National Academy of Sciences, Assessing Demand for Outdoor Recreation. Washington, D.C.

[2] Ibid., p. 56.

[3] Ibid., p. 56, 57.

concerned, the committee recommended that the federal government develop standard methods of collecting participation data. This would enable various studies to be compared and analyzed more effectively.[1]

3) Finally, the committee recommended that decisions concerning recreation development should flow through the political process, depending upon input from various community groups and organizations, providing information concerning the relation between demands for outdoor recreation facilities and the demands for other economic and social programs.[2]

The findings of the assessment committee help place in proper perspective the findings of the previous analysis of results for New Castle County. The quantitative results may vary significantly but they do reveal a trend. All but one of the studies reviewed indicated the existence and growth of unsatisfied water-based recreation demand among the residents of New Castle County and/or the State of Delaware. This trend, when combined with the increase in transportation costs which should encourage city dwellers to use urban recreation facilities more intensively, is but a first step in attempting to measure the need for water-based recreation facilities in New Castle County.

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[1]Ibid., p. 61.
[2]Ibid., p. 56.

TASK II

WATERBASED RECREATION FACILITIES IN OTHER URBAN AREAS

INTRODUCTION

Although a great deal of recreation development has taken place in the largest cities in the U.S., the urban water-front has largely been neglected in many areas. This neglect stems from the functions which the urban river has served in the development of American cities. Typically the city has expanded with little regard for its water resource. Railroads and industrial development dominate the waterfront. Instead of being integrated into the pattern of development and expansion of the urban area the river has been considered a barrier with development more on one side than on the other. And, of course, the river has served as a depository of urban waste.[1]

But now the conservationists, preservationists, and historians are being heard from and urban areas are becoming increasingly conscious of their water resources. A large number of urban areas are planning water-based recreational improvements. The following is a group of case studies on recreational developments compiled from information received from urban areas. In these case studies the condition of the water resource, the plans for improvement, and the actual development that evolved from these plans will be considered. This review will provide information concerning the direction of urban water-based development in the U.S.

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[1] Cultural Benefits from Metropolitan River Recreation - San Antonio Prototype. Technical Report No. 43, Texas Water Resources Institute, Texas A&M University, June, 1972, p. 21.

as well as enable us to draw upon the individual experiences of recreation developers throughout the country. A list of planning agencies contacted and the survey instrument used to obtain information on case studies is appended.

CASE STUDIES

San Antonio[2]

San Antonio's River Walk is probably the best known urban water improvement project in the nation. The recreation activities it provides are mainly passive ones, although sightseeing on foot is the most popular recreation activity in the area. Paddleboats rented from concessionaires also provide a form of active recreation. All other activities are directed toward less active recreation, especially simple relaxation and solitude. The River Walk's below-street walkway provides escape from the activity of urban life and the opportunity for experiencing the esthetic value of the water resource. Sightseeing barges which may be rented for private dinner parties also provide esthetic benefits. Special events, art shows, night clubs, and a river theater, supported by basic services provided by restaurants and lodging, round out the urban leisure activities along the River Walk.

The great success that the River Walk has enjoyed can be traced to the delicate balance that exists between park and commercial development. The River Walk has not faced competition with industrial plants for use of the water. Therefore it is and will remain clean and attractive. The corridor below street level

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[2]Source: Cultural Benefits from Metropolitan River Recreation - San Antonio Prototype.

combined with the landscape in contrast to the city above provides a unique combination of escape and relief from urban activity.

Perhaps the greatest lesson to be learned from the San Antonio River Walk is that urban water development can provide a basis for revitalization or urban areas. Although the San Antonio case is probably not directly applicable to the riverarea in New Castle County, it does prove that decision makers can collaborate for mutual good.

Washington, D.C.[3]

The District of Columbia enjoys a large waterfront area on both the Potomac and Anacostia Rivers but currently very little has been done to provide access to recreation opportunities along the water resource. The Potomac is polluted and largely unfit for swimming. Isolated private boat facilities exist and a towpath along the C & O Canal has been adopted for use as a pedestrian/bike way.

The National Capital Planning Commission has issued plans for acquisition and development of shoreline areas. These areas will evolve into a linear system of parks connected by a system of pedestrian and bike ways which will also provide linkage to the urban area. Certain areas will permit vendors to congregate and form a "public bazaar" atmosphere. Marinas will be developed at strategic locations along with ramp access to the river. The parks will emphasize an intimate atmosphere appropriate to passive outdoor recreation. Long-range plans call for the relocation of

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[3]Source: Shoreline Acquisition and Development Policies and Programs. National Capital Planning Commission, February, 1976.

heavy industry.

Historical areas are emphasized in the Commission's plans. Several forts as well as ancient indian sites will be integrated into the system. The areas of greatest planned development are near eventual subway service.

The plans for D.C.'s waterfront emphasize the acquisition and creation of open space as well as uninterrupted access to this open space. Great emphasis is placed upon the development of pedestrian and bike ways without interference from automobile traffic so that the intimate atmosphere appropriate to esthetic appreciation of the water can be preserved.

Chattahoochee River Corridor, Atlanta[4]

In the late 1960's the people of Atlanta began to recognize the recreation potential of the Chattahoochee River which cuts through the center of the city's developed areas. It was not used because few recreation areas existed along the 48 mile stretch of river corridor. A concept plan was developed and emphasized the need for river access, recreation areas, natural areas, historical areas, and a protected watercourse. River access points were desired at locations where road access already existed. Large recreation areas were to include facilities for picnicking, biking, hiking, boating and camping. Natural areas were desired at points of unique natural and scenic significance. Historical areas would illustrate the unique heritage of the area. The protected watercourse reflected the need for preserved open space in the area.

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[4]Source: Chattahoochee River Corridor: A Case Study. U.S. Department of the Interior, Bureau of Outdoor Recreation.

Interested citizens stimulated concern and public involvement which was rewarded with action and progress. In July 1972, the Atlanta Regional Commission approved a river corridor land-use plan. In September 1972, land acquisition began through the combined efforts of state and local governments, citizen groups, and individuals. Throughout 1973 land acquisition continued, public access improved and parkland along the river was expanded. Public interest had enabled Atlanta to take advantage of its water resource in a relatively short span of time.

Little Calumet River, Indiana[5]

A flooding problem exists along the Little Calument River in the northwest corner of Indiana near East Chicago and Lake Michigan. As a part of the flood control project the recreation potential of the river was investigated and from this investigation a master plan has evolved. It includes nine nodes of recreation activity along the 22 mile stretch of the river examined.

The objectives of the plan are to develop a regional park corridor which will preserve natural features, provide recreation and open space and coordinate existing public recreation and open space. It is the goal of the plan to create a system of recreation that binds the corridor resources together so the system functions as one unit. Emphasis is placed upon the linking of the various recreation nodes along the corridor.

Plans for boat access to the river exist at several places along the corridor but marina facilities are concentrated in one

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[5]Source: A Regional Park Conceptual Development Plan for the Little Calumet River in Northwestern Indiana. Prepared by Environmental Planning and Engineering, Inc. For Indiana Dept. of Natural Resources, January, 1976.

1300 berth area. Other nodes contain a park for the handicapped, ball fields, picnic and camping areas, and trail systems. Obviously, this urban area water development emphasizes active recreation.

Boston Harbor[6]

The proposed Boston Harbor Islands Park system desires to recognize the unique characteristics of the Harbor area. The goals of the plan are to provide a wide range of recreation alternatives which reflect the demand for such facilities in the Boston Metropolitan Area and to emphasize the Harbor Islands Park System as a recreation development for the Boston urban area.

Development plans include picnic areas, docks, bike and walking trails and historical interpretation. They also emphasize the need to limit vehicle access and the need to keep the entire water edge accessible.

Monongahela River, South of Pittsburgh, PA.[7]

Until recently pollution and debris bred indifference of the Monongahela River in the area directly south of Pittsburgh. But the water quality has been improving along with the people's attitude. A rebirth of fishing interest was the first sign of improved water quality and has been followed by increases in all types of activities. Increased use of municipal facilities has occurred and where such facilities are not provided, individual initiative and imagination has enabled recreation demand

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[6]Source: Boston Harbor Islands Comprehensive Plan. Prepared by Metropolitan Area Planning Council for Massachusetts Dept. of Natural Resources. Oct, 1972.

[7]Source: Life Again Along the Monongahela River. Bureau of Outdoor Recreation, Northeast Regional Office, 1976.

to be satisfied. An example is the use of railroad beds adjoining the river for hiking and biking.

The individual towns do have programs or plans for programs along the river. In the town of Charleroi the river has become a place of relaxation for the elderly. Donora has plans for an urban renewal project along its waterfront. Other towns have programs based on local history. Everywhere along the river boating flourishes and berths and launch ramps are increasingly demanded.

This renewed interest, within a 50 mile radius of Pittsburgh, reveals the significance of clean waterways and the likelihood of increased demand for water-based activities as the conditions improve.

Salt Lake City[8]

Residents in and around Salt Lake City, Utah have recently discovered the recreation potential of the Jordan River which extends some 130 miles through backcountry and intensely developed urban areas. The water quality until recently has been relatively poor but realization of recreation potential by residents has created increased demands for improvements of water quality.

Flooding is a problem in developed areas and in conjunction with Corps of Engineers' flood control project, a plan for a regional park near S.L.C. was developed. The developers' plans reflect their feeling that a multiple use recreation facility permits utilization by the most diversified range of age and income groups. Their proposed regional park utilizes a neighborhood

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[8]Source: Progress Report. Department of Natural Resources, Division of Provo-Jordon River Parkway Authority, January, 1976.

center as the focus of activity surrounded by active recreation facilities and open space. Also included is a launch ramp, amphitheater, stable, exercise track, and an observation tower.

Although little industry exists in the planned park area, power lines will be passing through the heart of the proposed recreation area. The developers feel that the existence of these power lines will detract little from this basically active recreation experience.

Land acquisition is currently underway in the municipalities along the Jordon River. Coordinated planned improvements along the riverfront include mixed residential, light industry and open space development with integration of recreation opportunities.

Other Areas[9]

Other urban areas have discovered the need to improve their water resources and have met with varying amounts of success. In Denver there has been little progress. There exists little evidence of cooperation between business and the public. Wichita has made some fragmented progress but there is a need for coordinated development. In Kansas City there is a need for publicity regarding the potential for redevelopment along the Missouri River.

The cities of the northwest have long respected their watercourses while using them for several purposes. Portland, through planning, preservation, and redevelopment, has created a well-managed park system. Victoria and Vancouver, British Columbia have been able to develop well-coordinated parks while making

[9]Source: Cultural Benefits from Metropolitan River Recreation - San Antonio Prototype.

heavy industrial use of the waters. These northwestern cities have been able to keep their water ways clean and, therefore, the people have always been attracted to them.

CONCLUSION

Out of a desire to improve urban life and preserve natural resources, an increase in interest in urban waterways has evolved. Economic benefits of waterways other than the traditional ones gained by industrial development are now being realized. Progress has been made in some areas, such as Portland, because an appreciation and respect for natural resources is more deeply rooted there.

Oregon, in the mid 1960's, initiated efforts to clean up its waterways through the institution of stiff pollution controls. As a result the Willamette River, which flows through such urban center as Portland and Eugene, is fit for swimming in all areas. Now the River Studies Division has instituted a Greenway Program for the Willamette preserving natural areas along its shore with emphasis on primative qualities of the areas. Naturally, the Willamette receives a great deal of spontaneous use. In other words, if a waterway is clean, people are naturally attracted to it. Another example is the spontaneous growth of interest in the Monongahela River in western Pennsylvania. But if the water is not clean facilities must be provided to attract potential users to the waterway and policy must be directed toward education of the public concerning the recreation potential of the waterway. The greatest initial need is for an esthetically appealing environment which will act as a natural attraction to the waterway. Therefore, river clean up efforts are of primary importance to any urban area.

Once interest has been generated by the existence of clean water or realization of the recreation potential of an otherwise unattractive body of water the next step in the development process calls for coordination of planning efforts. Any large scale or linear development will involve a variety of jurisdictions and may in the words of a Utah planner "...eventually, for the sake of function and maintenance, have to come under a single administration such as our Division of State Parks and Recreation." This same planner also suggested that a key aspect of a study of recreation potential will be input and suggestions by users of the water resource. Public involvement and planning coordination are also emphasized by San Antonio developers as well as those in Atlanta.

As far as the results of these plans and development are concerned we can again draw upon the experience of other areas. The type of development which has received the most interest along waterfronts in the case studies reviewed has been a linear or corridor system utilizing existing development, creating new development, and linking the various recreation nodes together, resulting in a regional park concept which is actually a complement of neighborhood, community, and regional type facilities. This, according to Department of Natural Resources of the State of Indiana recreation planners, makes the facilities available and reasonably accessible to all social and economic groups and geographic areas of the region. In Washington, D.C. the bike and pedestrian ways are considered natural links not only between recreation areas in a corridor system but also between regional

parks and nearby residential and business districts. Within these linear systems multiple recreation development is emphasized, including, besides the natural chain of bike and pedestrian ways, marina, launch ramp and pier development, nature study areas, picnic grounds, and field and court game facilities. Marina development must be fairly extensive. The State of Arizona has had experience that indicates that gasoline and convenience markets along with boat and camper sanitary pumping stations are a must for a successful recreational boating experience.

Specialized development plans include parks for the handicapped but the State of Indiana feels that all planned facilities should include provisions for the handicapped, such as wheelchair locks on fishing piers, so that the handicapped can be integrated into society rather than separated through the creation of a separate facility.

Innovative plans have utilized the unique physical characteristics of an area such as the Harbor Islands in Boston and the below-street walkway in San Antonio. Innovation has also been directed toward historical appreciation. Baltimore has the potential for development of its Five Forts Concept which would link the five historical forts in Baltimore Harbor with an excursion boat. This potential exists along the Delaware River waterfront where we are privileged to possess areas of great historical value.

The greatest effect industry has upon the waterfront other than potential pollution is limiting both visual and physical access to the water resource. In some areas this does not present a significant problem but in New Castle County it does. There seem to exist three approaches to the problem: first, attempt to force

existing industry to relocate and prohibit any further development; second, allow the barriers caused by industrial development to destroy any potential for recreation development and dismiss any plans for utilization of areas near industry as undersirable; or, third, accept the fact that industrial development exists and attempt to cooperate with existing industry to live together with their development as best as possible. The third alternative seems most appropriate and brings to surface again the need for cooperation and coordination, this time between industry and government. In the Nation's Capital, planners feel that industry is very conscious of its public image and is willing to provide access to the waterfront when possible. One petroleum company on the Anacostia River was willing to construct a dock-walkway along the tidal basin so that the linking concept in D.C. would be uninterrupted. It is important to most planners that the water be accessible at all points. The D.C. case is an example of what can be done in order to make the water accessible and provide benefits to both the users of the facility and private interests whose public image is enhanced. This example is directly applicable to the New Castle County shoreline and proves that the existence of industrial development does not preclude appreciation of water resources.

Waterfront improvements in urban areas are, in most cases, somewhere between the planning and development stages. Therefore the existence of hard data yielding a measure of success of specific activities is negligible. Because of this situation it is necessary to depend upon the direction of recreation planning and the advice of various planners concerning the establishment of this direction.

Rather than recommending development of specific facilities this review has been forced to take a more general outlook with respect to the steps of development. The recommendations which result from the survey and follow-up telephone interviews are as follows:

1) Before any development takes place sufficient public interest in the water resource must exist. When the water is polluted and the shoreline unattractive at some points due to industrial development public policy should be directed toward educating the public of the recreation potential of the water.

2) When sufficient interest exists, either naturally or generated as a result of public realization, as much input as possible from the users and potential users of the river should be gathered. New Castle County's situation is quite different from every area considered so that information concerning the potential success of specific activities should be gathered from New Castle County residents.

3) From the point of view of efficiency the corridor or linear system of recreation development seems to be the most effective. As in the preceeding case studies linear systems imply development of multiple use facilities. This type of linear development received emphasis from both the Little Calumet and Salt Lake City planners. A multiple-use linear system provides the greatest access to the most people for participation in the largest number of activities if it is tied into the urban area by a bicycle or pedestrian way, as is the case in Washington, D.C. It also enables existing facilities to be integrated into the development of new facilities and preserves the shoreline while making

it accessible at every possible point. It is strongly recommended that a linear system along New Castle County's shoreline receive priority consideration. With respect to development for specific activities within the system it is recommended that the results of Task I (the results of the surveys are a form of public input) be combined with public input from other sources before a decisions is made.

4) As a corollary to the development of a linear system innovative development capitalizing upon the unique characteristics of the County shoreline should be considered. The most unique characteristic of the area is its historical significance at various points along the shoreline. These points of interest should be preserved and integrated into a thematically unified system linked by either a bike path system or excursion/tour boat.

5) The water quality in the Delaware River along the New Castle County shoreline is improving somewhat but is still unfit for swimming. Also the condition of the water reduces the likelihood of successful large-scale fishing activity near the urban area. Citing examples of other areas with similar water quality, it is recommended that development of a medium to large scale marina be considered for development. This marina will act as a natural attraction to the water resource and, if and when the water quality improves, swimming and fishing will occur as natural complements to the boating experience in the urban area.

6) Industrial development already exists to a fairly large extent along the Delaware River shoreline in New Castle County. But so does the possibility of recreation development. The best way to accomplish coexistence of these developments is through

cooperation between the public and private groups involved. Washington, D.C. has proven that this cooperation can accomplish a great deal. Mutual respect, on the part of government for the necessary operation of industry and on the part of industry for the water resource and the environment in general, will result in benefits for both groups involved. Therefore it is recommended that before any development options are dismissed because of industrial development the company involved be contacted and persuaded to cooperate by providing access to the water resource.

APPENDIX A

UNIVERSITY OF DELAWARE
NEWARK, DELAWARE
19711

OLLEGE OF MARINE STUDIES
OBINSON HALL

To Whom It May Concern:

We need your special expertise and experience with waterbased recreation in or near urban areas.

The Delaware River south of Wilmington, Delaware is now used relatively little for waterbased recreation, yet studies have shown that the potential demand is quite large. A new study is being conducted by researchers at the University of Delaware to determine the activity (or mix of activities) that has the best potential to increase recreation use of the river.

One phase of this study is obtaining and applying the relevant experience of other areas. A difficulty is that published reports specific to this question are rare or not readily available because they exist only in the form of consultants reports or planning documents. Even this information by itself could be misleading without some knowledge of the local situation and background.

This is where your help is needed. We want you to read the enclosed description of waterbased recreation use and potential of the Delaware River and then share with us your experience which may be useful. If you do not have the local expertise, please forward this request to the person you feel most qualified. Obviously, no two areas are exactly alike. The Delaware will no doubt differ from your area in several major respects, but we hope that by getting the experiences of a number of areas, trends or similar situations may be identified that will be useful to those planning recreation facilities for the Delaware.

