Louisiana. State Planning Office. Coastal Resources Prog.

AN ANALYSIS OF AGRICULTURE, FORESTRY, AND MARICULTURE IN THE COASTAL ZONE OF LOUISIANA (USL)

COASTAL RESOURCES PROGRAM
STATE PLANNING OFFICE

EDWIN EDWARDS
GOVERNOR

CHARLES E. ROEMER, II
COMMISSIONER OF
ADMINISTRATION

NOTICE TO THE READER:

The attached is a consultant's report to the Louisiana State Planning Office and as such it does not necessarily represent the views of the Louisiana State Planning Office or its staff.

PATRICK W. RYAN
EXECUTIVE DIRECTOR
ATE PLANNING OFFICE

UL H. TEMPLET
AM COORDINATOR

P.O. BOX 44425
CAPITOL STATION
ON ROUGE, LA. 70804
(504) 389-7041

AN ANALYSIS OF AGRICULTURE, FORESTRY AND MARICULTURE IN THE COASTAL ZONE OF LOUISIANA

By

University of Southwestern Louisiana

PRINCIPAL INVESTIGATORS

Dr. Emmett F. Stallings, Project Director

Dr. Thomas F. Maher

Dr. Dave Manuel

SECTION I

Agricultural Use of Land in the Coastal Zone

SECTION II

Forestry in the Louisiana Coastal Zone

SECTION III

Agriculture and Forestry in Louisiana's Coastal Zone: A Study of Economic Growth and Significance

SECTION IV

A Report on Aquaculture in Louisiana's Coastal Zone

The preparation of this report was financed in part through a grant from the U. S. Department of Commerce under the provisions of Coastal Zone Management Act of 1972.

State of Louisiana, Coastal Resources Program.

SECTION I

AGRICULTURAL USE OF LAND IN THE COASTAL ZONE

By Thomas F. Maher

Department of Agricultural Engineering
University of Southwestern Louisiana
Lafayette, Louisiana 70501

TABLE OF CONTENTS

Chapter	Title	Cooperating Author*
1	Soils	Cain
2	Water Management	Langlinais
3	Rice	Desselle
4	Sugar Cane	Viator
5	Soybeans	
6	Vegetables	
7	Cotton	
8	Wheat - Sorghum	
9	Corn	
10	Cattle	Clement
11	Horses	Clement
12	Dairy	Labbe
13	Fruit and Vegetable Processing	Labbe - Barry
14	Pesticides	Barry
15	Fertilizer	Cain

*All members of the College of Agriculture staff at the University of Southwestern Louisiana except Dr. Cain.

Dr. Charles C. Cain, Professor of Agronomy (Retired)

Stephen J. Langlinais, Assistant Professor of Agricultural Engineering

Dr. Lynn J. Desselle, Professor of Agronomy

Dr. Daniel P. Viator, Associate Professor of Agronomy

Terry Clement, Instructor of Animal Husbandry

Leonder Labbe, Assistant Professor of Dairying

Dr. Robert Barry, Professor of Horticulture

OVERVIEW

Soils

Past, present and future agricultural use of land in the coastal zone is strongly influenced by soil type. The best alluvial soils extend like thin fingers through several parishes adjacent to the streams from which they were deposited. Competition for these soils for non-agricultural use is strong and has taken over most of these soils in some parishes.

The northern portion of the zone contains most of the other soils desirable for row crops where in the eastern and western areas agricultural activities may compete with timber production. Increases in tillable land that have occurred since 1950 are mostly in the northern timber producing parishes of the zone and have offset the loss of tillable land in the lower parishes. Some pumping off of water on marginal land has also occurred resulting in a total net gain of tillable land since 1950 within the zone of 1.5%.

Future agricultural use of the soils in the coastal zone will depend on food demand. Capital outlay and technical knowledge required for farming marginal soils restricts interest in their use for cultivated crops.

Water Management

Man's activities in the coastal zone have greatly changed the normal drainage pattern. Ten watershed plans have been developed by the Soil Conservation Service and co-operating agencies to tie together work that has been done at random. There is a need for more work of this nature.

These plans when implemented correct a variety of problems related to water management such as drainage, flooding, erosion, salt water intrusion, etc.

At present most of the irrigation water used in the zone is applied to rice. Even though irrigation water is plentiful, there is recent evidence of more efficient irrigation by means of underground pipe instead of open canals, and by water leveling of fields to insure even application depth.

Crops

The four most important agricultural parishes in the state (Vermilion, Acadia, Tangipahoa and Jeff Davis) are located in the coastal zone. In 1974 the farm value of coastal zone crops exceeded 1 billion dollars. Value of these products when purchased by the consumer averages about three times the farm value.

Rice, sugar cane and soybeans are the main cultivated crops grown in the zone but many other cereal, fruit, vegetable, fiber and nut crops are adapted and have been grown more extensively in past years under different economic situations. Cotton, once a traditional crop, is apparently gone for good and soybeans, once a very minor crop, have gained popularity in recent years.

Should food shortages develop in future years, assets of the coastal zone (water, soil type, climate, drainage conditions, etc.) favor more rice and forage production on marginal soils and more fruit and vegetable production on better drained soil.

Livestock

Accurate parish data on agricultural enterprises that do not require local processing and in which the unit itself is mobile are difficult to obtain. With the exception of dairy cattle, data on livestock generally fall in this category.

Most dairy farms are in the northern portion of the coastal zone while the forage grown on the marginal and extremely marginal soils, from a cropland viewpoint, is found at lower elevations. Generally beef cattle production predominates over dairy operations as one proceeds south in the zone.

The interest in race horses and pleasure horses plus the opening of local racetracks have created a new livestock enterprise in the zone in recent years.

Pesticides - Fertilizers

Concern about chemicals used in crop production finding their way into run-off water has caused the removal of several pesticides with a long life span from the market and the monitering of run-off water for chemical content. The 1974 data studied showed little or no evidence of insecticides in run-off water. Licensing of applicators in 1976 should further reduce the hazard from pesticides needed for optimum crop production.

Generally fertilizers are not being applied in sufficient quantities on crops in the coastal zone to obtain the best net profit to the farmer.

Loss of applied fertilizer into run-off water in amounts detrimantal to water quality appears unlikely.

Processing

Survival of some farm enterprises depend on processing facilities being available locally. Adequate facilities for sugar cane, rice and milk are available in 1974 although those for sugar cane show a downward trend. Facilities for cotton have closed down in the zone.

AGRICULTURAL USE OF COASTAL SOIL

Soil type is a major factor determining crops that can be successfully grown in the study area. Of course, all soil could be used for food production if the demand were such that market price encouraged the capital outlay necessary to overcome some of the hazards involved in production. The potential agricultural use classification maps for each parish, included in this section of the report, have been prepared with the aid of Soil Conservation Service general soil association maps.

The color legend chosen for these maps is as follows:

CLASSIFICATION LEGEND

Green	Cropland - Pasture

These areas contain soils of a type and elevation that can be profitably cultivated under our present economic structure if not devoted to another use. Some of these areas could also produce timber. Included in this classification are areas that would not be practical to farm were it not for the Mississippi River levee protection and the protection of other major levees.

Pink	Marginal Cropland-Pasture

These are lands that could or may be cultivated under sufficient economic pressure. The chief problem in using land in the low elevations of this region for Row Crop production is reducing the water in the root zone of the plant to field capacity in a desired period of time. Other agricultural uses such as pasture or rice production require less capital outlay for drainage.

A cost gradient exists for developing a system of moisture control or, in the northern part of the coastal zone, erosion control, that is strongly influenced by elevation. Higher elevations of the wetlands are sometimes farmed by using a well designed drainage system. As elevations decrease, dikes and pumps become necessary for water management. Pumping costs and levee construction costs increase as elevations decrease. Land adjacent to streams and unprotected by levees and subject to flooding is included in this classification. Many of these areas could also produce timber.

Clear	Water
Yellow	Chenieres, "Inland Islands"

PASTURE, RECREATION, SPECIALIZED CROPS

Blue	Extremely Marginal Cropland-Marginal Pasture

Nearly all of this land is too costly to develop for cultivated crops in the foreseeable future. Some instances exist of diking, leveling and pumping lands bordering areas of higher elevation, to square up property or for urban development.

Included in this classification are alluvial soil associations inside levees used to entrap or control the flow of water in rivers, streams and spillways. These soils can be used as pasture part of the year with close supervision. Some areas adjacent to bedding levees and chenieres also are grazed. In addition to limited grazing, the lower areas serve as a wildlife habitat and for recreation such as hunting and fishing.

The bar graph by each parish shows the percentage of the soil groupings of the parish as well as the total acres in each classification. In addition, a bargraph showing the change in tillable land area from 1950 until 1975 was drawn using data supplied by the Rural Development Land Use Committe.[1]

Most soil that is ranked highly for agricultural use also has properties desirable for other uses such as urban or industrial use, roads, etc. In fact, in Orleans Parish all such land is now utilized for non-agricultural use and data show Jefferson and St. Bernard Parishes may soon lose all soil with high agricultural potential to other uses.

The 1969 Conservation Needs Inventory data (Table I, Page 9) show that almost half the urban and built-up area of the whole state is in the study zone. Tillable land in the zone dropped from 43.6% of the state total in 1950 to 35.7% in 1975 as determined by analysis of data in Table II, Page 11. A net loss of tillable land was experienced by more than half the parishes in the study zone since 1950. A study of

[1]See Table II, Page 11 for data.

the parishes where loss occurred as indicated in Table II, Page 11, reveals that a large portion of this decline was due to urban and industrial development along the Mississippi River, Bayou Lafourché and Bayou Teche.

With few exceptions, those parishes contributing a net increase in tillable land during the 1950-1975 period were those noted for timber production. This suggests that such land use change came at the expense of timber. Three top timber parishes, Calcasieu, St. Tammany and Tangipahoa contributed almost one-third of the land cleared for agriculture use since 1950 (Table II, Page 11). Their soil potential maps show large green areas, indicating the soil growing timber could also grow crops and/or pastures.

There was a net increase in tillable land in the study area of 1.4% since 1950, compared to a 23.3% increase for the whole state.

Some areas in the marginal and extremely marginal agricultural use potential classification have been pumped off and are indicated on the pink and blue areas by cross-hatching. By referring to the maps, one will note considerable pumped-off acreage in Vermilion and Lafourche parishes. Most other large pumped-off areas are employed for non-agricultural purposes. Smaller individual endeavors exist in areas adjacent to high ground.

Pumped off lands that are high in organic matter may present some farming difficulties as oxidation of this matter occurs following the removal of gravitational water. If the soil is mostly mineral, its clay content is usually high and it is difficult to till. Farms on pumped-off lands visited by this writer in Vermilion and Cameron parishes seemed to be highly successful from the standpoint of yield, but an in-house consultant reported a pumped-off farm in Lafourche parish that appeared to be having difficulty.

Time allotted this study was not sufficient to allow an in-depth study of land within the zone farmed by means of protection levees and pumps. Success of such endeavors will depend upon a number of factors and it would be of interest to note the role soil classification plays in this success at similar elevations.

Some general observations can be made with regard to situations that make marginal soils inviting to agricultural use and that establish the economic gradient sufficient to warrant capital outlay:

1. Land is not far from an all-weather road usually constructed to gain access to a city or industrial development. Road construction costs dictate selection of a path utilizing the highest available elevations and soil types that are also best in the area for agricultural use.
2. Land near large cities is purchased and developed for agricultural use as well as an investment and/or hobby. Even if the agricultural enterprise is a failure, knowledge of eventual profitable non-agricultural use justifies the capital outlay.

3. Rice or pasture production can be most successfully pursued as an enterprise on heavy clay soils of low elevation. These compose a large percentage of the marginal and some percentage of the extremely marginal soil classifications.
4. Levee construction is more apt to occur if only part of the perimeter of the property must be enclosed to protect the fields from backwater or tidal flooding. Such areas are adjacent to chenieres, ridges, "islands" or large protection levees.
5. A rotation which includes crawfish and perhaps catfish production will become more common in the vicinity of urban areas and marketing facilities.

Limitations of time do not permit an investigation of the extent areas given the "marginal" or "extremely marginal" classifications are currently being used for agricultural purposes, and what crops are grown. The land use measurements made in 1967 for the 1969 Conservation Needs Inventory Report by the Soil Conservation Service, although not as current as desirable, were obtained with the use of a planimeter from maps and aerial photographs and give a useful breakdown for the study.

Table III, Page 13, shows the use of the remaining land after urban and built-up use, and federal land use are excluded. Analysis of the data shows that 66.6% of the lands remaining after this subtraction were in the "forest" or in the "other use" classification. The "other use" classification is composed mostly of marsh and the 2,991,063 acres listed in the "other use" classification for the coastal zone was 93% of the state acreage in this classification.

The present price of farm products is not sufficient to support the capital investment required to bring large amounts of soil classified as "marginal" or "extremely marginal" into agricultural use requiring tillage. Considerable acreages of these soils adjoining large cities has been put to non-agricultural use.

If one adds the acres in the "cropland" and the "pasture" classification for the coastal zone, the total approximates the 1975 tillable land acreage total in Table II, Page 11, (2,821,415 versus 2,718,515). Variation in definition and changes that have occurred in the 8-year lapse between 1967 and 1975 could easily account for the difference.

Table IV, Page 15, compares the acres in the highest agricultural soil potential classification from the colored maps with the 1975 tillable land. The tillable land acreage exceeds the high potential soil in three parishes (Iberville, Jeff Davis and Lafourche). A significant percentage of the tillable soil in Lafourche parish is not in the high potential classification. It is assumed most of this is diked or pumped off.

The parishes with a large surplus of high potential soil that is not tillable evidently have planted this land to timber or have it in urban use. If one subtracts the tilled land from the acreage with the highest potential in Table IV, Page 15, about 3/4 of the remaining land is located in these six parishes: Calcasieu, East Baton Rouge, Livingston, St. Martin, St. Tammany and Tangipahoa. Reference to data in Table III, Page 13, suggests most of this land is in forest, although some is in urban and built-up use.

After reviewing the present situation regarding farming practices within the zone; after consulting with numerous agricultural experts, farmers, and in-house consultants; and after examining the "Giant Step II" publications prepared by the Extension Service for the individual parishes, I find it evident that at present the most economical way of increasing food production within the coastal zone is through better farming practices. It is equally evident that the area has certain ingredients necessary for food production, particularly water, mild climate, long days and growing season, processing facilities, marketing and exporting facilities and trained producers. These factors are a tremendous advantage not matched in large areas of the United States.

TABLE I

Parishes	Total Acreage (1967 CNI*** Measurement)	Federal Non-Cropland	Urban and Built-Up	Small Water Area*
Acadia	423,852		17,246	2,849
Ascension	192,000		10,550	2,100
Assumption	222,242		4,615	7,100
Calcasieu	692,616		44,586	10,987
Cameron	849,211	128,241	8,993	31,401
E. Baton Rouge	294,363	10	84,168	2,049
Iberia	377,654	5,525	11,249	11,290
Iberville	401,920	395	8,575	7,778
Jefferson	231,860		70,000	16,000
Jeff Davis	421,120		13,338	2,673
Lafayette	181,120		15,200	925
Lafourche	739,785		10,568	14,200
Livingston	425,600		13,041	3,374
Orleans	127,360	2,000	71,000	7,000
Plaquemines	630,160	48,929	9,000	57,000
St. Bernard	326,400	7,000	12,000	30,000
St. Charles	193,302		7,000	10,000
St. James	159,360		3,803	860
St. John	144,000		4,000	3,000
St. Martin	483,304		4,827	7,737
St. Mary	407,345		15,242	20,887
St. Tammany	562,749	1,385	25,100	12,232

Parishes	Total Acreage (1967 CNI** Measurement)	Federal Non-Cropland	Urban and Built-Up	Small Water Area*
Tangipahoa	513,920		19,796	7,700
Terrebonne	890,240	117	12,717	60,196
Vermilion	783,360		18,236	18,855
W. Baton Rouge	128,640		8,000	1,020
T O T A L	10,803,483	193,664	522,850	349,213
STATE TOTAL	28,596,268	970,247	1,063,808	499,986

*Water Areas Under 40 Acres

**CNI -- Conservation Needs Inventory (Soil Conservation Service)

1. The coastal land area (including water surfaces less than 40 acres) comprises 37.8% of the state land area.

2. Some 49% of the urban and built-up area in the state is located within the study zone.

3. About 70% of the state small water bodies less than 40 acres in size are within the zone.

4. The federal non-cropland within the zone is 20% of the state total.

TABLE II

LAND USE CHANGES*

Parishes	1950 Tillable Crop Land	1975 Tillable Crop Land	Non-Agri-cultural Use Since 1950	Cleared For Agricultural Use Since 1950
Acadia	290,000	325,000	2,500	37,500
Ascension	53,027	44,349	11,678	3,000
Assumption	56,000	56,000	1,000	1,000
Calcasieu	264,000	300,000	12,000	46,000
Cameron	50,000	73,000	5,000	28,000
E. Baton Rouge	68,000	25,406	22,540	11,000
Iberia	134,218	132,495	3,500	2,650
Iberville	112,136	122,340	2,552	10,204
Jefferson	18,500	5,500	15,000	2,000
Jeff Davis	405,174	403,074	996	
Lafayette	154,000	150,000	4,000	600
Lafourche	81,320	72,000	40,000	40,100
Livingston	23,965	18,867	5,000	12,500
Orleans	3,000		3,000	
Plaquemines	32,000	21,000	11,000	
St. Bernard	18,000	2,000	16,000	
St. Charles	19,000	15,000	13,000	10,000
St. James	44,313	39,000	8,813	3,500
St. John	29,000	19,000	11,000	1,000
St. Martin	98,000	99,000	14,000	15,000
St. Tammany	87,000	107,000	3,010	20,000

Parishes	1950 Tillable Crop Land	1975 Tillable Crop Land	Non-Agri-cultural Use Since 1950	Cleared For Agricultural Use Since 1950
St. Mary	60,000	75,000	3,000	2,000
Tangipahoa	160,000	190,000	4,720	35,000
Terrebonne	41,727	38,366	4,561	1,200
Vermilion	346,000	349,800	200	4,000
W. Baton Rouge	32,771	35,318	2,500	5,047
T O T A L	2,681,151	2,718,515	220,570	322,801
STATE TOTAL	6,172,935	7,608,400	543,240	1,820,639

	1950	1975
Percent of state tillable land in coastal zone --	43.4%	35.7%

Increase in tillable land for state (1950-1975) -- 23.3%

Increase in tillable land for coastal zone (1950-1975) -- 1.4%

*Data were obtained from figures supplied by the Rural Development Land Use Committee Chaired by Dr. Floyd L. Corty.

TABLE III

LAND USE ACRES IN 1967 CNI INVENTORY

Parishes	1967 Agricultural Inventory Acres*	Cropland	Pasture	Range	Forest	Other Use
Acadia	403,757	286,896	36,153	225	71,500	8,983
Ascension	179,350	41,207	43,638		92,992	1,513
Assumption	210,527	66,171	4,635		137,188	2,533
Calcasieu	637,043	300,143	51,640	44,205	212,548	28,507
Cameron	680,576	103,174	39,781	250,000	1,560	286,061
E. Baton Rouge	208,136	20,466	58,870		120,000	8,800
Iberia	349,590	87,247	19,994		123,396	118,953
Iberville	385,172	56,921	45,174		277,973	5,104
Jefferson	145,860	3,872		4,357	33,236	104,395
Jeff Davis	405,109	319,297	11,000	508	67,943	6,361
Lafayette	164,995	77,633	71,452		4,520	11,390
Lafourche	715,017	84,842	22,741	24,927	150,875	431,632
Livingston	409,185	3,511	13,014		381,567	11,043
Orleans	47,360					47,360
Plaquemines	515,231	21,039	1,588		50,412	442,192

Parishes	1967 Agricultural Inventory Acres*	Cropland	Pasture	Range	Forest	Other Use
St. Bernard	277,400	1,469			22,949	252,982
St. Charles	176,302	13,371	2,475		81,714	78,742
St. James	154,697	60,161	4,297		85,500	4,739
St. John	137,000	23,322	1,506		93,700	18,472
St. Martin	470,740	83,848	26,059		348,153	12,680
St. Mary	371,154	74,722	1,450	13,641	162,938	118,903
St. Tammany	524,032	30,116	23,393		403,300	67,223
Tangipahoa	486,424	52,304	75,697		345,600	12,823
Terrebonne	817,210	48,408	15,010	26,227	122,300	605,265
Vermilion	746,269	297,580	50,094	70,537	30,051	298,007
W. Baton Rouge	119,620	23,500	20,570		69,200	6,350
T O T A L	9,737,756	2,181,220	640,231	434,627	3,490,615	2,991,063

*Total measured acres less federal non cropland, urban and built-up, and small water areas of 40 acres and less.

TABLE IV

PARISH	HIGHEST POTENTIAL* AGRICULTURAL SOIL (ACRES)	1975 TILLABLE LAND (ACRES)	DIFFERENCE (ACRES)
Acadia	385,280	325,000	60,280
Ascension	128,640	44,349	84,291
Assumption	89,640	56,000	33,640
Calcasieu	592,640	300,000	292,640
Cameron	113,920	73,000	40,920
E. Baton Rouge	245,760	25,406	220,354
Iberia	143,360	132,495	10,865
Iberville	116,480	122,340	-5,860
Jefferson	32,640	5,500	27,140
Jeff Davis	387,840	403,074	-15,234
Lafayette	165,760	150,000	15,760
Lafourche	51,200	72,000	-20,800
Livingston	281,600	18,867	262,733
Orleans	14,080	0	14,080
Plaquemines	32,640	21,000	11,640
St. Bernard	24,320	2,000	22,320
St. Charles	30,720	15,000	15,720
St. James	82,101	39,000	43,101
St. John	36,884	19,000	17,884
St. Martin	245,760	99,000	146,760
St. Mary	102,502	75,000	27,502
St. Tammany	407,040	107,000	300,040

PARISH	HIGHEST POTENTIAL* AGRICULTURAL SOIL (ACRES)	1975 TILLABLE LAND (ACRES)	DIFFERENCE (ACRES)
Tangipahoa	376,320	190,000	267,320
Terrebonne	49,280	38,366	10,914
Vermilion	382,080	349,800	32,280
W. Baton Rouge	108,160	35,318	72,842
T O T A L	4,626,647		2,030,926

*Green area on Maps 1 to 14

WATER MANAGEMENT

Water management problems for agricultural purposes in the 26 coastal parishes center around drainage, and on irrigation of soil types suitable for rice production. Table I, Page 9, taken from 1969 census data, indicates the acreage involved for each parish. Data should be similar today since rice acreage has changed little and since rice is the only crop in the area irrigated extensively.

The area is somewhat unique as far as irrigation is concerned, compared to other parts of the United States. So much water is available, visitors from dryer climates find it difficult to believe that the Doctrine of Riparian Rights, or appropriation, is not applied to users of water from streams flowing through agricultural land.

Early development of the rice industry depended upon commercial irrigation companies, which elevated the water from a stream source into a supply canal made from soil and delivered it to individual farms. It was the practice for the farmer to use whatever water was necessary to produce the crop, and in return pay the commercial water supply company a portion of his crop.

With the development of reliable pumps, drilled wells, rural electricity and higher crop yields, more land owners began to use their own water supply system but still used the same type surface delivery ditches.

Since 1965, when the first was designed by the S.C.S., there has been a rapid increase in the use of underground farm delivery pipe systems. As of March 29, 1975, the soil conservation service had designed 1,365,536 feet of underground pipe system that was installed in the coastal zone.

As can be seen from Table I, Page 9, there has been a steady increase in the amount of pipe installed each year, even though the cost has more than doubled in the last four years. Farm labor cost, water loss, land loss occupied by delivery ditches, elimination of delivery ditches as a source of weed seed, quick delivery of water to any part of the field, and elimination of some muskrat and snake problems are cited as factors favoring the investment required for underground irrigation pipe.

The high annual rainfall in south Louisiana limits interest in irrigation of other crops except during a drought cycle. The last cycle (1954-55) caused interest in the area by some people to irrigate such crops as pasture. After the drought cycle passed interest in pasture irrigation was lost since the market value of the cattle produced did not encourage this type of investment.

Some high value crops are irrigated every year because uniform spacing of rainfall is not dependable. For example, since 1960, to obtain optimum yields on the vegetable farm at the University of Southwestern Louisiana, no year has passed when irrigation was not used. Nursery stock, particularly in cans, and grass sod also require irrigation systems.

Higher prices for food and fiber will cause a greater investment in irrigation systems for other crops. Sugar cane farmers would not tolerate the yield reduction caused by dry weather experienced in some years, if a selling price as high as that obtained in 1974 could be depended upon.

Also, a high price for meat, as future world population demands more grain for food, will cause increased interest in obtaining maximum yields from grass and forage which is well adapted to growth on many of the soil associations found in the coastal zone. Again, irrigation of forage and grass is one means of obtaining optimum yields, and a plentiful water supply with little pumping head is an agricultural asset of the area. As can be seen from the 1969 census data in Table II Page 1), most of the irrigated land is in parishes that produce rice.

Drainage

The low elevation and minimum slope of the wetlands make removal of excess water a major problem in the production of most crops, and drainage is constantly changing whenever man changes the topography or land cover. Land being occupied by highways and buildings no longer absorbs water, resulting in an increased rate of run-off. When forests are cut or fields leveled, or when man changes other aspects of the surface, much of the water infiltrated into the soil or removed at a slow rate now finds its way in large amounts in a short period of time to lower elevations, resulting in more frequent flooding and also more frequent stagnant stream conditions.

Providing better drainage at higher elevations results in water being dumped to lower elevations, increasing drainage problems there.

In the vicinity of the coast, man made and natural estuaries are subjected to change when run-off rate changes. An outflow of fresh water at a high rate over a short period differs from continuous flow at a lower rate. Also a short-term drought may allow inflow of saline water a greater distance upstream than would have occurred had the time of concentration of run-off not been changed by modification of the land surface, and had the outflow of rainfall been allowed to take place at a slower rate.

From the standpoint of agricultural activities, water management is not as critical as it is for urban and industrial activities. The present price of food usually dictates that the hydrologist plan water control structures for possible flooding every two to five years for agricultural activities, whereas designing for flooding on a frequency of 25 to 100 years would be more common where greater damage would result, as with urban development.

For most crops, the removal within 24 hours of gravitional water from the root zone in a field following flooding is considered a desirable objective in designing a farm drainage system, in order to limit damage. To achieve this objective may prove too costly for flooding that can be expected less frequently than every 2 to 5 years because of ditch sizes, numbers, lengths, etc. However, higher prices for food and fiber would support a greater investment in agricultural water management systems. Also, yields of certain grass or forage crops as well as rice are less hindered during most stages of production by excessive moisture than are such crops as corn and soybeans, indicating a greater potential for forage crops and rice in marginal areas, should sufficient market demand develop.

Erosion

Drainage of water and soil erosion are interrelated, since an excessive rate of removal of surface water is associated with soil loss and inadequate water removal with crop damage.

Vegetative cover, particularly on flatland, is in most instances the most important means of erosion control. Raindrop splash erosion on newly plowed or tilled land occurs when the exposed soil must absorb the kinetic energy of the falling raindrops. Mechanical and chemical bonds broken in the energy absorption result in the formation of smaller particles and soil loss from the field will occur if rainfall is sufficient to cause run-off. It has been estimated that a 2" rain applies energy equal to 518 million foot-pounds of work to an acre of land.[1] Such energy absorbed by bare soil causes "bombed-out" pits and packing with minimum net horizontal movement until run-off begins.

The amount of soil removed by run-off water is dependent upon water velocity. As velocity of run-off water increases on flat land a second type erosion labeled "sheet erosion" occurs. This type erosion is mentioned as a problem in several of the "Giant Step II" publications for the parishes studied. With such erosion, the water velocity over the

[1] "Water", 1955 Yearbook of Agriculture, page 127.

soil moves the top sheet of soil in the direction of movement, in addition to causing the loss of particles suspended in the run-off water. Farming operations that keep vegetation on the surface as much as possible either as crop residue or planted vegetation reduce erosion. The vegetation acts as a pad to absorb raindrop splash energy and as a friction factor that reduces the velocity of water that flows from the field. Soil erosion in flat land results not only in the loss of fertile top soil but in the filling of drainage ditches that must be cleaned out at considerable expense.

Watershed

On the farm, cleaning of small ditches is up to the individual operators, but filling of large ditches outside the farm with eroded soil and an increase of the run-off rate upstream due to urban development and changing land use has resulted in the need for large drainage systems designed for use by several organizations to limit backwater flooding.

The watershed areas indicated in Figure I and located in the coastal zone are either completed or under construction through the help and co-operation of various organizations under plans developed by the Soil Conservation Service. Plans for these watersheds are prepared at the request of local organizations such as police juries, local S.C.S. districts, and gravity drainage districts. Table II, Page 10, shows some basic details of the various projects. As can be seen, almost one million acres are involved in the 10 projects nearing completion, which in general modify and tie together drains that were constructed at random.

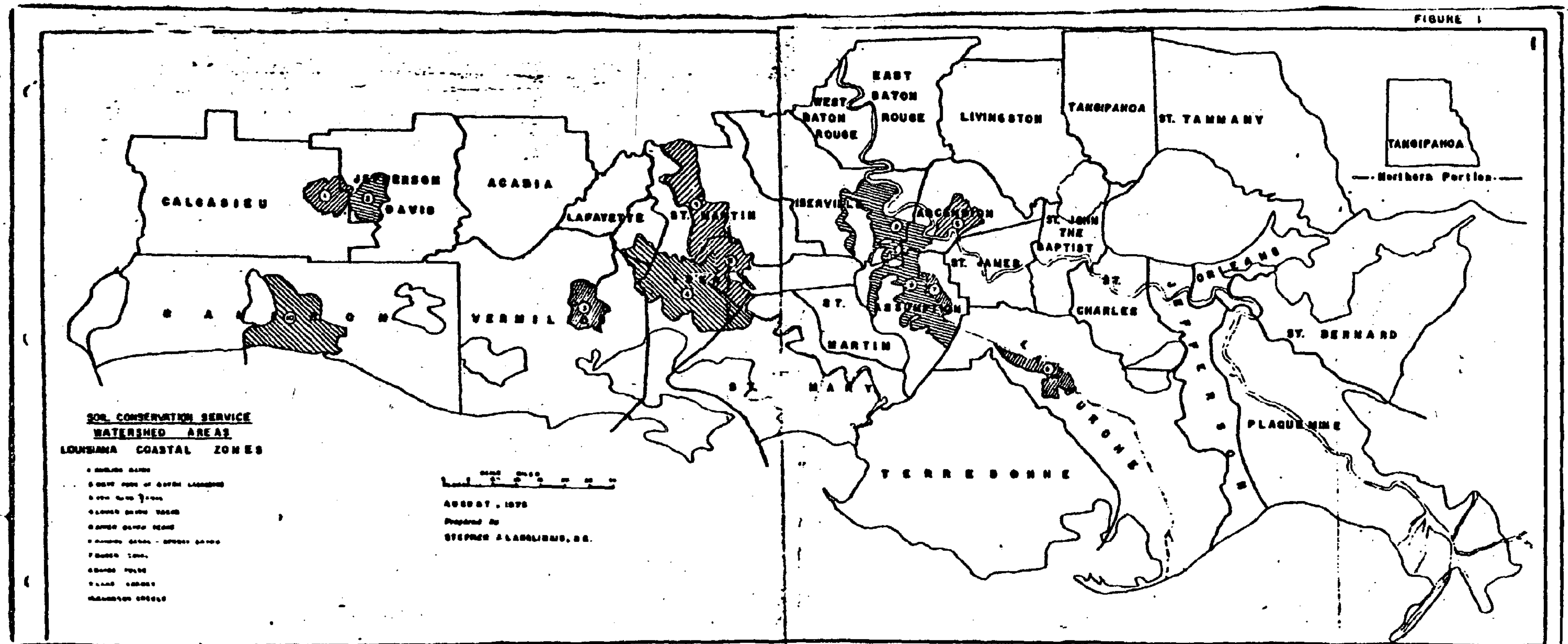

SOIL CONSERVATION SERVICE
WATERSHED AREAS
LOUISIANA COASTAL ZONES
AUGUST, 1975
Prepared by
STEPHEN A. LABOURMANS, DR.
CALCASIEU
JEFFERSON DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
VERMIL
ST. MARY
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
IBERVILLE
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ASSUMPTION
ST. CHARLES
ORLEANS
ST. BERNARD
MARTIN
TERREBONNE
PLAQUEMINE
TANGIPAHOA
Northern Portion

FIGURE 1

Included in the design work for each plan are such considerations as:

1. Land use and treatment
2. Soil conditions
3. Forestry
4. Fish and wildlife
5. Economic aspects
6. Hydraulic and hydrologic investigations
7. Sedimentation
8. Geology
9. Engineering
10. Project of other agencies that might affect or be related to the study
11. Disposal of soil to be moved

After the local organizations make a request for a study, an investigation of the above-listed items is made and the cost-benefit ratio determined. If all details of responsibility, financing and construction can be agreed upon a work plan is prepared. A period of 10 years may be required from initiation to completion of a watershed project.

An examination of Table II, Page 10, will show that a common problem in the flat area of the coastal zone is a need for more rapid removal of water from cropland. The original drainage system outside the farm boundary has become inadequate, probably from development of better farm drainage systems, changes in farm crops, and land use changes exterior to the individual farm that have caused overtaxed drains.

More rapid removal of water from higher elevations also causes flooding of agricultural land at lower elevations and/or filling of farm canals and exit canals to a level that will not allow flow from the farm system. A study of a large drainage area is necessary to properly size ditches that have been constructed without design, because frequently in some parts of the overall system ditches may have adequate carrying capacity, and in other parts of the system they are too small.

Most of the 10 work plans studied call for little additional canal construction, but rather for enlargement of canals in certain sections of the watershed. Levees, control structures and pumps become necessary where use is made of land near sea level elevations. An example of such a project is the Bayou Folse Project of the 1962 work plan, in which residence flooding was common. The levee and control structure portion of the Cameron-Creole Project to limit salt water intrusion has probably drawn the most debate and as yet has not been constructed.

Proper drainage of land used for agricultural purposes is necessary to limit the high risk already associated with crop production. As man attempts to use lower elevation lands for food production, the effect of changing water flow patterns by modifying drainage systems on marine life and wildlife is difficult to predict. There is little doubt that additional research information is needed in this regard.

TABLE I

UNDERGROUND IRRIGATION

First Pipelines 1965-1968 in Jennings, Crowley and New Iberia.

PARISH	TO DATE 1972	1973	1974	7/1/74-3/29/75	TO DATE 3/29/75
Vermilion	166,941	20,144	10,977	49,798	247,860 Ft.
St. Martin	3,480	0	0	0	3,480 Ft.
Cameron	2,276	0	0	0	2,276 Ft.
Acadia	166,651	42,841	50,653	45,899	306,044 Ft.
St. Mary	0	0	0	0	0 Ft.
Jeff Davis	226,157	50,079	67,843	55,231	399,310 Ft.
Lafayette	20,677	10,823	1,192	3,846	36,538 Ft.
Calcasieu	335,496	6,532	3,884	11,289	357,201 Ft.
Iberia	11,797	1,081	0	0	12,878 Ft.
TOTAL (Feet)	933,475	131,500	134,549	166,063	1,365,586 Ft.
% of March 29, 1975 Total	68%	10%	10%	12%	

Source: Data supplied courtesy of Nathan Shiller, Area Engineer, Soil Conservation Service, Crowley, Louisiana.

TABLE II

IRRIGATION AND DRAINAGE (1969 CENSUS DATA)

CLASS 1-5 FARMS

Parish	Irrigated (Acres)	Avg. Acres Irrigated/Farm	Irrigation Water Used (Acre-Ft.)	Acres Drained	Average Acreage Drained/Farm
Acadia	111,137	179.8	140,169	59,689	324.3
Ascension	385	77.0	206	29,354	772.4
Assumption	737	184.2	763	27,725	543.6
Calcasieu	76,458	352.3	89,641	122,200	1342.8
Cameron	14,913	261.6	17,233	70,786	1335.5
E. Baton Rouge	18	9	15	14,308	596.8
Iberia	8,512	202.6	8,333	36,928	535.1
Iberville	5	5	2	38,166	578.2
Jeff Davis	130,078	229.8	163,096	105,652	491.4
Jefferson	22	11	41	1,378	137.8
Lafayette	13,638	160.4	19,442	20,872	239.9
Lafourche	360	51.4	231	65,490	417.1
Livingston	117	6.5	80	2,900	152.6
Plaquemines	86	28.6	46	1,777	84.6
St. Bernard	2.0	2.0	2	1,328	166
St. Charles				10,383	546.4

Parish	Irrigated (Acres)	Avg. Acres Irrigated/Farm	Irrigation Water Used (Acre-Ft.)	Acres Drained	Average Acreage Drained/Farm
St. James	238	26.4	215	25,818	629.7
St. John				7,553	539.5
St. Martin	3,521	195.6	5,208	20,621	257.7
St. Mary	2,757	275.7	2,530	41,152	614.2
St. Tammany	480	48	764	4,861	220.9
Tangiph	1,387	12.1	923	5,532	62.8
Terrebonne				27,131	542.6
Vermilion	145,463	163.2	211,570	163,086	413.9
W. Baton Rouge	334	111.3	868	26,671	808.2
	510,666		661,378	931,361	

TABLE III

S.C.S. WATERSHED PROJECTS WITHIN THE COASTAL ZONE

Name of Project	Year Work Plan Book Published	Benefit to Cost Ratio	Project Size (Acres)	Construction Needed	Protection Interval Design For (Years)	Major Watershed Problems
Baker Canal	1959	6.1:1	21,000 (Private) 48% Cropland 30% Woodland 7% Pasture 1% Idle 14% Miscl.	10 miles of Drainage Canal Improvement	(?)	1. Poor drainage from farm outlets 2. Flooding of fields 3. Delayed cane harvest
Bayou Folse	1962	2.6:1	52,214 27% Cropland 23% Range (marsh) 22% Woodland 6% Urban and large water bodies 5% Miscl.	19.9 miles of drainage canal improvement, 4.4 miles of restoration of existing facilities, 36.2 miles of leave improvement	3-5 Pump capacity for water removal in 24 hours; 50 years for levee over-topping	1. 45 families in leveed area flooded when water reaches 3 ft. above mean sea level. 2. Inadequate pump capacity. 3. Run-off to low areas, crop damage. 4. Livestock disease loss from stagnant water. 5. Cultivating and harvesting delay.
Panama Canal - Conway Bayou	1964	2.4:1	43,730 (Private) 53% Brushy Pasture, Woods, Swamp 28% Pasture 13% Cropland 6% Miscl.	25 miles of drainage canal improvement	2	1. Flooding losses that have caused a 40% decrease in cropland in 10 years. 2. Poor drainage from farm outlets. 3. Increased runoff due to 1,000 acre industrial plant usage.

Name of Project	Year Work Plan Book Published	Benefit to Cost Ratio	Project Size (Acres)	Construction Needed	Protection Interval Design For (Years)	Major Watershed Problems
7th Ward Canal	1964	3.5:1	32,000 (Private) 53% Cropland 25% Woodland 15% Pasture 7% Miscl.	39.6 miles of drainage and irrig. canal. 3.3 miles of levee with 4 control structures to limit high tide damage to once in 5 year frequency.	5	1. Salt movement in and out of aquifers through river. 2. Flooding of low-lying areas by salt water tide. 3. Salt water in irrig. canals.
Lower Bayou Teche	1965	2.9:1	188,700 (Private) 40% Cropland 36% Marsh 13% Grassland 4% Woodland 7% Miscl.	168 miles of drainage canal improvement.	2	1. Flooding-some canals out of banks twice a yr. 2. 8,800 acres of marsh changing from fresh water to brackis. 3. Delayed crop harvest.
Upper Bayou Teche	1966	2.3:1	210,000 (700 Acres) (State Owned) 48% Cropland 33% Woodland 12% Grassland 7% Miscl.	Improve or straighten 1/2 of the existing 530 miles of multi-purpose channels.	2	1. Out-of-bank flow causing untimely harvest and damage to rice, sugar cane and truck crops. 2. Need for emergency type FHA loans has been necessary due to flood problems.
West Fork of Bayou Lacassine	1967	2.4:1	34,000 (Private) 82% Cropland 8% Woodland 2% Grassland 8% Miscl.	83 miles of channel improvement, some channel erosion control structures.	5	1. Channels are of insufficient size and out-of-banks 4 times per year (average). 2. Additional cultural practices are needed, harvest is delayed, soybeans frequently must be replanted.

Name of Project	Year Work Plan Book Published	Benefit to Cost Ratio	Project Size (Acres)	Construction Needed	Protection Interval Design For (Years)	Major Watershed Problems
English Bayou	1967	2.3:1	36,000 75% Cropland 7% Woodland 4% Grassland 14% Miscl.	44 Miles of stream channel improvement with some better alignment of existing channels	5	1. Inadequate outlet for water from on-the-farm drainage systems. 2. Present system out of banks an average of 4 times per year. 3. Delayed planting and harvesting-soybean production has suffered most.
Cameron Creole	1967	2.1:1	113,000 68% Rangeland 8% Pasture 1% Cropland 23% Miscl.	14 miles of single purpose levee, 35 miles of multi-purpose channel improvement, 3 multi-purpose water control structures		1. Rangeland grazing has deteriorated since 1940 due to increasing soil and salt intrusion since 1940. Construction of the Calcasieu ship channel plus the action of south winds and lunar tides are cited as causes.
Lake Verret	1969	2.8:1	246,000 acres 51% Woodland 33% Cropland 8% Pasture 8% Miscl.		2	1. Flooding of crops and average of twice a year. 2. Delayed harvest and increased cost of crop production. 3. Inadequate drainage outlet from farm. 4. Estimated 1400 acres will be used by industry by 1985.

