RECREATIONAL DWELLINGS IN THE LOUISIANA COASTAL MARSH

D. L. GARY AND D. W. DAVIS

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PARISH MAPS

This study produced a series of 29 plates showing the locations of recreational dwellings in Louisiana coastal parishes. These oversized plates can be reproduced at cost upon request. Please write to Information Dissemination, Center for Wetland Resources, Baton Rouge, LA 70803 for the cost of reproducing each plate of interest.

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AUTHORS

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Co-Co Marina, Inc., Houma, La.

Continental Land and Fur Co., New Orleans.

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Louisiana Land and Exploration Co., Houma, La.

Louisiana Power and Light, Houma, La.

New Orleans Public Service, Inc.

South Louisiana Electric Cooperative Assoc., Houma, La.

Southwest Louisiana Electric Membership Corp., Lafayette, La.

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ABSTRACT

Louisiana's 12,656 square miles of coastal marsh and intermingled water surfaces support an abundance of fish and wildlife that is eagerly pursued by users of 10,220 camps, i.e., temporarily occupied recreational dwellings. The marshes help to make possible roughly 10 million man days per year (1 man day = 24 hours) of sports activities. Since game fish inhabit all marsh types, sport-fishing-oriented camps are found throughout the marsh. Trapper and hunter camps tend to be located near the relatively fresh marsh habitats that furbearers and waterfowl prefer. Most camps are adjacent to highways and relatively close to highly populated areas. Louisiana people use public refuges, management areas, and parks in the coastal zone for about 600,000 man days of recreation annually. There are five large camp clusters with from 400 to more than 1,300 camps in the coastal zone. The clusters are at Holly Beach, Cocodrie, Grand Isle, North Lake Pontchartrain, and along the Chef Menteur Highway outside New Orleans. The camp total number grew at an average rate of from 7 to 8 percent each year between 1960 and 1973; the 1978 rate of expansion appears to be only 2.5 percent per year.

INTRODUCTION

Higher incomes and shorter working hours have prompted a demand for more recreational services, making leisure-related goods and services an important factor in the nation's economy. Leisure time activities account for nearly 7 percent of an individual's personal budget (Delaune 1971), and growth of recreation spending is widely recognized, although there is disagreement as to its actual value. In the late 1960s some felt recreation spending had reached $150 billion per year (Kraus 1971a). Other researchers forecast that the $100 billion level will not be reached until 1980 (Delaune 1971). The difference is related to how one defines recreation (Kraus 1971b). Suffice it to say that leisure time expenditures involve billions. In the boating industry, for example, more than 50 million people spent more than $5 billion on boats, motors, and accessories in 1975--a considerable increase over the $1.2 billion spent in 1955 (Marex and National Association of Engine and Boat Manufacturers 1977; hereinafter cited Marex/NAEBM 1977). By 2000 Francis and Busch (1973) project that 183 million Americans will go boating, an increase of 133 million over the 1975 figure. In New York State alone, between 1960 and 1970, the number of registered boats increased 300 percent--from 106,051 to 427,950. Because they have a variety of uses, pleasure boats serve as a useful indicator of the overall recreation industry (Marex/NAEBM 1977).

RECREATION IN THE COASTAL ZONE

Since water is the largest single attraction for outdoor recreational activities (David 1969), it is not surprising that the nation's coastal zone has become a focal point for outdoor recreation. The Atlantic coast, the beaches of the Great Lakes and Gulf of Mexico, and the rugged coastline of the Pacific (Table 1) provide considerable recreational opportunities to millions of people.

The Louisiana coastline is dominated by 12,656 square miles of marsh and intermingled water surfaces--the equivalent of slightly more than 25 percent of the nation's wetland area.

The lowlands in places extend inland as far as 80 miles. The accessible aquatic landscape provides an attractive site for concentrated recreational activity and a viable alternative to beach-oriented recreation. By the year 2000 the country's marshes will be needed to meet the recreation demands of the American people.

With two-thirds of Louisiana's population within a two-hour drive of the marsh and 41 percent living within its boundaries (Templet 1976), marsh recreation is already available to a large population for day or

Table 1. Major U.S. recreation coastline lengths.*

	Atlantic Ocean (mi)	Gulf of Mexico (mi)	Pacific Ocean (mi)	Great Lakes (mi)	Total (mi)
Total shoreline	28,377	17,437	7,863	5,480	59,157
General recreation shoreline	9,961	4,319	3,175	4,269	21,724
Public recreation shoreline	336	121	296	456	1,209
Restricted shoreline	263	134	127	57	581

*Outdoor Recreation Resources Review Commission (1962).

overnight use. As a result, Louisiana's lowlands support an estimated 10 million man days of sports activity annually (Martin 1972).

In 1800, New Orleanians built some of the state's earliest recreational dwellings in the small village of Milneburg on the shores of Lake Pontchartrain. Originally served by wagons, a horse-drawn railroad, and eventually a steam locomotive, the village became a playground. Huts, cottages, and squatter shacks were built into a cobweb-like pattern along the railroad trestle, resulting in hundreds of piling-supported summer camps (Waldo 1959), and the first clustering of recreational dwellings had been established. Contemporary examples exist at Chef Menteur, Little Woods, North Shore, and Spanish Fort, and all serve New Orleans (Fig. 1).

In the past three decades the desire to utilize Louisiana's coastal zone for leisure time activity has increased. To allow escape from the highly developed recreational sites, a new pattern of land use has evolved--the isolated recreational dwelling (Fig. 2).

Louisiana's Camps

In Louisiana's marshes the numerous camps, i.e., seasonally occupied recreational dwellings, have become a significant spatial phenomenon. As such, the study area's 10,220 camps cannot be ignored (Fig. 3). Perhaps the density does not compare with the Atlantic coast, but the

3,644 isolated camps are a unique aspect of the coastal zone. Only attainable by water, these units provide sportsmen with a summer site for fishing and boating and a winter base for hunting and trapping. A person wishing to build in the marsh must obtain a lease and follow the guidelines established by the property owner and the government.

STUDY GOALS

The focus of this study is on the geographical distribution, historical development, occupancy, recreational use, and construction of camps in the Louisiana coastal zone.

The purpose of the study is to provide planners and decision makers of Louisiana's overall coastal zone management plan with camp location and density information in order that the coastal zone resources be better marshalled. Also, the report will serve as a reference to researchers who may wish to investigate future trends of camp building and camp-based recreation.

Fig. 1. A site with a camp density of urban row housing.

Fig. 2. An isolated marsh camp.

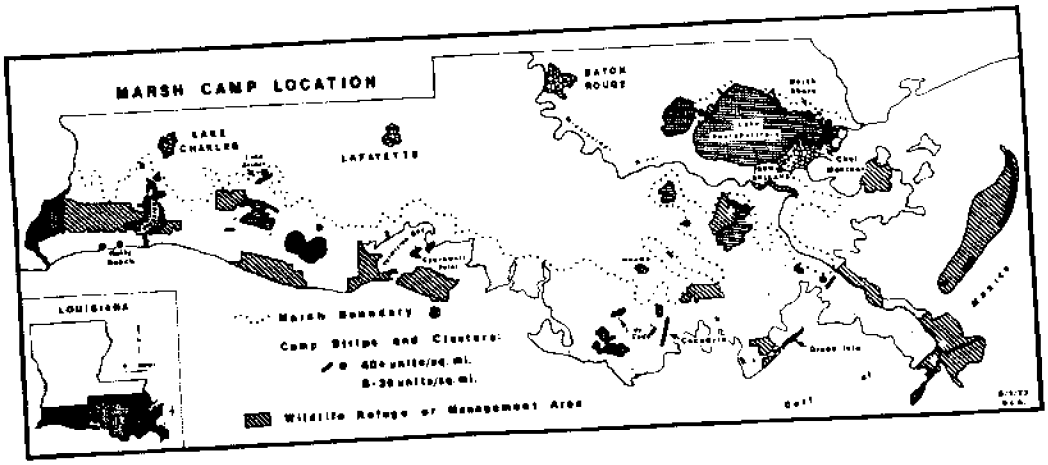


Fig. 3. Generalized map of camp location.

THE BIOPHYSICAL AND CULTURAL SETTING

As background information for understanding the geographical patterns of camp and recreation location, overviews of the study area biophysical environment and culture setting are presented. The biophysical elements not only influence local concentrations of fish and wildlife, but also help to determine suitability of sites for construction. Further, the study area's settlement is analyzed historically, and recreational activity is described and quantified for the recent past and present.

THE MARSH BIOPHYSICAL ENVIRONMENT

The more important biophysical factors that determine recreational use of study area sites include marsh bearing strength, climate, fauna, and vegetation; all except climate are notably sensitive to water salinity. These biophysical elements interact and permit a wide variety and great abundance of the sportsman's quarries--game fish and wildlife.

The Deltaic and Chenier Plains

Origin and physical geography serve to divide the study area into two regions: the deltaic and chenier plains, east and west, respectively, of Vermilion Bay (Fig. 4). The deltaic plain has north-south natural levee ridges and a shoreline that is irregular; the chenier plain has east-west ridges, and the coast is relatively smooth. Both regions contain extensive, poorly drained, near sea level marshes between the ridges and support an abundance of plants and fauna.

The Deltaic Plain

For the past 5,000 years the sediment-laden Mississippi River has discharged into the Gulf of Mexico along Louisiana's coast east of Vermilion Bay. The river's deposits and periodically changing course have created seven lobes that comprise the deltaic plain (Fig. 5). These were built by significant flow during intervals varying from 500 to 1,250 years (Kolb and Van Lopik 1958). Most of the plain is within 5 feet of mean sea level and, thus, is highly flood prone. Locally elevations range from 15 to 20 feet along the levee crests of the major waterways (Gagliano 1973).

West of Vermilion Bay, the marsh surface is firm. Between these two natural features are approximately 400 square miles of floating fresh marsh, called flotant (Fig. 6). This region is bounded on the north by high land or swamp (O'Neil 1949) and on the south by marsh

having a substrate of firm clay deposited in relatively saline water (Russell 1942). While extensive masses of maidencane flotant dominate interdistributary basins, on many freshwater lakes comparatively small floats of water hyacinth and alligator weed have propagated.[1] Both are notorious canal cloggers (Fig. 7). O'Neil (1949) and Russell (1942) detail the processes of maidencane and water hyacinth flotant formation. A quagmire underfoot, flotant usually must be traversed by pirogue (Fig. 8; D. W. Davis 1976). Nevertheless, a maidencane float 10 feet in diameter can support the weight of a 200-pound person (O'Neil 1949).

The Chenier Plain

The chenier plain is westward and down-current relative to the deltaic plain lobes. It is made up of sands, silts, and clays that were deposited by the Mississippi River when it had a more westerly course. These sediments, stabilized by salt-tolerant vegetation, created a mud coast along the plain's southern margin, the Gulf of Mexico. Gulfward growth of mud flats ceased intermittently during periods when the river shifted its course and sediments to a more easterly direction. During these periods waves removed the coastal sediments and deposited the coarser particles in beach ridges. The river's return to a more westerly course resulted in additional mud flat buildup along the coast and stranding of the newest beach ridge (Shepard and Wanless 1971; Fig. 9).

Well-drained cheniers average 600 feet in width and are from 3 to 10 feet in height. They often support live oaks and substantial populations of quadrupeds and waterfowl. More than 2 million duck annually winter on the plain, 30 percent of those in the Mississippi Flyway (Chabreck 1968). Cheniers are the loci of settlements and cultivated land. Some 22 percent of the chenier plain camps are on the inland ridges.

Salinity and Vegetation

For convenience the marsh has been subdivided into four vegetative types: saline, brackish, intermediate, and fresh (Penfound and Hathaway 1938; Fig. 10). In general these occur in bands that parallel the coast and encompass 6,110 square miles (Table 2; Perret et al. 1971).

Salt marshes generally conform to the 20 ppt salinity contour. They occur near the coast and in areas influenced by steady saltwater intrusion and consist of a vegetative mat underlain by clays.

Salt marsh vegetation is dominated by oyster grass, the abundance of which is in direct proportion to salinity. Salt meadows are dominated by wire grass, a plant that makes up one-fourth of the coastal marsh's vegetation (Chabreck 1972). Wire grass nearly doubles the cover area of its closest competitor, oyster grass (Perret et al. 1971). The intermediate marsh also is dominated by wire grass. In the brackish and intermediate zones, salt grass, roseau, bulltongue, and the far-ranging

Table 2. Principal plant species of salinity regions.*

Marsh Type	Common name	Percent of Marsh Type Area	Area† sq mi (sq km)
Saline	Oyster grass	62.1	
	Salt grass	14.3	
	Black rush	10.1	
	Wire grass	6.0	
	Saltwort	4.4	
	Black mangrove	0.6	
	Total	97.6	1,348 (3,491)
Brackish	Wire grass	55.2	
	Salt grass	13.3	
	Three-cornered grass	5.0	
	Total	73.5	1,881 (4,872)
Intermediate	Wire grass	34.0	
	Bulltongue	6.6	
	Roseau	6.6	
	Waterhyssop	4.8	
	Joint-grass	4.5	
	Deerpea	3.8	
	Total	60.3	1,017 (2,634)
Fresh	Maidencane	25.6	
	Bulltongue	15.6	
	Spikerush	10.7	
	Alligator weed	5.3	
	Pennywort	2.1	
	Water hyacinth	1.4	
	Total	60.7	1,865 (4,830)

*Chabreck (1972).
†Perret et al. (1971).

wire grass account for more than half of the marshland's plant cover. Inland, bordering the Pleistocene terrace, the fresh marsh is dominated by maidencane and by sawgrass on surfaces where the drainage has been altered due to canal, highway, or industrial construction (Chabreck 1972).

Climate

The humid subtropical climate of the study area results from its

Table 3. Chenier plain settlement sizes circa 1935.*

Structure No. Range	No. of Settlements	Total No. of Structures
1-5	51	112
6-10	13	94
11-20	4	53
20+	15	798
Totals	83	1,057

*Compiled from U.S. Geological Survey topographic maps.

Table 4. Deltaic plain settlement sizes circa 1935.*

Structure No. Range	No. of Settlements	Total No. of Structures
1-5	148	372
6-10	36	279
11-20	37	517
21+	21	927
Totals	242	2,095

*Compiled from U.S. Geological Survey topographic maps.

low latitude and proximity to the Gulf of Mexico. The Gulf of Mexico and coastal wetlands moderate temperature extremes; summers are sultry, and winters are mild. July daily temperatures generally are between 74 and 89°F. When there is no breeze, early afternoon relative humidities vary from 60 to 70 percent. The regional mean January daily maximum temperature ranges from 60 to 65°F (Baldwin 1973). Fall and spring are the moderate seasons.

In the absence of a cold front passage and associated dry northerly air flow, prevailing winds are southerly, warm, and moist. Mean annual precipitation is between 53.9 inches toward the west and 66.6 inches in the study area's central part (Cry 1975). Summer and winter are the wetter seasons, and fall and spring are comparatively dry.

Severe weather during the warm half of the year is a hazard to sportsmen and camps; small boat travel is dangerous in gusting winds during frequent local afternoon thunderstorms (Baldwin 1973). Days per month with coast-wide small craft advisories is up to four during summer and from six to eleven during winter.[2]

THE CULTURAL SETTING

Settlement of the chenier and deltaic plains occurred in the three decades of the 1830s to the 1850s. The sequence of development was similar for both regions. Initially, economies were of the subsistence type, and settlements proliferated in the marsh's isolated parts. In time the enterprises became increasingly commercial, and eventually highways and motorboats eliminated the necessity of living in close proximity to the fur and fish resources. At the same time isolated settlements gave way to marsh towns with construction of highways and urban cultures that attracted migrants from the isolated settlements. Many former permanent homes in remote marsh areas became recreational camps.

History of Marsh Settlement

French farmers, trappers, and fishermen, whom the British forced out of Nova Scotia in the mid 1790s, settled within the lower Mississippi River's alluvial valley (Leblanc 1967). They regarded the semi-aqueous terrain as an attractive location for their new settlements. In addition to the French, a group of Yugoslavian oyster fishermen settled along the bayous, bays, and lakes southeast of New Orleans. In time they were joined by other Balkan immigrants (Evans 1963). Filipinos, Germans, Irishmen, Italians, Spaniards, and others also settled within the coastal zone.

People began to occupy the deltaic plain in the 1830s and the chenier plain in the 1850s. By the mid 1930s there were 325 marsh communities (Tables 3 and 4). In the relatively isolated chenier plain 20 or more dwellings were located in 15 towns. On the deltaic plain

there were 21 sites accommodating more than 20 dwellings. These pre-World War II communities fit into four categories: agricultural, fishing, petroleum, and trapping.

Today former marsh dwellers or their descendants use their former homes as trapping base camps and recreation centers. The marsh has also appealed to many outsiders. These two groups have built 8,516 camps, with more than 40 percent of them accessible only by boat or seaplane. The original agricultural, fishing, hunting, and trapping villages have been transformed. They no longer serve as permanent settlements; they have changed from work- to leisure-oriented communities.

Recreation: Past and Future

Vegetation in the chenier and deltaic plains differs, but both regions support substantial wildlife populations. Inland from the gulf, water areas sustain abundant fresh- and saltwater fisheries.

Indeed, "the coastal parishes are far ahead of non-coastal parishes in user days of recreational activities" (Paterson et al. 1974). The study area total number of user days for broad categories of recreation are expected by 1985 to be roughly one-fourth greater than the 1970 levels (Table 5).

The major types of recreational activity are fishing, crabbing, frogging, shrimping, hunting, trapping, and boating.

