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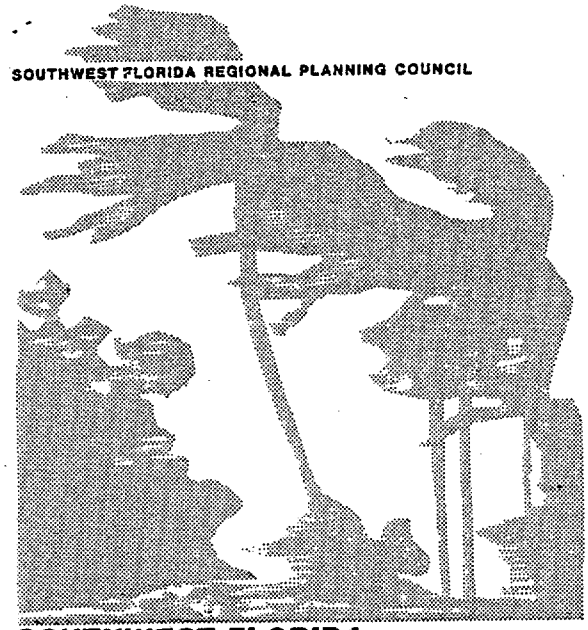

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INTRODUCTION

Southwest Florida is an area with a rapidly growing population, yet only a small percentage of its residents have ever experienced a hurricane. Hurricanes can have devastating effects upon a community, not only in terms of loss of life but in other ways, such as property damage, unemployment and similar economic impacts. Although technological developments have increased the accuracy of hurricane forecasting, and consequently, loss of life has been reduced, property damage has continued to increase drastically. Potential damage is especially great due to rapid population growth and the location of buildings in areas that are vulnerable to hurricane damage. This is particularly true in Southwest Florida, where 95% of the residents live in the coastal areas.[1]

The purpose of this study is to provide an analysis of the economic consequences of potential hurricanes in Southwest Florida, including potential property loss, employment loss, and loss to other important sectors of the economy, such as agriculture. By quantifying these potential impacts and dollar losses, policies and strategies can be formulated to mitigate impacts. Additionally, plans or strategies addressing post-hurricane redevelopment and future development can be formulated to serve as a decision-making tool for local governments.

SCOPE OF THE STUDY

The goal of this study is to provide quantitative estimates of potential hurricane loss in Southwest Florida. Quantifying these impacts can provide the basis for developing methods and techniques to mitigate adverse effects. Specific tasks that were accomplished in the estimation of potential hurricane losses include the following:

- A graphic delineation of geographic areas into vulnerability zones, based upon the predicted amount of storm surge over land and/or the predicted wind velocities that would occur as the result of hypothetical hurricanes simulated by the Sea, Lake and Overland Surges from Hurricanes (SLOSH) Model. (This model is described in detail in the Southwest Florida Regional Planning Council Regional Hurricane Evacuation Plan).
- A land use inventory and analysis by vulnerability zone and major land use category.
- A structural inventory by vulnerability zone and major land use category.
- An analysis of the impact of potential hurricanes upon agricultural land uses by vulnerability zone.

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1 Southwest Florida Regional Planning Council, Southwest Florida Economy 1982, SWFRPC, p. 19.

- An assessment of the value of structures located in the various vulnerability zones, by major land use type.

- An estimate of projected structural losses for each vulnerability zone and land use classification.

- An assessment of the value of public facilities located within the defined vulnerability zones, by type of facility (such as water and wastewater treatment, electrical facilities, transportation, health care and schools).

- An estimate of temporary employment loss by vulnerability zone and major employment classification, and its impact on the economic development of the Region.

- An analysis of the probability of occurrence of hurricanes in Southwest Florida.

- Quantitative estimates of total potential hurricane loss, by vulnerability zone (a summation of previous tasks).

- The continuous participation, involvement and coordination by the participating agencies and entities that are relevant to the plan.

STUDY AREA

The Southwest Florida Region includes the six counties of Charlotte, Collier, Glades, Hendry, Lee and Sarasota, and their thirteen municipalities (See Map 1). The Region encompasses 6,021 square miles, including approximately 1,676 miles of coastal shoreline. Four of the six counties (Charlotte, Collier, Lee and Sarasota) border on the Gulf of Mexico while the two inland counties of Glades and Hendry are located adjacent to Lake Okeechobee.

Population in the Region has grown rapidly over the past decade, especially in the coastal counties, where population has nearly doubled since 1970. This rapid population growth and consequent development in low-lying coastal areas could result in potentially great destruction from hurricanes.

PRIOR PLANS AND FUTURE PLANS

The Hurricane Loss Study is based upon the Regional Hurricane Evacuation Plan, published by the Southwest Florida Regional Planning Council in November, 1981. This was a quantitative regional hurricane evacuation plan designed to be used by local governments in the six-county area during emergencies. This plan defined the geographic vulnerability zones which are used in the Hurricane Loss Study.

The Hurricane Loss report is the first portion of the Hurricane Loss and Contingency Planning Study. It addresses the economic impacts of various types of hurricanes, by vulnerability zone.

The second portion of this study will address ways of implementing or mitigating the potential damages that have previously been quantified, through various methods and recommended policies.

REPORT ORGANIZATION

This report is divided into several sections. First, the methodology used in the study and subsequent analyses is explained. Second, a brief history of hurricanes in Southwest Florida and their probability of occurrence is given, followed by a brief examination of the impacts of Hurricane Donna in the area. Next, an analysis of land use and a structural analysis for the Region and its individual counties is provided. Utilizing this inventory, building damage due to hurricanes has been estimated. An inventory and analysis of hazardous materials is also included, as these could be potentially dangerous in a hurricane. Economic effects upon employment, agriculture and public facilities and services are also considered. Finally, total losses are projected, and conclusions and recommendations are provided.

PLAN COORDINATION AND REVIEW

Coordination was an integral part of the Hurricane Loss Study. Numerous agencies were involved in this effort, in various stages of plan preparation and review. Background information was obtained from county property appraisers' offices, and was processed by the University of Florida Computer Center. Invaluable assistance and suggestions were submitted by county civil defense offices, as well as by local government planning departments, who reviewed and commented upon the plan.

Coordination was also maintained with numerous entities outside the Region, including other Regional Planning Councils in various stages of completion of their individual hurricane evacuation plans, as well as State offices.

A list of agencies involved in the Plan is provided in Appendix A .

METHODOLOGY

The purpose of the Hurricane Loss Study is to quantify potential losses from hurricanes in Southwest Florida. The Southwest Florida area consists of six counties (Charlotte, Collier, Glades, Hendry, Lee and Sarasota) and thirteen municipalities. Estimates of potential damage have been provided for the Region as well as its individual counties.

A plan quantifying the potential economic impacts of hurricanes requires extensive data collection, generation and analysis to ensure accuracy. Various assumptions must be made concerning storm characteristics, values and other parameters used. The general assumptions upon which the plan is based are described below.

HURRICANE CHARACTERISTICS AND IMPACTS

A hurricane is one type of natural hazard, defined as a large cyclonic storm with winds of 74 miles per hour or greater (winds can reach up to 190 miles per hour). Winds form a large spiral configuration around a relatively calm eye. The "average" hurricane has a life span of nine days, and a diameter of 400 miles.[1]

Hurricane damage is caused by three major types of hazards:

Storm surge
Flooding
Winds

Storm surge is the most damaging of all hurricane impacts. It is described as the high and forceful wind-driven waters sweeping across the coastline near the area where the storm center or eye makes landfall. Storm surge results in an increase in water level above normal tidal action, caused by storm conditions, and is responsible for the greatest loss of lives in hurricanes.

The flooding caused by hurricane rains (6-12 inches can be expected to accompany a hurricane) is the second greatest damaging force, while hurricane winds cause the least amount of damage, compared to storm surge and flooding.

Hurricanes have been defined and classified according to their relative strength (wind speed, storm surge and central pressure) by the Saffir-Simpson Hurricane Scale. There are five major groupings, or categories, of storms, ranging from Category 1 (minimal damage) to Category 5 (catastrophic damage). This scale is explained in detail in Appendix B , and provides the basis for the storm categories used in this plan.

[1] Alan L. Sorkin, Economic Aspects of Natural Hazards, (Lexington, Mass.: D.C. Heath and Company 1982), p. 7.

VULNERABILITY ZONE CONCEPT

Vulnerability zones have been used in the plan to assess potential hurricane damage. These zones are based upon the categories used in the Southwest Florida Regional Hurricane Evacuation Plan. The principle tool used to delineate zones is the numerical storm surge prediction model known as SLOSH (Sea, Lake and Overland Surges from Hurricanes). This computerized model, developed by the National Hurricane Center, can predict the overland tidal surge heights and winds that result from hypothetical hurricanes with selected characteristics of pressure, size, forward speed, track and winds.

Categories, or groups of storms, have been used, since it would be virtually impossible to accurately estimate the potential damage for every possible hurricane. To determine potential storm flooding, 187 hypothetical hurricanes were simulated by the SLOSH model for use in the Regional Hurricane Evacuation Plan. Hurricanes were modeled based upon their probability of striking the Southwest Florida Coast, and also based upon parameters selected by the National Hurricane Center. Five groups or categories were used (as defined by the Saffir-Simpson Scale), and three directions of storms were used for each category: storms moving in from the southwest (landfalling); storms moving generally north to southwest (paralleling); and, those moving northwesterly or west-northwesterly (crossing or exiting).

Based upon these groups of storms, maps were prepared, showing expected maximum heights of flooding in feet above mean sea level. Maps 2-5 show the maximum[1] flooding levels for different types of hurricanes (categories 1-5) for each coastal county.[2]

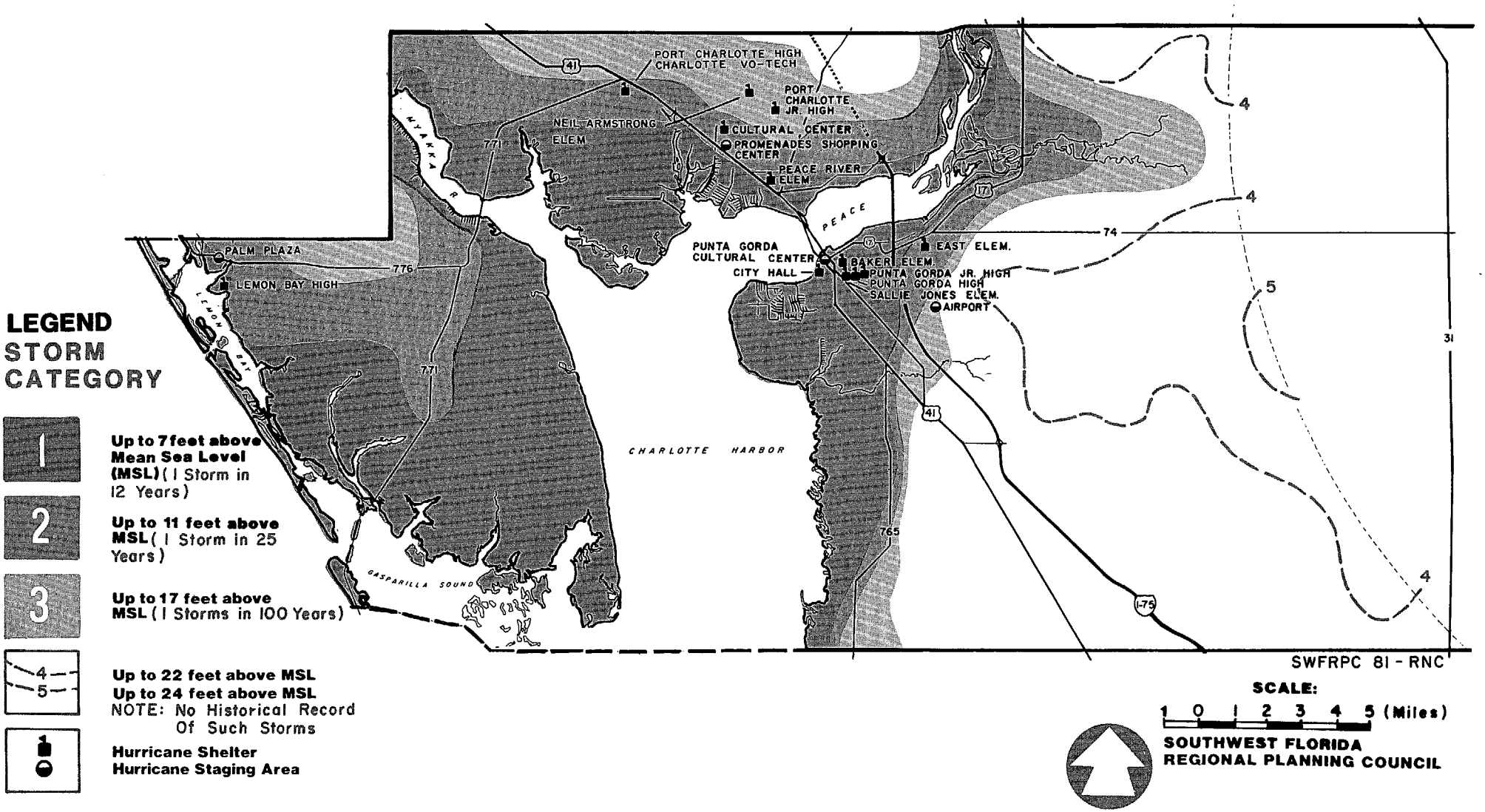
To determine maximum flooding levels for Charlotte County, for example, an examination of the Charlotte County map illustrates that, in a Category 1 storm (winds of 74-95 mph) up to 7 feet of flooding above mean sea level could be expected (although actual flooding in a particular point would depend upon land elevation). In a category 2 storm, 11 feet of flooding could occur, while in a category 3 (100 year) storm, 17 feet of flooding could occur. The area that is flooded by a category 1 storm is also known as vulnerability zone 1, for purposes of assessing potential property damage.

In summary, then, the 5 categories defined by the SLOSH model form the vulnerability zones which will be used in determining potential hurricane damage. These zones are defined by the amount of saltwater flooding that would be experienced in various hurricanes, as indicated by the maps. The Regional Hurricane Evacuation Plan provides a detailed explanation of the methodology used in determining flooding levels.

---

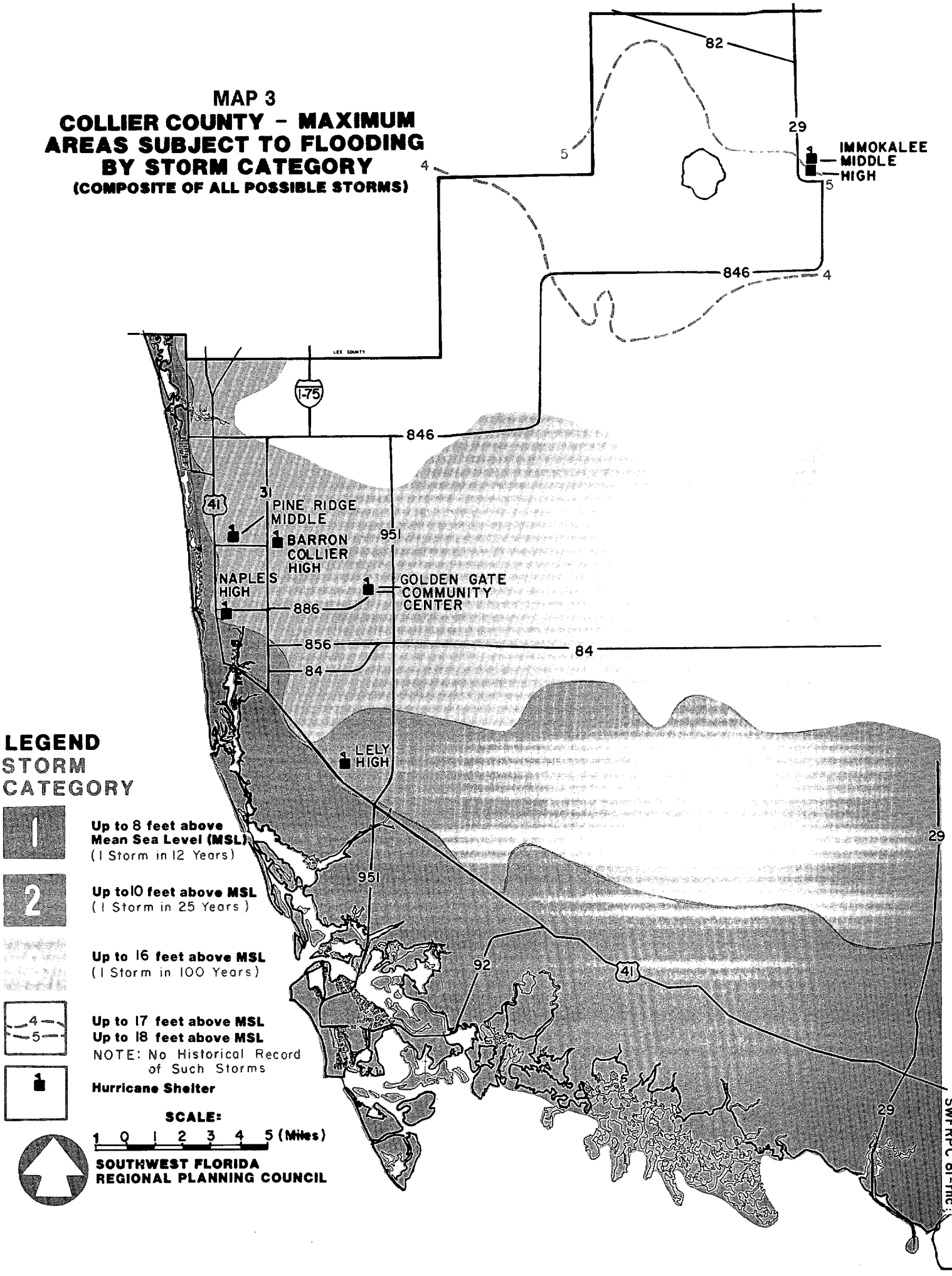
1 Maximum flooding for each selected point was used, to illustrate the worst probable case. It is improbable that any one storm would cause the amount of flooding depicted on the maps.

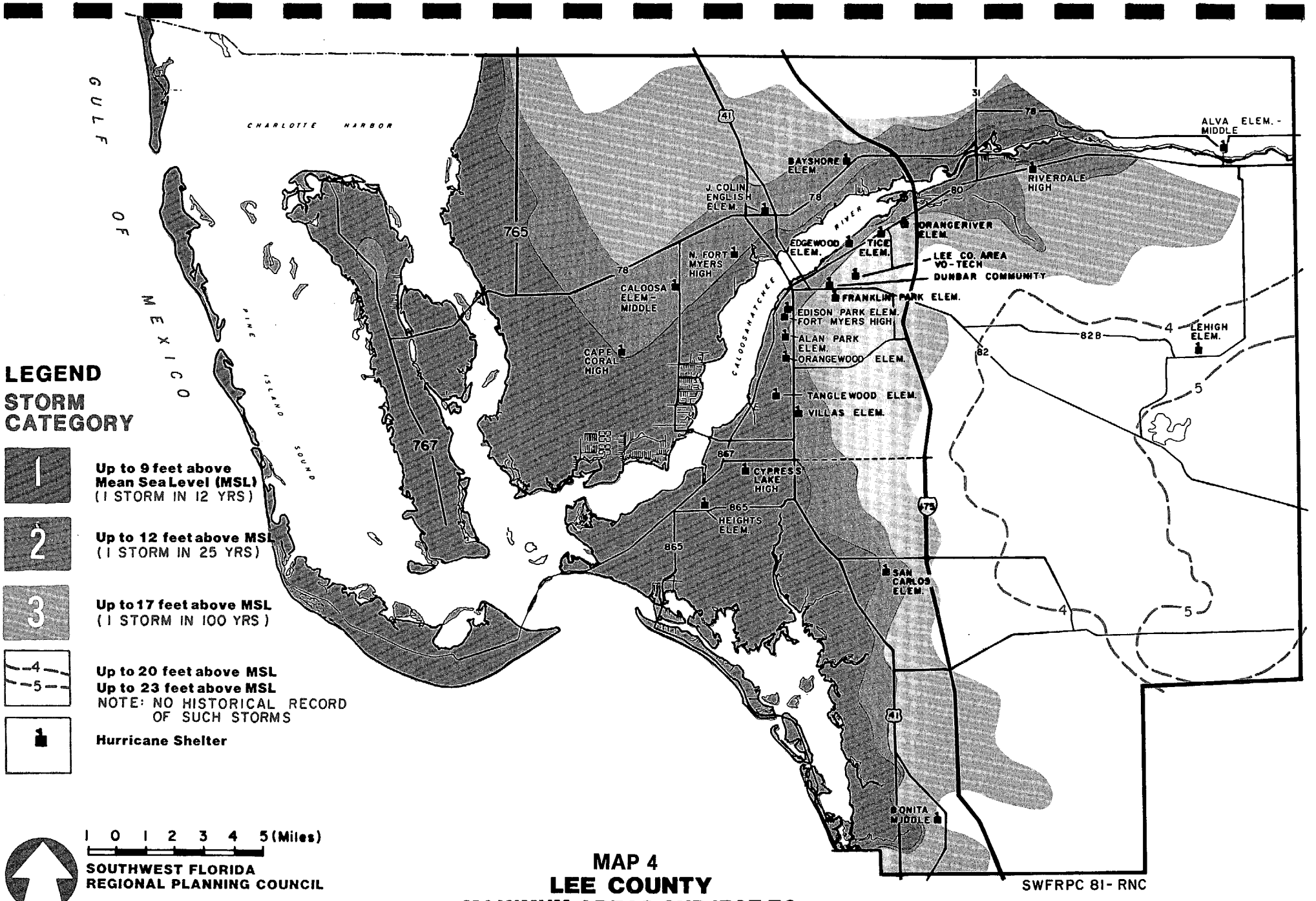
2 The counties of Glades and Hendry, due to their inland location, would not be subject to saltwater flooding (as projected by the SLOSH model), so they have not been mapped. They are subject to wind damage, which will be discussed later.



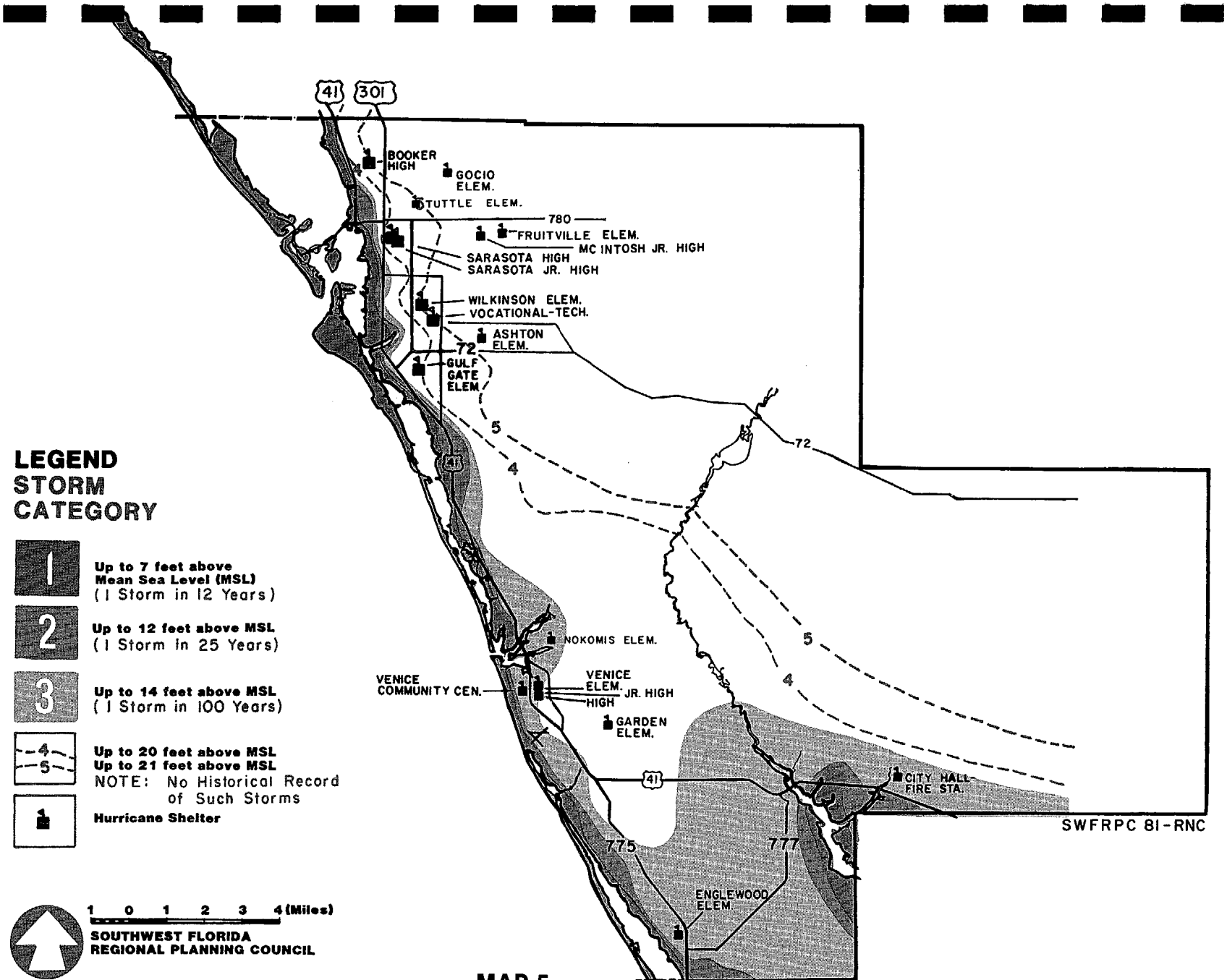
MAP 2
CHARLOTTE COUNTY
MAXIMUM AREAS SUBJECT TO FLOODING BY STORM CATEGORY
(COMPOSITE OF ALL POSSIBLE STORM TRACKS)

MAP 3
COLLIER COUNTY - MAXIMUM AREAS SUBJECT TO FLOODING BY STORM CATEGORY
(COMPOSITE OF ALL POSSIBLE STORMS)





MAP 4
LEE COUNTY
MAXIMUM AREAS SUBJECT TO FLOODING BY STORM CATEGORY
(COMPOSITE OF ALL POSSIBLE STORM TRACKS)



MAP 5

SARASOTA COUNTY
MAXIMUM AREAS SUBJECT TO FLOODING BY STORM CATEGORY
(COMPOSITE OF ALL POSSIBLE STORM TRACKS)

HISTORY AND PROBABILITY OF HURRICANES IN SOUTHWEST FLORIDA

Southwest Florida has been identified by the National Weather Service as one of the most hurricane-vulnerable areas of the United States. As such, the potential for large scale loss of life and property during a hurricane is great. This chapter will examine the history and probability of hurricane occurrence in Southwest Florida. The analysis of hurricane probability will be based upon historical occurrence in the Southwest Florida Region, employing available meteorological data from three sources: 1) Environmental Data and Information Service, National Climatic Center, Asheville, North Carolina; 2) National Hurricane Center, Coral Gables, Florida, and, 3) National Weather Service, Fort Myers and Tampa Area Offices.

In the time period from 1886 to 1981, Southwest Florida has had 38 tropical cyclones of hurricane intensity (sustained winds reaching 74 mph or more). Fourteen of these storms (as depicted in Table 1 and Map 6) passed with in 50 miles of Ft. Myers, while 24 additional storms (Table 2, Map 7) passed within 100 miles. Storms passing within 50 miles of Ft. Myers occurred on the average of once every 6.9 years, while those within 100 miles, but beyond 50 miles, averaged once every 4 years. The total number of storms passing within 100 miles averages one every 2.5 years. Thus, using the 100 mile distance as the minimum distance for issuing a hurricane warning, parts or all of Southwest Florida can expect such a warning during the hurricane season once every two and one-half years.

Technically, the official Atlantic hurricane season is defined as occurring from June 1 through November 30. The period of greatest hurricane frequency in Southwest Florida is the three month period from August to October, when 90 percent of all hurricanes passing within 100 nautical miles of Ft. Myers (the hypothetical center point of reference) have historically occurred. This is depicted in Tables 1 and 2.

Hurricanes of maximum concern, from the extent of damage and threat, are those of the greatest strength, or Categories 3, 4, and 5 as defined by the Saffir-Simpson Hurricane Scale (which is explained in detail in Appendix B), or those having velocities greater than 111 miles per hour. Such storms have passed within 100 miles of Ft. Myers on the average of 1 every 5.5 years in the 81 years since 1900 (see Table 3 which provides a chronological list of hurricanes affecting Florida). The last direct hit in Southwest Florida was Hurricane Donna, a Category 3 storm (winds up to 117 knots at closest point of approach, but higher in peak gusts). Donna passed directly over Ft. Myers Beach and Ft. Myers on September 10, 1960.

Using Hurricane Donna as an example of potential hurricane-induced flooding, it is possible to gauge the degree of hazard such storms produce. Table 4 lists the highest storm surges above mean sea level that were reported for different areas in the Region during Hurricane Donna. Note that one area, the Ten Thousand Islands, received over 17 feet of surge (MSL). In other areas, storm forces were not as great. The next chapter will examine Hurricane Donna and its impacts in greater detail.

TABLE 1

HURRICANES PASSING WITHIN 50 NAUTICAL MILES OF
26.6N 81.9W 1886-1981
FORT MYERS, FLORIDA

MAP INDEX (1)	STARTING DATE (2)	STORM'S NAME (3)	CLOSEST POINT OF APPROACH (CPA) (4)	(5)	DATE AT CPA (6)	WIND (7)
1	08/14/1888	NOT NAMED	26.1N	81.9W	8/16	87KT
2	09/18/1894	NOT NAMED	26.5N	81.9W	9/25	106KT
3	10/09/1896	NOT NAMED	26.6N	81.8W	10/19	85KT
4	09/09/1903	NOT NAMED	27.1N	81.6W	9/12	66KT
5	10/09/1910	NOT NAMED	26.7N	81.7W	10/18	88KT
6	10/14/1924	NOT NAMED	25.8N	81.7W	10/21	77KT
7	09/11/1926	NOT NAMED	26.4N	81.9W	9/18	110KT
8	09/22/1929	NOT NAMED	26.1N	82.2W	9/29	89KT
9	08/29/1935	NOT NAMED	26.3N	82.4W	9/23	104KT
10	10/03/1941	NOT NAMED	26.5N	82.2W	10/ 6	104KT
11	10/12/1944	NOT NAMED	26.5N	82.4W	10/19	85KT
12	09/12/1945	NOT NAMED	26.8N	81.4W	9/16	112KT
13	09/04/1947	NOT NAMED	26.1N	82.0W	9/18	120KT
14	08/29/1960	DONNA	26.6N	81.8W	9/10	117KT

NOTES:

(1) Index number corresponds to indicies given on map at beginning and end of storm track.
(2) Initial detection date of this tropical cyclone.
(3) Storms were not formally named prior to 1950.
(4)-(6) These columns give location and date of closest approach.
(7) Maximum sustained wind speed near storm center while storm center is within specified distance from site. This is not necessarily the wind recorded at a given site. See reference (2).

REFERENCES

(1) Jarvinen, B.R., and E.L. Caso, JA TROPICAL CYCLONE DATA TAPE FOR THE NORTH ATLANTIC BASIN, 1886-1977: Contents, limitations, and uses, NOAA Technical Memorandum NWS NOP 6, June, 1978

(2) Neumann, C.J., G.W. Cry, F.L. Caso and B.R. Jarvinen, TROPICAL CYCLONES OF THE NORTH ATLANTIC OCEAN, 1871-1977, NOAA, National Climatic Center, Asheville, N.C., June 1978, pp. 170.

TABLE 2

HURRICANES PASSING WITHIN 100 NAUTICAL MILES OF
26.6N 81.9W 1886-1981
FORT MYERS, FLORIDA

MAP INDEX (1)	STARTING DATE (2)	STORM'S NAME (3)	CLOSEST POINT OF APPROACH (CPA) (4)	(5)	DATE AT CPA (6)	WIND (7)
1	08/14/1888	NOT NAMED	26.1N	81.9W	08/16	90KT
2	08/18/1891	NOT NAMED	25.9N	82.0W	08/25	64KT
3	09/18/1894	NOT NAMED	26.5N	81.9W	09/25	106KT
4	10/07/1896	NOT NAMED	26.6N	81.8W	10/09	85KT
5	08/02/1898	NOT NAMED	27.6N	81.5W	08/02	70KT
6	09/09/1903	NOT NAMED	27.1N	81.6W	09/12	76KT
7	06/14/1906	NOT NAMED	26.1N	80.7W	06/17	71KT
8	10/11/1906	NOT NAMED	26.6N	81.9W	10/22	106KT
9	10/09/1910	NOT NAMED	26.7N	81.7W	10/18	103KT
10	08/09/1911	NOT NAMED	25.9N	82.9W	08/09	70KT
11	10/20/1921	NOT NAMED	27.8N	83.1W	10/25	91KT
12	10/14/1924	NOT NAMED	25.8N	81.7W	10/21	90KT
13	11/29/1925	NOT NAMED	27.2N	82.5W	12/01	65KT
14	09/11/1926	NOT NAMED	26.4N	81.9W	09/18	114KT
15	08/03/1928	NOT NAMED	27.7N	80.6W	08/08	82KT
16	09/06/1928	NOT NAMED	27.4N	81.0W	09/17	120KT
17	09/22 1929	NOT NAMED	26.1N	82.2W	09/29	90KT
18	07/25/1933	NOT NAMED	27.4N	81.9W	07/31	67KT
19	08/31/1933	NOT NAMED	27.4N	81.1W	09/04	110KT
20	08/29/1935	NOT NAMED	26.3N	82.4W	09/03	119KT
21	10/30/1935	NOT NAMED	25.3N	81.1W	11/05	65KT
22	08/07/1939	NOT NAMED	27.8N	81.2W	08/12	69KT
23	10/03/1941	NOT NAMED	26.5N	82.2W	10/06	105KT
24	10/12/1944	NOT NAMED	26.5N	82.4W	10/19	105KT
25	09/12/1945	NOT NAMED	26.8N	81.4W	09/16	115KT
26	10/05/1946	NOT NAMED	26.7N	82.9W	10/07	109KT
27	09/04/1947	NOT NAMED	26.1N	82.0W	09/18	131KT
28	10/09/1947	NOT NAMED	25.6N	80.9W	10/12	75KT
29	09/18/1948	NOT NAMED	25.9N	80.9W	09/22	105KT
30	08/23/1949	NOT NAMED	27.5N	81.0W	08/27	130KT
31	09/01/1950	EASY	26.2N	82.9W	09/04	110KT
32	10/13/1950	KING	27.0N	80.8W	10/18	88KT
33	08/29/1960	DONNA	26.6N	81.8W	09/10	119KT
34	08/20/1964	CLEO	27.0N	80.5W	08/27	86KT
35	10/08/1964	ISABELL	26.0N	81.1W	10/14	110KT
36	08/27/1965	BETSY	25.3N	82.2W	09/08	108KT
37	06/04/1966	ALMA	26.3N	82.8W	06/09	103KT
38	08/25/1979	DAVID	27.2N	80.2W	09/03	85KT

NOTES:

(1) Index number corresponds to indicies given on map at beginning and end of storm track.
(2) Initial detection date of this tropical cyclone.
(3) Storms were not normally named prior to 1950.
(4)-(6) These columns give location and date of closest approach.
(7) Maximum sustained wind speed near storm center while storm center is within specified distance from site.

REFERENCES

(1) Jarvinen, B.R., and E.L. Caso, JA TROPICAL CYCLONE DATA TAPE FOR THE NORTH ATLANTIC BASIN, 1886-1977: Contents, limitations, and uses, NOAA Technical Memorandum NWS NOP 6, June, 1978

(2) Neumann, C.J., G.W. Cry, F.L. Caso and B.R. Jarvinen, TROPICAL CYLONES OF THE NORTH ATLANTIC OCEAN, 1871-1977, NOAA, National Climatic Center, Asheville, N.C., June 1978, pp. 170

TABLE 3

CHRONOLOGICAL LIST OF HURRICANES THAT AFFECTED FLORIDA 1900-1981 BY CATEGORY

DATE	HIGHEST DAMAGE POTENTIAL (Saffir-Simpson Scale)	MINIMUM PRESSURE (mb)
* 1903 September	2	976
* 1906 June	1	-
* October	2	967
1909 October	3	957
* 1910 October	3	955
* 1911 August	1	-
1915 September	1	988
* 1916 October	2	972
November	1	-
1917 September	3	958
1919 September	4	927
* 1921 October	3	952
1924 September	1	985
* October	1	980
* 1925 November	1	-
1926 July	1	980
* September	4	935
* 1928 September	4	929
* 1929 September	3	948
* July	2	975
* 1933 August	2	975
September	3	948
* 1935 September	5	892
* November	2	973
1936 July	3	964
* 1939 August	1	985
* 1941 October	2	975
* 1944 October	3	962
1945 June	1	985
* September	3	951
* 1946 October	1	980
* 1947 September	4	940
* October	2	974
* 1948 September	3	963
October	2	975
* 1949 August	3	954
* 1950 September (Easy)	3	958
* October (King)	3	955
1953 September	1	985
1956 September	2	975
* 1960 September (Donna)	4	930
* 1964 August (Cleo)	2	968
September	2	966
* October (Isabelle)	2	974
* 1965 September (Betsy)	3	948
* 1966 June (Alma)	2	982
October	1	983
1968 October	2	977
1972 June	1	980
* 1979 (David)	2	972

Source: P. J. Hebert and G. Taylor, Hurricane Experience Levels of Coastal County Populations - Texas to Maine, National Weather Service Southern Regional Technical Report, Silver Spring, Department of Commerce, NOAA, 1975, p. 12.

* Passing within 100 miles of Southwest Florida.

HURRICANE DONNA: A CASE STUDY

This chapter will examine the impacts of one specific hurricane, Hurricane Donna. This hurricane will be used for two reasons; first, since it passed directly over Ft. Myers and Ft. Myers Beach, and second, because fairly accurate records of impacts are available for that particular storm. An examination of this hurricane's damages will provide a basis for comparison of estimates of potential hurricane damage made in subsequent chapters. In addition, estimates of damage from Hurricane Donna, if it were to occur today, are provided, as well as damage estimates from other hurricanes.

HURRICANE DONNA

In 1960, Hurricane Donna ravaged the lower gulf coast of Florida and the Florida Keys; over 600 homes and buildings were destroyed and about 10,000 more suffered some degree of damage.[1] Based upon records kept since 1886 by the National Weather Service, Donna was reported to have had some of the highest winds and destructive forces of any hurricane up to that time. Gusts of wind between 121 and 155 mph were reported over Fort Myers; estimated gusts over Naples were between 140-150 mph. Between Everglades City and Naples, tidal debris covered U.S. 41 from 4 to 6 miles inland, as a result of a 9 foot storm surge inundating the area.[2] Fort Myers Beach was swept by tides and wave action on September 10, 1960, lowering dune elevations that were previously 5-7 feet above MSL. Foundations were exposed and undermined, causing homes to topple. First-phase winds lowered water levels in the Caloosahatchee River; a similar lowering of water levels occurred at Punta Gorda and at Charlotte Harbor.[3] This created a funneling effect which caused tidal flooding at Bokeelia (on Pine Island) and in the Matlacha Pass area. In the South Banks area of Captiva Island, tides of 4 to 5 feet above normal overtopped the island, cutting a new entrance to Blind Pass about one-quarter mile south of the Blind Pass Bridge.[4]

Physical Damage

A summary of the estimated physical damage to the lower Gulf Coast caused by Hurricane Donna appears below. It is apparent from a review of this information that the number of buildings damaged was greatest in Charlotte County, and least severe in Collier, although monetary damage was most severe in Lee County.

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1 U.S. Army Corps of Engineers, Report on Storms & Floods in Florida, June-September, 1960, Jacksonville, Florida, 1961, p. 14.
2 Ibid., p. 8.
3 Ibid., p. 9.
4 Ibid., p. 9.

TABLE 5

HURRICANE "DONNA"

Summary of Physical Damage

Gulf Coast Area

Affected County	Item	Number Destroyed or suffering major damages
Collier County	Buildings	Over 200
	Mobile Trailers	Over 100
Lee County	Buildings	1,100
	Mobile Trailers	210
Charlotte County	Buildings	2,700
	Mobile Trailers	700

Source: U.S. Army Corps of Engineers, Report on Storms and Floods in Florida July-September 1960, 1961, p. 14.

Monetary damages resulting from Donna are summarized in the subsequent table, based on estimates made by the U.S. Army Corps of Engineers.

The total monetary damage for the state of Florida was estimated at $86,877,000; thus, Southwest Florida's dollar loss comprised 30.4 percent of the state's total.

According to Red Cross and U.S. Army Corps of Engineer reports, first phase winds in excess of 100 mph unroofed buildings and overturned mobile homes on the lower Gulf Coast well in advance of any tidal flood or wave damage.[1] Most of the damages were confined to Everglades City, Naples, Vanderbilt Beach, Bonita Beach and Fort Myers Beach, for an estimated $13 million loss. Eighty percent of that total can be attributed to losses at Fort Myers Beach and Naples. Additional damages not calculated from wave action include seawall and bulkhead destruction, loss of beach fill, and erosion of roads.

Agricultural Damage

Agricultural damages resulted from the long-duration flooding on the lands, exclusive of wind damages to citrus groves. These damages were primarily to truck crops, pasture lands and cattle. Citrus grove damages were the result of fruit blown off trees, and these losses were also quite extensive. It was estimated that the damage for the State approached $59.9 million based on 1958 sales of $337 million and estimated 1960-61 production of 145.5 million boxes.[2] (These citrus damages are not included in the damage summary table.) Thus, the overall impact of the storm was great, with losses amounting to nearly $150 million in the state.

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1 U.S. Army Corps of Engineers, p. 16.
2 Ibid , p. 16.

DAMAGE FROM OTHER HURRICANES

Since Hurricane Donna, other storms have affected the country, causing great devastation and damages amounting to billions of dollars. A recent survey by the National Oceanic and Atmospheric Administration revealed that the nation's costliest storms to date struck the United States within a two-week period in 1979: "Frederic," which swept through 10 states between September 12-14, causing a record $752,510,000 in insured losses; and "David," which hit 12 states, the District of Columbia, Puerto Rico and the Virgin Islands in late August and early September, leaving insured damages of more than $122 million.[1]

The 10 most costly hurricanes, in terms of estimated insured losses, are listed in the table below. Of the ten storms given, only Betsy and David passed within 100 miles of Southwest Florida.[2]

TABLE 7

THE TEN MOST COSTLY HURRICANES

Dates	Hurricane	Estimated Insured Losses
1979 - Sept. 12-14	Frederic	$ 752,510,000
1965 - Sept. 7-10	Betsy	715,000,000*
1970 - August 3	Celia	309,950,000*
1969 - Aug. 17-18	Camille	225,000,000
1954 - Aug. 30-31	Carol	129,700,000
1979 - August 30, Sept. 4-6	David	122,070,000*
1954 - Oct. 15-16	Hazel	122,050,000*
1975 - Sept. 16-26	Eloise	119,188,500
1961 - Sept. 9-12	Carla	100,000,000*
1972 - June 17-25	Agnes	97,853,000**

* Fixed property loss.
** Hurricane Agnes caused extensive uninsured losses, largely as a result of heavy flooding. Total property damage is estimated by the National Oceanic and Atmospheric Administration at $3.1 billion.

SOURCE: Sun Coast Gondolier, 1981.

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1 Sun Coast Gondolier, "1979 Hurricanes are Most Costly", 1981, p. 16.
2 SWFRPC, Regional Hurricane Evacuation Plan, Fort Myers, 1981, p. 38.

LAND USE ANALYSIS

In this chapter, land use acreage has been assimilated and analyzed for each geographic vulnerability zone, as previously described. Land uses have been categorized as follows: residential; commercial; industrial; public transportation, communication and utilities; and other public uses (institutional).

METHODOLOGY

The land use survey undertaken for this report is based upon work initially begun by the Council in its 1975 Coastal Zone Management program, and subsequently updated on an annual basis. The descriptive terms applied to land uses are those used by the Council staff in its coastal zone publications; they are also compatible with the land use classification system used by the Florida Division of State Planning in its Florida Land Use and Cover Classification System, published in April, 1976. The six urban land use categories in this report, and the specific uses they reflect, are described below:

1) Residential: Residential land uses are divided into two categories; single-family and multiple family. The single-family classification refers to dwelling units that are not physically connected by a wall, floor or ceiling to other units. The multiple-family classification, conversely, refers to those dwelling units which touch other dwelling units. Single-family units include the typical suburban home and the mobile home, while the multiple-family unit includes duplexes, triplexes, garden apartments, and low/mid/and high rises.

2) Commercial: Commercial land uses include retail, wholesale, professional, office, tourist, businesses and services. Typical commercial areas include shopping centers, office complexes, and highway "strip" commercial development.

3) Industrial: Industrial land uses include those uses where manufacturing takes place. Typical examples in the Region include lumber yards and concrete and cement plants.

4) Transportation, Communication, and Utilities: Transportation land uses, defined as the uses related to the movement of people and goods, include a variety of transportation facilities (truck terminals, ports, airports, and rail terminals); but do not include the actual road or rail lines, which are generally too small to be designated as a land use at the map scale used. Communication land uses refer to recognizably large communication centers, such as broadcasting stations or tele-communications facilities. Utility land uses include power plants, reservoirs, water and sewage treatment plants, and sanitary landfills. As with transportation, the actual utility easements are too small to be mapped at the scale used.

5) Institutional: Institutional land uses include schools, cemetaries, governmental centers, hospitals, and religious facilities.

6) Mixed: This use refers to combinations of the land uses above in which no one use constitutes 70% of the land coverage of a 20-acre parcel.

The land uses above were mapped at a scale of 1" to 2,000', based upon United States Geological Survey maps of the same scale. Land uses were determined through the analysis of aerial photographs provided by Mark Herd, Incorporated (1979) and the Florida Department of Transportation (DOT), with 1980 updates provided by Real Estate Data, Inc. (REDI). The REDI photos were used for the four coastal counties, while the Herd aerials were used for the two inland counties (Glades and Hendry). Areas whose use could not be determined from the aerials were either field surveyed, or validation was provided by local governments' county and city planning departments. The minimum size land use parcel mapped was five acres.

The estimates used in this report for land uses for the Region and individual counties were determined by measuring the parcels portrayed on land use maps through the use of a Compensating Polar Planimeter.

SOUTHWEST FLORIDA REGION

The Southwest Florida Region, as a whole, encompasses 3,853,440 acres, or 6,021 square miles (see Table 8). In land area alone, Collier County is by far the largest county in the Region, followed by Hendry County. In terms of shoreline, Collier County leads the Region and is closely followed by Lee County.

TABLE 8

County Size

County	Sq. Miles	Acres	Inland Water (Sq. Miles)	Shoreline (Miles)	Beaches (Miles)
REGION	*6,021.0*	*3,853,440*	*642*	*1,676.0*	*151.8*
Charlotte	703.0	449,920	129.0	219.8	14.4
Collier	2,006.2	1,283,968	112.8	675.2	39.3
Glades	752.8	481,792	145.2	---	---
Hendry	1,186.7	759,488	2.3	---	---
Lee	785.0	502,400	220.0	589.6	51.5
Sarasota	587.3	375,872	32.7	192.0	46.6

SOURCE: Southwest Florida Regional Planning Council, The Southwest Florida Economy 1982, p.6; Florida Department of Natural Resources, Statistical Inventory of Key Biophysical Elements in Florida's Coastal Zone, 1973, pp.3,4.

The following sections include an evaluation of the major land uses for each county, within vulnerability zones as defined by the SLOSH grid for storm categories 1-5. Lands unaffected by flooding are excluded from analysis within this section; their vulnerability to winds, however, is discussed in Chapter 8. A final summary of the Region's total vulnerable land, in acres, is also provided.

COLLIER COUNTY

Collier County land uses by hurricane zone are given below, in Table 10.

TABLE 10

Land Use by Hurricane-Vulnerability Zone
Collier County

Hurricane Vulnerability Zone (Storm Category)	Land Use (Acres)					
	SF/MF Residential	Commercial	Industrial	Transportation/ Communication/ Utilities	Institutional	Mixed
1	7,668 (25.8)	627 (7.3)	85 (5.4)	128 (9.6)	144 (21.1)	371 (71)
2	4,254 (14.3)	5,188 (60.5)	46 (2.9)	660 (49.6)	122 (17.9)	45 (8.6)
3	15,322 (51.6)	457 (5.3)	1,175 (74.3)	179 (13.4)	201 (29.5)	31 (5.9)
4	2,031 (6.8)	2,294 (26.8)	275 (17.4)	54 (4)	214 (31.4)	40 (7.7)
5	426 (1.4)	5 (.05)	0 (0)	310 (23.3)	0 (0)	35 (6.7)
TOTAL*Acres %	29,701 (100)	8,571 (100)	1,581 (100)	1,331 (100)	681 (100)	522 (100)

* Total in zones 1-5, excluding lands outside these zones.
SOURCE: SWFRPC.

From this table, it can be seen that over half of Collier County's residential land use in hurricane vulnerable areas is found in the Category 3 zone. However, one-fourth of the residential property is in the Category 1 SLOSH flood zone, which is extremely susceptible to flooding. Very little residential lands are found in Category 4 or 5 areas, which are less susceptible to hurricane impacts.

Most of the county's commercial areas are in either Category 2 or Category 4 vulnerability zones. Industrial land uses are chiefly located in Category 3 and 4 areas. Thus, commercial and industrial lands are relatively protected from major flooding in a minimal-strength storm, and are safe from a direct storm surge hit. These areas, however, will still incur flooding in a major storm, and are subject to wind damage, as well.

Approximately half of the transportation, communication and utility uses are located in the Category 2 zone, but a significant amount is also found in the Category 5 zone. Institutional uses are primarily situated in the Category 3 and 4 areas; however, some of these uses are in very vulnerable locations, particularly schools, churches and similar facilities on Marco Island. The mixed uses are fairly evenly divided throughout the county.

CHARLOTTE COUNTY

The land use acreages for Charlotte County, by hurricane-vulnerability zone, are listed below in Table 8.

A review of these land use acreages shows that much of Charlotte County's developed land is extremely hurricane-vulnerable. Over one-half of all residential development in susceptible areas is located in the most vulnerable area (zone 1), while 40 percent of commercial land use, and 25.9 percent of the industrial land use are also found in this area; most commercial and industrial lands are concentrated in the Category 2 area. These areas are still highly susceptible to hurricane-induced flooding.

TABLE 9

Land Use by Hurricane-Vulnerability Zone
Charlotte County

Hurricane Vulnerability Zone (Storm Category)	Land Use (Acres)					
	SF/MF Residential	Commercial	Industrial	Transportation/ Communication/ Utilities	Institutional	Mixed
1	11,065 (53.8)	456 (40)	400 (25.9)	133 (11.4)	48 (15)	85 (100)
2	6,252 (30.4)	619 (54.2)	695 (45.1)	304 (26.1)	240 (75.2)	0 (0)
3	2,581 (12.6)	51 (4.5)	195 (12.6)	432 (37.1)	21 (6.6)	0 (0)
4	610 (3)	14 (1.2)	142 (9.2)	296 (25.4)	10 (3.1)	0 (0)
5	48 (.2)	0 (0)	110 (7.1)	0 (0)	0 (0)	0 (0)
TOTAL*Acres %	20,556 (100)	1,140 (100)	1,542 (100)	1,165 (100)	319 (100)	85 (100)

* Total in zones 1-5, including lands outside these zones.
SOURCE: SWFRPC.

The majority of utility and transportation land uses in zones 1-5 are situated in Category 3 and 4 areas, which are less vulnerable to direct storm surge damage. Three-quarters of the institutional uses are in the Category 2 area, and all the mixed land uses are in the Category 1 zone. Note that there are virtually no developed lands located within the Category 5 area, that area that is least susceptible to hurricane flooding.

GLADES AND HENDRY COUNTIES

Neither Glades County nor Hendry County is located within the SLOSH grid pattern; consequently these areas will not be subject to storm surge or saltwater flooding. The land use inventory revealed the following uses for both Glades and Hendry Counties.

TABLE 11

Land Use (Acres)
Glades and Hendry Counties

County	Residential	Commercial	Industrial	Transportation/ Communication/ Utilities	Institutional	Mixed
Glades	3,026	151	89	10	113	0
Hendry	4,477	267	277	635	283	37

Source: SWFRPC, Land Use Policy Plan, Update '80, p. 131.

Although Glades and Hendry Counties are not in areas subject to saltwater flooding, they may experience some flooding from prolonged rainfall, as well as hurricane-induced winds, possible tornadoes and possible freshwater flooding. As both counties are basically rural in nature, however, the amount of developed land is relatively small, when compared to the four coastal counties. One major problem facing these inland counties is potential wind damage to mobile homes. This will be more fully discussed in the following chapters.

LEE COUNTY

Lee County is a highly developed county, and is also a rapidly growing area. The land use acreages, by hurricane zones, are given below, in Table 12.

TABLE 12

Land Use By Hurricane-Vulnerability Zone
Lee County

Hurricane Vulnerability Zone (Storm Category)	SF/MF Residential	Commercial	Industrial	Transportation/ Communication/ Utilities	Institutional	Mixed
1	23,642 (44.1)	1,861 (43.4)	778 (14.5)	280 (17.3)	400 (29.2)	407 (72.3)
2	14,713 (27.4)	1,164 (27.1)	877 (19.6)	705 (43.6)	506 (37)	136 (24.1)
3	8,776 (16.4)	1,068 (24.9)	825 (18.5)	312 (19.3)	420 (30.7)	0 (0)
4	5,488 (10.2)	159 (3.7)	1,985 (44.4)	318 (19.7)	42 (3.1)	0 (0)
5	1,004 (1.9)	35 (.8)	0 (0)	0 (0)	0 (0)	20 (3.5)
TOTAL* Acres	53,623	4,287	4,465	1,615	1,368	563
%	(100)	(100)	(100)	(100)	(100)	(100)

* Total in zones 1-5, excluding lands outside these zones.
SOURCE: SWFRPC

An analysis of Table 12 indicates that a major portion of the residential land uses in zones 1-5 are in the Category 1 vulnerability zone (44.1%). Most of these areas will be directly affected by the hurricane storm surge. The remaining residential land uses are in zones 2 or 3; only 12% of the residential uses are in zones 4 or 5. Hence, a Category 1,2, or 3 hurricane could cause tremendous damage to residential lands in Lee County.

Lee County also contains a great deal of commercial land in vulnerable areas. Over 95 percent of the lands in vulnerable areas are in zones 1-3. In comparison, 44.4 percent of the industrial land use is in Zone 4, indicating that these lands are much less susceptible to most storm threats. Some industrial uses, however, are prevalent throughout the most vulnerable zones (zones 1-3).

The transportation/communication/utility uses and the institutional uses are divided fairly evenly among the first four vulnerability zones; none of these uses were found in Zone 5. Mixed uses are primarily located only in zone 1 (72.3% of the total).

SARASOTA COUNTY

Sarasota County is another highly developed, urbanized county on the Gulf Coast. Table 13, below, lists the amount of developed land within each of the hurricane-vulnerability zones.

TABLE 13

Land Use by Hurricane-Vulnerability Zone
Sarasota County

Hurricane Vulnerability Zone (Storm Category)	Land Use (Acres)					
	SF/MF Residential	Commercial	Industrial	Transportation/ Communication/ Utilities	Institutional	Mixed
1	7,051 (25.8)	124 (5.8)	0 (0)	5 (.5)	61 (6.5)	132 (41.2)
2	4,864 (17.8)	270 (12.5)	3 (.6)	54 (6)	37 (3.9)	114 (35.6)
3	6,699 (24.5)	767 (35.6)	210 (45.4)	488 (53.6)	221 (23.5)	74 (23.1)
4	6,668 (24.4)	713 (33.1)	120 (25.9)	225 (24.7)	378 (40.2)	0 (0)
5	2,011 (7.4)	278 (12.9)	129 (28)	139 (15.3)	243 (25.9)	0 (0)
TOTAL* Acres	27,293	2,152	462	911	940	320
%	(100)	(100)	(100)	(100)	(100)	(100)

* Total in zones 1-5, excluding lands outside these zones.
SOURCE: SWFRPC.

The previous land use statistics illustrate that the majority of land uses in hurricane prone areas are found in vulnerability zones 3 and 4. Forty-nine percent of the residential development, 69 percent of commercial land use, 71.3 percent of the industrial lands, 78.3 percent of the transportation/communication/utility uses, and 63.7 percent of the institutional land uses are located in these two areas. These figures contrast greatly with those for the three other coastal counties, due primarily to Sarasota County's higher land elevations which afford it more protection. Although the majority of land use is located in less vulnerable areas, a significant amount is still found in the first two zones (where extensive development has occurred in coastal areas) and on the barrier islands. One quarter of residential land use is in the Category 1 zone, and 41.2 percent of the mixed uses are in this zone, as well.

When compared to the other coastal counties, Sarasota County has a significant amount of development in the more protected Category 5 areas. Twenty-eight percent of the industrial land uses are in this zone; these areas will be only slightly affected by flooding. A substantial amount of institutional land uses (25.9%) are also found in this vulnerability zone. However, only 7.4 percent of the residential uses, 12.9 percent of the commercial uses and 15.3 percent of the transportation/communication/utility uses are in the Category 5 zone.

LAND USE SUMMARY

A summary of the Southwest Florida Region's hurricane-vulnerable land uses appears in Table 14. This table shows the amount of land use (in acres) located within each storm area.

TABLE 14
Land Use by Hurricane-Vulnerability Zone (Acres)
Southwest Florida

Hurricane Vulnerability Zone (Storm Category)	County						
	Charlotte	Collier	Glades	Hendry	Lee	Sarasota	Region
1	12,187 (49.1)	9,023 (21.3)	N/A	N/A	27,368 (41.5)	7,373 (23)	55,951 (33.9)
2	8,110 (32.7)	10,315 (24.3)	N/A	N/A	18,101 (27.4)	5,342 (16.7)	41,868 (25.3)
3	3,280 (13.2)	17,365 (40.9)	N/A	N/A	11,401 (17.3)	8,459 (26.3)	40,505 (24.5)
4	1,072 (4.3)	4,908 (11.6)	N/A	N/A	7,992 (12.1)	8,104 (25.2)	22,076 (13.4)
5	158 (.6)	776 (1.8)	N/A	N/A	1,059 (1.6)	2,800 (8.7)	4,793 (2.9)
TOTAL* Acres	24,807	42,387	3,389	5,976	65,921	32,078	165,193
%	(100)	(100)	(100)	(100)	(100)	(100)	(100)

* Total in zones 1-5, exluding lands outside these zones.
SOURCE: SWFRPC.

Table 14 illustrates the distribution of urbanized land use in the region as it relates to hurricane vulnerability. In both Charlotte and Lee Counties, nearly half of all developed lands that are vulnerable to hurricanes are in the zone 1 area. In contrast, the greatest proportion of land in Collier and Sarasota Counties is located in zone 3. Of the four coastal counties, only Sarasota has a significant amount of development in the less susceptible zones 4 and 5 (33.9%).

Analysis of the previous table has shown that Southwest Florida has developed land use patterns that pose a tremendous loss potential in the event of a hurricane. Approximately 55,951 acres of developed land are directly susceptible to either storm surge or flooding from a Category 1 (minimal) hurricane. As storm intensity increases, even more land is subject to hurricane impacts. For example, approximately 138,324 acres of developed land are subject to the flooding effects of a Category 3 (Donna-type) hurricane.[1]

Lee and Charlotte Counties have exhibited the greatest potential for hurricane damage, due to the large amount of land in susceptible areas, while Sarasota County has the least potential for damage due to the fact that relatively smaller amounts of land are found in the most vulnerable areas; the predominant land uses are located in the relatively less hurricane-prone areas (zones 3 and 4). It should be noted that these figures indicated potential for damage, since the actual areas affected and resultant damage depends upon the specific storm track and characteristics.

The following chapter contains an inventory of structures located within the previously defined vulnerability zones. The land use and structural inventories will provide the basis from which projections of potential hurricane-induced damage will be determined.

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1 This figure was determined by summing the acreage for zones 1,2 and 3 to calculate the total acreage vulnerable to a category 3 type storm.

STRUCTURAL ANALYSIS

This chapter consists of an inventory of structures in Southwest Florida which may be affected by hurricanes. To accomplish this, an inventory of all structures in the Region was taken; the totals were then distributed by hurricane vulnerability zone as previously defined and explained in the Southwest Florida Regional Hurricane Evacuation Plan. The structures were classified by type, as follows: residential, commercial, industrial, utility, transportation, and other (institutional) facilities. The inventory was compiled using a variety of sources, including 1979-1980 REDI-book aerial photographs, various County and City Comprehensive Plans, the 1981 Southwest Florida Regional Support Services report, the 1981 Florida Statistical Abstract, Florida Department of Transportation maps, Florida Department of Business Regulation data, public health department data, and the Southwest Florida Regional Planning Council land use inventory in its Land Use Policy Plan, Update '80.

RESIDENTIAL STRUCTURES

A housing unit count was done using REDI-book aerial photographs for single family and mobile home units. March, 1979 aerial photographs were used for Charlotte, Collier Lee and Sarasota Counties. For Glades and Hendry Counties, February, 1980 aerial photographs were used. Since, aerial photographs are not completely reliable with regard to multi-family units, supplemental information was also used. The Florida Department of Business Regulation, Division of Hotels and Restaurants supplied a list of apartment, condominium, hotel and motel units, by county (January, 1980). For the counties of Collier, Lee, Charlotte and Sarasota, further refined information was obtained from planning departments and property appraiser offices. For Lee, Collier and Charlotte Counties, condominium unit counts were also obtained from a 1978-79 United Telephone System inventory. Additional information on travel trailer parks and travel trailer camps for all six counties was obtained from the Florida Division of Health (December, 1979). The results of this inventory appear in Table 15, below.

TABLE 15

Inventory of Residential Structures
Southwest Florida

COUNTY	SINGLE FAMILY	MOBILE HOME TRAVEL TRAILER	APART-MENT	CONDO-MINIUM	HOTEL/ MOTEL	TOTAL
Charlotte	18,640 (64%)	7,072 (24%)	853 (3%)	1,700 (6%)	890 (3%)	29,155 (9%)
Collier	23,029 (44%)	7,796 (15%)	1,227 (2%)	17,305 (33%)	3,004 (6%)	52,362 (17%)
Glades	1,801 (48%)	1,774 (47%)	97 (2%)	0	119 (3%)	3,791 (1%)
Hendry	4,963 (66%)	1,907 (25%)	362 (5%)	0	254 (3%)	7,486 (2%)
Lee	59,764 (55%)	20,787 (19%)	9,081 (8%)	13,222 (12%)	6,245 (6%)	109,099 (35%)
Sarasota	58,803 (53%)	18,999 (17%)	6,224 (6%)	21,323 (19%)	4,558 (4%)	109,907 (35%)
REGION	167,000 (53%)	58,335 (19%)	17,844 (6%)	53,550 (17%)	15,070 (5%)	311,799

SOURCE: SWFRPC.

Using this inventory, the number and type of residential structures located within the five vulnerability zones were determined. Since the housing unit count was based upon existing enumeration districts and census tracts, the data was simply reaggregated to conform to the vulnerability zone boundaries. The results appear in Table 16, below. (A full discussion of the housing unit count and reaggregation methodology appears in the SWFRPC Regional Hurricane Evacuation Plan, pp. 17-19, 60-75, and H-1 - H-27.)

LEE COUNTY

TABLE 16 (Continued)

THREAT	CATEGORY	SINGLE-FAMILY	MOBILE HOME	TRAVEL TRAILER	APART-MENT	CONDOMINIUM
Flood	Less Than 1	4,281	3,304	---	931	5,314
Flood	1	19,594	6,955	---	856	1,019
Wind	1	---	10,528	---	---	---
Flood	2	17,434	4,831	---	3,298	6,098
Wind	2	---	5,697	---	---	---
Flood	3	13,391	5,411	---	2,511	---
Wind	3	---	286	---	---	---
Flood	4	1,012	279	---	---	---
Wind	4	---	7	---	---	---
Flood	5	4,052	7	---	407	791
Wind	5	---	---	---	---	---

SARASOTA COUNTY

Flood	Less Than 1	4,486	269	---	767	8,064
Flood	1	7,303	1,831	---	1,595	2,774
Wind	1	---	16,899	---	---	---
Flood	2	4,286	1,740	---	180	1,344
Wind	2	---	15,159	---	---	---
Flood	3	9,956	3,445	---	317	708
Wind	3	---	11,530	---	---	---
Flood	4	7,329	1,250	---	---	685
Wind	4	---	10,468	---	---	---
Flood	5	5,262	1,416	---	91	114
Wind	5	---	9,052	---	---	---

NOTE: Each Category is exclusive of the total. The mobile home numbers for wind category decline as the category increases due to the inclusion of more mobile homes in areas subject to flooding.

SOURCE: SWFRPC.

A review of the preceding table reveals that the location of Southwest Florida's residential units is primarily in the most hurricane-vulnerable areas. The location of the Region's condominium units illustrates this problem; in the four coastal counties, over half of all units are in the Category 1 vulnerability zone (due to the high degree of vulnerability of units in Sarasota and Charlotte Counties). In some cases, units are in areas susceptible to flooding in storms so minor that they are not even ranked as Category 1.[1]

In Charlotte County, 37 percent of the single family homes are in the Category 1 flood vulnerability zone. In contrast, 73 percent of its condominium units are in the Category 1 area. In Collier County, 25.8 percent of the single family units and 46.7 percent of the condominium units are in Category 1 areas. Although these percentages are lower than those of Charlotte County, homes in Collier County are some of the Region's most expensive; thus, damage in the coastal areas could be disproportionately great, especially in terms of both present value and replacement cost of residential units.

Lee County, with 40 percent of its single family homes in either the Category 1 zone or less, is also vulnerable to severe damages. Furthermore, 47.9 percent of Lee County's condominiums units are in areas less than the Category 1 zone (barrier island areas) or in the Category 1 zone, while another 46.1 percent are found in the Category 2 zone. Thus, 94 percent of the total condominium units in Lee County are in areas expected to flood completely with a storm surge of 12 feet or less. Many of these condominiums are subject to the direct hit of a storm surge, and with a Category 3 storm producing a 17 foot surge, the damage potential is very severe.

In Sarasota County, thirty percent of the vulnerable single-family homes are in areas susceptible to the effects of a Category 1 strength hurricane or less (tropical storm). Seventy-nine percent of the county's condominium units are in the same situation. Housing units in the coastal areas of Sarasota County are also expensive, and damage to these structures could be substantial.

Glades and Hendry Counties are not on the coast; nevertheless, they can be affected by wind damage, especially to mobile homes. Onequarter of Hendry County's residential units are mobile homes, while nearly half of Glades County's units are of this variety. These units are all susceptible to damage or destruction, as witnessed by the performance of mobile homes during other hurricanes in the Southeastern U.S. within the past few years. Anchoring system and tie downs are of little help against winds 70 MPH or better.[2]

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1 Since Category 1 is the minimal strength hurricane, those ranked below Category 1 would be defined as tropical storms.

2 Vann and McDonald, An Engineering Analysis: Mobile Homes in Wind Storms, Lubbock, Texas, 1978, p. 140.

An examination of the Region's residential unit inventory demonstrates the potential dangers of coastal living. The low-lying coastal areas are extremely susceptible to flooding, even in storms below hurricane strength. The potential for property damage is also great, not only because of the concentration of dwelling units in the coastal areas (especially barrier islands) but also because of the high average price of these units.

COMMERCIAL LAND USE

An inventory of commercial structures in Southwest Florida was done using a specially designed computer program processed by the University of Florida, which contained tax assessment data supplied by the various county property appraiser's offices. The resultant printout contained land values, building values, just values, and parcel counts for each type of land use. The parcel counts were used to determine commercial structure locations.[1] Parcels were enumerated by land use type and were allotted to their respective vulnerability zones.

The following section summarizes commercial structure counts by land use type and vulnerability zone, for each of the Region's six counties, as well as Southwest Florida as a whole. Detailed lists for each county are found in the appendix (Appendix C).

TABLE 17

Commercial Structures by County and Vulnerability Zone
Southwest Florida

County	Vulnerability Zone 1	2	3	4	5	Outside 5	Total
Charlotte	2,375	1,900	911	248	1	11	5,446
Collier	486	312	271	13	119	54	1,255
Glades	- -	- -	N/A	- -	- -	--	154
Hendry	- -	- -	N/A	- -	- -	--	339
Lee	1,873	995	667	28	36	20	3,619
Sarasota	957	1,038	507	476	947	386	4,311
Region	5,691	4,245	2,356	765	1,103	471	15,124

N/A - Not Applicable (no vulnerability zones in Glades or Hendry Counties)

Source: Property appraiser Tapes; Florida Department of Revenue.

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1 Parcels are not always exactly equivalent to structures (since more than one building may be located in one parcel). Thus, the numbers of facilities may be slightly underestimated.

Charlotte County

In Charlotte County, there are 5,446 commercial parcels[1], according to the property appraiser tapes. Major uses include stores, office buildings, parking lots, repair shops, and similar uses. The number of parcels for each of the thirty major commercial land uses has been categorized by storm type, in Appendix C.

Analysis of the preceding table indicates that of the total 5,446 commercial parcels in Charlotte County, 43% are located in the category 1 area, while 34% are found in the category 2 area. Thus, over 77% of the total commercial structures are located in the most vulnerable areas of the county. Only 11 parcels are located outside the areas that would be affected by hurricanes.

All types of commercial land use would be affected by a hurricane, since all varieties are found in vulnerable areas. Stores would be especially affected, since they are located primarily in the category 1 and 2 areas. Few businesses are located outside the category 5 area (the safest area, thus subject to the least damage). Since the major businesses in Charlotte County are stores, office buildings, repair shops, and other service-oriented establishments, hurricane loss could be severe, in terms of both property damage and employment loss.

Collier County

Collier County's commercial parcels total 1,255. The majority of these are stores (21%), office buildings, restaurants, service stations, auto sales, and hotels and motels. (See Appendix C). The majority of establishments are located in areas vulnerable to hurricane forces. For example, approximately 85% of hotels and motels are located in category 1 and 2 areas, those most prone to direct hurricane impacts. In fact, the majority of most businesses are found in these areas. For example, 63% of total establishments are located in categories 1 and 2, while only 10% are found in the category 3 and 5 areas. Approximately 4%, or 54 establishments, are located outside all five storm areas. Considering only the area outside these five categories to be safe, only a very small portion of commercial establishments would be safe from a hurricane's effects.

Glades County

Glades County is not affected by saltwater flooding, since it is located outside the SLOSH Grid. Because there are no specific vulnerability zones, commercial structures have been aggregated for the county as a whole. In the county, there are 154 improved commercial parcels[2] (parcels with buildings). The majority of commercial structures are located in the Moore Haven area (the county seat), especially along U.S. 27, the major highway. A smaller amount is found in the extreme northeastern part of the county in Buckhead Ridge.[3]

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[1]Although the number of commercial parcels in this county is extremely great, over 80% of the parcels are vacant (however, the parcels with building values have still been included in the table).

[2]Florida Department of Revenue, 1981 total.

[3]The location of these structures had been verified by field checks, and consultation with the Comprehensive Land Use Plans for Glades County and the City of Moore Haven.

Hendry County

Hendry County is also located outside the SLOSH Grid and thus is not divided into storm vulnerability categories. In the county, there are 339 improved commercial parcels.[1] The commercial structures in the county are concentrated in the Cities of LaBelle(which functions as the county seat) and Clewiston, and are located primarily along the major highways (SR 80, SR 29 and U.S. 27).[2]

Commercial parcels account for only a small proportion of total parcels in each of the inland counties (less than 2%).

Lee County

In Lee County, there are 4,528 commercial parcels. Commercial uses comprise a variety of different types, including stores, shopping centers, office buildings, banks, gas stations, theaters, tourist attractions and other varied uses. There are thirty types of commercial uses, based upon the land use code utilized by each property appraiser and the Florida Department of Revenue. The number of parcels for each type of land use and storm category is found in Appendix C.

It can be seen from the previous table that of the 4,528 commercial parcels in Lee County, almost half this total (49%) is located in the category 1 area, which is most vulnerable to a hurricane. The second-largest total is located in the category 2 area (29%). Thus, over three-fourths (78%) of total commercials structures are located in the most hurricane-vulnerable areas in the county. Only 177 structures (less than 4%) are located outside the SLOSH Grid, and thus would not be vulnerable to saltwater flooding from hurricanes.

All types of commercial land uses would be affected by a hurricane, since all uses are found in the vulnerable areas. The major commercial land use categories in the county include stores, followed by office buildings, auto sales, service stations, repair shops, hotels and motels, and restaurants. These types of commercial activities reinforce the fact that the area's economic base is highly dependent upon trade and services as a major economic activity, and could be subject to great devastation from hurricane damage (not only in terms of direct property damage, but also indirect effects from employment and income loss, etc.)

Sarasota County

Commercial parcels in Sarasota County total 5,233. The major uses include stores and other shopping facilities, office and professional buildings, automobile sales, repair shops, restaurants, and similar types of businesses.

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1 Florida Department of Revenue.

2 These results were also verified through field checks, and comparison with Comprehensive Plans for the City of Clewiston, Hendry County and the City of LaBelle, as well as the SWFRPC report, Commercial and Industrial Strategies.

Commercial uses are primarily found in Categories 1 and 2 , which are the most vulnerable categories. Forty-three percent of the total businesses are found here. A large number of businesses, however, is located in the less vulnerable category 5 area. Approximately 32% of the county's businesses are located either in the category 5 area, or outside category 5. These establishments, which include a variety of uses, are relatively less susceptible to hurricane destruction.

Regional Summary

There are 5,691 commercial parcels in the six-county Southwest Florida area. Commercial uses vary, but the major types in the Region include stores, auto sales, repair shops, service stations, and hotels and motels. The number of parcels has been categorized, according to the storm vulnerability area within which they are located, in Table 17.

Examination of the previous table demonstrated that, as expected, the majority of commercial structures are located in Lee and Sarasota Counties, while smaller amounts are found in Collier and Charlotte Counties, and the least number of establishments are located in the small inland counties of Hendry and Glades.

Overall, most structures are located in the category 1 area, which is the area most susceptible to hurricane damage. Over 37% of total structures are located in this zone. The second largest amount is found in zone 2, which is also vulnerable to hurricane damage. These two categories alone account for approximately 65% of total structures. Fewer structures are located in zones 3, 4 and 5. For example, only 7% of total structures in the Region are located in area 5. The smallest number is found outside the category 5 area, which would not be subject to hurricane damage. Structures located outside category 5 only account for 3% of the total.

INDUSTRIAL STRUCTURES

An inventory of Southwest Florida's industries was compiled using the Directory of Florida Industries, 1981, published by the Florida Chamber of Commerce, in Tallahassee. Information in the Directory was tabulated from questionnaires sent to Florida manufacturers and mining concerns. The Florida Department of Commerce, county economic development councils, local chambers of commerce and private enterprise industrial development specialists also assisted in updating the listing of industrial parks and developments, and other data.

Industrial facilities (name and type of facility) are listed in Appendix D, by county, according to their location in hurricane-vulnerable areas. A table summarizing the number of facilities by county and zone is provided below. Following this table, an analysis of the number, type and locations of industries is also provided for each individual county, based upon the list of industries provided in the Appendix.

TABLE 18

Industrial Facilities
Southwest Florida

Hurricane Vulnerability Zone (Storm Category)	County						
	Charlotte	Collier	Glades	Hendry	Lee	Sarasota	Region
1	18	7	N/A	N/A	44	6	75
%	(69.2)	(20.0)			(21.2)	(3.6)	(16.8)
2	3	10	N/A	N/A	96	16	125
%	(11.5)	(28.6)			(46.4)	(9.7)	(28.0)
3	4	16	N/A	N/A	60	38	118
%	(15.4)	(45.7)			(29.0)	(23.0)	(26.4)
4	1	2	N/A	N/A	3	34	40
%	(3.8)	(5.7)			(1.5)	(20.6)	(8.9)
5	0	0	N/A	N/A	4	6	10
%	(0)	(0)			(1.9)	(3.6)	(2.2)
Outside Vulnerable areas	0	0	3	11	0	65	79
%	(0)	(0)	(100)	(100)	(0)	(39.4)	(17.7)
TOTAL	26	35	3	11	207	165	447
	(100)	(100)	(100)	(100)	(100)	(100)	(100)

N/A - Not Applicable.

Source: SWFRPC.

Charlotte County

The overwhelming majority (69.2%) of Charlotte County's industrial facilities are located within the Category 1 area. Most of these industries are related to the construction or printing business.

The remaining industries are located in the Category 2 area (11.5%), Category 3 area (15.4%) and Category 4 zone (3.8%). These industries chiefly consist of construction-related businesses, as well. No industries were located in the Category 5 vulnerability zone in Charlotte County.

Collier County

Collier County's industries, are primarily located in zones 1, 2 and 3. Over 94% of the total industries are located in these most vulnerable areas. No industries were found in the Category 5 vulnerability zone or outside the vulnerable areas. Most of Collier County's industrial facilities relate to either the construction industry, advertising, printing and publishing, or the processing of sand and gravel (indirectly construction-related).

Glades and Hendry Counties

Neither Glades nor Hendry County is in areas prone to storm surge or saltwater flooding, as defined by the SLOSH model. Thus, industrial facilities would not be damaged by these types of hurricane impacts, although damage from freshwater flooding and/or heavy winds is a possibility. The major industries in these two counties are affiliated with either citrus production and processing, or sugar refinement. The remaining industries are oriented to either construction or agriculture.

Lee County

Most of Lee County's industrial facilities are located in the Category 2 vulnerability zone (46.4%). These facilities are chiefly situated within the Fort Myers city limits. The Category 3 area houses 29.0% of the county's industries, followed by Category 1 areas, where 21.2% of the county's industry is found. Very few industrial facilities were located in either Category 4 or Category 5 areas.

In addition to the typical construction-oriented industries and printing, advertising and publishing, Lee County has other manufacturing facilities which are critical to the local economy. In particular, quartz crystal manufacturers employ significant numbers of people, as do the various machine shops and marine-oriented industries in the county. Two large tourist-oriented industries, The Shell Factory and Africana Gifts and Shells, Inc. are also important to the local economy, contributing in terms of employment as well as retail sales. Hurricane-induced impacts on these and other types of industries, such as loss of employment, will be discussed in a subsequent chapter.

Sarasota County

The majority of Sarasota County's industries are located outside the vulnerable areas (39.4%). Only 3.6 percent of the industrial facilities are in the most vulnerable Category 1 zone. Other categories with a significant amount of industry are zones 3 and 4, with 23 percent and 20.6 percent of the total, respectively. Categories 2 and 5 have relatively few industries, 9.7 percent and 3.6 percent, respectively. Since Sarasota County's industries are located in areas with relatively high elevations, most of these structures will not be affected by storm surge or saltwater flooding. This situation contrasts with the situation found in the other coastal counties of the Region.

The industries found in Sarasota County are more diversified than those in the rest of the Region. There are fewer construction and tourist-related industries, and more manufacturing firms. In particular, Sarasota County has approximately twelve firms related to the electronics industry, as well as several yacht builders and a mobile home manufacturing company.

Regional Summary

Based upon the previous information, it is obvious that the majority of the industrial facilities in Southwest Florida are in the two largest counties, Lee and Sarasota Counties. Together, these two counties account for 372 firms, or over 83% of the Region's total. The remaining four counties, by comparison, have relatively few industrial facilities.

Over 46% of the Region's total industries are located in Lee County alone. Nearly all are found in the most vulnerable zones (categories 1, 2 and 3). In contrast, industries in Sarasota County are primarily located in less susceptible zones (zones 3 and 4) or are outside areas subject to saltwater flooding. Industries in Charlotte County are primarily located in zone 1, the most vulnerable area, while in Collier County, nearly all are found in zones 1-3. Thus, potential damage to facilities in these counties is great. Glades and Hendry Counties, due to their inland location, are not subject to saltwater flooding or storm surge, although freshwater flooding and wind damage is possible.

In summary, the location of industry in Southwest Florids is primarily in areas that are most vulnerable to hurricanes. Over 71% of the Region's total industrial firms are found in zones 1, 2 and 3, while less than 18% are located outside vulnerable areas.

UTILITIES

The utility facilities inventoried for this study include the following:

1) Sewage treatment collection systems and plants with a capacity of at least 10,000 gallons per day;

2) Water treatment and supply systems with a capacity of at least 10,000 gallons per day;

3) Solid waste disposal sites and transfer stations currently in use, as well as known future sites. The size and lifespan of all sites has also been indicated where available; and,

4) Electrical power generating facilities, switching stations, and major substations.

These facilities have been inventoried and located on U.S. Geological Survey (USGS) scale maps (1" = 2,000'). These maps and an explanatory legend identifying the various sites appear in Appendix F. In addition, the inventory of sites is found in Appendix E. Map index numbers are also included in the inventory to enable the cross-referencing of facilities with their respective map locations. The inventories and maps are categorized by county. The inventory is based upon the Support Services Inventory Update '80, completed by the Southwest Florida Regional Planning Council in August 1980, and updated in 1982. A summary of this information by county and vulnerability zone is presented in the subsequent table.

TABLE 19

Utility Facilities
Southwest Florida

County	Hurricane Vulnerability Zone 1	2	3	4	5	Outside 5	Total
Charlotte	65	19	13	6	1	1	105
Collier	50	15	37	5	12	0	119
Glades	--	N/A	--	--	--	--	31
Hendry	--	N/A	--	--	--	--	30
Lee	140	57	44	11	4	5	261
Sarasota	10	15	37	23	8	35	128
REGION	265	106	131	45	25	41	674*

SOURCE: SWFRPC.

* Includes Glades and Hendry Counties.

The preceding table illustrates that a significant amount of facilities are susceptible to hurricane damage. For example, of the 674 total utility facilities (including wastewater treatment facilities, water treatment plants, solid waste sites, and electrical facilities), nearly 40% are in the most vulnerable zone (zone 1). Approximately 15% are outside vulnerable areas (including those located in Glades and Hendry Counties).

The following sections contain a brief analysis of facilities in each county.

Charlotte County

Facilities in Charlotte County have been categorized by type and by hurricane vulnerability zone , as noted in the following table.

TABLE 20

Utility Facilities
Charlotte County

Facility Type	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Wastewater	56	13	8	3	1	0	81
Water	6	4	3	2	0	1	16
Solid Waste	1	1	0	1	0	0	3
Electrical	2	1	2	0	0	0	5
TOTAL	65	19	13	6	1	1	105

SOURCE: SWFRPC.

According to this table, it is evident that most of the utilities in Charlotte County are located in the most hurricane vulnerable locations. Of the 81 sewage treatment plants, 56 are located in the Category 1 SLOSH grid (69.1%). Only 4 plants are in the Category 4 and 5 zones, and none of the plants are located in areas outside the Category 5 hurricane zone, according to the SLOSH model. Other facilities are also found primarily in the zones most vulnerable to hurricanes. Overall, 92% of utility facilities in Charlotte County are found in zones 1 and 2. One contributing factor in the location of these facilities is growth; rapid population growth has occurred principally in Punta Gorda, Englewood/Cape Haze, and Port Charlotte. Hence, the majority of Charlotte County's utilities are found in these generalized regions. A hurricane striking this coast could greatly affect these low-lying areas, creating utility shortages and malfunctions as well as temporary shutdowns of water and wastewater treatment plants, during an emergency.

Collier County

Collier County's facilities are summarized, by type and location in hurricane-vulnerable areas, inthe following table. A detailed listing is found in Appendix E.

TABLE 21

Utility Facilities
Collier County

Facility Type	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Wastewater	33	8	29	3	7	0	80
Water	11	3	3	2	3	0	22
Solid Waste	2	1	2	0	1	0	6
Electrical	4	3	3	0	1	0	11
TOTAL	50	15	37	5	12	0	119

SOURCE: SWFRPC.

Nearly all the Collier County utilities are in SLOSH vulnerability zones 1-3. Of the sewage treatment plants, 33 are in Category 1, 8 in Category 2 and 29 are located in Category 3. Only 10 plants are in either Categories 4 or 5, or are out of the SLOSH Model Grid (not affected by saltwater flooding). The majority of the water treatment plants are in the Category 1 zone, as well as most of the electrical substations. The location of many of these facilities in vulnerable areas is potentially dangerous in the event of a hurricane. In particular, the City of Naples, Everglades City and Marco Island could be susceptible to severe utility shortages should these areas incur heavy wind/water damage in a hurricane. Facilities in Immokalee, however, should be relatively safe from severe damage to support systems.

Glades and Hendry Counties

Since Glades County is inland, it is outside the SLOSH model grid and would not be affected by saltwater flooding. However, the facilities are subject to wind damage and possible freshwater flooding from prolonged rainfall.

As is true with Glades County, Hendry County is not included in the SLOSH model grid system. Hendry County has relatively few support services in comparison to the coastal counties, but disruption of services in a hurricane could still be a problem due to severe winds and freshwater flooding. The following table summarizes utility facilities in the inland counties.

TABLE 22

Utility Facilities
Glades and Hendry Counties

Facility Type	Glades County	Hendry County
Wastewater	16	17
Water	9	8
Solid Waste	3	2
Electrical	3	3
TOTAL	31	30

SOURCE: SWFRPC.

Lee County

Of the Region's six counties, Lee County has the greatest number of utility facilities, with 261, or 38% of the total for Southwest Florida. The distribution of these facilities by hurricane zone is given below.

TABLE 23

Utility Facilities
Lee County

	Hurricane Zone					Outside	
Facility Type	1	2	3	4	5	5	Total
Wastewater	109	35	36	6	1	2	189
Water	17	10	4	2	2	3	38
Solid Waste	2	1	0	1	0	0	4
Electrical	12	11	4	2	1	0	30
TOTAL	140	57	44	11	4	5	261

SOURCE: SWFRPC.

Lee County has the greatest dispersion of development of the six Southwest Florida Counties and, as such, has a similar dispersion of utility systems. As might be expected, the vast majority of Lee County's utility systems are located in the most hurricane-vulnerable areas. One hundred nine sewage treatment plants are in the Category 1 zone (57.7%), with 35 in the Category 2 zone (18.5%). Only 43, or less than 23% are in zones 3-5. Water treatment plants are similarly distributed; 17 are in Category 1 areas (44.7%), 10 are in the Category 2 zone (26.3%), and 8 are located in areas vulnerable to Category 3, 4 or 5 storms (22.9%).

The solid waste disposal system consists of 3 sites in Category 1 and 2 zones, 1 site in the Category 4 zone, but no sites in either Category 3 or 5 areas.

Electrical substations are primarily found in the coastal areas, as well; 23 are in the Category 1 and 2 zones, and only 7 are in Category 3-5 areas. In particular, the Florida Power and Light Company Generating Plant, the only one in the Region, is in the Category 1 area, directly beside the Caloosahatchee River. Flooding of the river in this area could create a severe problem in a hurricane; disruption of service could occur if the plant is damaged (not only in Lee County but in adjacent counties as well). In addition, the Gasparilla Oil Storage Facility, on the southern tip of Gasparilla Island, is undoubtedly in the most precarious location of any oil storage facility. There are four large storage tanks situated in this area, and severe winds or a high storm surge could create a tremendous hazard. Although the tanks have withstood previous hurricane winds and surges, the proper precautions must be made well in advance of a storm, to ensure that a minimum of damage occurs. Since the tanks store oil to be used at the FPL generating plant in Fort Myers, a spill or other mishap could affect the service not only in Lee County, but in other counties as well.

Sarasota County

Facilities for Sarasota County, which has the second largest amount of facilities (after Lee County) are summarized below.

TABLE 24

Utility Facilities
Sarasota County

	Hurricane Zone					Outside	
Facility Type	1	2	3	4	5	5	Total
Wastewater	5	9	20	14	2	25	75
Water	4	5	11	7	2	6	35
Solid Waste	0	0	1	1	0	1	3
Electrical	1	1	5	1	4	3	15
TOTAL	10	15	37	23	8	35	128

SOURCE: SWFRPC.

Sarasota County has far fewer utility facilities situated in the Category 1 or 2 vulnerability zones than any of the other Southwest Florida counties. Most of Sarasota County's support service facilities are in either the Category 3, 4 or 5 zone, or are out of the SLOSH grid system entirely. Only 14 sewage treatment plants are in either Category 1 or 2 vulnerability zones (18.7%); 36 are in the Category 3-5 zones (48.0%), and 25 are completely out of the SLOSH grid pattern (33.3%). Similarly, 9 water treatment plants are in Category 1 and 2 areas (25.7%), while 20 are in Category 3-5 areas (57.1%). Six (17.1%) are out of the SLOSH grid system. Sarasota County is more protected from hurricane impacts on support service facilities; thus, it should have less potential utility disruption than the other three coastal counties.

Of the three landfill sites in Sarasota County, one is out of the SLOSH grid pattern, one is in the Category 3 zone and one is in the Category 4 zone. No sites are located in Category 1 or 2 areas.

One electrical substation is located in the Category 1 zone, and one is in the Category 2 zone; the remaining thirteen facilities are either in Categories 3, 4 or 5, or are out of the SLOSH grid entirely. These substations are chiefly located in higher, less hurricane-vulnerable areas than are those of the other coastal counties, making Sarasota County less susceptible to lengthy power outages following a hurricane.

High winds could still pose a major hazard, and these could easily create utility service disruptions throughout the county despite the inland locations of most of the facilities.

Public Transportation Facilities

Transportation facilities have been inventoried in the same manner as utilities. The names and locations of individual facilities are found in Appendices E and F.

A summary of this information by county and vulnerability zone is presented in the table below.

TABLE 25

Transportation Facilities
Southwest Florida

County	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Charlotte	2	1	0	1	0	0	4
Collier	3	2	2	0	1	1	9
Glades							1
Hendry							6
Lee	1	3	1	1			6
Sarasota	0	0	5	2	2	0	9
Region	6	6	8	4	3	1	35

SOURCE: SWFRPC.

An examination of the previous table indicates that the Region's transportation facilities are primarily located in the most susceptible areas, vulnerability zones 1-3. Thus, a major storm could disrupt public transportation between counties in the Region and the remainder of the state. The Region's airports will be particularly affected, and precautions will have to be taken to avoid damage. Some airports located outside of very low-lying areas, however, such as the Sarasota-Bradenton facility and the Southwest Florida Regional Jetport in Lee County, should not be as detrimentally affected.

State and county roads, as well as federal highways, are not listed individually in this inventory. Major routes are shown on the accompanying maps; clearly, many of the roads are in hurricane-vulnerable areas and will be impassable. (A full discussion of roads, their service levels, evacuation capabilities and pre-storm impassibility estimates appear in the Southwest Florida Regional Hurricane Evacuation Plan.)

Other Public Facilities

The public facilities inventoried for this study include: health care facilities; schools; police protection facilities; and, fire protection facilities. These structures were inventoried in the same manner as the utility and transportation facilities, and are listed and mapped in the Appendix. A summary of facilities, by county, is provided below. The facilities have been cataloged by vulnerability zone, based on the SLOSH grid system.