Acreage in the [illegible] watersheds -- Total 976,694 acres

Cropland -- 40[illegible] Acres
Pasture -- 110,[illegible] Acres

Rangeland (Marsh) -- 156,781 Acres
Woodland -- 233,335 Acres

Miscellaneous* -- 71,955 Acres
*Highways, streams, ponds, urban, etc.

RICE

Rice is classified as a cereal crop and is second only to wheat in total world acreage. Rice is the most important food crop in the world -- a principal item in the diet of one-half of the world's population. Rice is best adapted to warm, humid climates and is the only cereal crop that can be grown in areas of excessive precipitation and/or poorly drained soils. Most of the world's rice is produced and consumed in the Far East.

Rice is a minor crop in the United States, which produces only 1.5% of the world's total. However, U. S. produced rice has a tremendous world economic, political and social impact because much of its rice is exported. Low per capita consumption (8 lbs.) in the U. S. plus inadequate rice supplies in foreign nations with high per capita consumption (300 lbs.) account for the United States' position as a rice exporter.

Total rice acreage in the U. S. in 1975 was 2,887,202 acres with four states planting 94% of the total. Louisiana's share was 24.2% of the U. S. total or 700,000 acres. Rice is a major crop in Louisiana and in 1973 was the number one cash crop. During the past decade it has been consistently ranked as one of the top three cash crops in the state. The value of the 1974 Louisiana rice crop exceeded 250 million dollars.

Much of Louisiana's rice is produced in the coastal zone parishes, particularly in the southwestern region. As shown in Table I, Page 6, in 1955, 19 of the 26 coastal parishes produced rice and this regional acreage accounted for 81% of the state's total rice acreage. In 1975 only 9 coastal zone parishes contained rice acreage which accounted for 72% of the states' total rice. Although the rice acreage in the coastal zone has shown a steady increase since 1960, the percentage of the state's rice acreage accounted for by the coastal zone parishes is decreasing. These statistics are illustrated in Figure I. An increasing proportion of the state's rice acreage is shifting from the coastal parishes to Northeast Louisiana (acreage has increased by a factor of 3.5 since 1970). However, rice production in the southwestern coastal parishes is expected to remain a strong and viable industry.

The coastal zone is naturally suited for rice production because of its warm temperatures, abundant rainfall, plentiful surface and ground water supply, and soils adapted to rice production. Other advantages include: close proximity to port facilities (for exporting), adequate milling and storage capacity (15.15 billion barrels/year milling capacity), thriving agribusiness industry (seed, fertilizer, pesticides, farm equipment), and research and higher education institutions which continually provide trained agriculturists and updated production technology.

Although Table I, Page 6, shows a trend to increased planting of rice outside the coastal zone, all of the rice mills listed in the July 1974 issue of the Rice Journal are located within the zone. Figure II shows the number of mills and dryers located in each parish. These processing facilities are concentrated in Southwestern Louisiana.

FIGURE I

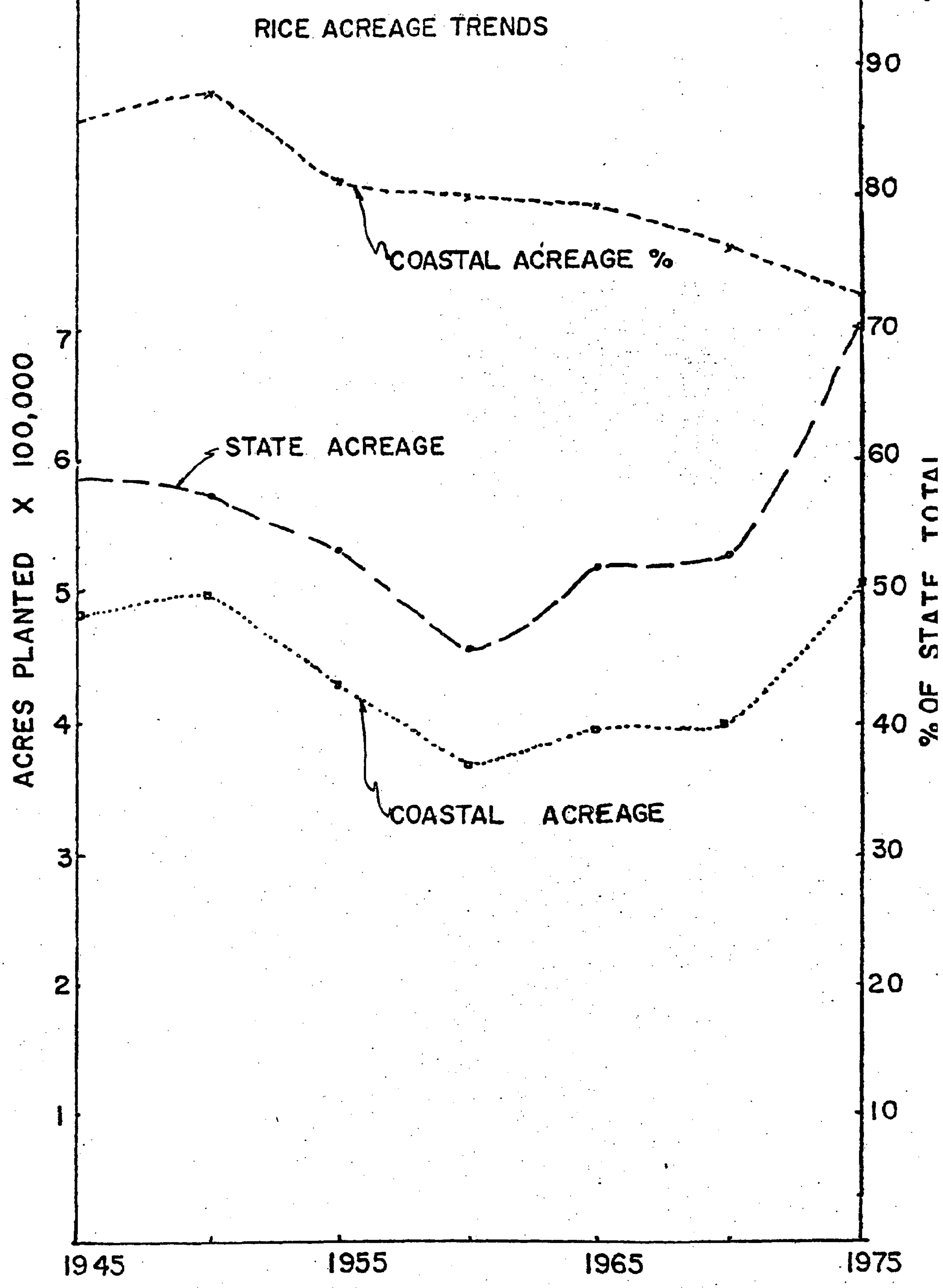
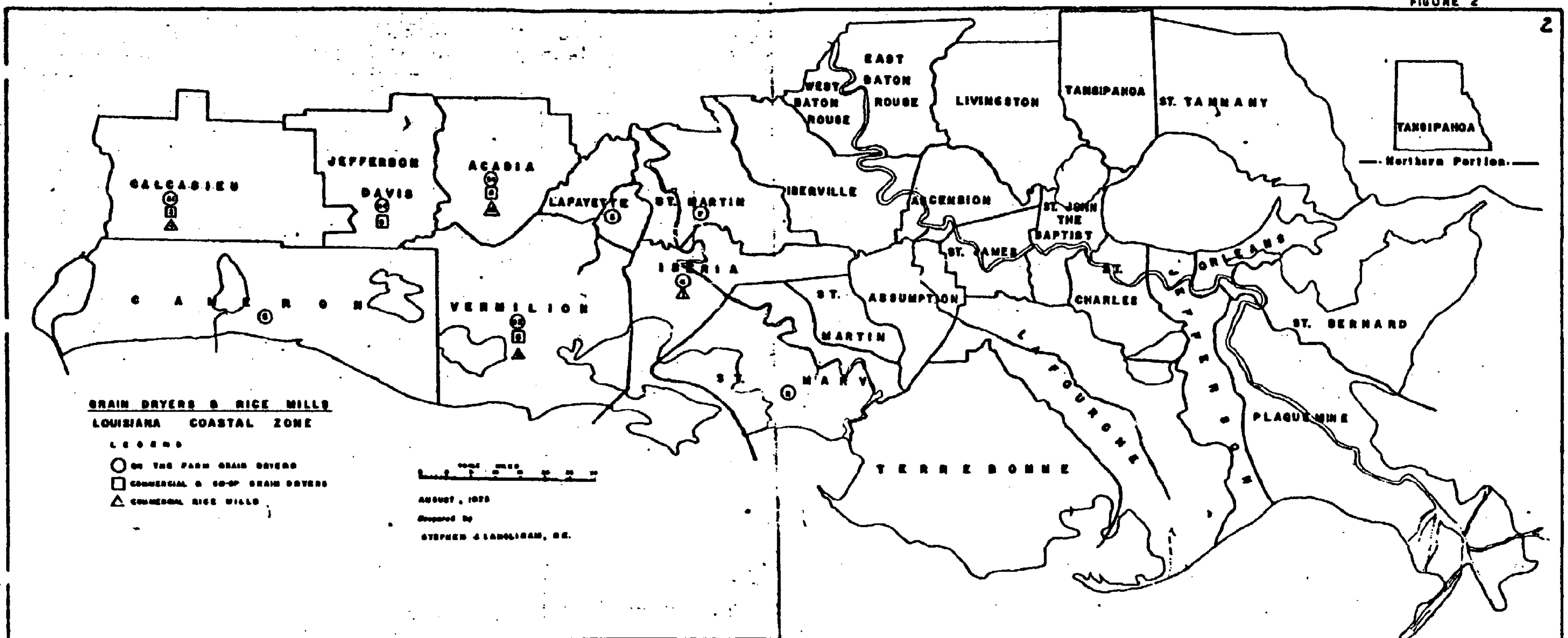

RICE ACREAGE TRENDS
COASTAL ACREAGE %
STATE ACREAGE
COASTAL ACREAGE
ACRES PLANTED X 100,000
% OF STATE TOTAL
1
2
3
4
5
6
7
10
20
30
40
50
60
70
80
90
1945
1955
1965
1975

FIGURE 2


2
TANGIPAHOA
Northern Portion
CALCASIEU
JEFFERSON DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
IBERVILLE
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ST. CHARLES
ORLEANS
ST. BERNARD
CAMERON
VERMILION
IBERIA
ST. MARTIN
ASSUMPTION
LAFOURCHE
JEFFERSON
PLAQUEMINE
ST. MARY
TERREBONNE
GRAIN DRYERS & RICE MILLS
LOUISIANA COASTAL ZONE
LEGEND
ON THE FARM GRAIN DRYERS
COMMERCIAL & CO-OP GRAIN DRYERS
COMMERCIAL RICE MILLS
AUGUST, 1975

There has been a marked increase in on-the-farm dryers and storage facilities in the last 10 years.[1] The numbers indicated in Figure II are individual units but the writer has observed considerable expansion in the capacity of many of these units after initial construction.

A well designed on-the-farm drying and storage facility permits more rapid harvesting of rice with less transporting vehicles and allows orderly marketing of a perishable product. Since the same equipment may be used for soybeans, dual usage and reduction of field loss from shattering of the beans is possible when combining is done at optimum moisture content of the beans and artifical drying to safe storage moisture.

The mills in the zone were contacted to obtain views on the future of rice milling and methods of disposing of rice hulls. It is doubtful that an adequate response was obtained to form a clear picture of problems and trends, but those mills responding were optimistic regarding the future. These mills are well aware of environmental problems associated with milling and watching closely for the most economical means of waste disposal. One mill listed six different means they had researched.

The huge investment in machinery on and off the farm is a strong point in favor of a stable rice industry. While current data are not

[1]"Farm Rice Driers in Louisiana", 1974 Directory, Tenth Edition. Louisiana Department of Agriculture.

available on a parish basis, observation indicates horsepower per worker on rice farms has increased rapidly. Tractors in the $30,000-$50,000 range are frequently observed on the modern rice farm.

Rice production in southwestern Louisiana is traditional if not historical in nature. The modern rice industry in Louisiana dates back to 1880, with Louisiana becoming the leading rice producing state in 1889. The average per acre yield has more than doubled since that time and higher per acre yields are predicted in the foreseeable future. Improved varieties, refined production techniques such as water leveling and underground irrigation facilities, increased fertilizer consumption and the availability of additional adapted soils are the reasons rice production in the southwestern coastal parishes will remain an important agricultural enterprise.

The rice crop is grown with water covering the soil for five months or more. It is desirable to have level land to minimize the water depth required between levees surrounding each plot and also to have large plots to utilize wide field machinery efficiently.

Table II, Page 8, shows the acres that have been water leveled for rice production. In this process the plot to be leveled is filled with water and soil from areas that extend above the water are moved by the farmer with drag units to low spots. It is estimated that about 1/3 less energy is required than for dry land leveling and some of the top soil settles back on the area scraped. The farmer does not require a level to perform the operation and removal of some levees and straightening of others is accurately done. About 60% of the rice land has been water leveled in the coastal zone by 1975.

Additional land areas that could be used for rice production should sufficient food demand occur from expanding world population are in general located in pink land areas shown on the 14 maps accompanying the soil use phase of this report. It is likely that only those areas with a soil high in clay content and with a slope less than 1%-2% could compete with other sections of the United States and the world should a significant increase in the market price of rice occur. In addition, those areas closest to processing facilities will be most economical to develop.

TABLE I

RICE ACREAGE PLANTED*

PARISH	1975	1970	1965	1960	1955	1950	1945
Acadia	119,271	93,500	92,300	84,400	96,000	108,000	115,000
Ascension			490		2,320	1,070	1,750
Assumption				350	650	450	700
Calcasieu	83,925	67,500	65,400	58,000	66,500	76,000	80,000
Cameron	16,974	16,400	13,200	12,300	15,300	16,500	16,800
Iberia	6,004	6,000	6,140	5,380	6,350	6,400	5,600
Iberville			1,000	1,080	2,750	1,370	690
Jefferson Davis	114,366	98,200	97,000	87,500	99,000	114,000	119,000
Lafayette	15,104	10,300	9,600	8,220	9,450	9,900	7,760
Lafourche				90	570	70	150
Plaquemines					400		
St. Charles					600	390	
St. James			510	2,490	2,300	2,330	1,850
St. John			600	890	1,050	1,060	850
St. Martin	6,643	4,100	4,080	3,640	4,330	2,980	5,100
St. Mary	1,520	3,100	3,100	2,630	3,140	3,020	3,750

PARISH	1975	1970	1965	1960	1955	1950	1945
St. Tammany				120	1,200	420	360
Terrebonne				70	210	90	90
Vermilion	142,342	114,800	101,500	101,500	116,000	126,000	124,700
Coastal Zone Total	506,149	400,400	394,920	368,660	428,120	500,050	484,150
State Total	700,000	525,000	517,000	464,000	530,000	569,000	584,000
% of State Total Planted in the Coastal Zone	72.31%	76%	78.4%	79.4%	80.7%	87.8%	86%

*Source: D.A.E. Research Report No. 436
"Louisiana Crop Statistics by Parish, Through 1970" except for 1975 which came from U. S. D. A. Statistics Report.

TABLE II

WATER LEVELING*

First Fields in 1960-1962 -- Calcasieu, Vermilion, Acadia and Jefferson Davis

PARISH	TO DATE 1972	1973	1974	7/1/74-3/29/75	TO DATE 3/29/75
Vermilion	6,890	628	0	190	7,708 Acres
St. Martin	67	0	0	0	67 Acres
Cameron	2,091	345	0	0	2,436 Acres
Acadia	22,487	1,173	2,087	245	25,992 Acres
St. Mary	0	0	0	0	0 Acres
Jefferson Davis	128,126	2,686	40	626	131,478 Acres
Lafayette	975	25	0	0	1,000 Acres
Calcasieu	135,912	795	0	278	136,985 Acres
Iberia	599	46	0	0	645 Acres
T O T A L	297,147	5,698	2,087	1,339	306,311 Acres

Source: Data supplied courtesy of Nathan Shiller, Area Engineer, Soil Conservation Service, Crowley, Louisiana.

SUGARCANE PRODUCTION IN LOUISIANA[1]

Sugarcane was first introduced to Louisiana in 1751 and has been a major crop since 1820. In 1974 sugarcane was the major cash crop in Louisiana and had an average value of over $500 million to the sugarcane grower.

Sugar production in Louisiana fluctuated from a low of 48,000 tons in 1926 to a high of 759,000 tons in 1963. Current average yields are approximately 25 Tons/Acre, 180 pounds of sugar/ton of cane, or about 4500 pounds of sugar per acre.

Growing Conditions

Sugarcane is currently grown in 16 southern parishes of Louisiana. The climate is subtropical but freezes do occur during the fall, damaging mill cane.

Rainfall is generally adequate and reasonably well distributed with the highest amounts occurring during June - September when cane is growing rapidly. Presently there is almost no commercial irrigation of cane although there is research currently being conducted that could result in some irrigation in the future.

Sugarcane grows actively for only about 7 months, from April to October 30. An average crop reaches a height of approximately 8-12 feet at harvest time which is usually begun by October 15.

Soil Types

Sugarcane is grown on 3 general soil groups in the State - (1) Pleistocene terrace, (2) Mississippi River alluvial and (3) Red River alluvial. The soils range from silt loam to heavy clays. Sugarcane is grown most successfully on the moderately well-drained soils.

Morphology

Sugarcane (Saccharum sp.) is a tall, perennial grass that stores sugar in the stem. Mature stalk vary from 3/4 - 1" in diameter and with an average length of 100 inches and weigh from 2 to 3.5 pounds. Louisiana varieties are generally erect but they sometimes lodge.

The stalk is made up 10 to 16 joints with a bud located at each node. The underground part of the stalk is composed of many short joints, each also containing a bud. Being a grass sugarcane has the ability to tiller or "stool" due to these buds.

Sugarcane rarely produces sexual flowers inthe field in Louisiana, although they are induced to flower artificially in the breeding programs. Commercial plantings are always by whole stalks in contrast to the short pieces utilized in tropical countries. Whole stalks are used since there is less disease damage than the short pieces.

Cultural Practices

In Louisiana, sugarcane is planted on ridges about 12 inches high. The rows are spaced 6 feet apart. There is currently research being conducted utilizing a double set of rows on a 6 foot bed. The results look favorable but appropriate harvesting equipment must be developed. Many producers now use precision grading on the light soils while crowning is used on the heavy soils.

Crop Rotation

The normal rotation of sugarcane obtained from each planting is a plant cane crop, first stubble, second stubble, and then fallow plow. Generally yields of older stubble decrease due to increase in disease or weed infestation. After the stubble is destroyed, the fields are cultivated frequently throughout the summer as part of a weed control program (primarily for control of Johnsongrass and Rauolgrass) and the cane is planted again in the fall.

Planting

Planting season is from early August to mid-October. Propagation is by whole stalks and approximately 3 to 4 tons of stalks are required to seed an acre. Generally cane used for planting has received special attention such as heat treatment for disease and application of insecticide for borer control. Whole stalks are harvested mechanically for planting.

A well-prepared seedbed is of extreme importance. A good fallow program is required to control perennial weeds such as Johnsongrass, Rauolgrass and Bermudagrass. Chisel plowing is also beneficial on the light soils to reduce compaction. Furrows are opened in the top of prepared rows to a depth of 4 to 10 inches and two to three whole stalks are placed side by side in the furrow and covered with 2-4 inches of soil using a 3 row chopper, culti-packed, and generally sprayed with a preemergence herbicide for control of winter weeds. Hand planting is gradually being replaced by automatic planters.

Planting is generally a very expensive process and the normal planting rate/day is 7-8 acres/day for a 4 man crew. Generally a farmer plants approximately one-fourth of his acreage each year.

Fertilization

In Louisiana, optimum response normally occurs when fertilizer is applied during April and May. Generally, all fertilizers are applied at one time. Recommended rates vary with soil type and for plant cane and stubble. The normal range is generally 120-140 lbs. actual N/A, 40 lbs. actual P_2O_5/A and 80 lbs. actual K_2O/A.

The most common source of Nitrogen is anhydrous ammonia and aqua ammonia while Phosphate and Potassium are applied in liquid or solid form.

Liming is generally recommended when soil pH is below 6.0.

Cultivation

Cultivation of sugarcane in Louisiana differs from that in many other producing areas. That is, high rows are maintained from the time the sugarcane is planted until the old stubble is plowed out.

shaving (mechanical removal of the top of the bed) when practiced for seed or soil removal, is generally done in January or February. However, improper or untimely shaving can be very damaging. Generally farmers who use a recommended herbicide program and who put the correct amount of soil on the cane at planting do not shave for weed or soil removal.

The next cultural practice is "off-barring," in which the soil is removed on either side of the row of cane leaving a ridge or "bar" about 12 inches wide. Generally a 3-row chopper with an off-bar blade in tandem and reversed is used to off-bar. The off-bar disk removes the soil from the row while the choppers, left in their normal cultivating position, immediately bring the soil back. The off-bar operation leaves the row in good physical condition so that little loss of fertilizer, particularly nitrogen, occurs. Fertilizer is applied into the loose soil on either side of the row at a depth of 8-10 inches.

To control weeds, the crop is cultivated 2-4 times until the cane leaves grow over the middle of the rows, at which time the crop is "laid". Generally, herbicides are used in a 30-inch band to control weeds on the top of the row. Many farmers also apply a lay-by herbicide on a broadcast basis to control weeds after cultivation is discontinued. Herbicides currently used in Louisiana for weed control are Sinbar, Fenac, Treflan, TCA, Dalapon, Silvex, Simazine, Atrazine, and 2,4-D.

Although some farmers with small acreages still use single row cultivators, most are now utilizing multirow equipment.

Varieties

Varieties currently being grown in Louisiana have been produced by a cooperative research program between L.S.U., U.S.D.A. and the American Sugarcane League. Major breeding objectives are high sugar yield/A, borer resistance, cold tolerance, early maturity, disease resistance, good mechanical harvesting ability, lodging resistance, and non-brittleness. Current recommended varieties are NCo 310, C.P. 48-103, L62-96, C.P. 61-37, C.P. 65-357 and C.P. 65-69.

Diseases

The Louisiana sugarcane crop has been constantly plagued by diseases. In fact in 1926 the crop was almost destroyed due to low yields caused by disease damage.

The two most serious sugarcane diseases in Louisiana are mosaic and ratoon stunting diseases (R.S.D.). Each of these diseases may cause as much as a 50% reduction in yield/A in susceptible varieties.

The most effective control of mosaic is by growing disease resistant varieties or varieties that are tolerant to the virus disease.

R.S.D. may be controlled by either varietal resistance or by heat treatment of susceptible varieties used for seed.

Two other important diseases are red rot and root rot. Control of these two diseases is by varietal resistance, good drainage, and good seedbed preparation.

Insects

The most destructive insect pest of sugarcane in Louisiana is the sugarcane borer (*Diatraea sacharalis*). Damage is caused by larvae feeding and tunneling within the cane stalks. Reduction in cane tonnage of approximately 5 tons/A is normal in susceptible cane varieties.

Control of the borer is generally through an intergrated program utilizing fire ants, varietal resistance, and most importantly insecticides when the appropriate economic threshold occurs.

Minor insect pest damage that occurs infrequently is from the sugarcane beetle and wireworms.

Harvesting

Harvesting (grinding) of sugarcane in Louisiana begins in Mid-October and ends in late December. The crop is only 7 to 8 months old when grinding begins. Generally the sucrose content increases during November and December. However, one must not wait until his crop has reached its peak maturity because of the risk of killing freezes. Depending on variety, moisture, and subsequent temperatures, a temperature of 29°F and below can cause substantial deterioration of cane.

The crop is harvested entirely by soldier type harvesters. These machines cut the cane at the bottom and top and pile it on "heap rows". Generally 3 rows are placed on each heap. The machine does not clean or strip the cane, although some experimental machines can clean the cane of trash. Leaves and adhering trash are then burned on the heap row.

The cut, burned cane is loaded mechanically onto tractor-drawn carts. Cane is hauled directly to the mill in the tractor wagons or loaded into trailer trucks by transfer loaders.

Almost all cane is now handled and transported by a bulk handling system or the dump system in constrast to the older "sling" system.

There is currently research being conducted utilizing the combine harvester in Louisiana. This experimental harvester cuts, chops, cleans, and loads the cane directly into wagons. However, the economic considerations and harvesting efficiency of this machine are questionable.

Manufacturing

Sugar is processed in raw sugar factories. There are 37 raw sugar factories now operating in Louisiana, as compared to over 50 mills during the 1940's. Due to tremendous cost in operating and constructing factories, the number of mills has been reduced while the milling capacity of remaining mills has increased. To construct a mill to grind 6000 tons/day would cost between \$30-\$40 million at current cost. Although resources such as land, water, etc. are available for some expansion of the Louisiana sugarcane industry, the limitation of milling facilities is the single most important factor regulating expansion.

When cane is delivered to a mill, it is weighed and sampled for trash and quality determinations (sucrose % and % total soluble solids).

Producers are paid for the number of standard tons delivered, with a standard ton of cane being a net ton (gross tons less trash) of cane that is converted to 12% sucrose and 76% purity.

The cane is piled in the factory yard or moved immediately onto a feeder table by a derrick or a front-end loader. The cane is washed and chopped by revolving knives.

Then by a series of tandem crushers and mills the juice is extracted. Juice extraction varies with efficiency of the equipment and the fiber of the cane, but generally averages 90%.

The pulp or residue containing the fiber after juice extraction is called bagasse. Some of it is used to generate steam to operate the factory while some is used in making paper and building boards.

The extracted juice is acid with a pH of 5-5.5. The pH is raised to 6-6.5 by addition of lime to precipitate some of the impurities and to prevent undesirable formation of sugar types. Clarification of the heated juice takes place in large vessels called clarifers. Precipitates that settle to the bottom of the clarifer are drawn off (filter press mud) and hauled to fields or ponds. The clear juice is decanted from the top of the clarifers and sent to the evaporators. The evaporators remove the water from the juice and produces a thick syrup.

The syrup goes to the "boiling pans" where it is heated under vacuum to produce sugar crystals. When the syrup has been evaporated until saturated, sugar crystals (grains) are produced and are ready to be dried in the centrifugals to produce brown or raw sugar. The brown sugar then will be sent to a refinery to produce white sugar.

Fourteen of the 26 parishes designated within the Coastal Zone of Louisiana now contain sugarcane acreages. Since there are only three sugarcane parishes outside the coastal zone area, most of the data presented in the report were based on all 17 parishes.

Figure I, Page 16, presents the production of sugarcane in Louisiana from 1900-1974. Since 1940 the production has increased steadily until 1970, when the production has become somewhat stable.

Figure II, Page 17, shows the state average yield in net tons of cane/A for the period 1950-1974. Within this period of time, yields have varied from a low of 17.3 tons/A in 1951 to a high of 28.9 tons/A in 1963. Yields have varied widely in this time period due to varietal selections, government programs, weather conditions and prices.

Acres of sugarcane planted in the Louisiana coastal zone for the time period from 1950-1974 are showed in Figure III, Page 18, while the data for the individual parishes within the zone at 5 year intervals are presented in Table I, Page 14.

The Louisiana sugarcane industry operated under the U. S. Sugar Act from 1937 until 1974 when it terminated. Included in the Sugar Act were provisions for quota limitations and this caused the severe drop in acres planted during two time periods -- 1954-1956 and 1968-1969. With quota restrictions reduced and presently entirely removed, the acres have increased to 331,000 acres in 1974. The bulk of the sugarcane acreage, approximately 94%, is located within the coastal zone.

As shown in Table II, Page 15, and Figure IV, Page 19, the number of raw sugar mills in Louisiana has decreased steadily since 1950 despite the increased production and acreage as presented earlier in Figure I, Page 16, and Figure IV, Page 19, respectively. This reduction can be attributed to high cost in construction and operation with low returns on investment. In order to survive the economic squeeze and remain in operation, raw sugar mills have had to increase grinding capacity. In Table II, Page 15, is shown the 24 hour grinding capacity of each mill within the Coastal Zone still in operation.

Based on the indicated daily grinding capacity of each mill for a 75-day season and assuming a yield of 25 tons/A, it would be possible to grow and process approximately 400,000 acres of cane, compared to 331,000 acres grain in 1975, using presently established raw sugar mills.

The prospects for expansion of sugarcane within the Coastal Zone area will depend on a number of factors such as sugar prices, prices obtained from other production enterprises already established in the zone, environmental considerations, etc.

It is the opinion of most knowledgeable people in the industry that the most important factor regulating the expansion of the Louisiana cane industry is limited raw milling. For example, the last raw cane mill constructed in the state was the Cajun Sugar Co-Op in New Iberia in 1963. At that time the cost for this 5000-6000 ton/day mill was approximately \$8 million. Present cost (1975) of a comparable mill would amount to between \$40-\$50 million. The location of the mills in the coastal zone is shown in Figure V, Page 20. It can be seen that most of the mills are in the vicinity of streams and many are near towns. Recent interest in the environment has, in some cases, proven this choice of a site selection unfortunate. Many mills were constructed to long ago (the most recently built is 12 years old) that problems of modern society and population growth were not anticipated. The 2½ month grinding season presents some pollution impact in the case of a few mills. Fortunately, the grinding season occurs during a time of the year when the hazard is minimized. During the grinding season cool weather allows residence windows to be closed and normal rainfall flushes out the streams. When abnormal weather occurs some mill operations have come under criticism.

Mills are in the process of establishing lagoons to prevent excess trash from finding its way into streams and cleaners for smoke stack output but time did not permit an examination of individual enterprises. Pollution of air from field burning will necessarily continue till a satisfactory substitute method of harvest can be developed.

The United States is dependent upon more than 50% of the sugar it uses from import sources. The study shows that the acreage grown is limited by climate and mill capacity. The number of mills is constantly decreasing and some are moving to South America where longer growing seasons exist. This is one crop where national needs are not met and whether it continues to be grown under economic pressure may deserve national as well as state consideration.

Although 1974 prices for sugarcane were excellent, this was an abnormal occurrence and these prices are not expected in the future.

Unless higher yields/acre are obtained or higher prices obtained for sugar than occurred prior to 1974, it does not appear that the sugar cane area in the Coastal Zone will expand.

U.S.D.A., Culture of Sugarcane for Sugar Production in the Mississippi Delta Ag. Handbook No. 417, - 1972.

TABLE I

SUGARCANE ACREAGE

PARISHES	1950	1955	1960	1965	1970	1974
Ascension	14,434	11,364	11,593	13,965	12,127	15,819
Assumption	30,384	25,686	29,873	32,370	31,833	38,334
Iberia	38,748	33,352	36,968	38,899	35,909	46,006
Iberville	21,239	16,651	17,520	21,914	20,329	25,009
Lafayette	8,735	7,220	8,279	8,274	7,687	7,833
Lafourche	29,246	24,235	26,458	31,567	29,298	29,250
Plaquemines				1,034		
St. Charles	1,531	1,330	1,502	2,814	1,849	1,208
St. James	17,331	14,383	16,994	20,940	19,269	22,956
St. John	15,762	12,560	9,249	9,948	8,301	10,138
St. Martin	17,028	16,728	18,371	18,539	16,956	21,808
St. Mary	35,411	30,054	35,050	38,451	36,373	42,051
Terrebonne	35,612	28,526	35,731	37,920	34,381	37,391
Vermilion	4,502	2,360	2,082	3,136	3,278	3,587
W. Baton Rouge	14,357	12,051	14,110	15,102	11,532	12,477
T O T A L S	279,244	236,502	263,782	294,925	269,127	313,867
STATE TOTALS	296,581	249,576	281,615	314,241	286,402	331,185
% OF STATE	94%	95%	94%	94%	94%	95%

TABLE II

DAILY GRINDING CAPACITY FOR EACH MILL LOCATED IN COASTAL ZONE AREA

Name of Factory	24 Hour Grinding Capacity -- Tons
1. Armant	3,400
2. Billeaud	2,750
3. Breaux Bridge	2,400
4. Cajun	6,000
5. Caldwell	5,000
6. Catherine (S)	2,000
7. Cedar Grove	1,868
8. Cinclare	4,000
9. Columbia (C&G)	1,900
10. Columbia (F)	1,800
11. Cora-Texas	3,000
12. Enterprise	4,250
13. Evan Hall	5,500
14. Georgia	2,500
15. Glenwood	4,500
16. Greenwood	3,600
17. Helvetia	3,000
18. Iberia	4,250
19. Jeanerette	3,000
20. Leighton	6,300
21. Louisa	2,600
22. Lula	4,500
23. Oaklawn	5,000
24. Raceland	5,000
25. St. James	4,200
26. St. Martin	3,500
27. St. Mary	4,000
28. Smithfield	2,400
29. Southdown	3,800
30. Sterling	6,000
31. Supreme	4,000
32. Terrebonne	3,000
33. Valentine	3,300
34. Westfield	4,500
35. Wilbert's Myrtle Grove	2,800
TOTAL	128,418

FIGURE I

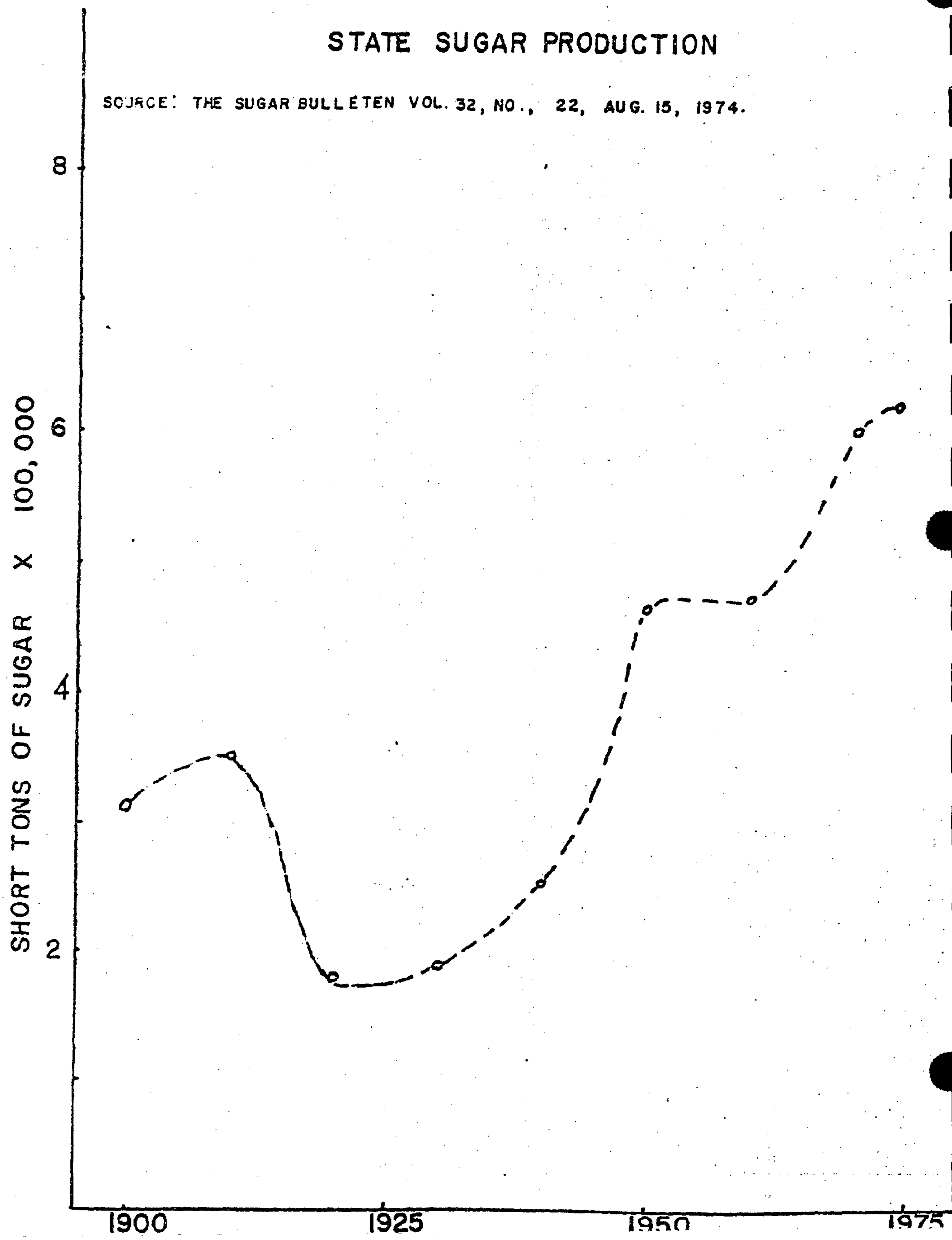

STATE SUGAR PRODUCTION
SOURCE: THE SUGAR BULLETEN VOL. 32, NO., 22, AUG. 15, 1974.
SHORT TONS OF SUGAR X 100,000
8
6
4
2
1900
1925
1950
1975

FIGURE 2

STATE AVERAGE YIELD PER ACRE
(NET TONS)

SOURCE: SUGAR-CANE BULLETIN (1950-1975)

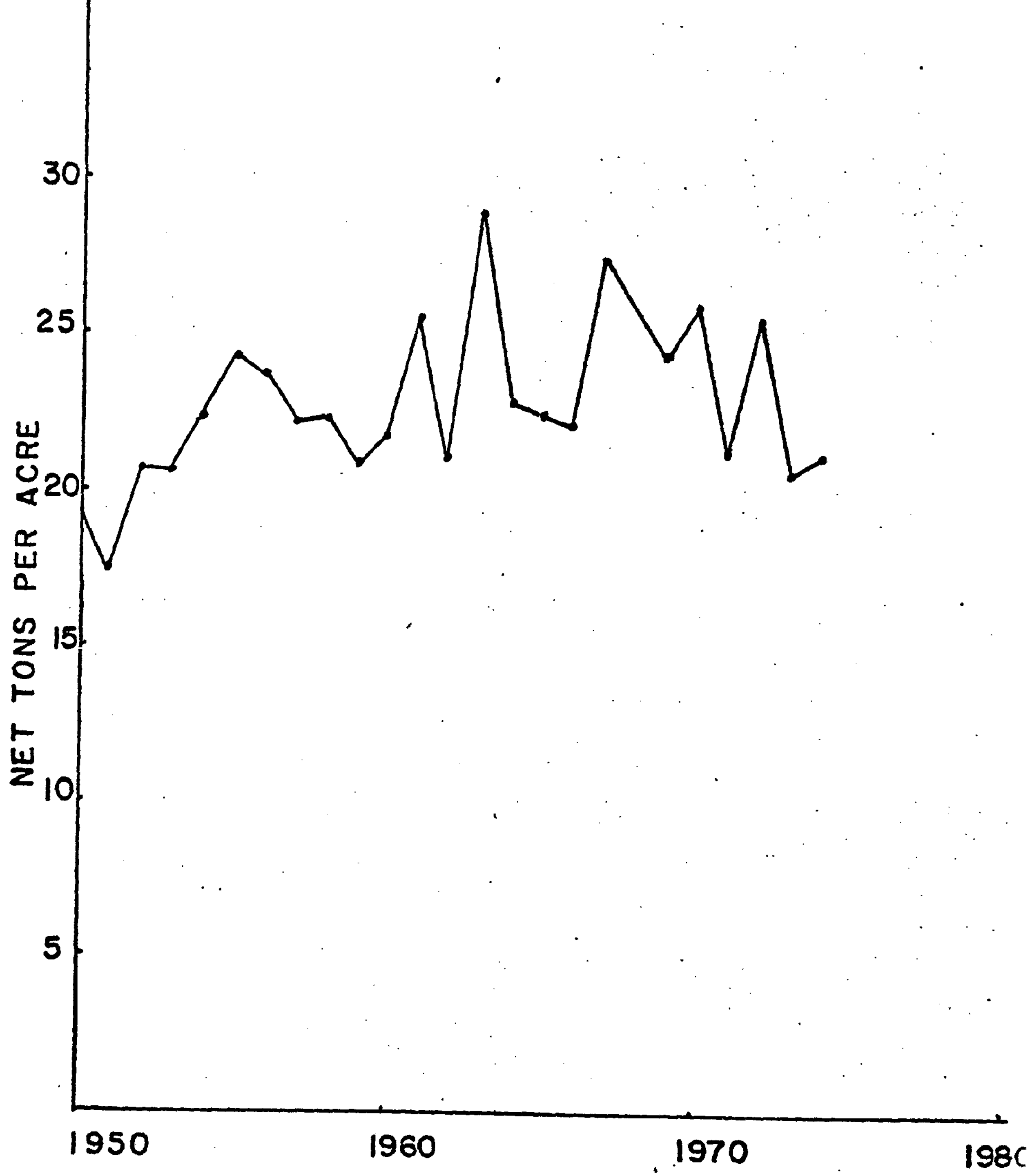
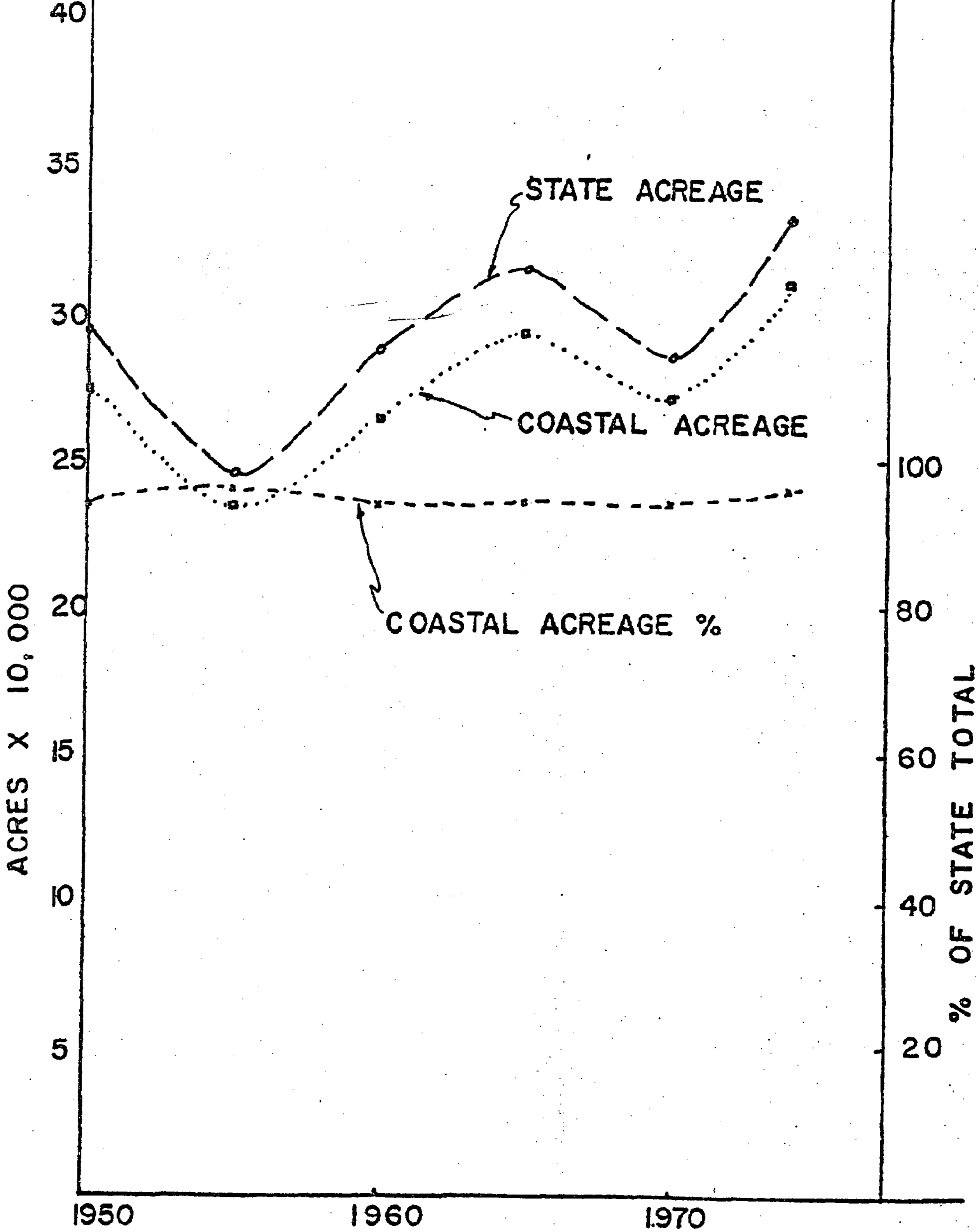


