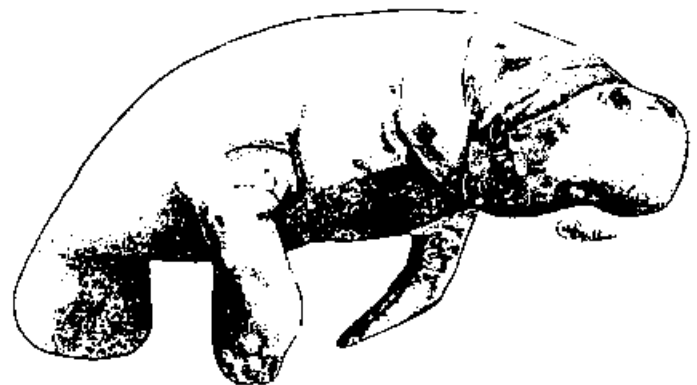


Metropolitan Dade
County, Florida

**Department of
Environmental
Resources
Management**

**DADE COUNTY
MANATEE PROTECTION
PLAN**



DERM Technical Report 95-5

DADE COUNTY MANATEE PROTECTION PLAN

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ACKNOWLEDGEMENTS

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DISCLAIMER

This version of the Dade County Manatee Protection Plan may require minor editing to clarify statements or maps or correct typographical errors before it is finalized.

February 1996

DADE COUNTY MANATEE PROTECTION PLAN

Executive Summary

The Dade Manatee Protection Plan is the result of 2 years of effort including 22 meetings by a citizen's advisory committee comprised of 13 representatives from environmental, marine, oceanaria, and other interest groups.

Chapter I of the plan provides a general introduction to problems that manatees face and a summary of manatee mortality in Dade County. This chapter also states the purpose for developing a manatee protection plan and defines a general goal of this manatee protection plan (MPP), which is to reduce the number of mortalities and ensure long-term protection for manatees in Dade County.

Chapter II, entitled "INVENTORY OF EXISTING CONDITIONS", identifies habitat, manatee-human interaction, land development, education and awareness, and governmental coordination as essential elements that must be addressed before manatee protection efforts can be successful.

A. Habitat

In this section, location of seagrass beds, warm and fresh water sources, aggregation areas, travel corridors, aquatic preserves, refuges, and sanctuaries are identified and portrayed on maps. Several of these areas are designated as **essential manatee habitat**. This section also discusses water quality and regional water management issues, efforts to control mosquito populations, and methods of aquatic plant management. Seasonal and year-round manatee distribution in Dade County is discussed at the end of the habitat section. A map of manatee sightings and table summarizing aerial survey data are presented.

B. Manatee-Human Interaction

The first part of this section provides a general overview of manatee mortality factors. A table is provided that lists manatee mortalities by year and causes of death from 1974 through 1994. This is followed by a comprehensive analysis of sources of mortality including flood gates, watercraft collision, and other human-related (poaching, litter, and entrapment in flood gates). Several figures are provided of total number of mortalities by death category including flood gates (46), watercraft collision (27), other human-related (18), natural (6), perinatal (10), and unknown (28).

The flood gate segment of this section also provides a thorough discussion of measures being developed by the South Florida Water Management District (SFWMD) and U.S. Army Corps of Engineers (COE) to reduce the number of manatee deaths attributed to flood gates. The most noteworthy measure has been the development and installation of pressure sensitive devices (PSD) on several gates where a high number of manatee deaths have occurred. Installation of these devices on gates has not eliminated the threat to manatees as two manatees were crushed in structures with PSDs installed when the devices malfunctioned.

Boating activity is also discussed in this section of the plan. The results of a boating activity study conducted by the Dade County Department of Environmental Resource Management (DERM) in 1991 are summarized. The study showed that boating activity was higher in summer than winter.

Another part of this section outlines the sources of other human-related mortality. The main

other human-related component discussed is the mortalities that have occurred from manatees being trapped and drowned in the underground canal system beneath the Miami International Airport. Twelve manatee carcasses have been recovered from this underground system of canals between 1979 and 1994. To correct this problem, Dade County Airport Department staff have recently completed construction of a barrier designed to prevent manatees from entering the canal system.

Manatee harassment is also addressed in this section. The plan points out that feeding, petting, and providing fresh water to manatees can create problems when manatees become accustomed to these types of manatee/human interaction. These actions may increase the risk to manatees by making them more susceptible to boat strikes.

At the end of this section there is a brief description of the existing vessel speed zones in Dade and maps depict existing zone boundaries. Current law enforcement effort is discussed and a table of agencies with the number of officers on patrol in Dade County is presented.

C. Local Land Development

This section covers county development standards, the Comprehensive Development Master Plan (CDMP), marina/boat facilities (including marina permitting criteria), boat ramps, residential docking facilities (single and multifamily), port facilities, and freshwater lakes. The development standards part of this section describes the county policy on shoreline development. The CDMP segment provides a list of comprehensive plan objectives that relate to endangered species and habitat protection. The marina/boat facilities segment addresses concerns regarding impact to manatees and their habitat. This segment also provides a description of the county's marina permitting process, a list of new marinas and proposed expansions, and a map of environmentally protected submerged lands in Dade County. The boat ramps segment includes a list of public (and a few private) ramps and some criteria for expansion of ramp sites. The segment on residential docking facilities describes guidelines for the development of single and multifamily docks. The port facilities segment provides a brief description of berthing requirements for large vessels. A brief description of DERM and DEP permit requirements for construction activities in freshwater areas is located in the segment on freshwater lakes.

D. Education and Awareness

In this section, current efforts by the DEP, Florida Power and Light company, Save the Manatee Club, Miami Seaquarium, Dade County School Board, Biscayne National Park, and Dade County DERM to provide manatee awareness programs are described.

E. Governmental Coordination

This section provides information on permitting procedures and development review. In this section, a list of agencies and a description of their role in review of permits that may have a potential impact on manatees is presented. This section also provides a summary of programs, including mangrove wetland restoration, shoreline stabilization, mangrove protection, water quality monitoring, pollution control enforcement, and restoration of native vegetation, which all may have an impact on manatees and their habitat.

Chapter III, "Manatee Protection Plan: Implementation", identifies implementation strategies for the

items that were covered in chapter II.

A. Habitat Protection

This section of the plan makes recommendations to protect seagrass beds, fresh water sources, warm water refuges, aggregation sites, and travel corridors. Specific areas within the county which are important to manatees are listed and recommendations for protecting each of these areas are presented.

This section also discusses efforts needed to protect and improve water quality, programs by state and regional agencies that address water quality and management concerns, and provides recommendations for improving water quality and clarity through mangrove restoration/shoreline stabilization. Recommendations on pesticide use to control mosquito populations and methods of aquatic plant management, including application of chemical herbicides, mechanical harvesting, and use of biological control agents are included, as are recommendations for acquiring manatee habitat within Dade County.

B. Manatee-Human Interaction

In this section, recommendations are made to improve operation and structurally modify flood gates and increase law enforcement presence in manatee protection zones. In the flood gate segment, numerous recommendations are made to minimize the risk of manatee being crushed. The SFWMD and COE are the lead agencies in the effort to develop alternative methods of water control that will not put manatees at risk. The plan recommends that SFWMD and COE continue to install PSD's where feasible and also investigate other types of permanent structures that will eliminate manatee flood gate deaths and use of sonar devices to detect manatees near structures. This section of the plan also recommends that the Dade County Airport Department maintain and monitor the operation of the manatee barrier to ensure that manatees are prevented from entering the canal system.

Vessel speed restrictions are addressed in this section of the MPP. The plan recommends monitoring boating use patterns and determine if adjustments to current speed zones need to be made. This section also recommends areas that are suitable for high speed water-related activities and defines criteria (a Manatee Watch Program) that must be followed during high speed events. Recommendations to improve law enforcement are also part of this section. The plan recommends funding at least one additional marine patrol officer to enforce manatee speed zones.

C. Land Development

This section of the plan recommends that any impacts to manatees should continue to be considered in review of projects requiring a Dade County Class I coastal construction permit. In addition, natural shoreline vegetation should be maintained and destruction/alteration of shallow water habitat used by manatees shall be prohibited unless necessary for protection of the public or restoration of environmental resources.

This section also includes a marine facility siting segment. The plan defines an existing facility as one that was in use on October 28, 1984 or later and if constructed before 1980, must have appropriate DERM permits. The plan also recommends that all existing marine facilities be allowed to continue with the existing use, and may renovate as long as the facility size remains the

same and the number of wet/dry slips does not increase. The following criteria are to be used to evaluate new marinas and expansion of existing facilities: (1) cause minimal or no manatee/boat travel pattern overlap, (2) cause minimal or no wetland or benthic community disturbance or similar impact, and (3) be compatible with surrounding land use. This section of the plan identifies specific areas and what type of shoreline development is appropriate for each area. Maps of suitable areas for new marine facilities or expansion of existing facilities are presented. The maps designate areas suitable for commercial marinas, freight terminals, special use marinas, boatyards, and residential docks (excluding single family). Protected areas where coastal construction is not allowed are also shown on these maps.

There is a brief segment on fuel and transitory docks which says that all fueling facilities must meet the criteria listed in state rule 16N-16.035, effective July 1, 1993.

Recommendations in the plan for freight terminals and large vessel docking facilities require a minimum of 4 feet of standoff from a wharf or bulkhead under maximum operational compression for vessels that are greater than 100 feet in length in most port facilities. Terminals in the Miami River are required to have 3 feet of standoff. The plan also allows a 1,600 foot section of the Miami River to be exempt from fendering requirements because of the narrowness of the river in this area. In exchange for this exemption, facilities in the 1,600 foot area and west of there cannot expand their facility or improve their bulkhead without complying with the 3 foot fendering requirement.

The plan also allows some flexibility in the density of powerboat slips and new boat ramp locations through the use of "performance" (or variance) criteria for facilities in areas restricted to 1 powerboat slip per 100 feet of owned shoreline. Under these criteria, if a facility can demonstrate that it will not adversely impact manatees, a higher ratio of boat slips per owned linear area of shoreline may be considered. The plan lists 9 different criteria that must be considered before allowing higher densities. These criteria include: (1) channels near the facility are designated "idle" or "slow" speed, (2) the facility is not within a manatee aggregation area, (3) no impact to seagrass beds, (4) there is sufficient water depth for vessels, (5) the site shall have appropriate signage, (6) boats docked at multi-family residences are registered to those residents, (7) location has adequate water circulation, (8) vessels should not travel through manatee travel corridors, and (9) facility must have had at 85% occupancy the previous years. The site must meet all of the criteria in order to qualify for higher powerboat densities. The maximum total buildout that could be considered is 5 powerboat slips per 100 feet of owned contiguous shoreline.

The plan does not attempt to put additional restrictions on single-family docks that are outside of essential manatee habitat areas. Residences within essential manatee habitat areas shall be limited to 2 powerboat slips. The plan also recommends that multi-slip docking facilities with more than 5 slips at multi-family residence located in essential habitats should be permitted to construct no more than 1 powerboat slip per 100 feet of owned developable shoreline.

D Education and Awareness

The plan recommends that manatee educational programs be developed for elementary, middle and high schools to provide students with a better understanding of manatees and the

environment. The plan points out a need for developing trilingual manatee information. Educational material should include ways to prevent pollution and habitat degradation. The plan also recommends a boater education program with a manatee protection component included.

E. Governmental Coordination

This section recommends that the land development and marine facility siting elements of the plan be incorporated into the Dade County Comprehensive Development Master Plan. Also, the plan recommends that boating studies and manatee aerial surveys be continued to determine changes in boating activity and manatee use. Following implementation of the plan, county staff will provide an annual report of manatee protection efforts.

Chapter IV is a list of objectives and policies that make up this MPP. The information contained in this chapter is essentially the same as what was covered in chapter III. It is likely that the language in this chapter will be included as part of the County CDMP.

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I. INTRODUCTION

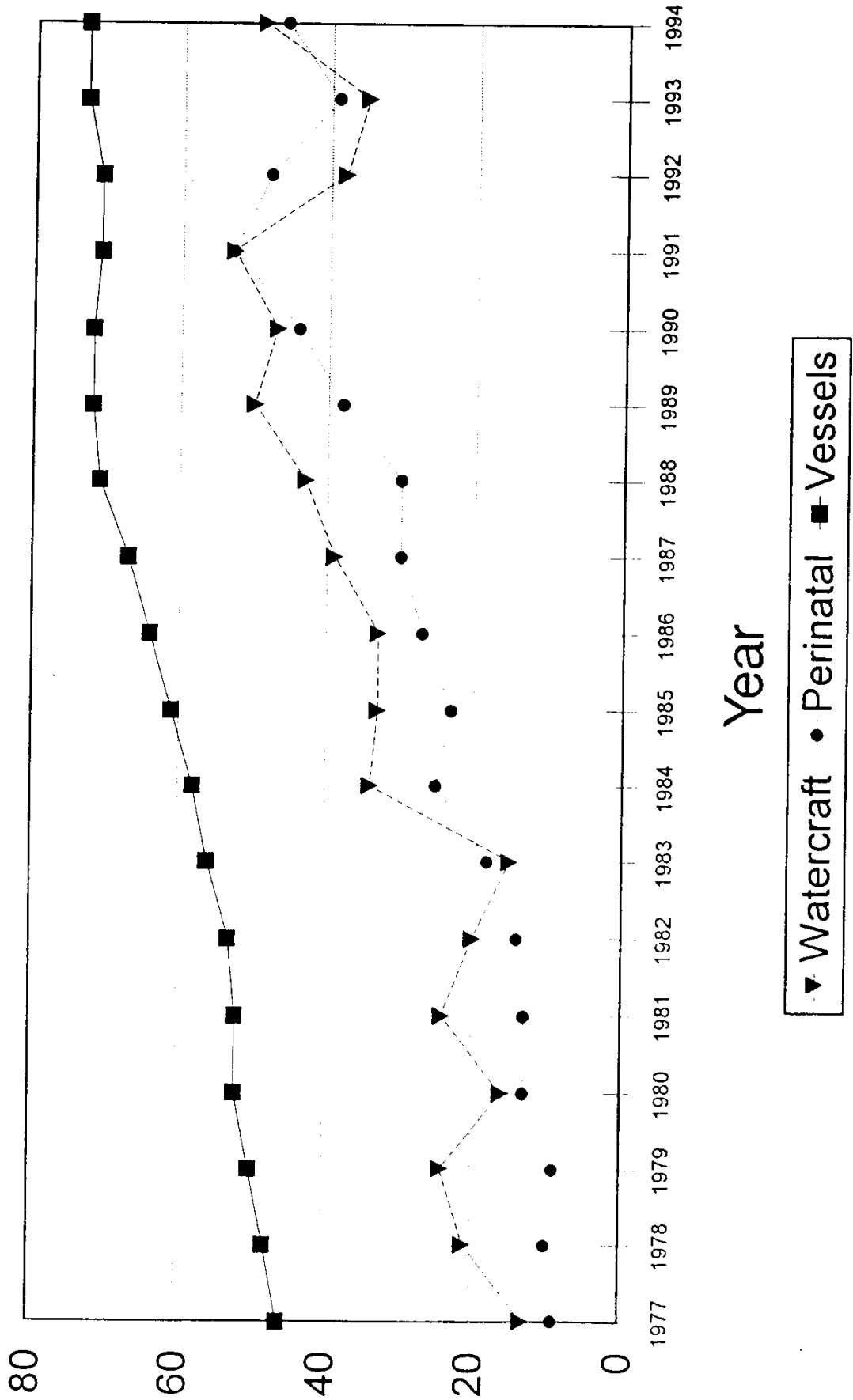
A. General Setting

The West Indian manatee found in Florida waters is *Trichechus manatus latirostris*. This endangered species is the state marine mammal of Florida. Manatees inhabit both fresh and saltwater areas including canals, rivers, estuaries, bays and the open ocean, but it appears that they need fresh water to drink periodically. They are vegetarians, feeding primarily on aquatic plants. Manatees are generally found in water at least 1.5 meters (5 feet) deep and cannot tolerate water temperatures below 20°C (68°F) for long periods of time. During especially cold winter weather, manatees congregate in warm water areas such as the discharge zones near power generating plants and natural warm water springs; in the warmer south Florida waters, they may aggregate in tributaries near flood gates (or dead-end residential canals). Otherwise they are seldom found in large groups. Manatees are not found north of Florida during the winter. They may remain in one area seasonally or may be transient, lingering for short periods in suitable habitats. Manatees are often observed at marina sites.

On a statewide basis, most human-related manatee deaths are caused by collisions with watercraft. The number of manatee mortalities due to vessel collisions statewide has been rising in recent years, as has the number of registered boats statewide (Figure 1). Manatees can move at a maximum speed of 15-20 mph for short periods of time under optimum conditions of clear, open water. This is not fast enough to avoid motorboats, particularly in confined or congested waterways, and turbidity makes it difficult for boaters to see manatees. Propeller blades can cut right through the skin, and most Florida manatees have distinctive prop scars (pers. comm. Kathryn Curtin, DNR, 1991). However, the majority of manatees that are killed by collisions with vessels die as a result of blunt impact injuries from the hull or skeg (lower unit of the motor). The animals attempt to elude boats by diving if the water is sufficiently deep and the boats are moving slowly. Manatees do not always avoid areas with heavy boat traffic, and regularly use the Intracoastal Waterway (ICW) in Dade County as a travel corridor, or cross this channel while moving to and from feeding areas.

Many manatees have been killed in automatic flood gates or salinity control structures (Figure 2), which continue to be a source of manatee mortality in Dade. Manatees have been injured and killed by entanglement in monofilament line, drowning in storm drain culverts, and a few are killed by poaching and vandalism. Herbicides and dredge and fill projects have adversely impacted the fresh water aquatic plants and seagrass beds upon which manatees feed. Ingestion of pollutants including pesticides, herbicides and industrial chemicals in water and vegetation may cause sublethal effects that reduce manatee viability, although these effects are poorly understood. Harassment and alteration or human use of

Watercraft and Perinatal Manatee Mortalities and Vessel Registrations (x10,000)



Florida Manatee Deaths

Total and Selected Causes

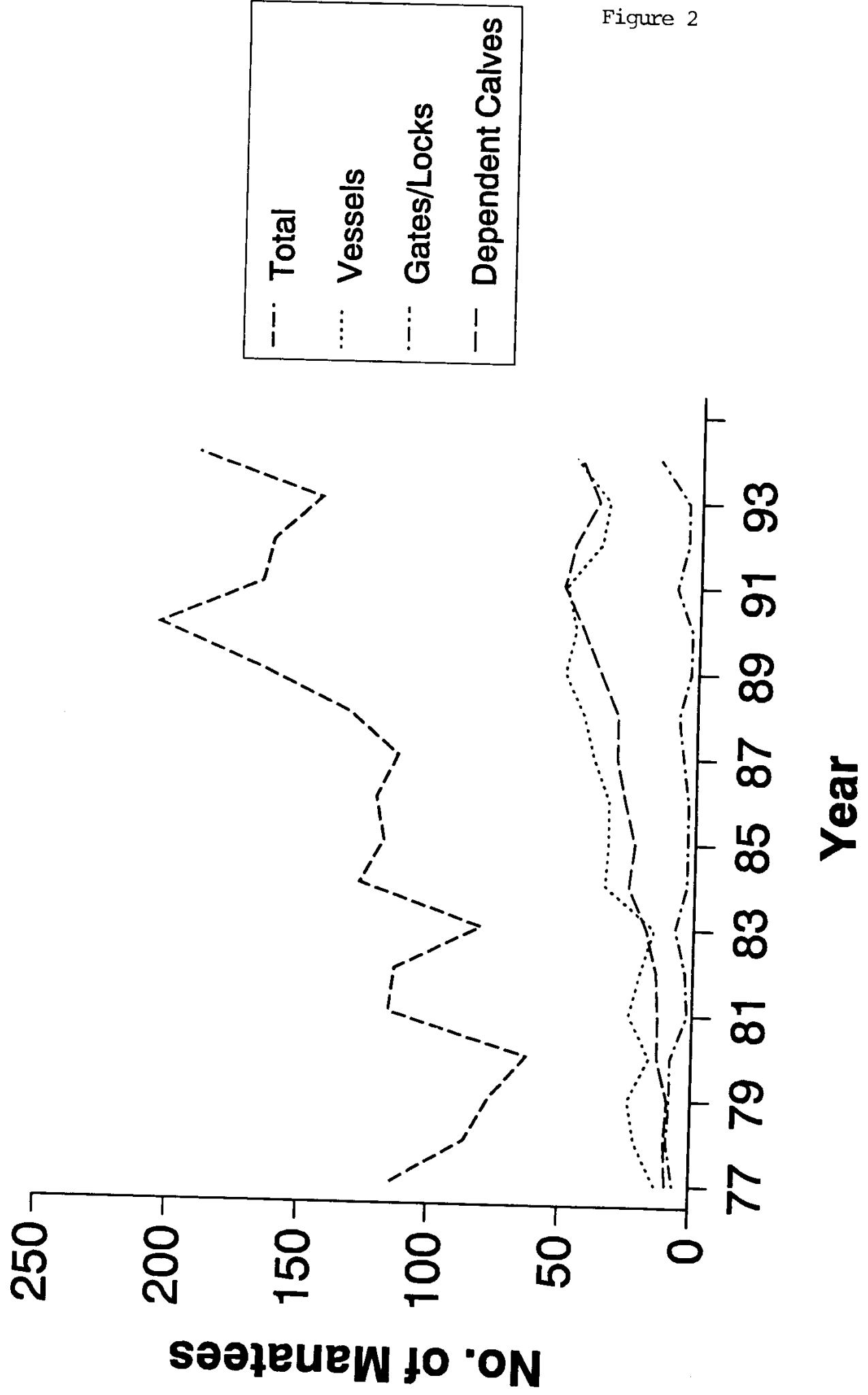


Figure 2

natural areas force manatees into less desirable habitats, increasing their exposure to cold stress or human-related causes of injury or death. This is problematic in that the rate of increase of vessel-related and perinatal (dependent calf) mortality is greater than the total mortality increase (Reynolds *et al.*, 1991). There has generally been an increasing trend in the annual number of manatee deaths in Florida since 1976. Biologists believe that the current mortality rate is close to or higher than the surviving birth rate (pers. comm. Patrick Rose, DNR, 1991). An estimated 2,000 manatees remain in Florida. Each animal is important to the survival of the species. The high manatee mortality rates are due in part to human-related factors.

Due to the large number of manatee deaths from human-related causes, the Florida Department of Environmental Protection (DEP, formerly the Department of Natural Resources, DNR) has instructed each Florida county with a significant manatee population to develop a manatee protection plan. The development of local plans is based upon recommendations made to DNR by the Marine Mammal Commission in 1989 (Marine Mammal Commission, 1992) and the Florida Manatee Recovery Plan developed in 1989 for the U.S. Fish and Wildlife Service (USFWS). Past problems related to management of manatees include lack of reliable and valid scientific data upon which to base management decisions, and weak enforcement of manatee protection laws (Reynolds *et al.*, 1991).

B. Purpose

The purpose of the manatee protection plan is to provide county-wide protection for the manatee and its habitat by including criteria for vessel speed zones, marina/boat facilities and their siting, law enforcement, shoreline and submerged land development, educational programs, habitat protection, human-manatee interactions, and governmental coordination. The objectives of the Dade County plan are drawn from relative objectives set forth in the Florida Manatee Recovery Plan developed in 1989. That plan was developed for the USFWS by the Florida Manatee Recovery Team, which was composed of various governmental agencies and interest groups who set a long range recovery goal as required by the Marine Mammal Protection Act of 1972, to maintain the health and stability of the marine ecosystem and to determine and maintain Florida manatee numbers at optimum sustainable population levels in the southeastern United States. "As an interim objective to reach this goal, this plan seeks to down-list Florida manatees from 'endangered' to 'threatened' pursuant to the provisions of the Endangered Species Act of 1973, as amended. To achieve this objective, it will be necessary to establish and maintain a viable, self-sustaining population of manatees on both the Atlantic and Gulf coasts. The most effective way to reach this goal is to reduce mortality and injury; ensure the continued existence of suitable habitat, upgrading where possible; minimize harassment; and monitor the status of manatee populations and their habitats. A viable population level will be determined when appropriate methodology and data are available to develop adequate population models. Downlisting should be considered when population modeling indicates that the population is growing or is stable, when mortality factors are controlled at

acceptable levels or are decreasing, and when habitats are secure and threats are controlled or are decreasing” (Florida Manatee Recovery Team, 1989).

C. Goal

The cumulative goal of the thirteen county manatee protection plans is to ensure the long-range protection of the manatee species and its habitat in Florida. In order to contribute to achieving this statewide goal, the following guidelines or objectives have been established for the Dade County plan: reduce the number of manatee mortalities and injuries, including but not limited to those which are human-related, particularly flood gate and boat-related causes; protect manatee habitat (the Marine Mammal Protection Act aims to maintain the health and stability of the marine ecosystem) and upgrade where possible; minimize manatee harassment; increase public awareness of the need to protect manatees and their environment; and monitor the status of manatee populations and their habitats.

II. INVENTORY OF EXISTING CONDITIONS

The following areas must be addressed and planned for in order to adequately protect the manatee:

- Habitat
- Manatee-Human Interaction
- Land Development
- Education and Awareness
- Governmental Coordination

A. Habitat

Protection of existing manatee habitat is essential to the survival of the species. Many of the areas historically used by manatees in Dade County have been substantially altered by dredge and fill projects. According to long time Dade County residents, the numbers of sea cows now using these areas has dwindled. According to the Marine Mammal Commission (1992), a major threat to Florida manatees is loss and degradation of habitat as a result of coastal development. The human population in Florida is increasing at a rate of more than 1,000 people per day. Much of the associated development has occurred along coastal waterways and rivers used by manatees. Habitat is degraded by siltation, nutrient enrichment, other forms of water pollution, and direct removal or filling of wetlands. This degradation results in a reduction of manatee food supplies, elimination of natural secluded areas for mating, giving birth and nursing, and a general reduction in the capacity of coastal and river ecosystems to support manatees (Marine Mammal Commission, 1992). The quality of the water and aquatic vegetation is poor in some coastal areas, and is unknown in many freshwater areas used by manatees.

The Dade County Department of Environmental Resources Management (DERM) initiated the Biscayne Bay Restoration and Enhancement Program in 1979 to maintain and improve the biological, recreational and aesthetic values of the Bay. This goal is addressed through projects including water and sediment quality monitoring, mangrove and other habitat restoration, pollution control enforcement, fisheries enhancement, and public awareness activities. By 1994, approximately 20 acres of mangrove trees had been planted and several miles of eroding shoreline had been stabilized at over 20 parks, street ends, spoil islands and public waterfront lands. In addition, seven inshore artificial reefs had been constructed and dredge holes in Biscayne Bay were being filled. These projects are expected to improve water clarity by reducing erosion and associated turbidity, provide habitat for marine life, and contribute to the marine food web. The program has been funded by Dade County, the Florida Department of Environmental Protection, the Florida Inland Navigation District and several other local and state agencies.

1. Locations

Manatees prefer relatively quiet spaces for resting, playing, mating, and nursing, and undisturbed areas for giving birth. Many such areas have been developed into marinas, water control systems, residential or urban areas. Travel corridors used by manatees to move within Dade coastal waters and for migration into and out of the county, generally have at least 4 feet of water depth. Preferred manatee habitats include areas with dense vegetation for feeding, freshwater sources for drinking, and warm water refuges for warmth during cold weather. The U.S. Fish and Wildlife Service (USFWS) defines Critical Manatee Habitat as a federally designated area with physical and/or biological features essential to the propagation of an endangered species. Critical manatee habitat in Dade County includes all waters of Card and Barnes Sounds, Manatee Bay, Biscayne Bay, and "all adjoining and connected lakes, rivers, canals, and waterways from the southern tip of Key Biscayne northward and including Maule Lake (USFWS, 1991). Manmade structures not necessary to the normal needs or survival of the manatee are excluded in these areas. Essential Manatee Habitat is defined as "any land or water area constituting elements necessary to the survival and recovery of the manatee population from endangered status which may require special management considerations and protective measures. The constituent elements include, but are not limited to: space for individual and population growth and for normal behavior; available food sources with adequate water depth and quality; warm and fresh water sources; sites for breeding and rearing of offspring; and habitats protected from disturbances that are representative of the geographical and seasonal distribution of the species" (Citrus County Manatee Plan Committee, 1991). Essential manatee habitat in Dade County is shown in Figure 3.

Seagrass Beds

Marine seagrasses, manatee grass (*Syringodium filiforme*) and turtle grass (*Thalassia testudinum*) in particular, are a favorite food of the manatee. Seagrass beds are also used by juvenile fish, epiphytes and other marine organisms. The Dumfoundling and Biscayne Bay areas of Dade County contain seagrass beds regularly used by manatees. More specifically, those seagrass beds where manatees have been most frequently observed feeding during the winter season, are located on either side of the ICW channel in Dumfoundling Bay; in north Biscayne Bay between 79th Street Causeway and Julia Tuttle Causeway, and between the Port of Miami and Rickenbacker Causeway; in south Biscayne Bay along the mainland shoreline between Rickenbacker Causeway and Coral Gables Waterway, and south of the marked boat channel to Black Creek (which leads to Black Point Marina). The Dade County Department of Environmental Resources Management (DERM) has developed a map showing the locations and species of seagrasses and other bottom communities in tidal waters of the county (Appendix A). Mitigation for the removal of seagrass by transplanting seagrass into areas where it does not occur, has generally been unsuccessful. The placement of limestone riprap boulders in the water is sometimes used to mitigate for seagrass loss. Although the boulders provide habitat for marine organisms (including algae) and fish, they do not provide a preferred food source for manatees, and therefore are not acceptable mitigation in areas used by manatees.

ESSENTIAL MANATEE HABITAT
 (all areas frequently used by
 manatees for feeding, resting,
 mating, nursing, cold shelter,
 and travel)

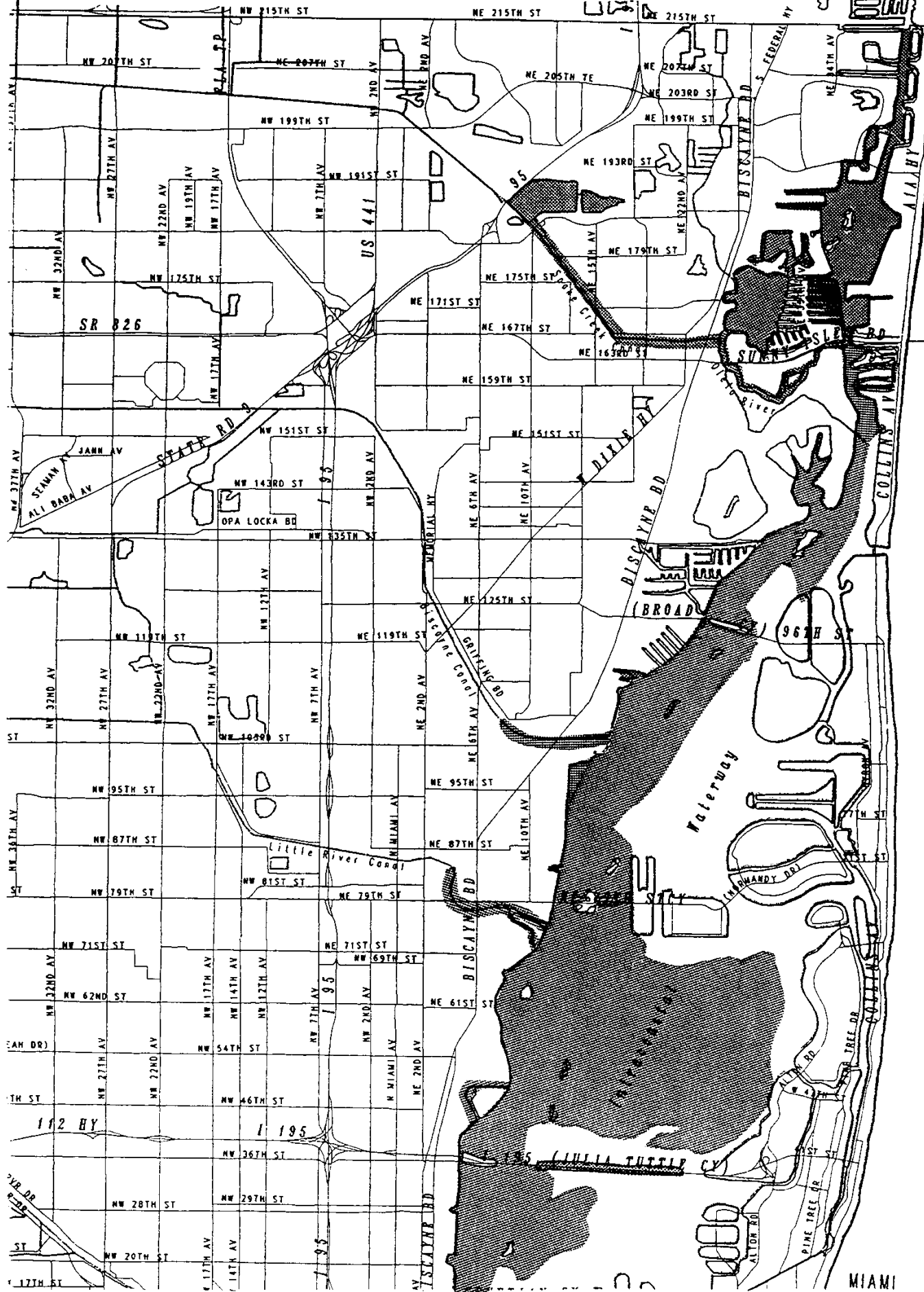
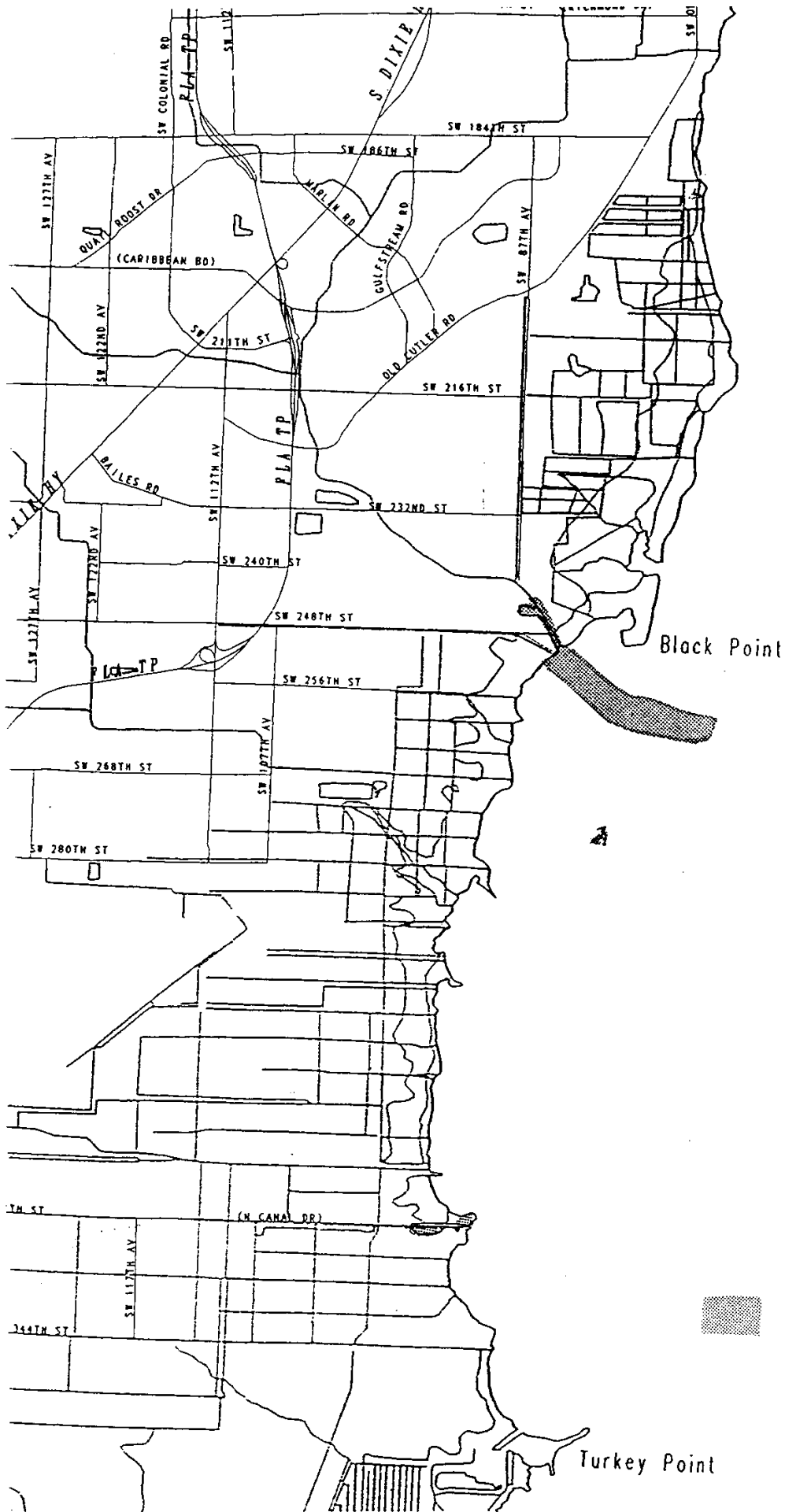


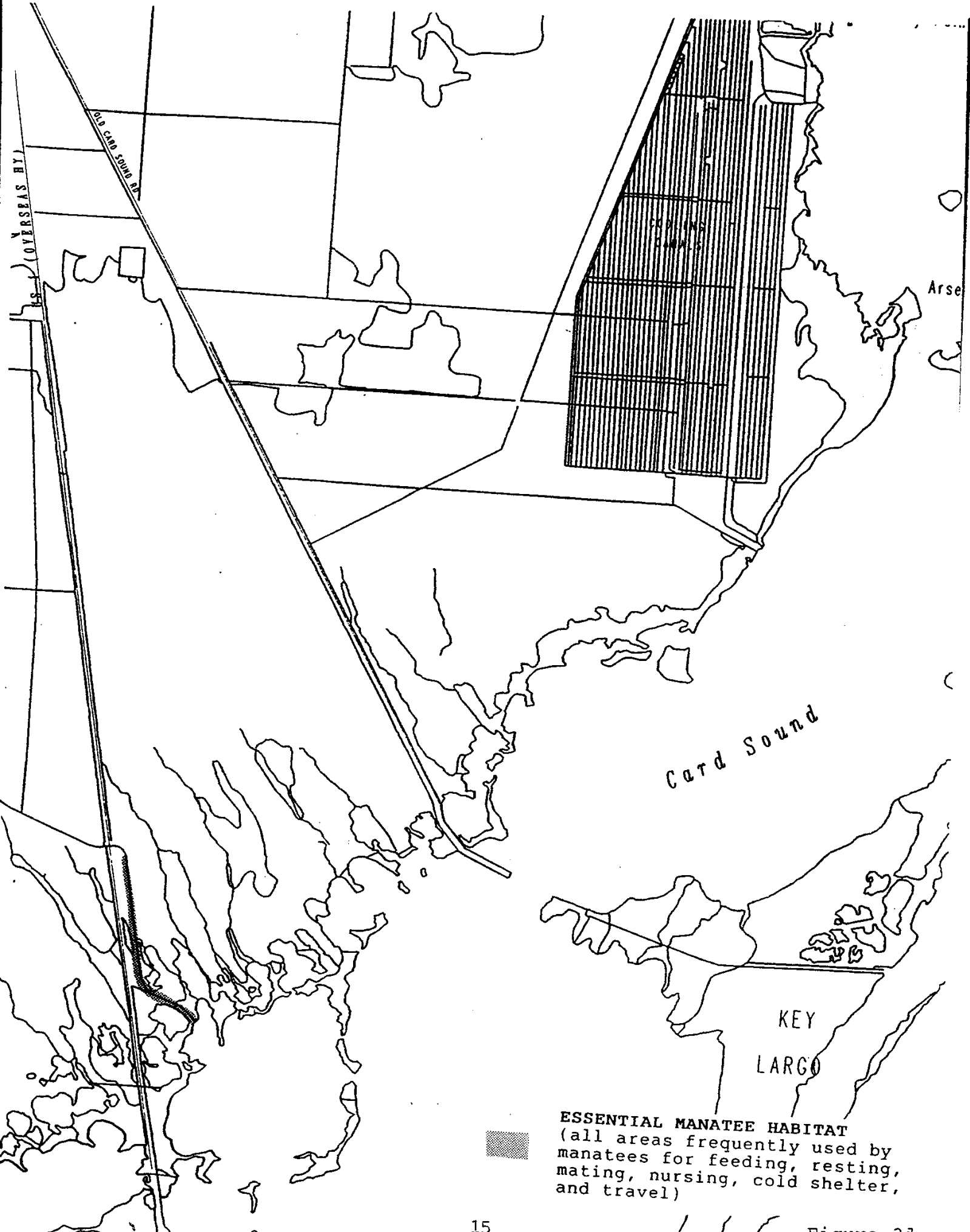
Figure 3a





ESSENTIAL MANATEE HABITAT
 (all areas frequently used by manatees for feeding, resting, mating, nursing, cold shelter and travel)

Figure 3c



Fresh Water Sources

Manatees utilize freshwater canal systems in Dade County, particularly during warm weather. They travel through open flood gates to access these areas. Manatees are observed at flood gates year-round, but aggregate at these locations in large numbers during cool weather. Those flood gates where manatees are most frequently observed are located on Snake Creek, Biscayne Canal, Little River, Miami River, Tamiami Canal and Black Creek. Another popular manatee fresh water source is a stormwater outfall structure on a canal connected to Coral Gables Waterway. A daily pattern has been observed by manatee trackers in Dade during cold weather months: many manatees leave Biscayne Bay in the morning and travel up rivers and canals to the fresh water source where they drink and rest, and return to the Bay in late afternoon (pers. comm., Kathryn Curtin, USFWS, 1990).

Warm Water Refuges

Since manatees cannot tolerate water temperatures below 68^oF for long periods of time, they move into warm waters when temperatures begin to drop. In south Biscayne Bay, they generally swim upstream into rivers and canals (larger than average numbers of manatees [42 were observed in January 1992] aggregate in the Coral Gables Waterway following severe cold fronts); these protected deeper waters tend to stay warmer than the open shallow bay waters. In north Biscayne Bay, the manatees may do likewise (high numbers of animals have been noted in the upper Miami River and Little River during cold weather), or during severe cold fronts may travel north in the Intracoastal Waterway (ICW) into Broward County to the Florida Power and Light Company (FPL) power plant at Port Everglades and the Dania cutoff canal, where they seek refuge in the warm outfall waters (Reid *et al.*, 1991). Large numbers of manatees (more than 200 animals) have been observed at the power plant during cold periods. Dade County does not presently have artificial warm water refuges that regularly operate during the winter and are used by manatees (although in 1991 the Old Cutler FPL power plant began operating as an emergency back-up to the plant at Turkey Point; the Old Cutler plant discharges into a tidal canal adjacent to Biscayne Bay), but there were several historically. Due to the subtropical location, Dade waters are naturally warm enough for manatee use except during rare prolonged periods of cold temperatures.

Other Aggregation Areas

There are few places remaining in Dade County for the manatee to safely avoid human activity. Only one such area used by manatees has been identified, the northwest side of Virginia Key. These areas contain extensive seagrass beds and except for the sewage treatment plant, the adjacent upland area is undeveloped and hosts large undisturbed mangrove stands. Boaters seldom entered due to shoals scattered throughout this area, which was officially made a "No Entry" zone for manatee protection in 1991.

Manatees do gather in areas which are greatly disturbed by humans. Biologists believe that the animals historically brought their young to these areas and subsequent generations tend to use the same areas. The portion of Little River immediately downstream of the SCS (salinity control structure) is a consistent manatee gathering place during the winter months. Manatees drink fresh water which leaks through the structure. A low bridge

II. Existing Conditions

nearby prevents most boats from entering this area. However, the site is a popular fishing spot for local residents and is located adjacent to a major road. Fishermen indicate that children have been observed throwing rocks at manatees, and crowds occasionally gather along the shoreline to observe the animals. A large quantity of litter is frequently present in this area which may be ingested by manatees feeding on decaying seagrass brought in by the tides (pers. comm. Kathryn Curtin, 1991).

Another manatee aggregation site is located in the north portion of the Black Point marina basin. The Dade County Park and Recreation Department has constructed a marina in the south portion of the basin and originally had plans to expand the marina into the north portion. However, due to opposition to the expansion by environmental permitting agencies (due to regular manatee usage of the area), the marina expansion plans were abandoned. Historically, the Black Point Marina area was highly utilized by manatees for resting, playing, nursing and giving birth according to fishermen and manatee research biologists. However, these activities (particularly the latter) occurred in narrow canals which no longer exist; they were filled for marina construction. Manatees are now observed resting, playing and mating in the north portion of the basin and to a lesser extent in Black Creek on the downstream side of the SCS (located northeast of the basin). Vessel speed regulations approved in 1991 officially prohibit boaters from these areas.

A year-round freshwater aggregation area for manatees is the Sky Lake and Little Sky Lake system located north of NE 183 Street and east of I-95. Manatees have been observed feeding on *Hydrilla* sp., which occurs in both lakes, on most aerial surveys conducted by DERM.

Travel Corridors

The primary manatee travel corridor used in north Dade is the Intracoastal Waterway (ICW) channel, the same channel used by boats. Manatees use the generally narrow ICW channel between the Broward County line and the Haulover area of Biscayne Bay for travel. Although Dumfoundling Bay is wide, manatees frequently linger along the edges of the ICW channel in this area to feed in adjacent seagrass-covered shoals. The waterway between Dumfoundling Bay and Haulover is relatively narrow. In the vicinity of Haulover, the water depth outside of the channel can be adequate for manatee travel. The animals often swim close to shore in such areas. Manatee sighting data indicate that the animals use the west (mainland) side of Biscayne Bay much more than the east (Miami Beach) side for travel. Travel in a north or south direction also occurs along the west bay shoreline in areas between the Port of Miami and Chicken Key. Although north-south travel surely occurs south of Chicken Key, it has been virtually unobserved according to available data, and routes are unknown. East and west travel patterns may be observed daily in major Dade County rivers and canals during the winter manatee season, and sometimes during the summer.

Aquatic Preserves, Refuges, Sanctuaries

In 1974, the Biscayne Bay Aquatic Preserve was established by the Florida Department of Natural Resources (now Department of Environmental Protection), 258.397 F.S. "for the purpose of preserving and enhancing Biscayne Bay and all natural waterways tidally connected to the bay in an essentially natural condition so that its biological and aesthetic values may endure for the enjoyment of future generations". The boundaries of the

preserve include all publicly owned islands and submerged land, excluding Biscayne National Park, between State Road 826 (Sunny Isles Boulevard) in north Dade County on the north, and State Road 905A (Card Sound Road) in northern Monroe County on the south (Figure 4). The preserve also includes privately owned submerged land and the water column within these boundaries. The management of the preserve includes the following goals: "To encourage activities that protect or enhance the biological and aesthetic values of the preserve..." and "To preserve and promote indigenous life forms and habitats including...marine mammals..." (Draft, Biscayne Bay Aquatic Preserve Management Plan, 1986).

A Critical Wildlife Area was established by the Florida Game and Freshwater Fish Commission and the City of Miami in 1991 on the west side of Virginia Key including a large area of submerged land, primarily to protect bird species which feed, roost and nest in the area. The submerged land portion is encompassed in the "No Entry" zone recently established for manatee protection on the northwest side of Virginia Key.

Biscayne National Park includes most of south Biscayne Bay waterward of the mean high water line, and extends eastward of the barrier islands into the Atlantic Ocean. Coral reefs and other submerged habitat are protected through park regulations, which include restrictions on habitat destruction.