Table 5. User days of high quarter* participation by recreation activity: 1970 and 1985.†

Parish	Swimming§ User Days 1970	Swimming§ User Days 1985	Non-Fishing Water Activities User Days 1970	Non-Fishing Water Activities User Days 1985	Other¶ User Days 1970	Other¶ User Days 1985
Calcasieu	1,006,521	1,254,711	325,226	405,417	784,143	977,488
Cameron	56,086	60,401	18,122	19,516	43,694	47,055
Iberia	389,511	402,791	125,857	130,098	303,451	313,674
Jefferson	2,307,759	3,690,107	745,675	1,192,333	1,797,871	2,874,796
Jefferson Davis	203,893	175,956	65,881	56,854	158,844	137,079
Lafourche	462,949	556,008	149,586	179,655	360,662	433,161
Orleans	4,162,608	4,132,705	1,345,006	1,335,344	3,242,900	3,219,604
Plaquemines	169,989	194,912	54,926	62,979	132,431	151,847
St. Bernard	353,274	716,790	114,148	231,606	275,220	558,418
St. Charles	199,219	304,892	64,371	98,516	155,202	237,528
St. John	160,045	229,693	51,713	74,218	124,684	178,944
St. Mary	406,228	518,557	131,259	167,554	316,474	403,985
St. Tammany	438,222	997,644	141,596	322,355	341,399	777,219
Tangipahoa	455,432	486,353	147,157	147,148	354,806	378,895
Terrebonne	509,608	631,278	164,662	203,976	397,012	491,800
Vermilion	297,728	297,242	96,201	96,044	231,956	231,568
Total	11,597,072	14,650,040	3,741,386	4,733,613	9,020,749	11,413,061

*Summer is the high quarter for all activities except hunting.

†Paterson et al. (1974).

§Includes pools and beaches.

¶Includes crabbing, crawfishing, and hunting.

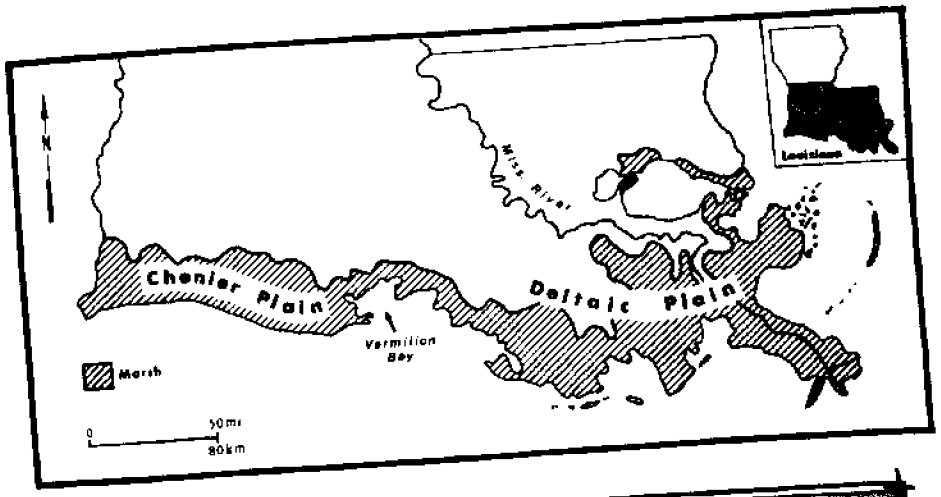


Fig. 4. Location of the marsh and chenier and deltaic plains.

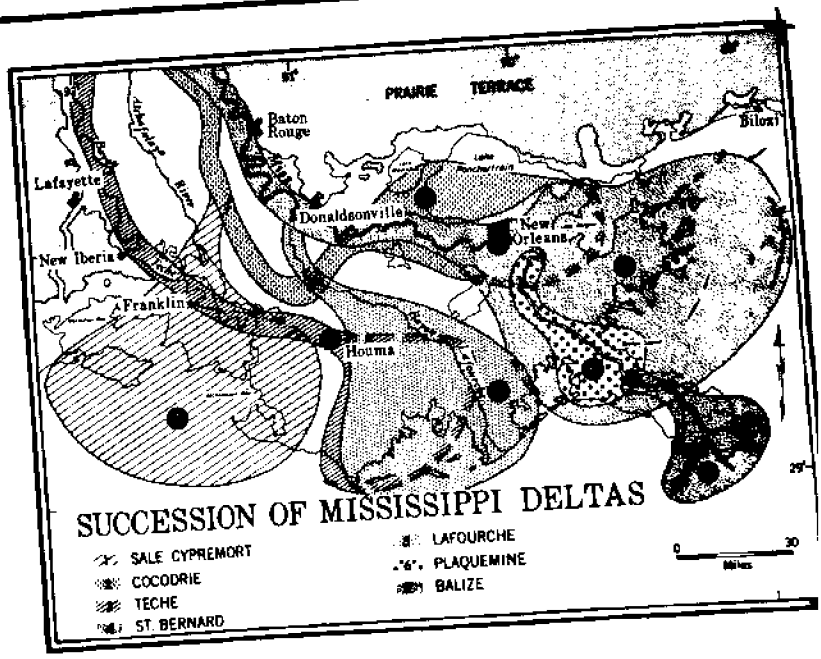


Fig. 5. Succession of the Mississippi River deltas.

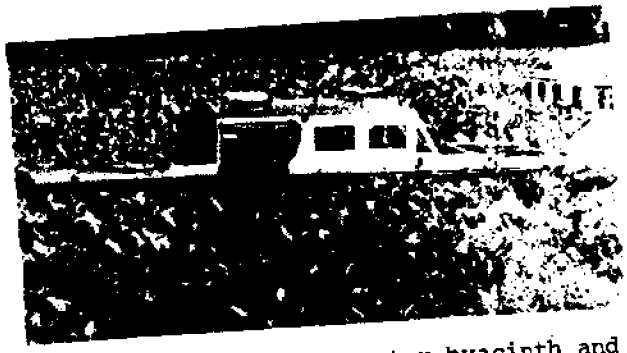


Fig. 7. Two exotics--water hyacinth and alligator weed.

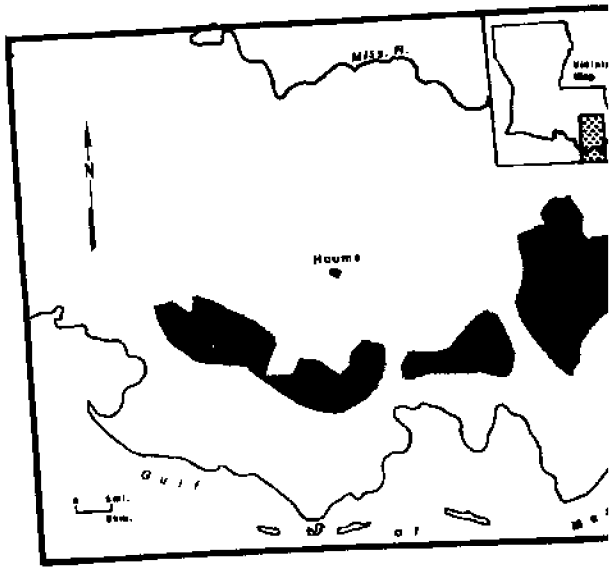
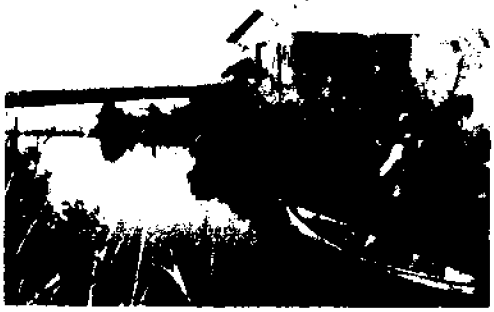


Fig. 6. Distribution of flotant.

Fig. 8. A pirogue.



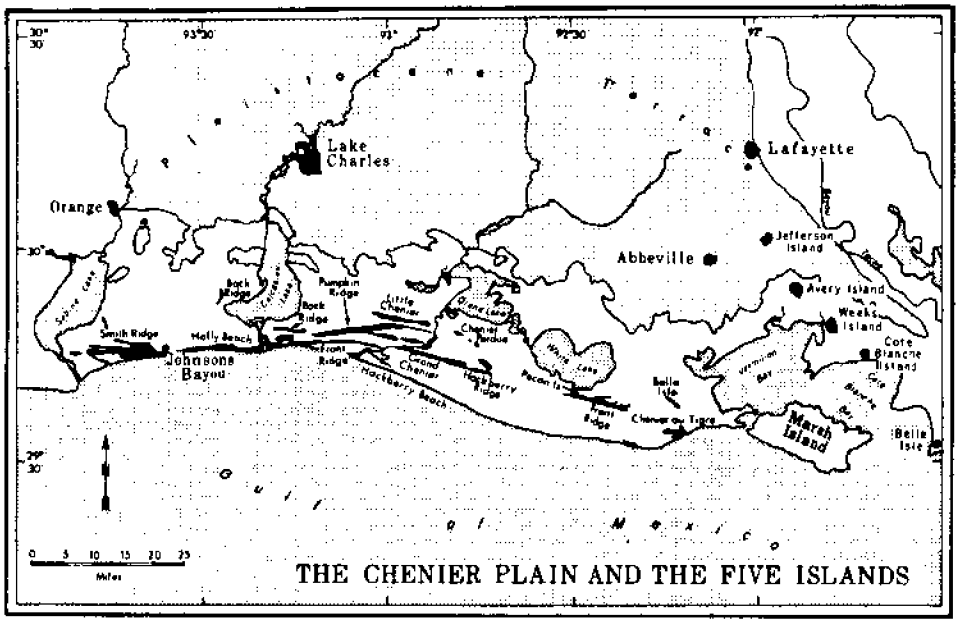


Fig. 9. Location of chenier ridges, southwestern Louisiana.

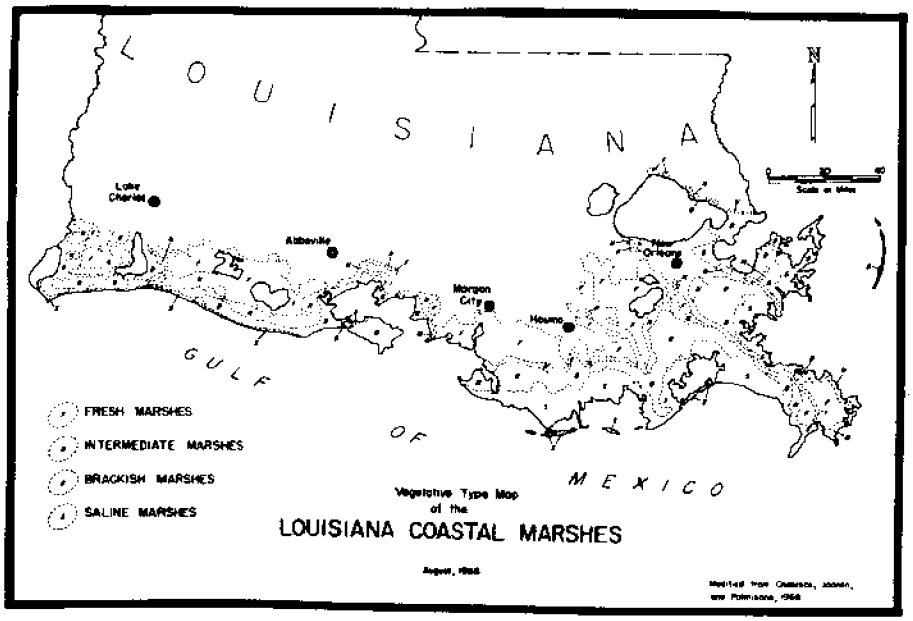


Fig. 10. Vegetative type map of the Louisiana coastal marshes.

CAMP GEOGRAPHICAL DISTRIBUTION AND ANALYSIS

A total of 10,220 camps were mapped from several sources of data in and adjacent to the study area between March 1976 and May 1977 (Table 6) By on-site inspection and field inquiry some 4,300 camps were located adjacent to highways and rural roads. Land company campsite lease location and parish permit file information made possible the plotting of 1,750 units, and the 1,353 Grand Isle camps were counted from municipal water supply records of seasonally supplied structures. The remaining one-fourth or so of the camps were mapped through discussion with individuals who have a first-hand knowledge of camp location and by air and boat reconnaissance. No doubt a small number of camps have been missed, but it is the investigators' consensus that the overall mapping accuracy is about 95 percent.

The chenier plain contains 17 percent of the camps. Most are along the coastal highway, on chenier ridges, and along the shore of Calcasieu Lake. The balance, 83 percent of the camps, is on the larger, more populous deltaic plain. From west to east, notable camp concentrations occur at Cypremort Point, the lower Terrebonne and Jefferson parish areas, along the Chef Menteur Highway in Orleans Parish, and the North Shore region of St. Tammany Parish. Camps are sparse or absent in the many ponds, lakes, bayous, and sounds that cover about one-half of the study area (Chabreck 1972), government refuges and wildlife management areas (Fig. 11), relatively inaccessible interdistributary basins, and the gulfward fringe excepting Holly Beach, Isles Dernieres, Cypremort Point, and Grand Isle.

There is a correlation between the densities of camp and population distribution. The chenier plain has 17 percent of the camps and 13 percent of the population; the deltaic plain has 83 percent of the camps and 87 percent of the population.[3]

Patterns of camp distribution are described and interpreted in the following sections, and the types of camps are discussed. Finally, the influence of numerous relevant biophysical and cultural factors on camp diffusion is elaborated upon.

CHENIER PLAIN CAMP LOCATION

On the chenier plain isolated camps are not common; 88 percent of the camps have highway access (Figs. 12 and 13). At Constance, Holly, Ocean View, Peveto, and Rutherford beaches there are 538 recreational structures. Use of these sites began in the early 1930s, when at Holly Beach there were only 21 buildings. The trend established more than 40 years ago continues. Storms periodically destroy the beach cottages,

Table 6. Camp count by parish.

Parish	No. of Camps	Percent of Total
CHENIER PLAIN	1,704	16.7
Calcasieu	127	1.2
Cameron	1,242	12.2
Jefferson Davis	82	0.8
Vermilion	253	2.5
DELTAIC PLAIN	8,516	83.3
Iberia	113	1.1
Jefferson	1,724	16.9
Lafourche	874	8.6
Orleans	1,051	10.3
Plaquemines	1,090	10.6
St. Bernard	150	1.5
St. Charles	152	1.5
St. John	155	1.5
St. Mary	281	2.7
St. Tammany	643	6.3
Tangipahoa	209	2.0
Terrebonne	2,074	20.3
Total	10,220	100.0

but the accessibility and proximity of these recreational regions to the people of Abbeville, Lafayette, and Lake Charles have expedited their reconstruction. The bungalows may be damaged or demolished by storms, but they are rebuilt; the cycle is continuous, simply because of Louisiana's limited beach property.

The shoreline east of the Mermentau River has not been utilized for recreational purposes because this section of coastline has retreated about 4,000 feet in the past 150 years, making it an unacceptable site for camps (U.S. Army Corps of Engineers [USACE] 1971a).

Camps at Grand Lake (143 structures), Hackberry (141), Holly Beach (398), Little Chenier (42), Oak Grove (55), and Pecan Island (142) serve as staging areas for weekend and seasonal fishing, hunting, and trapping. With 921 dwellings, the six clusters continue to dominate, as they did in the 1930s, the camp distribution pattern. There are 1,704 camps in the marsh of the four western parishes (Calcasieu [127], Cameron [1,242], Jefferson Davis [82], and Vermilion [253]), and 54 percent of the chenier plain's camp total is concentrated in the above mentioned recreation centers (Fig. 3).

Many chenier camps have been built to serve essentially one recreational interest--hunting. These are seasonally occupied dwellings that are used primarily during the fall and winter hunting seasons.

In order to meet the demand for hunting space, land owners initiated private and collective lease agreements. An individual who wants to hunt must lease a tract or join a club. Leases are also prerequisite to trapping fur-bearing and harvesting other quadruped animals and waterfowl that feed in this zone. To permit maximum use of finite hunting space, hunting clubs were organized.

In the late 1960s, when the Louisiana Department of Wildlife and Fisheries (LDWF) required such clubs to be licensed, there were about 40 in the study area, about equally divided between the chenier and deltaic plains (Cook 1968). Club camps vary from spartan to luxurious, with fees matching the facilities. Costs range from $100 to over $1,000 per year.

In the past, hunting club parties killed waterfowl by the hundreds, not only on the cheniers, but also in the marsh. Topographic map place names show that in the 1930s the region was already serving recreational sportsmen. The maps indicate that the Caldwell Camp, Crowley Hunting Club, Florence Hunting Club, Gate Camp, Lake Arthur Hunting Club, West Cove Camp, and many others had established title to their hunting preserves. From these camps a person could kill his 25-bird limit with ease.

In addition to these early club camps there were 77 other single or multiple-dwelling settlements. Each served the chenier plain's farming, hunting, and trapping interests. A permanent dwelling satisfied the needs of one family, whereas the hunting camp was a dormitory that accommodated the club's entire membership. Whether the camps were located on a ridge or within the marsh, sportsmen used mud boats (Fig. 14) to get to their leases through *trainasses* (narrow ditches cut through marsh vegetation by a mud boat). This method is still employed by the occupants of the 206 structures without highway access.

DELTAIC PLAIN CAMP LOCATION

On the deltaic plain there are 8,516 camps to serve the year-round sportsman. For recreational purposes the more notable areas are Chef Menteur (883 structures), Cocodrie (599), Grand Isle (1,353), and North Shore (405). These sites have a total of 3,240 structures, one-third of the study area total. Grand Isle is the largest site, extending 8.6 miles along the Gulf of Mexico. When added to the cottages paralleling U.S. Highway 90 at Chef Menteur, the two areas account for one-fourth of the deltaic plain's camps.

The plain's eleven parishes contain 8,516 camps, and 70 percent are in Jefferson (1,724 structures), Orleans (1,051), Plaquemines (1,090), and Terrebonne (2,074) parishes. More than half of the Terrebonne units

are without highway access; they represent one-third of the deltaic plain's isolated camps.

