Coastal Zone
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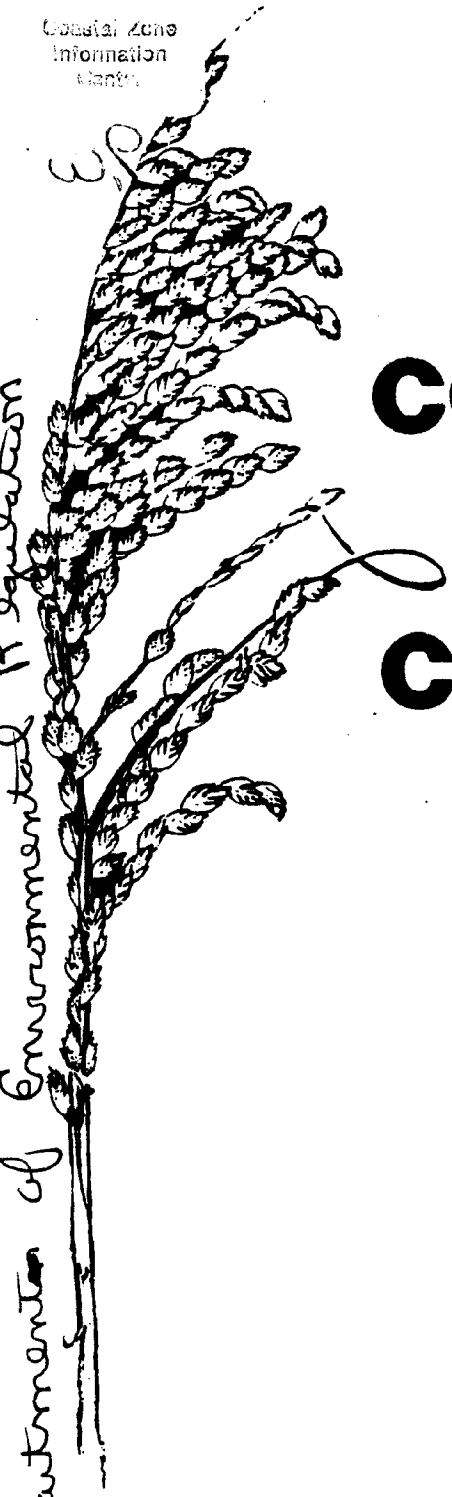

# COASTAL ZONE PROTECTION

# CONSERVATION ELEMENT

COASTAL ZONE

INFORMATION CENTER

## BROWARD COUNTY COMPREHENSIVE PLAN

BROWARD COUNTY
FLORIDA
MARCH 1981

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1981

Fl. Department of Environmental Regulation

# THE COASTAL ZONE PROTECTION/CONSERVATION ELEMENT

# OF THE

# BROWARD COUNTY COMPREHENSIVE PLAN

Prepared By

Broward County Office of Planning
March 1981

This element has been prepared in conformance to the Local Government Comprehensive Planning Act of 1975. Chapter 163, Florida Statutes.

## BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS

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Adopted by County Ordinance No. 81-13

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Mr. Larry Gore, Sierra Club
Mr. Pete Rhoades, South Florida Water Management District
Mr. Wesley Sarvis, Florida Wildlife Federation
Mr. Lew Watson, Broward County Agriculture Division
Mr. Donald Stone, Broward County Parks and Recreation Division
Broward County Environmental Quality Control Board
Broward County 208 Project Team
South Florida Regional Planning Council
Broward County Environmental Coalition
FAU-FIU Joint Center for Environmental and Urban Problems
Soil Conservation Service

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# PREFACE

The Coastal Zone Protection/Conservation Element has been prepared under the guidelines of the Broward County Charter, the Broward County Land Use Plan, the Local Government Comprehensive Planning Act (Chapter 163, Florida Statutes), and Broward County Ordinance 76-4. The objectives, policies and recommendations cited herein are to be followed in the protection of Broward County's Coastal Zone and the conservation and environmental management of the County's natural resources.

The Coastal Zone Protection/Conservation Element shall be legally binding and enforced in the Unincorporated Area of Broward County and shall also be legally enforceable countywide whenever the County's minimum standards protecting the environment are more stringent than those of municipalities, in accordance with the parameters set forth in Sections 8.04 and 8.17 of the Broward County Charter.
It also shall serve as a guide in a countywide approach to addressing environmental issues and planning principles. Local governments are encouraged to utilize its contents in total, in part, or with applicable modifications in designing municipal plans and elements. All coastal zone protection and conservation elements of comprehensive plans drafted by municipalities within Broward County shall be reviewed by the Broward County Office of Planning for coordination with this element of the County's Comprehensive Plan.

# INTRODUCTION

Fig. 1 and 2. These two sites, the Red Mangrove Swamp (top) and the Everglades Conservation Area (bottom) represent a major environmental issue in the County-the wetland protection vs development conflict. Both coastal wetlands and interior wetlands are vulnerable to development pressure.

## SCENARIO OF A COASTAL COUNTY

The post World War II era has witnessed the massive influx of the nation's population toward coastal areas. A report of the Southern Demographic Project notes that between 1940 and 1970, "the number of people living within fifty miles of the four coastal shorelines has increased by 47.8 million."[1] This shift from the center of the country to the coasts can be expected to continue. Such rapid growth strains the capabilities of local governments to provide support services such as roads and sewers. Competing demands for land uses in coastal areas may result in significant environmental degradation, thus threatening the quality of the resources which attracted growth originally.

Consistent with these nationwide trends, many communities in South Florida have experienced high rates of in-migration. Broward County, situated between Dade and Palm Beach Counties, was reported to be the fastest growing county in the nation between 1960 and 1970.[2] New residents generated intensive demands for residential development along the Atlantic coastline, thus competing with the recreational uses which are a major component of the County's economic base. At the same time, local communities found it difficult to provide the service needs of new developments. Consequently, they were challenged to develop more effective strategies to accommodate growth while maintaining the quality of life in Broward County.

The continuing population shift to coastal areas increases consumer demand for new housing, employment opportunities, and public services. Since the competition for coastal lands is keenest in urban areas, developmental pressures on the County's undeveloped land becomes intensified. In many cases the remaining vacant land is often wetlands. Dredge and fill techniques are usually then needed to make this land suitable for development. As a result, canal dredging and the subsequent landfill has typified much of the newer developments throughout South Florida. For the consumer, this technique provides not only housing but also access to the sea and water-adjacent living.

Canal-type developments might not cause alarming problems in and of themselves, except that the nation has lost over one-half million acres of wetlands through dredge and fill operations. Although navigation is the principal purpose for this dredging, commercial and housing development is second. The wetland preservation development conflict is a key example of the land-water relationship which is the heart of the Coastal Zone Management Program.

The fundamental concern of coastal zone management and conservation is that the components of the environment are interdependent and functionally related. There is also an ethical consideration behind the concept of management and conservation in that every user of land is,

in fact, a trustee responsible for future generations which will depend upon the same land. Decisions of one generation create the environment of the next. These decisions concerning the utilization of land and coastal resources are made invariably in an atmosphere of conflicting societal pressures pursuing a broad spectrum of community objectives.

## PURPOSE OF THE COASTAL ZONE PROTECTION/CONSERVATION ELEMENT

The purpose of the Coastal Zone Protection—Conservation Element is to serve as a resource protection and management guide for the County. The Element should aid local officials, planners and citizens in the decision-making process which allocates the County's natural resources to particular uses and controls the manner in which resources are utilized.

The Element approaches the problem of resource management on two levels: one addressing specific environmental issues, the other identifying particular sites which are unique and/or significant geographic areas. The basis of the approach to protection and management of the County's resources is the identification of various competing and conflicting goals and objectives. The diverse goals, objectives and policies stated in this Element should serve as a framework for the management of the County's essential and fragile resources—land, air and water. The recommendations for implementation represent some of the alternative mechanisms for accomplishing these objectives and policies.

The preparation of an implementable plan or program requires the consideration of both environmental concerns and socioeconomic needs. The manner in which each local jurisdiction decides to address these issues, concerns and needs will vary according to the political, legal, administrative and socioeconomic composition of the community.

## FEDERAL AND STATE COASTAL MANAGEMENT PROGRAMS

The Federal Coastal Zone Management Act of 1972 represents the first piece of comprehensive land and water management legislation passed by

Congress. The national policy expressed in the Act includes the following goals: "To preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone for this and succeeding generations."[3] The Act provides financial assistance to those states which participate in the CZM program, since the implementation of the national policy is viewed by the Federal government as a state responsibility.

The State's voluntary participation in the Federal Coastal Zone Management Program was extended to the local level when the 1975 Local Government Comprehensive Planning Act (Chapter 163, Florida Statutes) mandated coastal planning and management at the local level. In accordance with this Act, local governments in the Florida Coastal Zone, as defined by the 1978 Florida legislature, must propose techniques for the management and regulation of coastal resources. The basic requirements of the Coastal Zone Protection and Conservation elements of the Comprehensive Plan are spelled out in the Florida Statutes, Ch. 163.3177(6):

(d) A conservation element for the conservation, development, utilization, and protection of natural resources in the area, including as the situation may be; air, water, estaurine marshes, soils, beaches, shores, flood plains, rivers, lakes, harbors, forests, fisheries and wildlife, minerals, and other natural and environmental resources, and

(g) for those units of local government lying in part or in whole in the coastal zone as defined by the Coastal Zone Management Act of 1972, Title 16, United States Code s.1453(a), a coastal zone protection element, appropriately related to the particular requirements of paragraphs (d) and (e), including surveys of existing vegetation types which need to be preserved for natural control of dune and beach erosion and surveys of traditional patterns of public access and use of beach resources, setting out the policies for:

1. Maintenance, restoration, and enhancement of the overall quality of the coastal zone environment, including, but not limited to, its amenities and aesthetic values.

2. Continued existence of optimum populations of all species of wildlife.

3. The orderly and balanced utilization and preservation, consistent with sound conservation principles, of all living and nonliving coastal zone resources.

4. Avoidance of irreversible and irretrievable commitments of coastal zone resources.

5. Ecological planning principles and assumptions to be used in the determination of suitability and extent of permitted development.
6. Propcsed management and regulatory techniques.

The Local Government Comprehensive Planning Act also requires that the CZP/Conservation Element address consistency with other County elements such as land use, recreation, and open space. Consistency with the Federal and State Coastal Zone Management Program and the State's Comprehensive Plan are important considerations in the preparation of the County's Coastal Zone Protection/Conservation Element. The consistency of local plans with State policies will be one of the requirements that the State will use in determining the allocation of program funding. Programs or projects which are awarded funds will be eligible for fifty percent of the cost of public acquisition of lands for public access to beaches and other public coastal areas.

Additional funds have been authorized by the Federal CZM Program to: (1) help encourage state and local governments plan for Coastal and Outer Continental Shelf energy development, (2) provide public facilities and services connected with OCS development, and (3) help to mitigate any unavoidable impact on environmental or recreational resources. The source of this additional funding was the 1976 Amendments to the National Coastal Zone Management Act. The CZMA required that the states develop planning processes related to beach and public coastal area access, energy facility siting and shoreline erosion. These Amendments also increased the level of Federal funding available to states for coastal zone protection planning.

The Coastal Zone Management Act fully recognizes the competitive nature of the uses of coastal areas. The Act calls for a coastal management system which permits "conscious and informed choices among developed alternatives..."[4] In order to identify competing objectives and needs for the resources of the County, it is necessary that we understand the population and development trends which have occurred in the past and are expected to occur in the future.

The section "Population and Development Trends" addresses this topic and some of the growth impacts which have occurred as a result of urban development.

## DELINEATION OF THE COASTAL ZONE

The delineation of Broward County's coastal zone was determined by boundary criteria outlined in the State of Florida Coastal Management

Program Threshold Draft.[5] As required in the Coastal Zone Management Act, the boundary of the coastal zone must be broad enough to include those uses and activities which have a direct and significant impact on coastal waters. It must include transitional and intertidal areas, salt marshes and wetlands, beaches, islands, and all state waters with a measureable quantity of salt. The seaward limit of the coastal zone is the limit of the State's jurisdiction as described by law.

The 1978 session of the Florida State Legislature identified the coastal zone as an area composed of those cities and counties which abut the Gulf of Mexico or the Atlantic Ocean, or which include or are contiguous to waters of the State where marine species or vegetation listed by rule pursuant to Chapter 403.817 Florida Statutes, constitute the dominant plant community. Based upon guidelines established by the State of Florida, the following units of local government in Broward County are required to complete Coastal Zone Protection Elements.[6]

Broward County (Unincorporated)
Dania
Deerfield Beach
Fort Lauderdale
Hallandale
Hillsboro Beach
Hollywood
Lauderdale-By-The-Sea
Lighthouse Point
Oakland Park
Pompano Beach
Sea Ranch Lakes
Wilton Manors

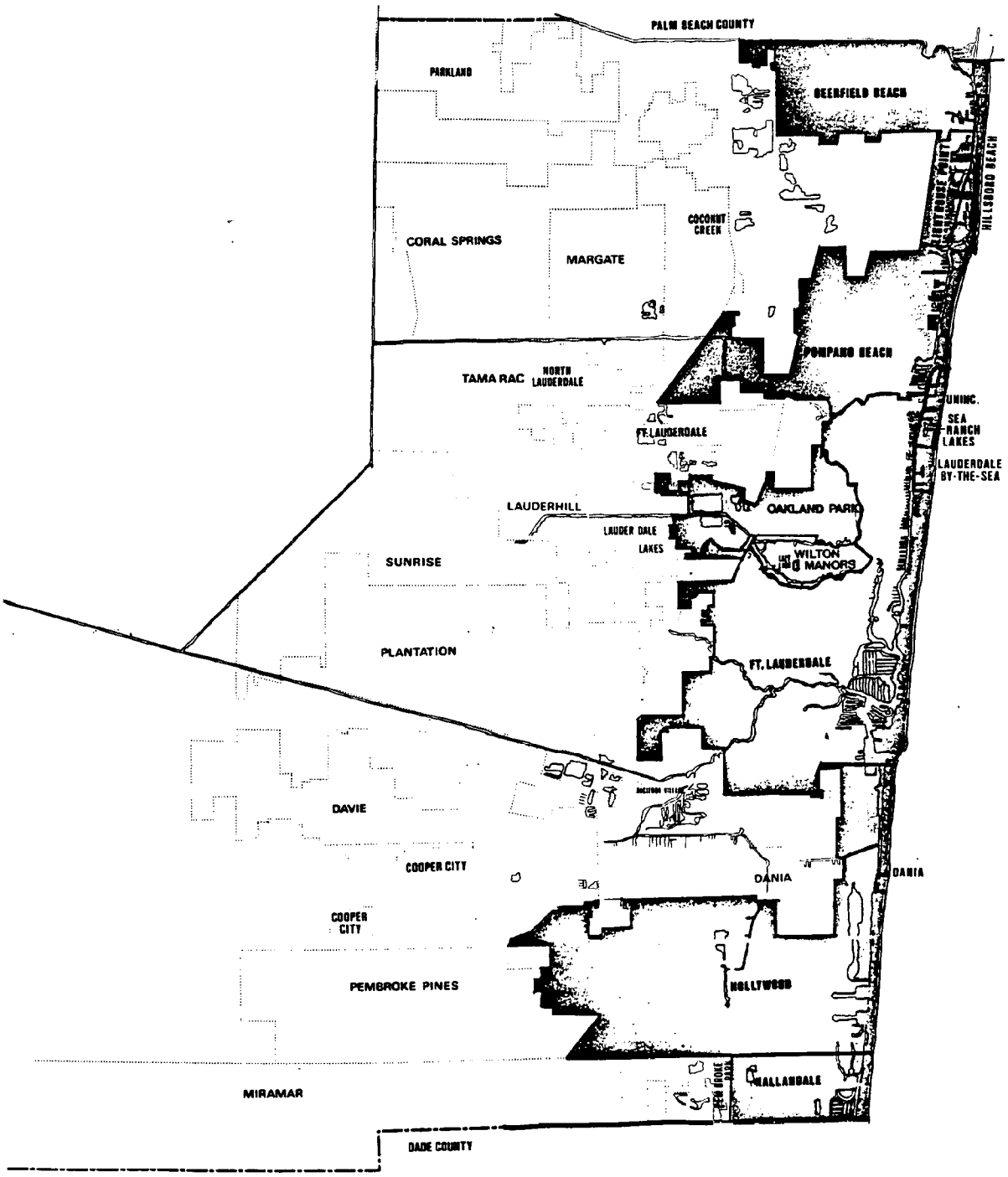
Map 1 identifies the coastal zone municipalities involved in the Coastal Zone Management Program. Only those cities listed above are eligible for state financial assistance to develop coastal zone protection elements.

Nevertheless, the Legislature by realizing the intricacy of hydrological systems requires all lands within the State to be subject to existing statewide policies and authorities as applied. It is also within the entire state area that technical assistance and other program benefits may occur. Thus, for example, financial and technical assistance could be provided to a water management district for an inland project that might affect estuarine resources.

Based upon the objectives of the State Coastal Zone Management Program and the intricate hydrology of Broward County, the goals and objectives of this Coastal Zone Protection—Conservation Element are to be observed countywide.

Map 1.

# COASTAL ZONE MUNICIPALITIES




COASTAL CITIES REQUIRED TO PREPARE COASTAL ZONE PROTECTION ELEMENTS

## POPULATION AND DEVELOPMENT TRENDS

Broward County's rapid population growth has changed much of its original character and brought new demands to its economy and environment. As stated in the Broward County Land Use Plan, the growth explosion saw the population quadruple to 333,946 by 1960, making Broward County the fifth most populous county in Florida. By 1970, the population had doubled again to 620,000 ranking the County's population second only to Dade. During the decade of the 1960's, Broward County was reported to be the fastest growing county in the United States.[7] Figure 3 lists population estimates by municipalities and the unincorporated area for 1960, 1970, 1975 and 1978. As indicated on Figure 3, over half (seventeen) of the municipalities in Broward County increased in population by over 50 percent between the years 1970 to 1978.

Various estmates for future growth of the County do predict continued population growth. Figure 4 graphically displays the University of Florida population ranges projected for Broward County. Although both the high projection and the low projection are considered possible, the University of Florida believes that the medium projection is the most likely course of the County's future population. The population range predicted for the County is dependent upon many factors. These factors are addressed in the Land Use Plan.

The University of Florida projections are based on certain assumptions about the level of growth that is likely to occur in the future. However, these assumptions do not consider the effect that governmental actions may have on future levels of growth and, therefore, may not accurately reflect the growth potential of Broward County. The Broward County Land Use Plan includes a Land Use Plan Map that denotes land uses and densities for all of Broward County. The number of dwelling units likely to be built under the plan is estimated to be between 880,000 and 920,000 (see page 67 of Housing and Residential Uses). Considering a 5% vacancy rate and an average household size of 2.2 persons per household, the probable buildout population of Broward County is between 1.84 and 1.93 million. Unlike the University of Florida projections, the potential population figures of the Land Use Plan are based on occupancy of the permanent housing stock whether the occupants are permanent or secondary residents. The rate of growth, or how soon Broward will reach its ultimate population, will depend largely on the availability of services as determined by the development review requirements of the County Land Use Plan.[8]

The rapid growth rate of South Florida has had a pronounced effect in Older localities experienced unprecedented growth and many new communities expanded in population to levels requiring incorporation as separate units of local government. While higher residential densities remained concentrated along the beach area, the outlying western communities experienced sprawling residential and commercial development.

Today, the development pressures upon the County's remaining vacant land continue to be strong. And among many civic leaders there is a growing concern that those pressures often conflict with the goals and policies of a sound coastal zone protection and conservation program.

Population Shifts

As indicated on Map 2, projections by the South Florida Regional Planning Council indicate that by 1985 the center of growth in the southeastern region will shift from Northern Dade to Southern Broward County. Furthermore, Map 3 indicates anticipation that the shift into Broward County will be most pronounced in the County's western half where the majority of all remaining vacant land presently exists.

Excluding the County's three western Conservation Areas and Indian Reservations, single family unit residential development is the largest land use in the County, comprising 23.2 percent of the land area (Figure 5). Most of the lower density housing is in the eastern half of the developable part of the County, with some relatively scattered developments in the western portions. Multifamily residential uses account for only 2.3 percent of the coastal zone, and the "open and other" category about 11 percent. Each of the other built classifications account for less than three percent. The total for all urban or built-up uses is approximately 47 percent.

Figure 3. POPULATION TRENDS 1950-1979

Broward County, Florida

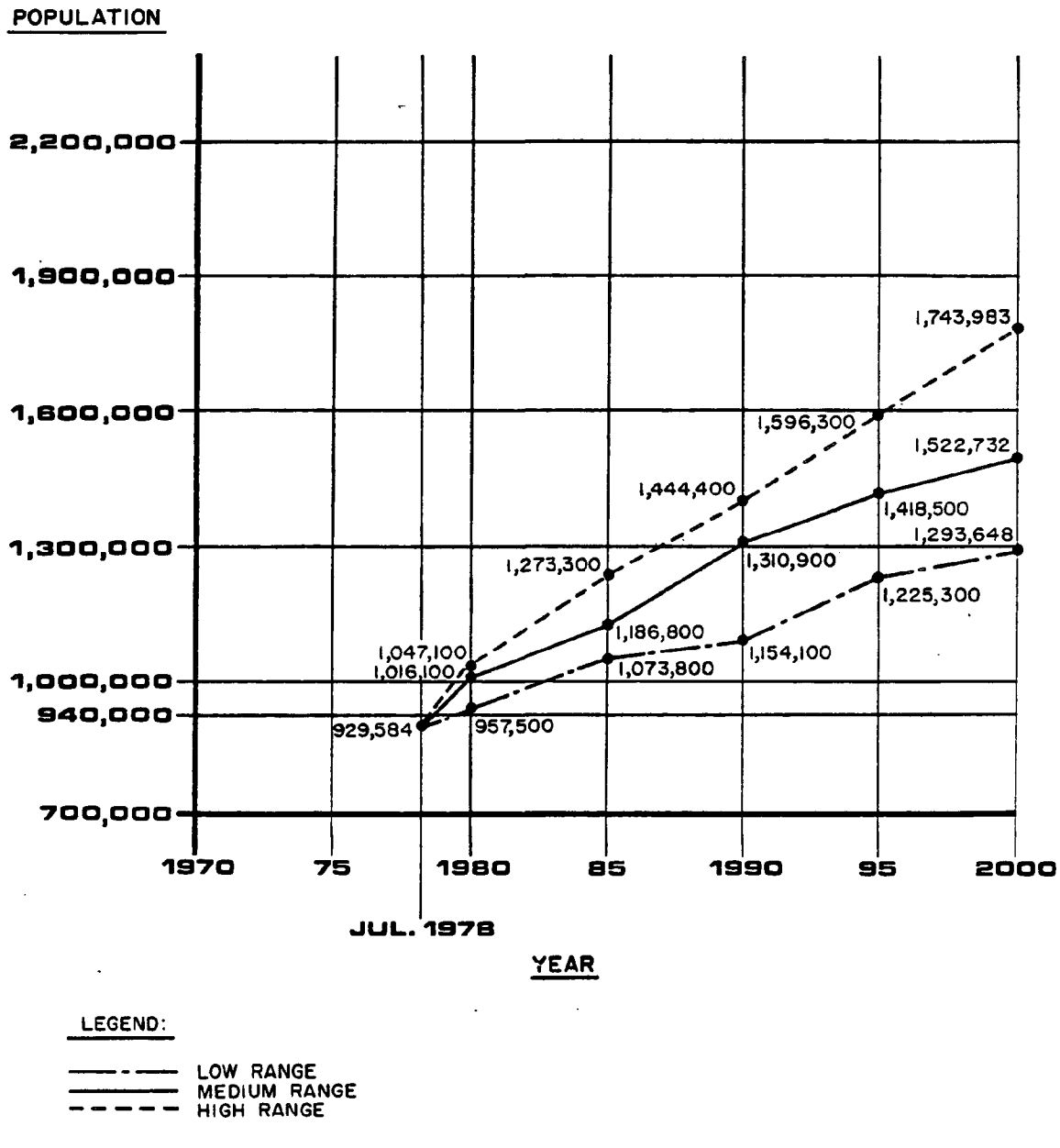
| | 1950* Pop. | 1960* Pop. | 1965° Est.Pop. | 1970* Pop. | 1976Δ Est.Pop. | 1979Δ Est.Pop. | Percentage Increase 1970-79 |
|---|---|---|---|---|---|---|---|
| Ft.Lauderdle | 36,328 | 83,648 | 116,700 | 139,590 | 154,000 | 158,000 | +13.2 |
| Hollywood | 14,351 | 35,237 | 72,200 | 106,873 | 122,400 | 124,800 | 16.8 |
| Pompano Bch | 5,682 | 15,992 | 25,100 | 38,587 | 54,250 | 58,700 | +52.1 |
| Plantation | --- | 4,772 | 11,200 | 23,523 | 42,200 | 47,600 | +102.4 |
| D'Field Bch | 2,088 | 9,573 | 14,700 | 16,662 | 30,000 | 40,300 | 145.5 |
| Lauderhill | --- | 132 | 1,950 | 8,465 | 31,600 | 38,400 | 353.6 |
| Hallandale | 3,886 | 10,483 | 16,600 | 23,849 | 34,100 | 37,500 | 57.2 |
| Sunrise | --- | --- | 2,300 | 7,403 | 28,530 | 37,400 | 405.2 |
| Margate | --- | 2,645 | 5,200 | 8,867 | 28,950 | 34,000 | 283.4 |
| Pembr.Pines | --- | 1,429 | 8,000 | 15,496 | 26,700 | 32,130 | 107.3 |
| Miramar | --- | 5,485 | 13,900 | 23,997 | 29,950 | 30,750 | 28.1 |
| Tamarac | --- | --- | 300 | 5,078 | 24,300 | 29,500 | 480.9 |
| Coral Springs | --- | --- | 10 | 1,489 | 20,200 | 27,500 | 1,746.9 |
| L'Dale Lakes | --- | --- | 4,300 | 10,577 | 24,550 | 25,900 | 144.9 |
| Oakland Park | 1,295 | 5,331 | 9,400 | 16,261 | 22,200 | 24,100 | 48.2 |
| Davie | --- | --- | 1,900 | 5,859 | 16,050 | 18,900 | +222.6 |
| N.Lauderdale | --- | --- | 40 | 1,213 | 10,280 | 16,480 | +1,258.6 |
| Wilton Man. | 883 | 8,257 | 10,100 | 10,948 | 14,250 | 14,720 | 34.5 |
| L'House Pt. | --- | 2,453 | 6,400 | 9,071 | 12,150 | 12,530 | 38.1 |
| Dania | 4,540 | 7,065 | 8,230 | 3,013 | 10,700 | 12,240 | 35.8 |
| Cooper City | --- | 550 | 750 | 2,535 | 5,550 | 7,640 | +201.4 |
| Coc.Creek | --- | --- | --- | 1,359 | 4,180 | 5,700 | 319.4 |
| Pemb.Park | --- | 569 | 1,070 | 2,949 | 4,450) | 5,280) | 79.0 |
| H'Wood RidgeFms† | --- | 108 | 124 | 302 | --- ) | --- ) | --- |
| L'Dale by Sea | 234 | 1,327 | 2,200 | 2,879 | 3,000 | 3,150 | +9.4 |
| Hillsboro Bch | 84 | 437 | 920 | 1,181 | 1,650 | 1,950 | 65.1 |
| Sea Rch Lakes | --- | 170 | 375 | 660 | 670 | 690 | 4.5 |
| Parkland | --- | --- | 50 | 165 | 320 | 350 | 112.1 |
| Hacienda Vil. | --- | 125 | 165 | 35 | 110 | 190 | 442.9 |
| Ferncrest Vil.♦ | --- | 93 | 105 | 1,029 | --- | --- | --- |
| Lazy Lake | --- | 49 | 50 | 48 | 50 | 50 | +4.2 |
| Lakeview | --- | 20 | 27 | --- | --- | --- | --- |
| Indian Res. | --- ) | --- ) | --- ) | 325 | 350 | 350 | +7.7 |
| Unincorp. Areas | 14,462) | 137,795) | 129,982) | 123,812 | 150,110 | 160,100 | +29.3 |
| TOTAL Broward Co. | 83,933 | 333,946 | 465,000 | 620,100 | 907,800 | 1,007,500 | +62.5% |

* U. S. Census of Population
° Broward County Area Planning Board
Δ Research Dept. - Broward County Planning Council

♦ Ferncrest Village - Disincorporated July 1, 1970
† Hollywood Ridge Farms - Disincorporated July 1, 1970
Annexed to Pembroke Park July 1, 1970

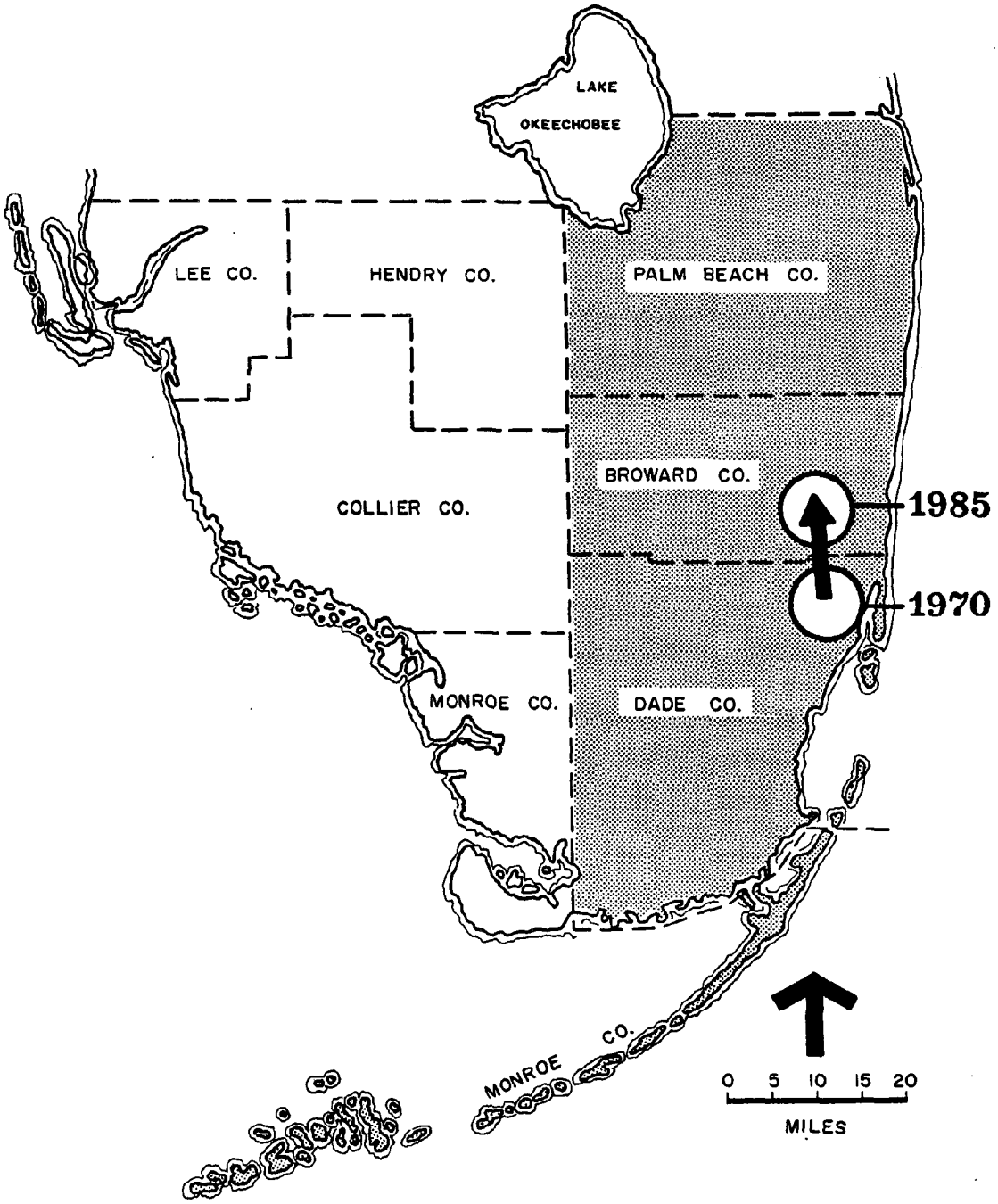
Figure 4.

# POPULATION PROJECTIONS FOR BROWARD COUNTY




SOURCE: University of Florida
Bureau of Economic and Business Research

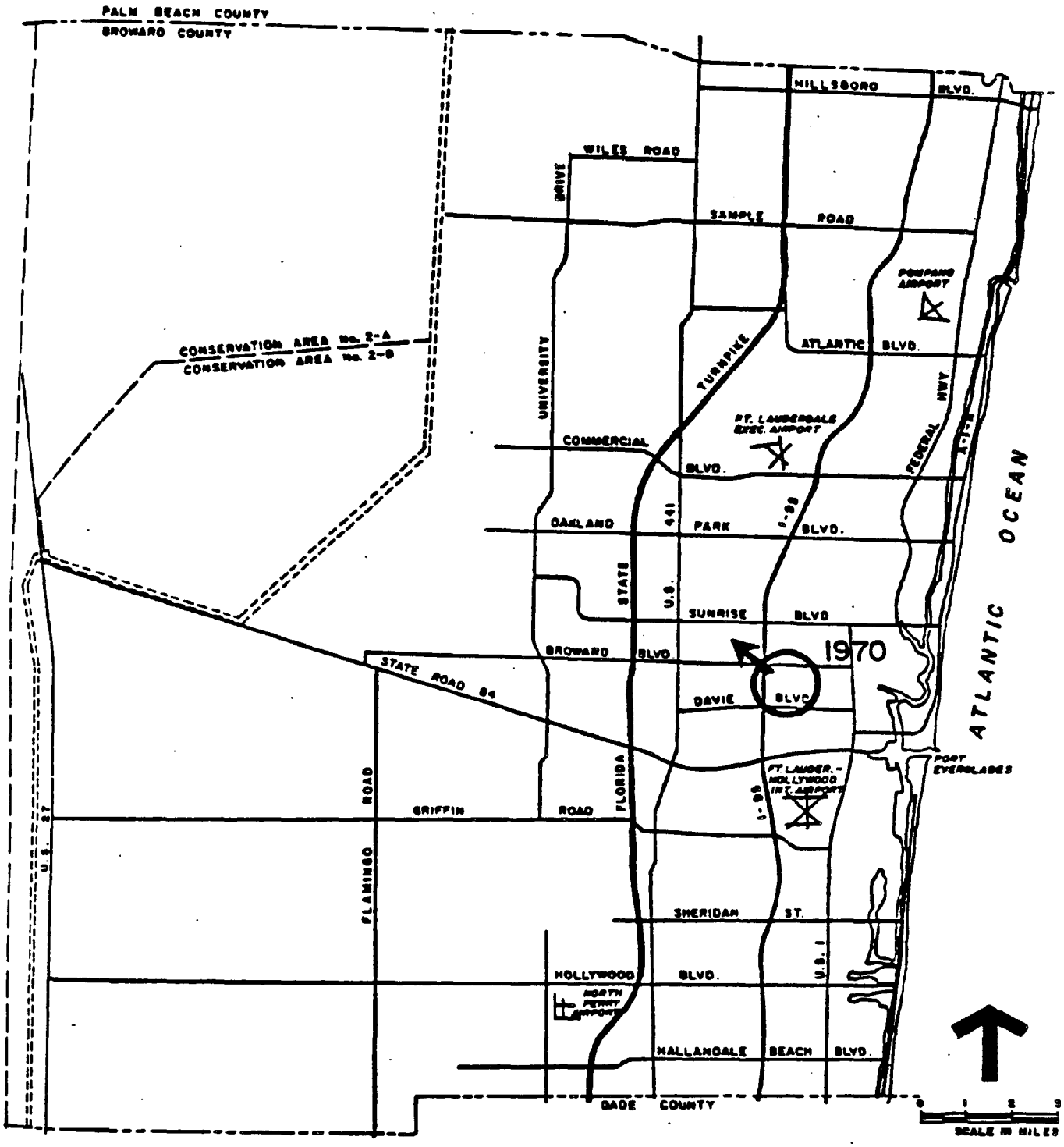
THE CENTER OF POPULATION IN THE THREE COUNTY REGION IS MOVING NORTH INTO BROWARD COUNTY.




# ESTIMATED CENTER OF POPULATION

Map 2.

SOURCE: Broward County Overall Economic Development Plan, 1976
Community Development Division




Map 3.

# BROWARD COUNTY CENTER OF POPULATION

Figure 5

LAND USE IN BROWARD COUNTY

| | | Acres | Percent |
|---|---|---|---|
| 1. | Single-Unit Residential | 62,560 | 23.2 |
| 2. | Multi-Unit Residential | 6,170 | 2.3 |
| 3. | Commercial | 6,600 | 2.4 |
| 4. | Industrial | 4,320 | 1.6 |
| 5. | Extractive | 2,930 | 1.1 |
| 6. | Transportation, Comm. Util. | 3,880 | 1.4 |
| 7. | Institutional | 3,470 | 1.3 |
| 8. | Mixed | 6,460 | 2.4 |
| 9. | Open and Other | 31,235 | 11.6 |
| A. | Cropland and Pasture | 53,680 | 19.9 |
| B. | Groves, Orchards, Bush, Hortic., Vinery | 0 | 0 |
| C. | Citrus Goves | 5,980 | 2.2 |
| D. | Confined Feeding Areas | 0 | 0 |
| E. | Other Agriculture | 49,160 | 18.2 |
| | Natural Cover | 33,587 | 12.4 |
| | TOTALS | 270,032 | 100.0 |

Source: South Florida Regional Planning Council, Analysis of Coastal Land Use, May 1976, p. 34.

Recent plat and site plan approvals support the continuation of this new trend with approximately an equal distribution of development projected for the northwest, southwest, and west-central portions of the County. A recent County study of major residential development in 1979 identifies where a total of 50 or more dwelling units are for sale or rent, under construction, or planned for construction in 1979.[9] Of a potential 29,003 approved dwelling units included within the study's threshold, it is expected that 71 percent or 20,552 units will be constructed west of the Florida Turnpike. Unincorporated Broward (4,077), Pembroke Pines (3,086), and Sunrise (2,772) represent nearly one-half of the potential 1979 residential development west of the Turnpike.

The resulting figures from this study become further inflated upon adding projects of less than 50 dwelling units (Note: Health Department

permitting regulations for septic tanks and wellfields includes a 50 dwelling unit threshold),[10] or anticipated projects such as Arvida's Indian Trace Community now scheduled for western Broward County. In addition, throughout the unincorporated and incorporated western portions of the County, platted development projects of less than 50 dwelling units each are commonplace. For example, along Griffin Road, between S.W. 178th Avenue and U.S. 27, residential plats of less than 50 dwelling units entered beneath the Health Department threshold. Only recently did the County Commission mitigate this problem by enacting Ordinance 7850 which establishes stricter development guidelines. Nevertheless, the result of previous developments are sprawling subdivisions having large scale composite impacts.

Spread of Suburban Development

The proliferating sprawl associated with the County's western growth poses many environmental, conservation, and energy costs. Service delivery systems of local governments are affected by certain types of housing unit construction. Generally, lesser operating and maintenance costs occur in higher density planned development compared to a low density, single-family sprawl community. Savings can be attributed to less road and utility pipe lengths and reduced electric consumption in the high density community.[11]

Development of the County's western vacant land will continue to have noticeable impacts upon our environmental and economic base. Of particular concern are the impacts which past and future development will have on; (1) environmentally sensitive lands, (2) the agricultural industry, and (3) open spaces, scenic vistas, and wildlife habitats. The significance of these impacts have been brought to light from studies by the Health Department, South Florida Regional Planning Council, and the South Florida Water Management District. In each study there arises concern that development in the western county poses significant impacts to water quality, water storage, and flood discharge.

Flooding

A Water Management District Study of the Southwest County defines much of Western Broward County as a "floodway" and states that "extensive fill in this area should be termed encroachment and will have the effect of displacing flood water storage, creating higher ponding stages and forcing water eastward creating higher stages in the east."[12] The mandate for local government to address floodplain management stems from the Unified National Program for Floodplain Management (U.S. Water Resources Council 1976) which sets forth a conceptual framework and recommends Federal and State actions for a continuing unified program for planning and action at all levels of government to reduce the risk of flood losses through floodplain management.[13]

Flood Hazard Boundary Maps produced by the Department of Housing and Urban Development have identified much of the western county as a floodplain. In this document, the term "floodplain" refers to any land area susceptible to being inundated from any source of flooding, including those which can be flooded from small and often dry water sources.

Reduction of Agricultural Land

Sprawling urban development has also had a pronounced effect upon the County's agricultural industry. Since 1956, there has been a steady decline in agricultural productivity and acreage. The 1970 U.S. Census of Agriculture indicated only 61,000 acres remained in farmland in 1969 and the Broward County Agricultural Extension Service estimates that 46,890 agricultural acres existed in 1978. This represents a 24 percent reduction during the last ten years alone.

Other factors affecting the County's agricultural acreage are existing zoning ordinances and regulations. Within Agriculturally zoned property multiple uses besides agriculture are presently permitted.[14] In fact, single-family homes can be constructed in agriculturally zoned districts providing they meet basic property size requirements. In many other instances, the active agricultural businesses remaining in Broward are located on tracts designated for estate land use. The overlapping situation between the estates, and agricultural land use categories and the respective zoning permitted in each, is compounded further by the differences in local zoning regulations. In order to slow the future urbanization of agriculturally designated lands, the Broward County Commission has recently made this category more restrictive. The density requirement for all agricultural land uses was altered to one dwelling unit per gross two-and-one-half acres. This county-wide policy change will affect the unincorporated area as well as portions of the cities of Parkland and Miramar. This resulting amendment will mandate zoning conformance within one year for these jurisdictions and encourage the reevaluation of what constitutes adequate services upon exurban areas.

Specifically, the sensitive ecological balance inherent in these agricultural greenbelts should be reflected in down-zoning. Characteristics of this land which hinder development are the inadequate traffic circulation system and the probability of flooding. The development of future quarrying areas, and the necessity of protecting aquifer recharge areas should be considered for land use plan and zoning amendments as well.

The preservation of the County's agricultural industry will depend upon the County's ability to protect sufficient usable acreage and the industry's ability to adapt to new agricultural products and marketplaces. The growth of the ornamental horticulture, horse ranching and bee-honey industries are indicative of such changes. These changes will be needed to offset losses in the cattle and produce segments of the industry. Figure 6 identifies the change in farmland acreage between 1940-1978.

## Park, Recreation and Open Space Demands

Development trends in Broward County have also had a significant impact upon open spaces, scenic vistas, and wildlife habitats. The population influence on the County has not only resulted in a loss of open space acreage but has also created new open space demands in the urbanizing portions of the County. These demands may be in the form of passive or active recreational uses and beach access sites.

In 1975, analysis of the amount of public neighborhood parks and playgrounds reveals that Broward County provides only 52.3% of the neighborhood open space recommended by the standard of 2 acres per thousand population.[15] Utilizing today's land use standard of 3 acres per thousand population, the severity of this problem becomes even more magnified.

Neighborhood, Community and Regional parks represent a vital part of an overall Coastal Zone Protection—Conservation program. Equally important are the County's coastal resources, native vegetation, and wildlife habitats. The successful County bond referendum which included the funding for the acquisition of over 2,100 acres of future park lands provides an important first step in preserving the county's natural habitat. An additional 1500-2000 acres may be added should the negotiations on the West Lake Mangrove Site be successful. These sites will play an important role in helping the County attain an adequate supply of regional and subregional parks as outlined in the Broward County Land Use Plan.

## Disappearing Wildlife Habitats and Wooded Areas

Development intrusion into wildlife habitats is another prime concern of the County Land Use Plan and its subsequent elements. The Florida Everglades is one of the few great nationally preserved wetlands in the United States and seasonally harbors hundreds of species of wildlife. Broward County's Conservation Areas, to be discussed later in the Element, provide the link to South Florida's rechargeable supply of fresh water.

Broward County was once a sparsely populated expanse of coastline, sawgrass marshes, and praires. Following the decline of the tomato farming industry in eastern Broward County during the mid-1940's, urbanization has steadily moved westward. Today, just over 200 acres of Pine Forest exist in the County which represents only four percent of the original Pine Forests.[16] Survey results of the Florida Division of Forestry indicate that between 1943 and 1976 Cypress trees have been reduced from 3,200 acres to 1,223 acres.

It is apparent that Broward County's rapid growth rate has significantly impacted its natural environment. The Broward County Land-Use Plan as adopted is the first step in controlling and managing these associated impacts. The Coastal Zone Protection—Conservation Element and subsequent elements of the Comprehensive Plan will provide county and municipal decision-makers the additional framework needed to preserve, protect, develop, and where possible restore the natural resources of Broward County.

Figure 6.