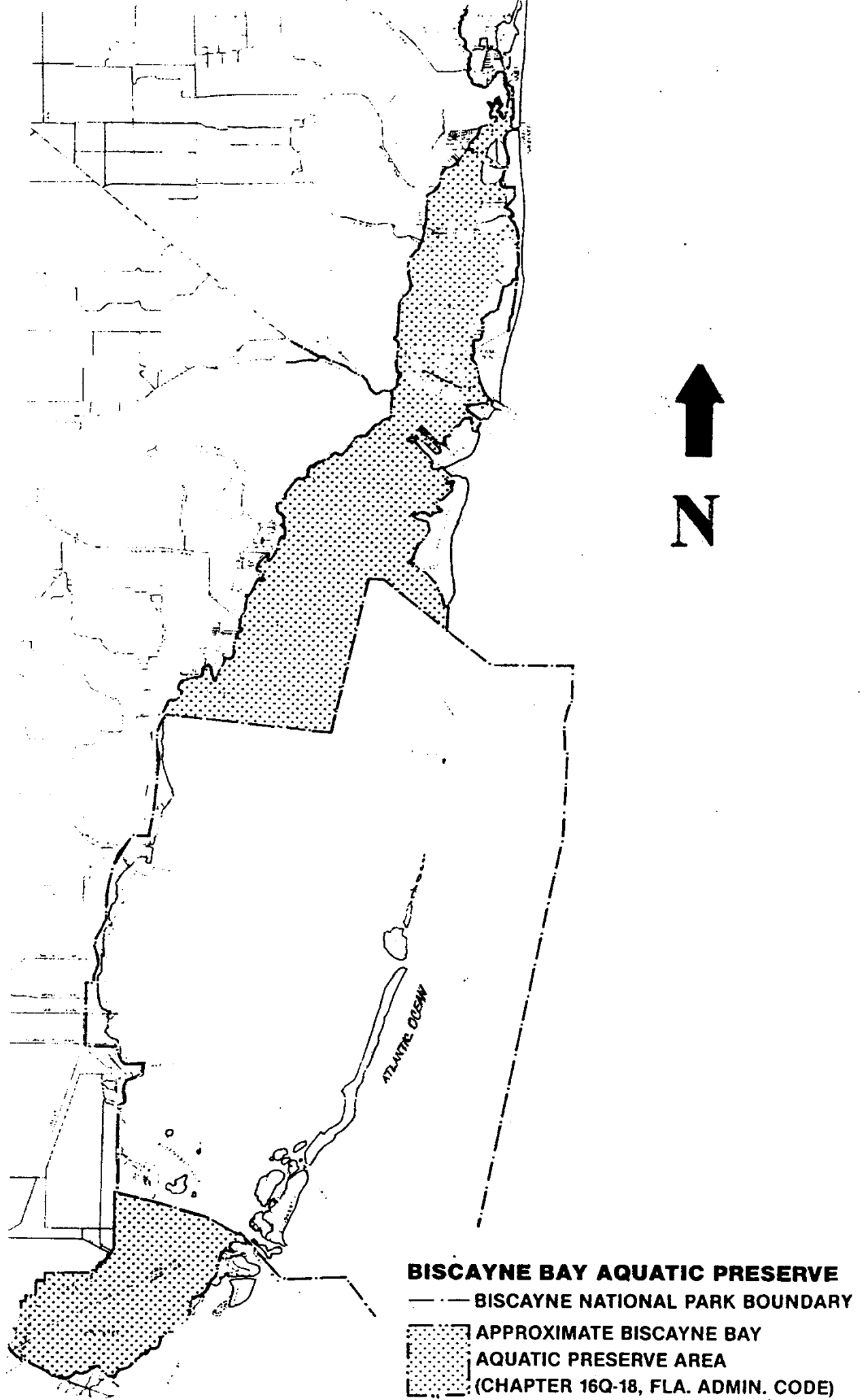
The taking of lobster is prohibited year round in the Biscayne Bay-Card Sound Lobster Sanctuary. The northern boundary of the state-designated sanctuary (46-11 F.A.C.) is between the north edge of Matheson Hammock Park east to the south tip of Cape Florida, and the south boundary is the Card Sound Bridge. The sanctuary contains a portion of Biscayne Bay, and Card Sound/Little Card Sound waters within its boundaries.

2. Water Quality and Vegetation

Research is needed regarding the effects of chemicals and pollution on manatees. Water contaminants including pesticides, herbicides, fertilizers, industrial byproducts, and human sewage may cause sublethal effects in manatees (Packard, 1983 *In* Citrus County Manatee Plan Committee *et al.*, 1991). Not only do sea cows drink the water, but they also feed upon possibly contaminated vegetation. Water quality improvements and maintenance may be necessary for manatee survival.

Water Quality

Since 1987, funding for water quality plan development management activities was provided through the Biscayne Bay Surface Water Improvement and Management (SWIM) program, which is coordinated by the South Florida Water Management District (SFWMD). This program has focused on expanded monitoring, stormwater outfall improvements in the Miami River and Little River watersheds, and selected mangrove enhancement projects. To date, more than \$9 million in SWIM and local matching funds has been committed to these activities. Goals and proposed projects are described in detail in the Biscayne Bay SWIM Plan (SFWMD, 1988). SWIM projects include an extensive water quality monitoring program at 91 stations in Biscayne Bay and its tributaries.



II. Existing Conditions

Parameters sampled include turbidity, suspended solids, color, total phosphorus, total ammonia nitrogen, nitrate and nitrite nitrogen, chlorophyll a, pheophytin, total coliform bacteria, fecal coliform bacteria, cadmium, copper, lead, zinc, water temperature, pH, dissolved oxygen, redox, specific conductance, and salinity (not all parameters are sampled at all stations). In addition, synthetic organic chemicals and tributyl tin have been sampled at many Biscayne Bay stations. Monitoring and enforcement activities undertaken in connection with the Biscayne Bay Restoration & Enhancement and SWIM Programs have determined that water quality meets or exceeds state and local standards throughout Biscayne Bay, except in certain tributaries. In the Miami River, the high coliform bacteria and low dissolved oxygen concentrations consistently violate standards. Less frequent violations of bacteria standards occur in Arch Creek, Little River, Black Creek, and several other canals. Canals and tributaries generally have higher dissolved nutrient, trace metal, and turbidity levels than the open bay, although these rarely exceed standards. Although the northwest Virginia Key area meets water quality standards, contaminated Miami River water may flow into this area (Alleman, 1990).

SWIM funds are used to investigate pollution problems in the Biscayne Bay watershed, to retrofit storm drains in the Miami River, and to construct habitat restoration projects in the Biscayne Bay area, such as recreating shoreline habitat in eroded areas of public ownership. Several SWIM sediment surveys have been conducted in Dade County tidal waters. A SWIM survey of sediments from 15 Dade County marina facilities in 1991 revealed significant contamination at only two facilities, located on Little River and south Miami Beach. Although both areas are used by manatees, the Little River area has considerably higher usage. The sediments at Little River contained high levels of metals and PCBs (polychlorinated biphenyls), and those at Miami Beach contained high levels of hydrocarbons and metals (pers. comm., Cecelia Weaver, DERM, 1991).

Oysters are indicators of ambient water quality and cleanse themselves in clean water. DERM conducted a SWIM project involving the analysis of Biscayne Bay oysters for contamination in 1992, which revealed no significant contamination.

The federal Clean Water Act requires that local governments and certain facilities obtain National Pollution Discharge Elimination System permits to discharge stormwater runoff to surface waters. In order to obtain the permit, the applicant must perform a variety of monitoring activities and implement programs to identify and eliminate improper or illicit discharges of pollutants to the storm sewer system. Both the City of Miami and Dade County have adopted Stormwater Utility ordinances (in 1989 and 1991 respectively) to provide funding to complete the application process, upgrade and maintain the storm sewer systems.

In addition to the stormwater improvement projects outlined above, DERM has developed recommendations for minimizing acute and chronic sewage pollution in the Miami River (DERM 1990, 1991), and additional surveys to identify sources of contamination are in progress. A new sewage pipeline across Biscayne Bay was constructed in 1994, which replaces an old pipeline, and should alleviate concerns about the possibility of environmental pollution due to a rupture developing in the old line.

Mosquito Control

Manatee habitat where mosquito control activities occur includes the entire coastal shoreline between Rickenbacker Causeway and SW 240th Street. The Dade County Public Works Department Mosquito Control division treats portions of this shoreline 6-7 times per year, between June and mid-November. Naled, an organophosphate insecticide, is aerially sprayed over these coastal areas at "ultra-low volume". The chemical is applied at a low rate of 2/3 ounce per acre in order to protect nontarget species; the effects on manatees is unknown. Water sampling reveals no trace of the insecticide 8 hours after application. The insecticide is applied in the late evening of the day notice is received of a heavy mosquito infestation; immediate insecticide application is necessary because mosquitoes may depart an area within 12 hours of being sighted (pers. comm. Marlon Nelms, Dade County Public Works Department, 1992).

Aquatic Plant Control

Marine and freshwater vegetation may create water discharge problems in canals. An accumulation of dead plant and other floating debris is removed by the Dade County Public Works Department in selected tidal waters and fresh water canals. The South Florida Water Management District (SFWMD) maintains nuisance aquatic vegetation in the freshwater canals most frequently used by manatees through the use of herbicides, mechanical harvesting and biological controls.

Virtually no studies have been conducted on the effects of any herbicides or other pesticides (including those used for mosquito control) on manatees. However, the effects of many have been studied in other animals and followed in humans; those determined to be unsafe are not recommended for use in areas where manatees are sighted. SFWMD uses a limited number of herbicides targeted at aquatic vegetation occurring on canal banks, the water surface, or submerged. In many areas herbicides are used in combination with or alternated with mechanical vegetation removal, depending on a number of variables (rate of water flow, species and density of vegetation, among others) in the canal at the time of treatment (pers. comm. Gordon Baker, SFWMD, 1992).

Herbicides most frequently used by SFWMD on submerged vegetation include fluridone and endothall. Fluridone has a very low toxicity level for humans, is highly soluble but degrades very slowly. Studies over a 20 year period reveal that endothall does not adversely affect animals, wildlife or the environment when applied at the recommended dosage (Keckemet 1980). Other herbicides which are used occasionally include glyphosate, 2,4-D, dicamba, and diquat. Glyphosate is used on canal banks and floating vegetation; it does not kill submerged vegetation. 2,4-D is used on submerged weeds, dicamba on broadleaf weeds, and diquat destroys floating and submerged vegetation. Tebuthiuron is sometimes used on canal banks. Copper sulfate was used in the past, but the frequency of its use has diminished in recent years (pers. comm. J. Jordan, DEP, 1995). Mechanical vegetation removal is the most costly of the methods used. Not only is this method the most labor intensive, but the results of mechanical removal alone are short-lived. Vegetation may recur as early as 3 months after removal (Dade County DERM Planning and Evaluation, 1990). Mechanical equipment may pose a threat to manatees by possibly crushing the animals against the side or bottom of a canal. This method greatly disturbs

bottom sediments, resuspending any pollutants that may exist and causing temporarily high turbidity levels in the water.

Biological controls which have been tested by the SFWMD in Dade include the release of herbivorous fish species and the planting of *Chara* sp., a low maintenance alga. Although an early fish experiment failed due to consumption of the introduced young by existing predator fish, the SFWMD is planning to test grass carp in a Fort Lauderdale canal in February 1996; these fish will be large enough to avoid predation by other fishes. If successful, grass carp will be added to a controlled area in Dade County not regularly used by manatees (pers. comm. Gordon Baker, SFWMD, 1995).

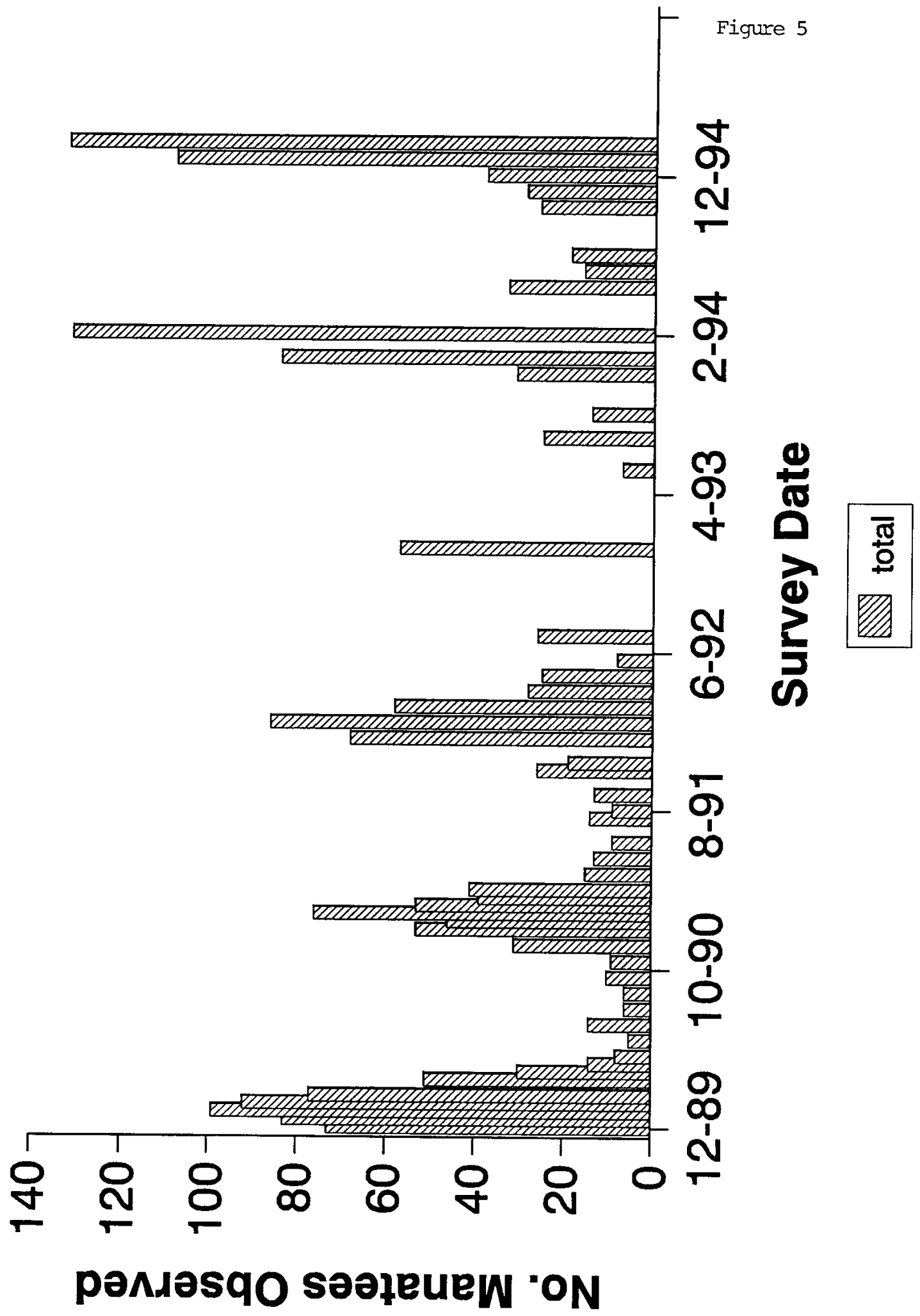
The establishment of *Chara* sp. has been successful in several south Dade canals. Initial energy and labor costs are considerable because complete eradication of aquatic weeds is required, involving mechanical removal and up to two cycles of herbicide application, prior to transplanting the *Chara* sp. Divers plant the *Chara* sp. in the bottom sediments and conduct follow-up maintenance in order to keep weeds from re-establishing dominance (Dade County DERM, Planning and Evaluation, 1990).

3. Manatee Distribution

Manatee distribution data in Dade County has been collected through ongoing aerial surveys conducted by DERM (monthly or biweekly year-round between December 1989 and April 1995, and quarterly since then) and Florida DNR (biweekly year-round, from December 1987 to March 1990, excluding January to March 1989). In addition, public manatee sightings are recorded. These data are entered into the DERM Geographical Information System (GIS). Maps may be produced indicating locations where manatees have been sighted using any or all of the data. Manatees are also followed through ongoing year-round satellite (since 1986) and radio tracking (since 1978) of tagged animals conducted by USFWS (O'Shea *et al.*, 1990).

Dade County supports a year-round manatee population with the largest numbers of animals present during the winter months (Figure 5). Many stay in Dade throughout the cool winter weather, while others may travel to the Florida Power and Light (FPL) power plant warm water outfall (a regular manatee congregation area) at Port Everglades in Broward County, during periods of extreme cold. Since manatees are vegetarians, and their food is not readily available in the vicinity of Port Everglades, many of these animals venture into Dade between cold periods to feed on the lush seagrasses in Dumfoundling and Biscayne Bays (Reid, 1990). During the winter months, manatees are most heavily concentrated in natural tributaries during the day, including Little River, the Miami River, Coral Gables Waterway, and Black Creek. Large concentrations of manatees are also observed in south Dumfoundling Bay seagrass beds, and in Biscayne Bay seagrass beds between the Port of Miami and Rickenbacker Causeway during the daytime (see Figures 6a-d). They have been frequently observed traveling out of the rivers toward the bays in late afternoon (pers. comm. Curtin, DNR, 1990), and radio tracking and satellite telemetry data reveal manatees feeding in Biscayne Bay seagrass beds at night (pers. comm. Jim Reid, USFWS, 1990). Manatees in Dumfoundling and north Biscayne Bays generally use the ICW channel as a travel corridor, rather than the shallow flats outside the channel.

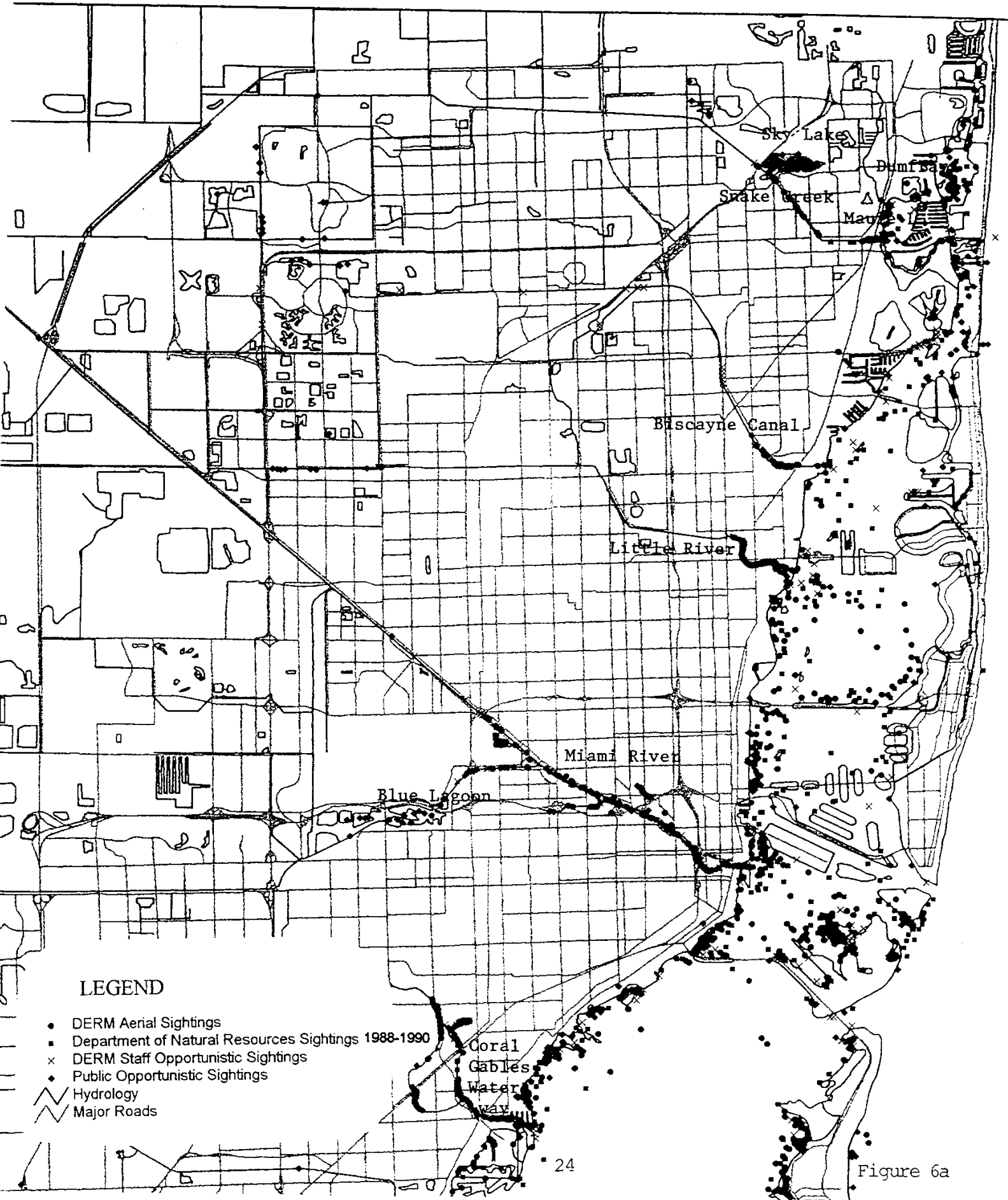
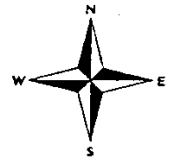
Dade County Manatee Aerial Survey



MANATEE SIGHTINGS DADE COUNTY FLORIDA



1989 - 1994



LEGEND

- DERM Aerial Sightings
- Department of Natural Resources Sightings 1988-1990
- × DERM Staff Opportunistic Sightings
- ◆ Public Opportunistic Sightings
- ~ Hydrology
- Major Roads

Figure 6a

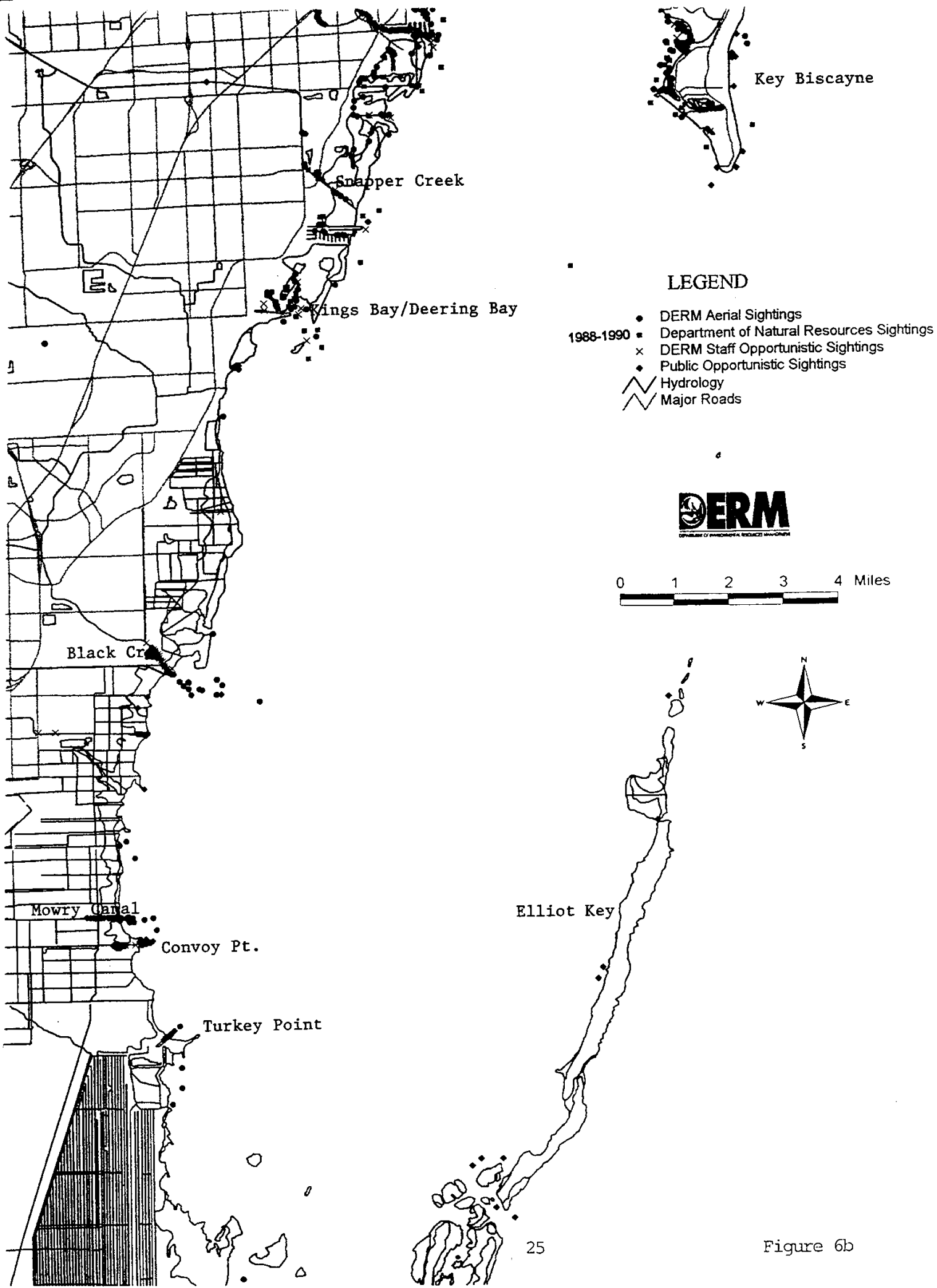


Figure 6b

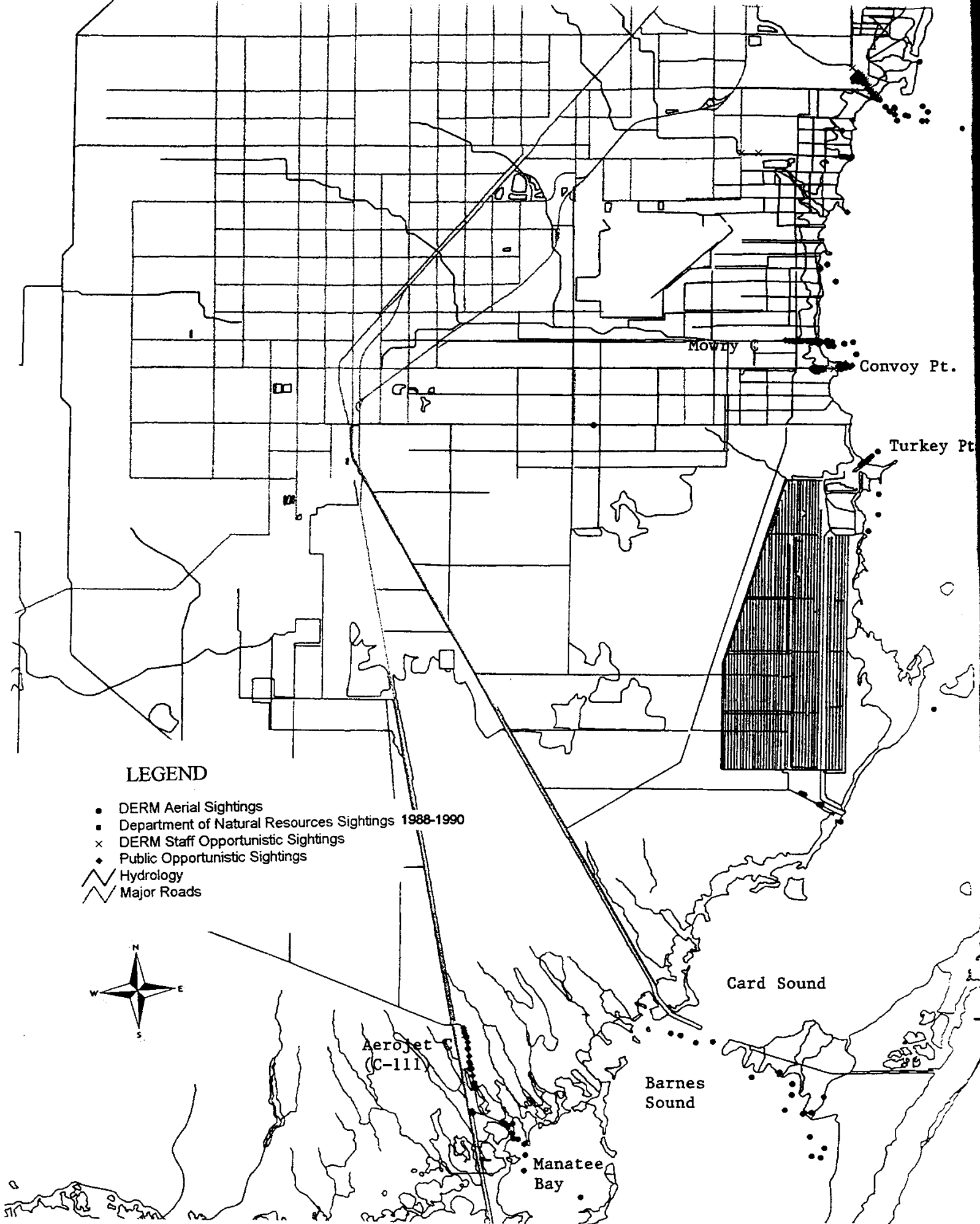


Figure 6c

II. Existing Conditions

In the warmer months, it appears that most manatees leave Dade County for Florida counties to the north. Several animals with satellite and radio tracking devices leave Dade County to summer in Brevard County. An estimated 30 animals reside in Dade during warmer weather. Some manatees travel upstream of flood gates (salinity control structures) and spend warm months in the fresh water canal/lake system feeding on freshwater vegetation. In addition, a few animals frequent the same manatee "hot spots" that are popular in the winter, including Miami River, Virginia Key area, Coral Gables Waterway, and Black Point Marina (pers. comm. Kathryn Curtin, USFWS, 1991; Dade County DERM manatee aerial survey data 1989-1994).

B. Manatee-Human Interaction

Interaction between manatee and human activities can result in mortality, injury, or disturbance to the manatee. Such activities include boating, water skiing, use of personal watercraft, swimming, diving, fishing, commercial shipping, operation of water control structures (flood gates) and water-related construction.

1. Manatee Mortality

Hartman (1971) wrote that man's activities, boating and vandalism in particular, were the major causes of manatee mortality in Florida resulting in their placement on the endangered species list. A total of 136 manatee carcasses were recovered in Dade County between 1974 and 1994 and at least 90 of those deaths were human-related. Verified causes of death are noted in Table 1. It is quite possible that manatees were not killed at the exact site where carcass recovery occurred, since injured animals attempt to move to protected areas.

TABLE 1
DADE COUNTY MANATEE DEATHS BY YEAR, 1974-1994

YEAR	TOTAL	WATER CRAFT	FLOOD GATE	OTHER HUMAN	DEP. CALF	OTHER NATURAL	VERIF. UNRECOV.	NOT DETER.
1974	2	2	0	0	0	0	0	0
1975	4	1	1	0	1	0	0	1
1976	15	2	4	0	0	1	5	3
1977	12	1	5	2	2	0	0	2
1978	12	2	8	0	0	0	0	2
1979	9	1	5	2	0	0	0	1
1980	2	0	2	0	0	0	0	0
1981	5	1	0	2	0	0	0	2
1982	4	0	2	0	0	0	0	2
1983	7	0	1	4	1	0	0	1
1984	1	1	0	0	0	0	0	0
1985	4	1	1	0	2	0	0	0
1986	2	1	0	1	0	0	0	0
1987	8	4	2	0	1	0	0	1
1988	9	1	6	0	0	1	1	0
1989	3	3	0	0	0	0	0	0
1990	4	1	1	0	0	0	0	2
1991	7	0	1	0	2	2	0	2
1992	10	4	1	1	1	1	0	2
1993	5	0	2	2	0	0	0	1
1994	11	1	4	3	1	1	1	0
TOTAL	136	27	46	17	11	6	7	22

Source: Florida Department of Environmental Protection, Division of Marine Research, 1995

II. Existing Conditions

The majority of manatee carcasses are recovered from tributaries or near shorelines rather than in the open bay, and the carcasses are found in both fresh and salt water (Figure 7a-d). Carcass recovery locations are clustered in some areas including the mouth of Snake Creek at the Oleta River, the coastal flood gate at Little River (S-27), Tamiami Canal and the Miami River between NW 42 and NW 30 Avenues, the Miami River in the vicinity of NW 12 Avenue, and the Black Point Marina area.

A total of 30 manatee carcasses have been recovered from the Miami River and its tributary, the Tamiami Canal, attributed to all cause of death categories as shown in Figure 8. Manatees continue to use the Miami River year-round.

Manatee deaths occur year-round in Dade County. No seasonal pattern is noted in individual categories nor in the total causes of death, as indicated in Figures 9 and 10. Total mortality varies from year to year and may be related to the number of manatees present in Dade or patterns in human activities.

2. Analysis of Manatee-Human Interaction

Human activities greatly impact manatees year-round. Waterbodies in the county which are affected by manatee-human interactions include all tidal waters, and fresh water areas connected to tidal canals. As previously noted, the largest winter concentrations of manatees occur in Dumfoundling Bay, Little River, Miami River, the northwest Virginia Key area, Coral Gables Waterway and Black Creek areas. In addition, during spring and summer months when flood gates are opened, some manatees swim upstream into the freshwater canals and lakes and may remain throughout the summer. During warm weather, manatees may be regularly observed feeding on vegetation in the interconnected canals, lagoons and lakes, such as Sky Lake and Blue Lagoon.

The largest known cause of manatee mortality in Dade is from crushing and/or drowning in flood gates. These deaths have been documented at seven different structures, all of which are operated by the South Florida Water Management District (see Figure 7a-d for manatee carcass recovery locations). Fresh carcasses have been found with impressions from flood gates on the surface of the skin, but these imprints tend to fade as decomposition progresses. If the carcass is badly decomposed when examined, the cause of death from a gate may be unclear by external inspection (Reynolds and Odell, unpublished). Necropsies reveal massive internal injuries, including numerous crushed or disarticulated bones, ruptured organs, extensive bruising or blood in body cavities. The injuries are often bilateral or dorsal-ventral.

Flood Gates

Tributaries that discharge to Biscayne Bay are part of a network of canals that were constructed in the early 1900's by the U.S. Army Corps of Engineers (USACOE), primarily for drainage to provide land for agriculture and other development. Subsequently, barriers or dams were installed on the coastal canals to prevent salinity intrusion and excessive drainage. Thirty years ago, most of the dams were replaced by remotely operated hydraulic gates known as flood gates or salinity control structures (SCS). The canals and flood

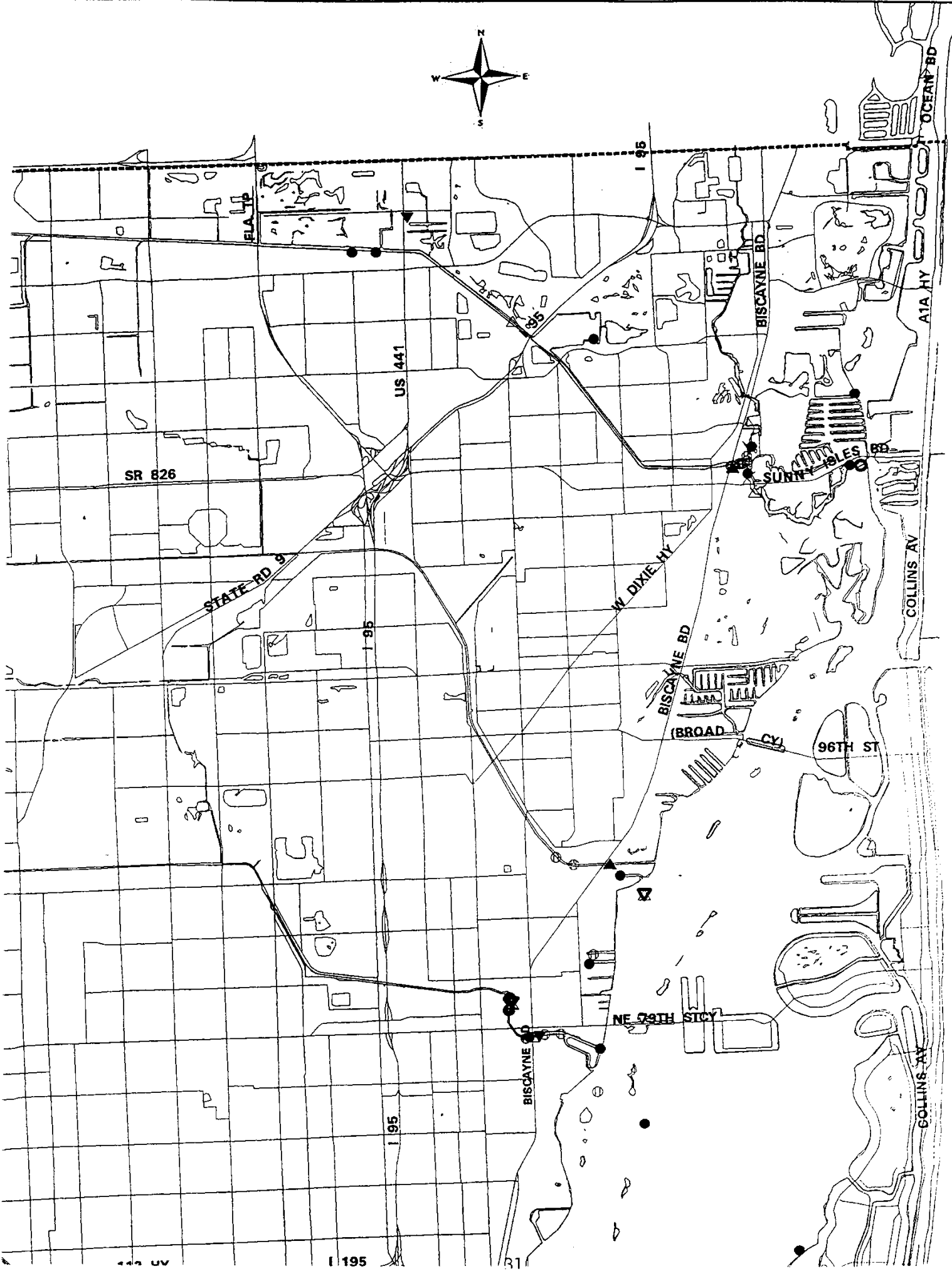
DADE COUNTY MANATEE CARCASS RECOVERY LOCATIONS 1974-1994

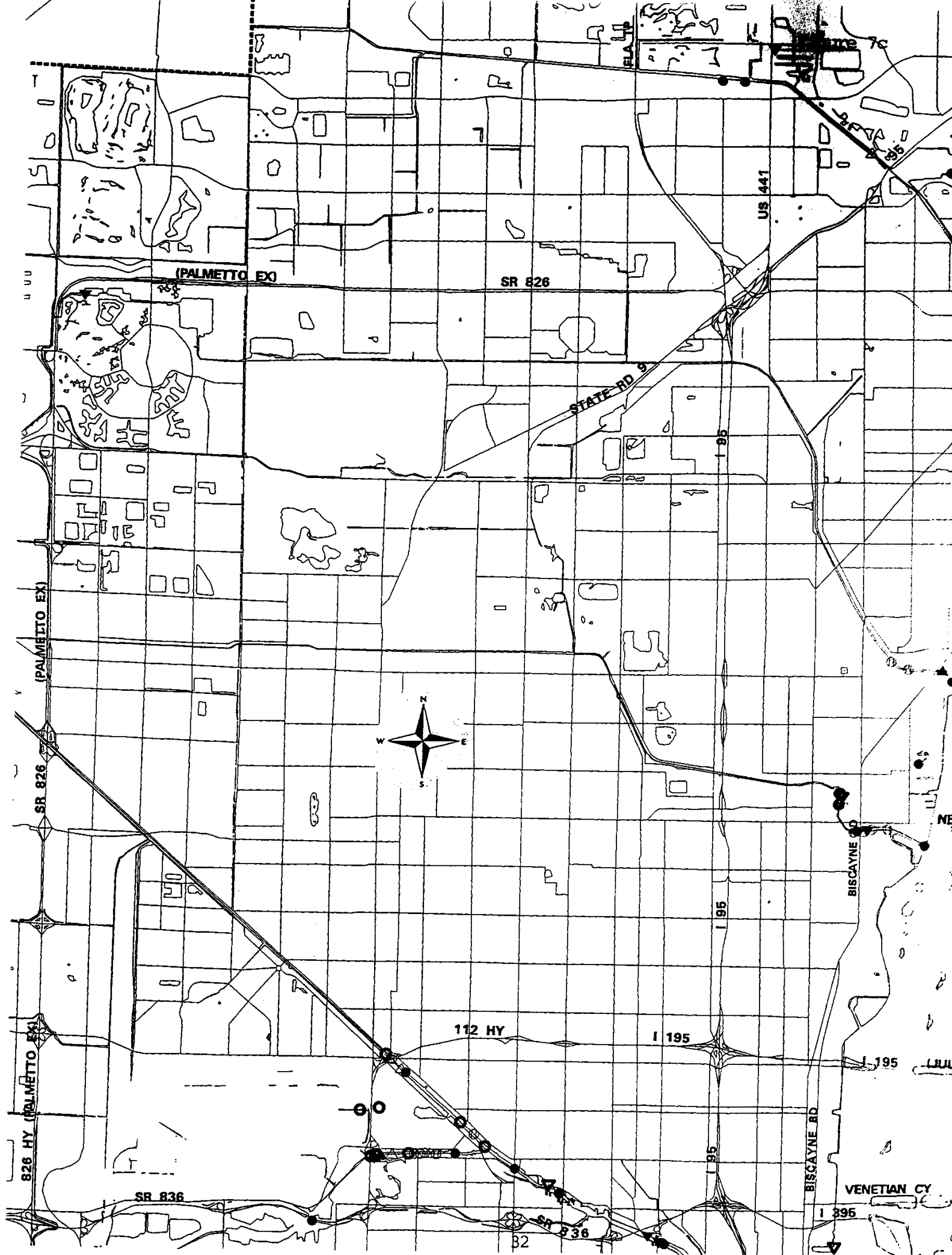
(Source: Florida Department of Environmental Protection,
1995)

- VESSEL COLLISION
- ⊙ FLOOD GATES
- OTHER HUMAN
- ▼ DEPENDENT CALF
- ◆ OTHER NATURAL
- ▽ VERIFIED-NOT RECOVERED
- ▲ UNDETERMINED-DECOMPOSED
- △ UNDETERMINED



Figure 7b



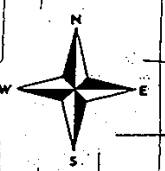


(PALMETTO EX)

SR 826

US 441

STATE RD 9



(PALMETTO EX)

SR 826

826 HY (PALMETTO EX)

112 HY

I 195

BISCAYNE RD

SR 836

VENETIAN CY

B2

I 395

BISCAYNE RD

I 195

I 95

I 95

SR 838

SR 839

SR 840

SR 841

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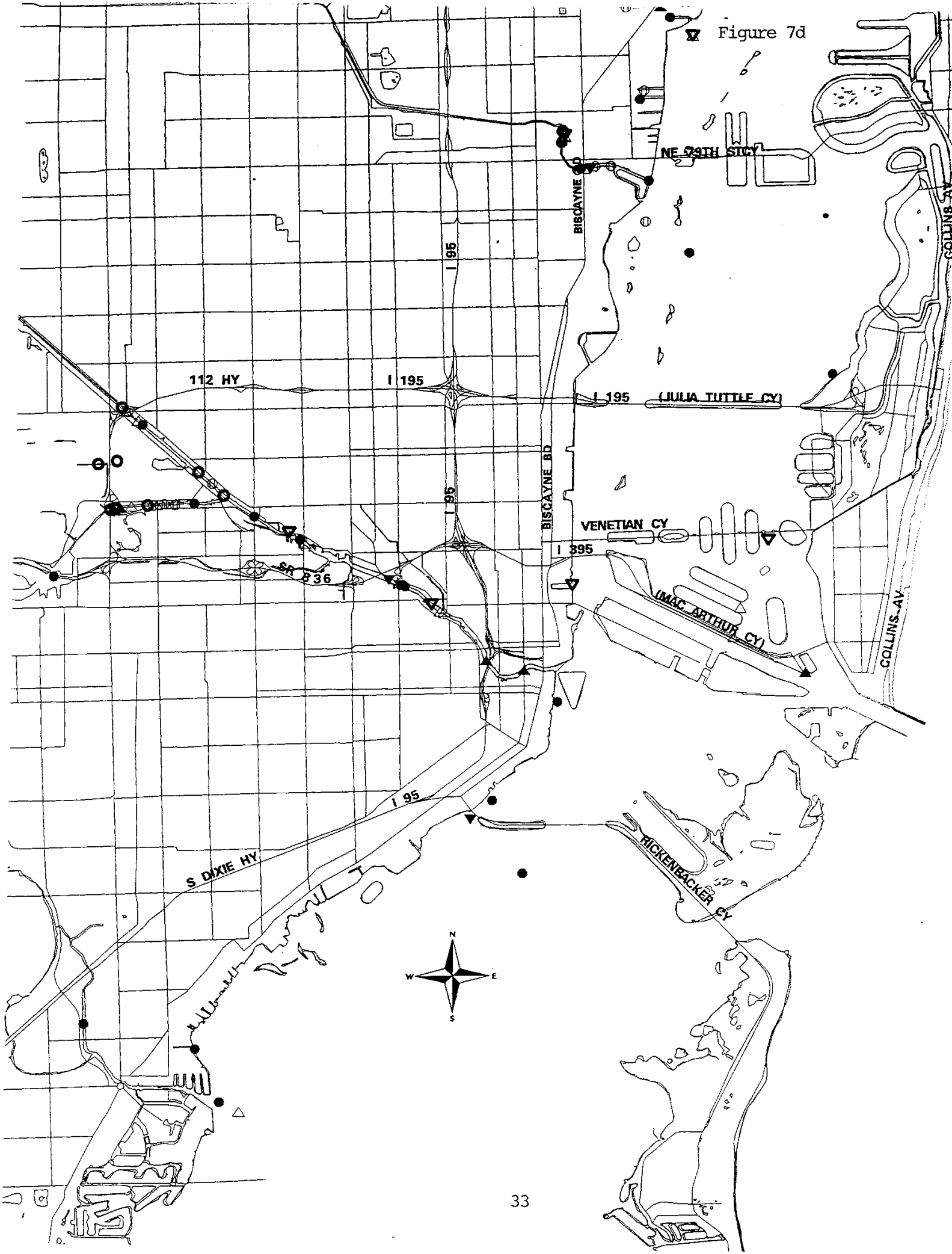
SR 897