TABLE 26

Other Public Facilities
Southwest Florida

County	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Charlotte	17	14	7	2	0	1	41
Collier	16	16	12	0	11	2	57
Glades	--	--	N/A	--	--	--	16
Hendry	--	--	N/A	--	--	--	27
Lee	46	44	26	1	4	0	121
Sarasota	5	7	26	19	14	32	103
Region	84	81	71	22	29	35	365*

* Including Glades and Hendry Counties.

SOURCE: SWFRPC.

Analysis of this table indicates that the majority of public facilities (related to the provision of health care, education, police and fire protection) are found in Lee and Sarasota Counties, the two most populous counties in Southwest Florida. Over 61% of the facilities are located in these two counties. The majority of facilities are found in the most hurricane-prone areas (zones 1, 2 and 3, with 64% of the total), while very few are located outside vulnerable areas (21%).

The following sections provide an analysis of public facilities for each county, by type of facility and location in hurricane vulnerable areas.

Charlotte County

An inventory of public facilities related to the provision of health care, education, and police and fire protection is given in Table 27.

TABLE 27

Other Public Facilities
Charlotte County

Facility Type	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Health Care	5	4	0	0	0	0	9
Schools	5	8	3	0	0	0	16
Police Protection	3	0	0	0	0	0	3
Fire Protection	4	2	4	2	0	1	13
TOTAL	17	14	7	2	0	1	41

SOURCE: SWFRPC.

Nearly all the previously-defined public facilities in Charlotte County are in the Category 1, 2 or 3 vulnerability zones. Only the forestry service (fire protection) is located outside vulnerable areas. Of note, several major health care facilities are in extremely flood-prone areas, as well as several schools and fire departments. The vulnerable location of many of Charlotte County's schools was previously noted in the Southwest Florida Regional Planning Council Regional Hurricane Evacuation Plan.

Collier County

Other public facilities have been inventoried for Collier County. The actual inventory is provided in the Appendix, and the information is summarized in the following table.

TABLE 28

Other Public Facilities
Collier County

Facility Type	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Health Care	1	4	2	0	1	0	8
Schools	5	6	7	0	7	1	26
Police Protection	3	1	0	0	1	0	5
Fire Protection	7	5	3	0	2	1	18
TOTAL	16	16	12	0	11	2	57

SOURCE: SWFRPC.

With the exception of the Immokalee-Lake Trafford area, all of Collier County's public facilities are situated in the Category 1-3 vulnerability zones. This includes 7 health care facilities, 18 schools and 19 police and fire departments. Several sites, however, are found in the Immokalee area, and are relatively safe from major hurricane impacts.

Glades and Hendry Counties

Few public facilities are located in Glades County in comparison to the counties located on the coast. There are no hospitals or nursing homes in Glades County, three schools, one police protection agency and eight fire protection facilities. These facilities will be subject to severe gusts of wind and flooding from heavy rains, although storm surge will not be a factor. Any disruption of services at these facilities will probably be minor and for short term periods only.

Hendry County will be impacted primarily by hurricane-induced winds and freshwater flooding, as opposed to coastal storm surge. Thus, most of the county's facilities will experience little, if any, service disruption. Facilities for these two counties are summarized below.

TABLE 29

Other Public Facilities
Glades and Hendry Counties

Facility	Glades County	Hendry County
Health Care	3	7
Education	3	9
Police Protection	1	3
Fire Protection	9	8
TOTAL	16	27

SOURCE: SWFRPC.

Lee County

Public facilities in Lee County are categorized, by type of facility and location in relation to hurricane vulnerable areas, in the following table.

TABLE 30

Other Public Facilities
Lee County

Facility	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Health Care	6	7	4	0	1	0	18
Schools	23	24	15	0	1	0	63
Police Protection	3	3	1	0	1	0	8
Fire Protection	14	10	6	1	2	0	33
TOTAL	46	44	26	1	5	0	122

SOURCE: SWFRPC.

Lee County has a large number of public facilities, most of which are located in hurricane - vulnerable areas. In general, 72% of all facilities are found in zones 1 and 2, while the majority of the county's health care facilities are in the Category 1 or 2 zone; only one hospital is in a relatively safe area (Lehigh General). Of the sixty-two educational facilities in Lee County, 22 are located in the high-hazard Category 1 zone (35.5%), 24 are in the Category 2 area (38.7%) and 15 are in Category 3 (24.2%). Hence, only 1 school is in an area not subject to direct saltwater flooding. Police and fire protection facilities are also located chiefly in Category 1 through 3 areas.

Sarasota County

Sarasota County's public facilities are summarized by type in the subsequent table.

TABLE 31

Other Public Facilities
Sarasota County

Facility	Hurricane Zone 1	2	3	4	5	Outside 5	Total
Health Care	1	3	6	8	4	6	28
Schools	1	2	11	6	10	17	47
Police Protection	1	0	2	3	0	0	6
Fire Protection	2	2	7	2	0	9	22
TOTAL	5	7	26	19	14	32	103

SOURCE: SWFRPC.

Most of Sarasota County's public facilities are in either Category 3, 4, or 5, or are outside vulnerable areas. Only one health care facility could be the direct target of a storm surge.

The Sarasota County schools are also in less vulnerable areas; 94 percent are in Categories 3-5, or out of the SLOSH grid pattern. With the exception of Longboat Key and Nokomis, the police and fire departments are in upland areas, as well. Longboat Key will need to make arrangements for its equipment,to avoid damages from an oncoming storm.

Potential damage to these structures will be discussed in a subsequent chapter.

HAZARDOUS MATERIALS INVENTORY

Hazardous materials, defined as any substance or material which poses a risk to safety and health, are potentially dangerous, especially in a natural disaster such as a hurricane. A natural disaster can trigger additional disasters if hazardous materials are exposed to water or air, or are struck by flying debris. One memorable example of this is the 1906 San Francisco earthquake; the earthquake itself did far less damage than the city-wide fire which started as a result of the earthquake. Thus, it is important to note the sites of major hazardous materials storage areas in this Region, so that adequate preparations may be made to offset possible damages resulting from a hurricane.

In this chapter, the location of hazardous materials storage in Southwest Florida was inventoried, based upon hurricane vulnerability zone (SLOSH Projected storm surge categories). A listing was made, using data obtained from local Disaster Preparedness agencies, the Florida Department of Environmental Regulation (FDER), Florida Department of Agriculture, and other local sources such as fire departments. Until on-site inspections are made of each storage area, it is not possible to establish the nature of each specific hazard. However, this inventory does contain potential sites and, as such, is a starting point from which local officials could begin making inspections. (At this time, Florida does not have a completed hazardous materials inventory by county, nor has one been mandated. FDER is currently inspecting a few major sites throughout the state.)

METHODOLOGY

The inventory of hazardous materials was arranged using the United Nations classification system of hazardous materials. There are nine classifications in this system: 1) Explosives; 2) Gases - compressed, liquified or dissolved under pressure; 3) Flammable Liquids; 4) Flammable Solids; 5) Oxidizing Substances and Organic Peroxides; 6) Poisonous Substances; 7) Radioactive Materials; 8) Corrosives; and 9) Miscellaneous Substances, such as etiological agents.[1] A final category, transportation corridors, was added to account for materials being transported along major arterials or in the air, since major spills can occur during the shipment of materials.

The following table presents the nine classifications of hazardous materials and their definitions, abstracted from the Code of Federal Regulations, Title 49 - Transportation, parts 100 to 199.[2]

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1 Conversation with Gil Haas, Director, Lee County Disaster Preparedness Agency, Fort Myers, December 1, 1981.

2 Charles J. Wright, Recognizing and Identifying Hazardous Materials, Student Information Packet, Bowling Green, Kentucky, September, 1979, pp. 1-4, appendices.

The sites of potentially hazardous materials in Southwest Florida have been listed by county, including site location, company name and type of hazardous material stored at each location. This inventory, due to its length, has been included in the appendix (see Appendix G). Maps listing these sites are included for each county. These maps reflect the potential storm surge vulnerability zones for hurricane categories 1-5, as shown in the 1981-82 Regional Hurricane Evacuation Plan. A general analysis of the material presented in the appendices is also included, for each county.

It should be noted that all potentially hazardous sites were listed, with the exception of gas stations, hardware stores and other retail establishments, which were either too numerous or contained only small amounts of hazardous materials. In the inventory, no delineation has been made between small and large establishments although the majority are small businesses (such as exterminating companies) and as such, pose less of a potential threat than major companies.

TABLE 32

HAZARDOUS MATERIALS DEFINITIONS

HAZARDOUS MATERIAL - Means a substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. (Sec. 171.8)

MULTIPLE HAZARDS - A material meeting the definitions of more than one hazard class is classed according to the sequence given in Sec. 173.2.

HAZARD CLASS	DEFINITIONS
1) EXPLOSIVE	An Explosive - Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified in Parts 170-189. (Sec. 173.50)
Class A Explosive	Detonating or otherwise of maximum hazard. The nine types of Class A explosives are defined in Sec. 173.53.

TABLE 32 (Continued)

HAZARD CLASS	DEFINITIONS
Class B Explosive	In general, function by rapid combustion rather than detonation and include some explosive devices such as special fireworks, flash powders, etc. Flammable hazard. (Sec. 173.88)
Class C Explosive	Certain types of manufactured articles containing Class A or Class B explosives, or both, as components but in restricted quantities, and certain types of fireworks. Minimum hazard. (Sec. 173.100)
Blasting Agents	A material designed for blasting which has been tested in accordance with Sec. 173.114a(b) and found to be so insensitive that there is very little probability of accidental initiation to explosion or of transition from deflagration to detonation. (Sec. 173.114a(a))
2) GASES	Compressed Gas - Any material or mixture having in the container a pressure exceeding 40 psia at 70°F, or a pressure exceeding 104 psia at 130°F; or any liquid flammable material having a vapor pressure exceeding 40 psia at 100°F. (Sec. 173.300(a))
Flammable Gas	Any compressed gas meeting the requirements for lower flammability limit, flammability limit range, flame projection, or flame propagation criteria as specified in Sec. 173.300(b).
Nonflammable Gas	Any compressed gas other than a flammable compressed gas.
3) FLAMMABLE LIQUID	Any liquid having a flash point below 100°F as determined by tests listed in Sec. 173.115(d). Exceptions are listed in Sec. 173.115(a).
	Pyroforic Liquid - Any liquid that ignites spontaneously in dry or moist air at or below 130°F. (Sec. 173.115(c))

TABLE 32 (Continued)

HAZARD CLASS	DEFINITIONS
Combustible Liquid	Any liquid having a flash point above 100°F and below 200°F. as determined by tests listed in Sec. 173.115(d). Exceptions to this are found in Sec. 173.115(b).
4) FLAMMABLE SOLID	Any solid material, other than an explosive, which is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious transportation hazard. (Sec. 173.150)
5) ORGANIC PEROXIDE	An organic compound containing the bivalent -0-0 structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals must be classed as an organic peroxide unless-- (See Sec. 173.151(a) for details).
Oxidizer	A substance such as chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter. (See Sec. 173.151)
6) POISONOUS SUBSTANCES	(A) Extremely Dangerous Poisons - Poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life. (Sec. 173.326)
	(B) Less Dangerous Poisons - Substances, liquids, or solids (including pastes and semi-solids), other than Class A or Irritating materials, which are known to be so toxic to man as to afford a hazard to health during transportation; or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man. (Sec. 173.343)

TABLE 32 (Continued)

HAZARD CLASS	DEFINITIONS
7) RADIOACTIVE MATERIAL	Any material, or combination of materials, that spontaneously emits ionizing radiation, and having a specific activity greater than 0.002 microcuries per gram. (Sec. 173.389) NOTE: See Sec. 173.389(a) through (l) for details.
8) CORROSIVE MATERIAL	Any liquid or solid that causes visible destruction of human skin tissue or a liquid that has a severe corrosion rate on steel. (See Sec. 173.240(a) and (b) for details.)
9) MISCELLANEOUS	
Etiologic Agent	An "etiologic agent" means a viable micro-organism, or its toxin which causes or may cause human disease. (Sec. 173.386) (Refer to the Department of Health, Education and Welfare Regulations, Title 42, CFR, Sec. 72.25(c) for details.)
Other Regulated Materials	ORM-A, B or C (Other Regulated Materials) - Any material that does not meet the definition of a hazardous material, other than a combustible liquid in packagings having a capacity of 110 gallons or less, and is specified in Sec. 172.101 as an ORM material or that possesses one or more of the characteristics described in ORM-A through D below. (Sec. 173.500)
	NOTE: An ORM with a flash point of 100°F. to 200°F., when transported with more than 100 gallons in one container shall be classed as a combustible liquid.
ORM-A	A material which has an anesthetic, irritating, noxious, toxic, or other similar property and which can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation. (Sec. 173.500(a)(1))

TABLE 32 (Continued)

HAZARD CLASS	DEFINITIONS
ORM-B	A material (including a solid when wet with water) capable of causing significant damage to a transport vehicle or vessel from leakage during transportation. Materials meeting one or both of the following criteria are ORM-B materials: (i) A liquid substance that has a corrosion rate exceeding 0.250 inch per year (IPY) on aluminum (nonclad 7075-T6) at a test temperature of 130°F. An acceptable test is described in NACE Standard TM-01-69, and (ii) Specifically designated by name in Sec. 172.101. (Sec. 173.500(a)(2))
ORM-C	A material which has other inherent characteristics not described as an ORM-A or ORM-B but which make it unsuitable for shipment, unless properly identified and prepared for transportation. Each ORM-C material is specifically named in Sec. 172-101. (Sec. 173.500(a)(4))
ORM-D	A material such as a consumer commodity which, though otherwise subject to the regulations of this subchapter, presents a limited hazard during transportation due to its form, quantity and packaging. They must be materials for which exceptions are provided in Sec. 172.101. A shipping description applicable to each ORM-D material or category of ORM-D materials is found in Sec. 172.101. (Sec. 173.500(a)(4))
TRANSPORTATION CORRIDORS	Major arterial, railroad line or airline used to ship hazardous materials.

TABLE 32 (Continued)

THE FOLLOWING ARE OFFERED TO EXPLAIN ADDITIONAL TERMS USED IN PREPARATION OF HAZARDOUS MATERIALS FOR SHIPMENT. (Sec. 171.8)

CONSUMER COMMODITY (See ORM-D)	Means a material that is packaged or distributed in a form intended and suitable for sale through retail sales agencies or instrumentalities for consumption by individuals for purposes of personal care or household use. This term also includes drugs and medicines.
FLASH POINT	Means the minimum temperature at which a substance gives off flammable vapors which in contact with spark or flame will ignite. (Sec. 173.115 and 173.150)
FORBIDDEN	The hazardous material is one that must not be offered or accepted for transportaiton. (Sec. 172.100(d))
LIMITED QUANTITY	Means the maximum amount of a hazardous material; as specified in those sections applicable to the particular hazard class, for which there are specific exceptions from the requirements of this subchapter. See Sec. 173.118, 173.118a, 173.153, 173.244, 173.306, 173.345 and 173.364.
SPONTANEOUSLY COMBUSTIBLE MATERIAL (SOLID)	Means a solid substance (including sludges and pastes) which may undergo spontaneous heating or self-ignition under conditions normally incident to transportation or which may upon contact with the atmosphere undergo an increase in termperature and ignite.
WATER REACTIVE MATERIAL (SOLID)	Means any solid substance (including sludges and pastes) which, by interaction with water, is likely to become spontaneously flammable or to give off flammable or toxic gases in dangerous quantities.

SOURCE: Wright, Charles J., Recognizing and Identifying Hazardous Materials, Bowling Green, 1979.

ANALYSIS OF HAZARDOUS MATERIALS

An analysis of the maps and inventory contained in the appendix reveals that there is an extremely large amount of potentially hazardous sites in the Region. A brief review by county is presented in the following sections.

Charlotte County

Hazardous materials storage facilities in Charlotte County are located primarily in the City of Punta Gorda and in Port Charlotte. Scattered sites are also found near Englewood and the Murdock and Acline areas. The majority of the sites are located along U.S. 41, although some sites were also found along S.R. 765, S.R. 775, S.R. 776, S.R. 74 and U.S. 17.

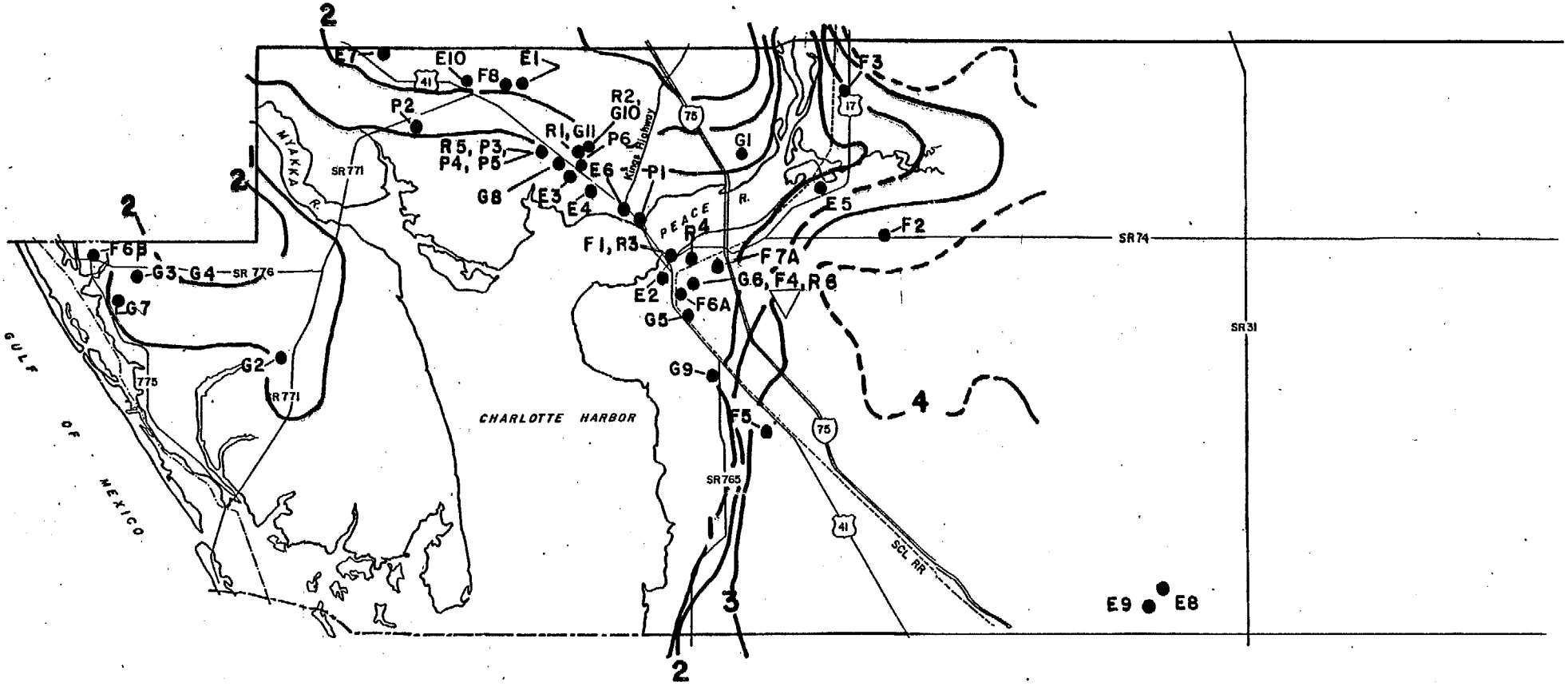
Since Charlotte County is one of the more hurricane-vulnerable counties in the Region, potential hazardous materials sites are particularly susceptible to hurricane impacts. Over half of all sites are located in the Category 1 vulnerability zone, while one-fourth were found in zone 2. Only a few sites were located in either zones 3 or 4, while none were in zone 5 or outside the vulnerable areas. In particular, sites clustered near the mouth of the Peace River and along the coast of Charlotte Harbor pose a severe threat to those environmentally sensitive areas, in the event of a disaster. Hazardous materials found in Charlotte County chiefly include explosives, gases, and flammable liquids. Establishments using hazardous materials primarily include excavating contractors, hospitals, oil and gas companies, water and sewage plants, and pest control businesses, among others.

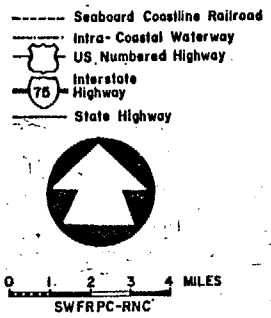
Collier County

Potential hazardous materials sites in Collier County are chiefly located in Naples, North Naples and Immokalee. Many of the sites are either near the Naples Airport, along U.S. 41, on the coast, or around S.R. 29 in Immokalee. A few sites were inventoried on Marco Island, with scattered sites near Everglades City, Carnestown, and Naples Manor.

The sites in Immokalee are primarily storage areas for flammable liquids, poisons or gases, used in fruit and vegetable packing and growing businesses. The hazards found on Marco Island are also gases and flammable liquids. All of the nine types of hazards can be found in Naples and North Naples.

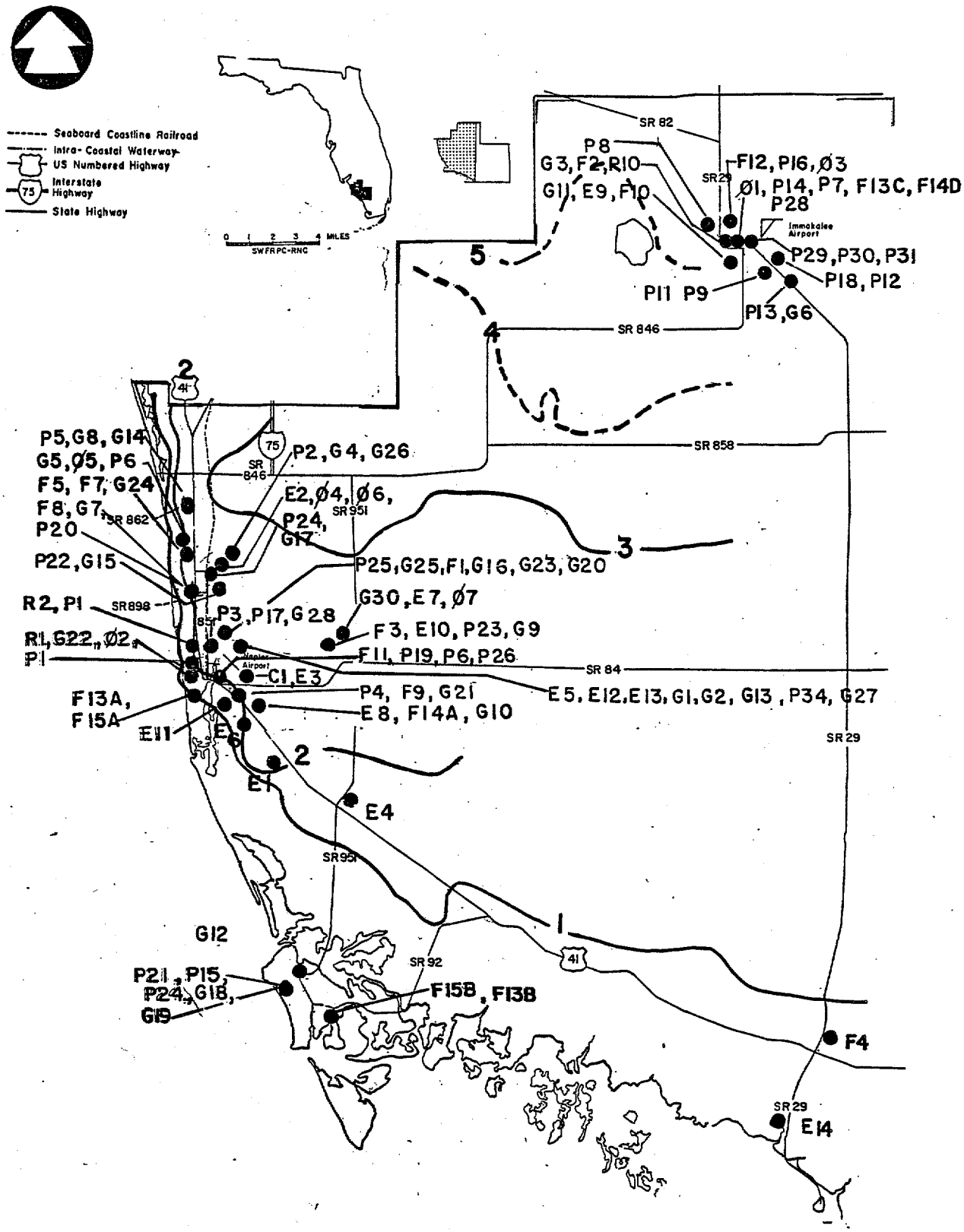
Almost all the sites are within hurricane vulnerability zones. Only the sites in Immokalee are outside the vulnerability areas for storms in categories 1-3. The majority of the sites near Naples are in the Category 3 vulnerability zone; however, since over 40% of the sites are found in the Category 1 and 2 zones, even a minimal strength hurricane would pose a threat.





MAP 8
CHARLOTTE COUNTY
POTENTIAL HAZARDOUS MATERIALS SITES

(See Appendix 6 for name)



MAP 9
COLLIER COUNTY
POTENTIAL HAZARDOUS MATERIALS SITES
(See Appendix G for names)

Glades County

All except one of the sites in Glades County are situated in and around the City of Moore Haven. The one exception is the Ortona Sand Company, on S.R. 78 in Ortona. Although there are few potentially dangerous sites in Glades County, the major highway through the county (U.S. 27) is a major route used for shipping materials into the southern part of the state and, as such, could be potentially dangerous if hazardous materials were transported along the highway during a hurricane.

Since Glades County is in the interior part of the state, it is not subject to saltwater flooding (as predicted by the SLOSH model). The county is susceptible to gale force winds, however, as well as possible freshwater flooding, so precautions should be taken. It should also be noted that nearly all hazardous materials sites are located in the Moore Haven area, adjacent to Lake Okeechobee. Although a dike has been built to prevent the lake from flooding, the possibility of freshwater flooding from the lake must not be discounted.

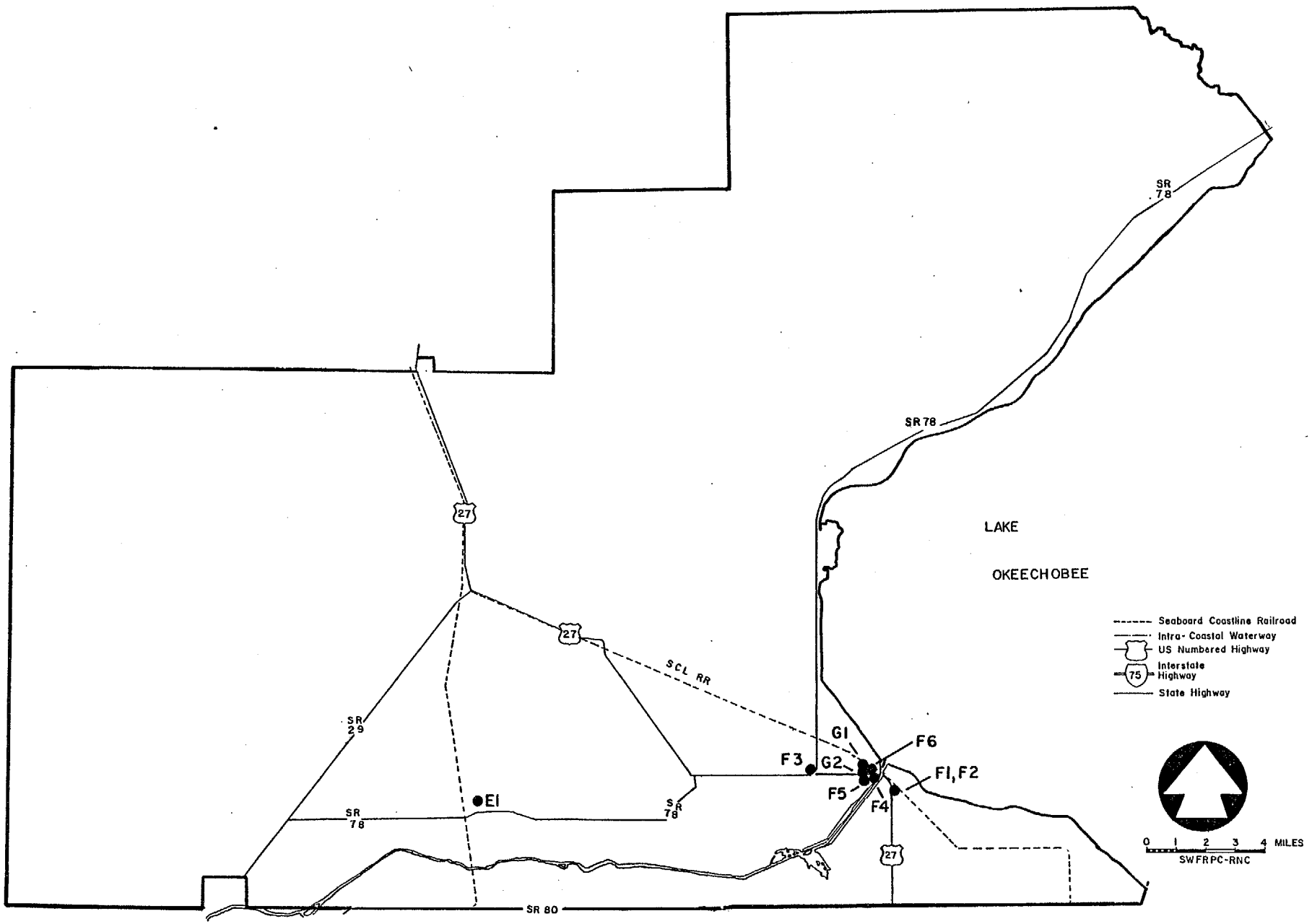
Hendry County

An examination of the map of Hendry County reveals that nearly all the potentially hazardous sites are clustered around the cities of LaBelle and Clewiston. There are also a few sites located south of both cities. The sites in the outlying areas are all located near major state roads, which is an advantage if an evacuation is necessary for any reason. The major sites located outside the incorporated areas are: the Evercane Sugar Company (G5) where varying quanties of fuel oil, gas, sulfuric acid, etc. are stored; Felda Growers and Packers (G10); the Big Cypress Water Plant (G3), users of chlorine in large quantities; and Citrus Belle (S1), users of chlorine, insecticides, etc. These and other sites should maintain communications with Disaster Preparedness officials to ensure that any assistance they need in an emergency can be provided in a timely manner.

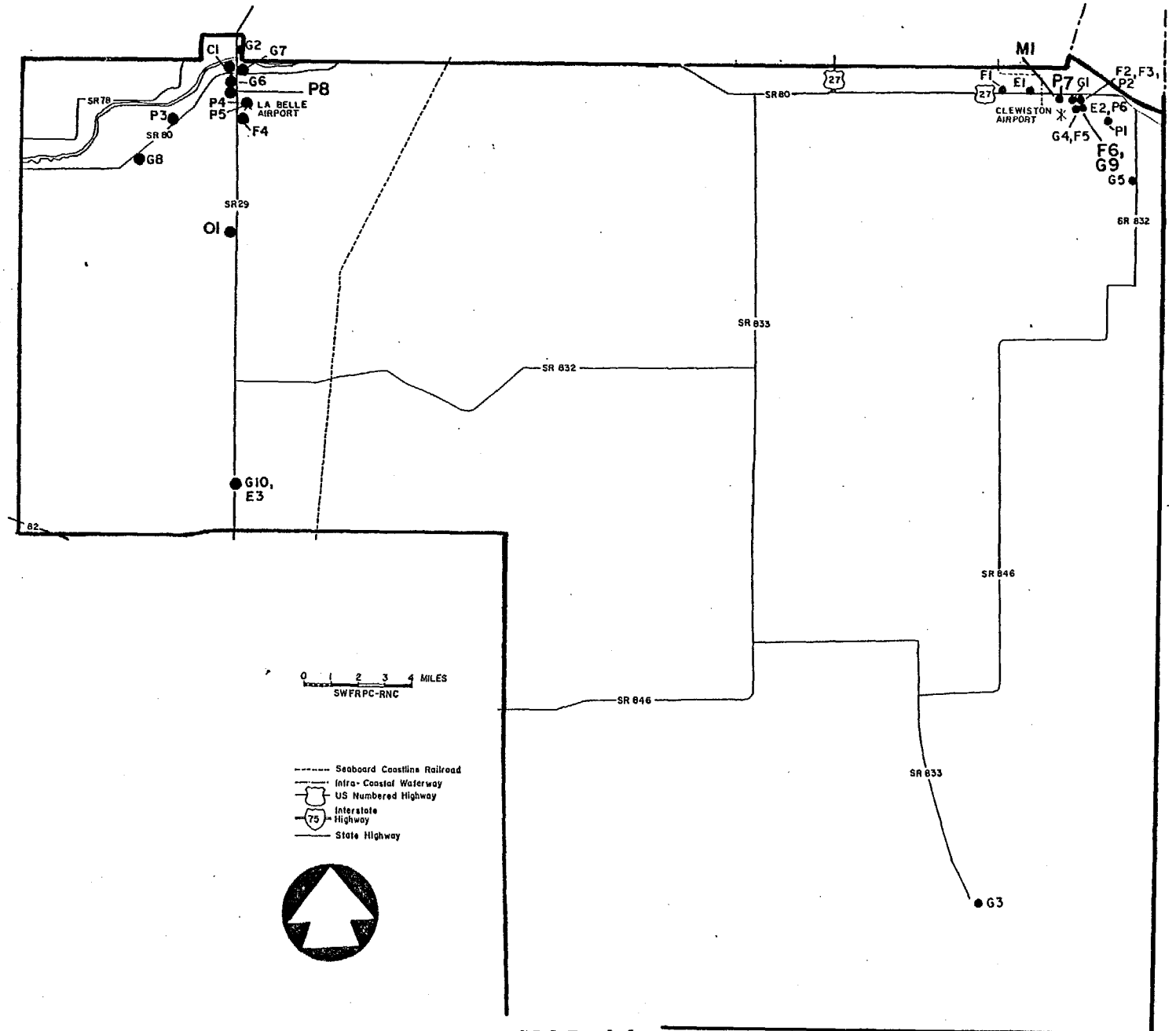
None of the Hendry County Sites are located in SLOSH vulnerability zones. However, gale force winds could affect Hendry County in a hurricane. Sites storing materials in containers located outside and above ground should take precautions in securing these materials or make other arrangements, if necessary, in the event of a storm. Underground storage areas should be adequately covered, so that water seepage from rainfall does not occur.

Lee County

The City of Fort Myers contains the majority of Lee County's potential hazardous materials sites. Most of these sites are located along U.S. 41, or near the Seaboard Coastline Railroad. A few sites are clustered near Page Field. Sites are also located in North Fort Myers, near both U.S. 41 and Business 41, as well as S.R. 78, and S.R. 78A. Additional sites are found in Alva, (East Fort Myers) Lehigh, South Fort Myers, and Bonita, near the Collier County line. Very few sites were found on Estero Island, Sanibel, Pine Island and in Cape Coral.

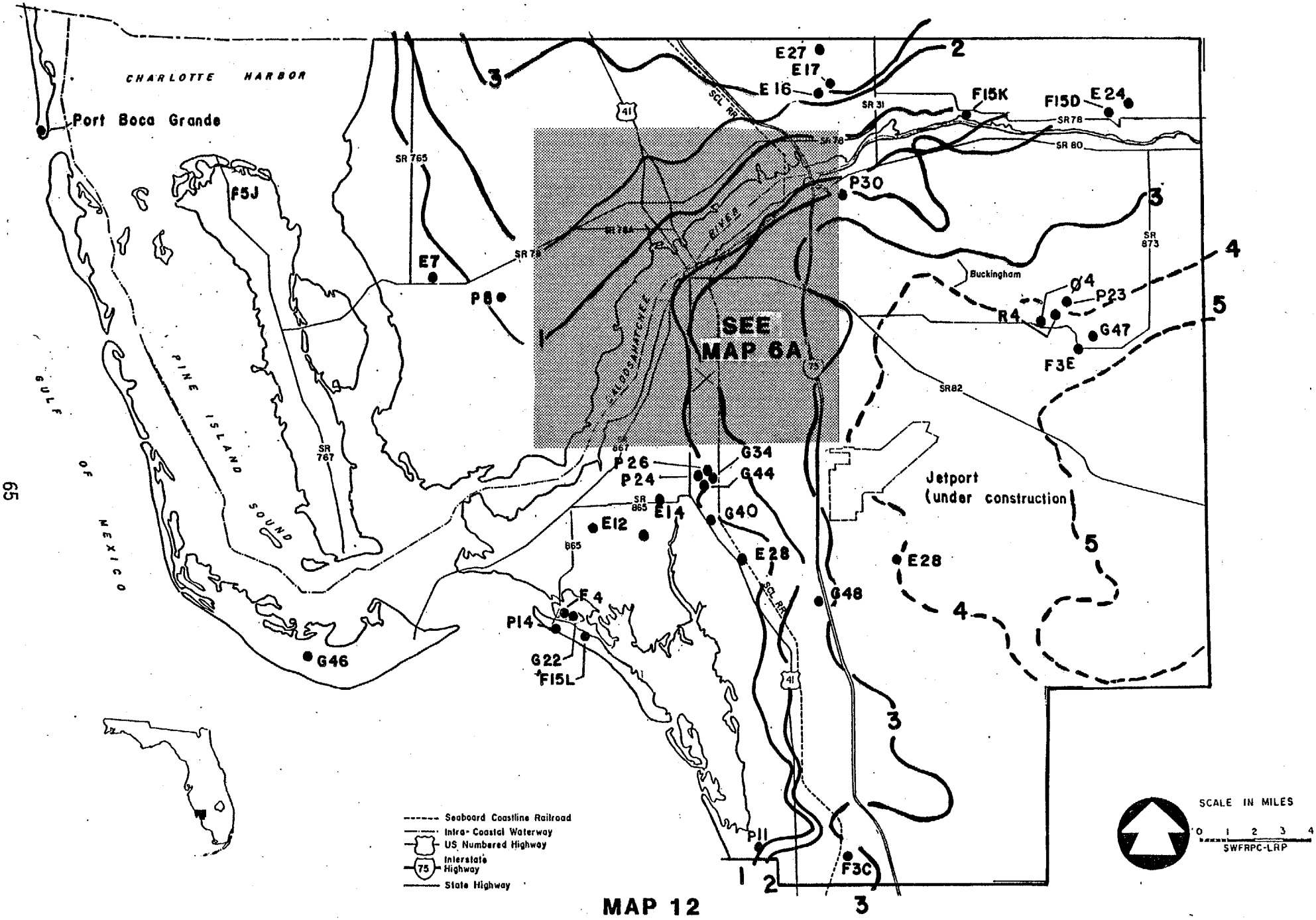


MAP 10
GLADES COUNTY
POTENTIAL HAZARDOUS MATERIALS SITES
(See Appendix G for names)



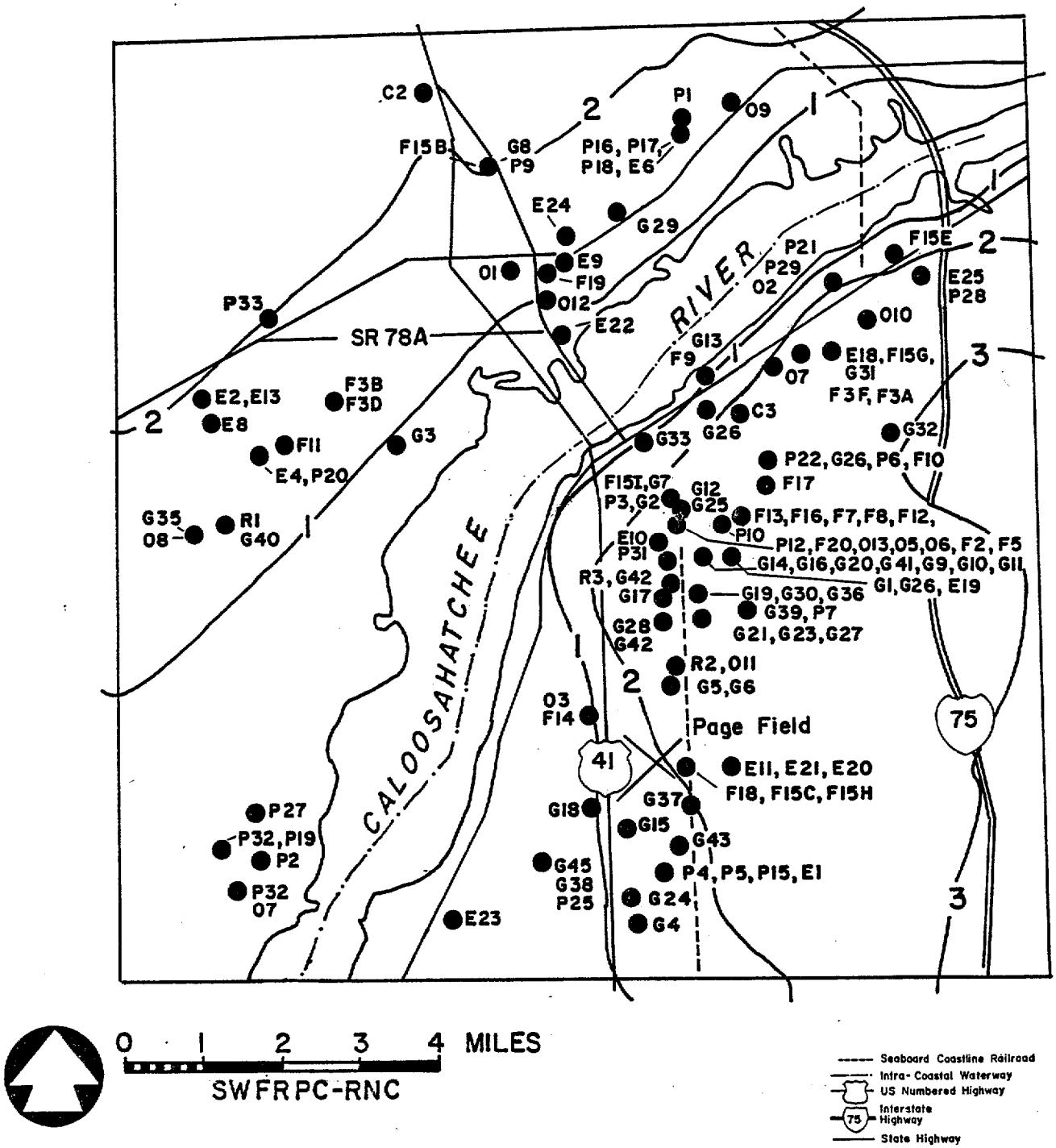
MAP 11
HENDRY COUNTY
POTENTIAL HAZARDOUS MATERIALS SITES

(See Appendix B for keys)



MAP 12
LEE COUNTY
POTENTIAL HAZARDOUS MATERIALS SITES

(See Appendix G for names)



0 1 2 3 4 MILES

SWFRPC-RNC

Seaboard Coastline Railroad
Intra-Coastal Waterway
US Numbered Highway
Interstate Highway
State Highway

MAP 12A
FORT MYERS AREA
POTENTIAL HAZARDOUS MATERIALS SITES
(See Appendix G for Names)

Nearly all (over 95%) of the sites in Lee County are in the Category 1, 2, or 3 vulnerability zones. This includes sites within the City of Fort Myers. Only a few sites in Lehigh fall in the Category 4 zone, while none are located in the Category 5 area or outside the vulnerable areas. Hence, nearly every site in Lee County is in a potentially vulnerable area. The sites near the mouth of the Caloosahatchee River and near the bridge approaches are particularly vulnerable. Sites on the barrier islands are the most susceptible to hurricane impacts, although there are few sites in these locations.

The predominant hazardous materials found in Lee County include explosives, gases, flammable liquids, and poisonous substances. A few major Lee County storage areas, such as Ohio Medical Supply, Asgrow Florida Company, the Exxon Bulk Plant, the Chevron Bulk Plant and the Robbins Manufacturing Company are inspected by the Department of Environmental Regulation.

Sarasota County

The overwhelming majority of potential hazardous materials sites in Sarasota County are located in the City of Sarasota and surrounding areas. Several sites are located in and around the Bee Ridge area, along Highway 301 south of the city and at the intersection of I-75 and S.R. 780. Additional sites were found scattered through the Venice area, and Englewood. No sites were located in the City of North Port or in the Town of Longboat Key. Only two sites were found on Siesta Key; no sites were located on the remaining barrier islands.

The majority of hazardous materials sites in Sarasota County are located in the less vulnerable areas. Over half of the sites are located in zones 4 and 5, affording those areas a greater degree of protection from less severe storms. Very few (less than 5%) of the sites are in the most vulnerable area (zone 1).

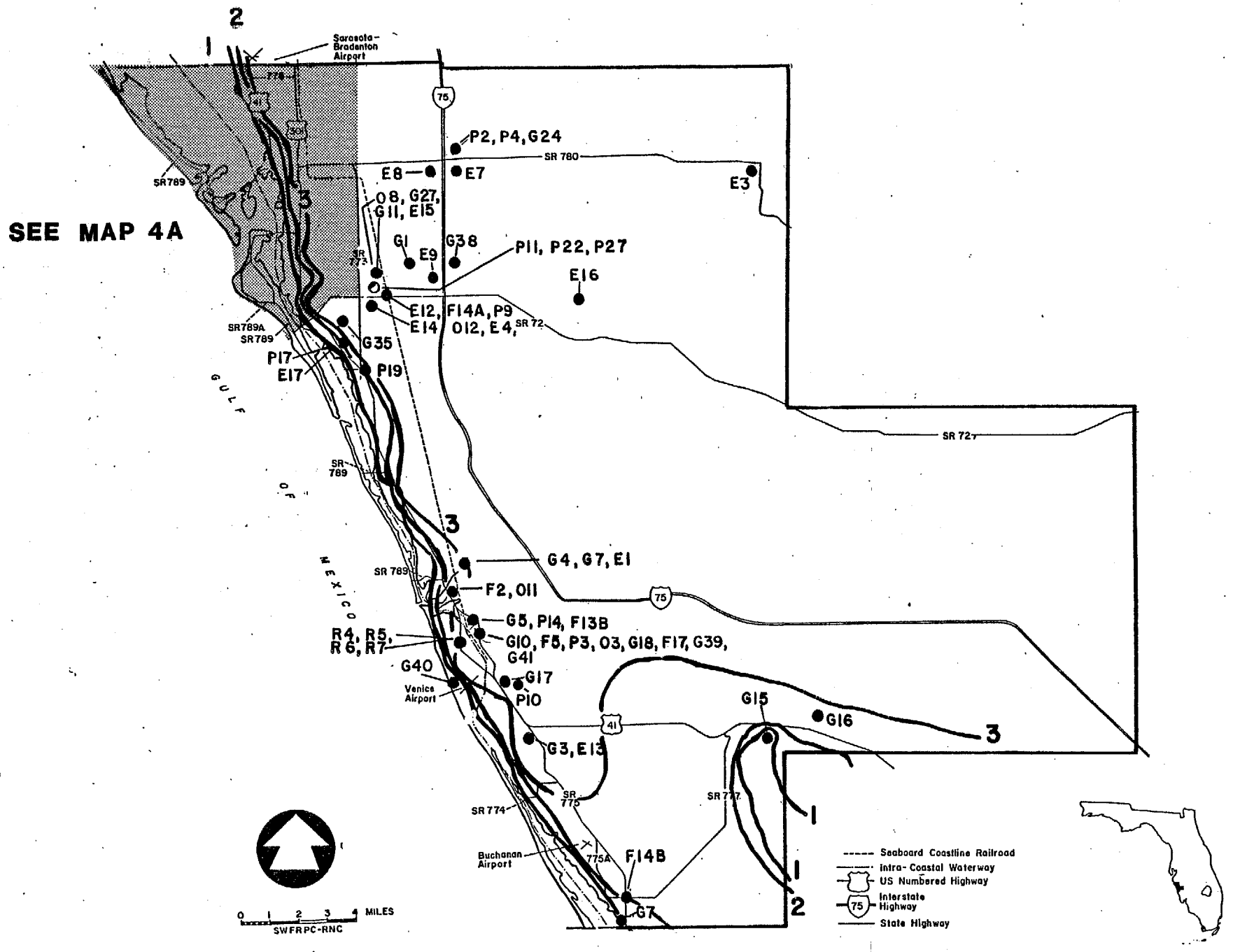
In general, a mix of hazardous materials was found in Sarasota County. The predominant hazardous materials include flammable liquids, gases and poisonous substances.

Regional Summary

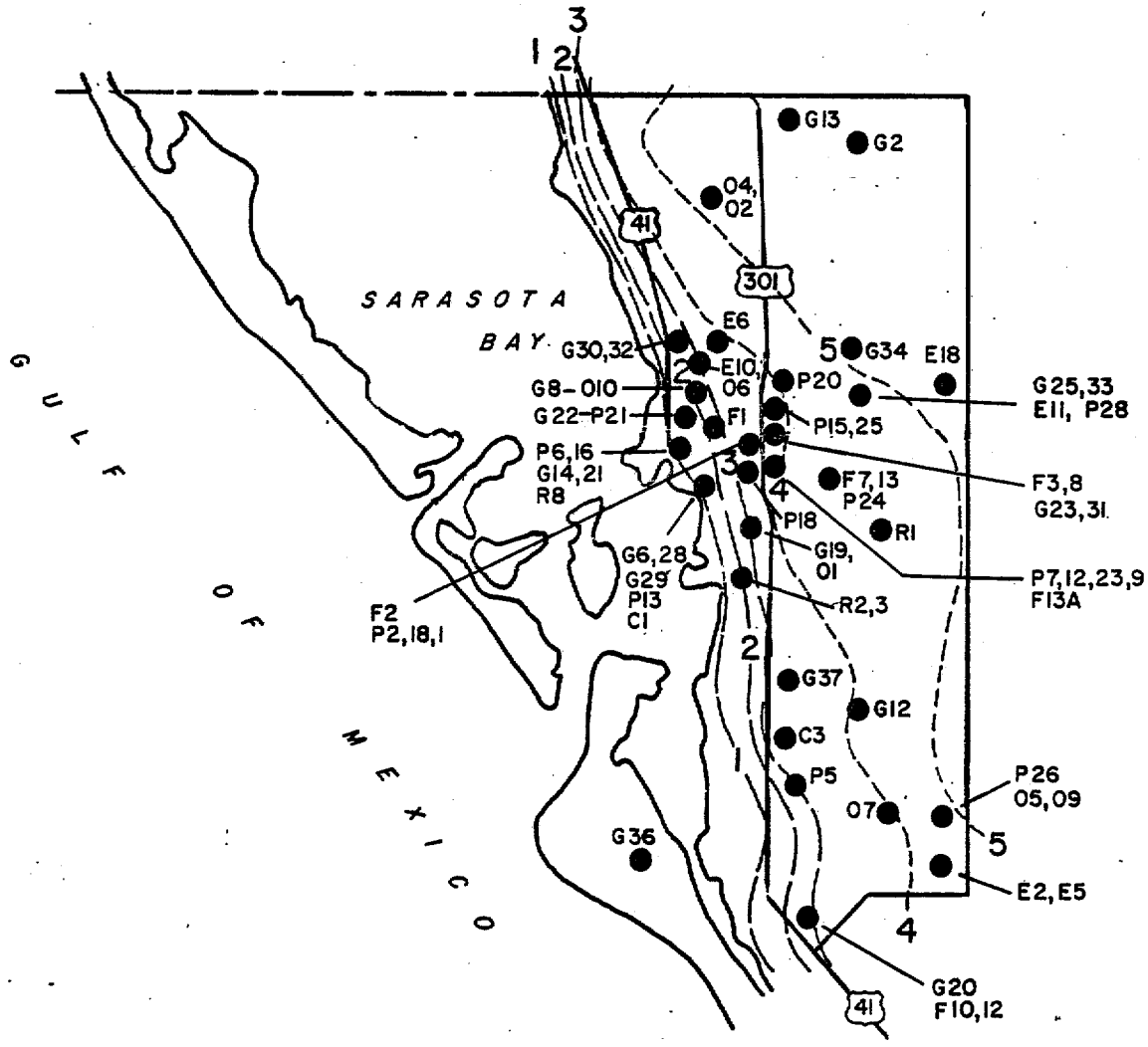
A brief survey of hazardous materials and their locations have been provided in the previous sections. Analysis of the inventory in the appendix indicates that the list is extensive; hazardous materials of all types are located within the Region. Many of the sites are located in areas that are extremely vulnerable to hurricane impacts. Lee and Charlotte Counties are particularly vulnerable while Sarasota County is less so. In the inland counties of Glades and Hendry, there are few hazardous materials sites. Although not subject to saltwater flooding, they are susceptible to high winds and possible freshwater flooding.

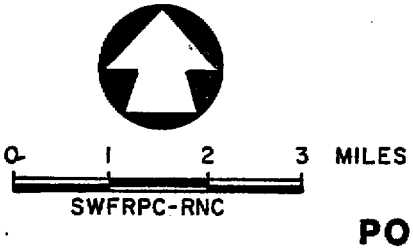
The Florida Department of Environmental Regulation inspects major hazardous materials sites in the Region on an infrequent basis. Major sites, however, account for few of the numerous facilities in Southwest Florida.

In summary, since there are numerous hazardous materials sites that could be potentially dangerous if a hurricane were to occur, these locations should be noted and precautions should be taken if necessary, to avoid any possible adverse impacts.



MAP 13
SARASOTA COUNTY
POTENTIAL HAZARDOUS MATERIALS SITES





MAP 13A
CITY OF SARASOTA AREA
POTENTIAL HAZARDOUS MATERIALS SITES

(See Appendix G for names)

PROJECTED STRUCTURAL LOSS

This chapter includes an assessment of the value of structures located within each previously-defined vulnerability zone. Building values for residential, commercial, industrial and public land uses have been included for each county in Southwest Florida as well as totals for the Region. In addition, projected hurricane-induced losses (dollar amounts) for structures were determined, based upon the subsequent methodology.

METHODOLOGY

Initial Assessment

Estimating structural losses due to hurricanes involved a two-part methodology. First, the most recent county tax assessment data (1981) was utilized to determine the values for various types of land uses for each county. This information was provided by either the respective property appraiser's office (in the case of Lee County) or the Florida Department of Revenue (which received the information from the County Property Appraiser's office). The data from the property appraiser's office, in the form of tax tapes, was processed by the University of Florida Center for Instructional and Research Computing Activity, and the information contained on the tape (just value, building value, land value and parcels) was categorized by township, range and section number to conform with vulnerability zones used in this study. The University of Florida Computer Center processed the tax tapes for Charlotte, Collier and Sarasota Counties while Lee County was done by the county's data processing center. Once the data was received, the sections of each township and range were allotted to their respective vulnerability zones (category 1, 2, 3, 4, 5 or outside category 5). For the inland counties of Glades and Hendry which were outside the SLOSH Grid, no flood categories were listed. Once all sections were defined by zone, the building values contained on the printout were then aggregated by zone and type of land use. There were 99 standardized types of land uses utilized by the property appraisers under the following general categories: Residential, Commercial, Industrial, Agricultural, Institutional, Government and Miscellaneous.

Determination of Loss

Once the total building values were determined by land use type and vulnerability zone, estimates of damage were calculated for both flood and wind damage. To determine the value of projected structural loss, a percentage of unit damage method was used, correlated to surge height and wind velocity thresholds. The percentage losses for flooding were derived from flood insurance studies and the Federal Insurance Administration Flood Insurance Rate Reviews. Percentage loss is based upon several factors including frequency of occurrence, elevation and depth of flooding (above floor level of structure). Several different percentages of damage were utilized, depending upon type of structure (residential, commercial, etc.) and type of unit (one story, over one story). A separate factor was applied to mobile homes. Percentages of damage varied widely, ranging from approximately 9% to 90% of total value. For wind damage, factors contained in Computer Simulation in Natural Hazard Assessment were utilized. It should be noted that two types of damage can occur to buildings:

either flood damage caused by a hurricane (storm surge or flooding) or wind damage. In addition, combinations of both wind and flood damage can also occur.

The resultant damage estimates represent potential hurricane damage, or that amount of damage that could be experienced in the worst possible hurricane damage, for that category (strength) of storm. Thus, the dollar losses in all subsequent tables represent maximum potential damage. It is improbable that any single storm would cause this stated amount of damage, since the categories are based upon a composite of storms.[1] The following sections describe in detail the percentage of damage used to determine loss.

Wind Damage

To determine wind damage, the methodology employed was that used in Computer Simulation in Natural Hazard Assessment by Friedman (1975). Vulnerability of buildings to hurricane winds was based upon the wind speed, (which was correlated by staff to storm category), as well as the type of unit (single unit residential, other residential, and non-residential). To estimate wind damage, first, the percentage of buildings that would be affected in a certain area was determined, then the percentage of value lost was determined for the affected buildings. This factor was applied to the total building value for each category storm, as seen in the table below.

TABLE 33

Wind Damage

Storm Category	% BUILDINGS AFFECTED			% VALUE LOST		
	Single Family	Other Residential	Non-Residential	Single Family	Other Residential	Non-Residential
1	8.4	7.0	5.6	2.9	1.8	1.7
2	25.0	20.9	16.7	3.9	2.4	2.3
3	51.0	42.5	34.0	5.5	3.5	3.4
4	72.0	60.0	48.0	9.3	6.0	5.9
5	100.0	83.4	66.7	16.0	11.0	10.9

Source: Don G. Friedman, Computer Simulation in Natural Hazard Assessment, Boulder Colorado, 1975, p. 73.

1 The hurricane vulnerability zones were based not upon one single storm, but upon a combination of possible storms, using the greatest flooding for each case.

These factors were applied to all units, although the wind damage percentages were reduced in areas that would also experience flooding. (Since the structures would have already been damaged by water, using both wind and flood damage values would overstate the total damage).

In general, wind damage was more severe for single-family residential units than for other types of residential and non-residential buildings. Non-residential units were affected the least and lost the least percentage of value.[1]

Flood Damage

Damage due to flood waters was calculated for each storm category. Again, flood damage varied according to the type of structure and water depth. For example, structural classifications included one-story structures, with or without basements; two stories or more, with or without basements; and mobile homes.

Percentages of damage varied according to the degree of flooding (water depth above floor), as well as classification of structure. The percentages were applied to the value of structures located in each vulnerability zone, to determine the loss for that specific zone. To calculate total loss, damage for each zone was added to the previous zone's damage. For example, in a category 2 storm, category 2 zones would receive a certain amount of flooding and a certain percentage of damage. At the same time, category 1 zones (in a category 2 storm) would also receive flooding and damage (more flooding than zone 2). These damages for both areas would have to be summed to determine total damage for a category 2 storm. Likewise, in a category 3 storm, damage for a category 3 area would have to be added to damages for categories 1 and 2 to arrive at a total damage. Table 34 gives damage percentages by type of structure and storm category, as well as average flooding for each storm category and maximum flooding (above mean sea level).

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1 It should be noted here that no separate factor is given for mobile homes. Although it is well known that mobile homes are extremely susceptible to damage due to their construction, no methodology exists to correlate percentages of damage with wind speed. Information obtained from the Florida Windstorm Underwriters Association (FWUA) and the Insurance Services Office (which sets rates for the FWUA), indicates that wind damage to mobile homes is based on numerous factors, including specific geographic location as well as wind speed. Thus, for the purposes of study, wind damage for single-family units is also used for mobile homes, although it is recognized that mobile home damage could be much more severe.

TABLE 34

Flood Damage Ratios by Storm Category

Storm Category[1]	Maximum Flooding (ft.) Above MSL[2]	Vulnerability Zone[3]	Average Flooding by Vulnerability Zone[4]	Percent Damage Single-Story	Over One Story	Mobile Home
1	9	1	1	9.94	8.6	42.6
2	12	1	4	28.56	19.75	77.85
		2	1	9.94	8.6	42.6
3	17	1	9	44.76	33.39	88.20
		2	5	30.37	22.18	79.19
		3	2	16.06	13.42	62.18
4	20	1	12	48.00	37.88	88.2
		2	8	44.21	29.98	88.2
		3	5	30.37	22.18	79.19
		4	1	9.94	8.6	42.6
5	23	1	13	49.0	37.8	88.2
		2	11	47.0	37.8	88.2
		3	8	44.21	29.98	88.2
		4	4	28.56	19.75	77.85
		5	1	9.94	8.6	42.6

Source: SWFRPC, Flood Insurance Rate Studies.

The percentages used to calculate damages are those used in Federal Flood Insurance Studies. Flooding is determined by the number of feet above floor level. Flooding levels for each storm category were determined by the staff, based upon maximum flooding for each category as defined by the SWFRPC Hurricane Evacuation Plan. Average elevation above mean sea level was subtracted to determine the level of flooding (above floor level). Flooding levels are graphically represented on maps 2-5.

The following example illustrates how Table 34 works. In a category 3 storm (winds of 111 to 130 mph, and maximum flooding of 17 feet above mean sea level), flooding must be determined for zones 1, 2 and 3. In vulnerability zone 1, the average elevation is subtracted from the maximum potential flooding of 17 feet (above mean sea level) to arrive at average flooding of 9 feet in that particular area. When 9 feet of flooding occurs, damage ranges from 33.39% of total value for buildings of more than 1 story, to 44.76% for single story homes, and 88.20%

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1 Based on Saffir-Simpson Scale.
2 See maps 2-5.
3 For example, in a category 3 storm, zone 1 areas would receive an average of 9 ft. of flooding, (17 feet maximum flooding minus average elevation of 8 feet) category 2 areas would receive 5 feet of flooding and category 3 areas would receive 2 feet of flooding.
4 Maximum flooding minus average elevation.

for mobile homes. In vulnerability zone 2, average flooding of 5 feet would occur (17 feet maximum minus average elevation for zone 2). Damage ratios for 5 feet of flooding are 30.37%, 22.18%, and 79.19% for single-story, over one story and mobile homes, respectively. In zone 3 areas, average flooding at 2 feet would occur (maximum flooding of 17 feet minus average elevation of 15 feet), Damage ratios are 16.00%, 13.42% and 62.18%, respectively. These percentages are applied to the value of structures located in each zone to determine the amount of damage. Total damage for a category 3 storm is calculated by adding together the damage in zones 1, 2, and 3.

It can be seen from the preceding table that flood damage to mobile homes is most severe, ranging from 42.6% of total value (when flooding of 1 foot occurs) up to 88.2% of value when flooding reaches 8 feet or more.[1] Damages increase quickly also, rising from 42.6% in 1 foot of flooding to 77.85% in four feet of flooding. Single-story homes receive a lesser amount of damage, approaching 10% damage in a category 1 storm, increasing to nearly 49% in category 5. Homes with more than one story receive the least damages overall, due to their elevation. Damages ranged from 8.6% in the least severe storms to 37.8% in the categories 4 and 5 storms.

Appendix H includes a detailed example of the methodology used in calculating both wind and flood damage, to determine damage totals.

Results of Analysis

To determine total damages by storm category, damages due to flooding, wind and surge must be added together. The subsequent sections analyze the results of the study for each county. A regional summary is included as well.

CHARLOTTE COUNTY

To determine the amount of damage that could occur in Charlotte County as the result of a hurricane, total building value must be determined for each vulnerability zone (area affected by storm). Values are given below, for each zone (1-5), and the total value is also given (which includes 1 through 5 as well as areas outside those zones).

---

1 In the Flood Insurance Rate Reviews 88.2% is the maximum damage listed.

TABLE 35

Charlotte County
Total Structural Value ($000)

Land Use	Total Value ($000)	Vulnerability Zone 1	2	3	4	5
Residential	965,488	503,155	346,815	100,300	13,488	562
Commercial	110,726	60,181	44,219	5,018	1,162	13
Industrial	9,775	3,162	5,521	857	235	0
Institutional	50,016	16,954	31,067	1,643	353	0
Government	69,423	36,508	8,284	14,679	9,858	53
Miscellaneous*	5,395	2,625	2,158	269	312	0
TOTAL	1,210,823	622,585	438,064	122,766	25,408	628

SOURCE: Property appraiser tapes, SWFRPC.

Note: Values for categories 1 through 5 may not equal the total because areas outside category 5 have been excluded.

* Miscellaneous includes categories such as utilities, water and sewer service, leasehold interests, mining lands, etc.

Analysis of the preceding table demonstrates that total building value amounts to $1.2 billion for Charlotte County. The greatest value occurs in the residential sector, with $965 million (79% of the total). Commercial value is the second greatest, followed by government, institutional, and finally industrial.

The greatest value is located in that portion of the county that would be affected by category 1 storms. Approximately $622 million worth of buildings are located in this area. Only a very small portion of total value is located in areas that are not subject to flooding (less than 1%).

Based upon these values, potential property damage to buildings has been determined. Wind and flood damages have been calculated separately, then summed to determine total damage. Wind damage for the various storm categories and land uses is found in the following table.

TABLE 36

Wind Damage ($000)
Charlotte County

Land Use	Storm Category 1	2	3	4	5
Residential	1,072	1,125	415	96	146
Commercial	46	24	15	4	10
Industrial	6	4	3	0	0
Institutional	30	8	4	0	0
Government	30	94	115	3	3
Miscellaneous	2	2	4	1	2
TOTAL	1,186	1,257	556	104	161

SOURCE: SWFRPC.

Note: Figures rounded to thousands

Wind damage could amount to $1.1 million in minor storms, but generally tends to decrease after category 2. This is because less building value is affected in storm categories 3 through 5 (the values for zones 1 and 2 have been excluded since they have already been damaged by flooding, thus, even though the percentage of wind damage would be greater in storm categories 3-5, the actual damage amounts would be less). As a percentage of total building value, wind damage is relatively small, amounting to less than 1% overall.

Flood damage is much greater, however. Damage due to high levels of water resulting from a hurricane have been estimated at up to $568 million, as seen in the subsequent table.

TABLE 37

Flood Damage ($000)
Charlotte County

Land Use	Storm Category 1	2	3	4	5
Residential	52,253	179,061	344,860	424,079	455,486
Commercial	5,980	21,570	41,155	50,032	52,806
Industrial	315	1,452	3,231	4,243	4,591
Institutional	1,613	7,373	16,127	20,848	22,320
Government	3,629	11,250	21,215	26,625	31,093
Miscellaneous	261	964	1,974	2,327	2,509
TOTAL	64,051	221,670	428,462	528,154	568,805

SOURCE: SWFRPC.

Flooding causes the greatest destruction in terms of dollar value of structures, when compared to wind. Flood damage is several hundred times greater than wind damage. Flood damage can range from $65 million in less severe storms, to $429 million in category 3 storms, to $568 million in major storms. Damage to residential property would be the greatest.

Total damage (caused both by wind and water)[1] has been estimated for Charlotte County in Table 38 .

TABLE 38

Total Structural Damage ($000)
Charlotte County

Land Use	Storm Category 1	2	3	4	5
Residential	53,325	180,186	345,276	424,176	455,632
Commercial	6,026	21,594	41,171	50,037	52,816
Industrial	320	1,457	3,233	4,243	4,591
Institutional	1,643	7,380	16,131	20,848	22,320
Government	3,659	11,344	21,330	26,627	31,096
Miscellaneous	264	967	1,878	2,328	2,511
TOTAL	65,237	222,928	429,019	528,259	568,966

SOURCE: SWFRPC.

Total damage could amount to $65 million in the least severe storm, to more than $568 million in a major storm. Residential property would be affected the most, accounting for 80% of total damage in the most severe storm. Commercial property would also be negatively affected with wind and flood damages of $52 million in category 5, or 9% of total damages. Government, institutional, industrial, and miscellaneous property would be affected the least, with combined damages ranging from less than $5.9 million (category 1) to $60.5 million in a category 5 storm (10% of the total).

COLLIER COUNTY

The amount of damage that could result from hurricanes in Collier County is dependent upon the total value of structures in the county. Values have been determined for each structure by land use group and vulnerability zone. Total value is found in the table below.

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1 Flooding calculations do not include storm surge, because the surge affects only a relatively small geographic area (portions of barrier islands, etc). Due to the format of the tax tapes (aggregated by township, range and section number) it was impossible to accurately estimate building values and project surge-related damage totals for such small areas. Damage totals would be slightly greater if surge were included.

TABLE 39

Total Structural Value ($000)
Collier County

Land Use	Total Value	Vulnerability Zone 1	2	3	4	5
Residential	2,007,356	1,199,892	396,996	389,689	52,850	49,115
Commercial	206,356	104,214	50,607	38,805	1,273	7,589
Industrial	27,619	1,849	3,232	19,601	95	2,574
Institutional	38,356	15,309	5,131	11,572	527	5,753
Government	21,237	4,344	10,570	1,262	21	3,735
Miscellaneous	3,177	368	1,393	1,164	18	111
TOTAL	2,309,782	1,326,766	369,015	462,863	55,143	69,744

SOURCE: Property appraiser tapes.

* Total value also includes areas outside categories 1-5.

Total building value in Collier County amounts to $2.3 billion. Residential structures account for the majority of the total value, with $2 billion, or 86%. Commercial property is the second most important group, followed by institutional. Residential property is by far the most important category, however. All the other categories combined account for only 14% of total building value in the county.

An examination of values by vulnerability zone reveals that the vast majority of structures and value is found in the zone 1 area. The total value of property (structures only) that lies in an area that could be affected in a category 1 (minor) hurricane equals $1.3 billion (or over 57% of total value). Amounts are much smaller in the remaining areas. Property located outside the category 5 area (area not subject to flooding) is valued at $26 million[1] or only 1% of the total building value.

The amount of damage that could occur to structures has been estimated using the percentage damage factors previously discussed. These factors have been applied to the total building values in Collier County to determine the amount of loss resulting from various types of storms (categories 1-5). The percentage used varies according to land use type, as explained in the methodology section. Damages by wind and water were also calculated separately. Wind damage estimates are provided in the following table.

---

1 Total value minus the sum of 1 through 5.

TABLE 40

Wind Damage
Collier County ($000)

Land Use	Storm Category 1	2	3	4	5
Residential	1,574	4,084	3,069	4,357	2,874
Commercial	92	196	148	324	281
Industrial	23	85	34	80	19
Institutional	21	68	74	165	5
Government	15	24	59	143	95
Miscellaneous	3	5	3	7	9
TOTAL	1,728	4,462	3,387	5,076	3,283

SOURCE: SWFRPC.

Potential wind damage would vary, according to the intensity of the hurricane. For example, a small storm (category 1) generally would damage only a small portion of the county, with losses possibly totaling $1.7 million. In a stronger storm (category 2), damages would increase because of the intensity of the storm and because a larger area would be affected. Damage actually declines in a category 5 storm, because the majority of structures have already sustained flooding damages; thus, less building value is affected.

Residential property would suffer the most damage, while damage to commercial, industrial and other land uses would be much less (due to the inland location of many of these land uses, and the greater predominance of residential property).

Wind damage accounts for only a minor portion of damage due to a hurricane. Damage from flood water is much more severe. Applying the flood damage factors (based upon level of flooding and type of structure) to total building value yields flood damage results, as depicted in Table 41.

TABLE 41

Flood Damage ($000)
Collier County

Land Use	Storm Category 1	2	3	4	5
Residential	111,304	306,429	593,944	726,589	803,468
Commercial	10,328	34,555	67,774	83,698	92,598
Industrial	184	849	4,957	8,279	11,374
Institutional	1,459	4,440	8,362	11,803	13,997
Government	432	2,291	5,357	7,143	8,031
Miscellaneous	37	244	775	1,148	1,366
TOTAL	123,744	348,808	681,169	838,660	930,834

SOURCE: SWFRPC.

Flood damage is far more costly and extensive than wind damage. Damage due to flood waters could range from $123 million in category 1 storms to $930 million in category 5 storms. Again, residential property would be most adversely affected, with damages potentially exceeding $803 million in major storms. Damages for other categories are also substantial.

Total damage in Collier County could range from $125 million in the least severe storm category to $684 million in a category 3 (Donna-type) storm, to over $934 million in the most severe storms. The most damage would occur in residential areas, with $806 million (category 5) or 86% of total damage. Other categories would also be detrimentally affected although to a lesser degree. Total damage to buildings is found in the following table.

TABLE 42

Total Structural Damage ($000)
Collier County

Land Use	Storm Category 1	2	3	4	5
Residential	112,878	310,513	597,013	730,946	806,343
Commercial	10,420	34,751	67,921	84,023	92,879
Industrial	207	935	4,991	8,359	11,393
Institutional	1,480	4,508	8,436	11,967	14,002
Government	447	2,315	5,415	7,286	8,126
Miscellaneous	39	249	778	1,154	1,375
TOTAL	125,471	353,271	684,555	843,835	934,118

SOURCE: SWFRPC.

GLADES COUNTY

Since Glades County is located inland (outside of the SLOSH grid), it is not subject to saltwater flooding. Thus the only damages that would occur would result from wind damage. (It should be noted, however, that some freshwater flooding could occur, but since the probability and amount have not been determined, damage cannot be accurately estimated).

Wind damage has been estimated, based upon total valuations for each major land use as noted in the following table.

TABLE 43

Total Value
Glades County

Land Use Category	Value ($000)
Single-family Residential	18,176
Mobile Homes	18,227
Multi-family Residential	784
Retirement Homes	6
Commercial	7,841
Industrial	1,974
Agricultural	314,595
Institutional	855
Government	19,593
Miscellaneous	9,062
Non-Agricultural	13,307
TOTAL*	404,420

* Excluding vacant residential, vacant commercial and vacant industrial values. Agricultural values have been included in this table for information purposes although these are land values, not building value.

SOURCE: Florida Department of Revenue.

Percentages of damage used were the same as those used for other counties. Percentages varied according to type of structure and wind speed. (It should be noted that percentages were applied against total value, which included some land value, because building values were not available separately. Since the percentage of damage is constant, the same methodology can be utilized, although damage figures may be slightly overestimated as a result). Estimated potential wind damages are provided in the following table.

TABLE 44

Potential Wind Damage ($000)
Glades County

Land Use	Wind Category* 1	2	3	4	5
	89	361	1,031	2,456	5,897
Single-family	44	178	509	1,212	2,908
Multi-family	1	4	12	28	72
Retirement	.008	.03	.09	.2	.6
Mobile Home	44	179	510	1,216	2,916
Commercial	7	30	91	222	570
Industrial	2	7	23	56	143
Institutional	.8	3	10	24	62
Government	18	74	227	554	1,424
Miscellaneous	8	34	105	256	659
Non-Agricultural	12	51	154	377	967
TOTAL	137	560	1,641	3,945	9,722

* Equivalent to storm category.

SOURCE: SWFRPC.

The wind category is equivalent to the storm category. For example, wind speeds range from 74-95 mph in category 1 to over 155 mph in a category 5 storm. Thus, damage is related to wind speed and type of building.

In Glades County, total wind damages could amount to $137,000 in a minor storm to over $9 million in a major storm (winds exceeding 155 mph). Residential property would be most adversely affected[1], with damages possibly amounting to over $5 million. Mobile homes would receive the worst wind damage, due to their predominance. Damage could amount to approximately 8% of total real property value of $421,707,120. It should be noted that since agriculture by far accounts for the greatest proportion of value (77% of total value), damage to other types of land use would be relatively less important.

HENDRY COUNTY

Hendry County is also located outside the areas that are subject to saltwater flooding. Because of its inland location, Hendry County would only be subjected to wind damage (or possible freshwater flooding which has previously been discussed). Wind damage generally increases as storm intensity (wind speed) increases, although different types of structures are affected by winds differently.

Wind damage is calculated as a percentage of total value. Total value for Hendry County is listed in Table 45 .

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1 Excluding agricultural property, which primarily consists of land value. Agricultural loss has been treated separately in another chapter.

TABLE 45

Total Value
Hendry County

Land Use	Value ($000)
Residential	
Single-family	114,349
Multi-family	10,747
Retirement Homes	-
Mobile Homes	22,337
Commercial	36,941
Industrial	12,790
Agricultural	660,627
Institutional	9,316
Government	83,894
Miscellaneous	2,752
Non-Agricultural	13,140
TOTAL	966,893

Source: Florida Department of Revenue.

Agricultural property accounts for the largest total value of all land use categories in Hendry County. Since agricultural loss has been examined in another chapter, it will be excluded from this discussion, except to note that it is the basis of the county's economy and most important land use.

Aside from agriculture, residential land use accounts for the greatest total value, with $147 million (primarily single-family housing). Government is the next most important category, followed by commercial use. Other categories account for relatively small proportions of total value.

When the percentages of damage for wind are applied to the values contained in the previous table, estimated damages are determined. Projected damages are contained in the following table.

TABLE 46

Potential Wind Damage ($000)
Hendry County

Land Use	Wind Category 1	2	3	4	5
Residential					
Single-family	274	1,121	3,202	7,627	18,296
Multi-family	14	54	160	387	985
Mobile Homes	54	219	625	1,490	3,574
Commercial	33	140	429	1,045	2,686
Industrial	12	49	148	362	930
Institutional	8	35	108	264	677
Government	76	9	973	2,374	6,099
Miscellaneous	2	10	32	78	200
Non-Agricultural	12	50	152	372	955
TOTAL	485	1,997	5,830	13,998	34,402

SOURCE: SWFRPC.

The above data, illustrates that in a storm of minimum intensity, approximately $485,000 in damages could accrue, while in a major storm, damages could amount to over $34.4 million.[1]

Residential damage could account for $22.8 million (in category 5), or 66% of total damage (excluding agricultural damage). Agricultural damage would also have a significant impact on the county (see Chapter 10). Wind damage to governmental land uses would also be significant, possible amounting to over $6 million in a major hurricane. Industrial and institutional uses would be least affected, in terms of structural damage.

LEE COUNTY

In order to determine the amount of potential damage expected to occur, the total value of buildings must be determined. Total value for Lee County structures, excluding land,[2] is given in the Table below. Value is included for each major land use category, by vulnerability zone.

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1 Excluding agricultural damage.

2 Only building values have been used in this study. It is assumed that land value generally will not be affected by storms, although this may not be entirely true, since many islands are subject to erosion and land values may thus be diminished.

TABLE 47

Total Structural Value ($000)
Lee County

Land Use	Total Value	1	2	3	4	5
Residential	3,060,595	936,184	511,211	178,761	35,686	182,992
Commercial	303,677	146,652	103,116	37,647	4,332	4,660
Industrial	47,540	4,752	7,150	20,595	0	1,210
Institutional	84,971	30,522	18,754	15,154	42	3,049
Government	108,324	14,090	28,300	37,711	125	330
Miscellaneous	22,169	6,734	1,970	1,657	0	312
TOTAL	3,627,276	1,138,934	670,501	291,525	40,185	192,553

SOURCE: Property Appraiser Tapes, Lee County.

Note: Adding values for categories 1 through 5 may not equal total value since total includes areas outside of storm category 5.

It can be seen upon examination of the above table that, as in the other counties, residential property accounts for the greatest portion of total value (over 48%). Commercial property follows, although it accounts for only 8.5% of the total. Government use is third, with less than 3%. Industrial is least important, accounting for only 1% of total value.

The greatest value occurs in the zone 1 area (31% or $1 billion), gradually decreasing to $192 million in the category 5 area. This is significant since 50% of the total value is located in the most vulnerable areas (zones 1 and 2). It should also be noted, however, that $1 billion in property (35%) is located outside the hurricane vulnerable areas. Further examination will determine amounts of damage based upon these values.

To determine the amount of storm damage, the previous values have been used in conjunction with percentage estimates for both flooding and wind damage (see Methodology). Different percentages were applied against the various types of land use, depending upon the types of structures for each land use category. Total potential wind damage is found in the table below.

TABLE 48

Wind Damage ($000)
Lee County

Land Use	Storm Category 1	2	3	4	5
Residential	$2,127	$3,980	$6,593	$13,407	$ 5,277
Commercial	141	205	189	338	529
Industrial	39	135	174	426	1,006
Institutional	49	136	238	480	1,269
Government	84	251	327	795	2,019
Miscellaneous	14	251	327	795	836
TOTAL	$2,454	$4,958	$7,848	$16,341	$10,936

SOURCE: SWFRPC.

It can be seen from the previous table that wind damage could range from $2.4 million in a minor hurricane to over $10 million in a major (category 5) hurricane[1]. As a percentage of total value, wind damages are relatively small (amounting to less than 1% of total building value in category 5). Residential property value would be most affected by wind damage, while damage to other sectors would be much smaller.

Damage from flooding water, however is much more significant. Again, to determine flood damages, percentages are applied to total values for each category storm for all zones that are subject to flooding. To determine totals, for example, in a category 3 storm, the percentage of damage resulting from a category 3 storm must be determined for zones 1, 2, and 3. Projected potential damage due to flooding is found below.

TABLE 49

Flood Damage ($000)
Lee County

Land Use	Storm Category 1	2	3	4	5
Residential	89,825	260,289	525,405	661,262	727,274
Commercial	14,565	51,959	102,291	126,639	137,711
Industrial	472	2,068	7,606	11,697	14,914
Institutional	2,891	9,504	19,659	24,749	28,162
Government	1,401	6,837	20,958	30,740	36,946
Miscellaneous	669	2,119	3,875	4,599	4,979
TOTAL	109,824	332,774	679,794	859,686	949,986

SOURCE: SWFRPC.

[1] Wind damage actually is the greatest in category 4, because in a category 5 hurricane damage is assessed against a smaller total value (against the total building value minus zones 1 through 5, which is equivalent to the value located outside vulnerable zones). This was done to avoid double counting since areas 1-5 would have already received flooding damage.

It can be seen that flooding caused the most destruction (in terms of dollar value of structures) when compared to wind.

Flooding damage in a category 1 storm is more than 20 times the amount caused by wind damage. In the most severe storm, flooding damage is nearly 5 times the amount of wind damage.

Total potential damage caused by both wind and water has been estimated in Table 50 for Lee County.

TABLE 50

Total Structural Damage ($000)
Lee County

Land Use	Storm Category 1	2	3	4	5
Residential	91,952	264,269	531,998	674,669	732,551
Commercial	14,706	52,164	102,480	126,977	138,240
Industrial	511	2,203	7,781	12,122	15,920
Institutional	2,940	9,640	19,897	25,330	29,431
Government	1,485	7,088	21,285	31,535	38,964
Miscellaneous	683	2,370	4,202	5,394	5,815
TOTAL	112,277	337,734	687,643	876,027	960,921

SOURCE: SWFRPC.

Total damage that could be caused by the forces of both wind and water could range from $112 million in the least severe category of storms to $687 million for a category 3 storm, to over $960 million in the most severe storm category. Residential property would be affected most, accounting for 76% of total damage. Commercial property would also be detrimentally affected, with wind and flood damages of $138 million (category 5) or 14% of total damages. Government, institutional and industrial property would be affected the least, with combined damage ranging from less than $5 million (category 1) to $84 million in category 5.

In summary, residential property by far would incur the most damage (76%), while the other land use categories would not be affected nearly as much. Water damage is much more intense than wind damage. Damage potential increases as storm level intensified, doubling between category 1 and 2, and increasing by smaller amounts through category 5. Damages increased nearly ninefold between categories 1 and 5. Thus, although damage potential in a small intensity storm may total $112 million, damage potential in a major storm could reach $960 million, or 26% of the total building value of the county.

SARASOTA COUNTY

Sarasota County's total structure value, as indicated in Table 51, amounts to over $4.4 billion. Potential wind and flood damages from storms can be determined, based upon these amounts.

TABLE 51

Total Structural Value ($000)
Sarasota County

Land Use	Total Value	Vulnerability Zone 1	2	3	4	5
Residential	3,559,266	1,421,462	286,683	205,486	449,228	545,287
Commercial	409,607	94,490	103,056	44,177	53,578	79,663
Industrial	62,953	1,220	2,092	4,989	11,654	12,917
Institutional	151,725	62,311	17,580	8,442	12,633	31,304
Government	193,278	72,854	25,590	30,293	18,554	30,803
Miscellaneous	38,253	18,682	13,503	462	2,376	1,559
TOTAL	4,415,082	1,671,019	448,503	293,850	548,024	701,533

SOURCE: Property Appraiser tapes, SWFRPC estimate.

An examination of the previous table shows that residential property accounts for the greatest percentage of total value (80%). Commercial property, valued at $409 million, accounts for the second largest amount, but only 10% of the total. Other categories combined account for only 10%, or $446 million.

Property in the category 1 area (that area of the county that would be affected by all hurricanes) is valued at $1.6 billion, the highest value of all zones (38% of total value). Values generally decrease in zones 2 and 3, since less land area is affected. Value rises, however, in categories 4 and 5. In addition, $752 million worth of property (17% of the total) is located outside the vulnerable areas (zones 1 through 5), and would not be affected by flood damage.

Damage that could result from a variety of hurricanes (categories 1 through 5) has been calculated, based upon total building value and percentages of damage related to wind speed, flood level and building type. Damage potential from wind alone is found in the following table.

TABLE 52

Wind Damage ($000)
Sarasota County

Land Use	Wind Category 1	2	3	4	5
Residential	4,591	16,284	41,883	71,361	92,519
Commercial	284	806	1,947	3,23	2,519
Industrial	56	227	634	1,217	2,187
Institutional	80	273	735	1,436	1,414
Government	109	360	749	1,301	1,104
Miscellaneous	14	20	54	66	121
TOTAL	5,134	17,970	46,003	78,616	99,864

SOURCE:

Damage from hurricane winds could be extensive in Sarasota County, depending upon the strength of the storm. Wind damage could range from $5 million in a minor storm, to nearly $100 million in a major hurricane. Even in a major storm, however, dollar loss accounts for only a minor portion (2%) of total building values. Residential property would be most adversely affected by hurricane winds, although detrimental impacts would also be significant for commercial and other types of land use.

TABLE 53

Flood Damage ($000)
Sarasota County

Land Use	Storm Category 1	2	3	4	5
Residential	134,359	364,418	658,547	821,577	1,001,031
Commercial	9,361	36,941	79,903	108,519	136,628
Industrial	121	556	1,983	4,184	8,399
Institutional	6,024	18,337	32,446	38,726	45,663
Government	7,242	23,351	45,246	57,327	69,479
Miscellaneous	1,857	6,678	12,537	15,314	16,538
TOTAL	158,964	450,281	830,662	1,045,647	1,277,738

SOURCE: SWFRPC.

Water damage could amount to $158 million in category 1 storms, but can increase many times to $1.2 billion in category 5 storms. Thus, damage can range from 3% of total building value in minor storms to approximately 27% of value in major storms.

Residential property again would receive the most negative impacts, with possible damages ranging from $134 million in category 1 (90% of total damage from category 1) to $1 billion in category 5 storms (82% of total damage for category 5).

Other types of land use would sustain damages, ranging from $9.3 million in a category 1 (commercial land use) to $136 million in a category 5 storm (for commercial land use).

When water damage and wind damage are combined, total damage can be very great. Damage due to wind and water is provided in Table 54 .

TABLE 54

Total Structural Damage ($000)
Sarasota County

Land Use	Storm Category 1	2	3	4	5
Residential	138,950	380,702	700,430	892,938	1,093,550
Commercial	9,645	37,747	81,851	111,754	139,147
Industrial	177	783	2,617	5,401	10,586
Institutional	6,104	18,610	33,181	40,163	47,077
Government	7,350	23,711	45,995	58,629	70,583
Miscellaneous	1,871	6,698	12,591	15,380	16,659
TOTAL	164,098	468,251	876,665	1,124,263	1,377,602

SOURCE:

Total damage potential due to a hurricane could amount to $164 million in minor storms, or could increase to $1.37 billion in major hurricanes.

The most negative effects would result in residential areas, since this is the predominate land use in the county. Residential damage could amount to 80% of total damage in a major storm, or approximately $1.1 billion.

Other land uses would also be negatively affected, but to a lesser degree. For example, commercial land use, which would be the category impacted the most (after residential) could suffer damages ranging from $9,645,000 to $139,147,000. Government land use could also be damaged by a large amount ($7 million to $70 million), followed by institutional and industrial uses.

In summary, it can be seen that the greatest damage occurs due to flooding, while wind damage is relatively minor. In addition, residential property would incur the most damage, approximately 8 times more damage than commercial property (the second greatest category).

REGIONAL SUMMARY

Building values have been summed for each county to determine total value for Southwest Florida. These values are given in the table below. It should be noted that since Glades and Hendry Counties are located outside the SLOSH Grid and thus are not subdivided into storm categories, only the total value is given.

TABLE 55

Total Structural Value ($000)
Southwest Florida

County	Total Value	Vulnerability Zone 1	2	3	4	5
Charlotte	1,210,823	622,585	438,064	122,766	25,408	628
Collier	2,309,782	1,326,766	369,015	462,863	55,143	69,744
Glades	89,825*	N/A				
Hendry	306,266*	N/A				
Lee	3,627,276	1,138,934	670,501	291,525	40,185	192,553
Sarasota	4,415,082	1,671,019	448,503	293,850	548,024	701,533
REGION	11,959,054	4,759,304	1,926,083	1,171,004	668,760	964,458

SOURCE: Property Appraiser tapes, SWFRPC.
N/A - Not applicable.
Note: Categories 1 through 5 may not equal total value since areas outside of category 5 have been excluded. Values are for the area within each vulnerability zone and are not cumulative.
* Total value for Glades and Hendry Counties includes some land values, but excludes agricultural land.

The greatest total value is found in Sarasota County, with $4.4 billion, followed closely by Lee County, with building value exceeding $3.6 billion. The remaining counties have relatively smaller values, since they are less developed. The inland counties of Glades and Hendry have the smallest values, together amounting to $396 million. Residential property accounts for the greatest proportion of total value in the Region, while industrial value is the least important.

The greatest building value occurs in the zone 1 areas, with $4.7 billion, or 40% of total value, gradually decreasing to $964 million in the category 5 areas. Structures in zones 1 and 2 combined are worth over $6.6 billion. Thus, over half the buildings (value) are located in the areas of the Region most susceptible to hurricanes. However, a substantial portion of property $2.5 billion, or 20% of total building value, is located outside the hurricane-vulnerable areas and thus would not be damaged by storm flooding.

Total storm damage is the result of wind and water damages in each county. Wind, flooding and total damages for the Region are displayed in the next three tables.

TABLE 56

Wind Damage ($000)
Southwest Florida

County	Category Storm 1	2	3	4	5
Charlotte	1,186	1,257	556	104	161
Collier	1,728	4,462	3,387	5,076	3,283
Glades*	137	560	1,641	3,945	9,722
Hendry*	485	1,997	5,830	13,998	34,402
Lee	2,454	4,958	7,848	16,341	10,936
Sarasota	5,134	17,970	46,003	78,616	99,864
REGION	11,124	31,204	65,265	118,080	158,368

* Excluding agricultural lands.
SOURCE: SWFRPC.

Wind damages in the Region range from $11 million in category 1 storms to $158 million in category 5 storms. The greatest wind damage would occur in Sarasota County, with damage ranging from $5 million to nearly $100 million (46%- 63% of the total). Damage is greater in Sarasota County than the other counties combined since a relatively greater percentage of structures is located inland, where wind damage ratios are greater, and also because in the other counties, such as Lee, the value of areas that received flood damage is excluded when determining wind damages; consequently, smaller values are used for these counties and, as a result, wind damage is less. The inland counties would experience more wind damage than the smaller coastal counties, since they are not subject to saltwater flooding damage.