We are aware of the time that would be required for a complete answer to our request and want to do everything possible to facilitate your response. We therefore suggest the following approach.

You could send us a copy of studies or literature describing projects you think are most relevant to our situation and any explanation you feel is necessary. The reports will be returned to you if you request it. We can then go over the information you send to identify what questions we will need to ask. Then we will call you (our nickel) to get the background needed to correctly interpret the information you provide.

The study results will be used primarily by New Castle County but will also be an input to the Bureau of Outdoor Recreation and the State in its SCORP update. We would be happy to send you a copy of the results, expected in early 1977. Your assistance will be appreciated by the University of Delaware, New Castle County, the State of Delaware, and the Bureau of Outdoor Recreation.

Sincerely,

Paul A. Jensen, Ph.D.
Delaware Sea Grant Marine Advisory Program

PAJ/ss
Enclosure

The Delaware River Shoreline

The Delaware River south of Wilmington is now heavily used as a commercial artery, a recipient of wastes, and a source of industrial cooling water.

Recreational use is limited on the Delaware side to various scenic vistas, a few small marinas, very limited fishing, tourism of historic waterfront towns (2) and a state historic fort site on Pea Patch island. A similar situation exists on the New Jersey bank with one state park and relatively heavier use of the shoreline for private housing. Swimming activities were halted at the few public beaches in the mid 1950s because of pollution problems. The polluted condition of the river is improving but no recent evaluation of water quality for swimming has been made.

Tides are strong (up to 5+ feet with 2+ kt currents) in the river, and there is the usual problem with shoaling (particularly out of the navigation channel). The shoreline is relatively low with numerous tidal marshes. Near Wilmington, the shoreline is heavily developed by industry and a smaller town. Farther south, industrial use of the shoreline is quite limited. From the C & D canal south, there are a few small towns, extensive marshes, few harbors and little population. This area is within 20 miles of Wilmington and 40 miles of the Philadelphia population centers. Use of the New Jersey shoreline is similar.

Recreational boating on that portion of the Delaware is relatively limited. Frequently cited complaints of people cruising these waters are the lack of port facilities and the sometimes adverse weather conditions. Water oriented recreationists frequently travel 75 to 100 miles to use established recreation areas of the northern Chesapeake, Delaware's ocean beaches and the New Jersey ocean shore. There is also fairly heavy recreational use of the Delaware River to the north of Philadelphia.

Marine facilities on the Delaware have substantial waiting lists. Power boats outnumber sailboats by a substantial margin. Expansion of these facilities has been severely limited by the cost of financing.

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TASK III

SHORELINE SITE EVALUATIONS

INTRODUCTION

New Castle County's Delaware River shoreline contains many distinct parcels of land, each with its own unique characteristics. Before any recommendations can be made concerning development of specific activities at specific sites, it is necessary to investigate the physical characteristics of each site. These characteristics must then be compared with physical requirements necessary to support development of specific recreation activities.

The purpose of Task III is to perform this comparison and to develop an objective site suitability rating for each site with respect to each activity. This site suitability rating, combined with the results of Task I and recommendations of Task II, will act as input for the development of a list of the most feasible recreation alternatives. This list will be the result of Task IV.

Methodology:

In order to investigate site suitability, it is necessary to develop a list of physical requirements necessary to support each recreation activity. This list was developed through a review of site planning guides of the U.S. Army Corps of Engineers, Outdoor Recreation Standards of the Bureau of Outdoor Recreation, and other sources. The physical requirements necessary to support each activity and the requirements upon which the physical comparsion is based are listed according to activity in Appendix A of this section. The activities included are those which should receive emphasis as a result of the findings of Task I.

Once a definition of site requirements for each activity was developed, it was necessary to evaluate uniformly each of the 14 sites listed in Table I. This work was greatly facilitated by the New Castle County Automated Environmental Resources Information (AERI) Systems for the shoreline areas. This computerized data bank system was designed for the New Castle County 208 Area-wide Waste Treatment Planning Program by Environmental System Research Institute of Redland, California. The output of this data bank reveals the physical characteristics of each 500-foot-square parcel of land in the county based upon the following parameters: topography, elevation, slope, soil types, soil characteristics, major and minor watersheds, geology, hydrology, flood plains, scenic unique and/or historical features, sewer districts, zoning, land use types and percentages, vegetation, aquifiers, ground water depth, and park and recreational site information. The only major additions to the data retrieved from the AERI system were that of offshore water depth in the Delaware River, obtained from the U.S. Army Corps of Engineers Delaware River Surveys and the land use plans (District Plans) developed by the New Castle County Planning Department.

A rating system was developed to evaluate each activity on each site by comparing the physical characteristics from the computer output, with the site requirements. The rating system based upon this comparison provides a means by which physical suitability of each site can be determined in an objective manner. Although the actual numerical rating which resulted from the comparison involves some qualitative judgments in comparing general site

Table I

Wilmington/Christina River

Pidgeon Point

Swan Creek

New Castle - Deemers Beach

Ommelanden

Delaware City

Gov. Bacon Property

1,000 Acre Marsh (Reedy Point area and south)

Port Penn

Augustine Beach

Bay View Beach/Augustine Wildlife Area

Appaquinimink Creek/Blackbird Creek

Collins Beach

Smyrna River

requirements with physical characteristics, these judgments were uniform (made by the same person at the same time) and thus provide a valid measure of relative suitability.

The site ratings were made on a 0 to 10 scale, 10 being the best possible score. For example, consider the requirements for "Light, Pleasure Boating" from Appendix A. The requirements are 3 feet depth of water near shore, adjacent fastland, near power lines, and adequate area. If a site possessed all the physical characteristics necessary to meet these requirements, it received four scores of 10 each. The average of these scores would yield the site suitability rating for light pleasure boating. Focusing on an actual site will clarify this procedure. Consider light, pleasure boating at the Wilmington/Christina River site. The scores received by this site were: water depth, 10; adjacent fastland, 10; nearness to power lines, 6; adequate land area, 8. The average of these 4 scores is 8.3. In order to indicate the presence of certain desirable facilities (nearby restaurants, stores, etc.), suitability scores for sites are rounded up to the next whole number; in the case of the Christina site, 9.0. If these facilities were not present, the rating would remain the average of the subscores.

Insect factors were also considered in the suitability ratings. The present insect situation, potential problem areas, and insect control needs are reported in Appendix B of this section.

Finally, consideration was given to "overriding concerns" in certain cases. For example, if available information on fecal coliform levels indicated that the water at a certain site did not meet primary body contact standards, wading and extensive swimming

were given a "0" rating at that site. Other overriding concerns were: lack of water depth for boating which would create the need for extensive dredging and lack of reasonable fastland for activities requiring buildings.

The application of this rating system to the sites considered resulted in the generation of Table II which reveals the suitability rating given to each site for each level of various activities.

DISCUSSION:

Table II, a suitability rating matrix, can be used in several ways. However, it is important to realize the intended use and limitations of this rating matrix. No special significance should be assigned to small numerical differences between ratings since the subscores used to generate the ratings are the results of qualitative judgments based on physical criteria. It also must be recognized that each site includes relatively large areas where significant internal differences can exist. With these qualifications in mind, Table II provides a convenient and relatively unbiased way to survey the shoreline for recreation site suitability.

Table II can be used in several ways. One is to select sites with the best potential for multiple activities by summing the ratings for each site. Another is to evaluate each site for a specific activity. In considering the specific activity, extensive swimming, one finds moving horizontally along Table II, that zero ratings are given until the Governor Bacon site is reached. There are two reasons for this: first, the fecal coliform levels at mid-

ACTIVITY		Wilmington Christina River	Pidgeon Point	Swan Creek	New Castle	Ommelanden	Delaware City	Cov. Bacon	1,000 Acre Marsh	Port Penn	Augustine Beach	Bay View Augustine Wild	Appoquinimink Blackbird Creek	Collins Beach	Smyrna River
Boating:	Light	9	9.8	3	9.5	0.5	9	10	0	8.8	10	6.5	6.5	10	6.5
	Moderate	8	9.3	2	8.5	0	8.5	9.5	0	8.5	9	3.5	3		5.5
	Intensive	7	8.8	1	7.5	0	6.0	8.8	0	7.8	8	1	2	8	3
	Short-Term Docking	9.8	9.5	3.5	9.5	0	9.0	9.5	0	5.5	9.5	1	2	8	3
Fishing:	Surf/Bank	1	1	3.5	6	1.5	8.0	8.5	9	6.5	7.5	7.5	8.5	9	8.5
	Tidal Creek Crabbing	3	3.5	2.5	5	5	8.0	7.5	8	7.5	7.5	8.5	10	10	10
	Dock/Pier	1	1	0	6	0	8.0	6.5	7.5	7.5	8	8	8	8.5	9.5
	Charter Boat	3	3	2	4.5	0	5.5	5.5	0	6	6	6	5	7	9
Swimming: [1]	Wading	0	0	0	4.5	3	5	8.5	0	6	9.5	9.5	7.5	7.5	6.5
	Extensive	0	0	0	0	0	0	5.0	0	3.5	9	9	3	5	5
	Sun Bathing	2	2	0	6.5	0	0	9.5	0	5	10	9	2	3	2
Day Nature Walk:	Light Intensity	2	0	2.5	5	9.5	8[2]	6[2]	10	7	5.5	10	8.5	8.5	7.5
	Organized Nature Appreciation	0	0	0	8	8.8	5	4.5[2]	9	5	6.5	8.5	7.5	7.5	6.5
	Historical Site	8.5	4	0	10	0	10	9.5[2]	0	0	0	0	0	0	0
	Picnicking	5	5	0	10	8	9.5	10	9	5.5	8.5	7.5	7	6.5	5
Camping:	"Rough-It"	5	5.5	0	0	5.5	2.5	10	0	7	8.5	8.5	6.5	8.5	5.5
	Developed	3	6.5	0	0	5.5	0.5	10	0	5	5	6	4.5	5	3
Trails/Riding:	Horseback/Hiking	2	7.3	4.5	7.5	8.3	9.5	10	7.5	6.5	9	9	7.5	8	8
	Hiking/Bicycling	8	5	1.0	7.5	7.8	8.5	9.5	5	5.5	8.5	75.	5	8	6.5
	Motor/Trailbiking	2	8	0	0	1.2	0	8.5	0	0.5	4	3	0	5	4
Other Activities:	Waterskiing	0	0	0	0	0	2.5	7	0	8	7.5	7.5	5	8.5	8.5
	Rowing/Canoeing	0	2.5	0	0	6.8	9.5	9.5	8.5	6	8.5	8.5	9.5	9	9
	Excursion/Tour Boats	7.5	2	0	10	0	10	7.5	0	0	0	0	0	0	0

[1]Water quality based on open river data. Beach data needed but no longer collected.

[2]Includes Pea Patch Island access.

RATINGS: 10-9, excellent; 8-7, good; 6-5, adequate; 4-3, marginal, 2-1, poor; 0, unacceptable (overrding concerns.

channel become marginally acceptable for swimming only between Wilmington and New Castle; second, no natural beach or potential for artificial beach exists south of New Castle until Governor Bacon is reached. Governor Bacon has potential for an artificial beach so its rating is in the adequate range. Augustine and Bay View have natural beach areas so their ratings are in the excellent range. Farther down the coast the water quality at mid-channel remains adequate but no beach areas exist, hence relatively low ratings.

Table II can be used to estimate the potential of a specific site for various activities. For example, consider Delaware City, which received good to excellent ratings for Boating, Fishing, Nature Walking, Trails, and Excursion/Tour Boat Activities. This site, based strictly on its physical characteristics, could support a wide variety of activities. Depending upon the range of activities desired, Table II can be used to identify the best multiple-use site available with respect to physical criteria.

While reviewing Table II it must be kept in mind that it was developed to be used as a relatively unbiased assessment of site suitability for recreation alternatives based upon physical characteristics only. Questions involving site ownership, adjacent use impacts, or travel time were not a part of this analysis. Table II is merely an additional input for the decision making process and should not be used independently to recommend any specific development at any specific site. The results of this Task must be combined with the results of previous and following tasks before any well-informed specific recommendations can be made.

Acknowledgement

Mr. Vern Svatos, New Castle 208 Program is gratefully acknowledged for his effort in generating the computerized output employed in developing the rating system.

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Potential Water Based Leisure Activities

BOATING

Activity Level	Boat Types: Power	Boat Types: Nonpower	Facilities	Site Requirements
Light, pleasure (public launch ramp)	<20'	Rowboats Daysailers	Launch ramp 2 lane road Small pier Lighting Parking for design number boats and trailers[1] Portable sanitary Portable water supply optional	3' deep water Fastland adjacent Near power Adequate area
Moderate (small boat docking)	15-25'	18-25'	Dock, mooring Wave protection Launch facility (ramp or crane) Parking and/or dry storage area Running water Waste water Bait/tackle/food/fuel at least easily accessible	4' deep water Limited fetch or breakwater Firm ground Adequate area Well or water connection Sewer or septic tank Near town or on site sale
Intensive	18-50'	18-40'	Dock/mooring Channel On site fuel, maintenance hauling, food, supplies	4' power water depth 7' sail water depth 7' channel and turning ba large area
Short-term docking	18-50'		Dock, fixed or floating possible attendant or harbor master for peak use periods	7' water Location near town or point of interest

[1]Launch ramp design criteria C of E call for 100' clearance radius at each ramp, the # of ramps sufficien so that maximum waiting time is one hour. This assumes 40 launches/weekend day. Parking needs are 10 car/ trailer and 25 car only spaces per ramp.

FISHING

Activity Level	Facilities	Site Requirements
Surf/bank fishing	Fishing location auto access	Fastland bank near parking area (alternative is pier or platform)
Tidal creek crabbing/fishing	Adequate water	Deepwater (>2' MLW) nearshore, proven good fishing
	Access road and parking possible small boat access	Near road
Dock/pier fishing	Sturdy dock	5' water depth, well consolidated sediments for pilings
	Access roads and parking Lighting for night fishing Portable head and water supply (Optional)	Upland area Near utility
Charter boat fishing	See boating	

SWIMMING

Activity Level	Facilities	Site Requirements
Wading (possibly with picnic area)	Beach	Smooth, sandy bottom and beach Aesthetically appealing Coliform levels, ok for primary contact recreation
	Access road and parking	Upland area
	Picnic or sunbathing area	Beach area
Extensive Swimming		Larger beach, maximum load ("peak") 8 persons/linear foot beach front, deeper water
	Beach	Water quality must look clean as well as meet public health standards
	Enclosure (optional)	Site must be attractive
	Water (showers, etc.)	Near utilities
	Sanitary	
	Concessions (optional)	
	Bath houses 1/50-600 daily swimmers Figure 600 swimmers to a bathhouse area/day in summer	
Sun Bathing	Beach-like area	Sunning area of 50 sq. ft./person

DAY NATURE WALK/PATH

Activity Level	Facilities	Site Requirements
Light intensity (birdwatching)	None	Undeveloped
(Organized) nature appreciation	Trails Guides Housing for guides Sanitary and water Access roads and parking	Adequate fastland nearshore Interesting vegetation Sewer or septic tank Water supply or well
Historical site appreciation	All of above	Historical site
Picnicking	All of above Table sites: Tables 5-50 @ rate of 1/4000 annual visitors or 5.5 people/ table/day Bar-B-Que pits, 1/table Minimum 1 parking site/table Some table shelters if no tree cover exists Ball Fields Volleyball, tennis, horse etc. courts	Stands of shade trees desired, level, grassy, mostly dry land with good drainage proximity to crowd drawing features (ie, swimming, fishing, boating, etc.)

TRAILS/RIDING

Activity	Facilities	Site Requirement
Horseback Riding and Hiking	Compact dirt trails with good drainage	Moderately fastland for trail development (no "bottomless" mire)
Hiking and Bicycling	Semi-paved roads - 8' wide Paved trails Resting spots (benches) Water	
Motorcycling and Trailbiking	Access roads and parking Hard Paved surfaces 10-12' wide Supervised track area Non-Erodable areas Trail bike course Track (hard) Water supply	Removed from residential or wildlife areas because of noise

CAMPING

Activity Level	Facilities	Site Requirements
Day picnic	(covered in Day Nature Walk/Path)	
"Rough-it" camping	Key attraction such as fishing, view, etc. Campgrounds (clean ground, campfire area, paths) Access Road Parking Fire safety area Portable water and sanitary facilities Lights (optional), electrical hookups	Area of reasonable fastland Proximity to Electrical connections (powerlines)
Developed Campground	Trash collection Sanitary/water/power connections Recreation facilities (ball park, playground, tables, etc.) Restrooms within 500'-1000' of access paths to sites Well-drained level Grounds for tents 1 site/5 campers daily or 1/7,500-10,000 annually Campsites 7 parking places in size at minimum Regular trash collection	Near utility hook-up, increased area 15 sq. ft./tent site and 100' between sites

OTHER WATER SPORTS/ACTIVITIES

Activity Level	Facilities	Site Requirements
Water skiing	Boating Facilities (see boating) Water surface area	1-5 acres/boat Protected waters Controlled depths and absence of rocks, sand bars, etc.
	Skiing areas marked Areas clearly marked	
Rowing and Canoeing	Adequate Docking, water depths etc. (see Boating section)	Protected waters Absence of strong currents and waves 1/3-1 acre/boat or 1/2 mi/canoe
	Road access and parking	
Excursions/Tour Boats		Proximity to historical or sites of interest, restaurants, food concession, tourist facilities

General Criteria

1. Vegetative wind barriers if 90% of area is barren.
2. Regular trash collection necessary especially for camping
3. Sanitary facilities
    a.) site pot type toilets must be above 50 year flood level or as state health code stipulates, i.e., no flood height/water table
    b.) No restriction on portable toilets other than emptying and maintenance
4. All areas proposed for people-intensive activities must be able to be controlled as far as pests and pest problem; insects in particular (see sheets attached).
    a.) ditching
    b.) spraying
    c.) control areas
    d.) trapping

Appendix B

Insect Control: Problems in the New Castle County Water-Based Recreation Potential Sites

Mosquitoes

In general, mosquito control (to a greater or lesser extent depending on the site) would be desirable for all potential recreation sites. This is particularly true where night time activity (i.e., lighting, ball fields and courts, campsites, etc.) is envisioned. This arises from the fact that female mosquito feeding (biting) has been shown to have two peaks: between sunset and dusk, and later on in the evening before dawn (sunrise).[1]

There are two broad types of mosquitoes that inhabit the areas in question: the urban/near-urban woodland types (culex), breeding in sewers, pipes, and permanent or impounded stands of fresh water, and the flood-water type (aedes vexans), residing in flood and/or tidal, brackish marsh areas. Due to the presence of these two generic types of mosquitoes problems with control fall into two categories: woodland/urban mosquito control above the C&D Canal and marsh mosquito control below this area. There is one notable exception to this guideline, the Cherry Island area. This area has had much data taken to support the conclusion that both types present significant problems. The recorded average trap count per evening (in season) is in excess of 250 females.[2] This is 10 times the defined "problem level" of 25 female/night (as defined by the State of Delaware and the University of Delaware Department of Entomology).

