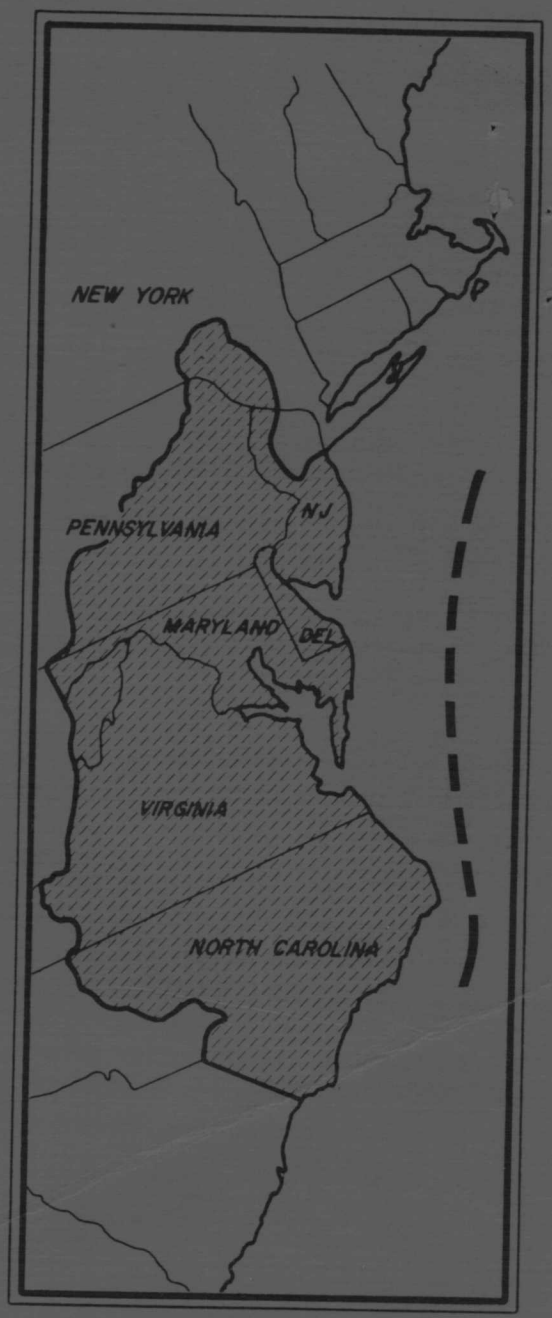
STUDIES 1974-7

# A Study of the Socio-Economic Factors Relating to the Outer Continental Shelf of the Mid-Atlantic Coast




Book 3 - Volumes VI, VII, VIII, IX

# RECREATION

Volume VI

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Table of Contents

# The Effects of Offshore Oil Development Upon the Recreation and Tourism Industry

The effects of offshore activity upon the recreation industry can be analyzed from three perspectives: displacement, economic, and socio-economic or demographic. Displacement refers to the transfer of a recreation site from one geographic location to another. For example, if the establishment of a refinery or pipeline uses land which previously was a recreation area, where can the recreation site be relocated? The first section of this report will provide data and maps necessary to answer this question.

The information relating to the demand for recreation (Section II) can be utilized as an adjunct to any discussion of displacement or substitution. The removal of a recreation site should involve a consideration of the demand either for use of that particular site or for the type of recreation available there.

The economic analysis of the travel industry presented in Section III will give the reader a measure of the importance of tourism and recreation for a state's economy. This importance will be discussed in terms of employment as well as dollars and cents.

The final section of this report will deal with the socio-economic and demographic effects of offshore activity on the second home phenomenon. The data will refer to the four conflict areas chosen for this study.

## I Inventory of existing and proposed recreation lands

Through the use of maps as well as tables, this section will provide an inventory of recreation sites in the study region. In attempting to locate support facilities onshore it will be necessary to identify those areas reserved for recreational use. If displacement is needed, then areas where recreation sites can be located will have to be noted. This inventory of current and proposed recreation areas should provide needed information for making displacement decisions.

The type of recreation available at a site, the owner/operator of the site, and the acreage are all considerations relevant to the displacement of recreation areas. Certain types of recreation (i.e., historical tours, battlefields, winter sports, surf fishing) can only be made available at specific locations or in particular regions. The inventory identified recreation sites by type; for example, forest, fish and wildlife, historical/cultural, or park.

The decision to displace a recreation site can be affected by the ownership of that site. It may be easier to buy private lands than to lease a government area. The inventory provides information pertaining to ownership or operator.[1]

The acreage of a recreation area can be important data in considering the area for support of offshore activity. It may be possible to reserve part of a large site for recreation while converting the remaining part to supporting services. The inventory provides acreage data.

The data contained in the recreation inventory is not of uniform detail for each state or for each of the conflict areas. All of the

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[1] Historic and cultural sites are not grouped exactly according to operator. Rather, they are classified as either state historical/cultural sites or as federal ones. The federal category includes not only federally owned sites but also any site registered as a National Historic Landmark or as a National Historic Place regardless of ownership.

states in the study area have published Statewide Outdoor Recreation Plans with the exception of North Carolina whose document is in press. Some states (such as Virginia, Pennsylvania, and West Virginia) are currently in the process of updating their documents.

The accompanying maps and overlays in the Atlas were drawn with the use of information from sources in addition to the Statewide Recreation Plans. Road maps and regional documents were consulted in order to obtain the most up-to-date information readily obtainable. Keyed maps can be found in the appendices of this report. As noted previously, equally detailed information was not available for each state so that the state maps vary in the information depicted.

A. North Carolina

The availability of outdoor recreation data for North Carolina is severely curtailed by the lack of a comprehensive state-wide outdoor recreation plan. The plan is currently in preparation (probably in press by this time). The information used in making the inventory maps was gathered from regional documents and road maps. Due to the paucity of this data, this narrative will focus upon the vicinity of Morehead City to the exclusion of the rest of the coastal plains and the Piedmont.

According to the data presented in Table IA, Carteret County has more recreation sites than the other counties in this area. The proximity of the county to the Outer Banks enhances its recreation value. Cape Lookout National Seashore is located in the northeastern boundary of Carteret County.

Not only does Carteret County have the largest number of recreation sites, it also has the greatest total recreation acreage. A substantially larger area of wetlands has been reserved for recreation in this county than in the neighboring ones (see Table IB). In comparison with the remaining coastal plain counties, Carteret has the third largest area of wetlands devoted to recreation purposes.[2]

[2]Computer Printout, North Carolina Department of Natural and Economic Resources, Feb.1974. Hyde County has 25,164 acres of wetlands used for recreation, and Bladen County has 12,395 acres used for this purpose.

TABLE I-A

NUMBER OF OUTDOOR RECREATION SITES OPERATED BY THE FEDERAL AND STATE GOVERNMENT, AND BY PRIVATE CONCERNS IN THE COUNTIES NEAR MOREHEAD CITY, N.C.

| County | Number of Sites Operated by Federal Gov't. | State Gov't. | Private Concerns |
|---|---|---|---|
| Carteret | 3 | 1 | 16 |
| Craven | 3 | 4 | 10 |
| Jones | 2 | 0 | 3 |
| Onslow | 0 | 2 | 11 |
| Pamlico | 0 | 2 | 11 |
| TOTAL | 8 | 9 | 51 |
| STATE TOTAL | 129 | 139 | 1,480 |

[1]Excludes city, county, and joint-locally operated sites.

Sources: Computer print-out, North Carolina Department of Natural and Economic Resources, Raleigh, February, 1974.

TABLE I-B

LAND, WATER, AND WETLAND ACREAGE DEVOTED TO OUTDOOR RECREATION IN THE COUNTIES NEAR MOREHEAD CITY, NORTH CAROLINA

| | A C R E A G E | | | |
|---|---|---|---|---|
| County | Land | Water | Wetlands | Total |
| Carteret | 61,092.5 | 50.0 | 10,000 | 71,142.5 |
| Craven | 51,348.2 | 31.5 | 30 | 60,409.7 |
| Jones | 63,090.0 | 17.0 | 20 | 63,127.0 |
| Onslow | 51,836.2 | 205.0 | 820 | 52,870.2 |
| Pamlico | 3,371.5 | 883.5 | 515 | 4,770 |
| TOTAL | 230,738.4 | 1,187 | 11,385 | 252,319.4 |
| STATE TOTAL | 1,973,255.1 | 118,517.7 | 79,816.1 | 2,179,273.1 |

SOURCE: See Table IA.

Carteret County contains 3.3% of North Carolina's total recreation acreage. The five county area around Morehead City has 11.6% of the state's total recreation acreage (see Table 1B).

While wetlands are one class of irreplaceable natural resources, historical and cultural sites are another class. A glance at the map of North Carolina (see atlas volume) shows a concentration of historical areas in three locations along the coastline: the Albemarle Region (particularly Dare County), the Carteret-Onslow Counties area, and the Brunswick-New Hanover counties area.

The recreation potential of the coastline is unlimited. However, development of this potential is limited by poor access to much of the area and by a dearth of recreation facilities needed to support increased usage.[3] In the Morehead City area, Carteret County has the largest number of existing recreation acres in a natural state that could be developed for intense activity uses (see Table I-C). The Core Banks (Cape Lookout National Seashore) have few transportation facilities. There are no ferries or bridges, and there are no plans to add them. Despite these limited access conditions the area is expected to become one of the state's major attractions. Most of the commercial resort facilities along Carteret's Coastline are found on the Bogue Banks at Emerald Isle and Atlantic Beach. Fort Macon State Park (east of Bogue Banks) is a popular attraction.

B. Virginia

With 1,862,343 acres of public recreation land and 826,592 acres of privately-owned recreation land, Virginia offers a total of nearly 3 million acres to travelers and residents for the purpose of outdoor recreation (see Table I-D). The federal government owns 87% (1,862,343 acres) of the total public recreation lands. Most of its

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[3] First Stage Economic Development Program for the Albemarle Regional Planning and Development Commission. Staff. Edenton, N.C. Nov. 1971, p. 16.
Recreational Development Opportunities of the Intracoastal Waterway in North Carolina, South Carolina, and Georgia. Prepared for Coastal Plains Regional Commission, Nov. 1969, p. VI-1.

TABLE I-C

EXISTING OUTDOOR RECREATION ACREAGE WITH POTENTIAL FOR DEVELOPMENT IN THE COUNTIES NEAR MOREHEAD CITY, NORTH CAROLINA

| County | Potential Acreage |
|---|---|
| Carteret | 1,000.0 |
| Craven | 59.0 |
| Jones | 4.0 |
| Onslow | 143.5 |
| Pamlico | 230.0 |
| TOTAL | 1,436.5 |
| STATE TOTAL | 53,860.4 |

SOURCE: See Table 1A

TABLE I-D

SUMMARY OF PUBLIC AND PRIVATE ACREAGE
USED FOR RECREATION, BY REGION
IN THE STATE OF VIRGINIA

| Region [1] | Public Acreage | | | | | Total Private Recreation Acreage[2] | Grand Total |
|---|---|---|---|---|---|---|---|
| | Local | Regional | State | Federal | Total | | |
| 1 | 3,946 | 3,980 | 2,848 | 21,266 | 32,040 | 27,254 | 59,294 |
| 2 | 2,206 | 200 | 12,388 | 2,330 | 17,124 | 47,208 | 64,332 |
| 3 | 5,254 | 10,461 | 7,465 | 12,646 | 35,826 | 69,120 | 104,946 |
| 4 | 3,959 | 7,400 | 36,981 | 397,728 | 446,068 | 60,010 | 506,078 |
| 5 | 3,345 | 0 | 35,505 | 386,590 | 425,440 | 79,795 | 505,235 |
| 6 | 1,915 | 0 | 61,680 | 830,650 | 894,245 | 59,979 | 954,224 |
| 7N | 1,302 | 0 | 44,856 | 109,319 | 155,477 | 194,695 | 350,172 |
| 7S | 711 | 0 | 17,104 | 89,420 | 107,235 | 103,060 | 210,295 |
| 8 | 157 | 0 | 1,372 | 394 | 1,923 | 75,868 | 77,791 |
| 9 | 1,437 | 0 | 4,534 | 1,523 | 7,494 | 103,450 | 110,944 |
| 10 | 68 | 0 | 16,400 | 10,477 | 26,945 | 6,153 | 33,098 |
| Total | 24,300 | 22,041 | 241,133 | 1,862,343 | 2,149,817 | 826,592 | 2,976,409 |

[2] Figures in this column do not include all the land which is open for hunting. Figures for hunting should be considered separate, although some of this acreage is open for hunting. See Appendix: For private hunting acreage.

Source: Virginia Outdoors Plan, Volume I. Richmond: Commonwealth's Commission of Outdoor Recreation, Page 43.

holding are managed by the Forest Service. (See Table I-E and atlas volume.) These lands are primarily located in the western and central section of the state which is dominated by the Blue Ridge Mountains.

Of the total public recreation acreage, 12% is managed by the National Park Service (see Table I-F).[4] This amounts to 274,421 acres. The federal government also permits some of its military land and its water impoundments (managed by the Army Corps of Engineers ) to be used for outdoor recreation purposes. (See Tables I-G and I-H). Most of the military land is located outside of Washington, D.C. The largest of the Corps of Engineers' reservoirs are located in the south central portion of Virginia above the North Carolina border.

The Department of Interior's Bureau of Sport Fisheries and Wildlife manages 8,859 acres as refuges and for fishing in tidal waters. Seventy-two per cent of the acreage set aside as refuges is located on or near the Chesapeake Bay in the Hampton and Eastern Shore regions. In addition, the Chincoteague Refuge in the Assateague National Seashore (eastern shore region) is larger than the other refuges combined (see Table I-I).

Less than 2% of Virginia's public recreation acreage is operated as State Parks.[5] The greatest number of State Parks (10 of 17) are found in the southern portion of Virginia from the Hampton Roads region west to the state border (see Table I-J and accompanying map with overlay in Atlas.

Virginia's state forest lands cover 48,924 acres, the bulk of which lie in the north central area of the state (see Table I-K). Most of the federal and state forest lands are in the mountainous western and north central areas of the Commonwealth.

The commission of Game and Inland Fisheries manages 151,072 acres of wildlife areas and fishing waters (see Table I-L). Most of

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[4] Virginia Outdoors Plan, Volume IV. Richmond: Commonwealth of Va., Commission of Outdoor Recreation, May, 1970, p. 16.

[5] loc. cit.

TABLE I-E

LAND ACREAGE MANAGED BY
THE UNITED STATES FOREST SERVICE
IN THE STATE OF VIRGINIA

| Region | Forests in Each Region | Acreage |
|---|---|---|
| 4 | 2 | 380,876 |
| 5 | 1 | 357,396 |
| 6 | 2 | 727,096 |
| 7N | 1 | 13,935 |
| Total | 2 | 1,479,303 |

Note: There are only two national forests in Virginia.

Virginia Outdoors Plan. Vol I., Richmond Commission of Outdoor Recreation, p. 35.

TABLE I-F

ACREAGE MANAGED BY THE
NATIONAL PARK SERVICE
IN THE STATE OF VIRGINIA

| Region[1] | Number Partly or Wholly Within[2] | Acreage |
|---|---|---|
| 1 | 7 | 20,421 |
| 2 | 1 | 747 |
| 3 | 1 | 7,205 |
| 4 | 2 | 16,852 |
| 5 | 2 | 13,015 |
| 6 | 2 | 103,554 |
| 7N | 3 | 95,384 |
| 7S | 1 | 5,849 |
| 8 | 1 | 394 |
| 9 | 1 | 1,523 |
| 10 | 1 | 9,477 |
| Total Areas | 17 | 274,421 |

[1]See Appendix II A for location of regions.

Source: Virginia Outdoors Plan, Vol. I, Richmond: Commission of Outdoor Recreation, p. 34.

TABLE I-G

**MILITARY LAND**
USED FOR RECREATION
IN STATE OF VIRGINIA

| Region[1] | Number of Areas Represented | Acreage |
|---|---|---|
| 1 | 2 | 129,000 |
| 7N | 2 | 26,800 |
| 7S | 1 | 7,000 |
| 9 | 1 | 15,200 |
| Total | 3 | 178,000 |

[1]See Appendix II-A for location of region.

Source: Virginia Outdoors Plan, Vol. I., Richmond: Commission of Outdoor Recreation, p. 35.

TABLE I-H

LAND AND WATER ACREAGE MANAGED
BY THE CORPS OF ENGINEERS
IN STATE OF VIRGINIA

| Region[1] | Number of Reservoirs[2] | Acreage | |
|---|---|---|---|
| | | Water | Total Land and Water |
| 5 | 3 | 1,600 | 14,310 |
| 7N | 1 | 0 | 1,000 |
| 7S | 2 | 56,080 | 83,571 |
| Total | 5 | 56,680 | 98,881 |

[1]See Appendix II-A for location of regions.

[2]Column is non-additive; part of the John H. Kerr Reservoir is in Region 7N.

Source: Virginia Outdoors Plan, Vol. I., Richmond: Commission of Outdoor Recreation, p. 34.

TABLE I-I

ACREAGE MANAGEMENT BY THE BUREAU OF SPORT FISHERIES AND WILDLIFE, U.S. DEPARTMENT OF THE INTERIOR, IN THE STATE OF VIRGINIA

| Region[1] | Number of Refuges | Acreage |
|---|---|---|
| 1 | 1 | 845 |
| 2 | 1 | 1,583 |
| 3 | 2 | 5,431 |
| 10 | 2 | 1,000[2] |
| TOTAL | 6 | 8,859 |

[1]For location of regions see Appendix II-A.

[2]Doesn't include 9,021 acres of Chincoteague National Wildlife Refuge which is part of Assateague National Seashore.

SOURCE: Virginia Outdoor Plan, Vol. 1, Richmond: Commonwealth Commission of Outdoor Recreation, May, 1970, p.33.

TABLE I-J

RECREATIONAL ACREAGE OF THE STATE

DIVISION OF PARKS IN VIRGINIA

| Region[1] | Number and Acreage | | | | | | | | Total Acreage |
|---|---|---|---|---|---|---|---|---|---|
| | State Parks | | Recreation Areas | | Natural Areas | | Historic Areas | | |
| | No. | Ac. | No. | Ac. | No. | Ac. | No. | Ac. | |
| 1 | 1 | 1,120 | | | | | 1 | 7 | 1,120 |
| 2 | 1 | 2,004 | | | | | | | 2,004 |
| 3 | 3 | 6,273 | | | 1 | (1000)[2] | | | 6,273 |
| 4 | 1 | 620 | 1 | 250 | | | | | 870 |
| 5 | 4 | 6,624 | | | 1 | 863 | 2 | 9 | 7,496 |
| 6 | 1 | 4,493 | | | 1 | 900 | | | 5,393 |
| 7N | 1 | 130 | 2 | 290 | | | 2 | 221 | 641 |
| 7S | 3 | 7,972 | | | | | 1 | 7 | 7,979 |
| 8 | 1 | 1,355 | | | | | | | 1,355 |
| 9 | 1 | 1,682 | | | 1 | 19 | | | 1,701 |
| 10 | — | — | — | — | 2 | 2,140 | — | — | 2,140 |
| Total | 17 | 32,273 | 3 | 540 | 6 | 3,922 | 6 | 244 | 36,979 |

[1]See Appendix II-A for location of regions.

[2]Part of Seashore State Park.

SOURCES: Virginia Outdoors Plan, Vol. I, Richmond: Commonwealth of Outdoor Recreation, 1970, p. 31.

TABLE I-K

ACREAGE OF THE VIRGINIA STATE DIVISION OF FORESTRY

| Region[1] | Number of Sites | Acreage |
|---|---|---|
| 1 | 1 | 400 |
| 2 | 1 | 5,600 |
| 4 | 1 | 11,291[2] |
| 6 | 1 | 173 |
| 7N | 4 | 31,460 |
| TOTAL | 7 | 48,924 |

[1]See Appendix II-A for location of regions.

[2]Appomattox-Buckingham State Forest is partly in Region 4 and partly in Region 7N.

SOURCE: Virginia Outdoors Plan, Vol. I.

Richmond: Commonwealth's Commission of Outdoor Recreation, May 1970, p. 32.

TABLE I-L. ACREAGE OF THE COMMISSION OF GAME AND INLAND FISHERIES

(Virginia)

| Region[1] | Number | | | | Total Acreage |
|---|---|---|---|---|---|
| | Wildlife Management Areas | Public Fishing Lakes | Public Water Access Areas[2] | Pay-as-you-go Trout Streams | |
| 1 | 1 | 1 | 2 | | 685 |
| 2 | 2 | 2 | 4 | | 4,680 |
| 3 | 2 | | 11 | | 1,167 |
| 4 | 2 | | 5 | | 24,767 |
| 5 | 2 | 4 | 4 | 1 | 25,063 |
| 6 | 4 | 1 | 13 | | 55,837 |
| 7N | 4 | 5 | 10 | 1 | 12,727 |
| 7S | 3 | 4 | 10 | | 9,042 |
| 8 | | | 15 | | 15 |
| 9 | 1 | 2 | 2 | | 2,833 |
| 10 | 2 | — | 12 | — | 14,256 |
| Total | 23 | 19 | 88 | 2 | 151,072 |

[1] See Appendix II-A for location of regions.

[2] Some access areas are not owned by the Game Commission and are not included in the acreage figure.

SOURCE: Virginia Outdoors Plan, Vol. I, Richmond: Commonwealth Commission of Outdoor Recreation, May, 1970, p. 29.

this acreage is in Western Virginia although over 14,000 acres are located on the Eastern Shore.

One important fishing resource - other than the freshwater streams and the ocean - is the tidewater. Table I-M lists some tidal fishing waters which are not entirely managed or "operated" by a bureau or agency. Nearly 2-1/2 million acres of tidal waters are available for fishing; nearly two million of them are along the Chesapeake Bay. A great portion of the Bay shoreline is wetlands which are unsuited for public beaches. However, recreational fishing has potential. Gloucester County, as an example of a Bay county, has 27 public boat landings. If adequate supporting facilities were established (i.e., bait and tackle shops, restaurants, camping sites) then the recreational potential of tidal fishing could be realized. This probably characterizes other Bay counties as well, particularly those on the Eastern shore.[6]

Virginia is rich in historical events. The State contains 202 existing historical landmarks. Of these, 152 are on the National Register of Historical Places (see Table I-N). There are ten sites on the National Register which are not on the State Register. This makes the National total 162 places. All historic and cultural sites in Virginia occupy a total of 12,511 acres of recreation land.[7]

Of the total public recreation acreage in Virginia, 77% is located west of the Blue Ridge Mountains where 18% of the population lives. In the most urban regions: Richmond, Washington-Fredericksburg, and Hampton (Norfolk), 57% of the population resides, while only 4% of the public recreation acreage is located there. However, 90% of the privately owned recreation land (including hunting acreage) is found

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[6] Marcellus, K. & Wass, M. Gloucester County Coastal Zone, Gloucester Point: VIMS, 1972, p. 16-20.

[7] Va. Outdoors Plan, Vol. 1. Richmond: Commission on Outdoor Rec., May 1970, p. 47.

TABLE I-M TIDAL FISHING WATERS

**Wholly or Partially in Virginia**

| Water Body or System | Fresh Water Acres | Salt Water Acres | Total Acres |
|---|---|---|---|
| Chesapeake Bay (South of Bush River, Md.) | | 1,864,039 | 1,864,039 |
| James River System (Tidal Part Only) | 64,340 | 72,588 | 136,928 |
| Rappahannock-York System (Tidal Parts Only) | 24,443 | 149,134 | 173,577 |
| Potomac River (Tidal Part Only) | 74,073 | 167,011 | 241,084 |
| Potomac Tributaries in Va. (Tidal Parts Only) | 14,405 | 17,091 | 31,496 |
| Eastern Shore of Virginia | 77 | 130 | 207 |
| Totals | 177,338 | 2,269,993 | 2,447,331 |
| Percentages | 7% | 93% | |

Source: Va. Outdoors Plan Vol. I. Richmond: Commonwealth's Commission of Outdoor Recreation, May, 1970, p.50.

TABLE I-N NUMBER OF HISTORIC SITES IN THE STATE OF VIRGINIA BY REGION

| Region[1] | Virginia Landmarks | Also on National Register of Historic Places | National Battlefields Historic Sites |
|---|---|---|---|
| 1 | 30 | 19 | 3 |
| 2 | 46 | 38 | 2 |
| 3 | 21 | 14 | 2 |
| 4 | 7 | 5 | - |
| 5 | 9 | 7 | 1 |
| 6 | 22 | 17 | - |
| 7N | 19 | 16 | 1 |
| 7S | 4 | 4 | 1 |
| 8 | 17 | 14 | - |
| 9 | 13 | 12 | - |
| 10 | 14 | 6 | 1 |
| Total[2] | 202 | 152 | 10 |

[1]See Appendix I-A for location of Regions

Source: Va Outdoors Plan, Vol. I.
Richmond: Commonwealth of Va., Commission of Outdoor Recreation, May, 1970, p. 20-23.

[2]As of January 12, 1970.

in three urban regions.[8] Table I-O summarizes the recreational acreage in the Hampton Roads (including Norfolk) region. There are 109,233 acres, including private land, devoted to recreation. This figure amounts to 3.6% of the state's total recreation acreage, including private land.

If some of the recreation land in this region were displaced, the percentage of the state's total recreation acreage thereby affected would not be large. However, in terms of the type of recreation available there, the impact would be great.

Proposed Recreation Sites:

Several potential recreation sites are under consideration for the Hampton Region (Region 3). These sites include a state park on Cape Henry, a state park and a wildlife refuge in Virginia Beach (Back Bay), several regional parks along Suffolk City's shoreline, and a large state park on the shore of Isle of Wight County.

In the Eastern Shore Region, at the tip of Northhampton County, a large recreation area at Butler's Bluff is under consideration. Several wildlife and natural areas are also under consideration. Four large sites along the coastline of Region Eight (Tidewater) are possible locations for state and historical parks.

C. Maryland

Public ownership of recreation lands in Maryland amounts to 324,244 acres. The majority of federally owned acreage lies in the lower Eastern Shore Region, while the bulk of state-owned lands is in the Western Maryland and Frederick Region (see Table I-P). Western Maryland has 47% of all public recreation land in the state, while the Baltimore and Suburban Washington Regions have 85% of the state's population. Southern Maryland and the Eastern Shore have a good distribution of recreation and open space areas, but this recreation

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[8] Va. Outdoors Plan, Vol. IV. Commission on Outdoor Rec., May, 1970, p. 16.

Table I-O TOTAL RECREATION ACREAGE IN HAMPTON ROADS REGION OF VIRGINIA

| TYPE OF AREA/MANAGEMENT | ACREAGE |
|---|---|
| National Park Service | 7,205 |
| Wildlife Refuge (U.S.) | 5,431 |
| State Parks | 6,273 |
| Natural Area | (1,000)[1] |
| Wildlife and/or Access Area | 1,167 |
| Historical and Cultural | 937 |
| Private[2] | 88,220 |
| Total | 109,233 |

[1]Part of Seashore State Park

[2]Includes hunting lands

Source: Va. Outdoors Plan, Vol. 1. Richmond: Commission of Outdoor Recreation, May, 1970: pp. 34,33,31,29,47,35,43.

TABLE I-P PUBLIC OWNERSHIP OF OUTDOOR RECREATION & OPEN SPACE AREAS BY COUNTY AND PLANNING REGIONS, 1971, IN STATE OF MARYLAND

| Region and County | Ownership: Federal | State | Local | Total Acres | |
|---|---|---|---|---|---|
| Western Maryland & Frederick Regions | 10,339 | 135,965 | 8,791 | | 155,095 |
| Allegany | 1,188 | 42,501 | 114 | 43,803 | |
| Garrett | 0 | 78,746 | 5 | 78,751 | |
| Frederick | 5,769 | 9,468 | 8,351 | 23,588 | |
| Washington | 3,382 | 5,250 | 321 | 8,953 | |
| Suburban Washington Region | 6,421 | 7,795 | 9,797 | | 24,013 |
| Prince Georges' | 5,769 | 4,057 | 2,346 | 12,172 | |
| Montgomery | 652 | 3,738 | 7,451 | 11,841 | |
| Baltimore Region | 17,826 | 17,692 | 15,896 | | 51,414 |
| Baltimore City | 86 | 0 | 5,844 | 5,930 | |
| Baltimore County | 45 | 9,262 | 6,422 | 15,729 | |
| Anne Arundel | 1,695 | 1,163 | 1,805 | 4,663 | |
| Harford | 16,000 | 1,367 | 681 | 18,048 | |
| Howard | 0 | 4,733 | 921 | 5,654 | |
| Carroll | 0 | 1,167 | 223 | 1,390 | |
| Southern Maryland Region | 10 | 7,159 | 960 | | 8,129 |
| Calvert | 0 | 313 | 518 | 831 | |
| Charles | 10 | 6,158 | 11 | 6,179 | |
| St. Mary's | 0 | 688 | 431 | 1,119 | |
| Upper Eastern Shore Region | 3,653 | 7,948 | 630 | | 12,231 |
| Cecil | 1,369 | 4,332 | 282 | 5,983 | |
| Kent | 2,284 | 1,367 | 128 | 3,779 | |
| Caroline | 0 | 1,920 | 150 | 2,070 | |
| Talbot | 0 | 159 | 27 | 186 | |
| Queen Anne's | 0 | 170 | 43 | 213 | |
| Lower Eastern Shore Region | 23,929 | 48,989 | 444 | | 73,362 |
| Worcester | 8,400 | 14,261 | 66 | 22,727 | |
| Dorchester | 11,216 | 13,058 | 32 | 24,306 | |
| Wicomico | 0 | 3,238 | 304 | 3,542 | |
| Somerset | 4,313 | 18,432 | 42 | 22,787 | |
| Totals | 62,178 | 225,548 | 36,518 | | 324,244 acres |

Source: Md. Outdoor Rec. & Open Space Comprehensive Plan Phase II, Dept. of State Planning 1972, p. 28.

potential is limited because much of the land is used as wildlife refuges (see Atlas).[9]

Western Maryland is essentially a wilderness area for recreation and it should continue as such. An increasing number of second homes is being built in Frederick and Washington counties. However, any recreational development must take into consideration the problems posed by strip mines and mine acid drainage.[10]

The Baltimore Region has 840 miles of rivers and the Bay, but little of the shoreline is accessible because of military and private ownership. There is a recommendation in the State's recreation plan for the conversion of parts of Aberdeen Proving Ground to civilian use. With such a large urban population there is a great need for recreation areas in this region, and the Bay is an enormous resource.[11]

Suburban Washington, D.C. is the fastest growing region in Maryland. The natural stream valleys and regional parks should be protected to meet the great recreation demand concentrated here. The recreation plan recommends the opening of some federal holdings to public recreation.[12]

The shoreline counties from Baltimore and Kent to the Virginia line, contain the largest concentration of historic sites in the state. (See accompanying map and overlay in Atlas). There are 61 places in the state listed in the National Register of Historic Places, and 153 places in the Maryland Historical Trust. Eleven sites are listed as National Historic Landmarks. Close to 20 of these historic places are located in Somerset County alone.[13]

The demand for vacation cottages is expected to increase in the southern Maryland counties, particularly Calvert and St. Mary's,

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[9] Md. Outdoor Recreation and Open Space Comprehensive Plan, Phase II, Publication #175 of the Dept. of State Planning, 1972, p. 26.

[10] op.cit., p. 53.

[11] op.cit., p. 59.

[12] op.cit., p. 66.

[13] op.cit., p. 23, 24.

because they are on the Bay, yet in proximity to Washington. Calvert County has a number of historic sites although its public recreation acreage is third smallest in the state.[14]

Most of the public owned recreation land in the upper Eastern Shore counties is found in wildlife areas. State planners expect pressure for the development of vacation home sites to arise in this area. However, there are wetlands along the shore which are valuable for breeding.[15]

Ninety per cent of the public recreation land in the lower Eastern Shore is in State Forests and wildlife management areas. However, the pressure for vacation homes is increasing because Ocean City and Assateague Island are important tourist attractions. There are valuable wetlands here, yet even the development of facilities and accommodations for Assateague present a possible conflict since state planners propose that they be located on the mainland.[16]

D. Delaware

There are 74,411 acres of land and water available for recreation in the State of Delaware. (See Table I-Q). With the exclusion of the private sector, 38.4% of the recreation acreage is owned by the federal government. The Army Corps of Engineers and the Department of the Interior manage this land (see Atlas).

The largest portion (50%) of state-owned recreation land is managed by the Division of Fish and Wildlife. The majority of these holdings are located in Kent and Sussex Counties.[17]

The State Division of Parks, Recreation, and Forestry also manages a great deal of the state-owned recreation land (see Table I-Q).

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[14] op.cit., p.72.

[15] op.cit., p.78.

[16] op.cit., p.84; Report to the Governor by the Joint Executive Legislative Committee on Assateague Island. Baltimore: Dept. of State Planning, March, 1972, p. 54-56.

[17] Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, Oct., 1970, p. 36.

TABLE I-Q

SUMMARY OF PRESENT OUTDOOR RECREATION LANDS IN DELAWARE
(Land and Water Areas in Acres)
July 1, 1969*

| | Land | Water | Total |
|---|---|---|---|
| Private Sector | | | |
| New Castle County | 2,800 | N/A Separately | |
| Kent County | 3,900 | N/A Separately | |
| Sussex County | 1,300 | N/A Separately | |
| TOTAL | 8,000 | 500 | 8,500 |
| Public Sector - State | | | |
| Fish & Wildlife | 15,838 | 2,895 | 18,733 |
| Forests | 6,365 | - | 6,365 |
| Parks | 6,044 | 208 | 6,252 |
| Archives | 95 | - | 95 |
| Highway Rests | 100 | - | 100 |
| Public Education | 5,188 | - | 5,188 |
| TOTAL | 33,630 | 3,103 | 36,733 |
| Public Sector - Federal | 25,080 | 270 | 25,350 |
| Public Sector - New Castle County | 2,203 | 23 | 2,226 |
| Public Sector - Municipal | | | |
| New Castle County | 1,002 | 6 | 1,008 |
| Kent County | 144 | 168 | 312 |
| Sussex County | 282 | - | 282 |
| TOTAL | 1,428 | 174 | 1,602 |
| Total Public Sector | 62,341 | 3,570 | 65,911 |
| GRAND TOTAL | 70,341 | 4,070 | 74,411 |

* Private sector data is July 1967.

Source: Del. Comprehensive Outdoor Recreation Plan. Dover: Del. State Planning Office, Oct., 1970, p. 53.

All but one of the state parks are in Sussex and New Castle Counties. Almost 75% of the state forest acreage is located in Sussex County.[18]

The State Division of Archives and Cultural Affairs currently manages 95 acres (16 sites) of historic and prehistoric importance. Two of the sites are listed on the National Register of Historical Landmarks (see Atlas).

In addition to the private recreation acreage summarized in Table I-Q, private conservation groups own 13,000 acres which the public may use with permission. Most of this land is located in Sussex County. Over 21,000 acres are owned by paper and pulpwood companies in southwestern Sussex County. Again, this land is open for public use (for hunting) by permission.[19]

Table I-R summarizes proposed additions to Delaware's supply of state outdoor recreation lands. The largest additional acreage will be in wildlife areas (see Atlas for the location of the proposed state areas.)

The federal government plans to acquire 4,000 additional acres at Bombay Hook and Primehook to enlarge the refuges. Also, there are plans to use part of the land along the Chesapeake and Delaware Canal for recreation. (The area is managed by the Corps of Engineers).[20]

A great deal of the Bay shore in Kent County is protected for conservation purposes.[21] There are a few residential areas in this part of the coast, but the "Bayshore Communities are relatively isolated by a lack of transportation and an inhospitable environment", i.e., large marsh areas, ditches, narrow beach strips.[22]

The major utilization of the Bay off the coast of Kent County, will

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[18] op.cit., p. 32,33.

[19] op.cit., p. 52.

[20] op.cit., p. 171.

[21] Goodman, Joel M., Delaware Bay Report Series, Vol. 8: Economic and Social Aspects of Delaware's Coastal Zone. Newark: CMS, Spring, 1973, p. 122.

[22] Goodman, op.cit., p. 135.

TABLE I-R

PROPOSED STATE OUTDOOR RECREATION AREAS IN THE STATE OF DELAWARE

| Outdoor Recreation Area by Type | BOR Class. | Present Acres* | Add. Acres | Ultimate Acres |
|---|---|---|---|---|
| Wildlife Areas: | | | | |
| Augustine - Silver Run | III | 753 | 11,247 | 12,000 |
| Blackiston | III | 1,417 | 3,583 | 5,000 |
| Woodland Beach | III | 3,543 | 2,057 | 5,600 |
| Little Creek | III | 3,217 | 4,083 | 7,300 |
| Milford Neck | III | 1,371 | 6,129 | 7,500 |
| Petersburg - Willow Grove | III | 3,320 | 3,180 | 6,500 |
| Inland Bay | III | 0 | 2,000 | 2,000 |
| Assawoman Bay | III | 1,329[1] | 1,271 | 2,600 |
| Nanticoke | III | 925 | 7,075 | 8,000 |
| Sub Total | | 15,875 | 40,625 | 56,500 |
| Ponds, Lakes & Water Accesses: | | | | |
| Ponds & Lakes (Land & Water) | II | 1,047 | 3,371 | 4,418 |
| Marine Access | II | 77 | 63 | 140 |
| Stream Valleys | III | 0 | 1,900 | 1,900 |
| Sub Total | | 1,124 | 5,334 | 6,458 |
| Parks: | | | | |
| White Clay Creek | I | 127 | 503 | 630 |
| Brandywine Creek | I | 434 | 566 | 1,000 |
| Lums Pond | I | 1,075 | 675 | 1,750 |
| Fort Delaware | VI | 305 | 0 | 305 |
| Killens Pond | II | 620[2] | 500 | 1,120 |
| Cape Henlopen | I | 1,641 | 2,000 | 3,641 |
| Delaware Seashores | I | 1,890 | 710 | 2,600 |
| Trap Pond | II | 965 | 1,555 | 2,520 |
| Sub Total | | 7,057 | 6,509 | 13,566 |
| Forest Preservations: | | | | |
| Blackbird | III | 676 | 124 | 800 |
| Redden | III | 1,520 | 980 | 2,500 |
| Sub Total | | 2,196 | 1,104 | 3,300 |
| Estuary Protection - Inland Bays | III | 0 | 3,976 | 3,976 |
| Total State Facilities | | 26,252 | 57,548 | 83,800 |

* As reported by the Natural Resources agencies as of July 1, 1969

[1] 130.4a. included in Del. Seashore State Park now part of Assawoman Wildlife Area.

[2] Includes 59.0a. of water at Coursey Pond now under the Division of Fish and Wildlife.

Source: Del. Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, October, 1970, p. 143.

be sport fishing. It is possible to build a safe harbor at Bowers Beach.[23] But tourism as an industry has several factors limiting its potential (biting insects, marshes, and turbid waters), along this section of the coast.[24]

Tourism is Delaware's second largest industry, and Sussex County's coastline is the major destination for recreation and tourism is the State.[25] This area includes the state's largest resort (Rehoboth Beach), two major marina centers (Indian River and Lewes), two coastal parks (Cape Henlopen and Delaware Seashore Park), three interior bays with access, and 120 miles of interior coastline.[26] Cape Henlopen Park contains 1,614.2 acres, and Delaware Seashore Park contains 1,759.4 acres.[27]

In addition to the State recreation land in the Sussex coastal area, Bethany Beach, Lewes, and Rehoboth Beach have a total of 214.5 acres municipally controlled recreation land.[28] Rehoboth has 1.25 miles of beach frontage on the ocean. Lewes has 2.5 miles of beach frontage on the Bay. Besides the beach area near the Cape May-Lewes Ferry terminal, Lewes' other municipal parklands extend along the Lewes and Rehoboth Canal.[29]

E. New Jersey

The state and the private sector own most of the outdoor recreation land in New Jersey. The state owns 79% of the public owned recreation acreage, and 57% of all recreation land. The private sector owns 27.4% of all recreation acreage in New Jersey (See Table I-S). The federal government holds 7% of the total recreation land. The National Park Service and th Fish and Wildlife Service manage nearly all of this land. Most of the Fish and Wildlife acreage is in the South Shore region,

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[23] The Comprehensive Plan. Kent County Regional Planning Commission, 1971. P.97.

[24] Goodman, op.cit., p. 171.

[25] Daniello, John D. quoted in Morning News, Wilmington, Del., April 22, 1974, p. 13; and, Goodman, Joel M. op.cit., p. 128.

[26] Goodman, op.cit., p. 132.

[27] Delaware Comprehensive Outdoor Recreation Plan, op.cit., p. 36.

[28] Delaware Comprehensive Outdoor Recreation Plan, op.cit., p. 47.

[29] Delaware Comprehensive Outdoor Recreation Plan, loc.cit.; Goodman, op.cit., p. 136-137.

TABLE I-S

OWNERSHIP OF
EXISTING RECREATION LAND IN NEW JERSEY, 1970

(acres)

| Region | Municipal | County | State | Federal | Interstate | Private | Total |
|---|---|---|---|---|---|---|---|
| Northwest | 347 | 4 | 60,257 | 16,368 | – | 64,943 | 141,919 |
| North Central | 1,605 | 4,793 | 26,069 | 6,856 | – | 38,238 | 75,561 |
| Northeast | 5,375 | 16,358 | 1,322 | 16 | 2,430 | 11,827 | 37,328 |
| Central Corridor | 4,151 | 7,577 | 5,395 | – | – | 11,843 | 28,966 |
| North Shore | 1,310 | 2,109 | 51,271 | 733 | – | 8,418 | 63,841 |
| Southwest | 1,384 | 4,030 | 67,432 | – | – | 18,094 | 90,940 |
| South Shore | 1,110 | 1,549 | 113,333 | 20,631 | – | 19,886 | 156,509 |
| Delaware Bay | 1,905 | 165 | 48,763 | 635 | – | 5,332 | 56,800 |
| State Totals | 17,187 | 36,585 | 371,842 | 45,239 | 2,430 | 178,581 | 651,864 |

Source: Outdoor Recreation in N.J., Trenton: Dept. of Envir. Protection, 1973, p.42.

while most of the national park land is in the hilly Northwest Region (see Table I-T). More than 2/3 of the proposed federal recreation land will be administered by the National Park Service in this same region.

Of the 371,842 acres of state recreation land, 304,390 acres are in forests and fish and wildlife acres (see Table I-U). The bulk of this type of land is located in the South Shore Region of New Jersey. Although state parks are found in every region, 46% of the state park acreage is located in the Northwest Region. The atlas maps depict the location of this and other public owned recreation land. With the proposed additions to state recreation lands, the Northwest Region will have the second largest acreage of state owned recreation areas. The South Shore will continue to lead in this respect (see Table I-V). Together these regions will contain 47% of New Jersey's total recreation land.[30]

The state is planning to transfer 7,406 acres of land currently used for recreation to the federal government for development of two national recreation areas. When completed, the Delaware Water Gap National Recreation Area will enclose 70,000 acres of land in New Jersey and Pennsylvania. The heart of this area will be a reservoir formed by a dam north of Tocks Island. The reservoir will be used for power, flood control, and a water supply as well as for recreation. The Gateway NRA will encompass 25,000 acres in the center of the north New Jersey-New York urban complex. The facility will be used for water-oriented recreation.[31]

Palisades Interstate Park extends for 13 miles along the Hudson River from Fort Lee to the New York border. The area contains 2,430 acres managed by a bi-state agency.[32]

North Shore Region (Monmouth, Ocean Counties):

The North Shore Region is predominantly rural except along the

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[30] Outdoor Recreation in N. J. Trenton: Dept. of Environmental Protection, 1973, p. 43.

[31] op. cit., p. 45-46.

[32] op. cit., p. 46.

TABLE I-T

OWNERSHIP OF
EXISTING AND PROPOSED FEDERAL RECREATION LAND
IN NEW JERSEY

| Region | 1970 | | | | PROPOSED | | | |
|---|---|---|---|---|---|---|---|---|
| | National Park Service | Fish & Wildlife Service | Other Federal Agencies | Total Existing Federal Land | National Park Service | Fish & Wildlife Service | Total Proposed Federal Land | Total Future Federal Land |
| Northwest | 16,368 | 0 | 0 | 16,368 | 27,800 | 3,000 | 30,800 | 47,168 |
| North Central | 1,367 | 5,489 | 0 | 6,856 | 3 | 189 | 192 | 7,048 |
| Northeast | 16 | 0 | 0 | 16 | 0 | 0 | 0 | 16 |
| Central Corridor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Shore | 0 | 652 | 81 | 733 | 0 | 4,832 | 4,832 | 5,565 |
| Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Shore | 0 | 19,645 | 986 | 20,631 | 0 | 582 | 582 | 21,213 |
| Delaware Bay | 0 | 635 | 0 | 635 | 0 | 2,365 | 2,365 | 3,000 |
| State Totals | 17,751 | 26,421 | 1,067 | 45,239 | 27,803 | 10,968 | 38,771 | 84,010 |

Source: Outdoor Recreation in N. J., Trenton: Dept. of Envir. Protection, 1973, p.45.

TABLE I-U

## EXISTING STATE RECREATION LAND IN NEW JERSEY, 1971

| Region | Parks | Forests | Fish and Wildlife Management Areas | Natural Areas | Historic Sites | Recreation Areas | Marinas | Reservoir Sites | Misc. Areas | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Northwest | 21,502 | 21,023 | 9,831 | 446 | 1 | 6,208 | 0 | 0 | 1,246 | 60,257 |
| North Central | 7,940 | 4,150 | 5,285 | 294 | 0 | 0 | 0 | 0 | 6,400 | 24,069 |
| Northeast | 1,299 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 14 | 1,322 |
| Central Corridor | 3,025 | 0 | 135 | 52 | 15 | 0 | 0 | 754 | 1,414 | 5,395 |
| North Shore | 8,530 | 9,309 | 33,159 | 108 | 7 | 0 | 23 | 15 | 120 | 51,271 |
| Southwest | 2,794 | 60,318 | 4,310 | 0 | 10 | 0 | 0 | 0 | 0 | 67,432 |
| South Shore | 690 | 79,189 | 30,261 | 3,066 | 4 | 0 | 28 | 0 | 95 | 113,333 |
| Delaware Bay | 1,229 | 1,523 | 45,897 | 100 | 1 | 0 | 15 | 0 | 0 | 48,763 |
| State Totals | 47,009 | 175,512 | 128,878 | 4,066 | 47 | 6,208 | 64 | 769 | 9,289 | 371,842 |

[1]Of the Northwest and North Central regional totals, 480 and 6400 acres, respectively, are under conservation easements

## TABLE I-V
## PROPOSED AND FUTURE STATE RECREATION LANDS IN NEW JERSEY

| PROPOSED RECREATION LAND GREEN ACRES PROGRAMS | | | | | | |
|---|---|---|---|---|---|---|
| Region | 1961 Bond Issue | 1971[1] Bond Issue | Total Green Acres | Water Resources Fund | Total Proposed Land | Total[2] Future State Rec Land |
| Northwest | 225 | 15,229 | 15,454 | 970 | 16,424 | 70,070[*] |
| North Central | 457 | 5,045 | 5,502 | 2,050 | 7,552 | 31,621 |
| Northeast | 14 | 700 | 714 | 0 | 714 | 2,036 |
| Central Corridor | 20 | 2,388 | 2,408 | 2,346 | 4,754 | 10,149 |
| North Shore | 589 | 6,039 | 6,628 | 1,990 | 8,618 | 59,094[**] |
| Southwest | 354 | 7,789 | 8,143 | 0 | 8,143 | 75,575 |
| South Shore | 525 | 22,296 | 22,821 | 0 | 22,821 | 136,154 |
| Delaware Bay | 470 | 3,323 | 3,793 | 0 | 3,793 | 52,556 |
| State Totals | 2,654 | 62,809 | 65,463 | 7,356 | 72,819 | 437,255 |

[1]Represents estimated acreage which will be acquired under the 1971 Green Acres Bond Issue.

[2]Represents the sum of existing State recreation land and the net gain of supply achieved through the State's proposed acquisition program

[*]The expected transfer of Worthington State Forest (5,824 acres) to the National Park Service and the anticipated Corps of Engineers purchases (totaling approximately 787 acres) of the Walpack Fish and Wildlife Management Area, and a section of the Flatbrook Fish and Wildlife Management Area for the Delaware Water Gap National Recreation Area are reflected in this figure.

[**]The expected transfer to the Department of Interior of real property and rights totalling 795 acres for the Gateway National Recreation Area is reflected in this figure

Source: Outdoor Recreation in N. J., Envir. Protection, 1973, p. 47.

coast where rapid suburban development has resulted from the outward expansion of New York City.[33] The region currently contains 9.8% of all recreation land in New Jersey. The State owns most of the recreation acreage in the North Shore (see Table I-S). The most intensely used state parks (Island Beach and Sandy Hook) are located in the North Shore. Two of the state's four marinas are located in this region. Most of the state fish and wildlife management areas are found along the coast. The North and South Shore Regions and the Delaware Bay Region combined have 85% of the total fish and wildlife areas.[34]

The North Shore Region presently has 2,109 acres of county recreation land and proposed additions amount to 1,537 acres. Nearly all of this land is in Monmouth County.[35]

Municipal recreation land in the North Shore Region amounts to 1,310 acres and 2,474 acres are proposed for addition. The North and South Shore Regions provide 47% of the total municipal fishing shoreline. The majority of municipal boating berths are in these two regions (see Appendix V).[36]

In the private sector, the North Shore Region has more commercial facilities than any in the state, and the second largest number of restricted or limited memberships facilities. (See Appendix V).[37] The highest annual attendance in New Jersey, in the private sector, occurs in the recreation facilities of the North and South Shore Regions.[38]

Displacement of recreation areas in the North Shore Region would have an enormous impact in terms of the demand for recreation. The huge

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33 op.cit., p. 120.
34 op.cit., p. 47,49,50.
35 op.cit., p. 52.
36 op.cit., p. 53,54.
37 op.cit., p. 55.
38 op.cit., p. 56.

populations found in the regions north and west of the North Shore place a sizeable pressure on the recreation resources of the area. In addition, the North Shore has an attraction for residents of New York.

South Shore Region (Cape May, Atlantic, part of Burlington and Ocean Counties):

"The South Shore contains more public recreation land than any other region in the state. Most of the public recreation land under federal and state juridiction is administered for conservation and wildlife management purposes . . ."[39] The South Shore has more federal and state owned recreation acreage than any other region (see Table I-S), and it contains 24% of all recreation acreage in the state.

The South Shore has about 75% of the state's natural areas, that is, areas of recognized ecological significance or uniqueness. There is one state marina in the region (Atlantic County).[40]

Most of the county recreation land in the region is found in Cape May County. Proposed additional county lands total 80 acres in Atlantic County (see Appendix V).

As noted previously, the North and South Shore Regions provide 47% of the total municipal fishing shoreline and the majority of municipal boating berths (see Appendix V).[41] The South Shore currently has 1,110 acres of municipal recreation land, and it plans an additional 1,948 acres (see Appendix V).

Many of the private recreational facilities in the South Shore are commercial. The region has the second largest number of commercial facilities in the state and the third largest acreage in the private sector (see Appendix V). The South and North Shore Regions have the highest annual attendance at private recreation sites.[42]

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[39] op.cit., p. 128.
[40] op.cit., p. 49.
[41] op.cit., p. 53,54.
[42] op.cit., p. 55,56.

If all future recreation land is considered (including municipal, county, and private lands), the South Shore Region will contain 23.4% and the North Shore Region will have 10.4% (see Tables I-W and I-X). State owned lands will make the largest contribution.

Displacement of recreation sites in the South Shore Region would have great effects economically as well as ecologically since the area is centered around the tourist and resort industry. The ecological impact stems from the fact that the region contains (as previously noted) three-quarters of New Jersey's natural areas.

Delaware Bay:

The Delaware Bay Region has comparatively little federal recreation land (see Table I-T). However, 35.6% of the state's fish and wildlife management areas are located in this region (see Table I-U). Thirteen commercial marine facilities operate in Salem and Cumberland counties. Although there are many beaches in the area, few are used for swimming because they are narrow and have extensive mud flats.[43]

F. Pennsylvania

The State of Pennsylvania has 4,214,676 acres of land for outdoor recreation. The state owns the bulk of this land (see Table I-Y), and most of it is found in state forests. The map and overlay in the atlas shows that the vast majority of state forest acreage is in central and north central Pennsylvania.

There are no national parks in Pennsylvania. However, a National Recreation Area is in the process of acquisition at Delaware Water Gap on the Pennsylvania-New Jersey state line. Other federal reservoir areas which are under consideration for recreational development are the Raystown Reservoir (Bedford and Huntingdon Counties), Tioga-Hammond Reservoir (Tioga County), Foster Joseph Sayers Dam (Centre County), Cowanesque Reservoir (Tioga County), Belzville Dam (Carbon County),

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[43] N. J.'s Delaware Bay Shore ... An Inventory of Land Use, Interdepartmental Committee for State Planning, 1964, p.25.

TABLE I-W

PROPOSED RECREATION LAND IN NEW JERSEY (acres)

| Region | Municipal | County | State | Federal | Total |
|---|---|---|---|---|---|
| Northwest | 1,283 | 1,413 | 16,424 | 30,800 | 49,920 |
| North Central | 2,992 | 115 | 7,552 | 192 | 10,148 |
| Northeast | 696 | 1,952 | 714 | 0 | 3,362 |
| Central Corridor | 1,755 | 1,273 | 4,754 | 0 | 7,782 |
| North Shore | 2,474 | 1,537 | 8,618 | 4,832 | 16,919 |
| Southwest | 723 | 0 | 8,143 | 0 | 8,866 |
| South Shore | 838 | 80 | 22,821 | 582 | 24,321 |
| Delaware Bay | 113 | 871 | 3,793 | 2,365 | 7,142 |
| State Totals | 10,874 | 7,241 | 72,819 | 38,771 | 129,705 |

TABLE I-X

FUTURE TOTAL RECREATION LAND IN NEW JERSEY (acres)

| Region | Municipal | County | State | Federal | Interstate | Private | Total |
|---|---|---|---|---|---|---|---|
| Northwest | 1,630 | 1,417 | 70,070[1] | 47,168 | 0 | 64,943 | 185,228 |
| North Central | 4,597 | 4,908 | 31,621 | 7,048 | 0 | 38,238 | 86,412 |
| Northeast | 6,071 | 18,310 | 2,036 | 16 | 2,430 | 11,827 | 40,690 |
| Central Corridor | 5,906 | 8,850 | 10,149 | 0 | 0 | 11,843 | 36,748 |
| North Shore | 3,784 | 3,646 | 59,054[2] | 5,565 | 0 | 8,418 | 80,507 |
| Southwest | 2,107 | 4,030 | 75,575 | 0 | 0 | 18,094 | 99,806 |
| South Shore | 1,948 | 1,629 | 136,154 | 21,213 | 0 | 19,886 | 180,830 |
| Delaware Bay | 2,018 | 1,036 | 52,556 | 3,000 | 0 | 5,332 | 63,942 |
| State Totals | 28,061 | 43,826 | 437,255 | 84,010 | 2,430 | 178,581 | 774,163 |

[1]The expected transfer of Worthington State Forest (5,824 acres) to the National Park Service and the anticipated Corps of Engineers purchases (totaling approximately 787 acres) of the Walnack Fish and Wildlife Management Area and a section of the Flatbrook Fish and Wildlife Management Area for the Delaware Water Gap National Recreation Area are reflected in this figure.

[2]The expected transfer to the Department of the Interior of real property and rights totaling 795 acres for the Gateway National Recreation Area is reflected in this figure.

Source: Outdoor Recreation in N. J.
Trenton: Dept. of Environmental Protection, 1973, p. 43.

TABLE I-Y

EXISTING ACRES OF LAND FOR OUTDOOR RECREATION IN PENNSYLVANIA BY REGIONS - 1968-69

| Region | Federal Recreation Areas | Dept. of F & W. | | State Game Commission[2] | Local Public Parks | Schools | | Private | | Total[4] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Parks[1] | Forests | | | Public | Parochial | Profit | Non-Profit | |
| 1 | 22 | 4,522 | 0 | 5,399 | 21,843 | 5,353 | 916 | 11,562[3] | 25,856[3] | 74,696 |
| 2 | 848 | 6,041 | 828 | 18,653 | 7,539 | 1,508 | 163 | 6,923 | 8,401 | 50,767 |
| 3 | 0 | 12,268 | 71,622 | 68,806 | 79 | 221 | 72 | 49,733 | 54,606 | 257,407 |
| 4 | 0 | 2,677 | 193,071 | 163,126 | 1,835 | 525 | 101 | 21,017 | 7,062 | 389,145 |
| 5 | 2,746 | 29,790 | 16,314 | 86,497 | 2,357 | 882 | 201 | 12,597 | 5,610 | 156,826 |
| 6 | 3,317 | 5,026 | 135,926 | 102,700 | 5,655 | 3,508 | 45 | 25,017 | 18,646 | 299,554 |
| 7 | 0 | 1,412 | 162,142 | 43,934 | 889 | 571 | 0 | 5,183 | 4,669 | 218,795 |
| 8 | 196 | 30,391 | 574,295 | 106,243 | 1,205 | 682 | 0 | 4,729 | 2,713 | 720,449 |
| 9 | 219,103 | 3,257 | 464,264 | 115,250 | 268 | 435 | 0 | 1,800 | 28,921 | 833,282 |
| 10 | 933 | 12,678 | 106,396 | 63,893 | 355 | 338 | 0 | 9,892 | 2,205 | 196,686 |
| 11 | 1,590 | 29,621 | 155,095 | 151,335 | 4,199 | 952 | 0 | 15,234 | 10,730 | 368,691 |
| 12 | 14.916 | 28,310 | 21,087 | 57,484 | 27,622 | 3,676 | 403 | 58,194 | 20,849 | 232,330 |
| 13 | 257,630 | 26,205 | 2,247 | 97,765 | 5,751 | 1,364 | 7 | 14,154 | 11,252 | 416,048 |
| Total | 501,301 | 192,198 | 1,903,287 | 1,081,085 | 79,597 | 20,015 | 1,908 | 236,035 | 201,520 | 4,214,676 |

[1] In addition to State parks, this category includes historical parks, commissioned commercial parks, State forest monuments, natural areas and State forest picnic areas.

[2] In addition to the 1.08 million acres owned by the State Game Commission, that agency makes available for hunting and game conservation 2.5 million acres in a safety zone program and 1.8 million acres in cooperative farm game projects for a total of approximately 5.3 million acres.

[3] Private profit and non-profit areas are not available for Philadelphia in Region 1.

[4] Excludes approximately 10,000 acres of land owned by electrical power companies and available for outdoor recreation throughout the State.

Source: Statewide Comprehensive Outdoor Recreation Plan. Harrisburg: Pa. State Planning Board, June, 1971. p. 130.

Blue Marsh Dam (Berks County), Trexler Dam (Lehigh County), and Woodcock Creek Lake (Crawford County).[44] At the present time 93.5% of the federal recreation land is located in the Allegheny National Forest in north central Pennsylvania.[45]

Privately owned recreation land, both commercial and non-profit, is less than 1/9 of the total recreation acreage yet this sector provides a significant proportion of the intensely developed activities (i.e., golf) and an important part of the hunting and fishing areas. There are 173 privately owned lakes in excess of 10 acres in the state. Including private land, there are 20 million acres available for public hunting.[46]

Regardless of ownership, Pennsylvania has 3,005 miles of stream and 162,808 acres of lakes for boating. Fishing opportunities are available in 4,799 miles of stocked trout streams, 4,556 miles of warm water streams and tributaries, and 217,656 acres of lakes over ten acres.[47]

Southeastern Region (Bucks, Chester, Montgomery, Delaware, and Philadelphia counties):

The Southeastern Region is the state's most populous one. There is relatively little fish, game, or forest land in the region, but seven state parks have been developed. Six additional park sites are under development. The area is rich in history with six sites under management of the State Historical and Museum Commission. Several important county parks are located in the region.[48]

Secondary Region of Analysis:

State parks, either existing or under development, are located throughout the area (see Appendix VI). The Piedmont Region (vicinity

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[44] Statewide Comprehensive Outdoor Recreation Plan, Harrisburg: State Planning Board, June, 1971, p. 271,281.

[45] op.cit., p. XIII.

[46] op.cit., p. 184,XIV; Statewide Outdoor Recreation Plan, 1969-1985. Harrisburg: Pa. Fish Commission, p. 79.

[47] Statewide Comprehensive Outdoor Recreation Plan, op.cit.,p.139 to 141; Statewide Outdoor Recreation Plan,1969-1985,op.cit.,p.79.

[48] SCORP op.cit.,p.148.

of Harrisburg, York, and Lancaster) and the Middle Tier Region (Mifflin to Columbia Counties) are particularly abundant in historical sites.

The Pocono Region contains a sizeable amount of state forest and state game land. The private recreation sector is of major importance in this region, particularly Lake Wallenpaupack. The Delaware Water Gap National Recreation Area will be located on the southwestern boundary of the Region.[49]

The Great Valley Region (Berks, Lehigh, and Northampton Counties) has two particularly important recreation areas in addition to its state parks and fish commission lakes: Blue Mountain, now largely preserved as state gameland; and the Hopewell Village National Historic Site.[50]

The Anthracite Region (Wilkes-Barre, Hazelton, Scranton) has ten developed and undeveloped state parks. Over 86,497 acres of state game land exists here, along with four fish commission lakes, and some state forest land.[51]

The Southern Alleghenies Region (Altoona, Bedford, Johnstown) is an important recreation resource. The area is predominantly rural and largely forested. Twelve state parks, eleven of which are developed are scattered throughout the area. A large portion of Laurel Ridge has been acquired as state forest, state game, and state park land. Several historic sites and fish commission lakes are located in the region.[52]

G. West Virginia

The state has a total of 1,303,760 acres of land and water available for outdoor recreation. Of this total, 75.8% lies in Region VI, the counties included in our study area. Nearly all of the recreation land in Region VI is found in the Monogahela National Forest and the George Washington National Forest, although these forests extend into

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[49] SCORP op.cit., p. 152.
[50] SCORP op.cit., p. 150.
[51] SCORP op.cit., p. 156.
[52] SCORP op.cit., p. 168.

the adjacent counties.[53]

A large addition to these federal holdings is currently under development. The Spruce Knob-Seneca Rocks National Recreation Area was established in 1965 and encompasses 100,000 acres in Pendleton County and the adjacent county, Randolph.

Part of the acreage is currently Monogahela National Forest. The Forest Service has proposed the development of a recreation complex consisting of Spruce Knob Lake and five new lakes of 25 to 110 acres each.[54]

Table I-Z summarizes the amount of recreation land available in the study region. The state is the second largest owner of recreation acreage, and the majority of its acreage is devoted to hunting and fishing. This region contains 18% of all state-owned recreation land.[55] (See accompanying map and overlay in Atlas for locations of sites).

There are four sites in West Virginia which are in the National Register of Historic Places. Two of the sites are located in the study region: Harper's Ferry and the Chesapeake and Ohio Canal Monument in Jefferson county.[56]

Region VI has 7% of the state's private recreation land. Private land open to hunters was not included in available statistics since much of the land is scheduled for mining or timbering and cannot be depended upon for recreational usage. The state's Department of Natural Resources and the Office of Federal/State Relations estimate this land to be 1,418,000 acres.[57]

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[53] Statewide Comprehensive Outdoor Recreation Plan. Charleston: West Virginia ... Governor's Office of Federal-State Relations, no date, p. 9-11, 48.

[54] North Atlantic Regional Water Resources Study, Appendix M, Outdoor Recreation. Bureau of Outdoor Recreation, May 1972. p. M-181.

[55] SCORP op.cit., p. 9.

[56] SCORP op.cit., p.61.

[57] SCORP op.cit., p.59.

TABLE I-Z

TOTAL OUTDOOR RECREATION ACREAGE IN REGION VI, WEST VIRGINIA

| Ownership | County | Land Acreage | Water Acreage | Total Acreage |
|---|---|---|---|---|
| Federal | | | | |
| Forest Service | Grant, Hardy, & Pendleton | 917,223* | NA | 917,223 |
| National Park Service | Jefferson | 1,279 | NA | 1,279 |
| (Total Federal) | | | | (918,502) |
| State | | | | |
| State Parks | Morgan | 6,107 | 8 | 6,115 |
| | Hardy | 3,680 | 0 | 3,680 |
| Public Hunting Areas | Hampshire | 17,288 | 4 | 17,292 |
| Public Fishing Areas | Hardy | 87 | 36 | 123 |
| Hunting & Fishing Areas | Berkeley/Morgan | 22,087 | 205 | 22,292 |
| River Access | Morgan | 22 | 0 | 22 |
| (Total State) | | | | (49,524) |
| City and County | - | 319.85 | NA | 319.85 |
| Private | - | 18,210.5 | NA | 18,210.5 |
| Quasi-Public | - | 1,133.00 | NA | 1,133.00 |
| Total | | 987,436.35 | 253 | 987,689.35 |

*Part of the National Forests are in other Regions, only the total acreage figure was available.

Source: Statewide Comprehensive Outdoor Recreation Plan, Charleston: Governor's Office of Federal-State Relations, no date, pp. 60, 58, 48, 50, 51.

Conclusion

Similarities exist for the states in the study area regarding the feasibility of displacing coastal recreation sites inland. Both West Virginia and North Carolina have sufficient land resources for the relocation of recreation sites. In North Carolina, poor access has hindered intensive development of recreation facilities along the coast. For example, marinas, support facilities, and inland access roads are lacking along much of the Intracoastal Waterway in the state.

West Virginia has great expanses of land yet the problem of access has only recently been tackled. In the late 1960's, federal funds were appropriated for interstate highway development in Appalachia. Even if the obstacle of access to potential recreation sites were removed, additional problems exist. Mine acid drainage, the aftermath of strip mining, slag dumps, and related conditions are found in West Virginia as they are in areas of Pennsylvania. Pennsylvania, however, has recreation areas of varying types, which are distributed well throughout the state. In addition, Pennsylvania has acted to develop sites appropriate for intense recreation use. In contrast, West Virginia has relatively fewer recreation areas; but the state has recognized that a needed boost to its economy could come from the tourism industry.

Between Virginia and Maryland a similar situation exists in that most of their recreation acreage - and potential resources - are found in the western regions while the bulk of their populations live in the eastern sections. Any displacement of recreation sites from the coastlines of these states poses a conflict because recreation opportunities will be removed from within reasonable reach of millions of residents and out-of-state urbanites in the vicinity. To add to the conflict, water-oriented recreation is the type most in demand in this section of the country.

Both Delaware and New Jersey have an exceptionally great demand placed upon their coastal recreation sites because of the proximity of major metropolitan areas and the popularity of water sports. New

Jersey and Delaware do not have large, unused inland resources suitable for recreation use. Potential conflict exists if displacement of recreation land along the shore is considered.

## II The Demand for Recreation

It is possible to consider the displacement of a recreation site without analyzing the demand for that site. The displacement of a recreation area will have an impact in terms of numbers of unsatisfied demands for the use of that area. However, a dimension of analysis which is more important is the demand for the particular type of recreation that had been available at the displaced site. The demand for surf-casting cannot be satisfied through the establishment of a mountain park.

The factor of time is a necessary component of demand analysis. In addition to the volume of demand for a site and a type of outdoor recreation, this section of the report will present data on the amount of demand currently being satisfied and the capacity of existing facilities to meet future demand. The Bureau of Outdoor Recreation expects demand for outdoor recreation to increase not only with population increase, but also with increases in income and leisure time.

If recreation is defined as activity which refreshes the mind and body for personal, household, or employment tasks, then everyone theoretically demands recreation. For the purposes of this report, however, recreation has been limited to the outdoors, and demand will be measured by attendance figures, boat registrations, hunting and fishing license sales and surveys.

Finally, there will be a differentiation between in-state and out-of-state demand. It is important when considering displacement of an area to remember that the demand for that area does not originate solely from within that state. It is necessary to keep a regional, rather than a county or state perspective.

A. North Carolina

Nearly all of the data needed for adequate analysis of this state is not available at the present time. The comprehensive outdoor recreation plan for North Carolina is in press and will not be available for several months.

Looking at the state as a whole, four-tenths of all visitors come from the border states of Virginia, Tennessee, Maryland, and South Carolina. "Two-thirds of North Carolina's tourists originate in Virginia, Tennessee, Ohio, Florida, Georgia, New York, South Carolina, and Pennsylvania. Four out of five come from these states plus New Jersey, Alabama, Illinois, Maryland, Indiana, and Michigan."[1]

In the Coastal Region of North Carolina, 45.32% of the tourists come from Virginia. Over 63% of the coastal visitors are from Virginia, Tennessee, Ohio, Florida, Georgia, New York, and South Carolina. The New England states, the Southwestern states, and the states Northwest of the Mississippi contribute the fewest visitors to North Carolina's coast.[2]

B. Virginia

The largest increases in attendance at federal recreation sites during the past decade occurred at parks (see Table II-A). Some historic - rather than recreational - parks experienced a decline in attendance.

The attendance at Virginia's State Parks steadily increased between 1960 and 1968.[3] The average increase per year was 14% (see Table II-B). The record attendance in 1968 of 2,334,715 persons was

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[1] 1972 North Carolina Travel Survey: An Economic Analysis. Lewis & Leona Copeland. Raleigh: Dept. of Natural and Economic Resources, p. 7 ( no date).

[2] Copeland & Copeland, op.cit., p. 7,8.

[3] An updating of Virginia's outdoor recreation plan is in preparation. It will provide up-to-date demand statistics.

TABLE II-A
ATTENDANCE TRENDS AT TYPICAL FEDERAL AREAS IN VIRGINIA

| Subject | 1960 Except As Noted | 1968 | Increase | |
|---|---|---|---|---|
| | | | Total | Per Year |
| Recreation Areas | | | | |
| Blue Ridge Parkway | 2,762,263 | 4,807,207 | 74% | 9.2% |
| Shenandoah National Park | 1,780,143 | 2,273,200 | 27 | 3.4 |
| Prince William Forest Park | 169,657 | 301,700 | 77 | 9.6 |
| Kerr Reservoir | 1,794,800 | 2,737,200 | 52 | 6.5 |
| Philpott Reservoir | 707,400 | 891,500 | 26 | 3.2 |
| Total | 7,214,263[1] | 11,010,807 | 53 | 6.6 |
| Colonial N. H. P. | 6,679,000[2] | 8,162,000 | 22 | 5.2 |
| Cumberland Gap N. H. P. | 221,500[3] | 246,500 | 11 | 3.7 |
| Battlefield Parks | 1965 | 1968 | | |
| Fredericksburg | 734,000 | 1,026,000 | 40 | 13.3 |
| Manassas | 426,000 | 581,000 | 36 | 12.0 |
| Petersburg | 1,279,000 | 2,340,000 | 83 | 27.7 |
| Richmond | 383,000 | 431,000 | 12 | 4.0 |
| Total | 2,822,000 | 4,378,000 | 55 | 18.3 |
| Other Historical Parks | | | | |
| Appomattox Court House | 148,800 | 125,000 | -16 | - 5.3 |
| Booker T. Washington | 25,600 | 15,300 | -40 | -13.3 |
| Custis-Lee Mansion | 528,800 | 269,300 | -49 | -16.3 |
| George Washington's Birthplace | 81,600 | 94,000 | 15 | 5.0 |
| Total | 784,800 | 503,600 | -36 | -12.0 |

[1]This total is for 1960.
[2]1964
[3]1965

SOURCE: Virginia Outdoors Plan, Vol. II. Richmond: Commission of Outdoor Recreation, p. 31.

TABLE II-B
STATE PARK ATTENDANCE IN VIRGINIA
(Total Attendance Each Year)

| Region | Park or Recreation Area | 1940 | 1950 | 1960 | 1968 | 1969 | 1960-68 Increase Average per year | % of Total 1969 |
|---|---|---|---|---|---|---|---|---|
| 2 | Pocahontas* | -- | 76,851 | 105,900 | 212,651 | 191,089 | 12% | 9.1% |
| 3 | Seashore | 23,307 | 150,600 | (closed) | 610,960 | 579,203 | 69[1] | 27.6 |
| 5 | Claytor Lake* | -- | -- | 154,071 | 242,613 | 222,802 | 7 | 10.6 |
| | Hungry Mother | 92,741 | 194,284 | 211,990 | 276,295 | 269,602 | 4 | 12.9 |
| | Natural Tunnel* | -- | -- | -- | 25,268 | 16,686 | - | 0.8 |
| | Sub-total | 92,741 | 194,284 | 366,061 | 544,176 | 509,090 | 6 | 24.3 |
| 6 | Douthat | 31,082 | 73,286 | 96,430 | 262,138 | 117,024 | 21 | 5.6 |
| 7N | Prince Edward* | -- | 29,160 | 42,681 | 64,884 | 61,942 | 6 | 3.0 |
| | Bear Creek* | -- | 22,242 | 18,157 | 67,814 | 59,211 | 34 | 2.8 |
| | Goodwyn Lake* | -- | 25,377 | 33,024 | 69,602 | 61,735 | 14 | 3.0 |
| | Holliday Lake* | -- | 62,768 | 61,469 | 81,001 | 66,696 | 4 | 3.2 |
| | Sub-total | 0 | 139,547 | 155,331 | 283,301 | 249,584 | 10 | 12.0 |
| 7S | Fairy Stone | 49,504 | 155,105 | 173,750 | 193,030 | 188,498 | 1 | 9.0 |
| | Staunton River | 12,548 | 28,495 | 38,763 | 46,562 | 43,253 | 2 | 2.1 |
| | Occoneechee* | -- | -- | -- | 33,184 | 73,496 | - | 3.5 |
| | Sub-total | 62,052 | 183,600 | 212,513 | 272,776 | 305,247 | 3 | 14.6 |
| 8 | Westmoreland | 39,922 | 99,056 | 147,996 | 148,713 | 142,298 | 0 | 6.8 |
| | STATE TOTALS | 249,104 | 917,224 | 1,084,231 | 2,334,715 | 2,093,535 | 14% | 100.0% |

*Pocahontas opened in 1946; Claytor Lake in 1951; Prince Edward, Bear Creek, Goodwyn Lake and Holliday Lake in 1941; Natural Tunnel and Occoneechee in 1968.

[1]Five year average since full reopening in 1963.

SOURCE: Virginia Outdoors Plan, Vol. II, Richmond: Commission on Outdoor Recreation, May 1970, p. 20.

only one-quarter of the national average and one-eighth of the average in adjacent states. The low Virginia rate resulted from the limited capacity and number of parks. Nearly 100,000 persons were turned away in 1969 for a lack of camp sites. In order to reach the national average attendance, Virginia must increase its park capacity by six before 1980.[4] Figure II-A illustrates the past and projected park attendance and demand.

The rapid increase in sales of hunting and fishing licenses since 1940 reflects increasing demand for this type of recreation. Figure II-B illustrates the increase in sales. In 1969, 8.3% of the state's population were licensed hunters and 9.2% were licensed fishermen (see Table II-C).

All but three regions of the state were deficient in acreage to meet the hunting demand. In 1968 the hunting lands were only 70% of that needed to meet the demand; and, corporations were providing 43% of the land. The demand for hunting is expected to increase by 55% by 1980 and 2.6 times by 2020.[5] At the same time, the deficiency in acres is expected to increase from 1,402,600 acres in 1968 to 4,148,600 acres in 1980, and 13,998,600 acres in 2020.[6]

Sport fishing is increasing in popularity in Virginia, but at a rate which is expected to level off at 10% of the population about the year 2000. Boat registration has increased about 10% per year since 1963 and continues to increase.

Overall, Virginia's recreation demand is increasing 75% faster than the population. By the year 2000 demand will be three times the current figures. By 2020, 75% of the demand will originate in the eastern quarter of Virginia.[7]

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[4] Virginia Outdoors Plan, Vol. 1V, Richmond: Commission on Outdoor Recreation, May, 1970, p. 15.

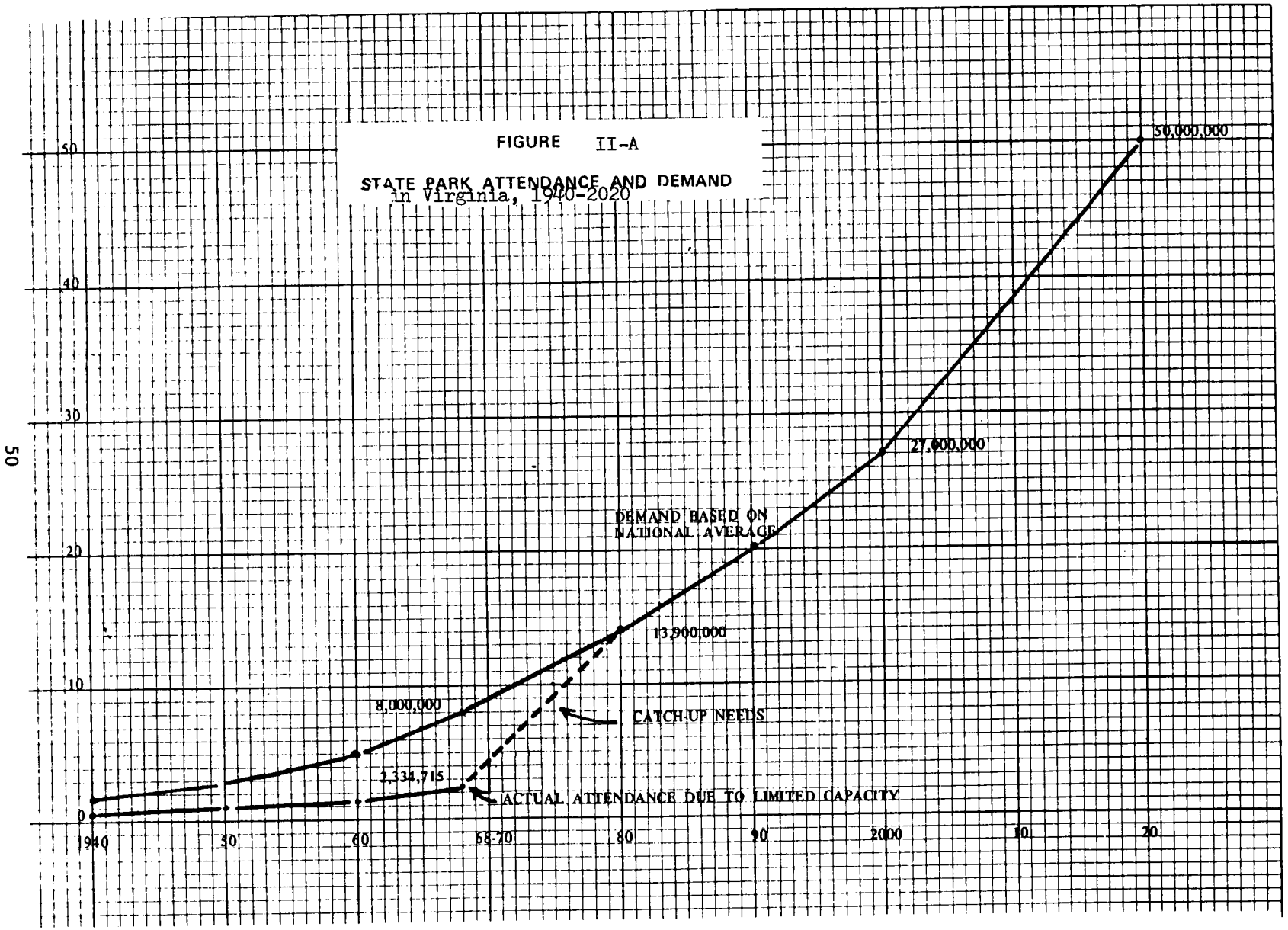
[5] op.cit., p. 15.

[6] Va. Outdoors Plan, Vol. 11, Richmond: Commission on Outdoor Recreation, May, 1970, p. 119.

[7] Va. Outdoors Plan, Vol. 1V, p. 15,16.

FIGURE II-A

STATE PARK ATTENDANCE AND DEMAND
in Virginia, 1940-2020




Source: Virginia Outdoors Plan, Volume II. Richmond, Commission on Outdoor Recreation, May, 1970.

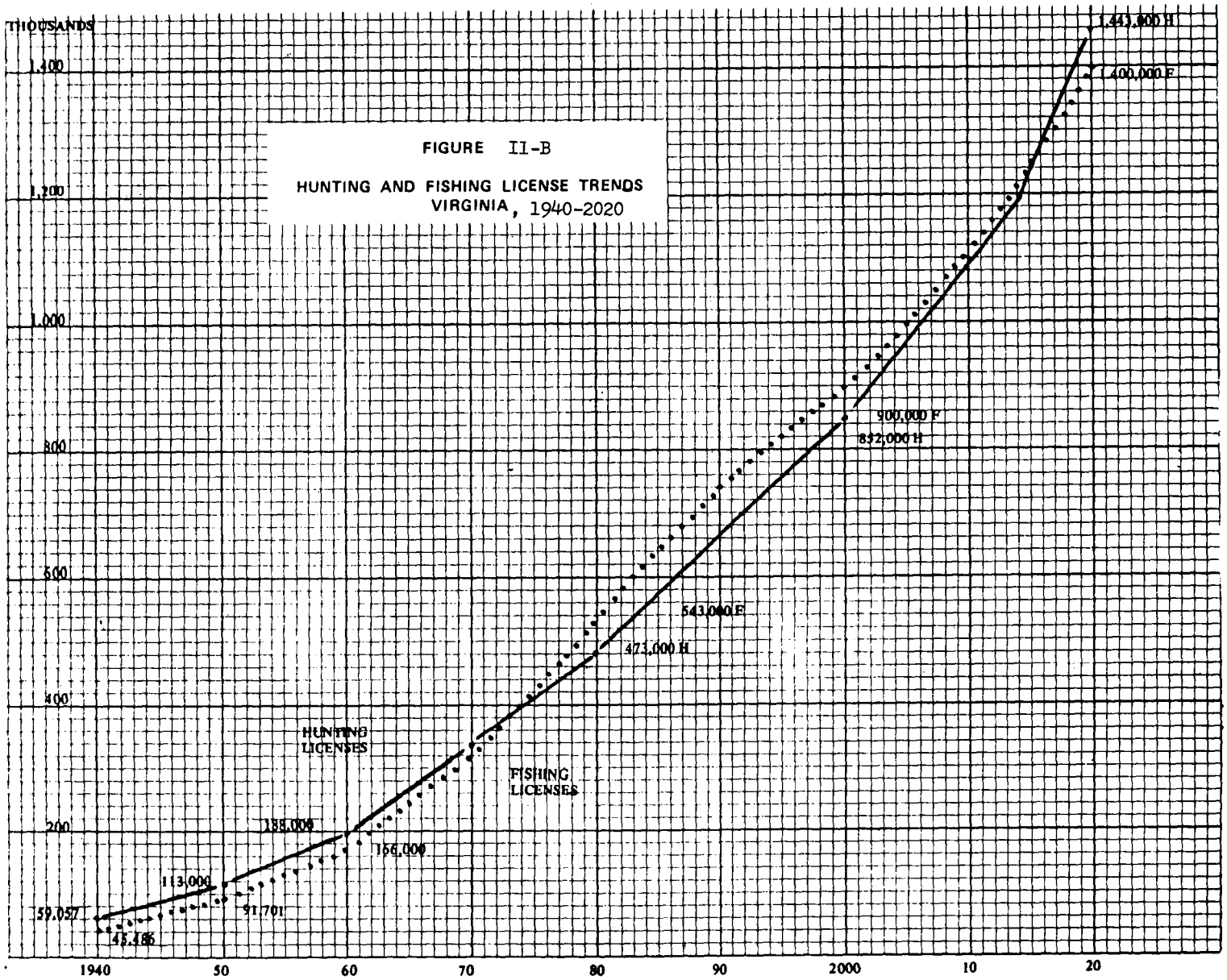



FIGURE II-B

HUNTING AND FISHING LICENSE TRENDS
VIRGINIA, 1940-2020

Source: Virginia Outdoors Plan, Volume II. Richmond, Commission on Outdoor Recreation, May, 1970.

TABLE II-C

HUNTING AND FISHING LICENSES
1940-1969

| Fiscal Year | State Population | Hunting Licenses | | Fishing Licenses | |
|---|---|---|---|---|---|
| | | Number Sold | Percent of Population | Number Sold | Percent of Population |
| 1940 | 2,678,000 | 59,067 | 2.2 | 45,486 | 1.7 |
| 1950 | 3,319,000 | 113,204 | 3.4 | 91,701 | 2.8 |
| 1960 | 3,967,000 | 188,603 | 4.8 | 166,465 | 4.2 |
| 1967 | 4,602,000 | 319,492 | 6.8 | 339,171 | 7.3 |
| 1968 | 4,693,000 | 375,548 | 8.0 | 415,297 | 8.8 |
| 1969 | 4,781,000 | 397,139 | 8.3 | 439,398 | 9.2 |

SOURCE: Virginia Outdoors Plan, Vol. II. Richmond: Commission on Outdoor Recreation, May 1970, p. 33.

In 1968, 18% of the total attendance at Virginia's state parks was from other states. Colonial Williamsburg in 1968 had more visitors from Pennsylvania, New Jersey, New York, Ohio, and Maryland than from Virginia. In the future, Maryland, Pennsylvania and Washington,D.C. should contribute much more to the demand on Virginia's resources than will the states to the west and south. The states to the west and south have smaller population centers, incomes, and growth potentials than the states to the east and north of Virginia. Also, they are not as readily accessible to Virginia, and they have comparable resources.[8]

Seashore State Park had 27% of the total attendance at all state parks in 1969. Attendance at the park increased by 69% per year between 1963 and 1968. (See Table II-B). The demand for seashore-type park facilities is doubling about once every two or three years.[9] Seashore State Park should continue to draw a heavy demand.

The Hampton Region had the largest deficiency in hunting acreage in 1968 in Virginia. By 1980 the region is expected to have the second largest deficit. The Norfolk-Hampton area had the smallest percentage of licensed fishermen in 1968.[10] Saltwater fishing has much more of a demand here because of the coastal location.

C. Maryland

The greatest demand for outdoor recreation in Maryland by the state's residents in 1970 was exerted upon the Baltimore region. The suburban Washington region felt the second largest demand and western Maryland had the third largest demand made upon it. The Upper Eastern Shore experienced the smallest demand in 1970 (see Appendix).[11]

The demand for outdoor recreation in Maryland by out-of-state visitors in 1970 was greatest in suburban Washington. Baltimore felt the second greatest demand from out-of-state tourists, western Maryland

[8] loc. cit.

[9] Va. Outdoors Plan, Vol. II, op.cit., p.10,11.

[10] Va. Outdoors Plan, Vol. IV, op.cit., p.15.

[11] Va. Outdoors Plan, Vol. 11, op.cit., p.119,121,122.

had the third largest demand, and southern Maryland experienced the lowest out-of-state demand (see Appendix).[12]

When in-state and out-of-state demands are combined for 1970, Baltimore experienced the largest demand, with suburban Washington second and western Maryland third in demand. Southern Maryland felt the smallest demand upon its recreation resources. If the upper and lower Eastern Shore regions are combined with southern Maryland, the resulting demand is nearly half of that in the Baltimore region. Much the same picture emerges from the projections for 1970, with the exception that the combined Bay demands will surpass the Baltimore demand (see Appendix III).[13]

Comparing the acreage needed to meet Maryland's recreation demands in 1970 with the supply of recreation lands in the same year, an interesting pattern emerges (see Table II-D). Although the state as a whole possessed a surplus of supply, four of the six regions had deficits. The surplus of recreation land in western Maryland was large enough to balance the land deficit in other areas. Assuming that no new acreage is obtained, by 1990 the state's overall ability to meet land requirements for recreation needs will turn into a deficit approaching the size of 1970's surplus.

A note of caution is pertinent at this point. It can be very misleading to speak of a state surplus of recreation acreage. First, most of this so-called "surplus" land is located in the mountains whereas the greatest recreation demand is for water-oriented recreation.[14] Also, the acreage devoted to wildlife management was included in the figures reported for Maryland. If this type of recreation site is excluded, then a deficit in outdoor recreation land currently exists in the state. And, it exists in every region except western Maryland.

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[12] Md. Outdoor Recreation and Open Space Comprehensive Plan, Phase II. Publication #175, State Planning Dept., 1972, p. 33.

[13] Op.cit., p. 34.

[14] Op. cit., p. 34,35.

TABLE II-D
GENERAL RECREATION LAND REQUIREMENTS & DEFICITS FOR STATE & REGIONS,
INCLUDING WILDLIFE MANAGEMENT AREAS, IN MARYLAND
(In Acres for 1970 & 1990)*

| Planning Regions | Requirements | Year 1970 Supply (1970)** | Deficit & Excess*** | Requirements | Year 1990 Supply (1970)** | Deficit & Excess*** |
|---|---|---|---|---|---|---|
| Western Maryland and Frederick Regions | 29,859 | 155,095 | +125,236 | 61,193 | 155,095 | + 93,902 |
| Suburban Washington | 64,725 | 24,013 | - 40,712 | 125,355 | 24,013 | -101,342 |
| Baltimore | 89,494 | 51,414 | - 38,080 | 174,850 | 51,414 | - 123,436 |
| Southern Maryland | 37,340 | 8,129 | - 29,211 | 76,401 | 8,129 | - 68,272 |
| Upper Eastern Shore | 36,886 | 12,231 | - 24,655 | 83,950 | 12,231 | - 71,719 |
| Lower Eastern Shore | 34,147 | 73,362 | + 39,215 | 69,577 | 73,362 | + 3,785 |
| State of Maryland | 292,451 | 324,244 | + 31,793 | 591,326 | 324,244 | -267,082 |

* Figures exclude hunting requirements and water surface area requirements because they tend to distort the total figures. Requirements and figures on hunting acreages and water surface acreage are presented for each of the regions as described within the chapter, Outdoor Recreation and Open Space Plan, starting on page 51.

** Based on Maryland Department of State Planning Recreation Inventory, conducted 1971.

*** Based on assumption that no new acres would be provided between 1970 and 1990.

SOURCE: Md. Outdoor Recreation & Open Space Comprehensive Plan, Phase II. Publication #175, State Planning Department, 1972, p. 42.

This deficit is expected to increase by six times the present figure by 1990 if no additional acreage is acquired (see Table II-E).

When Maryland residents travel to adjoining states for outdoor recreation they tend to visit sites which are within 60 to 75 miles of Maryland's urban centers. Many residents visit Delaware's seashore parks because Maryland's public shore is limited. Trap Pond State Park (Delaware) is also popular with Maryland residents.[15]

Twenty-three of Pennsylvania's 76 State Parks are within 60 miles of Maryland's state line. Baltimore residents are significant users of the six parks within 70 miles of the city.[16]

A number of visitors from Hagerstown and Garrett county use West Virginia's State Parks. The National Forests in West Virginia, as well as the public hunting areas, are used by Maryland residents.[17]

Eastern Shore:

The attendance figures at state parks in the Eastern Shore regions show that slightly less than a third were from out-of-state (see Appendix).[18] In the upper Eastern Shore Region the greatest recreation demand is from Baltimore, Philadelphia and Delaware Valley residents. An estimated 60% of the visitors to Elk Neck State Park are from out-of-state.[19]

In the lower Eastern Shore region, Assateague Island is an enormous attraction for tourists. Table II-F summarizes the number of visitors to both the State Park and the National Seashore. The Assateague State

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[15] This enormous popularity for water types of recreation-particularly swimming--is documented in nearly all state recreation plans, many county recreation plans, and in national surveys. For example, see Outdoor Recreation in N.J., op.cit., p. 37; Statewide Comprehensive Outdoor Recreation Plan, Pa. State Planning Board, June 1971,p.XII.

[16] Publication #175, op.cit., p. 35,36,37.

[17] loc. cit.

[18] loc. cit.

[19] op.cit., p. 33.

TABLE II-E

GENERAL RECREATION LAND REQUIREMENTS & DEFICITS FOR STATE & REGIONS IN MARYLAND

(In Acres for 1970 & 1990)*

| Planning Regions | Year 1970 Requirements | Year 1970 Supply (1970)** | Year 1970 Deficit & Excess*** | Year 1990 Requirements | Year 1990 Supply (1970)** | Year 1990 Deficit & Excess*** |
|---|---|---|---|---|---|---|
| Western Maryland and Frederick Regions | 29,859 | 135,825 | +105,966 | 61,193 | 135,825 | + 74,632 |
| Suburban Washington | 64,725 | 22,075 | - 42,650 | 125,355 | 22,075 | -103,280 |
| Baltimore | 89,494 | 50,805 | - 38,689 | 174,850 | 50,805 | -124,045 |
| Southern Maryland | 37,340 | 7,258 | - 30,082 | 76,401 | 7,258 | - 69,143 |
| Upper Eastern Shore | 36,886 | 9,319 | - 27,567 | 83,950 | 9,319 | - 74,631 |
| Lower Eastern Shore | 34,147 | 10,051 | - 24,096 | 69,577 | 10,051 | - 59,526 |
| State of Maryland | 292,451 | 235,333 | - 57,118 | 591,326 | 235,333 | - 355,993 |

* Figures exclude wildlife management areas, hunting requirements and water surface area requirements because they tend to distort the total figures. Requirements and figures on hunting acreages and water surface acreage are presented for each of the regions as described within the chapter, Outdoor Recreation and Open Space Plan, starting on page 51.

** Based on Maryland Department of State Planning Recreation Inventory, conducted 1971.

*** Based on assumption that no new acres would be provided between 1970 and 1990.



SOURCE: Md. Outdoor Recreation and Open Space Comprehensive Plan, Phase II. Publication #175, State Planning Department, 1972, p. 41.

TABLE II-F

ASSATEAGUE ISLAND

VISITOR-USE STATISTICS

Assateague State Park and Assateague Island National Seashore have experienced spectacular visitor-growth pattern since the beginning of operations as indicated in the following tabulations:

| | Assateague State Park | | Assateague Island National Seashore | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | | Maryland | | Virginia | |
| | Visitors | Camper Days | Visitors | Camper Days | Visitors | Camper Days | Visitors | Camper Days |
| 1966 | 173,845 | 43,125 | $ | $ | $ | $ | $ | $ |
| 1967 | 269,079 | 56,453 | 738,700 | 287,436 | 321,408 | 287,436 | 417,292 | # |
| 1968 | 582,716 | 75,833 | 1,164,694 | 348,348 | 519,819 | 348,348 | 544,875 | # |
| 1969 | 1,012,948 | 107,934 | 1,360,654 | @287,482 | 720,289 | @287,482 | 640,365 | # |
| 1970 | 1,199,290 | 118,782 | 1,648,060 | @ 99,142 | 822,819 | @ 99,142 | 825,241 | # |
| 1971* | | | 1,882,920 | @ 59,881 | 1,130,137 | @ 49,010 | 752,783 | |

$ Seashore not in operation
@ Decrease through limitation of camping capacity
# Camping accommodated by private campgrounds
* Thru October

SOURCE: Report to the Governor by the Joint Executive Legislative Committee on Assateague Island. Baltimore: Sept. of State Planning, March, 1972, p. 46.

Park draws more visitors than does the Maryland section of the National Seashore. In recent years, both the State Park and the entire National Seashore have had attendance figures topping the one million mark (see Table II-F).

D. Delaware

Table II-G lists the existing daily capacities for several outdoor recreation activities in Delaware, and the projected needed capacities for 1980 and 2000. Currently the state's largest capacities are for swimming, picnicking and fishing. The largest needed capacity in 1980 will be for picnicking. The demand for sport fishing has grown significantly since 1954. Between 1954 and 1968 the number of man-days of effort has increased from 102,500 to 453,118 days.[20] Since 94.5 % of boating is done in conjunction with fishing, boating license sales have increased in the state over the past several years. In 1962, 8,974 boats were registered in Delaware. By 1970 registration increased to 15,908 licenses.[21]

The demand for hunting in Delaware does not match the demand for fishing. In 1969, an estimated 26,800 hunters spent 308,080 man-days at the sport. The sale of waterfowl stamps and hunting licenses has increased from 30,390 in 1961-62 to 37,688 in 1969-70.[22]

Not all of the demand for recreation in Delaware comes from residents of the state. For example, 87% of ocean fishermen at Delaware's coast are non-residents. In the inland tidal bays, 50% of fisherman are not state residents.[23] Over sixteen million persons live in Washington, D.C., New York, Baltimore, and Philadelphia and,

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[20] op.cit., p.78.

[21] The Coastal Zone of Delaware: A Plan for Action, Newark:College of Marine Studies, U. of Del., July, 1972, p. 263.

[22] Coastal Zone of Delaware, op.cit., p. 256.

[23] Coastal Zone of Delaware, op.cit., p. 273, 274.

TABLE II-G

PROJECTED DAILY CAPACITY DEFICIENCIES BY ACTIVITY[1]
FOR YEARS 1980 and 2000, in Delaware

(No. of Persons)

| Activity | Present Daily Capacities[1] | 1980 | | 2000 | |
|---|---|---|---|---|---|
| | | Capacities Needed[1] | Peak Day Deficiency | Capacities Needed[1] | Peak Day Deficiency |
| Picnicking[2] | 23,139 | 149,314 | 126,175 | 208,500 | 185,361 |
| Boating | 7,900 | 16,052 | 8,152 | 22,500 | 14,600 |
| Camping | 17,067 | 20,860 | 3,793 | 29,000 | 11,933 |
| Swimming (Pond) | 18,369 | 38,331 | 19,962 | 51,660 | 33,291 |
| Swimming (Bay) | 21,592 | 72,771 | 51,179 | 101,550 | 79,958 |
| Swimming (Ocean) | 127,180 | 198,000 | 70,820 | 227,200 | 100,020 |
| Fishing | 20,171 | 37,440 | 17,269 | 52,180 | 32,009 |
| Hunting[3] | 2,313 | 6,035 | 3,722 | 7,770 | 5,457 |

Source: 1967 Recreation Inventory Conducted by Delaware State Planning Office.

[1] Capacity shown is daily capacity which is the number of users in one peak day. This should not be confused with instant capacity which is the number of users at one time during the day.

[2] Excludes many privately owned picnic areas and numerous informal areas not having picnic tables.

[3] These figures are somewhat misleading, since they do not include many privately owned farms where hunting is permitted on a restricted basis.

SOURCE: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, Oct. 1970, p. 100.

therefore, within a day's drive from Delaware. By 1980, an estimated average 13,000 non-residents per day will visit Delaware. This will contribute to Delaware's projected deficiency in meeting the demands of 301,072 users per peak season day in 1980.[24]

In the late 1950's the Corps of Engineers determined that the following populations were within easy access of the Sussex coast; the population of Delaware, and 15% of the population of Baltimore, Annapolis, Washington, D.C. and Kent, Cecil, Queen Anne's, and Caroline counties in Maryland. Peak seasonal population for beach use was estimated at 5% of this total tributary population.[25] Using data from the 1970 census the tributary population amounted to 5,622,537 persons. The peak seasonal population for beach use is 281,127 persons.

E. New Jersey

Table II-H summarizes the existing and projected demand for outdoor recreation in New Jersey. The South Shore region experienced the second largest demand in 1970. Combined, the North and South Shore regions have the greatest recreation demand in the state. Nearly 30% of the total demand was generated by out-of-state residents. The South Shore region experienced the largest interstate and interregional demand in 1970.[26] Figure II-C illustrates the area from which most out-of-state recreation demand in New Jersey originates. Table II-i lists the current and projected population for this recreational sphere of influence.