Potential damage due to flood waters amounts to $456 million in Southwest Florida in minor storms, (see Table 57), increasing to $3.7 billion in major storms. Flooding damage has the most dollar impact in Sarasota County (over one-third the total flood damage) followed by Lee and Collier Counties. Damage in Collier County actually exceeds that of Lee County in storms of lesser magnitude (categories 1-3). This is primarily due to Collier County's low elevation and flat topography. In general, damage increases as storm intensity increases; however, damage in Sarasota County is not as great as could be expected, since a large portion of the county is located outside vulnerable areas. Thus, the least damage is due to category 1 storms, while the most occurs in category 5 storms (see Table).

TABLE 57

Flood Damage ($000)
Southwest Florida

County	Storm Category 1	2	3	4	5
Charlotte	64,051	221,670	428,462	528,154	568,805
Collier	123,744	348,808	681,169	838,660	930,834
Glades	N/A				
Hendry	N/A				
Lee	109,824	332,776	679,794	859,686	949,986
Sarasota	158,964	450,281	830,662	1,045,647	1,277,738
REGION	456,583	1,353,535	2,620,087	3,272,147	3,727,363

N/A - Not applicable.

SOURCE: SWFRPC.

Total damage due to wind and water is summarized in the following table. Damages due to these combined impacts in the Region range from $467 million in a minor storm to $3.8 billion in a major storm. The two largest counties would receive the greatest damage to structures. Damage to Sarasota County would be the greatest, ranging from $164 million in category 1 to over $1.3 billion in category 5. Lee County would also incur great damage, with $112 million (category 1) to $960 million (category 5). The smaller counties would receive less damage,[1] but still significant amounts, especially in the more severe storms.

TABLE 58

Total Structural Damage ($000)
Southwest Florida

County	Storm Category 1	2	3	4	5
Charlotte	65,237	222,928	429,019	528,259	568,966
Collier	125,471	353,271	684,555	843,735	934,118
Glades*	137	560	1,641	3,945	9,722
Hendry*	485	1,997	5,830	13,998	34,402
Lee	112,277	337,734	687,643	876,027	960,921
Sarasota	164,098	468,251	876,665	1,124,263	1,377,602
REGION	467,705	1,384,741	2,685,353	3,390,227	3,885,731

* Excluding agricultural lands.
SOURCE: SWFRPC.

1 Even though amounts are small in the less populated counties, damages can be great in terms of the county's resource base. For example, per capita damages in Glades County are nearly as great as those in Lee County, indicating that the impact is approximately equal in terms of the resource base.

In summary, the larger counties generally will experience the greatest amounts of total damage. However, Sarasota County will incur relatively less damage than might be expected, since a large portion of the county is located outside the category 5 area and thus would not be affected by a hurricane. Collier County, conversely, would be damaged more than would be expected (even more than Lee County in Category 1 and 2 storms) due to its low elevation and large number of structures in vulnerable areas.

Residential property would receive the most damage, by far, due to its predominance as a land use type in all counties, and also due to its location in the most hurricane-vulnerable areas. Commercial property would also receive significant damage, while damage to other types of land uses would be relatively less.

Although total damage is comprised of both wind and water damage, water damage is the most severe, twenty to forty times greater than wind damage. Total damage from wind and water in Southwest Florida ranges from 4% (category 1) to 32% (category 5) of total building value.

Mitigating losses is important, especially when damage to buildings alone could total more than $3.8 billion in Southwest Florida. In addition to the direct effects upon structures, there are other hurricane-related impacts, such as indirect effects upon the economy and employment. These will be discussed in subsequent chapters.

IMPACTS ON PUBLIC SERVICES AND FACILITIES

A hurricane can cause numerous impacts, some which are readily apparent and others that are less evident. The previous chapter described the direct damage to buildings resulting from hurricane winds and flooding. There are other indirect impacts, such as social disruption, employment loss, monetary loss of income and wages caused by suspension of business, and other effects that are not as easily quantifiable. These impacts, as well as direct impacts to public facilities, will be described in the following two chapters.

This chapter will discuss damage to facilities providing public services, as well as service loss and social disruption caused by hurricanes. Public facilities, defined as those facilities providing services that are necessary for the public health, safety and welfare, may be damaged by hurricanes and service may consequently be disrupted. The following sections will examine the value of these public facilities, estimate potential damages to structures, and discuss briefly the consequences of service disruption. The following six types of public services will be examined.

Water (including water treatment plants)
Wastewater (including package and other plants)
Electricity (including generating plants, substations and switching stations)
Transportation (including land, water and air)
Health Care (including hospitals, nursing homes and similar facilities)
Other (schools)

METHODOLOGY

Assessed values for the previously described land uses were derived from the tax roll tapes of the various county property appraiser departments. The assessed values, which are generally equivalent to the fair market value of structures, have been used in most cases to determine potential damages. Information concerning the location and number of these facilities was derived from information contained in the Southwest Florida Regional Planning Council Support Services report (updated in 1982), while values for these facilities were derived from the tax rolls.

The following sections include an analysis of the number of service facilities for each county. Facilities are categorized by land use type, and are also allocated to zones of hurricane vulnerability. Values for buildings within each group are provided, and these values have been used to calculate structural losses. A regional summary and conclusions are also presented.

A detailed listing of each type of public service facility (water, wastewater treatment, electrical, transportation, health care and schools) by county and by vulnerability zone, is provided in Appendix E. Maps locating each facility are found in Appendix F.

CHARLOTTE COUNTY

An inventory of public facilities has been completed for Charlotte County. The results are presented in the following table.

TABLE 59

PUBLIC FACILITIES BY VULNERABILITY ZONE
CHARLOTTE COUNTY

Land Use Category	Total Facilities	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	16	6	4	3	2	0	1
Wastewater	81	56	13	8	3	1	0
Electricity	5	2	1	2	0	0	0
Transportation	4	2	1	0	1	0	0
Health Care	9	5	4	0	0	0	0
Schools	16	5	8	3	0	0	0
TOTAL	131	76	31	16	6	1	1

Source: SWFRPC

In Charlotte County, there are 131 public facilities. Most are located in areas that are extremely vulnerable to hurricanes. For example, approximately 58% of the total is found in the zone 1 area, which is defined as that portion of the county that would be affected even by minor hurricanes. Conversely, only 2 facilities are located in the Category 5 area or beyond,which are the relatively safer areas. Wastewater treatment plants are located in the most vulnerable area, with 56 or 69% of the total, located in the category 1 zone.

Health care facilities account for the greatest building value of all public facilities in Charlotte County, followed by schools, as seen in the subsequent table. Most health care facilities and schools are located in areas that can be affected by hurricanes. Other important public services include provision of water, wastewater treatment, electricity and transportation, although the values for these facilities amount to much less than that of health care.

Total building values for each type of service are provided in the table below. Values are also allocated to vulnerability zone, based upon their location.

TABLE 60

TOTAL BUILDING VALUE FOR PUBLIC FACILITIES
CHARLOTTE COUNTY ($000)

Land Use Category	Total	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	1,216	468	374	187	94	0	94
Wastewater	2,211	1,612	368	92	92	0	46
Electricity	774	464	309	0	0	0	0
Transportation	2,480	2,106	374	0	0	0	0
Health Care	30,873	8,202	22,671	0	0	0	0
Schools (Education)	19,890	12,182	3,922	3,787	0	0	0
TOTAL	57,444	25,034	28,018	4,066	186	0	140

Note: Transportation consists of airports, bus terminals, marinas, etc. Health care consists of hospitals (public and private), nursing homes, and convalescent and rest homes

Source: Property appraiser tapes, SWFRPC

Building value amounts to $57 million for Charlotte County. The greatest values are found in the education and health care services, which together account for 88% of the total. Building value is greatest in the most susceptible areas (zones 1 and 2), where $53 million, or 92% of total value is found. Thus, the greatest building value is located in the area where potential damage would be most significant.

Building values above have been used to determine potential hurricane losses for each type of storm (using the damage ratios described in Chapter 8). Losses are contained in Table 61 . Examination of the table indicates that losses could amount to $2 million in minimal types of hurricanes to over $26 million in extreme storms. Damage in most cases[1] would be greatest to buildings such as hospitals, nursing homes and similar facilities, while the least amount of damage would be incurred by electrical facilities.

[1] In minor (cat. 1) storms, schools would be damaged the most.

TABLE 61

TOTAL POTENTIAL STORM DAMAGE TO PUBLIC FACILITIES
CHARLOTTE COUNTY ($000)

Land Use Category	Storm Category 1	2	3	4	5
Water	39	118	194	216	222
Wastewater	133	405	670	746	766
Electricity	38	116	192	214	220
Transportation	210	639	1,056	1,176	1,208
Health Care	836	4,596	10,557	13,960	14,675
Schools	1,217	3,880	7,247	8,727	9,482
TOTAL	2,473	9,754	19,916	25,039	26,573

Note: Damage figures are cumulative; for example, damages in a category 2 storm are the sum of damages in both zones 1 and 2.

Source: SWFRPC

COLLIER COUNTY

An examination of public facilities has been made for the following land use categories in Collier County: water, wastewater, electricity, transportation, health care and schools. The totals for each type of facility are given, in relation to their location by storm zone. This information is contained in Table 62.

TABLE 62

PUBLIC FACILITIES BY VULNERABILITY ZONE
COLLIER COUNTY

Land Use Category	Total Facilities	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	22	11	3	3	2	3	0
Wastewater	80	33	8	29	3	7	0
Electricity	11	4	3	3	0	1	0
Transportation	9	3	2	2	0	1	1
Health Care	8	1	4	2	0	1	0
Schools	26	5	6	7	0	7	1
TOTAL	156	57	26	46	5	20	2

Source: SWFRPC

The number of public service facilities totals 156 in Collier County. It is evident from the preceding table that the majority of these facilities (83 or 53% of the total) are located in areas that are most susceptible to hurricane damage (zones 1 and 2). Some facilities are located in the inland areas, primarily in the category 3 zone, where 29% of the total is found. Very few facilities are found outside the most susceptible areas and only 2 facilities are found outside the categories 1-5 areas (and subsequently, not subject to hurricane flooding).

The types of public services that would be most vulnerable would be wastewater treatment plants, due to the large number of facilities in vulnerable areas, and also water plants, due to their location (half the total water plants are located in the category 1 area).

Other types of services would also be affected, although not to the same degree since their numbers are fewer. Most schools are located inland, thus, they would not be affected as severely.

The structural value of public facilities is also necessary to determine potential hurricane loss. Building values for facilities in the previously described land use categories are provided in Table 63, by vulnerability zone.

TABLE 63

TOTAL BUILDING VALUE FOR PUBLIC FACILITIES
COLLIER COUNTY ($000)

Land Use Category	Total	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	639	147	0	470	0	22	0
Wastewater	1,217	197	880	745	0	656	0
Electricity	370	295	70	0	0	5	0
Transportation	942	619	323	0	0	0	0
Health Care	9,648	7,267	1,641	740	0	0	0
Schools	12,268	3,944	0	4,747	0	1,946	1,631
TOTAL	25,083	12,467	2,914	6,032	0	2,038	1,631

Source: Property Appraiser tapes, SWFRPC

Building value for public service facilities in Collier County totals approximately $25 million. The greatest value is found in the education category, with $12 million, followed by health care, with $9 million. A significant portion of the total value could be adversely affected in minor storms ($12 million or nearly 50% in category 1 storms). The greatest building value total is found in the most susceptible areas. Nearly half the total value is located in the most vulnerable area (zone 1), while less than 7% of total value is found outside hurricane-vulnerable areas. Since the majority of structures (and consequently value) are found in the most vulnerable areas, potential damage could be substantial.

To determine potential damage, percentages of damage have been applied to the various types of structures and land uses. Total damage potential from wind and water is given in the following table. It should be noted that the dollar amount of damage for each category is the maximum amount of damage that could occur in a hurricane of the respective category's strength. For example, in a relatively minor hurricane (category 1), damage to wastewater facilities could total $18,000, although damage could conceivably be less (since the damage is based on a combination of possible storm tracks and the greatest amount of flooding for each case was used).

Total potential damage for public facility buildings for Collier County is found in Table 64, for storms of varying intensity.

TABLE 64

TOTAL POTENTIAL STORM DAMAGE
TO PUBLIC FACILITIES
COLLIER COUNTY ($000)

Land Use Category	Storm Category 1	2	3	4	5
Water	9	66	200	3	340
Wastewater	18	126	381	558	648
Electricity	5	38	116	169	197
Transportation	62	209	375	440	455
Health Care	725	2,241	3,870	4,438	4,659
Schools	388	1,080	2,368	3,034	3,700
TOTAL	1,207	3,760	7,309	8,932	10,000

Source: SWFRPC

Table 64 illustrates that potential damage to public facilities due to a hurricane could be substantial, possibly ranging from $1.2 million in minor storms, to $10 million in major hurricanes. The greatest dollar loss would occur to facilities in the health care sector, although damage would also be sizeable for education facilities.

GLADES AND HENDRY COUNTIES

An evaluation of public facilities for Glades and Hendry Counties indicates that, due to the counties' small size and rural nature, facilities are limited. An inventory of public facilities for each county is found below.

TABLE 65

PUBLIC FACILITIES
GLADES AND HENDRY COUNTIES

Land Use Category	Glades County	Hendry County
Water	9	8
Wastewater	16	17
Electricity	3	3
Transportation	1	6
Health Care	3	7
Schools	3	9
TOTAL	35	50

Source: SWFRPC

Since both counties are outside the SLOSH grid and thus would not be affected by saltwater flooding, no flooding damages have been estimated. Wind damage, however, could be substantial to some of these facilities, and freshwater flooding could also create problems. Wind damage by land use type has been estimated in the previous chapter. Wind damages for public facilities (correlated to land use category) in Glades County are given in the following table. Wind categories are based upon increasing wind speed, as described by the Saffir-Simpson scale (See Appendix B).

TABLE 66

WIND DAMAGE TO PUBLIC FACILITIES
GLADES COUNTY ($000)

Public Facility (Related Land Use)	Wind Category				
	1	2	3	4	5
Transportation (Commercial)	7	30	91	222	570
Schools, hospitals (Government)	18	74	227	554	1,424
Schools, hospitals (Institutional)	1	3	10	24	62
Electricity, water & sewer (Miscellaneous)	8	34	195	256	659
TOTAL*	34	141	433	1,056	2,715

*Since these land use categories also contain other types of uses, they are not totally exclusive, thus, damage estimates may be slightly overstated. It should also be noted that schools and hospitals are found under two different land use categories (government and institutional).

SOURCE: SWFRPC

Wind damages vary, depending upon wind speed. Damages to buildings in the above service categories are relatively minor in small storms, but can increase to $2.7 million in major hurricanes. Government buildings would be most detrimentally affected, with damage that could potentially amount to over $1.4 million. Other facilities, such as power substations, water and sewer plants, and transportation facilities could also be adversely impacted by hurricane force winds.

In Hendry County, which is also outside the SLOSH grid and would not be affected by saltwater flooding, there are approximately 50 public facilities. Wind damage to these buildings is provided in the subsequent table, by type of facility and related land use category.[1]

TABLE 67

WIND DAMAGE TO PUBLIC FACILITIES
HENDRY COUNTY ($000)

Public Facility (Related Land Use)	Wind Category 1	2	3	4	5
Transportation (Commercial)	33	140	429	1,045	2,686
Schools, etc. (Government)	76	319	973	2,374	6,099
Schools, hospitals (Institutional)	8	35	108	264	677
Electricity, sewer & water (Miscellaneous)	2	10	32	78	200
TOTAL	120	505	1,542	3,761	9,662

Source: SWFRPC

Damage to public services varies, with increasing wind speed. Potential damage could range from $120,000 in minor hurricanes to $9.6 million in major storms. The facilities most impacted in terms of monetary damage to buildings would be government facilities, including schools and county buildings. Damages to these buildings could conceivably total over $6 million in a major storm. Other categories would not be nearly as detrimentally impacted. Transportation facilities would be somewhat damaged, although damage to schools, hospitals electrical substations, sewer and water facilities would be relatively small.

[1] Categories are not mutually exclusive. For example, the commercial land use category would include transportation facilities, such as airports, bus stations, etc. This specific category also contains damage to businesses. In addition, the government sector includes both schools and county or city-owned land, so the total wind damage would not be exclusively to educational facilities.

LEE COUNTY

Since a hurricane could possibly have a devastating effect upon public facilities (not only directly, in terms of structural damage, but indirectly in terms of loss of service, loss of employment, productivity and social disruption), an analysis of major types of public facilities was made, including vulnerability to hurricanes, total structural value, and projected damage. Table 68 identifies each type of land use by its respective location in vulnerability zones (1-5).

TABLE 68

PUBLIC FACILITIES BY VULNERABILITY ZONE
LEE COUNTY

Land Use Category	Total Facilities	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	38	17	10	4	2	2	3
Wastewater	189	109	35	36	6	1	2
Electricity	30	12	11	4	2	1	0
Transportation	6	1	3	1	1	0	0
Health Care	18	6	7	4	0	1	0
Schools	63	23	24	15	0	1	0
TOTAL	344	168	90	64	11	6	5

Source: SWFRPC

From this table, it can be seen that the vast majority of publice services are located in the areas that are most vulnerable to hurricanes. One hundred sixty-eight services (nearly half the total) are found in the zone 1 coastal area, in comparison to 6 in the inland category 5 area. Three-fourths of the total is found in either zone 1 or 2, the most susceptible areas.

The most vulnerable type of service would be the wastewater treatment category, which includes sewage treatment plants (small package plants and centralized collection systems). In this case, approximately 109 facilities are located in the most vulnerable area (58% of the total). Other categories that would also be detrimentally affected by their location include the water category (water treatment plants), and electrical facilities (power plants, substations, and switching stations). The transportation and health care facilities are primarily located in less vulnerable categories, so they would be less prone to damage. However, they are still found mostly in zones 1 and 2, and damage could still be substantial.

To determine potential storm damage to buildings, total structure values must be known. These values are provided in the following table. Totals are provided for each land use, and values are also allocated to vulnerability zones (1-5).

TABLE 69

TOTAL BUILDING VALUE FOR PUBLIC FACILITIES
LEE COUNTY ($000)

Land Use Category	Total	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	1,987	634	1,156	0	1	156	39
Wastewater	2,164	1,199	609	355	0	0	0
Electricity	9,983	4,405	5,579	0	0	0	0
Transportation	211	201	10	0	0	0	0
Health Care	53,512	16,852	17,010	10,404	0	3,999	5,247
Schools	50,042	9,708	15,383	17,994	0	330	6,627
TOTAL	117,899	32,999	39,747	28,753	1	4,485	11,913

Source: Property appraiser tapes, SWFRPC

Building value for public service facilities for Lee County totals over $117 million. This is a substantial amount, especially since so much of it could be affected by a storm. The greatest building value is in the health care sector, with $53 million, followed by schools, with $50 million. Other sectors are less important in terms of building value. The third most important category is electricity, with nearly $10 million in value. Less important are wastewater, water, and transportation.

Again, examination of this table shows that the majority of structures (in terms of value) are located in the most vulnerable areas. Buildings located in the area that can be affected by a category 1 storm are worth nearly $33 million, or 28% of the total building value for public facilities. Building value generally decreases in the remaining areas, to $4 million in the category 5 area. It should be noted that buildings valued at $11 million (or 10% of total value) are located outside the vulnerable areas.

Wind and water (flooding) damages have been estimated for the previously defined public facilities. Damage estimates were based upon the methodology described in Chapter 2 . Wind damages were relatively small in comparison to flooding damages. Both wind and water damage were combined to arrive at total losses due to hurricanes of varying intensity, as seen in the subsequent table.

TABLE 70

TOTAL POTENTIAL STORM DAMAGE TO PUBLIC FACILITIES
LEE COUNTY ($000)

Land Use Category	Storm Category 1	2	3	4	5
Water	79	274	566	725	834
Wastewater	87	299	617	790	909
Electricity	399	1,378	2,845	3,644	4,193
Transportation	20	58	93	101	104
Health Care	1,933	6,680	13,759	17,637	20,252
Schools	991	4,325	11,888	17,027	20,358
TOTAL	3,509	13,014	29,768	39,924	46,650

Source: SWFRPC

This table indicates that total damage to public facility structures due to a hurricane could be quite substantial. Damages could range from $3.5 million in a minor storm, to over $46 million in a major hurricane. The most damage would occur to the health care sector, in all storms except category 5, where schools would sustain more damage. Significant damages would also occur to electrical facilities, although educational and health care facilities would account for the greatest damage by far. The total damage includes only direct loss to structures, and does not include any capital replacement costs, or indirect costs such as employment loss or loss of output.

SARASOTA COUNTY

Since damage to public facilities due to a hurricane or other natural disaster can have extremely serious consequences and adverse effects upon the provision of necessary public services, an examination of the types and numbers of these community services is necessary to assess potential impacts. An inventory of public facilities has been provided in the following table. The facilities have been located by storm vulnerability area (1-5).

TABLE 71

PUBLIC FACILITIES BY VULNERABILITY ZONE
SARASOTA COUNTY

Land Use Category	Total Facilities	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	35	4	5	11	7	2	6
Wastewater	75	5	9	20	14	2	25
Electricity	15	1	1	5	1	4	3
Transportation	9	0	0	5	2	2	0
Health Care	28	1	3	6	8	4	6
Schools	47	1	2	11	6	10	17
TOTAL	209	12	20	58	38	24	57

Source: SWFRPC

In Sarasota County, there are 209 public facilities in the above categories. The majority of facilities are related to the provision of water and wastewater treatment. These two categories together account for 60% of the total. Most of the facilities are located in areas of the county that are not the most susceptible to hurricane effects. For example, only 15% of the total is located in the most vulnerable areas (zones 1 and 2), while the greatest number of facilities (57% or 27%) are found outside all hurricane-prone zones and thus would not be affected by hurricane flooding.

Damage to public service facilities has been estimated for Sarasota County. Damage to structures is based upon the percentage loss method previously described, which assesses specific damage percentages against the total value of structures. Total building value for each type of land use is found in the following table.

TABLE 72

TOTAL BUILDING VALUE FOR PUBLIC FACILITIES
SARASOTA COUNTY ($000)

Land Use	Total	Vulnerability Zone 1	2	3	4	5	Outside 5
Water	1,293	308	238	137	492	63	55
Wastewater	11,773	522	10,036	231	459	13	510
Electricity	824	29	187	95	13	0	500
Transportation	3,911	0	0	3,126	218	567	0
Health Care	117,211	77,131	6,782	16,301	2,622	12,360	2,014
Schools	69,054	11,499	1,536	10,687	9,296	22,313	13,725
TOTAL	204,066	89,491	18,779	30,577	13,100	35,316	16,804

Source: Property Appraiser Tapes, SWFRPC

In Sarasota County, building value for public facilities amounts to over $204 million. The sector accounting for the greatest value is health care (with $117 million or 57% of the total), followed by schools, with $69 million, of over one-third the total. Other sectors are relatively less important in terms of building values, together accounting for less than 9% of the total.

When the value of buildings is determined for each vulnerability zone, it is evident that the majority of value is found in the most vulnerable area (zone 1). This means that the value of buildings that could be affected by minor hurricanes amounts to $89 million (although the actual damage amount would be much less). Only a relatively small amount ($16 million or less than 19%) is found outside the hurricane-vulnerable areas (outside 5).

Once the building values are determined, potential storm damage can be estimated. It should be noted that these amounts are potential damage, and actual amounts could be less. Loss of value has been estimated in the table below.

TABLE 73

TOTAL POTENTIAL DAMAGE
TO PUBLIC FACILITIES
SARASOTA COUNTY ($000)

	Storm Category				
Land Use	1	2	3	4	5
Water	24	165	412	583	670
Wastewater	223	1,504	3,753	5,313	6,108
Electricity	16	105	261	370	425
Transportation	3	15	503	973	15,006
Health Care	7,703	22,829	39,399	45,640	50,313
Schools	1,166	3,448	7,543	11,047	16,599
TOTAL	9,134	28,066	51,871	63,925	89,121

Source: SWFRPC

Damage totals are variable, depending upon the strength of the hurricane. Damages could total over $9 million in minor types of storms, and up to $89 million in extreme hurricanes. Health care facilities would receive the most loss in structure value in all cases, accounting for 56% of the total loss ($50 million) in major storms. Another important sector where losses would be substantial is schools.

REGIONAL SUMMARY

In Southwest Florida, there are 925 public service facilities. The majority, as expected, are found in the larger counties (Lee and Sarasota), while facilities in the rural inland counties are limited. The wastewater category, which includes

package plants and other treatment facilities, accounts for the greatest number of facilities (half the total). Water treatment facilities are also important. The fewest facilities are those related to transportation. A summary of the number of facilities for each county is found in Table .

TABLE 74

PUBLIC FACILITIES
SOUTHWEST FLORIDA

County	Water	Waste-Water	Electri-city	Transpor-tation	Health Care	Schools	Total
Charlotte	16	81	5	4	9	16	131
Collier	22	80	11	9	8	26	156
Glades	9	16	3	1	3	3	35
Hendry	8	17	3	6	7	9	50
Lee	38	189	30	6	18	63	344
Sarasota	35	75	15	9	28	47	209
REGION	128	458	67	35	73	164	925

Source: SWFRPC

The valuation of public facilities is important in attempting to determine potential losses from a hurricane. Building values for each county are found in the subsequent table. Analysis of this table indicates that the greatest value is found in Sarasota County.[1] The greatest value was found in the most vulnerable storm area (zone 1), with $159 million, or 27% , while other less susceptible areas had proportionately less value.

[1]Values in Glades and Hendry Counties were greater than would be expected because they were not categorized in the same degree of detail as the coastal counties; they included land values as well as some additional categories that were not strictly related to the provision of public service, thus these values are overstated. Values for Charlotte County are unexpectedly greater than those of Collier County, a more populous county. This is due to the tax assessment methods of the respective property appraisers.

TABLE 75

VALUE OF PUBLIC FACILITIES
SOUTHWEST FLORIDA ($000)

County	Total Value ($000)	Vulnerability Zone 1	2	3	4	5	Outside 5
Charlotte	57,444	25,034	28,018	4,066	186	0	140
Collier	25,083	12,467	2,914	6,032	0	2,038	1,631
Glades	37,351*	- -	- -	- -	- -	- -	- -
Hendry	132,903*	- -	- -	- -	- -	- -	- -
Lee	117,899	32,999	39,748	28,753	1	4,485	11,913
Sarasota	204,066	89,491	18,779	30,577	13,100	35,316	16,804
REGION	574,746	159,991	89,459	69,428	13,287	41,839	30,488

*Includes commercial, institutional, government and miscellaneous categories; also includes land values; totals will be overstated.

Source: Property appraiser tapes, SWFRPC

To determine structural damage from various types of hurricanes, specific percentages of damages were applied against total values to assess losses, which are presented for the Region, as well as for individual counties, in Table 76 .

TABLE 76

TOTAL DAMAGE TO PUBLIC FACILITIES
SOUTHWEST FLORIDA ($000)

County	Storm Category 1	2	3	4	5
Charlotte	2,473	9,754	19,916	25,039	26,573
Collier	1,207	3,760	7,309	8,932	10,000
Glades	34	141	433	1,056	2,715
Hendry	120	505	1,542	3,761	9,662
Lee	3,509	13,014	29,768	39,924	46,650
Sarasota	9,134	28,066	51,871	63,925	89,121
REGION	16,477	55,240	110,839	142,637	184,721

Note: Damage in Glades and Hendry Counties is wind damage.

Source: SWFRPC

It is obvious from examination of the above table that potential storm damage is very significant in Southwest Florida. Total damage could range from $16 million in minimal hurricanes to $184 million in major hurricanes. Damage to facilities providing health care would be most severe, while other facilities sustaining significant damage would include schools.

The greatest damage could occur in the most populous counties, especially in Sarasota County, where damage approximates half the total damage in the Region. Potential damage in Lee County is also significant. It should also be noted that these damage figures are primarily based upon appraised values, and replacement costs could be significantly greater.

CONCLUSION

This chapter has examined the losses to public facilities that could occur as the result of hurricanes. Losses for public facilities could range from $16 million in minor types of hurricanes to $184 million in major storms. As a percentage of total building value, however, public facilities account for only a minor portion.

In addition to the direct impact of hurricanes on public facility structures, there are other indirect losses that are less easily quantified. For example, not only would buildings be damaged, but contents of buildings (inventories, etc.) could be destroyed. More importantly, loss of service (such as disruption of sewer service, water, electricity, etc.) is difficult to place a dollar value on but has a great social impact. Another indirect impact is possible loss of employment due to curtailment of services or closing of facilities. Indirect impacts will be examined in a subsequent chapter.

ECONOMIC IMPACTS ON AGRICULTURE

Agriculture is an important industry in Southwest Florida, contributing directly to the economy in terms of income and employment, as well as indirectly, through support industries and related manufacturing. A hurricane could have disastrous impacts upon agriculture such as destruction of crops. The purpose of this chapter is to evaluate the impact of potential hurricane flooding upon the Region's agricultural yield.

The primary impacts of hurricanes on agriculture could result from saltwater flooding. (This impact is explained in detail in the SWFRPC Regional Hurricane Evacuation Plan.) This type of flooding would affect the four coastal counties (Charlotte, Collier, Lee and Sarasota), while the two inland counties (Glades and Hendry) could be subject to wind damage and possible freshwater flooding. Although these two types of damage are much less severe than saltwater flooding, impacts will be discussed for all counties, with emphasis on the four coastal counties.

The chapter is organized in the following manner. First, the value and importance of agriculture to the local economies will be explained. This will include an analysis of different types of agriculture.

Second, the soils capable of supporting significant agricultural activity will be depicted and discussed. This will include areas that may currently be vacant, but because of soil suitability, may be utilized for agricultural activity in the future. This type of analysis is necessary because expanding urban areas are infringing upon lands currently used for agriculture; future agricultural areas may include those lands that are presently vacant.

Third, suitable agricultural soils that are subject to hurricane inundation will be depicted on maps by soil type and by storm categories 1, 2, 3, 4, and 5. These categories or vulnerability zones will reflect all areas that may be flooded by storms in any specific category.[1]

Based upon the percentage of agriculturally suitable soils inundated by a given storm category, the final step will provide estimates of short and long term agricultural loss for each storm category in each coastal county. Particular emphasis will be given to fruit crops, which are especially important in the State of Florida, and are vulnerable to severe damage from hurricanes.

AGRICULTURE AND ITS IMPORTANCE TO THE REGION'S ECONOMY

Agriculture is an important component of the Region's economy. In 1978, the year of the most recent agricultural census, such activity contributed $108,298,000 to the economies of Charlotte, Collier, Glades, and Hendry counties; $91,549,000, or 84.5% of this amount, is from crop sales with the remainder from livestock production, primarily cattle. Relevant information is presented by county, on the following page.

[1] Each zone reflects the maximum possible flooding for a number of storms of a given intensity, and is not the result of any one particular storm.

TABLE 77

Market Value of Agricultural Products, 1978
Value ($000)

County	Total Market Value	Crops	Livestock Total	Livestock Percent Cattle	Total Cash Receipts (1979)
Charlotte	13,037	9,646	3,391	74	12,302
Collier	45,371	40,455	4,916	91	76,361
Lee	38,864	36,794	2,069	82	40,703
Sarasota	11,026	4,654	6,372	62	16,034
Total	108,298	91,549	16,748	75	145,200
Florida	3,047,231	2,176,214	871,017	36	4,124,591

Source: 1978 Census of Agriculture, Vol. 1; Florida Statistical Abstract, 1981

The value of products sold within these four counties accounted for 3.6% of the State's total in 1978, and 3.5% of cash receipts in 1979.

The importance of the different types of crops varies among the four coastal counties. Using the basic categories of Vegetables, Fruits and Nursery products, statistics indicate that vegetable crops are the most important crop (in terms of value) for three of the counties, while fruit crops are the most important category for one. This is depicted below in Table 78.

TABLE 78

Relative Importance of Crops
(% of total value)

County	Crop: Vegetables	Fruits	Nursery	Other*
Charlotte	29%	55%	16%	--
Collier	79%	15%	4%	2%
Lee	46%	14%	39%	1%
Sarasota	39%	22%	31%	8%

Source: 1978 Census of Agriculture

*Other includes hay, feed crops, grains, etc.

This agricultural activity in 1978 was supported by 1,019 farms within the four counties, containing 808,603 acres, or 31% of the total area in the four counties. The average farm value, including land, structure and improvements, ranged from $564,580 in Lee County to $978,818 in Collier County, as noted in the subsequent table.

Cropland, although the most economically important agricultural use, occupied the least farmland acreage, 15.1%. Woodland was the next most intensive, using only 23% of total farmland, with pasturage and rangeland (the least intensive) utilizing the greatest amount of land (62% of the total). Pertinent farm and farmland statistics are reflected in Table 79 below.

TABLE 79

Characteristics of
Farms and Farmlands, 1978

	COUNTY				
	Charlotte	Collier	Lee	Sarasota	Total
Number of Farms	183	219	366	251	1,019
Total Acres	169,181	295,479	107,182	236,761	808,603
Average Farm Value	780,696	978,818	564,580	718,762	N/A
Average Value per Acre	862	728	1,611	750	N/A
Total Cropland Acreage	35,392	39,532	32,462	14,793	122,179
Harvested Cropland	13,388	22,817	20,412	5,534	62,151
Cropland Used for Pasture	19,362	11,935	8,370	9,005	48,672
Other Cropland	2,642	4,780	3,680	254	11,356
Woodland Acreage	46,209	73,992	9,855	55,682	185,738
Other Land (Pasture/Range)	87,580	181,955	64,865	166,286	500,686
Citrus Acreage (1980)	6,122	6,706	5,531	1,538	19,817

Source: 1978 Census of Agriculture; 1980 Citrus Summary

Note: N/A = Not Available

SOIL AND SOIL CATEGORIES

Soil type is directly related to the kind of activity that an area can support. Some types of soils are capable of supporting agricultural activity, while others are not. Certain soils are more suitable for specific agricultural activities. This chapter will address those soils capable of supporting intensive and relatively high yield agricultural activity, such as cropland. Soils that are suitable for supporting improved rangeland or unimproved pasturage are not as important due to their relatively low productive value. Soils which are unsuitable for agricultural activity will not be evaluated.

As seen in Table 80, most of the area's soils are highly suitable for improved pasturage, while virtually no area has a similar suitability for citrus crops. Using the categories contained in the Florida General Soils Atlas, the suitability of soils for agricultural activity varies among counties, ranging from least suitable in Collier County where only 41% of soils are suitable for agriculture to the highest suitability in Sarasota County (where 83.5% of soils could be used for agriculture). Soil categories are defined in the Appendix, and generalized soils are depicted on Maps 14-17. These maps indicate generalized areas that have some potential for agricultural use, according to their soil characteristics.[1] Since some of these areas are already urbanized, acreage for urban areas will be excluded when calculating land use and potential damages.

[1] For example, in Lee County, only five types of soils (category #'s 2,3,4,5 and 7) are suitable to some degree for agricultural use. These are not the same as prime agricultural soils.

Table 80

AGRICULTURAL POTENTIAL OF GENERALIZED SOILS

COUNTY	SOIL CATEGORY*	Potential for CITRUS	TRUCK CROPS	IMPROVED PASTURE	% OF TOTAL SOILS
Charlotte	2	L	M	H	3.5
	3	L	M	H	13.5
	4	L	M	H	18.5
	5	M	H	H	0.5
	6	M	H	H	32.0
	7	M	H	H	8.5
	8	L	H	H	1.5
	10	M	H	H	0.5
					78.5
Collier	3	L	M	H	10.5
	4	M	H	H	1.0
	5	M	H	H	1.5
	6	L	H	H	13.0
	7	L	H	H	0.5
	8	M	H	H	1.5
	9	M	H	H	0.5
	10	L	M	M	12.5
					41.0
Lee	2	L	M	H	26.5
	3	M	H	H	26.5
	4	M	H	H	3.5
	5	L	H	H	15.5
	7	L	H	H	3.5
					75.5
Sarasota	2	L	M	H	0.5
	3	L	M	H	12.5
	4	L	M	H	43.5
	5	M	H	H	0.5
	6	M	H	H	23.5
	7	M	H	H	1.0
	9	L	H	H	1.0
	10	L	H	H	1.0
					83.5

SOURCE: The Florida General Soils Atlas, with Interpretations for Regional Planning Districts IX and X, Florida Division of State Planning, July, 1975.

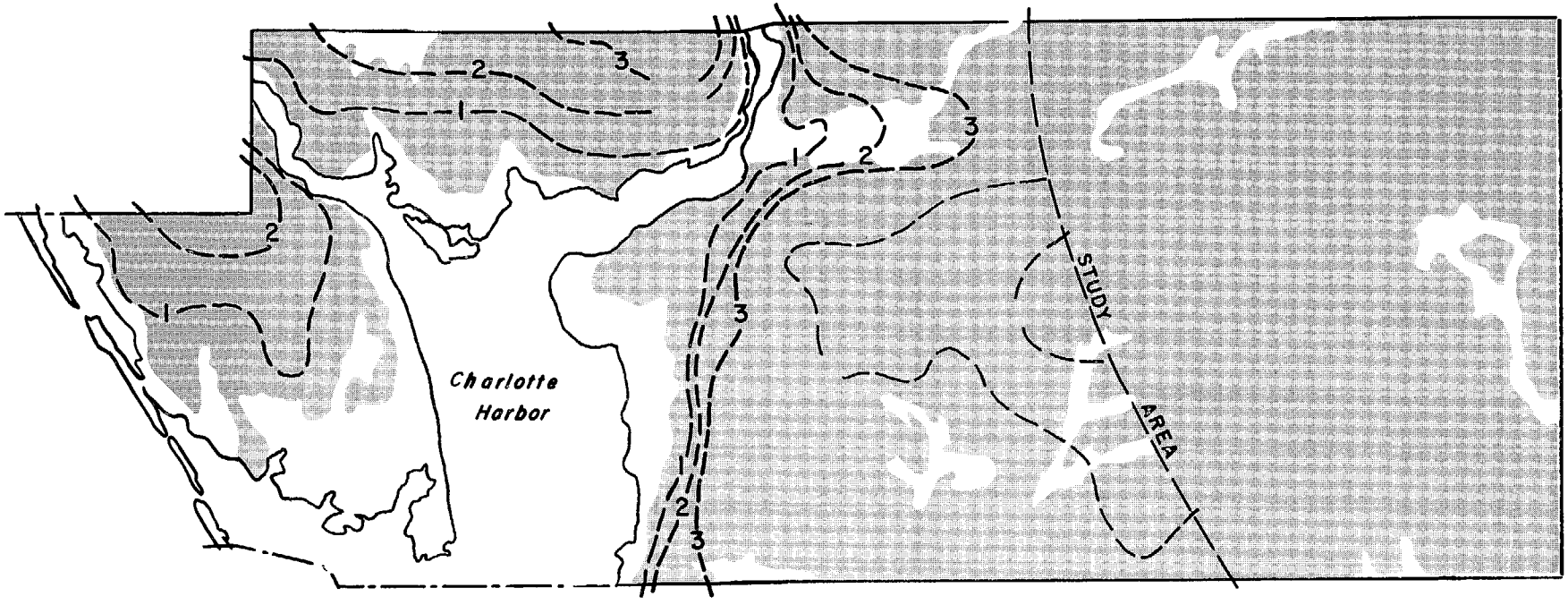
L = Low M = Medium H = High

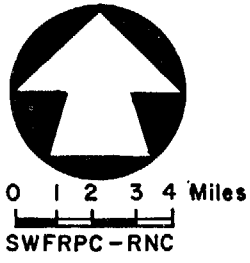
*Soil Category Definitions

Soil #'s 2-7 - areas dominated by moderately well to poorly drained soils not subject to flooding.

Soil #'s 8,9,10 - areas dominated by poorly and very poorly drained soils subject to flooding.

(See Appendix I for detailed definitions)



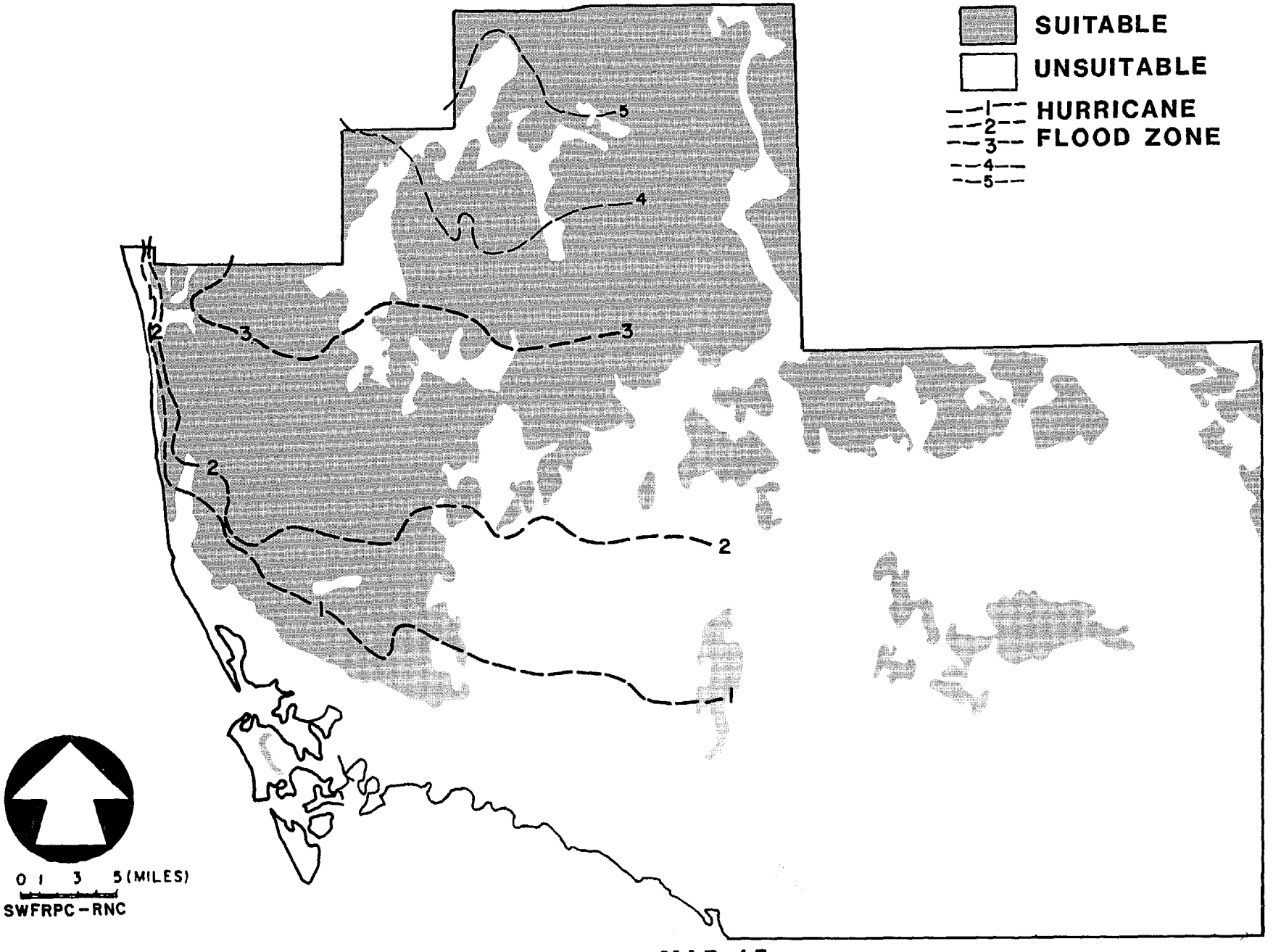


SUITABLE

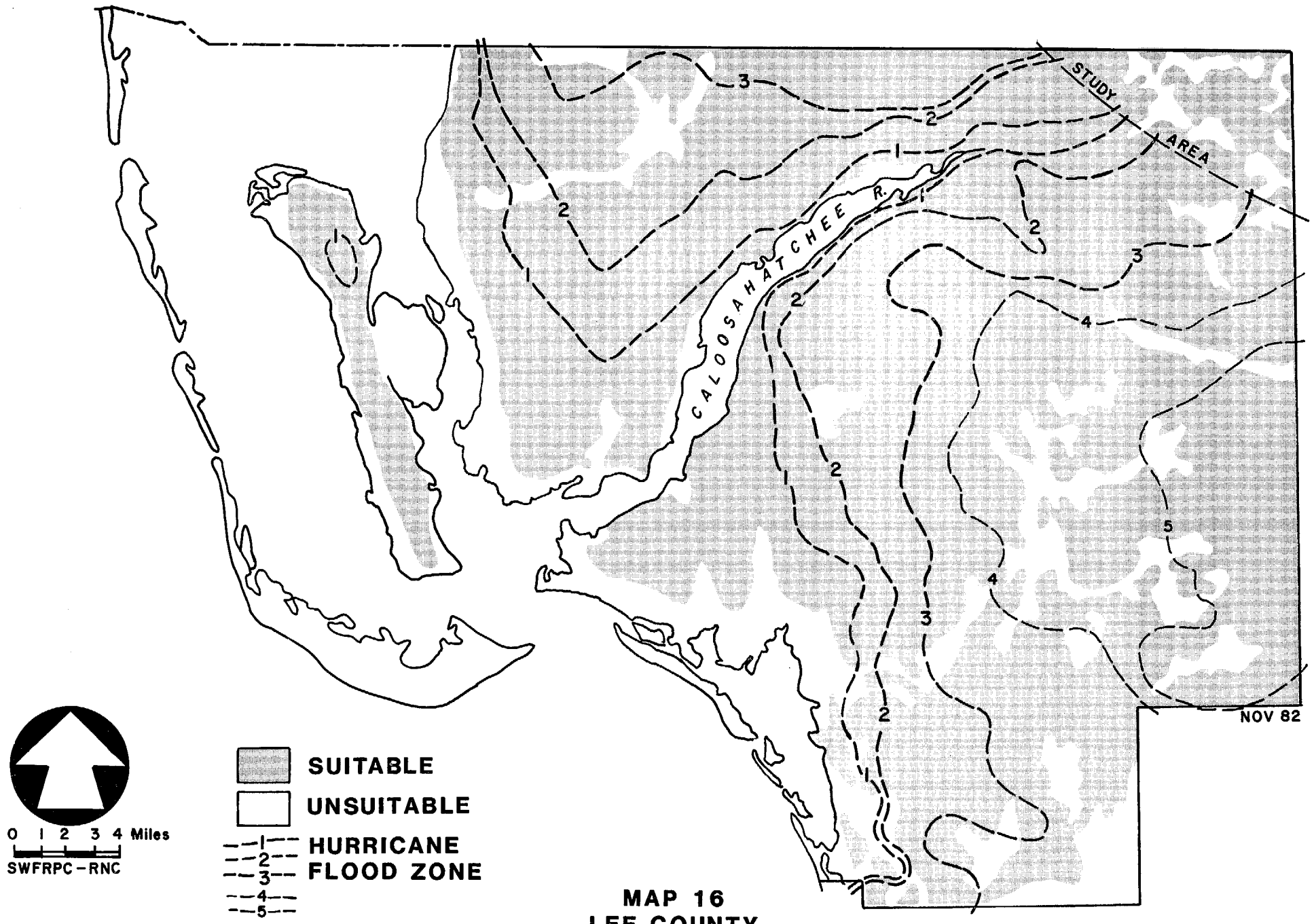
UNSUITABLE

1 HURRICANE
2 FLOOD ZONE
3
4
5

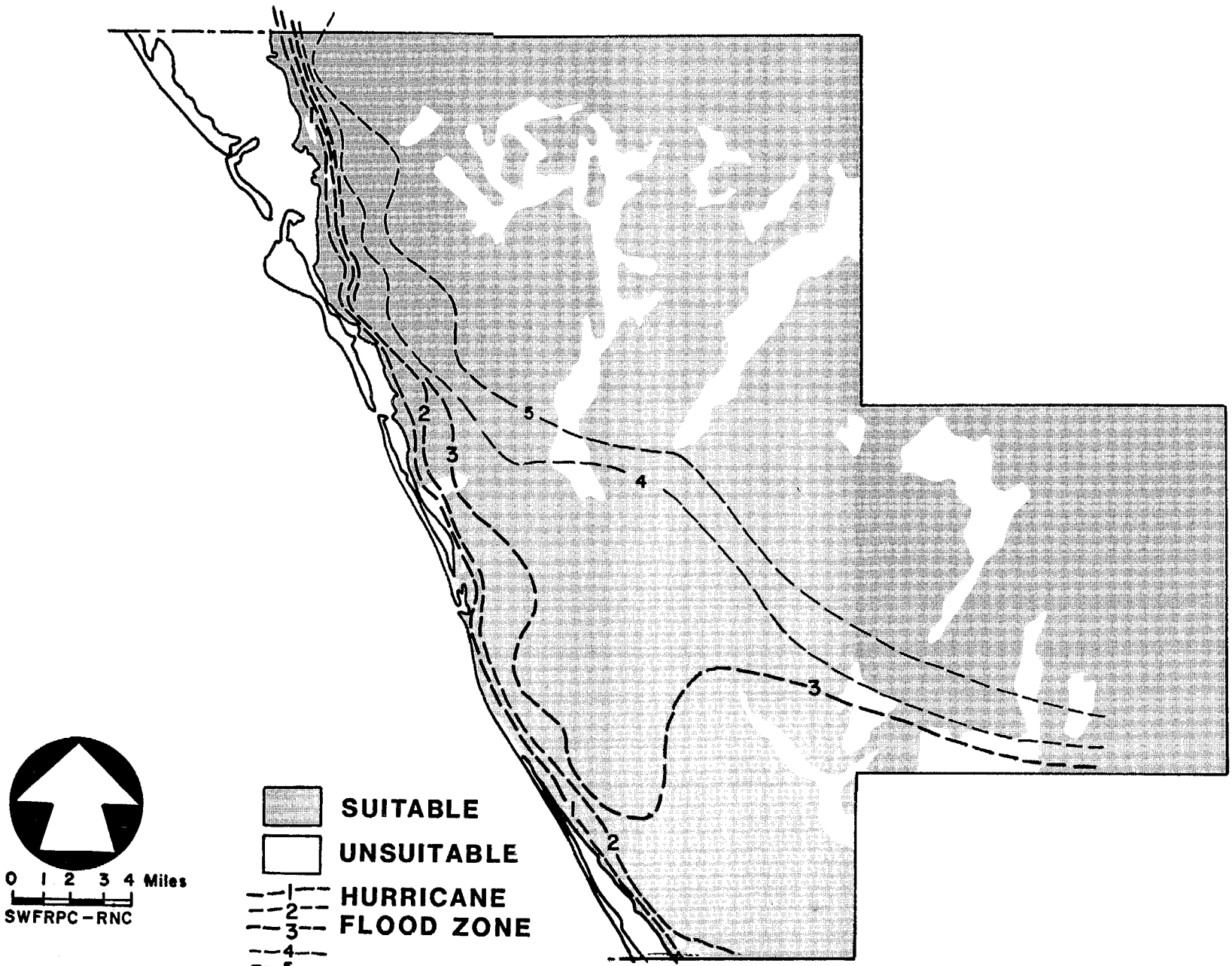
MAP 14
CHARLOTTE COUNTY
LAND SUITABLE FOR AGRICULTURE



MAP 15
COLLIER COUNTY
LAND SUITABLE FOR AGRICULTURE



MAP 16
LEE COUNTY
LAND SUITABLE FOR AGRICULTURE



MAP 17
SARASOTA COUNTY
LAND SUITABLE FOR AGRICULTURE

Soils that had very low potential for agricultural purposes were not included in the inventory. These primarily include saltwater and freshwater wetlands and barrier island areas. Soils with high suitability are probably currently used for agricultural purposes.

SOILS SUBJECT TO INUNDATION

The soils depicted in Maps 14-17 are subject to inundation by different types of storms. Using the storm categories 1-5 provided by the National Hurricane Center, the Council has previously prepared hypothetical inundation lines for its Southwest Florida Hurricane Evacuation Plan. These lines, overlaid on the soils maps (See Maps 14-17), depict the maximum amount of soils suitable for agricultural activity, that would be inundated by saltwater flooding in different storms. Analysis of the maps indicates that the vast majority of agricultural soils is located within the hypothetical flood lines; thus, these areas are subject to potential hurricane flooding and damage. The amount of land suitable for agricultural use in the four county area totals 1,989 square miles; of these, approximately 1,602 square miles are either subject to inundation or have already been used for urban purposes (See Table 81). The greatest percentage of these soils occurs in Lee County, with 82.2% either urban or subject to flooding; the lowest in Sarasota, with 55.9%.

Excluding soils already used for urban purposes, approximately 53.7% of the soils suitable for agriculture are subject to inundation. The percentage of inundation ranged from a low of 39.3% in Sarasota to a high of 75.4% in Lee County. Table 81 depicts the amount and percentage of agricultural soils subject to hurricane-induced saltwater flooding. To determine the amount of soils with agricultural potential, as well as the amount of soils subject to flooding, acreages were measured with a compensating polar planimeter.

TABLE 81

AGRICULTURAL SOILS[1]
BY HURRICANE ZONE (sq. mi.)

County	Agricultural Soils by Hurricane Zone (sq. mi.)					Total Soils in Hurricane Zones[2]	Total Agricultural Soils[3]	% of Total[4]	Total Urban Use	Total in Hurricane Zones & Urban Use	Total County Size
	1	2	3	4	5						
Charlotte	32.5	23.4	76.5	105.9	40.2	278.5	438.2	63.6	106.9	385.4	703
Collier	31.5	40.8	119.4	105.7	30.1	327.5	771.3	42.5	132.2	459.7	2006
Lee	45.2	36.5	101.8	85.2	54.3	323	428.6	75.4	164.1	487.1	785
Sarasota	- -	4.5	48.3	62.1	23.1	138	350.7	39.3	131.7	269.7	587.3
Total	109.2	105.2	346	358.9	147.7	1,067	1,988.8	53.7	534.9	1,601.9	4,081.3

1 Soils with agricultural potential.
2 Excluding Urban.
3 Total for each county (including zones 1 through 5, and outside zone 5).
4 Soils in hurricane zones as percent of total agricultural soils.

Source: SWFRPC.

POTENTIAL AGRICULTURAL LOSS

Inundation of agricultural areas due to hurricane flooding causes both short and long term impacts, which vary according to the type of agricultural activity. For purposes of this analysis, there are three primary types of agriculture: livestock, annual crops, and tree crops (primarily citrus). Nursery products will be defined as an "annual" crop, although a substantial portion of nursery business involves perennial plants.

Livestock

Marketed livestock value in the four coastal counties was $16,748,000 in 1978 (See Table 77). Total livestock value (including livestock kept and not marketed) is not provided but may be estimated from livestock summaries. Such summaries indicate that cattle, the primary livestock in Southwest Florida and the only one with consistent statistics, are marketed at an average of 42% of the herd each year. Assuming that, overall, only 42%[1] of the total livestock value is reflected by marketing value, total livestock value in the four counties would amount to $39,876,190.[2]

The damage that hurricane-induced flooding could cause would be twofold--loss of livestock by drowning and the loss of pasture. The loss of livestock would take approximately three years to replace (reflecting the maturation of a new generation), whereas pasturage should be restored after one good growing season, or approximately one year. It will be assumed for the purpose of this study that in the event of a hurricane, livestock will be removed from flood hazard areas (either transported to safer areas or moved to higher ground), thus, only livestock loss due to flooding of pasture land will be considered.

Total value of livestock in the four coastal counties is estimated in this report to be $39,876,190 (in 1978 dollars). Assuming all livestock production occurs on soils with a high potential for improved pasture, and assuming that all production within each county is equal for each soil type, (and that all land suitable for agriculture would be used for that purpose) it is possible to estimate the degree of potential livestock loss, based upon the percentage of suitable soils for each zone in relation to total potential pastureland in the county. (Since livestock production is a transitional use of land, the recognition of any specific location as a high producer of livestock would be of limited value.) The potential livestock loss is estimated in Table 82.

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[1] See Florida Department of Agriculture and Consumer Services annual "Livestock Summary".

[2] $16,748,000 ÷ 42% = $39,876,190

Table 82

Estimated Livestock Value and the Potential for Loss
($000)

County		Total Estimated Value	Hurricane Zone 1	2	3	4	5	Total
Charlotte	$	8,074	597	428	1,413	1,946	743	5,127
	%		(7.4%)	(5.3%)	(17.5%)	(24.1%)	(9.2%)	
Collier	$	11,705	480	620	1,814	1,604	4,564	4,975
	%		(4.1%)	(5.3%)	(15.5%)	(13.7%)	(3.9%)	
Lee	$	4,926	517	419	1,172	980	626	3,714
	%		(10.5%)	(8.5%)	(23.8%)	(19.9%)	(12.7%)	
Sarasota	$	15,171	0	197	2,094	2,685	1,001	5,978
	%		(0%)	(1.3%)	(13.8%)	(17.7%)	(6.6%)	
Coastal Region	$	39,876	1,595	1,664	6,493	7,215	2,826	19,793
	%		(4.0%)	(4.2%)	(16.3%)	(18.1%)	(7.1%)	(49.6%)

Source: U.S. Census of Agriculture, Livestock Summaries, SWFRPC.

Examination of the previous table indicates that loss of livestock (due to flooding of pastureland) could amount to nearly $1.6 million in minor storms (category 1), and could total over $19.7 million in major hurricanes, based upon total value.

Cropland

Cropland is one agricultural activity that has been particularly affected by encroaching urbanization. Traditional areas used for intensive crops along the coast have been displaced by rapidly increasing residential and commercial land uses. As a result, areas further inland have been developed for cropland while most of the coastal cropland has been lost. This process has somewhat diminished the effect upon cropland from lesser force hurricanes. Assuming the urbanization process continues, additional cropland (especially in coastal areas) will be lost to competing land uses, thus further reducing potential saltwater flooding impacts upon cropland.

It has been estimated that cropland flooded by saltwater will be relatively purified by one good rainy season.[1] Consequently, any crop reduction experienced by hurricane losses may, to a large extent, be restored within one and one-half years. Some nursery activity, however, may take longer to restore.

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1. County agricultural extension agent, Lee County.

For the purposes of this analysis, soils rated as either highly or moderately suitable for truck crops will be deemed as supporting all crop activity in the area. Grove land will be excluded, since it will be examined separately.

Marketed crops, including nursery products, contributed $73,972,000 to the economy of the area in 1978. The crop value in areas subject to inundation amounts to $42,637,000, or 57.6% of the total. The greatest amount subject to inundation is in Lee County with $23,820,000; the least in Sarasota County, with $1,435,000. The degree of vulnerability and potential loss are indicated below in Table 83.

Table 83

Crop Value and Potential For Loss
By Zone ($000)

County		Total Estimated Value*	Hurricane Zone 1	2	3	4	5	Total Subject to Flooding
Charlotte	$	4,373	324	232	765	1,054	402	2,777
	%		(7.4%)	(5.3%)	(17.5%)	(24.1%)	(9.2%)	
Collier	$	34,365	1,429	1,821	5,327	4,708	1,340	14,605
	%		(4.1%)	(5.3%)	(15.5%)	(13.7%)	(3.9%)	
Lee	$	31,591	3,317	2,685	7,519	6,287	4,012	23,820
	%		(10.5%)	(8.5%)	(23.8%)	(19.9%)	(12.7%)	
Sarasota	$	3,644	0	47	503	645	240	1,435
	%		(0.0%)	(1.3%)	(13.8%)	(17.7%)	(6.6%)	
Coastal Region	$	73,972	5,050	4,785	14,114	12,694	5,994	42,637
	%		(6.8%)	(6.5%)	(19.1%)	(17.2%)	(8.1%)	(57.6%)

Source: 1978 Census of Agriculture and SWFRPC estimates
*Excluding groves

The preceding table indicates that, in minor types of storms, damage to crops could amount to $5 million; in major hurricanes, however, damages could exceed $42 million, or 57% of total crop value. It should be noted that the loss potential is based upon the percentage of suitable cropland in each vulnerability zone.[1]

Groves

Damage to groves by floodwaters may have the greatest long term impact upon the area's agriculture. It has been estimated that a sustained period (8 hours) of saltwater inundation can result in the death of citrus trees, the predominant form of grove activity in the area.[2] After the soils are flushed by the following rainy season, it will take approximately seven years in order for replanted groves to begin to bear fruit.

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[1] To determine losses for each hurricane zone the percentage of agriculturally-suitable soils for each zone (in parentheses in Table 83) is multiplied by the total estimated crop value for each county. For example, to calculate potential losses for zone 1 in Charlotte County, the percentage of suitable soils (7.4%) is multiplied by total value of $4,373,000 to arrive at $324,000 total loss.

[2] Source: Bob Curtis, Lee County Agricultural Agent, 1982.

It is fortunate that most of the area's groves are outside of areas subject to inundation. Charlotte County's groves are the most vulnerable; 42.3% are within a flood zone. Sarasota's groves are the least exposed, with only 8.4% in susceptible areas. The following table illustrates the amount of grove land subject to flooding.

TABLE 84

Grove Exposure, (Acres and Percent)

County		Total Acres in Groves	Hurricane Zone 1	2	3	4	5	Total Subject To Flooding
Charlotte	$	7,246	67	901	790	1,189	120	3,067
	%		(0.9%)	(12.4%)	(10.9%)	(16.4%)	(1.7%)	(42.3%)
Collier	$	6,368	0	15	260	400	178	853
	%		(0%)	(0.2%)	(4.1%)	(6.3%)	(2.8%)	(13.4%)
Lee	$	6,911	352	410	525	0	0	1,287
	%		(5.1%)	(5.9%)	(7.6%)	(0%)	(0%)	(18.6%)
Sarasota	$	1,714	12	0	99	15	18	144
	%		(0.7%)	(0%)	(5.8%)	(0.9%)	(1.1%)	(8.4%)
Coastal Region	$	22,239	431	1,326	1,674	1,604	316	5,351
	%		(1.9%)	(6.0%)	(7.2%)	(7.5%)	(1.4%)	(24.1%)

Source: SWFRPC, totals and percentages rounded

The acreage was determined from 1979-1980 REDI-book aerial photographs for the coastal counties. Acreages were measured with a compensating polar planimeter, utilizing the region's land use inventory as the basis for determining grove acreage.

Table 84 illustrates areas subject to flooding as a result of various strengths of hurricanes. For example, in Lee County there are 6,911 acres of groves, but only a relatively small percentage of this total is vulnerable to flooding. In very minor storms, approximately 352 acres could be affected, while a major storm could impact 1,287 acres, or 18% of total grove land.

It is possible to estimate the value of the exposed groves, by using the number of acres inundated as a measure of the percentage of market value of fruit crops lost, and a multiplier of 7 to reflect the number of years it would take to restore grove land to its previous level of productivity. For example, in a minor hurricane, approximately $2 million of crops could be lost, whereas in major storms, the value of lost crops could total $28.7 million (over a 7 year period). This $28 million

accounts for approximately 23% of the total market value of grove production. This value is greatest in Charlotte County at $15,610,000, and least in Sarasota, at $602,000. The value of the groves by zone is estimated in Table 85 below.

Table 85

Grove Valuation Lost, By Zone ($000)

County	Total Value	Hurricane Zone 1	2	3	4	5	All Zones
Charlotte	36,911	332	4,577	4,023	6,053	627	15,612
Collier	42,630	0	85	1,748	2,686	1,194	5,713
Lee	36,421	1,857	2,149	2,768	0	0	6,774
Sarasota	7,077	50	0	410	64	78	602
Total	123,039	2,239	6,811	8,949	8,803	1,899	28,701

Source: U.S. Census of Agriculture, SWFRPC estimates

It should be noted that mature groves (considerably older than seven years) bear more fruit than younger groves[1]; consequently, it may take more than seven years to return areas to previous levels of productivity.

SUMMARY OF AGRICULTURAL LOSS IN COASTAL COUNTIES

Substantial portions of the area's agricultural lands are located in areas that are vulnerable to hurricane flooding. Approximately 53.7% of the area's soils suitable for agriculture are located within these zones. Within these zones lie approximately 49.6% of the area's livestock, 57.6% of the area's crops, and 24.1% of the area's groves. Since most of the agricultural activity is found in less susceptible zones (over 43% is located in the category 3 area, and significant amounts are also found in zones 4 and 5), however, the probability of massive flooding is low. In fact, over half the livestock areas and three-fourths of the Region's groves are located outside all vulnerable areas, and they would not be exposed to saltwater flooding (although wind and freshwater flooding damage could occur). The percentage of major types of agricultural activity for each zone is depicted on Table 86 on the following page.

[1]University of Florida, Institute of Food and Agricultural Services.

TABLE 86

Percentage of Agricultural Activity by Hurricane Zone

Agricultural Activity	Hurricane Zone 1	2	3	4	5
Livestock	4.0	4.2	16.3	18.1	7.1
Crops	6.8	6.5	19.1	17.2	8.1
Groves	1.9	6.0	7.2	7.5	1.4
Total Losses ($000)	8,884	13,260	29,556	28,712	10,719
Cumulative Losses ($000)	8,884	22,144	51,700	80,412	91,131

Source: SWFRPC.

The previous table indicates the combined dollar losses to agricultural in each vulnerability zone. For instance, in minor storms damage to agriculture (livestock, crops and groves) could amount to $8.8 million. The amount of potential damage increases by zone, and potential dollar losses could amount to $91 million in major hurricanes (the combined total for all zones). Crops losses would be most significant, totaling $42 million or 47% of the total, followed by grove damage ($28 million) and livestock loss ($19 million).[1]

AGRICULTURE AND PROJECTED LOSS IN THE INLAND COUNTIES

Agriculture is the predominant form of economic activity in the two inland counties of Glades and Hendry. The appraised value of agricultural land alone totaled $314 million in Glades County and $660 million in Hendry County.[2] As the dominant land use category, agricultural land accounted for 78% of the total value of property in Glades County, and 68% of the total in Hendry County. Other pertinent characteristics are found in the subsequent table.

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1 See Tables 82, 83 and 85.
2 See Tables 43 and 45.

TABLE 87

Farmland Characteristics
Glades and Hendry Counties

	Glades County	Hendry County
Number of Farms	160	290
Total Acres	493,850*	648,248
Average Farm Value	2,464,706	1,606,740
Average Value per Acre	797	734
Total Cropland Acreage	33,744	103,687
Harvested Cropland	14,795	74,919
Cropland used for Pasture	(D)	18,178
Other Cropland	(D)	10,590
Woodland Acreage	74,531	108,058
Other Land (Pasture/Range)	385,575	436,503
Citrus Acreage (1980)	3,395	30,086

* Acreage exceeds county total due to some holdings in other counties
(D) - information not disclosed due to confidentiality.
SOURCE: 1978 Census of Agriculture, SWFRPC Economy Report p. 81, 1982.

Potential Agricultural Loss

Glades and Hendry Counties are located inland, away from the damaging effects of saltwater produced by hurricanes. Despite this, these counties are still subject to potential freshwater flooding and wind damage. Freshwater flooding could occur from prolonged rainfall (which may or may not be due to a hurricane) while riverine flooding could occur if rainfall amounts were great enough to cause rivers to overflow their banks. A third type of flooding could occur if Lake Okeechobee (which is adjacent to both Glades and Hendry Counties and their two major cities)were to overflow. Although this happened once (during the hurricane of 1926), it is possible but extremely unlikely since a dike has been built around the Lake to prevent future occurrences. Wind damage is also possible in the inland counties, and could be great if a major hurricane were to pass directly over these two counties.

In order to assess potential agricultural damage, a methodology is necessary with which to correlate the percentage of damage with other factors, such as wind speed, or height or length of time of freshwater flooding. Unfortunately, no such methodology currently exists. It is possible, however, to make some generalizations about agricultural damage. For example, according to county agricultural extension agents,[1] wind damage could be severe when winds exceed 100 miles per hour.

Wind damage would be especially detrimental to citrus, and could cause trees to be uprooted due to their shallow root systems. Once trees are uprooted, it is at least 5 years before they begin to bear fruit, and 11 years until maturity;

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1 Interview with agricultural extension agents Victor Yingst & Doug Ross - Lee and Hendry Counties.

consequently, such damage is long-lasting. Other crops that could also be affected include sugarcane, which could be sandblasted and flattened by high winds.[1] These grassy-type crops, however, would generally be less adversely affected by winds than would citrus.[2] Wind damage would also depend on the type of storm (its intensity and storm track).

Flood damage is also possible. Although saltwater flooding is more damaging, major damage could occur to crops as a result of sustained freshwater flooding. If water is left standing for a period of 72 hours, damage could be devastating as the result of root damage, which occurs due to lack of oxygen (the air is taken out of the soil). Since hurricane waters generally recede within twelve to twenty hours, sustained flooding would probably not occur except in areas of poor drainage or where rainfall had preceded a hurricane and caused pre-hurricane flooding.

Some flooding damage to livestock is possible but unlikely. Drowning is possible, although cattle tend to seek higher ground (hammocks, etc). Although saltwater flooding can kill pastureland, freshwater flooding would probably not be damaging because grass is more resilient that other types of crops.

Since a methodology does not exist to correlate the percentage of damage to either wind speed or flooding levels, only one estimate of total potential damage has been calculated. This estimate is based upon total value of crops and groves. It will be assumed that livestock damage will be negligible,[3] since freshwater flooding would not damage pastureland as saltwater would.

The following table depicts the value of agricultural products in the inland counties.

TABLE 88

Value of Agricultural Products ($000)
Glades and Hendry Counties

Product	Glades County	Hendry County
Vegetables	2,333	19,507
Fruits	2,049	32,771
Other	4,931	8,982
Total Crop Value	9,323	62,739

Note: Totals may not add due to disclosure of confidential information.

Source: 1978 Census of Agriculture

1 Hurricane Iwa, with winds reaching 110 mph which hit Hawaii in November, 1982, damaged the sugarcane crop in this manner.
2 According to Doug Ross, Hendry County Extension Service.
3 Livestock is an important product in both counties with a value of $14,971,000 in Glades County, and $21,111,000 in Hendry County.

The value of crops was used to determine total potential damage. The market value for "vegetables" and "other" was used, while the value of citrus (fruits) was multiplied by seven (as in the other counties) to estimate total damage, since it has been assumed that destruction of citrus trees would have a long-term impact. For the other crops, it was assumed that only that year's crops would be destroyed. Total estimated damages are provided in Table 89.

TABLE 89

Total Potential Agricultural Damage ($000)
Glades and Hendry Counties

Product	Glades County	Hendry County
Crops	7,264	28,489
Citrus	14,343	229,397
Total	21,607	257,886

Based upon the previous table, crop damage could be severe, totaling $279 million in the inland counties. Damage in Hendry County would be especially great, due to its large citrus production. It should be noted, however, that this damage would occur only in severe storms, with winds exceeding 100 mph and sustained flooding (lasting for 72 hours).

Summary

Since Glades and Hendry Counties are agriculturally-oriented, any damage to crops could have a major impact on the economy of these two counties. It has been estimated that damage to crops and citrus could amount to $279 million, an amount greater than that of the coastal counties combined (although this amount of damage would only occur in a severe storm). This amount of damage would have a very detrimental effect on both counties, especially when considering their small size and limited resource base.

ECONOMIC EFFECTS UPON EMPLOYMENT

The previous chapters analyzed the potential structural damage caused by hurricanes. This chapter will examine the impacts of hurricanes upon the area's economy and employment, focusing on temporary employment loss resulting from hurricanes of varying intensity. Employment loss (the number of employees out of work and lost income) will be identified for each major type of land use and each category of hurricane. The impact of this potential loss upon the economic development of the Region will also be examined.

METHODOLOGY

In order to define and quantify potential short-term employment losses due to various types of hurricanes, "short-term" must be defined, and the types of employment that will be affected must be clarified.

In defining short-term impacts, a survey of existing literature was made. Although several studies have been done addressing the long-term impacts of hurricanes and other natural disasters, very little information is available concerning short-term impacts. The studies that have been done are primarily case studies of various types of natural disasters, including hurricanes, earthquakes and floods. These studies have shown that short-term impacts can persist for a period as short as two months to a period exceeding 8 years.[1] Each case is unique; however, in the cases examined, short-term impacts generally persisted for one year or less, so a one year period will be used as the maximum impact period.[2] The short-term period is defined as both the immediate post-disaster recovery period as well as the time during which reconstruction takes place to return the area to its predisaster condition.[3]

Employment losses have been estimated for hurricanes of differing strengths, ranging from minor storms to major hurricanes. Five groups of storms have been used, as defined previously, ranging from Category 1 (minimal), to Category 5 (major storms). Within each grouping, a variety of storms have been plotted, using different combinations of storm directions, expected landfalls and wind speeds. The worst case storm (maximum amount of flooding for each plotted point) was used for each category. Thus, it is improbable that any single storm would do the projected amount of damage and employment loss.

To determine short-term losses, first the types of employment that would primarily be affected by hurricanes were identified, then, the number of employees in each affected category was ascertained. From this, employment losses were estimated. It should be noted here that not all types of employment would be similarly affected by hurricanes. For example, construction employment may be temporarily

[1] James D. Wright et al., After the Clean-Up, 1979, p. 44 (See Bibliography for books containing case studies).

[2] In severe cases, it may take longer to fully recover from a natural disaster but most employment and other effects dissipate within one year (After the Clean-Up, p. 46, and Aftermath, pp. 41, 125).

[3] In some cases, the area never returned to its predisaster condition, although these cases were few.

reduced or eliminated after a natural disaster, but it quickly rebounds as rebuilding commences, and may even increase to a level greater than before the disaster.[1] Some persons displaced from other sectors might even find temporary jobs in this field. Another assumption used in this study is that most government jobs would not be lost (excluding Education). Even though services might be temporarily disrupted due to building damage, employees would probably be located to other buildings to continue necessary business.

For the purpose of this study, the types of employment that would be impacted by hurricanes include commercial employment (wholesale and retail trade, services and finance/ insurance/real estate); industrial (manufacturing); transportation, communication and public utilities; and education (government).

It might be expected that services and trade would be most detrimentally affected, since they account for over 42% of total employment in the Region. To determine short-term losses, employment losses were estimated for the affected sectors, for various types of storms, ranging from small to severe (category 1-5). Employment loss was estimated as a percentage of damage to building value, since employment is related to both building size and assessed value (building value). The dollar damage was divided by the total assessed building value for each job category, to determine a ratio of loss. Then, the resulting percentage was applied to total employment for each major type of job to project the number of jobs that would be temporarily lost in different types of hurricanes. Finally, average wages for each type of job were used to determine actual dollar value of lost employment, depending upon the severity of the hurricane and length of time persons would be unemployed.

It should be noted here that employment loss was only estimated for the four coastal counties, which would be subject to the greatest damage (saltwater flooding). In the inland counties of Glades and Hendry, which are subject to wind damage, employment loss would be very minor. However, agricultural damage could occur due to extensive freshwater flooding and this could affect employment if crops were destroyed. Agricultural workers, especially migrant and seasonal farm workers, could be adversely affected, but it would be impossible to determine actual numbers in this case. (See chapter on agriculture for estimation of agricultural damages).

GENERAL OVERVIEW OF THE REGION'S ECONOMY

A general description of the Region's economy is necessary to provide an understanding of the area and how hurricanes could affect its economy. Pertinent characteristics of the Southwest Florida economy will be discussed briefly in the following section.

The economy of Southwest Florida is unique. Historically, the area was primarily rural and oriented to agricultural production, until the early 1960's. Since that time, the population began to grow rapidly (primarily due to inmigration from other areas) and the nature of the Region changed, becoming more urbanized.

[1]One example of this is the Topeka tornado of June 8, 1967, where the workforce permanently increased after the disaster (See Aftermath: Communities After Natural Disasters, p.73).

The economic base became oriented to population growth, tourism and retirement living. Construction became a major element of the economy, as well as services and retail trade, which are oriented toward supplying the needs and desires of new residents.

The unique nature of the Region is seen in its employment profile. Employment by major sector for Southwest Florida is found below.

TABLE 90

SOUTHWEST FLORIDA EMPLOYMENT (1979)

Sector	Employment	% of Total
Agriculture	8,955	4.1
Services	42,245	19.3
Finance/Insurance/Real Estate	15,567	7.1
Trade	51,286	23.4
Transportation/Communication/ Utilities	7,839	3.6
Mining	380	.2
Construction	21,949	10.0
Manufacturing	11,964	5.5
Government	26,775	12.2
Proprietor	27,915	12.7
Other	4,044	1.9
TOTAL	219,112	100.0

Note: Totals may not add due to disclosure of confidential information in some sectors.

Source: SWFRPC, The Southwest Florida Economy, 1982.

The previous table verifies the service-oriented nature of the Region's economy. Trade (wholesale and retail) is the largest sector, with over 23% of total employment. Services (such as hotel and motel trade, etc.) accounts for 19% of the total, while construction and government are also important. The remaining sectors account for smaller proportions of total employment. Manufacturing, for example, only accounts for 5.5% of total employment, indicating that the Region's industrial base is not well-developed.

The previous employment figures, as well as individual county figures, have been used to calculate employment loss resulting from possible hurricanes. Average wages are also used, to determine dollar losses from unemployment caused by hurricanes. Wages vary, according to job type. Income information for the Region's counties is provided in the following table.

TABLE 91

AVERAGE WAGE AND SALARY INCOME
BY ECONOMIC SECTOR (1979)

Economic Sector	Charlotte	Collier	Glades	Hendry	Lee	Sarasota
Mining	(L)	18,197	(D)	18,317	20,456	(L)
Contract Construction	14,185	15,631	(L)	15,870	15,198	15,073
Manufacturing	12,015	13,891	14,019	19,863	12,997	14,384
Transportation/Communication/Utilities	(D)	17,406	19,463	16,580	19,030	19,751
Trade	8,968	10,452	10,602	9,434	11,015	10,395
Finance/Insurance/Real Estate	15,966	14,789	10,706	(D)	14,514	14,671
Services	12,223	15,074	(D)	(D)	12,855	12,814
Government	10,612	11,911	9,363	9,529	10,536	12,571
Other	(D)	6,834	7,578	7,173	13,133	10,719
Average Wage	12,389	13,144	10,467	12,495	13,211	12,974
% of State Average Wage	89.4	94.9	75.5	90.2	95.3	93.6

(D) and (L) - indicates information withheld due to confidentiality.

Source: SWFRPC, The Southwest Florida Economy, 1982.

Income varies among counties and by type of job. In general, average income is greater in Collier and Lee Counties, followed by Sarasota, Hendry and Charlotte Counties. The smallest average income is found in Glades County.

The greatest income is found in the following categories: mining, transportation/communication/utilities, construction, and finance/insurance/real estate (in the coastal counties). The lowest paying jobs are in the trade, government and services sectors. The trade and services sectors employ the most people, but since they pay relatively low wages, the potential dollar loss from hurricanes may be somewhat mitigated. Similarly, the sectors with the highest wages employ the fewest people, so the possible impacts would also be lessened.

The following sections will provide an estimate of temporary employment loss for each county, as well as the value of jobs lost to the economy from various hurricanes.

CHARLOTTE COUNTY

Employment in Charlotte County is based primarily upon retirement living. Major employment categories that would be impacted by hurricanes are provided in the table below.[1]

[1]Employment figures used in the study are 1980 figures.

TABLE 92

EMPLOYMENT BY SECTOR
CHARLOTTE COUNTY

Sector	Employment
Commercial	6,843
Industrial	312
Transportation/Communication/Utilities	397
Education	921
TOTAL	8,473

Source: SWFRPC, The Southwest Florida Economy 1982; University of Florida, 1981 Florida Statistical Abstract.

The number of employees whose jobs would be affected in a hurricane varies, depending upon the magnitude of the storm and the type of job. An estimate of the potential number of jobs that could be temporarily lost (due to businesses closing, building destruction, etc.) is given in the following table, for different types of storms, ranging from minor (category 1) to major (category 5).

TABLE 93

EMPLOYMENT LOSS
CHARLOTTE COUNTY

	Storm Category				
Employment Sector	1	2	3	4	5
Commercial	368	1,325	2,536	3,089	3,265
Industrial	10	46	103	135	146
Transportation/Communication/Utilities	24	83	153	182	190
Education	56	179	335	404	439
TOTAL	458	1,633	3,127	3,810	4,038

Source: SWFRPC

It can be seen that more jobs would be lost in major types of storms, while relatively few would be affected by minor storms. Loss could amount to 4,038 jobs in extreme storms. To determine the value of these jobs to the county's economy, the average annual income is multiplied by the length of time each person is unemployed. Since the length of time may vary, several estimates have

been prepared. Estimates are based upon average income, as found below.

TABLE 94

AVERAGE ANNUAL INCOME
CHARLOTTE COUNTY

Sector	Annual Income ($)
Commercial[1]	11,709
Industrial	12,015
Transportation/Communication /Utilities[2]	18,250
Education	9,607

Source: SWFRPC The Southwest Florida Economy 1982; 1981 Florida Statistical Abstract

[1]Including trade, finance/insurance/real estate, and services
[2]Approximate due to disclosure of information

The following tables show the amount of money lost to the county's economy due to hurricane-related unemployment, for various types of hurricanes and various periods of unemployment. Several time estimates have been utilized, since each case is unique, (case studies have shown a variety of time periods for short term impacts), and since the time period can also be affected by factors outside the disaster area (such as outside aid, disaster assistance, etc).

TABLE 95

CHARLOTTE COUNTY
INCOME LOSS - 1 WEEK PERIOD ($000)

Sector	Storm Category 1	2	3	4	5
Commercial	82	298	571	695	735
Industrial	2	11	24	31	34
Transportation/Communication/Utilities	8	29	54	64	67
Education	10	33	62	75	81
TOTAL	102	371	711	865	917

Source: SWFRPC

Table 95 estimates the amount of wages that could potentially be lost, if persons were unemployed for only a one-week period. Maximum amounts could range from $102,000 in the least severe types of hurricanes to $917,000 in extreme storms.[1]

TABLE 96

CHARLOTTE COUNTY
INCOME LOSS - 1 MONTH PERIOD ($000)

Sector	Storm Category 1	2	3	4	5
Commercial	359	1,293	2,475	3,014	3,184
Industrial	10	46	103	135	146
Transportation/Communication/Utilities	36	126	233	277	289
Education	45	143	268	323	351
TOTAL	450	1,608	3,079	3,749	3,970

Source: SWFRPC

Wage loss for a one-month period could range from $450,000 to over $3.9 million. The value of commercial employment lost could range from $359,000 to over $3.1 million, accounting for the majority of lost wages. The following table indicates losses for a six-month period.

TABLE 97

CHARLOTTE COUNTY
INCOME LOSS - 6 MONTH PERIOD ($000)

Sector					
Commercial	2,155	7,758	14,848	18,085	19,104
Industrial	60	277	619	811	877
Transportation/Communication /Utilities	219	758	1,396	1,661	1,734
Education	269	860	1,609	1,940	2,108
TOTAL	2,703	9,653	18,472	22,497	23,823

Source: SWFRPC

[1]In extreme storms, however, it is unlikely that persons would be unemployed only for one week; the lower categories are more representative of expected losses.

In more extreme cases, if hurricane damage were significant enough that persons were unemployed for one year, wage losses could total up to $47 million, as seen below.

TABLE 98

ANNUAL INCOME LOSS ($000)
CHARLOTTE COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	4,309	15,515	29,695	36,170	38,207
Industrial	120	553	1,238	1,622	1,754
Transportation/Communication /Utilities	438	1,515	2,792	3,321	3,468
Education	538	1,720	3,218	3,881	4,217
TOTAL	5,405	19,303	36,943	44,994	47,646

Source: SWFRPC

COLLIER COUNTY

Employment in Collier County totals 23,134 for the four economic sectors under consideration. The following table lists employment for each category.

TABLE 99

EMPLOYMENT BY SECTOR
COLLIER COUNTY

Sector	Employment
Commercial	18,934
Industrial	972
Transportation/Communication /Utilities	1,178
Education	2,050
TOTAL	23,134

Source: SWFRPC, The Southwest Florida Economy, 1982; University of Florida, 1981 Florida Statistical Abstract

To determine the amount of employment that would be affected by a hurricane, the following methodology was used. First, total building value and total building damage for each sector was determined. The percentage of damage to building value was then established. This same percentage was applied against the total employment figures to determine expected employment loss. Five groups of hurricanes were used, ranging in intensity from minor to extreme. Estimated employment loss is provided in the table below.

TABLE 100

EMPLOYMENT LOSS
COLLIER COUNTY

Employment Sector	Storm Category 1	2	3	4	5
Commercial	958	3,199	6,189	7,638	8,137
Industrial	7	33	176	294	410
Transportation/Communication /Utilities	31	145	353	481	540
Education	65	180	396	507	618
TOTAL	1,061	3,557	7,114	8,920	9,696

Source: SWFRPC

The above table illustrates projected employment loss. For example, in a minor storm (category 1), 958 jobs in commercial establishments could be lost as the result of a hurricane. This figure was determined by taking the building damage as a percent of total value, and multiplying the resultant percent (5.1%) by total commercial employment of 18,934.

As would be expected, employment loss increases with the magnitude of the storm. Total jobs lost could number 1,061 in minor storms, but could rise to nearly 10,000 in major hurricanes. (This still accounts for a relatively small proportion of total jobs, and only 41% of commercial, industrial, transportation/communication/utilities and education jobs).

The commercial sector, which primarily includes trade and services, would be most adversely affected in hurricanes. It is estimated that commercial jobs lost could account for 87% of total jobs in a storm of medium intensity (category 3).

Industrial jobs would account for the least amount lost (up to 401 or 4% of the total in major hurricanes). Education and transportation/communication/utilities together account for less than 14% of jobs lost in major hurricanes.

Once the employment loss has been estimated, lost income must be evaluated. Income loss has been projected for each group of hurricanes. Four time estimates have been utilized. Lost wages have been projected for a one-week, one-month, six months and a one-year period, since the specific length of time people would be out of work is variable. Dollar loss estimates are included in Tables 102-105. Average annual wages for each pertinent sector are given below.

TABLE 101

AVERAGE ANNUAL INCOME
COLLIER COUNTY

Sector	Annual Income ($)
Commercial	12,885
Industrial	13,891
Transportation/Communication /Utilities	17,406
Education	12,098

Source: SWFRPC, The Southwest Florida Economy, 1982;
University of Florida, 1981 Florida Statistical Abstract

Income loss when persons are unemployed for only one week is minor, as seen below.

TABLE 102

COLLIER COUNTY
INCOME LOSS - 1 WEEK PERIOD ($000)

	Storm Category				
Sector	1	2	3	4	5
Commercial	237	793	1,534	1,893	2,016
Industrial	2	9	47	79	107
Transportation/Communication /Utilities	10	48	118	161	181
Education	15	42	92	118	144
TOTAL	264	892	1,791	2,251	2,448

Source: SWFRPC

Estimates of lost income for a one-month period are found on the following page.

TABLE 103

COLLIER COUNTY
INCOME LOSS - 1 MONTH PERIOD ($000)

Sector	Storm Category 1	2	3	4	5
Commercial	1,028	3,435	6,645	8,201	8,737
Industrial	8	38	203	340	464
Transportation/Communication /Utilities	45	210	512	697	783
Education	65	181	399	511	623
TOTAL	1,146	3,864	7,074	9,749	10,607

Source: SWFRPC

Income loss is presented below, for a six month period. The value of income lost could range from $6.8 million to $63.6 million, depending on storm severity. Thus, even for a short period of time, this loss could be substantial.

TABLE 104

COLLIER COUNTY
INCOME LOSS - 6 MONTH PERIOD ($000)

Employment Sector	Storm Category 1	2	3	4	5
Commercial	6,172	20,610	39,873	49,208	52,423
Industrial	49	229	1,222	2,042	2,785
Transportation/Communication /Utilities	270	1,262	3,072	4,186	4,670
Education	393	1,089	2,395	3,067	3,738
TOTAL	6,884	23,190	46,563	58,503	63,646

Source: SWFRPC

The subsequent table estimates annual potential income lost as the result of hurricanes.

TABLE 105

ANNUAL INCOME LOSS
COLLIER COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	12,344	41,219	79,745	98,416	104,845
Industrial	97	458	2,445	4,084	5,570
Transportation/Communication /Utilities	540	2,524	6,144	8,372	9,399
Education	786	2,178	4,791	6,134	7,477
TOTAL	13,767	46,379	93,125	117,006	127,291

Source: SWFRPC

An examination of this table shows that annual wages lost as a result of a hurricane could amount to over $127 million in major types of storms, although in minor storms damage would be much less.[1]

The employment sector that would suffer the most loss is the commercial sector (including services, trade, and finance, insurance and real estate), where wages lost could amount to $12 million in minor storms, or $104 million in major hurricanes.[2] The commercial sector accounts for nearly 90% of total income loss in minor storms, and 82% of the total in major hurricanes. The education sector accounts for the second greatest value of employment lost in minor storms, although in major storms the transportation/communication/utilities sector would be affected more (in dollars but not employment). Industrial employment and wages would be least affected, accounting for up to only 4% of the total in major hurricanes.[3]

[1]Although the higher (category 5) estimate would be more accurate in assessing the impacts of a major storm.
[2]Determined by taking total average annual wages for each sector, and multiplying those wages by the number of jobs expected to be lost for each storm category.
[3]It should be noted again, as with structural damages, that these are maximum dollar losses for each category.

GLADES AND HENDRY COUNTIES

Estimates of the value of jobs lost were not done for the Region's two smallest counties. Since Glades and Hendry Counties are both located inland, away from the storm surge area, they would not be affected by saltwater flooding damage caused by hurricanes. It is possible that some freshwater flooding could occur as the result of a hurricane (especially in the case of sustained rainfall over a period of several days), but the amount is not known. Hurricane-force winds could cause a sizeable amount of damage as discussed previously. Also, tornadoes that occur in conjunction with hurricanes could have devastating impacts, but since they are not predictable, and damage is likely to be concentrated in a small area, they will not be considered.

Since wind damage is relatively minor compared to flood damage, it is unlikely that wind damage to buildings would be severe enough so that persons would be unemployed for any length of time. It is possible that some persons would be unemployed for a few days, while buildings were being repaired and services (electrical, telephone, etc.) restored, but the overall dollar impact on the economy would be negligible. Since the economy of these two counties is agriculturally-oriented, it would be expected that the worst impacts would be upon farming activities (See chapter on agriculture).

LEE COUNTY

In Lee County, employment is primarily oriented to trade (especially retail), services and construction. Employment by industry is given below for the sectors that would be affected by hurricanes, as previously discussed.

TABLE 106

EMPLOYMENT BY SECTOR
LEE COUNTY

Sector	Employment
Commercial	38,542
Industrial	3,717
Transportation/Communication /Utilities	4,217
Education	4,145
TOTAL	50,621

Source: SWFRPC, The Southwest Florida Economy 1982; University of Florida, 1981 Statistical Abstract

A portion of this employment will be affected by hurricanes. The actual number of employees whose jobs would be affected varies, depending upon the severity of the hurricane. Estimated jobs lost are given below for each type (category) hurricane.