The presently employed methods of control include ditching, drainage, and local larvacidal spraying of standing waters. However, onsite light traps have been and can be effective in small areas.

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[1] Dr. Robert Lake, Dept. of Entomology, U. of Delaware

[2] "Summary of Mosquito Trap Collection Records by Species and Location, Delaware June-September, 1975", report by Dr. Robert Lake to the Mosquito Control Section DNREC, State of Delaware.

Biting Flies

Biting flies, known by the group name of "Tabanid" occur to a very significant extent in all New Castle County shoreline areas which border on or near brackish or salt marsh areas. The main problem period for these pests is during sunlight hours from June through September. Peak attack (biting) period during the day is late afternoon. Therefore, any recreational areas in this region designed for extensive daytime use incur potential control problems.

In general, sites north of Cherry Island to Port Penn may have an annoyance problem though nothing considered severe. The area from the Delaware Memorial Bridge to Port Penn, however, may have some local deer fly, freshwater and salt marsh greenhead fly problems. Normally this should not constitute a severe restriction on land use and may be alleviated with traps. The one exception to this is the area adjacent to the C&D Canal where fly populations are more concentrated and an associated biting gnat problem often is severe. From Port Penn south, the Salt marsh greenhead and deerfly problem is severe, peaking in the marsh near the Smyrna River. In Woodland Beach, just south of the Smyrna River, for example, Dr. Paul Catts of the University of Delaware Entomology Department has collected in excess of 1,000 female greenheads per hour (during peak season in July), all seeking a blood meal. The problem in this area is compounded by the long flight range of the greenhead, the viscousness and repetitive of attack, and the proximity of adjacent upland livestock areas which provide excellent feeding grounds for the oviproducing females.

Dr. Catts suggested that he would expect that the Augustine Beach, Bay View, Blackbird Creek, Liston Point, Collin's Beach areas would be severely infested. Dr. Robert Lake, also from the University of Delaware Entomology Department, corroborated this opinion with personal observations from the Blackbird Creek area.

Control for these tabanids usually is confined to local site trapping. With the current methods which are usually employed, heat/CO_2 traps or black gumshoe panels, Dr. Catts stated that it was possible to effect small area control. He trapped more than 300,000 greenheads in one season at Woodland Beach which significantly reduced that area's problems. Such intensive trapping efforts at potential park sites in these areas would seem to be a necessity.

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TASK IV

RECREATION DEVELOPMENT SCENARIOS

INTRODUCTION

The purpose of Tasks I through III was to provide the investigators with sufficient information and background so that a list of the most feasible development alternatives could be established. In Task IV, five development alternatives will be presented. These scenarios are not recommendations but are preliminary alternatives to be evaluated by the Shoreline Committee. They are intended to provide a wide range of ideas for discussion. A public survey to be developed in Task V of this project will evaluate a more refined set of alternatives.

DEVELOPMENT SCENARIO: BICYCLE PATHS

Bicycle paths along the Delaware River or with access to the river provide people with a low cost visual experience and healthy exercise. Tasks I and III indicate a high unsatisfied demand for bicycling and several sites where the activity is compatible with the shoreline. Task II emphasizes the need for urban access to bicycle paths for recreation and the transportation opportunities provided by bicycle ways.

Several areas south of Wilmington to the C&D Canal appear to offer exceptional opportunities for bicycling near the Delaware River. These areas are in close proximity to the cities of Wilmington, Newark, and New Castle, and are easily accessible by good roads. The shoulders along these access roads are not always adequate in using the bicycle as the mode of transportation to the river, however. Although outside of our study area, the Delaware River Park proposal north of Wilmington along the I-495 corridor offers additional recreational opportunity for bicycling along the Delaware River.

City of New Castle

In New Castle there are several areas where bicycle paths along the Delaware River appear feasible. A limited bike-pedestrian way already exists along the Delaware River shoreline through Battery Park. It is of insufficient length to satisfy any real biking demand and is reaching the point of overuse on peak demand days. Therefore, extension of this bike pedestrian way is of primary importance. Plans were developed by Richardson Associates, in conjunction with

flood control plans north of Battery Park, for the extension of an existing dike structure which will be constructed in a manner that will support bike and pedestrian use from the sluice gates at Broad Creek extending through a small existing playground and tying into historic New Castle. This will make the existing bike/pedestrian way in Battery Park easily accessible. Development of these plans will serve to decrease any unsatisfied demand in the New Castle area for bicycling and walking for pleasure.

The area south from Battery Park beyond Deemer Beach to Army Creek provides another bicycling opportunity since a path and dike exist for much of this distance. Access to this path exists at Rt. 9 south of Deemer Beach and the southern end of Battery Park. This area would seem to have several positive features: 1) its location being somewhat removed from the end of Delaware Avenue would relieve crowding in old historic New Castle, 2) its length along the river (around one and a half miles) would afford a meaningful bicycling experience especially when connected with Battery Park and the Richardson Associates proposal north of New Castle, and 3) the existence of an open tidal marsh north of much of this stretch provides a scenic view for bicyclists on the side of the path away from the Delaware River.

Between New Castle and Delaware City

Bicycling as a way of experiencing the Delaware River south of Army Creek and north of Delaware City should utilize Rt. 9. If Rt. 9 were improved so that safety of bicyclists is assured, this road could provide several views of the river for bicyclists. In addition, excursions off of Rt. 9 towards the river along paths is

feasible. A potential excursion point with interesting views of the river is just south of Ommelanden to the mouth of Red Lion Creek. A dike and paths exist along Hamburg Cover making it possible to reach the River from Rt. 9 with minimal investment.

Delaware City, Governor Bacon Health Center, and the Chesapeake and Delaware Canal

The earthen dike along both sides of the C&D Canal provides an excellent recreational opportunity for bicyclists. There are numerous points of access to the dike (especially on the north side) convenient to large segments of the population of New Castle County. In addition, the connection of the dike to Delaware City, the Governor Bacon Health Center, and Lums Pond enhances the recreational opportunities further.

The eastern access to the C&D Canal may require some improvement. Currently, from Delaware City, access to the canal for bicyclists can proceed along Cox Neck Lane (Clinton Street) south to Biddle Point. From the Governor Bacon Health Center, access would have to proceed via Delaware City since no bridge exists across the Delaware City Branch Channel at the C&D Canal. The construction of a bridge across the Channel at the C&D Canal with access paths from the dirt road adjacent to Rt. 9 would significantly improve access from the Governor Bacon Health Center. In addition, this would afford the opportunity for a view of the entrance to the C&D Canal at Reedy Point.

Any promotion of recreation along the C&D Canal would require cooperation between the U.S. Army Corps of Engineers, the State of Delaware, and New Castle County. The Army Corps has expressed to the State an interest in allowing non-destructive uses of the Canal

dike (i.e., excluding abuse by motorized vehicles such as trail bikes and motorcycles).

Evaluation

In order to evaluate the various bicycle path proposals, detailed cost and usage data are required. Although cost data could only be obtained after a detailed plan is formulated, demand data can be generated as part of the survey to follow Tasks I through IV. The survey should seek to establish the type of bicycle experience most preferred, levels of usage, and access routes to the River most frequently used. In addition, extensive cooperation with the State Department of Transportation is required for access and Route 9 itself to be made safe for bicyclists.

RECREATION DEVELOPMENT SCENARIO: OMMELANDEN

The need to preserve open space for passive recreation, such as nature walking, in New Castle County, combined with growing residential development along Routes 13 and 40 to the south and west of Hare's Corner, make Ommelanden an important focus for future recreation development. The purpose of this scenario is to outline an appropriate strategy for developing the full recreation potential of the site, currently owned by New Castle County.

Physical Features

Ommelanden consists of approximately 240 acres of land on both sides of Route 9, bordering along the Delaware River and located between the City of New Castle and Delaware City. The property, a former estate, is comprised of various types of land configurations. Approximately 40% of the site is marshland bordering on the Delaware River while roughly 20% is mature woods which include several specimen trees, a bamboo stand, and dense shrubs. The remaining 40% is made up of fastland that is currently being farmed.*

Recreation Development

The results of Task III illustrate the inappropriateness of this site for development as a marina facility because of physical limitations. But because of the variety of land configurations

*These percentages are only estimates based upon visual observation of aerial photographs of the site. Actual percentages may vary.

mentioned earlier, Ommelanden has the potential to support various other types of recreation activity.

Taking into consideration the unique physical characteristics of the marshland and densely wooded areas, steps should be taken to preserve the natural features of the property while making them accessible for low intensity use through the development of a system of nature trails. This development should receive emphasis because of the high priority Nature Walking received in the results of Task I.

The focal point of the nature study portion of the Ommelanden scenario would involve construction of a nature center and necessary parking area on fastland adjacent to the wooded area. The center would include appropriate displays or exhibits emphasizing the site's history and various aspects of the wooded area and tidal marsh.

Task II emphasized the importance of making the shoreline accessible at every point possible. Therefore, it is suggested that the network of trails be extended to the fringe of the marsh, as close as possible to the river, to afford a clear view of the water resource.

Having taken into consideration the need to preserve the unique physical characteristics of the site, development considerations turn to the potential of the large tract of fastland lying on both sides of Route 9. This land is currently being farmed so that its nature study potential is minimal.

Because of the close proximity to the City of New Castle and the expanding residential developments along Routes 13 and 40, this fastland could be developed into a multiple-use, active

recreation area. This active recreation area would help relieve congested conditions in Battery Park, and also provide apparently needed facilities for nearby residential communities where very little parkland for active recreation currently exists. Activities that should receive consideration are court games, field sports, picnicking, bicycling, jogging, pool swimming, horseback riding, and, if possible, primitive camping.

Furthermore, it is important that provisions be made for construction of bikepaths between the park and nearby residential developments including New Castle, Llangollen, Beaver Brook, Wilton, etc. These bike paths could then tie in with any coastal bikeway that is developed.

The goal of this scenario is to strike a balance between preservation of unique physical characteristics and provisions of what, at this point, appears to be much needed active recreation facilities. In order to facilitate attainment of this goal, it is suggested that a buffer area, with no specific recreation development, separate the nature study area from the active recreation areas.

If Ommelanden is developed with this balance in mind it could serve as the hub of a corridor system of recreation development along New Castle County's Delaware River shoreline, acting as an attraction to the shoreline area while at the same time fulfilling the recreation needs of a growing nearby community.

Boating Facilities

This scenario will develop some general considerations for boating facility development and explain how a preliminary recommendation for use of the Governor Bacon area as a marina was obtained. In addition, other boating alternatives will be described.

Demand for boating facilities was ranked number 5 from the composite of demand studies and quite high (depending on boating category) by the recent Sea Grant survey. Surveys of marina operations both locally and regionally indicate demand has outstripped available slip capacity. The distance people are willing to travel for day or weekend trips appears to be dropping and water quality on the Delaware River is slowly improving. Surveys of other urban area water-based recreation developments and plans suggest that boating facilities are a beneficial addition to other shoreline activities and an essential portion of many of these developments. This information, although far from definitive, suggests potential demand for additional boating facilities.

One category of boating facilities, marinas, are a particularly valuable resource to an area because they are generally thought to be aesthetically appealing, generate revenue from users, spur local economic activity in boat sales, maintenance and repair, and service industries such as food, fuel and supplies. Marinas can be designed to have a minimum ecological impact, and can complement many other shoreline recreation uses such as fishing, walking, bicycle riding, scenic historic appreciation, swimming, camping, and picnicking. For these reasons marina development options should be evaluated more fully.

Marina facility options (size, dock types, services offered, etc.) are numerous, but a few general guidelines extracted from other areas should be recognized. The rise in slip rental charges has generally not kept up with the doubling of coastal land prices and interest rates over the last 8-10 years. As a result the low return on invested capital makes it difficult to develop new private marina facilities. Examples are, the financing difficulties of the recent Port Penn project and the fact that no new marinas have been built on the Texas coast in the last 9 years. This situation suggests that if new marina facilities are to be built on the Delaware River shoreline, some form of governmental support (perhaps in terms of land) will be needed and that a location with minimal investment requirements should be selected. Another general consideration is that traditionally, income from slip rental can be equalled by income from sales of food, supplies, fuel, and service and repair, usually with smaller initial investment. This suggests that for maximum economic viability a marina facility should offer these services. Another consideration is that although there appears to be a demand for wetslips, there is no corresponding demand for additional launch ramps at this time. Those ramps available appear to be used almost exclusively by Delawareans at a low use rate compared to downstate ramps. However, the most recent data available at this writing is from 1973. Use may have increased significantly in the last three years in response to higher transportation costs and improved water quality and fishing in the Delaware River.

All of these considerations combine to suggest the best marina alternative would be at a site that allowed at least 6' draft at low water, be self-scouring (require minimal dredging), have

sufficient dry land to allow for dry storage, maintenance, service yards, marine stores, and restaurant (preferably with a view of the river), be closely tied in with other recreation activities such as nature walks, bicycling, camping, etc., and be relatively near to both urban areas (to minimize travel time) and to the lower portion of the river and upper bay (where fishing is perceived to be better).

Several sites have the required water depth: Pigeon Point, Swan Creek, New Castle, Delaware City, Governor Bacon, St. George's Creek, Port Penn, Augustine Beach, Collins Beach, Smyrna River. Of those publicly owned, Pigeon Point is used in a way which could conceivably inhibit recreational activities (other than organized flyswatting), New Castle and Delaware City already have substantial development, and Augustine Beach has severely limited land available for onshore facilities. This leaves Governor Bacon which has good water depth near shore, ample land, proximity to historical sites, and potential for a tie-in via bicycle routes to along Rt. 9 and the C&D Canal. The marina could be built and operated by a private concession, thus minimizing state administrative costs. Obviously, no unfair competition with wholly private facilities would be allowed.

Another marina development option which must be recognized is that sites presently in private ownership could be developed as marinas. This could be facilitated either by governmental acquisition or encouragement through tax adjustments or low interest loans. A special analysis of this option would be required if it is determined that existing public lands are available and demand for marina facilities is strong.

Other boating facility options include mooring facilities (similar to the New Castle Sailing Club) located near shore. Onshore

facilities needed would include locker space, dinghy storage and limited dock space. The mooring option could be considered as a first stage in the development of a larger marina. The list of potential sites is larger since initial investment is lower, but the most promising appear to be New Castle, Governor Bacon, Port Penn, and Augustine Beach.

A final boating option to be considered would be for short-term floating dock facilities at New Castle. This would allow water access to New Castle thus reducing parking congestion. Short term docking is already available, (although not encouraged) along the bulkhead at Delaware City. This short term docking option could be used for excursion boats as well as private pleasure craft.

The information needed to evaluate these options includes detailed cost data and extensive data on the preferences and willingness to pay of the general public and specifically the boating portion of the general public. Cost and extensive boating public preference data are beyond the scope of the upcoming survey. These activity specific and site specific studies should be conducted if further definition is needed.

This survey can estimate public preferences between alternatives, estimate the degree of concern, if any, over recreating in close proximity to industry at the Governor Bacon site, estimate the value placed on having boating facilities in closer proximity to population centers, and estimate the value that participants in other activities place on their activity taking place near water and boating facilities. These estimates of public preference (and willingness to pay) should help decision makers make the best possible use of the New Castle County Shoreline.

DEVELOPMENT SCENARIO: CITY OF NEW CASTLE

The greatest and most obvious attraction of the City of New Castle involves historical appreciation. It is the objective of this scenario to incorporate that historical attraction into a plan for innovative development and then to extend the levels of development to include multiple use facilities.

New Castle may be the focal point but is not alone in its historical significance. The cities of Wilmington and Delaware City both have historically valuable areas that lie directly on the water. It is recommended that this chain of historical significance, easily accessible by water, be linked by the development of a river excursion/tour boat activity. The potential of this activity goes beyond simple recreation and may be an aid in giving rebirth to the river as a passenger service link between urban areas.

Before the age of the automobile the river ferry/excursion vessel was extremely common on the Delaware River and C&D Canal. The Ericsson and Wilson Lines were successful in providing passenger transportation up and down the river. Of course, like so many other things, the automobile changed all that. But now, in conjunction with the Delaware County, Pa. Bicentennial celebration, a more modern form of the excursion vessel has returned to the Delaware River. A hydrofoil tour of the river has been in operation only since July 1, 1976 but already the operators see a strong future. They hope eventually to be able to provide inexpensive, appealing, yet rapid commuter service between Delaware County and Penn's Landing in Philadelphia. This combined potential of recreation and urban commuter service makes

the river excursion vessel appealing to any urban area with sufficient access from the water.

Potential Development: Level 1

Sufficient historical attraction already exists at three New Castle County sites along the river. Level 1 development would include the construction of floating dock and gangway facilities of sufficient length and at appropriate depth for the excursion vessel used. This level of development would create a linear system of historical attraction based on existing sites while providing access to the urban area, without increasing traffic congestion. The activity at this level would be a combination of esthetic and historical appreciation. These floating dock facilities could be large enough to provide short-term docking for private pleasure craft. Private craft would obviously have to be kept clear of the excursion boat dock.

Level 2:

Placing emphasis on the City of New Castle as the chief attraction of the river tour, additional support facilities would be developed there as a Level 2 option. These facilities would include integration into a coastline bikeway, nature trails, improvement of the old ferry landing site to make it more esthetically appealing and possibly an information center for historical appreciation and excursion boat activity, and construction of an additional fishing pier near this site. For this option the excursion vessel desired would be such that passengers could bring their bikes and fishing gear aboard and gain access to areas outside the urban center to participate in these activities without having to use their automobiles.

Under Level 2 the linear system of recreation facilities would be retained but a much broader range of activities would be integrated into it.

Level 3:

Picnicking is an important activity associated with biking, walking for pleasure, and boating. And facilities for more active recreation such as field and court games are natural complements to picnicking. Under the Level 3 option picnic and field game facilities would be developed on fastland north of the city bordered by Broad Creek and Route 9 north of Ferry and Chestnut Streets in order to complement and fulfill the recreation potential of Level 2 development. Level 3 development would result in a linear system with participation in multiple activities.