Unlike the chenier plain where club hunting dominates, the eastern marsh is often hunted on an individual basis. Leases are required and can be quite expensive, but local people have not often organized into clubs. When the marsh was settled, individual hunting areas were claimed, and shooting times were established by the community. Each hunting territory was honored, and the tradition continues.

The campsite map (Fig. 13) shows 3,438 recreational units without highway access--a ratio of 16.7 to 1 over the chenier plain. Isolated camps are a common phenomenon. A map scan reveals that the major centers are clustered along shoreline property and waterway natural levees. Highway access is related to the pre-eminent bayous and beaches. Structures built away from the road are scattered throughout the marsh. Where possible, natural levees support the camps. If there is no available high ground, the units are built on pilings above the marsh muck (Fig. 15). These secluded campsites border the remote bays, bayous, estuaries, and lakes.

Accessible only by boat or seaplane, many of the isolated recreational dwellings are concentrated on sites that have been utilized intensively since the 1930s. Among these recreation/permanent settlements are Bayou Carrion Crow, Bayou Cholas, Bayou Creole, Bayou Mount, and Redfish Bayou, along with Avoca Island, Camardelle, Seabreeze Pass, Oak, Queen Bess Island, and numerous others. These were characterized by few structures, but the historical entrenchment of these sites continues. Some are now connected to highways; others are isolated. People made their living by killing the waterfowl and shipping them by iceboat to the nearest railroad. In fact, most of the hand-dug canals and *trainasses* that cross this marsh were hacked out by trappers to get to their traps or hunters to get to duck or deer blinds--rarely did the fisherman excavate a transportation route.

Recreational clusters adjacent to the principal highways have expanded due to accessibility. People in Houma, Metairie, Morgan City, New Orleans, Slidell, Thibodaux, and many other cities are attracted to these coastal settlements. They have built accommodations to meet their needs--from the simple (Fig. 16) to exotic ranch houses and multistoried structures capable of sleeping 50 or more.

In some instances, isolated camps are hardly austere. At Bayou de Cade in lower Terrebonne Parish a power line crosses the marsh to meet the recreational dweller's needs. In most of the 1,706 isolated camps in Lafourche and Terrebonne parishes, however, generators are used for electrical power.

CAMP TYPES

Louisiana's 10,220 marsh recreational dwellings come in all shapes,

sizes, styles, and designs. They may be built on pilings above the semifluid marsh muck, on a slab anchored to a natural levee, or on a chenier or beach. Structures include rough-hewn, tar-paper hovels; piling-supported mobile homes suspended 15 feet above the ground, simple, but adequate, bungalows, elaborate second homes, and a multitude of other architectural styles (Fig. 17). A few of the more luxurious camps have swimming pools, glass-enclosed verandas, and enough rooms and beds to lodge 50 guests comfortably. Some two-storied units have outside elevators. At the other extreme are camps that have just one room.

Hunting Camps

There are hunting camps throughout the marsh, but the largest number is on the chenier plain. They are staging areas for weekend waterfowlers who average 30 days of hunting per season (Hunter 1976).

The camps are generally of wood frame construction and have electricity, gas, privies, running water, and yards large enough to accommodate from 20 to 30 automobiles. Regardless of camp size or appearance, an interconnecting system of *trainasses* has been cut into an individual hunter's or club's lease. The routes may connect directly into the camp site or join the highways. A frequent sight is a mud boat beached on the camp property or tied in a small sheet-metal shed in the *trainasse*.

Deltaic plain hunting camps are built from a variety of construction materials. The austere piling-supported, wood or tin structures are used usually for hunting and fishing. Many of these camps have butane stoves, cisterns, and generators to make them more comfortable. The camps with highway access generally are better built and frequently have electricity, gas, and water supplies provided by public service companies. Even with such amenities, the structures are often shanties. There are small, but adequate, hunting base camps, reached by pirogues rather than mud boats.

If a sportsman does not wish to take the time or effort to build a camp, he can hunt his lease from a barge- or skid-mounted houseboat (Fig. 18). These mobile units are often pulled onto a levee for the hunting season, then moved gulfward for marine sport fishing toward spring. They are not always self-propelled, thus, some must be pushed or pulled by another vessel. Roughly 5 percent of the deltaic plain camps with no highway access are barge mounted.

Fishing/Boating Camps

Fishing/boating camps are usually identified by name: Sunday Strugglers, Hangover Lodge, Camp-My-Foot, Buzzard's Roost, and Granny's Poor House (Fig. 19). The region's French heritage is also reflected in these camp placards--C'est Notre Plaisir, Chateau de Bateau, Lagniappe, and C'est la Vie. These camps are located in the Chef Menteur, St. Bernard Parish, and North Shore areas, and on Grand Isle, Cypremort

Point, and Holly Beach. Some are expensive and luxurious, costing more than $150,000. They go beyond the definition of a bungalow or cottage and are second homes. In the Calcasieu Lake, Lake Arthur, Lake Pontchartrain, and Cypremont Point areas, their pile-supported fishing piers are popular appurtenances that provide a convenient platform from which to fish.

Raised two-story structures often have a screen-enclosed lower floor used as a mosquito-free, all-purpose day room. At some of these sites property has become so dear that trailers are being placed under the pile-supported building to provide additional sleeping space. A boat storage and garage facility is usually placed adjacent to the camp. The upper floor is elevated above flood waters and contains the main living accommodations. In some cases, the camp is built over a boat slip; thus, the living quarters are high above water (Fig. 20). Each of these structures is equipped with a launching ramp or hoists to put the boat in or out of the water. To attract recreational boaters, some developers have constructed a system of canals to guarantee camp access.

There are fishing camps in the Louisiana wetlands that are more rustic. Some of the camps are partially screened to keep them cooler during the warm summer months. Many structures have a crude, partially dilapidated wharf in front. Wharf-mounted *poupiers* (Fig. 21), outside wash basins and counters used for cleaning fish, protective bulkheads, or a combination of any of these features also identify fishing camps. In the shrimp season pleasure boats are outfitted to pull a 25-foot or greater trawl. The nets usually are dried and repaired at the camp.

Trapping Camps

Camps of the trapper are usually old cypress structures of board and batten or wood-frame construction. Ordinarily a wood-burning or butane stove supplies heat, the light sources are white-gas lanterns, and a cistern provides water. These camps are crude, rough-hewn buildings, but they are used only three months of the year. Several identifying characteristics distinguish this type of camp from the others. A washing machine wringer used to dry pelts is visible somewhere on the premises. A wood-frame curing rack may be on one side of the structure, and during the trapping season stretchers and traps hang from the building (Fig. 22).

Only a few of these camps remain in the coastal zone. Built for trapping, they also provide the owner's family with a recreational site for off-season fishing and hunting. Like all marsh camps, they are multifunctional. They differ from the other types in that they serve income as well as leisure-oriented interests.

BIOPHYSICAL FACTORS AND CAMP LOCATION

Three biophysical factors that affect camp location are marsh substrate strength, the hurricane hazard, and game animal habitat preference.

Marsh Substrate Strength

Recreational camps have been constructed on a variety of soils that differ widely in shrink-swell and corrosion potential, load-bearing capacity, wetness, and trafficability (Lytle and Driskell 1970). Favorable building sites are limited by these elements. Typically, the marsh is exceedingly wet, with a low to extremely low load-bearing capacity and is subject to possible overflow hazards.

On a regional basis, some southeastern Louisiana land surfaces may sink as much as 17 feet each century (Kolb and Van Lopik 1958). A current map shows that the potential for subsidence varies from zero on a natural levee's non-organic soil to more than 4 feet in marsh (Louisiana State Planning Office 1976). "In many areas aggradation cannot keep pace with subsidence, and small ponds may develop in tracts that were once continuous marsh. These small water bodies expand rapidly as wind-driven waves attack the poorly consolidated sediment of which the pond margins are composed, and they soon evolve into lakes with smooth, rounded shorelines" (Gagliano and van Beek 1970). In habitats colonized by three-cornered grass, muskrats can denude the terrain of all vegetation. If these places are inundated by highly saline storm tides, they can disintegrate into permanent ponds and lakes (O'Neil 1949). Moreover, a die back of oyster grass may create a rotten spot that can deteriorate into an open water body (Smith 1970). Occasional burns, initiated by hunters and trappers, can also disturb the vegetation.

As the Mississippi River changed its course over the past 5,000 years, numerous distributaries were abandoned for more favorable routes (Fig. 5). The seaward growth of the channel levees was characterized by the deposition of fine-grained sediments. Based on grain size and appearance, these sedimentary structures can be divided into six groups: prodelta clays, bar sands, natural levee silts and clays, channel fill sands and peats, interdistributary silts and clays, and marsh clays and peats (Treadwell 1955). The substrate strength for supporting a recreational dwelling is based on, in addition to the soil's water content, the sedimentary structure properties.

Through time the recurring channel changes have created the intricate horse's tail pattern of natural-levee fingers that extend into the wetlands. Recent alluvial silt, sand, and clay soils are better drained, and they are rated by the U.S. Soil Conservation Service as having properties favorable for camp construction. Levees vary in local aerial extent, depending on the stream's stage, volume, and sediment load; in short, the larger the river, the wider the levee.

The natural levee's texture is distinguished by little or no organic matter, and it can support between 800 and 1,200 pounds per square foot (Kolb and Van Lopik 1958). Classified as Mhoon-Commerce, these high ground soils are rated favorable for camps or homesites. The limitations are so minor that they can be easily tolerated.

A factor of at least local importance is the pattern of canals that have been dredged in recent years. Unlike natural levees, the higher, better drained canal banks are susceptible to shrinkage and subsidence. Nichols (1959) reports the organic-rich spoil may lose from 50 to 60 percent of its volume due to shrinkage and subsidence. Camps on these soils are constructed on a soft, almost fluid material--a substance that is an unstable building foundation.

Between the Mississippi River's present and past deltas are the interdistributary basins, whose clays can support from 100 to 400 pounds per square foot. The line of demarcation "between the interdistributary and overlying swamp and marsh clays is particularly indistinct" (Kolb and Van Lopik 1958). The peats and mucks are distinguished by high water content and organic properties--two factors that make them susceptible to consolidation and subsidence, and reduce their load-bearing capabilities well below those of interdistributary clays. The drained peat marsh east of New Orleans, for example, shrinks and subsides as much as 75 percent (Wagner and Durabb 1976). *Sagittaria* peat shrinks to roughly one-third of its former volume when air dried (Kolb and Van Lopik 1958). The peats are, in effect, too unstable for homesites. Sportsmen who use these areas must rely on houseboats or locate a movable structure on the spoil bank of a canal.

Numerous sand and shell beaches stretch along the coast. Sand beaches border the Gulf of Mexico on the chenier plain and are found on the deltaic plain's Isles Dernieres, Timbalier Island, and Grand Isle island arcs. Beaches are described as stable or retreating. High density clustering at Grand Isle and Holly Beach attests to the high bearing strength of the support sands. The load-bearing capacities of shell beaches have also attracted camp builders. This accounts for some of the small clusters and individual isolated recreational dwellings located on the inner margins of bays and sounds, particularly in Terrebonne and St. Bernard parishes. Although beaches have attracted numerous individuals looking for weekend camping facilities, they are at times vulnerable to flooding.

Hurricane Hazard

Tropical storms and hurricanes obviously cause loss of human lives, damage and destroy camps and utility and communication networks, and have negative impacts on vegetation, fish, and wildlife. Between 1559 and 1971 158 such events struck or threatened Louisiana coasts. In the 20th century the annual average has been 1.2. At one extreme there were four in 1932 and 1934 (USACE 1972c); at the other, none entered the Gulf of Mexico in 1962 and 1976 (*Times-Picayune* 1976).

Five hurricanes have crossed the Louisiana coast since 1950: Audrey, 1957; Hilda, 1964; Betsy, 1965; Camille, 1969; and Carmen, 1974. Their tracks are mapped in Figure 23 (for relevant meteorological and hydrologic data see Table 7). In Louisiana these hurricanes collectively flooded 19,600 square miles of land, caused 698 deaths, displaced

Table 7. Hurricane meteorological and hydrologic data (1957-1974).*

Hurricane (yr)	Maximum Winds (mph)		Storm "Tide" Elevation (ft)		Rainfall (in)	
Audrey-1957	105	Cameron	11.9	Grand Chenier		
			10.6	Cameron†		
			8.5	Morgan City		
Hilda-1964	135	Franklin	7.8	Cocodrie	17.7	Iberia Parish
			6.4	Lower Atchafalaya River	9.0	Franklin
Betsy-1965	160	Grand Isle	15.2	W. Pointe a la Hache	5.8	Schriever§
			10.4	Empire	5.7	Morgan City§
			10.6	Rigolets	5.1	New Orleans§
			9.1	Chef Menteur		
			8.8	Grand Isle		
			6.5	Mandeville		
Camille-1969	202	Miss. Coast¶	11.3	Chalmette	2-6	Southeastern La.¶
			10.9	Empire		
			8.7	Chef Menteur		
Carmen-1974	180	Offshore**	11.6	Cocodrie**	7.8	Boothville**
					7.2	New Iberia**
					5.0	Lafayette **

*Unless otherwise noted, the data are from USACE (1972c).
†Morgan et al. (1958).
§USACE (1965).
¶USACE (1970b).
**USACE (1975).

more than one-half million people, and damaged or destroyed more than 4,100 camps.

In most areas camp construction slows down as the hurricane season approaches. Excepting Audrey, the post-1956 storms damaged primarily deltaic plain camps. Most of the existing gutted, unrestored structures are on the deltaic plain.

CULTURAL FACTORS AND CAMP LOCATION

Camp location patterns have developed from interaction between the biophysical and such cultural factors as attitudes toward marsh recreation, highway and waterway access to camps, land company site leasing policies, and government regulation of recreation and camp building.

Attitudes toward Marsh Recreation

The coastal landscape means different things to different people. Individuals living in the area recognize its economic significance; at the same time, they appreciate the available outdoor activity. They may want the marsh left in its natural state. Lindsey et al. (1976) report three out of ten interviewees want it untouched or restored to its natural condition. "Of those who expressed feelings that the coastal zone be developed in some way, the most often named projects were recreation and light industry." Nearly 20 percent of the sample favored developing sport fishing and hunting.

Camp Access Routes

Camps must be accessible to land, water, or aircraft. As only a few of the marsh recreation seekers can afford to travel to camps in an aircraft, the vast majority of the camps must be reached by road and/or waterway. Indeed, 64 percent of the study area's camps are accessible by road, and often additionally by water, and the balance, 36 percent, by waterway alone (Figs. 12 and 13).

Highways

Camps accessible by highways are more desirable than units isolated from roads because they are more convenient to go to and from--a fact especially appreciated in an emergency. Furthermore, power lines that may be tapped almost invariably parallel public roads.[4] Power line electricity off of highways is a rare luxury in that it costs from $25,000 to $35,000 per mile to extend service into the marsh.[5] Among the few exceptional isolated areas served by power line electricity are Bayou de Cade and Lake Fields in the south-central deltaic plain. Isolated camps must use batteries or generators for sources of electricity.

The hard-surfaced roads of the marsh were completed between the

early 1930s and mid-1950s.[6] They provided essential north-south and east-west routes on the deltaic and chenier plains, respectively. Furthermore, they enhanced access to isolated camps by facilitating building of boat launching facilities further in the marsh. Highways set the stage for the camp building boom of the 1960s. Artificial waterways predated hard-surface roads by more than a century in coastal Louisiana.

Waterways

Barrett (1970) measured south of the Intracoastal Waterway 7,227 miles of bayous and passes and 4,573 miles of man-made watercourses. The network is more than adequate to meet the needs of the sportsmen. Only freshwater routes, at times, are untraversable when they are clogged with water hyacinths in the warm season (Geagan 1953; Fig. 7).

Bayous

The word bayou is used to describe every type of natural watercourse, with the possible exception of major rivers. They vary considerably in physical appearance. More than 6,500 square miles (Gagliano 1973) of bayous are on the landscape and serve as valuable traffic corridors. Fishermen get an added dividend in that bayous provide some of the state's finest angling fishing (Gresham 1963).

Canals

Canal building began with the earliest European settlers and continues today. Canals were necessary to exploit the region's timber, fur, hydrocarbon, and agricultural resources, as road construction was impractical. Five categories of canals are recognized: drainage and reclamation, transportation, trapping, logging, and petroleum. Each type served a particular economic function. A by-product of their growth and development is a transportation network of substantial size.

Drainage and Reclamation Canals. Marsh and swamp drainage ditches were excavated by the French as early as 1720. In a practical sense these were part of a great land reclamation movement designed to help planters drain potential crop and pasture land. In many cases reclamation canals became viable transportation arteries (D. Davis 1973). They are multifunctional units serving as drainage and access waterways. Whether large enough for a pirogue or powerboat, they are often key passageways into productive fishing or hunting grounds. In some instances, channelization and stream improvement have increased runoff and lowered the water table. To the sportsman, such constructive works often mean destruction of a watershed's valuable wildlife habitat (Madson 1974).

Transportation Canals. Movement of goods by water has long been an integral part of the coastal zone's transportation geography. Natural drainage patterns in the chenier and deltaic plains generally are aligned in a north-south direction, making east-west movement difficult.

To overcome this inconvenience, canals were excavated as connective links between streams. These additions improved the transportation system and became outstanding commercial and recreational traffic corridors. The sportsman as well as the push boat benefit from the system.

Trapping Canals. Trappers built canals known locally as *trainasses*, a term derived from a French word meaning to drag but used to identify a "trail cut through the marsh grass for the passage of a pirogue" (Read 1937) (Fig. 24). These channels are 5 feet wide by 6 to 12 inches deep and provide the marsh dweller with convenient watercourses.

Before the increase in fur price from 8 to 50 cents per pelt between 1914 and 1922 (Chatterton 1944), hunting was more profitable than trapping. The 525 percent increase in fur value prompted local people to change their winter subsistence activity from hunting to trapping. In so doing, they extended their hunting *trainasses* into areas of high furbearer production. They methodically added a unique element to the coastal zone, one that would later provide weekend sportsmen with routes between their camps and other areas of activity. *Trainasses* represent the first large-scale marsh canalization (D. Davis 1976).