SR 898

SR 899

SR 900

Figure 7d



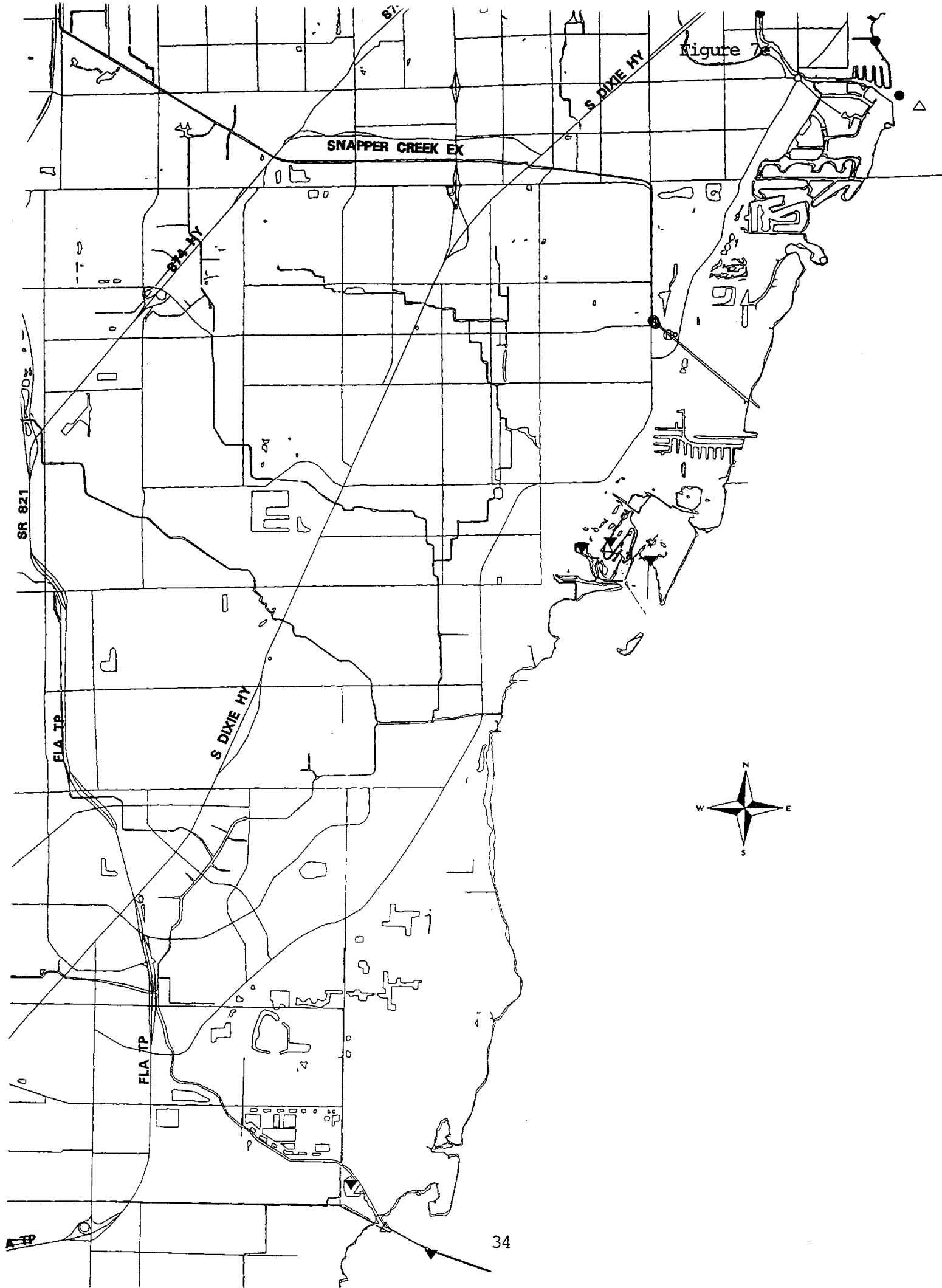


Figure 7a

SNAPPER CREEK EX

S DIXIE HY

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FLA TP

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FLA TP

A TP

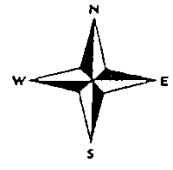
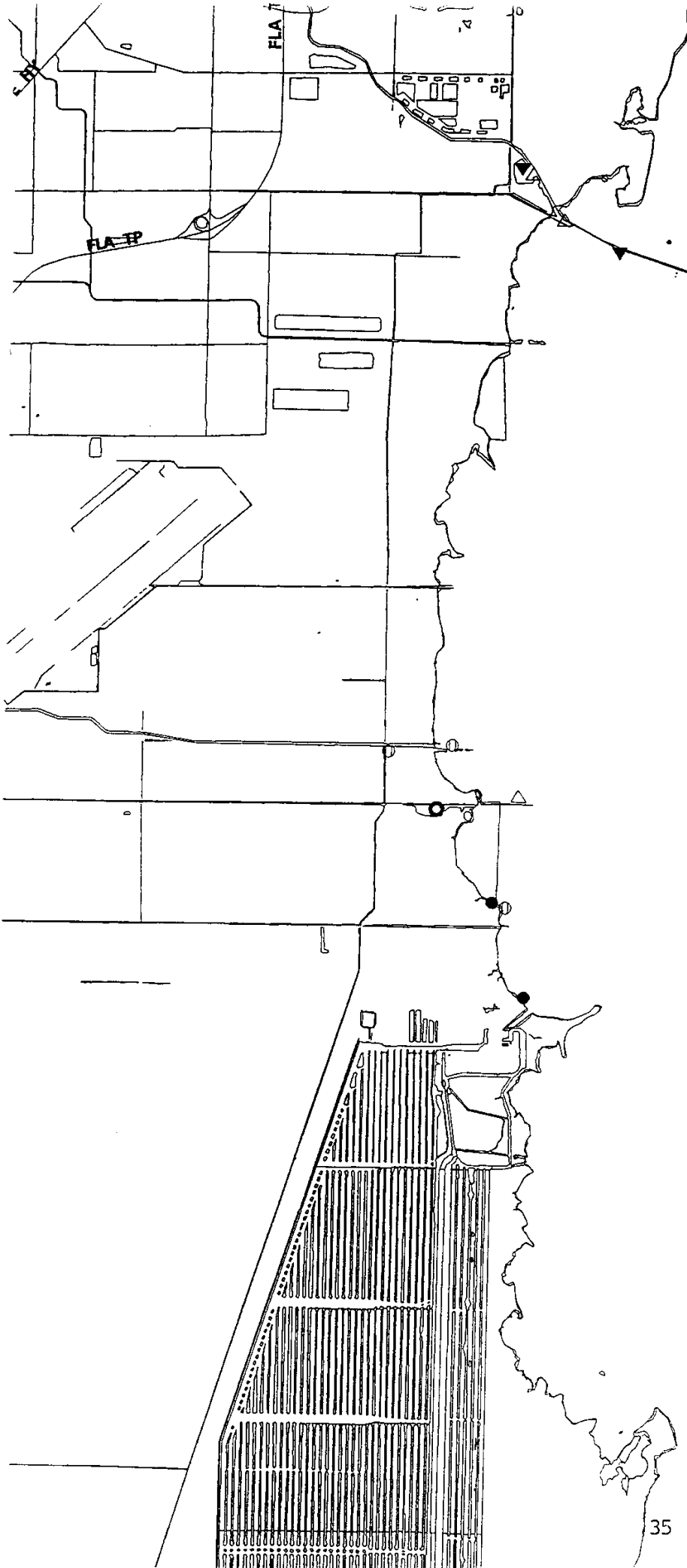


Figure 7f



Causes of Death for Manatees Recovered in Tidal Portions of the Miami River

1974 to December 1994

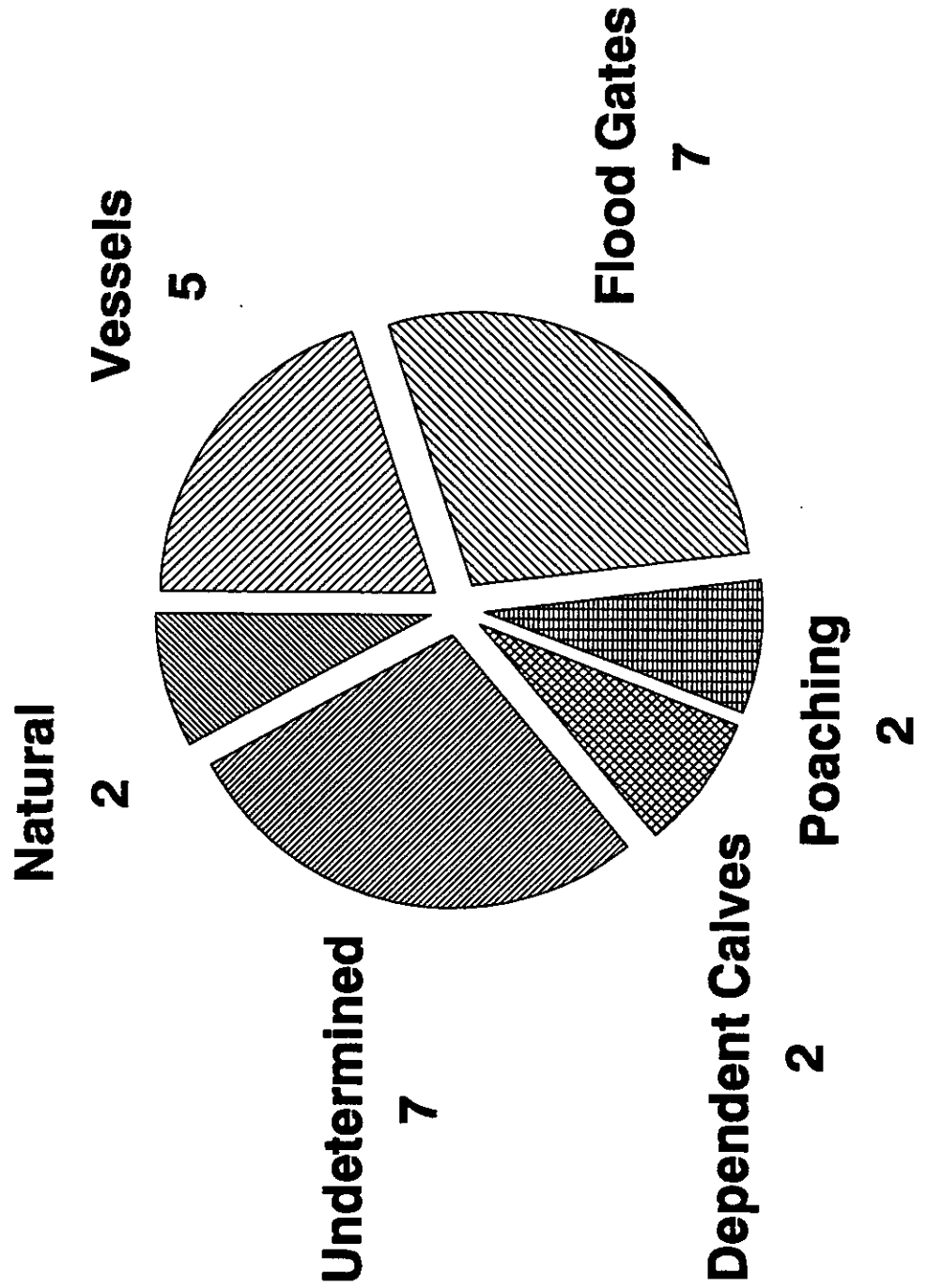


Figure 8

Dade County Flood Gate Manatee Mortality

By Month January 1974-December 1994

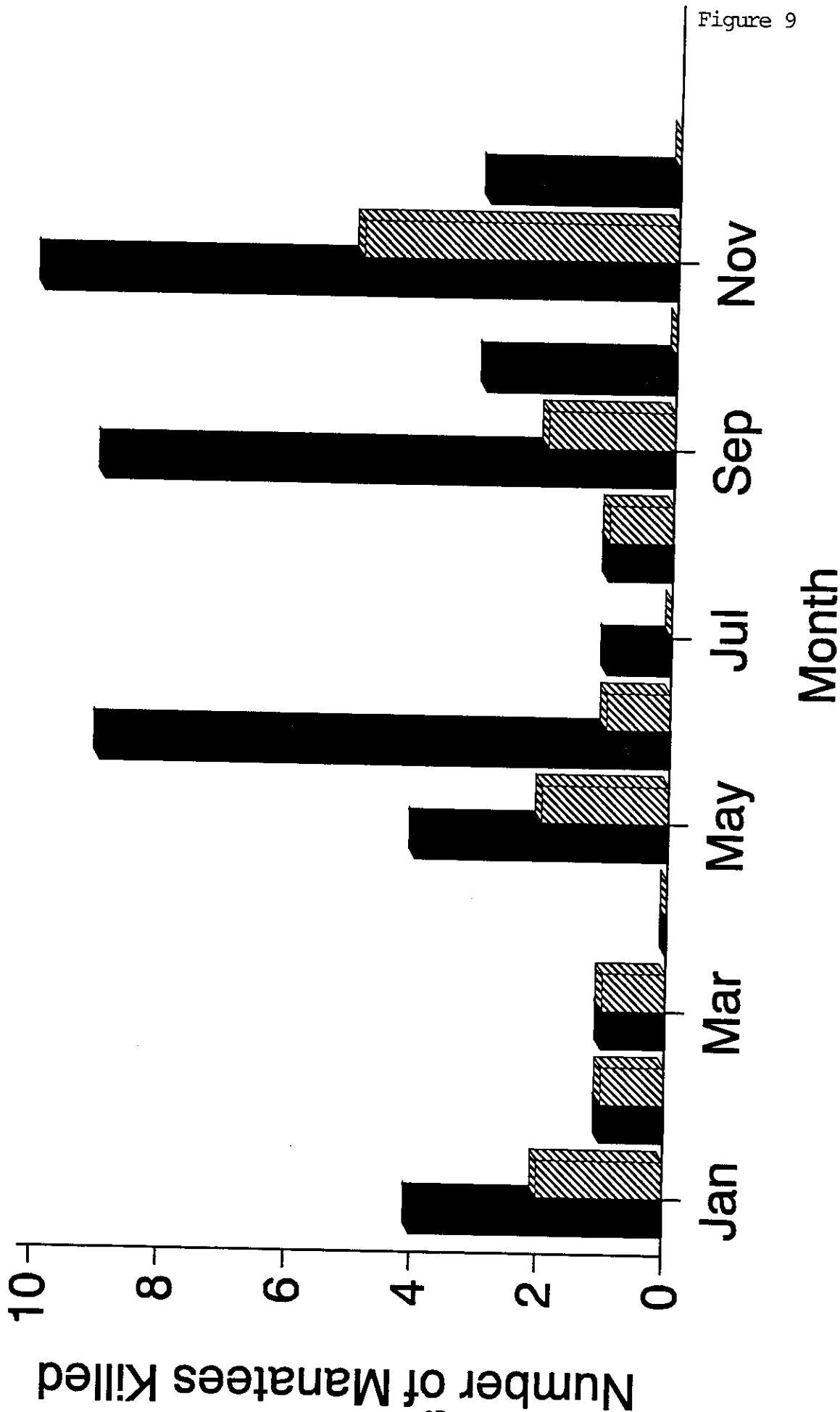
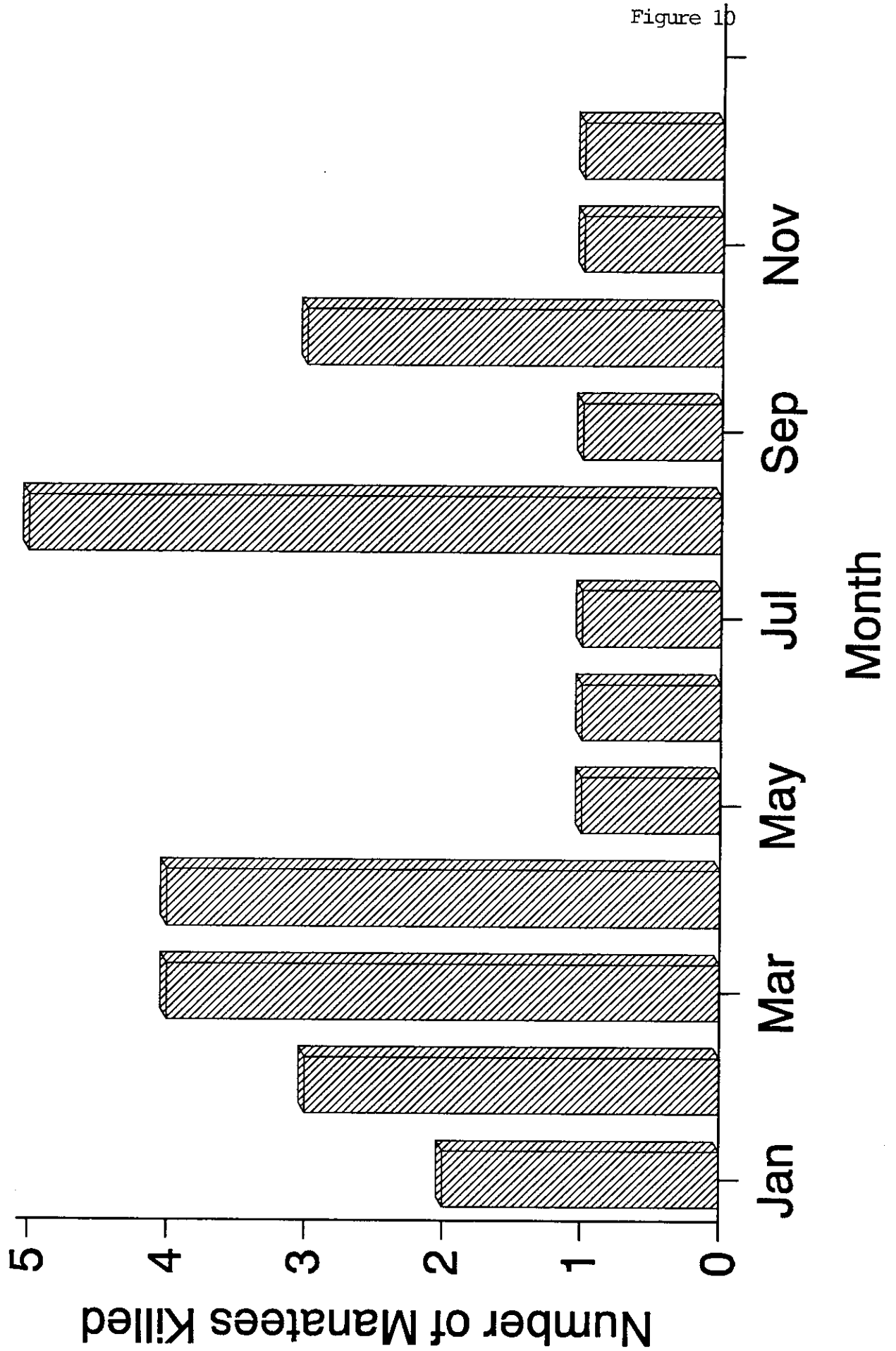


Figure 9

Dade County Vessel Related Manatee Mortality

By Month January 1974-December 1994



II. Existing Conditions

gates/SCS, are operated and maintained by the SFWMD for the primary purposes of flood control and water supply protection (pers. comm. Julio Fanjul, SFWMD, 1993).

Manatees aggregate in large numbers (20 or more) on the downstream side of some flood gates in Dade County during the winter, where they have been observed drinking fresh water, resting, feeding, nursing and mating. Using scar patterns to distinguish individuals, researchers have documented that at least 150 different manatees use certain Dade canals (pers. comm. K. Curtin, USFWS, 1992).

Unfortunately, manatees have frequently been trapped or crushed in the hydraulic gates (Reynolds and Odell, 1979). Manatee mortality data for Dade indicates that at least 46 manatees had been killed by flood gates from 1974 through 1994. This represents approximately 34% of all recorded manatee deaths county-wide and is the single largest cause of manatee mortality in Dade County (Figures 11 and 12). Drowning and/or crushing by flood gates has been a cause of manatee death in Dade in most years in which mortality data has been collected. Flood gate operation has been altered by the SFWMD to try to reduce this cause of death, but methods tested thus far have been determined unsuccessful in preventing mortality. Structure-related mortality has been documented at Snake Creek (S-29), Biscayne Canal (S-28), Little River (S-27), Miami River/Canal (S-26), Tamiami Canal (S-25b), Snapper Creek (S-22), and Mowry Canal (S-20F).

The manatee mortality data base shows that manatees have been killed at flood gates in all months but April. Combining all structure-related mortality for all canals or evaluating selected canals independently, reveals no obvious seasonal pattern in mortality (Figure 9).

When recording manatee deaths began in 1974, the flood gates in Dade County operated by opening the minimum amount possible to allow appropriate downstream flow of the floodwaters built up on the freshwater (upstream) side of the gates. It is believed that manatees are most likely to be killed when the gates are partially open, but the opening size is too small for the manatee to completely pass through. Strong current flow through the gate may hold the animal against or in the opening (Odell *et al.*, 1979). Most animals killed by structures exhibit massive soft tissue damage, internal hemorrhaging, or disarticulated bones. Injuries may often, but not always, include impressions, scrapes or bruises on the skin from flood gates, and broken or crushed bones. A review of necropsy report summaries suggests that approximately 15% of the structure-related deaths in Dade could be attributed to drowning (evidence of post-mortem crushing or no evidence of massive tissue damage in otherwise healthy animals with external gate marks).

After repeated flood gate structure-related manatee deaths were documented during the late 1970's at several canals in Dade County, efforts were made to modify the gates or their operation. One of the first methods considered was the construction of a mechanical barrier that would prevent manatees from moving through an open gate. Such a device was tested in Tamiami Canal (S-25b) in 1979, when an iron grate barrier was placed 8 feet downstream of the gate. The gate was designed so that the upper section could be rotated out of the water to clear floating debris. In spite of the self-cleaning design, the barrier became

CAUSES OF MANATEE MORTALITY IN DADE

1974 to December 1994

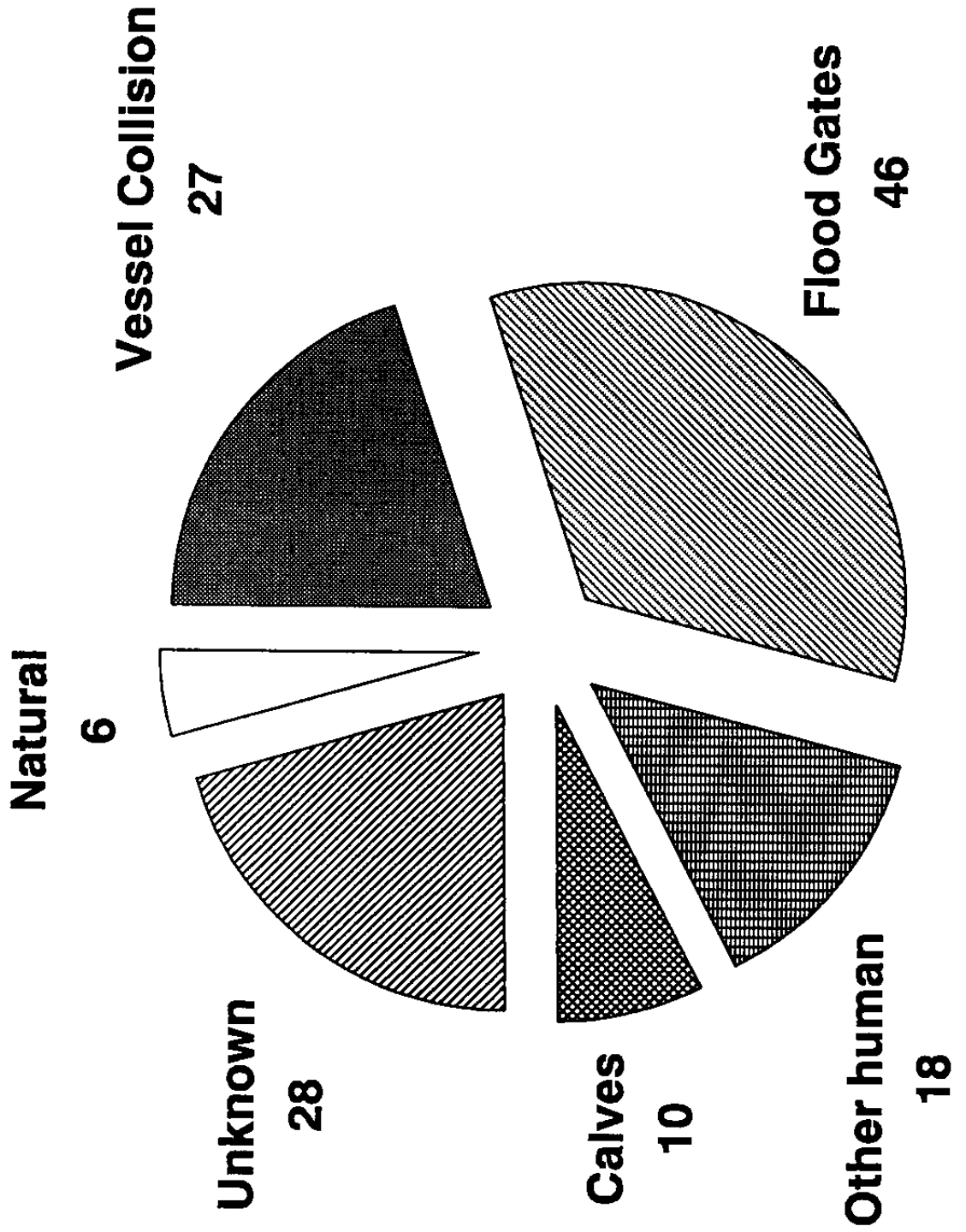
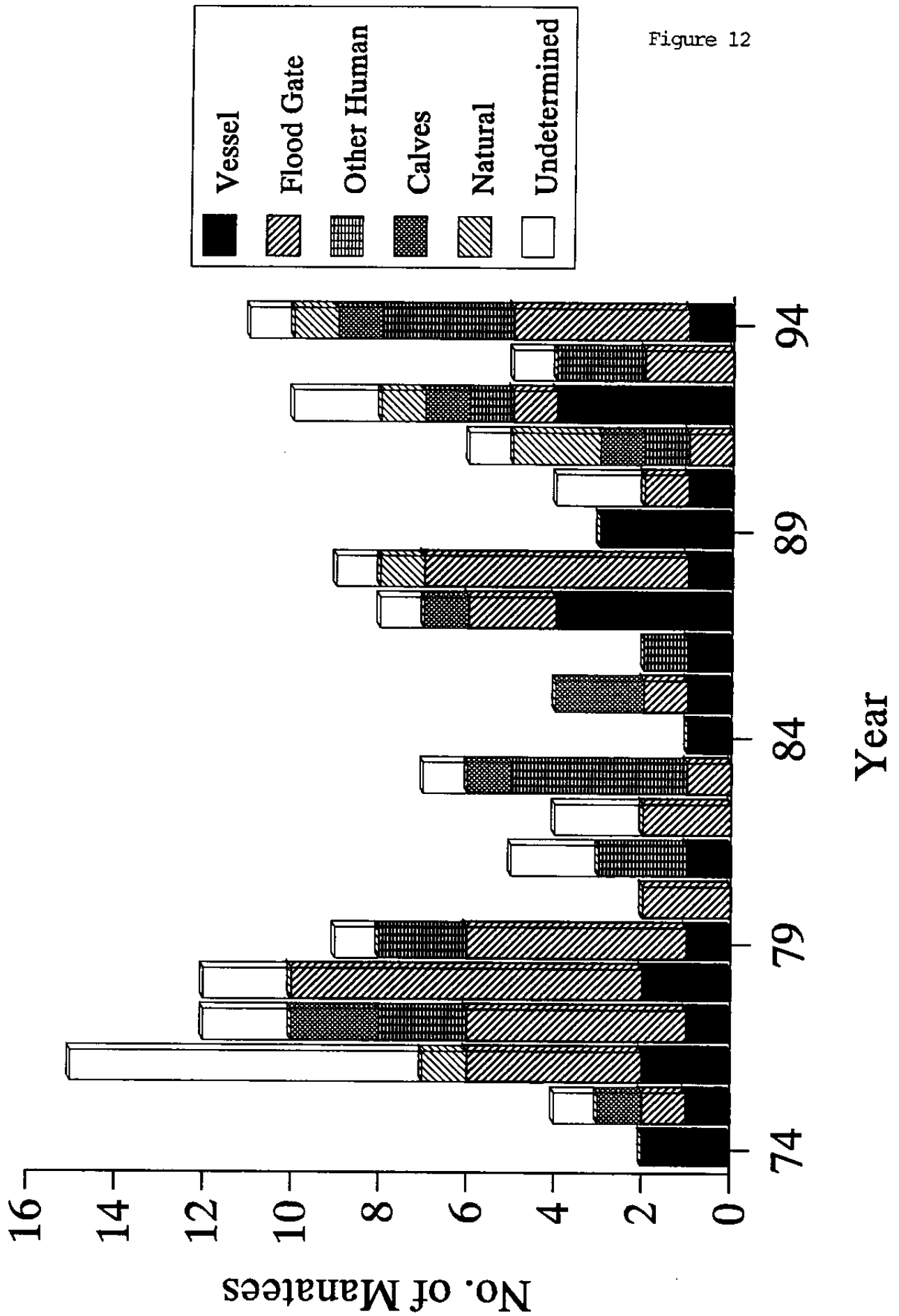


Figure 11

Manatee Deaths in Dade County



II. Existing Conditions

obstructed with unmanageable amounts of trash, which threatened to restrict flow or normal gate operation, and this approach was abandoned (SFWMD, 1991). The barrier approach is not a preferred alternative from a biological perspective since such structures interfere with existing manatee travel corridors and habitat use patterns. Following interagency meetings on the manatee-flood gate problem in the late 1970's, the operation of selected coastal gates was modified to initially open to an elevation of 2-1/2 feet, which would allow manatees to pass through the gate. This was accomplished by installing electrical control circuits consisting of timers, relays and limit switches which caused gates to immediately open to 2-1/2 feet and close at a slow rate of 6 inches per minute. The initial "manatee circuit" allowed the gates to partially close, depending on the amount of discharge required to meet flood protection criteria and prevent saltwater intrusion. The Snake Creek gates (S-29) were the first to be modified in August 1979, followed later that year by Biscayne Canal (S-28), Little River (S-27), and Snapper Creek (S-22), the sites of the most frequent mortalities. Gates on the Miami River (S-26) were modified in March 1976, and the Tamiami Canal structure (S-25b) was modified by 1980. This approach was utilized until late 1988, when due to continuing manatee mortality, further improvements were required to cause the gates to close completely, instead of remaining partially open. This circuitry was installed on the gates listed above by October 1988, and on coastal structures at Black Creek (S-21) and Mowry Canal (S-20f) by January 1991 (SFWMD, 1991).

Although structure-related manatee deaths declined on an annual basis following installation of the initial "manatee circuits", total annual manatee mortality decreased county-wide; it is possible that a smaller number of the animals were present in Dade during this period. Furthermore, manatees continued to be crushed and killed, sometimes with alarming regularity in certain structures. It is not clear in some cases whether manatees were killed because gates had malfunctioned or because the 2-1/2 foot protocol failed to resolve the problem. In either event, it is apparent that existing strategies failed to protect manatees from structure related mortality.

Analysis of gate operation records show that use of the manatee circuit may result in an oscillation or "yo-yo" effect of the gates cycling up and down repeatedly. By the time the gate reaches the 2-1/2 foot position, the water elevation changes enough to signal for closure, then opening immediately, thereby increasing the number of gate actions and increasing the opportunity for manatees to become trapped. This action also creates accelerated wear and maintenance problems at the structures. The SFWMD has developed computer algorithms to control the gate operations with the multiple objectives of maintaining flood and water supply protection and 2-1/2 foot openings, while minimizing the number of gate cycles. Preliminary tests indicate that the oscillation is minimized using a central computer and algorithm to control the gates through microwave telemetry. This approach was implemented at Dade coastal structures during late 1991 and January 1992.

An interagency task force was developed in Fall 1991 to deal with the problem of manatee mortality due to flood gates and canal locks (where manatees are also crushed). The task force is composed of staff from the SFWMD, DEP, USFWS, USACOE, and DERM. The goal of the task force is to develop solutions to the flood gate and canal lock problems which can be implemented statewide to reach zero manatee mortality for this cause of death. The strategies for achieving this goal can generally be divided into two categories:

II. Existing Conditions

modifications to structures and their operations that reduce the risks of manatee entrapment in the closing gates, and modifications to structures that would prevent mortalities when animals become entrapped. As a result of the first meeting, the SFWMD procured and modified commercially available sonar (fish-finder) devices to determine if such technology could detect manatees in the vicinity of structures. Initial modifications of beam width, sensitivity and frequency, and the addition of scanning capability suggest that sonar may detect manatees, even in bounded, highly turbulent waters. The sonar idea was dropped until 1995 when the USACOE Waterways Experiment Station tested such a device at a lock to determine its feasibility. A report on the matter is expected in early 1996.

In November 1992, the SFWMD installed a prototype manatee protection device on one of the two flood gates at Little River (S-27). The pressure sensitive device (PSD) is composed of peg-like Teflon coated "fingers" spaced 6 inches apart and located in a row parallel to the edge of the flood gate. The PSD "fingers" are set back approximately 8 inches from the leading edge of the upstream side of the gate. The PSD projects below the bottom edge of the flood gate and is designed to detect an obstruction placing 3 pounds or more of pressure on the PSD. If an obstruction is detected as the gate is closing, the gate is designed to reverse direction and immediately reopen to 2-1/2 feet, and simultaneously signal an alarm at the SFWMD headquarters in West Palm Beach where the gate operation is monitored.

In December 1992, the second flood gate at the Little River structure was removed for routine maintenance and to have the PSD manatee protection device installed. Stop logs composed of sheet metal walls surrounded the dewatered area at the missing flood gate, and only the first flood gate with the PSD was operational until mid-March 1993. In January 1993, a manatee's head was crushed in the first flood gate with the prototype manatee protection device in operation. The cause of the system malfunctioning was not determined. Although the PSD alarm did not sound in the West Palm Beach office of the SFWMD, records indicate that several hours before the carcass was recovered, the gate did not close as programmed, likely due to an obstruction. The SFWMD reported that electrical continuity in the device was confirmed, and that the PSD reversing mechanism was operational prior to and following the manatee death. The manatee protection system malfunction may have been due to transmission problems with the radio signal between the device and the control house, or the animal may not have triggered the PSD due to too much distance between the "fingers" and the edge of the gate and/or due to the spacing between the "fingers" (it appeared that the manatee snout could fit between them, causing them not to trigger), or the cause may be due to some other problem. The gate transmission was hard-wired to the control house later that year to minimize miscommunication in transmission. However, in January 1994, another manatee was crushed at the same structure. In spring 1994, the Snake Creek SCS (composed of four gates) was fitted with a modified PSD with two rows of "fingers", one near the upstream and one near the downstream edges of the gates. In November 1994, a manatee was crushed in the Little River SCS. The gates were tested and worked fine immediately after the carcass was recovered; SFWMD determined a problem with the trigger switch that causes the closing gate to reverse direction, and corrected the problem in mid-1995. The Tamiami Canal flood gate is scheduled to be fitted with the double row PSD in late 1995.

II. Existing Conditions

The interagency task force has strongly recommended that the SFWMD continue to review their possible controls for manatee protection at the SCSs, including a sonar device and other technology addressed in a Corps of Engineers study on flood gate/navigation lock manatee protection devices.

Locks

Navigational or other types of lock structures are not present in Dade County. However, they have been constructed in other areas of the state and are a source of manatee mortality. The animals may be crushed by the opening and/or closing of the gates to a lock, or between a vessel and the side of the lock, or between two vessels.

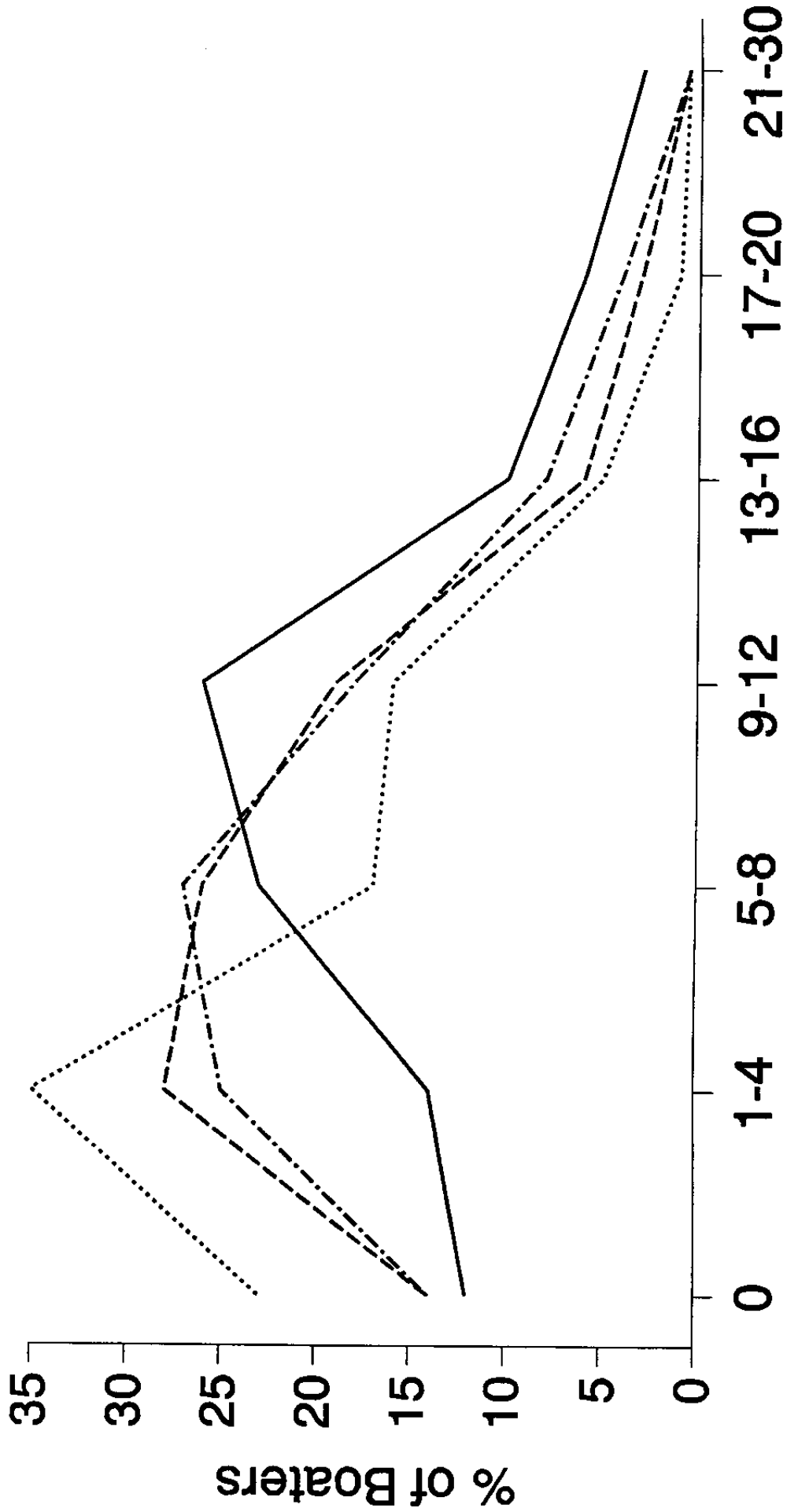
Boating Activity

Dade County boat ramp surveys were conducted during the summers of 1989 and 1990, and winter ramp surveys were conducted during early 1991. A random mail survey was sent to 2,000 people whose boats were registered in Dade County. The results were incorporated into a boating study prepared by the University of Miami Boating Research Center entitled "Boat Use Patterns and Boat Traffic Study, Biscayne Bay, Dade County, Florida". The findings of the study indicate the following:

- Most boaters own 16-26 foot vessels.
- Outboard motors are the most common type of propulsion.
- An overwhelming percentage of boats are stored on trailers at home.
- The number of boating trips per season (Figures 13 and 14) average much higher in summer (June to August) than in winter (December to February). The boating days are primarily on weekends.
- Fishing is the most popular boating activity, followed by cruising, swimming and snorkeling.
- The mail survey showed the choice of offshore destination is highly correlated with the launch site. A boat launched in the southern part of Biscayne Bay, is likely destined for the south area. However, trailered boats are often launched at ramps near the homes of the boat owners rather than near the destinations.
- The most popular destinations are offshore (Atlantic Ocean) and south Biscayne Bay.
- Ramp receipts show that boat ramps in south Dade are used by the largest number of boaters.
- Most boaters depart from ramp sites between 0800-1200 hours and return between 1400-1800 hours.
- The majority of boaters believe that ramp space at the marinas should be increased.
- Surveyed boaters were overwhelmingly in favor of speed limits to promote boating safety and to protect marine life.
- In the mail survey most boaters favored licensing boat operators, but the majority of boaters interviewed in the ramp survey were opposed to licensing.

Number of Boat Trips Reported

(1990 mail survey)



Number of Days Boating

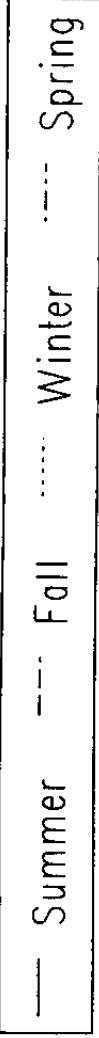


Figure 13

Boat Ramp Use by Season

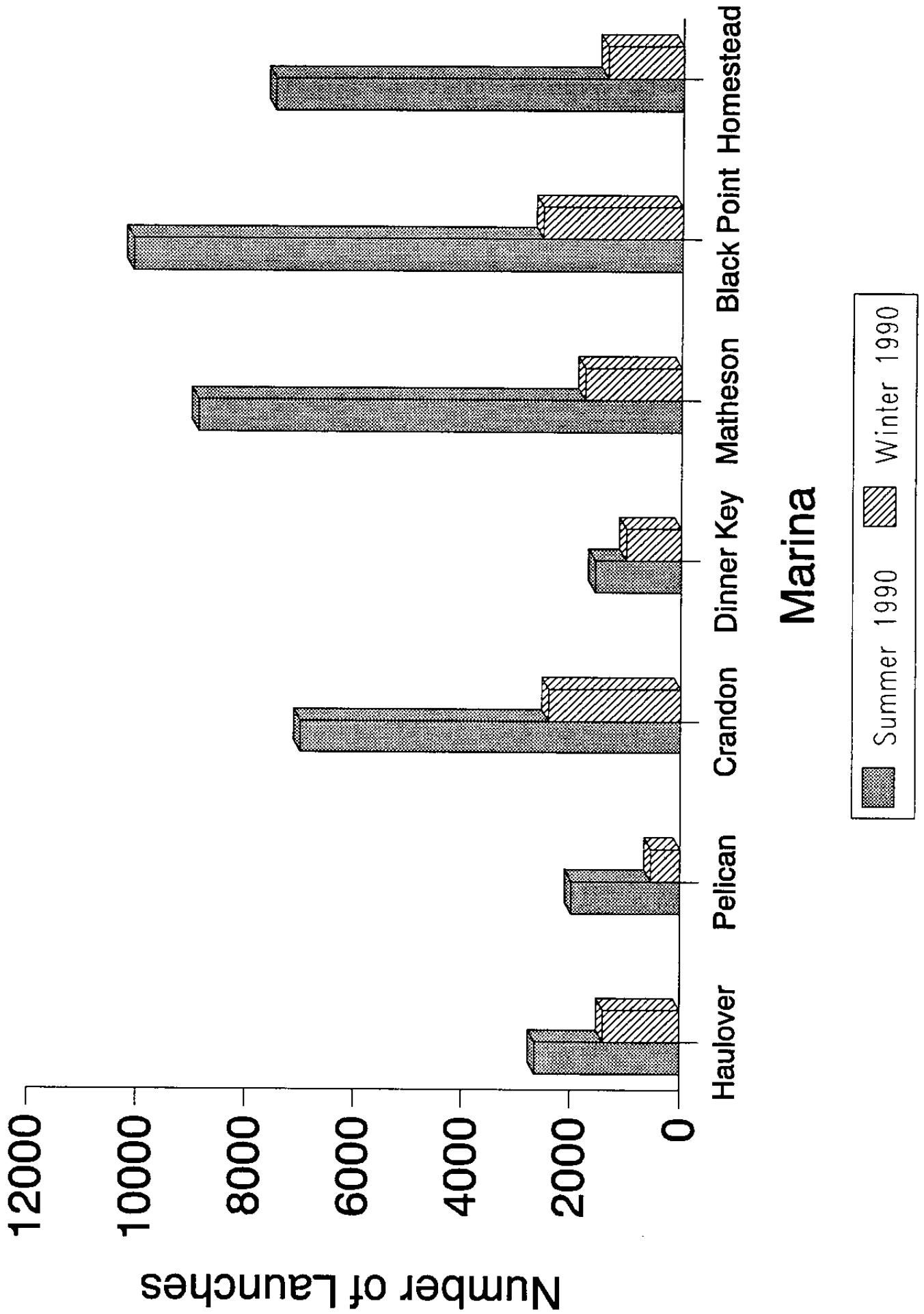


Figure 14

II. Existing Conditions

Figure 15a-c indicates popular boat trip points of origin and destination determined from the surveys. In north Dade where Biscayne Bay is relatively narrow, boat travel patterns coincide with and/or intersect areas heavily used by manatees during the daytime. In south Dade, Biscayne Bay becomes broad, but manatees generally use nearshore grassbeds and channels and mainland tributaries during the day when most boat traffic occurs. According to daytime aerial survey data, manatees do not frequent central or eastern areas in south Biscayne Bay, probably due to shallow water depths and lack of fresh water sources. Thus, the potential for conflict between vessels and manatees is largely limited to the vicinity of the launch site and its access channels.

Manatee mortality from vessel collisions statewide has generally increased with an increase in the number of boat registrations (Figure 1, page 6). Although a much larger manatee population occurs in Dade County during the winter months than during the summer, the number of manatee mortalities from vessel collisions does not change significantly on a seasonal basis (see Figure 10, p.38). Perhaps this is related to the fact that the number of boats on the water is highest during the summer months.

Several types of vessel impacts to manatees may occur. Over half of the manatees that die as a result of a vessel collision, do so from blunt trauma, the impact of the hull or skeg of the boat hitting the manatee. This action often results in broken ribs which may puncture vital organs. Another form of vessel collision mortality is from the skeg and/or propeller cutting through the flesh of the manatee, damaging vital organs or exposing the animal to infection. Manatees also may be crushed by large vessels such as freighters, between the vessel and a bulkhead or between two vessels. Manatees may suffer sublethal impacts from vessel collisions; they may be weakened and therefore more vulnerable to subsequent boat hits, flood gate crushings, cold stress, disease or other cause of death. Female manatees may no longer be able to carry a fetus full term.

Manatees may be harassed by moving vessels, causing the animals to move into undesirable areas in order to avoid the boats. The animals will generally dive or otherwise move out of the path of oncoming vessels, and have been observed by DERM biologists at two locations, moving out of the way of vessels entering manatee occupied waters.

Perinatal

The cause of the statewide increase in perinatal deaths (see Figure 1 on page 6) is unknown, but scientists believe it may be due to contaminant pollution, disease, environmental changes, vessel traffic, or a combination of some of these. Newborn calves cannot survive without a lactating female from which they can nurse. The mother may be seriously injured or killed by a vessel collision, flood gate or other human-related cause; become separated from the calf by a flood gate or while dodging intensive boat traffic, or give birth prematurely when stressed by vessel noise or traffic (Marine Mammal Commission, 1992). DER is further investigating the causes of perinatal deaths, examining such factors as reduced water quality, herbicides and other pesticides, and disturbance of manatee habitat (pers. comm. Carol Knox, DNR, 1992).