The total demand for outdoor recreation on an average weekend day in the peak season is expected to increase (over 1970 figures) by 40%

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[24] op.cit., p. 256.

[25] Delaware Comprehensive Outdoor Recreation Plan. Dover: Delaware State Planning Office, Oct. 1970, p. 15, 99; Outdoor Recreation in N. J., Dept. Environmental Protection, 1973, p.32,76

[26] Goodman, J. M., Delaware Bay Report Series, Vol. 8. Newark: College of Marine Studies, University of Delaware, 1973, p. 132.

TABLE II-H: OUTDOOR RECREATION DEMAND*
1970, 1985, and 2000
(by region)

| Region | 1970 | | 1985 | | 2000 | |
|---|---|---|---|---|---|---|
| | Home[1] | Total | Home | Total | Home | Total |
| Northwest | 80,200 | 261,900 | 119,500 | 349,800 | 181,200 | 483,400 |
| North Central | 152,700 | 424,300 | 249,000 | 593,300 | 394,300 | 846,200 |
| Northeast | 1,170,700 | 1,253,600 | 1,705,100 | 1,810,100 | 2,387,200 | 2,525,600 |
| Central Corridor | 373,500 | 434,300 | 583,700 | 660,400 | 882,400 | 983,200 |
| North Shore | 223,900 | 781,600 | 373,100 | 1,078,800 | 588,500 | 1,516,200 |
| Southwest | 296,200 | 363,200 | 475,700 | 560,100 | 728,000 | 839,600 |
| South Shore | 78,800 | 1,039,900 | 116,100 | 1,329,900 | 168,400 | 1,770,300 |
| Delaware Bay | 57,300 | 109,600 | 84,700 | 151,000 | 120,800 | 208,400 |
| State Totals | 2,433,300 | 4,668,400 | 3,706,900 | 6,533,400 | 5,450,800 | 9,172,900 |

*Demand on an average weekend day in the peak season

SOURCE: Outdoor Recreation in N. J., Trenton: Dept. Environmental Protection, 1973, p. 40.

[1]Home demand occurs within one's own region of residence; away demand involves interregional or interstate travel.

FIGURE II-C

**MEGALOPOLIS, RECREATIONAL SPHERE OF INFLUENCE, AND NEW JERSEY**

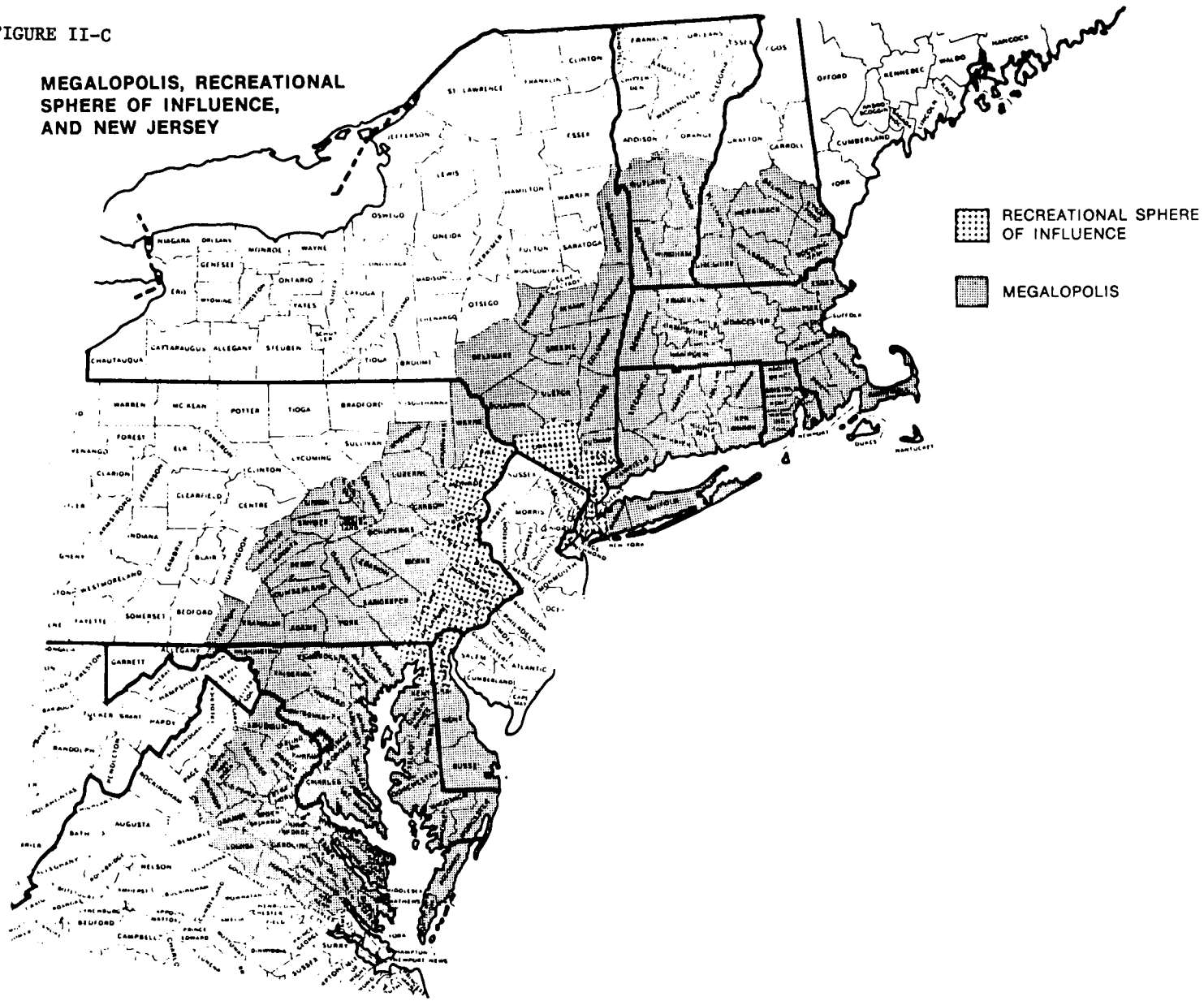

TABLE II-i

## RECREATION SPHERE OF INFLUENCE POPULATION FORECASTS BY STATE AND COUNTY

| State/County | 1970 (census) | 1985 | 2000 |
|---|---|---|---|
| Delaware | | | |
| New Castle | 385,856 | 496,154 | 615,518 |
| Maryland | | | |
| Cecil | 53,291 | 67,600 | 86,000 |
| New York | | | |
| Bronx | 1,472,216 | 1,608,150 | 1,652,985 |
| Kings | 2,601,852 | 2,649,057 | 2,583,033 |
| New York | 1,524,541 | 1,450,162 | 1,368,485 |
| Orange | 220,558 | 459,018 | 717,767 |
| Queens | 1,973,708 | 2,233,128 | 2,332,129 |
| Richmond | 295,443 | 433,967 | 602,168 |
| Rockland | 229,903 | 354,250 | 518,182 |
| Westchester | 891,409 | 1,241,815 | 1,534,334 |
| Totals | 9,209,630 | 10,429,547 | 11,309,083 |
| Pennsylvania | | | |
| Bucks | 415,056 | 635,663 | 973,518 |
| Chester | 278,311 | 399,734 | 574,098 |
| Delaware | 600,035 | 749,648 | 936,535 |
| Leheigh | 255,304 | 320,718 | 402,886 |
| Monroe | 45,422 | 60,694 | 81,099 |
| Montgomery | 623,799 | 870,200 | 1,213,929 |
| North Hampton | 214,368 | 242,830 | 275,054 |
| Philadelphia | 1,948,609 | 2,221,194 | 2,531,717 |
| Pike | 11,818 | 13,260 | 14,878 |
| Totals | 4,392,722 | 5,513,941 | 7,003,714 |
| Total RSI | 14,041,499 | 16,507,242 | 19,014,315 |

SOURCE: Outdoor Rec. in N. J. Trenton: Dept. Environmental Protection, 1973, p. 32.

in 1985 and by 96% in 2000. The North Shore region is expected to have the greatest relative increase in home demand in the coming decades since home demand is a function of population. The South Shore, however, with its great away demand, will remain the focal point of outdoor recreation in New Jersey.[27] Over one-half of the beach users in Atlantic and Cape May counties are from Pennsylvania.[28]

The prime recreation attraction in the North and South Shore regions is the beach. Table II-J summarizes beach usage in 1967. Ocean county drew the largest number of users; Cape May county had the second largest number of users.

The South Shore region currently has a deficit in boating capacity. This deficit is expected to increase five times by 1985. The North Shore is currently meeting its boating demand although it will have a deficit in capacity by 1985. Neither region has a swimming or fishing capacity deficit, nor is one projected by the State's Department of Environmental Protection.

The ability of New Jersey recreation acreage to meet demand has been described in a cursory yet important manner:

> "This demand generated by the residents of New Jersey and neighboring states in many instances has surpassed the capacity of the existing supply of outdoor recreation facilities for many activities and has resulted in the reduction of the quality of the individual experience."[29]

F. Pennsylvania

The demand for all forms of outdoor recreation in Pennsylvania is expected to increase rapidly by the end of the century. By 1985, the number of activity days spent in recreation will increase from 590

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[27] Outdoor Recreation in N. J., p. 37,39.

[28] Outdoor Recreation in N.J., op.cit., p. 41.

[29] N. J. Shore Study. Trenton: State Planning Dept., 1969.

TABLE II-J

NUMBER OF BEACH USERS IN NORTH AND SOUTH SHORE REGIONS OF NEW JERSEY, 1967

| County | # Users Prime Weekend | # Users Weekdays | # Users Prime Week[1] | # Users Total Season |
|---|---|---|---|---|
| Ocean | 174,922 | 251,930 | 853,704 | 8,537,040 |
| Cape May | 123,310 | 244,715 | 736,050 | 7,360,500 |
| Monmouth | 113,464 | 187,585 | 603,098 | 6,020,980 |
| Atlantic | 83,310 | 140,435 | 447,490 | 4,474,900 |
| TOTAL | 495,006 | 824,665 | 2,639,342 | 26,393,420 |

[1]Number of beach users during week = Number of users on weekend + number of users on weekdays x 2 ( allows for turnover) during the day).

SOURCE: N. J. Shore Study. Richard Osworth, Regional Planning. 1969, p. 17.

million to 929 million.[30] The demand generated by the Philadelphia region is expected to increase much faster than the Pittsburgh region, but only a little more rapidly than the remainder of the state.[31]

Considering the state as a whole, 8% of day visitors and 20% of overnight visitors to Pennsylvania state parks are non-residents. Total state park attendance increased by 150% between 1953 and 1968.[32]

The demand for fishing, as measured by the number of fishing licenses sold in the state, increased 46% between 1965 and 1969.[33] In the Philadelphia region the demand for fishing is expected to increase from 2,537,428 man-days usage to an expected 4,371,467 man-days in 1985. The demand for boating is expected to increase from a usage of 86,510 man-days in 1969 to an expected demand of 157,151 man-days in 1985.[34] The demand for boating by Philadelphia residents is met by the Delaware and the Schuylkill Rivers. The lower Susquehanna River basin is within two hours of the city. Many Philadelphia residents use the ocean and Bay for boating. Nineteen percent of Philadelphia's demand for boating is satisfied within one hour of the city, while 69.5% is satisfied within a two-hour drive.[35] Figure II-D illustrates the areas within a one-hour drive and within a two-hour drive where recreation demands can be satisfied in 1968 and in 1985.

A large percentage of recreation demand in Pennsylvania is being met at the present time. For example, 89% of camping demand and 73% of the picnicking demand are being met. The total water area available is adequate to meet boating and fishing demands, and the land is potentially

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[30] Statewide Comprehensive Outdoor Recreation Plan. Harrisburg: Pennsylvania State Planning Board, June, 1971, p. XII.

[31] Statewide Comprehensive Outdoor Recreation Plan., op. cit., p. 105.

[32] Statewide Comprehensive Outdoor Recreation Plan, op. cit., p. 109, 111. In 1953, 12.8 million persons visited Pennsylvania State Parks. In 1968 this total was 32 million persons.

[33] Statewide Outdoor Recreation Plan, 1969-1985. Harrisburg: Pa. Fish Commission, p. 77. The increase in number of licenses was from 512,653 in 1965 to 750,140 in 1969.

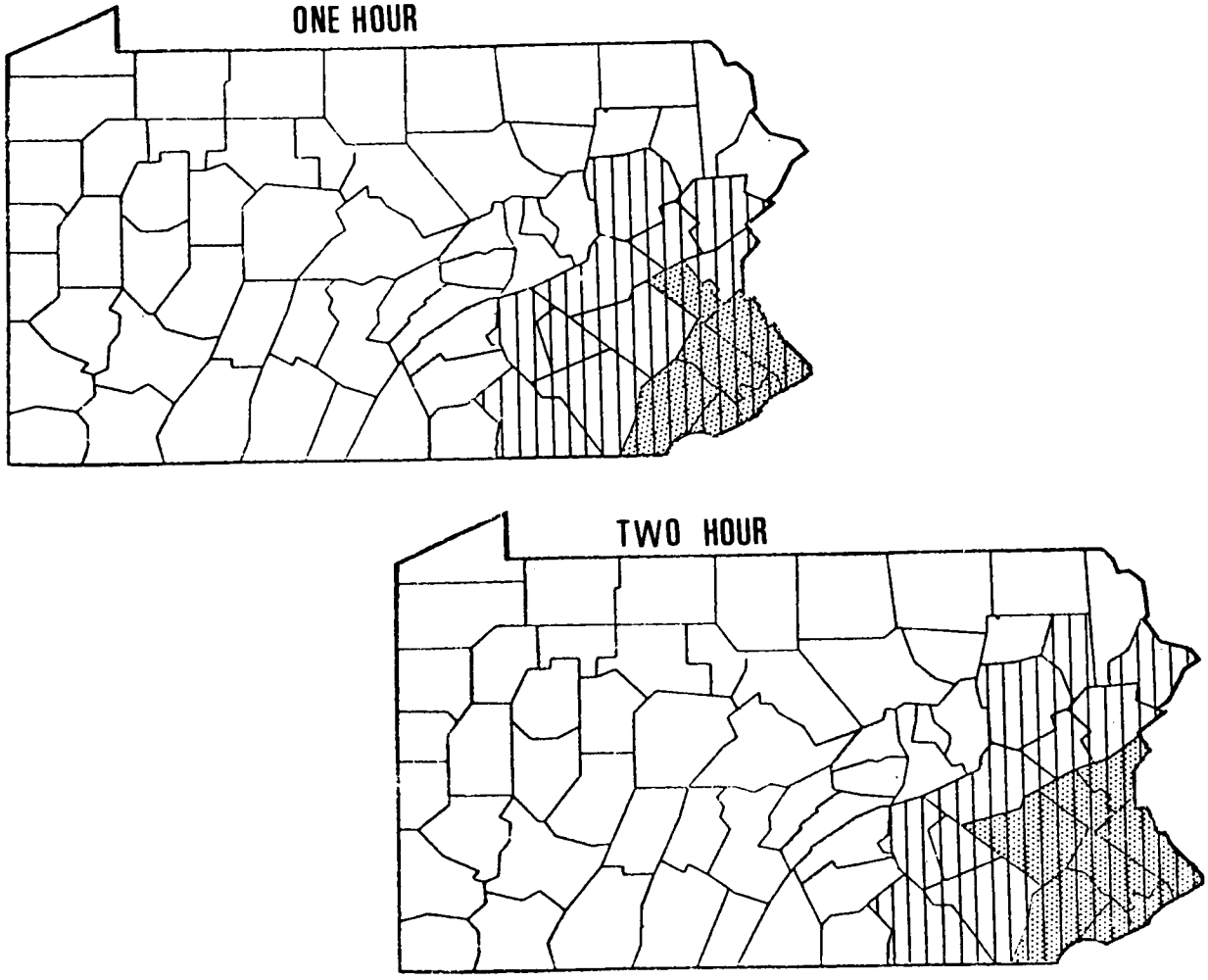
[34] Statewide Outdoor Recreation Plan, 1969-1985, op. cit., p. 80.

[35] Statewide Comprehensive Outdoor Recreation Plan, op. cit., p. 209,210.

FIGURE II-D.

ONE-AND TWO-HOUR ACCESSIBILITY ANALYSIS ZONES 1968 AND 1985

FOR SATISFACTION OF RECREATION DEMAND, PHILADELPHIA, PA.




SOURCE: Statewide Comprehensive Outdoor Recreation Plan, Pa. State Planning Board, June, 1971, p. 208.

adequate for hunting demands. However, a need exists for more facilities to meet the 1985 projected demand. The usability of the existing acreage needs to be improved. That is, access and water quality need to be improved.[36]

G. West Virginia

West Virginia is expecting a significant increase in the demand for outdoor recreation by 2000.[37] Figure II-E illustrates the level of outdoor recreation demand for 1960 and for the future. Region VI has a relatively moderate level of demand and a relatively moderate increase is projected. Evidence of an increased demand is evident at both the federal and the state levels of land ownership.

Attendence at Harper's Ferry National Historical Park (Jefferson County) has been experiencing a 10% per year increase. In 1968 over one million persons visited the park.[38]

The national forests which are in the study area have had small changes in attendence. George Washington National Forest had an increase from 128,400 visitors in 1966 to 142,300 visitors in 1968. Visitor days at Monongahela National Forest decreased from 909,500 in 1966 to 882,000 in 1968.[39] For the future, attendence at the Monongahela National Forest is expected to increase sizably by 1985. Nearly four million visitor days are projected for that year. The large increase will be due to the planned development of the Spruce Knob-Seneca Rocks National Recreation Area at the eastern end of the forest in Randolph and Pendleton counties. About two and one-half million visitor days are expected for this NRA by 1980.[40]

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[36] Statewide Comprehensive Outdoor Recreation Plan, op. cit., p. XVI.

[37] Statewide Comprehensive Outdoor Recreation Plan. Charleston, West Virginia: Governor's Office of Federal/State Relations, Outdoor Recreation Division, no date, p. 11.

[38] op. cit., p. 12.

[39] op. cit., p. 85, 86.

[40] op. cit, p. 12, 85, 86; North Atlantic Water Resources Study: Appendix M, Outdoor Recreation. Bureau of Outdoor Recreation, May 1972, p. M-181.

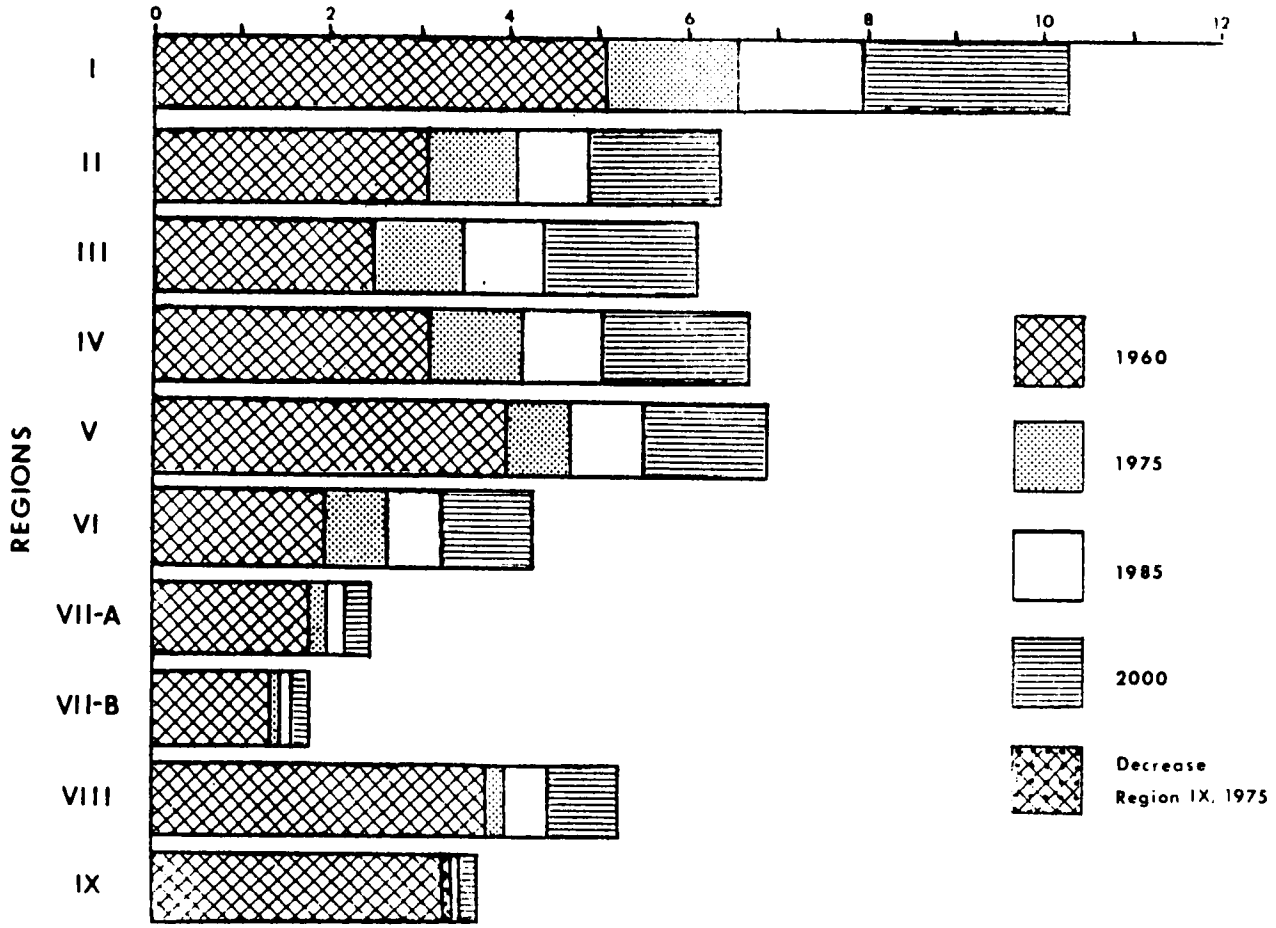
WEST VIRGINIA

RECREATION DEMAND PROJECTION

BY REGIONS

(IN MILLIONS OF RECREATION DAYS)

Figure II-E




SOURCE: Statewide Comprehensive Outdoor Recreation Plans. Charleston: Governor's Office of Federal/ State Relations, no date, p. 93.

Attendence at state parks increased by 13%, of 224,000 persons, from 1967 to 1968. Attendence nearly doubled in the decade from 1958 to 1968. This increase occurred despite a decline in West Virginia's population.[41] Out-of-state visitors comprised about 50% of the total state park attendance, while the out-of-state attendence at both state and federal sites amounted to 35% of the total. Fifty-five percent of the nation's population lives within 500 miles of West Virginia's borders. Four out of five of the nation's largest metropolitan centers are within this radius.[42]

Although attendance at one of the national forests declined recently, there has been an increase in both hunting and fishing activity in the two forests. Hunting increased by 20% between 1960 and 1968 while fishing increased by 70% in the same period. The sale of combined hunting and fishing licenses in the state rose 24% between 1960 and 1968.[43]

The lowest number of registered motorboats is found in Region VI, the study area for this report. However, registration increased 64.5% between 1967 and 1969.[44]

West Virginia possesses adequate land resources to meet its future recreation demands. However, deficiencies exist within, and adjacent to, urban centers. There is a need for local public agencies to acquire 27,261 acres of recreation land.[45]

Summary and Conclusions

At the present time, four of the states in the study area are meeting all or much of their outdoor recreation demand. The picture is not so bright for the future. Virginia's demand has been increasing 75% faster

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[41] Statewide Comprehensive Outdoor Recreation Plan. Charleston, West Virginia: Governor's Office of Federal/State Relations, no date, p. 11, 81.

[42] op. cit., p. 94, 12.

[43] op. cit., p. 83.

[44] op. cit., p. 84; This comparatively low registration is due to the lack of reservoirs and rivers with access in this region.

[45] Data were unavailable to adequately analyze North Carolina's capacities.

than the state's population. By 2020, 75% of Virginia's demand will originate from the eastern quarter of the state. In this light, Virginia's coastal recreation resources are vital.

If Maryland's fish and wildlife management areas are considered, then the state is currently meeting its recreation demand. However, many of these lands are removed from the population centers and they do not offer developed facilities for sports. Without additional recreation lands, Maryland's current deficit (which exists if wildlife lands are excluded from the tally) will increase six times by 1990.

The State of Delaware projects a deficit of 301,072 users per peak season day by 1980. Considering the popularity of water-oriented recreation and the great usage of Delaware's seashore parks, the reservation of her coastline for recreation is necessary.

New Jersey's situation is similar to Delaware's in that the shore regions are heavily used, particularly by out-of-state visitors. Both the North and the South Shore regions project boating deficiencies by 1985 although neither area expects a swimming or fishing deficit.

Pennsylvania is now meeting much of its recreation demand. By 1985, however, the state must improve access, the quality of water, and its recreational facilities to continue meeting its demand.

Currently West Virginia is meeting its recreation demand. In order to meet future demand the state must develop existing sites for activity usage, acquire sites near urban areas, and improve water quality.

## III The Economic Effects of Travel and Tourism

The effects of travel and tourism upon the economy of a state can be considerable in terms of the jobs, personal income, and revenue generated by this industry. Any decision to locate oil activity off-shore, and/or support facilities on the coast, must take this economic factor into consideration. This section of the report will provide the data to evaluate the economic impact resulting from a displacement of tourist and recreation areas in the states of the study region.

Since this report has focused upon outdoor recreation, data will be cited which gives an indication of the role outdoor recreation plays in the travel industry. Finally, a comparison will be made between the effects an increase in tourism and an increase in general industrial employment, such as manufacturing, would have on a state's economy.

For the geographic area under consideration in this report, the existing analyses are the work of Dr. and Mrs. Lewis Copeland, Department of Statistics, College of Business Administration, University of Tennessee. The states of Virginia, North Carolina, Pennsylvania, and Delaware have each commissioned their research. For each of these states, this report will draw heavily upon published summaries of their work.[1] For Maryland, New Jersey, and West Virginia census data will be cited.

### A. Delaware

Ten million out-of-state residents visited Delaware in 1971. This figure represented an increase of 600,000 visitors over the previous year.[2]

The receipts from major travel business in 1971 amounted to $277

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[1] The comparability of data across states is qualified by the fact that the statistics do not refer to the same year for each state.

[2] Copeland, Lewis and Leona Copeland. Delaware Travel Survey. Dover: Bureau of Travel Development, 1971, p. 14.

million (see Table III-A). As expected from its relative size, Delaware's receipts were much smaller than the other states cited in Table III-A. However, a better indicator of the importance of the travel industry in this state concerns retail sales. The percentage of retail sale expenditures by travelers in Delaware is higher than the percentage in North Carolina or Virginia (see Table III-B). Pennsylvania's figure (18%) combines retail trade with services, yet when compared with Delaware's combined figure (19%), Delaware is still slightly ahead.

Travelers also contribute to a state's economy through revenue collections. In 1971, a total of $33,000,000 was collected from travel-related spending. The state benefited most with ten cents of every tourist dollar being collected as some form of state taxes.[3] The sizable share of federal revenue should also be noted (see Table III-C).

Workers have a large stake in the travel industry as indicated in Table III-D. Travel-related businesses generated $95 million in personal income in 1971. The industry provided jobs for 17,780 proprietors and workers. Fifty new travel industry firms opened for business in 1971 in Delaware. This led to hiring 1,930 new employees.[4]

Finally, the effect of travel on the state's wholesalers and producers should be mentioned. The cost of goods and services purchased from other industries by the travel business created a $139 million market.[5]

B. North Carolina

Out-of-state visitors in 1972 traveled 6.5 billion passenger miles within the state. This traffic amounts to 1/5 of all trips away from home excluding commuting and shopping.[6] Sales and receipts from retail businesses serving this traveling public amounted to over $926 million

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[3] Ibid., p. 7.

[4] Ibid., p. 6.

[5] Ibid., p. 14.

[6] Copeland, Lewis and Leona Copeland. 1972 North Carolina Travel Survey: An Economic Analysis. Raleigh: State Dept. of Natural and Economic Resources, no date, p. 2. This traffic includes rail, air, and highway transportation.

TABLE III-A

SALES AND RECEIPTS

From out-of-state visitors, in-state travelers, and local trade in travel-related retail businesses in Delaware, Pennsylvania, North Carolina, and Virginia *

| State | Out of state visitors | in-state visitory | local trade | total |
|---|---|---|---|---|
| Delaware | 119,941,000 | 31,024,000 | 126,035,000 | 277,000,000 |
| Pennsylvania | 1,710,000,000 | 800,000,000 | 2,900,000,000 | 5,440,000,000 * |
| North Carolina | 598,000,000 | 328,230,000 | NA | 926,000,000 * |
| Virginia | 662,000,000 | 436,000,000 | NA | 1,098,000,000 |

Sources: See Table C.

*Excludes expenditures by local trade.

TABLE III-B

RETAIL SALES EXPENDITURES BY OUT-OF-STATE VISITORS AND BY TRAVELERS AS A PERCENTAGE OF TOTAL RECEIPTS OF ALL RETAIL BUSINESS FOR DELAWARE, NORTH CAROLINA PENNSYLVANIA AND VIRGINIA

| State | Out-of-State Visitors | All Travelers |
|---|---|---|
| Delaware | 9* | 19** |
| North Carolina | 5 | 8 |
| Pennsylvania | NA | 18* |
| Virginia | 5 | 9 |

Source: See Table C.

*Figure is for 1970. However, the 19% figure remained the same for 1970 and 1971.

**Proportion of retail trade and service receipts.

TABLE III-C

TAX REVENUE COLLECTED FROM TRAVEL-RELATED BUSINESS IN DELAWARE, NORTH CAROLINA, PENNSYLVANIA, AND VIRGINIA

| State | Federal | State | Local | Total |
|---|---|---|---|---|
| Delaware | NA** | 28,000,000 | 5,000,000 | 33,000,000 |
| North Carolina | NA | 60,800,000 | 15,000,000 | 75,870,000 |
| Pennsylvania | 218,000,000 | 579,000,000 | 83,000,000 | 880,000,000 |
| Virginia | 96,660,000 | 338,200,000 | 49,850,000 | 484,710,000 |

*Excludes revenue collections from wholesale distributors and other firms performing services for business allied with travel.

**The figure for 1970 is $5.1 million.

Sources: Copeland, Lewis and Leona; Delaware Travel Survey; Dover: Travel Development Bureau, 1971; Copeland, Lewis and Leona. 1972 North Carolina Travel Survey: An Economic Analysis Raleigh: State Department of Natural and Economic Analysis; Copeland, Lewis and Leona. The Effect of Travel on the Economy of Pennsylvania. Harrisburg, Pa., Travel Industry Advisory Council, 1972; Copeland Lewis and Leona, Virginia's Billion Dollar Year 1973: An Economic Analysis of 1973 Travel in Virginia. Richmond, Va. State Travel Service.

TABLE III-D

PERSONAL INCOME GENERATED AND THE NUMBER OF PEOPLE EMPLOYED BY TRAVEL-RELATED BUSINESSES IN DELAWARE, NORTH CAROLINA, PENNSYLVANIA AND VIRGINIA

| State | Personal Income ($) * | People employed ** |
|---|---|---|
| Delaware | 95,000,000 | 17,780 |
| North Carolina | 738,000,000 | 149,590 |
| Pennsylvania | 2,134,000,000 | 361,500 |
| Virginia | 750,000,000 | 145,220 |

Source: (See Table C)

*Includes wages, dividends, interests, and rents.
**Includes proprietors and employed workers.

(see Table III-A). Although the volume of travel sales and receipts is lower in North Carolina than in Virginia, the proportion of total retail sales is nearly equal in the two states.

Travel expenditures have been increasing in North Carolina for two decades. All travel expenditures had a 6.5% annual compound rate of growth between 1954 and 1972. Out-of-state expenditures had a 6.9% annual compound rate of growth for the same period. Nineteen-seventy-three statistics show total travel expenditures of $955 million of which $745 million are to surpass $1.1 billion in 1975 and $1.5 billion in 1980. Out-of-state travel expenditures are expected to exceed $1 billion by 1980.[7]

One-fourth of state tax revenues for 1972 were collected from travel-related firms and individuals. Twelve cents of every tourist dollar was used for state and local revenue.[8] Table III-C contains figures for state and local tax collections in 1972.

The travel business in North Carolina yielded more personal income and provided more jobs than it did in Virginia although retail sales and receipts were lower in North Carolina (see Tables III-A and III-D). Referring only to private commerce, travel-related firms produced 11% of all income and provided 15% of the jobs. In retail business alone one-fourth of the employees were dealing with travelers. Proprietors of travel-related businesses comprised 1/6 of the non-farm self-employed.[9]

Travel expenditures figures on a county basis were available for North Carolina. Table III-E lists all travel expenditures for the coastal counties. All of these counties are in the primary zone with the exception of Brunswick, New Hanover, and Pender. The total travel expenditures for all coastal counties ($80,680,000) was 8.7% of the statewide total.

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[7] Ibid., p. 12 and personal communication from Travel and Promotion Division of North Carolina's Dept. of Natural and Economic Resources; March 20, 1974.

[8] Ibid., p. 10.

[9] Ibid., p. 3.

TABLE III-E

TOTAL EXPENDITURES BY OUT-OF-STATE VISITORS AND IN-STATE TRAVELERS BY COASTAL COUNTY IN NORTH CAROLINA, 1972

| County | Total Expenditures in $1,000 |
|---|---|
| Beaufort | 5,660 |
| Bertie | 1,830 |
| Brunswick | 3,660 |
| Camden | 520 |
| Carteret | 8,050 |
| Chowan | 1,470 |
| Craven | 9,230 |
| Currituck | 880 |
| Dare | 6,320 |
| Hyde | 710 |
| Jones | 510 |
| New Hanover | 19,590 |
| Onslow | 12,720 |
| Pamlico | 730 |
| Pasquotank | 4,290 |
| Pender | 2,030 |
| Perquimans | 840 |
| Tyrrell | 270 |
| Washington | 1,370 |
| Total | 80,680 |

Source: Copeland, Lewis and Leona. 1972 North Carolina Travel Survey: An Economic Analysis Raleigh: Dept. Natural Economic Resources, pp. 5-6.

Morehead City:

Table III-F summarizes the expenditures for all travel in 1958, 1968, and 1972 for the coastal counties in the vicinity of Morehead City. Carteret County showed a 72% increase between 1958 and 1968, and a 38% increase between 1968 and 1972. The five county area experienced a 66% increase between 1958 and 1968, and a 35.6% increase between 1968 and 1972.

Out-of-state travel expenditures by county were available for 1958 and 1968. Table III-G summarizes these expenditures for the vicinity of Morehead City. Carteret and Craven Counties had the largest percentage increase in the area.

C. Pennsylvania

Many travelers regard Pennsylvania as a state through which they must pass enroute to a destination elsewhere. Half of the out-of-state visitors either pass through Pennsylvania or return home in one day.[10]

The large percentage of travel simply passing through Pennsylvania gives this state by far the greatest total of both out-of-state travel expenditures of the four states listed in Table III-A. If we exclude local trade, Pennsylvania has the largest total of travel expenditures ($2,510,000,000).

Travel-related businesses, such as hotels, eating places, gas stations, bus lines, auto repair shops, and recreational facilities, derive 46% of their sales from out-of-state visitors and in-state travelers, and 54% of their sales from local trade. These figures reveal a sizable dependency upon tourism.[11]

Still another way of looking at these travel expenditures is to consider their combined effect on payrolls, wholesalers, taxes and service suppliers. Each original travel dollar is estimated to turn over 2.36 times through payrolls, taxes, and such. The result is that the $2.51 billion originally spent by travelers accounts for a total contribution of $5.9 billion to the Pennsylvania economy.[12]

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[10]Copeland, Lewis and Leona Copeland. The Effect of Travel on the Economy of Pennsylvania. Harrisburg: Pa. Travel Industry Advisory Council, 1974, p. 3.

[11]Ibid., p. 1.

[12]Ibid., p. 5.

TABLE III-F

ALL TRAVEL EXPENDITURES, 1958,1968, AND 1972 IN COASTAL COUNTIES, NEW MOREHEAD CITY, NORTH CAROLINA IN THOUSANDS OF DOLLARS

| County | 1958 | 1968 | 1972 |
|---|---|---|---|
| Carteret | 3,386 | 5,815 | 8,050 |
| Craven | 4,244 | 7,633 | 9,230 |
| Jones | NA | NA | 510 |
| Onslow | 5,842 | 9,281 | 12,720 |
| Pamlico | 178 | 321 | 730 |
| Total | 13,850 | 23,050 | 31,240 |

Sources: A Study of the Potential Economic Impact of Proposal Development Freeways in the Coastal Plains Region, prepared for Coastal Plains Regional Commission, April 1970, p. 63; Copeland, L & L; N. C. Travel Survey: An Economic Analysis. State Department of Natural and Economic Resources, pp. 5-6.

TABLE III-G

OUT-OF-STATE TOURIST EXPENDITURES IN COASTAL COUNTIES NEAR MOREHEAD CITY, NORTH CAROLINA 1958 AND 1968

| County | Out-of-State Expenditures ($1,000) 1958 | 1968 | Percent Growth 1958 to 1968 |
|---|---|---|---|
| Carteret | 2,221 | 4,166 | 86 |
| Craven | 2,539 | 4,954 | 95 |
| Jones | NA | NA | NA |
| Onslow | 3,689 | 6,306 | 71 |
| Pamlico | 83 | 125 | 51 |
| TOTAL | 8,532 | 15,551 | 303 |

SOURCE: A Study of the Potential Economic Impact of Proposed Developmental Freeways in the Coastal Plains Region. Prepared for Coastal Plains Region Commission, April, 1970, p. 62.

The amount of revenue collected by the state from travel-related business shown in Table III-C. The travel industry contributed 11% of its sales as state taxes in 1972.[13]

Travel gave incomes amounting to over $2.1 billion dollars to Pennsylvania workers in 1972 (see Table III-D). "There are 50,400 firms employing 361,500 people engaged in travel-related businesses" in the state. In other terms, 14% of all business firms and 16% of all employees in commerce are in the travel-related business.[14]

D. Virginia

During 1973, 48 million travelers visited or passed through Virginia. Of this total, 25 million were out-of-state, traveling seven billion passenger miles. Virginians traveled 24 billion passenger miles. The sales and receipts of businesses serving these travelers amounted to over a billion dollars (see Table III-A).

These expenditures represent a 10% increase of the previous year's total of $997 million.[15]

The total travel sales figure accounted for 9% of all retail sales in Virginia (see Table III-B). Out-of-state visitors accounted for 5% of all retail sales. By this measure, Virginia's travel market is second in the importance of the four states. These sales created a market of $1 billion for producers, wholesalers, and services.[16]

The revenue collected from travel business in Virginia in 1973 is summarized in Table III-C. One-fifth of the revenue obtained from travel-related business stems from out-of-state visitors. Nearly all of the money spent by out-of-state visitors is subject to sales and lodging or gasoline tax.[17]

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[13] Ibid., p. 11.

[14] Ibid., p. 1.

[15] Copeland, Lewis and Leona Copeland. Virginia's Billion Dollar Year 1973: An Economic Analysis of 1973 Travel in Virginia. Richmond: State Travel Service, no date, p. 1.

[16] Ibid., p. 14.

[17] Ibid., p. 5.

While all retail business in Virginia grew at the rate of 6.7% annually since 1948, travel-related business growth has been 7.1% annually in the same period. The effects of this growth in 1973 on income and labor market are presented in Table III-D. Travel-related businesses paid $750 million in personal income in 1973; or, 20 cents of each sales dollar from all retail business in the Commonwealth.[18]

Travel firms comprise one of five non-farm businesses, and one-fourth of all establishments in private commerce in Virginia. The jobs provided by these firms amounted to 145,220 (see Table III-D). One of six employees in private commerce, or one of eight employees in retail business, work in travel-related jobs.[19]

Table III-H presents data for the coastal counties of Virginia concerning expenditures, sales, workers, and firms in travel-related businesses. Expenditures are those by travelers for the costs of living away from home. Sales are all those made in major travel-serving businesses.

Norfolk Area:

Table III-I presents data for expenditures, sales, and employment for the cities and counties in the vicinity of Norfolk, Virginia. The three localities with the heaviest economic dependency upon travelers and tourism in the coastal region are all in the Norfolk area. James City County has the greatest dependence of retail trade upon the travel industry (37.2%). York County ranks second (30.1%) and Virginia Beach is third (22.9%). Virginia Beach has the largest number of active firms serving the travel industry.

E. Maryland

Lacking economic research for the State of Maryland like that of the Copelands, data for all remarks have been drawn from County Business Patterns, 1972.

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[18] Ibid., p. 15.

[19] loc. cit.

TABLE III-H

EXPENDITURES BY ALL TRAVELERS, SALES TO ALL CUSTOMERS IN TRAVEL-RELATED BUSINESSES, AND THE NUMBER OF EMPLOYEES AND FIRMS SERVING VISITORS, TRAVELERS, AND LOCAL TRADE IN COASTAL COUNTIES AND INDEPENDENT CITIES IN VIRGINIA, 1973

| Counties and Independent Cities | EXPENDITURES | | TOTAL SALES | | | |
|---|---|---|---|---|---|---|
| | Amount in $1,000 | Per Cent Retail Business | Amount in $1,000 | Per Cent Retail Business | Owners and Workers | Active Firms |
| Chesapeake | 9,377 | 7.9 | 22,487 | 18.9 | 1,727 | 364 |
| Hampton | 25,629 | 8.4 | 45,359 | 14.9 | 3,196 | 619 |
| Nansemond | 798 | 6.7 | 1,809 | 13.0 | 364 | 105 |
| Newport News | 30,775 | 7.6 | 54,427 | 13.4 | 3,365 | 648 |
| Norfolk | 88,967 | 8.6 | 155,374 | 15.1 | 11,835 | 1,194 |
| Portsmouth | 23,418 | 7.4 | 41,796 | 13.2 | 2,167 | 486 |
| Virginia Beach | 63,300 | 13.4 | 108,070 | 22.9 | 4,644 | 1,221 |
| Accomack | 4,594 | 7.8 | 9,368 | 15.8 | 713 | 305 |
| Gloucester | 1,719 | 7.0 | 3,655 | 14.9 | 199 | 61 |
| Isle of Wight | 1,994 | 6.5 | 4,463 | 14.5 | 257 | 85 |
| James City | 645 | 15.0 | 1,598 | 37.2 | 380 | 72 |
| King George | 830 | 7.0 | 2,124 | 17.8 | 190 | 49 |
| Lancaster | 2,721 | 9.7 | 5,285 | 18.9 | 243 | 74 |
| Mathews | 1,109 | 6.7 | 2,722 | 16.4 | 120 | 40 |
| Middlesex | 1,044 | 8.5 | 2,080 | 16.9 | 177 | 58 |
| Northampton | 2,693 | 7.5 | 5,134 | 14.2 | 344 | 103 |
| Northumberland | 973 | 7.8 | 2,112 | 17.0 | 139 | 53 |
| Richmond (County) | 1,618 | 8.3 | 2,981 | 15.4 | 133 | 36 |
| Surry | 287 | 5.3 | 500 | 9.3 | 86 | 203 |
| Westmoreland | 1,928 | 8.7 | 3,553 | 16.1 | 431 | 120 |
| York | 3,020 | 12.4 | 7,350 | 30.1 | 530 | 100 |
| Total | 267,439 | | 482,247 | | 31,240 | 5,816 |

SOURCE: Copeland, L. et al., Virginia's Billion Dollar Year, 1973. An Economic Analysis of 1973 Travel in Virginia, p. 7-11. Richmond: Virginia State Travel Service.

TABLE III-I

EXPENDITURES BY ALL TRAVELERS, SALES TO ALL CUSTOMERS IN TRAVEL-RELATED BUSINESSES AND THE NUMBER OF EMPLOYEES AND FIRMS SERVING VISITORS, TRAVELERS, AND LOCAL TRADE IN THE INDEPENDENT CITIES AND COUNTIES IN THE VICINITY OF NORFOLK, VIRGINIA 1973

| | EXPENDITURES | | TOTAL SALES | | | |
|---|---|---|---|---|---|---|
| City/County | Amount in $1,000 | Percent Retail Business | Amount in $1,000 | Percent Retail Business | Owners and Operators | Active Firms |
| Chesapeake | 9,377 | 7.9 | 22,487 | 18.9 | 1,727 | 364 |
| Gloucester | 1,719 | 7.0 | 3,655 | 14.9 | 199 | 61 |
| Hampton | 25,629 | 8.4 | 45,359 | 14.9 | 3,196 | 619 |
| Isle of Wight | 1,994 | 6.5 | 4,463 | 14.5 | 257 | 85 |
| James City | 645 | 15.0 | 1,598 | 37.2 | 380 | 72 |
| Mathews | 1,109 | 6.7 | 2,722 | 16.4 | 120 | 40 |
| Nansemond | 798 | 6.7 | 1,809 | 13.0 | 364 | 105 |
| Newport News | 30,775 | 7.6 | 54,427 | 13.4 | 3,365 | 648 |
| Northampton | 2,693 | 7.5 | 5,134 | 14.2 | 344 | 103 |
| Surry | 287 | 5.3 | 500 | 9.3 | 86 | 23 |
| Virginia Beach | 63,300 | 13.4 | 108,070 | 22.9 | 4,644 | 1,221 |
| York | 3,020 | 12.4 | 7,350 | 30.1 | 530 | 100 |
| Totals | 141,348 | 12.9 | 257,574 | 12.2 | 15,212 | 3,441 |
| State Totals | 1,098,000 | 8.5 | 2,116,000 | 16.4 | 133,220 | 23,270 |

Source: Copeland, L., op.cit., p. 7-11.

Eight Standard Industrial Classifications were selected as representing the bulk of industrial categories serving travelers. These industry groups are:

| S.I.C. | Businesses |
|---|---|
| 70 | Hotels, lodging places |
| 72 | Personal Services |
| 75 | Auto repair, services, garages |
| 76 | Miscellaneous repair |
| 78 | Motion pictures and Allied services |
| 79 | Amusement and Recreation |
| 58 | Eating and drinking places |
| 5997 | Novelty, souvenir and gift shops |

Transportation and utilities were excluded from the data. Table III-J summarizes the total number of employees, the payroll, and the number of active firms for this group of travel-related businesses for the coastal counties of Maryland. Note that the number of employees and payroll were tabulated during the off-season, and thus do not reflect the volume of business during the peak season. However, using March as a base period does give an indication of full-time, non-seasonal employment in the travel industry.

An inspection of Table III-J shows that Baltimore and Baltimore City have the largest proportion of employees, payroll, and firms for the selected industries. This can be expected because of the intense urbanization which would create a demand for many of these industry groups on the part of local trade. Similarly, Anne Arundel is urban. If Baltimore County, Baltimore City, and Anne Arundel county are excluded from analysis then the remaining areas have 10,225 employees, $7,514,000 payroll, and 2,304 units of business. These figures are 13.1%, 11.8% and 33.5% of the original ones.

The lowest percentages of employees in travel-related industries exist in Calvert, Caroline, Dorchester, Kent and Somerset Counties. These are (with the exception of Calvert) Eastern Shore counties. Worcester and Wicomico counties fare better, though they are also on the Eastern Shore, because of the proximity of Ocean City, Maryland, a popular tourist spot. St. Mary's and Charles Counties are in a slightly more favorable position

TABLE III-J

NUMBER OF EMPLOYEES, AMOUNT OF PAYROLL AND NUMBER OF ESTABLISHMENTS IN TRAVEL-RELATED BUSINESSES IN THE COASTAL COUNTIES OF MARYLAND, 1972[1]

| County | Number of Employees (Mid-March) | Percent of State Total | Taxable Payroll | Percent of State Total | Units | Percent of State Total |
|---|---|---|---|---|---|---|
| Anne Arundel | 7,568 | 7.2 | 6,800 | 6.6 | 619 | 6.6 |
| Baltimore | 16,332 | 15.6 | 16,062 | 15.6 | 1,259 | 13.4 |
| Baltimore City | 44,134 | 42.0 | 33,140 | 32.0 | 2,696 | 29.0 |
| Calvert | 212 | 0.2 | 130 | 0.1 | 31 | 0.3 |
| Caroline | 229 | 0.2 | 166 | 0.2 | 45 | 0.5 |
| Cecil | 834 | 0.8 | 606 | 0.6 | 1,223 | 13.0 |
| Charles | 1,342 | 1.2 | 954 | 1.0 | 133 | 1.4 |
| Dorchester | 400 | 0.4 | 249 | 0.2 | 63 | 0.7 |
| Harford | 2,175 | 2.0 | 1,541 | 1.5 | 229 | 2.4 |
| Kent | 302 | 0.3 | 211 | 0.2 | 39 | 0.4 |
| Queen Anne's[2] | 182 | - | 87 | - | 19 | - |
| Somerset[3] | 172 | 0.2 | 146 | 0.1 | 33 | 0.4 |
| St. Mary's | 974 | 1.0 | 689 | 0.7 | 107 | 1.1 |
| Talbot | 738 | 0.7 | 547 | 0.5 | 76 | 0.8 |
| Wicomico | 1,587 | 1.5 | 1,412 | 1.4 | 163 | 1.7 |
| Worcester | 1,078 | 1.0 | 776 | 0.8 | 143 | 2.0 |
| Totals | 78,259 | 74.4 | 63,516 | 61.6 | 6,878 | 73.3 |

[1]Includes eating and drinking places; personal services; gift, novelty and souvenir shops; hotels and lodging places; auto repair, services, and garages, miscellaneous repair services; motion pictures; and, amusement and recreation services.

[2]Only eating and drinking establishments were reported.

[3]Only eating and drinking establishments and personal services were reported.

SOURCE: County Business Patterns, 1972, U. S. Bureau of Census.

regarding their share of the travel business because of their closeness to Washington, D. C.

For data by travel-related industries for 1970, 1971, and 1972 see Appendix III. This data is for coastal counties only.

F. New Jersey

Tourism has been one of New Jersey's major industries for decades. The center of this industry flourishes along the Jersey coast. The shore region has been a resort area since the early 1800's.[20]

Some indication of the economic importance of travel and tourism to the coastal counties of the state is shown in Table III-K. Atlantic and Monmouth Counties receive more of the state's travel business than do the other shore counties.

Monmouth County is both a resort area and a horse-breeding area.[21] It is the most developed shore county in terms of population and industry. Most of its growth has been due to an influx of suburbia from New York City; continued expansion of suburban development is expected.[22]

Atlantic County greatly relies on tourism as an economic base. Between 1960 and 1969 the county experienced a 79% increase in retail sales due primarily to tourists and conventions.[23]

The bay shore counties rank low in comparison with the north shore counties' share of travel business. The Delaware Bay shore currently has little to offer as a resort area. Its beaches are narrow and have extensive mud flats. The area lacks supporting facilities for boating and fishing (e.g., bait shops).[24] The greater volume of travel business in Cumberland County than in Salem County is probably due to its proximity to Cape May.

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[20] New Jersey Shore Study, Richard Osworth, Regional Planning Office, 1969.

[21] "Enjoy N. J." N. J. Division of Economic Development, no date.

[22] Osworth, op. cit.

[23] "Enjoy N. J." op. cit.

[24] N. J.'s Del. Bay Shore: An Inventory of Land Use. Trenton: Interdepartmental Committee for State Planning, 1964.

TABLE III-K Percentage of State's Total Number of Employees, Taxable Payroll, and Number of Firms in Travel-Related Industries for the Coastal Counties of New Jersey, 1972[1]

| County | (Mid-March Payroll) Employees | (Jan.-March, $1,000) Taxable Payrolls | Total Reporting Units |
|---|---|---|---|
| Atlantic | 5.6 | 4.7 | 4.1 |
| Cape May | 0.9 | 0.6 | 1.2 |
| Cumberland | 1.3 | 1.3 | 1.6 |
| Monmouth | 6.6 | 5.9 | 6.7 |
| Ocean | 2.8 | 2.3 | 3.1 |
| Salem[2] | 0.6 | 0.4 | 0.8 |

[1]Includes eating and drinking places; gift, novelty and souvenir shops; hotels and lodging places; personal services; auto repair, services, and garages; miscellaneous repair services; motion pictures; and amusement and recreation services.

[2]Exclusive of the Wilmington SMSA.

SOURCE: County Business Patterns, 1972, U. S. Bureau of the Census.

Cape May's small share of the tourist business could be due to several factors. First, it has one of the smallest year-round resident populations in the state, and the figures in Table III-K are based on local trade in addition to tourist trade. Also, much of the county's population is composed of retired persons. One effect of this age variable is evident in that no motion picture establishments were counted in the 1972 County Business Patterns. Finally, the seasonal nature of the statistics in Table III-K must be kept in mind. Retail and wholesale employment in the county nearly doubled, in 1969, during the peak season.[25]

Monmouth and Cape May - North and South Shore:

Monmouth County is still an important resort area although it is beginning to attract other industries. New York City and Philadelphia residents still use Monmouth and Ocean counties as resorts, yet Monmouth County is becoming suburbanized. Cape May and Atlantic Counties are rural and resort-oriented by comparison.[26]

Economic differences have begun to develop between the north and the south shore counties. The northern counties, particularly Monmouth, have an increasing median family income and comparatively lower unemployment. The southern counties have great seasonal variations in employment. Total retail sales and services had been increasing for both areas, but more slowly in the south shore.[27]

G. West Virginia

An inspection of Table III-L reveals that travel and tourism are not economic mainstays of the area of West Virginia included in this report. However, it is possible that the seasonal nature of the statistics in Table III-L minimizes the economic role of recreation in this area of the state. The inventory maps (see Atlas) locate parts of two National Forests (the Monongahela and the George Washington) in Grant, Hardy and Pendleton

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[25] "Enjoy N. J." op. cit.

[26] Interdepartmental Committee for State Planning, op. cit.

[27] loc. cit.

TABLE III-L

PERCENTAGE OF STATE'S TOTAL NUMBER OF EMPLOYEES TAXABLE PAYROLL AND NUMBER OF FIRMS IN TRAVEL-RELATED INDUSTRIES FOR THE COUNTIES OF NORTH-EASTERN WEST VIRGINIA, 1972

| County | (Mid-March) Employees | (Jan.-March $1,000) Taxable Payroll | Total Reporting Units |
|---|---|---|---|
| Berkeley | 1.4 | 1.4 | 1.8 |
| Grant | 0[2] | 0[2] | 0[2] |
| Hampshire | 0[2] | 0[2] | 0[2] |
| Hardy | 0.2[3] | 0.1[3] | 0.3[3] |
| Jefferson | 3.0 | 2.8 | 1.5 |
| Mineral | 0.5 | 0.4 | 0.8 |
| Morgan | 0.2[3] | 0.1[3] | 0.2[3] |
| Pendleton | 0[2] | 0[2] | 0[2] |

[1]Includes eating and drinking places; personal services; hotels and lodging places; auto repairs, services and garages; and amusement and recreation services.

[2]No figures reported for travel-related industries.

[3]Refers only to eating and drinking places.

SOURCE: County Business Patterns, 1972, U. S. Bureau of Census.

Counties. In addition, Hardy County has a public fishing area (Wardens Lake) and a state park (Lost River). Hampshire County has over 17,000 acres of public hunting lands. However, the commercial return on such a recreation facility is not great.[28]

Morgan and Hardy Counties have a state park and a public fishing area, respectively, which may stimulate travel-related business in the peak season. Berkeley's hot springs attraction to tourists is evident in Table III-L. The location of Harper's Ferry in Jefferson County has been beneficial to the travel industry.

For the future, the planned development of Spruce Knob-Seneca Rocks as a National Recreation Area should stimulate travel-related business in Pendleton County.

Purposes of Travel

Throughout this section no mention was made of why people travel. No distinction was made (in the statistics) between business trips and vacation trips. Since the focus of this report is upon recreation--particularly outdoor--it would be helpful to account for the proportion of travel for pleasure.

According to the National Travel Survey in 1971, 16.2% of all domestic travel in the United States was for business and convention trips. Personal and family affairs claimed 1.9% of all travel. The major part of all travel in the continental United States --81.8% -- was for pleasure trips. Within this pleasure category the two most popular purposes were visiting friends and relatives, and outdoor recreation (42.2% and 17.2% of all travel, respectively).[29]

Therefore, in analyzing the effects of travel upon the economy of a state, keep in mind that pleasure trips are the mainstay of the travel industry.

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[28] Statewide Comprehensive Outdoor Recreation Plan, Governor's Office of Federal/State Relations, Outdoor Recreation Division, Charleston, no date, p. 50-51.

[29] Copeland, L. and L. Copeland. North Carolina, op. cit., p. 11.

## Comparative Benefits of Tourism as an Industry

One very important economic effect of the travel industry was bypassed in the preceding analyses. A high percentage of unskilled and semi-skilled workers is employed in travel firms. Therefore, when travel and tourism decline not only are taxes and incomes lost, but an increase in public welfare costs results. Conversely, when an increase in travel is promoted, little public money has to be spent since private investment finances most travel development.[30]

When travel increases, in comparison with an increase in general industrial employment, a proportionate increase in facilities for education and other public services is not required. This benefit and several others are summarized in Table III-M. Table III-M compares increased tourism with the creation of new manufacturing jobs within a state. The travel industry appears to offer a higher rate of growth although the assumptions behind the data were not specified.

## Conclusions

Although data was not available for Sussex county, Delaware, the demand statistics indicate that Delaware's shore is the state's prime tourist attraction. Statewide, tourism is Delaware's second largest industry.[31]

Recreation and tourism is the number one industry in Carteret County, North Carolina. County planners foresee the same role for future years providing that the water is not polluted.[32]

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[30] Copeland, L. and L. Copeland. Pennsylvania, op. cit., p. 9.

[31] John Daniello, Secretary of Community Affairs and Economic Development. Wilmington: Morning News, April 2, 1974, p. 13.

[32] Land Development Plan: Carteret County, N. C. County Planning Commission, April, 1967, p. 65.

TABLE III-M.

COMPARATIVE EFFECTS OF TRAVEL AND MANUFACTURING ON THE ECONOMY OF A STATE

| 100 New Manufacturing Jobs* | vs. | 100 Tourists per Day |
|---|---|---|
| Increase in population of 360 | | Increase in population of 459 |
| 100 new households | | 140 new households |
| 91 more school children | | $78,000 in tax receipts or enough to support 156 school children |
| $410,000 increase in personal income | | $777,000 increase in personal income |
| $229,000 increase in bank deposits | | $144,000 increase in bank deposits |
| $331,000 in retail sales | | $1,120,000 in retail sales |
| 3 more retail outlets | | Support of 7 retail establishments |
| 65 industry-related jobs | | 111 new industry-related jobs |

*Manufacturing data from U. S. Chamber of Commerce; tourism data from the Ohio Development Department.

SOURCE: Copeland, Lewis and Leona Copeland. The Effect of Travel on the Economy of Pennsylvania. Harrisburg: Pennsylvania Travel Industry Advisory Council, 1974, p. 10.

## IV Socioeconomic and Demographic Aspects of Second Home Communities

The introduction of a group of industrial workers and their families into a seasonal resort community as permanent residents will effect a change in the profile of that community. This section of the report will provide some socioeconomic data pertaining to the occupants of vacation homes. The data should help to assess the changes which would occur should offshore oil activity cause an influx of personnel as new residents of a coastal community.

The available data on characteristics of second home owners is quite limited. Use will be made of a detailed and comprehensive study of seasonal residents of some Delaware shore communities. It will be assumed that this analysis would apply to similar communities in the remaining three conflict areas. Census data will be cited for these areas.

### The Second Home Phenomenon

Several factors have generated a pressure to build second homes. These factors include:

1. More people are earning more money.
2. Apartment renters want their own place and outdoor space.
3. Some people buy a home for later retirement use.
4. More people have more paid vacations and longer weekends.
5. There has been a heavy merchandizing of second homes.
6. Recreation areas are more accessible now for weekend trips from urban regions.

There are no available statistics to measure the growth of seasonal homes sales. In the early part of the 1960's the National Association of Home Builders estimated that 75,000 to 100,000 units were being built each year.[1] At the present time, the short supply of loan money has severely hurt the growth of this industry. However, the high level of demand still exists and it has created a large market for vacation home rentals, particularly in the coastal areas.[2]

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[1] Bureau of Outdoor Recreation. Outdoor Recreation Commission Study Report #21, Volume II: Outdoor Recreation and Megalopolis. 1962, p. 71.

[2] Cole, Gerald. Personal communication. Department of Agriculture and Food Economics, University of Delaware, Newark, Delaware, April 22, 1974.

The high cost of buying waterfront property (especially oceanfront) has created a boom for the sale and/or rental of mobile homes on leased or rental lots. An estimated 75% of all the new seasonal housing units in the coastal zone of Sussex County, Delaware, is in mobile homes.[3] Therefore, it is difficult to obtain an accurate count of the existing number of vacation homes because the Census only enumerates mobile homes, tents, and trailers if they are occupied.

Table IV-A summarizes current census data for the occupancy of housing units in the conflict areas of the study region. Among the shore resort towns of New Jersey, Ocean City has the smallest number of year-round housing units in comparison with all housing units (42%). In Cape May, 78% of all housing units are year-round, and, in Atlantic City the proportion rises to 94%. Most of the housing in Monmouth County is of the year-round type. As noted previously in this report, Monmouth County is beginning to serve as a suburb of New York City.

Over 80% of the housing units in Lewes, Delaware, are year-round units. Year-round units comprise only 21% of the housing units in Rehoboth Beach.

Nearly all of the housing units in Norfolk City (99.9%) are year-round units. This characteristics is expected considering the urban nature of Norfolk.

Nearly all of the housing units in Morehead City, North Carolina, are year-round dwellings. Seasonal homes in this vicinity are located primarily in Atlantic Beach, Emerald Isle, on the Bogue Banks, the Bogue Sound Coast, and on the northern section of the Neuse River.[4]

Analysis of Selected Resort Communities in Sussex County, Delaware

Two ocean and two bay shore communities were studied in the summer of 1971 by means of a questionnaire and data from tax records. During this

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[3] Loc. cit.

[4] U.S. Department of Commerce. 1970 Census of Housing Advance Report HC(VI)-9 Delaware. Nov. 1970, p. 2. Enumeration occurred April through July, 1970. Note that figures for vacant seasonal and migrant housing are somewhat inflated in regard to housing that is used solely as vacation dwelling.

TABLE IV-A

HOUSING OCCUPANCY CHARACTERISTICS FOR SELECTED COASTAL AREAS IN NEW JERSEY, DELAWARE, VIRGINIA AND NORTH CAROLINA

| | Housing Units | All year-round Housing units | Vacant--Seasonal or Migrant Units | Units Held for Occasional Use |
|---|---|---|---|---|
| New Jersey | 2,388,011 | 2,302,609 | 85,402 | 21,490 |
| Atlantic City | 24,055 | 22,737 | 1,318 | 520 |
| Cape May County | 53,152 | 27,804 | 25,348 | NA |
| Ocean City | 13,176 | 5,624 | 7,552 | 830 |
| Monmouth County | 149,920 | 142,499 | 7,421 | 136 |
| Long Branch | 11,963 | 11,561 | 402 | NA |
| Delaware | 180,212 | 174,990 | 5,222 | 2,016 |
| Lewes | 1,260 | 1,045 | 215 | NA |
| Rehoboth Beach | 2,571 | 556* | NA | NA |
| Sussex County | 34,287 | 29,307 | 5,192 | NA |
| Virginia | 1,492,954 | 1,484,151 | 8,803 | 19,032 |
| Norfolk | 91,050 | 90,989 | 61 | NA |
| North Carolina | | | | |
| Carteret County | 12,720 | 11,275 | 1,445 | NA |
| Morehead City | 1,973 | 1,889 | 84 | NA |

SOURCE: U. S. Department of Commerce. Housing Characteristics for States Cities, and Counties, Vol. 1 of the 1970 Census of Housing, Parts 9, 32, 35, and 48.

*owner-occupied.

period 26.2% of the homes in these areas were unoccupied. However, 68.2% of the distribued questionnaires were usable in compiling the data for the study.[5]

Descriptions of Communities Studied

Fenwick Island is an oceanfront community comprised mainly of permanent single family dwellings. The permanent population of 58 swells to 3,000 in season. Thirty per cent of the residents own rental property (see Appendix IV). Over 68% of those who rent housing units here would like to buy housing. More than 23% of the seasonal occupants had lived on Fenwick Island over 20 years. None of the permanent residents lived there for more than 20 years (see Appendix IV).[6]

The other oceanfront community which was surveyed was South Bethany. The town consists of 247 permanent dwellings. None of the permanent residents own rental property, yet 72.1% of the seasonal renters would like to buy a vacation home here. The community is a new one; all of the permanent residents have lived there for 12 years or less. Over 80% of all seasonal occupants have lived there for this same period of time.[7]

Oak Orchard is the oldest community of the group. In 1968, there were 419 permanent dwellings and 145 mobile homes. The summer population has been estimated at 2,325 persons. About 21% of the permanent residents own rental property. Of those people who rent homes in Oak Orchard, 80% would like to buy a seasonal home there. Approximately 80% of the community's permanent residents have lived there for 30 years or less; about 90% of the seasonal occupants have lived there as long.[8]

Pot-Nets is a mobile home park located on the Indian River Bay. The park is privately owned and rents lots for 400 homes. There are plans for

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[5]Chicoine, David L. A Profile of Delaware's Seasonal Home Occupants and Permanent Residents with Local Public Policy Implications. Masters Thesis, U. of Del., Newark, Delaware, May 1971, p. 13-15.

[6]Chicoine, op. cit., p. 50, 133, 135, 51, 46.

[7]Chicoine, op. cit., p. 138, 46, 51, 50.

[8]Chicoine, op. cit., p. 136, 46, 51, 50.

expansion to accommodate 1,000 homes. Only a few persons rent here permanently. The park began its operations about nine years before the time of Chicoine's study.[9]

Origin of Seasonal Occupants

The geographical region contributing 90% of the seasonal occupants of the communities studied is shown in Figure IV-A. More than 60% of the occupants lived in four SMSA's: Baltimore, Washington, D. C., Philadelphia, and Wilmington (see Appendix IV). Pot-Nets draws most heavily upon the in-state population. The oceanfront communities receive most of their occupants from out-of-state metropolitan areas (see Table IV-B). Data presented in Table IV-C shows that nearly all of the seasonal homes occupants travel 200 miles or less from their permanent residences. Over 53% of the occupants in Fenwick Island and over 66% of the occupants in South Bethany resided in suburban areas. Approximately 81% lived in a single family dwelling on an individual lot at their permanent residence.[10]

Socioeconomic and Demographic Characteristics of Occupants and Residents

With the exception of Pot-Nets, each community had most of its residents distributed between one-and two-adult households. Nearly 75% of all seasonal occupant households contained two adults. The majority of all residents were age 55 or older (see Table IV-D and E). Most of the seasonal occupants were between the ages of 45 and 64. Comparatively few of the permanent households contained children (see Table IV-F). Anywhere from 50% to 70% of the seasonal households contained children. Overall, permanent residents tend to be older than seasonal occupants.

Thirty-five per cent of all seasonal occupants were in professional, technical, and kindred occupations (see Table IV-G). In contrast, 17% of the permanent residents fell into this category. Fenwick Island and South Bethany had an exceptionally large percentage (47%) of these occupants. Perhaps the high incomes associated with this classification allowed the purchase or rental of oceanfront, rather than bayfront property. Note the

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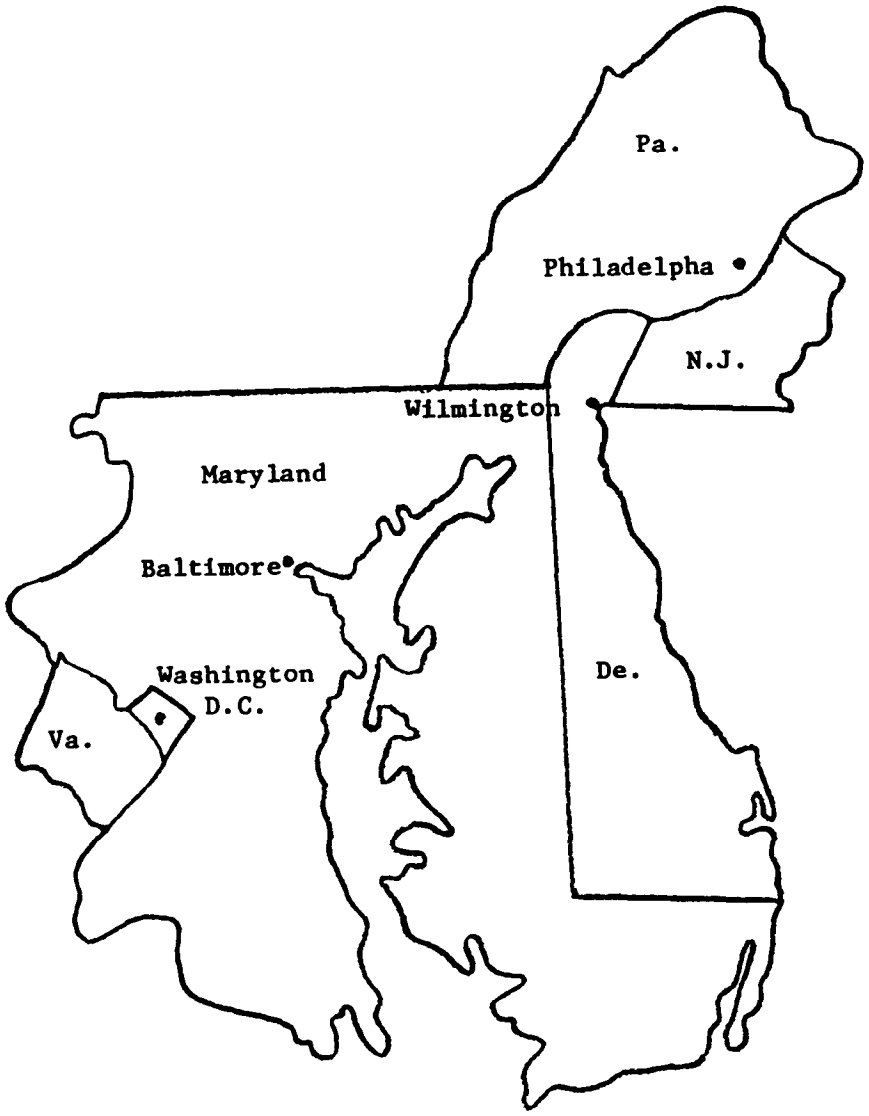
[9] Chicoine, op. cit., p. 137, 46.

[10] Chicoine, op. cit., p. 30.

FIGURE IV-A

AREA WHERE NINETY PER CENT OF THE

SEASONAL OCCUPANTS OF RESORT COMMUNITIES LIVE




Source: Chicoine, David L. A Profile of Delaware's Seasonal Home Occupants and Permanent Residents with Local Public Policy Implications. Master's Thesis, May, 1971, p. 29.

Table IV-B

Percentage of Occupants from Four
Standard Metropolitan Statistical Areas
in the Immediate Region, by Community, in Delaware

| | Community | | | | |
|---|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | Pot-Nets | South Bethany | Total |
| SMSA | Per Cent | | | | |
| Baltimore | 7.1 | 0 | 0 | 14.0 | 5.9 |
| Philadelphia | 10.3 | 20.7 | 6.4 | 3.3 | 7.8 |
| Washington, D.C. | 28.4 | 0 | 0 | 43.8 | 20.4 |
| Wilmington | 20.6 | 17.2 | 64.3 | 20.7 | 36.1 |
| Other | 3.9 | 0 | 3.5 | 6.6 | 4.2 |
| Rural | 26.5 | 62.1 | 22.2 | 11.6 | 23.3 |
| No Answer | 2.6 | 0 | 0 | 5.0 | 2.1 |

SOURCE: Chicoine, David L. A Profile of Delaware's Seasonal Home Occupants and Permanent Residents with Local Public Policy Implications. Masters Thesis, May, 1971, p. 27.

Table IV-C

Percentage of Occupants Living Various Distances from their Seasonal Homes, by Community, in Delaware

| | Community | | | | |
|---|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | Pot-Nets | South Bethany | Total |
| in Miles | Per Cent | | | | |
| 0 - 100 | 25.2 | 62.1 | 77.8 | 17.4 | 44.3 |
| 101 - 200 | 63.2 | 34.5 | 16.9 | 74.4 | 47.7 |
| 201 - 300 | 1.9 | 0 | 1.8 | 4.1 | 2.3 |
| 301 - 400 | .7 | 0 | 0 | .8 | .4 |
| 401 - 500 | 2.58 | 0 | 0 | 0 | .8 |
| 501 - 600 | .7 | 0 | 0 | 0 | .2 |
| 601 - 700 | 0 | 3.5 | 0 | 0 | .2 |
| 701 - 800 | 0 | 0 | 0 | 0 | 0 |
| 801 - & over | 2.6 | 0 | 0 | 0 | .8 |
| No Answer | 3.2 | 0 | 3.5 | 3.3 | 3.15 |

Source: Figure IV-B, p. 28.

Table IV-D

Percentage Distribution of Occupant and Resident Households by Number of Adults and Community in Delaware

| | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| Number of Adults per Household | Per Cent | | | | | | | | |
| one | 5.8 | 50 | 6.9 | 31.6 | 2.9 | 4.1 | 50 | 4.4 | 40 |
| two | 74.2 | 50 | 72.4 | 63.2 | 74.3 | 70.2 | 50 | 73.0 | 57.1 |
| three | 12.3 | 0 | 17.8 | 0 | 15.8 | 14.9 | 0 | 14.2 | 0 |
| four | 5.2 | 0 | 0 | 0 | 3.5 | 7.4 | 0 | 4.7 | 0 |
| five | 1.3 | 0 | 0 | 0 | 1.2 | 2.5 | 0 | 1.7 | 0 |
| six | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| eight | 0 | 0 | 3.4 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| No Answer | 0.65 | 0 | 3.4 | 5.3 | 2.3 | 0.8 | 0 | 1.5 | 2.9 |

(a) Seasonal occupant

(b) Permanent resident

Source: Figure IV-B, p. 44.

Table IV-E

Percentage of Occupant and Resident Household Heads
by Age Categories and Community in Delaware

| Age Category (In Years) | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| | Per Cent | | | | | | | | |
| 0 - 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 - 34 | 5.2 | 10 | 6.9 | 5.3 | 8.8 | 10.7 | 0 | 7.9 | 5.7 |
| 35 - 44 | 20.0 | 10 | 20.7 | 15.8 | 17.5 | 21.54 | 0 | 19.5 | 14.3 |
| 45 - 54 | 36.8 | 10 | 24.1 | 10.5 | 35.1 | 33.1 | 16.7 | 34.5 | 11.4 |
| 55 - 64 | 23.9 | 10 | 31.0 | 26.3 | 23.4 | 21.5 | 16.7 | 36.1 | 22.9 |
| 65 - 74 | 8.4 | 40 | 13.8 | 15.8 | 7.6 | 8.3 | 33.3 | 8.4 | 25.7 |
| 75 and over | 1.3 | 10 | 0 | 10.5 | .6 | .8 | 33.3 | .8 | 5.7 |
| No Answer | 4.5 | 10 | 3.4 | 10.5 | 7.0 | 4.1 | 0 | 5.3 | 8.6 |

(a) Seasonal Home Occupant

(b) Permanent Resident

Source: See Figure IV-B, p. 38.

Table IV-F

Percentage Distribution of Occupant and Resident Households by Number of Children and Community in Delaware

| Number of Children per Household | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| | Per Cent | | | | | | | | |
| No answer and/or no children | 36.1 | 80.0 | 62.1 | 84.1 | 50.9 | 38.0 | 83.3 | 34.5 | 82.9 |
| one | 18.6 | 10 | 13.8 | 11.3 | 18.9 | 16.5 | 16.7 | 17.8 | 11.5 |
| two | 17.5 | 10 | 17.1 | 5.7 | 16.0 | 15.7 | 0 | 16.2 | 5.6 |
| three | 14.4 | 0 | 0 | 0 | 10.1 | 12.3 | 0 | 11.8 | 0 |
| four or more | 13.4 | 0 | 7.0 | 0 | 4.1 | 17.5 | 0 | 19.7 | 0 |

(a) Seasonal occupants

(b) Permanent residents

Source: See Figure IV-B, p. 45.

Table IV-G

Percentages of Occupants, Residents and Officials in Occupation Categories by Community

| Occupation of Head of Household(d) | Community | | | | | |
|---|---|---|---|---|---|---|
| | Fenwick Island | | | Oak Orchard | | Pot-Nets |
| | O(a) | R(b) | P(c) | O | R | O |
| | Per Cent | | | | | |
| Professional, technical and kindred | 49.0 | 20.0 | 0 | 20.7 | 10.5 | 16.4 |
| Farmer | 0 | 0 | 0 | 6.9 | 0 | 0 |
| Manager, official and proprietors | 14.8 | 0 | 40.0 | 20.7 | 5.3 | 18.7 |
| Clerical and kindred | 1.3 | 0 | 0 | 0 | 0 | 0.6 |
| Sales workers | 3.9 | 0 | 40.0 | 0 | 0 | 7.0 |
| Craftsmen, foremen and kindred | 10.3 | 30.0 | 20.0 | 13.8 | 36.8 | 20.5 |
| Operatives and kindred | 0.7 | 0 | 0 | 0 | 0 | 0 |
| Private household workers | 0 | 0 | 0 | 0.3 | 0 | 0.6 |
| Service workers | 2.6 | 0 | 0 | 13.8 | 0 | 8.8 |
| Farm laborers and foremen | 0 | 0 | 0 | 0 | 0 | 0 |
| Laborers | 0.7 | 0 | 0 | 0.3 | 15.9 | 5.8 |
| Retired | 11.6 | 50.0 | 0 | 13.8 | 26.3 | 12.9 |
| Student | 0 | 0 | 0 | 0 | 0 | 0 |
| Unemployed | 0 | 0 | 0 | 0 | 0 | 0 |
| Not reported | 5.2 | 0 | 0 | 0.3 | 5.3 | 8.8 |

Source: Figure IV-B, p. 35.

Table IV-G (cont.)

**Percentages of Occupants, Residents and Officials in Occupation Categories by Community**

| Occupation of Head of Household(d) | Community | | | | | | |
|---|---|---|---|---|---|---|---|
| | South Bethany | | | County Officials | Total | | |
| | O(a) | R(b) | P(c) | P | O | R | P |
| | Per Cent | | | | | | |
| Professional, technical and kindred | 47.1 | 33.3 | 33.3 | 0 | 35.1 | 17.0 | 16.7 |
| Farmer | 0.8 | 0 | 0 | 25.0 | 0.6 | 0 | 5.6 |
| Manager, official and proprietors | 11.6 | 0 | 33.3 | 50.0 | 15.8 | 2.9 | 38.9 |
| Clerical and kindred | 2.5 | 0 | 0 | 0 | 1.3 | 0 | 0 |
| Sales workers | 12.4 | 0 | 0 | 0 | 6.9 | 0 | 11.1 |
| Craftsmen, foremen and kindred | 4.1 | 16.7 | 0 | 25.0 | 12.6 | 31.4 | 11.1 |
| Operatives and kindred | 0.8 | 0 | 0 | 0 | 0.4 | 0 | 0 |
| Private household workers | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 |
| Service workers | 1.7 | 0 | 0 | 0 | 5.3 | 0 | 0 |
| Farm laborers and foremen | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Laborers | 1.7 | 0 | 0 | 0 | 2.9 | 8.6 | 0 |
| Retired | 10.7 | 50.0 | 22.2 | 0 | 11.9 | 37.1 | 11.1 |
| Student | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unemployed | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Not reported | 1.7 | 0 | 11.1 | 0 | 5.5 | 2.9 | 5.6 |

(a) Seasonal occupants
(b) Permanent occupants
(c) Public officials
(d) Classified by definition in U.S. Department of Labor's Occupational Outlook, Bulletin 1300, 1961 edition, passim.

Source: Figure IV-B, p. 36.

large difference between these newer oceanfront communities and the older bayfront and mobile home park when comparing the proportion of occupants employed in the top category.

Eleven per cent of all seasonal occupants were retired, while 37.1% of the permanent residents were in this category. One-half of the permanent residents of both South Bethany and Fenwick Island were retired.

Table IV-H presents data on personal income for the four communities. Most of the permanent residents have incomes less than $10,000. This figure reflects the retired status of many residents. Nearly all of the seasonal occupants earning $20,000 or more live in the oceanfront communities. These are the people who can afford such property. The rapid increase in mobile homes as second homes, due to prohibitive construction and property costs, is reflected in the income structure of Pot-Nets. Only 6.5% of the renters there earn over $20,000.

Fenwick Island and South Bethany have among both their permanent residents and their seasonal occupants an education level that is considerably higher than the level of the bay communities (see Table IV-I).

Attitudinal Characteristics

The combined data for all of the communities shows that recreational opportunity was the most important reason for people to establish a second home in the area. Community assets and a quiet atmosphere were also important considerations. In the oceanfront communities the natural environment and recreational opportunity were very important factors in the decision to locate a second home there (see Table IV-J).

A comparison of the facilities and services desired by seasonal occupants shows conservation and wildlife areas, police protection, and medical facilities consistently ranking as the items occupants want most. Public beaches are the facilities most in demand in South Bethany, while outdoor recreational facilities rank high in preference in the remaining communities. More housing developments are the least desired facility in all areas.

Among permanent residents, police, fire and/or medical facilities are in demand in each community. Conservation and wildlife areas are also quite important to all residents. Also, like the seasonal occupants, more housing

Table IV-H

Percentage of Occupants and Residents by
Annual Gross Family Income and Community in Delaware

| | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| In dollars | Per Cent | | | | | | | | |
| Less than 10,000 | 14.8 | 60.0 | 34.5 | 31.6 | 23.4 | 9.1 | 50 | 17.6 | 42.9 |
| 10,000 - 19,999 | 40.6 | 10.0 | 41.4 | 15.8 | 51.5 | 33.1 | 0 | 42.6 | 11.4 |
| 20,000 - 29,999 | 15.5 | 20.0 | 3.4 | 31.6 | 4.7 | 23.1 | 0 | 12.8 | 22.9 |
| 30,000 and over | 13.5 | 0 | 0 | 5.3 | 1.8 | 20.7 | 33.3 | 10.3 | 8.6 |
| No Answer | 14.8 | 10.0 | 20.7 | 15.8 | 18.7 | 14.0 | 16.7 | 16.4 | 14.3 |

(a) Seasonal occupants

(b) Permanent residents

Source: Figure IV-B, p. 42.

Table IV-I

Educational Level Achieved by Occupant and
Resident Households by Community in Delaware

| | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| In Years | Per Cent | | | | | | | | |
| <12 | 7.1 | 20.0 | 10.3 | 31.6 | 21.6 | 8.3 | 0 | 12.8 | 22.9 |
| 12 | 21.3 | 30.0 | 24.8 | 15.9 | 40.9 | 15.7 | 33.3 | 26.9 | 22.9 |
| >12, <16 | 18.1 | 0 | 17.2 | 31.6 | 12.9 | 16.5 | 16.7 | 15.8 | 20.0 |
| 16 | 19.4 | 20.0 | 13.8 | 5.3 | 7.0 | 19.8 | 0 | 14.7 | 8.6 |
| >16 | 28.4 | 20.0 | 10.3 | 0 | 5.3 | 14.6 | 16.7 | 21.8 | 8.6 |
| No Answer | 5.8 | 10 | 24.1 | 15.9 | 12.3 | 2.5 | 16.7 | 8.4 | 14.3 |

(a) Seasonal occupant

(b) Permanent resident

Source: Figure IV-B, p. 40.

Table IV-J

Percentages of Reasons for Coming
to Community by Community in Delaware

| Reason for Coming to Community | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| | Per Cent | | | | | | | | |
| Natural environment | 16.1 | 20.0 | 3.4 | 5.3 | 4.1 | 14.9 | 16.7 | 10.7 | 11.4 |
| Community assets | 25.8 | 10.0 | 0 | 0 | 13.5 | 8.3 | 0 | 15.3 | 2.9 |
| Recreational opportunity | 12.3 | 20.0 | 34.5 | 0 | 19.3 | 17.4 | 0 | 17.4 | 5.7 |
| Personal reasons | 5.2 | 20.0 | 27.6 | 47.4 | 21.6 | 9.9 | 16.7 | 11.6 | 34.3 |
| Institutional arrangements | 0.6 | 0 | 0 | 0 | 1.8 | 4.9 | 0 | 2.7 | 0 |
| Location of community | 5.8 | 0 | 3.4 | 15.9 | 14.6 | 11.6 | 16.7 | 10.3 | 11.4 |
| Quiet atmosphere | 8.4 | 30.0 | 17.2 | 10.5 | 13.5 | 11.6 | 33.3 | 11.6 | 20.0 |
| Remoteness, uncongested area | 9.7 | 0 | 0 | 0 | 2.3 | 7.4 | 16.7 | 5.9 | 2.9 |
| Economic consideration | 5.8 | 0 | 0 | 5.3 | 3.5 | 8.3 | 0 | 5.3 | 2.9 |
| Social reasons | 5.2 | 0 | 6.9 | 0 | 4.1 | 4.9 | 0 | 4.8 | 0 |
| Nothing in particular | 0 | 0 | 0 | 0 | 0.6 | 0 | 0 | 0.2 | 0 |
| Unusable answer | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| No answer | 3.2 | 0 | 6.9 | 15.9 | 7.0 | 0.8 | 0 | 4.2 | 8.6 |

(a) Seasonal home occupants (b) Permanent resident

Source: Figure IV-J, p. 83.

developments are the least favored facilities in all areas. South Bethany and Oak Orchard's residents however, express desire for employment opportunities. In Oak Orchard this factor ranks third in importance. The residents of Fenwick Island do not seek expanded employment opportunities (see Appendix IV).

## Conclusions

The impact of offshore oil activity could be monumental in Sussex County and in other second home regions along the coast. The location of support facilities and personnel in second home areas will pose a source of conflict for oceanfront communities in terms of the age, education, and occupational structure of the seasonal population. Seasonal occupants tend to be older, well-educated, and holding prestigious white-collar positions. Nearly all of them use the shore as an outlet or leisure place away from suburban life. In addition, the attitudes of second home dwellers clearly do not favor housing development. Instead, they desire more conservation land.

The effects of offshore oil activity, along with the location of support personnel and facilities on the coast, will be quite marked in reference to the existing permanent residents. For the most part these people tend to be older, retired couples living on the lower end of their income scale (note that the lowest division is $10,000). Many of the working residents are in the craftsmen and foreman occupational category. Conflict could result if a younger population were brought into these communities. The communities themselves would have to develop more schools since there are few children currently living there. Although the permanent residents of Oak Orchard and South Bethany somewhat favor additional employment opportunities, no unemployment was reported in those areas.

All occupants, both seasonal and permanent, favor additional conservation land and more recreational facilities. However, a source of conflict already exists in this regard. Public access points to beaches are limited in comparison with the demand for such facilities. This conflict situation is becoming acute on the beaches in front of condominium developments.[11]

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[11] Cole, loc. cit.

Problems stemming from recent growth along the shore (increased congestion, traffic and parking problems) are the most objectionable traits to many seasonal occupants and permanent residents. Thirty-one percent of seasonal occupants and twenty-five per cent of permanent residents have noticed development as a significant change in the area. All residents except those in Fenwick Island and the seasonal occupants of Oak Orchard feel that the natural beauty of their areas has recently deteriorated from an influx of people.[12] Quite obviously the introduction of oil activity would not be a welcome change.

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[12]Chicoine, op. cit., p. 112.

# APPENDIX

Included in the following section is additional recreation information for each of the study area states. This information is intended to supplement the main report. The appendices are grouped according to state.

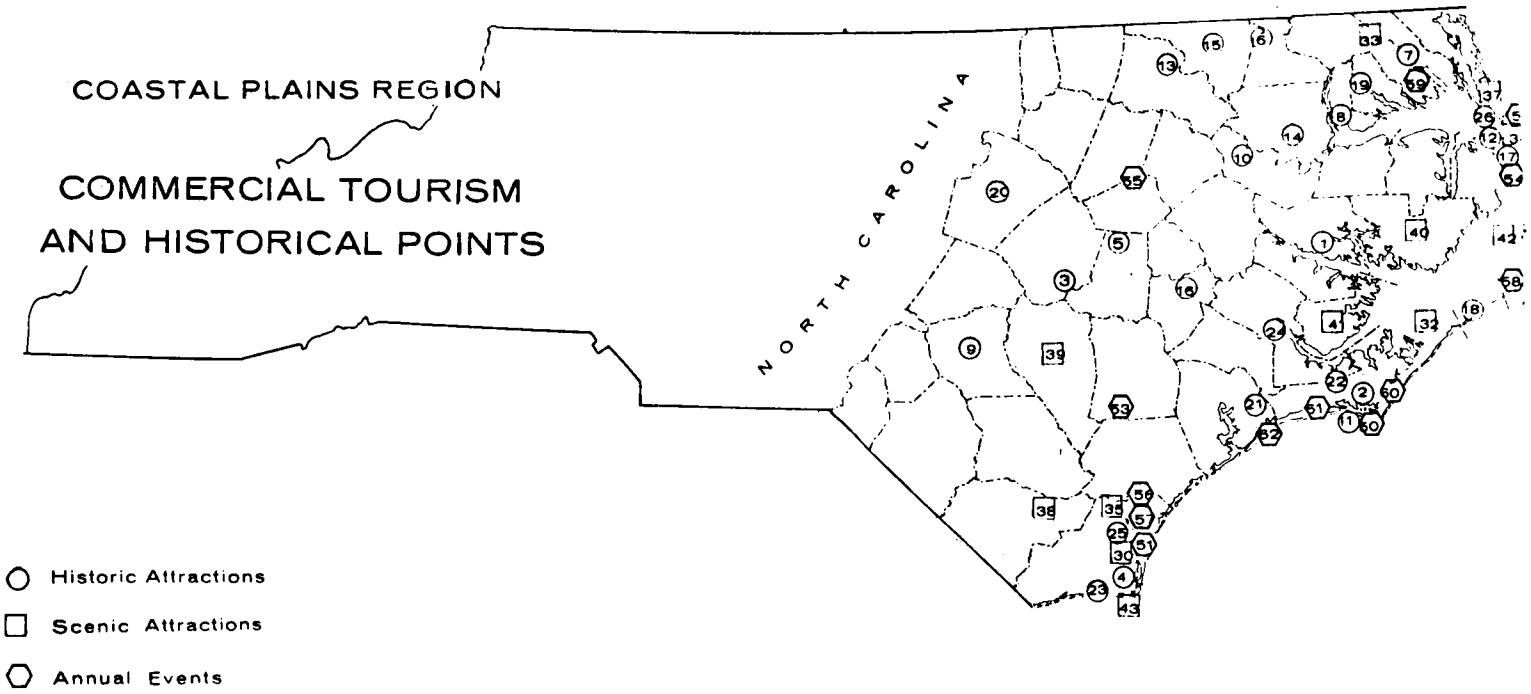
Recreation Appendices

Table of Contents

# RECREATION APPENDIX I

## North Carolina

Appendix I-A




See Following Page for Number Key.

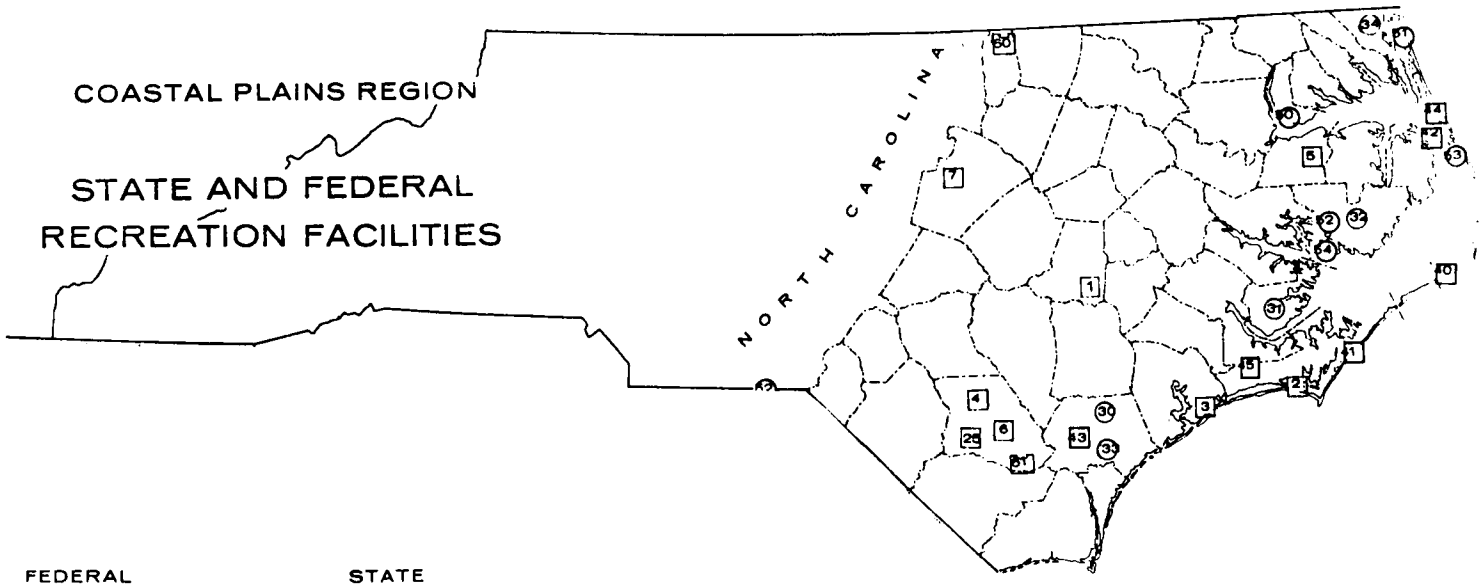
Source: Floyd, C. F., R. J. Heyl, and J. A. Barnes. Economics Profile of the Coastal Plains Region. University of Georgia, College of Business Administration, January, 1970, p. 134-135.

## Appendix I-A (continued)

## Commercial Tourism and Historical Points in the Coastal Plains Region of North Carolina

| Map No. | Name and City | County |
|---|---|---|
| **Selected Historic Attractions** | | |
| 1 | Bath: | Beaufort |
| | Palmer-Marsh House | |
| | St. Thomas Episcopal Church | |
| 2 | Beaufort: | Carteret |
| | Capt. Burns Burial Site | |
| | Dunean House | |
| 3 | Bentonville Battle Site (Smithfield) | Johnston |
| 4 | Brunswick Town | Brunswick |
| 5 | Charles B. Aycock Birthplace (Fremont) | Wayne |
| 6 | Columns, The (Murfreesboro) | Hertford |
| 7 | Dismal Swamp Canal - 1790 (Elizabeth City) | Pasquotank |
| 8 | Edenton: | Chowan |
| | Chowan County Courthouse | |
| | Cupola House | |
| | James Iredell House | |
| | Penelope House | |
| 9 | Fayetteville: | Cumberland |
| | Longstreet Presbyterian Church - Fort Bragg | |
| | Market House | |
| 10 | Fort Branch (Hamilton) | Martin |
| 11 | Fort Macon (Atlantic Beach) | Carteret |
| 12 | Fort Raleigh (Roanoke Island) | Dare |
| 13 | Halifax: | Halifax |
| | Constitution House | |
| | The Grove | |
| 14 | Hope House (Windsor) | Bertie |
| 15 | Jackson: | Northampton |
| | Northampton County Courthouse | |
| | Ransom House | |
| 16 | Kinston: | Lenoir |
| | Caswell Memorial | |
| | C.S.S. Neuse - Confederate Navy | |
| 17 | Lost Colony (Manteo) | Dare |
| 18 | Ocracoke Island: | Hyde |
| | Blackbeard's Conquest | |
| | Ocracoke Lighthouse | |
| | Ship Ruins | |
| 19 | Perquimans County Courthouse (Hertford) | Perquimans |
| 20 | Raleigh: | Wake |
| | Andrew Johnson's House | |
| | Governor's Mansion | |
| 21 | Ringware House (Swansboro) | Onslow |
| 22 | Roy Hampton Museum (Morehead City) | Carteret |
| 23 | Southport: | Brunswick |
| | Orton Plantation | |
| | Fort Caswell | |
| | Fort Jackson | |
| 24 | Tyorn Place (New Bern) | Craven |
| 25 | Wilmington: | New Hanover |
| | Burgwin-Wright House | |
| | Cornwallis House | |
| | Fort Anderson | |
| | Fort Fisher | |
| | St. Johns Art Gallery | |
| | U.S.S. North Carolina Battleship | |
| 26 | Wright Brothers' National Memorial (Kitty Hawk) | Dare |
| **Selected Scenic Attractions** | | |
| 30 | Airlie Gardens (Wilmington) | New Hanover |
| 31 | Cape Hatteras Lighthouse (Buxton) | Dare |
| 32 | Cedar Island—Ocracoke Ferry | Carteret, Hyde |
| 33 | Dismal Swamp | Camden |
| 34 | Elizabethan Gardens (Manteo) | Dare |
| 35 | Greenfield Gardens (Wilmington) | New Hanover |
| 36 | Hatteras Island Fishing Villages | Dare |
| 37 | Jockey's Ridge | Dare |
| 38 | Lake Waccaman | Columbus |
| 39 | Laurel Lake Gardens (Clinton) | Sampson |
| 40 | Mattamuskeet Lake | Hyde |
| 41 | Oldest Holly Tree (Bayboro) | Pamlico |
| 42 | Pamlico Sound | |
| 43 | Smith Island | New Hanover |

Appendix I-B




FEDERAL

- Parks and Forests
- Corps of Engineers
- Fish and Wildlife Service

STATE

- Parks and Forests
- Game and Fish Agencies

See Following Page for Number Key.

Source: Floyd, C. F., R. J. Heyl, and J. A. Barnes. Economic Profile of the Coastal Plains Region. University of Georgia, College of Business Administration, January, 1970, p. 130-131.