TABLE 107

EMPLOYMENT LOSS
LEE COUNTY

Employment Sector	Storm Category 1	2	3	4	5
Commercial	1,693	6,025	10,138	14,674	15,977
Industrial	56	242	857	1,336	1,755
Transportation/Communication /Utilities	233	740	1,354	1,641	1,875
Education	95	413	1,135	1,626	1,944
TOTAL	2,077	7,420	13,484	19,277	21,551

Source: SWFRPC

The table above provides the greatest degree of impact that each category storm would have. In a minimal hurricane, for instance, employment subject to loss could total 2,077 in the worst possible case, although it probably would be much less[1] due to the fact that impacts are not the same for each storm category countywide. In major hurricanes, jobs subject to loss could amount to 21,551, or 42% of the total jobs that could be affected by hurricanes. The most deleterious impact would be upon commercial employment, where job loss could amount to nearly three-fourths of total employment loss.

Other types of jobs would not be as adversely affected. In small storms, the greatest employment loss (after commercial jobs) would be in the transportation/communication/utilities category, while in severe storms, more education-related jobs would be affected.

After employment loss is determined, lost income must be calculated. To assess lost wage and salary income, average annual income for each type of job is used, multiplied by the length of time persons are unemployed. Average annual income is found below.

[1]Since in a minor storm, building damage would not be severe, some businesses could probably operate in damaged buildings and employment loss would be minimal.

TABLE 108

AVERAGE ANNUAL INCOME
LEE COUNTY

Sector	Annual Income ($)
Commercial	12,531
Industrial	12,997
Transportation/Communication/Utilities	19,030
Education	11,076

Source: SWFRPC, The Southwest Florida Economy 1982, 1981 Florida Statistical Abstract

Several time periods have been used to calculate income loss due to hurricane-induced unemployment. Although the exact period of time people would be out of work is unknown, case studies have indicated that unemployment effects often subside within one year. Therefore, selected periods up to one year have been used to determine wage loss.

TABLE 109

INCOME LOSS - 1 WEEK PERIOD ($000)
LEE COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	408	1,452	2,443	3,536	3,850
Industrial	14	61	214	334	439
Transportation/Communication/Utilities	85	271	496	601	686
Education	20	88	242	346	414
TOTAL	528	1,871	3,395	4,817	5,390

Source: SWFRPC

The previous table indicates income lost for a one-week period, based upon annual values, for each employment sector. In minor storms, the value of lost employment could amount to $528,000, while in major hurricanes, this value could total up to $5,390,000. Commercial wages would account for the most loss (over 70% in all cases),while losses in other sectors would be much less, together accounting for less than commercial loss. Losses for a one-month period are given below.

TABLE 110

INCOME LOSS - 1 MONTH PERIOD ($000)
LEE COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	1,768	6,292	10,587	15,323	16,684
Industrial	61	262	928	1,447	1,901
Transportation/Communication/Utilities	369	1,174	2,147	2,602	2,973
Education	88	381	1,048	1,501	1,794
TOTAL	2,286	8,108	14,710	20,873	23,353

Source: SWFRPC

Wage loss for the one-month period could range from $2.2 million to over $23 million. Commercial employment loss could range from $1.7 million to $16.7 million, accounting for the majority of lost wages. The one-month period is a crucial time, since it has been shown in case studies that unemployment peaks the month following a disaster. The subsequent table indicates losses for a six-month period.

TABLE 111

INCOME LOSS - 6 MONTH PERIOD ($000)
LEE COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	10,607	37,750	63,520	91,940	100,104
Industrial	364	1,573	5,569	8,682	11,405
Transportation/Communication/Utilities	2,217	7,041	12,883	15,614	17,841
Education	526	2,287	6,286	9,005	10,766
TOTAL	13,715	48,651	88,258	125,241	140,115

In a six-month period, lost wages could amount to $140 million, in extreme storms, although the dollar amount could be much less in less severe storms.

Finally, if unemployment were to continue for a year, lost wages could amount to over $280 million (for major storm occurrences). Annual wage loss is presented below.

TABLE 112

ANNUAL INCOME LOSS ($000)
LEE COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	21,215	75,499	127,039	183,880	200,208
Industrial	728	3,145	11,138	17,364	22,810
Transportation/Communication/Utilities	4,434	14,082	25,767	31,228	35,681
Education	1,052	4,574	12,571	18,010	21,532
TOTAL	27,429	97,301	176,516	250,482	280,231

Source: SWFRPC

It is evident that the dollar value of lost employment could vary considerably, dependent upon the hurricane magnitude. Total lost wages could range from $27 million to $280 million, principally due to commercial employment loss. In some case studies, unemployment has persisted at higher than pre-disaster levels for over two years, so this is a conservative estimate.[1]

SARASOTA COUNTY

Hurricane effects upon employment have been determined for Sarasota County. To determine impacts, employment must be known for each job type that would be affected in a hurricane, as given below.

TABLE 113

EMPLOYMENT BY SECTOR
SARASOTA COUNTY

Sector	Employment
Commercial	45,875
Industrial	6,217
Transportation/Communication/Utilities	3,000
Education	3,897
TOTAL	58,989

Source: SWFRPC, The Southwest Florida Economy 1982; University of Florida, 1981 Florida Statistical Abstract

1 In the aftermath of Hurricane Carla, unemployment in Galveston rose significantly and the effect persisted for a period exceeding two years (See Aftermath, p. 73).

Hurricane-vulnerable employment in Sarastoa County is primarily business-related. There are nearly 59,000 jobs in sectors that could be affected, compared to 72,525 total jobs. The number of jobs that could be lost temporarily due to different types of hurricanes is found below.

TABLE 114

EMPLOYMENT LOSS
SARASOTA COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	1,081	4,107	9,172	12,522	15,592
Industrial	17	77	258	533	1,045
Transportation/Communication/Utilities	44	295	735	1,040	1,196
Education	66	195	426	624	937
TOTAL	1,208	4,674	10,591	14,719	18,770

Source: SWFRPC

As storms become more intense, potential job loss increases. In minor storms, approximately 1,208 jobs could be lost, increasing to 18,770 (maximum) in major hurricanes. Even in major storms, this loss accounts for less than one-third of the total hurricane-vulnerable jobs, and only 25% of total county employment.

Once the number of jobs that could be lost has been calculated, the economic value of lost income can be determined for various time periods. The annual average income as displayed in Table 115, is used to derive the dollar value of lost employment.

TABLE 115

AVERAGE ANNUAL INCOME
SARASOTA COUNTY

Sector	Annual Income ($)
Commercial	11,998
Industrial	14,384
Transportation/Communication/Utilities	19,751
Education	10,399

Source: SWFRPC, University of Florida

Annual income is multiplied by jobs lost to determine the value of lost income to the economy. Estimates are given for periods of one week, one month, 6 months and one year.

TABLE 116

INCOME LOSS - 1 WEEK ($000)
SARASOTA COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	250	948	2,117	2,889	3,598
Industrial	5	21	71	147	289
Transportation/Communication/Utilities	17	112	279	395	454
Education	13	39	85	125	187
TOTAL	284	1,120	2,553	3,556	4,528

Source: SWFRPC

Wage loss for a one week period is relatively minimal, ranging from $284,000 to $4,528,000. In longer periods of time, lost income increases. The subsequent table illustrates income lost in a one-month period.

TABLE 117

INCOME LOSS - 1 MONTH ($000)
SARASOTA COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	1,081	4,106	9,173	15,520	15,589
Industrial	20	92	309	639	1,253
Transportation/Communication/Utilities	72	486	1,210	1,712	1,969
Education	57	169	369	541	812
TOTAL	1,231	4,853	11,062	15,411	19,623

Source: SWFRPC

For a one-month period, income loss ranges from a maximum amount of $1.2 million in minor hurricanes to $19.6 million in major hurricanes. If persons were unemployed for six months wage loss would be more substantial, as seen in the following table.

TABLE 118

INCOME LOSS - 6 MONTHS ($000)
SARASOTA COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	6,485	24,638	55,041	75,119	93,536
Industrial	122	554	1,856	3,833	7,516
Transportation/Communication/Utilities	435	291	7,258	10,271	11,811
Education	343	1,014	2,215	3,244	4,872
TOTAL	7,385	29,119	66,370	92,468	117,735

Source: SWFRPC

Wage loss for a six-month period could range from $7 million to $117 million, depending upon the strength of the storm.

TABLE 119

ANNUAL INCOME LOSS ($000)
SARASOTA COUNTY

Sector	Storm Category 1	2	3	4	5
Commercial	12,970	49,276	110,082	150,239	187,073
Industrial	225	1,108	3,711	7,667	15,031
Transportation/Communication/Utilities	869	5,827	14,517	20,541	23,622
Education	686	2,028	4,430	6,489	9,744
TOTAL	14,770	58,238	132,740	184,936	235,470

Source: SWFRPC

If persons in the above job categories were unemployed for one year, lost wages could range from $14 million in small storms, to $235 million in major hurricanes. Business jobs account for the greatest proportion of lost value, with approximately 80% of the total (Category 5).

SOUTHWEST FLORIDA REGION

The overall impact of hurricanes upon employment in Southwest Florida has been calculated, for different types of jobs and various kinds of hurricanes. Short-term employment loss was determined, based upon employment for each job sector, wages, and the number of jobs that would be affected for different groups of hurricanes (based upon a ratio of building damage to assessed value). Employment by sector is presented below, for each coastal county, as well as the four-county Region.

TABLE 120

EMPLOYMENT
SOUTHWEST FLORIDA

Sector	Region	County			
		Charlotte	Collier	Lee	Sarasota
Commercial	110,194	6,843	18,934	38,542	45,875
Industrial	11,218	312	972	3,717	6,217
Transportation/Communication/Utilities	8,792	397	1,178	4,217	3,000
Education	11,013	921	2,050	4,145	3,897
TOTAL	141,217	8,473	23,134	50,621	58,989

Source: SWFRPC, The Southwest Florida Economy 1982;
University of Florida, 1981 Florida Statistical Abstract

The preceding table indicates that Sarasota County has the most employees in sectors that are subject to hurricane impacts, followed closely by Lee County. Employment in Charlotte and Collier Counties is relatively less. Employment that could be affected by a hurricane amounts to 141,217, or approximately 70% of total employment in the coastal Region. Estimated potential employment losses for various types of hurricanes are given in the following table.

TABLE 121

EMPLOYMENT LOSS
SOUTHWEST FLORIDA

County	Storm Category 1	2	3	4	5
Charlotte	458	1,633	3,127	3,810	4,038
Collier	1,061	3,557	7,114	8,920	9,696
Lee	2,077	7,420	13,484	19,277	21,551
Sarasota	1,208	4,674	10,591	14,719	18,770
REGION	4,804	17,284	34,316	46,726	54,055

Source: SWFRPC

The number of employees that would be displaced by potential hurricanes could total 4,804 in minor storms, and could amount to 54,055 in major hurricanes. Employment loss is greatest in Lee County.

To determine the actual dollar impact of potential unemployment upon the Region's economy, average income is multiplied by the number of people unemployed (for each particular type of hurricane) and the length of time persons would be unemployed. Average annual wage and salary income has been provided below for each coastal county.

TABLE 122

INCOME
SOUTHWEST FLORIDA

Sector	Annual Income ($) Charlotte	Collier	Lee	Sarasota
Commercial	11,709	12,885	12,531	11,998
Industrial	12,015	13,891	12,997	14,384
Transportation/Communication/Utilities	18,250	17,406	19,030	19,751
Education	9,607	12,098	11,076	10,399

Source: SWFRPC, University of Florida

Wage loss has been calculated for periods of one week, one month, six months and one year in the subsequent tables.

TABLE 123

INCOME LOSS - 1 WEEK PERIOD
SOUTHWEST FLORIDA

County	Storm Category 1	2	3	4	5
Charlotte	102	371	711	865	917
Collier	264	892	1,791	2,251	2,448
Lee	528	1,871	3,395	4,817	5,390
Sarasota	284	1,120	2,553	3,556	4,528
SOUTHWEST FLORIDA	1,178	4,254	8,450	11,489	13,283

Source: SWFRPC

This table estimates the amount of wages that could potentially be lost, based upon unemployment resulting from different types of hurricanes in a one-week period. This total is relatively small compared to the other time periods. Lost income for one month is illustrated in Table 124.

TABLE 124

INCOME LOSS - 1 MONTH PERIOD ($000)
SOUTHWEST FLORIDA

County	Storm Category 1	2	3	4	5
Charlotte	450	1,608	3,079	3,749	3,970
Collier	1,146	3,864	7,074	9,749	10,607
Lee	2,286	8,108	14,710	20,873	23,353
Sarasota	1,231	4,853	11,062	15,411	19,623
SOUTHWEST FLORIDA	5,113	18,433	35,925	49,782	57,553

Source: SWFRPC

Wage loss for a one-month period could range from $5 million to over $57 million, depending upon the type of storm. The following table indicates losses for a six month period.

TABLE 125

INCOME LOSS - 6 MONTH PERIOD ($000)
SOUTHWEST FLORIDA

County	Storm Category 1	2	3	4	5
Charlotte	2,702	9,652	18,472	22,497	23,823
Collier	6,884	23,189	46,563	58,503	63,645
Lee	13,714	48,650	88,258	125,241	140,115
Sarasota	7,385	29,119	66,370	92,468	117,735
SOUTHWEST FLORIDA	30,685	110,610	219,663	298,709	345,318

Source: SWFRPC

Income loss for a one-year period is provided in the following table.

TABLE 126

ANNUAL INCOME LOSS ($000)
SOUTHWEST FLORIDA

County	Storm Category 1	2	3	4	5
Charlotte	5,405	19,303	36,943	44,994	47,646
Collier	13,767	46,379	93,125	117,006	127,291
Lee	27,429	97,301	176,516	250,482	280,231
Sarasota	14,770	58,238	132,740	184,936	235,470
REGION	61,371	221,221	439,324	597,418	690,638

Source: SWFRPC

It is evident upon examination of this table, that the dollar value of employment loss could be significant in the coastal counties of Southwest Florida. Although maximum losses in small storms might amount to $61 million, in major storms annual employment loss (in terms of lost income) could be valued at $690 million.

Annual income loss is greatest in Lee County for all categories of storms. Despite the fact that Sarasota County has more employment in categories that could be affected by hurricanes, employment loss (in terms of both number of employees and lost income) is greater in Lee County. The valuation of lost income could total up to $280 million in major storms when persons are unemployed for a one-year period.

CONCLUSION

Even in the worst case hurricane, when employment loss could amount to 54,055 jobs, unemployment still amounts to a relatively minor percentage (26%) of total jobs in the four-county Region.

The dollar value of lost employment could total up to $690 million in major storms. The greatest impact would be upon the commercial sector (not because of wages but primarily because this sector accounts for the greatest number of jobs) in all counties.

Lee County would be the most detrimentally affected by employment loss and lost wages in most cases.[1] Although Sarasota County has the greatest number of employees, many of its buildings are located in areas that would be less susceptible to hurricane damage, so employment loss would be less severe.

EFFECT ON REGIONAL ECONOMY

In addition to the actual dollars lost to the economy as a result of hurricane-induced unemployment, there would also be a greater indirect (ripple or multiplier) effect upon the overall economy. For example, not only would a certain amount of income be directly lost to the economy due to unemployment, but unemployed persons would be unable to purchase the goods and services they normally would consume.[2] If less goods and services are purchased, then fewer jobs in other sectors would be needed, and unemployment could affect other sectors that previously had not been impacted. Therefore, the dollar impact is greater than the amount quantified here, but since these indirect impacts are very difficult to quantify, they will not be estimated.

The next chapter will summarize the total impacts of hurricanes upon the Region, in terms of both building damage and potential employment loss.

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[1]When generalizing by storm categories, this is true, but some specific storms might have a greater impact upon Sarasota County's employment.

[2]This assumption discounts any unemployment payments that might be made to affected persons, or other forms of disaster assistance.

TOTAL HURRICANE LOSS

This chapter will evaluate the total potential loss from hurricanes in Southwest Florida, estimated for various intensities of storms. Total losses include property loss (damage to buildings), service loss (damage to public facilities), employment loss (lost income), and agricultural loss.

PROPERTY LOSS

Property loss has been defined for the purposes of this study as building damage. Damage to contents or accessory uses (cars, boats, etc.) was not estimated due to inadequate data and methodologies to assess these types of damages. Total estimated building damage is based upon building value, which is provided below.

TABLE 127

Total Building Value ($000)
Southwest Florida

County	Total Value	Vulnerability Zone 1	2	3	4	5
Charlotte	1,210,823	622,585	438,064	122,766	25,408	628
Collier	2,309,782	1,326,766	369,015	462,863	55,143	69,744
Glades	89,825	N/A	N/A	N/A	N/A	N/A
Hendry	306,266	N/A	N/A	N/A	N/A	N/A
Lee	3,627,276	1,138,934	670,501	291,525	40,185	192,553
Sarasota	4,415,082	1,671,019	448,503	293,850	548,024	701,533
Region	11,959,054	4,759,304	1,926,083	1,171,004	668,760	964,458

Source: Property Appraiser Tapes, SWFRPC.

* Total value, including some land values but excluding agricultural land
N/A - not applicable

Building value amounts to nearly $12 billion in Southwest Florida. Value is greatest in Sarasota County, with $4.4 billion or 37% of the total, while Lee County also accounts for a significant portion ($3.6 billion).

The greatest portion of total value is located in the most vulnerable hurricane zone (zone 1), while value gradually decreases in the less susceptible zones.

Building value was used to project wind and water damage to structures from hurricanes, for different strengths of storms. Estimates are provided in the table below, by county.

TABLE 128

Total Potential Building Damage ($000)
Southwest Florida

County	Hurricane Category 1	2	3	4	5
Charlotte	65,237	222,928	429,019	528,259	568,966
Collier	125,471	353,271	684,555	843,735	934,118
Glades*	137	560	1,641	3,945	9,722
Hendry*	485	1,997	5,830	13,998	34,402
Lee	112,277	337,734	687,643	876,027	960,921
Sarasota	164,098	468,251	876,665	1,124,263	1,377,602
Region	467,705	1,384,741	2,685,353	3,390,227	3,885,731

* Wind damage only (excluding agricultural damage)
Source: SWFRPC.

An examination of the previous table indicates that total building damage varies, according to hurricane strength. In minor storms, damage could amount to $467 million, while in major storms, this total could reach $3.8 billion. Projected damage is greatest in Sarasota County, where it could range from $164 million to $1.3 billion. Damage is nearly as severe in Lee County where it could range from $112 million to $960 million. In other counties, damage is less, due to the smaller size of the counties. Damage amounts for Collier County are very close to the amounts for Lee County (and even exceed them in category 2) due to the low relief of the county and its flood-prone nature.

Building damage can amount to nearly one-third of total building value in the Region (in a major storm). Percentages vary among counties. In Glades and Hendry Counties for example, damage represents only 8% of total building value in major storms, since only wind damage has been considered. In Lee and Sarasota Counties, damage ranges from 3% of building value in minor storms to 26% for Lee County and 31% for Sarasota County in major hurricanes. The worst percentage damage ratio is found in Collier County, where total damage in major storms amounts to over 40% of building value for the county.

LOSS TO PUBLIC SERVICES AND FACILITIES

This loss is defined as damage to public facilities providing necessary community services such as water, wastewater treatment, electricity, transportation, health care and schools. Most of these services are required to maintain the public health, safety and welfare, although some, such as schools and health, are secondary support services.

Damage to facilities providing these services has been estimated in a previous chapter. This damage totaled in excess of $184 million (in category 5), but since these amounts have already been included in total building damages in the previous section, they will not be addressed here separately.

EMPLOYMENT AND INCOME LOSS

The value of temporary employment loss has been calculated for various storms. Lost income depends upon the type of storm and the length of time persons are out of work. For this analysis, a time period of one year will be utilized to calculate potential lost income due to hurricanes, as seen in the following table.

TABLE 129

Annual Income Lost ($000)
Southwest Florida

County	Storm Category 1	2	3	4	5
Charlotte	5,405	19,303	36,943	44,994	47,646
Collier	13,767	46,379	93,125	117,006	127,291
Glades	N/A	N/A	N/A	N/A	N/A
Hendry	N/A	N/A	N/A	N/A	N/A
Lee	27,429	97,301	176,516	250,482	280,231
Sarasota	14,770	58,238	132,740	184,936	235,470
Total	61,371	221,221	439,324	597,418	690,638

Source: SWFRPC.

N/A - not applicable

Lost income was determined, based upon the number of persons unemployed as calculated in the previous Chapter. These amounts vary by county and by and by storm type.

Since Glades and Hendry Counties would be affected primarily by wind damage only (and some possible freshwater flooding) employment loss would be minimal, and would be very short term (probably for periods of less than 2 weeks), so employment loss has not been estimated.

Lost income due to a hurricane could range from $61 million in less intense storms, to $690 million in major storms, when people are unemployed for a one-year period. Employment loss would be most significant in Lee County, ranging from $27 million to $280 million depending on storm intensity. Unemployment and income loss in Sarasota County would also be sizeable. As a percentage of total income, however, income lost due to hurricanes is relatively small.

AGRICULTURAL LOSS

Agricultural losses due to the impact of hurricanes upon crop production have been estimated in a previous Chapter. Total projected dollar losses are presented in the table below. These totals include damage to crops, livestock, and groves (primarily citrus).

TABLE 130

Total Agricultural Damage ($000)
Southwest Florida

County	Hurricane Category 1	2	3	4	5
Charlotte	1,253	6,490	12,691	21,744	23,516
Collier	1,889	4,415	13,304	22,302	25,293
Glades	N/A	N/A	N/A	N/A	N/A
Hendry	N/A	N/A	N/A	N/A	N/A
Lee	5,691	10,944	22,403	29,670	34,308
Sarasota	50	294	3,301	6,695	8,015
Region	8,884	22,144	51,700	80,412	91,132

Source: SWFRPC.

Agricultural damage varies considerably, depending upon the storm type. In minor storms, damage totals could rise to $8.8 million, whereas in major hurricanes, this total could increase tenfold, to $91.1 million.

The greatest potential damage could occur in Lee County, where destruction amounts could range from $5.6 million in minor storms to $34 million in severe hurricanes. Destruction in Collier County could amount to up to $23 million in major storms, while amounts in Sarasota County are relatively small (less than all other coastal counties, and up to only $8 million in intense hurricanes). In general, damage to crops would be the greatest (accounting for 47% of total agricultural damage) followed by grove (citrus) damage (31%). Livestock damage would be the least, at 21% of total agricultural damage.[1]

TOTAL LOSS

Total potential loss due to hurricanes is the summation of structural damage, lost income, and agricultural damage.[2] These amounts can be significant, especially in major hurricanes. In minor storms, damage totals could reach $537 million, increasing more than 8 times to $4.6 billion in extreme hurricanes.[3] Damage totals by storm category are listed in the following table.

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1 In addition, crop damage in Glades and Hendry County (which are not divided into zones as are the coastal counties) could amount to $279 million in severe storms (an amount three times greater than agricultural damage in the other counties combined).

2 Public facilities damage is included in structural damage.

3 Excluding crop damage in Glades and Hendry Counties.

TABLE 131

Total Potential Damage from Hurricanes ($000) Southwest Florida

County	Hurricane Category 1	2	3	4	5
Charlotte	71,895	248,721	478,653	594,997	640,128
Collier	141,127	404,065	790,984	983,043	1,086,702
Glades	137	560	1,641	3,945	9,722
Hendry	485	1,997	5,830	13,998	34,402
Lee	145,397	445,979	886,562	1,156,179	1,275,460
Sarasota	178,918	526,783	1,012,706	1,315,894	1,621,087
Region	537,959	1,628,105	3,176,376	4,068,056	4,667,501

Source: SWFRPC.

Other Economic Impacts

The purpose of this study was to evaluate the short-term economic impacts of potential hurricanes in Southwest Florida. The primary impacts that have been addressed in this report include damage to building structures, employment disruption and subsequent loss of income, service and facilities loss, and agricultural damage.

There are other hurricane-related impacts that have not been discussed in this study but are significant, nevertheless. These impacts which are beyond the scope of this report (but would be suitable topics for future study), include both direct and indirect impacts, in the following categories: Personal loss, other property damage, road damage, environmental impacts, social impacts, and other economic impacts.

Personal loss includes loss of life and injury, which also could indirectly result in loss of future wages. It has been shown previously that loss of life in hurricanes is relatively minor, in comparison to other impacts.

In addition to damage to buildings, there are other types of property damage, including damage to contents of structures, and damage to appurtenant structures. Damage to personal property such as automobiles and boats (from sandblasting, saltwater, etc) could also be significant. Damage could occur to seawalls and bulkheads (which are not covered by insurance), as well as to the land itself from erosion and other processes.

Road and bridge damage could occur from wave action and other hurricane-related effects that can erode or destroy highways. Road damage would be especially severe along barrier islands and coastal areas subject to storm surge. The replacement cost of highways is extremely high; costs for reconstruction alone can range from $436,000 per mile (2 lane highway) to $1.2 million per mile (4 lane highway).[2] Costs for new construction are nearly double these amounts.

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1 Boat damage could be significant. There are nearly 50,000 pleasure boats registered in Southwest Florida.(1980- SWFRPC Economy 1982) Gross sales of motor boats alone totaled over $48 million in 1980.

2 Florida Department of Transportation.

Environmental damage consists of effects such as beach erosion, impact on plant and animal communities due to loss of habitat, and death of wildlife due to drowning.

Social impacts include changes in the amount and distribution of population resulting from a hurricane, as well as impacts upon community integration, and changes in other social characteristics (such as increases in crime, divorce rates, stress, etc).

Other economic impacts, aside from the ones that have been discussed in this study, include effects upon the commercial fishing industry and tourism. The commercial fishing industry is extremely important in the coastal counties of the Region, (especially Lee County), accounting for landings of 33 million pounds with a value of $12.5 million in 1974.[1] Destruction of fishing habitats could cause a substantial loss of income in this sector. Tourism is one of the most significant sectors of the economy in Southwest Florida. Estimated expenditures by tourists in the Region exceeded $1.1 billion in 1981.[2] One of the primary reasons tourists visit Florida is for the beaches; however, hurricane destruction could greatly affect beaches, and consequently would detrimentally affect the tourist industry.

These impacts, although they are beyond the scope of this report, are still significant, and provide a suitable topic for future studies.

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1 The Southwest Florida Economy 1982, p. 84.
2 Ibid., p. 100

CONCLUSION AND RECOMMENDATIONS

An examination of various hypothetical hurricanes and their impact has revealed that the total economic losses could be substantial. The most significant damage that could occur as a result of hurricanes would be building damage, while lost income due to hurricane-induced unemployment and agricultural damage to livestock, crops and groves would be, in comparison, relatively minor.

In extreme storms (category 5), total hurricane-induced damage could amount to $4.6 billion in Southwest Florida. Building damage would account for $3.8 billion of the total, while lost income could amount to $490 million, and agricultural damages would exceed $91 million (not including an additional $279 million in potential damages in Glades and Hendry Counties due to freshwater flooding and wind damage).

In general, the largest counties would receive the most detrimental impacts, due to their size and extensive development along the coastal areas. Building damage and income loss are greatest in the most populous counties. Agricultural damage is also extensive in the coastal counties (with the exception of Sarasota County), although this type of damage is most significant in the two inland counties of Glades and Hendry, which are the most agriculturally-oriented in the Region.

Due to the significant potential economic impacts and monetary losses that could be sustained in this area as the result of a hurricane, it is recommended that future studies could include the development of policies addressing the mitigation or prevention of future loss from hurricanes.

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APPENDICES

APPENDIX A
COORDINATING AGENCIES

APPENDIX A

COORDINATING AGENCIES

LOCAL AGENCIES

CHARLOTTE COUNTY

PLANNING DEPARTMENT
Mr. Terry Hixson

PROPERTY APPRAISER
Mr. Oliver Lowe

CIVIL DEFENSE
Mr. John P. Derr,
Coordinator

COLLIER COUNTY

PLANNING DEPARTMENT
Mr. Terry Virta

PROPERTY APPRAISER
Mr. Sam Colding

CIVIL DEFENSE
Mr. Neil Dorrill

GLADES COUNTY

PLANNING DEPARTMENT
Mr. Norman Waldron

PROPERTY APPRAISER
Mr. J. C. Sealey

CIVIL DEFENSE
Mr. Gerry Harris

HENDRY COUNTY

PLANNING DEPARTMENT
Mr. Robert M. Williams

PROPERTY APPRAISER
Mr. Dale Small

CIVIL DEFENSE
Ms. Judy Kennington,
Administrative Assistant

LEE COUNTY

PLANNING DEPARTMENT
Mr. David Depew

PROPERTY APPRAISER
Mr. Ken Wilkinson

CIVIL DEFENSE
Mr. Terry Dillon

SARASOTA COUNTY

PLANNING DEPARTMENT
Mr. Douglas James

PROPERTY APPRAISER
Mr. John W. Mikos

CIVIL DEFENSE
Mr. Sebastian J. D'Alli,
Director

CITY OF CAPE CORAL

PLANNING DEPARTMENT
Mr. Frederick P.D. Carr

CITY OF CLEWISTON

CITY MANAGER
Mr. C. F. Blair

LOCAL AGENCIES (Continued)

CITY OF EVERGLADES

PLANNING DEPARTMENT
Mr. Herman Askren

CITY OF LABELLE

CITY MANAGER
Mr. Duncan W. Fields

CITY OF MOORE HAVEN

CITY CLERK
Ms. Carmen Whitney

CITY OF NORTH PORT

CITY CLERK
Ms. Lillian A. Pedersen

CITY OF SANIBEL

PLANNING DEPARTMENT
Mr. Bruce A. Rogers

CITY OF VENICE

CITY MANAGER
Mr. Dale E. Rieth

PLANNING DEPARTMENT
Mr. H. M. Place

CITY OF FORT MYERS

PLANNING DEPARTMENT
Mr. John Kremski

CITY OF LONGBOAT KEY

TOWN MANAGER
Mr. G. Wayne Allgire

CITY OF NAPLES

PLANNING DEPARTMENT
Mr. Roger Barry

CITY OF PUNTA GORDA

PLANNING DEPARTMENT
Mr. Robert M. Berg

CITY OF SARASOTA

PLANNING DEPARTMENT
Mr. Paul Segal

FEDERAL AGENCIES

Dr. Neil Frank, NOAA
National Hurricane Center
Post Office Box 8286
Coral Gables, FL 33124

Mr. Brian Jarvinen, NOAA
National Hurricane Center
Post Office Box 8286
Coral Gables, FL 33124

Mr. Richard Sanderson, Chief
Natural Hazards Division
Federal Emergency Management Agency
Washington, D.C. 20472

STATE AGENCIES

Mr. Robert Hawfield
Bureau of Disaster Preparedness
1720 S. Gadsden Street
Tallahassee, FL 32301

South Florida Area Coordinator
Division of Disaster Preparedness
Attn: Mr. Richard Smith
Post Office Box 1038
Jupiter, FL 33458

Mr. David Worley, Chief
Bureau of Coastal Zone Mgmt.
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301

Florida Department of Environmental Regulation
South Florida District
2269 Bay Street
Fort Myers, FL 33901

AREAWIDE AGENCIES

Mr. P. K. Sharma, Sr. Planner
South Florida Water Management District
Post Office Box V
West Palm Beach, FL 33402

Planning Section
Southwest Florida Water Management District
5060 U. S. 41 South
Brooksville, FL 33512

Mr. Dave Griffith
Tampa Bay Regional Planning Council
9455 Kroger Boulevard
St. Petersburg, FL 33702

Mr. Barry Peterson
Executive Director
South Florida Regional Planning Council
1515 N. W. 167th Street
Suite 429
Miami, FL 33169

AREAWIDE AGENCIES (Continued)

Mr. James Duane
Executive Director
Central Florida Regional
Planning Council
Post Office Drawer 2089
Bartow, FL 33830

Mr. Sam Shannon
Executive Director
Treasure Coast Regional
Planning Council
Post Office Box 2395
Stuart, FL 33494

OTHER

Mr. Neil Sipe
University of Florida
Bureau of Economic and
Business Research
Gainesville, FL 32611

Ms. Fran Cruse
Center for Instructional
and Research Computing
Activities (CIRCA)
411 Weil Hall
University of Florida
Gainesville, FL 32611

Mr. Kevin T. Riley
General Reinsurance Corporation
600 Steamboat Road
Greenwich, CT 06830

APPENDIX B

THE SAFFIR/SIMPSON HURRICANE SCALE

APPENDIX B

THE SAFFIR/SIMPSON HURRICANE SCALE

The Saffir/Simpson Hurricane Scale is used by the National Weather Service to give public safety officials a continuing assessment of the potential for wind and storm surge damage from a hurricane in progress. Scale numbers are made available to public safety officials when a hurricane is within 72 hours of landfall. Scale assessments are revised regularly as new observations are made, and public safety organizations are kept informed of new estimates of the hurricane's disaster potential.

Scale numbers range from 1 to 5. Scale No. 1 begins with hurricanes in which the maximum sustained winds are at least 74 mph, or which will produce a storm surge 4 to 5 feet above normal water level, while Scale No. 5 applies to those in which the maximum sustained winds are 155 mph or more, which have the potential of producing a storm surge more than 18 feet above normal.

The scale was developed by Herbert Saffir, Dade County, Florida consulting engineer, and Dr. Robert H. Simpson, former National Hurricane Center director, and projects scale assessment categories as follows:

Category No. 1 - Winds of 74 to 95 mph. Damage primarily to shrubbery, trees, foliage, and unanchored mobile homes. No real damage to other structures. Some damage to poorly constructed signs. Storm surge 4 to 5 feet above normal. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings.

Category No. 2 - Winds of 96 to 110 mph. Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials of buildings; some window and door damage. No major damage to buildings. Storm surge 6 to 8 feet above normal. Coastal roads and low-lying escape routes inland cut by rising water two to four hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying island areas required.

Category No. 3 - Winds of 111 to 130 mph. Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some window and door damage. Some structural damage to small buildings. Mobile homes destroyed. Storm surge 9 to 12 feet above normal. Serious flooding at coast and many smaller structures near coast destroyed; large structures near coast damaged by battering waves and floating debris. Low-lying escape routes inland cut by rising water three to five hours before hurricane center arrives. Flat terrain 5 feet or less above sea level flooded inland 8 miles or more. Evacuation of low-lying residences within several blocks of shoreline possibly required.

Category No. 4 - Winds of 131 to 155 mph. Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows, and doors. Complete failure of roofs on many small residences. Complete destruction of mobile homes. Storm surge 13 to 18 feet above normal. Flat terrain 10 feet or less above sea level flooded inland as far as six miles. Major damage to lower floors to structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes inland cut by rising water three to five hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single-story residences on low ground within two miles of shore.

Category No. 5 - Winds greater than 155 mph. Shrubs and trees blown down; considerable damage to roofs of buildings; all signs down. Complete failure of roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings over-turned or blown away. Complete destruction of mobile homes. Storm surge greater than 18 feet above normal. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes inland cut by rising water three to five hours before hurricane center arrives. Massive evacuation of residential areas on low ground within five to ten miles of shore possibly required.

Dr. Neil Frank, present National Hurricane Center director, has adapted atmospheric pressure ranges to the Saffir/Simpson Scale. These pressure ranges, along with a numerical break-down of wind and storm surge ranges are:

SCALE NUMBER	CENTRAL PRESSURES MILLIBARS	CENTRAL PRESSURES INCHES	WINDS (MPH)	SURGE (FT.)	DAMAGE
1	980	28.94	74-95	4-5	Minimal
2	965-979	28.5 -28.91	96-110	6-8	Moderate
3	945-964	27.91-28.47	111-130	9-12	Extensive
4	920-944	27.17-27.88	131-155	13-18	Extreme
5	920	27.17	155+	18+	Catastrophic

APPENDIX C
COMMERCIAL PARCELS

APPENDIX C

CHARLOTTE COUNTY

Commercial Parcels

Land Use	Storm Category 1	2	3	4	5	Outside 5	Total
10 - Vacant Commercial -	1,859	1,577	882	219	-	5	4,452
11 - Stores, One Story -	89	94	2	2	1	-	188
12 - Mixed Use -	43	26	3	3	-	0	75
13 - Department Stores -	-	-	-	-	-	-	-
14 - Supermarkets -	-	-	-	-	-	-	-
15 - Regional Shopping Centers -	3	1	-	-	-	-	4
16 - Community Shopping Centers -	12	4	-	-	-	-	16
17 - Office Buildings, One Story -	54	28	3	1	-	-	86
18 - Office Buildings, Multi-Story -	1	-	-	-	-	-	-
19 - Professional Services Buildings -	32	13	4	-	-	-	49
20 - Airports, bus terminals, piers, marinas -	17	6	-	-	-	-	23
21 - Restaurants -	26	21	-	3	-	-	50
22 - Drive-in Restaurants -	7	4	1	-	-	-	12
23 - Financial Institutions -	10	13	2	-	-	-	25
24 - Insurance Company Offices -		-	-	-	-	-	-
25 - Repair Service Shops -	46	18	4	3	-	2	73
26 - Service Stations -	23	10	-	-	-	-	33
27 - Auto Sales, Service, etc. -	41	22	-	3	-	-	66
28 - Parking Lots	45	20	5	7	-	3	80
29 - Wholesale Outlets -	1	-	-	-	-	-	1
30 - Florist, greenhouse -	12	3	1	1	-	1	18
31 - Drive-ins -		-	-	-	-	-	-
23 - Enclosed Theaters -	1	-	-	-	-	-	1
33 - Bars -	10	8	-	-	-	-	18
34 - Bowling Alleys, Pool Halls -	3	14	1	-	-	-	18
35 - Tourist Attractions -	1	-	1	-	-	-	2
36 - Camps	3	-	-	-	-	-	3
37 - Race Tracks (auto, dog, etc.) -		-	-	1	-	-	1
38 - Golf Courses -	11	13	1	1	-	-	26
39 - Hotels, Motels -	25	5	1	4	-	-	35
TOTAL PARCELS	2,375	1,900	911	248	1	11	5,446

APPENDIX C

COLLIER COUNTY

Commercial Parcels

Land Use	1	2	3	4	5	Outside 5	Total
10 - Vacant Commercial -	0	0	22	0	0	0	22
11 - Stores, One Story -	111	67	51	3	23	13	268
12 - Mixed Use -	139	58	43	2	34	11	287
13 - Department Stores -	0	0	0	0	0	0	0
14 - Supermarkets -	2	0	6	0	5	1	14
15 - Regional Shopping Centers -	1	1	0	0	0	0	2
16 - Community Shopping Centers -	9	8	4	0	1	1	23
17 - Office Buildings, One-Story -	28	21	23	0	5	7	84
18 - Office Buildings, Multi-Story	6	11	2	0	1	0	20
19 - Professional Services Buildings -	5	7	17	0	1	0	30
20 - Airports, bus terminals, piers, marinas	8	4	0	0	0	0	12
21 - Restaurants -	23	12	24	0	8	2	69
22 - Drive-in Restaurant	2	4	1	0	0	0	7
23 - Financial Institutions -	15	12	4	0	1	2	34
24 - Insurance Company Offices	0	1	0	0	0	0	1
25 - Repair Service Shops -	13	8	2	0	3	3	29
26 - Service Stations -	19	25	8	1	12	3	68
27 - Auto Sales, Service, etc.	12	21	13	2	6	3	57
28 - Parking Lots -	17	12	6	-	2	1	38
29 - Wholesale Outlets -	7	1	2	0	4	2	16
30 - Florist, greenhouse -	5	8	6	1	0	0	20
31 - Drive-ins -	0	1	1	0	0	0	2
32 - Enclosed Theaters -	1	0	1	0	1	0	3
33 - Bars -	4	4	3	0	6	1	18
34 - Bowling Alleys, Pool Halls -	1	1	3	0	2	0	7
35 - Toursit Attractions -	5	4	14	0	1	0	24
36 - Camps -	4	1	0	0	1	1	7
37 - Race Tracks (auto, dog, etc.)	0	0	1	0	0	0	1
38 - Golf Courses	9	3	9	3	0	1	25
39 - Hotels, Motels -	40	17	5	1	2	2	67
TOTAL PARCELS	486	312	271	13	119	54	1,255

APPENDIX C

LEE COUNTY

Commercial Parcels

Land Use	Storm Category 1	2	3	4	5	Outside 5	Total
10 - Vacant Commercial -	709	72	233	-	10	-	1,024
11 - Stores, One Story -	304	202	104	2	4	6	622
12 - Mixed Use -	147	185	63	6	3	3	407
13 - Department Stores -	1	5	0	0	0	0	6
14 - Supermarkets -	10	7	5	0	0	0	22
15 - Regional Shopping Centers -	6	3	0	0	1	0	10
16 - Community Shopping Centers -	25	11	7	4	0	0	47
17 - Office Buildings, One Story -	18	92	33	5	0	2	250
18 - Office Buildings, Multi-Story -	8	33	7	0	0	0	48
19 - Professional Services Buildings -	20	25	21	2	0	0	68
20 - Airports, bus terminals, piers, marinas -	0	1	0	1	0	0	2
21 - Restaurants -	67	51	17	2	0	1	138
22 - Drive-in Restaurants -	7	9	3	0	0	0	19
23 - Financial Institutions -	21	26	6	0	0	0	53
24 - Insurance Company Offices -	2	1	0	0	0	0	3
25 - Repair Service Shops -	63	63	22	2	0	1	151
26 - Service Stations -	78	50	27	1	2	1	159
27 - Auto Sales, Service, etc. -	46	70	47	1	2	1	167
28 - Parking Lots	37	20	7	0	0	0	64
29 - Wholesale Outlets -	13	28	17	0	11	0	69
30 - Florist, greenhouse -	4	5	3	0	0	0	12
31 - Drive-ins -	2	0	1	0	0	0	3
23 - Enclosed Theaters -	4	1	0	0	0	0	5
33 - Bars -	16	6	10	0	0	1	33
34 - Bowling Alleys, Pool Halls -	8	3	1	0	1	0	13
35 - Tourist Attractions -	9	1	5	0	1	0	16
36 - Camps	3	0	0	0	0	0	3
37 - Race Tracks (auto, dog, etc.) -	0	0	3	0	0	0	3
38 - Golf Courses -	19	0	5	0	1	3	28
39 - Hotels, Motels -	126	25	20	2	0	1	174
TOTAL PARCELS	1,873	995	667	78	36	20	3,619

APPENDIX C

SARASOTA COUNTY

Commercial Parcels

Land Use	Storm Category 1	2	3	4	5	Outside 5	Total
10 - Vacant Commercial -	174	135	96	113	210	121	849
11 - Stores, One Story -	139	209	68	73	164	40	693
12 - Mixed Use -	185	94	46	62	81	30	498
13 - Department Stores -	0	2	-	2	2	-	6
14 - Supermarkets -	8	2	2	1	7	6	26
15 - Regional Shopping Centers -	1	-	1	7	-	-	9
16 - Community Shopping Centers -	11	4	4	4	7	2	32
17 - Office Buildings, One Story -	57	77	28	31	71	21	285
18 - Office Buildings, Multi-Story -	12	21	-	1	5	2	41
19 - Professional Services Buildings -	74	99	51	11	67	11	313
20 - Airports, bus terminals, piers, marinas -	-	-	-	-	-	-	-
21 - Restaurants -	56	54	8	20	23	10	171
22 - Drive-in Restaurants -	3	5	6	2	3	-	19
23 - Financial Institutions -	21	29	5	5	18	7	85
24 - Insurance Company Offices -	3	1	-	1	1	-	6
25 - Repair Service Shops -	53	56	83	43	99	46	380
26 - Service Stations -	41	26	15	11	35	17	145
27 - Auto Sales, Service, etc. -	28	33	36	39	53	25	214
28 - Parking Lots	56	152	12	9	35	5	269
29 - Wholesale Outlets -	-	6	8	8	30	7	59
30 - Florist, greenhouse -	7	6	17	4	6	9	49
31 - Drive-ins -	-	-	-	-	-	-	-
23 - Enclosed Theaters -	-	6	1	1	2	1	11
33 - Bars -	14	8	3	4	14	5	48
34 - Bowling Alleys, Pool Halls -	3	2	4	7	5	2	23
35 - Tourist Attractions -	4	2	1	-	1	2	10
36 - Camps	2	2	-	1	-	-	5
37 - Race Tracks (auto, dog, etc.) -	-	-	-	-	-	3	3
38 - Golf Courses -	5	7	10	6	8	14	50
39 - Hotels, Motels -	-	-	-	1	-	-	1
TOTAL PARCELS	957	1,038	507	478	947	386	4,311

APPENDIX D
INDUSTRIAL FACILITIES BY VULNERABILITY ZONE

APPENDIX D

INDUSTRIAL FACILITIES
By Vulnerability Zone

CHARLOTTE COUNTY

CATEGORY 1

Industry Name	Industry Type
Bob's Printing, Inc.	Printing - Letterpress
Brown's Machine Co., Inc.	Heavy machinery, tractor & dragline
County's Garage & Machine Shop	Ironworks
Climatrol Screen Company	Screen enclosures
Daily Herald News	Daily newspaper
Dumas Concrete Specialists	Lawn & patio ornaments
Jasty - Prints of Port Charlotte, Inc.	Printing - lithography
Jimmy's Seafood	Fresh seafood
L & M Printing	Letterpress
Littrell Concrete Division - Florida Mining & Materials Corp.	Ready-mix concrete
Port Charlotte Awning & Aluminum - Charlotte Solar Energy	Aluminum fabrication
Punta Gorda Ready-Mixed Division - West Coast Industries	Ready-mix concrete
Randi Color, Inc.	Commercial offset-color
Renshaw Press - Penta, Inc.	Lithographic
Rock Block of Florida, Inc.	Concrete & split face blocks
Roger's Seawall Company	Seawalls & docks
Sentinel Star Company	Charlotte shopping guide
Stan's Septic Service & Concrete	Septic tanks & distribution boxes

CATEGORY 2

Charlotte Lumber & Supply Company, Inc., ADCA Corporation	Wooden roof trusses
Gulf Shore Seafood, Inc.	Crabmeat
Port Charlotte Signs, Inc.	Billboards, neon & commercial signs

CATEGORY 3

Ashland - Warren, Inc.	Asphast & asphaltic mixtures
Baker Industries	Aluminum fabrication, vinyl panels
J & R Septic Tank Service	Septic tanks
Port Charlotte Ready - Mix Division, West Coast Industries, Inc.	Ready-mixed concrete

CATEGORY 4

Industry Name	Industry Type
Carey Concrete Coatings	Various concrete products

CATEGORY 5

None

COLLIER COUNTY

CATEGORY 1

Industry Name	Industry Type
D. C. Industries	Pool enclosures, porches, shutters, awnings, roofs, hurricane panels, four trac vinyl windows, plexiglass
Gulf Shore Publishing Co., Inc.	Magazine publishing
Krehling Industries, Inc.	Redi-mix concrete, concrete block
Marco Island Eagle	Weekly newspaper
Municipal Supply & Sign Company	Traffic, business, real estate signs, sign posts, hardware
Naples Ready-Mixed Concrete Division, West Coast Industries, Inc.	Ready-mixed concrete
Signman	Custom signs

CATEGORY 2

Baker's Custom Cabinets, Inc.	Wood household furniture, custom woodwork
Builder's Mart Components Corp. - Lennox Corp.	Wood trusses, lumber & plywood
Collier County Publishing Company	Daily newspaper publishing
Custom Metal Furniture	Cushions
Draperies Unlimited - Sawyer's Carpet & Tile	Curtains & draperies
Hoffman, Henry & Son Printers, Inc.	Printed material
Naples Millwork & Fixture Co., Inc.	Custom cabinets
Naples Printing Company, Inc.	Commercial printing, offset
Naples Star	Newspaper publishing
Pat's Draperies	Custom draperies, slipcovers, upholstery, woven woods, shades

CATEGORY 3

Industry Name	Industry Type
Tom Abbott, Inc.	Piling, seawalls, docks
Cement Products Corp.	Ready-mixed concrete, concrete block
Collier County Concrete Division, Florida Mining & Materials Corp.	Ready-mixed concrete
Dubroy, Inc.	Septic tank mfg.
Eagle Steel Products, Inc.	Steel buildings
Florida Rock Corp.	Limestone - rock processing
Highway Pavers, Inc.	Asphaltic concrete, limerock
International Packaging Machines, Inc.	Pallet stretch wrappers
Mars Signal Light Company	Signal lights, sirens, floodlights
Naples Gulf Coast Cabinets	Mica cabinets
Naples Lumber & Supply Co., Inc.	Roof & floor trusses, prehung door units
Rain Control Aluminum of Naples	Aluminum soffit & gutters
Redclay Printing	Commercial printing
Scofield Marine Construction	Pile driving, marine construction
Stonecraft Industries	Copy, tiles, stepping stones, concrete fountains
Tropichem, Inc.	Miscellaneous cleaners & chemicals

CATEGORY 4

Meekins, Inc.	Limestone quarry
Rainwaters, Orville, Inc.	Stumpwood contractor

CATEGORY 5

None

GLADES COUNTY

Industry Name	Industry Type
Thomas Gaskins	Cypress knees & lamp bases
Ortona Sand Company, Inc., Jahna, E. R., Industries, Inc.	Mining, builders, sand

INDUSTRIAL FACILITIES

HENDRY COUNTY

Industry Name	Industry Type
Berry Citrus Products	Frozen orange & grapefruit concentrate - citrus pulp feed
Citrus Belle	Citrus concentrate
Clewiston News	Newspaper, printing
Everglades Sugar Refinery, Inc., Division Savannah Foods & Industries	Refined sugar & sugar syrup
Florida Rock and Caloosa Sand	Sand, asphalt
International Minerals and Chemical Corp. - Rainbow D	Mix & blend fertilizer
LaBelle Lumber & Cabinets	Building supplies, kitchen cabinets
LaBelle Porte-Room System	Mobile home add-on rooms - garages & utility rooms
LaBelle Sportswear, Inc.	Children's wear
Swindle Brothers Paving	Asphalt paving mix
United States Sugar Corporation	Sugar, sugar cane, molasses

LEE COUNTY

CATEGORY 1

Industry Name	Industry Type
Ashland-Warren, Inc.	Asphalt paving
Awnings by Scottie, Inc.	Canvas & vinyl
Beach Bulletin	Newspaper publishing
Beach Shrimp Packers, Inc.	Shrimp packing
Bollinger's Business Service	Advertising art, offset printing, layout
Cape Coral Breeze	Daily newspaper
Cape Coral Printing	Commercial printing - lithographic
Commodore Yacht Corp.	Sailboats
Custom Gems	Stone cutting, jewelry
Ernie's Signs	Outdoor billboards, graphics, commercial signs
Florida Aggregate Division, Florida Rock Industries	Mining, sand
Florida Printing & lithographing	Commercial printing
Fugate Construction	Limerock material
Gator Press	Commercial printing
Glory of the Sea	Shell novelties & jewelry
HAPS Welding & Trawler Repair	Anchors, steel fabrication
Hanson Marine Ways, Inc.	Boat overhaul
Harbor Enterprises	Boat tops, boat snugs
Hart's Dairy, Inc.	Dairy products
Homes Magazine	Magazine publishing
Hurricane Bay Marine	Boat and engine repair
Island Press Printing	Printed material
Island Reporter - Sentinel Star Co.	Weekly newspaper
J. J.'s Beach Signs	Advertising, silk screen, routed wood signs
Knight Brothers	Boat building and repair
Lee Septic Tank & Crane Service, Inc.	Septic tanks
Liggett's Custom Cabinets	Book cases, cabinets
M.E.K. Signs	Plastic signs & letters

CATEGORY 1 (Continued)

Industry Name	Industry Type
Meltzer Company	Sewing machine attachments
Middleton's Drapery	Draperies, mini-blinds
Pine Island Boats, Inc.	Fluid separator
Pine Island News	Miscellaneous printing, advertising
Print Shop of the Island	Commercial printing
Quick Print Copy Center	Printing - offset
Raber Industries, Inc.	Steel and aluminum fabrication
Raymond Building Supply, Inc.	Wood and plastic prehung doors
Rick's Welding	Shrimp boat repair, anchors
Rochette River Groves	Fruit, candies, sailboats & trawlers
Scotties Custom Canvas	Canvas production, printing
Speed-D Print	Printing
Terras Fiberglass, Inc.	Fiberglass, machine parts, prototype parts
Fort Myers Beach Observer	Newspaper publishing
The Ultimate, Division of JJ's Signs	Advertising, signs
Wicked Wick, Inc.	Candles and accessories

CATEGORY 2

Industry Name	Industry Type
A & S Rubber Stamps	Rubber stamps
Ace Press, Inc.	Commercial printing
Aluminum Metals, Inc.	Trailer skirting, posts
Bayshore Concrete Mfg.	Concrete rings, baths
Bet-R-Maid Cabinet Company	Mica kitchen cabinets
Betsy-B of Florida	Ladies handbags
Bonita Banner	Newspaper publishing
Borden's Dairy Division	Dairy products
Broadfire Corporation	Commercial fishing trawlers
Brothers Marine	Boats, fiberglass
CSH Industries, Inc.	Egg washer & cooler machines
Cape Coral Engineering, Division of Janeandy, Inc.	Rotary printing press
Cape Coral Fabricating	Sheet metal
Cape Coral Togs	Cotton blouses
Cheyenne, Inc.	General welding
City Products, Inc.	Ice
Concrete Seawalls, Inc.	Seawalls & docks
Corinthian Cultured Marble	Molded marble
Crestwood Enterprises	Laminated cabinets
Crystock Corporation	Quartz crystals
Currier Roof Tile Mfg. Company	Cement roof tile
Curry Printing Center	Printing
Daniel Byrd Cabinets, Inc.	Custom cabinets
Day's Corporation of Lee County	Draperies
Di Ma Corporation	Wood furniture
Diel-Zero Indicator	Scale accessories
Ken Domke Aluminum	Storm products
Dovetail Cabinets, Inc.	Cabinets
Ed-Ro, Inc.	Fire-retardant draperies

CATEGORY 2 (Continued)

Industry Name	Industry Type
Florida Aggregate Division	Mining sand
Florida Steel Corporation	Reinforcing steel
Fort Myers Coca-Cola Bottling	Bottling plant
Fort Myers Mattress Factory	Box springs & mattress
Fort Myers Vault Service	Concrete burial vaults
General Counting Scales	County scales
Gulf Industries	Body splint
Gwenita Wood Products	Mica kitchen cabinet
Glenn Hale	Rubber stamps
Hamlet Printing Company	Letterpress, offset
Hansen Manufacturing Co. of Fla., Inc.	Ceiling fans
Harding Trailer Company	Boat trailers
Harvey Manufacturing Company	Garment bags
Hercules, Inc.	Stumps
Holtgraver Service Machine Tool Co.	Small machine parts
Home Draperies	Custom drapes
Home Products Cabinet	Custom built cabinets
Home Products Truss Company	Roof trusses
Imperial Bedding	Mattresses and box springs
Jan Crystals, Division of Bob Whan and Son Electronics, Inc.	Crystals for communication
Jem's Draperies	Custom drapes
Jensen Furniture	Oak tables
Jones Industries, Screen Enclosures	Shutters, aluminum doors
Richard Kull	Commercial Printing
Lester's Fabricators	Pool enclosures
Lifetime Florida Steps	Concrete products
Longmire and Taylor Printers, Inc.	Printing
M.O.P. Press	Quarterly news-letter
Marine Concepts	Boat manufacturing
Melweb Signs	Electric signs
Munters Corporation	Cooling tower fill
News-Press Publishing Company	Daily newspaper
O. F. Ecklund, Inc.	Heat penetration equipment
Ohio Medical Products, Division of Airco, Inc.	Oxygen, medical products
Palm City Machine & Tool Co., Inc.	Machine shop
Peschel Instruments, Inc.	Electric test equipment
Plasma Corporation of America	Plasma
Plastic Letters and Signs	Miscellaneous plastic products
Povia Paints, Inc.	Paints
Prevatt, Don and Associates, Inc.	Carports
Printcraft of Fort Myers	Printing
Printers Ink of Southwest Florida	Publications
Product Research & Dev. Corp.	Fabricated metals
Quick Print Copy Center	Printing
R. G. Blouse, Inc.	Children's blouses
Rain-Tite Harvey Mfg. Co.	Garment bags
Russell Cabinets	Kitchen cabinets

CATEGORY 2 (Continued)

Industry Name	Industry Type
Sahara Cabinets	Mica kitchen cabinets
Sarlo Power Movers, Inc.	Lawn mowers
Schucker Yacht Corporation	Sailboats
Service Machine Tool Company	Tools & dies
Shannon, J. Supply	Redi-mix concrete
Shar-In Cabinets	Kitchen cabinets
South Florida Fiberglass, Inc.	Toilets, tanks, baths
Styleview Industries	Aluminum awnings
Sun Tropics Industries	Patio furniture
Sutphen Marine Corporation	Off-shore sportboats
Tami Products	Linen cart covers
The Breeze Corporation	Newspapers
Tolles Concrete Specialties, Inc.	Culv rts
Tolles Ready-Mix, Inc.	Concrete
Trail Dairy, Inc.	Prepared feed for animals
Update, Inc.	Maps and graphics
Wood Plastic, Inc.	Desks
Woodcraft Cabinets of Cape Coral	Cabinets and tops
Woods Metal Company, Inc.	Sheetmetal
Zamborik Mold and Die, Inc.	Plastics

CATEGORY 3

Industry Name	Industry Type
ABC Sign Service, Inc.	Outdoor advertising, neon
Aer-O-Bic Systems	Sewage treatment plants, septic
Africana Gifts and Shells, Inc.	Shell and coral
Alcan Building Products	Aluminum windows and doors
Big "K" Ice Company	Wholesale ice
Scott Carter Signs	Signs
Cement Industries,Inc.	Concrete
Cement Products Corporation	Concrete
Classic Home Builders, Inc.	Mobile homes
Crews Culverts	Culverts
Crews Septic Tank Sales & Service	Septic tanks
Dean Steel Buildings, Inc.	Pre-engineered metal buildings
Bob Dean Supply, Inc.	Welding
Dick's Welding	Bar joist
Diemold Machine, Inc.	Injection molded plastics
Drouin Cabinets, Inc.	Vanities
Floyd Southwest Bottlers	Bottling
Fort Myers Construction Company, GAC Properties, Inc.	Asphaltic concrete
Fort Myers Metal Products, Inc.	Sheetmetal
Fort Myers Ready Mixed Division, West Coast Industries	Concrete
General Counting Scales	Counting scales
Golden Door Millwork & Supply Company	Trim, casework
Groff Industries of Fort Myers	Miscellaneous aluminum fabrication
Gulf Paving Company	Hot & cold asphalt mix
Harper Brothers, Inc.	Asphalt mixes
Frank E. Hawk	Metal work
Hirshals Machine Shop	Welding

CATEGORY 3 (Continued)

Industry Name	Industry Type
Indo-Pacific Sea Shells	Conch lamps
J. B. Drapery	Drapes
Johnson Paints, Inc.	Paints
K-D Motor Service, Inc.	Industrial engine rebuilding
Learning Laboratories, Inc.	Science charts
Lee County Concrete Division, Florida Mining & Materials Corp.	Concrete
Lee County Metal and Roofing Company	Sheetmetal
Lehigh Publishing	Newspaper
Lehigh Sign	Signs
Miller Container Corporation	Corrugated boxes
Ott Welding	Machinery
Page Ready Mix & Supply Company	Ready-mix concrete
Pall Industrial Hydraulics Corp.	Hydraulic filters
Patnode Industries, Inc.	Concrete roof tile
Pelliccione Builders Supply, Inc.	Roof trusses
Perfection Water Company, Inc.	Distilled spring-bottled water
Postal Instant Press	Printing
Precision Econowind, Inc.	Voice coils for loud speakers
Press Printing Enterprises	Printing
Producers Manufacturing Corporation	Fertilizer
Robbins Manufacturing Co., Inc.	Lumber treating
Royal Enterprises	Acrylic paint
Southern Machine & Steel, Inc.	Steel
Southland Pre-stressed Concrete, Florida Mining & Materials, Inc.	Prestressed concrete products
Sunniland Corporation	Roofing, building materials, chemicals
T. V. Tempo	TV scheduling
Ted's Sheds	Aluminum sheds
Shell Factory, Inc.	Shell lamps
United Welding and Machine Company	Welding
Walker Builders Supply, Inc.	Roof & floor trusses
Webb Wright Corporation	Prellin insecticide
Weggeland Small Assemblies, Inc.	Mini-cassette assembly

CATEGORY 4

Industry Name	Industry Type
AAA Aluminum Stamping	Sliding glass doors
Tri-County Printing & Stationery	Printing
Unique Designs, Inc.	Resin & shell items

CATEGORY 5

Industry Name	Industry Type
Kole's Custom Cabinets, Inc.	Custom cabinets
Lehigh Publishing	Newspaper
Lehigh Sign	Signs
Mighty Mite Marine, Inc.	Outboard motors

INDUSTRIAL FACILITIES

SARASOTA COUNTY

CATEGORY 1

Industry Name	Industry Type
Redland Automation, Inc.	Inductive vehicle detectors
Riegels Landing	Small boat repair
Salvatori Ophthalmics, Inc.	Ophthalmic goods
Sarasota Kitchens	Wood & mica cabinets
Siesta Key Pelican	Newspaper
William Swain	Electronics

CATEGORY 2

Industry Name	Industry Type
American Optical Corporation, Warner Lambert Company	Eyeglass frames & lenses
BPI	Industrial & commercial engraving
John Holmes, Inc.	Fiberglass, wood & aluminum boats; yacht repair
Kwik-Kopy Printing	Quick printing
Marine Products - The Winslow Co.	Rubberized nylon life rafts
Nokomis Septic Tank, Inc.	Concrete septic tanks
Norman Industries, Inc.	Generators
Offshore Enterprises, Inc.	Machine shop
Orange State Lumber Company	Roof trusses
Perfection Water Company	Bottled drinking water
Porter Wood Custom Woodworking & Cabinets, Inc.	Cabinets, commercial fixtures
Sarasota Blinds Manufacturing	Venetian blinds; window shades
Serbin Printing, Inc.	Printing
Tervis Tumbler	Plastic insulated drinking glasses
The Bulletin	Newspaper publishing
United States Awning Company	Canvas & vinyl awnings

CATEGORY 3

Industry Name	Industry Type
Associated Label Systems, Inc.	Pressure sensitive labels
Associated Services, Inc.	Rebuild air compressors; air & gas compressors
Berlin Sign Company	Signs, outdoor advertising
Bookbinders, Inc.	Bookbinding, plastic laminating
Central Printing	Commercial printing
Florida Graphic Arts, Inc.	Letter press
General Devices, Inc.	Industrial drafting materials
Hynautic, Inc.	Hydraulic steering equipment
Integrity Aluminum	Aluminum products
Jan's Hang-Ups	Custom draperies, vertical blinds
Kent Manufacturing	Aluminum castings, machine parts

SARASOTA COUNTY (Continued)

CATEGORY 3 (Continued)

Industry Name	Industry Type
Littrell Concrete Division, Florida Mining & Materials Corp.	Ready-mixed concrete
Mackay Masonry	Apply plaster & stucco
R. C. Martin Concrete Products, Inc.	Ready-mix
Morgan Sheet Metal Works	Custom sheetmetal
Norman's Cabinet Shop	Cabinets & vanities
Orbits Roof Tile, Inc.	Cement roof tiles
Peter Lieb Interiors, Inc.	Electroplating
Roehr's Machine Shop, Inc.	Machine shop
Rudy's Welding	Iron & aluminum
Sarasota Concrete Division, Florida Mining & Materials Corporation	Ready-mixed concrete
Southern Church Envelope & Supply Co.	Church printing - letterpress
Southern Spring & Stamping, Inc.	Flat springs, wire forms
Springlock Scaffolding, Inc.	Construction scaffolding
Sun Coast Gondolier	Newspaper
Sunshine Press of Venice	Offset printing
Thermo-Spray Company	Painting, paint manufacturing
Transco Products, Inc.	Paper industries machinery
Tri-County Aluminum Company	Utility & screened enclosures
Venice Millwork and Supply	Furniture
Venice Specialties & Manufacturing	Silk screen printed products
Venice Upholstery & Drapery, Inc.	Curtains & drapes
Weber Manufacturing & Supplies	Screw machine products
Weeks Machine Shop	Machine shop
West Coast Precast Products	Ready-mix
White's Cement	Concrete products
Zacchini Machine Shop	Machine shop products

CATEGORY 4

Industry Name	Industry Type
ABC Sheet Metal, Inc.	Steel hoods, tables
Ace Boat Hoist Company, Division Ace Lab Inc.	Boat hoists
All State Systems, Inc.	Electric wiring harnesses
Automotive Electronics, Inc.	Alternator stators
Bates File Company, Inc.	Manicure implements
Beachcomber Press	Printing, NCR forms
Builders Aluminum	Masonry, concrete, aluminum
Cement Products Corporation of Venice	Septic tanks
Cochran Concrete Company	Septic tank, brick, stone
Crescent Rubber Stamp Company	Printing, rubber stamps
Custom Awnings	Boat tops
Custom Woodcraft	Cabinets
Dryco Company of Florida, Inc.	Lithographic printing inks
Electra-Tronics, Inc.	110 volt AC generators

SARASOTA COUNTY (Continued)

CATEGORY 4 (Continued)

Industry Name	Industry Type
Flight Instrument, Inc.	Aircraft instrument overhaul
Florida Horizons, Inc.	Sheetmetal/roofing
Florida Ladder Company	Wood step & extension ladders
G & G Metals	Amusement & circus equipment, steel buildings
D/B/A The Gemcrafter, 14 Karat Connection, Inc.	Handcrafted jewelry, gems
General Air Conditioning	A-C ductwork
Gulf Coast Signs of Sarasota, Inc.	Signs
Impact Golf, Inc.	Custom golf clubs & repair
Independent Concrete Products, Inc.	Precast concrete products
Joelson Concrete Pipe Company	Concrete pipe & culverts
Kinetics Corporation	Prototype manufacturing of applic.systems
King Plastic Corp.	Therm-plastic sheets
Leco Engineering & Machine, Inc.	Tools & dies
Mechanical Rebuilders, Inc.	Rebuild A/C
Sarasota Awning Company	Canvas awnings
Security Shutter Corporation	Aluminum shutters
Skillcraft Industries	Heavy duty transit buses
Superior Heating - Cooling Corp.	Ductwork
Martin J. Tobin Company	Wire forms
Trophy Reloading	Bullets, target ammunition

CATEGORY 5

Industry Name	Industry Type
American Industries	Plastic letters, trays
Berta's Iron Works, Inc.	Ornamental iron work
Leaf Tent & Sail, Inc.	Tents & canvas products
George Luzier, Boatbuilder	Custom yachts
Nelson Glass Company	Glass & aluminum doors
Starlynn Custom Drapes	Curtains, drapes

OUTSIDE OF SLOSH GRID SYSTEM

Industry Name	Industry Type
Adco, Inc.	Amusement rides and related equipment
American Business Forms, Inc.	Office supplies
American Sign Company	Manufacture & erect signs
Ashland-Warren, Inc.	Asphaltic concrete
Bay Marine Service, Inc.	House & fishing boats
Beck Corporation	Mobile home chassis
Borden's Dairy Division	Dairy products
Brannen Prestress Company, Inc.	Structural concrete products
Butler Enterprises, Inc.	Custom furniture
Cement Products Corporation	Ready-mix
Corrugated Packaging, Inc.	Corrugated cartons

INDUSTRIAL FACILITIES

SARASOTA COUNTY (Continued)

OUT OF SLOSH GRID SYSTEM

Industry Name	Industry Type
Craftsman Cabinet Works of Sarasota	Kitchen cabinets
Custom Metals, Inc.	Aluminum fabrication
Cyclotronics, Inc.	Custom transformers
DeLoach Plastics	Aeration & degasification equipment
Demaco Corporation	Customized masonry
Display Concepts, Inc.	Interior & exterior display letter & graphics
Electio Corporation	Electronic tachometer
Florida Tape & Labels, Inc.	Bumper stickers
Force Engineering Company, Inc.	Advanced composit structures
Funkhouser, W. R., Inc.	Printing office forms
Gilmore Cabinet & Supply	Office Furniture
Gulf Coast Cabinet & Millwork	Cabinets for banks, schools, etc.
Harmar Products, Inc.	Electronic components
Hong Enterprises - Creative Arts	Lithographic printing
J & G Printing & Composition, Inc.	Printing
Jenkins Wholesale Company, Inc.	Ceramic kits for ceramic hobbyists
Jevco Manufacturing Company	Machine shop
Key Packaging Company	Plastic containers
L & S Furniture, Inc.	Formica furniture
Lawrence Cabinets, Inc.	Residential & commercial cabinets
Machine Craft of Florida	Job shop production
Martin Concrete - Bee Ridge Division	Ready-mix
G. C. Messel & Sons, Inc.	Furniture
Microlife Technics, Inc.	Bacteria cultures for foods
Mictron, Inc.	Voltage tunable magnetrons
Naomi's Draperies	Draperies
Nelson Medical Products, Inc.	Auto hand controls
On Tool & Die, Inc.	Dies, tools, jigs, molds
Orion Corporation	Air support & fabric tension structure
Pannier Corporation - Southern Div.	Machine shop
Peterson Manufacturing Company	Pen & pencil tubular metal parts
Prindle Fabbri Corp.	Fishing leader wire
Rexham Corporation, Bartect Machinery Division	Packaging machinery
Rexnord, Inc., Hydraulic Comp. Div.	Hydraulic valves & controls
Sangamo Weston, Inc.	Telemetry products, tape recorders
Sarasota Belting Company	Specialized conveyer belts
Sarasota Cabinet Works	Cabinets, vanities
Sarasota Lamps & Shade Manufacturing	Lamps, hydrocal, wood
Sarasota Precast Products, Inc.	Precast concrete products
Sarasota Shopping Guide, Inc.	Newspaper, advertising
Scott Paint Corporation	Paint, varnish & coatings
SEE Magazine	Visitor guide
Skyline Corporation	Doublewide mobile homes
Sun Hydraulics Corporation	Hydraulic valves
Sunshine Plating, Inc.	Electroplating
Super-Sensitive Musical String Co.	Musical accessories - bow strings
Teleflex Incorporated Marine Ind.	Engine instruments, wiring harnesses
Thiele Redwood Products	Redwood planters
Title Slide Company, Inc.	Non-drip beverage coasters, wood furniture
Trail-Mate, Inc.	Adult 2 & 3 wheel bikes
Truss Manufacturing	Roof trusses

INDUSTRIAL FACILITIES

SARASOTA COUNTY (Continued)

OUT OF SLOSH GRID SYSTEM (Continued)

Industry Name	Industry Type
Williams Brothers Sheet Metal	Heating & air conditioning sheet metal
Wisco-Sarasota Division	Metal fabrication
Workman Electronic Products, IPM Technology, Inc.	Resistors, electric chemicals & parts, circuit breakers

APPENDIX E
PUBLIC FACILITIES BY VULNERABILITY ZONE

APPENDIX E

Public facilities by Vulnerability Zone

The following inventory lists the types of public facilities in each of the Region's counties, by vulnerability zone. Major types of public facilities include sewage treatment plants, water treatment plants, solid waste sites, electrical power facilities, transportation facilities, and other public facilities (hospitals, schools, police protection and fire protection facilities). The inventory is arranged to correspond with the respective chapters of the text.

A map number and facility number is given for each individual facility; these numbers correspond to the maps which are contained in Appendix F. (The map number is found on the bottom right hand corner of the page).

APPENDIX E

PUBLIC FACILITIES BY VULNERABILITY ZONE

Charlotte County

SEWAGE TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
15	3	Aqua Gardens	.010	S.D.
15	4	Banyon Point Condominium	.022	S.D.
15	5	Bay Palms Trailer Park	.010	S.P.
13	7	Castaways Apartments	.010	S.D.
15	9	Charlotte Co. Public Safety Bldg.	.010	S.R.
15	10	Charlotte Manor	.014	S.R.
13	11	Cumberland Apartments	.010	S.D.
13	13	Eagle's Nest	.125	S.S.I.
15	14	Eagle's Point MHP	.250	S.R.
15	15	Econotravel Motor Hotel	.015	S.D.
15	16	Edge Water Manor Condominimum	.010	S.P.
15	17	Edge Water Village Condominimum	.010	S.P.
13	18	El Galeon Motel	.025	S.
14	19	El Jobean MHP	.028	S.P.
15	20	Emerald Pointe	.030	S.D.
13	21	Englewood Beach Condominimum	.010	S.D.
13	22	Englewood Beach Cottages (EBCO)	.050	S.P.
20	24	Gasparilla Mobile Estates	.015	S.R.
14	26	General Development Utilities, Gulf Cove	.330	S.
14	28	General Development Utilities, Quesada	.050	S.P.
15	29	General Development Utilities, S. Punta Gorda	1.50	S.S.I.
15	30	Harbor View Trailer Park	.025	S.
13	32	Holiday Isles Commercial Bldg.	.010	S.D.
16	34	Hunter's Creek	.080	S.P.
13	35	Indigo Isles MHP	.035	S.P.
15	36	Jamaica Way	.010	S.P.
15	37	Kenbridge Condominimum	.015	S.D.
13	38	Knight Island	.055	S.D.
15	39	KOA - Burnt Store Road	.020	S.P.
13	40	LaCoquina Condominimum Apartments	.015	S.D.
16	41	Lazy Lagoon MHP	.015	S.D.
13	42	Lemon Bay Breezes	.043	S.S.I.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

* Capacity greater than or equal to .01 MGD.

Charlotte County

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
13	45	Manasota Manor	.050	S.D.
13	46	Manasota Shores	.045	S.D.
13	49	Musgrave Apartments	.070	S.D.
14	50	Myakka River	.015	S.D.
16	55	Palm & Pine Trailer Park	.015	S.D.
15	57	Parkhill Manor	.015	S.D.
16	58	Pelican Harbor MHP	.200	S.R.
13	59	Pelican Landing	.020	S.D.
15	60	Pine Terrace Motel & Trailer Park	.015	S.P.
15	62,			
15	63	City of Punta Gorda	1.00	S.S.I.
15	65	City of Punta Gorda Kampground	.015	S.R.
15	66	City of Punta Gorda Isles	.010	S.S.I.
15	68	Rainbow Bay Condominimum	.015	S.D.
15	69	River Forest MHP	.035	S.P.
15	70	River Haven MHP	.015	S.P.
20	71	Rotonda Waste Water Treatment Plant	.250	S.P.
13	73	Sandpiper Key	.075	S.P.
15	75	Southern Oaks	.007	S.D.
14	77	Suburbaner Step	.012	S.P.
13	78	Tamarind Gulf & Bay Condominimums	.044	S.D.
15	81	Westchester Park	.015	S.D.
15	82	Westchester Woods	.025	S.D.
13	83	Wildflower Golf Course	.043	S.P.
15	84	Windmill Village	.050	S.P.

CATEGORY 2

15	1	Alligator Park South	.050	S.D.
21	6	Burnt Store Colony	.070	S.D.
15	12	Deep Creek Utilities	.020	S.R.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

Charlotte County

SEWAGE TREATMENT PLANTS

CATEGORY 2

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
15	25	General Development Utilities, Bionitrogen STEP	3.00	S.S.I.
14	27	General Development Utilities, Murdock	.030	S.P.
13	44	Lemon Bay JR/SR High School	.015	S.D.
15	48	Meadow Park Elementary School	.010	S.P.
13	51	Oyster Creek	.015	S.D.
13	52	Palm Manor	.015	S.D.
13	53	Palm Plaza Shopping Center	.010	S.D.
15	54	Palmetto MHP	.013	S.P.
15	64	Punta Gorda County Club	.005	S.S.I.
13	80	Water's Edge	.025	S.P.

CATEGORY 3

15	8	Charlotte Co. Development Authority	.007	S.
13	31	Holiday Inn Travel Park	.036	S.R.
13	33	Holiday Mobile Estates	.100	S.R.
15	47	Maple Leaf Estates	.200	S.P.
15	61	Port Charlotte Village	.060	S.P.
16	67	Punta Gorda Pines	.100	S.P.
16	74	Shell Creek Trailer Park	.010	S.R.
16	79	Villages of 1774	.028	S.P.

CATEGORY 4

22	23	Evergreen Mobile Community	.050	S.D.
15	72	Sandhill Pines Condominimum	.050	S.D.
22	76	Sun N Shade Family Campground	.010	S.R.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

Charlotte County

SEWAGE TREATMENT PLANTS

CATEGORY 5

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
18	56	Paradise Travel Trailer Condominimums	.035	S.P.

OUT OF SLOSH GRID SYSTEM

None

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

WATER TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Design Capacity*
20	202	Cape Haze	.150
15	206	Eagle Point	.035
13	207	Five Lands	.500
20	209	Little Gasparilla Island W.P.	.010
15	212	PGI Burnt Store Golf Course	.136
13	213	Rotonda West Corp.	.500

CATEGORY 2

15	203	Charlotte Harbor Water Association	.385
15	204	Deep Creek Utilities	.140
14	208	Gasparilla Island Water Association	.80
15	210	Port Charlotte Water Treatment #2	2.20

CATEGORY 3

15	200	Alligator Utilities	.040
21	201	Burnt Store Water	.036
16	214	Shell Creek Park	.010

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

Charlotte County

SEWAGE TREATMENT PLANTS

CATEGORY 4

Map #	Facility #	Facility	Design Capacity*
22	215	Sun N Shade	.010
16	216	Villages of 1774	N/A

CATEGORY 5

None

OUT OF SLOSH GRID SYSTEM

17	205	Dr. Franklin Miles Camp BSA	.020

SOLID WASTE SITES

CATEGORY 1

Map #	Facility #	Facility
15	301	Charlotte Sanitation (Transfer Station)

CATEGORY 2

14	302	Englewood Disposal (Transfer Station)

CATEGORY 4

22	300	Zemel Road Landfill (160 acres, 6 year life span)

CATEGORY 3, 5

None

ELECTRICAL POWER FACILITIES

CATEGORY 1

Map #	Facility #	Facility
15	313	Punta Gorda Substation (FPL)
15	311	Harbor Substation (FPL)

Charlotte County ELECTRICAL POWER FACILITIES (continued)

CATEGORY 2

Map #	Facility #	Facility
14	310	Murdock Substation (FPL)

CATEGORY 3

16	312	Charlotte Substation (FPL)
16	314	Cleveland Substation (FPL)

CATEGORY 4

None

CATEGORY 5

None

PUBLIC FACILITIES

Collier County

SEWAGE TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
118	1	Angler's Motel & Bay View Trailer Park	.025	S.
109	11	Collier Seminole State Park	.015	S.S.I.
108	12	Coon Key Pass Fishing Village	.012	S.D.
111	13	Copeland Road Prison	.010	S.P.
111	14	Copeland Village	.020	S.R.
100	16	Cricket Lake Apts.	.015	S.P.
100	18	Doyle Hopkins - Enzian Apts.	.020	S.P.
100	20	Enchanting Acres	.025	S.
117	22	Everglades City	.100	S.P.
111	26	Golden Lion	.015	S.P.
92	27	Gulf Shore	.028	S.D.
92	28	Harmony Shores MHP	.014	S.D.
101	29	Hitching Post MHP	.100	S.P.
100	30	Hopkins Apts.	.050	S.
108	38	Johnson's Bay Club	.010	S.D.
101	45	M&E MHP	.015	S.
108	46	Marco Island Utilities	2.50	S.S.I.
101	47	Marco Shores Golf & Tennis Club	.140	S.S.I.
108	48	Marco Towers	.035	S.D.
92	49	Moorehead Manor	.020	S.
101	56	Naples KOA Campground	.015	S.R.
92	57	Naples Land Yacht Harbor	.040	S.D.
92	59	Naples Shopping Center	.010	S.
92	60	Naples Villa Care Center	.015	S.P.
92	61	Parkshore, Unit 5	.035	S.P.
92	62	Pelican Bay	.500	S.S.I.
100	63	Pinebrook Lake	.055	S.P.
109	66	Remuda Ranch	.035	S.P.
101	67	Riverwood MHP	.010	S.P.
101	68	Rookery Bay Utility	.150	S.P.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

Collier County

SEWAGE TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
109	69	Royal Palm Hammock	.010	S.P.
108	75	Tarpon Village	.015	S.D.
101	78	Tree Tops of Naples	.025	S.P.

CATEGORY 2

92	17	Collier Co. Vocational-Tech. School	.015	S.P.
100	24	Glades Subdivision	N/A	S.S.I.
92	37	Jimmie's Reef	.020	S.P.
101	39	Kountree Kampin	.010	S.P.
101	44	Lely Estates	.700	S.P.
92	52	Naples, City	5.40	S.
102	71	Six L Farm	.010	S.P.
92	81	WTW Enterprises	.048	S.P.

CATEGORY 3

92	2	Barron Collier High School	.026	S.P.
92	3	Bear's Paw County Club	.108	S.P.
93	4	Blue Skies MHP	.030	S.P.
92	5	Camp Happy	.020	S.D.
87	6	Carribean Park - North	.025	S.R.
87	7	Carribean Park - South	.030	S.R.
87	8	Collier Co. District A	1.50	S.P.
92	10	Collier Co. Production Park	.040	S.P.
92	19	East Naples Middle School	.014	S.P.
93	21	Endless Summer MHP	.012	S.R.
92	23	Fat Boys Barbeque	.015	S.D.
93	25	Golden Gate	.300	S.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

Collier County

SEWAGE TREATMENT PLANTS

CATEGORY 3

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
93	36	Kings Lake	.052	S.D.
87	40	Lake San Marino	.020	S.D.
87	43	Landmark Estates	.019	S.P.
93	50	Myrana Village	.015	S.R.
92	51	Naples Bath & Tennis	.075	S.R.
93	53	Naples, Christian Academy	.010	S.P.
101	54	Naples Estates	.093	S.P.
92	55	Naples Industrial Park	1.00	S.
	58			
92	64	Pine Ridge Middle	.020	S.R.
87	70	Sandy Ridge Labor Camp	.020	S.R.
92	72	Sorrento Villas	.020	S.R.
92	73	Southwind Mobile Village	.035	S.P.
92	76	The Moorings Park	.070	S.P.
101	79	Wing South Airpark	.040	S.D.
92	80	World Tennis Club	.040	S.S.I.
92	82	Wyndemere	.048	S.P.
87	83	Victoria Park	.100	S.P.

CATEGORY 4

87	15	Crescent Lake Estates	.040	S.P.
87	35	Imperial Gulf Estates	.022	S.P.
88	65	Quail Creek Subdivision	.050	S.P.

CATEGORY 5

85	9	Collier Co. Housing Authority	.060	S.P.
85	31	Immokalee Apts.	.033	S.R.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

Collier County

SEWAGE TREATMENT PLANTS

CATEGORY 5

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
85	32	Immokalee High School	.030	S.R.
85	33	Immokalee Stockade	.010	S.R.
85	34	Immokalee Water/Sewer	1.50	S.D.
85	41	Lake Trafford Elementary School	.010	S.R.
85	74	Tara Park	.012	S.D.

OUT OF SLOSH GRID SYSTEM

None

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

WATER TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Design Capacity*
118	200	Angler's Motel	.045
101	201	Capri Water Works	.765
109	205	Collier-Seminole State Park	.055
117	207	Everglades City	.140
108	209	Goodland Water	.250
101	211	Hitching Post MHP	.100
108	216	Marco Island Utilities	4.03
108	217	Marco Island Utilities (Marco Shores)	.050
87	218	Naples Drive-In Theatre	.115
111	220	Ochopee	.020
109	221	Remuda Ranch	.290

CATEGORY 2

92	202	City of Naples	20.00
101	215	Kountree Kampin	.017
102	222	Six L Farms	.010

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

Collier County

WATER TREATMENT PLANTS

CATEGORY 3

Map #	Facility #	Facility	Design Capacity*
93	208	Golden Gate (GAC)	.720
92	210	Glades Water Plant	1.00
87	219	Naples Tomato Growers	.115

CATEGORY 4

88	206	Corkscrew Swamp Sanctuary	.010
87	214	Imperial Golf Club	.033

CATEGORY 5

92	204	Collier Co. Stockade	.021
85	212	Immokalee Utilities	1.25
85	213	Immokalee Indian Village	.011

OUT OF SLOSH GRID SYSTEM

None

*Capacity Greater or Equal to .01 MGD

SOLID WASTE SITES

CATEGORY 1

Map #	Facility #	Facility
108	303	Marco Island Transfer Station (5 Acres)
111	305	Carnestown Transfer Station (7 Acres)

CATEGORY 2

92	302	Naples Transfer Station (15 Acres)

CATEGORY 3

93	301	Naples Sanitary Landfill (311 Acres, 10 Year Lifespan)
92	306	Naples Yard Trash Compost Site (15 Acres)

CATEGORY 4

None

CATEGORY 5

85	304	Immokalee Sanitary Landfill (82 Acres, 15 Year Lifespan)

PUBLIC FACILITIES

Collier County

ELECTRICAL POWER

CATEGORY 1

Map #	Facility #	Facility
101	314	Capri Substation (Belle Meade) (FPL)
108	315	Marco Island Substation (LCEC)*
111	316	Carnestown Switching Station (LCEC)
117	317	Everglades Substation (LCEC)

CATEGORY 2

	310	Solona Substation (FPL)
	312	Naples Substation (FPL)
	313	Alligator Alley Substation (FPL)

CATEGORY 3

92	311	Collier Substation (LCEC)
	318	Immokalee Substation (LCEC)
	319	Pine Ridge Substation (FPL)

CATEGORY 4

None

CATEGORY 5

	318	Immokalee Substation (LCEC)

*Lee County Electric Co-operative

Glades County

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
36	1	Becks Park	.010	S.P.
43	2	Benbow Village	.040	S.P.
31	3	Brighton Indian Reservation	.075	S.S.I.
37	4	Caloosa Lodge Mobile Home Park	.010	S.D.
7	5	Canal Front Trailer Park	.005	S.D.
12	6	Florida Hendry Land Corp.	.015	S.R.
13	7	Gulf-Western Food Products Labor Camp	.015	S.R.
38	8	Hance's Kissimmee River Park	.005	S.D.
35	9	Lykes Fisheating Creek	.025	S.P.
11	10	Meadowlark Camp	.015	S.P.
43	11	Moore Haven School	.015	S.D.
32	12	Peace Marina (Buckhead Ridge)	.010	S.S.I.
41	13	Riveroak Subdivision & Campground	.040	S.R.
43	14	Scavetta Motel	.010	S.P.
44	15	Shawnee Farm Labor Camp	.025	S.R.
43	16	Sugarcane Harvesting	.012	S.P.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

WATER TREATMENT PLANTS

Map #	Facility #	Facility	Design Capacity*
1	200	Brighton-Seminole Reservation	1.00
2	201	Hendry Isles Country Club	.024
6	202	Lakeport Water Association	1.00
35	203	Lykes Fisheating Creek	.090
11	204	Meadowlark Campground	.040
3	205	Moore Haven City	.576
1	206	Ortona Lock Campground	.040
	207	Ramey Trailer Park	.028
1	208	Riveroaks Subdivision & Campground	.070

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

Glades County

SOLID WASTE SITES

Map #	Facility #	Size (Acres)	Facility	Life Span
37	300	40	Moore Haven Landfill	50 years
41	301	20	Ortona Yard Trash Compost Site	10 years
35	302	20	Palmdale Yard Trash Compost Site	10 years

ELECTRICAL POWER FACILITIES

Facility #	Facility	Life Span
325	Moore Haven Substation (GCEC)	N/A
326	FPL - Okeechobee Substation	N/A
327	FPL - LaBelle Substation	N/A

PUBLIC FACILITIES

Hendry County

SEWAGE TREATMENT PLANTS

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
68	1	Airglades Mobile Home Park	.047	S.P.
69	2	Clewiston, City, NFW Plant	.500	S.P.
69	3	Clewiston, City, Industrial Canal	.500	S.P.P.
69	4	Clewiston, City, Olympia St. (East)	.100	S.P.
69	5	Clewiston, City, Olympia St. (West)	.100	S.P.
69	6	Florida Lettuce Labor Camp	.025	S.P.
69	7	Gulf & Western Food Products	.020	S.S.I.
65	8	Hendry County Correctional Inst.	.010	S.S.I.
65	9	LaBelle, City of	.070	S.P.
65	10	LaBelle Labor Village	.015	S.P.
65	11	Palm and Pine Mobile Home Park	.0075	S.P.
65	12	Port LaBelle (GDU)	.100	S.P.
67	13	Sandlewood Estates Mobile Home Park	.015	S.R.
65	14	Riverbend East Mobile Home Park	.020	S.P.
69	15	U.S. Sugar Corp.	.015	S.P.
68	16	Camp Nocatee GSA	.004	S.D.
69	17	DOA Campground	.009	S.P.

** Key: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.R. - Secondary Treatment, Retention
S.P. - Secondary Treatment, Percolation
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

WATER TREATMENT PLANTS

Map #	Facility#	Facility	Design Capacity (MDG)*
68	200	Airglades Mobile Home Park	.012
65	201	Berry Citrus Products	.432
83	202	Big Cypress Indian Reservation	.115
68	203	Camp Nocatee GSA	.086
69	204	Clewiston, City, (Water from U.S. Sugar)	***
65	205	LaBelle, City	1.50
65	206	Port LaBelle	.50
67	207	U.S. Sugar	4.00

* Capacity greater than or equal to .01 MGD.
*** Distribution system only.