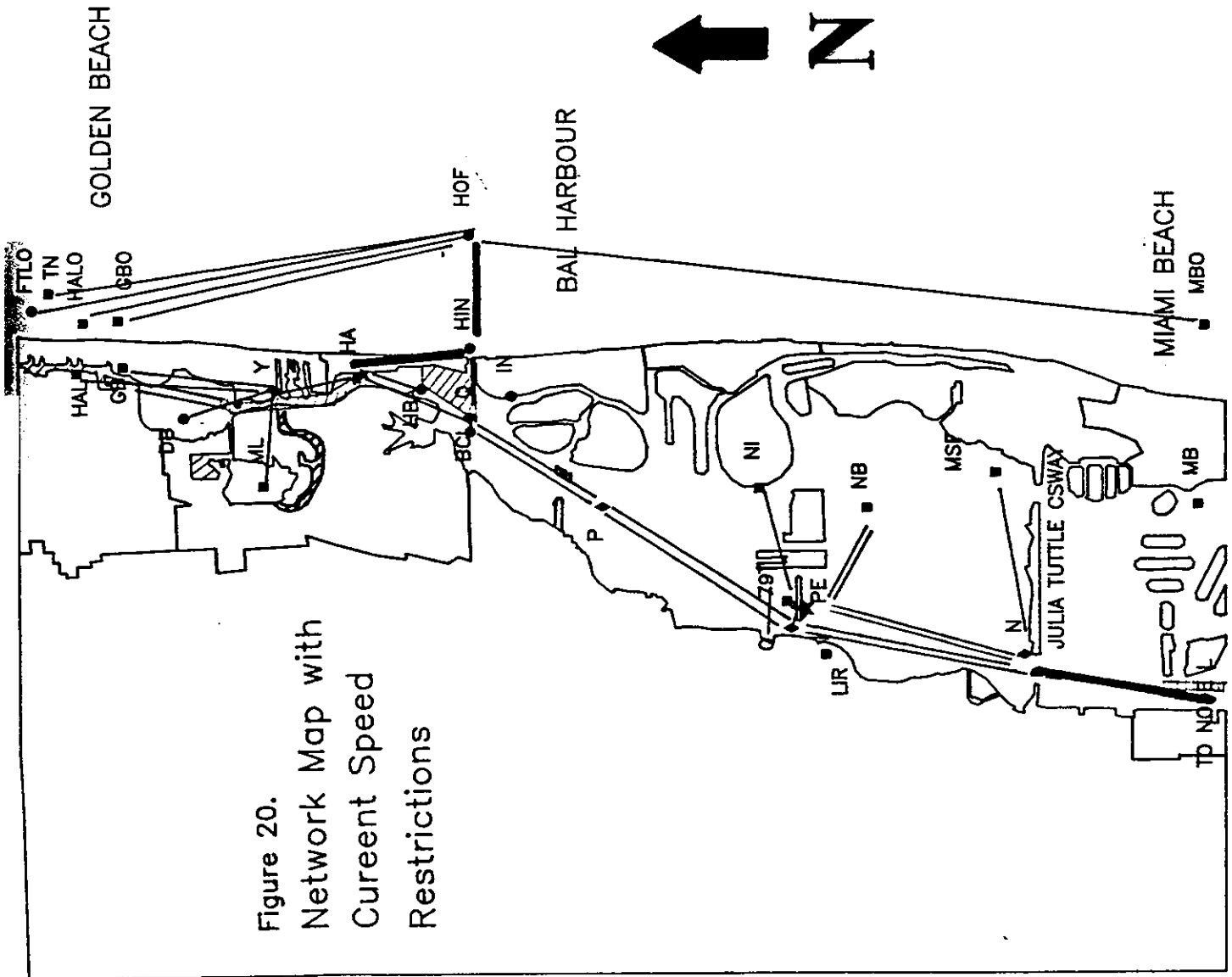


Figure 20.
Network Map with
Current Speed
Restrictions

■ DESTINATIONS

- FTL FT. LAUDERDALE
- TN TENNECO REEF
- HAL HALLANDALE VIA ICW
- HALO HALLANDALE OFFSHORE
- GB GOLDEN BEACH
- GBO GOLDEN BEACH OFFSHO
- DB DUMBFOUNDING BAY
- ML MAULE LAKE
- HBA HAUL BAY
- HIN HAUL INLET
- HOF HAUL OFFSHORE
- BCI BEAR CAN IS
- IN INDIAN CREEK
- LIR LITTLE RIVER
- 79T 79TH ICW
- NI NORMANDY ISLE
- NB NORTH BAY
- MSF MT SINAI FLATS
- MB MIAMI BCH
- MBO MIAMI BCH OFFSHORE

★ RAMPS

- HA HAULOVER
- PE PELICAN

DESTINATIONS

- MIR MIAMI RIVER
- MB MIAMI BEACH
- MBO MIAMI BEACH OFFSHORE
- MI MONUMENT IS
- BY BAYSIDE
- GC GOVT CUT
- GCO GOVT CUT OFFSHORE
- NO NORRIS CUT
- FI FISHER IS
- MAS MARINE STADIUM
- RI RICKENBACKER CSWAY
- BC BEAR CUT
- BCO BEAR CUT OFFSHORE
- KB KEY BISCAVNE
- KOF KEY BISC OFFSHORE
- NNK NO NAME KEY
- CO COCOPLUM
- BB BILL BAGGS
- BBO BILL BAGGS OFFSHORE
- SK SOLDIER KEY
- FO FOWEY ROCKS

RAMPS

- ★ CR CRANDON
- DK DINNER KEY
- MH MATHESON HAMMOCK

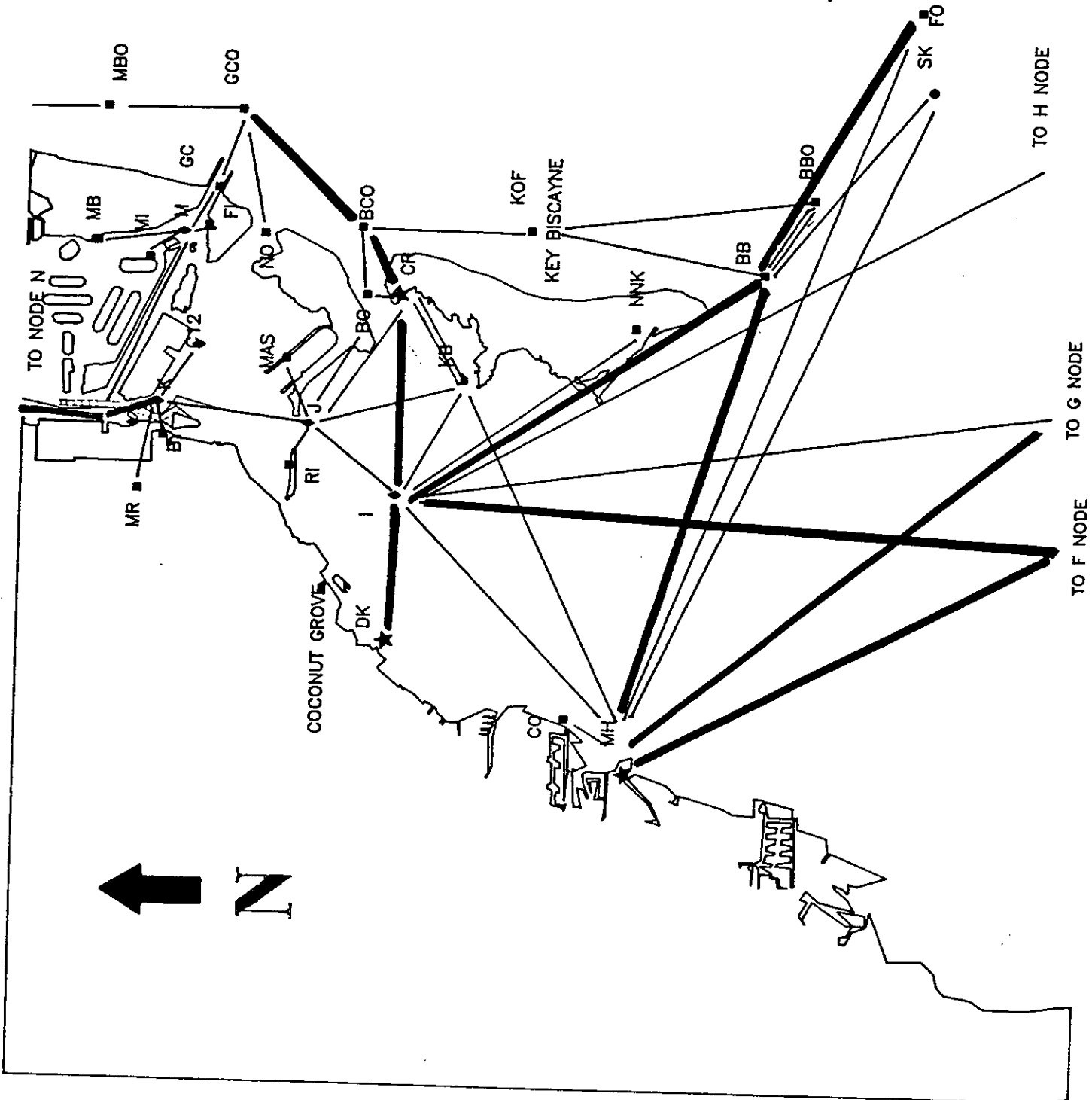


Figure 15b

DESTINATIONS

- SK SOLDIER KEY
- FO FOWEY ROCK
- BCH BOCA CHITA
- LC LEWIS CUT
- LCO LEWIS CUT OFFSHORE
- SF SO. FEATHERBEDS
- SC SANDS CUT
- SCO SANDS CUT OFFSHORE
- EL ELLIOT KEY
- ELO ELLIOT KEY OFFSHORE
- CC CEAZAR CREEK
- CCO CEAZAR CREEK OFFSHORE
- ANK ANGELFISH KEY
- ANKO ANGELFISH KEY OFFSHORE
- KEY TO KEYS
- KYO TO KEYS VIA OFFSHORE
- SR STAR REEF
- TR TRIUMPH REEF
- AR AJAX REEF
- PR PACIFIC REEF
- TP TURKEY PT

RAMPS

- ★ BP BLACK POINT
- HO HOMESTEAD BF

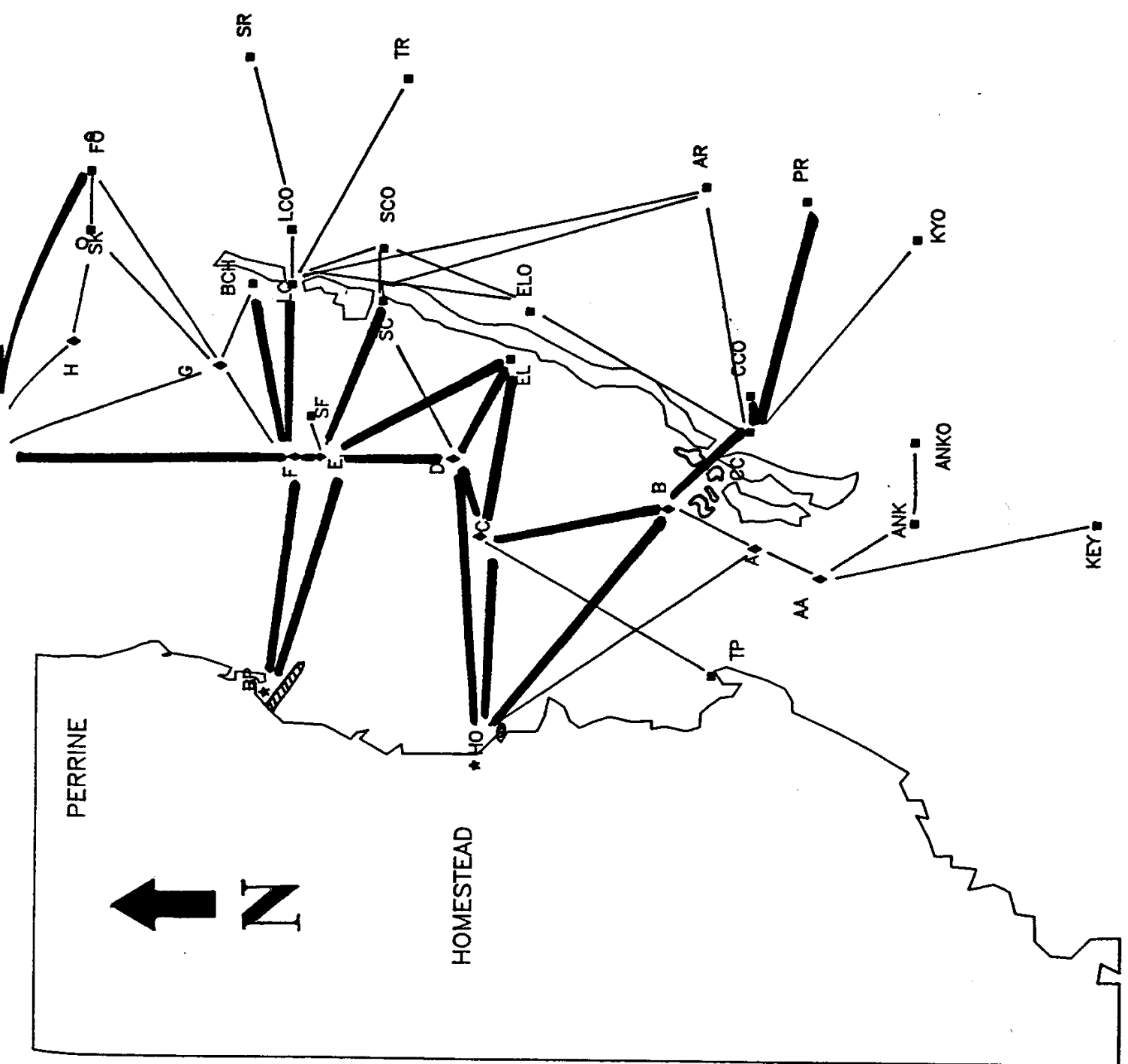


Figure 15c

II. Existing Conditions

Other

Other causes of manatee mortality include poaching, litter (including plastic items and monofilament fishing line), and entrapment in culverts. The two most recent documented cases of poaching in Dade occurred in the Miami River in the early 1980's. While feeding on floating vegetation, a manatee may accidentally ingest plastic, Styrofoam or monofilament line litter, blocking its digestive tract. Manatees may also become entangled in monofilament line which cuts into the flesh and may cut off circulation to appendages. Manatees sometimes drink stormwater runoff from culverts which are partially or entirely submerged, and have become entrapped and drowned.

Between 1979 and 1994, twelve manatee carcasses were recovered from the Miami International Airport culvert/canal system. It is believed that the animals swim into the large culverts which lead into a 2 mile underground culvert system. They likely either become trapped as the culverts narrow and/or water levels decrease, or drown when water levels rise. All of the carcasses recovered at the airport have been too decomposed to determine exactly how the animal died. The extremely decomposed carcasses appear after a heavy storm event when they are flushed out of the culvert system and into an open canal.

Manatees traveling in the fresh water canal system are able to access the airport system at two locations off of Tamiami Canal on the eastern side of the airport. In 1989, the U.S. Fish and Wildlife Service mandated the construction of a barrier at the northern access canal to keep manatees out of the airport. Biologists and airport staff believed that the manatees were entering the airport at this location because the carcasses had been recovered closest to this access point; had they entered through the southern access canal, the manatees would have had to make their way through a 36-inch section of culvert to appear at the carcass recovery locations. The barrier was composed of a series of 5-foot long sections resembling metal bicycle racks with 6-inch spacing between the vertical bars. These sections were held in place by vertical I-beams at either end. The section would slide along the I-beams for easy removal for the purpose of cleaning vegetation or other debris which catches on the vertical bars. Sand-cement rip-rap bags were installed along the bottom of the barrier to prevent manatees from swimming underneath to the airport side of the canal.

Manatee carcasses continued to be recovered after the barrier construction. Biologists from USFWS, DEP and DERM met with airport environmental engineering staff and maintenance staff to closely examine the barrier in 1992-1993. It was determined that when water levels are high in the canal, the barrier cleared the waterline by only an inch or so. Manatees have been observed hoisting themselves over barriers approaching 12 inches in height above the water level in some areas (pers.comm. Sharon Tyson, DNR, 1992), and may have entered the airport side of the canal in this fashion. A second way in which manatees could enter the airport system is by swimming through sections of the barrier which have broken away before they are replaced. The barrier sections are designed to break away during periods of heavy water flow to prevent airport flooding. A third way that manatees may be getting through the barrier is by swimming beneath it. A close inspection revealed that some of the riprap bags had sunk into the soft canal substrate and others had washed away, leaving spaces between the bottom of the barrier and the canal

II. Existing Conditions

bottom. A manatee could conceivably put its head under a barrier section and lift it up on its back as it swims through, since the sections slide on the I-beams.

By late 1993, the airport staff believed that they had corrected these problems to the best of their ability. Additional sections were soldered onto the top of the barrier to increase the height to the level of the adjacent catwalk (which agencies reviewing the problem agreed would be adequate). Airport staff increased the frequency of the barrier inspections, including inspecting immediately after heavy rainstorm events so that sections could be quickly replaced if necessary. The maintenance staff also agreed to look for manatees whenever they worked near the canals. Airport staff locked the barrier sections in place so that they no longer slide without being unlocked, and they added sand-cement bag riprap to fill gaps between the canal bottom and the lower edge of the barrier. They also agreed to have their consultant design an additional barrier to install at the southern access canal in case the animals were entering the system from that direction.

In February and March 1994, three additional carcasses were recovered. The barrier was inspected and appeared to be intact. The airport was advised by DERM and DEP (with approval from USFWS) to install a temporary barrier at the south access canal to keep manatees out until the new permanent barrier was installed. A chain-link fence with sand-cement bag riprap was installed on March 4, 1994. Beginning that same day, a crew of divers waded/swam through the main culvert system in search of manatees (dead or alive); the airport staff did not want to trap manatees with the temporary barrier. The divers found groups of manatee rib bones in two areas of the culvert system, and an additional rib bone in the canal where the recent carcass recoveries occurred. Since the recovered manatee carcass skeletons have been virtually intact, government biologists believe that these rib bones represent at least two additional manatees that died in the system. No live or dead manatees were discovered by the divers. The divers inspected the bottom of the existing barrier and discovered that a couple of riprap bags had washed away, which were immediately replaced. Their inspection of the temporary barrier revealed that the riprap was intact.

Construction of a new permanent manatee barrier at the airport was completed in early 1995. The new barrier design has steel sheet pile driven into the canal bottom, which overlaps the lower edge of the barrier by 6 inches. This will eliminate the need for riprap bags to prevent manatees from swimming beneath the barrier.

Harassment

Feeding and petting manatees can become a serious problem. It may cause the animals to become accustomed to humans and expect to be fed or touched in the future when they see people (pers. comm. Curtin, USFWS, 1992). This can create several problems. An animal may approach people in a power boat expecting to be fed, and may become injured by a skeg or prop when the engine is running. Manatees may begin to rely on humans for food, staying in areas which are not safe for them as long as they are being fed. Some people may feed manatees dangerous objects in order to get the animals to come close to view or touch them. The Save the Manatee Club requested Florida DEP to initiate legislation to make feeding and watering (running a freshwater hose for manatee use) of manatees illegal (pers. comm. Carol Knox, DEP, 1994).

3. Speed Zones, Sanctuary

In 1979, the Florida Department of Natural Resources (DNR) designated the Black Creek area including Black Point Marina as a manatee sanctuary. The "Idle Speed No Wake" zone associated with this sanctuary extends from the Black Creek entrance channel in Biscayne Bay to the salinity control structure on Black Creek and Goulds Canal, and includes all tidal canals in the vicinity. Prior to late 1991, there were no other speed zones in Dade County established for manatee protection, although several other areas were regulated for boating safety. In November 1991, the Florida Governor and Cabinet approved a state rule (Appendix B) establishing many additional vessel speed restrictions for manatee protection. All approved boat speed zones are indicated in Figure 16a-g.

4. Law Enforcement

Boat speed and manatee protection regulations in Dade County are enforced primarily by municipal marine patrols, the Metro-Dade Marine Patrol, Florida Marine Patrol, and the Florida Game and Freshwater Fish Commission. The U.S. Coast Guard also has enforcement authority. In Biscayne National Park and Everglades National Park, some park service employees have been granted authority to enforce these regulations.

TABLE 2

Agency	Total Number of Officers on Staff
<i>Freshwater:</i>	
Florida Game & Freshwater Fish Commission (Dade)	7
<i>Tidal Waters:</i>	
Florida Marine Patrol (Dade)	16
Dade County Marine Patrol	12
Coral Gables Marine Patrol	2
Indian Creek Village Marine Patrol	18
Miami Marine Patrol	6
Miami Beach Marine Patrol	4
North Miami Marine Patrol	1
North Miami Beach Marine Patrol	1

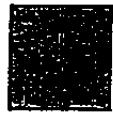
(information updated 2/95)

Waterfront municipalities without marine patrol offices include Bal Harbour, Bay Harbor Islands, Golden Beach, Key Biscayne, Miami Shores, North Bay Village and Surfside.

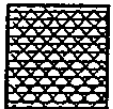
DADE COUNTY VESSEL SPEED ZONES

Including Dade Manatee Protection Zones in F.A.C. Ch.16N-22.025

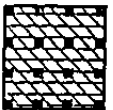
LEGEND:



NO ENTRY



NO ENTRY (RESIDENTS ONLY)
IDLE/NO WAKE FROM NOV. 15 - APRIL 30



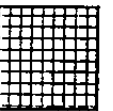
MOTOR BOAT EXCLUSION



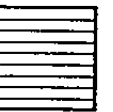
IDLE/NO WAKE ZONE



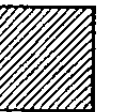
SLOW SPEED



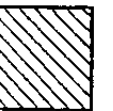
SLOW NOVEMBER 15 - APRIL 30
30 MPH REMAINDER OF THE YEAR



SLOW NOVEMBER 15 - APRIL 30
35 MPH REMAINDER OF THE YEAR



30 MPH YEAR-ROUND

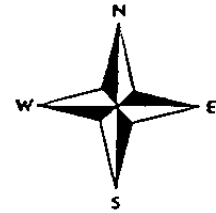


35 MPH YEAR-ROUND

— LAKES/CANALS

NOTE: WHITE AREAS UNREGULATED

EXISTING PUBLIC BOAT RAMPS ►
(in tidal waters)



SCALE

1" = 5280 Ft

1 : 63360

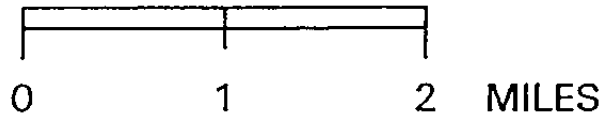
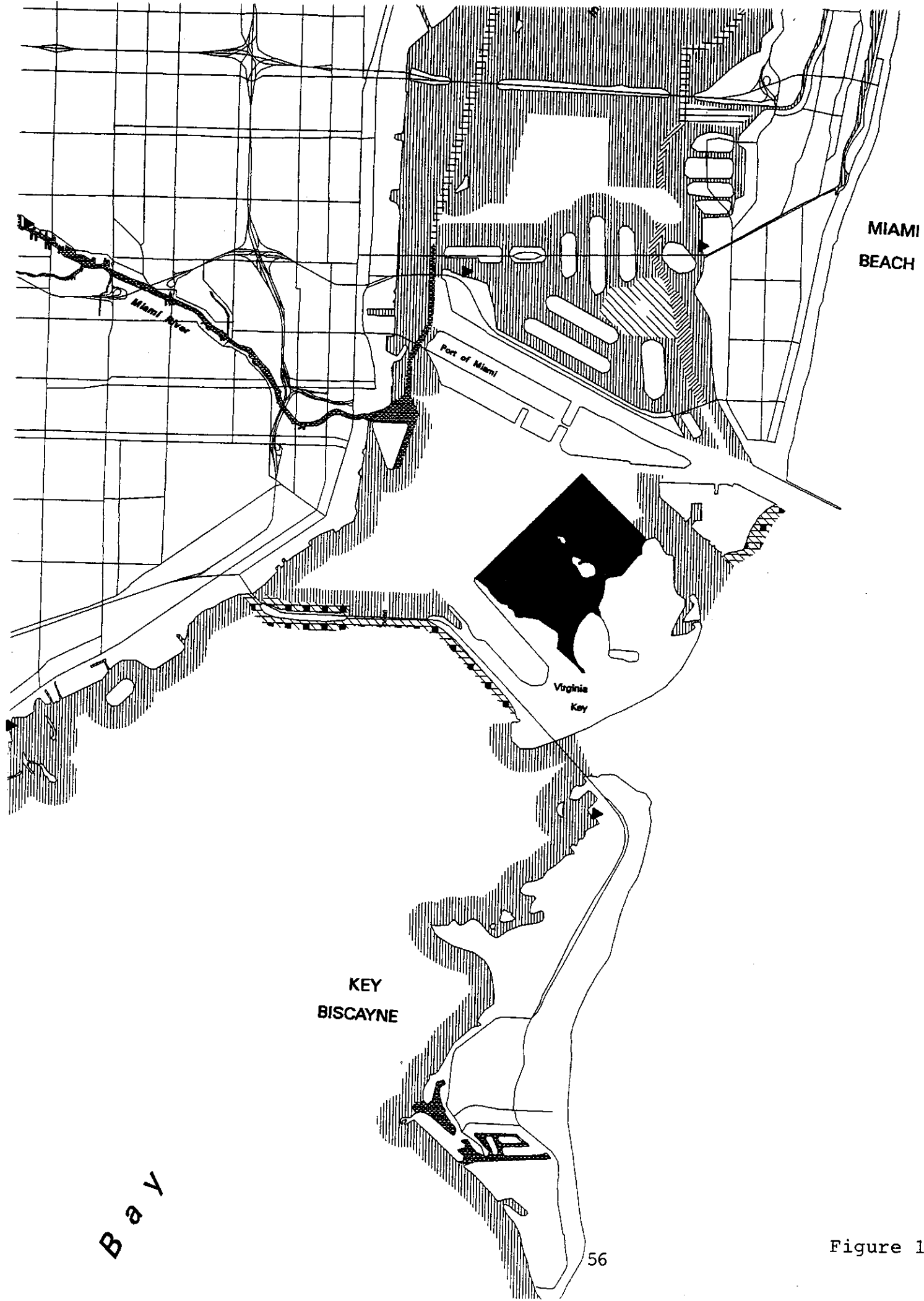


Figure 16a



Figure 166



MIAMI
BEACH

Port of Miami

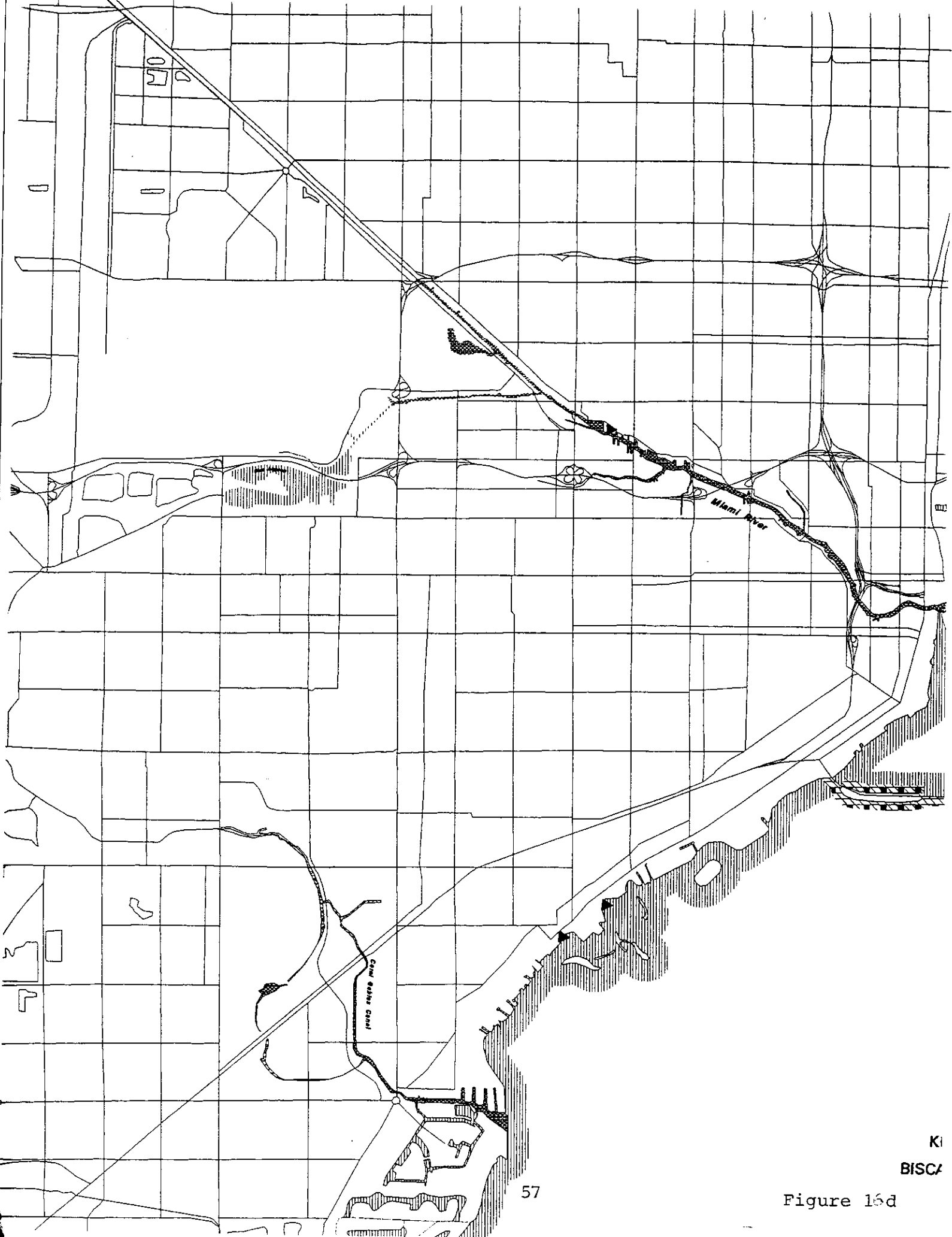
Virginia
Key

KEY
BISCAYNE

Bay

56

Figure 16c



KI
BISCA

Figure 16d

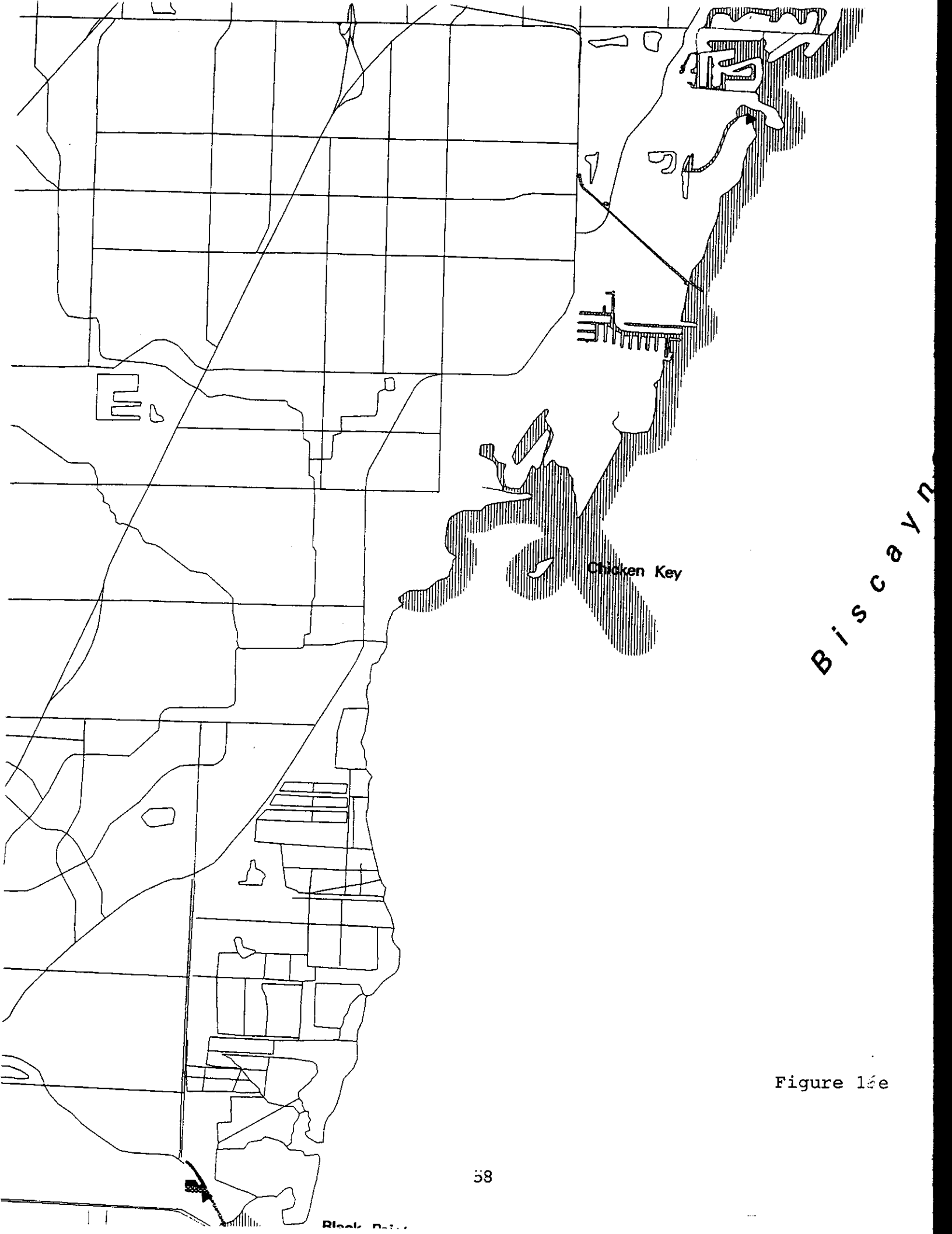
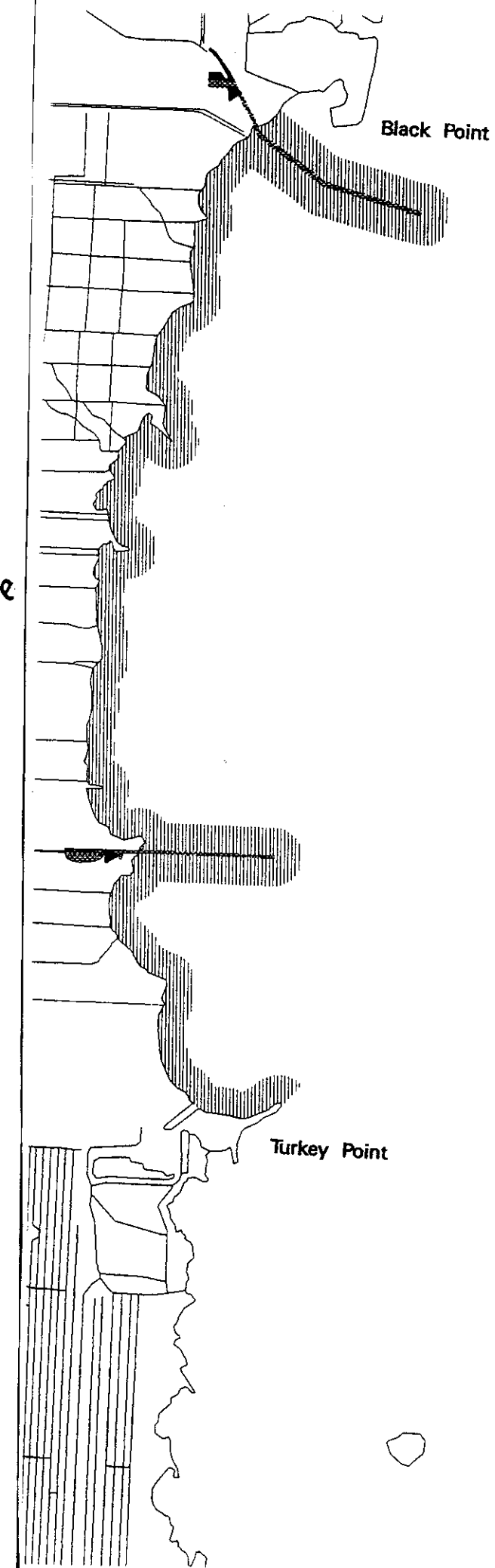
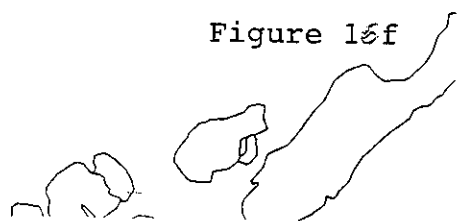


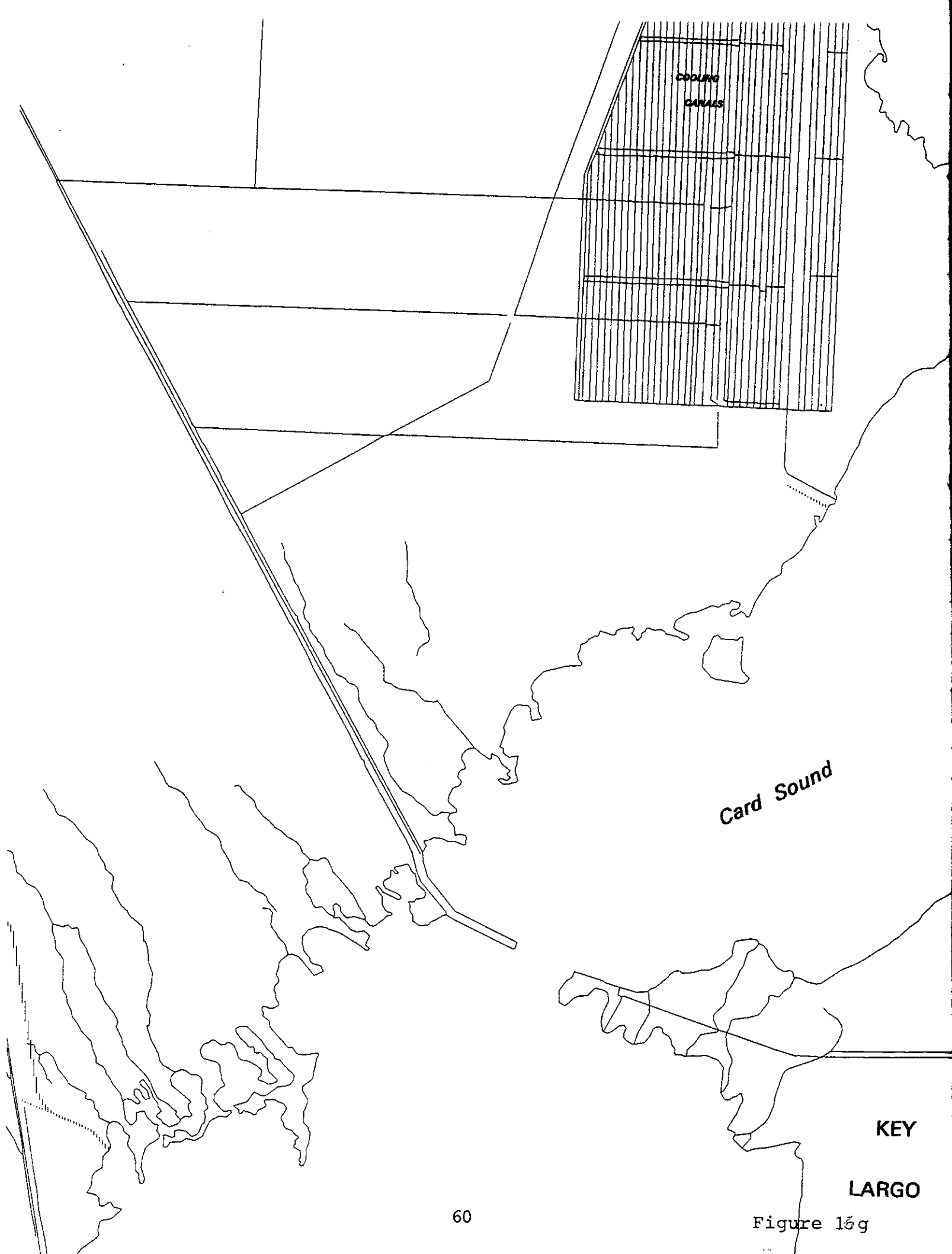
Figure 16e



ISLANDIA

Figure 16f





II. Existing Conditions

C. Local Land Development

(also see section E. Governmental Coordination)

Land development and submerged land development can be critical to manatee survival. Harmful development activities include those which destroy wetland and aquatic vegetation such as artificial canal systems, dredging and filling, and construction of structures such as docks and bulkheads; and the installation of structures which can trap or crush manatees. The construction of facilities which could increase the number of boats in areas utilized by manatees are also considered incompatible with the goal of protecting manatees. Power plants which discharge warm water into coastal areas provide artificial warm water refuges for large numbers of manatees during cold weather. Construction of additional power plants of this sort is considered undesirable because they may temporarily shut down during cold weather, subjecting manatees to cold stress leading to pneumonia.

1. Development Standards

Shoreline and submerged land development may have adverse effects on manatees. The quantity and quality of food resources for manatees may be affected, and development may increase the possibility of injury, harassment and mortality from waterborne activities.

Alteration of the shoreline and upland areas to construct waterfront communities can destroy the natural functions of the shoreline and associated wetlands and degrade water quality. The Biscayne Bay Aquatic Preserve Act prohibits the transfer of state-owned submerged land unless the project is determined to be in the public interest and passes an "extreme hardship" test. This regulation has effectively limited the construction of private marinas and docking facilities (other than those for single family homes) in Biscayne Bay. It should be noted that many tidal areas are not within the preserve and marinas may be constructed in these areas without DEP approval for submerged land use; however, an Environmental Resource Permit (ERP) is required for any activity in wetlands or surface waters in the state. A local DERM Class I coastal construction permit is required in all tidal waters of Dade County. A permit applicant may appeal a decision by DERM to the Dade County Board of Commissioners for a standard form application (or the Environmental Quality Control Board for a short form application). Pursuant to the Code of Metropolitan Dade County, any construction in, on or upon tidal waters in Dade County must be related to a water dependent activity.

2. Comprehensive Development Master Plan (CDMP)

There are several objectives and policies in the Coastal and Conservation Elements of the Dade County Comprehensive Development Master Plan (1990) that are relevant to manatee protection. Coastal Element Objective 1 is to "Protect, conserve and enhance coastal wetlands in Metropolitan Dade County". In a similar vein, Conservation Element Objective 7 states that "the net loss of high quality, relatively unstressed wetlands in Dade County shall cease upon the adoption of this [CDMP] Plan".

II. Existing Conditions

The policies under Coastal Element Objective 1 seek to protect and restore wetlands, restore surface water flows through coastal wetlands and to monitor water quality, benthic habitats and wildlife. Coastal Policy 1A designates "mangrove protection areas" and establishes strict guidelines for any alteration to the designated areas, including the requirement that habitat used by endangered or threatened species shall not be reduced or adversely affected.

Conservation Element Objective 9 and related policies specifically address endangered species protection. Objective 9 states "Freshwater fishes and wildlife shall be conserved and used in an environmentally sound manner and the net amount of habitat critical to federally, state or county designated endangered, threatened, or rare species or species of special concern shall be preserved". Policies include the following:

- prohibition of all activities that adversely affect habitat that is critical to federal or state designated endangered or threatened species unless such activity(ies) are a public necessity and there are no possible alternative sites where the activity(ies) can occur;
- protection and buffering from surrounding development or activities of all nesting, roosting and feeding habitats used by federal or state designated endangered or threatened species, and
- protection, conservation and/or restoration of wildlife habitats when planning for the future development of open space areas.

Coastal Element Objective 3 is to "Maintain and improve the quality of coastal and estuarine waters to meet all applicable federal, state and local water quality standards by 1995". These policies involve:

- the County seeking funds to provide 24 hour enforcement of pollution control laws on the Miami and Little River areas;
- identifying the most environmentally damaging storm water outfalls;
- seeking funds to eliminate or upgrade the outfalls so identified;
- identifying unconsolidated submerged cuts and shorelines which are a persistent source of turbidity, and stabilizing those in public ownership;
- requiring boat facilities with fuel to have secondary containment of underground tanks and wells with continuous automatic leak detection systems;
- seeking the authority and funding to enforce laws regulating discharge of wastewater and bilge water;
- stormwater management techniques which emphasize retention and filtration, and
- monthly or biweekly trash and litter pickup along the shoreline of Biscayne Bay and its islands.

In addition to the above requirements, Conservation Aquifer Recharge and Drainage Element, Objective 2 states "All applicable federal, state and local ground and surface water quality standards shall be met by 1995. Policies include:

- priority listing of existing stormwater/drainage improvements;

II. Existing Conditions

- the continued establishment of best management practices for certain agricultural use such as pesticide mix-loading facilities and handlers of hazardous materials, and
- reduction in the use of hazardous materials and wherever possible, the reuse and recycling of materials onsite.

Objective 4 states “The amount of shoreline devoted to water dependent and water related uses shall be maintained or increased by 1995”. However, Policy 4D indicates as a criterion for the development of marina and other water dependent projects, that the construction or subsequent operation of such a project shall not destroy or degrade “...habitats used by endangered or threatened species”, hammocks, pinelands or salt marshes, mangrove protection areas, and seagrass or hard bottom communities. Additional criteria included in Policy 4D are:

- a minimum 4 feet MLW water depth for marina basin and access channel and direct access to a dredged channel with at least 6 feet of depth at MLW;
- good landside accessibility;
- compatibility with existing surrounding land uses;
- enough land to accommodate the project and required parking;
- consistency with the Shoreline Development Review requirements (Appendix C);
- preservation or improvement of traditional public shoreline uses and public access;
- preservation or enhancement of the quality of estuarine and coastal waters including water circulation, tidal flushing and light penetration;
- preservation of archaeological artifacts or zones and preservation or sensitive incorporation of historic sites, and
- submission of a hurricane contingency plan where applicable.

Other policies under Objective 4 address the maintenance and siting of water dependent uses, including the impacts of marina siting and design, and the necessity of a comprehensive study of the need for additional marinas in Dade. Policy 4B includes minimum review criteria for all new developments, except single family/duplex homes, along the urban shoreline of Biscayne Bay.

3. Marina/Boat Facilities

A marina/boat facility is defined for the purposes of this Plan, as a commercial marina, commercial docking structure, and public or private boat launching facility, which includes wet and/or dry slips. These facilities or their operation may affect manatees and their essential habitat by reducing/eliminating aquatic vegetation in feeding areas, obstructing manatee movements along shorelines, providing a source of contaminants, disrupting wetland functions through dredge and fill work, disturbing or displacing manatees and increasing the probability of boat collisions with manatees.

In 1991, DERM began issuing marine facility operating permits (MOPs) to all commercial facilities and facilities with ten or more slips or storage spaces. The MOP gives DERM the authority to ensure compliance with conditions in federal, state and local coastal construction/dredge and fill permits after permit expiration. The MOP ensures that pollution control equipment or practices such as sewage pumpout facilities, fuel spill management, solid

II. Existing Conditions

waste and waste oil management remain operational. Specific operating conditions are included in each MOP to safeguard against pollution including conditions that were previously part of a coastal construction permit for the facility, adherence to standards in the Dade County Code and implementation of best management practices to materially reduce pollution at the facility.

A list of existing marine facilities and associated occupancy information obtained from the MOP program is found in Appendix D, including Figures 17a-k which show existing marina locations. Proposed new and expanded facilities (as of December 1994) are listed below.