Appendix I - B (cont'd)

State and Federal Recreation Facilities in the Coastal Plains Region of North Carolina

**NORTH CAROLINA**

| Map No. | Name | County | Acres |
|---|---|---|---|
| **State Parks** | | | |
| 1 | Cliffs of the Neuse St. Park[1] | Wayne | 365 |
| 2 | Fort Macon[2] | Carteret | 390 |
| 3 | Hammocks Beach[2] | Onslow | 894 |
| 4 | Jones Lake[1] | Blader | 2,000 |
| 5 | Pettigrew[2] | Washington, Tyrrett | 16,828 |
| 6 | Singletary Lake[2] | Bladen | 1,237 |
| 7 | Wm. B. Umstead[1] | Wake | 3,886 |
| **State Forests** | | | |
| 25 | Bladen Lakes State Forest | Bladen | 35,000 |
| **State Game and Fish Agencies** | | | |
| 30 | Anzola Bay Wildlife Management Area | Pender | 28,000 |
| 31 | Goose Creek Wildlife Management Area | Pamlico | 7,000 |
| 32 | Gull Rock Wildlife Management Area | Hyde | 15,000 |
| 33 | Holly Shelter Wildlife Management | Pender | 48,500 |
| 34 | N.W. River Marsh Wildlife Management | Currituck | 1,256 |

| Map No. | Name | County | Acres |
|---|---|---|---|
| **U. S. Park Service** | | | |
| 40 | Cape Hatteras National Seashore[1] | Dare | 32,500 |
| 41 | Cape Lookout National Seashore | Carteret | 25,000 |
| 42 | Fort Raleigh National Historical Site | Dare | 19 |
| 43 | Moores Creek National Military Park | Pender | 46 |
| 44 | Wright Brothers National Memorial | Dare | 425 |
| **U. S. Forest Service** | | | |
| 45 | Croatan National Forest[1] | Craven | 152,351 |
| **U. S. Fish and Wildlife Service** | | | |
| 50 | Edenton National Fish Hatchery | Chowan | 88 |
| 51 | MacKay Island National Wildlife Refuge | Currituck | 4,184 |
| 52 | Mattamuskeet National Wildlife Refuge | Hyde | 50,178 |
| 53 | Pea Island National Wildlife Refuge | Dare | 31,580 |
| 54 | Swan Quarter National Wildlife Refuge | Hyde | 39,938 |
| **Corps of Engineers** | | | |
| 60 | John H. Kerr Reservoir[1] | Vance | 25,820 |
| 61 | Navigation Lock and Dam, Cape Fear River | Bladen | 2,625 |

[1]Both fishing and camping facilities.

[2]Fishing facilities.

[3]Camping facilities

Appendix I-C

Number of Recreation Sites in the Counties near Morehead City, North Carolina, by Type of Recreation.

| County | City Park | District Park | County Park | State Park | Historic Areas | Recreation Areas | Wilderness Areas |
|---|---|---|---|---|---|---|---|
| Carteret | -- | -- | -- | 1 | -- | 19 | -- |
| Craven | -- | 1 | -- | -- | 1 | 17 | -- |
| Jones | -- | -- | -- | -- | -- | 5 | -- |
| Onslow | -- | -- | 1 | 1 | -- | 11 | -- |
| Pamilico | -- | -- | -- | -- | -- | 13 | -- |
| Total | 0 | 1 | 1 | 2 | 1 | 65 | 0 |
| State Total | 27 | 24 | 40 | 26 | 35 | 1,426 | 9 |

Source: Computer print-out Recreation Division, Department of Natural and Economic Resources, Raleigh, 1974.

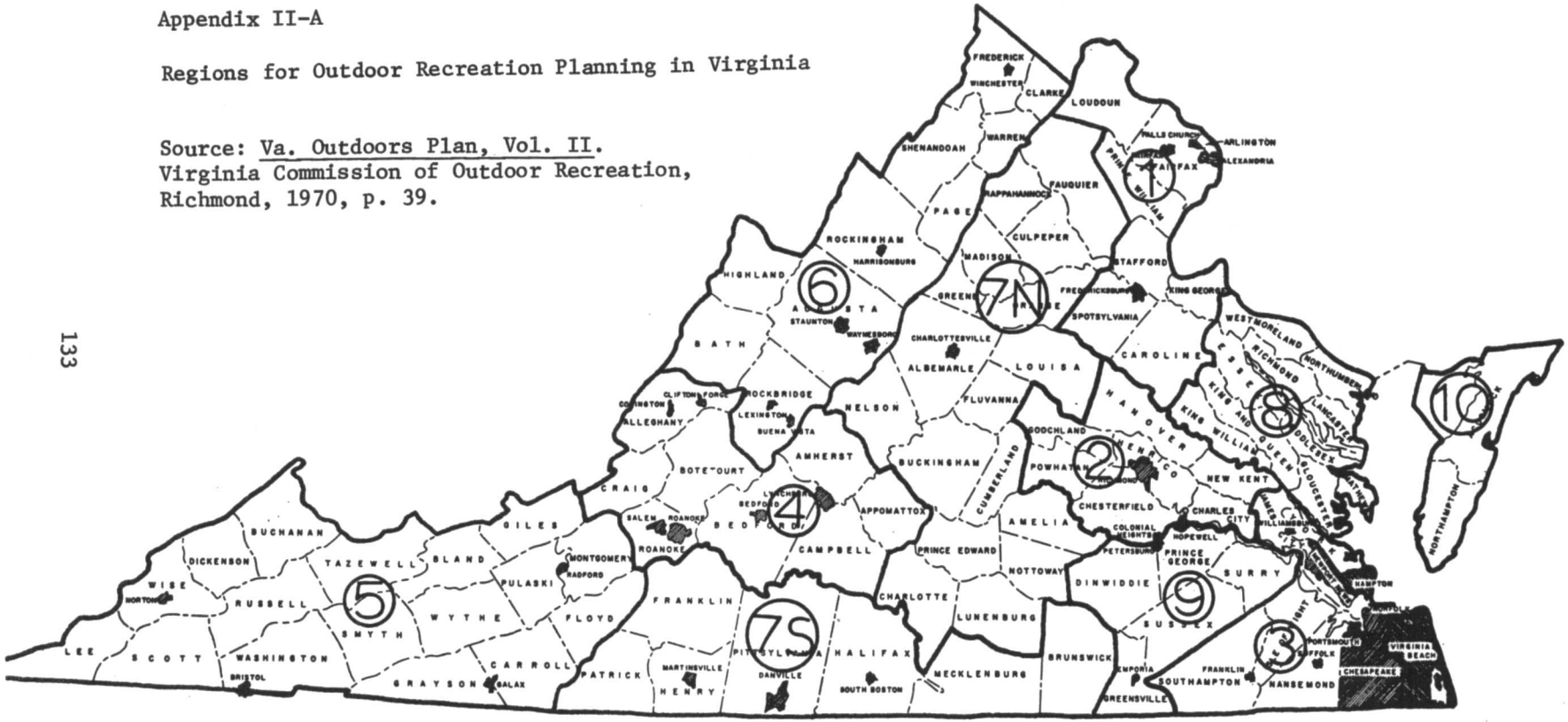
# RECREATION APPENDIX II

## Virginia

Appendix II-A

Regions for Outdoor Recreation Planning in Virginia

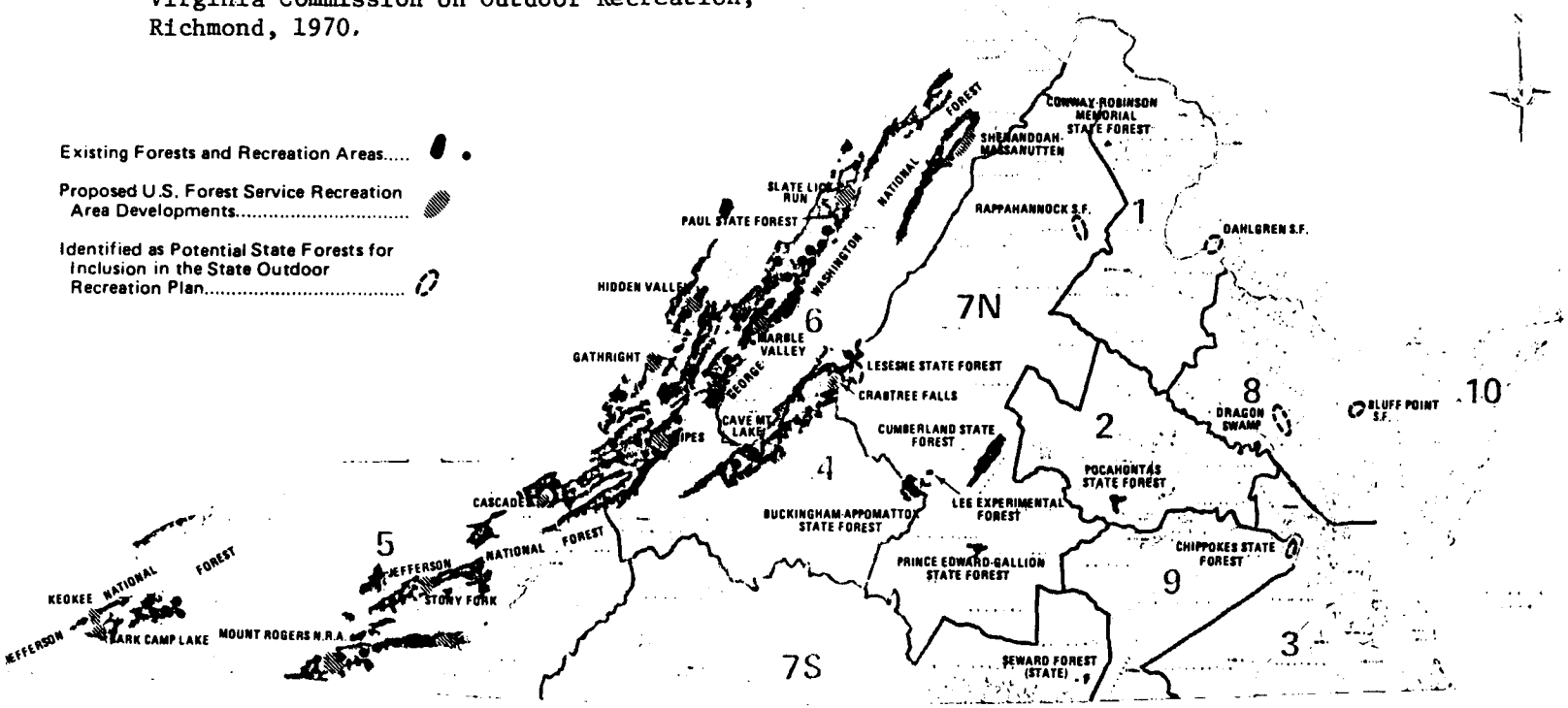
Source: Va. Outdoors Plan, Vol. II.
Virginia Commission of Outdoor Recreation,
Richmond, 1970, p. 39.



Appendix II-B

Public Forests in Virginia (National and State)

Source: Virginia Outdoors Plan, Vol. IV,
Virginia Commission on Outdoor Recreation,
Richmond, 1970.

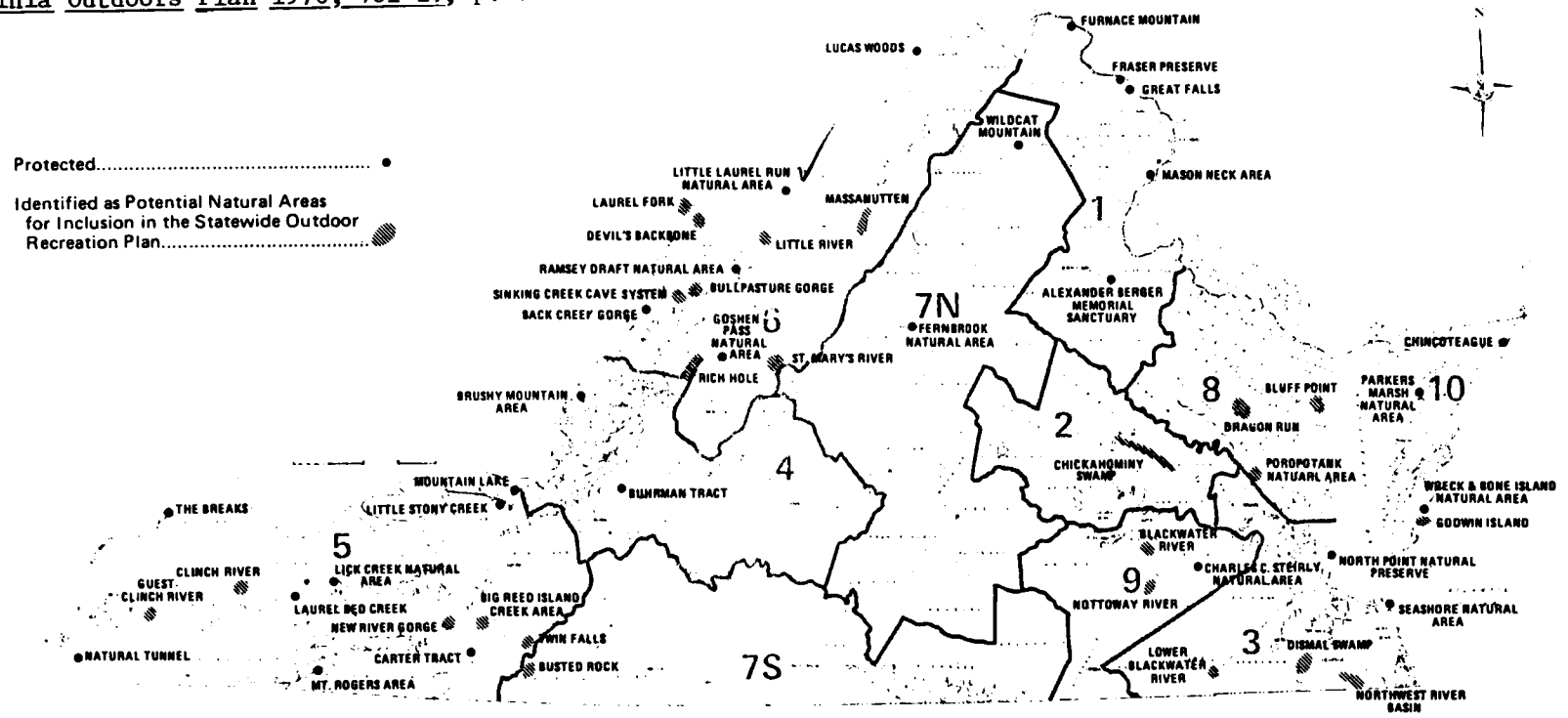


Appendix II-C

Natural Areas in Virginia

(National, State, Local and Private)

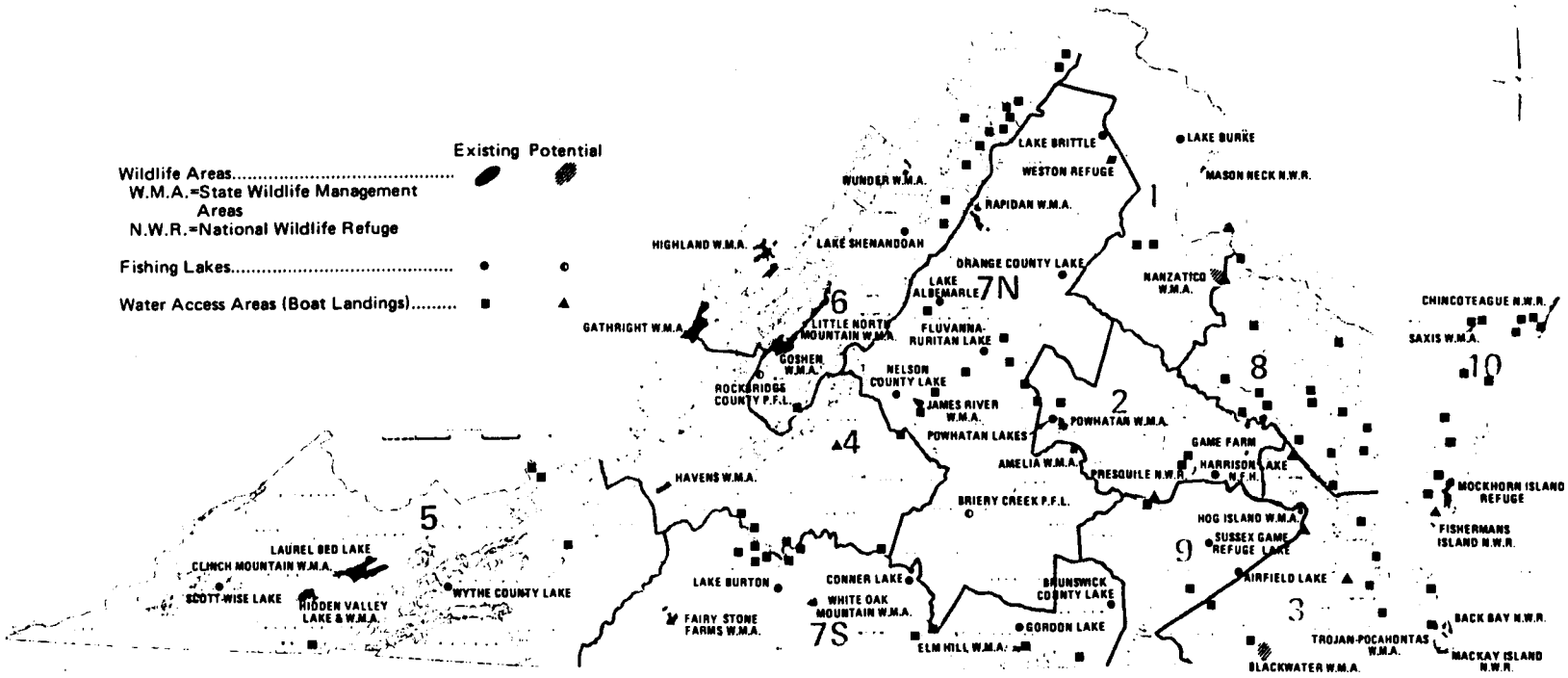
Richmond: Commission on Outdoor Recreation,
Virginia Outdoors Plan 1970, Vol IV, p. 120



Appendix II-D

Public Game and Fish Management Areas in Virginia
(State and Federal)

Source: Virginia Outdoors Plan, Vol. IV, Virginia Commission on Outdoor Recreation, Richmond, 1970.

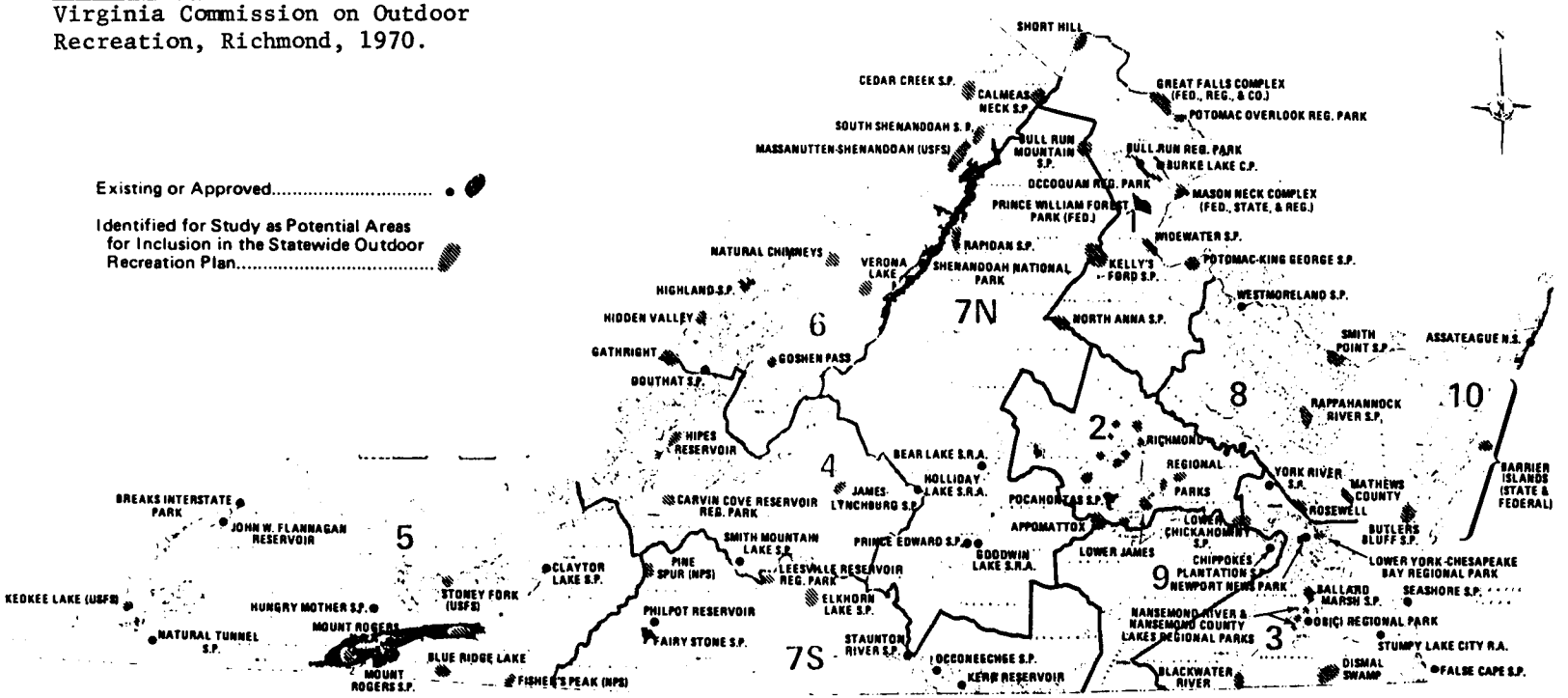


Appendix II-E

Major Recreational Areas in Virginia

Source: Virginia Outdoors Plan, Vol. IV
Virginia Commission on Outdoor
Recreation, Richmond, 1970.

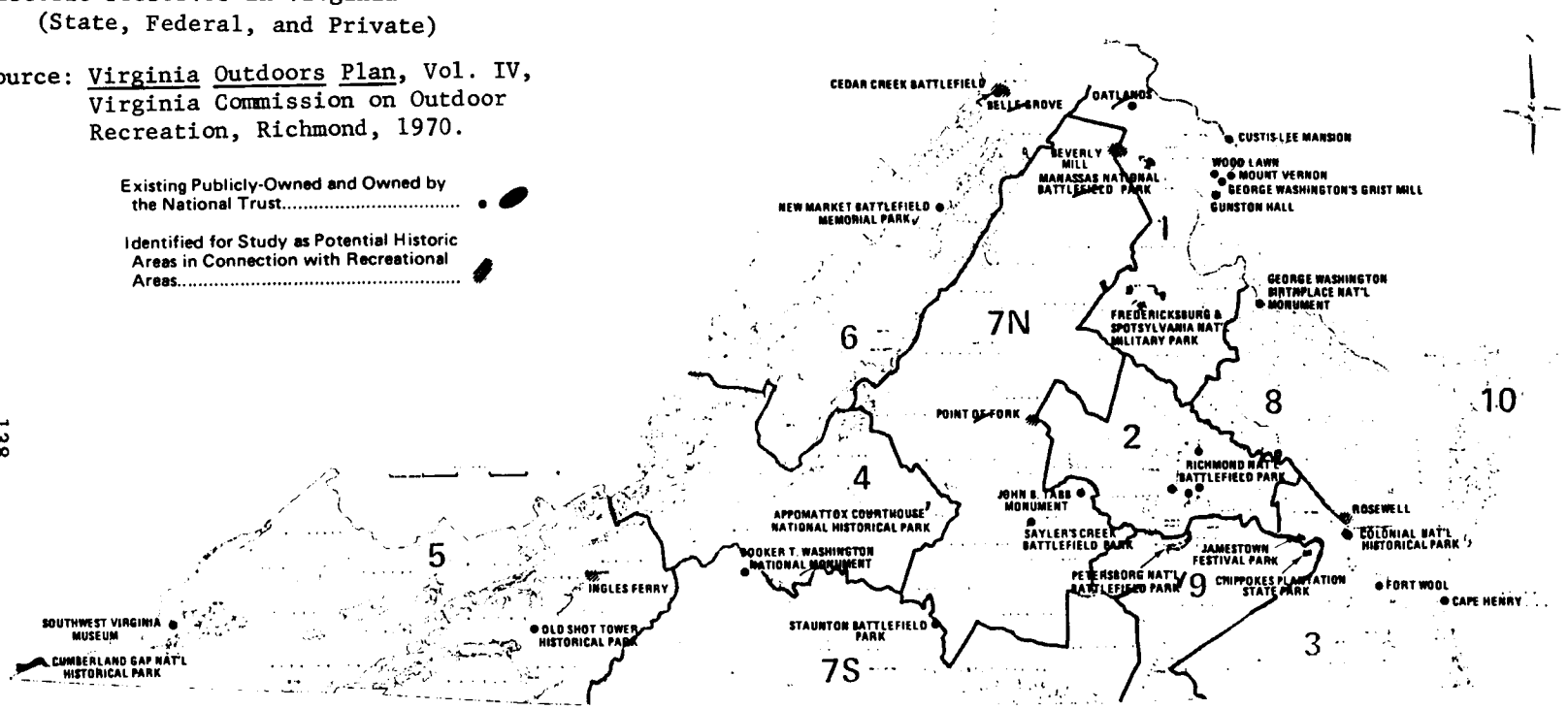




Appendix II-F

Historic Preserves in Virginia
(State, Federal, and Private)

Source: Virginia Outdoors Plan, Vol. IV, Virginia Commission on Outdoor Recreation, Richmond, 1970.

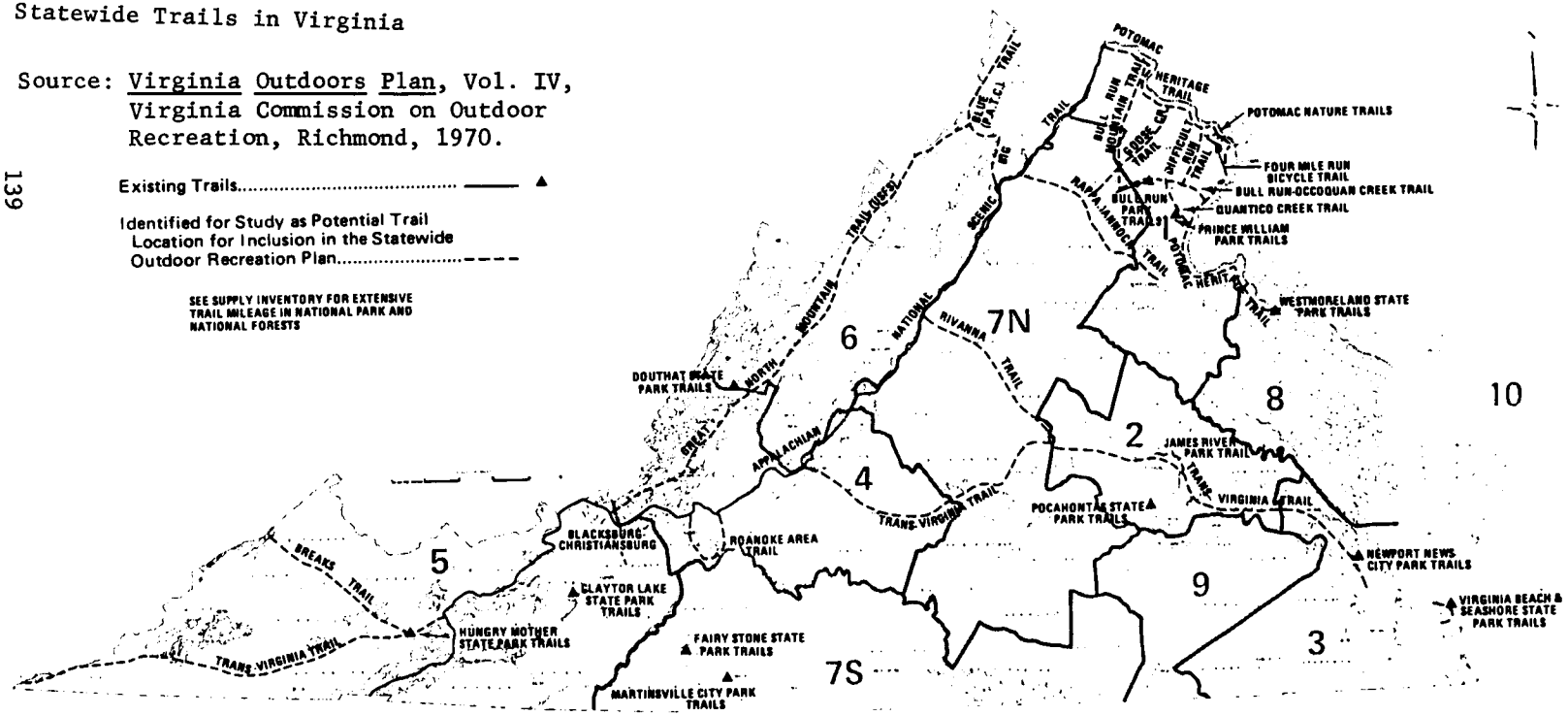


Appendix II-G

Statewide Trails in Virginia

Source: Virginia Outdoors Plan, Vol. IV, Virginia Commission on Outdoor Recreation, Richmond, 1970.





## Appendix II-H

### Summary of Public and Private Recreation Land and Facilities

| Region | Total Land & Water Acr. | Picnicking (Tables) | Bicycle Trails (mi.) | Hiking Trails (mi.) | Nature Trails (mi.) | Riding Trails (mi.) | Games & Sports (Persons) | Camping Sites | Boating | Swimming (Persons) | Fishing Lake (acres) | Fishing Stream (mi.) | Hunting (acres) | Nature Study | Cabins (units) | Golf (holes) | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 59,298 | 1,760 | 4 | 56 | X[1] | X | X[1] | 977 | X[1] | 29,050 | 4,832 | X | 164,400 | X | 79 | 324 | X[2]<br>100[3]<br>500[4] |
| 2 | 64,332 | 381 | | 4 | | 4 | X[1] | 453 | X[1] | 3,615 | 5,930 | X | 108,600 | X | 10 | 108 | X[2] |
| 3 | 236,587 | 778 | | 40 | | X | X[1] | 1,456 | X[1] | X[1] | 12,695 | X | 20,300[6] | X | 27 | 27 | X[2] |
| 4 | 496,084 | 2,214 | | 248 | | X | X[1] | 1,255 | X[1] | 8,010 | 16,577 | | 523,600 | X | 141 | 189 | X[2] |
| 5 | 505,232 | 1,751 | | 439 | X[1] | 5 | X[1] | 1,576 | X[1] | 7,220 | 9,306 | X | 854,800 | X | 658 | 180 | 500[3] |
| 6 | 953,924 | 2,614 | | 502 | | X | X[1] | 2,566 | X[1] | 7,220 | 662 | X | 790,000 | X | 4,354 | 252 | 500[2]<br>2312[5]<br>125[3] |
| 7N | 350,172 | 1,113 | | 145 | | X | X[1] | 1,161 | X[1] | 6,550 | 2,980 | X | 383,000 | X | 131 | 81 | X[2]<br>1000[5] |
| 7S | 210,295 | 2,165 | 5 | 15 | | 10 | X[1] | 1,720 | X[1] | 2,715 | 85,182 | X | 228,600 | X | 107 | 162 | X[2] |
| 8 | 77,791 | 900 | | 15 | | | X[1] | 1,189 | X[1] | X[1] | 1,504 | X | 74,800 | X | 6 | 36 | |
| 9 | 120,944 | 142 | | X | | | X[1] | | X[1] | X[1] | 6,654 | | 218,300 | X | | 63 | X[2] |
| 10 | 33,098 | 43 | | X | | | X[1] | 1,000 | X[1] | 1,550 | 0 | | 30,000 | X | 85 | 27 | |
| Total | 3,107,757 | 13,861 | 9 | 1,464 | X[1] | X[1] | X[1] | 13,353 | X[1] | X[1] | 146,322 | X | 3,396,400 | X | 5,591 | 1,456 | X[2]<br>725[3]<br>500[4]<br>3312[5] |

[1] Adequate information not available for Demand-Supply Analysis--inventory was not adequate
[2] Historic Interest
[3] Ice Skating
[4] Field Trails
[5] Snow Skiing
[6] In addition, the Department of Defense permits controlled hunting on 48,509 acres at five different areas.

Source: Va. Outdoors Plan, Vol. I, Richmond: Commission of Outdoor Recreation, 1970, p. 46.

Appendix II-I

Total State Existing Supply for Hunting
Expressed in Annual Activity Days,
By Region, in Virginia
1968

| Region | Public Land[1] | Private Corporation Land[2] | Total Open To Hunting |
|---|---|---|---|
| 1 | 129,000 | 35,400 | 164,400 |
| 2 | 10,300 | 98,300 | 108,600 |
| 3 | 1,200 | 19,100 | 20,300 |
| 4 | 407,200 | 116,400 | 523,600 |
| 5 | 385,100 | 469,700 | 854,800 |
| 6 | 782,700 | 7,300 | 790,000 |
| 7N | 92,300 | 290,700 | 383,000 |
| 7S | 88,300 | 140,300 | 228,600 |
| 8 | 0 | 74,800 | 74,800 |
| 9 | 17,900 | 200,400 | 218,300 |
| 10 | 23,000 | 7,000 | 30,000 |
| Total | 1,937,000 | 1,459,400 | 3,396,400 |

[1]Public Land Permanently Open to Hunting.
[2]Private Corporation Land Now Open to Hunting.

Source: Va. Outdoors Plan, Vol. II. 1970 Richmond: Commission of OUtdoor Recreation, P. 119.

Appendix II-J

Acreage of Forest Products Industry Land Open to Hunting, by Region, in Virginia

| Region | Acreage |
|---|---|
| 1 | 35,400 |
| 2 | 98,300 |
| 3 | 19,100 |
| 4 | 116,400 |
| 5 | 469,700 |
| 6 | 7,300 |
| 7N | 290,700 |
| 7S | 140,300 |
| 8 | 74,800 |
| 9 | 200,400 |
| 10 | 7,000 |
| Total | 1,459,400 |

Source: Va. Outdoor Plan, Vol. I, Commission on Outdoor Recreation, May, 1970, p. 35.

Appendix II-K

Hunting Needs in Virginia

By Regions

| Region | Deficiency in Acres or Annual Activity Days[1] | | | |
|---|---|---|---|---|
| | 1968 | 1980 | 2000 | 2020 |
| 1 | 485,600 | 1,035,600 | 1,835,600 | 3,235,600 |
| 2 | 371,400 | 661,400 | 1,191,400 | 1,891,400 |
| 3 | 549,700 | 879,700 | 1,379,700 | 2,179,700 |
| 4 | 1,400 | 306,400 | 876,400 | 1,676,400 |
| 5 | ( 84,800)* | 245,200 | 845,200 | 1,345,200 |
| 6 | ( 190,000)* | 140,000 | 610,000 | 1,010,000 |
| 7N | 67,000 | 287,000 | 617,000 | 917,000 |
| 7S | 161,400 | 381,400 | 671,400 | 1,071,400 |
| 8 | 55,200 | 105,200 | 175,200 | 205,200 |
| 9 | ( 28,300)* | 81,700 | 231,700 | 401,700 |
| 10 | 14,000 | 25,000 | 35,000 | 65,000 |
| Totals | 1,402,600 | 4,148,600 | 8,468,600 | 13,998,600 |

[1]One acre provides for one activity day of hunting per year.

*Surplus capacity.

Source: Virginia Outdoors Plan, Vol. II. Richmond: Commission of Outdoor Recreation, 1970, p. 119.

Appendix II-L

Freshwater Fishing Demands in Virginia

By Regions

| Year | Population | | No. of Licensed Fishermen[1] | Activity Rate[2] (days/year) | Fishing Demand (Annual Activity Days) |
|---|---|---|---|---|---|
| | Total | % With Licenses | | | |
| Region 1 | | | | | |
| 1968 | 965,753 | 4.7 | 45,792 | 21 | 960,000 |
| 1980 | 1,443,600 | 5.8 | 82,000 | 23 | 1,900,000 |
| 2000 | 2,360,000 | 6.5 | 150,000 | 22 | 3,300,000 |
| 2020 | 3,900,000 | 6.5 | 250,000 | 22 | 5,500,000 |
| Region 2 | | | | | |
| 1968 | 554,730 | 6.1 | 33,894 | 21 | 710,000 |
| 1980 | 707,800 | 7.5 | 53,000 | 23 | 1,200,000 |
| 2000 | 1,125,000 | 8.3 | 93,000 | 22 | 2,000,000 |
| 2020 | 1,800,000 | 8.3 | 150,000 | 22 | 3,300,000 |
| Region 3 | | | | | |
| 1968 | 1,088,797 | 3.2 | 35,112 | 21 | 735,000 |
| 1980 | 1,362,500 | 3.9 | 53,000 | 23 | 1,200,000 |
| 2000 | 1,980,000 | 4.4 | 87,000 | 22 | 1,900,000 |
| 2020 | 3,100,000 | 4.4 | 135,000 | 22 | 3,000,000 |
| Region 4 | | | | | |
| 1968 | 400,657 | 11.7 | 46,890 | 21 | 985,000 |
| 1980 | 506,200 | 14.4 | 73,000 | 23 | 1,700,000 |
| 2000 | 785,000 | 16.0 | 125,000 | 22 | 2,800,000 |
| 2020 | 1,300,000 | 16.0 | 210,000 | 22 | 4,600,000 |
| Region 5 | | | | | |
| 1968 | 495,061 | 13.1 | 64,844 | 21 | 1,360,000 |
| 1980 | 566,000 | 16.1 | 91,000 | 23 | 2,100,000 |
| 2000 | 785,000 | 18.0 | 140,000 | 22 | 3,100,000 |
| 2020 | 1,100,000 | 18.0 | 200,000 | 22 | 4,400,000 |
| Region 6 | | | | | |
| 1968 | 293,645 | 12.4 | 36,332 | 21 | 765,000 |
| 1980 | 360,400 | 15.3 | 55,000 | 23 | 1,250,000 |
| 2000 | 495,000 | 17.0 | 85,000 | 22 | 1,900,000 |
| 2020 | 700,000 | 17.0 | 120,000 | 22 | 2,600,000 |

Appendix II-L (continued)

| Year | Population | | No. of Licensed Fishermen[1] | Activity Rate[2] (days/year) | Fishing Demand (Annual Activity Days) |
|---|---|---|---|---|---|
| | Total | % With Licenses | | | |
| Region 7N | | | | | |
| 1968 | 270,487 | 7.4 | 20,048 | 21 | 420,000 |
| 1980 | 323,900 | 9.1 | 30,000 | 23 | 700,000 |
| 2000 | 440,000 | 10.0 | 44,000 | 22 | 1,000,000 |
| 2020 | 630,000 | 10.0 | 63,000 | 22 | 1,400,000 |
| Region 7S | | | | | |
| 1968 | 326,582 | 11.5 | 37,608 | 21 | 790,000 |
| 1980 | 407,300 | 14.2 | 58,000 | 23 | 1,300,000 |
| 2000 | 565,000 | 15.7 | 90,000 | 22 | 2,000,000 |
| 2020 | 840,000 | 15.7 | 130,000 | 22 | 2,800,000 |
| Region 8 | | | | | |
| 1968 | 86,130 | 4.1 | 3,569 | 21 | 75,000 |
| 1980 | 97,700 | 5.0 | 4,900 | 23 | 110,000 |
| 2000 | 125,000 | 5.6 | 7,000 | 22 | 150,000 |
| 2020 | 140,000 | 5.6 | 8,000 | 22 | 180,000 |
| Region 9 | | | | | |
| 1968 | 165,651 | 8.6 | 14,208 | 21 | 300,000 |
| 1980 | 212,300 | 10.6 | 23,000 | 23 | 530,000 |
| 2000 | 290,000 | 11.8 | 35,000 | 22 | 800,000 |
| 2020 | 420,000 | 11.8 | 50,000 | 22 | 1,100,000 |
| Region 10 | | | | | |
| 1968 | 45,182 | 1.9 | 874 | 21 | 20,000 |
| 1980 | 46,000 | 2.3 | 1,000 | 23 | 23,000 |
| 2000 | 50,000 | 2.6 | 1,300 | 22 | 30,000 |
| 2020 | 70,000 | 2.6 | 1,800 | 22 | 40,000 |
| STATE TOTALS* | | | | | |
| 1968 | 4,692,675 | 7.3 | 339,171 | 21 | 7,120,000 |
| 1980 | 6,033,700 | 9.0 | 543,000 | 23 | 12,500,000 |
| 2000 | 9,000,000 | 10.0 | 900,000 | 22 | 20,000,000 |
| 2020 | 14,000,000 | 10.0 | 1,400,000 | 22 | 31,000,000 |

[1] 1968 figures are licenses sold in Region in 1967. Other years are projections.

[2] 1968 Activity Rate is for South Atlantic Region, from Bureau of Sport Fisheries and Wildlife. Other years are projections.

* State totals will not check necessarily with regional totals, due to roundings.

Source: Va. Outdoors Plan, Vol. II. Richmond: Commission of Outdoor Recreation, 1970 p. 121, 122.

APPENDIX II-M

Current Recreation Status of all Cities
and Urban and Urbanizing Counties

| City or County | Reg. | Pop. (1968) | Recreational Acreage - Local Government Responsibility (Based upon 10 ac. Per Thousand) | | | |
|---|---|---|---|---|---|---|
| | | | 1968 Demand (Ac.) | Total 1968 Supply (Ac.) | Need (Ac.) | % Adeq. |
| Fairfax Co. | 1 | 422,496 | 4,220 | 2,324 | 1,896 | 55 |
| Norfolk | 3 | 305,585 | 3,060 | 1,522 | 1,538 | 51 |
| Richmond | 2 | 216,451 | 2,170 | 1,457 | 713 | 67 |
| Arlington Co. | 1 | 184,260 | 1,840 | 750 | 1,090 | 41 |
| Henrico Co. | 2 | 160,600 | 1,610 | 318 | 1,292 | 20 |
| Virginia Beach | 3 | 158,506 | 1,590 | 1,189 | 401 | 75 |
| Newport News | 3 | 136,430 | 1,360 | 724 | 636 | 53 |
| Portsmouth | 3 | 127,208 | 1,270 | 564 | 706 | 44 |
| Hampton | 3 | 120,575 | 1,210 | 640 | 570 | 53 |
| Alexandria | 1 | 114,628 | 1,150 | 280 | 870 | 24 |
| Chesterfield Co. | 2 | 111,392 | 1,110 | 550 | 560 | 49 |
| Roanoke City | 4 | 99,053 | 990 | 2,137 | 0 | 216 |
| Prince William Co. | 1 | 98,441 | 980 | 176 | 804 | 18 |
| Chesapeake | 3 | 85,771 | 860 | 178 | 682 | 21 |
| *Pittsylvania Co. | 7S | 63,893 | 640 | 105 | 535 | 16 |
| Roanoke County | 4 | 59,184 | 590 | 411 | 179 | 70 |
| Lynchburg | 4 | 54,926 | 550 | 469 | 81 | 85 |
| *Danville | 7S | 49,789 | 500 | 238 | 262 | 48 |
| Campbell Co. | 4 | 41,510 | 420 | 4 | 336 | 1 |
| *Washington Co. | 5 | 40,949 | 410 | 252 | 158 | 61 |
| *Albemarle Co. | 7N | 39,181 | 390 | 589 | 0 | 150 |
| *Charlottesville | 7N | 38,154 | 380 | 318 | 62 | 84 |
| *Petersburg | 9 | 37,944 | 380 | 1,257 | 0 | 330 |
| Hanover Co. | 2 | 36,163 | 360 | 40 | 320 | 11 |
| *Nansemond Co. | 3 | 35,945 | 360 | 142 | 218 | 39 |

| City or County | Reg. | Pop. (1968) | Recreational Acreage - Local Government Responsibility (Based upon 10 ac. Per Thousand) | | | |
|---|---|---|---|---|---|---|
| | | | 1968 Demand (Ac.) | Total 1968 Supply (Ac.) | Need (Ac.) | % Adeq. |
| Loudoun Co. | 1 | 35,613 | 360 | 115 | 245 | 32 |
| York Co. | 3 | 32,533 | 330 | 54 | 276 | 16 |
| *Prince George Co. | 9 | 30,858 | 310 | 28 | 282 | 9 |
| Bedford Co. (1) | 4 | 27,994 | 340 | 76 | 264 | 22 |
| Amherst Co. | 4 | 26,489 | 260 | 39 | 221 | 15 |
| *Dinwiddie Co. | 9 | 25,911 | 260 | 49 | 211 | 19 |
| *Staunton | 6 | 24,508 | 250 | 509 | 0 | 203 |
| Salem | 4 | 24,410 | 240 | 496 | 0 | 207 |
| Fairfax City | 1 | 22,718 | 230 | 53 | 177 | 23 |
| *Martinsville | 7S | 21,264 | 210 | 96 | 114 | 46 |
| *Hopewell | 9 | 21,157 | 210 | 49 | 161 | 23 |
| *Waynesboro | 6 | 17,771 | 180 | 153 | 27 | 85 |
| *Bristol | 5 | 16,875 | 170 | 905 | 0 | 530 |
| *James City Co. | 3 | 16,016 | 160 | 0 | 160 | 0 |
| *Winchester | 6 | 15,167 | 150 | 246 | 0 | 164 |
| *Fredericksburg | 1 | 15,080 | 150 | 61 | 89 | 41 |
| *Harrisonburg | 6 | 14,849 | 150 | 245 | 0 | 163 |
| *Colonial Heights | 9 | 14,291 | 140 | 13 | 127 | 9 |
| *Suffolk | 3 | 11,981 | 120 | 50 | 70 | 42 |
| *Radford | 5 | 11,918 | 120 | 156 | 0 | 130 |
| Falls Church | 1 | 11,119 | 110 | 60 | 50 | 55 |
| *Williamsburg | 3 | 10,891 | 110 | 22 | 88 | 20 |
| *Covington | 4 | 10,459 | 110 | 48 | 62 | 44 |
| *Lexington | 6 | 8,454 | 80 | 32 | 48 | 40 |
| *Franklin | 3 | 8,033 | 80 | 83 | 0 | 104 |
| *South Boston | 7S | 7,489 | 70 | 21 | 49 | 30 |
| *Buena Vista | 6 | 6,979 | 70 | 212 | 0 | 303 |
| *Galax | 5 | 6,677 | 70 | 77 | 0 | 110 |
| *Bedford City (1) | 4 | 6,505 | | | | |
| *Clifton Forge | 4 | 6,006 | 60 | 43 | 17 | 72 |
| *Emporia | 9 | 5,404 | 50 | 0 | 50 | 0 |
| *Norton | 5 | 5,070 | 50 | 703 | 0 | 1400 |
| TOTAL | | 3,358,973 | 33,590 | 21,405 | 16,697 | 50 ave. |

(1) Both Bedford Co. and City are combined under the County listing. Population has been listed individually

*Non-metropolitan counties and cities as of 1968.

Source: Va. Outdoors Plan, Volume II, 1970. Richmond: Commission of Outdoor Recreation, Pages 103, 104.

Appendix 11-N

Demand, Supply and Need for Recreation Land
in Urban and Urbanizing Areas for 1980,
Local Government Responsibility
State of Virginia

| City or County | Reg. | Population (1980) | 1980 Demand | 1968 Total Supply (Ac.) | Need (Ac.) | % Adequacy |
|---|---|---|---|---|---|---|
| Fairfax Co. | 1 | 615,000 | 6,150 | 2,324 | 3,826 | 38 |
| Norfolk | 3 | 351,900 | 3,519 | 1,522 | 1,997 | 43 |
| Richmond | 2 | 230,300 | 2,303 | 1,457 | 846 | 63 |
| Virginia Beach | 3 | 226,400 | 2,264 | 1,189 | 1,075 | 52 |
| Arlington Co. | 1 | 215,600 | 2,156 | 750 | 1,406 | 35 |
| Prince William Co. | 1 | 200,700 | 2,007 | 176 | 1,831 | 9 |
| Henrico Co. | 2 | 200,500 | 2,005 | 318 | 1,687 | 16 |
| Alexandria | 1 | 181,800 | 1,818 | 280 | 1,538 | 15 |
| Chesterfield Co. | 2 | 170,000 | 1,700 | 550 | 1,150 | 32 |
| Newport News | 3 | 168,800 | 1,688 | 724 | 964 | 43 |
| Hampton | 3 | 156,100 | 1,561 | 640 | 921 | 41 |
| Chesapeake | 3 | 132,200 | 1,322 | 178 | 1,144 | 13 |
| Portsmouth | 3 | 125,100 | 1,251 | 564 | 687 | 45 |
| Roanoke City | 4 | 107,600 | 1,076 | 2,137 | 0 | 198 |
| Roanoke Co. | 4 | 94,200 | 942 | 411 | 531 | 44 |
| Pittsylvania Co. | 7S | 81,100 | 811 | 105 | 706 | 13 |
| Loudoun Co. | 1 | 80,200 | 802 | 115 | 687 | 14 |
| Lynchburg | 4 | 65,400 | 654 | 469 | 185 | 72 |
| Danville | 7S | 60,500 | 605 | 238 | 367 | 39 |
| Campbell Co. | 4 | 58,900 | 589 | 4 | 585 | 0.7 |
| Hanover Co. | 2 | 58,300 | 583 | 40 | 543 | 7 |
| York Co. | 3 | 56,700 | 567 | 54 | 513 | 10 |
| Albemarle Co. | 7N | 56,000 | 560 | 589 | 0 | 105 |
| Washington Co. | 5 | 54,600 | 546 | 252 | 249 | 46 |
| Charlottesville | 7N | 51,700 | 517 | 318 | 199 | 61 |
| Prince George Co. | 9 | 50,100 | 501 | 28 | 473 | 6 |
| Nansemond Co. | 3 | 46,100 | 461 | 142 | 319 | 31 |
| Petersburg | 9 | 40,600 | 406 | 1,257 | 0 | 310 |
| Salem | 4 | 40,000 | 400 | 496 | 0 | 124 |
| Fairfax City | 1 | 36,000 | 360 | 53 | 307 | 15 |
| Amherst Co. | 4 | 34,000 | 340 | 39 | 301 | 11 |
| Dinwiddie Co. | 9 | 33,900 | 339 | 49 | 290 | 14 |
| Bedford Co. | 4 | 29,800 | 298 | 25 | 273 | 8 |
| Hopewell | 9 | 29,200 | 292 | 49 | 243 | 17 |
| Staunton | 6 | 28,100 | 281 | 509 | 0 | 181 |

| City or County | Reg. | Population (1980) | 1980 Demand (Ac.) | 1968 Total Supply (Ac.) | Need (Ac.) | % Adequacy |
|---|---|---|---|---|---|---|
| Martinsville | 7S | 26,300 | 263 | 96 | 167 | 36 |
| Waynesboro | 6 | 22,400 | 224 | 153 | 71 | 72 |
| James City Co. | 3 | 20,300 | 203 | 0 | 203 | 0 |
| Colonial Heights | 9 | 20,200 | 202 | 13 | 189 | 6 |
| Fredericksburg | 1 | 18,300 | 183 | 61 | 122 | 33 |
| Bristol | 5 | 17,900 | 179 | 905 | 0 | 505 |
| Harrisonburg | 6 | 17,000 | 170 | 245 | 0 | 144 |
| Winchester | 6 | 16,000 | 160 | 246 | 0 | 154 |
| Radford | 5 | 13,500 | 135 | 239 | 0 | 177 |
| Suffolk | 3 | 13,400 | 134 | 50 | 84 | 37 |
| Falls Church | 1 | 13,000 | 130 | 60 | 70 | 46 |
| Lexington | 6 | 11,100 | 111 | 32 | 79 | 29 |
| Covington | 4 | 10,000 | 100 | 48 | 52 | 48 |
| Williamsburg | 3 | 9,800 | 98 | 22 | 76 | 22 |
| Franklin | 3 | 9,300 | 93 | 83 | 10 | 89 |
| South Boston | 7S | 8,600 | 86 | 21 | 65 | 24 |
| Buena Vista | 6 | 8,300 | 83 | 212 | 0 | 255 |
| Bedford City | 4 | 8,000 | 80 | NA | NA | |
| Galax | 5 | 7,400 | 74 | 77 | 0 | 104 |
| Clifton Forge | 4 | 6,700 | 67 | 43 | 24 | 64 |
| Emporia | 9 | 5,700 | 57 | 0 | 57 | 0 |
| Norton | 5 | 5,500 | 55 | 703 | 0 | 1280 |
| TOTAL | | | 44,561 | 21,360 | 27,157 | 39 ave. |

Source: Va. Outdoors Plan Volume II, Richmond: Commission of Outdoor Recreation, 1970 Pages 107, 108

Appendix II-0

Virginia's Demand, Supply and Need for Recreation Land in Rural Areas, Local Government Responsibility,* 1968 and 1980

| Region | 1968 Demand (Acres) | 1968 Supply (Acres) | 1968 Need (Acres) | % Adeq. | 1980 Demand (Acres) | 1980 Need (Acres) |
|---|---|---|---|---|---|---|
| Region 1 | | | | | | |
| Caroline Co. | 140 | 14 | 126 | 10 | 170 | 156 |
| King George Co. | 80 | 29 | 51 | 36 | 100 | 71 |
| Spotsylvania Co. | 170 | 35 | 135 | 20 | 230 | 195 |
| Stafford Co. | 230 | 5 | 225 | 2 | 330 | 325 |
| | 620 | 83 | 537 | 13 | 830 | 747 |
| Region 2 | | | | | | |
| Charles City Co. | 70 | 8 | 62 | 11 | 80 | 72 |
| Goochland Co. | 100 | 23 | 77 | 23 | 200 | 177 |
| New Kent Co. | 50 | 8 | 42 | 4 | 60 | 52 |
| Powhatan Co. | 80 | 5 | 75 | 6 | 150 | 145 |
| | 300 | 44 | 256 | 15 | 490 | 446 |
| Region 3 | | | | | | |
| Isle of Wight Co. | 190 | 57 | 133 | 30 | 230 | 173 |
| Southampton Co. | 200 | 29 | 171 | 14 | 210 | 181 |
| | 390 | 86 | 304 | 22 | 440 | 354 |
| Region 4 | | | | | | |
| Alleghany Co. | 130 | 19 | 111 | 14 | 150 | 131 |
| Appomattox Co. | 100 | 11 | 89 | 10 | 120 | 109 |
| Botetourt Co. | 180 | 121 | 59 | 67 | 210 | 89 |
| Craig Co. | 30 | 5 | 25 | 17 | 40 | 35 |
| | 440 | 156 | 284 | 35 | 520 | 364 |
| Region 5 | | | | | | |
| Bland Co. | 60 | 15 | 45 | 25 | 60 | 45 |
| Buchanan Co. | 380 | 31 | 349 | 7 | 430 | 399 |
| Carroll Co. | 250 | 54 | 196 | 23 | 310 | 256 |
| Dickenson Co. | 190 | 46 | 144 | 24 | 160 | 114 |
| Floyd Co. | 100 | 16 | 84 | 16 | 110 | 94 |
| Giles Co. | 170 | 74 | 96 | 43 | 200 | 126 |
| Grayson Co. | 170 | 25 | 145 | 15 | 190 | 165 |
| Lee Co. | 230 | 61 | 169 | 27 | 210 | 149 |

| Region | 1968 Demand (Acres) | 1968 Supply (Acres) | 1968 Need (Acres) | % Adeq. | 1980 Demand (Acres) | 1980 Need (Acres) |
|---|---|---|---|---|---|---|
| Region 5 (cont'd) | | | | | | |
| Montgomery Co. | 420 | 33 | 387 | 8 | 640 | 607 |
| Pulaski Co. | 290 | 580 | 0 | 200 | 370 | 0 |
| Russell Co. | 270 | 57 | 213 | 21 | 310 | 253 |
| Scott Co. | 250 | 41 | 209 | 16 | 280 | 239 |
| Smyth Co. | 320 | 37 | 283 | 12 | 360 | 323 |
| Tazewell Co. | 430 | 57 | 373 | 13 | 460 | 403 |
| Wise Co. | 390 | 78 | 312 | 20 | 340 | 262 |
| Wythe Co. | 230 | 44 | 186 | 19 | 250 | 206 |
| | 4150 | 1249 | 3191 | 30 | 4680 | 3641 |
| Region 6 | | | | | | |
| Augusta Co. | 440 | 103 | 337 | 23 | 580 | 477 |
| Bath Co. | 50 | 10 | 40 | 20 | 60 | 50 |
| Clarke Co. | 80 | 20 | 60 | 25 | 90 | 70 |
| Frederick Co. | 270 | 25 | 245 | 9 | 380 | 355 |
| Highland Co. | 30 | 7 | 23 | 23 | 20 | 13 |
| Rockbridge Co. | 170 | 22 | 148 | 13 | 170 | 148 |
| Rockingham Co. | 470 | 71 | 399 | 15 | 600 | 529 |
| Page Co. | 170 | 92 | 78 | 54 | 200 | 108 |
| Shenandoah Co. | 230 | 123 | 107 | 53 | 280 | 157 |
| Warren Co. | 160 | 44 | 116 | 27 | 190 | 146 |
| | 2070 | 517 | 1553 | 25 | 2570 | 2053 |
| Region 7N | | | | | | |
| Amelia Co. | 80 | 5 | 75 | 6 | 90 | 85 |
| Buckingham Co. | 110 | 40 | 70 | 35 | 120 | 80 |
| Charlotte Co. | 140 | 61 | 79 | 44 | 150 | 89 |
| Culpepper Co. | 170 | 14 | 156 | 8 | 210 | 196 |
| Cumberland Co. | 70 | 8 | 62 | 11 | 70 | 62 |
| Fauquier Co. | 280 | 43 | 237 | 15 | 340 | 297 |
| Fluvana Co. | 80 | 20 | 60 | 25 | 90 | 70 |
| Greene Co. | 50 | 32 | 18 | 64 | 70 | 38 |
| Louisa Co. | 140 | 24 | 116 | 17 | 150 | 126 |
| Lunenburg Co. | 130 | 20 | 110 | 15 | 140 | 120 |
| Madison Co. | 90 | 15 | 75 | 17 | 100 | 85 |
| Nelson Co. | 120 | 24 | 96 | 20 | 120 | 96 |
| Nottoway Co. | 150 | 39 | 111 | 26 | 150 | 91 |
| Orange Co. | 130 | 23 | 107 | 18 | 150 | 127 |
| Prince Edward Co. | 140 | 16 | 124 | 11 | 170 | 154 |
| Rappahannock Co. | 50 | 11 | 39 | 22 | 60 | 49 |
| | 1930 | 395 | 1535 | 20 | 2160 | 1765 |

| Region | 1968 Demand (Acres) | 1968 Supply (Acres) | 1968 Need (Acres) | % Adeq. | 1980 Demand (Acres) | 1980 Need (Acres) |
|---|---|---|---|---|---|---|
| Region 7S | | | | | | |
| Brunswick Co. | 170 | 34 | 136 | 20 | 190 | 156 |
| Franklin Co. | 290 | 38 | 252 | 13 | 350 | 312 |
| Halifax Co. | 350 | 47 | 303 | 13 | 400 | 353 |
| Henry Co. | 520 | 55 | 465 | 11 | 780 | 725 |
| Mecklenburg Co. | 340 | 63 | 277 | 18 | 400 | 337 |
| Patrick Co. | 160 | 14 | 146 | 9 | 180 | 166 |
| | 1830 | 251 | 1579 | 14 | 2300 | 2049 |
| Region 8 | | | | | | |
| Essex Co. | 80 | 17 | 63 | 21 | 90 | 73 |
| Gloucester Co. | 130 | 20 | 110 | 15 | 180 | 160 |
| King & Queen Co. | 60 | 11 | 49 | 18 | 60 | 49 |
| King William Co. | 80 | 15 | 65 | 19 | 90 | 75 |
| Lancaster Co. | 90 | 15 | 75 | 17 | 110 | 95 |
| Mathews Co. | 70 | 8 | 62 | 11 | 60 | 52 |
| Middlesex Co. | 60 | 18 | 42 | 30 | 60 | 42 |
| Northumberland Co. | 100 | 18 | 82 | 18 | 110 | 92 |
| Richmond Co. | 70 | 13 | 57 | 19 | 80 | 67 |
| Westmoreland Co. | 120 | 22 | 98 | 18 | 150 | 128 |
| | 860 | 157 | 703 | 18 | 990 | 833 |
| Region 9 | | | | | | |
| Greensville Co. | 120 | 15 | 105 | 12 | 140 | 125 |
| Surry Co. | 60 | 6 | 54 | 10 | 60 | 54 |
| Sussex Co. | 120 | 20 | 100 | 17 | 120 | 100 |
| | 300 | 41 | 259 | 14 | 320 | 279 |
| Region 10 | | | | | | |
| Accomack Co. | 280 | 52 | 228 | 19 | 280 | 228 |
| Northampton Co. | 170 | 16 | 154 | 9 | 180 | 164 |
| | 450 | 68 | 382 | 15 | 460 | 392 |
| TOTALS | 13,340 | 3,047 | 10,583 | 21 | 15,760 | 12,923 |

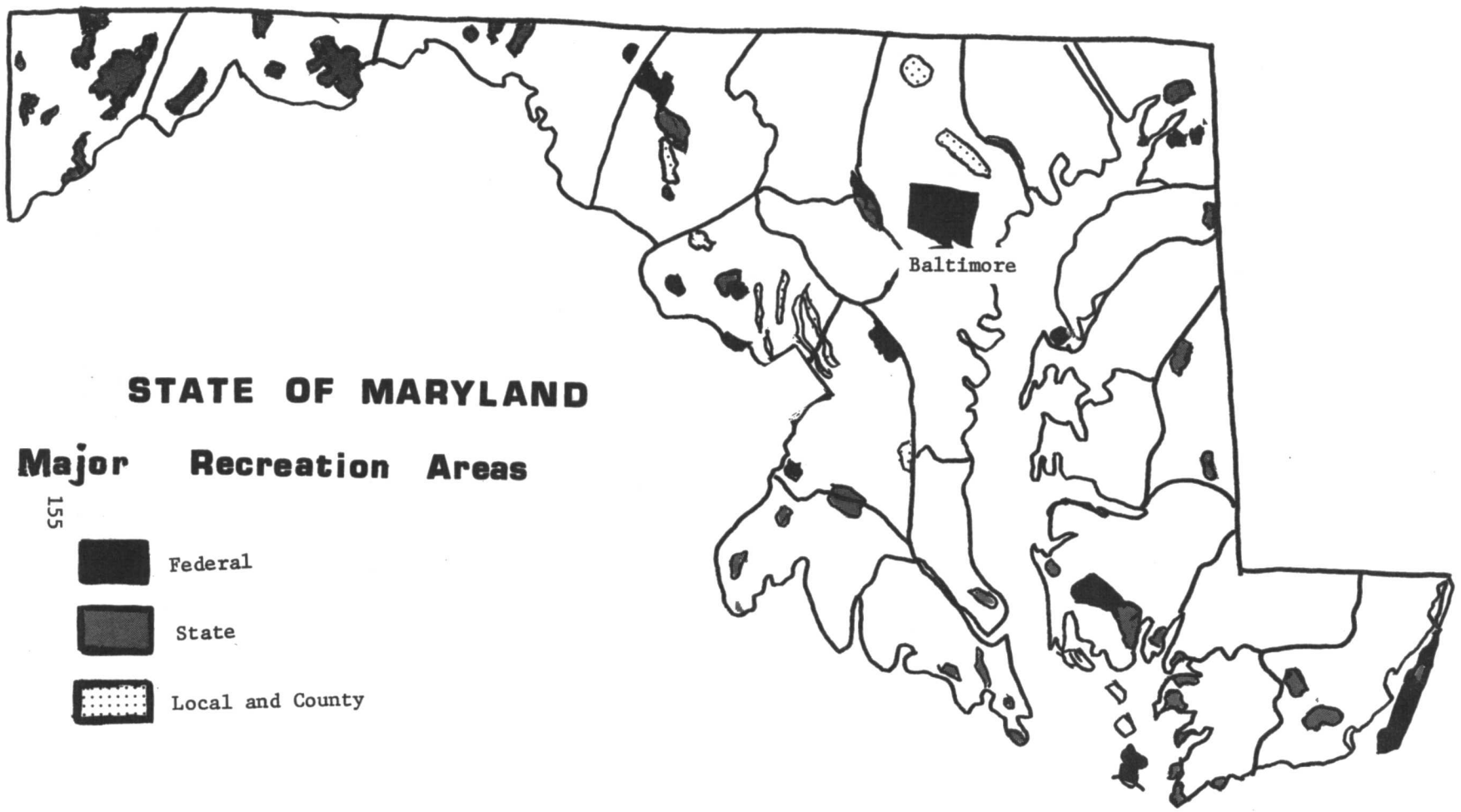
*County figures include component towns

Source: Va. Outdoors Plan Volume II, 1970, Richmond: Commission of Outdoor Recreation, Pages 110, 111, 112.

# RECREATION APPENDIX III

## Maryland

Appendix III-A




Adapted From: Maryland Outdoor Recreation and Open Space Comprehensive Plan, Phase II. Publication #175, Baltimore: State Planning Dept., Sept., 1972, p.27.

Appendix III-B

SUMMARY OF ANNUAL RESIDENT DEMAND OCCASIONS BY REGION AND ACTIVITY — 1970 and 1990 (in thousands)*

| Activities | Western Maryland/ Frederick County 1970 | 1990 | Baltimore 1970 | 1990 | Sub. Washington 1970 | 1990 | South. Maryland 1970 | 1990 | U. Eastern Shore 1970 | 1990 | L. Eastern Shore 1970 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attending Outdoor Concerts, | 145.5 | 279.1 | 1,535,900 | 3097.1 | 926.4 | 2362.1 | 57.4 | 119.5 | 69.0 | 136.8 | 58.5 | 110.9 |
| Attending Outdoor Sports Events | 207.8 | 1089.8 | 8670.4 | 13564.6 | 4913.4 | 9893.1 | 462.5 | 775.0 | 523.5 | 831.9 | 509.6 | 419.2 |
| Bicycling | 306.9 | 413.0 | 2081.8 | 2990.9 | 1187.9 | 2150.5 | 109.1 | 164.8 | 128.1 | 181.4 | 122.7 | 164.8 |
| Boating | 698.9 | 1287.1 | 5681.5 | 10731.9 | 3189.0 | 7877.8 | 256.9 | 522.0 | 308.99 | 603.1 | 309.2 | 369.8 |
| Camping | 288.6 | 665.5 | 2220.7 | 4499.4 | 1383.1 | 3609.5 | 127.0 | 276.6 | 146.4 | 289.3 | 136.0 | 263.6 |
| Driving for Pleasure | 5232.5 | 7925.0 | 37862.700 | 56866.0 | 10006.9 | 40744.9 | 1969.6 | 3338.7 | 2363.9 | 3781.3 | 2305.4 | 3181.0 |
| Fishing | 1004.1 | 1312.9 | 5892.0 | 8014.4 | 3537.8 | 6232.0 | 425.6 | 527.5 | 522.0 | 611.3 | 509.1 | 361.6 |
| Hiking | 141.0 | 263.8 | 1042.5 | 2100.5 | 808.6 | 2017.7 | 57.5 | 119.3 | 63.9 | 130.2 | 65.1 | 120.8 |
| Horseback Riding | 417.7 | 661.6 | 3058.0 | 5199.9 | 1790.8 | 3759.8 | 175.8 | 307.0 | 188.6 | 314.2 | 167.6 | 316.6 |
| Hunting | 469.5 | 623.0 | 2423.6 | 3182.9 | 2235.4 | 3836.5 | 199.4 | 289.2 | 235.4 | 319.1 | 220.7 | 382.5 |
| Ice Skating | 122.3 | 200.2 | 958.0 | 1655.4 | 592.9 | 1305.8 | 45.5 | 88.0 | 54.2 | 93.8 | 53.2 | 87.1 |
| Nature Walks | 726.1 | 1133.8 | 6213.7 | 10121.9 | 3627.9 | 7558.8 | 272.3 | 485.6 | 333.4 | 616.3 | 298.2 | 162.6 |
| Picnicking | 2089.7 | 3173.4 | 17857.9 | 28289.6 | 10355.2 | 21105.7 | 794.1 | 1354.4 | 956.4 | 1243.3 | 904.0 | 1367.2 |
| Playing Outdoor Sports | 5439.6 | 6946.8 | 51415.9 | 79552.0 | 31314.0 | 61044.7 | 1877.7 | 3107.7 | 2472.5 | 3821.0 | 2167.0 | 3137.1 |
| Sightseeing | 1645.9 | 2717.2 | 14234.8 | 24457.7 | 8562.9 | 18880.5 | 561.6 | 1033.8 | 701.5 | 1219.5 | 478.3 | 1110.4 |
| Sledding & Tobogganing | 378.5 | 636.1 | 4556.9 | 7896.3 | 2762.4 | 6077.1 | 120.0 | 235.6 | 142.6 | 249.9 | 125.2 | 303.9 |
| Snow Skiing | 45.5 | 76.0 | 352.3 | 864.2 | 308.3 | 660.9 | 15.5 | 31.2 | 17.7 | 30.6 | 17.3 | 28.4 |
| Swimming Beach | 2056.4 | 3760.7 | 17766.2 | 33915.4 | 11017.3 | 26968.0 | 754.2 | 1498.3 | 886.3 | 1806.8 | 882.0 | 1605.3 |
| Swimming Pool | 8243.0 | 13397.2 | 68946.6 | 117222.4 | 40506.4 | 88249.3 | 2824.1 | 5198.2 | 3546.8 | 6099.8 | 3546.1 | 6756.6 |
| Walking for Pleasure | 199.1 | 449.8 | 1156.0 | 2805.0 | 841.2 | 2563.7 | 65.9 | 167.8 | 78.0 | 184.7 | 72.2 | 163.1 |
| Water Skiing | | | | | | | | | | | | |
| TOTALS | 30858.6 | 48732.0 | 253913.4 | 417038.5 | 149867.8 | 316898.4 | 11171.7 | 19641.2 | 13739.1 | 22764.3 | 13047.4 | 20537.5 |

* Figures are rounded to the nearest hundreds.

Note: Resident Demand is the demand expressed in a given county or region by the residents of that particular county or region.

Source:
Maryland Outdoor Recreation and Open Space Comprehensive Plan, Phase II.
Baltimore: Maryland Dept. of State Planning, July 1971, p. 32.

Appendix III-C

SUMMARY OF ANNUAL IN-STATE DEMAND OCCASIONS BY REGION AND ACTIVITY — 1970 and 1990 (in thousands)*

| Activities | Western Maryland/ Frederick County 1970 | 1990 | Baltimore 1970 | 1990 | Sub. Washington 1970 | 1990 | South. Maryland 1970 | 1990 | U. Eastern Shore 1970 | 1990 | L. Eastern Shore 1970 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attending Outdoor Concerts | 88.9 | 195.2 | 1654.1 | 3615.0 | 927.3 | 2027.1 | 36.6 | 80.2 | 45.3 | 97.6 | 41.8 | 92.4 |
| Attending Outdoor Sports | 276.4 | 470.4 | 11466.0 | 19224.7 | 3698.5 | 6271.0 | 441.0 | 746.8 | 276.4 | 470.4 | 261.7 | 441.0 |
| Bicycling | 306.0 | 413.6 | 1081.7 | 1989.7 | 1187.1 | 2149.0 | 107.6 | 164.8 | 127.8 | 181.6 | 121.1 | 164.8 |
| Boating | 103.7 | 216.5 | 4229.2 | 8785.8 | 2444.7 | 4076.8 | 1326.1 | 2755.8 | 1107.8 | 2299.2 | 1233.3 | 2559.3 |
| Camping | 1902.3 | 4245.3 | 378.4 | 846.2 | 663.4 | 1457.8 | 515.6 | 1151.8 | 205.8 | 461.5 | 736.0 | 1642.2 |
| Driving for Pleasure | 3694.7 | 6156.6 | 19247.6 | 32056.1 | 24688.7 | 41114.8 | 8438.7 | 14052.3 | 6905.1 | 11498.6 | 6765.6 | 11267.5 |
| Fishing | 2103.9 | 3055.8 | 1866.8 | 2709.5 | 2615.0 | 3796.6 | 1724.2 | 2502.1 | 1783.5 | 2589.1 | 1794.6 | 2605.8 |
| Hiking | 362.1 | 775.0 | 506.5 | 1082.1 | 657.0 | 1012.9 | 309.2 | 663.1 | 351.9 | 750.5 | 179.0 | 382.4 |
| Horseback Riding | 672.4 | 1218.0 | 1740.4 | 3152.3 | 1810.2 | 3276.5 | 793.9 | 1437.8 | 540.5 | 977.5 | 243.1 | 442.2 |
| Hunting | 2064.2 | 3045.8 | 393.8 | 580.1 | 133.9 | 195.9 | 1024.3 | 1511.3 | 1185.3 | 1749.9 | 983.6 | 1451.1 |
| Ice Skating | 284.6 | 535.5 | 614.0 | 1155.7 | 513.1 | 967.0 | 127.5 | 239.7 | 185.6 | 349.9 | 96.9 | 181.6 |
| Nature Walks | 726.8 | 1133.0 | 6212.9 | 10120.8 | 3628.9 | 7558.8 | 271.6 | 484.5 | 332.8 | 616.6 | 298.5 | 452.5 |
| Picnicking | 3164.4 | 5455.6 | 9590.3 | 16538.9 | 10053.6 | 17333.9 | 2956.3 | 6820.3 | 3195.7 | 5511.9 | 2998.5 | 4170.8 |
| Playing Outdoor Sports | 5439.0 | 7947.1 | 51416.9 | 79552.1 | 31313.4 | 61045.8 | 1877.0 | 3106.6 | 2472.3 | 3822.3 | 2166.5 | 3135.9 |
| Sightseeing | 2509.0 | 4698.6 | 7708.4 | 14438.3 | 4989.9 | 9346.2 | 3009.8 | 5636.3 | 4013.9 | 7516.8 | 4172.3 | 7813.2 |
| Sledding & Tobogganing | 378.8 | 636.2 | 4556.7 | 7896.1 | 2762.8 | 6077.5 | 120.3 | 236.0 | 142.7 | 249.5 | 124.8 | 203.4 |
| Snow Skiing | 600.8 | 1361.3 | 122.6 | 277.9 | 225.0 | 507.4 | 15.8 | 31.5 | 1.1 | 2.3 | 0 | 0 |
| Swimming Beach | 104.0 | 215.7 | 3886.7 | 8090.5 | 2470.4 | 5142.4 | 3195.9 | 6652.4 | 256.8 | 5358.2 | 5043.6 | 1050.6 |
| Swimming Pool | 989.8 | 1810.1 | 9198.6 | 17560.0 | 5303.7 | 12983.6 | 363.0 | 716.4 | 426.3 | 821.5 | 423.9 | 772.5 |
| Walking for Pleasure | 8242.7 | 13399.1 | 68845.7 | 117222.4 | 40506.2 | 88250.0 | 2825.8 | 5197.3 | 3548.0 | 6098.3 | 3544.3 | 5755.8 |
| Water Skiing | 60.6 | 158.8 | 714.7 | 1875.0 | 258.4 | 678.4 | 586.9 | 1539.8 | 258.4 | 664.9 | 539.7 | 1418.7 |
| TOTALS | 34075.1 | 57143.2 | 206432.0 | 349769.2 | 140851.2 | 276269.4 | 31067.1 | 55726.8 | 27357.6 | 52088.0 | 31758.8 | 56463.9 |

* Figures are rounded to the nearest hundred.

Note: In-State Demand is the demand exerted upon a given county or region by Maryland residents regardless of the participants' place of residence.

Source:
See Appendix III-H, p. 33.

SUMMARY OF ANNUAL OUT-OF-STATE DEMAND BY REGION AND ACTIVITY — 1970 and 1990[1] (in thousands)*

| Activities | Western Maryland/ Frederick County 1970 | 1990 | Baltimore 1970 | 1990 | Sub. Washington 1970 | 1990 | South. Maryland 1970 | 1990 | U. Eastern Shore 1970 | 1990 | L. Eastern Shore 1970 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attending Outdoor Concerts | 45.3 | 97.6 | 247.5 | 542.1 | 184.8 | 406.1 | 5.2 | 12.1 | 15.7 | 34.9 | 13.9 | 31.4 |
| Attending Outdoor Sports | 138.2 | 235.2 | 1699.3 | 2884.1 | 740.9 | 1255.4 | 64.7 | 111.7 | 97.0 | 164.6 | 91.1 | 155.8 |
| Bicycling | | | | | | | | | | | | |
| Boating | 52.8 | 109.1 | 634.8 | 1317.0 | 489.3 | 985.9 | 198.3 | 412.9 | 387.4 | 804.0 | 431.1 | 896.8 |
| Camping | 950.1 | 2122.7 | 56.1 | 126.8 | 312.3 | 551.6 | 76.9 | 172.6 | 72.8 | 162.2 | 257.8 | 573.8 |
| Driving for Pleasure | 1849.2 | 3078.3 | 2887.5 | 4810.1 | 4938.5 | 8222.2 | 1264.8 | 2109.7 | 2417.9 | 4024.9 | 2366.5 | 3944.2 |
| Fishing | 1051.9 | 1527.9 | 279.7 | 405.6 | 522.3 | 759.3 | 259.3 | 376.0 | 624.1 | 905.6 | 627.8 | 913.0 |
| Hiking | 181.0 | 386.5 | 75.3 | 162.7 | 93.6 | 203.4 | 46.8 | 100.0 | 122.0 | 262.4 | 63.1 | 134.2 |
| Horseback Riding | 336.2 | 610.3 | 261.2 | 473.2 | 362.0 | 654.3 | 199.0 | 214.6 | 188.8 | 352.4 | 85.3 | 155.2 |
| Hunting | 1032.1 | 1522.9 | 58.2 | 87.3 | 27.2 | 38.8 | 153.3 | 227.0 | 415.2 | 613.0 | 343.4 | 508.3 |
| Ice Skating | 141.8 | 267.2 | 91.8 | 173.4 | 103.0 | 193.8 | 19.4 | 35.7 | 64.3 | 122.4 | 33.7 | 63.2 |
| Nature Walks | | | | | | | | | | | | |
| Picnicking | 1580.7 | 2729.4 | 1439.8 | 2482.1 | 2009.5 | 3455.5 | 594.7 | 1023.5 | 1117.4 | 1928.1 | 1048.6 | 1809.1 |
| Playing Outdoor Sports | | | | | | | | | | | | |
| Sightseeing | 1254.5 | 2348.0 | 1157.4 | 2166.6 | 999.0 | 1870.3 | 452.2 | 845.7 | 1405.3 | 2361.7 | 1458.9 | 2733.9 |
| Sledding & Tobogganing | | | | | | | | | | | | |
| Snow Skiing | 300.4 | 680.6 | 18.0 | 41.6 | 45.0 | 101.3 | | | | 1.1 | | |
| Swimming Beach | 51.4 | 107.9 | 582.9 | 1213.3 | 494.3 | 1028.5 | 478.9 | 997.7 | 89.9 | 1875.9 | 1765.5 | 3674.8 |
| Swimming Pool | | | | | | | | | | | | |
| Walking for Pleasure | | | | | | | | | | | | |
| Water Skiing | 29.6 | 79.4 | 107.7 | 281.3 | 25.6 | 135.9 | 87.5 | 228.8 | 887.0 | 232.9 | 189.8 | 496.7 |
| TOTALS | 8995.2 | 15903.0 | 9597.2 | 17167.2 | 11147.3 | 19562.3 | 3822.0 | 6868.1 | 7905.8 | 13835.1 | 8776.5 | 16090.4 |

* Figures are rounded to the nearest hundreds.

1 The total number of occasions of participation of out-of-state residents in Maryland within each region.

Source:
See Appendix III-H, p. 34

Appendix III- E

Per cent Out-of-State Demand

Summary by Region in Maryland

State Parks

| Region | Out-of-state average % of total attendance[1] | % of Maryland residents going out-of-state[2] | Net out-of-state demand as % of total demand | Out-of-State demand as % of in-state demand |
|---|---|---|---|---|
| Western Maryland | 48 | 15 | 33 | 50 |
| Baltimore | 20 | 7 | 13 | 15 |
| Suburban Washington | NA[3] | -- | 17[3] | 20 |
| Southern Maryland | 20 | 7 | 13 | 15 |
| Upper Eastern Shore | 31 | 5 | 26 | 35 |
| Lower Eastern Shore | 32 | 6 | 26 | 35 |

1 This represents the average of the percentages of out-of-state attendance compared to total attendance at each surveyed state park in each region. The figures are based on a 1965 state park attendance survey and estimates by Urban Research & Development Corporation.

2 Urban Research & Development Corporation estimates.

3 The 1965 State survey did not include parks in the Suburban Washington Region. The Suburban Washington estimate of net out-of-state demand is based on comparable figures of 18.6 percent, 15.3 percent and 5.5 percent for three regional parks (Cabin John, Wheaton and Clinton respectively) in the Suburban Washington Region.

Source:

See Appendix III-H, p. 33.

Appendix III-F

SUMMARY OF TOTAL IN-STATE AND OUT-OF-STATE ANNUAL & PEAK SEASON DEMAND OCCASIONS BY REGION AND ACTIVITY FOR 1970 (in thousands)*

| Activities | Western Maryland/ Frederick County | | Baltimore | | Sub. Washington | | South. Maryland | | U. Eastern Shore | | L. Eastern Shore | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual | Peak | Annual | Peak | Annual | Peak | Annual | Peak | Annual | Peak | Annual | Peak |
| Attending Outdoor Concerts | 134.2 | 77.0 | 1901.6 | 1090.0 | 1112.0 | 638.0 | 41.9 | 24.0 | 61.0 | 35.0 | 55.8 | 32.0 |
| Attending Outdoor Sports | 414.5 | 141.0 | 13165.3 | 4478.0 | 4439.4 | 1510.0 | 505.7 | 172.0 | 373.4 | 127.0 | 352.8 | 120.0 |
| Bicycling | 306.0 | 91.0 | 2081.7 | 619.0 | 1187.1 | 353.0 | 107.6 | 32.0 | 127.8 | 38.0 | 121.1 | 36.0 |
| Boating | 156.4 | 86.0 | 4864.0 | 2674.0 | 2934.0 | 1613.0 | 1524.3 | 838.0 | 1495.2 | 822.0 | 1664.4 | 915.0 |
| Camping | 2852.4 | 1372.0 | 434.5 | 209.0 | 975.7 | 625.0 | 592.5 | 285.0 | 278.6 | 134.0 | 993.8 | 478.0 |
| Driving for Pleasure | 5543.9 | 1511.0 | 22135.1 | 6033.0 | 29627.2 | 8075.0 | 9704.5 | 2645.0 | 9322.9 | 2541.0 | 9132.1 | 1489.0 |
| Fishing | 3155.8 | 1704.0 | 2146.5 | 1159.0 | 3137.3 | 1694.0 | 1983.5 | 1071.0 | 2407.6 | 1300.0 | 2422.4 | 1308.0 |
| Hiking | 543.1 | 267.0 | 581.7 | 286.0 | 750.5 | 369.0 | 356.0 | 175.0 | 473.9 | 233.0 | 242.0 | 119.0 |
| Horseback Riding | 1008.5 | 390.0 | 2001.6 | 774.0 | 2172.2 | 840.0 | 912.9 | 353.0 | 729.3 | 282.0 | 328.4 | 237.0 |
| Hunting | 3096.2 | 1596.0 | 452.0 | 233.0 | 161.0 | 183.0 | 1177.6 | 607.0 | 1600.5 | 825.0 | 1327.0 | 684.0 |
| Ice Skating | 426.4 | 418.0 | 705.8 | 692.0 | 616.1 | 604.0 | 146.9 | 144.0 | 250.9 | 246.0 | 130.6 | 128.0 |
| Nature Walks | 726.8 | 297.0 | 6212.9 | 2539.0 | 3628.9 | 1483.0 | 271.6 | 111.0 | 332.8 | 136.0 | 298.5 | 122.0 |
| Picnicking | 4745.1 | 1516.0 | 11030.1 | 3524.0 | 12063.0 | 3854.0 | 4551.0 | 1454.0 | 4313.1 | 1378.0 | 4047.1 | 1293.0 |
| Playing Outdoor Sports | 5439.0 | 1672.0 | 51416.9 | 15806.0 | 31313.4 | 9626.0 | 1877.0 | 577.0 | 2472.3 | 760.0 | 2166.5 | 666.0 |
| Sightseeing | 3763.5 | 1473.0 | 8865.9 | 3470.0 | 5988.9 | 2344.0 | 3462.0 | 1355.0 | 5419.2 | 2121.0 | 5631.2 | 2204.0 |
| Sledding & Tobogganing | 378.8 | 337.0 | 4556.7 | 3995.0 | 2762.8 | 2458.0 | 120.3 | 107.0 | 142.7 | 127.0 | 125.8 | 211.0 |
| Snow Skiing | 901.1 | 801.0 | 140.6 | 125.0 | 270.0 | 240.0 | 15.8 | 0 | 1.1 | 1.0 | 0 | 0 |
| Swimming Beach | 155.4 | 121.0 | 4469.6 | 3481.0 | 2964.8 | 2309.0 | 3674.8 | 2862.0 | 346.7 | 2700.0 | 6809.1 | 5303.0 |
| Swimming Pool | 989.8 | 829.0 | 9198.6 | 7164.0 | 5303.7 | 4442.0 | 363.0 | 304.0 | 426.3 | 357.0 | 523.9 | 355.0 |
| Walking for Pleasure | 8242.7 | 2214.0 | 68845.7 | 18492.0 | 40506.2 | 10880.0 | 2825.8 | 759.0 | 3548.0 | 953.0 | 3544.3 | 952.0 |
| Water Skiing | 90.2 | 67.0 | 822.4 | 611.0 | 284.0 | 211.0 | 674.3 | 501.0 | 1140.1 | 245.0 | 729.5 | 542.0 |
| TOTAL | 43069.8 | 16980.0 | 216029.2 | 77455.0 | 151898.2 | 53951.0 | 34889.0 | 14376.0 | 35263.4 | 15370.0 | 40545.3 | 17984.0 |

*Figures are rounded to the nearest hundreds.

Source:
See Appendix III-H, p. 34

SUMMARY OF TOTAL IN-STATE AND OUT-OF-STATE ANNUAL & PEAK SEASON DEMAND OCCASIONS BY REGION AND ACTIVITY FOR 1990 (in thousands)*

| Activities | Western Maryland/ Frederick County | | Baltimore | | Sub. Washington | | South. Maryland | | U. Eastern Shore | | L. Eastern Shore | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual | Peak | Annual | Peak | Annual | Peak | Annual | Peak | Annual | Peak | Annual | Peak |
| Attending Outdoor Concerts | 292.8 | 168.0 | 4157.1 | 2385.0 | 2433.2 | 1396.0 | 92.4 | 53.0 | 132.5 | 76.0 | 123.8 | 71.0 |
| Attending Outdoor Sports | 705.6 | 240.0 | 22108.8 | 7520.0 | 7526.4 | 2560.0 | 858.5 | 292.0 | 635.0 | 216.0 | 596.8 | 203.0 |
| Bicycling | 413.6 | 123.0 | 2989.7 | 889.0 | 2149.0 | 639.0 | 164.8 | 49.0 | 181.6 | 54.0 | 164.8 | 49.0 |
| Boating | 325.6 | 179.0 | 10102.7 | 554.0 | 6062.7 | 3333.0 | 3168.7 | 1742.0 | 3103.2 | 1706.0 | 4566.1 | 1900.0 |
| Camping | 6368.0 | 3063.0 | 973.0 | 468.0 | 1909.4 | 1226.0 | 1324.3 | 637.0 | 623.7 | 300.0 | 2216.2 | 1066.0 |
| Driving for Pleasure | 9234.9 | 2517.0 | 36866.1 | 10048.0 | 49337.0 | 13447.0 | 16161.9 | 4405.0 | 15523.5 | 4231.0 | 15211.7 | 4146.0 |
| Fishing | 4583.7 | 2475.0 | 3115.1 | 1682.0 | 4555.9 | 2460.0 | 2878.0 | 1554.0 | 3494.7 | 1887.0 | 3518.8 | 1900.0 |
| Hiking | 1161.4 | 571.0 | 1244.8 | 612.0 | 1216.3 | 598.0 | 762.8 | 375.0 | 1012.9 | 498.0 | 516.6 | 254.0 |
| Horseback Riding | 1828.3 | 707.0 | 3625.6 | 1402.0 | 3930.7 | 1520.0 | 1652.5 | 639.0 | 1318.9 | 510.0 | 597.4 | 231.0 |
| Hunting | 4568.7 | 2355.0 | 667.4 | 344.0 | 234.7 | 221.0 | 1738.2 | 896.0 | 2362.9 | 1218.0 | 1959.4 | 1010.0 |
| Ice Skating | 802.7 | 787.0 | 1329.1 | 1303.0 | 1160.8 | 1138.0 | 275.4 | 270.0 | 472.3 | 463.0 | 244.8 | 240.0 |
| Nature Walks | 1133.0 | 463.0 | 10120.8 | 4136.0 | 7558.8 | 3089.0 | 484.5 | 198.0 | 616.6 | 252.0 | 462.5 | 189.0 |
| Picnicking | 8185.0 | 2615.0 | 19021.0 | 6077.0 | 20789.5 | 6641.0 | 7843.8 | 2506.0 | 7440.0 | 2377.0 | 6979.9 | 2230.0 |
| Playing Outdoor Sports | 7947.1 | 2443.0 | 79552.1 | 24455.0 | 61045.8 | 18766.0 | 3106.6 | 955.0 | 3822.3 | 1175.0 | 3135.9 | 964.0 |
| Sightseeing | 7046.7 | 2758.0 | 16604.9 | 6499.0 | 11216.5 | 4390.0 | 6481.0 | 2537.0 | 9878.5 | 3972.0 | 10547.0 | 4128.0 |
| Sledding & Tobogganing | 636.2 | 566.0 | 7896.1 | 7560.0 | 6077.5 | 5407.0 | 236.0 | 210.0 | 249.5 | 222.0 | 203.4 | 181.0 |
| Snow Skiing | 2041.9 | 1815.0 | 319.5 | 284.0 | 608.6 | 542.0 | 31.5 | | 3.4 | 3.0 | | |
| Swimming Beach | 323.6 | 252.0 | 9303.9 | 7246.0 | 6170.9 | 4806.0 | 7650.1 | 5958.0 | 7234.1 | 5634.0 | 14175.4 | 11040.0 |
| Swimming Pool | 1810.1 | 1510.0 | 17560.0 | 13676.0 | 12983.6 | 10874.0 | 716.4 | 600.0 | 821.5 | 688.0 | 772.5 | 647.0 |
| Walking for Pleasure | 13399.1 | 3599.0 | 117222.4 | 31486.0 | 88250.0 | 23704.0 | 5197.3 | 1396.0 | 6098.3 | 1638.0 | 5755.8 | 1546.0 |
| Water Skiing | 238.2 | 177.0 | 2156.3 | 1602.0 | 814.3 | 605.0 | 1768.6 | 1314.0 | 897.8 | 667.0 | 1915.4 | 1523.0 |
| TOTALS | 73046.2 | 29383.0 | 366936.4 | 135228.0 | 295631.6 | 106762.0 | 62594.3 | 26586.0 | 64923.2 | 27787.0 | 72554.2 | 33418.0 |

* Figures are rounded to the nearest hundreds.