ACREAGE OF FARM LAND IN BROWARD COUNTY 1940-1978

(year)

| Commodity | 1940 | 1945 | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1978 |
|---|---|---|---|---|---|---|---|---|---|
| Beef (Pastures) | 160,000 | 60,785 | 74,417 | 70,000 | 60,000 | 50,600 | 45,000 | 25,000 | 30,000 |
| Dairy (Pastures) | 5,000 | 10,000 | 15,000 | 30,000 | 20,000 | 7,500 | 7,000 | 6,000 | 5,000 |
| Horses (Pasture) | 1,000 | 850 | 600 | 500 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Poultry & Misc. | 1,000 | 1,200 | 800 | 800 | 600 | 800 | 400 | 200 | 40 |
| Citrus | 3,500 | 6,500 | 7,000 | 6,000 | 6,000 | 5,600 | 5,000 | 3,300 | 3,000 |
| Nursery | 5 | 17 | 102 | 466 | 550 | 600 | 750 | 850 | 1,000 |
| Sod | 50 | 2,000 | 3,000 | 5,000 | 4,800 | 3,700 | 2,000 | 1,000 | 50 |
| Vegetables | 35,000 | 40,000 | 28,500 | 30,000 | 11,000 | 10,400 | 8,500 | 12,000 | 6,800 |
| Total Acres | * | 108,111 | 139,235 | 129,872 | 74,200 | 84,050 | 61,000 | 46,000 | 46,890 |
| Total Farms | * | 1,104 | 423 | 408 | 257 | 312 | 291 | * | * |

Source: Florida Cooperative Extension Service, University of Florida, Institute of Food and Agricultural Sciences

* Information for these categories not available at this time.

FOOTNOTES

## INTRODUCTION

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2. South Florida Regional Planning Council, Population Analysis of the Coastal Zone in Region 10, Miami, Florida, 1976, p. 12.

3. National Coastal Zone Management Act.

4. Ibid.

5. State of Florida Department of Environmental Regulation, The Florida Coastal Management Program Threshold Draft, October 1978, pp. 25-30.

6. Note: Pursuant to the Local Government Comprehensive Planning Act of 1975 all units of local government are required to complete Conservation Elements.

7. Broward County Land Use Plan, prepared by Broward County Planning Council, November 1977, p. 26.

8. Ibid, p. 29.

9. Broward County Planning Council, Broward County Major Residential Development of 1979, February 1979.

10. State of Florida, Department of Health and Rehabilitative Services. Chapter 10D-6. Standards for individual Sewage Disposal Facilities. Section 100-6.23(5)(b) - Subdivisions of 50 or less lots, each lot having a minimum of at least one-half acre and a minimum dimension of 200 feet may be developed with private well and individual sewage disposal provided that satisfactory ground water can be obtained and all distance and setbacks, soil conditions, water table elevations and other related requirements of Chapter 10D-6 are met.

11. Real Estate Research Corporation, Costs of Sprawl, April 1974. p. 21.

12. South Florida Water Management District, Water Management Plan for the Western C-9 Basin, August 1976, pp. 21 and 40.

13. U.S. Water Resources Council Floodplain Management Guideline for Implementing Executive Order 11988. 43 FR 6030. February 10, 1978, p. 7.

14. Broward County Planning Council. Abstract of Permitted uses and Densities as Adopted in the County Land Use Plan November 9, 1977. Permitted Uses and Densities in Agricultural Areas', p. 28.

15. Broward County Planning Council, Open Space Study 1975, p. 168

16. Florida Division of Forestry, A Vegetation Inventory for Broward County. November 1977, p. 3.

# GOALS AND OBJECTIVES

## GOALS

A. To maintain, restore and enhance the environmental quality of Broward County.

B. To ensure the environmental, social and economic benefits of coastal and inland resources to the public.

C. To provide for a coordinated intergovernmental management approach for the protection and proper utilization of land and water resources.

## OBJECTIVES

A. LAND USE/DEVELOPMENT TRENDS

1. To encourage a balanced, diversified pattern of land uses compatible with the important environmental systems, whether coastal or inland.

2. To provide the opportunity for coastal-dependent land uses to locate in appropriate areas within the coastal zone.

3. To diversify the economic base by encouraging appropriate locations of environmentally compatible industry.

4. To protect the present and future economy by maintaining the environmental quality of the Region.

5. To direct development to locations that are advantageous for development with the least undesirable impact on both the natural and the built environment.

6. To encourage coordination and consistency between County and municipal comprehensive plans.

7. To protect those geographic areas which provide unique or significant habitats for a productive biological/ or hydrological system.

B. WATER QUALITY AND QUANTITY

1. To encourage a balanced distribution of water resources among uses to ensure a viable, long-term existence for both man and nature.
2. To maintain a high level of water quality throughout the region to insure both a sustained yield of water for urban and agricultural use and perpetuation of the natural systems that are essential to the well-being of all people in the region.

3. To encourage coordination and consistency between state, regional and local water resource planning and management agencies.

C. AIR QUALITY AND NOISE

1. To preserve South Florida's invaluable natural resource of clean air by supporting laws and programs to minimize air pollution emanating from automobiles, and industrial and energy facilities.

2. To mitigate the impacts of noise from highway traffic, airports and industrial facilities.

D. FLOOD AND OTHER HAZARD PROTECTION

1. To protect life and property from natural and man-made hazards, such as flooding, windstorms and oil spills.

2. To manage surface waters to provide for reasonable beneficial uses while maintaining and, where necessary, storing biological and hydrological systems to the greatest degree practical.

E. VEGETATION AND SOILS

1. To protect, preserve and, where possible, restore native vegetative species so as to enhance the aesthetic and environmental quality of the urban environment.

2. To encourage conservation practices which prevent erosion of soils.

3. To protect, preserve and, where possible, restore native vegetative species which support native and endangered wildlife of the region.

F. RECREATIONAL/EDUCATIONAL OPPORTUNITY

1. To protect natural areas which provide recreational and educational opportunity.

2. To provide adequate beach access to serve public needs.

3. To provide adequate shoreline protection so as to preserve beach resources.

4. To increase public awareness and knowledge concerning Broward County's environment and the need for the protection of natural systems as well as the prioritization of uses in the coastal zone.

# PART 1: ENVIRONMENTAL CONCERNS : ISSUES, POLICY GUIDELINES AND IMPLEMENTATION

Fig. 7. Hollywood Beach Dune Restoration Project: This photo demonstrates that coastal protection measures (such as dunes) and recreational opportunity are compatible.

## ENVIRONMENTAL CONCERNS IN THE COUNTY

The purpose of this chapter is to identify environmental concerns in Broward County which are generally countywide in scope and cannot be adequately examined on a site specific basis. These concerns are outlined and discussed within the following categories:

Offshore Energy Impacts
Beach Erosion
Coastal Recreation Through Public Access
Air Quality
Noise Abatement
Water Resources
Flood Plain Management
Soils
Wetlands
Vegetation
Wildlife

Each section of this chapter includes policy guidelines and recommendations for implementation. The identification of specific sites or areas of particular environmental concern will be addressed in the following chapter entitled "Local Areas of Particular Concern."

## OFFSHORE ENERGY IMPACTS

The issues related to offshore energy development and transport hold crucial impacts for the coastal areas of Southeast Florida and the Florida Keys.[1] The inevitable growth of increased energy activity off the coast falls outside the bounds of local jurisdictions. Municipalities, port authorities and counties, though regulated by state and federal environmental legislation to deal with onshore impacts, must begin to address the potentially adverse problems associated with offshore energy facilities. While offshore oil development does not apply to the Gold Coast Region, the transportation of petroleum products represents a serious concern to the economic vitality of Broward County.

The economic benefits resulting from Broward's coastal area depend on the quality of the air, water and beach amenities. The possibility of an oil spill in the waters off the coast would have serious consequences to the health of the tourist market. Realizing that Broward lies only three miles from the Atlantic shipping lanes strengthens the argument for additional local involvement in offshore activities.

Unlike onshore development which can be controlled through a variety of mechanisms in Florida—local land use plans, land development regulations, the Development of Regional Impact process, local pollution control ordinances, dredge and fill permit requirements, etc.—the reliance of these local management tools on offshore energy impacts may be tenuous. A spill disaster similar to the Amoco Cadiz, which has devastated the beaches of Northern France, might disrupt Broward's tourism lifeline for at least a decade. The destruction to marine life and the fragile reef system caused by a super tanker accident alone would be severe over and above the fiscal impacts to the resident population.

In order to minimize the negative externalities associated with offshore energy development and transport, local governments should examine methods for increasing their involvement. One such program being developed is the State/Local OCS program, the purpose of which is to address issues associated with oil and gas activities on the outer Continental shelf which can impact environmental and recreational resources.

Policy Guidelines

1. Guide the growth and development of Port Everglades with policies which recognize the importance of conservation of the natural resources within the Port area.

2. Encourage coordination between the County, the business community and the Port in dealing with the Port's environmental and economic relationships.

3. Encourage risk management planning associated with oil spills and tank explosions.

Recommendations for Implementation

1. Coordinate local disaster plans with the Port Everglades Spillage Committee and the U.S. Coast Guard contingency plan for the cleanup of oil spills along the coast of Broward County.

2. Reexamine the Pollutant Spill Prevention and Control Act (Ch. 376.12, F.S.) to determine the legality of enacting local oil spill liability provisions to recover costs of cleaning up an oil spill.

3. Support the involvement by the Florida Division of Local Resource Management and the County in the State and Local Outer Continental Shelf Program.

4. Support the participation by Broward County in the intergovernmental committee of the "Oil Spill Shoreline Priority Protection Response Strategy" project.

## BEACH EROSION

Broward County's beaches represent our single most important natural resource. Their protection as a valuable resource for aesthetic and economic reasons should be given a high priority. As reprinted from the Broward County Land Use Plan:

> The beaches are composed generally of fine sand and shell fragments formed by marine organisms. Ocean waves, generated by offshore winds, strike the shore at an angle and set up an alongshore current. Beach sand is almost in constant motion, stirred up by this wave action and carried along by the current. In order for a beach to remain stable, it must receive as much sand by way of the alongshore current as it loses. If more is carried away than is deposited, there is a net loss of sand, resulting in beach erosion. Erosion problems are the most severe when the sand-carrying, alongshore current is interrupted, thus shutting off the supply of sand on the downdrift side of the obstruction. A major case of such current interruption in Broward County has been the inlets at Boca Raton, Hillsboro and Port Everglades.
>
> Broward County Beach Erosion Prevention District
>
> The Broward County Beach Erosion Prevention District was established in 1963 by the Florida Legislature (F.S. 63-1175). Its main purpose and function is to prevent and control beach erosion in Broward County.
>
> The entire area of Broward County, east of the dikes, is considered as part of the District for funding purposes. The main source of revenue for the Erosion Prevention District is an ad valorem tax levied on all Broward property owners in both the incorporated and the unincorporated areas. The District has the authority to levy a 3/16 mil tax on all property in Broward County; however, current funding requires only a tax of .051 mil. The power to initiate bond issues, granted by the legislation, has never been used.[2]

The Erosion Prevention District, which operates under the Environmental Quality Control Board, is developing data gathering programs to enhance the staff ability to understand the natural erosion forces and beach responses within Broward County. The District has received authority to expand its resources to provide surveying and biological monitoring expertise. The addition of these personnel will allow timely surveys of storm events, annual projections of erosion and accretion, and immediate response to beach nourishment project needs.

The beach nourishment programs accomplished and projected by the Erosion Prevention District include the entire shoreline of Broward County. The Erosion Prevention District is presently monitoring the final phase of the Hollywood/Hallandale beach nourishment project. The

Pompano Beach Phase II project was initiated in 1978 and is estimated to be complete in late 1982. Following the completion of this project, the program will be directed to periodically nourishing those areas of the County shoreline experiencing erosion beyond the established design beach profile.

The beach renourishment projects and maintenance programs in the County are:

| PROJECT | LOCATION |
|---|---|
| Pompano Beach Phase II | Hillsboro Inlet south to the southern limit of Lauderdale-by-the-Sea |
| John U. Lloyd | Port Everglades Inlet south 1½ miles |
| Hollywood/Hallandale | Balboa Street south to county line |
| Maintenance | Countywide |

The Environmental Quality Control Board is also completing a beach survey. This survey will provide essential beach maintenance data and will update the Beach Condition Report completed by the State Department of Natural Resources in 1973. The Countywide Survey contract, when completed, will provide a monumental base line from which all future beach surveys will be based. The program also allows the first countywide comparison of the existing shoreline to the 1963 Army Corps' Study authorizing the County's undertaking of beach nourishment projects on a federal reimbursement basis.

In order to supplement artificial renourishment with the benefit of natural forces, it is important for the County to encourage the redesign of current beaches into modified dunes to protect existing buildings east of State Road A1A. By revegetating dunes along wider beach areas, a protective barrier can be stabilized. Currently, the cities of Dania, Hollywood and Fort Lauderdale are experimenting with this type of reduning. The Soil Conservation Service has offered its assistance to the cities in dune restoration projects by means of supplying plants and technical assistance to the projects.

The Erosion Prevention Division has also been involved in many aspects of erosion prevention and environmental protection of the offshore reef ecology. The development of an artificial reef system in Broward County began in 1972. The combined objective of the Erosion Prevention and Solid Waste Divisions were to create a reef to attract an increased amount and variety of fish to the depleted coral reef system along Broward's coast and to recycle used tires rather than dispose of them through a merged landfill site. Since 1972 over 200,000 bundled tires have been submerged approximately one mile east of Sunrise Boulevard off the Fort Lauderdale Beach in sixty-five feet of water. The project terminated last year due to cost considerations. While this experiment in artificial reef construction has not produced the desired results, erojack constructed reefs have proven to be more successful for attracting fish in deeper water and in mitigating sand transport offshore.[3] Barring further damage to the existing coral reefs and the artificial reefs from the sedimentation effects of dredging, the growth of new organisms

and, possibly, hard coral will eventually occur. The monitoring of the present artificial reef system is divided between in-house and contractual studies by the Erosion Prevention District.

Coastal Construction Control Lines

The State of Florida has enacted coastal construction control lines to protect shoreland resources from destruction (Chapter 161.053 F.S.). Coastal construction control lines delineate a building line imposed to protect beaches and dunes and to control or prevent development in erosion-prone or otherwise unstable areas.

According to State Statute (161.052) "No person, firm, corporation, municipality, county, or other public agency shall excavate or construct any dwelling house,...building,...seawall,...or other structure within fifty (50) feet of the line of mean high water at any riparian coastal location...". The Act also directs the Department of Natural Resources (DNR) to determine the need of coastal construction control lines based upon "comprehensive engineering study and topographic survey." Following a determination of need and ample public hearings DNR shall set and establish a coastal control line which considers "ground elevations in relation to historical storm and hurricane tides, predicted maximu, wave uprush, beach and offshore ground contours, the vegetation line, erosion trends, the dune or bluff line, if any exist, and existing upland development."[4]

Coastal construction control lines delineate that portion of the beach-dune system which is subject to a 100-year storm surge or other predictable weather conditions and may be used in conjunction with coastal construction building and zoning codes. These codes may be established by local authorities, but must be approved by the Department of Natural Resources. The Department is meeting with representatives from each municipality and the County to establish a line and a model Coastal Construction Building Code which could be adopted by local authorities.

The significance of the codes in terms of coastal construction lies not only in undeveloped coastal areas, but also in the reconstruction of existing structures, should existing buildings be storm damaged. In other words, an important aspect of the Act is its development limitations upon existing structures located east of the coastal line. Enlargement of an existing foundation is prohibited within this area and a penalty clause for violators is stipulated in the act.

Although the County's jurisdiction in terms of enforcement of zoning and building codes is virtually limited to the unincorporated area (of which there is only a small portion along the coast), the County does have an important function in coordinating the Coastal Construction Control Line Program between the State, the municipalities and itself. In addition, if the South Florida Building Code is to be revised for the purpose of effectively implementing Chapter 161.053(3), the County's Board of Rules and Appeals is the agency empowered to do so. The Broward County Erosion Prevention Division is the County agency

which has been involved in establishing the Coastal Construction Control line for Broward County. In addition, their Advisory Committee makes recommendations to the Pollution Control Officer regarding the approval or denial of Class II Coastal Construction permits.

Policy Guidelines

1. Encourage the preservation and restoration of sand dune systems within the Coastal Zone.

2. The County should continue to serve as an important coordinating link between the State and the municipalities in terms of implementing the Coastal Construction Control Line legislation (Chapter 161.053, F.S.)

3. Encourage the Coastal municipalities to establish and enforce coastal construction control lines which will protect the beach areas from erosion and flood damage.

4. The monitoring of beach nourishment projects in terms of their cost and benefits, both financial and environmental, should be continued.

5. Future consideration of artificial reef projects to attract fish and decrease offshore transport of sand should be encouraged.

Recommendations for Implementation

1. Examine the potential for reduning and revegetating beach areas in Broward County. If determined to be feasible, formulate a County Dune Restoration/Beach Enhancement Plan which will provide beach and upland protection complementary with recreational access and opportunity. A possible funding source is the State Coastal Management Program.

2. The County should review the State's Model Coastal Construction Code and consider possible revisions to the South Florida Building Code, as deemed appropriate by the County's Board of Rules and Appeals.

3. Identify by municipality those structures and portions of vacant land parcels along the oceanfront which fall to the east of the Coastal Construction Control Line (when it is established.)

4. Proposals for future beach nourishment projects should be evaluated in light of cost-benefit analysis of current projects.

5. Prior to local government approval of future nourishment projects, the impact of past and current dredging projects on reef systems and associated marine life inhabiting Broward County must be thoroughly examined.

## COASTAL RECREATION THROUGH PUBLIC ACCESS

Texas and Oregon have passed the strongest state legislation to protect public beach rights.[5] In the remaining states, the burden of providing adequate public beach access inevitably falls upon local government. While the public has the right to use the beaches of most coastal areas, this right encompasses only the area between the mean high and low tide county, a guaranteed right of access to the beaches and rights to use the dry-sand area above the high tide line.

Federal efforts in the problem of public beach access is reflected in the 1976 enactment of comprehensive amendments to the Coastal Zone Management Act. A new provision requires state coastal planning programs to include "a definition of the term 'beach' and a planning process for the protection of, and access to, public beaches and other public coastal areas of environmental, historical, aesthetic, ecological, or cultural value." The amendments provide for an overall allocation of $25,000,000 per year, for five years, to cover up to 50 percent of the cost of acquiring lands needed for "access to public beaches and other public coastal area..."

In the State of Florida, under the Outdoor Recreation and Conservation Act (Ch. 375.011 F.S.), the Division of Recreation and Parks of the Department of Natural Resources may exercise the power of eminent domain to acquire any and all rights which may be necessary for the use and enjoyment of public waterways. The Department is also authorized to assist local governments financially in the acquisition of local beach properties, and is urged by the Legislature to give priority to applications relating to the acquisition of public beaches in urban areas.[6]

Beach access represents an expensive undertaking for local government; for this reason there is more and more interest in the acquisition of easements, rather than fee-simple acquisition in beach lands.

Another method of beach acquisition is through mandatory dedication. State and local legislation throughout the nation has sought to condition subdivision approval upon the developer's consent to certain dedication. The required dedication of essential community services such as streets, sidewalks, water and sewer lines is now a well accepted aspect of subdivision regulation. Local government in Broward County should consider beach access dedication as a requirement to plat or replat approval along coastal areas.

According to a 1971 study by the U.S. Army Corps of Engineers, private interests owned 15.6 miles of Broward County's 24-mile ocean front. The state government and local municipalities owned 8.2 miles, and the federal government owned one-fifth of a mile (the mouth of Port Everglades).

Local governments in Broward must assess the long-range shoreline recreation needs of their communities as compared to the existing supply of public beach and access points. A recent report[7] prepared by the Joint Center for Environmental and Urban Problems at Florida Atlantic University examined the beach activity patterns of the 40-mile coastline between Hollywood and Palm Beach. This study relates the problems of traffic congestion, limited parking and mass transportation to the development of a beach access program. Local governments must look not only at the supply and location of beach access sites, but also the accessibility of those sites to various transportation systems.

The initial phase in providing future beach access sites will result from ongoing beach renourishment programs. As federal government funds are involved in this project, federal guidelines require that an ample beach access and parking plan be added to the renourishment program.

Policy Guidelines

1. To the extent feasible, Broward County beaches should be preserved for the enjoyment of residents and tourists.

2. Local governments should attempt to maximize public ownership of beaches to ensure their conservation and recreational opportunity.

3. Transportation plans should include beach access considerations.

Recommendations for Implementation

1. Local governments should initiate a Comprehensive Beach Access Needs Analysis based upon existing and future populations of Broward County.

2. Local governments should encourage donations of coastal land through tax incentives.

3. Local governments should consider beach access dedication as a requirement to development plat or replat approval along coastal areas.

4. The County should pursue funding for either fee-simple or easement acquisition of beach areas.

5. Mass Transit programs should include provisions for transportation to beach areas.

## AIR QUALITY

The Broward County Metropolitan Area experiences very good air quality despite the growing number of people and the increasing automobile

traffic that has occurred over the past decade. While this essential natural resource is overlooked by many residents and nonresidents alike, air quality represents one of the major amenities of the unique South Florida environment. Through the combined efforts of local, state and federal law, especially in the field of transportation planning, the legal authority exists to ensure the maintenance of clean air standards in Broward County.

The Environmental Quality Control Board (EQCB), established under Section 8.17 of the Charter of Broward County, possesses the authority to regulate the Air Quality Control process mandated by the Clean Air Act of 1970 (42 USC et. seg.) and provided by Chapter 65-1338 of the Laws of the State of Florida. The air quality program operated by the EQCB consists of two major facets:

(1) a monitoring system which samples actual air quality data from various sources according to these three categories:

   (a) Area Sources - small point pollution sources (1% of all pollutants);

   (b) Major Point Sources - large industrial and/or municipal pollution sources (14% of all pollutants); and

   (c) Mobile Sources - transportation pollution emissions (85% of all pollutants).

(2) a permitting system which requires actual and potential sources of air pollution to be reviewed to ensure compliance with air quality standards.

A joint report published by the Broward County Metropolitan Planning Organization (MPO) and the EQCB in January of 1979 describes transportation-related emissions (mobile sources) as the major contributor to air pollution. Based on this nationwide fact, transportation-related pollution should be given primary consideration. The report states the following:

> Each year in Broward County, Florida, over 70,000 tons of hydrocarbons are produced and released into the atomosphere where they react chemically with other elements in the presence of sunlight to form ozone. Burning gasoline in internal combustion engines produces the majority of hydrocarbon emissions. Evaporation of volatile fuels and solvents also contributes substantially to the presence of ozone in the atmosphere as do certain industrial processes.[8]

The Clean Air Act of 1970 established National Ambient Air Quality Standards to protect human life, vegetation, and property from the possible harmful effects of air pollution. The State of Florida has adopted a State Implementation Plan designed to enable Florida to attain the clean air standards.

The U.S. Environmental Protection Agency has analyzed the results of ongoing air quality monitoring and determined that Broward County, along with 14 other urban areas in Florida and nearly all urban areas in the United States, has not attained the clean air standards for ozone. Under the Clean Air Act Amendments of 1977, Broward County is required to attain standards by December 31, 1982. This period may be extended to December 31, 1987 by the USEPA if it can be shown that the standards cannot be attained by 1982 and that an extension is warranted.

Each unit of state and local government, including special authorities, has certain powers established in State Law for planning and implementing publicly financed transportation improvements. Because of the complexity of transportation problems and the nature of political unit boundaries, local governments in Broward County have joined with the Florida Department of Transportation to form the Broward County Metropolitan Planning Organization (MPO) whose purpose is to advise its members concerning transportation problems and solutions. This agency satisfies the Federal Requirements under the Federal Aid Highway Act (23 USC, 134) and the Urban Mass Transportation Act (49 USC, 1604) for continuing comprehensive, cooperative urban transportation planning.

Authority and responsibility for implementation and operation of transportation plans rests with the appropriate units of state and government. Although the Federal government does not directly implement or operate transportation improvements, responsible state and local government may receive Federal Financial Assistance for those improvements which are consistent with the recommendations of the MPO.

Policy Guidelines

1. Local and regional transportation policies should continue to address air quality standards.

2. Future energy resource development or power generation facilities should be carefully managed so as to balance energy needs with air quality attainment standards.

Recommendations for Implementation

The preliminary strategies for improving air quality in Broward County are also depicted in the previously cited report, Transportation Control Plan for Air Quality. In order to satisfy the emissions reduction requirements, the recommendations include:

(1) Identifying mobile and stationary sources of Hydrocarbon

(2) Predicting changes in the stationary and mobile source inventories through the years 1982 and 1987.

(3) Determining the allowable emission levels which will enable Broward County to achieve the National Ambient Air Quality Standard.

(4) If required, implementing a series of commitments for attaining air quality goals (i.e., vehicle inspection/ maintenance, alternative transportation control measures, and public transit improvement).

(5) Future County energy plans should address air quality standards as they relate to energy resources and utilization.

## NOISE ABATEMENT

Environmental noise represents a growing problem in residential areas across the United States. Community noise has become recognized as the leading undesirable neighborhood condition among residents in a national survey conducted by HUD in 1976. The survey sample size involved 74,000 homes. Twenty-five percent of the population surveyed ranked noise as the number one community problem.

The leading noise source indicated through a survey of 2,500 people in San Francisco was motorcycles in local streets. Traffic ranked third, while domestic animals ranked fourth overall. Aircraft was number eight and neighbors' music ranked thirteenth. By comparison, industry ranked eighteenth out of twenty in importance as a source of sound.

The negative effects of excessive noise exposure on the individual ranges from distraction and irritation to more serious conditions such as a permanent loss of hearing. However, poor urban planning with regard to incompatible land uses can create long-term noise pollution in residential neighborhoods.

An Urban Noise Study of Broward County in 1976, completed by Dr. Stanley E. Dunn of Florida Atlantic University, stated that Broward County represents a typical urban residential community. The predominant noise sources found throughout the County consisted of vehicle and aircraft noise. Similarly, a 1977 statewide survey conducted in Florida disclosed that noise from motorcycles annoyed more people (41 percent) than any other noise source.

Since 1978 the Planning and Administrative Systems Division (now the Office of Planning) and Aviation Division of Broward County have undertaken an Airport Noise Compatibility and Land Use Control (ANCLUC) Study dealing with Fort Lauderdale-Hollywood International Airport. The interference of human activity due to aircraft noise in most metropolitan areas has encouraged the Environmental Protection Agency (EPA) and the Federal Aviation Administration (FAA) to sponsor such a program for local communities. The overall objectives of airport/ land use planning are to minimize the noise impact through the operations of the airport and to recommend changes in existing land uses, in-

cluding vacant parcels, which are more compatible to the airport and its environs. The completed ANCLUC Study will serve as a coordinating mechanism for improved land use planning at the local level.

A comprehensive noise control program involving all governmental entities in Broward County should emphasize public education and support. Transportation problems and fixed sources of noise such as industry, construction, etc., usually involve the best application of engineering principles; however, many annoying noise sources such as barking dogs should rest with the pet owner. The awareness that their pet is causing an annoyance must be accomplished through a countywide awareness program. Methods of control through personal training or obedience school is encouraged. This is but one example of how annoying noise, which affects so many, can be controlled and reduced through awareness, education and involvement. This type of action has produced immediate relief while other approaches to noise control will not produce tangible effects for years to come.

Still, many of these problems involving long-range solutions must be addressed through engineering principles, architectural solutions and the definite involvement of law enforcement personnel in many instances (i.e., vehicular noise). Some communities have set up task forces to control noise problems. These are comprised either of Police Department or other governmental agencies and divisions. The training of environmental personnel at law enforcement academies has become more popular in some municipalities. Other local governments have purchased "noise control vehicles" to enforce regulations addressing mobile sources of noise pollution.

In Broward County, many noise sources are presently monitored by the Environmental Quality Control Board. To improve the noise control efforts of EQCB, countywide cooperation with local law enforcement agencies is necessary since disturbances created by vehicles, residential units, and commercial establishments are best handled through the use of police powers. In addition, public awareness and education represents another significant aspect of the abatement program. Through these combined efforts and the determination of attainable goals and agency responsibilities, noise abatement and control can be achieved.

Policy Guidelines

1. Noise impact from highway traffic, airports and other sources should be a guiding factor in land use decisions.

2. Native vegetation to diminish noise impacts should be encouraged whenever possible.

Recommendations for Implementation

1. Incorporate the land use strategies recommended in the ANCLUC Study through amendments to the Broward County Land Use Plan for noise impacted areas.

2. Through the Environmental Quality Control Board, Broward County should develop an updated and improved noise abatement and control program.

3. Native vegetation to diminish noise impacts should be a consideration in the site development review process.

## WATER RESOURCES

Water resource problems in the County consist of two, interrelated types: water quantity and water quality. The major water quantity—or sufficient supply—problem lies in the water storage vs. positive drainage conflict. In order to protect developed and developing areas from flooding there are a series of canals which drain the land; however, in doing so, much of the potential water source is diverted from recharging the groundwater of the Biscayne Aquifer—the sole source of freshwater for the County.

Aside from the positive drainage by canals and storm sewers, a related problem associated with development is that of fill encroachment. Filling of areas which previously held water results in both a loss of surface storage area (potential recharge source) and also a displacement of water which must raise the flood water elevation of adjacent lands. When low-lying interior areas are filled too extensively, the flood stage (level) is increased to the point of endangerment for previous development. Consequently, it is vitally important that the extent of area filled in interior portions of the County be limited.

An effective and advantageous measure for allowing development without totally displacing water storage capacity is the management practice known as on-site detention/retention. These techniques have beneficial and cumulative effects by mitigating peak runoff and total short-term runoff. "If fully applied on an areawide basis, they would reduce the necessity for investments in major public facilities required to prevent flood hazard to structures and to develop additional water supplies, while minimizing ecological sacrifices."[9]

The other aspect of the water resource issue is water quality, of which the major concerns for the County are surface water pollutants, saltwater intrusion, wastewater pollution, solid waste pollution and areas of special concern, such as wellfields and surface water bodies.

The ecological link between surface water quality and the preservation of an adequate groundwater supply in South Florida has been profoundly documented. Due to the water recharge function of the canals and other freshwater bodies to the Biscayne Aquifer, the occurrence of abnormally dry conditions or deteriorating water quality would pollute the shallow aquifer. In order to protect this indispensable freshwater supply, specific state and federal programs serve to coordinate its resource management.

The consistency provision of the Florida Coastal Zone Management Act requires that local coastal zone protection elements be compatible with existing state laws and program. In line with this directive are the goals and program objectives of the South Florida Water Management District Water Use and Supply Development Plan, the Broward County (201) Facility Plan on Wastewater Management Systems, and the Broward County (208) Areawide Clean Water Management Plan. The goals and objectives of these programs provide the basic references of this section.

As stated in the Facility Plan:[10]

> The Biscayne Aquifer, managed and protected by South Florida Water Management District, is the sole source of municipal water supply in Broward County. Use of this groundwater has generally proven to be more economical than local surface waters, which have similar characteristics but would require additional treatment to ensure removal of contaminants. The Floridan Aquifer in Broward County contains water too saline for all but a few uses.

The quality of water from the Biscayne Aquifer is generally suitable for municipal, agricultural, and domestic uses. Except for the relatively high hardness (100 to 300 mg/1) and occasionally high iron content, the chemical quality of this aquifer water is good. Additional details of water quality within the Biscayne Aquifer are given in Chapter Five of the Facility Plan.

The overall objective of the Areawide Clean Water Management Plan of Broward County is to meet the 1983 water quality goal of fishable-swimmable waters by developing a plan and selecting (a) management agency(ies) to implement the plan. Section 208(b)(2) of P.L. 92-500 states the following objectives:

> "(b)(2) Any plan prepared under such process shall include, but not be limited to--
>
> (A) the identification of treatment works necessary to meet the anticipated municipal and industrial waste treatment needs of the area over a twenty-year period...
>
> (B) the establishments of construction priorities for such treatment works...
>
> (C) the establishment of a regulatory program...
>
> (D) the identification of those agencies necessary to construct, operate, and maintain all facilities required by the plan...

(E) the identification of the measures necessary to carry out the plan (including financing), the period of time necessary to carry out the plan, the costs of carrying out the plan within such time, and the economic, social, and environmental impact of carrying out the plan within such time...

(F) a process to (i) identify, if appropriate, agriculturally and silviculturally related nonpoint sources of pollution...

(G) a process to (i) identify, if appropriate, mine-related sources of pollution...

(H) a process to (i) identify construction activity related sources of pollution...

(I) a process to (i) identify, if appropriate, saltwater intrusion into rivers, lakes, and estuaries resulting from reduction of freshwater flow from any cause...

(J) a process to control the disposition of all residual waste generated in such area which could affect water quality; and

(K) a process to control the disposal of pollutants on land or in subsurface excavations..."

The South Florida Water Use and Supply Development Plan[11] has also identified the growing problems of saltwater intrusion in Broward County. As stated in that report:

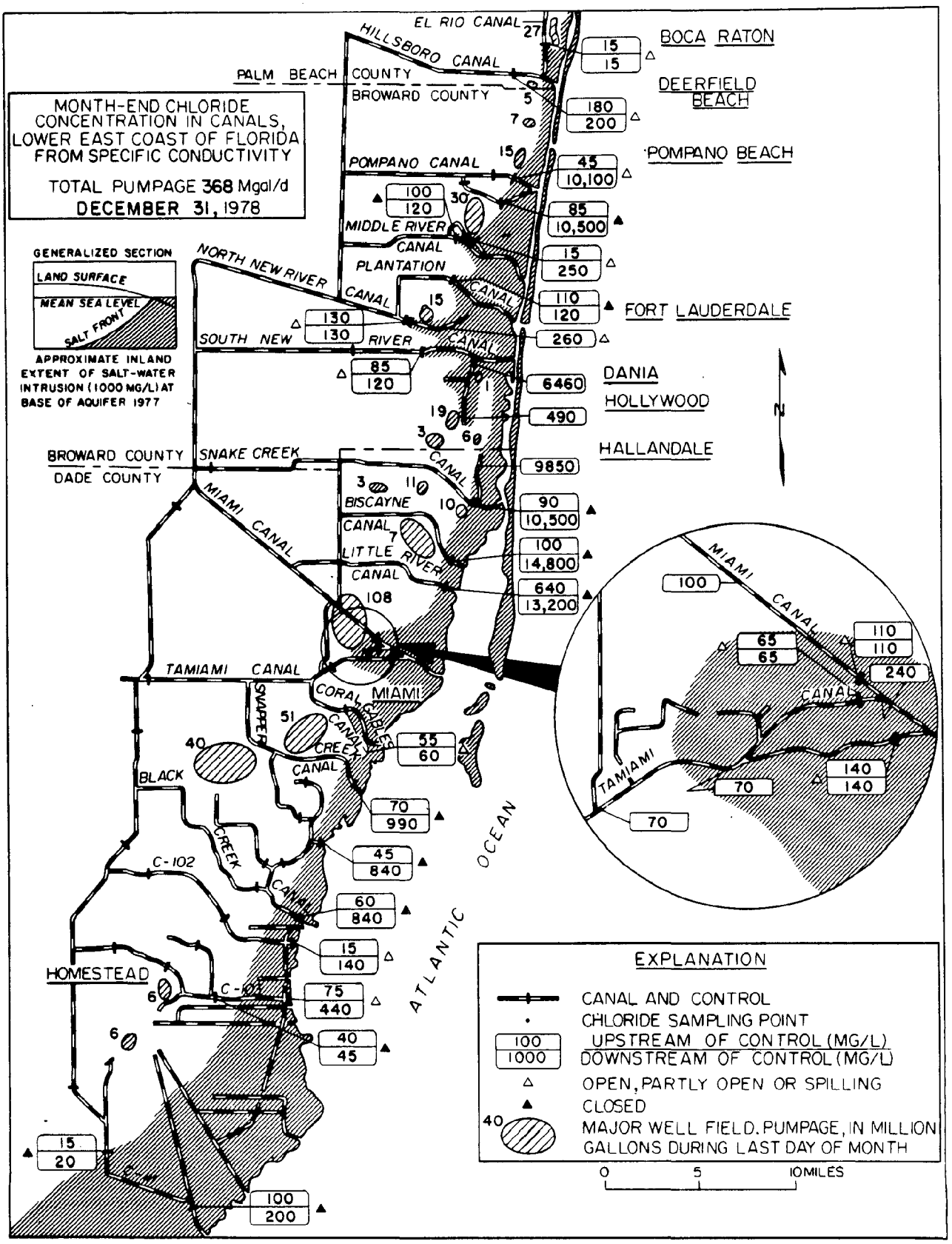
> Problems with saltwater intrusion in Broard County are in general associated with finger canals without salinity barriers. Uncontrolled canals caused saltwater intrusion in Pompano Beach. These finger canals provide the means for continuously lowering freshwater heads and for direct incursions of seawater to more inland locations (Tarver, 1964)....
>
> The same conditions basically existed in the area of Fort Lauderdale's Prospect wellfield until salinity control structures were installed on the major canals, and feeder canals were constructed to convey freshwater into the upstream side of those structures (Sherwood, et al, 1973)....
>
> A similar situation also exists in the Hollywood area where the chief threat to the freshwater supply is saltwater intrusion from the Hollywood Canal. Obviously, care must be exercised to prevent lowering of water levels in the wellfields (Bearden, 1974).

Map 4 shows the extent of saltwater intrusion as of March 31, 1976.

To prevent the further encroachment of saltwater and to recharge freshwater wellfields along the coast, the South Florida Water Management District operates salinity barriers and higher than mean sea level (msl) stages in its canals. This insures minimum groundwater levels and holds back the intrusion of saltwater during the dry season. In the wet season precipitation will naturally recharge the aquifer through interior wetland areas and maintain the freshwater head.

Map-4.

ESTIMATED SALTWATER INTRUSION LINE FOR SOUTHEASTERN FLORIDA



Another factor involved is the location of future wellfields by municipal and private interests. Wellfields lower the freshwater head by creating depression cones. These cones of depression can eventually pull saltwater into the area of the withdrawal. Several years ago, it was discovered that at least four wellfields in Broward and Dade Counties were lying eastward of the saltwater intrusion line. This has resulted in saline groundwater withdrawals in eastern areas of Hollywood and Hallandale.

While other Broward wellfields have not been contaminated by encroachment, the vast majority of wellfields are situated along the coastal poplulation centers. As the demand for water to meet the additional urban uses has increased tremendously over the past decade, new wellfield development has remained concentrated in the eastern portions of the County. Saltwater intrusion is encouraged by the proliferation of wells within a limited wellfield area. In order to maintain a freshwater mound between the point source of withdrawal and the line of saltwater encroachment, the location of new wellfields must not draw down the interface excessively. To adequately prevent the combined effect of overlapping withdrawal sources, future wellfield development should be synchronized throughout western Broward County.

Policy Guidelines

1. Land use decisions, including location and type of use, should be consistent with protection of areas with high aquifer recharge capacity.

2. Encourage proposed developments to have water recharge areas sufficient to meet the water resource demand created by the development. Encourage on site retention/detention technigues to satisfy both drainage and recharge requirements.

3. Ocean outfalls should be designed to ensure adequate dilution and dispersion of treated effluent and avoid adverse impacts.

4. Where practical, treated effluent should be recycled to serve other needs.

5. New developments around or along fresh or saltwater bodies should incorporate sufficient water quality management practices so that the integrity of the water will in no way be impaired.

6. Land uses within cones of influence of public drinking water supplies should be strictly regulated to prevent chemical or biological contamination of such wells.

7. Water basin studies such as the Water Management Plan for the Western C-9 Basin[12] by the South Florida Water Management District should provide water management guidelines for land use decisions.

8. Limit the extent of fill allowed in water recharge/storage areas.

9. Mitigate water quality degradation by utilizing vegetative cover to retard overland flow and filter pollutants from the water.

Recommendations for Implementation

1. Local government in Broward County should commence a county-wide wellfield development program to locate wells further inland and encourage improved management of the Biscayne Aquifer.

2. Encourage the use of alternatives to direct stormwater outfalls such as grassy swales, retention ponds, pavers, and berms to filter runoff waters and improve the surface water quality in canals and open-water bodies.

3. Encourage the increased use of and include new water quality provisions in existng nonstructural water management pracices (i.e., laws, ordinances) on the local and regional level. Encourage the adoption of new regulations where necessary. (See #4 and 5)

4. Allow for flexible zoning and site planning which encourage on-site groundwater recharge by cooperating with developers in the use of PUD and cluster zoning districts.

5. Establish cones of influence area regulations. Wellfields, cones of influence areas, and aquifer recharge areas of local significance may be nominated for designation as Local Areas of Particular Concern (see Part 2: LAPC section of this document).

6. Sanitary landfills for solid waste disposal should be appropriately monitored for negative impacts on groundwater quality.

## FLOOD PLAIN MANAGEMENT

The completion of the Water Use and Supply Development Plan in 1978 provides an excellent summary of the flood control functions and related responsibilities of the South Florida Water Management District. The design of the water management system in the sixteen-county area depicts the extensive coordination between the U.S. Army Corps of Engineers and the SFWMD in controlling the surface hydrology in South Florida. The relatively recent alteration of historic surface water and drainage patterns by man has proved to be necessary to provide consistent flood plain management. More than any other factor, the development of this modified hydrologic system has allowed the growth and urbanization of the lower East Coast.

In Broward County, flood plain management represents the principal land use management technique. Without the consideration of adequate flood elevation precautions, development would be prohibited. The

National Flood Insurance Program, operated through the U.S. Department of Housing and Urban Development and established by the Flood Disaster Protection Act, affects conventional sources of construction financing in flood-prone areas. The regulations require cities and counties to enforce minimum ground floor elevations through adopted building codes. Local subdivision regulations base floor elevation criteria on the minimum difference between the floor elevation and that of the road centerline. While this difference is usually between one-half foot and two feet, the current mandate of the Federal Flood Insurance Administration requires that floor elevations for new housing be above the one-hundred (100) year flood elevation.

Within Broward County, flood plain management programs are implemented by individual drainage districts under the Water Management Division and the SFWMD. A synopsis of the flood plain conditions and its management in the County was compiled from the (201) FacilityPlan on Wastewater Management Systems as follows:

> ...Broward County was originally a swamp subject to flooding and standing water in many areas. Following the development by the Central and South Florida Flood Control District (CSFFCD)—now called the South Florida Water Management District (SFWMD)—of large-scale projects for drainage, flood protection, and aquifer recharge during the 1950's and 1960's, the majority of Broward County was adequately protected from freshwater runoff. Based on data from the SFWMD, areas of adequate flood protection are concentrated in the urbanized eastern half of the County.
>
> Three areas are subject to flooding, however. Inland areas in southwest and northwest parts of the SFWMD are subject to flooding from canals which have exceeded the designed drainage capacities. Since 1970, no further canals have been dredged pending development of a water management plan for SFWMD.
>
> Additional lowlands along the coastline, the Intracoastal Waterway, and inland as far as the salinity control structures on Cypress Creek, Middle River and New River are subject to flooding from a different source, daily fluctuations in the tide and tidal flooding from tropical storms. Map 5 illustrates flood zones within the County with the probability of occurrence in each zone.
>
> Three canals draining Broward County have reached their design developing areas from regular flooding. Basically, the problem results from the rapid increase of urban areas, which have less permeable ground surfaces and thus produce greater amounts of surface water runoff than the agricultural areas they replace. For example, the SFWMD generally considers a canal removal rate of 0.75 inches of rain from the drainage area in a 24-hour period to be acceptable for agriculture, 1.5 in/day for estate density and 2.0 to 2.5 in/day for urban density.

Portions of the northwest portion of the County are subject to flooding from the Hillsboro Canal. Orginally designed to accept 1.0 in of runoff per day from its drainage area, the canal does not have adequate capacity for anticipated urban growth in its drainage area. Currently, the SFWMD has no plans to increase its capacity or to backpump to the Everglades.

In the southwest part of the Study Area [Broward County], the South New River Canal (C-11) and the Snake Creek Canal (C-9) could also cause flooding. The South New River Canal currently has a capacity for 0.75 in/day of runoff and is the only section of the primary network which is backpumped to the Everglades Conservation Areas. The low design capacity is sufficient only for agriculture. SFWMD plans to increase capacity to 1.25 in/day,... [the improvements to the C-11 drainage area will be completed through Arvida Corporation's covenant provisions which are essential to the safe development of the area]. The Snake Creek Canal, designed for 1.25 in runoff per day, is also nearing its capacity.

The Broward County Planning Council has considered the implications of the adequacy of flood protection on land use. Basically, the Council, the SFWMD, and the South Florida Regional Planning Council concurred that developments in limited drainage basins should be evaluated differently than those in adequately-protected areas. The SFWMD requires that all storm runoff in excess of the 0.75 in or 1.5 in/day used for canal design be retained on the property, which necessitates that 50-70% of the development sites remain in lakes, canals, and floodable land. Another SFWMD requirement is 100% recharging of the aquifer. Both requirements serve to limit the density and degree of development within the southwest portion of the Study Area.[13]

The flooding potential within Broward County has been addressed through several techniques. To meet the one-hundred (100) year flood criteria, general landfill requirements for road crowns and building foundations were established. Map 6 displays the generalized landfill requirements.