FIGURE 3

SUGAR CANE ACREAGE TRENDS



SOURCE: SUGAR CANE BULLETIN (1950- 1975)

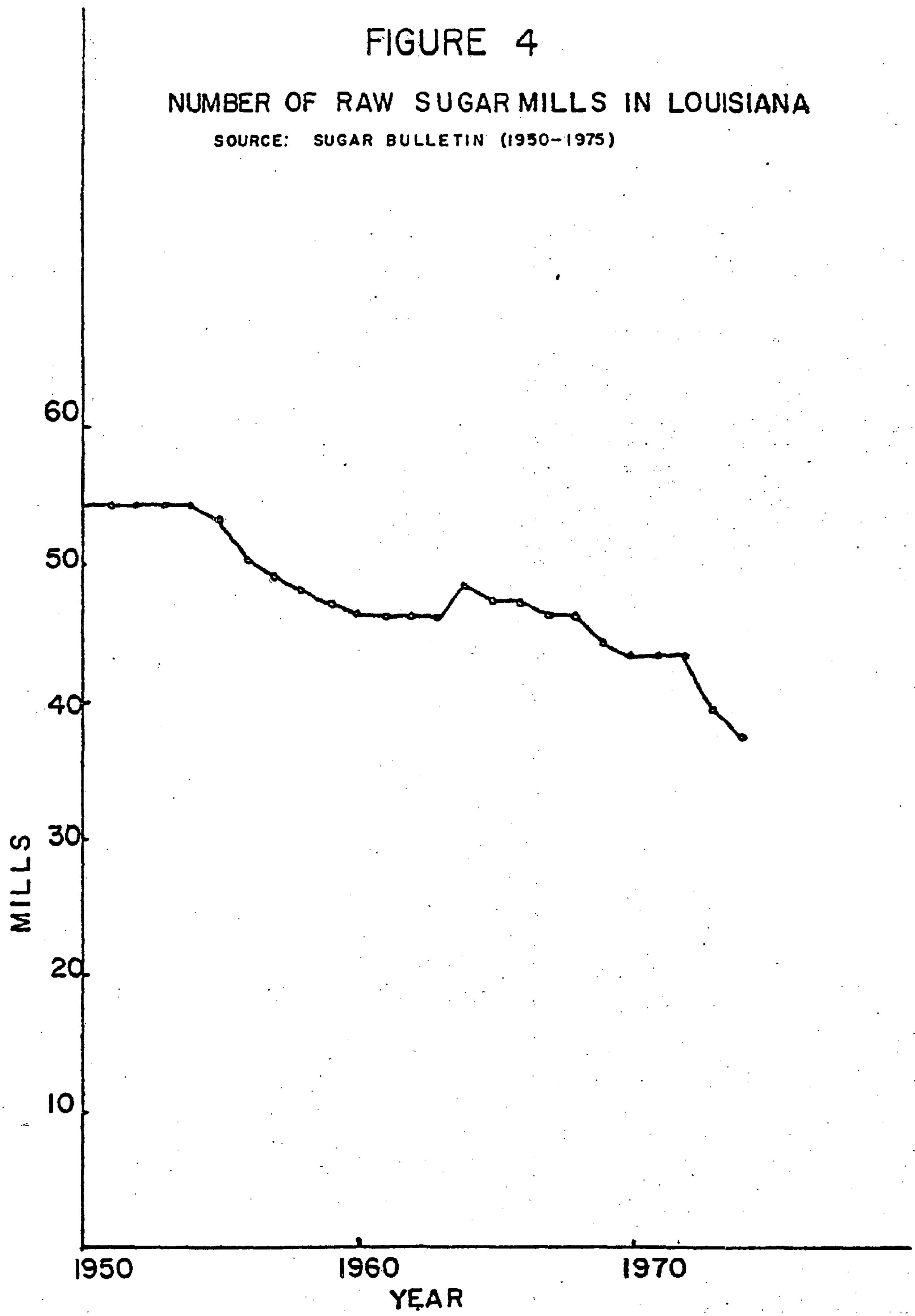
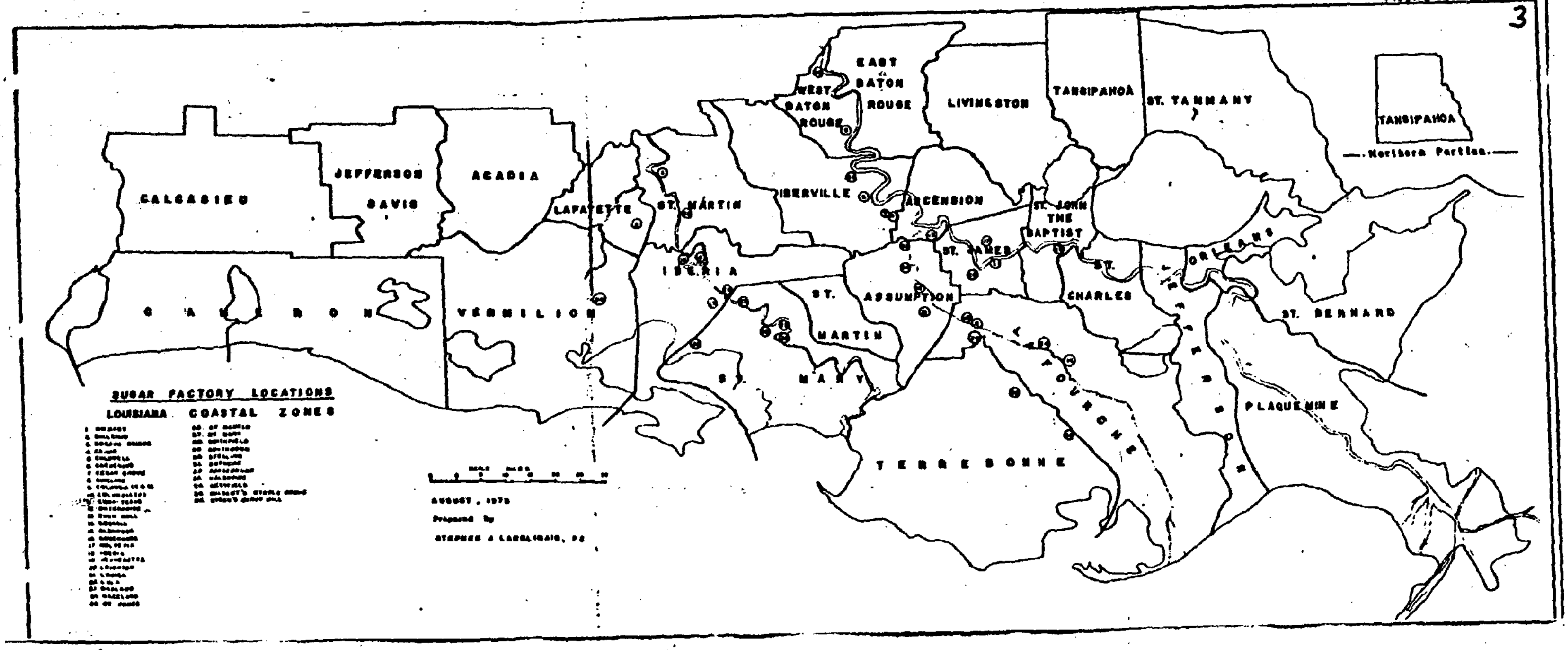


FIGURE 4
NUMBER OF RAW SUGAR MILLS IN LOUISIANA
SOURCE: SUGAR BULLETIN (1950-1975)
60
50
40
30
20
10
MILLS
1950
1960
1970
YEAR


PAGE 20
FIGURE V
3
TANGIPAHOA
Northern Portion
CALCASIEU
JEFFERSON DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
IBERVILLE
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ST. CHARLES
ORLEANS
JEFFERSON
ST. BERNARD
PLAQUEMINE
CAMERON
VERMILION
IBERIA
ST. MARTIN
ASSUMPTION
ST. MARY
LAFOURCHE
TERREBONNE
SUGAR FACTORY LOCATIONS
LOUISIANA COASTAL ZONES
AUGUST, 1975
Prepared by

SOYBEANS

Soybean planting acreage in the study area has increased from an insignificant amount in 1955 to the second-ranking crop behind rice. Most of this acreage has come at the expense of cotton acreage and pasture grown in rotation with rice. As can be seen from Table I, Page 4, 77% of the total acreage grown in 1974 was from four rice-producing parishes -- Acadia, Jeff Davis, Calcasieu and Vermilion. The most expensive equipment used in production of the crop is the same as needed for rice growing and rotating rice and soybeans, plus a good job of weed control reduces the problem of red rice, a weed that cannot be controlled with a herbicide in rice production years but can in soybean production years.

The high market value of soybeans has tempted some idle acres in most parishes into production, to such an extent that 22 parishes reported some beans grown in 1970 compared to 13 in 1965. A large percentage of the cotton land of 1960 is also in soybean production.

In addition to high market price, an important factor in the expansion of bean acreage has been the rapid progress made in the development of weed control herbicides that reduce labor requirements and provide cleaner fields for harvesting with the combine. Labor costs make hoeing for weed control impractical and such weeds as the cocklebur (Xanthium), curly indigo (Aeschynomene Virginica), and Johnson Grass (Sorghum Halepense), not only reduce yields when not controlled but make combining difficult.

Soybeans cannot tolerate gravitational water in the root zone for more than a day or two without having growth affected. Rice fields are ideally fairly level between levees, and even though internal soil drainage is poor for soils suitable for rice production, soybean yields are less affected by excessive rainfall than on similar soil-types that have been cleared of timber or other vegetation and not leveled in order to plant beans. Low spots where water is trapped will cause beans to die or will affect growth.

Soybeans are normally planted at a later date than rice and are also harvested after rice, which fits well with the rice farmers' time schedule. Soybean planting is done with an airplane, a grain drill, or a row crop planter without the need of nitrogen fertilizer, an expensive production item for most crops.

Harvesting time is more critical with soybeans than with many crops harvested with a combine because of shatter losses if the crop becomes too dry. The coastal area has many drying facilities associated with the rice industry that allow slightly earlier harvest of the beans and artificial drying to the 11%-12% moisture level safe for storage. These facilities are an asset to the production of this crop, and offset to some extent the rainfall hazard at harvest time.

Figure I shows the trend in planted acres from 1955 till 1974 for the state and the coastal zone. The large spread in the acres planted in the zone compared to state acreage that began to develop about 1960 came largely at the expense of woodland and cotton outside the zone.

If the world demand for protein continues to increase (which seems likely) soybean plantings should remain high and may increase on suitable land. The greatest potential for production increase remains in increasing average yield per acre by using recommended practices. The damage from excessive moisture in 1975 should focus attention on better drainage for planted acres and decrease interest in poorly drained marginal land. If the market price exceeds $6-$8 per bushel, interest will remain high in producing this crop. The soybean growing season lends itself well to double cropping.

Based on a market value of $6 per bushel and the average yield and planted acres of 1974, the value of the crop grown in the coastal zone would be over 46 million dollars. Viewing all aspects of the cost of production, the trend in world price, the compatibility with other farm enterprises, and the potential for increased production, soybeans appear to be a crop that will be planted increasingly in the coastal zone.

Only one soybean processing facility presently exists in the zone, but more will undoubtedly develop as the crop becomes well established, due to the vicinity of exporting facilities.

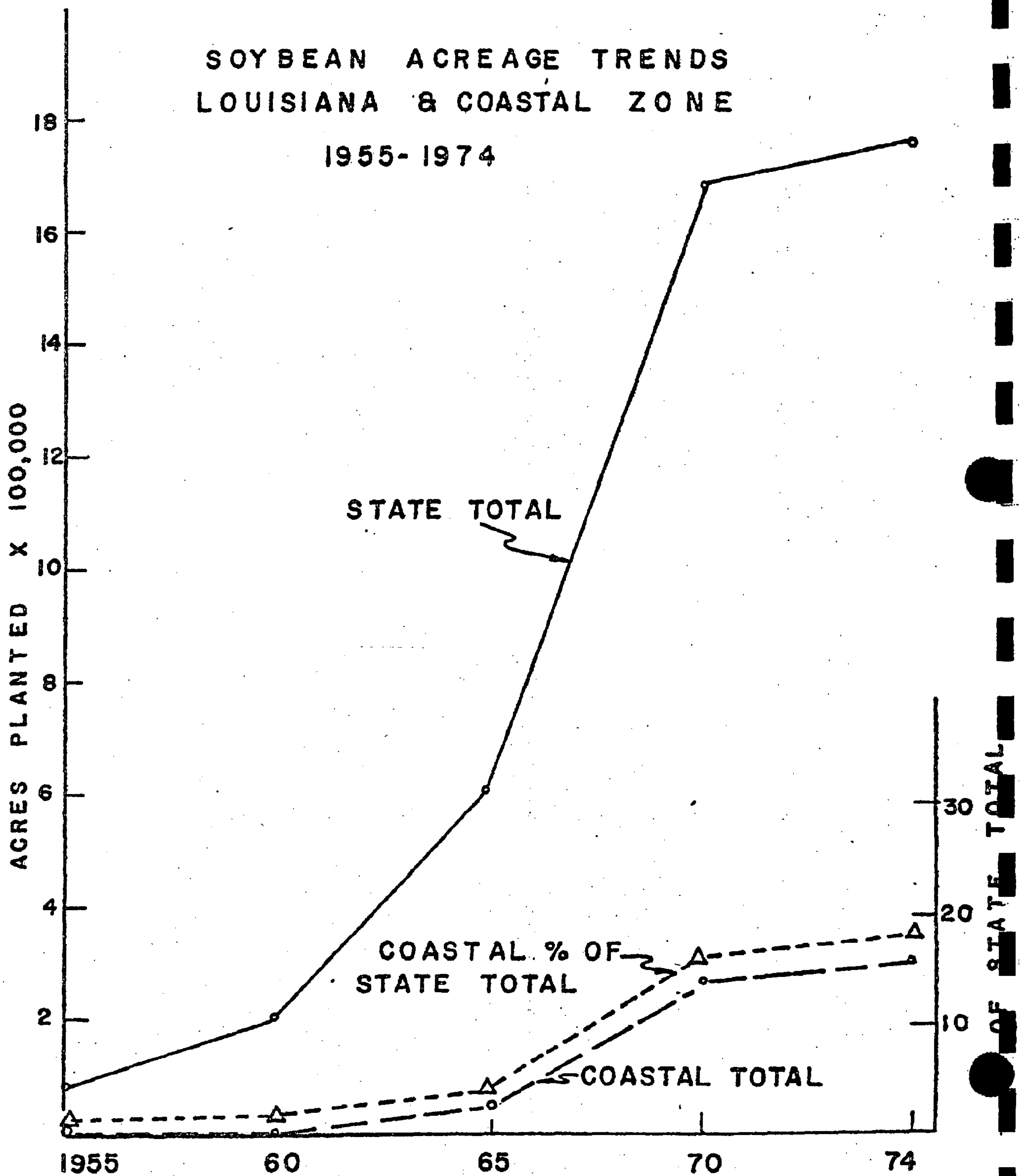
TABLE I

SOYBEAN ACREAGE*

Parish	1955	1960	1965	1970	1974
Acadia		1,000	16,000	65,000	75,000
Ascension	100		200	3,900	4,500
Assumption	300	50		3,500	2,500
Calcasieu			6,500	35,000	38,500
Cameron			3,200	10,000	5,500
E. Baton Rouge		50	150	5,500	4,000
Iberia	600	750	300	2,500	2,000
Iberville	300	100	50	13,000	11,000
Jeff Davis		130	24,000	83,000	108,000
Lafayette		250	500	6,000	12,000
Lafourche	800			1,900	4,000
Plaquemines				500	500
St. Charles				1,000	400
St. James			200	1,400	3,300
St. John				3,000	3,600
St. Martin		650	150	3,000	7,500
St. Mary	300			5,500	3,000
St. Tammany			250	3,000	800
Tangipahoa				2,500	1,800
Terrebonne				2,500	1,700
Vermilion		90	600	21,000	25,000
W. Baton Rouge				5,000	3,500

Parish	1955	1960	1965	1970	1974
T O T A L	2,400	3,070	52,100	277,700	318,100
STATE TOTAL	95,000	216,000	622,000	1,688,000	1,760,000
% of State Total in Wetlands	2.5	1.4	8.3	16.4	18.1
State Average Yield Per Acre	22.0	24.0	21.5	22.5	25.5

*Source -- D.A.E. Research Report No. 436
"Louisiana Crop Statistics, by Parishes, Through 1970" except for 1974 which came from Louisiana Crop and Livestock Reporting Service, USDA Statistical Reporting Service.


SOYBEAN ACREAGE TRENDS
LOUISIANA & COASTAL ZONE
1955-1974
ACRES PLANTED X 100,000
18
16
14
12
10
8
6
4
2
STATE TOTAL
COASTAL % OF STATE TOTAL
COASTAL TOTAL
30
20
10
% OF STATE TOTAL
1955
60
65
70
74

FRUIT-NUT-VEGETABLES

The climatic conditions of the coastal zone and the numerous soil types permit production of a unique variety of horticultural crops such as tung nuts in St. Tammany Parish and perique tobacco in St. James Parish. The production of fruit, nuts and vegetables generally requires considerable hand labor and even though potential production of numerous vegetables in various parishes has been well demonstrated in the past, high labor costs and limited mechanization (particularly at harvesting) is a major factor in the decline of acreage devoted to this purpose. Accurate recent data on a parish basis are very difficult to obtain for specific vegetables and much conflicting data were found. Table I, Page 7, was taken from the 1969 Louisiana Census Report. As can be seen the coastal parishes no longer have extensive acreage devoted to vegetable production.

Since 1969 there has been a rapid increase in the price of fresh vegetables at the retail level causing an increased interest in home gardens and farmers' markets. Unfortunately, small producers are seldom trained to stage production, anticipate market demands, and co-operate with other producers in developing a successful market operation. Nevertheless, interest is so great it appears the larger towns in the zone will develop or attempt to develop a farmers' market where producers do not have a local market. Six cities operated such markets in 1975. The "Giant Step II" report for St. John Parish indicated 45% of the produce from 725 acres was sold thru the French Market in New Orleans. Similarly, the outlet in Lafayette was generally short of producers. Such a trend in marketing is too recent to be considered well established but based on 1975 retail vegetable prices, energy, transportation, and labor demands should continue to increase, making locally grown vegetables competitive with large, out-of-state producers. Many vegetables that cannot be shipped or compete with other areas of the country for processing can be grown for such an outlet.

The interest in home gardens has also increased as expensive, forced-ripened vegetables become common in the supermarket. A large number of these gardens are grown in urban areas on land that would be classified as cropland from the standpoint of soil type had it not been utilized otherwise. The value of the home garden is substantial. Seventeen "Giant Step II" reports included an estimate of home garden values that totaled some $33,692,000.

Major fruits and berries grown in the area are citrus, strawberries, figs and blackberries (principally wild). A major freeze in 1962 plus two hurricanes caused a major setback in the citrus industry, but a considerable portion of the zone can produce this product profitably. Availability of trees had limited replanting but 2000 acres are in production in Plaquemines Parish, the major growing area, in 1975, compared to 568 acres in 1969. As with pecans, all parishes in the zone produce some citrus but local consumption and marketing methods do not permit an accurate estimate of value.

Strawberries are best grown commercially on sandy soil. Some 500 producers in Tangipahoa Parish farmed 1000 acres in 1974 where marketing facilities have been long established. A few other parishes of the coastal zone have suitable soil, but high labor cost limits interest, and the acreage devoted to this crop commercially may continue to decline or become a family enterprise. Statewide statistics indicate a stabilization of acreage thru 1972.

The pecan is the most widely grown nut in the coastal zone. Since few orchards are planted and most production comes from scattered native trees instead of planted varieties, estimates of value are difficult. In addition, production tends to be on alternate-year basis so that yield data collected one year would be vastly different from a year later. The "Giant Step II" report for Iberville Parish attempts to evaluate production in that parish and discusses some of the difficulty in obtaining yield information because of the marketing method. A dealer estimate of 2 million pounds of production is given for that parish.

Mechanization of pecan production has been successful and it is quite possible that orchards will be planted in the region on suitable soil types. A well drained deep soil is best suited for this purpose. Flooding for one or two days can be tolerated on soil with good internal drainage.

The tung nut orchards grown in St. Tammany Parish are rapidly being replaced by another enterprise. Table I, Page 7, shows about a 2/3 reduction in acreage between the 1964 and 1969 census reports. Farm value in 1969 was only 7%-8% of the 1965 value (1).

Sweet potatoes once were a major crop in some portions of the wetland where suitable soil types exist. Soils with a high percentage of sand and silt are considered desirable for this crop. However, an area around Arnaudville having finer textured soils has consistantly produced the earliest potatoes which bring higher prices on the fresh market. Production on soils with a poor internal drainage is hazardous should rainfall persist at harvest time and make loss of the crop from rotting more likely.

The production of sweet potatoes for the fresh market has declined but areas close to a canning plant have experienced some increase in production as indicated by Table I, Page 7. In the opinion of one processor interviewed, the future of this crop is dependent upon development of suitable harvesting machinery to reduce labor costs. It will be necessary to meet competition in other sections of the United States for the present acreage to increase.

Processing plants for vegetables are located at several points in the coastal parishes as indicated in the section of this report dealing with processing facilities. Present and future demands of our urban society indicate a need for increasing output from these plants but economic aspects of the canning industry direct that mechanical harvesting techniques be developed for the industry to survive.

Like sweet potatoes, okra is a crop well adapted to production in many areas of the wetlands. In fact, it can be successfully grown in any area that will grow cotton. Because of labor costs, competition, and lack of mechanization 50% of the processed okra from one plant is now being trucked in from Mexico.

Another horticultural crop processed and sold world-wide from the coastal area is the hot pepper. Soil requirements for this crop are more restrictive particularly for best quality tabasco sauce. As with other processed vegetables labor reduction is important for future growth.

Vegetables such as cabbage, shallots, squash and bell peppers can be grown readily in some areas of the region under study as well as numerous other crops. For these vegetables to be sold for fresh market use outside the region on a scale that would expand acreage significantly would require a co-operative effort and mechanization that shows little signs of developing.

Recent interest in greenhouse production of tomatoes and cucumbers has resulted in rapid expansion of this enterprise. Most growers use some form of growing media other than soil which solves some problems and creates others. One operation in Acadia Parish consists of more than 350,000 sq. ft. under glass and the total in the coastal zone has increased from no growers 10 years ago to about 30 growers and approximately 500,000 sq. ft. as indicated by the secretary of the Louisiana Greenhouse Vegetable Growers' Association. This type agricultural operation allows control of some climatic conditions but requires a great deal of technical training and management skill to be successful.

Better varieties of fruits, nuts and vegetables are continually being developed by agricultural researchers to overcome some of the hazards of a climate to which they may not be well adapted. The advantage of a long growing season, development of better pesticides, ability to grow fall, spring and summer crops on the same land, a large and rapidly growing consumer population in the same area plus better trained growers lead to the conclusion that this asset of the coastal zone will be more valuable in the future as energy and food become higher in price.

1. D.A.E. Research Report No. 458. Agricultural Statistics for Louisiana, 1964-1972, L. L. Fielder and S. L. Guy. Department of Agricultural Economics and Agribusiness, Louisiana State University and U.S.D.A.

TABLE I

VEGETABLE - ORCHARD - POTATO ACREAGES

PARISHES	VEGETABLES 1969	VEGETABLES 1964	ORCHARDS 1969	ORCHARDS 1964	POTATO 1969	POTATO 1964
Acadia	34	33			1,628	1,051
Ascension	34	30			8	NA
Assumption	2			21	103	20
Calcasieu	12	2	99	90	2	5
Cameron	4		8	39	15	NA
E. Baton Rouge	679	787	27	44	534	298
Iberia	367	299	139	194	77	8
Iberville	27	6	418	82	18	33
Jeff Davis		2	34	138	49	196
Jefferson	423	704	103	12	1	
Lafayette	192	208	23	34	1,069	379
Lafourche	794	587	8	4	481	517
Livingston	15	102	24	36	21	164
Plaquemines	642	620	568	1,396	2	4
St. Bernard	178	236	127	37		1
St. Charles	31	278	2	11	22	36
St. James	449	558		12	14	16
St. John	285	514	33	NA	4	9
St. Martin	309	654	393	273	1,538	901
St. Mary	5	3	19	14	13	
St. Tammany	35	48	4,092	11,256	8	7

PARISHES	VEGETABLES 1969	1964	ORCHARDS 1969	1964	POTATO 1969	1964
Tangipahoa	562	664	117	4,316	46	95
Terrebonne	100	109	42	12	110	510
Vermilion	37	51	24	112	15	28
W. Baton Rouge	110		100	39	2	12
T O T A L	5,326	6,495	6,402	18,192	5,780	4,290

ORNAMENTAL HORTICULTURAL -- SOD

A very valuable agricultural enterprise frequently overlooked because of small acreage requirements is the production of ornamental horticultural crops and sod for home lawns. For example, the "Giant Step II" publication for St. Tammany Parish indicates some 38 producers in that Parish with only 5.75 acres of greenhouse space, 1178 acres of nursery stock and 425 acres of sod produce material worth 5.2 million dollars and the goal for 1978 is 10 million dollars. About 45% of the nursery production from that parish is now sold thru chain stores.

The coastal zone has an advantage of a long growing season, low energy requirements for greenhouse heat and a plentiful supply of water.

Although many areas are capable of production the industry has tended to band together in certain localities where buyers can obtain the specialty of various growers without undue travel and some co-operative purchases of input supplies can be attained. Most nursery acreages are located in St. Tammany, Tangipahoa and Lafayette Parish.

COTTON

As can be seen from Table I, Page 4, and Figure I cotton was once a very important crop in the coastal zone and in 1930 was produced in 25 of the 26 parishes. The area produced almost 11% of the state total and Lafayette Parish alone produced 2.67% of the state total. Since that time the crop has been almost completely lost as an agricultural enterprise even though it would not be unreasonable to assume the crop would gross 40 to 50 million dollars if the 1930 acres were planted and grown using the technical knowledge available.

The sharp decline in acreage since 1930 indicates other land uses have proved more profitable since cotton was well established in the area by tradition. At one time cotton required a great amount of hand labor but the advent of chemical weed control, the use of airplanes to apply insecticide and mechanical harvesting greatly changed this need. For example a two row harvester can replace 100 hand pickers and under Arizona conditions has been found to pick up slightly less trash (1).

Cotton grown in south Louisiana is the medium staple type and requires a well drained root zone for optimum production. On the flatland areas this requires the preparation of an elevated seedbed with a lister and/or bedding disks. Modern operations plant three or four acid delinted seed in hills about 16" apart on the elevated beds when the soil is warm enough for germination and apply a pre-emergence herbicide for weed control. Recommended fertilizer may be applied at or before planting with possible side dressing later in the season.

One of the chief problems encountered in producing cotton in the coastal zone is insect control. Warm winters allow many insects to survive and start multiplication early in the spring. Spraying for boll weevil control at an early date frequency kills desirable predator insects that are helpful in controlling the boll worm. Eradication of the weevil now under study, would greatly simplify and reduce the cost of controlling cotton insects. Once a week spraying is frequently required at the present time and lack of a suitable insecticide for control of the tobacco bud worm has greatly reduced the cotton grown in the state during 1975.

Factors that have influenced the decrease in cotton acreage in the coastal zone besides the insect problems are:

1. Small plots of land not well suited to mechanization.
2. High production costs such as labor cost and machinery cost.
3. Climatic conditions not well suited for mechanical harvest or for field storage to extend the ginning season.
4. The availability of herbicides for weed control in soybeans grown as a substitute crop.
5. A decrease in the accessibility of gins.
6. Low yields per acre in some areas.
7. Cost price squeeze.

It is quite probable that cotton will increase in price in future years since competition for clothing fiber has been from synthetic fiber which is dependent upon the oil industry. As the price of oil increases synthetic fiber prices should increase placing cotton fiber in a more favorable position. In addition oil and protein prices have shown an upward trend making cotton seed more valuable.

Even though most parishes in the coastal zone have some potential for cotton production and assuming the insect problem can be overcome there will have to be a substantial increase in cotton price to coax any of the acreage back into cotton. This will be difficult since there are only four gins listed in the entire area in 1973 and their output was so small that none of the 26 parishes were listed in "Report on Cotton Ginnings for the Crop of 1973, by Counties" (2). As an example, it appears that the 1975 Lafayette crop of 200-400 acres will have to be transported to Opelousas for ginning. Without a gin within a reasonable distance where cotton is grown it appears that it will become a crop with little more than historical importance in this zone.

(1) Engineer's Corner, "A Mechanization Case History -- Cotton", by Kenneth K. Barnes, Implement and Tractor Magazine, Page 44, May, 1963.

(2) Cotton Ginnings, U. S. Department of Commerce. Social and Economic Statistics Administration. Bureau of Census, Report A 20: 73-7, April, 1974.

TABLE

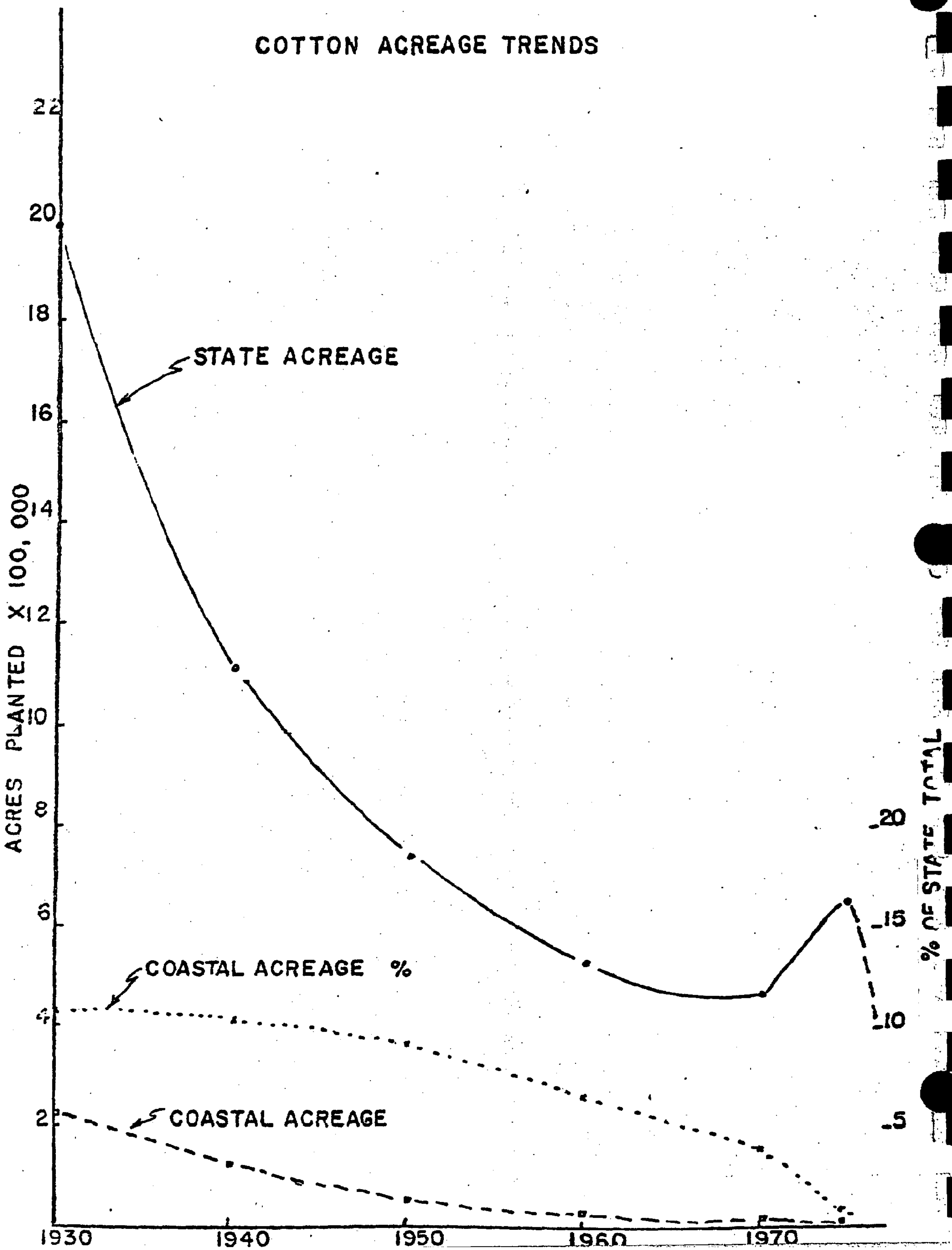
COTTON ACREAGE*

PARISHES	1930	1940	1950	1960	1970	1974
Acadia	42,300	26,900	17,200	10,000	5,800	3,139
Ascension	1,325	476	495	15		
Assumption	180	5	30			
Calcasieu	11,700	3,650	410			
Cameron	7,700	3,900	730			
E. Baton Rouge	11,400	4,630	940	160		28
Iberia	4,400	2,190	2,100	590		
Iberville	800	690	940	235		
Jefferson	20	14				
Jeff Davis	11,400	7,020	1,080	100		10
Lafayette	53,000	29,600	20,500	12,000	5,750	2,044
Lafourche	3,870	1,108	430			
Livingston	300	2,070	260	50		
Orleans	10	23	10			
St. Bernard	10					
St. James	10	4	5			
St. John	30					
St. Martin	15,500	10,790	10,550	6,150	2,630	1,566
St. Mary	1,100	95				
St. Tammany	1,500	1,480	390	85		
Tangipahoa	8,000	7,080	1,220	305		

PARISHES	1930	1940	1950	1960	1970	1974
Terrebonne	145					
Vermilion	36,400	13,400	8,800	3,100	1,100	68
W. Baton Rouge	1,000	1,140	1,320	580		7
TOTAL	212,100	121,265	67,410	33,370	15,280	6,862
STATE TOTAL	1,983,000	1,199,000	739,000	525,000	465,000	649,036
% of State Total Planted in Wetlands	10.7%	10.1%	9.1%	6.4%	3.3%	1%
Harvested (# of lint)	175	194	287	470	555	

*Source -- D.A.E. Research Report No. 436
"Louisiana Crop Statistics by Parish, Through 1970" except for 1974 which came from the 1974 ASCS Annual Report.

FIGURE I


COTTON ACREAGE TRENDS
ACRES PLANTED X 100,000
% OF STATE TOTAL
STATE ACREAGE
COASTAL ACREAGE %
COASTAL ACREAGE
22
20
18
16
14
12
10
8
6
4
2
20
15
10
5
1930
1940
1950
1960
1970

WHEAT

Wheat is a minor crop in the coastal zone but the acres planted have almost tripled since 1965 as indicated in Table I, Page 4. Plant disease has been a factor restricting wheat production in humid climates such as that of the coastal zone. Development of varieties with some disease resistance, the increased selling price of wheat as a grain, and the possibility of double-cropping wheat with soybeans for grain or pasture point to increased interest in this crop in the coastal zone. An additional factor that would cause increased interest would be removing the disease limitation by development of an economical and acceptable fungicide.

At present only about 1/3 to 1/2 the acreage planted in the coastal zone is harvested for grain. Most of the remainder is used for pasture, particularly if rust disease attacks the plant.

It is interesting to note that wheat has been planted in 21 of the 26 parishes under study and the largest number of acres planted was in 1974 as shown by Table I, Page 4. Even though wheat is not well adapted to the climate, yields per acre harvested for grain in some years have compared quite favorably with yields in the wheat belt. This suggest continued interest in production of this important world food crop particularly if pesticides are approved for control of disease and if the price level is maintained. Many farmers already have the necessary equipment for wheat production. On certain soil associations prior to soybean harvest, wheat may be planted among soybeans by airplane, enabling double use of the land, reducing winter erosion, and increasing farm profits.

In 1974 the value of the wheat crop planted in the coastal zone, if harvested for grain, would have been approximately one million dollars assuming a healthy plant and based on recent selling prices. Its value when grazed off would have been considerably less.

It is doubtful that wheat will replace other crops at the present time but may be used as a double crop more often, when soil types and farm management systems are suitable.

Sorghum

As with wheat, grain sorghum is a minor crop in the coastal zone and most varieties are better adapted to a dryer and less humid climate. Research by plant breeders to develop disease and bird resistant varieties has made considerable progress. A large percentage of the sorghum acreage is planted for silage instead of for grain harvest.

Sorghum can be produced with essentially the same machinery used for rice and soybeans. Recent yield averages have increased considerably: the 1960 state average yield was 27 bushels per acre, compared to the 1974 average of 40 bushels per acre.

Sorghum plantings have decreased since a 1970 peak both state-wide and in the coastal zone, as shown in Figure 2 and Table II, Page 6. It is not a well established crop and its future use as a grain crop would be difficult to predict. It will no doubt continue to be used

FRUIT AND VEGETABLE PROCESSING IN THE LOUISIANA COASTAL ZONE*

While many kinds of fruit and vegetables are marketed as fresh produce, Louisiana fruit and vegetable growers are fortunate to have a stable fruit and vegetable processing industry as a potential buyer for their produce. The Louisiana fruit and vegetable industry is located essentially in the Coastal Zone, having only four plants in the state which are outside the Coastal Zone. The plants were classified according to their primary operation and are listed as follows for the 1971-1972 season:

Type of Plant	Number of Plants in Coastal Zone
Canner	6
Freezer	1
Specialty Items	4
Canner and Freezer	2
Canner and Specialty	4
Miscellaneous	2
TOTAL	19

The location of these plants in the Coastal Zone is depicted in Figure I.

The estimated aggregate wholesale value of fruit and vegetables processed in Louisiana in the 1971-1972 season was $54,669,180. Of this,

*Coral Francois and Jerry M. Law, Commercial Fruit and Vegetable Processing Operations in Louisiana, 1971-72 Season, A.E.A. Information Series No. 26 (Baton Rouge: Louisiana State University Agricultural Experiment Station, February 1973).

as a silage crop particularly if the area experiences a drouth period since it is more productive than corn under dry conditions. Sorghum can also tolerate a wider range of soil types than corn with fewer production problems.

The value of the 1974 coastal zone sorghum crop is estimated from Table II, Page 6 data at about $200,000. The 1970 planting was about five times the 1974 planting. The crop has been grown in 21 of the 26 parishes and has definite potential on some soil associations, if disease problems are overcome and market price is high enough to interest production.

TABLE I

WHEAT ACREAGES*

PARISHES	1955	1960	1965	1970	1974
Acadia	1,700	2,000	1,100	2,100	2,800
Ascension		50	100	700	1,400
Assumption				100	200
Calcasieu	50	100	200	900	1,100
Cameron			200	200	200
E. Baton Rouge	400		300	500	400
Iberia	50				
Iberville	100	100	300	200	700
Jeff Davis	900	1,200	600	1,300	1,400
Lafourche					300
Lafayette		100	200	300	300
Livingston				100	100
St. Charles				200	200
St. James	90	100	100		600
St. Martin				100	100
St. Mary				200	200
St. Tammany				200	400
Tangipahoa	100		100	100	300
Terrebonne				500	500
Vermilion	500	1,100	600	1,400	1,100
W. Baton Rouge	500	800	400	1,000	700
T O T A L	4,350	5,450	4,200	10,010	13,300
STATE TOTAL	35,000	63,000	90,000	78,000	80,000

PARISHES	1955	1960	1965	1970	1974
% of State Total	12.4	8.6	4.6	12.8	16.6

*Source -- D.A.E. Research Report No. 436
"Louisiana Crop Statistics, By Parishes, Through 1970" except for 1974 which came from Louisiana Crop and Livestock Reporting Service, USDA Statistical Reporting Service -- Louisiana Wheat: Acreage, Yield and Production, 1974 Preliminary Report.