On these canals, people used pirogues (Fig. 8), mud boats (Fig. 14), and marsh buggies (Fig. 25). While the pirogue has been modified many times, it is still one of the principal boats used to plow through the marsh muck (Waldo 1965). Mud boats and marsh buggies have improved chenier plain travel by helping trappers and hunters fulfill their needs for quick lease access (Ensminger 1967).

Logging Canals. To harvest the extensive cypress swamps of the deltaic plain, logging companies had to solve two problems--access and timber removal. The former obstacle was overcome by excavating canals to logging sites. Removal of the cut timber was accomplished by using a pull-boat to drag the logs into the dredged channels (Norgress 1935).

Hundreds of miles of logging canals are still a part of the landscape. Between 1880 and 1940 these channels were essential to the forest industry; they now provide bass fishermen with access routes into freshwater pools (F. Davis 1973).

Petroleum Canals. In the 20th century oilmen sought and exploited the coastal zone's hydrocarbon resource. To gain access to drilling sites, drilling contractors, beginning in the 1920s, produced a canal system that further opened up the coastal lowlands. The petroleum canals represent the largest number of man-made canals added to the landscape and provide sportsmen with valuable access routes (Fig. 26). Many petroleum-related waterways have become important fishing areas. For example, the Bluebird Canal in northern Terrebonne Parish is the site of an annual bass rodeo.

Effects of canal building have not been all positive. Adkins and Bowman (1976) report that the extensive network of artificial waterways

has created problems that reduce the "probability of supporting a healthy population of organisms." The canals have contributed to salt- and freshwater intrusions (Yancey 1967), direct land loss (Gagliano and van Beek 1970), and reduction of water levels (Adkins and Bowman 1976).

Tract Lease Policies of Private Landowners

Waterfowl hunting and trapping outside of certain public wildlife refuge and management areas and camp building away from high value land with highway access almost invariably require a land lease from one of approximately 50 marsh landowners. Roughly one out of three camps is on a land company surface lease. On the deltaic plain a site is ordinarily leased by an individual for use by family and guests. Chenier plain recreation seekers, however, frequently get access to the marsh through membership in a hunting club that leases property from a land company.

Examined below are lease agreement details excerpted from the formal policies of four of the larger land companies that in aggregate own 1,700 square miles of fee land for recreational use.[7] The following discussion is simply an overview; the policy of a particular land company may differ with respect to any single generalization.

Land Company Lease Agreements

Tract leasing is advantageous to lessees and land companies. Hunters and trappers, on the one hand, may pursue their avocations for intervals of from one to five years with the possibility of renewal, assuming the company rules have been adhered to, and all activities have been legal. On the other hand, there are several advantages to property owners' land leasing. It is good public relations; lessees promise to be prudent, conservation-minded caretakers of the land and to notify the company of trespassing. Further, the lease serves occasionally to refine delimitation of the property boundaries and to reaffirm the company's ownership of the land.

Waterfowl lease agreements are valid for either five years or for one year with a renewal of the option for up to five years. Trapping and surface lease contracts are made annually and are renewed if the company rules and all federal, state, and local laws have been obeyed. Either party may end the lease if the other one is given notice from 15 to 30 days in advance. If the lessee cancels, all rentals paid are forfeited; if the company rescinds, the proportionate part of any paid fee is refunded for the unused period of the current year. In the case of waterfowl leases, most companies that cancel refund a pro rata portion of the rent, based on the unexpired part of the legal waterfowl season.

The lease as a rule is for the benefit of only the lessee and his guests, and unauthorized subleasing of lessee rights is prohibited. The lessee agrees not to institute any litigation involving title to or possession of the leased land, and the company is not responsible for damages to any person or property on the lease site. The lessee may not

construct any work, facility, structure, or improvement or use marsh buggies or air boats without consent of the company. Be that as it may, camps are allowed routinely on trapping and surface leases, and blinds are permitted on waterfowl leases. All such structures must be removed within 30 days following termination of the lease.

Land Company Policy: A Case Study[8]

The Louisiana Land and Exploration Co. (LL&E) owns on the deltaic plain in St. Mary Parish east through Plaquemines Parish 1,250 square miles of fee land, of which 95 percent is marsh. All of their property is open to the public at no charge for fishing purposes. The company owns and maintains roughly 360 water control weirs (Fig. 27). These structures maintain a constant water level to benefit fish, fur-bearing animals, and waterfowl. Sport fishermen use these pools heavily during fall and winter when prevailing northerly winds tend to push water that is not retained by weirs out of the marsh.

Trapping Leases

All LL&E lands have been under lease for trapping purposes since 1929. Tract sizes are from 300 to 1,280 acres, and the average is 640 acres. The fee, which is a percentage of the value of the fur harvest for the year of the lease, ranges from $100 to $400. It is adjusted if a natural catastrophe limits the pelt yield, or if the lessee is hampered by illness or death. On LL&E land there are roughly 140 active trappers.

Waterfowl Leases

Approximately 80 percent of the trapping territory is leased to waterfowl hunters who agree not to interfere with trappers and to conduct non-commercial hunting, using only legal firearms. Waterfowl leases numbering more than 280 range in size from 40 to 640 acres. The annual rent is from $100 to $200 per tract, and it varies with site location, size, and number of ponds. Holding the lease size constant, the rent is relatively low for the less productive saline marsh and increases for the fresher marsh inland. An estimated 4,800 waterfowlers annually use LL&E lands.

Surface Leases

The LL&E Co. has roughly 950 active surface leases, and at least 95 percent of them are occupied by camps. They account for almost 10 percent of the study area camp total. The camp sites front on waterways, and most are 100 by 100 feet. The annual rent is usually $25, but it may be as high as $50. About 70 percent of the camps are bases for recreational fishermen, 15 percent are hunter-occupied, and the remaining camps are dwellings for trappers or commercial fishermen.

Government Policies Affecting Recreation and Camp Building

Numerous federal and state rules govern recreational activities and camp building. Parish police juries usually regulate only camp construction.

General Regulation of Recreation

State and federal controls over fish and wildlife are attempts to assure a never-ending supply of fish, fur, and game resources. Sportsmen should become aware of hunting, trapping, and sport fishing laws and motorboat registration requirements of the Louisiana Department of Wildlife and Fisheries by obtaining the annual regulation leaflets furnished by LDWF.[9]

Recreational Activity and Its Regulation on Public Land

More than 600,000 man days of recreational activity take place annually on study area federal wildlife refuges and state wildlife management areas, refuges, and parks. Though the federal refuges have existed for more than four decades, expansion of the state parks and management areas is a relatively recent phenomenon.

Five of more than 390 National Wildlife refuges are in the study area (U.S. Fish and Wildlife Service [USFWS] 1977) (Fig. 11); almost 2,000 privately owned camps are within 25 miles of them. There are no camps for general public use in the sanctuaries. Details are given below for all study area national refuges, except the 8-acre Shell Keys haven, which is made up of oyster shell islands for colonial bird nesting.[10]

Chenier Plain National Wildlife Refuges

The Sabine and Lacassine National Wildlife refuges total 273 square miles and have collectively 133 square miles of hunting and fishing area. Waterfowling is in accordance with special conditions and all federal and state regulations and is confined to duck, geese, and coots. The sport fishing season is from March 1 through October 15.

Deltaic Plain National Wildlife Refuges

The two refuges, the Delta and the Breton National Wildlife Refuges, are located near the mouth of the Mississippi River. Hunting and any nighttime activities are not allowed on the sanctuaries; sport fishing complying with state and special regulations is permitted year-round except on the Delta refuge during duck season.[11]

State Wildlife Refuges

Within the study area are four state-owned wildlife refuges totaling 279 square miles (Fig. 11). Hunting is not permitted on them, but sport fishing is allowed without special approval except in the Rockefeller sanctuary, which requires a visitor permit for daytime activities. About 8,000 such licenses are issued per year, and roughly 100,000 are in circulation.[12] The 128-square mile Marsh Island refuge has been described as "one of the most important wildlife areas on the North American Continent, particularly from the standpoint of migratory waterfowl and furbearing animals" (Yancey 1962). In addition to accommodating recreation enthusiasts, these refuges are places for wildlife management research and contain impounded water for hosting hundreds of thousands of migratory and resident birds.

State Wildlife Management Areas

More than 152,000 man days of recreation take place annually on the seven state wildlife management areas that are at least partly within the study area (Fig. 11). Hunting, fishing, boating, and swimming, all subject to special rules, have been allowed on them for more than two decades. Four are owned by the LDWF and are dedicated permanently to recreational use by the public. The remaining areas are "leased by the state and administered by the LDWF with federal aid for upland game restoration, management, and protection as waterfowl areas" (Lowery 1974). Since hunting is not allowed on the Delta and Breton National Wildlife Refuges, the deltaic plain wildlife management areas are by and large the only regional hunting sites that are available to thousands of hunters without access to land company-leased tracts.[13]

Camp Building and Insurance Regulation

Federal, state, and parish permitting procedures are varied and, in cases, interdependent. Some of the policies are applicable study-area-wide, while others are relevant regionally or only parish-wide. All are intended to be in the public's best interest. Insuring camps against rising water damage finally became possible after Hurricane Betsy.

Federal and State Regulation of Camp Building

The federal government, through the U.S. Army Corps of Engineers, controls structure building, including erection of camps, slips, bulkheads, and piers in certain wetland areas.[14] During the past several years the jurisdiction of the USACE over wetlands has expanded. In Phase I, coastal wetlands adjacent to coastal waters and freshwater wetlands adjacent to navigable waters of the U.S. came under USACE regulation beginning in July, 1975. In Phase II freshwater wetlands adjacent to primary tributaries were added to the USACE's jurisdiction in September 1976. Implemented on July 1, 1977, was Phase III whereby all waters of the U.S., the destruction or degradation of which could

affect interstate commerce, were added to the USACE's jurisdiction.[15] With respect to the study area, more than 95 percent of the coastal marsh, which under normal circumstances supports a prevalence of vegetation typically adapted for life in saturated soil conditions, is currently under the USACE's jurisdiction.[16]

Structure building liable to USACE regulation requires a permit from that agency. In accordance with rules governing permitting of slip, bulkhead, fill, ramp, wharf, and pier construction, the USACE requirements include a description and drawing of the proposed activity and letters of no objection from the Louisiana Department of Transportation and Development's Office of Public Works, LDWF, Louisiana Stream Control Commission, and local governing bodies, i.e., the town and/or parish, levee district, and port commission. If a camp is involved, an additional letter of no objection must be requested from the Louisiana Department of Health and Human Resources. This request must include a drawing and description of plans for disposal of domestic wastes. Further, the permit applications are subject to review by other federal agencies, including the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Environmental Protection Agency.[17]

Among the USACE's responsibilities are weighing benefits of the proposed activity against the detriments to water quality, insuring that navigable waterways do not become obstructed, and checking that barrier island development is not impacted.[18] The LDWF and the Stream Control Commission try to protect the environment from negative impacts of dredge spoils disposal and, with the Department of Health and Human Resources, attempt to assure lawful disposal of domestic wastes. The Louisiana Department of Transportation and Development's Office of Public Works review of permit applications is related to state-owned waterbottoms and water resource development and is primarily concerned with negative effects on navigation and flood control-associated facilities.[19]

Statutory sanctions regarding the USACE's protection of the nation's waters involve up to thousands of dollars in fines and years of imprisonment.[20]

A General Permit for Camp Construction. A general permitting program was initiated on January 31, 1978, for camps and specified associated structures in certain coastal wetland areas within the New Orleans District, including the marsh of all of the study area parishes (USACE 1978). Through June, 1979, camp structures may be built without individual permits being issued for each structure. In the general scope of work is construction of buildings and appurtenances, including outbuildings, small wharves, boat landings, walkways, boathouses, and gazebos,[21] all to be used for non-commercial purposes.

Persons in need of a camp permit under the authority of general permitting must submit a written application to the USACE and receive written approval before commencing operations; further, all licenses, permits, or approvals required by state or local governing bodies or

agencies must be obtained before work may be lawfully performed (USACE 1978). Since no dredging or filling is authorized, except if necessary to install approved septic tanks or other sewerage treatment works for use by one or two camps, there will be no irreversible commitment of resources. Assuming sanitary wastes will be properly handled, environmental impacts by individual camps will be minimal.[22] In cases where the USACE determines that the public interest will be best served by denying approval, a regular, individual permit must be obtained before the work begins.

Excluded in the Public Notice are certain waterways and zones, including vicinities of levees built or maintained with federal funds and the Scenic Waterway system of Louisiana. Additional areas may be excluded, particularly those with existing excessive camp development and resultant pollution problems, as a consequence of future hearings.[23]

By January, 1979, the USACE had issued seventeen authorizations under general permitting.[24] The new program might be extended past June, 1979, but may be suspended in whole or part if the USACE determines such action is necessary to protect the public interest.[25]

Parish Regulation of Camp Building

The main concerns of parish-level governing bodies with respect to camp building are enforcing legal waste disposal standards and Federal Flood Insurance Administration requirements. In recent years some parishes have imposed moratoriums on camp construction because of the hazard of inadequate camp waste disposal. Since 1972 there has been a camp building moratorium in the marsh areas of Plaquemines Parish;[26] to date it is enforced.[27] The Department of Safety and Permits of the City of New Orleans during the summer of 1976 suspended issuance of permits for any type of structure along U.S. Highway 90 between Chef Pass and the Rigolets and on nearby U.S. Highway 11 at Irish Bayou.[28] Finally, concerning Jefferson Parish, outside of the town of Grand Isle, the Parish Council is not accepting marsh camp applications "until a system of acceptable disposition of wastes is functioning."[29] Regarding the remaining parishes, only Cameron has a formal camp permitting policy.[30] St. Bernard, St. Tammany, and Terrebonne parishes are developing statements of policy.[31] The other parishes do not plan to formulate such policies in the foreseeable future.[32]

Flood Insurance for Camps

In 1965 Hurricane Betsy flooded a considerable portion of southeast Louisiana. With nearly one-third of New Orleans under water and over a billion dollars of property damage in Louisiana, Mississippi, and Florida, Congress authorized the Department of Housing and Urban Development to investigate the possibility of flood insurance. Their research led to the National Flood Insurance Act of 1968 (National Flood Insurers Association 1976). The law is designed to assist flood victims to

rebuild their homes and businesses through subsidized insurance. Another purpose is to minimize flood damage by encouraging state and local governments to initiate land use controls designed to discourage development within certain flood-prone areas (U.S. Congress 1967). A flood-prone area, under the law, is defined as a site that has a 1 percent probability of being seriously flooded at least once in 100 years. "If it is found the 100-year flood level is too restrictive for community development, then the local government should apply for an exception as provided by the law" (Emmer 1976).

In time a series of amendments was added. The most significant was the Flood Disaster Protection Act of 1973. It "makes participation in the flood insurance program almost mandatory for flood-prone communities" (National Flood Insurers Association 1976). Emmer (1976) notes that "if a community does not voluntarily join the program, it is notified by the Federal Insurance Administration that it is tentatively identified as having some areas which are flood-prone. The community then has one year to join the program or suffer the consequences." If it fails to join or qualify for the program, residents of flood-prone areas cannot in the future receive mortages, loans, or any form of financial assistance from any lending agency. These individuals are thus effectively barred from purchasing developed real estate, erecting new facilities, or reconstructing existing structures in the flood zone. Lastly, the amendment decrees that land use standards must be initiated within the flood-hazard area.

A community application to become a member of the Federal Insurance Administration must include evidence of the adoption of a building permit system and an expression of the community's willingness to comply with the flood plain management requirements and standards set by the government (National Flood Insurers Association 1976). These standards include directing future development away from danger zones and enacting zoning measures that require new structures to be elevated on stilts, pillars, or pilings above the scientifically determined flood level. The building also should be anchored to prevent collapse, flotation, or lateral movement.

A community first becomes a member of the "Emergency Program" by indicating its desire to be included in the federal insurance program. After flood hazard and rate maps are completed, the community enters the "Regular Program" and becomes eligible for full flood damage coverage (McIntire et al. 1975).

Growing development pressures in Louisiana's coastal areas are increasing the risk of life and property from natural hazards. The hurricane is a significant problem. The coastal landscape between Lake Charles and New Orleans has a 1 percent probability of experiencing a 14-foot storm surge (Simpson and Lawrence 1971). In other words, the areas of extremely low elevations probably will experience a 14-foot flood once every 100 years. This portion of the lowlands, which includes almost all of the marshland, is considered a "special flood hazard." The USACE (1970a) flood hazard maps indicate that only about 150 camps

north of Lakes Calcasieu and Arthur and perhaps a few on Lake Pontchartrain's northern shore are outside of the 100-year flood zone.

All but perhaps 2 percent of the camps constructed in the study area, thus, are in flood-prone zones. Indeed, contoured maps indicate that 90 percent of the study area structures are on sites within 5 feet of sea level (Table 8). Most of the roughly 1,100 camps that are within 5 to 10 feet above sea level are at Holly Beach and adjacent to thoroughfares in St. Tammany Parish. The 40 camps on property located from 10 to 20 feet above sea level are in southern Calcasieu Parish. No known camp sites are above the 20-foot contour. Further, 20 percent of the population has never experienced a major hurricane. Most camp owners built or bought their camps without any regard for the projected hazard zone and have increased the risk of possible property loss (White et al. 1976).

Most of the study area has a 100-year flood level of from 6.4 to 15.2 feet. The lowest floor on structures built within the projected flood-prone area must be elevated on adequately anchored piles or columns above these levels; however, often land use controls can be circumvented by a section of the parish ordinance designed to treat each applicant separately.