TABLE 3

Proposed New/Expanded Facilities	Address	New Slips
A.F. of Dade T-Site at Aventura	E. Country Club Dr./Yacht Club Way	73
A.F. of Dade - T-Site at Aventura	E. Country Club Dr./Yacht Club Way	1
Alvarez	600 NW 7 St. MIA	10
Aventura	21394 Marina Cove Cir.	26
Barbara	5025 Collins Ave. MB	17 (2 sail)
BPMK	SW 37 Ave. at Coral Gables Waterway	50 sail
Brickell Bay	1408 S. Bayshore Dr. MIA	11
Club Atlantis Condo	2555 Collins Ave. MB	25
Coral Reef Yacht Club	2484 S. Bayshore Dr. MIA	34
Coscan Moorings	21169 Yacht Club Dr.	17 sail
Cricket Club	1800 NE 114 St. NM	25
Deering Bay Air Force Marina	13605 Old Cutler	47(reconstr)
Deering Bay Lagoon	14401 SW 62 Ave.	18 moorings
Fisher Island Visitor Dock	17106 Fisher Island	26
Fisher Island Basin	Fisher Island	5 sail
Fisher Island Floating Dock	Fisher Island	1
Forrest City	194 St. and Collins Ave.	18
Haulover Marina	10800 Collins Ave.	111
International Transport	3440 NW North River Dr. MIA	1
Jockey Club North Basin	11111 Biscayne Blvd. NM	5 sail
Jockey Club South Basin	11111 Biscayne Blvd. NM	16 sail
Le Montcalm Condo Assoc.	18000 N. Bay Rd.	5 (+ sail)
Marine Mgt.. Black Point Marina	24777 SW 87 Ave.	7
Mazacco	500 Sunny Isles Blvd.	5
Merril Stevens	2640 S. Bayshore Dr. MIA	300
Miami River Food Company	400 NW N River Dr. MIA	2
Oceania	16375 Collins Ave. MB	41 sail
Paco Rabonne	5937 Collins Ave. MB	18
Pirate's Spa Marina	8701 SW 248 St.	96 dry
President Marine International	2901 NE 185 St. NMB	9
Rickenbacker Marina	3301 Rickenbacker Cswy MIA	12 floating
Rodriguez	201 NW S River Dr. MIA	32
Rose	1492 Lincoln Terr. MB	6 sail
Rosebud Real Property	3131 NE 188 St.	13?
Seaquarium Village	4400 Rickenbacker Cswy. MIA	31

II. Existing Conditions

Marina Permitting Criteria

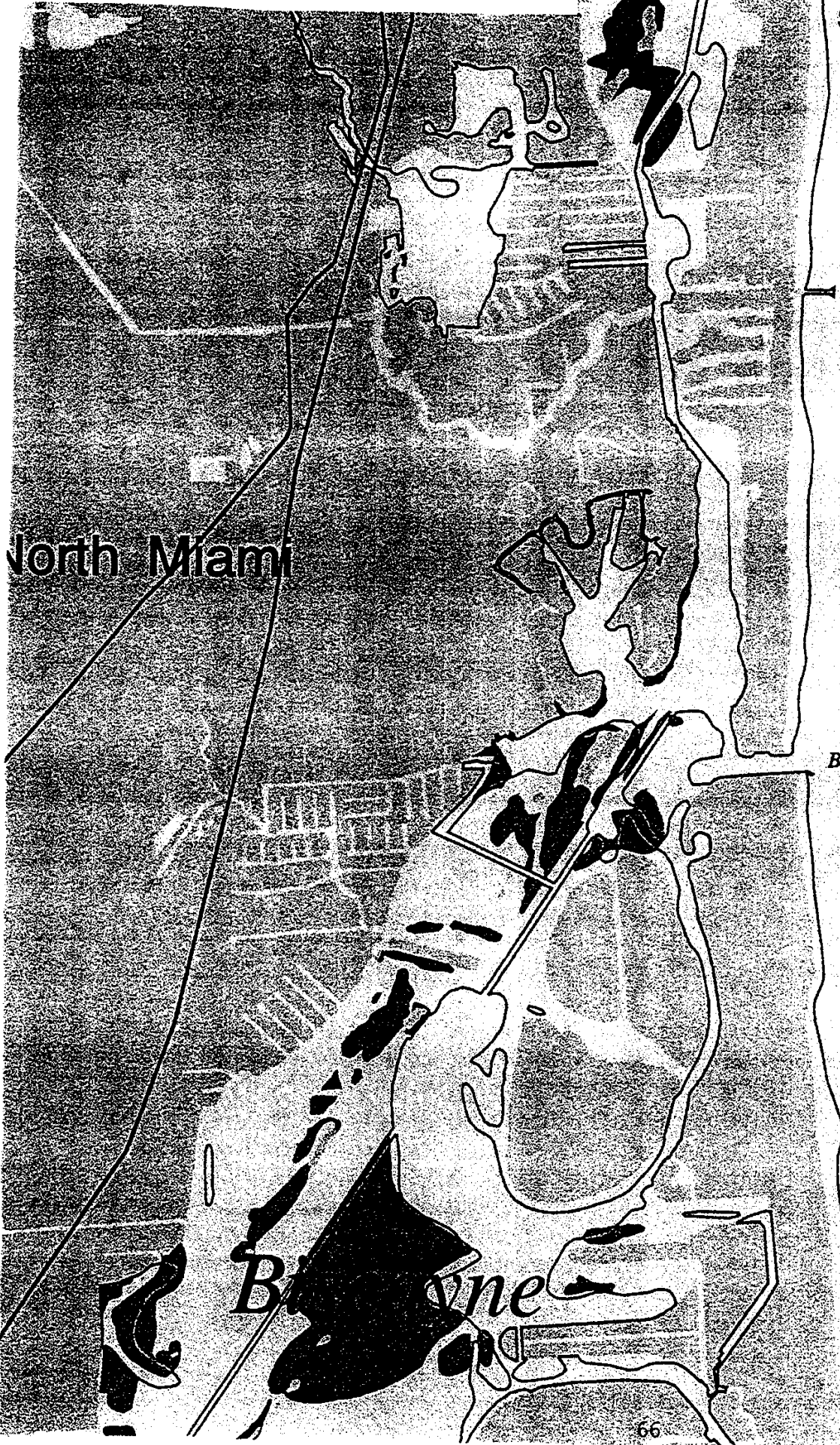
Marina construction permits are required by the U.S. Army Corps of Engineers, the Florida Department of Environmental Protection, Dade County DERM, and any municipality in which the project is located. A submerged land lease or other form of authorization is required by the Florida Department of Environmental Protection (formerly Natural Resources) for marina development upon or over state-owned submerged land. Permitting criteria used by Dade County DERM related to manatee protection are listed. Some of the criteria (*) became effective in 1989, when DNR (now DEP) mandated that Dade and other counties develop manatee protection plans.

- *New marinas with powerboat slips are currently permitted only where the applicant can prove that the facility and associated power boats will not adversely affect the manatee or its habitat; these facilities are limited by DEP to one powerboat slip for every 100 linear feet of owned shoreline. Marinas developed for "sailboats only" may be permitted if other criteria are met.
- *If turbidity curtains are used, they shall be properly secured and regularly monitored to avoid manatee entrapment.
- *All construction personnel are notified of the possible presence of manatees, and are advised of the civil and criminal penalties related to manatee protection. They are provided with the Manatee Hotline (1-800-DIAL FMP) to report injured manatees.
- *In-water construction activity shall cease upon the sighting of a manatee(s) within 50 feet of the project area, and shall not resume until all manatees have departed the project area.
- *For vessels 100 feet or larger, fender systems are required which extend a minimum of 4 feet off the bulkhead at maximum compression.
- *Contractor shall maintain a log of manatee sightings, collisions, or other injuries to manatees that occur during the contract period. This information shall be submitted to DEP, USFWS and DERM within 60 days of project completion.
- *A minimum of two temporary manatee awareness signs shall be installed in the project area prior to commencement of and maintained for the duration of construction activities. Permanent manatee awareness signs shall be installed and maintained at the completed docking facility.
- *An informational manatee display is required.
- *A manatee protection bond is held by DERM until project completion to ensure compliance with manatee protection conditions in marina construction permits.
- The facility must be designed to eliminate or minimize adverse impacts to mangrove wetlands, seagrass beds and any other ecologically important marine communities. Any unavoidable impacts must be offset by substantial mitigation.
- The proposed facility must be designed so as to require little or no dredging or filling. (Some large environmentally sensitive areas are identified in Figure 18a-c, p.66-68, where dredging and/or filling are restricted by existing environmental regulations. These include the entire shoreline of the lower Oleta River, the northeast portion of the shoreline of Oleta River State Recreation Area along the ICW, and most of the south Biscayne Bay shoreline between the southern border of Matheson Hammock Park in Coral Gables and the Monroe County line).

Environmentally Protected Submerged Land

Figure 18a

Sunny Isles



North Miami

Bakers Haulover Inlet

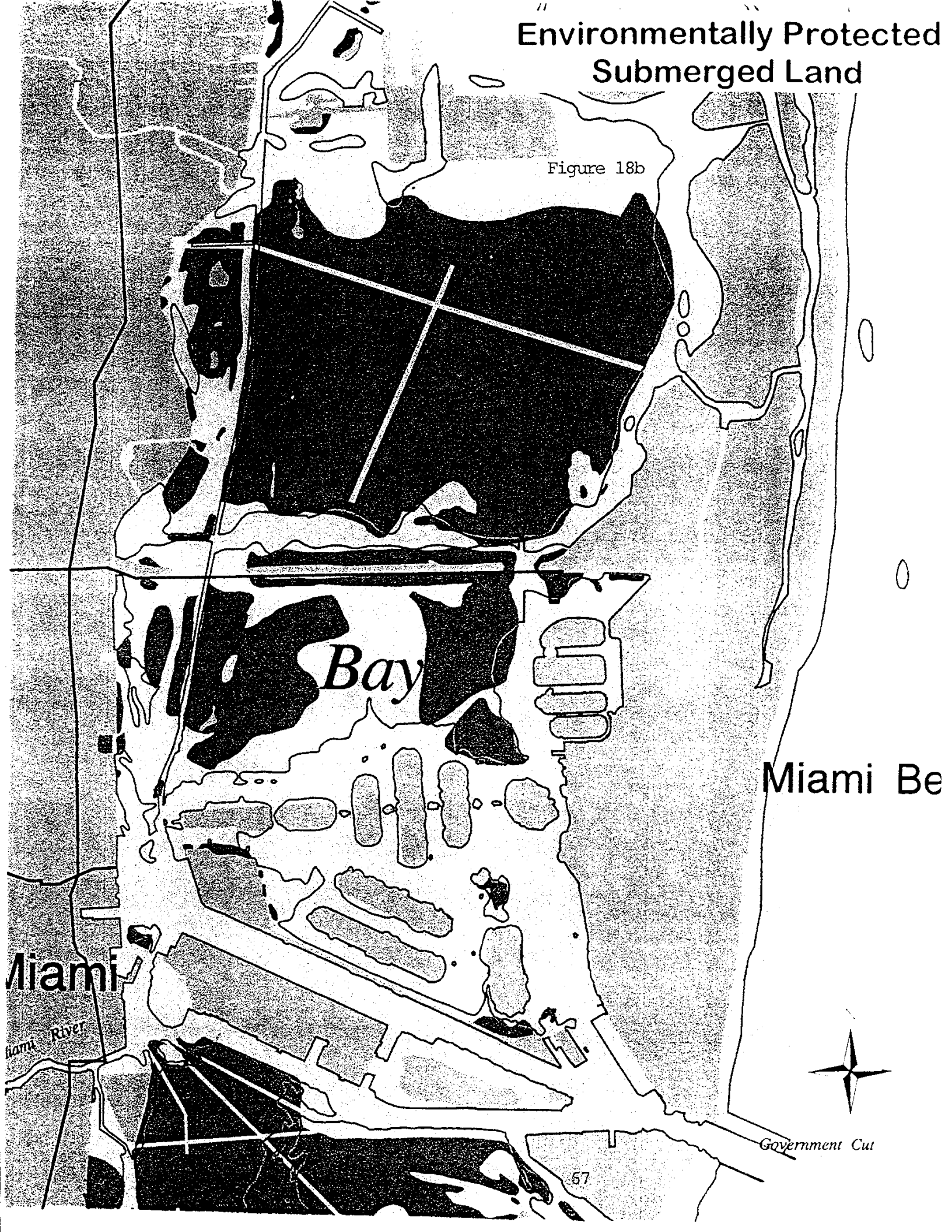
Atlantic

Bonne



Environmentally Protected Submerged Land

Figure 18b



Bay

Miami Be

Miami

Miami River



Government Cut

Environmentally Protected Submerged Land



Atlantic

Ocean

- Other
- Land
- Protected Submerged Land



II. Existing Conditions

- Sewage pumpout facilities are required for marinas with 10 or more boat slips. Water depth must be at least -4 feet MLW to protect bottom communities and sediments from boat disturbances.

4. Boat Ramps

Existing boat ramps are listed below and are indicated on Figure 16a-g, p.54-60.

Existing Public Boat Ramps (in tidal waters)

- Haulover Beach Park, 10800 Collins Avenue, Sunny Isles
- Pelican Harbor, 1275 NE 79th Street, Miami Beach
- Legion Park, 6447 NE 7th Avenue, Miami
- Morningside Park, 750 NE 55th Terrace, Miami
- Island View Park, Venetian Causeway, Miami Beach
- Watson Island Park, MacArthur Causeway, Miami Beach
- Curtis Park and Pool, 1901 NW 24th Avenue, Miami
- Elizabeth Virrick Gym, 260 Bayshore Drive, Coconut Grove
- Dinner Key Marina, SW 27th Avenue at Biscayne Bay, Coconut Grove
- Matheson Hammock Park, 9610 Old Cutler Road, Coral Gables
- Crandon Park and Marina, 4000 Crandon Boulevard, Key Biscayne
- Black Point Park, 24755 SW 87th Avenue, South Dade County
- Homestead Bayfront Park, 9698 North Canal Drive, Homestead

Several privately owned boat ramps are available for public use including:

- Blue Marlin Marina, 22500 NE 163rd Street, North Miami Beach
- International Yacht Harbor, 300 Alton Road, Miami Beach
- Virginia Key Marina, 3501 Rickenbacker Causeway, Virginia Key
- Snapper Creek Marina, 11190 Snapper Creek Road, Coral Gables

Existing Fresh Water Public Boat Ramps

- Griffing Park on Biscayne Canal at NW 123 Street and 4 Avenue, North Miami (available to city residents only)
- Antonio Maceo Park at Blue Lagoon at NW 7 Street and 51 Avenue, Miami

In addition, a few makeshift boat ramps are located in freshwater areas used by manatees. These include Snake Creek and Little River upstream of the flood gates, and an additional ramp in the Blue Lagoon area.

There are no proposed boat ramps in Dade County. In order for boat ramp sites to be considered suitable for development or expansion, the following criteria must be met:

- minimize boat/manatee overlap;
- do not cause destruction of aquatic vegetation fed upon by manatees;

II. Existing Conditions

- minimize adverse impact on wetlands, and
- appropriate marina permitting conditions listed above also apply to boat ramps.

Boat ramps are not permitted in areas supporting dense stands of mangroves or dense seagrass beds. In areas of sparse mangrove or seagrass coverage, public facilities may be permitted with mitigation, provided that impacts have been minimized and alternative sites are not available; a quantity of mangrove trees (based on the canopy size removed) are planted to compensate for those removed, and a quantity of riprap or other form of in-water mitigation is required for every 10 square feet of seagrass shaded or otherwise destroyed.

Since the manatee protection plan was mandated, proposed new or expanded boat ramps for powerboat use are not permitted by DERM, unless the applicant can prove that the proposed facility and the boats using the facility will not endanger the manatee.

5. Residential Docking Facilities

Residential docking facilities include docks and boat slips for use by residents of upland property adjacent to a water body. These are classified as single-family and multi-family docks.

Single family docks

Dockage for a maximum of two power boats per single family property may be permitted providing that certain zoning criteria are met and that adverse impacts to marine communities are negligible. Docks are designed to minimize shading impacts. New dredging is generally not permitted, although maintenance dredging may be approved in upland canals.

Multifamily docks

Currently, new powerboat slips are not permitted in multifamily boat docking facilities unless the permit applicant can demonstrate that the construction and use of such slips will not adversely affect the manatee.

6. Port Facilities

The Port of Miami at Dodge Island is the largest existing port facility in Dade County; there are also numerous shipping terminals along the Miami River, serving smaller freighters and container ships. In 1990, the Miami River was the fifth largest port in Florida based on the combined cargo volume of its facilities. All new bulkhead construction or replacement in areas utilized by freighters (or any vessel 100 feet in length or larger) requires the installation of large fenders extending a minimum of 4 feet waterward of the bulkhead under maximum compression, in order to protect manatees from being crushed against bulkheads.

7. Freshwater Lakes

DERM does not have permitting authority over construction activities in freshwater lakes located outside of jurisdictional wetlands. However a state ERP may be required by DEP for some types of construction in natural lakes larger than 10 acres and greater than 2 feet deep, with multiple property owners. (pers. comm. Larry O'Donnell, DER (now DEP), 1992; pers. comm. Carol Knox, DEP, 1995).

D. Education and Awareness

Since the primary identifiable causes of manatee mortality in Dade County are human-related, it is important that the public is educated on the plight of the manatee, public awareness is improved, and the availability and distribution of educational information and literature is improved. In Dade County, the Florida Department of Environmental Protection (DEP), the Dade County School Board, Biscayne National Park, the Miami Seaquarium, the Florida Power and Light Company (FPL), and the Dade County Department of Environmental Resources Management (DERM), are currently involved in educational and awareness activities.

1. Florida Department of Environmental Protection (DEP)

The DEP develops public information material and cooperates with private organizations and groups. The agency publishes posters, brochures, and boating guides in addition to developing television public service announcements promoting manatee education and awareness. Manatee auto license plates, vessel licensing and manatee decals are sold by the Florida Division of Motor Vehicles (370.12(6)(b) F.S.), and a portion of those funds is placed into the Save the Manatee Trust Fund. This money is used by DEP for manatee research and management, including support for the Bureau of Protected Species, which is responsible for the county manatee protection plans, permit reviews and public information.

2. Florida Power and Light Company (FPL)

FPL publishes booklets with general information about manatees, and pamphlets with tips for boaters to aid in avoiding injury and harassment to manatees. FPL also conducts public presentations about manatees including a video movie, *Silent Sirens*.

3. Save the Manatee Club

This group increases manatee public awareness and education. The Club produces and distributes: manatee awareness signs for posting by the public in areas frequented by manatees, public service announcements for manatee protection, a manatee activity booklet

II. Existing Conditions

for children, manatee protection and informational brochures, educational guides and videos for various age groups, volunteer speakers, display boards for public awareness and manatee reference information. The Club also has an extremely popular "Adopt-a-Manatee" program which includes a regular club newsletter.

4. Miami Seaquarium

The Miami Seaquarium has a manatee display tank which provides an excellent opportunity for a close-up view of manatees, where general manatee information is presented. The staff is involved in rescue and rehabilitation of injured and orphaned manatees on a continuing basis. Seaquarium also hosts marine life education camps for children, outreach programs to schools, orientation for schools on field trips, manatee workshops, and develops educational newspaper articles (pers. comm. Melanie Calvo, Miami Seaquarium, 1991).

5. Dade County School Board

The manatee is introduced at various levels of the Dade County public school system as part of the science program. Each teacher determines the amount of emphasis placed on informing students of the importance of this endangered species. Elementary school students visit the Miami Seaquarium, while middle school students have in-class manatee activities such as adopting a manatee through the Save the Manatee Club.

The public school system also has MAST (Maritime And Science Technology) Academy High School which selects students interested in marine science. These students are offered courses such as marine biology, ecology, limnology and physical science in addition to the standard curriculum.

The Center for Environmental Education at Crandon Park on Key Biscayne is operated by the Dade County School Board and teaches children about plants and animals in the area.

6. Biscayne National Park

Biscayne National Park has an organized program for fifth and sixth graders where the children are taken by boat to an island in south Biscayne Bay and taught about marine life through educational exercises. The staff will also present educational programs at schools. A concessionaire at the park takes any school class to coral reefs for an educational program. (personal communication, Marilyn Hause-Loflus, Biscayne National Park, 1992)

7. Dade County DERM

DERM currently distributes manatee literature published by DEP, FPL and the Save the Manatee Club, and gives presentations on an as-requested basis to public and private groups about manatees and what is being done to protect these gentle creatures. DERM has also prepared a portable display for conferences, exhibitions, festivals, etc.

8. Educational Needs

Standardized manatee education programs are needed in the public school system to ensure that all students are adequately exposed to the plight of this endangered species.

9. Awareness Needs

Manatee awareness is important in areas where in-water activities occur. Dade County waters are generally too murky to easily see the gentle creatures. People should become aware of areas used by manatees in order to protect themselves as well as the sea cows. Manatees may unexpectedly surface and startle humans enjoying in-water activities such as canoeing or water skiing.

At present in Dade County, manatee information signs are posted only at the Miami Seaquarium manatee display tank and a few marina facilities. DERM has posted colorful "Caution, Manatee Area" signs provided by the Save the Manatee Club along the Miami River, and most marina facilities, and many waterfront homeowners have also posted these signs on their property where boaters will see them. The DERM MOP is promoting manatee awareness by encouraging marine facilities to maintain a detailed manatee sighting log.

Areas of awareness which need to be addressed include the placement of informational signs at boat ramps, marinas, and shoreline/water-use access sites. These signs should educate the public on the effects of feeding and harassing manatees, in addition to general manatee and boater information, to make any user of the facility and passerby aware of important manatee safety information.

Pamphlets indicating the locations of vessel speed zones and seagrass beds in the county should be developed and sent to all registered boaters, and provided to anyone who rents a powerboat. All written manatee educational material should be printed in English, Spanish and Creole in order to best serve the residents of the community.

E. Governmental Coordination

1. Permit Procedures and Development Review

Permit and development review procedures for marine facilities, docks, and general structures located on the shoreline or submerged lands affecting manatees are conducted by many agencies. Facilities which ultimately affect the manatee are reviewed by the municipality (if any), Dade County, Florida DEP (Department of Environmental Protection), SFWMD (South Florida Water Management District), U.S. Army Corps of Engineers (ACOE), and the U.S. Fish and Wildlife Service (USFWS).

II. Existing Conditions

The ACOE and DEP have a joint application for dredge and fill projects which include boat docking facilities. The ACOE issues permits under Section 10 of the Rivers and Harbors Act of 1899 for projects located in navigable waters and structures that would alter or modify the condition, capacity, or channel of any navigable water. In addition, the ACOE issues permits under Section 404 of the Federal Water Pollution Control Act Amendments, which prohibits the discharge of dredge or fill material into navigable waters without a permit. The ACOE is required to consult the USFWS when an "individual" permit application is received, to insure that its actions are not likely to result in the destruction or adverse modification of designated critical habitat or jeopardize the continued existence of any endangered or threatened species. The ACOE issues "general" permits for small projects (including docks and bulkheads for single family residences). If these projects do not meet the conditions for a "general" permit, an "individual" permit will be required.

Pursuant to Chapters 253, 258, 403, 373 F.S., the state Environmental Resource Permit (ERP) program regulates the construction, alteration, maintenance, removal, modification, and operation of all activities in uplands, wetlands and other surface waters (whether publicly or privately owned) that will alter, divert, impede, or otherwise change the flow of surface waters, including dredging and filling in most wetlands (whether isolated or connected to other waters) and surface waters. This program is designed to ensure that such activities do not degrade water quality by discharging untreated stormwater runoff or cause flooding by changing off-site runoff characteristics. In addition, the ERP program regulates dredge and fill activities such as the dredging of navigation channels, filling of wetlands, and the construction of docks and seawalls. This will ensure that water quality is not degraded, and that these wetlands and other surface waters continue to provide healthy levels of wildlife habitat (including those of threatened and endangered species) and aquatic productivity. The ERP program streamlines the permitting process by allocating the processing of ERP applications to one agency, either a water management district or the DEP. The Department of Community Affairs and the Regional Planning Council are responsive to manatee issues through their state and regional review procedures.

Dade County DERM issues permits for boat docking facilities of any size in tidal waters and the Dade County Building and Zoning Department permits docks in freshwater lakes and canals in the county. The guidelines used by DERM are described in section "II.C. Land Development" in this Plan. Municipal governments are primarily concerned with the building and zoning regulations associated with boat facility projects. Environmental concerns, including manatee protection, are deferred to DERM.

The Biscayne Bay Aquatic Preserve Act (Ch.258.397F.S.) contains provisions that further restrict marina construction including the following:

- sovereignty submerged lands in the preserve may not be sold, transferred, or leased except by proof of extreme hardship by the applicant and a determination by the board of trustees that the action is in the public interest;

II. Existing Conditions

- no dredging or filling submerged lands in the preserve unless minimum dredge and fill is authorized for public navigation projects, is of public necessity or for preservation of the Bay in accordance with the Act;
- other alteration of physical conditions may be authorized if necessary to enhance the quality or utility of the preserve;
- minimum dredging and filling may be authorized for marina and associated channel construction and maintenance if the board of trustees determines that the project will be constructed and operated so as not to adversely impact water quality and utility of the preserve - this does not authorize the connection of upland canals to preserve waters, and
- dredging which is clearly in the public interest and is necessary to eliminate conditions hazardous to public health or stagnant waters, islands, or spoil banks which would enhance the aesthetic and environmental quality and utility of the preserve, may be authorized by the board of trustees.

2. Programs and Projects

DERM has administered the Biscayne Bay Restoration and Enhancement Program since 1980, which involves projects such as mangrove wetland restoration, shoreline stabilization, mangrove protection and bay island improvements. Spoil islands in Biscayne Bay are improved by replacing exotic with native vegetation, stabilizing the shoreline with riprap, mangroves and small vegetated sand dunes, and installing bird nesting platforms.

The SFWMD funds the Surface Water Improvement and Management (SWIM) program in Dade County for the cleanup of the Miami River and the restoration of Biscayne Bay. SWIM projects contracted to the DERM Restoration and Enhancement Program include comprehensive water quality monitoring programs and pollution control enforcement in the Miami River and the Bay. SWIM funds are also spent on stormwater improvements within the Miami River and Little River drainage basins in the City of Miami. Other SWIM projects include water toxicity monitoring, pollutant assessment studies and other stormwater improvement projects.

The Miami River Interagency Enforcement Program responds to citizen complaints, identifies new potential sources of hazardous or industrial waste, and initiates various enforcement actions including waste dumping, sanitary nuisance notices and civil violation notices. The core agencies involved with the program include DERM, FDEP and the Florida Marine Patrol. This program developed the Miami River Enforcement Group which involves more than 15 agencies at all levels of government, with jurisdiction over the Miami River. The group meets monthly to discuss and coordinate enforcement activities, perform multi-agency enforcement inspections, improve communications, make recommendations and develop sound enforcement policies for the environment and the public health, safety and welfare.

II. Existing Conditions

The Environmentally Endangered Lands (EEL) Program was established in Dade County in May 1990. The EEL referendum authorizes the acquisition, preservation, enhancement, restoration, conservation, and maintenance of environmentally endangered lands. It is funded by an ad valorem millage. A Land Acquisition Selection Committee reviews proposed acquisitions of environmental land, ancillary land and buffer land. Environmental land is evaluated for biological value and integrity, vulnerability to damage or destruction, and the cost and feasibility of managing the natural resource over the long term. Buffer land is evaluated on the basis of its vulnerability to development and the biological value of the environmental land which it buffers.

Dade County DERM should do the following:

- promote wise use of water-dependent and water-related projects and activities along shorelines in order to protect our natural resources;
- protect manatee habitat;
- promote greater cooperation between law enforcement agencies;
- promote public education and awareness programs;
- evaluate the need for additional regulations and regulated areas for waterborne activities;
- identify areas of public use conflict and evaluate ways to reduce the conflict;
- design regulatory measures to improve surface water quality, reduce chemical spraying, and promote the development of solutions to surface runoff problems, and
- continue manatee distribution/abundance surveys.

III. MANATEE PROTECTION PLAN: IMPLEMENTATION

Unless stated otherwise, any proposals in this portion of the Dade County Manatee Protection Plan which are not already implemented, shall be implemented upon approval of the Plan by the Florida Department of Environmental Protection and/or the Governor and Cabinet.

A. *Habitat Protection*

Habitat protection is critical to ensure the continued survival of the manatee. The following habitat protection measures are recommended for Dade County.

1. **Habitat Areas**

Seagrass Beds

Seagrass beds should continue to be protected from impacts during coastal construction projects through the DERM Class I permitting process. New dredge and fill projects shall generally be prohibited in seagrass areas; mitigation will be required for any adverse seagrass impacts. Protected seagrass areas include, but are not limited to, seagrass beds in Dumfoundling Bay and Biscayne Bay between the 79th Street and Julia Tuttle Causeways, between the Port of Miami and Rickenbacker Causeway, in the Chicken Key area, and in the area of the Black Creek channel.

Fresh Water Sources

Areas adjacent to flood gates should be kept as clean of pollutants and debris as possible. Members of the public who run fresh water hoses for use by manatees in areas where people or boats may congregate shall be discouraged from doing so.

Warm Water Refuges

The construction of new artificial warm water refuges (such as power generation plants discharging warm water) which may be used by manatees, shall be prohibited due to the overall adverse impacts of such facilities. Manatees rely on the warm water discharge from power plants during cold weather, and are extremely susceptible to cold stress if the facility fails to operate for a prolonged period of time.

Aggregation Areas

Any area where manatees frequently gather to rest, play, mate, nurse, or give birth shall be protected and/or enhanced. This protection shall occur through the Comprehensive Development Master Plan, zoning codes and ordinances and habitat acquisition by federal, state and local agencies where possible (see Habitat Acquisition Areas, page 80). Such areas include but are not limited to Sky Lake, Biscayne Canal near the Miami Shores

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Country Club golf course, Little River west of Biscayne Boulevard, northwest Virginia Key, upstream Miami River including Palmer Lake, upstream Coral Gables Waterway, and Black Point marina basin.

Travel Corridors

The recently approved vessel speed restriction rule for Dade County was designed to provide improved protection to important manatee habitat, including travel corridors. As the manatee vessel speed zones are properly enforced, modified boating patterns are anticipated in some areas. Manatee travel patterns are not expected to change, but these patterns shall continue to be monitored. If a change in manatee travel corridors is revealed in future manatee data, or the vessel speed zones do not provide adequate manatee protection, the Dade vessel speed restriction rule shall be altered to provide further manatee protection and/or to eliminate existing vessel speed restrictions developed solely for manatee protection, in areas no longer used by manatees.

2. Water Quality and Vegetation

Water Quality Restoration

In view of the fact that manatees heavily use several tributaries identified as being contaminated enough to violate state or county water quality standards, it is important to investigate methods to enhance and restore water quality and commence with this clean-up as soon as possible. Ongoing projects undertaken as part of the Biscayne Bay Restoration & Enhancement Program and the SWIM Program are expected to contribute to manatee protection through protection or improvement of water quality and general habitat value. Some of the areas targeted by these programs, such as the Miami River, Little River, Black Creek Canal, and Oleta River/Snake Creek Canal are regularly used by manatees. Therefore, continuing SWIM and local funding of stormwater and sanitary sewer investigation and improvements in these areas is strongly recommended. Although the specific effect of the contaminants in these waterbodies upon manatees is unknown, it is recommended that appropriate tissue samples from all manatee carcasses recovered in these waterbodies be collected and analyzed (if state of decomposition permits) for trace metals, organic chemicals or other compounds. New bioassay techniques for assessing toxicity or immune system response should be used in conjunction with tracking studies to evaluate effects of degraded water quality on manatees. If adequate funding is not available through DEP research programs, matching contributions should be provided through SWIM or local programs. DERM, the City of Miami, and state and federal agencies are currently identifying illegal discharges and sources of stormwater, surface water and sediment contamination. Once identified, efforts shall be made to address contamination problems by retrofitting storm drains and dredging contaminated sediments from the Miami River.

Shoreline stabilization and mangrove, wetland and coastal hammock restoration, are expected to improve water quality and clarity by reducing turbidity caused by erosion and resuspension present in stormwater runoff. Maintaining and improving water clarity or transparency is critical for protection or enhancement of seagrass communities, particularly in portions of north Biscayne Bay that have been degraded by past dredging and filling

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practices. It is therefore recommended that such habitat restoration projects continue to receive funding through SWIM and complementary local programs.

Pesticide Use

Pesticides used for mosquito control or other purposes (excluding herbicides as noted below under Aquatic Plant Control) shall not be used in waterways where manatees are present. If mosquito control personnel observe a manatee during pesticide application to a specific control area, all control operations shall cease, and shall not resume until all manatees have evacuated the specific control area. Pesticide for mosquitoes shall not be applied in a greater concentration than that recommended on the pesticide container.

Aquatic Plant Control

Overgrowth of aquatic vegetation occurs during the summer in freshwater canal systems, when manatees frequently use these areas. Three types of aquatic weed control are used in Dade County. These include chemical, mechanical and biological controls. Eradication of vegetation in fresh water canal-lake systems and along canal banks shall be minimized during the period from May 1 to November 15 as feasible while maintaining flood protection. Manatees may be disturbed by equipment used in mechanical removal, and herbicides used to control vegetation may cause sublethal effects in the animals. Land-locked lakes are excluded from following recommendations specific to manatee protection.

Aquatic plant removal shall be permissible in manatee habitat only as necessary to maintain flood protection, canal conveyance capacity, navigation or public safety. Plants should not be removed for aesthetic reasons. Fresh water areas where this restriction is especially important include the following waterways and all contiguous tributaries (canals and lakes): Snake Creek from NW 12 Avenue downstream to Maule Lake (including Sky Lake and Little Sky Lake), Biscayne Canal from NW 17 Avenue downstream to Biscayne Bay, Little River downstream of NW 22 Avenue, Tamiami Canal from NW 57 Avenue (including the Blue Lagoon lakes) northeastward to the flood gate, Snapper Creek from SW 62 Avenue downstream, Black Creek south of SW 232 Street, and Aerojet Canal (C-111) east of US1. These areas are primarily maintained by the SFWMD and the Dade County Public Works Department. These agencies shall be required to notify DERM a minimum of 72 hours prior to planned treatment so that a review of manatee sighting data or a survey of the area for manatees may be conducted. If emergency treatment is necessary, DERM staff shall be notified as soon as possible of the job. The work shall not commence or shall halt where one or more manatees are observed within 500 feet of the treatment area. Only FDEP permitted herbicides shall be used in Dade County waterways. FDEP should not permit the use of chemicals shown to be harmful to large herbivorous mammals, in essential manatee habitats. Chemical herbicides shall only be used by licensed applicators. Independent treatments by individuals shall be eliminated. Mechanical harvesting techniques should be used in manatee areas not maintained by government agencies.

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Since adequate studies have not been conducted on the effects of any herbicides on manatees, those chemicals determined to be unsafe for other animals or humans shall not be used in areas where manatees have been sighted. The use of herbicides or any chemical treatment containing copper, shall be prohibited in Dade County due to toxicity to invertebrates and copper may be harmful to manatees and other wildlife (pers. comm. Kent Smith, DNR, 1993; Thomas O'Shea, USFWS, 1994; Patrick Rose, DNR, 1992). Herbicides containing endothall or fluridone are most acceptable, if biological and mechanical controls are not feasible. If herbicides are used, they shall be applied using schedules and rates which minimize dosage and maximize effectiveness. This is best achieved by using low concentrations of herbicide in a regular program to maintain aquatic plant biomass at relatively low density. Attempts to eliminate high densities of aquatic plants over large areas are less likely to provide satisfactory results, leading to multiple treatments, greater habitat and wildlife disturbance, and high costs (pers. comm. Jackie Jordan, DNR, 1993). No chemical treatment shall exceed the recommended dosage noted on the herbicide container.

The biological controls used by the SFWMD, which include fish and insects, are not expected to impact manatees. The use of these controls is encouraged. Dade County agencies shall support research on the effects of biological controls and chemical herbicides on manatees and other wildlife.

An interagency group composed of the various entities involved in aquatic plant control in Dade County (including a representative from DERM) shall meet annually to address these issues.

3. Habitat Acquisition Areas

Manatee aggregation areas need to be incorporated into the state or federal systems of refuges, parks, reserves, and preserves in order to protect the manatee and other wildlife, as well as the coastal ecosystems in which they occur. Environmental restoration and compatible human activities could be permitted in these areas.

Many of the areas in Dade County most highly utilized by manatees are owned by the state of Florida or Dade County, or are developed areas under private ownership and are not appropriate for environmental acquisition programs. However, there are few areas in Dade County frequently used by manatees that are undeveloped and available for purchase. Bird Key, located south of the 79th Street Causeway in north Biscayne Bay, was on the CARL (Conservation and Recreation Lands) list for purchase, but has been removed. At present, it is not on priority ranking lists for County endangered lands acquisition, because existing regulations are believed to provide strong protection against development. However, even greater protection against unregulated uses or future changes in regulations could be afforded by public acquisition and preservation. The EEL (Environmentally Endangered Lands) list includes several parcels along the Oleta River where it intersects with Snake Creek, including the south side of Snake Creek downstream of the flood gate near US1

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(pers. comm. Carol Rist, EEL Committee, 1993), an area frequented by manatees year-round. The purchase of this parcel by EEL should be encouraged.

B. Manatee-Human Interaction

Interactions between manatees and human activities have increased dramatically in recent years causing manatees to sustain physical impact, harassment and general disruption of daily activities (pers. comm. K. Curtin, USFWS, 1992). Impacts to manatees may be reduced by the following: improved operation of or structural modifications to flood gates, vessel speed restrictions, law enforcement, expansion of sanctuaries, and the designation of critical habitat.

1. Flood Gates/Locks/Manatee Barriers

Flood Gates

A full-time position should be established at the SFWMD to organize manatee protection efforts within the agency. A backup system or device should be investigated and developed simultaneously with the development of the primary project for manatee protection from flood gates, so that the backup project could be implemented immediately if the primary project fails during testing.

The SFWMD has developed the pressure sensitive device (PSD) to sense manatees and reverse the direction of closing flood gates. However, it is unknown if the device has been perfected. Two manatee mortalities occurred (January 1993 and January 1994) at the Little River flood gate (S-27) after the installation of a single row of pressure sensitive devices (PSDs) along one edge of the flood gate. After one modification, the PSD system at Little River was responsible for one manatee mortality (November 1994). The PSD system trigger has been modified since the November 1994 mortality, and should continue to be monitored and modified as necessary.

Preliminary tests of sonar devices suggest that it may be possible to detect manatees in the vicinity of structures, and it may further be possible to integrate the sonar into the electronic operation of gates to prevent or reverse closure on large objects in the opening. The field testing and implementation of such an integrated sonar for coastal salinity control structures should resume. It is recommended that field testing of a sonar device should begin at Little River (S-27), a site where manatees aggregate on a regular and consistent basis and where structure related mortality has most often occurred. As a related strategy, further assessment of mechanical gate reversal devices similar to the PSD should be explored by the SFWMD. Such a device would act as a final safeguard that interrupts closure of a gate on a large obstruction, such as a manatee, in the opening. Possible design concepts include but are not limited to leading edge strips, deflectors, or switches that are displaced.

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A parallel fence or screening device that advances prior to gate closure might also serve in concept as a component in a mechanical fail-safe. The parallel screen would block manatees from entering the opening, but only when the gate is in a closing cycle. This temporary barrier, which would be less massive than the flood control structure and therefore easier to reverse, would have to close fully before the heavy gate could come down. The temporary parallel screen would be retracted when the structure is fully open, avoiding problems with debris blockage and habitat limitation. Parallel screen concepts should be evaluated for their utility on both the upstream and downstream sides of flood structures. Conceptual designs and specifications should be provided by the SFWMD or through a "request for proposals". Promising prototypes could also be tested at Snake Creek (S-29), Miami Canal (S-26), Tamiami Canal (S-25b), or Mowry Canal (S-20f) during 1996. Field testing could be integrated with major maintenance if this occurs prior to the target date.

It is recognized that sonar and/or mechanical reversal mechanisms will result in additional costs and that extreme malfunctions could result in excess discharge or salinity intrusion. However, these risks could be addressed through routine maintenance programs and alarms or signals that trigger computer override or default mechanisms. The successful development of one or more reversal mechanisms, which act as a "fail-safe" to protect those animals that still manage to enter a gate during closing, is necessary to achieve "zero mortality" and is considered a high priority. Redundant systems or backups may also prove to be necessary for zero mortality.

The central computer algorithms implemented in 1991 represented an important improvement in minimizing gate operations. Additional evaluation of the effectiveness of the algorithm in reducing gate oscillations is necessary. Gate operation records could be randomly selected for assessment. Further refinement of the algorithm or circuitry may be achieved by revising the time delay between sequenced opening of gates in multiple-gate structures or by modifying the default mechanism during telemetry failures. All coastal structures presently operating with manatee protection algorithms should be modified with successful designs during major maintenance. The SFWMD should provide a plan for assessing these factors, and a draft report with conclusions by July 31, 1995.

Another possible approach to minimize opening/closing cycles is the use of skimmer or slot gates, structures which permit discharge of limited volumes of water over the top of the structure instead of beneath it. A structure of this sort where a gate lowers toward the bottom of the waterway, would not pose a threat of crushing a manatee. This method of discharge is expected to provide other benefits including reduced operation and maintenance of the hydraulic gates, and improved hydroperiods. Such structures were included in the original USACOE design and were at one time installed on many gates. They have been removed from most structures which are equipped with manatee circuits due to problems with trash accumulation, vandalism, and saltwater infiltration during high tides. However, modifications of the original design could be implemented to address these concerns, but at a substantial cost (SFWMD, 1991). This type of structure should be most

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heavily considered as a manatee protection solution, and should replace all structures where feasible (i.e. in low to moderate flow discharge areas).

The U.S. Army Corps of Engineers and the South Florida Water Management District are conducting a study of various alternative manatee protection strategies at flood gates and navigation locks. Their recommendations are expected to be finalized by November 1995.

Preliminary conceptual evaluation suggests that during moderate to high flow, a structure that drops toward the canal bottom would not alone provide a large enough volume discharge to meet flood protection criteria and could not reduce gate operations. Additional assessment of this approach for low to moderate flow conditions should be undertaken before dismissing the skimmer gate concept, since recent structure-related manatee deaths have occurred during periods of dry weather. It is recommended that the SFWMD perform an analysis by July 31, 1995 to determine what portion of a normal year is considered low to moderate flow, what the typical discharge requirements would be during such periods, and what percent of gate opening/closing cycles could be eliminated by this approach. If significantly reduced operations may be achieved during such flow conditions, installation of a prototype skimmer gate is recommended (optimally during scheduled maintenance at a Dade County coastal structure to field test the feasibility and effectiveness of this concept). Site selection should consider discharge requirements, likelihood of trash or vandalism problems, and frequency of manatee use.

For each manatee mortality where a salinity control structure cannot be ruled out as contributing to the death, the SFWMD shall provide DEP with a report within 30 days of notification of the cause of mortality. Each report shall include a compilation of appropriate gate operation records and assessments, conceptual designs, prototype test results and observations, and similar documentation. The reports shall be reviewed at quarterly interagency meetings attended by at least one representative of the SFWMD, DEP, USACOE, USFWS and DERM. In addition, the gate operation records should be audited on a continuing basis at these meetings to certify that coastal structures are opening to the 2-1/2 foot criteria without excessive oscillation, or to identify any other system problems. The interagency task force shall continue to meet until all agencies are satisfied that the goal of zero manatee mortality from flood gates has been achieved. The SFWMD shall record action items and future agenda topics at the meetings which shall be distributed to all meeting participants and shall be available to the public. No management strategy should be dismissed from further consideration until adequate technical information is available for full review and involved agencies reach consensus. The SFWMD shall prepare an annual report summarizing all flood gate-related manatee mortality, and the status of the SFWMD manatee protection program. This document shall also include a summary of relevant system operations. The report shall be completed by February 1 of the following year. This report shall be available to the public and distributed to Interagency Task Force members for review at least one month prior to being placed on the SFWMD governing board agenda for discussion. DERM and the SFWMD should jointly conduct an annual public workshop in Dade County, at an appropriate facility provided by DERM, to inform and receive input on manatee protection from interested members of the community.

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Strategies which alter established manatee movement patterns, limit access to suitable habitat, or disturb sensitive behavior should only be considered if the strategies outlined above fail to prevent mortality. Such low priority approaches include permanent barriers and acoustic or other deterrents, and are not recommended at this time.

The SFWMD shall notify DEP and DERM prior to conducting any activities involving vessels or heavy equipment, or other work in tidal waters. The SFWMD shall apply for any permits required by state or local regulations.

Locks

Although lock structures are not present in Dade County, recent permit applications to construct locks in various parts of the state have been received by DEP. Due to the potential threat to manatees, the construction of locks in manatee habitats, including travel corridors shall be prohibited in Dade County by the SFWMD and federal, state and local permitting agencies.

Manatee Barriers

Miami International Airport shall install and maintain permanent barriers to prevent manatees from entering the airport canal/culvert system. A design for such a barrier has been conceptually approved by the USFWS, DEP and DERM. This barrier is expected to replace a temporary manatee barrier at the airport southern tributary off of Tamiami Canal. The permanent barrier at the airport north tributary shall be modified with sheet pile or other permanent base at the existing gate sections; this is necessary to prevent manatees from entering the airport system through holes which recur in the sand-cement bag riprap which is presently used. Additional barriers or other modifications may be required if additional manatee access points into the airport system are discovered.

Dade County Aviation Department (DCAD) staff shall prepare quarterly reports describing all maintenance work to manatee barriers. These reports shall include the dates of underwater or other inspections, and any work performed, including the amount of riprap replaced. These reports shall be submitted to DERM and DEP within 30 days after the end of the quarter.

DCAD staff shall immediately contact manatee protection personnel at DERM, DEP and USFWS with manatee sightings in the airport canal system, including dead or injured manatees. DCAD Environmental Engineering Division staff shall submit manatee incident reports within 30 days of the manatee sighting to those agencies noted above. These reports shall contain the date, time, location (including a map with location indicated) and the name and telephone number of the first person to observe the manatee. DCAD, DERM and DEP staff shall discuss the state of decomposition of any dead manatee and determine the method of carcass disposal prior to meeting onsite. If extremely decomposed, DEP may authorize DERM to arrange for disposal of a carcass at the South Dade landfill. DCAD Public Works staff shall assist in carcass recovery from Miami International Airport (MIA) canals. If a manatee carcass is discovered upstream of airport manatee barriers, airport

personnel shall locate the point of entry within 48 hours and have divers search for additional manatees in the vicinity. Live manatees shall be relocated by Miami Seaquarium and USFWS, DEP, or DERM staff after receiving authorization from USFWS. If manatees are not discovered, the access point shall be repaired within 48 hours after the completion of the divers' inspection.

2. Site Specific Vessel Speed Recommendations

A state rule for vessel speed restrictions for manatee protection in Dade County (Appendix B) was adopted by the Florida Governor and Cabinet on November 14, 1991. The speed zones are indicated on Figure 16a-g, p. 54-60. Buoys shall be maintained at year-round "No Entry" areas. Vessel and manatee usage patterns shall continue to be monitored for appropriate adjustments; this monitoring shall be funded by Florida DEP and Metro-Dade County.

3. Recommended Areas For High Speed Water-Related Activities

High speed (greater than 30 mph) water-related activities, other than powerboat races, should occur only in designated and unregulated areas in Dade County tidal waters (see Appendix B), and in land locked lakes, borrow pits and other waterbodies not accessible to manatees. Two areas in Biscayne Bay historically used for water-skiing have been set aside for this purpose on a year-round basis with a 35 mph speed limit. One is located on the east side of Meloy Channel (along Miami Beach) between theoretical 64th Street and West 51 Street, and the other is located on the west side of Meloy Channel surrounding Monument Island, between Rivo Alto and Star Islands. Two additional water-ski areas east of Meloy Channel have a seasonal (May 1 - November 14) speed limit of 35 mph, and are slow speed the remainder of the year. One is located between Indian Creek Village and Biscayne Point, and the other is between Julia Tuttle Causeway and the Sunset Islands. Areas which are unregulated year-round may also be used. DERM is working with other agencies and private industry to determine the feasibility of developing some land-locked lakes in Dade County for water-ski and personal watercraft activities.

Power boat racing shall be prohibited in Government Cut or in the unregulated areas of Biscayne Bay. Power boat races shall occur at least 1,000 feet offshore in deep water areas of the Atlantic Ocean, or in the Miami Marine Stadium; these races may occur year-round. However, during non-event periods in Marine Stadium, a "Slow Speed, Minimum Wake" buffer shall extend waterward for 200 feet from shore around the entire edge of the basin.

During high speed marine events such as jet or water ski events and power boat races, the following manatee protection measures shall be adhered to (adapted from DEP conditions recommended for boat race permits).

- A Manatee Watch Program shall be established.
- The manatee watch shall consist of four qualified observers, including one primary observer. Surveys shall be conducted from an aircraft and also from elevated

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- land-based and/or boat-based positions. Each observer shall be equipped with a two-way radio and will be dedicated exclusively to the manatee watch.
- A continuous aerial survey shall be conducted beginning 1 hour prior to the event and prior to any organized practice sessions to identify any manatees in the vicinity of the event site. The survey shall continue until all official and spectator vessels have cleared the area. Aerial surveys shall extend 1 mile from the perimeter of the race course.
 - An observer shall be in close communication with race sponsors/officials in order to halt the event if a manatee(s) is spotted within 500 feet of the perimeter of the event site. The event shall be halted immediately upon the request of the observer. The event shall not resume until the animal(s) move away from the area under its own volition. Manatees must not be herded away or harassed into leaving. If the manatee(s) is not sighted a second time, the event shall not resume until 30 minutes after the initial sighting.
 - All participants and official boats shall adhere to speed zones adjacent to the event site.
 - The primary observer shall write a report providing the names of the observers and their positions during the event, number and location of manatees sighted, and any problems encountered during the event (and possible solutions). This report shall be submitted to the Coast Guard, USFWS, DEP and DERM within 30 days of completion of the event.
 - If any of the aforementioned conditions is not met prior to or during the race, the event shall be immediately terminated. The Coast Guard shall designate a monitor (possibly a Coast Guard representative or the primary manatee watch observer) who shall have the authority to terminate the event as required above.

