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See Preface

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PREFACE

The Corps of Engineers' comprehensive study of Chesapeake Bay is being accomplished in three distinct developmental stages or phases. Each of these phases is responsive to one of the following stated objectives of the study program.

1. To assess the existing physical, chemical, biological, economic and environmental conditions of Chesapeake Bay and its related land resources.

2. To project the future water resources needs of Chesapeake Bay to the year 2020.

3. To formulate and recommend solutions to priority problems using the Chesapeake Bay Hydraulic Model.

In response to the first objective of the study, the initial or inventory phase of the program was completed in 1973 and the findings were published in a document titled *Chesapeake Bay Existing Conditions Report.* Included in this seven-volume report is a description of the existing physical, economic, social, biological and environmental conditions of Chesapeake Bay. This was the first published report that presented a comprehensive survey of the entire Bay Region and treated the Chesapeake Bay as a single entity. Most importantly, the report contains the historical records and basic data required to project the future demands on the Bay and to assess the ability of the resource to meet those demands.

In response to the second objective of the study, the findings of the second or future projections phase of the program are provided in this the *Chesapeake Bay Future Conditions Report.* The primary focus of this report is the projection of water resources needs to the year 2020 and the identification of the problems and conflicts which would result from the unrestrained growth and use of the Bay's resources. This report, therefore, provides the basic information necessary to proceed into the next or plan formulation phase of the program. It should be emphasized that, by design, this report addresses only the water resources related needs and problems. No attempt has been made to identify or analyze solutions to specific problems. Solutions to priority problems will be evaluated in the third phase of the program and the findings will be published in subsequent reports.

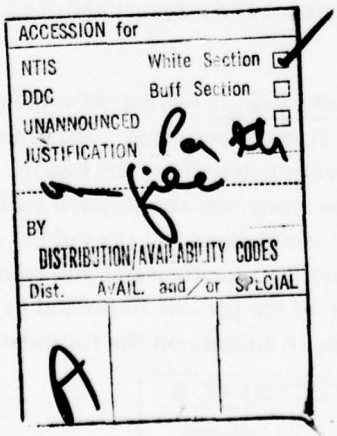
The *Chesapeake Bay Future Conditions Report* consists of a summary document and 16 supporting appendices. Appendices 1 and 2 are general background documents containing information describing the history and conduct of the study and manner in which the study was coordinated with the various Federal and State agencies, scientific institutions and the public. Appendices 3 through 15 each contain information on specific water and related land resource uses to include an inventory of the present status and expected future needs and problems. Appendix 16 focuses on the formulation of the

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initial testing program for the Chesapeake Bay Hydraulic Model. Included in this appendix is a description of the hydraulic model, a list of problems considered for inclusion in the initial testing program and a detailed description of the selected first year model studies program.

The published volumes of the *Chesapeake Bay Future Conditions Report* include:

Volume Number	Appendix Number and Title
1	Summary Report
2	1 – Study Organization, Coordination and History 2 – Public Participation and Information
3	3 – Economic and Social Profile
4	4 – Water-Related Land Resources
5	5 – Municipal and Industrial Water Supply 6 – Agricultural Water Supply
6	7 – Water Quality
7	8 – Recreation
8	9 – Navigation 10 – Flood Control 11 – Shoreline Erosion
9	12 – Fish and Wildlife
10	13 – Power 14 – Noxious Weeds
11	15 – Biota
12	16 – Hydraulic Model Testing



CHESAPEAKE BAY FUTURE CONDITIONS REPORT

APPENDIX 8

RECREATION *

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* Prepared by the Bureau of Outdoor Recreation

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CHAPTER I

THE STUDY AND THE REPORT

The key elements related to the overall framework and coordination efforts of the study are summarized in this chapter. These elements include the following: Authority, Purpose, Scope, Supporting Studies, Study Participation and Coordination.

AUTHORITY

The authority for the Chesapeake Bay Study and the construction of the hydraulic model is contained in Section 312 of the River and Harbor Act of 1965, adopted 27 October 1965, which reads as follows:

> The Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to make a complete investigation and study of water utilization and control of the Chesapeake Bay Basin, including the waters of the Baltimore Harbor and including, but not limited to, the following: navigation, fisheries, flood control, control of noxious weeds, water pollution, water quality control, beach erosion, and recreation. In order to carry out the purposes of this section, the Secretary, acting through the Chief of Engineers, shall construct, operate, and

maintain in the State of Maryland a hydraulic model of the Chesapeake Bay Basin and associated technical center. Such model and center may be utilized, subject to such terms and conditions as the Secretary deems necessary, by any department, agency, or instrumentality of the Federal Government or of the States of Maryland, Virginia, and Pennsylvania, in connection with any research, investigation, or study being carried on by them of any aspect of the Chesapeake Bay Basin. The study authorized by this section shall be given priority.

The Outdoor Recreation Resources Act, Public Law 88-29, of May 28, 1963, (77 Stat. 49; U.S. Code 6401 Z et seq.) provides the Bureau of Outdoor Recreation (BOR) with the basic authority for participating in comprehensive basin studies. Under the provisions of the Federal Water Project Recreation Act, Public Law 89-72 (79 Stat. 213; 16 U.S. Code 460 Z 12 et seq.) the Bureau of Outdoor Recreation is authorized to engage in the study of water and land related planning projects. Section 6(a) of this Act requires that the views of the Secretary of the Interior, as developed in accordance with Section 3 of the Act of May 28, 1963, (77 Stat. 49), with respect to outdoor recreation, be set forth in any report of any project or appropriate unit thereof. These views are to include a report on the extend to which the proposed recreation and fish and wildlife development conforms to and is in accord with the State comprehensive plans developed pursuant to sub-section 5(d) of the Land and Water Conservation Fund Act of 1965, Public Law 88-578 (78 Stat. 897, as amended: 16 U.S. Code 460 Z-4 et seq.). Under the provisions of Section 102(2)(c) of the National Environmental Policy Act of 1969, Public Law 91-190 (88 Stat. 582, January 1, 1970), the Bureau of Outdoor Recreation is authorized to express views and comments relative to any other major Federal action significantly affecting the quality of the human environment.

PURPOSE

→ The purpose of ~~Appendix 8~~ this volume is to present current (1970) and projected recreation demand (1980, 2000, and 2020) for the Chesapeake Bay Study Area. Recreation demand less current supply is tabulated ~~herein~~ as existing and projected outdoor recreation needs. ←

SCOPE

This section delineates the geographic region of the Chesapeake Bay area that was considered in this report and is referred to as the Recreation Study Area. It also deals with the duration of BOR's involvement and examines the extent of the investigation.

As shown in Fig. 8-1, the Recreation Study Area is divided into 12 regions adjacent to the Chesapeake Bay. Included are portions of Maryland, Pennsylvania, Virginia, and the entire State of Delaware. The boundaries of the Maryland and Virginia regions conform to those of the state planning regions as defined in the Statewide Comprehensive Outdoor Recreation Plan (SCORP) for these states. Table 8-1 presents a complete list of the municipalities comprising these regions. The three county area of Delaware and the four county area within Pennsylvania were grouped into two regions respectively.

Each region is composed of several entire counties with regional boundaries corresponding to county lines. Thus, no county is part of two separate regions and no region contains any partial counties. This simplifies analysis and makes calculation procedures easier because figures generated relate more consistently with regional data from other plans and studies which are generally based on whole counties.

The District of Columbia was included in the Suburban Washington Region together with Prince Georges and Montgomery counties as determined by the Maryland SCORP. This assignment was based upon the fact that most of the land surrounding Washington, D.C. is located in Maryland rather than Virginia.

BOR's participation in the study spanned a 6 year period from 1968 to 1974. The following planning documents were completed on the dates shown as a part of the study effort:

1. Chesapeake Bay Study, Recreation Element Planning Aid Report No. 1, Volume I, Existing Conditions (1972)
2. Chesapeake Bay Study Recreation Element Planning Aid Report No. 1, Volume II, Detailed Work Plan (1972)
3. Outdoor Recreation Chesapeake Bay Demand Supply Needs (1974)
4. Recreational Potential of Nuclear Power Plants (1974)

FIGURE 8-1

CHESAPEAKE BAY STUDY AREA BY REGIONS

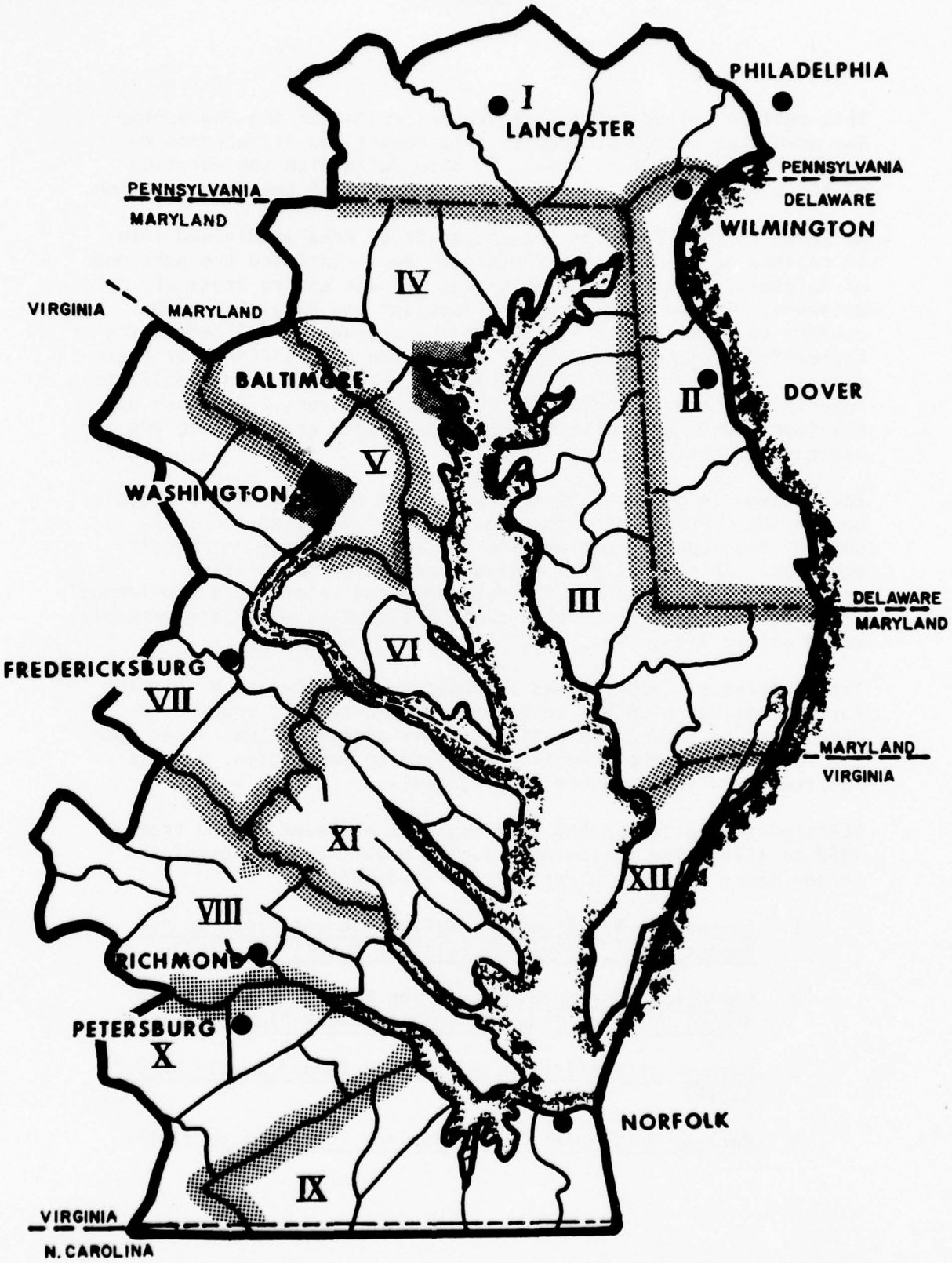


TABLE 8-1

COUNTIES AND INDEPENDENT CITIES (VIRGINIA)
COMPRISING THE STUDY REGIONS OF CHESAPEAKE BAY

Region	County
I - Pennsylvania	Chester
	Delaware
	Lancaster
	York
II - Delaware	Kent
	New Castle
	Sussex
III - Maryland (Upper and Lower Eastern Shore in Maryland SCORP)	Caroline
	Cecil
	Dorchester
	Kent
	Queen Annes
	Somerset
	Talbot
	Wicomico
	Worchester
IV - Maryland (Baltimore Region in Maryland SCORP)	Anne Arundel
	Baltimore County
	Carrol
	Harford
	Howard
	Baltimore City
V - Maryland (Suburban Washington Region in Maryland SCORP)	Montgomery
	Prince Georges
	Washington, D.C.
VI - Maryland (South in Maryland Region in Maryland SCORP)	Calvert
	Charles
	St. Marys

Region	County
VII - Virginia (Region 1 - Northern Virginia in Virginia SCORP)	Arlington
	Caroline
	Fairfax
	King George
	Loudoun
	Prince William
	Spotsylvania
	Stafford
	*Alexandria
	*Falls Church
	*Fredericksburg
	*Fairfax City
VIII - Virginia (Region 2 - Richmond in Virginia SCORP)	Charles City
	Chesterfield
	Goochland
	Hanover
	Henrico
	New Kent
	Powhatan
	*Richmond City
IX - Virginia (Region 3 - Hampton Roads in Virginia SCORP)	Isle of Wight
	Southampton
	*Chesapeake
	*Franklin
	*Norfolk
	*Portsmouth
	*Suffolk
	*Virginia Beach
	James City
	York County
	*City of Hampton
	*City of Newport News
	*City of Williamburg
X- Virginia (Region 9 - Petersburg - Hopewell in Virginia SCORP)	Dinwiddie
	Greensville
	Prince George
	Surry
	Sussex
	*Petersburg
	*Colonial Heights
	*Emporia
	*Hopewell

*Independent Cities

Region	County
XI - Virginia (Region 8 - Tidewater in Virginia SCORP)	Essex
	Gloucester
	King and Queen
	King William
	Lancaster
	Mathews
	Middlesex
	Northumberland
	Richmond
	Westmoreland
XII - Virginia (Region 10 - Eastern Shore in Virginia SCORP)	Accomack
	Northampton

The development of Appendix 8 was chiefly carried out through the following exercises:

1. Inventory of existing recreation supply.

2. Development of methodology designed to measure present and future outdoor recreation demands in boating, sailing, swimming, picnicking, and camping. Activities such as recreational fishing, hunting, bird watching and nature photography are discussed in Appendix 12, "Fish and Wildlife".

3. Comparison of existing supply and present and future demand resulting in estimation of recreation needs from the present through the year 2020.

SUPPORTING STUDIES

The following outdoor recreation plans and resource studies were utilized extensively in the preparation of this Appendix.

1. Outdoor Recreation - A Legacy for America, U.S. Department of the Interior, Bureau of Outdoor Recreation, Washington, D.C.: 1971.
   This document is the official outdoor recreation plan for the Nation.

2. The Virginia Outdoor Recreation Plan; 1973. Commonwealth of Virginia Commission of Outdoor Recreation. The plan offers "current information and a statement of broad policy for all agencies -- federal, state, and local -- concerning recreational needs of the Commonwealth."

3. Delaware Comprehensive Outdoor Recreation Plan; 1970. Delaware State Planning Commission. Delaware's outdoor recreation resources and potential are assessed through detailed inventory, demand and need studies, and possible future acquisitions.

4. Maryland Outdoor Recreation and Open Space Plan, Comprehensive Plan Phase II; 1972. Maryland Department of Natural Resources. The Plan evaluates present and future outdoor recreation facilities needed to meet the state's outdoor recreation requirements.

5. Chesapeake Bay Existing Conditions Report; 1973. U.S. Department of the Army Corps of Engineers, Baltimore District, Appendix-B, Chapter XII. The recreation element of the existing conditions report compiled by the Bureau of Outdoor Recreation estimates "current recreation needs in the Bay area" through comparison of supply and demand. Special emphasis is given to access to the Bay.

6. North Atlantic Regional Water Resources Study, Appendix M, Outdoor Recreation; 1972. Northeast Regional Office, Bureau of Outdoor Recreation. The study is a comprehensive analysis of recreational needs in the North Atlantic Region and offers suggestions to strengthen outdoor recreation in the area.

7. The Existing Regional Parks and Specialized Regional Facility System for the National Capital Region; 1973. National Capital Planning Commission. The study determines future needs of the National Capital Region in order to establish priorities necessary to provide recreation opportunities for residents and visitors in the region.

8. Boating Almanac, 1973, Vol. 4, G. W. Bromley and Co., Inc., New York: 1973.
Listing of marina and boating facilities in the Chesapeake Bay area.

9. Boating Resources Development Planning Study, California Department of Navigation and Ocean Development, Sacramento: October, 1973.
An outdoor recreation planning methodology for predicting boating facility needs.

STUDY PARTICIPATION AND COORDINATION

Under the coordination and guidance of the Baltimore District, Corps of Engineers, the following Federal agencies and States participated in the study.

Department of Agriculture
Department of Commerce
Energy Research Development Administration
Environmental Protection Agency
Federal Power Commission
Department of Housing and Urban Development
Department of the Interior
Department of Defense
Department of Transportation
National Science Foundation
Smithsonian Institution
State of Delaware
District of Columbia
State of Maryland
Commonwealth of Pennsylvania
Commonwealth of Virginia

The Recreation Task Group chaired by the Bureau of Outdoor Recreation consisted of the following members:

Department of Agriculture
Information was provided by the State Offices of the Soil Conservation Service in Delaware, Maryland and Virginia.

Environmental Protection Agency
Information was provided by the Annapolis Field Office.

Baltimore District, Corps of Engineers
Information was provided by the Chesapeake Bay Study Group.

State of Delaware
Information was provided by the Department of Natural Resources and Environmental Control.

District of Columbia
Information was provided by the National Capital Planning Commission.

State of Maryland
Information was provided by the Department of Natural Resources.

Commonwealth of Pennsylvania
Information was provided by the Department of Environmental Resources.

Commonwealth of Virginia
Information was provided by the Commission on Outdoor Recreation.

Department of the Interior
Information was provided by the U.S. Fish and Wildlife Service and by the Bureau of Outdoor Recreation.

The following regional planning councils supplied data and arranged meetings for further coordination of the study:

Richmond Regional Planning District Commission (Virginia)
Radco Planning District Commission (Virginia)
Northern Neck Planning District Commission (Virginia)
Crater Planning District Commission (Virginia)
Southern Virginia Planning District Commission (Virginia)
Peninsula Planning District Commission (Virginia)
Northern Virginia Regional Park Authority (Virginia)
Accomack - Northampton Planning District Commission (Virginia)
Northern Virginia Planning District Commission (Virginia)
Delmarva Advisory Council (Delaware, Maryland, and Virginia)
Baltimore Regional Planning Council (Maryland)
Tri-County Planning Council for Southern Maryland (Maryland)
Metropolitan Washington Council of Governments (District of Columbia)
Maryland-National Capital Park and Planning Commission (District of Columbia)

Institutions of higher learning represented at meetings and providing information for the preparation of this appendix are:

The Johns Hopkins University
University of Delaware
University of Maryland
Virginia Polytechnic and State University
Virginia Institute of Marine Science

In addition to the above, several meetings were held to publicize and discuss the recreational component of the study. Local involvement in these meetings included representation by planning councils, conservation organizations, environmental groups, outdoor recreation commissions, and others. Numerous personal contacts were made throughout the course of the study.

CHAPTER II

OUTDOOR RECREATION IN THE CHESAPEAKE BAY REGION

Outdoor recreation must be viewed as the use of land and water by people in their leisure time. This chapter describes the resources of the Chesapeake Bay that make high quality recreation possible.

DESCRIPTION OF REGION

The Chesapeake Bay Region

The Chesapeake Bay and its tributaries constitute the largest estuarine system in the United States and one of the largest in the world. The complex functioning of such a system with its myriad of life forms provides for recreational pursuits such as fossil collecting, crabbing, and fishing. The Bay is oriented in a north-south direction and connects with the waters of the Atlantic at the southern end. After cutting through the Appalachian range, the Susquehanna River enters the northern head of the Bay providing 50 percent of the Chesapeake's fresh water supply. The major western shore tributaries of the Bay,

including the Potomac, Rappahannock, James, Patuxent and York Rivers originate in the Allegheny Mountains and cross a broad tidal plain at the Bay. Their watersheds are generally forested with mixed hardwoods in the highlands and are partly cleared for cultivation and home site development in the lower reaches.

The general topography of the western shore with its numerous embayments and harbors easily lends itself to a variety of recreation activities, especially, swimming, boating and canoeing. Also, as a result of this topography, scenic vistas on the western shore such as Calvert Cliffs serve as substantial resource bases for picnicking, camping, and hiking.

The Eastern Shore of the Bay, also known as the Delmarva Peninsula, is of low relief elaborately dissected by small tributary rivers including the Pocomoke, Wicomico, Nanticoke, Choptank, and Chester. These watersheds are mainly cultivated. Throughout the Bay, the tidal river reaches and baylets are fringed with marshes. Swamp forests are found on sections of the lower Bay. These marshes and swamp forests are ideal hunting areas for deer and waterfowl.

The tidal shoreline of the Bay is about 7,325 miles in length of which approximately 60 percent is in Maryland and 40 percent in Virginia. The water surface of the Bay and its tributaries (about 4,400 square miles) provide an enormous area for fishing, sailing, boating, and water skiing.

The climate of the Bay region is temperate continental characterized by abundant precipitation, moderate snowfall, plentiful sunshine and a long frost-free season. Summers tend to be long and humid, while winters are variable. While such a climate is extremely conducive for most outdoor recreation activities, it offers little to the recreationist interested in winter sports.

As the primary locus of the Atlantic Flyway, Chesapeake Bay is one of the key areas of the United States for the wintering and resting of migratory waterfowl and shorebirds. Several thousand acres of high quality salt marsh are managed specifically for waterfowl by public and private agencies. The greatest concentration of waterfowl is located on the central Eastern Shore of the Bay where there are numerous wildlife management areas. The national wildlife refuges in the study area include Blackwater, Bombay Hook, Primehook, Linkswood, Deal Island, Eastern Neck, Fishermans Island, Back Bay, and Chincoteague. These cover approximately 78,800 acres.

Resources of the Bay

In recent years the commercial seafood harvest has exceeded one-half billion pounds annually, and is valued yearly at more than $65 million. A significant additional quantity of finfish and shellfish is landed by sport fishermen. Commercial fisheries employ approximately 20,000 persons. Sport fishing is enjoyed by many thousands. Together, these activities contribute mightily to the tidewater way of life, cherished by both residents and nonresidents.

Waterborne commerce, totaling 110 million tons annually, moves over the waterway and contributes to the economy of an 11-state area. The trend in commercial navigation is toward larger ships which in turn require deeper channels posing greater problems locating dredge spoil disposal areas. Modifying channel geometry may cause increase in upstream salinity, and unwise disposal of spoil can have marked effects on living marine organisms. It is estimated that the raw sewage discharged into the Bay by ships in transit is equivalent to that of a community of twenty-five thousand people.