By January 1975, fifteen of the study area parishes had enacted some type of ordinance or resolution regulating land use in flood-prone areas (McIntire et al. 1975). Nine were under the Emergency Program and six in the Regular (Table 9). Under the emergency plan the maximum amount of insurance available is $35,000 for a single-family home and $10,000 for its contents. Once the regular plan is approved, these limits usually are doubled. Under the Emergency Program the camp owner buys a policy at 90 percent subsidized premium cost. Through the Regular Program insurance may be purchased at actuarial, i.e., non-subsidized, rates--with premiums varying according to coverage (Emmer 1976). "All of these parishes have used the 100-year flood elevation as a standard building requirement" (McIntire et al. 1975), but only camps constructed since adoption of the building ordinances must comply with the law. Pre-ordinance structures may not be insured against floods, since the regulations usually are not retroactive.

It appears that many study area camps do not meet current flood plain regulations; these are built on slabs well below the 100-year flood level. Many of those that are raised have been enclosed below floor level, thus there is no space free of obstruction. Abnormally high tides and wind-driven water pose hazards to these structures. Trailers generally rest on cement blocks less than 2 feet above sea level, and many are not anchored or tied down. New camps are not always built above the 100-year flood level.

Such building practices occur coastwide. To the marsh dweller, compliance with building codes is extremely restrictive. Some ignore the law and construct their camps without a building permit. Even

Table 8. Camp site number versus elevation range.*

Parish	NUMBER OF CAMPS Elevation Range (0-5 ft)	(5-10 ft)	(10-20 ft)
Chenier Plain			
Calcasieu	40	47	40
Cameron	647	595	--
Jefferson Davis	42	40	--
Vermilion	155	98	--
Subtotal	884	780	40
Deltaic Plain			
Iberia	96	17	--
Jefferson	1,664	60	--
Lafourche	874	--	--
Orleans	1,043	8	--
Plaquemines	1,064	26	--
St. Bernard	130	20	--
St. Charles	152	--	--
St. John	155	--	--
St. Mary	281	--	--
St. Tammany	503	140	--
Tangipahoa	208	1	--
Terrebonne	2,035	39	--
Subtotal	8,205	311	40
Total	9,089	1,091	40

*Contour maps used were 1:62,500 "Storm Evacuation Maps" T-15001, T-15036 through T-15046, and T-15048 through T-15055. U.S. Department of Commerce, National Oceanic Administration, National Ocean Survey.

Table 9. Status of flood insurance programs by parish.*

Parish	Program Type†	Date Ordinance Adopted
Calcasieu	E	3/3/70
Cameron	R	12/16/74§
Iberia	E	2/11/75¶
Jefferson	R	12/12/74
Jefferson Davis	-**	
Lafourche	E	1/1/75
Orleans	R	12/5/75††
Plaquemines	E	6/6/73
St. Bernard	R	12/3/74
St. Charles	E	5/27/74§§
St. John	E	2/6/74
St. Mary	E	2/28/73
St. Tammany	R	12/19/74
Tangipahoa	E	3/11/75
Terrebonne	R	12/27/74
Vermilion	E	5/20/74

*McIntire et al. (1975); As of January 31, 1975.
†E = emergency; R = regular.
§Amending ordinance of 12/29/71.
¶Amending ordinance of 4/24/73.
**Not identified.
††Amending ordinance of 4/6/72.
§§Amending ordinance to include requirements for flood insurance.

though a permit is required to borrow from a lending institution, many have enough savings to build their camps without a loan. In economic terms the building codes have restricted commercial development, and, thus, eroded the local tax base (Natural Hazard Observer 1977).

Compliance by camps in areas below the 100-year flood level is complicated by the fact that some of them would have to be elevated as high as 15.2 feet to meet the guidelines. For these low structures the USAC (1972a) suggests installation of watertight windows and doors, provision for moving dwelling contents that might be damaged to higher levels, emergency electrical, water, and sanitary systems, sealing walls and foundations against seepage, strengthening walls to resist hydrostatic pressure loads, and installing pumps and drains. The piling support and structural changes could become prohibitively expensive (Fig. 15). To avoid these costs, many marsh dwellers will continue to build inadequate, near-sea-level structures. They will take their chances with the hurricane hazard and, in some cases, get a tax write-off if the structure is destroyed.

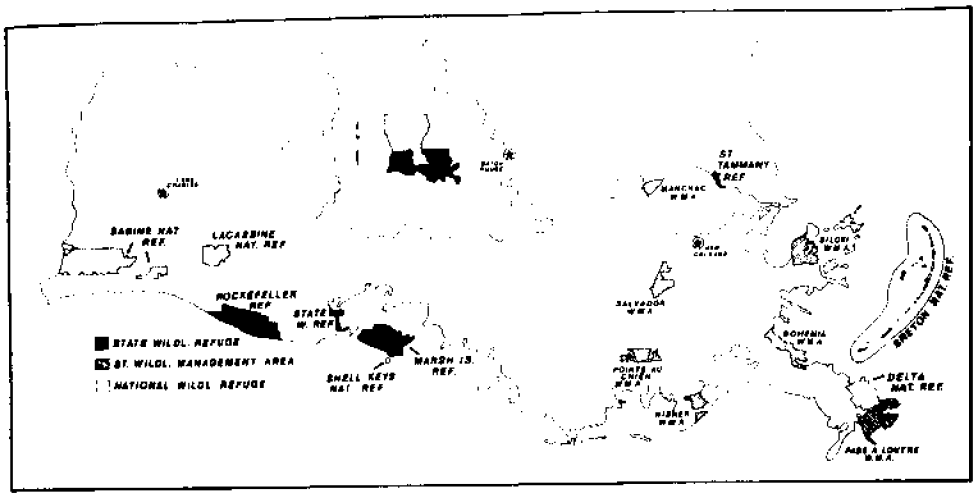


Fig. 11. Government refuges and management areas.

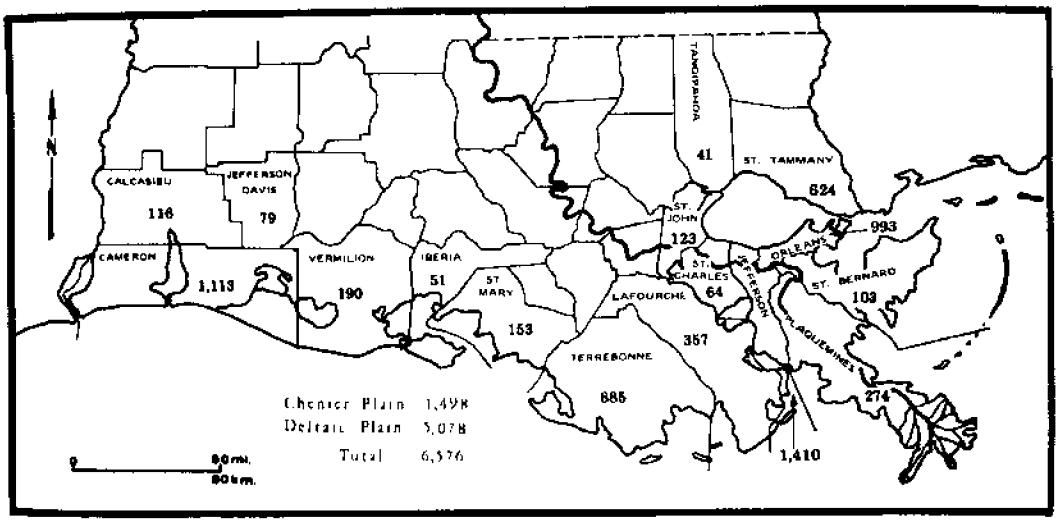


Fig. 12. Location by parish of camps with highway access.

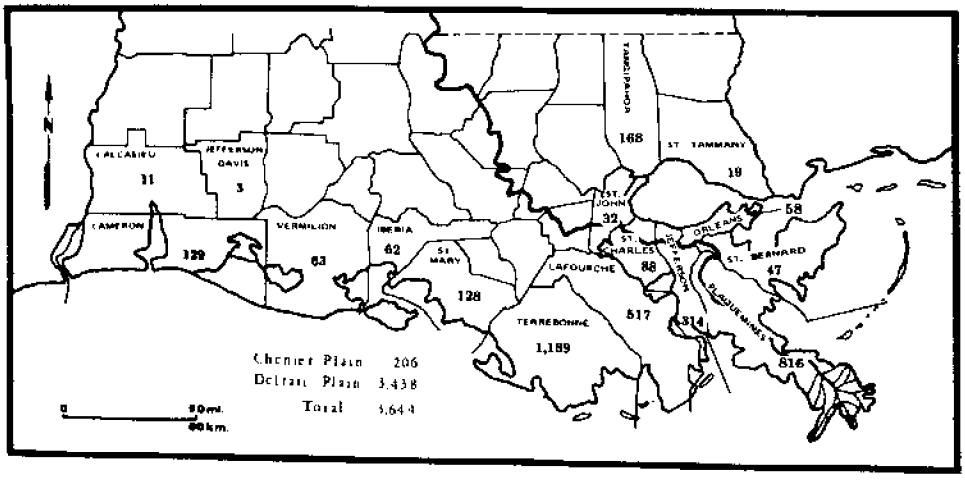


Fig. 13. Location by parish of camps without highway access.

Fig. 14. Mudboat use on the chenier plain.

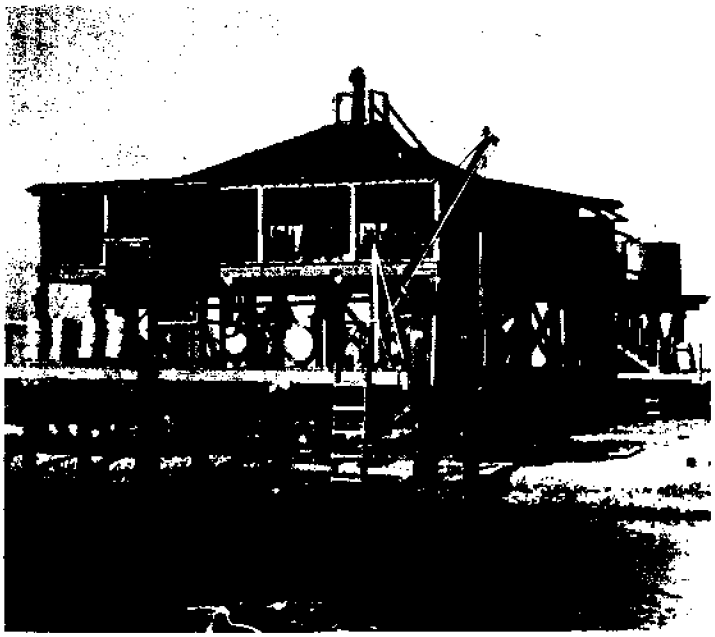


Fig. 15. A piling-supported camp.

Fig. 16. A non-pretentious camp.

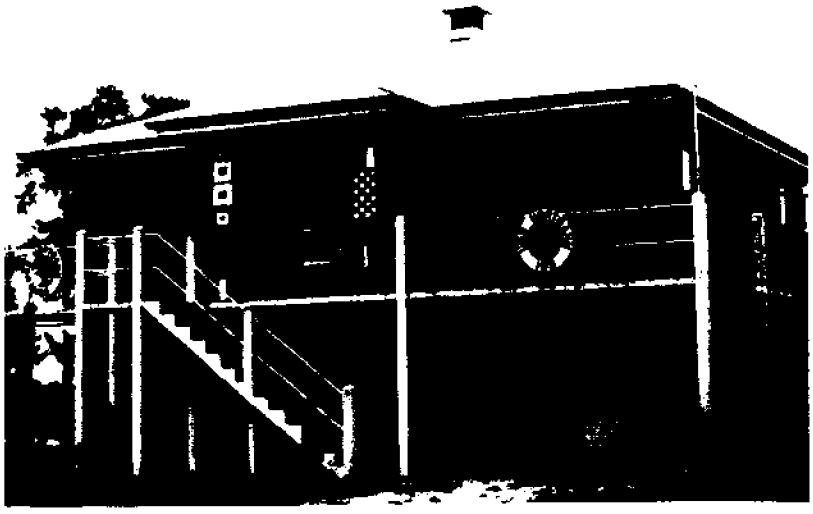
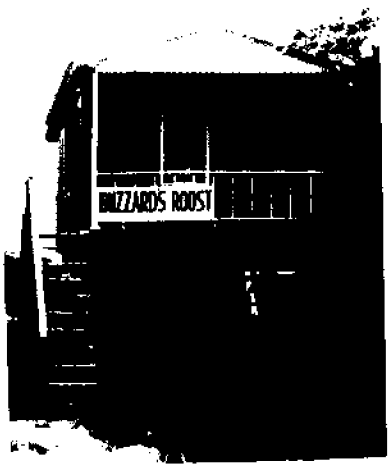


Fig. 18. A barge-mounted camp.

Fig. 17. North Shore fishing camp.

Fig. 19. A fishing camp.



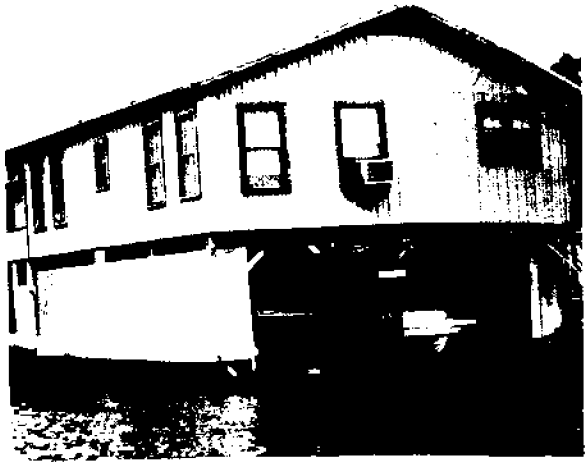


Fig. 20. A camp with a boat dock below.

Fig. 21. A *poupier*.

Fig. 22. An isolated trapping community.

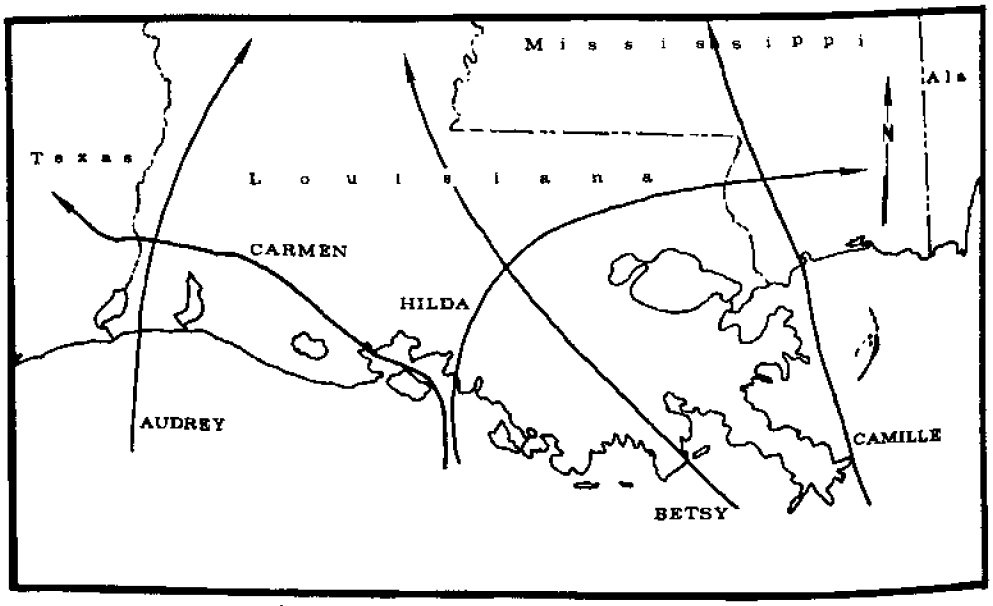


Fig. 23. Paths of the post-1965 hurricanes.

Fig. 24. A *trainasse*.

Fig. 25. A wheeled marsh buggy.

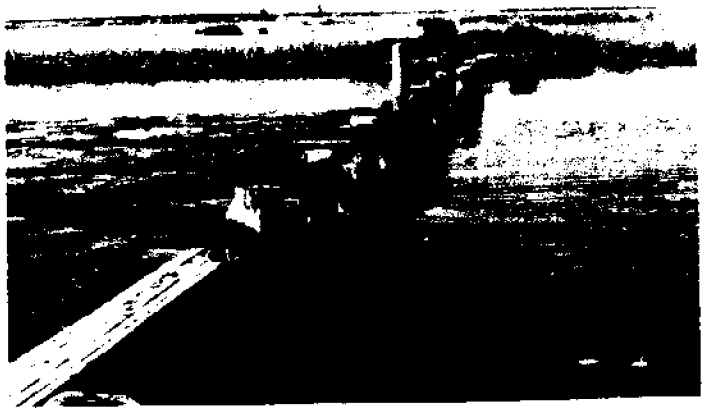


Fig. 27. A marsh water control structure.

Fig. 26. A petroleum canal network.

OCCUPANCY AND USE OF A FISHING-ORIENTED CAMP CLUSTER: A CASE STUDY

An example of the isolated fishing-oriented camp assemblages of the deltaic plain is the Bayou de Cade site in lower Terrebonne Parish (Fig. 28). Both fresh- and saltwater sport fishing occurs in this vicinity. The typical camp is occupied year-round but used most during summer.

CAMPS AND RECREATION ON BAYOU DE CADE

Along Bayou de Cade in south-central Terrebonne Parish, users of 88 camps enjoy nearly 30,000 man days of recreation annually. The 3-mile long bayou is a natural waterway between Lake de Cade and Jug Lake. According to Chabreck et al. (1968) marsh in the bayou vicinity is brackish; it is fresh 3 miles to the north and saline 5 miles to the south. Most sportsmen regard the fresh- and saltwater fishing as excellent and hunting as good. Bayou site privacy is enhanced by the absence of highway access.