PUBLIC FACILITIES

Hendry County

SOLID WASTE SITES

Map #	Facility #	Facility	Acres	Life Span
65	301	LaBelle Yard Trash Compost Site and Transfer Station	15	10 years
67	302	Hendry County Sanitary Landfill	311	30 years

ELECTRICAL POWER FACILITIES

Map #	Facility	Facility
69	310	Clewiston Substation (GCEC)
65	311	LaBelle Substation (FPL)
69	312	Clewiston Switching Station (GCEC)

Lee County

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
58	1	Aloha Land Yacht Harbor	.040	S.P.
62	3	Ambassador Condominium	.025	S.D.
59	4	American Outdoors Travel Trailer Park	.025	S.P.
58	6	Atrium Vista Condominium	.015	S.D.
58	8	Bayside Estates	.090	S.S.I.
62	9	Beach and Tennis Club	.050	S.P.
53	10	Bermuda Cay Condominium	.070	S.D.
62	11	Bonita Bay Club	.100	S.D.
62	12	Bonita Beach Trailer Park	.015	S.P.
45	21	Cameo Lakes Travel Trailer Park	.025	S.P.
53	22	City of Cape Coral	4.00	S.
51	24	Captiva Shores Condominium	.010	S.D.
62	26	Casa Bonita	.035	S.D.
53	27	Century 21 Mobile Community	.040	S.R.
52	28	Cherry Estates Inc.	.100	S.D.
57	29	Chez Rondelet Restaurant	.010	S.D.
59	30	Coachlight Manor MHP	.030	S.R.
53	32	Coral Cove	.030	S.D.
53	33	Coral Waters Harbor	.015	S.
53	36	The Cypress	.015	S.D.
53	38	Cypress Estates	.035	S.P.
53	39	Davis Woods	.025	S.D.
58	44	Estero 7000	.200	S.S.I.
59	46	The Farm	.020	S.D.
53	48	Fiesta Village	2.00	S.S.I.
53	49	First Addition to Palm Acres	.015	S.D.
52	50	Fisherman's Wharf Condominium	.010	S.D.
52	51	Flamingo Bay Inc.	.035	S.R.
54	52	The Forest	.500	S.P.
53	54	City of Fort Myers, Bowling Green	6.0	S.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
58	56	Fort Myers Beach Sewer District	2.71	S.
53	57	Fort Myers Beach KOA	.065	S.P.
59	58	Fort Myers Campground	.020	S.P.
47	59	Fosters Mobile Lodge	.015	S.D.
47	60	Fountainview R.V. Condominium Park	.070	S.P.
53	61	Garden Cove MHP	.012	S.R.
45	62	Gasparilla Island Water Assoc.	.275	S.S.I.
59	67	Granada Lakes R.V. Park	.020	S.P.
53	68	Groves Campground	.025	S.D.
53	69	Gulf Air	.020	S.D.
57	71	Gulf Pines Subdivision	.015	S.R.
53	72	Gulf Point Square	.025	S.D.
57	73	Gumbo Limbo	.010	S.R.
62	74	Hacienda Village	.010	S.P.
45	75	Harbor Point Condominium	.015	S.D.
54	76	Harper Commercial Park	.025	S.D.
53	77	Heights Elementary	.010	S.P.
53	79	Holiday Travel Park	.029	S.D.
53	82	Iona Trailer Ranch	.010	S.D.
57	83	Island Inn	.010	S.D.
54	84	Jamaica Bay	.200	S.P.P.
57	85	Jamestown Beachview	1.00	S.S.I.
57	86	Jolly Roger	.010	S.D.
53	90	Kellybrooke Subdivision	.035	S.P.
57	91	Kings Crown Condominium	.055	S.D.
52	93	Lake Wood Campground	.030	S.P.
57	102	Lucky 48 Condominium	.015	S.D.
47	103	Mariners Cove	.019	S.R.
52	104	Matlacha Sewer District	.150	S.P.
53	106	Minors Shopping Center	.075	S.D.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
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S.S.I. - Secondary Treatment, Spray Irrigation
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O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY 2

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
48	55	City of Fort Myers, Raleigh St.	4.00	S.
62	66	G.P. Enterprises	.030	S.P.
47	87	Jones Motel & Trailer Park	.020	S.P.
48	89	Julia Park MHP	.015	S.P.
62	95	Lawhon Shopping Center	.192	S.P.
47	96	Lazy Days MH Subdivision	.060	S.R.
48	98	Lee Co. Arena	.020	S.
57	109	Nutmeg Village	.015	S.D.
48	111	Old Bridge Park	.150	S.P.
47	124	Pine Island Plaza	.025	S.D.
48	128	Pioneer Village	.015	S.R.
48	136	Riverside Beach Condominium	.010	S.D.
48	137	River Trails MHP	.060	S.P.
47	139	Royal Hawaiian Club	.050	S.P.
59	146	San Carlos Utilities	.150	S.S.I.
48	154	Seminole Campgrounds	.015	S.P.
47	155	Serendipity MHP	.035	S.P.
47	161	Six Lakes	.080	S.P.
62	166	Spring Creek Elementary	.020	S.D.
62	168	Springs Plaza	.192	S.S.I.
48	171	Sun & Fun Travel Trailer Park	.025	S.P.
47	177	Swifts Trailer Park	.010	S.P.
47	179	Tamiami Village	.150	S.P.
62	184	Trost International Campground	.100	S.P.P.
47	190	Weavers Corner	.010	S.P.
47	194	Windmill Village	.050	S.P.
59	195	Woodsmoke Camping Resort	.025	S.R.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
58	160	Siesta Isles Unit V	.015	S.P.
51	163	Southseas Plantation	.160	S.S.I.
62	164	Spanish Harbor	.015	S.D.
59	167	Spring Creek Village	.035	S.P.
62	170	Sunshine Suprex Inc.	.010	S.D.
51	174	Sunset Captiva	.022	S.D.
58	175	Sunshine Mobile Village	.020	S.P.
59	178	Tahiti Mobile Village	.030	S.P.
62	180	Three S Trust	.030	S.P.
53	181	Thunderbird Services, Inc.	.050	S.R.
54	182	Tip Top Trailer Village	.010	S.D.
58	183	Tropicana Mobile Manor	.060	S.R.
51	185	Tween-Waters Inn	.035	S.D.
48	186	Upriver Campground	.030	S.P.
45	187	Useppa Island Club	.025	S.P.
47	189	Waterway Estates	.080	S.
58	191	Westwind Condominium	.015	S.D.
57	192	Westwind Motel	.020	S.D.
53	193	Whispering Pines of Cape Coral	.010	S.D.

CATEGORY 2

62	14	Bonita Middle School	.030	S.P.
47	19	Buccaneer Mobile Home Estates	.020	S.R.
47	20	Calposa Middle School	.025	S.P.
48	25	Carriage Village MHP	.060	S.P.
47	31	Coral Cape MHP	.010	S.P.
59	35	Covered Wagon	.015	S.P.
59	45	Estero Woods	.022	S.P.
48	53	Forest Park MHP	.050	S.P.

** KEY: TYPE TREATMENT

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O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY 2

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
48	55	City of Fort Myers, Raleigh St.	4.00	S.
62	66	G.P. Enterprises	.030	S.P.
47	87	Jones Motel & Trailer Park	.020	S.P.
48	89	Julia Park MHP	.015	S.P.
62	95	Lawhon Shopping Center	.192	S.P.
47	96	Lazy Days MH Subdivision	.060	S.R.
48	98	Lee Co. Arena	.020	S.
57	109	Nutmeg Village	.015	S.D.
48	111	Old Bridge Park	.150	S.P.
47	124	Pine Island Plaza	.025	S.D.
48	128	Pioneer Village	.015	S.R.
48	136	Riverside Beach Condominium	.010	S.D.
48	137	River Trails MHP	.060	S.P.
47	139	Royal Hawaiian Club	.050	S.P.
59	146	San Carlos Utilities	.150	S.S.I.
48	154	Seminole Campgrounds	.015	S.P.
47	155	Serendipity MHP	.035	S.P.
47	161	Six Lakes	.080	S.P.
62	166	Spring Creek Elementary	.020	S.D.
62	168	Springs Plaza	.192	S.S.I.
48	171	Sun & Fun Travel Trailer Park	.025	S.P.
47	177	Swifts Trailer Park	.010	S.P.
47	179	Tamiami Village	.150	S.P.
62	184	Trost International Campground	.100	S.P.P.
47	190	Weavers Corner	.010	S.P.
47	194	Windmill Village	.050	S.P.
59	195	Woodsmoke Camping Resort	.025	S.R.

** KEY: TYPE TREATMENT

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O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY 3

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
62	5	Angler's Paradise Trailer Park	.011	S.D.
62	13	Bonita Lake Resort	.010	S.R.
62	16	Bonita Springs Campground	.015	S.R.
59	17	Bonita Springs Country Club	.300	S.P.
46	18	Brookside Club	.080	S.P.
59	34	Corkscrew Woodlands	.050	S.P.
59	37	Cypress Bend RV Resort	.020	S.D.
47	49	Del Tura Country Club	.042	S.P.
54	41	Eagle Ridge Country Blub	.200	S.P.
59	42	Eastgate at San Carlos	.028	S.P.
47	43	Suncoast Elementary School	.030	S.P.
54	47	Fiddlesticks Country Club	.250	S.S.I.
62	63	Glenbrook Condominium	.020	S.D.
62	64	Glenbrook Condominium	.010	S.P.
62	65	Glenbrook Condominium	.015	S.P.
50	70	Gulf Coast Camping	.015	S.
62	81	Imperial Harbor	.040	S.R.
63	88	Jones Mobile Village	.010	S.P.
47	92	Lake Fairways MHP	.050	S.P.
47	94	Laurel Estates MHP	.080	S.P.
48	97	Lazy J Adventures	.015	S.D.
59	100	Leisure Time Campsites	.020	S.D.
54	105	McGregor Baptist Church	.010	A.D.
62	108	Naples-Fort Myers Kennel Club	.040	S.P.
62	116	Palm Lake MHP	.010	S.D.
62	122	Pine Haven Condominium	.060	S.P.
49	133	Riverdale High School	.020	S.P.
49	134	Riverdale Shores	.030	S.P.
47	148	San Souci Lakes, North	.060	S.P.
47	149	San Souci Lakes, South	.060	S.P.

** KEY: TYPE TREATMENT

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S.D. - Secondary Treatment, Drainfield
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S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY 3

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
47	158	Shell Factory	.015	S.P.
62	165	Spanish Wells	.150	S.D.
59	172	Sunny Grove Park	.020	S.S.I.
47	173	Sunseekers Travel Park	.050	S.
47	176	Swan Lake MHP	.025	S.D.
62	188	Vanderbilt Lakes	.015	S.P.

CATEGORY 4

62	15	Bonita Royal Apartments	.010	S.D.
62	80	Imperial Bonita Estates	.100	S.P.
62	101	Leitner Creek Manor	.050	S.R.
63	141	Saldivar and Quinn Association	.050	S.P.P.
54	162	S. W. Florida Regional Airport	.150	O.D.
49	169	Sunland Training Center	.096	S.P.

CATEGORY 5

55	99	Lehigh Utilities	1.00	S.R.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Lee County

CATEGORY

SEWAGE

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
OUT OF SLOSH GRID SYSTEM				
50	2	Alva Middle School	.020	S.P.
50	110	Oak Park Mobile Home Village	.013	S.

** KEY: TYPE TREATMENT

S. - Secondary Treatment
S.D. - Secondary Treatment, Drainfield
S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

CATEGORY 1

WATER TREATMENT PLANTS

Map #	Facility #	Facility	Design Capacity*
48	203	Bayshore Utilities	.216
45	205	Cabbage Key	.010
52	206	Cape Coral RO Plant	5.00
53	207	Cape Coral Lime Plant	3.70
53	215	Florida Cities Water (Cypress Lake)	3.0
47	218	Florida Cities Water (Waterway Estates)	.550
53	220	Iona Trailer Ranch	.020
57	221	Island Water Association	1.60
47	226	Logans Trailer Park	.014
47	227	Mariner's Cove	.050
48	230	Orange Harbor	.288
53	231	Palmetto Pines, Cape Coral	.035
46	232	Pine Island Water Association	1.10
59	234	Shady Acres	.041
59	237	Spring Creek Village	.086
59	238	Tahiti Mobile Village	.040
45	239	Useppa Island Club	.056

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

Lee County

WATER TREATMENT PLANTS

CATEGORY 2

Map #	Facility #	Facility	Design Capacity
	208	Coral Cape MHP	.043
48	210	City of Fort Myers	13.0
59	211	Covered Wagon	.015
59	212	Estero Woods Village	.050
47	213	Evergreen Mobile Community	.050
47	214	Executive Golf Course	.014
47	217	Florida Cities Water (Cape Coral)	1.00
47	222	Jones Motel & Trailer Park	.046
59	223	Koreshan State Park	.021
49	225	Lee County Utilities	5.00

CATEGORY 3

48	200	Al Jones Trailer Park	.017
62	219	Imperial Harbor MH Estates	.120
59	233	San Carlos Utilities	.415
59	236	Sunny Grove	.024

CATEGORY 4

62	204	Bonita Springs Water Association	1.25
49	235	Sunland Training Center	.288

CATEGORY 5

60	216	Florida Cities Water (Green Meadows)	3.00
55	224	Lehigh Utilities	1.75

OUT OF SLOSH GRID

50	201	Alva Middle School	.057
50	202	Alva Motel and Trailer Park	.021
56	228	Mirror Lake Country Club	N/A

Lee County

SOLID WASTE

CATEGORY 4

Map #	Facility #	Size	Landfill	Life Span
54	300	160 Acres	Gulf Coast Sanitary Landfill	10 years

Map #	Facility #	Size	Transfer Stations
CATEGORY 1			
58	301	N/A	Beach Disposal
53	302	N/A	Southern Disposal
CATEGORY 2			
47	303	N/A	Turner Disposal

ELECTRICAL POWER FACILITIES

CATEGORY 1

Map #	Facility #	Facility
	310	Gasparilla Oil Storage Facility
	314	Estero Substation
	315	Tice Substation
	316	Burnt Store Substation
	320	Del Prado Substation
	321	Colonial Substation
	326	Pine Island Substation
	327	Cape Coral Substation
	328	Edison Substation
	329	FPL Generating Plant
	330	Sanibel Substation
	331	Iona

CATEGORY 2

	311	Lee Substation
	312	Bayshore Substation
	313	Salvista Substation
	317	Suncoast Substation
	318	Tropic Isles Substation
	319	Fort Myers Substation
	324	Caloosa Switching Station
	332	Bonita Springs Substation
	335	Slater Substation
	336	North Fort Myers Substation
	339	Industrial Substation

Map #	Facility #	Facility
CATEGORY 3		
	323	Ortiz Substation
	334	Orange River Substation
	337	Corbett Substation
	338	Lee #2 Substation
CATEGORY 4		
	322	Buckingham Substation
	333	Alico Substation
CATEGORY 5		
	325	Lehigh Acres Substation

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Sarasota County

CATEGORY 1

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
4	18	Fairwinds Condominiums	.030	S.D.
9	34	Myakka Utilities	.400	S.P.
1	44	Pelican Cove	.240	S.P.
1	53	Siesta Key Utilities	2.70	T.
8	71	Venice Gardens Utilities #1	1.35	S.

CATEGORY 2

4	1	The Arbors Mobile Home Park	.030	S.P.
12	11	Deer Creek MHP	.016	S.D.
12	15	Englewood Isle Subdivision	.400	S.P.
12	17	Englewood Shopping Center	.010	S.D.
8	31	Manasota Beach Gardens	.010	S.D.
10	37	North Port (GDU)	.950	S.S.I.
8	42	Palm and Pine Trailer Park	.014	S.P.
4	57	South Bay Yacht & Racquet Club	.250	S.D.
4	67	Tri-State MHP	.010	S.P.

CATEGORY 3

8	6	Bay Lake Estates	.040	S.P.
8	7	Brook to Bay Trailer Park	.020	S.D.
12	14	Englewood Golf Condominiums	.025	S.P.
12	16	Englewood School	.015	S.D.
8	23	Hourglass Lakes	.200	S.P.
8	24	Japanese Gardens	.053	S.P.
12	25	Jo-Ra Laundry	.010	S.D.

** KEY: TYPE TREATMENT

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S.P. - Secondary Treatment, Percolation
S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

* Capacity greater than or equal to .01 MGD.

PUBLIC FACILITIES

Sarasota County

SEWAGE TREATMENT PLANTS

CATEGORY 3

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
8	29	Kwality Kwik Laundry	.012	S.D.
4	30	Lake Village MHP	.050	S.P.
8	35	Nokomis School		
8	36	Nokomis Village Square	.018	S.P.
8	38	Oak Grove MHP	.018	S.D.
8	45	Polynesian Village	.040	S.D.
12	46	Quail Run Condominium Apartments	.075	S.D.
4	48	Royal Coachman Resort	.035	S.P.
4	49	Royal Palms MHP	.018	S.D.
4	54	Sorrento Shores	.200	S.P.
4	58	Spanish Lakes MHP	.060	S.P.
4	63	Terra Cove MHP	.020	S.P.
4	69	Venetian MHP	.030	S.P.

CATEGORY 4

8	10	Circlewoods of Venice	.080	S.P.
1	19	Florida Cities Water, Gulfgate	1.80	T.
4	28	Kings Gate	.040	S.P.
1	39	Oakwood Apartments	.010	S.D.
4	40	Oscal Scherer State Park	.015	S.D.
9	47	Rambler's Rest Resort	.025	S.P.
1	50	Sarasota, City	9.10	S.
4	52	Sarasota Square Shopping Center	.175	S.P.
8	65	The Plantation	.100	S.P.
4	68	Vamo Water & Sewer	.240	S.P.
9	70	Venice Campground	.010	S.P.
8	72	Venice Gardens Utilities #1	1.35	S.
8	73	Venice Gardens Utilities #2	.135	S.P.
8	74	Venice Ranch MHP	.035	S.P.

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S.R. - Secondary Treatment, Retention
S.P.P. - Secondary Treatment, Polishing Pond
S.S.I. - Secondary Treatment, Spray Irrigation
A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

SEWAGE TREATMENT PLANTS

Sarasota County

CATEGORY 5

Map #	Facility #	Facility	Capacity* (MGD)	Type** Treatment
4	51	Sarasota Country Club	.150	S.S.I.
1	75	Wilhelm's Nursing Home	.015	S.P.

OUT OF SLOSH GRID SYSTEM

2	2	Ashton Bliss School	.010	S.D.
2	3	Atlantic Utilities	.900	A.S.
2	4	Bahia Vista Estates	.040	S.P.
1	5	Barclay House	.015	S.P.
2	8	Camelot Lakes	.100	S.P.
2	9	Children's Haven	.010	S.P.
1	12	DY-MI (Dolomite Utilities)	.300	A.S.
2	13	EMR (Electro-Mechnical Research)	.020	S.S.
1	20	Florida Cities Water, Southgate	1.36	T.
2	21	Fruitville School	.010	S.D.
8	22	Gulf and Bay	.020	S.P.
2	26	Kansas City Royals	.015	S.P.
2	27	Kensington Park	.560	A.S.
3	32	Myakka River State Park #1	.015	A.S.
5	33	Myakka River State Park #2	.015	A.S.
2	41	Orange Acres	.036	S.P.
2	43	Palmer Utilities	.115	S.S.I.
2	55	Southeast Shopping Plaza	.092	S.
2	56	Southeastern Development & Utilities	.750	S.S.I.
2	59	Sun 'n' Fun Resort	.100	S.S.I.
2	60	Sunnyside Rest Home	.010	S.P.
2	61	Sunrise Golf Condominiums	.180	S.S.I.
2	62	Tamaron	.155	S.P.
2	64	The Meadows	.350	S.P.
2	66	Tippecanoe Village	.060	S.P.

** KEY: TYPE TREATMENT

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A.D. - Secondary Treatment, Aerobic Disc
O.D. - Secondary Treatment, Overland Distribution

PUBLIC FACILITIES

Sarasota County

WATER TREATMENT PLANTS

CATEGORY 1

Map #	Facility #	Facility	Capacity (MGD)
4	208	Fairwinds Condominiums	.013
9	217	Myakka MHP	N/A
1	224	Siesta Key Utilities	N/A
4	227	Sorrento Utilities	.200

CATEGORY 2

8	201	Bay Lake Estates	.028
12	207	Englewood Water Management	3.00
4	210	Heron Bay Club	N/A
4	225	Southbay Utilities	.500
4	233	Tri-State MHP	.010

CATEGORY 3

8	202	Brook to Bay	.045
1	203	Buckingham Club MHP	.015
8	211	Japanese Gardens of Venice	.066
4	215	Lake Village MHP	.081
10	218	North Port (GDU)	2.00
1	221	Pine Shores Trailer Park	.050
4	222	Royal Palm Harbor Assn.	.011
1	223	Sarasota, City	10.0
4	228	Spanish Lakes	.050
4	231	Terra Cove	.045
8	234	Venice, City	4.00

CATEGORY 4

8	205	Circlewoods of Venice	.018
4	212	Kings Gate Travel Trailer Park	.030
4	220	Park East MHP	.035
1	226	Southgate Water	N/A
8	232	The Plantation	N/A
8	235	Venice Gardens	2.20
8	236	Venice Ranch MHP	.030

CATEGORY 5

1	209	Florida Cities Water	N/A
2	213	Knotty Pines Estates	.043

OUT OF SLOSH GRID SYSTEM

Map #	Facility #	Facility	Capacity (MGD)
1	200	Aloha Trailer City	.030
1	206	DY-MI (Dolomite Utilities)	N/A
2	214	Lake Tippecanoe Condominiums	.070
2	219	Orange Acres MHP	.110
2	229	Sun 'N' Fun Resort	.360
2	237	Windward Isle MHP	.030

SOLID WASTE SITES

CATEGORY 3

Map #	Facility #	Size	Facility
10	302	12 Acres	North Port

CATEGORY 4

9	301	160 Acres	Venice Landfill

OUT OF SLOSH GRID SYSTEM

2	300	319 Acres	Bee Ridge Landfill

ELECTRICAL POWER FACILITIES

CATEGORY 1

Map #	Facility #	Facility
1	310	Payne Substation

CATEGORY 2

4	317	Osprey Substation

CATEGORY 3

1	314	Phillippi Substation
8	320	Venice Substation
8	321	S. Venice Substation
10	322	Cocoplum Substation
12	323	Englewood Substation

Sarasota County

ELECTRICAL POWER FACILITIES

CATEGORY 4

Map #	Facility #	Facility
1	312	Sarasota Substation

CATEGORY 5

1	313	Hyde Park Substation
2	315	Clark Substation
5	319	Laurelwood Substation
1	324	Tuttle Substation

OUT OF SLOSH GRID SYSTEM

2	311	Ringling Switching Station
2	316	Fruitville Substation
2	318	Beneva Substation

APPENDIX E

TRANSPORTATION FACILITIES
By Vulnerability Zone

CHARLOTTE COUNTY

CATEGORY 1

Map #	Facility #	Facility
16	341	Trailways Bus Station
15	343	Greyhound Bus Station

CATEGORY 2

15	342	Trailways Bus Station

CATEGORY 3

None

CATEGORY 4

16	340	Charlotte County Airport

CATEGORY 5

None

OUT OF SLOSH GRID SYSTEM

None

COLLIER COUNTY

108	344	Marco Island Airport
121	346	Dade-Collier Transition and Training Airport
117	347	Everglades Airport

CATEGORY 2

92	341	Greyhound Bus Line
92	343	Trailways Bus Line (Naples)

CATEGORY 3

Map #	Facility #	Facility
92	340	Naples Airport
85	342	Rattlesnake Hammock Airfield

CATEGORY 4

None

CATEGORY 5

85	345	Trailways Bus Line (Immokalee)

OUT OF SLOSH GRID SYSTEM

85	348	Immokalee Airport

GLADES COUNTY

OUT OF SLOSH GRID SYSTEM

35	341	Palmdale Train Station (SCR)

HENDRY COUNTY

OUT OF SLOSH GRID SYSTEM

69	340	Clewiston Airport
68	341	Airglades Airport
65	342	LaBelle Airport
69	343	Seaboard Coastline Railroad
65	344	Trailways Bus Line (LaBelle)
69	345	Trailways Bus Line (Clewiston)

LEE COUNTY

CATEGORY 1

45	340	Port Boca Grande

LEE COUNTY (Continued)

CATEGORY 2

Map #	Facility #	Facility
48	341	Greyhound Bus Lines (Ft. Myers)
48	342	Trailways Bus Lines (Ft. Myers)
54	344	Page Field Airport

CATEGORY 3

48	343	Gateway Transportation Company, Inc.

CATEGORY 4

54	345	Southwest Florida Regional Jetport (under construction, opening - 1983)

SARASOTA COUNTY

CATEGORY 1

None

CATEGORY 2

None

CATEGORY 3

8	343	Greyhound Bus Lines (Venice)
8	344	Trailways Bus Lines
8	345	Seaboard Coastline Railroad Depot
8	346	Terminal Transport Company, Inc.
8	347	Venice Airport

CATEGORY 4

1	340	Trailways Bus Lines (Sarasota)
1	341	Greyhound Bus Lines (Sarasota)

CATEGORY 5

1	342	Seaboard Coastline Railroad
1	348	Sarasota-Bradenton Airport

OUT OF SLOSH GRID SYSTEM

None

APPENDIX E

OTHER PUBLIC FACILITIES
By Vulnerability Zone

CHARLOTTE COUNTY

HEALTH CARE

CATEGORY 1

Map #	Facility #	Facility
15	402	Medical Center Hospital
15	403	Life Care Center of Punta Gorda
15	405	Port Charlotte Care Center
15	406	Charlotte County Health Dept.
15	408	Charlotte County Mental Health Clinic, Inc.

CATEGORY 2

15	400	Fawcett Memorial Hospital
15	401	St. Joseph Hospital
13	407	Englewood Health Department

CATEGORY 3

13	404	Fawcett Clinic - Englewood

CATEGORY 4

None

CATEGORY 5

None

SCHOOLS

CATEGORY 1

15	453	Peace River Elementary
15	455	Benjamin J. Baker Headstart
15	457	Sallie Jones Elementary
15	459	Punta Gorda Middle
15	460	Charlotte Christian Academy

OTHER PUBLIC FACILITIES

CHARLOTTE COUNTY

CATEGORY 2

SCHOOLS (Cont'd.)

Map #	Facility #	Facility
15	452	Meadow Park Elementary
13	454	Lemon Bay Middle and High School
15	456	East Elementary
15	458	Charlotte High
15	461	Port Charlotte Christian School
15	463	Edison Community College, Port Charlotte Center
14	464	Charlotte County Vo-Tech School
14	465	Port Charlotte High School

CATEGORY 3

15	450	Neil Armstrong Elementary
15	451	Port Charlotte Middle
15	462	Port Charlotte Seventh Day Adventist School

CATEGORY 4

None

CATEGORY 5

None

POLICE PROTECTION

CATEGORY 1

15	602	Punta Gorda Police Department
15	600	Charlotte County Sheriff's Office
13	601	Charlotte County Sheriff's Office Substation (Englewood)

CATEGORY 2

None

CATEGORY 3

None

OTHER PUBLIC FACILITIES

CHARLOTTE COUNTY

CATEGORY 4

Police Protection (Cont'd.)

Map #	Facility #	Facility

None

CATEGORY 5

None

FIRE PROTECTION

CATEGORY 1

13	650	Englewood - Grove City V.F.D.
14	651	El Jobean/Gulf Cove Fire District
15	657	Alligator Creek V.F.D.
15	658	Punta Gorda Fire Department

CATEGORY 2

15	652	Port Charlotte Fire Department/Charlotte Harbor
15	653	Harbour Heights V.F.D.

CATEGORY 3

16	654	East Charlotte V.F.D.
16	655	Charlotte County Airport Fire Department
21	656	South Punta Gorda Heights
21	662	Burnt Store Fire

CATEGORY 4

14	659	El Jobean (Florida Forestry Service)
22	660	Punta Gorda Work Site (Forestry Service)

CATEGORY 5

None

OUT OF SLOSH GRID SYSTEM

17	661	Babcock Tower (Forestry Service)

OTHER PUBLIC FACILITIES

COLLIER COUNTY

HEALTH CARE

CATEGORY 1

Map #	Facility #	Facility
N/A	N/A	Everglades Health Department

CATEGORY 2

92	400	Naples Community Hospital
92	401	Gold Drive Rest Home
101	407	Moorings of Pelican Bay
92	403	Collier County Health Department (Naples)

CATEGORY 3

92	402	Greater Naples Nursing Home
93	405	Collier County Mental Health Clinic

CATEGORY 4

None

CATEGORY 5

85	404	Immokalee Health Care Center

SCHOOLS

CATEGORY 1

87	450	Naples Park Elementary
92	459	St. Ann Catholic School
100	461	Avalon Elementary
108	463	Tommie Barfield Elementary
117	466	Everglades School

CATEGORY 2

92	452	Sea Gate Elementary
92	455	Lake Park Elementary
92	458	Gulfview Middle
101	462	Lely High
92	473	Barron-Collier High
92	474	Edison Community College, Collier Center

OTHER PUBLIC FACILITIES

COLLIER COUNTY

CATEGORY 3

SCHOOLS (Cont'd.)

Map #	Facility #	Facility
92	451	Pine Ridge Middle
92	453	Poinciana Elementary
92	454	Naples High
93	456	Golden Gate Elementary
92	460	Shadowlawn Elementary
92	464	Collier County Vocational-Technical Center
92	465	East Naples Middle

CATEGORY 4

None

CATEGORY 5

92	457	Immokalee Day School
85	467	Immokalee High School
85	468	Immokalee Middle School
85	469	Bethune Elementary
85	470	Pinecrest Elementary
85	472	Lake Trafford Elementary
85	475	Immokalee Vocational-Technical

OUT OF SLOSH GRID SYSTEM

85	471	Highlands Elementary

POLICE PROTECTION

CATEGORY 1

92	600	Naples Police Department
111	603	Collier County Sheriff's Substation (Everglades)
108	604	Collier County Sheriff's Substation (Marco Island)

CATEGORY 2

92	601	Collier County Sheriff's Office (Naples)

CATEGORY 3

None

OTHER PUBLIC FACILITIES

COLLIER COUNTY

CATEGORY 4

POLICE PROTECTION (Cont'd.)

Map #	Facility #	Facility

None

CATEGORY 5

85	605	Immokalee Jail Center

FIRE PROTECTION

CATEGORY 1

108	663	Marco Island V.F.D. #2
108	664	Marco Island V.F.D. #1
117	654	Everglades City V.F.D.
87	662	Little Hickory - Bonita Shores
111	669	Ochopee V.F.D.
111	655	Copeland
108	661	Isles of Capri V.F.D.

CATEGORY 2

92	667	North Naples Fire Department #1
92	666	City of Naples Fire Department #2
92	653	East Naples Fire Department #2
101	665	City of Naples Fire Department #1
92	658	Naples (Florida Division of Forestry)

CATEGORY 3

87	668	North Naples Fire Department #2
93	659	Golden Gate Fire Department
92	652	East Naples Fire Department #1

CATEGORY 4

None

CATEGORY 5

85	660	Immokalee V.F.D.
85	656	Immokalee (Forestry)

COLLIER COUNTY

OUT OF SLOSH GRID SYSTEM

FIRE PROTECTION (Cont'd.)

Map #	Facility #	Facility
96	657	Miles City (Forestry)

GLADES COUNTY

NOT IN SLOSH GRID SYSTEM

HEALTH CARE

Map #	Facility #	Facility
43	400	Glades County Health Department
43	401	Glades-Hendry Mental Clinic (LaBelle)
43	402	Glades-Hendry County Health Department (LaBelle)

SCHOOLS

43	450	Moore Haven Elementary
43	451	Moore Haven Junior-Senior High
43	452	Grace Christian School

POLICE PROTECTION

43	600	Glades County Sheriff's Department

FIRE PROTECTION

43	650	Moore Haven Volunteer Fire Department
28	651	Buckhead Ridge Volunteer Fire Department
37	652	Lakeport Volunteer Fire Department
35	653	Palmdale Volunteer Fire Department
35	654	Palmdale Tower - State of Florida Division of Forestry
40	655	Lykes Tower - State of Florida Division of Forestry
41	656	Ortona V.F.D.
43	657	Glades County V.F.D.
38	658	Muse V.F.D.

OTHER PUBLIC FACILITIES

HENDRY COUNTY

NOT IN SLOSH GRID SYSTEM

HEALTH CARE

Map #	Facility #	Facility
69	400	Hendry County General Hospital (Clewiston)
65	401	Hendry County Health Department (LaBelle)
69	402	Hendry County Health Department (Clewiston)
65	403	Hendry-Glades Mental Health Clinic
69	404	Glades/Hendry County Health Department
69	405	Clewiston Migrant Health Clinic
69	406	Clewiston Community Health Center

SCHOOLS

69	450	Clewiston High School
69	451	Clewiston Elementary School
69	452	Clewiston Middle School
83	453	Ahfachkee Day School
69	454	LaBelle Elementary
69	455	LaBelle Middle School
69	456	LaBelle High School
N/A	457	LaBelle Christian School
N/A	458	Clewiston Intermediate

POLICE PROTECTION

65	600	Hendry County Sheriff's Department
69	601	Hendry County Sheriff's Department Substation
69	602	Clewiston Police Department

FIRE PROTECTION

65	650	LaBelle Volunteer
69	651	Clewiston Volunteer
71	652	Felda Volunteer
67	653	Pioneer Plantation Volunteer
72	654	Keri Tower, State of Florida Division of Forestry
73	655	Devil's Garden, State of Florida Division of Forestry
68	656	Flagpole Volunteer
N/A	657	Montura Volunteer

OTHER PUBLIC FACILITIES

LEE COUNTY

HEALTH CARE

CATEGORY 1

Map #	Facility #	Facility
53	405	Shell Point Nursing Pavilion
54	407	Beacon-Donegan Manor Nursing Home
53	409	Cape Coral Nursing Pavilion
48	410	Calusa Nursing Center
53	411	Fort Myers Care Center
48	415	Lee Mental Health, Alcoholism Unit

CATEGORY 2

48	400	Lee Memorial Hospital
54	401	Fort Myers Community Hospital
47	403	Cape Coral Medical Center
48	404	Lee Convalescent Center
54	406	Shady Rest Nursing Home
62	417	Bonita Springs Migrant Health Clinic
54	418	Veteran's Health Clinic

CATEGORY 3

48	412	Lee County Health Department
54	413	Lee Mental Health Guidance Center, Inc.
48	416	Lee County Migrant Health Clinic
49	408	Sunland Training Center

CATEGORY 4

None

CATEGORY 5

55	402	Lehigh Acres General Hospital

SCHOOLS

CATEGORY 1

53	463	Orangewood Elementary
53	467	Cape Coral Elementary
53	468	Tanglewood Elementary
53	470	Cypress Lake Middle
53	471	Cypress Lake Senior High

OTHER PUBLIC FACILITIES

LEE COUNTY

SCHOOLS (Cont'd.)

CATEGORY 1

Map #	Facility #	Facility
53	472	Heights Elementary
57	481	Sanibel Elementary
58	482	Fort Myers Beach Elementary
53	486	Bishop Verot High School
53	488	Canterbury School
52	490	Pine Island Elementary
52	514	Pine Island Middle
48	491	Alternative Learning Center
53	493	Riverside School
53	494	Edison Community College
53	499	Pelican Elementary School
48	502	Avalon Park
47	507	Good Shepherd Lutheran School
53	508	J. Hamilton Welsh Academy
54	511	Park Meadow
53	513	Pelican Middle School
52	514	Pine Island Middle School
62	515	Spring Creek Middle School

CATEGORY 2

47	451	Fort Myers High
48	452	Bayshore Elementary
47	456	Tropic Isles Elementary
47	457	North Fort Myers High
48	458	University of South Florida
47	459	Caloosa Elementary
47	460	Caloosa Middle
48	461	Edison Park Elementary
53	462	Allen Park Elementary
54	464	Fort Myers Middle
54	469	Villas Elementary
48	475	Edgewood Elementary
59	478	San Carlos Elementary
48	484	St. Francis Xavier
54	487	St. Michael's
47	497	Exceptional Learning Center
53	498	Cape Coral High
47	500	J. Colin English Elementary
48	501	Temple Baptist
54	504	Early Childhood Academy
54	505	Evangelical Christian School
49	506	Fort Myers Junior Academy
47	509	Landmark Christian School
47	510	New Testament Baptist

SCHOOLS (Cont'd.)

CATEGORY 3

Map #	Facility #	Facility
49	453	Riverdale High School
50	454	Alva Elementary/Middle School
48	465	Area Vocational Technical School
48	473	Orange River Elementary
48	476	Lee Middle
48	477	Michigan Elementary
48	479	Franklin Park Elementary
62	483	Bonita Springs Elementary
48	485	Tice Elementary
48	489	Dunbar Middle
47	492	Suncoast Elementary
62	495	Bonita Springs Middle
47	496	Suncoast Middle
48	503	Children's Personal Development Center
49	474	Sunland Training Center

CATEGORY 4

None

CATEGORY 5

55	466	Lehigh Acres Elementary

POLICE PROTECTION

CATEGORY 1

58	602	Lee County Sheriff's Substation (Fort Myers Beach)
48	606	City of Fort Myers
57	607	City of Sanibel

CATEGORY 2

47	600	City of Cape Coral
48	601	Lee County Sheriff's Office
47	605	Lee County Sheriff's Substation (Cape Coral)

CATEGORY 3

62	604	Lee County Sheriff's Substation (Bonita Springs)

POLICE PROTECTION (Cont'd.)

CATEGORY 4

Map #	Facility #	Facility
None		

CATEGORY 5

55	603	Lee County Sheriff's Substation (Lehigh Acres)

FIRE PROTECTION

CATEGORY 1

52	669	Matlacha-Pine Island Fire Department
46	672	Matlacha-Pine Island
45	671	Matlacha-Pine Island Fire Department
47	673	North Fort Myers #1
47	674	North Fort Myers #2
52	670	Matlacha-Pine Island Volunteer Fire Department
53	665	Iona-McGregor Fire Control District #1
53	666	Iona-McGregor Fire Control District Station #2
53	658	Cape Coral #2
57	676	Sanibel #1
57	677	Sanibel #2
58	661	Fort Myers Beach Fire Control District Station #1
45	654	Boca Grande Volunteer Fire Department
48	680	Tice Station #2

CATEGORY 2

48	653	Bayshore Volunteer Fire Department
48	682	Fort Myers Shores
47	657	Cape Coral Station #1
48	662	Fort Myers Station #1
48	664	Fort Myers Station #3
48	663	Fort Myers Station #2
54	678	South Trail
54	652	Page Field
62	656	Bonita Springs Station #2
59	675	San Carlos Volunteer Fire Department

LEE COUNTY

CATEGORY 3

FIRE PROTECTION (Cont'd.)

Map #	Facility #	Facility
50	650	Alva #1
50	651	Alva #2
48	679	Tice Station #1
51	659	Captiva Fire Control District
59	660	Estero Volunteer Fire Department
62	655	Bonita Springs Station #1

CATEGORY 4

48	681	Florida Division of Forestry, Fort Myers

CATEGORY 5

55	668	Lehigh Acres Fire Control District Station #2
50	667	Lehigh Acres Fire Control District Station #1

SARASOTA COUNTY

CATEGORY 1

HEALTH CARE

Map #	Facility #	Facility
1	409	Plymouth Harbor

CATEGORY 2

4	424	Life, Inc.
1	420	Store Front, Inc., Drug Abuse Treatment Center
4	404	Bay Village Retirement Center

CATEGORY 3

1	407	Hillhaven Convalescent Center
1	402	Sarasota Palms
8	413	Venice Nursing Pavilion North
8	414	Venice Nursing Pavilion South
8	403	Venice Hospital
1	426	First Step of Sarasota

SARASOTA COUNTY

HEALTH CARE (Cont'd.)

CATEGORY 4

1	411	Sarasota Welfare Home
1	406	East Manor Nursing Home
1	401	Memorial Hospital
1	419	Sarasota County Health Department (Venice)
8	422	Store Front, Inc. (S. County)
1	425	First Step of Sarasota, Inc., Alcoholism Treatment Center
1	408	J. H. Floyd Sunshine Manor, Inc.
1	428	Sarasota Guidance Clinic, Inc.

CATEGORY 5

1	421	Store Front, Inc. (Newton)
1	415	Wilhelm's Nursing Home
1	400	Doctor's Hospital
1	410	Sarasota Nursing Pavilion

OUT OF SLOSH GRID SYSTEM

2	405	Burzenski's Nursing Home
2	412	Sunnyside Rest Home
1	416	Springwood Nursing Center
1	418	Sarasota County Health Department (Sarasota)
2	423	Straight, Inc.
1	427	Restwood Dormitory

SCHOOLS

CATEGORY 1

1	493	McClelland Park School

CATEGORY 2

1	450	University of South Florida
1	451	Bay Haven

CATEGORY 3

1	456	St. Martha's School
1	465	Southside Elementary
1	472	Phillippi Shores
8	476	Nokomis Elementary

SARASOTA COUNTY

CATEGORY 3

SCHOOLS (Cont'd.)

Map #	Facility #	Facility
8	477	Venice Elementary
8	478	Venice Senior High
8	479	Venice Junior High
12	482	Englewood Elementary
8	487	Ideal Alternative High School
8	491	Epiphany Catholic School
8	495	St. Marks Episcopal School

CATEGORY 4

1	455	Brookside Junior High
1	466	Incarnation School
8	480	Garden Elementary
8	481	Loveland School
1	494	Prew School
1	473	Riverview High School

CATEGORY 5

1	452	Booker, North
1	453	Booker, East
1	457	Tuttle Elementary
1	461	Alta Vista Elementary
1	462	Sarasota Junior High
1	463	Sarasota Senior High
1	464	Pine View (Exceptional Education)
1	475	Gulf Gate Elementary
1	484	Booker Senior High
1	485	University of Sarasota

OUT OF SLOSH GRID SYSTEM

1	454	Gocio Road Elementary
2	458	Cardinal Mooney High
2	459	Fruitville Elementary
2	460	McIntosh Junior High
2	467	Brentwood
1	468	Out of Door Academy
2	469	Children's Haven Center
1	470	Wilkinson Elementary
2	471	Sarasota County Student Center
2	474	Sarasota Vocational-Technical
2	483	Ashton Elementary
2	488	New Directions Alternative High School

OTHER PUBLIC FACILITIES

SARASOTA COUNTY

OUT OF SLOSH GRID SYSTEM

SCHOOLS (Cont'd.)

Map #	Facility #	Facility
N/A	489	Center for Adjustive Education
2	490	Exceptional Student Education
N/A	492	Sunnyside Mennonite School
2	496	Sarasota Mennonite School Christian Day School
2	497	Fielding Academy of Sarasota

POLICE PROTECTION

CATEGORY 1

1	600	City of Longboat Key Police Department

CATEGORY 2

None

CATEGORY 3

8	604	City of Venice Police Department
10	605	City of North Port Police Department

CATEGORY 4

8	603	Sarasota County Sheriff's Substation (Venice)
1	601	City of Sarasota Police Department
1	602	Sarasota County Sheriff's Department

FIRE PROTECTION

CATEGORY 1

2	661	City of Sarasota #3
1	654	Longboat Key V.F.D. #2

CATEGORY 2

8	655	Nokomis V.F.D.
12	650	Englewood Fire Department

CATEGORY 3

1	659	City of Sarasota #1
1	660	City of Sarasota #2
1	662	City of Sarasota #4
8	669	City of Venice #1

OTHER PUBLIC FACILITIES

SARASOTA COUNTY

CATEGORY 3

FIRE PROTECTION (Cont'd.)

Map #	Facility #	Facility
8	670	City of Venice #2
8	671	South Venice V.F.D.
10	656	City of North Port Fire Department

CATEGORY 4

1	664	South Trail Fire Control District Station #1
4	667	South Trail Fire Control District Station #4

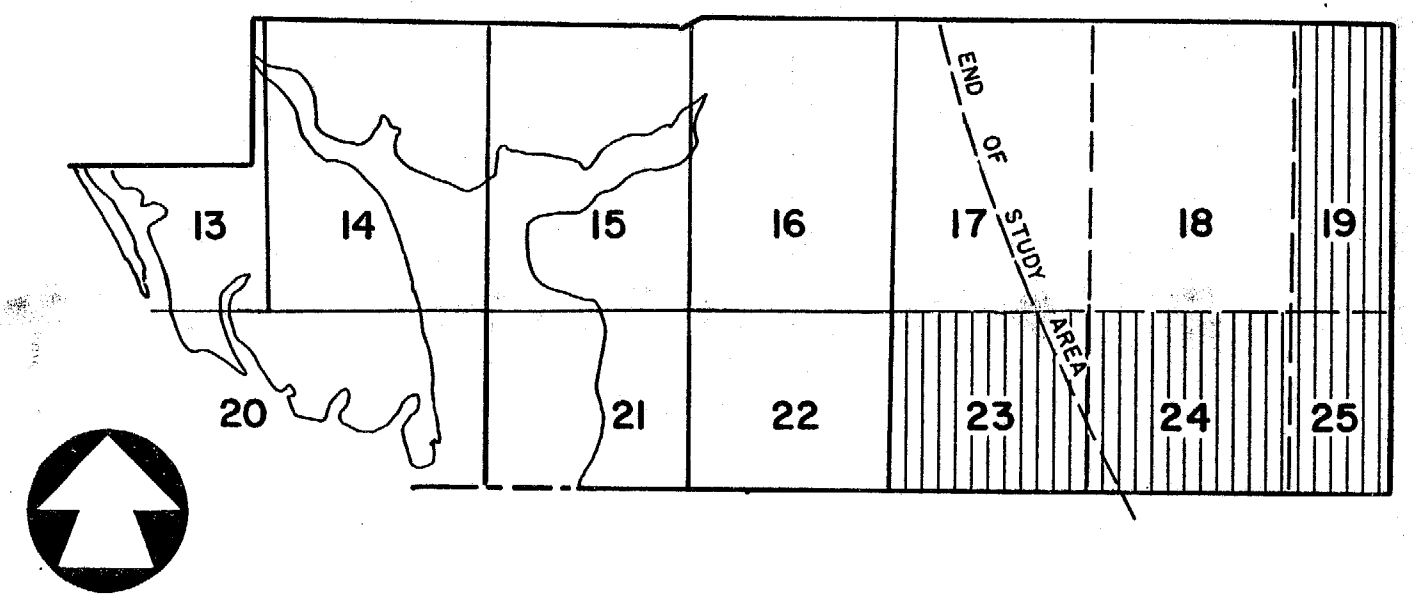
CATEGORY 5

None

OUT OF SLOSH GRID SYSTEM

2	663	City of Sarasota #5
1	657	Northeast Area Fire Control District
2	651	Fruitville Fire Control District Station #1
2	652	Fruitville Fire Control District Station #2
2	653	Fruitville Fire Control District Station #3
1	665	South Trail Station #2
1	666	South Trail Station #3
5	668	South Trail Station #5
1	658	Pinecraft Fire Control District

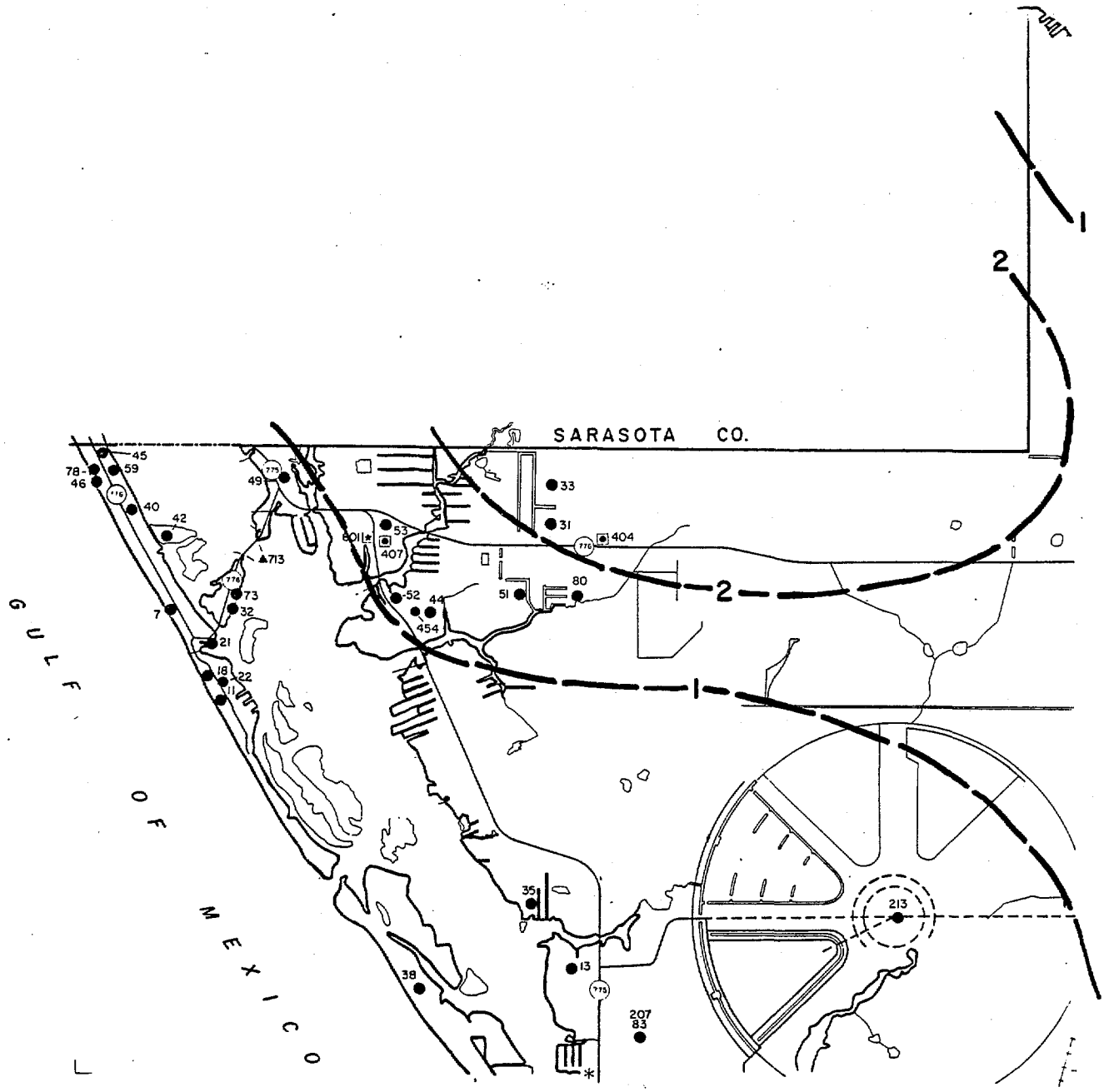
APPENDIX F
LOCATION MAPS
PUBLIC FACILITIES



13-25 SWFRPC NUMBERS DENOTING USGS QUADRANGLE 7.5 MINUTE MAPS

NO FACILITIES

KEY SHEET
HURRICANE LOSS STUDY
CHARLOTTE COUNTY

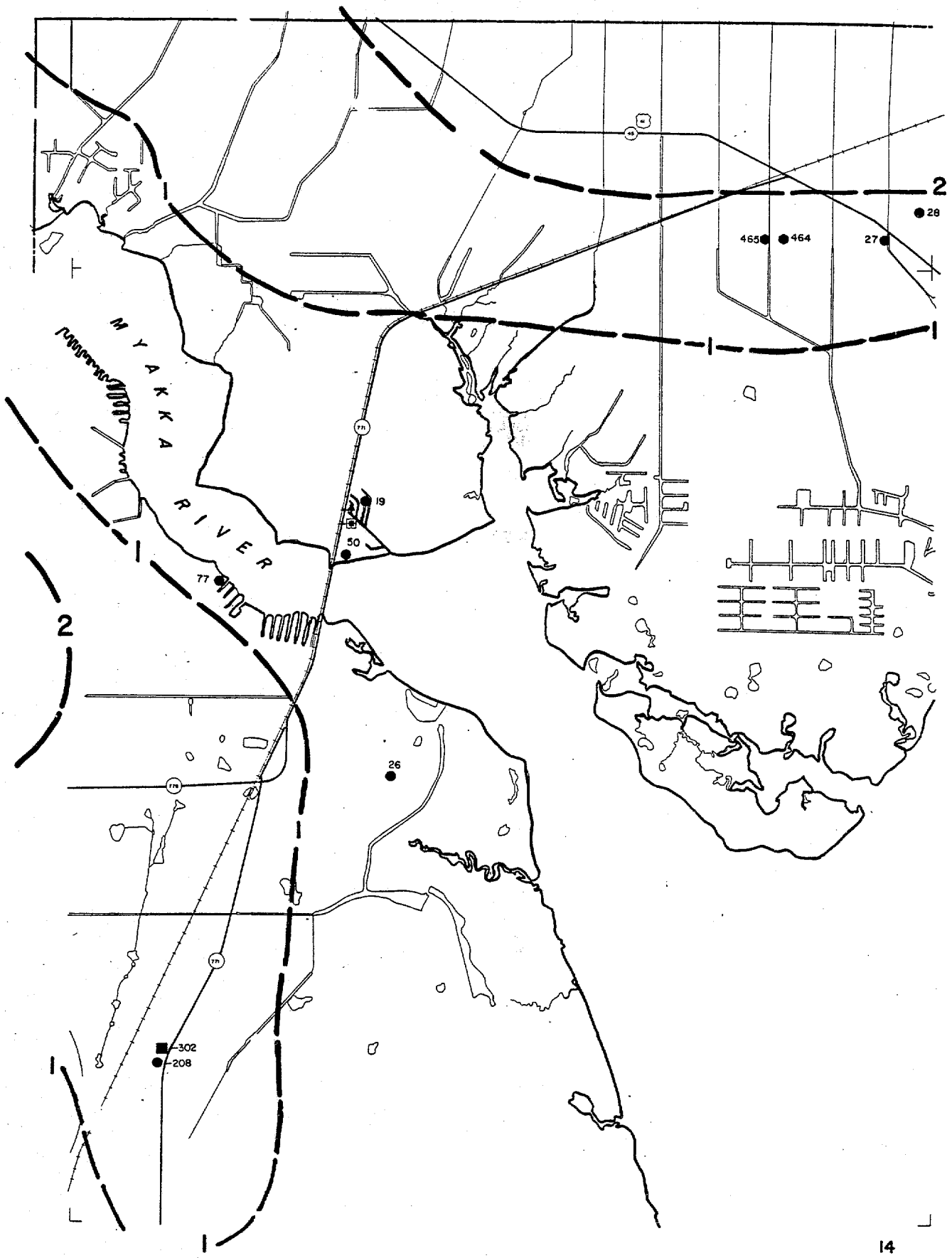


CHARLOTTE COUNTY

13
ENGLEWOOD

0 1 MILE
SCALE 1:24,000

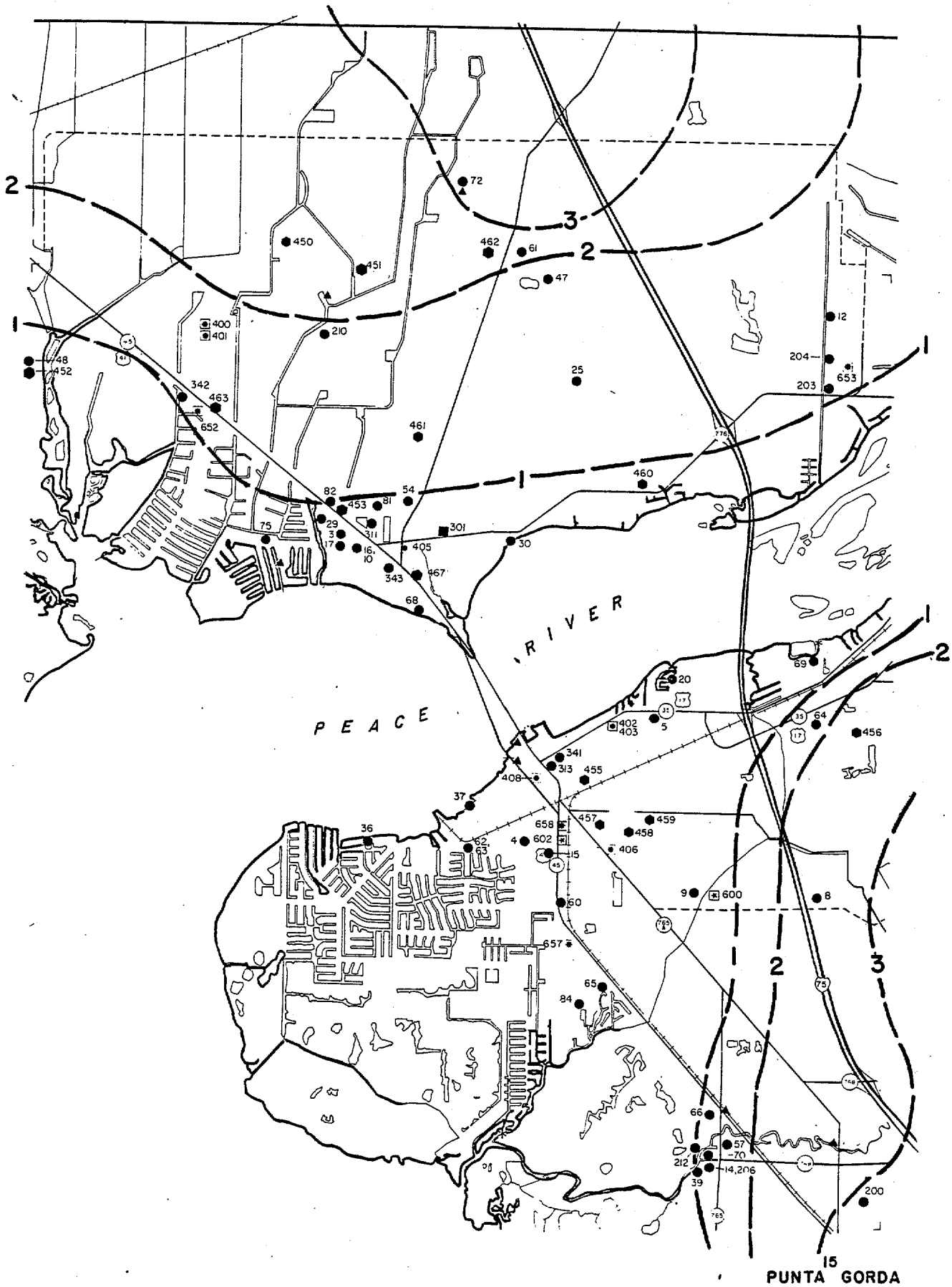
SWFRPC



CHARLOTTE COUNTY

0 1 MILE
SCALE 1:24,000

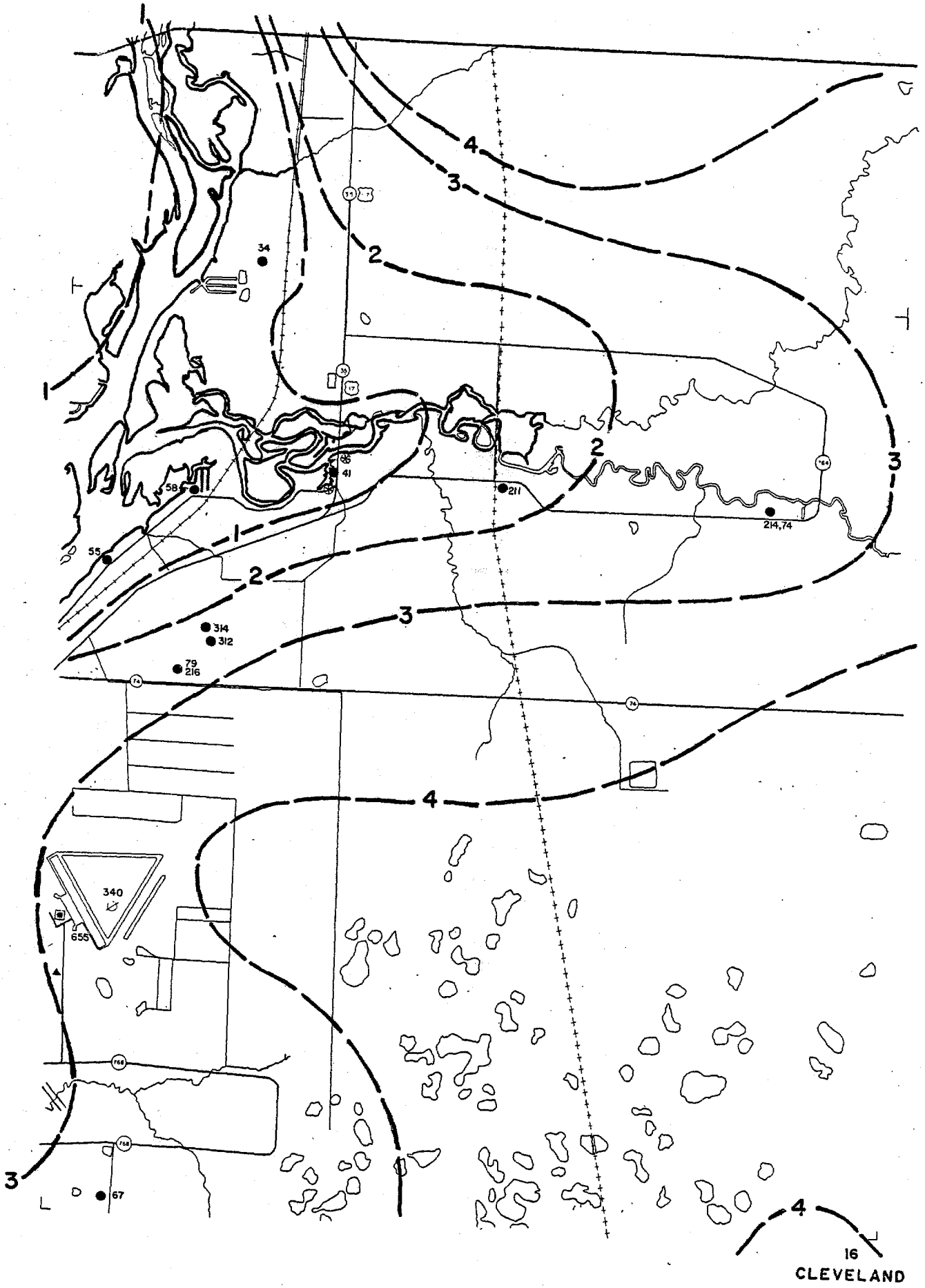
SWFRPC



CHARLOTTE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC



CHARLOTTE COUNTY

0 1 MILE
SCALE 1:24,000

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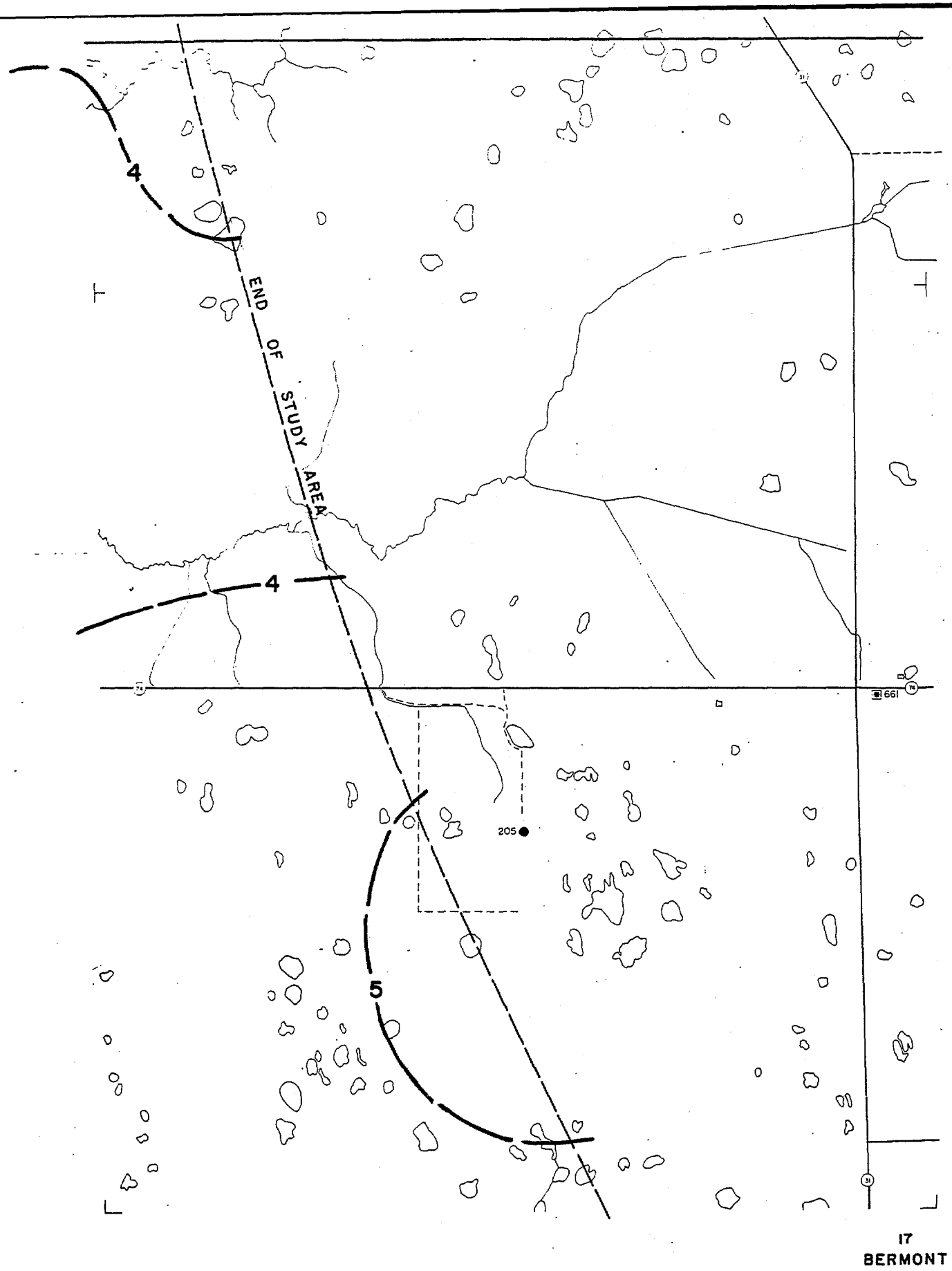

CHARLOTTE COUNTY

0 1 MILE
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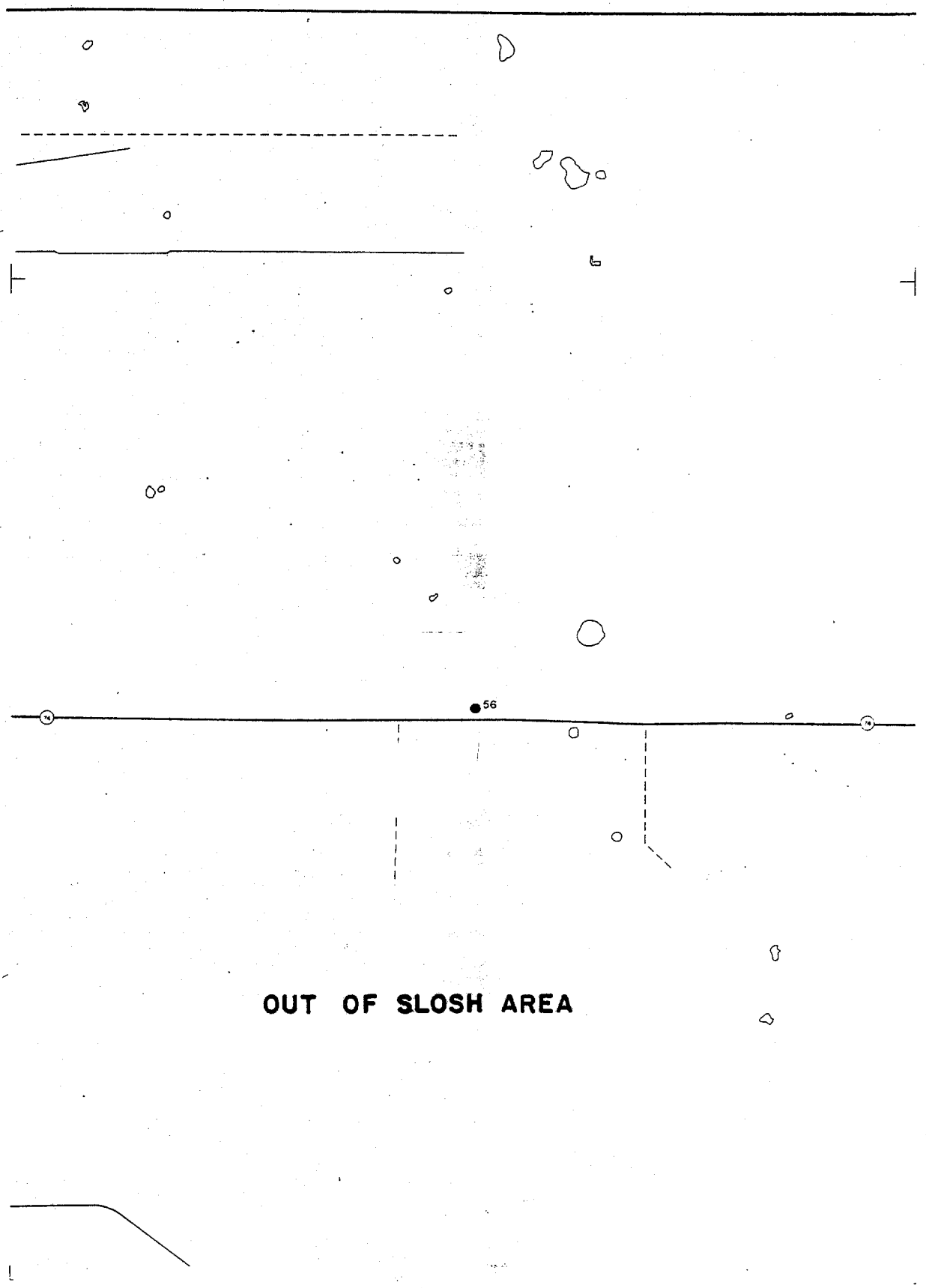
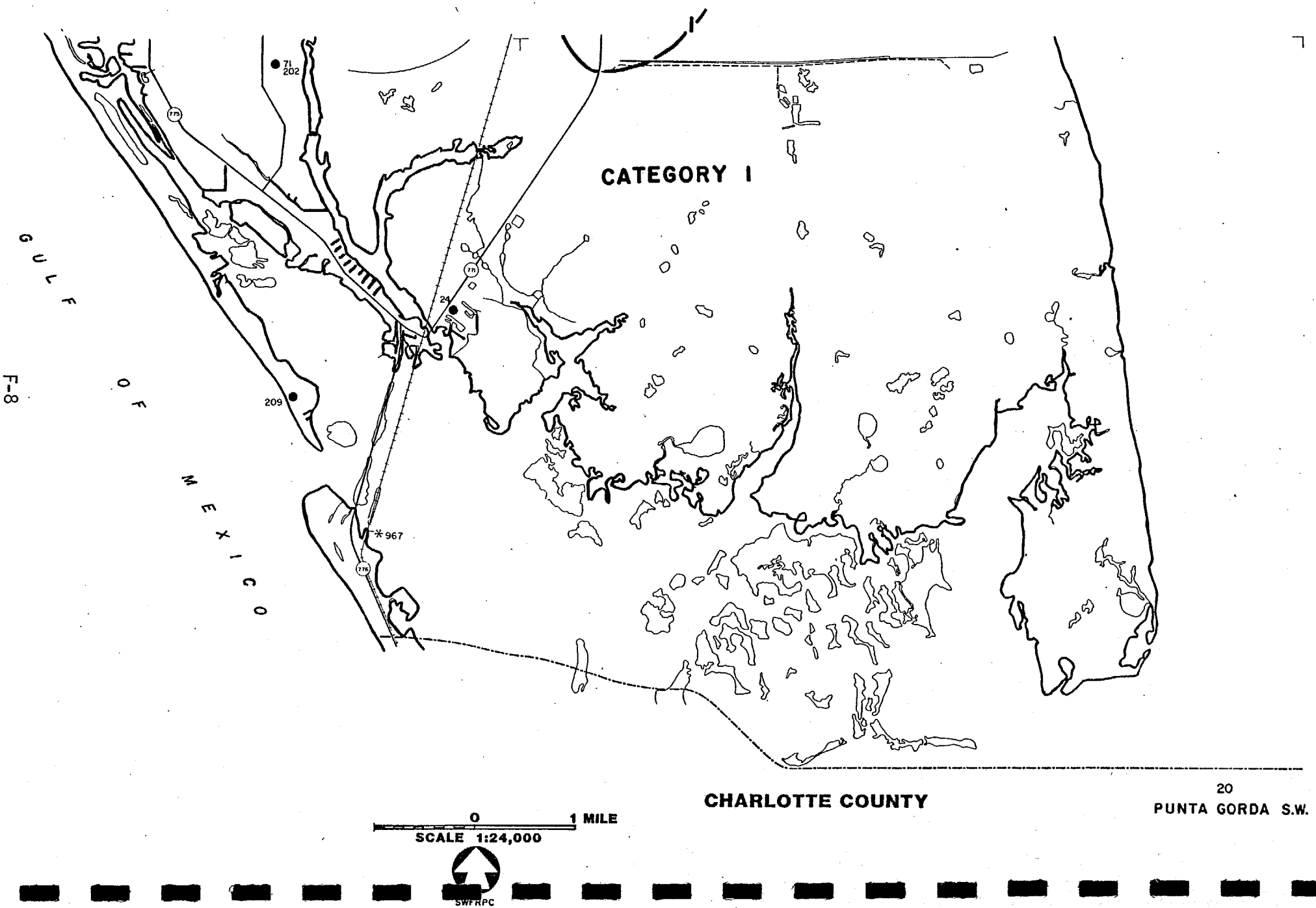


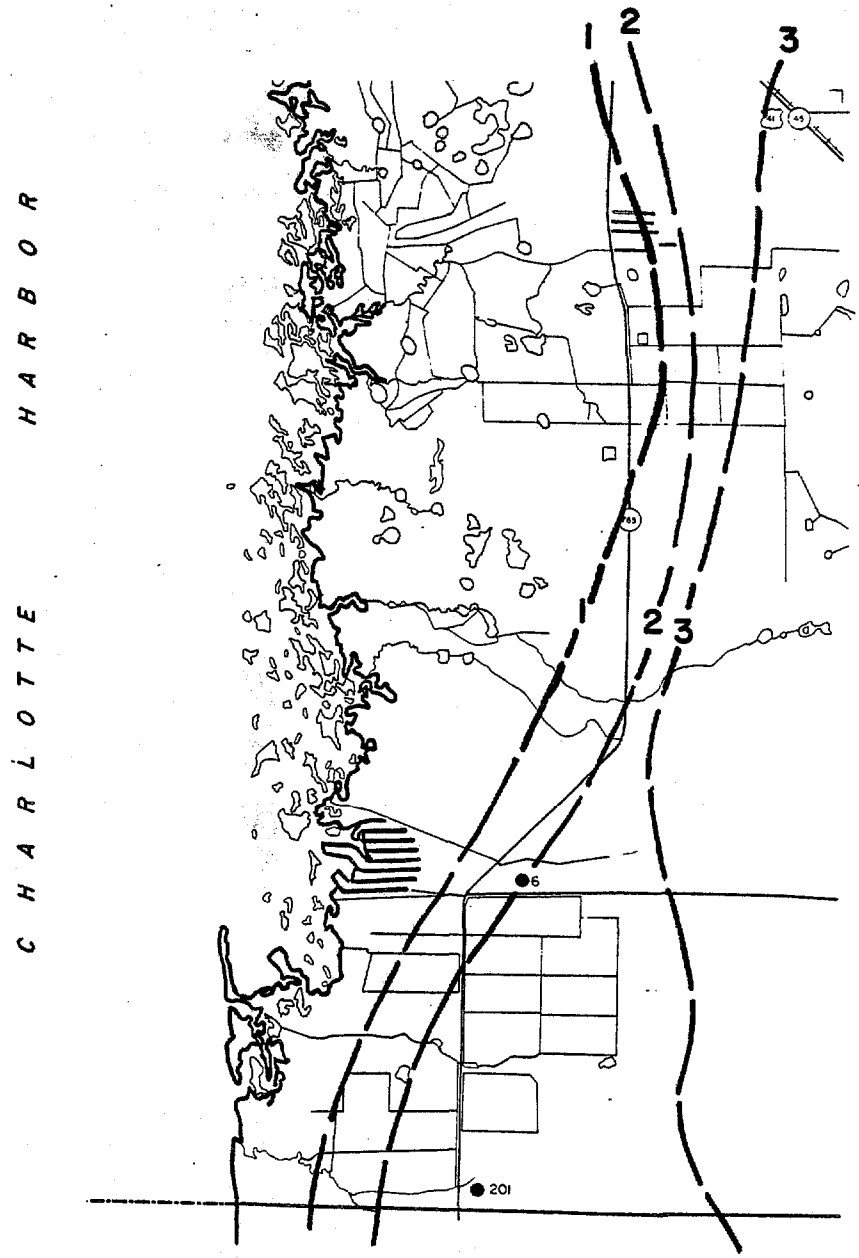
18
TELEGRAPH
SWAMP
N.W.

CHARLOTTE COUNTY

0 1 MILE

SWFRPC


CATEGORY I
GULF OF MEXICO
71
202
775
771
24
209
967
776
CHARLOTTE COUNTY
20
PUNTA GORDA S.W.
0
1 MILE
SCALE 1:24,000
SWFRPC

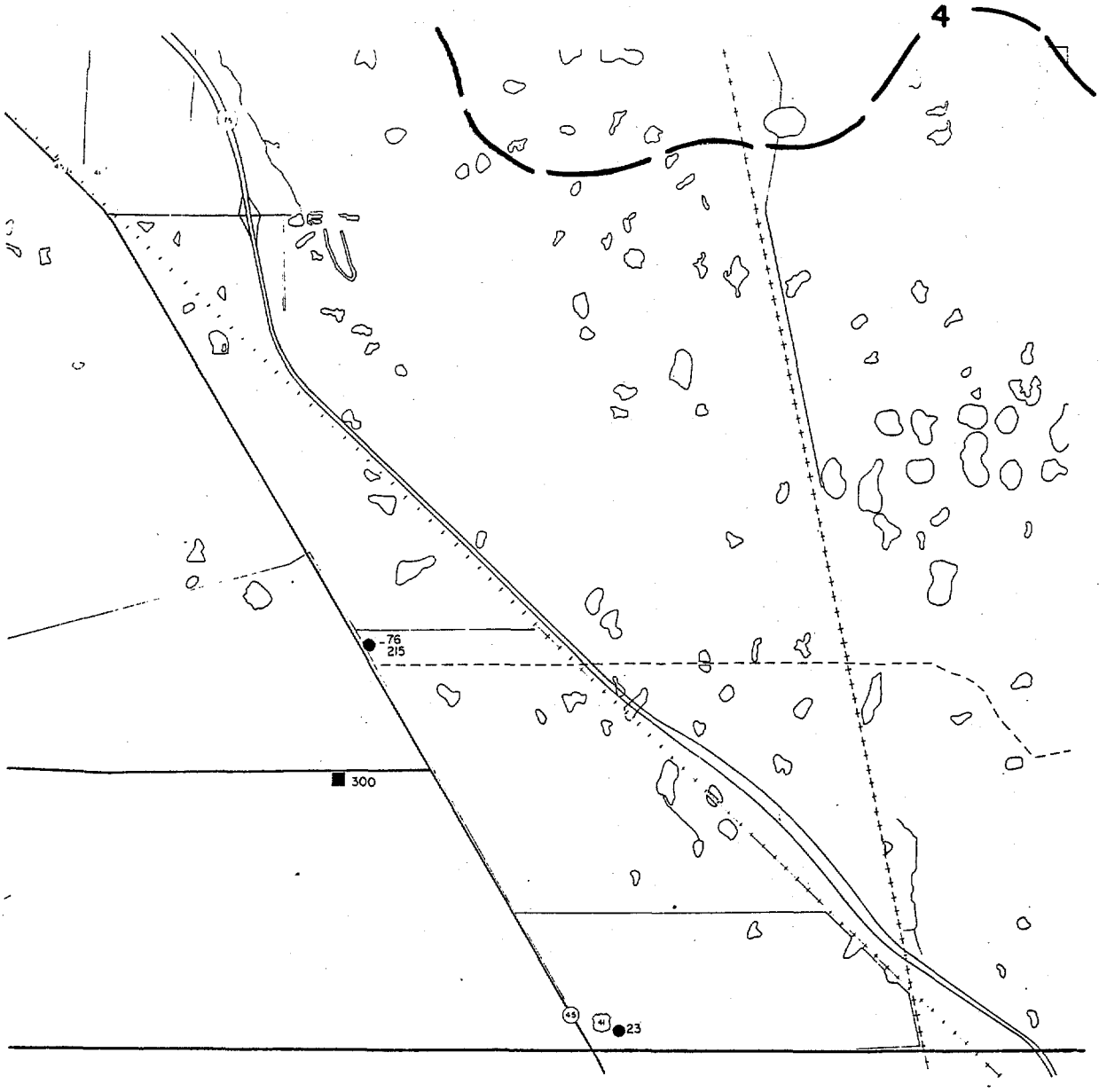


CHARLOTTE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

21
PUNTA GORDA S.W.

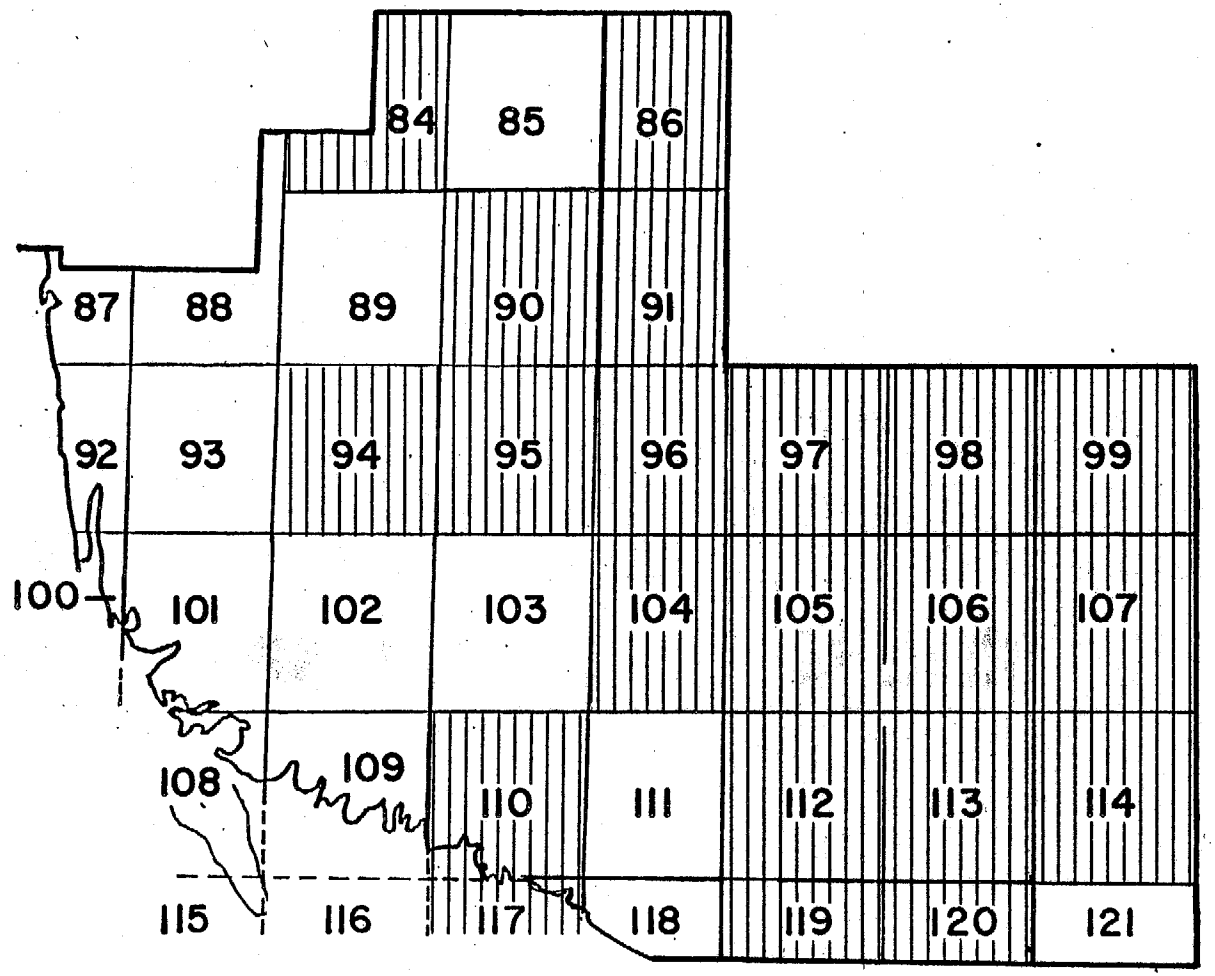


22
GILCHRIST

CHARLOTTE COUNTY

0 1 MILE
SCALE 1:24,000

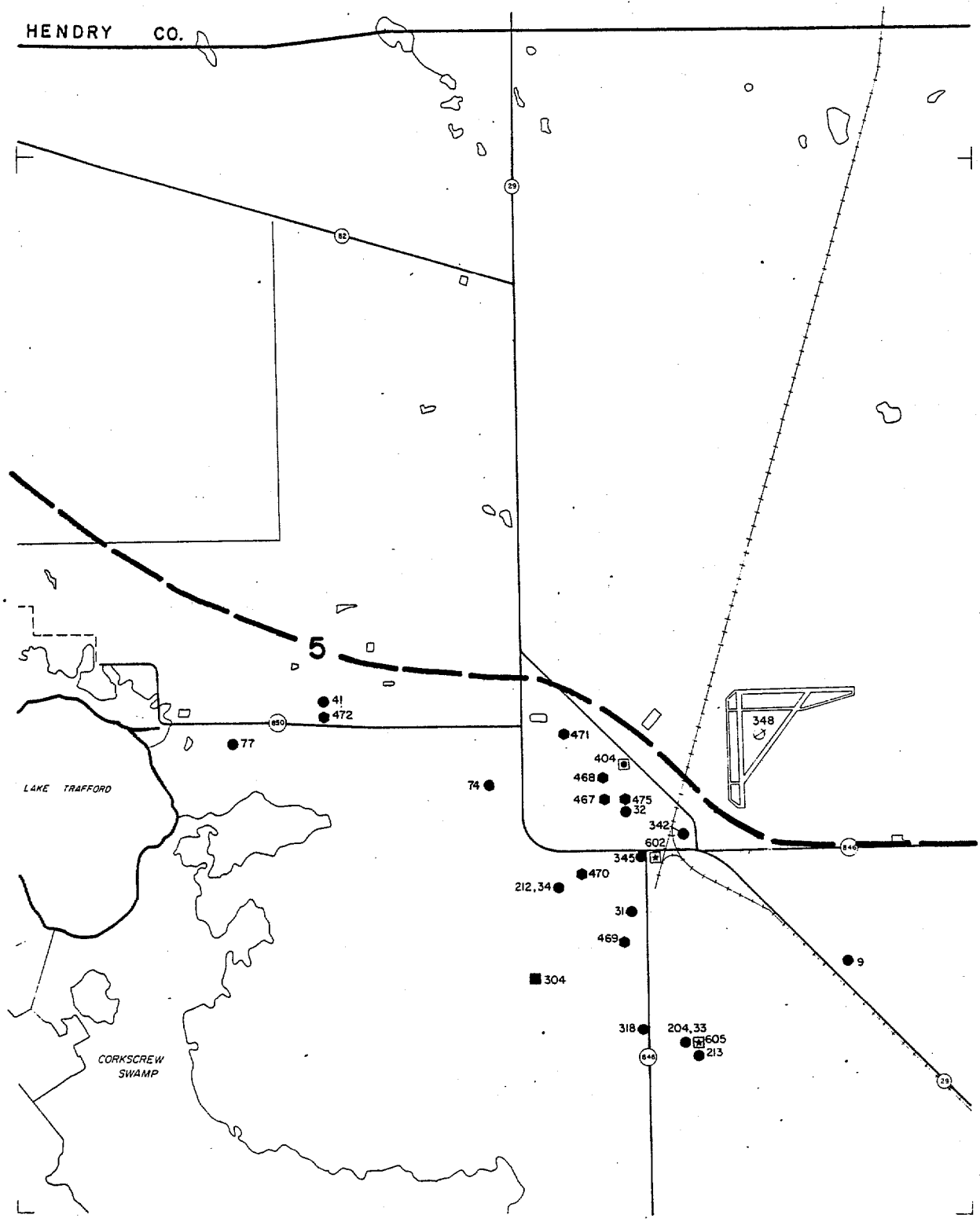
SWFRPC



84-121 SWFRPC NUMBERS DENOTING USGS QUAD-RANGLE 7.5 MINUTE MAPS

NO FACILITIES

KEY SHEET
HURRICANE LOSS STUDY
COLLIER COUNTY



85
IMMOKALEE

COLLIER COUNTY

0 1 MILE
SCALE

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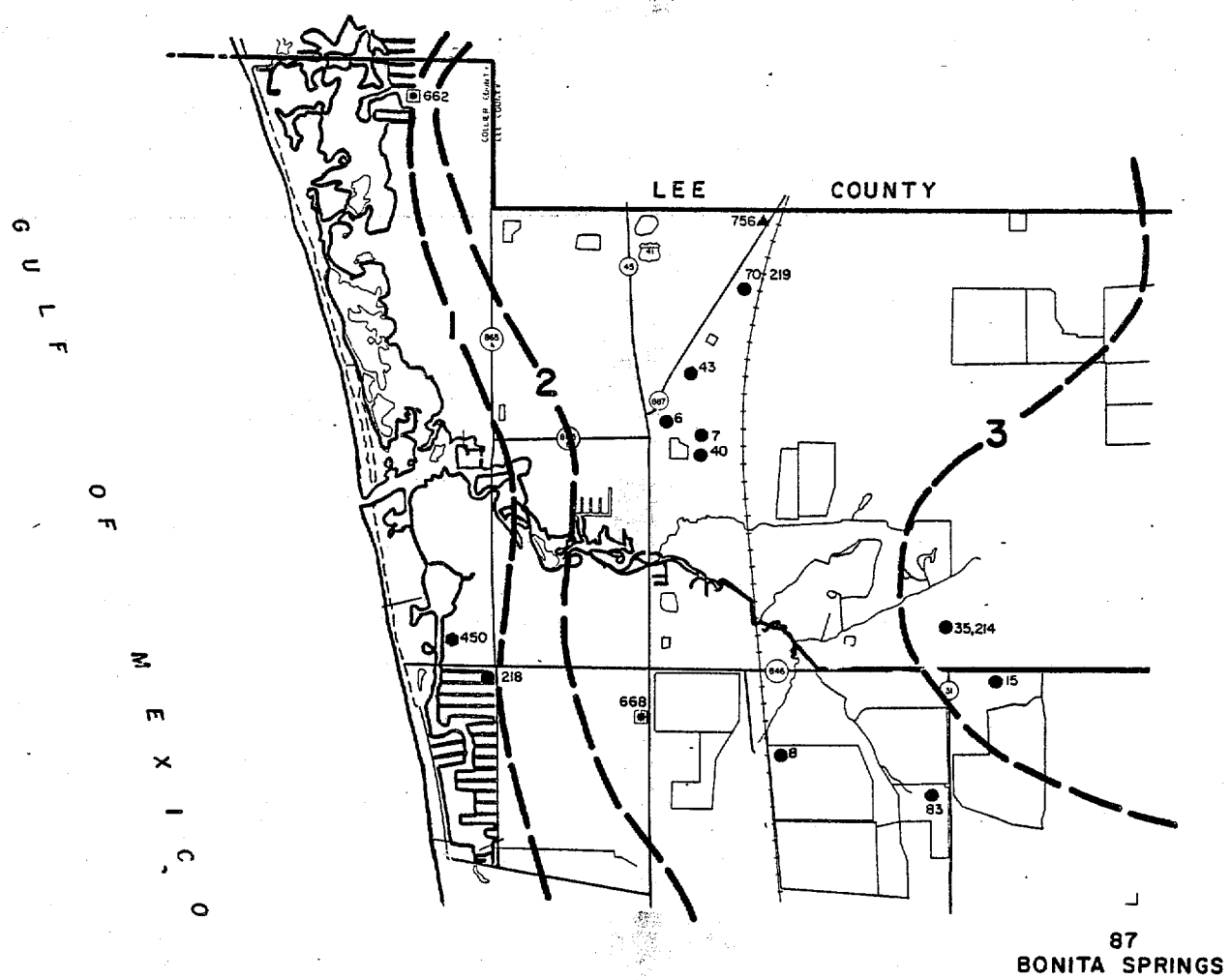
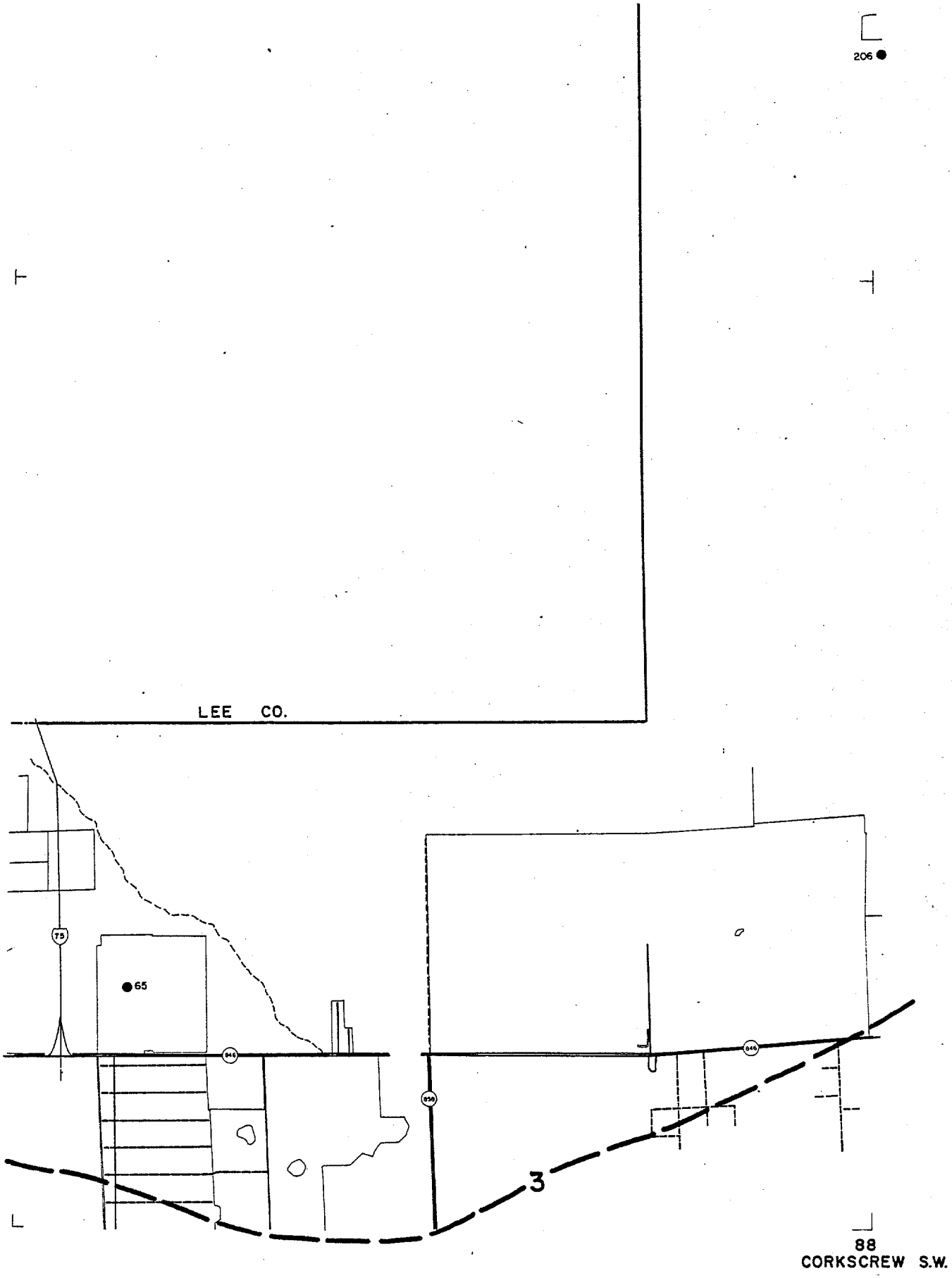