A deep draft navigation channel, with an authorized depth of 42 feet, leads to Baltimore, Maryland. A study is currently underway to determine the economic feasibility of channel depths significantly greater than 42 feet. A 45 foot channel is being provided in the Norfolk-Hampton Roads area in Virginia. In addition, there are more than 100 federally constructed navigation projects on the Bay and its tributaries, with channels ranging in depth from 4 feet to 35 feet and in width from 25 feet to 1,000 feet. Virtually, every indentation on the Bay and its tributaries is a potential harbor for small boats.

The rapid increase in population and the accompanying rapid increase in water-oriented pursuits have created conflicts of usage among various competing interests. The basin includes developed areas which sustain a vigorous economy and other areas where the economy is depressed as a result of technological changes. The development of resource is essential in both areas: for the first, to maintain and expand existing economic activity; and for the latter, to stimulate development through the creation of an important element of the base upon which new economic activities can grow. In depressed areas, industrial development and the recreation industry are expected to be prime factors in economic development. Elsewhere in the Bay areas, several of the major water-using industries are expected to grow as fast,

or faster, than the national rate for such industries, creating demands for water of adequate quantity and quality. There are extensive developments in the flood plains which require appraisal of the needs for additional flood-control works on tidewater as well as fresh water streams and there is need for planning to minimize improper future development of flood plains.

History

Early recreational use of the Bay was primarily hunting or fishing. Pleasure sailing craft did not begin to appear on the Bay in significant numbers until the 1870's and 1880's. During the years from 1910 to 1930, the use of power craft began to emerge. The masses, however, had not the leisure time to draw upon the Bay as an outdoor recreation resource.

Recreation in the Bay region during the 1880's and early 1900's was closely linked with tourism and resorts. Because of its rich colonial history and as the location of the national capital, the Bay region has attracted thousands of tourists every year and the tourist industry is a vital part of the Bay's economy even today.

Following World War II, the increase in population, urban development, personal income levels, mobility and leisure time in such Bay area metropolitan centers as Baltimore, Washington, D.C., Wilmington, Richmond, and Norfolk-Newport News created an intensified demand for water-oriented recreational use of the Bay and its tributaries. Along with this general recreation demand on the Bay came a local demand within these metropolitan areas for parks and recreation programs.

Descriptive Publications

In addition to the "Supporting Studies" noted on pages 9 and 10, among the more noteworthy publications that have been useful in the preparation of this Appendix are the following:

Remote Sensing of the Chesapeake Bay, National Aeronautics and Space Administration, Wallops Island: April 1971.
A study of remote sensing techniques in the Bay area.

PRESENT STATUS

Statewide Comprehensive Outdoor Recreation Plans (SCORPs), which have been completed by all States in the Study Area, provide the best source of inventories of existing recreational resources. Only through an assessment of present supply and demand can an estimate be made of recreation needs as well as the existing problems and conflicts.

Present Resource Use

The Chesapeake Bay area has been inventoried for existing boating, sailing, swimming, camping, and picnicking activities. The results show that the Bay area has a public capacity for nearly 300,000 swimmers, 443 boat ramps, about 5,000 camping sites, and 11,000 picnicking sites. In addition, an inventory of the eight metropolitan areas in the Bay region shows a total of about 55,000 acres of parkland. Pressure for expanded recreation in the Bay area is ever increasing. Provision of local, State, and Federal land and water access for public recreation has not kept pace with the burgeoning demand. For example, the Bureau of Outdoor Recreation estimates that the present demand for swimming in the study area is four times the available supply, five times the supply for boating, three times the supply for camping, and about four times the supply for picnicking as shown in Fig. 8-2. In the private sector, however, a different response has occurred. Private enterprise has responded to increased demands and today controls access to an estimated 47 percent of all land and water recreation acres in the Bay area. Trailer parks, private beaches, resorts, and marinas are the primary private entities.

When recreational resources in the Study Area are inventoried on a regional basis, present shortages appear in most areas in terms of outdoor recreational opportunity. Sizeable local surpluses occur, however, which can be effective in satisfying certain needs on a local level. Various studies have revealed that the most effective way of insuring recreational opportunity is to plan for it prior to or during an area's development rather than after. Even though problems are evident, the potential for recreation in the Bay area is of a much greater magnitude. The resources are there, they only need development to allow expanded public use.

Forces are at work at the local, State, and Federal level to maintain existing recreation areas and provide for new facilities and open space. Provisions are often made at the local level by city and county governments and by local school boards. State

ANNUAL PUBLIC RECREATION ACTIVITY DAYS—1970

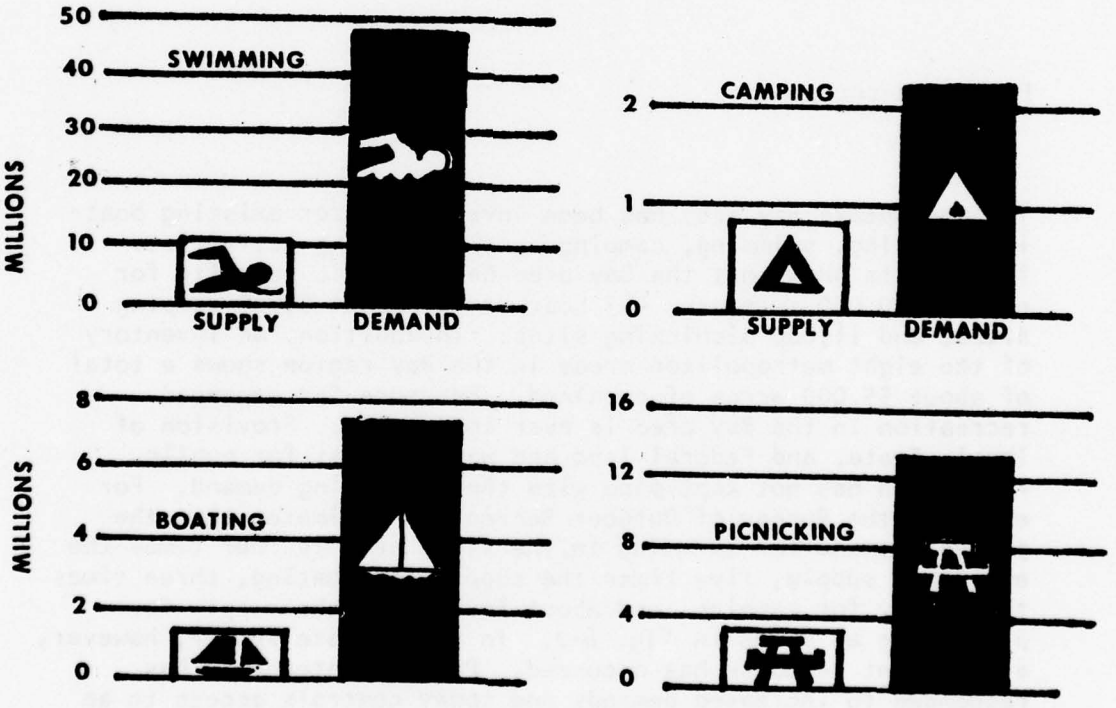


FIGURE 8-2 RECREATION SUPPLY AND DEMAND

agencies such as the Commission of Game and Inland Fisheries and the Commission of Outdoor Recreation in Virginia, and the Department of Natural Resources in Maryland provide recreational facilities and plan for new development and land acquisition. The Land and Water Conservation Fund Program, administered by the Bureau of Outdoor Recreation, and the National Wildlife Refuge Program, administered by the U.S. Fish and Wildlife Service, are very important measures currently being utilized to meet recreation resources needs. Also, at the Federal level, it is planned that existing land holdings under the jurisdiction of several agencies will be made available for public use. This is referred to further under the section on "Programs Related to Recreation" starting on page 93.

EXISTING PROBLEMS AND CONFLICTS

This section considers the problems and conflicts associated with the utilization of the outdoor recreation resources in the Chesapeake Bay area. Among the more significant of these problems are current land use patterns, water pollution, and bay biota.

Land Use and Inaccessibility to the Bay

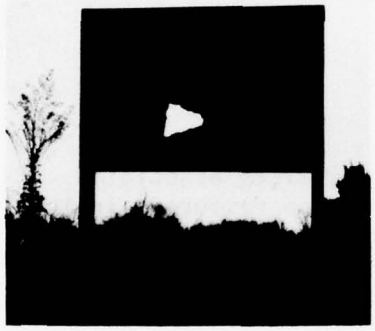
The 7,325 miles of Chesapeake shoreline offer an opportunity for a myriad of uses of the Bay. Unfortunately, recreation, one of the most obvious and socially desirable uses for the shoreline, is extremely limited at the present time.

The Chesapeake Bay is the most inaccessible estuary in the nation as the majority of the shoreline is in private ownership. 2/ According to a study conducted by the Chesapeake Bay Interagency Planning Committee, only 3 percent of the Maryland shoreline is publicly owned. 3/ On all portions of the Bay, residential development is steadily increasing. Single residence shoreline

Photo Group 8-1: Problems Associated with Public Access to the Chesapeake Bay Shoreline



Restricted Boat Access



Posted Shoreline



Spoiled Beach Areas



Intensive Industrial Development

development has preempted long stretches of waterfront and denied access from adjacent inland areas.

Physiographically, much of the shoreline is not amenable to intensive recreation development because of the extensive amount of swampy wetlands. In fact, much of the recreationally developable and desirable land is located along the tributaries and embayments and recreation is in high competition with other forms of land development such as second homes, utility development (especially power plants and transmission lines), industry, or military reservations. Also, much of the area adjacent to the sand beaches is the target of not only residential but utility industrial development.

In urban areas where recreation opportunities are most sorely needed, the shoreline has often been used as transportation corridors without providing for the public use of the shore.

Ironically, a significant percent of the publicly owned shoreline is held by the Federal government, primarily the military, and yet it is unavailable to the general public. However, military ownership has kept large tracts of shoreline from being bought up and developed for purposes other than recreation. See Appendix 4, "Water Related Land Resources" regarding Military Installations in the Bay area.

Water Pollution

Recreation beaches have been closed due to water pollution. Water quality has deteriorated in many sections of the tributaries precluding recreation which involves body contact with the water.

This finding is especially noted in the urban areas on the Bay where demands are the greatest for water-oriented recreation. For example, the number of bathing beaches in Baltimore County approved for operation by the County Health officials has steadily declined from 21 in 1966 to 6 in 1971. 4/

Some motor boats and boaters also pollute the waters in or near prime recreation areas. Both Maryland and Virginia are preparing regulations to prevent this form of pollution.

Appendix 7, "Water Quality" discusses this topic in fuller detail.

Bay Biota: Sea Nettle

The stinging sea nettle (see Figure 8-3) and the closely related comb jellies or ctenophores which reach peak abundance in the summer months discourage swimming, water skiing, and fishing. Other deterrents to recreation activities are objectionable growths of acquatic plants such as the Eurasian milfoil and water chestnut which prevent boating and swimming.

MANAGEMENT RESPONSIBILITIES

This section identifies the framework for filling the gaps, eliminating the overlaps, and providing balanced opportunity for outdoor recreation over the next several years.

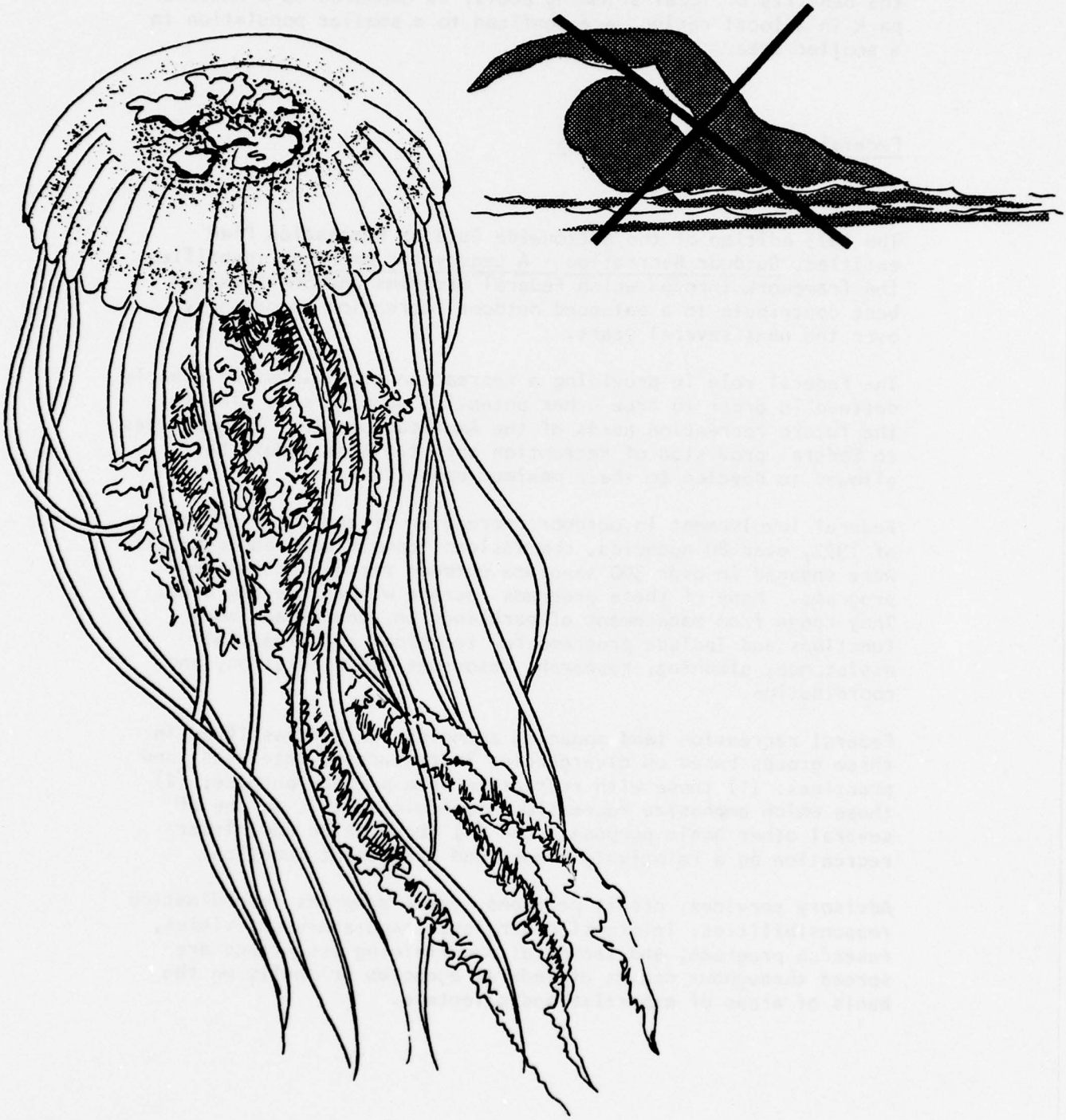
Role and Responsibilities: The Framework for Action.

Outdoor recreation is of major social and economic significance: its provision is a substantial responsibility for private and public interests. The implementation of successful outdoor recreation programs necessitates that public agencies and the private sector operate in a complementary, noncompetitive manner.

A definition of roles and responsibilities is crucial to implementation of the official Nationwide Outdoor Recreation Plan recently completed by the U.S. Department of the Interior.

In determining the role and responsibilities of various levels of government in providing recreation, the extent of the benefits to the specific area and the Nation must be considered. For example, a local government may under invest in recreation facilities if it does not consider the benefits to surrounding communities and the Nation. The greater the ability of the local

Fig. 8-3: The stinging sea nettle is one of the primary reasons for public reluctance to use the Chesapeake Bay for swimming.



community to directly realize the benefits of recreation, the more prominent their role should be in providing the opportunities; the more external the benefits are to the local community, the greater the State or Federal participation. For example, the benefits of local swimming pools, as compared to a national park in a local region, are confined to a smaller population in a smaller area.

Federal Programs and Services

The 1973 edition of the Nationwide Outdoor Recreation Plan entitled, Outdoor Recreation - A Legacy for America, identifies the framework through which Federal Programs and Services can best contribute to a balanced outdoor recreation opportunity over the next several years.

The Federal role in providing a recreation supply must be clearly defined in order to free other potential suppliers to plan for the future recreation needs of the American people. Alternatives to Federal provision of recreation opportunities should be allowed to develop to their maximum capability.

Federal involvement in outdoor recreation is vast. By the end of 1972, over 80 agencies, commissions, committees, and councils were engaged in over 300 separate outdoor recreation-related programs. Many of these programs operate within the Bay area. They range from management of parklands to general advisory functions and include programs for technical and financial assistance, planning, research, resources use regulation, and coordination.

Federal recreation land managing agencies can be classified in three groups based on divergencies in resources, interests, and practices: (1) those with recreation as a primary purpose; (2) those which emphasize recreation but administer it as one of several other basic purposes; and (3) those which administer recreation as a relatively minor land management function.

Advisory services, credit programs, grant programs, coordination responsibilities, information services, regulatory activities, research programs, and technical and training assistance are spread throughout dozens of Federal agencies primarily on the basis of areas of expertise and clientele.

Federal programs in outdoor recreation are too numerous to itemize here: however, to indicate their significance, some of those which have the greatest impact in the Chesapeake Bay area are worthy of mention. The orginal emphasis of the National Park Service in the Study Area was the setting aside and management of expansive and scenic wild areas for the preservation and enjoyment of natural features. Gradually, this role has evolved to include emphasis on preservation and interpretation of the Nation's significant historic and cultural resources located in cities such as Baltimore, Washington, D. C., Fredericksburg, Williamsburg, and Norfolk. The U.S. Fish and Wildlife Service provides a variety of recreation opportunities on one third of the lands under its administration within the Bay area. Such recreation opportunities can be found at Bombay Hook National Refuge and Prime Hook National Wildlife Refuge in Delaware; Blackwater and Patuxent National Refuges in Maryland and Chincoteague National Wildlife Refuge in Virginia. There are numerous water resource development projects such as the Chesapeake and Delaware Canal built and maintained by the Corps of Engineers that provide additional resources for the enthusiastic Bay area recreationist.

The Bureau of Outdoor Recreation is the focal point in the Federal Government for outdoor recreation policy and programs and has a crucial role in coordinating these functions. The Bureau does not manage any recreation areas or facilities. Its major functions include nationwide planning, coordinating Federal and State outdoor recreation programs, studying outdoor areas with public recreational potential, providing technical assistance to government and private interest and administering the Land and Water Conservation Fund. It also evaluates recreation potential of surplus Federal real property for possible transfer to State and local governments under the President's "Legacy of Parks" program.

The National Oceanographic and Atmospheric Administration is responsible for the implementation of the Coastal Zone Management Act of 1972 (P.L. 92-583). The Act calls for "the effective management, beneficial use, protection and development of the coastal zone" in order reconcile the increasing and competing demands upon the lands and waters of coastal zone. The Act encourages the states to develop extensive programs for the effective protection and use of coastal resources, which the Act calls "the key" to anticipating future problems. Under this program states would delineate their coastal zone boundaries and identify geographical areas of particular concern including those of substantial recreational value and/or opportunity. A fuller discussion of the Act and related state programs may be found in Appendix 4, "Water Related Land Resources".

State Programs and Services

Outdoor recreation planning, development, regulation, technical assistance, land acquisition, and financial aid are responsibilities of several different agencies within most states. The states exercise the key role in comprehensive land use planning and in identifying, acquiring, developing, and managing major public outdoor recreation resources.

Since enactment of the Land and Water Conservation Fund Act in 1965, each state has prepared a comprehensive statewide outdoor recreation plan. These plans reflect state outdoor recreation policies, priority outdoor recreation needs, and action programs. State outdoor recreation plans provide the overall direction to efforts to State and local governments and the private sector in providing recreation opportunities and services within the state. State recreation planners should take into account land use and recreation planning by other State, local and Federal agencies.

Because State and local governments are generally in closer proximity to the population they serve, they are more able than the Federal government to identify the recreation demand and supply within their jurisdictional boundaries. It is not the duty of the Federal government to identify specific actions that State and local governments must take in response to the demand/supply situations. Suggestions can be made, however, regarding conditions prevalent in many states.

State and local governments are often prohibited from providing recreation opportunities on lands owned by the private sector or other governmental bodies due to financial restrictions in constitutions, charters, or other legal authorizations. No public bodies could be restricted from fully utilizing the innovative financing methods accepted and practiced today.

The state park and forest programs for the State of Pennsylvania are administered by the Department of Environmental Resources (DER), in which the Bureau of State Parks and the Bureau of State Forestry, manage their respective programs.

The Fish Commission, an independent agency, maintains hatcheries and stock streams for Pennsylvania anglers. The independent Game Commission assists in the management of the State game lands and wildlife resources. Through the efforts of the Bureau State Parks, residents of the State are able to enjoy and participate in several outdoor recreation activities at a multitude of State parks. In addition to the DER, the Pennsylvania Department of Community Affairs aids in technical assistance and grants to municipalities while the State Office of Planning and Development has major responsibilities for compilation and updating of the SCORP.

Maryland's recreation programs fall under the general jurisdiction of the Department of Natural Resources (DNR). Scattered throughout the Maryland portion of the Bay region are numerous state parks administered by the Maryland Park Service. Two other divisions with the Maryland DNR of significanceefor outdoor recreation are the Maryland Forest Service and the Wildlife Administration. The Forest Service operates the state forest system, a prime recreational resource. The Wildlife Administration contributes substantially to quality recreation experiencesdfor hunters in the state through its wildlife management program.

Maryland's Coastal Zone Management program is housed in the Energy and Coastal Zone Administration of the DNR. Maryland's coastal zone has been divided into resource protection areas such as wetlands and prime recreation areas and several others.

Under the direct supervision of the Delaware Department of Natural Resources and Environmental Contol, the Division of Parks, Recreation and Forestry carries out the major program areas for recreation in the State. These areas include the development of the SCORP, maintenance of the state park system, operation of state wildlife refuges and management of state forests.

Delaware pioneered the restriction on heavy industrial development in coastal regions within two miles of the shore. The State Planning Office is expanding its program under the Federal Act.

The Commission on Outdoor Recreation is the central coordinating mechanism in the development of outdoor recreation programs in the Commonwealth of Virginia. One of the principle responsibilities of the Commission is the compilation of the SCORP. Virginia's Department of Conservation and Economic Development also has several functions related to outdoor recreation. Its Divisions of Forestry, and Parks and its Salt Water Sport Fishing program all provide excellent recreational opportunities for Virginia's residents and nonresidents.

Virginia is using existing programs to expand its Coastal Zone Management Program to qualify for Federal support under P.L. 92-583. Virginia's Department of Commerce and Resources has the prime responsibility to develop the Commonwealth's overall program.

The Department of Recreation of the District of Columbia is responsible for the execution of several outdoor recreation programs in the Nation's capitol. Among these programs are the development of the D. C. SCORP and many inner city activities. The National Capital Planning Commission makes a substantial contribution toward outdoor recreation through the evaluation of future recreation needs in the area.

Local Programs and Services

Cities, counties, regions, and other political subdivisions of states are closest to the people and in the best position to know the needs and desires of their citizens, and guage requirements for community and neighborhood outdoor recreation resources and facilities. They have an important responsibility to work closely with their citizens and local organizations to ensure that outdoor recreation needs are recognized, understood, and effectively met.

The patterns of recreation supply and demand increasingly cut across local governmental boundaries. It is important that county and regional organizations be prepared to cope with problems and opportunities which result.

The current trend in local recreation provision is toward decentralized neighborhood facilities rather than large complexes serving broad geographical areas. This trend may reflect more sensitivity to the problems of physical accessibility to public recreation than has been apparent in the recent past.