Prior to the 1950s settlement along the waterway was restricted to a few trapper camps. Louisiana Highway 315, which originates in Houma and passes 6 miles east of the junction of Bayou and Lake de Cade was completed in 1940. Access to the bayou was further improved about 1960 by a boat launch facility built at the intersection of the highway and Falgout Canal. The canal runs westward into Lake de Cade (Fig. 28). In 1969 a power line was built out to the bayou area.[33] Meanwhile the number of camps along the bayou increased from 36 in the mid-1960s to 88 by 1977.

A peculiarity of some Terrebonne camps, including those of Bayou de Cade, is a code number painted on the roof. The number expedites camp location in emergency situations and facilitates security patrol. The Terrebonne Parish Sheriff's Flying Posse checks registered camps for evidence of vandalism each Sunday.[34]

The camps are located on the south side of the bayou; none occupy the northern shore because they would hinder levee maintenance by the landowner. The levee bank protects the area to the north from land loss due to storm surges from the south.[35]

Camp Use Survey

In 1976 a questionnaire requesting recreation-related information was mailed to the 80 owners whose camps were connected to a power line. The address roster[36] revealed that roughly 83 percent of them are from

Terrebonne Parish, 11 percent are from the New Orleans area, and 6 percent are from adjacent Lafourche and Assumption parishes. Thirty questionnaires were completed and returned; thus, 34 percent of the 88 camp owners of Bayou de Cade were sampled. The gathered data are analyzed below.

Camp Construction Year and Cost

All but three camps were built after 1950, and 80 percent were constructed between 1960 and 1973 (Table 10). From the mid-1960s to the early 1970s camp erection was stimulated by the generally favorable economic condition of southeastern Louisiana and by availability of power line electricity.

Camp costs ranged from $1,000 to $16,000, and the median cost was $5,000 (Table 11). The hurricane hazard and possibilities of vandalism and burglary discouraged many from investing more heavily in them.

Recreational Activities

Fishing, by far, is the preferred recreational activity, followed by relaxing and hunting. Angling, in contrast to hunting, can be a year-round sport, does not require a site under lease, and can be enjoyed with relatively inexpensive equipment. Camp owners were requested to rank order their two more important recreational pursuits. Fishing was the first choice of 80 percent of the camp owners, and the remaining 20 percent were divided equally between hunting and relaxing. Hunting was the most favored second-choice activity, 47 percent; followed by relaxing, 26 percent; fishing, 17 percent; and boating, 10 percent.

Camp Occupancy and Waste Disposal

Camps typically were used year-round and primarily on weekends (Table 12). The higher frequencies of camp use were during summer. At the other extreme, camp habitation was lowest during the cool, post-duck season months of February and March. Be that as it may, during these two late winter months the camps were occupied for the equivalent of almost two weekends per month. To reiterate, the camps are used often.

The annual total man days of occupancy, 10,180, was computed for the sample by adding the products of the number of people occupying a camp on the average and the number of days the camp was occupied for a typical year. Assuming the sample was representative of the remaining camps, the man days of camp occupancy for Bayou de Cade totaled 29,860 per year.

Methods of sewerage and garbage disposal are in Table 13. Most owners had cesspools or septic tanks and either burned their garbage or brought it to the boat launch site or to home.

Table 10. Bayou de Cade: camp construction by year.

Year	Percent of Total Number of Camps (N = 30)
1974-1977	3.3
1970-1973	36.7
1960-1969	43.3
1950-1959	6.7
1940-1949	10.0

Table 11. Bayou de Cade: cost of camp construction.

Cost Range	Percent of Total Number of Camps (N = 30)
$12,500 and up	3.3
10,000 - 12,499	10.0
7,500 - 9,999	3.3
5,000 - 7,499	43.3
2,500 - 4,999	23.3
1,000 - 2,499	16.7

Table 12. Bayou de Cade: monthly camp occupancy.

Month	Average No. of Days of Occupancy (N = 30)
January	4.2
February	3.6
March	3.6
April	4.2
May	4.4
June	5.3
July	5.4
August	7.0
September	5.3
October	5.2
November	4.6
December	4.4

Table 13. Bayou de Cade: waste disposal methods.

Method of Sewerage Disposal	Percent of Total (N = 30)	Method of Garbage Disposal	Percent of Total (N = 30)
Cesspool	40.0	Home or landing	36.7
Septic tank	36.7	Burn	26.7
Dump on marsh	16.7	Fill bulkhead	20.0
No response	6.7	Bury	13.3
		Dump on marsh	3.3

Camp Construction Moratorium

Camp owners were asked whether camp building should be suspended along Bayou de Cade. The response was divided among those who were in favor of a moratorium, 50 percent, and those who were not, 37 percent, or had no opinion, 13 percent. Owners desiring an end to camp construction objected to marsh degradation and to increased boat traffic in the bayou area. Those not wishing for a moratorium were either apathetic or liked the added security that new neighbors bring despite the accompanying stress on the bayou and marsh environs that results from increased use of the site.

HISTORICAL DEVELOPMENT OF THE FIVE MAJOR CAMP CLUSTERS

The five larger complexes of recreational dwellings, Chef Menteur-Rigolets, Cocodrie, Grand Isle, Holly Beach, and North Shore, contain from 400 to over 1,300 camps and collectively account for 36 percent of the study area's camp total. One, Holly Beach, is on the chenier plain; four are on the deltaic plain (Fig. 29). Cocodrie, Holly Beach, and North Shore did not come into their own until the 1930s; the Grand Isle and Chef Menteur-Rigolets resorts have much longer histories. All are fishing-oriented camp clusters with highway access. Detailed below are the stories of how each evolved and in time contributed toward the recreational enjoyment of the public.

HOLLY BEACH

With some 400 camps, Holly Beach (Fig. 30) has 30 miles of accessible beach, gulf swimming, sport fishing, and waterfowl hunting. Port Arthur, Texas, is 38 miles to the west, Lake Charles is 42 miles to the north, and Lafayette via Pecan Island is 123 miles to the east.

The natural beach ridges of southwestern Cameron Parish, from 2 to 20 feet thick and from 100 to 1,500 feet wide, are made up of shells, silts, and sands (Fig. 9). Though the coast west of Ocean View Beach is accreting, at Holly Beach, 9 miles to the east, the shoreline has receded as much as 240 feet mainly because of Hurricanes Audrey (1957) and Carla (1961). The Calcasieu River is the principal supplier of sediments, which contain insufficient granular material to maintain the present beach. Prevailing east-to-west littoral currents, thus, are eroding Holly Beach and depositing materials to the west (USACE 1971b).

By the early 1970s the most gulfward of the original six east-west streets of Holly Beach was completely lost, and the eastern portion of the next north street was under water; almost 30 beach houses were in the foreshore zone, i.e., between mean low water and wave runup at mean high water. In response to the desire of local interests for protection of the resort and coastal highway against erosion, the U.S. Army Corps of Engineers examined the feasibility of possible measures in 1971. To preserve the Holly Beach shoreline with a 5-foot stone-covered dune and the highway with a 2.6-mile revetment would have cost $2.7 million. However, the respective cost:benefit ratios were 0.3 and 0.5, and the projects were not undertaken (USACE 1971b). However, no improvements were recommended by the USACE because this agency felt that local residents were aware of the hurricane threats, most camps were evacuated accordingly, and Cameron Parish officials had an adequate evacuation plan for the area. Further, construction of recreational improvements

was not feasible because of an accreting beach in the western portion of the area (USACE 1971b).

Historical Background

The initial settlement of Holly Beach was in 1932, when a houseboat was put ashore and made into a hunting lodge (Daigle 1964). Highway completion between the beach and the Lake Charles area before the mid-1930s facilitated early era camp expansion (Taylor 1970). The 1934 Geological Survey topographic map shows 21 structures. In 1938 the first annual Southwest Louisiana Deep Sea Fishing Rodeo took place; it and its associated festive activities remained headquartered in the nearby Cameron Community until 1976.[37] By the late 1940s the camp count had increased to about 100 (Louisiana Department of Public Works 1948) despite hurricane damage in 1938 and 1940 (USACE 1972c).

Power line electricity came to Holly Beach in 1950.[38] Instituted in 1956 was the Cameron community-based Fur and Wildlife Festival. It features retriever dog trials, muskrat and nutria skinning, fur judging, trap shooting, archery, duck and goose calling, and beauty contests. A gala parade and ball attract thousands of pleasure seekers.

The Post-Audrey Period

Holly Beach was Cameron Parish's only settlement that had 100 percent of its structures destroyed by Audrey. Only a few leaning utility poles remained subsequent to the storm. Ten-year, low interest, Small Business Administration loans expedited its restoration (Stanley 1970).

In 1959 the highway from Port Arthur, Texas, through Holly Beach east to Lafayette was completed. The same year a private 660-foot, $50,000 fishing pier was constructed on the beach. During the first year of operation more than 5,000 customers paid $1 to fish. Planned at the time were cabins adjacent to the pier, extension of the pier to nearly 1,000 feet, and a boat slip (Tillman 1960).

The original pier and those future plans were destroyed in 1961 by one of the major gulf hurricanes of the century, Carla. The eye crossed the central Texas coast, thus Holly Beach was in the dangerous north-eastern quadrant. Wind gusts up to 58 mph were observed at Lake Charles, and 6.6-feet storm tides were recorded at the nearby Cameron community (USACE 1972c). The hurricane demolished 88 and damaged 180 of Holly Beach's camps (*Cameron Pilot* 1961); immediately west a 3-mile segment of the coastal highway was washed away and later restored at a cost of $300,000 (USACE 1971b). Rebuilding and repairs were swift, and prosperity quickly returned to this popular resort. In spite of buffeting in 1963 by Hurricane Cindy with 6-foot storm tides (USACE 1972c), the number of camps increased to 275 by 1970.[39]

Contemporary Holly Beach

The present camp total is 386 on Holly Beach. They range from elaborate to crude. Some camp owners who prefer only summertime recreation rent their units to hunters during autumn and winter. Angling is pursued in a variety of habitats; there is inland freshwater and surf fishing and trolling near the numerous offshore oil and gas platforms. Crab and shrimp boils and fish fries on the beach are common summer sights (Hollister 1952).

In addition to camps at Holly Beach are general stores, restaurants, dance halls, and bars. The permanent population is about 60, and almost all of these residents are in local business. The commercial establishments ordinarily take in $1 million per year. Crowds of 10,000 people gather for the July fishing rodeo. In 1976 the Southwest Louisiana Deep Sea and Inland Fishing Rodeo headquarters was moved to Lake Charles. The same year the first annual Fourth-of-July Cameron Deep Sea Fishing Rodeo, headquartered in the Cameron community, took place; this three-day event is highlighted by Rodeo Queen, tug-of-war, greased pig catching, and tricycle riding contests; shrimp and crab boils, street dances, boat races, and baseball games.[40]

Piped-in potable water will become a reality by the summer of 1980; Holly Beach's Ward has approved taxes to fund tapping of water wells near Hackberry, 19 miles to the north.[41]

COCODRIE

The 10.2 miles of Louisiana Highway 56 parallel to Bayou Petit Caillou is dotted with multifunctional recreational dwellings (Fig. 31). The elongated camp assemblage extends from Boudreaux Canal south to Cocodrie and includes nearly 600 structures. These weekend resorts account for 68 percent of Terrebonne Parish's highway-accessible camps and 6 percent of the study area camp grand total. The tract is actually a series of 16 discontinuous clusters that contain from 4 to 106 units.

All of the camps are within the saline and brackish marsh and serve as year-round sporting centers. Saltwater and freshwater game to the south and north, respectively, provide numerous opportunities for sport fishing and hunting.

By traveling one mile south of Cocodrie and then turning southeast along the Houma Navigation Canal, a camp owner can fish within the Terrebonne-Timbalier Bay complex or the open gulf. If freshwater angling is preferred, the northern part of the parish has some excellent bass water bodies.

Historical Background

In the antebellum era Isles Dernieres, or Last Islands, was a prominent gulf coast resort before it was destroyed by a hurricane on

August 10, 1856, that killed 200 vacationers (*Aquanotes* 1973). The main hotel, The Trade Wind, and 100 adjacent cottages were demolished (Hansen 1941).

The original settlers of the Cocodrie area were Cajun fishermen and trappers.

Camps were developed with completion in 1938 of the state highway from Houma to Cocodrie. U.S. Geological Survey topographic maps from the late 1930s show fewer than 110 structures. Certainly some of these were camps, but their exact number is unknown. In 1946, the Louisiana Power and Light Co. added the area to its service region. At the time 25 camps were connected to the power line.[42] By 1964 the Louisiana Highway Department had counted 117 camps. At that time marsh camp sites were leased from oil or land companies for as little as $10 a year (Saucier 1968). This is no longer possible; prices have increased, and the better sites are occupied.

Building of new concrete and steel bridges at Boudreaux and Robinson canals in 1959 and 1966, respectively,[43] improved Cocodrie's accessibility. Since the 1964 survey, an average of 37 structures have been added annually, with a cumulative total of 255 by 1970 (Louisiana Department of Highways 1970) and 599 by 1977--a five-fold increase over the 1964 count.

Electricity is available in these camps, but only 338 subscribe to the service.[44]

Contemporary Cocodrie

The nearly 600 camps along Highway 56 south of the Boudreaux Canal were built for hunting and fishing. In addition to duck and coots, these hunters can seek out deer, rabbits, rail, snipe, and squirrel. To promote fishing, numerous tournaments are held each year, which attract fishermen from many parishes. In addition to finfishing many individuals enjoy catching crabs or trawling for shrimp.

In the area are several service-oriented businesses, which provide bait, fuel, groceries, boat docking facilities, and camping hookups with electricity, water, and sewage disposal for 16 recreational vehicles. Further, the marina developers plan to recycle the buildings on the 12-acre Lake Pelto Freeport Sulphur artificial island into a 56-unit resort (Fig. 32) equipped with a large commercial kitchen, tennis and basketball courts, and a fishing pier (*Houma Daily Courier* 1976).

Demand for additional campsites in Cocodrie will continue. A Louisiana State Parks and Recreation Commission (1974) study suggests that Terrebonne Parish's water-oriented recreation activity will by 1990 experience considerable growth. Estimates are that freshwater fishing will increase by 850 percent, motor boating by 430 percent, and saltwater fishing by 250 percent. Cocodrie, with proper planning, certainly will benefit from these projected expansions. The relatively undeveloped west side of the highway could accommodate perhaps up to 500 new camps.

GRAND ISLE

There are 1,353 camps on Grand Isle and Chenier Caminada to the west. An estimated 450,000 visits per year are made to a state park and the private beach (USACE 1972b).[45]

Grand Isle is knife-shaped, 8.6 miles long, and 0.75 miles wide. Marsh lies on its landward side, and beach with elevations of up to 6 feet is along the gulfward margin. The beach varies in width from 25 to 400 feet and is roughly 40,000 feet long. About 28,500 feet of it is private but accessible to the general public, and 8,000 feet are state park (USACE 1972b). The barrier island was created by deposits of the Mississippi River when its course was located in the Bayou Lafourche area from 700 to 1,900 years ago (Kolb and van Lopik 1958) (Fig. 5). Gresham (1958) attributes the local bountiful fish life to fertile silt that empties into the gulf from the mouth of the Mississippi River, about 35 miles southeast of the island.

Grand Isle is advantageously located for good surf, deep-water, and inland bay angling. Heralded as "one of the ten best fishing spots in the world," it is the focus of Louisiana's saltwater angling. Though some game fish visit the island environs seasonally, such as the pompano and cobia, many other species are caught year-round. Among the popular surf and inland bay fish are speckled trout, redfish, and flounder. In deeper water, especially near the numerous offshore oil platforms, sailfish, king and Spanish mackerel, bluefish, bonito, dolphin, and tarpon are caught.

Historical Background

As early as the 1780s the island was occupied by several sugarcane plantations (Swanson 1975). Toward the turn of the 19th century the Grand Isle area became a pirate stronghold and trade center for contraband goods destined for New Orleans. Jean and Pierre Lafitte and their lieutenants stored their booty on Grand Terre, just east of Grand Isle (Fig. 33). Within 3,700 feet of the east end of Grand Isle are the walls of Fort Livingston on Grand Terre (Fig. 34). It was constructed on the site of Lafitte's strategically located fort and was garrisoned from 1850 to 1870.[46] The fortress became an addition to the National Register of Historic Places in 1975 (USACE 1976).

Planters built a number of hotels by the late 1800s to accommodate summer tourists. In 1866 weekend excursions began by steamer from New Orleans to the island via the Harvey Canal and Bayou Barataria (Swanson 1975). Before the 1930s island access was only by boat.

1930-1954: Highway Access, Rodeos, and Offshore Platforms

Completion of Louisiana Highway 1 from Raceland to Grand Isle, including a wooden bridge at the island's western end in 1934,[47] improved

its accessibility to traffic from points west and the New Orleans area. Thus, Grand Isle by the mid-1930s was well on its way to becoming a very popular recreational spot in Louisiana. During the following decades the permanent population steadily increased. The annual Tarpon Rodeo began in 1928 and became the oldest fishing tournament in the United States (*Louisiana Almanac* 1975).

Beginning toward the late 1940s to early 1950s Louisiana's booming inland oil extraction industry encroached upon the gulf. Consequently built were hundreds of offshore oil and natural gas platforms, which attracted game fish and, of course, sport fishermen.[48] Six miles southeast of Grand Isle is the largest offshore platform in the Western Hemisphere with respect to horizontal dimensions. More than 5,700 feet in length, it is used to mine sulphur.[49]

1955-1967: Incorporation

Between 1955 and 1965 almost 500 structures were built on the island (Morgan 1965), and by 1960 the permanent population of Grand Isle and adjacent Cheniere Caminada had increased to 2,074 (U.S. Bureau of the Census 1973).

A landmark year for the island was 1959, when it and Cheniere Caminada were incorporated into the Town of Grand Isle. Significant amenities soon were added to this resort area that greatly enhanced its attractiveness as a place for camp building. The town government installed potable water and natural gas utilities, created a planning commission, and inaugurated 24-hour police protection and regular garbage pickup (Morgan 1965).