At this point there seem to be two major problems that, assuming sufficient demand exists, would prevent development of the above scenario. The first problem involves the high costs of purchase and operation of an excursion vessel as well as the cost of dock facilities necessary for it. This problem may not be as significant as it could be. The operator of the excursion vessel between Delaware County, Pa. and Philadelphia has indicated that he would be interested in extending his service south into the Delaware area provided sufficient demand can be shown to exist and necessary dock facilities are constructed. If sufficient demand can be shown to exist (possibly through the survey following Task IV of this project), the vessel will be available provided there are no other extenuating circumstances. The only additional cost will result from the construction of docking facilities. The facility necessary, a short-term floating dock, requires a minimal investment.

The second problem that would block development of this scenario at any one of the three levels results from the willingness of the people and officials of the City of New Castle to accept new development. In order to establish some background on the situation it should be noted that plans developed by Richardson Associates for improvement of the old ferry landing along with creation of a dike-top bikeway and development of picnic and field game facilities were not received warmly by the residents and officials in 1975. Therefore, if this feeling persists the County should explore the option of Level 1 development (excursion boat docking only; no related development) in the City of New Castle. Any additional or related development should take place at another site where the excursion vessel could dock and public opinion would be more receptive. This last option could be exercised at the site of marina development.

DELAWARE CITY/PEA PATCH ISLAND AND GOVERNOR BACON PROPERTY AS A MULTI-PURPOSE SITE

Introduction

One scenario for development arising directly from the recommendations of Task II, is that of the multi-purpose shoreline recreational site. This alternative has the obvious advantage of offering a variety of different and complementary activity opportunities at a single location. Public appeal for and use of a site for one particular activity (i.e., camping) may be enhanced by the existence of other varied experience opportunities (i.e., fishing, boating, bicycling, etc.). Multiple usage of basic facilities (access, power, personnel, etc.) can decrease initial unit costs and increase chances for operational success.

Using the rating system in Table III of Task III, the site suitability ratings for the various sites were compared. It was determined that the Governor Bacon/Delaware City area rates the highest in terms of physical suitability. This conclusion is reinforced by noting that lands in this area are presently in public ownership and can be tied into other facilities such as bicycle/hiking paths along the C&D Canal.

Delaware City

Significant state funds are now appropriated to establish a Delaware City Visitors Center Complex to complement the Old Fort Delaware facility. This work is now underway. Money is to be spent on bulkheading, recreation, and cleanup of the old canal and plans include possible barge trips, benches and walkways. Bank fishing is available at this time.

The recreational value of the Delaware City facilities could be enhanced by improving opportunities for historical appreciation, for instance, by providing walking tours of Delaware City (perhaps with cassette recorders or guides) and allowing or encouraging access to both Delaware City and Fort Delaware by excursion boats. Another possibility would be to enhance the historical value of Delaware City by berthing an historical vessel (preferably a "tall ship") at the old Getty slip adjacent to the present county waterfront property. Use of the old canal could be encouraged for canoeing or rowing by boat rental operations, and its banks might be used for horseback riding and bike trails.

Finally, attempts can be made to tie the Delaware City area into a larger scheme of development with bike trails connecting New Castle County population centers with the town of New Castle, the Governor Bacon property (as a developed site), C&D Canal recreation areas: Reedy Point, Summit, Lums Pond. This final suggestion necessarily requires investigation and cooperation with U.S. Army Corps projects and Delaware State plans.

Certain potential problems which could impede development must be recognized. Delaware City plans and wishes must be considered as would state plans and financial limitations.

Governor Bacon Property

This complex is administered by the Delaware Department of Health and Social Services, and is used for a range of health services including treating children/adolescents with emotional and/or social problems.

Other tenants, using areas but not having control or ownership of the lands include: Civil Defense, 3 warehouses, 1 bunker, and

State of Delaware Central Purchasing with 2 administration buildings and a parking lot. The U.S. Army Corps of Engineers maintain hydraulic dredge disposal areas adjacent to the Governor Bacon complex. Little problem is foreseen with cooperation and use of portions of this land given a reasonable development plan in advance. There exists a possibility to tie into Army Corps C&D Canal master planning and state plans (Spring 1977).

Suggestions for site development fall into four intersecting categories, boating and fishing, camping, expanded active recreation, and as an access point for C&D hiking/biking/horseback riding trails.

Governor Bacon appears particularly well suited to boating and fishing facilities because of good water depth near shore, moderately good wave protection, good fastland, access roads and utilities, and a minimal problem with wetlands (both permits and mosquitos). It is a potentially good camping area either on an overnight or organized (space rental) basis. Roads and utilities are present and some usable buildings exist. Governor Bacon has proximity to fishing, boating and at Pea Patch Island, historical sites, and nature areas. There is some possibility for an artificial wading/swimming area on the river. It is also an excellent area for horseback trails and there already exists a small stable operation on the grounds. There is a good opportunity to connect with existing Army Corps C&D Canal access roads as trails out to developing recreational areas at Reedy Point and Summit-Lums Pond. Also it is a good site for a day picnic/outing area since there is ample room for traditional outing activities and active sports with a river enhancement. This could also fulfill potential increased population needs for local parks as land speculation has already begun in and around the C&D Canal area.

Potential problems which could affect development include inter- and intra-government agency conflicts of interest, potential for industrial installations adversely affecting use of facilities, the possible need for separation of park users and hospital patients for reasons of health, safety, and/or embarrassment, the need to patrol C&D trail areas against motorized abuse of dike banks, and problems with using county dollars on federal lands (there is no recreation funding available from the Army Corps).

Discussion

In order to ascertain the likelihood of success of multi-activity facility at the Governor Bacon/Delaware City site, certain inputs from the public should be obtained. First, given an accurate description of the area and possible recreational options, the public preferred mix of activities should be determined. Data are needed on public willingness to use this facility (in various forms) and, to what extent, and how much they would be willing to pay in user fees. Further the public conception of this site with regards to its proximity and compatability with existing heavy industry (Getty, DP&L, etc.) must be surveyed. Finally, alternative choice data should be solicited (i.e., "would you use this facility as opposed to traveling to. . .").

Another piece of information which could be useful concerns the public conception of the Delaware River at this location and willingness to swim in its waters (provided hard water quality data supports this) versus a swimming pool facility. Yet other considerations for which public opinion could be of value are the public reaction to a recreational area coexisting on this tract of land with a state

health facility and link ups with Army Corps and state projects along the C&D Canal.

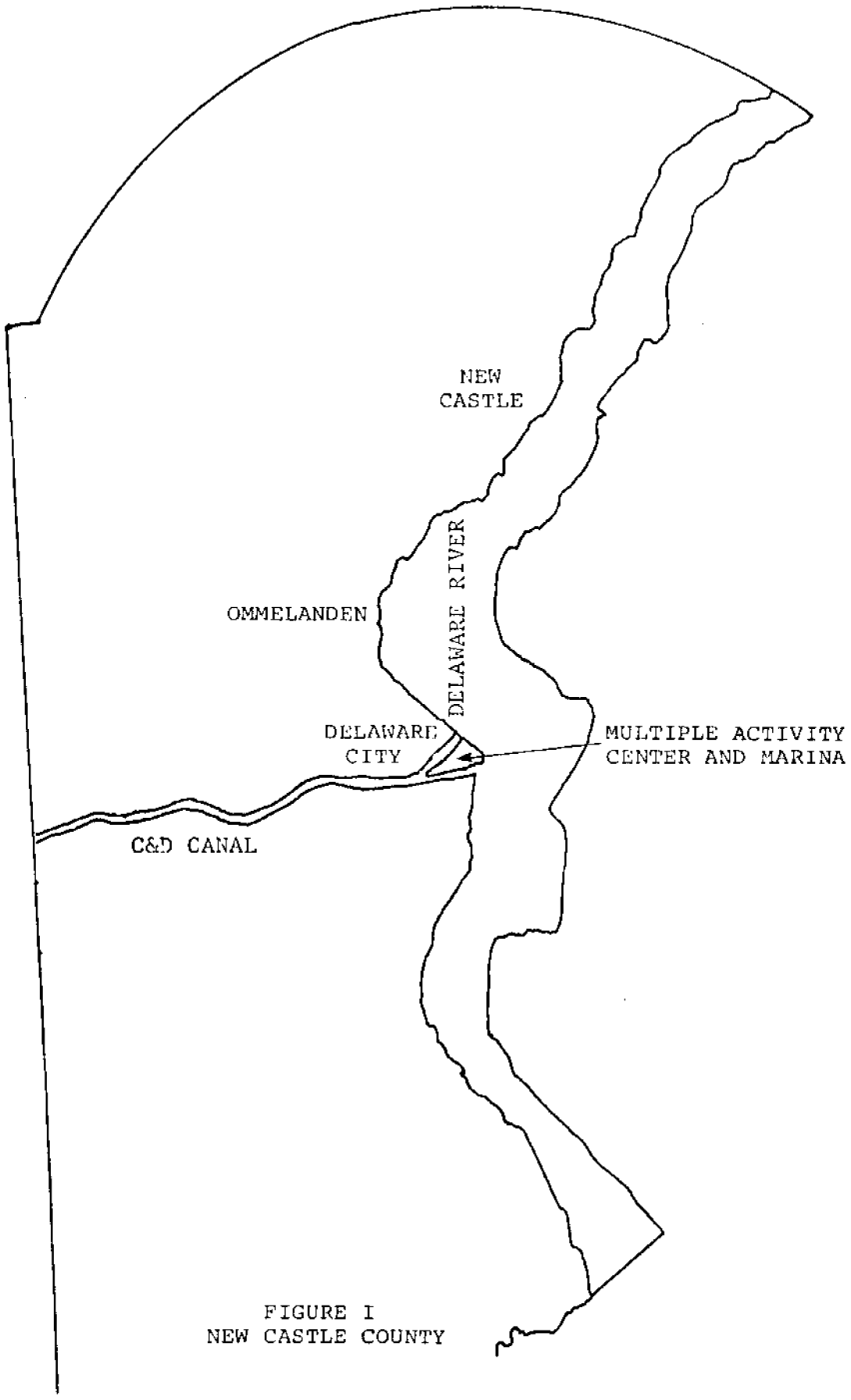


FIGURE I
NEW CASTLE COUNTY

TASK V

WORKSHOP TO DISCUSS PRELIMINARY RESULTS OF THE SHORELINE STUDY

The workshop was constructed in the following manner.

First, Dr. Paul Jensen of the College of Marine Studies, University of Delaware, opened the meeting by summarizing the history of the development of the project.

He was followed by Dr. Lawrence Donnelley, Department of Economics, University of Delaware, who gave an overview of the methodology of the project.

Richard Kirk and Charles Brine briefly summarized the first three preliminary tasks which led up to the development of the five scenarios. These three tasks included a preliminary demand estimate, a group of recommendations based on information gathered from recreation planners throughout the country and finally a physical evaluation of shoreline sites for recreation suitability.

Finally, Dr. Richard Agnello of the Economics Department ended the formal discussion with a summarization of each scenario. This presentation was followed by a question and answer period, moderated by Paul Jensen.

MINUTES OF THE SHORELINE STUDY WORKSHOP
ON JULY 29

Presentations were made by the Shoreline Study Group on Tasks I-IV. Afterwards a very useful question and answer period took place.

Ken Dodunski, from the City of Wilmington Planning and Development Department, asked why the mouth of the Christina River was defined as the northern boundary of the study area. Paul Jensen replied that since the County owned and had plans for a large portion of the land along the river north of the Christina that they were only interested in the shoreline south of the mouth of the river.

Leah Roedel mentioned that construction of a boardwalk through the marshland had provided access to interesting points in the Cape Cod area and suggested that development of such a facility would provide an interesting nature study experience here.

Tom Pendleton, Bicycle Consultant to the N.C.C. Bikeways Plan, said that he was pleased to see that bicycling received emphasis in the development scenarios. He also made the following suggestions: in order to provide urban access the excursion boat along the shoreline could double as a bike ferry so that people would not be forced to drive their cars great distances in order to access bikeways; secondly he stated that Rt. 9 near the Getty property was not a suitable place for a bikeway and suggested looking into a coastline bikeway in this area.

Mr. Pat Marinelli, City Councilman from New Castle, questioned why Task III gave the New Castle area such a low rating for extensive swimming, rowing, and canoeing. Charles Brine replied that the fecal

coliform level at mid-channel off New Castle was not up to standards for extensive swimming and, due to the existence of industrial ship traffic, rowing and canoeing were not recommended.

Sonya A. Brown from WILMAPCO asked how the scenarios were developed. Lawrence Donnelley replied that the results of Tasks I through III along with some qualitative judgments served as guides. Ms. Brown then asked whether the scenarios should be considered separately or as a group and was told that the scenarios could be considered individually or integrated into a linear system. Finally she asked if specific objectives had been set up for evaluating the scenarios. The reply from Paul Jensen was that public input would serve as the guide for evaluation.

Robert Hill from the City of New Castle expressed concern over the cost of developing the scenarios. Paul Jensen replied that the only financial constraint was to make reasonable recommendations. Mr. Kelly questioned the method of acquiring title to property. This question was directed to Dick May of New Castle County Parks and Recreation who responded to the question by stating that at this point acquisition of property is not relevant. Few constraints had been placed upon the study at this point. Feasibility of any specific recommendations would be considered at a much later point.

Mrs. James H. Earle, Executive Secretary of the New Castle Historical Area Commission, pointed out the need to get the opinions of the people, particularly those in the City of New Castle, whose life-styles would be effected by development of the New Castle scenario. She pointed out that development would cause congestion in the Battery Park area and that costs of providing facilities for additional visitors would be considerable.

Mr. William Press, mayor of Delaware City pointed out that Rt. 72 was being improved in the Delaware City area and would be able to facilitate bikers. He also pointed out two potential problems with development of water-based facilities at the Governor Bacon facility: first, raw sewage has leaked into the Delaware River and caused problems with the water quality there; second, there exists a problem with wave action which he felt would create problems for a marina. He suggested development of a marina bordering the old Canal.

Paul Dentiste of the N.C. County Department of Planning asked if the Corps of Engineers had been consulted concerning plans near the Canal. He also mentioned his interest in upgrading the Old Channel area in Delaware City.

Pat Redden of the State Division of Parks and Recreation pointed out that the Corps of Engineers does not wish to encourage increased pleasure boat traffic in the Canal.

Mrs. Robert Rada from the Delaware Federation of Garden Clubs inquired as to what level of usage was considered successful for recreation property. Pat Redden replied that this level varies greatly for each activity and that the question could not be answered until final definite plans are made.

At this point Dick May suggested that all those in attendance recall the purpose of the workshop: to make general comments so that the investigators could get a feeling as to where to go from here in their survey.

Mrs. Earle then reemphasized the need to consider the impact on the residents of the area. Paul Dentiste suggested that there are two sides of the development question that must be considered, the

impact of recreation development versus the impact of some other type of development. Pat Redden suggested that there is no development without impact and the choice may be between recreational or industrial development. Mrs. Earle felt that this was a form of "polite blackmail" and reinforced her feeling that public input should receive top priority before any development takes place.

Mayor Jack Klingmeyer of New Castle said that he favored giving further consideration to the New Castle scenario but emphasized the need for cautious development. He also stated that he does believe that land development could come down to industry versus recreation development and he would favor recreation development.

Tom Pendleton mentioned that the scenarios fit together and that removing one portion would weaken the whole concept.

Mrs. Roedel agreed and stressed her desire to emphasize urban needs and water-based recreation.

Mrs. Cay Trask, President of the Delaware Federation of Garden Clubs, stated her special interest in the nature study at Ommelanden and emphasized the fact that it would be inexpensive to develop it.

Alton Dahl of the Delaware Friends of Bikecology pointed out his pleasure in seeing emphasis placed upon biking and made some general comments concerning the coexistence of bike and pedestrian ways.

Mayor Klingmeyer, referring to biking in the Battery Park area, said that parking is a great problem in that area. He suggested the idea of developing Ommelanden so that some pressure would be taken off Battery Park. The Mayor then mentioned some confusion concerning the scenarios, stating that they seemed to overlap. He had difficulty in separating them in order to make a choice. Dick May suggested that

in order to get public input at this meeting the scenarios could not be very specific.

Paul Dentiste mentioned the need to get some newspaper coverage of the project and Paul Jensen and Dick May stated that they had no objections.

Richard Agnello asked for input for a 6th scenario. Mrs. Roedel suggested looking at Odessa and Tom Pendleton mentioned the possibility of coordination with parks in New Jersey.

Finally Lawrence Donnelley asked Mayor Klingmeyer his opinion concerning development of a bikeway in New Castle utilizing the extended dike structure and some city streets. The Mayor replied that some opposition would exist and only after he could gauge the intensity of the opposition could he make a definite statement. But he did indicate that he felt the development was feasible and deserved further consideration.

At this point Paul Jensen thanked those in attendance for their input and the meeting was adjourned.

APPENDIX A

UNIVERSITY OF DELAWARE
NEWARK, DELAWARE
19711

July 21, 1976

MEMORANDUM

TO: Those Interested in the Recreation Potential of the New Castle County Delaware River Shoreline

FROM: Lawrence Donnelley, Department of Economics
Richard Agnello, Department of Economics
Paul Jensen, Sea Grant Marine Advisory Program

SUBJECT: Workshop to Discuss Preliminary Results of Shoreline Study Thursday, July 29 at the New Castle City Hall, on the Green

We have completed the preliminary phases of a study of the water-based recreation potential of the New Castle County Delaware River shoreline supported by New Castle County Parks and Recreation Department. The work has included a review and analysis of other recreation demand studies, the experiences of other urban areas and an assessment of the physical suitability of sites along the river for a range of recreation activities. Out of this work we have developed and enclosed with this memo a set of alternative recreation scenarios which appear reasonable and worthy of further study. Are they?

The next phase of our study is to survey the citizens of New Castle County to assess their demand for and willingness to support portions of these scenarios. Before we do this, we need to have the reactions and suggestions of the major communities, agencies and interested groups. We can then modify our scenarios accordingly.

We intend to open the workshop with a brief presentation of our preliminary work and the scenarios. Following this, the floor will be wide open for questions, suggestions, etc.

What we need most are your thoughts on which scenarios are most needed and which should we stress in our public survey, what you feel are the most important criteria for making decisions, which scenarios contain specific ideas you feel are not practical and why, and your special insight and knowledge of the situation.

The workshop should be interesting and hopefully spark some lively discussion. We therefore plan to take complete notes and to incorporate your ideas into the study.

We look forward to seeing you 0930, Thursday morning, July 29 at the New Castle City Hall.

APPENDIX B

MAILING LIST OF THOSE PERSONS INVITED TO THE WORKSHOP

A memorandum announcing the workshop was sent to the following list of individuals along with a copy of Task IV which described the development scenarios.