COLLIER COUNTY

0 1 MILE
SCALE

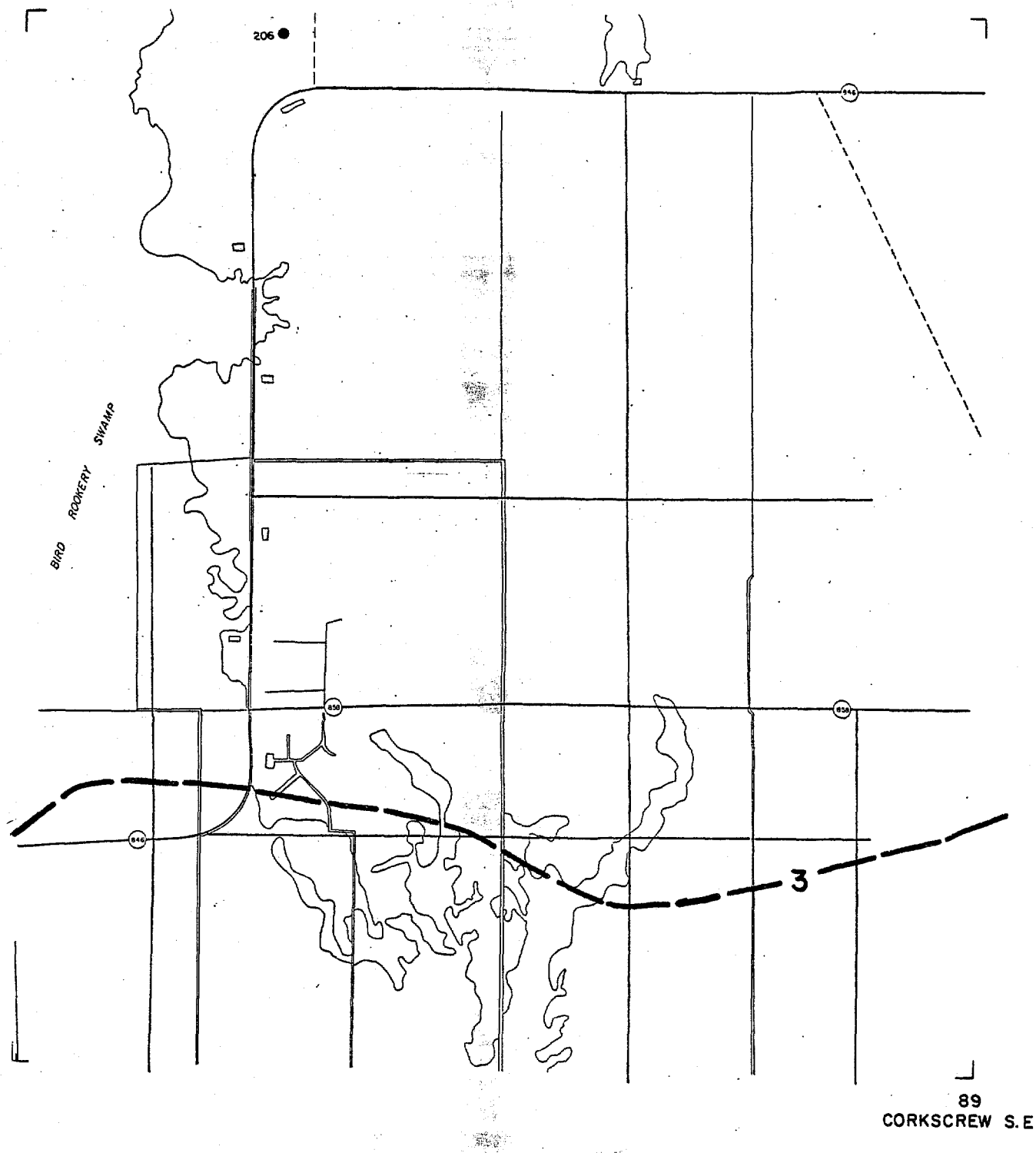
SWFRPC



COLLIER COUNTY

0 1 MILE
SCALE

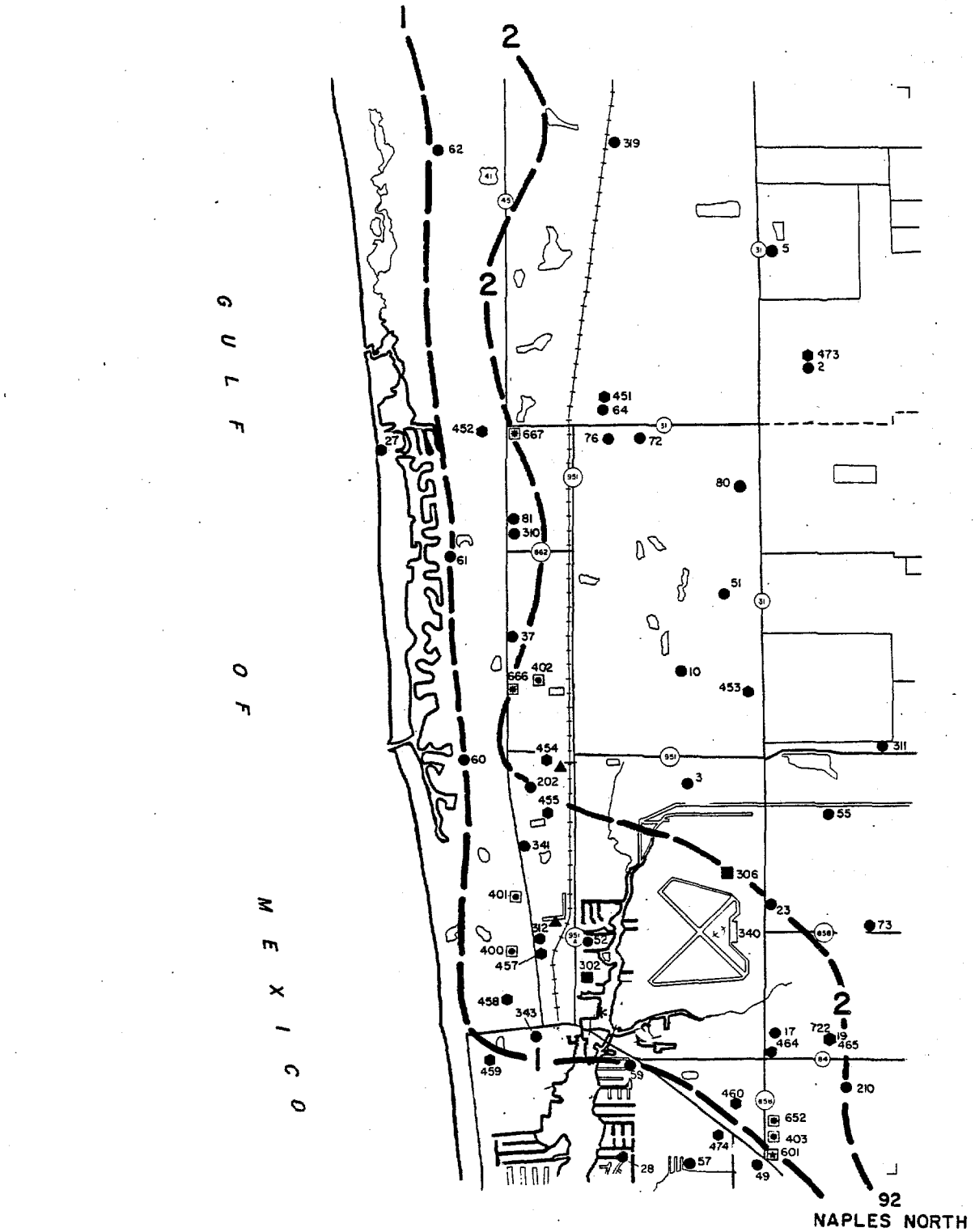
SWFRPC



COLLIER COUNTY

0 1 MILE
SCALE

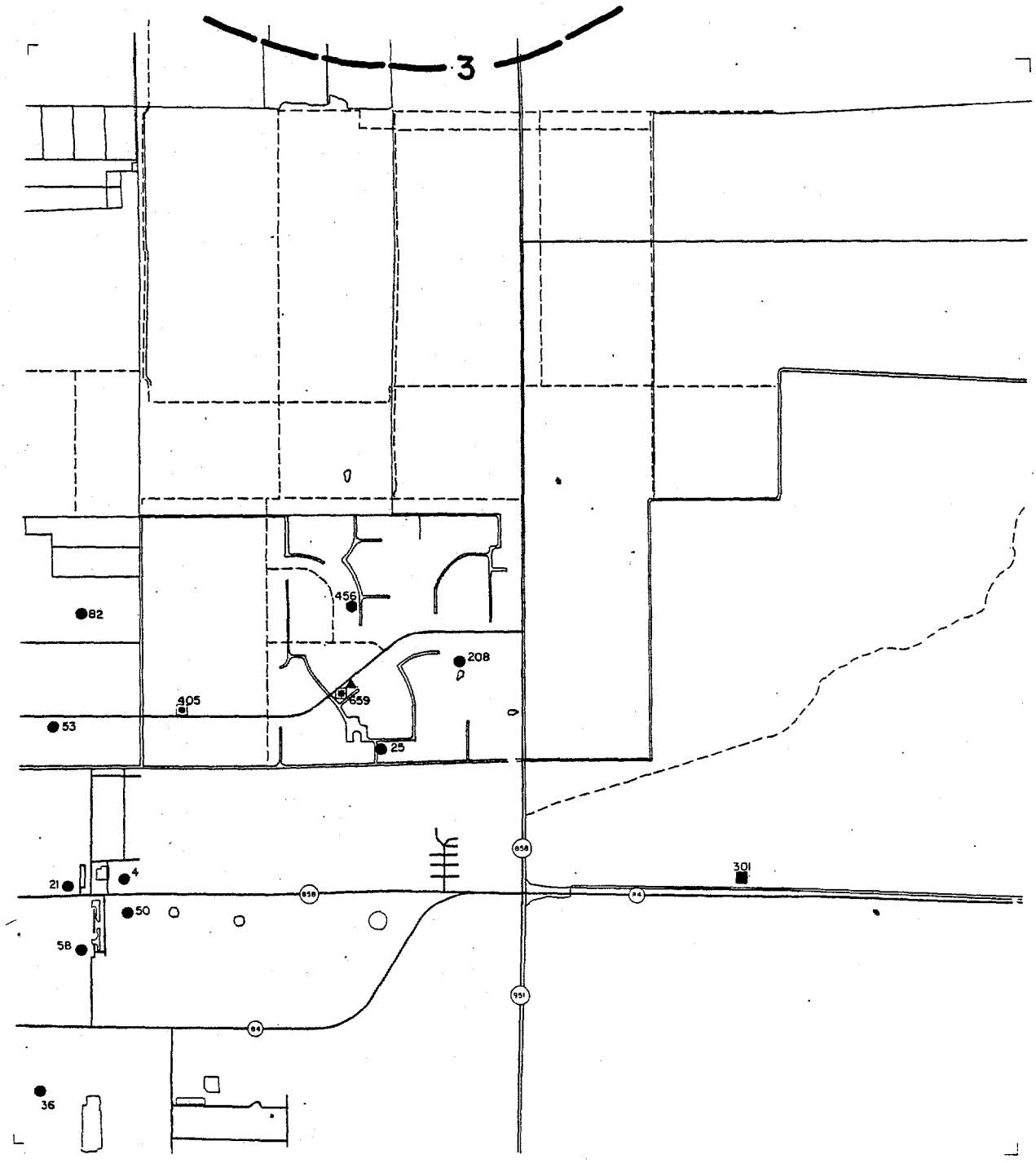
SWFRPC



COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC

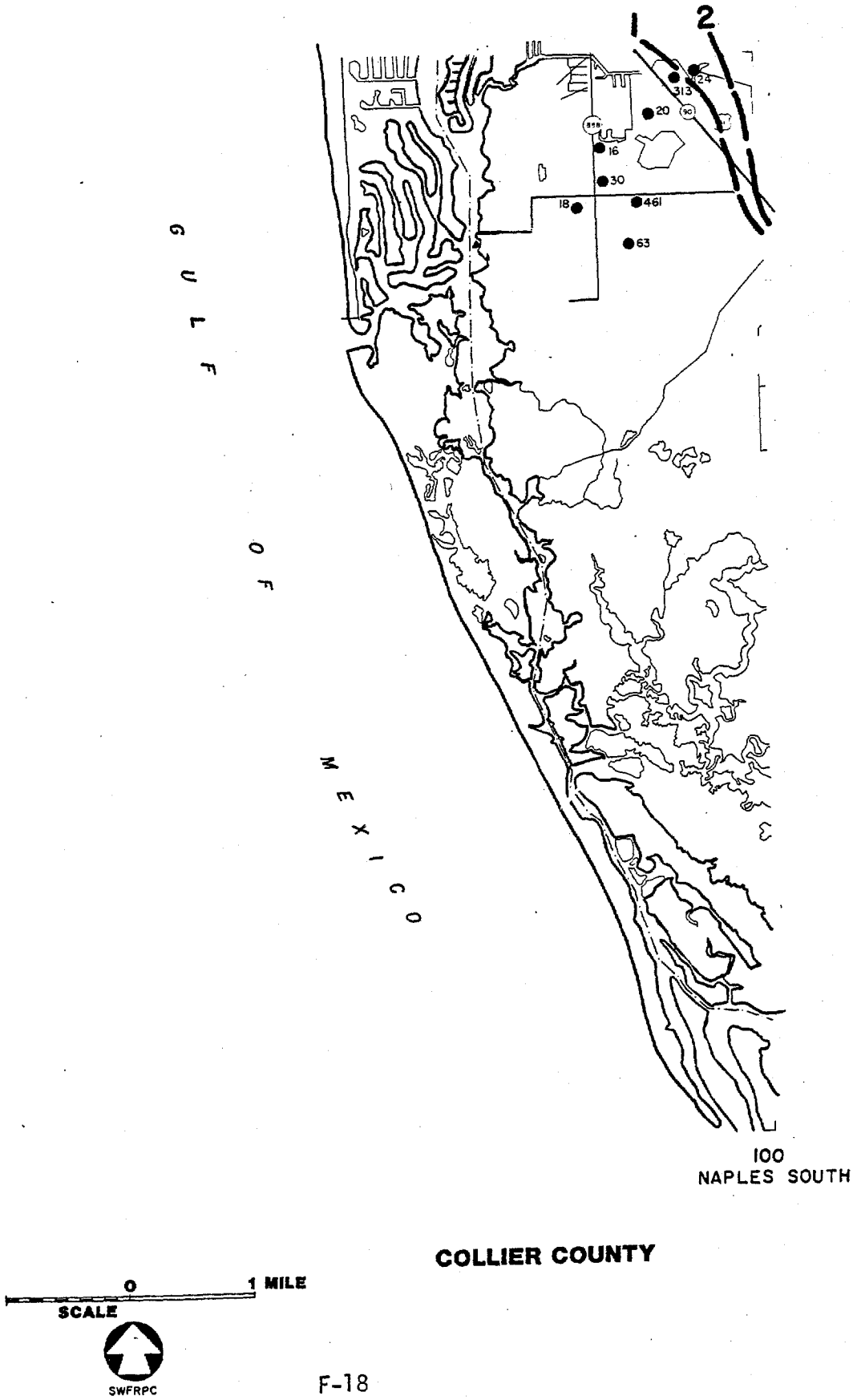


93
BELLE MEADE N.W.

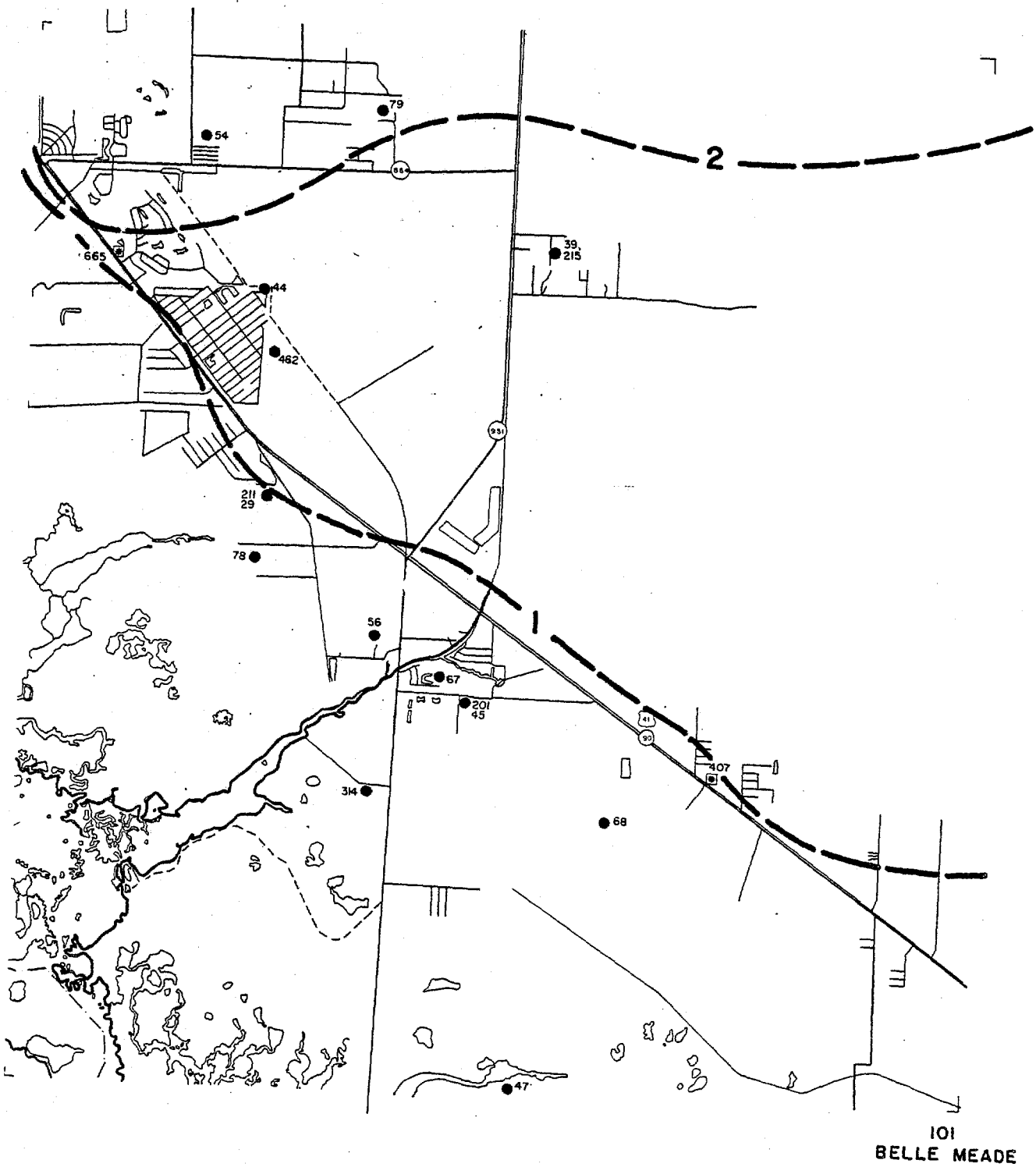
COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC



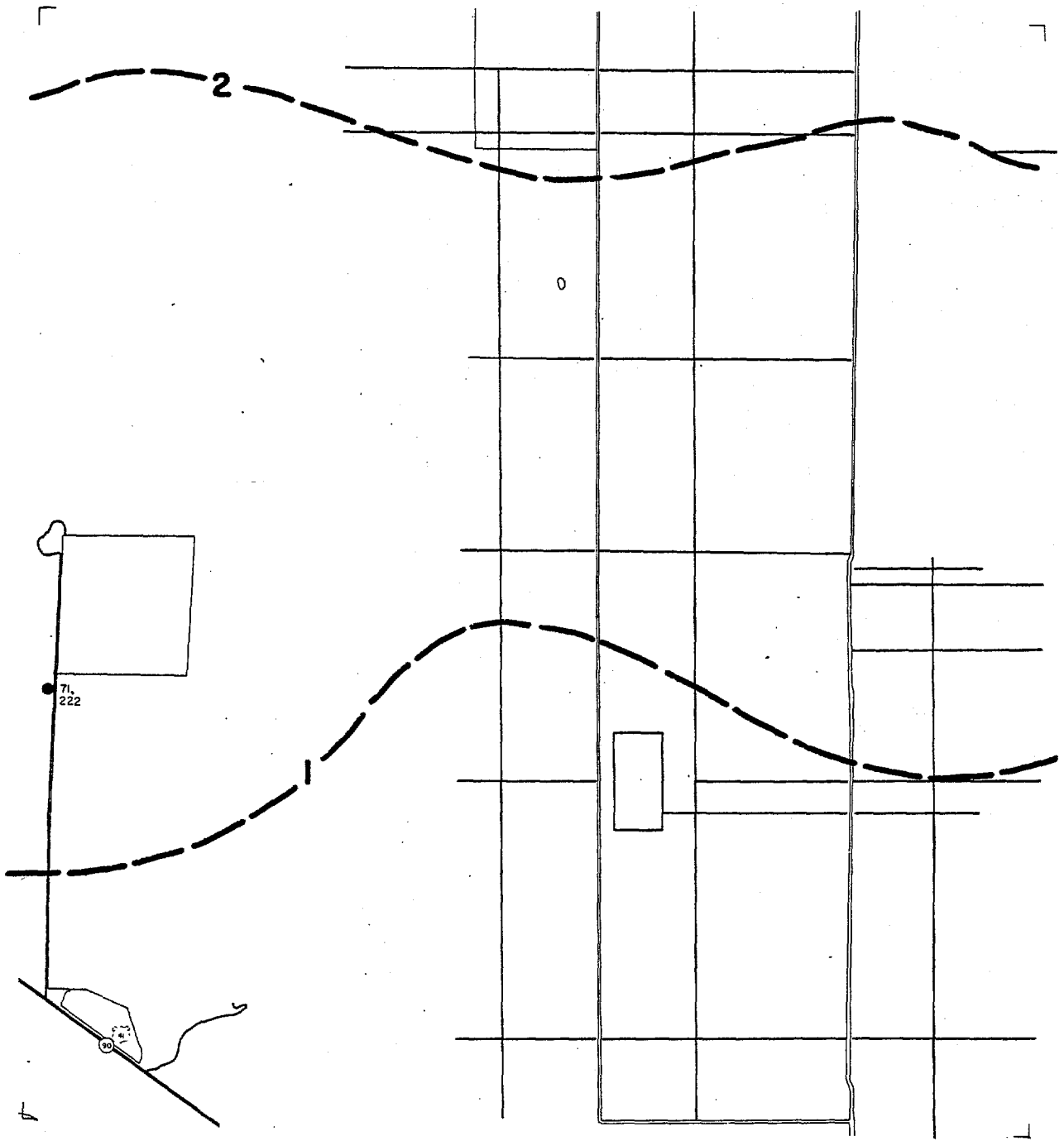
COLLIER COUNTY



COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC

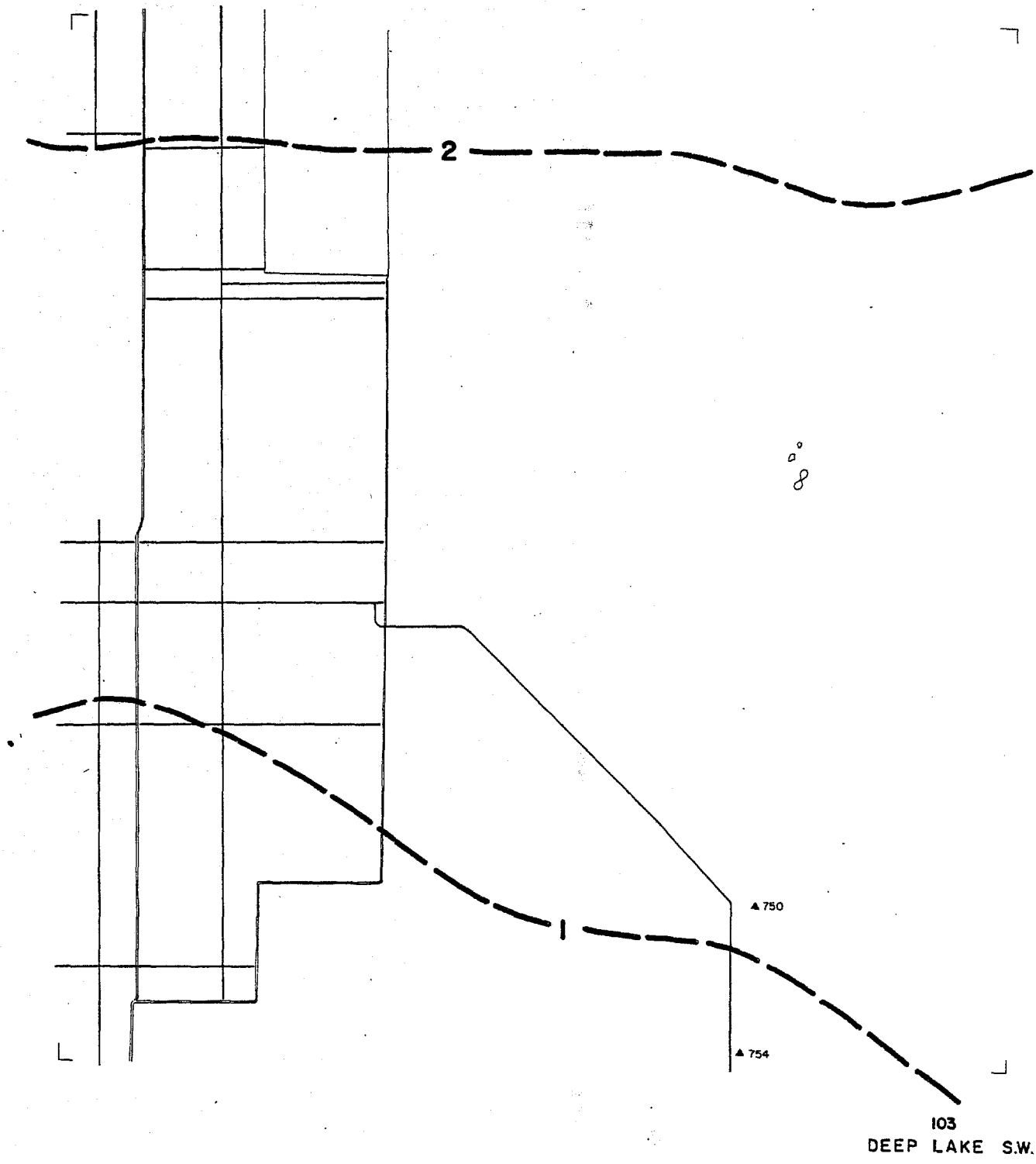


102
BELLE MEADE S.E.

COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC

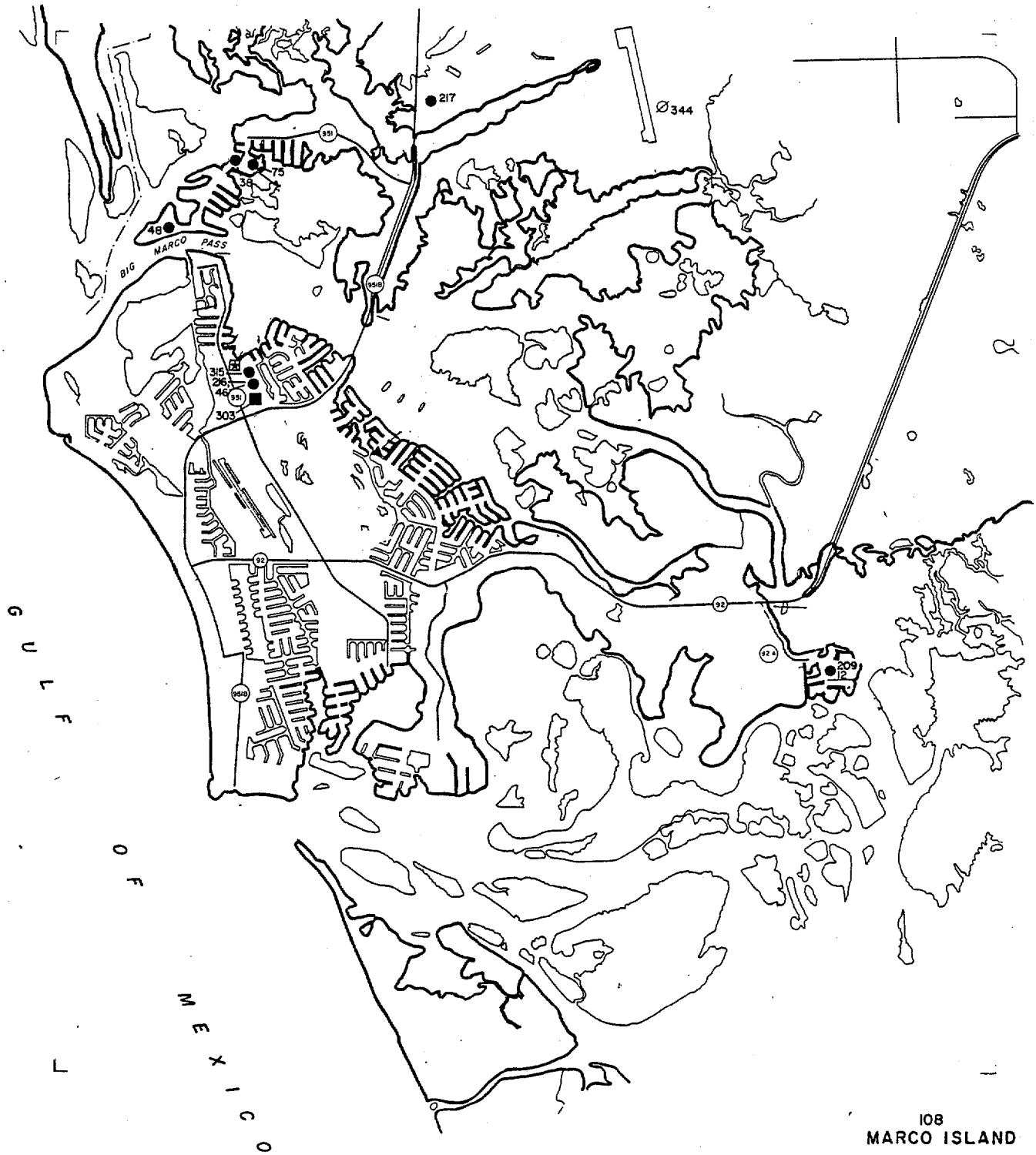


COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC

CATEGORY I



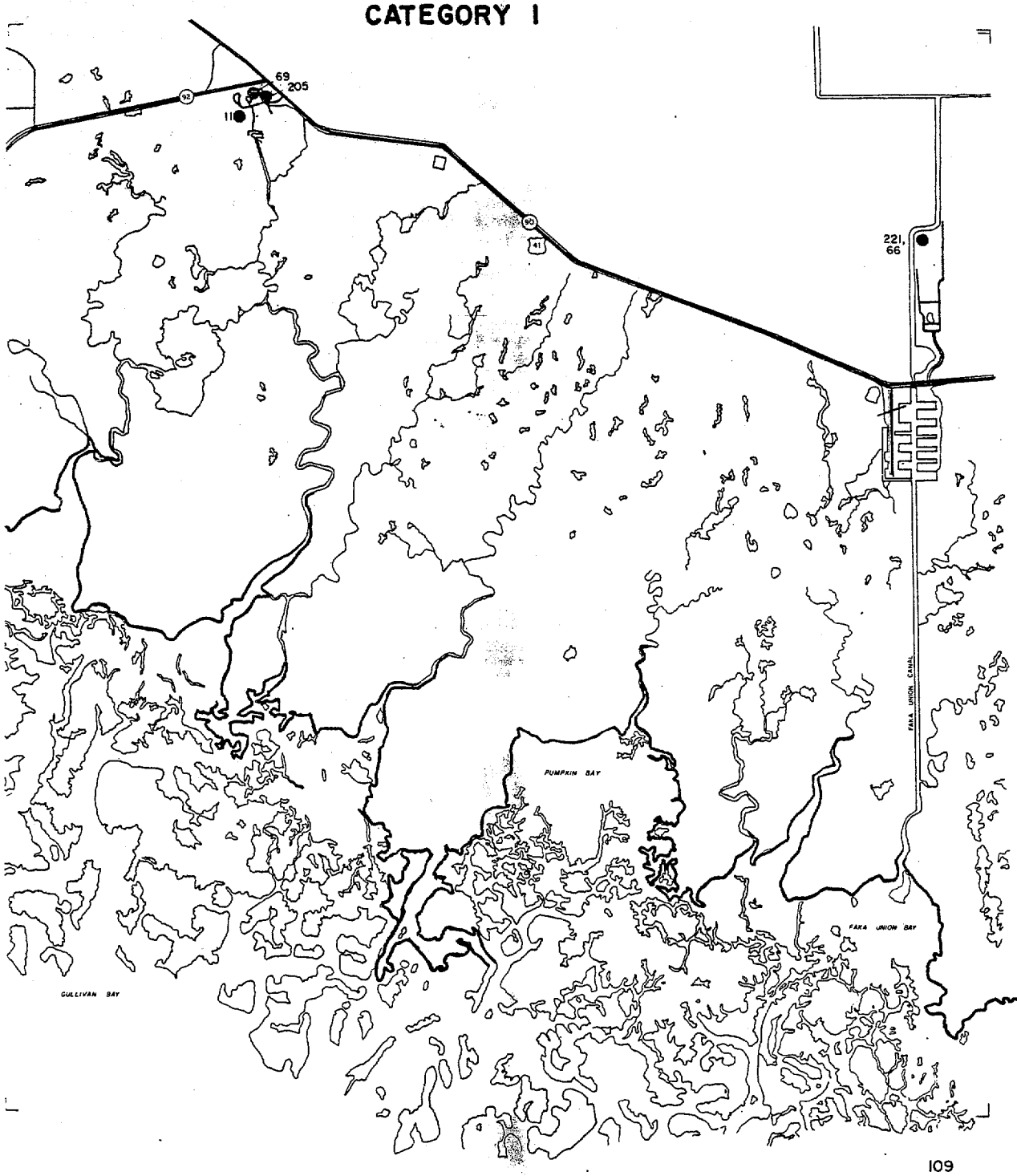
108
MARCO ISLAND

COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC

CATEGORY I

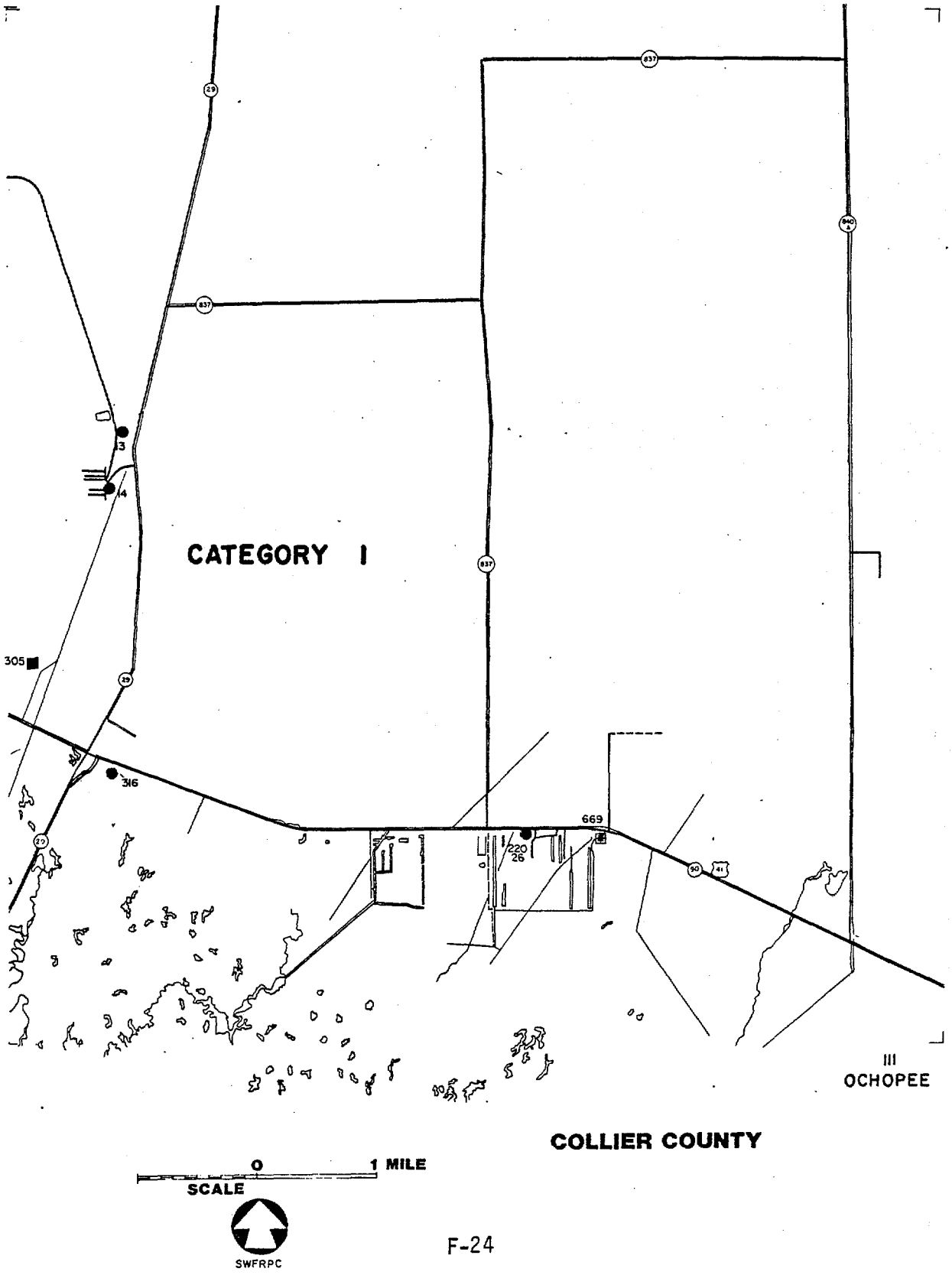


109
ROYAL PALM HAMMOCK

COLLIER COUNTY

0 1 MILE

SWFRPC


CATEGORY I
305
316
669
220
26
III
OCHOPEE
COLLIER COUNTY
0
1 MILE
SCALE
SWFRPC

CATEGORY I

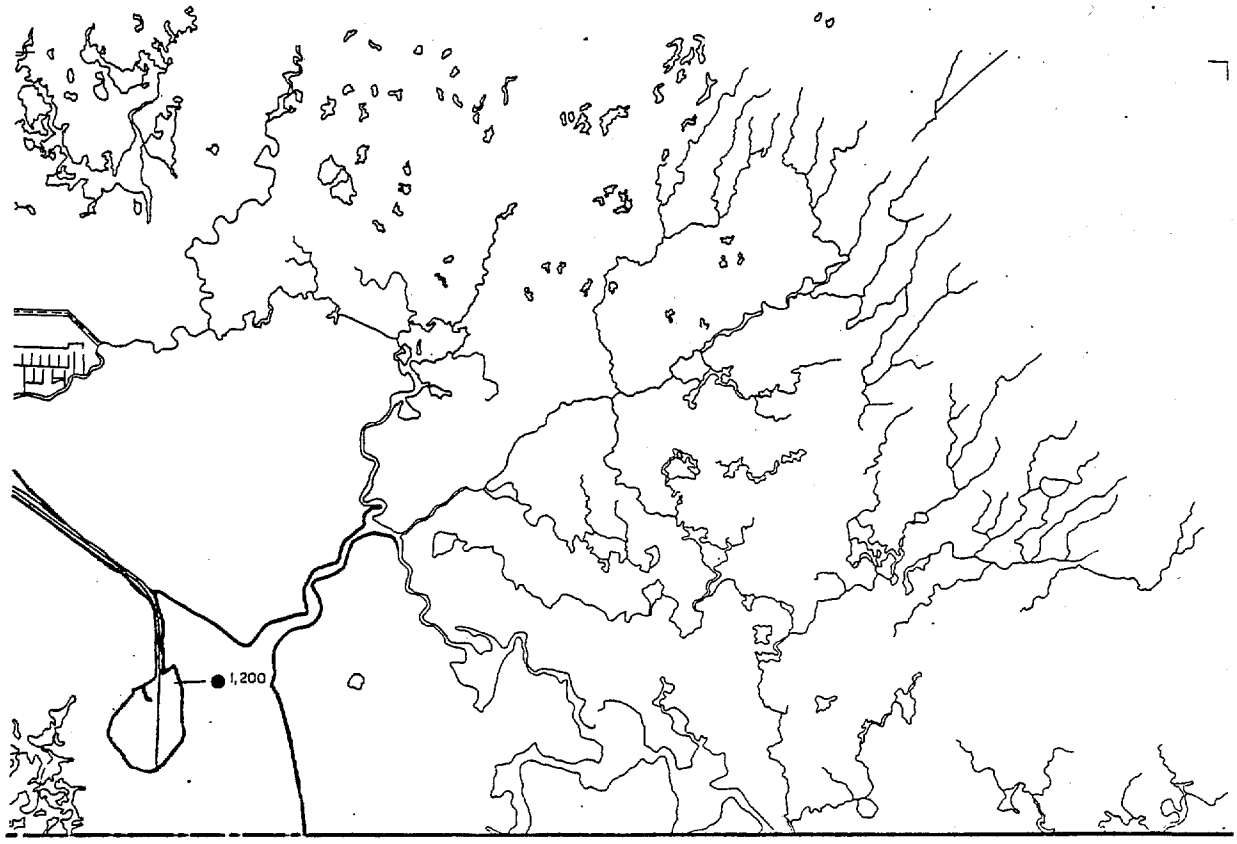
117
EVERGLADES CITY

COLLIER COUNTY

0 1 MILE

SWFRPC

CATEGORY I



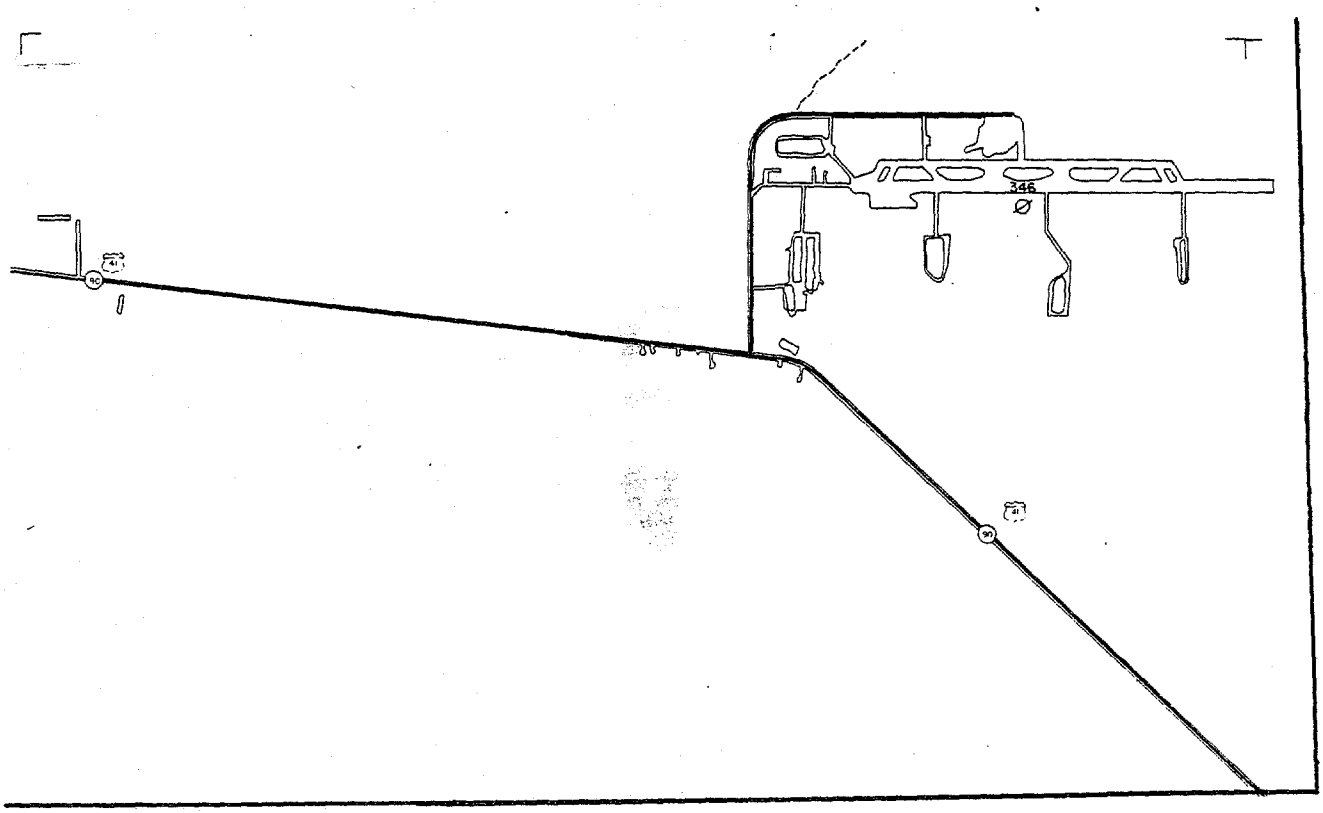
118
CHOKOLOSKEE

COLLIER COUNTY

0 1 MILE
SCALE

SWFRPC

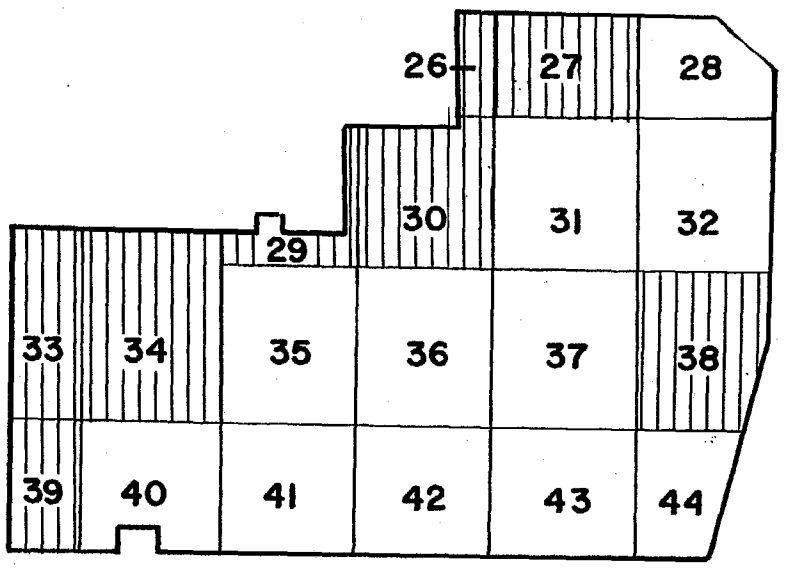
OUT OF SLOSH AREA



COLLIER COUNTY

0 1 MILE

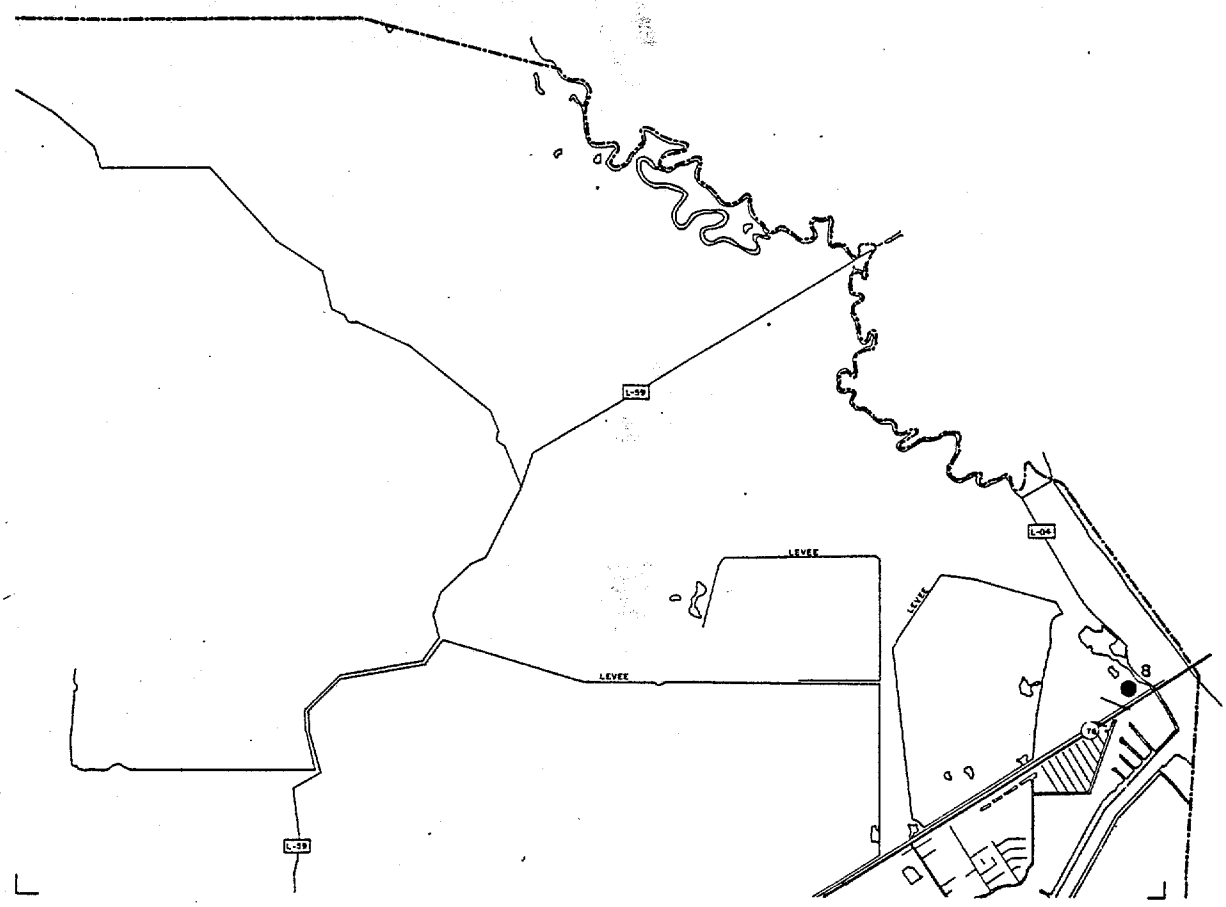
SWFRPC



26-44 SWFRPC NUMBERS DENOTING USGS QUADRANGLE 7.5 MINUTE MAPS

NO FACILITIES

KEY SHEET
HURRICANE LOSS STUDY
GLADES COUNTY

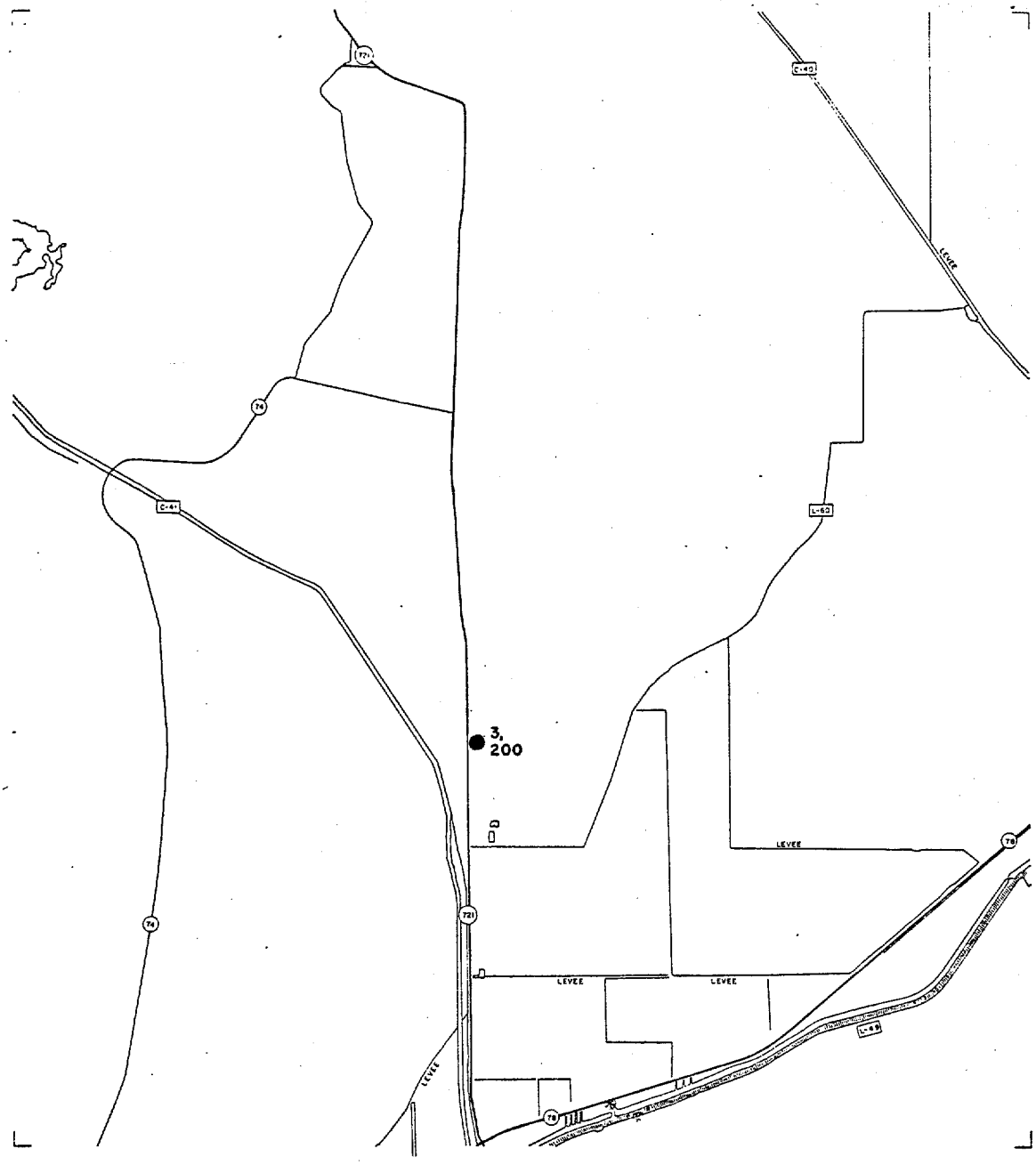


28
OKEECHOBEE N.W.

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY

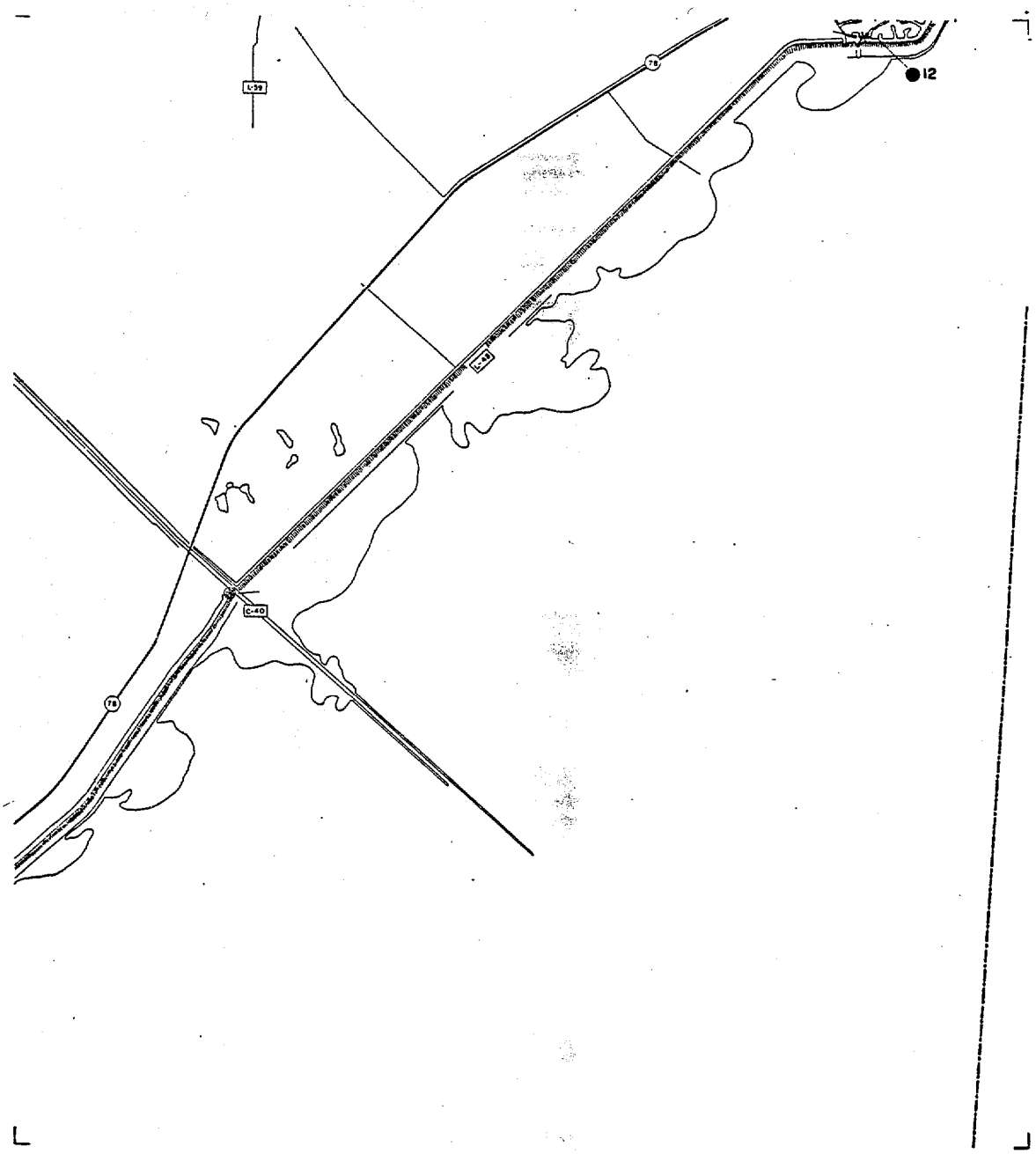


31
BRIGHTON S.E.

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY

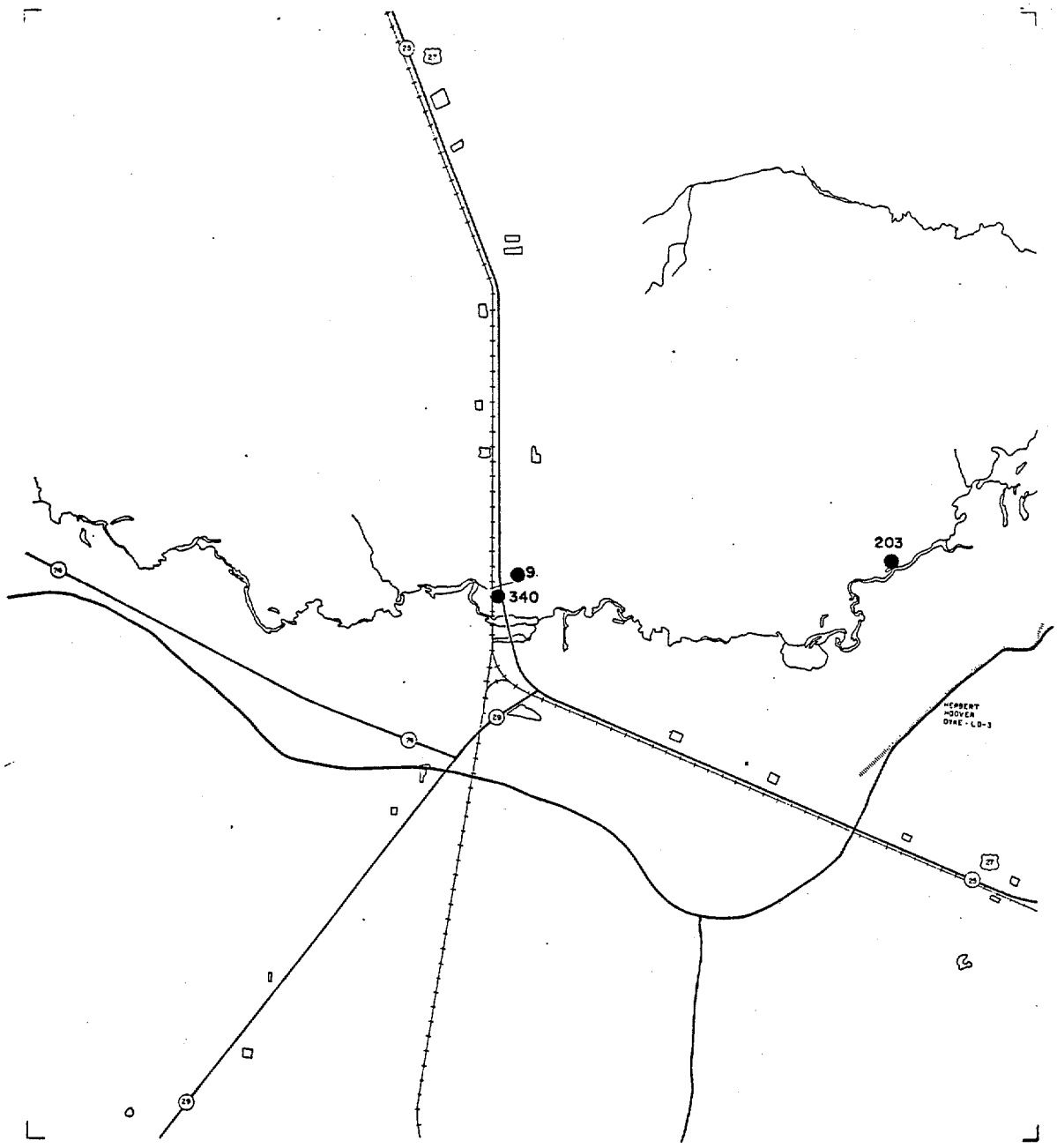


32
OKEECHOBEE S.W.

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY

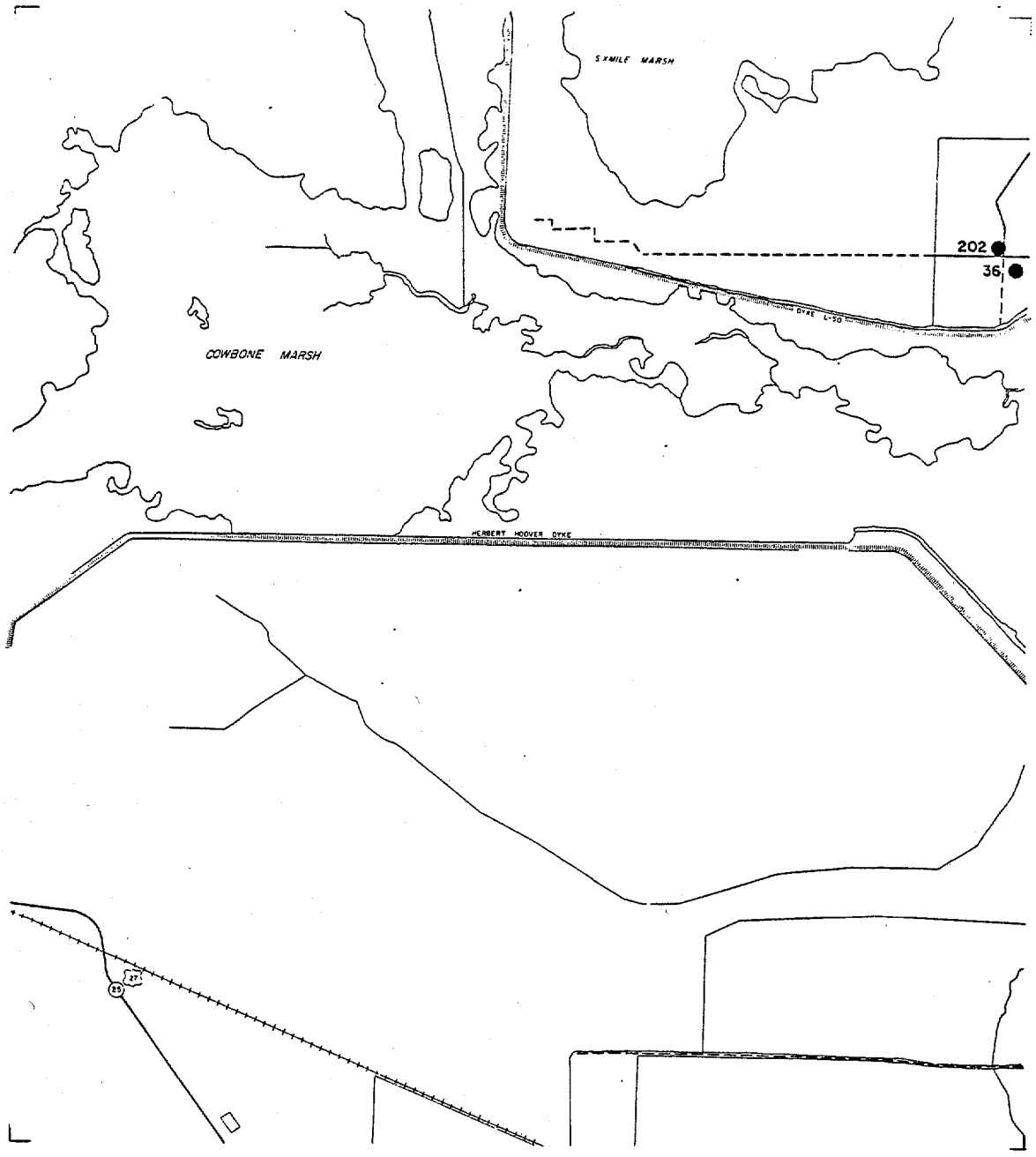


0 1 2 Miles

Approx. Scale RNC

SWFRPC

GLADES COUNTY

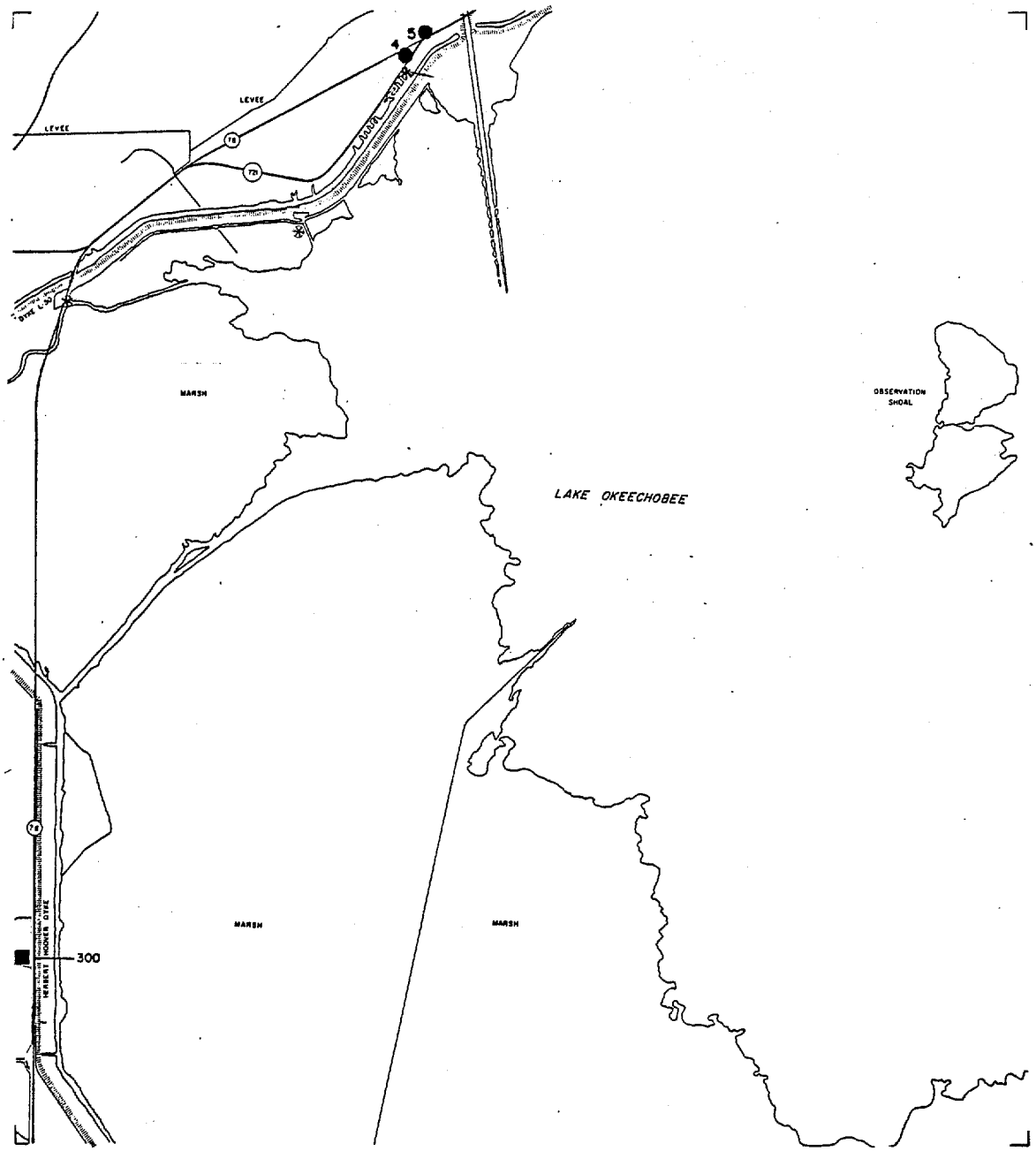


36
LAKEPORT

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY

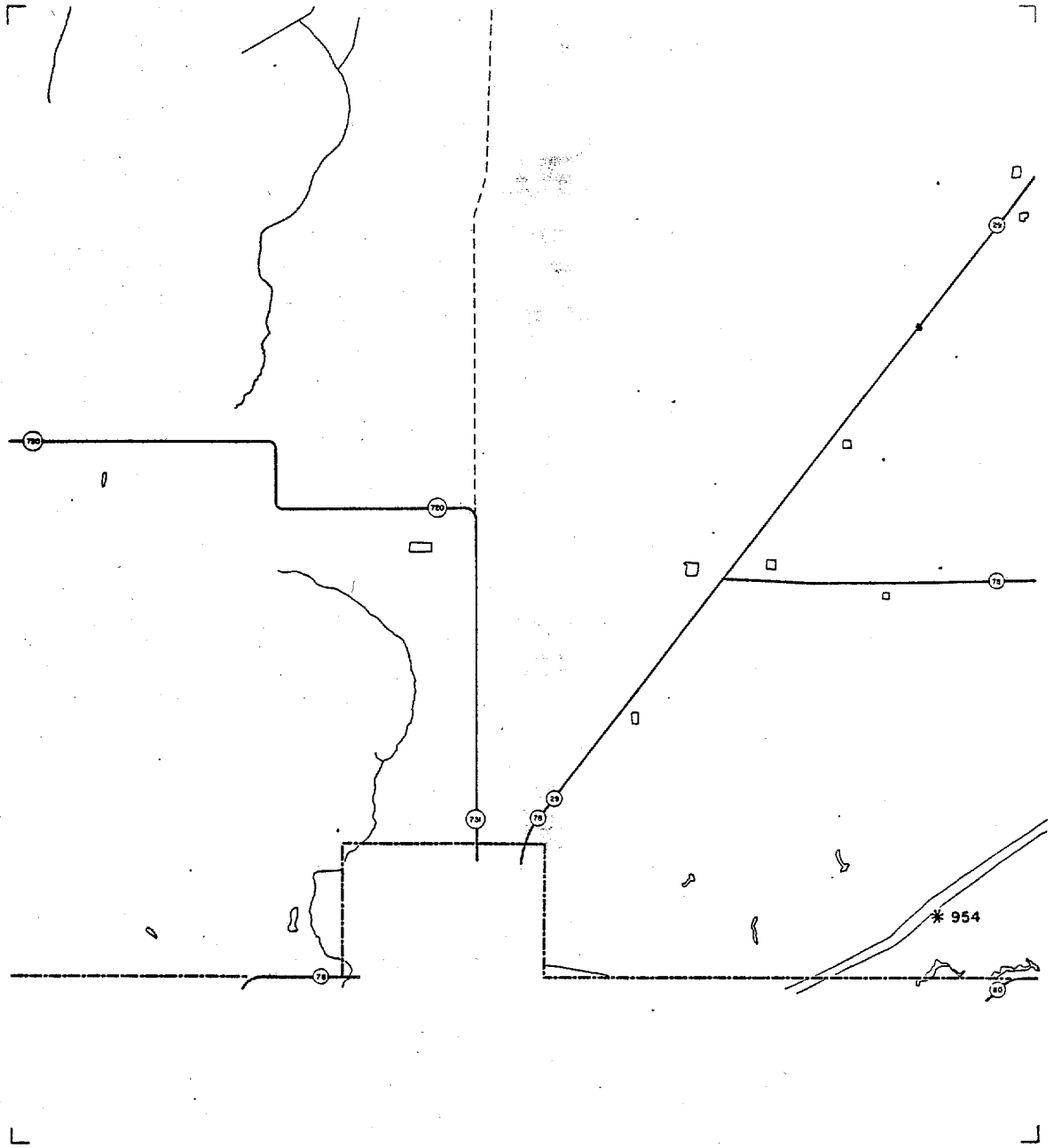


37
FISHEATING BAY

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY



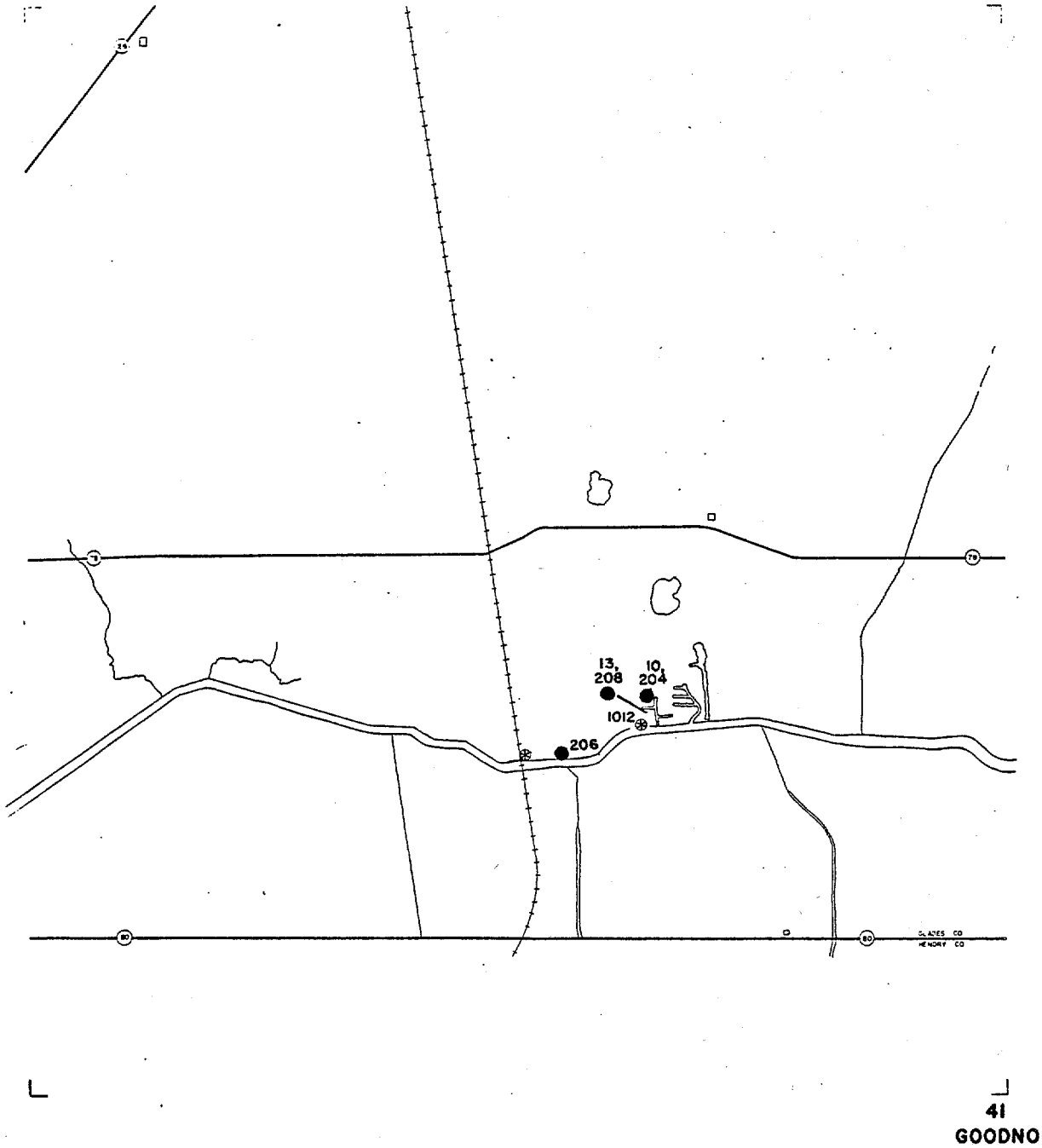
0 1 2 Miles

Approx. Scale RNC

SWFRPC

GLADES COUNTY

F-35

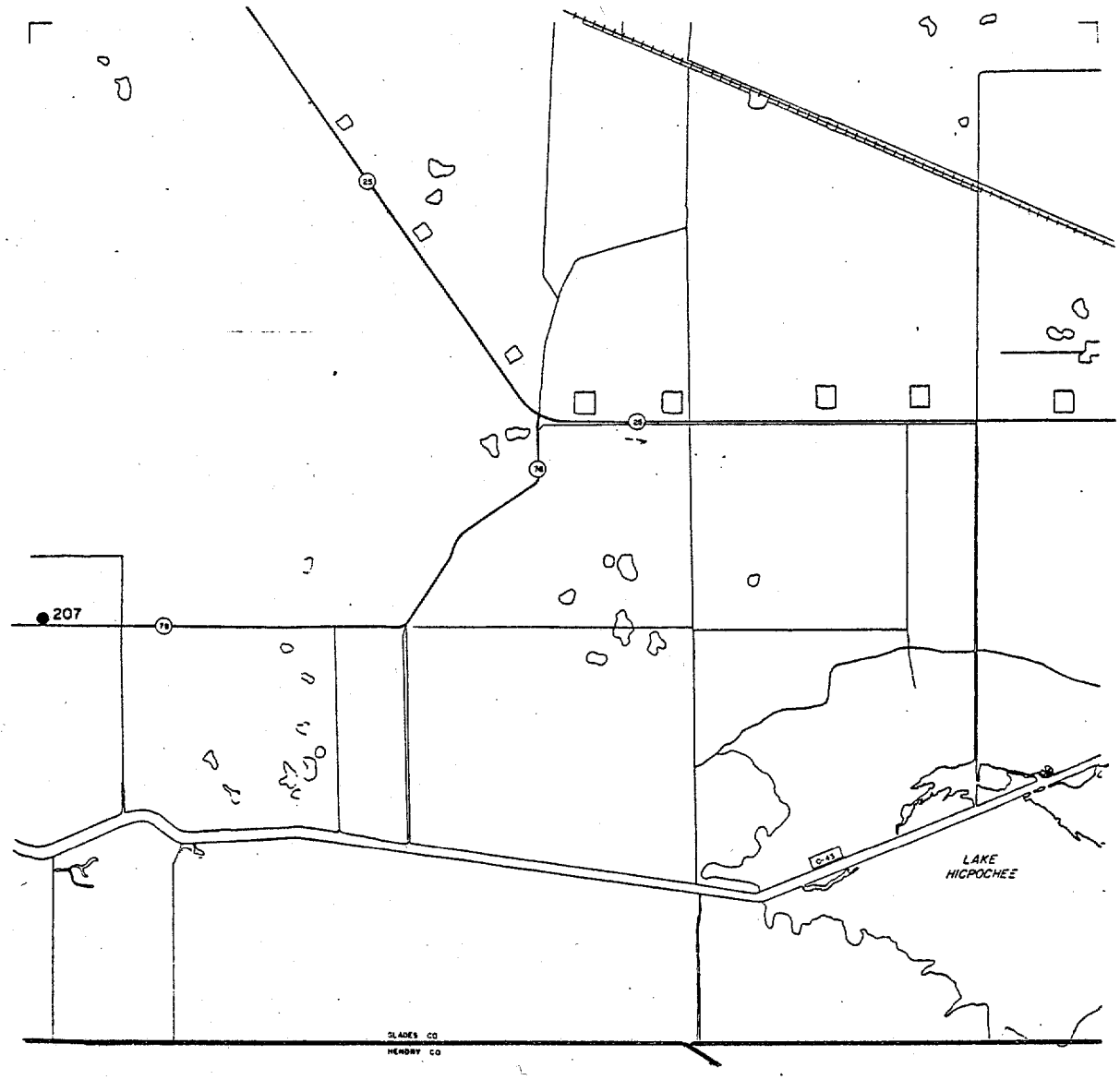


0 1 2 Miles

Approx. Scale RNC

SWFRPC

GLADES COUNTY



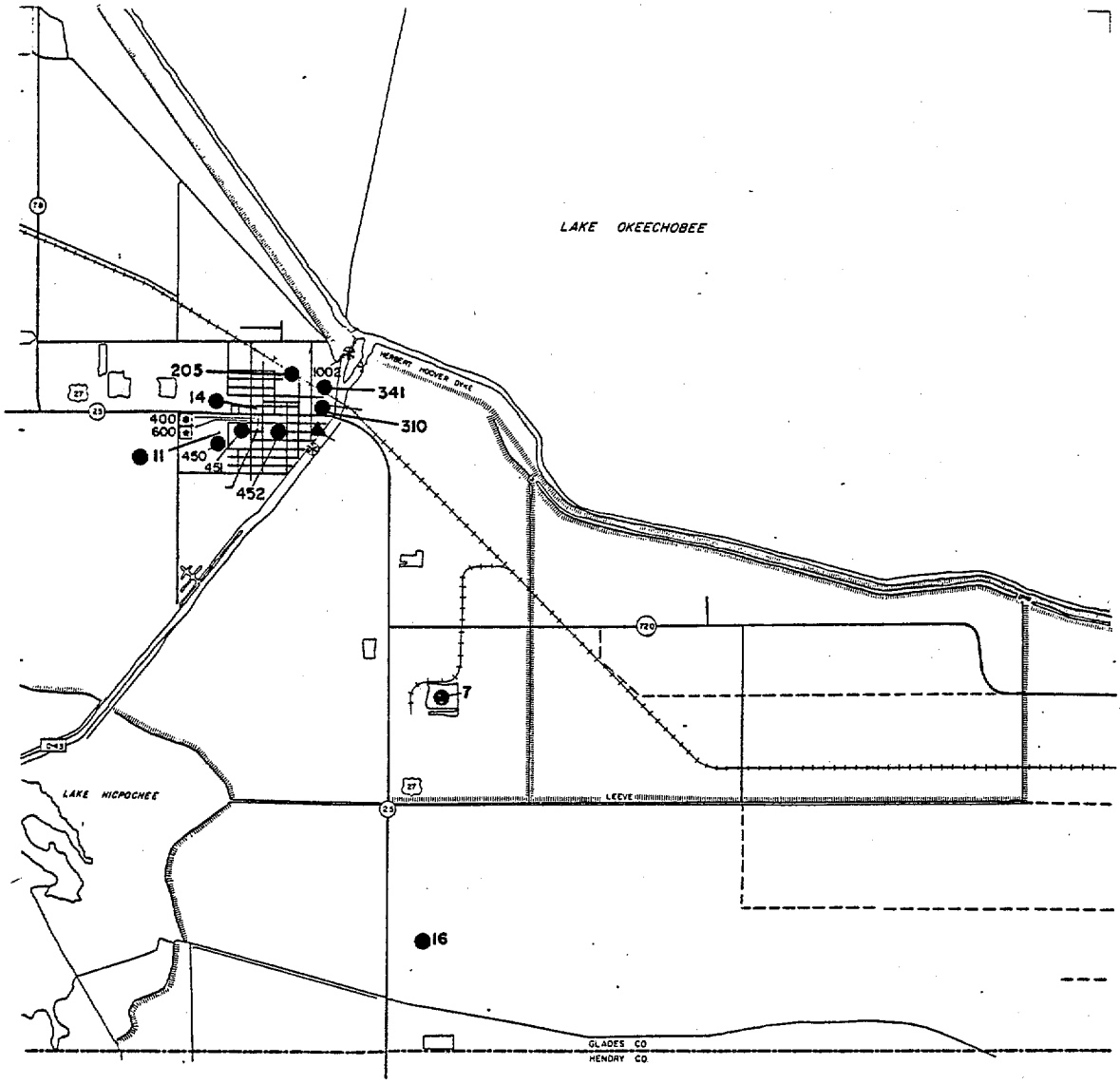
42
LAKE HICPOCHEE

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY

F-37

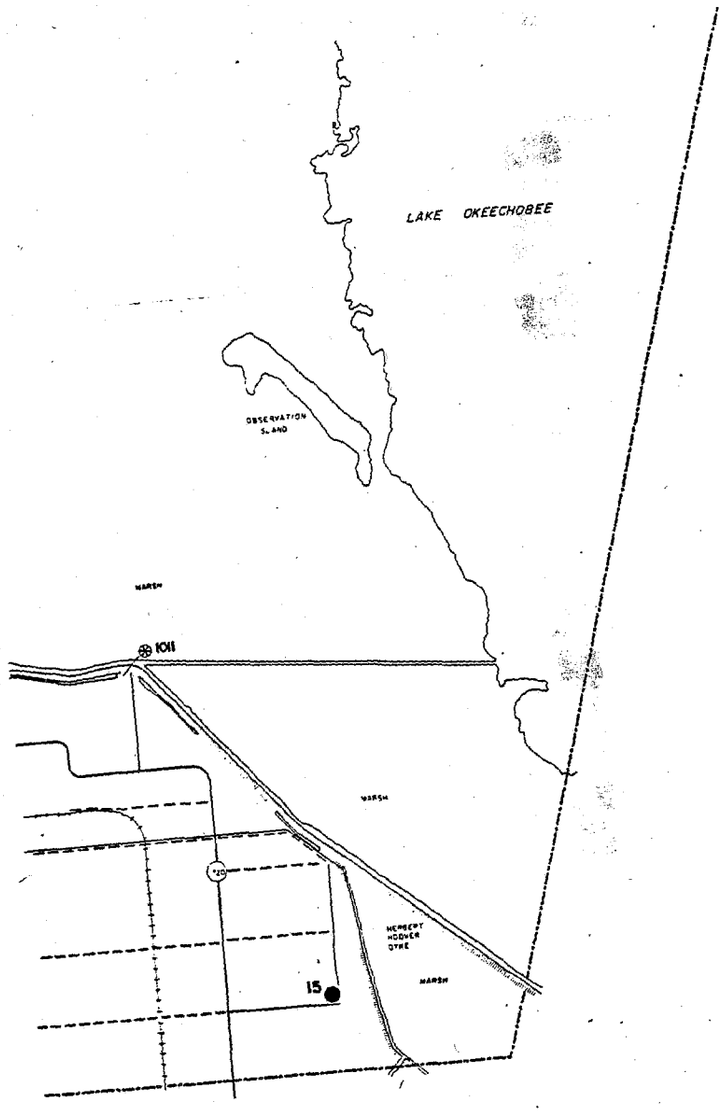


43
MOORE HAVEN

0 1 2 Miles
Approx. Scale RNC

SWFRPC

GLADES COUNTY

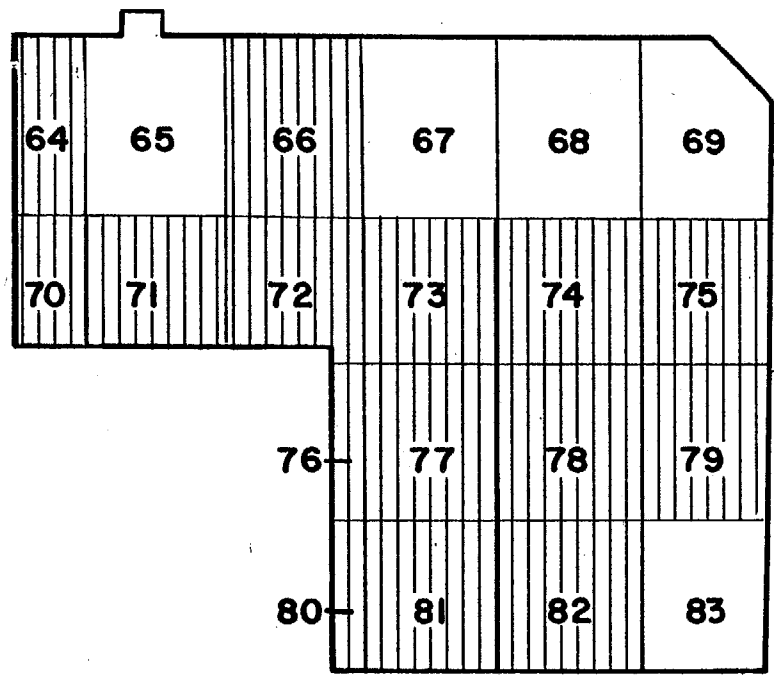


44
CLEWISTON NORTH

0 1 2 Miles
Approx. Scale RNC

SWFRPC

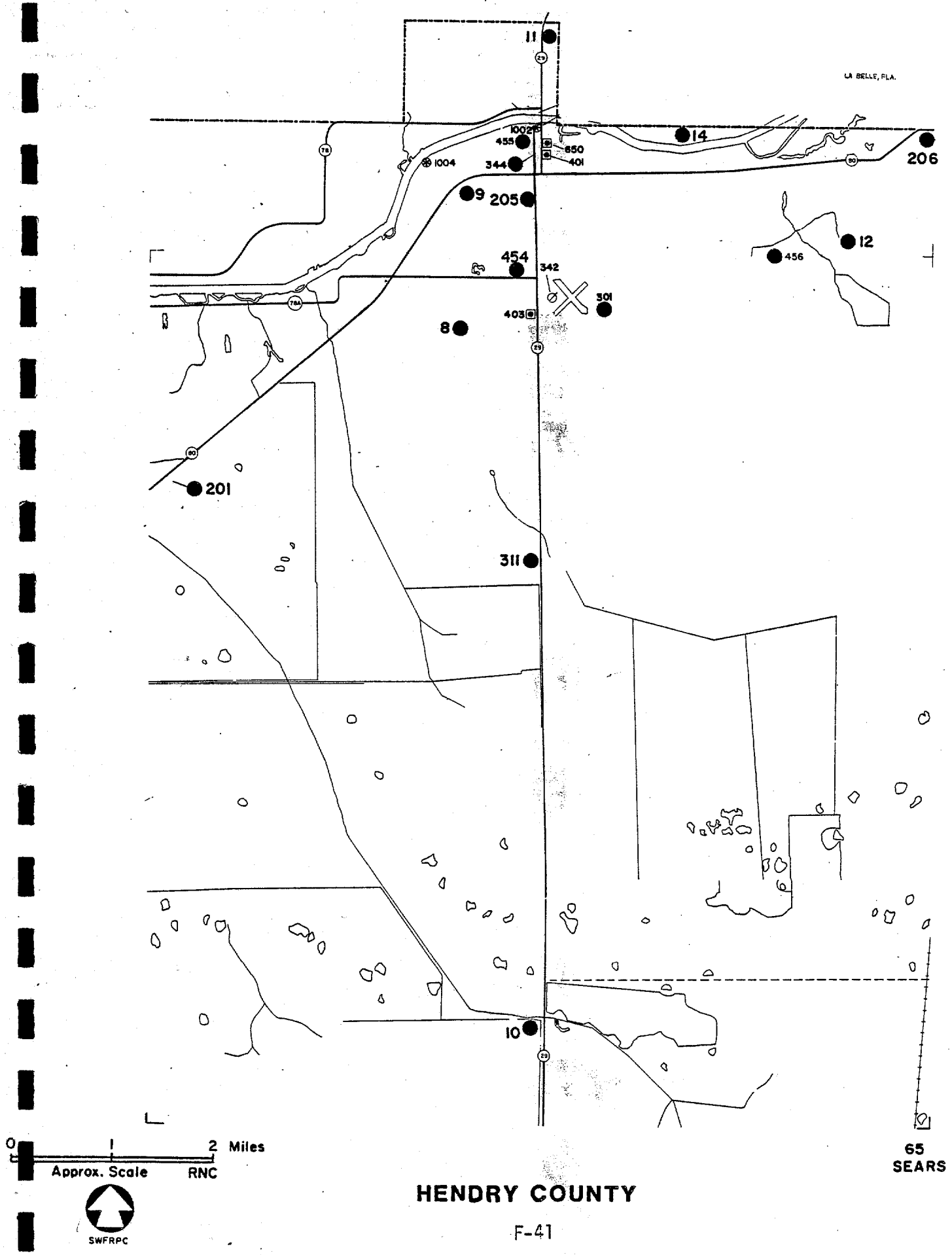
GLADES COUNTY



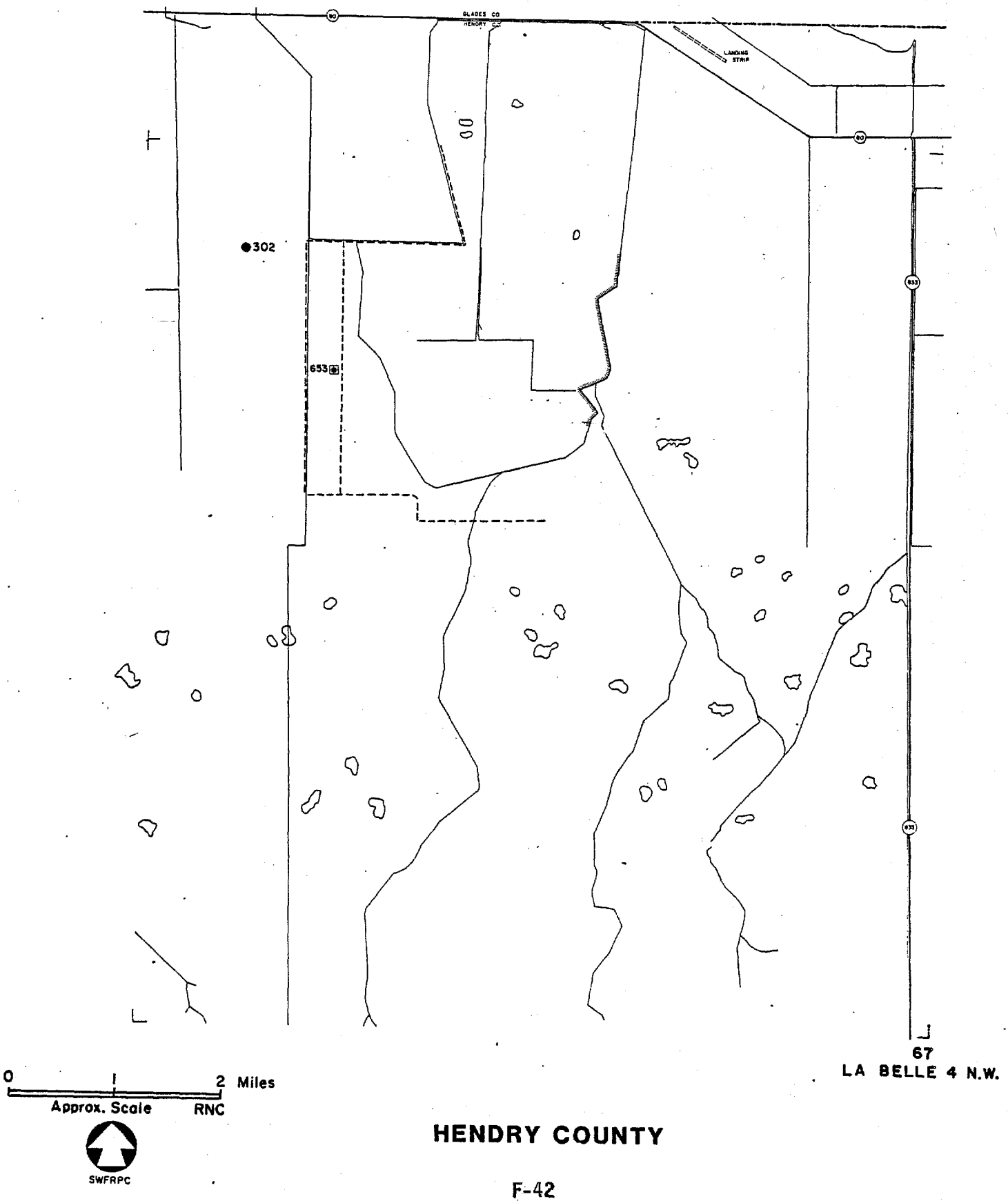
64-83 SWFRPC NUMBERS DENOTING USGS QUAD-RANGLE 7.5 MINUTE MAPS