A second protective measure was the preparation of a set of comprehensive maps delineating the minimum road grade elevations and finished floor elevations throughout the County. These provide the developer with elevation information adequate to design a subdivision with the appropriate level of flood protection required by law.

The most dramatic test of Broward's flood plain management system accompanied the recent severe storm of April 25-26, 1979 which dumped fourteen inches of rain over a twenty-four hour span. Extensive flooding occurred to roads and rights-of-way, older urbanized sections and some newer neighborhoods experienced the flooding of buildings. The latter flooding was due for the most part to a failure in the secondary drainage system or lack of an adequate storm sewer system.

Overall, the system handled this 100 year storm very well with certain exceptions.

Policy Guidelines

1. Land use planning should continue to recognize problems associated with flooding, especially in coastal and western areas of the County.

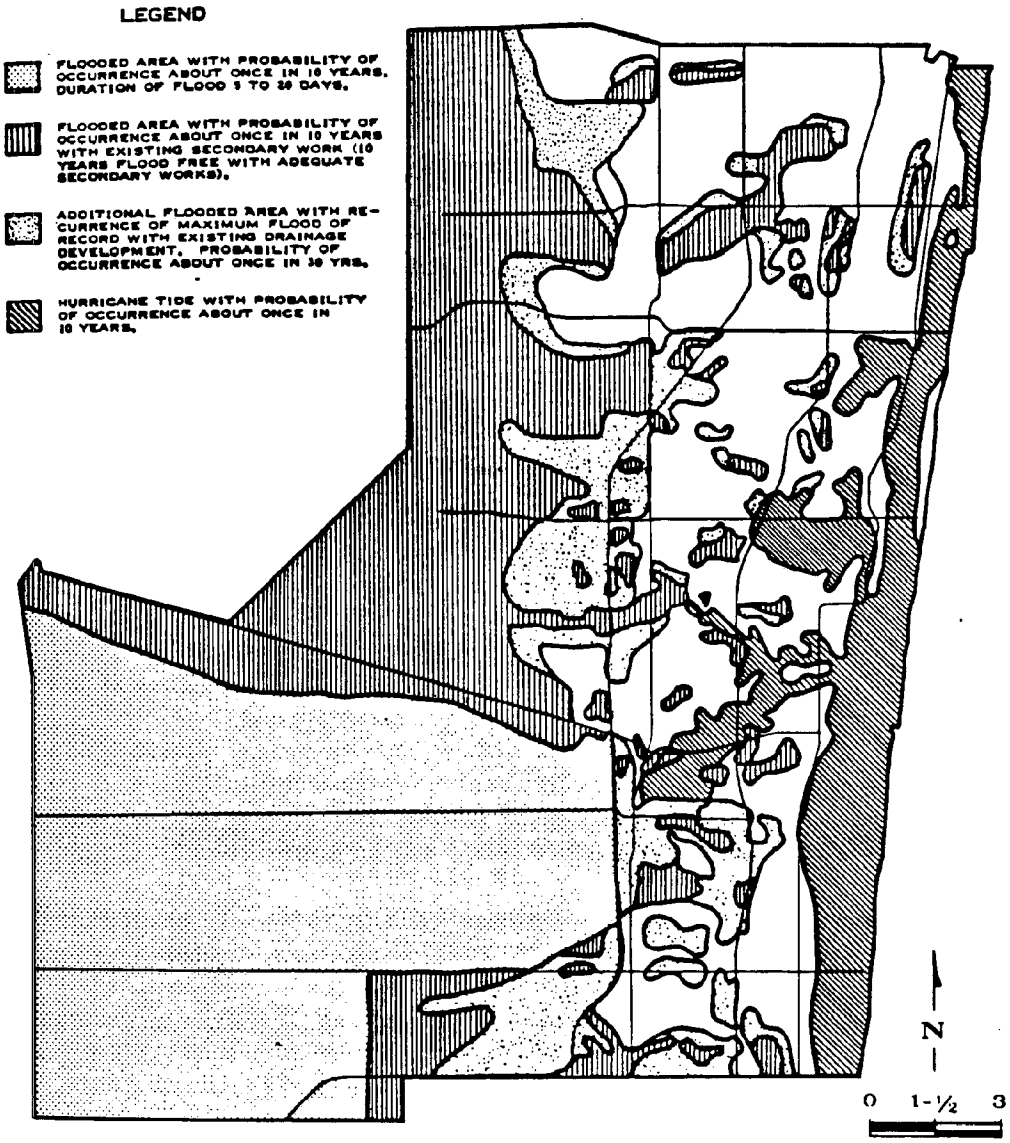
2. Septic tank development in lowlying areas should be carefully monitored and restricted to prevent (or at least minimize) contamination of surface and groundwaters due to tank overflow during flooding.

Recomendations for Implementation

1. Broward County should review the design performance of those secondary and tertiary systems which flooded during the April 1979 storm.

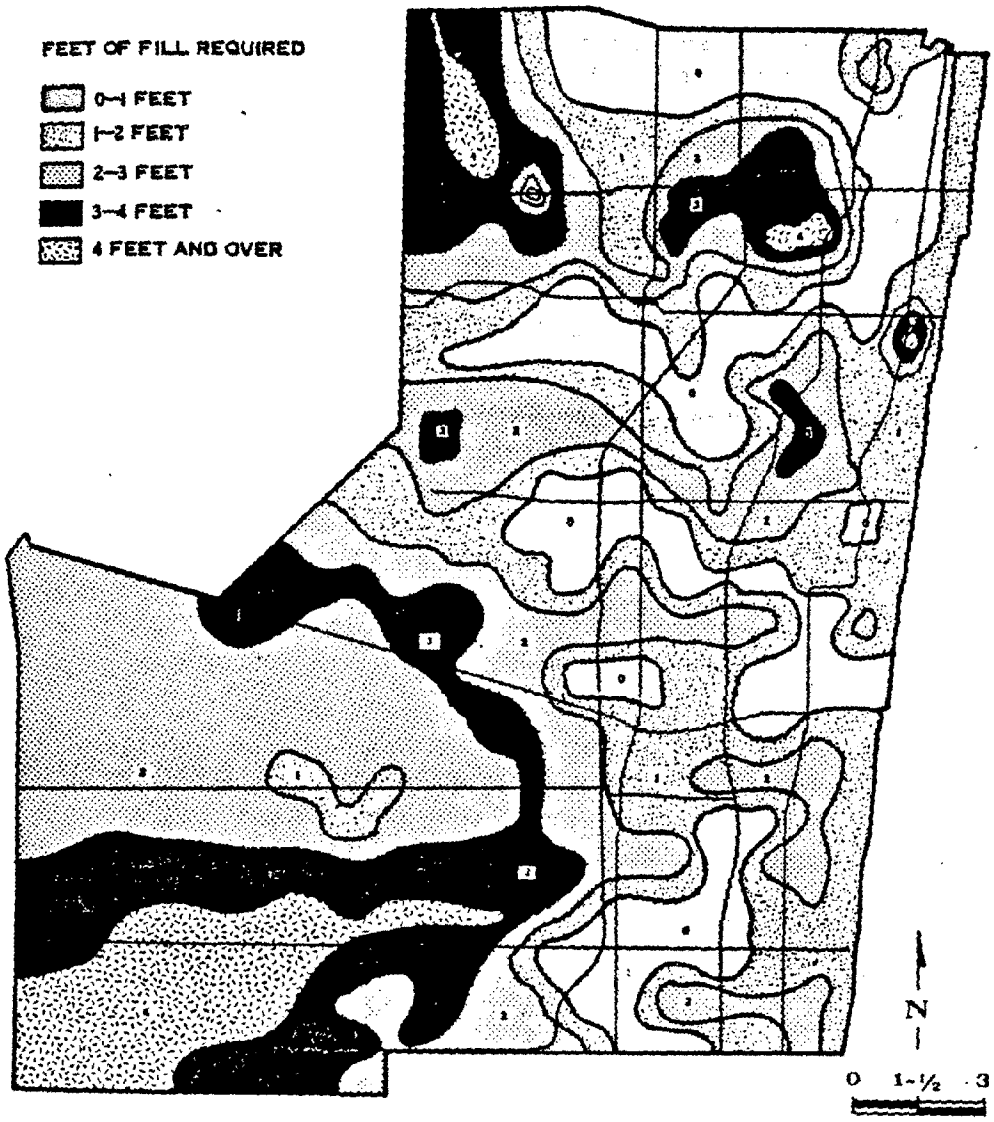
2. Evaluate the ongoing basin studies for western Broward County and incorporate those recommendations into the Land Use and Drainage Elements.

3. Broward County should coordinate their local contingency/evacuation plans with the Coastal Evacuation Study underway by the U.S. Army Corps of Engineers.




Map 5.

FLOOD ZONES




GENERALIZED LANDFILL REQUIREMENTS

Map 6.

## SOILS

In 1972, the Soil Conservation Service (SCS) completed a Soil Survey of the Broward County Area. The guide consists of soil maps with boundary lines to designate general soil associations existing throughout western and northern Broward County. In addition, the soil survey contains information that can be applied in:

1) managing farms, ranches and woodlands;

2) selecting sites for roads, ponds, buildings and other structures; and

3) judging the suitability of tracts of land for farming, industry, and recreation.

The original area of the survey is bounded by Dade County on the south, Conservation Areas 2A, 2B and 3A on the west, Palm Beach County on the north, and is generally west of the Sunshine State Parkway and north of Oakland Park Boulevard. The remainder of Broward County, most of which was defined as "urban land,"[14] will be surveyed over the next two years and incorporated into the Soil Survey document when completed.

The information gathered by soil scientists is based upon a soil profile. The profile is determined by core sampling to display the sequence of natural layers, or horizons, in a soil type. Soils having similar characteristics (horizon thickness, sequence arrangement, etc.) are grouped into a series. Named for a town or geographic feature near the original site of observation, the soil series evident in Broward County is mapped on aerials in the Soil Survey. In addition to these specific mapping units, a general soils map of the county is also shown in that report.

The general soils map provides an overview of the individual soil series of a large area. These soil associations describe a distinct proportional pattern of soils. In the Broward County Area the major soil associations include the following:

(1) Paola-Urban Land-St. Lucie Association;
(2) Immokalee-Urban Land-Pompano Association;
(3) Hallandale-Margate Association; and
(4) Lauderhill-Dania Association.

### Soil Surveys and Land Use Planning

Detailed soil surveys can be extremely helpful in land use planning. It is recommended that farms, transportation engineers, developers, planners and land management authorities should consult with the Soil Conservation Service and the Soil Survey during the consideration of land use and site planning. Building and road construction, dredge and fill operations, construction of flood and erosion control structures,

solid waste landfill siting, agricultural uses, water and sewer systems, and septic tank installations are all affected by soil characteristics and limitations. "Soil characteristics that help in determining possible limitations for a particular land use include slope, water content, permeability, depth to rock, susceptibility to erosion, drink-swell potential, bearing strength (ability to support a load, such as a building), and corrosion potential."[15]

In addition to the limitations by soil characteristics on land use, the impacts of land use on soils include erosion and subsidence. Erosion, including coastal erosion, is caused by the breakdown and movement of earth materials at the surface. Agents of erosion include water (such as from flooding), wind (during storms) and gravity (from buildings and other structures). The removal of vegetation from the land increases the vulnerability of soils to erosion, which in turn creates problems of situation of our surface waters.

Subsidence is a sinking, settling, or otherwise lowering of parts of the crust of the earth. Subsidence can and has occurred due to withdrawal of fluids (such as groundwater, oil and gas) from subsurface reservoirs or collapse of surface and near surface soil and rocks over subterranean voids. "Subsidence is also caused when subterranean earth materials are removed....Rock such as limestone and dolomite are soluble, and subterranean voids often form. Lack of support for overlying rock may lead to collapse and the formation of large sinkholes,....One near Tampa, Florida collapsed suddently in 1973, swallowing part of an orange orchard."[16] Although a disaster of this magnitude is rare, more common problems are those associated with the settling of buildings, particularly on or near canal banks. Subsidence problems can be controlled by the following of engineering principles. Erosion problems can be controlled both by engineering principles and vegetation protection and landscaping.

Policy Guidelines

1. Land use planning and site development review must continue to include and expand upon soil limitations and runoff control (erosion and sedimentation) criteria.

2. The policy guidelines listed under the "Vegetation" section and numbers 1-3 under the "Beach Erosion" section are important for soil conservation.

Recommendations for Implementation

1. The County and municipalities should continue and expand upon the utilization of the expertise of the Soil Conservation Service in such matters as site development planning, coastal erosion control and agricultural preservation.

2. The use of sedimentation and erosion controls, as recommended by the Areawide Clean Water Management Plan (208), should be implemented as part of the development review process.

## WETLANDS

The issue of wetlands management represents an important aspect of the Coastal Zone Protection/Conservation Element. As discussed in the Introduction of this text, the consistency provision of the Federal CZM Act of 1972 can aid local governments address wetland protection. The consistency of local plans with approved state policies will be one of the considerations the state will use in determining the allocation of local implementation funding under Section 306 of the Federal CZM Act. Programs eligible for funding include grants to pay half the cost of buying land for access to public beaches and other public coastal areas. Once the State of Florida's Coastal Zone Management Plan has been approved by the Office of Coastal Zone Management, Broward County may wish to apply for state funding to document and officially research potential wetland areas.

The expressed national interest in wetlands by specific Federal Legislation includes the Federal Water Pollution Control Act of 1972 (FWPCA) and National Environmental Policy Act of 1969 (NEPA). The FWPCA discusses wetlands as they relate to the discharge of dredged or fill material into waters of the United States. Section 404 of the Act prohibits such actions in all wetlands above and below the mean high water level of "navigable waters" without a permit from the U.S. Army Corps of Engineers. Presently, this regulation provides some support at the local level due to its flexible focus on varied scale point source pollution problems. Similarly, NEPA requires federal environmental impact statements (EIS) to encourage environmental protection and/or restoration on a project basis. Although state, regional and metropolitan area government agencies review impact statements through local clearinghouses the process usually would not apply to wetland determination and protection.

At the state level, a number of Florida laws only tentatively address wetlands within the purpose of each Act. The lack of a functional "wetlands" definition in any of the Florida Statutes reviewed limits the potential use of these regulations for local purposes. The following lists those State Statutes which consider wetlands as a natural resource:

(1) Chapter 163.3177, F.S. - Intergovernmental Programs

A required Conservation element of the Local Government Comprehensive Planning Act of 1975, includes "the conservation, development, utilization, and protection of natural resources in the area, including, as the situation may be, air, water, estuarine marshes, soils, beaches, shores, flood plains, rivers, lakes, harbors, forests, fisheries and wildlife, minerals, and other natural and environmental resources."

(2) Chapter 253.123, F.S. - Land Acquisition Trust Fund

This law relates generally to restrictions on dredging and filling lands bordering on, or being in the navigable waters of, the state

and would in the vast majority of cases apply to natural marine habitats or tidal wetlands (i.e., West Lake). One area where this Act would pertain to freshwater wetlands is along the shores and submerged bottoms of the New River.

(3) Chapter 258.21, F.S. - State Parks and Preserves

In defining the types of natural lands which may be designated as state wilderness areas, wetlands appear to be included within: (a) natural water storage areas, (b) groundwater recharge areas, and (c) preservation areas of estuarine and marsh systems. The Urban Wilderness Ordinance #77-36 of Broward County, provides the same language for the determination of local urban wilderness areas.

(4) Chapter 258.21, F.S. - State Parks and Preserves

In the acquisition of real property, the South Florida Water Management District is empowered to acquire real property for flood control and water storage to be necessary for the public health and welfare. Under this section, the "preservation of wetlands" is explicitly mentioned as it pertains to flood control protection and water storage conservation.

(5) Chapter 374.139, F.S. - Outdoor Recreation and Conservation

The State Division of Recreation and Parks of the Department of Natural Resources may acquire any land, water areas or other related resources including...wetlands to preserve and protect recreation and conservation areas and projects.

(6) Chapter 403.062, F.S. - Environmental Control

Through the Department of Environmental Regulation, the Act establishes the public policy of the State to conserve, maintain, and improve the quality of public water supplies (Class I waters). Realizing that natural wetland areas serve an important water recharge function for all underground water reserves, especially aquifers, the law provides that no wastes be discharged into these waters of the state without the proper degree of treatment necessary to protect the public water supply.

The State Statutes, while providing impetus for the acquisition of wetlands or other environmentally endangered lands at the state level, offer minimal support to county and municipal governments to do the same locally. A foundation is offered for preserving wetlands through Section 404 of the Federal Water Pollution Control Act and under Chapter 255 and 373 of the Florida Statutes. The "permitting" procedures and regulations of these laws can be arbitrary and inconsistent from site to site but do provide some leverage in protecting saltwater wetlands and, to a lesser extent, freshwater wetlands. Locally the official designation of specific lands as "wetlands" may only occur at the request of the property owner or upon the presentation of a De-

velopment Application to the U.S. Army Corps of Engineers. In the latter case the local agency reviewing the project usually requests the Corps' evaluation of lands in question. If appropriate, the wetland determination is then made by the Corps in conjunction with the permitting office of the State Department of Environmental Regulation.

With regards to the Broward County Property Appraiser, no special assessment is now granted based on the positive evaluation of "Wetlands" on a landowner's property. Barring exemption status, the land is assessed at its "highest and best use" unless a special covenant has been applied for and granted by the Board of County Commissioners stating otherwise. The assessment of special classes of property is covered by Chapter 193 of the Florida Statutes and furnishes a sound basis for qualifying certain lands as "environmentally endangered."

Part II of s. 193, dealing with the Assessments of Special Classes of Property, was revised substantially during the 1978 Legislative Session. Among the changes to s. 193.501 was the inclusion of a covenant provision for "environmentally endangered lands" as defined herein:

6(h) ... "Qualified as environmentally endangered" means land which has unique ecological characteristics, rare or limited combinations of geological formations, or features of a rare or limited nature constituting habitat suitable for fish, plants or wildlife, and which, if subject to a development moratorium or one or more conservation easements or development restrictions appropriate to retaining such land or water areas predominately in their natural state, would be consistent with the conservation, recreation and open space, and, if applicable, coastal protection elements of the comprehensive plan adopted by formal action of the local governing body pursuant to the Local Government Comprehensive Planning Act of 1975, s. 163.3161; or land subject to regulation by the Department of Environmental Regulation and defined as submerged lands in regulations adopted pursuant to s. 403.817.[17]

(7) The property appraiser shall report to the department the just value and the classified use value of property assessed as environmentally endangered land pursuant to this section separately from property assessed as outdoor recreational or park land. (effective January 2, 1979).

Prior to the amendment changes to s. 193.501, the conveying of development rights to the governing board of the county by the landowner for not less than ten years applied only to outdoor recreational or park lands. Since the specified meaning of "recreational or park lands" did not depict a wetlands definition, this is the first year whereby wetlands may be classified as a special assessment under s. 193.501.

The procedure for receiving a special assessment for wetlands based upon the "environmentally endangered lands" definition would be initiated by the landowner. Through an application to the Board of County Commissioners, the subject property could be evaluated by the

Broward County Urban Forester and a Tax Appraiser as to its special status. If the land was judged to be "environmentally endangered," a covenant running with the land would then be established on an individual basis. Under Paragraph (7) of s. 193.501, the property and its valuations would be reported to the Department of Environmental Regulation by the Office of the Broward County Property Appraiser. As a condition of the covenant, a deferred tax liability would be due if the land were removed from its special status in less than ten years.

The use of this statute by a "qualified" property owner seeking a special tax assessment has not been utilized to date. One method for determining an "environmentally endangered land" or wetland area would be to apply the "Ecological Plant Communities" Section of the Appendix. These plant communities may be used to associate wetland vegetation with site specific locations or habitats. The verification of these procedures would then fall to the Broward County Urban Forester for preliminary approval for each site.

Due to the fact that the Broward County Land Use Plan, 1977 established no category of use for wetlands or environmentally endangered lands, the potential for a wetland designation initiated by the County would be limited. To remedy this deficiency the former list of "unique natural areas" has been revised and updated to be included as Local Areas of Particular Concern in the next chapter. In addition, the Local Areas of Particular Concern reflect consistency with those Urban Wilderness Areas compiled by the Urban Wilderness Advisory Board and other environmentally endangered lands determined by Broward municipalities.

Policy Guidelines

1. Protect and, where possible, preserve wetland areas of sufficient size to maintain a productive biological and hydrological system.

2. Wetlands are valuable as water recharge and purification areas; therefore, development within these areas should be designed to maximize natural water storage potential.

Recommendations for Implementation

1. Amend the Broward County Land Use Plan to include a land use category for "environmentally endangered lands."

2. Where development occurs, provide for flexible zoning and site planning to maximize open space.

3. Encourage coordination between the County and the U.S. Army Corps of Engineers in the determination of wetlands.

4. Encourage the utilization of preferential tax assessments for wetlands and other environmentally-sensitive open spaces.

## VEGETATION

### The Significance of Vegetation in the Urban Environment

Vegetation has a significant role in urban, as well as, agricultural areas. In addition to providing food and ornamental pleasure, we should recognize its ability to reduce air and water pollution, moderate temperatures, alter wind patterns and attenuate sound. In addition to the psychological pleasure associated with gardening and an aesthetic environment, vegetation contributes a variety of advantages to our physical environment.

Vegetative cover has the ability to assimilate residuals/pollutants in the air and attenuate noise levels, and is therefore very beneficial as a buffer along roadways. Vegetation also serves a crucial role in terms of controlling water pollution and decreasing energy needs. These two advantages will be elaborated upon in the following discussion.

Vegetation works as a cleansing medium for urban runoff. Water quality can be improved (i.e. pollutants reduced) by interaction of water with vegetation. Vegetative cover intercepts urban runoff, allowing suspended solids to settle out of the water and permitting water to slowly infiltrate the surface soils and under-lying bedrock. As infiltration occurs, nutrients are abosrbed into the plants and returned to the soils. This continuous cycling of nutrients associated with water pollution provides a natural water purification system.

Another major advantage of vegetation is its role as a reducer of energy needs. Vegetation serves as a natural cooling medium in micro-climates. Energy-efficient landscaping reflects the sun and directs prevailing breezes in a manner which keeps structures cooler in warm weather. The cooling effect of vegetation also encourages bicycling and walking. During cooler weather, deciduous trees drop their leaves, allowing the sun to reach buildings and the ground surface.

The previous examples of the advantages of vegetation illustrate its desirability in the urban environment. However, the paradox exists that as urbanization occurs and population impacts increase, thereby increasing the need for vegetation, vegetation is frequently diminished.

The following discussion depicts the nature of the problem, and the problem description is followed by guidelines and implementation strategies for alleviating at least part of the problem.

### Urbanization Problems and Remedies

The rapid urbanization of Broward County has steadily depleted the natural vegetation of the area. According to the Division of Forestry's Vegetation Inventory[18] for Broward County and the Broward County Land Use Plan 1977, vast portions of the natural landscape have been altered by the imposition of urban uses. This has left much of the native woodland vegetation concentrated in the northwestern sector of the County.

Consequently, Broward County presently experiences an extremely low tree canopy cover. Tree canopy refers to the percentage of shade tree coverage, which occupies approximately five (5) percent of the overall land area in the County. Comparative figures for the cities of Coral Gables in Dade County and Boca Raton in Palm Beach County are 22% and 23%, respectively.

Several reasons for this low canopy percentage can be given. Over the past decade, palm tree vegetation has been devastated by the lethal yellowing disease. Seventy percent of all Jamaican coconut palms have been lost due to lethal yellowing. In addition, twenty-five different species of palm vegetation are also vulnerable to the disease. While progress has been made in developing hybrid vegetation that is not susceptible to lethal yellowing, the disease will continue to lower the canopy level for the next several years.

Secondly, the improper selection of the original tree species along major roadways has forced their removal. One example of this was the removal of Australian pine (Casurina spp.) trees on State Road 84 due to safety considerations. Other undesirable exotic vegetation which will continue to be removed for various reasons include Brazilian Pepper (Schinus terebinthin folius), Melaleuca (Melaleuca quinqueria), Poisonwood (Methopim toxiferum), Castorbean and Bishop's Wood (Bishofia-javania). While the removal of undersirable vegetation is a sound objective, these should be replaced with the appropriate type(s) of native tree species.

To remedy the situation, local landscaping and tree protection ordinances have been initiated by most cities and the County. Larger local governments have also become involved in tree planting and nursery development programs. Due to staff and budgetary constraints, many of the smaller municipalities look to the County for guidance in reforestation programs. While the County utilizes the services of an Urban Forester loaned by the State Division of Forestry, the development of a reforestation plan for Broward County has not received adequate attention.

Unfortunately, the sizable County nursery located near Copans Road in the northern portion of Broward is understaffed and underfunded. A strong commitment by the County Commission to hire a full-time urban forester and supply adequate funding to expand the existing nursery would provide the necessary impetus. For example, the City of Fort Lauderdale has established a very productive nursery over the past several years through improved maintenance practices and increased budgetary support. An investment of the County into their existing nursery would also decrease the dependence upon private nurseries to supply landscaping for the numerous public projects planned for the next decade.

Policy Guidelines

1. Encourage the protection and use of suitable native vegetation in both public and private development.

2. Encourage the sharing of expertise and equipment between County, municipal and university forestry programs.

Recommendations for Implementation

1. Establish and maintain a full-time County urban forestry position, possibly through the existing County nursery budget and the Office of Planning.

2. Develop a countywide management plan for reforestation with the objective of providing available tree planting material for all future public projects in conjunction with the landscaping requirements of the development review process for private projects.

3. Reevaluate City/County discrepancies within individual ordinances to establish more consistent planting guidelines along road rights-of-way (i.e., swales, medians, etc.).

4. Update the Broward County Vegetation Inventory at least every five years to serve as a guide for land use planning and the development review process.

5. Redraft the existing Landscape Code and Tree Protection Ordinance to reflect the goals and objectives of this element.

6. Establish a countywide goal of replacing the tree canopy cover at a given rate for the next five years.

7. Encourage maximum emphasis on species diversification in planning the reestablishment of vegetative cover including the use of shrubbery and herbaceous cover to help mitigate pollution problems associated with urban runoff.

## WILDLIFE

The wildlife present in Broward County today presents only a remnant of the original native fauna. Many species of birds, mammals, and reptiles which thrived in the South Florida area less than fifty years ago are now considered rare. These include the Brown Pelican, the Manatee and the Green Sea Turtle to name but a few. Due to the continued growth and sprawl of urban centers in the region, the habitats of many species have been substantially altered or destroyed. While some of these animals may have adapted to urbanization, the vast majority of wildlife have retreated into the Everglades or into smaller wilderness areas which have been protected. Generally speaking, the overall protection of these habitats is the most critical factor to improving the plight of the rare, threatened or endangered species of South Florida.

In addition to the twelve ecological plant communities discussed in the Appendix, four other environmentally related communities are found below. Each is important to Broward County in terms of the fauna which are supported by these environs:

(1) Ocean Surface - The ocean surface reflects a separate habitat which is crucial to the Brown Pelican and Common Loon.

(2) Open Spaces - These areas would include golf courses, airports, campuses and pastures which may attract the Burrowing Owl or the Meadow Lark.

(3) Urban - Urbanized portions of Broward County such as Port Everglades offers a distinct environment to certain types of wildlife.

(4) Suburban - Many backyard environments provide very viable communities to bird and animal species.

The Broward County Audubon Society has offered their expertise in determining a list of bird species which can be found in the County. The matrixes compiled in the Appendixes were based upon the annual Christmas Bird Count records from 1958 through 1977. The BCAS Bird county data covers a circle centered at the junction of Sunrise Blvd. and the Sunshine State Parkway, with a radius of 7½ miles. The species observed were then categorized by the twelve ecological plant communities plus the four additional habitats previously mentioned.

In terms of birdlife, Broward County attracts numerous species throughout the year. The Conservation Areas serve as the major feeding ground in the fall and winter months for many annual and migratory birds.

As estimated by the Broward County Audubon Society, the existing breeding species within the County number at least sixty. This figure

represents approximately one-third of the total bird species sighted in Broward County. Broward County ranks as one of the 20 counties in the United States with the largest diversity in bird life. Other wildlife considerations which augment the considerable natural resources found in the Conservation Areas are those related to the sea. The interface of the beach with the ocean has proved to be a crucial nesting site for a variety of turtles. Of special concern is the Atlantic Green Sea Turtle (Chelonia mydas) which is found on the endangered species list and nests occasionally on Broward's beaches. More frequently nesting in this area is the Atlantic Loggerhead Sea Turtle which is a threatened species. Within Broward County, major nesting areas occur along the beaches of John U. Lloyd State Park.

Another seasonal animal unique to the South Florida area is the Manatee or Sea Cow (Trichechus mantus latirostris). This mammal numbers approximately one-thousand throughout the entire eastern Atlantic Coast and migrates to the warmer waters of South Florida during the winter months. The slow moving, docile creature, which may grow to over ten-feet long and weigh in excess of one-thousand pounds, enjoys the warm currents flowing from the outfall canals of accessible power plants. Unfortunately, in Broward County, the Florida Power and Light Company canals along the South Fork of the New River and at Port Everglades have attracted the manatee into waters crowded with power boats. Due to the slow maneuverability of the animal, the manatee has fallen prey to man-made creations which it has difficulty avoiding. The harm inflicted to manatees, though not deliberate, can be traced to two major causes: power boats of various sizes and flood control structures. The propellers of power boats have produced the greatest threat to these animals especially in the vicinity of the Port.

According to sightings made of these animals by the Florida Audubon Society during the past two winters, both sites have recorded an increasing number of manatees.[19] During the 1977-78 winter one-hundred-fourteen (114) manatees were sighted at Port Everglades on January 31, 1978. This was the largest number ever recorded on any one day until the 1978-79 winter. On January 29, 1979, one-hundred-twenty-five (125) manatees were spotted at the same site.

The consistent sightings of the animal at Port Everglades has led to the establishment of that portion of the Port as a Manatee Sanctuary under the Florida Manatee Protection Act of 1978 (Chapter 370.12, F.S.) While the Endangered Species Act (P.L. 93-205) and the Marine Mammal Protection Act (P.L. 92-522) has offered some Federal safeguards to the manatee, the Florida legislation provides for reduced power boat speeds in recognized sanctuaries throughout the State. Currently, the Florida Marine Patrol under the Department of Natural Resources enforces this Act between November 15th and March 31st of the year.

The South New River area does not fall under any type of protection category for manatees at the present. Depending upon the coldness of the water along the coast, manatees may congregate in large numbers along the F.P.& L. outfall to the River. As many as thirty-six animals were counted in this section of the South Fork of New River on January 22, 1978. The knowledge of their westward migration patterns in

Broward waterways will help prevent further boating accidents in the future. Presently, the Florida Power and Light Company is working with the Florida Audubon Society to monitor the manatee records at these two sites. In terms of enforcement, local governments can be of assistance to the Florida Marine Patrol by posting slower speed boat signs along these waterway habitats of the manatee.

Policy Guidelines

1. Development activities which may degrade, destroy or severely impact productive areas for wildlife should be required to assess possible means of protection from, or abatement of impacts on, wildlife habitat.

2. Improvement of habitat through encouragement of native vegetation which would give desirable species the best chance to flourish should be supported and encouraged.

3. Intensive development should be directed away from the habitat of rare, threatened or endangered species.

Recommendations for Implementation

1. The County should continue to seek assistance from various groups such as the Audubon Society involved in wildlife conservation and management in maintaining an up-to-date inventory of the County's wildlife resources. This inventory should accompany the Vegetation Inventory of Broward County as a guide in the development review process.

2. Public adquisition of Local Areas of Particular Concern, including significant wildlife habitat (See LAPC's Section), should be encouraged and funding sources for such acquisition explored.

3. Special resource management techniques, such as Transfer of Development Rights and tax relief methods (see LAPC's Section), should be considered where feasible to prevent development in designated sensitive areas.

4. Any major development project should be reviewed to assess its impact on wildlife habitats and adequate protective measures should be a required condition of the development order.

5. The proposed development review ordinance, as it is finalized, should maintain Section 10.10 "Consideration of Impact on Environmentally Sensitive Lands" with adequate provisions for protection of urban wilderness areas, including those containing significant wildlife habitat.

6. Recommendatons 1-7 under Section "Vegetation" provide protective measures for native vegetation and encouragement of revegetation, both of which are important to maintaining and attracting wildlife in an urban area.

7. Broward County government will participate in a local government effort to post slower speed boat signs along known waterway habitats of the manatee.

FOOTNOTES

PART 1: ENVIRONMENTAL CONCERNS

1. John Corbett and R.D. Woodson, "Local Control Over the On-Shore Impacts of Off-Shore Energy Development in Florida," Marine Advisory Program, April 1979.

2. Broward County Land Use Plan, prepared by the Broward Planning Council, 1977, pp. 213-215.

3. D.E. Britt Associates, Inc., Report of Investigation of Broward Artificial Reef, June, 1974, pp. 6-7.

4. Florida Statutes, Chapter 163.053

5. Frank E. Maloney and Dan Fernandez, Development of County and Local Ordinances Designed to Protect the Public Interest in Florida's Coastal Beaches, University of Florida College of Law, July 1977, p. 1.

6. Ibid, p. 13.

7. Joint Center for Environmental and Urban Problems, Florida Atlantic University, Increasing Beach Access in Urban Areas: The South Florida Experience, November-December 1978, p. 10.

8. Transportation Control Plan for Air Quality, prepared jointly by the Broward Metropolitan Planning Organization and the Environmental Quality Control Board, 1979.

9. 1979 Revisions to the Dade County Comprehensive Development Master Plan, prepared by the Metro-Dade County Planning Dept., p. 32.

10. James M. Montgomery, Consulting Engineers, Facility Plan on Wastewater Management Systems, March 1978: Volume I: pp. 3-18.

11. South Florida Water Management District, Water Use and Supply Development Plan, April 1977: Volume IB: Part 5, p.4.

12. South Florida WMD, Water Management Plan for the Western C-9 Basin, August 1976.

13. Montgomery, Facility Plan on Wastewater Management Systems.

14. Soil Conservation Service, Soil Survey of Broward County Area, 1972.

15. Keller, Edward A., Environmental Geology, Columbus, Ohio: Charles E. Merrill Publishing Co., 1976, p. 401.

16. Ibid, p. 118.

17. Florida Statutes, Chapter 403.817 deals with the method used by DER to determine the natural landward extent of waters for regulatory purposes.

18. 1979 Revisions to the Dade County Comprehensive Development Master Plan, PP 35-37.

19. American Planning Association, Energy-Efficient Land Use, PAS report #341: May 1979; and Joint Center for Environmental and Urban Problems at Florida Atlantic University, Green Technology: Landscaping and Energy Conservation, February 1979.

20. Florida Division of Forestry, A Vegetation Inventory for Broward County, April 1977 (revised November 1977).

21. Pat Rose, Aquatic Biologist, Florida Audubon Society, conversation on September 7, 1979.

# PART 2:
# LOCAL AREAS OF PARTICULAR CONCERN

## DEFINITION AND CRITERIA:
## LOCAL AREAS OF PARTICULAR CONCERN

The State Coastal Management Program encourages local government to identify and establish management policies for "Local Areas of Particular Concern." Such areas would be identified by local government in order to recognize or protect their conservation, recreational, ecological, development and aesthetic values. Potential areas would include parks, ports, historic sites, aquifer recharge areas of local significance, or unique local environmental features. Local Areas of Particular Concern are primarily managed through local government comprehensive plans and regulations. However, upon review and acknowledgement by the State Department of Environmental Regulation, such sites could become eligible for special management funds as a result of the Florida Coastal Management Program.

The Coastal Zone Protection/Conservation Element of the Broward County Comprehensive Plan identifies six categories of Local Areas of Particular Concern. Categories of Local Areas of Particular Concern which will be considered environmentally sensitive are: Marine Resources, National Landforms and Features, Natural Vegetation, and Wildlife Areas of Particular Concern. Each area is based upon planning criteria outlined as follows:

### A. MARINE RESOURCES AREAS OF PARTICULAR CONCERN

Criteria for Designating Areas of Particular Concern:

1. Areas of unique, scarce, fragile, or vulnerable natural habitat, physical feature and scenic importance;

2. Areas of high natural productivity or essential habitat, for living resources, including fish, wildlife, and the various trophic levels in the food web critical to their well-being;

3. Areas of substantial recreational value and/or opportunity;

4. Areas needed to protect, maintain, or replenish coastal lands or resources, including coastal flood plains, coral and other reefs, beaches, offshore sand deposits and mangrove stands.

### B. NATURAL LANDFORMS AND FEATURES AREAS OF PARTICULAR CONCERN

Criteria for Designating Areas of Particular Concern:

1. A geological, hydrological or physiographical feature confined to a small area of Broward County and considered quite rare locally or regionally.

2. A representative natural ecosystem and/or its units existing in a few isolated locations but extirpated from most of the County.

C. NATURAL VEGETATION AREAS OF PARTICULAR CONCERN

Criteria for Designating Areas of Particular Concern:

1. Areas containing plant communities of unique character and/ or rare, threatened or endangered species.

2. Vegetative communities exceptionally outstanding in growth, structure, and/or variety.

3. Isolated communities or well developed natural vegetation in urban or rapidly urbanizing areas.

4. Areas of substantial recreational and/or educational value and/or opportunity.

D. WILDLIFE AREAS OF PARTICULAR CONCERN

Criteria for Designating Areas of Particular Concern:

1. Existing wildlife refuges, reserves, and sanctuaries.

2. Known habitats of rare and endangered species as defined by the U.S. Department of Interior, the Florida Game and Freshwater Fish Commission, or the Florida Department of Natural Resources.

3. Major wildlife intensive use areas such as well developed hammock communities, highly productive coastal tidelands and mangroves.

4. Areas used for scientific study and research concerning wildlife.

5. Areas of substantial recreational and/or educational value and/or opportunity.

E. ECONOMIC RESOURCE AREAS OF PARTICULAR CONCERN

Criteria for Designating Areas of Particular Concern:

1. Existing ports, marinas, piers, energy resources, and artificial reefs.

2. Areas which act to benefit the Broward County economy.

3. Areas noted for scientific study and research concerning economic development.

F. CULTURAL RESOURCE AREAS OF PARTICULAR CONCERN

Criteria for Evaluating the Cultural Significance of a Site: (To be used for future designation of historical and archeological sites).

1. How does the site relate to the general development of the local area, the regional area, the State, and perhaps even the Nation? Does it represent a trend, a movement, a departure from the typical, etc.?

2. If a building is an important architectural design example of its period: Why is this the case? Does it retain enough of its significant design to be recognizable?

3. Is the site associated with the life/lives of any important persons(s), or social, political, cultural, or economic movement(s) or with any important historic event(s)? Can the associative value(s) be identified and documented?

4. If an archeological site has, or could it yield, useful information?

5. Are there any important engineering or technological features (apart from design)?

Although an inventory of historical and archeological sites is not included in this document, the various County and municipal historical commissions have prepared inventories which may be included and supplemented in the future Historic Preservation Element of the County's Comprehensive Plan.

Table on the following page summarizes the significant features (in relation to the above criteria) of the Local Areas of Particular Concern which are discussed in this section.

FIGURE 8: SITE SELECTION CRITERIA

| | Site | Particular Concerns: Marine Resources | Natural Landform | Natural Vegetation | Wildlife Area | Economic Resources * |
|---|---|---|---|---|---|---|
| 1. | Deerfield Isl. Park | X | | X | X | |
| 2. | Deerfield Sand Pine Site | | X | X | X | |
| 3. | May Site | | X | X | X | |
| 4. | Rookery Site | | | | X | |
| 5. | Port Everglades | X | | X | X | X |
| 6. | Red Mangrove Site | X | X | X | X | |
| 7. | West Lake Site | X | X | X | X | |
| 8. | Hollywood Beach Strand | X | X | X | | |
| 9. | South Fork New River Site | | X | X | X | |
| 10. | Holmberg Road Site | | X | X | X | |
| 11. | Holmberg Pond Apple Slough | | X | X | X | |
| 12. | Swamp 22 Site | | X | X | X | |
| 13. | Leitner Site | | X | X | X | |
| 14. | Rumors Site | | X | X | X | |
| 15. | Palm Aire Site | | X | X | X | |
| 16. | Inverrary Site | | | X | X | |
| 17. | Pine Island Ridge Site | | X | X | X | |
| 18. | Everglades Buffer Strip Site | | X | X | X | |

* Any site which enhances the environmental quality of Broward County is actually of economic benefit to the County. However, of particular interest are those sites which might offer recreational or tourist facilities to the public. In addition, Port Everglades has a special function as an energy facility as well as a tourist facility.

MAP 7.

# SEVEN PLANNING SUBREGIONS OF BROWARD COUNTY

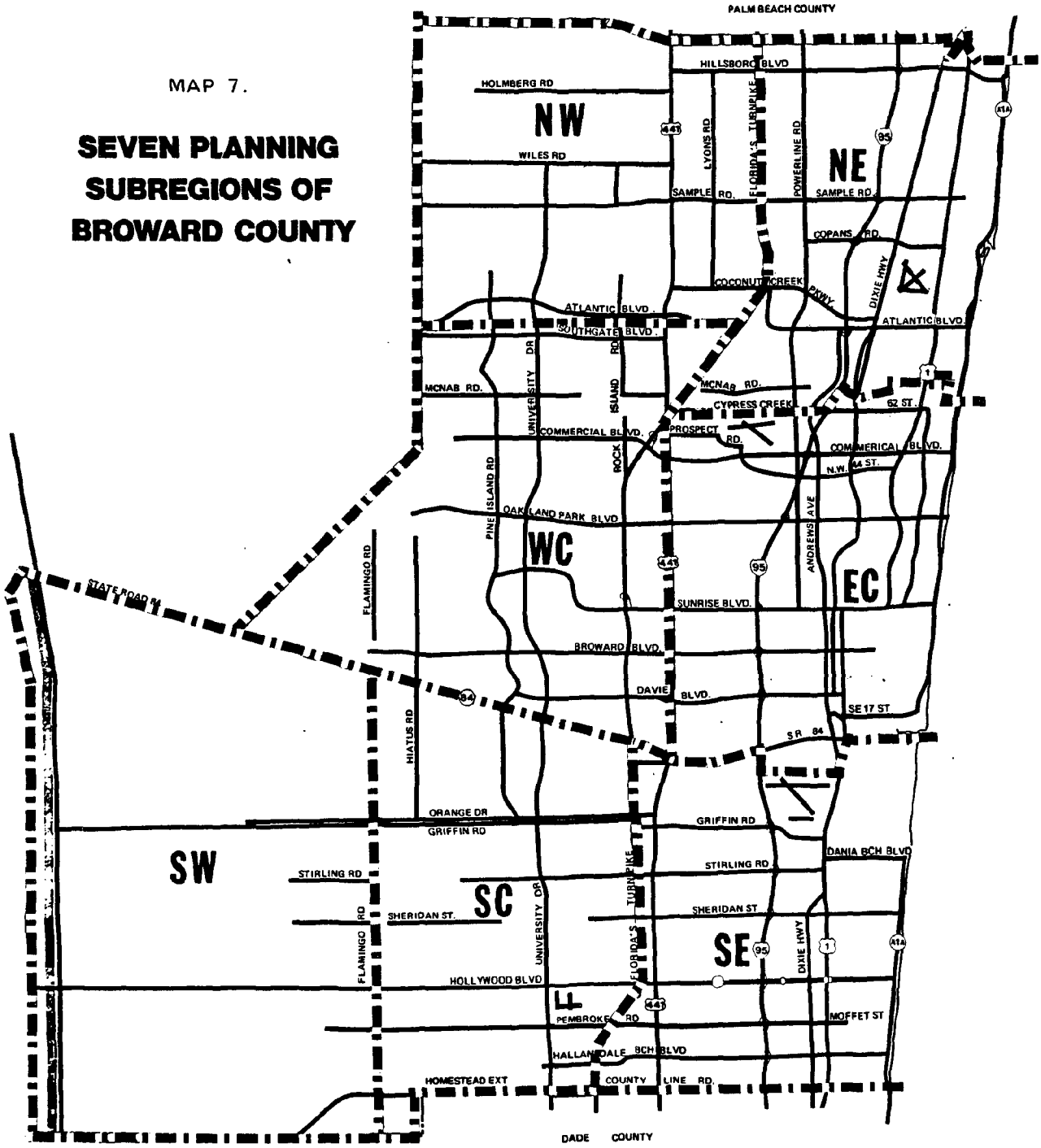


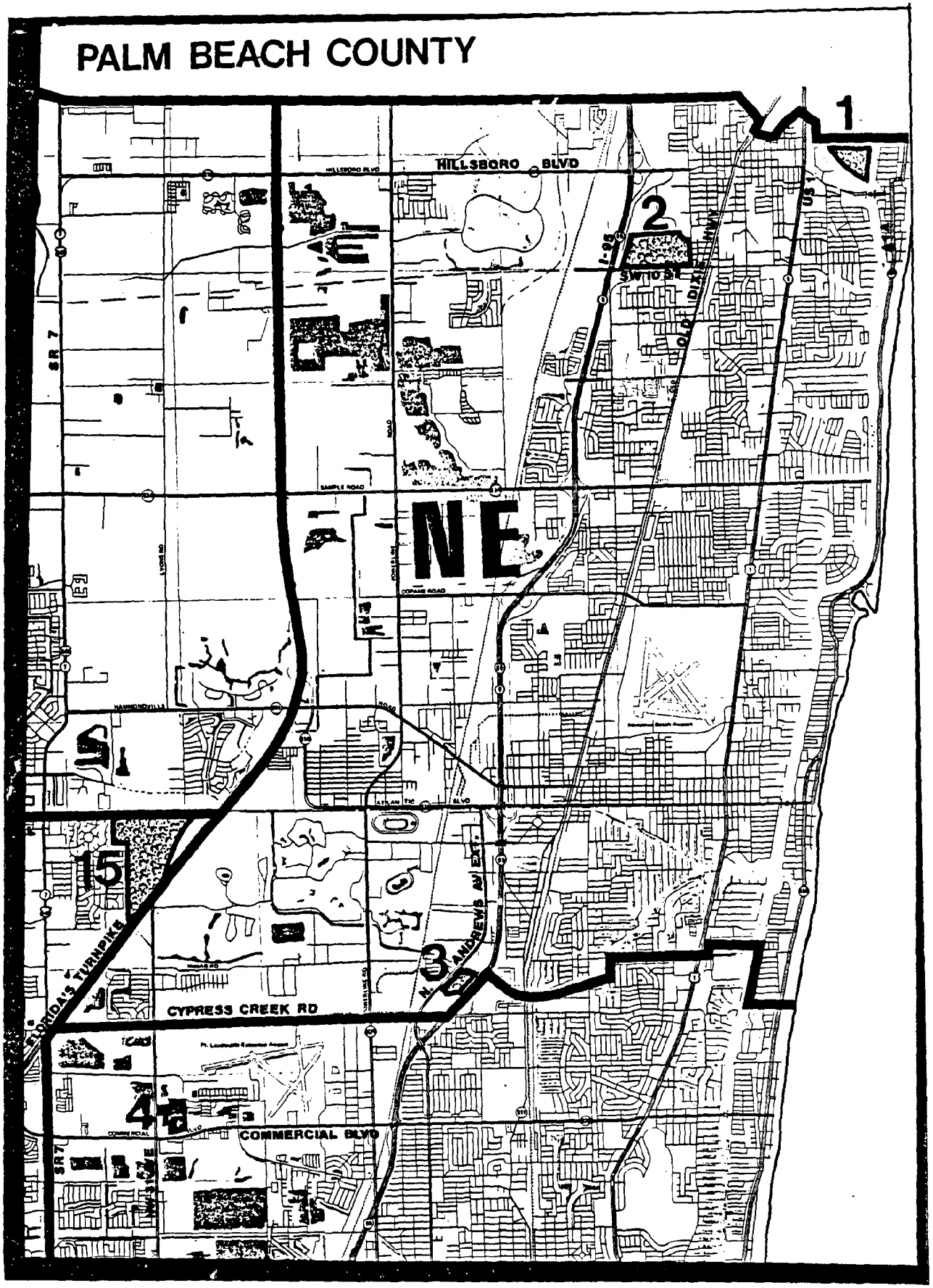
Fig. 9. Deerfield Sand Pine Site: A remnant of the disappearing sand pine scrub plant community in Broward County.