TABLE II

SORGHUM ACREAGES*

PARISHES	1960	1965	1970	1974
Acadia	150	300	500	
Ascension		40	700	
Assumption		40	50	
Calcasieu	200	300	1,500	
Cameron	20	40	100	
E. Baton Rouge	40	250	1,700	1,100
Iberia	150	400	100	
Iberville		150	1,300	400
Jeff Davis	100	300	800	
Lafourche		40		
Lafayette	40	150		
Livingston	10	40		
St. Charles	40		150	
St. James	20		50	
St. Martin	50	80	150	
St. Mary			150	
St. Tammany	20	250	1,100	
Tangipahoa	150	1,700	500	400
Terrebonne			400	
Vermilion	50	100	1,200	300

PARISHES	1960	1965	1970	1974
W. Baton Rouge	10	10	300	
T O T A L	1,100	4,190	10,900	2,200
STATE TOTAL	11,000	17,000	87,000	42,000
% of State Total	10	24.6	12.5	5.2

*Source -- D.A.E. Research Report No. 436
"Louisiana Crop Statistics, By Parishes, Through 1970" except for 1974 which came from Louisiana Crop and Livestock Reporting Service, USDA Statistical Reporting Service -- Louisiana Sorghum: Acreage, Yield and Production, 1974 Preliminary Report.

FIGURE I

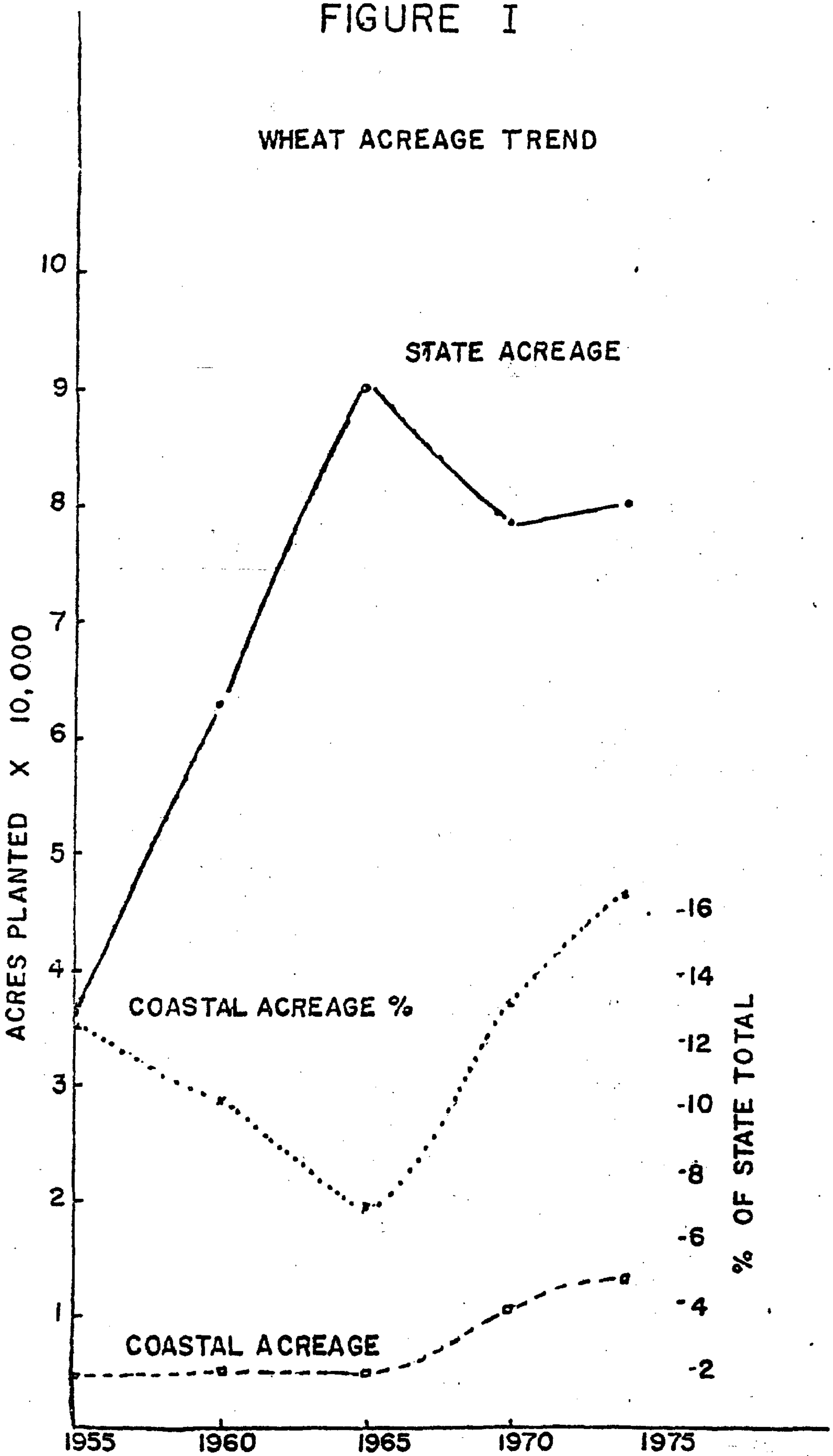
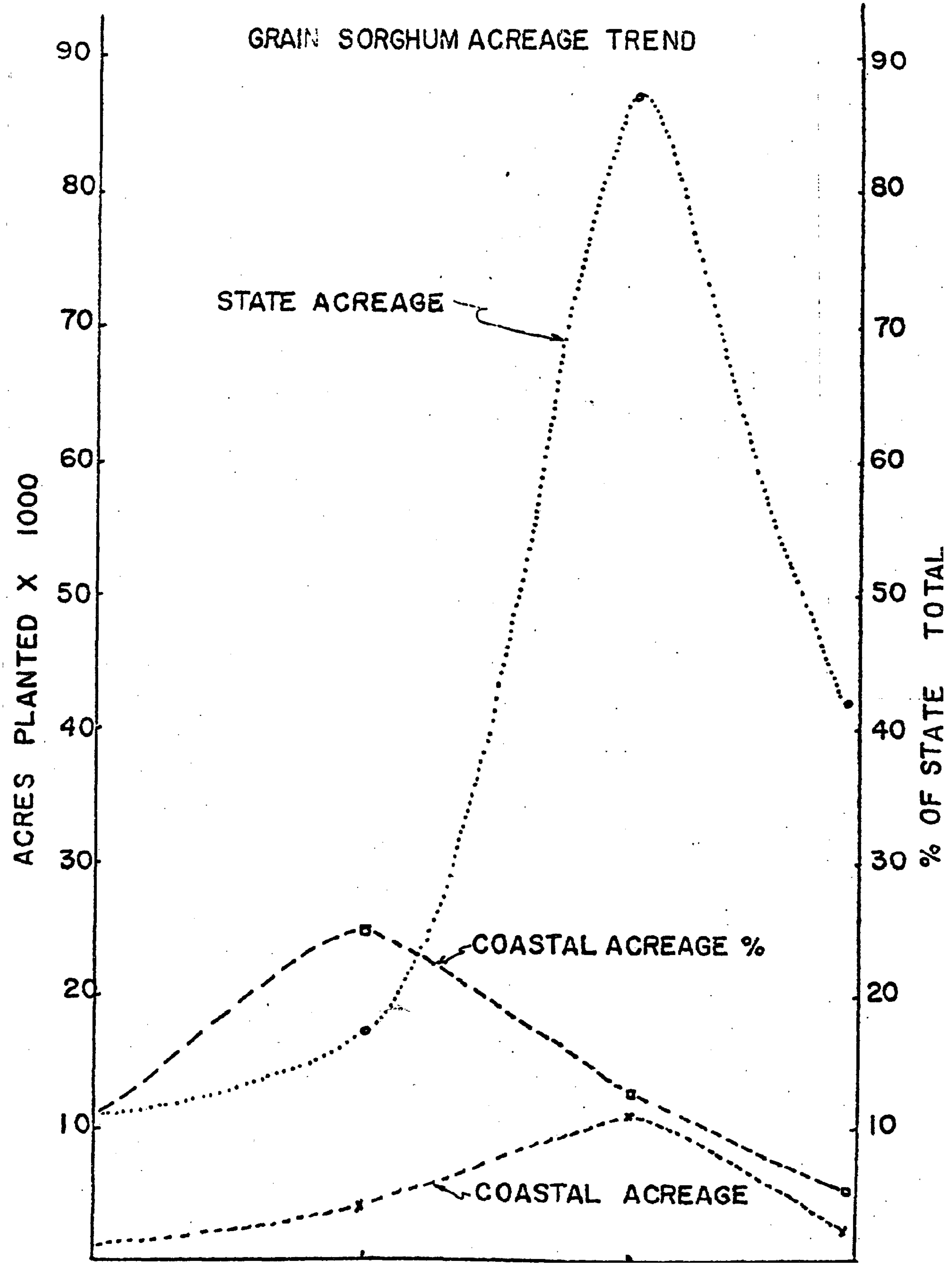

WHEAT ACREAGE TREND
STATE ACREAGE
COASTAL ACREAGE %
COASTAL ACREAGE
ACRES PLANTED X 10,000
% OF STATE TOTAL
10
9
8
7
6
5
4
3
2
1
-16
-14
-12
-10
-8
-6
-4
-2
1955
1960
1965
1970
1975

FIGURE 2



GRAIN SORGHUM ACREAGE TREND
ACRES PLANTED X 1000
% OF STATE TOTAL
90
80
70
60
50
40
30
20
10
STATE ACREAGE
COASTAL ACREAGE %
COASTAL ACREAGE

CORN

Acres of corn planted in the wetlands have decreased rapidly in the last 14 years as shown in Table I, Page 4, but not as rapidly as has the acreage of the entire state, since the coastal parishes have increased planting percentages from 18.1% of the state total in 1960 to 29% in 1974. Yields per acre are not high compared to corn belt producers but the high price of grain since 1972 has resulted in use of better cropping practices and much higher yield averages for the state (51 bushels per acre for 1974 compared to 27 in 1960). Corn belt state averages may exceed 100 bushels per acre.

Corn grows best on soils that are well drained both internally and externally. In the wetlands many of these soils are producing sugar cane, generally a more profitable crop. Soybeans can also replace corn and can be harvested with no major revisions in the combine whereas corn harvesting with a combine requires purchase and changing of the header. Without a strong market demand and relatively large acreage for efficient mechanized production, corn in the coastal zone can not be economically justified. In addition, the rapid increase in the cost of nitrogen fertilizer, a required ingredient for high yields, has undoubtedly influenced the farmers' decision to substitute another crop for corn.

Constant research to develop better adapted varieties and cultural practices that increase yields while minimizing production cost indicates potential for this crop in an environment not ideal for corn production. One promising use of corn is as a forage in production of silage. This use is largely limited today to dairy farms in the coastal zone but shows considerable promise for beef production. It has the advantage compared to hay as a forage of a high production of total digestible nutrient per acre in a short time period. Corn also may be harvested without fear of loss from rain after cutting, and has adaptibility to mechanical feeding with automatic controls. The chief disadvantage of silage as a processing method for corn forage is the high capital outlay required for equipment. The recent closing of feedlots in Texas and Oklahoma, along with research results designed to fatten beef with minimum grain input, point to more interest in silage use in years to come for the beef producer.

Silage manufacture is not limited to using corn as a forage, cool season crops grown in the long warm winters of the coastal zone can also be utilized when growing exceeds grazing needs.

An attempt was made to determine the extent of the use of automatic feeding silos in the coastal zone, since high labor costs and competition from other areas of the United States are necessitating this device in the local dairy industry. Very few silos are in use at present, but the trend to their use is indicated by the recent origin of those employed.

Use of land for production of corn for grain appears to be under sufficient competition to cause a continual decrease as shown by the curve in Figure I. Although individual records of yields per acre exceeding 100 bushels are recorded in the coastal zone, corn is hindered by mechanization costs with regard to harvesting and storing and lack of dependable weather during critical stages of growth. Additionally, the use of wide rows to form the beds needed to meet the drainage requirements of the coastal zone usually results in low plant population per acre and weed and insect control require considerable technical knowledge.

The value of the corn crop in the coastal zone in 1974 was approximately 2.28 million dollars. If the same yield per acre could have been obtained on the acreage grown in 1960, the value would have been about 6 million dollars.

Although both the market price and yield per acre have increased in the last 15 years the net profit has not been sufficient to keep corn acreage from shifting to other uses.

TABLE [illegible]

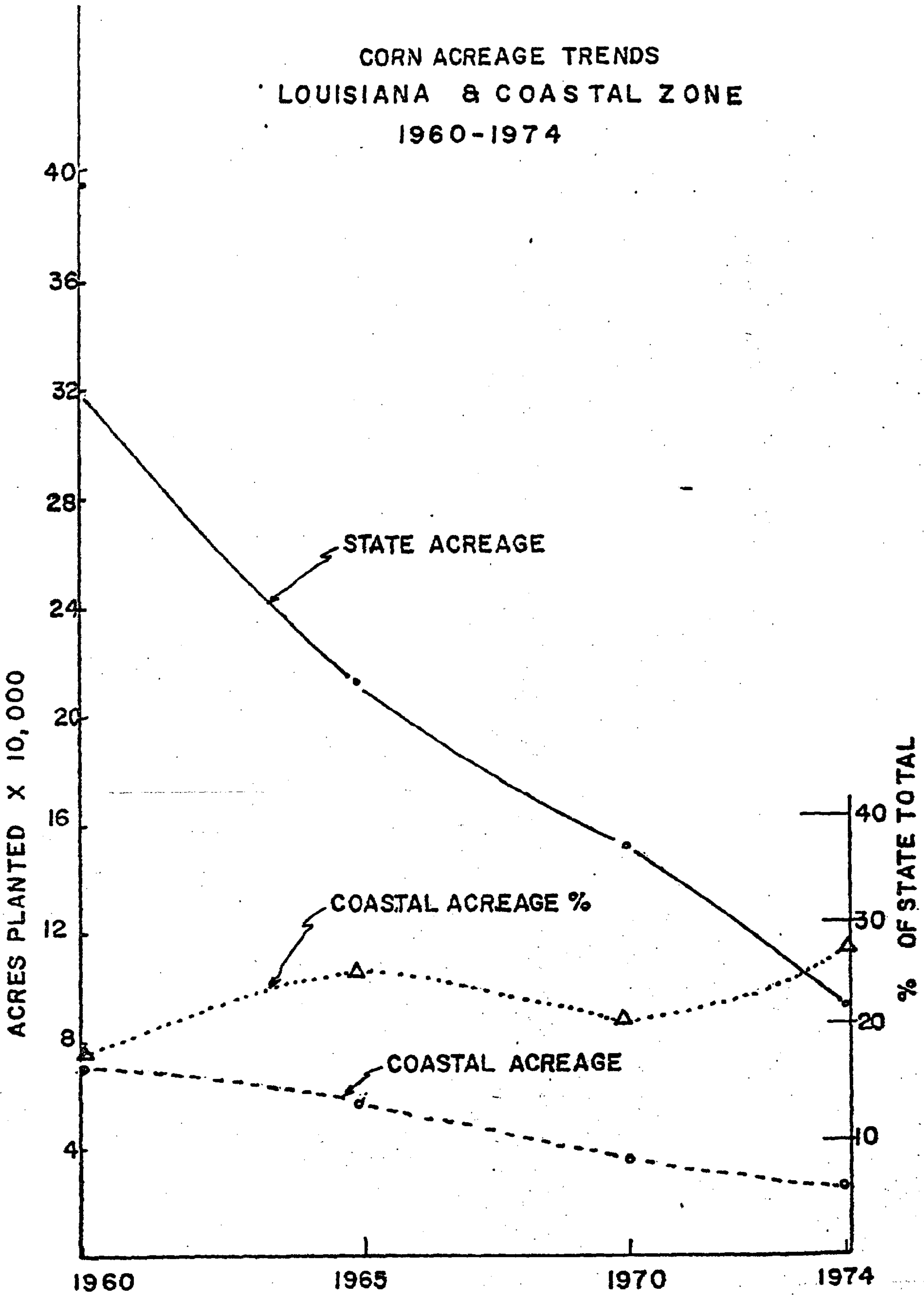
CORN ACREAGE*

PARISHES	1960	1965	1970	1974
Acadia	6,200	5,800	2,700	2,900
Ascension	2,300	2,100	1,700	1,200
Assumption	3,100	900	600	200
Calcasieu	250	300	300	300
Cameron	400	500	200	150
E. Baton Rouge	1,400	2,000	1,300	1,100
Iberia	7,600	3,300	2,000	1,200
Iberville	5,000	2,800	2,300	1,100
Jefferson	100	30		
Jeff Davis	500	800	400	250
Lafayette	14,200	10,800	7,300	3,500
Lafourche	7,000	2,200	1,800	2,400
Livingston	1,900	1,300	900	450
Plaquemines		100	100	
St. Bernard	20	20	100	
St. Charles	250	250	300	200
St. James	1,000	500	450	500
St. John	700	550	250	600
St. Martin	17,000	12,300	7,900	4,100
St. Mary				400
St. Tammany	2,000	800	700	850
Tangipahoa	3,900	2,900	1,000	1,300

PARISHES	1960	1965	1970	1974
Terrebonne	2,450	650	800	700
Vermilion	6,400	3,800	2,400	3,600
W. Baton Rouge	3,100	1,400	900	550
T O T A L	71,470	56,100	37,300	27,550
STATE TOTAL	395,000	213,000	172,000	95,000
% of State Total Plant in Wetlands	18.1	26.3	21.7	29.0
State Average Yield Per Acre Harvested (Bushels)	27.0	35.0	34.0	51.0

*Source -- D.A.E. Research Report No. 436 "Louisiana Crop Statistics, By Parishes, Through 1970" except for 1974 which came from Louisiana Crop and Livestock Reporting Service, USDA Statistical Reporting Service -- Louisiana Corn: Acreage, Yield and Production, 1974 Preliminary Report.

FIGURE I


CORN ACREAGE TRENDS
LOUISIANA & COASTAL ZONE
1960-1974
STATE ACREAGE
COASTAL ACREAGE %
COASTAL ACREAGE
ACRES PLANTED X 10,000
% OF STATE TOTAL
40
36
32
28
24
20
16
12
8
4
40
30
20
10
1960
1965
1970
1974

CATTLE POPULATION IN THE COASTAL ZONE

Cattle production in the coastal zone has followed state and national trends with a 10% increase in cattle numbers. This trend is reflected in Table I, Page 8, which shows an increase of fifty-four thousand head in 1974 as compared to 1969. The total figure of 600,000 head represents 32.7% of all cattle in the State of Louisiana as indicated in Figure I.

To aid in analyzing data contained in Table I, Page 8, this report will group parishes into the official state planning districts.

ACADIANA: This district has approximately 200,000 head of cattle, the largest number in the coastal zone. Eighty-one per cent of the cattle in this district are in the parishes of Vermilion, Acadia, and Lafayette. Lafayette parish is the only parish in the district with a large dairy cattle population, 10,320 head.[1] Beef cattle are predominate in other parishes within the district.

FLORIDA DISTRICT: This district has experienced the largest increase in cattle numbers over the last six years with an increase of 24,000 head in 1974 from 1969. This district has a large population of dairy cattle in Tangipahoa parish, approximately 30,000 head, with beef cattle predominate in other parishes within the district.

---

[1] Giant Step II, Lafayette Parish, Louisiana Cooperative Extension Service. 1973-1978, p. 10.

Increased cow numbers can be attributed to smaller dairy farmers converting to beef operations and the high meat prices in 1972 and 1973.

SOUTHWEST: Calcasieu, Cameron, and Jefferson Davis are the only parishes in the Southwest district located in the coastal zone. Cattle numbers in these parishes have shown a moderate increase of seven percent over the past six years. Total cattle numbers in 1974 were 141,000 head as compared to 132,000 in 1969. Beef cattle account for practically all cattle within the district.

TECH: The Tech district has 41,000 head of cattle of which 24,000 head are located in Lafourche parish. Cattle numbers in all parishes except Lafourche have not grown sizably over the past six years. St. John is one of two parishes in the coastal zone that does not list cattle as an agricultural enterprise.

METROPOLITAN: The smallest number of cattle in the coastal zone is located in the metropolitan district. The six parishes have a combined total of 30,000 head. Eighty per cent of the total are in St. Tammany parish. The 1972 Giant Step lists 1,600 head of dairy cattle in St. Tammany, other parishes have no significant numbers of dairy cattle.[2]

---

[2] Giant Step II, St. Tammany Parish, Louisiana Cooperative Extension Service. 1973-1978.

Livestock Marketing

The beef cattle industry in the wetlands is geared to cow - calf operations in which calves are weaned at relatively light weights and shipped to out-of-state feedlots. There are no major feeding operations in the coastal zone and few calves are carried on the farm beyond weaning.

According to Paul Dominic, President of Dominic's Stockyards, Inc., eighty-five per cent of the cattle in the coastal zone are marketed through local stockyards.[3] The remaining fifteen per cent are sold directly to local butchers or contract buyers. There are ten stockyards in the coastal zone marketing an average of six-hundred head per week at each facility. The major auctions are located in East Baton Rouge, Calcasieu, and Lafayette parishes.

It appears obvious to this writer that cattlemen will continue to utilize local stockyards to market their livestock. Trends indicate that larger producers will truck cattle to larger stockyards that attract out-of-state buyers.

If livestock prices continue to fluctuate, many ranchers will turn to contract marketing to stabilize prices. This system of marketing is limited in the coastal area by the relative small size of individual operations.

---

[3] Paul Dominic (President of Dominic's Stockyard, Lafayette, Louisiana). Personal interview, July 17, 1975.

Processing

The meat processing industry in the coastal zone is composed of slaughter plants, processing plants, and custom slaughterhouses. The number of slaughter plants has declined since 1972 primarily due to state inspection laws passed in 1969. Some small abattoirs were forced out of business because of strict state health codes which they could not economically implement. However, according to Dr. James Broussard of the State Department of Agriculture, the total capacity of the industry has not been reduced and he projects an increase in the number of state inspected plants over the next five years.[4]

Table II, Page 9, provides a comparison of the number of slaughter houses in the coastal zone that are under state inspection. The data indicate a decline of 25% from 1972 to 1975. This figure is misleading because a number of establishments lost under state inspection are still operating as Custom Exempt Plants not requiring inspection.

USDA figures list three establishments in the coastal zone under federal inspection. The largest plant is located in Lafayette parish with a kill capacity of one-hundred cows per day. This plant has processing facilities for beef and pork and furnishes meat products to their out-of-state plants.

---

[4] Dr. James Broussard, (Louisiana Department of Agriculture), Personal interview, July 21, 1975.

Table IIX, Page 10, indicates that 73,714 head of cows and calves were slaughtered in state inspected coastal zone plants in 1972. This figure represents 43% of total cattle slaughter in Louisiana.

Trends and Projections

The cattle industry is currently in a period of over-supply resulting in depressed prices nation wide. Cattle numbers will have to decrease substantially to bring the forces of supply and demand into a balance more favorable to cattle producers. Cattle production in the wetlands will follow national trends and numbers will be reduced by 1978. However, cattle production in the wetlands has tremendous potential and higher meat prices and expanded markets could result in substantial increases in cattle production in the coastal region.

Cattle and soybeans have competed for acreage for the past several years. Increased prices for soybeans have caused many farmers to plant beans on fallow land instead of raising cattle. However, if bean prices fall and production cost per acre for rice and sugar cane continues to rise, additional grazing land will become available and cattle numbers could increase. Decreased cotton production in the wetlands should supply additional land for pasture.

Non-tillable land in the coastal zone will continue to supply land for cattle production. Research in animal breeding and insect control has increased meat production in these areas where parasites and insects have reduced production in the past. Brahman hybrid cattle adapt well to marsh land due to their heat and insect tolerance, and can produce a quality carcass.

Cattlemen in the coastal zone could realize a substantial increase in the pounds of meat produced without increasing acreage or cattle numbers. Under present management practices in the coastal zone, the average calving percentage is 60% with a weaning weight of 350 pounds.[5] If calving percentage were increased to the national average of 80%, and weaning weights increase to 450 pounds, a 25% increase in production could be realized without increasing cattle numbers or acres of grazing land. Increased production per cow and per acre is closely related to the following factors:

1. A larger percentage of grazing land must be established into improved permanent pastures to supply a higher level of nutrition.
2. Management practices improving health, reproduction, and parasite control must be adapted.
3. Systems of breeding should be geared to maximum beef production under existing climatic conditions.
4. Feedlots using silage and hayage should be established to reduce dependence on out-of-state feeders and grain producers.
5. There is a need to increase the number and quality of purebred herds to furnish breeding stock adapted to existing climatic conditions.
6. Prices payed to cattlemen must increase to off-set the cost of improved management practices and increase return per acre.

[5] Giant Step II, Louisiana Cooperative Extension Service, 1973-1978.

The wetlands have an abundance of natural forages needed to support cattle production. Improved varieties of bermudagrass recently introduced to the region have adapted well and have increased meat production per acre. The increased consumption of grass-fed beef provides the greatest potential for increased cattle production in the coastal zone. Long grazing seasons and mild winters facilitate grazing cattle year round with minimum grain feeding. Consequently, if all factors involved materialize over the next five years, the coastal zone could become a major producer of grass-fed beef.

TABLE I

CATTLE AND CALVES -- ESTIMATED NUMBER ON FARMS FROM 1969-1974
(FROM AGRICULTURE ECONOMICS DEPARTMENT, LOUISIANA COOPERATIVE EXTENSION SERVICE)

	1969		1970		1971		1972		1973		1974	
AREA PARISH	1000 HEAD	%	1000 HEAD	%	1000 HEAD	%	1000 HEAD	%	1000 HEAD	%	1000 HEAD	%
Metropolitan												
Jefferson	2	0.1	2	0.1	2	0.1	1	0.1	1	0.1	1	0.1
Orleans	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Plaquemines	3	0.2	3	0.2	3	0.2	3	0.2	3	0.2	3	0.2
St. Bernard	1	0.1	1	0.1	1	0.0	1	0.0	1	0.0	1	0.0
St. Tammany	24	1.5	24	1.4	25	1.4	25	1.4	24	1.4	25	1.4
Florida												
Ascension	12	0.7	12	0.7	12	0.7	12	0.7	12	0.7	12	0.7
E. Baton Rouge	37	2.3	36	2.2	38	2.2	38	2.2	38	2.2	39	2.1
Iberville	20	1.2	20	1.2	22	1.3	22	1.3	22	1.3	24	1.3
Livingston	13	0.8	13	0.8	14	0.8	14	0.8	13	0.8	14	0.7
Tangipahoa	75	4.6	76	4.7	82	4.7	85	4.8	85	4.9	91	5.0
W. Baton Rouge	7	0.4	7	0.5	8	0.5	8	0.5	8	0.5	8	0.5
Assumption	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Tech												
Lafourche	21	1.3	21	1.3	22	1.3	23	1.3	23	1.3	24	1.3
St. Charles	6	0.4	6	0.4	6	0.4	6	0.4	6	0.4	7	0.4
St. James	3	0.2	3	0.2	3	0.2	3	0.2	3	0.2	3	0.2
St. John	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Terrebonne	6	0.3	6	0.3	6	0.3	6	0.3	6	0.3	6	0.3
Acadian												
Acadia	42	2.6	41	2.5	43	2.5	44	2.5	43	2.5	45	2.4
Iberia	17	1.0	17	1.0	18	1.0	18	1.0	18	1.0	18	1.0
Lafayette	38	2.3	28	2.4	41	2.4	42	2.4	42	2.4	44	2.4
St. Martin	15	0.9	15	0.9	15	0.9	15	0.9	15	0.9	16	0.9
St. Mary	3	0.2	3	0.2	4	0.2	4	0.2	3	0.2	3	0.2
Vermilion	68	4.2	67	4.1	71	4.1	72	4.1	71	4.1	74	4.0
Southwest												
Calcasieu	53	3.3	53	3.3	56	3.3	57	3.3	57	3.3	59	3.2
Cameron	45	2.8	44	2.7	46	2.7	46	2.6	45	2.6	47	2.5
Jeff Davis	34	2.1	33	2.0	35	2.0	35	2.0	34	1.9	35	1.9
T O T A L	546	33.5	542	33.0	574	33.2	581	33.2	574	33.2	600	33.7

TABLE II

NUMBER OF STATE INSPECTED SLAUGHTER HOUSES
LISTED BY PARISH, 1972 AND 1974

(FROM LOUISIANA DEPARTMENT OF
AGRICULTURE, MEAT AND POULTRY DIVISION)

Parish	1972	1974
Acadia	6	4
Calcasieu	4	3
East Baton Rouge	4	2
Iberia	3	2
Jefferson Davis	1	1
Lafayette	9	6
Lafourche	4	5
St. James	2	2
St. Martin	4	3
St. Tammany	1	2
Tangipahoa	3	3
Terrebonne	5	2
Vermilion	5	5
West Baton Rouge	1	1
T O T A L	52	40

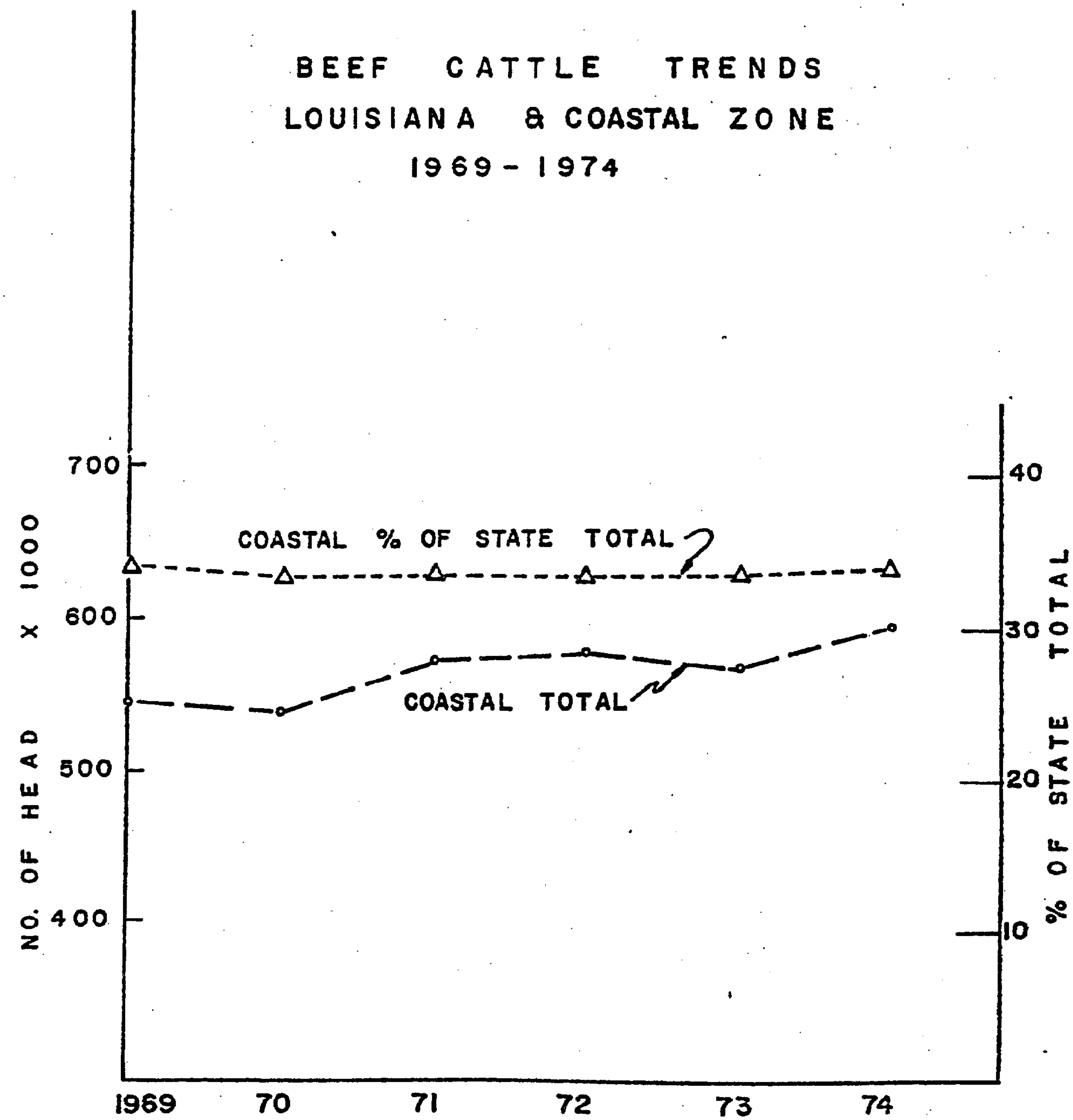
TABLE III

(FROM LOUISIANA DEPARTMENT OF AGRICULTURE, MEAT AND POULTRY DIVISION)

	July 1971 - June 1972	
Parish	State Inspected Plants	Federal Number of Cattle Killed
Acadia	6	3,836
Calcasieu	4	14,048
E. Baton Rouge	4	17,997
Iberia	3	3,184
Jeff Davis	1	1,575
Lafayette	9	9,087
Lafourche	4	5,932
St. James	2	640
St. Martin	4	1,220
St. Tammany	1	618
Tangipahoa	3	2,936
Terrebonne	5	15,290
Vermilion	5	2,324
W. Baton Rouge	1	27
T O T A L		78,714

(This figure represents 43% of the cattle slaughtered in the state of La.)

FIGURE I


BEEF CATTLE TRENDS
LOUISIANA & COASTAL ZONE
1969 - 1974
COASTAL % OF STATE TOTAL
COASTAL TOTAL
NO. OF HEAD X 1000
700
600
500
400
% OF STATE TOTAL
40
30
20
10
1969
70
71
72
73
74

HORSES

The horse population in the coastal zone of Louisiana has maintained a constant growth and is presently a milti-million dollar industry. Table I, Page 3 indicates that in 1971 there were 62,639 horses in the coastal zone, thirty-five per cent of which were quarter horses. Current data on horse numbers are not available, however, Mr. C. O. McKerlly with the Louisiana Cooperative Extension Service estimates horse numbers in the coastal zone will increase 10% per year over the next five years.[1]

In the opinion of the writer, South Louisiana is considered a major producer of quality quarter horses in the nation. Table I, Page 3 indicates that Lafayette, Calcasieu, Vermilion, and East Baton Rouge are the leading parishes in quarter horse production. Most quarter horses in the coastal zone are used for stock horses and pleasure horses, however, an increasing number is bred for racing.

Horse racing has become a popular sport in the region with "big-time" racing facilities located in Orleans, Jefferson, Lafayette, and Calcasieu parishes. Each track has a pari-mutuel system of betting and racing dates arranged to provide year-round racing in the coastal zone. Racing has not only increased horse numbers but has had a dramatic economic effect on the horse industry. This is evident in the results of the 1975 Louisiana - Bred

[1] C. O. McKerlly, (Horse Specialist, Louisiana Cooperative Extension Service), Personal interview, September 10, 1975.

yearling sale for thoroughbreds held in Lafayette, where seventy-nine horses grossed $245,769; an average of $3,111 per head.[2]

The number of thoroughbreds will increase substantially over the next five years while the quarter horse population may decline. This is primarily due to racing conditions favoring the thoroughbred, with tracks in Orleans, Jefferson, and Lafayette parishes offering strictly thoroughbred racing. Delta Downs in Calcasieu parish runs an equal amount of thoroughbred and quarter horse races in the fall, and plans a special summer meet for quarter horses. Calcasieu and other parishes in Southwest Louisiana will become the center of quarter horse breeding and racing. Orleans, Jefferson, Lafayette, and St. Tammany will increase thoroughbred numbers to facilitate racing in those areas.

Although racing offers the major impetus for the horse industry, there is increasing interest in horses for showing and pleasure riding. Boarding and riding stables are thriving in metropolitan areas of the coastal zone, while in other areas riding clubs have organized and are producing horse shows at a growing rate. This renewed interest and enthusiasm in horses will increase numbers over the next five years and will accent the economic importance of the horse industry in the coastal zone of Louisiana.

---

[2] "Sale Results," Louisiana - Bred Yearlings Sale, Lafayette, Louisiana, 1975.

TABLE I

HORSE POPULATION BY PARISHES, 1971
(From Census of Horses in Louisiana, Cooperative Extension Service)

Parishes	Quarter Horses	Thoroughbred	Total Horses
Jefferson	434	669	3,018
Orleans	140	34	789
Plaquemines	99	6	388
St. Bernard	172	32	493
St. Tammany	791	1,119	4,544
Ascension	632	10	1,895
E. Baton Rouge	1,855	84	6,136
Iberville	573	20	1,572
Livingston	624	6	2,576
Tangipahoa	812	153	4,312
W. Baton Rouge	223	5	771
Assumption	100	10	1,895
Lafourche	259	23	1,525
St. Charles	83	118	697
St. James	46	0	194
St. John	31	3	279
Terrebonne	541	83	1,611
Acadia	1,531	259	3,337
Iberia	1,078	305	2,213
Lafayette	3,021	1,141	6,292
St. Martin	1,286	218	2,682
St. Mary	359	34	1,139
Vermilion	2,200	211	4,237
Calcasieu	2,912	76	6,110
Cameron	1,067	4	1,856
Jefferson Davis	955	71	2,078
TOTAL	21,824	4,694	62,639

THE DAIRY INDUSTRY OF THE LOUISIANA COASTAL ZONE

In 1974 the cash income from milk accounted for 8.2% of all Louisiana farm income. A total of 1,059,000,000 pounds of milk was produced in Louisiana in 1974 valued at $102,843,000 according to U.S.D.A. statistics.[1] About one-third of this amount, or 375,787,852 pounds was produced in the 26 parishes of the Coastal Zone. There were approximately 117,806 cows in commercial dairy herds in Louisiana in 1974 with 44,726 cows in the Coastal Zone. Farmers had about $2,500 per cow invested in their enterprises.[2]

Production - Trends

Table I, Page 7, contains data on the number of farms, the number of cows and the estimated pounds produced in indicated years from 1959 to 1974. The trends are summarized in Figure I, Page 11 and Figure II, Page 12. Trends will be discussed for the state and the Coastal Zone in general and specific reference will not be made for individual parishes. The picture for all parishes in the Coastal Zone is almost identical and the totals parallel state and national trends. Numbers of dairy farms, and numbers of cows have been declining while total production has remained stable due to higher productivity per cow.

Figure III, Page 13, gives a pictorial display of the concentration of milk production in Louisiana. It is readily evident that milk production in the Coastal Zone takes place on high ground near the population centers of Lafayette, Baton Rouge, and New Orleans.

The United States and the State of Louisiana have been net importers of dairy products in recent years. (Table II, Page 5).

Figure IV portrays the location of dairy and other processing facilities in the Coastal Zone. The number of processing plants in the Coastal Zone has declined from 27 in 1969 to 18 in 1975.[3]

Consumption - Trends

Per capita consumption of milk equivalent in the United States has steadily declined from 818 pounds in 1940 to 543 pounds in 1974.[4] Total milk consumption has remained relatively stable because of a rising population. Since some authorities feel the U. S. may be approaching zero population growth, larger percentages of the population will be in older age groups which historically have consumed less milk.

A forecast for continued decline in per capita consumption can be made if one assumes past trends will continue. Promotion, however, is an important factor in enhancing milk consumption and in some areas has reversed the downward trend of consumption. The U. S. produces about the same amount of milk as it consumes but this level does not provide the optimal one quart per person per day.[5] Of the major Western countries, only Italy has a lower per capita consumption that the U. S. Several countries have twice the per capita consumption of milk as the U. S.[6] Consumption levels cannot be mandated, but for the public welfare, policies adopted by government should tend to encourage milk production and consumption.

Consumption Projections

Per capita milk consumption may be near its low point and should remain stable or decline only slightly. With a rising population in the Coastal Zone, the future demand for fluid milk and manufactured dairy products will remain at or above present levels.

Production Projections

A continued trend to fewer, larger dairy farms with higher production per cow is likely. In 1974 the state milk production average was 7,730 pounds while the national average was 10,286 pounds.[7] The producers remaining in business will be the more efficient ones who are capable of producing the higher levels and have the desire to expand to meet the market demand for milk.

Larger operations will have the advantages of better quality control, greater efficiency, and the ability to afford better labor and management. The difficulties will be in obtaining qualified labor and management, obtaining adequate capital investment of about $2,500 per cow, and coping with the environmental problems caused by concentrating large numbers of livestock. Disposal of waste is a solvable problem, but will take additional capital and management. The proximity to populated areas will be more critical under high density dairying.

Continued production at any level is more likely in the parishes where the dairy industry is presently concentrated. These parishes have the trained and experienced people, they have the educational program of the Cooperative Extension Service in place, and they have a milk procurement system established. The parishes of the Coastal Zone that have substantial dairying activities probably already have inherent competitive advantages over other parishes. The dairying parishes generally have the more elevated, better drained soils. These areas have fewer problems with waste disposal than land near or within wetlands. They also have fewer pest and disease problems than low lands. Health Department statistics suggest that animals kept in lower elevation areas of the state may be more susceptible to mastitis, an udder inflammation that severely reduces milk production.[8]

The parishes of the Coastal Zone where dairying is concentrated are also conveniently located with respect to markets, thus minimizing transportation costs. Traditionally, fluid milk dairying has had to be near the consuming population, but with good roads and modern tank trucks populous areas receive milk from wider areas despite high transportation costs. Fluid milk is differentiated from manufacturing milk since about 70% of the milk produced in Louisiana goes in fluid products, and farmers are paid higher prices for milk used in fluid form.[9]

Finally, dairy farming is a logical choice for land that is rolling or not otherwise level since pastures minimize soil erosion. The low, flat areas of the Coastal Zone give the comparative advantage to rice and other field crops.