NO FACILITIES

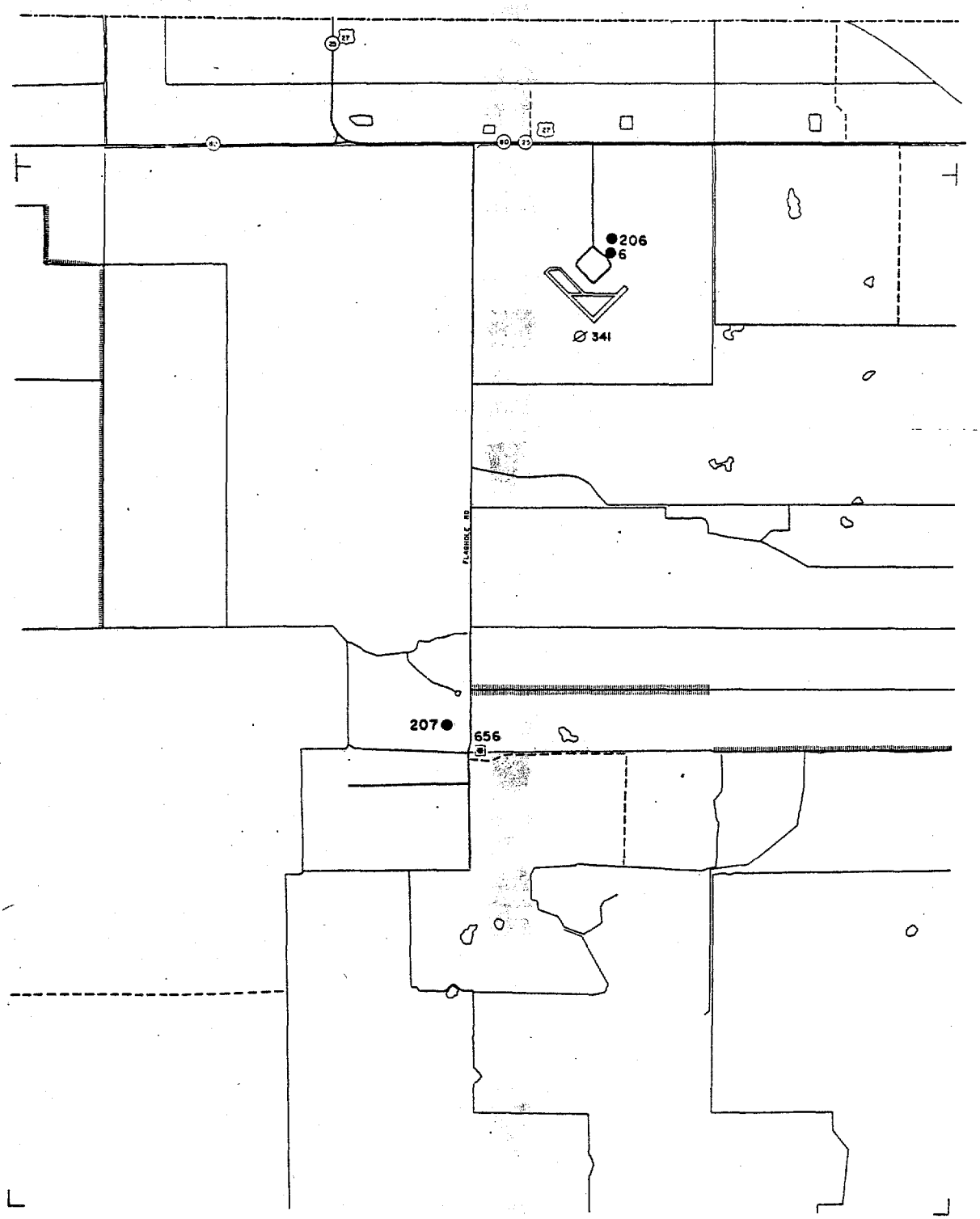
KEY SHEET
HURRICANE LOSS STUDY
HENDRY COUNTY



HENDRY COUNTY



HENDRY COUNTY

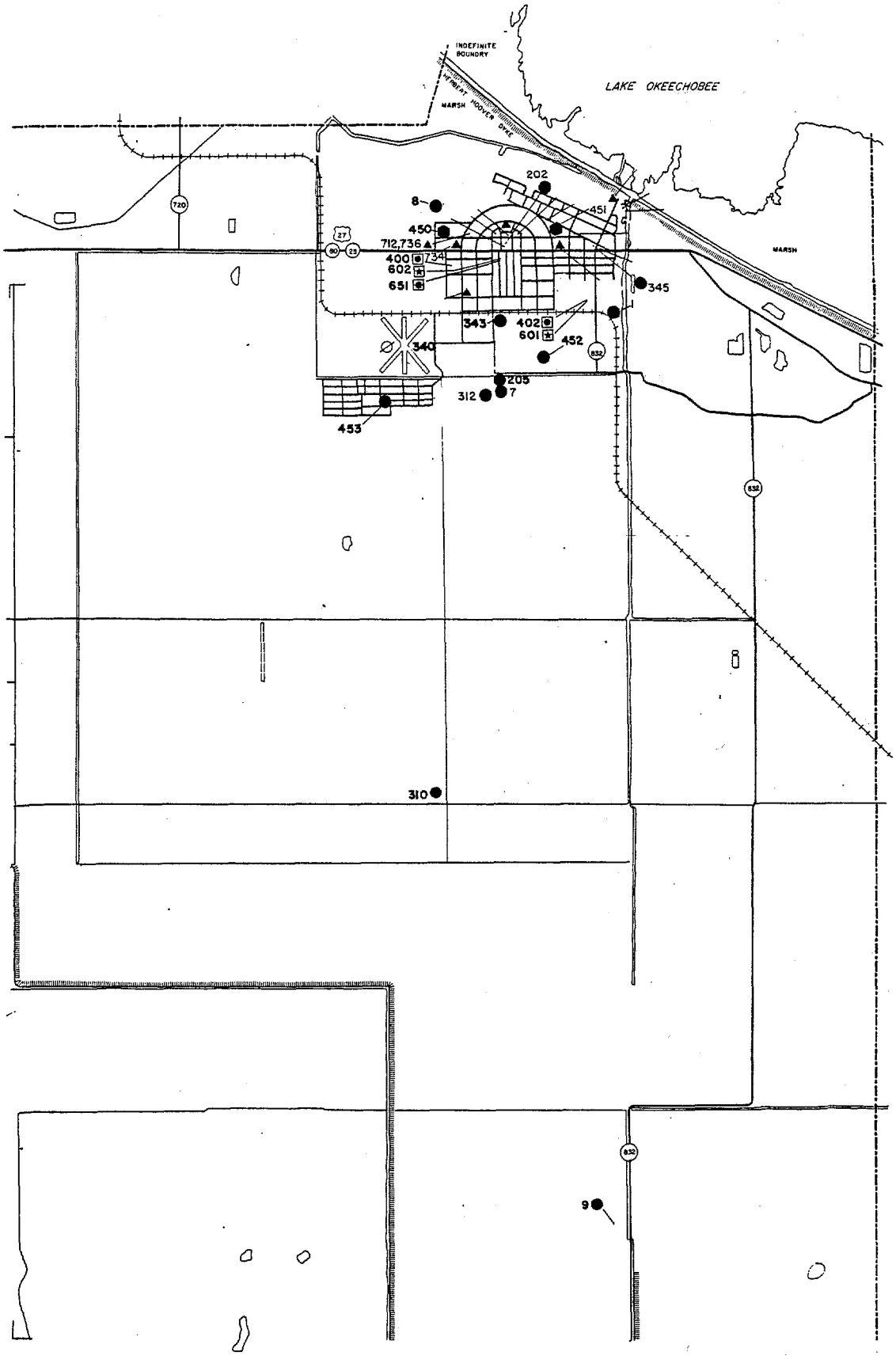


68
LA BELLE 4 N.E.

0 1 2 Miles
Approx. Scale RNC

SWFRPC

HENDRY COUNTY



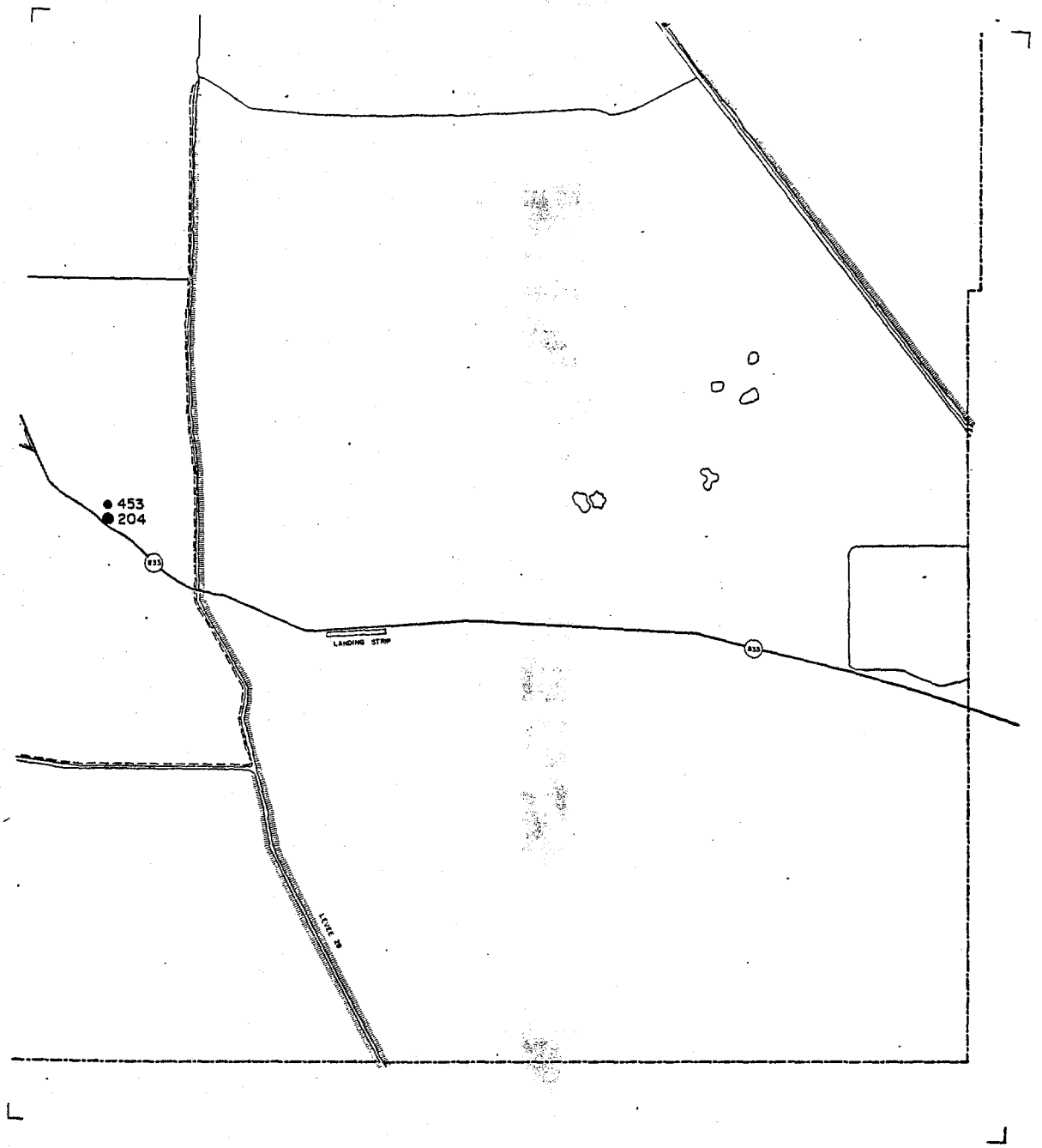
69
CLEWISTON S.

1 2 Miles
Approx. Scale

RNC

SWFRPC

HENDRY COUNTY

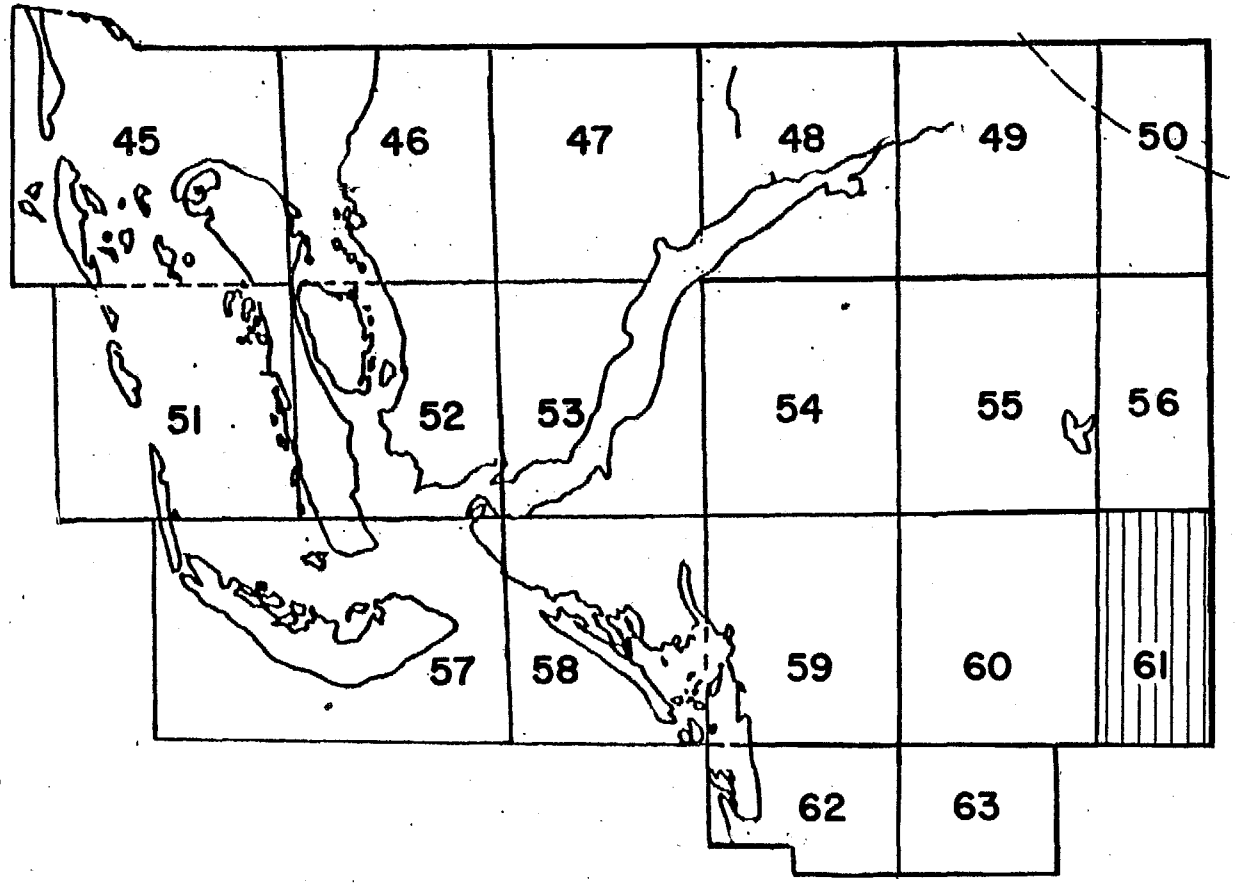


83
EVERGLADES 2 S.W.

1 2 Miles
Approx. Scale RNC

SWFRPC

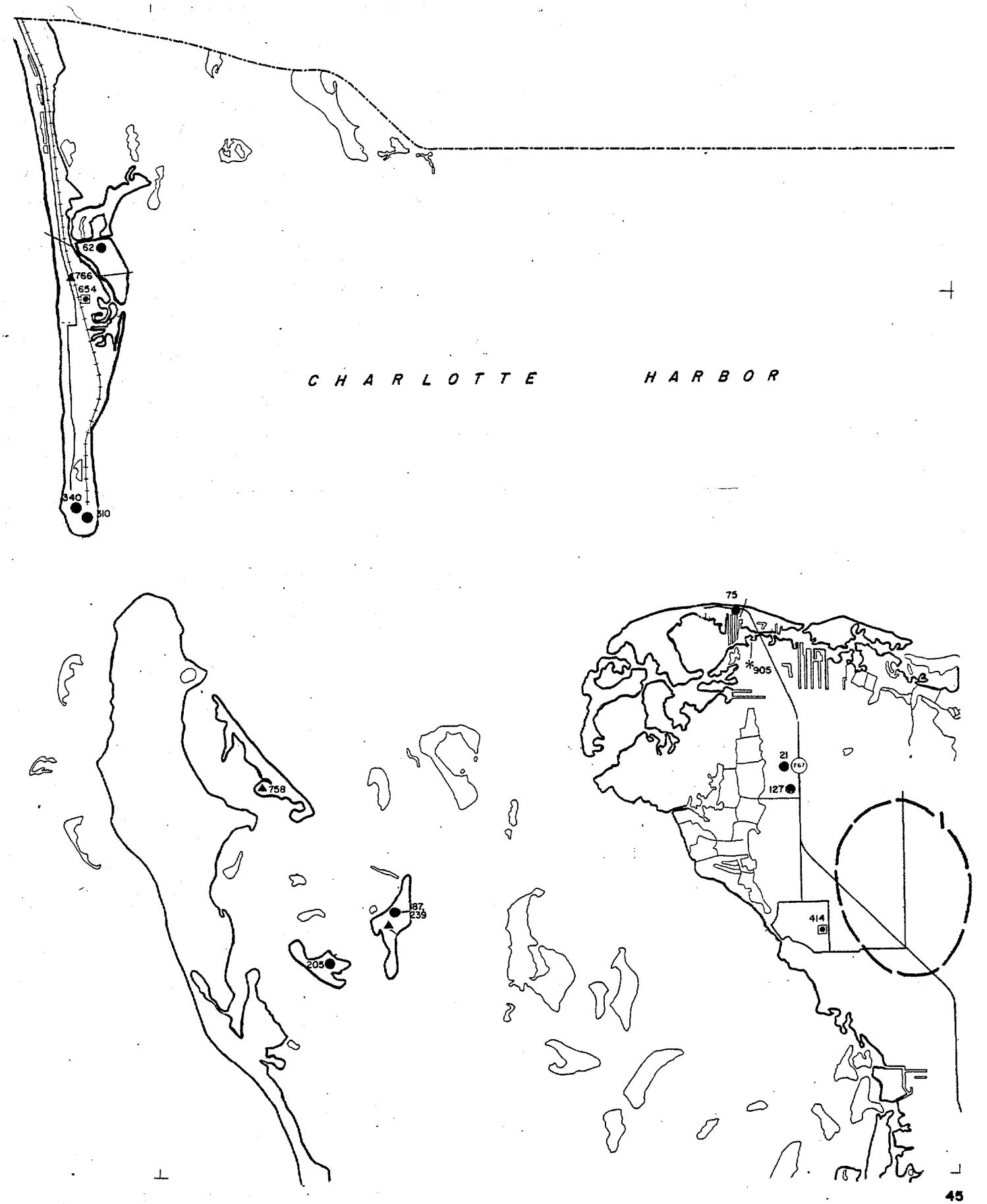
HENDRY COUNTY



45-63 SWFRPC NUMBERS DENOTING USGS QUADRANGLE 7.5 MINUTE MAPS

NO FACILITIES

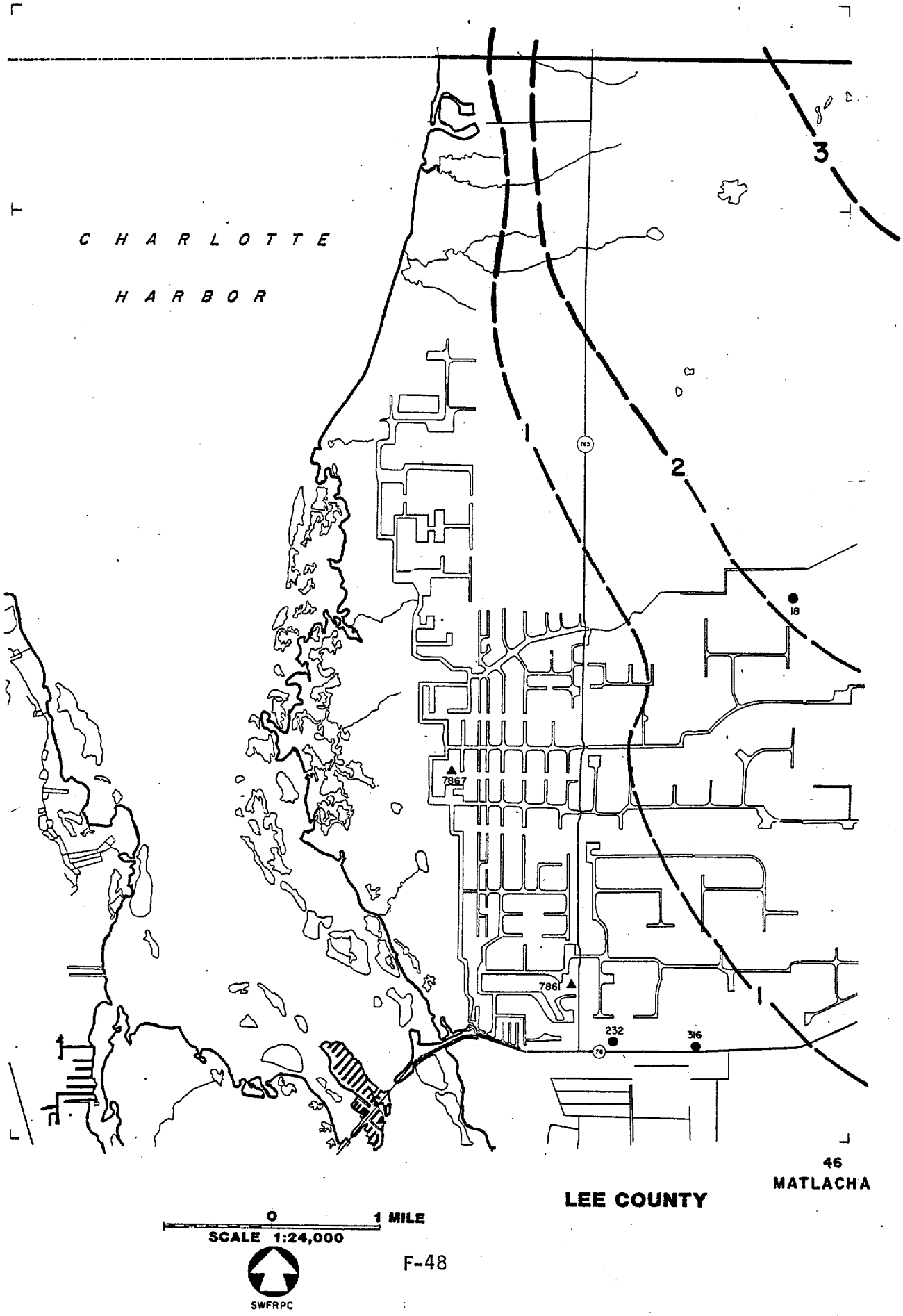
KEY SHEET
HURRICANE LOSS STUDY
LEE COUNTY

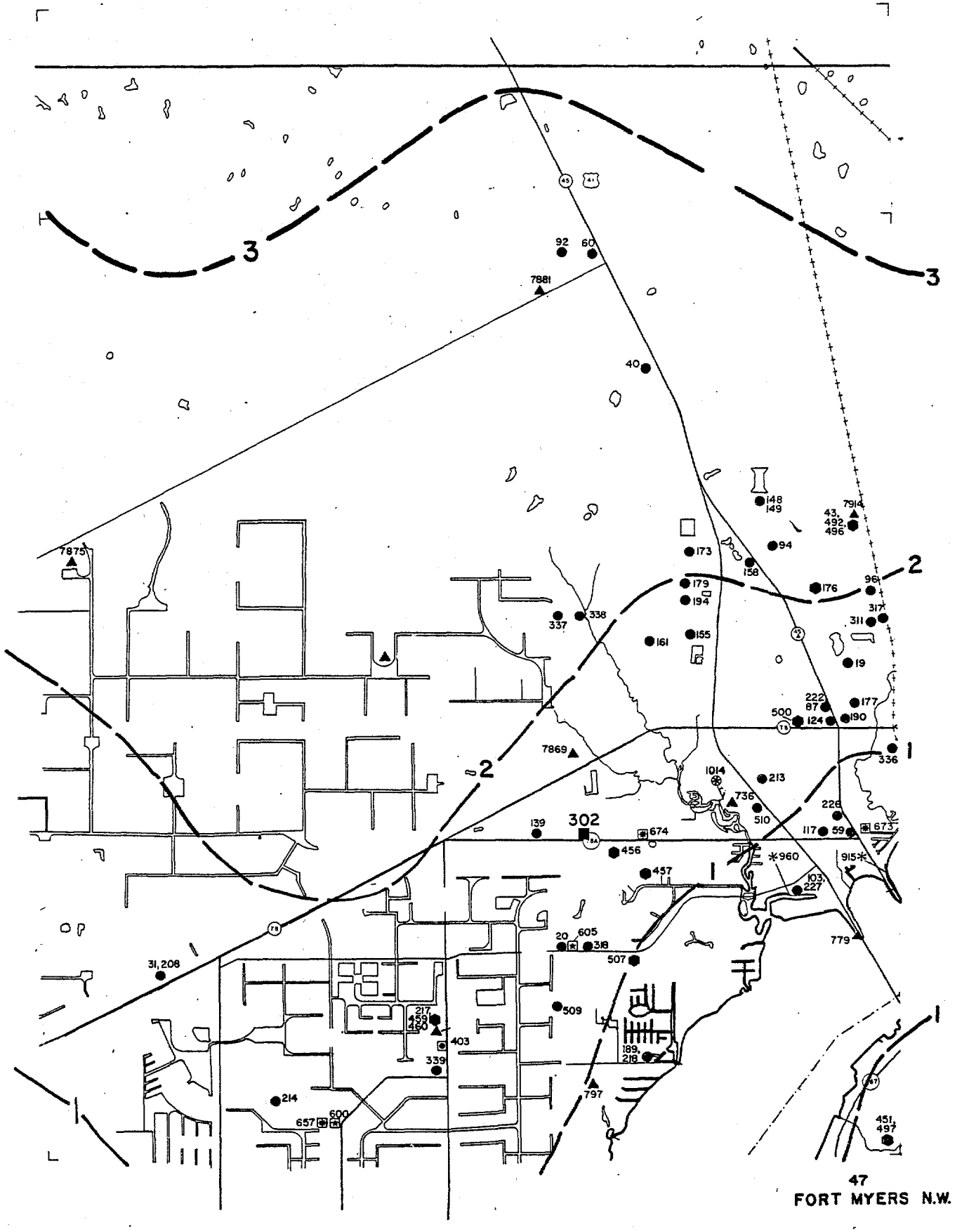


45
BOKEELIA
PORT BOCA GRANDE

LEE COUNTY

0 1 MILE
SCALE 1:24,000


CHARLOTTE
HARBOR
3
2
1
1
18
7867
7861
232
316
46
MATLACHA
LEE COUNTY
0
1 MILE
SCALE 1:24,000
SWFRPC

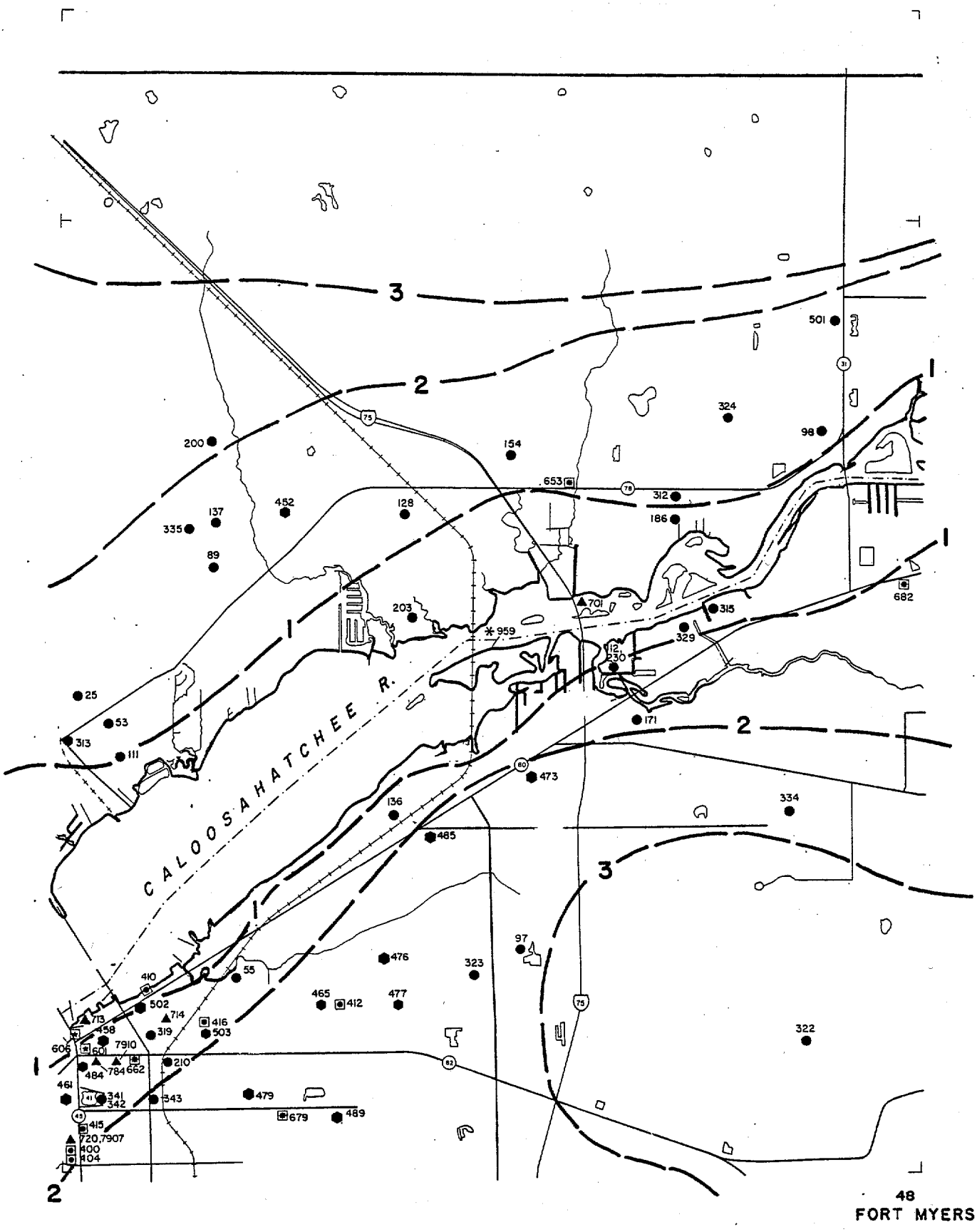


LEE COUNTY

0 1 MILE

SCALE 1:24,000

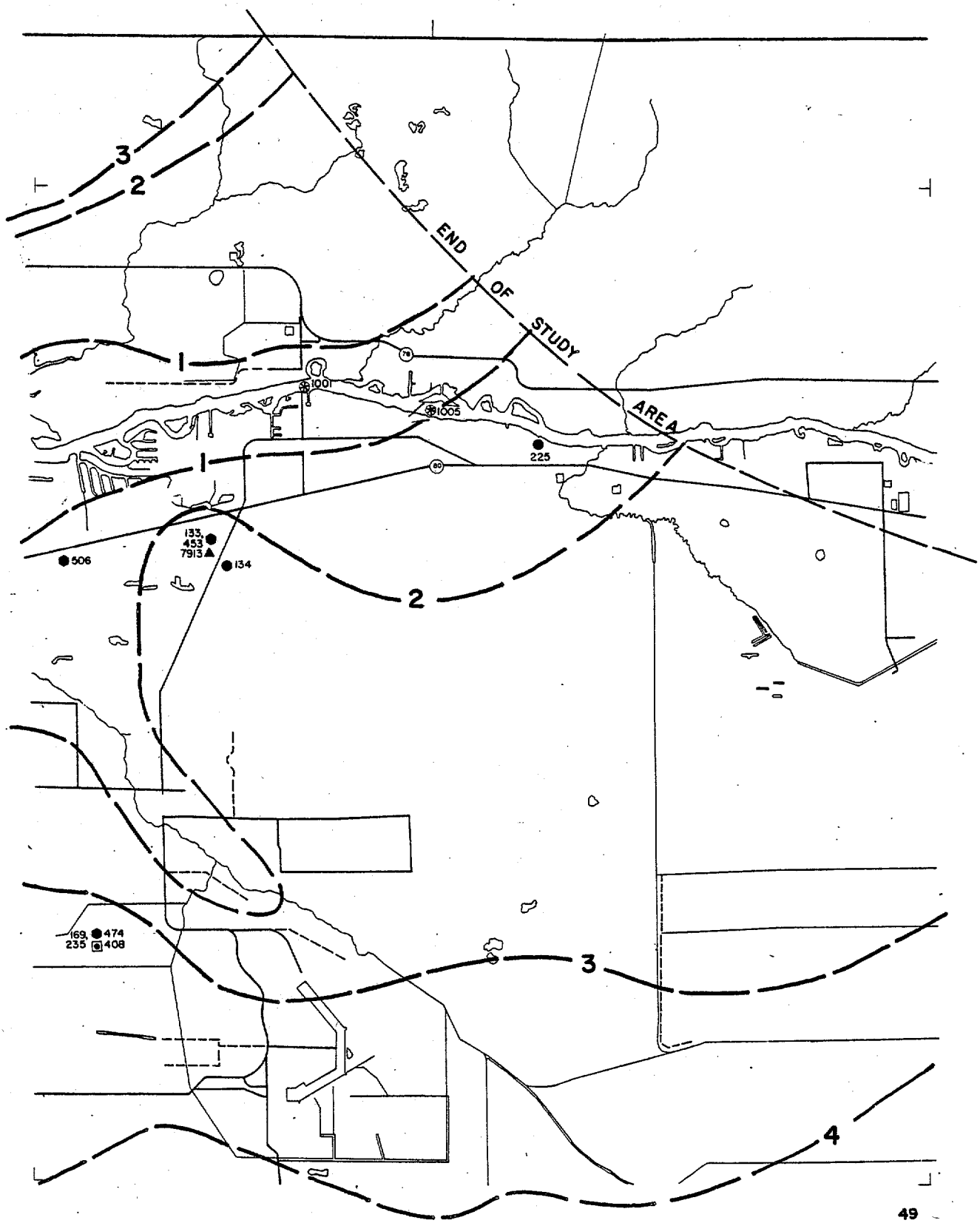
SWFRPC



LEE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

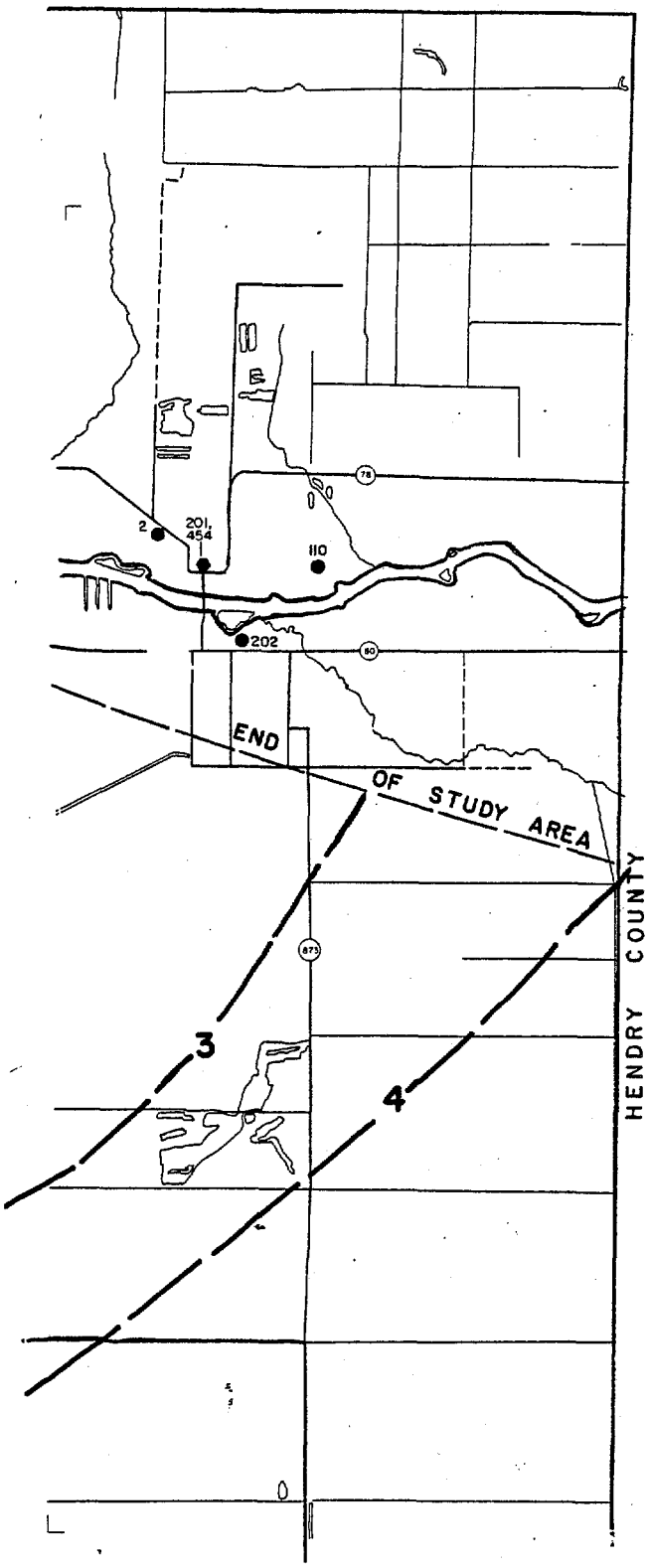


49
OLGA

LEE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

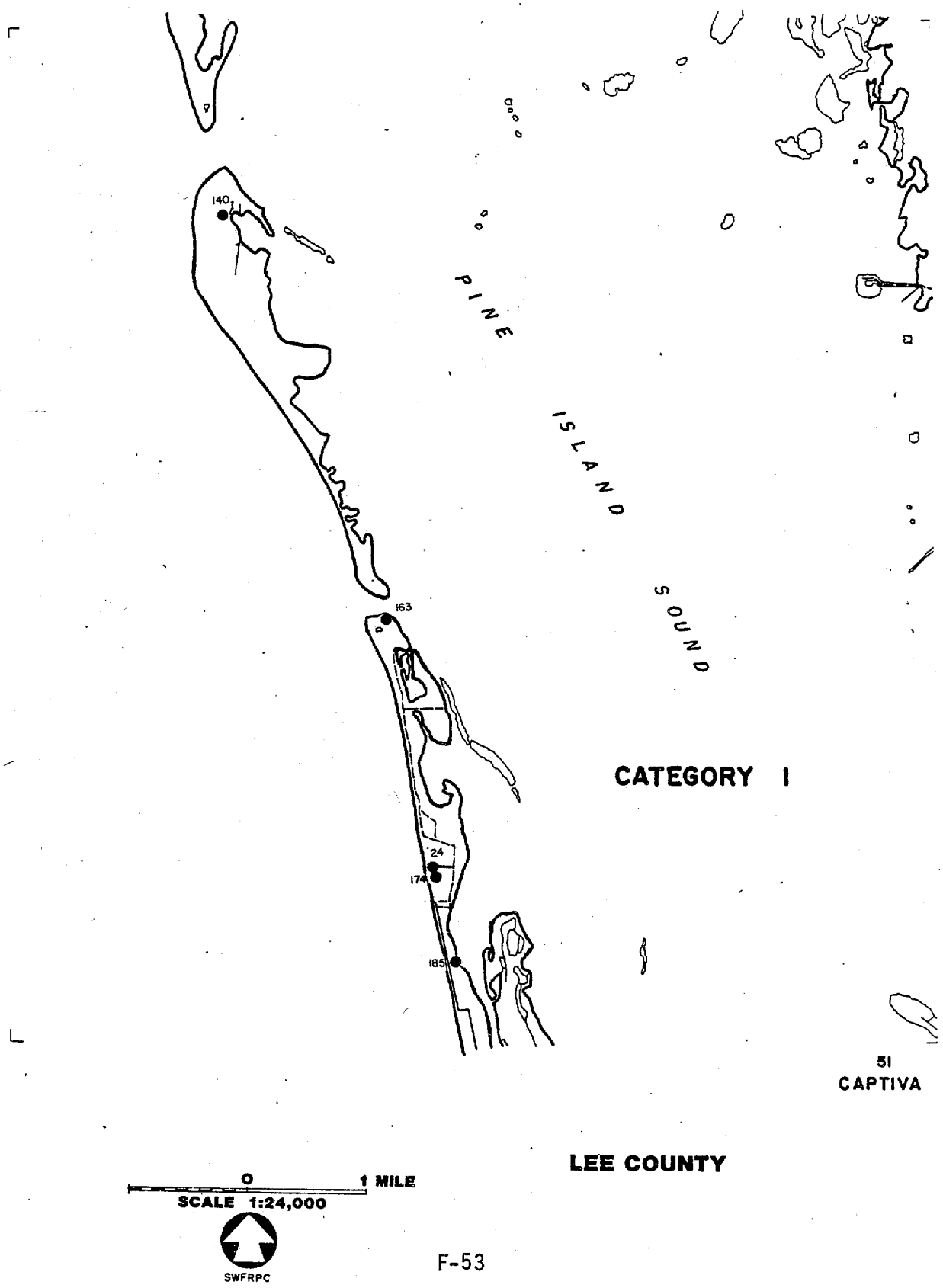


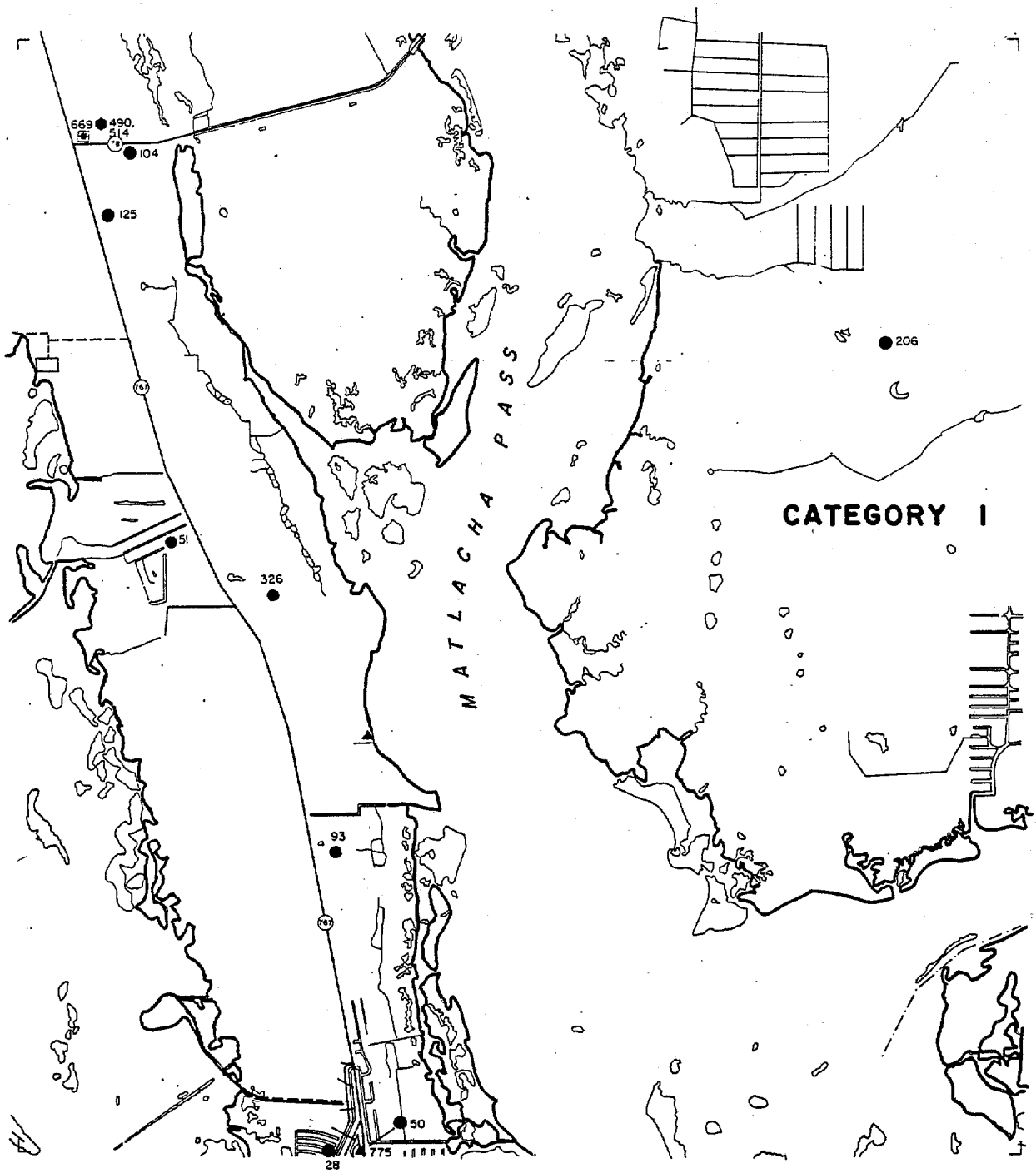
50
ALVA S.W.

LEE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

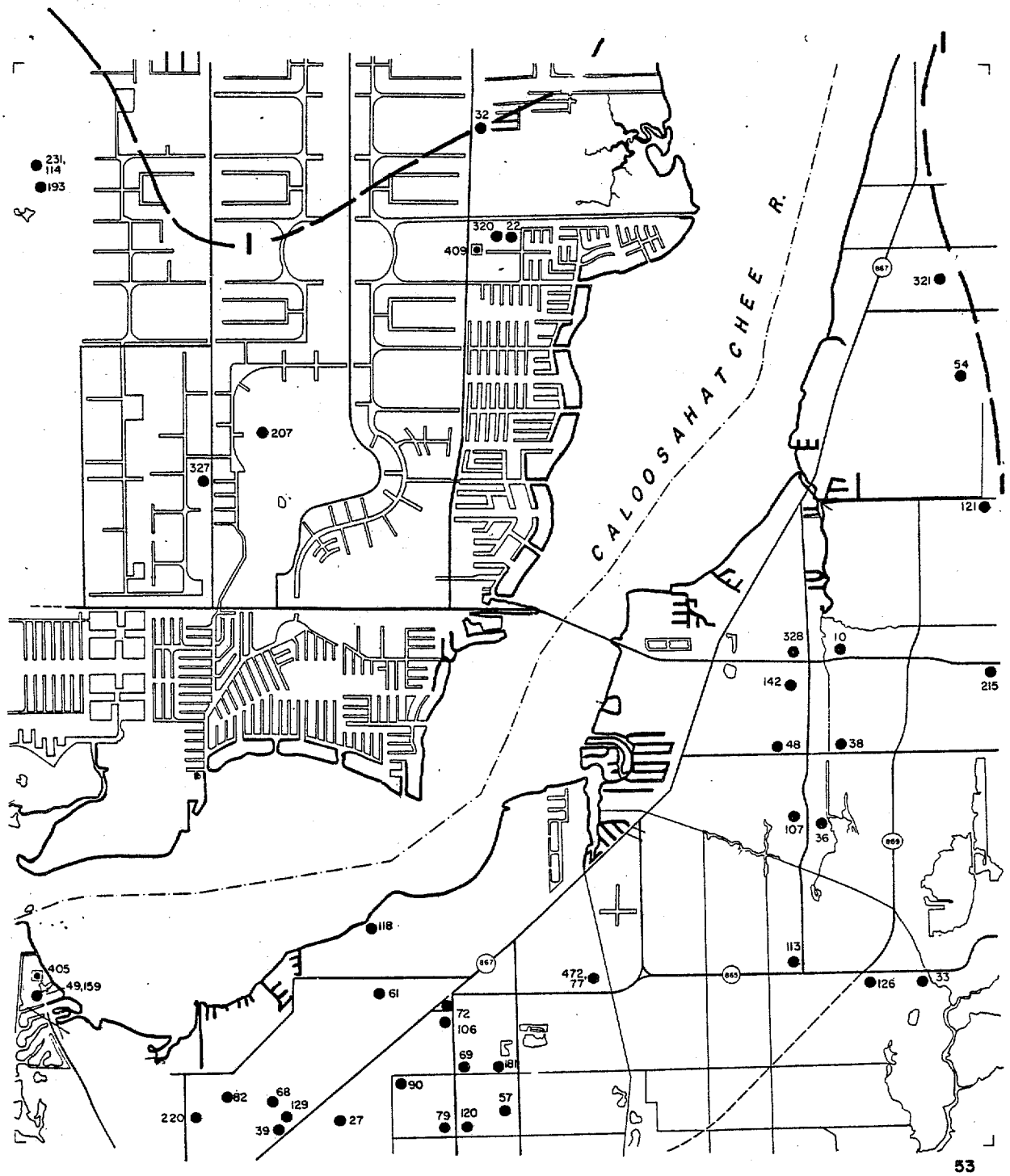

140
163
174
185
PINE
ISLAND
SOUND
CATEGORY I
51
CAPTIVA
LEE COUNTY
0
1 MILE
SCALE 1:24,000
SWFRPC



LEE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC



LEE COUNTY

0 1 MILE

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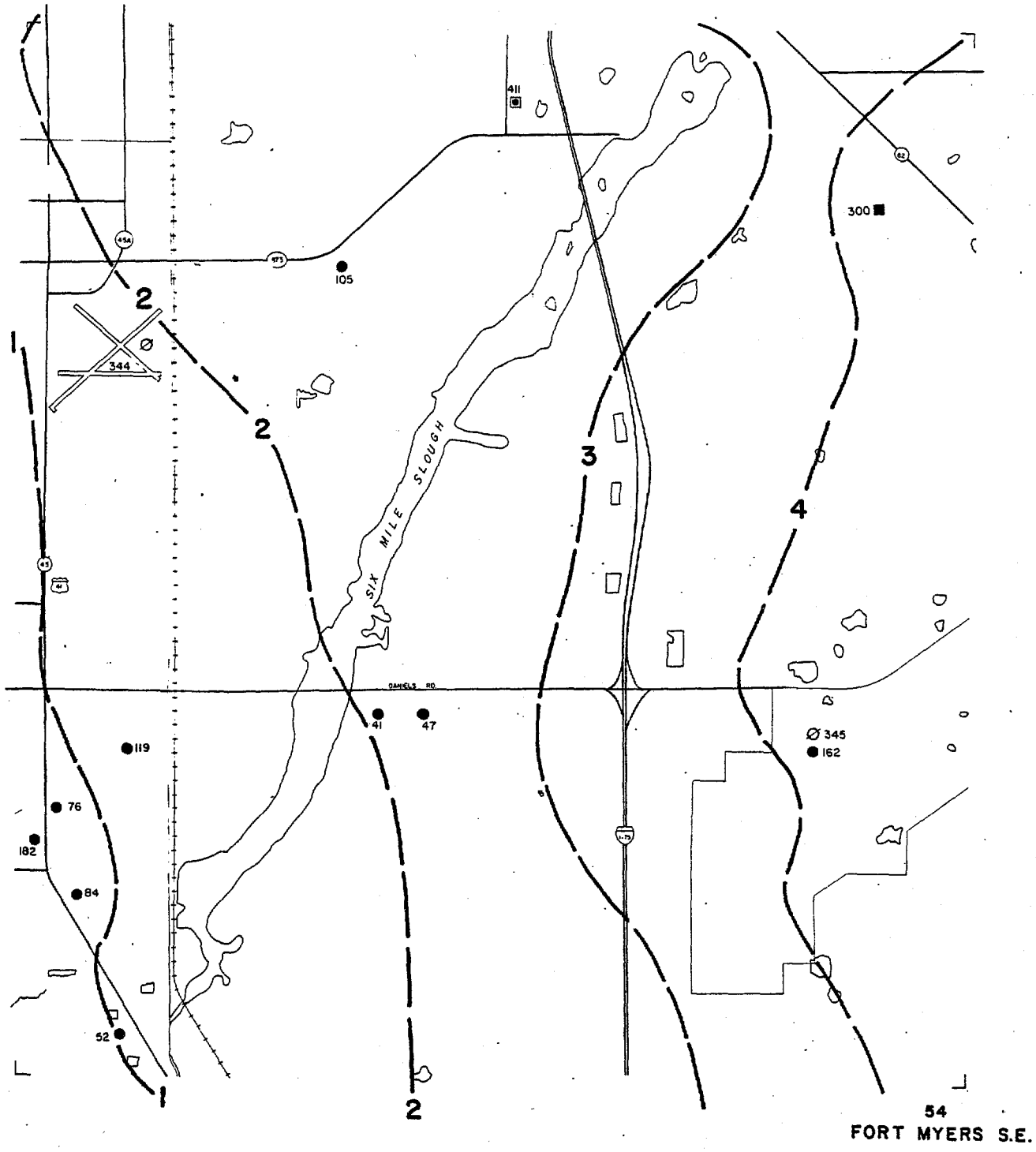
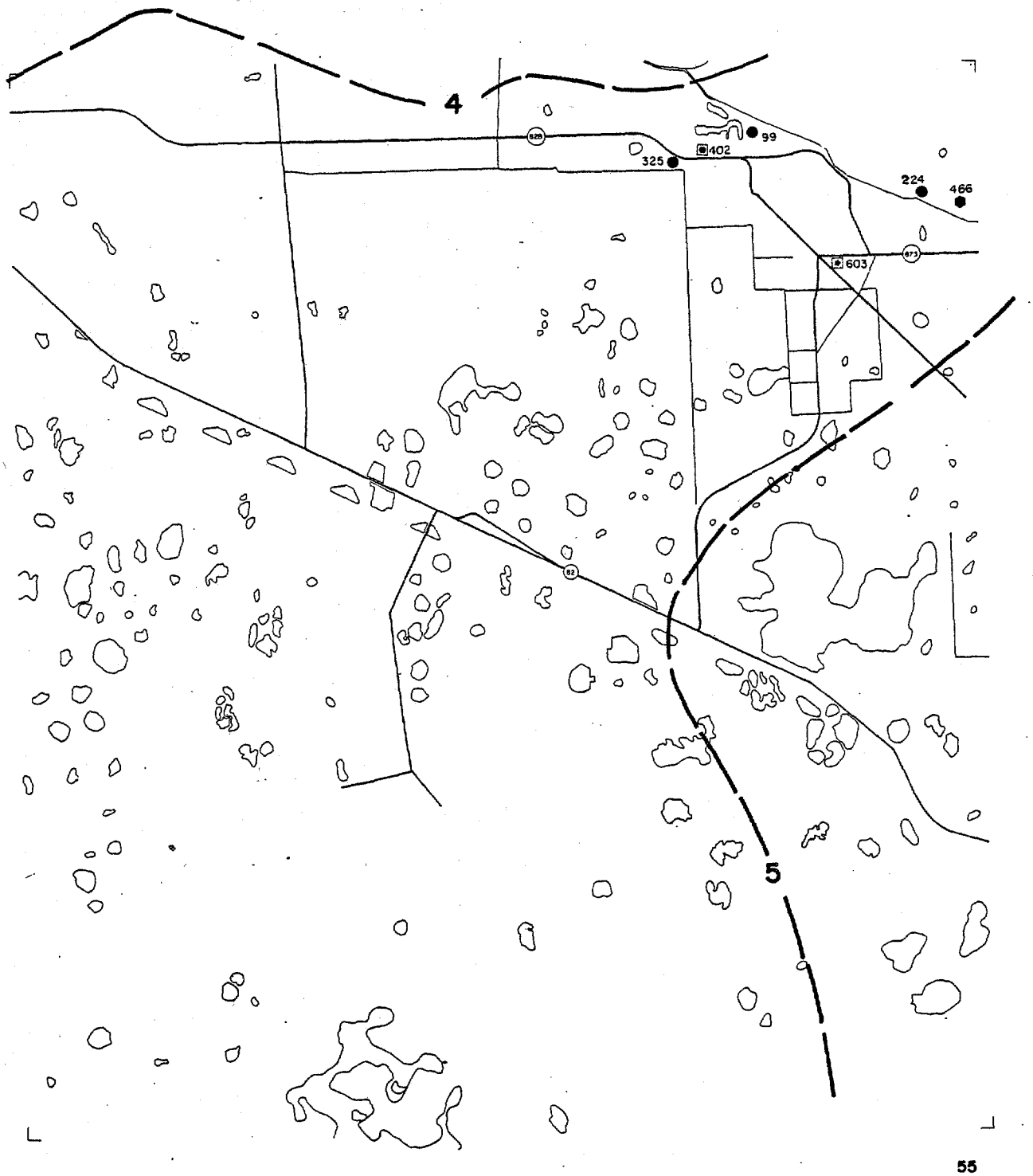
SWFRPC



LEE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

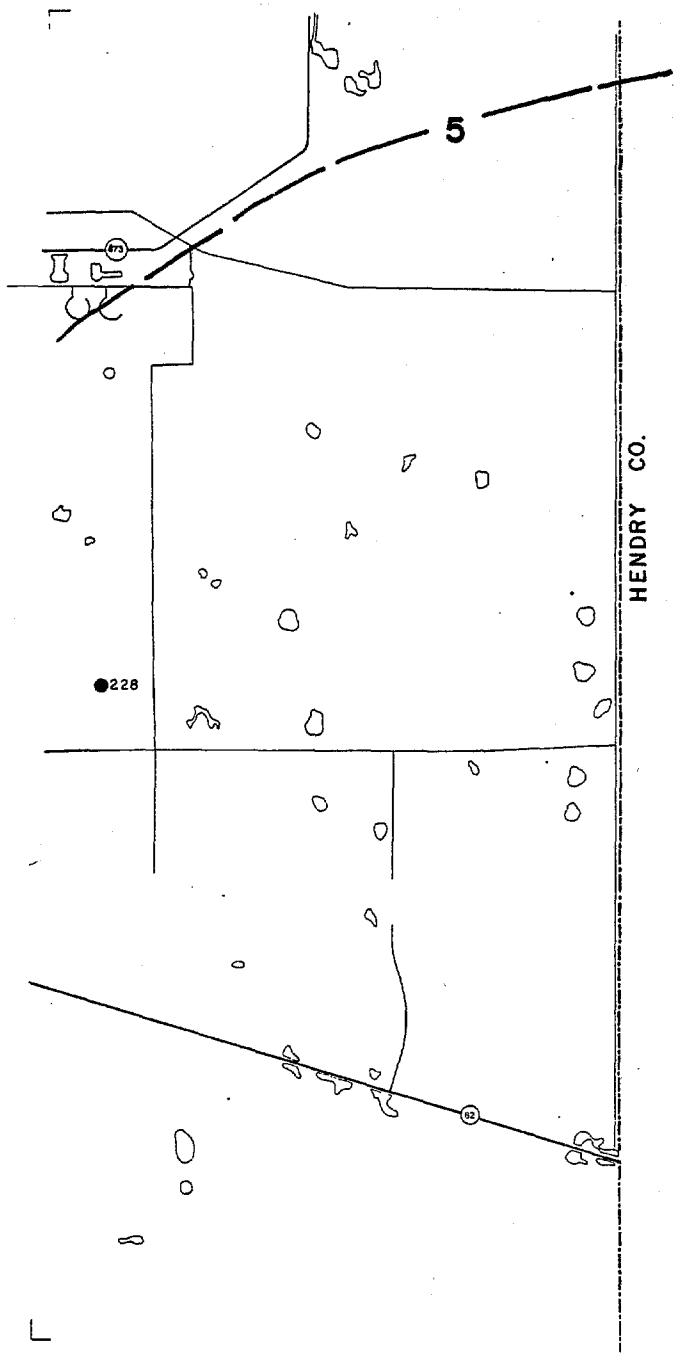


55
ALVA S.W.

LEE COUNTY

0 1 MILE
SCALE 1:24,000

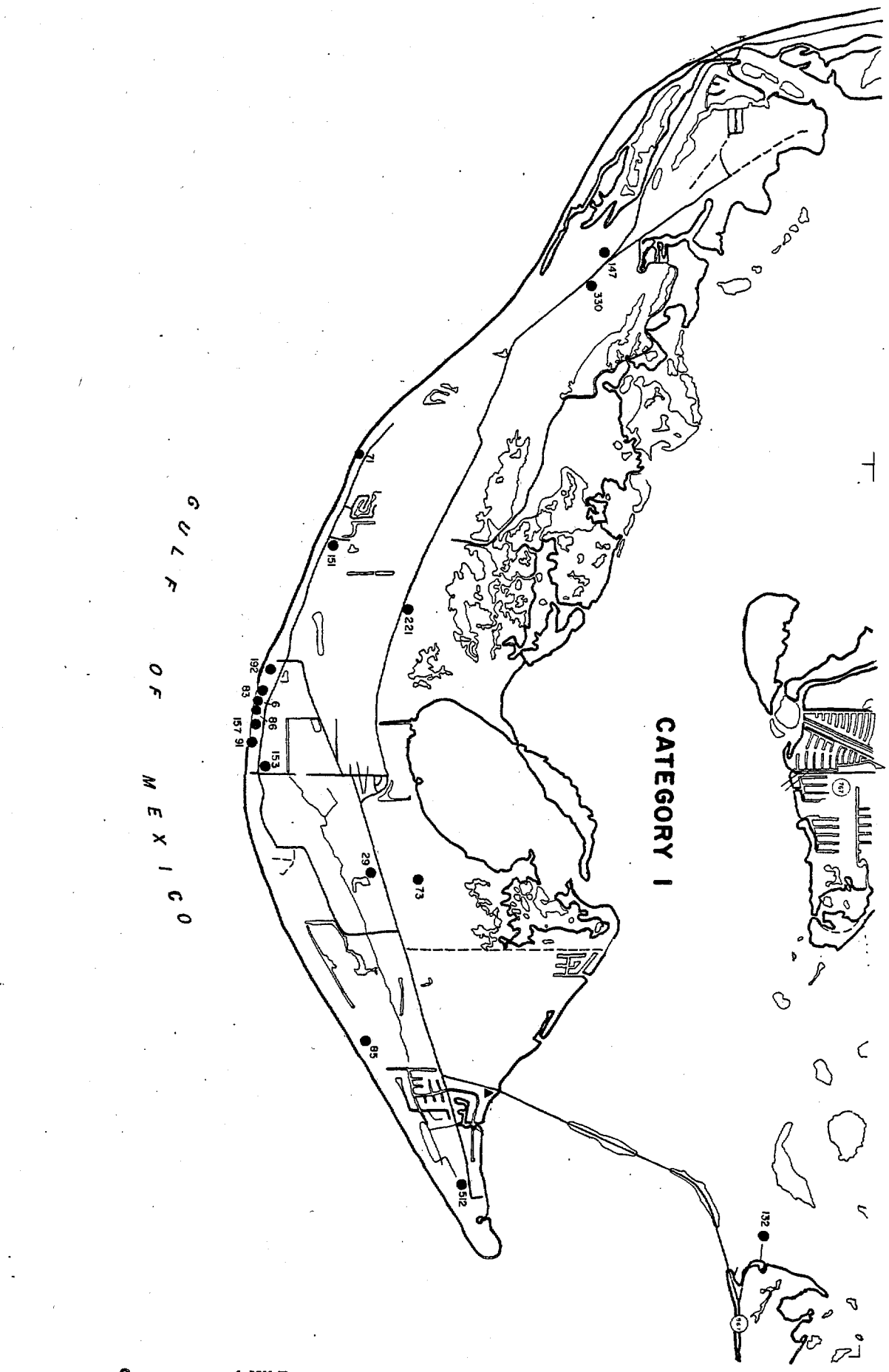
SWFRPC



56
ALVA S.E.

LEE COUNTY

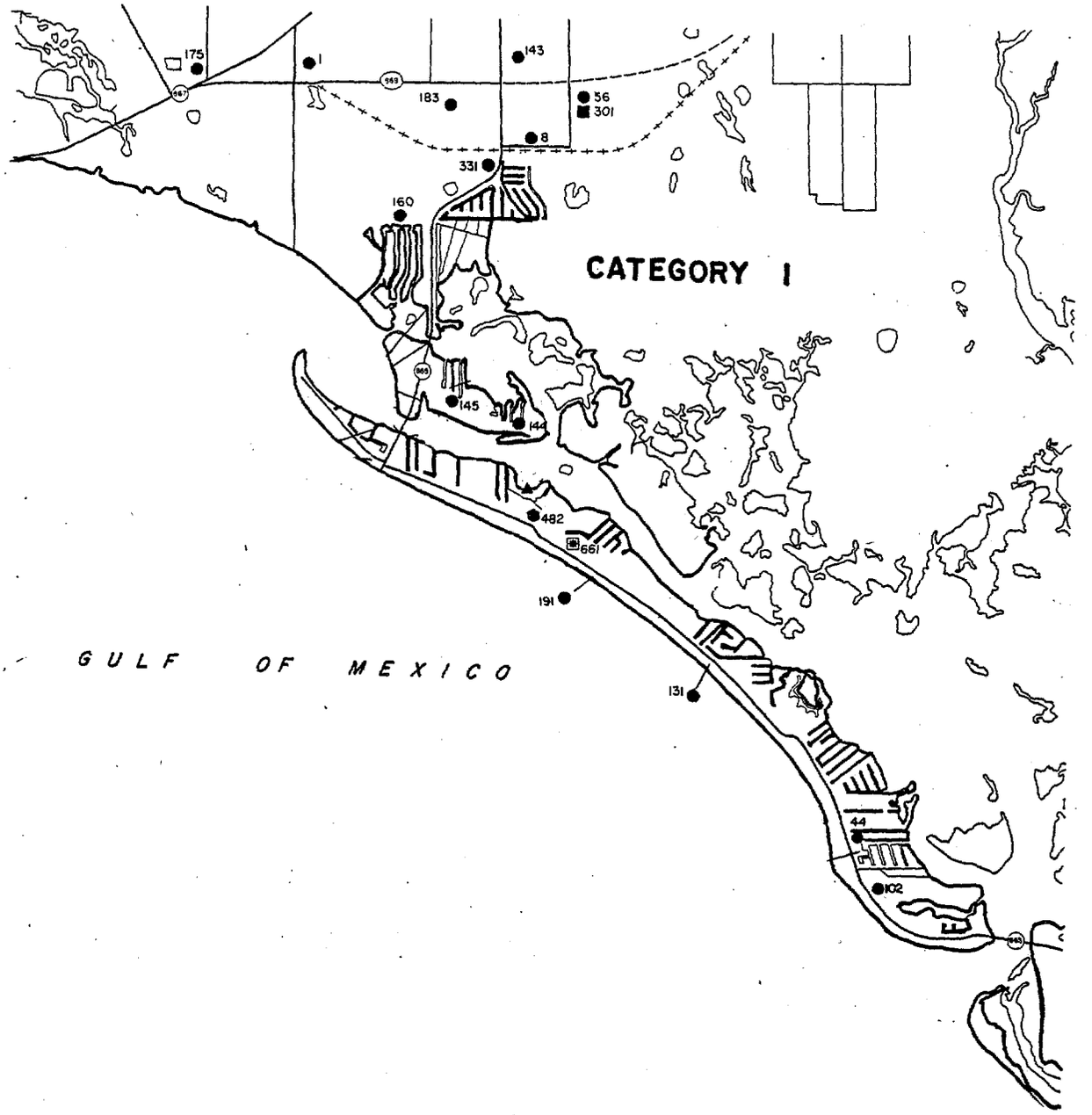
0 1 MILE
SCALE 1:24,000



0 1 MILE
SCALE 1:24,000
SWFRPC

57
SANIBEL-
WULFERT

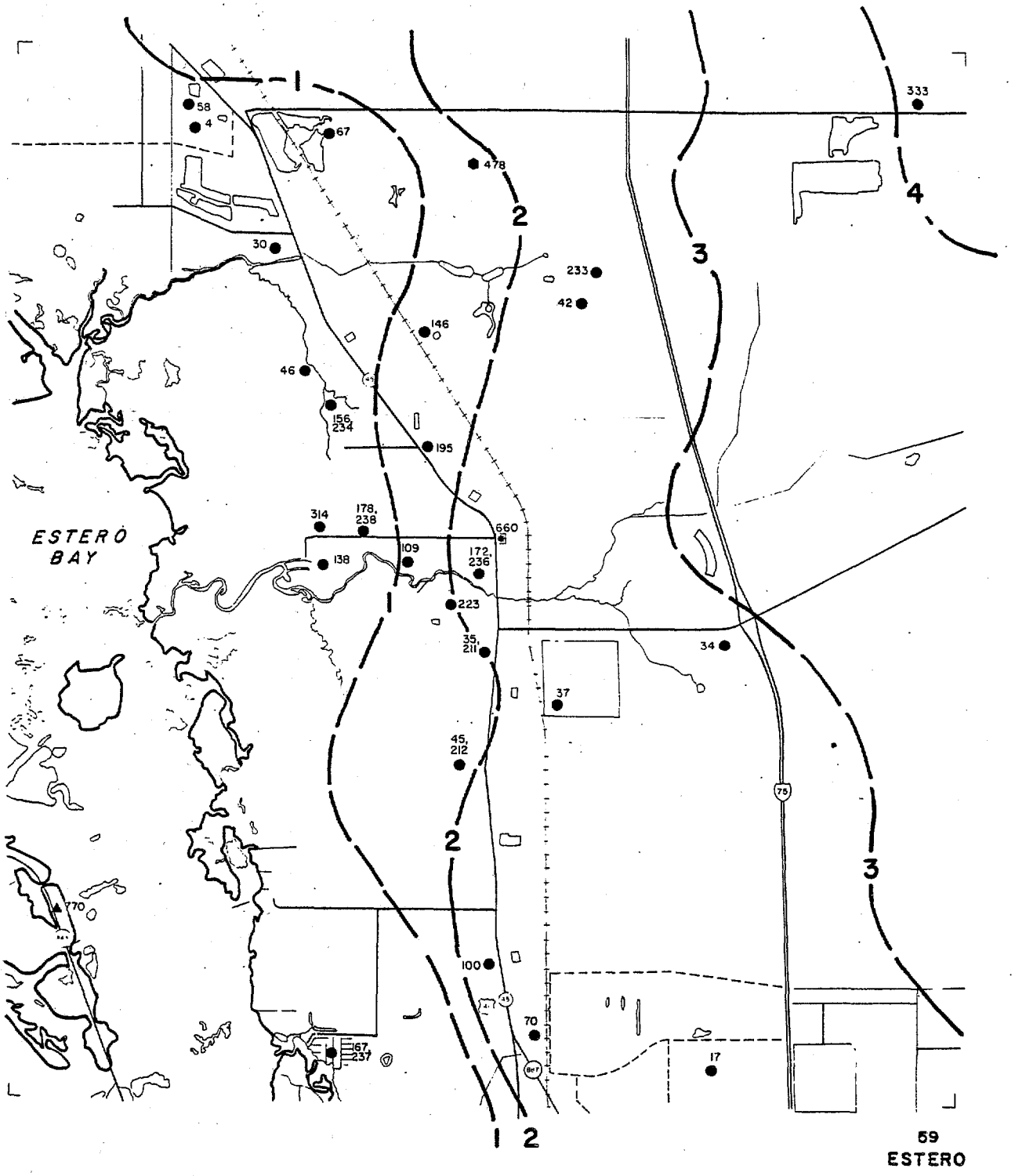
LEE COUNTY



LEE COUNTY

0 1 MILE
SCALE 1:24,000

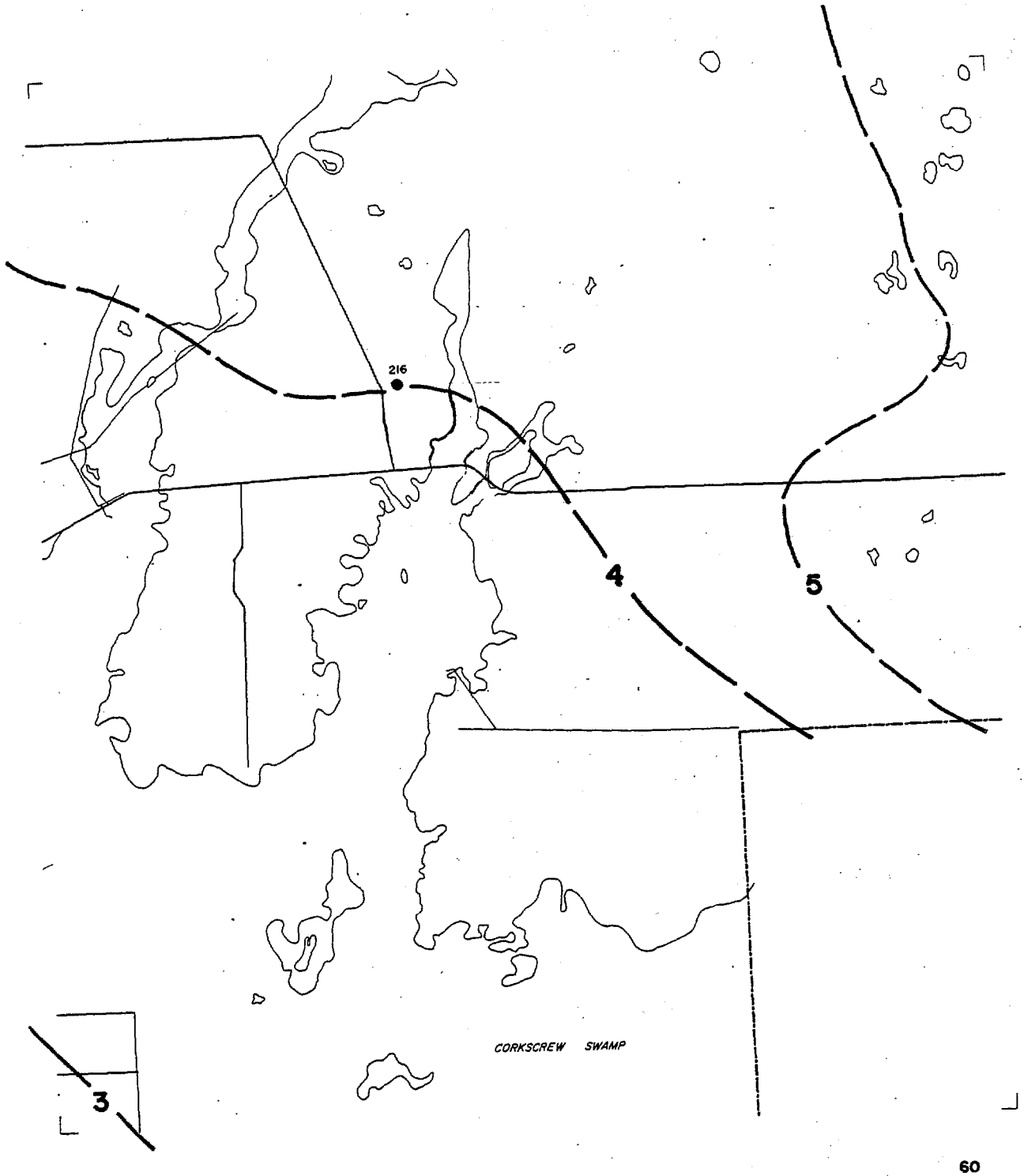
SWFRPC



LEE COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

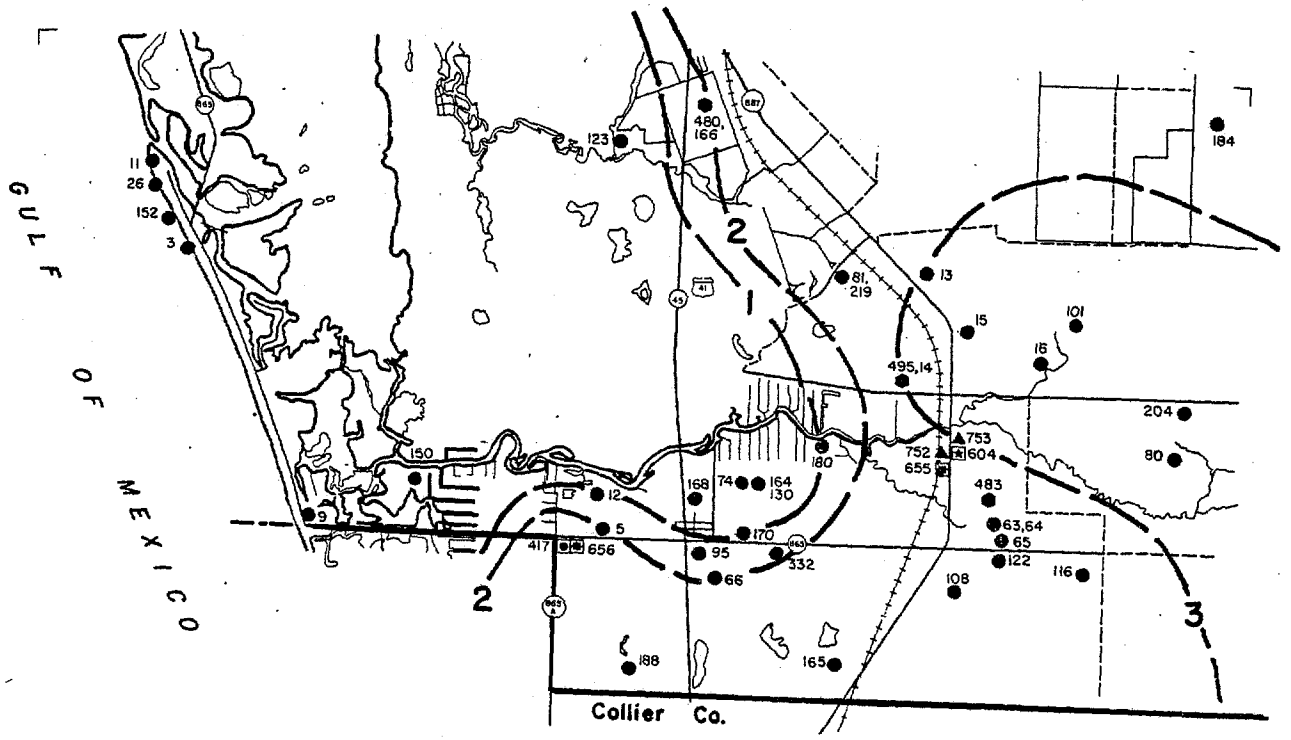


60
CORKSCREW N.W.

LEE COUNTY

0 1 MILE
SCALE 1:24,000

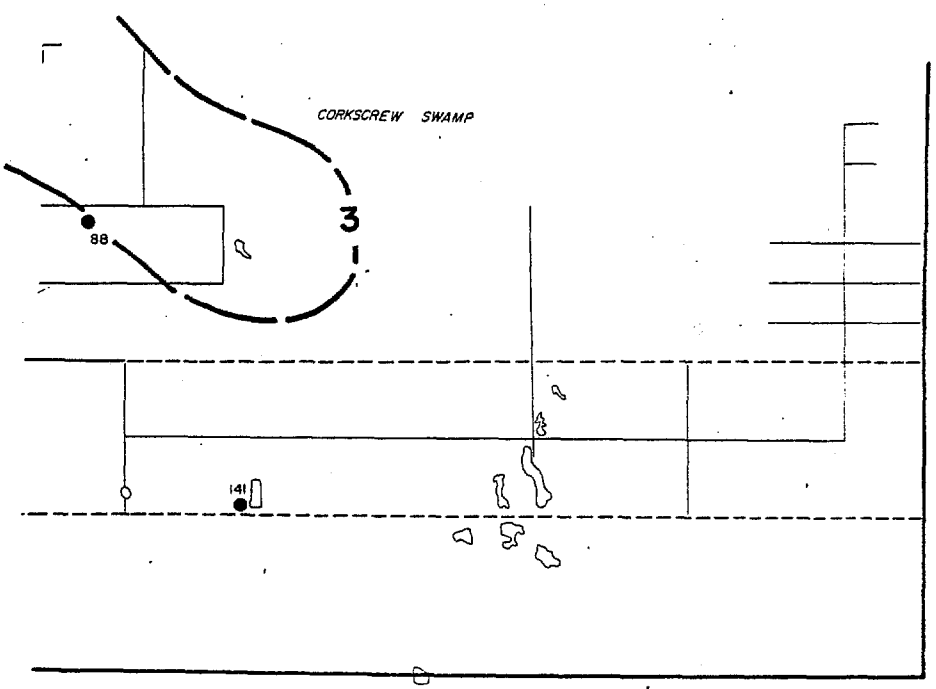
SWFRPC



62
BONITA SPRINGS

LEE COUNTY

0 1 MILE
SCALE 1:24,000

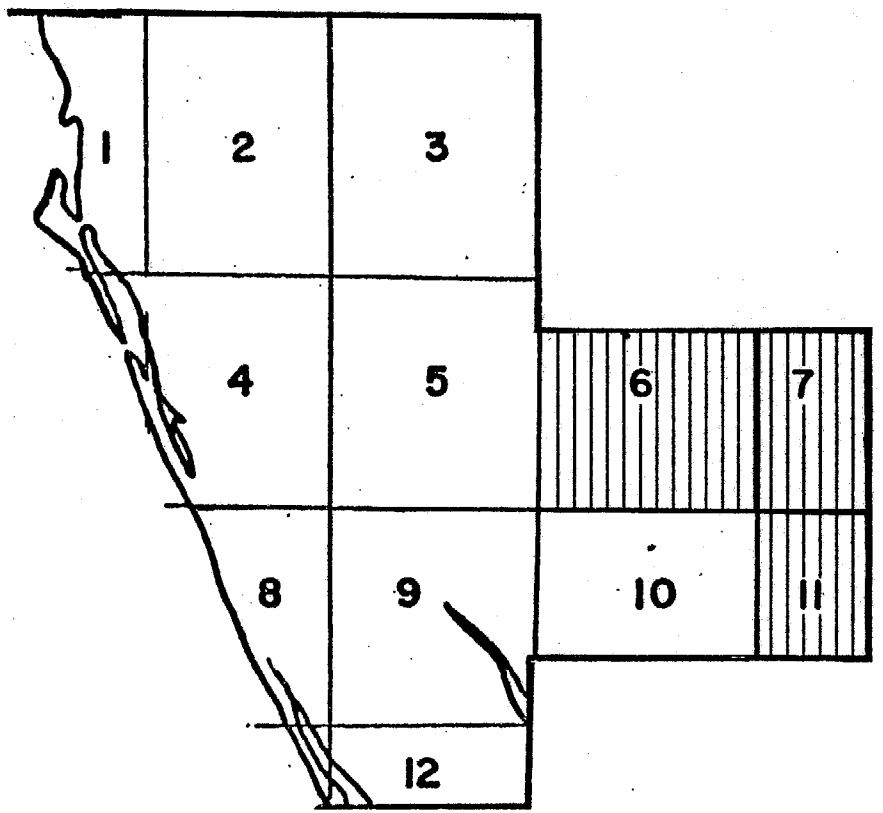


63
CORKSCREW S.W.

LEE COUNTY

0 1 MILE
SCALE 1:24,000

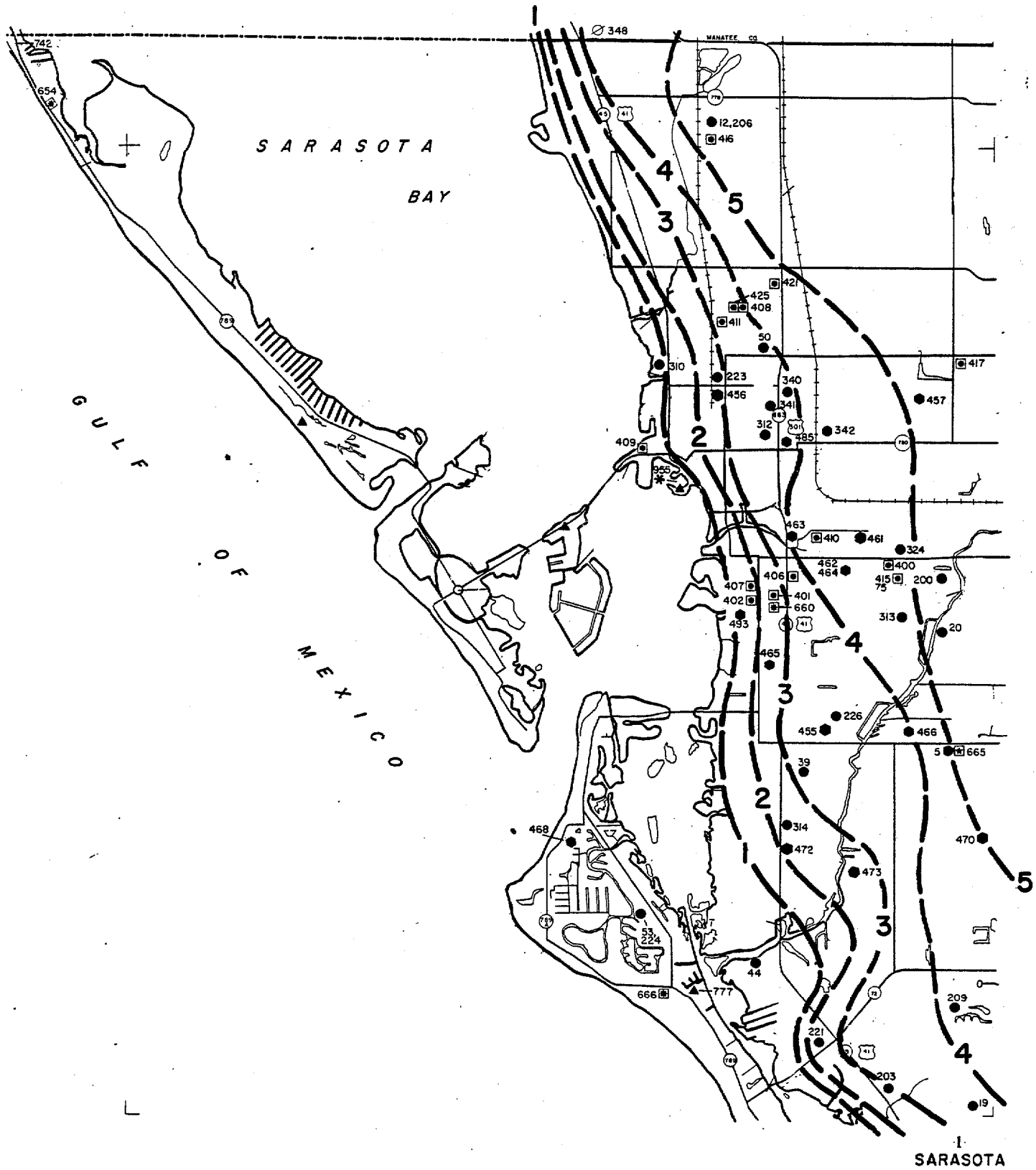
SWFRPC



1-12 SWFRPC NUMBERS DENOTING USGS QUAD-RANGLE 7.5 MINUTE MAPS

NO FACILITIES

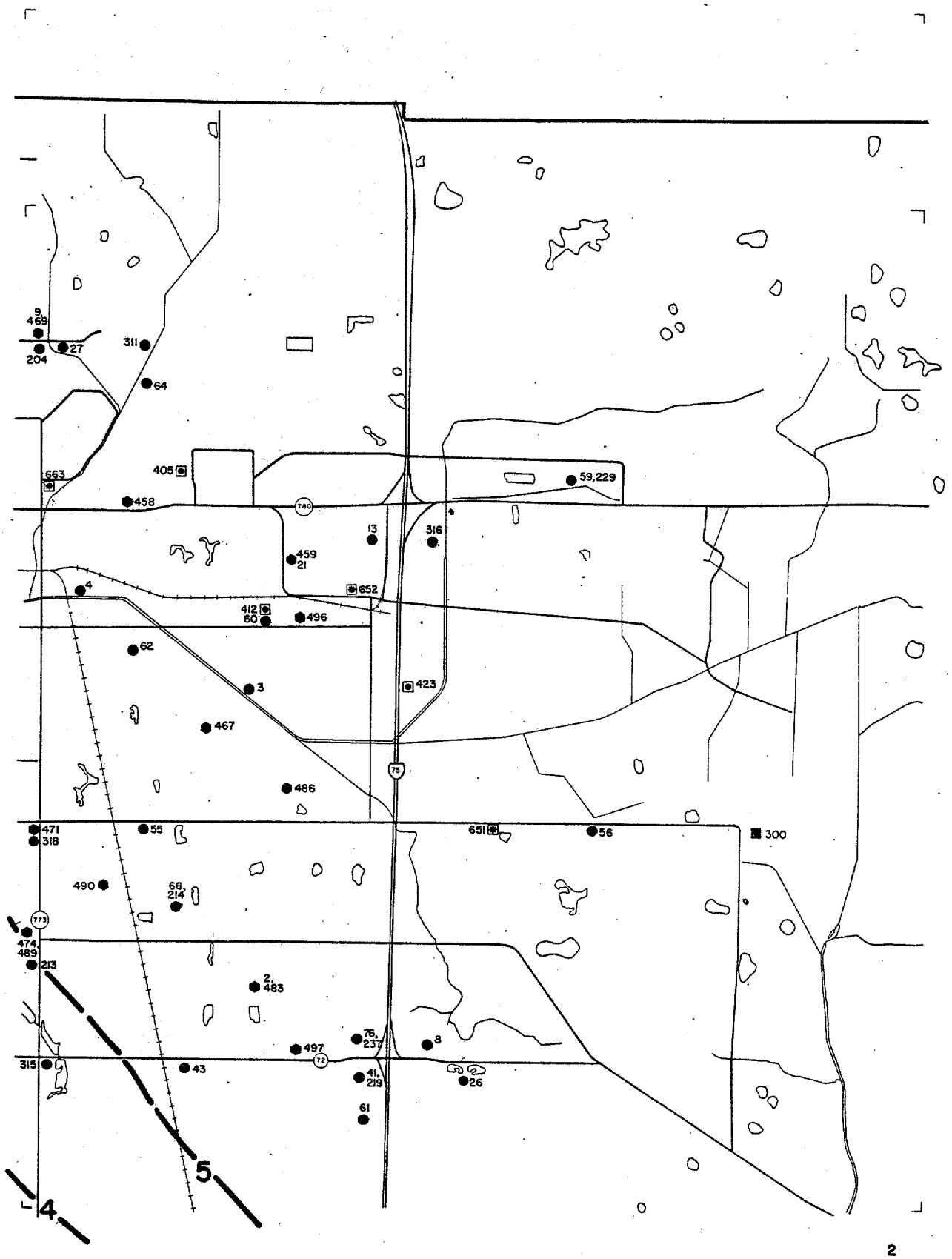
KEY SHEET
HURRICANE LOSS STUDY
SARASOTA COUNTY



SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

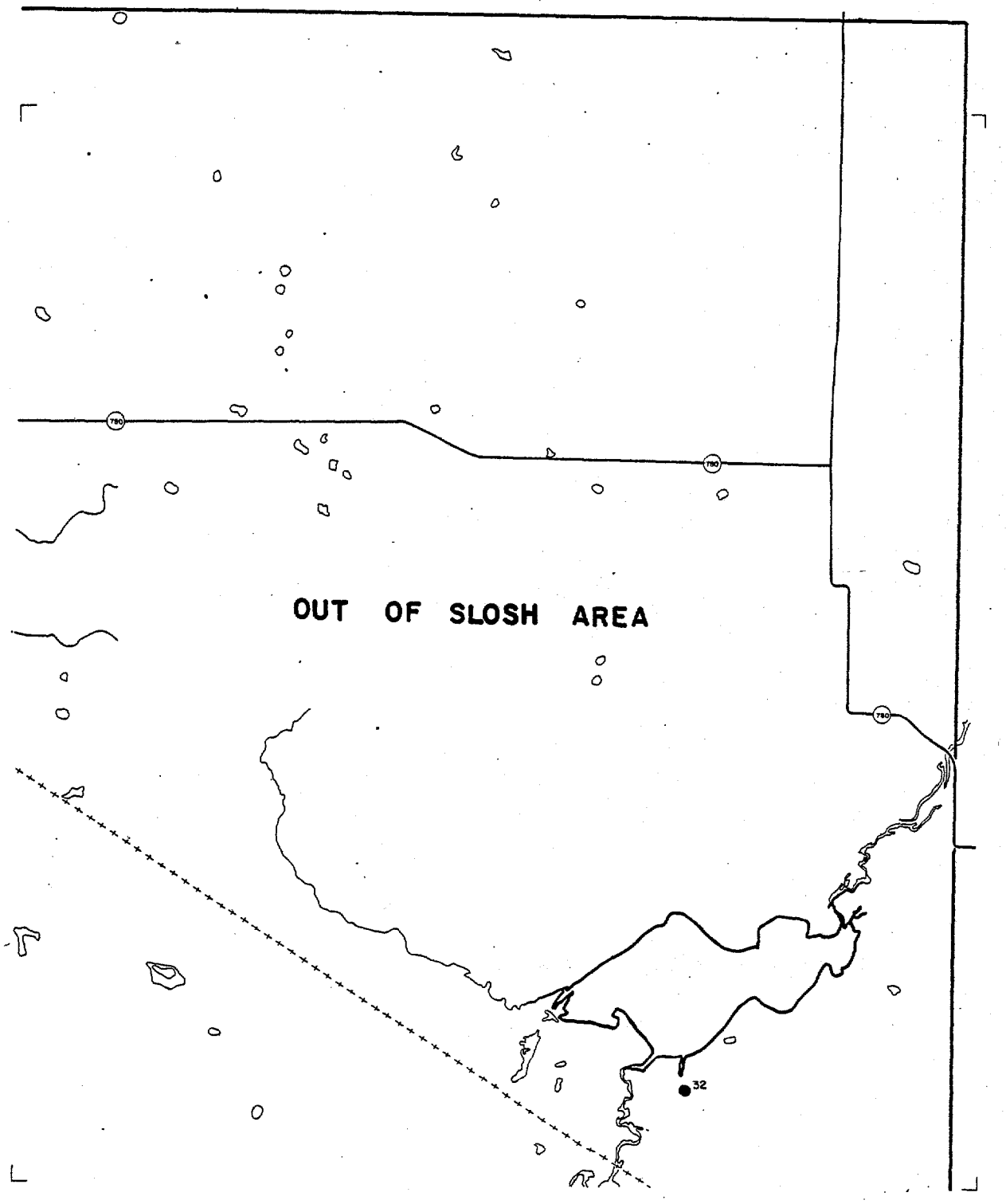
SWFRPC



SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

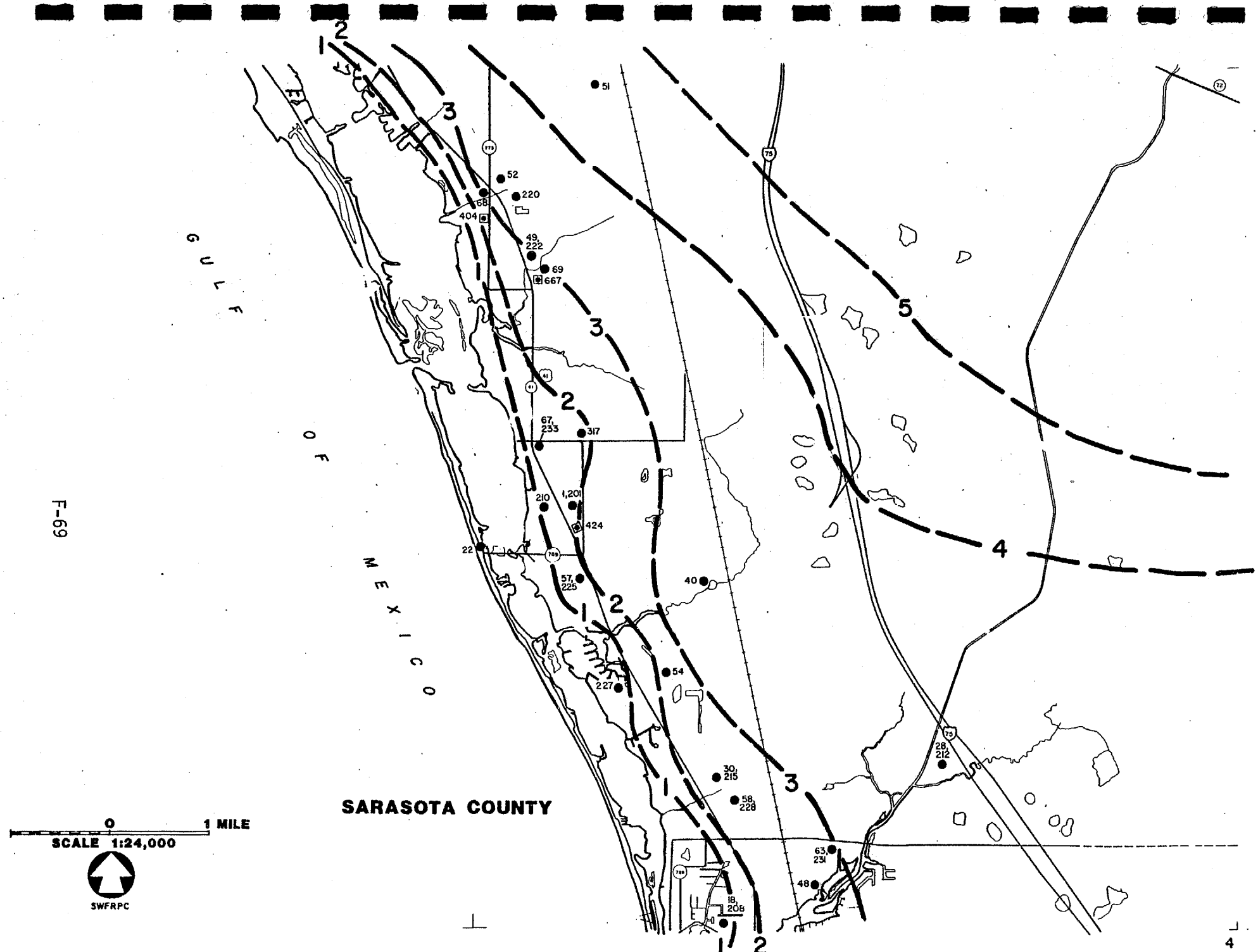


3
OLD MYAKKA

SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC


GULF OF MEXICO
SARASOTA COUNTY
SCALE 1:24,000
0
1 MILE
SWFRPC
4
BIRD KEYS - LAUREL
1
2
3
4
5
51
52
220
68
404
49, 222
69
667
67, 233
317
210
1,201
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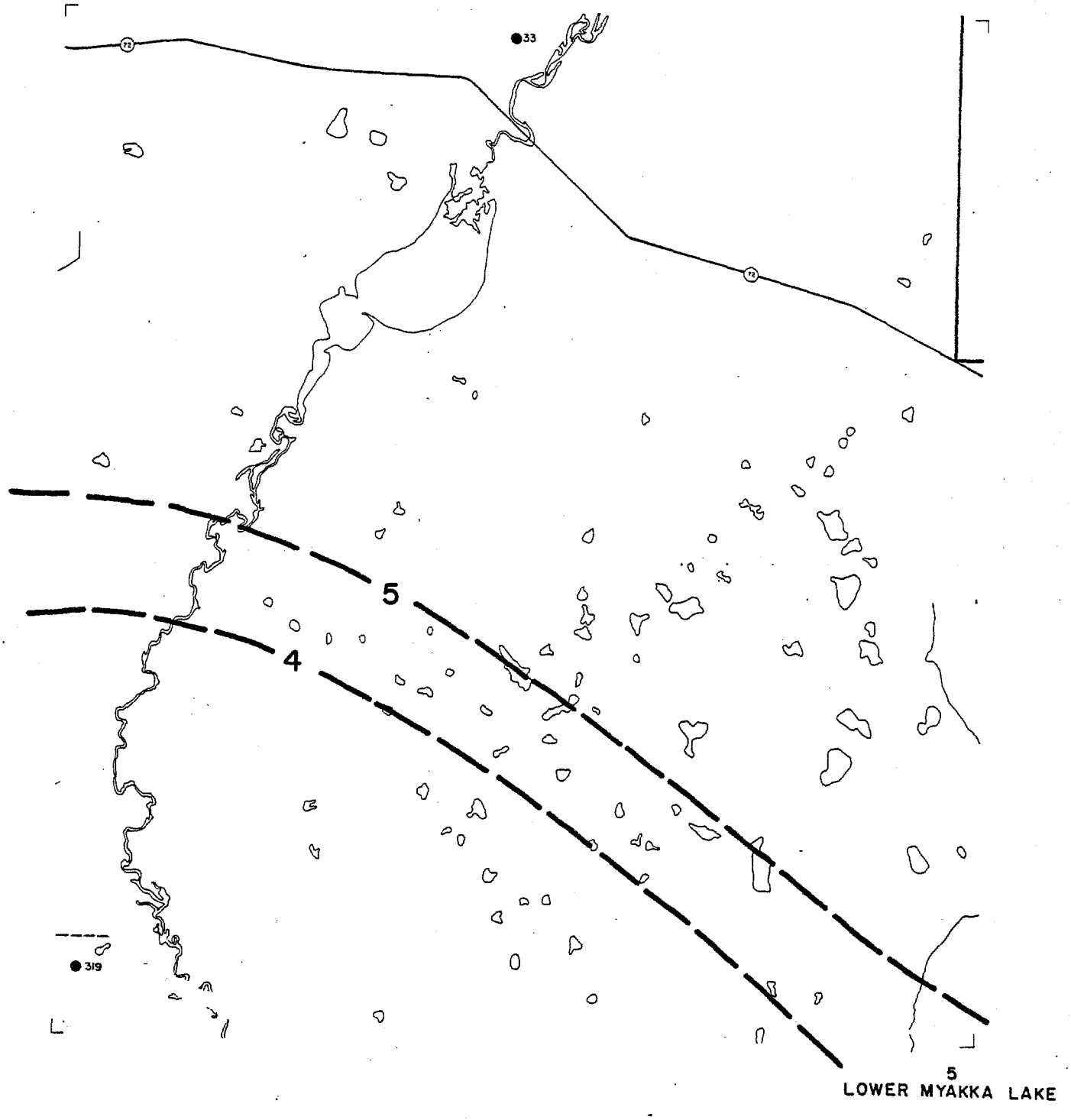
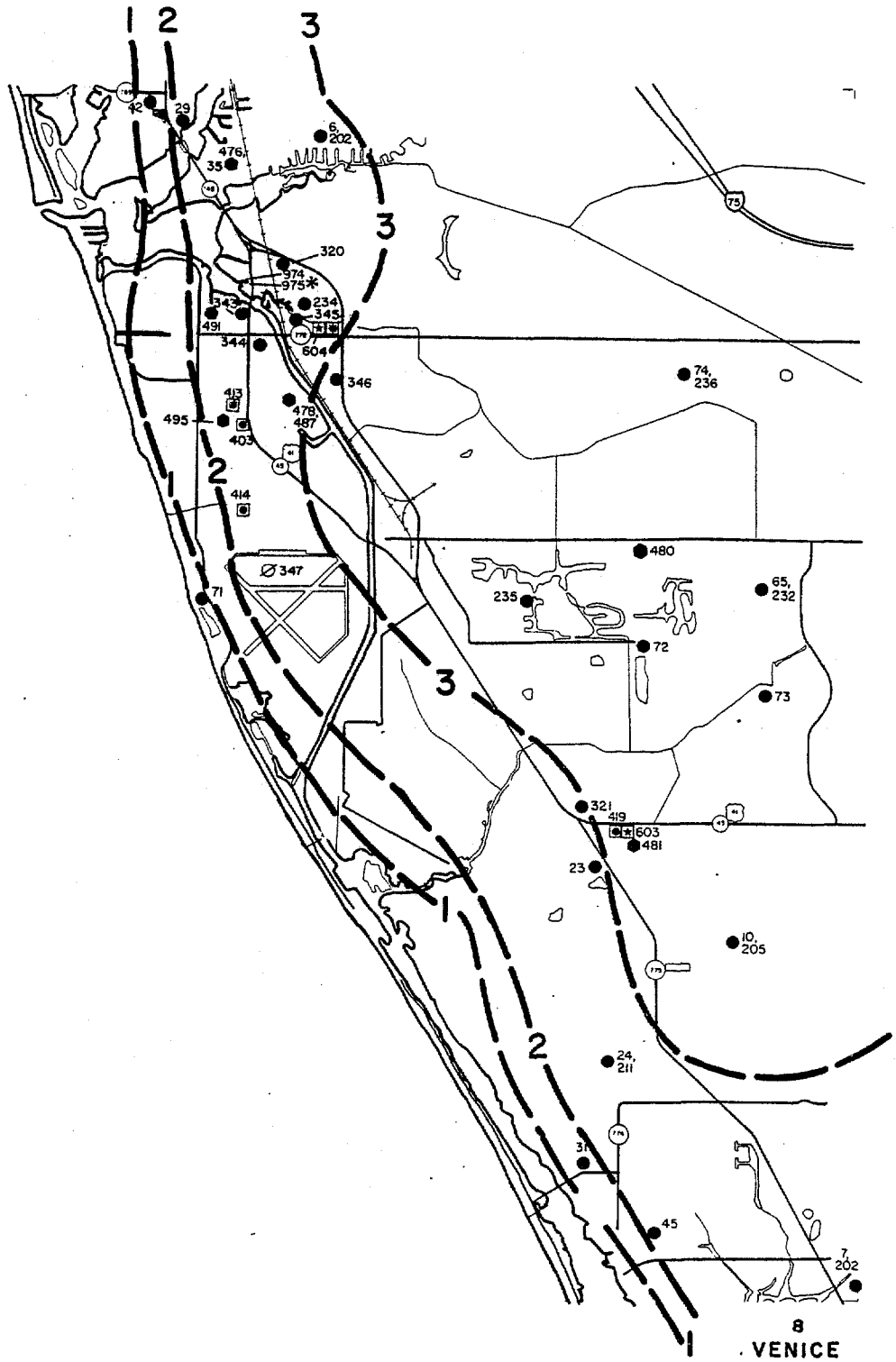
28, 212



SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC

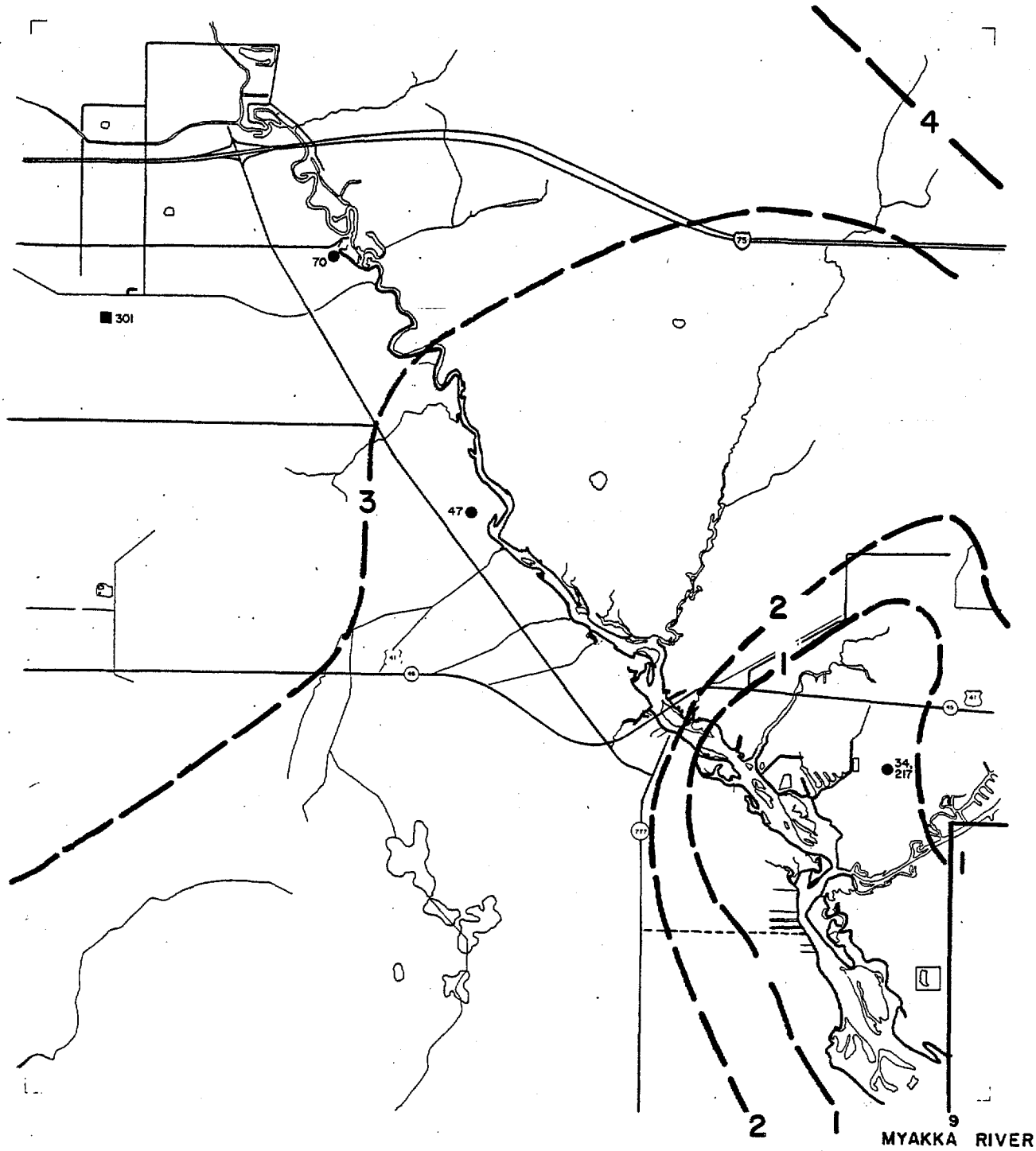


SARASOTA COUNTY

0 1 MILE

SCALE 1:24,000

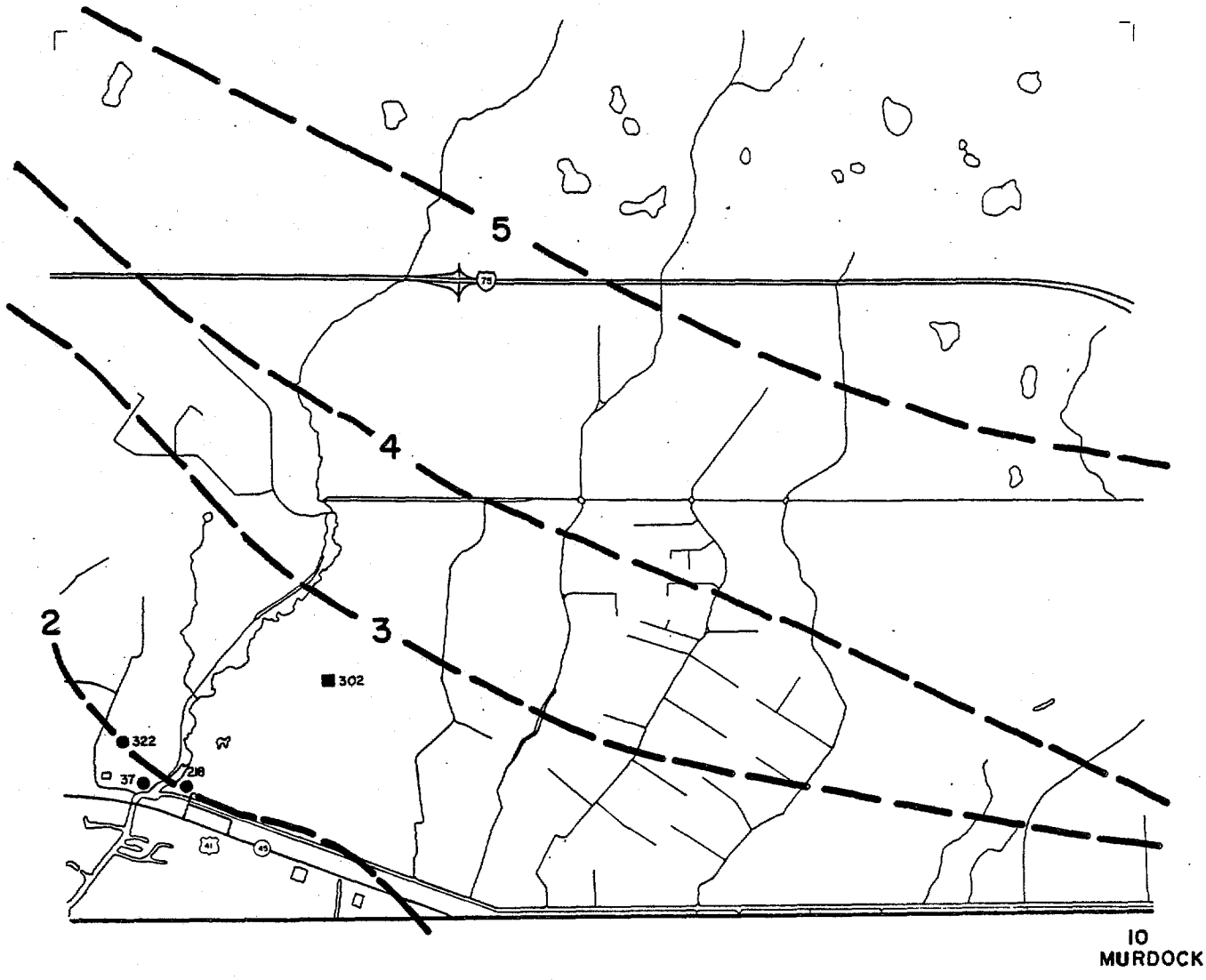
SWFRPC



SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

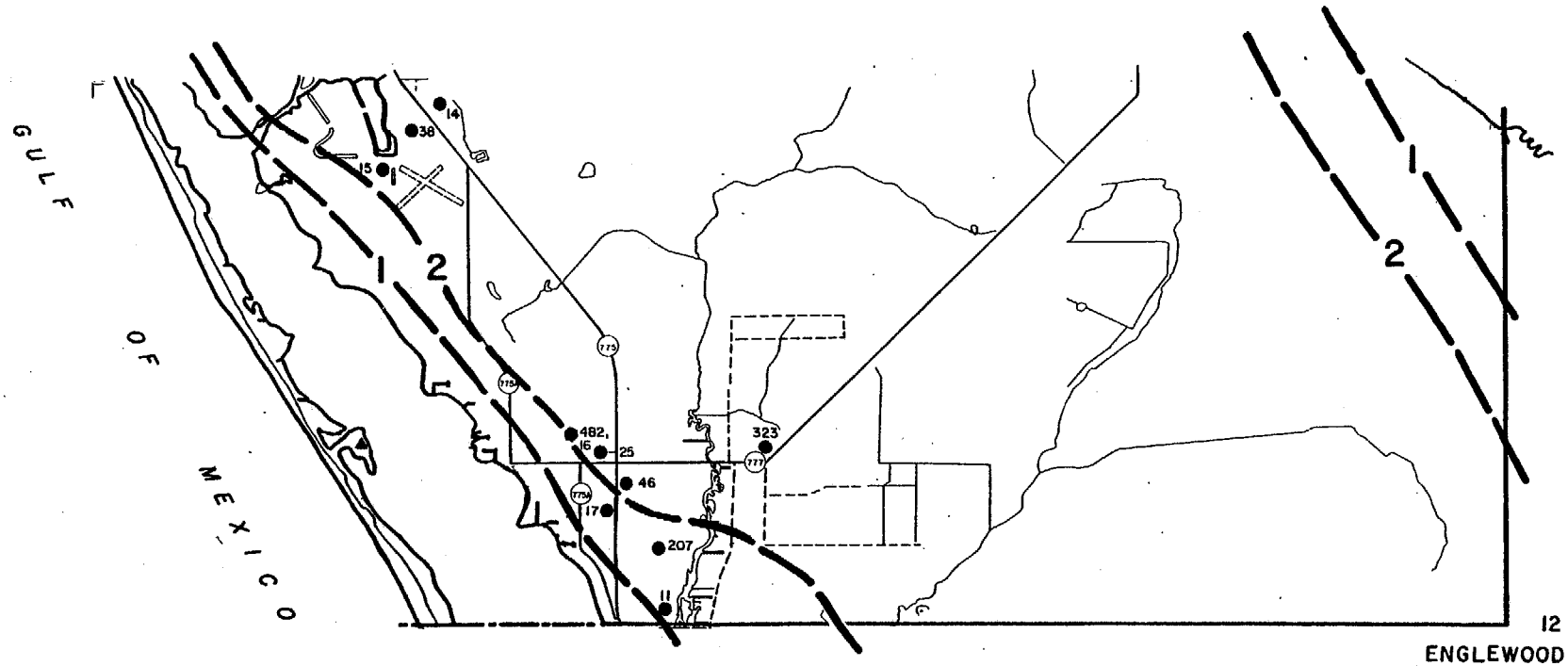
SWFRPC



SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

SWFRPC



12
ENGLEWOOD -
ENGLEWOOD N.W.

SARASOTA COUNTY

0 1 MILE
SCALE 1:24,000

APPENDIX G
HAZARDOUS MATERIALS INVENTORY

APPENDIX G

HAZARDOUS MATERIALS INVENTORY

Charlotte County

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
1) Explosives	E-1	Charlotte Excavating, Inc.	Peach Land Boulevard	Excavating Contractor
	E-2	DM Construction Corporation	705 E. Virginia Ave.	Excavating Contractor
	E-3	Ed Smith Construction, Inc.	607 Tamiami Trail	Excavating Contractor
	E-4	M & M Land Service	686 Tamiami Trail, NW	Excavating Contractor
	E-5	Sargant Excavating	7329 Riverside Drive	Excavating Contractor
	E-6	Tri-Corp Equipment	555 Main Street	Excavating Contractor
	E-7	Carso Contracting	12240 Saragasso Ln., North Port	Excavating
	E-8	Wayne Land Clearing	Cook & Brown Road	Excavating
	E-9	Toppino Lee Mar Pit 31	Cook & Brown Road	Quarry
	E-10	U.S. Army Reserve Unit	Paulson Dr., Murdock	Live ammunition, shells, etc.
2) Gases - compressed, liquified or dissolved under pressure	G-1	Charlotte Harbor Water Assoc.	3059 Del Prado Blvd. Port Charlotte	Water Company
	G-2	Gasparilla Island Water Assoc.	Hwy. 771, Cape Haze	Water Company
	G-3	Fender Bender, Inc.	2071 Westeria Street, Englewood	LP Gas
	G-4	Petrolane LP Gas	Englewood	LP Gas (20,000 gal. propane)
	G-5	Norgas (Northern Propane)	Cooper Street, Punta Gorda	LP Gas
	G-6	Southern Oxygen & Welding Supply, Inc.	129 Carmalita Street	Welding Materials
	G-7	Outdoor Mart	Taylor Rental Building Grove City	Pool Chemicals
	G-8	GDC Utilities, Inc.	Promenades Shopping Center	Water Company (3 1-ton tanks)
	G-9	PGI Sewage Treatment Plant	PGI Entrance, Punta Gorda	Chlorine Gas (5 1-ton tanks; 10 150# tanks) (60,000 gal.)
	G-10	St. Joseph Hospital	601 Harbor Blvd. NE Port Charlotte	LP Gas, Oxygen storage (above ground)
	G-11	Fawcett Memorial Hospital	101 Olean Blvd. NW Port Charlotte	LP Gas, Oxygen storage (above ground)

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Charlotte County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
3) Flammable Liquids	F-1	Risser Oil Corp.	525 Nesbit Street, Punta Gorda	Texaco Distributor
	F-2	Des Rosiers Brothers	Oaklea Subdivisions	Paving Materials
	F-3	A-1 Roofing Company	Peach River Blvd. Punta Gorda	Roofing Distributor
	F-4	Gulf Coast Building Materials Inc., of Charlotte County	250 Carmalita Street	Roofing Materials Distributor
	F-5	Andy's Roofing	S. Punta Gorda Heights	Roofing Manufacturer
	F-6	Charlotte County Sheriff's Department		
	F-6A	Charlotte County Main Station		1/2,000 Gas, 1/4,000 Gas, 1/500 Diesel, Above-ground 2/2,000 each propane
	F-6B	Charlotte County Englewood Sub Station		1/500 Gas, 1/1,000 Gas, Above-ground 2/2,000 each propane
	F-7	Charlotte County Road Dept.	1926 Florida Street, Punta Gorda	5,000 Gas, 10,000 Diesel, 10,000 Diesel, 5,000 Unleaded, 5,000 Unleaded, 1,000 Kerosene
	F-7A			
	F-8	Asphalt Plant	Bachman Blvd., Port Charlotte	Flammable liquids and soilds (above ground)
4) Flammable Solids		----------	----------	----------
5) Oxidizing Substances & Organic Peroxides		----------	----------	----------

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Charlotte County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
6) Poisonous Substances	P-1	Ban-A-Bug Pest Control	303 Fourth Avenue SE, Port Charlotte	Pesticide
	P-2	Glenn's Pest & Termite Control	703 Phyllis Street, NW, Port Charlotte	Pesticide
	P-3	Earl's Lawn Spray Service	153-C S. Tamiami NW., Port Charlotte	Pesticide
	P-4	Fahey Pest Control, Inc.	135-A S. Tamiami Dr., Port Charlotte	Pesticide
	P-5	Topps Pest Control	113-D S. Tamiami Dr., Port Charlotte	Pesticide
	P-6	Lan Mac Pest Control	Sunny Dell Plaza Port Charlotte	Pesticide storage (outside)
7) Radioactive	R-1	Fawcett Memorial	101 Olean Blvd., NW	Hospital
	R-2	St. Joseph	601 Harbor Blvd., NE	Hospital
	R-3	Punta Gorda Oncology Center	733 E. Marian Street Punta Gorda	Clinic (Strontium-90.
	R-4	Medical Center	809 E. Marion Ave.	Hospital 35 millicuries
	R-5	Intermedic Health Center	297 S. Tamiami Dr., NW Port Charlotte	Nuclear Medicine
	R-6	County Engineering Compound	Carmalita Road	Radioactive Material Storage (6 items of cobalt 60,30 mill. ea)
8) Corrosive		----------	----------	----------
9) Miscellaneous		----------	----------	----------
Transportation		Charlotte County Airport Seaboard Coastline RR Hwy. 771 Hwy. 775 Hwy. 776 S.R. 74 I-75 U.S. 41	4830 Airport Road	

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Charlotte County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
Transportation		U.S. 31 Kings Hwy. U.S. 17 S.R. 765		

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

COLLIER COUNTY

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
1) Explosives	E- 1	CJC	5285 Cove Lane, North	Blasting Contractor
	E- 2	Oren Construction	5780 Shirley Street, NW	Blasting Contractor
	E- 3	Ackerman	1820 Holiday Lane	Land Clearing
	E- 4	Highway Pavers Inc.	Davis Road, North	Limestone
	E- 5	Raymond Heims Association	4000 Gail Blvd., N.	Excavating
	E- 6	BJ Enterprises	4102 Outer Drive, N.	Excavating
	E- 7	Golden Gate Excavating & Clearing	Golden Gate	Excavating
	E- 8	Tom's Excavating	Naples	Excavating
	E- 9	Jack Queen Construction	211 N. 9th Street, N.	Land Clearing
	E-10	Ettings Development Corp.	2260 Sunshine Blvd., GG	Land Clearing
	E-11	Bullets & Bait	2291 E. Tamiami Trail, North	Gun Supplies
	E-12	Colwell Specialties Inc.	3727 Enterprise Avenue	Gun Supplies
	E-13	Fayard Hardware & Supplies Inc.	901 Airport Road	Manufacturer
	E-14	Harmon Bros. Rock Company	Scenic Drive	Limestone
2) Gases - Compressed, Liquified or dissolved under pressure	G- 1	Balgas & Oil Company	3506 Prospect Avenue	LP Gas
	G- 2	Massey's Gas & Appliances Service	Domestic Avenue, N.	LP Gas
	G- 3	Petrolane Gas Service Inc.	Jerome Street, Imm.	LP Gas
	G- 4	Industrial Air Products	2051 J&C Blvd., NN	Bulk Gas
	G- 5	Careful Gas Service	185 Viking Wy E., NN	LP
	G- 6	Carl Cook Gas Service	207 N. 15 St., Imm.	Equipment & LP
	G- 7	Northern Propane Gas Company	4000 Tamiami Tr., E, NN	LP
	G- 8	Specialty Engineering Lubrication & Chemical Co.	10395 Tamiami Tr., NN	Chemicals
	G- 9	Avatar Utilities Inc.	4267 25th Ave., SW	Water Company
	G-10	Glades Utility Division	Teryl Road, North	Water Company

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Collier County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
2) Gases	G-11	Immokalee Utility Inc.	S. 9th Street, Imm.	Water Company
	G-12	Marco Island Utility Office	N. Barfield, MI.	Water Company
	G-13	Collier County Utility Warehouse	3906 Mechantile Ave.	
	G-14	Bungartz Pool Service & Supply Inc.	660 9th Street, North	Pool, Chem-chlorine
	G-15	Care-free Pool Service	1911 Pine Ridge Road, NN	Pool, Chem-chlorine
	G-16	Dabco Pool Service & Supply	3402 Dean Street, N.	Pool, Chem-chlorine
	G-17	Doug's Pool Service	1380 Hernadno Street, North	Pool, Chem-chlorine
	G-18	Marco Pool Care & Supplies	571 Bald Eagle Dr., MI	Pool, Chem-chlorine
	G-19	Marco Pool & Solar Center Inc.	761 Elkcam Circle, MI	Pool, Chem-chlorine
	G-20	Naples Pool Service Inc.	6455 Airport Road, N,N	Pool, Chem-chlorine
	G-21	Naples Sanitary Supplies	1650 Avondale Street, North	Pool, Chem-chlorine
	G-22	Nassau Pool Service	997 2nd Ave., N,N	Pool, Chem-chlorine
	G-23	Pelican Pool Care Service & Supplies	N	Pool, Chem-chlorine
	G-24	Tri-City Pool Service & Supply Corp.	4883 Tamiami Tr., N	Pool, Chem-chlorine
	G-25	Gennar Brothers Co. of Fla.	4063 Enterprise Ave.	Pool, Chem-chlorine
	G-26	Propane Conversions Inc.	5435 Shirley Street	LP
	G-27	Tropigas Of Florida	Airport Road, N	LP
	G-28	Naples Water Plant	100 17 Ave., N,N	Water Company

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Collier County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
3) Flammable Liquids	F- 1	Combs Oil Company	1500 Airport Road, N	76 Distributer
	F- 2	Immokalee Truck Stop	Main Street, Imm.	76 Bulk Supply
	F- 3	Brawner's Automotive	1999 St., R. 951, 66	Diesel Fuel
	F- 4	Carnestown Gulf	U.S. 41	Diesel
	F- 5	Fla. Automated Energy Systems	3003 Tamiami Tr., N	Diesel & Oil
	F- 6	Gulf Oil Company	3003 Tamiami Tr., N	Bulk Plant
	F- 7	Oleum Corporation	3003 Tamiami Tr., N	Oil Market
	F- 8	Hopco Resources	2400 Tamiami Tr., N	Oil Operator
	F- 9	Callander & Kimbrell	67 Glades Blvd., N	Oil Driller
	F-10	Exxon Company	Highway 846	Oil Drilling
	F-11	Evans Oil Company	1190 1st Avenue, S	Fuel Oil
	F-12	Glidden Oil Company	New Market Road, E. Imm.	Petroleum
	F-13	Collier County Sheriff's Dept.	3301 Tamiami Tr., E. Building D, Naples	
	F-13A	Main Department	Naples	2-10,000 each - unleaded 1- 1,000 - Hi-test
	F-13B	Sheriff's Department	Marco Island	1- 4,000 - unleaded 1- 1,000 Hi-test 1- 500 - diesel above-ground
	F-13C	Sheriff's Department	Immokalee	1- 4,000 - unleaded 1- 1,000 - Hi-test
	F-14	Collier Road/Bridge Dept.	County Barn Road, Naples	
	F-14A			2- 3,000 ea. - regular 2- 3,000 ea. - unleaded 1- 2,000 - diesel 1- 4,000 - diesel

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Collier County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
3) Flammable Liquids	F-14B	Collier Road/Bridge Department	Immokalee	1-2,000 - unleaded 1-2,000 - unleaded 1-2,000 - diesel
	F-15	Dept. of Transportation Collier County	3301 Tamiami Trail, East, Bldg. D	
	F-15A		Courthouse	1-10,000 - unleaded 1-10,000 - unleaded
	F-15B		Marco	1- 4,000 - unleaded 1- 500 - diesel above-ground
4) Flammable Solids		----------	----------	----------
5) Oxidizing Substances & Organic Peroxide	Ø- 1	Broom's Spreader Service	New Market Road, Imm.	Fertilizer
	Ø- 2	Corbin-Lindabury Garden Centers	410 10th St., S., N	Fertilizer
	Ø- 3	Estech General Chemical Corporation	651 Alachua St., Imm.	Fertilizer
	Ø- 4	Florida Favorite Fertilizer	5467 Yahl St., NN	Fertilizer
	Ø- 5	Garden Exchange Inc.	5051 N. Tamiami Tr., N	Fertilizer
	Ø- 6	Naples Fertilizer & Supply	5467 Yahl Street	Fertilizer
	Ø- 7	Golden Gate Hardware & Garden Center	GG Shopping Center	Fertilizer
	Ø- 8	Setre, Inc.	P.O. Box 7849, Naples	
6) Poisonous Substances	P- 1	Alphe Chemical & Janitorial Supply	985 Central Ave., N	Toxics
	P- 2	Bay Chemical & Supply Co.	6135 Shirley St., N	Insecticides
	P- 3	Dubois Chemicals	Naples	Cleaners
	P- 4	Naples Chemical & Janitor Supply	1650 Avondale St., N	Cleaners
	P- 5	Specialty Engineering, Lubrication & Chem. Company	10395 Tamiami Tr., N, NN	Toxics

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Collier County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
6) Poisonous Substances	P- 6	Custom Chemical Cleaning	2900 14 Street, N,N	Toxics
	P- 7	Joe Brown Aerial Service	New Market Road, Imm.	Crop Dusting
	P- 8	Farmer's Flying Service	Carson Road, Imm.	Corp Dusting
	P- 9	Collier County Produce	Highway 29, South	Wholesale Fruits
	P-10	State Farmers Market	Immokalee	Wholesale Fruits
	P-11	Tony Packing House	Highway 29, Immokalee	Wholesale Fruits
	P-12	Barfield Produce, Inc.	Highway 29, S. Imm.	Wholesale Fruits
	P-13	Dan Cortright Farms	Highway 29, S. Immo.	Wholesale Fruits
	P-14	MJ Duer Company	New Market Road, Imm.	Wholesale Fruits
	P-15	Island Foods	24 Marco Lake Dr., MI	Wholesale Fruits
	P-16	M & M Produce	109 New Market Rd.,Imm.	Wholesale Fruits
	P-17	Naples Fruit & Veg. Co.	Airport Road, NN	Wholesale Fruits
	P-18	Six L's Packing	Immokalee	Wholesale Fruits
	P-19	Townsend Produce	606 9th, N,N	Wholesale Fruits
	P-20	Aardvark Pest Control	703 Orange Blossom Trail, N.	Pesticide
	P-21	Advanced Pest Control	961 Abaco Ave., MI	Pesticide
	P-22	Brackett's Pest Control	1328 Cooper Dr., N	Pesticide
	P-23	Bugman	2217 44 Ter. SW, GG,NN	Pesticide
	P-24	Lan Mac Pest Control	2272 J & C Blvd., NN	Pesticide
	P-25	No Risk Chemical Co., Inc.	1024 Industrial Blvd., North	Pesticide
	P-26	Orkin Exterminating Co.	2107 Andrea Ln, SE, N	Pesticide
	P-27	SWF Service Co., Inc.	Sable Palm Rd., N	Pesticide
	P-28	Asgrow Florida Company	3706 Progress Ave., N	Farm Supplies
	P-29	FMC Agr. Chem. Div.	524 New Mkt. Rd., Imm.	Farm Supplies
	P-30	Helena Chem., Co., SE	New Mkt. Rd.	Farm Supplies
	P-31	Kaiser Agr. Chem.	211 E. New Mkt. Rd.	Farm Supplies

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Collier County (Cont'd.)

U.S. Classification*	Map No.	Company	Address	Type of Business Hazardous Material
7) Radioactive	R- 1	Naples Community Hospital	350 7th Street, N	Hospital
	R- 2	Npales Radiologists	960 Central Ave., N	(Clinic) X-ray
8) Corrosives	C- 1	American Battery of Naples	Naples	Supplies
9) Miscellaneous		----------	----------	----------
Transportation		Immokalee Airport	Immokalee	
		Naples Municipal Airport	Naples	
		S.R. 29		
		Highway 858		
		Highway 846		
		S.R. 82		
		S.R. 951		
		S.R. 84		
		I-75		
		Highway 31		
		U.S. 41		
		Highway 862		
		Highway 898		
		Highway 92		

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Glades County

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
1) Explosives	E- 1	Ortona Sand Company	Moore Haven Highway 78	Fuel Oils, LP Gas - See Hendry County
2) Gases - Compressed, Liquified or Dissolved Under Pressure	G- 1	Glades Gas Company	Moore Haven	1,000 Tank Gas Distributer
	G- 2	Moore Haven Water Plant	Moore Haven	Chlorine, Other Gases
3) Flammable Liquids	F- 1	Glades County Co-op, Inc.	Highway 27, Moore Haven	Oil, Petroleum
	F- 2	G & K Oil Company, Inc.	Highway 27, Moore Haven	Fuel Oil Distribution, Bulk Storage
	F- 3	Mac's Phillips 66 Truck Stop	Highway 27, Moore Haven	Bulk Oil & Gas
	F- 4	County "Barn"	Highway 27 & 2nd Street	Storage Facilities 1-1,000 Regular Gas 1-1,000 Diesel 1- 550 Unleaded
	F- 5	Sheriff's Department	Highway 27/Sixth Street/Avenue J	1-2,000 Gallon Gas Underground
4) Flammable Solids		----------	----------	----------
5) Oxidizing Substances and Organic Peroxides		----------	----------	----------
6) Poisonous Substances		----------	----------	----------
7) Radioactive Substances		----------	----------	----------
8) Corrosives		----------	----------	----------

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Glades County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
9) Miscellaneous				
Transportation Corridors		Seaboard Coastline RR	Glades County	
		U.S. Highway 27	Glades County	
		S.R. 29	Glades County	
		S.R. 78	Glades County	
		S.R. 80	Glades County	

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Hendry County

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
1) Explosives	E-1	Swindle Bros. Asphalt Plant	U.S. Highway 27, West, Clewiston	Asphalt/Construction Company
	E-2	Ingram's Gun Shop	515 E. Trinidad Ave.,	Gun Shop
	E-3	Bell Supply Company	Felda	Oil Drilling Equip.
2) Gases-compressed, liquified or dissolved under pressure	G-1	Glades Gas of Clewiston	309 E. Sugarland Hwy.	LP
	G-2	LaBelle Gas Company	Patton Road	LP
	G-3	Big Cypress Water Plant	Big Cypress Reservation	Chlorine
	G-4	Gulf Oil Corp. Plant	San Pedro	LP, Battery Acid, Oil, Gas
	G-5	Evercane Sugar Corp.	Highway 832	Caustic Soda, Fuel Oils, LP Gas Tank, LP,Oxygen, Hydrogen, Sulfuric Acid, etc.
	G-6	City of LaBelle - City Barn	S. Clewiston	Chlorine, Melathan
	G-7	Merit Shell Bulk - Merit Petroleum Company	Highway 80	Underground Gas & Diesel, Oil
	G-8	Berry Groves	Highway 80	Chlorine, O,LP,Corrosives, Ammonia, Caustic Soda, Insecticides Toxic
	G-9	Harrel Swimming Pool Supply	597 W. Hickpochee Ave.	Chlorine
	G-10	Felda Growers & Packers	Felda	Fruit Growers
3) Flammable Liquids	F-1	A & G Clewiston Truck Stop	Highway 27, C	Gas - Union 76
	F-2	Clewiston Oil Company	641 E. Sugarland Highway, C	Oil - Mobil Gas
	F-3	Clewiston Auto Parts, Inc.	729 E. Sugarland Highway, C	Kerosene, Oil, Paint

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Hendry County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
	F-4	Paul Porterfield Bulk Plant	Highway 29, South	Oil, Fuels, Minerals Spirits
	F-5	Berner Gulf Oil Products Chevron USA	Clewiston	Oil Distributor
	F-6	Clewiston Bulk Plant	Clewiston	8000 Diesel Gal., 1000 Gal. LP, Battery Acid, Cleansing Agents
4) Flammable Solids		----------	----------	----------
5) Oxydizing Substances and Organic Peroxides	Ø- 1	Citrus Bell	Highway 29, South LaBelle	Citrus Processing - Oxygen, Corrosives LP, Insecticides, Chloride
6) Poisonous Substances	P- 1	U.S. Sugar Corp.	111 Ponce De Leon Avenue	Pesticides & Insecticides
	P- 2	Rainbow Fertilizers - manuf. by International Minerals & Chemicals Corp.	330 San Diego	Fert. Manuf. - Herbicides, Nitrate, etc. in Bulk
	P- 3	LaBelle Liquid Fertilizer	Highway 80	Fert., Insecticide, Nitrogen, Sulfur
	P- 4	Colonial Helicopters, Inc.	4002 Teek Court, LaBelle	Crop Dusting
	P- 5	Del Ray Flying Service	Lincoln Street, L	Crop Dusting
	P- 6	Brooks Exterminating	Alverdez, Clewiston	Pesticides
	P- 7	Corbin Farm & Ranch Supplies	544 E. Sugarland Highway, Clewiston	Fert., Corrosives, Herbicides Fertilizers, etc.
	P-8	Miller Farm Supplies	Hwy. 29 LaBelle	
7) Radioactive Substances		----------	----------	----------
8) Corrosives	C- 1	LaBelle School Warehouse	LaBelle	Industrial Cleaners

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Hendry County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
9) Miscellaneous	M- 1	Hendry General Hospital	W. Sagamore Avenue	Etiological Agents
Transportation		Clewiston Airport LaBelle Municipal Airport Seaboard Coastline RR U.S. 27 S.R. 29 S.R. 80 S.R. 82 S.R. 832 S.R. 833 S.R. 846		

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
1) Explosives	E- 1	Joseph Abraham Enterprises	214 3rd Street	Excavation
	E- 2	Cape Coral Excavating	1129 SE 12 Ct., CC	Excavating
	E- 3	Carter Contracting	Highway 80	Excavating
	E- 4	RJ Culverts	938 SE 11 Ave., CC	Excavating
	E- 5	Draper Enterprises	1919 Courtney Dr.	Excavating
	E- 6	Ellis Enterprise of FMY	Williams Road	Excavating
	E- 7	Foote Bros. Contracting	6333 McGregor	Excavating
	E- 8	Gulf Excavating	1107 SE 12 Ave., CC	Excavating
	E- 9	Raymond Gurgol Excavating	134 Bayshore	Excavating
	E-10	H & H Contracting	2531 Cleveland	Excavating
	E-11	Laser Line Utilities	Ranchette Road	Excavating
	E-12	Lee-Mar Construction Co.	Pine Ridge Road	Excavating
	E-13	Neptune Construction Co.	1227 SE A Terr.	Excavating
	E-14	Payne & Sons	Gladiolus Drive	Excavating
	E-15	Anthony's Site Dev.	#15 Bonita Bch. Trl. Pk., Bonita Spgs.	Excavating
	E-16	Pierre Construction Company	FMY	Excavating
	E-17	Pitchford Land Clearing	Pearce Street	Excavating
	E-18	Vito Trucking & Excavating Co.	3865 Palm Bch. Blvd.	Excavating
	E-19	General Sand & Stone	3791 Edison Avenue	Quarry
	E-20	Mike Wood's Construction Co.	Idlewild Road	Excavating
	E-21	Yeoman's Excavating	Ranchette Road	Excavating
	E-22	Bulls-Eye Sport & Shooters Supply	1214 N. Tamiami Tr.	Gun Supply
	E-23	C & C Sportsman Supplies, Inc.	6058 McGregor Blvd.	Gun Supply
	E-24	Fugate Construction Co.	137 Texas Avenue, Alva	Quarry
	E-25	Mountain Man Gunshop	4912 Steward Dr., EFM	Gun Supply
	E-26	Western Gun Traders	3687 Fowler	
	E-27	Coral Rock Industries	State Road 31	Quarry
	E-28	Florida Rock Industry	Alico Grade	Quarry

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
2) Gases - Compressed Liquid or Dissolved under Pressure	G- 1	Robbins Manuf. Co.	3068 Hardee St.	Whol. refrig. manuf.
	G- 2	Graves Bros. Refrigeration Supplies, INc.	2328 Fowler Street	Whol. refrig. manuf.
	G- 3	South Fla. CO_2 Supplies	4705 Forest Glenn Dr.	Distribution
	G- 4	TCL Enterprises	9600 S. Tamiami Trail	Chemical Supplies
	G- 5	BASF Wyandotte Corp.	Fort Myers	Chemical Supplies
	G- 6	Delta Chemical Systems, Inc.	4222 Fowler Street	Chemical Supplies
	G- 7	Dumont Company	2573 Franklin St.	Chemical Supplies
	G- 8	Palm City Pool Equip. & Service	1324 Littleton Rd.	Storage - chemical supplies
	G- 9	Sun Lite Products Co. of Fla.	2028 Victoria St.	Chemical Supplies
	G-10	Sunniland Corp.	3443 Hardee St.	Chemical Supplies
	G-11	Triton Pools	3051 Hanson St.	Chemical Supplies
	G-12	Webb Wright Corp.	2140 Alicia St.	Chemical Supplies
	G-13	Daniel's Food, Inc.	3131 E. Riverside Dr.	Frozen Food Wholesale
	G-14	Gulf Food Service, Inc.	2814 South Street	Frozen Food Wholesale
	G-15	Jeff-El Distributors	122-B 5th St.	Frozen Food Wholesale
	G-16	Plantation Foods	2134 Alicia St.	Frozen Food Wholesale
	G-17	Jackson Welding Supply	3275 Fowler St.	Welding Equip. & Gases
	G-18	George Fowler Co.	1936 Honda Road	Welding Equip. & Gases
	G-19	Bob Dean Supply	2624 Hanson Street	Welding Equip. & Gases
	G-20	Fort Myers Provisions	3550 Work Drive	Frozen Food Wholesale
	G-21	A-1 Gas Service	2619 Katherine St.	LP Gas
	G-22	Balgas & Oil Company	2000 Main St., FMB	LP Gas
	G-23	Petrolane Gas	2610 South Street	LP Gas
	G-24	Propane Conversions,Inc.	3862 Washington Ave.	LP Gas
	G-25	Pyrogas Gas Corp.	2273 Fowler Street	LP Gas
	G-26	South Florida Gas Company	2600 Anderson	LP Gas
	G-27	Tropigas Company	2600 Katherine	LP Gas
	G-28	Fort Myers Trailer Supply, Inc.	3111 Cleveland Ave.	LP Gas
	G-29	Northern Propane Gas Co.	650 Bayshore	LP

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
2) Gases Compressed Liquid or Dissolved under Pressure	G-30	Texgas	2919 South Street	LP
	G-31	Lee Co. Water Treatment Plant	East Fort Myers	Chlorine
	G-32	Amelio's Ice	2022 Fowler	Ice Manuf.
	G-33	City Ice	1745 Lee Street	Ice Manuf.
	G-34	Sea Blue	2150 Andrea Lane, SE	Chlorine
	G-35	Gordon's Pool Service	4632-A Del Prado Blvd.	Chlorine
	G-36	Munters Corp.	1205 6th STreet	Heat & Moisture Devices
	G-37	Culligan Water Conditioning	Lee County Ind. Park	Water Treatment Supplies
	G-38	Pinch-A-Penny	1219 Lafayette St.	Chlorine
	G-39	Ronbo Enterprises	3451 Hardee Street	Chlorine
	G-40	Tri-City Pool Service	S. Commercial Pk., CC	Chlorine
	G-41	Genner Bros. Company	2925 Hanson	Chlorine Wholesale
	G-42	Miller Associates	2551 Katherine St.	Chlorine Wholesale
	G-43	Solar Incorporated	206 Center Road	Chlorine Wholesale
	G-44	Southern Gulf Distrib.	South Fort Myers	Water Bottler
	G-45	Florida Cities Water Co.	815 Lagoon	Water Company
	G-46	Sanibel Island Water Assoc.	Fort Myers	Water Company
	G-47	Lehigh Utilities	Lehigh	Water Company
	G-48	San Carlos Utilities	San Carlos Park	Water Company
3) Flammable Liquids	F- 1	Florida Power & Light	SR 80	Electric Company
	F- 2	Carco Equipment Company	2948 Fowler Street	Oil Handling Equipment
	F- 3	Lee Co. Sheriff's Dept.	Anderson Avenue	Fuel Storage
	F- 3A	Sheriff's Dept. Stockade	Ortiz Avenue	1,000 unl. tank
	F- 3B	N. Sub Station	Hancock Bridge Pkwy.	1,000-regular - never store more than 500 gal.
	F- 3C	Bonita Sub Station	Bonita Springs	Propane Storage (above-ground) - 1000 (1) gal.
	F- 3D	North Sub Station	Hancock Bridge Pkwy.	Propane Storage (above-ground) - 1000 (1) gal.

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
3) Flammable Liquids (continued)	F- 3E	Lehigh Sub Station	Lehigh Acres	Propane Storage (above-ground) - 1000 gal. (1)
	F- 3F	Stockade	Ortiz Avenue	Propane Storage (above-ground) - 1000 gal. (2)
	F- 4	Balgas & Oil Company	2000 Main St., FMB	Oil Marketers
	F- 5	Carroll Oil Company	2958 Fowler St.	Oil Marketers
	F- 6	Comer Oil Company	2738 Hanson	Oil Marketers
	F- 7	Jack Ryan - Gulf Dist.	2650 Edison Avenue	Oil Marketers
	F- 8	Chevron USA Bulk Plant	2612 Edison Avenue	Fuel Oil - Bulk
	F- 9	Edison Oil Company	3006 Palm Beach Blvd.	Fuel Oil - Bulk
	F-10	Newman Oil Company	3705 E. Anderson Ave.	Fuel Oil - Bulk
	F-11	Ams-Oil Synthetic Lubricants	2610 SE 20 Place	Lubricant Oil
	F-12	Crouch Oil Company	2612 Edison Avenue	Lubricant Oil
	F-13	Exxon Products Distribution	2650 Hanson	Lubricant Oil
	F-14	Pennzoil Company	1957 Dana Drive	Lubricant Oil
	F-15	Lee County Vehicle Maint. Dept.	1766 Henderson Ave.	County Vehicle Fuel Storage - See Classifications for locations
	F-15A	Maintenance Barn	1766 Henderson	10,000 Gal. - Regular 10,000 Gal. - Unleaded 2,000 Gal. - Diesel
	F-15B	Depot #1	Evergreen Rd., NFM	1,500 Gal. - Regular 2,000 Gal. - Unleaded 1,000 Gal. - Diesel
	F-15C	Depot #7	Page Field	3,000 Gal. - Regular 2,000 Gal. - Unleaded 3,000 Gal. - Diesel
	ABOVE GROUND STORAGE			
	F-15D		Alva	4,000 Gal. - Unleaded 550 Gal. - Diesel

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
3) Flammable Liquids (continued)	F-15E	Tice Fire Dept.	Fort Myers	2,000 Gal. - Regular
	F-15F	FM Beach Sewer Dist.	Pine Ridge Road	2,000 Gal. - Regular
				2,000 Gal. - Diesel
				6,000 Gal. - Propane
	F-15G	Terry Park	East Fort Myers	2,000 Gal. - Regular
	F-15H	Transit Authority	Page Field	2,000 Gal. - Regular
				2,000 Gal. - Unleaded
				2,000 Gal. - Diesel
	F-15I	Val Ward Building	Hendry Street	555 Gal. - Regular
				550 Gal. - Unleaded
				1,000 Gal. - Propane
				550 Gal. - Tropigas LP
	F-15J	4 Winds Marina	Bokeelia	1,200 Gal. - Diesel
	EMERGENCY LP ABOVE-GROUND (Not Mapped)			
	F-15K		Olga	1,000 Gal.
	F-15L		San Carlos	1,000 Gal.
	F-15M		Winkler Rd/McGregor	500 Gal.
	F-16	Robertson Oil Company	2650 Hanson Street	Petroleum Oil
	F-17	Johnson Paint, Inc.	2715 Toles	Manufacturer
	F-18	Povia Paints	504 Center Road	Manufacturer
	F-19	Gordon's Truck Stop	1382 N. Tamiami Trail	Diesel
4) Flammable Solids	----	----------	----------	----------
5) Oxidizing Substances & Organic Peroxides	O- 1	AA Garden Center	271 Pondella Road	Fertilizer
	O- 2	A & G Garden Center	4711 Palm Beach Blvd.	Fertilizer
	O- 3	Colonial Garden Center	1915 Colonial Blvd.	Fertilizer
	O- 4	Plant Place	1401 Lee Blvd.	Fertilizer
	O- 5	LECO Fertilizer Company	2804 Hanson	Fertilizer Prod.
	O- 6	Scrivner's Garden Center	1211 Seaboard	Fertilizer

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
5) Oxidizing Substances & Organic Peroxides (continued)	O- 7	Respiratory Rentals, Inc.	1335 SE 46 Lane, CC	Oxygen Supply
	O- 8	Mahr Supply Company	941 SE 11 Avenue, CC	Nursery Supplies
	O- 9	Still Leonard Peat & Potting Soil	Williams Road	Nursery Supplies
	O-10	Ohio Medical Products	5030 Tice Street	Oxygen
	O-11	Home Medical Equipment	3559 Fowler	Oxygen
	O-12	Star Pharmacy, Inc.	1240 N. Tamiami Tr.	Oxygen
	O-13	Asgrow Florida Company	2546 Fowler	Wholesale Seeds-Manuf.
6) Poisonous Substances	P- 1	Brown's Sanitary Supplies	1500 Slater Road	Chemical Supply
	P- 2	D & B Janitorial Supplies	434 SE 47th Terrace	Chemical Supply
	P- 3	Dumont Company	2573 Franklin St.	Chemical Supply
	P- 4	Ft. Myers Chemical & Supply Co.	2401 Crystal Drive	Chemical Supply
	P- 5	Gulf Coast Sanitary Supply	2045 Beacon Manor Dr.	Chemical Supply
	P- 6	Sun Lite Products Company	2028 Victoria	Chemical Supply
	P- 7	Unijax	3989 Hardee Street	Chemical Supply
	P- 8	Wilcox Supplies	941 Country Club Blvd.	Chemical Supply
	P- 9	A & C Pest Control	1324 Littleton Road	Pesticides
	P-10	Arab Pest Control	2345 Fowler Street	Pesticides
	P-11	Naples Pest Control	1282 Venetian Way	Pesticides
	P-12	Beehler	2219 Hoople	Pesticides
	P-13	Bob's Pest Control	203 Grackle Drive	Pesticides
	P-14	Brown	447 Palermo Circle, FMB	Pesticides
	P-15	R. W. Collins	2040 Beacon Manor Dr.	Pesticides
	P-16	Fort Myers Pest Control	58 Bayshore Road	Pesticides
	P-17	Gene Sutton's Cinch Bug Cont.	Slater Road	Pesticides
	P-18	George Smith Exterminating	58 Bayshore Road	Pesticides
	P-19	Guaranteed Pest Control	Cape Coral	Pesticides
	P-20	Irvin Pest Control	1412 Viscaya Pkwy.	Pesticides
	P-21	Kelso Landscaping	4436 Scott Street	Pesticides
	P-22	Lan Mac	3422 Fowler	Pesticides
	P-23	Lehigh Acres Pest Control	117 Robert Avenue	Pesticides

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Lee County (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
6) Poisonous Substances (continued)	P-24	National Exterminators	2134 Andrea Ln., SE	Pesticides
	P-25	No Risk Chemical Company	8800 Cleveland	Pesticide & Chemical
	P-26	Orkin	2107 Andrea Ln., SE	Pesticide & Chemical
	P-27	Shur-Shot	1611-A SE 47 Terr, CC	Pesticide & Chemical
	P-28	Skill	329 New York Drive,	Pesticide & Chemical
	P-29	Spears	378 Montgomery, EFM	Pesticide & Chemical
	P-30	Star	5480 Orange River Blvd.	Pesticide & Chemical
	P-31	Steve's Pest Control	1629 Sunset Place	Pesticides
	P-32	Sunshine	813 SE 47 St., CC	Pesticides
	P-33	Trap	1136 Pine Island Rd.	Pesticides
7) Radioactive Substances	R- 1	Cape Coral Hospital	636 Del Prado Blvd.	Hospital
	R- 2	Fort Myers Community Hosp.	3785 Evans Avenue	Hospital
	R- 3	Lee Memorial Hospital	2776 Cleveland	Hospital
	R- 4	Lehigh Acres General Hosp.	1500 Lee Blvd.	Hospital
8) Corrosives	C- 1	Commercial Battery & Products Company, Inc.	2938 Fowler	Battery Distributor
	C- 2	Interstate Battery of SW Fla.	3009-B N. US 41, NFM	Battery Distributor
	C- 3	West Coast Batteries	3459 Anderson Ave.	Battery Distributor
	C- 4	Manning Batteries	Fort Myers	Battery Distributor
9) Miscellaneous		----------	----------	----------
Transportation		S.W. Fla. Regional Airport Page Field Buckingham-Mosquito Control I-75 US 41 Caloosahatchee River SR 867 SR 865 SR 765		

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

LEE COUNTY (Cont'd.)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
9) Miscellaneous - Transportation (continued)		SR 78 SR 78A SR 80 SR 873 SR 31 Seaboard Coastline RR Intra-Coastal Waterway		

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
1) Explosives	E- 1	Venice Landclearing	316 E. Laurel Road	excavating
	E- 2	Lewis Addison	5629 Blount Avenue, S	excavating
	E- 3	Larry Albritton Excavating	Myakka City	excavating
	E- 4	Armstrong Contracting	4913 Clark Rd., S	excavating
	E- 5	Dale Contracting	4688 Ashton Road, Sarasota	excavating
	E- 6	Petrecco Excavating	5681 Derek Avenue Sarasota	excavating
	E- 7	Sarasota Excavating Company	700 Bell Road Sarasota	excavating
	E- 8	Sommers, Inc.	886 Packinghouse Rd. Sarasota	land clearing
	E- 9	Su-Say Land Devl. Corp.	5418 Skyline Place Sarasota	land clearing
	E-10	Wendel Kent Construction	3801 N. Orange Avenue	land clearing
	E-11	Trophy Reloading	1226 Zacchini Ave. Sarasota	gunshop - distributor
	E-12	Dennis Pale Excavating, Inc.	4637 Ashton Rd., S	excavating
	E-13	L. Johnson & Sons	711 E. Colonial Lane	excavating
	E-14	W. D. McNutt Excavating Cont.	4577 Samuel Sarasota	excavating
	E-15	Midway Construction	4692 Ashton Road Sarasota	excavating
	E-16	TJ's Land Clearing, Inc.	7249 Bee Ridge Road Sarasota	land clearing
	E-17	Gun Hut II	7650 S. Tamiami Tr. Sarasota	gunpowder distributor
	E-18	John Baily Excavating	Baily Road	excavating
	E-19	University of South Florida	5700 N. Tamiami Trail	Laboratory Supplies

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
2) Gases - Compressed, liquified or dissolved under pressure				
	G- 1	Southern Gulf Utilities, Inc.	4611 Bee Ridge Road	chlorine
	G- 2	Troyer's Citrus Packing House	6400 N. Tuttle Avenue Sarasota	foods - wholesale
	G- 3	Gulf Coast Propane	3926 Tarpon Venice	gas company
	G- 4	Northern Propane Gas Co.	E. Laurel Road Venice	gas company
	G- 5	Venice Gas Company	217 S. Seaboard Ave. Venice	gas company
	G- 6	Mid-Florida Service Corp.	1484 12th Street Sarasota	LP Bulk Terminal
	G- 7	Tex-gas Corp.	250 S. Seaboard Ave. Venice	LP bottler
	G- 8	The Ice House, Inc.	1314 10th St. Sarasota	ammonia
	G- 9	Miller Associates	530 Mango Drive Englewood	chlorine
	G-10	Pinch-A-Penny	713 E. Venice Ave. Venice	chlorine
	G-11	Gorman Co., Inc.	5757 McIntosh Road Sarasota	chlorine
	G-12	Armco Pool Service	4509 Groveland Ave. Sarasota	chlorine
	G-13	Crystal Pure Water Company	1886 County Line Rd. Sarasota	chemicals
	G-15	Myakka Utilities	U.S. Hwy. 41 North Port	chemicals

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
2) Gases	G-16	North Port Utilities - Water Treatment Plant	North Port Blvd. North Port	chemicals (water company)
	G-17	Venice Gardens Utility Corp.	1490 S. Venice By-Pass Venice	chemicals (water company)
	G-18	Hughs Supply	341 S. Seaboard Venice	wholesale distributor chemicals
	G-19	Environmental Products	269 S. Tamiami Trail Sarasota	chemicals
	G-20	Toma Water Conditioning	5770 S. Tamiami Trail Sarasota	chemicals
	G-21	Al's Welding Equipment & Supplies	1108 N. Orange Avenue	carbon dioxide
	G-22	Coastal Janitor Supply, Inc.	2904 Hyde Park Sarasota	chemicals
	G-23	Sanitary Chemicals of Sarasota	1075-1/2 Central Ave. Sarasota	chemicals
	G-24	Sparkle-Brite	80 NE Shopping Plaza Sarasota	chemicals
	G-25	Super Chem, Inc.	1555 N. Lime Avenue Sarasota	chemicals
	G-26	LES King - Fire & Safety Equipment, Inc.	12th Street Sarasota	chemicals
	G-27	Detweiler's Propane Gas Svc.	5350 McIntosh Rd. Sarasota	LP
	G-28	Mid-Florida Service Corp.	1565 State Sarasota	LP
	G-29	Southern Gas Company	1565 State Sarasota	natural gas distributor
	G-30	Snyder Gas	1801 Myrtle Sarasota	natural gas distributor
	G-31	Florida Chlorinators	2064 17th Street Sarasota	chlorine

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
2) Gases	G-32	Walde Pool Supply & Service	4523 30th Street, W. Sarasota	chlorine
	G-33	Outdoor World Dist.	1562 Lime Avenue, N	chlorine
	G-34	Kissimmee Water Company	Sarasota	chlorine
	G-35	Florida Cities Water Company	2112 Gulf Gate Dr.	chlorine
	G-36	Siesta Key Utilities Authority, Inc.	6647 Midnite Pass Road	chlorine
	G-37	South Gate Water & Sewer Company, Inc.	Tulip & Shade Ave.	chlorine
	G-38	SE Dev. & Utilities Co.	Bee Ridge Road	chlorine
	G-39	City of Venice Water Plant	E. Venice Ave.	chlorine, formaldehyde, sulfuric acid, sodium hydroxide, aluminum sulfate
	G-40	City of Venice Sewer Plant	S. Harbor Drive	chlorine
	G-41	Dove Machine Shop	436 E. Venice Ave.	Sodium Hydroxide
3) Flammable Liquids	F-1	Oil Products, Inc.	3815 N. Osprey Ave. Sarasota	oil distributor
	F-2	Helser Oil & Gas Company	506 Buena Vista Dr. Venice	oil distributor
	F-3	Midway Oil & Gas Company	2212 6th Street Sarasota	oil distributor
	F-4	Standard Heating Service	454 E. Venice Ave. Venice	oil distributor
	F-5	Southland Supply Company	Venice	oil distributor
	F-6	Albritton Oil Company	1066 Central Avenue	oil distributor
	F-7	Weeks Oil Company	1960 21st Street Sarasota	oil distributor
	F-8	McCarley Oil Co., Inc.	1450 Mango Avenue Sarasota	oil distributor

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
3) Flammable Liquids	F-9	Trucker's Exxon	1120 N. Washington Blvd.	truck stop
	F-10	Bay Gasoline - Tropic Oil Co.	6212 S. Tamiami Trail	oil distributor
	F-11	(Attco, Inc.) Amoco Oil Prod.	3800 N. Washington Blvd. Sarasota	oil distributor
	F-12	Jim Wilkie Oil Company	2026 Couver Drive Sarasota	oil distributor
	F-13	Sheriff's Department	Washington Blvd. Sarasota	
	F-13A	Sheriff's Dept.		1-4,000 gas 1-10,000 gas 1-1,000 approx. propane (above ground)
	F-13B	South County Sub-Station	Venice	1-3,000 gas
	F-14	DOT (Road/Bridge Dept.)	5301 Pinkney Ave.	
	F-14A	North Depot	4310 Ashton Road	1-15,000 gas 1-15,000 diesel
	F-14B	South Depot	Off 775 Englewood	1-10,000 gas 1-10,000 diesel (above ground 1-10,000 gas 1-8,000 gas 1-4,000 gas 1-8,000 diesel)
	F-15	Cement Products Corp.	252 S. Seaboard Ave.	3000 gal. petroleum
	F-16	Martin Concrete	101 S. Seaboard Ave.	6000 gal petroelum 1000 gal. LPG
	F-17	Ernie's Body Shop	657 E Venice. Ave.	Paints, thinners
4) Flammable Solids	----	----------	----------	----------

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
5) Oxidizing Substances & Organic Peroxides	0-1	Greenwood Garden Center	3750 S. Osprey Ave. Sarasota	fertilizer
	0-2	All Florida Grassing, Inc.	2811 N. Lemon Avenue Sarasota	fertilizer
	0-3	Dmelio's Nursery, Inc.	701 S. Tamiami Trail Venice	fertilizer
	0-4	Shelton's of Venice	2372 S. Tamiami Trail Venice	fertilizer
	0-5	Gulfcoast Respirator Svc.	5648 Swift Sarasota	oxygen
	0-6	Linde Homecare Medical Sys.	1677 10th St. Venice	oxygen
	0-7	Medicare Convalescent Aids	2038 Bee Ridge Road Sarasota	oxygen
	0-8	Wes-Cor Nurseries	4917 Sawyer Road Sarasota	fertilizer
	0-9	Calvert's Garden Market	2345 Bee Ridge Road	fertilizer
	0-10	Farm & Gardens Supply Store	1492 4th Street Sarasota	fertilizer
	0-11	Tropical Gardens Nursery	2100 N. Tamiami Trail Nokomis	fertilizer
	0-12	Woodland Ridge Sod & Nursery	3303 Wilkinson Road Sarasota	fertilizer
	**	Town of Longboat Key Water Dept.	300 Gulf of Mexico Dr. Longboat Key	hydrogen peroxide storage
6) Poisonous Substances	P-1	John Rhoades	3051 Dividing Creek Rd. Sarasota	pesticide
	P-2	Pest Away	3930 Brown Road Sarasota	pesticide
	P-3	Multi-Products, Inc.	312 E. Venice Ave.	chemicals
	P-4	Pat's	2001 Brown Road Sarasota	

*Gas stations, hardware stores and other retail establishments not included in this inventory.
**Located in Manatee County.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
6) Posionous Substances	P-5	McAnn Pest	2537 Grove Sarasota	pesticide
	P-6	Smith Speciality, Inc.	2044 47th Street Sarasota	chemicals
	P-7	West Florida Supply Co.	1184 N. Washington Blvd. Sarasota	chemicals
	P-8	Budget Pest Control, Inc.	868 S. Tamiami Trail Osprey	pesticide
	P-9	A Pest Control	6217 Goldfinch Sarasota	pesticide
	P-10	Venice Pest Control	1720 S. Lakeside Dr. Venice	pesticide
	P-11	Arab Termite	3981 Sawyer Road Sarasota	pesticide
	P-12	Arrow Pest Control	920 S. Tamiami Trail Nokomis	
	P-13	Bruce Terminex	1312 2nd Street Sarasota	pesticide
	P-14	Bug Termite & Pest	401 N. Seaboard Ave. Venice	pesticide
	P-15	Burke Pest	2512 N. Washington Blvd. Sarasota	pesticide
	P-16	Fahey Pest	2155 12th Street Sarasota	pesticide
	P-17	Hughes Exterminating	6354 S. Tamiami Trail Sarasota	pesticide
	P-18	Truly Nolen	1610 12th St. Sarasota	pesticide
	P-19	No Bugs In	8333 Tamiami Trail Sarasota	pesticide
	P-20	Orkin Exterminating	4133 US Hwy. 301 N Sarasota	pesticide
	P-21	Rentokil	2512 N. Washington Blvd. Sarasota	pesticide

*Gas stations, hardware and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
6) Poisonous Substances	P-22	Jones & Sons	4117 Sawyer Road	pesticide
	P-23	Harvey's Pest Control	966 Charlotte Avenue	insecticide
	P-24	Harvey's	966 Charlotte Avenue Sarasota	pesticide
	P-25	Super Chem, Inc.	1555 N. Lime Avenue	chemicals
	P-26	BE Walsh Pest Control	2955 Bee Ridge Road Sarasota	pesticide
	P-27	Brown's	5605 Olive Avenue	pesticide
	P-28	D & A Pest	3121 Claude Lane Sarasota	pesticide
7) Radioactive Substances	R-1	Doctor's Hospital of Sarasota	Sarasota	hospital
	R-2	Memorial Hospital	1901 Arlington Sarasota	hospital
	R-3	Sarasota Palms Hospital	1650 S. Osprey Avenue Sarasota	hospital
	R-4	Venice Hospital	540 Rialto Venice	hospital
	R-5	Dr. Melecito Baga	622 The Rialto	nuclear medicine
	R-6	Dr. Russell Mitchell	622 The Rialto	nuclear medicine
	R-7	Freeman, Herron, Powell	205 Palermo Place Venice	radiology
	R-8	Quality X-Ray of Sarasota	1695 10th Street Sarasota	radiology
8) Corrosives	C-1	Sarasota Standard Auto Parts	1517 State Sarasota	battery distributor
	C-3	Battery Sales & Supply Co.	4105 S. Tamiami Trail Sarasota	battery distributor
	C-4	Chloride, Inc.	3500 Central Avenue Sarasota	battery distributor
9) Miscellaneous	-----	----------	----------	----------

*Gas stations, hardware stores and other retail establishments not included in this inventory.

HAZARDOUS MATERIALS INVENTORY

Sarasota County (continued)

U.N. Classification*	Map No.	Company	Address	Type of Business or Hazardous Material
Transportation		Venice Municipal Airport		
		Sarasota-Bradenton Airport		
		Buchanan Airport		
		Seaboard Coastline Railroad		
		I-75		
		U. S. 41		
		S. R. 72		
		Hwy. 780		
		Hwy. 683		
		Hwy. 301		
		Hwy. 789		
		Hwy. 778		
		Hwy. 789		
		Hwy. 773		
		Hwy. 789A		
		Hwy. 774		
		Hwy. 775		
		Hwy. 775A		

*Gas stations, hardware stores and other retail establishments not included in this inventory.

APPENDIX H
SAMPLE CALCULATIONS
WIND AND FLOOD DAMAGE

APPENDIX H

Sample Calculations - Wind and Flood Damage

The following sample calculations of damage have been provided, to illustrate the complexity of the methodology used in determining wind and flood damage. This relatively simple example is for damage in the transportation section (Land Use Code 20 on the property tax tape) for Sarasota County. It should be noted that all these calculations were necessary to determine damages for each one of 100 land use types. To estimate total damage for all six counties, thousands of similar calculations were involved.

Sarasota County

Potential Damage
Transportation Facilities

Transportation Facilities	Building Value ($) by Vulnerability Zone 1	2	3	4	5	Outside 5
Total Value	0	0	3,126,000	218,000	567,000	0
Cumulative Total	0	0	3,126,000	3,344,000	3,911,000	3,911,000

To estimate wind damage, the following methodology was used:

Wind Damage

Category 1 Total value - value zone 1 x damage factor zone 1 (5.6% x 1.7%)* = wind damage
$3,911,000 - 0 = 3,911,000 x .0009 = $3,520

Category 2 Total value - value zone 1 - value zone 2 x damage factor zone 2 (16.7% x 2.3%)*= wind damage
$3,911,000 - 0 - 0 = 3,911,000 x .0038 - $14,862

Category 3 Total value - value zone 1 - value zone 2 - value zone 3 x damage factor zone 3 (34.0% x 3.4%)* = wind damage
$3,911,000 - 0 - 0 - 3,126,000 = 785,000 x .0016 - $1,256

Category 4 Total value - value zone 1 - value zone 2 - value zone 3 - value zone 4 x damage factor zone 4 (48.0% x 5.9%)* = wind damage
$3,911,000 - 0 - 0-3,126,000 - 218,000 = 567,000 x .00283 = $1,605

Category 5 Total value - value zone 1 - value zone 2 - value zone 3 - value zone 4 - value zone 5 (equivalent to value outside zone 5) x damage factor zone 5 (66.7% x 10.9%)* = wind damage
$3,911,000 - 0 - 0 - 3,126,000 - 218,000 - 567,000 = 0 x .0727 = $0

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* See Table 33 for wind damage factors (The damage factor used in this case for wind damage was for non-residential buildings)

Flood damage is estimated in the following manner:

Flood Damage

Category	Vulnerability Zone	Average Flooding (ft.)	Damage factor* %	x	Building Value	=	Damage ($)
1	1	1	9.94	x	0	=	0
2	1	4	28.56	x	0	=	0
	2	1	9.94	x	0	=	0
3	1	9	44.76	x	0	=	0
	2	5	30.37	x	0	=	0
	3	2	16.06	x	3,126,000	=	502,036
4	1	12	48.0	x	0	=	0
	2	8	44.21	x	0	=	0
	3	5	30.37	x	3,126,000	=	949,366
	4	1	9.94	x	218,000	=	21,669
5	1	13	49.0	x	0	=	0
	2	11	47.0	x	0	=	0
	3	8	44.21	x	3,126,000	=	1,382,005
	4	4	28.56	x	218,000	=	62,261
	5	1	9.94	x	567,000	=	56,360

Total Damage is calculated below:

Total Wind & Flood Damage ($)

	Storm Category				
	1	2	3	4	5
Wind Damage	3,520	14,862	1,256	1,605	0
Flood Damage	0	0	502,036	971,035	1,500,626
TOTAL	3,520	14,862	503,292	972,640	1,500,626

* See Table 34 for flood damage factors (The damage factor for flood damage was for single-story buildings)

APPENDIX I
SOIL CATEGORY DEFINITIONS

APPENDIX I

SOIL CATEGORY DEFINITIONS

AREAS DOMINATED BY MODERATELY WELL TO POORLY DRAINED SOILS NOT SUBJECT TO FLOODING

2. Immokalee-Pomello association: Nearly level to gently sloping and moderately well drained sandy soils with weakly cemented sandy subsoil.

3. Immokalee-Myakka-Pompano association: Nearly level poorly drained sandy soils with weakly cemented sandy subsoil and poorly drained soils sandy throughout.

4. Myakka-Immokalee-Basinger association: Nearly level poorly drained sandy soils with weakly cemented sandy subsoil and poorly drained soils sandy throughout.

5. Wabasso-Bradenton-Myakka association: Nearly level poorly drained sandy soils with a weakly cemented sandy subsoil layer underlain by loamy subsoil; poorly drained soils with thin sandy layers over loamy subsoil and poorly drained soils with weakly cemented sandy subsoil.

6. Adamsville-Pompano association: Nearly level somewhat poorly and poorly drained soils sandy throughout.

7. Scranton, var.-Ona-Placid association: Nearly level somewhat poorly drained, dark surface soils sandy throughout; poorly drained soils with thin sandy layers over weakly cemented sandy subsoil and very poorly drained soils sandy throughout.

AREAS DOMINATED BY POORLY AND VERY POORLY DRAINED SOILS SUBJECT TO FLOODING

8. Pompano-Delray association: Nearly level poorly drained soils sandy throughout and very poorly drained soils with thick sandy layers over loamy subsoil.

9. Placid-Basinger association: Nearly level very poorly and poorly drained soils sandy throughout.

10. Terra Ceia association: Nearly level very poorly drained well decomposed organic soils 16 to 36 inches thick over loamy material.