Local park and recreation agencies could coordinate recreation and land use planning efforts with school and other land managing authorities to take full advantage of the recreation benefits to be derived from the multiple use of land and water resources. Water supply and irrigation reservoirs and municipal watershed areas are examples of opportunities that should be explored. Present policies in many jurisdictions discourage recreation use of such water resources areas. Much of the resistance to multiple use of these reservoirs and associated lands has to do with the problems of maintenance and liability as well as possible contamination of the water supply. Many water projects have high potential and can provide varying degrees of public recreational opportunities without endangering public health. It is important that optimum use be made of the recreation potential of existing water supply reservoirs, particularly those close to urban populations.

Local park and recreation agencies are increasingly active in the ecology field. They are sponsoring conservation programs, nature education centers, and waste recycling campaigns and are taking leadership roles in civic anti-pollution and environmental protection efforts. Where appropriate, local agencies should provide direct technical assistance to organizations and landowners interested in providing facilities or services to the general public.

In spite of evident problems, Chesapeake Bay does possess a tremendous potential for providing public recreation benefits as well as supporting a substantial recreation industry. Recreation can also function to entice industrial development and to serve as a modifier to that development.

Several municipalities in the Bay region possess outstanding recreational resources and have developed significant programs for the effective utilization of these resources. One of the more notable park systems in the region is located in the City of Baltimore. Included in this system are such large parks as Gywnn Falls, Herring Run, Clifton, Patterson, and Fort McHenry National Park.

The District of Columbia's Recreation Department makes extensive use of school facilities in many of its program areas. There are also cooperative agreements between the Recreation Department and the National Park Service for the use of Federal lands in the District.

The Northern Virginia Regional Park Authority, a unique intercity agreement, is primarily concerned with the preservation of open space and wooded areas for the counties of Arlington, Fairfax, and Loudoun, and the cities of Alexandria, Falls Church, and Fairfax. Increasing consolidation of municipal recreation projects is being encouraged by the Virginia Commission of Recreation by offering increased cost-sharing for regional projects. This has lead to better and more diversified recreation programs.

Private Sector

Private contributions to outdoor recreation constitute a complex array of enterprises, groups, organizations, and individual efforts touching practically every aspect of outdoor recreation. The involvement ranges from family owned and operated cabin resorts to the corporation-managed hotel chain; from providers of recreation facilities or services to manufacturers of recreation equipment.

Today the private sector owns or operates as much recreation acreage as the public sector and involves more people and a much wider variety of organizations and interests. Both public and private planners and administrators now recognize the need to consider the private contribution in the development of responsive programs to avoid unnecessary duplication, unfair competition or an unbalance of supply and demand.

It is estimated that about 50 percent of all U.S. recreation opportunity is directly attributable to the private sector. Indications of this involvement can be seen along public park and recreation areas accessways that are lined with private camping areas, sales establishments and other facilities. Private lands around the perimeters of public parks, recreation areas, and forests have skyrocketed in value because of the premium placed on them for second homes, mountain cabins, and outdoor activity areas. Franchised campgrounds dot the continent. In some areas, these are destination type areas where the camper can rent all of the equipment needed to enjoy fishing, hunting, skiing, snowmobiling or whatever the area's feature attractions provide. Private winter sport areas have blossomed and spread southward with the stimulus of artificial snow.

Private enterprises can be broadly grouped by motif into two categories: profit and nonprofit. The profit category includes enterprises directly providing outdoor recreation facilities and services, concession operations, related services and equipment manufacturers. The nonprofit category includes foundation and service types of organizations, industrial properties and industrial recreation facilities.

Theme parks and other tourist and amusement areas of major national repute abound within the Chesapeake Bay Region. These areas help to relieve the demand for certain outdoor recreational facilities, especially those which are family oriented.

CHAPTER III

FUTURE OUTDOOR RECREATION NEEDS

This chapter presents the findings of this study concerning future outdoor recreation needs in the Chesapeake Bay area. In order to adequately evaluate the availability of existing supply to meet future needs, three major elements were considered: Future Demands, Future Supply, and Future Problem Areas. An in-depth examination of future needs was made. Also, in order to assess a range of outdoor recreation trends in the Bay area, a sensitivity analysis, that is, a study of the range of results using differing variables, was conducted.

FUTURE DEMANDS

This section sets forth the principal assumptions relating to the demand analysis. In addition, it discusses the methodology used in the project demands which centers on the various quantitative techniques employed in the forecasting process. Finally, it presents a tabular listing of the facility requirements for satisfying Bay-wide future outdoor recreation needs.

Assumptions

Appendix M, Outdoor Recreation, of the North Atlantic Regional Water Resources Study (NAR) completed in May 1972, was the principal source for the demand methodology. The objectives of Appendix M was to determine in broad terms the overall requirements in the North Atlantic Region for water and related land resource development for outdoor recreation. The Appendix presents an analysis of present and prospective recreation demands within the North Atlantic Region as a whole and in series of subregions.

The NAR recreation demand projections were based on the 1960 national recreation survey by the Outdoor Recreation Resources Review Commission (ORRRC), "The 1965 Survey of Outdoor Recreation Activities," conducted by the Bureau of Outdoor Recreation (BOR), and material gleaned from on-going research. Using the NAR recreation demand projections for the Chesapeake Bay Study region, the following assumptions must be made:

1. Use of the findings presented in the report entitled "The 1965 Survey of Outdoor Recreation Activities" is valid for 1970 projection purposes, in particular, the application of census region participation rates and one-way travel distances by type of trip and activity to residents of the respective census regions. 6/

2. The composite effect of six socio-economic variables upon participation rates as measured in the 1960 ORRRC Survey for the period 1960-1976 and 1960-2000 are equally valid for the time intervals of 1965-1980 and 1965-2000, respectively. These six variables include: Education; Occupation; Age/Sex; Family Income; Residence; and Leisure (available). 7/

3. Persons under 12 years of age will participate at the same rate as those over that age. 8/

4. Population projections known as Series "C" were provided for each of the study regions by the Office of Business Economics, U.S. Department of Commerce. The Baltimore District, Corps of Engineers, reviewed these projections and then distributed them to the governmental agencies participating in the Chesapeake Bay Study.

Demand Methodology

In order to evaluate the sufficiency of existing recreation resources of the Bay, one must first determine demand. Demand is a schedule of the quantity of outdoor recreation opportunity people are willing and able to pay for at one point in time with a given level of opportunity conditions. The demand estimates for the outdoor recreation activities of swimming, boating, sailing, picnicking, and camping in the Chesapeake Bay Basin were based on the following methodology originally developed in Appendix M, Outdoor Recreation of the North Atlantic Region Study (NAR). 9/ However, several sections of the original NAR methodology for predicting outdoor recreation demands and needs have been expanded, rewritten, and included in this report to make the methodology available to a wider audience of planners and resource specialists.

A. Estimation of Demand

Demand (D) for outdoor recreation is determined by multiplying the participation rate (p. r.) for a given activity times the population (p.).

$$D = p.\ r.\ X\ p.$$

Participation rates and projected populations by years appear in Tables 8-2 and 8-3, respectively. Population can be based on present data from a census tract or on a future projection. The participation rate is calculated by multiplying the percentage of the population which takes part in an activity times the average number of days that was spent in that activity and dividing by 100. 10/

$$p.\ r. = \frac{\%\ of\ p.\ X\ average\ activity\ days}{100}$$

B. Distribution of Demand

When determining the magnitude of demand generated by a particular population, it is necessary to find how that demand will be distributed, how far and to what areas will the population go to satisfy its recreation desires. The procedure for deriving demand distribution follows.

TABLE 8-2

PARTICIPATION RATES FOR DEMAND, SUPPLY, AND NEEDS 1/
FOR OUTDOOR RECREATION IN CHESAPEAKE BAY STUDY AREA

	1970 (1965) 2/	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

1/ The increases noted in this table are based on item five under Assumptions.

2/ See item one under Assumptions.

TABLE 8-3

PROJECTED SERIES "C" POPULATION DATA
FOR STUDY REGIONS OF THE CHESAPEAKE BAY

REGION		1970	1980	2000	2020
I	Pennsylvania	1,470,642	1,962,000	2,611,000	3,511,000
II	Delaware	548,104	672,000	931,000	1,216,000
III	Eastern Shore - Maryland	258,329	305,000	396,000	494,000
IV	Baltimore	2,070,670	2,398,000	3,106,000	3,853,000
V	Washington	1,939,886	2,231,000	2,933,000	3,819,000
VI	Southern Maryland	115,748	138,000	206,000	294,000
VII	Northern Virginia	998,662	1,342,000	2,196,000	3,309,000
VIII	Richmond	547,542	661,000	908,000	1,239,000
IX	Hampton Roads	1,088,452	1,180,000	1,391,000	1,615,000
X	Petersburg - Hopewell	161,737	190,000	227,000	364,000
XI	Tidewater	83,957	94,000	105,000	119,000
XII	Eastern Shore - Virginia	43,446	45,000	48,000	51,000
TOTAL STUDY AREA		9,327,175	11,218,000	15,058,000	19,884,000

Twelve regional population centers were plotted on a map of the Chesapeake Bay Study Area (scale 1: 250,000). Then a series of distributional circles (concentric rings) were drawn around each of these centers. 12/ In line with the original NAR methodology, these circles had scaled radii of 5, 10, 25, 50, 100 and 250 linear miles, encompassing 78, 235, 1,648, 5,887, 23,550, and 164,850 square miles of land area respectively.

The next step involved measuring the amount of influence of each region on every other region. This was accomplished by comparing the land areas of one region with the total land area of a zone of influence or concentric ring in which the region or part of the region lies. 13/

The distributional circles included as Figures 8-4 to 8-8 show the relationship between distance from home and the percentage distribution of the occurrence of each activity. For instance, by referring to Fig. 8-4 we see that 14.4 percent of all boating took place within five miles of the recreationist's home. 14/

The proportion of demand for each activity that occurs within each distributional ring is shown in Figures 3-4 to 8-8. To determine the distribution of demand generated by the population of each Chesapeake Bay Study (CBS) Region multiply this proportion by the projected number of activity days from Tables 3-4 and 8-8. This result is then multiplied by the portion of the ring that lies within the boundaries of the Study region. 15/ For a more detailed explanation of the demand methodology see Attachments I through V.

Tables 8-4 to 8-8 represent resident demand in activity days for swimming, boating, sailing, camping, and picnicking in the Chesapeake Bay area for the years 1970, 1980, 2000, and 2020.

C. Non-Resident Demand

The demand figures generated by the above methodology represent approximately 78.2 percent of the total demand for outdoor recreation in the Chesapeake Bay Study Area. About 21.8 percent of the total demand is generated by non-residents -- those who live outside the Chesapeake Bay Study Area Regions. The 21.8 percent figure was based on the NAR Study and the Virginia and Maryland SCORPs. Non-resident demand based on the 21.8 percent figure is quantified in Tables 8-9 to 8-13. (See Facility Requirements Methodology starting on page 47.)

Fig. 8-4: Distribution of the Percent of Boating Participation Days Based on Distance From Population Center (Summer Season)

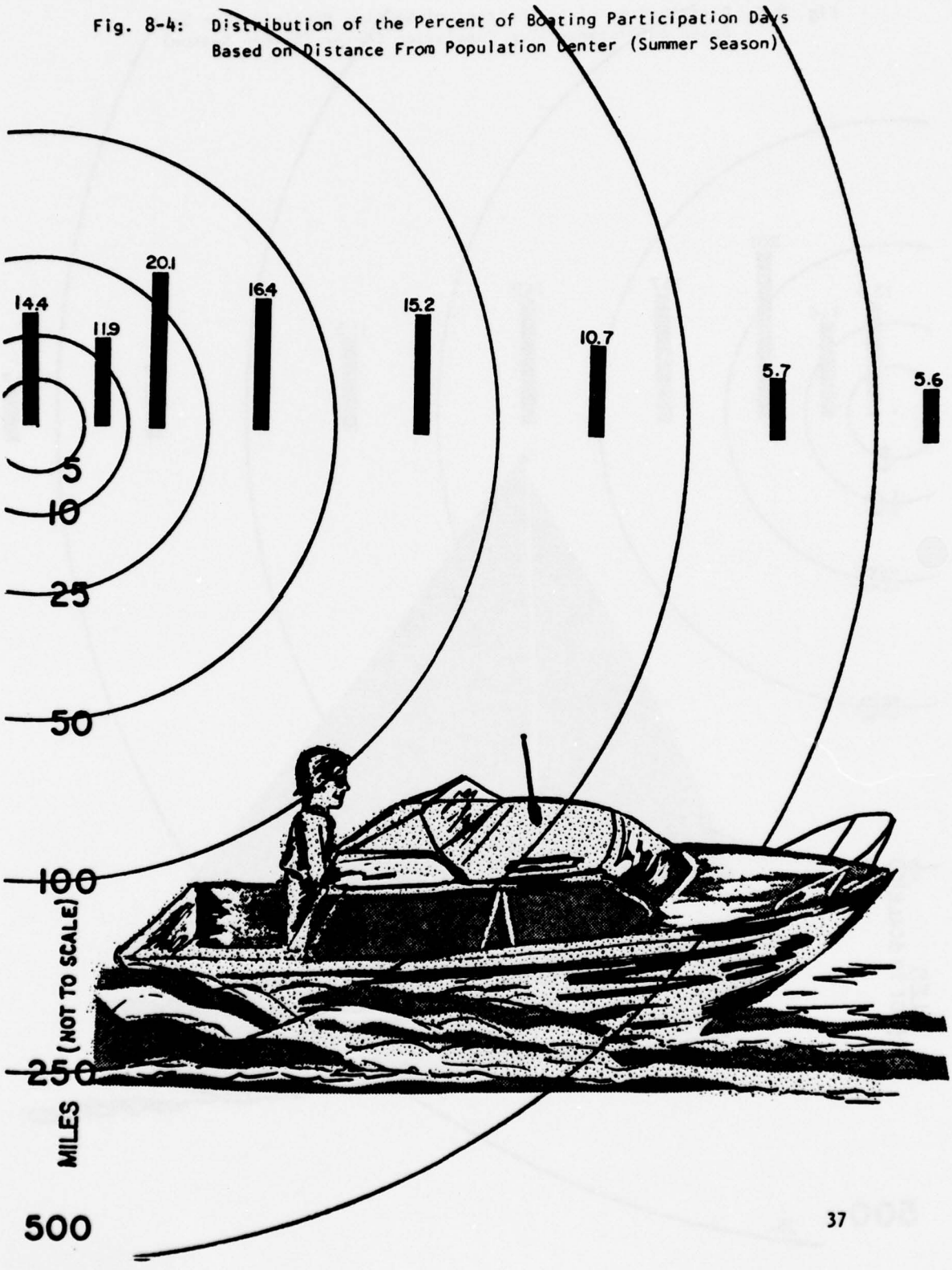


Fig. 8-5: Distribution of the Percent of Sailing Participation Days Based on Distance from Population Center (Summer Season)

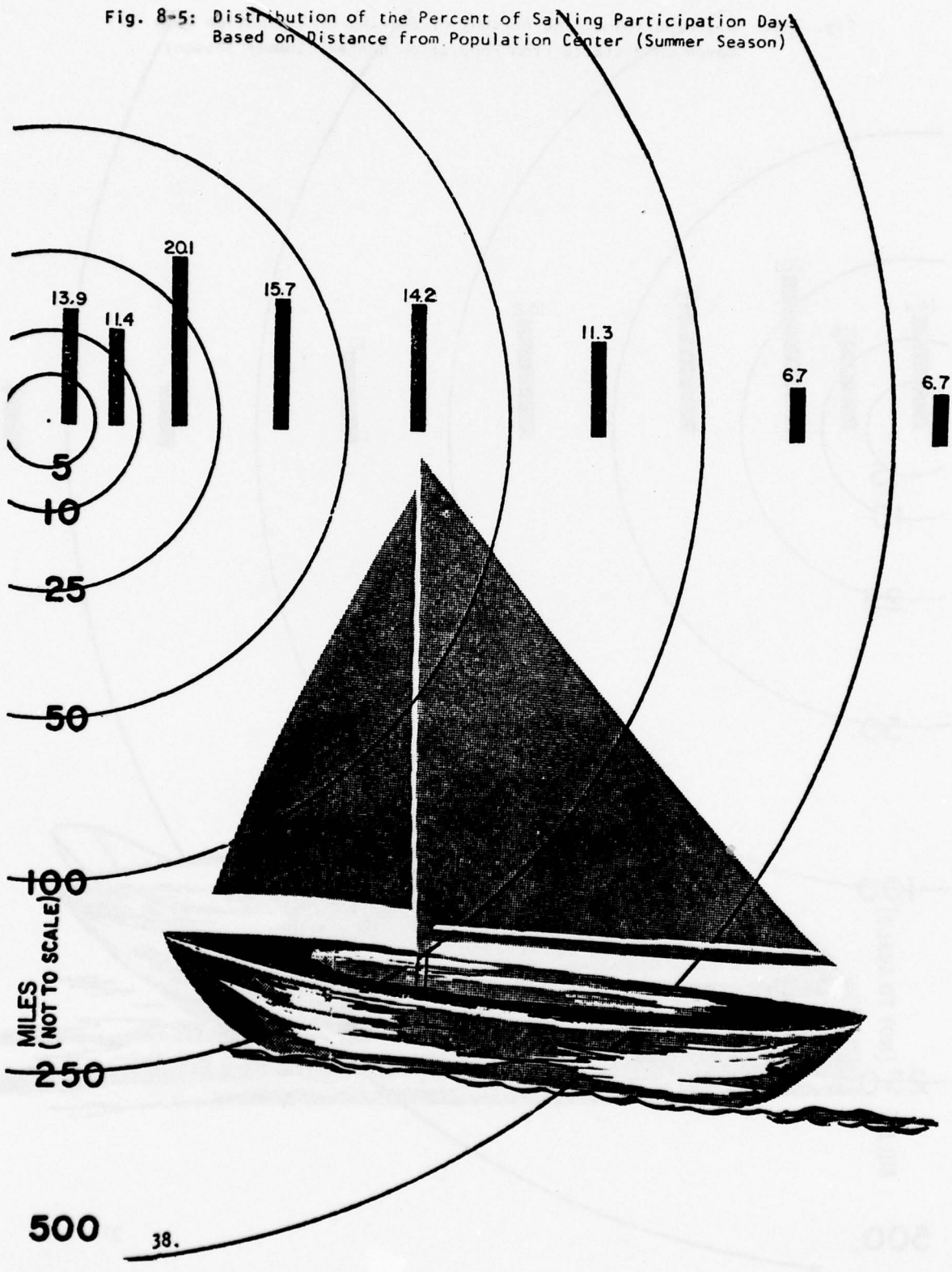


Fig. 8-6: Distribution of the Percent of Swimming Participation Days Based on Distance from Population Center (Summer Season)

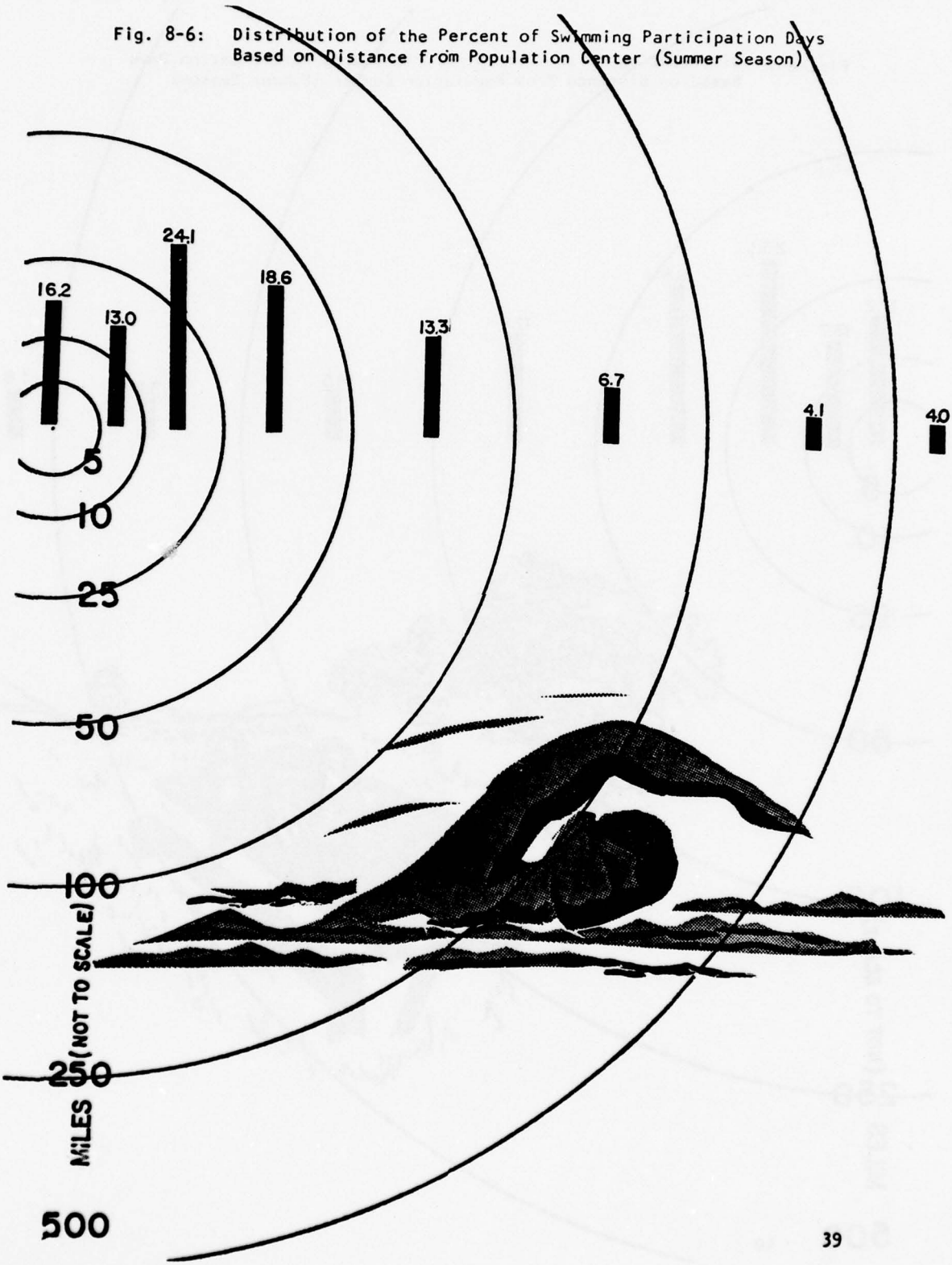


Fig. 8-7: Distribution of the Percent of Picnicking Participation Days Based on Distance from Population Center (Summer Season)