Fig. 10. West Lake Mangrove Area: The only substantial estuarine community remaining in Broward County.

Fig. 11. Pine Island Ridge Site: The highest land form elevation in the County provides a unique hardwood hammock setting in a low-lying environment.

Fig. 12. Everglades Buffer Strip: An essential water recharge area needed to Buffer the Conservation Areas from intense development.

Map 8 Northeast Subregion



## PROPOSED AREAS BY SUBREGION

Within the following sections Local Areas of Paricular Concern are identified within each of the planning subregions. In order to facilitate planning efforts, the Planning Area of the County was divided into seven subregions plus the Conservation Areas. These subregions were established based on various similarities in development patterns, availability of services, natural or man-made barriers, municipal boundaries and other similar criteria. The boundaries for the subregion were selected based on major roads or waterways. Map 7 illustrates the seven subregions which are referenced throughout the text of this element. The LAPC's discussed here are based on proposals by various municipalities, state agencies, environmental groups and field inventories. However, the list is not meant to be final in that future sites may become designated as additional information becomes available.

### Northeast Subregion

The Northeast Subregion extends north of Cypress Creek Road to the Palm Beach County line and lies between the Atlantic Ocean and the Sunshine State Parkway. This subregion contains a mixture of old and new developments encompassing some of the wealthiest and poorest neighborhoods within Broward County. As the building patterns in the established eastern residential communities moved west, the former agricultural land uses have been altered to accommodate future industrial growth.

The municipalities located in the Northeast Subregion include Deerfield Beach, Hillsboro Beach, Lighthouse Point, Pompano Beach and portions of unincorporated Broward County. The Pompano Airport offers general aviation services to this subregion while the road and rail transportation provides excellent north-south routes through the entire area. In addition to the two railway systems, the Sunshine State Parkway, Powerline Road, Interstate 95, Federal Highway (U.S. Route 1) and AIA have encouraged the growth of the overall economic base of northern Broward County. Hillsboro Inlet also plays an important role to boaters as the only harbor access to the Intracoastal Waterway between Port Everglades and Boca Raton in Palm Beach County.

The Broward County Land Use Plan, 1977 has depicted this Subregion of Broward County as the heart of the industrial corridor between Interstate 95 and the Sunshine State Parkway. The relative abundance of vacant property in northern Broward has produced many intensive land uses such as landfills, borrow pits, and various utility franchises. Compatible land use planning for these growing industrial centers as well as ensuring adequate service delivery are significant concerns for local governments in these areas.

Presently, the commercial businesses are mostly stripped along major highways. Commercial centers such as the Pompano Fashion Square and the Pompano Harness Track are important attractions to the older residents and seasonal visitors.

Newer residential developments of large scale, such as Palm Aire and Century Village, have provided alternative living styles to the exclusive beachfront development. Other unincorporated neighborhoods represent prime targets for future residential and commercial redevelopment. Initiating the historic preservation of downtown Pompano Beach, one of South Florida's oldest communities, has become a long-range conservation goal of the city.

In the Northeast Subregion, coastal zone management must reflect the need to protect and improve surface water quality and to enforce a floodplain management program, especially for the eastern urbanized areas. Similar to the other coastal subregion, the establishment of coastal construction control lines and the maintenance of beach areas exist as vital environmental concerns.

1. Deerfield Island Park Site

The Deerfield Island Park Site is situated adjacent to the Intracoastal Waterway just south of the Broward-Palm Beach County border in the City of Deerfield Beach. The County-owned property covers approximately 48 acres and is currently being developed as a park by the Broward County Parks and Recreation Division. In the 1920's, Al Capone, among others, utilized the Island as a drop-off station for his bootlegging operations. During the last year the name was formally changed from its original namesake.

The vegetation covering the man-made Island is a combination of exotic species (65%), such as Australian Pine and Brazilian Pepper, with Red, White and Black Mangrove (25%) also present. Other tree species include Gumbo-Limbo (*Bursera simaruba*) and Cabbage Palm (*Sabal palmetto*). Wax Myrtle, Cocoplum, and Scrub Palmetto are also scattered throughout the higher ground.

Deerfield Island is a very suitable habitat for migrating birds like Warblers. Cardinals and Western Kingbirds are among some of the identified bird species inhabiting the site. Gray squirrels and raccoons are also prevalent.

According to the Parks and Recreation Division, the Park is scheduled to be completed by Autumn. Located on the Island will be a boat docking area along the southwestern shore, a picnic shelter, a rest room area, a ranger station and several small observation towers near the water.

2. Deerfield Sand Pine Site

The Deerfield Sand Pine Site is located east of I95 and north of Southeast 10th Street in the City of Deerfield Beach. This site is approximately 85 acres in size and is bordered by the Natura Development to the north and by an unimporved portion of Southwest 3rd Avenue. No other area along the coastal ridge of Broward County holds a Sand Pine stand of this quality and size.

The scrub pineland plant community is relatively rare in Broward County. Characteristic of scrub associations, this area is dominated by Sand Pine (Pinus Clausa), Myrtle Oak (Quercus myrtifolia), and Chapman Oak (Quercus champanii) as well as other scrub oak species. Pine flatwoods vegetation such as Slash Pine (Pinus elliotii) and Saw Palmetto (Serenoa repens) replaces the scrub pine associations along the western area. Gopher Aplle (Licania michauxii), Prickly Pear Cactus (Opuntia stricta) and Pennyroyal (Satureja rigida) are also found in this pineland plant community.

The State Division of Forestry noted this area in the Vegetation Inventory (1977) and the Urban Wilderness Advisory Board has nominated it as an Urban Wilderness Area. The present owner, Chase Manhattan Bank, is actively marketing the land which was once under a PUD designation through the City. The allowable residential density stands at 10 units per acre and the area has yet to be platted by both the City and the County.

3. May Site

The May Site is located directly north of the Cypress Creek Road exit and abuts the west side of Interstate 95. The twenty-two acre site is bordered by the Andrews Avenue Extension on the west and by the Cypress Creek Canal to the north in an unincorporated portion of northwestern Broward County. The wide variety of native vegetation coupled with the site's excellent accessibility provide a valuable environmental resource to the residents of the County.

Although the site is presently under private ownership, it has been recommended for purchase as a park site in the Broward County Land Use Plan, 1977 as well as in the 1975 Open Space Study.[17] To the northwest and southwest of the property, development has boomed in the Gateway Industrial Area. This has left the May Site as one of the few undeveloped parcels in the entire area.

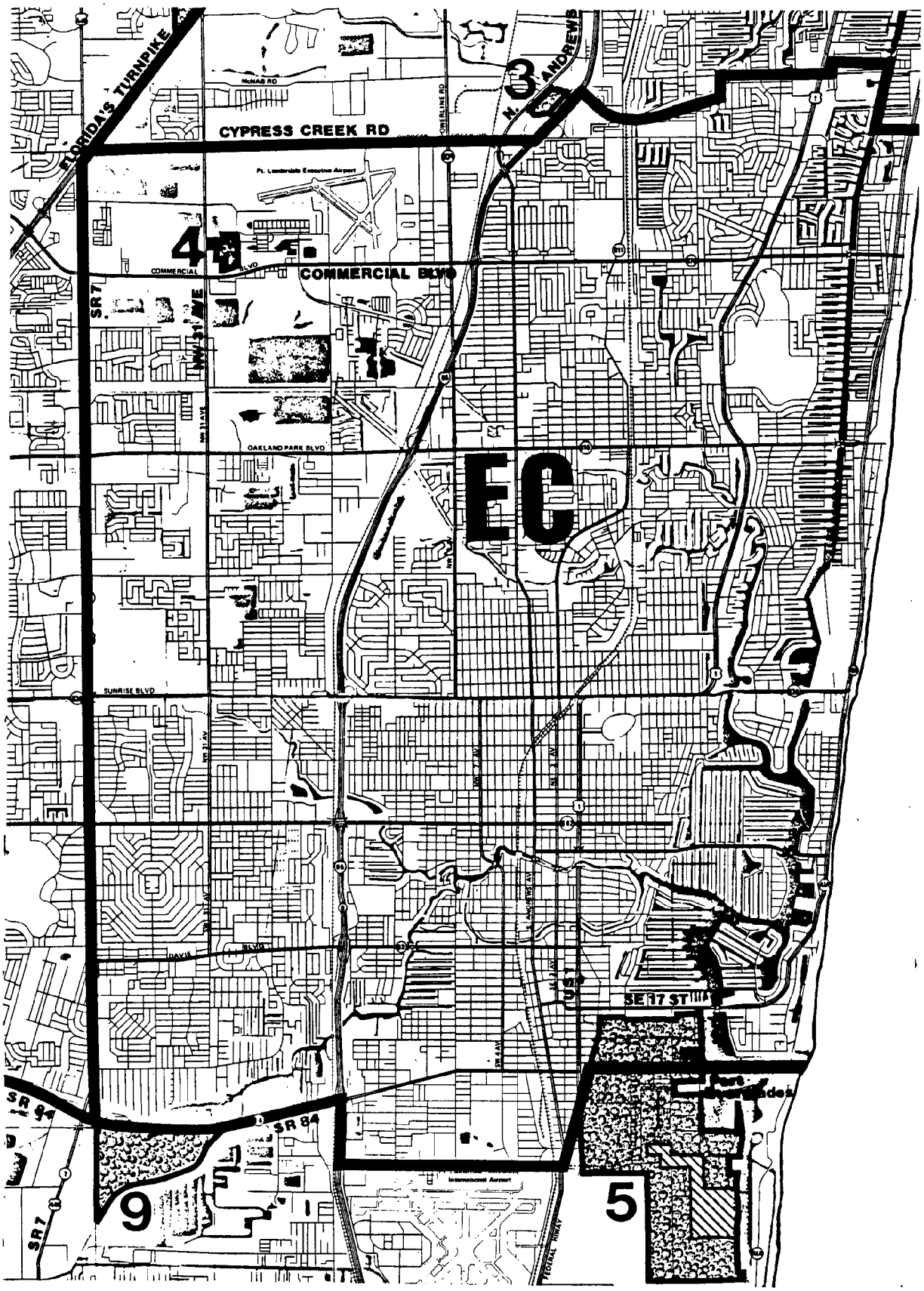
The site itself is a lowlying wetland with substantial muck associations measured up to forty feet at some points. An impressive variety of large native vegetation exists which is in good to excellent condition. Predominant tree species include Bald Cypress (Taxodium distichum), Red Maple (Acer rubrum) and Strangler Fig (Ficus aurea). The site also contains numerous Cabbage or Sabal Palm (Sabal palmetto) on the eastern portions of the property. Shrub species present include Wild Coffee (Psychotria undata), Cocoplum (Chrysobalanus icaco), Marlberry (Ardisia escallonioides), and Lancewood (Nectandra coriocea). The ground cover noticed were comprised of Boston, Leather, and Strap Ferns, Arrowheads, Virginia Creeper and Grape Vines. Bromeliads are also abundant such as Mealy Wild Pine (Catopsis berteroniana) and Cardinal Air Plants (Tillandsia fasciculata). In addition, the site possesses one endangered plant species called the Shoestring Maple.

Various birdlife inhabit the site and offer a unique setting unlike other natural parks in Broward County. Species such as the Blue Heron, Limpkin, White Ibis, Green Heron, Cattle Egret, Snowy Egret, Coot,

Snake Bird, Double-crested Cormorant, nesting Alligators, a Bobcat, and the Osprey have been recorded at this site.

The present land use designation for the May Site is industrial, according to the Broward County Land Use Plan, and the site is zoned agricultural (A-1).

Map 9 East Central Subregion



East Central Subregion (EC)

The East Central Subregion represents the metropolitan core of Broward County. The area described is located between the Atlantic Ocean and U.S. Route 441 (State Road 7) and from State Road 84 to Cypress Creek Road. The City of Fort Lauderdale, the largest municipality in the county, represents an important focal point in Broward's historical population growth. The completion of the Florida East Coast Railway through to Miami in 1896 brought the initial influx of residents and trade to the coastal ridge of the County. Today, this highly active urban area serves as the hub of Broward's tourist-oriented economy.

Bordering the city of Fort Lauderdale are other municipal governments of the East Central Subregion including Lauderdale-by-the- Sea, Sea Ranch Lakes, Oakland Park, Wilton Manors, and portions of unincorporated Broward County, Lauderdale Lakes and Tamarac. The transportation routes which grid this subregion are among the most utilized in the County. Interstate 95 and Federal Highway (U.S. Route 1), for example, provide local residents two highly accessible north-south roadways. Rail facilities, including the Florida East Coast and the Seaboard Coastline Railroads also offer parallel north-south service through the East Central Subregion. This combined with the close proximity of Port Everglades and the Fort Lauderdale-Hollywood International Airport as major trade facilities has encouraged the steady growth of construction, retail, and light industrial businesses to the west of Interstate 95. The Fort Lauderdale Executive Airport, located to the south of the expanding Gateway Industrial area, services an increasing amount of the general aviation traffic from western and northern Broward County interests.

The higher density residential land uses in this sector are concentrated along the Intracoastal Waterway and the oceanfront. Numerous condominium developments, hotels, motels and apartment houses account for a large proportion of the toal housing stock in this portion of the County. This has made the East Central Subregion a favorite spot for vacationers and retirees.

Commercial land uses in the East Central Subregion are stripped adjacent to the jamor arterial roadways. Other centers of business and retail trade are found in the abundant number of shopping plazas and malls which cater to the residents as well as the seasonal population.

Coastal zone planning for this area of Broward must consider the possible evacuation of the beach area in the case of a hurricane threat. Being the most urbanized sector of the County, the potential impact of flooding and storm surge would be the greatest in the East Central Subregion. Similar to the other coastal regions, other significant environmental concerns include saltwater intrusion and the maintenance of adequate coastal construction control lines.

4. The Rookery Site

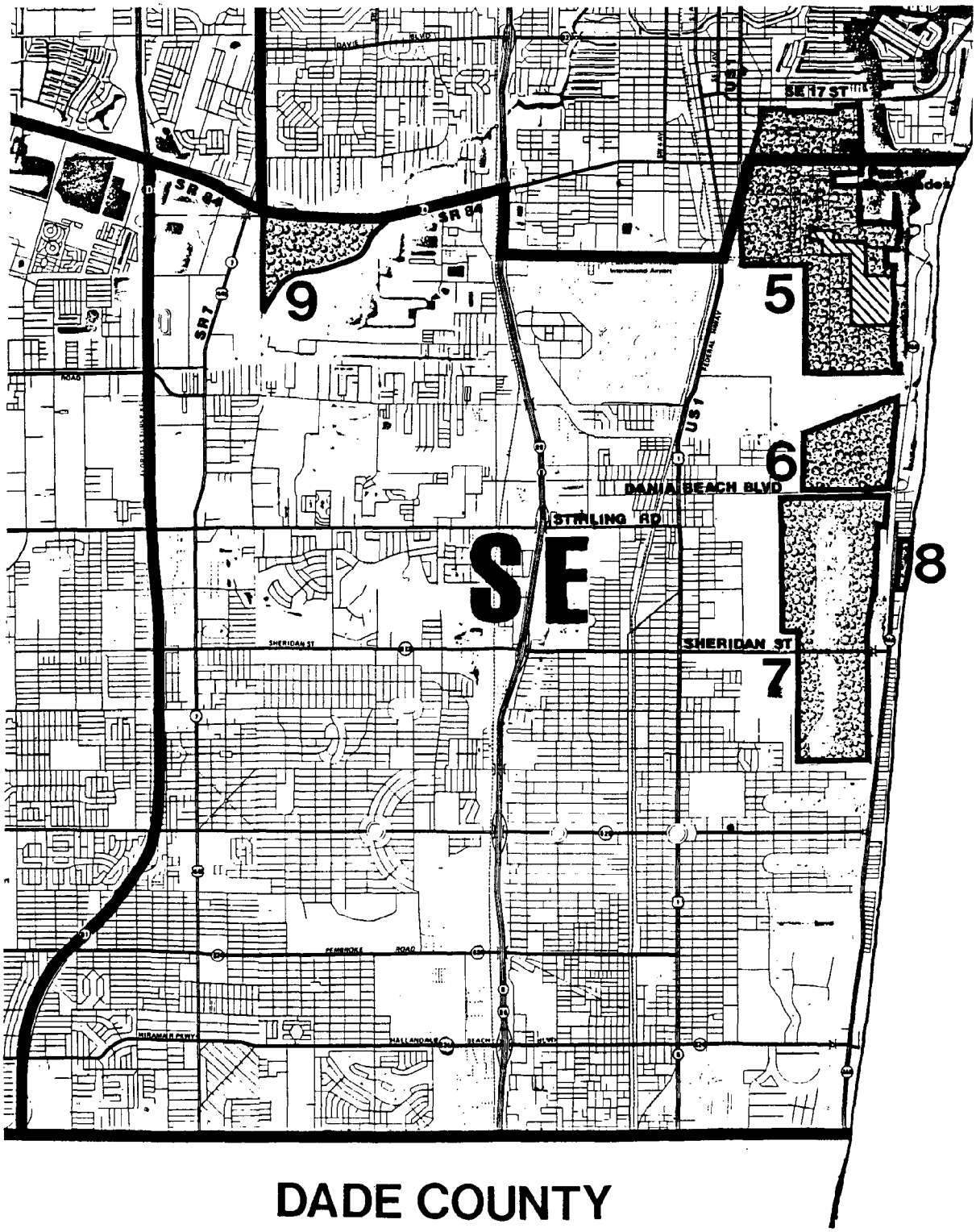
The Rookery Site is located at the northeastern corner of West Commercial Boulevard and DeBlois Road (N.W. 31st Avenue) in the City of

Fort Lauderdale. This seventeen acre area contains an inactive borrow pit which in the past has been a favorite roosting spot for waterfowl.

The Rookery possesses few natural species of vegetation due to the previous disturbance of the site. Australian Pines dominate the fringes of the property which was purchased by Broward County three years ago. Future plans for the Rookery, which has been renamed the William T. Kelley Park, include an observation platform and an improved access road.

The site was previously mentioned in the Broward County Land Use Plan, 1977 as a unique natural area.

Map 10 Southeast Subregion




DADE COUNTY

Southeast Subregion (SE)

The Southeast Subregion comprises an area of diverse land uses of a highly urbanized character. Specifically, this subregion stretches south from State Road 84 to the Dade County line and east from the Sunshine State Parkway to the Atlantic Ocean. Similar to the other coastal subregions of the County, the competition for location along the oceanfront between commercial, industrial, residential, and tourist uses has produced linear urbanization. This unique pattern of contiguous development close to the ocean is interrupted only by the last remaining mangrove wetland in Broward County.

The municipalities of Dania, Hallandale, Hollywood, Pembroke Park and portions of unincorporated Broward County cover the Southeast Subregion. Other political jurisdictions include the Fort Lauderdale-Hollywood International Airport, portions of Port Everglades and the Seminole Indian Reservation. Interstate 95 bisects the subregion from north to south and is situated adjacent to the Southeast Coast Railroad. To the east, the Florida East Coast Railroad parallels Federal Highway (U.S. Route #1), the main artery of travel for local residents.

Residential land use varies substantially within the Southeast Subregion. The high-rise and condomimium development along the beach in Hallandale include some of the highest densities in Broward County. Multi-family dwelling units are clustered east and west of Federal Highway, I-95, and State Road 7 (U.S. 441) transportation corridors. The remaining residential land uses represent a variety of single-family and duplex style development with newer, western neighborhoods displaying relatively larger lot areas.

Commercial land uses such as retail businesses and office buildings border every major arterial road. Industrial land uses are generally concentrated in the northern third of the Southeast Subregion. While much of this area has been designated industrial on the Broward County Land Use Plan due to its proximity to the Fort Lauderdale-Hollywood International Airport, Port Everglades and the proposed Port Expressway (State Road 84), much of this land is unsuitable for development. Moreover, portions of these industrial lands have been noted to be unique natural areas which are recommended for acquisition or preservation.

Within the coastal zone of the Southeast Subregion, the municipalities of Dania, Hallandale, and Hollywood will be preparing Coastal Zone Protection Elements under the Local Government Comprehensive Planning Act guidelines. Beach renourishment, saltwater intrusion and the establishment of sound coastal construction control lines entail the most demanding environmental challenges facing this section of Broward County.

5. Port Everglades

Port Everglades, the second largest seaport on the east coast of Florida and the deepest harbor in the state, occupies approximately 1,840

acres. Situated between the cities of Fort Lauderdale and Hollywood, the Port is of special interest because of its coastal value. Due to its diverse character, in terms of its energy importation, economic base and the existing land use configuration, the entire jurisdiction is regarded as a Local Area of Particular Concern (LAPC).

Within the Port Everglades boundaries, numerous examples of significant concerns exist to justify the Local Areas of Particular Concern designation:

(a) Environmentally sensitive areas include the manatee habitat and the mangrove swamp. These Wildlife and Natural Vegetation Areas are:

1. The Florida Power and Light Discharge Canal which was designated as a "manatee sanctuary" by the Florida State Legislature in 1978, in the Florida Manatee Sanctuary Act, Chapter 370, Subsection 370.12(2) Florida Statutes;

2. The approximately sixty-one and one half (61.5) acre mangrove swamp immediately south of the eastern portion of the Discharge Canal; and

3. A buffer extending fifty (50) feet beyond the Canal's banks.

(b) As an Economic Resource, the Port is most readily recognized for its economic benefits to the County and the Region. Imported commodities, passenger traffic, product distribution and related services generate many employment opportunities. In addition, the Port serves as the major South Florida supply point for petroleum importation, storage and shipment.

The future economic growth of Port Everglades is contingent on the sound management of competing land uses. The close proximity of the Fort Lauderdale-Hollywood International Airport provides regular passenger and airfreight service. Railroad facilities combined with direct access to State Road 84 (eastwest), Federal Highway (U.S. 1), Interstate 95 and Florida's Turnpike offer an excellent transportation network to and from the Port. Recognizing these important support services, the recent establishment of the Foreign Trade Zone will insure economic growth within the Port jurisdiction in the coming years. Due to the finite land resources available for the expansion of current operations, Port Evergaldes must accept environmental concerns in resolving its future economic growth.

6. Red Mangrove Swamp Site

The Red Mangrove Swamp Site is situated between the Dania Cut-off Canal and Dania Beach Boulevard in the City of Hollywood. The site covers approximatly 300 acres west of the Intracoastal Waterway and contains the only expansive remaining Red Mangrove swamp in Broward County. As a wetland area, this mangrove swamp once functioned as a

The isolation of this area from development pressures has helped to preserve the natural vegetative and wildlife amenities of a mangrove swamp. The importance of the mangrove wetlands in the food chain of saltwater fish and shellfish have been well-documented during the past decade. Red Mangrove (Rhizophora mangle), Black Mangrove (Avicennia germinons), and White Mangrove (Laguncularia racemosa goetrn) are present. Red Mangrove can grow in saltwater by dropping air roots to prop themselves above the mean high tide level and are protected by Section 404 of the Federal Water Pollution Control Act of 1972.

The Broward County Land Use Plan has designated this entire area as residential (Low-5 dwelling units per acre).

7. West Lake Mangrove Area

The West Lake Mangrove Area is located in the City of Hollywood, south of the Dania Beach Boulevard, north of Johnson Street and west of the Intracoastal Waterway. The total land and water area covers approximately 1,500 acres and contains the only substantial mangrove estuarine community remaining in Broward County. As an open space in a densely populated section of the County and as a unique wildlife area of mangrove wetlands, the site represents an indispensable natural resource.

Research within the past decade has established the contribution of mangrove wetlands to shoreline stabilization and, most importantly, to supporting the food webs for Florida's rich finfish and shellfish population. Found only on the lower and middle coastlines of the state, the three species of woody plants mostly known as mangroves are: Red Mangrove (Rhizophora mangle), Black Mangrove (Avicennia germinans) and White Mangrove (Laguncularia racemosa goetrn). Mangroves have the unique ability to exist and grow in saltwater by dropping air roots to prop themselves above the mean high tide level.

The mangrove food chain is highly efficient in the production of protein from the leaf matter through fungi, bacteria, nematodes, small crustaceons, mollusks and shrimp to a wide variety of small and large fish. Realizing that nearly all of the commercial and sport fishing species of fish and shellfish depend on this nutrient-rich, protein environment during their life cycle, these mangrove wetlands are protected by Section 404 of the Federal Water Pollution Control Act of 1972.

The major types of tree vegetation in the West Lake area can be grouped into three separate zones. In the wetland zones, species of mostly Red and White Mangrove flourish in the low-lying saltwater marsh. The relatively higher transitional zones are populated with species of Sea Oxeye (Conocorpus erecta). Vegetation in the upland zones has mostly been invaded by Australian Pine (Casuarina spp.) due to the gradual drainage of these areas by mosquito control canals.

Many species of wildlife are found in the West Lake area. Fishing birds recorded here include Anhingae, Cormorants, Ospreys, Louisiana Blue Herons, Yellow-crowned Night Herons, Green Herons, American Egrets, White Ibis, and Great White Herons to name only several of the 56 bird

species sighted at West Lake. Periwinkle Snails, Fiddler Crabs, Killifish, Mullet, Needlefish, Snook and Tarpon are very abundant in the area. As a feeding and nesting sanctuary for numerous types of wildlife, the West Lake area provides an irreplaceable habitat for migratory birds.

In September of 1978 the voters of Broward County pledged $7,500,000 toward the acquisition of the West Lake site in the Bond Issue Referendum. Local officials intend to match this money with state and/or federal grants to help purchase the property in the near future.

Prior to this mandate, the County purchased the Miller Tract, abutting West Lake to the southwest, to buffer the existing wetlands from potential development to the west. Currently, alternatives are being explored to preserve the West Lake area as a state recreational area. The present land use designation for the West Lake area is residential (Low-5) which allows five (5) dwelling units per acre according to the Broward County Land Use Plan.

8. Hollywood Beach Strand Site

The Hollywood Beach Strand Site is located between A1A and the Atlantic Ocean and is bordered by Franklin Street on the north and Charleston Street to the south. This 20-acre strip contains the last remaining, environmentally stable sand dune in Broward County.

The beach habitat area of Hollywood was once a portion of a natural functioning ecosystem stretching throughout South Florida. The Beach Strand Site has been altered somewhat by a paved one-way road running north behind the foredune and three connector streets which allow public parking to the west. Boardwalks extend from the roadway over the remaining dune system to the beach. These serve to protect the fragile grasses which colonize the seaward or foredune face of the dunes. This vegetation is critical to dune stabilization which in turn provides a natural obstruction against storm surge.

The existing foredune vegetation found on the Hollywood Beach Strand Site include Sea Oats (*Unioloa paniculata*), Sea Purslane (*Sesuvium portulacastrum*) and Dune Panic Grass (*Panicum amarulum*). In the scrub zone area, larger vegetation such as Sea Grape (*Coccoloba uvifera*) and Saw Palmetto (*Serenoa repens*) are abundant.

The present owner of the property does plan to develop the Beach Strand and is currently in litigation with the City of Hollywood concerning the use of the property. The land use designation, according to the Broward County Land Use Plan 1977, is Medium to High Residential (16-25 units per acre), but the future density of the property is one of the issues to be resolved under negotiation between the owner and the city.

This LAPC provides local residents with a unique vestige of the natural beach system which once existed throughout Broward County; it is hoped that the owner will develop the property, if he must develop it, in a manner which provides maximum feasible protection to the dunes

and dune vegetation on the site (see Sections "Beach Erosion" and "Coastal Construction Control Lines.")

9. South Fork New River Site

The South Fork New River Site is located south of State Road 84 and one-quarter mile east of State Road 7 (U.S. 441) in the unincorporated area of Broward County. Bordered on the south by the South Fork of the Middle River, this environmentally sensitive area is approximately 120 acres in size. It offers the lone remaining example of a forested, non-tidal wetlands system in the eastern regions of Broward County.

This privately-owned site has recently received attention due to the proposed Port Everglades Expressway to be constructed over the existing State Road 84 directly to the north. Environmentalists and local officials fought to protect the area from extensive ecological damage which would have resulted from a southern realignment of the Expressway. South Fork New River is now being studied by the State Department of Natural Resources for possible acquisition as a recreation or natural preserve area. Years earlier the site had been designated as a State Forest by the Florida Division of Forestry and very recently the Urban Wilderness Advisory Board of Broward County has requested this site be named as an urban wilderness area.

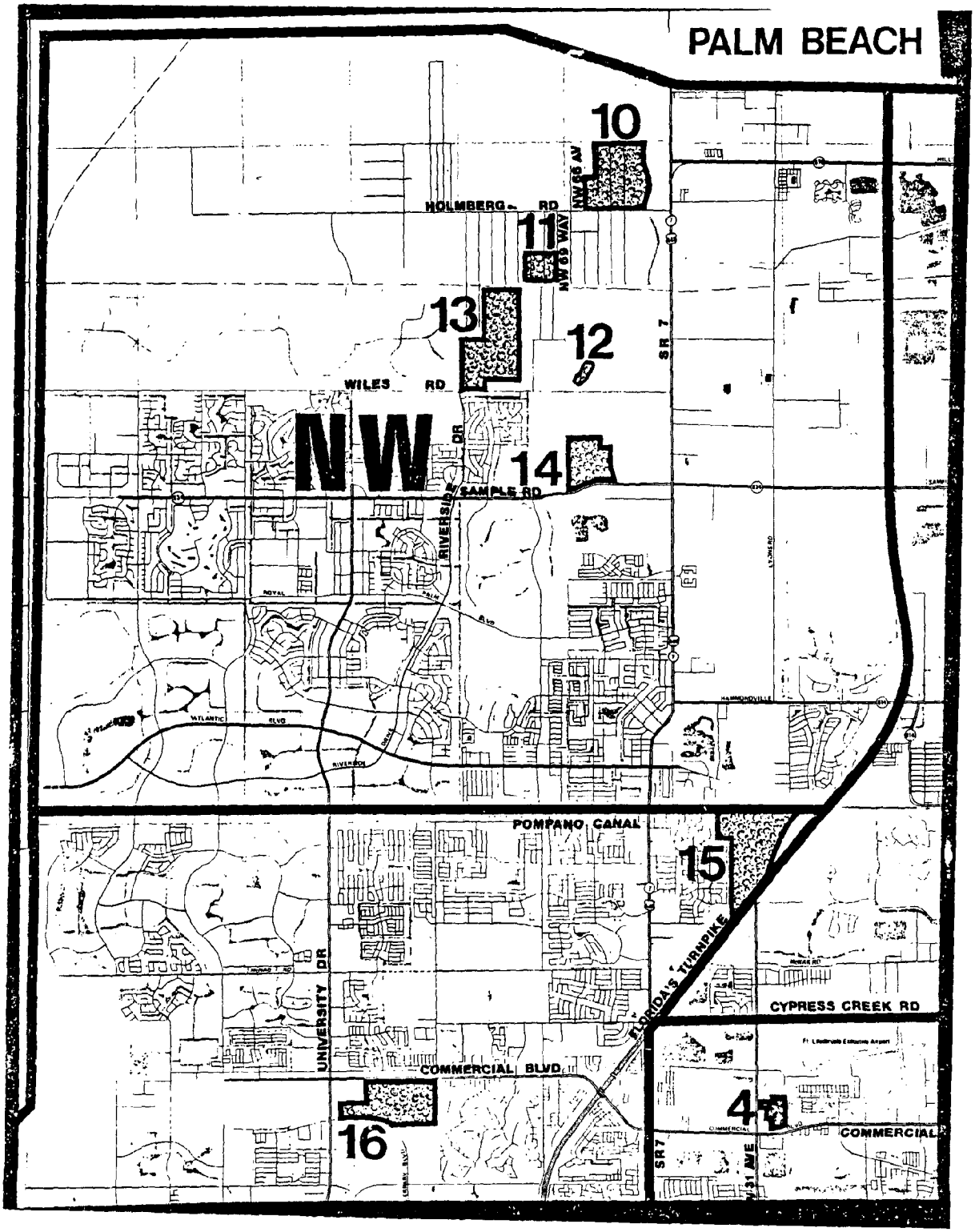
Major plant species are in good to excellent condition with a large variety of tree, shrub and ground cover species. Tree species include Bald Cypress (Taxodium distichum), Red Maple (Acer rubrum), Sabal Palm (Sabal palmetto) and Strangler Fig (Ficus aurea). Cypress trees dominate the southern portion of the site which give rise to the hundreds of cypress knees scattered within the area. Scrub vegetation is scattered throughout the site which is comprised of predominantly Wax Myrtle and Wild Coffee (Psychotria undata) plants. Ground cover is also abundant with Boston, Leather and Swamp Ferns the most noticeable. Undesirable species and exotics are limited to the western and northern fringes. Few of these invading species--Brazilian Pepper (Schinus terebinthinfolius), Melalueca (Melaluca quinquenervia) and Austrialian Pine (Casuarina lepidophloia)--have been able to penetrate the thick native vegetation.

Animal life surveyed in the area include the Gray Squirrel, Marsh Rabbit, Oppossum, Land Crab, Raccoon, and numberous bird species such as the Pileated Woodpecker, Barn and Screech Owls. The many Cypress ponds throughout the interior provide freshwater habitats for the existing wildlife. In addition, the Middle River Shore zone offers a rare riverine wetland area for Blue Herons and other wading birds. Threatened or endangered animal species supported here are the Southeastern Kestrel and the American Alligator.

While this site was not included as a unique natural area in the Broward County Land Use Plan, the South Fork New River Site has been noted by the State Division of Forestry and by the Fish and Wildlife Service of the U.S. Department of the Interior as a unique and extensively vegetated wetland. Considering the proximity of development to the west and north of the site, very urgent action is needed to preserve this lowlying area from being adversely affected.

The present land use designation for the South Fork New River Site is industrial according to the Broward County Land Use Plan. The site is zoned agricultural (A-1) with the exception of the frontage on State Road 84 which is zoned commercial (B-3).

Map 11 Northwest Subregion



Northwest Subregion (NW)

The Northwest Subregion contains that portion of Broward County which is north of the Pompano Canal (C-14), west of the Sunshine State Parkway, south of the Palm Beach County line and east of Conservation Area 2-A. Active agricultural interests once dominated the land use configuration of this Subregion. A low-density, single-family style pattern has replaced most of the "bonafide" farming business. Today, only the northwestern tip of the Subregion falls within the agricultural green belt.

Coconut Creek, Coral Springs, Margate, Parkland and areas of unincorporated Broward County comprise the political jurisdictions. Of these cities, Coral Springs and Margate account for nearly ninety percent of the population. Within the next few years, Coconut Creek will receive a substantial boost in new residents due to the recently approved Development of Regional Impact (DRI), the Tartan Development.

The lag in new road construction in the Northwest Subregion has slowed the growth pattern. Sample Road and U.S. 441 (State Road 7) presently comprise the only major thoroughfares. The proposed University-Deerfield Expressway, which was designed to provide an inner belt commuting system for western Broward, may not be constructed due to financial constraints. While other roadways are scheduled for improvements, the overall transportation routes for the subregion will be slow in developing.

The relatively low growth rate in this Subregion has left much land in an open space category. This has made the Northwest Subregion a significant area for studying some of the natural ecosystems still remaining in Broward County. Development of these unique natural sites should be avoided whenever possible.

In addition, the suitability of existing drainage patterns should be reexamined. Surface water management and improved drainage systems pose immediate challenges to controlling urban runoff. The affected municipalities are encouraged to work together to relieve flood-prone areas so as to limit the need for backpumping into the adjacent Conservation Areas.

10. Holmberg Road Site

The Holmberg Road Site is located in the northwestern municipality of Parkland. The designated area contains a mixture of pine and cypress stands covering approximately 185 acres. Lying generally north of Holmberg Road, east of N.W. 66th Avenue, south of N.W. 72nd Street and west of the drainage canal, this site provides a potentially valuable educational and recreational resource.

The State Division of Forestry had previously recommended the subject site as a preservation area in the Vegetation Inventory of Broward County. Similarly, the Holmberg Road site was also referred to in the Broward County Land Use Plan as a unique natural area which should be considered as a preservation site.

The many different plan communtiies found on this site provide a fine variety of tree, shrub and ground cover species. Major tree species of excellent quality include Slash Pine (Pinus elliotti), Bald Cypress (Taxodium distichum); Palmetto (Serenoa repens), Gallberry (Ilex glabra), Stagger Bush (Lyonia ferruginea), Gopher Apple (Licania michauxii), and Myrsine (Myrsine guianensis) comprise the most abundant shrub types. Ground cover vegetation such as Bromeliads, Wild Flowers, Tick Seed, Love Vines, Royal and Leather Ferns offer a lush habitat for various types of wildlife.

Although paved roads divide the Holmberg Road site into parcels of approximately fifty acres, invasion by exotic species has been limited to the roadsides. Brazilian Pepper (Schinus terebinthinfolius), Australian Pine (Casaurina spp.), and Guava (Psidium guajava) can be found along these corridors.

Over the years the area has undergone change due to the gradual drainage of the wetlands and the paving of residential access roads. However, the site offers the coexistence of differing ecological communities such as dry pine flatwoods and wet cypress head areas. This area has been used in the past as a study area for students from Broward Community College and Florida Atlantic University. This refuge is also part of the territory of the Florida Panther, a mammal whose statewide status is considered "rare". Due to the diversity of the vegetation, the land receives a high priority as a unique natural park setting.

The present land use designation for the Holmberg Road Site is residential (estate) which allows up to one dwelling unit per acre.

11. Holmberg Pond Apple Slough Site (Deerfield-Expressway Site)

The Deerfield Expressway Site is located south of Holmberg Road in the City of Parkland. Similar to the Holmberg Road Site, the area generally consists of pure flatwoods intermixed with a variety of wetland vegetation. The site covers approximately 126 acres and is dissected by three paved roads between N.W. 75th Way and N.W. 69th Way. Due to the preliminary alignment of the proposed Deerfield Expressway which was to border the site on the south, the area is so named. Unlike the Holmberg Road Site, single-family development is actively occurring in the Deerfield Expressway Site and threatens to destroy one of the finest Slash Pine hammocks remaining in the County.

In the Broward County Land Use Plan, 1977 and on the map accompanying the text, the Deerfield Expressway Site is recommended as a future park site. The State Division of Forestry has also noted this land for preservation in A Vegetation Inventory for Broward County. Currently, the area is being studied by the Urban Wilderness Advisory Board for consideration as an urban wilderness site.

The major tree species found on this land are consistent with the Holmberg Road Site; Slash Pine (Pinus elliotti), Bald Cypress (Taxodium distichum), Cabbage or Sabal Palm (Sabal palmetto), and Strangler Fig (Ficus

aurea). In addition, the swampy portions of the area harbor Pond Apple or Custard Apple trees (Annona glabra) which are rela tively rare. Shrub vegetation includes trees Coastal Willow (Solix caroliniana), Saw Palmetto (Serenoa repens), Gallberry (Ilex galbra), Stagger Bush (Lyonia ferruginea), Gopher Apple (Licania michauxii), and (Myrsine guianensis). Leather, Royal and Bracken Ferns are scattered throughout the site along with numerous types of vines and bromeliads. Abundant wildlife including squirrels, raccoons, a variety of birdlife, opossums, and the panther have been sited here.

Guava (Psidium guajava) and Brazilian Pepper (Schinus terebinthinfolius) represent the only recorded species of undesirable vegetation. These are generally located along the paved roadways which split the Deerfield Expressway Site into four separate tracts.

The recent drainage of the area has lowered the surface waters in the cypress head plant communities which has encouraged the filling of individual parcels for single-family home construction. While it appears that the majority of the land in the Deerfield Expressway Site will be developed into a traditional estate-type subdivision, there exists one portion of the site which should be preserved for several reasons. This 18-acre, rectangular piece of land lies at the southwest corner of the site between N.W. 75th Way and N.W. 72nd Way. It contains one of the largest strands of Slash Pine in the entire County and would provide an excellent open space facility for future residents living south of Holmberg Road.

The present land use designation for the Deerfield Expressway Site is residential (estate) which allows up to one dwelling unit per acre.

12. Swamp-22-Site

The Swamp-22 Site is located in the City of Coral Springs to the north of Wiles Road and approximately one miles west of U.S. 441. Covering 14 acres in size, the area is one of the finest freshwater swamps remaining in Broward County. Due to the small size and the outstanding quality of this wetland, the site should receive priority for conservation as an educational open space facility.

The Swamp was originally identified in the State Division of Forestry's Vegetation Inventory and is currently under consideration as an Urban Wilderness Area. The Broward County Chapter of the Audubon Society has also endorsed this site as an excellent preserve for future residents.

Vegetation abundant in this lowlying wetland include Bald Cypress (Taxodium districhum), Red Maple (Acer rubrum), Pond Apple (Annona glabra), Cabbage Palm (Sabal palmetto), Strangler Fig (Ficus aurea), and Slash Pine (Pinus elliotti). The Wild Coffee plants are complemented by a large variety of ground cover including Royal, Boston and Leather Ferns. The Swamp is bordered by several small drainage canals to the east side of the site which has insured sufficient water retention to the area. Several bird species such as Blue Heron and Common Egret were also noticed in this habitat.

The Swamp is surrounded by fallow farmland which represents the Butler Farms Development of Regional Impact (DRI) of several years ago. Since last year, an unincorporated portion of the Butler Farms Property, including Swamp-22, was annexed into the City of Coral Springs and has received plat approval from the municipality. However, according to Ch. 171, F.S., for a period of two years since the effective annexation date, the Board of County Commissioners remains responsible for altering land use and zoning on that land.