Richard M. Appleby
13 The Strand
New Castle, Delaware 19720

Richard Bauer
Director of Planning
Engineering Building
2701 Capitol Trail
Newark, DE 19711

Mrs. Paige S. Buckle
New Castle County Parks
and Recreation
Advisory Board
9 North Kingston Road
Newark, DE 19711

Arnold Budin
Wilmington Department of Planning
Public Building
Tenth and King Streets
Wilmington, DE 19801

James Corly, President
The Civic League of New Castle County
800 Sycamore Road
Wilmington, DE 19807

Ralph Cryder, Director
Dept. of Parks and Recreation
New Castle County
102 Middleboro Road
Wilmington, DE 19804

Alton J. Dahl
President, Friends of Bikecology
2117 Meadow Lane
Arden, DE 19810

G. D. Daniello
Secretary
Department of Community Affairs
and Economic Development
State House Annex
Dover, DE 19901

Paul Dentiste, Head
Advanced Planning Division
County Engineering Building
2701 Capitol Trail
Newark, DE 19711

Ken Dodunski
Planning and Development Dept.
Room 358, Public Building
1000 King Street
Wilmington, DE 19801

Mr. Joseph Dombrowski
Water & Swim Management
Department of Public Works
One Peddlers Row
Peddlers Village
Newark, DE 19702

Henry F. Folsom, Jr.
County Executive
Public Building
Wilmington, DE 19801

James P. Gorman
First State RC&D Project Coord.
2-12 Treadway Towers
9 East Lockerman Street
Dover, DE 19901

F. William Haas, Jr.
R. D. #2
Middletown, DE 19709

Clifford E. Hall, Secretary
Dept. of Highways and Trans.
Highway Administration Building
Dover, DE 19901

Mr. Edmund Harvey, President
Delaware Wild Lands, Inc.
5806 Kennett Pike
Wilmington, DE 19807

Mrs. A. Louise Hayland
1203 Red Leaf Road
Carrcroft
Wilmington, DE 19803

Robert H. Hill
Fort Delaware Society
8 The Strand
New Castle, DE 19720

William Hopkins
Manager of Technical Services
Division of Parks and Recreation
Tatnall Building
Dover, DE 19901

Senator J. Donald Isaacs
RD 2, Levels Road
Townsend, DE 19734

M. Martin Isaacs, Secretary
Department of Agriculture
Agriculture Building, Route 13
Dover, DE 19901

Mrs. Robert J. Kallah
518 Kerfoot Farm Road
Woodbrook
Wilmington, DE 19803

David R. Keifer, Director
State Planning Office
Thomas Collins Building
Dover, DE 19901

John Klingmeyer, Mayor
City of New Castle
New Castle, DE 19720

Carl Krienen
Mayor's Office
City of New Castle
City Hall
New Castle, DE 19720

Peter A. Larson
Executive Vice President
Greater Wilmington Development
Council, Inc.
P. O. Box 1790
Wilmington, DE 19899

Darrell Lauder
Director
Division of Fish and Wildlife
Tatnall Building
Dover, DE 19901

Earl MacGuiness, Secretary
Dept. of Health and Social Service:
1112 King Street
Wilmington, DE 19801

William MacGuiness, Administrator
Governor Bacon Health Center
Delaware City, DE

Dr. Albert Matlack
Society of Natural History of DE
R. D. # , Box 137
Hockessin, DE 19707

Richard May
Environmental Research Analyst
102 Middleboro Road
Wilmington, DE 19804

The Honorable G. William Miller, Jr
Mayor of Odessa
City Hall
Odessa, DE 19730

David A. Nash
District Conservationist
USDA, Soil Conservation Service
421 Harmony Street, Room 102
New Castle, DE 19720

Lawrence Newcomb
WILMAPCO
2062 New Castle Avenue
New Castle, DE 19720

Mrs. J. Newlon
108 Waylander Road
Sedgeley Farms
Wilmington, DE 19807

Mr. Thomas Pendleton
2210 Baynard Boulevard
Wilmington, DE 19806

The Honorable William Press
City Hall
Delaware City, DE 19706

Jeff Radley
U.S. Army Corps of Engineers
Custom House, 2nd & Chestnut Sts.
Philadelphia, PA 19016

Leah Roedel
6 Crestfield Road
Wilmington, DE 19810

William Shipley, Chairman
Delaware City Planning Board
Delaware City, DE 19706

Allen Silverman
New Castle County
Department of Planning
2701 Capitol Trail
Newark, DE 19711

Mrs. Marion Stewart
Civil League for New Castle County
407 Brentwood Drive
Carrcroft
Wilmington, DE 19803

Jane Sundberg
State Planning
Northeast Region
Bureau of Outdoor Recreation
600 Arch Street
Philadelphia, PA 19106

Councilman Joseph F. Toner
144 East 3rd Street
New Castle, DE 19720

Norman Wilder, Director
Delaware Nature Education Center
P. O. Box 3900
Greenville, DE 19807

APPENDIX C

List of Those Attending the Workshop

Name	Organization
Mrs. James H. Earle, Exec. Sec.	Historic Area Commission
Sonya A. Brown	WILMAPCO
Paul G. Dentiste	New Castle County Dept. of Housing
Alan Silverman	NCC Dept. of Planning
Leah Roedel	RC&D - Civic League
Robert H. Hill	Historical Soc. Planning Comm.
Bill Press	Delaware City, DE. (Mayor)
Douglas P. Lloyd	New Castle Co. Parks & Recreation
Mrs. Robert Rada	DE. Fed of Garden Clubs
R. E. May	NCC Parks & Recreation
Marion Steward (Mrs. C.A.)	Civic League for New Castle County
Cay Trask (Mrs. J. H.)	Del. Federation of Garden Clubs
Tom Pendelton	Bicycle Consultant - New Castle County Bikeways Plan
Helga Ganci	AAUW
Roxanne Harris	AAUW
Bud Gorman	RC&D Dover, DE
David S. Hugg III	Del. Coastal Zone Program, State Planning Office
Jack Klingmeyer	New Castle City
Pat Marinelli	New Castle, Del-City Councilman
Alton J. Dahl	Del. Friends of Bikecology
Pat Redden	State of Del. Div. of Parks & Recreation

APPENDIX D

UNIVERSITY OF DELAWARE

NEWARK, DELAWARE

19711

August 4, 1976

M E M O R A N D U M

TO: Those Interested in the Recreation Potential of the New Castle County Delaware River Shoreline

FROM: Lawrence Donnelley, Department of Economics
Richard Agnello, Department of Economics
Paul Jensen, Sea Grant Marine Advisory Program

SUBJECT: Summary Statement of July 29 Shoreline Study Workshop and Intended Plans of Shoreline Study Group

Attached you will find the minutes of the workshop conducted on July 29 concerning the preliminary results of the N.C.C. Shoreline Recreation Study. We thank the members of the Committee for their cooperation in making the workshop successful.

It is the consensus of the study group that all five scenarios received favorable responses at the workshop and that each should be considered in the design of the survey instrument under Task VI. It is also our feeling that a linear system of development, including at least the basic characteristics of each scenario, was very well received by most persons present at the session.

Our original intention was to design a survey instrument that would evaluate a limited number of the scenarios. However, the strong interest in a linear system including parts of all five scenarios suggests that a new approach to design of the survey is appropriate. We suggest the following strategy for design of the survey:

> Extract from each scenario the strongest or most basic point of that scenario (e.g., development of an excursion boat dock is the most basic point of the New Castle scenario); organize these strongpoints into a general corridor recreation development scheme along Route 9, and then survey a random sample of New Castle County residents on that scheme.

This approach to the survey would enable us to gather demand information for development of a linear system comprised of all or any combination of the scenarios.

Feedback from the Shoreline Committee concerning the above strategy is necessary before we can proceed. The need for a prompt reply is important since the survey is scheduled for September.

We would also like to request all interested persons at this time to submit to us ideas or specific questions for possible inclusion in the survey. Once the survey instrument is established, it is both costly and time consuming to alter it.

It is our intention to meet with the County officer for the Shoreline Study during the week of August 30th to present the survey instrument.

np

TASK VI

SURVEY RESULTS

TASK VI

INTRODUCTION

In order to establish the attitudes of New Castle County residents towards river based recreation in general and the five scenarios proposed in Task IV in particular, a county-wide survey was undertaken. In October and November of 1976, 399 households were interviewed in person by trained personnel of the College of Urban Affairs at the University of Delaware. The sample was selected from a previously determined and much larger random sample of households collected by the College of Urban Affairs. Since demographic characteristics such as family size, income, housing characteristics, etc. were already established for the larger sample, our subsample could devote more interview time to the development scenarios and still have available the household's demographic characteristics as established in the larger sample.

Approximately 50 households were randomly drawn from each of the first seven planning districts in New Castle County and a total of 50 from the last three southernmost districts of Central Pencader, Red Lion, and Middletown-Odessa-Townsend. In this way results for individual districts have some statistical reliability. However, since the actual number of households in each district is not in the proportion chosen in our subsample, county-wide population estimates cannot be made from the new results of the survey. The problem of over or under sampling of districts is eliminated by weighting each respondent's answers according to

which district he lives in. The weights assigned to each district are given below. A map showing the districts appears in the appendix to this chapter.

	District	Sample Frequency	Weight Factor
1.	Brandywine	57	48.6842
2.	Piedmont	41	12.0244
3.	Pike Creek-Central Kirkwood	47	20.6596
4.	Greater Newark	56	28.3750
5.	Lower Christiana	54	26.0741
6.	Wilmington	47	55.0000
7.	Upper Christiana-New Castle	56	37.3929
8.	Central Pencader	12	17.0833
9.	Red Lion	12	9.5000
10.	Middletown-Odessa-Townsend	17	21.6471

The weight factor is a number such that when multiplied by the sample frequency arbitrarily equals one-tenth the number of households in that district. It follows that the sum of each district's sample frequency times its weight factor equals 1/10 the households in the county. The weighted sample size, 12,602, is one tenth of the households estimated for New Castle County in 1976. For example, if one person from Newark answers 'yes' to a particular question on the survey, the computer records 28.3750 people to have answered 'yes'. Any computer tabulations or cross tabulations using these weights become population estimates and not statistics about the sample. All of the response frequencies reported in this chapter are weighted. The tabulation of the survey responses for each question appears on the survey instrument in the appendix to this chapter of the report.

SURVEY RESULTS

The sample was broken down according to several demographic characteristics. The following table shows the percentage composition

for some of the available characteristics on the households in the sample.

Sex	Male	Female			
	29.1%	70.7%			
Race	White	Black	Spanish Speaking	Other	
	89.9%	8.8%	0.8%	0.5%	
Income	Less Than $5,000	$5000 to $10,000	$10,000 to $15,000	$15,000 to $25,000	Over $25,000
	12.7%	17.1%	29.2%	27.6%	13.3%
Home Ownership Status	Own or Buying	Renting	Free Rent		
	77.4%	21.3%	1.3%		
Age of Head of Household	35 and Under	36 to 55	56 and Over		
	28.3%	42.1%	26.3%		
Number of Children	No Children	1 or 2 Children	3 or More Children		
	43.4%	41.1%	15.5%		

Familiarity With Delaware River

A major goal of the survey was to establish people's familiarity with the Delaware River Shoreline. Over thirteen percent have never seen any part of the river shoreline, 71.9% visit the shoreline occasionally, and 14.6% visit the shoreline often. Also, 6.2% think the shoreline is unsuitable for most recreational activities, 66.9% think it is suitable for some activities, and 26.9% think it is suitable for most activities. The respondents were asked to give their perspectives of environmental problems along the shoreline. The table below gives the percent of people in New Castle County who perceive various levels of environmental problems.

Percentage Response

Problem Area	Extent of Problem		
	Little	Some	Great
Industry	20.9	61.4	17.7
Air Pollution	8.4	62.5	29.1
Water Pollution	5.0	56.4	38.6
Mosquitoes	2.8	79.6	17.6
Poor Roads and Traffic Congestion	16.8	69.2	14.0

Most people feel that these five problems exist but that they are somewhat controllable. Focusing on the perception of a great problem (i.e., the last column of the table) water pollution seems to be of most concern with 38.6% of the people responding that there is heavy water pollution in the Delaware River. Air pollution appears to be the second problem area with 29.1% indicating a high level of the problem. Industry and mosquito problems are perceived as less severe with access (poor roads and traffic) ranked lowest in posing significant environmental problems.

Recreation Development Scenarios

We now present the survey results for each of the five proposals for greater utilization of the recreation potential of the Delaware River shoreline.

Bikeway Proposal

Thirty-six percent of the households have family members over 18 years old who participate in bicycling. Biking occurs predominantly

within neighborhoods (79.5%). Percentage responses were much lower for rural areas of New Castle County (10.5%), vacations (6.3%) and commuting (3.8%). Over 66% bike at least 10 times a year while 22% bike over 50 times a year. Three-fourths of those who don't bicycle have no interest in it.

If the bikeway proposal were carried through, 37% would use it. However, only 45% of those who would use it would do so at least 10 times a year. It is interesting to note that 35% of those who would use it might do so for commuting and other transportation purposes. Those who were interested in the proposal checked two facilities they would like to see in the bikeway. Below are the percent of those who checked each facility:

Bike racks	10.1%
Asphalt paving	62.7%
Picnic facilities	34.8%
Rest rooms	55.5%
Nearby auto parking	37.7%

Asphalt paving and rest rooms are the most desirable facilities to those who would use the bikeway.

The main reason most people would not use the bikeway is that they have no interest (73.3%). Some also feel that is is too far to travel (13.4%). Sixty percent of all respondents feel that the bikeway should be completely county owned and maintained while only 13% feel the county should have no participation at all.

Forty-one percent favor financing the bikeway by user fees. The 59% who do not are fairly split among three alternatives: 1) a general bicycle registration fee (34.0%), 2) using funds currently spent on highway maintenance (29.2%), and 3) cutting back other county services (33.6%). Only 2.5% of the respondents

want higher taxes. If user fees were charged, 54% would not be willing to pay anything for a year's use for their family. Almost 28%, however, would be willing to pay at least $5 a year for the family's usage.

Nature Study Proposal

Forty-two percent of all households have adult members who visit nature study areas, and 44.8% have children who visit these areas. Of these, 67.1% visit a park set aside as a natural area with visitor facilities and displays while 25.7% visit parks without facilities and displays. Seventeen percent visit their favorite location over 10 times a year and over 96% visit at least once a year. When asked which two of the following natural areas they would be likely to use, they chose each at the rates given below.

Stream valleys	53.8%
Park with grass & flowers	52.0%
Hill trails	49.4%
Tidal marsh	27.9%
Open fields	23.6%

The three most popular areas are stream valleys, parks with grass and flowers, and hill trails. Seventy-five percent of those who do not visit natural areas say they have no interest in it with 14.1% indicating that they don't know of any existing sites.

Two-thirds of the families said they would visit the nature study area described in the development proposal. Of these, 30% would visit it at least 5 times a year while 98.2% would visit it at least once a year. These respondents checked two facilities they would like in order to make the nature area more enjoyable. The percentages of respondents who checked each choice are given

below.

Trails	57.5%
Exhibition building	40.8%
Guided tours	40.1%
Playground for children	36.7%
Good view of the river	20.4%

The respondents definitely favor trails within the nature study area. A good view of the river was ranked last. Of those who would not visit the area, 92.8% indicated no interest as the reason.

Forty-six percent of all respondents think that the area should be completely county owned and operated and only 10% feel the county should have no participation. Almost 25% feel the county should acquire the land but allow the nature study facilities to be privately owned and operated. An additional 7.5% would have the county own the facilities but leave the operation in private hands. In addition, 12.3% of the respondents were in favor of the county acquiring the land to be left undeveloped.

Sixty percent favor a user fee for the nature area. Of those who do not want fees, 93.9% would like the county to cut back on some other services rather than raise taxes. If the user fee were used, the respondent was asked to state the most he would be willing to pay per family per visit. Almost 36% were willing to pay at least a dollar and 36.8% would pay less than $.50 per visit.

Tour Boat Proposal

Sixty-four percent of all households have family members who have taken a ride on an excursion vessel or tour boat and 80.7% said they would take a ride on the proposed boat if it were

available. Of these, 89.2% would take a ride at least once a year and almost everyone (96.7%) prefers a large slow vessel. The percentages of people who would like to see each of the following facilities on the tour boat are given below.

Guided tours of historical areas	51.9%
Picnicing near the dock	45.7%
Eating facilities	37.7%
Guide on the vessel	37.5%
Allow passengers to carry bicycles	13.5%
Make vessel available for private use	10.6%

Respondents definitely favor guided tours and picnic facilities. Less strongly they favor eating facilities and a guide on the vessel.

Ninety-one percent of those who won't ride the tour boat say they have no interest. Thirty-four percent of the respondents feel that the county should not be involved in the provision of a tour boat while 29.8% feel it should be completely county owned and operated. Over 36% feel that the vessel should be privately operated. Ninety-six percent feel that it should be financed by a user fee, and 90.7% would be willing to pay at least one dollar per person for a two hour excursion, and 26.8% would be willing to pay at least 3 dollars.

Boat Marina

The boat marina seems to be the least favored of the five proposals probably because 89.2% of the households do not own or intend to buy a recreational boat. Of these 70% have no interest and 23.7% feel the cost is too great. Half of those who do own a boat have one between 16' and 22'. Almost 78% have power boats

while the rest are split between sail boats and rowboats or canoes. Most boat owners (72.6%) keep their boat on a trailer rather than at a marina. Two-thirds use their boats for fishing and the other third enjoy pleasure boating. The boats are used in three areas with roughly the same frequency (freshwater lakes or rivers, Del. river and upper bay, and Sussex County waters) and are used in the Chesapeake area with somewhat less frequency. Two-thirds use their boat over 20 times a year.

Eighty-three percent say they would not use the marina if it were developed. This is less than the percentage (89%) who do not own boats now. Thus the provision of the marina would generate some usage from those who do not own boats now. Of those who won't use the marina, 74% have no interest and 21.5% can't afford a boat.

The 17.4% who said they would use the marina checked two facilities they would like available at the marina. Given below are the percentage of people who checked each facility.

Repair services	67.0%
Dry storage	41.5%
Restaurant	40.9%
General store	40.8%
Hauling	13.6%

Repair services are clearly most favored with a general store, a restaurant, and dry storage facilities ranked equally and somewhat lower than repair services.

More people favor no county participation in a boat marina than any of the other four proposals (45.8%). One-fourth, however, favor complete county operation. Almost all (97.9%) favor user fees to finance the entire cost of the marina.