4. Speed Zone Signage

The Florida Inland Navigation District (FIND) was directed by the state legislature to install signs to mark the designated speed zones. The manatee protection zone areas should be inspected annually to ensure that adequate marking is present, and that no hazards to navigation exist. Vessel speed restrictions in areas of high-speed water-related activity should be indicated by and/or delineated with buoys.

5. Increasing Law Enforcement Presence

New vessel speed restrictions and other manatee protection regulations will probably not be effective without adequate law enforcement. Law enforcement should be improved through the coordination of enforcement agencies and by increasing enforcement personnel. All municipal marine patrol officers are authorized to enforce vessel speed restrictions for manatee protection, in addition to the Florida Marine Patrol and Metro-Dade County Marine Patrol officers. All of these officers shall have an annual review of the vessel speed zones prior to the beginning of manatee season. All law enforcement agencies shall adhere to all vessel speed restrictions unless an emergency is in progress.

Law enforcement efficiency may be increased between the various agencies and offices by developing a task force, and by increasing personnel. Developing a manatee protection law

enforcement task force composed of one officer from each marine patrol office (state, county and municipal) and the Florida Game and Freshwater Fish Commission, should aid in establishing a working relationship between enforcement agencies. The goal of the task force would be to ensure full and efficient monitoring of areas with vessel speed regulations, and proper handling of manatee-related incidents. This would include confirming manatee deaths and reporting them to the appropriate agencies, and coordinating manatee protection activities among the marine patrol agencies in Dade County. Each of these officers should be designated as the "manatee specialist" for their office, and would be notified of any manatee-related proposals with which the law enforcement agencies may be involved.

At least one additional marine patrol officer position should be funded. DERM may be able to aid in obtaining a grant to fund an additional Metro-Dade Marine Patrol position or overtime pay necessary to cover the added workload of enforcing the new vessel speed zones. Increasing personnel would allow for additional monitoring of the regulated areas. A similar position or funds should be added to the Florida Marine Patrol with funding from an increase in the state boat registration fee. Those municipalities on the waterfront that do not have marine patrol offices should be encouraged to establish them to create additional law enforcement presence.

A proposal has been developed requiring a statewide mandatory boater education program for powerboat operators. This program shall include a manatee protection component. Licensing of powerboat operators should be encouraged statewide.

6. Sanctuary Designation

DERM will continue to compile manatee sighting data to determine if manatee habitat usage patterns change in Dade County with the implementation of the Dade County Manatee Protection Plan. New areas used for feeding, mating or congregating should be evaluated for protection and possible sanctuary designation.

C. Land Development

Land development in Dade County can adversely impact manatees. Only shoreline and submerged land development is addressed in this Plan, although other development may cause impacts, including stormwater runoff, wastewater discharge, and an increase in overall users of natural systems.

Potential impacts to endangered species and their habitats shall continue to be considered in the review of all activities requiring a Dade County Class I coastal construction permit. Projects or facilities whose construction or operation results in adverse impact to manatees or their essential habitats should not be permitted, except as necessary to protect the health and safety of the public. Essential manatee habitat includes portions of natural and man-made waterbodies used by manatees for feeding and drinking, refuge from extreme cold, shelter for resting and sensitive behavior, and travel or migratory corridors. Permitted

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projects or activities in any waterbody accessible to manatees shall be required to avoid (or minimize) impacts to the animals or their habitat that arise as a consequence of construction or operation of the facility.

Although some of the subsections under this "Land Development" section may recommend general areas for specific types of development, other regulations such as those for state-owned submerged land, may preclude this development.

1. Shoreline Development Standards

Natural shoreline vegetation shall be maintained. Non-water dependent structures shall be constructed on the upland above the mean high water line, landward or away from wetlands or other natural areas. All new or replacement structures accessible to manatees shall be designed to prevent entrapment of or injury to the animals.

Manatees may attempt to enter submerged storm water drainage pipes and culverts. Any culvert that is closed at one end so that a manatee cannot pass through to a natural waterway may cause an animal to drown. Those culverts which are greater than 7 and less than 60 inches in diameter, shall be covered with grates or screens with spaces less than 7 inches wide in order to prevent entrapment; these shall be maintained to prevent upland flooding. New culverts installed in areas not previously accessible to manatees shall be covered with flap gates or other devices designed so as not to cause injury to manatees, and prevent the animals from entering the culvert.

DERM currently issues a Class I Coastal Construction Permit for wet slip marinas, but does not regulate construction of dry storage facilities where in-water work is not required. Therefore, the Dade County Code shall be modified to include DERM plan review and approval for the construction, expansion, replacement or major repair of all dry storage facilities, including those in municipalities. An existing dry storage facility shall meet the definition of an "existing marine facility" indicated below under III.C.2.a. Marine Facility Siting Criteria. New dry storage facilities should be sited according to Commercial Marina Sites noted on pages 89-93. A state ERP may be required for stormwater runoff treatment of a dry storage facility).

2. Development Standards for Submerged lands

Standards and policies related to the development of submerged land shall address the preservation of submerged vegetation, placement of dredge and fill material, and the size and design of structures below the mean high water line. Destruction or alteration of shallow water habitat used by manatees shall be prohibited unless necessary for the protection of the public or for restoration and enhancement of environmental resources. Blasting in or adjacent to habitat regularly used by manatees (see Essential Manatee Habitat map Figure 3, pages 9a-d) shall be prohibited.

a. Marine Facility Siting Criteria

An “existing marine facility” for the purposes of the remainder of this Manatee Protection Plan, is one which was in use on October 28, 1984 or later, and if constructed after 1980, must have appropriate DERM permits. Facilities that have not been in use at any time since October 28, 1984 will not be considered existing and will be considered a new facility. An existing marine facility may be reconstructed with at least the maximum number of slips that were in use at one time since October 28, 1984. ***ALL EXISTING MARINE FACILITIES SHOULD BE ALLOWED TO CONTINUE WITH THE EXISTING USE, AND MAY RENOVATE*** (according to permitting guidelines) as long as there is no change in facility size, including no increase in the number of wet or dry slips (unless the facility meets the expansion criteria addressed below).

When reviewing proposals for new or expanded marine facilities, the draft of vessels and water depth must be considered for adequate clearance over manatees. In waterbodies which may be too narrow for the animals to avoid vessels by moving aside, water depth must be at least 3 feet deeper than the average draft of vessels using the facility. A boat slip is generally considered to be 20 feet wide by 40 feet long, in this Plan. The docking of motorized vessels (other than sailboats) along bulkheads in excess of the number of approved slips shall be restricted through a covenant associated with the Class I permit or through the DERM marine facility operating permit. All Class I permits for project sites accessible to manatees should contain pertinent special conditions from Appendix F.

A Class I permit is currently required for wet slip marinas and any in-water work related to dry storage facilities, but not for the upland dry storage buildings. All new marine facility sites and marina expansion sites in Dade coastal waters should meet the following criteria:

- 1) cause minimal or no manatee/boat travel pattern overlap
- 2) cause minimal or no wetland or benthic community disturbance or similar environmental impact
- 3) be compatible with surrounding land use

In order to comply with criterion 1), the marine facility may not be situated so that a travel route through areas of heavy manatee use would be more likely than a route through areas used less by manatees, in order to travel to popular destinations. If only sailboats with minimal horsepower auxiliary motors (allowing the vessels to travel at a maximum speed of 8 knots) or without motors are permitted to be moored in a marina, only criteria 2) and 3) must be met. Criterion 1) was primarily considered in choosing the following sites because criteria 2) and 3) are extremely site specific. Existing land use (zoning) was not always considered when developing this “recommended marine facility site” map (Figure 19a-c).

Each category of vessel facility addressed below may impact manatees differently from another type of facility. For example, a large number of powerboats may be launched at boat ramps (the number launched varies with the number of ramps and parking space at the location, how quickly users get their boats into and out of the water, and other factors), while a single-family residence launches a relatively small number (generally one or two). Transitory slips, such as those at a fueling facility or waterfront restaurant where many boats may use the facility during a day, could generate more boat trips per slip than another

type of facility such as a freight terminal or boat yard, where fewer vessels enter or leave the facility daily. Large full service commercial marinas with dry storage may generate more boat traffic than a small multi-family residential marina.

All vessel storage and launching facilities should be required to post manatee informational displays and manatee signs on site as noted in section "III.D.2. Awareness" of this document.









Commercial Marina Sites

Wet and dry boat storage facilities contribute to the number of boats entering Dade County waters. The information on page 94 applies only to facilities storing power boats. Sites recommended for marina development and expansion with no restriction on the number of slips from a manatee protection perspective include the following areas as shown in Figure 19a-c.

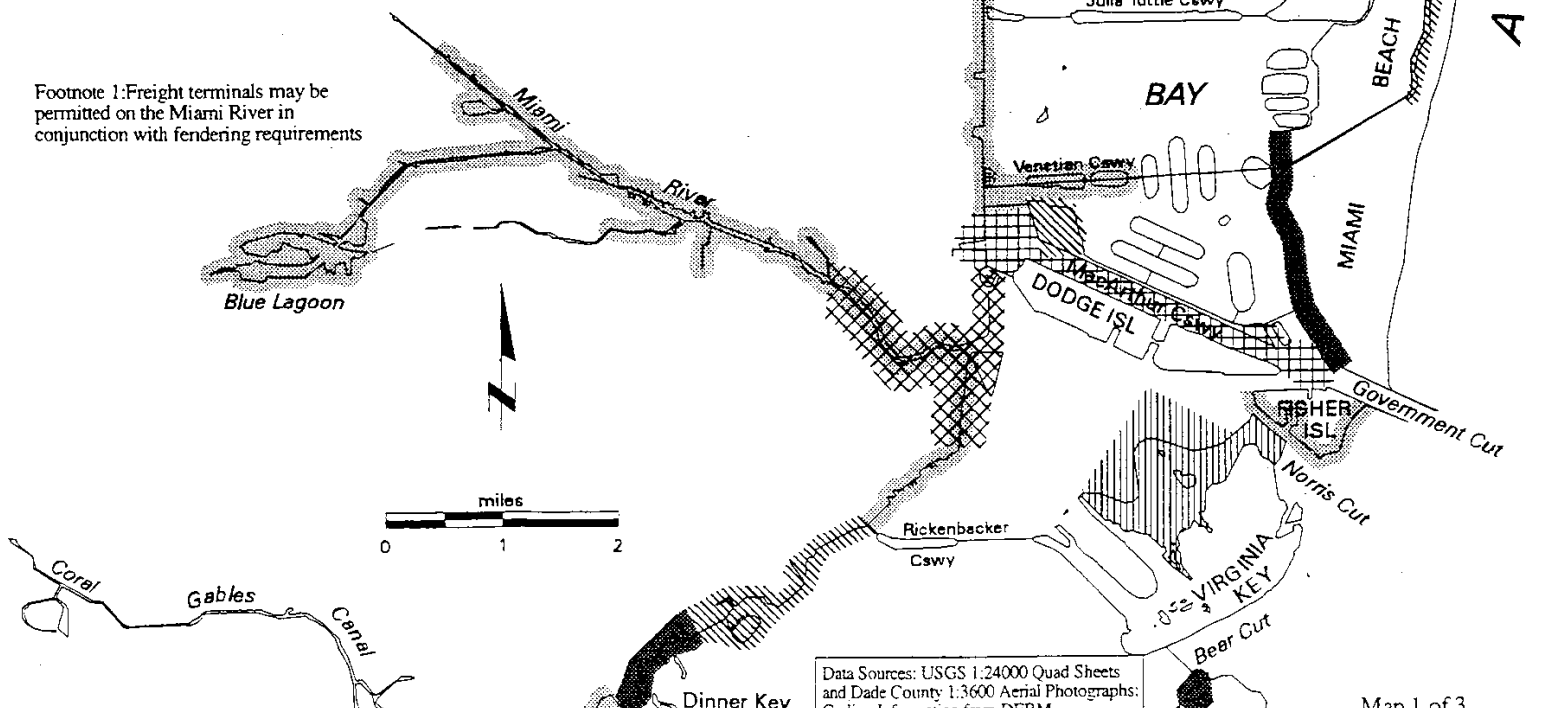
Figure 19a

PROTECTION GUIDELINES FOR ESSENTIAL MANATEE HABITAT

Limits and Recommended Sites for New or Expanded Marine Facilities, Other than Single Family Residences

-  Commercial Marinas, Dry Storage, Transitory Docks, Boatyards or Boat Ramps
-  Freight Terminals/Large Vessel (>100') Berthing
-  Special Use Marinas or Transitory Docks
-  Limited Special Use Docks 1:500
-  Boatyards Only
-  Residential Docking: 1 Motorboat per 100' of Shoreline (Density limit does not apply to single-family residences) —docking access for upland owners
-  No Coastal Construction
-  Motorboat Density and Various-Water Dependent Uses as Determined by Existing Zoning or Environmental Regulations

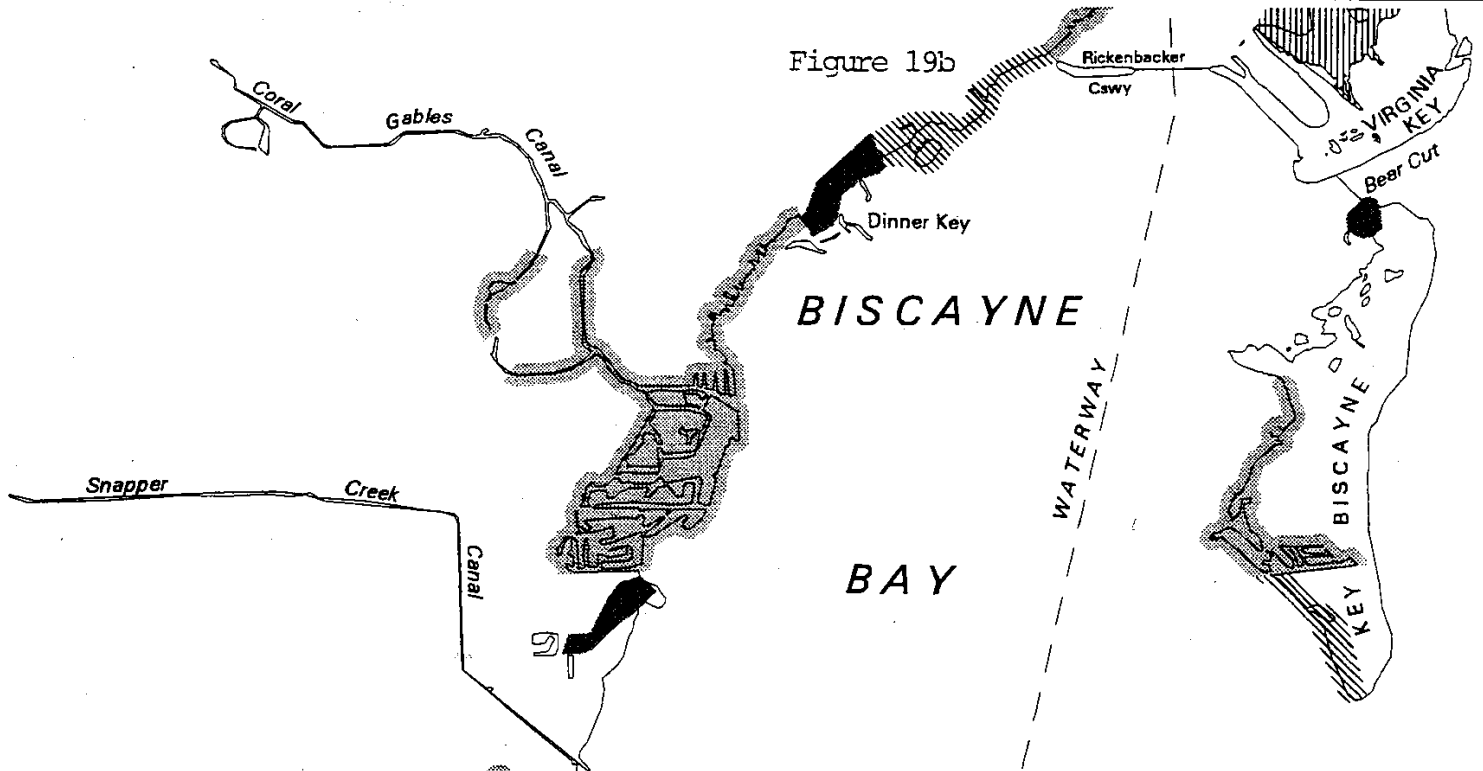
Footnote 1: Freight terminals may be permitted on the Miami River in conjunction with fendering requirements



Data Sources: USGS 1:24000 Quad Sheets and Dade County 1:3600 Aerial Photographs; Coding Information from DERM






ATLANTIC OCEAN

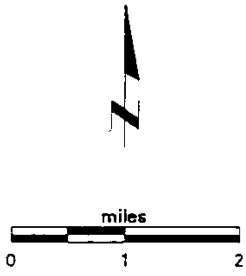
Figure 19b



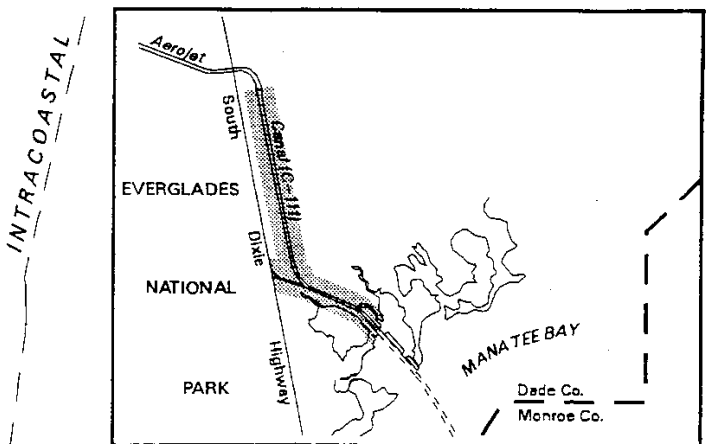
PROTECTION GUIDELINES FOR ESSENTIAL MANATEE HABITAT

Limits and Recommended Sites for New or Expanded Marine Facilities, Other than Single Family Residences

-  Commercial Marinas, Dry Storage, Boat Ramps, Transitory Docks, or Boatyards
-  Special Use Marinas or Transitory Docks
-  Residential Docking: 1 Motorboat Per 100' of Shoreline (Density limit does not apply to single-family residences) —docking access for upland owners
-  No Marine Construction
-  Motorboat Density and Various Water-Dependent Uses as Determined by Existing Zoning or Environmental Regulations

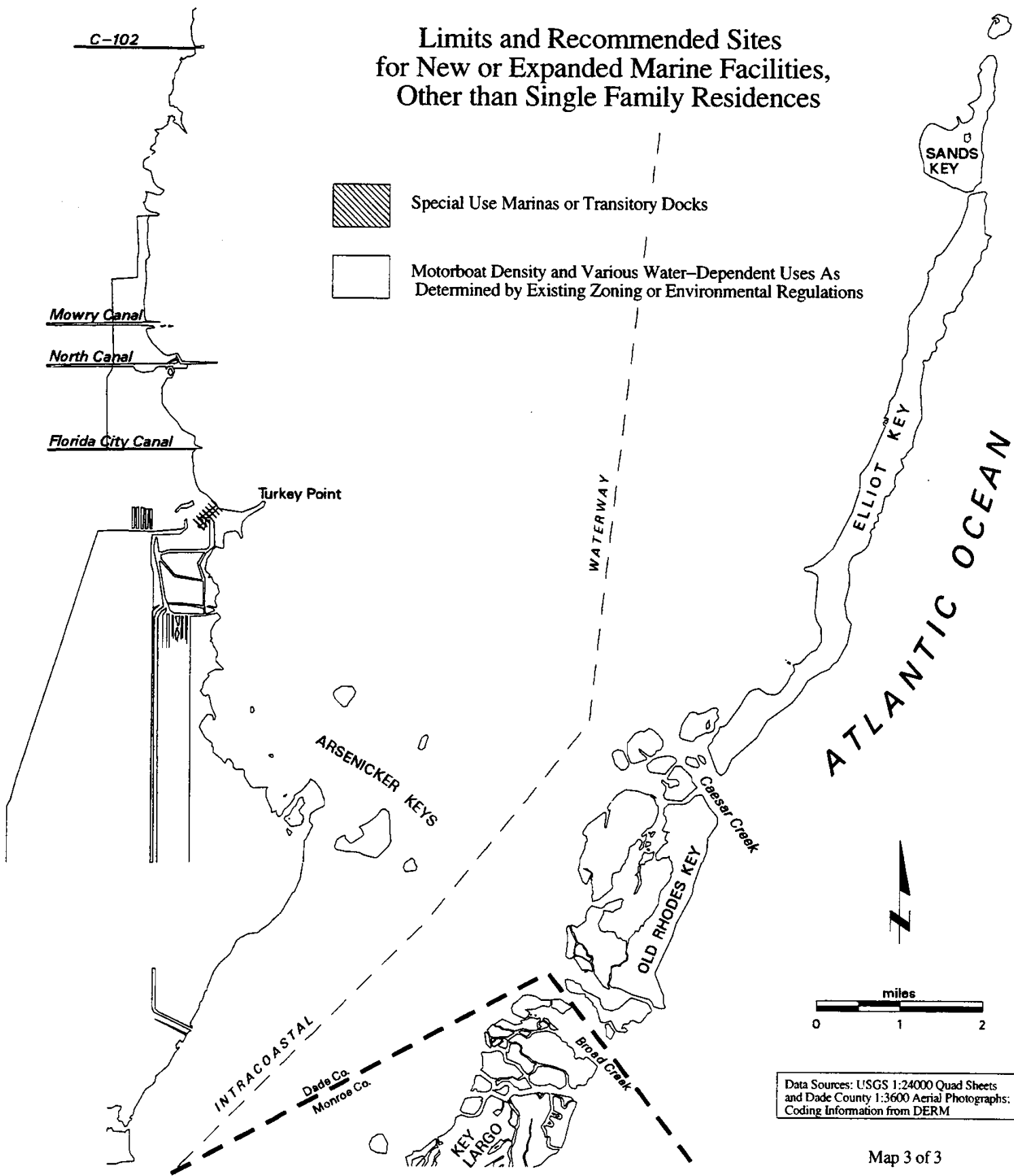


Data Sources: USGS 1:24000 Quad Sheets and Dade County 1:3600 Aerial Photographs; Coding Information from DERM



PROTECTION GUIDELINES FOR ESSENTIAL MANATEE HABITAT

Limits and Recommended Sites for New or Expanded Marine Facilities, Other than Single Family Residences



Map 3 of 3

III. Implementation

- 1) Since the number and frequency of manatee sightings has been relatively lower on the east side of Biscayne Bay along Miami Beach between Haulover and Government Cuts, and most boats using a facility constructed in this area would be likely to travel along Meloy channel and exit to the Atlantic Ocean through either of these inlets, marina development should be considered in this area. Expansion of Crandon Marina on Key Biscayne could be considered due to its nearby ocean access which excludes designated manatee habitat.
- 2) The Keystone Point area located east of Biscayne Boulevard between NE 135 and NE 125 Streets is due west of Haulover Cut. Boats using a marina in this area would be expected to go to the ocean through this inlet, traversing through a very small portion of the Bay, which although used by manatees, is protected by vessel speed limits. Boaters whose destination is south Biscayne Bay have direct access to the Meloy Channel at Broad Causeway.
- 3) Some marinas south of Rickenbacker Causeway may be considered suitable sites for expansion, since boaters using these facilities generally are heading to south Biscayne Bay or offshore destinations that do not require extensive travel through essential manatee habitat. Manatees near shore should be protected from high-speed vessel impacts by the approved speed zones.

Areas south of Rickenbacker Causeway that are NOT SUITABLE for marina expansion or development in which moderate to heavy manatee use, mortality or sensitive manatee behavior is documented, include the following:

- a portion of west Key Biscayne from Crandon Marina to the south shore of Pines Canal,
 - the Coconut Grove shoreline from the south side of Dinner Key Marina to Coral Gables Waterway,
 - all of Coral Gables Waterway located east of SW 57 Avenue and all other canals in Coral Gables (excluding the Matheson Hammock Marina area),
 - the Kings Bay/Deering Bay waterways located between theoretical SW 140 Street and SW 160 Street,
 - the Black Point area waterways, and
 - the Homestead Bayfront Park/Biscayne National Park marina basin areas.
- 4) Marina expansion at Matheson Hammock Park could be considered due to infrequent manatee sightings in the immediate area, and the improbability of boats using the facility to travel through areas of heavy manatee use.

The installation of new or additional commercial boat lifts should be permitted in the suitable areas noted above.

Fuel and Transitory Docks

Expansion of marine fuel facilities and transitory (transient) boat slips should be permitted in those areas listed above under Commercial Marina Sites, numbers 1, 3 and 4 only. These areas are not near habitat frequently used by manatees. Fuel dispensers should be located on the upland if feasible. In order to aid in maintaining water quality, secondary containment shall be required on any fuel line extending over water along a dock. Fueling facilities shall meet the following criteria contained in state rule 16N-16.035, effective July 1, 1993:

- 1) All equipment used for transferring fuel shall be kept and maintained in good repair and excellent operating condition.
- 2) Hoses used for a transfer of fuel shall be in good condition with no cracks or bubbles in their outer cover material. Hoses shall be maintained so that the inner lining or core is not exposed to damage from external forces. Hose and nozzle connections must be in good condition and not leaking. The fittings, clamps and bands must be compatible to the fuel being transferred, and must be in good condition and securely attached to the hose. These fittings, clamps and bands shall be used only for the purpose for which they are designed.
- 3) All systems will be equipped with hard connections or delivery nozzles. The nozzles shall hang vertically while not in use and will not be lying on the ground or dock. The transfer equipment shall be equipped with an emergency shutdown device unless gravity fed. The person in charge, or his designee, must be in the proximity and have immediate access to the emergency shut-down device during all fuel transfers.
- 4) Any fuel remaining in a hose after a transfer shall not be drained onto the ground or into the water.
- 5) Dispensers located in such a manner that they are subject to being damaged or destroyed by impact, shall be equipped with safety valves. These safety valves shall stop the flow of fuel if the dispensers are damaged or destroyed by impact.

Freight Terminals and Large Vessel Docking Facilities

Due to the necessity of deep dredged channels and existing regulations restricting new dredging in Biscayne Bay, opportunity for expansion of freight terminal construction is limited. Manatee use is heavy in the Miami River and on the southwest side of the Port of Miami. Therefore, expansion of freight or large vessel terminals shall be limited to the north shore of Fisher Island, the east portion and north side of the Port of Miami, existing boat basins along the City of Miami shoreline between NE 6 and NE 9 Street, and the south shoreline of MacArthur Causeway. Upon implementation of the recommendations in this section noted below, expansion of large vessel docking facilities within appropriately zoned areas, such as the Miami River, may be approved. Large vessel docking facilities shall not be expanded within state designated manatee protection "No Entry" zones. All existing freight terminals and other facilities mooring vessels greater than 100 feet in length shall be retrofitted with fender systems or other design which provide at least 4 feet of standoff from the bulkhead or wharf **under maximum operational compression**. This standoff is

III. Implementation

required in order to prevent manatees from becoming crushed between a vessel and bulkhead or other structure. Fenders shall be installed entirely above the mean high water line, and maintained. A minimum of 3 feet of standoff at maximum compression (fenders, cantilever docks/bulkheads, or other system) is acceptable in the Miami River. However, an exemption to this requirement in the Miami River applies to a 1,600 linear foot narrow area bordered by the Bernuth and Universal terminals on the south and the Antillean and the former Hyde terminals on the north sides of the River. This area may be allowed to remain without fendering as a reasonable option in compromise as long as there is no development or expansion of berthing for terminals to the west of this passage beyond what are already existing facilities (as defined at the top of page 89). This exemption means that there will be no new slips or mooring facilities for large vessels approved within or west of this 1,600 linear foot area. Any takeover of an existing facility by new or different operators will not be considered as new development provided new slips are not created. Further improvement of an existing facility will not be prohibited, provided berthing area is not expanded. Replacement or major renovation of any large vessel berthing in a manatee habitat, including this portion of the Miami River will require standoff. If the 3 foot standoff is achieved in the future, the development and expansion of large vessel docking facilities may be permitted on the River.

Within 6 months after approval of this Plan by the Florida DEP or Governor and Cabinet, DERM shall notify all affected property owners of this standoff condition and their need to comply, including options acceptable for compliance. The affected property owners have 12 months after receipt of this information to comply with the standoff requirement or inform DERM of intent to construct a cantilever dock or bulkhead, or any other type of standoff requiring permit approval. In the latter case, a complete permit application shall be submitted to all permitting agencies within 12 months of receipt of the DERM information, and construction of the permitted standoff project shall be completed within 12 months of receipt of all required permits. The study of prop guard technology is encouraged. The Manatee Protection Plan Review Committee is unaware of a feasible prop guard in existence for tug boat or freighter use. If a prop guard or similar device is recommended for use on tug boats in the future, the requirement of the device should receive public review and must receive county commission approval prior to implementation. Should such a recommendation come to pass, economic incentives should be considered for retrofitting tugs with the device for manatee protection.

Special Use

Areas designated for mooring vessels for special uses such as commercial fishing, charter fishing boats, and ocean-going luxury yachts include those noted above under "Commercial Marina Sites" on page 89 and "4. Freight Terminals, etc." on page 94 in addition to the entire shoreline of Watson Island (located on MacArthur Causeway).

Limited Special Use

Limited special use dockage includes courtesy docks, water dependent public transportation dockage and commercial/charter fishing boat docks with a maximum density (including existing boat slips) of 1 vessel slip per 500 feet of shoreline, or one slip per parcel,

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whichever is more restrictive. This applies to the west Biscayne Bay shoreline from the Port of Miami bridge south to SW 15th Road including Bayside and the Miami River from the mouth, upstream to the NW 5th Street bridge.

Boat Yards

In any Dade County coastal waters with vessel speed restrictions of "Slow Speed" year-round, renovation or expansion of an existing boat yard (including waterfront boat building facilities) is preferred to the construction of a new facility. New boat yards, including waterfront boat building facilities, should be permitted at the Port of Miami, along the eastern (Miami Beach) shoreline of Biscayne Bay and in the two canals located in northwest Dumfoundling Bay between NE 185 and NE 190 Streets, where compatible with the surrounding land use and other permitting and zoning requirements. Elsewhere along the Biscayne Bay shoreline or in small dead end canals on Biscayne Bay, the construction of any new boat yard should generally be prohibited.

Boat Ramps

Boat launching facilities greatly contribute to the number of boats entering Dade County tidal waters. These ramps should meet the criteria noted above in III.C.2.a. Marine Facility Siting Criteria. In addition, at all boat ramps located in essential manatee habitat, parking should be limited to the existing spaces (including existing overflow parking both on and off paved areas) only during the winter manatee season, November 15 through April 30. Excess parking should be prohibited and enforced by Dade County (through a fine, and revocation of the MOP where applicable, if not in compliance).

Suitable Boat Ramp Sites

Sites suitable for boat ramp development or expansion, including the installation of new or additional boat lifts or parking spaces, are located in the following areas:

- The east side of Biscayne Bay in the vicinity of Haulover Cut, Government Cut, and Bear Cut
- South Biscayne Bay including southwest Key Biscayne, the Dinner Key area, Matheson Hammock Park, and Turkey Point.

New boat ramps located in other areas than those listed above may be considered provided they comply with the performance criteria for docking facilities noted below under 2b.

Dade County Park and Recreation personnel should supervise parking in trailer spaces at County-owned marinas on weekends and holidays to ensure that only vehicles with trailers use the spaces.

b. Performance Criteria

For docking facilities subject to the 1 powerboat slip to 100 feet of shoreline restriction, and new boat ramps proposed at locations not approved under "Suitable Boat Ramp Sites" (page 96), higher ratios may be considered if the facility can demonstrate that it will not have an adverse impact on manatees. In no case shall the maximum total buildout of 5 powerboat slips per 100 feet of owned contiguous shoreline be exceeded. Uses proposed in a location not shown as an acceptable site for that particular type of facility on the map in Figure 19a-c, p.90-92, may be evaluated according to the following listed criteria numbered 1-9. This demonstration would be satisfied if the facility met applicable criteria from the following list. However, adherence to these criteria does not automatically ensure the applicant's ability to exceed the allowable powerboat restrictions as defined above. The plan restrictions will remain in effect, if at the time of review, additional information about manatees or the proposed facility indicates threats not addressed by these criteria. Consideration can be given for additional site-specific factors or operating practices (e.g. seasonal operation, etc.) that may be proposed by either the applicant or the County, that may result in improved conditions for manatees or manatee protection. Any facility exceeding the allowable powerboat slip restrictions (1:100) or use according to the criteria defined below, must agree to obtain and comply with an annual marina operating permit (MOP), even if the facility does not meet the threshold established in the MOP ordinance. The criteria are:

1. The waters adjacent and channels leading to the facility are designated "slow speed" or "idle speed" as authorized by the Florida Manatee Sanctuary Act Ch. 62N-22 (formerly 16N-22) F.A.C. or Boating Restricted Areas Ch. 62N-24 (formerly 16N-24), F.A.C.
2. The facility is not located within a cold-weather aggregation area or other area where sensitive manatee activities occur, or in a travel corridor from these areas, as indicated on pages 22 and 27.
3. The facility must provide net benefit to manatees and/or their habitat. For example, facilities may include a manatee "refuge" space as part of the design, a conservation easement, restoration of adjacent wetlands such as mangrove or seagrass restoration to increase the net coverage of the nearby area, reduced nutrient input to receiving waters, requiring prop guards on any high traffic vessels such as water taxis or dive boats or rental boats, etc. The marina construction and subsequent uses will neither destroy nor negatively impact mangrove and benthic (seagrass, hard bottom, etc.) communities and the water quality.
4. The facility must have sufficient water depth in the marina basin and in any access channel, and does not require any new dredging or filling that would degrade shallow water habitat (this may exclude maintenance dredging, excavation into uplands or pile installation). Sufficient water depth shall be water depth, measured at mean low tide, of 3 feet greater than the draft of vessels occupying the slips on a permanent basis, and/or 3 feet greater than the draft of vessels typically using the facility on a transient basis. Vessel drafts shall be obtained by using best available data. Entrance/exit channels near marinas shall be adequately marked if marina repairs or expansion are proposed.

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5. The site shall contain appropriate signage (including vessel speed and manatee information signs), and provide educational material advising boaters of essential manatee habitats in the vicinity.
6. Multi-family residential docking facilities will require that all vessels moored at the site be registered to individuals residing at the site.
7. The marina has adequate water circulation, tidal flushing, and meets State of Florida and local water quality standards.
8. In traveling to principal destinations or from principal origination or launch points determined by the boat study, vessels using the facility should not travel through manatee travel corridors, cold weather aggregation areas or other especially sensitive manatee habitats as described on pages 11-17.
9. Before expanding and exceeding the allowable powerboat slips defined above, an existing facility must demonstrate not less than 85% occupancy over the previous 2 years of operation. New facilities should be able to demonstrate the need for additional boat slips in the vicinity based on occupancy of existing marina slips within the boater sphere of influence.

c. Residential Dock Density

Residential dock facilities may have a significant cumulative impact on manatees and their habitat. In this Manatee Protection Plan, a single family residence is considered to be a detached building having a roof and outer walls entirely separated from any other structure by space, and occupied by members of a single family with not more than three outsiders, if any, accommodated in rented rooms. A multifamily residence is a building occupied by more than two families, in which each family shares a roof and/or outer wall(s) with at least one other family. The density of new coastal structures, including multifamily residential docks, should be limited in areas that are essential to the survival of the manatee. Figure 3 (page 12-15) indicates waterbodies and shorelines that have been determined essential habitat for the manatee.

Within Essential Habitat Areas:

Each single-family residence shall be limited to two power boat slips, and vessels using those slips shall be registered to the upland property owners or residents. It is not the intent to impose any additional restrictions on single family docks. Single family docks shall continue to be constructed according to the existing DERM coastal construction guidelines. For multifamily residential developments within essential habitat areas, multi-slip docking facilities with more than five boat slips should be permitted to construct no more than one powerboat slip per 100 feet of owned developable shoreline. Any additional slips (existing or newly constructed) may be occupied by sailboats. In no case should the number of new powerboat slips exceed the number of multifamily residential units approved and/or constructed. If a DERM Marine Facilities Operating Permit is required, it should specify that all vessels docked in a multifamily facility should be registered to individuals residing at the site.

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Sites on tributaries or canals which are upstream of or flow into a water body designated as an essential habitat area, should be subject to the aforementioned essential habitat standards.

d. Residential "No Entry" Areas

Several areas heavily used by manatees during the winter have been designated "No Entry, Residents Only, November 15 - April 30". These include portions of Biscayne Canal, Little River, and Coral Gables Waterway (Figure 16a-g, page 54-60). Single-family dock construction should be limited to two boat slips with only the upland residents permitted to use the dock space in these areas on a permanent basis. Temporary docking by authorized visitors should be allowed. Construction or renovation, other than emergency repairs required for the safety of the residents, shall be undertaken during the manatee summer season (May 1 - November 14).

e. No Coastal Construction

Undeveloped areas of extremely frequent manatee use are designated "no coastal construction or vessel access". These areas are designated "No Entry" in Figure 16a-g, pages 54-60, and include the northwest shorelines of Virginia Key, the north portion of the Black Point Marina basin, and the area of Black Creek from the salinity control structure (S-21) south to the north shore of the entrance to the Black Point Marina basin. No construction, other than environmental restoration or work required to protect the health and safety of the public, shall be permitted in these areas.

f. Freshwater Lakes

The Dade County Commission should pass an ordinance to give DERM permitting authority in freshwater lakes and canals which have vessel speed restrictions established for manatee protection. The construction restrictions DERM should impose shall be the same as those for similar uses in tidal waters noted above in III.C.1. through III.C.2g.

D. Education and Awareness

1. Educational Programs

Metropolitan Dade County (including DERM, Parks and Recreation and Communications) staff shall work with the Florida State Department of Education, Office of Environmental Education and the Florida Advisory Council on Environmental Education (FACEE) to develop a manatee supplemental educational curriculum program targeting students in elementary, middle and high schools. A teacher guide shall also be developed to assist teachers on how best to use the curriculum and where to obtain additional education about manatees. A local resource directory, listing available materials for use in the classroom should also be compiled.

Metropolitan Dade County staff will work with the Dade County School Board and local environmental educational groups to coordinate, compile and develop maps, video and educational plans on how to best protect manatees in Dade County. Local educational resources such as the Miami Seaquarium manatee display tank or "Manatee Halfway House", field trips and camps for various ages shall be incorporated into the local educational plan. A "distribution plan" will be developed for the distribution of the educational materials to both the public and private school systems. The information developed shall be printed in English and Spanish. In addition, the school system should explore the possibility of developing a boater education and operation program similar to existing driver education courses with a strong manatee awareness component.

Upon completion of the teacher guide and list of supplemental educational materials, teacher's workshops shall be held twice a year to provide basic information on manatee behavior and protection. Teachers participating in the workshops should receive continuing education credit.

Persons who operate vessels in Dade County should be required to complete a boater education class, which includes a strong manatee protection component, approved by the Florida Department of Environmental Protection, or pass an equivalency examination. The Florida Inland Navigation District (FIND) "Dade County Manatee Protection Zones" brochure should be presented and discussed in the class. Mandatory boater education is most likely to be successful if implemented statewide by statute, and if required of all vessel operators. Significant incentives for compliance, such as reduced insurance rates, or disincentives for failure to complete the educational requirements should be incorporated. Therefore, Dade County should encourage members of the Dade County delegation to the Florida legislature to support bills that make significant progress toward achieving this goal.

2. Awareness

DERM should annually promote Manatee Awareness Month in November as declared by Florida DNR (now DEP).

III. Implementation

- Local schools, conservation and boating groups should launch a campaign utilizing existing literature, videos, slide shows, etc. annually during November
- Pamphlets, bumper stickers and other manatee items should be distributed
- Radio and television public service announcements should be aired during manatee season
- Metro-Dade DERM, Parks and Recreation and Communications staff should develop a poster contest targeting residents of all ages and backgrounds, as part of the manatee awareness campaign
- Manatee education information should be included in bills from all of the water utilities doing business in Dade County
- Manatee protection awareness should be incorporated into themes for environmental education programs, activities and events such as Bayanza, Miami Riverfest and Earth Day celebrations, and SWIM educational programs and campaigns
- DERM and DEP should conduct an annual manatee education program for agents who enforce manatee protection laws, including state and local marine patrol officers, judges and prosecutors

In order to increase boater awareness of manatees, DERM with funding assistance from DEP, shall print a brochure explaining vessel speed zones in county waters and "No Entry" areas designed for manatee protection. This brochure should be completed in 1994 and mailed to all owners of boats registered in Dade County prior to November 15, the beginning of manatee season. The brochures should give boaters tips on how to minimize chances of collisions with manatees. Information regarding the locations of boat ramps should be included, since boaters may decide to launch their boats at a ramp close to their destination in order to avoid vessel speed zones. The brochure should be printed on waterproof paper in English and Spanish (due to the large Hispanic population in Dade County) and distributed to boaters with their boat registration purchase or renewal, and at marina/boat ramp and boat rental facilities. The FIND "Dade County Manatee Protection Zones" brochure should also be readily available to boaters.

All marina facilities which require a DERM marine facilities operating permit shall be required to post manatee awareness signs onsite. Those facilities with more than 50 slips, and all boat ramps and fuel docks, should be required to post "Manatee Basics for Boaters" and "West Indian Manatee Fact Sheet" information signs. In addition, facilities with boat ramps or more than 100 wet and/or dry slips, should develop a manatee information display with the two manatee information signs, the vessel speed brochure displayed with additional copies for boaters to take with them, an enlarged map showing the vessel speed restrictions in the immediate area, and any other pertinent information.

Due to the extremely heavy manatee use of Little River in the vicinity of the flood gate, the SFWMD shall post a manatee information sign which includes information on how to report an injured or dead manatee, the importance of not littering manatee areas and that it is illegal to harass, harm, feed, touch or kill manatees. The sign should be trilingual (English, Spanish and Creole) and should use international symbols to the greatest extent possible. A trash receptacle shall be installed adjacent to the sign, and the SFWMD shall be responsible for maintaining it.

III. Implementation

A similar trash collection problem exists in one area off the Coral Gables Waterway where manatees aggregate at a stormwater discharge site. Appropriate signs and a trash can should be placed onsite and maintained by the City of Coral Gables, owner of the upland property.

Funding for manatee awareness activities should be provided by Dade County, Florida DEP, the Florida Advisory Council on Environmental Education (FACEE) and the SFWMD. Private-public partnerships for funding should be encouraged. Upon acceptance of the Dade County Manatee Protection Plan, the above-mentioned funding agencies could dedicate that year's environmental education funding to the development of manatee educational and awareness activities. In the years to follow, the funding would decrease from year to year until it reaches a predetermined prorated share of the total available dollars. Metro-Dade County could utilize funds from several sources, such as the Biscayne Bay Environmental Enhancement Trust Fund, the Parks and Recreation Department and the Aviation Department and/or the Seaport Department to fund the Manatee Awareness Campaign. Additionally, the Dade County Board of County Commissioners could stipulate to all environmental community groups that receive funding from Dade County to earmark a portion of those funds for manatee education as part of the overall campaign.

3. **Coordination of Education and Awareness**

A committee composed of a representative from Dade County DERM, Florida DEP, USFWS, FPL, SFWMD, the Dade County School Board, the Marine Council, the Marine Industries Association of Greater Miami, Miami Seaquarium, and Save the Manatee Club should be created to coordinate suggestions and to determine funding for the various activities recommended in the Education and Awareness portion of section III. "Implementation" in this Plan. Florida DEP should be the lead agency on the committee.

E. *Governmental Coordination*

1. **Land Development Code**

The objectives and policies regarding land development and marine facility siting at the end of this Plan should be incorporated into the Dade County Comprehensive Development Master Plan in the Conservation Element, under Objective 9 which deals with protection of endangered species and their habitat. Appropriate portions related to coastal construction and marine facility operating permit programs should be integrated into the Dade County Code, in order to ensure compliance.

2. Boat Traffic/Manatee Area Usage Study

An annual boating survey should be conducted during the winter and summer every 5 years beginning in 1996, to determine how boat traffic patterns may change in response to vessel speed restricted zones and/or any other factors. The study should also include sampling to determine levels of compliance at several essential habitat or highly regulated locations, with and without targeted enforcement. In addition, aerial manatee surveys should be conducted monthly during the manatee winter season and every 2 months during the summer season through winter 1995-6 to determine if areas used by manatees change in response to the vessel speed zones or other factors. At the end of each 5 year boat study, alterations to the vessel speed restrictions developed for manatee protection may be considered. Possible funding sources for this study include FDEP, Save the Manatee Club, the Florida Boating Improvement Trust Fund, and/or the Biscayne Bay Environmental Enhancement Trust Fund.

3. Plan Implementation

Dade County shall prepare an annual report on the status of implementation of the Dade County Manatee Protection Plan. The Florida DEP shall continue to produce an annual report of the Save the Manatee Trust Fund, including statewide income and expenditure information. An annual accounting of money spent on manatee protection activities in Dade County shall be provided upon request.

IV. MANATEE PROTECTION PLAN: OBJECTIVES AND POLICIES

OBJECTIVE 1

Manatee habitat shall be protected from degradation.

POLICIES

1A. Seagrass beds used by manatees shall be protected from dredge and fill projects through the DERM Class 1 permit. New dredge and fill projects shall generally be prohibited in seagrass beds; mitigation will be required for any adverse seagrass impacts.

1B. The construction of new power generation plants or other structures which discharge warm water into areas accessible to manatees, shall be prohibited.

1C. Manatee aggregation areas shall be protected from alteration or human activities that will negatively impact manatee usage.

1D. Manatee travel corridors shall be protected through the establishment and enforcement of vessel speed restrictions and/or other appropriate means.

OBJECTIVE 2

Methods to enhance and restore water quality in manatee habitats shall be investigated by DERM and other agencies (e.g. City of Miami, SFWMD), and cleanup shall commence as soon as possible.

POLICIES

2A. Freshwater sources used by manatees shall be kept as free as possible of added pollutants and debris. The public shall be discouraged from running fresh water from hoses for use by manatees.

2B. Sources of sewage contamination and other illegal discharges in the Little River, Miami River, Black Creek and other waterbodies shall be identified and corrected. Tissue samples from manatee carcasses recovered in these waterbodies shall be collected and analyzed (when state of decomposition permits) for trace metals, organic chemicals or other compounds. New bioassay techniques for assessing toxicity or immune system response should be used in conjunction with tracking studies to evaluate effects of degraded water quality on manatees.

2C. Stormwater outfall improvements shall be identified and completed.

IV. Objectives and Policies

2D. Habitat restoration projects such as shoreline stabilization and mangroves, wetland and coastal hammock restoration, that improve water clarity and transparency, which protect or enhance seagrass communities, shall continue to receive funding through SWIM and complementary local programs.

2E. Pesticides for mosquito control shall not be used in areas where manatees are present.

OBJECTIVE 3

Aquatic plant removal shall be minimized in areas used by manatees.

POLICIES

3A. Eradication of freshwater aquatic vegetation in Dade County canal-lake systems shall be minimized between May 1 and November 15, exclusive of land-locked lakes, as feasible while maintaining flood protection.

3B. Aquatic plant removal in manatee areas shall be permissible only as necessary to maintain flood protection, canal conveyance capacity, navigation, or public safety.

3C. Only FDEP permitted herbicides shall be used in Dade County waterways. FDEP should not permit the use of chemicals shown to be harmful to large herbivorous mammals, in essential manatee habitats. When manatees are present, no aquatic plant treatments shall be applied within 500 feet of the animals. The use of herbicides or any chemical treatment containing copper shall be prohibited in Dade County. Herbicides shall be applied using schedules and rates which minimize dosage and maximize effectiveness. No chemical treatment shall exceed the recommended dosage noted on the herbicide container. Chemical herbicides shall only be used by licensed contractors; independent treatments by individuals shall be eliminated. Mechanical harvesting techniques shall be used in manatee areas not maintained by government agencies.