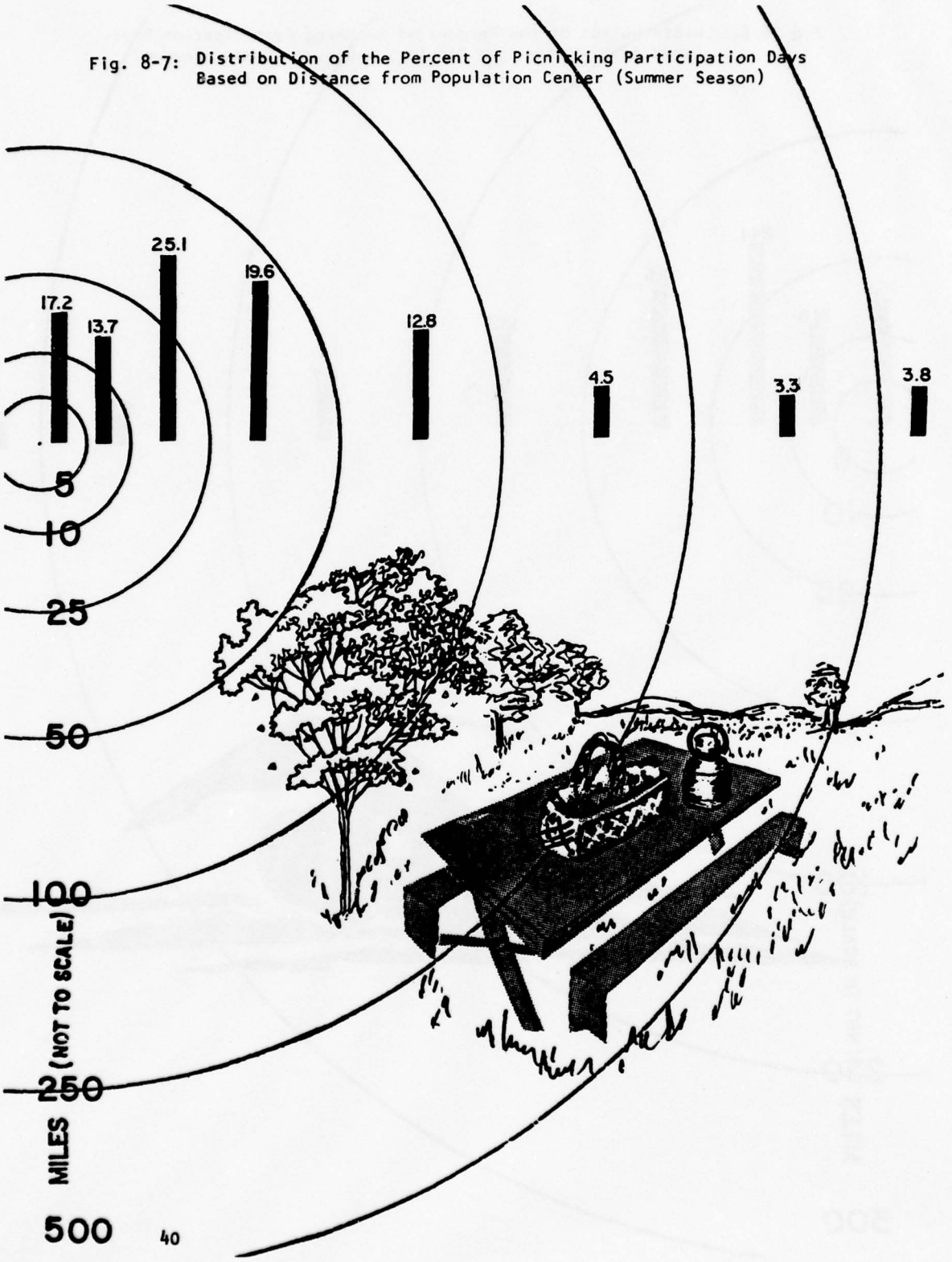


Fig. 8-8: Distribution of the Percent of Camping Participation Days Based on Distance from Population Center (Summer Season)

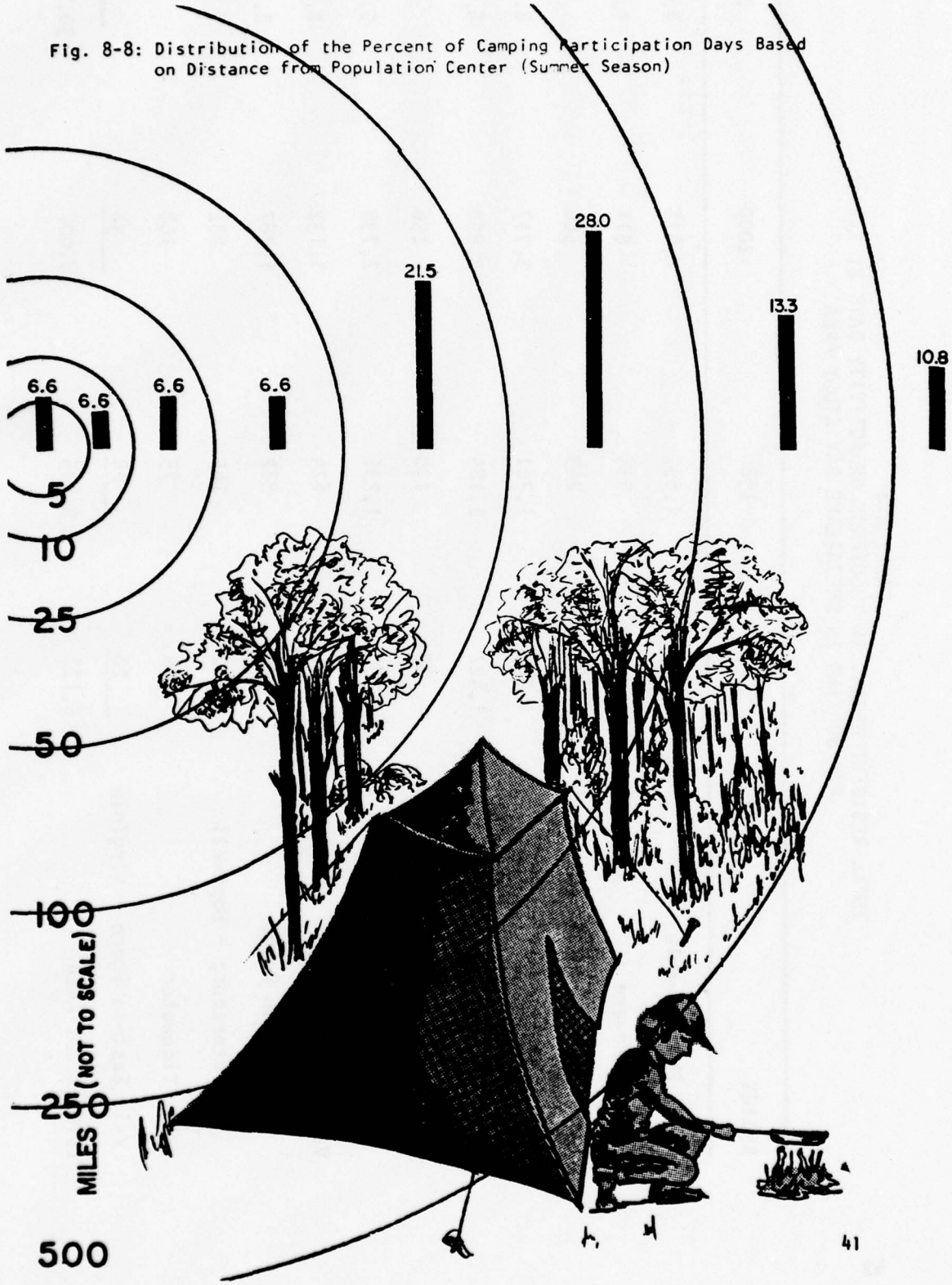


TABLE 8-4
TOTAL RESIDENT DEMAND IN THOUSANDS OF ACTIVITY DAYS BY REGION
FOR BOATING IN CHESAPEAKE BAY STUDY AREA

REGION		1970	1980	2000	2020
I	Pennsylvania	953	1,692	2,925	4,965
II	Delaware	231	338	611	1,210
III	Eastern Shore - Maryland	183	249	506	832
IV	Baltimore	1,383	1,761	3,717	6,170
V	Washington	1,422	2,185	3,850	6,670
VI	Southern Maryland	80	130	256	467
VII	Northern Virginia	700	1,296	2,799	5,385
VIII	Richmond	381	624	1,132	2,064
IX	Hampton Roads	608	882	1,787	2,174
X	Petersburg - Hopewell	112	145	282	576
XI	Tidewater	49	75	108	164
XII	Eastern Shore - Virginia	20	28	34	54
TOTAL	STUDY AREA	6,122	9,405	18,007	30,731

TABLE 8-5

TOTAL RESIDENT DEMAND IN THOUSANDS OF ACTIVITY DAYS BY REGION
FOR SAILING IN CHESAPEAKE BAY STUDY AREA

REGION		1970	1980	2000	2020
I	Pennsylvania	122	223	374	1,006
II	Delaware	29	58	90	230
III	Eastern Shore - Maryland	23	44	65	158
IV	Baltimore	176	326	454	1,156
V	Washington	181	332	492	1,226
VI	Southern Maryland	10	19	33	91
VII	Northern Virginia	90	194	357	1,057
VIII	Richmond	48	93	145	387
IX	Hampton Roads	77	134	177	404
X	Petersburg - Hopewell	14	27	36	113
XI	Tidewater	6	11	14	31
XII	Eastern Shore - Virginia	3	4	5	11
TOTAL STUDY AREA		779	1,465	2,252	5,870

TABLE 8-6

TOTAL RESIDENT DEMAND IN THOUSANDS OF ACTIVITY DAYS BY REGION
FOR SWIMMING IN CHESAPEAKE BAY STUDY AREA

REGION		1970	1980	2000	2020
I	Pennsylvania	5,553	9,812	17,016	27,176
II	Delaware	1,330	2,181	3,957	6,105
III	Eastern Shore - Maryland	1,065	1,696	2,886	4,422
IV	Baltimore	8,069	12,498	21,214	30,644
V	Washington	8,282	12,668	21,965	33,753
VI	Southern Maryland	463	739	1,445	2,377
VII	Northern Virginia	4,130	7,423	15,709	27,752
VIII	Richmond	2,236	3,608	6,446	10,479
IX	Hampton Roads	3,462	5,111	7,895	10,827
X	Petersburg - Hopewell	660	1,018	1,624	3,068
XI	Tidewater	305	425	677	907
XII	Eastern Shore - Virginia	114	158	221	276
TOTAL STUDY AREA		35,669	57,337	101,055	157,786

TABLE 8-7

TOTAL RESIDENT DEMAND IN THOUSANDS OF ACTIVITY DAYS BY REGION
FOR PICNICKING IN CHESAPEAKE BAY STUDY AREA

REGION		1970	1980	2000	2020
I	Pennsylvania	2,445	3,705	5,516	9,826
II	Delaware	584	816	1,315	2,190
III	Eastern Shore - Maryland	470	639	930	1,536
IV	Baltimore	3,560	4,706	6,952	11,224
V	Washington	3,607	4,742	7,065	12,090
VI	Southern Maryland	204	278	457	864
VII	Northern Virginia	1,820	2,792	5,115	10,106
VIII	Richmond	989	1,360	2,140	3,784
IX	Hampton Roads	1,549	1,917	2,541	3,910
X	Petersburg - Hopewell	291	390	524	1,110
XI	Tidewater	124	159	216	297
XII	Eastern Shore - Virginia	50	69	81	99
TOTAL	STUDY AREA	15,693	21,573	32,852	57,036

TABLE 8-8

TOTAL RESIDENT DEMAND IN THOUSANDS OF ACTIVITY DAYS BY REGION
FOR CAMPING IN CHESAPEAKE BAY STUDY AREA

REGION		1970	1980	2000	2020
I	Pennsylvania	171	301	559	1,013
II	Delaware	44	78	152	267
III	Eastern Shore - Maryland	33	54	98	162
IV	Baltimore	241	400	730	1,214
V	Washington	230	394	754	1,288
VI	Southern Maryland	15	26	53	100
VII	Northern Virginia	128	233	553	1,138
VIII	Richmond	64	120	204	386
IX	Hampton Roads	107	161	275	431
X	Petersburg - Hopewell	19	31	53	112
XI	Tidewater	9	15	25	36
XII	Eastern Shore - Virginia	4	6	9	13
TOTAL	STUDY AREA	1,065	1,819	3,465	6,160

D. Facility Requirements Methodology

Once the projected demand (number of activity days) for the regions had been calculated for each of the five activities, the demand was then converted to facility requirements. In the case of boating, sailing, and swimming, acreage was determined. For picnicking and camping, tables and sites, respectively, were computed.

The method for converting demand into facility requirements was taken from the NAR Study and is summarized as follows:

$$R = \left\{\frac{D}{CTU}\right\} S$$

wherein

R = resource requirements in specified units, acres, square feet, camp sites and picnic tables.

D = demand - projected number of seasonal activity days, taken from Tables 4 through 8.

C = capacity utilization days - The total number of days of full facility use during the recreation season. The quantity for C for time periods is shown below. The 1980, 2000, and 2020 figures are taken from the NAR Study and vary with climate and expected changes in leisure. The 1970 figure is based on the assumption that the summer season is 13 weeks long with 3 peak capacity utilization days per week (Saturday, Sunday, and Monday to Friday counting as one capacity day). (Source: NAR Study.)

1970	1980	2000	2020
39	47	52	60

T = turnover rate - mean number of parties at each facility per day.

Activity	Turnover Rate
Boating	4 parties per boat, 50 boats per day/ramp.
Sailing	4 parties per boat
Swimming (Beach)	3 people per space occupied by a bather
Picnicking	2 parties per picnic site
Camping	1 party per camp site

U = unit capacity, number of persons accommodated simultaneously at a facility unit.

Activity	Unit Capacity
Boating	4 people per boat
Sailing	2 people per boat
Swimming (Beach)	1 person
Picnicking	5 people per picnic table
Camping	1 party per campsite

S = spatial factors assigned to the facility units based on the NAR Study. They are as follows:

Activity	Spatial Factor
Boating	1.5 acres per boat (average of powered and non-powered)
Sailing	3 acres per boat
Swimming (Beach)	50 sq. ft. per person
Picnicking	12 tables per acre
Camping	12 sites per acre

The above method ($R = \left(\frac{D}{CTU}\right) S$) will result in acres (or in the case of swimming, square feet which were then converted to acres.) To compute facility units such as number of tables or campsites, eliminate the spatial standards factor in the equation, i.e., $R = \frac{D}{CTU}$.

Tables 9 through 13 list the computed facility requirements for 1970, 1980, 2000, and 2020.

Projected Demands

Tables 9 through 13 show the projected demands for outdoor recreation facilities on the Chesapeake Bay area based on the methodology and assumptions contained in the preceeding section. The term "facility requirement" simply means a particular unit or outdoor recreation resource to satisfy the demands of a certain number of people expected to use the facility. For boating and sailing, facility requirements have been tabulated both in water surface acreage and in the number of ramps and launching lanes in order to give a more complete picture for this activity; for swimming - beach acreage; for picnicking - number of tables and for camping - number of campsites. 16/

TABLE 8-9

Facility Requirements for Boating and Sailing in
Chesapeake Bay Study Area

REGION		Water Surface Acreage			
		1970	1980	2000	2020
I	Pennsylvania	3,370	5,020	7,800	13,700
II	Delaware	820	1,110	1,700	3,300
III	Eastern Shore - Maryland	650	930	1,300	2,200
IV	Baltimore	4,880	5,970	9,700	16,500
V	Washington	5,020	6,840	10,200	17,700
VI	Southern Maryland	290	410	700	1,300
VII	Northern Virginia	2,480	4,030	7,400	14,700
VIII	Richmond	1,340	1,940	3,000	5,500
IX	Hampton Roads	2,140	2,750	4,400	5,800
X	Petersburg - Hopewell	400	490	800	1,600
XI	Tidewater	170	230	300	400
XII	Eastern Shore - Virginia	70	90	100	100
* Total Resident		21,630	29,810	47,400	82,800
** Total Non-Resident		6,010	8,260	13,100	23,000
GRAND TOTAL		27,640	38,070	60,500	105,800

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

TABLE 8-10

Facility Requirement for Boating and Sailing in
Chesapeake Bay Study Area

REGION		Number of Launching Ramps			
		1970	1980	2000	2020
I	Pennsylvania	90	130	210	330
II	Delaware	20	30	40	80
III	Eastern Shore - Maryland	20	20	40	50
IV	Baltimore	130	140	260	400
V	Washington	130	170	270	430
VI	Southern Maryland	10	10	20	30
VII	Northern Virginia	70	100	200	350
VIII	Richmond	40	50	80	130
IX	Hampton Roads	60	70	120	140
X	Petersburg - Hopewell	10	10	20	40
XI	Tidewater	5	10	10	20
XII	Eastern Shore - Virginia	3	3	3	5
* Total Resident		588	743	1,273	2,005
** Total Non-Resident		160	210	350	560
GRAND TOTAL		748	953	1,623	2,565

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

TABLE 8-11

Facility Requirement for Swimming in
Chesapeake Bay Study Area
(Beach and Pools)

REGION		Water Surface Acreage			
		1970	1980	2000	2020
I	Pennsylvania	50	80	120	170
II	Delaware	10	20	30	40
III	Eastern Shore - Maryland	10	10	20	30
IV	Baltimore	80	100	160	200
V	Washington	80	100	160	200
VI	Southern Maryland	5	10	10	20
VII	Northern Virginia	40	60	120	180
VIII	Richmond	20	30	50	70
IX	Hampton Roads	30	40	60	70
X	Petersburg - Hopewell	10	10	10	20
XI	Tidewater	3	4	5	10
XII	Eastern Shore - Virginia	1	1	2	2
*	Total Resident	339	465	747	1,012
**	Total Non-Resident	100	130	210	280
	GRAND TOTAL	439	595	957	1,292

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

TABLE 8-12

Facility Requirements for Picnicking in
Chesapeake Bay Study Area

REGION		Number of Picnic Tables			
		1970	1980	2000	2020
I	Pennsylvania	6,270	7,880	10,600	16,400
II	Delaware	1,500	1,740	2,500	3,700
III	Eastern Shore - Maryland	1,200	1,360	1,800	2,600
IV	Baltimore	9,130	10,010	13,400	18,700
V	Washington	9,250	10,090	13,600	20,200
VI	Southern Maryland	520	590	900	1,400
VII	Northern Virginia	4,670	5,940	9,800	16,800
VIII	Richmond	2,540	2,890	4,100	6,300
IX	Hampton Roads	3,970	4,080	4,900	6,500
X	Petersburg - Hopewell	750	830	1,000	1,900
XI	Tidewater	320	340	400	500
XII	Eastern Shore - Virginia	130	150	160	200
*	Total Resident	40,250	45,900	63,160	95,200
**	Total Non-Resident	11,190	12,760	17,600	26,500
	GRAND TOTAL	51,440	58,660	80,760	121,700

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

TABLE 8-13

Facility Requirements for Camping in
Chesapeake Bay Study Area

REGION		Number of Campsites			
		1970	1980	2000	2020
I	Pennsylvania	1,100	1,600	2,700	4,200
II	Delaware	280	410	700	1,100
III	Eastern Shore - Maryland	210	290	500	700
IV	Baltimore	1,550	2,130	3,500	5,100
V	Washington	1,480	2,100	3,600	5,400
VI	Southern Maryland	100	140	300	400
VII	Northern Virginia	820	1,240	2,700	4,700
VIII	Richmond	410	640	1,000	1,600
IX	Hampton Roads	690	860	1,300	1,800
X	Petersburg - Hopewell	120	170	250	500
XI	Tidewater	60	80	100	150
XII	Eastern Shore - Virginia	30	30	40	50
* Total Resident		6,850	9,690	16,690	25,700
** Total Non-Resident		1,900	2,690	4,600	7,000
GRAND TOTAL		8,750	12,380	21,290	32,700

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

FUTURE SUPPLY

This analysis estimates the response of supply to projected needs. It includes a discussion of the assumptions and methodology concerned with existing and future supply and a tabular presentation of the various resources and facilities that serve as the supply basis for outdoor recreation activities in the Bay area.

Assumptions

The supply analysis was formulated on the basis of the following assumptions:

1. It is assumed that we are dealing with a fixed resource base.

2. It was assumed for this analysis that the present supply of outdoor recreation facilities represents the supply base.

3. As a result of increased leisure time and in some cases, more disposable income and increased physical mobility, it is assumed that participation in outdoor recreation activities will increase.

Methodology and Inventory of Supply

Since the present supply serves as the future supply in this analysis, then the methodology utilized to assess the present supply also serves for future supply. The methodology consisted of an intensive Bureau survey of the involved states' SCORPs as well as consultation and fact gathering from regional planning councils and local officials. The resultant inventory data was assessed and a recreation supply analysis formulated. The

results of this analysis are included in the inventory data Tables 8-14 and 8-15.

When SCORP figures were not available for a specific activity, the Bureau of Outdoor Recreation Inventory (1971) and the NAR Water Resources Study - Appendix M, Outdoor Recreation, were employed. The States are constantly improving their inventories and the Soil Conservation Districts through the leadership of the National Association of Conservation Districts in cooperation with the Bureau of Outdoor Recreation recently conducted a private recreation survey on a county basis. The data was not available in time to include it in this effort. However, data can be obtained now and used to provide a more realistic projection of needs.

TABLE 8-14

EXISTING SUPPLY OF OUTDOOR RECREATION FACILITIES
FOR THE CHESAPEAKE BAY STUDY AREA

REGION		SAILING & BOATING (In Acres)	BOAT RAMPS	SWIMMING* (In Acres)	PICNICKING (Tables)	CAMPING (Sites)
I	Pennsylvania	26,000 1/	113	22 1/	7,270 1/	1,770 1/
II	Delaware	48,000 2/	20	223 3/	770 3/	610 3/
III	Eastern Shore - Maryland	266,100 2/	91	608 4/	440 4/	1,470 4/
IV	Baltimore	67,300 2/	11	28 4/	4,770 4/	370 4/
V	Washington	14,600 5/	1	22 4/	4,760 6/	560 5/
VI	Southern Maryland	74,800 2/	11	18 4/	1,110 4/	380 4/
VII	Northern Virginia	25,300 2/	14	36 7/	3,360 7/	1,820 7/
VIII	Richmond	40,000 2/	11	9 7/	440 7/	1,210 7/
IX	Hampton Roads	117,600 2/	81	756 7/	2,310 7/	5,390 7/
X	Petersburg - Hopewell	30,100 2/	11	10 7/	250 7/	740 7/
XI	Tidewater	107,300 2/	73	6 7/	430 7/	3,300 7/
XII	Eastern Shore - Virginia	168,300 2/	7	716 7/	730 7/	2,590 7/
TOTAL STUDY AREA		985,400	444	2,454	26,640	20,210

1/ PA Resources Planning
2/ Area measurements U.S. Bureau of Census
3/ BOR Inventory (1971)
4/ Maryland SCORP
5/ National Cap. Region
6/ NAR Study
7/ VA SCORP

* See Table 8-15 for breakdown of swimming into beach and pool.

TABLE 8-15

Surface Water Area for Swimming in Beaches and Pools

SWIMMING

REGION		Pool (Square Feet)	Beach (Acres)
I	Pennsylvania	*	22
II	Delaware	*	223
III	Eastern Shore - Maryland	1,611,720	571
IV	Baltimore	1,045,440	4
V	Washington	479,160	1
VI	Southern Maryland	43,560	18
VII	Northern Virginia	284,719	30
VIII	Richmond	9,975	9
IX	Hampton Roads	392,810	747
X	Petersburg - Hopewell	16,789	10
XI	Tidewater	0	6
XII	Eastern Shore - Virginia	7,200	716

* No pool figures given in SCORP's.