Multiple Activity Center

Forty-seven percent of the households have family members over 18 who visit multiple activity parks now. Of those who do not, 69.4% have no interest, 11.6% feel existing facilities are too far away, and 18.5% don't know of any sites. Twenty-one percent of those who do visit multiple activity parks visit the parks at least 10 times a year while 90.2% visit at least twice a year. Twenty-six percent visit neighborhood parks and 42.7% visit parks outside the immediate neighborhood but inside New Castle County.

Sixty-four percent of the families would use the multiple activity center if it were constructed. Of these 93% would visit at least twice a year while 20.4% would go at least 10 times a year. The respondents were asked to choose four facilities they felt were important to make the park more attractive. The percent of people selecting each option is given below.

Picnic areas	68.9%
Hiking trails	41.8%
Court games	35.8%
Fishing pier	35.6%
Ballfields	33.3%
Camping	33.0%
Bike trails	30.9%
Swimming pools	28.7%
Swimming beach	27.4%
Food facilities	27.1%
River overlook	20.4%
Public boat ramp	13.7%

The main reason some people would not visit the new park is they have no interest (84.6%) and a secondary reason is they feel it is too far to travel (10.9%).

Fifty-three percent of the respondents favor complete county

operation, while 14.3% favor no county participation and 32.8% favor some degree of county participation. Three fourths favor user fees to finance the cost. Of those who do not, 90.7% favor cutting back existing facilities. Fifty-seven percent would be willing to pay at least one dollar for their family for one visit, while 8.6% would pay over $3 and 23.1% would pay less than $.50 per visit.

Summarization of Interest Levels

In the last part of the survey people were asked to summarize their interest in each of the five proposed plans, first assuming that there would be no environmental problems, and then again considering that there would be some problems with respect to heavy industry, air and water pollution, mosquitoes, and traffic. They were asked to rate their interest on a 0 to 10 scale, 0 being no interest and 10 being strong interest. The numbers in Table 1 are the cumulative frequency responses for each plan.

There are several ways to interpret this chart. One is to find the response which holds the 50th percentile (i.e., the median response; any other percentile could be chosen). With no environmental problems the 50th percentile for the bicycle plan falls between 2 and 3. One could say that 50% have an interest level of less than 3. Similarly for the other plans, the nature study plan has a 50 percentile at 4, the tour boat plan is between 4 and 5, the boat marina is off the scale at 0, and the multiple activity center's median is the highest between 5 and 6.

Another way to interpret the results is to compare the cumulative frequencies at a certain response level, say 5. For bicycling,

Table 1
Cumulative Frequency of Interest Levels

Proposal	Level of Interest											
	No Environmental Problems											
	0	1	2	3	4	5	6	7	8	9	10	Mean
Bicycling	41	42.8	49.7	53.1	61.2	69.6	76.8	88.3	90.3	90.8	100	3.36
Nature Study	22	25.6	34.6	44.6	50.2	60.2	67	79.4	84.2	87.1	100	4.15
Tour Boat	17.2	19.5	28.1	38.2	43.9	57.5	66.2	80.2	84.9	86.9	100	4.77
Boat Marina	69	72.7	77.1	78.3	80.8	85.6	86.8	91.7	93.8	94.5	100	1.70
Multiple Activity Center	21.6	22	26.5	32.8	38	46.3	54.6	67.4	74.3	77.2	100	5.39
	Some Environmental Problems											
	0	1	2	3	4	5	6	7	8	9	10	Mean
Bicycling	45.7	48.3	55.6	54.3	66.5	72.8	78.3	90.1	92.4	93.2	100	2.98
Nature Study	27	30.7	41.5	51.6	58.5	67.5	72.8	84.2	88.3	89.8	100	3.88
Tour Boat	24	27.3	36.3	48.9	53.9	65.8	70.1	83.8	87.1	88.2	100	4.15
Boat Marina	73.3	76.8	81.5	83.5	85.2	89.2	90	93.7	95	95.3	100	1.37
Multiple Activity Center	26.3	27	31.3	40	46.5	56.8	65.6	78.3	82.4	84	100	4.62

69.6% have an interest level of 5 or less, while only 60.2% have an interest level of 5 or less for the nature study plan. Similarly the other 5 or less interest level figures are: tour boat (57.5%), boat marina (85.6%), and multiple activity center (46.3%). Since the multiple activity center has the lowest cumulative frequency at 5, a relatively large number of people highly favor it.

The degree of interest in each plan can also be shown by calculating the mean responses from the absolute frequencies. Although this is shown in Table 1, we present the means below with the proposals rank-ordered by mean.

Proposal	Mean Response No Environmental Problems	Mean Response Some Environmental Problems
Multiple Activity Center	5.39	4.62
Tour Boat	4.77	4.15
Nature Study	4.15	3.88
Bicycling	3.36	2.98
Boat Marina	1.70	1.37

Using any of these three methods shows the same ranking of favored plans. Even when considering that there may be environmental problems, this ranking stays the same although, as one would expect, the interest level for each plan goes down. The people feel that the environmental problems present at the location of the sites will cause the plans to lose some of their appeal but not all of their appeal.

As indicated above the plans for a multiple activity center and a tour boat have the greatest interest with a boat marina

generating the least interest. When focusing on question #2 of the survey (i.e., would you use the facility if constructed) a slightly different ranking results. The frequency of "yes" and "no" responses appears below.

Proposal	Percentage Response	
	Yes	No
Tour Boat	80.7	19.3
Nature Center	66.3	33.7
Multiple Activity Center	63.7	36.3
Bikeway	36.9	63.1
Boat Marina	17.4	82.6

The tour boat and nature study center improve their ranking with the multiple activity center falling somewhat. The general conclusion that the bikeway and boat marina are the least favored proposals remains.

County Involvement and User Fees

The respondents were asked to what degree should the county be involved with each proposal. The following table shows the percent of people who chose each alternative.

Proposal	Participation Alternatives				
	1	2	3	4	5*
Bikeway	12.9	8.8	17.9	60.4	----
Nature Study	9.9	24.6	7.5	45.6	12.3
Tour Boat	34.0	23.7	12.5	29.8	----
Boat Marina	45.8	16.1	13.0	25.0	----
Multiple Activity Center	14.3	14.6	18.2	52.9	----

1) No participation by county.
2) County acquires land; facilities owned and operated by private interests.
3) County owns land and facilities; operation by private interests.
4) Complete county operation.
5) County acquires land and leaves it undeveloped.

*Option 5) was given for the nature study proposal only.

The responses indicate a preference for complete county participation for the bikeway, multiple activity center, and nature study areas, and no participation being most preferred for the boat marina and tour boat proposals. The responses are certainly not unambiguous for some proposals, however, and it might be argued that the choice for partial county involvement is diluted by separating out options 2) and 3). If these options are aggregated, some county involvement becomes the most preferred option for the tour boat and the second most preferred option (out of three) for the other proposals.

Based on these results the nature study area has the strongest support for county involvement since this proposal has the lowest response rate for no participation (9.9%). Thus 90.1% of the people in New Castle County prefer some involvement by the County in nature study areas even if it entails only the acquisition of undeveloped land (12.3% chose this response).

The responses for the question asking whether people prefer user fees as the sole method of financing the proposals is tabled below.

Proposal	Yes	No
Bikeway	40.8	59.2
Nature Study Area	60.5	39.5
Tour Boat	95.7	4.3
Boat Marina	97.9	2.1
Multiple Activity Center	75.7	24.3

Almost everyone favors user fees for the tour boat and boat marina. Over three-fourths favor user fees for the multiple activity center also. A multiple activity center may not lend itself readily to user fees since people come to use different facilities for different amounts of time. A parking fee may solve this problem or perhaps a membership option where members can bring friends and pay guest fees. Over 60% favor user fees for the nature study area. Even if no facilities were built a parking fee could be implemented to cover development costs.

The bikeway proposal is the only one where user fees are not favored. This is reasonable since enforcement would be costly for a long bikeway. This leads to the question of how the bikeway should be financed. Of those who do not favor user fees, three responses received equal attention: a general bicycle registration fee, cutback of funds spent on highway maintenance, and cutting other county services. An insignificant number want higher taxes.

For the nature study area and the multiple activity center the overwhelming funding plan of those who do not want user fees is to cut back other county services to free up money. For the tour boat and boat marina proposals this is again the most popular

financing plan. A summary of responses for alternative modes of finance is given below. These percentages apply only to those who do not favor user fees which, we recall, is only 4.3% and 2.1% of the respondents for the tour boat and boat marina proposals respectively.

	Cut Back	Raise Taxes	Registration Fee	Highway Funds
Nature Study Area	93.9	6.1	---	---
Tour Boat	64.0	36.0	---	---
Boat Marina	65.1	34.9	---	---
Multiple Activity Center	90.7	9.3	---	---
Bikeway	33.6	2.5	34.0	29.2

When we weight by the percentages who do not favor user fees for each proposal, it becomes clear that raising taxes is not a popular alternative.

Crosstabulations

In addition to tabulating the survey responses for the whole population, breakdowns of responses (or crosstabulations) by subgroups were performed. A crosstabulation is defined as a contingency table showing the frequency of responses of two or more variables simultaneously. The questions on the survey were crosstabulated against seven demographic characteristics: region, sex, race, home ownership status, income, number of children, and age of head of household.

Each crosstabulation summary keys on six topics of interest: the respondents' familiarity with the environmental problems along the shoreline, the percent of respondents who will use each new facility, to what extent should the county be involved in each proposal, should user fees be charged, how much are the respondents willing to pay to use each facility, and how the respondents rated their interest in each proposal.

Crosstabulations by Region: Individual Planning Districts

The first regional crosstabulation compares individual planning districts. The districts are defined on page two of Task VII. As previously mentioned, approximately 50 respondents were selected from each of the first seven districts and a total of 50 from the last three districts. Since predictions are being made within rather than across district lines, the sample in this case was not weighted.

The easiest way to interpret people's familiarity with the environmental problems along the river is to look at the percent of people who feel that the problems are somewhat severe. This is

shown in Table 2.

The mean responses of each district were calculated for the rating of interest level question on the survey. These numbers are shown in Table 3. The numbers in parentheses show the ranking of the proposals according to their mean response by each group.

A complete analysis of how each district differed in their survey responses would indeed be lengthy and perhaps misleading due to small sample sizes. For these reasons we proceed to systematically group some of the districts together. This is done in two ways. First, shoreline districts and inland districts are compared and second, northern districts and southern districts are compared.

Crosstabulations by Region: Shore vs. Inland Districts

Shore residents are from households in planning districts of New Castle County located along the Delaware River (the map found in the Appendix indicates these districts to be 1, 6, 7, 9 and 10). Sixty-three percent of the respondents are from shore districts while 37% are from inland districts. Shore and inland residents have somewhat different opinions on the severity of environmental problems along the shoreline. The table below shows that a higher percentage of shore residents feels that industry, air and water pollution are severe problems while a higher percentage of inland dwellers indicates mosquito and road problems to be severe.

Percent of Population Perceiving the Problem Severe

	Shore	Inland	Total
Industry	18.2	16.7	17.7
Air Pollution	29.7	28.1	29.1
Water Pollution	41.2	34.1	38.6
Mosquitos	16.0	20.4	17.6
Poor Roads	10.5	20.1	14.0
Percent of Respondents	63.0	37.0	100

Table 2

Percent of Respondents from Each District
Who Feel Problems are Severe Along the Delaware River Shoreline

Planning District / Problem	1	2	3	4	5	6	7	8-9-10	Total
Industry	25.0	27.5	24.8	1.9	22.2	23.4	7.1	0.0	17.0
Air Pollution	29.8	30.0	46.8	11.1	37.0	44.7	16.4	7.3	27.8
Water Pollution	42.9	38.5	45.7	24.5	39.6	66.0	15.4	2.6	34.8
Mosquitos	14.3	32.5	13.3	1.9	42.6	31.9	1.8	4.9	17.6
Poor Roads	13.0	28.9	41.3	5.6	20.4	17.0	1.8	2.4	15.6
Sample Size	57	41	47	56	54	47	56	41	399

Table 3

Means of Interest Level and Proposal Ranking
(in parentheses) by Planning District

Proposal \ Planning District	1	2	3	4	5	6	7	8-9-10	Total
Multiple Activity Center	4.64 (1)	3.32 (2)	6.21 (1)	3.02 (2)	5.06 (1)	6.02 (1)	3.60 (1)	3.27 (1)	4.66 (1)
Tour Boat	4.02 (3)	3.12 (3)	4.94 (3)	3.24 (1)	4.71 (2)	5.47 (3)	3.29 (2)	2.62 (3)	4.20 (2)
Nature Study	4.17 (2)	3.49 (1)	5.25 (2)	1.76 (4)	3.85 (3)	5.89 (2)	2.12 (3)	2.80 (2)	3.92 (3)
Bikeway	3.09 (4)	2.20 (4)	4.77 (4)	2.04 (3)	2.66 (4)	4.43 (4)	1.50 (4)	1.90 (5)	3.02 (4)
Boat Marina	1.50 (5)	1.00 (5)	2.79 (5)	0.63 (5)	1.30 (5)	1.94 (5)	0.57 (5)	2.27 (4)	1.39 (5)

The table below presents the mean responses of shore and inland residents of the interest level rating from 0 to 10 for each of the proposed recreation plans assuming some environmental problems.

	Shore	Inland	Total
Multiple Activity Center	4.76	4.37	4.62
Tour Boat	4.24	3.99	4.15
Nature Study	4.17	3.38	3.88
Bikeway	3.06	2.83	2.98
Boat Marina	1.36	1.37	1.37

From this table we can see that the ranking of the projects seem unaffected by the location of the household in New Castle County. As one might expect interest levels for the projects are higher for shore households with the exception of the boat marina where interest levels are virtually the same.

We will now briefly examine some of the response differences for each proposal.

Bikeway -- The same percentage of shore and inland residents said they would use the proposed bikeway. However, 44% of the shore residents would use it for other commuting and transportation purposes while only 21% of inland residents would do the same. Shore residents favor complete county control of the bikeway somewhat more than those in the inland (65% vs. 53%). Inland residents favored no county participation to a slightly higher degree than shore residents. Fourty-four percent of shore inhabitants favor user fees while only 34% of those living inland do. Both groups are willing to pay about the same amount if user fees were charged.

Nature Study Area -- Both groups would visit a shoreline nature study area with about the same frequency. They also feel the same

as to the extent of county involvement, except that 17% of inland residents favor the county leaving some land undeveloped while only 9.5% of shore residents are in favor of this. Shore residents favor user fees only to a slight degree over inland residents. Both groups are willing to pay about the same if user fees were charged.

Tour Boat -- A slightly higher percentage of inland residents (82.7%) would ride the proposed tour boat than would shore residents (79.5%). Shore inhabitants favor complete county involvement somewhat more than inland residents while the opposite is true for no county participation. The percentages are virtually identical for the other choices. Both groups favor user fees to the same extent. The number who favor alternate plans is too small to consider differences between groups. Also, each group would pay about the same if user fees were charged.

Boat Marina -- Nineteen percent of shore dwellers would use the marina while only 14% of those inland would. Over half the inland residents favor no county participation while only 42% of shore residents do. Over 15% of shore occupants favor the county owning the land and dock only while 9% of those living inland feel the same. There is no difference between the groups on user fees.

Multiple Activity Center -- There is no difference in the percentage of shore and inland residents who will use this facility. They also show no significant difference in their opinions of county involvement and user fees. However, of those who do not want user fees, 15% of shore residents will accept higher taxes

while only 1% of inland residents will. Each group will pay the same amounts if user fees are charged.

Crosstabulations by Region: North and South Districts

The sample was divided into two groups: the five northern most planning districts (1, 2, 3, 5 and 6) and the five southern most districts. This grouping indicates the greatest difference in the survey responses compared to all other sample splits by region.

For each environmental problem considered, a much higher percentage of northern respondents feel that the problems are somewhat severe than southern respondents. The percent of north or south New Castle County who feel that each of these problems is somewhat severe along the Delaware River shoreline is shown below.

	North	South	Total
Industry	24.7	4.7	18.4
Air Pollution	37.7	13.4	30.0
Water Pollution	49.7	18.4	40.0
Mosquitos	25.8	2.2	18.2
Poor Roads	19.8	3.6	14.6
Percent of Respondents	67.9	32.1	100

For each proposal the percentage of people in the north saying that they would use the new facility is always higher than the percentage response from the southern part of the county. The table below shows the usage percentages for the two groups.

	North	South
Tour Boat	83.3	73.0
Nature Study	74.6	49.1
Multiple Activity Center	66.8	58.3
Bikeway	41.7	28.5
Boat Marina	22.2	8.2

This disparity is also revealed when comparing the mean response for the interest level ratings on each proposal. The means (shown below) for the northern districts are always higher than those for

the southern districts.

Bikeway	North	South	Total
Nature Study	3.59	1.76	3.02
Tour Boat	4.75	2.08	3.92
Boat Marina	4.65	3.21	4.20
Multiple Activity Center	1.74	6.64	1.39
	5.26	3.36	4.67

Concerning the bikeway proposal, 44% of northern respondents would consider the bikeway for other transportation purposes while only 8.5% of those from the south would.

The following table shows the percent of people in each region who want complete county control of the individual proposals.

Tour Boat	North	South
Nature Study	71.0	37.9
Multiple Activity Center	66.2	6.3
Bikeway	75.0	7.5
Boat Marina	36.9	1.9
	44.7	2.5

The differences are pronounced. Northern districts favor county involvement to a much higher degree than southern districts.

The respondents from the north also favor user fees strongly except for the boat marina and tour boat proposals, where almost everyone favors user fees. Northern respondents have a much higher percentage wanting to finance the proposal with user fees than southern respondents. Also, northern respondents are willing to pay more to use any new recreational facility. Although northern residents perceive environmental problems to be more severe, they show a much greater enthusiasm for the proposals by indicating higher usage rates and willingness to pay.

Crosstabulations by Sex: Male vs. Female Respondent

Female respondents outnumber male respondents 69.4% to 30.6%. The table below gives the percent of male and female respondents who feel that each of these problems is somewhat severe along the

Delaware River shoreline.

	Male	Female	Total
Industry	20.3	16.6	17.7
Air Pollution	25.9	30.6	29.2
Water Pollution	39.0	38.6	38.7
Mosquitos	13.9	19.4	17.7
Poor Roads	18.2	12.2	14.1
Percent of Respondents	30.6	69.4	100

There is no fundamental difference between male and female opinions of the environmental problems along the river. More males feel that industry and roads are severe problems while more females feel that air pollution and mosquitos are severe. They feel virtually the same about water pollution.

The table below presents the mean responses on an interest level rating scale from 0 to 10 for each of the proposed recreation plans assuming some environmental problems.