3D. The use of biological controls is encouraged. Dade County shall support research on the effects of biological controls and chemical herbicides on manatees and other wildlife.

3E. An interagency group composed of representatives from the Dade County Public Works Department, the South Florida Water Management District, the Florida Department of Environmental Protection and Dade County DERM shall meet annually to address aquatic plant control issues in Dade County.

OBJECTIVE 4

Manatee aggregation areas shall be incorporated into the state and federal systems of refuges, parks, reserves, and preserves.

POLICIES

4A. The listing of manatee aggregation sites for purchase by CARL (Conservation and Recreation Lands), EEL (Environmentally Endangered Lands), and/or the LATF (Land Acquisition and Trust Fund) is encouraged.

OBJECTIVE 5

DERM shall work with the South Florida Water Management District (SFWMD) to reduce to zero the number of manatee mortalities related to flood gates/salinity control structures.

POLICIES

5A. A full-time position should be established at the SFWMD to organize manatee protection efforts within the agency.

5B. A backup system or device should be investigated and developed simultaneously with the development of the primary project for manatee protection from flood gates. The backup project could be implemented immediately if the primary project fails during testing. The following concepts should be considered:

- (1) Continue monitoring and modifying the pressure sensitive device (PSD) concept
- (2) Resume development of a sonar device to detect manatees in the vicinity of flood gates
- (3) Consider plans for a parallel fence or screening device that advances prior to gate closure to serve as a mechanical fail-safe
- (4) Refinement of the algorithm or circuitry by revising the time delay between sequenced opening of gates in multiple-gate structures or by modifying the default mechanism during major maintenance, should be performed
- (5) Structures which permit discharge of limited volumes of water over the top of the structure instead of below it, should be most heavily considered as a manatee protection solution, and should replace all structures where feasible, i.e. in low to moderate flow discharge areas
- (6) Strategies which alter established manatee movement patterns, limit access to suitable habitat, or disturb sensitive behavior should only be considered if the strategies outlined above fail to prevent mortality

5C. For each manatee carcass recovered in the vicinity or downstream of a flood gate, where gate crushing cannot be immediately ruled out as a contributing cause of death, the SFWMD shall provide FDEP with reports for structure-related manatee mortalities within 30 days of notification. These reports should include a compilation of appropriate gate operation records and assessments, conceptual designs, prototype test results and observations, and similar documentation. The reports shall be provided for review at quarterly Interagency Manatee Task Force meetings attended by at least one representative of the SFWMD executive office, DEP, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service and DERM.

IV. Objectives and Policies

5D. The SFWMD, shall prepare an annual report summarizing all flood gate-related manatee mortality, and the status of the SFWMD manatee protection program. This document shall also include a summary of relevant system operations. It shall be completed by February 1 of each year. The annual report shall be distributed for public review and Interagency Manatee Task Force review at least one month prior to being placed on the SFWMD governing board agenda for discussion.

5E. The Interagency Manatee Task Force shall continue to meet until all agencies are satisfied that the goal of zero manatee mortality from flood gates has been achieved. The SFWMD shall record action items and future agenda topics at the meetings which shall be distributed to all meeting participants and shall be available to the public.

5F. Flood gate operation records should be audited on a continuing basis at the Interagency Task Force meetings to certify that coastal structures are opening to the 2-1/2 foot criteria without excessive oscillation, or to identify any other system problems.

5G. No management strategy shall be dismissed from further consideration until adequate technical information is available for full review, and the agencies composing the task force reach a consensus.

5H. DERM and the SFWMD should jointly conduct an annual public workshop in Dade County, at an appropriate facility provided by DERM, to inform and receive input on manatee protection from interested members of the community.

5I. The SFWMD shall notify DEP and DERM prior to conducting any activities involving vessels or heavy equipment, or other work in tidal waters. The SFWMD shall apply for any permits required by state or local regulations.

5J. The construction of locks shall be prohibited.

OBJECTIVE 6

Miami International Airport shall install and maintain barriers to prevent manatees from entering the canal-culvert system.

POLICIES

6A. The design for a manatee barrier shall be approved by DERM, DEP and the USFWS, and appropriate permits shall be obtained prior to installation.

6B. A permanent manatee barrier shall be installed and maintained at the south tributary off of Tamiami Canal.

6C. The sand-cement bag riprap base on the manatee barrier at the north tributary off of Tamiami Canal shall be replaced with a more substantial base.

6D. Additional barriers or other modifications may be required if additional manatee access points into the airport system are discovered.

IV. Objectives and Policies

6E. Dade County Aviation Department (DCAD) staff shall submit quarterly manatee barrier maintenance reports to DERM and DEP.

6F. DCAD staff shall immediately contact manatee protection personnel at DERM, DEP and USFWS with manatee sightings in the airport canal system, including dead or injured manatees. DCAD Environmental Engineering Division staff shall submit manatee incident reports within 30 days of the manatee sighting to those agencies noted above. These reports shall contain the date, time, location (including a map with location indicated) and the name and telephone number of the first person to observe the manatee.

6G. DCAD, DERM and DEP staff shall discuss the state of decomposition of any dead manatee and determine the method of carcass disposal prior to meeting onsite whenever possible. If extremely decomposed, DERM may arrange for disposal of a carcass at the South Dade landfill, after receiving authorization from the appropriate DEP staff. DCAD Public Works staff shall assist in carcass recovery from Miami International Airport (MIA) canals.

6H. If a manatee carcass is discovered upstream of airport manatee barriers, airport personnel shall locate the point of entry within 48 hours and have divers search for additional manatees in the vicinity. Live manatees shall be relocated by USFWS, DEP, DERM and Miami Seaquarium staff after approval from USFWS. If no manatees are observed, the access point shall be repaired within 48 hours after the completion of the divers' inspection.

OBJECTIVE 7

Manatee protection shall be considered during high speed (greater than 30 mph) water-related activities.

POLICIES

7A. Water-ski activities should occur only in designated (35 mph) and unregulated areas in Dade County tidal waters (see Appendix B of the Manatee Protection Plan), and in land-locked lakes, borrow pits and other waterbodies not accessible to manatees.

7B. Power boat racing shall be prohibited in Government Cut or in the unregulated areas of Biscayne Bay. Power boat races shall occur at least 1,000 feet offshore in deep water areas of the Atlantic Ocean, or in the Miami Marine Stadium. Races may occur year-round.

7C. During high speed marine events such as personal watercraft or water-ski events, and power boat races, the following manatee protection measures shall be adhered to:

- (1) A Manatee Watch Program shall be established.
- (2) The manatee watch shall consist of four qualified observers, including one primary observer. Surveys shall be conducted from an aircraft and also from elevated land-based and/or boat-based positions. Each observer shall be equipped with a two-way radio and will be dedicated exclusively to the manatee watch.

IV. Objectives and Policies

- (3) A continuous aerial survey shall be conducted beginning 1 hour prior to the event and prior to any organized practice sessions to identify any manatees in the vicinity of the event site. The survey shall continue until all official and spectator vessels have cleared the area. Aerial surveys shall extend 1 mile from the perimeter of the race course.
- (4) Events in the Miami Marine Stadium should require manatee observers on boats positioned across the stadium entrance
- (5) An observer shall be in close communication with race sponsors/officials in order to halt the event if a manatee(s) is spotted within 500 feet of the perimeter of the event site. The event shall be halted immediately upon the request of the observer. The event shall not resume until the animal(s) move(s) away from the area under its own volition. Manatees must not be herded away or harassed into leaving. If the manatee(s) is (are) not sighted a second time, the event shall not resume until 30 minutes after the initial sighting.
- (6) All participants and official boats shall adhere to speed zones adjacent to the event site.
- (7) The primary observer shall write a report providing the names of the observers and their positions during the event, number and location of manatees sighted, and any problems encountered during the event (and possible solutions). This report shall be submitted to the Coast Guard, USFWS, DEP and DERM within 30 days of completion of the event.
- (8) If any of the aforementioned conditions is not met prior to or during the race, the event shall be immediately terminated. The Coast Guard shall designate a monitor (possibly a Coast Guard representative or the primary manatee watch observer) who shall have the authority to terminate the event as required by these measures.

OBJECTIVE 8

Vessel speed restrictions for manatee protection should be adequately marked.

POLICIES

8A. DEP and FIND shall approve of and install sufficient vessel speed signage for appropriate law enforcement. The installation and maintenance of additional signs by third parties should be considered.

8B. Manatee protection zone areas should be inspected annually to ensure that adequate marking is present, and that no hazards to navigation exist.

8C. Vessel speed restrictions in areas of high-speed water-related activities should be indicated by and/or delineated with buoys.

OBJECTIVE 9

Law enforcement should be improved through the coordination of enforcement agencies and by increasing enforcement personnel.

POLICIES

9A. All state and local marine patrol officers shall have an annual review of the vessel speed zones prior to the beginning of manatee season (November 15).

9B. All law enforcement agencies shall adhere to all vessel speed restrictions unless an emergency is in progress.

9C. A manatee protection law enforcement task force should be developed consisting of one officer from each marine patrol office (state, county and each municipality) and the Florida Game and Freshwater Fish Commission, to aid in establishing a working relationship between enforcement agencies. The goal of the task force would be to ensure full and efficient monitoring of areas with vessel speed regulations, and proper handling of manatee-related incidents. Each of these officers should be designated as the "manatee specialist" for their office, and would be notified of any manatee-related proposals with which the law enforcement agencies may be involved.

9D. DERM shall work with the various marine patrol agencies to obtain necessary funding for marine patrol officers to improve enforcement capabilities.

9E. Waterfront municipalities that do not have marine patrol offices should be encouraged to establish them to create additional law enforcement presence.

9F. Any approved boater education program for powerboat operators shall include a manatee protection component. Licensing of powerboat operators should be encouraged statewide.

OBJECTIVE 10

Development of shoreline and submerged land areas shall be regulated in a manner that does not directly or indirectly impact the manatee or its habitat in an adverse manner.

POLICIES

10A. Potential impacts to endangered species and their habitats shall continue to be considered by DERM for projects requiring a Dade County Class I coastal construction permit. Project or facility construction or operation which could result in adverse impact to manatees or their essential habitats (as defined in the Dade County Manatee Protection Plan) should not be permitted, except as necessary to protect the health and safety of the public.

10B. Natural shoreline vegetation shall be maintained. Non-water dependent structures shall be constructed on the upland above the mean high water line, landward or away from

wetlands or other natural areas. All new or replacement structures accessible to manatees shall be designed to prevent entrapment of or injury to the animals.

10C. Any culvert greater than 7 and less than 60 inches in diameter, shall be covered with grates or screens with spaces less than 7 inches wide in order to prevent manatee entrapment. These grates/screens shall be maintained to prevent upland flooding. New culverts installed in areas not previously accessible to manatees, shall be covered with flap gates or other devices designed so as not to cause injury to manatees, and prevent manatee entry into the culvert.

10D. Standards and policies related to the development of submerged land shall address the preservation of submerged vegetation, placement of dredge and fill material, and the size and design of structures below the mean high water line. Destruction or alteration of shallow water habitat used by manatees shall be prohibited unless necessary for the protection of the public or for restoration and enhancement of environmental resources. Blasting in or adjacent to habitat regularly used by manatees shall be prohibited.

10E. An existing marine facility as defined for this Manatee Protection Plan, is one which was permitted and in use as of October 28, 1984 or later. The facility must hold all required permits from appropriate federal, state and local agencies. Such a facility shall be permitted to reconstruct at least the maximum number of slips that were in use and approved in permits, at any given time since October 29, 1984. All existing marine facilities should be allowed to continue with the existing use, and may renovate according to permitting guidelines, as long as there is no change in facility size, including no increase in the number of wet or dry slips for powerboats (unless the facility meets the expansion criteria addressed below in 10F-I). A facility may also be considered for expansion if it meets the variance criteria in Policy 10Q below.

10F. New or expanded marine facilities shall have adequate water depth for the draft of the vessels using the facility, plus 3 feet in order to clear manatees, in waterbodies which may be too narrow for the animals to avoid vessels by moving aside.

10G. The number of powerboats docked at a facility, including dockage along bulkheads, shall not exceed the number of slips approved by the Class I permit or the DERM marine facility operating permit. A boat slip is generally considered to be 20 feet wide by 40 feet long as defined by the Dade County Manatee Protection Plan.

10H. All new marine facility and marina expansion sites in Dade coastal waters shall cause no or minimal overlap of manatee-boat travel patterns, no or minimal wetland or benthic community disturbance or similar environmental impact, and shall be compatible with surrounding land use. If **only** sailboats with or without minimal horsepower auxiliary motors (allowing vessels to travel at a maximum speed of 8 knots) are permitted to be moored at a marina, overlap of manatee-boat travel patterns may not be considered.

10I. Marine facility expansion and new facility locations shall be permitted as indicated in III.C.2.a."Marine Facility Siting Criteria" on pages 88-99, and on Figures 19a-c, pages 90-92 of the Dade County Manatee Protection Plan.

10J. A DERM Class I permit shall be required for the construction, expansion, replacement or repair of all dry storage boat facilities, including those located in municipalities.

IV. Objectives and Policies

10K. Sites recommended for marina development and expansion with no restriction on the number of powerboat slips from a manatee protection perspective include the following areas as shown in Figure 19a-c, p.90-92, in the Dade County Manatee Protection Plan. The installation of new or additional boat lifts should be permitted in the suitable areas noted below.

- 1) Since the number and frequency of manatee sightings has been relatively lower on the east side of Biscayne Bay along Miami Beach between Haulover and Government Cuts, and most boats using a facility constructed in this area would be likely to travel along Meloy channel and exit to the Atlantic Ocean through either of these inlets, marina development should be considered in this area. Expansion of Crandon Marina on Key Biscayne could be considered due to its nearby ocean access which excludes designated manatee habitat.
- 2) The Keystone Point area located east of Biscayne Boulevard between NE 135 and NE 125 Streets is due west of Haulover Cut. Boats using a marina in this area would be expected to go to the ocean through this inlet, traversing through a very small portion of the Bay, which although used by manatees, is protected by vessel speed limits. Boaters whose destination is south Biscayne Bay have direct access to the Meloy Channel at Broad Causeway.
- 3) Some marinas south of Rickenbacker Causeway may be considered suitable sites for expansion, since boaters using these facilities generally are heading to south Biscayne Bay or offshore destinations that do not require extensive travel through essential manatee habitat. Manatees near shore should be protected from high-speed vessel impacts by the approved speed zones. Areas south of Rickenbacker Causeway that are not suitable for marina expansion or development in which moderate to heavy manatee use, mortality or sensitive manatee behavior is documented, include the following:
 - a portion of west Key Biscayne from Crandon Marina to the south shore of Pines Canal,
 - the Coconut Grove shoreline from the south side of Dinner Key Marina to Coral Gables Waterway,
 - all of Coral Gables Waterway located east of SW 57 Avenue and all other canals in Coral Gables (excluding the Matheson Hammock Marina area),
 - the Kings Bay/Deering Bay waterways located between theoretical SW 140 Street and SW 160 Street,
 - the Black Point area waterways, and
 - the Homestead Bayfront Park/Biscayne National Park marina basin areas.
- 4) Marina expansion at Matheson Hammock Park could be considered due to infrequent manatee sightings in the immediate area, and the improbability of boats using the facility to travel through areas of heavy manatee use.

10L. Fuel dispensers should be located on the upland if feasible. Secondary containment shall be required on any fuel line extending over water along a dock.

10M. Existing freight terminals and other facilities mooring vessels greater than 100 feet in length, shall be retrofitted with fender systems or other design which provide at least 4 feet of standoff from the bulkhead or wharf under maximum operational compression; due to the narrowness of the waterway, existing freight terminals in the Miami River shall be required to have at least 3 feet of standoff at maximum compression. However, an exemption to this requirement in the Miami River applies to a 1,600 linear foot narrow area bordered by the Bernuth and Universal terminals on the south and the Antillean and the former Hyde terminals on the north sides of the River. This area may be allowed to remain without fendering as a reasonable option in compromise as long as there is no development or expansion of berthing for terminals to the west of this passage beyond what are already existing facilities (as defined at the top of page 89). This exemption means that there will be no new slips or mooring facilities for large vessels approved within or west of this 1,600 linear foot area. Any takeover of an existing facility by new or different operators will not be considered as new development provided new slips are not created. Further improvement of an existing facility will not be prohibited, provided berthing area is not expanded. Replacement or major renovation of any large vessel berthing in a manatee habitat, including this portion of the Miami River will require standoff. If the 3 foot standoff is achieved in the future, the development and expansion of large vessel docking facilities may be permitted on the River.

10N. Within 6 months after the Dade County Manatee Protection Plan is approved by the Florida DEP or the Governor and Cabinet, DERM shall notify affected property owners of this condition and their need to comply, including options acceptable for compliance. The affected property owners have 12 months after receipt of this information to comply with the standoff requirement or inform DERM of intent to construct a cantilever dock or bulkhead, or any other type of standoff requiring permit approval. In the latter case, a complete permit application shall be submitted to all appropriate permitting agencies within 12 months of receipt of the DERM information, and construction of the permitted standoff project shall be completed within 12 months of receipt of all required permits. A 4 foot standoff system (at maximum compression) shall be required on all other bulkheads and piers that are not cantilever constructed, where a manatee may be crushed between a vessel and the bulkhead. Fender systems or other design providing at least 4 feet of standoff at maximum compression shall be required in permits for all new or expanded facilities of this sort, and for repairs to existing facilities. Similar fenders shall be required between two large vessels moored together.

10O. The study of prop guard technology shall be encouraged. If a prop guard or similar device is recommended for use on tug boats in the future, the requirement of the device should receive public review prior to implementation. Should such a recommendation come to pass, economic incentives should be considered for retrofitting tugs with the device for manatee protection.

10P. All parking at boat ramps located in essential manatee habitat shall be limited to the number of existing spaces (including existing overflow parking both on and off paved areas). Excess parking should be prohibited and enforced by Dade County through a fine, and revocation of the MOP where applicable, if not in compliance. Dade County Park and Recreation Department personnel should supervise parking in trailer spaces at

IV. Objectives and Policies

County-owned marinas on weekends and holidays to ensure that only vehicles with trailers use the spaces.

10Q. For docking facilities and boat ramps subject to the 1 powerboat slip to 100 feet of shoreline restriction, higher ratios may be considered if the facility can demonstrate that it will not have an adverse impact on manatees. In no case shall the maximum total buildout of 5 powerboat slips per 100 feet of owned contiguous shoreline be exceeded. Uses proposed in a location not shown as an acceptable site for that particular type of facility on the map in Figure 19a-c, p.90-92, may be evaluated according to the following listed criteria numbered 1-9. However, adherence to these criteria does not automatically ensure the applicant's ability to exceed the allowable powerboat restrictions as defined above. The plan restrictions will remain in effect, if at the time of review, additional information about manatees or the proposed facility indicates threats not addressed by these criteria. Consideration can be given for additional site-specific factors or operating practices (e.g. seasonal operation, etc.) that may be proposed by either the applicant or the County, that may result in improved conditions for manatees or manatee protection. Any facility exceeding the allowable powerboat slip restrictions (1:100) or use according to the criteria defined below, must agree to obtain and comply with an annual marina operating permit (MOP), even if the facility does not meet the threshold established in the MOP ordinance. The criteria are:

1. The waters adjacent and channels leading to the facility are designated "slow speed" or "idle speed" as authorized by the Florida Manatee Sanctuary Act Ch. 62N-22 (formerly 16N-22) F.A.C. or Boating Restricted Areas Ch. 62N-24 (formerly 16N-24), F.A.C.
2. The facility is not located within a cold-weather aggregation area or other area where sensitive manatee activities occur, or in a travel corridor from these areas, as indicated on pages 12-15.
3. The facility must provide net benefit to manatees and/or their habitat. For example, facilities may include a manatee "refuge" space as part of the design, a conservation easement, restoration of adjacent wetlands such as mangrove or seagrass restoration to increase the net coverage of the nearby area, reduced nutrient input to receiving waters, requiring prop guards on any high traffic vessels such as water taxis or dive boats or rental boats, etc. The marina construction and subsequent uses will neither destroy nor negatively impact mangrove and benthic (seagrass, hard bottom, etc.) communities and the water quality.
4. The facility must have sufficient water depth in the marina basin and in any access channel, and does not require any new dredging or filling that would degrade shallow water habitat (this may exclude maintenance dredging, excavation into uplands or pile installation). Sufficient water depth shall be water depth, measured at mean low tide, of 3 feet greater than the draft of vessels occupying the slips on a permanent basis, and/or 3 feet greater than the draft of vessels typically using the facility on a transient basis. Vessel drafts shall be obtained by using best available data. Entrance/exit channels near marinas shall be adequately marked if marina repairs or expansion are proposed.
5. The site shall contain appropriate signage (including vessel speed and manatee information signs), and provide educational material advising boaters of essential manatee habitats in the vicinity.

IV. Objectives and Policies

6. Multi-family residential docking facilities will require that all vessels moored at the site be registered to individuals residing at the site.
7. The marina has adequate water circulation, tidal flushing, and meets State of Florida and local water quality standards.
8. In traveling to principal destinations or from principal origination or launch points determined by the boat study, vessels using the facility should not travel through manatee travel corridors, cold weather aggregation areas or other especially sensitive manatee habitats as described on pages 9-13.
9. Before expanding and exceeding the allowable powerboat slips defined above, an existing facility must demonstrate not less than 85% occupancy over the previous 2 years of operation. New facilities should be able to demonstrate the need for additional boat slips in the vicinity based on occupancy of existing marina slips within the boater sphere of influence.

A permit applicant may appeal a decision made by DERM according to existing guidelines.

10R. The following restrictions apply to boat slips within essential manatee habitat areas. These restrictions also apply to similar sites on tributaries or canals which are upstream of or flow into a water body designated as an essential habitat area.

- (1) Each single family residence shall be limited to two powerboat slips, and vessels using those slips should be registered to the upland property owners or residents. Single family docks shall continue to be constructed according to the existing DERM coastal construction guidelines.
- (2) For multifamily residential developments within essential habitat areas, multi-slip docking facilities with more than five boat slips should be permitted to construct no more than one powerboat slip per 100 feet of owned developable shoreline. Any additional slips (existing or newly constructed) may be occupied by sailboats. In no case should the number of approved powerboat slips exceed the number of multifamily residential units. If a DERM Marine Facilities Operating Permit is required, it should specify that all vessels docked in a multifamily facility should be registered to individuals residing at the site.

10S. In "No Entry, Residents Only" zones, single-family dock construction should be limited to two boat slips. Only the upland residents shall be permitted to use the dock space for permanent dockage in these areas. Construction or renovation, other than emergency repairs required for the safety of the residents, shall be undertaken during the manatee summer season (May 1 - November 14).

10T. No construction except environmental restoration or work required to protect the health and safety of the public, shall be permitted in areas designated "No Entry" (year-round) for manatee protection.

10U. DERM should have permitting authority in freshwater lakes and canals which have vessel speed restrictions established for manatee protection. The construction restrictions DERM should impose shall be the same as those for similar uses in tidal waters noted above in Policies 10A through 10T.

OBJECTIVE 11

Information about manatees shall be readily available to the general public.

POLICIES

11A. Metro-Dade County (including DERM, Park and Recreation and Communications) staff shall work with the Florida State Department of Education, Office of Environmental Education and the Florida Advisory Council on Environmental Education (FACEE) to develop a manatee supplemental educational curriculum program targeting students in elementary, middle and high schools. A teacher guide shall also be developed to assist teachers on how best to use the curriculum and where to obtain additional education about manatees. A local resource directory, listing available materials for use in the classroom should also be compiled.

11B. Metro-Dade County staff will work with the Dade County School Board and local environmental educational groups to coordinate, compile and develop maps, video and educational plans on how to best protect manatees in Dade County. Local educational resources such as the Miami Seaquarium manatee display tank, field trips and camps for various ages shall be incorporated into the local educational plan. A "distribution plan" will be developed for the distribution of the educational materials to both the public and private school systems. The information developed shall be printed in English and Spanish. In addition, the school system should explore the possibility of developing a boater education and operation program similar to existing driver education courses with a strong manatee awareness component.

11C. Upon completion of the teacher guide and list of supplemental educational materials addressed in Policies 11A-B above, teacher's workshops shall be held twice a year to provide basic information on manatee behavior and protection. Teachers participating in the workshops should receive continuing education credit.

11D. Persons who operate vessels in Dade County should be required to complete a boater education class, which includes a strong manatee protection component, approved by the Florida Department of Environmental Protection, or pass an equivalency examination. The Florida Inland Navigation District (FIND) "Dade County Manatee Protection Zones" brochure should be presented and discussed in the class. Mandatory boater education should be implemented statewide by statute, and if required of all vessel operators. Significant incentives for compliance, such as reduced insurance rates, or disincentives for failure to complete the educational requirements should be incorporated. Therefore, Dade County should encourage members of the Dade County delegation to the Florida legislature to support bills that make significant progress toward achieving this goal.

11E. DERM should annually promote Manatee Awareness Month in November as declared by Florida DNR (now DEP).

IV. Objectives and Policies

- (1) Local schools, conservation and boating groups should launch a campaign utilizing existing literature, videos, slide shows, etc. annually during November
- (2) Pamphlets, bumper stickers and other manatee items should be distributed
- (3) Radio and television public service announcements should be aired during manatee season
- (4) Metro-Dade DERM, Parks and Recreation and Communications staff should develop a poster contest targeting residents of all ages and backgrounds, as part of the manatee awareness campaign
- (5) Manatee education information should be included in bills from all of the water utilities doing business in Dade County

11F. Manatee protection awareness should be incorporated into themes for environmental education programs, activities and events such as Bayanza, Miami Riverfest and Earth Day celebrations, and SWIM educational programs and campaigns.

11G. DERM and DEP should conduct an annual manatee education program for agents who enforce manatee protection laws, including state and local marine patrol officers, judges and prosecutors.

11H. Dade County vessel speed brochures should be available at large marinas, boat ramps and boat rental facilities.

11I. All marina facilities which require a DERM marine facilities operating permit shall be required to post manatee awareness signs onsite. Those facilities with more than 50 slips, and all boat ramps and fuel docks should be required to post "Manatee Basics for Boaters" and "West Indian Manatee Fact Sheet" information signs. In addition, facilities with boat ramps or more than 100 wet and/or dry slips, should develop a manatee information display with the two manatee information signs, the vessel speed brochure displayed with additional copies for boaters to take with them, and enlarged map showing the vessel speed restrictions in the immediate area, and any other pertinent information.

11J. Appropriate manatee informational signs should be posted at locations where the general public gather to observe manatees in the wild.

- (1) Due to the extremely heavy use of Little River in the vicinity of the flood gate, the SFWMD shall post a manatee information sign which includes information on how to report an injured or dead manatee, the importance of not littering manatee areas and the fact that it is illegal to harass, harm, feed, touch, or kill manatees. The sign should be trilingual (English, Spanish and Creole) and should use international symbols to the greatest extent possible. A trash receptacle shall be installed adjacent to the sign, and the SFWMD shall be responsible for its maintenance.
- (2) appropriate signs addressing feeding and littering, and a trash can should be placed onsite and maintained by the City of Coral Gables at a dead end canal off of Coral Gables Waterway, where manatees aggregate at a stormwater discharge site.

11K. Funding for manatee awareness activities should be provided by Dade County, Florida DEP, the Florida Advisory Council on Environmental Education (FACEE) and the SFWMD. Private-public partnerships for funding should be encouraged. Upon acceptance

of the Dade County Manatee Protection Plan, the above-mentioned funding agencies could dedicate that year's environmental education funding to the development of manatee educational and awareness activities. In the years to follow, the funding would decrease from year to year until it reaches a predetermined prorated share of the total available dollars. Metro Dade County could utilize funds from several sources, such as the Biscayne Bay Environmental Enhancement Trust Fund, the Park and Recreation Department and the Aviation Department and/or the Seaport Department to fund the Manatee Awareness Campaign. Additionally, the Dade County Board of County Commissioners could stipulate to all environmental community groups that receive funding from Dade County to earmark a portion of those funds for manatee education as part of the overall campaign.

11L. A committee composed of a representative from Dade County DERM, Florida DEP, USFWS, FPL, SFWMD, the Dade County School Board, the Marine Council, the Marine Industries Association of Greater Miami, Miami Seaquarium, and Save the Manatee Club should be created to coordinate suggestions and to determine funding for the various activities recommended in the Education and Awareness portion of section III. "Implementation" in this Plan. Florida DEP should be the lead agency on the committee.

OBJECTIVE 12

Vessel traffic and manatee usage patterns should continue to be monitored in order to detect changes in these patterns and modify vessel speed restricted zones accordingly.

POLICIES

12A. An annual boating survey should be conducted during the winter and summer every 5 years beginning in 1996, to determine how boat traffic patterns may change in response to vessel speed restricted zones and/or any other factors. The study should also include sampling to determine levels of compliance at several essential habitat or highly regulated locations, with and without targeted enforcement. In addition, aerial manatee surveys should be conducted monthly during the manatee winter season and every 2 months during the summer season through winter 1995-6 to determine if areas used by manatees change in response to the vessel speed zones or other factors. At the end of each 5 year boat study, alterations to the vessel speed restrictions developed for manatee protection may be considered. Possible funding sources for this study include FDEP, Save the Manatee Club, the Florida Boating Improvement Trust Fund, and/or the Biscayne Bay Environmental Enhancement Trust Fund.

OBJECTIVE 13

The general public shall be able to obtain information from county and state government regarding manatee protection in Dade County.

POLICIES

13A. Dade County shall prepare an annual report on the status of implementation of the Dade County Manatee Protection Plan.

13B. The Florida DEP shall produce an annual report on income received and money spent in each county on manatee protection activities.

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APPENDIX

Appendices A, B and C are not included in this copy of the Draft Manatee Protection Plan for Dade County due to their considerable size.

Appendix A is the "Bottom Communities of Biscayne Bay" map which indicates the locations of various species of seagrass beds in addition to algae, hard and soft coral communities, and barren substrate. The locations of significant marine communities are indicated on Figure 18 a-c as areas where dredge and fill activities are restricted. This series of maps is located on pages 66-68 of this Manatee Protection Plan document.

Appendix B is the state rule for Dade County vessel speed restrictions for manatee protection, which was adopted by the Florida governor and Cabinet on November 14, 1991. Figure 16a-g ,page 54-60 of this Manatee Protection Plan document, shows the locations of the various speed restricted zones.

Appendix C is the Shoreline Development Review Ordinance and Master Plan

APPENDIX D**EXISTING MARINE FACILITIES IN DADE COUNTY**

(Updated 1/1/95)

Existing Facilities	Address	#Slips	#Occ	%Occ
Action Bay Boat Rentals	100 Sunny Isles Blvd. NM	15	11	73
Adventurers Yacht & Sailing	2480 S Bayshore Dr. MIA	20	0	0
Allied Marine	2051 NW South River Dr.	62	47	76
Ameritrade Terminals	200 SW North River Dr. MIA	10	10	100
Ameritrade Terminals	377 NW South River Dr. MIA	3	3	100
Anchor Marine Marina	961 N.W. 7 St. MIA	15	15	100
Antillean Marine Shipping	3038 NW North River Dr.	3	3	100
Apache Marine	3161 NE 188 St.	12	12	100
Arellano Bros. Inc. Sponges	5 SW South River Dr. MIA	6	6	100
Arlen House	275 Bayview Dr.	25	15	60
ATCO Marine Service	28 NW North River Dr. MIA	6	4	67
Atlantic Aero Marine	3600 NW South River Dr.	18	15	83
Atlantic Marine Boat Yards	401 SW 3 Ave. MIA	15	4	27
Aventura Marina	NE 34 Ct./Country Club Dr.	27	12	44
Bal Harbour Yacht Club	200 Bal Bay Dr. BH	37	20	54
Banyan Bay Apartments	703 N.E. 63 St.	21	0	0
Basset Sea Ray Marina	700 NE 79 St. MIA	32	0	0
Bayshore Yacht	7904 West Dr. NBV	23	23	100
BayView Marine	3301 NW South River Dr.	2	2	100
Beach Boat Rentals	2380 Collins Ave. MB	8	6	75
Bernuth Marine Shipping Inc.	3201 NW 24 St. MIA	4	4	100
Bertram Yacht	3660 NW 21 St. MIA	93	75	81
Bertram Yachts	3480 NW 21 St. MIA	47	15	32
Besancon	3615 NW South River Dr.	3	3	100
Best Beverage	3825 NW North River Dr.	1	1	100
Best Yacht Repair	2535 NW 18 Terr. MIA	9	0	0
Big Toe Marina	3301 Rickenbacker Cswy.	4	4	100
Bimini Boat Yard	151 N.W. South River Dr.	10	9	90
Biscayne Bay Marriott Marina	1633 N. Bayshore Ct. MIA	222	98	44
Biscayne Bay Yacht Club	2540 S. Bayshore Dr. MIA	123	123	100
Blattman North & South Islands	Dumfoundling Bay	49+	0	0
Blue Marlin Marina	2500 N.E. 163 St. NM	10	10	100
Bobby Moore's Custom Marine	3016-30 NE 188 St.	3	0	0
Bojean Boat Yard	3041 NW South River Dr.	42	20	48
Brickell Bay Village	2101 Brickell Ave. MIA	13	8	62
Brickell Biscayne Condo	150 S.E. 25 Rd. MIA	17	17	100

Existing Facilities	Address	#Slips	#Occ	%Occ
Brickell Harbour Condo	200 SE 15 St. Rd. MIA	12	12	100
Brickell Place Phase II	1925 Brickell Ave. MIA	22	0	0
Byrd Commercial Diving	3345 NW South River Dr.	2	1	100
Byrd Diving & Salvage II	3369 NW South River Dr.	12	8	75
C & F Marine Supply	2151 N.W. 12 St. MIA	40	18	45
Carriage Club	5005 Collins Ave. MB	10	10	100
Carriage House Condo	5401 Collins Ave. MB	22	15	68
Castaways Marina	16425 Collins Ave. MB	13	6	46
Causeway 79 Marina	724 N.E. 79 St. MIA	267	267	100
Centro Espanol	3615 NW South River Dr.	3	3	100
Century Towers Condo	100 Kings Point Dr.	15	0	0
Champion Marine	19055 Biscayne Blvd.	91	0	0
Cigarette Racing Team Inc.	3131 NE 188 St.	2	0	0
Club Nautico Bayside	401 Biscayne Blvd. MIA	4	0	0
Club Nautico of Biscayne Bay	Biscayne Marriott	4	4	100
Club Nautico in the Grove	2560 S Bayshore Dr. MIA	7	7	100
Club Nautico of Key Biscayne	5420 Crandon Blvd. KB	4	4	100
Club Nautico of Maule Lake	17201 Biscayne Blvd	6	4	67
Club Nautico of Miami Beach	300 Alton Rd. MB	3	3	100
Coastal Fuels Marketing Inc.	Fisher Island	5	5	100
Coastal Towers	400 Kings Point Dr.	32	20	63
Coastal Tug & Barge	2215 NW 14 St. MIA	1	0	0
Coconut Grove Sailing Club	2990 S. Bayshore Dr. MIA	278	278	100
Cocoplum Yacht Club	185 Cocoplum Rd. CG	176	115	65
Coffey's Marine	801 NW 4 St. MIA	18	0	0
Coral Reef Yacht Club	2484 S. Bayshore Dr. MIA	169	167	99
Costa Brava	11 Island Ave. Belle Isl. MB	30	6	20
Cougar (Boss) Marine	2940-50 NE 188 St.	40	40	100
Curry Industries	3020 NE 188 St.	2	2	100
Dade Co. Black Point Marina	24775 S.W. 87 Ave.	209	192	92
Dade Co. Crandon Park Mar.	4000 Crandon Blvd. KB	362	317	88
Dade Co. Haulover Park Mar.	10800 Collins Ave.	44	16	36
Dade Co. Homestead Marina	9698 N. Canal Dr. HM	233	125	54
Dade Co. Matheson Marina	9610 Old Cutler Rd. CG	323	313	97
Dade Co. Pelican Harbor Mar.	1275 N.E. 79 St.	98	0	0
Dawson Marine Service	55 SW Miami Ave. Rd. MIA	4	0	0
Deering Bay	14401 SW 62 Ave.	72	72	100
Defender Yacht Corp.	3499 NW 25 St. MIA	14	6	43
Del Prado on the Bay	18071 Biscayne Blvd. NMB	60	21	35
Dinner Key Boat Yard	2640 S. Bayshore Dr. MIA	82	61	74
Dinner Key Marina	3400 Pan American Dr. MIA	581	581	100

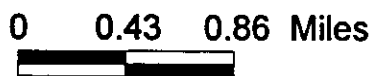
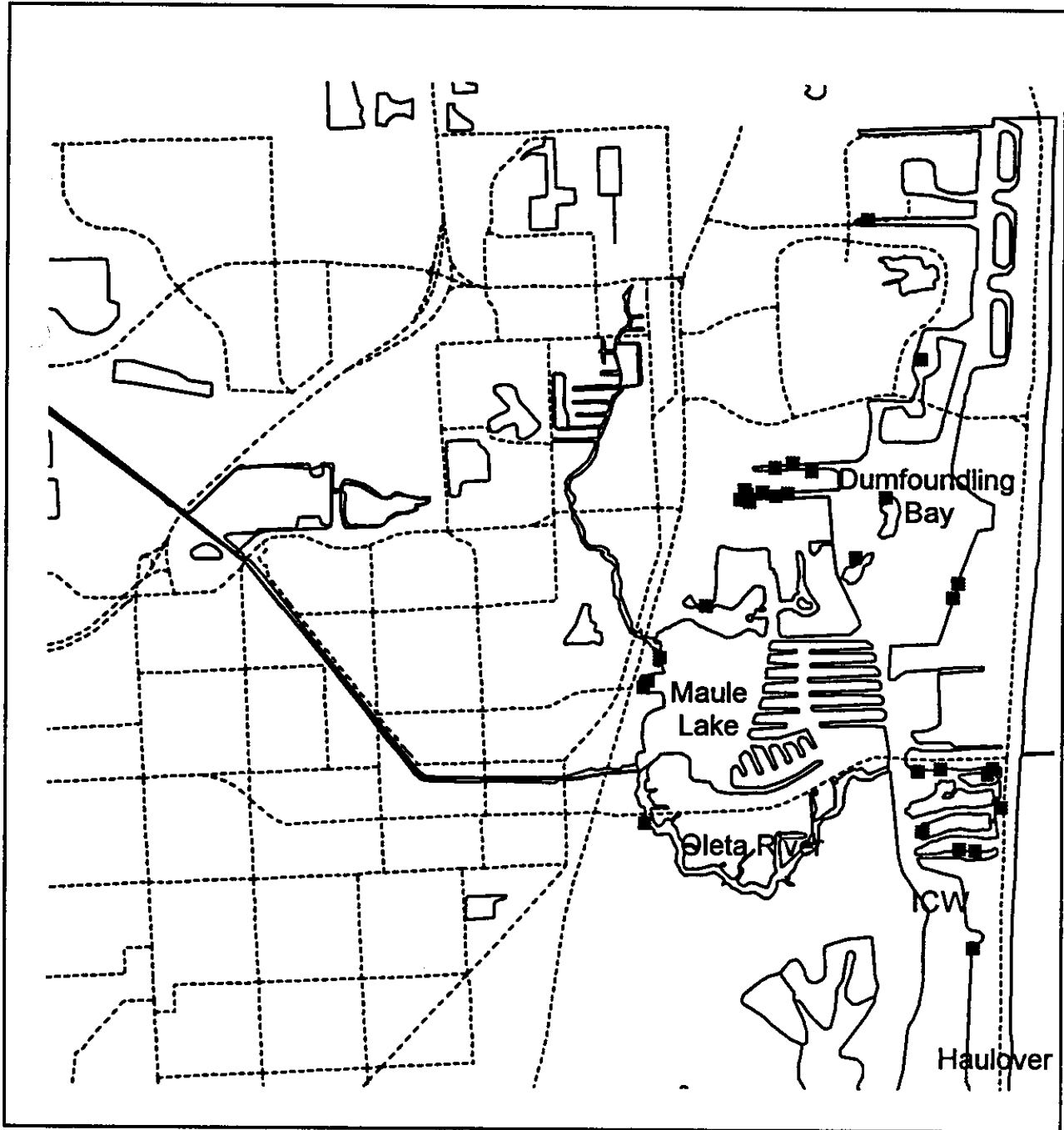
Existing Facilities	Address	#Slips	#Occ	%Occ
Dock & Marine Construction	752 NE 79 St. MIA	10	10	100
Doral Hotel	4833 Collins Ave. MB	11	7	64
East River Terminal Inc.	2974 NW North River Dr.	4	4	100
Easy Sailing	3301 Rickenbacker Cswy.	10	10	100
Ebsary Foundation Co.	2154 NW North River Dr.	2	2	100
Eden Roc Hotel and Dock	4520 Collins Ave. MB	17	4	24
5660 Collins Ave. Condo	5660 Collins Ave. MB	10	0	0
Fisher Island Club and Marina	1 Fisher Island Dr.	106	106	100
Fisher Island Construction	1 Fisher Island Dr.	3	3	100
Fisher Island Ferry	Fisher Island	4	3	75
Fisher Island Visitor Docking Facility	Fisher Island	7	7	100
Flamingo Fishing	3199 NW 20 St. MIA	3	2	67
Flamingo Marina	7601 E Treasure Dr. NBV	147	38	26
Florida Caribe Fishery	25 SW South River Dr. MIA	6	6	100
Florida Marine Towing	1201 NW South River Dr.	4	4	100
Florida Yacht Charters	1290 5 St.	18	12	67
Fontainebleau Hotel and Docks	4441 Collins Ave. MB	23	0	0
Fort Apache Marina Inc.	3025 N.E. 188 St.	204	133	65
Forte Towers	1000 West Ave. MB	16	16	100
Four Ambassadors Marina	801 S. Bayshore Dr. MIA	36	17	47
FPL Docking Facilities Cutler Plant	14928 SW 67 Ave.	180	89	49
FPL Miami Beach	158 MacArthur Cswy MB	2	2	100
FPL Miami Riverside	401 SW 2 Ave. MIA	3	0	0
FPL Docking Facilities Turkey Pt.	9700 SW 344 St.	2	2	100
Gables Harbor Condo	6901 Edgewater Dr. CG.	23	23	100
Gables Waterway Executive Center	1390 S. Dixie Hwy. CG	31	31	100
Gables Waterway Towers	90 Edgewater Dr. CG	31	27	87
Garcia Brothers Seafood	236 SW North River Dr.	9	9	100
Glass Tech Corp.	3175 NW 20 St. MIA	29	28	97
Gold Coast Cruises/Kelly Fishing	10800 Collins Ave. BH	2	0	0
Grove Isle Marina	4 Grove Isle Dr. MIA	85	54	64
Grove Key Marina	3385 Pan American Dr. MIA	328	325	99
Harbor Island Spa	7900 Larry Paskow Way	11	11	100
Harbor West Apartments & Yacht Club	7910 West Dr. NBV	33	24	73
Hardies Yacht Basin	2100 N.W. North River Dr.	94	94	100
Haulover Resort Marina	15000 Collins Ave.	385	150	39
Hempstead Marine	2122 NW North River Dr.	6	6	100
Hi Lift Marina Inc.	2890 N.E. 187 St.	269	220	82
Hyde Shipping Corp.	3030 NW North River Dr.	2	2	100
Imperial House Condo	5255 Collins Ave. MB	10	8	80
Inn on the Bay	1819 79 th Street Cswy.	20	6	30
International Marine Terminal	3701 NW South River Dr.	3	3	100

Existing Facilities	Address	#Slips	#Occ	%Occ
International Yacht Harbor	300 Alton Rd. MB	376	113	30
Isla del Mar Yacht Club	1800 NW 24 Ave. MIA	60	50	83
Jack Ott-Shark Fleet	2222 NW 22 Ct. MIA	5	5	100
Jockey Club	11111 Biscayne Blvd. NM	38	25	66
Jones Boat Yard	3399 NW South River Dr.	40	40	100
Journey's End Marina	Journey's End Rd. CG	14	6	43
JPM River Terminal	3777 NW South River Dr.	3	3	100
Kadey Krogen Yachts	1310 NW 18 Ave. MIA	5	0	0
Kelly Fishing Fleet	10800 Collins Ave.	5	4	80
Key Biscayne Yacht Club	180 Harbor Dr.	140	140	100
Keystone Harbour	13155 Ixora Ct. NM	14	12	86
Keystone Point Marina	1950 N.E. 135 St. NM	475	450	95
King Cole Condo	900 Bay Dr. MB	30	8	27
King's Bay	14401 SW 62 Ave.	198	0	0
La Coloma	243 NW South River Dr. MIA	23	9	39
Lagoon Fina Fuel Service	488 Sunny Isles Blvd. NMB	1	1	100
Langer's Marine	522 West Ave. MB	5	0	0
Las Americas Marine Inc.	501 NW South River Dr. MIA	17	17	100
Le Laurier	17800 N. Bay Dr.	11	0	0
Le Montcalm	18000 N. Bay Dr.	11	0	0
Lewis Yacht Center	801 N.W. 4 St. MIA	14	11	79
L'Hermitage	2000 S. Bayshore Dr. MIA	15	6	40
Little River Marina	820 N.E. 79 St. MIA	44	9	20
Magnum Marine	2900 NE 188 St.	8	8	100
Malibu Plaza	16100 Collins Ave.	12	5	42
Manhattan Towers	6770 Indian Creek Dr. MB	16	6	38
Manny's Marine Service	125 NW South River Dr. MIA	6	0	0
MAP Construction	3312 NW North River Dr.	1	1	100
Marine Management	24777 SW 87 Ave.	306	64	21
Marine Plaza Apartments	660 NE 78 St. MIA	22	22	100
Mariners Bay Condo	12000 N. Bayshore Dr. NM	28	8	29
Martin's Point	2490 NW 18 Terr. MIA	25	25	100
Maule Lake Marina	17201 Biscayne Blvd.	315	225	71
Merrill Stevens Dry Dock	1270 NW 11 St. MIA	40	0	0
Metro-Dade Seaport	1015 N. American Way MIA	variable	variable	82
Miamarina at Bayside	401 Biscayne Blvd. MIA	35	35	100
Miami Beach Marina	300 Alton Rd. MB	396	140	35
Miami Beach Sailport	6840 Indian Creek Dr.	27	23	85
Miami Outboard Club	1099 MacArthur Csy. MB	119	119	100
Miami River Recycling	3700 NW North River Dr.	1	1	100
Miami Ship Service	615 SW 2 Ave. MIA	1	1	100
Miami Ship Yards	615 SW 2 Ave. MIA	11	1	9