In view of the fact that this property will require plat approval by the Board of County Commissioners, the preservation of this lowlying wetland should be insured through this process. The residential land use for the area is presently Low-5 according the Broward County Land Use Plan, 1977.

13. Leitner Tract

The Leitner Property is located north of Wiles Road and South of the Pinetree Canal between Godfrey Road and N.W. 79th Way. The 320-acre tract is situated in unincorporated Broward County to the south of Parkland and north of Coral Springs. The forested site consists of a fine mixture of South Florida flatwoods which might serve as an excellent natural recreation area for northwestern Broward County.

Major vegetation on the Leitner Property such as Slash Pine (*Pinus elliotti*) and Bald Cypress (*Taxodium distichum*) are among the largest species recorded in this area. Other native tree species include Pond Apple (*Annona glabra*), Cabbage Palm (*Sabal palmetto*), and West Indies Mahogany (*Swietenia mahogoni*).

The Leitner Property has been recognized in the Vegetation Inventory by the State Division of Forestry and is currently being considered by the Urban Wilderness Advisory Board as an Urban Wilderness Area. Although the land is relatively higher in elevation than the surrounding area--13 feet above mean sea level--several man-made impediments to the natural drainage system have caused flooding on the property. Once these drainage problems are resolved, the land would be an attractive acquisition for the future residents of the area.

The Leitner Tract is presently designated Residential (Low-3) according to the Broward County Land Use Plan, 1977.

14. Rumors Site

The Rumors Site is located in the City of Coral Springs north of Sample Road between the Coral Springs High School and west of State Road 7 (U.S. 441) by approximately one-half mile. Totalling nearly 100 acres, this heavily forested area contains a variety of natural vegetation including one lowlying wetland area found near the center of the land.

The site was initially mentioned in the Vegetation Inventory by the State Division of Forestry. In addition, the Rumors Site is presently

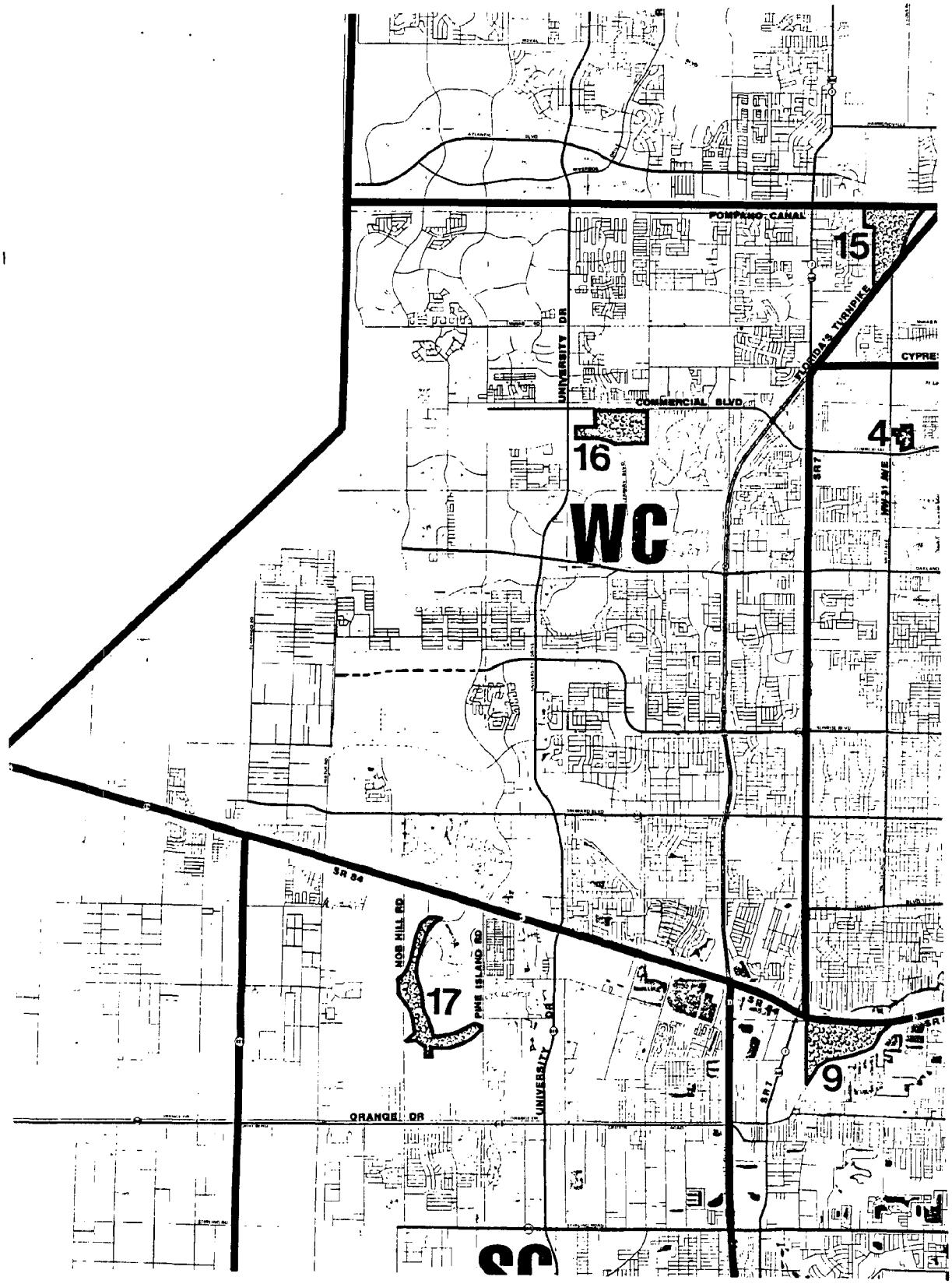
being considered as an Urban Wilderness Area by the Urban Wilderness Advisory Board. While the Land Use Plan of Coral Springs has designated a small section of this parcel for a future park site, the majority of the Rumors Site would be lost to development.

Major tree vegetation includes Bald Cypress (Taxodium distichum), Slash Pine (Pinus elliotti), Cabbage Palm (Sabal palmetto), Red Maple (Acer rubrum) and Pond Apple (Annona glabra). Shrub vegetation is abundant in the form of Wax Myrtle, Cocoplum, Marlberry and Myrsine. Leather and Royal Ferns complement a wide mixture of ground cover such as Virginia Creeper and Pennygrass. Surrounding the central wetland community are Pond Apple and willow trees along with numerous bromeliads and several aquatic plant species.

Although the U.S. Army Corps of Engineers and the Florida Department of Environmental Regulation (DER) have determined that the property is exempt from their "wetland" permitting process, it has been recommended that this lowlying parcel be preserved within the drainage plan of the development.

According to the Coral Springs Land Use Plan the allowable density for residential development is currently in the moderate range, or 2-9 dwelling units per acre.

Map 12 West Central Subregion



West Central Subregion (WC)

The West Central Subregion includes that area north of State Road 84, west of State Road 7 (U.S. 441) and the Sunshine State Parkway, south of the Pompano Canal and east of Conservation Area 2-B. The urbanization of western Broward during the past decade has made this County one of the fastest growing in the United States. The boom of commercial and residential development in this area outstripped the urban service livery capacities of the cities and County during this period. Even today, road construction and improvements to relieve overcrowded trafficways continues to fall far behind the transportation needs of the existing residents of the West Central Subregion.

The member cities of this subregion are Lauderhill, North Lauderdale, Plantation, Sunrise, Tamarac, and portions of Lauderdale Lakes and unincorporated Broward County. Since 1975, building permit activity in these municipalities has accounted for nearly half of the total number issued for the entire County. The University Drive corridor has received the bulk of this construction activity. In providing the main north-south arterial highway for western Broward, University Drive has absorbed traffic far beyond its capacity. Until additional routes such as Pine Island Road can be improved, the traffic congestion on University Drive will only worsen.

The residential land use pattern in the West Central Subregion generally reflects a single-family character. Several zones of higher density development are scattered along the east-west highways of Commercial Boulevard, Oakland Park Boulevard, Sunrise Boulevard and Broward Boulevard. Those multi-family projects located west of University Drive have attracted thousands of retirees from the northeastern part of the country.

Commercial and industrial land uses are situated or are proposed along major access routes. The establishment of strip commercial business along U.S. 441 has forced large retail centers to western sites. For example, the new Broward Mall, at the intersection of University Drive and Broward Boulevard, offers regional shopping opportunities to residents from northern Dade and south Palm Beach Counties as well as from all parts of Broward.

The proposed construction of the University Expressway at the western limit of the West Central Subregion would help to alleviate future traffic problems and stimulate industrial development in this area. Major employment centers are planned at the Expressway intersections of State Road 84 and Commercial Boulevard. The relative shortage of prime industrial land in western Broward should encourage the utilization of these sites in the very near future.

Water quality considerations are crucial to this area of the County. In terms of surface water management, drainage, and potable water availability, local officials within the West Central Subregion need to examine the services required for the continued build-out of the area. Environmental trade-offs, such as backpumping urban runoff into the Conservation Areas in emergency situations, will inevitably cause higher costs for water treatment in the future.

15. Palm-Aire Site

The Palm-Aire Site (now known as Fern Forest) is located northwest of the Sunshine State Parkway, south of the Cypress Creek (C-14) Canal, east of State Road 7 (U.S. Route 441) in the municipality of Coconut Creek. The 254-acre parcel, composed of an excellent variety of natural vegetation, was approved for acquisition in the Bond Issue Program, and has since been acquired as a County park. Due to its ecological significance and widespread aesthetic appeal, the Palm-Aire Site provides a valuable asset to the residents of Broward County.

The site contains a mix of hydric hammock (50%), tropical hammock (4%), and pine flatwoods vegetation (17%). Also evident are numerous limestone rock outcroppings and scattered solution holes. The remaining acreage (22%) includes former dairy cattle land and some encroachment by undesirable exotics such as Brazilian Pepper (Schinus terebinthinfolius). The overall diversity of plant communities is marked by the recording of twenty-one tree species and twenty-eight fern species on this site.

The hydric hammock plant community includes tree species such as Red Maple (Acer rubrum), Laurel Oak (Quercus laurifolia) and Cabbage Palm (Sabal palmetto). Shrub vegetation is dominated by Wild Coffee (Psychotria undata) and Marlberry (Ardisia escallonioides). Royal Ferns (Osmunda regalisvar spectabilis), Sword Ferns (Nephrolepis biserrata), Boston Ferns (Nephrolepis cordifolia) and Swamp Ferns (Blechum serralatum) are prevalent.

In the pine flatwoods, several Slash Pine (Pinus elliotti) remain, however much of this land was originally cleared for pasture land. The tropical hammock community is dominated by tall Bald Cypress (Taxodium districhum) trees in the southern section of the site. Other subtropical species include Gumbo-Limbo (Bursera simaruba), Strangler Fig (Ficus aurea), Wild Lime (Zanthoxylum fagara) and Paradise Tree (Simarauba glauca).

The Palm-Aire Site has been impacted by drainage canals and a high voltage powerline which runs through the property from north to south. Despite encroachment by man and exotics, over sixteen species of birdlife and seven species of mammals are native to the area.

The Vegetation Inventory and the Broward County Land Use Plan, 1977 have both regarded the Palm-Aire Site as a unique natural area. In addition, the area has traditionally been utilized by naturalists, conservationists and university professors as an environmental classroom.

16. Inverrary Site

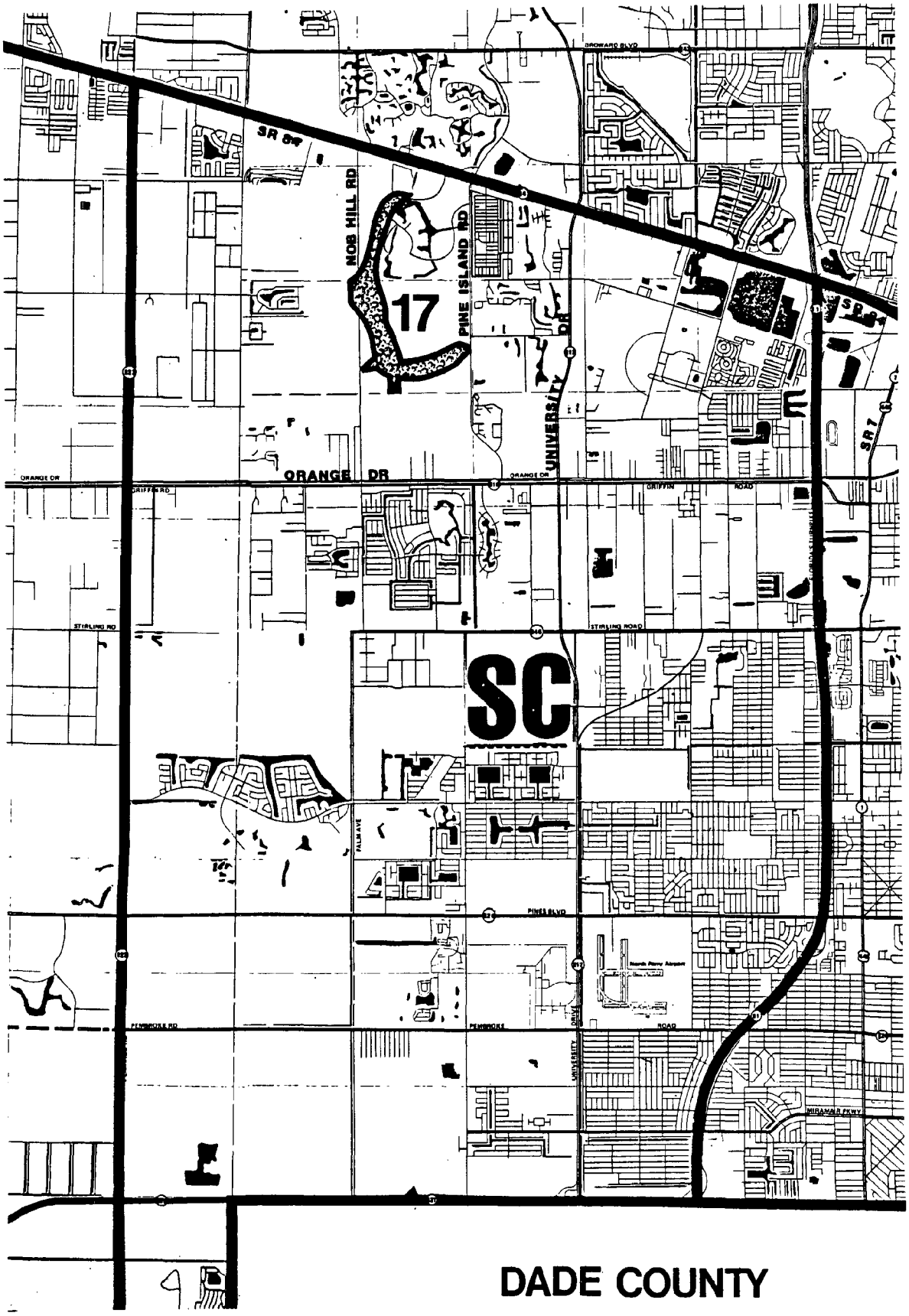
The Inverrary Site is situated southeast of the Commercial Boulevard and University Drive intersection in the municipality of Lauderhill. The 200-acre site is bordered by Inverrary Boulevard on the south and by

Woodlands Village on the east. The ideal location of the area has produced interest in preserving it as an open space acquisition.

The vegetation consists predominantly of tropical and hydric hammock tree species such as Bald Cypress (Taxodium distichum), Red Maple (Acer rubrum) and Sabal Palm (Sabal palmetto). Other tree species include Strangler Fig (Ficus aurea) and Slash Pine (Pinus elliotti). Various types of ferns and native shrubs such as Cocoplum, Red Bay, Wild Coffee and Pond Apple are also present.

The Inverrary Site was originally noted in the Vegetation Inventory and the Broward County Land Use Plan, 1977. The area has already been platted according to a single-family subdivision pattern at five dwelling units per acre. In addition, the northwest corner of the site is currently being developed as a shopping center. While the Inverrary Site is considered a unique natural area of Broward County, it would appear that much of the area will be lost to urbanization in the near future.

Map 13 South Central Subregion




DADE COUNTY

South Central Subregion (SC)

The South Central Subregion encompasses the fastest growing suburban area of Broward County. Bordered on the east by the Sunshine State Parkway and on the west by Flamingo Road, this Subregion extends from State Road 84 to the Dade County line. The predominant development in this area over the past decade has been residential in nature. Based opon the future land use patterns of the municipalities, the South Central Subregion will continue to serve as a suburban bedroom community for the employment centers in Eastern Broward and Northern Dade Counties.

Included in the South Central Subregion are the cities of Cooper City, Davie, Hollywood (western part), Miramar, Pembroke Pines and portions of unincorporated Broward County. A small segment of the Seminole Indian Reservation, the Broward Community College and the North Perry Airport comprise some of the more diverse land uses. Also of significance is the Pine Island Ridge formation which is located to the south of State Road 84 in unincorporated Broward County and overlooks the surrounding countryside.

The traditional single-family subdivision construction in the South Central Areas is complemented by an increasing number of multi-family development. Over the past several years much of the active agricultural land, consisting of mostly citrus groves, have been converted to more intensive land uses. The tremendous growth of strip commercial development along University Drive has helped push the urban fringe further west. Subsequently, the east-west transportation corridors or the area have been plagued with substantial traffic congestion. Improvements to the roadways in the South Central Region through the Road Bond Issue will offer relief to Taft Street, Sheridan Street, Stirling Road and to Southwest 100th Avenue.

Improvement of the surface water quality and flood plain management practices in the South Central Subregion provide major considerations for the municipalities of this area.

17. Pine Island Ridge Site

The Pine Island Ridge Site extends from one-half mile south of South Road 84 to approximately one mile north of Orange Drive (SW 45th Street) in unincorporated Broward County. The Ridge attains the highest land form elevation in the County and provides a unique hardwood hammock setting in a lowlying environment.

Multi-family development by Pine Island Ridge Inc. has occurred along the northern stretch of the Ridge. By court order 3,612 units may be developed on their property which covers approximately 567 acres. Some single-family construction has also been planned west of the Ridge.

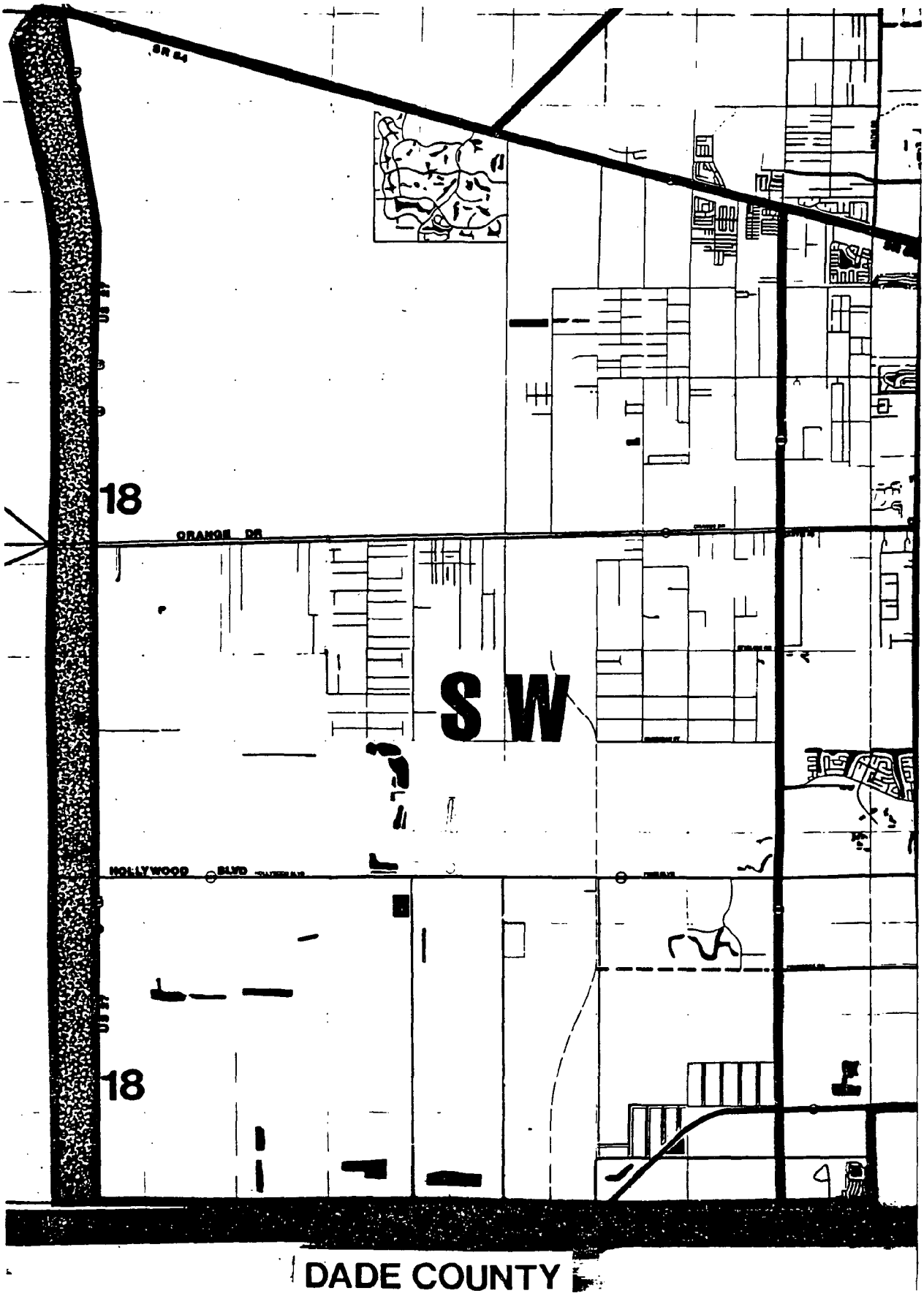
To the south of this development, the Ridge winds through citrus groves. This portion of the site is relatively undisturbed. Indigenous

laurifolia), Live Oak (Quercus virginiana), Strangler Fig (Ficus aurea), Gumbo Limbo (Bursera simaruba) and Mastic (Mastichodendron Foetidissiumum). Some of these oak trees range up to two feet in diameter and are over forty feet in height. Few undesirable species or exotics were found along this portion of the Ridge.

This site was included as a unique natural area in the Broward County Land Use Plan, 1977 and also noted in the Vegetation Inventory compiled by the State Division of Forestry. Adjacent to the southern boundary of the Ridge, the Snead Tract was included for acquisition in the approved Bond Issue Program. Due to the central location of these two excellent hardwood hammocks to the growing western municipalities of Broward County, the Pine Island Ridge site would serve as a natural complement to the Snead Tract.

Presently, the Pine Island Ridge property in Section 17-50-41 is designated residential (medium density) by the Broward County Land Use Plan; however, the buildout has been predetermined by the court order and zoning, which includes the preservation of the Ridge in this section. The land use classification for Section 20-50-41 is residential (estate) and the entire area is zoned agricultural (A-1).

Map 14 Southwest Subregion



Southwest Subregion (SW)

The Southwest Subregion, relative to the remainder of the County, is the least developed subregion. Located west of Flamingo Road to the Conservation Areas and between State Road 84 and the Dade County Line, the area represents a dichotomy to Broward residents. The lowlying, flood plains of southwestern Broward County provide a vast water recharge source for the Biscayne Aquifer. Yet, within the Subregion, several of the largest Broward developments are planned.

The municipal jurisdictions of this subregion include large portions of unincorporated Broward County and the western extensions of the municipalities of Davie, Miramar and Pembroke Pines. The main transportation routes currently running north and south are limited to U.S. Route 27 and Flamingo Road. Other major roadways are Hollywood Boulevard, Griffin Road, and State Road 84 which divide the area from east to west. In addition to the planned improvements to these roads, the construction of the Port Expressway and Interstate 75 will insure the continued urbanization of southwestern Broward.

According to the Broward County Land Use Plan, 1977, major commercial and industrial land uses are envisioned along the I-75 corridor. While the commencement of its construction is not expected until the early 1980's, right-of-way acquisition for this federally-funded project is being coordinated by the Florida Department of Transportation. When completed, the proposed I-75 will connect the Port Expressway and State Road 84 with the Palmetto Expressway (Route 826) in Dade County.

The recent approval of two Developments of Regional Impact (DRI's) in the northern half of this Subregion have raised many service delivery and environmentally-related questions. Both the 84 South Development and Arvida Corporation's Indian Trace Development must remedy problems such as flood plain and drainage constraints in this most sensitive environmental Subregion of Broward County. For example, the primary drainage system for the Southwest Subregion will be the C-11 canal which was orginally designed for only agricultural land use runoff. The increased urban development brought by these DRI's must provide accompanying improvement to the drainage network to limit flooding in these exurban communities and to eliminate any potential for backpumping urban runoff into the Conservation Area.

To the south of the C-11 Basin, the C-9 Basin sits very low with an average elevation of only from (4) feet above mean sea level. With no effective slopes present, the C-9 tends to accumulate water from the higher South Central Subregion. The natural ponding of water in this area acts as a direct recharge to the Region's underground freshwater supply, the Biscayne Aquifer. Flooding would become a serious problem with an increased amount of intensive land uses and the resulting urban runoff. To ameliorate this hazard, local governments are urged to adopt the guidelines established in the Water Management Plan for the Western C-9 Basin. Most importantly, in order to minimize the degradation of both surface and ground waters, the Southwest Subregion must be able to provide the basic urban services and utilities (public water

supply, wastewater collection and treatment, and solid waste collection and disposal) to permit any future development.

18. Everglades Buffer Strip

The Everglades Buffer Strip is located west of U.S. 27, east of Conservation Area 3A and south of State Road 84. The Buffer Strip has been recommended as a Local Area of Particular Concern (LAPC) by the Florida Game and Freshwater Fish Commission due to its proximity to the Everglades Water Conservation Areas. This large expanse of land serves as the westerm limit of potential development in Broward County. Of the 4,160 total acres encompassed by the Buffer Strip, approximately 700 acres are situated in the City of Miramar. The remainder of this land, or over 85% of the total acreage to the north of the proposed alignment of Pembroke Road, lies partly in the City of Pembroke Pines and partly in unincorporated Broward County.

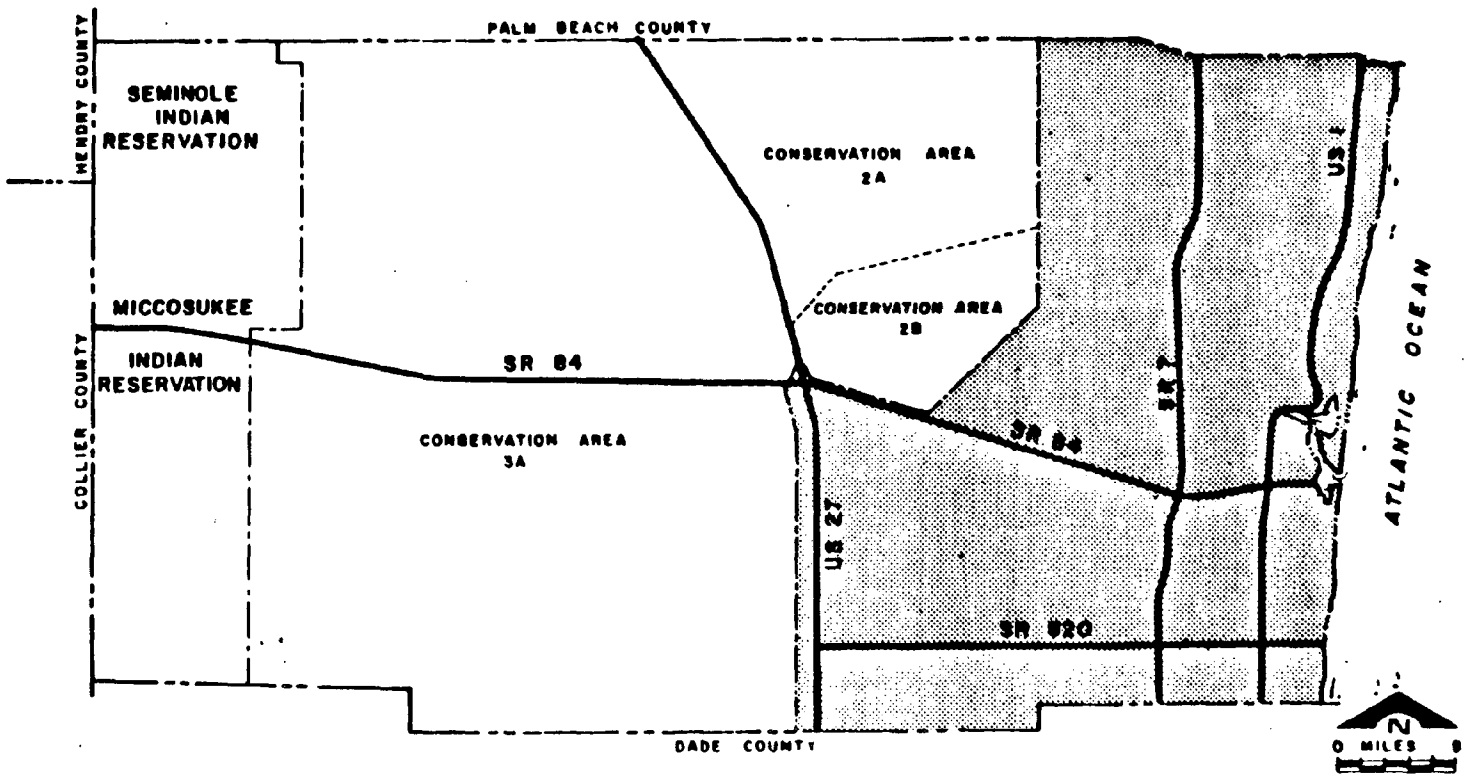
The major vegetation found in this Buffer Strip is comprised of Sawgrass, Melaleuca, Willow and Wax Myrtle. Exotic trees (Melaleuca) have propagated extensively along U.S. Route 27, especially through the southern half of the strip. Permanent structures to the west of U.S. 27 include a mobile home trailer park, a Florida Power and Light Company Substation, and the Holiday Park recreation area. In addition, a six-hundred foot wide Florida Power and Light easement bisects the Buffer Strip to the north of the substation. Several rockpits have also been developed within the northern half of the area.

The present improvement and widening of U.S. 27 will affect the pattern of development on both sides of the roadway. According to the Broward County Land Use Plan and a recent amendment, the Buffer Strip may only be developed under the agricultural density of one unit per two-and-one-half acres. Unfortunately, this type of sprawl land use would not be compatible with the limited access design proposed for U.S. 27. Water quality would definitely be impacted from the septic tanks and runoff of single-family type development bordering so close to the Everglades Conservation Area.

In order to resolve these important issues it is recommended that such development in the Buffer Strip be handled on a special exception basis. The development of a comprehensive growth strategy for this remote area of Broward County is necessary to adequately address the environmental hazards of allowing certain types of land uses to the west of U.S. Route 27.

MAP 15

# BROWARD COUNTY CONSERVATION AREAS



Everglades Water Conservation Areas

The Everglades Water Conservation Areas comprise the last remaining expanse of freshwater wetlands existing in Southern Florida. An intricate web of levees, dikes and canals running from Lake Okeechobee to South Dade County directs water into these large storage reservoirs to control flooding and to provide a water recharge area for the coastal cities of Southeast Florida. Broward County is currently covered by approximately 790 square miles of Water Conservation Area or roughly two-thirds of the total County area west of levees 33, 35, 35A, 36 and 37.

Historically, the Everglades Region was a "river of grass" which flowed southward from the banks of Lake Okeechobee into two natural drainage systems, the Shark River Slough and the Taylor Slough. Due to the potential for agricultural land development, a drainage program began in the early 1900's to lower the water level of the entire Everglades ecosystem. Canals were constructed to the ocean which caused significant environmental damage such as saltwater intrusion along the coast and drought conditions in the Everglades during the dry season. Despite these efforts, flooding continued to occur in the rainy season. The flood conditions of 1947 prompted the United States Congress to promulgate House Document 643, 80th Congress, second session, which created the federally authorized project for central and southern Florida. This project included the construction of levees and canals by the U.S. Army Corps of Engineers, which would create the three Water Conservation Areas to provide for flood control, water storage and conservation, and protection against saltwater intrusion.

The Water Conservation Areas (WCA) provide for a flow of water from north to south subject to a Regulation Schedule. This schedule provides for storage of water during the rainy season in order to provide adequate supplies of water for the dry season in the winter and spring months. The operation and maintenance of the main spillways, designed for control of water levels in the Water Conservation Areas, remains with the U.S. Army Corps of Engineers. The remainder of the system, including structures and pump stations, is operated and maintained by the South Florida Water Management District. For the purpose of wildlife management, Water Conservation Area 1 has been leased by the Water Management District to the U.S. Fish and Wildlife Service and the remainder to the Florida Game and Freshwater Fish Commission to manage subject to consideration of flood control and water storage requirements.

The western portion of Broward County includes Water Conservation Areas 2A (partial), 2B, and 3A (partial). The Seminole and Miccosukee Indian Reservations occupy the westernmost 105,000 acres of the County which abut Collier and Hendry Counties. The Indian tribes of Florida received the right to use certain lands located within the Water Conservation Areas as reservations through Chapter 285, F.S. Their use is subject to the property interests and statutory obligations and authority authority of the South Florida Water Management District. Only two major roadways transgress the Water Conservation Areas in western Broward County—Alligator Alley (Everglades Parkway) and U.S. Route 27 (north-south)—thus limiting vehicular travel in this sensitive environment.

Water Conservation Area 1 is located wholly within the southwestern portion of Palm Beach County. As a surface water storage facility, Water Conservation Area 1 releases water to the larger Conservation areas to the southwest. This area covers approximately 221 sq. miles and is leased to the U.S. Fish and Wildlife Service as the Loxahatchee Wildlife Refuge.

Water Conservation Area 2A, totalling 173 square miles, is situated north of Water Conservation Area 2B. This area abuts the urbanized eastern third of Broward County as well as Water Conservation Area 2B to the south and Water Conservation Area 3A to the west. The water bearing capacity of Water Conservation Area 2A has promoted surface water storage for many years. This has altered the ecological characteristics of the area's sawgrass environment into a wetter, aquatic-oriented habitat. The planned drawdown of the surface water levels in Area 2A, recently proposed by the South Florida Water Management District, would serve to compact flocculant material accumulating as a thick layer on the bottom of the area. The drawdown would simulate a dry period. However, the area would still be managed as an impoundment with a flat water level pool and without the continuous flow that characterized the virgin Everglades. The drawdown will also attempt to bring back certain species of plants which have disappeared from the area. The drawdown would not result in a loss of an excellent fishing and recreational facility; however, it would mean a temporary inconvenience while the area was drawndown.

Water Conservation Area 2B (37 sq. miles) lies south of Water Conservation Area 2A. It is bordered by the urbanized third of Broward County to the east and south by the Water Conservation Area 3A to the west. Water Conservation Area 2B was created because prior to the construction of L-35B, water losses as a consequence of seepage were considerable due to the high permeability of the Biscayne Aquifer in this area. L-35B was created to reduce seepage losses and, consequently, hold water in WCA 2A for a longer period of time. Any seepage impact of this area on the abutting municipalities of Sunrise, Tamarac and unincorporated Broward County is handled and diverted by Canal 42 and Canal 14.

Water Conservation Area 3A covers a total acreage larger than all the other storage areas combined (787 sq. miles). Occupying the remainder of Western Broward County which is west of U.S. Route 27, Water Conservation Area 3A also extends southward to the Tamiami Trail (U.S. Route 41) in Dade County. Due to its extremely large size, the area is divided into Water Conservation Area 3A and 3B. Water Conservation Area 3A provides the Biscayne Aquifer with a tremendous water recharge area. Generally, the flowage of water across this Water Conservation Area occurs according to the schedule set by the Army Corps of Engineers. South of Water Conservation Area 3A, water is regularly released into Everglades National Park in order to maintain a consistent ecology. In 1968, a tentative agreement was reached between the National Park Service, the State of Florida and the Army Corps of Engineers to deliver a specific amount of water to the Park annually. Passed in 1970, Public Law 91-282 authorizes the South Florida Water Management District to deliver "not less than 315,000 acre feet of water

annually" to the Everglades National Park. Realizing the overall complexity involved in providing this service, as well as ameliorating flooding, and maintaining a water supply for the coastal metropolitan areas, the significance of the Water Conservation Areas is crucial to the vitality of the South Florida economy. In addition, the natural systems embodied in these areas are a unique remnant of the orignial Everglades Drainage Systems prior to the intervention of man.

Geology

The unique nature of the Everglades basin, which covers approximately 4,000 square miles from Lake Okeechobee on the north to Florida Bay on the South and from the Coastal Ridge on the east to the Big Cypress Swamp on the west, can be traced to its geological origins. The gradual emergence of southern Florida's peninsula created various layers of limestone deposits of differing types. The impact of rising and falling sea levels and the deposition of limestones created three distinct formations, the Ft. Thompson, Tamiami and Miami Limestone. These formations underline the Everglades system and conduct interrelated ground and surface water storage functions.

Western Broward County provides an interface for all three of these geological formations above the Aquifer. The Fort Thompson formation south into Northwestern Broward County, the marl layers of the Fort Thompson formation display low permeability in holding surface water. In the Southern Everglades the formation becomes increasingly porous especially where it combines with Miami Oolite to form the Biscayne Aquifer. The wedge shape of Fort Thompson formation increases in thickness from western Broward County toward the Atlantic Coastal Ridge.

In the Western-central area of Broward County, Water Conservation Areas provide surface water storage which recharges the Biscayne Aquifer, particularly in Water Conservation Area 3B. As the Fort Thompson formation moves south into Broward County, this less permeable limestone mixes with the Tamiami Limestone to the west and Miami Limestone to the south. The higher permeability of these latter deposits alter the hydrologic characteristics of the overlying Water Conservation Areas. Water Conservation Area 3A, for example, is underlain by sandy limestone perforated by numerous solution holes. Referring to this recharge capability, the Biscayne Aquifer has excellent permeability. It includes the Miami Limestone, Fort Thompson formation and the Tamiami formation. The Hawthorne formation serves as the aquiclude separating the Biscayne Aquifer from the Floridan Aquifer. A review of these geological patterns proves significant to managing the hydrology in each of the Water Conservation Areas as well as for the entire Everglades drainage basin.

Vegetation & Soils

The vegetation found in the Water Conservation Areas is, in part, characterized by the surface water levels maintained in each storage

basin. The majority of the region is covered with sawgrass marsh and wet prairie. Tree islands are scattered throughout these wetland and are referred to as willow heads, bayheads, palm glades or tropical hardwood hammocks, based upon the dominant tree vegetation. The elongated tree islands are aligned north to south with the rounded head facing the surface water flow to the north. Shrub vegetation including Wax Myrtle, Mrysine, Cocoplum and Dahoon Holly are present as well as numerous ferns and bromeliads. Slightly lower and wetter hammocks may display Water Oaks, Sabal Palms, or Strangler Figs while relatively higher areas may sustain Slash Pine and Palmetto.

In those areas where fresh water stands during the entire year, pond vegetation such as Pickerel Weed, Sagittaria, Water Lilies, Bladderwort and Cattail flourish. The thick muck and peat soil produced result from the slow decay of aquatic plant remains. If these unstable organic soils are exposed to the warm air due to drought or drainage, they begin to dry and can be gradually dispersed by the wind. This experience has plagued the drier agricultural lands south of Lake Okeechobee where compaction and oxidation of the organic deposits are subsiding the soil at the rate of one inch per year.

The peat and muck soils of the Water Conservation Areas become very susceptible to burning over prolonged dry conditions or drought. Usually fires started by lightning provide a valuable service by burning off the tops of the sawgrass to encourage new growth. However, during dry periods, these fires may burn through to the finely grained peat, destroying the soils and exposing bare limestone rock. Only when the rainy season returns can these "muck fires" be extinguished. Unfortunately, replacing the lost organic matter takes years of soil rebuilding and aquatic plant decay.

### Animal Life

The Water Conservation Areas support an enormous and varied amount of wildlife. Over one-hundred-seventy-five birds species and at least forty species of fish have been observed in these freshwater wetlands. In addition, many mammals such as deer, wild hog and raccoon, as well as reptiles like the American Alligator, Softshell Turtle and Water Mocasin are found in the Water Conservation Areas. The Appendix includes a listing for fish, mammals and reptiles native to the Water Conservation Areas. For information on birdlife characteristics in these Areas, please refer to bird species matrices under "Ecological Plant Communities" in the Appendix.

Wildlife research in the Water Conservation Areas, and the Everglades region generally, has produced a greater awareness of the complex ecology governing this freshwater habitat. The seasonal propagation of fauna is synchronized by the South Florida wet season lasting from May through October. As the Water Conservation Areas fill with water during this period, plant germination and animal regeneration flourish in the tropical summer climate. When the waters recede in the dry season, the smaller aquatic organisms are concentrated to sustain the larger fish, birds, mammals and reptiles. This enormous food web is

partially responsible for the seasonal migration of birdlife to the Everglades. Due to the fact that only a portion of the original Everglades basin remains intact-within the three Water Conservation Areas, the East Everglades Study Area in Dade County, and Everglades National Park—the protection of this unique habitat is essential for the resident wildlife and migratory characteristic of South Florida.

## ENVIRONMENTAL PROTECTION OF LOCAL AREAS OF PARTICULAR CONCERN

It is necessary to protect and preserve certain environmentally significant sites or areas of the County in order to ensure that the health and welfare of the public will be maintained. When total preservation or conservation of a site is not possible, land development and environmental regulations should be established (and enforced) which will control man's activity in the development of an LAPC.

In addition to the policy guidelines listed under the various "Environmental Concerns" sections which would apply to the protection of environmentally significant and sensitive sites, the following recommendations are directed towards the protection of these sites:

### RECOMMENDATIONS FOR IMPLEMENTATION

1. A continued and expanded effort should be encouraged to integrate and coordinate the planning and implementation of this element, particularly in reference to LAPC's, with the activities of the Urban Wilderness Advisory Board.

2. The County should undertake a feasibility study to determine the use of the transfer of development rights process to protect environmentally sensitive areas, possibly as a complement to the promulgation of low and moderate income housing.

3. The County should continue to pursue funding from state and federal sources for the acquisition of environmentally significant lands.

4. The County should continue the effort to protect natural vegetation areas under private ownership and development through the site planning process including the updating of the vegetation inventory and the landscaping and tree protection ordinances.

5. The County should redraft the existing zoning regulation for the Flood Control (F-1) District to adequately reflect the importance of the Water Conservation Areas in providing water storage for supply to coastal well fields, replenishment of the Biscayne Aquifer and prevention of saltwater intrusion. The scope and purpose of the revised F-1 District should be clear with regards to those permitted uses within the Water Conservation Areas which are consistent with the South Florida Water Management District.

6. The County should examine the potential impact of constructing I-75 across Alligator Alley upon the natural systems characteristic of the Everglades Water Conservation Areas.

7. An integrated land use/water resource study of the Southwest Subregion of the County, similar to that of the East Everglades Resources Planning Project of Dade County, would serve as a land/ water management guide for future decision-making regarding this environmentally sensitive area.

## ALTERNATIVE IMPLEMENTATION TECHNIQUES

The major techniques for conservation and protection of natural resources are embodied in five major governmental powers: police power, eminent domain power, spending power, proprietary power and taxing power.

These techniques or tools can be categorized according to three major governmental activities: (a) public acquisition, (b) land development regulations, and (c) taxation. Any combination of these activities may be applicable to a particular site, and each technique has advantages and disadvantages.

### Public Acquisition

This technique affords the highest degree of manageability to the governmental body which owns the land. There are basically two types of acquisition—"fee-simple" and "less-than-fee-simple." Fee-simple acquisition means acquiring full title to land for a public purpose such as a park or open space. This provides the public with the highest degree of manageability of the site, but it is the most expensive method of acquisition. Less-than-fee-simple acquisition allows for the purchase of conservation easements or development rights. Easement gives the local government a less-than-fee interest in the land, such that the landowner may have partial or no use of the land for a specified period of time. Easements protect open space from untimely or uncontrolled development. The advantages to the public of easement acquisition include the following: (1) the easement is maintained by the owner at the owner's expense; and (2) the land is afforded some measure of protection.

An important mechanism for the public acquistion and management of particular sites within the County is the Urban Wilderness System:

### Broward County Urban Wilderness Advisory Board

The Broward County Urban Wilderness Advisory Board was created by County Ordinance #77-36 in order to establish an Urban Wilderness Park System in Broward County. The objective of the system is to set aside "wilderness areas" in permanent preserves which will be protected from incompatible human activity. The role of the Urban Wilderness System occupies an important function within the scope of the Broward County Coastal Zone Protection/Conservation Element.