Summary of Projections

1. Continued trend to fewer, larger dairy farms with higher production per cow is evident.

2. Continued production to meet demand for milk will take place in parishes where dairying is presently concentrated.

TABLE II

U. S. and Louisiana Milk Imports

Year	Imported Milk U.S.[1]	Imported Milk La.*[2]
	mil. lb.	lb.
1969	1,144	143,401,982
1970	1,833	154,321,021
1971	(617)	181,419,896
1972	810	187,606,895
1973	3,781	172,846,881
1974	2,626	170,664,246

*Includes only milk regulated by the Federal Market Order

[1]Milk Industry Foundation, Milk Facts 1975 (Washington, D.C.: Milk Industry Foundation 1975), p. 22, citing U.S.D.A. statistics.

[2]Elvin L. Hollon, "Pictograph of the Louisiana Dairy Industry 1970-1974" (Baton Rouge: Milk Division Louisiana Department of Agriculture), (mineographed), citing data from Federal Milk Market Orders 1094 and 1096, and the Louisiana Department of Agriculture.

References

1. Milk Industry Foundation, Milk Facts 1975 (Washington, D.C.: Milk Industry Foundation 1975), p. 26, citing U.S.D.A. statistics.

2. Elvin L. Hollon, "Pictograph of the Louisiana Dairy Industry 1970-1974" (Baton Rouge: Milk Division Louisiana Department of Agriculture), (mimeographed), citing data from Louisiana Cooperative Extension Service Census.

3. Louisiana Health and Human Resources Administration, Division of Health, Milk and Dairy Products Section (New Orleans; unpublished file data, 1975).

4. Milk Industry Foundation, op. cit., p. 22.

5. John R. Campbell, Robert T. Marshall, The Science of Providing Milk for Man (New York: McGraw-Hill Book Company, 1975), p. 17.

6. Milk Industry Foundation, op. cit., p. 19.

7. Ibid, pp. 26-27.

8. Louisiana Health and Human Resources Administration, op. cit.

9. Louisiana Department of Agriculture, Louisiana Annual Milk Marketing Report 1974, (Baton Rouge: Milk Division, May 1975), p. 11.

TABLE I

NUMBER DAIRY HERDS, NUMBER COMMERCIAL DAIRY COWS,
POUNDS OF MILK PRODUCED,
UNITED STATES, LOUISIANA, COASTAL ZONE 1959-1969

	1959[1]			1964[1]			1969[2]		
	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED
United States		18,220,000	123,104,000,000		15,960,000	126,967,000,000		12,550,000	116,108,000,000
Louisiana	3,507	205,433	551,736,841	2,595	187,102	792,724,131	1,846	136,517	979,475,346
Coastal Zone Parishes	1,348	78,056	219,282,501	1,557	73,072	314,289,435	792	54,967	394,374,484
Acadia	56	7,033	5,396,560	24	3,525	6,157,153	17	760	5,452,810
Ascension	1	1,232	(NR)	1	542	(NR)	1	100	717,475
Assumption	11	395	797,650	4	334	42,020	0	0	0
Calcasieu	27	812	4,329,285	8	454	1,184,635	7	280	2,008,930
Cameron	1	409	12,900	0	0	0	0	0	0
E. Baton Rouge	30	4,293	10,743,255	45	4,438	22,156,760	47	6,127	43,959,693
Iberia	36	4,500	12,861,647	51	4,884	23,295,412	43	3,000	21,524,250
Iberville	1	554	185,000	2	305	(NR)	0	0	0
Jefferson	15	663	3,766,800	6	363	1,757,097	0	0	0
Jeff Davis	16	1,457	671,015	11	975	569,697	2	90	645,728
Lafayette	121	9,203	20,354,950	118	8,643	36,554,955	98	6,800	48,788,300

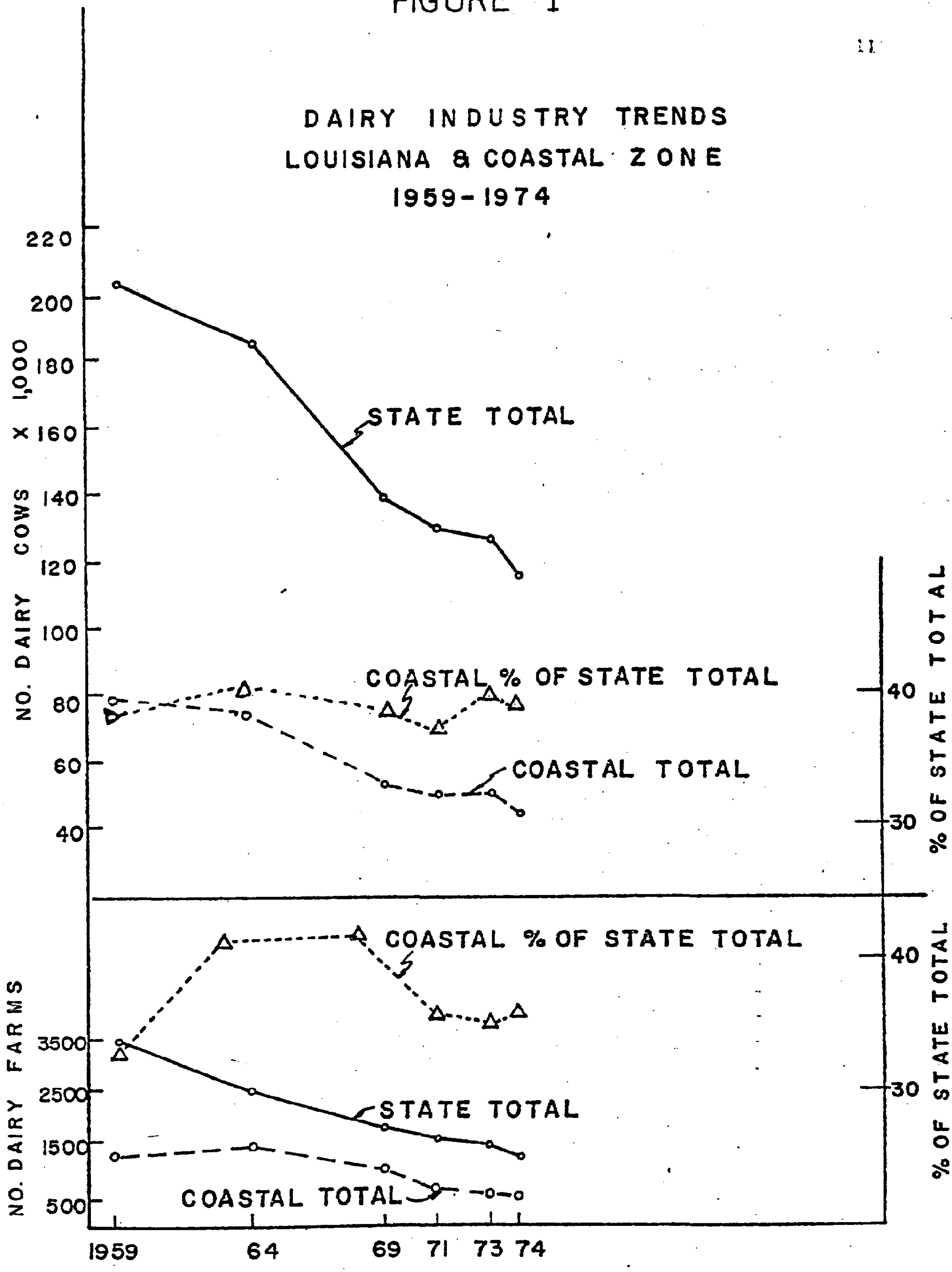
	1959[1]			1964[1]			1969[2]		
	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED
fourche	15	904	118,680	2	563	13,657	0	0	0
vingston	30	2,319	2,563,150	21	1,922	7,844,232	17	765	5,488,684
leans	15	747	3,605,640	5	218	832,399	0	0	0
aquemines	0	0	0	1	30	(NR)	0	0	0
. Bernard	0	0	0	0	0	0	0	0	0
. Charles	2	309	645,000	2	55	(NR)	0	0	0
. James	0	0	0	0	0	0	0	0	0
. John	5	76	155,000	0	0	0	0	0	0
. Martin	26	3,389	5,896,300	36	3,742	10,506,835	27	1,720	12,340,570
. Mary	6	361	555,480	1	153	(NR)	0	0	0
. Tammany	62	2,608	7,648,706	52	2,700	11,095,575	28	2,000	14,349,500
ngipahoa	728	29,019	123,180,725	643	33,826	176,358,720	470	30,000	215,242,500
rrebonne	10	713	488,050	5	590	637,976	1	50	358,738
rmilion	123	5,985	13,579,508	55	4,507	14,050,252	30	3,000	21,524,250
Baton Rouge	11	573	1,727,200	4	303	1,232,060	4	275	1,973,056

R) - Not Reported

United States Bureau of the Census, Census of Agriculture: 1964, Statistics for the State and Counties, Louisiana, Vol. I, part 35 (Washington: U. S. Government Printing Office, 1966), pp. 384-387.

Elvin L. Hollon, "Pictograph of the Louisiana Dairy Industry, 1970-1974" (Baton Rouge: Milk Division Louisiana Department of Agriculture), (Mimeographed), citing data from Louisiana Cooperative Extension Service Census.

FIGURE I

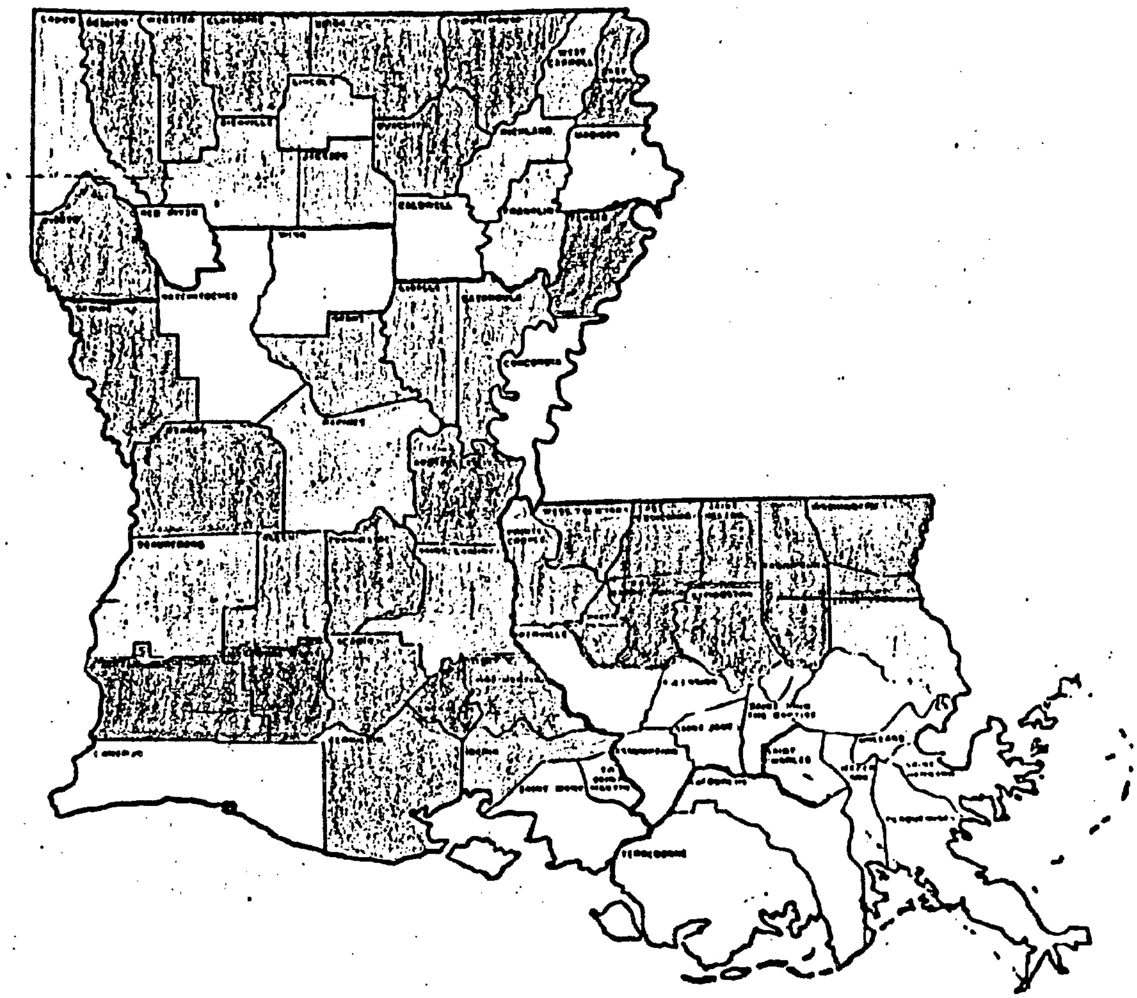

DAIRY INDUSTRY TRENDS
LOUISIANA & COASTAL ZONE
1959-1974
NO. DAIRY COWS X 1,000
220
200
180
160
140
120
100
80
60
40
STATE TOTAL
COASTAL % OF STATE TOTAL
COASTAL TOTAL
% OF STATE TOTAL
40
30
NO. DAIRY FARMS
3500
2500
1500
500
COASTAL % OF STATE TOTAL
STATE TOTAL
COASTAL TOTAL
% OF STATE TOTAL
40
30
1959
64
69
71
73
74

	1971[2]			1973[2]			1974[2]		
	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED	NO. HERDS	NO. COWS	POUNDS MILK PRODUCED
Livingston	16	800	6,497,600	13	950	7,369,150	12	700	5,881,40
Orleans	0	0	0	0	0	0	0	0	0
Plaquemines	0	0	0	0	0	0	0	0	0
St. Bernard	0	0	0	0	0	0	0	0	0
St. Charles	0	0	0	0	0	0	0	0	0
St. James	0	0	0	0	0	0	0	0	0
St. John	0	0	0	0	0	0	0	0	0
St. Martin	20	1,785	14,497,770	13	1,150	8,920,550	9	640	5,377,2
St. Mary	0	0	0	0	0	0	0	0	0
St. Tammany	26	2,100	17,056,200	20	1,800	13,962,600	20	1,600	13,443,20
Tangipahoa	438	30,660	249,020,520	425	31,875	247,254,375	405	31,000	260,462,00
Terrebonne	0	0	0	0	0	0	0	0	
Vermilion	24	1,800	14,619,600	16	2,000	15,514,000	13	845	7,099,69
W. Baton Rouge	4	266	2,160,452	2	238	1,846,166	2	150	1,260,30

1. United States Bureau of the Census, Census of Agriculture: 1964, Statistics for the State and Counties, Louisiana, Vol. I, part 35 (Washington: U. S. Government Printing Office, 1966), pp. 384-387.

2. Elvin L. Pellon, "Pictograph of the Louisiana Dairy Industry, 1970-1974" (Baton Rouge: Milk Division Louisiana Department of Agriculture), (Mimeographed), citing data from Louisiana Cooperative Extension Service Census.

Fig. III CONCENTRATION OF DAIRY INDUSTRY



POUNDS SHIPPED ANNUALLY	CODE	NUMBER OF PARISHES
No Dairy Farms		20
0 - 1 Million		4
1 - 5 Million		8
5 - 10 Million		13
10 - 20 Million		10
20 - Above Million		9

Prepared from Files of the Louisiana Milk Division of the Louisiana Department of Agriculture by Elvin L. Hollon.

FIGURE II

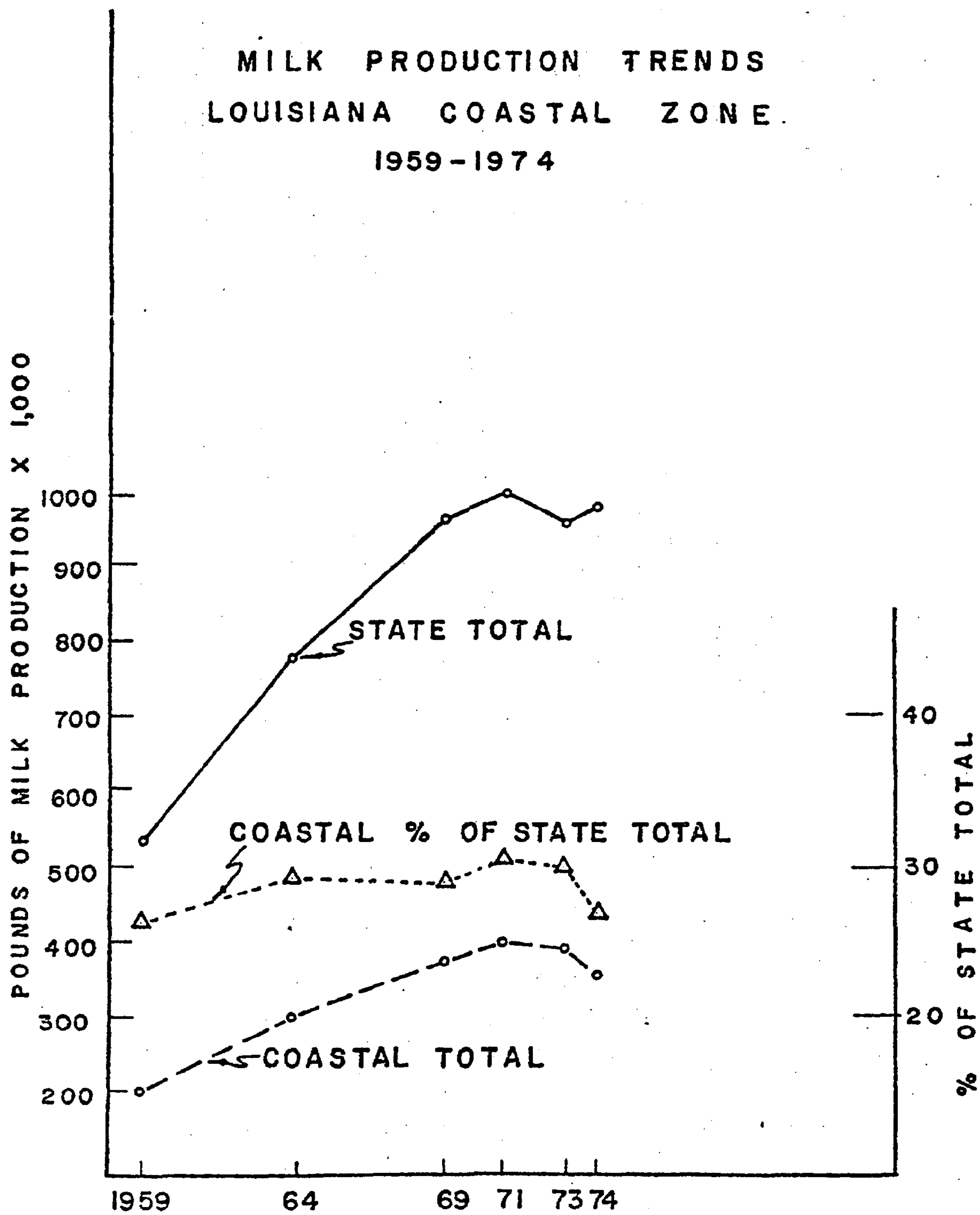

MILK PRODUCTION TRENDS
LOUISIANA COASTAL ZONE
1959-1974
POUNDS OF MILK PRODUCTION X 1,000
1000
900
800
700
600
500
400
300
200
STATE TOTAL
COASTAL % OF STATE TOTAL
COASTAL TOTAL
40
30
20
% OF STATE TOTAL
1959
64
69
71
73
74

FIGURE IV

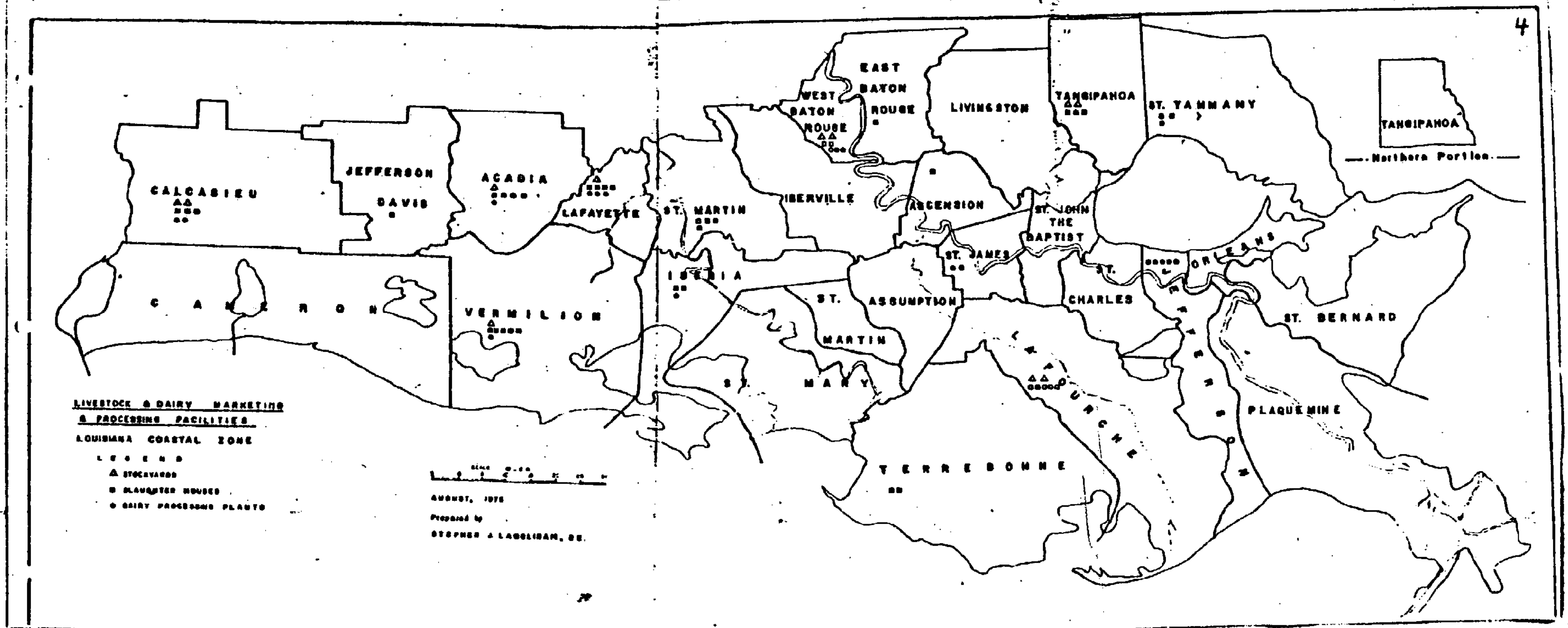
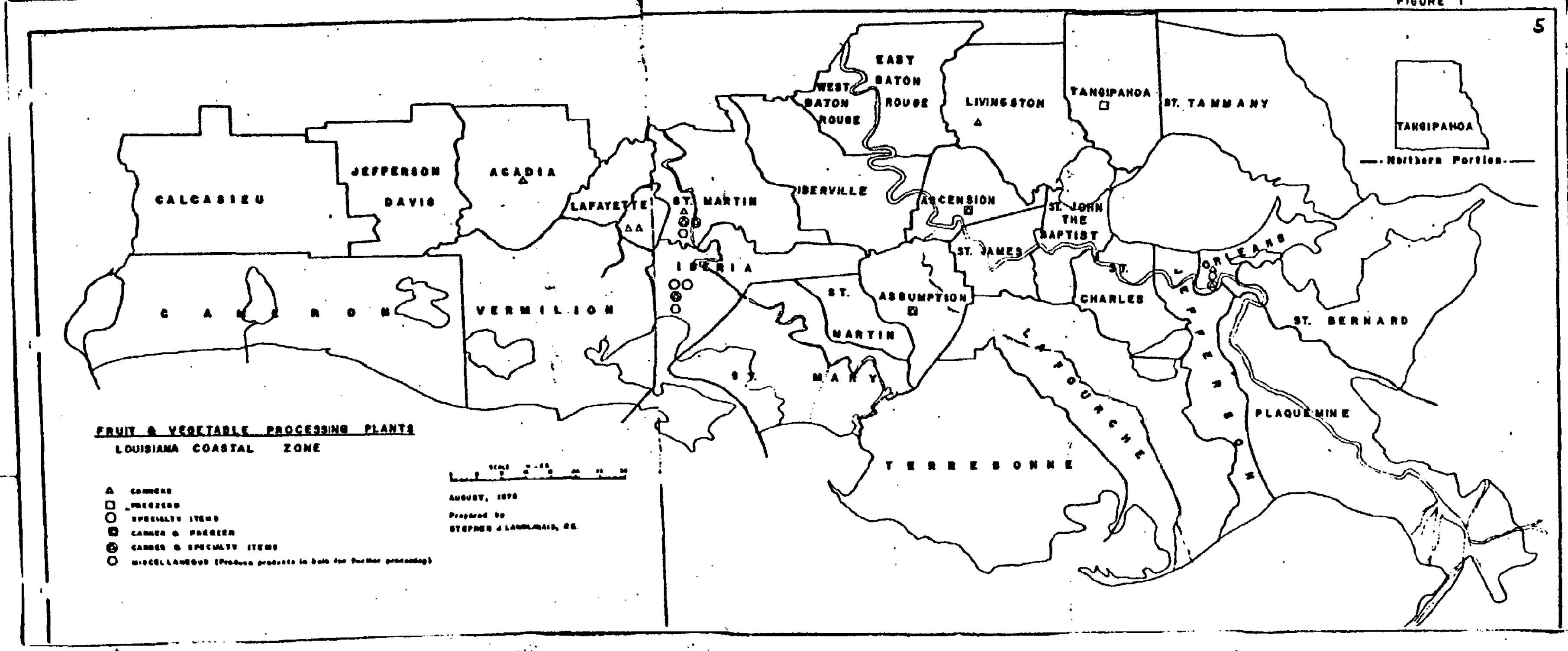

4
TANGIPAHOA
Northern Portion
CALCASIEU
JEFFERSON
DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
IBERVILLE
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ST. CHARLES
ORLEANS
ST. BERNARD
CAMERON
VERMILION
IBERIA
ST. MARY
ST. MARTIN
ASSUMPTION
LAFOURCHE
TERREBONNE
JEFFERSON
PLAQUEMINE
LIVESTOCK & DAIRY MARKETING
& PROCESSING FACILITIES
LOUISIANA COASTAL ZONE
LEGEND
STOCKYARDS
SLAUGHTER HOUSES
DAIRY PROCESSING PLANTS
Prepared by

FIGURE 1


5
FRUIT & VEGETABLE PROCESSING PLANTS
LOUISIANA COASTAL ZONE
CANNERS
FREEZERS
SPECIALTY ITEMS
CANNER & FREEZER
CANNER & SPECIALTY ITEMS
MISCELLANEOUS (Produce products in bulk for further processing)
SCALE MILES
AUGUST,
Prepared by
CALCASIEU
JEFFERSON DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
IBERVILLE
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ST. CHARLES
ORLEANS
JEFFERSON
ST. BERNARD
PLAQUEMINE
LAFOURCHE
TERREBONNE
ASSUMPTION
ST. MARTIN
ST. MARY
IBERIA
VERMILION
CAMERON
TANGIPAHOA
Northern Portion

the canned pack was $38,828,180, the specialty items pack was $14,205,000, and the frozen pack was $1,636,000.

Table I, Page 4, shows the volume and value of fruits and vegetables frozen in Louisiana during selected seasons from 1950 to 1972. There is no significant trend indicated by these data.

The volume of the canned pack has been increasing since the 1951-1952 season and the main products packed have been sweet potatoes and okra. (Table II, Page 5). This increase has come despite a decline in the amount of fruits and vegetables grown in Louisiana and the Coastal Zone as indicated earlier in this report and by Table III, Page 6. Apparently the processing plants are staying in operation by purchasing farm products from other areas. One processor interviewed stated that the local harvests were inadequate to fill specific needs and so products were purchased from out of state. As long as the processors can remain in business, they are a potential buyer for the farmer's produce. Table IV, Page 7, shows the number of plants in Louisiana that processed various commodities in certain seasons since 1951-1952. Table IV, Page 7, also defines each processing category by the products that are included in each category. While the number of plants has remained fairly stable, it should be noted that for the 1968-1969 and 1971-1972 seasons, specialty items were counted for the first time.

The volume and value of the specialty items pack appear to be increasing although this a fairly new category and data are not readily available.

Processing plants have had to spend a significant amount of money in order to clean up their effluent to meet standards of the Environmental Protection Agency. Those plants that have made large investments are most certainly interested in staying in business and would like to have a local supply of raw materials for processing.

Projection

The existence of processing plants in the Coastal Zone represents a potential for expansion of fruit and vegetable production. Fruits and vegetables generally produce high returns per acre but also incur high labor costs. With successful mechanization, these crops could be grown economically on high value land in the Coastal Zone. Large production units would be needed to justify the high cost of harvesting machinery. The potential for growth of fruit and vegetable production in the Coastal Zone exists, but it is difficult to predict to what extent this potential will be exploited.

TABLE I

VOLUME AND VALUE OF FRUITS AND VEGETABLES FROZEN IN LOUISIANA PLANTS DURING SELECTED SEASONS, 1950-1972. 1/

Season	Volume 2/ (1000 Pounds)	Value 3/ (1000 Dollars)	Products Packed
1950-51	13,000	4,000	Strawberries, okra, green beans, leafy vegetables, sweet potatoes
1956-57	12,000	2,000	Strawberries, sweet potatoes, okra, and other items packed in small quantities
1959-60	11,800	1,900	Sweet potatoes, okra, turnips, beans, spinach, blackeyed peas, squash, crowder peas, mustard greens, collard greens
1962-63	17,218	2,222	Sweet potatoes, strawberries, okra, leafy vegetables, squash, peas
1965-66	8,494	1,018	Sweet potatoes, squash, blackeyed peas, blackberries, okra, okra in bulk solution
1968-69	11,748	1,521	Blackberries, banana puree, sweet potatoes, okra, okra in bulk solution
1971-72	8,962	1,636	Blackberries, banana puree, sweet potatoes, squash, mangos, okra, okra in bulk solution

1/ Includes okra cooled in bulk solution for further processing for 1965-66, 1968-69, and 1971-72 seasons.

2/ Finished product weight.

3/ Estimated wholesale value of finished product at plant.

TABLE II

NUMBER OF CASES OF FRUITS AND VEGETABLES CANNED BY LOUISIANA PROCESSORS DURING SELECTED SEASONS, 1951-1972

Product	Season											
	1951-1952	1953-1954	1954-1955	1955-1956	1956-1957	1957-1958	1958-1959	1959-1960	1962-1963	1965-1966	1968-1969	1971-1972
	Thousand Standard Cases 1/											
Sweet Potatoes	1360	2131	1649	2728	2241	2462	3377	3168	4427	5624	5646	5345
Okra	354	347	205	171	164	189	299	193	256	310	337	323
Okra Mixtures	2/	2/	2/	2/	2/	2/	2/	2/	2/	157	164	188
Green Beans	53	37	88	54	26	20	43	34	3/	3/	0	0
Beets	0	48	28	0	0	0	0	0	0	0	0	0
Spinach	7	0	0	0	0	0	0	0	0	0	0	0
All Others	373	318	148	181	331	409	465	137	262	184	265	1632
T O T A L	2147	2881	2118	3134	2762	3080	4184	3532	4945	6275	6412	7488

1/ Basis 24/303 cans.

2/ Okra mixtures are included in "All Others" prior to 1965.

3/ 1962 and 1965 green bean pack included in "All Others" to avoid revealing confidential information.

TABLE III

VEGETABLES FOR COMMERCIAL PROCESSING -
ACREAGE, PRODUCTION, PRICE, AND VALUE, 1964-1972*

Year	Acres Planted	Acres Harvested	Production	Value
	Acres	Acres	Tons	1,000 Dollars
1964	530	460	1390	68
1965	1460	1330	2740	177
1966	2330	1220	1590	142
1967	1860	1530	4080	388
1968	2360	1850	4590	341
1969	1720	1340	3000	218
1970	1240	1140	2750	212
1971	1140	890	2800	338
1972	710	400	2000	172

*Lonnie L. Fielder and Sam L. Guy, Agricultural Statistics for Louisiana, 1964-1972, D.A.E. Research Report No. 458 (Baton Rouge: Louisiana State University Agricultural Experiment Station, October 1973).

TABLE IV

NUMBER OF LOUISIANA PROCESSING PLANTS PACKING SPECIFIED FRUITS AND VEGETABLES DURING SELECTED SEASONS, 1951-1972.

Products Packed	Season 1951-1952	1953-1954	1954-1955	1955-1956	1956-1957	1957-1958	1958-1959	1959-1960	1962-1963	1965-1966	1968-1969	1971-1972
Canned												
Sweet Potatoes	15	16	14	16	16	16	16	14	14	10	12	10
Green Beans	6	4	4	4	3	3	3	3	1	2	0	0
Okra	9	9	8	5	6	6	6	6	6	5	6	6
Okra Mixtures	1/	1/	1/	1/	1/	1/	1/	1/	1/	5	5	5
Frozen												
Sweet Potatoes	1/	1/	1/	1/	1/	1/	1/	3	3	2	2	1
Okra 2/	1/	1/	1/	1/	1/	1/	1/	2	4	4	2	3
Banana Puree	1/	1/	1/	1/	1/	1/	1/	0	0	0	1	1
Blackberries	1/	1/	1/	1/	1/	1/	1/	0	0	1	1	1
Squash	1/	1/	1/	1/	1/	1/	1/	1	3	2	0	1
Blackeyed Peas	1/	1/	1/	1/	1/	1/	1/	1	2	1	0	0
Crowder Peas	1/	1/	1/	1/	1/	1/	1/	1	2	0	0	0
Leafy Greens 3/	1/	1/	1/	1/	1/	1/	1/	1	1	0	0	0
Mangos	1/	1/	1/	1/	1/	1/	1/	0	0	0	0	1
Specialty Items												
Table Sauces 4/	1/	1/	1/	1/	1/	1/	1/	1/	1/	1/	8	7
Pickled Products 5/	1/	1/	1/	1/	1/	1/	1/	1/	1/	1/	7	7
Total Number of Plants 6/												
In State	22	25	21	20	20	19	18	18	19	20	25	23
In Operation During the Year	18	19	19	19	18	18	17	16	18	15	25	23

1/ Data not ascertained for these years.
2/ Includes frozen okra as well as okra cooled in bulk solution for further processing.
3/ Includes mustard greens, collard greens, spinach, etc.
4/ Includes primarily hot pepper sauce, but also other sauces, and semi-processed hot sauce in bulk.
5/ Includes all pickled hot peppers, pickled peppers, cucumber pickles, and pickled okra.
6/ Does not include specialty items plants prior to 1968-69 season.

PESTICIDES

Most efficient farm enterprises in the coastal zone region are highly dependent upon the effective use of agricultural chemicals. Agricultural chemicals include pesticides, plant growth regulators and fertilizers. Presently pesticides and fertilizers are the principal agricultural-chemicals used in the coastal zone region. Pesticides are defined as those chemicals used to control or destroy harmful insects, weeds, plant diseases, rodents and other types of pests which attack living things or spread disease among plants, animals, and mankind.

Climatic factors in this region are ideal for many forms of agriculture, but these same conditions are likewise ideal for agricultural pests such as insects, crop diseases, weeds and nematodes. The long, warm, humid growing season with an average annual rainfall of approximately 60 inches is well suited for these pests. Presently it is estimated that pests destroy a fourth of the nations' agricultural production, and the losses in the coastal zone region of Louisiana are proportional if not greater. However, with the implementation of modern pest control techniques and the development of new and improved pesticides, crop losses may be reduced significantly. Improved pest control measures may also allow commercial production of crops new to this region.

Although Louisiana farmers utilize a variety of pest control techniques, most rely heavily upon the use of pesticides for insect, disease, and weed control. In spite of greatly expanded research efforts directed toward development of alternative pest control measures, it is likely that pesticides will remain the principal pest deterrent for the next decade or more. Current trends indicate an increase in pesticide use during this period. Pesticides frequently used for production of major crops grown in the coastal zone region are listed in Table I, Page 5. Pesticides are also used extensively for weed control in industrial areas, on rights of way, for aquatic weed control, for mosquito and fire ant control and for home and garden pest control.

While pesticides play an important role in agriculture and in maintaining industrial, public and aquatic areas as well as providing better living conditions for coastal zone residents, there are hazards associated with this form of pest control. Pesticides can be harmful to humans, livestock, crops and to the environment if improperly used. This question of pesticide hazards has been the subject of much controversy during recent years.

If agriculture is to maintain its present status or to expand within the coastal zone region the industry must be compatible with the environment and with other area industries such as commercial fishing and trapping. Agricultural pesticides if not properly controlled could conceivably conflict with our wildlife and fisheries resources. Pesticides may be of immediate and longterm danger to man and the environment. Pesticides with potential for immediate hazard may be highly toxic but of short duration and will breakdown into harmless products in a matter of days or weeks after application. These types of pesticides may be safely used by application techniques which insure that they are precisely placed on the proper target areas.

Long term pesticide hazards result from chemicals which are persistent in the environment. Some types such as DDT may persist for 10 or more years after application and their full effects upon the environment are yet unknown. Whether the hazards of these pesticides exceed the benefits provided is a matter of much conjecture and may never be totally resolved. This point is largely academic since registrations for most of the persistent pesticides have been withdrawn and it is not likely that persistent pesticides will be registered for broad field usage in the future. The most common persistent pesticides are of the chlorinated hydrocarbon group. Among these are DDT, aldrin, dieldrin, endrin, heptachlor and chlordane.

Biomagnification is a term used to explain some of the hazards of persistent pesticides. This term refers to the accumulation of pesticides within lower life forms which serve as food for higher life forms. As residues move upward through the food chain they become more concentrated or magnified in the higher life forms until dangerous levels result. Some propose this theory to explain diminishing numbers of brown pelicans and certain other wildlife.

The extent to which pesticide residues occur in the Louisiana coastal zone region and the hazards involved are difficult to assess. Data were compiled on pesticide residues in waters at various points within the state by the Water Resources Division of the U.S. Geological Survey and are reported in the 1974 volume of "Water Resources Data for Louisiana". These data indicate that water samples contained either no residues or only minute amounts (less than 1 part per billion) of a number of chlorinated hydrocarbon and organic phosphate pesticides.

Table II, Page 6, contains data on pesticide residues in waters from the Flat Lake site in the Atchafalaya River Basin which are generally typical of data recorded for other sampling stations throughout the coastal zone region of Louisiana. In these water samples no residues of aldrin, chlordane, DDD, DDE, DDT, diazinon, endrin and heptachlor were detected, and only .01 ppb of dieldrin residue was found.

With the recent banning of DDT, dieldrin, aldrin, chlordane, heptachlor and certain other persistent pesticides by the Environmental Protection Agency future residue problems should diminish to negligable levels. Judicious use of pesticides will also contribute to a clean environment. Under the New Federal Insecticide Fungicide and Rodenticide Act hazardous pesticides can only be applied by or under the supervision of "certified applicators" who have been examined and found competent in the use of pesticides. These regulations become effective in October of 1976 and will insure that pesticides are used safely and judiciously with a minimum of harm to the environment. Agriculture in the Louisiana coastal zone region is compatible with the environment and with environmentally dependent enterprises. Future expansion of agriculture should not contribute undue pesticide hazards to the environment if present laws and policies are enforced.

TABLE I. LIST OF PRINCIPAL PESTICIDES USED ON MAJOR CROPS IN THE COASTAL ZONE REGION

Crop	Acreage	Insecticides	Herbicides
Corn	27,550	carbaryl carbofuran	atrazine simazine alachlor cyanazine
Cotton	6,862	methyl parathion parathion toxaphene monocrotophos azinphosmethyl	trifluralin diuron fluometuron prometryne MSMA DSMA
Rice	500,350	malathion carbaryl methyl parathion carbofuran	propanil molinate 2,4-D 2,4,5-T
Soybeans	318,100	carbaryl methyl parathion guthion methomyl	paraquat trifluralin alachlor dinoseb linuron metribuzin 2,4-DB bentazon
Sugar Cane	275,000	guthion diazinon	fenac terbacil TCA trifluralin 2,4-D dalapon atrazine simazine

TABLE II* ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES
ATCHAFALAYA RIVER BASIN, LOUISIANA

DATE	ALDRIN (UG/L)	CHLOR-DANE (UG/L)	DDD (UG/L)	DDE (UG/L)	DDT (UG/L)	DI-AZINON (UG/L)	DI-ELDRIN (UG/L)	ENDRIN (UG/L)	HEPTA-CHLOR (UG/L)	HEPTA-CHLOR EPOXIDE (UG/L)	LINDANE (UG/L)
294353091114000 - ATCHAFALAYA RIVER BASIN FLAT LAKE (LAT 29 43 53 LONG 091 11 40)											
OCT. 18 '73	.00	.0	.00	.00	.00	.00	.01	.00	.00	.00	.00
MAR. 12 '74	.00	.0	.03	.00	.00	.00	.00	.00	.00	.00	.00
JULY 09	.00	.0	.00	.00	.00	.00	---	.00	.00	.00	.00

DATE	METHYL PARA-THION (UG/L)	PARA-THION (UG/L)	PCB (UG/L)	2,4,5-T (UG/L)	SILVEX (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL BORON (B) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	HEXA-VALENT CHRO-MIUM (CR6) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)
294353091114000 - ATCHAFALAYA RIVER BASIN FLAT LAKE (LAT 29 43 53 LONG 091 11 40)											
SEP. 28 '73	--	--	--	--	--	--	50	--	--	--	--
OCT. 18	.00	.00	.0	.00	.01	1	120	1	0	5	4
NOV. 15	--	--	--	--	--	--	--	--	--	--	--
DEC. 13	--	--	--	--	--	--	240	--	--	--	--
JAN. 14 '74	--	--	--	--	--	--	40	--	--	--	--
FEB. 12	--	--	--	--	--	--	50	--	--	--	--
MAR. 12	.00	.00	.0	.00	.00	--	10	--	--	---	--
APR. 09	--	--	--	--	--	--	20	--	--	--	--
MAY 07	--	--	--	--	--	--	30	--	--	--	--
JUNE 11	--	--	--	--	--	--	20	--	--	--	--
JULY 09	--	--	.0	.00	.00	1	60	0	--	3	2
AUG. 07	--	--	--	--	--	--	30	--	--	--	--
SEP. 17	--	--	--	.01	.00	--	--	--	--	--	--
SEP. 19	--	--	--	--	--	--	50	--	--	--	--

*Table taken from "Water Resources Data for Louisiana". 1974. United States Department of Interior Geological Survey. P. 439. 1 UG/L = 1 PPB.