Existing Facilities	Address	#Slips	#Occ	%Occ
Miami Yacht Club	1001 MacArthur Csy. MB	178	178	100
Moby Marine II	3630 NW North River Dr.	6	5	83
Monty Trainers Dock and Bar	2560 S. Bayshore Dr. MIA	149	144	97
Moorings Yacht Services	1585 N.W. 24 Ave. MIA	45	44	98
Morton Towers	1500 Bay Rd. MB	26	0	0
Mystic Pointe Marina	3575 Mystic Pointe Dr.	122	122	100
National fisheries	325 NW South River Dr. MIA	6	6	100
Nine Island Ave.	Belle Isl. MB	35	35	100
Norseman Ship Building	437 NW South River Dr. MIA	11	0	0
North Bay Landing	7601 E. Treasure Dr. NBV	147	38	26
North River Dock	450 NW North River Dr. MIA	4	4	100
North River Terminals	2974 NW North River Dr.	2	2	100
Nuta's Boat Yard	1884 N.W. North River Dr.	129	91	71
Ocean Neptune	17501 Biscayne Blvd	108	45	42
Orkin Exterminating	1960 NW 27 Ave.	2	2	100
Palm Bay Yacht Club	720 NE 69 St. MIA	51	13	27
Pelican Reef East & West	1632 S Bayshore Ct. MIA	11	11	100
Pioneer Shipping	3250 NW North River Dr.	1	1	100
Pirate's Spa Marina	8701 SW 248 St.	100	0	0
Poinciana Island Yacht Club	350 Poinciana Dr.	40	40	100
Poland Yacht Basin	2190 N.W. North River Dr.	28	28	100
Popeye Marina	830 NW 8 Street Rd. MIA	36	0	0
President Marine	2901 NE 185 St.	10	10	100
Racquet Club	7930 East Dr. NBV	19	19	100
Reel Deal	201 SW 6 St. MIA	15	15	100
Rickenbacker Marina	3301 Rickenbacker Cswy. MIA	183	173	95
River Marine Terminal	3795 NW South River Dr.	1	1	100
River Run Marina	1700 NW North River Dr.	65	64	98
Royal Harbour Yacht Club	200 S.W. 152 St.	51	40	78
Sailboats of Key Biscayne	4000 Crandon Blvd. KB	6	5	83
Schurger Diving & Salvage	3300 NW North River Dr.	4	2	50
Seacoast Towers South	101 Collins Ave. MB	22	7	32
Sierra Seafoods	445 NW North River Dr. MIA	4	4	100
Snapper Creek Marina	11190 Snapper Creek Rd.	50	50	100
Snug Harbor Townhouse	1000 NW North River Dr.	25	5	20
South Bay Club Condo	800 West Ave. MB	18	17	94
South Dade Marina	54400 S Dixie Hwy.	17	17	100
South Gate Towers Condo	900 West Ave. MB	15	14	93
Southern & Caribbean Agencie	3611 NW South River Dr.	1	1	100
Spinnaker Marina	1940 N.E. 135 St. NM	480	350	73
Sunny Isles Marina	400 Sunny Isles Blvd.	250	100	40
Sunset Harbor Marina	1928 Purdy Ave. MB	125	117	94

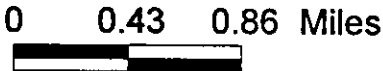
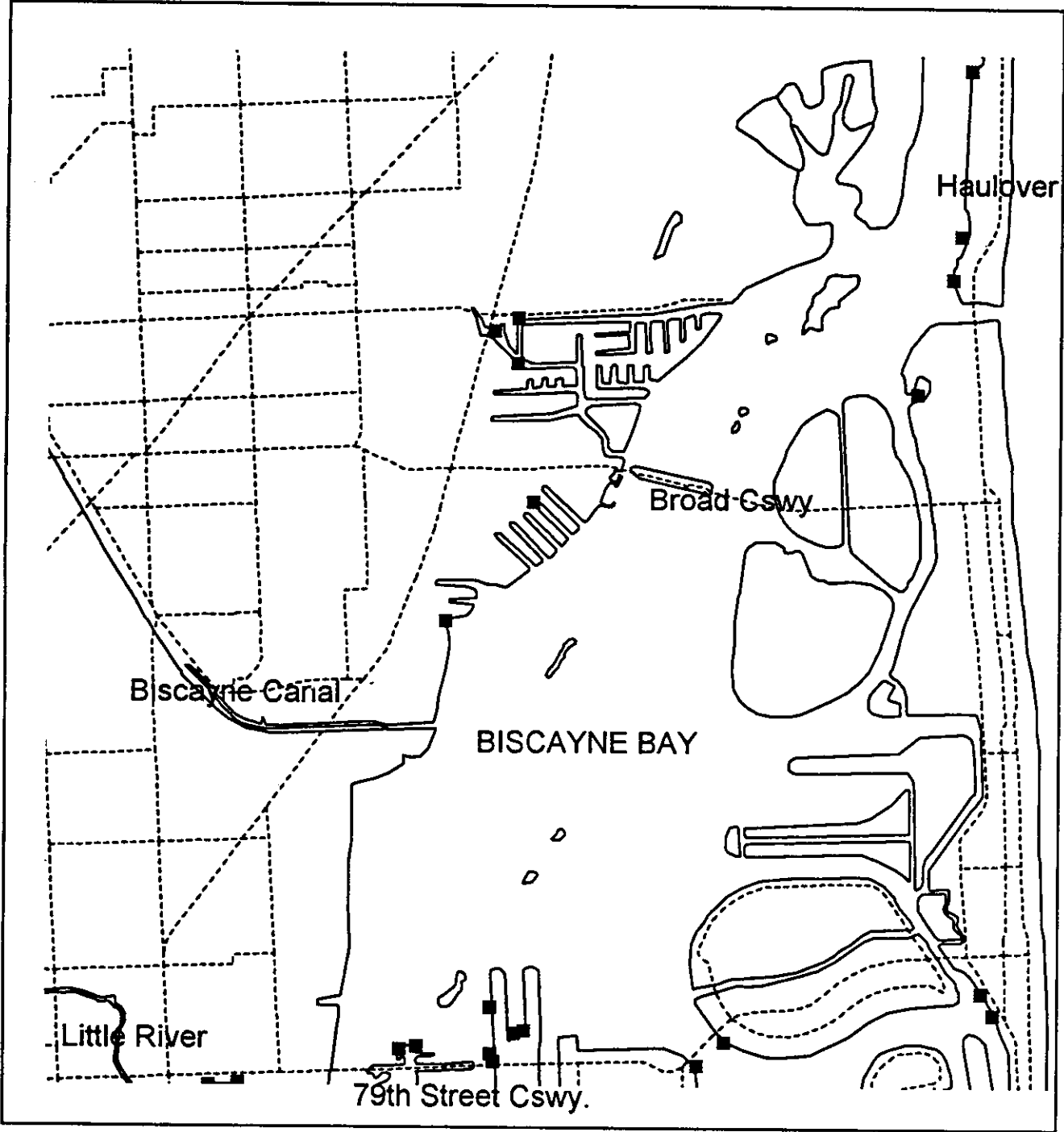
Existing Facilities	Address	#Slips	#Occ	%Occ
Sunsplash Boat Rental	1633 N. Bayshore Dr. MIA	6	0	0
Superior Marine Supply	517 N.W. South River Dr.	14	14	100
TCY Limited	17201 Biscayne Blvd.	315	225	71
Tempest Yachts	3333 NE 188 St.	14	6	43
Tower House Condo	5500 Collins Ave. MB	17	0	0
Towers of Quayside	10670 NE Quay Plaza	63	21	33
Tropical Splash	4833 Collins Ave. MB	3	3	100
Trujillo Ship Services	555 NW South River Dr.	4	4	100
Turnberry Isle Yacht Club	19999 W Country Club Dr.	117	117	100
Universal Shipping Agency	3201 NW South River Dr.	2	1	50
U.S. Coast Guard	100 MacArthur Cswy. MB	26	0	0
Victoria Shipping Line	111 SW 3 St. MIA	1	1	100
Villa Regina Condo	1581 Brickell Ave. MIA	43	43	100
Virginia Key Marina Inc.	3501 Rickenbacker Csy. MIA	388	380	98
Waterfront Construction	3660 NW North River Dr.	4	4	100
Water's Edge Condo	100 Edgewater Dr. CG	18	16	89
Waterways Marina	3601 N.E. 207 St.	99	44	44
Watson Island Marina	1050 MacArthur Csy. MB	3	43	100
Watson Island Marina	Fuel & Fishing	3	3	100
West River Terminal	3825 NW South River Dr.	4	4	100
Williams Island	7000 Island Blvd.	99	58	59
Winston Towers Yacht Basin	250 NE 174 St.	50	35	100
Yacht Service of Miami	2629 NW 16 St. Rd. MIA	1	1	100

**DADE COUNTY
MARINE FACILITY SITES
December 1994**



- Marine Facilities
- Shoreline
- - - Major Roads
- /// Lakes
- /// Canals

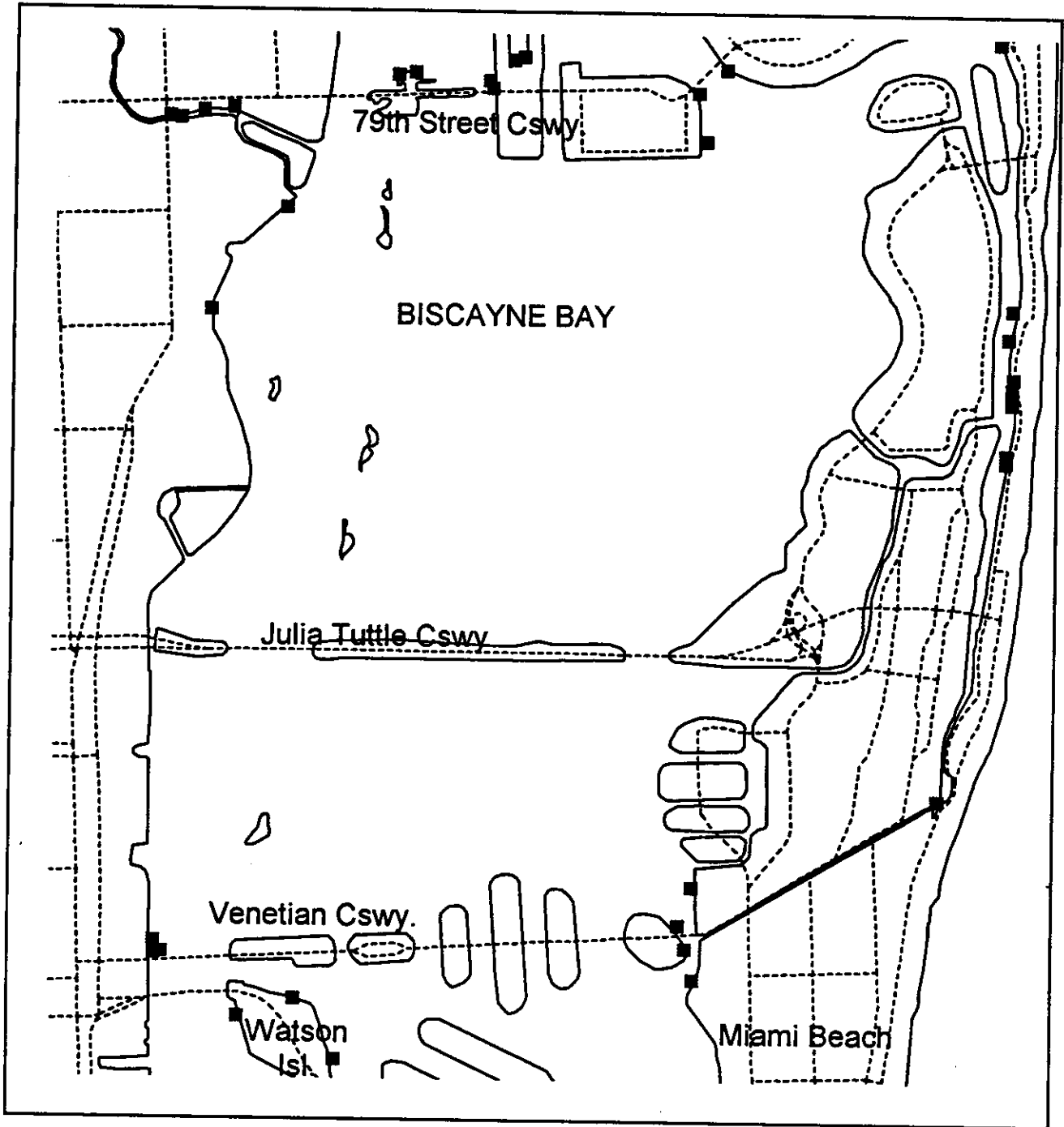
DADE COUNTY
MARINE FACILITY SITES
December 1994



- Marine Facilities
- Shoreline
- - - Major Roads
- Lakes
- Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

Figure 17c

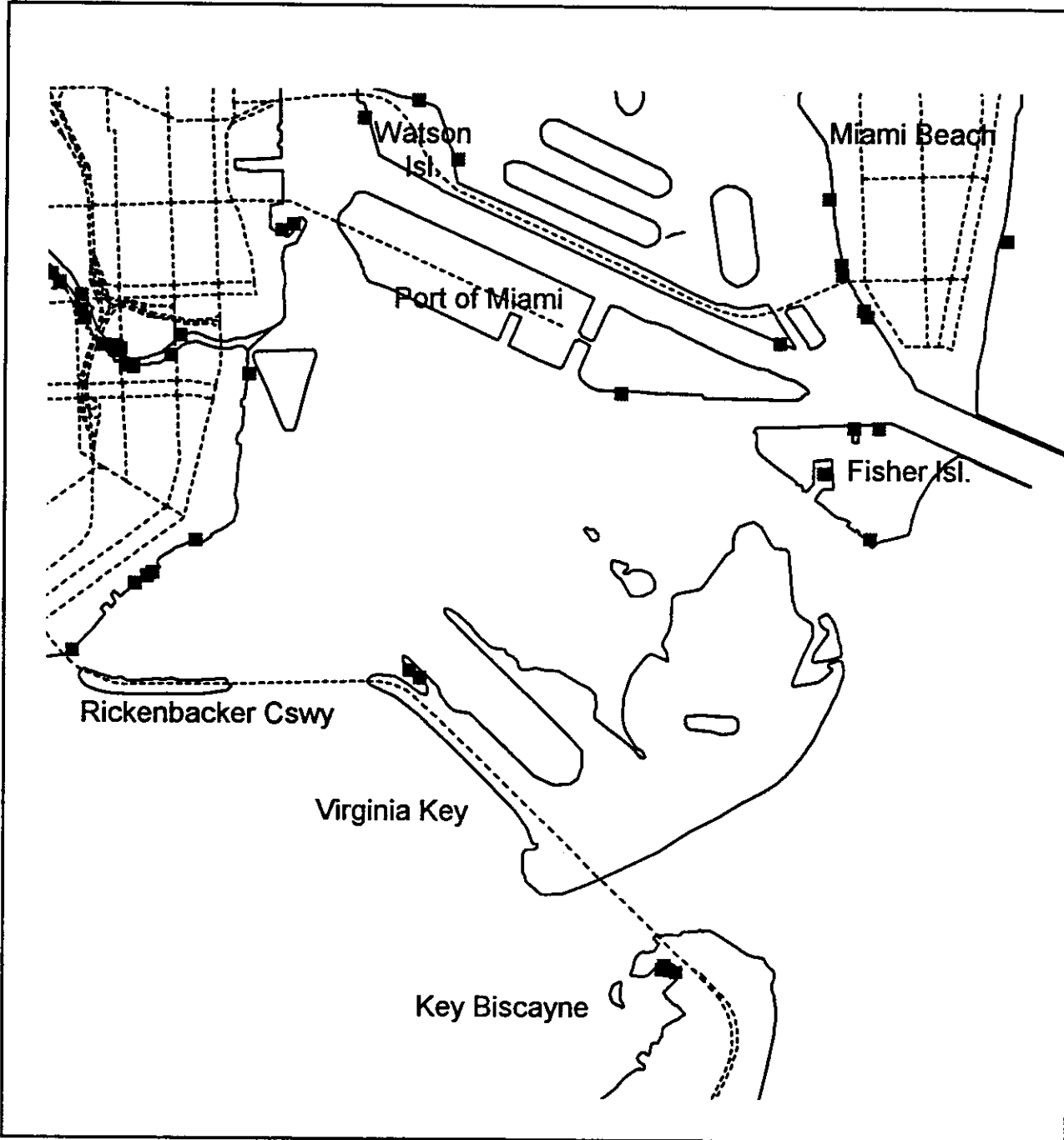


0 0.43 0.86 Miles

- Marine Facilities
- Shoreline
- - - Major Roads
- Lakes
- Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

Figure 17d



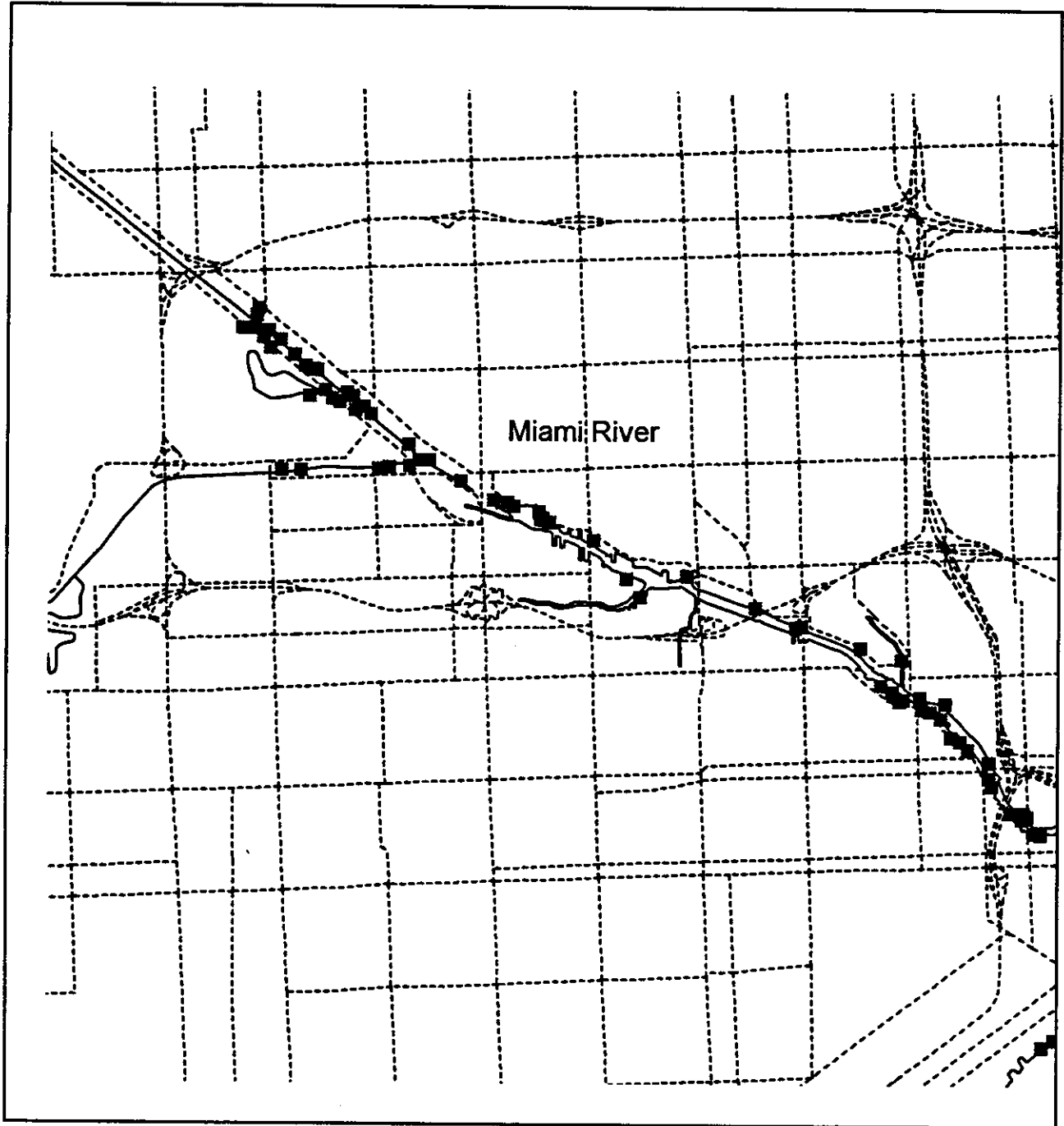
0 0.47 0.94 Miles



- Marine Facilities
- Shoreline
- - - Major Roads
- ~ Lakes
- ~ Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

Figure 17e



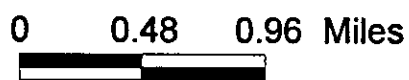
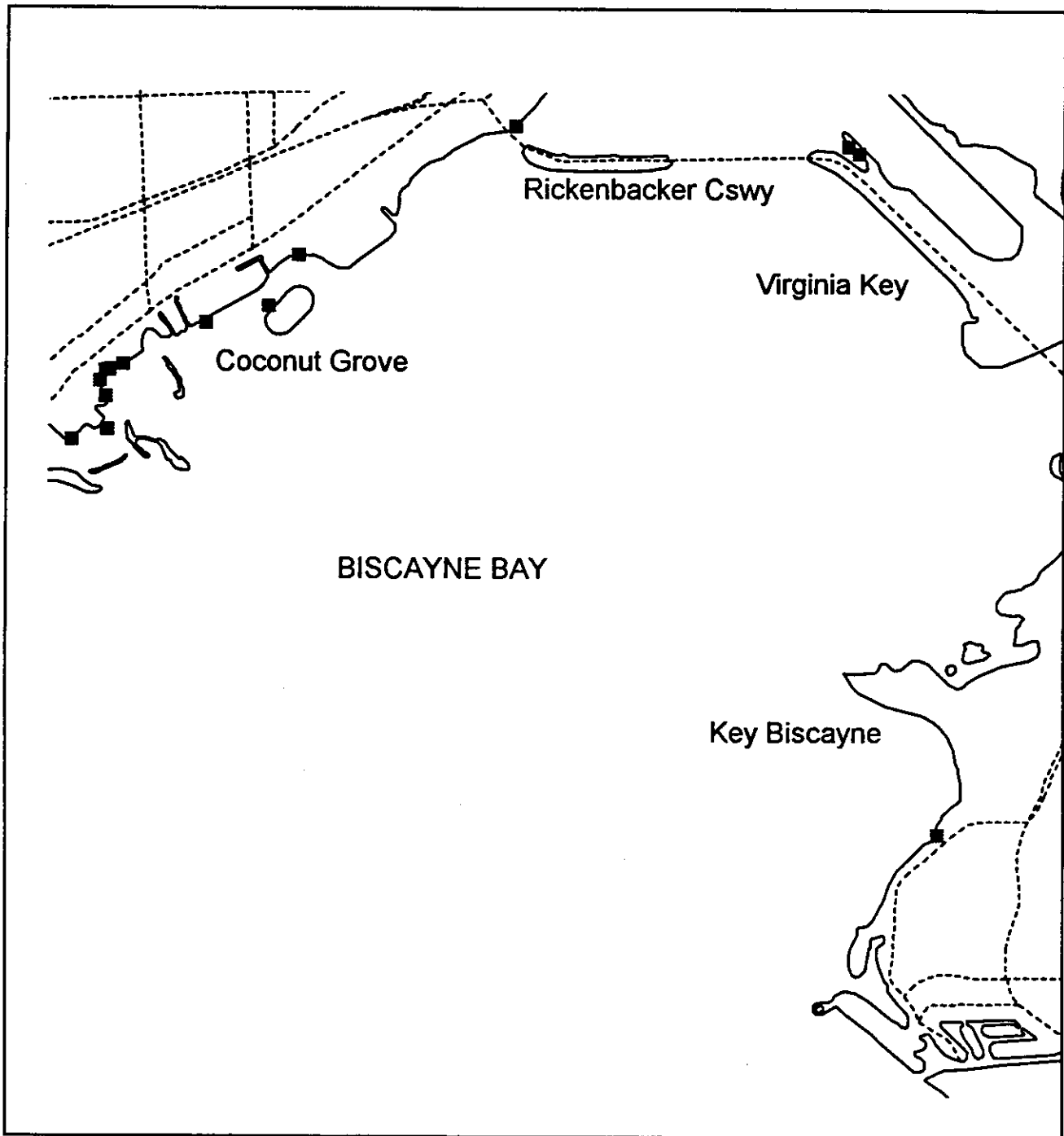
0 0.48 0.96 Miles

A horizontal scale bar with three segments, labeled 0, 0.48, and 0.96 Miles.

- Marine Facilities
- Shoreline
- Major Roads
- Lakes
- Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

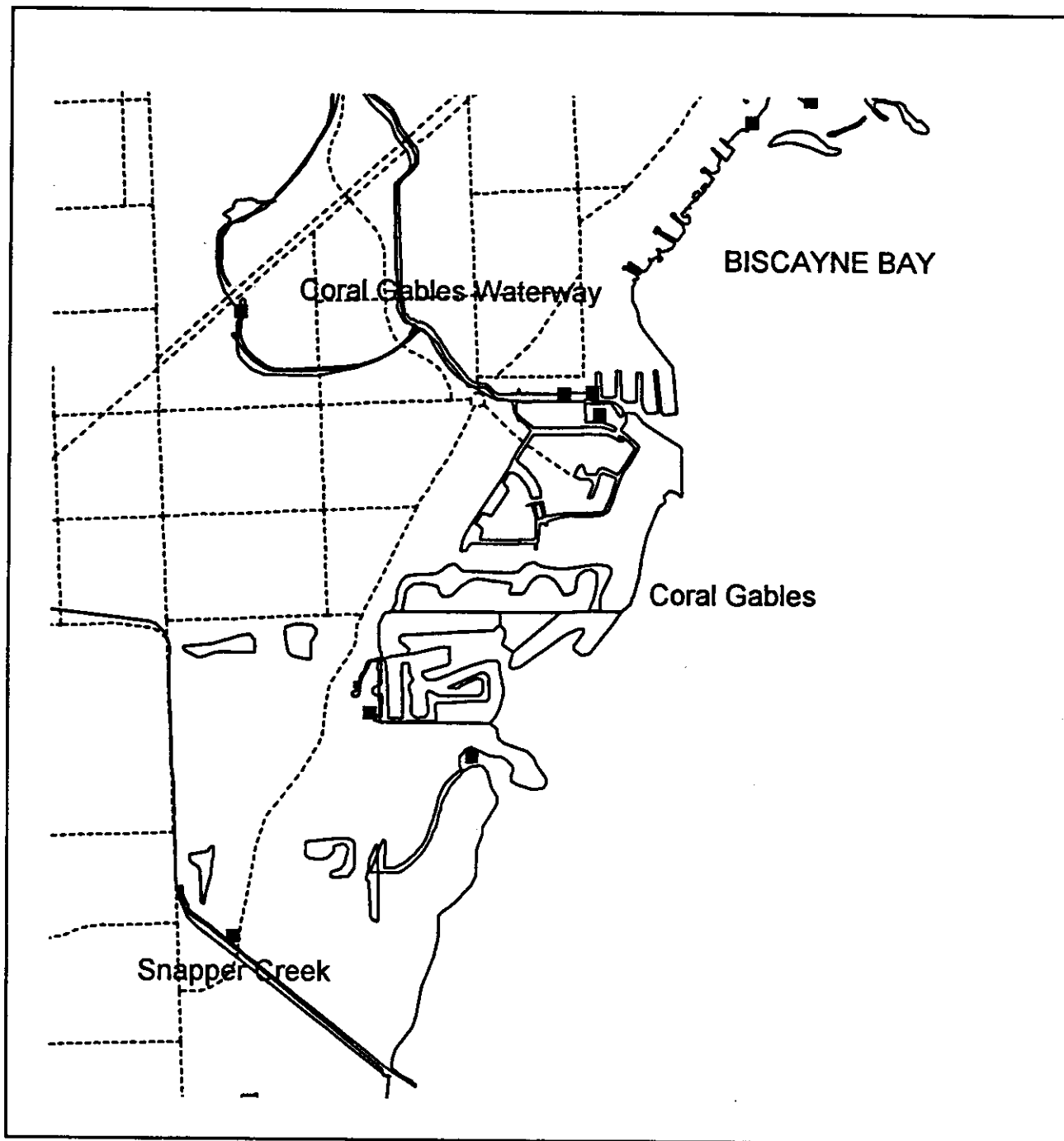
Figure 17f



- Marine Facilities
- Shoreline
- - Major Roads
- ~ Lakes
- ~ Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

Figure 17g

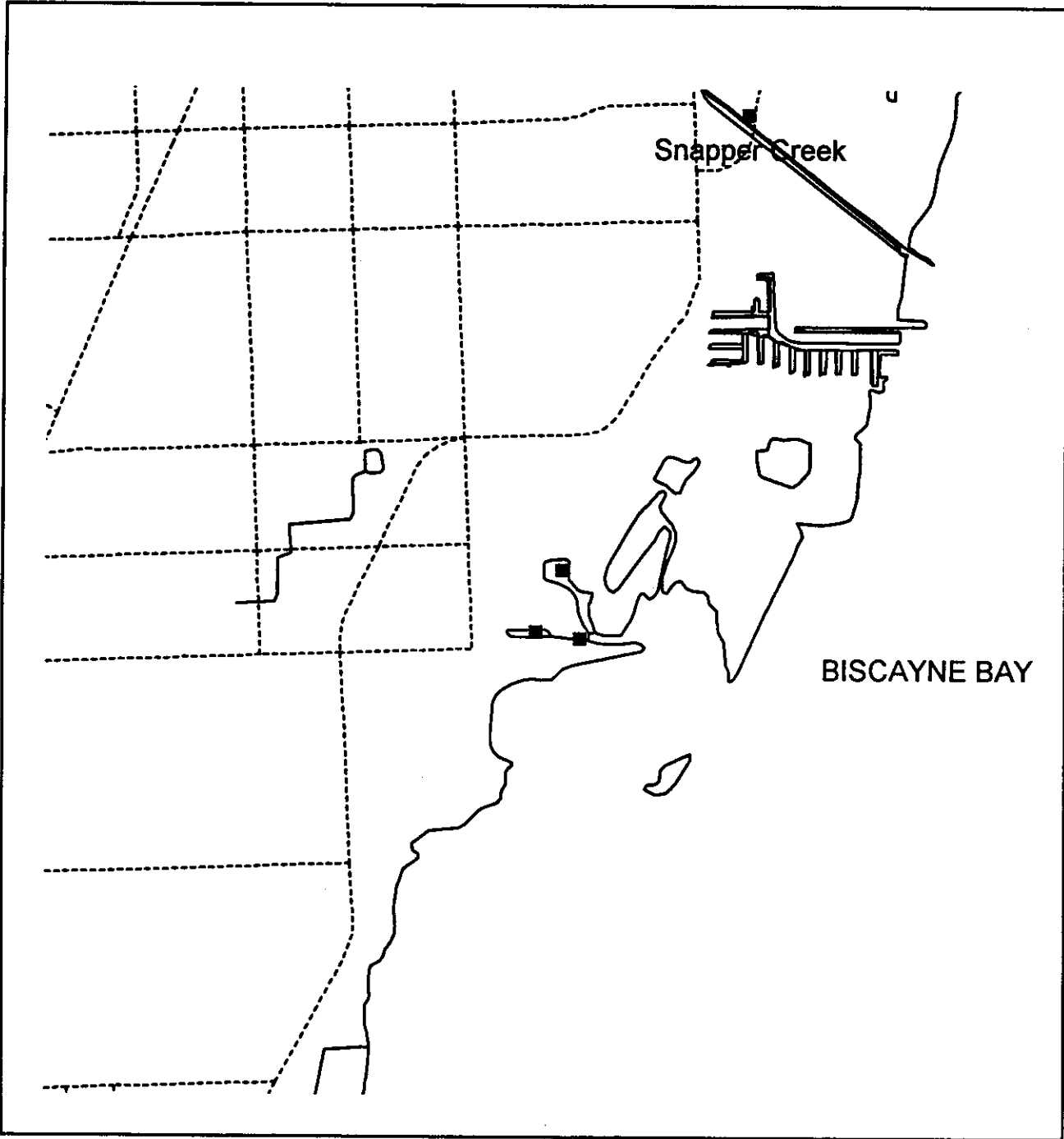


0 0.47 0.94 Miles

- Marine Facilities
- ∩ Shoreline
- - - Major Roads
- ∩ Lakes
- ∩ Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

Figure 17h

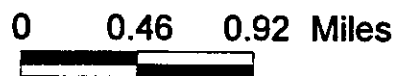
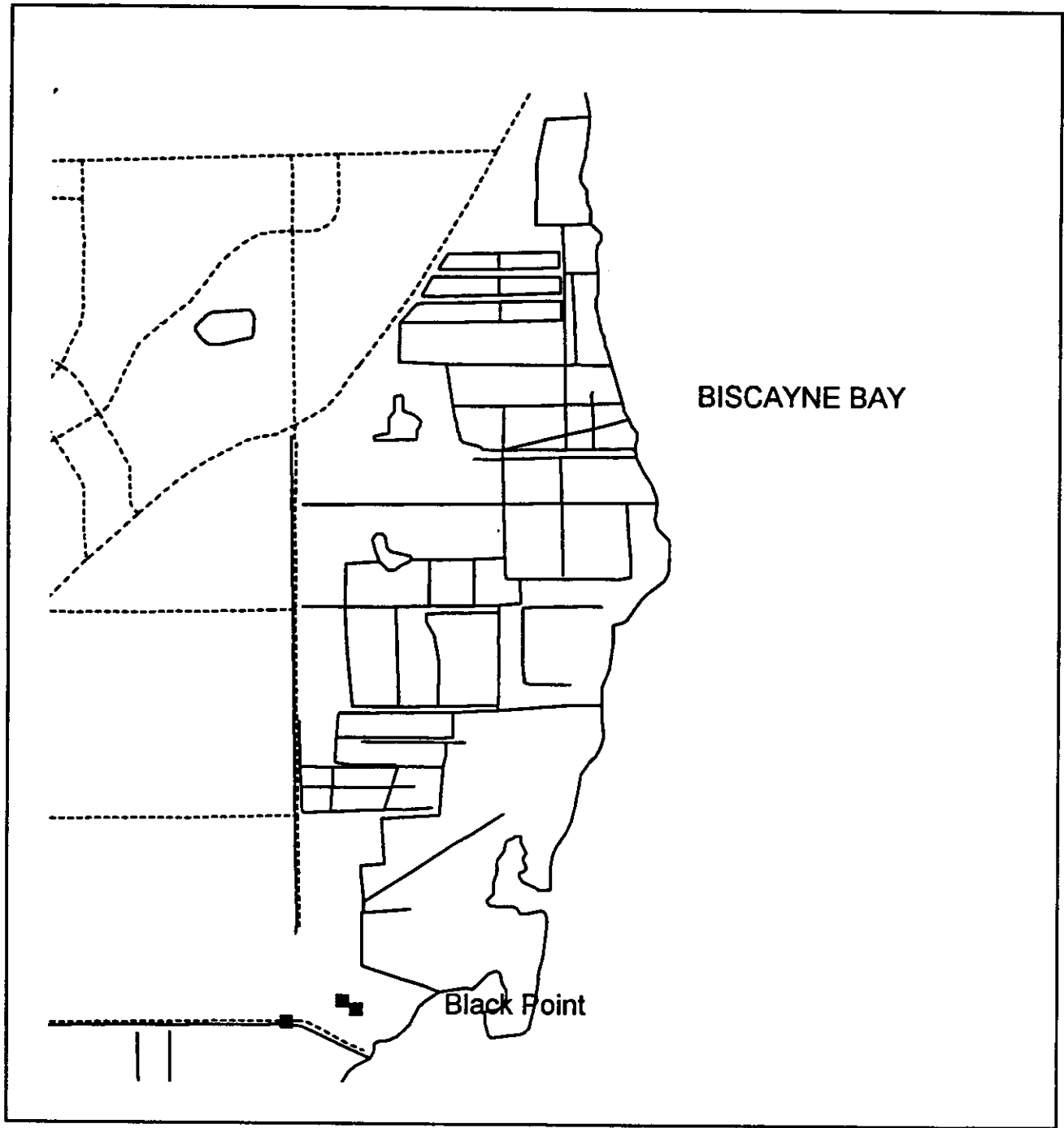


0 0.46 0.92 Miles

A horizontal scale bar with three segments. The first segment is labeled '0', the second '0.46', and the third '0.92 Miles'.

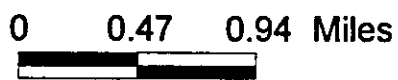
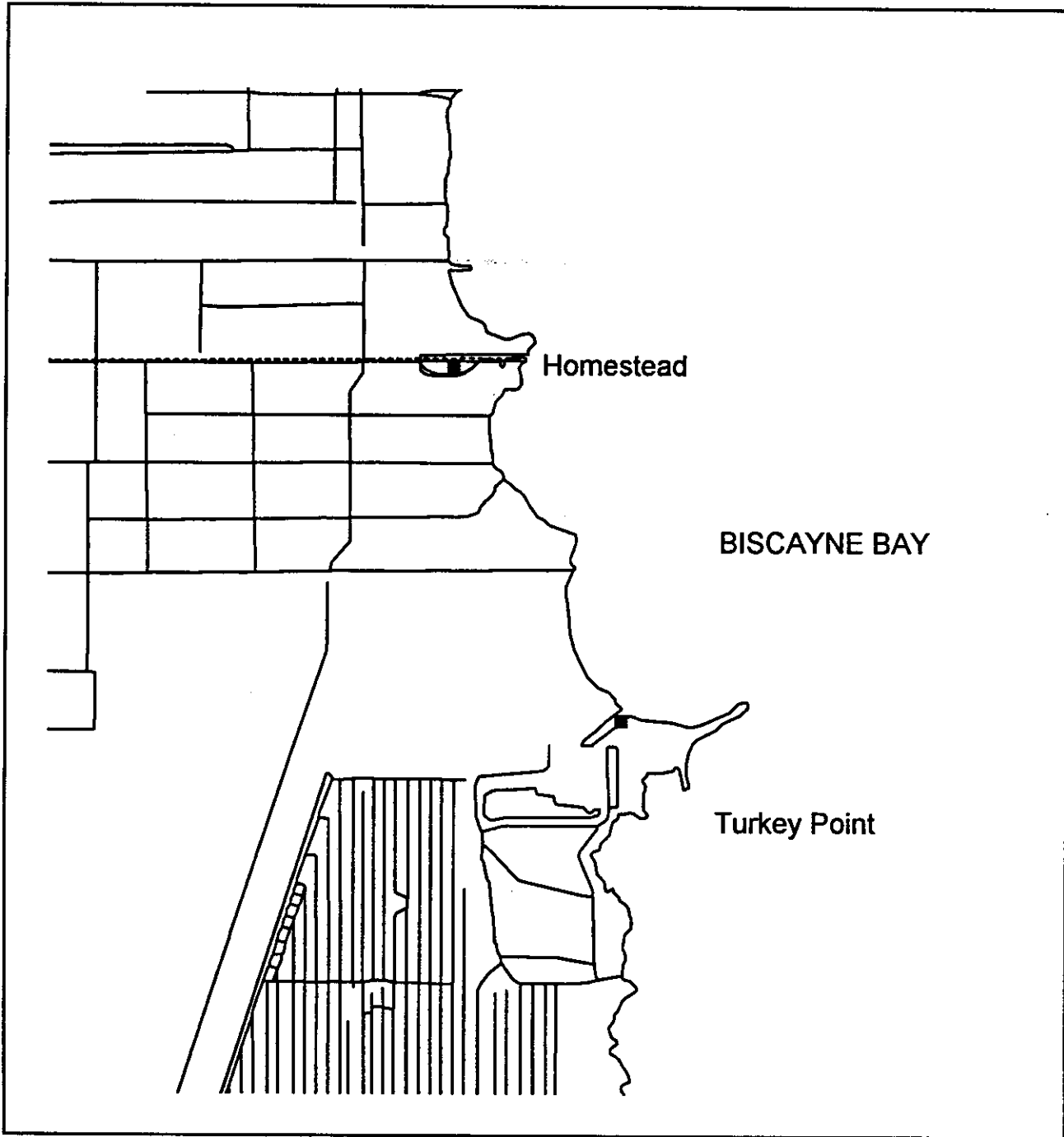
- Marine Facilities
- Shoreline
- - - Major Roads
- ~ Lakes
- ~ Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994



- Marine Facilities
- ∩ Shoreline
- - - Major Roads
- ∩ Lakes
- ∩ Canals

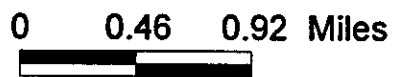
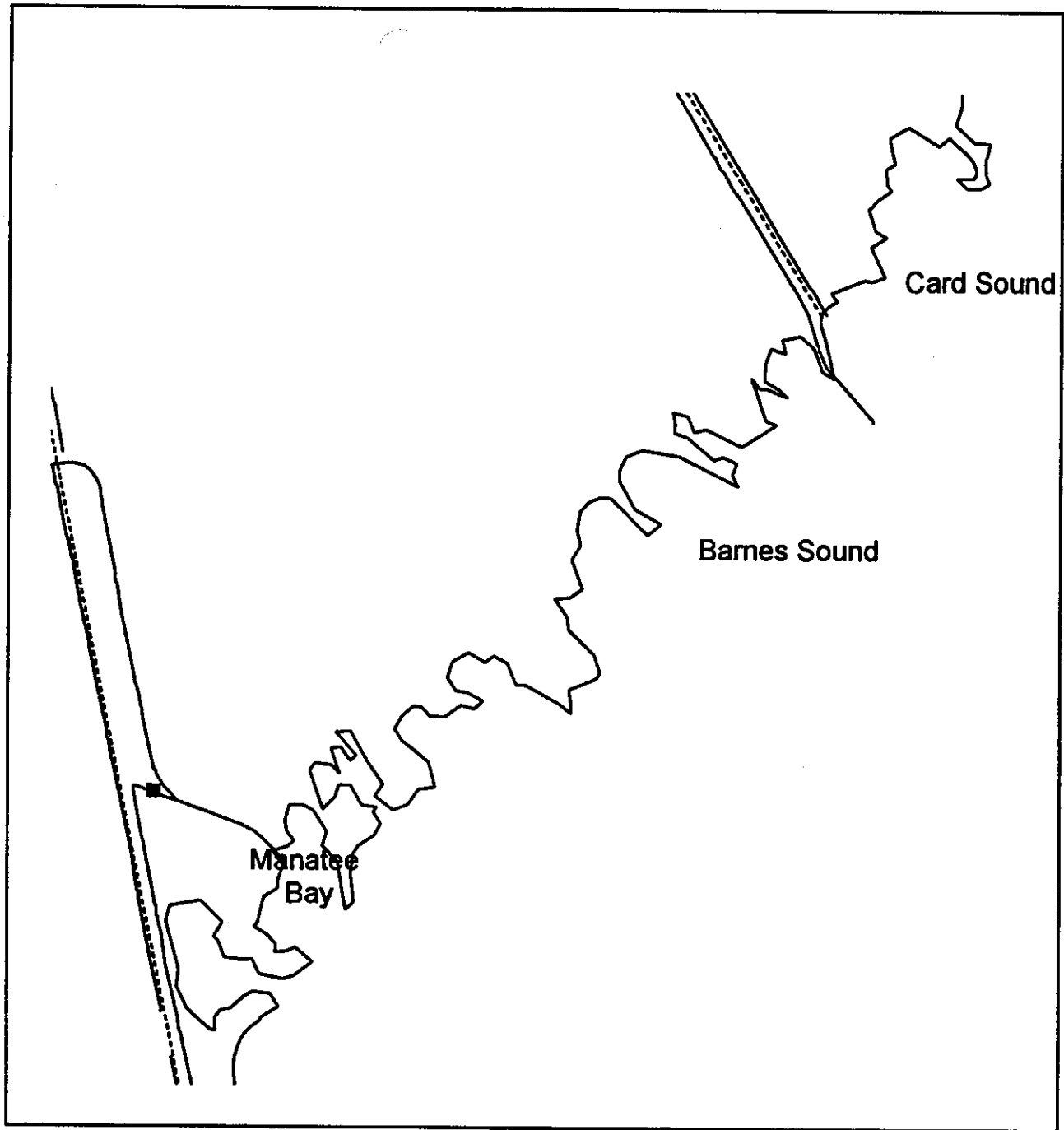
DADE COUNTY
MARINE FACILITY SITES
December 1994



- Marine Facilities
- ∩ Shoreline
- - - Major Roads
- ∩ Lakes
- ∩ Canals

DADE COUNTY
MARINE FACILITY SITES
December 1994

Figure 17k



- Marine Facilities
- Shoreline
- - - Major Roads
- ~ Lakes
- Canals

APPENDIX F

Definitions

Boat slip - a 20 foot wide by 40 foot long area of water adjacent to a dock or bulkhead in which an average-sized vessel may be moored

Boat yard - a facility used solely for boat repair and/or boat building

Existing marine facility - a marine facility which was in use on or after October 28, 1984.

Multi-family residence - a building occupied by more than two families, in which each family shares a roof and/or outer wall(s) with at least one other family

Single family residence - a detached building having a roof and outer walls entirely separated from any other structure by space, and occupied by members of a single family.

Transitory boat slip - one that is used by a vessel for a very brief period of time (generally less than 1 day), and/or is used by various vessels. Examples include water dependent public transportation dockage and courtesy slips (at a fuel dock or restaurant).

RESOLUTION NO. R1595-95

RESOLUTION AUTHORIZING SUBMITTAL OF THE
DADE COUNTY MANATEE PROTECTION PLAN TO
THE FLORIDA DEPARTMENT OF ENVIRONMENTAL
PROTECTION

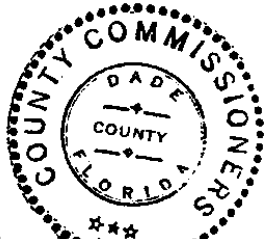
WHEREAS, this Board desires to accomplish the purposes outlined in the accompanying memorandum, a copy of which is incorporated herein by reference,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF DADE COUNTY, FLORIDA, that this Board authorizes the submittal of the Dade County Manatee Protection Plan, a copy of which is attached hereto and made a part hereof, to the Florida Department of Environmental Protection.

The foregoing Resolution was offered by Commissioner Maurice A. Ferre, who moved its adoption. The motion was seconded by Commissioner Miguel Diaz de la Portilla and upon being put to a vote, the vote was as follows:

James T. Burke	absent	Miguel Diaz de la Portilla	aye
Betty T. Ferguson	aye	Maurice A. Ferre	aye
Bruce Kaplan	absent	Gwen Margolis	absent
Natacha S. Millan	aye	Dennis C. Moss	aye
Alexander Penelas	aye	Pedro Reboredo	aye
Katy Sorenson	aye	Javier D. Souto	aye
	Arthur E. Teele, Jr.	absent	

The Chairperson thereupon declared the resolution duly passed and adopted this 21st day of November, 1995.



DADE COUNTY, FLORIDA
BY ITS BOARD OF
COUNTY COMMISSIONERS

HARVEY RUVIN, CLERK

Approved by County Attorney as
to form and legal sufficiency.

By: RS

KAY SULLIVAN

Deputy Clerk

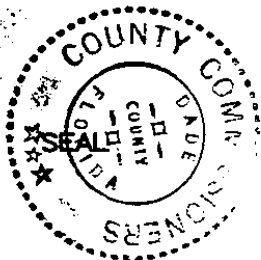
STATE OF FLORIDA)
) SS:
COUNTY OF DADE)

I, HARVEY RUVIN, Clerk of the Circuit Court in and for Dade County, Florida, and Ex-Officio Clerk of the Board of County Commissioners of said County, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of Resolution No. R-1595-95, adopted by the said board of County Commissioners at its meeting held on Nov. 21 19 95.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on this 30th day of November, A.D. 19 95.

HARVEY RUVIN, Clerk
Board of County Commissioners
Dade County, Florida

By *Elizabeth Ato*
Deputy Clerk



Board of County Commissioners
Dade County, Florida



Department of Environmental Protection

Lawton Chiles
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Virginia B. Wetherell
Secretary

December 21, 1995

Mr. John W. Renfrow, P.E.
Director, Metro-Dade
Department of Environmental Resources Management
33 SouthWest 2nd Avenue
Miami, Florida 33130-1540

Dear Mr. Renfrow:

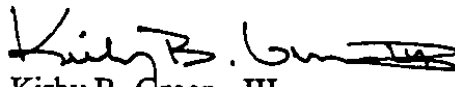
We have completed our review of the Dade County Manatee Protection Plan (MPP). As a part of our review process, we received several comments from other Divisions of the Department. After discussion with your staff, it appears that all of these comments have been appropriately addressed. We are pleased to approve the MPP and request a final edited version once available.

We stand ready to assist you in reviewing those portions of the plan that will be submitted as a part of the Dade County Comprehensive Plan amendment cycle. With this approval, the Department's interim standards for boating facilities, such as the 1:100 policy, are replaced with the standards set forth by the MPP.

This represents a significant accomplishment and I appreciate the countless hours of hard work and personal sacrifice made by all of the County staff, especially Dr. Susan Markley and Ms. Keven Mayo.

If you or your staff have any questions, please contact Mr. David Arnold, Chief of the Bureau of Protected Species Management at (904)922-4330. Mr. Arnold will be following up with appropriate County staff to coordinate implementation of the Plan.

Sincerely,


Kirby B. Green, III
Assistant Secretary

KBG/dwa