Source:
See Appendix III-M, p. 35

Total Number of Employees, Payroll, and Units of Business
During mid-March 1970, 1971, and 1972 in Travel-Related
Standard Industrial Classifications of Coastal Counties in Maryland

Anne Arundel

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 4,070 | 2,668 | 272 | 3,896 | 2,724 | 262 | 4,370 | 3,373 | 268 |
| 5997 | 59 | 42 | 16 | 53 | 31 | 13 | 73 | 44 | 16 |
| 70 | 676 | 527 | 31 | 735 | 582 | 29 | 701 | 635 | 32 |
| 72 | 1,065 | 1,040 | 139 | 1,040 | 1,001 | 138 | 1,033 | 1,095 | 139 |
| 75 | 420 | 497 | 57 | 400 | 530 | 61 | 396 | 555 | 67 |
| 76 | 252 | 299 | 49 | 237 | 326 | 46 | 215 | 323 | 46 |
| 78 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 79 | 785 | 724 | 48 | 769 | 750 | 48 | 780 | 775 | 51 |
| All S.I.C.'s | 48,237 | 76,500 | 2,998 | 40,300 | 84,490 | 3,024 | 49,820 | 90,354 | 3,160 |

Baltimore City

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 13,123 | 9,650 | 1,307 | 13,708 | 11,066 | 1,311 | 13,731 | 11,849 | 1,245 |
| 5997 | 127 | 75 | 28 | 162 | 118 | 31 | 208 | 152 | 35 |
| 70 | 1,803 | 1,484 | 81 | 1,699 | 1,573 | 78 | 1,668 | 1,643 | 71 |
| 72 | 7,467 | 7,843 | 834 | 6,857 | 7,512 | 784 | 6,272 | 7,293 | 730 |
| 75 | 3,010 | 4,349 | 297 | 3,210 | 4,847 | 294 | 3,010 | 5,306 | 281 |
| 76 | 1,567 | 2,456 | 195 | 1,485 | 2,536 | 181 | 1,487 | 2,819 | 190 |
| 78 | 1,053 | 921 | 44 | 952 | 924 | 43 | 940 | 992 | 42 |
| 79 | 2,266 | 2,787 | 117 | 2,702 | 3,817 | 102 | 2,879 | 3,086 | 102 |
| All S.I.C.'s | 367,249 | 587,607 | 15,922 | 361,898 | 609,956 | 15,502 | 359,852 | 674,568 | 15,034 |

Baltimore

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 7,984 | 6,288 | 473 | 7,869 | 6,954 | 470 | 8,660 | 7,897 | 460 |
| 5997 | 85 | 46 | 20 | 121 | 63 | 23 | 140 | 78 | 26 |
| 70 | 1,032 | 939 | 46 | 211 | 133 | 19 | 198 | 130 | 20 |
| 72 | 2,528 | 2,327 | 418 | 406 | 307 | 74 | 401 | 308 | 69 |
| 75 | 800 | 1,097 | 124 | 179 | 219 | 38 | 201 | 256 | 42 |
| 76 | 382 | 626 | 69 | 30 | 36 | 12 | 39 | 42 | 16 |
| 78 | 317 | 184 | 18 | NA | NA | NA | NA | NA | NA |
| 79 | 1,666 | 1,376 | 103 | 108 | 90 | 11 | 124 | 94 | 6 |
| All S.I.C.'s | 150,938 | 263,111 | 6,266 | 14,658 | 17,944 | 1,273 | 16,486 | 21,001 | 1,315 |

Calvert

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 116 | 72 | 19 | 113 | 60 | 16 | 158 | 90 | 19 |
| 70 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 72 | NA | NA | NA | 53 | 41 | 14 | 54 | 40 | 12 |
| 75 | NA | NA | NA | NA | NA | NA | NR* | NR | NR |
| 76 | (All services=) | | | (All Services=) | | | (All Services=) | | |
| 78 | (531) | (445) | (52) | (567) | (506) | (58) | (554) | (547) | (56) |
| 79 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| All S.I.C.'s | 2,659 | 3,870 | 262 | 3,732 | 7,884 | 282 | 4,315 | 12,712 | 305 |

*None Reported

Caroline

| S.I.C. | 1970* # | 1970* $ | 1970* units | 1971* # | 1971* $ | 1971* units | 1972* # | 1972* $ | 1972* units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 96 | 39 | 16 | 112 | 47 | 13 | 119 | 54 | 13 |
| 70 | NR** | NR | NR | NR | NR | NR | NR | NR | NR |
| 72 | 78 | 54 | 16 | 80 | 61 | 21 | 74 | 58 | 20 |
| 75 | NA | NA | NA | NA | NA | NA | 36 | 54 | 12 |
| 76 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 78 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 79 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| All S.I.C.'s | 3,737 | 4,513 | 341 | 3,700 | 4,268 | 335 | 3,062 | 4,382 | 335 |

* All Services = 231/183/69 225/191/70 326/294/75

** None Reported

Cecil

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 428 | 259 | 64 | 473 | 282 | 62 | 521 | 334 | 57 |
| 70 | 39 | 21 | 12 | 50 | 29 | 16 | 52 | 30 | 17 |
| 72 | 95 | 80 | 37 | 116 | 91 | 36 | 115 | 90 | 34 |
| 75 | 52 | 74 | 18 | 55 | 77 | 16 | 60 | 83 | 15 |
| 76 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 84 | 70 | 14 | 91 | 73 | 13 | 86 | 69 | 11 |
| All S.I.C.'s | 9,032 | 12,197 | 689 | 9,077 | 12,864 | 699 | 8,835 | 13,350 | 690 |

*None Reported

Charles

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 632 | 398 | 63 | 639 | 408 | 61 | 808 | 501 | 62 |
| 70 | 97 | 54 | 18 | 102 | 52 | 17 | 81 | 45 | 16 |
| 72 | 262 | 204 | 22 | 243 | 199 | 25 | 292 | 236 | 29 |
| 75 | NR* | NR | NR | 45 | 61 | 11 | 65 | 87 | 12 |
| 76 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 127 | 87 | 15 | 109 | 85 | 14 | 96 | 85 | 14 |
| All S.I.C.'s | 7,028 | 11,677 | 590 | 6,461 | 9,725 | 605 | 6,371 | 8,799 | 630 |

*None Reported

Dorchester

| S.I.C. | 1970* # | 1970* $ | 1970* units | 1971* # | 1971* $ | 1971* units | 1972* # | 1972* $ | 1972* units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 221 | 86 | 27 | 190 | 91 | 25 | 218 | 96 | 24 |
| 70 | NR** | NR | NR | NR | NR | NR | NR | NR | NR |
| 72 | 113 | 83 | 24 | 104 | 63 | 23 | 138 | 87 | 27 |
| 75 | 47 | 61 | 13 | 42 | 60 | 11 | 44 | 66 | 12 |
| 76 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| All S.I.C.'s | 7,632 | 9,259 | 520 | 7,755 | 10,451 | 518 | 7,401 | 10,570 | 528 |

* All Services= 721/ 637 / 125 805 / 754 / 118 839 / 783 / 124

** None Reported

Harford

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 919 | 548 | 80 | 909 | 610 | 78 | 1,212 | 711 | 76 |
| 70 | 173 | 112 | 22 | 211 | 133 | 19 | 198 | 130 | 20 |
| 72 | 395 | 320 | 73 | 406 | 307 | 74 | 401 | 308 | 69 |
| 75 | 124 | 168 | 31 | 179 | 219 | 38 | 201 | 256 | 42 |
| 76 | 31 | 35 | 11 | 30 | 36 | 12 | 39 | 42 | 16 |
| 78 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 115 | 85 | 11 | 108 | 90 | 11 | 124 | 94 | 6 |
| All S.I.C.'s | 14,024 | 17,111 | 1,260 | 14,658 | 17,944 | 1,273 | 16,486 | 21,001 | 1,315 |

* None Reported

Kent

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 173 | 97 | 20 | 174 | 104 | 24 | 196 | 112 | 20 |
| 70 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 72 | 119 | 100 | 18 | 124 | 98 | 22 | 106 | 99 | 19 |
| 75 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 76 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| All S.I.C.'s | 3,358** | 3.943 | 346 | 2,983 | 3,642 | 357 | 3,160 | 4,240 | 333 |

* None Reported

** All Services = 713 / 836 / 88 729 / 928 /93 698 / 941 / 81

Queen Anne's

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 149 | 65 | 17 | 154 | 63 | 17 | 182 | 87 | 19 |
| 70 | NR* | NR | NR | NR | NR | NR | | | |
| 72 | NR | NR | NR | NR | NR | NR | | | |
| 75 | NR | NR | NR | NR | NR | NR | | | |
| 76 | NR | NR | NR | NR | NR | NR | | | |
| 78 | NR | NR | NR | NR | NR | NR | | | |
| 79 | NR | NR | NR | NR | NR | NR | | | |
| All S.I.C.'s | 2,476** | 2.446 | 283 | 2,544 | 2,512 | 277 | 2,921 | 3,346 | 288 |

* None Reported

** All services= 220 / 194 / 51 270 / 226 / 50 287 / 267 / 48

Somerset

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 83 | 36 | 17 | 70 | 33 | 13 | 86 | 41 | 14 |
| 70 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 72 | 86 | 79 | 16 | 71 | 85 | 17 | 86 | 105 | 19 |
| 75 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 76 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| All S.I.C.'s | 2,774** | 2,575 | 286 | 2,490 | 2,427 | 280 | 2,680 | 3,111 | 273 |

* None Reported

** All Services= 272 / 237 / 49 282 / 267 / 54 339 / 435 / 56

St. Mary's

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 476 | 242 | 51 | 483 | 273 | 54 | 554 | 326 | 57 |
| 70 | 116 | 99 | 12 | 128 | 108 | 12 | 234 | 189 | 10 |
| 72 | 173 | 145 | 24 | 166 | 148 | 25 | 156 | 146 | 27 |
| 75 | NR | NR | NR | 28 | 27 | 10 | 30 | 28 | 13 |
| 76 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| All S.I.C.'s | 4,330 | 5,042 | 564 | 4,284 | 5,302 | 572 | 4,726 | 6,318 | 598 |

* None Reported

Talbot

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 238 | 126 | 26 | 234 | 119 | 28 | 310 | 179 | 30 |
| 70 | 260 | 165 | 8 | 191 | 142 | 6 | 211 | 158 | 6 |
| 72 | 179 | 160 | 26 | 167 | 141 | 26 | 169 | 165 | 26 |
| 75 | 26 | 32 | 11 | 36 | 36 | 14 | 48 | 45 | 14 |
| 76 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| All S.I.C.'s | 7,005 | 8,360 | 648 | 7.082 | 8.805 | 657 | 7,410 | 10,015 | 667 |

* None Reported

Wicomico

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 772 | 406 | 44 | 867 | 494 | 48 | 892 | 697 | 43 |
| 70 | 155 | 113 | 14 | 173 | 139 | 11 | 154 | 142 | 12 |
| 72 | 349 | 281 | 45 | 284 | 252 | 50 | 343 | 302 | 53 |
| 75 | 141 | 143 | 26 | 129 | 139 | 27 | 99 | 113 | 24 |
| 76 | 98 | 134 | 20 | 102 | 151 | 19 | 99 | 158 | 20 |
| 78 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 89 | 62 | 13 | 97 | 64 | 11 | D** | D | 11 |

*None Reported

** Not reported to avoid disclosure

Worcester

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 285 | 174 | 46 | 308 | 185 | 50 | 377 | 203 | 55 |
| 70 | 291 | 230 | 38 | 323 | 285 | 38 | 400 | 324 | 42 |
| 72 | 107 | 90 | 21 | 106 | 90 | 21 | 101 | 95 | 23 |
| 75 | 65 | 109 | 10 | 79 | 126 | 10 | NR | NR | NR |
| 76 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 102 | 96 | 22 | 102 | 108 | 20 | 200 | 154 | 23 |
| All S.I.C.'s | 7,049 | 8,114 | 636 | 7,272 | 8,700 | 635 | 8,219 | 9,624 | 672 |

* None Reported

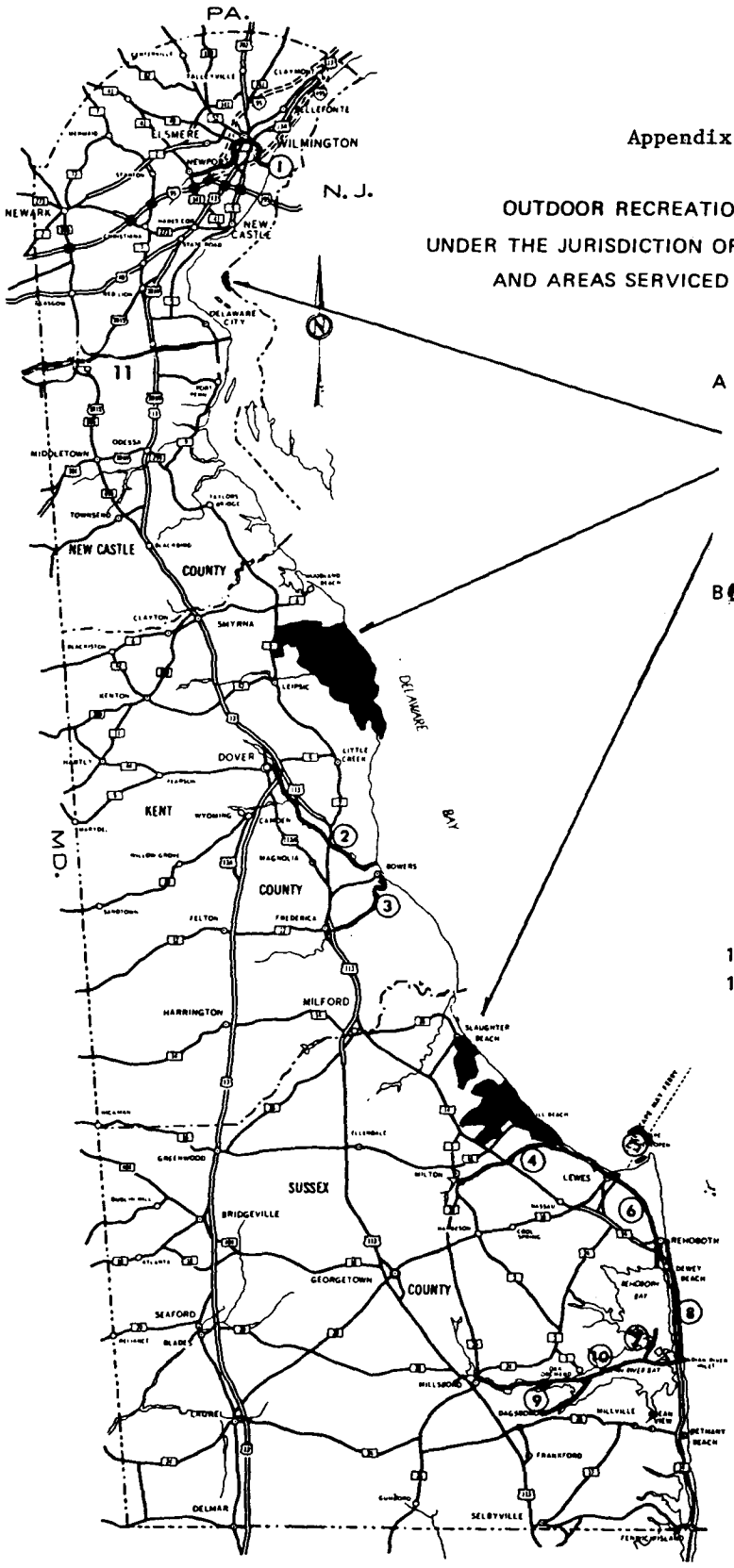
Source:
County Business Patterns, U.S. Dept. of Commerce, Bureau of Census

# RECREATION APPENDIX IV

## Delaware

Appendix IV-A

OUTDOOR RECREATION AREAS IN DELAWARE
UNDER THE JURISDICTION OF THE FEDERAL GOVERNMENT
AND AREAS SERVICED BY FEDERAL AGENCIES




A FEDERAL LANDS -

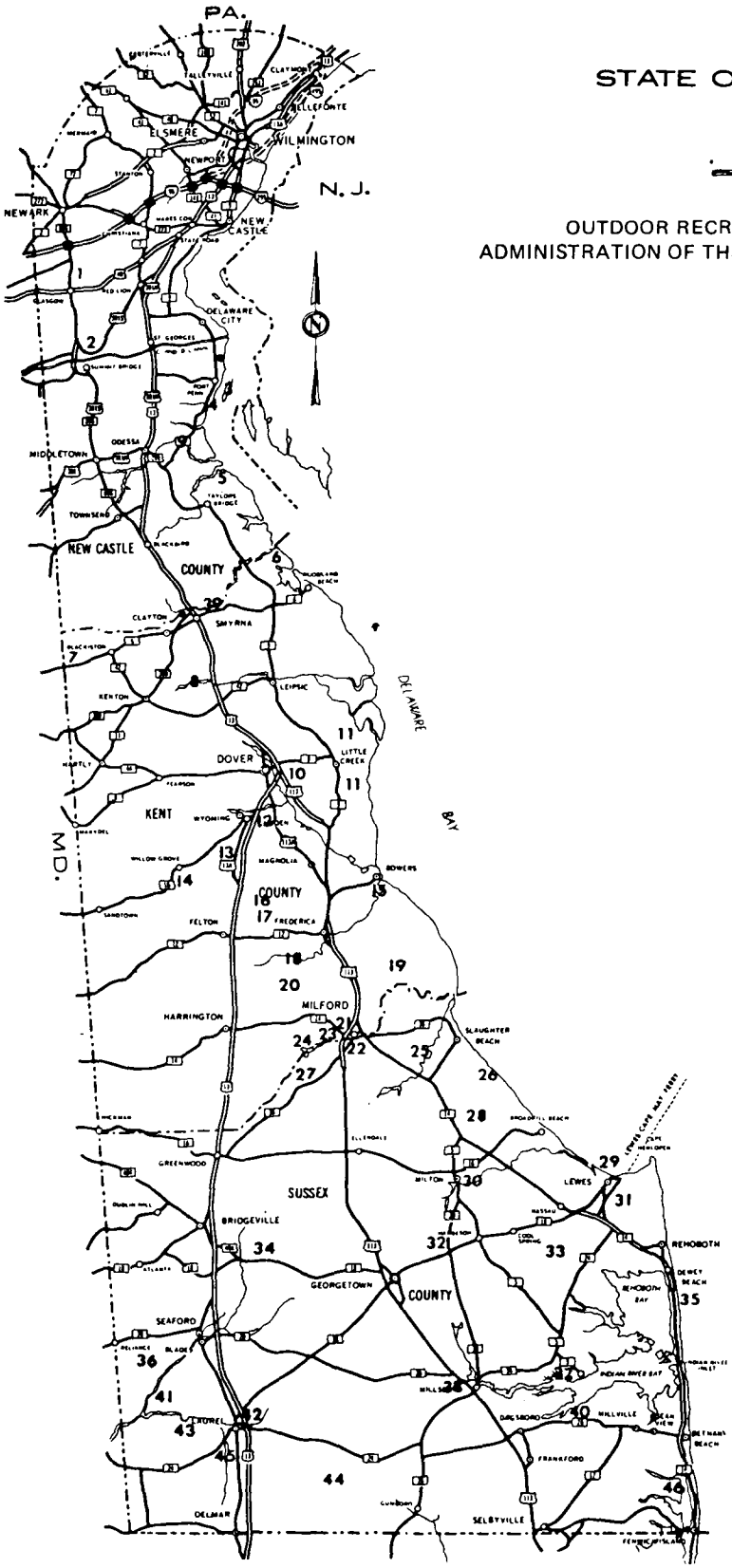
Kilcohook Wildlife Refuge
Bombay Hook Wildlife Refuge
Prime Hook Wildlife Refuge

B AREAS SERVED BY U.S. CORPS OF ENGINEERS — (9)

1. Christiana River Project (Wilmington Harbor)
2. St. Jones River Project
3. Murderkill River Project
4. Broadkill River Project
5. Harbor of Refuge, Lewes, Delaware
6. Inland Waterway - Rehoboth to Lewe
7. Waterway - Indian River Inlet to Rehoboth Bay
8. Beach Erosion Control Project
9. Pepper Creek Project
10. Indian River Inlet and Bay Project
11. Chesapeake and Delaware Canal

Source: Delaware Comprehensive Outdoor Recreation Plan. State Planning Office, 1970. p.26.

# STATE OF DELAWARE




OUTDOOR RECREATION AREAS UNDER
ADMINISTRATION OF THE FISH AND WILDLIFE DIVISION

A.A. Access Area
W.A. Wildlife Area

Legend

21 Becks Pond*
22 Lums Pond
23 Reedy Island
24 Augustine Beach
25 Appoquinimink W.A.
26 Woodland Beach W.A.
27 Blackiston W.A.
28 Garrisons Lake
29 Silver Run W.A.
~~10~~ S.P.C.A. Dog Shelter
11 Little Creek W.A.
12 Moores Lake
13 Derby Pond
14 Petersburg W.A.
15 Bowers Beach
16 McGinnis Pond
17 Andrews Lake
18 Coursey Pond
19 Milford Neck W.A.
20 McCauley Pond
21 Haven Lake
22 Silver Lake
23 Griffiths Lake
24 Blairs Pond
25 Cedar Creek
26 Fowler Beach
27 Abbotts Pond
28 Primehook W.A.
29 Lewes A.A.
30 Milton A.A.
31 Gordon Pond
32 Gravel Hill
33 Rabbits Ferry
34 Tussock Pond (Collins)
35 Rehoboth Bay A.A.
36 Craigs Pond
37 Rosedale Beach A.A.
38 Ingrams Pond
39 Duck Creek A.A.
40 Pepper Creek
41 Nanticoke W.A.
42 Records Pond
43 Portsville Pond
44 Raccoon Pond
45 Horsey Pond
46 Assawoman W.A.

*Leased to New Castle County Parks and Recreation Commission Dec. 14, 1967

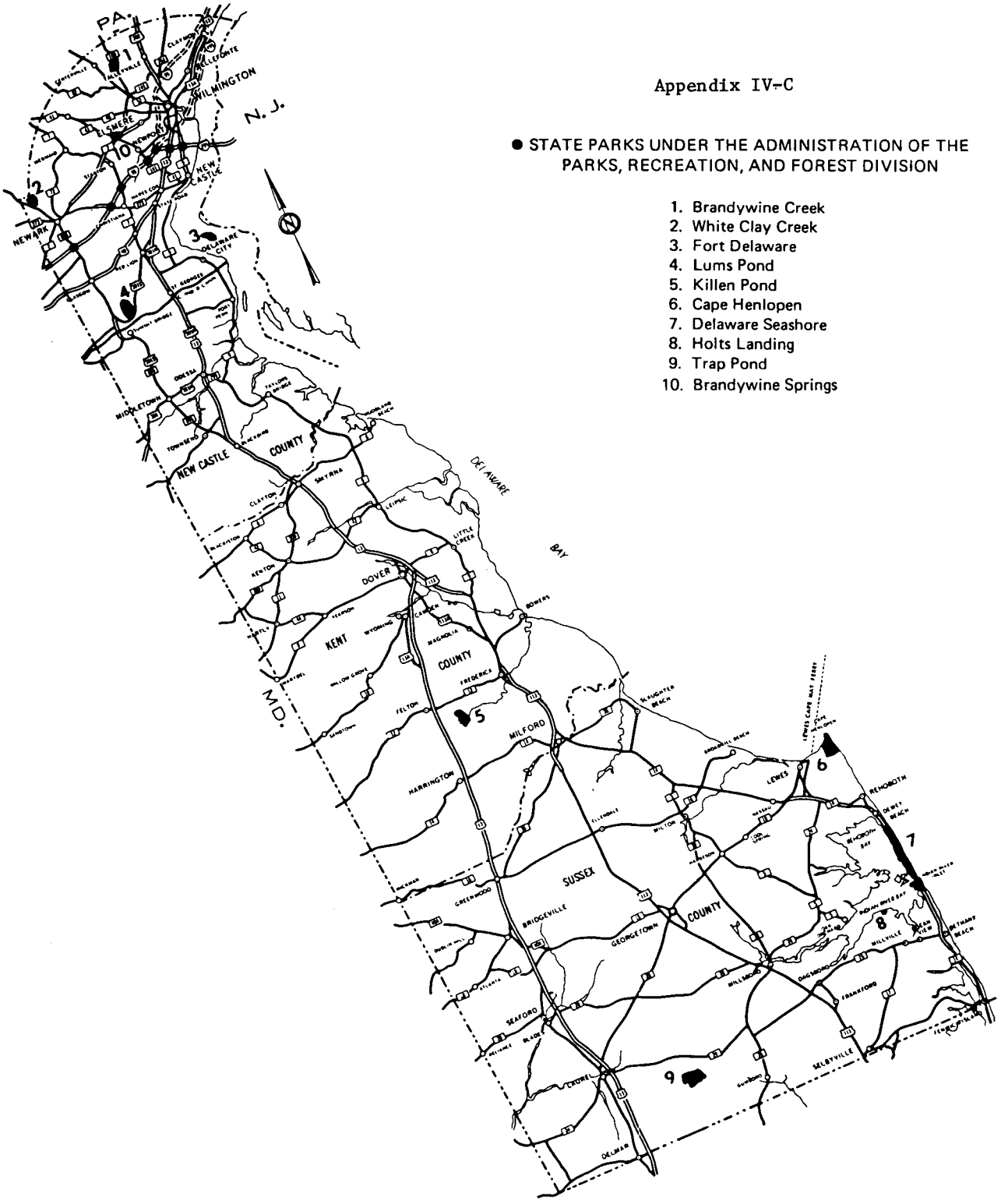


Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 37

Appendix IV-C

● STATE PARKS UNDER THE ADMINISTRATION OF THE PARKS, RECREATION, AND FOREST DIVISION

1. Brandywine Creek
2. White Clay Creek
3. Fort Delaware
4. Lums Pond
5. Killen Pond
6. Cape Henlopen
7. Delaware Seashore
8. Holts Landing
9. Trap Pond
10. Brandywine Springs

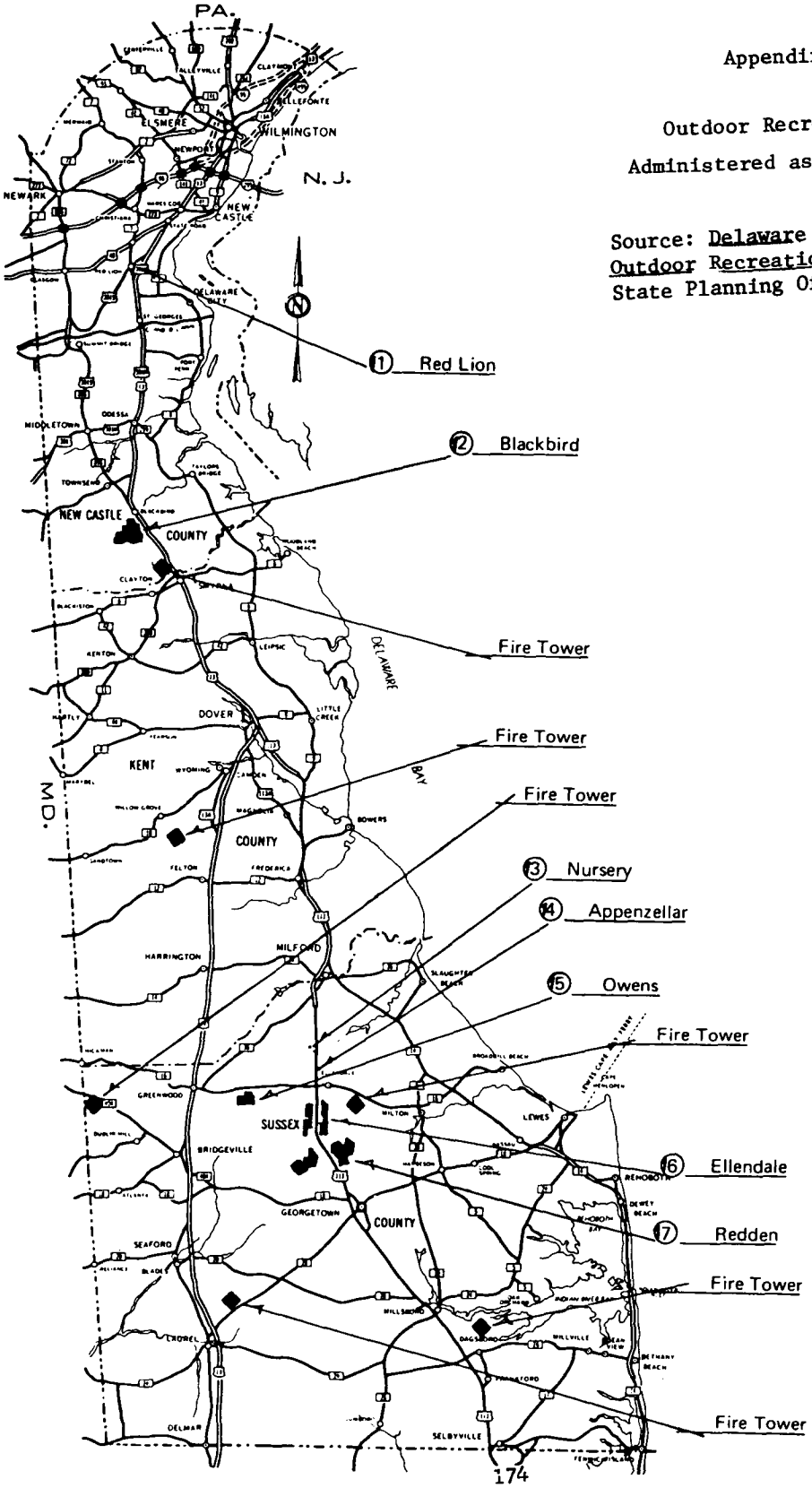



Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 35.

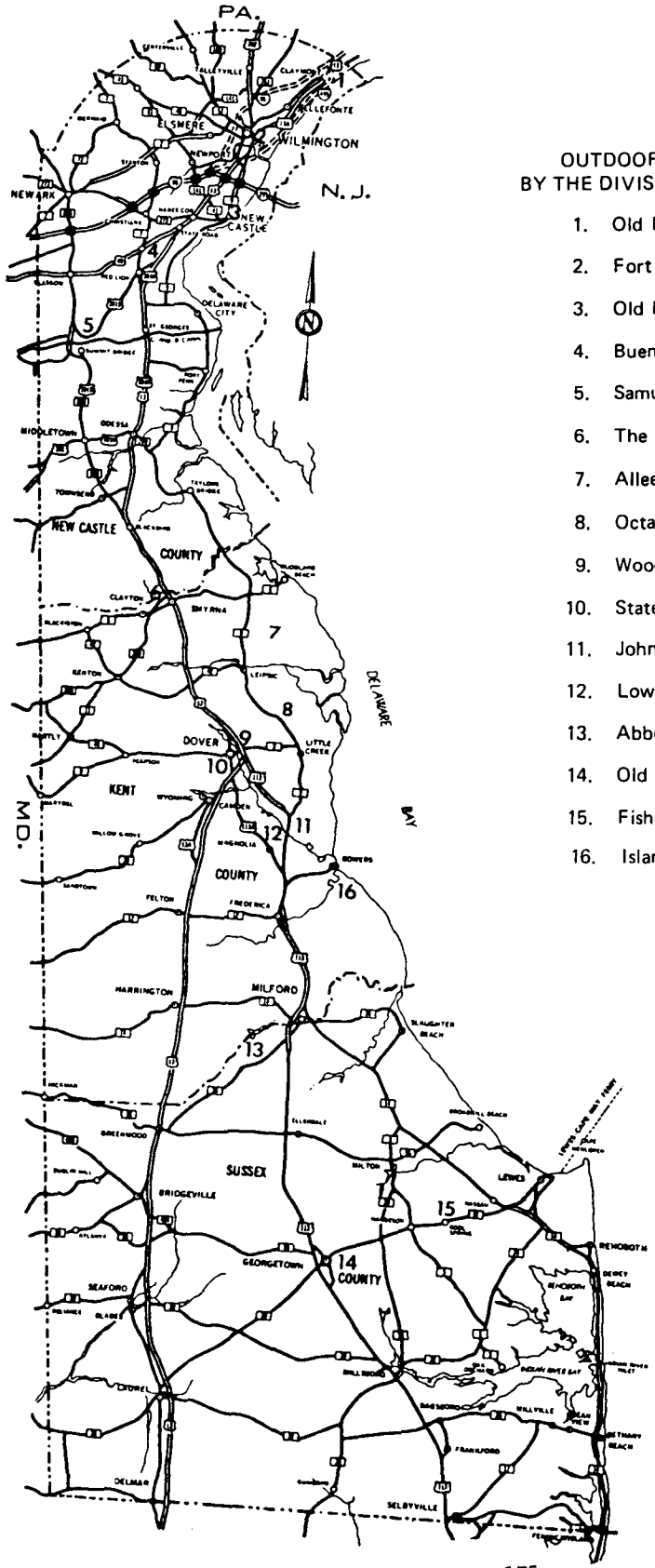
Appendix IV-D

Outdoor Recreation Areas
Administered as State Forests

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 33.



Appendix IV-E



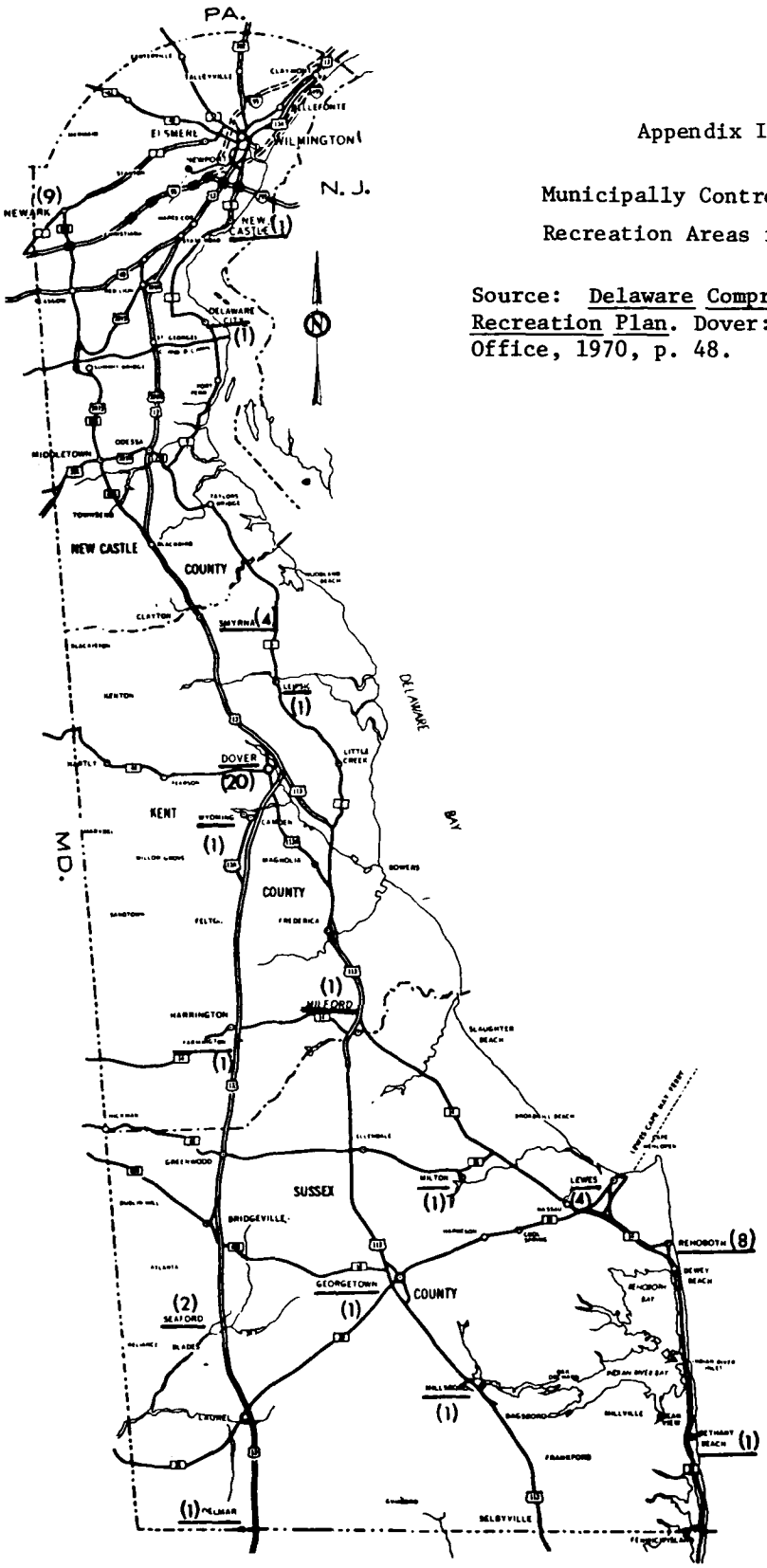

OUTDOOR RECREATION AREAS ADMINISTERED
BY THE DIVISION OF ARCHIVES AND CULTURAL AFFAIRS

1. Old Robinson House and Early Swedish Block House
2. Fort Christina Monument
3. Old New Castle County Court House
4. Buena Vista
5. Samuel Davies House and Sign of the Buck Tavern
6. The Lindens and Plank House
7. Allee House
8. Octagonal School
9. Woodburn
10. State Museum Presbyterian Church
11. John Dickinson Mansion
12. Lowber House
13. Abbotts Mill
14. Old Sussex County Court House
15. Fisher House (White Meadow Mansion)
16. Island Field Site

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 30 and 31.

Appendix IV-F

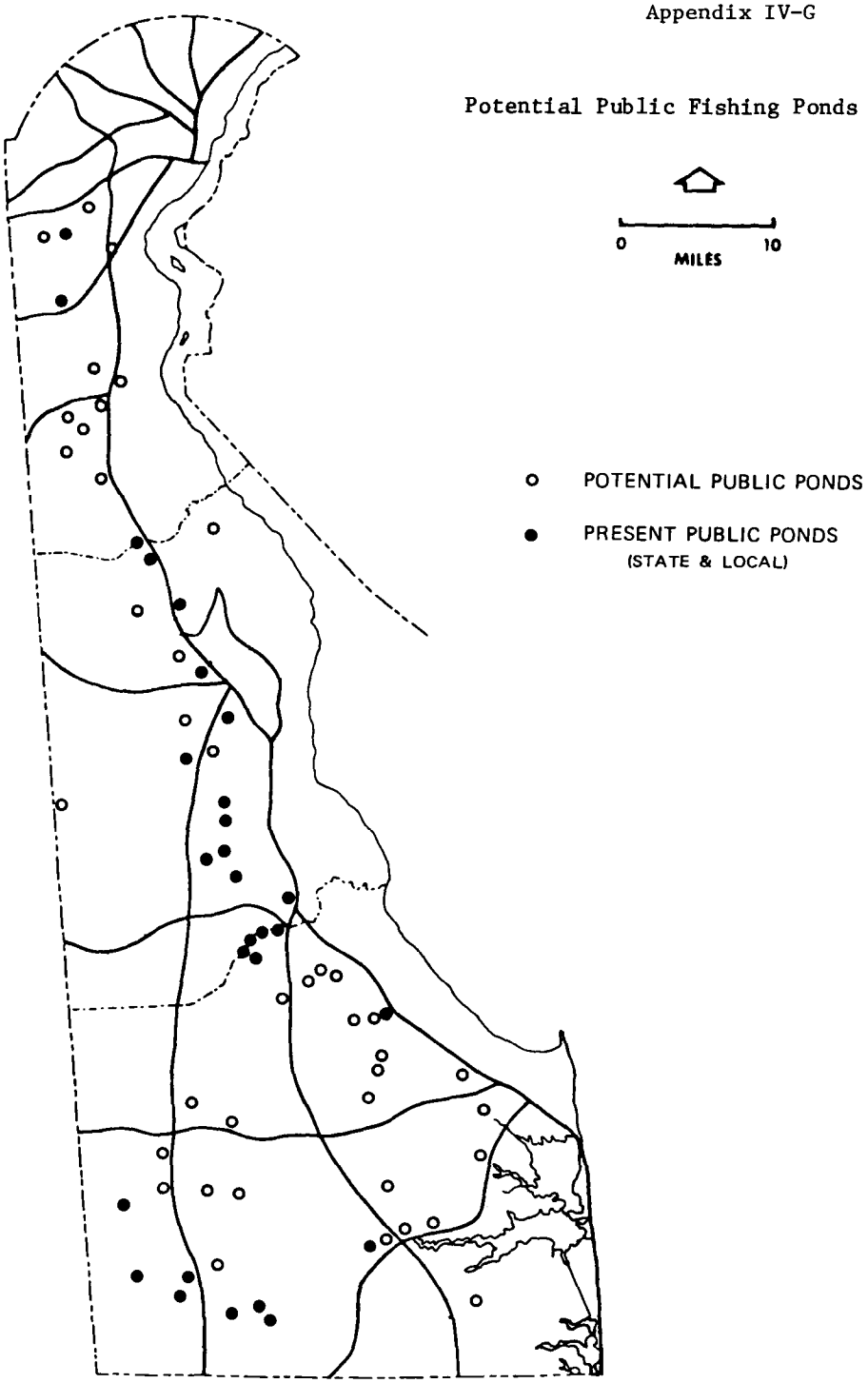
Municipally Controlled Outdoor Recreation Areas in Delaware




Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 48.

Appendix IV-G

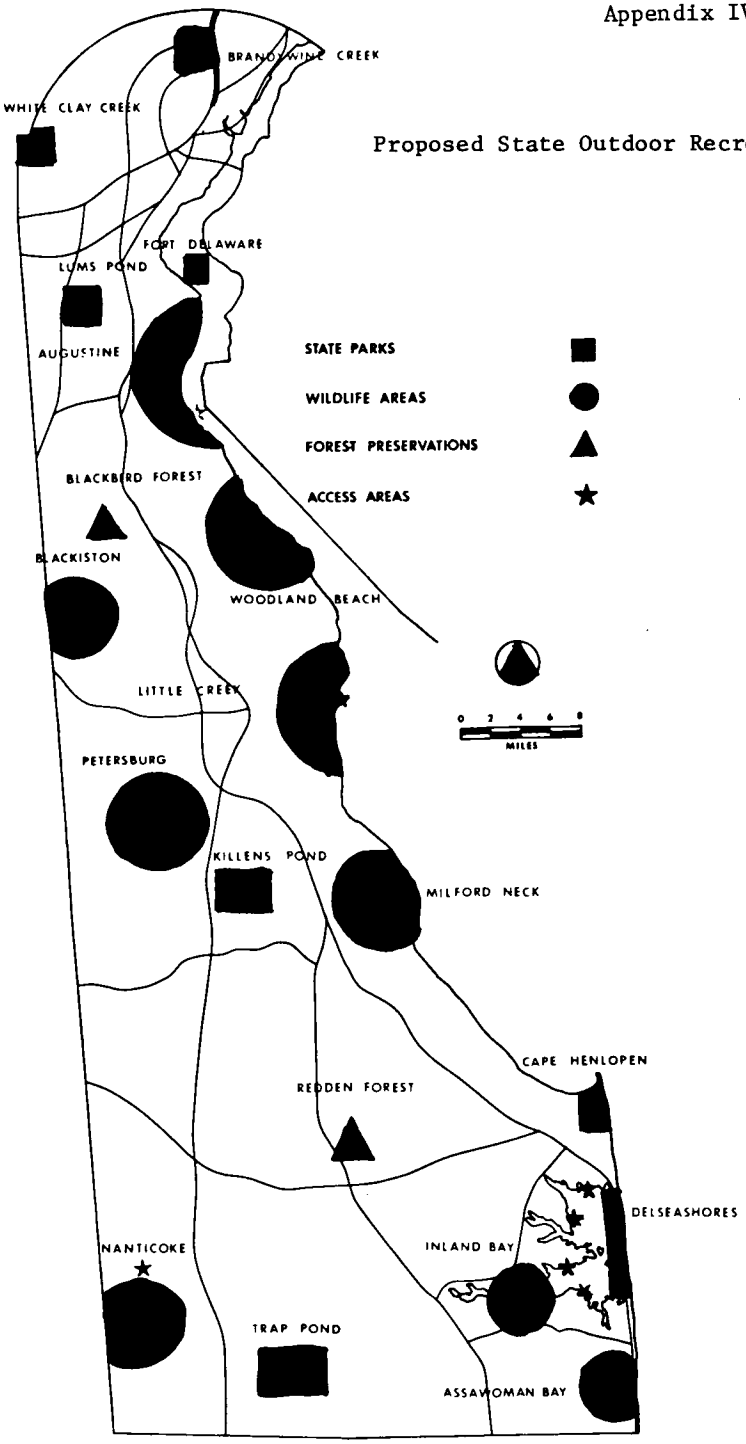
Potential Public Fishing Ponds in Delaware




Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, October 1970, p.150.

Appendix IV-H

Proposed State Outdoor Recreation Facilities in Delaware




Source: Delaware Comprehensive Outdoor Recreation Plan, Dover: State Planning Office, Oct., 1970, p. 144.

DELAWARE STATE FOREST AREAS, FACILITIES AND ACTIVITIES PERMITTED AND AVAILABLE

| Area | Area in Acres | Hunting | Picnicking | Hiking | Horse Riding | Sightseeing | Picnic Tables | Shelters | Fire Places |
|---|---|---|---|---|---|---|---|---|---|
| Blackbird | 1,663 | x | x | x | x | x | 3 | | |
| Red Lion | 5 | | x | x | | x | 4 | | 2 |
| Redden | 3,113 | x | x | x | x | x | 1 | 1 | |
| Owens | 170 | x | x | x | x | x | 3 | | |
| Appenzeller | 124 | x | | x | x | x | | | |
| Ellendale | 1,223 | x | x | x | x | x | 5 | 1 | 1 |
| Nursery | 58 | | | | | x | | | |
| Fire Tower Areas | 6 | | | x | | x | | | |
| Old Nursery | 3 | | | | | | | | |
| TOTAL | 6,365 | 5 | 5 | 7 | 5 | 8 | 16 | 2 | 3 |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 34.

OUTDOOR RECREATION AREAS AND PERMITTED
ACTIVITIES UNDER THE JURISDICTION OF THE DIVISION OF PARKS,
RECREATION AND FORESTRY

| | | | Activities Permitted | | | | | | Present Facilities | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Facility | Acres | Parcels | Fishing | Picnicking | Swimming | Hiking | Horseback Riding | Sightseeing | Tables | Shelters | Bathhouse | Fire Places |
| White Clay Creek | 126.8 | 1 | | x | | x | | x | | | | |
| Brandywine Creek | 433.5 | 1 | x | x | | x | x | x | 6 | | | |
| Brandywine Springs | 57.9 | 1 | | x | | x | x | x | 101 | 2 | | 15 |
| Fort Delaware | 161.4 | 2 | x | x | | x | x | x | 18 | | | 5 |
| Lums Pond | 512.3 | 1 | x | x | x | x | x | x | 110 | | 2 | 32 |
| Killens Pond | 561.4 | 1 | x | x | x | x | x | x | 18 | | | |
| Cape Henlopen | 1,641.2 | 2 | x | x | x | x | x | x | 210 | | | 39 |
| Delaware Seashore | 1,759.4 | 3 | x | x | x | x | x | x | 41 | 1 | | |
| Holts Landing | 33.0 | 1 | x | x | x | x | x | x | 14 | | | |
| Trap Pond | 965.3 | 1 | x | x | x | x | x | x | 320 | | | 37 |
| Total | 6,252.2 | | | | | | | | | | | |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 36.

Appendix IV- K

## OUTDOOR RECREATION AREAS UNDER THE ADMINISTRATION OF THE DIVISION OF FISH AND WILDLIFE

Key: WA - Wildlife Area
AA - Access Area

| Facility | Acres Total | Acres Land | Acres Water | Major Recreation Activity By Rank: Driving and Sightseeing | Swimming | Salt Water Fishing | Fresh Water Fishing | Picnicking | Nature Study | Boating | Hunting - Small Game | Hunting - Big Game | Hunting - Waterfowl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Becks Pond [1] | 55.0 | 7.0 | 48.0 | | 1 | | 2 | 4 | | 3 | | | |
| Lums Pond | 563.0 | 413.0 | 150.0 | | | | 1 | | | 3 | 2 | | |
| Reedy Island | 50.0 | 50.0 | | 3 | | | | | | 1 | | | 2 |
| Augustine Beach | 190.7 | 190.7 | | | | 1 | | 3 | | 2 | | | 4 |
| Appoquinimink W.A. | 34.0 | 34.0 | | | | | | | | | | | 1 |
| Woodland Beach | 3,542.9 | 3,542.9 | | 1 | | 4 | | | 3 | 5 | | | 2 |
| Garrisons Lake | 101.9 | 2.9 | 99.0 | | | | 1 | 2 | | 3 | | | |
| Moores Lake | 58.7 | 12.2 | 46.5 | 4 | | | 1 | 2 | | 3 | | | |
| Little Creek W.A. - North | 345.3 | 345.3 | | 3 | | | | | | | 1 | | 2 |
| SPCA Dog Shelter | 2.0 | 2.0 | | | | | | | | | | | |
| Little Creek W.A. - South | 2,872.0 | 1,607.0 | 1,265.0 | 3 | | | | | | | 1 | | 2 |
| Petersburg W.A. | 3,320.2 | 3,320.2 | | 1 | | | | 4 | 5 | | 2 | 3 | |
| Derby Pond | 15.0 | .3 | 14.7 | | | | 1 | | | 2 | | | |
| McGinnis Pond | 137.6 | 102.6 | 35.0 | | 4 | | 1 | 2 | | 3 | | | |
| Bowers Beach | 13.1 | 13.1 | | | 2 | 1 | | | | 3 | | | |
| Andrews Lake | 24.3 | 12.3 | 12.0 | | | | 1 | | | 2 | | | |
| Coursey Pond | 63.8 | 4.8 | 59.0 | | | | 1 | 2 | | 3 | | | |
| McCauley Pond | 55.0 | | 55.0 | | | | 1 | | | 2 | | | |
| Milford Neck | 1,370.8 | 1,370.8 | | 5 | | | | | 3 | | 1 | 2 | 4 |
| Griffiths Lake | 35.0 | .3 | 34.7 | | | | 1 | 2 | | 3 | | | |
| Blairs Pond | 94.0 | 67.0 | 27.0 | | | | 2 | 1 | | 3 | | | |
| Abbotts Pond | 25.3 | 10.3 | 15.0 | 3 | | | 1 | | | 2 | | | |
| Haven Lake | 83.7 | 8.3 | 75.4 | | | | 2 | 3 | | 1 | | | |
| Silver Lake | 34.3 | .3 | 34.0 | | | | 1 | | | 2 | | | |
| Cedar Creek | 15.0 | 15.0 | | | | 1 | | | | | | | |
| Fowler Beach | 2.0 | 2.0 | | | | 1 | | | | | | | |
| Primehook W.A. | 635.0 | 635.0 | | | | | 4 | | | | 2 | 3 | 1 |
| Milton A.A. | .7 | .7 | | | | 1 | | 3 | | 2 | | | |
| Lewes A.A. | 1.7 | 1.7 | | | | 1 | | | | 2 | | | |
| Craigs Pond | 16.0 | 2.0 | 14.0 | | | | 1 | 3 | | 2 | | | |
| Gravel Hill | 7.4 | 2.4 | 5.0 | | | | 1 | 2 | | 3 | | | |
| Rabbits Ferry | 1.8 | 1.8 | | 4 | | | 1 | 3 | 5 | 2 | | | |
| Portsville Pond | 33.0 | 18.0 | 15.0 | 4 | | | 1 | 2 | 5 | 3 | | | |
| Tussock Pond (Collins) | 3.3 | 3.3 | | | | | 1 | | | | | | |
| Records Pond | 99.8 | 8.9 | 90.9 | 4 | | | 1 | 3 | 5 | 2 | | | |
| Horsey Pond | 68.0 | 8.0 | 60.0 | | | | 1 | | 2 | | | | |
| Raccoon Pond | 4.4 | | 4.4 | | | | 1 | | | | | | |
| Ingrams Pond | 43.0 | 8.2 | 34.8 | | | | | | | | 3 | 2 | 1 |
| Rosedale Beach A.A. | 10.0 | 10.0 | | | | 1 | | 2 | | 3 | 4 | 5 | |
| Pepper Creek | 17.5 | 17.5 | | | | | | | 2 | | | | 1 |
| Assawoman W.A. | 1,459.9 | 1,059.9 | 400.0 | | | 1 | | | | 2 | | | |
| Nanticoke W.A. | 925.0 | 925.0 | | | | 2 | | | | 1 | | | |
| Gordon Pond | 300.0 | | 300.0 | | | | | | 3 | | 1 | 2 | |
| Duck Creek | 12.6 | 12.6 | | | | | 1 | 3 | | 2 | | | |
| Silver Run | 561.9 | 561.9 | | | | 4 | | | | 5 | 1 | 3 | 2 |
| Rehoboth Bay A.A. | 10.0 | 10.0 | | | | 2 | | 3 | | 1 | | | |
| Blackiston | 1,417.1 | 1,417.1 | | | | | 3 | | | | 1 | 2 | |
| | 18,732.7 | 15,838.3 | 2,894.4 | | | | | | | | | | |

[1] Leased to New Castle County Parks Department

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 38.

## Appendix IV-L

STATE-OWNED LANDS AVAILABLE FOR OUTDOOR RECREATION

| Agency | Acres* |
|---|---|
| Department of State: | |
| Division of Archives and Cultural Affairs | 95 |
| Department of Transportation: | |
| Division of Highway | 100 |
| Public Educational Facilities | 5,188 |
| Department of Natural Resources and Environmental Control: | |
| Division of Fish and Wildlife | 18,733 |
| Division of Parks, Recreation and Forestry | 12,617 |
| Total State | 36,733 |

* Areas rounded to nearest acre

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 42.

Appendix IV-M

MUNICIPALLY CONTROLLED OUTDOOR RECREATION AREAS
Sussex County

| Municipality | Total Acres | Number of Parks | Predominant Use |
|---|---|---|---|
| Bethany Beach | 26.0 | 1 | Swimming |
| Delmar | 5.5 | 1 | Playground, Playfield |
| Georgetown | 1.0 | 1 | Park |
| Lewes | 111.5 | 4 | Swimming, Park |
| Millsboro | 6.5 | 1 | Picnic, Playfield |
| Milton | 14.0 | 1 | Playfield, boating, fishing |
| Rehoboth Beach | 77.0 | 8 | Swimming, fishing, boating |
| Seaford | 10.0 | 2 | Swimming, playfield, picnic |
| Milford | 3.0 | 1 | Playfield, park |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 40.

Appendix IV-N

Private Recreation Areas, Sussex County, Delaware

| Name | ACTIVITY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sight Seeing | Picnicking | Athletic Fields | Nature Study | Hiking | Bicycling | Swimming | Fishing | Boating | Hunting | Golf | Camping |
| Arnold Palmer Dr. Range | | | | | | | | | | | X | |
| Bay Shore Campsites | | | | | | | X | X | X | | | X |
| Camp Antiock | | | X | | | | | | | | | X |
| Careys Camp | | | X | | | | | | | | | X |
| Collins Pond | | | | | | | | X | X | | | |
| Cubbage Pond | | | | | | | X | X | X | | | X |
| Del-Mar-Va Camp | | | X | | | | | | | | | X |
| Fleetwoods Pond | | | | | X | | | X | | | | |
| Hearn Pond | | | | | | | X | X | | | | |
| Hickmans Marina | | | | | | | | X | X | | | |
| Indian River Yacht Basin | | | | | | | | X | X | | | |
| Log Cabin Hill | | X | X | | | | | X | | | | X |
| Love Creek Trailer Park | | X | | | | | | | | | | X |
| Lowes Recreation Area | | | | | | | X | X | X | X | | X |
| Lynn Lee Mobil Village | | | | | | | X | X | X | | | X |
| Masseys Landing | | | | | | | | X | X | | | |
| Misspillion Light | | | | | | | | X | X | | | |
| Murrays Farm | X | X | | X | X | | X | X | X | X | | |
| Nanticoke Shores, Inc. | | | | | | | | X | | | | X |
| Old Landing Golf Course | | | | | | | | | | | X | |
| Old Inlet Campsite | | | | | | | X | X | X | | | X |
| Pier Point Marina | | | | | | | X | | X | | | |
| Pine Haven Campsite | | X | | | | | | | | | | X |
| Pot-Nets Park | | X | X | | | | X | X | X | | | X |
| Rainbow Cove Marina | | | | | | | | | X | | | |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 51.

Appendix IV-N (continued)

PRIVATE RECREATION AREAS , SUSSEX COUNTY, DELAWARE

| Name | ACTIVITY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sight Seeing | Picnicking | Athletic Fields | Nature Study | Hiking | Bicycling | Swimming | Fishing | Boating | Hunting | Golf | Camping |
| Rehoboth Airport | | | | | (FLYING) | | | | | | | |
| Rehoboth Bay Sailing Area | | X | | | | | X | X | X | | | |
| Rehoboth Bay Marina | | | | | | | | X | X | | | X |
| Rehoboth Country Club | | | | | | | X | | | | X | |
| Sandy Cove Camping Area | | X | | | | | X | X | X | | | X |
| Seaford Golf | | | X | | | | | | | | X | |
| Seaside Campsite | | X | | | | | X | X | X | | | X |
| Shawns Hideaway | | X | | | | | X | X | X | | | X |
| Shawnee Country Club | | | | | | | X | | | | X | |
| Shockleys Boat-Tel | | | | | | | | X | X | | | |
| South Shore Marina | | | | | | | | X | X | | | |
| Sussex Rec. Center | | | X (archery) | | | | | | | | X | |
| Sussex Country Club | | | | | | | X | | | | X | |
| Swann Keys | | | | | | | | | | | | X |
| Tuckahoe Acres | | | X | | | | X | X | X | | | X |
| Whitehouse Farm | | | | | | | X | X | X | | | X |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 52.

PROJECTED USER DAYS FOR OUTDOOR RECREATION ACTIVITIES,
DELAWARE RESIDENTS, NON-RESIDENT VISITORS AND TOTAL USERS, YEAR 1980

| Activity | Per Capita Frequency of Participation | Delaware Resident User Days (In Thousands) | Non-Resident Visitor User Days (In Thousands) | Total User Days in Delaware (In Thousands) |
|---|---|---|---|---|
| Pleasure Rides | 23.02 | 16,459 | 300 | 16,759 |
| Picnicking | 3.74 | 2,674 | 50 | 2,724 |
| Swim-Ocean | | | | |
| Head | 2.54 | 1,816 | 35 | 1,851 |
| Homemaker | 2.66 | 1,902 | 35 | 1,937 |
| Children | 2.04 | 1,459 | 30 | 1,489 |
| Pleasure Walks | 15.02 | 10,739 | 195 | 10,934 |
| Swim-Pool (Not at Home) | | | | |
| Head | 1.99 | 1,423 | 25 | 1,448 |
| Homemaker | 2.98 | 2,130 | 40 | 2,170 |
| Children | 7.73 | 5,527 | 100 | 5,627 |
| Fishing[2] | 2.34 | 1,673 | 35 | 1,708 |
| Boating activities | 3.13 | 2,238 | 40 | 2,278 |
| Ice Skating[2] | .96 | 686 | * | 686 |
| Swim-Lake | | | | |
| Head | .83 | 593 | 10 | 603 |
| Homemaker | 1.05 | 750 | 15 | 765 |
| Children | 1.83 | 1,308 | 25 | 1,333 |
| Swim-Bay | | | | |
| Head | .65 | 465 | 10 | 475 |
| Homemaker | .83 | 593 | 10 | 603 |
| Children | 1.18 | 844 | 15 | 859 |
| Golfing[3] | 1.09 | 779 | 15 | 794 |
| Swim-Pool (at Home) | | | | |
| Head | 1.03 | 736 | * | 736 |
| Homemaker | 1.59 | 1,137 | * | 1,137 |
| Children | 4.67 | 3,339 | * | 3,339 |
| Hunting[2] | .79 | 565 | 10 | 575 |
| Camping | .43 | 307 | 5 | 312 |
| Horseback Riding[2] | .70 | 504 | 7 | 511 |
| Swim-River | | | | |
| Head | .38 | 272 | 5 | 277 |
| Homemaker | .36 | 257 | 5 | 262 |
| Children | .84 | 601 | 10 | 611 |
| Swim-Pond | | | | |
| Head | .20 | 143 | 4 | 147 |
| Homemaker | .19 | 136 | 5 | 141 |
| Children | .39 | 278 | 5 | 283 |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 75, 76.

Appendix IV-O
(cont'd)

| Activity | Per Capita Frequency of Participation | Delaware Resident User Days (In Thousands) | Non-Resident Visitor User Days (In Thousands) | Total User Days in Delaware (In Thousands) |
|---|---|---|---|---|
| Tobogganing | .21 | 150 | * | 150 |
| Snow Skiing | .21 | 150 | * | 150 |
| Vacation Trips | .27 | 3,288 | 60 | 3,348 |
| Weekend Trips | 5.06 | 3,618 | 65 | 3,683 |

Delaware Population, 1980 - 835,000
Non-Resident Visitors, 1980 - 13,000 average per day

* Not calculated for visitors due to insufficiency of Delaware resources for these winter activities

[1] Source: Cole, P. 50 - factored according to study findings
[2] Frequencies divided by 2 (see text)
[3] Frequency divided by 3 (see text)
[4] Frequency multiplied by 4.75 days (average trip length from survey)
[5] Frequency multiplied by 2.00 days in weekend

Appendix IV-P

PROJECTED USER DAYS FOR OUTDOOR RECREATION ACTIVITIES,
DELAWARE RESIDENTS, NON-RESIDENT VISITORS AND TOTAL USERS, YEAR 2000

| Activity | Per Capita Frequency of Participation | Delaware Resident User Days (In Thousands) | Non-Resident Visitor User Days (In Thousands) | Total User Days in Delaware (In Thousands) |
|---|---|---|---|---|
| Pleasure Rides | 23.02 | 23,020 | 405 | 23,425 |
| Picnicking | 3.74 | 3,740 | 65 | 3,805 |
| Swim-Ocean | | | | |
| Head | 2.54 | 2,540 | 55 | 2,595 |
| Homemaker | 2.66 | 2,660 | 50 | 2,710 |
| Children | 2.04 | 2,040 | 35 | 2,075 |
| Pleasure Walks | 15.02 | 15,020 | 270 | 15,290 |
| Swim-Pool (Not at Home) | | | | |
| Head | 1.99 | 1,990 | 35 | 2,025 |
| Homemaker | 2.98 | 2,980 | 55 | 3,035 |
| Children | 7.73 | 7,730 | 140 | 7,870 |

Appendix IV-P (continued)

| Activity | Per Capita Frequency of Participation | Delaware Resident User Days (In Thousands) | Non-Resident Visitor User Days (In Thousands) | Total User Days in Delaware (In Thousands) |
|---|---|---|---|---|
| Fishing[2] | 2.34 | 2,340 | 40 | 2,380 |
| Boating Activities | 3.13 | 3,130 | 55 | 3,185 |
| Ice Skating[2] | .96 | 960 | (6) | 960 |
| Swim-Lake | | | | |
| Head | .83 | 830 | 15 | 845 |
| Homemaker | 1.05 | 1,050 | 20 | 1,070 |
| Children | 1.83 | 1,830 | 30 | 1,860 |
| Swim-Bay | | | | |
| Head | .65 | 650 | 10 | 660 |
| Homemaker | .83 | 830 | 15 | 845 |
| Children | 1.18 | 1,180 | 20 | 1,200 |
| Golfing[3] | 1.09 | 1,090 | 20 | 1,110 |
| Swim-Pool (at Home) | | | | |
| Head | 1.03 | 1,030 | (7) | 1,030 |
| Homemaker | 1.59 | 1,590 | (7) | 1,590 |
| Children | 4.67 | 4,670 | (7) | 4,670 |
| Hunting[2] | .79 | 790 | 15 | 805 |
| Camping | .43 | 430 | 5 | 435 |
| Horseback Riding[2] | .70 | 700 | 15 | 715 |
| Swim-River | | | | |
| Head | .38 | 380 | 5 | 385 |
| Homemaker | .36 | 360 | 5 | 365 |
| Children | .39 | 390 | 5 | 395 |
| Tobogganing | .21 | 210 | (6) | 210 |
| Snow Skiing | .22 | 220 | (6) | 220 |
| Vacation Trips[4] | 4.61 | 4,610 | 85 | 4,695 |
| Weekend Trips[5] | 5.06 | 5,060 | 90 | 5,150 |
| Swim-Pond | | | | |
| Head | .20 | 200 | 5 | 205 |
| Homemaker | .19 | 190 | 5 | 195 |
| Children | .39 | 390 | 5 | 395 |

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 77.

Appendix IV-Q

Modified User Day Projections Based on Composite Effects of Changes in Socio-Economic Characteristics, Projected Demand for Year 1980 & Year 2000
STATE OF DELAWARE

| Activity | Composite Factors: % Increase | 1980 User Days (x1,000) Unmodified (Table ) | 1980 User Days (x1,000) Modified Total | 2000 User Days (x1,000) Unmodified (Table ) | 2000 User Days (x1,000) Modified Total |
|---|---|---|---|---|---|
| Pleasure Rides | 29.8 | 16,759 | 21,753 | 23,425 | 30,405 |
| Picnicking | 27.9 | 2,724 | 3,484 | 3,805 | 4,865 |
| Swim-Ocean | 75.3 | 5,277 | 9,251 | 7,380 | 12,940 |
| Pleasure Walks | 41.4 | 10,934 | 15,461 | 15,290 | 21,620 |
| Swim-Pool (not at home) | 75.3 | 9,245 | 16,208 | 12,930 | 22,660 |
| Fishing | 2.3 | 1,708 | 1,747 | 2,380 | 2,435 |
| Boating | 78.9 | 2,278 | 4,075 | 3,185 | 5,700 |
| Ice Skating | 99.6 | 686 | 1,369 | 960 | 1,915 |
| Swim-Lake | 75.3 | 2,701 | 4,737 | 3,775 | 6,620 |
| Swim-Bay | 75.3 | 1,937 | 3,396 | 2,705 | 4,740 |
| Golfing | 79.7 | 794 | 1,427 | 1,110 | 1,995 |
| Swim-Pool (at home) | 75.3 | 5,212 | 9,137 | 7,290 | 12,780 |
| Hunting | -11.8 | 575 | 507 | 805 | 710 |
| Camping | 100.6 | 312 | 626 | 435 | 870 |
| Horseback riding | 34.1 | 511 | 685 | 715 | 960 |
| Swim-River | 75.3 | 1,150 | 2,016 | 1,605 | 2,815 |
| Swim-Pond | 75.3 | 571 | 1,004 | 795 | 1,395 |
| Tobogganing | 54.2 | 150 | 321 | 210 | 325 |
| Snow Skiing | 54.2 | 150 | 231 | 220 | 340 |
| Vacation Trips[12] | 100.0 | 3,348 | 6,696 | 4,695 | 9,390 |
| Weekend Trips[12] | 100.0 | 3,683 | 7,366 | 5,150 | 10,300 |

[12] Vacation trips and weekend trips reflect projected decrease in hours of work, a doubling in length of paid vacation, and an increase in numbers of paid holidays from 6 in 1960 to 10 in 2000 (see ORRRC, Report #26, P. 29)

Source: Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970, p. 82.

## Appendix IV-R

## Delaware Local Recreation Inventory, Need and Projected Deficit

| Community Development Area[1] | Present Inventory Acres[2] | 1980 Population | 1980 Recreation Need-Acres[3] | 1980 Deficit Acres | 2000 Population | 2000 Recreation Need-Acres | 2000 Deficit Acres |
|---|---|---|---|---|---|---|---|
| Wilmington (N. New Castle) | 2,744 | 477,000 | 11,925 | 9,187 | 667,000 | 16,675 | 13,931 |
| Middletown-Odessa | 0 | 12,100 | 300 | 300 | 17,000 | 425 | 425 |
| Smyrna-Clayton | 38 | 17,150 | 428 | 390 | 24,000 | 600 | 562 |
| Dover | 76 | 62,200 | 1,555 | 1,479 | 87,000 | 2,175 | 2,099 |
| Milford-Harrington | 8 | 43,600 | 1,090 | 1,082 | 61,000 | 1,525 | 1,517 |
| Georgetown | 1 | 7,150 | 179 | 178 | 10,000 | 250 | 249 |
| Seaford-Laurel | 15 | 47,200 | 1,180 | 1,165 | 66,000 | 1,650 | 1,635 |
| Millsboro-Selbyville | 7 | 22,150 | 554 | 547 | 31,000 | 775 | 768 |
| Lewes-Rehoboth | 202 | 20,000 | 500 | 298 | 28,000 | 700 | 498 |
| Bethany-Fenwick | 26 | 6,450 | 161 | 135 | 9,000 | 225 | 199 |
| STATE | 3,117 | 715,000 | 17,872 | 14,755 | 1,000,000 | 25,000 | 21,883 |

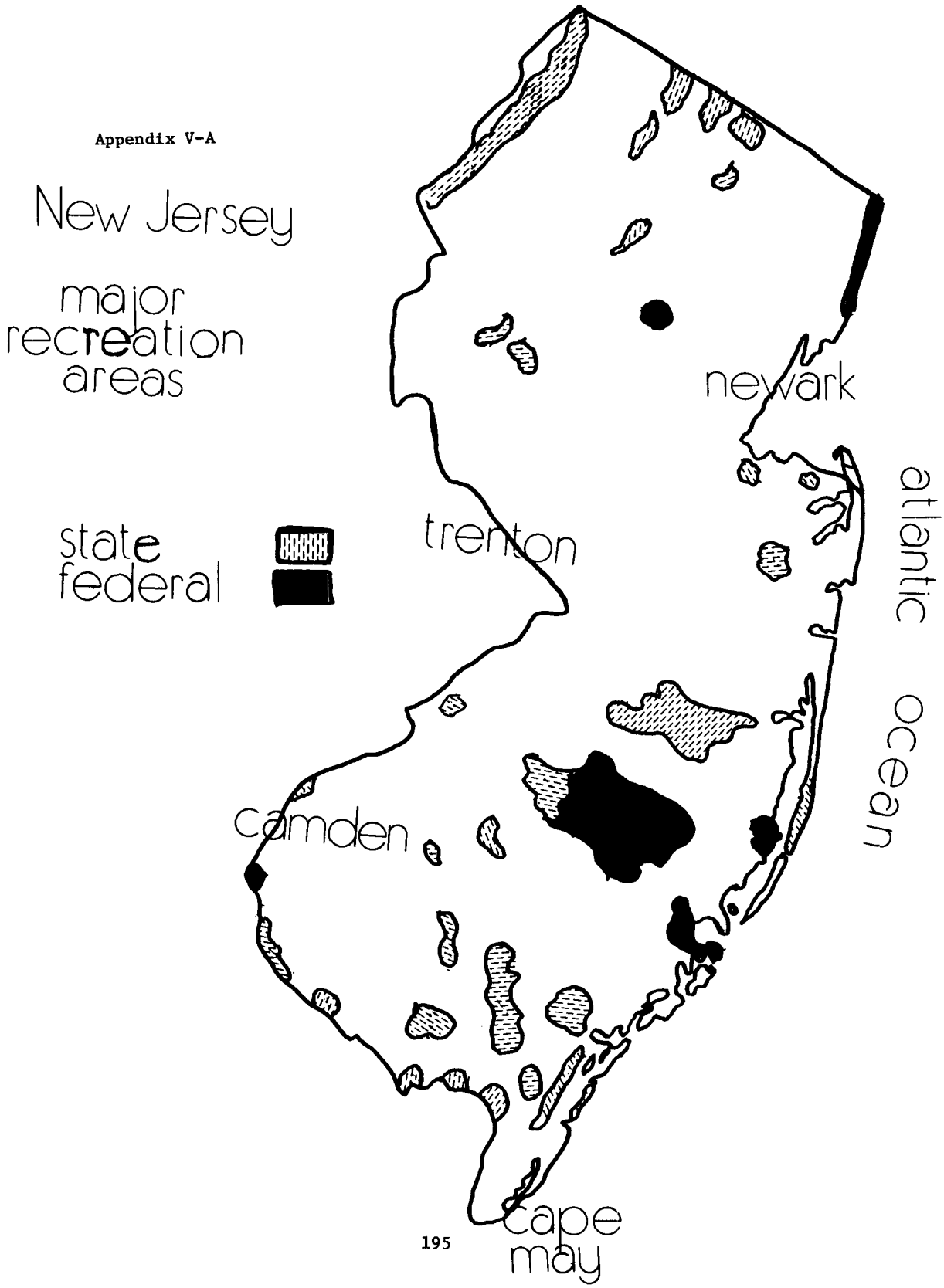
1- Based on Community Development areas from Delaware Comprehensive Development Plan
2- Source: "Outdoor Recreation for Delaware, Inventory," August, 1968
3- Based on 25 acres per 1,000 population local recreation area standard

**Source:** Delaware Comprehensive Outdoor Recreation Plan. Dover: State Planning Office, 1970,p.174.

# RECREATION APPENDIX V

## New Jersey

Appendix V-A


New Jersey
major recreation areas
state
federal
newark
trenton
atlantic ocean
camden
cape may

Appendix V-B

## FEDERAL RECREATION AREAS AND PALISADES INTERSTATE AREA DEVELOPED RECREATIONAL FACILITIES 1970

| Facilities | FEDERAL RECREATION AREAS | | | | | | INTERSTATE PARK | |
|---|---|---|---|---|---|---|---|---|
| | Northwest | North Central | North Shore | South Shore | Delaware Bay | State Total | Northeast | State Total |
| Swimming | | | | | | | | |
| Permanent Pools | 1 | | | | | 1 | | |
| Ft. of Shoreline | 250 | | | | | 250 | | |
| Acres of Beach | | | | | | | | |
| Boating | | | | | | | | |
| Areas | | | | | | | | |
| Ramps | 1 | | | 1 | | 2 | 1 | 1 |
| Berths | | | | | | | 252 | 252 |
| Water Acreage | | | 2,000 | 2,200 | | 4,200 | | |
| Fishing | | | | | | | | |
| No. of Fac. | | | | | | | | |
| Water Acres | 240 | | 2,000 | 2,200 | | 4,440 | | |
| Mi. of Shoreline | 29.7 | 0.7 | | 0.25 | | 30.65 | 12 | 12 |
| Camping | | | | | | | | |
| Family Sites | 30 | | | | | 30 | | |
| Hiking | | | | | | | | |
| Miles of Trails | 31 | 23.9 | | | | 54.9 | 33 | 33 |
| Bicycling | | | | | | | | |
| Miles of Trails | | | | | | | | |
| Horseback Riding | | | | | | | | |
| Miles of Trails | 4.4 | 8.4 | | | | 12.8 | | |
| Hunting | | | | | | | | |
| Acres | 7,570 | | | 5,000 | 635 | 13,205 | | |
| Picnicking | | | | | | | | |
| Acres | | | | | | | | |
| Tables | 50 | 24 | | | | 74 | 500 | 500 |
| Ice Skating – Natural Areas | | | | | | | | |
| No. of Sites | | | | | | | | |
| Acres | 6 | | | | | 6 | 1 | 1 |
| Ice Skating – Artificial | | | | | | | | |
| Acres | | | | | | | | |
| Snow Skiing | | | | | | | | |
| Acres | | | | | | | | |
| Outdoor Games & Sports | | | | | | | | |
| Playgrounds | | | | | | | | |
| Open Playfields | 10 | 5 | | | | 15 | 1 | 1 |
| Game Courts | | | | | | | | |
| Golf – 18 holes | | | | | | | | |
| Golf – 9 holes | | | | | | | | |
| Golf – Par 3 | | | | | | | | |

Source: Outdoor Recreation in New Jersey, Trenton: State Planning Dept. 1973, p. 45.

## COUNTY DEVELOPED RECREATIONAL FACILITIES 1970

| Facilities | Northwest | North Central | Northeast | Central Corridor | North Shore | Southwest | South Shore | Delaware Bay | State Total |
|---|---|---|---|---|---|---|---|---|---|
| Swimming | | | | | | | | | |
| Permanent Pools | | | 3 | | | 4 | | | 7 |
| Ft. of Shoreline | | | 700 | 400 | 3,450 | 1,200 | | | 5,750 |
| Acres of Beach | | | 7 | | | | | | 7 |
| Boating | | | | | | | | | |
| Areas | | | 1 | | | 4 | | | 5 |
| Ramps | | 2 | 3 | 5 | 1 | 1 | | | 12 |
| Berths | | | | | | | | | 1 |
| Water Acreage | | | | | | | | | |
| Fishing | | | | | | | | | |
| No. of Fac. | | | | | | | | | 409 |
| Water Acres | | 20 | 309 | 10 | 70 | | | | 80 |
| Mi. of Shoreline | | 1 | 25 | 4 | | 50 | | | |
| Camping | | | | | | | | | |
| Family Sites | | 12 | 19 | | 43 | | | | 74 |
| Hiking | | | | | | | | | |
| Miles of Trails | | 12 | 82.5 | 50 | 40 | 360 | | | 544.5 |
| Bicycling | | | | | | | | | |
| Miles of Trails | | | 2 | | | | | | 2 |
| Horseback Riding | | | | | | | | | |
| Miles of Trails | | 1 | 47 | 7 | | | | | 55 |
| Hunting | | | | | | | | | |
| Acres | | | | | | | | | |
| Picnicking | | | | | | | | | |
| Acres | | | | | | | | | |
| Tables | | 100 | 3,641 | 765 | 752 | 40 | 50 | | 5,348 |
| Ice Skating | | | | | | | | | |
| Natural Areas | | | | | | | | | |
| No. of Sites | | | | | | | | | |
| Acres | | 10 | 178 | 29 | 97 | 1,200 | 5 | | 1,519 |
| Ice Skating | | | | | | | | | |
| Artificial | | | | | | | | | |
| Acres | | | 10 | | | | | | 10 |
| Snow Skiing | | | | | | | | | |
| Acres | | | 28 | 27 | 2 | | | | 57 |
| Outdoor Games & Sports | | | | | | | | | |
| Playgrounds | | 1 | 97 | 6 | 2 | 3 | 1 | | 110 |
| Open Playfields | | 4 | 212 | 27 | 10 | 5 | 1 | | 259 |
| Game Courts | | | 447 | 83 | 20 | 26 | 11 | | 587 |
| Golf [illegible] holes | | 1 | 9 | 5 | 1 | 1 | | | 17 |
| Golf [illegible] holes | | 1 | 1 | 1 | | | | | 3 |
| Golf [illegible] | | | 2 | 1 | | 9 | | | 12 |

Source: Outdoor Recreation in New Jersey. Trenton: State Planning Dept., 1973, p. 52.

Appendix V-D

## MUNICIPAL DEVELOPED RECREATIONAL FACILITIES IN NEW JERSEY 1970

| Facilities | Northwest | North Central | Northeast | Central Corridor | North Shore | Southwest | South Shore | Delaware Bay | State Total |
|---|---|---|---|---|---|---|---|---|---|
| Swimming | | | | | | | | | |
| Permanent Pools | 5 | 3 | 54 | 18 | 6 | 11 | | | 97 |
| Ft. of Shoreline | 1,918 | 16,669 | 2,450 | 8,552 | 104,427 | 18,680 | 278,440 | 18,216 | 449,342 |
| Acres of Beach | | | | | | | | | |
| Boating | | | | | | | | | |
| Areas | 11 | 2 | 4 | 30 | 15 | 12 | 10 | 3 | 87 |
| Ramps | 3 | 2 | 3 | 9 | 32 | | 33 | 9 | 91 |
| Berths | | | 20 | | 2,650 | 7 | 1,233 | 45 | 3,941 |
| Water Acreage | | | | | | 7 | | | 7 |
| Fishing | | | | | | | | | |
| No. of Fac. | | | | | | | | | |
| water Acres | | | | | | | | | |
| Mi. of Shoreline | 35 | 132 | 48 | 21 | 143 | 79 | 164 | 27 | 649 |
| Camping | | | | | | | | | |
| Family Sites | | | | | | | | | |
| Hiking | | | | | | | | | |
| Miles of Trails | 2 | 2 | 5 | 4 | 110 | 7 | 8 | 1 | 139 |
| Bicycling | | | | | | | | | |
| Miles of Trails | | 4 | 4 | 3 | 6 | 1 | 28 | 1 | 47 |
| Horseback Riding | | | | | | | | | |
| Miles of Trails | | | 1 | | 15 | | 12 | | 28 |
| Hunting | | | | | | | | | |
| Acres | | | | | | | | | |
| Picnicking | | | | | | | | | |
| Acres | | | 13 | | | | | | 13 |
| Tables | 151 | 52 | 1,450 | 470 | 338 | 178 | 276 | 161 | 3,077 |
| Ice Skating | | | | | | | | | |
| Natural Areas | | | | | | | | | |
| No. of Sites | | | | | | | | | |
| Acres | 31 | 243 | 259 | 277 | 40 | 82 | 130 | 1,574 | 2,638 |
| Ice Skating | | | | | | | | | |
| Artificial | | | | | | | | | |
| Acres | | | .3 | | | | | | .3 |
| Snow Skiing | | | | | | | | | |
| Acres | | | | | | | | | |
| Outdoor Games & Sports | | | | | | | | | |
| Playgrounds | 73 | 83 | 618 | 281 | 121 | 187 | 86 | 36 | 1,485 |
| Open Playfields | 90 | 225 | 1,204 | 588 | 268 | 450 | 143 | 77 | 3,045 |
| Game Courts | 68 | 231 | 1,315 | 527 | 217 | 415 | 202 | 71 | 3,044 |
| Golf 18 Holes | | | 2 | 1 | 2 | | | | 5 |
| Golf 9 Holes | | | 1 | | 1 | 1 | | | 3 |
| Golf Par 3 | | | 2 | | | | 1 | | 3 |

Appendix V - E

## EXISTING AND PROPOSED MUNICIPAL RECREATION LAND (acres) NEW JERSEY

| | Existing Recreation Land 1970 | Proposed Recreation Land Green Acres Programs 1961 Bond Issue | 1971[1] Bond Issue | Total Proposed Land | Total Future Municipal Rec. Land |
|---|---|---|---|---|---|
| Northwest | 347 | | 1,283 | 1,283 | 1,630 |
| North Central | 1,605 | 11 | 2,981 | 2,992 | 4,597 |
| Northeast | 5,375 | 6 | 690 | 696 | 6,071 |
| Central Corridor | 4,151 | 194 | 1,561 | 1,755 | 5,906 |
| North Shore | 1,310 | 217 | 2,257 | 2,474 | 3,784 |
| Southwest | 1,384 | 49 | 674 | 723 | 2,107 |
| South Shore | 1,110 | 11 | 827 | 838 | 1,948 |
| Delaware Bay | 1,905 | | 113 | 113 | 2,018 |
| State Total | 17,187 | 488 | 10,386 | 10,874 | 28,061 |

[1]Represents estimated acreage which will be acquired under the 1971 Green Acres Bond Issue.

Source: Outdoor Recreation in New Jersey. Trenton: State Planning Dept., 1973, p. 54.

Appendix V-F

EXISTING PRIVATE SECTOR LAND SUPPLY IN NEW JERSEY 1970

| Region | Number of Facilities | | | | Total Area (Acres) |
|---|---|---|---|---|---|
| | Commercial | Private Restricted or limited Membership | Quasi-Public | Total | |
| Northwest | 69 | 102 | 31 | 211 | 64,943 |
| North Central | 79 | 127 | 13 | 248 | 38,238 |
| Northeast | 89 | 156 | 13 | 281 | 11,827 |
| Central Corridor | 43 | 75 | 25 | 149 | 11,843 |
| North Shore | 192 | 137 | 11 | 421 | 8,418 |
| Southwest | 75 | 102 | 14 | 207 | 18,094 |
| South Shore | 158 | 32 | 4 | 206 | 19,886 |
| Delaware Bay | 43 | 49 | 15 | 112 | 5,332 |
| State Totals | 748 | 780 | 126 | 1,835 | 178,581 |

Source: Outdoor Recreation in New Jersey. Trenton: State Planning Dept., 1973, p. 55.

Appendix V-G

## RECREATION DEMAND IN NEW JERSEY
## AVERAGE WEEKEND DAY IN THE PEAK SEASON, 1985

| | OUTDOOR RECREATION ACTIVITIES | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Driving for Pleasure | Walking for Pleasure | Playing Outdoor Games | Swimming | Sightseeing | Bicycling | Fishing | Attending Outdoor Sports | Picnicking | Nature Walking | Boating | Hunting | Horseback Riding | Camping | Ice Skating | Sledding | Hiking | Water Skiing | Outdoor Concerts | Canoeing | Sailing | Mountain Climbing | Snow Skiing | Total |
| Northwest | 42,200 | 32,700 | 26,400 | 65,100 | 21,300 | 8,300 | 16,000 | 7,200 | 19,100 | 8,100 | 13,300 | 3,400 | 1,300 | 7,000 | 56,600 | 8,200 | 2,900 | 3,100 | 2,300 | 700 | 1,100 | 800 | 2,700 | 349,800 |
| Home | 16,300 | 17,200 | 11,700 | 14,000 | 4,900 | 4,000 | 1,500 | 2,200 | 4,400 | 2,000 | 3,000 | 800 | 800 | | 29,800 | 3,100 | 1,100 | 1,000 | 900 | 300 | 200 | 200 | 100 | 119,500 |
| Away | 25,900 | 15,500 | 14,700 | 51,100 | 16,400 | 4,300 | 14,500 | 5,000 | 14,700 | 6,100 | 10,300 | 2,600 | 500 | 7,000 | 26,800 | 5,100 | 1,800 | 2,100 | 1,400 | 400 | 900 | 600 | 2,600 | 230,300 |
| North Central | 72,400 | 58,700 | 46,100 | 105,300 | 34,500 | 14,700 | 24,800 | 12,000 | 33,500 | 13,100 | 21,700 | 5,600 | 2,400 | 10,500 | 101,600 | 14,100 | 5,000 | 5,200 | 3,900 | 1,100 | 1,700 | 1,300 | 4,100 | 593,300 |
| Home | 33,700 | 35,600 | 24,200 | 28,900 | 10,000 | 8,300 | 3,100 | 4,600 | 11,500 | 4,000 | 6,300 | 1,600 | 1,600 | | 61,500 | 6,400 | 2,300 | 2,100 | 1,900 | 500 | 300 | 400 | 200 | 249,000 |
| Away | 38,700 | 23,100 | 21,900 | 76,400 | 24,500 | 6,400 | 21,700 | 7,400 | 22,000 | 9,100 | 15,400 | 4,000 | 800 | 10,500 | 40,100 | 7,700 | 2,700 | 3,100 | 2,000 | 600 | 1,400 | 900 | 3,900 | 344,300 |
| Northeast | 256,100 | 265,300 | 182,900 | 233,200 | 80,400 | 62,200 | 29,400 | 35,300 | 89,900 | 32,200 | 50,300 | 12,800 | 12,100 | 3,300 | 357,600 | 48,500 | 17,600 | 16,500 | 14,700 | 4,000 | 2,900 | | 2,900 | 1,810,100 |
| Home | 243,900 | 258,000 | 176,000 | 209,200 | 72,700 | 60,200 | 22,600 | 33,000 | 83,000 | 29,300 | 45,500 | 11,600 | 11,800 | | 347,800 | 46,100 | 16,800 | 15,500 | 14,100 | 3,800 | 2,500 | | 1,700 | 1,705,100 |
| Away | 12,200 | 7,300 | 6,900 | 24,000 | 7,700 | 2,000 | 6,800 | 2,300 | 6,900 | 2,900 | 4,800 | 1,200 | 300 | 3,300 | 9,800 | 2,400 | 800 | 1,000 | 600 | 200 | 400 | | 1,200 | 105,000 |
| Central Corridor | 92,400 | 93,600 | 65,100 | 89,100 | 30,500 | 22,100 | 12,700 | 13,000 | 33,400 | 12,100 | 19,100 | 4,900 | 4,300 | 2,400 | 126,300 | 17,600 | 6,400 | 6,000 | 5,300 | 1,400 | 1,200 | | 1,500 | 660,400 |
| Home | 83,500 | 86,300 | 60,100 | 71,600 | 24,900 | 20,600 | 7,700 | 11,300 | 28,400 | 10,000 | 15,600 | 4,000 | 4,100 | | 119,100 | 15,800 | 5,800 | 5,300 | 4,800 | 1,300 | 900 | | 600 | 583,700 |
| Away | 8,900 | 5,300 | 5,000 | 17,500 | 5,600 | 1,500 | 5,000 | 1,700 | 5,000 | 2,100 | 3,500 | 900 | 200 | 2,400 | 7,200 | 1,800 | 600 | 700 | 500 | 100 | 300 | | 900 | 76,700 |
| North Shore | 135,000 | 105,200 | 84,600 | 206,800 | 67,600 | 26,700 | 50,700 | 22,900 | 64,600 | 25,700 | 42,400 | 10,800 | 4,300 | 22,100 | 142,100 | 26,300 | 9,400 | 9,900 | 7,400 | 2,200 | 3,400 | | 8,700 | 1,078,800 |
| Home | 53,400 | 56,500 | 38,400 | 45,800 | 15,900 | 13,200 | 4,900 | 7,200 | 18,200 | 6,400 | 10,000 | 2,500 | 2,600 | | 76,100 | 10,100 | 3,700 | 3,400 | 3,100 | 800 | 500 | | 400 | 373,100 |
| Away | 81,600 | 48,700 | 46,200 | 161,000 | 51,700 | 13,500 | 45,800 | 15,700 | 46,400 | 19,300 | 32,400 | 8,300 | 1,700 | 22,100 | 66,000 | 16,200 | 5,700 | 6,500 | 4,300 | 1,400 | 2,900 | | 8,300 | 705,700 |
| Southwest | 85,700 | 86,000 | 60,200 | 85,000 | 29,000 | 20,300 | 12,700 | 12,200 | 31,500 | 11,500 | 18,200 | 4,600 | 3,900 | 2,800 | 59,700 | 16,300 | 5,900 | 5,600 | 4,900 | 1,400 | 1,200 | | 1,500 | 560,100 |
| Home | 75,500 | 79,900 | 54,400 | 64,800 | 22,500 | 18,600 | 7,000 | 10,200 | 25,700 | 9,100 | 14,100 | 3,600 | 3,700 | | 55,400 | 14,300 | 5,200 | 4,800 | 4,400 | 1,200 | 800 | | 600 | 475,700 |
| Away | 10,200 | 6,100 | 5,800 | 20,200 | 6,500 | 1,700 | 5,700 | 2,000 | 5,800 | 2,400 | 4,100 | 1,000 | 200 | 2,800 | 4,300 | 2,000 | 700 | 800 | 500 | 200 | 400 | | 1,000 | 84,400 |
| South Shore | 165,400 | 107,300 | 96,500 | 305,900 | 98,700 | 26,900 | 84,200 | 30,800 | 89,900 | 36,900 | 61,700 | 15,900 | 4,000 | 39,900 | 74,700 | 32,700 | 11,500 | 12,900 | 8,800 | 2,800 | 5,500 | | 15,900 | 1,329,900 |
| Home | 18,400 | 19,500 | 13,300 | 15,800 | 5,500 | 4,500 | 1,700 | 2,500 | 6,300 | 2,200 | 3,400 | 900 | 900 | | 13,500 | 3,500 | 1,300 | 1,200 | 1,100 | 300 | 200 | | 1,100 | 116,100 |
| Away | 147,000 | 87,800 | 83,200 | 290,100 | 93,200 | 24,400 | 82,500 | 28,300 | 83,600 | 34,700 | 58,300 | 15,000 | 3,100 | 39,900 | 61,200 | 29,200 | 10,200 | 11,700 | 7,700 | 2,500 | 5,300 | | 14,900 | 1,213,800 |
| Delaware Bay | 21,300 | 18,900 | 14,100 | 27,100 | 9,100 | 4,800 | 5,700 | 3,300 | 9,000 | 3,500 | 5,700 | 1,400 | 800 | 2,200 | 14,500 | 4,100 | 1,500 | 1,400 | 1,200 | 300 | 400 | | 900 | 151,000 |
| Home | 13,300 | 14,100 | 9,600 | 11,400 | 4,000 | 3,300 | 1,200 | 1,800 | 4,500 | 1,600 | 2,500 | 600 | 600 | | 10,800 | 2,500 | 900 | 800 | 800 | 200 | 100 | | 100 | 84,700 |
| Away | 8,000 | 4,800 | 4,500 | 15,700 | 5,100 | 1,500 | 4,500 | 1,500 | 4,500 | 1,900 | 3,200 | 800 | 200 | 2,200 | 3,700 | 1,600 | 600 | 600 | 400 | 100 | 300 | | 800 | 66,300 |
| State Totals | 870,500 | 767,700 | 575,900 | 1117,500 | 371,100 | 187,800 | 236,200 | 136,700 | 570,900 | 143,100 | 232,400 | 59,400 | 33,100 | 90,200 | 933,100 | 167,800 | 60,200 | 60,900 | 48,500 | 13,900 | 17,400 | 2,100 | 37,300 | 6,533,400 |
| Home | 538,000 | 569,100 | 387,700 | 461,500 | 160,400 | 132,700 | 49,700 | 72,800 | 182,000 | 64,600 | 100,400 | 25,600 | 26,100 | | 714,000 | 101,800 | 37,100 | 34,100 | 31,100 | 8,400 | 5,500 | 600 | 3,700 | 3,706,900 |
| Away | 332,500 | 198,600 | 188,200 | 656,000 | 210,700 | 55,100 | 186,500 | 63,900 | 188,900 | 78,500 | 132,000 | 33,800 | 7,000 | 90,200 | 219,100 | 66,000 | 23,100 | 26,800 | 17,400 | 5,500 | 11,900 | 1,500 | 33,600 | 2,826,500 |



Source: Outdoor Recreation in New Jersey. Trenton: State Planning Dept., 1973, p. 40.

## NEW JERSEY
## POPULATION FORECASTS

| Region | 1970 (census) | 1985 | 2000 | Region | 1970 (census) | 1985 | 2000 |
|---|---|---|---|---|---|---|---|
| Northwest | | | | North Shore | | | |
| Hunterdon | 69,718 | 83,463 | 99,827 | Monmouth | 459,379 | 590,835 | 739,286 |
| Sussex | 77,528 | 94,449 | 117,908 | Ocean (Part of) | 192,084 | 262,184 | 334,962 |
| Warren | 73,879 | 82,589 | 93,874 | Totals | 651,463 | 853,019 | 1,074,248 |
| Totals | 221,125 | 260,501 | 311,609 | | | | |
| | | | | Southwest | | | |
| North Central | | | | Burlington (Part of) | 321,969 | 433,392 | 556,116 |
| Morris | 383,454 | 491,371 | 620,545 | Camden | 456,291 | 553,208 | 654,747 |
| Passaic (Part of) | 37,093 | 46,409 | 57,057 | Gloucester | 172,681 | 220,187 | 272,233 |
| Totals | 420,547 | 537,780 | 677,602 | Totals | 950,941 | 1,206,787 | 1,483,096 |
| | | | | | | | |
| Northeast | | | | South Shore | | | |
| Bergen | 898,012 | 1,127,701 | 1,340,514 | Atlantic | 175,043 | 196,469 | 220,817 |
| Essex | 929,986 | 985,540 | 1,028,961 | Burlington (Part of) | 1,163 | 1,588 | 1,897 |
| Hudson | 609,266 | 620,350 | 636,400 | Ocean (Part of) | 16,386 | 24,325 | 34,101 |
| Passaic (Part of) | 423,689 | 499,574 | 576,911 | Cape May | 59,554 | 71,916 | 86,390 |
| Union | 543,116 | 664,096 | 774,901 | Totals | 252,146 | 294,298 | 343,205 |
| Totals | 3,404,069 | 3,897,261 | 4,357,687 | | | | |
| | | | | Delaware Bay | | | |
| Central Corridor | | | | Cumberland | 121,374 | 143,251 | 166,098 |
| Mercer | 303,968 | 351,675 | 403,337 | Salem | 60,346 | 69,355 | 77,304 |
| Middlesex | 583,813 | 730,166 | 892,499 | Totals | 181,720 | 212,606 | 243,402 |
| Somerset | 198,372 | 252,407 | 314,315 | | | | |
| Totals | 1,086,153 | 1,334,248 | 1,610,151 | New Jersey | 7,168,164 | 8,596,500 | 10,101,000 |

Source: Outdoor Recreation in New Jersey. Trenton: State Planning Dept., 1973, p. 32.

## EXISTING AND PROPOSED COUNTY RECREATION LAND (New Jersey) (acres)

| Region/County | Existing Recreation Land 1970 | Proposed Recreation Land Green Acres Programs 1961 Bond Issue | 1971 Bond Issue | Total Proposed Land | Total Future County Recreation Land |
|---|---|---|---|---|---|
| Northwest | | | | | |
| Hunterdon | | | 1,413 | 1,413 | 1,413 |
| Sussex | | | | | |
| Warren | 4 | | | | 4 |
| Regional Total | 4 | | 1,413 | 1,413 | 1,417 |
| North Central | | | | | |
| Morris | 4,500 | | 115 | 115 | 4,615 |
| Passaic (Part of) | 293 | | | | 293 |
| Regional Total | 4,793 | | 115 | 115 | 4,908 |
| Northeast | | | | | |
| Bergen | 4,490 | | 672 | 672 | 4,662 |
| Essex | 5,319 | | | | 5,319 |
| Hudson | 612 | | | | 612 |
| Passaic (Part of) | 1,207 | | 1,027 | 1,027 | 2,234 |
| Union | 5,210 | 2 | 251 | 253 | 5,463 |
| Regional Total | 16,958 | 2 | 1,950 | 1,952 | 18,910 |
| Central Corridor | | | | | |
| Mercer | 2,924 | | | | 2,924 |
| Middlesex | 2,500 | 11 | 266 | 277 | 2,777 |
| Somerset | 2,154 | -- | 966 | 966 | 3,149 |
| Regional Total | 7,577 | 21 | 1,252 | 1,273 | 8,850 |

| Region/County | Existing Recreation Land 1970 | Proposed Recreation Land Green Acres Programs 1961 Bond Issue | 1971 Bond Issue | Total Proposed Land | Total Future County Recreation Land |
|---|---|---|---|---|---|
| North Shore | | | | | |
| Monmouth | 1,666 | | 922 | 922 | 2,588 |
| Ocean (Part of) | 441 | | 615 | 615 | 1,056 |
| Regional Total | 2,107 | | 1,537 | 1,537 | 3,644 |
| Southwest | | | | | |
| Burlington (Part of) | | | | | |
| Camden | 3,470 | | | | 4,000 |
| Gloucester | 30 | | | | 30 |
| Regional Total | 3,500 | | 0 | 0 | 4,030 |
| South Shore | | | | | |
| Atlantic | 9 | | 80 | 80 | 89 |
| Burlington (Part of) | | | | | |
| Cape May | 1,445 | | | | 1,445 |
| Ocean (Part of) | 95 | | | | 95 |
| Regional Total | 1,549 | | 80 | 80 | 1,629 |
| Delaware Bay | | | | | |
| Cumberland | 165 | | 871 | 871 | 1,036 |
| Salem | | | | | |
| Regional Total | 165 | | 871 | 871 | 1,036 |
| State Totals | 36,505 | 23 | 7,218 | 7,241 | 43,826 |

[1]Represents estimated acreage which will be acquired under the 1971 Green Acres Bond Issue.

Source: Outdoor Recreation in New Jersey. Trenton: State Planning Dept., 1973, p. 52.

Appendix V - J

TOTAL NUMBER OF EMPLOYEES, PAYROLL, AND UNITS OF BUSINESS DURING MID-MARCH 1970, 1971, AND 1972 IN TRAVEL-RELATED STANDARD INDUSTRIAL CLASSIFICATIONS FOR COASTAL COUNTIES IN NEW JERSEY.

Atlantic

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 4,064 | 2,929 | 382 | 4,319 | 3,141 | 384 | 4,409 | 3,357 | 379 |
| 5997 | 213 | 168 | 29 | 197 | 155 | 30 | 192 | 169 | 27 |
| 70 | 4,051 | 3,400 | 137 | 3,713 | 3,234 | 130 | 3,264 | 3,273 | 134 |
| 72 | 851 | 824 | 201 | 782 | 771 | 200 | 757 | 799 | 183 |
| 75 | 285 | 318 | 59 | 210 | 244 | 56 | 200 | 245 | 57 |
| 76 | D* | D | 33 | D | D | 29 | 124 | 227 | 31 |
| 78 | 151 | 133 | 14 | 145 | 123 | 13 | D | D | 11 |
| 79 | 729 | 798 | 60 | 608 | 755 | 55 | 661 | 764 | 57 |
| Total | 46,742 | 61,455 | 3,659 | 45,492 | 63,240 | 3.605 | 46,781 | 72,806 | 3,559 |

* Not reported to avoid disclosure

Cape May

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 735 | 484 | 107 | 765 | 583 | 100 | 770 | 597 | 107 |
| 70 | 239 | 159 | 48 | 239 | 199 | 55 | 256 | 238 | 48 |
| 72 | 242 | 228 | 63 | 257 | 237 | 62 | 254 | 247 | 59 |
| 75 | NR* | NR | NR | 42 | 36 | 10 | 44 | 46 | 12 |
| 76 | 45 | 61 | 13 | 48 | 66 | 13 | 34 | 51 | 11 |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 103 | 117 | 26 | 89 | 107 | 18 | 103 | 121 | 19 |
| Total | 9,605 | 12,459 | 1,367 | 9,985 | 13,886 | 1,349 | 10,412 | 15,793 | 1,381 |

* None reported

Cumberland

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 890 | 650 | 142 | 1,019 | 816 | 141 | 1,069 | 889 | 135 |
| 70 | 81 | 57 | 11 | NR | NR | NR | 74 | 51 | 10 |
| 72 | 479 | 454 | 101 | 422 | 428 | 101 | 461 | 433 | 104 |
| 75 | 330 | 561 | 60 | 312 | 596 | 54 | 343 | 639 | 54 |
| 76 | 198 | 249 | 31 | 155 | 235 | 29 | 160 | 288 | 29 |
| 78 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | 93 | 98 | 18 | 93 | 84 | 15 | 87 | 80 | 16 |
| Total | 40,102 | 61,701 | 2,178 | 38,925 | 63,952 | 2,136 | 40,451 | 73,225 | 2,151 |

* None Reported

Monmouth

| | 1970 | | | 1971 | | | 1972 | | |
|---|---|---|---|---|---|---|---|---|---|
| S.I.C. | # | $ | units | # | $ | units | # | $ | units |
| 58 | 5,077 | 3,528 | 581 | 5,441 | 4,012 | 575 | 5,740 | 4,513 | 568 |
| 5997 | 52 | 41 | 18 | 59 | 52 | 21 | 77 | 66 | 25 |
| 70 | 1,275 | 1,069 | 127 | 1,451 | 1,229 | 127 | 1,403 | 1,285 | 115 |
| 72 | 1,921 | 2,058 | 428 | 1,941 | 2,064 | 411 | 1,879 | 2,143 | 391 |
| 75 | 640 | 804 | 135 | 673 | 903 | 140 | 640 | 920 | 140 |
| 76 | 304 | 450 | 76 | 313 | 478 | 76 | 314 | 536 | 73 |
| 78 | 160 | 225 | 7 | 227 | 251 | 8 | 237 | 283 | 12 |
| 79 | 906 | 996 | 116 | 940 | 1,077 | 114 | 1,007 | 1,168 | 110 |
| Total | 87,298 | 131,580 | 7,031 | 87,646 | 137,654 | 6,960 | 90,939 | 161,476 | 6,960 |

Appendix V - J
(cont'd)

Ocean

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 2,350 | 1,665 | 269 | 2,592 | 1,919 | 273 | 2,913 | 2,219 | 273 |
| 5997 | 47 | 36 | 16 | 47 | 40 | 14 | 54 | 50 | 14 |
| 70 | 815 | 643 | 55 | 1,451 | 1,229 | 127 | 1,403 | 1,285 | 115 |
| 72 | 528 | 476 | 166 | 1,941 | 2,064 | 411 | 1,879 | 2,143 | 391 |
| 75 | 210 | 312 | 56 | 673 | 903 | 140 | 640 | 920 | 140 |
| 76 | 106 | 145 | 42 | 313 | 478 | 76 | 314 | 536 | 73 |
| 78 | 196 | 216 | 4 | 227 | 251 | 8 | 237 | 283 | 12 |
| 79 | 262 | 249 | 49 | 940 | 1,077 | 114 | 1,007 | 1,168 | 110 |
| Total | 30,119 | 40,545 | 3,217 | 87,646 | 137,654 | 6,960 | 90,939 | 161,476 | 6,960 |

Salem

| S.I.C. | 1970 # | 1970 $ | 1970 units | 1971 # | 1971 $ | 1971 units | 1972 # | 1972 $ | 1972 units |
|---|---|---|---|---|---|---|---|---|---|
| 58 | 563 | 372 | 67 | 509 | 337 | 69 | 623 | 405 | 76 |
| 70 | 148 | 122 | 14 | 161 | 135 | 12 | 164 | 146 | 12 |
| 72 | 123 | 91 | 41 | 116 | 92 | 42 | 113 | 82 | 44 |
| 75 | 43 | 56 | 16 | 59 | 71 | 21 | 56 | 74 | 24 |
| 76 | NR* | NR | NR | NR | NR | NR | NR | NR | NR |
| 78 | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| 79 | NR | NR | NR | NR | NR | NR | 60 | 44 | 11 |
| Total | 17,194 | 34,355 | 827 | 16,550 | 34,738 | 823 | 18,936 | 46,661 | 850 |

* None Reported

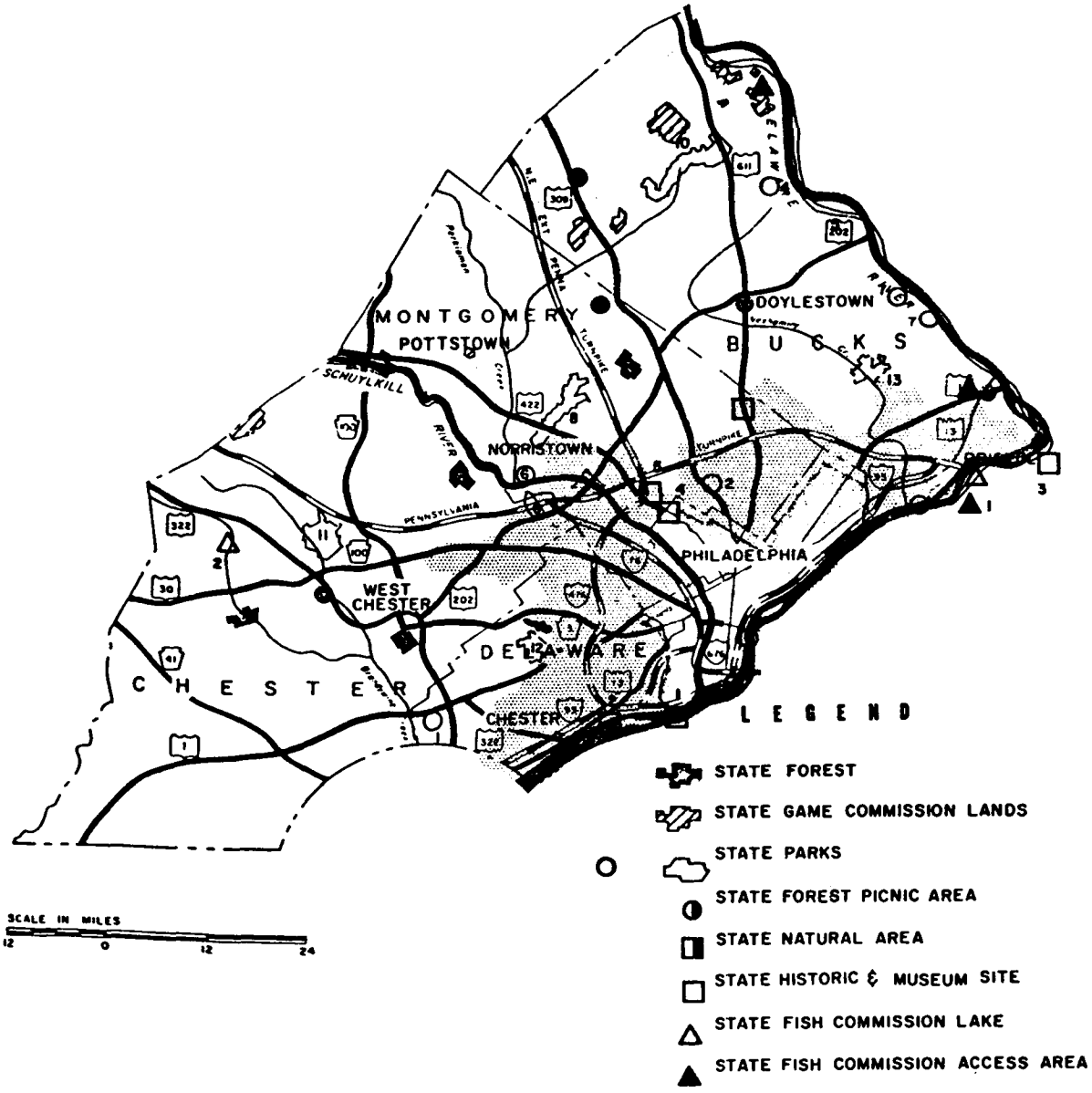
Source: County Business Patterns, U.S. Dept. of Commerce, Bureau of Census.