FERTILIZER

Lack of sufficient plant nutrients is the major factor limiting yields for most crops in the Louisiana Coastal Zone. The area is blessed with a mild climate, long growing season, adequate moisture and long days, but many fields are deficient in some essential elements for optimum yields.

The four elements commonly required in quantity for agricultural production are nitrogen, phosphorus, potassium and calcium. The first three are commonly referred to as commercial fertilizer and sold under a designation such as 34-0-0 or 13-13-13. The first number is an indication of the nitrogen in the fertilizer, the second phosphorus, and the third potassium. If only nitrogen is desired a farmer would purchase a mixture such as 34-0-0 or 82-0-0. The extra material (66# or 18#) is a material that has little or no value as a fertilizer.

Calcium is usually applied as lime to correct soil acidity and to supply calcium for plant nutrition. Soil acidity limits the availability of some plant nutrients which may be present in the soil but not readily used by the plant because of soil chemistry associated with low pH or acidity.

Agricultural experts are well aware of the lack of proper utilization of fertilizer to supply plant nutrients and, almost without exception, the "Giant Step II" publication prepared by the area county agents lists lack of fertilizer use as the major factor limiting yields. For many of the main crops the objective for 1978 listed in the publication is to have 40 to 60 percent of the farmers use the recommended amount of fertilizer.

Of the three major crops in terms of acreage; rice, sugar cane, and soybeans, the least amount of fertilizer is used by soybeans since as a legume it can utilize nitrogen produced by bacteria associated with its own root system. If the soil pH is maintained at the proper level, phosphorus and potassium may or may not be added for optimum production depending on existing levels already in the soil. In rare instances, one or two minor elements may be depleted and their addition is necessary in very small quantities for best yields.

Sugar cane and rice respond well to nitrogen fertilizer however, and the amount of other elements required depends on the soil type and past soil treatment. An additional consideration is the expected crop price at harvest versus the fertilizer cost when applied. Since fertilizer prices have tripled in many areas since 1972, the investment required to produce a crop has increased enough to discourage growers without adequate financial backing.

On crops such as rice and wheat the amount of nitrogen that can be applied is limited by the fact that high rates of fertilization will cause lodging, or falling down of the crop resulting in a loss at harvest that may offset the potential yield increase.

Table I, Page 5, shows some census data indicating the use of fertilizer by parish. As might be expected the parishes with the highest agricultural production are also those having the highest use of fertilizer. The 50% increase in money spent for fertilizer between 1964 and 1969 is an indication of increased use since the price per ton did not change appreciably during that period.

However, fertilizer production is dependent upon the petroleum industry and the rapid increase in the price of oil since the 1969 census has driven the price of fertilizer so high that use ~~declined~~ last year. There was a 24% decrease in statewide use between 1973 and 1974.[1]

Lack of knowledge regarding soil chemistry and plant needs frequently results in uneconomical use of applied fertilizer. Also, proper soil pH for a specific crop must be maintained for best yields. Soil tests will indicate if there is a need for application of lime for this purpose.

When the soil becomes too acid, some minor elements needed by the plant are not available in sufficient quantity, thus restricting growth even though commercial fertilizer is added. As shown in Table I, Page 5, the lime added in some parishes is rather low and the "Giant Step II" publication indicates this is restricting crop yields in most parishes.

When one considers minor crops such as vegetables and fruit, there is a tendency to use more fertilizer since this a minor cost of production. The amateur gardener is probably the leading offender in

---

[1] Minutes of the meeting of the Louisiana Fertilizer Commission held July 9, 1975. Presented by Mr. Robert Odom, Jr.

the excessive use of fertilizer. In some cases enough fertilizer is added to damage the crop or cause a temporary loss of land use because of excessive fertilizer salt.

The loss of fertilizer in run-off water from soils in the coastal zone is minimal when applied at the recommended rate. Nitrogen is the element most likely to leach from the soil if excessive rainfall occurs before it is utilized by the crop. The present high cost of nitrogen encourages application timing that minimizes loss from farmland. Unfortunately the high cost of nitrogen also discourages its use on pasture and forage crops where yield potential is high but the future market price of meat is unstable. Since nitrogen finds its way into run-off water from other sources, such as decaying leaves and vegetation, it is difficult to determine the portion attributable to the use of fertilizers. Phosphorus and potassium, when applied as commercial fertilizers, are retained in the soil and subject to very little leaching.

Parishes	Fertilizer Use (Census Data) 1969	Fertilizer Use (Census Data) 1964	Lime Application (Acres) 1969	Lime Application (Tons) 1969
Acadia	$ 2,209,671	$1,258,310	1,376	1,526
Ascension	176,308	113,204	375	695
Assumption	288,282	283,670	212	278
Calcasieu	1,292,210	694,843	1,389	1,389
Cameron	223,925	134,707	820	1,640
East Baton Rouge	282,205	100,950	3,841	4,872
Iberia	876,878	796,339	1,541	2,955
Iberville	220,675	184,019	265	254
Jefferson Davis	2,555,493	1,262,635	6,250	6,540
Jefferson	21,610	2,046	33	11
Lafayette	635,959	313,740	2,868	4,693
Lafourche	295,557	378,555	194	157
Livingston	83,753	32,897	279	501
Plaquemines	30,280	14,795	73	93
St. Bernard	5,044	7,235		
St. Charles	38,874	38,094	30	54
St. James	171,372	203,722	1,169	1,676
St. John	78,095	117,730	25	50
St. Martin	405,633	389,592	1,686	3,853
St. Mary	565,094	651,894	1,591	3,526
St. Tammany	337,327	243,341	4,502	6,751
Tangipahoa	1,157,825	768,164	6,649	10,915
Terrebonne	124,597	118,680	170	281
Vermilion	2,007,603	1,401,758	6,478	7,507
West Baton Rouge	134,323	126,799	38	76
TOTAL	$14,218,593	$9,637,769	841,054	60,239

SECTION II

FORESTRY IN THE LOUISIANA COASTAL ZONE

By Emmett F. Stallings
Department of Social Studies (Geography)
University of Southwestern Louisiana
Lafayette, Louisiana 70501

TABLE OF CONTENTS

Chapter	Title
1	Forestry in the Louisiana Coastal Zone
2	Processing Facilities
3	Projects
4	Recreation in Louisiana Forests
5	Watershed
6	Growth Potential

FORESTRY IN THE LOUISIANA COASTAL ZONE

The exploitation of the forests of the Southeastern United States was origninally of an entirely extractive nature. Men went out and cut the trees in an area, usually within a short period of time, often as little as three to eight years, and then moved on. The time span for cypress was usually longer due to the difficulty of their removal from the swamps. The cutters would return again some thirty or forty years later when sufficient regrowth had occured to once again make lumbering profitable. The commercial cutting began in earnest in Louisiana in the late 1800's.

The prime species utilized was of course the pine. This selective cutting gave other species, usually the hardwoods, a comparative advantage so that the forest type tended to change from softwood or mixed to hardwood. This process is reflected to some extent in Table VIII, Page 40, which indicates that even today there are larger stands of hardwoods in some of the South Louisiana Parishes than was the case before any significant interference by man. This type of exploitation resulted in a boom and bust cycle for many small towns as well as the eventual loss of the pine forests.

With the removal of most of the virgin forest in the Eastern United States the realization eventually set in that our forest resources were not inexhaustable and that something would have to be done to improve the supply of lumber and pulpwood. With the increasing demand for paper and the improvement of the sulphate process in the 1930's it became profitable to grow pines solely for pulp and this could be done in a relatively short period of time. A large sulphate process mill was established at Panama City, Florida with other mills soon following which provided ready markets for the pulp wood. By this time the forests of Louisiana were in large measure cut over with little or no effort having been put into reforestation. Forest fires were also a major problem. There were no new areas of virgin forest within easy reach elsewhere in the United States to fill the demand.

The foundation was thus laid for the advent of sustained yield practices. Timber companies understandably did not wish to see themselves go out of business because of a lack of wood. Therefore they began to seek ways of maintaining a steady yield of marketable wood. The most obvious, of course, was to plant new trees. Also attention was focused on the development of hybrid trees, the improvement of the forest habitat (primarily for pine), better fire prevention and control, and more efficiency in the use of trees (one of the early cutting practices was to cut off the tree some distance above the ground because an old pine had so much sap near the base that a log from that portion of the tree would sometimes sink).

The forests of Coastal Louisiana fit into this picture in a variety of ways. Our cypress was cut rapidly and completely with little thought of the future. Today there are no virgin stands of any consequence left and much of the second growth will not be mature for another 200 years.

Some of the smaller trees that were left standing from the early cuttings have now reached a size where limited harvesting is possible but the quality of this immature wood is generally low.

The hardwoods that resulted from the selective cutting and those that were already present are being rapidly cut and the land converted to pine wherever conditions allow it. The hardwood is valuable, however, it is often slow growing and a greater return can be gained by producing successive crops of pines. As noted in the section on recreation many people are alarmed by this loss of hardwood forests because a pine forest supports very little in the way of wildlife.

As noted above the pine has become the favorite tree of the forest industry in Louisiana. It grows off rapidly, even in thick stands, and can be thinned over the years yielding in the earlier period pulp and in later years timber. There has been a notable degree of success in developing hybrid trees that grow off faster, produce better pulp and lumber, and have a higher resistence to disease. The demand for wood and wood products is so great that we are forced to import substantial quantities annually into the United States.

The Louisiana Coastal Zone is not heavily forested with the exception of certain areas. Much of the zone is coastal prairie, especially in the Southwest. Trees were not generally found here at the time of settlement except along streams, however, when planted they do very well. These prairie lands also lend themselves well to agriculture so consequently there has been little effort at afforestation.

Table I, Page 30, shows the area of each parish and the portion devoted to commercial forest as well as the change since 1964. These figures do not indicate the potential for there are many areas of low grade woodland that could be upgraded to levels of significant timber production. Of the parishes listed, the most valuable stands, generally pine, are found in Livingston, Tangipahoa, and St. Tammany. Some of the other parishes rank very high in hardwoods, Iberville for example, but the level of exploitation is not nearly as high. Table II, Page 31, shows growing stock volume on the commercial forest lands.

One of the serious problems faced by the forest industry is the loss of land to other uses and the difficulty of persuading many private landowners to upgrade their forest. Table I, Page 30, shows this loss of commercial forest land since 1964. With five exceptions the trend is downward in the Coastal Zone. The Louisiana Forestry Commission reports that (on the basis of U. S. Forest Service Surveys) of the original 23,000,000[1] forested acres in the state that 16,000,000 acres remained in 1964 and 14,500,000 acres in 1974. In the Coastal Zone the average loss in commercial forest land per parish was 8.1% ranging from virtually no change in Iberville to a loss of 51% in Vermilion, Cameron and Lafayette and to a gain of 14% in Lafourche. This loss of commercial

---

[1] Earles, Jacqueline M., Forest Statistics for Louisiana Parishes, U. S. Forest Service, New Orleans, 1975.

forest land can be expected to continue as 83.69%[2] of the state's population growth from 1960-1970 was in the Coastal Zone. This growth pattern seems stable and can be expected to continue although the rate may decline somewhat if oil and gas fields are depleted and no new ones discovered.

In view of these trends the Louisiana Forestry Association has begun a public relations program centered around the theme "Louisiana's Third Forest." The timber companies, who own a relatively small proportion of timber producing land, are generally following sustained yield practices and associated upgrading of their lands, primarily to produce pine. The purpose of this public relations program is to persuade private landowners to do the same thing. Table III, Page 32, shows the specific amount of land held by the various sectors by parish. If the present trend of planting more trees than are cut is to continue then there must be a large scale effort on the part of farmers and other forest landowners. As noted above the loss of forest land is especially great in the Coastal Zone (for the state as a whole the most rapid loss of forest land has been in the delta area).

Table IV, Page 33, and Table V, Page 34, show the specific species of trees in the Coastal Zone in terms of growing stock volume. The hardwoods still predominate, primarily because of the Atchafalaya Basin.

---

[2] Jones & Rice, An Economics Base Study of Coastal Louisiana, Center for Wetlands Resources, LSU, Baton Rouge, 1972.

However, they are being progressively cut and replaced by pines where land conditions permit. Table VI, Page 35, shows timber production and value by parish. A detailed treatment of the economic value of forest lands is included in another section of this study.

PROCESSING FACILITIES

The contribution of the Coastal Zone in terms of its forest products is very significant to Louisiana. Tables I through VI give a good indication of forest area, types, and species. Of the state's commercial forest land 21%, or 2,183,200[3] acres, are found in the study area. In general, the forests of the coastal zone are not as productive as those in the rest of the state. For example, in 1974 the Coastal Zone accounted for the following percentages and values of the state total for the categories listed in Table VI, Page 35; saw timber 15%, pine pulpwood 11%, hardwood pulpwood 6%, total stumpage 14% and value delivered to mill 12%. This areas contribution should not be lightly dismissed for the above percentages represent $27,955,909 for value delivered to the mill in 1974.

As shown on the accompanying map processing facilities are spread across the Coastal Zone but with concentrations in Calcasieu and Tangipahoa Parishes. With the exception of the post, pole, and piling companies most of the facilities represent primary processing rather than manufacture of a finished product. The paper mills, for example, concentrate mostly on kraft products. There are several furniture manufacturers in the state but none are in the Coastal Zone. A list of the types of facilities as well as specific plants are included in Table VII, Page 36.

---

[3] Earles, Jacqueline M., Forest Statistics for Louisiana Parishes, U. S. Forest Service, New Orleans, 1975.

The state is a net importer of wood. In the state, production isn't high enough to supply the plants and mills. Thus there is a good incentive present for an increase in production. The second growth cypress composes a forest of potentially great value. Whether or not the landowners, espcially the large ones, will elect to institute sustained yield practices for the cypress remains to be seen.

PROJECTS

Following is a list of projects proposed and in the process of being instituted in the Louisiana coastal zone that have significance to forestry interests. Projects are included that are of significance to commercial forest interests as well as to those who are concerned with areas of forest that may have little or no value for timber production. Frequently forests of the latter type are of very high value for flood control and watersheds, wildlife, and recreation.

U. S. Corps of Engineers Projects

Baton Rouge Harbor-Devil's Swamp

Beginning in 1958 a 12' deep 200' wide channel was constructed for a distance of 2½ miles from a bend of the Mississippi inland near the north city limits of Baton Rouge. Land clearing along this channel has taken place as various industries have located there. The project calls for an ultimate length of 5 miles; the extension to be constructed when there is sufficient demand for industrial sites. This extension, when and if constructed, will result in additional clearing of forest land for industiral sites.

Lake Ponchartrain, Louisiana, and Vicinity Hurricane Protection Project

New Orleans and its environs are not adequately protected at this time from a strong hurricane in terms of flooding. This plan envisions the improvement of existing levees as well as the construction of new levees and water control structures. The new control structures would be built across the Rigolets, Chef Menteur Pass, and in the Seabrook complex. There are two areas included in this plan where the increased and improved drainage is expected to result in a conversion of forest land to urban uses. The St. Charles Parish levee, construction of which is in doubt, would involve the conversion of 24,770 acres of marsh, swamp, and open water to urban uses. An additional 916 acres of land would be required for right of way and construction. It is unlikely that this levee will be built because of the inclusion of Bayous Trepagnier and La Branche in the Louisiana Natural and Scenic Rivers System. Currently this part of the project is indefinitely deferred. The Chalmette area plan would alter the condition of 16,312 acres of swamp and make it fit for urban land uses. It is expected that most of this area would eventually be converted to urban land uses. These two areas are currently of limited value in terms of forestry and will probably remain so until the second growth cypress reaches a higher level of maturity.

East Atchafalaya Levee to Mississippi River - Morganza to Gulf

A Corps of Engineers study is underway in this area to see if actions can be taken to alleviate future flood conditions similar to those occuring during 1973. A considerable portion of this area is forested both with hardwoods and cypress. Thus any flood control plan has the potential of changing the forest regimes.

New Orleans - Baton Rouge Metropolitan Area Study

The Corps is presently making a general study of this region to delineate problem areas. At a later stage specific problems will be examined and possible solutions outlined. Until specific proposals are made it is impossible to determine the potential effects on the forests. The parishes involved are: East Baton Rouge, West Baton Rouge, Orleans, Iberville, Jefferson, Ascension, St. James, St. John the Baptist, Assumption, St. Charles, Lafourche, St. Bernard, and Plaquemines.

U. S. Soil Conservation Service Project

Lake Verret Watershed

This proposed project represented a joint effort between three parish police juries and the U. S. Soil Conservation Service. In the proposal the area to be included is described as follows:*

> The watershed covers 246,000 acres in the southeastern part of the state. It includes 22,300 acres (34.84 sq. mi.) in Ascension Parish, 104,500 acres (163.28 sq. mi.) in Assumption Parish and 119,200 acres (186.25 sq. mi.) in Iberville Parish. Approximately 33% of the area is cropland, 8% is pasture, 51% is woodland, and 8% is in miscellaneous uses. The miscellaneous area includes roads, channels, industrial sites, farmsteads, urban areas, etc.

The heart of this plan involved the channelization of about 230 miles of streams and waterways. Other measures would also be taken to improve drainage. Should this plan be put into effect it would allow the conversion of a significant part of the forested land in this area to be converted to farmland and some of the areas presently in hardwoods to be converted to pine production.

It appears unlikely at the present time that this plan will be implemented. The mayor of Morgan City led a successful effort to stop it on the basis that the improved drainage upstream along with increased siltation would only make the already bad flood problems of Morgan City even worse. This project is now in limbo.

RECREATION IN LOUISIANA FORESTS

The recreational value of forests varies according to:[4]

(1) How far people are willing to travel for such recreation

(2) What kinds of activities they prefer or demand

(3) What kinds of equipment they wish to use

(4) What seasonal use patterns they will insist upon

(5) How much crowding they are willing to tolerate at the recreation site and on the road to and from

Barring an astronomical increase in the price of gasoline a liberal interpretation of these factors indicates that the recreational potential of Louisiana forests is extremely high. In Louisiana 61%[5] of the people, or over 2,300,000 individuals, live within the Coastal Zone. Thus there is hardly a shortage of people to utilize recreational potential whether it be forest oriented or centered upon other possibilities.

Tourism and recreation are important sources of income in Louisiana, however, they fall far short of the actual potential. Most out of state tourists are headed for New Orleans whereas residents make a proportionately greater use of other areas. Our potential becomes evident when one takes the time to compare Louisiana to a state like Florida. The Coastal Zone ranks very high in both total potential and developed

---

[4] Clawson, Marion, Forests for Whom and for What?, Johns Hopkins, 1975.

[5] Jones & Rice, An Economic Base Study of Coastal Louisiana, Center For Wetlands Resources, LSU, Baton Rouge, 1972.

potential when compared to the rest of the state, although that isn't saying much. Most of the activity centers around hunting and fishing as well as some of the historical sites. There are other cultural attractions not related to the coastal environment.

Much of the Coastal Zone is devoid of large forests of commercial value with several notable exceptions. Most if not all of the parishes have some forest that is of value from a recreational viewpoint. Forest related recreational activities revolve around hunting, hiking, camping, and in some of the swamp forests fishing. Most of the land is privately owned with the exception of several large wildlife refuges. Many of the more desirable tracts are leased out to individuals or clubs or posted. The wildlife refuges and state parks tend to be in the non-forested areas.

The paucity of forest related recreational development is shown by a survey of a tourist brochure compiled by the Evangeline Economic Development District under the direction of Tony Perot. This brochure covers the eight parishes of the Acadiana Planning and Development District. Of those Parishes in the coastal zone (Vermilion, Acadia, Lafayette, St. Martin, Iberia, and St. Mary) there were only four attractions that could be termed forest oriented. These attractions do not include several notable trees that were listed such as the live oak on the grounds of St. John's cathedral in Lafayette. In one case, Swamp Gardens in Morgan City, the setting is primitive swamp forest with little modification by man. Longfellow-Evangeline State Park near St. Martinville maintains primarily native vegetation but in a modified condition. The other two attractions, Jungle Gardens on Avery Island and Rip van Winkle's Live Oak Gardens on Jefferson Island, both have a forest setting but with a highly modified environment including the introduction of exotic species. Notably absent were forest preserves of any type that included nature trails, camping, and hunting and fishing (Swamp Gardens is a very small park entirely within the city limits of Morgan City and does include a nature trail). A listing of state parks with a forest type environment is included on Page 13.

One of the favorite forms of recreation for the state as a whole as well as the coastal zone is hunting. Most of the hunting is associated with waterfowl, however, several forest type areas rank quite high especially for deer and squirrel hunting.

One of the more productive type areas for fish and wildlife is the swamp forest. The ability of a body of water to support marine life is greatly enhanced by the periodic flooding that is characteristic of this situation. Periods of low water in the swamp forest tend to inhibit the growth of thick masses of water weeds, at least until the debut of the hyacinth, whereas during periods of high water the marine creatures spread out through the area reaping a food bonanza. Such an area can support a standing crop of 400-600 pounds per acre of marine life with peaks during favorable periods reaching 972 pounds per acre.[6]

---

[6] Winn, Bill & Palermo, Ray, "Acorns a la Carte," <u>Louisiana Conservationist</u>, May/June, 1975.

Much land of this type is found in the Atchafalaya Basin. However, as is well known, the character of the great swamp is being rapidly changed by siltation.

For hunting purposes the bottomland hardwoods are especially attractive. Here the presence of oak and other nut bearing trees in large numbers supports a dense and varied population of wildlife. More than 90 animals and birds, many of them valuable for food or fur, depend on oak mast either as a staple or as a supplementary food item in their diets.[7] When selected cutting occurs the forest floor produces good browsing plants for deer and rabbits. As long as varied stands of trees remain both in terms of age and species productivity remains high. During periods of winter flooding waterfowl will frequent the area to feed off acorns and other foods that are available.

Several serious problems are in evidence concerning forest associated recreation in the state which are applicable to the coastal zone. These are the loss of forest land to agriculture and urban uses and the change in character of many of our forests.

Table VIII, Page 40, shows the losses of bottomland hardwood acreage during the 1960's. As can be determined from this table the losses of this type of land to other uses is rapid. The clearing

---

[7] Yancey, Richard K., "Our Vanishing Delta Hardwoods," Louisiana Conservationist, March/April, 1970.

of the land is only one part of the picture. The other part involves a basic change in the character of the forest. As noted earlier the reason for this change in forest type is found in the economic realm. Namely, hardwoods are valuable but tend to be slow growing. If the owner is to maximize his income from forest land then it is in his best interest, once the hardwoods have been removed, to replace them with the generally more rapidly growing pines. Soon after a pine forest is established the lands ability to support wildlife becomes very low in that a pine forest provides almost nothing in the way of food for the animals. Sometimes the conversion is possible with the existing drainage whereas in other instances it is necessary to improve drainage, often through channelization. Drainage improvements normally mean a sharp reduction in marine life.

Large timber producers have tended to follow this pattern with the resultant loss of our hardwood forests. The trends of the 1960's have continued on the 1970's and it is the opinion of many that we will witness the demise of the hardwood forests as a major type in the state. The industry's attitude towards this problem and multiple use forestry practices in general is clearly shown in the following quote:[8]

> Forest industries can help both the region and themselves by maintaining attractive forested strips along roads and in view of scenic outlooks. They may also wish to provide roadside

---

[8] Southern Forest Resource Analysis Comm.-1969, <u>The South's Third Forest</u>, 1969, p. 197.

parks that contain tables, water, toilets, and trash receptacles for travelers. Such facilities need not be expensive, and part or all of the cost might be paid by the public in exchange for the use of the land. Roadside strips can and should be converted into demonstrations of multiple-use forestry. Losses in timber production and added costs of harvest in these strips eventually should be compensated for by public funds or tax reductions.

Louisiana has purchased some tracts in the northern part of the state to insure that we have at least a few areas of this type left. The state has also acquired large tracts of the Pearl River bottom lands. In the coastal zone the major areas of hardwoods remaining are in the Pearl and Atchafalaya Basins where some land is under either public ownership or control. Thus the possibility of saving some of the hardwoods in the coastal zone is still with us. Fortunately the swamp forest is more difficult to change in character through cutting practices. The main danger to these forests is through drainage. Following is a list of publicly owned or managed lands having in whole or part a forest type environment:

Laccassine National Wildlife Refuge

This Federal refuge is mostly a marsh type environment, however, some swamp forest is present in the northern part. Primary activities are hunting and fishing with some commercial trapping.

Bonnet Carre Wildlife Management Area: 3,800 acres in St. Charles Parish. Hardwood terrain; center portion rich in aquatic and semi-aquatic plants. Squirrels on both the east and west boundaries. Quail--fair. Dove, woodcock, duck, coot, snipe, and rail--found in varying numbers during winter months. No deer on the area. Access via Hwy. 61. Interior dirt roads. Camping on designated areas--one public site on Hwy. 61 in Norco.

Manchac Wildlife Management Area: 5,200 acres in St. John Parish between Lakes Pontchartrain and Maurepas. Marshland terrain. Duck, snipe, rail, and gallinule--good. Rabbit and woodcock--fair. Deer--poor. Entrance by boat only off Hwy. 55 at Manchac via Pass Manchac or North Pass. Interior lacks major waterway network. Limited high ground. No camping permitted at this time.

Pearl River Wildlife Management Area: 26,986 acres in St. Tammany Parish. River swampland. Turkey--excellent. Deer and squirrel--good. Rabbit--fair. Unmarked hogs. Experimental raccoon season. Highway access excellent; I-10 bisects the tract. Interior access largely by small outboard boat. Camping on designated areas--one campsite on the west side of the area is opened for public use (Crawford's Landing).

Point-Au-Chien Wildlife Management Area: 28,243 acres approximately 15 miles southeast of Houma. Slightly brackish marsh; timber stands adjacent to natural bayous and oil company levees. Deer, rabbit, squirrel, rail, and waterfowl--good. Morning hunting only for waterfowl. Rabbit hunting with beagles allowed after waterfowl season closes. Access by driving to Point-au-Chien from Houma on Hwys. 55 and 65. Boat ramp at the end of the road at Point-au-Chien. Marine access through Grand Bayou and St. Jean Charles Canal. No campgrounds.

Sabine Island Wildlife Management Area: 8,103 acres in west-central Calcasieu Parish. Mostly wetland habitat; some bottomland hardwoods. Rabbit--good. Deer, squirrel, duck--fair. Morning hunting only for ducks. Entrance via Hwy. 109; interior access mainly by boat. No major roads on the tract. No campgrounds.

Salvador Wildlife Management Area: 27,500 acres in St. Charles Parish. Freshwater marsh type; numerous ponds; cypress stands along the northern extremity. Deer, rabbit, squirrel, rail, and waterfowl--good. Morning hunting only for all game species. Access via (1) Bayou Segnette from Westwego into Lake Cataouatche; (2) Seller Canal to Bayou Verret into Lake Cataouatche; and (3) Bayou Des Allemands to the south-west end of the area or on into Lake Salvador and back into the area from Bayou Couba and Lake Cataouatche. Interior access only by boat. No campgrounds.

Listing of State Parks With a Forest Type Environment

1. Fairview Riverside State Park (P. O. Box 152, Mandeville, LA 70447) is located two miles east of Madisonville in St. Tammany Parish on La. 22. The park consists of 98 acres of picturesque moss-draped oaks and woodlands near the banks of the Tchefuncte River.

2. Fontainebleau State Park (P. O. Box 152, Mandeville, LA 70448) is located southeast of Mandeville in St. Tammany Parish on U. S. 190. The park embraces over 2700 acres on the north shore of Lake Pontchartrain. Nature trails, the ruins of a plantation brickyard and sugar mill, and an alley of live oaks lining the entrance road are popular assets of the park.

3. Longfellow-Evangeline State Commenorative Area (P. O. Box 129, St. Martinville, LA 70582) is located three miles northeast of St. Martinville in St. Martin Parish on La. 31, along the banks of the Bayou Teche. Development is centered around an Acadian house of the late 18th century and its kitchen-garden. Also of note is the Acadian craft shop, an accurate wood and mud replica of an old Acadian cottage. The 157-acres park and its structures interpret the history of the early French settlers of Louisiana.

4. Niblett's Bluff State Commemorative Area (Route 4, Box 212, Lake Charles, LA 70601), a 32-acre site located on the Sabine River in Calcasieu Parish, was the site of a Civil War ammunition supply point.

5. Sam Houston State Park (Route 4, Box 212, Lake Charles, LA 70601) is located twelve miles north of Lake Charles on La. 378 in Calcasieu Parish. Situated at the confluence of the Houston River, the west fork of Calcasieu River, and Indian Bayou, the 1068-acre tract features several lagoons and many nature trails which penetrate the densely wooded area.

WATERSHED

One of the most significant values of a forest is its role as a watershed. Two major functions of a watershed, streamflow regulation and groundwater recharge, are of special interest here.

Major determinants of streamflow are the nature of the precipitation (rate, duration, form, and extent) and the condition of the land. The condition of the land or soil is the major determinant of concentration time, flow rates, and infiltration. At this point man obviously has little control of climatic factors, therefore, the best possibilities for control lie in the condition of the land.

Groundwater recharge occurs in most areas where there is sufficient precipitation and a permeable subsoil. In some areas this recharge is of primarily local significance in that the soil moisture and groundwater are replinished only for that immediate area whereas in certain areas there may be large quantities of water entering aquifers that are major sources of groundwater for agricultural, industrial, and municipal users some of which may be miles away from the zone of recharge. Again the condition of the land or soil is of major significance in determining the nature of groundwater recharge. Happily the factors which result in a generally desirable streamflow pattern are likewise those which enhance recharge.

Of the major factors affecting streamflow and recharge the ground cover is one of the most important. The longer the concentration time the more favorable the situation becomes for recharge and evenness of streamflow. The shortest concentration time or the most rapid runoff generally occurs on bare ground where a layer of dense soil soon develops as a result of the raindrops breaking up the soil aggregates. Such a layer may become almost impermeable after a short period of time. The slowest runoff and the greatest infiltration generally occurs where the land is forested. Runoff is slowed by a forest because a considerable amount of water is retained by the leaves and branches of the trees to be released slowly to the forest floor or evaporated back into the atmosphere. Also the forest floor is often covered by leaves, branches, and twigs and underlain by humus. Thus water is retained at ground level by these organic materials for a longer period of time thus increasing percolation. Recharge is enhanced and streamflow peaks are smoothed as compared to non-forest streams. In swamps and marshy areas the effect is much the same in that the profusion of vegetation and the slowness of drainage retards rapid water movement and likewise smoothes flow cycles and enhances recharge. In Louisiana subsidence of the land has occured in the vicinity of Baton Rouge and New Orleans partially due to the removal of groundwater without adequate replenishment either through normal or artificial recharge.

When forests are cut and channels cleared of vegetation and other obstructions to flow, (often through channelization) and streamflow curves tend to become more extreme with a resulting increase in siltation and flood damage. The mayor of Morgan City successfully opposed a plan to channelize several hundred miles of waterways in the watershed of Lakes Palourde and Verret. His contention was that channelization would result in better drainage with the conversion of thousands of acres of marshy and swampy land into farming areas. Streamflow extremes would increase as would siltation. The water supply of Morgan City would be jeopardized with additional filling of the already shallow lakes and the already precarious position of Morgan City in respect to flooding would further deteriorate. Had this project been carried out runoff could have been expected to increase by 10 to 20 inches per year.

There is a lack of knowledge of the major recharge areas in the state as a whole and the coastal zone. One of the prime research needs for effective coastal zone management is a study of ground water conditions.

GROWTH POTENTIAL

The continuing growth of the United States population is resulting in a removal of land from the production of trees. More people mean more land for agricultural, urban, transportation and other uses. The only obvious way at this time for an increase in wood production is to intensify output on the present and constantly shrinking acreage. The forest industry is doing a good job in moving towards this goal on company owned land. However, in the state of Louisiana 73%[9] of the forest land is privately owned, much of it in small plots. Generally the less desirable land has been relegated to the growth of trees since the economic return from this activity is one of the lowest for any type of land use. The large land owner (1,000 acres plus) has an incentive to apply technology to the production of trees. However, the economic return from a few hundred or less acres seldom offers sufficient economic return for the owner to go the trouble of applying management techniques.

In the last few years economic changes have been such that it is becoming more attractive for even the small land owner to apply advanced management techniques. Also the Louisiana Forestry Commission and the U. S. Agricultural Stabilization and Conservation Service now provide ready assistance to the landowner. The forest industry has begun a

---

[9] Louisiana Cooperative Extension Service, LSU, 1973.

concerted public relations effort aimed at the private owner. It is entitled "Louisiana's Third Forest." It is their hope that the message will get across and a higher production will result.

The Coastal Zone fits fairly well into the previously outlined patterns. One exception is the relatively large acreages of second growth cypress slowly edging toward maturity. Once these trees attain a marketable size the economic return from their harvest will be very great. At the present time good clear cypress, if it can be found, sells for more than mahogany at Lafayette lumber yards and this situation doesn't seem likely to change.

The hardwoods found in the coastal zone are on the way out, at least on lands that will support pine. The price for hardwoods would have to double for them to become economically attractive on a par with pine. There will always be hardwoods for many areas simply will not lend themselves to the growth of pine, that is, unless someone comes up with an exotic softwood species that will do well in such a habitat. Thus the production of hardwoods can be expected to decline until a point is reached where most of the land suitable for pines is being used for that purpose.

Forest land losses in the Coastal Zone are running slightly ahead of the rest of the state and are likely to acclerate in the future as most of the state's population growth is occuring here. The change from forest and farms to urban uses will remove additional amounts of land from production. At this point there seems to be little hope of significant increases in timber production with the exception of the eventual harvesting of the cypress which may or may not be done on a sustained yield basis. The most likely future trend will be downwards; depending somewhat on the success of the "Third Forest" effort.

SUMMARY

Forestry in the Coastal Zone is of major economic significance primarily in Livingston, Tangipahoa and St. Tammany Parishes. These parishes are the location of the most valuable softwood forests. Calcasieu Parish has a large group of processing facilities. However, much of the wood used there is brought in from other parishes and from Texas.

The character of the forests is changing as landowners switch over to pine production, as opposed to hardwoods, where conditions permit. Improved drainage tends to speed this process. This change is economically attractive to the companies because of the more rapid growth and higher value of pine. From a recreational viewpoint the change is a disaster because a pine forest supports very little in the way of wildlife, especially as it matures.

Land reclamation projects and urban growth are taking their toll of forest land with acreages decreasing yearly. This trend seems certain to continue as most of the state's population growth is occuring in the Coastal Zone. About the only hope for an increase in wood output on a long term basis lies with the desire and ability of landowners to intensify production on the ever shrinking forest land. If a growth in output should occur because of better management it will be unlikely to continue in a long term situation. After the second growth cypress is harvested a decline can be expected unless the land losses are stopped and most landowners apply sustained yield management techniques. The economic yield may hold steady or even increase over the long term due to the increasing scarcity of wood.

The timber companies and the large timber producing landowners are unlikely to approve of or support any type of coastal zone management plan. The heart of such a plan is the multiple use concept with a determination of and weighing of the various alternatives. If forced to employ a multiple use approach to forest lands the owners will receive less income and society more from these lands. Forest interests realize this and will oppose any plan that might require them to weigh the benefits to society on a par with their own economic return.

Attached are statements from the Southern Forest Products Association, The Louisiana Forestry Commission, and the Louisiana Forestry Association that should be of value in formulating a coastal zone management plan for Louisiana.

TABLE I

TOTAL AREA, COMMERCIAL FOREST LAND, AND PROPORTION OF TOTAL AREA, 1974, AND CHANGE SINCE 1964

Parish	Total Area	Commercial Forest Area	Commercial Forest Proportion	Commercial Forest Change Since 1964
	Thousand Acres		Percent	
ACADIA	424.3	66.0	16	- 8
ASCENSION	197.1	97.2	49	- 6
ASSUMPTION	243.2	138.6	57	- 3
CALCASIEU	714.9	192.5	27	- 21
CAMERON	-------	-----		
EAST BATON ROUGE	302.1	106.4	35	- 19
IBERIA	414.1	121.9	29	+ 6
IBERVILLE	411.5	279.3	68	- 1
JEFFERSON	-------	-----		
JEFFERSON DAVIS	423.0	68.2	16	- 17
LAFAYETTE	-------	-----		
LAFOURCHE	865.9	178.2	21	+ 14
LIVINGSTON	443.5	336.0	76	- 6
ORLEANS	-------	-----		
PLAQUEMINES	-------	-----		
ST. BERNARD	-------	-----		
ST. CHARLES	270.7	76.8	28	+ 12
ST. JAMES	165.8	85.5	52	
ST. JOHN	238.1	99.6	42	+ 6
ST. MARTIN	514.6	305.5	59	- 2
ST. MARY	453.8	148.5	33	+ 4
ST. TAMMANY	738.6	378.2	51	- 6
TANGIPAHOA	543.4	306.0	56	- 12
TERREBONNE	1,144.3	113.4	10	- 7
VERMILION (1)	2,113.3	23.4	1	- 51
WEST BATON ROUGE	135.7	62.0	46	- 10

(1) Includes Cameron and Lafayette

SOURCE: Forest Statistics for Louisiana Parishes, Earles, 1975.

TABLE II

GROWING STOCK VOLUME ON COMMERCIAL FOREST LAND BY SPECIES GROUP, 1974

Parish	All Species	Softwood	Hardwood
	Million Cubic Feet		
ACADIA (1)	86.6	14.2	72.4
ASCENSION	122.4	28.4	94.0
ASSUMPTION	308.0	142.9	165.1
CALCASIEU	139.3	77.4	61.9
EAST BATON ROUGE	87.5	13.5	74.0
IBERIA	125.9	52.9	73.0
IBERVILLE	335.2	76.6	258.6
JEFFERSON DAVIS	84.7	47.9	36.8
LAFOURCHE	251.5	107.3	144.2
LIVINGSTON	399.9	210.5	189.4
ST. CHARLES	71.3	27.9	43.4
ST. JAMES	148.0	52.1	95.9
ST. JOHN	183.6	76.3	107.3
ST. MARTIN	366.6	107.5	259.1
ST. MARY	169.9	61.6	108.3
ST. TAMMANY	412.6	268.0	144.6
TANGIPAHOA	313.7	186.0	127.7
TERREBONNE	180.2	90.4	89.8
WEST BATON ROUGE	92.0	-----	92.0

(1) Includes Cameron, Lafayette, and Vermilion

SOURCE: Forest Statistics for Louisiana Parishes, Earles, 1975.

TABLE III

COMMERCIAL FOREST LAND BY OWNERSHIP CLASS, 1974

Parish	All Ownerships	National Forest	Other Public	Forest Industry	Farmer	Misc. Private
			Thousand Acres			
ACADIA	66.0	....	0.4	....	17.8	47.8
ASCENSION	97.2	....	3.8	....	10.9	82.5
ASSUMPTION	138.6	....	3.4	....	25.5	109.7
CALCASIEU	192.5	....	9.6	60.5	11.4	111.0
EAST BATON ROUGE	106.4	....	3.0	....	38.5	64.9
IBERIA	121.9	....	3.5	....	5.4	113.0
IBERVILLE	279.3	....	4.6	79.8	28.8	166.1
JEFFERSON DAVIS	68.2	....	.1	....	12.8	55.3
LAFOURCHE	178.2	....	1.6	....	33.3	143.3
LIVINGSTON	336.0	....	.9	156.0	23.6	155.5
ST. CHARLES	76.8	....	3.8	....	4.8	68.2
ST. JAMES	85.5	....	.3	....	5.8	79.4
ST. JOHN	99.6	....	.3	....	8.4	90.9
ST. MARTIN	305.5	....	28.9	....	6.6	270.0
ST. MARY	148.5	....	1.5	....	61.1	85.9
ST. TAMMANY	378.2	....	29.1	....	24.4	324.7
TANGIPAHOA	306.0	....	4.6	35.7	55.2	210.5
TERREBONNE	113.4	....	2.0	....	19.1	92.3
VERMILION (1)	23.4	....	(2)	....	....	23.4
WEST BATON ROUGE	62.0	....	.4	31.0	....	30.6

(1) Cameron and Lafayette Included
(2) Negligible

SOURCE: <u>Forest Statistics for Louisiana Parishes</u>, Earles, 1975.