Through the guidance of the Urban Wilderness Advisory Board, as appointed by the Broward Board of County Commissioners, a comprehensive inventory of potential sites has been developed during the past two years. The list of potential Urban Wilderness Areas is not unlike the intent of designating Local Areas of Particular Conern (LAPC). In the determination of Wilderness Areas, close coordination evolved between the staff of the Planning and Administrative Systems Division and the Urban Wilderness Advisory Board. This working relationship has culminated in the designation of certain LAPC's as top priority Urban Wilderness Sites. Realizing that different methodologies and criteria were utilized in the identification of each list, it is significant to note that eight (8) Urban Wilderness Sites* out of an original inventory of over fifty (50) areas are identical to those LAPC's shown on Page 2-6 of this report. A site checklist of methodology used by the Urban Wilderness Advisory Board is shown in the Appendices.

Urban Wilderness Areas

Below are listed those Urban Wilderness Areas by priority ranking:

1. West Lake*
2. South Fork New River Site*
3. Hollywood Beach Strand Site*
4. Deerfield Sand Pine Site*
5. Golden Shoe Hammock Site
6. Holmberg Road*
7. Woodside Village
8. Pine Ridge Nature Trail
9. North New River Bend
10. May Tract*
11. Holmberg Pond Apple Slough Site*
12. Cypress Lake
13. Pompano Airport Natural Arboretum
14. Knox Village
15. Lauderhill-Inverrary*
16. Hager Hills

The acquisition of specific Local Areas of Particular Concern for Coastal Zone Protection/Conservation purposes remains a key objective within this Element. Several of the sites on the priority list have been designated as Urban Wilderness Areas by the Board of County Commissioners and their management policies are being drafted by the Wilderness Board. Other sites are under consideration.

Broward County Urban Wilderness Ordinance

Through the Broward County Urban Wilderness Ordinance (#77-36), Sections 9-12, the implementation of this acquisition program is described as follows:

Section 9. Acquisition of Lands

The acquisition of lands within Broward County to be established and maintained as wilderness areas is hereby declared to be a necessary public purpose, and the Commission, after consideration of the recommendations of the Board, may acquire title to, or an interest in, lands located within Broward County by any lawful means.

The Commission may, after consideration of the recommendations of the Board:

(a) accept any and all instruments conveying land or the development right of land located within Broward County; or

(b) enter into covenants, for a term of not less than ten (10) years, with the owner of land located within Broward County that the land will not be used for any purpose other than for wilderness park purposes; or

(c) purchase, or lease for a term of not less than ten (10) years, land or the development right of land located within Broward County. Rental for such a lease shall be payable only from sources other than ad valorem taxation; and

(d) accept donations of property from public and private sources to be held in trust by the County for the use and benefit of the Urban Wilderness Park System.

Whenever a person conveys land or the development right in land to the County, the Commission may take such action as may be necessary to transfer the development rights in the conveyed land to other lands owned by the same person in a manner consistent with the provisions of the County Land Use Plan.

The owner of lands which have been conveyed or leased and the donor of property to the County for the use and benefit of the Urban Wilderness Park System shall be entitled to such ad valorem tax, estate and gift tax, income tax and other tax advantages and benefits as may be provided by law.

Any conveyance, covenant or lease of land or an interest in land pursuant to this Ordinance shall be evidenced by written instrument and recorded in the official records of Broward County. The Commission shall have the power and duty to enforce the provisions of each conveyance, covenant or lease agreement and shall have the power to terminate or modify a covenant or lease agreement only if the termination or modification is determined to be in the best interest of the Urban Wilderness Park System.

Section 10. Establishment of Wilderness Areas

The Commission shall, after consideration of the recommendations of the Board, and after due public notice and public hearing,

establish wilderness areas by ordinance formally setting aside such areas for inclusion within the Urban Wilderness Park System.

The ordinance establishing a wilderness area shall include the following:

(a) A legal description of the area; and

(b) A dedication of the interest in the area possessed by the County to the public as a wilderness area; and

(c) A designation of the type of wilderness area being established and a general statement of what is being sought to be preserved; and

(d) A clear statement of the management responsibilities for the area.

Lands, submerged or otherwise, owned by the County may upon recommendation of the Board be included within the Urban Wilderness Park System. Upon the request of the Commission, lands owned by other governmental agencies may be included within the Urban Wilderness Park System after specific approval by formal action of the governmental agency owning an interest in the land and acceptance by the Commission.

Section 11. Rules and Regulations

The Board shall prepare and propose general rules and regulations prescribing a uniform set of management criteria covering all wilderness areas and special rules and regulations as may be necessary for each wilderness area to be adopted after due notice and public hearing by the Commission and to be implemented by the County Administrator.

Section 12. Withdrawal of Lands from System

No part of any wilderness area may be withdrawn from the Urban Wilderness Park System except by ordinance adopted by at least five (5) members of the Commission and only after:

(a) the Commission has held at least two (2) public hearings with due public notice; and

(b) the Commission has considered the recommendation of the Board; and

(c) the Commission has determined that the withdrawal is in the best interests of the Urban Wilderness Park System.

Land Development Regulations

There is a variety of special zoning and design techniques which can be included in local ordinances for the purpose of natural resource pro-

tection. These include, but are not limited to, flexible zoning, resource management districts and performance controls.

PUD Zoning

This type of zoning allows for flexibility in design which encourages the preservation of large areas of open space and on-site drainage techniques.

Resource Management District

This technique provides for the designation of certain land areas as environmentally-sensitive through either the Land Use Plan, zoning, or both. Designated areas may be protected by means of (1) special performance controls which are identified in subdivision regulations, such as for drainage or wastewater plans, or (2) use restrictions, such as land uses permitted or special density provisions.

Transfer of Development Rights

Although the TDR process is not currently used between two property owners in Broward County, the transfer of development rights process may permit the transfer of unused development rights of one parcel to another in exchange for the payment of a fee as determined by market value. An example of this process is that of the owner of land designated for open space being allowed to sell his/her development rights to other property owners. This technique may be used not only to preserve open space, but also to provide an incentive to builders of low and moderate income housing on the recipient parcel.

In order to use the TDR concept, certain steps must be taken by the local government to evaluate its feasibility in a particular jurisdiction:

1. Identify areas to be preserved; determine private ownership and acreage of these parcels.

2. Identify those areas most suitable for future development and determine acreages and private ownership of these parcels.

3. Determine original and potential dwelling capacity for these parcels, according to environmental and service delivery factors.

4. Determine the marketability of the development rights available.

Cones of Influence Area Regulations

The cone of influence is the depression, roughly conical in shape, produced in the water table by the pumping of water from a well at a given rate. In order to protect public water supply wellfield cones of influence from degradation by development, special regulations can be adopted to amend pollution control, building, and subdivision regulations. These regulations should include provisions regarding the siting of potentially polluting land use activities. Any land uses which generate pollutants or facilitate the movement of contaminants into the Biscayne Aquifer should be more stringently controlled for areas within the cones of influence.

Tax Relief

As discussed under the Section "Wetlands," Florida Statutes Chapter 193 provides the basis for special assessment of parks or environmentally endangered lands.

# PART 3: INTERGOVERNMENTAL COORDINATION AND IMPLEMENTING AGENCIES

## INTERGOVERNMENTAL COORDINATION: PREPARATION AND POLICIES

During the preparation of this element, various County, Regional and State documents served as a guide for the formulation of coastal zone protection and conservation policies. In addition, the selection process for Local Areas of Particular Concern included input from the Urban Wilderness Advisory Board, the County's Urban Forester (Division of Forestry), various environmental groups and the municipalities.

Policy Guidelines

1. The County shall support the adoption of the Florida Coastal Management Program, and shall participate in its implementation at the local level.

2. The County's Coastal Zone Protection/Conservation Element shall, to the extent appropriate, be consistent with the State's Coastal Management Program and State Comprehensive Plan.

3. The County's Coastal Zone Protection/Conservation Element shall be consistent, to the extent appropriate, with the South Florida Regional Planning Council's policies as stated in the Regional Plan.

4. The County shall coordinate with the municipalities in the preparation and implementation of both the County's and municipalities' Coastal Zone Protection (for coastal cities) and Conservation Elements.

The following section summarizes the intergovernmental aspects of plan implementation.

## INTERGOVERNMENTAL COORDINATION: IMPLEMENTING AGENCIES

The legal and organizational structure necessary to manage the natural resources of Broward County presents a complicated scenario. A mixture of Federal, State, Regional and Local authorities have direct responsibilities for the sound utilization and/or protection of the environment. In order to simplify the regulatory framework, a comprehensive list of pertinent Federal and State legislation may be found in the Appendix. The laws are classified by resource area (i.e., water, air, solid waste, coastal, fish and wildlife, etc.) and by governmental level. A brief description of each piece of legislation is also provided.

The following section discusses the roles and responsibilities of the key Federal, State, Regional and Local authorities involved in the management of natural resources in Broward County.

## A. FEDERAL AGENCIES

At the Regional and Local government level, the Federal responsibilities relating to environmental control and protection are administered by several key agencies: the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency (EPA), the U.S. Department of Interior, the U.S. Department of Commerce, and the U.S. Coast Guard.

### 1. U.S. Army Corps of Engineers

The Army Corps of Engineers reviews dredge and fill-related projects under Section 404 of the Federal Water Pollution Control Act. Activities which fall under the permitting jurisdiction of the Corps include excavating, dredging, filling, constructing piers, levees, canals, jetties, beach restoration, cables, pipes or wires over or under the water, dumping of material, etc. In conjunction with the Florida Department of Environmental Regulation (DER), the Corps issues permits for dredge and fill operations based on the probable impact of the proposed activity in the public interest. While DER is mainly concerned with the impact of the proposed project on the waters of the state (rivers, streams and tributaries, bays, bayous, sounds, estuaries, the Atlantic Ocean and the Gulf of Mexico), the evaluation by the Corps is based on a combination of factors (conservation, economics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use classification, navigation, recreation, and overall welfare of the community). Wetland determination is a significant responsibility of the Corps when related to a specific project. Activities which would impact valuable wetlands are usually discouraged by the Corps as being contrary to the public interest. However, such determinations can be arbitrary in terms of the size and location of the wetland resource. Recognizing that the natural boundary of these water resource areas may be difficult to

establish due to seasonal fluctuations in water levels, the Corps also utilizes a vegetative index for periodically submerged lands. Wetland areas which are decidely isolated from a recognizable water body are regarded as uplands and excluded from the permitting process.

### 2. U.S. Environmental Protection Agency (EPA)

Pursuant to the Federal Water Pollution Control Act of 1972, the Environmental Protection Agency holds jurisdiction over those activities which may discharge pollutants into the waters of the United States. Pollutant, according to the Act, is defined as "...dredged, spoiled, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water..." (502 [sic], FWPCA).

EPA's extensive permitting procedure for point and nonpoint source pollutants coordinates with the Florida Department of Environmental Regulation in reviewing specific projects and activities. Through the National Pollution Discharge Elimination System (NPDES), effluent limitations for pollutants are established by the State according to stringent water

quality standards. In addition, the State water plans must be consistent with the goals and objectives of EPA. Among these goals is included the "protection and propagation of fish, shellfish and wildlife and recreation in and on the water."

In terms of air quality, EPA has established national ambient air quality standards and emission standards pursuant to the Clean Air Act Amendments of 1970 (P.L. 91-604). The State government through the Department of Environmental Regulation is responsible for the implementation and enforcement of the national standards. At the local level, the Broward County Environmental Quality Control Board and the Metropolitan Planning Organization aid in monitoring and administering the State program according to local conditions.

3. U.S. Department of the Interior

The Department of the Interior has the responsibility for the enforcement of the Endangered Species Act (P.L. 92-522). The Secretary of the Interior is required to determine endangered and threatened species and provide rules and regulations for their protection and conservation within a designated area.

Within Broward County, the Department of the Interior's jurisdiction would most likely coincide with the Everglades Conservation Areas. Endangered species such as the Florida Kite and Florida Sandhill Crane tend to select these undeveloped areas for their habitats.

4. U.S. Department of Commerce

Through the Coastal Zone Management Act of 1972, the Office of Coastal Zone Management (OCZM) and National Oceanic and Atmospheric Administration (NOAA) under the Department of Commerce is responsible for administering the program. The guidelines of the Florida CZM program are structured according to existing State regulation. Once the State program is approved by OCZM, local governments with completed CZM elements or plans will qualify for implementation funding under Section 306 of the Coastal Zone Management Act of 1972. Eligible programs for funding include grants to subsidize half the cost of buying land for access to public beaches and other public coastal areas.

5. U.S. Coast Guard

The U.S. Coast Guard acts as the multi-jurisdictional coordinator for the clean up of oil spills along the coast of Broward County. Under the Federal Water Pollution Control Act, the Coast Guard is designated as the lead agency for investigating the cause of the accident and filing charges against the responsible party. A contingency plan, describing the procedural coordination between the appropriate local agencies such as the Broward County Environmental Quality Control Board, is being prepared by the Coast Guard Office. At such time when the Coast Guard plan is completed, the local Coastal Zone Protection/Conservation Element should be amended to include these emergency provisions.

## B. STATE AGENCIES

State agencies which regulate and enforce both state and federal environmental legislation—include the Department of Environmental Regulation (DER), and the Department of Natural Resources (DNR). Within the State's network of permitting, several regional agencies have the re sponsibility in the monitoring of special environmental law. The South Florida Water Management District (SFWMD), and the South Florida Regional Planning Council (to be discussed in the Regional Agency Section), assist in implementation with regards to Chapter 373 and Chapter 380, Florida Statutes, respectively.

### 1. Florida Department of Environmental Regulation (DER)

The Florida Department of Environmental Regulation (DER) is responsible for the permitting legislation developed under Chapters 253, 373, and 403, F.S. Created under, and pursuant to, the authority of the "Florida Air and Water Pollution Control Act of 1967" (Chapter 403), DER was given the broad duties to control and prohibit water and air pollution. These powers include, but are not limited to, planning, legislative drafting, permitting and enforcement.

The Florida DER maintains "water" jurisdiction over the rivers, lakes, streams, impoundments, canals, ditches, underground waters, coastal waters, and all other waters or bodies of water, including fresh, brackish, saline, tidal and surface waters of the State of Florida. The DER also establishes ambient air and water quality standards for the State as well as standards for the abatement of excessive and unnecessary noise levels. Pollutant discharges, pertaining to any of the above categories, which are emitted in such quantities as to be harmful or injurious to human health and welfare, or animal, plant or aquatic life or property, are in violation of Chapter 403. Local activities involving domestic and industrial waste facilities, drainage facilities or dredge and fill development which may be a source of water pollution would fall under the jurisdiction of DER. In addition, the Bureau of Coastal Zone Planning now operates within the general purview of DER, which functions as the key permitting agency for implementing the Coastal Zone Program.

### 2. Florida Department of Natural Resources (DNR)

The Florida Department of Natural Resources (DNR) is generally in charge of the supervision, development and conservation of the State's "living" natural resources. As a result of Florida's Environmental Reorganization Act of 1975, the Coastal Coordinating Council was abolished and its functions originally transferred to DNR. Under the Bureau of Coastal Zone Planning, DNR utlizes a broad array of management powers to assist in implementation. These activities include: (a) the establishment of the coastal construction control line (Chapter 161); (b) the management of the Aquatic Preserve System and the Wilderness System (Chapter 258); (c) the lease and sale of State lands in conjunction with the Board of Trustees of the Internal Improvement Trust Fund (Chapter 253); (d) the development and acquisition of park and recreation areas (Chapter 375); (e) the planning and coordination of all plans and activities relating to erosion control, beach preservation and hurricane

protection (Chapter 161); (f) the development of the State Lands Plan, including the acquisition of environmentally endangered lands (Chapter 259); and (g) the management of mineral and living marine resources (Chapter 370).

DNR is also responsible for the development of a comprehensive plan for submerged lands owned by the State. These submerged lands would include sovereign waters to the line of mean high water, including man-made bodies of water connecting to naturally navigable waters. Similar to the Federal role of the U.S. Coast Guard, the DNR Marine Patrol is responsible for enforcing State law in the territorial waters of Florida. In addition, the Marine Patrol is charged with enforcing the Florida Manatee Protection Act (Chapter 370.12) in sanctuary areas such as Port Everglades and its environs.

### 3. Florida Department of Community Affairs (DCA)

The Department of Community Affairs (DCA) has assumed some of the responsibilities of the now defunct Division of State Planning. DCA presently reviews comprehensive plans and elements submitted by local governments pursuant to Chapter 163. Through close coordination with DER and DNR, DCA monitors consistency with the CZM program through the following planning and management authorities: (a) the Development of Regional Impact (DRI) process; (b) facility ten-year plan requirements; (c) the review of the State budget; (d) the State Comprehensive Plan; and (e) the Coastal Energy Impact Program (CEIP).

## C. REGIONAL AGENCIES

Two regional agencies operate as important branches of the State government in the South Florida area. The South Florida Water Management District (SFWMD) and the South Florida Regional Planning Council (SFRPC) play significant roles in the regulation of larger scale developments in Broward County. Additionally, these multi-jurisdictional agencies provide environmental expertise and technical assistance to the participating local governments.

### 1. South Florida Water Management District (SFWMD)

The South Florida Water Management District (SFWMD) is responsible for the control and management of all significant freshwater users and waterways in the sixteen-county area. SFWMD reviews proposed works for the diversion and storage of surface waters and issues permits for their construction and operation. The authority granted to the SFWMD via DER is provided in the Water Resources Act of 1973 (Chapter 373).

The SFWMD has also developed the Water Use and Supply Development Plan (1977) for the South Florida area which will be incorporated in the State Water Use Plan. The regulation of the use, transfer and consumption of water by the SFWMD has a crucial impact on numerous environmental issues in Broward County. For instance, the close relationship between saltwater intrusion and aquifer recharge through the County's canal system is controlled by the SFWMD. In terms of land use, the SFWMD holds flowage easements in areas of Broward County. During the next

decade, water conservation, in addition to improved flood protection in developing communities, will encompass a major focus of the SFWMD.

2. South Florida Regional Planning Council (SFRPC)

The South Florida Regional Planning Council (SFRPC) serves as the coordinating agency in formulating regional policy for Broward, Dade, and Monroe Counties. As a regional body created under Chapter 160, F.S., the SFRPC acts in an advisory capacity to the constituent local governments. Technical assistance in planning activities such as housing, help provide counties and municipalities with the expertise to make improved decisions.

Since 1975, the Regional Planning Councils across the State have been involved in the Statewide Coastal Zone Management Program to incorporate regional differences into local plans. The SFRPC also coordinates their A95 Review and Development of Regional Impact (DRI) processes with those participating local, state and federal agencies. Other responsibilities undertaken by SFRPC include the Areawide Housing Opportunities Plan (AHOP), the Comprehensive Community Energy Management Program (CCEMP) and the review of local comprehensive plans or elements under Chapter 163, F.S. The multi-jurisdictional authority which rests with the SFRPC within these monitoring activities varies accordingly. However, in most cases, the functions of the agency are limited to identifying conflicts in the planning process between different units of government. Through the A-95 Review process and the DRI process (Chapter 380, F.S.), the SFRPC may affect significant alterations in development plans or proposals at the local level.

Under the requirements of Chapter 380.04(1), the determination of any development as meeting the threshold criteria for a Development of Regional Impact (DRI), pursuant to Chapter 22F-2, Florida Administrative Code, must apply to the County Commission for approval. Following notification by the County, the SFRPC would prepare and submit to the local government a report of recommendations on the regional impact of the proposed development. Based upon these evaluations, the decision of the local governmental entity is subject to appeal to the Florida Land and Water Adjudicatory Commission. Through this process the SFRPC may affect regional policy at the local level in terms of large-scale development.

D. LOCAL AGENCIES

The role of local government in the management of the Coastal Zone Protection/Conservation Element identifies the most diversified, and indispensable link in managing the natural resources of the State. Cooperation between the cities and the county is needed to achieve consistency in the direction of growth and development throughout the metropolitan area.

Without the positive involvement of local entities, the voluntary basis of the State CZM Program would depend only on the amount of incentives and benefits offered to participating jurisdictions. By coordinating the enforcement of environmental permitting and sound land use planning

through compatible countywide plans, Broward local governments become more directly involved in the existing state permitting process.

Projects which are consistent with adopted Coastal Zone Protection/ Conservation Elements and meet approval at the local level will receive more favorable consideration at the state permitting stage. Besides reducing permit delays and costs, this process serves as an effective local check against inappropriate projects of state and federal agencies.

Under the Local Government Comprehensive Planning Act of 1975 (Chapter 163, F.S.), all local governments are required to develop comprehensive plans. Included in the scope of mandatory elements is the Conservation Element as well as the Coastal Zone Protection Element; the latter required of all cities or counties abutting salt-influenced waters. Within the text of this countywide element, a listing of those local governments required to complete coastal zone protection elements may be found (p. INTRO-7). Coupled with the land use zoning regulations governing these local municipalities, several county wide boards and agencies enforce environmentally-related functions; the Board of Broward County Commissioners, the Environmental Quality Control Board, the Broward County Health Department and the Broward County Planning Council.

1. The Board of County Commissioners:

Through the powers vested in the Charter of Broward County, the Board of County Commissioners serves as the leading implementor of countywide policies and controls. The Board is aided in its land use and environmental decision-making by the recommendations and reports of the following County Departments and Divisions: Office of Planning, Community Services Department, Transportation Department, and Utilities Department. The Charter also grants certain agencies and departments the specific responsibility for enforcing environmental controls (i.e., Environmental Quality Control Board).

The Broward County Land Use Plan (BCLUP) mandated by the Charter and the Plat Ordinance (#77-43) provide the most significant local mechanisms for protecting coastal zone and conservation interests. The implementation procedures of the BCLUP (Section 5.01) establish the following development review requirements prior to the issuance of a certificate of occupancy:

(a) adequate potable water service;
(b) available wastewater treatment and disposal services;
(c) available solid waste disposal service;
(d) adequate drainage to protect new structures from a one-hundred year flood;
(e) adequate regional transportation capacity to serve the proposed development;
(f) adequate local transportation access;
(g) adequate fire protection service;
(h) adequate police protection service;
(i) adequate parks and recreation facilities;
(j) adequate school sites and buildings.

In conjunction with the BCLUP development requirements, the existing Plat Ordinance (#77-43) creates a uniform review procedure for engineers, surveyors and developers and, most importantly, creates a standard design criteria for all forms of developments. Through the implementation regulations of the BCLUP and Ordinance #77-43, all plats as well as site plans within the unincorporated areas are evaluated by the Plat and Site Plan Review Committee. Based upon the recommendation of the Committee and upon the decision of the County Commission, the plat application is denied, approved, approved with conditions or deferred by the Board within ninety days from the time it is accepted for review.

At the County level, the review process is handled by a number of authorized divisions, agencies and service companies including:

(a) Office of Planning
(b) Engineering Division
(c) Parks and Recreation Division
(d) Water Management Division
(e) Water and Wastewater Division
(f) Building and Zoning Enforcement Division
(g) Traffic Engineering Division
(h) Broward County School Board
(i) Broward County Urban Forester
(j) Soil Conservation Service
(k) Florida Power and Light Company
(l) Broward County Environmental Quality Control Board
(m) Broward County Health Department
(n) Broward County Planning Council

At the local level, other forms of municipal plat approval may exist which must occur prior to County action on said plat. In those municipalities where platting regulations do not exist, the County Plat Ordinance takes precedence.

The Zoning Code of Broward County provides several guidelines for meaningful environmental review for unincorporated Broward County. Smaller projects are addressed through Section 3.41 of the Code which outlines specific site plan review requirements. The Landscape Manual, Section 3.42, including the existing Tree Protection Ordinance, also encourages and monitors the creation of healthful environments; for example, the planting of exotic vegetation (i.e., Australian Pine, Brazilian Pepper, Melalucea, etc.) is prohibited. Also considered as beneficial to the overall environment that specific native trees not be removed without a tree removal permit. The actual administration of the Zoning Code is the responsibility of the Broward County Building and Zoning Enforcement Division.

Currently, the Plat Ordinance is being rewritten. The proposed Development Review and Plat Ordinance includes the consideration of the impact on Environmentally-Sensitive Lands. Section 10.10 states that "if a proposed development includes all or any part of any lands identified as a unique natural area on the County Land Use Plan or recommended for establishment as an urban wilderness area by the Urban Wilderness

Advisory Board, then the County Administrator or his designee shall prepare an environmental impact statement identifying the effects that the proposed development would have on the unique natural qualities and resources of the area." Pending the adoption of this ordinance to replace the existing Plat Ordinance, the environmental review of various developments will be limited to: (a) those projects within the unincorporated area of Broward County which must receive site plan or platting approval; (b) those plats received from municipalities requiring approval by the Board of County Commissioners; and (c) rezoning applications over one-hundred acres in size.

The latter condition reflects the Impact Statement Requirements of Section 52.10(3)(b) of the Zoning Code of Broward County. This Section states that as a condition of the rezoning application the petitioner must submit

> ...an impact statement describing the anticipated impact of the development proposal, or the maximum development permissable under the requested zoning, upon the natural environment, the economy, the housing market, and upon existing and programmed public facilities and beyond the subject property. The Office of Planning shall enumerate the specific items to be included.

A copy of the environmental impact statement (Section 2) is contained in the Appendices. In terms of environmental considerations, the County-level EIS review represents the most comprehensive planning safeguard available at the present time for large-scale developments, rezoning applications greater than one-hundred acres, and projects located in the C-11 or Hillsboro Canal Basins. Through these various reviews, procedures, zoning and land use regulations, the Board of County Commissioners controls the impacts of local development upon the sensitive South Florida environment.

2. Broward County Environmental Quality Control Board (EQCB)

The Broward County Environmental Quality Control Board (EQCB) was created by the Broward County Charter. All functions, duties and responsibilities of the former Pollution Control Board of the County were transferred to EQCB. The authority of the Erosion Prevention District, as provided by Chapter 63-1175, Laws of Florida, Special Acts of 1963, are also vested in the EQCB. The Advisory Committee of the Erosion Prevention District reports to the EQCB. The latter is directly responsible to the Board of County Commissioners.

In addition to the indirect review of erosion control projects, the EQCB is responsible for the review of coastal construction setbacks and access to public beach areas. Within the Broward County Plat Ordinance No. 77-43, Section 4.06 states:

> The design of the proposed plat and the required improvements shall not interfere with the existing legal rights of the public to access to and use of the public beach area seaward of the mean high water line and shall not unnecessarily interfere with the natural uses of the beach in areas seaward of the Coastal Construction Setback Line.

Examples of the EQCB staff duties are the review of applications for the construction of groins, seawalls, revetments, breakwaters, boardwalks, and the biological monitoring of the artificial reef.

The overall water and air quality responsibilities of the EQCB also includes the abatement of noise pollution. Pursuant to the adoption of the unincorporated Noise Abatement Ordinance as Regulation 78-3, the EQCB monitors noise levels in excess of specified decibel limitations.

In coordination with the State DER and the Federal EPA air and water quality standards, EQCB's major functions are comprised in the surveillance and enforcement of these regulations. The charter specifies that County ordinances shall prevail over municipal ordinances whenever the County sets minimum standards protecting the environment by prohibiting or regulating air or water pollution, or the destruction of the resources of the County belonging to the general public (Section 8.17). The maintenance of the air pollution standards and the improvement of surface water quality represent significant countywide challenges. The accurate assessment and analysis of these conditions by EQCB are essential services in the implementation of this Element.

3. Broward County Health Department (HRS)

The Broward County Health Department operates as a quasi-public agency with several important controls over the timing and service requirements of new subdivisions. The Health Department is actually a branch of the State Health and Rehabilitative Services (HRS) Department serving District #10 in South Florida in addition to its semiautonomous role within the charter government of the County.

The Environmental Engineering Section of the Department contains a surveillance program over the construction and operation of drinking water and supply plants and systems of public swimming pools and of septic tank and water distribution lines. The bacteriological sampling of private systems is also undertaken upon request.

In conjunction with the Environmental Health Section, permits are issued subsequent to an inspection of the completed development activity. Compliance with local subdivision regulations is achieved through participation by the Health Department on the Plat and Site Plan Review Committee of the County. Subdivisions which may create health problems relating to potable water supply or individual sewage disposal facilities would be prohibited by the Health Department. In terms of environmental planning, these are very crucial considerations in southwestern Broward County where a vast number of future residents will depend on private well and septic tank systems.

4. Broward County Planning Council (BCPC)

The Broward County Planning Council (BCPC) was created in the County Charter to replace the Broward County Area Planning Board (APB). The BCPC was charged with all the functions and responsibilities of the old APB plus the preparation of the Land Use and Potable Water Elements of Broward's Comprehensive Plan. Within the controls and

provisions of the Land Use Plan which was adopted by the County Commission on November 22, 1979, all units of local government must adopt municipal zoning in substantial conformance with the permitted uses and densities provided for in the Countywide LUP. At the time of this writing, twenty-four of the twenty-nine jurisdictions have received land use Certification approval from the Planning Council. Other duties of the Planning Council include the development of the 208 Areawide Clean Water Management Plan and the A-95 Review Process. Through the latter procedure, countywide projects involving federal funding are reviewed to ensure the coordination of planning and development activities at the local level. The BCPC also receives "701" funding through the Housing and Urban Development (HUD) Department. The "701" Comprehensive Planning Assistance Program provides a major funding source for housing research and related planning activities.

The 208 Plan not only addresses the water quality problems associated control the workings of the remaining sections of the FWPCA (see pages 41-43 of Chapter G). The 208 staff is currently working on several implementation tasks designed to: reduce or mitigate stormwater runoff into Broward's surface waterways, designate the agencies and municipalities responsible for implementing the final water quality tasks, and locate proper areas to use as sludge disposal sites.

# APPENDICES

## APPENDIX A: LEGISLATION

### A. WATER: FEDERAL LEGISLATION

1. WATER RESOURCES PLANNING ACT (P.L. 89-90):
states that Congress must encourage federal, state, and local public and private agencies and organizations to conserve, develop, and utilize water and related land resources to the fullest extent possible.

2. WATER POLLUTION CONTROL ACT (P.L. 92-500):
objective is "to maintain the chemical, physical, and biological integrity of the Nation's waters." The Act authorizes the preparation or development of comprehensive programs to prevent, reduce, and eliminate pollution of ground waters; maintain a water quality surveillance system; control of oil pollution and pesticides; administration and funding of waste treatment plants; lists of toxic pollutants are to be peridically complied; establishes a Water Pollution Control Advisory Board within the Environmental Protection Agency, and the National Marine Water Quality Laboratory.

3. NATIONAL ENVIRONMENTAL POLICY ACT (P.L. 91-190):
reports on waterways and their conditions, and examines them in terms of environmental characteristics. The Agency acts to review programs of other federal, state, and local governmental and non-governmental entities or individuals. NEPA establishes the Council on Environmental Quality.

4. SAFE DRINKING WATER ACT (P.L. 93-523):
requires the maintenance of health standards of drinking water, especially when concerning federally-owned or operated water systems. The protection of underground water resources has also received increased attention due to this legislation passed in 1974.

5. RIVER AND HARBORS ACT (P.L. 91-611):
limits excavation and landfilling of waterways if such construction alters its course. The Act recognizes the fact that waterways are a pollutable resource.

6. NATIONAL FLOOD INSURANCE ACT OF 1968 (P.L. 90-448):
is established "to make available to residents of flood-prone areas flood insurance at reasonable premium rates through the means of a Federal subsidy, and to require local jurisdictions to enact land use and control measures designed to guide the rational use of the flood plains as a condition for the availability of federally subsidized flood insurance." The Act requires "the agreement by communities to adopt and enforce land-use control measures consistent with designed criteria." In addition, the Act involves the upgrading of existing structures not in conformance to flood program specifications.

7. FLOOD DISASTER PROTECTION ACT OF 1973 (P.L. 93-234):
expanded the Flood Insurance Program, authorizes the dissemination of information concerning flood areas, requires purchase of flood insurance by homeowners, mandates that citizen participation be present at the local levels of the comprehensive planning process.

8. WATERSHED PROTECTION AND FLOOD PREVENTION ACT (P.L. 83-566):
provides technical and financial assistance for watershed works of improvement for flood prevention, irrigation, drainage, water quality management, sedimentation control, fish and wildlife development, public water-based recreation, and water storage and related costs.

9. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583):
emphasizes water use planning as an integral factor in planning as well as being a viable technique for control. The Act identifies the boundaries of the coastal zone; defines permissible land and water uses; prepares an inventory of areas of particular concern; describes a state management system to exert control over land and water uses; and describes the organizational structure for implementation and management of the program.

10. ESTUARINE AREAS PROTECTION AND RESTORATION ACT (P.L. 92-454):
recognizes the need for protection/enhancement of estuaries and related areas in planning.

11. MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT (P.L. 90-532):
specifically concerns the regulation of ocean dumping.

12. FEDERAL WATER RECREATION ACT (P.L. 89-72):
requires consideration of outdoor recreation and fish and wildlife enhancement in navigation, flood control, reclamation, hydroelectric, or multiple-purpose water resource project.

13. DEEPWATER PORT ACT OF 1974 (P.L. 93-627):
involves the construction of imported oil transfer stations-off-shore.

## AA. WATER: STATE STATUTES

1. Chapter 259 - LAND CONSERVATION ACT:
deals with water control as it relates to land reclamation.

2. Chapter 342 - STATE PARKS AND PRESERVES:
recognizes that storage and recharge systems, estuarine and marsh systems can be protected when identified as wilderness areas. This chapter establishes water management districts and provides for aquatic preserves.

3. Chapter 370 - SALT WATER FISHERIES AND CONSERVATION: delineates the role of the Department of Resource Management to "coordinate the activities of all public bodies, authorities, agencies, and special districts;" responsible for carrying out Chapter 378. The Division of Marine Resources of the Department of Natural Resources is given exclusive power and control over water bottoms, while D.N.R. is responsible for dredge and fill activity.

4. Chapter 373 - WATER RESOURCES: gives the Department of Environmental Regulation the responsibility to accomplish the conservation, protection, management, and control of the waters of the state, through the delegation of appropriate powers to the various water management districts. In addition, the act requires formulation of a state water use plan, including emergency provisions in event of water shortages. DER must also regulate surface retention and runoff/dam construction, as well as construction, repair, and abandonment.

5. Chapter 375 - OUTDOOR RECREATION AND CONSERVATION: provides for the acquisition of land and water areas for recreation and conservation, under the domain of the Department of Natural Resources.

6. Chapter 376 - POLLUTANT SPILL PRESERVATION AND CONTROL: identifies water as a pollutable resource.

7. Chapter 377 - ENERGY RESOURCES: identifies oil as a possible pollutant.

8. Chapter 380 - ENVIRONMENTAL LAND AND WATER MANAGEMENT: requires coordination of local decisions relating to growth and development. The Act establishes two tools to accomplish this: the identification of Areas of Critical State Concern, and Developments of Regional Impact. Both forms of review act to limit and/or modify development within the specified boundaries.

9. Chapter 403 - ENVIRONMENTAL CONTROL: prohibits water pollution, of both surface and underground water resources. A program of Pollution Control Awards is established and includes water as an eligible resource. Within the Department of Environmental Regulation, a Division of Environmental Programs is formed to monitor water quality and quantity.

10. Chapter 582 - SOIL AND WATER CONSERVATION: establishes the Soil and Water Conservation Council of the Department of Agriculture and Consumer Services.

B. RIVERS AND LAKES: FEDERAL LEGISLATION

1. RIVER AND HARBOURS ACT (P.L. 91-611):
Prevents the construction of any structure that appears as an obstruction to rivers/harbours.

2. FISH AND WILDLIFE COORDINATION ACT (P.L. 92-500):
to protect rivers and lakes for fish and wildlife.

3. WATER POLLUTION CONTROL ACT (P.L. 92-500):
encourages the maintenance of water quality conducive to fish, shellfish, and wildlife protection and propagation; promotes protection of lakes from pollution; mandates the identification and classification of lakes according to eutropic condition.

4. NATIONAL ENVIRONMENTAL POLICY ACT (P.L. 91-190):
requires the maintenance of environmental quality standards.

BB. RIVERS AND LAKES: STATE STATUTES

1. Chapter 258 - STATE PARKS AND PRESERVES:
rivers and lakes as they qualify as wilderness areas.

2. Chapter 342 - BEAUTIFICATION OF WATERWAYS:
includes rivers and lakes as waterways.

3. Chapter 370 - SALT WATER FISHERIES AND CONSERVATION:
concerns rivers and lakes as they pertain to saltwater fisheries.

4. Chapter 372 - GAME AND FRESHWATER FISH:
specifies fishing licensing for freshwater lakes.

5. Chapter 376 - POLLUTANT SPILL PRESERVATION AND CONTROL:
prohibits the pollution of rivers and lakes.

6. Chapters 380 - ENVIRONMENTAL LAND AND WATER MANAGEMENT:
discusses rivers and lakes as areas of critical state concern.

7. Chapter 403 - ENVIRONMENTAL CONTROL:
prohibits/prevents the pollution of rivers and lakes.

C. FLOOD PLAINS AND BASINS: FEDERAL LEGISLATION

1. RIVER AND HARBORS ACT (P.L. 91-611):
concerns the construction of harbors and redirection of rivers and the impacts made upon flood plains/basins.

2. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583): the maintenance of plains and basins and their effects on the coastal zone.

CC. FLOOD PLAINS AND BASINS: STATE STATUTES

1. Chapter 298 - DRAINAGE AND WATER MANAGEMENT: establishes water management districts to protect flood plains and basins, ".... to effect the drainage, protection, and reclamation of the land.

2. Chapter 403 - ENVIRONMENTAL CONTROL: determines that protection of flood plains and basins is essential to maintain the public water supply; retain wildlife, ecological, industrial, agricultural, domestic, recreational, etc. uses of water. This act also concerns the pollution and contamination of flood plains and basins.

3. Chapter 591 - FOREST DEVELOPMENT: stresses the importance of plains/basins as applied to forestry.

D. WETLANDS: FEDERAL LEGISLATION

1. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583): includes wetlands in the coastal zone description, thereby protecting such areas under the Act.

2. WATER POLLUTION CONTROL ACT (P.L. 92-500): discusses wetlands as affected by pollution and discharges.

3. NATIONAL ENVIRONMENTAL POLICY ACT (P.L. 91-190): requires an Environmental Quality Report by the Council on Environmental Quality, to include the wetlands.

DD. WETLANDS: STATE STATUTES

1. Chapter 253 - LAND ACQUISITION TRUST FUNDS: establishes the Board of Trustees to administer state lands including tidal, submerged or fresh water land areas plus determines restrictions on dredging and filling.

2. Chapter 258 - STATE PARKS AND PRESERVES: includes wetlands as areas which may be designated as wilderness areas.

3. Chapter 298 - DRAINAGE AND WATER MANAGEMENT ACT: relates to wetlands in as much as affected by drainage and filling.

4. Chapter 373 - WATER RESOURCES ACT:
provides for the management of water and related land uses to promote the conservation, development and proper utilization of surface and ground water.

5. Chapter 376 - POLLUTANT SPILL PRESERVATION AND CONTROL:
concerns the pollution of marine areas-includes spill prevention and control.

6. Chapter 380 - ENVIRONMENTAL LAND AND WATER MANAGEMENT ACT:
protects wetlands as identified under or within an Area of Critical State concern.

7. Chapter 403 - ENVIRONMENTAL CONTROL:
recognizes the wetlands as a pollutable resource and particularly susceptible to sewage discharge.

E. COASTAL REGION: BEACHES, SHORES, AND REEDS - FEDERAL LEGISLATION

1. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583):
provides for management programs that are designed to retain the integrity of coastal areas.

2. WATER POLLUTION CONTROL ACT (P.L. 92-500):
prohibits coastal pollution.

EE. COASTAL REGION: STATE STATUTES

1. Chapter 161 - BEACH AND SHORE PRESERVATION ACT:
purpose of which is the aversion and prevention of erosion, hurricane, and storm damage; concerns coastal construction and excavation; establishes the Erosion Control Trust Fund. The Act attempts to analyze public access to beaches, and establishes a beach nourishment and restoration program.

2. Chapter 177 - FLORIDA COASTAL MAPPING ACT OF 1974:
recognizes the importance of the coastal zone for public purposes, and the integral role that coastal mapping plays; Department of Natural Resources is responsible for the mapping.

3. Chapter 258 - STATE PARKS AND PRESERVES:
establishes aquatic preserves of submerged lands and associated waters; establishes a system for identifying state wilderness areas.

4. Chapter 259 - LAND CONSERVATION ACT:
determines that "beaches or areas within the state which have been eroded or destroyed by natural forces or which are

threatened, or potentially threatened, by erosion or destruction by natural forces," are environmentally endangered lands.

5. Chapter 370 - SALTWATER FISHERIES AND CONSERVATION: defines the duties of the Division of Marine Resources including beach erosion prevention and control, beach preservation, beach protection, establishes an interdepartmental/intergovernmental advisory council to study and issue recommendations concerning action on coastal zone issues.

6. Chapter 375 - OUTDOOR RECREATION AND CONSERVATION: expresses a goal of the Department of Natural Resources for the establishment of public beaches to encourage public use of shores.

7. Chapter 376 - POLLUTANT SPILL PRESERVATION AND CONTROL: "The highest and best use of the seacoast of the state is as a source of public and private recreation." Prohibits "the discharge of pollutants into or upon any coastal waters, estuaries, tidal flats, beaches, and lands adjoining the seacoast...".

8. Chapter 380 - ENVIRONMENTAL LAND AND WATER MANAGEMENT: contains the Florida Coastal Management Act of 1978; establishes Florida D.E.R. as the lead agency.

9. Chapter 403 - ENVIRONMENTAL CONTROL: concerns the pollution of the coastline.

F. FISH AND WILDLIFE: FEDERAL LEGISLATION

1. FISH AND WILDLIFE COORDINATION ACT (P.L. 85-624): declares that fish and wildlife conservation must be considered equally with other features of water resource development programs.

2. WILD AND SCENIC RIVERS ACT ( ): provides for the preservation of rivers to insure maintenance of fish and wildlife maintenance.

3. COASTAL ZONE MANAGEMENT ACT (P.L. 92-532): requires planning with consideration given to fish and wildlife maintenance.

4. MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT (P.L. 92532): defines marine sanctuaries and provides for their establishment; determines that ocean dumping is hazardous and prohibited by law.

FF. FISH AND WILDLIFE: STATE STATUTES

1. Chapter 258 - STATE PARKS AND PRESERVES:
provides for the establishment of aquatic preserves.

2. Chapter 342 - BEAUTIFICATION OF WATERWAYS:
prohibits the use of poisons determined to be detrimental to fish and wildlife.

3. Chapter 370 - SALTWATER FISHERIES AND CONSERVATION:
establishes the licensing of fisherman, food dealers, ets, in essence, the chapter seeks to protect fish, shellfish, and other marine life. There are also regulations for marine animals-specifically, turtles, manatees or sea cows, dolphins (porpoise), manta rays.

4. Chapter 372 - GAME AND FRESHWATER FISH:
establishes rules and regulations for the taking of fishes and wildlife, under the Department of Natural Resources' jurisdiction. The Chapter also establishes the Endangered and Threatened Species Advisory Council. The Game and Freshwater Fish Commission is assigned the responsibility for maintenance of freshwater/upland species. The chapter further provides for licensing of fishermen; regulates exotic/foreign wildlife, through the Florida Aquatic Weed Control Act.

5. Chapter 375 - OUTDOOR RECREATION AND CONSERVATION:
provides for the acquisition of land deemed appropriate for wildlife management.

6. Chapter 376 - POLLUTANT SPILL PRESERVATION AND CONTROL:
provides for the preservation of natural (including fish and wildlife) resources from pollution spills.

GG. FORESTS AND VEGETATION STATE STATUTES

1. Chapter 161 - BEACH AND SHORE PRESERVATION:
stresses the importance of vegetation in beach nourishment and restoration.

2. Chapter 258 - STATE PARKS AND PRESERVES:
authorizes the Department of Natural Resources to purchase land to be designated as state wilderness areas; including biological preserve which may be set aside to promote certain forms of animal or plant life or their supporting habitat.

3. Chapter 342 - BEAUTIFICATION OF WATERWAYS:
legitimizes the use of registered poisonous substances in eradicating obnoxoius vegetation.

4. Chapter 370 - OBNOXIOUS SALTWATER FISHERIES AND CONSERVATION ACT:
prohibits the harvesting of sea oats and seagrapes due to their erosion prevention function on the beaches and shores of the state.

5. Chapter 372 - GAME AND FRESHWATER FISH:
establishes the Florida Aquatic Weed Control Act - assigns to the Department of Natural Resources the responsibility of removing noxious aquatic weeds.

6. Chapter 403 - ENVIRONMENTAL CONTROL:
discusses forests and vegetation as relating to water supply and quality; pollution control awards or provide for the restoration and maintenance of the environment.

7. Chapter 589 - FORESTRY ACT:
creates the Florida Forestry Council of the Division of Forestry, "to disseminate information in regard to forests, their care and management, to prevent and extinguish forest fires, and enforce all laws pertaining to forests and wood; cooperates in growing refurbishing forests and in the planting of indigenous trees."