By 1965 $24 million in offshore crude oil flowed through Grand Isle's installations annually; the seafood industry generated $4.7 million, and more than $500,000 was spent on recreation. This $29.2 million of economic activity was projected to increase to almost $500 million per year by 1985 (Morgan 1965).

1968-1977: The State Park Era

Grand Isle's recreational potential markedly increased in 1968, when the legislature created state parks on accreted beach at the eastern and western extremes of the island (Byrd 1971). The 23-acre West End Park with 2,000 feet of beach front is the smaller. It has not been ameliorated for recreation due to lack of funds for personnel, operation, and maintenance; however, the LSPRC had authorized $830,000 (in 1977) for bond sales in the State Parks Plan to improve the site.[50]

The 103-acre East End Park has 10 portable flush toilets and showers, 12 drinking water outlets, and a pavilion. Approximately 400,000 visitors used it in 1976.[51] Swimming, camping, picnicking, surf fishing, and crabbing are the more important recreational activities.

It is estimated that two-thirds of the annual visits take place from June 1 through August (USACE 1972b).

The permanent population increased rapidly during the 1960s and by 1970 was 2,236 (U.S. Bureau of the Census 1973), in spite of the fact that several hundred permanent residents had resettled outside of the town after Hurricane Betsy in 1965. Accommodations for sportsmen continued to improve. By 1977 there were five marinas and seven charter boat services,[52] and during the previous six years the number of hotel-motel rooms increased from 165 to 308.

1977-1990: A Superport, Highway, and Hurricane Protection Project

Three proposed changes could affect Grand Isle in the forseeable future. The Louisiana Superport, a deep-water oil port in construction about 20 miles south of the island will no doubt bring the town a share of the 16,200 new jobs and the $169 million per year in income the superport is predicted to generate in southeastern Louisiana by 1980 (Johnston 1976).

If ever completed, the four-lane highway from Lafitte to Larose will shorten the driving time from New Orleans to Grand Isle by one hour. The improved road will also serve as a hurricane evacuation route (U.S. Department of Transportation and Louisiana Department of Highways 1972). Although the northern segment between Marrero and Lafitte is due to be opened in late 1979, the Louisiana Department of Transportation and Development has been holding in abeyance its plans for the litigation-plagued southern portion to Larose (Nolan 1977).

Perhaps more inevitable is the third change, a hurricane protection plan for Grand Isle. Congress authorized the Grand Isle Hurricane Protection and Beach Erosion Project in 1976. If the plan recommended by the USACE (1972b) were adopted, it would consist of a 2,600-foot long jetty at the western end of the island and a 180-foot wide vegetated sandfill dune with a crown elevation of 11.5 feet above mean sea level. This barrier would be built along the entire gulf shore of the island and would be expected to protect it from the 10-foot water stages generated by the 100-year hurricane. The project, with a 1.7 cost:benefit ratio,[53] will be carried out by the USACE and reportedly will cost approximately $10.6 million, with the federal government paying $6.4 million. For the fiscal year 1979-80 Congress appropriated $200,000 for engineering and design.[54]

In conclusion, most factors relevant to the town's future economy are favorable for the coming decades. Not only the resiliency of Grand Isle to hurricane disaster but also the island's growth potential are pointed up by the increase of total value of all improvements from $21 million for the year following Hurricane Betsy to $42 million by 1970, five years later. Though no significant expansion in petroleum-related physical facilities is expected, the recreation-oriented economic activities should continue to rise at a rapid rate. The anticipated increase

in recreation will attract permanent residents who will provide visitors with goods and services. It has been estimated conservatively that the town's permanent population will grow to 3,900 by 1980 and to 6,100 by 1990. The summer visitor day demand for camping, swimming, and picnicking is projected to be over 11 million in 1985 (USACE 1972b).[55]

CHEF MENTEUR-RIGOLETS

The Chef Menteur-Rigolets strip involves 9.1 mi of U.S. Highway 90, extending from Fort Macomb north to Fort Pike, with no part farther than 30 miles from downtown New Orleans (Fig. 35). Along it are some 900 camps. Since the 1930s St. Catherine's Island, sandwiched between Lakes Pontchartrain and St. Catherine, has attracted sport fishermen interested in angling within the area's expansive water bodies. They have built a wide variety of camp types--from mediocre, crude shacks to well-built, colorful, and elaborate recreational dwellings.

In this marsh environment, "high ground" is a rarity. The highway is elevated from 4 to 10 feet, but few camps are located on this land. The majority are off this man-made ridge, where the surface is at sea level or, at best, from 1 to 3 feet above it. The from 15 to 50 percent organic content of the soils (Chabreck 1972) subjects these cottages to some subsidence that increases vulnerability to wave attack by hurricane storm surges.

With the entire shoreline complex within the overflow boundary of the 100-year flood (USACE 1970a), camps built below the projected high water levels are especially liable to be damaged or destroyed. Most of the structures appear to fall in this category because piling-supported camps as a rule are not elevated above the approximate level of the 100-year flood.

The Fort Pike shoreline is eroding due to the swift Rigolets tidal current, but the remaining coastal property is not experiencing any critical difficulties with shore erosion (USACE 1971a). The resort's principal problem is not erosion or subsidence, but storm surges.

Historical Background

One of the first structures built on this tract was Fort Pike. Originally called Petites Coquilles, i.e., little canal, the fortification was constructed in 1793, with the present structure dating from 1818. The gun placements overlooked the Rigolets and protected the route into Lake Pontchartrain. The second fortress was called Fort Chef Menteur, later Fort Woods, and finally Fort Macomb. Completed in 1828 at a cost of $360,000, it sealed off the remaining major passage into the lake, Chef Menteur Pass (Hansen 1941).

For the past 150 years, St. Catherine's Island has been considered to be a valuable stretch of real estate. The forts have become parks,

and the land in between has served recreational interests since the early 1800s. One newspaper reports that in 1906 the Talleyho Club had a magnificent nearby hunting preserve and a dormitory that could accommodate 50 guests. Further, "the club has been the representative rod and gun rendezvous in this section since in the early thirties, long before there were railroads by which it could be reached" (*New Orleans Item* 1906).[56]

As early as 1866, many people wanted a road into the area (*New Orleans Daily Crescent* 1866). By 1923 the Motor League had begun to lobby for a good dirt road into the area (Fleming 1923). Their interests were somewhat self-serving; in 1922 they had built a hunting and fishing camp there (*New Orleans Item* 1922).

The Post-1930 Period

By 1930 U.S. Highway 90 had been completed north to Fort Pike.[57] The route opened the area for extensive camp development. The resort region became firmly entrenched, with plenty of room to expand. Despite flooding by storm surges associated with hurricanes between 1930 and 1960, the camp count had increased to 430 by 1960 (Louisiana Department of Highways 1960). The 1960s witnessed the greatest expansion.

From 1960 to 1965 there were 186 structures added to the recreational property (Louisiana Department of Highways 1965)--an increase of 37 per year. Even though storm tides from Betsy in 1965 and Camille in 1969 damaged or destroyed almost 800 camps (USACE 1965, 1970b), the structures were rebuilt. The risk apparently is overshadowed by the area's convenience and proximity to New Orleans.

Contemporary Chef Menteur-Rigolets

Currently there are 883 camps on St. Catherine's Island in spite of the damage by Hurricanes Betsy and Camille. Dwellings facing Lakes Pontchartrain and St. Catherine are characterized by fishing piers and boat docks. Those along the Chef Menteur Pass are a montage of diverse structures without private access piers, but they do have boat docks.

Fishing is the preferred recreational activity. The favored game fish include speckled trout, Atlantic croaker, and black and red drum (Rogillio 1975). At one time tarpon were caught (Flanagan and Klein 1954); today the region is regarded as speckled trout country. The variety of fish and shellfish provides an individual with year-round sporting activity. The proposed local 12.5-square mile Rigolets Wilderness Park will increase the area's attractiveness and enlarge its recreational potential (Regional Planning Commission: Jefferson, Orleans, St. Bernard, and St. Tammany parishes 1974).

Along with camps there are general stores, restaurants, marinas, and bars that cater to the resort's culinary and boat launching and storage needs. The permanent population is very small relative to the number of transient sportsmen.

The tract has plenty of room to expand. Along both sides of U.S. Highway 90 there is a total of over 3 miles of undeveloped property, with and without access to the lakes. Land is available; the problem is to meet federal, state, and local construction requirements. If a person can comply with the laws, then he can build his camp between Chef Menteur Pass and the Rigolets. Only time will tell whether or not the site continues to expand at the 1960s' rate.

NORTH SHORE

Waterfront camps at North Shore fringe approximately 3.4 miles of Lake Pontchartrain's shoreline. Just south of Slidell and less than 30 miles from New Orleans, this tract has become a notable recreation assemblage (Fig. 36). With 400 dwellings, North Shore is the most significant marsh-related camp site on the lake. Moreover, since 1940 the only major catastrophe was Hurricane Camille's 6.8-foot storm tides (USACE 1970b). The eleven previous storms did little damage.

At present the principal problem is shoreline retreat. Along the lake marsh loss varies from 1 to 8 feet per year. At North Shore from 2 to 2.5 feet of shoreline are lost annually (USACE 1972d). The eastern section's piling-supported camps parallel a broken stretch of deteriorating marsh, which shows the effect of shoreline retreat. The camps are accessible now only by wooden, piling-supported foot paths. Without them the camps would be isolated and accessible only by boat.

Like Chef Menteur, the lakefront real estate provides a convenient retreat for the urban dweller and serves as an accommodating outpost for water-related recreational pursuits. Boating, fishing, and water skiing are popular activities enjoyed by thousands of New Orleanians on weekends and holidays.

Unlike the other major clusters, North Shore is distinguished by North Shore Harbor, a development that features homesites adjoining six shallow-water canals. The 2.3 miles of waterfront lots increased the strip's carrying capacity.

The available property is nearly saturated with recreational dwellings. The North Shore area experienced the greatest growth in the 1970s, when 30 percent of the structures were constructed. In 1965, there were 226 units, and 52 were added during the next seven years. By 1977 the area supported 405 recreational dwellings, and the growth continues.

This expansion occurred not only along the shoreline but also within the channeled terrain of North Shore Harbor--the most recent recreation-residential appendage. The complex is dominated by well-designed dwellings, with many costing in excess of $100,000 and serving a dual purpose--they are recreational retreats as well as eventual retirement homes.

Historical Background

Since the late 1800s, the lakefront area has attracted recreational sportsmen interested in fishing and hunting. The land-water interface provided an ideal site for development. Nevertheless, the low lying marsh was unattractive largely because of 15- to 25-foot uplands abutting Mandeville's shoreline (USACE 1972d). For nearly 100 years steamboats transported recreation seekers to their lakefront beach houses. The old-time recreation and vacation sites were firmly entrenched and have always attracted the New Orleanians. North Shore was not ignored, it simply did not attract the 19th century's affluent New Orleanians; it was the home of sailors and fishermen (Roberts 1946).

By 1905 telephone service was initiated between New Orleans and Slidell. With 49 stations on the line, several were located on the lake.[58] Sportsmen could also cross Lake Pontchartrain on the Louisville and Nashville Railroad and enjoy the region's recreational opportunities. Hunters and fishermen congregated in the marsh, and camps began to appear along the right-of-way. The site was accessible. On the 1935 U.S. Geological Survey topographic map, North Shore had 38 structures. The community was in its infancy when the Louisiana Highway Department in 1938 completed U.S. Highway 11 across Lake Pontchartrain.[59]

Though the highway should have encouraged development, during the early post-World War II era only a few structures were added to the landscape. The narrow strip of land between the highway and the borrow pit eventually began to attract camps. The site was an elongated tenacle extending toward Slidell. For three decades a new structure was added the equivalent of every other month or so, and by 1965 a total of 225 cottages had appeared.[60]

Between 1965 and 1972 only 52 structures were added, but by 1977 the count had reached 405. In five years 128 units were constructed--an increase of about 25 per year. Since 1956 most of these structures have been connected to a gas line.[61] Although Hurricane Camille did a million dollars of damage to roofs, foundations, and walkways, only 25 camps were completely destroyed (USACE 1970b). This fact undoubtedly convinced many people to move to North Shore from the badly ravaged Chef Menteur-Rigolets area.

Contemporary North Shore

When analyzing the camps' spatial distribution, four localities are apparent. They include Lakeshore Drive, North Shore Harbor, and the lakefront sites west of this development along North Shore Beach (Fig. 36). The three areas account for 290 camps. In addition, 115 structures align U.S. Highway 11's 2.1-mile long borrow pit, the fourth locality.

Lakeshore Drive's piling-supported bungalows are built over the lake and connected to small parking areas by wooden foot paths. Many of

these units have spacious screen-enclosed verandas. The waterfront lots adjoining North Shore Harbor's canals are more reminiscent of a rather exclusive subdivision. These dwellings are not high above the water surface; they have been built on canal spoil banks. At North Shore Beach the homes are more permanent in design, often constructed of brick. From them piling-supported fishing piers extend into the lake. U.S. Highway 11's borrow pit camps are a heterogenic mixture of low cost, no-maintenance structures.

Boating and fishing are the preferred recreational sports. Lake Pontchartrain is a nursery ground, with the aquatic fauna composed primarily of brackish water species. Boats and fishing piers provide opportunities to angle for speckled trout, sheepshead, and drum; shrimp and crabs also are caught.

The marsh is only moderately productive for wildlife. In winter, marsh water levels often are reduced, forcing many waterfowl species into the lakeshore's shallow water. Scaup and coots are the principal waterfowl hunted. The marsh west of U.S. Highway 11 is the only section of land hunted by residents of North Shore--an area once controlled by the Bonfouca Hunting Club.[62]

To serve the sportsman, there is one boat launch and several restaurants and convenience stores (F. Davis 1975). These facilities cater to the community's needs.

The area has room to expand only if the property between U.S. Highway 11 and North Shore Harbor is developed. If this land is opened up, the area could easily accommodate up to 300 more structures, but the numerous federal, state, and local construction requirements discourage camp construction.

Along Lake Pontchartrain's North Shore recreational property demands will increase. Most sites cannot accommodate additional structures, and people will be forced to purchase land away from the lake. Unless property becomes available, North Shore will be fully developed within the coming decade.

CAMP CONSTRUCTION TREND

The camp building rate of today apparently is considerably slower than that of the 1960 to 1973 period. Regarding the 13-year, post-1960 era, the only study-area-wide source of documentation of camp building rate change with uniform criteria for defining camp structures, which was feasible to use, was the Louisiana Department of Highways' 1:62,500 parish maps. They show camps adjacent to highways by a special symbol; during the time span in question the maps were updated by the Louisiana Department of Highways after an interval of roughly six years.[63]

Compared in Table 14 are growth rates of camps bordering on highways for a period of about six years, from 1960 to 1973. The average annual rate of increase for the chenier and also the deltaic plain was more than 7 percent. St. Tammany, Cameron, Terrebonne, and Plaquemines parishes had the greater camp number expansions (230, 201, 163, and 141 units, respectively).

Three sources of data indicate a considerable deceleration of post-1973 camp growth. During the early summer of 1976 the investigators surveyed all of the study area land adjacent to highways and rural roads and recorded fewer than a score of camps under construction. Further, between 1973 and 1976 the USACE, New Orleans District, issued only 68 camp building permits (Table 15). Finally, the police juries were asked for the number of camp permits approved for a recent year; none were reported by 11, and the remaining parishes granted a total of 69.

An estimate of camp number rate of increase based on the above information is necessarily conservative. The investigators' highway reconnaissance was carried out at the beginning of the hurricane season, which deters camp construction; further, government permitting requirements are not complied with by all of the camp owners. Nevertheless, in all probability on the order of 250 camps were built during 1976. That is equivalent to an annual increase of 2.5 percent, which is quite in contrast to the indicated 7 percent per year growth rate for the previous 13 years.

The decline in camp development is explicable in terms of the previously noted Jefferson, Orleans, and Plaquemines parish building moratoriums; the reality that camp densities are rapidly approaching that of row houses in the Holly Beach, Cypremort point, Cocodrie, Grand Isle, Chef Menteur-Rigolets, and North Shore areas; and the fact that it is becoming extremely difficult to secure a land company site lease. Further, toward the mid-1970s the necessity of complying with Federal Flood Administration Insurance regulations has discouraged many potential camp builders, and double digit inflation no doubt has reduced the resources individuals can spend on recreation.

Table 14. 1960-1973 trend of camp construction adjacent to highways.*

Parish	A 1960-1968 (Yr/No. of Camps)		B 1965-1973 (Yr/No. of Camps)		Net Change of No. of Camps (A-B)	Average Percent Change per Year
Chenier Plain		529		808	279	7.4
Calcasieu	1962	43	1969	69	26	7.0
Cameron	1964	451	1970	652	201	6.3
Jefferson Davis	1968	21	1973	52	31	19.9
Vermilion	1963	14	1969	35	21	16.5
Deltaic Plain		1,396		2,157	761	7.1
Iberia	1963	18	1969	33	15	10.6
Jefferson†		--	--		--	--
Lafourche	1964	23	1970	38	15	8.7
Orleans	1960	480	1965	616§	136	5.1
Plaquemines	1965	86	1972	227	141	14.9
St. Bernard	1966	33	1973	65	32	10.2
St. Charles	1966	16	1972	19	3	2.9
St. John	1965	25	1972	49	24	10.1
St. Mary	1964	109	1970	114	5	0.8
St. Tammany	1965	450	1972	680	230	6.1
Tangipahoa	1965	31	1971	28	-3	-1.7
Terrebonne	1964	125	1970	288	163	14.9

*Unless remarked otherwise, column A and B data are from the Louisiana Department of Highways 1:62,500 parish maps.
†Camp symbols do not appear on the Louisiana Department of Highways Jefferson Parish map.
§USACE (1965).