FUTURE NEEDS AND PROBLEM AREAS

To determine outdoor recreation facility needs for boating, sailing, swimming, picnicking, and camping, the current supply was simply substracted from the projected facility requirements. These results are tabulated in Tables 8-9 through 8-13.

Boating and Sailing

The most outstanding observation related to boating and sailing in the Chesapeake Bay Study Area is the overwhelming surplus of available water surface acreage to meet projected needs. Even without the addition of available inland surface water areas, the vast water surface area of the Chesapeake Bay is sufficient to maintain this surplus.

If the Chesapeake Bay is assumed to be the only source of supply to satisfy boating and sailing needs, only 1.8 percent of the Bay's total water surface is required to meet 1980 needs. (See Table 8-17. By 2020 about 5.1 percent of the Bay's surface water area will fill the projected need. However, if the inland waterways and the Bay proper are analyzed together, only 1.2 percent of their combined water surfaces are needed to satisfy current boating and sailing needs. By 2020 about 3.4 percent of the combined water surface area will be needed.

Boating and sailing are today the most visable outdoor recreation activities in the Chesapeake Bay Study Area. The Demand, Supply and Needs methodology indicates that the supply is there; however, the Maryland and Virginia SCORPs assert that boating supply cannot satisfy current needs. The problem, therefore, is not supply of water surface but the shortage of marina slips and ramps that give access to the Bay and its tributaries. This is the problem that should be further analyzed.

Marinas are generally considered to be the responsibility of the private sector because they are profit-oriented. The high cost of renting a marina slip in addition to the cost of the vessel itself precludes those of lower income levels from maintaining either a boating or sailing craft on the Bay. Therefore, rental

facilities and public launching ramps with minimal or no charge are required, particularly in the large urban areas of the Bay. Where such facilities do exist, however, there is usually a long waiting period to launch a craft on weekends and holidays.

These manifestation of unmet needs is another indication of the recreational potential of the Chesapeake Bay area for boating and sailing provided ramps, launching lanes, and other access facilities could be made available. There is an estimated need for an additional 518 ramps to meet 1980 demands. As indicated in Table 8-18, this figure could double by the year 2000 and quadruple in 2020. The Baltimore and Washington portions of the Bay are likely to have the biggest shortages of ramp facilities for all projected years. These shortages are expected to range from around 300 in 1980 to 820 in 2020. The only regions of the Bay anticipated to have a surplus of ramps through the year 2020 are the Eastern Shore of Maryland and the Tidewater and Eastern Shore areas of Virginia.

The Boating Almanac 1973, Vol. 4, Chesapeake Bay and North Carolina records over 38,000 slips and moorings in the Study area. According to the Almanac listings, approximately one percent are publicly owned slips and moorings. Around 125 public launching ramps are also listed. However, when spotted over the miles of shoreline along the Bay, rivers, and Atlantic Ocean, the severe shortage of public launching ramps is readily demonstrated.

These shortages of slips and ramps were also observed from boating and marina figures available for the State of Maryland. According to the Maryland Department of Economic and Community Development, Division of Tourism, there are over 300 marinas on the Maryland portion of the Bay. The majority are located on the upper portion of the Bay in Anne Arundel, Baltimore and Cecil Counties. 17/ In 1971 Maryland registered more than 66,000 pleasure craft of which approximately 28,000 were trailer boats kept at home. 18/ It might be assumed that the remaining 38,000 would require marina slips, consequently using the supply of 38,000 slips listed for the Bay area in the Boating Almanac 1973. This does not even consider the needs of Virginia, Delaware, and other states. Furthermore, when the 28,000 trailer boats are viewed in light of the 125 available public ramps in Maryland alone (although some commercial marinas provide ramps), the lack of adequate access to the Bay for boating and sailing becomes astounding.

The above figures are not exact and are meant only to show the trend of future need for marina slips and launching ramps. Despite the absence of boat registration figures for Delaware and Virginia at the time of data collection, a definite shortage of these facilities is obvious. Such data should be incorporated in future studies.

TABLE 8-16

Boating and Sailing Needs in
Chesapeake Bay Study Area

REGION		Water Surface Acreage 1/			
		1970	1980	2000	2020
I	Pennsylvania	22,630(+)	20,980(+)	18,200(+)	12,300(+)
II	Delaware	47,180(+)	46,890(+)	46,300(+)	44,700(+)
III	Eastern Shore - Maryland	265,450(+)	265,170(+)	264,800(+)	263,900(+)
IV	Baltimore	62,420(+)	61,330(+)	57,600(+)	50,800(+)
V	Washington	9,580(+)	7,760(+)	4,400(+)	3,100(+)
VI	Southern Maryland	74,510(+)	74,390(+)	74,100(+)	73,500(+)
VII	Northern Virginia	22,820(+)	21,270(+)	17,900(+)	10,600(+)
VIII	Richmond	38,660(+)	38,060(+)	37,000(+)	34,500(+)
IX	Hampton Roads	115,460(+)	114,850(+)	113,200(+)	11,800(+)
X	Petersburg - Hopewell	29,700(+)	29,610(+)	29,300(+)	28,500(+)
XI	Tidewater	107,130(+)	107,070(+)	107,000(+)	106,850(+)
XII	Eastern Shore - Virginia	168,230(+)	168,210(+)	168,200(+)	168,150(+)
*	Total Resident	963,770(+)	955,590(+)	938,000(+)	808,700(+)
**	Total Non-Resident	6,010	8,260	13,200	23,000
	GRAND TOTAL	957,760(+)	947,330(+)	924,800(+)	785,700(+)

1/ Supply limited to inland water only
* Total resident includes population in the Study Area.
** Total non-resident includes people living outside Study Area.
(+) Indicates Surplus.

TABLE 8-17

Boating and Sailing Needs

Water Surface Areas	Water Surface Acreage	Percent of Surface Acres Required to Meet Resident and Non-Resident Needs			
		1970	1980	2000	2020
Inland Waterways	985,386 1/	1.7	3.8	6.1	10.7
Chesapeake Bay	2,071,680 2/	0.8	1.8	2.9	5.1
Combined Total (Inland Waterway & Bay Proper)	3,056,066	0.5	1.2	1.9	3.4

1/ This acreage represents permanent inland water surface of counties in the Chesapeake Bay Study Area, such as lakes, reservoirs, and ponds having 40 acres or more of area; streams, sloughs, estuaries, and canals one-eighth of a statute mile or more in width; deeply indented embayments and sounds and other coastal waters behind or sheltered by headlands or islands separated by less than one nautical mile of water and islands having less than 40 acres. It excludes acres of oceans, bays, sounds, etc., lying within U.S. jurisdiction, but not defined as inland water.

2/ Source: U.S. Bureau of the Census, 1970 Volume I and Measurements Reports series GE - 20 No. 1.

TABLE 8-18

Boating and Sailing Needs in
Chesapeake Bay Study Area

REGION		NUMBER OF RAMPS			
		1970	1980	2000	2020
I	Pennsylvania	20 (+)	20	90	210
II	Delaware	2	10	20	70
III	Eastern Shore - Maryland	70 (+)	70 (+)	50 (+)	40 (+)
IV	Baltimore	120	130	250	390
V	Washington	130	170	270	430
VI	Southern Maryland	4 (+)	0	10	20
VII	Northern Virginia	50	90	180	340
VIII	Richmond	20	40	70	120
IX	Hampton Roads	20 (+)	10 (+)	40	60
X	Petersburg - Hopewell	1 (+)	2	10	30
XI	Tidewater	70 (+)	70 (+)	60 (+)	60 (+)
XII	Eastern Shore - Virginia	4 (+)	4 (+)	4 (+)	2 (+)
* Total Resident		133	308	826	1,568
** Total Non-Resident		160	210	350	560
GRAND TOTAL		293	518	1,176	2,128

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

(+) Indicates surplus.

The importance of the Chesapeake Bay as a tourist and boating center, and the resultant large influx of non-residents will continue to contribute to the shortage of slips and ramps. A more thorough study to obtain accurate slip and ramp figures and to recommend ways to meeting boating and sailing facility needs, should be conducted.

Swimming

There are two significant aspects of the swimming acreage supply in the Chesapeake Bay areas as shown in Table 3-19 and Fig. 8-9. First, the four regions adjacent to the Atlantic Ocean show extensive surpluses in swimming acreage into the year 2020. Second, the two most highly urbanized regions, Baltimore and Washington, continue to show the greatest need for additional swimming acreage for all projected years.

The four regions with projected surpluses are Delaware, the Maryland Eastern Shore, Hampton Roads, and the Virginia Eastern Shore. With the exception of Northern Delaware and the Norfolk areas, these regions are characterized by low resident population and vast stretches of ocean beach such as Assateague Island National Seashore, and Virginia Beach. Although the swimming surpluses in the above regions indicate that the eastern section of the Chesapeake Bay area is not of high priority in acquisition and development for swimming, the large undeveloped areas and frontage on both the Atlantic Ocean and the Chesapeake Bay make them of prime importance because of their great potential for meeting the unfulfilled swimming needs of the whole study area. This is of greater significance if viewed in the light of a potentially large out-of-state visitor rate that could quickly absorb the surpluses.

In contrast to the rural eastern regions of the Bay are the highly urbanized regions of Baltimore and Washington and their fast growing suburban populations. Both regions have only a few acres of beach although the Baltimore region with its prime location on the Bay demonstrates a vast potential for beach swimming if access can be acquired. Because of the pollution on the Potomac River, it presently offers very little short range potential for swimming supply in the Washington area. Although beach swimming may be highly desirable to urban residents, water pollution and lack of access currently dictate that swimming needs in these areas will be met to a large degree by swimming pools.

TABLE 3-19

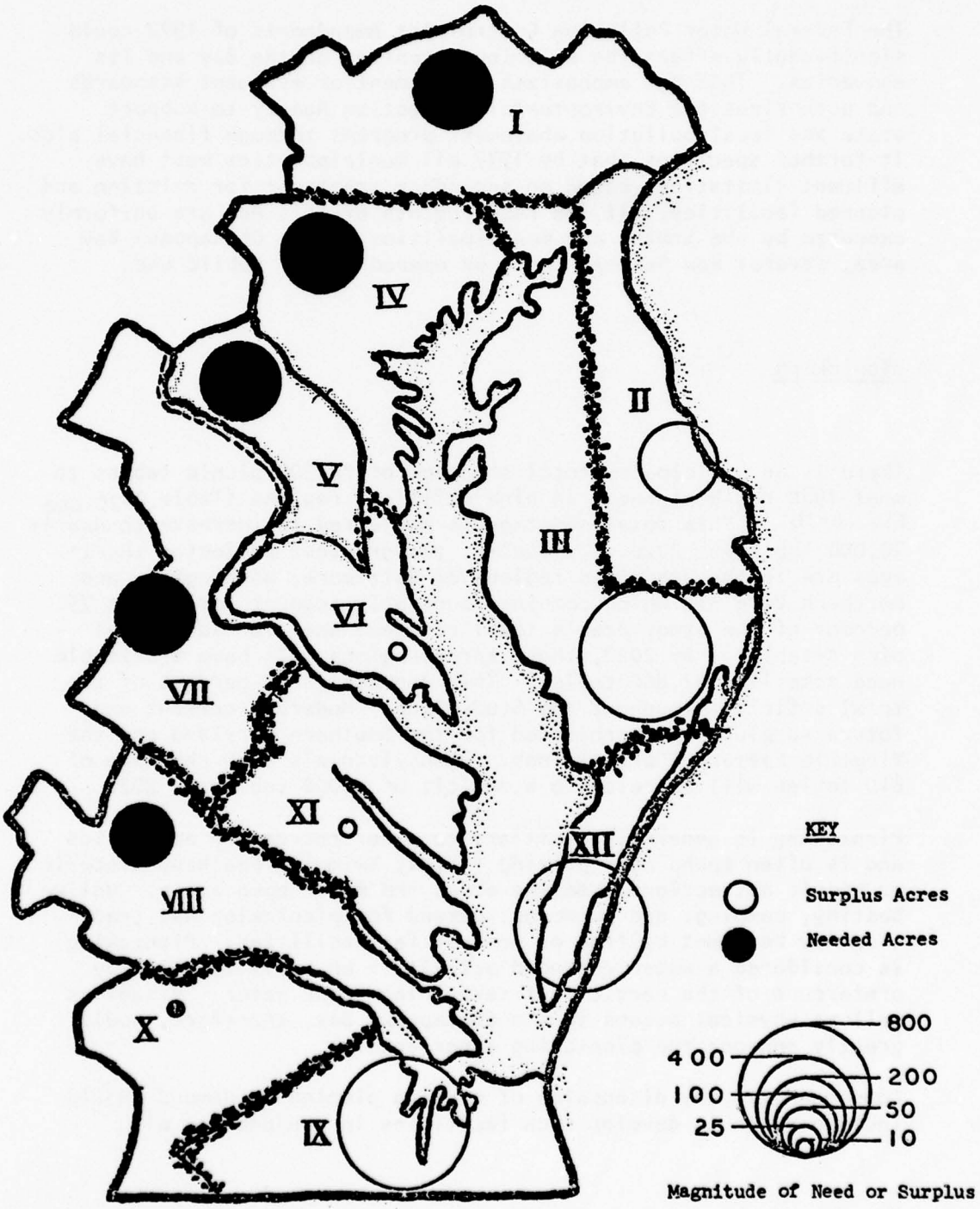
Swimming Needs in
Chesapeake Bay Study Area

REGION		Water Surface Acreage (Beach and Pools)			
		1970	1980	2000	2020
I	Pennsylvania	30	60	100	150
II	Delaware	210(+)	200(+)	200(+)	180(+)
III	Eastern Shore - Maryland	600(+)	600(+)	600(+)	580(+)
IV	Baltimore	50	70	130	170
V	Washington	60	80	140	190
VI	Southern Maryland	10(+)	12(+)	10(+)	3(+)
VII	Northern Virginia	5	20	80	140
VIII	Richmond	10	20	40	60
IX	Hampton Roads	720(+)	710(+)	700(+)	690(+)
X	Petersburg - Hopewell	4(+)	2(+)	2	10
XI	Tidewater	3(+)	2(+)	1(+)	1
XII	Eastern Shore - Virginia	710(+)	710(+)	710(+)	710(+)
*	Total Resident	2,102(+)	1,986(+)	1,729(+)	1,442(+)
**	Total Non-Resident	100	130	207	297
	GRAND TOTAL	2,002(+)	1,856(+)	1,522(+)	1,145(+)

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

Fig. 8-9: Projected Resident Swimming Needs for 2020 by Region



The Pennsylvania and Northern Virginia counties also show substantial need for additional swimming acreage in years 1980, 2000, and 2020. These two regions are adjacent to the Baltimore and Washington regions respectively and demonstrate similar urban needs. By 2020 the Baltimore, Washington, Northern Virginia, and Pennsylvania regions combined will need 650 additional swimming acres to satisfy the expected resident demands.

The Federal Water Pollution Control Act Amendments of 1972 could significantly effect the swimming potential of the Bay and its estuaries. This Act emphasizes attainment of effluent standards and authorizes the Environmental Protection Agency to support state and local pollution abatement programs through financial aids. It further specifies that by 1977 all municipalities must have effluent limitations based on secondary treatment for existing and planned facilities. If the requirements of this Act are uniformly executed by the States and municipalities in the Chesapeake Bay area, several new beaches could be opened up for public use.

Picnicking

There is an anticipated total shortage of 20,500 picnic tables to meet 1980 resident needs in nine deficient regions (Table 8-20 and Fig. 8-10). This total shortage is projected to increase to nearly 70,000 tables by 2020. Typically, the greatest projected shortages are in the urbanized regions of Baltimore, Washington, and Northern Virginia which combined currently account for almost 75 percent of the Study Area's total resident need for additional picnic tables. By 2020, these three regions will have a sizeable need totalling 42,800 tables. This represents 60 percent of the total deficit throughout the Study Area. Moderate current and future surpluses are projected for the Southern Maryland and the Virginia Eastern Shore regions. Pennsylvania's 1980 shortage of 610 tables will increase to a deficit of 9,000 tables by 2020.

Picnicking is generally ancillary to other recreation activities and is often found near playing fields, swimming beaches, historic or scenic attractions, camping areas and major open areas. Unlike boating, camping, and swimming, demand for picnicking has traditionally been met by free or nominal fee facilities. Picnicking is considered a water enhanced activity - an activity which by preference of the participant takes place near water. Visual as well as physical access to the Chesapeake Bay, therefore, would greatly enhance the picnicking experience.

Consequently, any discussion of meeting picnicking demand should include plans to develop such facilities in conjunction with

TABLE 8-20

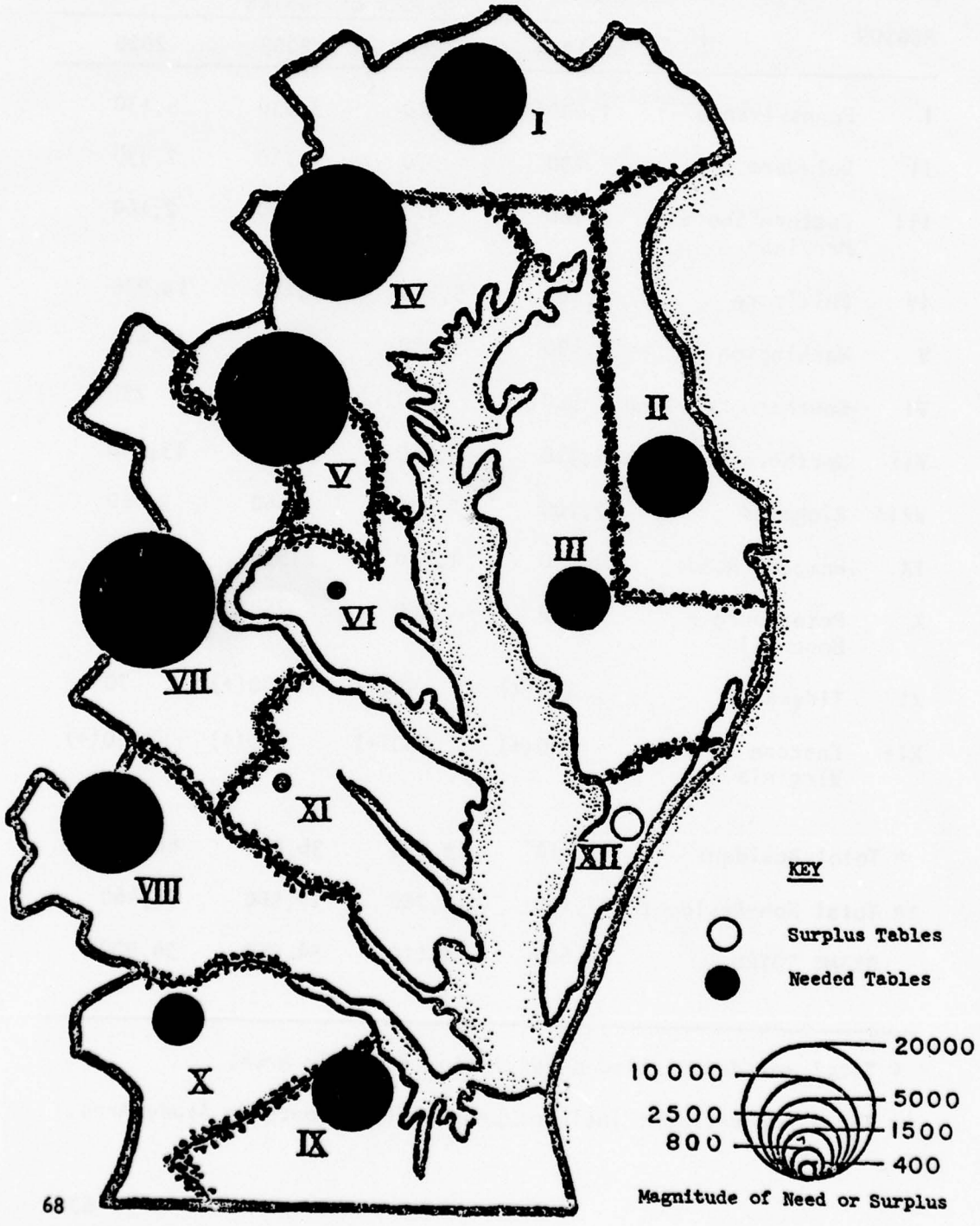
Picnicking Needs in
Chesapeake Bay Study Area

REGION		Number of Tables			
		1970	1980	2000	2020
I	Pennsylvania	1,000(+)	610	3,330	9,130
II	Delaware	730	970	1,730	2,930
III	Eastern Shore - Maryland	760	920	1,360	2,160
IV	Baltimore	4,360	5,240	8,600	13,930
V	Washington	4,490	5,330	8,840	15,440
Vi	Southern Maryland	590(+)	520(+)	210(+)	290
VII	Northern Virginia	1,310	2,580	6,440	13,440
VIII	Richmond	2,100	2,450	3,660	5,860
IX	Hampton Roads	1,660	1,770	2,590	4,190
X	Petersburg - Hopewell	500	580	750	1,650
XI	Tidewater	110(+)	90(+)	30(+)	70
XII	Eastern Shore - Virginia	600(+)	580(+)	570(+)	560(+)
*	Total Resident	13,610	19,260	36,490	68,530
**	Total Non-Resident	11,190	12,760	17,560	26,460
	GRAND TOTAL	24,800	32,020	54,050	94,990

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

Fig. 8-10: Projected Resident Picnicking Needs for 2020 by Region



other activities and in existing recreation areas. This is particularly important in the urban areas which show the greatest picnicking shortages and where acquisition of additional acreage for this activity may be feasible. For instance, the "Baltimore Urban Recreation Analysis," completed by BOR in 1974, points out that, although the Baltimore region needs to acquire about 112,000 additional acres in order to meet the publicly owned recreation and open space lands needs of its population, much of the existing 60,000 acres still have not been developed and offer an opportunity to meet some of the population's facility needs for activities such as picnicking.

Resident and non-resident demand will differ in the case of picnicking. Resident picnicking is generally a single day activity and is close to home. Non-resident picnicking will usually be ancillary to such activities as camping, boating or other overnight activities connected with tourism.

Camping

The most populated regions of the Bay area, Baltimore and Washington, are the only regions that are expected to lack an adequate number of sites to meet 1980 residental recreational need for camping. Combined they will need an additional 3,200 sites in 1980 (Table 8-21 and Fig. 8-11). By 2020 most of the other regions are expected to have unmet needs for camping facilities. The Baltimore and Washington regions together are expected to need 9,500 campsites by 2020 whereas the five other regions with deficits will have a combined need of 62,000 sites.

Demand for camping facilities, however, should be viewed in its diversity in order to comment on the surpluses and shortages indicated by Table 8-21. Camping facility preferences range from transient recreationists looking for motel-like convenience, to destination campers desiring sophisticated facilities, to primitive camping buffs desiring minimum accommodations. Traditionally, sophisticated camping units and hook-ups have been provided by the private sector as these types of sites are profit oriented. Primitive, resource oriented camping opportunities generally are provided by the public sector.