TABLE IV

GROWING STOCK VOLUME OF SOFTWOODS ON COMMERCIAL FOREST LAND BY FOREST TYPE, 1974

Parish	All Types	Longleaf-slash Pine	Loblolly-shortleaf Pine	Oak-pine	Oak-hickory	Oak, gum Cypress	Elm, ash Cottonwood
			Million Cubic Feet				
ACADIA (1)	14.2	.....	6.0	....	1.1	7.1	....
ASCENSION	28.4	.....	9.7	....	.5	18.2	....
ASSUMPTION	142.9	.....	.....	....	....	142.9	....
CALCASIEU	77.4	22.8	23.1	16.7	4.6	10.2	....
EAST BATON ROUGE	13.5	.....	.....	3.5	1.4	7.8	.8
IBERIA	52.9	.....	.....	....	....	49.4	3.5
IBERVILLE	76.6	.....	.....	....	....	70.0	6.6
JEFFERSON DAVIS	47.9	.....	26.7	10.9	2.8	7.5	....
LAFOURCHE	107.3	.....	.....	....	....	107.3	....
LIVINGSTON	210.5	.....	114.7	59.6	1.9	33.0	1.3
ST. CHARLES	27.9	.....	.....	....	....	27.9	....
ST. JAMES	52.1	.....	.....	....	....	52.1	....
ST. JOHN	76.3	.....	.....	....	....	76.3	....
ST. MARTIN	107.5	.....	.....	....	....	88.5	19.0
ST. MARY	61.6	.....	.....	....	....	61.6	....
ST. TAMMANY	268.0	118.3	111.3	10.4	9.6	18.4	....
TANGIPAHOA	186.0	31.4	98.1	19.6	10.7	25.4	.8
TERREBONNE	90.4	.....	.....	....	....	90.4	....

(1) Includes Cameron, Lafayette, and Vermilion

SOURCE: Forest Statistics for Louisiana Parishes, Earles, 1975.

TABLE V

GROWING STOCK VOLUME OF HARDWOODS ON COMMERCIAL FOREST LAND BY FOREST TYPE, 1974

Parish	All Types	Longleaf-slash Pine	Loblolly-shortleaf Pine	Oak-pine	Oak-hickory	Oak, gum Cypress	Elm, ash Cottonwood
	Million Cubic Feet						
ACADIA (1)	72.4	....	.9	....	4.4	67.1	....
ASCENSION	94.0	....	....	....	3.0	91.0	....
ASSUMPTION	165.1	....	....	....	....	165.1	....
CALCASIEU	61.9	....	.8	8.2	14.1	38.8	....
EAST BATON ROUGE	74.0	....	....	3.8	17.1	52.7	.4
IBERIA	73.0	....	....	....	....	51.4	21.6
IBERVILLE	258.6	....	....	....	....	207.7	50.9
JEFFERSON DAVIS	36.8	....	7.3	14.2	4.9	10.4	....
LAFOURCHE	144.2	....	....	....	....	141.5	2.7
LIVINGSTON	189.4	....	4.5	38.6	6.6	138.1	1.6
ST. CHARLES	43.4	....	....	....	....	36.6	6.8
ST. JAMES	95.9	....	....	....	....	95.9	....
ST. JOHN	107.3	....	....	....	....	107.3	....
ST. MARTIN	259.1	....	....	....	2.6	158.1	98.4
ST. MARY	108.3	....	....	....	....	102.6	5.7
ST. TAMMANY	144.6	.5	15.9	6.4	24.1	97.7	....
TANGIPAHOA	127.7	.9	10.9	13.1	26.9	72.6	3.3
TERREBONNE	89.8	....	....	....	....	89.8	....
WEST BATON ROUGE	92.0	....	....	....	....	75.1	16.9

(1) Includes Cameron, Lafayette, and Vermilion

SOURCE: Forest Statistics for Louisiana Parishes, Earles, 1975.

TABLE VI

TIMBER PRODUCTION AND VALUE BY PARISH, 1974

Parish	Saw Timber	Pine Pulpwood	Hardwood Pulpwood	Total Stumpage	Value Delivered To Mill
	Board Feet	Cords	Cords	Dollars	Dollars
ACADIA	4,836,249	11,332	141	373,889	806,354
ASCENSION	260,246	27	1,969	23,524	76,624
ASSUMPTION	617,835	149	955	25,192	74,292
CALCASIEU	20,079,133	45,662	356	1,828,802	3,488,951
CAMERON	0	0	32	85	789
EAST BATON ROUGE	4,947,411	1,220	2,559	345,152	608,460
IBERIA	0	14	9	109	629
IBERVILLE	6,370,847	48	452	226,055	492,910
JEFFERSON	30,191	4	0	1,103	2,404
JEFFERSON DAVIS	4,997,967	11,510	400	434,648	859,298
LAFAYETTE	0	0	8	21	195
LAFOURCHE	1,590,640	0	0	56,070	119,950
LIVINGSTON	72,006,246	62,492	33,225	6,392,366	10,389,306
ORLEANS	94,616	34	16	3,584	8,511
PLAQUEMINES	0	5	6	44	280
ST. JAMES	219,177	217	443	10,195	33,562
ST. JOHN	235,502	0	10	8,328	18,007
ST. MARTIN	3,131,376	77	9	159,028	280,398
ST. MARY	1,505,936	42	18	72,359	131,682
ST. TAMMANY	29,370,459	84,877	3,711	2,614,213	4,457,853
TANGIPAHOA	27,895,312	58,943	13,655	2,504,492	5,192,240
TERREBONNE	2,372,197	49	4	83,925	180,375
VERMILION	0	26	53	298	2,053
WEST BATON ROUGE	2,561,328	6	1,524	94,344	230,786

SOURCE: "Giant Step II Parish Progress Reports," La. Cooperative Extension Service, Cassens and Main, 1974.

TABLE VII

Parish	Firm	Plant Location	Plant Address[2]
	Large Sawmills[1]		
CALCASIEU	Koppers Co., Inc.[3]	DeQuincy	Box 836
	Louisiana Pacific Corp.[3]	DeQuincy	Box 1011
EAST BATON ROUGE	J. & H. Hardwood Lumber Co.[3]	Zachary	Box 339
IBERVILLE	Plaquemine Hardwood Inc.[3]	Plaquemine	Box 701
	A. Wilbert & Sons Industries	Plaquemine	Box 694
ST. MARTIN	South Louisiana Sawmill Co., Inc.	Cade	Box 126
ST. TAMMANY	Jenkins Lumber Co., Inc.[3]	Folsom	Rt. 4, Box 198, Franklinton
TANGIPAHOA	Batson Lumber Co., Inc.[3]	Natalbany	Box 158
	Clemons Bros. Lumber Co., Inc.[3]	Amite	Hwy. 515
	Edward Hines Lumber Co.[3]	Fluker	Box 608, Amite
	Ponchatoula Lumb er Co., Inc.[3]	Ponchatoula	Box 447
	Southern Tupelo Lumber Co., Inc.[3]	Ponchatoula	Box 487
	Tremont Lumber Co.[3]	Ponchatoula	Box 248
TERREBONNE	Taylor Lumber Co.[3]	Gray	Box 1074, Thibodaux
	Small Sawmills[1]		
ACADIA	Esthays Sawmill	Evangeline	
CALCASIEU	Vincent Lumber Co.[3]	Sulphur	Box 411

Parish	Firm	Plant Location	Plant Address[2]
	Small Sawmills[1]		
IBERVILLE	Perkins Door Co.	Maringouin	Box 64826, Baton Rouge
JEFFERSON DAVIS	Varise Conner Mill	Lake Arthur	415 Hwy. 26
	Ulysses Fontenot Jr. Sawmill	Jennings	Star Rt., Box 16
ST. MARTIN	Southwest Timber Co., Inc.	Parks	315 Columbus, St. Martinville
ST. TAMMANY	Crows Sawmill	St. Tammany	Rt. 1, Box 84B, Lacombe
TANGIPAHOA	Doughty Lumber Co.[3]	Roseland	Box 149
	Overland Lumber Co.	Natalbany	Rt. 1, Box 149B, Tickfaw

[1]Output of less than 3 million board feet (small sawmills). [1]Output of 3 million board feet or more (large sawmills).

[2]Office address specified when different from plant location.

[3]Produced chips for sale to pulpmills.

Parish	Firm	Plant Location	Plant Address
	Wood Pulpmills		
EAST BATON ROUGE	Georgia-Pacific Corporation	Port Hudson	
ORLEANS	Southern Johns-Manville Products Corp.	New Orleans	

Parish	Firm	Plant Location	Plant Address[1]	Plant Type[2]
	Veneer Plants			
CALCASIEU	Boise Southern Co.[3]	DeQuincy	Box 2000	P
	General Box Co.[3]	DeQuincy	Box 997	C
IBERIA	Freeman Veneer Co.	Jeanerette	Box 366	O
LIVINGSTON	U. S. Plywood[3]	Holden		P
ST. CHARLES	Trans Match Inc.[3]	Kenner	Box 368	

[1]Office address specified when different from plant location.

[2]C = Plants producing chiefly container veneer.
O = Plants producing chiefly commercial and other hardwood veneer.
P = Plants producing southern pine plywood.

[3]Produces chips for sale to pulpmills.

Parish	Firm	Plant Location	Plant Address[1]
	Post, Pole, and Piling Plants		
ACADIA	Evr-Wood Treating Co., Inc.	Jennings	Box 726
CALCASIEU	Boise Southern Co.	DeQuincy	Box 2000
	McLeod Bros.	DeQuincy	Box 1055
ORLEANS	E. G. Boh Forest Products, Inc.	New Orleans	Box 19611

Parish	Firm	Plant: Location	Plant: Address[1]
	Post, Pole, and Piling Plants		
ST. TAMMANY	Madisonville Creosote Works, Inc.	Madisonville	Box 125
	Pearl River Wood Preserving Corp.	Pearl River	Box 468
TANGIPAHOA	Maurin Lumber & Wood Preserving Co.	Hammond	Box 1412
	Oliver Treated Products Co.	Hammond	Box 640
	R & K Creosoting Co.	Natalbany	Box 650

[1]Office address specified when different from plant location.

	Miscellaneous Plants		
LIVINGSTON	B & H Construction[1]	Holden	Box 7

[1]Log cabin logs.

SOURCE: Louisiana Forest Industries, 1973.

TABLE VIII

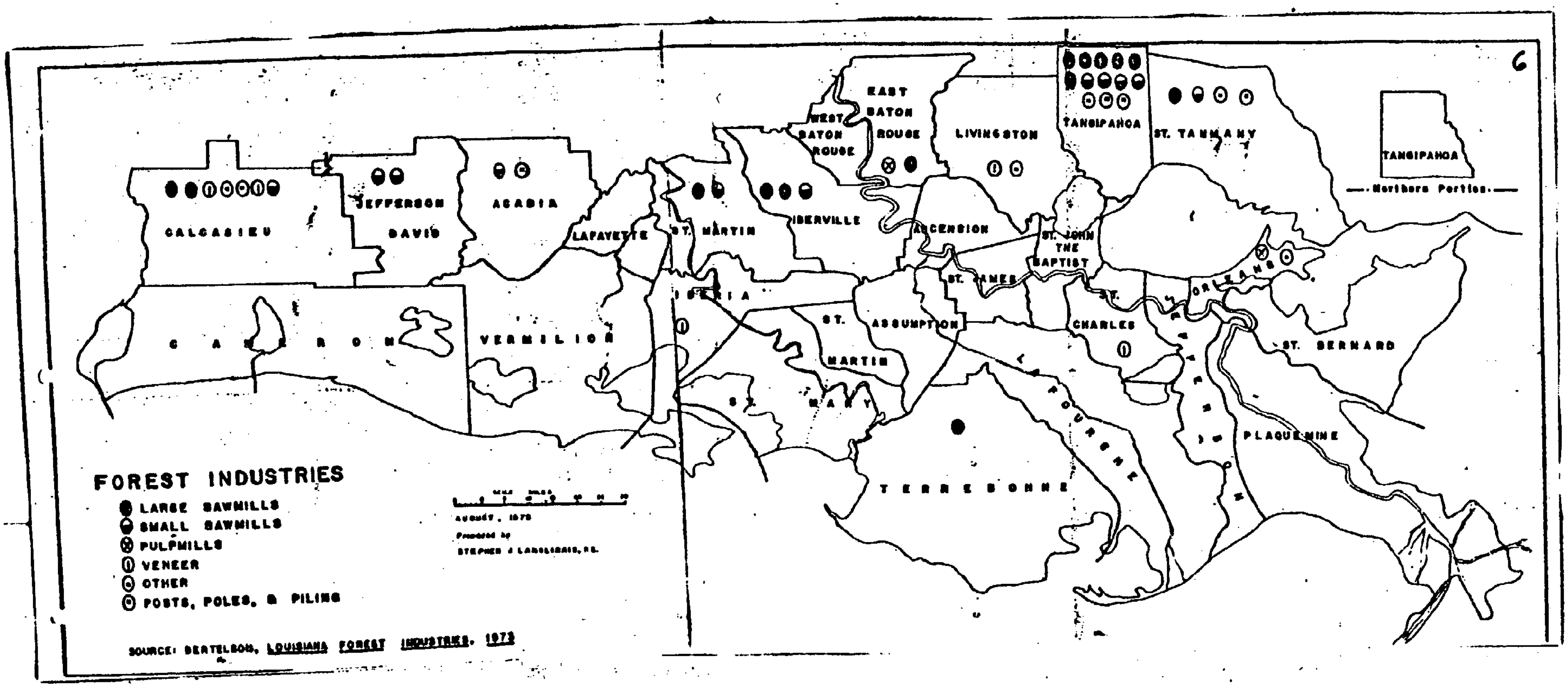
ACREAGE IN BOTTOMLAND HARDWOODS AT VARIOUS PERIODS FOR SOUTH LOUISIANA PARISHES

Parish	Original Area* (1)	Acreage Remaining 1961	1964	1968	Average Cleared By Year 1962-68	Acreage Remaining, 1985
ACADIA	33,178	49,500	49,500	38,950	1,507	13,331
ASCENSION	186,314	92,325	91,500	90,180	306	84,978
ASSUMPTION	221,380	143,800	143,000	142,426	196	139,094
EAST BATON ROUGE	258,259	53,900	53,900	48,050	835	33,855
IBERIA	233,499	115,000	115,000	114,040	137	111,711
IBERVILLE	394,182	281,025	280,800	275,030	856	260,478
LAFAYETTE	130,521	14,100	14,100	13,945	22	13,571
LAFOURCHE	138,240	156,500	156,000	155,875	89	154,362
LIVINGSTON	133,632	123,200	123,200	119,117	583	109,206
PLAQUEMINES	58,061	5,908	3,908	2,858	435	0
ST. BERNARD	25,805	13,758	13,538	13,288	67	12,149
ST. CHARLES	95,846	69,150	68,800	68,000	145	65,535
ST. JAMES	158,544	86,275	85,500	85,170	157	82,501
ST. JOHN	109,891	93,870	93,800	93,590	40	92,910
ST. MARTIN	453,703	325,000	310,000	307,000	2,571	263,293
ST. MARY	197,039	143,400	143,000	142,285	159	139,582
ST. TAMMANY	3,686	131,480	131,100	127,133	621	116,576
TANGIPAHOA	87,552	86,400	86,400	82,600	542	73,386
TERREBONNE	204,595	122,935	122,400	120,997	276	116,305
WEST BATON ROUGE	127,358	70,950	69,300	63,800	1,021	46,443

(1) Before Extensive Alteration By Man

*Lytle & Sturgis, 1962, General Soil Areas and Associated Soil Series Group of Louisiana.

SOURCE: Yancey, Richard K., The Vanishing Delta Hardwoods, 1969.


6
FOREST INDUSTRIES
LARGE SAWMILLS
SMALL SAWMILLS
PULPMILLS
VENEER
OTHER
POSTS, POLES, & PILING
SOURCE: BERTELSON, LOUISIANA FOREST INDUSTRIES, 1973
AUGUST, 1975
Prepared by
STEPHEN J. LANGLINAIS, P.E.
CALCASIEU
JEFFERSON DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
IBERVILLE
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
TANGIPAHOA
Northern Portion
CAMERON
VERMILION
IBERIA
ST. MARY
ST. MARTIN
ASSUMPTION
ASCENSION
ST. JAMES
ST. JOHN THE BAPTIST
ST. CHARLES
ORLEANS
ST. BERNARD
PLAQUEMINE
JEFFERSON
LAFOURCHE
TERREBONNE

SECTION III

AGRICULTURE AND FORESTRY IN LOUISIANA'S COASTAL ZONE: A STUDY OF ECONOMIC GROWTH AND SIGNIFICANCE

By Dave Manuel

Department of Economics
University of Southwestern Louisiana
Lafayette, Louisiana 70501

TABLE OF CONTENTS

Chapter	Title
1	The Allocation of Agriculture in the Coastal Zone
2	Trends of Agricultural Economics in the Coastal Zone
3	Forestry Production in the Coastal Zone

THE ALLOCATION OF AGRICULTURE IN THE COASTAL ZONE

Land area in Louisiana's coastal zone has decreased slightly from 1934 to 1969. This decrease, while not great, resulted in a net decrease probably due to soil erosion, mostly in the lower Mississippi River area. In 1934, there were 11.38 million acres in the 26 parishes of the coastal zone. This total acreage represented 39.2 percent of the state's total acreage. The coastal zone's share of total land area declined to 37.8 percent by 1969. Data reported by the Census Bureau on land area reflects political changes in boundaries or actual changes in land area caused by changes in the number or size of reservoirs, lakes, and streams.[1] It is anticipated that the building of reservoirs and river-widening activities have led to this net decline in total acreage.

With the perspective of the amount of land within the coastal zone, it is interesting to determine and compare the amount of land in farms within the entire state and the coastal zone. The amount of acreage defined as "land in farms" consists primarily of agricultural land used for crops and pasture. Included is land not actually under cultivation nor used as pastureland, such as woodland, unless such land was used for nonagricultural purposes.[2]

---

[1] U.S. Department of Commerce, Bureau of the Census, <u>United States Census of Agriculture, 1964</u>, A1.

[2] Ibid., A1.

Since 1934, total land in farms in Louisiana has declined 655,600 acres or 6.3 percent. Within the coastal zone, such acreage increased 303,000 acres or 9.5 percent. The decline in the non-coastal zone area was apparently large enough to cause a net decline in farmland for the entire state. Farmland area as a percent of total area reached its peak in 1954, 39.6 percent. It had increased from 34.5 percent in 1939 and since 1954, has declined to 34 percent. In the coastal zone, a peak proportion of 36.8 percent was also reached in 1954. Since that year, however, it has declined to 32 percent of the 26-parish area.

Following national trends, the number of farms in Louisiana and in the coastal zone have decreased drastically. Since 1934, Louisiana's farms have declined 75 percent. The decrease in the coastal zone was large, 67 percent, but not as great as that of the entire state. Coastal zone farms fell in number from 40,595 in 1934 to 13,397 in 1969. As a percent of the total state farms, the coastal zone's share has steadily increased. In 1934, 23.8 percent of Louisiana's farms were in the 26-parish coastal zone. Due to the slower decrease in the coastal zone, its share of total farms increased to 32 percent in 1969.

Coupled with the drastic decline in the number of farms, there has been an interesting development in average farm size. Technology, mechanization, and a changing labor forse have accounted for larger farms, offsetting the effect of fewer farms. In 1934, the average Louisiana farm was 61 acres and within the coastal zone, the average size was 93 acres. Of every five years in which the Census of

Agriculture was taken, Louisiana's farm size increased an average of 21.3 percent or just over four percent per year. For the five-year intervals, the coastal zone farm size increased an average of 18.5 percent or slightly less than 4 percent per year. These latter farms were larger than the state average, tending to make growth somewhat slower. In 1969, the average within the coastal area was 301.3 acres per farm compared to 231.5 acres per farm for the entire state. In summary, average farm acreage in Louisiana increased 277 percent since 1934, while in the coastal zone, average acreage increased 222 percent.

PARISH-BY-PARISH ANALYSIS

Acadia Parish

Acadia parish's total acreage in 1969, 424,000 acres, represented 3.9 percent of the total coastal zone. This area increased only slightly since 1934, 10,000 acres. This Southwest Louisiana parish increased the number of acres in farms by 8 percent, a small increase when most parishes experienced declines. In 1934, Acadia's farmland totalled 305,000 acres. Through 1964, total farm acreage increased to 349,255; however, by 1969, it had declined to 335,630 acres.

In relation to the entire coastal farmland, Acadia exhibited little change. It represented 9.6 percent of coastal farm acreage in 1934 and 9.5 percent in 1969. Acadia parish's proportion of farmland was considerably higher than both the state and the coastal zone parishes. In 1934, 28 percent of the coastal zone was in farmland compared to 73.6 percent for Acadia parish. This parish's proportion increased to 79.1 percent in 1969, to rank second in the coastal zone.

Acadia parish has mostly a rural population, living in small towns and villages. The two largest cities, Crowley and Rayne, are located in close proximity and the absence of coastal marshlands itself strongly to farming development. The parish's increase in farming acreage-to-total acreage peaked in 1964 with 82.4 percent. The decline since 1964 to 79.1 percent is probably a function of residential and suburban encroachment.

Farms numbered 3850 in 1934 within Acadia parish. The number declined steadily to 1453 in 1969, a 62.2 percent drop. This decline was slightly less than the 66 percent drop in the 26-parish coastal zone. Nevertheless, Acadia was among the five parishes in 1969 with more than 1,000 farms. In 1934, Acadia's 3,850 farms represented 9 percent of the coastal zone total; however, by 1969, the ratio had increased to 10.8 percent due to the greater decline in the 26 coastal parishes.

Due to the lack of a large metropolitan area and many other factors, average farm size increased in Acadia parish dramatically. Over the years 1934-1969, average acreage increased 191 percent compared to 222 percent in the coastal area. The slower rise in Acadia may have been due to the large number of farms; i.e. many smaller farms on a relative basis. Acreage increases were, however, slow prior to 1954; after 1954, the average farm in Acadia parish more than doubled in size, from 103.8 acres in 1954 to 230.9 acres in 1969.

Ascension Parish

One of the smallest parishes in Louisiana and in the coastal zone is Ascension. Its 192,600 acres represents slightly less than two percent of the coastal area. The amount of land in farms within this parish's boundaries declined 22 percent between 1934 and 1969. Much of this is due to the intensity of swamplands along the western edge of Ascension and, the industrial and strip development along highways 61 and U.S. 90. Acreage increased from 85,000 in 1934 to 112,000 in 1949. Since 1949, farm acreage declined to just over 64,000 in 1969, or two percent of total coastal farming acres. In 1949, Ascension parish contained three percent of the coastal farmland; therefore, its decline since then has been minor.

Early agriculture development after the Great Depression exhibited an increasing proportion of total land area in farms. It peaked in 1949 with 58.7 percent so allocated; however, in 1969, 33.4 percent of Ascension's area was classified as farmland by the Census Bureau. The number of farms in Ascension parish decreased 79 percent over the relevant years, from 1415 to 293. This decline was faster than both the state and coastal zone decreased.

Average farm size increased from 60.3 acres in 1934 to 218.8 acres in 1969. Coastal zone increase of 222 percent in average farm size was slower than that in Ascension parish; nevertheless, average size in Ascension was smaller than both the state and coastal zone.

Assumption Parish

Assumption parish, approximately 3 percent of the coastal land area, is one of rich soils and extensive sugar cane farming. Since 1934, its farmland acreage has declined by 16.4 percent. The peak year, 1949, resulted in 101,845 acres devoted to farming. Such acreage has since declined to 84,743 in 1969. In 1969, this represented 2.4 percent of coastal farming acreage in Louisiana, down from 3.2 percent in 1934. The extensive decline in farm acreage in Assumption was counter to the 9.5 percent increase in such acreage in the coastal zone of Louisiana.

The percentage of Assumption's total area in farms exhibited interesting changes. From 1934 to 1949, farm acreage-to-total acreage increased from 32.7 percent to 44.5 percent. In 1969, just over 37 percent of this parish was classified as farming.

The number of farms in Assumption parish increased slightly from 1934 to 1939, however, the peak of 551 in 1939 led to a continual decline to 194 in 1969, a drop of 54.1 percent. This drop was not as severe as that of the state or the coastal zone, but it did constitute a significant decline.

On a relative scale, farms in Assumption parish have been quite large. Prior to 1949, its average farm size was greater than most within the coastal zone. Probably due to the Depression, most farms fell in size as many took public works jobs and moved to larger urban areas; i.e. Baton Rouge and New Orleans. Since 1939, farms have increased, on the average in Assumption parish, from 170 acres to 437 acres in 1969, an increase of 157 percent. While other parishes made larger gains in farm size, Assumption was beginning from a larger base, showing a smaller percentage increase. The coastal zone's average farm increased from 93 acres in 1934 to 301 acres in 1969.

Larger farm size in Assumption is probably due to large plantations which have accumulated more farmland as smaller, marginal farms were abandoned.

Calcasieu Parish

Calcasieu parish ranks as one of the five largest parishes in Louisiana's coastal zone. Located on the western tip of Louisiana, it has traditionally been a leader in cattle farming and rice cultivation. Its land area of 707,000 acres represents 6.5 percent of the coastal zone.

In terms of farmland area, Calcasieu experienced an increase in acreage. From 1934 to 1969, acreage increased 78.8 percent or almost 178,000 acres. The latest year of data, 1969, showed 403,000 acres classified as being in farms. However, this was 125,000 fewer acres than in 1964. This parish has experienced an extensive amount of urban and suburban growth which may have caused such a drastic decline. In addition, the accompanying highways (federal and state) needed to handle the sprawl of the population contributed to this decline in farm acreage. Nevertheless, Calcasieu increased its proportion of coastal zone farmland from 7 percent in 1934 to 12 percent in 1969. Its large land mass should account for this increase, given that farmland within the coastal zone increased only 9.5 percent.

Farm acreage as a percent of Calcasieu's total acreage has shown interesting trends. Between 1934 and 1944, this proportion declined from 32.5 percent to 28.2 percent. A dramatic increase to 56.8 percent in 1949 may be due to collection procedures, but data following 1949 exhibit similar increases. In 1964, almost 75 percent of Calcasieu's area was classified as being in farms. All years' proportion of farm acreage to total acreage were greater in Calcasieu than in the coastal zone.

The decline in the number of farms in the coastal zone was slightly higher than in Calcasieu which had a 61.2 percent decrease. There was a steady decline in Calcasieu farms from 1931 in 1934 to 739 in 1969. This decline was accompanied by an increase in average farm size from 117 acres in 1934 to 546 acres in 1969. The coastal increase from 93 acres to 301 acres over the same years was considerably less than the 367 percent increase in Calcasieu. In the western segment of Louisiana, large rice farms are the norm and obviously, Calcasieu is no exception.

Cameron Parish

Cameron parish is the largest parish in Louisiana. Its 922 thousand acres represent 8.5 percent of the coastal zone's land area; however, it is one of the most sparsely populated. The amount of land area in farms increased by 158,000 acres since 1934 or 122 percent. There was a decrease in acreage in 1959; however, steady increases since then have resulted. It is more interesting that in relation to the coastal zone, Cameron had only 4.1 percent of farmland, yet in 1969, this percentage increased to 8.2 percent.

As a percent of its own total area, Cameron's farmlands increased from 7.8 percent in 1939 to 31.1 percent in 1969. This development is likely due to a significant amount of drainage of wetlands and the incorporation of marginal lands into farms which had only highly productive land. Few major projects in Cameron parish as well as a minor population problem have contributed to this farmland increase over the last 40 years.

Farms in Cameron parish have decreased in number, but not as dramatically as in Calcasieu or as in the entire coastal zone. From 1934 to 1969, the number of farms fell from 892 to 423, or 52.5 percent. Due to its slower decline in the number of farms, Cameron's share of coastal zone farms rose to 3.1 percent, a one percent gain. Size growth is comparable to Calcasieu, approximately 368 percent. In 1934, the average farm was 145 acres in Cameron. Cameron did not have the highest average due to the central and eastern parishes' sugar cane plantations. By 1969, Cameron had the highest average of 679 acres per farm. This was due primarily to the growth of rice farming and the resulting marshland drainage.

East Baton Rouge Parish

East Baton Rouge parish, one of the most highly populated in Louisiana, averages about 295,000 acres in area. This represents approximately 2.7 percent of the coastal zone. Its port and industrial activity have grown significantly since 1945, particularly along the parish's river boundary.

Farmland reached its peak in 1954 with 185,322 acres classified as being in farms. Since 1954, such acreage has declined steadily, averaging a 1.6 percent decline each year. In 1969, total farm acreage was 133,500 in East Baton Rouge. Expanding industrial base and an over-growing need for residential land forced this rapid decline in farm acreage. As a percent of coastal farmland, East Baton Rouge fell from 4.8 percent of total acreage in 1954 to 3.8 percent in 1969.

The greater portion of East Baton Rouge's farmland was concentrated in the eastern segment of the parish. Despite the large decreases in total farm acreage, as a percent of its total acreage, total farmland declined from 62.7 percent in 1954 to 45.4 percent in 1969. From 1939 to 1954, such acreage increased from 51.4 percent to 62.7. The proportion of East Baton Rouge's land devoted to farming was significantly greater than both the coastal zone and the entire state.

Total farms in East Baton Rouge have fallen from 2557 in 1934 to 675 in 1969, a 73.6 percent decline. This decrease was slightly less than that for the entire state and seven percentage points higher than the coastal zone's decline. In 1934, East Baton Rouge had 6.3 percent of the coastal area's farms; but in 1969, only five percent were so located. The increased industrial development of the parish were obviously a contributing factor.

Farm size in East Baton Rouge parish increased 204.6 percent, from 64.9 acres in 1934 to 197.7 acres in 1969. This increase was not as rapid as in the coastal zone or in the entire state, probably because of the alternative uses for land--city expansion, industrial development, malls, shopping centers, and the growth of suburbia.

Iberia Parish

Iberia parish, are of the southernmost of the coastal zone encompasses 337,000 acres. It is bordered by Vermilion Bay on the south and St. Martin parish and the Atchafalaya Basin on the north-eastern portion. The land area of Iberia parish is approximately 3.5 percent of the coastal 10,874,800 acres.

Farmland acreage in Iberia parish vascillated from 1934 to 1959. In that 25-year interval, it increased almost seven percent, from 130,379 acres to 138,846. However, since 1959, it has declined slightly to 131,000. In its peak year, 1959, Iberia's farmland was 3.8 percent of the coastal zone total. This represents a slight decline from 4.0 percent in 1934.

Much of Iberia parish's land is wetland. Industrial activity is beginning to increase, but is probably another five to ten years from full capacity. As a result, farming is a strong element in the local economy. The allocation of Iberia's land in farming has represented about 35 percent since 1934. This allocation is just slightly more than that for the entire coastal zone.

The number of farms in Iberia have decreased steadily since the Great Depression. 1934, the highest year, saw 1538 farms and the number had fallen to 286 by 1969. Such a decline is somewhat significant since four percent of the coastal farms were Iberia farms in 1934, whereas only two percent were so located in 1969.

Average farm size increased in Iberia, but certainly not as fast as in the entire state or the coastal zone. The total increase of 161 percent resulted in an average size increase from 85 acres to 221.2 acres. While there are a number of large sugar plantations in Iberia parish, there remain many relatively small farms. It is interesting to note from Table V that the average farm size increased from 1934 through 1964; but, little growth in size resulted in 1969.

Iberville Parish

The extreme western tip of Iberville parish is mostly marsh and swampland. This area is part of the Atchafalaya Floodway and Basin while the eastern area is split by the Mississippi River. Encompassing slightly more than 400,000 acres, Iberville is a narrow parish. In comparable size, it is virtually the mean of the coastal zone's parishes in Louisiana.

Farmland in Iberville parish increased from 103,662 acres in 1934 to 134,561 in 1954, a 30 percent increase. Since 1954, acreage declined to 122,340 or 9 percent. Overall, it has increased 18 percent over the 35 years in question. The peak year of 1954 represented 33 of Iberville's land area and the resulting decrease was to 30 percent. This farmland allocation was slightly less than the coastal zone's allocation and is probably due to the increased business and industrial development which occurred along the Mississippi River.

The number of farms in Iberville parish have declined from 923 in 1934 to 236 in 1969, a 69 percent drop. This decrease is higher than the decrease in the coastal zone, yet less than that for the state. On the other hand, average acreage per farm increased a healthy 282 percent per year, from 112 acres in 1934 to 428 in 1969. In this latter year, Iberville's farms were among the largest in the coastal zone.

Jefferson Parish

Jefferson parish, long an integral part of metropolitan New Orleans, has undergone many dynamic changes in the past 36 years. Its area of 236,000 acres is relatively small when compared to the rest of the coastal zone and despite this limitation, its northern half is extremely productive.

From 1934 to 1949, farmland in Jefferson parish increased 295 percent, yet there were still only 31,000 acres in farms. Since 1949, such land has decreased 72 percent to 9,000 acres in 1969. The lower part of Jefferson is mostly swampland, so that the industrialization in the northern segment obviously pushed farming out. Much of Jefferson has developed into residential areas, particularly between U. S. Highway 90 and Lake Pontchartrain. As a result, only minor areas of Jefferson are in farming, about four percent in 1969. In 1949, farming share was 12 percent.

The number of farms have declined in Jefferson parish from 413 in 1934 to 54 in 1969. Such few farms comes as no surprise since such a large area of this parish is marshland. Average farm size is among the lowest quintile, 165 acres in 1969 and 19 acres in 1934. Industrial expansion and its accompanying developments have all contributed to the minor role of farming in Jefferson parish.

Jefferson Davis Parish

Of the three most western parishes in the coastal zone, Calcasieu, Cameron, and Jeff Davis, the last is the smallest. Its land area of 401,000 acres represents almost four percent of the coastal zone. Jeff Davis, however, has little marshland and is characterized by an extensive degree of agriculture. From 1934 to 1949, Jeff Davis' agricultural land increased 13.8 percent, from 309,000 acres to 352,000 acres. Since 1949, however, such land has increased only four percent, to 365,769 acres in 1969. Jeff Davis' share of coastal farmland was 11 percent in 1969 which represented a small increase since 1949.

The proportion of farmland in Jeff Davis parish has increased from 64.3 percent in 1934 to 86.3 percent in 1969. Such a large share in this parish is far greater than in either the entire state or the coastal zone. Along with Acadia parish, Jeff Davis had the highest proportion of any of the coastal parishes. The number of farms in Jeff Davis parish decreased 49 percent over the above 35-year period, a loss of 857 farms. However, proportionately, more coastal zone farms were located in this parish in 1969 than in 1934.

The occurrence of relatively more farms in Jeff Davis parish is probably a natural occurrence because of its extensive size and the availability of land. In addition, there have been only minor changes in city size in the parish. Increases in average farm size have not been as great in Jeff Davis. In 1934, its average farm size was 176 acres compared to the coastal zone average of 93 acres. Over 35 years, its increased in size to 408 acres, or 132 percent while the average coastal farm increased 222 percent.

Lafayette Parish

Lafayette parish is one of the six smallest of the coastal zone parishes, having less than 200,000 acres. Farmland in Lafayette parish, however, is quite extensive. While such acreage decreased from 155,000 acres in 1934 to 136,450 in 1969, the decrease was minor, 11 percent. Of the parishes which experienced a decline in acreage, Lafayette's somewhat smaller than average.

In 1934, 75 percent of Lafayette parish was devoted to farming. This percentage increased to 78 percent in 1959; however, it declined to 75 percent in 1969. Over the long term there has been only a slight change in agriculture's share of Lafayette parish land.

Growth of the City of Lafayette has undoubtedly encroached on farmlands in the parish, but formerly idle land was probably employed to compensate for the loss. The net gain was minor since farmland declined by approximately 20,000 acres in the 35 years in question.

In the early years after the Great Depression, Lafayette had a disproportionately large number of farms: 3677 in 1934, 3441 in 1939, and 3152 in 1944. Their number declined 60.5 percent from 1934 through 1969 to 1452 in the latter year. One would assume, therefore, that given the large number of farmers and the relatively small area of the parish, that Lafayette's farms are small. Indeed, the data indicate that aside for Livingston and Orleans parishes, Lafayette had the smallest farms. The average size in 1934 was 42 acres. Farm size increased fairly consistently to 94 acres in 1969. It will be illustrated later that Lafayette parish's continued growth does not lie in the area of agriculture.

Lafourche Parish

Lafourche parish, one of the southern-most of the coastal zone, ranks among the five largest in coastal area. Agriculture is an important part of this parish's economy, however, a large part of the parish is marshland. Lafourche's area represents almost seven percent of the coastal zone.

Farmland in Lafourche parish decreased only seven percent in the period 1934-1969. Acreage in farms increased through 1949; however, since that year, it has declined to 204,629 acres in 1969. Much of this decline was caused by substantial industrial growth in the parish as well as significant urban sprawl in Thibodaux.

the southernmost area along state highway 1 has experienced much growth, particularly in the Grand Isle, Golden Meadow, and Leesville areas. In any case, Lafourche's share of coastal farmland decreased from 6.7 percent in 1949 to 5.9 percent in 1949.

Approximately 30 percent of Lafourche's land was devoted to agriculture purposes. Specifically, in 1934, 34 percent was so classified; however, by 1969, this had declined to 28 percent. While the coastal zone's allocation of farmland increased from 28 percent in 1934 to 37 percent in 1954, Lafourche showed a decline. From 1954 to 1969, Lafourche's allocation of farmland declined faster than that of the entire coastal zone.

The number of farms (primarily sugar cane) in Lafourche parish declined 58 percent from 1934 to 1969. This represented a loss of 703 farms from 1222 to 413. Such a rate of decrease is less than both the state's total decrease and the decrease with the coastal zone. Due to the relatively large number of plantations, farm size increased 120 percent over the 35 years in question. This increase is slower than the remaining coastal area parishes as a whole. Average farm size in the pre-World War II years in Lafourche was large compared to other parishes. Hindering further farm growth were two factors -- a growing city, Thibodaux, and vast wetlands in the southern half of the state.

Livingston Parish

Livingston parish is primarily a rural parish with a mixture of agriculture and forestry activities contributing to a local area. The parish is segmented by U. S. Interstate 12 connected to I-55 and Baton Rouge. In 1970, 75 percent of its population were classified as rural non-farm, confirming that most of its residents have small local businesses or commute to Baton Rouge to pursue their employment. A considerable amount of the land is in forestry and forestry income is obviously a large contributor to the economic structure.

Livingston's land area of 418,000 acres in 1969 was slightly less than previous years' studies. This is probably the result of massive highway expropriation and some loss of land due to erosion along the parishes many bayous. Farmland acreage illustrated extensive declines in the 35 years, from 101,000 acres in 1934 to 44,864 in 1969. Since much of this land had standing timber, the cost of clearing for agricultural purposes was probably a deterent. Rather than clear stumps for farming, most landowners simply cut the timber for sale and did not clear. As a result, the highest proportion of land in farms in Livingston was 24 percent in 1954. Such lands had increased from 19.5 percent in 1934; however, since 1954, farmland has declined to 11 percent in 1969.

Despite the small allocation of farmland in Livingston parish, there were many farmers. There were only minor declines in their number between 1934 and 1954. (See Table IV) Since 1954, the number of farms fell from 2585 to 489 in 1967, an 81 percent decrease. Average farm size reflects the lack of available farmland in Livingston parish. From 1934 to 1964, average size increased from 39 acres to 43 acres. In 1969, average acreage was 92 per farm.

Orleans Parish

Orleans parish is one of the two smallest parishes in Louisiana's coastal zone. Its size of 127,000 acres is slightly smaller than that of West Baton Rouge. Despite its physical size, Orleans is densely populated, comprising most of metropolitan New Orleans. The predominence of port activities, service industries, and manufacturing virtually preclude the existence of farming activities. As a result, Orleans parish has rarely had more than 10,000 acres in farms.

In 1959, six percent of Orleans parish was in farming. After 1959, the Bureau of the Census discontinued reporting data for Orleans in order not to reveal figures on individual farms. Between 1934 and 1959, the number of farms declined from 312 to 69. Average farm size, on the other hand, changed from 1934 to 1954, an increase from 26 acres to 109. In 1959, the average size declined to 29 acres, probably due to the increase in residential areas and industrial expansion throughout the 1960's.

Plaquemines Parish

Plaquemines parish is one of five largest parishes in the coastal zone of Louisiana. Comprising most of the far-south eastern tip of

Louisiana, Plaquemines' 660,000 acres is mostly marshland. Farmland has increased slightly since 1934, making a significant gain up to 1949. Between 1934 and 1949, farm acreage increased 130 percent; since 1949, acreage in farms has declined 47 percent to 31,691 acres in 1969.

Due to the extensive amount of marshland, Plaquemines obviously has devoted a relatively small part of its land to farming. In 1934, 7.3 percent was so allocated. This figure had increased to 9.6 percent by 1949, and has since dropped to 4.8 percent in 1969.

Since 1934, the number of farms has dropped 85 percent, from 704 to 111 in 1969. The most dramatic declines occurred after 1954. This could be due to the massive industrialization occurring in Orleans, Jefferson, and St. Bernard parishes. Some spillover in employment has likely occurred in Plaquemines.

Despite the few farmers and little farmland available, farm sizes increased quite substantially. In 1934, the average farm in Plaquemines was 37 acres. By 1954 and 1959, size had increased to 94 acres. The greatest gains came after 1959, so that average size in 1967 was 286 acres, more than the coastal zone average and the state average.

St. Bernard Parish

St. Bernard parish is the most eastern of the coastal parishes. Its extensive marshlands are bordered by Plaquemines parish, Lake Borgne, and numerous eastern sounds. The western portion of the parish is highly populated since it borders Orleans parish and provides large residential areas. The somewhat average size of St. Bernard parish represents approximately three percent of the coastal zone.

Due to the extensive marshland, St. Bernard's farmland in 1969 was only 7,112 acres in 1969. This acreage was 39 percent less than the farm acreage in 1934. Peak agriculture acreage was 22,000 in 1954. In this peak year, seven percent of St. Bernard's area was allocated to farming. Agriculture's allocation was 2.2 percent in 1969. Obviously residential and industrial encroachment aided in this decline.

Farmers in St. Bernard have never been very numerous. This is understandable since the lack of arable land and urban growth have not made agriculture particularly attractive. There were only 27 individuals so classified in 1969. By this latter year, average farm size had increased to 263 acres per farm. The state average was 277 per farm in 1969, while the coastal zone average was 222 acres.