# RECREATION APPENDIX VI

## Pennsylvania

Appendix VI-A

Recreation in Pennsylvania's Southeastern Region




Source: Statewide Comprehensive Outdoor Recreation Plan.

Harrisburg: State Planning Board, June, 1971, P.-148-149

Appendix VI-A (con't)

Key to Recreation Areas and Facilities

STATE PARKS

1. Brandywine Battlefield (D)
2. Fort Washington (D)
3. Independence Mall (D)
4. Ralph Stover (D)
5. Roosevelt (D)
6. Valley Forge (D)
7. Washington Crossing (D)
8. Evansburg
9. Neshaminy (d)
10. Nockamixon
11. Marsh Creek
12. Ridley Creek (d)
13. Tyler (d)

D = developed
d = under development

STATE HISTORICAL & MUSEUM COMMISSION PROPERTIES

1. Governor Printz Park
2. Morton Homestead
3. Pennsbury Manor
4. Hope Lodge
5. Old Mather Mill
6. Graeme Park

STATE FISH COMMISSION LAKES

1. Levittown Lake
2. Icedale Lake

Appendix VI - B

Existing Recreation Facilities in Pennsylvania

by Type of Ownership - 1968

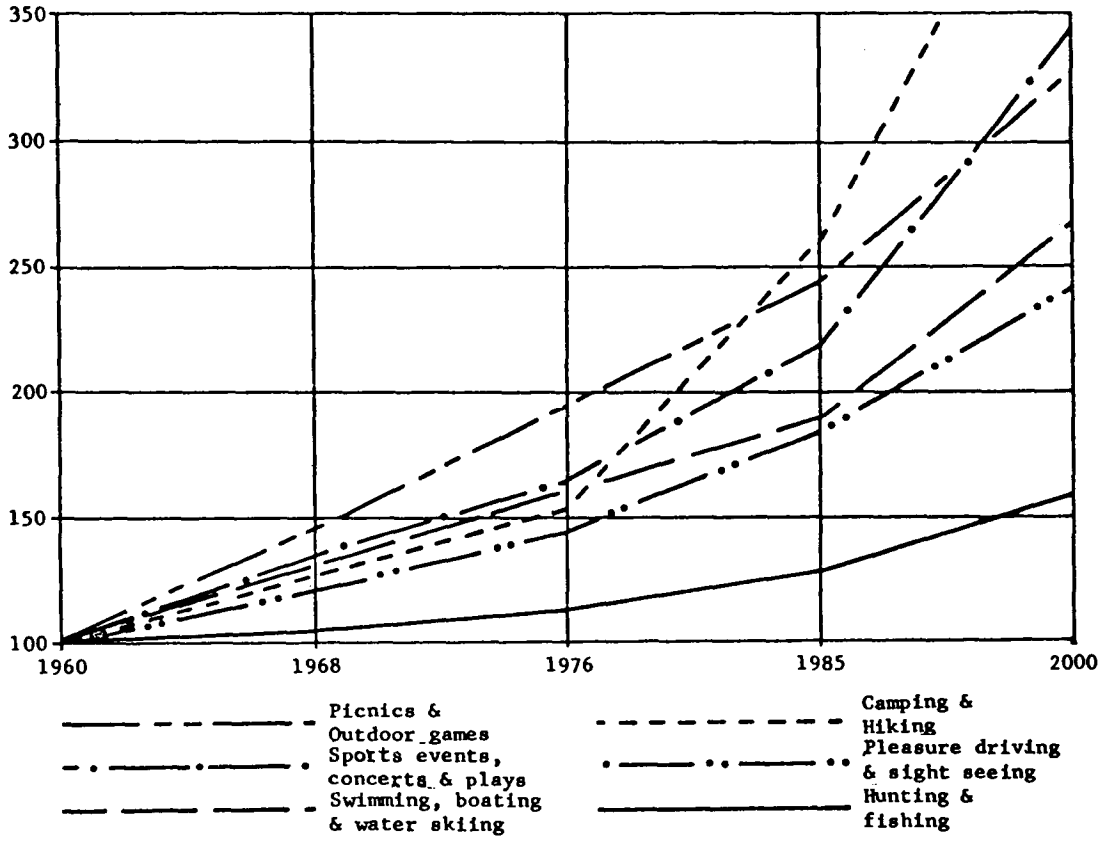
| Facilities | Federal | State | Local Public | Private | | Total |
|---|---|---|---|---|---|---|
| | | | | Profit | Non-Profit | |
| Picnic Tables | 1,147 | 29,548 | 24,043 | 20,956 | 8,751 | 84,445 |
| Trailer and Tent Sites | 634 | 5,294 | 494 | 7,378 | 4,480 | 18,280 |
| Group Facilities | 31 | 1,178 | - - | - - | - - | 1,209 |
| Cabins | 129 | 161 | - - | - - | - - | 290 |
| Swimming Capacity (persons) | 5,112 | 110,800 | 307,605* | 4,054,905* | 1,423,266* | 5,901,688 |
| Beach (acres) | 36 | ** | 69 | 720 | 220 | 1,045 |
| Swimming Pools | - - | ** | 303 | 311 | 237 | 851 |
| Marinas and Mooring Slips | 180 | 5,227 | 194 | 1,900 | 579 | 8,080 |
| Launch Ramps | 8 | 96 | 41 | 536 | 117 | 798 |
| Nature Walks (miles of trails) | 5 | 41 | - - | 461 | - - | 507 |
| Horseback Riding (miles of trails) | 21 | 96 | 110 | 764 | 109 | 1,100 |
| Bicycling | - - | 71 | 32 | 96 | 23 | 222 |
| Skiing (lift capacity-persons per hour) | - - | 6,000 | 8,940 | 79,370 | 1,720 | 96,030 |
| Sledding (number of slopes) | - - | ** | 91 | 92 | 45 | 228 |
| Ice Skating (acres) | - - | ** | 4 | 677 | 628 | 1,309 |

* Estimated

** Facilities available but not quantified

Source: Statewide Comprehensive Outdoor Recreation Plan. Harrisburg: State Planning Board, June 1971, p. 143.

TRENDS IN THE DEMAND FOR SELECTED
OUTDOOR ACTIVITIES IN PENNSYLVANIA




Source: Statewide Comprehensive Outdoor Recreation Plan. Harrisburg: State Planning Board, June 1971, p. 116.

Appendix VI - D

Fishing License Sales in Pennsylvania, 1965-69

| Type of License | 1965 | 1966 | 1967 | 1968 | 1969 |
|---|---|---|---|---|---|
| Resident | 446,007 | 477,612 | 529,138 | 601,655 | 645,482 |
| Senior Resident | 43,036 | 45,345 | 49,370 | 52,486 | 55,210 |
| Non-Resident | 13,659 | 1 5,194 | 17,847 | 22,271 | 26,396 |
| 5-day Tourist | 8,322 | 8,877 | 10,436 | 11,701 | 12,483 |
| Free | 1,629 | 1,144 | 736 | 5,420 | 10,569 |
| Totals | 512,653 | 548,172 | 607,527 | 693,533 | 750,140 |

Source: Statewide Outdoor Recreation Plan, 1969-1985, Harrisburg: Pennsylvania Fish Commission, 1969, p. 77.

Appendix VI - Z

Boating Pressure in Region I, Pennsylvania 1969-85

| County | (miles) Stream | (acres) Lakes | usage 1969 | Estimated Demand 1976 | 1980 | 1985 |
|---|---|---|---|---|---|---|
| Bucks | 132 | 44 | 10,560 | 13,200 | 16,368 | 19,008 |
| Chester | 7 | 650 | 26,280 | 32,850 | 40,734 | 47,304 |
| Delaware | 15 | 0 | 5,250 | 6,565 | 8,140 | 9,712 |
| Montgomery | 34 | 814 | 33,920 | 42,400 | 52,576 | 62,752 |
| Philadelphia | 33 | 0 | 10,500 | 13,125 | 15,750 | 18,375 |
| Total | (221) | (1,508) | (86,510) | (108,140) | (133,568) | (157,151) |

Source: Statewide Outdoor Recreation Plan, 1969-1985. Harrisburg: Fish Commission, 1968, exhibit 3.

Appendix VI - F

Fishing Pressure in Region I, Pennsylvania

| County | (miles) Streams | (acres) Lakes | usage 1969 | Estimated Demand (Man-days) 1976 | 1980 | 1985 |
|---|---|---|---|---|---|---|
| Bucks | 193 | 158 | 845,590 | 1,056,987 | 1,268,385 | 1,479,782 |
| Chester | 126 | 689 | 281,862 | 352,102 | 422,343 | 440,758 |
| Delaware | 48 | 200 | 60,600 | 75,750 | 90,900 | 106,000 |
| Montgomery | 140 | 700 | 1,294,440 | 1,618,050 | 1,941,660 | 2,265,270 |
| Philadelphia | 42 | 0 | 54,936 | 65,923 | 74,163 | 79,657 |
| Total | (549) | (1,747) | (2,537,428) | (3,168,812) | (3,797,451) | (4,371,467) |

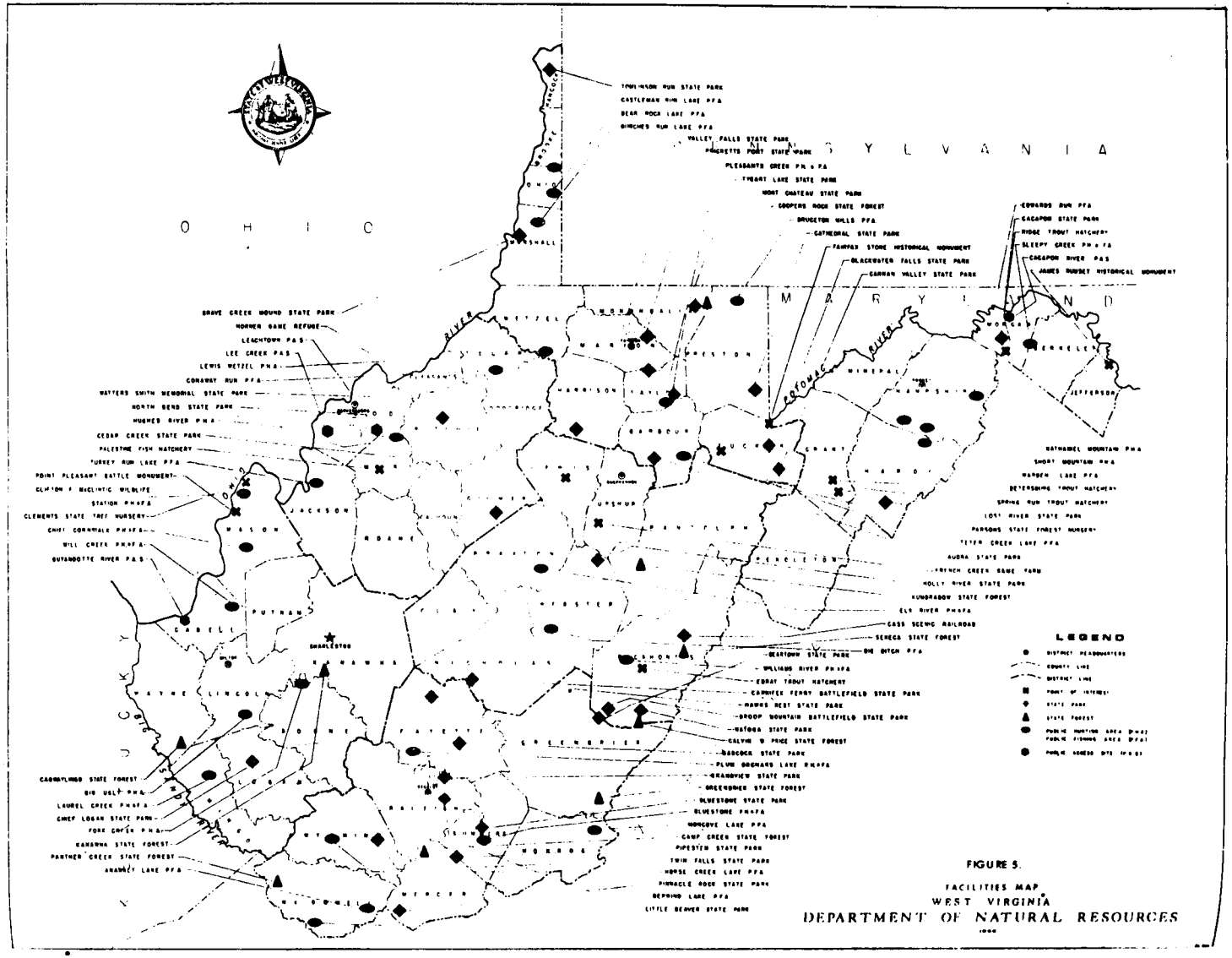
Source: Statewide Outdoor Recreation Plan, 1969-1985.
Harrisburg: Fish Commission, 1968, p. 80, exhibit 2.

# RECREATION APPENDIX VII

## West Virginia

Appendix VII - A

## STATE-OPERATED RECREATION SITES IN WEST VIRGINIA




Source: Statewide Comprehensive Outdoor Recreation Plan. Charleston: Governor's Office of Federal/State Relations, no date.

## Significant Federal Holdings for Outdoor Recreation in West Virginia

| U.S. Forest Service Acreage | Region | Total Acreage | Water Acreage | Land Acreage |
|---|---|---|---|---|
| Monongahela National Forest | V VI VII-A, VII-B | 816,949 | NA | 816,949 |
| By Class 190 (II) | | | | |
| 815,744 (III) | | | | |
| 1,015 (IV) | | | | |
| George Washington National Forest | VI | 100,274 | NA | 100,274 |
| By Class 120 (II) | | | | |
| 100,154 (III) | | | | |
| Jefferson National Forest | VIII | 16,757 | NA | 16,757 |
| By Class 16,757 (III) | | | | |
| Total Forest Service Acreage | | 933,980 | NA | 933,980 |
| National Park Service | | | | |
| Harpers Ferry National Historical Park | VI | 1,275 | NA | 1,275 |
| By Class 1,275 (VI) | | | | |
| Chesapeake & Ohio Canal National Monument | VI | 4 | NA | 4 |
| By Class 4 (VI) | | | | |
| Total Park Service Acreage | | 1,279 | NA | 1,279 |
| Corps of Engineers Lakes | | | | |
| Bluestone Lake | VIII | 24,437 | 1,970* | 22,467 |
| Tygart Lake | V | 7,469 | 1,740* | 5,729 |
| Summersville Lake | VII-B | 12,654 | 2,723* | 9,931 |
| Sutton Lake | VII-A | 14,615 | 1,520* | 13,095 |
| Total Corps Acreage | | 59,175 | 7,953 | 51,222 |
| TOTALS | | 994,434 | 7,953 | 986,481 |

* Recreation Pool Level

Source: Statewide Comprehensive Outdoor Recreation Plan. Charleston: Governor's Office of Federal/State Relations, no date. p. 48.

## Appendix VII - C

## WEST VIRGINIA

CITY AND COUNTY HOLDINGS*

SUMMARY OF PUBLIC OUTDOOR RECREATION AREAS BY B O R CLASSIFICATION

| | | Acres in BOR Classification | | | | | |
|---|---|---|---|---|---|---|---|
| Region | Total | I | II | III | IV | V | VI |
| I | 1,867.65 | 373.65 | 597.50 | 801.00 | 9 | 65.5 | 21 |
| II | 1,053.25 | 80.75 | 768.50 | 204.00 | | | |
| III | 824.40 | 192.25 | 180.00 | 452.15 | | | |
| IV | 1,734.46 | 860.46 | 701.00 | 164.00 | 9 | | |
| V | 1,663.65 | 116.25 | 594.00 | 952.40 | | | 1 |
| VI | 319.85 | 60.35 | 217.00 | 42.50 | | | |
| VII-A | 948.00 | 338.00 | 429.00 | 177.00 | | | 4 |
| VII-B | 208.00 | 21.00 | 178.00 | 9.00 | | | |
| VIII | 1,899.00 | 53.00 | 1,150.00 | 696.00 | | | |
| IX | 90.25 | 61.25 | 19.00 | 10.00 | | | |
| TOTAL | 10,608.51 | 2,156.96 | 4,834.00 | 3,508.05 | 18 | 65.5 | 26 |

Source: Statewide Comprehensive Outdoor Recreation Plan. Charleston: Governor's Office of Federal/State Relations, no date, p. 58.

TOTAL NUMBER OF EMPLOYEES, PAYROLL, AND UNITS OF BUSINESS DURING MID-MARCH, 1972, IN REGION VI, WEST VIRGINIA.

Berkeley County

| S.I.C. | # | $ | units |
|---|---|---|---|
| 58 | 180 | 114 | 28 |
| 70 | 76 | 63 | 10 |
| 72 | 205 | 205 | 38 |
| 75 | 29 | 32 | 10 |
| 76 | NR | NR | NR |
| 78 | NR | NR | NR |
| 79 | NR | NR | NR |
| Total | 8,255 | 14,268 | 584 |

Jefferson County

| S.I.C. | # | $ | units |
|---|---|---|---|
| 58 | 308 | 182 | 29 |
| 70 | 107 | 65 | 6 |
| 72 | 53 | 41 | 16 |
| 75 | NR* | NR | NR |
| 76 | NR | NR | NR |
| 78 | NR | NR | NR |
| 79 | 541 | 456 | 13 |
| Total | 4,104 | 5,355 | 345 |

*None Reported

Mineral

| S.I.C. | # | $ | units |
|---|---|---|---|
| 58 | 85 | 37 | 19 |
| 72 | 78 | 64 | 20 |
| All retail | 576 | 501 | 121 |
| All serv. | 1,274 | 2,709 | 8 |
| Total | 3,127 | 5,334 | 319 |

Morgan

| S.I.C. | # | $ | units |
|---|---|---|---|
| 58 | 80 | 28 | 10 |
| All retail | 210 | 183 | 39 |
| All services | 193 | 178 | 29 |
| Total | 1,211 | 1,892 | 117 |

Grant

| S.I.C. | # | $ | units |
|---|---|---|---|
| All retail | 296 | 263 | 55 |
| All serv. | 103 | 60 | 35 |
| Total | 2,894 | 6,026 | 161 |

Hampshire

| S.I.C. | # | $ | units |
|---|---|---|---|
| All retail | 278 | 251 | 55 |
| All serv. | 136 | 102 | 41 |
| Total | 1,350 | 1,549 | 149 |

Hardy

| S.I.C. | # | $ | units |
|---|---|---|---|
| 58 | 69 | 25 | 12 |
| All retail | 267 | 217 | 54 |
| All serv. | 57 | 34 | 32 |
| Total | 1,382 | 1,445 | 131 |

Pendleton

| S.I.C. | # | $ | units |
|---|---|---|---|
| All retail | 145 | 129 | 32 |
| All serv. | 65 | 42 | 21 |
| Total | 918 | 908 | 88 |

Source: County Business Patterns. U.S. Dept. of Commerce, Bureau of Census.

# RECREATION APPENDIX VIII

## Second Home Communities

PERCENTAGE OF OCCUPANTS LIVING IN DIFFERENT STATES, BY COMMUNITY, DELAWARE

| | Community | | | | |
|---|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | Pot-Nets | South Bethany | Total |
| Home State | Per Cent | | | | |
| Delaware | 39.2 | 68.9 | 83.0 | 29.8 | 52.3 |
| Maryland | 32.9 | 3.4 | 0 | 39.7 | 21.0 |
| Pennsylvania | 18.7 | 20.7 | 11.7 | 6.6 | 13.2 |
| Virginia | 5.8 | 0 | 0.5 | 16.5 | 6.3 |
| District of Columbia | 2.5 | 0 | 0 | 4.1 | 1.9 |
| Florida | 2.5 | 0 | 0 | 0 | 0.8 |
| New Jersey | 0 | 0 | 1.8 | 0.8 | 0.8 |
| New York | 0.6 | 3.4 | 0 | 0.8 | 0.6 |
| Ohio | 1.9 | 0 | 0 | 0 | 0.6 |
| Rhode Island | 0 | 0 | 0 | 0.8 | 0.2 |
| South Carolina | 0 | 3.4 | 0 | 0 | 0.2 |
| West Virginia | 0 | 0 | 0 | 0.8 | 0.2 |
| No Answer | 0.6 | 0 | 2.9 | 0.8 | 1.7 |

Source: Chicoine, Davild L. A Profile of Delaware's Seasonal Home Occupants and Permanent Residents with Local Public Policy Implications. Master's Thesis, University of Delaware, Newark, Del., May, 1971, p. 26.

Appendix VIII - B

Percentage of Occupants by Area of Permanent Residence and Community, Delaware

| | Community | | | | |
|---|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | Pot-Nets | South Bethany | Total |
| | Per Cent | | | | |
| Central city area | 7.1 | 6.9 | 7.6 | 6.6 | 7.1 |
| Suburban area | 53.5 | 10.3 | 48.5 | 66.9 | 52.5 |
| Rural-urban fringe | 20 | 17.2 | 18.7 | 15.7 | 18.3 |
| Small town/village | 18.7 | 55.2 | 9.4 | 9.1 | 15.1 |
| Mobile home park | 0 | 3.4 | 11.7 | 0 | 4.4 |
| Farm | 0 | 10.3 | .6 | .8 | 1.1 |
| No Answer | .7 | 3.4 | 2.3 | .8 | 1.5 |

Source: Chicoine, David L., p. 30 (See Appendix VIII - A)

Appendix VIII - C

Percentage of Occupant Permanent Dwelling Types, by Community, Delaware

| | Community | | | | |
|---|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | Pot-Nets | South Bethany | Total |
| | Per Cent | | | | |
| Single-family dwelling | 89.7 | 62.1 | 72.5 | 89.3 | 81.7 |
| Mobile home | 0 | 6.9 | 12.3 | 0 | 4.8 |
| Apartment | 3.2 | 6.9 | 5.3 | 2.5 | 3.9 |
| Townhouse | 3.2 | 10.3 | 2.9 | 3.3 | 3.6 |
| Two-family dwelling | 2.6 | 0 | 2.3 | 1.7 | 2.1 |
| Farmhouse | 0.7 | 10.3 | 0.6 | 0.8 | 1.3 |
| Row house | 0 | 0 | 1.2 | 3.3 | 0.6 |
| No Answer | 0.7 | 3.4 | 2.9 | 1.7 | 1.9 |

Source: Chicoine, David L., p. 31 (See Appendix VIII - A)

## Percentage of Time Occupants and Residents had Lived in Their Community in Delaware

| | Community | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fenwick Island | | Oak Orchard | | Pot-Nets | South Bethany | | Total | |
| | O(a) | R(b) | O | R | O | O | R | O | R |
| In Years | Per Cent | | | | | | | | |
| 1 - 3 | 13.5 | 10.0 | 17.2 | 10.5 | 43.9 | 23.9 | 33.3 | 27.3 | 14.3 |
| 4 - 6 | 17.4 | 20.0 | 3.4 | 15.8 | 39.2 | 22.3 | 33.3 | 25.6 | 20.0 |
| 7 - 9 | 7.1 | 10.0 | 3.4 | 10.5 | 8.8 | 14.0 | 16.7 | 9.0 | 11.4 |
| 10 - 12 | 18.1 | 30.0 | 24.1 | 10.5 | 0 | 18.2 | 16.7 | 11.9 | 17.1 |
| 13 - 15 | 6.5 | 0 | 6.9 | 5.3 | 0 | 8.3 | 0 | 4.6 | 2.9 |
| 16 - 20 | 14.2 | 30.0 | 10.3 | 10.5 | 0 | 4.9 | 0 | 6.7 | 14.3 |
| 21 - 25 | 5.2 | 0 | 3.4 | 10.5 | 0 | 2.5 | 0 | 2.5 | 5.7 |
| 26 - 30 | 5.8 | 0 | 10.3 | 0 | 0 | 0.8 | 0 | 3.2 | 0 |
| over 30 | 8.4 | 0 | 10.3 | 5.3 | 0 | 0 | 0 | 3.6 | 2.9 |
| No Answer | 3.9 | 0 | 10.3 | 21.1 | 7.6 | 0 | 0 | 4.2 | 11.4 |

(a) Seasonal occupants

(b) Permanent residents

Source: Chiocoine, David L., P. 46 (See Appendix VIII - A)

Appendix VIII - E

Percentage of Permanent Residents Owning Rental Property by Community in Delaware

| | Community | | | |
|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | South Bethany | Total |
| | Per cent | | | |
| Own Rental Property | 30.0 | 21.1 | 0 | 20.0 |
| Do Not Own Rental Property | 70.0 | 73.7 | 100 | 77.1 |
| No Answer | 0 | 5.3 | 0 | 2.9 |

Source: Chicoine, David L., p. 51 (See Appendix VIII-A)

Appendix VIII-F

Percentage of Owner Occupants Who Rent Their Homes to Others, by Community in Delaware

| | Community | | | | |
|---|---|---|---|---|---|
| | Fenwick Island | Oak Orchard | Pot-Nets | South Bethany | Total |
| | Per Cent | | | | |
| Rent to Others | 16.1 | 10.3 | 0.6 | 20.7 | 11.3 |
| Do Not Rent to Others | 63.2 | 65.5 | 97.1 | 61.9 | 75.2 |
| No Answer | 20.6 | 24.1 | 2.3 | 17.4 | 13.4 |

Source: Chicoine, David L., p.52 (See Appendix VIII-A)

Respondents' Ranking of Service or Facility in Descending Order by Community in Delaware

| Fenwick Island Seasonal Occupants | Ranking Number(a) | Fenwick Island Permanent Residents | Ranking Number(a) |
|---|---|---|---|
| Fire protection | 348 | Medical facilities | 25 |
| Medical facilities | 345 | Fire protection | 23 |
| Conservation and wild-life areas | 339 | Open space areas | 20 |
| Police protection | 283 | Conservation and wild-life areas | 20 |
| Outdoor recreational facilities | 276 | Police protection | 17 |
| Indoor recreational facilities | 247 | Highways | 14 |
| Highways | 233 | Outdoor recreational facilities | 14 |
| New public beaches | 232 | New public beaches | 13 |
| Open space areas | 224 | Business activities | 12 |
| Employment opportunities | 208 | Indoor recreational facilities | 12 |
| School | 199 | Employment opportunities | 11 |
| Housing developments | 171 | Housing developments | 11 |
| Business activities | 166 | Schools | 9 |
| **Oak Orchard Seasonal Occupants** | **Ranking Number(a)** | **Oak Orchard Permanent Residents** | **Ranking Number(a)** |
| Police protection | 67 | Police protection | 45 |
| Medical facilities | 60 | Medical facilities | 44 |
| New public beaches | 56 | Employment opportunities | 39 |
| Outdoor recreational facilities | 56 | Conservation and wild-life areas | 39 |
| Conservation and wild-life areas | 55 | Outdoor recreational facilities | 37 |
| Indoor recreational facilities | 51 | Indoor recreational facilities | 32 |
| Fire protection | 48 | New public beaches | 32 |
| Open space areas | 44 | Open space areas | 32 |
| Employment opportunities | 41 | Fire protection | 32 |
| Schools | 40 | Business activities | 30 |
| Highways | 35 | Schools | 26 |
| Business activities | 35 | Highways | 24 |
| Housing developments | 31 | Housing developments | 23 |

Respondents' Ranking of Service or Facility
in Descending Order by Community

| Pot-Nets Mobile Home Park Seasonal Occupants | Ranking Number(a) |
|---|---|
| Conservation and wild-life areas | 381 |
| Medical facilities | 380 |
| Police protection | 357 |
| Outdoor recreational facilities | 349 |
| Indoor recreational facilities | 346 |
| Fire protection | 345 |
| Open space areas | 328 |
| Employment opportunities | 281 |
| Highways | 266 |
| Schools | 256 |
| Business activities | 213 |
| New public beaches | 203 |
| Housing developments | 180 |

| South Bethany Seasonal Occupants | Ranking Number(a) | South Bethany Permanent Residents | Ranking Number(a) |
|---|---|---|---|
| New public beaches | 283 | Police protection | 17 |
| Conservation and wild-life areas | 281 | Medical facilities | 15 |
| Police protection | 268 | Conservation and wild-life areas | 15 |
| Medical facilities | 264 | Open space areas | 14 |
| Fire protection | 255 | Employment opportunities | 13 |
| Open space areas | 251 | Schools | 12 |
| Outdoor recreational facilities | 227 | Outdoor recreational facilities | 11 |
| Indoor recreational facilities | 214 | Business activities | 11 |
| Highways | 203 | Highways | 11 |
| Employment opportunities | 169 | Fire protection | 11 |
| Business activities | 165 | Indoor recreational facilities | 11 |
| Schools | 160 | New public beaches | 10 |
| Housing developments | 146 | Housing developments | 8 |

Respondents' Ranking of Service or Facility in Descending Order by Community

| Total Seasonal Occupants | Ranking Number(a) | Total Permanent Residents | Ranking Number(a) |
|---|---|---|---|
| Conservation and wild-life areas | 1056 | Medical facilities | 84 |
| Medical facilities | 1049 | Police protection | 79 |
| Fire protection | 996 | Conservation and wild-life areas | 74 |
| Police protection | 975 | Fire protection | 66 |
| Outdoor recreational facilities | 908 | Open space areas | 66 |
| Indoor recreational facilities | 858 | Employment opportunities | 63 |
| Open space areas | 847 | Outdoor recreational facilities | 62 |
| New public beaches | 774 | New public beaches | 55 |
| Highways | 737 | Indoor recreational facilities | 55 |
| Employment opportunities | 699 | Business activities | 53 |
| Schools | 655 | Highways | 49 |
| Business activities | 579 | Schools | 47 |
| Housing developments | 528 | Housing developments | 42 |

(a) Respondents indicated whether they desired more, same or less of the above facilities and services. These ratings were given weights of 3, 2, 1, respectively. The number of respondents in each rating multiplied by the weight gives the ranking number.

Source: Chicoine, David L., p. 103-105 (See Appendix VIII-A).

# LAND AND WATER USE

Volume VII

BY: Mary Jenny
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Prepared For:
Bureau of Land Management
Department of the Interior

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LAND AND WATER USE

LAND USE - TABLES

LAND USE - MAPS

# I. Historical and current land use in the study area

## A. Introduction

### 1. Summary overview

A broad overview of the study area is dominated by the predominately urban character of the Boston-Washington, D. C. corridor - the Atlantic Megalopolis. However, surrounding this urban corridor are large areas of agriculture, forests, and open land. Also, according to M. Clawson, "Within the counties of the Northeastern Urban Complex, about a seventh of the total land area is used for residental, commercial, and industrial purposes."[1] Thus, the majority of land, even in the highly urbanized regions, is open, unused, or vacant. From this, it would seem reasonable to suggest that additional development, at least for commercial and industrial purposes, can be located in the urbanized areas of the Atlantic Coast, rather than in the largely undeveloped coastal areas.

### 2. Rationale

The following information and inventory, concentrating on the coastal counties from Sandy Hook, New Jersey to Cape Hatteras, North Carolina, will show the current uses of land within these counties.

"Land use" is used herein to denote the major type of activity or condition in reference to a particular area or parcel of land. Examples of types of activities are farming, urban (industrial and/or residential), and recreation. Forests, grasslands, and open spaces are examples of conditions of land. Overlap may occur in some cases, for example, grasslands may be used for pasturing cattle, a type of agricultural activity.

The right to use land as determined by ownership, zoning, administrative or legal determination, while limiting the use to which land may be put, does not in itself constitute land use. For example, while an air force base and a national park are both owned by the federal government, the land use is very different.

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[1] M. Clawson, Suburban Land Conversion in the United States. (Johns Hopkins Press: Baltimore), 1971, p. 218.

Comparable statistical information is not available for each county within the study area. County land use information was generally obtained from county and state planning documents. In some cases, this information is from documents published in 1966 or earlier. Obviously land uses and the acreages devoted to given uses have, in most cases, changed between 1966 and 1974. However, the inventory information is the best that could be located and data gaps are noted where they occur.

Statistical information on state levels is included where available and is generally taken from a national source so as to provide some degree of comparability between states.

3. Organization

The land use inventory is organized from the smallest study areas (i.e., the four target locations) and then to the state level.

Land use acreages by the three categories of federal land, urban and built-up land, and total farm and forest land are listed by counties, where available. In most cases these categories are not comparable from county to county or state to state because of the lack of a standardized definition for each category. Figures for recreation acreages are not always included as they are extensively covered in the recreation volume of this report.

Industrial land use is generally included in the urban and built-up category except in those areas where there is an exceptionally large concentration of a relevant industry, e.g., the petrochemical complex on upper Delaware Bay.

Overlays showing urban land, open land (farm and/or forest) and recreation land are included in the atlas of this report.

Information on Pennsylvania and West Virginia is included in lesser detail as these states are on the fringe of the study area and the land uses within these states are of lesser concern.

B. Summary information by target areas

1. Cape May, New Jersey - Lewes, Delaware

This area was chosen as a target area because of its proximity to some of the possible oil and gas accumulation sites (the Baltimore

Canyon) off the Atlantic Coast and because of its proximity to the petrochemical refining complex of the upper Delaware Bay. These areas are shown on Maps 1 and 2 on the following pages.

Cape May County and the area surrounding Lewes, Delaware, although located in two states, evidence many similar land use and socio-economic characteristics. Both areas are predominately rural with the majority of the land open, forest or farm land.

Cape May County, with a total area of 169,800 acres, has 10% of its land in farms, 37% in forests, 43% residential and other, and only 1% industrial.[2] The population of Cape May county in 1970 was 59,554 persons, giving the county a population density of less than 1 person per acre.

However, all is not idyllic pastoral life in Cape May County. Some 4377 acres of natural marsh have been destroyed in the 17-year period from 1953-70 and this destruction is approaching the point where there are no longer many acres of marsh to lose.[3] These marshes have been destroyed mainly as the result of diking for mosquito control and salt hay production.[4] Also, the unemployment rate is higher than for the rest of the state and traditional sources of jobs (tourism and fishing) are adversely affected by increased pollution of the Bay and ocean.[5]

Lewes, Delaware, located on the opposite side of Delaware Bay, is in much the same land use position as Cape May. Lewes is located in Sussex County, an overwhelmingly rural county. With a total land area of 601,100 acres, 570,200 acres, accounting for 95% of the land, were identified in 1964 as being non-urban.[6] The city of Lewes has 2,553 year-round residents and 23 acres of commercial enterprises.[7] Much of the surrounding

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[2] Figure taken from Enjoy N.J., New Jersey Department of Labor and Industry, Trenton, N.J.

[3] Inventory and Evaluation of Information on Delaware Bay, v. 2, p. 107.

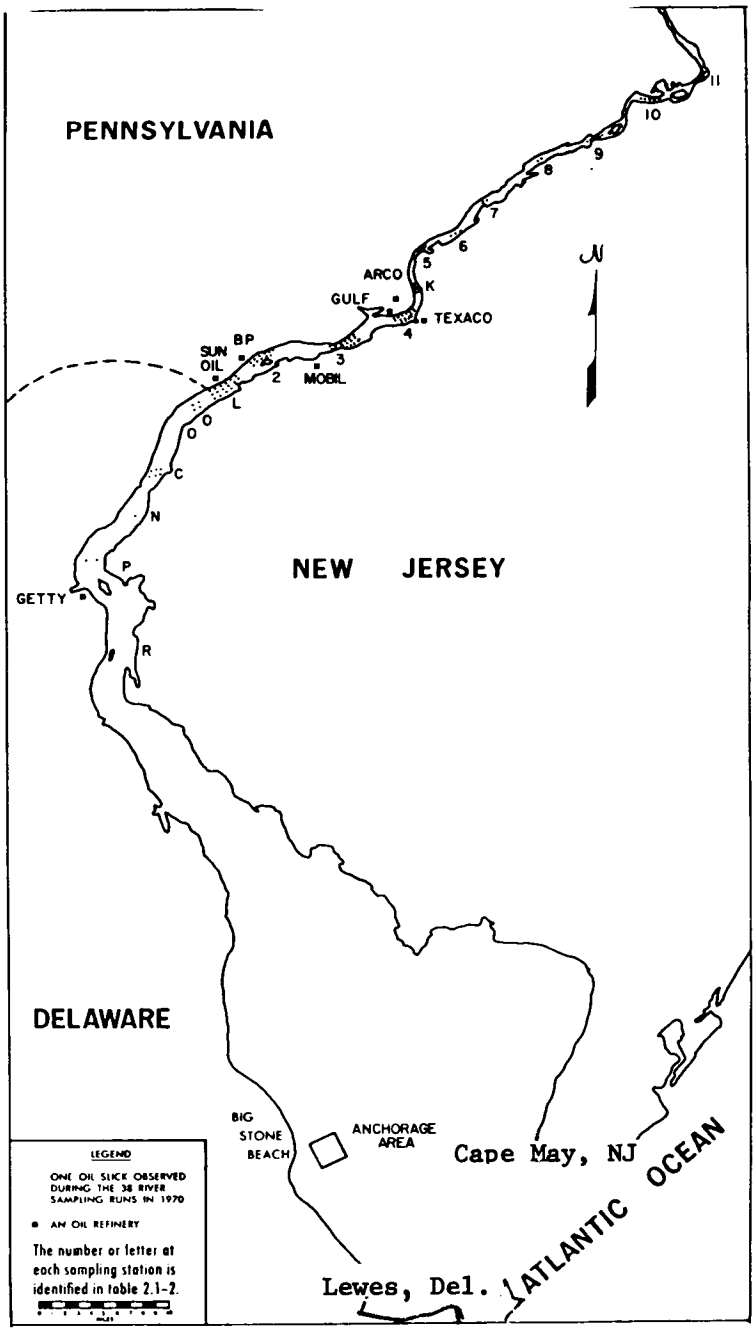
[4] Ibid., p. 108.

[5] Employment and Recreation are covered in other parts of this report.

[6] Preliminary Comprehensive Development Plan. Delaware State Planning Office (June, 1967).

[7] Inventory and Evaluation of Information on Delaware, v. 2.

REFINERY SITES ON THE UPPER DELAWARE ESTUARY

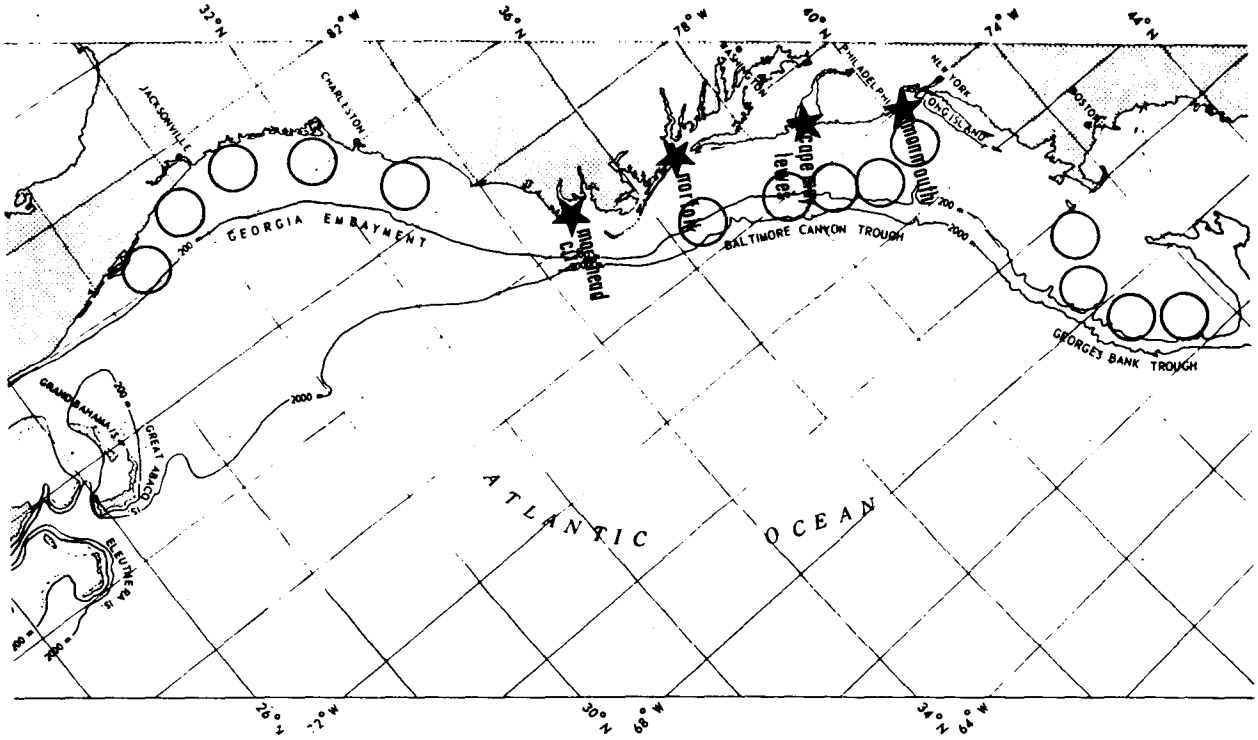



Source: Department of Natural Resources and Environmental Control

SOURCE: The Coastal Zone of Delaware. The Governor's Task Force.

Map 1

POSSIBLE OIL AND GAS ACCUMULATIONS ALONG THE MID-ATLANTIC COAST




**U.S. ATLANTIC OCS**

**HYPOTHETICAL LOCATIONS OF POSSIBLE OIL AND GAS ACCUMULATIONS**

50 0 50 100 150 200
MILES
50 0 50 100 150 200
KILOMETERS
WATER DEPTH IN METERS

FIGURE 1

★ TARGET AREAS

SOURCE: COUNCIL ON ENVIRONMENTAL QUALITY, PROGRESS REPORT, January 11, 1974.

Map 2

area is farm land and recreation land. The city of Lewes owns 3,600 acres of city public common, the State of Delaware owns Cape Henlopen State Park and the federal government owns approximately 7,200 acres in the area, 800 acres of which is a military reservation and 6,400 acres which are in the Primehook Wildlife area.[8]

The maps shown on the following three pages indicate the developed areas and open land for the study area of Cape May-Lewes. Also shown on these maps are the surrounding coastal areas of Cape May and Lewes.

Maps and tables indicating land use relative to the rest of the states of New Jersey and Delaware are included in the state section of this land use chapter.

2. Monmouth County, New Jersey

Monmouth County, New Jersy is located close to the highly urbanized-industrialized areas of Newark-New York City. It is bordered on the west by the Atlantic Ocean and on the north by Sandy Hook and Raritan Bay. In 1966, 28.9% of the land was in farms, and 6.5% in industrial uses.[9] According to figures from the state of New Jersey,[10] the land uses in Monmouth were: 14,502 acres (5%) federal, 57,811 acres (19%) urban and built-up, and 219,987 acres (72%) open space (including farm, forest, open space and recreation land). The majority of the federal land in the county is in the Earle Naval Depot (11,143 acres). The major state-owned open space areas in the county are Sandy Hook State Park, consisting of 450 acres; Monmouth Battlefield, 1347 acres; Turkey Swamp, 1855 acres, and Assumpink Wildlife Area, 2657 acres.[11]

Monmouth County is currently characterized as predominately suburban, i.e., single family residential, within a short distance of an urban area. With a total land area of 305,920 acres, Monmouth County had a 1970 population of 461,849 persons, for a density of 979.4 persons per

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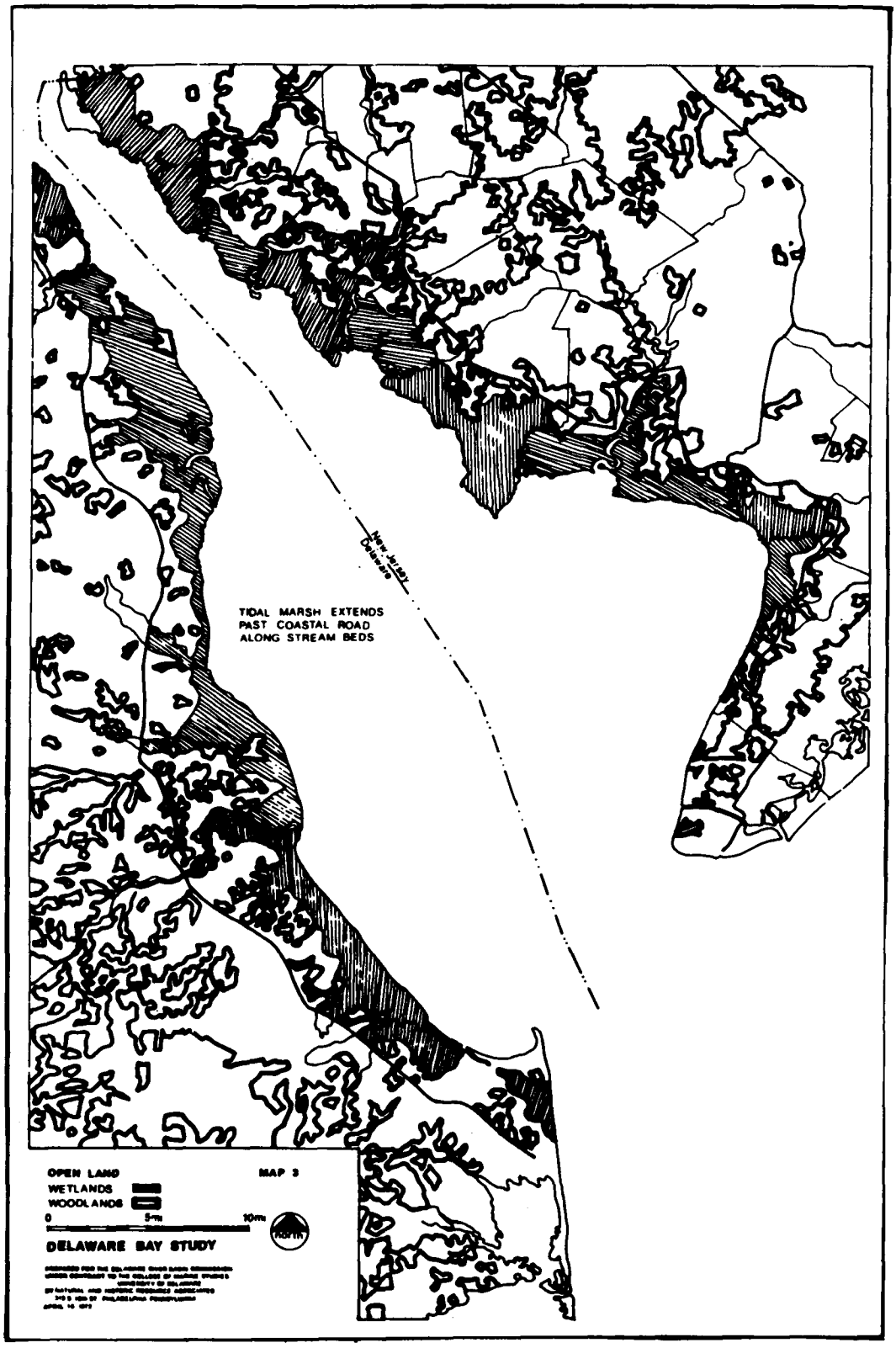
[8] Ibid., pp 90-94.

[9] Enjoy N.J., New Jersey Department of Labor and Industry.

[10] 1966 Land Use by Muncipalities and Counties.

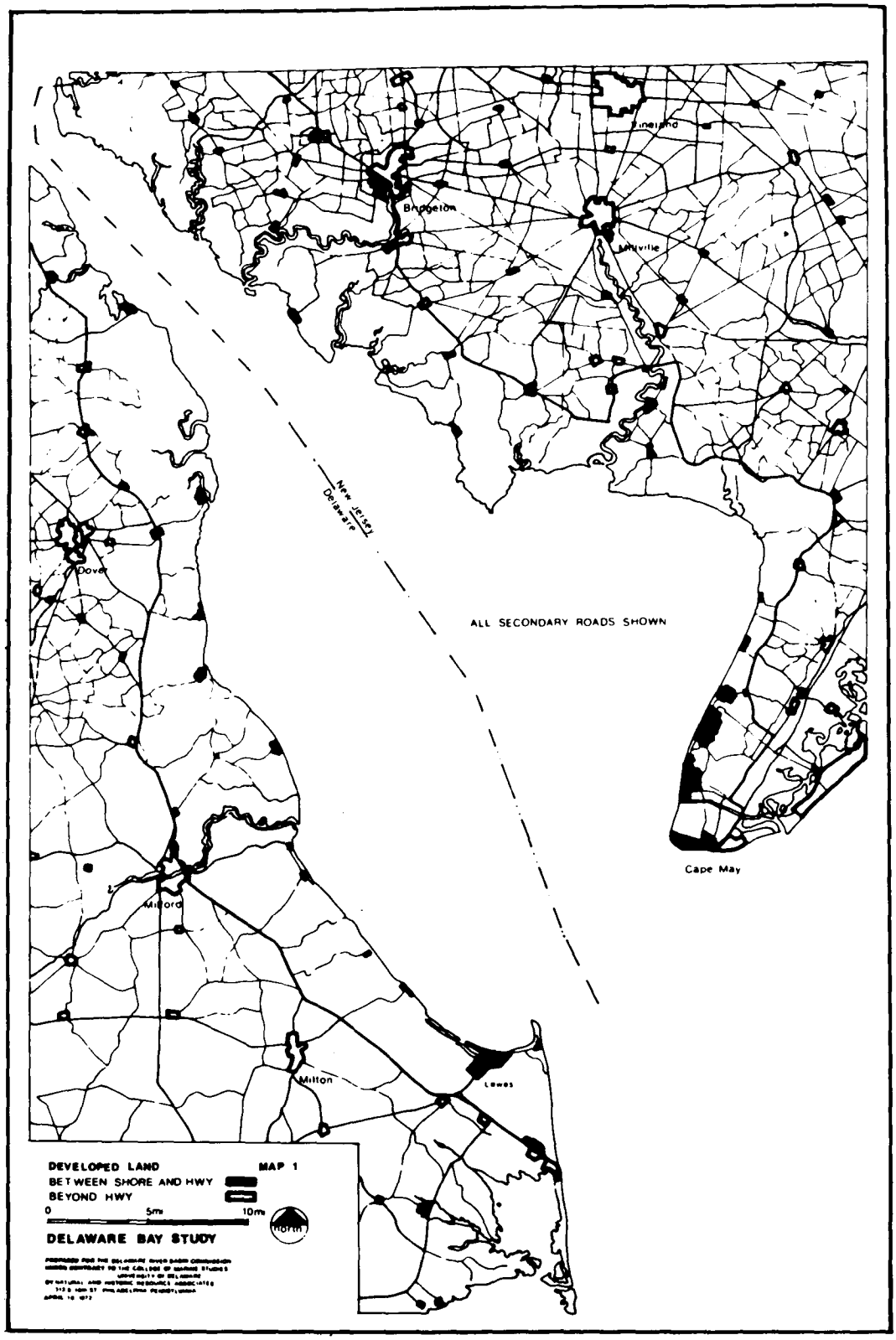
[11] State Owned Real Property in New Jersey, Jan. 1973, N.J. Department of Community Affairs.

Map 3 OPEN LAND---------CAPE MAY, NEW JERSEY -- LEWES, DELAWARE



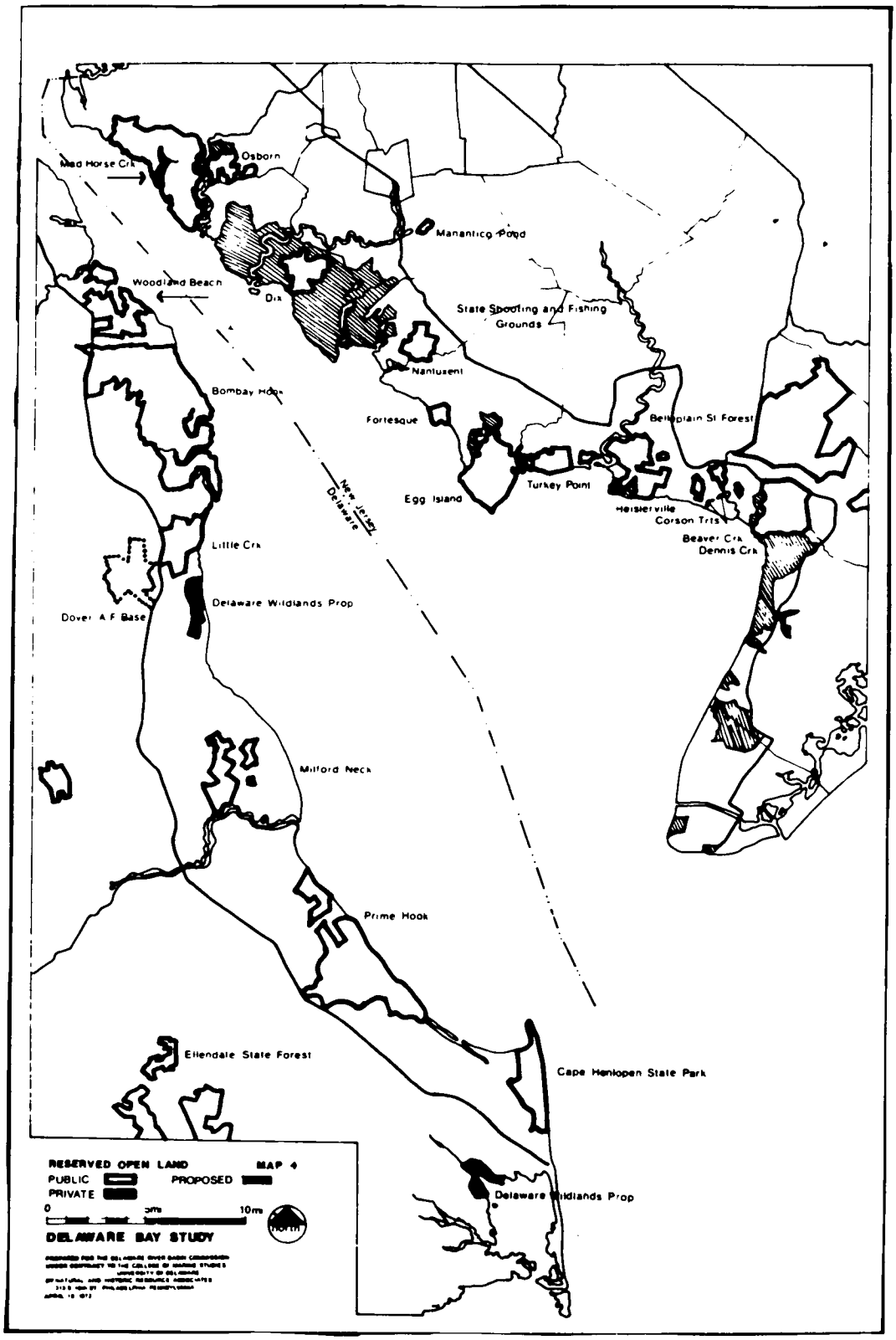

SOURCE: Inventory and Evaluation of Information on Delaware Bay, Volume 2,

Map 4 DEVELOPED LAND--CAPE MAY, NEW JERSEY-- LEWES, DELAWARE




SOURCE: INVENTORY AND EVALUATION OF INFORMATION ON DELAWARE BAY, VOL. 2.

Map 5 RESERVED OPEN LAND ------ CAPE MAY, NEW JERSEY --- LEWES, DELAWARE




SOURCE: INVENTORY AND EVALUATION OF INFORMATION ON DELAWARE BAY, VOL. 2.

square mile. This represents a population increase of 38 percent over 1960 figures.[12] Also, with the increasing population of the Newark-New York City area, pressure for second homes along the Atlantic Ocean of Monmouth County will increase.

The following map shows land use for Monmouth County.

State information for New Jersey will be given in the state section of this land use report. This will allow the land use information for Monmouth County to be compared to other counties within New Jersey.

3. Norfolk, Virginia

The intensely industrialized area in southeastern Virginia includes the independent cities of Norfolk, Chesapeake City, Newport News, and Portsmouth, Hampton, and Virginia Beach. Although land use figures were not available for all those independent cities,[13] the figures which were available are indicated below.

| Virginia<br>Table 1: Land Use by Counties<br>1967 figures,[14] in acres | total land | federal non-crop | urban & built up | farm & forest |
|---|---|---|---|---|
| Hampton | 37,400 | 4,200 | 30,800 | 2,300 |
| Chesapeake City | 263,600 | 5,700 | 53,700 | 203,200 |
| Virginia Beach | 162,800 | 12,300 | 15,800 | 133,200 |
| Newport News | 47,700 | 1,200 | 43,000 | 2,700 |

As can be seen from the above figures, the urban concentration varies from city to city but it is generally quite high. The urban character of this area shows up even more when contrasted with the other coastal counties of Virginia. For example, Northampton County, located across the mouth of Chesapeake Bay has a total area of 128,000 acres, of which approximately 123,000 acres are in farm, forest, or open lands.[15] According to state

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[12] New Jersey Municipal Profile Intensity of Urbanization, N.J., Department of Community Affairs (January, 1972).

[13] In some, cases, the land use information was included in state and county data; in other cases, land use information is given separately.

[14] Virginia Conservation Needs Inventory of 1967, (Feb. 1970).

[15] Ibid.

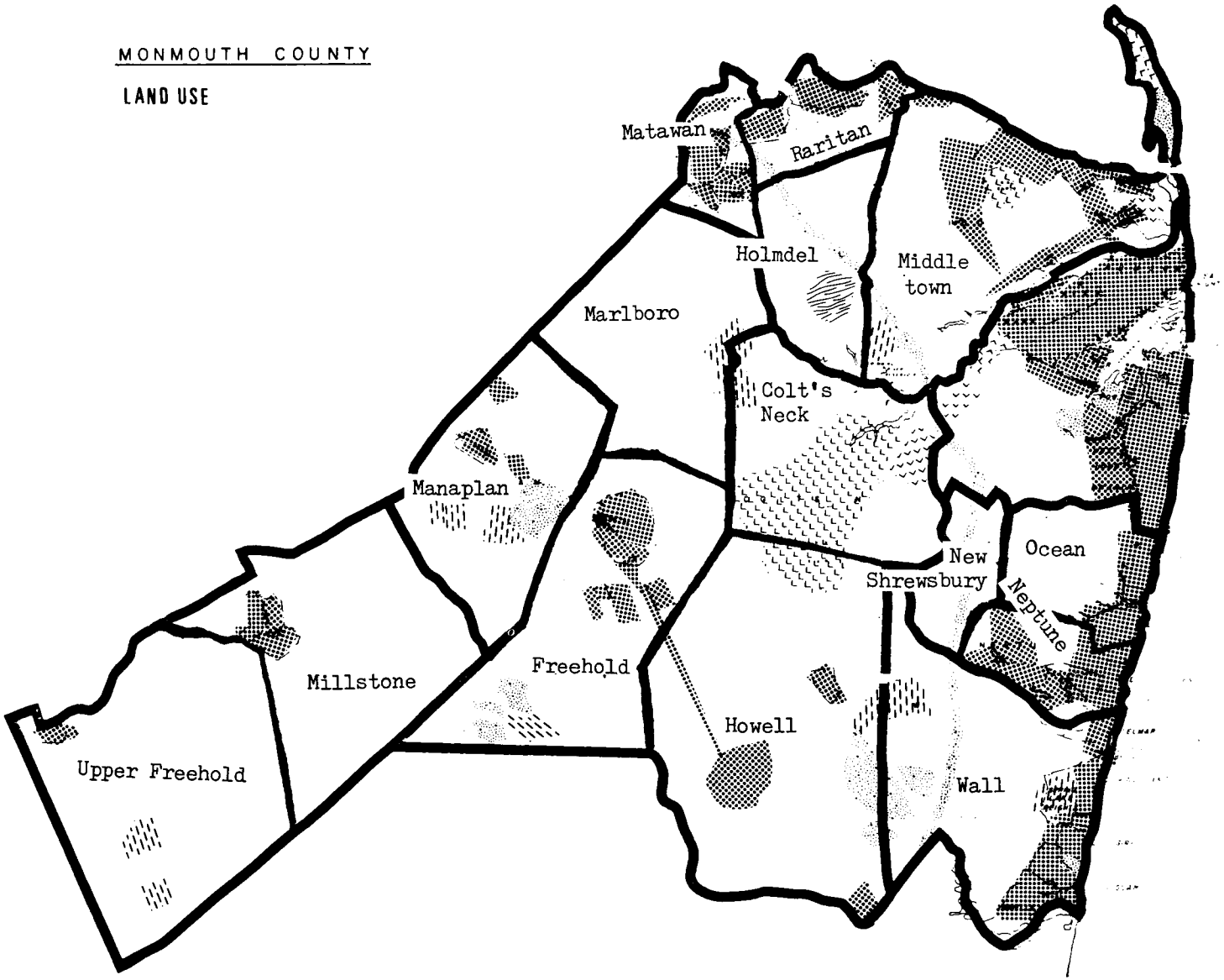
Map 6

**KEY**

- urban-residential
- Federal gov't
- public lands
- quasi-public lands
- industrial and public utilities
- commercial
- vacant, agricultural, and woodland
- township boundary

MONMOUTH COUNTY

LAND USE



figures,[16] 90% of the population of the Southeastern Planning District, which includes Norfolk, Portsmouth, Virginia Beach, Chesapeake, Suffolk City, Southampton County and Isle of Wight County is urban.

The following two maps indicate the study area relative to the rest of Virginia and also the industrial concentrations in the study area as well as the rest of the state. Also included is a map of the target area and surrounding counties depicting the urbanized areas.

From the above information, it is apparent that the Norfolk-Hampton area differs markedly from the other target areas of Cape May-Lewes and Monmouth County, New Jersey. It has much heavier industrialization-urbanization than does Lewes-Cape May and it is not a suburban residential area as is Monmouth County.

Recreation, transportation, and demographic data for this area are included in greater detail in the relevant parts of this study.

4. Morehead City, North Carolina

Morehead City, North Carolina is located on one of North Carolina's three cape areas. It is almost completely surrounded by water and is one of North Carolina's growing deep water ports. In 1960, Carteret County, where Morehead City is located, had a population of 27,000.

Morehead City is predominately urban and built up. There has been some strip highway development. At the time the Carteret County land development plan was formulated (1967), Morehead City had no zoning ordinance or land use plan.

Also, because of the city's proximity to the barrier islands of Bogue Banks and the National Seashore of Car Banks, there are some seasonal second home residences in the area. It is projected that seasonal residency acreages will run to 10,000-12,000 acres in the future. Some of the development along the Bogue Banks is of the commercial, carnival amusement park type. Much of the potential recreation-seasonal use

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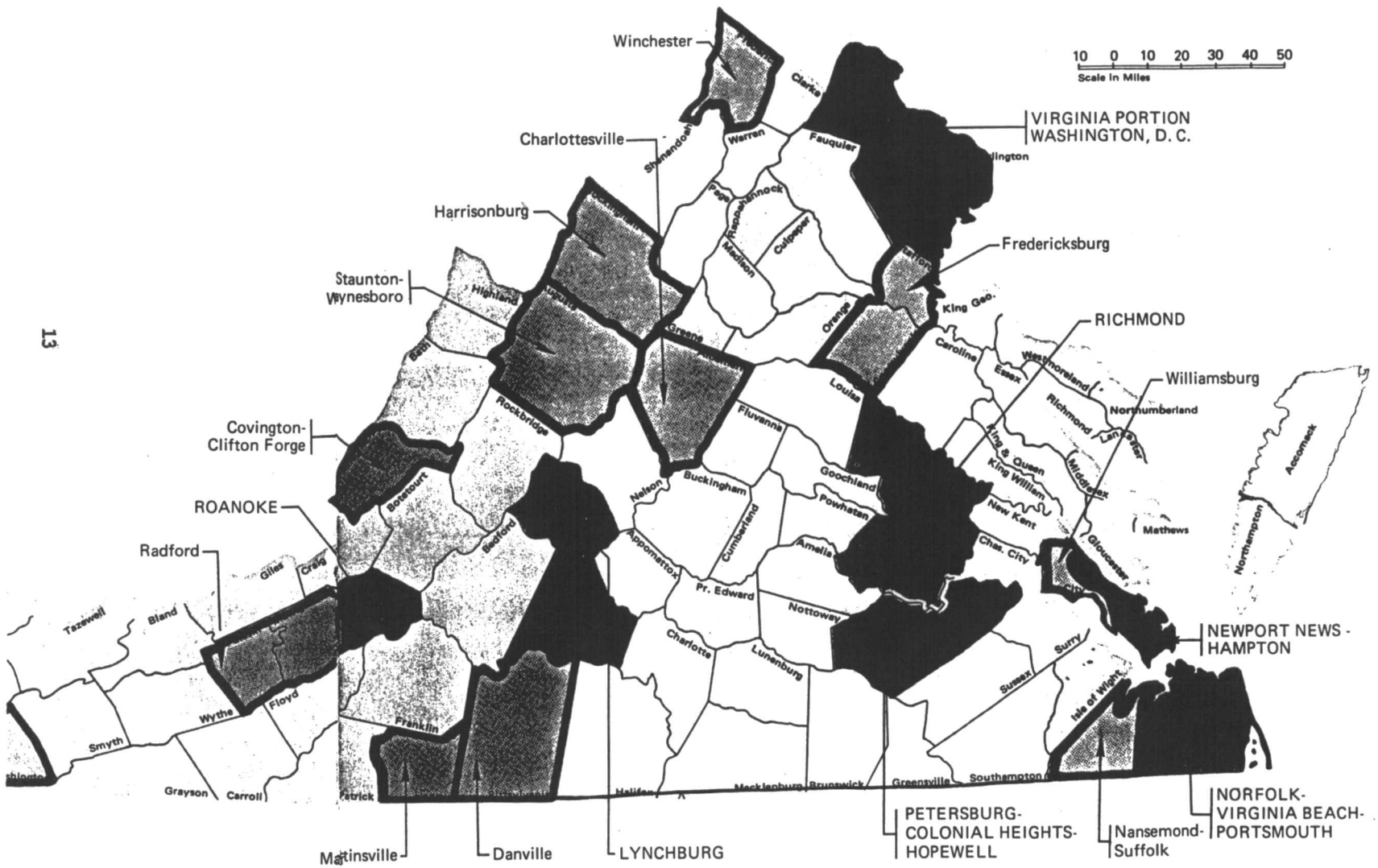
[16] Critical Environmental Areas. Virginia, Division of State Planning and Community Affairs (Dec. 1972).

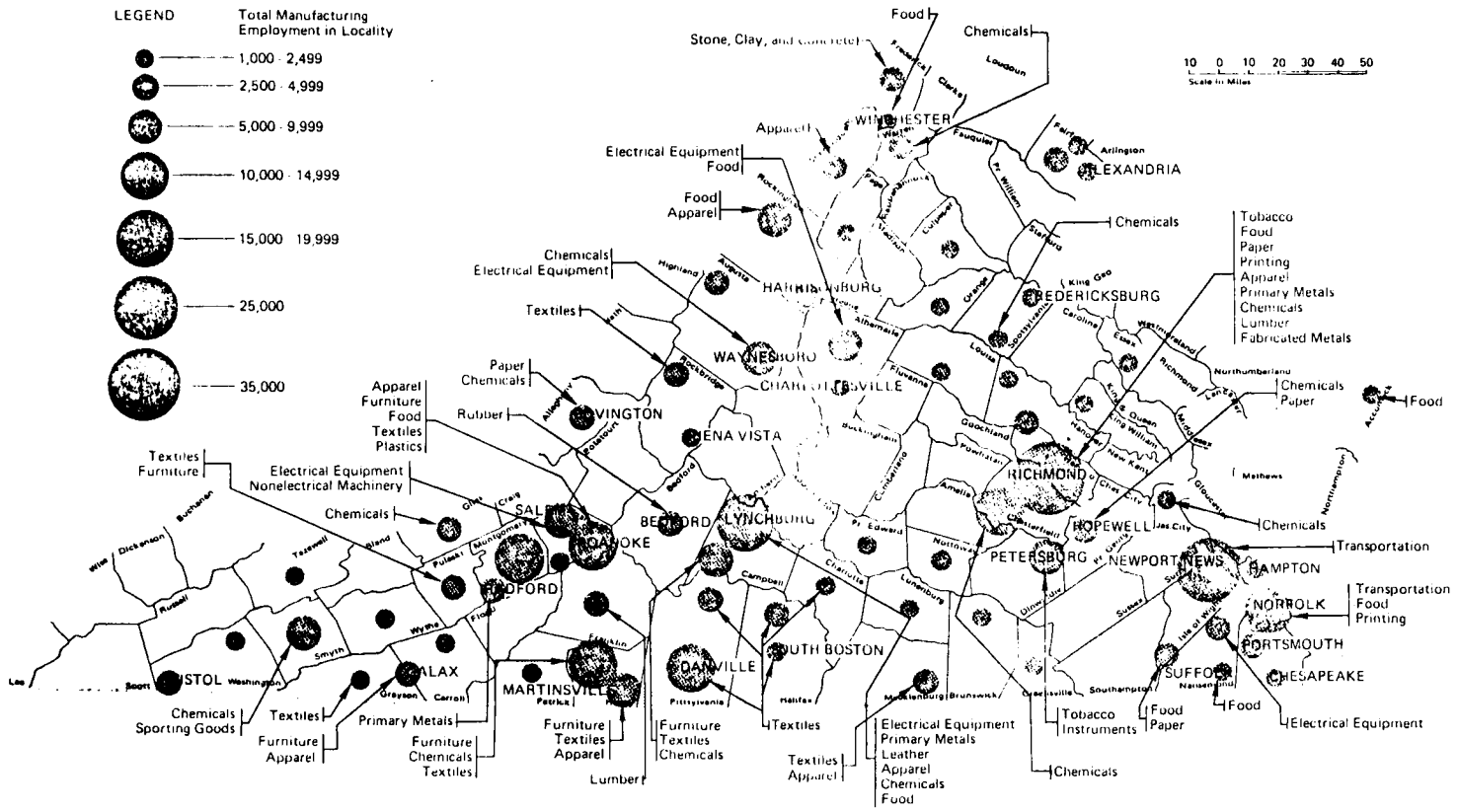
Map 7

# VIRGINIA'S STANDARD METROPOLITAN STATISTICAL AREAS




SOURCE VA. DIV. IND. DEVELOP.

Map 8
INDUSTRIAL CONCENTRATIONS IN VIRGINIA




Explanation: The circle size denotes the number of persons in manufacturing jobs in that county or city. If a locality has 1,000 or more employees in a particular industry, it is indicated on the map.

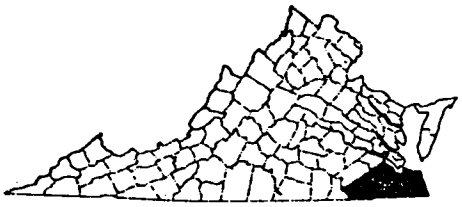
Source: Virginia Employment Commission, 1st quarter 1969 records.

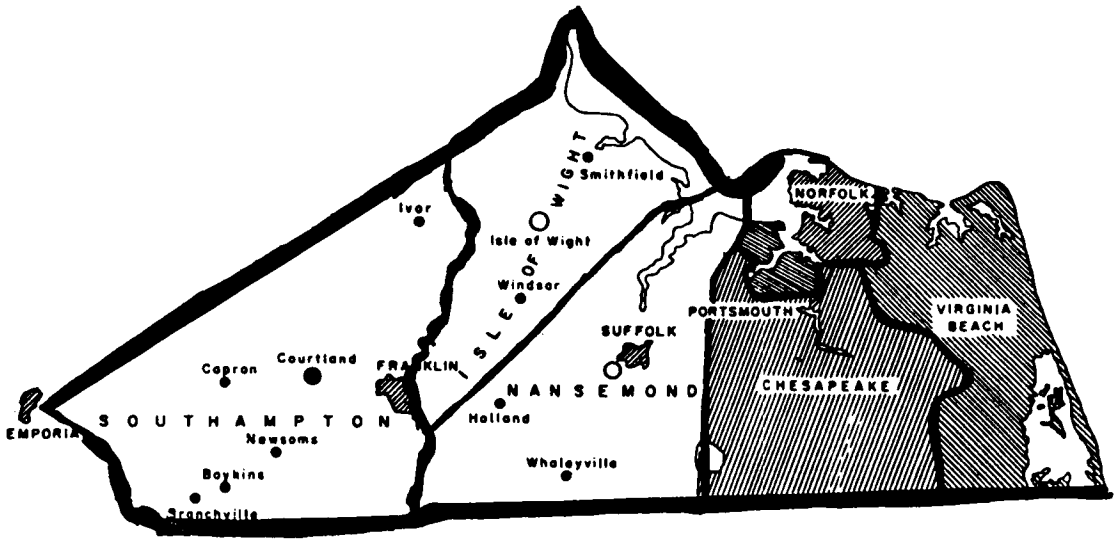
Map 9

# SOUTHEASTERN VIRGINIA

Planning District Number 20

Scale: 1 inch equals approximately 10 miles






Source: Virginia. Critical Environmental Areas.

land is being purchased by private interests, thus cutting down the potential public recreation areas.

According to the county land development plan, approximately 8,000 acres of the county are suburban strip and cluster development and 70,000 acres are in residential use. Existing industrial use is approximately 400 acres. The largest land components in Carteret County are forests and woodlands. This land use covers 216,000 acres (63% of the total land area). The largest single unit is the Croatan National Forest which accounts for 56,000 acres.

Lands, not forest, which are considered to be idle, abandoned, and unused account for another 67,000 acres (20% of total county land).[17]

The above quantitative information on Morehead City and Carteret County, although taken from 1962-1967 figures, gives an indication of Carteret County and Morehead City's land use patterns. The county is a predominately rural-forested area with great recreation and tourism potential. However, action is being taken to build the Morehead City-Beaufort deep port into a major east coast port. Thus, Carteret County presents a classic conflict situation between the clear air-clean water requirements of recreation areas and the industrial-transportation development necessary to produce an economically growing port. Reconciliation of these goals is extremely difficult to accomplish with the technology currently available.

The map on the following page shows the county and regional setting of the Morehead City-Carteret County area and the major urban areas of Carteret County.

C. Land use information by state

1. Delaware

Delaware, one of the smallest of the 50 states, has a total land

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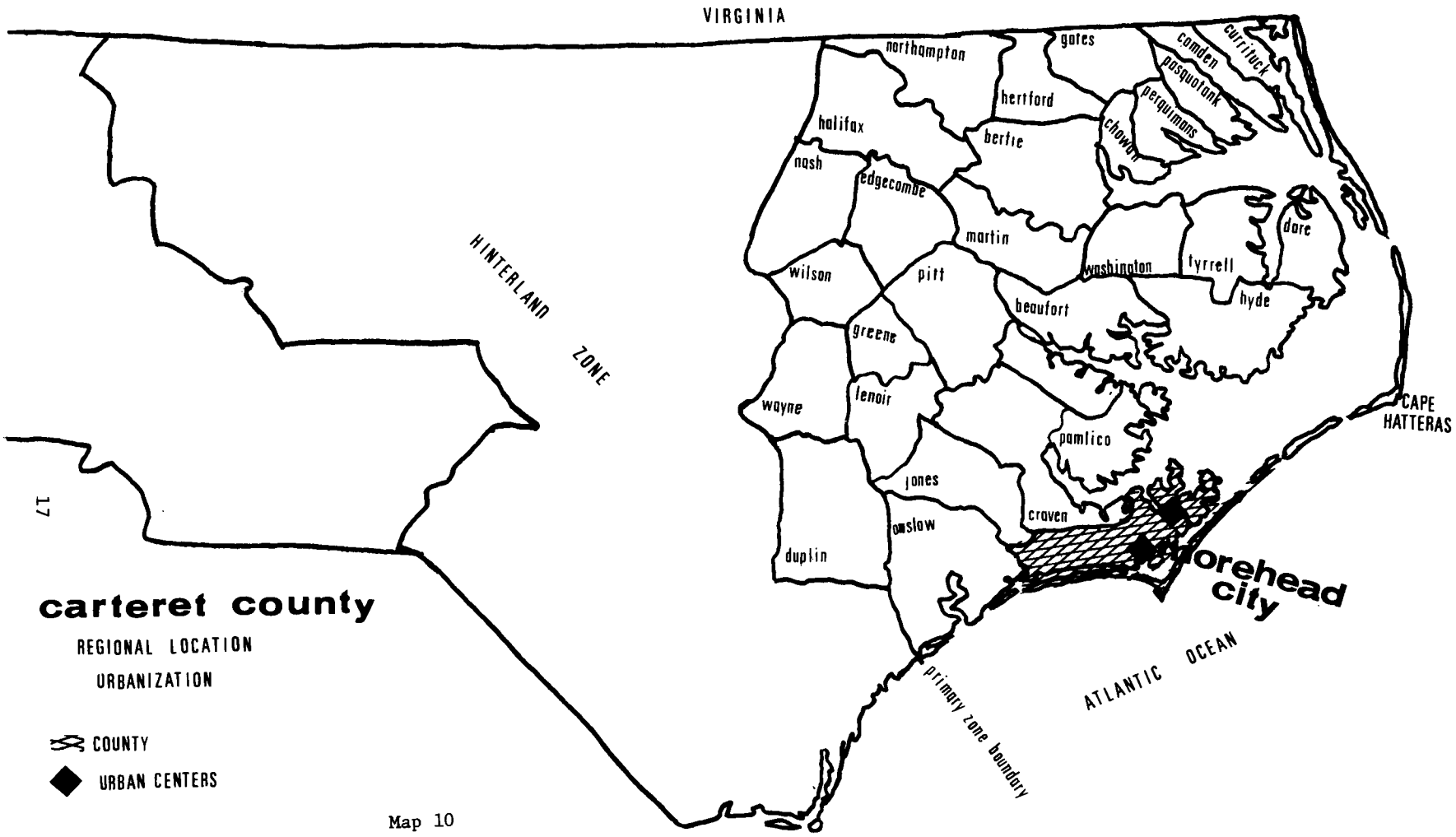
[17] Figures for foregoing section taken from: Carteret County, North Carolina Land Development Plan, Carteret County Planning Commission, (April, 1967).


VIRGINIA
northampton
gates
camden
currituck
pasquotank
perquimans
hertford
halifax
bertie
chowan
nash
edgecombe
martin
dare
HINTERLAND
ZONE
wilson
pitt
washington
tyrrell
hyde
beaufort
greene
wayne
lenoir
CAPE
HATTERAS
pamlico
jones
craven
onslow
duplin
Morehead
city
ATLANTIC OCEAN
primary zone boundary
17
carteret county
REGIONAL LOCATION
URBANIZATION
COUNTY
URBAN CENTERS

Map 10

area of approximately 1,266,000 acres. Of this area, only 103,700 acres were designated as urban in 1964; 52,300 urban acres (over 50% of the total urban land) were in New Castle County, the smallest of the three Delaware counties with a total acreage of 278,300 acres.[18]

The major reasons for this urban concentration in New Castle County are the industrial-port complex around Wilmington, Delaware, and the proximity of New Castle County to the major urban-industrial center of Philadelphia.

Even with over 50% of the urban area of the state, New Castle County has approximately 226,000 acres of non-urban land, representing 81% of the total county land. This non-urban land includes low density residential areas as well as 61,000 acres of forest (1957 figures), 3800 acres of state recreation land (1964 figures) and 83,964 acres of harvested cropland and pasture (1964 figures).[19]

Kent County, the second most urbanized Delaware County, has 21,074 acres of developed land, 29,070 acres of tideland conservation holdings, 232,000 acres of farmland and 78,000 acres of forests.[20] Much of the developed land is accounted for by the City of Dover and the large air force base located on the outskirts of Dover.

Sussex County, with a total land area of 601,100 acres, is the least urbanized of Delaware's counties. The 1964 figures for land use in Sussex County are: 12,400 acres of state recreation land; 10,500 acres of federal wildlife refuge; 220,073 acres of harvested cropland and pasture, and 251,000 acres of forest.[21] From the above figures, it is obvious that Sussex County is predominately rural, with comparatively few acres

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[18] Statistical Abstract of the United States, 1967.

[19] Preliminary Comprehensive Development Plan. Delaware State Planning.

[20] Figures from The Comprehensive Plan. Kent County (1972) and Inventory and Evaluation of Information on Delaware Bay. Delaware Bay Report Series.

[21] Figures taken from Comprehensive Development Plan (June, 1967); Inventory and Evaluation of Information on Delaware Bay; Comprehensive Development Plan, Sussex County (Feb., 1970).

devoted to urban or industrial uses. Most of the population is engaged in farming, fishing or seasonal work related to tourism. There is some concentration of seasonal, second home development along the Sussex County coast, especially in the areas surrounding Lewes and Rehoboth Beach.

The above has been a summary overview of land use in Delaware. Information was given in some detail for all of the state because the entire state is located in the area identified as coastal in this study.

Maps indicating recreational and conservation facilities and urban concentration are included on the following pages.

2. Maryland

The state of Maryland, with a total land area of 6,324,000 acres, is divided into 23 counties and one independent city (the city of Baltimore). Fifteen of these counties are identified, for the purpose of this study, as being coastal counties; six are primary zone counties; and three are hinterland. The coastal counties will be covered in the most detail as they would receive the majority of impact from offshore oil development.

Out of Maryland's total acreage, approximately 2,963,000 acres (47%) are forest and 3,220,000 acres (50%) are farms,[22] leaving 3% of the land for industrial-urban uses. Although 3% of the land in industrial-urban does not seem to be much land, it must be remembered that this figure includes the highly developed areas such as Baltimore City and County (see map on the following page) as well as sparely developed counties such as Allegany and Garrett in western Maryland.

The table on the following pages gives a rough indication of the open land-farm, forest and recreation acreages for the coastal counties of Maryland. In most cases, the farm and forest acreage total is greater than the total acreage of the county in question. This is because of the time gap in the inventory years and the overlap in category definition. However,

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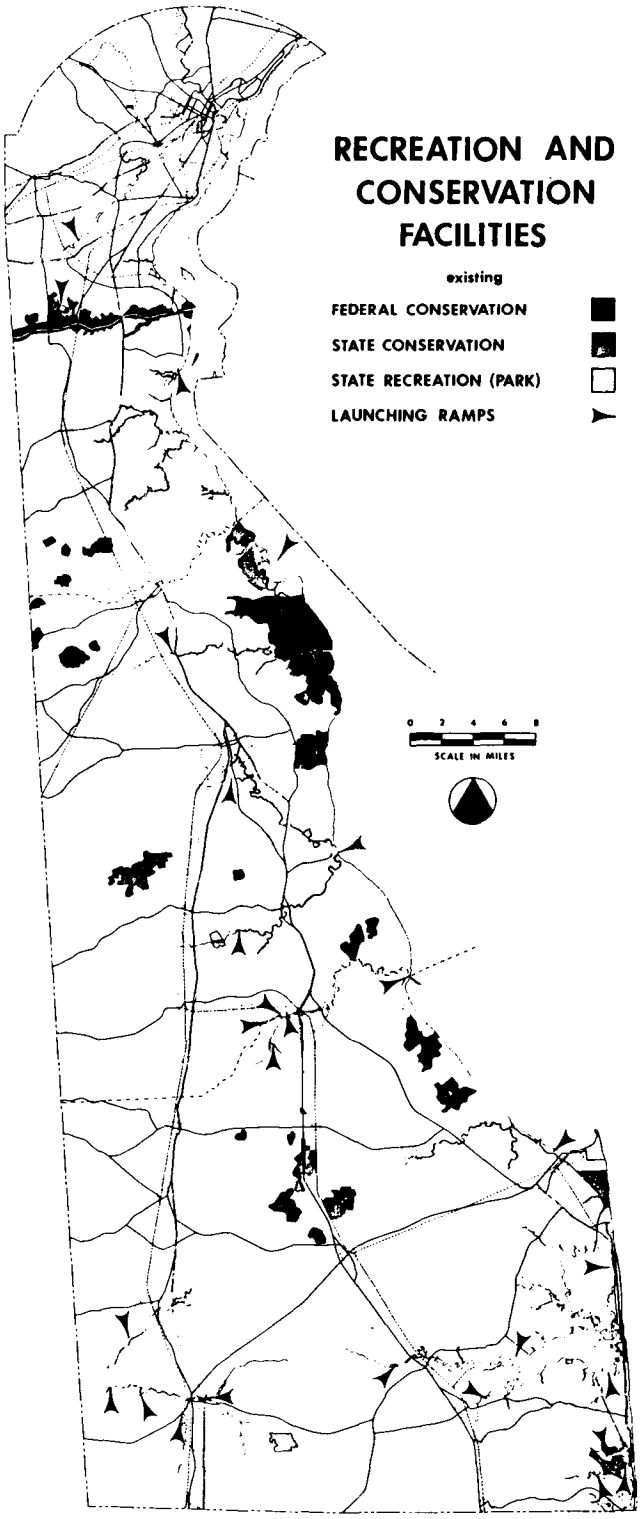
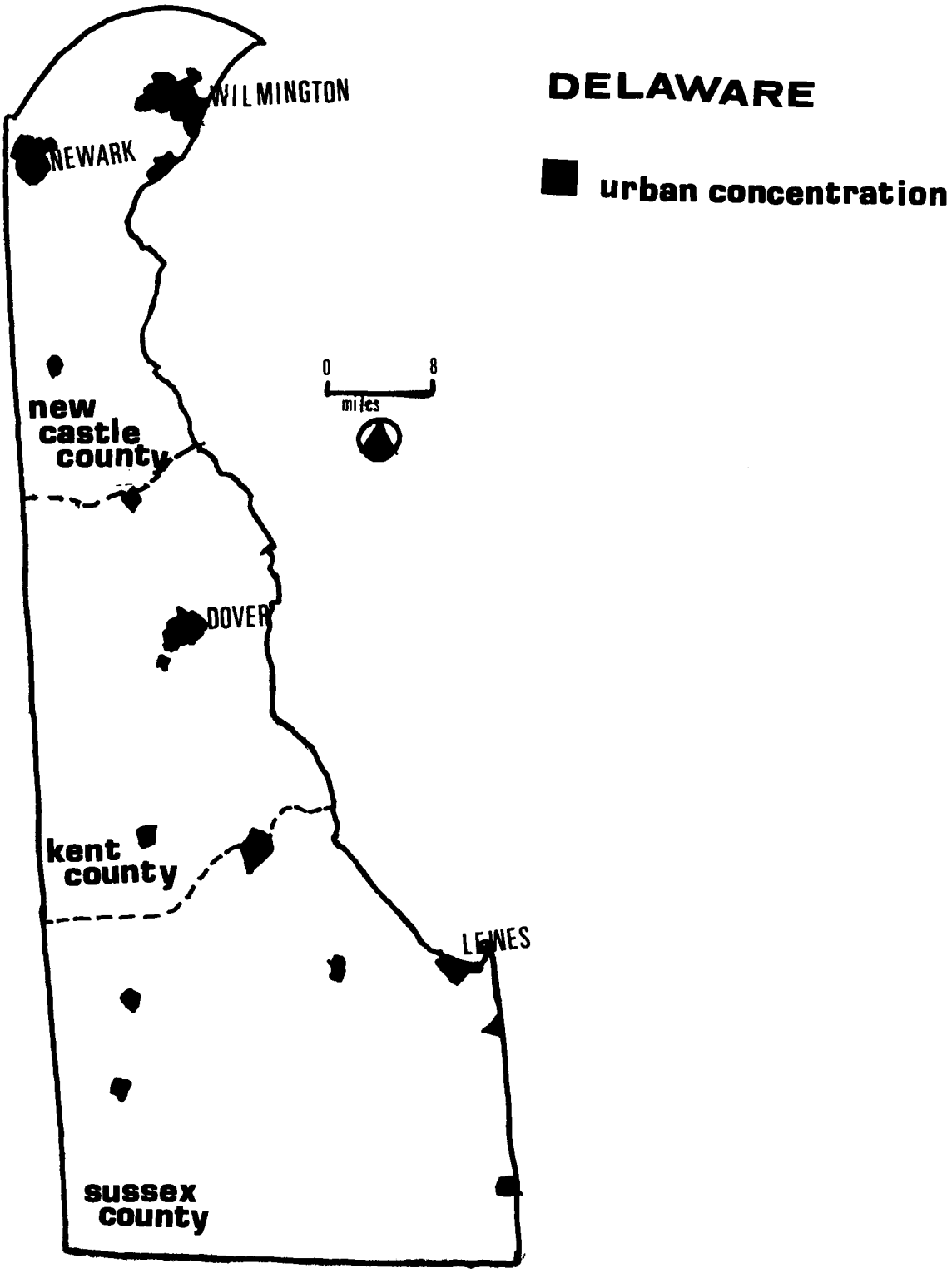
[22] Basic Plant Location Data. Maryland Division of Economic Development. (1970).

Map 11

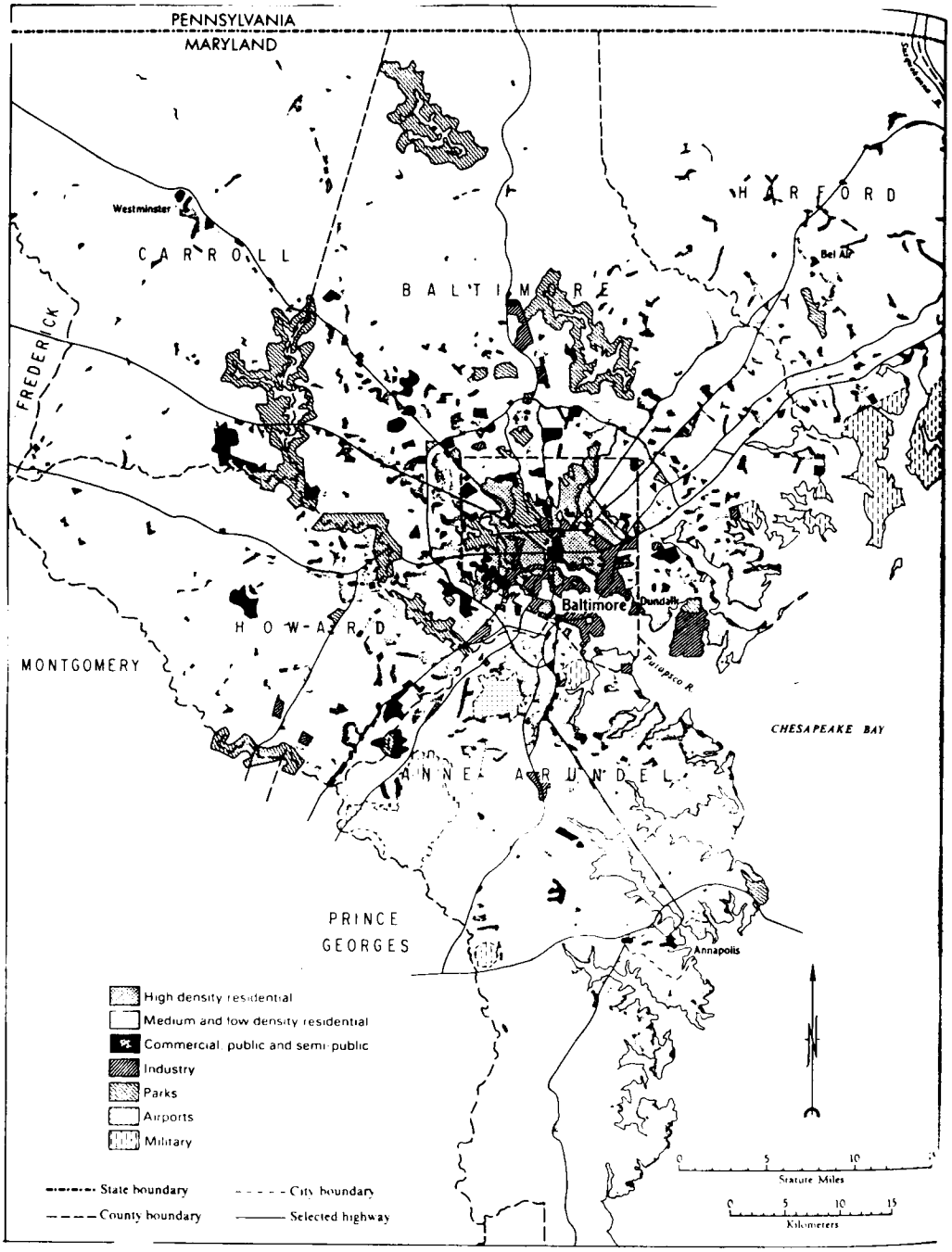
# DELAWARE



Map 12


DELAWARE
urban concentration
WILMINGTON
NEWARK
0
8
miles
new castle county
DOVER
kent county
LEWES
sussex county

Map 13 LAND USE IN THE BALTIMORE REGION, CIRCA 1962




SOURCE: M. Clawson. Suburban Land Conversion in the U.S.

TABLE 2

LAND USE BY MARYLAND COASTAL COUNTIES[23]

| County | Farm(1964) | Forest(1967) | Recrea-tion | Total Area |
|---|---|---|---|---|
| Anne Arundel | 63,159 | 125,800 | 3,180 | 270,592 |
| Baltimore City | | | 5,700 | 50,500 |
| Baltimore | 117,723(1969) | 159,100 | 16,124 | 482,688 |
| Calvert | 75,016 | 91,600 | 1,500 | 140,160 |
| Cecil | 127,454 | 96,600 | 5,000 | 225,280 |
| Charles | 127,049 | 185,400 | 5,800 | 293,120 |
| Dorchester | 150,069 | 155,200 | 20,000 | 371,200 |
| Harford | UN | UN | UN | UN |
| Kent | 145,867 | 53,500 | 2,300 | 181,760 |
| Queen Anne's | 177,608 | 75,400 | 4,000 | 238,720 |
| St. Mary's | 95,146(1969) | 157,200(1968) | 500 | 238,976 |
| Somerset | 78,610 | 85,500 | UN | 212,480 |
| Talbot | 125,154(1969) | 48,700(1968) | UN | 167,400 |
| Wicomico | 116,479(1969) | 113,400(1968) | UN | 243,200 |
| Worcester | UN | UN | UN | UN |

UN - Unknown Figures in Parens. - Date if different from indicated in heading.

[23]Figures from Community Economic Inventories - Maryland Division of Economic Development. These inventories are published at various times for each of the counties in Maryland. Figures do not add because of the time differential and overlap in categories.

from this table, it is apparent that most Maryland coastal counties, with the exceptions of Baltimore County and City and Anne Arundel County, are predominately rural.

Anne Arundel County is located between the urban centers of Baltimore and Washington, D. C. and is a part of the northeast urban corridor. Its location in the urban corridor is responsible for the urban character of this county.

The land use picture for Maryland's coastal counties is one of rural land use with the exception of the industrial-urban-port area of Baltimore-Anne Arundel County. However, other areas of the Maryland coast are under pressure for recreation and second home uses.

Of the six Maryland counties that comprise the primary zone counties for this study, four are predominately rural and two are urbanized. The two urbanized counties are Montgomery and Prince George's, both of which border the District of Columbia and are residential-urban areas for the Washington metropolitan area. Figures for Montgomery county indicate that 36% of the land area in 1969 was in farms and 32% in forest, leaving approximately 32% of the land in urban-residential uses. The figures available for Prince George's County were (1964) farm: 37% and (1967) forests: 53%.[24] However, considering the population growth figures for this county between 1960-1970, these figures are probably an over estimate of current undeveloped land for this area.

Also of interest in this area are the 17,000 acres of park land in Montgomery County and the 11,000 acres at the U.S. Department of Agriculture Agricultural Research Center in Prince George's County.

The other four primary zone counties, Caroline, Carroll, Frederick and Howard, have an average of 70% in their land area in farms and close to 30% in forest lands. Carroll, Frederick and Howard Counties had population densities of 100-499 persons per square mile and Caroline County had under 100 persons per square mile (see map on following page). Although population

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[24]Figures from Community Economic Inventory Maryland Division of Economic Development.

density does not give land use per se, it is an indicator of urban versus rural usage.

The three hinterland counties in Maryland are Washington, Allegany and Garrett. These counties are primarily forest and farm, with approximately 70% forest and 30% farm in Allegany and Garrett and 55% farm and 40% forest in Washington County. Allegany and Garrett both have large recreation areas - Allegany with approximately 30,000 acres and Garrett with 75,000 acres.[25] These counties are in the Appalachian coal region and have some active coal mines. Population densities for all three hinterland counties are low with Washington and Allegany having densities of 100-499 persons per square mile and Garrett having under 100 persons per square mile (see population density map on following page.)

Thus, an overview of the state of Maryland indicates a state with much open and rural land with urbanization and industrialization centered around the Baltimore-Washington, D. C. section of the northeast urban corridor.

3. New Jersey

New Jersey's land use picture is a multihued scene, varying from the heavily urbanized-industrialized area in and around Newark to the largely rural open lands of Cape May and Cumberland counties. The table on the following page indicates the study location and three land use categories for each of the twenty-one New Jersey counties. The classification of federal land includes all land owned by the federal government. The uses of land in this classification vary from intensely used land, such as an army base, to open areas, such as wildlife areas.