The historical nature of the Chesapeake area, its key location on the Atlantic Flyway and its importance as a recreational boating center all contribute toward a large non-resident influx which will demand camping sites in addition to resident demand. Consequently, the surpluses may be absorbed and the shortage of the urban regions increased. Taking into account an energy

TABLE 8-21

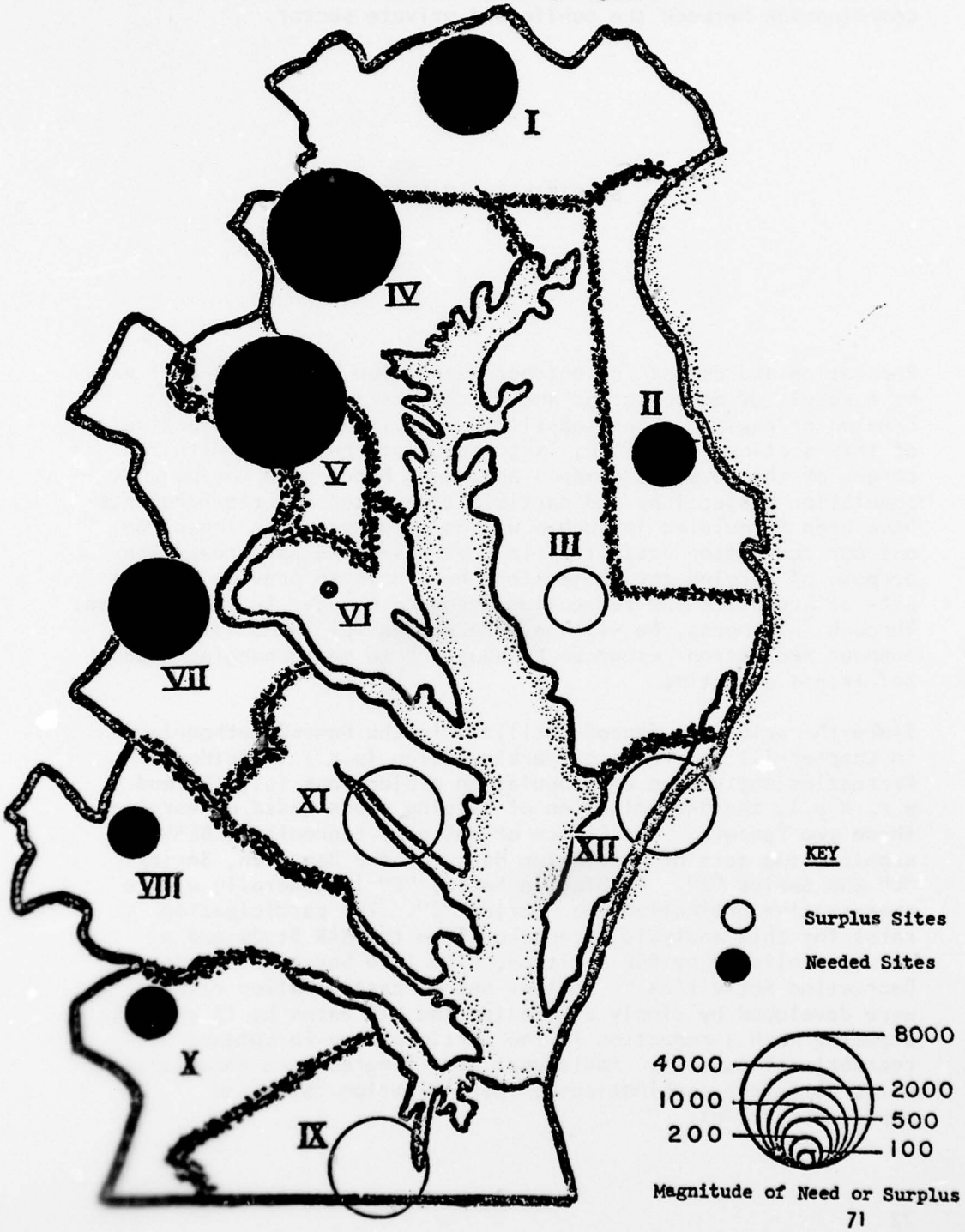
Camping Needs in
Chesapeake Bay Study Area

REGION		Camping Sites			
		1970	1980	2000	2020
I	Pennsylvania	670(+)	170(+)	930	2,430
II	Delaware	330(+)	200(+)	90	490
III	Eastern Shore - Maryland	1,260(+)	1,180(+)	990(+)	790(+)
IV	Baltimore	1,180	2,170	3,130	4,730
V	Washington	920	1,540	3,040	4,840
VI	Southern Maryland	280(+)	240(+)	120(+)	40
VII	Northern Virginia	1,000(+)	580(+)	880	2,880
VIII	Richmond	800(+)	570(+)	210(+)	390
IX	Hampton Roads	4,700(+)	4,530(+)	4,090(+)	3,590(+)
X	Petersburg - Hopewell	620(+)	570(+)	490(+)	270(+)
XI	Tidewater	3,240(+)	3,220(+)	3,180(+)	3,150(+)
XII	Eastern Shore - Virginia	2,560(+)	2,560(+)	2,550(+)	2,540(+)
* Total Resident		13,360(+)	10,110(+)	3,560(+)	5,460
** Total Non-Resident		1,900	2,690	4,630	7,140
GRAND TOTAL		11,460(+)	7,420(+)	1,070	12,600

* Total resident includes population in Study Area.

** Total non-resident includes people living outside Study Area.

Fig. 8-11: Projected Resident Camping Needs for 2020
Number of Sites by Region



crisis two situations may occur in the near future: the increased demand for destination-type sites and the increased demand for resource oriented camping. Transient campers may dwindle in number because of the gas shortage and the resultant cost of keeping camping vehicles constantly on the road. The total demand for campsites, however, will not decrease, but continue to increase. Meeting this demand calls for close planning coordination between the public and private sector.

SENSITIVITY ANALYSIS

Population and demand for outdoor recreation activities will vary as a result of economic and social changes as well as newly created or newly popular substitute activities. The objective of this section, therefore, is to acquaint the reader with the ranges of the possible demands and needs based upon various population projections and participation rates. These forecasts have been formulated in such a way as to portray the impact on outdoor recreation activities in the Chesapeake Bay area. The purpose of varying the projections herein is to provide several sets of trends to the recreation resource manager in the Bay area. Through this means, he will be more successful in managing the outdoor recreation resources by adapting to meet changing needs and trends over time.

Since the principle factors utilized in the Demand Methodology in Chapter III are rates of participation (p.r.) in Outdoor Recreation activities and population projections (p.) (Demand = p.r. X p.), the determination of varying needs based on varying these two factors. The Office of Business Economics (OBERS) supplied two sets of population data for the Bay area, Series "C" and Series "E". Population Series "E" is generally a more conservative projection than Series "C". The participation rates for this analysis were taken from the NAR Study and a survey published by BOR entitled, "The 1970 Survey of Outdoor Recreation Activities." Another set of participation rates were developed by simply decreasing the NAR rates by 15 percent, assuming such a reduction in the participation in outdoor recreational pursuit. Additional need figures were formulated using different combinations of participation rates and population series.

Any given combination of participation rates and population projections is referred to herein as a projection set. The combination used in the derivation of the future needs figures used in Chapter III of this Appendix is referred to as projection Set "A". Projection Set "A" and the four others used in this sensitivity analysis are listed below.

Set A - NAR participation rates x Series "C" projections.

Set B - 15% reduction of NAR participation rates x Series "E" projections.

Set C - NAR pa.ticipation rates x Series "E" projections.

Set D - 1970 BOR Survey Participation rates x Series "C" projections.

Set E - 1970 BOR Survey Participation rates x Series "E" projections.

From these four new projection sets four additional sets of need figures were generated utilizing the procedures described in Attachment III and the Demand Methodology section of Chapter III. The results are shown in Tables 8-22 to 8-29.

NEW TRENDS AND NEEDS

Boating and Sailing: Surface Water Acreage

Regardless of which projection set is used, there is still an overwhelming surplus of surface water acreage to meet resident and nonresident boating and sailing needs as Table 8-22 indicates. For the year 1980, projected surplus surface water would range from a high of approximately 953,800 acres, to a low of 918,000 acres using projection Sets B and D respectively. Set D demonstrates the least surplus of surface water acreage because of the combined magnitude of the highest participation rates and highest population projections.

Boating and Sailing: Ramps

While surface water acreage is one way of estimating need for boating and sailing, another method is to determine the number of boat ramps that are required to respond to these same needs. The demonstration of these needs is especially critical in the Chesapeake Bay area where access to the Bay has been a major impediment to the recreational use of the Bay. The greatest total aggregate need for ramps in the Bay area in the year 1980 is projected to be 1,200 ramps based on projection Set D or 140 percent increase over the number of ramps shown under Set A. Set D also shows the greatest need figures for the years 2000 and 2020, with a requirement of 2,200 and 3,800 ramps respectively. For all projected years, projection Set B indicates the smallest numerical need for boat ramps in the Bay area: 300 in 1980, 800 in the year 2000, and 1,400 in 2020 (See Table 8-23).

Swimming

Based upon the wide range of participation rates and population projections, a large surplus of beach acreage is forecasted well into the year 2020 to meet future swimming needs. For each projected year, projection Set B displays the largest surplus. In 1980, these surpluses are anticipated to vary from 1,600 to 2,000 acres and in the year 2000 from 1,100 to 1,700 acres. On the other hand, year 2020, the variation of surplus beach acreage could range from 600 to 1,500 acres depending upon which projection set is used (Table 8-24). The figure of 1,500 acres represents a 20 percent increase over the estimated number needed as shown in Chapter II and Table 8-28.

Picnicking

The number of tables required to satisfy aggregate need in the Chesapeake area varies substantially depending upon which combination of participation rates and population series is employed. The lowest figure projected to meet the 1980 requirement is 20,800 picnic tables while the highest hovers around 32,900, a difference of about 12,000 tables (See Table 8-25).

For the year 2000, a difference of about 19,300 tables is predicted (a low of 36,400 based on Projection Set B and a high of 55,700 based on Projection Set D) while in the year 2020 there is an anticipated difference of 35,700 tables (a low of 60,100 vs. a high of 95,800 using the same Sets B and D). Such a wide variation indicates how easily an increase or decrease in either the participation rate or projected population data can seriously affect the projected demand.

Camping

Like water surface and beach acreage, the facility requirement for camping as expressed in the number of campsites will be adequately satisfied in 1980 according to Projection Sets A, B, and C. In fact, surpluses ranging from 7,800 to 10,000 campsites are indicated with the use of these same projection sets (Table 8-26). The greatest need for camping sites in the Bay area in 1980 is demonstrated by Projection Set D with an additional requirement of 27,600 sites, or a 254 percent increase over the number estimated in Chapter III (See Table 8-27). The projected figures for the year 2000 only show surpluses of campsites with the employment of Projection Sets B and C. No surpluses of campsites for the Chesapeake Bay area are forecasted in the year 2020. An extreme range of need here is expected to vary from 3,400 to as much as 110,100 additional sites. The latter figure here represents a 773 percent increase in the number of campsites over the number shown in Chapter III (See Table 8-29).

Conclusions

Many of the original findings and recommendations in this Appendix are supported by the results of this exercise. Among the more significant of these are the following:

1. No matter what projection set is used, the Chesapeake Bay and the Study area inland surface waters provide an overwhelming abundance of supply to meet current and future boating and sailing needs.

2. The inability of boating and sailing supply to meet current demand is not due to the absence of sufficient surface water but to insufficient access to the water in terms of marina slips and launching ramps.

3. Picnicking displays a critical shortage of facilities.

4. Camping facilities are also in short supply regardless of projection figures used to estimate demand.

5. There is sufficient supply of beach acres to meet the total swimming demands of the Bay area well into the year 2020, although there is a need to develop this supply for use by the public.

TABLE 8-22

Sensitivity Analysis
Range of Boating and Sailing Needs in
Chesapeake Bay Study Area

PROJECTION SET	Water Surface Acreage 1980	2000	2020
A			
DSN - NAR Participation rates x Series "C" projections	947,300(+)	925,200(+)	885,700(+)
B			
(15% reduction of NAR Participation rates x Series "C" projections)	953,800(+)	937,000(+)	907,500(+)
C			
NAR Participation rates x Series "E" projections	948,400(+)	928,500(+)	893,600(+)
D			
1970 BOR Survey Participation rates x Series "C" projections	918,100(+)	879,700(+)	796,700(+)
E			
1970 BOR Survey Participation rates x Series "E" projections	921,000(+)	887,400(+)	826,600(+)

(+) Indicates Surplus.

TABLE 8-23

Sensitivity Analysis
Range of Boating and Sailing Needs by Number of Ramps in-
Chesapeake Bay Study Area

Number of Ramps

PROJECTION SET	1980	2000	2020
A			
DSN - NAR Participation rates x Series "C" projections	500	1,200	2,100
B			
(15% reduction of NAR Participation rates x Series "C" projections)	300	800	1,400
C			
NAR Participation rates x Series "E" projections	500	1,000	1,700
D			
1970 BOR Survey Participation rates x Series "C" projections	1,200	2,200	3,800
E			
1970 BOR Survey Participation rates x Series "E" projections	1,100	2,000	3,100

(+) Indicates Surplus.

TABLE 8-24

Sensitivity Analysis
Range of Swimming Needs in
Chesapeake Bay Study Area

Beach Acreage

PROJECTION SET	1980	2000	2020
A			
DSN - NAR Participation rates x Series "C" projections	1,900(+)	1,500(+)	1,200(+)
B			
(15% reduction of NAR Participation rates x Series "C" projections)	2,000(+)	1,700(+)	1,500(+)
C			
NAR Participation rates x Series "E" projections	1,900(+)	1,600(+)	1,500(+)
D			
1970 BOR Survey Participation rates x Series "C" projections	1,600(+)	1,100(+)	600(+)
E			
1970 BOR Survey Participation rates x Series "E" projections	1,600(+)	1,200(+)	900(+)

(+) Indicates Surplus.

TABLE S-25

Sensitivity Analysis
Range of Picnicking Needs in
Chesapeake Bay Study Area

PROJECTION SET	Number of Tables 1980	2000	2020
A			
DSN - NAR Participation rates x Series "C" projections	32,000	54,000	95,000
B			
(15% reduction of NAR Participation rates x Series "C" projections)	20,800	36,400	60,100
C			
NAR Participation rates x Series "E" projections	29,400	47,600	75,400
D			
1970 BOR Survey Participation rates x Series "C" projections	32,900	55,700	95,800
E			
1970 BOR Survey Participation rates x Series "E" projections	29,200	57,200	89,900

(+) Indicates Surplus.

TABLE 8-26

Sensitivity Analysis
Range of Camping Needs in
Chesapeake Bay Study Area

PROJECTION SET	Number of Campsites		
	1980	2000	2020
A			
DSN - NAR Participation rates x Series "C" projections	7,800(+)	1,100	12,600
B			
(15% reduction of NAR Participation rates x Series "C" projections)	10,000(+)	3,600(+)	3,400
C			
NAR Participation rates x Series "E" projections	5,400(+)	3,800(+)	13,900
D			
1970 BOR Survey Participation rates x Series "C" projections	27,600	64,100	110,100
E			
1970 BOR Survey Participation rates x Series "E" projections	27,500	57,200	89,900

(+) Indicates Surplus.

TABLE 8-27

Sensitivity Analysis
Variation in Projected Needs for
Boating and Sailing 1/

PROJECTION SET	Water - Surface Acres			Ramps		
	1980	2000	2020	1980	2000	2020
B (15% reduction of NAR Participation rates x Series "C" projections)	1% (+)	1% (+)	2.5%(+)	40% (-)	33% (-)	50% (-)
C NAR Participation rates x Series "E" projections	1% (+)	.3% (+)	1% (+)	No Change	16% (-)	14% (-)
D 1970 BOR Survey Participation rates x Series "C" projections	3% (-)	5% (-)	10% (-)	140% (+)	83% (+)	81% (+)
E 1970 BOR Survey Participation rates x Series "E" projections	3% (-)	4% (-)	7% (-)	120% (+)	66 (+)	48% (+)

(+) Indicates percentage increase over original estimates in Chapter III.
(-) Indicates percentage decrease from original estimates in Chapter III.
1/ As compared to the estimates contained in Chapter III, in the Future Needs and Problem Areas section.

TABLE 8-28

Sensitivity Analysis
Variation in Projected Needs for
Swimming and Picnicking[1/]

PROJECTION SET	Swimming			Picnicking		
	1980	2000	2020	1980	2000	2020
B						
(15% reduction of NAR Participation rates x Series "C" projections)	5% (+)	13% (+)	20% (+)	35% (-)	33% (-)	37% (-)
C						
NAR Participation rates x Series "E" projections	No Change	7% (-)	20% (+)	8% (-)	12% (-)	21% (-)
D						
1970 BOR Survey Participation rates x Series "C" projections	16% (-)	26% (-)	50% (-)	3% (+)	3% (+)	1% (+)
E						
1970 BOR Survey Participation rates x Series "E" projections	16% (-)	20% (-)	25% (-)	9% (-)	6% (+)	5% (-)

(+) Indicates percentage increase over original estimates in Chapter III.
(-) Indicates percentage decrease from original estimates in Chapter III.
1/ As compared to the estimates contained in Chapter III, in the Future Needs and Problem Areas section.

TABLE 8-29

Sensitivity Analysis
Variation in Projected Needs For
Camping 1/

PROJECTION SET	1980	2000	2020
B (15% reduction of NAR Participation rates x Series "C" projections)	28% (+)	227% (-)	73% (-)
C NAR Participation rates x Series "E" projections	5% (+)	27% (+)	10% (+)
D 1970 BOR Survey Participation rates x Series "C" projections	254% (+)	5,727% (+)	773% (+)
E 1970 BOR Survey Participation rates x Series "E" projections	253% (+)	5,100% (+)	613% (+)

(+) Indicates percentage increase over original estimates in Chapter III.
(-) Indicates percentage decrease from original estimates in Chapter III.
1/ As compared to the estimates contained in Chapter III, in the Future Needs and Problem Areas section.

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CHAPTER IV

MEANS TO SATISFY NEEDS

This chapter describes the general broad range alternatives that could be employed to meet the needs presented in Chapter III. In considering the recreation needs of the study area, it responds to the question, "What measures can be taken to meet the unsatisfied demand?" Given the enormous physical and human resources of the Bay area, the answer to this question lies not only in the realm of the quantity of resources available, but also in their successful management.

SOURCES OF LAND INFLUENCING SUPPLY

Federal and Military Lands

Among the underutilized resources for outdoor recreation in the Bay Area are vast stretches of Federal lands, adjacent to the western and southern shores of the Chesapeake. These lands include large tracts of military lands such as Aberdeen Proving Ground,

Edgewood Arsenal, Quantico Marine Base, and Fort Story. It has been brought to the attention of various Federal, State and local agencies that some of these lands may offer excellent recreation possibilities for the people of the Bay area through the Surplus Property Program. The "Baltimore Urban Recreation Analysis" contains information and general findings directly related to the use of Federal and military lands in the Baltimore Region. The Report states that, "despite the more than 840 miles of shoreline in the Baltimore SMSA, less than 1.5 percent of the shoreline is available for public recreation use." Also, the Baltimore Regional Planning Council's document, "Chesapeake Bay: Shoreline Utilization in the Baltimore Region," (1969) reports that twelve percent of the Baltimore regional shoreline is in military use. Although not all of these military lands would or should be open to public recreation, the Baltimore Analysis points out the immense possibilities for multiple use of these shoreline lands which are located in a highly urbanized area.

Several proposals other than the Baltimore Analysis have been presented by State and local governments and private organizations on the future of Federal lands in all areas of the Chesapeake Bay. However, no single plan integrates such proposals into a regional framework.

Watersheds and Water Supply Reservoirs

Watersheds and water supply reservoirs also offer significant potential for joint or multiple uses such as swimming and picnicking. Many of the water supply reservoirs and the upper reaches of water supply lands are located on attractive, wooded upland sites which offer potential for both swimming and boating as well as picnicking, camping and hiking. At the present time, some reservoirs and their adjacent lands in the Chesapeake Bay Area are used for walking, fishing and hunting. Again, the "Baltimore Urban Recreation Analysis" points out the possibilities of water supply reservoirs in the Baltimore Region. In the past, public health constraints, company policy and public opinion have discouraged or prevented joint use of water supply reservoirs. However, existing restrictions should be reexamined in the light of modern technology to determine if they are essential. It may be necessary, in order to relieve the water companies from responsibility and liability, to study the possibility of appointing another public or quasi-public agency to plan and administer recreation activities at reservoir sites. If water companies can be assured that public use will not have a detrimental impact, they may be willing to open their properties to the general public.

The multiple use of existing land and water associated with existing and planned water supply reservoirs offer an attractive alternative to single purpose recreation reservoirs for meeting the increased recreation needs. A recent study, completed by the Bureau of Outdoor Recreation in May 1974, entitled, "The Use of Water Supply Reservoir Areas for Outdoor Recreation: Case Examples and Guidelines," examines this multiple use concept, citing specific cases where it has proven successful and shows the potential that exists in this area.

Perception regarding use of water supply reservoirs is slow to change. Public pride in the use of protected drinking water supplies is great in many communities. Rational arguments do not necessarily change these feelings.

Other Man-Made and Natural Lakes

Existing lakes, other than water supply reservoirs, have outstanding potential for boating, swimming and sailing. These areas in particular would be well suited for private recreation interests as much of the adjacent land is probably in private hands. Some such lakes are located in existing State parks or forests and thus are open for public recreation. As new surface water areas are created, all types of recreational uses should be fully considered and planned for.

ACCESSIBILITY

The inadequacy of public access is a major problem affecting the recreational use of the waters of the Chesapeake Bay. To assure efficient utilization of existing waters and the adjacent shoreline more access will have to be provided.

The lineal development of private homes and other structures along waterfronts has prohibited public access in many areas. In urban areas around the Bay, apartment houses and other shoreline develop-

ments constructed over the water or piling or fills restrict access to and use of the public waters. Lands should be acquired for public recreation use and access before residential or commercial development pressures occur. In areas where vacation homes are popular, the cluster development or residences around a community waterfront park area should be encouraged to facilitate maximum use and benefit from waterfront lands. Priorities of waterfront development should be established by State and local agencies. Marinas, a legitimate use of waterfront lands, should have a higher priority than shopping centers at the water's edge. Commercial development not dependent upon water access should be located or relocated inland.

The enactment and implementation of specific planning legislation aimed at the preservation of wetlands and key shoreline areas from developmental pressures could assure greater access to the Bay's waterfront. Zoning ordinances in the Bay area need to be effectively and uniformaly enforced to provide for the orderly development of the shorelines as well as other areas.

TRANSPORTATION AND RECREATION IN THE CHESAPEAKE BAY AREA

The Chesapeake Bay area possesses an abundance of transportation corridors and facilities that provide quick and convenient conveyance to many of the prime recreational resources in the region. These facilities include a large network of highways, fast and efficient rail and bus systems and several airports serving millions of people daily.

The main arteries of traffic on the western shores of the Bay are principally interstate highway systems. Highway I-95 virtually runs the entire length of the study area from Wilmington through Baltimore, Washington, D.C., Richmond, and finally terminates at Petersburg, Virginia. Among the other important roads in the region are I-83 between Baltimore and Harrisburg, Pennsylvania, I-64 from Richmond to Hampton Roads, I-70 from Frederick to Baltimore and two beltways, I-695 and I-495, providing easy access to the various sections of Baltimore and Washington respectively. Other roads heavily used by the region's recreationists, US 50 and 113 account for much of the summer traffic for the Atlantic Coasts, resorts. In additions,

several state routes also serve as both connecting highways between the interstate systems and as a thoroughfare to reach more remote sections of the region.