H. AIR: FEDERAL LEGISLATION

1. CLEAN AIR ACT (P.L. 91-604):
requires the Environmental Protection Agency to establish primary and secondary air quality standards; leaves the implementation of the regulations to the individual states. The Act also establishes the Air Quality Advisory Board and the Council on Environmental Quality.

2. SOLID WASTE DISPOSAL ACT (P.L. 91-512):
requires conformity with Federal Air Quality standards.

HH. AIR: STATE STATUTES

1. Chapter 403 - ENVIRONMENTAL CONTROL:
states that air pollution "constitutes a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish, and other acquatic life, and impairs domestic, agricultural, industrial, recreational, and other beneficial uses of air and water." The chapter expresses the need for regional and local agencies designed to control air and water pollution; the Department of Environmental Regulation has the ultimate state authority over air and water pollution control. The Pollution Control Awards Program, established at the local level, includes the area of air pollution, awards are distributed to agencies, municipalities, counties and other governmental units or primate organizations, institutions, industries, communication mediums, or residents of the state.

I. NOISE: FEDERAL' LEGISLATION

1. NOISE CONTROL ACT - (P.L. 92-574):
states that the individual federal agencies are responsible for noise pollution control within their respective domains.

II. NOISE: STATE STATUTES

J. WASTE WATER: FEDERAL LEGISLATION

1. WATER POLLUTION CONTROL ACT (P.L. 92-500):
provides assistance in the development of treatment works (Section 201); encourages the development of areawide treatment facilities (Section 208); establishes effluent limitations (Section 301), including the discharge of hot water (Section 316). Section 401 requires permits and licensing of treatment plants.

2. MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT (P.L. 92-532):
concerns ocean dumping of wastewater.

JJ. WASTE WATER: PUBLIC HEALTH:

1. Chapter 381 - PUBLIC HEALTH:
local health officials concurrent with the Department of Health and Rehabilitation Services shall supervise all private water systems, and individual sewage disposal systems.

K. SOLID WASTE: FEDERAL LEGISLATION

1. MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT (P.L. 92-531):
prohibits the dumping of solid wastes into the ocean, requires the issuance of permits for ocean dumping.

KK. SOLID WASTE: STATE STATUTES

1. Chapter-376 - POLLUTANT SPILL PRESERVATION AND CONTROL:
seeks to control the spill of solid waste, as a pollutant.

2. Chapter 380 - ENVIRONMENTAL LAND AND WATER MANAGEMENT:
prohibits the dumping of solid waste on land to be used for development.

3. Chapter 403 - (Part IV) RESOURCE RECOVERY:
seeks to enhance the quality of the environment, conserve and recycle our natural resources through a statewide recovery and management program.

L. HISTORICAL, CULTURAL, ARCHAEOLOGICAL RESOURCES: FEDERAL LEGISLATION

1. NATIONAL ENVIRONMENTAL POLICY ACT (P.L. 91-190):
emphasizes the preservation of "important historic, cultural, and natural aspects of our natural heritage," and "assure... aesthetically and culturally pleasing surroundings."

2. HISTORIC PROPERTIES-PRESERVATION ACT(P.L. ):
to insure that there is an authority body "to insure future generations a genuine opportunity to appreciate and enjoy the rich heritage of our nation."

3. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583):
requires the preservation, restoration, and revitalization of coastal aesthetic and scenic resources.

4. PROTECTION AND ENHANCEMENT OF THE CULTURAL ENVIRONMENT:
(Executive Order 11583):
determines that the federal policy is consonant with the above legislation - a reaffirmation of dedication of resources (monetary) for the maintenance of National Register sites.

LL. HISTORICAL, CULTURAL, AND ARCHAEOLOGICAL RESOURCES: STATE STATUTES:

1. Chapter 258 - STATE PARKS AND PRESERVES:
establishes the state wilderness system for public enjoyment; also provides for aquatic preserves - those lands set aside to maintain certain scenic qualities and amenities.

2. Chapter 266.501 - HISTORIC BROWARD COUNTY PRESERVATION BOARD:
establishes a Board of Trustees to acquire, restore, preserve, reconstruct and operate certain historic landmarks or sites.

3. Chapter 267 - FLORIDA ARCHIVES AND HISTORY ACT:
provides for the acquisition, restoration and operation of historic sites and properties, and archaeological sites.

4. Chapter 372 - GAME AND FRESHWATER FISH: establishes rules and regulations concerning game and fish, and the preservation of these resources.

5. Chapter 375 - OUTDOOR RECREATION AND CONSERVATION: determines that recreational areas, such as public beaches, are cultural resources.

6. Chapter 377 - ENERGY RESOURCES: requires that while extracting resources, the aesthetic resources remain intact and/or are enhanced.

7. Chapter 403 - ENVIRONMENTAL CONTROL: concerns the pollution of public resources.

8. Chapter 592 - PARKS AND RECREATION: permits and encourages the dedication of land for parks for the preservation of natural resources.

M. PARKS AND RECREATION: FEDERAL LEGISLATION

1. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583): establishes that the coastal areas are recreational areas.

2. FISH AND WILDLIFE COORDINATION ACT (P.L. 85-624): restricts certain areas for fish and wildlife, as parks.

MM. PARKS AND RECREATION: STATE STATUTES

1. Chapter 161 - BEACH AND SHORE PRESERVATION: preserves the public beaches and shores for public recreation.

2. Chapter 193.501 - TAX ASSESSMENTS OF SPECIAL CLASSES OF PROPERTY: provides for a special tax break for private property qualifying as outdoor recreational or park lands or environmentally endangered lands which is left in an open space use for a minimum of ten years.

3. Chapter 258 - STATE PARKS AND PRESERVES: establishes a state wilderness system for public enjoyment, to set aside areas that have exceptional biological, aestetic, and scientific value as preserves.

4. Chapter 259 - LAND CONSERVATION ACT: involves the ecquisition of land for conservation purposes.

5. Chapter 370 - SALTWATER FISHERIES AND CONSERVATION: encourages the use of land for recreational purposes.

6. Chapter 589 - FORESTRY: discusses the dedication of land for state parks, specifically forests.

7. Chapter 592 - PARKS AND RECREATION:
specifies that the Department of Recreation and Parks of the Department of Natural Resources controls parks - that is, monuments, memorials, historic sites, and archaeological sites.

N. LAND RESOURCE: FEDERAL LEGISLATION

1. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583):
involves the conservation of coastal land.

2. NATIONAL HISTORIC PRESERVATION ACT (P.L. ):
concerns the preservation of land as an historical resource.

NN. LAND RESOURCE: STATE STATUTES

1. Chapter 161 - BEACH AND SHORE PRESERVATION includes beaches and shores as they relate to land-use that is, coastal construction, revitalization, restoration, etc.

2. Chapter 258 - STATE PARKS AND PRESERVES:
pertains to the acquisition of land for parks and preserves.

3. Chapter 259 - LAND CONSERVATION ACT:
involves conservation of the land resource.

4. Chapter 267 - FLORIDA ARCHIVES AND HISTORY ACT:
provides for the preservation of historical sites/land.

5. Chapter 298 - DRAINAGE AND WATER MANAGEMENT:
involves the drainage, protection, and reclamation of land.

6. Chapter 380 - ENVIRONMENTAL LAND AND WATER MANAGEMENT ACT:
seeks to coordinate local decisions relating to growth and development; also distinguishes areas of critical state concern and establishes requirements for D.R.I.s.

7. Chapter 403 - ENVIRONMENTAL CONTROL: involves the stipulation for environmentally sound use of land.

8. Chapter 582 - SOIL AND WATER CONSERVATION: discusses soil as an integral factor in the determination of the relative value of land.

9. Chapter 592 - PARKS AND RECREATION: also concerns the acquisition of land for parks.

O. SOILS: FEDERAL LEGISLATION

1. COASTAL ZONE MANAGEMENT ACT (P.L. 92-583):
relates soil condition to coastal erosion.

OO. SOILS: STATE STATUTES

1. Chapter 161 - BEACH AND SHORE PRESERVATION: discusses soil as relating to beach and shore erosion, and the quality of landfill.

2. Chapter 370 - SALTWATER FISHERIES AND CONSERVATION: concerns soil and erosion.

3. Chapter 381 - PUBLIC HEALTH: requires consideration of the public health and well-being in soil analysis.

4. Chapter 403 - ENVIRONMENTAL CONTROL: involves soil types and quality, and Section-208. Prior to plant siting, soils must be analyzed for foundation purposes.

5. Chapter 582 - SOIL AND WATER CONSERVATION: discusses soil as an integral factor in the determination of the relative value of land.

6. Chapter 591 - FOREST DEVELOPMENT: deals with soils and forest development.

PP. MINERALS: STATE STATUTES

1. Chapter 377 - ENERGY RESOURCES: establishes the Interstate Oil Compact - to conserve oil and gas.

2. Chapter 533 - WASTES FROM MINES: requires county enforcement of regulatory waste legislation, concerning wastes resulting from the mining process.

Q. ENERGY RESOURCES: FEDERAL LEGISLATION

1. DEEPWATER PORT ACT (P.L. 93-627): provides for the construction of deepwater ports as "transfer stations" for imported oil (and their products).

2. ENERGY REORGANIZATION ACT (P.L. 93-438): establishes a research and development administration and a regulatory/-licensing council within the Nuclear Regulatory commission.

QQ. ENERGY RESOURCES: STATE STATUTES

1. Chapter 290 - NUCLEAR CODE: establishes the Southern Interstate Nuclear Compact (and the Southern Interstate Nuclear Board) to insure the proper employment of nuclear energy, facilities, materials, and products.

2. Chapter 376 - POLLUTANT SPILL PRESERVATION AND CONTROL: involves the prevention of energy resource pollution.

3. Chapter 377 - ENERGY RESOURCES: discusses the interstate compact to conserve oil and gas; the policy is to conserve energy, prevent waste, provide protection for the people owning land from which the resources are obtained. The Department of Resource Management of the Department of Natural Resources has authority over the determination of waste. This chapter also is concerned with the regulation of wells, and pollution of land or water due to drilling (extraction of energy resources).

R. PORTS AND HARBORS: FEDERAL LEGISLATION

1. RIVER AND HARBOR ACT (P.L. 91-611): prohibits coastal construction without expressed permission - so as not to obstruct and/or alter waterways.

2. DEEPWATER PORT ACT (P.L. 93-627): construction of off-shore ports for oil transportation.

3. MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT (P.L. 92-532): as ports and harbors affect ocean dumping and pollution.

4. WATER POLLUTION CONTROL ACT (P.L. 92-500): involves ports and harbors, and to what degree they contribute pollution.

RR. PORTS AND HARBORS: STATE STATUTES

1. Chapter 315 - PORT FACILITY FINANCING LAW: empowers municipalities with ability to purchase land, and contruct and/or have constructed any type of port facility.

2. Chapter 376 - POLLUTANT SPILL PREVENTION AND CONTROL: concerns ports and harbors and water pollution.

3. Chapter 380 - ENVIRONMENTAL LAND WATER MANAGEMENT: restricts development in areas of critical state concern; required under section 22F -2.09 = D.R.I. for Port Facilities.

4. Chapter 252 - DISASTER PREPAREDNESS encourages local disaster prevention measures to be taken for areas which are particularly susceptible to flooding or other catastrophic occurrances, manmade or natural.

## APPENDIX B

### BROWARD COUNTY ENVIRONMENTAL IMPACT STATEMENT REQUIREMENTS SECTION 2 (AUTH. SEC. 39.100 (d), ZONING REGS.)

A. AIR QUALITY:

1. List averages and peak emissions by type (i.e.; CO, Particulates, etc), amount, source, and specific location for sources other than automobiles.

2. Specify measures that will be taken to avoid air quality conditions that exceed federal or state standards.

B. WATER QUALITY:

What is the impact of the proposed development on the water resources of the area?

1. Discharges into surface waters. State the initial and final receiving body of water and provide current dry season (January - May) and wet season (August - November) nutrient analysis of receiving waters using total P., total Kjedahl N. $NO_3$, $NH_4$, Ortho-$PO_4$, total dissolved solids, and BOD.

   (a) detergents and solvents
   (b) fuel and oil
   (c) sediment and silt from (1) dredge and fill, (2) erosion
   (d) surface runoff
   (e) thermal discharges
   (f) central sewer system effluent

2. Creation of water bodies

   (a) wastewater treatment or polishing lagoons
   (b) borrow pits
   (c) lakes
   (d) canals
   (e) storm water impoundments

3. Discharge of seepage into ground water

   (a) liquid waste
   (b) solid waste

4. Ground water

   (a) ground water recharge areas and water retention or pounding areas.

(b) withdrawals from ground water and subsequently from surface waters.

C. OTHER EFFECTS:

1. Noise

(a) Specify how applicable federal, state, or local noise control standards or regulations will be met both during and after construction.
(b) Provide data on the increase in noise over the ambient noise background both during construction and after completion. Include specific location information on noise sources in relation to persons both on and off site.
(c) Specify methods to be used to minimize noise during construction.
(d) Specify the construction and landscaping materials and design techniques used to reduce noise sources or buffer them.
(e) Specify whether the development is within NEF-30 contour of an existing or proposed airport. If so, provide a map of the area showing the surrounding NEF contours and the specified anticipated noise level of the site. What specific measures will be taken to lower the noise level?

2. Radiation

(a) Specify the location and type of any radioactive materials that will be used during or after development.

(b) Specify any radioactive by-products or wastes that will result from activity in the development area, including their degree of radioactivity and the method and location of disposal.

D. OTHER CONSIDERATIONS:

1. Lakes, Rivers, Streams, Creeks, Swamps, Marshes and Strands:

(a) Outline the boundaries of any of the above aquatic systems and their flood plains that occur in or adjacent to the proposed development.

(b) Identify any of the above areas that will be altered by the proposed development.

(c) How will such alteration affect associated ecosystems?

2. Historical or Archeological Sites:

(a) Show the location and describe the signifigance of any such site on or adjacent to the proposed development.

3. Specify the planning and design procedures that will be used to minimize the amount of clear-cutting or elimination of existing natural areas and to restore, either by landscaping or reintroduction of native vegetation, any areas that are necessarily or inadvertantly cleared. Specify the methods and procedures that will be used during development to minimize unplanned damage or elimination of natural areas.

THE FOLLOWING QUESTIONS NEED ONLY BE ANSWERED IF THE DEVELOPMENT IS LARGER THAN 100 ACRES OR LIES IN THE C-11 OR HILLSBORO CANAL BASIN

E. DISCUSS THE IMPACT OF THE PROPOSED DEVELOPMENT ON THE FOLLOWING:

1. Topography (as shown on the topographic map)

2. Natural vegetation (use existing terrestrial and aquatic vegetation map, site plan showing areas to be maintained in natural condition, and the landscaping plan).

   (a) What effect will change in hydrology due to the proposed development, including alteration of natural drainage patterns and changes in ground water levels have on natural vegetation and on maintenance needs for landscaping?

   (b) What quantity of erosion is likely due to removal of natural vegetation?

   (c) What type and extent of buffer areas are provided between natural and developed areas?

   (d) What effect will alteration of existing aquatic vegetation have on water quality and nutrient uptake?

3. Animal life:

   (a) Include information on mammals, reptiles and birds.

   (b) For each of the three types of animals, list the species that inhabit or frequent the area and identify any feeding, breeding or nesting sites.

   (c) What measures will be taken to insure or enhance the survival and reproduction of indigenous species?

4. Aquatic Life (include fish, amphibians and aquatic invertebrates and insects):

(a) What species currently exist in the area under consideration? Use acceptable scientific taxonomy and treat the benthic, littoral, limnetic and tidal zone populations separately.

(b) Identify and show the location of those wetland and water areas on or near the site that will be modified in any way by the proposed development.

(c) What new and additional chemical or biological elements will be introduced to aquatic environments as a result of the proposed development and what is the effect of the resultant new concentrations in relation to the tolerance levels of aquatic life in the receiving areas?

5. Endangered Species:

(a) Answer the questions under Animal Life and Aquatic life for any species of those listed in Attachment-I that frequent, breed, nest, feed or are resident in the area.

(b) What action will be taken in the proposed development area to maintain or enhance the existence of any species identified in (a) above.

F. SOILS: (the detailed soils series map specified in the appendix should be used in answering this question)

1. Describe each soil series in terms of:

(a) Dust potential
(b) Erosion potential
(c) Depth to bedrock
(d) Corrosion potential
(e) Shrink-swell potential
(f) Permeability and percolation rate
(g) Depth of wet season water table
(h) Duration of wet season water table
(i) Presumptive bearing value
(j) Reservoir embankment suitability.
(k) Specify the source of information for each item, A thru J; provide detailed results of soils percolation tests by a registered or licensed soils testing firm determining steady percolation rate capability of the soils in the project area.

2. Analysis and conclusions on the development suitability of the soils.

LIST OF ENDANGERED SPECIES AND SPECIES OF FLORIDA CONCERN

This is a list compiled from the Florida Game and Freshwater Fish Commission and the United States Bureau of Sport Fisheries and Wildlife publications in accordance with Section 1 (C) of the Endangered Species Preservation Act of October 15, 1966 (80 Statute. 926; 16 U.S.C. 668 aa(c) 1968 Edition. An asterisk (*) indicates those not on the Federal list, but of concern to Florida officials.

Those whose range extends into South Florida include:

MAMMALS

Florida Panther (Endangered)
Florida Manatee (Endangered)
Everglades Mink (Undetermined)
Key Deer (Endangered)
*Bear
*White-tailed Deer

BIRDS

Florida Great White Heron (Rare)
Everglade Kite (Endangered)
Southern Bald Eagle (Endangered)
Florida Sandhill Crane (Rare)
Ivory-Billed Woodpecker (Endangered)
Cape Sable Sparrow (Endangered)
Reddish Egret (Peripheral)
Wood Ibis (Peripheral)
Roseate Spoonbill (Peripheral)
Florida Mangrove Cuckoo (Peripheral)
American Burrowing Owl (Undertermined)
*Eastern Glossy Ibis
*Flamingo
*Eastern Brown Pelican
*Florida Scrub Jay
*Mississippi Kite
*Caracara
*Limpkin

REPTILES AND AMPHIBIANS

American Crocodile (Peripheral)
*Alligator (Florida protected)

## APPENDIX C:

### ECOLOGICAL PLANT COMMUNITIES OF BROWARD COUNTY

The relationship between soil type and the species of native vegetation present on the site vary directly. Climate plus the availability of fresh water and the type of vegetation can indirectly influence the kinds of wildlife that may inhabit a site. The interrelated nature of an ecological community can even be utilized to explain and predict which kinds of animal and plant life would be the most susceptible to disturbance or change.

The following pages describe those ecological plant communities native to South Florida and Broward County in particular. The twelve ecological plant communities are utilized by the Soil Conservation Service to correlate soil types with natural vegetation. In this document, revisions have been made to the SCS Technical Guide by the County's Urban Forester so as to make the discussions specific to Broward County. For the purposes of the Coastal Zone Protection/Conservation Element, these communities offer:

(1) an educational function in terms of environmental management; and
(2) a method for identifying the unique natural areas (marine resources, natural land forms, vegetation and wildlife characteristics) of a rapidly urbanizing metropolitan county.

The twelve ecological plant communities are listed below with a brief synopsis of each found on the following pages:

1. South Florida Coastal Strand Plant Community
   a. Beach Environment
   b. Saltwater Edge Environment
2. Sand Pine Scrub Plant Community
3. South Florida Flatwood Plant Community
4. Cabbage Palm Hammock Plant Community
5. Tropical Hammock Plant Community
6. Oak Hammock Plant Community
7. Cypress Swamp Plant Community
8. Salt Marsh Plant Community
9. Mangrove Swamp Plant Community
   a. Mudflat Environment
10. Sawgrass Marsh Bog Plant Community
11. Freshwater Marsh and Pond Plant Community
12. Slough Plant Community

Relative to these twelve ecological plant communities, a previous section (in the "Environmental Concerns" section) entitled "Wildlife" considers four additional environments which are crucial to bird and animal life. These more generalized environments include: (1) Ocean Surface; (2) Open Spaces; (3) Urban; and (4) Suburban.

## SOUTH FLORIDA COASTAL STRAND PLANT COMMUNITY

### OCCURRENCE

This ecological community occurs along the Atlantic Ocean in Broward County. Individual communities are generally large in size, being narrow and long, parallel to the coastal beaches. Small, isolated communities can also be found along some bays or sounds. This community generally encompasses the area affected by salt spray from the ocean, salt water bays and would include two special environments which are important in attracting certain species of wildlife. The Beach Environment, the narrow tidal area along the water's edge, provides a crucial habitat for sandpipers. The second type of environment actually subsumes the entire Coastal Strand Community in addition to the Intracoastal Waterway and Port Everglades. These Saltwater Edge areas attract numerous gulls and terns.

### DESCRIPTION

This community occurs on nearly level to strongly sloping land. It is easily identified by its location adjacent to the Atlantic Ocean and by plants that are adapted to or influenced by the salty environment. Small areas of Upland Hardwood Hammock may occur on the more inland parts of this community.

1. Soil

   The soils are nearly level to strongly sloping, and mostly well to excessively drained with some moderately well drained or somewhat poorly drained. They are coarsely textured throughout. Representative soils include: Canaveral and Palm Beach.

2. Vetetation

   The natural vegetation of this community is low growing grasses, vines, and herbaceous plants with few trees or large shrubs. These trees and shrubs often occur in stunted form due to the action of the wind. The natural forces of wind, salt, and blowing sand make plant establishment difficult on the foredunes. Plants which do establish here are well adapted to disturbance and are pioneer species. The backdunes will often have vegetation similar to the sand pine scrub ecological community. Plants which characterize this community are:

   TREES: Cabbage palm, *Sabal palmetto*; Common seagrape, *Coccoloba uvifera*;

   SHRUBS: Bay Cedar, *Suriana maritima*; Coco plum, *Chrysobalanus icaco*; Inkberry, *Scaevola plumieri*; Marshelder, *Iva imbricata*; Saw palmetto, *Serenoa repens*; Silverleaf croton, *Croton punctatus*; Spanish bayonet, *Yucca aloifolia*;

HERBACEOUS PLANTS AND VINES:

Bay bean, Canavalia maritima; Beach morning-glory, Ipomoea pes-caprae; Cucumerleaf sunflower, Helianthus debilis; Sea purslane, Sesuvium portulacastrum

GRASSES AND GRASSLIKE PLANTS:

Bitter panicum, Panicum amarum; Sandbur, Cenchrus spp.; Seaoats, Uniola paniculata; Seashore paspalum, Paspalum distichum.

3. Animals

A variety of shorebirds, terns, and gulls can be found on or near the beach. This community provides a good food source as well as meeting sites. Small mammals can also be found on the coastal dunes. Larger mammals also occur behind the foredunes. Gulls, terns, shorebirds, mice, and crabs are the most commonly found animals. Others that may occur are racoons, rabbits, bobcats, foxes, skunks, pelicans, American kestrel, other predatory birds, alligators, lizards, skinks, and frogs. This area also serves as nesting grounds for sea turtles.

4. Endangered and Threatened Plants and Animals

a. The following endangered or threatened plants may occur in this Community:

HERBACEOUS: Beach star, Remirea maritima; Four o'clock, Okenia hypogaea;

SHRUBS: Sea lavender, Mallotonia gnaphalodes; Beach Jacquemontia, Jacquemontia reclinata; Beach creeper, Ernodea littoralis; Wild Cotton, Gossypium hirstutum

b. The following endangered or threatened wildlife species may be found in or around this community.

BIRDS: Peregrine Falcon, Falco perigrius; Osprey, Pondion haliaetus carolinensis; Royal Tern, Sterna maxima; Least Tern, Sterna albifrons antillarum; Black Skimmer, Rynchops nigra; American Oyster catcher, Haematopus palliatus; Brown Pelican, Pelecanus occidentalis carolinensis

REPTILES: Atlantic hawksbill turtle, Eretmochelys imbricata, Atlantic loggerhead turtle, Caretta caretta caretta; Atlantic Ridley turtle, Lepitochelys kempii; Gopher tortoise, Gopherus polyphemus; Green turtle, Chelonia mydas (Atlantic coast only);

5. Environmental Value as a Natural System

The coastal strand is highly endangered. Areas privately owned but undeveloped are in demand for residences, hotels and motels. This urban development can have serious effects on the community.

Coastal strands are important in regulating wave action along the coast. This action tends to break away part of one beach and build up another. Unplanned structures and development which alter this process accelerates beach and coastal dune erosion.

Clearing and leveling of dunes for development also cause erosion through removal of native vegetation, which helps hold the dune together, and by removal of sand from the offshore transport system.

Recreational use and wildlife values on the coastal strand are important. Recreation is much in demand in these areas but can cause damage due to trampling and destroying vegetation. When these plants die, their extensive root systems are no longer available to hold the soil together and build the dune. Occasional use may also degrade this fragile community, without the construction of walkovers to replace dune cuts caused by foot traffic.

## SAND PINE SCRUB PLANT COMMUNITY

### OCCURRENCE

The Sand Pine Scrub ecological community occurs in the northern portions of Broward County along Old Dixie Highway and Executive Airport. It typically has a few smaller communities of wetland types interspersed throughout.

### DESCRIPTION

This community occurs on nearly level to sloping land. Water movement is rapid through the soil. It is easily identified by the even-aged stands of sand pine.

1. SOIL

   The soils are nearly level to strongly sloping, deep, acid, well to excessively drained and coarse textured throughout. Representative soils include: Paola and St. Lucie.

2. VEGETATION

   The natural vegetation of this community is typically even-aged sand pine trees with a dense understory of oaks, saw palmetto, and other shrubs. Ground cover under the trees and shrubs is scattered and large areas of light colored sand are noticeable. In some cases, the sand pine are scattered with oaks being the dominant vegetation. Plants which characterize this community are:

   TREES: Chapman oak, *Quercus chapmanii*; Myrthe oak, *Quercus myrtifolia*; Sand Live oak, *Quercus virginiana geminata*; Sand pine, *Pinus clausa*

   SHRUBS: Gopher apple, *Licania michauxi*; Rosemary, *Caratiola erociodes*; Runner oak, *Quercus pumila*; Saw palmetto, *Seranoa repens*; Tallowood, *Ximenia*

   HERBACEOUS PLANTS AND VINES:

   Common prickly pear, *Opuntia drummondii*; Grassleaf goldaster, *Heterotheca graminifolis*; Reindeer Moss, *Pilophoron rangiferina*; Smilax, *Smilax spp*.

GRASSES AND GRASSLIKE PLANTS:

Bluestem species, Andropogon spp.;
Indiangrass, Sorghastrum secundum

3. Animals

Animals found in this community are adapted to high temperatures and droughty conditions. The wildlife food production is low. Dense vegetation provides good escape cover and deer utilize this community frequently. The various species of oaks provide good food when they are fruiting. Gopher apple is also a good wildlife food plant.

Typical animals of the sand scrub are: deer, gopher, tortoise, gopher frog, scrub lizard, sand skink, black racer, Florida mouse, towhee, Great crested flycatcher, and scrub jay.

4. Endangered and Threatened Plants and Animals

a. The following endangered or threatened plants may occur in this community:

HERBACEOUS PLANTS AND VINES:

Large-leaved jointweed Polygonella macrophylla;
Lewton's polygala, Polygala lewtonii.

b. The following threatened wildlife species may be found in or around this community:

BIRDS: Cooper's Hawk, Accipertar cooperii; Florida Burrowing Owl, Athena cunicularia floridana; Florida Scrub Jay, Aphelocoma coerulescens coarulescens; Hairy Woodpecker, Picioles villosus auduboni

MAMMALS: Florida mouse, Peromyscus floridanus

REPTILES: Gopher Tortoise, Gopherus polyplyphemus; Gopher Frog, Rana areolata aesopus; Eastern Indigo Snake, Drymarchon corais couperi; Florida Scrub Lizard, Sceloporus woodi

5. Environmental Value as a Natural System

The sand pine scrub is a fire-based community. Understory vegetation is dense and fuel supplies build up in the trees due to a minimum of leaf fall. The thick understory creates a pathway to the tree crowns when fire occurs. Fire normally occurs every 20-40 years. Sand pines have a low resistance to fire and the high density, even-aged stands make fire devastating. Cones of

the sand pine require the heat of a fire to open and release sands. This method of regeneration helps to form even-aged stands. Without occasional fire this community would become a type of upland hammock community.

The sand pine scrub is a valuable ecological community. The coarse textured, excessively and well drained soils make the community important in aquifer recharge. It is a unique ecosystem which gives it an important scientific value. Heat and drought stress response by plants and animals are often studied on these sites. Uncontrolled fire and damage to vegetation by excessive foot or vehicle travel are adverse effects on the community. Sand scrubs are good producers of sand pine and some areas are utilized for commercial woodland.

This community has fair to good wildlife values, especially with proper management. It is especially important as an escape area and for wildlife cover.

Areas of sand pine scrub communities are rapidly declining. Favorable conditions for residential use and proximity to the coast make them prime sites for real estate development.

## SOUTH FLORIDA FLATWOOD PLANT COMMUNITY

### OCCURRENCE

This community is found throughout Broward County. The highest concentration is in the Parkland area (N.W. Broward). Typically it is interspersed with smaller communities of other types, especially wetlands.

### DESCRIPTIONS

South Florida Flatwoods ecological community occurs on nearly level land. Water movement is very gradual to the natural drainageways, swamps, ponds and marshes associated with this community. During the rainy season, usually June-September, this community may have water on or near the soil surface.

1. Soil

   The soils are usually nearly level, poorly to somewhat poorly drained, deep, and coarse textured throughout or coarse textured in the upper part and moderately coarse textured or moderately fine textured in the lower part. Representative soils include: Hallandale, Boca and Immokalee.

2. Vegetation

   The landscape position of this community affects plant-water relationships and causes slight differences in plant composition from wetter to drier areas. Although these differences are recognized, they are not significant enough to delineate as separate communities.

   The natural vegetation of this community is typically scattered pine trees with an understory of saw palmetto and grasses. Plants which characterize this community are:

   TREES: S. Florida Slash pine, *Pinus elliottii var. dense*

   SHRUBS:
   Dwarf huckleberry, *Gaylussacia dumosa*;
   Fetter bush, *Lyonia lucida*;
   Gallberry, *Ilex glabra*;
   Saw palmetto, *Serenoa repens*;
   Tarflower, *Befaria racemosa*;
   Shining sumac, *Rhus copallina*;
   Partridge pea, *Cassia fasciculatap*;
   Runner oak, *Quercus plumila*;
   Wax myrtle, *Myrica cerifera*;

   HERBACEOUS PLANTS AND VINES:

   Creeping beggarweed, *Desmodium canum*;
   Dog fennel, *Eupatorium capillifolium*;

Grassleaf goldaster, Heterotheca graminifolia; Milk pea, Galactia elliottii; Smilax, Smilax spp;

GRASSES AND GRASSLIKE PLANTS:

Chalky bluestem, Andropogon capillipes; Indiangrass, Sorghastrum secundum; Threeawn (wiregrass), Aristida spp.; and Sedges, Cyperus spp.

3. Animals

The South Florida Flatwoods is host to a diverse and numerous wildlife population. Many larger animals are found in areas where the flatwoods join other communities. These ecotones provide nesting sites, den sites, food and cover.

Typical animals of the flatwoods are deer, bobcat, raccoons, gray fox, fox squirrels, cottontail rabbits, cotton rats, Eastern diamondback rattlesnakes, pygmy rattlesnakes, oppossums, skunks, bobwhite quail, meadow larks, redbellied woodpeckers, and pileated woodpeckers. Introduced feral hogs have long inhabited much of the community.

4. Endangered and Threatened Plants and Animals

a. The following endangered and threatened plants are not common in this community, but may occur in some instances:

PLANTS: Silver palm, Coceothrinax argentata; Fall-flowering Ixia, Nemastylis floridana; Tiny polygala, Polygala smallii; Florida coontie, Zamia floridana

b. The following endangered and threatened wildlife species may be found in or around this community:

BIRDS: Cooper's hawk, Accipiter cooperii Short-tailed hawk, Butelo brachynrus; American kestrel, Falco sparverius paulus; Hairy woodpecker, Picoides villosus auduboni; Florida Burrowing owl, Athena cunicularia floridana

MAMMALS: Florida black bear, Ursus americanas floridanus

REPTILES: Eastern Indigo snake, Drymarchon corais couperi; Gopher frog, Rana areolata aesopus; Miami black-headed snake, Tantilla oolicata

5. Environmental Value as a Natural System

Fire and water are the major stress conditions of this community. Fire is important in control of hardwoods and natural regeneration of pine. Removal of fire will cause a successional evaluation to a hardwood community, the kind of which depends on soil drainage.

Native forage production is good with proper management. Use for rangeland has only a slight effect on the community if properly managed. Chopping and similar range practices results in more grasses and fewer shrubs. With sufficient cover left, the resulting increase in diversity usually leads to an increase in types and amount of wildlife.

This community has good wildlife values, expecially with proper management. It is especially important as a wildlife buffer zone between urban areas occurring on better drained sites.

## CABBAGE PALM HAMMOCK PLANT COMMUNITY

### OCCURRENCE

Cabbage palm hammocks occur predominantly in the N.W. portion of the county. An example of this would be in the area of the Florida Turnpike's Pompano Service Plaza known as the Palm Aire tract.

### DESCRIPTION

This community is easily identified by the occurrence of thick stands of cabbage palm with a few scattered oak. It occurs on slightly elevated areas within the Slough and South Florida Flatwoods Communities.

1. Soils

   Soils are on low-lying, poorly drained ridges or flats and consist of Hallandale and Margate. Most of the soils are coarse textured and calcareous in nature.

2. Vegetation

   Tree species consist predominantly of cabbage palms. Plants that characterize this community are:

   TREES: Cabbage palm, *Sabal palmetto*;
   Laurel oak, *Quercus laurifolia*;
   Live oak, *Quercus virginiana*;
   Florida Strangler fig, *Ficus aurea*;
   Red mulberry, *Morus rubra*

   SHRUBS: Amercian beautyberry, *Callicarpa americana*;
   Saw palmetto, *Serenoa repens*;
   Wax myrtle, *Myrica cerifera*;
   Shining sumac, *Rhus copallina*;
   Wild coffee, *Psychotria spp*.

   GRASSES Bluestems, *Andropogon spp*;
   Low panicums, *Panicum spp*.;
   Threeawn, *Aristida spp*.

3. Animals

   Wildlife species include deer, turkey, wild hogs, armadillo, raccoons, oppossums, skunk, bobcat, grey squirrel, owls, woodpeckers, red-shouldered hawk and numerous songbirds and snakes.

4. Endangered and Threatened Plants and Animals

   a. PLANTS: Birds nest spleenwort, *Asplenium serratum*;
   Silver palm, *Coccothrinax argentata*;
   Twisted air-plant, *Tillandsia flexuosa*;
   Hand fern, *Ophioglossum palmata*

b. Endangered and threatened animals are:

| | |
|---|---|
| BIRDS: | Cooper's hawk, Accipiter cooperii;<br>American kestrel, Falco sparverius paulus;<br>American Redstart, Setophaga ruticilla;<br>Hairy woodpecker, Picoides villosus auduboni |
| MAMMALS: | Florida black bear, Ursus americanus floridanus |
| REPTILES: | Eastern Indigo snake, Drymarchon corais couperi |

5. Environmental Value as a Natural System

Prominent in the landscape of South Florida, cabbage palm hammocks lend a certain natural amenity not found elsewhere in the state. They offer resting cover for both migratory and resident wildlife and serve as refuges during wet conditions.

## TROPICAL HAMMOCK PLANT COMMUNITY

### OCCURRENCE

This community is confined to South Florida. It occurs on elevated areas in the Everglades. Individual communities range in size from less than an acre to several acres in Broward County. An example of this is located west of Pompano Beach Service Plaza known as the Palm-Aire tract.

### DESCRIPTION

Tropical hammocks generally appear as thick clumps or strands of small to medium-sized trees. On the better sites where disturbance has not occurred for several years, a more "jungle-like" appearance is observed A heavy canopy closure, causing deep interior shade is prevalent. This condition serves to moderate temperatures and conserve moisture. Characteristically, trees of the tropical hammocks have dense, heavy strong wood and shallow spreading root systems which adapt them to a harsh environment of wind, periodic droughts and salt spray.

1. Soils

   Soils are shallow to rock with only a few inches of organic material overlying porous limerock and marl. Characteristic soils were mapped in an older reconnaissance type soil survey and have not been classified into the current soil classification system.

2. Vegetation

   Tropical hammocks typically have a very high plant diversity. Most of the vegetation is probably of West Indies origin. The following species are characteristic:

   TREES:
   Gumbolimbo, *Bursera simaruba*;
   Pigeonplum, *Coccoloba diversifolia*;
   Florida poisonwood, *Metopium foxiferum*;
   Florida Strangler fig, *Ficus aurea*;
   Mastic, *Mastichodendron fostidissimum*;
   Paradise tree, *Srmarouba glauca*;
   Cabbage palm, *Sabal palmetto*;
   Black ironwood, *Krugiodentron ferreum*;
   Wildlime, *Zanthoxylum fagara*

   SHRUBS:
   Marlberry, *Ardisia escallonmides*;
   Snowberry, *Chiococca alba*;
   Wild coffee, *Psychotria spp.*;
   White stopper, *Eugenia axillaris*;
   Silverpalm, *Goccothinax argentata*

HERBACEOUS PLANTS AND VINES:

Golden serpent fern, Phlebodium aureum;
Resurrention fern, Polypodium polypodioides;
Cardinal airplant, Tillandsia fasciculata;
Spider ordhic, Brassia caudate;
Strap-leaved bromeliad, Gusmania monostachia

GRASS AND GRASSLIKE SPECIES:

Paspalum, Paspalum fluitans;
Sour paspalum, Paspalum conjugatum

3. Animals

Tropical hammocks serve as habitat for a variety of wildlife species.

4. Endangered and Threatened Plants and Animals

a. Threatened or endangered plants of the tropical hammocks are:

TREES: Silver palm, Coccothrinax argentata;
Slander spleenwort, Asplenium dentatum;
Bird's nest spleenwort, Asplenium serratum;
Star-scale fern, Pleopeltis revoluta

SHRUBS: Yellowheart, Zanthoxylum flavum

b. Rare, threatened, endangered, or fauna of special concern are:

BIRDS: Cooper's hawk, Accipiter cooperii;
Short-tailed hawk, Buteo brachyurus;
Black whiskered vireo, Vireo altiloquus

MAMMALS: Florida black bear, Ursus americanus floridanus

REPTILES: Miami black-headed snake, Tantilla oolitica;
Eastern Indigo snake, Drymarchon corais couperi

5. Environmental values as a Natural System

Tropical hammock communities are probably the most endangered ecological type in Florida. Such endangerment lies in the fact that the communities are not widespread in occurrence and have received considerable pressures for other land uses. Special consideration should be given to incorporating all existing tropical hammocks into an overall land use plan. Such a plan would insure the continued use of these communities as landscape and greenbelt areas, parks, and wildlife habitat in an area under tremendous population growth pressures.

## OAK HAMMOCK PLANT COMMUNITY

### OCCURRENCE

Oak hammocks occur throughout Broward County. Typical examples of this community occur along the Pine Island Ridge and in the Riverland neighborhood near the New River.

### DESCRIPTION

This community is readily identified by the dense canopy of predominantly Live Oak trees on nearly level to rolling topography. The understory is usually sparse.

1. Soils

   Soils are somewhat poorly to poorly drained. Some have limestone rocks occurring on or near the surface. Representative soils include: Adamsville, Lochloosa, Nobleton and Panasofkee.

2. Vegetative

   Tree species consist of mostly Live Oaks associated with other oaks and pine. There are few understory plants. Plants that characterize this community are:

| | |
|---|---|
| TREES: | Cabbage palm, *Sabal palmetto*;<br>Laurel oak, *Quercus laurifolia*;<br>Live oak, *Quercus virginiana*;<br>Slash pine, *Pinus elliotii*;<br>Water oak, *Quercus nigra*;<br>Florida strangler fig, *Ficus aurea* |
| SHRUBS: | American beautyberry, *Callicarpa americana*;<br>Palmetto, *Serenoa repens*;<br>Wax myrtle, *Myrica cerifera*;<br>Wild coffee, *Psychotria spp.* |
| VINES: | Greenbriar, *Smilax spp.*;<br>Poison ivy, *Toxicodendron radicans*;<br>Muscadine grape, *Vitis rotundifolia* |
| GRASSES: | Sedges, *Cuperus spp.*;<br>Low paspalum, *Paspalum spp.*;<br>Low panicum, *Panicum spp.*;<br>Hairy panicum, *Panicum rhizomatum*;<br>Longleaf uniola, *Chasmoanthium sessilifolorum*;<br>Bluestems, *Andropogon spp.*;<br>Indian grass, *Sorghastrum secundum* |

HERBACEOUS PLANTS:

Resurrection fern, Polypolium polypodioides;
Spanish moss, Dendropogon usneoides;
Strap-leaved bromeliad, Guzmania monostachia;
Wild pine, Tillandsia utriculata

3. Animals

The most common animals of this community are: deer, squirrels, bobcat, foxes, skunks, raccoons, oppossums, rabbits, armadillos, turkey, woodpeckers, owls and songbirds.

Endangered and Threatened Plant is:

Twisted airplant, Tillandsia xuosa

Fauna which are considered rare, threatened, endangered, or of special concern include:

BIRDS: Cooper's hawk, Accipiter cooperii;
American Kestrel, Falco sparverius paulus;
American Redstart, Setophaga ruticilla; Hairy Woodpecker, Picoides villosus auduboni;

MAMMALS: Florida black bear, Ursus americanus floridanus

REPTILES: Gopher tortoise, Gopherus polyphemus
Eastern Indigo snake, Drymarchon corais couperi

5. Environmental Value as a Natural System

Oak hammocks add considerably to the quality of the landscape. Spreading, stately oaks in many hammocks offer desirable surroundings for homesites and were used extensively for this purpose by many early settlers. They are also important wildlife areas. This community offers both food and cover to various species.

## CYPRESS SWAMP PLANT COMMUNITY

### OCCURRENCE

The Cypress Swamp Community occurs along rivers, lake margins, slough and strands or interspersed throughout other communities such as flatwoods and slough. In Broward County the existing Cypress Swamp Communities are very limited in size and number.

### DESCRIPTION

This community is poorly drained and water is at or above ground level a good portion of the year. Bald cypress is the dominant tree and is often the only plant which occurs in significant numbers. Cypress swamps growing on sand, rock and shallow mucky pond areas are not as productive as those found on alluvial floodplain soils. As the soil depth in muck ponds increases, so does the growth rate of cypress. The submerged or saturated condition of the soil and general absence of fire help reduce competition and keep the community from a successional change to a swamp hardwood community.

Fire is a stress factor, primarily on the drier areas, but water is important in all areas. Water enters the swamp directly from rainfall or runoff. The water level is highest in summer and peak productivity occurs in early spring. Stagnant water will result in slower tree growth especially if it occurs during the growing season.

Natural regeneration of cypress requires fluctuation of the water. Water must be available to germinate the seeds, it provides natural stratification. When the seedling starts to grow its top must be maintained above water.

1. Soils

   Soils commonly associated with this community are level or depressional, poorly drained and have loamy subsoils and sandy surfaces. Representative soils include: Bassinger, Margate, Pompano and Surrency.

2. Vegetation

   Bald cypress, along lakes and stream margins, is dominant and often is the only plant found in large numbers. Pond cypress occurs in cypress heads or domes which are usually found in flatwoods and prairies. The diversity of trees is low in the cypress heads but increases in the strands and stream margins. Plants which characterize this community are:

   TREES: Bald cypress, *Taxodium distichum*; Pond cypress, *Taxodium ascendens*; Red maple, *Acer rubrum*; Willow, *Salix spp.*; Sweet Bay, *Magnolia virginiana*; Red bay, *Persea borbonia*

SHRUBS: Common button bush, Cephalanthus occidentalis; Carolina ash, Fraxinus caroliniana; Wax mrytle, Myrica cerifera; Wild coffee, Psychotria spp.; Mrysine, Mrysine guianensis; Saltbush, Baccharis halimifolia

VINES: Smilax spp.; Muscadine grape, Vitis rotundifolia

HERBACEOUS: Sawgrass, Cladium Jamaicensis; Maidencane, Panicum hemitomon; Stringlily, Crinum americanum; Boston fern, Nephrolepis biserrata; Arrowhead, Sagittaria lancifolia

3. Animals

Wildlife species include: deer, black bear, mink, raccoon, Herons, egrets, wood stork, pileated woodpecker, barred owl, anhinga, limpkin, purple gallinue, alligator, and a variety of water snakes, turtles, frogs and salamanders.