The six coastal counties for New Jersey are Atlantic, Cape May, Cumberland, Monmouth, Ocean, and Salem. Cape May and Monmouth counties were covered in some detail earlier in this land use section as they are two of the target areas of this study. The remaining four coastal counties can be classified into two regions, i.e., Salem and Cumberland which front

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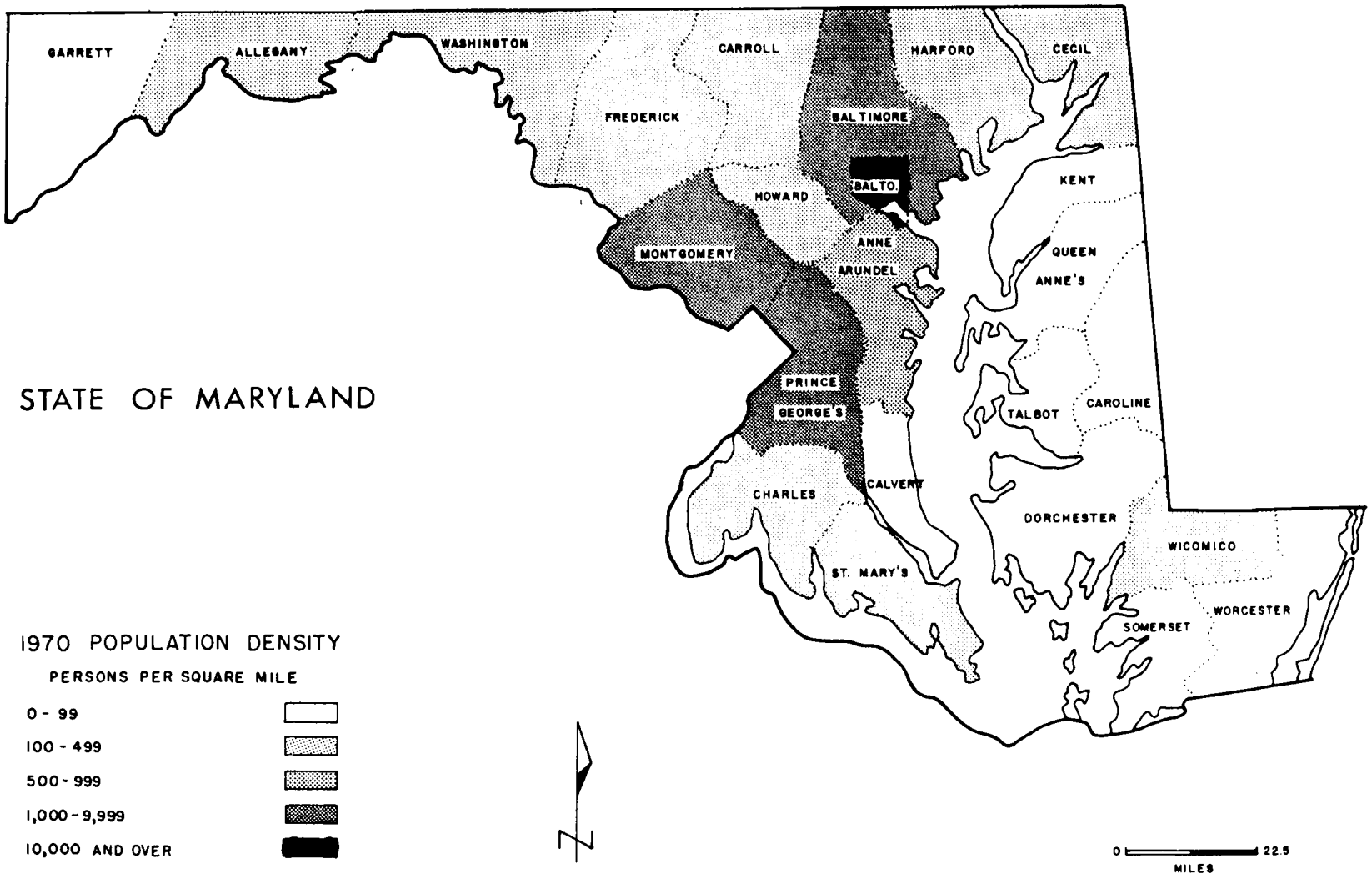
[25] Ibid.

Map 14




Source: Maryland Population. 1930-1970. Md. Dept. of State Planning.

TABLE 3

LAND USE BY NEW JERSEY COUNTIES - 1966

| | County | Location | Total Land Area | Federal ** | Urban & Built Up * | Forest & Farm (Open Land & Rec.*) |
|---|---|---|---|---|---|---|
| 1. | Atlantic | Coastal | 361,600 | 24,388 | 22,170 | 329,084 |
| 2. | Bergen | Hinterland | 150,400 | 91 | 53,066 | 75,859 |
| 3. | Burlington | Primary | 524,800 | 20,562 | 37,933 | 461,178 |
| 4. | Camden | Primary | 142,080 | 227 | 46,432 | 89,837 |
| 5. | Cape May | Coastal | 169,600 | 2,090 | 12,800 | 152,179 |
| 6. | Cumberland | Coastal | 321,280 | 64 | 22,467 | 294,746 |
| 7. | Essex | Hinterland | 81,280 | 118 | 49,798 | 22,963 |
| 8. | Gloucester | Primary | 210,304 | 85 | 29,370 | 177,939 |
| 9. | Hudson | Hinterland | 28,160 | 1,118 | 17,510 | 8,941 |
| 10. | Hunterdon | Hinterland | 407,680 | 0 | 14,470 | 261,658 |
| 11. | Mercer | Primary | 144,640 | 81 | 35,584 | 100,243 |
| 12. | Middlesex | Hinterland | 197,120 | 850 | 57,888 | 130,918 |
| 13. | Monmouth | Coastal | 305,920 | 14,502 | 57,811 | 219,987 |
| 14. | Morris | Hinterland | 305,920 | 12,724 | 52,211 | 233,786 |
| 15. | Ocean | Coastal | 407,680 | 24,525 | 35,891 | 348,115 |
| 16. | Passaic | Hinterland | 122,880 | 37 | 34,502 | 83,181 |
| 17. | Salem | Coastal | 229,760 | 5,613 | 14,669 | 198,758 |
| 18. | Somerset | Hinterland | 199,040 | 1,442 | 45,830 | 140,634 |
| 19. | Sussex | Hinterland | 336,640 | 10,298 | 18,438 | 315,539 |
| 20. | Union | Hinterland | 65,920 | 27 | 42,829 | 16,858 |
| 21. | Warren | Hinterland | 213,120 | 6,119 | 14,579 | 209,280 |

** Figures from Federal-Owned Real Property in New Jersey, New Jersey Dept. of Community Affairs, Div. of State & Regional Planning (Jan., 1972).

* Figures from info. in 1966 Land Use by Muncipalities and Counties State of New Jersey, Dept. of Community Affairs, Div. of State & Regional Planning (Reprinted 1970) Trenton, N.J.

onto Delaware Bay and Atlantic and Ocean which face the Atlantic Ocean.

Taking Atlantic and Ocean Counties as the first survey area, it is apparent that these two counties have many similarities. Both have about 60% of their land forested; 15% in farms; 20% residential and only 1% industrial. Both counties are large resort and second home areas for the urban populations of Newark, New York City, and Philadelphia. This second home resort character is indicated by the much high area classified as residential. For example, Passaic County, with a total land area of 122,880 acres and a population of 460,780 has approximately 36,800 acres (30%) classified as residential, whereas Ocean County with a total land area of 407,680 acres and a population of 208,470, has 81,500 acres (20%) designated as residential. Some of the above difference in residential density can be attributed to larger lot size in Ocean County but the second home-resort character of the county is also responsible for some of the difference.

Salem and Cumberland Counties, the two New Jersey counties bordering Delaware Bay, also have similar characteristics. Salem County has 48% farms, 12% forests, 4% public, 1% industrial and 35% residential and other. Cumberland County land uses break down as follows: 29% farm, 37% forests; 1% industrial, 9% public; and 24% residential and other. Salem County, because of its proximity to the greater Philadelphia metropolitan area is under greater residential and industrial pressure than is Cumberland County. Salem and Cumberland Counties have both lost valuable salt marshes to development pressure.

The above summary of the land uses in New Jersey's shore counties indicates that, while there are still large areas of non-urban land, all of these lands are coming under increasing development pressure from the growing population of the Northeast urban corridor. In some cases, this pressure is in the form of increased second home and resort demands; in others it is for permanent homes; and in still others, e.g., Salem County, the pressure for increased industrial expansion is paramount.[26]

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[26] Figures in the above section are from Enjoy N.J.; New Jersey Department of Labor and Industry.

Four of New Jersey's counties are identified as primary zone counties for purposes of this study. These counties are Burlington, Camden, Gloucester, and Mercer. All four primary zone counties are influenced by their proximity to the Philadelphia metropolitan area. Burlington county, with a total area of 524,800 acres has 25% of its land in forest; 23% public; 11% residential, 31% farms; and 5% industrial. The industrial-residential land uses are concentrated on the western end of the county and the rural-open land uses in the center and eastern end of the county. The land uses for Gloucester and Camden counties are similar: Gloucester - 37.8% farms; 28.2% forests; 1.6% public; 2% industrial; 30.4% residential and other; for Camden County - 10.2% farms; 34.1% forest; 14.3% public; 1.9% industrial; 39.5% residential and other. Mercer County's land uses are much the same as the other primary zone counties.[27]

Eleven counties are identified as hinterland counties in this study. These counties' land uses range from the almost completely developed county of Hudson (30.3% industrial) to the primarily large lot residential open land use in Hunterdon County. The following table shows the percentage land use breakdowns for these eleven counties.[28]

Table 4 Hinterland Land Use

| County | Farms | Forests | Public | Industrial | Residential & other | Highways etc. |
|---|---|---|---|---|---|---|
| | % | % | % | % | % | |
| Bergen | 4.2 | 36.0 | 5.0 | 3.0 | 51.0 | |
| Essex | 1.9 | 27.3 | 8.7 | 6.6 | 55.5 | |
| Hudson | 1.5 | | 8.7 | 30.3 | 28.3 | 31.2 |
| Hunterdon | 50.0 | UN | UN | UN | UN | |
| Middlesex | 20.0 | 25.0 | | 25.0 | 30.0 | |
| Morris | 9.7 | 44.3 | | 10.0 | 36.0 | |
| Passaic | 3.2 | 56.0 | 6.1 | 1.9 | 29.5 | 3.3 |
| Somerset | 27.0 | 10.0 | 3.0 | 2.0 | 54.0 | 4.0 |
| Sussex | 32.0 | 32.0 | | 1.0 | 25.0 | |
| Union | 2.4 | 21.0 | 10.0 | 10.0 | 41.0 | 15.6 |
| Warren | 49.0 | 15.0 | 4.0 | 1.0 | 31.0 | |

[27] Ibid.

[28] Figures compiled from Enjoy N.J.; New Jersey Department of Labor and Industry.

The preceding table, while not complete for all categories, gives a summary picture of the relative land uses for each of the hinterland counties.

For New Jersey as a state, the estimated land uses in 1972 were: farms 1,045,000 acres, (22% of the total land area); forests 2,000,000 acres (42%); urban and built-up areas 1,403,000 acres (29%); and other uses 365,000 acres (7%).[29] Both forest and farm land acreage show a decrease over earlier years: farm land has decreased from 1,156,000 acres in 1964[30] and forest land has decreased from 2,229,000 acres in 1963.[31] Although the losses of 100,000 and 200,000 acres in these two categories may not appear very large, it must be remembered that once these acres are lost, they are generally lost for good. Also, the urban and built-up category for the state is of greater area than all other categories except forests, thus reflecting the increasing urbanization of New Jersey as a whole.

The map on the following page indicates the existing development for the state. The lined and crosshatched areas show the remaining concentrations of agricultural and open land.

4. North Carolina

North Carolina, with one hundred counties and more than 31 million acres of land, is the largest of the states considered in this study. Thirty-eight of North Carolina's 100 counties are outside of the boundaries of this study. However, land use figures are given in the following table for all North Carolina counties so as to give a state-wide as well as a regional picture of land use for the state. The word "outside" in the location column in the table indicates those counties beyond the boundary of the study area.

North Carolina has 18 counties identified as coastal counties for purposes of this study. Three of these coastal counties, Pender, New Hanover, and Brunswick, are located in the hinterland zone.

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[29] Figures from New Jersey Farm Facts (1973).

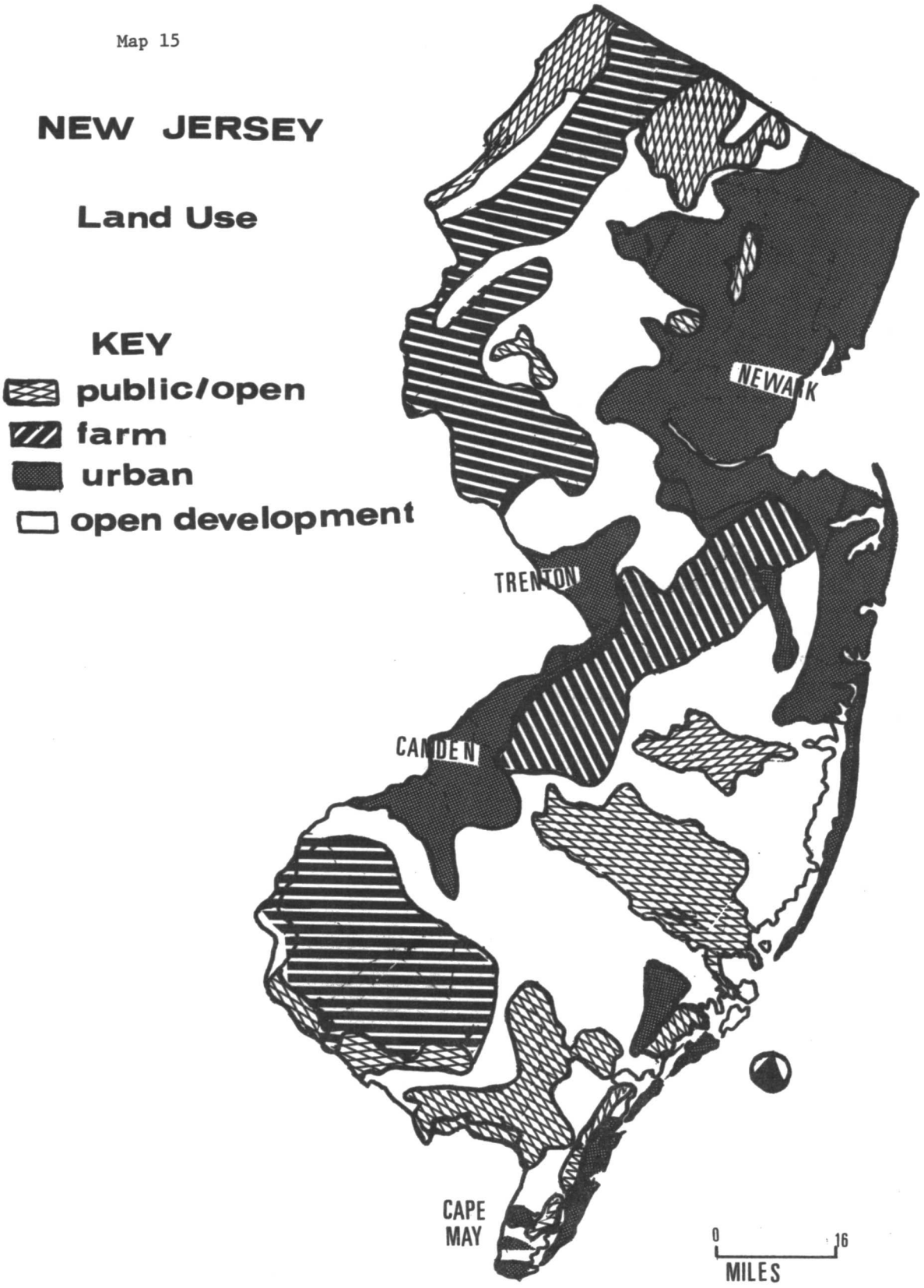
[30] Statistical Abstract of the United States, 1967, p. 608.

[31] Ibid., p. 658.

Map 15

# NEW JERSEY

## Land Use



None of the coastal counties of North Carolina evidence the urban-industrial concentration found in the coastal areas of other states in this study. As can be seen from the following table, most of the North Carolina coastal counties have at least 95% of their land in farm and forest uses.

Even though none of the counties have large urban or industrial concentrations, the northern counties of Dare, Carretuck, Camden, and Pasquotank are under increasing pressure from the expanding urban population of the Norfolk, Virginia area. Dare County is under the most pressure as a second home, resort area.

Craven, Pamlico and Carteret counties are involved in expanding their industrial-port activity, especially through the expansion and upgrading of the deepwater port at Morehead City, Carteret County. The land uses in the Morehead City area were covered in greater detail in a preceding part of this section.

Thus, it is possible to characterize the coastal counties of North Carolina as rural, non-industrialized areas, relying on agriculture and tourism for the bulk of their employment and income.

The following table indicates the urban and built-up areas and the per cent of total land for each of the planning regions in North Carolina. Although the highest per cent of total land area in this category for any of the regions is only 3.4%, it should be noted that two of the regions had percentage growth rates of more than 100% for the nine-year period covered. The percentage increase of 253% for Region R, which includes 9 of the coastal counties, is the highest percentage increase in urbanized acreage of any region within the state. County-by-county examination of urbanization figures shows that all coastal counties in Region R, except one, had percentage increases of 200% or higher (see table on following page).

Fourteen of North Carolina's counties are identified as primary zone counties. Land use figures for these counties are shown on the following table.

Table 5

NORTH CAROLINA COUNTIES: LAND USE, 1958-1967

| | | Location | Federal 1958 | Federal 1967 | Urban & Built-up 1958 | Urban & Built-up 1967 | Farm & Forest 1958 | Farm & Forest 1967 | % Farm & Forest | Total Area 1967 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Alamance | hinterland | 0 | 0 | 17,905 | 18,905 | 257,510 | 254,325 | 92 | 276,685 |
| 2. | Alexander | outside | 0 | 0 | 1,322 | 5,052 | 161,518 | 157,788 | 97 | 163,200 |
| 3. | Alleghany | outside | 4,900 | 4,900 | 1,030 | 4,540 | 140,770 | 137,220 | 93 | 147,200 |
| 4. | Anson | outside | 0 | 1,075 | 5,845 | 9,282 | 333,175 | 328,583 | 96 | 341,120 |
| 5. | Ashe | outside | 1,600 | 1,661 | 3,500 | 10,000 | 266,987 | 260,406 | 95 | 273,280 |
| 6. | Avery | outside | 23,500 | 23,500 | 3,000 | 3,480 | 130,900 | 130,300 | 82 | 158,080 |
| 7. | Beaufort | coastal | 0 | 2,300 | 5,045 | 11,983 | 524,255 | 515,057 | 97 | 531,840 |
| 8. | Bertie | coastal | 0 | 0 | 3,200 | 13,277 | 437,500 | 427,403 | 96 | 443,520 |
| 9. | Bladen | hinterland | 0 | 0 | 1,247 | 10,092 | 559,437 | 550,418 | 98 | 562,560 |
| 10. | Brunswick | coastal | 13,200 | 13,200 | 4,700 | 6,690 | 539,020 | 536,460 | 96 | 558,720 |
| 11. | Buncombe | outside | 35,100 | 36,625 | 27,628 | 34,535 | 348,500 | 339,470 | 82 | 412,480 |
| 12. | Burke | outside | 47,700 | 47,700 | 10,761 | 12,597 | 264,295 | 262,499 | 81 | 323,840 |
| 13. | Cabarrus | outside | 0 | 0 | 20,350 | 32,377 | 209,421 | 197,346 | 86 | 230,400 |
| 14. | Caldwell | outside | 49,400 | 49,400 | 13,000 | 20,000 | 241,500 | 234,540 | 77 | 304,640 |
| 15. | Camden | coastal | 0 | 245 | 412 | 1,900 | 152,208 | 150,435 | 98 | 152,960 |
| 16. | Carteret | coastal | 58,500 | 70,776 | 4,227 | 6,177 | 276,181 | 261,825 | 77 | 340,480 |
| 17. | Caswell | hinterland | 0 | 0 | 800 | 5,590 | 276,790 | 271,680 | 98 | 278,100 |
| 18. | Catawba | outside | 0 | 0 | 14,695 | 26,212 | 244,255 | 226,378 | 89 | 253,490 |
| 19. | Chatham | hinterland | 0 | 0 | 3,980 | 13,553 | 446,930 | 437,339 | 97 | 452,480 |
| 20. | Cherokee | outside | 88,651 | 88,651 | 2,567 | 6,382 | 198,882 | 195,067 | 67 | 290,560 |
| 21. | Chowan | coastal | 3,140 | 35 | 1,130 | 4,365 | 110,555 | 110,400 | 96 | 115,200 |
| 22. | Clay | outside | 61,400 | 61,400 | 168 | 2,185 | 74,423 | 72,426 | 53 | 136,320 |
| 23. | Cleveland | outside | 0 | 0 | 15,500 | 24,330 | 281,800 | 272,970 | 92 | 298,240 |
| 24. | Columbus | hinterland | 0 | 0 | 3,719 | 5,219 | 596,258 | 594,708 | 99 | 601,000 |
| 25. | Craven | coastal | 71,000 | 71,000 | 6,333 | 6,640 | 382,556 | 382,249 | 82 | 464,000 |
| 26. | Cumberland | hinterland | 43,148 | 43,148 | 14,458 | 34,000 | 362,674 | 342,948 | 81 | 423,040 |
| 27. | Currituck | coastal | 200 | 6,200 | 500 | 2,500 | 171,400 | 163,420 | 94 | 174,720 |
| 28. | Dare | coastal | 6,500 | 22,045 | 1,850 | 6,100 | 238,850 | 219,075 | 88 | 248,320 |
| 29. | Davidson | hinterland | 1,000 | 1,000 | 16,860 | 37,810 | 330,000 | 308,000 | 88 | 348,610 |
| 30. | Davie | hinterland | 0 | 0 | 1,800 | 16,600 | 166,650 | 151,780 | 90 | 168,960 |
| 31. | Duplin | primary | 0 | 0 | 8,775 | 12,400 | 516,513 | 512,545 | 97 | 526,080 |
| 32. | Durham | hinterland | 0 | 5,800 | 15,000 | 19,400 | 175,200 | 164,860 | 86 | 191,360 |
| 33. | Edgecombe | primary | 0 | 0 | 5,565 | 12,663 | 320,110 | 313,022 | 96 | 327,040 |
| 34. | Forsyth | hinterland | 0 | 0 | 23,945 | 43,425 | 246,200 | 225,760 | 83 | 271,345 |
| 35. | Franklin | hinterland | 0 | 0 | 4,170 | 12,000 | 310,530 | 302,560 | 96 | 316,160 |

| | | Location | Federal 1958 | Federal 1967 | Urban & Built-up 1958 | Urban & Built-up 1967 | Farm & Forest 1958 | Farm & Forest 1967 | % Farm & Forest | Total Area 1967 |
|---|---|---|---|---|---|---|---|---|---|---|
| 36. | Gaston | outside | 0 | 0 | 34,020 | 47,952 | 193,500 | 179,318 | 78 | 229,120 |
| 37. | Gates | primary | 0 | 0 | 245 | 2,984 | 219,030 | 216,361 | 96 | 219,520 |
| 38. | Graham | outside | 113,000 | 113,000 | 800 | 2,100 | 63,100 | 69,420 | 36 | 184,960 |
| 39. | Granville | hinterland | 2,634 | 3,404 | 4,258 | 12,900 | 337,825 | 327,906 | 95 | 346,220 |
| 40. | Greene | primary | 0 | 0 | 1,000 | 2,766 | 170,366 | 168,550 | 98 | 172,160 |
| 41. | Guilford | hinterland | 200 | 200 | 54,720 | 70,744 | 357,982 | 341,226 | 82 | 415,940 |
| 42. | Halifax | primary | 50 | 50 | 11,500 | 18,400 | 446,050 | 436,415 | 96 | 455,365 |
| 43. | Harnett | hinterland | 0 | 0 | 8,210 | 10,451 | 376,293 | 373,832 | 96 | 387,840 |
| 44. | Haywood | outside | 124,000 | 124,513 | 6,000 | 12,000 | 216,487 | 209,954 | 60 | 347,500 |
| 45. | Henderson | outside | 18,401 | 18,401 | 9,891 | 11,383 | 215,099 | 213,522 | 87 | 244,480 |
| 46. | Hertford | primary | 0 | 0 | 2,500 | 5,220 | 224,100 | 221,420 | 97 | 227,840 |
| 47. | Hoke | hinterland | 92,000 | 92,000 | 5,300 | 6,340 | 145,000 | 143,500 | 59 | 243,840 |
| 48. | Hyde | coastal | 66,000 | 50,000 | 470 | 2,630 | 339,197 | 352,997 | 87 | 405,760 |
| 49. | Inedell | outside | 100 | 100 | 7,000 | 19,000 | 360,300 | 347,000 | 95 | 366,940 |
| 50. | Jackson | outside | 44,100 | 49,129 | 2,000 | 2,250 | 269,726 | 264,444 | 83 | 316,800 |
| 51. | Johnston | hinterland | 0 | 0 | 8,000 | 17,176 | 497,800 | 488,224 | 96 | 508,800 |
| 52. | Jones | primary | 37,400 | 37,400 | 1,140 | 1,240 | 259,460 | 259,340 | 87 | 298,880 |
| 53. | Lee | hinterland | 0 | 0 | 5,452 | 8,919 | 156,713 | 153,149 | 93 | 163,200 |
| 54. | Lenoir | primary | 0 | 0 | 6,750 | 8,750 | 240,250 | 238,280 | 95 | 250,240 |
| 55. | Lincoln | outside | 0 | 0 | 1,907 | 9,428 | 194,208 | 182,117 | 95 | 192,620 |
| 56. | McDowell | outside | 67,000 | 65,700 | 3,400 | 8,500 | 212,400 | 208,480 | 74 | 282,880 |
| 57. | Macon | outside | 147,866 | 147,843 | 1,997 | 2,047 | 180,637 | 180,540 | 55 | 330,880 |
| 58. | Madison | outside | 46,700 | 46,700 | 2,510 | 5,870 | 241,690 | 237,094 | 81 | 291,840 |
| 59. | Martin | primary | 0 | 0 | 3,156 | 8,456 | 304,284 | 299,014 | 97 | 307,840 |
| 60. | Mecklenberg | outside | 3,300 | 0 | 46,823 | 76,027 | 294,186 | 257,762 | 77 | 336,530 |
| 61. | Mitchell | outside | 16,800 | 16,800 | 1,480 | 2,646 | 121,620 | 120,415 | 86 | 140,800 |
| 62. | Montgomery | outside | 34,260 | 34,260 | 2,968 | 7,700 | 274,472 | 269,570 | 86 | 312,170 |
| 63. | Moore | outside | 600 | 600 | 9,245 | 20,441 | 439,275 | 428,188 | 95 | 451,027 |
| 64. | Nash | primary | 0 | 0 | 4,500 | 19,120 | 347,820 | 332,760 | 94 | 353,280 |
| 65. | New Hanover | coastal | 1,844 | 2,142 | 15,312 | 36,130 | 106,304 | 85,148 | 69 | 124,160 |
| 66. | Northampton | primary | 0 | 0 | 2,637 | 7,540 | 341,808 | 330,876 | 97 | 338,871 |
| 67. | Onslow | coastal | 85,200 | 85,200 | 12,500 | 13,459 | 385,138 | 384,219 | 79 | 483,840 |
| 68. | Orange | hinterland | 0 | 0 | 8,392 | 14,312 | 245,501 | 239,469 | 94 | 254,720 |
| 69. | Pamlico | coastal | 500 | 500 | 1,000 | 2,856 | 212,657 | 210,000 | 96 | 218,240 |
| 70. | Pasquotank | coastal | 1,400 | 865 | 3,196 | 5,000 | 141,475 | 140,206 | 96 | 146,560 |
| 71. | Pender | coastal | 100 | 100 | 2,533 | 3,972 | 541,464 | 539,998 | 98 | 548,480 |
| 72. | Perquimans | coastal | 1,300 | 1,300 | 978 | 3,309 | 164,217 | 161,926 | 97 | 167,040 |

| | | Location | Federal 1958 | Federal 1967 | Urban & Built-up 1958 | Urban & Built-up 1967 | Farm & Forest 1958 | Farm & Forest 1967 | % Farm & Forest | Total Area 1968 |
|---|---|---|---|---|---|---|---|---|---|---|
| 73. | Person | hinterland | 0 | 0 | 3,166 | 6,980 | 251,770 | 244,570 | 97 | 252,550 |
| 74. | Pitt | primary | 0 | 6,193 | 13,120 | 25,650 | 404,680 | 386,000 | 92 | 419,840 |
| 75. | Polk | outside | 0 | 0 | 2,975 | 3,860 | 146,375 | 145,400 | 97 | 149,760 |
| 76. | Randolph | hinterland | 8,100 | 8,100 | 6,600 | 55,808 | 496,700 | 447,432 | 87 | 512,640 |
| 77. | Richmond | outside | 40,500 | 1,400 | 13,000 | 13,463 | 251,000 | 289,405 | 95 | 305,280 |
| 78. | Robeson | hinterland | 1,400 | 1,400 | 14,155 | 29,464 | 587,037 | 571,588 | 95 | 604,160 |
| 79. | Rockingham | hinterland | 0 | 0 | 12,343 | 15,481 | 351,037 | 347,719 | 95 | 366,080 |
| 80. | Rowan | outside | 400 | 400 | 20,044 | 29,404 | 307,721 | 292,361 | 91 | 322,980 |
| 81. | Rutherford | outside | 0 | 0 | 10,700 | 18,000 | 350,220 | 342,930 | 95 | 362,240 |
| 82. | Sampson | hinterland | 0 | 0 | 4,234 | 15,074 | 609,744 | 598,824 | 97 | 616,320 |
| 83. | Scotland | hinterland | 32,500 | 32,500 | 3,137 | 6,117 | 166,390 | 163,390 | 81 | 202,880 |
| 84. | Stanly | outside | 0 | 0 | 9,499 | 15,500 | 245,075 | 238,495 | 94 | 254,830 |
| 85. | Stokes | hinterland | 0 | 0 | 6,865 | 8,900 | 285,949 | 283,790 | 97 | 293,760 |
| 86. | Surry | hinterland | 900 | 900 | 14,000 | 15,800 | 327,600 | 325,580 | 95 | 343,680 |
| 87. | Swain | outside | 235,204 | 235,204 | 4,450 | 5,000 | 99,016 | 98,456 | 29 | 339,200 |
| 88. | Transylvania | outside | 87,300 | 88,511 | 1,200 | 5,834 | 153,530 | 147,310 | 61 | 242,025 |
| 89. | Tyrrell | coastal | 0 | 0 | 600 | 2,220 | 253,800 | 252,140 | 99 | 255,360 |
| 90. | Union | outside | 0 | 0 | 8,059 | 20,490 | 401,241 | 388,681 | 95 | 411,520 |
| 91. | Vance | hinterland | 8,230 | 8,230 | 4,600 | 7,600 | 146,070 | 142,580 | 90 | 159,360 |
| 92. | Wake | hinterland | 1,000 | 0 | 28,796 | 68,860 | 520,909 | 481,418 | 87 | 552,778 |
| 93. | Warren | hinterland | 589 | 589 | 2,549 | 8,898 | 279,133 | 264,365 | 96 | 275,630 |
| 94. | Washington | coastal | 0 | 2,450 | 1,226 | 6,488 | 213,730 | 205,750 | 96 | 215,040 |
| 95. | Watauga | outside | 9,835 | 9,835 | 3,275 | 8,000 | 190,890 | 186,165 | 91 | 204,800 |
| 96. | Wayne | primary | 3,002 | 3,002 | 9,089 | 14,164 | 342,409 | 337,084 | 95 | 355,030 |
| 97. | Wilkes | outside | 4,700 | 6,265 | 15,000 | 25,000 | 467,967 | 454,965 | 93 | 488,230 |
| 98. | Wilson | primary | 0 | 0 | 5,830 | 12,706 | 232,354 | 225,498 | 94 | 238,720 |
| 99. | Yadkin | hinterland | 0 | 0 | 8,400 | 10,290 | 205,000 | 203,000 | 95 | 214,400 |
| 100. | Yancy | outside | 32,300 | 32,120 | 4,000 | 4,430 | 162,100 | 161,890 | 81 | 199,040 |
| | TOTAL | | 1,879,654 | 1,877,967 | 799,689 | 1,461,711 | 28,580,634 | 27,850,688 | 89 | 31,331,346 |

1. federal - federally-owned land except federally-owned cropland operated under lease or permit.

2. urban & built-up - (a) cities, villages & built-up areas of more than 10 acres; (b) industrial sites; (c) institutional & public administrative.

Table 6

URBAN AND BUILT-UP LAND, SUMMARY BY REGION

| Region | Total area (sq. miles) | urban & built up 1958 (sq. miles) | urban & built up 1967 (sq. miles) | % increase 1958 - 1967 | % of total Land, 1967 |
|---|---|---|---|---|---|
| O | 2856 | 41.0 | 81.3 | 98 | 2.8 |
| P | 4844 | 79.4 | 106.9 | 35 | 2.2 |
| Q | 2987 | 42.2 | 100.9 | 139 | 3.4 |
| R | 3205 | 16.6 | 58.5 | 253 | 1.8 |

Source: North Carolina Conservation Needs Inventory, 1971.

TABLE 7

NORTH CAROLINA COASTAL LAND USE

| County 1967 figs. | Federal | Urban | Farm & Forest | % of F & F | % Inc. Urban | Total land |
|---|---|---|---|---|---|---|
| Duplin | 0 | 12,400 | 512,545 | 97 | 41 | 526,080 |
| Edgecombe | 0 | 12,663 | 313,022 | 96 | 128 | 327,040 |
| Gates | 0 | 2,934 | 216,361 | 96 | 1098 | 219,520 |
| Greene | 0 | 2,766 | 168,550 | 98 | 177 | 172,160 |
| Halifax | 50 | 18,400 | 436,417 | 96 | 60 | 455,365 |
| Hertford | 0 | 5,220 | 221,520 | 97 | 109 | 227,840 |
| Jones | 37,400 | 1,240 | 259,340 | 87 | 9 | 298,880 |
| Lenoir | 0 | 8,750 | 238,280 | 95 | 30 | 250,240 |
| Martin | 0 | 8,456 | 200,014 | 97 | 168 | 307,840 |
| Nash | 0 | 19,120 | 332,760 | 94 | 325 | 353,280 |
| Northampton | 0 | 7,540 | 330,876 | 97 | 186 | 338,871 |
| Pitt | 6,193 | 25,650 | 386,000 | 92 | 96 | 419,840 |
| Wayne | 3,002 | 14,164 | 337,084 | 95 | 56 | 355,030 |
| Wilson | 0 | 12,706 | 225,498 | 94 | 118 | 238,720 |

TABLE 8

NORTH CAROLINA LAND USE

| | urban & built-up (in acres) 1958 | 1967 | percent change 1958-1967 | urban as % of total 1967 |
|---|---|---|---|---|
| Region R | | | | |
| Camden | 412 | 1,900 | +361% | 1.2% |
| Chowan | 1,130 | 4,365 | 286 | 3.8 |
| Currituck | 500 | 2,500 | 400 | 1.4 |
| Dare | 1,850 | 6,100 | 230 | 2.4 |
| Gates | 245 | 2,934 | 1098 | 13.4 |
| Hyde | 470 | 2,630 | 460 | 6.5 |
| Pasquotank | 3,196 | 5,000 | 56 | 3.4 |
| Perquimans | 978 | 3,309 | 238 | 2.0 |
| Tyrell | 600 | 2,220 | 270 | 0.8 |
| Washington | 1,226 | 6,488 | 429 | 3.0 |
| Total | 10,607 | 37,446 | 253% | 1.8% |
| State of North Carolina | 799,689 | 1,461,713 | 83% | 4.7% |

Source: Land Policy Alternatives for North Carolina. Dept. of Administration, Office of State Planning.

As can be seen from the preceding table, the majority of the primary zone counties are predominately rural, with most land in farm and/or forest. Also, the rates of urbanization are, in most cases, smaller than for the coastal counties. Gates County, with an urbanization increase of 1098%, is a notable exception to this statement. The reason for Gates' outstanding increase is probably a result of its proximity to the Norfolk-Chesapeake City urban area.

Thirty counties are located in the hinterland zone. This zone includes most of North Carolina's statistical metropolitan areas and, thus, the majority of North Carolina's urban population and urban land use. The table on the following page gives the acres of urban and built-up land for 29 of the 30 hinterland counties. The county of Columbus is not included as it was not in any of the state planning regions shown. However, the data for this county shows it had 3,719 acres of built-up land in 1958 and 5,219 acres in 1967, for a percentage increase of 40%, representing 0.9% of the total land in the county. From the table, it is apparent that the hinterland counties have much higher acreages and percentage of total land in urban and built-up uses than do either the coastal or primary zone counties. This could lead to the prediction that a secondary impact as either a labor source or a market would result from offshore oil development adjacent to the North Carolina coast. However, the effect of this secondary impact on land use would probably be greater in either the primary or coastal zone counties than in the hinterland counties.

5. Pennsylvania

The major area of concern for this study in relation to the State of Pennsylvania is the Philadelphia area. It is in this region that industry, port activities, and urban uses are centered. Because of this concentration in the Philadelphia area, state land use figures are misleading for purposes of this study. For example, according to 1972 Agricultural Statistics,[32] 24,862,000 acres of Pennsylvania's 28,778,000 acres were in forests and farms. However, a glance at the Philadelphia region map on the following page will

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[32] U. S. Department of Agriculture.

TABLE 9

NORTH CAROLINA LAND USE BY PLANNING REGION

| | urban and built-up (in acres) 1958 | 1967 | percent change 1958-1967 | urban as % of total 1967 |
|---|---|---|---|---|
| Region G | | | | |
| Alamance | 17,905 | 18,905 | 6 | 6.8 |
| Caswell | 800 | 5,590 | 599 | 2.0 |
| Davidson | 16,860 | 37,810 | 124 | 10.8 |
| Davie | 1,800 | 16,600 | 822 | 9.8 |
| Forsyth | 23,945 | 43,425 | 81 | 16.0 |
| Guilford | 54,720 | 70,744 | 29 | 17.0 |
| Randolph | 6,600 | 55,808 | 746 | 10.9 |
| Rockingham | 12,343 | 15,481 | 25 | 4.2 |
| Stokes | 6,865 | 8,900 | 30 | 3.0 |
| Surry | 14,000 | 15,800 | 13 | 4.6 |
| Yadkin | 8,400 | 10,290 | 22 | 4.8 |
| Total | 164,238 | 299,355 | 82 | 8.6 |
| Region H | | | | |
| Anson | 5,845 | 9,282 | 59 | 2.7 |
| Montgomery | 2,968 | 7,700 | 159 | 2.5 |
| Moore | 9,245 | 20,441 | 121 | 4.5 |
| Richmond | 13,000 | 13,463 | 4 | 4.4 |
| Total | 31,058 | 50,886 | 64 | 3.6 |
| Region J | | | | |
| Chatham | 3,980 | 13,553 | 241 | 3.0 |
| Durham | 15,000 | 19,400 | 29 | 10.1 |
| Johnston | 8,000 | 17,176 | 115 | 3.4 |
| Lee | 5,452 | 8,919 | 64 | 5.5 |
| Orange | 8,392 | 14,312 | 71 | 5.6 |
| Wake | 28,796 | 68,860 | 139 | 12.5 |
| Total | 69,620 | 142,220 | 104 | 6.7 |
| Region K | | | | |
| Franklin | 4,170 | 12,000 | 188 | 3.8 |
| Granville | 4,258 | 12,900 | 203 | 3.7 |
| Person | 3,166 | 6,980 | 120 | 2.8 |
| Vance | 4,600 | 7,600 | 65 | 4.8 |
| Warren | 2,549 | 8,898 | 249 | 3.3 |
| Total | 18,743 | 48,378 | 158 | 3.6 |
| Region M | | | | |
| Cumberland | 14,458 | 34,000 | 135 | 8.0 |
| Harnett | 8,210 | 10,451 | 27 | 2.7 |
| Sampson | 4,234 | 15,074 | 256 | 2.4 |
| Total | 26,902 | 59,525 | 121 | 4.2 |
| Region N | | | | |
| Bladen | 1,247 | 10,092 | 710 | 1.8 |
| Hoke | 5,300 | 6,340 | 20 | 2.6 |
| Robeson | 14,155 | 29,464 | 108 | 4.9 |
| Scotland | 3,137 | 6,117 | 95 | 3.0 |
| Total | 23,839 | 52,013 | 118 | 3.2 |

show that most of the land area in and around the Philadelphia region is urbanized and highly developed. According to the 1967 definition of the Philadelphia Standard Metropolitan Statistical Area, 2,273,920 acres of land were included in this area. Also of importance are the large number of petroleum refineries and petrochemical industries located in this area. Details on these industries are included in other sections of this report.

Because the Pennsylvania area is located in the hinterland zone, the foregoing is deemed sufficient land use information for purposes of this report.

6. Virginia

Virginia, with a total land area of more than 25 million acres, has 22,265,000 acres in rural land, 2,248,000 acres in federal land, and 995,000 acres of urban and built-up land.

The following table gives the county breakdown of land use in Virginia's coastal counties.

TABLE 10

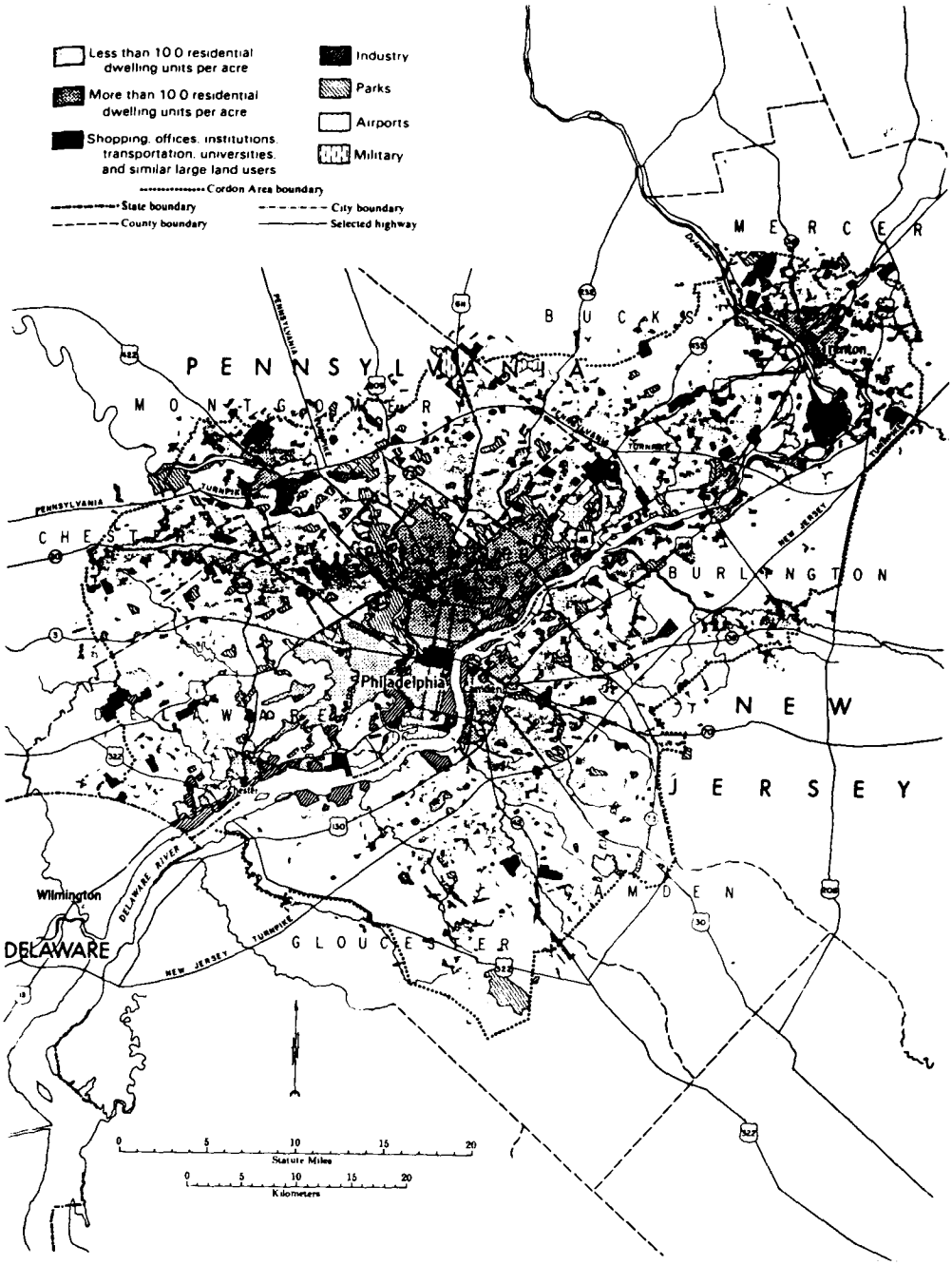
| County 1967 figures | Federal | Built-up | Forest | Total land area | % urban | % Farm & Forest |
|---|---|---|---|---|---|---|
| Accomack | 18,300 | 5,700 | 275,500 | 300,800 | 1.9 | 91.6 |
| Gloucester | 0 | 3,600 | 140,200 | 144,000 | 2.5 | 97.4 |
| Lancaster | 0 | 1,800 | 88,600 | 90,800 | 2.0 | 97.6 |
| Mathews | 0 | 2,000 | 53,500 | 55,600 | 3.6 | 96.9 |
| Northampton | 1,200 | 2,700 | 136,500 | 144,600 | 1.9 | 94.4 |
| Northumberland | 0 | 3,800 | 123,100 | 128,000 | 3.0 | 96.2 |
| Westmoreland | 300 | 7,300 | 142,800 | 142,800 | 4.8 | 94.6 |
| York | 31,300 | 16,100 | 31,000 | 31,000 | 20.4 | 39.4 |

The figures in the preceding table do not tell the whole story of Virginia's coast as the land use figures for the highly industrialized, urbanized area of Hampton Roads-Norfolk-Chesapeake City are not in some cases included in the county totals. The figures for some of these independent cities are in the table below.

| County 1967 Figures | Federal | Urban Built-up | Farm & Forest | Total land area | % urban | % Farm & Forest |
|---|---|---|---|---|---|---|
| Chesapeake City | 5,700 | 53,700 | 203,200 | 263,600 | 20.4 | 77.0 |
| Hampton | 4,200 | 30,800 | 2,300 | 37,400 | 82.4 | 6.1 |
| Newport News | 1,200 | 43,000 | 2,700 | 47,700 | 90.1 | 5.7 |
| Virginia Beach | 12,300 | 15,800 | 133,200 | 162,800 | 9.7 | 81.8 |

LAND USE IN AND AROUND PHILADELPHIA

Map 16




Source: M. Clawson. Suburban Land Conversion in the U.S.

TABLE 11

VIRGINIA LAND USE BY COUNTY

Thousands of Acres

| | | Location | Federal Non-Crop | | Urban & Built-Up | | Total Farm, Forest | | Total Land Area |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1958 | 1967 | 1958 | 1967 | 1958 | 1967 | 1967 |
| 1. | Accomack | coast | 18.3 | 18.3 | 5.3 | 5.7 | 276.1 | 275.5 | 300.8 |
| 2. | Albemarle | hinterland | 14.0 | 14.0 | 9.1 | 15.8 | 449.6 | 445.7 | 476.3 |
| 3. | Alleghany | hinterland | 133.3 | 133.3 | 5.9 | 7.1 | 148.8 | 148.0 | 289.2 |
| 4. | Amelia | hinterland | 0.1 | 0.2 | 1.3 | 1.9 | 232.5 | 231.6 | 234.2 |
| 5. | Amherst | hinterland | 53.9 | 54.5 | 3.6 | 4.0 | 241.2 | 239.8 | 298.8 |
| 6. | Appomattox | hinterland | 0.9 | 0.9 | 2.5 | 3.4 | 215.5 | 214.4 | 219.5 |
| 7. | Arlington | primary | 0.0 | 0.0 | 15.2 | 15.3 | 0.1 | 0.0 | 15.3 |
| 8. | Augusta | hinterland | 204.4 | 224.6 | 10.5 | 21.2 | 414.9 | 394.0 | 641.2 |
| 9. | Bath | hinterland | 160.1 | 168.7 | 3.4 | 3.6 | 181.4 | 172.5 | 345.6 |
| 10. | Bedford | hinterland | 20.1 | 20.0 | 6.6 | 6.7 | 468.1 | 460.2 | 487.6 |
| 11. | Bland | outside | 21.2 | 21.2 | 1.8 | 1.8 | 213.1 | 213.0 | 236.1 |
| 12. | Botetourt | hinterland | 69.7 | 76.7 | 2.9 | 5.2 | 276.5 | 267.0 | 350.7 |
| 13. | Brunswick | hinterland | 4.5 | 7.6 | 5.3 | 5.6 | 359.5 | 353.9 | 368.5 |
| 14. | Buchanan | outside | 0 | 0 | 3.1 | 4.0 | 221.2 | 220.1 | 225.1 |
| 15. | Buckingham | hinterland | 2.7 | 2.6 | 2.8 | 2.8 | 362.6 | 362.4 | 368.6 |
| 16. | Campbell | hinterland | 0 | 0.1 | 5.8 | 18.5 | 333.2 | 330.6 | 349.6 |
| 17. | Caroline | primary | 75.5 | 75.5 | 3.1 | 5.1 | 268.7 | 266.4 | 348.1 |
| 18. | Carroll | outside | 6.0 | 6.7 | 4.9 | 5.2 | 305.2 | 302.8 | 316.1 |
| 19. | Charles City | primary | 0 | 0 | 0.9 | 1.3 | 116.4 | 115.9 | 117.7 |
| 20. | Charlotte | hinterland | 2.1 | 2.0 | 4.1 | 5.1 | 292.4 | 290.7 | 298.8 |
| 21. | Chesterfield | primary | 1.7 | 3.3 | 30.0 | 54.9 | 264.7 | 239.5 | 299.3 |
| 22. | Clarke | hinterland | 0 | 0 | 3.0 | 3.0 | 108.4 | 108.2 | 111.3 |
| 23. | Craig | hinterland | 112.0 | 112.5 | 1.7 | 1.6 | 100.9 | 100.3 | 215.0 |
| 24. | Culpeper | hinterland | 0 | 0 | 3.3 | 3.5 | 245.4 | 245.0 | 248.8 |
| 25. | Cumberland | hinterland | 0 | 0 | 3.3 | 2.8 | 245.4 | 179.2 | 184.3 |
| 26. | Dickenson | outside | 9.0 | 14.4 | 3.5 | 3.5 | 201.8 | 194.2 | 212.4 |
| 27. | Dinwiddie | primary | 15.1 | 15.0 | 3.5 | 10.0 | 305.5 | 304.1 | 329.6 |
| 28. | Essex | primary | 0 | 0 | 1.3 | 1.3 | 158.5 | 158.3 | 160.0 |
| 29. | Fairfax | primary | 20.6 | 22.2 | 76.3 | 133.0 | 166.3 | 114.0 | 270.0 |
| 30. | Fauquier | hinterland | 5.9 | 4.4 | 4.1 | 5.6 | 412.0 | 411.2 | 422.3 |
| 31. | Floyd | hinterland | 2.6 | 2.6 | 3.3 | 3.2 | 239.1 | 239.1 | 245.1 |
| 32. | Fluvanna | hinterland | 0 | 0 | 1.7 | 2.0 | 178.5 | 178.2 | 180.4 |
| 33. | Franklin | hinterland | 2.3 | 2.8 | 6.3 | 7.0 | 450.3 | 432.9 | 443.5 |
| 34. | Frederick | hinterland | 4.5 | 4.4 | 3.4 | 7.4 | 268.5 | 266.8 | 279.0 |
| 35. | Giles | hinterland | 49.5 | 49.4 | 3.2 | 3.1 | 175.0 | 175.0 | 227.8 |
| 36. | Gloucester | coastal | 0 | 0 | 2.2 | 3.6 | 141.7 | 140.2 | 144.0 |
| 37. | Goochland | primary | 0 | 0 | 1.9 | 4.0 | 182.7 | 180.5 | 184.9 |
| 38. | Grayson | outside | 13.0 | 18.3 | 3.7 | 5.1 | 269.8 | 264.1 | 289.9 |
| 39. | Greene | hinterland | 13.9 | 13.9 | 1.0 | 1.1 | 82.9 | 82.7 | 97.9 |
| 40. | Greensville | primary | 0 | 0 | 3.5 | 3.9 | 188.6 | 188.0 | 192.6 |
| 41. | Halifax | hinterland | 9.9 | 9.8 | 8.0 | 9.7 | 495.0 | 492.2 | 513.2 |
| 42. | Hanover | primary | 0.2 | 0.2 | 4.2 | 7.1 | 293.2 | 290.0 | 298.2 |
| 43. | Henrico | primary | 0.4 | 0.4 | 23.0 | 53.6 | 124.9 | 117.7 | 172.1 |
| 44. | Henry | hinterland | 0.4 | 0.3 | 8.1 | 20.3 | 237.4 | 230.8 | 252.1 |
| 45. | Highland | hinterland | 53.5 | 53.4 | 1.6 | 1.6 | 210.8 | 210.7 | 266.2 |
| 46. | Isle of Wight | primary | 0.1 | 0.2 | 2.6 | 2.9 | 201.1 | 200.3 | 204.1 |
| 47. | James City | primary | 2.5 | 2.5 | 5.5 | 9.8 | 86.6 | 84.0 | 96.6 |

| | | Location | Federal Non-Crop | | Urban & Built-Up | | Total Farm, Forest | | Total Land Area |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1958 | 1967 | 1958 | 1967 | 1958 | 1967 | 1967 |
| 48. | King & Queen | primary | 0.0 | 0.0 | 1.8 | 1.8 | 200.3 | 200.2 | 203.5 |
| 49. | King George | primary | 3.9 | 3.8 | 1.4 | 2.4 | 107.6 | 106.5 | 113.9 |
| 50. | King William | primary | 0 | 0 | 1.2 | 1.4 | 176.3 | 176.1 | 177.9 |
| 51. | Lancaster | coastal | 0 | 0 | 1.8 | 1.8 | 88.7 | 88.6 | 90.8 |
| 52. | Lee | outside | 17.9 | 17.8 | 4.0 | 4.2 | 255.7 | 255.3 | 277.7 |
| 53. | Loudoun | primary | 7.8 | 8.0 | 7.8 | 15.6 | 314.5 | 306.0 | 330.6 |
| 54. | Louisa | hinterland | 0 | 0 | 2.2 | 2.4 | 325.7 | 325.4 | 328.9 |
| 55. | Lunenburg | hinterland | 0 | 0 | 3.3 | 3.3 | 279.8 | 299.5 | 283.5 |
| 56. | Madison | hinterland | 32.6 | 32.5 | 1.9 | 1.9 | 174.6 | 174.3 | 209.2 |
| 57. | Mathews | coastal | 0 | 0 | 1.9 | 2.0 | 53.7 | 53.5 | 55.6 |
| 58. | Mecklenburg | hinterland | 31.2 | 31.2 | 7.0 | 9.4 | 360.8 | 351.9 | 394.5 |
| 59. | Middlesex | coastal | 0 | 0 | 1.5 | 1.9 | 82.4 | 81.8 | 84.4 |
| 60. | Montgomery | hinterland | 19.0 | 19.2 | 4.2 | 10.3 | 228.5 | 225.1 | 256.0 |
| 61. | Nansemond | primary | 2.4 | 2.3 | 9.1 | 13.5 | 244.5 | 241.4 | 258.5 |
| 62. | Nelson | hinterland | 15.0 | 15.0 | 5.5 | 5.6 | 278.5 | 278.2 | 299.5 |
| 63. | New Kent | primary | 0 | 0 | 1.6 | 2.0 | 134.0 | 132.5 | 134.7 |
| 64. | Northampton | coastal | 1.2 | 1.2 | 2.3 | 2.7 | 137.1 | 136.5 | 144.6 |
| 65. | Northumberland | coastal | 0 | 0 | 2.0 | 3.8 | 125.0 | 123.1 | 128.0 |
| 66. | Nottoway | hinterland | 25.8 | 25.7 | 3.9 | 4.3 | 166.8 | 166.0 | 197.1 |
| 67. | Orange | hinterland | 0.3 | 0.2 | 2.7 | 2.7 | 223.3 | 223.0 | 226.5 |
| 68. | Page | hinterland | 63.2 | 63.1 | 4.2 | 4.9 | 134.2 | 133.5 | 202.2 |
| 69. | Patrick | hinterland | 7.7 | 7.6 | 3.6 | 3.6 | 288.6 | 288.4 | 300.1 |
| 70. | Pittsylvania | hinterland | 0 | 0 | 10.2 | 14.9 | 643.1 | 637.5 | 653.6 |
| 71. | Powhaten | primary | 0 | 0 | 0.8 | 3.5 | 170.2 | 167.4 | 171.5 |
| 72. | Prince Edward | hinterland | 0 | 0 | 3.8 | 4.2 | 224.6 | 223.9 | 228.4 |
| 73. | Prince George | primary | 8.1 | 9.7 | 2.1 | 7.2 | 171.4 | 166.9 | 184.3 |
| 74. | Prince William | primary | 49.2 | 51.1 | 14.7 | 20.8 | 156.5 | 148.2 | 220.8 |
| 75. | Pulaski | hinterland | 23.6 | 23.5 | 6.2 | 8.6 | 179.3 | 176.7 | 209.2 |
| 76. | Rappahannock | hinterland | 31.8 | 31.8 | 1.3 | 1.4 | 137.7 | 137.5 | 170.8 |
| 77. | Richmond | primary | 0 | 0 | 1.5 | 1.8 | 121.3 | 120.9 | 122.8 |
| 78. | Roanoke | hinterland | 1.9 | 2.1 | 12.0 | 32.2 | 161.8 | 158.5 | 193.9 |
| 79. | Rockbridge | hinterland | 64.4 | 64.7 | 6.7 | 10.6 | 314.5 | 311.7 | 388.1 |
| 80. | Rockingham | hinterland | 170.6 | 174.2 | 9.4 | 13.6 | 375.6 | 368.9 | 557.4 |
| 81. | Russell | outside | 0 | 0 | 10.9 | 11.9 | 297.9 | 296.6 | 309.1 |
| 82. | Scott | outside | 31.0 | 30.9 | 4.6 | 9.3 | 308.9 | 304.1 | 344.9 |
| 83. | Shenandoah | hinterland | 76.0 | 75.9 | 5.3 | 5.3 | 242.9 | 242.7 | 324.4 |
| 84. | Smyth | outside | 61.0 | 62.8 | 7.7 | 7.9 | 209.2 | 209.1 | 278.4 |
| 85. | Southampton | primary | 0 | 0 | 4.6 | 4.7 | 382.2 | 382.0 | 388.4 |
| 86. | Spotsylvania | primary | 2.1 | 2.1 | 2.9 | 6.2 | 258.5 | 256.2 | 265.6 |
| 87. | Stafford | primary | 32.7 | 32.6 | 2.9 | 12.0 | 136.7 | 127.5 | 173.4 |
| 88. | Surry | primary | 0 | 0 | 1.9 | 2.7 | 176.7 | 175.7 | 179.2 |
| 89. | Sussex | primary | 0 | 0 | 4.6 | 4.6 | 310.7 | 310.5 | 317.4 |
| 90. | Tazewell | outside | 5.3 | 5.2 | 6.7 | 6.7 | 322.0 | 321.9 | 334.0 |
| 91. | Warren | hinterland | 18.2 | 18.1 | 3.8 | 5.1 | 117.7 | 116.2 | 140.1 |

| | | Location | Federal Non-Crop | | Urban & Built-Up | | Total Farm, Forest | | Total Land Area |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1958 | 1967 | 1958 | 1967 | 1958 | 1967 | 1967 |
| 92. | Washington | outside | 17.4 | 18.1 | 6.5 | 9.7 | 344.3 | 342.8 | 373.1 |
| 93. | Westmoreland | coastal | 0.3 | 0.3 | 6.8 | 7.3 | 143.4 | 142.8 | 151.0 |
| 94. | Wise | outside | 29.0 | 31.6 | 5.2 | 5.2 | 230.7 | 227.2 | 264.2 |
| 95. | Wythe | outside | 48.3 | 48.2 | 5.7 | 7.3 | 239.4 | 237.7 | 294.4 |
| 96. | York | coastal | 31.4 | 31.3 | 13.8 | 16.1 | 33.4 | 31.0 | 78.7 |
| 97. | Hampton | coastal | 0 | 4.2 | 31.8 | 30.8 | 4.0 | 2.3 | 37.4 |
| 98. | Chesapeake City | coastal | 5.8 | 5.7 | 17.2 | 53.7 | 206.5 | 203.2 | 263.6 |
| 99. | Virginia | coastal | 12.4 | 12.3 | 16.0 | 15.8 | 141.5 | 133.2 | 162.8 |
| 100. | Newport News | coastal | 0 | 1.2 | 40.6 | 43.0 | 4.8 | 2.7 | 47.7 |
| 101. | Norfolk | coastal | | | | | | | 33.9 |
| 102. | Portsmouth | coastal | | | | | | | 18.6 |
| | other independent cities | | | | | | | | |
| | 34 cities: 488 sq. miles total area | | | | | | | | |

figures from: Virginia Conservation Needs Inventory of 1967. Virginia Conservation Needs Inventory Committee. (Feb. 1970) Pub. 384. Cooperative Extension Service. Blacksburg, Virginia.

From the above tables it is apparent that much of Virginia's coast is rural, with high percentages of land in farm and forest uses. The major urban-industrial concentration is at the south-eastern end of the state and has been covered in greater detail in the "target area" part of this section.

Twenty eight of Virginia's counties are located in the primary zone. Figures showing land use for these counties are included in the state land use table in the beginning of this section. In general, land use for counties in the primary zone evidence the same variance of rural-urban uses as do the counties in the primary zone. There are two major urban concentrations in the primary zone. One is the Virginia part of the Washington, D. C. metropolitan area which includes Arlington, Fairfax, Loudoun, and Prince William Counties. The urbanization rate for these counties ranges from 100% in Arlington to approximately 10% in Prince William. The other urbanized primary zone area is that surrounding the City of Richmond and including Hanover, Henrico, and Chesterfield Counties. This area is not as heavily urbanized and built up as is the Washington, D. C. area but the acres classified as urban and built-up are increasing very rapidly.

The 46 Virginia hinterland counties evidence the same varying land use characteristics as do the primary and coastal zone counties. However, none of the hinterland counties have the same high level of industrialization-urbanization found in some of the coastal-primary zone counties. There are two Standard Metropolitan Statistical Areas in the hinterland counties - Lynchburg and Roanoke. Thus, the general land use picture for the Virginia hinterland counties is one of predominant rural-farm and forest uses.

However, the land use picture in Virginia is changing. According to a Virginia state document, Critical Environment Areas:

> "In the past 20 years Virginia has been transformed from a state that was classified as being predominately rural to one which is now predominately urban. In 1950 the total population was 3,318,680 with 53% of the people living in rural areas. By 1960 the proportion of the population classified as urban had surpassed that classified

as rural. Figures based upon the last census in 1970, indicate Virginia's population has risen to 4,651,487 and that the urban population has increased to 2,935,051 or 63% of the total."

As the state becomes urban, agricultural land is being converted to permanent, non-agricultural use. This conversion rate is estimated to be 36,500 acres per year.[33]

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[33] Virginia Conservation Need Inventory of 1967, page 20.

## II. Land use controls

### A. Introduction

Land use controls are usually considered in terms of traditional zoning and subdivision regulations applied on a local or county level. However, with increasing pressure from conflicting sources for a share of the finite supply of land, new methods of land use control are emerging. These methods vary from state-level zoning, such as Delaware's Coastal Zone Act, to county planning commissions and land use plans. Federal interest in land use is shown by recent and on-going attempts to pass federal land use legislation to provide financial assistance to the states in land use planning. Existing federal laws also have an impact on land use, such as the National Environmental Policy Act and the 1899 Rivers and Harbors Act.

This section will consider land use controls from two basic viewpoints: traditional zoning and subdivision regulations and special state laws directly concerned with land use. The general role of local planning commissions and county comprehensive plans will be considered under the first division. The concluding section will consider regional commissions as a factor in land use controls. The Delaware River Basin Commission will be analysed as the primary example of this type of land use control body.

### B. Zoning and subdivision regulations

The most accurate statement that can be made concerning local and county zoning and subdivision regulations for the study area is that most counties have them, as do many municipalities. Taken as a whole, the zoning picture is a fragmented multi-faceted collection of zoning laws, some of which are more honored in the breach than in the enforcement. One county in New Jersey, a target county for this study, has 52 communities with zoning ordinances, 44 communities with subdivision regulation and 49 with planning boards.[1] This multiplicity of zoning and subdivision ordinances is reflected in every state in the

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[1] Enjoy N. J., New Jersey Department of Labor and Industry.

study area. Thus, a state-by-state or county-by-county compilation of zoning and subdivision regulations would be too time-consuming and not relevant for purposes of this study. Therefore, zoning and subdivision regulations will be inventoried only for the target areas.

1. Cape May, New Jersey - Lewes, Delaware

A zoning regulation map was available for the Cape May, New Jersey - Lewes, Delaware target area. Said map is reproduced on the following page. This map shows the uses for which the various areas are zoned, such as open, farm, residential, etc. However, it does not indicate the zoning agencies nor does it indicate how closely the zoning regulations are enforced. The Delaware coast presents a special case in zoning as there is a state law prohibiting heavy industry from locating within the coastal zone. This law will be considered in greater detail in a subsequent portion of this report.

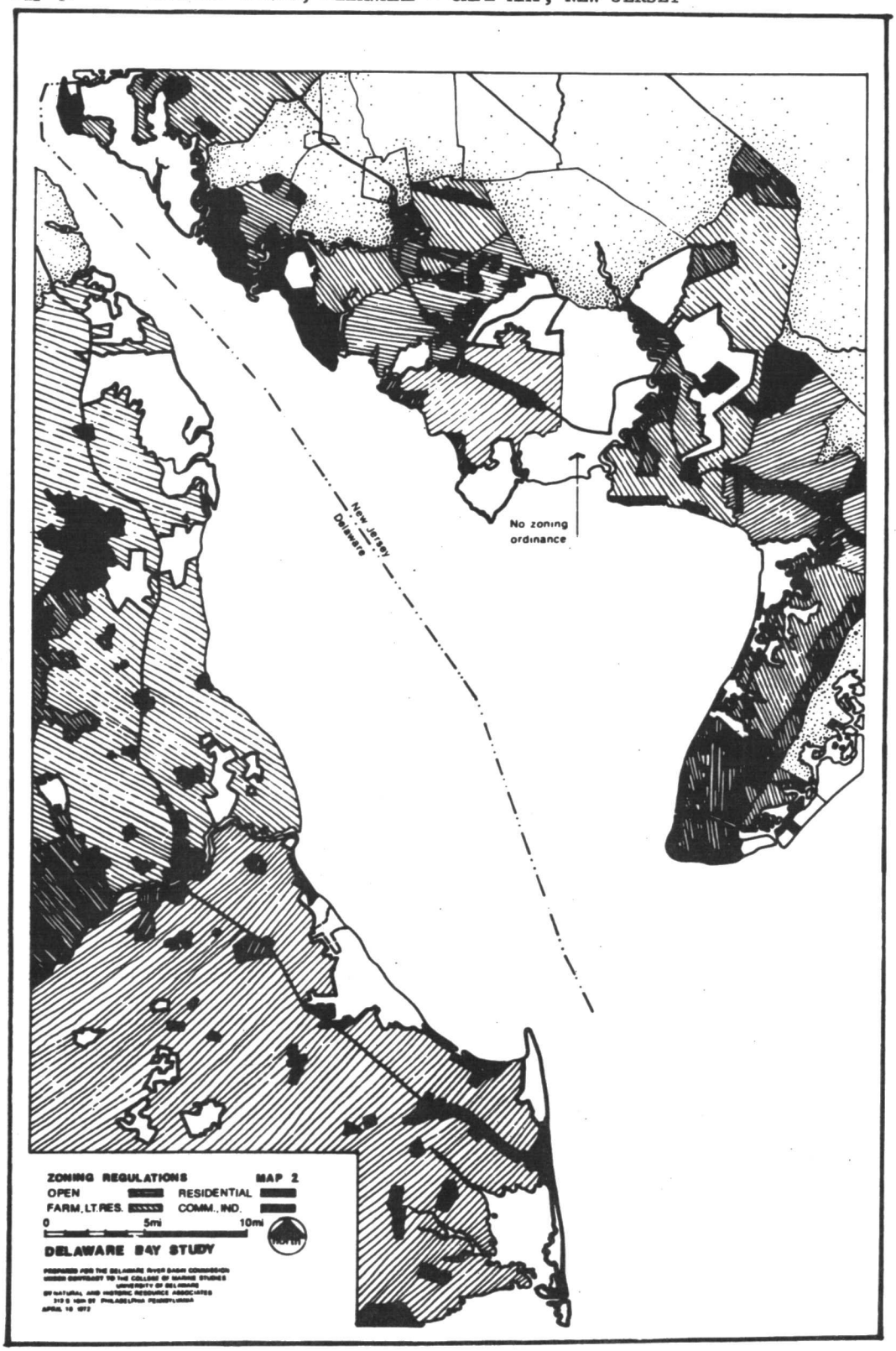
In Delaware as a whole, zoning and subdivision control is in the hands of county and local governments. According to the 1967 state Preliminary Comprehensive Development Plan, only New Castle county had county-wide zoning, and only in the cities of Wilmington, New Castle, Newark and Dover were the zoning regulations based on comprehensive development plans. Wilmington, New Castle, Newark, Dover and Rehoboth beach were identified as having subdivision regulations. This situation is changing as evidenced by the recent publication of the Sussex and Kent County comprehensive development plans.

2. Monmouth County, New Jersey

Monmouth County, as pointed out earlier in this report, has 52 communities with zoning regulations, 44 with subdivision controls, and 49 with local planning boards. The majority of land in the county is zoned for residential uses, with intersparsed areas zoned for industrial development. Residential uses have taken over much of the land in this county. Whether this suburbanization of the county was a result of the zoning or was a function of its proximity to the Newark-New York urban area is not clear.

Because of the large number of zoning agencies and the number of counties in New Jersey, zoning regulations on a county-by-county basis will not be considered for the rest of New Jersey.

Map 17 ZONING: LEWES, DELAWARE - CAPE MAY, NEW JERSEY




Source: Inventory and Evaluation of Information on Delaware Bay.

A summary overview of New Jersey indicates that many municipalities have zoning and subdivision regulations. Most counties have a county planning board, responsible for land use planning in uncorporated areas. Many municipalities also have planning boards, responsible for land use planning within the municipal boundaries.

3. Norfolk, Virginia Area

Virginia is in somewhat the same zoning posture as are Delaware and New Jersey. However, Virginia has some counties without a planning commission and/or zoning regulations. Also, the state is divided into regional planning districts, which have planning responsibilities for a multi-county area. The map on the following page indicates the location and programs for each of these 22 regional planning districts. These multicounty planning districts do not have exclusive control over land use in each area but they do act as regional planning bodies.

Norfolk and other independent cities in the area all have zoning and subdivision regulations. Norfolk, Portsmouth, Virginia Beach, Chesapeake City, Suffolk City, Southampton and Isle of Wight counties are all included in the Southeastern Virginia Planning District (District 22). This is the most highly urbanized area of Virginia with 90% of the population defined as urban. The city of Norfolk has had an active planning body since 1918. The present planning commission consists of seven members, who direct compliance to zoning ordinances and subdivision regulations.[2] Considering Norfolk's land area (35 square miles), the population for the city (283,000 in 1972) and the high level of manufacturing, port activities, and naval operations, it is obvious that most of Norfolk's land falls into the traditional zoning categories of industrial, commercial, residential with none or very little land in open land categories.

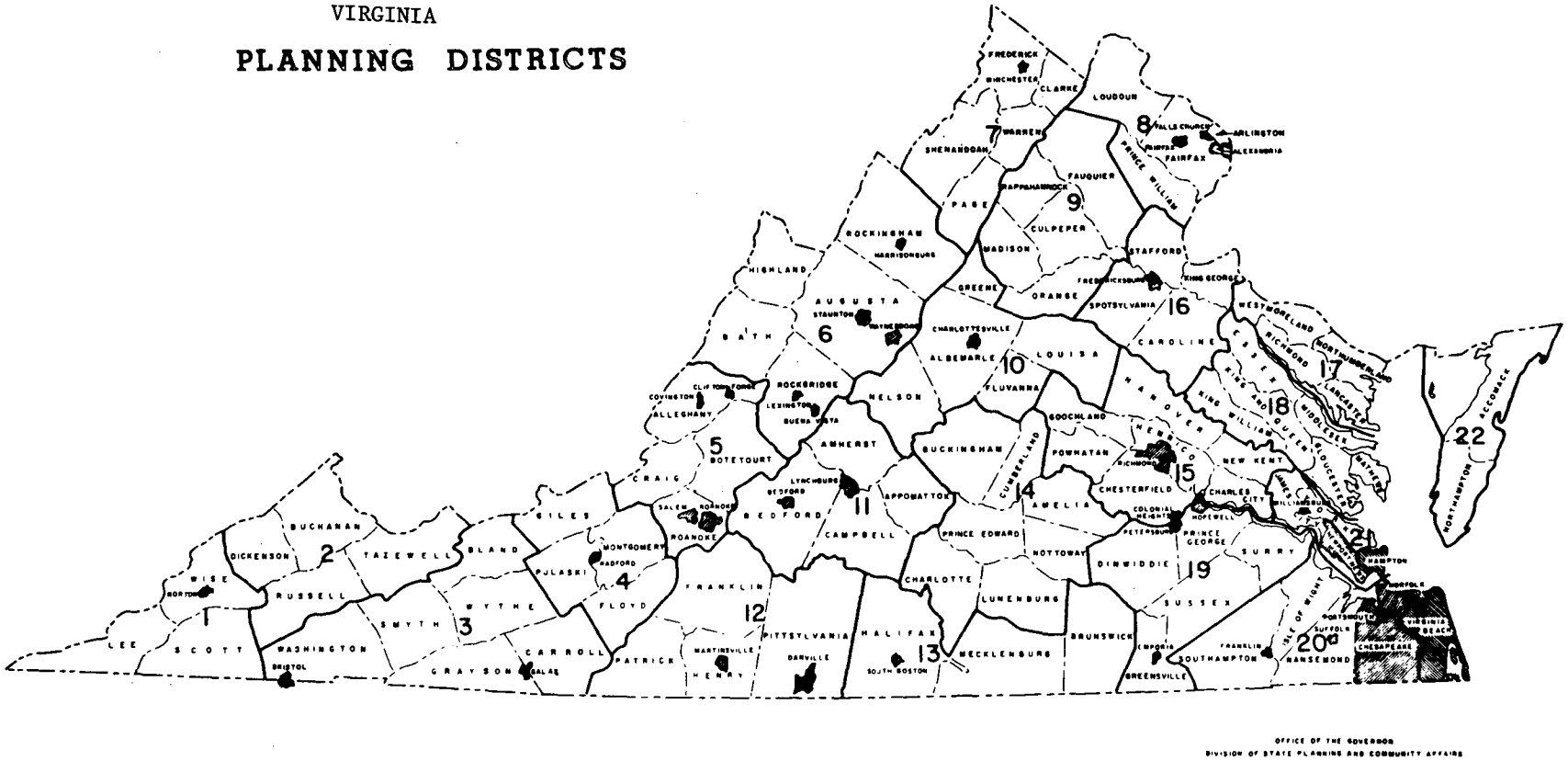
Another note of interest concerning Virginia as a whole, although not strictly a zoning factor, is the state's system of independent cities. As of 1971, Virginia had 95 counties, 39 independent cities, and 192 incorporated towns. In Virginia, when an area is incorporated

[2]Data Summary, City of Norfolk, Division of State Planning & Community Affairs. (July 1973).

Map 18

VIRGINIA

# PLANNING DISTRICTS




OFFICE OF THE GOVERNOR
DIVISION OF STATE PLANNING AND COMMUNITY AFFAIRS

as a city, it ceases to be a part of the county. Cities levy and collect their own taxes, and no county taxes are levied in them.[3] This multiple level local governing power can have a two-sided effect on zoning and land use controls. The more localized control can have a positive effect in that the controlling body will have more knowledge and interest in the use of local land. It can have a negative effect in that decisions may be made with no consideration given to regional impact and planning goals.

4. Morehead City (Carteret County), North Carolina

According to the 1967 Carteret County land development plan, Morehead City had no planning program and no professional technical staff. Also, the land development plan gave no indication as to the status of zoning and subdivision regulations within the incorporated area of Morehead City. It did indicate, however, that the right to zone surrounding areas had been relinquished to Carteret County. This relinquishment was necessary because North Carolina state law allows all cities and towns to extend their zoning authority for one mile beyond the corporate limits.[4]

The Carteret County Planning Commission is in charge of the comprehensive plan for the county. Its duties include making studies for and recommendations to the County Commission. It is also authorized to prepare ordinances for subdivision control and land use control and make plans for all lands within the boundaries of the county except for those lands within the corporate boundaries of the various towns in the county. Within the county area, the Carteret County commissioners have adopted and are enforcing a set of subdivision regulations. A zoning ordinance covering two areas around Morehead City and Beaufort was adopted in 1962.

Other cities within the county have zoning and subdivision controls, applicable to the incorporated area and, in some cases, to the surrounding one mile limit.

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[3] Virginia Facts and Figures, 1973. Division of Industrial Development.

[4] Legal Aspects of Doing Business, N. C. Institute of Government, University of North Carolina, (1972).

The land development plan recommends that zoning and subdivision controls be adopted to prevent substandard mobile home developments, the loss of public access to the prime beach areas, and the uncontrolled development of seasonal and second home areas.

Thus, it appears that Carteret County is taking an active role in directing the development and growth of various land uses in the county. The main instruments of direction are zoning ordinances, subdivision regulations and a building code.

In 1974 North Carolina enacted major land use legislation. This legislation put coastal development under a permit system, required the 20 coastal counties to adopt zoning plans, provided for the classification of all the state's land, provided for state acquisition of environmentally choice areas and appropriated $9.6 million for parkland acquisition and improvement.[5]

This legislation is of special importance to Carteret County as it is one of the 20 coastal counties and, thus, comes under the permit and zoning requirements of the above mentioned bills. Additional details on these land use bills were not available at this time. However, they will be of importance for future industrial development in Carteret County.

All North Carolina counties and municipalities have legislative authority to adopt zoning and subdivision ordinances. In addition, all cities and towns may extend their zoning authority for one mile beyond the corporate limits. Cities with a population of 10,000-25,000 may, with the permission of the county, extend their zoning jurisdiction for up to three miles.

County zoning authority starts where the city's ends and ordinances may cover all or parts of the unincorporated area of the county.

Almost all cities over 10,000 and at least half of North Carolina's 100 counties have active planning programs aimed at directing future development, utility development, housing and urban renewal, among other areas.

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[5] G. Hill. "Many States Pass Environment Bills to Improve Quality of Life," The New York Times, Sunday, August 11, 1974.

North Carolina has a uniform statewide building code applicable to all structures except farm buildings. Enforcement of this code is divided among the counties, cities and various state agencies.[6]

In addition to the above zoning regulations and other land use controls, North Carolina's 100 counties are divided into 17 multicounty planning regions. These regions were set up to facilitate consistent development policy, planning and administrative purposes. Nearly all of the regions have designated lead regional organizations to assume major responsibility for comprehensive regional development planning and other area-wide activities. A map showing these regional planning areas is on the following page.

Many of these regional planning districts have active programs concerning land use planning, water and sewer development, and other regional problems. Region Q (also known as the Mid-East Commission) encompassing Beaufort, Bertie, Hertford, Martin, and Pitt Counties is an example of this type of planning region. This region has, among other plans, published a region-wide sketch water and sewer plan, a first stage overall economic development plan, an initial housing element, and a solid waste disposal study.

The above gives some idea of the various land use controls currently existing in North Carolina. The table on the following page gives a summary overview of the current traditional land use control pictures in the state. From this table, it is obvious that much of the land in North Carolina is not under traditional land use controls and that there is a lack of uniformity from area to area.

5. Maryland

Although Maryland does not have a designated target area, a general summary of land use controls will be made.

Most Maryland counties and larger cities have planning commissions and zoning ordinances. Subdivision regulations appear to exist mostly in those counties which are undergoing rapid residential - urbanization pressure, for example, Anne Arundel and Prince George's Counties.

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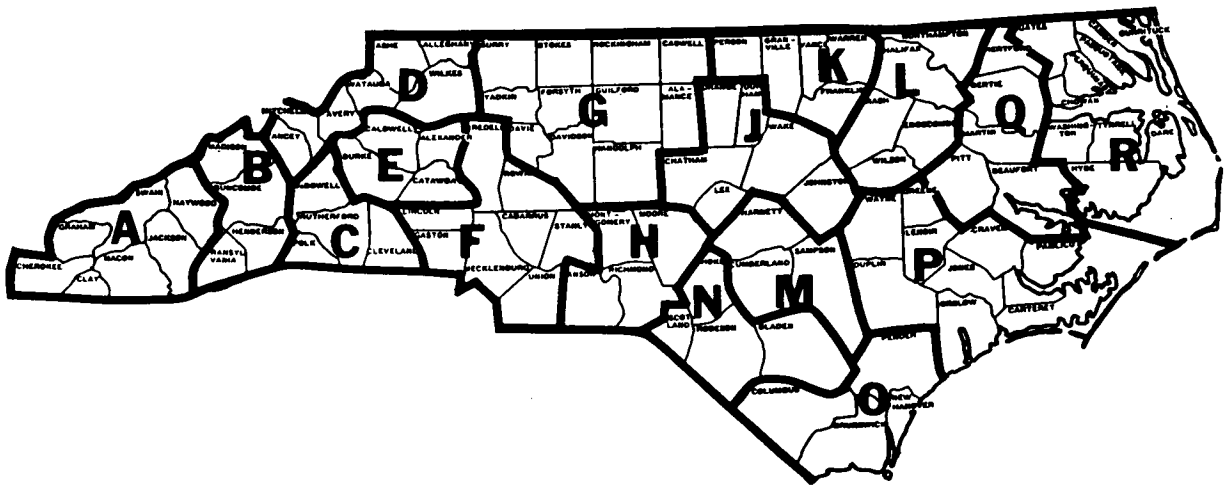
[6] Ibid., p. 35-37.

Map 19




North Carolina Multi county
Planning Regions

Source: North Carolina Council on State Goals and Policy
First Annual Report (1972).

TABLE 12

North Carolina
Zoning and Subdivision Regulation
by Jurisdiction

| | Number in class | Zoning | Subdivision Regulation | Neither |
|---|---|---|---|---|
| Cities | | | | |
| over 50,000 | 7 | 7 | 7 | 0 |
| 3,000 - 50,000 | 96 | 94 | 76 | 1 |
| under 3,000 | 219 | 117 | 60 | 85 |
| Counties | 100 | 33+ | 29++ | 58 |

+ only 6 of the 33 have countywide zoning
++only 23 of the 29 have uniform application throughout the county

Source: A Land Policy for North Carolina
Office of State Planning (Nov. 1972).

Maryland does not appear to have any regional or multicounty planning groups, nor is there any state-wide land use policy. However, in February 1974 a state land use planning bill was under consideration by the Maryland General Assembly. This bill, if passed, would create a land use board, develop a general state land use policy, incorporate local plans, identify areas of critical state concern, and regulate development having an impact on major public facilities and areas around existing and proposed public facilities. In areas of critical state concern, state policy would be controlling.[7]

Also, Maryland was the first state to pass a preferential assessment law, giving tax preference to land actively devoted to farm or agricultural use.[8] This was seen as a means of preserving open land in urban fringe areas by taxing on actual use rather than on value for development purposes. In 1960, the original law was struck down as unconstitutional. However, constitutional amendments were passed to allow such preferential assessment. It is unclear exactly how effective this law has been in directly effecting land use. Apparently, much of the land designated farm land in urban fringe areas is held by developers who get the benefit of this law until such time as development takes place, resulting in financial gain for the developers, loss of tax revenue by the state and county, and little open space being gained. An attempt to reform this law was made in 1969 with a roll-back provision. However, this amendment was weakened by requiring payment of back taxes only if the owner requested a zoning change from farm to a higher use.[9]

Thus, it appears that the state of Maryland's traditional land use controls of zoning and subdivision regulations are in much the same state of fragmentation and lack of uniformity as the other states in the study area.

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[7] Central Atlantic Environment News, V. IV, #2. February 1974, (Washington, D. C.).

[8] Maryland Code. Act 81, Section 19 (1969). enacted 1956.

[9] Taken from Land Policy Alternatives for North Carolina. Department of Administration, June 1972.

C. Special state laws concerning land use

This section will consider those laws which apply directly to land use control on a state-wide basis. The two laws that will be considered in this section are the Delaware Coastal Zone Act and the New Jersey Wetlands Act.[10] Maryland's Preferential Assessment Act will not be covered as it was included in the preceding section.

The Delaware Coastal Zone Act, approved by the Governor in June 1971, declares that state policy will control land use in Delaware's Coastal Zone. This zone was defined as being the land from the limits of the state's holdings in the Bay landward to certain Delaware highways. Within this zone, heavy industry, including petroleum refineries and offshore bulk transfer facilities, are completely forbidden. Other manufacturing uses require permits, the granting of which is based on economic effects, environmental effects, aesthetic effects and the effect of supporting facilities. Environmental impact must consider the effects of human and mechanical malfunction as well as use under normal operating conditions. The State Planning Office administers the act and initial application is made to the State Planner, who conducts a public hearing, and then denies or grants the permit. His decision can be appealed to the State Coastal Zone Industrial Control Board and then to the Superior Court of the county in which the proposed project would be located. Such court appeal can be made by an aggrieved applicant, the State planner, or a member of the public.

Violation of this act has a maximum fine of $50,000, with each day that illegal action continues considered as a separate violation.

This act is currently under attack in the state legislature by various groups. A bill to amend the Act has been introduced in the Delaware State Legislature. This amendment would remove the flat heavy industry prohibition and would operate on a case by case permit basis.

A map showing the legally defined coastal zone pursuant to this act is on the following page. This state law is of special interest for

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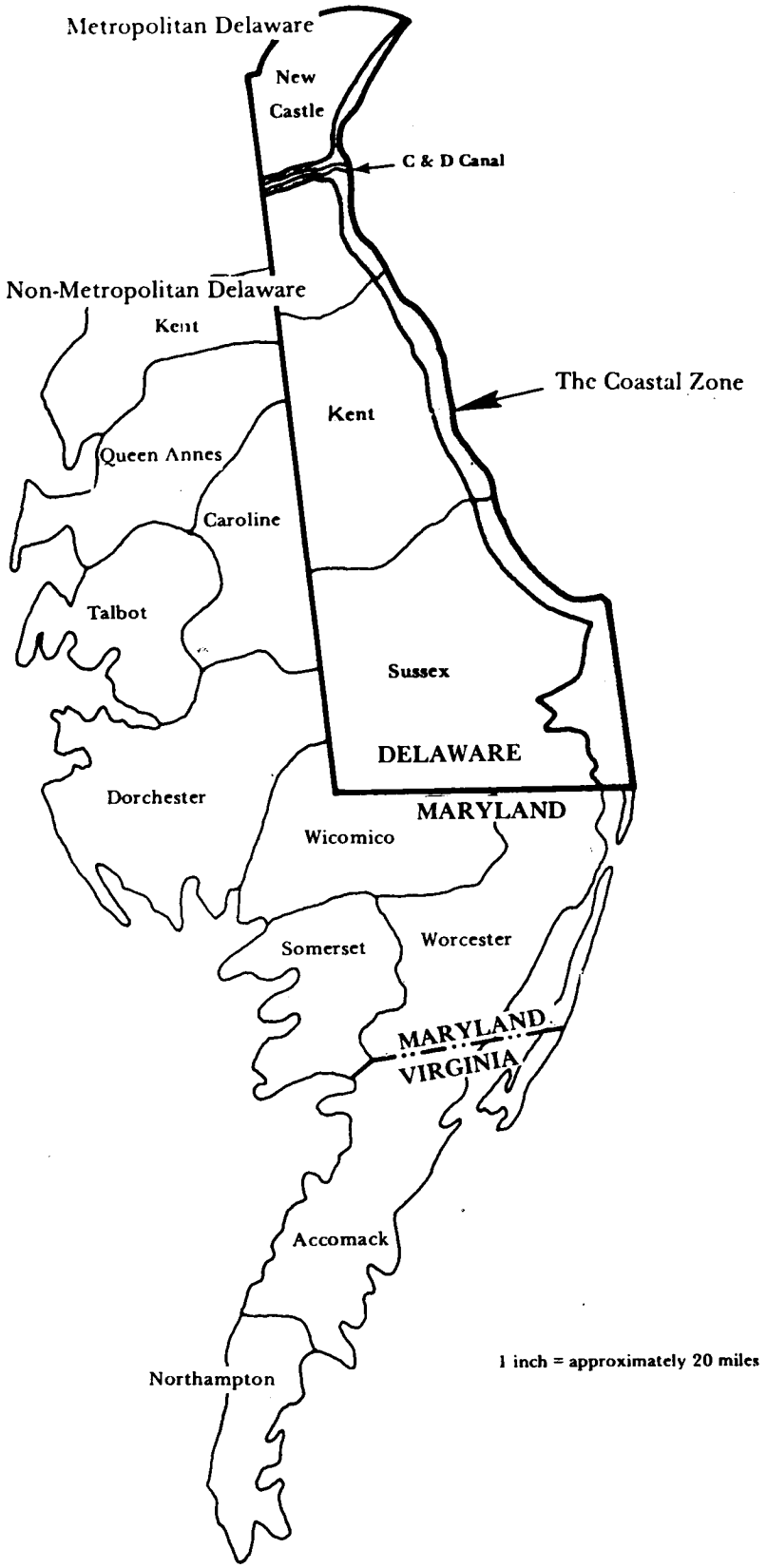
[10] Laws of Delaware, Vol. 58, Chapter 175 and New Jersey Statutes Annotated 13:9A-1-13:9A-9.

Map 20

# DELAWARE'S COASTAL ZONE



this study because it, as currently enacted, prohibits location of petroleum refining and bulk oil transport facilities in one of the target areas. What effect this bill would have on the location of other onshore support facilities would depend on the specific support facility being considered.

The New Jersey Wetlands Act of 1970,[11] while not as restrictive concerning coastal industrial development as is the Delaware Coastal Zone Act, gives the Commissioner of the Department of Environmental Protection the power to adopt, amend, or repeal orders regulating, restricting, or prohibiting dredging, filling or polluting the wetlands of New Jersey. Wetlands are defined in the Act as being any land which is subject to tidal action and upon which grow certain species of grass and plants. Such wetlands account for about 5 percent of the land area of New Jersey and are in public and private ownership.

The act provided two years (until November 5, 1972) during which time the wetlands were accurately mapped. The area covered by this act includes lands along Raritan Bay and the Raritan River to Sandy Hook, down the Atlantic Coast to Cape May and along the Delaware Bay shore and the Delaware River to the head of tidal action at Trenton.

Regulations are promulgated by the Department of Environmental Protection and are adopted after public hearing and review. Public hearings are held in the counties effected by the regulations. The act also guarantees the individual the opportunity to challenge the regulation in court.

The Act establishes two kinds of regulated activities, Type A, which includes repair of bridges, excavation of small noncommercial boat slips involving no spoil placement on wetlands, construction of facilities costing less than $5000, and establishment of conservation areas. These activities have a simplified application procedure. Type B activities include any activity which involves permanent physical change to the wetlands. These activities require an environmental impact statement and a public hearing.

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[11] New Jersey Statutes Annotated, 13:9A-1 through 13:9A-9.

Prohibited activities include, among others, dumping garbage, discharging domestic or industrial wastes, driving mechanical conveyances over wetlands, and applying persistant pesticides.

Court jurisdiction is in the Superior Court of New Jersey. Violators are liable to the State for restoration of the wetlands to prior conditions as far as is possible and a fine of not more than $1,000.[12]

The New Jersey Wetlands Act is not as strict in prohibiting heavy industrial development as is the Delaware Coastal Zone Act. The strictness of the New Jersey Act is more dependent upon the enforcement policy and the general conservation policy of the New Jersey Department of Environmental Protection than upon the words of the Act. Thus, it is feasible that, with very strict enforcement and a conservation-protection policy within the Department, the New Jersey Act could have the same result as is written into the Delaware Act, e.g., prohibition of petroleum refineries within the area covered in the act.

From the above it is apparent that states are starting to apply land use controls on a statewide basis, thus taking land use controls from strictly a local or county basis to a basis that considers land use from a state point of view. This has both positive and negative facets. Negative facets include removal of decision making from a local level which could have the effect of forcing a local area to accept a use which they did not favor or lose a use which they wanted. For example, a local community, faced with chronic high unemployment and low income, may be very happy to have an industry locate in their area, even if it meant the destruction of some of their coastal wetlands or salt marshes. The positive aspects of statewide controls include a more objective consideration of land use from a state basis and uniformity of controls throughout the state or area.

D. Interstate commissions

There are a number of interstate planning and economic commissions active within the study area, for example, the Interstate Commission on the Potomac River is a multistate agency to deal with problems

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[12] The above section was taken from: History, Land Ownership and Laws. DRPS, V. 2, (1973), and Plain Facts about New Jersey's Environment, The Wetlands N. J. Dept. of Environmental Protection.

of pollution, water and associated land resources in the Potomac River Basin. This commission includes members from Maryland, Pennsylvania, West Virginia, Virginia and the District of Columbia. The Appalachian Regional Development Commission, which includes Maryland, Pennsylvania, Virginia and West Virginia, is an example of an interstate economic development commission.

The Delaware River Basin Commission, composed of New York, Pennsylvania, Delaware, New Jersey and the federal government, is a federal-interstate agency charged with developing and effectuating plans, policies, and projects relating to the water resources of the Delaware River Basin. The Commission must review and approve all projects having a significant effect on the basin's water resources and it must determine whether such projects will conform with the Master Plan for the Basin.

The Commission also has power to acquire, operate, maintain and control water storage facilities, pollution control facilities, flood control facilities, dams and related facilities for hydroelectric power generation.

Much of the Commission's work has been in the area of research and planning. It does not have the power to enforce or regulate zoning restrictions but it does have the ability to influence land use through its construction and land acquisition functions.[13]

Other areas of land use control, such as the public trust doctrine, land banking and development charges, were not considered in this report as they do not seem directly relevant to an inventory of current land use controls in the target areas. These and other emerging types of land use controls will undoubtedly be of some impact on future development of land use throughout the United States. However, their possible impact on the study area is too speculative for purposes of this report.

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[13] Ibid., p. 145-151.

## III. Water usage in the study area

### A. Introduction

Water use and potential expansion of water supplies is a determinate of the expansion potential of industrial and residential land use. This limitation is of special importance to industries with high water usage requirements such as electric power production, oil refineries, and pulp and paper manufacturers.

Water usage and potential for expansion will be considered first from a state basis with emphasis given to areas of current or potential problems of quality and quantity. Then usage by user categories of petroleum refining, electric power generation and municipalities will be considered. Pollution problems will be considered only briefly as they will be covered in the following section on pollution.

### B. Water usage and expansion potential by state

#### 1. Delaware

Although large areas of Delaware have .5 million gallons per day (hereinafter mgd) per square mile water capacity, the urbanized areas of New Castle County and of most of the Delaware Coast have impending water supply problems. The water resources evaluation map on the following page indicates the problem and caution areas. Most of the Delaware Coast problems are associated with water quality problems, as opposed to water quantity. This difference is of importance in deciding what use can be made of the land. For example, water with high salinity will preclude residential or agricultural use but may be usable as cooling water in an electrical generating plant.

Much of the water supply in Delaware comes from ground water sources as opposed to surface water. Much of the demand increase has been on the ground water sources for municipal and industrial uses.

Kent County has a 134 mgd potential with some quality and quantity problems in the coastal zone.[1] Underlying this county

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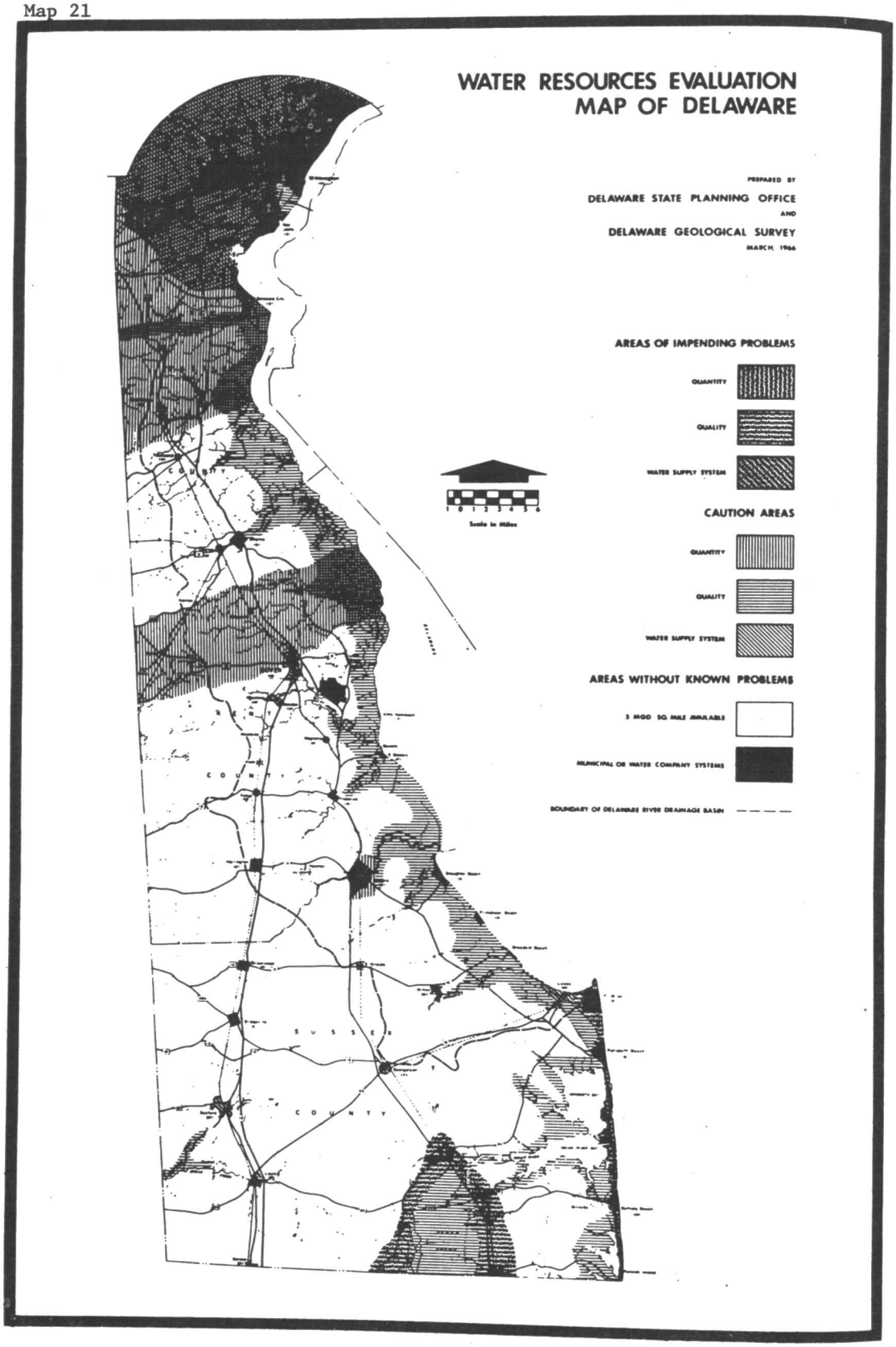
[1] Kent County. The Comprehensive Plan. (1972?).