	Male	Female	Total
Multiple Activity Center	4.47	4.69	4.62
Tour Boat	3.80	4.32	4.15
Nature Study	3.66	3.52	3.88
Bikeway	3.20	2.55	2.98
Boat Marina	1.87	1.16	1.37

From the interest level table we note that female respondents show more interest in the tour boat and the multiple activity center while males favor the bikeway, marina, and nature study area more strongly. The ranking of the proposals is unaffected by the sex of the respondent. Very little difference was found in the response frequencies for males and females with respect to the detailed questions on each proposal.

Crosstabulations by Race: White vs. Nonwhite Families

Eighty-seven percent of the weighted sample were white and thirteen percent were non-white. The non-white group included blacks, spanish speaking people and any other race except caucasian.

Since there is such a high sample of whites the percentages associated with white responses will very much resemble those of the entire population.

Approximately the same percent of each group visit the shoreline the same amount of time. They also agree on the suitability of the shoreline for recreation. Thirty percent of non-whites feel that mosquitos are a severe problem while only 16% of whites do. There is no significant difference in their opinions on the other environmental problems. The table below gives the percent of each racial group who feels that each problem is somewhat severe along the Delaware River shoreline.

	White	Non-White	Total
Industry	17.7	17.5	17.7
Air Pollution	28.6	32.5	29.2
Water Pollution	38.0	42.6	38.6
Mosquitos	15.7	30.2	17.6
Poor Roads	14.4	11.7	14.1
Percent of Respondents	87.0	13.0	100.00

According to the mean responses both groups rank the plans in the same manner as the total. However, for each plan, non-whites have a higher mean than whites. This is most pronounced for the nature study area and the multiple activity center where the difference in the means is rather large. The table below presents the mean responses for each racial group of an interest rating of 0 to 10 for each proposal.

	White	Non-White	Total
Multiple Activity Center	4.47	5.64	4.62
Tour Boat	4.14	4.21	4.15
Nature Study	3.72	4.98	3.89
Bikeway	2.90	3.55	2.98
Boat Marina	1.33	1.63	1.37

We will now focus on differences in responses by race for the details of each proposal.

Bikeway -- A higher percentage of non-whites will use the new bikeway than whites. The most striking difference is that of all those who will use the bikeway, 76% of non-whites will consider using it for commuting or other transportation purposes compared to only 27.5% of whites. Both groups agree on county involvement and user fees. Non-whites are willing to pay slightly more than whites.

Nature Study -- Both groups have the same percentage wanting to visit the nature study area. Non-whites favor complete county control more than whites, while whites are more in favor of the absence of county involvement. Both groups agree on user fees and the amount they are willing to pay to use the area.

Tour Boat -- Eighty-two percent of whites will ride on the proposed river boat, while 72% of non-whites will. Over sixty percent of non-whites want complete county operation while only 25% of whites want the same. Whites have a higher percentage for each of the other options on county involvement. Both groups feel the same on user fees and how much they are willing to pay to take a boat ride.

Boat Marina -- The same percentage of each group will use the marina. Again a much larger percentage of non-whites (52.8%) want complete county operation than whites (21%). Whites favor no county control more than non-whites. Consequently, 99% of whites want user fees while only 88.5% of non-whites do.

Multiple Activity Center -- About seventy-three percent of non-whites will use the center if constructed while only 62% of whites

will. Almost seventy percent of non-whites favor complete county control while only half of the whites do. This pattern is the same for each proposal except the bikeway. Both groups agree on user fees. Non-whites are willing to pay slightly more to visit the center.

Crosstabulations by Home Ownership Status: Renter vs. Home Owner

Homeowners outnumber renters in the population by 74.2% to 25.3%. Only 0.5% of the weighted sample live rent free and so were not considered in the crosstabulations. Both groups visit the shoreline about the same amount and they agree on the suitability of the shoreline for recreation. A higher percent of renters feel that industry and air pollution are severe problems along the shoreline than home owners. The table below presents the percent of each group who feels that each of these problems is somewhat severe along the Delaware River shoreline.

	Renters	Home Owners	Total
Industry	22.2	16.2	17.7
Air Pollution	35.4	27.1	29.1
Water Pollution	36.9	39.4	38.6
Mosquitos	18.5	17.4	17.6
Poor Roads	12.9	14.4	14.0
Percent of Respondents	25.3	72.2	100.0

Both groups rank the proposals in the same manner as the total population. Home owners show a slightly higher mean response for all proposals except the tour boat. The table below gives the mean responses for each group of an interest rating of 0 to 10 for each proposal.

	Renters	Home Owners	Total
Multiple Activity Center	4.60	4.61	4.62*
Tour Boat	4.18	4.12	4.15
Bikeway	3.26	2.86	2.98
Nature Study	3.72	3.92	3.89
Boat Marina	1.10	1.44	1.37

*Since the total includes some respondents who did not indicate

home ownership status, the total mean is not equal to the weighted sum of the means of the subtotals. This is true for all crosstabulations, but only in this instance does the total mean not lie between the subgroup means.

We discuss below differences in responses by home ownership status for the details of each proposal.

Bikeway -- There is only one significant difference between the groups on the bikeway proposal. Renters favor complete county control more than home owners while the opposite is true for no county participation.

Nature Study -- A higher percent of home owners may visit the nature area than renters. Almost half of the home owners want complete county control while only 38% of renters do. Home owners favor user fees more and will pay slightly more to visit the nature study area.

Tour Boat -- The only difference between the groups on this proposal is that 36% of the renters want complete county operation of the tour boat while only 28% of the home owners do. On the other hand 37% of the home owners favor no county participation while only 25% of the renters do.

Boat Marina -- The only difference is that renters favor complete county control more than home owners, while the opposite is true for no county participation.

Multiple Activity Center -- Again, renters favor complete county control more than home owners. For this proposal, however, there is no difference in the percent of each group wanting no county participation. Home owners are willing to pay slightly higher user fees.

Crosstabulations by Income Levels

Income is stratified into five groups in the survey. Table 4 defines the income groups and indicates that people's perceptions of environmental problems do not change in a systematic way as income changes. In general, however, the lowest income group perceives that environmental problems are more severe than the highest income group. There is little difference in familiarity with the Delaware River shoreline among the income groups. However, the percent of families who feel that the shore is suitable for most recreational activities steadily increases with income.

Table 5 presents the mean responses for each income group of an interest level rating from 0 to 10 for each proposal. The middle income groups rank the proposals in the same manner as the total population. However, the lower two income groups differ from this in that they rate the tour boat above the multiple activity center. The $15,000 to $25,000 group are similar to the entire population except they rate the nature study area above the tour boat. The highest income group, over $25,000, rates the nature study area first with the other proposals following in the same manner as the total population.

Differences in responses by income status for each proposal is discussed below.

Bikeway -- The results show that middle income families indicate the highest percent usage for the bikeway with the percentages falling steadily for richer and poorer families. The opposite is

Table 4

Percent of Respondents in Each Income Group Who Feels Problems are Severe Along the Delaware River Shoreline

Income Group / Problem	Less Than $5000	$5000 to $10,000	$10,000 to $15,000	$15,000 to $25,000	Over $25,000	Total
Industry	23.0	18.9	19.1	18.0	6.5	18.0
Air Pollution	45.2	24.5	34.8	24.4	19.7	30.2
Water Pollution	57.8	28.6	38.7	44.6	38.2	41.4
Mosquitos	29.3	18.7	14.5	14.9	15.5	17.8
Poor Roads	23.7	14.1	6.4	9.8	24.3	13.4
Percent Of Respondents	16.0	18.3	28.3	26.4	10.9	100

Table 5

Means of Interest Level Responses
for Each Income Group

Income Group / Proposal	Less Than $5000 (16.0%)	$5000 to $10,000 (18.3%)	$10,000 to $15,000 (28.3%)	$15,000 to $25,000 (26.4%)	Over $25,000 (10.9%)	Total (100%)
Multiple Activity Center	3.96	4.92	5.21	4.89	4.19	4.62
Tour Boat	4.25	5.15	4.47	3.89	3.51	4.15
Nature Study	3.51	3.94	3.98	4.34	4.26	3.88
Bikeway	2.54	2.92	3.12	3.25	3.12	2.98
Boat Marina	0.57	2.02	1.70	1.17	1.60	1.37

true for the willingness to use the bikeway for commuting or other transportation purposes with middle income families having the lowest percent usage. Income does not seem to affect a person's opinion on the extent of county involvement nor on the user fees question. The "willingness to pay question" shows the highest percentage of those willing to pay over $10 per year comes from the over $25,000 group.

Nature Study -- The over $25,000 group indicates the highest usage for the nature study area while the under $5,000 group indicates by far the lowest usage. About thirty-two percent of the $10,000 to $15,000 group want complete county control. This percentage increases steadily for both the rich and poor groups. The opposite is true in the responses for the county to leave land completely undeveloped with the middle income group most in favor of this option. There is no relationship between income and the desire for user fees. The over $25,000 group is most willing to raise taxes to finance the nature center. The higher a family's income the more willing a family is to pay over $3 per visit.

Tour Boat -- The desire to ride the tour boat does not change with income. The percent of people wanting complete county control falls steadily with income. The responses to the user fee question do not change with income. However, for those who do not want user fees, the richest and poorest groups were the only ones with any desire for higher taxes. The poorest group has the highest percentage of those willing to pay over $4 per person. The percentage of those not willing to pay anything steadily drops with income.

Boat Marina -- Twenty-five percent of the over $25,000 group will use the new boat marina. Also, the richest group has by far the highest percent wanting limited county involvement and the lowest percent wanting complete county operation. Although most everyone wants user fees, they are more desired by higher income groups. Again, the extreme income groups are most willing to accept higher taxes.

Multiple Activity Center -- Seventy-five percent of the $10,000 to $15,000 group will use the center if constructed. This percentage drops steadily for both higher and lower income groups. A higher percent of the poorest group (77%) desires complete county operation. The total survey percentage response for this option is 53.8%. Fifty-seven percent of the richest group favors user fees compared to a total survey percentage response of 74.7%. This group also has the highest percentage not willing to pay anything to use the park. It is difficult to conclude which group is willing to pay the most to use the park.

Crosstabulations by Number of Children

The families are divided into three size groups: those households with no children, those with one or two children, and those with three or more children.

The table below shows no meaningful difference in the opinions on severe environmental problems for the groups.

	No Children	One-Two Children	Three or More	Total
Industry	21.1	14.9	14.4	17.7
Air Pollution	28.9	29.7	28.1	29.1
Water Pollution	35.9	39.9	43.3	38.6
Mosquitos	15.5	18.2	22.4	17.6
Poor Roads	16.4	11.4	13.6	14.0
Percent of Respondents	45.6	39.1	15.3	100

The groups visit the shoreline about the same amount of time. It seems however, that the percent of families in each group who feel the shoreline is suited for most recreational activities increases with the number of children in the family.

The groups respond in a consistent manner for all the proposals. The percent of families with three or more children who will use any of new recreational facilities is always highest and the percent of families with one or two children is second. The table below indicates that the mean response for interest level ratings on each proposal increases with the number of children in the family. Families with children rank the proposals in the same manner as the total population. Families with no children rank the tour boat first above the multiple activity center.

	No Children	One-Two Children	Three or More	Total
Multiple Activity Center	3.74	5.14	5.95	4.62
Tour Boat	3.77	4.32	4.82	4.15
Nature Study	3.46	3.85	5.24	3.88
Bikeway	2.67	3.12	3.52	2.98
Boat Marina	1.10	1.32	2.24	1.37

So many people want user fees for the tour boat and boat marina that no information is gained by dividing the sample in these cases. However, for the bikeway, the nature study area, and the multiple activity center families with either no children or three or more children favor user fees to a much higher extent than families with one or two children. The groups showed no meaningful difference in their opinion of county involvement or how much they would pay for each proposal.

Crosstabulations by Age

The sample is divided into three age groups: 35 and under,

36-55, and 56 and above. The ages given are those of the head of the household and not of the respondent. In practically all cases the respondent was the head of the household or his spouse. The table below indicates no meaningful difference in the groups opinions of severe environmental problems along the shoreline. Younger people feel that the shoreline may be more suitable for recreation than older people.

	35 and Under	36-55	56 and Over	Total
Industry	14.9	16.7	19.9	17.1
Air Pollution	31.2	29.1	28.2	29.5
Water Pollution	37.3	41.8	33.5	38.1
Mosquitos	13.1	21.4	14.8	17.0
Poor Roads	9.4	13.8	15.7	13.0
Percent of Respondents	30.5	41.3	28.2	100

The table below indicates the mean responses of each age group of an interest level rating of each proposal.

	35 and Under	36-55	56 and Over	Total
Multiple Activity Center	5.87	5.10	2.64	4.63
Tour Boat	4.64	4.30	3.30	4.18
Nature Study	4.21	4.41	2.80	3.89
Bikeway	3.10	3.50	1.91	2.93
Boat Marina	1.73	1.74	0.45	1.36

The oldest group has a much lower mean response for each proposal. They rate the tour boat first and the nature study area second above the multiple activity center. The other two groups rank the proposals like the total population. The three groups showed somewhat consistent responses for usage rates of the five proposals. For each proposal, about the same percentage of the young and middle age groups will use the new facility. And in each case the percentage of older respondents was far less.

The younger respondents showed the lowest percentage wanting complete county control for the bikeway, nature study area, and

multiple activity center. The groups had the same responses for the tour boat and boat marina concerning extent of county involvement. For each proposal the desire for user fees to finance the entire plan increased with the age of the head of household. Except for the tour boat plan, the middle age group is willing to pay more to use each new facility. The oldest group is willing to pay the most to ride the tour boat.

Interviewer: _____

Sample: _____

Area: _____

Phone Number: _____

Address: _____

_____

_____

For Official Use Only

_____Type of structure:

1-single family
2-twin or duplex
3-row or townhouse
4-garden apartment
5-flat or walk-up
6-elevator apts. (high rise)
7-mobile home
8-rooming house
9-other, commercial
10-other, institution

_____Occupancy status:

1-vacant, undifferentiated
2-vacant, under construction
3-vacant, for rent
4-vacant, for sale
5-occupied
6-commercial
7-industrial
8-institutional
9-no such address
10-unknown

Date of Interview: _____ ☐ -Missed ☐ -Refused ☐ -Interviewed

_____ ☐ -Missed ☐ -Refused ☐ -Interviewed

_____ ☐ -Missed ☐ -Refused ☐ -Interviewed

_____Time of Interview: 1-morning; 2-afternoon; 3-evening

_____Sex of Interviewee: 1-male; 2-female

_____Race of Interviewee:

0-caucasian
1-black
2-Spanish speaking
3-other non-white

_____Interviewee was:

1-basically disinterested
2-mild interest
3-interested
4-very interested

_____Interviewee situation:

1-no one else present
2-children only present
3-adults only present
4-both adults and children present
5-by telephone

Descriptions of Recreation Development Proposals:

(1) Bicycling

A system of bike trails would be constructed, originating in urban areas and moving along the Delaware River coastline whenever possible. The bike trails would be extended by tying into the bike trails along the C&D Canal.

(2) Nature Study

This proposal calls for the preservation of the woods, marshland, and unusual plants at the site indicated on the map. A nature study center would be constructed along with a network of trails into the site. Separated from the nature study area, picnic and ballfield facilities would be provided.

(3) Tour Boat

In this proposal an excursion boat would provide rides on the Delaware River, stopping at points of historical and cultural significance along the shore, such as Philadelphia, Wilmington, the City of New Castle, Fort Delaware, and Delaware City.

(4) Boat Marina

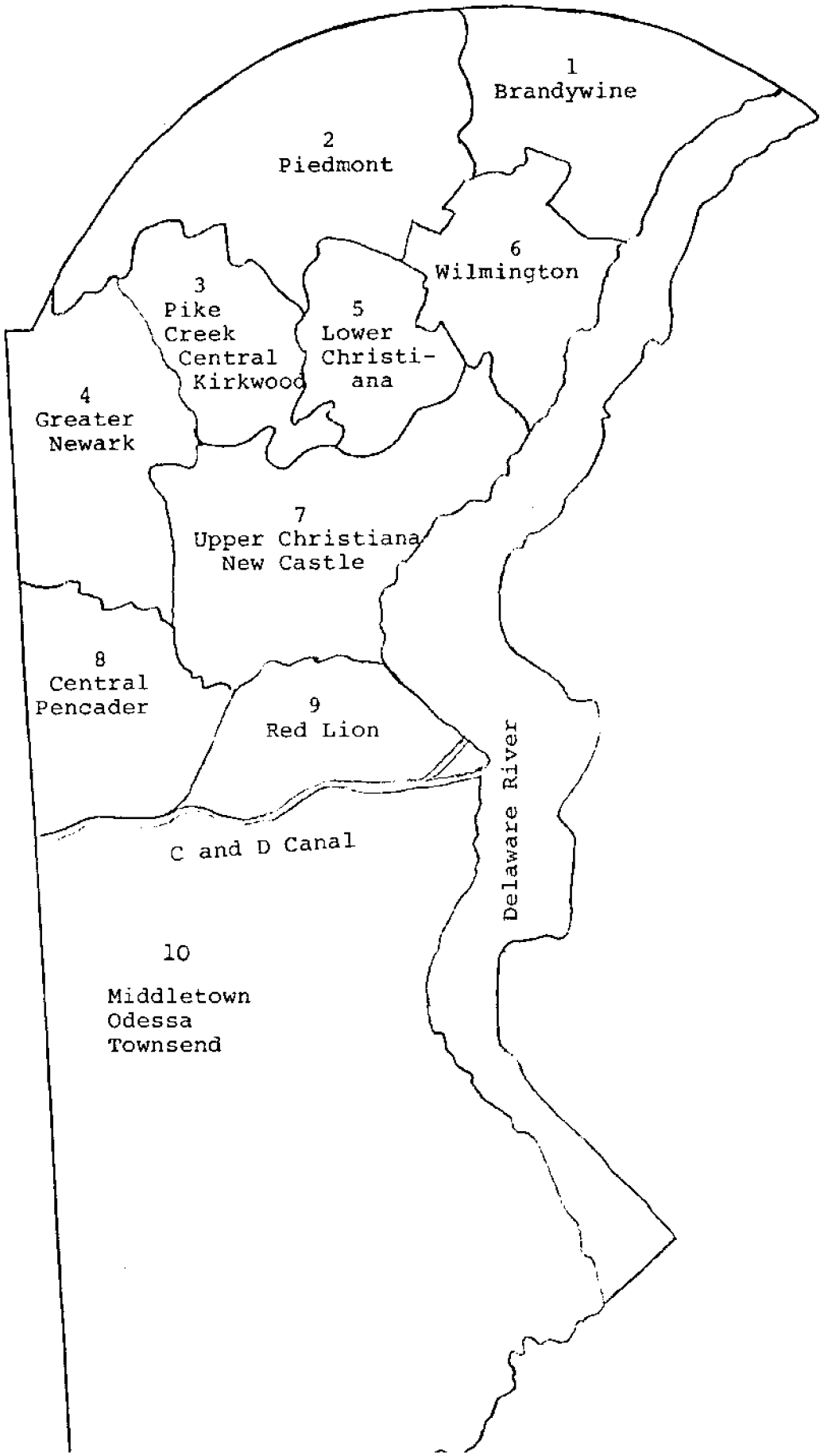
A marina would be constructed to provide New Castle County boat owners with slip facilities without having to travel great distances. Based upon shoreline characteristics and location the best place for this marina is the site located on the map near Delaware City.