4. Endangered and Threatened Plants and Animals

a. The following plants of this community are considered threatened or endangered:

PLANTS: Bird's nest spleenwort, Asplainium serratum; Twisted air-plant, Tillandsia flexuosa; Climbing day flower, Commelina gigas

b. Rare, threatened, endangered birdlife or those of special concern may be found in or around this community.

BIRDS: Wood Stork, Mycteria americana Cooper's hawk, Accipiter cooperii; Osprey, Pandion haliaetus carolinensis; Limpkin, Aramus quarauna Hairy Wookpecker, Piciodes villosus auduboni Short-tailed hawk, Buteo brachyurus

MAMMALS: Everglades mink, Mustela vison arvergladensis; Florida black bear, Ursus amariceanus floridanas

REPTILES: American alligator, Alligator mississippiensis; Eastern Indigo snake, Drymarchon corais couperi

5. Environmental Value as a Natural System

Cypress swamps are an extremely valuable resource. They can be used for environmental educational study, scientific research, and recreation. They have a high value for use as wildlife habitat. This community has a low diversity of plant species due to the fluctuating water levels and low nutrient availability. Both drastic changes in the water level and a stabilized water level may change the plant community. Often this will occur when man builds dams, dikes or drainage channels. Flooding of a cypress swamp during the dry season will prevent the cypress trees from reproducing.

When ditched and drained, these areas may be used for pine production, although they are not as productive as the surrounding pine lands.

Cypress swamps provide water storage areas by holding excess water and slowly releasing it into the water table. Along riverbanks Cypress communities serve as excellent floodplains.

Water quality is enhanced by the community which functions as an environmental sink by absorbing nutrients from the water and recycling the water through the system.

## SALT MARSH PLANT COMMUNITY

### OCCURRENCE

Salt marshes occur along the Atlantic and inland along tidal rivers. A very viable area occurs along portions of the Westlake Mangrove Area in Southeastern Broward County.

### DESCRIPTION

This community appears as an open expanse of grasses, sedges, and rushes. Usually there is a matrix of interconnected shallow natural channels that aid tidal influx.

1. Soils

   Soils commonly associated with this community are level, very poorly drained, muck or sandy clay loams underlain by loamy sand or organic soils underlain by clay or sand. Some are clayey throughout. Many of the soils have a high sulfur content. Many of them are soft and will not support the weight of a man or large animal. Tidal action causes saturation of the soil with salt water and inundation to a depth of a few inches. Representative soils are: Bassinger Variant and Hallandale Variant.

2. Vegetation

   Vegetation often occurs in zones within the salt marsh complex as a result of water levels from tidal action and salinity concentrations in water and soils.

   Some species have a wide tolerance range and may be found throughout the grass marsh. Plants in this group are needlegrass rush and seashore saltgrass. Smooth cordgrass is more indicative of low marsh while the high marsh supports salt myrtle, marshelder, saltwort and sea oxeye. Along the North Atlantic Coast, smooth cordgrass is usually dominant. Additional plants that occur in the salt marsh community are:

   SHRUBS: Christmas berry, Lycium carolinianum

   HERBACEOUS PLANTS AND VINES:

   Sea blite, Suaeda linearis;
   Sea purslane. Sesuvium portulacastrum;
   Leather fern, Acrostichum aureum;
   Seaside goldenrod, Solidago sempervirens var. maxicana

   GRASSES AND GRASSLIKE PLANTS:

   Big cordgrass, Spartina cynosuroides;
   Smooth cordgrass, Spartina aiterniflora;

Needlegrass rush, Juncus roemerianus; Seashore paspalum, Paspalum veginatum; Common reed, Pharagmites communis; Saltmarsh bulrush, Scripus robustus; Seashore saltgrass, Distichlis spicata; Sawgrass, Cladium jamaicensis

3. Animals

The salt marshes support a variety of wildlife. Raccoons, deer, otter, rails, coots, egrets, gulls, terns, brown pelicans, and many forms of waterfowl are dependent upon this community for habitat. The diamondback terrapin, alligator, and salt marsh snake are among the reptiles found here.

4. Endangered and Threatened Plants and Animals

a. There are no known endangered or threatened plants that would occur in this community.

b. Rare, threatened, endangered fauna or those of special concern may be found in or around this community:

BIRDS: Little Blue Heron, Egretta caerulea; Osprey, Pandion haliaetus carolinensis; Great Egret, Casmerodius albus; Louisiana Heron, Egretta tricolor; Roseate Spoonbill, Ajaia ajaia; Yellow Crowned Night Heron, Nyctricorax violacea; White Ibis, Eudocimus albus; Wood Stork, Mycteria americana

MAMMALS: West Indian Manatee, Trichechus manatus latirostris; Round-tailed muskrat, Neofiber alleni

REPTILES: Hawksbill turtle, Eretmachelys imbricata; Eastern Indigo snake, Drymarchon corais

5. Environmental Value as a Natural System

The functions of salt marshes are probably the most important yet least understood and recognized of all ecological communities. Along wetland coastlines and estuaries, the marsh functions as a transition zone from terrestrial to oceanic life.

Nutrients, sediments and detritus from upland systems are redistributed by tidal action, making the marsh one of the most productive natural ecological systems. The area serves as a habitat for the early life stages of numerous ocean species as they feed on countless invertebrate organisms. Many wildlife forms overlap normal ranges at least seasonally to become harvesters, and in many cases part of, the natural food chain.

Salt marshes perform an important function in the stabilization and protection of shorelines, especially during storm tides.

Salt marshes are good habitat for a variety of wildlife. The habitat type is usually maintained by natural forces and influences such as tidal action and periodic hurricanes. Storms usually cause the creation of "open" water in salt and brackish marshes and also may change salinities. The resulting effect is that plant succession is set back and more favorable habitat may be created for waterfowl, fur bearers and some other forms of wildlife such as wading birds. Artificially created dikes to control salinity are used in managing marsh plants for wildlife. Prescribed burning is also a technique used in marsh management.

Today, Broward County lacks an extensive saltmarsh habitat since the majority of local estuarine habitats are open water bodies.

## MANGROVE SWAMP PLANT COMMUNITY

### OCCURRENCE

Mangrove swamps occur primarily along saltwater shorelines in South Florida. Coastlines that host this community normally have mild wave action in the form of backbays and estuary fringes. In Broward County only several mangrove swamp communities remain. The Westlake area in Hollywood is a good example of a mangrove swamp.

### DESCRIPTION

Mangroves appear as a medium-height (10-20 feet) thicket of fleshy-leaved woody plants in coastal areas. In most areas of its range, the red mangrove, Rhizophora mangle, is the most seaward emergent plant. Prop-roots are characteristic of this plant while the black and white species send up modified vertical roots to facilitate in respiration.

1. Soils

   Representative soils include: Basinger Variant, Hallendale Variant.

2. Vegetation

   The most frequent species found in this community are the three mangroves: red, black and white. However, depending on elevation and resulting tidal influx, considerable variation occurs in the composition of these three species as well as associated species.

   Plants which characterize this community are:

   TREES: Red mangrove, Rhizophora mangle; Black mangrove, Avicennia nitida; White mangrove, Lanquncularia racemosa; Pond apple, Annona glabra; Buttonwood, Conocarpus erecta

   SHRUBS: Saltbush, Baccharis halimifolia L. var angustior; Coin vine, Dalbergia ecastophyllum

   HERBACEOUS PLANTS:

   Leather fern, Acrostichum aureum; Sea oxeye, Borrichia fratescens; Perennial glasswort, Salicornia virginica; Sea purslane, Sesuvium portulacastrum

3. Animals

   Animals inhabiting mangrove communities include: Mangrove cuckoo, Roseate spoonbill, Osprey, Wood stork, Southern bald eagle, Great white heron, Everglades mink, Brown pelican, Wood ibis, Little blue heron, Little green heron, Louisana Heron, Anhinga, Frigate Bird, Scarlet Ibis, Rat Snake, Raccoon.

4. Endangered and Threatened Plants and Animals

a. With the exception of the various mangrove species, no endangered plants are known.

b. The following wildlife may occur in this community which are considered rare, threatened, endangered or of special concern:

BIRDS:
Little Blue Heron, Egretta caerulea;
Osprey, Pandion haliaetus carolinensis;
Worm-eating Warbler, Helmitheros vermivorous;
Peregrine Falcon, Falco peregrinus;
Great Egret, Casmerodius albus;
Snowy Egret, Egretta thula;
Lousiana Heron, Egretta tricolor;
Yellow Crown Night Heron, Nyctricorax violacea;
White Ibis, Eudocimus albus;
Roseate Spoonbill, Ajaia ajaia;
Wood Stork, Myeteria americana;
Black Whiskered Vireo, Vireo alfiloquus;
Brown Pelican, Pelecanus occidentalis carolinensis;
Florida Prairie Warbler, Dendroica discolor paludicola

REPTILES: American alligator, Alligator mississippiensis

MAMMALS: West Indian Manatee, Trichechus manatus latirostris

5. Environmental Value as a Natural System

The mangrove community is extremely important to shoreline protection and stabilization. There is some evidence that mangroves serve a function in land-building by trapping sediments. Definitely, this community acts as buffer of wind and waves during storm tides.

Wildlife is best served by assuring that the mangrove community is not destroyed. Mangrove plants themselves seem to be quite hardy appearing as specially adapted pioneer plants in a tenacious, but yet fragile ecosystem. The mangroves are extremely valuable as nesting sites for many birds.

Probably the most important function of this ecosystem is that of changing a detrital base that accumulates underneath into estuarine production and higher marine life.

Competition between land uses has caused many mangrove swamps to be lost or altered by dredge and filling for development. Adjacent perturbations may also cause changes in water flow patterns and affect the plant composition of this community.

The Westlake Mangrove Area also includes a separate but related Mudflat Environment referred to as the Sheridan Flats which is located just to the north of the Sheridan bridge. The Mudflat Environment provides a periodic tidal habitat for sandpipers, yellowlegs and other small wading birds.

Mangrove estuarine systems provide valuable "nursing grounds" for various animals, including fish species significant in commercial and sport fishing. Some important fish species require the mangrove habitat for reproduction since they cannot propagate in the open ocean. The reduction of mangrove swamp communities diminishes these commercially significant fish species.

Additionally, mangrove systems, like other shallow estuarine habitats, have exceptionally high primary productivity. This productivity makes possible the "nursing grounds" function mentioned above. Mangrove swamps can also serve as nutrient sinks allowing biological recycling of materials (inorganic and organic) that might otherwise build up and become "pollutants."

## SAWGRASS MARSH BOG PLANT COMMUNITY

### OCCURRENCE

This community occurs south of Lake Okeechobee and comprise a vast portion of the existing Conservation Area. While individual communities vary widely in size, the larger communities are many thousands of acres in size. Sawgrass marsh outside the Everglades are included in the Freshwater Marsh & Ponds Plant Community.

### DESCRIPTION

This community appears as an open expanse of sawgrass in an area where the soil is saturated or covered with surface water during part of the year.

1. Soils

   Soils commonly associated with this community are nearly level and very poorly drained with marly or organic surfaces underlain by limestone. Representative soils are Plantation and Sanibel.

2. Vegetation

   The natural vegetation of this community is dominated by sawgrass. In south Florida, Muhly grass increases and becomes obvious when the sawgrass is repeatedly exposed to fire and the hydroperiod is shortened. With natural conditions, the vigorous sawgrass is 6 to 10 feet tall and of such density that few other plants can survive. Other marsh plants invade the sawgrass where marginal conditions occur for sawgrass growth. These conditions include shallow organic soils and areas where the period of water submergence is short.

   Trees are not characteristic of this community, but a few may occur on the banks of gator holes.

   Plants that characterize this community are:

| | |
|---|---|
| SHRUBS: | Wax Myrtle, *Myrica cerifera*;<br>Coastal Willow, *Salix caroliniana*;<br>Saltbush, *Baccharis halimifolia* |
| GRASSES: | Sawgrass, *Cladium jamaicensis*;<br>Muhly grass, *Muhlanbergia filipes*;<br>Plume grass, *Erianthus gigandus*;<br>Maidencane, *Panicum hemitoman*;<br>Sand Cordgrass, *Spartina bakarri* |
| HERBACEOUS: | Arrowhead, *Saggitoria lancifolia*;<br>Common cattail, *Typha latifolia*;<br>Pickeral weed, *Pontederia lanceolata*;<br>Yellow Water lilly, *Nuphar luteum*;<br>White Water lilly, *Nymphaea odorata* |

3. Animals

The extensive sawgrass community supports very few mammals. Numerous birds and waterfowl use this community for wintering or year around. This community provides an excellent habitat for waterfowl and also is suited for aquatic animals and reptiles.

Animals that commonly occur in this community are: Red-winged blackbirds, egrets, herons, ibis, bitterns, kites, alligators, water snakes, frogs, snails, deer and crayfish.

4. Threatened or Endangered Plants and Animals

a. Threatened or endangered plants do not normally occur in this community.

b. Fauna which are considered rare, threatened, endangered, or of special concern include:

| | |
|---|---|
| BIRDS: | Everglades Kite, *Rostrhamus sociabilis plumbeus*; Osprey, *Pandion haliaetus carolinensis*; Great Egret, *Casmerodius albus*; Snowy Egret, *Egretta thula*; Little Blue Heron, *Egretta caerulea*; Black Crowned Night Heron, *Nycticorax nycticorax*; Yellow Crowned Night Heron, *Nycticorax violacea*; Louisiana Heron, *Egretta tricolor*; Least Bittern, *Ixobrychus exilis*; Wood Stork, *Mycteria americana*; White Ibis, *Eudocimus albus*; Roseate Spoonbill, *Ajaia ajaia* |
| MAMMALS: | Everglades mink, *Mustela vison evergladensis*; Florida panther, *Felis concolor coryi* |
| REPTILES: | American alligator, *Alligator mississippiensis*; Eastern Indigo Snake, *Drymarchon coraid couperi* |

5. Environmental Value as a Natural System

The sawgrass marsh bogs serve as filter systems for water by decreasing the nutrient loadings within the plant community. Marshes will retain water during drought and also help slow down water at flood times. Their principal environmental values are related to water quality and quantity.

Tall, dense sawgrass occurs in deep organic soils and requires water coverage of the rhizomes for most of the year. It also forms extensive but shorter and less dense stands on marl soils in South Florida. Drainage, organic soil subsidence, and fires have reduced the amount of sawgrass and promoted the growth of other plants in many areas.

The sawgrass community is one of the most resistant communities to change under natural conditions. Fires and water quantity reductions can completely alter the community's characteristics within 10 to 20 years.

## FRESH WATER MARSH & PONDS PLANT COMMUNITY

### OCCURRENCE

This community occurs throughout Florida. Individual communities vary widely in size. The largest communities, several thousand acres in size, generally occur in Western Broward.

### DESCRIPTION

This community appears as an open expanse of grasses, sedges, and rushes, and other herbaceous plants in an area where the soil is usually saturated or covered with surface water for two or more months during the year. The sawgrass marsh that occurs in the Everglades is not included within this community.

1. Soils

   Soils commonly associated with this community are nearly level and very poorly drained with coarse textured or organic surfaces underlain by clay or sand. Representative soils are: Basinger, Dania, Okeelanta and Pompano.

2. Vegetation

   Within Florida, eight different types of freshwater marshes have been described. Any one marsh may be composed of sections of different major types. There is also intergrading of these types. The types are: Flag marshes dominated by pickerelweed; Arrowhead marshes; Fire flag and other non-grass herbs marsh; Cattail marsh; Spike-rush marsh; Bulrush marsh; Maidencane marsh; and Sawgrass marsh.

   Plants that characterize this community are:

   | | |
   |---|---|
   | GRASS: | Sawgrass, Cladium jamaicensis;<br>Spike rush, Eleocharis cellulosa;<br>Maidencane, Panicum hemitomon;<br>Soft stem bulrush, Scirpus validus |
   | HERBACEOUS: | Arrowhead, Saggitaria lancifolia;<br>Prairie iris, Iris savannarum;<br>Common cattail, Typha geniculate;<br>Pickerelweed, Pontederia cordata;<br>Slender spikerush, Eleocharis acicularis;<br>Arrowroot, Thalia geniculata;<br>Common cattail, Typha latifolia |

3. The freshwater marshes and ponds provide excellent habitats for many wildlife species. Numerous birds and waterfowl use this communtiy for wintering or year-round. Animals that commonly

occur in this community are: Herons, egrets, bitterns, ibis, sandhill cranes, rails, limpkins, gallinules, snipe, Killdeer, Florida duck, red-winged blackbirds, caracara, marsh hawk, red-shouldered hawk, swallow-tailed kite, amphiums, dwarf salamander, sirens, frogs, cricket frogs, bullfrog, leopard frog, turtles, mud turtle, red-bellied turtle, chicken turtle, snakes (horn, water, swamp, brown, cottonmouth, ribbon), alligator, otter, mink, raccoon, marsh rabbit, white-tailed deer, Florida water rat.

4. Endangered and Threatened Plants and Animals

a. No threatened or endangered plants.

b. Fauna which are considered to be rare, threatened, endangered or are of special concern include:

BIRDS: Osprey, *Pandion haliaetus carolinensis*; Little Blue Heron, *Egretta caerulea*; Louisiana Heron, *Egretta tricolor*; Black Crowned Night Heron, *Nycticorax nycticorax*; Yellow Crowned Night Heron, *Nycticorax violacea*; Least Bittern, *Ixobrychus exilis*; White Ibis, *Eudocimus albus*; Roseate Spoonbill, *Ajaia ajaia*

MAMMALS: Everglades mink, *Mustela vison evergladensis*; Round-tailed muskrat, *Neofiber alleni*

REPTILES: American alligator, *Alligator mississippiensis*; Eastern Indigo Snake, *Drymarchon corais couperi*

5. Environmental Value as a Natural System

The freshwater marshes and ponds serve as a filter system for rivers and lakes. This protects the rivers and lakes from eutrophication and provides the marsh with nutrients that are used in the vegetative growth. Marshes will retain water during drought and large marshes also help slow down water flows at flood times.

Fire and water level fluctuation are the major factors affecting these wetland areas. Variations in the water pattern on the marsh will change the diversity and productivity. Marsh-prairie systems will eventually move to a woody community with exclusion of the fire or permanent water level changes.

Recreational use of this community may cause much disturbance. In fact, recreational vehicles when used a great deal, will change the plant community found in the area.

The freshwater marsh community is highly endangered. Many have been destroyed or at least degraded. Drainage of this community has caused most of this damage. An example of areas where drainage has occurred for reclamation of land and for agricultural interests is the Everglades.

## SLOUGH PLANT COMMUNITY

### OCCURRENCE

This community occurs throughout South Florida. Individual communities vary widely in size. Most are relatively long and narrow and serve as drainageways for water during periods of heavy and prolonged rainfall. These areas are found primarily in western Broward County.

### DESCRIPTION

This community appears as an open expanse of grasses, sedges, and rushes in an area where the soil is saturated during the rainy season. Most sloughs are relatively long and narrow and slightly lower in elevation than the surrounding flatwoods or hammocks.

1. Soils

   Soils commonly associated with this community are nearly level and poorly drained with coarse textured surfaces underlain by clay or sand.

   Representative soils are: Basinger and Pompano.

2. Vegetation

   Grasses are the most common plants found in sloughs. Sedges and rushes also occur along with scattered shrubs in some locations. Plants that characterize this community are:

   | | |
   |---|---|
   | SCRUBS: | Wax Myrtle, *Mycica cerifera*; Coastal Willow, *Salix caroliniana*; Saltbush, *Baccharis halimifolia* |
   | HERBACEOUS: | Pickerelweed, *Pontederia lanceolata*; Common cattail, *Typha latifolia* |
   | GRASSES: | Blue maidencane, *Amphicarpum muhlenbergianum*; Sand cordgrass, *Spartina bakeri*; Panicgrass, *Panicum nitidum*; Beak rushes, *Rhynchospora spp*. |

3. Animals

   Sloughs are host to a diverse wildlife population. Many larger animals occur where sloughs join flatwoods and hammocks. Typical animals of the sloughs are: Deer, bobcat, raccoon, gray fox, marsh rabbit cotton rat, oppossum, frogs, Eastern diamondback rattlesnake, pigmy rattlesnake, water snakes, cotton mouth moccasin, ringneck snake, meadowlark, bobwhite quail, egrets, herons, craines, ibis, red-shouldered hawks and snipe.

4. Endangered and Threatened Plants and Animals

a. No threatened or endangered plants.

b. Those which are considered to be rare, threatened, endangered or of special concern include:

BIRDS: Little Blue Heron, Egretta caerulea;
Great Egret, Casmerodius albus;
Snowy Egret, Egretta thula;
Lousiana Heron, Egretta tricolor;
Black Crowned Night Heron, Nycticorax nycticorax;
Yellow Crowned Night Heron, Nycticorax violacea;
Wood Stork, Mycteria americana;
White Ibis, Eudocimus albus;
Osprey, Pandion haliaetus carolinensis

MAMMALS: Round-tailed muskrat, Neofiber alleni;
Everglades mink, Mustela vison evergladensis

REPTILES: American alligator, Alligator mississippiensis;
Eastern Indigo Snake, Drymarchon corais couperi

5. Environmental Value as a Natural System

Sloughs serve as natural drainageways during high water periods. As such, they have treat value in improving water quality by natural processes. They also retain water, help slow down water flows, and thereby increase water quantity.

Fire and artificial water level fluctuations are the major factors affecting these areas. Variations in the natural sequence of either event will change the slough's diversity and productivity. With the exclusion of fire or permanent water level changes, the plant succession will be to a woody community.

Native forage production is good with proper management. Use for rangeland has only a slight effect on the community if properly managed. The community has good wildlife values, expecially with proper management.

FOOTNOTES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7. Rare & Endangered Biota of Florida, University Presses of Fl., Gainesville.

   1978 Volume 1: Mammals; Layne, J.N.; 52 P.
   1978 Volume 2: Birds; Kale, H.W.; 122 P.
   1978 Volume 3: Amphibious & Reptiles; McDaarmid, R.W.; 74 P.
   1978 Volume 4: Fishes; Gilbert, C.R.; 58 P.
   1978 Volume 5: Plants; word, D.B.; 175 P.

## Endangered, Threatened, or Rare Plant Species in Broward County*

### Endangered:

Asplenium serratum (Bud's Nest Spleenwort)
Gossypium Hirsutum (Wild Cotton)
Jacquemontia reclinata (Beach Jacquemontia)
Ophioglossum palmatum (Hand Fern)
Okenia Hypolgaea (Burrowing Four O'clock)
Polygala smallii (Tiny Polygala)
Remirea maritima (Beach Star)

### Threatened:

Asplenium dentatum (Slender Spleenwort)
Coccothrinax argentata (Silver Palm)
Commelina gigas (Climbing Dayflower)
Ernodea littoralis (Beach Creeper)
Mallotonia gnaphalodes (Sea Lavender)
Nemastylis floridana (Fall-Flowering Ixia)
Tillandsia flexuosa (Twisted Air Plant)
Zamia floridana (Florida Coontie)

### Rare:

Drosera intermedia (Water Sundew)

*Ward, D.B. 1979. Rare and Endangered Biota of Florida, Volume 5: Plants. University Presses of Florida, Gainesville. 175 p.

## APPENDIX D: ANIMAL SPECIES OF BROWARD COUNTY

| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Loon | 12 | | | | | | | | | | | | ▲ | | ▲ | | | | |
| Horned Grebe | 5 | | | | | | | | | | | | ▲ | | ▲ | | | | |
| Pied-billed Grebe | 20 | | | | | | | | | | | | ▲ | | ▲ | | | | |
| Brown Pelican | 20 | | | | | | | | | | ▲ | | | | ▲ | | | | *Threatened* |
| Gannet | 12 | | | | | | | | | | | | | | ▲ | | | | |
| Double-crst. Cormorant | 19 | | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | | | | |
| Anhinga | 20 | ▲ | | | | | | | ▲ | | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Magnificent Frigatebird | 15 | | | | | | | | | | | | | | ▲ | | | | *Threatened* |
| Great Blue Heron(wh. form) | 4 | | | | | | | | | | | | | | | | | | |
| Great Blue Heron | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Green Heron | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Little Blue Heron | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Cattle Egret | 20 | ▲ | | ▲ | ▲ | | | | | | | | | | | ▲ | ▲ | | |
| Great Egret | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Snowy Egret | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Louisiana Heron | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Blk-crnd Night Heron | 19 | | | | | | | | ▲ | | | ▲ | ▲ | ▲ | | | | | *Special Concern* |
| Ylw-crnd Night Heron | 19 | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Least Bittern | 17 | | | | | | | | | | | ▲ | ▲ | | | | ▲ | | *Special Concern* |
| American Bittern | 19 | | | | | | | | | | | ▲ | ▲ | | | | | | |
| Wood Stork | 10 | | | | | | | | | | ▲ | ▲ | | ▲ | | | | | *Endangered* |
| Glossy Ibis | 20 | ▲ | | | | | | | | | | ▲ | | ▲ | | | | | |
| White Ibis | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Scarlet Ibis | 5 | | | | | | | | | | ▲ | | | | | | ▲ | | |
| Scarlet Ibis X White Ibis | 1 | | | | | | | | | | | | | | | | | | |
| Roseate Spoonbill | 1 | | | | | | | | | ▲ | ▲ | ▲ | | | | | | | *Rare* |
| Fulvous Tree Duck | 3 | | | | | | | | | | | ▲ | | | | | | | |
| Mallard Duck | 9 | | | | | | | | | | | ▲ | ▲ | | | | | | |
| Mottled Duck | 18 | | | | | | | | | | | ▲ | ▲ | | | | | | |

SOURCE: BROWARD COUNTY AUDUBON SOCIETY, CHRISTMAS BIRD COUNT RECORDS; 1958 THROUGH 1977 INCLUSIVE.

| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clapper Rail | 8 | | | | | | | | ▲ | ▲ | | | | | | | | |
| Sora Rail | 16 | | | | | | | | | | ▲ | ▲ | ▲ | | | | | |
| Purple Gallinule | 17 | ▲ | | | | | | | | | ▲ | ▲ | | | | | | |
| Common Gallinule | 20 | ▲ | | | | | | | | | ▲ | ▲ | ▲ | | | ▲ | | |
| American Coot | 20 | ▲ | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Semipalmated Plover | 12 | | | | | | | | ▲ | | | | | | | | | Mudflats |
| Wilson's Plover | 10 | | | | | | | | ▲ | | | | | | | | | Mudflats |
| Killdeer | 19 | | | | | | | | ▲ | | | | | | | ▲ | | Mudflats |
| Black-bellied Plover | 20 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Ruddy Turnstone | 20 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Common Snipe | 20 | | | | | | | | | | ▲ | ▲ | ▲ | | | | | |
| Spotted Sandpiper | 20 | | ▲ | | | | | | ▲ | ▲ | | | | | | ▲ | | Mudflats, Beach |
| Solitary Sandpiper | 6 | | ▲ | | | | | | ▲ | ▲ | | | | | | ▲ | | Mudflats, Beach |
| Willet | 12 | | | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Greater Yellowlegs | 20 | | | | | | | | | | ▲ | | | | | | | Mudflats |
| Lesser Yellowlegs | 20 | | | | | | | | | | ▲ | | | | | | | Mudflats |
| Pectoral Sandpiper | 1 | | | | | | | | | | ▲ | | | | | | | Mudflats |
| Least Sandpiper | 17 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Dunlin | 12 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Short-billed Dowitcher | 17 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Stilt Sandpiper | 3 | | | | | | | | ▲ | | | | | | | | | Mudflats |
| Semipalmated Sandpiper | 10 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Western Sandpiper | 11 | | | | | | | | ▲ | | | | | | | | | Mudflats |
| Sanderling | 20 | | ▲ | | | | | | ▲ | | | | | | | | | Mudflats, Beach |
| Black-necked Stilt | 2 | ▲ | | | | | | | ▲ | | ▲ | | | | | | | Mudflats |
| Great Black-backed Gull | 5 | | ▲ | | | | | | | | | | | | | | | Saltwater Edge |
| Herring Gull | 19 | | ▲ | | | | | | | | | | | | | | | |
| Ring-billed Gull | 20 | | ▲ | | | | | | | | | | | | | | | |
| Laughing Gull | 20 | | ▲ | | | | | | | | | | | | | | | |

SOURCE: BROWARD COUNTY AUDUBON SOCIETY, CHRISTMAS BIRD COUNT RECORDS; 1958 THROUGH 1977 INCLUSIVE.

| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Red-head woodpecker | 4 | ▲ | | | ▲ | | | | | | | | | | | | | |
| Yellow-bellied Sapsucker | 20 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | ▲ | ▲ | | |
| Hairy Woodpecker | 5 | ▲ | | | ▲ | | | | | | | | | | | | | | *Special Concern* |
| Downy Woodpecker | 16 | ▲ | | ▲ | ▲ | | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Eastern Kingbird | 2 | ▲ | | | | | | | | | | ▲ | | | | | ▲ | | |
| Gray Kingbird | 4 | ▲ | | | | | ▲ | | | | | | | | | | ▲ | | |
| Western Kingbird | 18 | | | | | | | | | | | | | | | | ▲ | | |
| Scissor-tld. Flycatcher | 10 | | | | | | | | | | | | | | | | ▲ | | |
| Great Crstd. Flycatcher | 17 | | | | | | ▲ | | ▲ | | ▲ | | | | | | ▲ | | |
| Eastern Phoebe | 20 | | | | ▲ | | | | ▲ | | | | ▲ | | | | ▲ | | |
| Tree Swallow | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Rough-winged Swallow | 18 | | | | | | | | | | | ▲ | ▲ | ▲ | | | | | |
| Barn Swallow | 1 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Purple Martin | 3 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Blue Jay | 20 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | ▲ | ▲ | | |
| Fish Crow | 16 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| House Wren | 20 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | ▲ | ▲ | | |
| Carolina Wren | 20 | ▲ | | | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | ▲ | | |
| Long-billed Marsh Wren | 8 | | | | | | | | | | | ▲ | | | | | | | |
| Short-billed Marsh Wren | 6 | | | | | | | | | | | ▲ | | | | | | | |
| Mockingbird | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Catbird | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Brown Thrasher | 19 | ▲ | ▲ | | ▲ | | ▲ | ▲ | | | | | | | | | ▲ | | |
| Robin | 18 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Hermit Thrush | 15 | | ▲ | | ▲ | | ▲ | | ▲ | | | | | | | | ▲ | | |
| Swainson's Thrush | 5 | | ▲ | | | | ▲ | ▲ | ▲ | | | | | | | | | | |
| Veery | 1 | | ▲ | | | | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Blue-gray Gnatcatcher | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | ▲ | ▲ | | |
| Ruby-crowned Kinglet | 20 | | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |

SOURCE: BROWARD COUNTY AUDUBON SOCIETY, CHRISTMAS BIRD COUNT RECORDS; 1958 THROUGH 1977 INCLUSIVE.

| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wilson's Warbler | 6 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | *Rare* |
| American Redstart | 17 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| House Sparrow | 20 | ▲ | | | | | | | | | | | | | | ▲ | ▲ | | |
| Eastern Meadowlark | 20 | ▲ | | | | | | | | | | | | | | | ▲ | ▲ | Pastures |
| Red-winged Blackbird | 20 | ▲ | | | | | | | | ▲ | | ▲ | ▲ | ▲ | | | ▲ | | |
| Spot-breasted Oriole | 17 | ▲ | | | | | ▲ | ▲ | | | | | | | | ▲ | ▲ | | |
| N. (Baltimore) Oriole | 17 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | ▲ | ▲ | | |
| Boat-tailed Grackle | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Common Grackle | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Brown-headed Cowbird | 16 | | | | | | | | | | | | | | | | ▲ | ▲ | Pastures |
| Summer Tanager | 2 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Cardinal | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Rose-breasted Grosbeak | 2 | | | | | | ▲ | | ▲ | | | | | | | | ▲ | | |
| Indigo Bunting | 20 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | ▲ | | |
| Painted Bunting | 20 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | ▲ | ▲ | | |
| American Goldfinch | 20 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Rufous-side Towhee | 20 | | | ▲ | ▲ | | | | | | | | | | | | ▲ | | |
| Savannah Sparrow | 20 | | | | | | | | | | | | | | | | | ▲ | Pastures |
| Grasshopper Sparrow | 19 | | | | | | | | | | | | | | | | | ▲ | Pastures, *Endangered* |
| Vesper Sparrow | 11 | | | | | | | | | | | | | | | | | ▲ | Pastures |
| Lark Sparrow | 11 | | | | | | | | | | | | | | | | | ▲ | Pastures |
| Bachman's Sparrow | 3 | ▲ | | | ▲ | | | | | | | | | | | | | | |
| Chipping Sparrow | 13 | | | | | | | | | | | | | | | | | ▲ | Pastures |
| Swamp Sparrow | 19 | | | | | | | ▲ | | | ▲ | ▲ | | | | | | | |
| Song Sparrow | 10 | | | | | | | | | | | | | | | | | ▲ | Pastures |
| Cory's Shearwater | * | | | | | | | | | | | | | ▲ | | | | | |
| Greater Shearwater | * | | | | | | | | | | | | | ▲ | | | | | |
| Leach's Petrel | * | | | | | | | | | | | | | ▲ | | | | | |
| Wilson's Petrel | * | | | | | | | | | | | | | ▲ | | | | | |

SOURCE: BROWARD COUNTY AUDUBON SOCIETY, CHRISTMAS BIRD COUNT RECORDS; 1968 THROUGH 1977 INCLUSIVE.

| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pintail | 6 | | | | | | | | | | | ▲ | ▲ | | | | | | |
| Green-winged Teal | 13 | | | | | | | | | | | ▲ | ▲ | | | | | | |
| Blue-winged Teal | 18 | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| American Widgeon | 12 | | | | | | | | | | | ▲ | ▲ | ▲ | | | ▲ | | |
| Shoveler | 7 | | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Wood Duck | 7 | | | | | | | | ▲ | | | ▲ | | | | | | | |
| Redhead | 5 | | | | | | | | | | | | | | | | ▲ | | |
| Ring-necked Duck | 20 | | | | | | | | | | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Canvasback | 7 | | | | | | | | | | | | | | | | ▲ | | |
| Lesser Scaup | 19 | | | | | | | | | | ▲ | ▲ | ▲ | | | | ▲ | | |
| Ruddy Duck | 12 | | | | | | | | | | | ▲ | ▲ | ▲ | | | ▲ | | |
| Hooded Merganser | 12 | | | | | | | | | | ▲ | ▲ | | | | | | | |
| Red-brst Merganser | 15 | | | | | | | | | | | | | | ▲ | | ▲ | | |
| Turkey Vulture | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Black Vulture | 20 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | | | ▲ | | |
| Everglade Kite | 8 | | | | | | | | | | | ▲ | | | | | | | *Endangered* |
| Sharp-shinned Hawk | 16 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Cooper's Hawk | 12 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Special Concern* |
| Red-tailed Hawk | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Red-shouldered Hawk | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Broad-winged Hawk | 11 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Marsh Hawk | 20 | | ▲ | | | | | | | ▲ | | ▲ | ▲ | ▲ | | | ▲ | | |
| Osprey | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | *Threatened* |
| Peregrine Falcon | 6 | | ▲ | | | | | | | | ▲ | | | | | | | | *Endangered* |
| Merlin | 17 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| American Kestrel | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | *Threatened* |
| Bobwhite | 20 | ▲ | | ▲ | ▲ | ▲ | | | | | | | | | | | ▲ | | |
| Limpkin | 15 | ▲ | | | | | | | ▲ | | | ▲ | ▲ | ▲ | | | ▲ | | |
| King Rail | 17 | | | | | | | | | | | ▲ | ▲ | ▲ | | | | | |

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| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bonaparte's Gull | 16 | | ▲ | | | | | | | | | | | | | | | | |
| Forster's Tern | 15 | | ▲ | | | | | | | | | | ▲ | | | | | | *Threatened* |
| Least Tern | 1 | ▲ | | | | | | | | | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | | *Special Concern* |
| Royal Tern | 19 | | | | | | | | | | | | | | ▲ | | | | *Special Concern* |
| Caspian Tern | 13 | | | | | | | | | | | ▲ | ▲ | | ▲ | | ▲ | | SW. Edge, *Spec. Concern* |
| Black Skimmer | 18 | | ▲ | | | | | | | | | | | | ▲ | | | | |
| Rock Dove | 5 | ▲ | | | | | | | | | | | | | | ▲ | ▲ | | |
| White-winged Dove | 10 | ▲ | | | | | ▲ | | | | | | | | | | ▲ | | |
| Mourning Dove | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | ▲ | ▲ | | |
| Ground Dove | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | ▲ | ▲ | | |
| Monk Parakeet | 4 | ▲ | | | | | | | | | | | | | | ▲ | ▲ | | |
| Canary-winged Parakeet | 5 | ▲ | | | | | | | | | | | | | | ▲ | ▲ | | |
| Budgerigar | 4 | | | | | | | | | | | | | | | | | | |
| Red-crowned Parrot | 4 | ▲ | | | | | | | | | | | | | | ▲ | ▲ | | |
| Yellow-billed Cuckoo | 5 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Smooth-billed Ani | 20 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | ▲ | | |
| Barn Owl | 20 | ▲ | | ▲ | ▲ | | ▲ | ▲ | | | | | | | | ▲ | ▲ | | |
| Screech Owl | 19 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | ▲ | ▲ | | |
| Great Horned Owl | 13 | ▲ | | ▲ | ▲ | | ▲ | ▲ | | | | | | | | | | | |
| Burrowing Owl | 20 | ▲ | | | | | | | | | | | | | | | ▲ | ▲ | *Special Concern* |
| Barred Owl | 11 | ▲ | | | | | ▲ | | ▲ | | | | | | | | | | |
| Chuck-will's-widow | 16 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | ▲ | | |
| Whip-poor-will | 15 | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | | | | | | | | |
| Common Nighthawk | 5 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | ▲ | | |
| Ruby-thrtd. Hummingbird | 20 | | | | | | ▲ | ▲ | | | | | | | | | ▲ | | |
| Belted Kingfisher | 20 | | | | | | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | | ▲ | | |
| Common (Yel.-sh.) Flicker | 20 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Pileated Woodpecker | 16 | ▲ | | | | | ▲ | | | | | | | | | | ▲ | | |
| Red-bellied Woodpecker | 20 | ▲ | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | ▲ | ▲ | | |

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| BIRD SPECIES OF BROWARD COUNTY (RESIDENT & MIGRATORY) | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cedar Waxwing | 10 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | ▲ | ▲ | | |
| Loggerhead Shrike | 20 | | | ▲ | | | | | | | | | | | | | ▲ | | |
| Starling | 15 | ▲ | | | | | | | | | | | | | | ▲ | ▲ | | |
| White-eyed Vireo | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Yellow-throated Vireo | 12 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Solitary Vireo | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Red-eyed Vireo | 1 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Black & White Warbler | 19 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Worm-eating Warbler | 7 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | *Special Concern* |
| Tennessee Warbler | 1 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Orange-crowned Warbler | 18 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Parula Warbler | 18 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Yellow Warbler | 3 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Magnolia Warbler | 7 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Cape May Warbler | 4 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Black-thrtd.Blue Warbler | 15 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Yel-rmpd. (Myrtle) Warbler | 19 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Black-thrtd. Green Warbler | 11 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Blackburnian Warbler | 2 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Yellow-thrtd. Warbler | 19 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Chestnut-sided Warbler | 2 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Bay-breasted Warbler | 4 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Pine Warbler | 19 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Prairie Warbler | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Palm Warbler | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Ovenbird | 19 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| N. Waterthrush | 20 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Common Yellowthroat | 20 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |
| Yellow-breasted Chat | 10 | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | | |

SOURCE: BROWARD COUNTY AUDUBON SOCIETY, CHRISTMAS BIRD COUNT RECORDS; 1958 THROUGH 1977 INCLUSIVE.

BIRD SPECIES
OF
BROWARD COUNTY
(RESIDENT & MIGRATORY)

| | NO. YEARS SEEN | Breeding | Coastal Strand | Sand Pine Scrub | South Florida Flatwood | Cabbage Palm Hammock | Tropical Hammock | Oak Hammock | Cypress Swamp | Salt Marsh | Mangrove Swamp | Sawgrass Swamp | Freshwater Marsh, Pond | Slough | Ocean | Urban | Suburban | Open Space |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Swallow-Tailed Kite | * | | | | | | | ▲ | | | ▲ | | ▲ | | | | | |
| Bridled Tern | * | | | | | | | | | | | | | ▲ | | | | |
| Black Whiskered Vireo | * | ▲ | | | | | | | | ▲ | | | | | | | | Rare |
| Blackpoll | * | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | |
| Hooded Warbler | * | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | |
| Connecticut Warbler | * | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | |
| Swainson's Warbler | * | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | |
| Scarlet Tanager | * | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | | ▲ | | | | | | ▲ | |

* Infrequently observed during the Christmas bird counts but common in other seasons.

SOURCE: BROWARD COUNTY AUDUBON SOCIETY, CHRISTMAS BIRD COUNT RECORDS; 1958 THROUGH 1977 INCLUSIVE.

## FISHES FOUND IN THE CONSERVATION AREAS

## OF DADE, BROWARD AND PALM BEACH COUNTIES

Largemouth Bass
Bluegill Sunfish
Redear Sunfish
Spotted Sunfish
Warmouth
Black Crappie
Dollar Sunfish
Bluespotted Sunfish
Everglades Pygmy Sunfish
Chain Pickerel
Redfin Pickerel
Bowfin
Florida Gar
Longnose Gar
Tadpole Madtom
Yellow Bullhead
Brown Bullhead
Channel Catfish
White Catfish
Lake Chubsucker
Golden Shiner
Golden Topminnow
Starhead Topminnow
Marsh Killifish
Goldspotted Killifish
Bluefin Killifish
Seminole Killifish
Flagfish
Brook Silverside
Mosquitofish
Least Killifish
Sailfin Molly
Gizzard Shad
Threadfin Shad
Darter
Pirate Perch
Needlefish
Tarpon
Snook
Black Acara

## MAMMALS AND REPTILES FOUND IN THE CONSERVATION AREAS

| REPTILES | MAMMALS |
|---|---|
| American Alligator | Deer |
| Cooter Turtle | Wild Hog |
| Softshell Turtle | Otter |
| Mud Turtle | Raccoon |
| Rattlesnake | Oppossum |
| Green Water Snake | Marsh Rabbit |
| Brown Water Snake | Florida Water Rat |
| Mud Snake | Cotton Rat |
| Rat Snake | Florida Panther |
| Corn Snake | Black Bear |
| Garter Snake | Exotic Cats |
| Frogs (Many varieties) | |

Source: Florida Game and Fresh Water Fish Commission

# APPENDIX E

## SITE CHECK LIST

URBAN WILDERNESS ADVISORY BOARD

SITE: _____

FILE: _____

DATE: _____

A. Priority: Areas which meet any of the following criteria will be given primary consideration.

Wilderness areas which:

a) Are in close proximity to urban or rapidly developing areas, (YES__NO__), or

b) Are in imminent danger from some other source, (YES__NO__), or

c) Protect, rare or endangered species or other unique features, (YES__NO__), or

d) Constitute the last vestiges of natural conditions in Broward County, (YES__NO__).

B. Characterization of wilderness area type:

Biological type - a wilderness area set aside to promote certain forms of animal or plant life or their supporting habitats.

Aesthetic type - a wilderness area set aside to preserve certain scenic qualities or amenities.

Scientific type - a wilderness area set aside to preserve certain features, qualities or conditions which may or may not include biological and aesthetic, for scientific and educational purposes.

| QUALITY FACTORS | BIOLOGICAL TYPE | AESTHETIC TYPE | SCIENTIFIC TYPE |
|---|---|---|---|
| 1. Ecosystems | | | |
| a) Rarity | | | |
| b) Variety | | | |
| 2. Flora | | | |
| a) Variety | | | |
| b) Rarity | | | |
| *c) Threatened | | N/A | N/A |
| *d) Endangered | | N/A | N/A |
| **e) Protected | | | |
| 3. Fauna | | | |
| a) Variety | | | |
| b) Rarity | | N/A | |
| *c) Threatened | | N/A | N/A |
| *d) Endangered | | N/A | N/A |
| **e) Protected | | N/A | N/A |
| 4. Condition | | | |
| a) Exotic invasion (1=100%, 5=70%) | | N/A | N/A |
| b) Disturbance by man (low or No = 5) | | | |
| c) Natural reproduction | | N/A | |
| 5. Geological Features | | | |
| a) Rock | | | |
| b) Water | | | |
| c) Soil | | | |
| d) Dunes | | | |
| e) Other | | | |
| SUB-TOTALS | | | |

RATING SCALE: 1-5 (5 highest)

5 = Outstanding features; 4 = Feature(s) of special importance.

3 = Few individually important features, but the whole is significant.

2 = Areas of value due to adjacent features; 1 = Area of low significance.

*Refer to State or Federal lists. **Refer to State law

(NUMERICAL SUB-TOTAL RATING IS NOT CONCLUSIVE AS TO WILDERNESS DESIGNATION)

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