Map 21


WATER RESOURCES EVALUATION
MAP OF DELAWARE
PREPARED BY
DELAWARE STATE PLANNING OFFICE
AND
DELAWARE GEOLOGICAL SURVEY
MARCH, 1966
AREAS OF IMPENDING PROBLEMS
QUANTITY
QUALITY
WATER SUPPLY SYSTEM
CAUTION AREAS
QUANTITY
QUALITY
WATER SUPPLY SYSTEM
AREAS WITHOUT KNOWN PROBLEMS
5 MOD SQ. MILE AVAILABLE
MUNICIPAL OR WATER COMPANY SYSTEMS
BOUNDARY OF DELAWARE RIVER DRAINAGE BASIN
0 1 2 3 4 5 6
Scale in Miles
COUNTY
COUNTY
SUSSEX
COUNTY

are three major aquifers, which would be the major source of water supply expansion.

The table on the following page shows the water demand for most of Delaware, 1950's-1966.

The water supply problem areas must be taken into account in the location and/or expansion of industrial and residential land use. Municipal (used here to equate with residential) water must meet certain standards of quality and quantity in order for people to use it for household needs. Thus, certain areas of Delaware, especially in the coastal area, cannot supply sufficient quantities of potable water for greatly increased population, without elaborate and expensive treatment or transport systems. This fact will act as a constraint on urbanization of this area.

If, for example, Lewes, Delaware were chosen as an onshore support area for off-shore oil development, provision must be made to supply the increased population with water for household use and the industries with water for industrial uses. If such water were not available except by transport from water rich areas of the state or by desalinization of seawater, it may be economically infeasible to locate such onshore support in this area.

2. Maryland

Although no water potential map was located for Maryland, the state can be characterized as having some water quality and quantity problems in areas of urban concentration.

Anne Arundel County, Baltimore County, and Baltimore City are the major Maryland areas of urban concentration. Ann Arundel County is generally supplied via ground water as this county is underlain by five major aquifers.

Baltimore County and City are generally supplied via surface water, much of which comes from the Patapsco and Susquehanna Rivers. Some homes in Baltimore County have their own wells, tapping ground and water supplies.

TABLE 13

Delaware: Water Supply Demand

Table 3.4.3.—*Increase in the demand for water supply by Delaware counties in the drainage basins of the Delaware River and Bay and the Atlantic coast between 1953, 1954, or 1957 and 1966*

| Locality and use | Total use 1953, -54,-57 | Total use 1966 | Increase in demand | Increase in demand | Increased ground water | Increased surface water |
|---|---|---|---|---|---|---|
| | *million gallons per day* | *million gallons per day* | *million gallons per day* | *percent* | *percent* | *percent* |
| New Castle County (1954-1966): | | | | | | |
| Municipal | 28.5 | 50.5 | 22.0 | 77 | 127 | 44 |
| Industrial | 32.8 | 44.6 | 11.8 | 26 | 64 | 33 |
| Irrigation | 1.2 | 2.2 | 1.0 | 91 | 45 | 46 |
| Rural | 1.1 | 2.0 | .9 | 82 | 82 | 0 |
| Kent County (1953-1966): | | | | | | |
| Municipal | 2.8 | 7.5 | 4.7 | 168 | 168 | 0 |
| Industrial | 2.5 | 4.5 | 2.0 | 80 | 80 | 0 |
| Irrigation | 1.4 | 4.4 | 3.0 | 214 | 107 | 107 |
| Rural | 1.0 | 3.0 | 2.0 | 200 | 200 | 0 |
| Other | ..... | .3 | .3 | ..... | ..... | ..... |
| Eastern Sussex County (1957-1966): | | | | | | |
| Municipal | 2.0 | 4.1 | 2.1 | 105 | 105 | 0 |
| Industrial | 4.6 | 6.9 | 2.3 | 50 | 50 | 0 |
| Irrigation | 3.1 | 8.4 | 5.3 | 171 | 167 | 175 |
| Rural[1] | .2 | 3.2 | 3.0 | ..... | ..... | ..... |
| Total | 81.2 | 141.6 | 60:4 | 75 | 119 | 55 |

[1]Use in 1957 does not appear to include livestock and poultry use.

Source: Sundstrom, R. W., and R. D. Varrin, Water supply and use in the drainage basins of the Delaware River system and Atlantic coastal drainage basins in Delaware, 1971, page 8. Water Resources Center, University of Delaware, Newark, Delaware.

Source: Governor's Task Force: The Coastal Zone of Delaware.

The remaining coastal counties of Maryland, primarily because of their low population density and lack of high water-using industries, do not appear to have significant water supply problems at this time. Most of these counties rely on ground water supply, much of which is obtained via private wells. Ocean City, in Worcester County, has water supply problems in the summer, because of its intensive use as a summer resort area with the resultant influx of people and high water demand.

The table on the following page shows the total domestic rural water use by Maryland's Chesapeake Bay counties over a 20-year time span (1950-1970). In every county domestic water use has increased over this period. In some counties, most notably Anne Arundel and Baltimore, the agricultural use quantities have decreased. This decrease is undoubtably caused by the increasing urbanization of these two counties, thereby removing some of the land from agricultural use.

Even though some counties have had a decrease in agricultural water use, the totals for each category have increased over the reporting period and the total gallonage used has increased from 10,190 million gallons to 18,119 million gallons, an increase of almost 80%. From the table, it is apparent that the largest increase, both by percentage and gallonage was in the domestic use category. This category should also be considered in light of the fact that four of the 19 counties surveyed lost rural population between 1960 and 1970 and five of the remaining 15 counties has increases less than 1000 persons during this time. (Population figures are shown in the table on the second following page). Thus, these figures seem to show that fewer numbers of rural people are using more water per capita, both for domestic and agricultural uses.

The four remaining Maryland counties, Allegany, Frederick, Garett, and Washington, obtain water from both surface and ground sources and appear to have no current or potential quality or quantity problems.

3. District of Columbia

The District of Columbia will be reviewed separately for water use because of the large water supply facility operated by the federal

Table 14

TOTAL RURAL WATER USE, BY COUNTY, CHESAPEAKE BAY STUDY AREA

| State and County | Domestic Use | | | Livestock and Poultry Use | | | Irrigation Use | |
|---|---|---|---|---|---|---|---|---|
| | 1950 | 1960 | 1970 | 1950 | 1959 | 1969 | 1964 | 1969 |
| | Million Gallons | | | | | | | |
| Maryland | | | | | | | | |
| Anne Arundel | 944.4 | 1,710.3 | 1,717.1 | 44.3 | 55.7 | 38.3 | 81.1 | 59.0 |
| Baltimore | 1,015.4 | 1,143.9 | 1,276.5 | 166.3 | 181.6 | 159.2 | 156.1 | 89.3 |
| Calvert | 98.2 | 202.0 | 310.9 | 19.5 | 21.1 | 17.0 | 17.3 | 23.1 |
| Caroline | 166.5 | 251.4 | 304.8 | 88.9 | 141.0 | 189.9 | 449.1 | 762.6 |
| Carroll | 410.2 | 695.5 | 1,050.5 | 144.6 | 348.4 | 357.2 | 28.0 | 128.4 |
| Cecil | 294.9 | 619.4 | 716.4 | 120.4 | 180.3 | 151.1 | 55.1 | 34.5 |
| Charles | 226.2 | 443.8 | 637.3 | 42.0 | 40.3 | 30.7 | 64.2 | 97.1 |
| Dorchester | 129.1 | 189.4 | 271.9 | 49.9 | 42.4 | 60.5 | 203.0 | 175.3 |
| Harford | 460.7 | 822.8 | 970.9 | 188.4 | 309.9 | 236.9 | 16.3 | 19.6 |
| Howard | 215.9 | 473.6 | 691.6 | 98.3 | 125.8 | 144.4 | 47.3 | 24.1 |
| Kent | 94.8 | 158.2 | 193.4 | 96.6 | 145.4 | 120.3 | 101.7 | 365.0 |
| Montgomery | 503.7 | 730.7 | 1,022.9 | 194,1 | 245.3 | 170.3 | 67.1 | 72.1 |
| Prince Georges | 642.0 | 871.8 | 930.2 | 55.2 | 53.3 | 43.2 | 68.4 | 100.4 |
| Queen Annes | 125.5 | 204.8 | 275.8 | 136.9 | 197.8 | 136.5 | 146.0 | 352.9 |
| St. Marys | 312.6 | 435.9 | 632.4 | 39.5 | 46.6 | 43.9 | 60.3 | 91.9 |
| Somerset | 116.6 | 163.0 | 209.9 | 38.5 | 104.4 | 189.0 | 97.8 | 106.9 |
| Talbot | 146.3 | 207.9 | 274.4 | 84.5 | 113.4 | 101.9 | 23.5 | 50.8 |
| Wicomico | 218.9 | 443.8 | 644.3 | 101.2 | 162.5 | 332.1 | 329.8 | 416.2 |
| Worcester | 201.3 | 265.0 | 313.5 | 108.8 | 175.3 | 259.9 | 26.7 | 21.8 |
| Subtotal | 6,323.3 | 10,033.2 | 12,444.7 | 1,827.5 | 2,690.5 | 2,782.3 | 2,038.8 | 2,891.6 |

Source: Existing Conditions Report: Appendix B

Table 15

RURAL POPULATION AND PERCENT SERVED BY RUNNING WATER, BY COUNTY, CHESAPEAKE BAY STUDY AREA, 1950, 1960, AND 1970

| State and County | Rural Population | | | Percent served by running water | | |
|---|---|---|---|---|---|---|
| | 1950 | 1960 | 1970 | 1950 | 1960[3] | 1970[4] |
| Maryland | | | | | | |
| Anne Arundel | 79,960 | 109,243 | 97,376 | 55.89 | 82.23 | 95.78 |
| Baltimore | 80,967 | 73,014 | 71,146 | 60.90 | 82.30 | 97.89 |
| Calvert | 12,100 | 15,826 | 20,682 | 30.56 | 62.43 | 77.96 |
| Caroline | 18,234 | 19,462 | 19,781 | 37.57 | 63.46 | 80.54 |
| Carroll | 38,767 | 47,662 | 61,799 | 47.47 | 77.08 | 91.43 |
| Cecil | 28,111 | 42,419 | 42,672 | 46.85 | 75.00 | 89.99 |
| Charles | 23,415 | 32,572 | 40,310 | 41.16 | 68.33 | 83.28 |
| Dorchester | 17,464 | 17,427 | 17,810 | 25.61 | 49.41 | 79.56 |
| Harford | 38,451 | 54,233 | 55,728 | 57.07 | 78.90 | 94.32 |
| Howard | 19,708 | 30,410 | 40,047 | 50.01 | 81.67 | 93.29 |
| Kent | 10,534 | 11,879 | 12,670 | 36.64 | 66.18 | 79.55 |
| Montgomery | 39,930 | 47,541 | 56,564 | 61.40 | 80.28 | 98.87 |
| Prince Georges | 53,814 | 59,452 | 51,660 | 56.71 | 75.44 | 98.31 |
| Queen Annes | 14,579 | 16,569 | 18,422 | 33.98 | 59.67 | 77.53 |
| St. Marys | 29,111 | 31,876 | 38,252 | 48.53 | 68.66 | 88.24 |
| Somerset | 17,057 | 16,083 | 15,846 | 21.79 | 44.41 | 65.75 |
| Talbot | 14,592 | 15,241 | 16,873 | 43.86 | 68.43 | 86.40 |
| Wicomico | 24,500 | 32,748 | 38,984 | 36.18 | 67.80 | 88.20 |
| Worchester | 19,957 | 20,404 | 20,869 | 44.09 | 63.92 | 77.89 |
| Subtotal | 581,251 | 693,061 | 737,491 | 49.51 | 74.15 | 90.57 |

government for the District. This facility currently serves a population of 756,000, has a maximum capacity of 289 mgd and is currently using 148 mgd. The water source for this facility is the Potomac River and, because of the degraded quality of the Potomac River, the water undergoes rather extensive treatment before use.[2]

4. New Jersey

New Jersey's municipal water supplies are predominately obtained from ground water sources. According to the U.S. Public Health Service's 1963 summary of Municipal Water Facilities, 89% of the total facilities were supplied from ground water sources, 6% from surface water, and 5% from a combination of ground and surface sources. Of the total facilities, 72% provided some type of treatment to the water. The majority of treatment provided was either chlorine-ammonia or liquid chlorine.

The New Jersey coastal area and the Newark-Raritan areas use 599 mgd in public (municipal) use and 1074 mgd industrial use. Of the industrial use category, 733 mgd is brackish water, used mainly in the chemical and petroleum industries. If the use figures for the Delaware River Basin are included (800 mgd public and 1652 mgd industrial), the totals rise to 1399 mgd public use and 2659 mgd industrial uses.[3]

These uses are projected to increase sharply by the year 2020. The highest projection for the three areas in 4,542 mgd public and 17,396 industrial.[4] The largest increase is projected to be in the Delaware River Basin.

Various methods of obtaining the supplies are proposed. These methods include: water reclamation, desalting processes, and exploitation of surface waters to a greater extent than is now done. Ground water use along the New Jersey Coast must be carefully monitored as this area is low and poorly drained, which makes its ground water sources susceptible to salt water intrusion if too large a quantity is withdrawn in a short time.

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[2]Chesapeake Bay. Existing Conditions Report. Appendix B.

[3]Figures from North Atlantic Regional Water Resources Study Appendix R. Water Supply.

[4]Ibid.

5. North Carolina

The coastal areas of North Carolina suffer from the same poor drainage and salt water intrusion problems as do the coastal areas of Delaware and New Jersey. Dare County, located on the northern barrier islands, is especially susceptible to this problem. As this county's population increases, potable water for residential uses becomes increasingly hard to obtain. This problem is compounded if septic tanks are used for sewage treatment as they tend to contaminate the ground water. Also, the summer influx of vacationers tends to increase water and sewer demand beyond capacity for a portion of the year.

Carteret County, one of the target areas for this study, is in much the same water resource position as are Sussex County, Delaware, and Cape May County, New Jersey. This county,like the other target areas, is situated on the Coastal Plain, with the attendant poor drainage and salt water intrusion problems. Increasing population presents a twofold problem: (1) an increased demand for domestic water, and (2) disposal of such water after use so as to prevent contamination of water sources. If the increase in population is caused by industrial expansion, another twofold problem is added to the supply-disposal web, i.e., supply and disposal of water used by industry. An additional complication of quantity is introduced if the industrial component consists of high water-use industries such as the petrochemical industry.

Thus, although Carteret County does not currently have any large-scale water supply problem, the above indicated inter-relationships should be considered before any large industrialization factor is introduced into the county.

The primary and coastal zone counties of North Carolina generally have adequate water supplies, provided by both surface and ground water sources. However, because of the rural nature of the majority of these counties, the majority of people in this area obtain their water from shallow wells. Because of the sparsity of population in most areas, it is not economically feasible to extend central water delivery systems to much of the area. Since shallow wells are particularly susceptible

to contamination, care must be taken to insure that disposal does not lower the quality of water below that considered safe for domestic use.

However, North Carolina's coastal plains region does have vast quantities of subsurface water flowing from the Appalachians to the Atlantic. Because of this fact, water supply is not and will not become a state or regional problem for North Carolina. However, local problems, of the type outlined above, will be of increasing occurrence as the population of the state increases.

6. Pennsylvania

Pennsylvania will not be considered separately for purposes of water supply. The main area of concern in this state is the Delaware Bay area and the water supply question for this area was included in the preceding section on New Jersey.

7. Virginia

Virginia's current coastal and primary zone water uses, excluding the Potomac River Basin, are currently estimated to be 203 mgd public uses and 546 mgd industrial uses.[5] If the figures for the densely populated Potomac River Basin (including the Washington, D.C. metropolitan area) are added to the above figures, the current use patterns show 563 mgd in public use and 845 mgd in industrial uses. Projected needs for 2020 at the highest level of development show the public use figure increasing to 2082 mgd and the industrial figure growing to 4412 mgd.[6]

Also of interest is the current rural water use in the coastal and primary zone counties of Virginia. The tables on the following pages show the rural use of water over time by county and by use category. As is shown by these tables, domestic use has more than doubled in 20 years and also represents the largest use category in gallons.

The majority of water used in Virginia comes from ground water sources. The state is underlain by a number of acquifers at varying depths and expansion of production from these acquifers is favorable for

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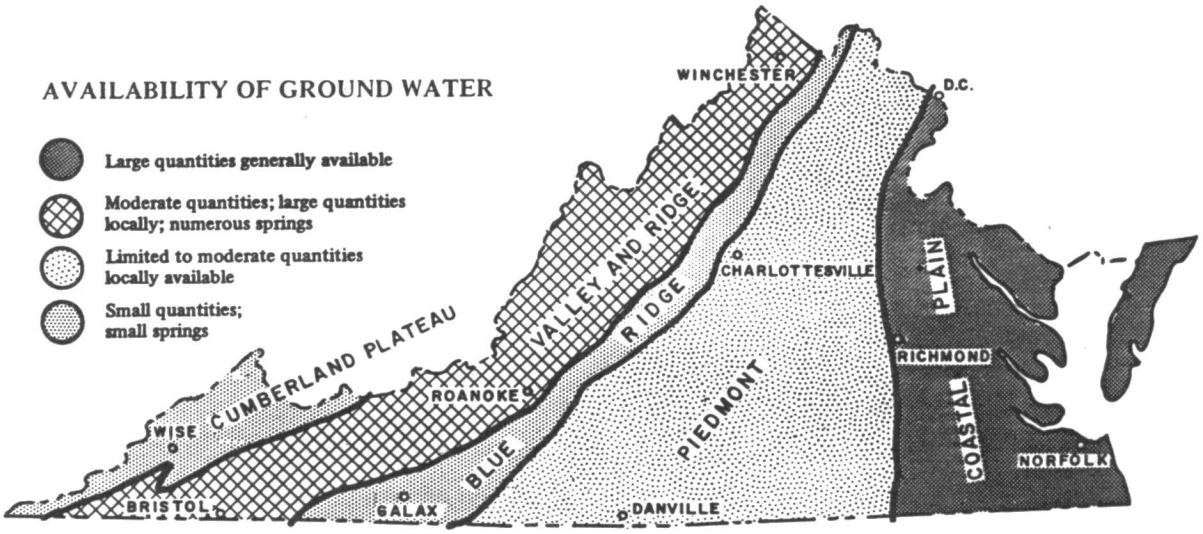
[5] Figures from North Atlantic Regional Water Resources Study, Appendix R.

[6] Ibid.

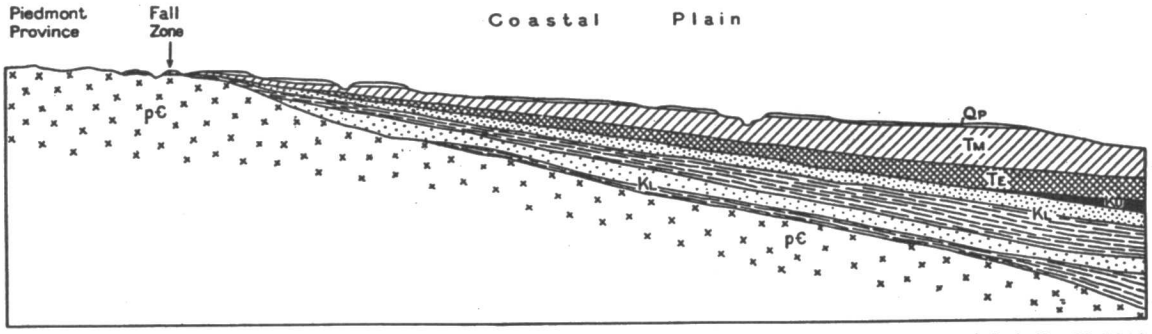
# *Underground Water*

Underground water is available in large quantity in Virginia's Coastal Plain and Valley and Ridge regions. Many of the sites shown above the Fall Zone are in the Valley and Ridge region and have significant ground water available with large minimum surface flows.




Virginia Division of Water Resources

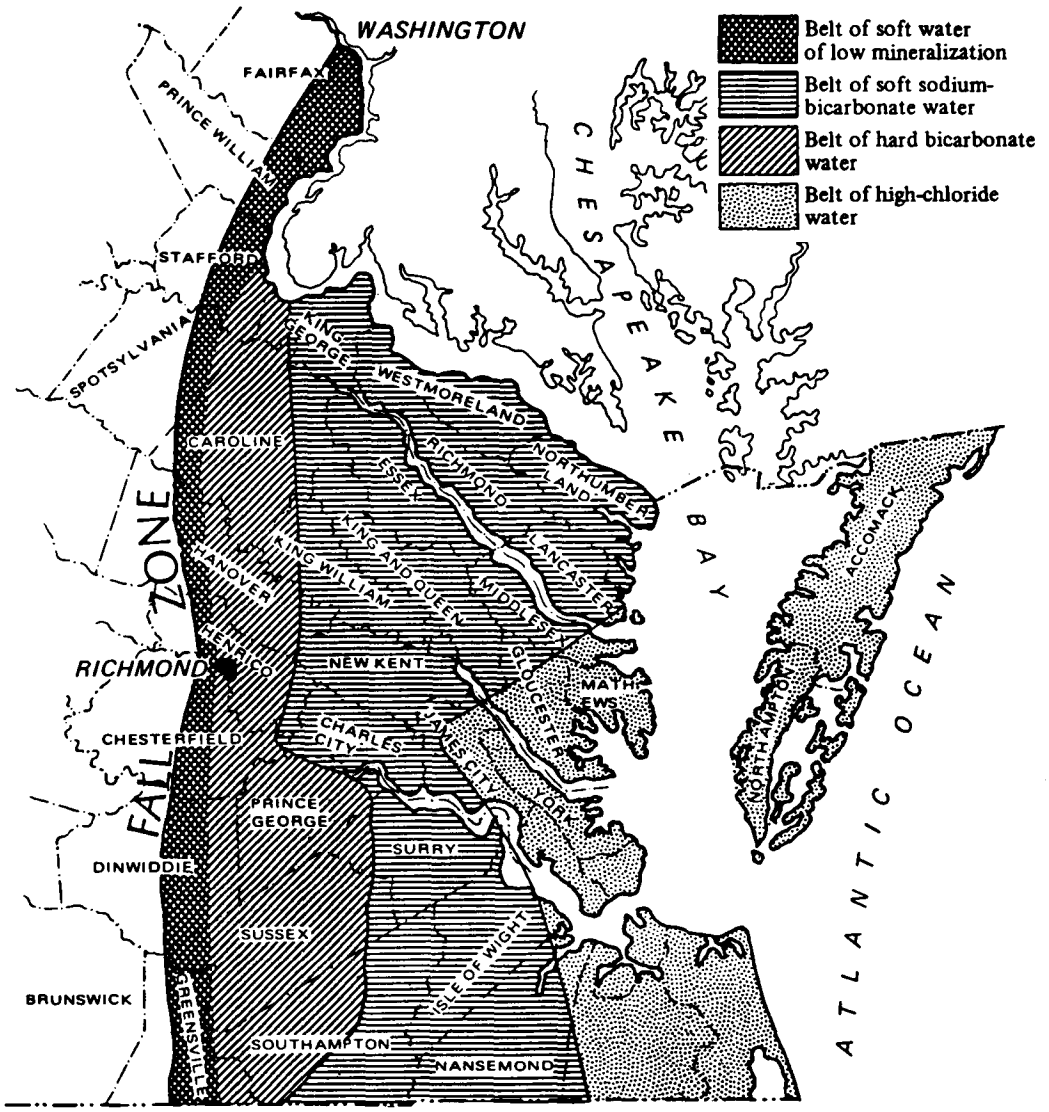
In the Coastal Plain where surface supplies of water are very limited, ground water could be the most economical source of water for large water using industries. East of the Fall Zone the basement rock lies at progressively greater depths and unconsolidated sediments thicken to more than 2,000 feet. There are places where supplies of 20 million gallons a day could be obtained from three to five well-placed wells in an area of approximately one square mile.




Source: Virginia Geological Survey Bulletin No. 68, 1946.

Source: Prime Virginia Site for Chemical and Water Using Industries, Virginia Division of Industrial Development.

The Coastal Plain region is divided into several belts based on differences in chemical character of the water yielded by deep wells penetrating the most important water bearing strata. Along the Fall Zone, water from the deep wells is generally soft and has a low total mineralization. Eastward, the water gains in mineral content, mostly as calcium bicarbonate and becomes hard. Still further to the east, it is softened by base exchange and becomes a soft sodium-bicarbonate water. In the vicinity of Chesapeake Bay, the sodium-bicarbonate water is somewhat brackish and in places contains more than 1,000 parts per million of chloride.




Source: Virginia Geological Survey Bulletin No. 68, 1946.

Source: Prime Virginia Sites for Chemical and Water Using Industries
Virginia Division of Industrial Development.

TABLE 16

TOTAL RURAL WATER USE, BY COUNTY, CHESAPEAKE BAY STUDY AREA

| State and County | Domestic Use | | | Livestock and Poultry Use | | | Irrigation Use | |
|---|---|---|---|---|---|---|---|---|
| | 1950 | 1960 | 1970 | 1950 | 1959 | 1969 | 1964 | 1969 |
| | | | | Million Gallons | | | | |
| Virginia | | | | | | | | |
| Accomack | 224.3 | 331.3 | 367.1 | 36.0 | 43.8 | 69.8 | 720.6 | 864.6 |
| Caroline | 84.6 | 124.4 | 167.9 | 35.5 | 42.1 | 40.9 | 16.0 | 0.0 |
| Charles City | 28.1 | 43.0 | 68.3 | 11.7 | 13.9 | 9.1 | 1.0 | 1.0 |
| Chesapeake[1] | 186.0 | 293.5 | 120.4 | 30.3 | 40.5 | 36.8 | 319.4 | 358.8 |
| Chesterfield | 176.5 | 576.8 | 610.7 | 30.2 | 34.8 | 31.5 | 31.3 | 7.8 |
| Essex | 47.0 | 79.1 | 95.8 | 22.4 | 23.5 | 22.3 | 0.7 | 0.0 |
| Fairfax | 400.5 | 922.8 | 849.0 | 80.9 | 60.7 | 38.7 | 26.1 | 9.5 |
| Gloucester | 80.2 | 145.7 | 208.8 | 13.0 | 13.1 | 13.6 | 4.9 | 11.1 |
| Hanover | 164.9 | 314.1 | 460.9 | 62.8 | 90.4 | 122.0 | 38.1 | 138.8 |
| Henrico | 365.5 | 541.0 | 447.6 | 45.0 | 66.3 | 41.6 | 13.4 | 13.0 |
| Isle of Wight | 114.8 | 203.6 | 228.7 | 47.5 | 42.8 | 74.7 | 16.9 | 50.2 |
| James City | 51.3 | 153.2 | 260.0 | 9.2 | 17.7 | 14.9 | 20.9 | 0.0 |
| King & Queen | 35.0 | 54.9 | 66.8 | 19.2 | 19.9 | 22.4 | 0.0 | 3.3 |
| King George | 64.7 | 91.8 | 121.3 | 22.6 | 21.3 | 19.0 | 0.0 | 0.0 |
| King William | 65.4 | 89.9 | 69.7 | 26.8 | 40.6 | 48.9 | 0.0 | 0.0 |

Source: Chesapeake Bay. Existing Conditions Report. Appendix B.

TABLE 16 (continued)

TOTAL RURAL WATER USE, BY COUNTY, CHESAPEAKE BAY STUDY AREA

| State and County | Domestic Use | | | Livestock and Poultry Use | | | Irrigation Use | |
|---|---|---|---|---|---|---|---|---|
| | 1950 | 1960 | 1970 | 1950 | 1959 | 1969 | 1964 | 1969 |
| | Million Gallons | | | | | | | |
| Lancaster | 69.5 | 112.7 | 127.2 | 9.3 | 10.7 | 12.5 | 0.0 | 0.0 |
| Loudoun | 202.9 | 287.5 | 386.8 | 245.8 | 280.1 | 303.9 | 18.3 | 52.8 |
| Mathews | 50.2 | 87.2 | 103.0 | 7.0 | 5.5 | 8.3 | 0.7 | 3.6 |
| Middlesex | 53.2 | 77.2 | 91.7 | 13.3 | 15.1 | 14.8 | 0.0 | 1.3 |
| Nansemond | 135.6 | 296.3 | 455.5 | 52.2 | 53.2 | 69.7 | 28.4 | 113.7 |
| New Kent | 29.2 | 48.8 | 76.1 | 9.8 | 12.8 | 11.6 | 1.3 | 0.7 |
| Northampton | 143.0 | 170.6 | 175.6 | 13.0 | 11.4 | 11.7 | 769.8 | 742.7 |
| Northumberland | 76.5 | 116.1 | 123.3 | 19.8 | 13.4 | 18.4 | 0.0 | 16.3 |
| Prince George | 176.6 | 311.4 | 276.1 | 23.7 | 38.4 | 42.2 | 15.3 | 2.0 |
| Prince William | 268.5 | 582.9 | 669.3 | 86.2 | 92.9 | 74.4 | 20.2 | 3.3 |
| Richmond | 44.8 | 68.0 | 77.2 | 17.9 | 18.0 | 20.8 | 0.0 | 0.0 |
| Spotsylvania | 99.0 | 163.7 | 232.5 | 54.6 | 62.3 | 75.1 | 14.0 | 0.0 |
| Stafford | 105.5 | 225.8 | 392.9 | 24.4 | 26.8 | 25.8 | 0.7 | 1.6 |
| Surry | 43.2 | 61.9 | 72.3 | 25.8 | 30.1 | 38.0 | 0.0 | 8.8 |
| Virginia Beach[2] | 369.3 | 500.3 | 95.1 | 43.3 | 46.8 | 57.2 | 130.0 | 81.8 |
| Westmoreland | 92.6 | 137.0 | 173.2 | 25.5 | 24.0 | 27.2 | 23.8 | 22.8 |
| York | 121.4 | 237.8 | 433.5 | 4.4 | 13.0 | 12.9 | 18.3 | 16.0 |
| Subtotal | 4,169.8 | 7,450.3 | 8,104.3 | 1,169.1 | 1,326.0 | 1,430.7 | 2,250.1 | 2,525.5 |
| Chesapeake Bay | 11,289.4 | 19,102.1 | 22,713.8 | 3,428.8 | 4,633.4 | 5,081.4 | 6,143.2 | 7,559.6 |

[1] Formerly Norfolk County and South Norfolk City. Combined into Chesapeake City in 1963.
[2] Formerly Princess Anne County and Virginia Beach City. Combined into Virginia Beach City in 1963.

some counties. However, most expansion would be required to go to depths of 500-1000 feet, and in some areas, objectionable mineral content may be present.

Surface water sources are not as large as ground water. The Potomac, Rappahannock,York, and James River basins are the major surface water sources, either already in use or of potential use. Most of these rivers are used as disposal outlets for sewerage and, in most cases, require treatment before use as domestic water sources. The James River below Richmond has a very high pollution factor which renders it unfit for domestic use without treatment.

In general, Virginia obtains its domestic, rural and industrial water from ground water sources. Also, there appear to be additional large quantities of ground water available from aquifers. Some of the larger cities and urbanized counties obtain surface water from the various rivers in the state.

Virginia does not appear to have major water source problems at this time. However, increasing urbanization and industrialization may put a burden on potable water within the state. Also, some of the ground water potentially available in large quantities may be unfit for domestic and various industrial uses because of high mineral content.

C. Water use by selected user category

1. Petroleum

The petroleum refinery industry is characterized as a high water use industry. Approximately 85% of the 14.2 trillion gallons of water used by manufacturing plants in 1964 was used by the four major industry groups of primary metal industries; chemical and allied products; paper and allied products; and petroleum and allied products.[7] This high water use designation is of interest in this study because of the concentration of petroleum refining complexes in the New York-Northern New Jersey area and the upper Delaware Bay. Seventy-eight plants with more than 20 employees per

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[7]National Estuarine Pollution Study, p. IV-338.

plant are located in the Middle Atlantic Region[8] (Cape Cod to Cape Hatteras, exclusive of Chesapeake Bay).

Industrial needs in Delaware Bay are estimated to be more than 1600 mgd at the current time, with an increase to 3,474 mgd[9] by 1980. Much of this water is used by the petroleum industries in the Delaware Bay. Brackish water accounts for 533 mgd of the current use and the majority of this is used by the petroleum industry. It is anticipated that needs through at least 1980 can be met by the same sources, river intakes, wells and brackish water, as at present but regional water development plans must be carefully considered to insure an adequate supply of water for any large scale industrial expansion, especially in a high water-use industry, such as petroleum.

Because the Delaware Bay is the major petroleum refining region in the study area it is the only area considered in this part.

2. Electric power generating

Electric power generation is another major water user for the study area. According to the National Estuarine Pollution Study,[10] in 1963 power generating plants in the Middle Atlantic, Chesapeake Bay and South Atlantic Regions used a total of 10,140 mgd of cooling water per day. The bulk of this use (9,000 mgd) was in the Middle Atlantic Region.

This use will increase as the number and size of electric power generating plants increase. Demand and production of electric power in the United States has doubled every ten years in this century and is projected to continue at this rate. Also of importance is the increase in the number of nuclear power generation plants planned or in operation. Nuclear plants currently must operate at lower and therefore, less efficient temperatures,[11] thus, requiring more cooling water to produce the same amount of electricity. According to the same report, approximately 25

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[8] Ibid., p IV-161

[9] North Atlantic Regional Water Resources Study. Appendix R. Water Supply

[10] p. IV-132.

[11] Ibid.

# TABLE 17

ELECTRIC GENERATING PLANTS IN THE UPPER BAY

| Electric Power Company, Plant Name, Location, and Fuel | Receiving Stream | Condenser Cooling Water Flow Million Gallons Per Day (MGD) | Total Electric Generating Capacity Megawatts (MW) |
|---|---|---|---|
| Baltimore Gas & Electric Company - Pratt Street Generating Station Baltimore, Maryland - coal | Baltimore Harbor | Not available | 16.0 |
| Baltimore Gas & Electric Company - Gould Street Generating Station Baltimore, Maryland - coal | Baltimore Harbor | Not available | 173.5 |
| Baltimore Gas & Electric Company - Herbert A. Wagner Generating Station Baltimore, Maryland - coal | Baltimore Harbor | Not available | 627.8 |
| Baltimore Gas & Electric Company - Riverside Generating Station Baltimore, Maryland - coal | Baltimore Harbor | Not available | 333.5 |
| Baltimore Gas & Electric Company - Westport Generating Station Baltimore, Maryland - coal | Baltimore Harbor | Not available | 311.5 |
| Baltimore Gas & Electric Company - Charles P. Crane Generating Station Baltimore, Maryland - coal | Baltimore Harbor | Not available | 399.8 |
| Baltimore Gas & Electric Company - Bethlehem Steel Generating Station Baltimore, Maryland - owned by Bethlehem Steel Company - coal | Baltimore Harbor | Not available | 158.0 |
| Philadelphia Electric Power Company - Peach Bottom Generating Plant Delta, Pennsylvania - nuclear | Susquehanna River | Not available | 40.0 |
| Philadelphia Electric Power Company - Muddy Run Pumped Storage Muddy Run, Pennsylvania - hydroelectric | Muddy Run | Not available | 800.0 |
| Philadelphia Electric Power Company - Conowingo Conowingo, Maryland - hydroelectric | Susquehanna River | Not available | 474.5 |
| Delmarva Power & Light Company - Delaware City Power Station Delaware City, Delaware - petroleum, coke, refinery gas by-products | Delaware River | Not available | 125.0 |

TABLE 18

ELECTRIC GENERATING PLANTS IN THE MIDDLE BAY

| Electric Power Company, Plant Name, Location, and Fuel | Receiving Stream | Condenser Cooling Water Flow Million Gallons Per Day (MGD) | Total Electric Generating Capacity Megawatts (MW) |
|---|---|---|---|
| Baltimore Gas & Electric Company - Calvert Cliffs Generating Plant Lusby, Maryland - nuclear* | Chesapeake Bay | 2880.000 | 1600.0 |
| Delmarva Power & Light Company - Vienna Generating Plant Vienna, Maryland - coal | Nanticoke River | Not available | 94.5 |
| Virginia Heating & Sewage Treatment Pentagon, Virginia - coal | Potomac Estuary | 43.000 | |
| Potomac Electric Power Company - Benning Generating Station Washington, D.C. - coal | Anacostia River | 154.500 | 553.6 |
| Potomac Electric Power Company - Buzzard Point Generating Station Washington, D.C. - coal | Anacostia River | 109.200 | 270.0 |
| Potomac Electric Power Company - Potomac River Generating Station Alexandria, Virginia - coal | Potomac Estuary | 315.600 | 514.75 |
| Virginia Electric & Power Company - Possum Point Generating Station Dumfries, Virginia - coal | Potomac Estuary | 400.000 | 437.60 |
| Potomac Electric Power Company - Morgantown Generating Station** Newburg, Maryland - coal | Potomac Estuary | 1434.000 | 1148.0 |
| Potomac Electric Power Company - Chalk Point Generating Station Aquasco, Maryland - coal | Patuxent Estuary | 720.000 | 727.6 |

*Still under construction
**Begins operating in May, 1971

# TABLE 19

ELECTRIC GENERATING PLANTS IN THE LOWER BAY

| Electric Power Company, Plant Name, Location, and Fuel | Receiving Stream | Condenser Cooling Water Flow Million Gallons Per Day (MGD) | Total Electric Generating Capacity Megawatts (MW) |
|---|---|---|---|
| Virginia Electric & Power Company - Surry Power Station Surry County, Virginia - nuclear | James River | Not available | 1600.0 |
| Virginia Electric & Power Company - Yorktown Power Station Yorktown, Virginia - coke & refinery gas by-products | York River | Not available | 340.0 |
| Virginia Electric & Power Company - Portsmouth Power Station Portsmouth, Virginia - coal and oil | Elizabeth River | Not available | 570.0 |
| Virginia Electric & Power Company - Chesterfield Power Station Chesterfield County, Virginia - coal and oil | James River | Not available | 1390.0 |
| Virginia Electric & Power Company - 12th Street Power Station Richmond, Virginia - oil | James River | Not available | 79.0 |
| Virginia Electric & Power Company - Reeves Ave. Power Station Norfolk, Virginia - oil | Elizabeth River | Not available | 88.8 |

Source: Chesapeake Bay. Existing Conditions Report. Appendix B.

nuclear power plants are planned or are in existance in the estuarine part of the study area.

From the preceding figures, it is apparent that water use by electric generating plants is already at a high level and will increase in the near future.

A list of electric generating plants in the Chesapeake Bay region is shown on the following pages. Although cooling water flow figures are not given for all plants listed, it is obvious that many million gallons per day of heated water are being discharged into the Chesapeake Bay. The possible adverse environmental effects of this thermal pollution will be considered briefly in the following section on pollution.

3. Municipal water use

The final user category to be considered in this section is municipal or domestic use. This category refers to water supplied by a public or private user to individual households for bathing, drinking, etc.

Municipal water facility figures for 1963[12] indicate that almost 26,000,000 people were served by public and private municipal water facilities in the seven-state study area. The table on the following page gives the state, ownership, and supply source breakdown of this information.

The population served has obviously increased by a large number over the 10-year period. The North Atlantic Regional Water Resources Study indicates that approximately 19 million people are served by public water supply in the 8 major river basins of the area. (This geographical area does not include all of the states of Pennsylvania and Virginia nor does it include North Carolina and West Virginia). Thus, it is probably accurate to estimate that the population served has increased by at least 10,000,000 persons by 1973.

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[12]U.S. Public Health Service.

TABLE 20

STATE POPULATIONS SERVED BY PUBLIC AND PRIVATE WATER FACILITIES

| | Total | Public | Private | Surface* | Ground* |
|---|---|---|---|---|---|
| Delaware | 409,845 | 231,020 | 178,825 | 193,100 | 216,745 |
| District of Columbia | 1,092,870 | 1,092,870 | 0 | 1,092,870 | 0 |
| Maryland | 2,574,085 | 2,530,075 | 68,710 | 2,229,260 | 317,975 |
| New Jersey | 5,604,460 | 3,581,850 | 2,022,310 | 2,472,895 | 2,204,624 |
| North Carolina | 2.292,380 | 2,152,475 | 138,905 | 1,881,625 | 385,155 |
| Pennsylvania | 9,856,291 | 6,317,316 | 3,538,725 | 7,725,330 | 1,255,325 |
| Virginia | 2,590,670 | 2,087,560 | 501,110 | 1,838,285 | 368,245 |
| West Virginia | 1,171,305 | 547,815 | 616,360 | 720,065 | 365,580 |
| TOTAL | 25,591,906 | 18,513,981 | 7,064,945 | 18,153,430 | 5,113,650 |

*Figures do not add to total as combined surface-ground sources are not included.

Source: U.S. Department of Health, Education & Welfare, Public Health Service. Statistical Summary of Municipal Water Facilities the United States, January 1, 1963. (Gov. Printing Office, Washington, D. C.).

# Table 21

WATER SUPPLY FACILITIES

| REFERENCE NUMBER | WATER USER | COUNTY | POPULATION (1000) | AREA SERVED (SQ. MI.) | MAXIMUM CAPACITY (MGD) | PRESENT USAGE (MGD) | WATER SOURCE | TYPE OF TREATMENT | OWNER OR OPERATOR |
|---|---|---|---|---|---|---|---|---|---|
| | DISTRICT OF COLUMBIA | | | | | | | DISTRICT OF COLUMBIA | |
| 1 | DISTRICT OF COLUMBIA | NONE | 746.0 | 62.0 | 289.00 | 148.00 | POTOMAC RIVER | S,FL,CHL,F,CT | U.S. GOV'T. |
| | MARYLAND | | | | | | | MARYLAND | |
| 2 | FT. GEORGE G. MEADE | AARUN | 16.7 | 21.1 | 3.50 | 3.50 | LITTLE PATUXENT R & WELLS | F,S,CHL,FL,CT | U.S. GOV'T. |
| 3 | MARLEY NECK | AARUN | 52.0 | 10.7 | 1.41 | 1.41 | BALTIMORE CITY | F,S,CHL,FL,CT | CITY |
| 4 | GLEN BURNIE AND FERNDALE | AARUN | 60.0 | 15.0 | 9.10 | 8.10 | BALTIMORE CITY & WELLS | A,CT,FL,S,F | COUNTY |
| 5 | SEVERNA PARK AND SEVERNDALE | AARUN | 23.0 | 15.2 | 3.70 | 1.80 | WELLS | A,CT,FL,S,F | COUNTY |
| 6 | CITY OF ANNAPOLIS | AARUN | 30.5 | 24.0 | 6.50 | 5.50 | WELLS | A,CT,FL,S,F | COUNTY |
| 7 | THIRD ZONE WESTERN | BALCY | 268.4 | 42.3 | 41.20 | 30.45 | PATAPSCO RIVER | CHL,F,FL,S,CT | CITY |
| 8 | 1ST ZONE | BALCY | 432.5 | 62.4 | 150.32 | 119.03 | GUN POW. FALLS & SUSQ. R. | CHL,F,FL,S,CT | CITY |
| 9 | 2ND ZONE | BALCY | 397.8 | 35.1 | 65.84 | 55.14 | PAT.R.; GUN.FALLS; & SUSQ | CHL,F,FL,S,CT | CITY |
| 10 | THIRD ZONE EASTERN | BALCY | 214.1 | 28.6 | 29.40 | 20.11 | GUN POW. FALLS & SUSQ. R. | CHL,F,FL,S,CT | CITY |
| 11 | CATONSVILLE | BALTO | 41.3 | 6.3 | 8.80 | 7.00 | PATAPSCO RIVER | F,CHL,CT,FL,S | COUNTY |
| 12 | REISTERSTOWN | BALTO | 22.1 | 2.9 | 4.80 | 2.00 | PATAPSCO RIVER | F,CHL,CT,FL,S | COUNTY |
| 13 | TOWSON | BALTO | 83.5 | 22.3 | 22.80 | 10.44 | GUN POW. FALLS & SUSQ. R. | F,CHL,CT,FL,S | COUNTY |
| 14 | PIKESVILLE | BALTO | 58.4 | 11.0 | 14.10 | 6.40 | PATAPSCO RIVER | F,CHL,CT,FL,S | COUNTY |
| 15 | WESTMINISTER | CAROL | 11.0 | 3.4 | 1.75 | 1.00 | PATAPSCO RIVER | S,F,CHL,FL | TOWN |
| 16 | BAINBRIDGE NAVAL TRAINING CENTER | CECIL | 10.0 | 2.2 | 3.80 | 1.50 | SUSQUEHANNA RIVER | CT,F | U.S. GOV'T. |
| 17 | CAMBRIDGE | DORCH | 12.7 | 3.0 | 6.00 | 3.10 | WELLS | CHL,A | CITY |
| 18 | ABERDEEN | HARFD | 12.4 | 3.2 | 1.00 | 1.00 | WELLS | NONE | TOWN |
| 19 | BEL AIR AREA | HARFD | 12.4 | 3.2 | 1.00 | 0.60 | WINTERS RUN | NONE | UTIL. CORP. |
| 20 | PINE HILL RUN WATER SERVICE AREA | MARYS | 16.8 | 80.5 | 2.56 | 2.56 | WELLS | CHL | SMWC |
| 21 | ROCKVILLE | MONTG | 41.6 | 7.0 | 8.00 | 4.00 | POTOMAC RIVER | S,CHL,FL,CT,F | CITY & WSSC |
| 22 | P. GEORGE'S & MONTG. COUNTIES | PGEOS | 1183.4 | 980.0 | 175.00 | 140.00 | POTOMAC & PATUXENT RIVERS | S,CHL,FL,CT,F | WSSC |
| 23 | CITY OF BOWIE | PGEOS | 35.0 | 7.5 | 10.00 | 3.00 | WELLS | S,IR,PH | PRIVATE |
| 24 | SALISBURY | WICOM | 16.3 | 7.0 | 6.50 | 3.70 | WELLS | A,CHL,FL | TOWN |
| | VIRGINIA | | | | | | | VIRGINIA | |
| 25 | ARLINGTON COUNTY | ARLIN | 174.2 | 26.0 | 60.00 | 24.40 | DALECARLIA FIL. PLANT | F,S,CHL,FL,CT | CITY |
| 26 | APPOMATTOX RIVER WATER AUTHORITY | CFIEL | 81.5 | 50.0 | 22.00 | 8.50 | APPOMATTOX RIVER | S,CHL,CT,F,FL | ARWA |
| 27 | CHESAPEAKE 2ND | CHESA | 13.0 | 199.5 | 3.25 | 1.30 | PORTSMOUTH | F,CT,CHL,A,FL | TOWN |
| 28 | CHESAPEAKE 1ST | CHESA | 35.0 | 178.1 | 7.25 | 2.90 | NORFOLK | CHL,CT,S,FL,F | TOWN |
| 29 | FORT BELVOIR | FAIRX | 14.6 | 14.4 | 7.50 | 2.67 | FCWA & WELL | F,FL,S,A,CHL,CT | U.S. GOV'T |
| 30 | FAIRFAX COUNTY | FAIRX | 455.0 | 394.0 | 49.80 | 49.80 | OCCOQUAN CREEK & WELLS | F,FL,S,A,CHL,CT | FCWA |
| 31 | VIENNA | FAIRX | 11.4 | 10.0 | 2.30 | 2.00 | D.C. & WELLS | F,S,CHL,FL,CT | COUNTY |
| 32 | SANITARY DISTRICTS 2 & 3 | HENIO | 12.5 | 7.0 | 1.20 | 0.60 | WELLS | IR | COUNTY |
| 33 | SANITARY DISTRICT A - TUCKAHOE | HENIO | 57.0 | 20.5 | 9.50 | 3.48 | RICHMOND | F,CHL,CT | COUNTY |
| 34 | SANITARY DISTRICT B - BROOKLAND | HENIO | 43.6 | 17.7 | 4.50 | 2.20 | RICHMOND | F,CHL,CT | COUNTY |
| 35 | SANITARY DIST. C - GLENWOOD FARM | HENIO | 12.0 | 4.6 | 5.00 | 0.60 | RICHMOND | F,CHL,CT | COUNTY |
| 36 | LOUDOUN COUNTY | LOUD | 37.2 | 517.0 | 2.00 | 2.00 | GOOSE CREEK | S,FL,F,CHL | COUNTY |
| 37 | SUFFOLK | NANSD | 11.8 | 2.0 | 31.00 | 2.00 | PORTSMOUTH | F,CHL | TOWN |
| 38 | NEWPORT NEWS,POQUOSSON, & YORK CO | NNEWS | 146.4 | 135.0 | 33.27 | 18.66 | RESERVOIR | F,CHL,FL | TOWN |
| 39 | CITY OF ALEXANDRIA | NONE | 110.9 | 15.0 | 46.00 | 27.90 | FCWA | F,FL,S,A,CHL,CT | PRIVATE |
| 40 | CITY OF FAIRFAX | NONE | 22.0 | 6.0 | 6.00 | 6.00 | GOOSE CREEK | F,CHL | CITY |
| 41 | CITY OF HOPEWELL | NONE | 20.0 | 9.0 | 3.00 | 3.00 | APPOMATTOX RIVER | S,F,CHL | ODWC |
| 42 | CITY OF COLONIAL HEIGHTS | NONE | 15.0 | 7.9 | 3.57 | 1.48 | APPOMATTOX RIVER | S,CHL,CT,F,FL | ARWA |
| 43 | CITY OF PETERSBURG | NONE | 43.0 | 8.0 | 13.42 | 5.56 | APPOMATTOX RIVER | S,CHL,CT,F,FL | ARWA |
| 44 | CITY OF PORTSMOUTH | NONE | 109.8 | 45.5 | 31.00 | 17.30 | SURFACE & WELLS | F,CT,CHL,A,FL | COUNTY |
| 45 | CITY OF RICHMOND | NONE | 248.1 | 62.6 | 80.00 | 40.00 | JAMES RIVER | F,CT,CHL | CITY |
| 46 | CITY OF NORFOLK | NONE | 410.0 | 53.0 | 63.00 | 50.00 | RESERVOIRS & WELLS | CHL,CT,S,FL,F | CITY |
| 47 | WILLIAMSBURG, WAM, AND CAMP PEARY | NONE | 16.5 | 32.0 | 2.50 | 2.47 | WALLER MILL RESERVOIR | F,CT | CITY |
| 48 | CITY OF FREDERICKSBURG | NONE | 14.4 | 45.0 | 6.00 | 2.00 | RAPPAHANNOCK RIVER | F,CT,CHL | CITY |
| 49 | CITY OF HAMPTON | NONE | 119.6 | 55.0 | 16.73 | 9.38 | NEWPORT NEWS WATER SER. | F,CHL,FL | CITY |
| 50 | CITY OF FALLS CHURCH | NONE | 10.8 | 33.0 | 40.00 | 14.20 | DALECARLIA FIL. PLANT | S,FL,F,CHL,CT | CITY |
| 51 | OCCOQUAN SANITARY DISTRICT | PWILL | 26.0 | 31.0 | 7.35 | 3.35 | OCCOQUAN CREEK | F,FL,S,A,CHL,CT | FCWA |
| 52 | DALE CITY | PWILL | 10.0 | 10.0 | 2.65 | 1.21 | FCWA & WELLS | F,FL,S,A,CHL,CT | PRIVATE |



Chesapeake Bay. Existing Conditions Report. Appendix B (Hereinafter Ches. App. B.)

The Delaware Valley Regional Planning Commission estimates that 700 mgd municipal demand was reached for that area in the early 1960's.[13]

The municipal water demand in the state of Delaware was 62.1 mgd in 1966, on increase of 26.8 mgd over 1957. The municipal demand in the District of Columbia is currently 148 mgd. Figures compiled from the North Atlantic Regional Water Resources Study indicate that current public demand for the study region's coastal and primary area (excluding North Carolina) total approximately 3,200 mgd. This demand is projected to increase sharply over the next 25 years to a high estimate of approximately 5,500 mgd.

From the above information, it is apparent that municipal-public water use is one of the major water users for the study area. The gallonage figure will increase as more areas build and expand municipal water systems on a local, county, and regional basis.

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[13] Delaware Valley Regional Planning Commission. Regional Water Supply and Water Pollution Control Plans, p. 11.

IV. Pollution in the study area

A. Introduction

The subsequent section contains a general summary of pollution problems in the study area. First to be considered will be waterborne pollution as caused by industrial and municipal waste disposal. Industrial waterborne pollution will be viewed from a receiving water basis, i.e., Delaware Bay and Chesapeake Bay. Also, any large sources will be mentioned.

Municipal air pollution will be covered in the second main section. Tables showing average levels of given pollutants for major cities will be included.

Other pollution sources such as oil spills, dredge spoils, thermal pollution and agricultural runoff will be covered briefly and locations where one or more of these problems exist will be mentioned.

The final section covers a cursory overview of various federal and state pollution control acts.

B. Waterborne Pollution

1. Introduction

Waterborne pollution has become a problem for many areas of the country because industries and municipalities are using the rivers and estuarine water as the final disposal place for various wastes. The wastes are being dumped into these waters at a much faster rate than the waters can flush out or purify them. As population and industry concentrates in smaller and smaller land areas, as is happening on the Mid-Atlantic urban corridor, greater and greater amounts of wastes must be disposed of and disposal is mainly into the water bodies. Raritan Bay, Delaware Bay and Chesapeake Bay are the major estuarine receiving waters for waste disposal from the vast Mid-Atlantic urban concentration. Although most municipal and industrial waste undergoes some type of treatment before disposal into the water, the total waste load grows as the population and industrial complexes grow. Also contributing to the increase in pollution is the growth in per capita usage of goods and services. For example,consumption of coal and oil to produce electricity rose from .4 tons per person in 1940 to 1.4 tons

per person in 1968.[1] This increase in per capita consumption produces a two-fold pollution increase; first, the industrial section is producing more and thereby has increased wastes to dispose of and, secondly, people are using more and increasing the amount of municipal wastes.

2. Industrial pollution

According to the National Pollution Study, 7,874 mgd of industrial waste discharges were produced in the six-state study area in 1963. Of this total discharge, 5,539 mgd were discharged untreated to waters and streams. The amount treated has increased in the past 10 years but the amount being discharged has also increased. The Commission on Marine Sciences, Engineering and Resources estimates that industrial pollution is increasing at 4.5% a year or three times as fast as the population is increasing.[2]

The tables on the following pages show waste discharge volumes by states and by major water use industries within the study area. These tables give an indication of the massive amounts of industrial wastes produced in the study area states.

a. Delaware Bay

In 1968 an estimated 1 billion gallons of liquid waste were produced every day in the Delaware Valley urban area. Of this amount 500 mgd were industrial wastes.[3] Much of this industrial waste was produced by the petroleum refining and petro-chemical industries situated along the upper Delaware Bay. Getty, Sun, BP, Mobil, Texaco, ARCO, and Gulf Oil Companies all have refineries located along the Delaware River.

The following table indicates current waste sources and waste load allocations in the Delaware Estuary between Pennsylvania-Delaware state line and Reedy Island. This table shows only oxygen-demanding

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[1] D. N. Thompson. The Economics of Environmental Protection. Winthrop Publishers, Inc. Cambridge, Mass. 1973. page 3.

[2] Science and Environment. Vol. 1, 1969, p. III-49.

[3] Delaware Valley Regional Planning Commission. The Regional Water Supply and Water Pollution Control Plans (1969). p. 17.

TABLE 22

## WASTE DISCHARGES OF MAJOR WATER USE INDUSTRIES IN THE COASTAL STATES
## (VOLUME IN MGD)
## 1963

| STATE | FOOD AND KINDRED PRODUCTS | | | PAPER AND ALLIED PRODUCTS | | | CHEMICALS &ALLIED PRODUCTS | | | PETROLEUM & COAL PRODUCTS | | | PRIMARY METALS INDUSTRIES | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | TREA-TED | UN-TREA-TED | TOTAL | TREA-TED | UN-TREA-TED | TOTAL | TREA-TED | UN-TREA-TED | TOTAL | TREA-TED | UN-TREA-TED | TOTAL | TREA-TED | UN-TREA-TED |
| MAINE | 3 | | 3 | 395 | 25 | 370 | | | | | | | | | |
| NEW HAMPSHIRE | | | | | | | | | | | | | | | |
| MASSACHUSETTS | 30 | | 30 | 123 | 30 | 93 | 45 | 15 | 30 | | | | 30 | | 30 |
| RHODE ISLAND | 5 | | 5 | | | | | | | | | | 11 | | 11 |
| CONNECTICUT | 3 | | 3 | 17 | 14 | 3 | 25 | | 25 | | | | 63 | | 63 |
| NEW YORK | 87 | 5 | 82 | 348 | 41 | 307 | 348 | 132 | 216 | | | | 485 | 263 | 222 |
| NEW JERSEY | 41 | 11 | 30 | 66 | 30 | 36 | 192 | 22 | 170 | 359 | 88 | 271 | 85 | 3 | 82 |
| PENNSYLVANIA | 80 | 3 | 77 | 187 | 88 | 99 | 414 | 19 | 395 | 301 | 268 | 33 | 2811 | 597 | 2214 |
| DELAWARE | 6 | 3 | 3 | 11 | 11 | | 115 | 8 | 107 | | | | | | |
| MARYLAND | 36 | 3 | 33 | | | | | | | | | | | | |
| VIRGINIA | 6 | 3 | 3 | 175 | 63 | 112 | 438 | 49 | 389 | | | | 3 | | 3 |
| DISTRICT OF COLUMBIA | | | | | | | | | | | | | | | |
| NORTH CAROLINA | 11 | 3 | 8 | 178 | 110 | 68 | 33 | 11 | 22 | | | | 1 | | 1 |
| SOUTH CAROLINA | 3 | | 3 | | | | 91 | 3 | 88 | | | | | | |
| GEORGIA | 24 | 5 | 19 | 422 | 156 | 266 | 74 | 27 | 47 | | | | | | |
| FLORIDA | 57 | 5 | 52 | 359 | 167 | 192 | 206 | 44 | 162 | | | | | | |
| ALABAMA | 5 | | 5 | 307 | 162 | 145 | 178 | 11 | 167 | | | | 128 | 60 | 68 |
| MISSISSIPPI | 6 | 3 | 3 | | | | 49 | | 49 | | | | | | |
| TEXAS | 19 | 5 | 14 | 76 | 60 | 16 | 2852 | 68 | 2784 | 595 | 518 | 79 | | | |
| LOUISANA | 30 | 30 | | 154 | 129 | 25 | 931 | 52 | 879 | 663 | 608 | 55 | | | |
| CALIFORNIA | 148 | 36 | 112 | 66 | 47 | 19 | 85 | 38 | 47 | 378 | 307 | 71 | 28 | 25 | 3 |
| OREGON | 24 | 5 | 19 | 194 | 52 | 142 | | | | | | | 30 | 11 | 19 |
| WASHINGTON | 33 | 11 | 22 | 646 | 178 | 468 | 77 | 44 | 33 | 5 | 5 | | 71 | 41 | 30 |
| ALASKA | | | | | | | | | | | | | | | |
| HAWAII | | | | | | | | | | | | | | | |
| TOTAL | 657 | 131 | 526 | 3724 | 1363 | 2361 | 6153 | 543 | 5610 | 2303 | 1794 | 509 | 3746 | 1000 | 2746 |
| % OF TOTAL TREATED | | 20 | | | 37 | | | 9 | | | 78 | | | 27 | |

Source: National Estuarine Survey

TABLE 23

## INDUSTRIAL WASTE DISCHARGES IN COASTAL STATES, 1963

| STATE | TOTAL WASTE DISCHARGE | | TREATED WASTE DISCHARGE | | UNTREATED WASTE DISCHARGE | | TOTAL WASTES TREATED |
|---|---|---|---|---|---|---|---|
| | NUMBER PLANTS | VOLUME (MGD) | NUMBER PLANTS | VOLUME (MGD) | NUMBER PLANTS | VOLUME (MGD) | PERCENT |
| MAINE | 64 | 447 | 21 | 55 | 43 | 392 | 12 |
| NEW HAMPSHIRE | 40 | 96 | 12 | 14 | 28 | 82 | 15 |
| MASSACHUSETTS | 304 | 395 | 78 | 44 | 226 | 351 | 11 |
| RHODE ISLAND | 67 | 44 | 11 | 8 | 56 | 36 | 18 |
| CONNECTICUT | 209 | 319 | 65 | 25 | 144 | 294 | 8 |
| NEW YORK * | 565 | 1559 | 176 | 578 | 389 | 981 | 37 |
| NEW JERSEY | 421 | 1082 | 148 | 361 | 273 | 721 | 33 |
| PENNSYLVANIA * | | 4041 | 10 | 1008 | | 3033 | 25 |
| DELAWARE | 45 | 499 | 21 | 318 | 24 | 131 | 71 |
| MARYLAND | 143 | 1099 | 48 | 258 | 95 | 841 | 23 |
| VIRGINIA | 147 | 753 | 69 | 189 | 78 | 564 | 25 |
| DISTRICT OF COLUMBIA | | | | | | | |
| NORTH CAROLINA | 238 | 400 | 86 | 151 | 152 | 249 | 38 |
| SOUTH CAROLINA | 158 | 277 | 60 | 38 | 98 | 239 | 14 |
| | | | | 296 | 80 | 638 | 32 |
| GEORGIA | 200 | 584 | 58 | 208 | 142 | 376 | 36 |
| FLORIDA | 116 | 630 | 59 | 219 | 57 | 411 | 35 |
| ALABAMA | 154 | 663 | 44 | 249 | 110 | 414 | 38 |
| MISSISSIPPI | 71 | 178 | 23 | 66 | 48 | 112 | 37 |
| TEXAS | 343 | 3986 | 169 | 737 | 174 | 3249 | 18 |
| LOUISANA | 171 | 2310 | 68 | 819 | 103 | 1491 | 35 |
| CALIFORNIA | 578 | 857 | 230 | 526 | 348 | 331 | 61 |
| OREGON | | 414 | 49 | 93 | | 321 | 22 |
| WASHINGTON | | 934 | | | | | |
| ALASKA | | 83 | | 11 | | 72 | 13 |
| HAWAII | | 279 | | 41 | | 238 | 15 |
| TOTAL | 4034 | 21879 | 1505 | 6312 | 2668 | 15567 | 29 |

* INCLUDES SOME DISCHARGES TO THE GREAT LAKES & THE OHIO RIVER.

REFERENCE: NATIONAL ESTUARINE INVENTORY
**SOURCE: U.S. DEPT. OF COMMERCE, BUREAU OF THE CENSUS**
NOTE: THE ESTABLISHMENTS INCLUDED IN THIS TABLE ARE THOSE HAVING WATER USE OF 20 MILLION GALLONS OR MORE ANNUALLY. THIS REPRESENTS 97% OF TOTAL INDUSTRIAL MANUFACTURING WATER USE.

Source: National Estuarine Inventory

TABLE 24

INDUSTRIAL WASTE: DELAWARE BAY

*Waste sources and waste-load allocations in Zone IV of the Delaware Estuary*[1]

| Waste source | Raw load | First-stage ultimate oxygen demand | |
|---|---|---|---|
| | | Present discharge[2] | Permissible discharge |
| Sun Oil Co., Pa., SunOlin Chemical Co., Del. | 114,900 | 37,600 | 14,400 |
| Allied Chemical Corp., Del. | 6,750 | 1,840 | 845 |
| Phoenix Steel Corp., Del. | 90 | 250 | 11 |
| Penns Grove, N. J. | 1,900 | 960 | 240 |
| Penns Neck, N. J. | 1,850 | 1,200 | 230 |
| DuPont & Co., Carneys Pt., N. J. | 8,480 | 8,900 | 1,060 |
| Wilmington, Del. | 107,500 | 53,300 | 13,400 |
| DuPont & Co., Deepwater, N. J. | 169,000 | 81,000 | 21,100 |
| Atlas Chemical Ind., Del. | 34,450 | 10,600 | 4,310 |
| DuPont & Co., Edgemoor, Del. | 33,800 | [3]22,350 | 4,230 |
| Pennsville, N. J. | 2,800 | 1,460 | 350 |
| Getty Oil Co,, Del. | 30,000 | 5,200 | 2,500 |
| Salem, N. J. | 3,150 | 1,960 | 395 |
| Delaware City, Del. | 290 | 230 | 36 |
| Total: | | | |
| Pennsylvania | 114,900 | 37,600 | 14,400 |
| New Jersey | 187,180 | 95,480 | 23,375 |
| Delaware | 212,880 | 93,370 | 25,332 |
| Grand Total | 514,960 | 226,850 | 63,107 |

[1]Waste-load allocations made by Delaware River Basin Commission in cooperation with the member states.
[2]Estimated from information currently available.
[3]This value is actually chemical oxygen demand and is not due to carbonaceous material.

Source: The Coastal Zone of Delaware

materials and does not consider other waste components, such as heavy metals, phenols, and oils, which may pose a serious threat to the estuarine ecology.[4]

The preceding information and following table gives an indication of the current industrial pollution situation in the Delaware Bay. Obviously, expansion of refineries or construction of new petrochemical complexes will increase the already existing estuarine pollution in the Delaware Estuary. The foregoing does not include the large amounts of municipal wastes which are disposed of in the Bay as this factor will be considered in a subsequent section.

b. Chesapeake Bay

Chesapeake Bay is presented with much the same pollution problems as in Delaware without the petrochemical concentration found in Delaware Bay. However, the flushing action of upper Chesapeake Bay takes longer and, therefore, pollution tends to build up more than it does in Delaware Bay. Also the industrial groups, especially food processing and paper products, add their waste products to a large municipal sewer load.

Baltimore is one of the major industrial areas on Chesapeake Bay and Baltimore Harbor is the major receiving water for industrial waste from the industrial complex. The map on the following page indicates the location of the major industrial discharges into Baltimore Harbor. A December 1971 field investigation by the Annapolis Field Office of industrial discharges into Baltimore Harbor identified significant discharges of ethion, cyanide, phenol, nutrients, and various heavy metals into the Harbor.[5] Excessive amounts of volatile solids, chemical oxygen demands, and oil and greases in the bottom sediment of the Harbor were also found from a harbor bottom sample.[6]

The James River is another tributary water of Chesapeake Bay that carries a high industrial waste load. A can company and a power

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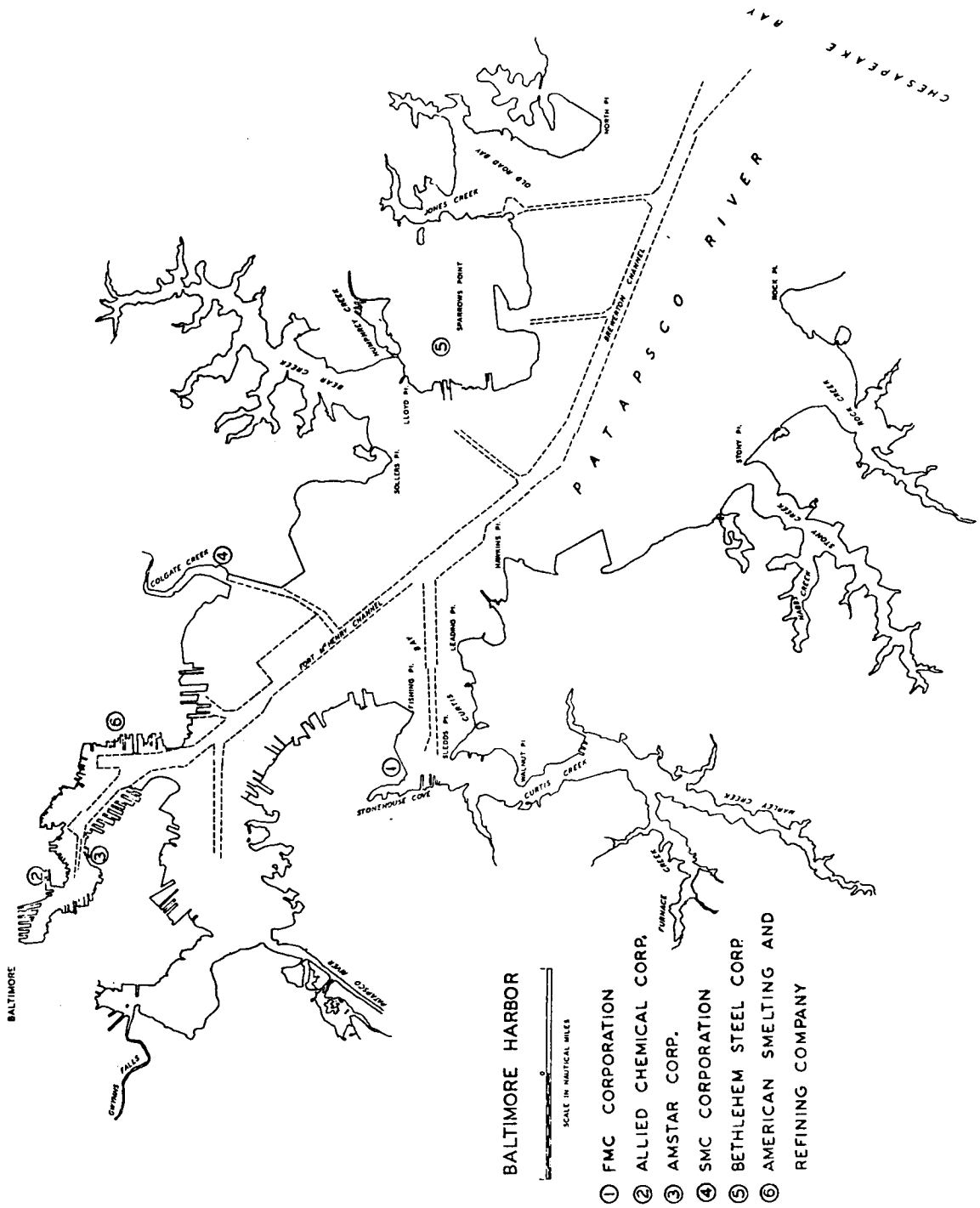
[4]The Governor's Task Force on Marine and Coastal Affairs, The Coastal Zone of Delaware (1972), p. 64-65.

[5]Chesapeake Bay, Existing Conditions Report, Appendix B, p. B-XI-178.

[6]Ibid.

Map 24

Industrial Discharge Survey - Baltimore Harbor




Source: Chesapeake Bay. Existing Conditions Report. Appendix B.

company, both discharging into Bailey Bay, contribute 5-day BOD loadings of approximately 39,840 pounds per day and 39,400 pounds per day, respectively.[7]

3. Municipal waterborne pollution

a. Raritan Bay, New Jersey

Raritan Bay is located between New York City and Newark-Northern New Jersey and is the receiving water for the industrial and municipal wastes produced by this highly urbanized area. According to the National Estuarine Pollution Study, the Raritan system, composed of the Bay, Raritan River, the Arthur Kill, and the Narrows, received approximately 1,500,000,000 gallons of wastes per day which contain over 1,300,000 pounds of BOD. 75% of this waste volume is from industry, but the major impact on the estuary is from the nutrient and bacteriological content of the municipal sewage. Coliform bacteria counts are high and have forced the closing of some public beaches. In some portions of Arthur Kill and the Raritan River dissolved oxygen (DO) values reach zero in summer conditions.

Pollution abatement facilities are being constructed to alleviate some of the problems.[8] However, the sludge disposal resulting from secondary treatment plants has caused another problem. The sludge from New York treatment plants is being dumped offshore and is polluting nearshore ocean water.

b. Delaware Bay

The municipal wastes discharged into Delaware Bay were estimated to be 390 mgd in 1968. This waste, combined with the industrial waste discharges into the Bay was estimated to produce a biological oxygen demand of 1,200,000 pounds per day.

It is expected that domestic and industrial sewage will total at least 1,150 mgd in 1975 and will rise to 1,300 mgd by 1985.

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[7] Ibid.,p. B-SI-185.

[8] National Estuarine Pollution Study, Volume II.

The Delaware Valley Regional Planning Commission has published a report detailing the necessary steps for dealing with the domestic sewage problem for the upper Delaware Bay.[9]

Philadelphia and its surrounding suburban area is the largest single source of municipal waterborne waste to upper Delaware Bay.

The lower Bay communities of Wilmington and Delaware City also contribute to the domestic sewage discharge into the Bay. Wilmington has a raw load ultimate oxygen demand of 53,000.[10]

The cities of Trenton, Philadelphia, Camden, Chester and Wilmington have combined sewer-storm drain systems and during heavy precipitation some of the flow containing sewage and storm water is diverted into the nearest natural water course without any treatment. In 1964, it was estimated that 76,000 pounds per day of the Delaware River's ultimate oxygen demand was contributed by stormwater overflows.[11]

Attempts are being made, through updating, expansion and construction of municipal sewage treatment plants to lessen the impact of sewage disposal into Delaware Bay. However, as the area's population and the cost of pollution control increases this becomes an exceedingly expensive operation.

c. Chesapeake Bay

The Washington metropolitan area is one of the major contributors of municipal wastes to Chesapeake Bay. In 1970, the District of Columbia wastewater loading was 251.7 mgd, from a population of 1,830,000. This resulted in high $BOD_5$, suspended solids, and other pollutant ratings as shown in the following table. This table also shows the wastewater loading trends from 1913-1970.

Metropolitan Washington is not the sole contributor to the pollution of the Potomac River. Various municipalities and government installations contribute to the 326 mgd discharged into the Potomac. The National Estuarine Pollution Study found that during the low flow periods of the warm summer month, dissolved oxygen levels approach

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[9] DVRCP. The Regional Water Supply and Water Pollution Control Plan (1969).

[10] The Coastal Zone of Delaware. p. 65.

[11] Ibid., p. 65.

TABLE 25

WASTEWATER LOADING TRENDS:
WASHINGTON METROPOLITAN AREA

| Year | Population Served | Flow[1 (mgd) | Untreated 5-Day BOD (lbs/day) | Removal 5-Day BOD % | Treated 5-Day BOD (lbs/day) | Ultimate[2 Car. BOD (lbs/day) | Ultimate[3 Nit. BOD (lbs/day) | Total Ultimate BOD (Car. + Nit.) (lbs/day) | Total Nitrogen (lbs/day) | Total Phos. as P (lbs/day) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1913 | 320,000 | 42 | 58,000 | 0 | 58,000 | 84,000 | 29,000 | 113,000 | 6,400 | 1,100 |
| 1932 | 575,000 | 75 | 103,000 | 0 | 103,000 | 149,000 | 52,000 | 201,000 | 11,400 | 2,000 |
| 1944 | 1,149,000 | 167 | 235,000 | 40 | 141,000 | 205,000 | 105,000 | 310,000 | 23,000 | 4,000 |
| 1954 | 1,390,000 | 195 | 280,000 | 28 | 200,000 | 290,000 | 145,000 | 435,000 | 31,700 | 5,500 |
| 1957 | 1,680,000 | 210 | 305,000 | 33 | 204,000 | 297,000 | 153,000 | 450,000 | 33,500 | 8,600 |
| 1960 | 1,860,000 | 222 | 370,000 | 70 | 110,000 | 160,000 | 170,000 | 330,000 | 37,200 | 10,000 |
| 1965 | 2,100,000 | 285 | 417,000 | 70 | 125,000 | 182,000 | 192,000 | 384,000 | 42,000 | 18,800 |
| 1968 | 2,415,000 | 319 | 428,000 | 70 | 130,000 | 188,000 | 226,000 | 414,000 | 50,000 | 20,100 |
| 1969 | 2,480,000 | 320 | 439,000 | 71 | 129,000 | 186,000 | 222,000 | 408,000 | 55,000 | 21,100 |
| 1970 | 2,535,000 | 322 | 484,000 | 71 | 141,000 | 204,000 | 254,000 | 456,000 | 60,000 | 24,000 |

1. Includes estimated sewer overflow loadings

2. Ultimate carbonaceous BOD = 1.45 x 5-day BOD

3. Ultimate nitrogenous BOD = 4.57 x unoxidized nitrogen

Source: Chesapeake Bay. Existing Conditions Report. Appendix B.

zero in some reaches, with the effects of the massive municipal discharges being measurable along twenty miles of the river.[12]

The following table gives the source breakdown of waste water loadings to the upper Potomac Estuary and tributaries.

Current use of the Potomac River as the final disposal treatment stage in the Washington municipal sewage system releases 8,000,000 pounds of phosphorus and 25,000,000 pounds of nitrogen annually into the estuary. Doubling of this loading is predicted in 30 years.[13]

The Interstate Commission on the Potomac River Basin and concerned states and municipalities are working to expand and upgrade the development of area wide treatment management plans, but the expense is a delaying factor.

The James River system in Virginia is another major river system contributing heavy wastewater loading to Chesapeake Bay. Richmond, Virginia is the major waste source on the upper James River. The Richmond sewage treatment plant discharged 38,364 pounds per day $BOD_5$ in 1970 with primary treatment. Secondary treatment at this plant was scheduled by August, 1972.

Other industrial and municipal loadings contributed to the pollution of the James River as shown on the following table. This table indicates that various steps are being taken to reduce the waste water loading to the James River; however, the lead time on sewage treatment plants can be as much as five years, thus causing delays in actual water clean up.

The Hampton Roads-Norfolk-Newport News area is another metropolitan area that contributes large quantities of municipal discharge to the lower Chesapeake Bay. Newport News and Norfolk both have (1973) primary treatment with chlorination with discharge into the Elizabeth River. Norfolk's treatment system, with a capacity of 31 mgd, was operating in excess of capacity. Norfolk has plans to upgrade their system.[14]

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[12] Volume II, p. IV 416.

[13] Ibid., p. V-270.

[14] City of Norfolk Data Summary, Division of State Planning and Community Affairs, (July, 1973).

TABLE 26

WASTEWATER LOADINGS TO THE UPPER POTOMAC ESTUARY AND TRIBUTARIES
GREAT FALLS TO INDIAN HEAD 1970

| Facility | Population Served | Flow mgd | $BOD_5$ Untreated (lbs/day) | $BOD_5$ Treated (lbs/day) | Suspended Solids Untreated (lbs/day) | Suspended Solids Treated (lbs/day) | T. Phosphorus as P Treated (lbs/day) | TKN Treated (lbs/day) | $NO_2 + NO_3$ Treated (lbs/day) |
|---|---|---|---|---|---|---|---|---|---|
| Pentagon | 10,600* | 1.060 | 2,100 | 360 | 2,100 | 310 | 65 | 290 | 20 |
| Arlington | 247,000 | 19.390 | 33,500 | 5,460 | 37,400 | 14,300 | 1,650 | 1,020 | 1,465 |
| Sewer Overflows D.C. System | 18,300** | 2.516 | 3,740 | 3,740 | 3,700 | 3,700 | 170 | 460 | 20 |
| Naval Laboratory White Oaks, Md. | 950* | 0.095 | 25 | 7 | 32 | 12 | 7 | 25 | 1 |
| District of Columbia | 1,830,000 | 251.660 | 373,700 | 103,800 | 369,900 | 102,000 | 17,300 | 46,200 | 2,000 |
| Alexandria | 190,000 | 23.300 | 38,000 | 13,000 | 36,200 | 12,600 | 2,300 | 3,690 | 20 |
| Fairfax-Westgate | 124,400 | 11.570 | 12,500 | 10,900 | 9,600 | 8,200 | 1,280 | 1,830 | 40 |
| Piscataway, WSSC | 55,000 | 5.810 | 6,300 | 540 | 7,300 | 1,310 | 320 | 630 | 100 |
| Andrews AFB No. 1 | 8,200* | 0.820 | 1,200 | 110 | 770 | 110 | 45 | 50 | 30 |
| Andrews AFB No. 4 | 860* | 0.086 | 104 | 16 | 80 | 10 | 5 | 3 | 3 |
| Naval Comm. Station Cheltenham, Md. | 670* | 0.067 | 110 | 15 | 140 | 14 | 3 | 2 | 1 |
| Fairfax-Hunting Cr. | 25,000 | 3.260 | 4,060 | 1,390 | 3,880 | 1,130 | 380 | 620 | 15 |
| Fairfax-Dogue Cr. | 20,000 | 2.441 | 4,048 | 915 | 4,010 | 760 | 270 | 365 | 20 |
| Fort Belvoir No. 1 | 33,600 | 0.600 | 1,100 | 120 | 110 | 70 | 30 | 25 | 25 |
| Fort Belvoir No. 2 | 18,400 | 2.340 | 3,500 | 380 | 3,800 | 325 | 175 | 430 | 20 |
| Fairfax-Lower Potomac*** | - | - | - | - | - | - | - | - | - |
| Naval Ordnance Station Indian Head, Md. | | | | | | | | | |
| Site I | 2,500* | 0.250 | 155 | 90 | 200 | 160 | 12 | 25 | 1 |
| Site II | 3,600* | 0.360 | 355 | 140 | 430 | 80 | 8 | 5 | 1 |
| Site III | 60* | 0.006 | 2 | 1 | 2 | 1 | 1 | 1 | 1 |
| Site IV | 10* | 0.001 | 2 | 1 | 2 | 1 | 1 | 1 | 1 |
| TOTAL | | 325.632 | 483,501 | 140,985 | 479,656 | 145,093 | 24,022 | 55,672 | 3,784 |

* Based on 100 gcpd
** Based on dry weather flow to wastewater facility
*** Under construction

Source: Chesapeake Bay. Existing Conditions Report. Appendix B.

TABLE 27

JAMES RIVER ORGANIC LOADING SOURCES

| Facility | Receiving Stream | Treatment | 5-day BOD Pounds per day | Remarks |
|---|---|---|---|---|
| Richmond City STP | James River | Primary | 38,364 | Secondary treatment by 8/72 |
| Richmond Deep Water Terminal STP | James River | Primary | 130 | Approved plans for phasing out go to Richmond Secondary pH |
| DuPont Company | James River | Secondary equivalent | 4,400 | pH control, aerated lagoons, flyash ponds |
| Chesterfield Company Falling Creek STP | Falling Creek to James River | Secondary | 857 | Secondary treatment since 3/72 |
| American Tobacco Company | James River | Settling lagoons | 7,800 | Future plans for equivalent of secondary treatment |
| Petersburg STP | Appomattox River | Primary | 8,620 | Overloaded, approved plans for secondary treatment 1974 |
| Colonial Heights STP | Old Town Creek to Appomattox River | Primary | 1,350 | Plans for phasing out. Will go to Petersburg Secondary STP |
| Hopewell STP | Bailey Creek | Primary | 3,000 | Plans for regional secondary STP by 1975 to include Fort Lee and sanitary wastes (limited process wastes) from Firestone, Allied Chemical, Continental Can, and Hercules Powder (not to include cooling water treatment) |
| Fort Lee STP | Bailey Creek | Primary | 2,000 | |
| Firestone Company | Bailey Bay | None | 1,280 | |
| Allied Chemical Company | Gravely Run to Bailey Bay | None | 3,340 | |
| Continental Can Company | Gravely Run to Bailey Bay | Settling lagoons | 39,840 | |
| Hercules Powder Company | Bailey Bay | Settling lagoons | 39,400 | |

Source: Chesapeake Bay. Existing Conditions Report. Appendix B.

d. North Carolina Coast

The North Carolina coast has no metropolitan concentrations that lead to the excessive wastewater loadings found in the other estuarine waters of the study area. However, the fact that they are located on the almost flat coastal plains leads to sewage disposal problems and water pollution because of high water tables and poor drainage. For most of this area, septic tanks are not efficient because of the high water table. Dare County on the outer banks has found sewage disposal to be an increasing problem as the number of permanent and part-year residents increases. Regional and local sewage treatment plants will be necessary for this area and any area of the North Carolina coast that experiences a large population and/or industrialization increase.

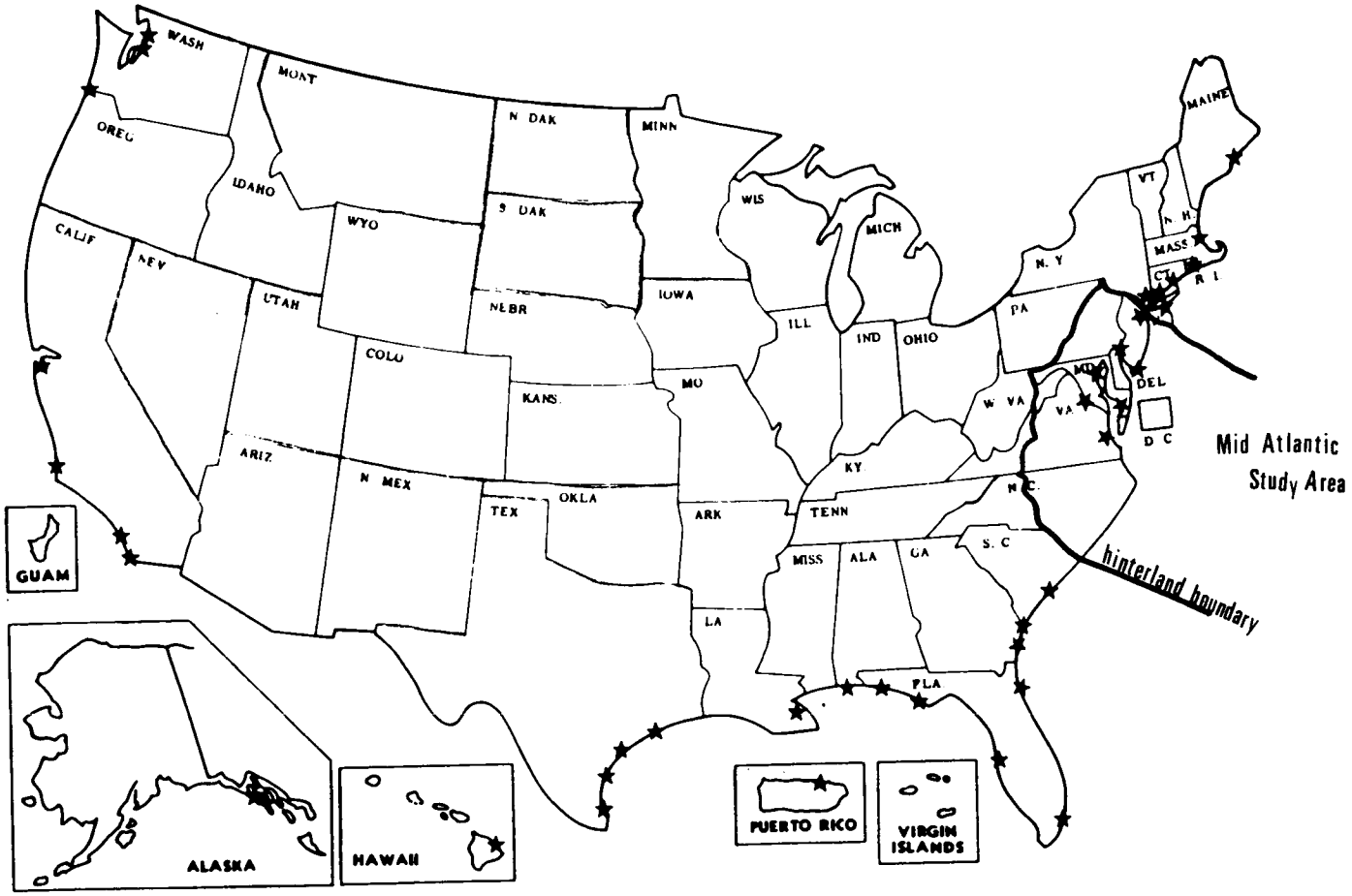
4. Regional water pollution information

The following tables and maps are included to give a brief overview of the problem areas of the study region.

From the degraded water quality map, it can be seen that many of the degraded estuaries are located in the study area. The areas are covered in some detail in the preceding section on pollution and the map is included here only as a means of locational identification.

The two tables dealing with municipal waste are included as a means of comparison among the various states. In reviewing these tables it should be remembered that the facilities table includes population and number of facilities for the entire state, not just for the study area.

Map 25 Estuaries with Degraded Water Quality




Source: National Estuarine Pollution Study, Volume II

Table 28 Population Served by Municipal Waste Facilities, 1968

| | esti. pop. served | 1966 est. pop. | primary | secondary |
|---|---|---|---|---|
| Delaware | 387,610 | 512,000 | 17,285 | 370,325 |
| New Jersey | 5,827,710 | 6,898,000 | 3,290,410 | 1,059,730 |
| North Carolina | 1,980,410 | 5,000,000 | 119,460 | 1,726,580 |
| Maryland | 1,594,605 | 3,613,000 | 186,930 | 1,399,000 |
| Pennsylvania | 10,237,071 | 11,582,000 | 2,475,035 | 4,338,616 |
| Virginia | 2,286,969 | 4,507,000 | 1,234,444 | 1,007,500 |
| West Virginia | 849,715 | 1,794,000 | 504,305 | 211,150 |
| District of Columbia | 1,750,000 | 808,000 | 0 | 1,750,000 |

Source: Municipal Waste Facilities, 1968, U.S. Department of Interior, FWQA

Table 29

Municipal Waste Discharges in the Estuarine Zone

| Biophysical Region | Total Volume of Municipal Waste (1) | Percent of Sewered Population with Secondary Treatment, 1968 (2) | Volume per Square Mile of Estuarine area (gals./day) |
|---|---|---|---|
| Middle Atlantic | 3500 | 60 | 680,000 |
| Chesapeake Bay | 640 | 90 | 140,000 |
| South Atlantic | 270 | 75 | 70,000 |

(1) Based on 150 gallons per capita per day of total population in Standard Metropolitan Statistical Areas, 1965, Volume in mgd.

(2) Data from USDI, FWPCA, "Cost of Clean Water, 1969."

(3) N.A. means data are not available.

Source: National Estuarine Pollution Study, Volume II.

C. Air pollution

1. Introduction

Air pollution is harder to trace to its sources and to correct than is water pollution. However, the automobile appears to be the major source of air pollution by weight. Ninety million automobiles and trucks annually discharge 66 million tons of carbon monoxide; 6 million tons of nitrogen oxides; 12 million tons of hydrocarbons; 1 million tons of sulfer oxides and 190 thousand tons of lead compounds.[1] Two possible methods can be used to reduce the air pollution originating from automobiles: (1) reduce the number of automobiles in operation and/or (2) reduce the amount of pollutants produced by each unit. Current national policy as enunciated in the various air quality acts and amendments is concentrated on the latter method, by requiring a cleaning up of automobile emissions.

The data available on air pollution is of lesser quantity than that available for water pollution. However, in 1971 the Council on Environmental Quality estimated that air pollution costs the United States $16 billion a year: $6 billion in human mortality and morbidity; $4.9 billion in damage to trees, plants, crops and materials; and $5.1 billion in lower property values.[2]

The Environmental Protection Agency, under the objectives mandated by the Clean Air Act of 1970, is currently working with the states to achieve primary ambient air standards designed to protect public health by limiting the amount of pollutants in the air. All states are to meet these standards by 1975.

2. Selected metropolitan data

The table on the following page (taken from the New Jersey Air Quality Index) shows the national primary and secondary air quality standards for selected air pollutants. This table gives the various amounts of a given pollutant necessary to obtain a ranking of good,

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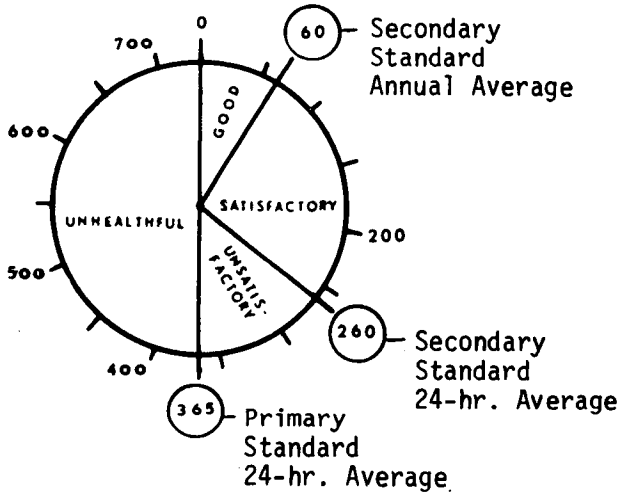
[1] D. N. Thompson, The Economics of Environmental Protection, 1973. p. 38.

[2] Ibid., p. 74.

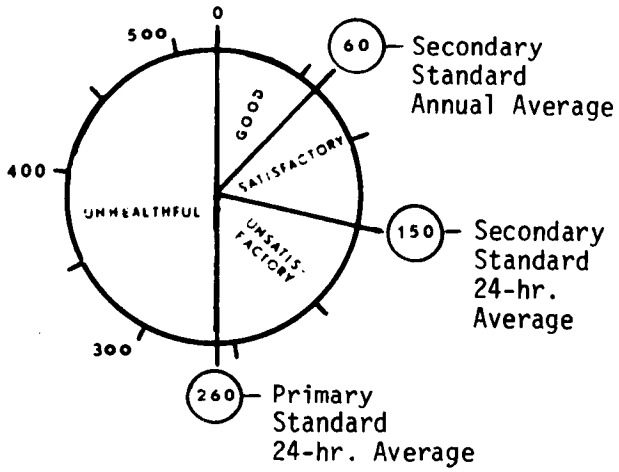
TABLE 30

HOW THE NEW JERSEY AIR QUALITY INDEX RELATES TO NATIONAL AIR QUALITY STANDARDS

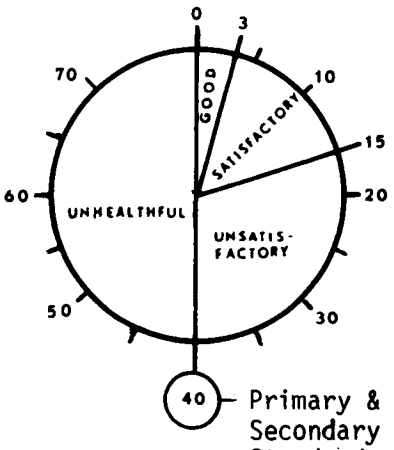
SULFUR DIOXIDE
24-hr. Average
Micrograms per Cubic Meter



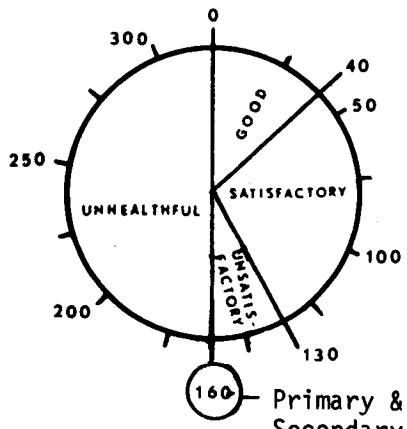

SMOKE AND PARTICLES
24-hr. Average
Micrograms per Cubic Meter




CARBON MONOXIDE
1-hr. Maximum
Milligrams per Cubic Meter




OXIDANTS
1-hr. Maximum
Micrograms per Cubic Meter




Clock faces show national primary and secondary air quality standards for sulfur dioxide, smoke and particles, carbon monoxide, and oxidants, as well as verbal ratings for pollutant levels to be used in the New Jersey Air Quality Index proposed by the Bureau of Air Pollution Control.

satisfactory and unsatisfactory. Many of the metropolitan areas in the study area do not meet the federal standards for some or all of these pollutants.

For example, according to the New Jersey Environmental Times for March, 1973, only seven counties in New Jersey meet the federal standards for carbon monoxide and photochemical oxidants.

A table on the next page shows minimum and maximum and average suspended particulate matter for selected cities in the study area. As can be seen from a comparison between this table and the preceding one, all of the cities sampled had maximum measurements that exceeded the satisfactory rating. Also apparent from this table is the fact that the average for some of the cities has decreased over the time span covered and for others it has increased. In all but two of the cities the maximum measurement has decreased over time. This table indicates that some progress is being made in cleaning up the air over the metropolitan areas but much still needs to be done.

Table 31

AIR POLLUTION

National Sampling Levels, Selected Cities

| | Suspended Particulate Matter 1965[1] (micrograms/cubic Meter) | | | Suspended Particulate Matter 1969[2] (micrograms/cubic meter) | | |
|---|---|---|---|---|---|---|
| | Min | Max | Arith Ave | Min | Max | Arith Ave |
| New Jersey | | | | | | |
| Newark | 49 | 285 | 123 | 35 | 166 | 74 |
| Pennsylvania | | | | | | |
| Philadelphia | 72 | 312 | 182 | 88 | 182 | 129 |
| Delaware | | | | | | |
| Wilmington | 78 | 228 | 126 | 31 | 262 | 127 |
| Maryland | | | | | | |
| Baltimore | 55 | 244 | 132 | 45 | 265 | 118 |
| Virginia | | | | | | |
| Norfolk | 53 | 217 | 114 | 49 | 211 | 94 |
| West Virginia | | | | | | |
| Charleston | 53 | 726 | 187 | 56 | 493 | 213 |
| North Carolina | | | | | | |
| Charlotte | 57 | 283 | 113 | 29 | 215 | 108 |
| District of Columbia | | | | | | |
| Washington | 51 | 199 | 98 | 38 | 120 | 77 |

[1]Statistical Abstract of the U.S., 1967, p. 183.(Air pollution is defined as the presence in the air of substances put there by the activities of man in concentrations sufficient to interfere with comfort, safety, or health or with use and enjoyment of property. Data represent values of samples taken nationally on a biweekly basis by the National Air Sampling Network.)

[2]Statistical Abstract of the U.S., 1971, p. 172.

D. Other Pollution Sources

1. Introduction

There are a number of specific pollution sources that can have a major impact on water quality. The following section will briefly consider some of these specific sources. Only locations that are particularly threatened by these specifics will be considered.

2. Oil Spills

The first specific pollution source to be considered is oil spills. This source has particular relevance to the Delaware Bay area because of the amount of oil transported in these waters on the way to the refineries in the upper Bay. The table on the following page indicates the number of oil slicks observed by the Delaware Department of Natural Resources and Environmental Control during routine sampling runs. This table does not indicate the quantity or source of oil involved in the slick but it gives some idea of the frequency of oil contamination of the River. Oil spills are a potential occurrence whenever oil is being transported or refined and whatever the means of transportation. Much more biological data, both baseline and on the effects of oil spills on estuarine environments, is needed to accurately assess long-term damage caused by oil spills. The short-run damage of dead birds and oil blackened boats is quite obvious but the long-term damage to the ecological balance of an estuarine system is only now being studied. Thus, the importance of a specific estuarine system should be considered carefully before the location of a refinery, pipeline, or oil transport facility is made.

3. Dredge Spoils

The act of dredging, whether to deepen harbors, keep ship channels open or build boat basins, has a two-pronged effect. First, it changes the bottom of the area dredged by removing sediment and other materials and second, there is the problem of where to deposit the material dredged from the bottom. The removal of material from the dredged area may have little effect on the benthic community

Table 32 Number of Oil Slicks Observed in the Delaware River (1970)

| | Miles from the mouth of Delaware River | Number of Oil Slicks |
|---|---|---|
| R - Reedy Island | 55.0 | 0 |
| P - Pea Patch Island | 60.6 | 2 |
| N - New Castle | 67.7 | 1 |
| C - Cherry Island | 70.7 | 6 |
| O - Oldman's Point | 74.9 | 4 |
| L - Marcus Hook | 78.2 | 17 |
| 2 - Eddystone | 84.4 | 11 |
| 3 - Paulsboro | 87.9 | 15 |
| 4 - Navy Yard | 93.3 | 16 |
| K - Wharton Street | 98.6 | 6 |
| 5 - Ben Franklin Bridge | 100.2 | 4 |
| 6 - Allegheny Avenue | 106.3 | 2 |
| 7 - Palmyra | 107.1 | 2 |
| 8 - Torresdale | 110.3 | 2 |
| 9 - Burlington Bristol Bridge | 117.8 | 6 |
| 10 - Florence | 122.5 | 5 |
| 11 - Fieldsboro | 127.5 | 3 |

Source: The Coastal Zone of Delaware. Governor's Task Force, p.56.

if the area dredged is a long-term ship channel or harbor. However, removal of material from marshlands or wetlands obviously destroys the pre-existing ecology.