A principal drawback in the existing highway system in the Chesapeake Bay area is its lack of provision for access to the Bay. Rural roads often terminate within several hundred feet from the Bay and preclude many scenic vistas for the passengers. Few highways in the area running parallel to the Bay or Atlantic Ocean have parking areas near the shoreline where the recreating public could simply stop and partake in such activities as swimming, fishing, sea-shell collecting. Much of the problem is due to the fact that most of the shoreline is in private ownership. In the future, transportation planners designing new roads adjacent to the Bay should provide for acquiring enough rights-of-way to permit some recreational activity in the area between the Bay and the highway corridor.

In addition to highways, the railroads provide another means of transportation for Bay area recreationists. There are at present seven major railroads in the portions of those states comprising the Study Area that have passenger service: the Baltimore and Ohio, the Norfolk and Western, the Penn Central, the Reading, the Richmond, the Fredericks and Potomac, the Southern and the Western Maryland. Intra-city commuter trains and buses are also making it possible for many people who may be situated several miles from their places of residence, especially in the Baltimore-Washington area, to enjoy quality recreation experiences at city parks, municipal auditoriums and athletics fields.

Air travel likewise continues to serve as a mode of transportation for many residents of the Chesapeake Bay area. Numerous airports are located throughout the entire area. Intensive use is made of those airports near resort spots like Ocean City, Maryland, Rehoboth Beach, Delaware and Virginia Beach during the summer months. Special flights are frequently arranged for travel groups to reach the more historical places around the Bay such as Williamsburg and Tangier Island. It is expected that the trend for air travel to the prime regional recreational areas will increase substantial by the year 2000.

ADDITIONAL RECREATION OPPORTUNITIES

The extremely limited access to the Chesapeake Bay dictates that other prospects for recreation, such as those discussed above, must be found in the study region. However, in addition to finding ways to make optimal use of existing areas, recreation opportunities other than boating, sailing, camping, swimming and picnicking should be identified.

The alternatives listed below deserve attention not only because they take into consideration the problem of supply, but because they offer additional opportunities for the enjoyment of the outdoors.

Recreation Trails

One important alternative means for meeting recreation needs in the Bay area is the development of a multiple trail system. As a broad system, both motorized and non-motorized vehicle trails as well as non-vehicle trails of all kinds could add substantially to the resource base in the Chesapeake Bay area. Because of the rich historical resources of the Bay Region, a trails system should include historical trails which would perhaps contribute to the tourism industry.

Wild and Scenic Rivers

Another opportunity to meet outdoor recreation needs in the Chesapeake Bay area would be the development of a wild and scenic and recreational river system. Rivers preserved in their natural free flowing state offer a wide variety of recreational potential for such activities as kayaking, white-water canoeing and boating. In addition, the scenic vistas usually located near these rivers can provide ample opportunity for many other outdoor recreation pursuits ranging from picnicking and hiking to nature study and birdwatching. The States of Maryland, Pennsylvania and Virginia have enacted legislation aimed at the protection of some of the wild and scenic rivers within their State

boundaries. Maryland's Scenic Rivers Act of 1971 has identified five rivers as initial components in their State system; four of these rivers are located in the Chesapeake Bay Study area: the Patuxent, the Pocomoke, the Severn, and the Wicomico. In accordance with the passage of the Scenic Rivers Act of 1972, the Department of Environmental Resources of Pennsylvania is currently making an inventory of rivers for possible inclusion into their statewide programs. In a similar manner, the State of Virginia is examining several rivers to determine if their scenic and recreational qualities are worthy of preservation under the 1970 Virginia Scenic Rivers Act. To date, Delaware has no scenic rivers legislation.

Harbor Redevelopment

The waterfront areas of the major urban centers of the Chesapeake Bay should serve the multiple needs of such interests as commerce, shipbuilding, transportation and the recreating public. Although historically significant, many harbor areas have become rundown and underutilized. Several studies have been completed outlining the possibilities for the redevelopment and multiple use of waterfront areas in urban centers.

The Recreation Industry

"Outdoor Recreation - A Legacy for America," the Nationwide Outdoor Recreation Plan released by the Bureau of Outdoor Recreation in December 1973, includes as one of its objectives better coordination and cooperation among public and private recreation suppliers and suggests actions to improve the management of and investment opportunities for private enterprise in supplying recreation areas and facilities to the public. Private industry engaged in the development of outdoor recreation facilities should be encouraged to provide many of the facilities required to meet the Bay area needs. This could be accomplished by developing facilities in areas of the Bay where various studies have indicated critical shortages.

Flood Plain Utilization

Land adjacent to river channels can serve as a substantial resource base to meet recreation needs. The use of flood plains in urban areas as opportunities for a variety of quality recreational experiences (trails, parks, etc.) may preclude development on those flood plains and thus reduce flood losses. In rural areas, too, farmland susceptible to flooding could be preserved for open space needs through zoning and other land-use controls.

Islands

Islands are a valuable and a vulnerable resource of the Chesapeake Bay area. They vary from the shifing sands of the barrier islands on the Atlantic Ocean, to the marshy Bay islands where multiple natural life forms survive, to man-made islands where rising reservoir waters isolate high knolls, ridges and peaks. As a recreation resource, islands offer the whole gamut of outdoor experience from fishing, nature study and picnicking to hiking, biking, sightseeing, camping and swimming.

The majority of the Chesapeake Bay islands are undeveloped and are most suited, and in fact are used, as wildlife feeding and sheltering grounds. Many of these islands are under the management of the Virginia or Maryland Fish and Game Commissions or the U.S. Fish and Wildlife Service. The Nature Conservancy has been most active in protecting these islands from development but has been giving priority to the barrier islands of the atlantic side where it has now purchased six islands - Parramore, Smith, Myrtle, Shipshoal, Hog and Cobb.

A few of the Chesapeake's islands are owned by the Federal Government as part of military or civilian lands. Others are privately owned and are being preserved in their natural state or are slated for commercial and residential development. The larger islands - Tilghman, Deal and Tangier, are the base for a fairly prosperous oyster industry.

Many of the developed and undeveloped islands, particularly those close to urban centers, have a significant potential for supplying the diversified outdoor recreation needs of the Chesapeake Bay area's residents and for encouraging a prosperous tourist trade. The recreation potential may include only passive kinds of recreation because of the delicacy of the island's biota and erosion problems.

In other cases, more extensive types of recreation could be developed by or in conjunction with private interests.

Youth Hostels

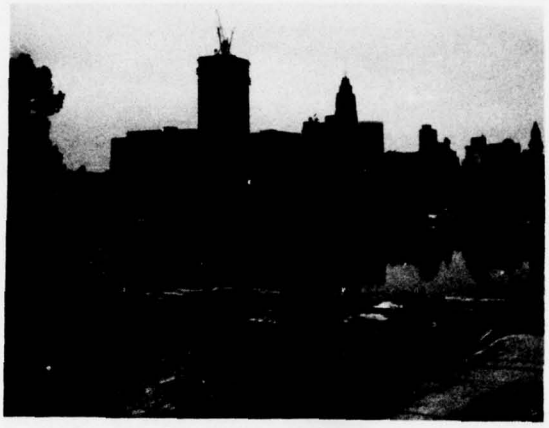
Night lodging has often been a detriment to some outdoor recreation activities in the Bay area such as hiking and all day nature study. Hostels selectively located on trails or near areas of high density recreational use could contribute substantially to the improvement of the nigh lodging problem. Hostels too can provide a place where recreationists can meet each other, discuss their common interests and develop a sense of camaraderie based on their mutual enjoyment of outdoor recreation pursuits.

The Bureau of Outdoor Recreation is currently conducting a study to identify potential youth hostel sites in Virginia and Delaware. The intent of the study is to promote hosteling which involves people "traveling under their own steam" primarily on trails, scenic rivers, and existing roads. The study's approach is to identify low cost recreation-travel corridors throughout both states, contact public land managers along those corridors and discuss with them the possibilities of including hostels on the public land they manage, and identify specific sites on those areas whose managers would like to have hostels. The recreation corridors will be identified on maps and distributed for public review and input by mid-winter 1974. The study, itself, will be published by early summer in 1975.

PROGRAMS RELATED TO RECREATION

A survey of the Chesapeake Bay's natural areas was undertaken by the Smithsonian Institution under contract to the Nature Conservancy and the Chesapeake Bay Foundation. As a result of the survey, the Conservancy has developed a program to protect 234 prime natural areas by encouraging individuals and organizations to "adopt" specific areas. And, as a product of the inventory, the Conservancy now has a computerized data bank on the Bay's plant and animal life. The

Photo Group 8-2: Alternatives for Increasing Outdoor Recreation Opportunities for the Chesapeake Bay and Vicinity



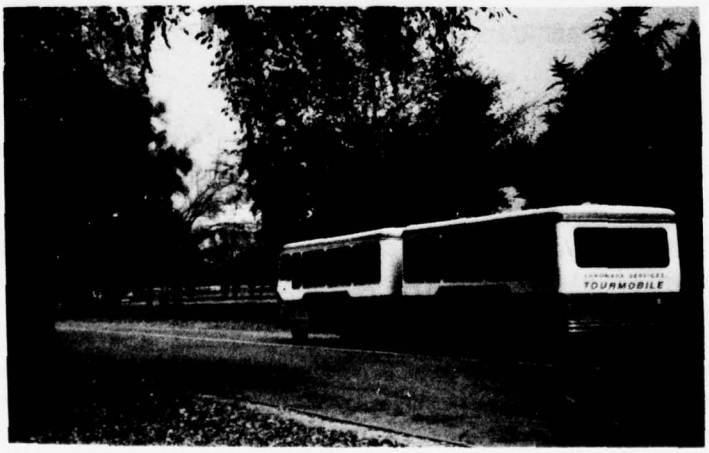
Harbor Redevelopment



Urban Parks



Sea Nettle Control Program



Improved Transport of People

inventory data bank and selected areas will help to guide all levels of government and the private sector to make optimal land use decisions and to save areas of unique ecological importance.

The stinging jelly fish is one of the main deterrents to swimming in the Chesapeake Bay and any discussion of swimming needs should take this nuisance into consideration. According to Natural Resources Institute of the University of Maryland, the sea nettle influx is cyclical and it is expected that it will not be a serious problem for the next 3-4 years. However, when studying swimming needs and supplies in the Chesapeake Bay, the possibility of future serious influxes of the sea nettle should be expected. An expanded program to further address the sea nettle problem should be conducted by the appropriate agency or agencies.

Under the Federal Power Act (as amended March 1, 1971) each hydroelectric project licensed must be adapted to a comprehensive plan. This plan is designed to improve or develop the waterway for several uses other than power, one of which is recreation.

Federal Power Commission (FPC) projects offer an important contribution toward meeting the ever-increasing demand for water-related outdoor recreation activities by including in their Exhibit R's (recreation plans) provisions for bathing areas, boating, camping, fishing, hunting, hiking, horseback riding, picnicking, playgrounds, and visitors centers.

The FPC has five licensed projects situated within or immediately adjacent to the Region I Study Area. The projects, consisting of Conowingo Dam, Muddy Run Pumped Storage, Holtwood, Safe Harbor and York Haven are located along the lower reaches of the Susquehanna River and contain an aggregate water surface area of approximately 21,000 acres. The projects provide an aggregate recreation resource for the general public consisting of the following water oriented facilities:

Facility	Existing	Ultimate (Future)
Access Areas	67	70
Boat Ramps	28	31
Marinas	8	8
Beach Areas (swimming)	0	0
Picnic Areas	32	39
Picnic Tables	1300	1650
Camping Areas	3	5
Camping Sites (tent and trailer)	320	720

There are numerous fishing access points and fishing piers at each project and additional provisions for canoe portages at the various FPC facilities.

Two public laws have direct bearing on the potential of Federal military and civilian properties for public recreation. Under legislation enacted in October 1970, States and their subdivisions may obtain free or at virtually no cost, Federal properties that have been declared surplus to the needs of the Federal Government for public park or recreation purposes. From the inception of this Surplus Property Program (also known as the Legacy of Parks) to July 1, 1974, fourteen properties within the Chesapeake Bay Study Region consisting of 2,637 acres have been conveyed for public park and recreation. Numerous other properties have been declared surplus and are awaiting management designation. The deeds of conveyance provide that the property transferred must always be used for public park and recreation and if it ceases to be used for such purposes, it reverts back to the United States.

Another important public law which is often overlooked is P. L. 90-465 authorizing the Secretary of Defense to plan for the development, operation and maintenance of public outdoor recreation at military reservations in cooperation with the Secretary of the Interior and the appropriate hosting state agency. Two military reservations in Virginia, Camp A. P. Hill and Quantico Marine Reservation, currently provide public recreation facilities. Other military lands in the Chesapeake Bay area presently being under-utilized, should be examined for any recreational potential they may offer to nearby residents, and steps should be taken to make them available.

There are two opportunities that could be used by the Corps of Engineers to meet outdoor recreation needs in the Bay area. The Urban Wastewater Program could aim at integrating recreational goals in its overall framework and development. Also, the popularization of the hydraulic model of the Chesapeake Bay could serve to make the recreational resources of the Bay better known to the American public during the Bicentennial Celebration and in future years.

Finally, the Coastal Zone Management Program under P.L. 92-583 is designed to squarely address the increasing and conflicting demands upon the coastal lands and waters. Recreation is certain to benefit as order is sought in the future development of the coastal areas.

CHAPTER V

REQUIRED FUTURE STUDIES

The aim of this study was to determine present and future recreation needs in the Chesapeake Bay area. While the results offer much guidance concerning recreation opportunities and shed a great deal of light on the problems related to the outdoor recreation experience in the Bay region, it was impossible within the framework of this study to make detailed analyses about every aspect of this experience. Hence, this chapter lists and describes future studies that should be considered in the development of a management plan to optimize the use of the recreation resources of the Bay area in meeting future recreation needs. All recreation planning studies conducted by public and private agencies for the Chesapeake Bay Study Area should consider and incorporate the policies and recommendations stated in Outdoor Recreation - A Legacy for America.

The options for increasing outdoor recreation opportunities as discussed in the alternatives section of this report should be investigated and the findings incorporated into a final plan. Included among these would be federal and military lands, water supply reservoirs, other water reservoirs, public transportation, wild and scenic rivers classification, harbor redevelopment, trails, and recreation as an industry.

Reduce Environmental Impact

Studies are needed to assure that a minimum adverse impact upon the environment will occur from the development of boating access facilities. These would include the investigation of careful designs for slips and ramps as well as a study of the feasibility of greatly expanded dry or upland storage of boats.

Nettles

A more definitive study of the attitude of recreationists toward nettles as a barrier to use or even to plan use of the Bay for swimming is needed.

Accessibility

There is a need to study the problems related to public access to recreation resources of the Bay area. Solutions are especially needed to the problem of private ownership of desirable recreation lands adjacent to Chesapeake Bay.

Urban Recreation

In light of the acute shortage of urban facilities, coupled with the generally acknowledged desire to enhance the urban setting, priority must be given to developing a broad range of recreational opportunities catering to the needs of the urban resident. Both neighborhood and regional problems encompassing much more than just water-related activities should be studied.

Military Lands

A study is needed to integrate the various proposals on the future of military lands in the Bay area. The study should explore the recreation potential of these sites, ways to opening these areas to the public, and quantify the portion of recreation demand that could be met by them.

Water Supply Reservoirs

A study is needed to determine the recreational potential of the Bay area's water supply reservoirs in much the same way as the Baltimore Urban Recreation Analysis has done for the Baltimore

SMSA. This study too, should explore ways of opening these reservoirs and related land areas to public use and quantify the potential recreation supply.

Public Transportation

Due to increased importance of public transportation, a study should be conducted to determine present transportation patterns and their relationship to existing recreation areas. The study should include new public transportation patterns that would allow for increased accessibility to public recreation areas.

Trails

A comprehensive trail study is needed to combine the various trail proposals that have been put forth by the SCORPs as well as state and local special interest groups. The study should be broadly based enough to include all types of motorized and non-motorized systems.

Harbor Redevelopment

An integrated study of harbor development plans is needed to outline the complete possibilities for redevelopment and multiple use (including recreation and open space) of the many harbors in the Bay area.

Private Industry

In keeping with the findings and recommendations of, Outdoor Recreation - A Legacy for America, a study should be undertaken to identify the major constraints and obstacles which limit private enterprise in meeting the recreation needs of the Chesapeake Bay Region. This effort should identify alternatives

and subsequently recommend actions to improve private enterprise's ability to meet these recreation needs. Such a study would provide a better understanding of the problems faced by private enterprise and provide a framework for solving those problems.

Inventories

In depth inventories and a method for updating such inventories should be considered by the Federal and State governments through the SCORPs. To improve the usability of the resultant data and thus increase its effectiveness, it is essential that all interested parties continue their efforts to standardize all inventory data going into the SCORPs.

Boating and Sailing

When a standardized inventory for marina slips and launching ramps is available, then further study of boating and sailing demand, supply, and needs for the Chesapeake Bay should be conducted.

Non-Resident Demand

The states should conduct a more thorough study of non-resident demand to determine the role of the Chesapeake Bay and vicinity as a major regional and national recreational resource. Their findings should be incorporated into the SCORPs.

Use of Flood Plains

Federal, State, and local officials in the Bay area concerned with the flood problem should study the flood prone areas to determine which ones could most appropriately respond to regional recreational demand, and the manner in which they could best be utilized to meet recreational needs.

FOOTNOTES

1/ The Pennsylvania SCORP had assigned its counties included in this study into two separate planning regions that were comprised of several other counties extraneous to the study area of the Chesapeake Bay. Hence, in the interests of uniformity the Pennsylvania counties of York, Lancaster, Chester, and Delaware were placed into one region.

2/ Dr. Ralph Lufkin - Johns Hopkins University, Marine Technology Society Annual Conference, Washington, D.C., August 1971.

3/ CBIPC, Integrity of the Chesapeake Bay, Summary, Department of State Planning, Annapolis, Maryland, n.d. p. 38.

4/ Chesapeake Bay Existing Conditions Report, Appendix B, The Land - Resources and Use, Vol. 1, p. B-XI - 178.

5/ Martha J. Ketelle and Paul D. Uttormark, Problem Lakes in the United States, U.S. Environmental Protection Agency, Washington, D.C., p. 127.

6/ North Atlantic Regional Water Resources Study, Appendix M: Outdoor Recreation (May 1972), p. M-4.

7/ Ibid.

8/ Ibid.

9/ For a more indepth discussion of demand methodology and explanation of participation rates, see Attachment I, Section B.

10/ The derivation of participation rates is explained in greater detail in Attachment I, Section B.

11/ Population projections for each of the regions were provided by the Office of Business Economics, U.S. Department of Commerce. The Baltimore District, Corps of Engineers reviewed these projections and then distributed them to the various governmental agencies participating in the Chesapeake Bay Study.

12/ The method used for the determination of these twelve centers can be found in Attachment II.

13/ Attachment III describes this section on the distribution on demand in some detail.

14/ The derivation of Figures 8-4 through 8-8 is discussed in Attachment IV.

15/ Attachment V gives a step-by-step explanation of these calcuations.

16/ In this study, State supply figures combined boating and sailing. Therefore, after converting boating and sailing facilities requirements separately, their acreage was combined to form one activity and then substracted from the supply.

17/ Agricultural Experiment Station, University of Maryland, Economic Analysis of Marinas in Maryland, April 1969. p. 60.

18/ State of Maryland, Department of Chesapeake Bay Affairs, 1971 Boating Report.

19/ Department of the Interior, Bureau of Outdoor Recreation, Baltimore Urban Recreation Analysis, January 1974.

20/ Footnote to Set C - Page 2 Ses. Analyis
The 1970 BOR Survey is an update of the 1965 survey, both of which were designed to provide recreation oriented interests with nationwide recreation data on as current a basis as possible. The 1970 survey provides information on participation in 14 major outdoor recreation activities. The NAR 1970 participation rates employed in this report came originally from the 1965 survey. Since the NAR was Level A Water Resources Study, the data derived is to be utilized in any Level B study (Chesapeake Bay) that attemps to assess water-land related resources in a region originally covered by a Level A study. This is in accordance with the requirements of the Water Resources Council.

21/ While these percentages may seem to be unusually large increases over those figures originally computed in Chapter III, "Future Needs and Problem Areas," they nevertheless represent accurate arithmetic calculations. For example, from Table Projection Set A indicates a need of 1,100 campsites to meet projected needs for the year 2000. Projection Set D indicates a need for the same year of 64,100 sites. Subtracting the latter figure from the former gives an increase of 63,000 additional campsites. This is more than a fifty fold increase: 63,000 ÷ 1,100.

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GLOSSARY

Activity Day: The participation by one person in one activity during any portion or all of one day. A person participating in three different activities in one day would have engaged in three activity days.

Capacity Utilization Day: A 24-hour period in which actual use of a recreation facility is equal to or exceeds the designed or intended level of use.

Composite Effect of Socio-economic Factors: The projected percent change in the participation rate for certain outdoor recreation activities as influenced by the six variables of education, occupation, age/sex, family income, residence, and available leisure.

Distribution of Demand: 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 distribution in this report is based on the distribution rings of 5, 10, 25, 50, 100, and 250 miles from the regional center.

Distribution Ring or Circle: Rings drawn about the regional center in increments of 5, 10, 25, 50, 100, and 250 miles in radius to represent the distribution of recreationists originating from the regional center.

Destination Camper: Recreationist who normally commutes some distance to camp.

Facility Requirements: The number of facilities necessary to meet projected demand.

Magnitude of Demand or Projected Demand: A measure of the amount of recreation opportunity which the public desires in relation to water dependent and water enhanced recreation activities.

Outdoor Recreation: Leisure time activities which utilize an outdoor setting.

Participation Rate: The percent of the number of recreation days a certain percent of the population will take part in an activity. For the purpose of this report, the activities considered were boating, sailing, swimming, picnicking, and camping.

Recreation Day: A standard of measure of use consisting of a visit by one person to an outdoor facility or area to engage in one or more recreation activities during all or part of a day.

Recreation Need: Unsatisfied demand in terms of land, water and recreation facilities.

Recreation Supply: The resources and facilities capable of providing outdoor recreation opportunities.

Regional Center: A point within a region determined by multiplying the population of each county times the longitude and latitude, respectively, of the population center of each county and dividing the result by the total regional population to determine a new longitude and latitude coordinate.

Resource Oriented Camper: Recreationist who utilizes the resources (water, land, parking facilities, etc.) as a campsite.

SCORP: Statewide Comprehensive Outdoor Recreation Plan.

Water Dependent Activities: Those recreation activities which take place in or on the water. For purposes of this report, these activities consist of swimming, boating, and sailing.

Water Enhanced Activities: Those recreation activities which by preference of the participant take place near water. For the purpose of this report, these activities consist of picnicking and camping.

Zone of Influence: That portion or area between distributional rings or circles which partly or wholly falls within the land areas of its own region and/or another region.