(5) Multiple Activity Center

This center would be located on a large tract of publicly owned waterfront land near Delaware City and the C&D Canal, a part of which is unused. The proposal calls for development of a broad range of activities including ballfields, picnic areas, swimming, hiking, camping, horseback riding, and marina facilities.

VIA-3

MAP OF NEW CASTLE COUNTY WITH PLANNING DISTRICTS



Familiarity Questions

1. How often have you visited the Delaware River Shoreline in New Castle County south of Wilmington?

Never Seen Any Part of River Shoreline	Visit the Shoreline Occassionally	Visit the Shoreline Quite Often
0	1	2
13.4	71.9	14.6

2. How much industry do you think exists along the Delaware River? (please guess if you don't know)

Little Industry	Some Industry	Heavily Industrialized
0	1	2
20.9	61.4	17.7

3. How much air pollution do you think exists along the Delaware River? (please guess if you don't know)

Little Air Pollution	Some Air Pollution	Heavily Polluted
0	1	2
8.4	62.5	29.1

4. How much water pollution do you think exists along the Delaware River? (please guess if you don't know)

Little Water Pollution	Some Air Pollution	Water Heavily Polluted
0	1	2
5.0	56.4	38.6

5. How much of a problem do you think mosquitoes and other insects are along the Delaware River? (please guess if you don't know)

No Problem	Some Problems But Can Be Controlled	Severe and Uncontrollable Problems
0	1	2
2.8	79.6	17.6

6. How much of a problem do you think poor roads and traffic congestion are for the Delaware River Shoreline? (please guess if you don't know)

No Problem	Some Problems	Major Problem
0	1	2
16.8	69.2	14.0

7. What is your overall feeling about the suitability of the Delaware River Shoreline in New Castle County south of Wilmington for recreation activities? (please guess if you don't know)

Not Suitable	Suitable for a Few Activities	Suitable for Most Activities
0	1	2
6.2	66.9	26.9

Demand for Facilities

I. Bikeway Proposal

A system of bike trails would be constructed, originating in urban areas and moving along the Delaware River coastline whenever possible. The bike trails would be extended by tying into the bike trails along the C&D Canal.

1. Do you or any member of your family over the age of 18 participate in biking now? 1-Yes 36.1 2-No 63.9

If 'YES'

A. Where do the adults of your family participate in this activity now?

79.5 1) around home
3.8 2) between home and work
10.5 3) in rural areas in New Castle County
6.3 4) on vacation

C. How often? (circle one)

22.0 1) more than 50 times a year
44.3 2) between 10 & 50 times a year
25.0 3) between 5 & 10 times a year
7.0 4) between 2 & 5 times a year
1.7 5) once a year or less

If 'NO'

B. Why not? (circle one)

1) no interest 75.9
2) no site available 4.8
3) existing sites are too far to travel 4.1
4) don't know of any existing sites 3.8
5) cost of equipment 7.0
6) age 4.5

Skip to Q. 2

2. Would you or any member of your family use the bike paths described in the proposal if they were constructed? 1-Yes 36.9 2-No 63.1

If 'YES'

A. How often? (circle one)

12.7 1) more than 50 times a year
32.3 2) between 10 & 50 times a year
29.1 3) between 5 & 10 times a year
23.1 4) between 2 & 5 times a year
3.0 5) once a year or less

C. If the bikeway were constructed what are the <u>two</u> most important facilities needed in order to make the experience more enjoyable?

10.1 1) bike racks
62.7 2) asphalt paving
34.8 3) picnic facilities
55.5 4) rest rooms
37.7 5) nearby auto parking areas

D. Would you or any member of your family use the bikeway for commuting and other transportation purposes? 1-Yes 35.4 2-No 64.6

If 'NO'

B. Why not? (circle one)

1) no interest 73.3
2) too far to travel 13.4
3) adequate facilities exist now 3.1
4) cost of equipment 6.1
5) area ill-suited for a bikeway 0
6) age 4.0

Skip to Q. 3

3. To what extent should New Castle County be involved in the provision of a coastline bikeway? (circle one)

12.9 1) no participation by county
8.8 2) county acquires land; bikeway construction and maintenance by private interests
17.9 3) county acquires land and constructs bikeway; maintenance and operation by private interests
60.4 4) completely county owned and maintained

4. Do you prefer to finance the entire cost of the bikeway (both construction and maintenance) by charging a fee to those who use it? 1-Yes 40.8 Skip to Q. 5
2-No 59.2

If 'No,' where should the County get the additional funds?

34.0 1) general bicycle registration fee
29.2 2) from funds currently spent on highway maintenance
33.6 3) cutting back other county services to free up money
2.5 4) raise taxes

5. If user fees were charged for use of the bikeway, what is the most you would be willing to pay, per family, per year? (circle one)

0 1) more than $25
11.6 2) between $10 & $25
15.2 3) between $5 & $10
10.3 4) between $2 & $5
8.6 5) less than $2
54.3 6) 0

II. Nature Study

This proposal calls for the preservation of the woods, marshland, and unusual plants at the site indicated on the map. A nature study center would be constructed along with a network of trails into the site. Separated from the nature study area, picnic and ballfield facilities would be provided.

1. Do you or any adult members of your family visit nature study areas now? 1-Yes 42.5 2-No 57.5

Do any children in your family visit nature study areas now? 1-Yes 44.8 2-No 55.2

If 'YES' to Either Question

A. Where do you or any member of your family go to take part in this activity?

67.1 1) a park set aside as a natural area with visitor facilities and displays
25.7 2) a park set aside as a natural area without visitor facilities and displays
7.2 3) private lands

C. How often? (circle one)

17.5 1) more than 10 times a year
23.9 2) between 5 & 10 times a year
36.4 3) between 2 & 5 times a year
18.6 4) once a year
3.6 5) less than once a year

D. Since you or an adult member of your family participate in nature study, which 2 of the following natural areas would you be most likely to use?

49.4 1) hill trails
53.8 2) stream valleys
52.0 3) park with grass and flowers
27.9 4) tidal marsh
23.6 5) open fields

If 'NO' to Both

B. Why not? (circle one)

1) no interest 75.1
2) too far to travel to existing sites 7.5
3) don't know of any existing sites 14.1
4) other costs 1.3

Skip to Q. 2

2. Would you or any member or your family visit the nature study area described in the development proposal? 1-Yes 66.3 2-No 33.7

If 'YES'

A. How often? (circle one)

9.5 1) more than 10 times a year
20.5 2) between 5 & 10 times a year
48.0 3) between 2 & 5 times a year
20.3 4) once a year
1.8 5) less than once a year

If 'NO'

B. Why not? (circle one)

1) no interest 92.8
2) too far to travel 6.7
3) adequate facilities exist now 0
4) area ill-suited for a nature center 0.5

Skip to Q. 3

C. What are the 2 most important facilities needed in the nature study area in order to make it a more enjoyable area?

40.8 1) a building which would provide space for exhibits, lectures, slides, etc.
36.7 2) playground for children
57.5 3) trails within the nature study area
40.1 4) guided tours of the nature study area
20.4 5) good view of river

3. To what extent should New Castle County be involved in the provision of nature study areas? (circle one)

9.9 1) no participation by county
12.3 2) county acquires land; leaves land completely undeveloped
24.6 3) county acquires land; nature study facilities privately owned and operated
7.5 4) county owns land and facilities; operation by private interests
45.6 5) completely county owned and operated

4. Do your prefer to finance the entire cost of the nature study center by charging a fee to those who use it? 60.5 1-Yes Skip to Q. 5
39.5 2-No

If 'No' where should the County get the additional funds?

93.9 1) cutting back some existing county services to free up money
6.1 2) raise taxes

5. If the user fee were charged, what is the most you would be willing to pay per family per visit? (circle one)

2.5 1) more than $3.00 per visit
12.2 2) between $2 & $3 per visit
21.1 3) between $ 1 and $2 per visit
27.4 4) between $.50 & $ 1 per visit
21.9 5) less than $.50 per visit
14.9 6) 0

III. Tour Boat

In this proposal an excursion boat would provide rides on the Delaware River, stopping at points of historical and cultural significance along the shore, such as Philadelphia, Wilmington, the City of New Castle, Fort Delaware, and Delaware City.

1. Have you or any member of your family ever taken a ride on an excursion vessel or tour boat? 1-Yes 63.7 2-No 36.3

2. If an excursion vessel like the one described in the proposal were to travel on the Delaware River, would you or any member of your family use it? 1-Yes 80.7 2-No 19.3

If 'YES'

A. How often? (circle one)

5.1 1) over 5 times a year
37.9 2) between 2 & 5 times a year
46.8 3) once a year
10.2 4) less than once a year

C. What type of vessel would you most prefer? (circle one)

3.3 1) small high speed vessel
96.7 2) large slow vessel

D. What are the 2 most important facilities needed to make it a more pleasant experience?

37.7 1) eating facilities on the vessel
37.5 2) guide on the vessel
45.7 3) picnic areas near docking facilities
13.5 4) allow passengers to carry on their bicycles
51.9 5) guided tours of historical areas near docking facilities
10.6 6) make the vessel available for rental for private engagements

If 'NO'

B. Why not? (circle one)

1) no interest 91.2
2) too far to travel to get to it 1.5
3) cost too great 2.9
4) area not suitable for an excursion boat 4.4

Skip to Q. 3

3. To what extent should New Castle County be involved in the provision of a tour boat? (circle one)

34.0 1) no participation by county
23.7 2) county owns dock and parking facilities; vessel owned and operated privately
12.5 3) county owns dock, parking and vessel; vessel operated privately
29.8 4) completely county owned and operated

4. Do your prefer to finance the entire cost of the tour boat and shore facilities by charging a fee to those who use them?
   1-Yes 95.7 Skip to Q. 5
   2-No 4.3
   If 'No' where should the county get the additional funds?
64.0 1) cutting back on some existing County services to free up money
36.0 2) raise taxes

5. What is the most you would be willing to pay per person for a two hour excursion on the vessel? (circle one)
 6.7 1) more than $4.00
20.1 2) between $3 & $4
39.7 3) between $2 & $3
24.2 4) between $1 & $2
 4.3 5) less than $1
 5.0 6) 0

IV. Boat Marina

A marina would be constructed to provide New Castle County boat owners with slip facilities without having to travel great distances. Based upon shoreline characteristics and location the best place for this marina is the site located on the map near Delaware City.

1. Do you or any member of your family own or intend to buy in the near future a recreational boat? 1-Yes 2-No
   10.8 89.2

If 'YES'

A. What kind of boat is it?

37.8 Size 1) less than 16'
50.2 2) between 16' and 22'
12.0 3) greater than 22'

.7 C. Type 1) sail
77.8 2) power
11.5 3) rowboat or canoe

D. Where is it kept?

27.4 1) at a marina
72.6 2) on a trailer away from a marina

E. What is the boat used for?

66.7 1) fishing
33.3 2) pleasure boating
0 3) water skiing
0 4) racing

F. Where is it used?

28.2 1) freshwater lakes or rivers
28.8 2) Delaware River and upper Bay
25.9 3) Sussex County waters
17.2 4) Chesapeake area

G. How often is it used? (circle one)

66.4 1) more than 20 times a year
20.1 2) between 10 & 20 times a year
5.5 3) between 5 & 10 times a year
8.0 4) less than 5 times a year

If 'NO'

B. Why not? (circle one)

1) no interest 70.0
2) cost 23.7
3) don't know of any boating facilities 1.2
4) too far to travel to existing facilities 3.4
5) existing facilities too crowded 0.6

Skip to Q. 2

2. If the nearby marina proposal were developed, charging a fee similar to the one charged at existing facilities and providing similar services, would you use it? 1-Yes 2-No
17.4 82.6

If 'YES'

A. What are the 2 most important facilities besides docks and ramps which should be constructed at the site in order to make the area more enjoyable and useful?

67.0 1) repair services
40.8 2) general store
40.9 3) restaurant
13.6 4) hauling
41.5 5) dry storage

If 'NO'

B. Why not? (circle one)

74.0 1) no interest
21.5 2) cost
1.0 3) too far to travel
1.6 4) present facilities in the County are adequate
1.5 5) satisfied with facilities in other areas
0.5 6) area not suitable for this activity

3. To what extent should New Castle County be involved in the provision of a marina along the Delaware River? (circle one)

45.8 1) no participation by county
16.1 2) county owns land; dock and storage facilities privately owned and operated
13.0 3) county owns land, dock, and storage facilities; dock and storage facilities privately operated
25.0 4) completely county owned and operated

4. Do you prefer to finance the entire cost of a boat marina by charging fees to those who use it? 97.9 1-Yes 2.1 2-No Skip to Next Page

If 'No' where should the County get the additional funds?

65.1 1) cutting back on some existing county services to free up money
34.9 2) raise taxes

V. Multiple Activity Center

This center would be located on a large tract of publicly owned waterfront land near Delaware City and the C&D Canal, a part of which is unused. The proposal calls for development of a broad range of activities including ballfields, picnic areas, swimming, hiking, camping, horseback riding, and marina facilities.

1. Do you or does any member of your family over the age of 18 visit multiple activity parks now? 1-Yes 47.4 2-No 52.6

If 'YES'

A. How often? (circle one)

7.3 1) more than 20 times a year
13.7 2) between 10 & 20 times a year
23.0 3) between 5 & 10 times a year
46.2 4) between 2 & 5 times a year
9.8 5) once a year or less

C. Where do you go now?

26.3 1) neighborhood park
42.7 2) another park within New Castle County that you drive to
13.5 3) another park in Delaware outside of New Castle County that you drive to
17.5 4) out of state parks

If 'NO'

B. Why not? (circle one)

1) no interest 69.4
2) too far to travel to existing facilities 11.6
3) don't know of any sites that offer multiple activity facilities 18.5
4) other costs 0
5) existing facilities too crowded 0.5

Skip to Q. 2

2. Would you or any member of your family use the multiple activity facilities if they were constructed? 1-Yes 63.7 2-No 36.3

If 'YES'

A. How often? (circle one)

3.9 1) more than 20 times a year
16.5 2) between 10 & 20 times a year
37.3 3) between 5 & 10 times a year
35.2 4) between 2 & 5 times a year
7.0 5) once a year

C. What are 4 most important facilities needed to make the park more attractive?

33.3 1) ballfields
68.9 2) picnic areas
28.7 3) swimming pools
27.4 4) swimming beach
41.8 5) hiking trails
33.0 6) camping
13.7 7) public boat ramp
35.6 8) fishing pier
20.4 9) river overlook
27.1 10) food facilities
30.9 11) bike trails
35.8 12) court games

If 'NO'

B. Why not? (circle one)

1) no interest 84.6
2) too far to travel 10.9
3) present facilities are adequate 1.4
4) area not suited for this type of development 2.8
5) other costs 0.3

Skip to Q. 3

3. To what extent should New Castle County be involved in the provision of a multiple activity center along the shoreline? (circle one)

14.3 1) no participation by county
14.6 2) county acquires land; facilities privately owned and operated
18.2 3) county owns land and facilities; operation by private interests
52.9 4) completely county owned and operated

4. Do you prefer to finance the entire cost of a multiple activity center by charging fees to those who use them? 1-Yes 2-No Skip to Q. 5

Yes-7.57, No-24.3

If 'No' where should the county get the additional funds?

90.7 1) cutting back on some existing county services to free up money
9.3 2) raise taxes

5. If a user fee were instituted what is the most you would be willing to pay to use the facility per family, per visit? (circle one)

8.6 1) more than $3.00
26.7 2) between $2 & $3
21.6 3) between $ 1 & $2
20.0 4) between $.50 & $1
11.9 5) less than $.50
11.2 6) 0

Summarization of Your Interest Level

1. If there were no environmental problems with respect to heavy industry, air pollution, water pollution, mosquitoes, and traffic, please indicate your level of interest in each plan with respect to the services that New Castle County should be providing along the Delaware River shoreline. Circle one of the numbers from 0 to 10, 0 being 'no interest' and 10 being 'strong interest.'

Please rate each development plan independently since, if sufficient interest is shown, the County will consider developing more than one plan.

Plan	Level of Interest										
	No Interest				Some Interest				Strong Interest		
	41	42.8	49.7	53.1	61.2	69.6	76.8	88.3	90.3	90.8	100
Bicycling	0	1	2	3	4	5	6	7	8	9	10
	22	25.6	34.6	44.6	50.2	60.2	67	79.4	84.2	87.1	100
Nature Study	0	1	2	3	4	5	6	7	8	9	10
	17.2	19.5	28.1	38.2	43.9	57.5	66.2	80.2	84.9	86.9	100
Tour Boat	0	1	2	3	4	5	6	7	8	9	10
	69	72.7	77.1	78.3	80.8	85.6	86.8	91.7	93.8	94.5	100
Boat Marina	0	1	2	3	4	5	6	7	8	9	10
	21.6	22	26.5	32.8	38	46.3	54.6	67.4	74.3	77.2	100
Multiple Activity Center	0	1	2	3	4	5	6	7	8	9	10

2. Rate each plan again considering that there would likely be some heavy industry, occasional air pollution, little water pollution, occasional mosquito problems, and some traffic congestion along the Delaware River Shoreline south of Wilmington.

Plan	Level of Interest										
	No Interest				Some Interest				Strong Interest		
	45.7	48.3	55.6	59.3	66.5	72.8	78.3	90.1	92.4	93.2	100
Bicycling	0	1	2	3	4	5	6	7	8	9	10
	27	30.7	41.5	51.6	58.5	67.5	72.8	84.2	88.3	89.8	100
Nature Study	0	1	2	3	4	5	6	7	8	9	10
	24	27.3	36.3	48.9	53.9	65.8	70.1	83.8	87.1	88.2	100
Tour Boat	0	1	2	3	4	5	6	7	8	9	10
	73.3	76.8	81.5	83.5	85.2	89.2	90	93.7	95	95.3	100
Boat Marina	0	1	2	3	4	5	6	7	8	9	10
	26.3	27	31.3	40	46.5	56.8	65.6	78.3	82.4	84	100
Multiple Activity Center	0	1	2	3	4	5	6	7	8	9	10