Table 15. Study area structures and slips permitted by the U.S. Army Corps of Engineers, New Orleans District.*

Proposed Activity	No. of Permits Issued between July 1, 1973 through June, 1976
Camp	68
Wharf	37
Boat slip	10
Walkway	5
Boat shed	4
Camp extension	2
Pier	1

*C. W. Decker, personal communication, USACE, New Orleans District, New Orleans.

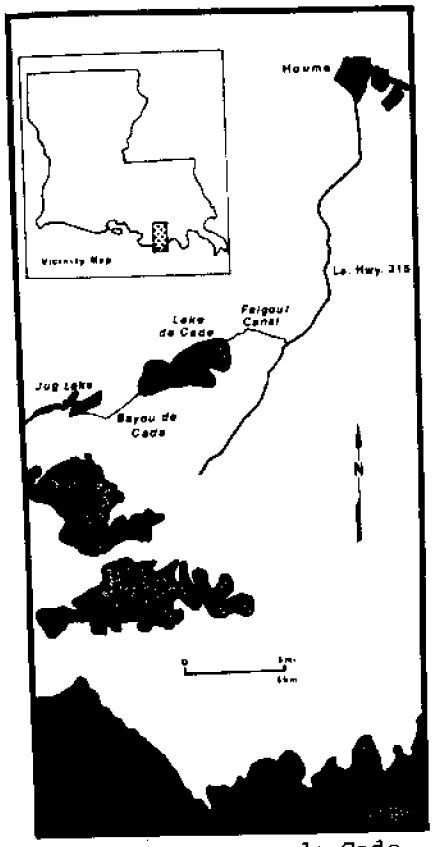


Fig. 28. Bayou de Cade.

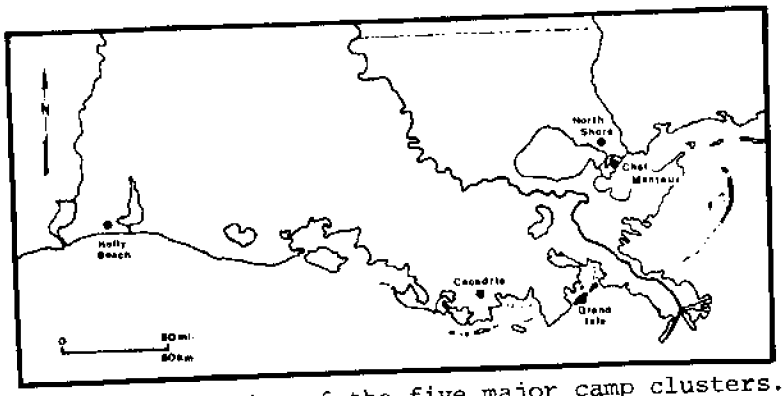


Fig. 29. Location of the five major camp clusters.

Fig. 30. An aerial oblique view of Holly Beach, 1971.

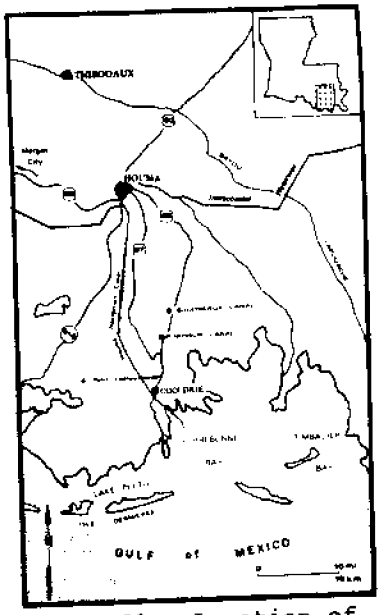


Fig. 31. Location of the Cocodrie strip.

Fig. 32. An artificial island for sulphur mining.

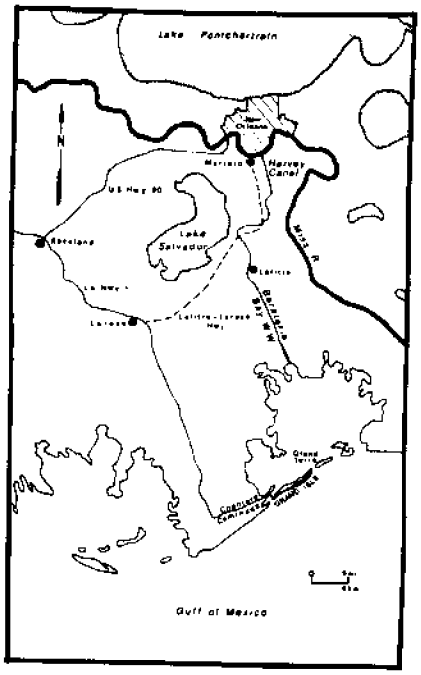


Fig. 33. The Grand Isle-New Orleans area.

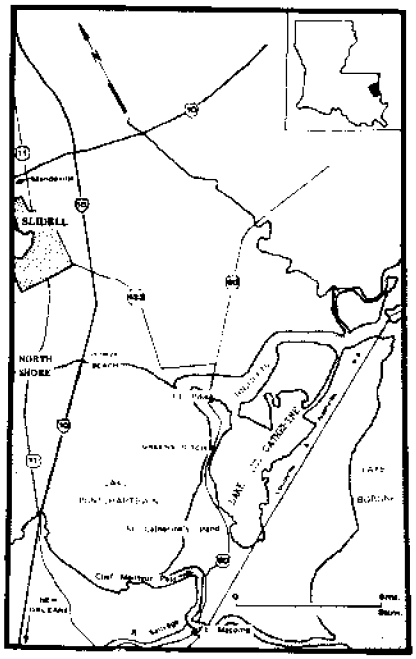


Fig. 35. The Chef Menteur-Rigolets area.

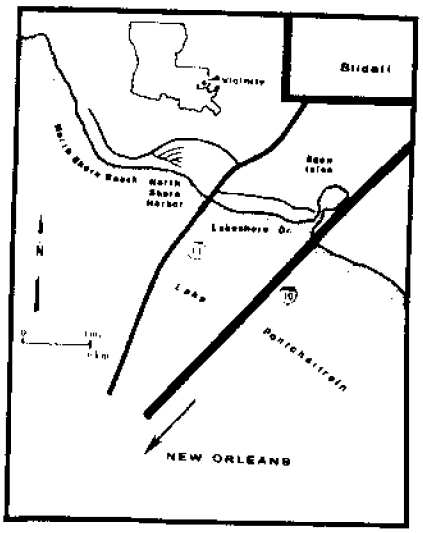


Fig. 36. North Shore and vicinity.

Fig. 34. Fort Livingston.

NOTES

1. R. H. Chabreck, personal communication, Louisiana State University School of Forestry and Wildlife Mgt., Baton Rouge.

2. D. P. Barnes, personal communication, National Weather Service, New Orleans.

3. The population percentages are based upon the 1975 revised estimate of the population of Louisiana parishes, which appears in Louisiana State Planning Office (1977).

4. The generalization is based on information on power line maps that were provided by H. R. Boultinghouse Jr., Central La. Electric Co., Alexandria, La.; C. Duke, South La. Electric Cooperative Assoc., Houma, La.; M. L. Hurstell, New Orleans Public Service, Inc., New Orleans; R. T. Landry, Southwest La. Electric Membership Corp., Lafayette, La.; Manager, Tech Electric Cooperative, Inc., Jeanerette, La.; T. J. Myles, Washington-St. Tammany Electric Cooperative, Inc., Franklinton, La.; J. A. Richardson, Gulf States Utilities Co., Lake Charles, La.; J. S. Robbins, Jefferson Davis Electric Cooperative, Inc., Jennings, La.

5. C. Duke, personal communication, South Louisiana Electric Cooperative Association, Houma, La.

6. E. Smith, personal communication, Louisiana Department of Transportation and Development, Office of Highways, Baton Rouge.

7. The Continental Land and Fur Co., Inc., the Louisiana Land and Exploration Co., the Tenneco Oil Co., and the Vermilion Bay Land Co.

8. G. Voisin, personal communication, Louisiana Land and Exploration Co., Houma, La.

9. Unless otherwise noted, the following remarks were excerpted from the LWFC's 1976-1977 hunting, fishing, trapping, and boating regulation leaflets, which include federal regulations (LWFC 1976 a,b).

10. B. W. Brown, personal communication, USFWS, Lake Arthur, La.

11. C. E. McMullan, personal communication, USFWS, Venice, La.

12. A. B. Ensminger, personal communication, LDWF, New Orleans.

13. Exceptions include "16 Section" lands; local school boards put up the lease of them for bids.

14. Some of the relevant federal laws administered by the USACE are as follows: Section 301 of the Federal Water Pollution Control Act (33 USC §1311) prohibits the unauthorized discharge of pollutants from point

sources, or the unauthorized discharge of dredged or fill material, into waters of the United States. Section 9 of the River and Harbor Act of 1899 (33 USC §401) prohibits the unauthorized construction of dikes or dams in navigable waters of the Unites States; Section 10 of that Act (33 USC §403) prohibits the authorized obstruction or alteration of navigable waters of the United States. The Refuse Act (33 USC §407) prohibits the unauthorized discharge or deposit of any refuse matter into navigable waters of the United States, except for discharges from streets and sewers. The Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC §1411) prohibits the unauthorized transportation of dredged material for the purpose of dumping it into ocean waters (J. C. Weber, personal communication, USACE, New Orleans District, New Orleans).

15. Permits for discharges or dredged or fill material into waters of the United States *in* Title 33, Part 323 of the Federal Code of Regulations, Federal Register, July 19, 1977.

16. J. C. Weber, personal communication, USACE, New Orleans District, New Orleans.

17. C. W. Decker, M. Martinez, and J. C. Weber, personal communications, USACE, New Orleans District, New Orleans. Permitting procedures are subject to change. At the time of writing the New Orleans District of the USACE was working with the state toward creation of a single-agency system for review of comments from agencies with input into the permit process (J. C. Weber, personal communication, USACE, New Orleans District, New Orleans).

18. Personal communications: L. S. St. Amant, LDWF, New Orleans; R. A. Lafluer, La. Stream Control Commission, Baton Rouge; C. E. Bishop Jr., Department of Health and Human Resources, New Orleans; A. R. Theis, La. Department of Transportation and Development, Office of Public Works, Baton Rouge.

19. C. W. Decker, personal communication, USACE, New Orleans District, New Orleans. The District encompasses the entire study area, excepting a small 233-square mile Sabine River-drained zone of land toward extreme southwestern Louisiana on which are only 64 camps.

20. The penalty under Section 309 of the Federal Water Pollution Control Act Amendments of the 1972 (33 USC §1319) for knowingly falsifying application form information is a fine of not more than $10,000, or imprisonment for not more than six months, or both. The penalty under the Federal Criminal Code (18 USC §1001) for knowingly and willfully making a false statement to obtain a permit is a $10,000 fine, imprisonment for not more than five years, or both. Violators of Sections 9 and 10, River and Harbor Act of 1899 (33 USC §401 and 403), may be punished by a fine not to exceed $2,500 nor less than $500, by imprisonment not exceeding one year or both pursuant to 33 USC §406. Willful or negligent violators of Section 301 of the Federal Water Pollution Control Act Amendments of 1972 (33 USC §1311) may be punished for their offenses by a fine of not less than $2,500 nor more than $25,000 per day of violation, by imprisonment for not more than one year, or both, pursuant to 33 USC §1319.

Violators of the Refuse Act (33 USC §407) may be punished by a fine not exceeding $2,500 nor less than $500, or by imprisonment for not less than 30 days nor more than one year, or by fine and imprisonment, pursuant to 33 USC §411. Knowing violators of the Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC §1401 et seq.) may be punished by a $50,000 fine, or by imprisonment for not more than one year, or both, for each violation or per day of a continuing violation, pursuant to 33 USC §1415 (J. C. Weber and S. A. Millan, personal communications, USACE, New Orleans, District, New Orleans).

21. Piers that are engineeringly sound and not hazardous to navigation may become authorized by a separate general permit proposed for minor works and structures in Louisiana (Special Public Notice, October 29, 1976, USACE, New Orleans District, New Orleans).

22. General permit for camp structures and waterways, Special Public Notice, September 27, 1976, USACE, New Orleans District, New Orleans.

23. C. W. Decker, personal communication, USACE, New Orleans District, New Orleans.

24. General permit for camp structures and waterways, Special Public Notice, September 27, 1976, USACE, New Orleans District, New Orleans, La.

25. C. W. Decker, personal communication, USACE, New Orleans District, New Orleans, La.

26. Resolution of the Plaquemines Parish Commission Council; the resolution provided for the possibility of exceptions regarding oyster fishermen and other persons whose livelihoods depend upon their residing in the marsh.

27. C O. Perez, personal communication, Plaquemines Parish Commission Council, Pointe a la Hache, La.

28. Letter from F. E. Robbins, New Orleans Department of Safety and Permits, to Lt. Col. L. A. Hubert Jr., USACE, New Orleans District, New Orleans.

29. H. R. Trapani, personal communication, Jefferson Parish Council, Metairie, La.

30. J. G. Jones, personal communication, Cameron Parish Police Jury, Cameron, La.

31. Personal communications: J. Stephens, St. Bernard Parish Police Jury, Calmette, La.; W. C. Sniden, St. Tammany Planning Commission, Covington, La.; D. P. Landry, Terrebonne Parish Police Jury, Houma, La.

32. Personal communications from Parish Police juries: J. P. Smythe, Calcasieu, Lake Charles, La.; E. Freyou, Iberia, La.; R. J. Boudreaux, Lafourche, Thibodaux, La.; K. M. Friloux, St. Charles, Hahnville, La.; R. Becnel, St. John the Baptist, Edgard, La.; C. A. Martin, St. Mary, Franklin, La.; D. T. Dufreche, Tangipahoa, Hammond, La.; J. Hulin, Vermilion, Abbeville, La.

33. C. Duke, personal communication, South Louisiana Electric Cooperative Association, Houma, La.

34. The posse is an organization of almost 70 volunteer pilots that conduct emergency rescue operations and ourtine patrols in the marsh of Terrebonne Parish and a part of Lafourche Parish. Founded in 1971, it is probably the only volunteer flying posse in the U.S., according to its operations officer, J. Goertzen, who had heard talk of one in California (Angers 1977).

35. R. Aucoin, personal communication, Tenneco Oil Company, Houma, La.

36. Provided by the South Louisiana Electric Cooperative Association, Houma, La.

37. J. Wise, personal communication, *Cameron Pilot*, DeQuincy, La.

38. J. S. Robbins, personal communication, Jefferson Davis Electric Cooperative, Inc., Jennings, La.

39. According to the Louisiana Department of Highways' latest 1:62,500 map of the west section of Cameron Parish.

40. J. Wise, personal communication, *Cameron Pilot*, DeQuincy, La.

41. Cameron Parish Police Jury, personal communication, Cameron Parish Waterworks, Cameron, La.

42. J. D. Bruno, personal communication, Louisiana Power and Light, Houma, La.

43. G. Carlisle, personal communication, Louisiana Department of Transportation and Development, Office of Highways, Baton Rouge.

44. J. D. Bruno, personal communication, Louisiana Power and Light, Houma, La.

45. S. Resweber, personal communication, Louisiana State Parks and Recreation Commission (LSPRC), Baton Rouge.

46. Named for Edward Livingston, who was Lafitte's attorney and Andrew Jackson's Secretary of State, it never saw military action. The unfinished fort was in possession of Confederate troops during 1861, one

year prior to the fall of New Orleans to federal forces. Subsequent to the city's seizure, the Confederates evacuated it without battling. Had they chosen to fight, the relatively modern heavy calibre artillery of the federal ships would have pulverized the brick ramparts. The property was returned to the state in 1923, and on it today is a marine research laboratory of the LDWF (Swanson 1975).

47. Replaced in 1960 by a steel and concrete bridge.

48. Offshore platforms concentrate and sustain game fish and, therefore, make them easy prey for anglers. Light and sea water interaction on rig legs permits flourishing of algae, barnacles, mollusks, and worms, a food chain base rich for fish. In addition, the platforms, as solid objects, attract game fish and provide hiding places (Duffy 1975).

49. F. C. Bacon, personal communication, Freeport Sulphur Co., New Orleans.

50. L. Kent, personal communication, LSPRC, Baton Rouge.

51. S. Resweber, personal communication, LSPRC, Baton Rouge.

52. D. J. Martin, personal communication, Grand Isle Tourist Commission, Grand Isle, La.

53. For the recommended plan, cost:benefit directives assumed a 50-year project life and included were the following cost and benefit items: average annual costs of jetty and sandfill material, engineering and design, easement, administrative, and contingency costs were estimated at $678,000; prevention of physical damage and recreational, intensified land use, social well-being, and indirect benefits were given an average annual value of $1.2 million (USACE 1972b).

54. L. Boggs, personal communication, U.S. House of Representatives, Washington, D.C.

55. Fishing activities are excluded from this estimate because the State Recreation Plan does not differentiate between fresh- and saltwater fishing.

56. The trains were vital; fifty-five people died in a 1915 hurricane because they missed the train (W. A. Roberts 1946).

57. G. Carlisle, personal communication, Louisiana Department of Transportation and Development, Office of Highways, Baton Rouge.

58. J. P. Pasque, personal communication, South Central Bell Telephone Co., Slidell, La.

59. G. Carlisle, personal communication, Louisiana Department of Transportation and Development, Office of Highways, Baton Rouge.

60. According to the Louisiana Department of Highway's 1:62,500 map of the southeast section of St. Tammany Parish.

61. L. Barthelemy, personal communication, Louisiana Gas Service Co., Slidell, La.

62. L. R. Rausch, personal communication, Clerk of Court, St. Tammany Parish, Covington, La.

63. Ignored, therefore, is the contribution to the overall rate of change of camp number by non-highway units, which in the mid-1970s comprised 36 percent of the camp total. Be that as it may, there is no reason to suspect that the ratio of highway to non-highway camps has changed over the past two decades.

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