Dredge spoil disposal effects have been a subject of controversy in the professional literature. Some observers have found little or no long-term detrimental effects and others have found serious damage to benthic communities from waste deposits.[3] Thus, the deposition of dredge spoils is another area where careful consideration is necessary before using a given area as a dump site. Most of the harbors in the study area require periodic dredging to retain their ship channels at given depths. Also, proposals to deepen harbors so as to accommodate deep draft oil tankers necessitate careful consideration of disposal sites because such deepening would require removal and disposal of vast quantities of dredge spoil.

The table below gives the amount of estuarine habitat removed by dredging and filling operations over the 20-year period 1947-1967. This gives some indication of the magnitude of dredging and filling operations in the study area.

Table 33
Estuarine Habitat Removed by Dredging and Filling Operations

| | Available Habitat in 1955 Acres | | Habitat Lost, 1947-1967 | |
|---|---|---|---|---|
| | Area of Total Marsh and Wetland | Area of Important Wildlife Habitat | Area Dredged and/or filled | % of Habitat Loss- |
| Middle Atlantic | 424,000 | 424.000 | 89,000 | 8.6 |
| Chesapeake Bay | 441,000 | 428,000 | 3,000 | 0.5 |
| South Atlantic | 1,551,000 | 797,000 | 25,000 | 2.3 |

Source: National Estuarine Pollution Study, Vol. II

[3] D. Maurer, et al. Effect of Spoil Disposal on Benthic Communities Near the Mouth of Delaware Bay, January , 1974.

4. Thermal Pollution

Brackish estuarine waters are extensively used as a source of cooling water by manufacturing industries and electric power generation plants. Fresh water is also used for cooling water and most of the water used for cooling, both fresh and brackish, is discharged to the estuarine system. The majority of cooling water is used by electric power generating plants. According to figures in the National Estuarine Pollution Study,[4] the total estimated cooling water used in the coastal counties of the Middle Atlantic and Chesapeake Bay regions in 1963 was 12,070 mgd and, of this, 9,850 mgd (82%) was used by power generating plants, with the remaining 2,220 mgd used by manufacturing and industrial plants. This gallonage has increased over time, the increase caused by the increase in the number of electric power plants and by the increasing number of nuclear power plants (under construction or in operation). As was noted earlier in this report, cooling water requirements for nuclear power plants are much higher than for fossil fuel plants.

The map and table on the following page give the location and mgd cooling water uses for the major cooling water users in the Delaware Estuary. This gallonage will increase by more than 65% when the nuclear power plant currently under construction at Salem, New Jersey goes on line.

The environmental effects of dumping large amounts of heated water into an estuarine body are still unclear.

5. Agricultural Runoff

Agricultural runoff contributes two major types of pollutants to ground and surface water. First, excessive nutrients from the use of fertilizers on crop land can be conducted to surface water via precipitation runoff. Secondly, pesticides used on crops frequently find

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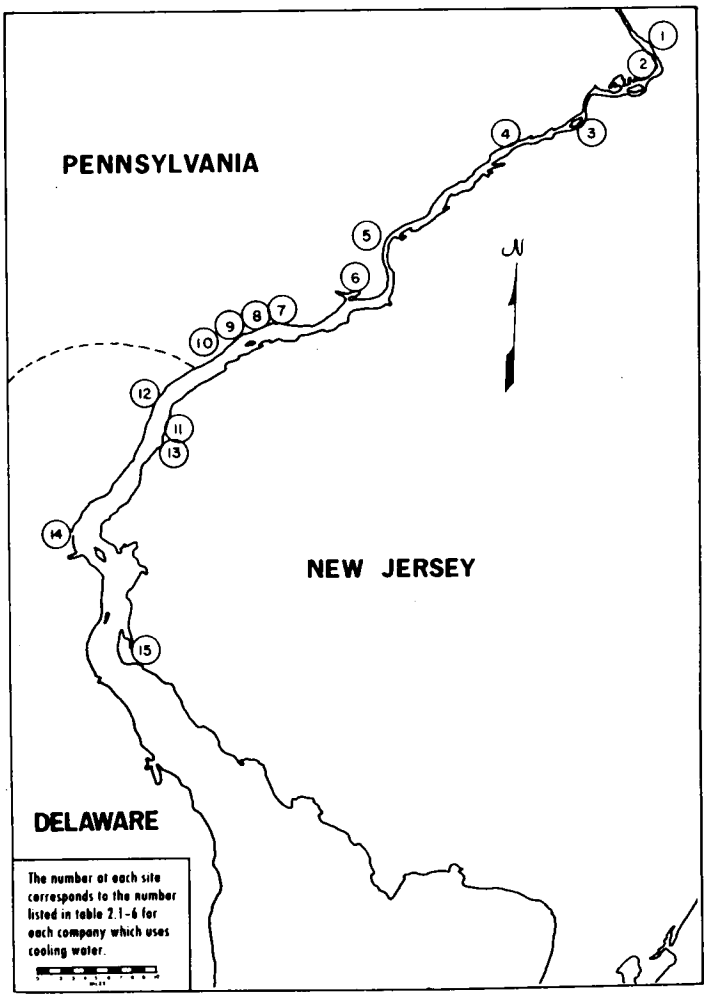
[4] Volume 2, page IV-132.

Map 26 Major Cooling Water Users on the Delaware Estuary




| *Companies using cooling water* | *million gallons per day* |
|---|---|
| 1. Public Service Electric & Gas Co. (Mercerville, N.J.) | 630 |
| 2. U.S. Steel Corp. (Pa.) | 250 |
| 3. Public Service Electric & Gas Co. (Burlington, N.J.) | 288 |
| 4. Philadelphia Electric Co. (Richmond Sta., Phila., Pa.) | 568 |
| 5. Philadelphia Electric Co. (Delaware Sta., Phila., Pa.) | 265 |
| 6. Philadelphia Electric Co. (Southwark Sta., Phila., Pa.) | 363 |
| 7. Philadelphia Electric Co. (Eddystone, Pa.) | 726 |
| 8. Philadelphia Electric Co. (Chester, Pa.) | 109 |
| 9. BP Oil Corp. (Trainer, Pa.) | 120 |
| 10. Sun Oil Co. (Marcus Hook, Pa.) | 115 |
| 11. Du Pont & Co. (Deepwater, N.J.) | 113 |
| 12. Delmarva Power and Light Co. (Edgemoor, Del.) | 408 |
| 13. Atlantic City Electric Co. (Deepwater, N.J.) | 139 |
| 14. Delmarva Power and Light Co.—Getty Oil Co. (Delaware City, Del.) | 325 |
| 15. Salem (N.J.) nuclear power plant[2] (under construction) | 2,880 |

Source: The Coastal Zone of Delaware, The Governor's Task Force.

their way into the water sources. Persistent pesticides such as DDT are apparently world-wide contaminants because of their earlier indiscriminate use for a variety of agricultural and non-agricultural purposes.

The exact amount of pollution resulting from agricultural sources is unknown but it is another area that requires study in more detail.

The above section concerning various other pollution sources is deliberately brief as it is not of major concern in this socio-economic study, being more of an environmental concern.

E. Federal pollution controls

1. Introduction

The following section will briefly consider some of the major federal laws having an impact on pollution and pollution controls. This is not an attempt to closely analyze these laws but is an annotated checklist of the major laws.

As the state of the environment gained national attention and concern, various federal laws were passed or strengthened so as to protect and, in some cases, clean up the physical environment. These laws have become important pollution control tools.

States have become aware of the importance of a clean environment and many laws have been passed on the state level to implement and supplement the federal laws. Some states, such as New Jersey and Delaware, have passed strong state laws aimed at protecting the fragile estuarine environments of their coastal zones. Examples of these laws are discussed in a preceding section of this report.

2. Major Laws

Some of the major federal laws aimed at pollution control are the National Environmental Policy Act (42 U.S.C.4332); the Water Pollution Control Act (33 U.S.C.466 et seq.);section 13 of the 1899 Rivers and Harbors Act (33 U.S.C. 401 et seq.)the Air Quality Act (42 U.S.C.1857 et seq.)and the Water Quality Act (33 U.S.C. 1151 et seq.).

The National Environmental Policy Act is an important pollution control law because it affects all areas over which federal agencies have regulatory control. The section 102 environmental impact statement requirement insures that the pollution potential of a given action be considered prior to the action being taken. Thus, NEPA acts as a before-the-fact pollution control rather than an after-the-fact control, which is probably the most economically and environmentally efficient method of pollution control.

The Water Pollution Control Act is an after-the-fact act, in that it sets up enforcement procedures to abate water pollution of navigable and interstate waters. Also, the time allowed for abatement and the time limits required for hearings tend to reduce the efficiency of this act.

This act also includes specific provisions to control pollution by oil, hazardous substances, or sewage from vessels.

Section 13 of the 1899 Rivers and Harbors Act states that it is unlawful to discharge refuse, except sewage, into the navigable waters of the United States without a permit from the Secretary of the Army. The Refuse Permit Program, established in 1970 under Executive Order 11574, makes such a permit mandatory for all industrial discharges into navigable waters. Also, before a permit can be issued, the discharger must be certified as being in compliance with the applicable state water quality standards.

The Act provides criminal penalties and permits injunctions against a violator. It also provides that citizens bringing information to U. S. attorneys that results in conviction receive half of the fine. The criminal penalty is being used against corporations as well as individuals and, if the penalties are large enough, it may help promote more corporate responsibility concerning corporate pollution.

The Air Quality Act requires the states to set air quality standards (not lower than federal standards) and implement said standards. In May 1971, the Environmental Protection Agency announced its first national air quality standards for six pollutants, to go into effect by July 1, 1975. Some cities in the study area, namely Baltimore and Philadelphia, are expected to have difficulty meeting these standards.

All of the states in the study area have departments and/or commissions that regulate air and water pollution on a state basis. These departments and commissions administer pollution control laws, undertake research and studies dealing with pollution problems, and have power to deal on a short-term emergency basis with pollution that threatens the public health.

The above gives a very brief summary of the major federal laws dealing with pollution controls. These laws are evidence of a continuing concern over the protection and upgrading of the physical environment and should be observed in the spirit as well as the letter of the law.

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[5]Much of the above was compiled from: D. N. Thompson, The Economics Environmental Protection, and History, Land Ownership and Laws, (DBRS) Natural and Historic Resource Associates.

APPENDIX

Land Use Maps, 1970

**LAND USE CLASSIFICATION LEGEND**

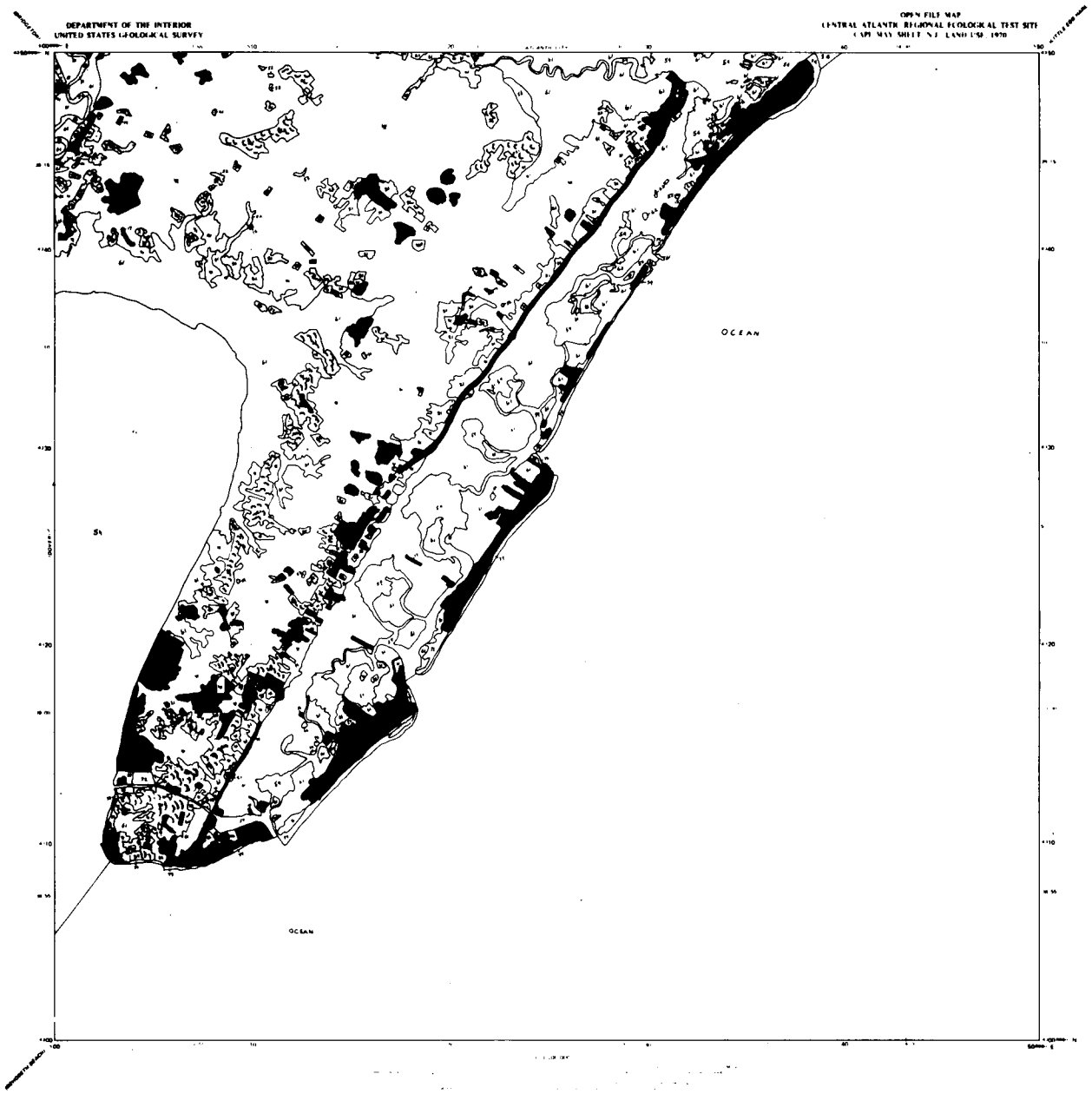
| | | |
|---|---|---|
| URBAN AND BUILTUP | Residential | 11 |
| | Commercial and services | 12 |
| | Industrial | 13 |
| | Extractive | 14 |
| | Transportation, communications, and utilities | 15 |
| | Institutional | 16 |
| | Strip and clustered settlement | 17 |
| | Mixed | 18 |
| | Open and other | 19 |
| AGRICULTURAL | Cropland and pasture | 21 |
| | Orchards, groves, bush fruits, vineyards, and horticultural areas | 22 |
| | Feeding operations | 23 |
| | Other | 24 |
| FORESTLAND | Heavy Crown Cover (40% and over) | 41 |
| | Light Crown Cover (10% to 30%) | 42 |
| WATER | Streams and waterways | 51 |
| | Lakes | 52 |
| | Reservoirs | 53 |
| | Bays and estuaries | 54 |
| | Other | 55 |
| NON-FORESTED WETLAND | Vegetated | 61 |
| | Bare | 62 |
| BARREN LAND | Sand other than beaches | 72 |
| | Bare exposed rock | 73 |
| | Beaches | 74 |
| | Other | 75 |

Symbol Key

Agricultural and built-up areas are keyed by symbol for easier reference. All other areas are referenced by number.

Source: Open File Maps, U.S. Geological Survey, Dept. of the Interior

CAPE MAY, N.J.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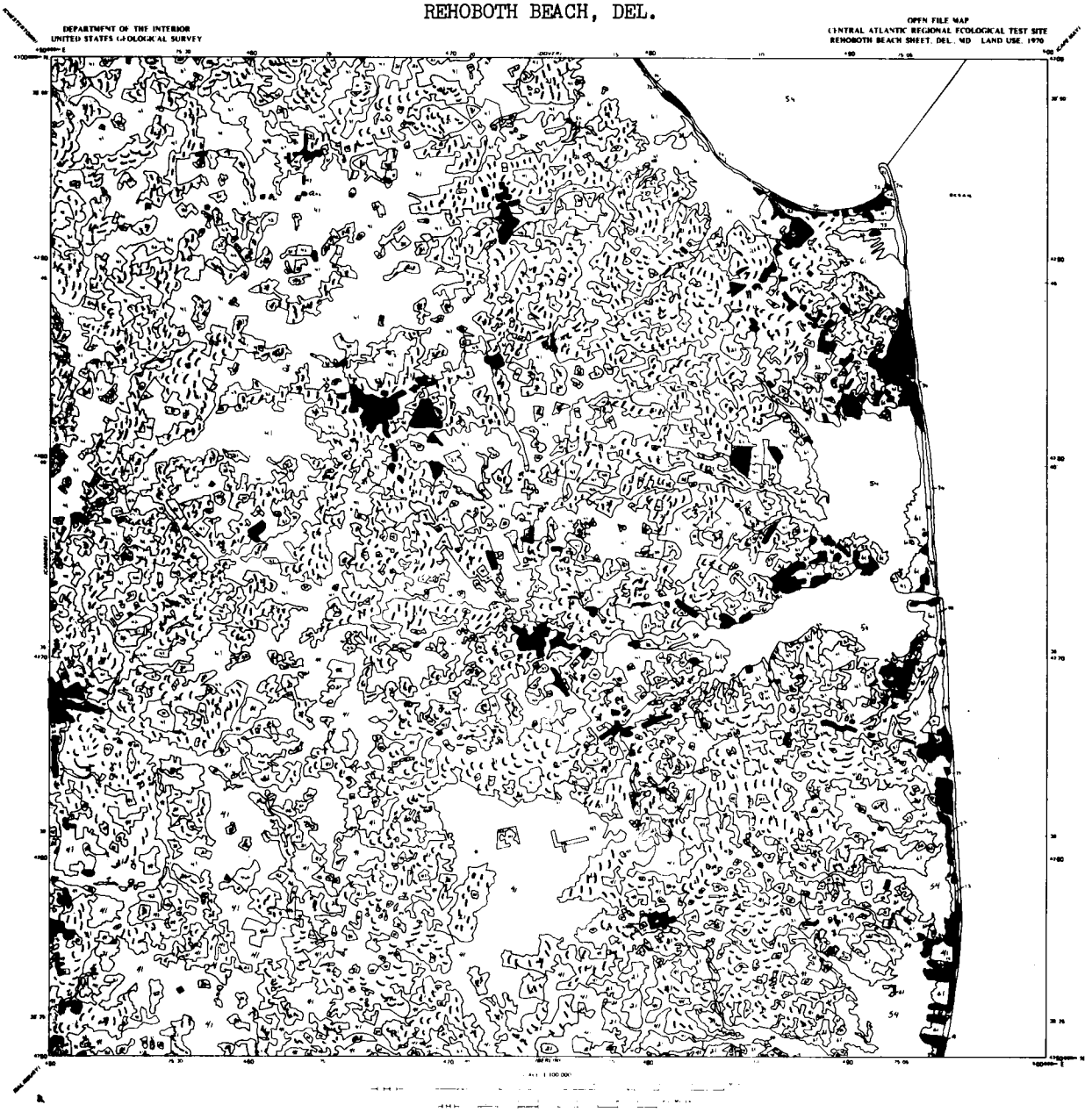

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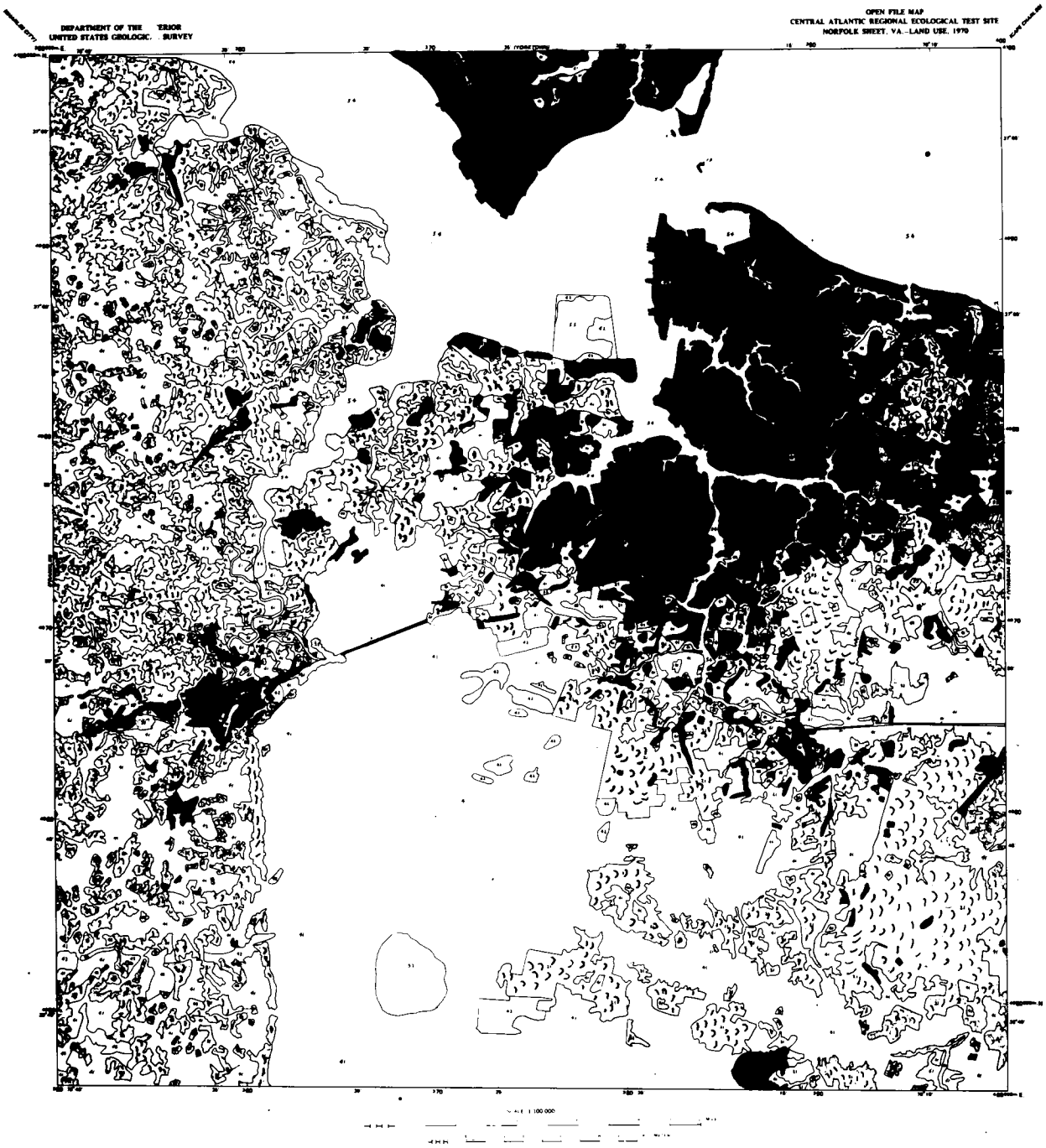
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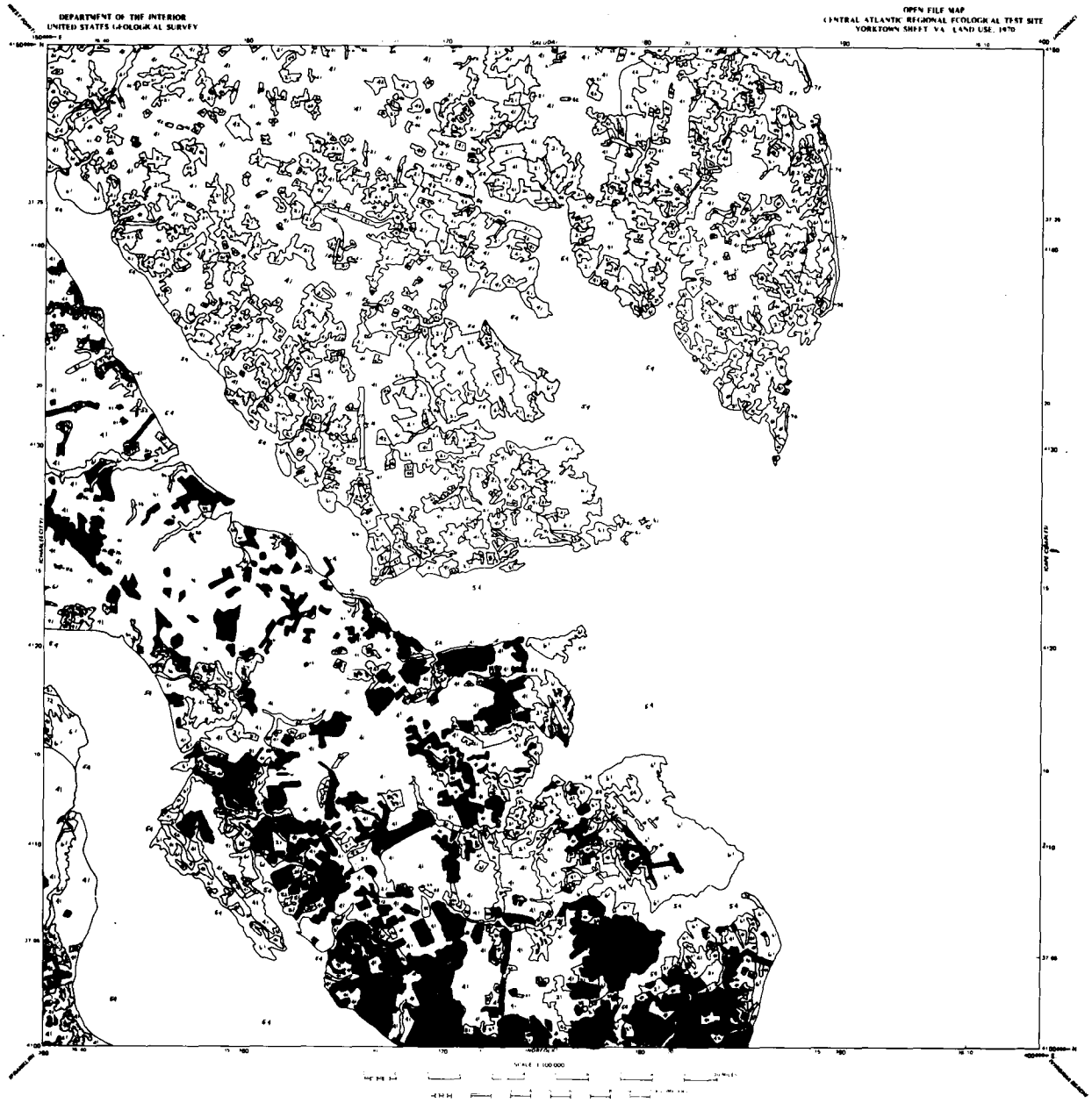
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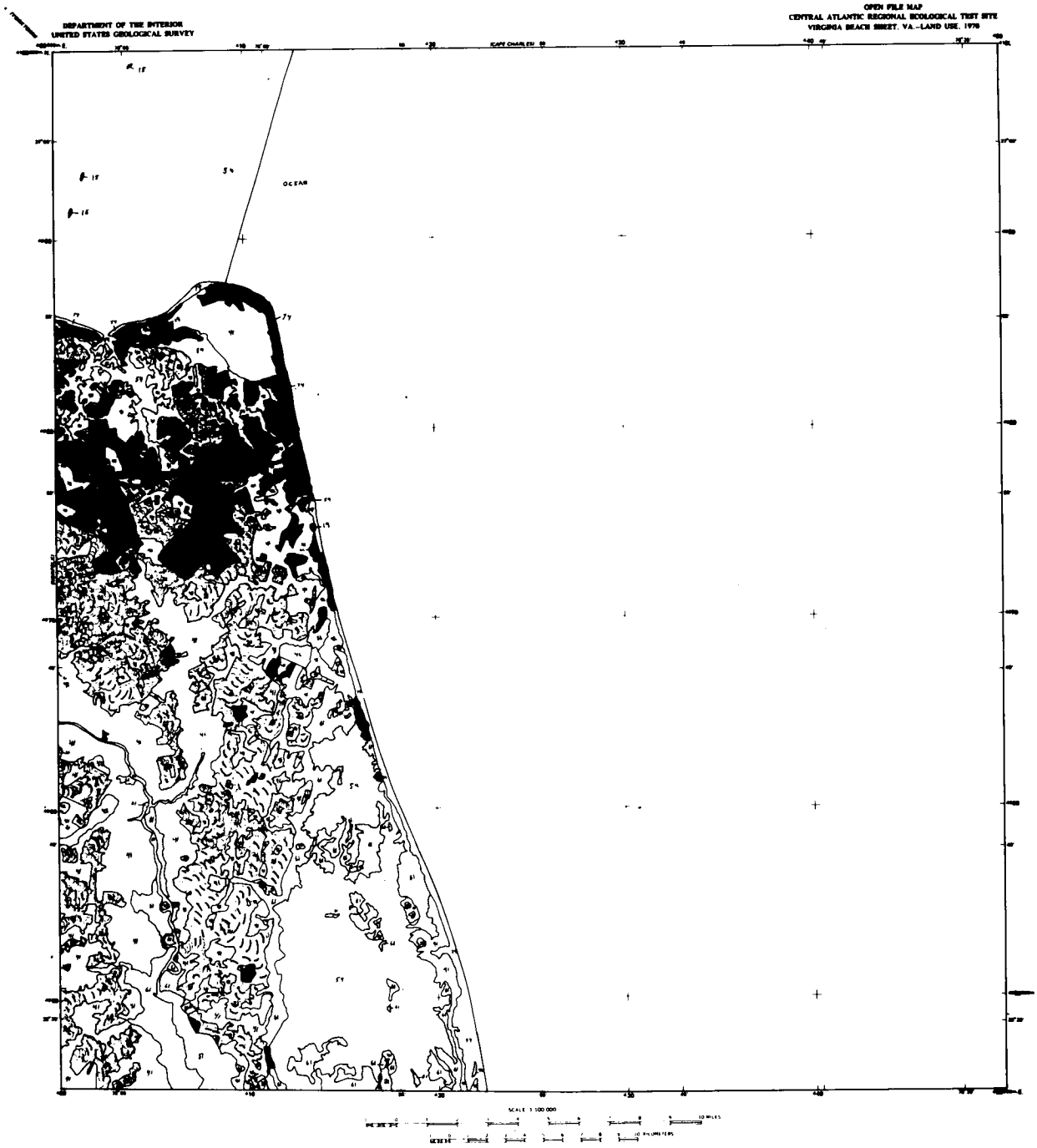

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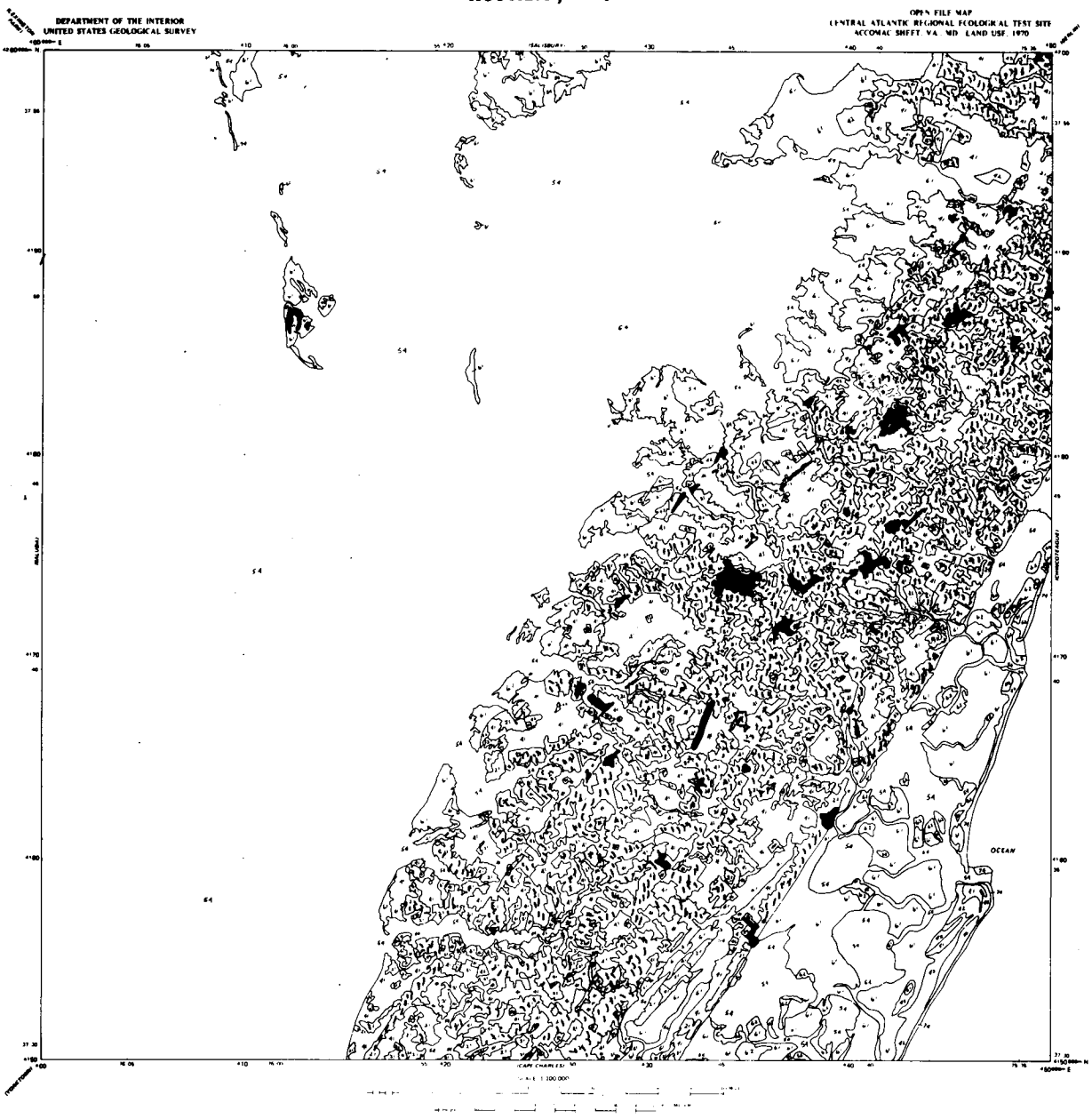
CAPE CHARLES, VA.

ACCOMAC, VA.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# BIBLIOGRAPHY AND CONTACT LOG

Volume VIII

Prepared For:
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Department of the Interior

By:
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This volume is divided into two sections. The first section is a Contact Log, a record of the people who were contacted and consulted in the gathering of data for this study.

The second section is a consolidated Bibliography for the entire study. As many hundreds of sources were analyzed and consulted in writing this study, only the most important sources have been listed.

The Contact Log and Bibliography are both arranged by state, with multi-state and extra-state sources listed in the General sections.

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Table of Contents

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CONTACT LOG - GENERAL

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| University of Virginia School of Architecture Fine Arts Library | University of Virginia<br>School of Architecture<br>Charlottesville, Va. 22903 | | either library or an architecture professor (city planning) |

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# ENERGY EXCHANGES

Volume IX

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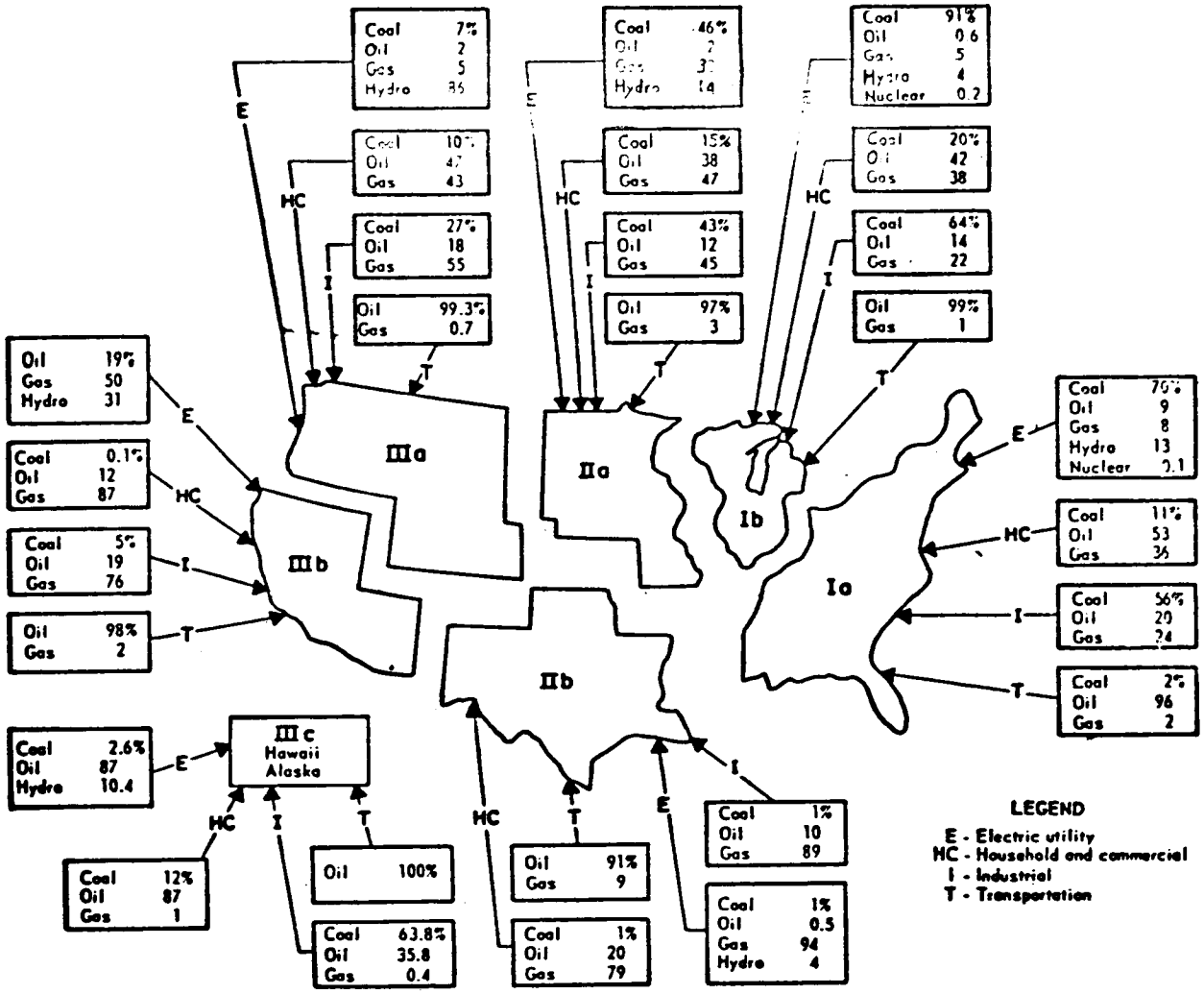
General Background

The mix of energy products consumed by states and regions in the United States is influenced in part by the production possibilities available on a regional basis and thereby by the relative supplies and prices of various energy sources, as well as by government policies on price levels, import quotas, pollution controls, subsidization and taxation. All of these influences can, in some way be viewed as having both well defined and ambiguous impacts on the regional supply and demand functions for energy. Such is the caze for the national energy markets: government policy on the energy production and consumption is confusing, sometimes contradictory and almost always complex. At the regional level, and especially the East Coast region, the same type of observations can be made.

But over and above the government policies, a market for energy does exist and the consumption patterns can be rationalized in terms of a general supply and demand approach. For example, where supplies of coal are abundant as in the Appalachian area, the relative price of coal including transportation cost is low, and the quantity of coal demanded by users is greater than where coal prices are high. Again, the Eastern Coast electrical utility producers switched from coal to residual fuel in large numbers in the mid-1960's as residual fuel became quota-free and was imported in large quantities at relatively low prices. It is apparent that many different factors influence the decision to utilize one fuel source rather than another. Long-term considerations include future pollution control policy changes, the costs of switching fuel sources, the surety of long-run supply, convenience of handling and storage, technological change and so forth. However, given the above factors, it still is true that the law of demand holds: the lower the price of a fuel source, the greater is the quantity demanded of that source.

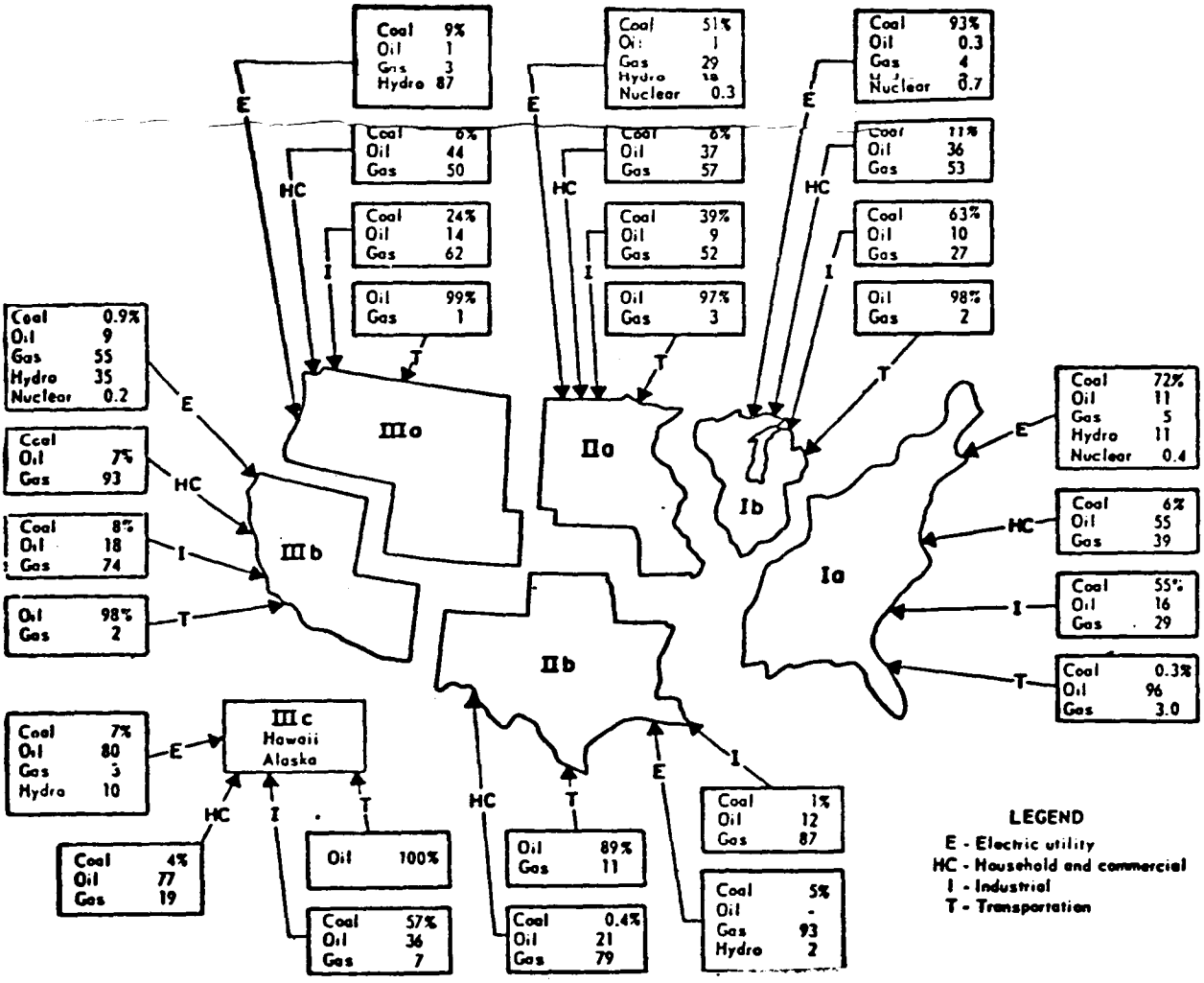
The general question of the determinants of the mix of energy sources utilized on a regional basis is quite complex. Regional energy consumption and distribution patterns reveal an extremely varied energy input-output and consumption mix. As Figures 1 and 2 reveal, consumption patterns vary on a regional basis for all consumers and among final users as well. These final user patterns are influenced by regional differences in import quotas; produc-

Figure 1




Source: U.S. Dept. of the Interior, The Supply and Demand for Energy, Washington, 1969.

Figure 2




Source: U.S. Dept. of the Interior, The Supply and Demand for Energy, Washington, 1969.

tion; supply and transportation networks; environmental considerations, especially pollution standards; the relative growth in the demand for energy on a regional basis; relative prices as influenced by transportation and other cost differences deriving from efficiency in production and utilization of various sources.

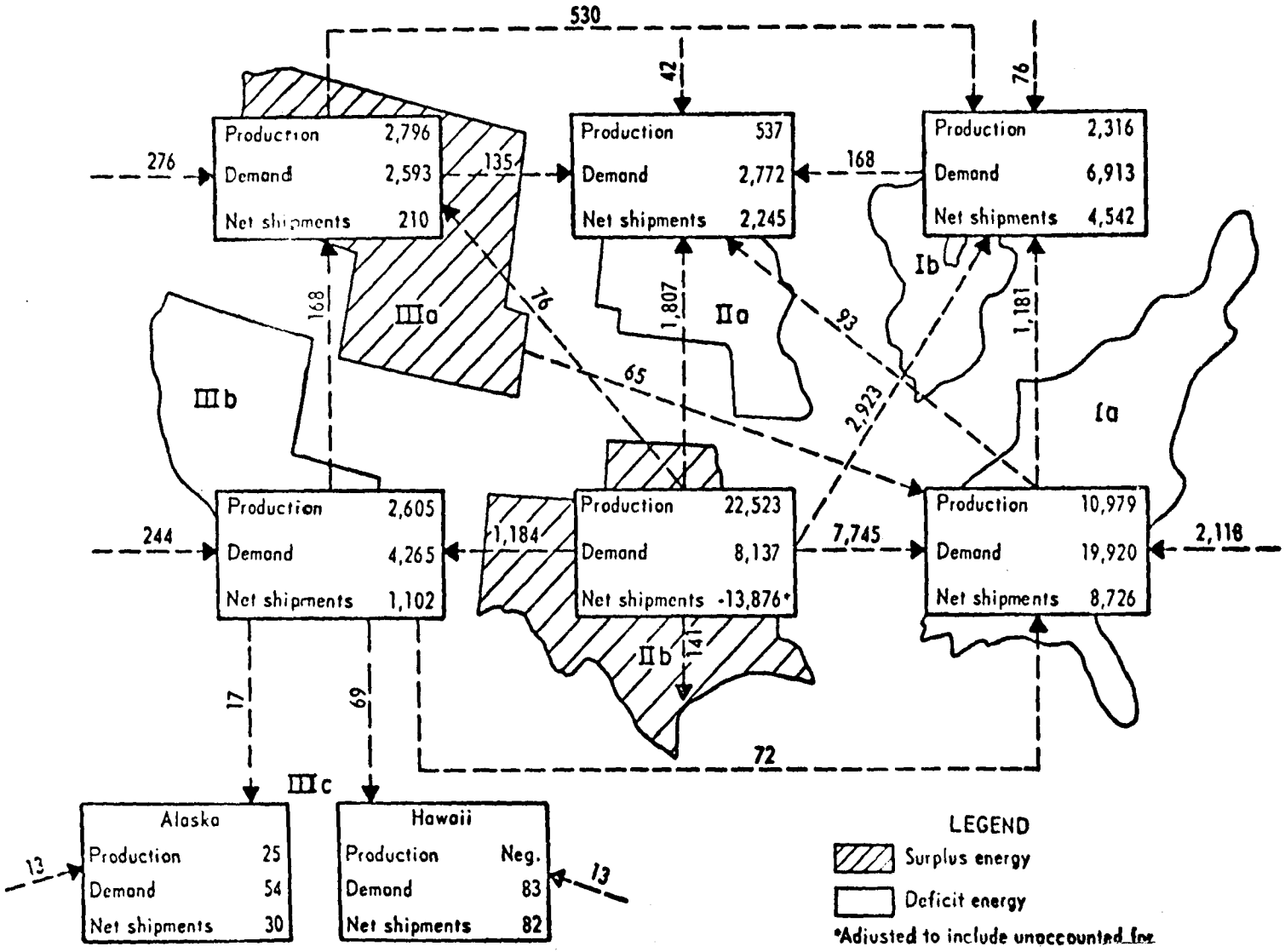
The East Coast region of the United States is of special interest here. This region is a net importer of oil and gas and a net exporter of coal. Over all, the Eastern Coast states are net importers of energy supplies. As Figures 3 and 4 indicate, in 1969 the East Coast imported approximately 44 percent of its total energy consumption. The bulk of these imports flow into the region from abroad and from the Gulf Coast. In addition to the net import position, the East Coast's consumption patterns differ substantially from nation-wide patterns.

In general, the East Coast consumes less natural gas than does the average sub-region, 14 percent versus 33 percent nation-wide in 1971. Oil is used more extensively in the East Coast, accounting for 56 percent of total consumption, a figure that compares to 44 percent nation-wide. Table I indicates that substantially more coal is utilized in the East Coast than is used on a nation-wide basis. These comparisons would be even more extreme if the East Coast region (Region Ia) is compared to IIa, the Gulf Coast states. Here coal is almost never used and natural gas is utilized for almost everything except transportation.

Actually, the question might be asked: Why aren't the East Coast states, particularly in the middle Atlantic region, much more dependent upon coal than they appear to be? Transport costs are low from the Pennsylvania and West Virginia Coal fields, and the delivered price of coal should be relatively low in the coal-producing areas of the country. In the main, oil is and has been more expensive per BTU than coal. However, this is not true for all regions of the country and as Table II shows, the relative prices of generating electricity from coal, oil or gas vary considerably among regions of the United States. In general, coal is cheaper where it is produced and gas and oil are cheaper where they are produced.

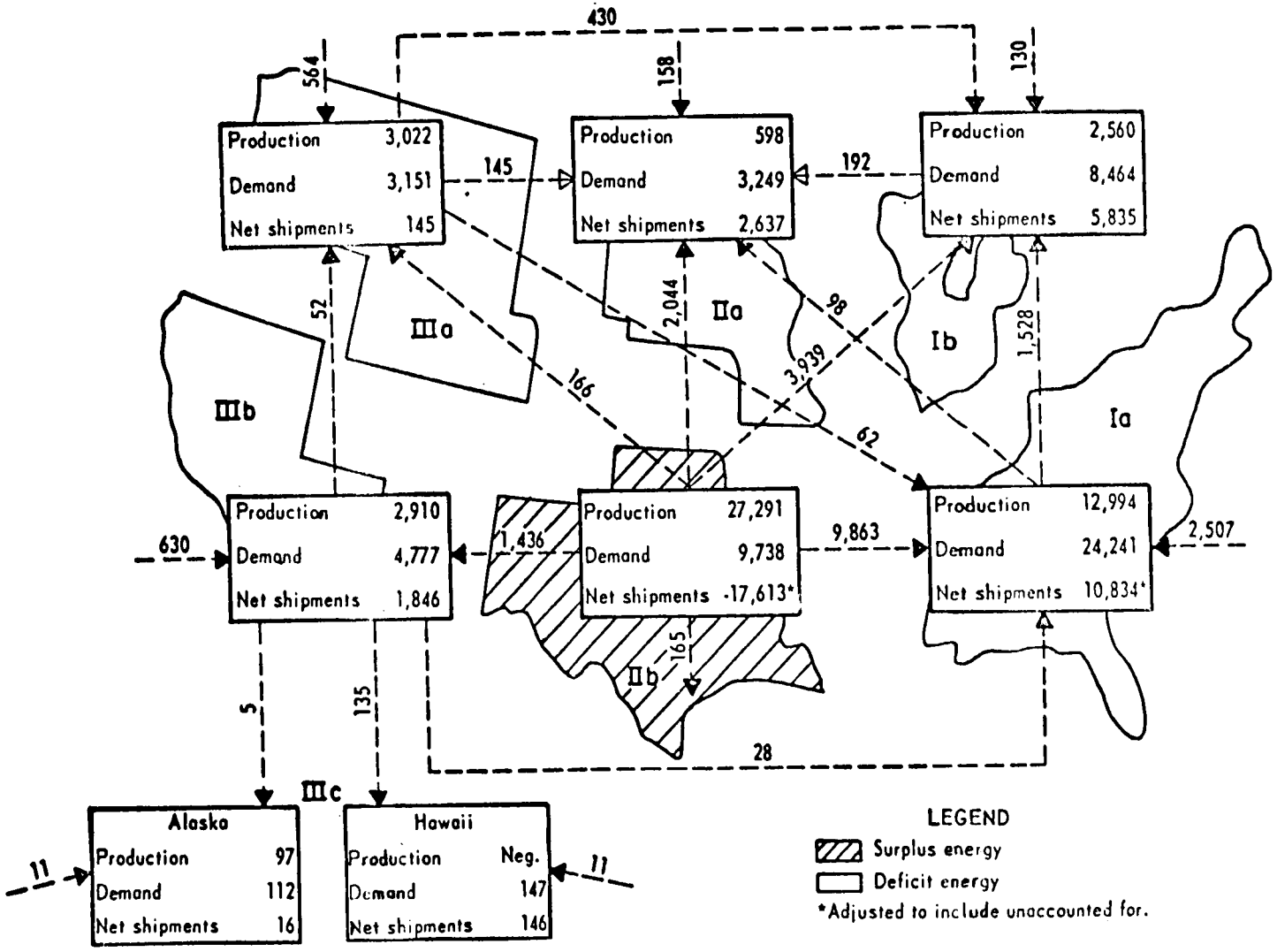
Secondly, the time trend of the relative price of coal and oil has changed. Oil prices have fallen relative to coal prices since the 1950's.

Figure 3




Source: U.S. Dept. of the Interior, The Supply and Demand for Energy, Washington, 1969.

Figure 4




Source: U.S. Dept. of the Interior, The Supply and Demand for Energy, Washington, 1969.

Table I

COMPARISON OF U.S. AND
DELAWARE VALLEY ENERGY USE

| Category | U.S. Btu Consumption 1970-1971 ($10^{12}$ Btu) | U.S. Use Proportions (in percent) | Del. Val. Btu Consumption 1970-1971 ($10^{12}$ Btu) | Del. Val. Use Proportions 1970-1971 (in percent) |
|---|---|---|---|---|
| Anthracite Coal | | .25 | 103 | 3.33 |
| Bituminous and Lignite Coal | 12,543 | 18.39 | 746 | 24.08 |
| Natural Gas | 22,381 | 32.80 | 436 | 14.06 |
| Still Gas | 1,000 | | 79 | 2.56 |
| Hydroelectric Power | 2,741 | 4.01 | 11 | .36 |
| Oil | 30,053 | 44.00 | 1,720 | 55.55 |
| Nuclear | 310 | .45 | 2 | .05 |
| Total | 68,227 | 99.65 | 3,096 | 99.99 |
| Electricity | 16,057 | 24.19 | 728 | 23.51 |

Source: U.S. Dept. of the Interior, Minerals Yearbook, Vol. I, 1971. Estimates of Delaware Valley consumption from the University of Delaware Department of Economics.

Table II

—Cost of fuel in steam-electric power generation

(Cents per million Btu)

| Region | Coal | Oil | Gas | Coal | Oil | Gas | Coal | Oil | Gas |
|---|---|---|---|---|---|---|---|---|---|
| | 1956 | | | 1957 | | | 1958 | | |
| New England | 38.8 | 41.4 | 37.9 | 41.0 | 46.9 | 40.7 | 40.1 | 40.7 | 37.8 |
| Middle Atlantic | 30.0 | 40.2 | 31.9 | 31.9 | 45.9 | 32.1 | 32.3 | 38.5 | 32.0 |
| East North Central | 21.6 | 74.3 | 21.7 | 23.8 | 68.2 | 23.1 | 23.8 | 64.5 | 21.6 |
| West North Central | 26.9 | 43.4 | 22.1 | 28.2 | 47.6 | 22.2 | 28.1 | 51.3 | 22.0 |
| South Atlantic | 29.1 | 39.5 | 25.2 | 29.0 | 46.2 | 25.8 | 29.6 | 39.7 | 27.6 |
| East South Central | 18.7 | 42.4 | 19.8 | 19.4 | 46.1 | 21.6 | 19.4 | 37.6 | 21.6 |
| West South Central | 15.2 | 40.4 | 12.4 | 14.9 | 41.7 | 12.9 | 15.6 | 41.8 | 12.9 |
| Mountain | 22.0 | 26.0 | 22.0 | 22.0 | 25.1 | 22.2 | 21.9 | 25.2 | 22.2 |
| Pacific | ------ | 33.0 | 25.0 | ------ | 41.6 | 26.5 | ------ | 42.0 | 26.5 |
| Average, United States | 26.2 | 37.9 | 18.5 | 27.5 | 44.4 | 19.5 | 27.4 | 39.6 | 19.5 |
| | 1959 | | | 1960 | | | 1961 | | |
| New England | 37.7 | 35.8 | 34.5 | 36.5 | 36.0 | 36.6 | 36.2 | 37.7 | 36.3 |
| Middle Atlantic | 30.8 | 35.5 | 33.0 | 30.0 | 35.1 | 35.7 | 29.9 | 36.2 | 32.7 |
| East North Central | 25.6 | 73.2 | [1] 24.5 | 25.3 | 65.5 | [1] 25.3 | 25.0 | 64.7 | 20.4 |
| West North Central | 27.5 | 46.7 | 22.4 | 27.0 | 43.4 | 23.0 | 26.2 | 47.4 | 22.8 |
| South Atlantic | 27.2 | 35.5 | 29.7 | 26.3 | 35.6 | 31.8 | 25.8 | 35.2 | 32.5 |
| East South Central | 19.1 | 47.1 | 23.4 | 19.6 | 50.3 | 24.8 | 19.7 | 50.9 | 25.4 |
| West South Central | 15.8 | 43.2 | 15.0 | 32.3 | 45.1 | 16.7 | ------ | 43.8 | 19.0 |
| Mountain | 21.3 | 24.3 | 25.7 | 20.2 | 25.0 | 27.8 | 19.6 | 25.6 | 28.5 |
| Pacific | ------ | 34.8 | 32.0 | ------ | 32.3 | 33.4 | ------ | 32.6 | 35.2 |
| Average, United States | 26.5 | 35.2 | 22.3 | 26.0 | 34.5 | 23.8 | 25.8 | 35.5 | 25.1 |

[1] Excludes blast-furnace gas, which would lower cost slightly.

Source: National Coal Association. Steam-Electric Plant Factors 1956 through 1961.

| | 1962 | | | 1963 | | | 1964 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Coal | Oil | Gas |
| New England | 35.5 | 36.1 | 35.1 | 34.1 | 34.7 | 34.6 | 33.4 | 34.4 | 34.2 |
| Middle Atlantic | 29.0 | 34.2 | 37.2 | 27.2 | 32.1 | 33.3 | 26.0 | 31.7 | 33.5 |
| East North Central | 24.9 | 70.5 | 25.7 | 24.8 | 69.8 | 24.9 | 24.6 | 68.2 | 24.8 |
| West North Central | 26.6 | 49.7 | 23.8 | 26.4 | 50.1 | 23.8 | 26.0 | 50.4 | 24.3 |
| South Atlantic | 25.6 | 34.6 | 32.3 | 25.5 | 34.4 | 32.6 | 25.4 | 33.9 | 32.2 |
| East South Central | 19.3 | 48.9 | 25.4 | 20.0 | 47.5 | 24.5 | 19.3 | 50.1 | 24.6 |
| West South Central | ------ | 42.2 | 19.5 | 16.6 | 39.3 | 19.4 | 14.9 | 42.6 | 19.6 |
| Mountain | 22.7 | 25.1 | 29.0 | 20.4 | 27.4 | 27.7 | 19.2 | 25.7 | 26.6 |
| Pacific | ------ | 33.6 | 34.8 | ------ | 33.0 | 36.1 | --- | 30.7 | 32.2 |
| Average | 25.0 | 34.5 | 26.4 | 25.0 | 33.5 | 25.9 | 24.6 | 32.6 | 25.3 |

| Region | 1965 | | | 1966 | | | 1967 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coal | Oil | Gas | Coal | Oil | Gas | Coal | Oil | Gas |
| New England | 33.4 | 34.4 | 34.2 | 33.6 | 32.9 | 33.8 | 34.3 | 30.5 | 32.2 |
| Middle Atlantic | 26.2 | 32.3 | 33.8 | 26.5 | 31.8 | 34.4 | 27.8 | 33.2 | 35.4 |
| East North-Central | 24.3 | 66.2 | 25.9 | 24.4 | 69.8 | 25.9 | 24.7 | 62.9 | 26.7 |
| West North-Central | 26.2 | 50.8 | 24.2 | 26.4 | 49.9 | 24.2 | 25.6 | 51.6 | 24.0 |
| South Atlantic | 25.1 | 33.7 | 32.3 | 25.6 | 33.6 | 31.8 | 26.6 | 32.5 | 31.7 |
| East South-Central | 18.9 | 62.8 | 23.8 | 19.8 | 62.1 | 22.7 | 20.1 | 53.2 | 23.4 |
| West South-Central | 17.7 | 50.4 | 19.8 | ------ | 40.7 | 19.8 | ------ | 42.4 | 19.9 |
| Mountain | 19.3 | 26.2 | 27.1 | 20.4 | 25.4 | 26.7 | 20.1 | 26.1 | 26.2 |
| Pacific | --- | 32.0 | 31.4 | ------ | 31.5 | 31.5 | ------ | 31.4 | 30.8 |
| United States | 24.4 | 33.1 | 25.0 | 24.7 | 32.4 | 25.0 | 25.2 | 32.2 | 24.7 |

| | 1968 | | | 1969 | | | 1970 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coal | Oil | Gas | Coal | Oil | Gas | Coal | Oil | Gas |
| New England | 34.3 | 29.4 | 32.0 | 36.9 | 28.3 | 33.7 | 41.9 | 32.8 | 35.3 |
| Middle Atlantic | 28.3 | 35.0 | 35.8 | 30.0 | 33.6 | 35.6 | 36.1 | 40.2 | 38.3 |
| East North-Central | 25.2 | 64.6 | 28.0 | 26.4 | 62.0 | 31.6 | 30.4 | 66.7 | 37.1 |
| West North-Central | 25.1 | 52.6 | 24.5 | 26.2 | 51.8 | 24.9 | 28.2 | 69.0 | 25.6 |
| South Atlantic | 27.0 | 32.3 | 31.6 | 28.4 | 30.4 | 31.6 | 36.1 | 31.9 | 34.7 |
| East South-Central | 20.1 | 65.2 | 23.9 | 21.1 | 51.1 | 24.3 | 23.6 | 54.1 | 25.3 |
| West South-Central | 21.6 | 38.2 | 20.1 | 31.1 | 36.9 | 20.5 | 40.1 | 44.6 | 21.1 |
| Mountain | 20.4 | 26.8 | 26.9 | 20.6 | 27.3 | 27.3 | 19.8 | 28.2 | 29.3 |
| Pacific | -- | 32.0 | 30.7 | -- | 34.5 | 31.2 | -- | 36.8 | 32.4 |
| United States | 25.5 | 32.8 | 25.1 | 26.6 | 31.9 | 25.4 | 31.1 | 36.6 | 27.0 |

These data may be misleading in that gas prices are probably seriously distorted by FPC regulation which took hold in the early 1960's, and the price of gas may not be an equilibrium price in the sense that the quantity demanded exceeds the quantities supplied in some areas of the country. The relative price changes exhibited in Table II may well explain the shifts in energy mixes that have taken place in the East Coast area, particularly in the New England area where coal costs rose significantly in relation to oil and gas prices in the decade of the 1960's.

In addition to price changes brought about by price regulation and changes in import quotas, the substitution of residual oil for coal by utilities was hastened considerably during 1964 and thereafter by increasingly stringent air pollution regulations. PAD I (the East Coast) was exempted from the import quotas for residual oil, and imports climbed from 27 million barrels in 1964 to 555 million barrels in 1971. In this same time period, Penn Central's shipments of coal to East Coast utilities fell by some 33 million tons. Both residual oil and natural gas replaced coal in the East Coast electric utility industry.[1]

The extent of the coal oil-gas substitution in this period is clearly shown by Table III where the number of coal-fired plants declined from 100 to 27 in a span of eight years. It is probably quite difficult to disentangle the relative price changes from the relative cost changes in this period.

A low sulphur emissions policy raises the costs of using coal relative to low sulphur residual oil, even though the price of coal remains unchanged or falls. High stacks and stack scrubbers msut be installed to meet the regulations on emissions. Low sulphur coal supplies are apparently quite abundant in West Virginia, but low sulphur coal is more expensive and is in short supply because most of it is held by steel firms for their own purposes. Apparently some of this low sulphur coal is now being sold in the market to electrical utilities.[2]

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[1] Carl E. Bagge in Implementation of the Clean Air Amendments of 1970, Part 2 (Title 1).

[2] Congressional Research Service, "Factors affecting the use of coal in present and future Energy Markets," Prepared for the Committee on Interior and Insular Affairs, U. S. Senate, (Washington, D. C., U. S. Government Printing Office, 1973).

Table III

COAL FIRED PLANTS--1964 and 1972

| REGION (only within 100 miles of coast) | NUMBER OF COAL FIRED PLANTS | | PERCENTAGE OF COAL BURNED OF ALL FUELS BURNED | |
|---|---|---|---|---|
| | 1964 | 1972 | 1964 | 1972 |
| NEW ENGLAND | 32 | 4 | 61% | 4% |
| MIDDLE ATLANTIC N.Y.,PA., N.J. | 44 | 13 | 63% | 19% |
| SOUTH ATLANTIC DE., MD., VA., D.C. | 24 | 10 | 97% | 38% |
| | ---- | ---- | ---- | ---- |
| TOTAL | 100 | 27 | 70% | 19% |

FUEL CONSUMPTION OF UTILITIES ON NORTHEAST COAST WITHIN 100 MILES OF COASTLINE

| | COAL | OIL | GAS | NUCLEAR | TOTAL |
|---|---|---|---|---|---|
| 1964 | | | | | |
| 1964 | 40,031 | 11,952 | 4,984 | 623 | 57,590 |
| 1972 | 18,220 | 67,945 | 6,352 | 3,994 | 96,511 |

figures represent thousands of equivalent tons

The reasons for the relatively heavy dependence on oil energy sources is spelled out in some detail above. Oil becomes relatively cheaper with respect to both coal and gas throughout the 1960's. Natural gas however is and was very cheap in all parts of the United States. Gas is also very clean and is burned with almost no air pollution. This being the case, the East Coast and most regions of the country should have switched to gas for electrical power generation, home heating and so on. This dominance of gas as a source of heat and electrical energy is only exhibited in the gas-producing areas of the country. This is to be expected because pipeline transportation costs are a factor in effecting the cost of using gas. If the market for natural gas were much more subject to market conditions than it is, a substantially larger quantity of gas would flow north into the densely populated East Coast. Prices at the well head would be bid up and South Central users would find it economical to switch to oil or even coal for boiler fire use.

The Federal Power Commission regulates interstate sales of gas but does not regulate intrastate sales. On a BTU basis interstate sales of natural gas sell for roughly 40 percent of the price of oil (see Table IV). Interstate sales however, have the BTU price of gas close to 90 percent of the comparable price of oil. Intrastate buyers will bid up to what they must pay for oil to get gas. Because transport costs are low intrastate, instate users can bid higher prices for gas and yet pay below what more distant customers would pay. Natural gas then is utilized much more heavily in the gas-producing states than it would be without price controls; and as a result less oil is demanded and more oil flows to the East Coast and other energy-importing areas of the country. Secondly, the transport facilities, pipelines for natural gas, are regulated as natural monopolies. The permitted rate of return is quite low and gas pipeline companies have had difficulty attracting risk capital to the industry. Finally, with well head prices fixed by FPC rules and pipeline rates controlled by governmental regulation, there is simply little or no incentive to pump gas great distances whenever all of the gas produced can be sold to markets within a short distance. Also, natural gas is more readily marketed in the interior of the country where competition from water-borne oil is not so great. In other words, the differential in transport cost to the Midwest is much greater than is the differential to East Coast markets.

TABLE IV

PRICE COMPARISON BETWEEN GAS, OIL,

AND ELECTRICITY FOR RESIDENTIAL USE

| REGION | COST PER THERM AND COST PER KWH | COST/MILLION BTU DELIVERED TO HOME | COST/MILLION BTU OF USEFUL HEAT |
|---|---|---|---|
| U.S. | | | |
| Gas | 10.6¢/therm | $1.06 | $1.52 |
| Electricity | 2.1¢/kwh | 6.15 | 6.15 |
| New England | | | |
| Gas | 18.8¢/therm | 1.88 | 2.69 |
| Electricity | 2.6¢/kwh | 7.62 | 7.62 |
| Oil (Aug. 1972) | 20.9¢/gal | 1.49 | 2.04 |
| South Atlantic | | | |
| Gas | 12.3¢/therm | 1.23 | 1.76 |
| Electricity | 1.9¢/kwh | 5.57 | 5.57 |
| Oil (Aug. 1972) | 19.9¢/gal | 1.42 | 2.02 |
| West South Central | | | |
| Gas | 8.5¢/therm | .85 | 1.21 |
| Electricity | 2.1¢/kwh | 6.15 | 6.15 |
| Pacific | | | |
| Gas | 9.7¢/therm | .97 | 1.39 |
| Electricity | 2.1¢/kwh | 6.15 | 6.15 |

The final column above is based on seventy percent efficiency for for gas and oil heat and one hundred percent efficiency for heat from electricity, when these fuels are applied in residential structures.

Column 2 is calculated on the basis of 140,000 BTU/gallon No. 2 Fuel oil.

The data and narrative presented above indicate that relative prices as influenced by supply and demand do seem to be able to explain the consumption patterns of regions. The determinants of demand and supply are very complex and are subject to changes over time. However, a rudimentary beginning can be made on the demand side by utilizing regional cross sectional data on total consumption and the energy mix consumed in states and regions.

To begin with a simple liner model of energy consumption in terms of BTU's in each state might be stated as follows:

$$E^i = f\left(\frac{p^i E}{p},\ Y^i,\ N^i,\ I^i,\ D^i,\ W^i,\ A^i,\ S^i\right)$$

$$\sum_{i=1}^{50} E^i = \text{total energy consumed in United States, 1960, 1965.}$$

Where:

$E^i$ = total energy in BTU's consumed in state i, in years 1960, 1965.

$p^i$ = weighted average of energy prices from all sources in state i in 1960, 1965.

$p$ = general price level for all commodities, 1960, 1965.

$y^i$ = total personal income in state i, 1960, 1965.

$N^i$ = number of residents in state i, 1960, 1965.

$I^i$ = index or total value of industrial activity in state i, 1960, 1965.

$D^i$ = population density in state i, 1960, 1965, or alternatively, the availability of public transportation in the cities of state i, 1960, 1965.

$W^i$ = degree days in state i, 1960, 1965.

$A^i$ = automobile registrations in state i, 1960, 1965.

$S^i$ = air pollution standards in cities in state i, 1960, 1965. This may be a dummy variable taking the value of 0 in 1960, and of 1 in 1965 in cities where standards were promulgated in 1964 and 1965.

These variables should be able to explain a significant portion of the variation of total energy consumption in the states in the two periods where data is available on BTU consumption. An alternative model may want to explain

per capita differences in energy consumption, and for this purpose, all the independent variables could be expressed in per capita terms if desired. If the preceding model is reasonably successful in explaining the differences in state consumption for energy in total, then a further refinement of the model is possible.

The next step in the process would be to explain the energy mix among the various states. An equation for the demand for each fuel source can be set up with the prices of the fuel source and the prices of substitute fuels also determining in part, the position of the demand curve for fuel from a certain source. Some of the same demand variables would appear in all of the equations as follows:[3]

$$E_o^i = f\ (P_o^i,\ P_c^i,\ P_g^i,\ Y^i,\ N^i,\ I^i,\ D^i,\ W^i,\ S^i,\ A^i)$$

$$E_g^i = f'\ (P_o^i,\ P_c^i,\ P_g^i,\ Y^i,\ N^i,\ I^i,\ D^i,\ W^i,\ S^i)$$

$$E_c^i = f''\ (P_o^i,\ P_c^i,\ P_g^i,\ Y^i,\ N^i,\ I^i,\ D^i,\ W^i,\ S^i)$$

$$S_o^i = f^1\ (P_o^i) = E_o^i$$

$$S_g^i = f^2\ (P_g^i) = E_g^i$$

$$S_c^i = f^3\ (P_c^i) = E_c^i$$

In some cases, regional data might have to suffice if price data on a state-by-state basis does not exist. Additional price data could be approximated by transport costs data. For example, the price of coal at the production site is known for every state. Transportation costs are approximately $.008 per ton mile for coal, so that the delivered price may be calculated readily if the distance from the nearest mine source is known. Gas prices are similarly known and controlled at the well head, and pipeline rates per mile can be calculated as well. Nuclear power is ignored in the above, although it

[3] See for example, Paul MacAvoy, Price Formation in Natural Gas Fields, (Yale University Press, 1962).

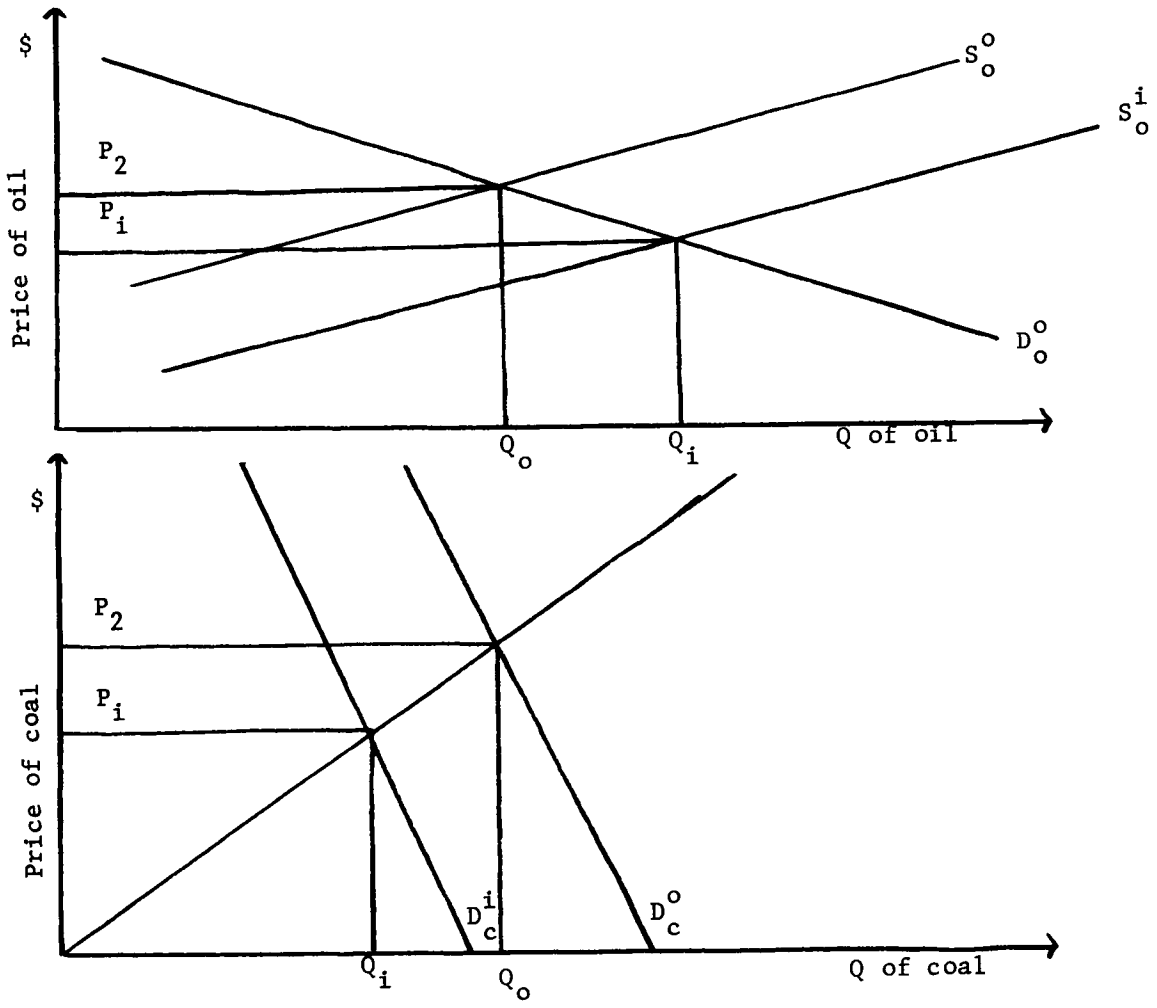
does become more important in the 1970's. Similarly, hydro-electric power is ignored here, although it may be reasonable to estimate the demand and substitution possibilities in the regions of the country where hydro-electric power is quite important.

The set of demand equations and supply relations may enable the investigator to estimate with reasonable reliability the state differences in energy consumption. If this is the case, it may be possible to extend the model to the county level. County data is available, in census years at least, for all of the variables in the equations. Estimates of county consumption patterns can be built up by using the regression coefficients developed from the state models developed above. The model can be checked out by plugging in the county data and generating estimates of each energy source. If the proportions of energy consumption are correct when aggregated across counties, the model can be indirectly verified in this manner.

The model can then be used to estimate the impact of a shift in supply in one or more of the energy sources on the demand for a third energy source. For example, the import quota relaxation on residual fuel had the result of shifting the supply of oil to the right. Oil prices, and residual oil in particular would fall or not use as rapidly as they would otherwise. The quantity demanded for oil would increase as users of oil shifted from now higher priced alternative fuels. Figure 5 depicts the situation.

In the middle 1960's, the opening of the import quota for residual oil had the impact of shifting the supply curve for oil to the right resulting in a lower price and larger quantity demanded. Because of the substitute goal relationship between coal and oil, a reduction in the price of oil will, everything else being euual, result in the demand curve for coal, shifting downward and to the left, from $D_c^o$ to $D_c^1$. The price of coal falls, and the quantity of coal exchanged is reduced, depending on the shape and slope of the demand and supply curves for coal. The regression equation set out above can be used to measure the extent of the demand shift created by a shift in supply of a substitute. The regression coefficient for the price of oil in the demand equation for coal is, in one sense a measure of the degree of substitutability and the size of the demand shift created by a change in the price of a substitute good.

Figure 5


$
Price of oil
$S_o^o$
$S_o^i$
$P_2$
$P_i$
$D_o^o$
$Q_o$
$Q_i$
Q of oil
$
Price of coal
$P_2$
$P_i$
$D_c^i$
$D_c^o$
$Q_i$
$Q_o$
Q of coal

One measure of the degree of substitution is a measure of the cross elasticity of demand. The cross elasticity is defined as the ratio of the percentage change in the quantity of one good, with respect to the change in the price of another good that is either a complement or a substitute. Expressing our demand equation in a linear and additive manner, the equation for the demand for coal may be written as follows:

$$E_c^i = a_o + a_1 P_c^i + a_2 P_o^i + a_3 P_c^i + \ldots\ldots + a_8 S^i$$

The regression coefficient for oil price as $a_2$ and $a_2$ is equivalent to $\frac{\partial E_c^i}{\partial P_o^i}$. In other words, $a_2$ measures the extent to which a change in the price of oil will change the demand for coal, all other things being equal. The coefficient of cross elasticity of demand,

$$N = \frac{\partial E_c^i}{\partial P_o^i} \cdot \frac{P_o^i}{E_c^i} .$$

The value of N can be estimated from data on a cross sectional basis by multiplying $a_2$ times the ratio of the average price of oil to the average quantity of coal consumed. The resulting value of N is then a measure of the impact of say $a^1$ percent drop in the price of oil caused by an increase in the supply of oil.

An example of the application of the above would be a situation where N = 2 and the price of oil drops by 5 percent. The demand for coal would then fall by 10 percent as a first approximation. A more precise model would recognize that a 10 percent shift in the demand for coal would be offset, in part, by a reduction in the price of coal and a consequent increase in the quantity demanded for coal, followed in turn by a small shift in the demand for oil and another decrease in the price of oil. These secondary shifts in demand and price are assumed to be negligible in size, although it is possible that this assumption does not fit the facts in the case of coal and oil. At any rate, a reduction in the price of a good like oil caused by an increase in supply will have a tendency to reduce both the output and the price of substitute goods.

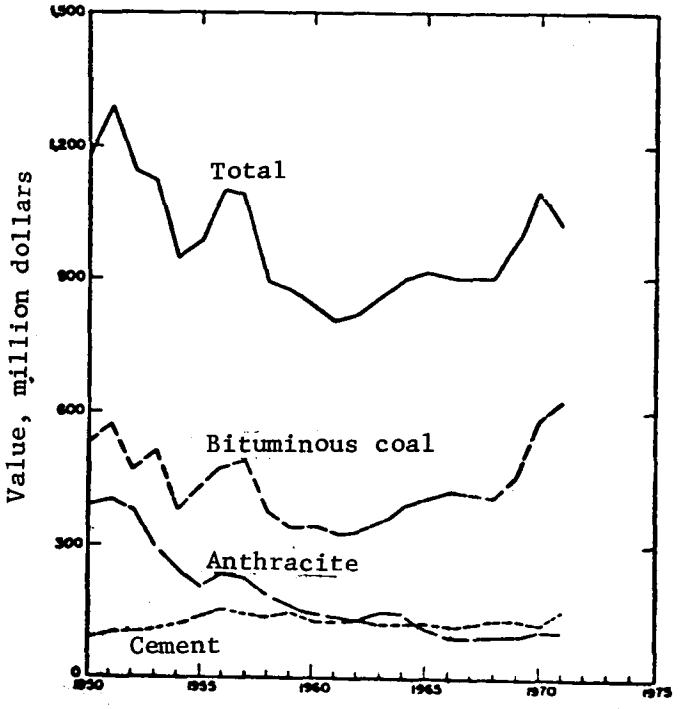
Clearly this did happen in the coal industry during the 1960's, as Figure 6 indicates. The total value of coal produced in Pennsylvania for example drops off its trend in 1966 with the advent of the relaxation of residual oil quotas, and does not recover until the latter part of 1968.

The reduction in the output and the value of output is accompanied by increased unemployment in the coal industry, by reduced profits and wages earned by firms and men employed in the industry, and by a reduction in the number of coal mines operating in the industry (see Table V). The high cost, low productivity, underground mines are the most likely to shut down or halve the industry as demand shifts downward. Highly mechanized mines and strip mining are generally more productive, lower cost operations and these are likely to contract output somewhat but not shut down. Of course, the reduction in value of output leads to smaller earnings for both capital and labor in the mining industry and in industries related to mining that either supply inputs to the mining industry or transport coal to final users. These related industries also suffer a decline in gross earnings and employment as electric utilities in particular shift from coal to oil in response to a greater supply of oil and to higher user costs associated with burning coal under stricter pollution standards.

The demand model set out above is a tool that would enable the investigator to isolate the impact of a supply shift due to a supply shift. In this same period, the user cost of coal is rising not because coal prices are rising, but because air pollution standards make coal either completely unsuitable or a very high cost mode of electricity generation. Higher stacks and stack scrubbers are needed in order to attain sulphur emission limits. Coal can be crushed and washed to reduce some of the sulphur content, but this again is an expensive process. Both of these developments resulted in a substantial shift in energy input mixes during the latter part of the 1960's.

From a regional point of view, these impacts in the coal industry are not the end of the story. As coal employment and incomes fall off, employment in the production and distribution of the oil and gas industries increase. Substantial quantities of both crude and residual oil entered eastern ports to be refined or shipped to final consumers. In addition, the larger quantities of oil at lower prices induce increased development of petrochemical and other

Figure 6




Source: Minerals Yearbook, 1971.

Table V

WEST VIRGINIA

| Year | Output | Value of Output | Employment in Coal Mining | Unemployment Rate, W. Va. |
|---|---|---|---|---|
| 1952-55 | 137,374 | $690,763 | ------ | ------- |
| 1957 | 156,842 | 875,587 | 71,201 | --------- |
| 1958 | 119,468 | 635,201 | ------ | 10.3 |
| 1959 | 119,692 | 621,003 | 53,847 | 10.1 |
| 1960 | 118,944 | 597,222 | 51,062 | 11.9 |
| 1961 | 113,070 | 558,525 | ------ | 13.5 |
| 1962 | 118,499 | 578,293 | 43,763 | 12.0 |
| 1963 | 132,568 | 634,794 | 44,647 | 10.3 |
| 1964 | 141,409 | 693,572 | 45,200 | 8.8 |
| 1965 | 149,191 | 726,096 | 45,000 | /7.8 |
| 1966 | 149,681 | 753,851 | 44,369 | 6.8 |
| 1967 | 153,749 | 800,683 | 44,400 | 6.4 |
| 1968 | 145,921 | 775,720 | 42,121 | 6.5 |
| 1969 | 141,001 | 807,811 | 42,600 | 5.5 |
| 1970 | 144,072 | 1,142,215 | 46,171 | 6.4 |
| 1971 | 118,258 | 1,128,282 | 45,700 | 6.9 |

------ indicates data not available.

Source: Minerals Yearbook, various years.

industries that utilize crude oil and residual oil for feedstocks in their production processes. Regional statistics on the employment and income effects of oil imports are much more difficult if not impossible to obtain, but oil refineries are generally considered to be more capital intensive than mining. This being the case, less direct employment is created by an equivalent increase in mining output. But more employment is created in constructing refineries and storage facilities for oil as oil capacity expands more than it would without the quota change. On balance, the direct and indirect employment and income effects could be offsetting as between oil and coal. More on this point cannot be said unless a much finer regional breakdown of employment and incomes in the petroleum industry is attainable.

Even then, the existing figures would have to be interpreted very carefully. One must isolate the additional or marginal changes due to a marginal change in the supply of oil, just as one must evaluate the extra or additional unemployment due to a supply increase of oil. Employment in the mining industry was falling off before imports of oil began to increase. This was a deliberate policy objective of the United Mine Workers after World War II. Miners' wages were pushed to high levels and employment fell off rapidly. Another factor to be taken into account is that the rapid rate of productivity increases as measured by output per man hour. This would put a downward pressure on coal prices without oil supplies increasing. However, total earnings or total value of coal produced would not have gone down so long as the demand for coal was relatively elastic, and the fact that coal has good substitutes would imply that the demand cure is elastic.

Finally, one other aspect of the impact must be ascertained. To the extent that oil and gas are cheaper, cleaner, and more convenient to produce, transport and utilize, consumers receive an increase in their real incomes. These gains reflect the reduction in man hours and capital needed to produce a given amount of energy and are clearly the net benefits to the region as a whole. The benefits are clearly positive because the consumers of energy directly and indirectly chose to substitute the more preferred fuel source for a less preferred one. These net benefits are positive for the region as a whole, but may be negative for some parts of a region. This same argument

can be extended to any change in the economic system that affects relative prices and the value of resources. Typically, the benefits are diffused throughout the region and are relatively small per capita. Typically also, the costs are not diffused, but are localized and these costs are therefore much larger per capita. No doubt, this same situation holds true in the coal producing regions of the East Coast. The above reasoning holds so long as prices measure the true marginal cost of production and consumption of oil or gas. It is probably true that the prices of both oil and coal are determined under reasonably competitive conditions, so that private marginal cost approximated the market price in both markets. On balance, one could argue that coal prices did not fully reflect the social externalities or social costs of production and consumption. Strip mining in particular leads to environmental costs of water pollution and land degradation. Similarly, burning high sulphur coal results in air pollution given current technology (see Table VI). Moreover, black lung and mine accidents are other externalities not fully reflected in coal's price. On these counts a case can be made that the reduction in production and consumption of coal occasioned by increased oil supplies actually reduced particular costly externalities related to coal's use. A tolerably accurate estimate of these externalities is probably difficult to attain. But a simple enumeration of the indidence of black lung disease, mining accidents, miles of streams polluted with acid drainage, acres of land scarred by strip mining and the health hazzards due to air pollution would give a qualitative picture of the costs. Table VI indicates the extent to which coal utilization contributes to sulphur dioxide emissions in the United States.

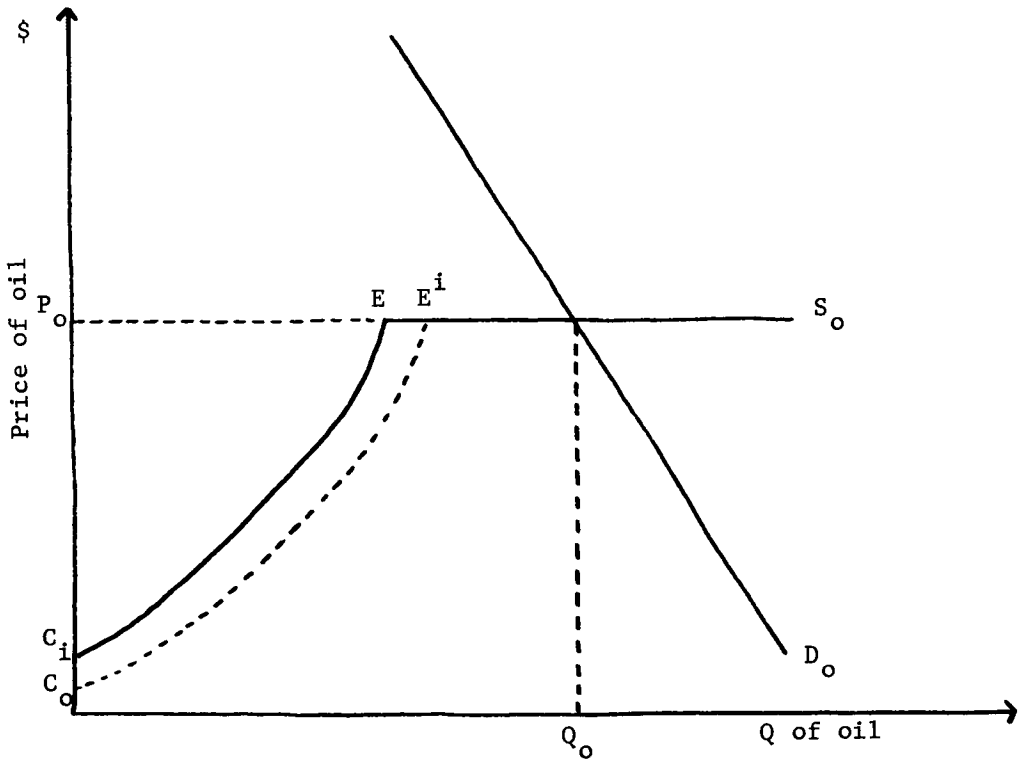
The extension of the same type of analogous reasoning to offshore oil finds and production of offshore oil is very tenuous for several reasons: the shape and slope of the supply curve in question is quite important. Suppose the supply curve contains two parts? An upsloping domestic curve, and a substantial imported component that indicates the U. S. can import all of the oil it wants at the going world price for crude or residual. Suppose the supply and demand situation appears as follows (see Figure 7, next page):

TABLE VI

EMISSION OF $SO_2$ IN THE U.S. BY VARIOUS PROCESSES IN 1966

| SOURCE | THOUSAND TONS PER YEAR |
|---|---|
| **Fuel combustion** | |
| **Coal, power plants** | 11,925 |
| **Coal, other** | 4,700 |
| **Oil, power plants** | 1,218 |
| **Oil, other** | 4,386 |
| **Natural gas** | 3 |
| **Ore smelting** | 3,500 |
| **Petroleum refining** | 1,583 |
| **Sulfuric acid manufacture** | 550 |
| **Coke processing** | 500 |
| **Refuse burning** | 200 |
| **Miscellaneous** | 75 |
| **Total** | 28,640 |

Figure 7



The U. S. domestic price is determined in this case by the import price of foreign crude. Domestic crude producers whose costs are below the imported price will supply OQ, and receive price OP. These firms will earn substantial rents because prices will be above their cost of production. An offshore oil find which simply replaces some of the imported crude will shift the supply curve as depicted from $S_o^0$ to $S_o^1$, but this will not cause the domestic price to fall. The firms that supply the new offshore crude will receive substantial rents or profits, but the price of oil does not fall, and the quantity demanded does not increase and displace coal production. So we conclude that since $\Delta P_o^1$ is zero, the change in coal demand $\Delta E_c^i$ is also zero.

The actual supply-demand configuration is difficult to stipulate in an a priori way. Perhaps the discovery will shift the supply curve in a significant manner, that is, in a manner that will definitely affect the price or availability of oil and gas. Probably one can say more about the effect of a significant discovery of gas. The substitution effects are not likely to arise because the price that will fall will depend on the FPC policy decisions, but because excess demand is already evident and there is a substantially larger quantity demanded at prevailing prices than is supplied at prevailing prices on the East Coast and elsewhere. The most likely type of substitution will entail a substitution of East Coast gas for Permian Basin and other Southwestern suppliers. Moreover, gas will supplant residual and distillate fuel oil and electricity for household use. If this does happen some oil will become available for possible coal substitution at electrical power plants.

The impact and substitution possibilities described above will be tempered by uncertainties: how much gas and oil will be discovered and what will energy markets look like in 1980-1985? What changes in technology are likely to occur by then, and what will be the supply decisions and pricing decisions of the OPEC countries in the next 10 years? One estimate of the ultimate recoverable deposits of gas and oil is that 13 billion barrels of oil and 74 trillion cubic feet of gas may be obtained offshore.[4]

[4] O. B. Shellbourne and L. Litwak, "Future Hydrocarbon Potential of Atlantic Coastal Province," in Future Petroleum Provinces of the U.S.: Their Geology and Potential, ed. by Ira H. Crum (Tulsa, Oklahoma American Association of Petroleum, 1971) II, 1295-1310.

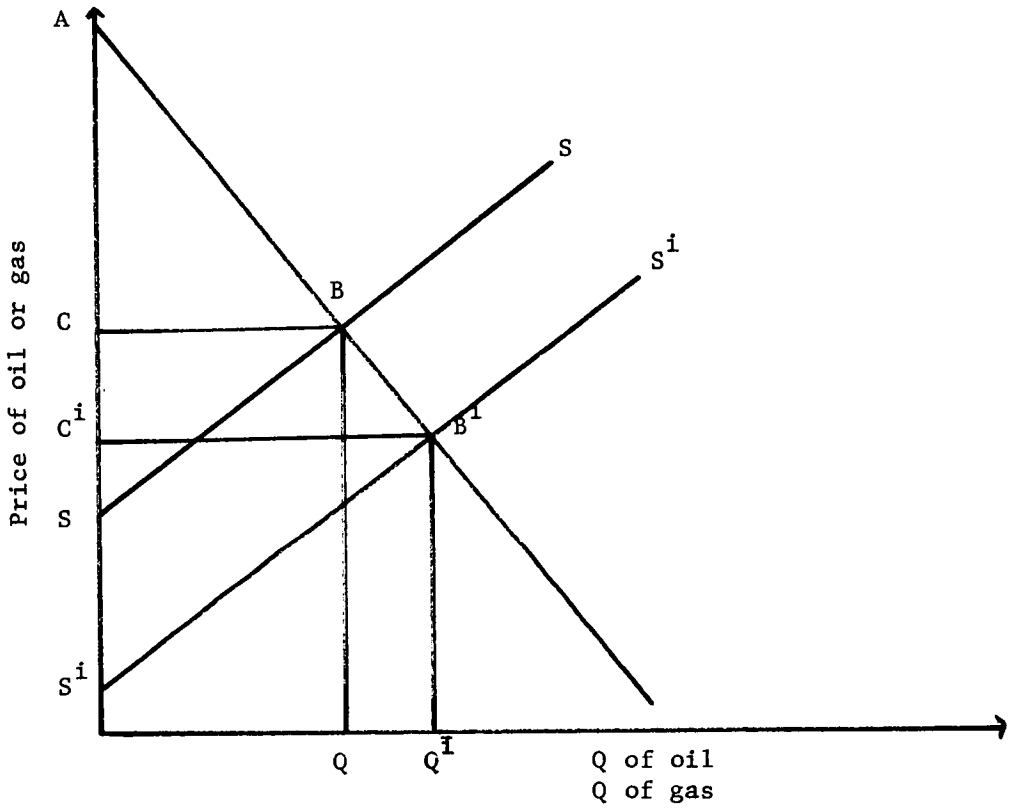
Depending on the flow rate of output from these additional reserves, this could result in a substantial shift in the regional supply of crude and natural gas.

SUMMARY

As a general statement of the costs and benefits associated with economically significant finds of oil and gas, it is clear that several possibilities hold. Suppose the economy is at full employment so that regional and national multipliers of the usual type can be ignored. A fully employed economy cannot experience a multiplier impact on real output and employment. Now a discovery of gas and oil which significantly shifts the supply curve of energy on the East Coast will have the effect of reducing energy prices and result in a real income increase to regional and extra-regional consumers of energy. This effect could be measured if the demand curve were known, and in reality it is the increase in consumer's surplus. In the diagram following, Figure 8, this would be equal to the area $CBB^1C^1$. In addition producers' surplus would also increase from CBS to $C^1B^1S^1$. This increase in producers surplus can be broken down into several components: increased incomes and earnings of factors of production including increased profits of firms in the industry, and increased governmental rent or royalty payments. These would exhaust the total of increased producers' supplies depending on the elasticity of supply and demand for the factors of production and the governmental contract terms and lease agreements. If the federal government receives the bulk of the lease payments from private industry, then the East Coast region would have to be apportioned its share on some tax and federal expenditure incidence relationship.

Some other of the above benefits as measured by the producers' and consumers' surplus will be extra-regional in impact. For example, an increased supply of oil and gas on the East Coast will cause supply adjustments in the South Central and South Western regions of the country. Since less oil and gas is being supplied to the East Coast, a larger supply will remain for customers in these producing regions. Consumers' real incomes will rise and producers' incomes will tend to fall in these producing and exporting regions of the U. S. In the same vein, profits earned by East Coast oil producers may flow out of the East Coast region to residents of other areas.

Figure 8



The gains in real income experienced by consumers and producers however distributed are the only gains in the region at full employment. As stated above, the so-called multiplier impacts could only occur in real terms if substantial chronic slack in the labor force prevailed in the East Coast region. Several costs are apparent as well: the temporary and long-term unemployment experienced in these regions and the reduction in the value of resources experienced by the West Virginia and Pennsylvania soft coal industry. Another potential cost is the loss in environmental quality and recreational uses of the East Coast beaches and bays. The cost should be properly compared to the environmental and other damages associated with coal production and consumption. All told, it appears possible to estimate in money terms some of the costs and benefits outlined above. For example the overall cost or benefit to the region would be a summation of the quantitative costs and benefits and a listing with descriptions and probabilities of a qualitative scale of the non-measurable costs. These calculations are not changed appreciably if temporary or frictional unemployment exists throughout the East Coast region. Only if a chronically depressed region or sub-region exists would the employment effects and the utilization of a regional multiplier effect be warranted.