ACKNOWLEDGEMENTS

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ATTACHMENT I

A. Explanation of Participation Rates

Demand is determined by multiplying the participation rates times the population. D = p.r. X P. The population can either be the present population as determined by the census or it can be a future population as determined from projections. The participation rate is calculated by multiplying the percentage of the population who take part in an activity, times the average number of days that they spent in that activity, and then dividing by 100:

$$\frac{\%\text{ of P} \quad X \quad \text{Average Activity Days}}{100} = \text{p.r.}$$

These figures were obtained from the Bureau of Outdoor Recreation's 1965 Survey of Outdoor Recreation Activities, which will be referred to as the 1965 Survey in this report. 1/

For example, on page 108 of the 1965 Survey, the statement is made that in the summer of 1965, 57 percent of the population went picnicking on an average of 5.6 days. Applying these figures to the above equation we get: $\frac{57 \text{ X } 5.6}{100} = 3.192$. Rounding the figure off to two decimal places, we obtain a participation rate of 3.19.

This in effect says that a hypothetical "average" citizen spends 3.19 days per year picnicking. By multiplying the average times the population, we determine demand, or how many days the citizens of an area spend picnicking. For example, if the population of an area is 100,000, we multiply this times 3.19 giving us a demand of 319,000 activity days.

If the picnicking season is 100 days, then it is anticipated that 3,190 people will be picnicking each day. If three people can be accommodated at each picnic table, then 1,064 picnick tables will

1/ U.S. Department of the Interior, Bureau of Outdoor Recreation, The 1965 Survey of Outdoor Recreation Activities. (Washington: October, 1967).

be required. Any difference between this calculated demand and the actual supply of tables is called the needs and unsatisfied demand of that resident population.

If national goals change and resulting programs were instituted which would provide more free time, more money, or both, then participation rates would probably increase. If so, this would allow latent demand to become active demand. Average number of activity days would rise, causing a rise in participation rates which in turn would increase calculated demand.

It appears at this time that no such program is likely to be instituted, so calculations are based upon those participation rates referred to in the NAR Study as encompassing a goal of "National Efficiency." This program is essentially a laissez faire approach to National guidelines and, as such, seems closest to what will actually be instituted.

B. Derivation of Participation Rates

The participation rates for the Chesapeake Bay area used in this report are the same as the National Efficiency per capita rates which appear in the North Atlantic Regional Water Resources Study (NAR), Appendix M, Outdoor Recreation. The 1970 participation rates are the same as those developed in the 1965 Survey. The projected participation rates for boating, sailing, swimming, picnicking, and camping were developed in a uniform manner for the years 1970, 1980, 2000, and 2020. The projected participation rates of the NAR Study are based on the composite effect (or percentage changes) of six socio-economic variables for factors on the participation rates which were defined in a study published by the Outdoor Recreation Resources Review Commission (ORRRC Report). 1/

These variables include education, occupation, age/sex, family income, residence and available leisure (Table 8-30). The composite effect or percentage change of these six socio-economic factors

1/ Outdoor Recreation Resources Review Commission, Prospective Demand for Outdoor Recreation - ORRRC Study Report 26, 1962, Washington, D.C

were multiplied by the basic participation rates found in the 1965 Survey to arrive at the projected 1980 and 2000 participation rates. 2/

2/ In the original ORRRC Report, the composite effect was used only for the projection year 1976; however, the projection year was extended to 1980 for the NAR Study. This means that the same composite effect for 1976 was employed for 1980 with no change in figures.

TABLE 8-30

Estimated net and composite effects (percent changes) 1960 to 1976 and 1960 to 2000 upon selected seasonal days per person activity rates, expected from changes in six socio-economic factors

Season and Activity	1960 to 1976							1960 to 2000						
	Income	Education	Occupation	Residence	Age/Sex	Leisure	Six Factor Composite	Income	Education	Occupation	Residence	Age/Sex	Leisure	Six Factor Composite
Summer: June-August														
Swimming	14.0	6.2	.7	.8	.8	7.0	33.7	22.7	12.3	1.4	2.2	3.5	18.6	75.3
Picnicking	5.2	4.2	.5	.8	.5	2.2	14.1	6.5	8.5	.9	2.1	1.9	5.4	27.9
Boating other than sailing or canoeing	18.2	5.1	.5	.0	.1	8.8	35.9	31.1	10.1	1.1	.4	2.3	19.4	78.0
Camping	18.3	5.3	0.7	-1.6	.9	15.7	44.2	25.6	10.5	1.4	3.8	2.4	44.7	100.6

ATTACHMENT II

DETERMINATION OF THE REGIONAL POPULATION CENTERS

The most common way of establishing centers for the twelve regions is to simply average out the location coordinates (longitude and latitude) of the population centers of the counties comprising this region. 1/ To illustrate this, let us suppose that the location coordinates of the population center for County A are 75.1 degrees (longitude) and 41.1 degrees (latitude) while those for County B are 76.2 degrees and 43.5 degrees respectively. By averaging these figures, the center for the two county region would be located on a longitudinal line of 75.6° with a latitude of 42.3°.

$$75.1 + 76.2 = 151.3 \div 2 = 75.6$$

$$41.1 + 43.5 = 84.6 \div 2 = 42.3$$

The principal drawback to this method is that it assumes that both counties have equal population and that the regional center for the two county areas must be halfway between the two population centers. If, however, County A has a population of 100 and County B, 200, then the assignment of the regional center based on this method would be skewed erroneously toward the county having a smaller population.

As demonstrated, averaging lines of longitude and latitude of county population centers is one method of arriving at centers for a region. Another approach emphasizes the utilization of actual population data in combination with these population centers. It is this approach on which this demand, supply and needs analysis is based. The determination of the regional center is derived partly from the assumption that the total population of a region will shift the regional center toward the greatest population concentration if this total were calculated along with the population centers.

1/ The Geographical Division of the Bureau of Census provided the location coordinates for all the counties in the study area.

For example, let us assume County A has a population of 100, and County B 200. Again the location coordinates for both Counties A and B are the same as above. By multiplying the population of each county times its longitude, adding the resultant figures for the two counties and dividing by the total population for the two county area, a new longitudinal figure is derived, taking into account the population concentration of an area. The same format is followed for the determination of latitude. Thus, the new regional center lies at 75,8° longitude and 42.7° latitude.

County	Population	Longitude	Latitude
A	100	75.1	41.1
B	200	76.2	43.5

Longitude:

75.1 X 100 = 7.510

76.2 X 200 = 15,240

22,750 ÷ 300 (100 + 200) = 75.8 (new longitude)

Latitude:

41.1 X 100 = 4.110

43.2 X 200 = 8.700

12.810 ÷ 300 = 42.7 (new latitude)

A comparison of the two sets of location coordinates (those averaged vs. those taking into account the county population totals weighted) reveals that those weighted with the population areas are closer to the location coordinates of County B than to County A. (See Below). This is due to the pulling influence of the population factor (County B has more people than A). This fact can be quantitatively demonstrated by subtracting the difference between these coordinates - (Note: there is not special form for the subtraction process. Figures are simply subtracted).

	County A	County B	Regional Center Averaged	Regional Center Weighted with Population
Longitude	75.1	76.2	75.6	75.8
Latitude	41.1	43.5	42.3	42.7

Longitude

Regional Center	75.8	County B:	76.2
(weighted)	75.1	Regional Center	75.8
County A	.7	(weighted)	.4

Latitude

Regional Center	42.7	County B:	43.5
(weighted)	41.1	Regional Center	42.7
County A	1.6	(Weighted)	.8

Differences are greater between County A and the regional center weighted with the population factor than those corresponding figures for County B (.7 and 1.6 va. .4 and .8). These larger figures (.7 and 1.6) indicate that population "pulled" the population center in the general direction of County B since this County had more inhabitants.

Table 8-31

Longitude and Latitude of Regional Centers
(derived from preceding methodology)

Region		Longitude	Latitude
I	Pennsylvania	75.867	39.974
II	Delaware	75.560	39.479
III	Eastern Shore - MD	75.838	38.787
IV	Baltimore	76.612	39.304
V	Washington	76.994	38.946
VI	Southern Maryland	76.731	38.443
VII	Northern Virginia	77.222	38.777
VIII	Richmond	77.471	37.547
IX	Hampton Roads	76.344	36.914
X	Petersburg-Hopewell	77.379	37.146
XI	Tidewater	76.638	37.724
XII	Eastern Shore - VA	75.737	37.646

ATTACHMENT III

DISTRIBUTION OF DEMAND

Influence of Region I on itself

Figure 8-12 depicts four regions, each having a population center. Superimposed on Region I are circles having radii of five and ten miles drawn to scale from the regional population center. By looking at this diagram we can see that a certain portion of the total area of Region I lies within the five-mile zone of influence of Region I. With the use of a grid, one can find the number of square miles of Region I lying within this five mile circle. If the total area of the five mile circle is 78.5 square miles and the total number of square miles of land of Region I lying within its five mile circle is 55 square miles, then we arrive at the percentage of the land area in the five mile circle (zone) of Region I that is occupied by Region I. In this case, the percentage is 70% (55 --- 78.5 = .70 or 70%). On the other hand only a small portion of Region I lies within the ten mile zone of Region I. Hence, our percentage here would be small (no. of square miles --- by 235.5 area of ten mile circle). It is important to note that while the above percentages are based on sight and therefore are only theoretical in the given diagram for purposes of explanation, they were all calculated to two decimal places on the original map. The same procedure is followed for the 25, 50, 100 and 250 mile zones of Region I.

Influence of Other Regions on Region I

While Figure 8-12 shows the influence of the distribution circles of

Region I on itself, Figure 8-13 shows the influence of the distribution rings of surrounding regions on Region I. The cross-hatched areas in the diagram represent those areas where there is an overlap of one or more zones.

By looking at Fig. 8-13 it can be observed that only a small area perhaps 7 percent of the five mile zone around Region II cuts into and is occupied by Region I. However, a larger portion of Region II's ten mile zone is occupied by Region I - possibly 10%.

These percentages would be calculated in the same manner as for Fig. 8-12 the area of that portion of the zone of influence radiating from Region II and cutting into Region I divided by the total area of the circle or zone of influence of Region II. The other zones (25, 50, 100 and 250 miles) of Region II and the resulting percentages are calculated in the same way. This procedure is followed for the other ten regions to determine their influence on Region I. The figures shown in Table 8-32 illustrate the results.

In Table 8-32 all of the figures of the square mile column of each region add up to a regional total of 2,800 square miles (no. of square miles in Region I or fairly close to that figure). This results from the fact that if a number of circles totally bisect a region, the total area of the bisections must add up to the total land area of the region.

Fig. 8-12: Diagram Representing Method Used to Distribute Recreation Demand

The Effect of Region I on Itself

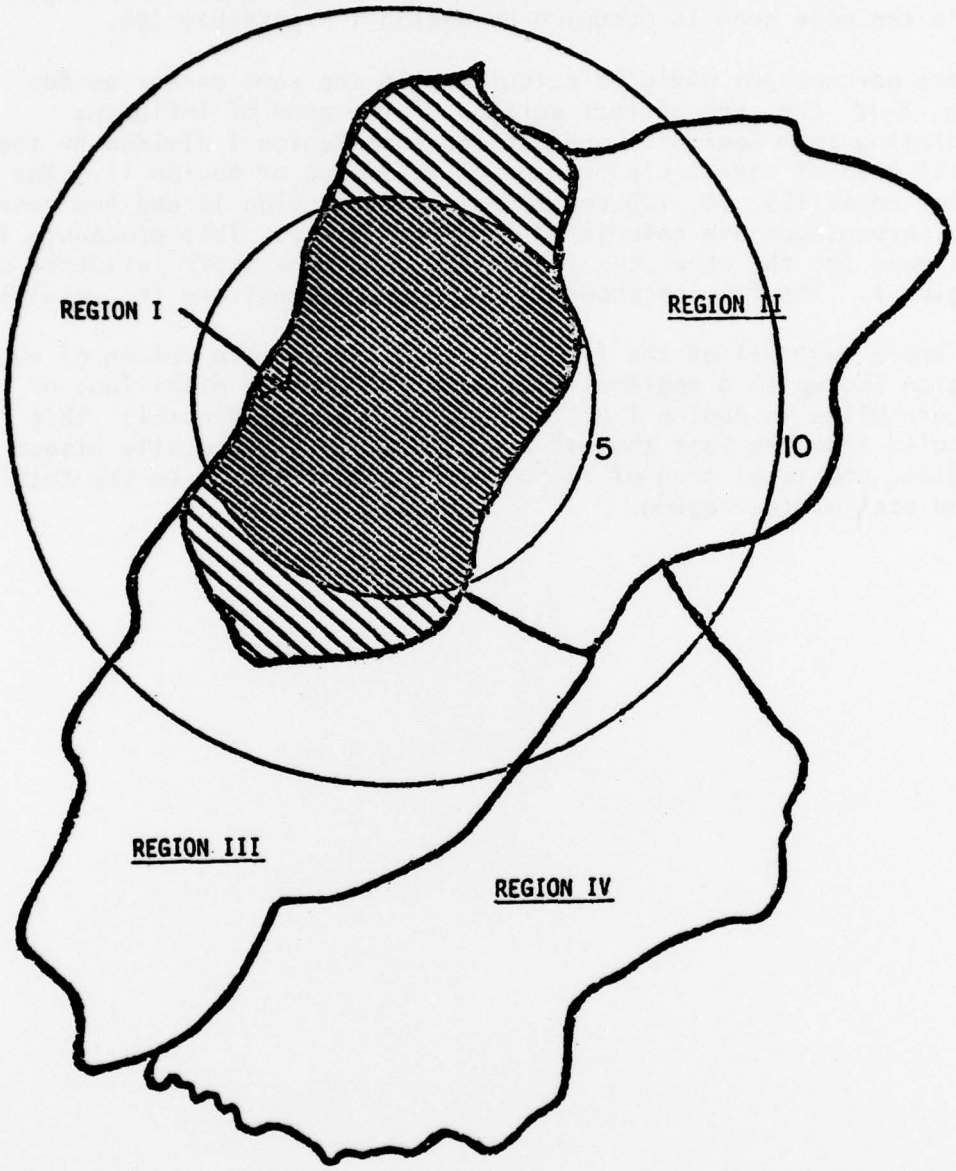


Fig. 8-13: Diagram Representing Method Used to Distribute Recreation Demand

Effect of Surrounding Regions on Region I

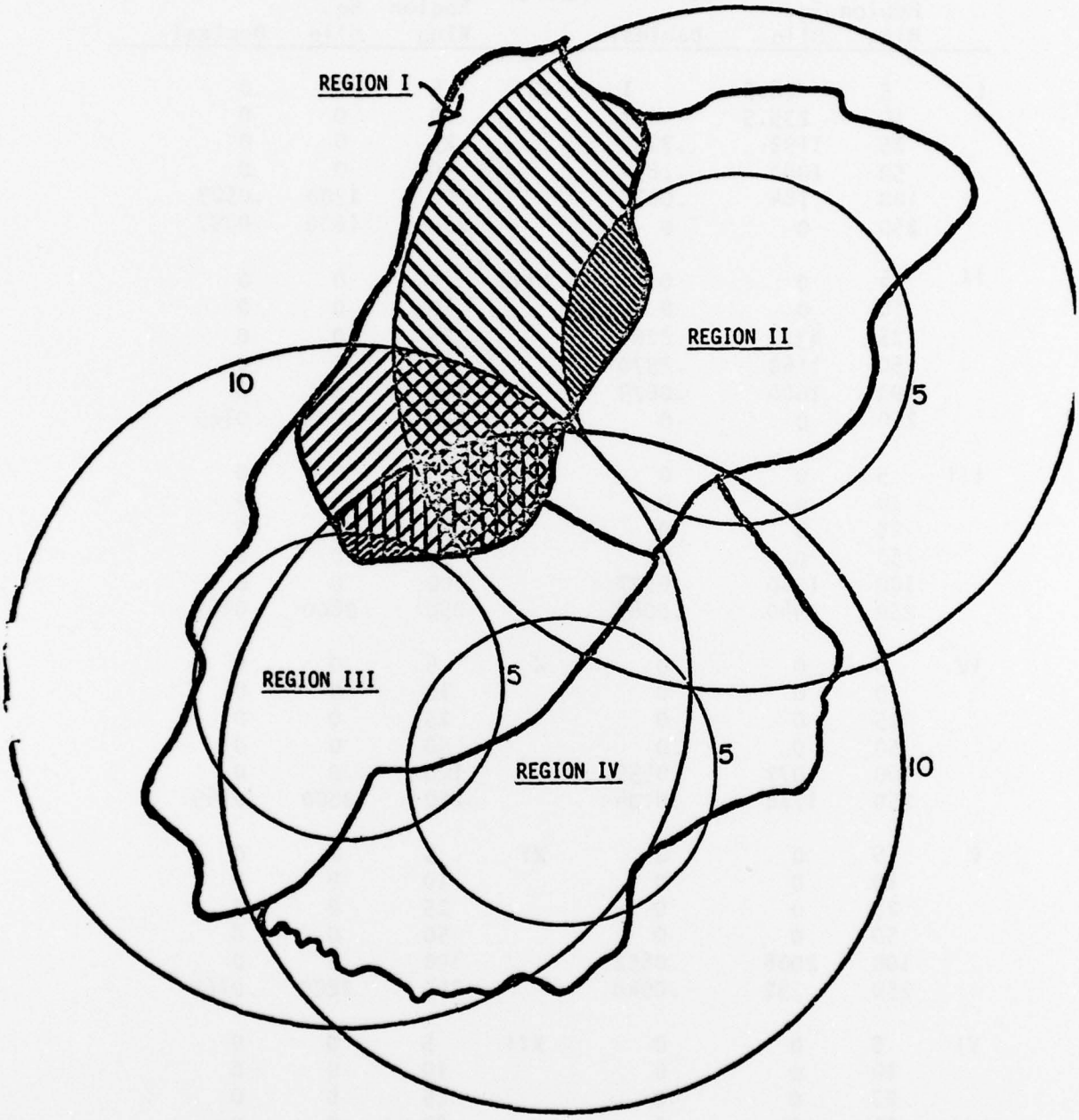


Table 8-32

PROPORTIONAL DISTRIBUTION OF DEMAND GENERATED
BY ALL REGIONS AFFECTING REGION I

	Region Ring	Sq. Mile	Decimal		Region Ring	Sq. Mile	Decimal
I	5	78.5	1	VII	5	0	0
	10	235.5	1		10	0	0
	25	1192	.7230		25	0	0
	50	1080	.1834		50	0	0
	100	184	.0078		100	1200	.0509
	250	0	0		250	1600	.0097
II	5	0	0	VIII	5	0	0
	10	0	0		10	0	0
	25	43.2	.0263		25	0	0
	50	1160	.1970		50	0	0
	100	1600	.0679		100	0	0
	250	0	0		250	2800	.0169
III	5	0	0	IX	5	0	0
	10	0	0		10	0	0
	25	0	0		25	0	0
	50	0	0		50	0	0
	100	1360	.0577		100	0	0
	250	1440	.0087		250	2800	.0169
IV	5	0	0	X	5	0	0
	10	0	0		10	0	0
	25	0	0		25	0	0
	50	0	0		50	0	0
	100	1072	.0455		100	0	0
	250	1728	.0104		250	2800	.0169
V	5	0	0	XI	5	0	0
	10	0	0		10	0	0
	25	0	0		25	0	0
	50	0	0		50	0	0
	100	2008	.0852		100	0	0
	250	792	.0048		250	2800	.0169
VI	5	0	0	XII	5	0	0
	10	0	0		10	0	0
	25	0	0		25	0	0
	50	0	0		50	0	0
	100	384	.0163		100	0	0
	250	2416	.0146		250	2800	.0169

Table 8-33

PERCENT OF ACTIVITY BY TYPE OF OCCASION
ACTIVITY

Type of Occasion	Picnicking	Camping	Swimming	Sailing	Boating
Vacations	7	35	10	19	14
Overnight Trips	6	65	11	19	22
Outings and Few Available Hours	87	0	79	62	64
Total	100	100	100	100	100

Table 34

PERCENTAGE DISTRIBUTION OF ACTIVITIES BY MILEAGE INCREMENTS

	5-0	5-10	10-25	25-50	50-100	100-250	250-500	500+
Vacations	1.75	1.75	1.75	1.75	11	28	25	29
Overnight Trips	9.25	9.25	9.25	9.25	27	28	7	1
Outings and Few Available Hours	19	15	29	22	12	1	1	2

ATTACHMENT IV

DERIVATION OF FIGURES 8-4 THROUGH 8-8 1/

Table 8-33 states that 35% of all camping takes place on vacations. Table 8-34 revels that 1.75% of all vacations take place five miles or less from the origin of destination. If these two percentages are multiplied together .35 X .0175, the resulting figure of .0061 will indicate the percentage of camping that takes place on vacation within five miles or less from the origin of destination. The same procedure is repeated for overnight trips (.65 X .925 = .0601 and for outings with few "available hours" 0 X .19 = 0). The total of these figures .0061 + .0601 = 0 + .0662 is the total percent of all camping that took place five miles or less from the origin of destination. This total (.0662 or 6.6%) appears on Figure 8-8 under five miles or less mileage increment for camping. Other calculations for the 5, 10, 25, 50, 100, 250 and 500 mile increments are done in a similar fashion. The final distribution total of all percentage of all increment for each activity must total 100%.

1/ Figures 8-4 through 8-8 were derived by multiplying the percentage type of occasion (overnight trips, vacations, outings, and few available hours) times the percentage distribution of activities by mileage increments. Both of these national percentage factors were taken from the 1965 Bureau of Outdoor Recreation Survey.

ATTACHMENT V

SUMMARY OF CALCULATION PROCEDURES FOR DISTRIBUTION OF REGIONAL DEMAND

The following paragraphs describe in summary form, an example of what calculations were performed to arrive at final demand figures and their regional distributions.

Distribution of Activity Days (A.D.) for Zones of Influence

For each region, multiply the activity days times the percentage of each recreational activity which takes place within a distributional ring. For instance, using Table 8-35, which gives demand for picnicking in 1980, Region II generates 1,957,000 picnicking activity days. To determine how many of these activity days occur 25 miles from home, multiply 1,957,000 (A.D.) X .251 (the percent of picnicking in the region done in the 25 mile ring) which equals 491,207 A.D.

Since 491,207 A.D. is demanded by the population of Region II within the 25 mile circle and since .0263 of that 25 mile circle falls on Region I (Table 8-32 then 491,207 X .2063 - 12,918 A.D. is the amount of demand for picnicking generated by Region II and falling on Region I.

All of the regional influences of Region I are calculated in the proceeding manner. The resultant figures are totalled for each activity (Tables 8-4 to 8-8). These totals, represent the demand in activity days for each region for the years 1970, 1980, 2000 and 2020.

Table 8-35

NUMBER OF ACTIVITY DAYS FOR
PICNICKING (1980) FOR STUDY REGIONS OF THE CBS AREA
(PARTICIPATION RATE = 2.91)

REGION		1980 POPULATION	ACTIVITY DAYS
I	Pennsylvania	1,962,076	5,710.000
II	Delaware	672,500	1,957,000
III	Eastern Shore - MD	305,200	888,000
IV	Baltimore	2,398,300	6,979,000
V	Washington	2,231,000	6,492,000
VI	Southern Maryland	138,000	402,000
VII	Northern Virginia	1,342,900	3,908,000
VIII	Richmond	660,800	1,923,000
IX	Hampton Roads	1,180,000	3,434,000
X	Petersburg - Hopewell	189,900	553,000
XI	Tidewater	94,500	275,000
XII	Eastern Shore - VA	45,100	131,000