St. Charles Parish

St. Charles' 188,000 acres in 1969 represented almost two percent of the coastal zone. Interestingly, it had less than one percent of the farmland in the coastal zone in that year, 33,600 acres. Farming acreage reached its peak in 1954 with 64,400 acres, 145 percent more than in 1934. Since the late 1940's, St. Charles has experienced great industrial growth, especially along the Mississippi River. Additionally, there has been some residential and service industry spillover from Jefferson Parish. All of these factors would account for the decline in acreage in farms.

In the peak year spoken of earlier, 1954, St. Charles devoted 33 percent of its land to agriculture. Since that year, it has declined to 17.8 percent in 1969. The coastal zone's allocation was considerably higher than that in St. Charles.

Average farm size in St. Charles increased from 80 acres in 1934 to 400 acres in 1954 and 1959. A dramatic increase to 507 acres was registered in 1964; however, average size declined to 274 acres in 1969. The net gain was not as great as that in the rest of the coastal zone due to competing alternatives for land in this river parish.

St. James Parish

St. James parish is another of the parishes bisected by the Mississippi River. The 162,000 acres of St. James represent almost 1.5 percent of the coastal zone. Land in farms increased from 61,000 in 1934 to 70,000 in 1954. Since 1954, there has been a decline to 57,000 in 1969. St. James' percentage share of coastal farmland has changed little over the years, remaining about 1.7 percent.

St. James' allocation of farmland has followed state and coastal trends quite closely. In 1934, 36 percent of the parish was in farms, compared to 35 percent for the state and 29 percent for the coastal zone. The coastal farm allocation increased to 37 percent by 1954 and the state's to 40 percent, while St. James increased to 44 percent.

After 1954, farmland as a percent of total area declined to 35 percent in St. James parish for 1969. The coastal zone's share declined to 32 percent and that for the entire state fell to 34 percent.

Almost two percent of the coastal area's farmers in 1934 were located in St. James parish. By 1969, their number had fallen to one percent. In the former year, this represented 675 farmers; however, by 1969, their number in St. James had declined to 145. The decline in St. James of 78.5 percent was greater than the decline in the entire state or the coastal zone.

Average farm size increased much more dramatically in St. James than in most parishes, from 90 acres in 1934 to 395 in 1969. There has been only a minor amount of pressure of residential growth and industrial entrance, resulting in only a small decline in agricultural acreage.

St. John the Baptist Parish

St. John the Baptist parish is the second-to-smallest parish in the coastal zone. Its 145,000 acres represent 1.3 percent of the coastal zone. Farmland in the parish decreased to 31,000 and 32,000 acres in 1939 and 1944 from 47,000 acres in 1934. After World War II, such acreage increased to almost 48,000 in 1949. Since 1949, there has been a steady decline in farm acreage, 53 percent, to 22,556 acres in 1969. As a result, St. John's share of coastal farm which was never particularly high, fell to less than one percent in 1969.

As expected from the total acreage data, St. John's percent of farmland peaked on 1949; 33 percent of its area so utilized. Since 1949, such acreage has declined until in 1969, 15.6 percent of the total area was in farmland. Only in 1949 was St. John's percent of farmland comparable to that of the coastal zone. Much of this development is due to the encroachment on the northeastern bank of the Mississippi River by major industries. Interstate Highway 10 has also probably reduced the amount of available farmland. Alternative land uses have obviously bid upward the value of land in St. John parish, so that agricultural uses have been superseded by urban, industrial, and residential uses.

St. John parish has never had a large number of farmers. In 1934, they numbered 305. The decline to 47 in 1969 was erratic, some years experiencing sharp gains. Since the 1934 base year, average farm size has increased from 156 acres to 480 in 1969, a 207 percent increase. Due to the few farmers, St. John's average farm was far larger than the state or coastal zone's average farm.

St. Martin Parish

Slightly larger than the average coastal parish, St. Martin parish is almost fifty percent swampland. The Atchafalaya Basin occupies almost all of the eastern half of the parish. However, this parish represents more than four percent of Louisiana's coastal zone.

In 1934, there were more than 108,000 acres in farms in St. Martin parish. By 1954, the acreage had grown to 130,000 or 3.2 percent of coastal farmland. Since 1954, farmland area has declined 23 percent, to 99,532 acres in 1969. St. Martin's percent of farmland averaged 24.4 percent over the 1934-69 period. The highest percentage was 28.2 in 1954. The limited availability of land was obviously an important factor in farmland allocation.

Despite the limited amount of land, St. Martin parish had many farmers. In 1934, they numbered over 2700; however, by 1969, their numbers had declined to 774, a 72 percent decrease. With such limited farmland and such a high number of farmers, average farm size was small. There was a significant increase in size from 1934 to 1969, 228 percent; however, in 1969, the average St. Martin farm was only 129 acres. The only parishes with smaller average farms were Lafayette, Livingston, Orleans, and Tangipahoa.

St. Mary Parish

St. Mary parish, a long-time sugar cane farming area, has developed industrially since 1950. The onslaught of petroleum and gas exploration in the Gulf of Mexico aided greatly in bolstering the local economy. The 400,000 acres of St. Mary represent 3.7 percent of the coastal zone. Interestingly, its land in farms increased 35 percent over the years 1934-1954. Since 1954, farmland has declined from 162,000 acres in 1954 to 121,000 in 1969, virtually the same acreage that existed in 1934. While it is true that technological developments have led to larger farms and has overall farm acreage, the industrial development has also probably been responsible for the sharp decline since 1954.

A natural outcome is the percentage of total acreage devoted to farming in St. Mary parish. The ratio increased to 42 percent in 1954 from 29 percent in 1934. In 1969, 30.4 percent of the parish was in farms. There was never a particularly large number of farms in St. Mary. Its 509 farms in 1934 represented only 1.3 percent of coastal farms. By 1969, they had declined to 216, or 1.6 percent of the coastal area.

Farm size, on the other hand, has been relatively larger due to the many sugar cane plantations. By 1969, the average farm in St. Mary parish had grown to 561 acres, second only to Cameron parish in the coastal zone. The average coastal farm in that year was 311 acres, considerably smaller on a comparable basis.

St. Tammany Parish

Located on the northeastern banks of Lake Ponchartrain, St. Tammany parish is one of the coastal zone's largest parishes. Its 570,000 acres represent more than five percent of Louisiana's coast. The Interstate Highway system has contributed greatly to the development of this parish, particularly in the southern and eastern portions.

Farmland acreage increased from 62,000 in 1934 to 140,700 in 1954, an impressive rise. However, since 1954, such acreage declined 43 percent to 80,200 in 1969. Nevertheless, there has been a net gain of 29 percent over the 35 years in question. The increases in absolute acreage are reflected in the percent of St. Tammany devoted to farming. The respective ratio rose from 11 percent in 1934 to 24 percent in 1954. Since 1954, it has declined to 14.1 percent of the total area. These agriculture allocations were considerably less than that for the coastal zone as a whole.

In the 20 years from 1934 to 1954, the number of farms increased from 1179 to 1405. While this is not a large gain, most of the remaining coastal parishes were experiencing falling numbers. Between 1954 and 1969, farms declined to 526, a 63 percent decrease.

Tangipahoa Parish

Tangipahoa parish is a relatively large parish of 517,000 acres, comprising 4.8 percent of the Louisiana coastal zone. More than 70 percent of the parish is forested, leaving little land for farming. Farmland peaked in 1954 with 215,400 acres in farms. Since 1934, farmland had increased 23 percent, from 175,000 acres. Erratic declines since 1954 resulted in 160,000 acres in farms in 1969. Tangipahoa's share of coastal farmland declined from 5 percent in 1954 to 4 percent in 1969.

The extent of farming in Tangipahoa increased through 1954. Forty-two percent of the land was utilized in agriculture in that year; however, since then, it has declined until 31 percent was in farms in 1969. The number of farmers declined 68 percent over the 35 years studied. Interestingly, Tangipahoa was one of the four parishes with more than 1000 farms in 1969. Only Vermilion had more, 1738. Relatively, 11.3 percent of coastal farms in Louisiana were in Tangipahoa parish. In addition, only three parishes had smaller average farms than Tangipahoa. Its average farm increased from 37 acres in 1934 to 105 acres in 1969, considerably below the state and coastal zone averages.

Terrebonne Parish

Terrebonne parish is the second largest parish in Louisiana's coastal zone, 875,000 acres. Much of the parish, however is marshland, leaving a much smaller area for cultivation and development. Nevertheless, Terrebonne encompasses 8 percent of the coastal zone.

Land in farms declined 29 percent in Terrebonne, from 1934 to 1969. There was little decrease in the 1940's, but after 1954, erratic trends culminated in 100,080 acres classified as farms in 1969. The proportion of land allocated to farms was never higher than 13.9 percent (1964). A 35-year low was in 1969, 11.4 percent. These results are primarily due to the extensive marshlands. Drainage activity in marshlands has probably resulted from industrial growth in the Houma environs.

While agricultural land has not changed as dramatically as in other parishes, the number of farmers in Terrebonne parish has decreased sharply from 1151 in 1934 to 217 in 1969. As a result, average farm size skyrocketed 275 percent, from 123 acres in 1934 to 461 acres in 1969.

Vermilion Parish

Vermilion Parish is the third largest parish in Louisiana's coastal zone. Its area of 771,300 acres is 7.1 percent of the coastal zone. The land in farms in Vermilion increased 25.6 percent from 1934 to 1969; however, most of this increase came before 1949, when land in farms increased 28 percent to 403,227. Since 1949, a slight decline has resulted and 393,113 acres were in farmland in 1969. Some coastal parishes increased farmland more than Vermilion but this was due to Vermilion extensive farmlands at the outset.

Over 40 percent of the parish was in farms in 1934. The allocation increased to 51 percent in 1949 and registered slight declines since that year. By 1967, the ratio was once again 51 percent. These percentages of Vermilion parish in farms were higher than the coastal zone's ratios and with good reason.

Most of Vermilion parish is farmland and marshland. There has been only a minor loss of land to residential and industrial growth, mostly coming in the Abbeville and Intracoastal City areas. The fertility of the land has resulted in an extensive amount of rice farming and to some degree, sugar cane cultivation.

Since 1934, the number of farms have declined 56 percent, from 3959 in the initial year to 1738 in 1969. Of the 26 coastal parishes, Vermilion had the most farms in 1969. On a comparable basis, this parish lost farms at a slower pace than the state or the entire coastal area. Due to the large number of farms, the average farm size in Vermilion was smaller than that of the coastal area. Average size increased from 79 acres in 1934 to 226 acres in 1969 in Vermilion. Coastal zone average farms rose from 93.4 acres to 301 acres over the same time-span.

West Baton Rouge Parish

West Baton Rouge is one of the coastal zone's smallest parishes. Its 130,000 acres across the Mississippi River from East Baton Rouge is slightly more than one percent of the coastal zone. Despite its small size, West Baton Rouge was one of the 13 parishes which increased its land in farms over the 35 years under study. The increase of 16,300 acres, from 39,000 in 1934 to 55,300 in 1969, represents a gain of 42 percent, one of the larger net increases.

The gains in farmland are impressive when seen in relation to total area. In 1934, 28 percent of the parish was in farms. By 1969, the ratio had increased to 43 percent, significantly more than the remaining coastal area in total. The number of farms, however, were never particularly numerous in West Baton Rouge. Only 464 farms were registered in 1934 and after 1954, the number fell 66 percent, from 414 to 141 in 1969.

Since there were relatively few farms, yet a high ratio of farmland to total area, average farm size increased dramatically. In 1934, the average farm in West Baton Rouge was 84 acres. A 366 percent increase resulted in an average size of 392 acres in 1969. This increase was far greater than the state's or the coastal zone's increase.

TRENDS OF AGRICULTURAL ECONOMICS IN THE COASTAL ZONE

A study of the significance of agriculture in Louisiana's coastal zone would not be complete without tracing employment and earnings for the area. This segment first analyzes the data for the entire coastal area and follows with a parish-by-parish analysis. Most of the employment and payroll data was extracted from County Business Patterns which presents data for the first quarter of each year. There was therefore a necessary extrapolation of payrolls to determine annual payrolls. Cyclical change and seasonal unemployment obviously do not surface in the data due to this extrapolation.

From 1954 through 1969, total payroll employees covered by unemployment compensation increased 38 percent in Louisiana, a 2.5 percent annual change. This was an increase of slightly more than 220,000 employees, from 578,206 in 1954 to 797,926 in 1969. The coastal zone increase was almost the same amount in sheer numbers, 221,000 over the 15 years in question. However, percentage-wise, the coastal zone registered almost twice as great a gain, 64 percent. Total employees rose from 347,670 in 1954 to 568,820 in 1969. Due to the larger gain within the coastal area; its share of total employees increased from 60.1 percent in 1954 to 71.3 percent in 1964. The same percentage share was evident in 1969.

Over the fifteen years in question here, retail trade employees increased 46 percent in Louisiana. Within the coastal zone, the increase was 51 percent, from 73,000 in 1954 to 110,312 in 1969. As a percent of the state's retail employees, the coastal area's percent did not fluctuate widely, 66.3 percent in 1954, 68 percent in 1964, and 68.5 percent in 1969.

It is interesting that the state's manufacturing employees did not increase significantly over the 15-year period under study. In fact, in 1954, 151,729 employees were in manufacturing. This number increased 14 percent, to 172,882, in 1969. The coastal zone's increase was even less, 11 percent. Apparently, the remaining 38 parishes in Louisiana experienced greater gains in manufacturing employment. More important, the coastal share of total manufacturing employees did not change until 1969. From 1954 to 1964, the coastal share was approximately 67 percent; but in 1969, the percent dropped to 65.2 percent.

Hired farm workers in Louisiana have been declining steadily, following national trends. From 1954 to 1969, they declined 72 percent, from 53,305 to 14,743. Within the coastal zone, the decline was 77.1 percent, from 30917 in 1954 to 7079 in 1969. The state and coastal zone share of farms workers to total employees was quite close, each registering 9 percent in 1954, declining to approximately one percent in 1969.

An examination of payroll data presents trends which otherwise would not have surfaced. Total payrolls in Louisiana covered by unemployment compensation increased 186 percent from 1954 to 1969. The former year's figure was approximately 1.6 million dollars; however, by 1969, the payrolls had risen to 4.6 million dollars. Coastal zone payrolls in 1954, 63 percent of the state's, were just over 1 million dollars. An increase of 240 percent over the fifteen years in question resulted in an amount of 3.4 million in 1969. By this latter year, the coastal share had increased to 75 percent of the state.

Retail payrolls increased 167 percent from 1954 through 1969 in Louisiana. The coastal zone parishes registered an increase of 180 percent. Due to its larger population and urban centers, the share of state retail payrolls increased from 66.4 percent in the 26-parish area in 1954 to 70 percent in 1969. There has been some levelling off in coastal share since 1959.

Manufacturing payrolls have increased at the same pace for the coastal area and non-coastal area in Louisiana, 155 percent for the fifteen years. Interestingly, the coastal share of state payrolls in manufacturing has declined from a peak of 72.1 percent in 1959 to 69.7 percent in 1969.

Of particular interest to this study is the movement of agricultural payrolls in Louisiana's coastal zone. The data presented here are for workers employed for more than 150 days; therefore, family workers and income to owners are not included. Louisiana's total payroll for hired farm workers was 39.4 million dollars in 1954. Only a minor increase resulted in 1959, but by 1969, payrolls had increased to 56.7 million dollars. The fifteen year increase of 44 percent (2.9 percent annually) was hardly sufficient to compensate for inflationary trends. Louisiana's coastal zone experienced worse increases - 39.6 percent for the 1954-1969 period. The share of farm workers' payrolls vascillated from year to year: 48.6 percent in 1954, 47.7 percent in 1959, 51.6 percent in 1964, and 47.1 percent in 1969.

As a percent of total payrolls, farm labor expenditures were 2.5 percent for all of Louisiana in 1954. Within the coastal zone, the amount was a 1.9 percent share. By 1969, the farm worker payroll was 1.2 percent of the state's total and .9 percent for that of the coastal zone.

An examination of manufacturing and agricultural payrolls is more interesting from a development viewpoint. In 1954, agricultural payrolls were 8.1 percent of manufacturing payrolls in Louisiana, and 5.7 percent in the state's coastal parishes. By 1969, the state's share was 4.6 percent and the coastal share was 3.1 percent. While there was a greater emphasis on manufacturing in the coastal zone, the non-coastal area experienced a much greater decline in the relative ratio. A source of the decline was probably more of a decline in agriculture's importance in the non-coastal area rather than an increase in manufacturing's economic role, e.q. the equal increase in manufacturing payrolls in both geographical sectors.

In order to determine the relative significance of farm income and sales, the market value of agricultural products sold is compared to retail sales. Over the course of the fifteen-year period, state agricultural products' sales increased 60.2 percent, from 309 million dollars in 1954 to 496 million dollars. The coastal area's increased slightly less, 54 percent. It is particularly interesting that the coastal share of agricultural sales increased from 44 percent in 1954 to 45.6 percent in 1959. Since 1959, the coastal share decreased to 43 percent. When viewed as a percent of retail sales, agricultural sales were 9.1 percent in 1954, but declined to 5.9 percent in 1969. Generally speaking, agricultural sales have declined in importance to the economy of the coastal zone.

PARISH-BY-PARISH ANALYSIS

Acadia Parish

Total employees in Acadia parish covered by unemployment compensation increased 28 percent in the fifteen years studied, from 4921 in 1954 to 6301 in 1969. As a percent of the coastal employees, these in Acadia parish declined from 1.4 percent to 1.1 percent respectively. However, Acadia registered a 54 percent increase in manufacturing employees, a much larger gain than the state and the coastal area parishes. Retail trade employees declined slightly, from 1707 in 1954 to 1668 in 1969. Hired farm workers declined 89 percent, from more than 4400 in 1954 to 481 in 1969. In 1954, there were almost as many farm workers as there were non-farm in Acadia parish, but by 1969, only 10 percent of the workers in Acadia were agriculturally employed. While many farm workers were hired on a parttime basis and may have had other jobs, the advent of widespread technology in agriculture was obviously a deterrent to farm labor as a gainful occupation.

Total payrolls in Acadia increased 151 percent from 1954 to 1969. In 1954, this amounted to 10.6 million dollars and one percent of the coastal zone; by 1969, they had increased to 26.6 million dollars and .8 percent of the coastal area. Wages paid to farm workers were 26 percent of total payrolls, more than either retail sales or manufacturing's share of the total.

Market value of agriculture products sold increased 16 percent in current dollars while that for the coastal zone increased 54 percent. As a percent of the coastal area, Acadia registered 13.7 percent of agricultural products, but this ratio declined to 10.3 percent in 1969.

Ascension Parish

Ascension parish has experienced a tremendous growth in total employees covered by unemployment compensation, 304 percent in the fifteen-year study period. This growth far outpaced both the state and the coastal zone. Most of the growth is due to the extensive development which occurred along highway 61 between Baton Rouge and New Orleans.

Retail trade employees increased slightly more than 100 percent, from 656 in 1954 to 1318 in 1969. Once again, this increase was greater than that of the state or the coastal zone. Manufacturing employees increased almost 500 percent in Ascension parish between the above years. The industrial development in the parish is an obvious cause.

The loss of farmland, industrial development, and higher skill levels forced farm laborers to decline in Ascension parish from 1088 in 1954 to 215 in 1969. Despite the high concentration of industry in Ascension parish, the parish's loss of farm labor was just higher than that of the remaining coastal parishes.

Total payrolls in Ascension parish made a phenomenal gain in the fifteen years studied, over 1400 percent, far outpacing both the state and the coastal area. Retail payrolls increased 300 percent while manufacturing payrolls increased from 1.9 million dollars in 1954 to over 24 million dollars in 1969.

Agricultural payrolls peaked at just over one million dollars in 1959 and in 1969, were 981 thousand dollars. The value of agricultural products sold increased from 2.6 million dollars in 1954 to 3.9 million dollars in 1969, a 50 percent increase. On the other hand, retail sales increased from 14.7 million dollars to 50 million over the same years.

Assumption Parish

Total covered employees increased 84 percent in Assumption parish, from 1551 in 1954 to 2791 in 1969. While this gain was more than the coastal zone increase, Assumption employees were only five-tenths of one percent of coastal employees covered by unemployment compensation. An equal increase (88 percent) was registered in manufacturing employees and in 1969, 63 percent of Assumption's covered workers were so employed. The increase in retail workers was small, from 240 in 1954 to 349 in 1969.

Most of this past result was due to the lack of a large urban area to which consumers would be drawn.

Hired farm workers decreased 64.5 percent from 1954 to 1969. The loss of such hired labor from 1430 persons to 507 was smaller than the state's loss or the coastal zone's. In 1954, there were almost as many farm workers as there were covered employees; however, by 1969, farm laborers were 18 percent of covered employees. Even a highly rural parish like Assumption experienced a dramatic change in labor force concentration.

Total covered payrolls in Assumption parish rose from 3.2 million dollars in 1954 to over 14 million dollars in 1969. This increase represents a jump of over 400 percent, one of the highest of the coastal zone, and much more substantial than that of the entire 26-parish coastal area. Retail payrolls rose 200 percent, yet in 1969, Assumption's retail payrolls were the third lowest of the coastal zone.

Manufacturing payrolls increased 567 percent over the pertinent fifteen years, to 12.3 million dollars in 1969. Much of this is probably due to the increased sugar processing undertaken in the parish. On the other hand, wages paid to hired farm workers increased on 11 percent from 1954 to 1969, and in the latter years, were eleven percent of total covered payrolls.

Market value of agricultural products sold increased 45 percent in Assumption, from 5.4 million dollars in 1954 to 7.8 million in 1969. The state and coastal zone experienced slightly greater gains, which may have been due to the parish's concentration in one crop, sugar cane. Despite this smaller gain in market value of sales, Assumption's gains outpaced the cost of living and the wholesale price paid for farm products. On the other hand, agricultural products were 85 percent of retail sales in 1954, but in 1969, they were 60 percent of such sales.

Calcasieu Parish

Calcasieu parish gained 7839 covered employees in the fifteen years from 1954 to 1969. This represented a 31 percent increase or 2.1 percent per year. Much of this gain was realized in the retail sector which had a 44 percent increase in covered employees over the fifteen years studied. Approximately six percent of coastal retail workers were in Calcasieu parish.

On the other hand, Calcasieu which has had a considerable industrial base since World War II, gained only 17 percent in manufacturing employees; however, its 8956 workers were 8 percent of coastal manufacturing workers. There was not a significant increase in Calcasieu's share of these workers.

Hired farm workers declined 62 percent from 1954 to 1969 in Calcasieu parish. Its 618 farm laborers in 1954 were two percent of coastal farm workers and the 235 so classified in 1969 were 3.3 percent. These same hired workers were paid 52 percent more in 1969 than in 1954. Total covered payrolls increased 138 percent; retail payrolls increased 131 percent; and manufacturing payrolls rose 141 percent to far outpace the growth in agricultural payrolls.

Apparently, Calcasieu has maintained its share of agricultural marketings in the coastal area at approximately 6.3 percent. An increase over the 1954-1969 period in dollar value has resulted in a 52 percent increase, from 8.8 million dollars to 13.3 million dollars. This increase in farm marketings was slightly less than that of the state and the coastal zone.

Cameron Parish

Total covered employees in Cameron parish increased significantly by 273 percent over the 1954-1969 period. Its retail employees were the fewest in the state in 1969, 49, while manufacturing employees were only 141 in the same year. The lack of manufacturing in this parish is not surprising, given the small population, extensive marshland, and widespread agriculture. Nevertheless, hired farm workers declined from 161 in 1954 to 57 in 1969.

Cash paid to farm workers increased from $262,000 in 1954 to $405,000 in 1969. This relatively small amount is a good indication of the high degree of technology on Cameron farms and their large average size. Total covered payrolls were only $694,000 in 1969, of which $191,000 was in manufacturing.

Interestingly, agricultural marketings in Cameron parish increased from 2.3 million dollars in 1954 to 3.2 million in 1969, a 39 percent increase. Retail sales had increased almost 100 percent over the same period.

East Baton Rouge Parish

East Baton Rouge parish has long been a center of economic activity in Louisiana. Its port and industrial base have helped to increase total covered employees by 224 percent. In 1954, there were 25,057 covered employees in East Baton Rouge. This category had increased to 81,253 in 1969. Most of this increase came in the area of retail trade employees, an increase from 9274 employees in 1954 to 15,563 in 1969. It is interesting to note that manufacturing employees did not increase significantly during the fifteen-year period. Of course, hired farm labor in East Baton Rouge were only a very small part of the labor force, 318 in 1954 and 167 in 1969.

Total payrolls in East Baton Rouge have increased 223 percent from 1954 to 1959, or 15 percent annually. This increase is not as fast as that of the coastal zone, but more than that of the state. Retail payrolls rose 208 percent over the same years and in 1969, accounted for 12 percent of the parish's total payrolls. Manufacturing payrolls were approximately 30 percent of the total for East Baton Rouge, but agriculture's payroll was minor at best, $558,000 in 1969. This figure was 21 percent less than the 1959 payroll for hired farm workers.

Despite the large industrial base, 45 percent of East Baton Rouge was in farmland in 1969. This high concentration is evident from the data on market value of agricultural products sold. In 1954, these amounted to 1.4 million dollars; by 1969, this had increased 271 percent to 5.2 million dollars. Of most coastal parishes, East Baton Rouge marketings keep pace quite well with retail sales. In terms of a source of income, agriculture was a minor contributor in East Baton Rouge, but highly ranked in terms of the other coastal parishes.

Iberia Parish

Total covered employees in Iberia Parish increased 73 percent over the 1954-1969 period. In 1954, they numbered almost 6,000, however, by 1969, covered employees had risen to 10,260. Most of this increase was in areas other than retail sales and manufacturing since these categories increased 62.5 and 38 percent respectively. Neither category accounted for more than 20 percent of covered employees. As in the previous parishes, hired farm laborers decreased and in Iberia, the decline was an average of five percent per year. In 1969, there were 535 farm workers, 7.5 percent of the coastal zone's total. As a percent of covered employees, these workers in Iberia were 5.2 percent in 1969; however, in 1954, hired farm laborers equaled 32.4 percent of the parish's covered employees.

Covered payrolls increased 282 percent from 1954's 14.4 million dollars to 1969's 55 million dollars. Retail payrolls rose 224 percent over the fifteen years and were 15 percent of total payrolls in 1969. Manufacturing payrolls increased 181 percent or about 35 percent faster than the rest of the coastal zone area.

Wages paid to hired farm laborers rose from 1.2 million dollars in 1954 to two million dollars in 1964; there has since been a slight decline in this labor wage category. Iberia was, however, in the upper 20 percent of the coastal parishes that paid over 1.9 million dollars in 1969 in farm wages. Indicative of this is the fact that Iberia parish has traditionally rated quite high in the value of its agricultural marketings. These crop and livestock marketings have increased from 6.1 million dollars in 1954 to 11.2 million in 1969, or five percent of the coastal marketings.

Iberville Parish

Iberville parish has made impressive gains in employment over the fifteen years studied. Its covered employees increased 143 percent, however, it was starting from a small base of 2181 employees in 1954. Its manufacturing employees increased by the same percent as did its total, while retail employees rose from 550 to 931, accounting for 17.5 percent of covered workers in 1969. Hired farm workers declined almost 80 percent to 340 in 1969. These 340 farm laborers were approximately 6 percent of total covered employees.

Total covered payrolls in Iberville parish were 34.3 million dollars in 1969, 650 percent above the 1954 figure. As a percent of this total, retail payrolls declined from 21 percent in 1954 to 9 percent in 1969; however, manufacturing payrolls increased only slightly as a percent of the total, remaining at about 33 percent over the 15 years examined.

Wages for hired workers increased 63 percent from 1954 to 1969 to 1.34 million dollars in 1969. While the Iberville parish gain was greater than that of the coastal zone, its hired labor payroll amounted to approximately 5 percent of the coastal zone's total, up slightly from 1954.

Marketings of agricultural products rose from 3.7 million dollars in 1954 to 7.9 million in 1969. As a share of coastal area agricultural marketings, there was a slight increase, from 2.7 percent in 1954 to 3.7 percent in 1969. As a percent of the parish's retail sales, agricultural marketing declined in relative importance from 22 percent to 18 percent in 1954 and 1969.

Jefferson Parish

Jefferson parish is one of the most industrialized areas of Louisiana's coastal zone. The growth of its employees and payrolls reflect this industrialization as well as the declining role of agriculture in the parish. Total covered employees increased 282 percent, from 16,557 in 1954 to 63,247 in 1969. Of this gain, retail trade employees increased over 500 percent during the 15-year period. A smaller gain, 200 percent, was registered by manufacturing employees, to 16,000 in 1969. Without surprise, hired farm workers declined to less than 50 before 1960.

Payrolls for hired farm workers in 1969 were 120,000 dollars, indeed a minor amount considering that total covered payrolls in

Jefferson parish in 1969 were 382 million dollars. Of particular interest is the fact that agricultural marketings in Jefferson declined from 1.26 million dollars in 1954 to 451,000 dollars in 1969.

Jefferson Davis Parish

Jeff Davis parish has long been an agricultural parish in South Louisiana. A quick glance at its labor structure convinces one of agriculture's significance. Total covered employees increased only 28.5 percent between 1954 and 1969, less than the state's increase and that of the coastal zone. Over 30 percent of its 4000 employees were in retail trades while less than 10 percent were in manufacturing. The number of hired farm workers decreased from 714 to 547 over the 1954 to 1969 period. In 1954, these farm workers were 23 percent of total covered employees, but by 1969, they had fallen to only 17.3 percent of the total.

Total covered payrolls increased 162 percent from 1954 to 1969; the gain in retail payrolls was 218 percent to 5.4 million dollars. Manufacturing has been very slow in entering Jeff Davis parish. In 1969, only 1.7 million dollars accounted for manufacturing payrolls or 9 percent of total payrolls. The significance of agriculture is borne out by the growth of farm labor wages. In the fifteen-year period, these wages rose from 972 thousand dollars in 1954 to 1.9 million in 1969, a 100 percent increase.

Agricultural marketings in Jeff Davis parish increased from 15.2 million dollars in 1954 to 22.9 million in 1969. As a percent of coastal marketings, Jeff Davis' changed little, from 11 percent in 1954 to 10.8 percent. This is a much greater than proportionate share in the coastal zone.

Lafayette Parish

Lafayette parish is the newest SMSA in Louisiana. Its covered employees in 1969 were 25,871, 155 percent above the 1954 level. Much of the covered employee growth has come in the retail trade sector of Lafayette parish. In 1954, 2874 persons were employed in this sector, and by 1969, there were 6556, or 28 percent of total covered employees. On the other hand, manufacturing employees have barely increased in contrast to construction and wholesale trade employees. Hired farm workers have represented about only one percent of the parish's total labor force.

Wages paid to hired farm workers have increased slightly, from 863 thousand dollars in 1954 to 950 thousand dollars in 1969. These payments are minor contributions when seen in reference to total covered payrolls of 141.4 million dollars in 1969. Agricultural marketings have declined as a percent of that in the coastal zone from 6.5 percent in 1954 to 4.7 percent in 1969. All of the above data point to the declining role of agriculture in Lafayette Parish as it became more urbanized.

Lafourche Parish

Lafourche parish, one of the highly cultivated parishes of Louisiana, experienced a 100 percent increase in total covered payrolls between 1954 and 1964. There was little gain in 1969 above 1954, with approximately 10,600 workers employed. Manufacturing employees increased about 200 persons in the fifteen-year period, while retailing gained more than 1300 workers or 204 percent. Farm workers declined by 50 percent, from over 1000 in 1954 to 521 in 1969. The share of coastal farm workers, however, increased from 3.8 percent in 1954 to 7.3 percent in 1969.

An interesting comparison relates the percentage changes in various payrolls. Wages paid to Lafourche farm workers increased only 37 percent, one of the lowest of agriculturally related coastal parishes. Yet this parish retained a fairly proportion of farm workers when compared to other coastal parishes. Much of this development may be due to the relatively parttime nature of the form employment and the high intensity of technology and mechanization that occurred in the fiftaen-year period examined.

Livingston Parish

Primarily a rural parish, Livingston had relatively little agricultural activity. Its total of covered employees in 1969 was 2109 or four-tenths of one percent. Retail employees accounted for one-third of total payrolls and manufacturing employees actually declined in numbers over the fifteen years examined. Hired farm workers declined from 282 in 1954 to 55 in 1964; however, there was a rise to 112 in 1969.

Cash paid to farm workers was less than 500,000 dollars in 1969. This figure represented more than a 100 percent increase since 1954. Total payrolls covered by unemployment compensation had increased more than 300 percent over the same period. Perhaps a more interesting trend in Livingston parish is the growth of agricultural marketings from 1.7 million dollars in 1954 to 9.3 million in 1969. Its share of coastal marketings increased from 1.2 percent to 4.4 percent for the above years.

Orleans Parish

Orleans parish is the center of economic activity, not only of Louisiana, but of much of the southeastern United States. Total covered employees numbered 186,000 in 1954 and by 1969, had grown to 224,000 a 20.7 percent increase. Over the fifteen years examined, there has been a decline in manufacturing employees in Orleans and retail employees have not changed significantly. Hired farm laborers numbered 50 in 1959 which is not surprising in this nonagricultural parish.

There is no comparison in hired farm worker wages in Orleans. In 1959, these wages were not even 300,000 thousand dollars and agricultural marketings did not break 1,000,000 dollars. Data was not reported after 1959 to prevent disclosure of information on individual farms. In summary, agriculture's role in Orleans' economy was minimal at best.

Plaquemines Parish

The minor degree of farming in Plaquemines due to land availability is evident from the previous analysis of the parish. As a result, non-agricultural employment has made significant gains since 1954. In 1954, 3,350 workers were covered employees and these increased to 11,424 in 1969, a 241 percent increase. Retail trade employees increased to 850 from 190 in 1954; however the gain in manufacturing employees from 683 in 1954 to 1,322 in 1959 was negated by a decline to 827 in 1969.

A dramatic 90 percent decline in farm workers is indicative of the declining role of agriculture in this coastal parish. The market value of agricultural products declined to 460,000 dollars in 1969, or equivalent to two percent of retail sales. In 1954, these sales were equal to 10 percent of retail sales. Earnings status of farm workers was far below that of other occupations, receiving an average of $3,300 per capita compared to manufacturing employees who received an average of $7,256 per capita in 1969.

St. Bernard Parish

Much like Orleans, St. Bernard parish had only a few farms and a very minor proportion of hired farm workers. Total covered employees in 1969 were 7,524. Over one-half of these were in manufacturing compared to 17 percent in retail establishments. Hired farm workers numbered 16 in 1969 and received 96,000 dollars in wages. This data seems high considering that manufacturing employees received $8,900 per capita in 1969 while farm workers received about $8,000 per capita.

Market value of agricultural products sold averaged about 250,000 dollars in the fifteen years examined. The data on wages paid to agricultural workers may be even more suspect with this observation. Regardless of data limitations on this parish, the obvious result is that agriculture had a very minor role to play in this primarily residential and industrial parish.

St. Charles Parish

St. Charles parish has experienced a considerable amount of growth in the 1954-1959 time period. Median family income increased from $2150 in 1949 to $9004 in 1969. In the latter year, this parish ranked fourth in the coastal zone in median family income. Total covered payrolls rose to 7,555 in 1969, 113 percent higher than the 1954 level. Very little gain was registered in the retail sector, however by 1969, one-third of the covered employees were in the manufacturing sector.

Hired farm labor fell from 224 in 1954 to 57 in 1969. Total wages did not increase in the farm labor sector, but on a per capita basis, they increased from $1070 in 1954 to $4263 in 1969. Manufacturing employees earned $9631 per capita in 1969 and all employees earned $7756 per capita in the same year.

Agricultural marketings in St. Charles parish increased 34 percent from 1954 to 1969, to 1.1 million dollars in the terminal year. These marketings were equivalent to 6 percent of retail sales in 1969 while the equivalency in 1954 was 11 percent.

St. James Parish

The allocation of land for agricultural purposes in St. James parish changed little on the year of this study. Because of this, the advent of widespread technology accounts for the decline in labor employment.

Total covered employees in manufacturing increased from 809 in 1954 to 2028 in 1969, a 151 percent increase. Total employees experienced a 100 percent gain in numbers and in 1969, manufacturing workers were 61 percent of the total. Retail employees numbered only 471 in 1969 compared to farm workers' 281. These 281 farm laborers were 74 percent below the 1954 level, a somewhat greater decline than the coastal zone as a unit.

Per capita wages for all covered employees averaged $12,000 in 1969. Manufacturing wages per capita were $9,637 per capita, while hired farm workers averaged $4359. In 1954, the farm workers' pay averaged $4300, considerably less than in 1969. Manufacturing workers in 1954 averaged a per capita income of $3,500.

Agricultural marketings in St. James increased 2.5 percent per year, not enough to counter inflationary tendencies. In 1954, these marketings were equivalent to 44 percent of retail sales; however, by 1969, the proportion had declined to 27.4 percent.

St. John the Baptist Parish

St. John parish has experienced a significant decline in agricultural activity, particularly in acreage in farms. Industrial development has resulted in a fifty percent decline in hired farm workers.

Total covered employees have increased from 1602 in 1954 to 3033 in 1964. A small decrease in 1969 resulted, however. Much of the employment increase was in manufacturing, 50.5 percent of the total in 1954 to 67 percent in 1969. Hired farm workers declined from 574 in 1954 to 207 in 1969.

Per capita income per farm worker increased from $914 in 1954 to $2859 in 1969, a 212 percent increase. Per capita manufacturing income increased 112 percent, but in manufacturing, the per capita income was $7764 in 1969.

Despite the relatively high importance of agriculture in St. John parish, the market value of agricultural products increased from 1.6 million dollars in 1954 to 1.9 million dollars in 1969. This increase was only nineteen percent, considerably less than that for the state or the coastal zone.

St. Martin Parish

St. Martin parish has one of the smallest labor forces in the coastal zone, however, in recent years it has been successful in attracting light manufacturing to the parish. Covered employees were relatively stagnant from 1954 to 1964. Since 1964, they have increased 74 percent to 3275 in 1969. Retail employees were 22 percent of this total while manufacturing were 15 percent.

A parish with many small farms, St. Martin's hired workers declined 90 percent in the 1954-69 period to 263 workers. Income per worker in 1969 was $3053 compared to $3067 for retail employees, $3731 for manufacturing employees, and $4333 for all covered employees.

Market value of agricultural products sold decreased 5.8 percent over the fifteen years examined. This is in comparison to a 100 percent increase in retail sales to 20.4 million dollars in 1969. Nevertheless, this is equivalent to 28 percent of retail sales in St. Martin parish, while the equivalency for the coastal zone was only 6 percent.

St. Mary Parish

While there has been a considerable degree in farm acreage from 42 to 30 percent in St. Mary parish from 1934-1969, agriculture still plays an important role in this parish. Due to the massive industrial expansion, total covered payrolls increased from 5,831 in 1954 to 16,477 in 1969, a 183 percent increase. Retail trade employees increased about 114 percent to 2560 in 1969, but manufacturing increased 50 percent. Much of the increase in covered payrolls came in oil field support activities, construction activities, and wholesale trade. Fully 20 percent of covered employees were in the petroleum industry.

Hired farm workers in St. Mary parish numbered 1108 in 1954. By 1969, this number had declined 57 percent to 680. Nevertheless, St. Mary had more hired farm workers than any other coastal parish and employed 10 percent of the coastal zone's total farm workers. Cash paid for these workers totalled 2.7 million dollars or $3973 per capita in 1969. Retail employees averaged $3623 per capita while petroleum employees averaged $8913 per capita.

St. Tammany Parish

St. Tammany has experienced a healthy increase in covered employment from 1954 to 1964, 135 percent. The 6412 covered employees were one percent of coastal zone employees. Retail employees increased by 1,000 to 1895 in 1969, 30 percent of the parish's total. Manufacturing employees rose 56 percent to 1446 in the terminal year. As expected, farm labor declined 70 percent, slightly less than the state's decline and the coastal area's decrease.

Total payrolls in St. Tammany increased substantially from 1954 to 1969, 388 percent. This gain was far greater than the 186 percent in Louisiana or the 240 percent increase in the coastal zone. Of the 30.8 million dollar total payroll, retail employees shared in 22 percent and manufacturing employees had 30 percent of the total. Hired farm workers' payrolls declined from $680,000 in 1954 to $188,000 in 1969. These data observations reflect the increasing by declining role of agriculture in St. Tammany parish. Much of this decline has been caused by the growth of suburban in the parish as a spillover from metro New Orleans. Agricultural sales as an equivalent to retail sales were 14.3 percent in 1954; however, by 1969, the ratio had fallen to 5 percent.

Tangipahoa Parish

Hired farm laborers declined 73 percent in Tangiaphoa parish from 1954 to 1969. This decline was slightly less than the 77 percent decline in the coastal zone. On the other hand, total covered employees increased 37 percent in this parish, much less than the 64 percent increase in the remaining coastal parishes. Manufacturing employees declined to 2022 in 1969 from 2471 in 1954.

Wages paid to farm laborers increased from $1,055,000 in 1954 to $1,491,000 in 1969. These wages were equivalent to 9 percent of covered payrolls in 1954 and 5 percent in 1969. On a per capita basis, farm laborers earned $3976 in 1969, compared to $4046 in manufacturing, $3546 in retailing, and $3824 for all employees. Overall, farm laborers were in a relatively good economic position in Tangipahoa parish.

The market value of agriculture products in Tangipahoa parish was equivalent to 30 percent of retail sales. In 1969, this equivalency was 23 percent, a relatively healthy position for agriculture. In fact, agricultural marketings increased at an annual rate of 11 percent in Tangipahoa, compared to 3.6 percent in the coastal zone.

Terrebonne Parish

Terrebonne parish, like St. Mary parish, has experienced large gains in its labor force and employed persons. Much of the cause is apparently the same-oil and gas activity and their ensuring demands on construction and industry. From 1954 to 1969, total covered workers rose from 6506 in 16442, a 153 percent increase. Retail employees increased more than 100 percent in the fifteen-year period, representing 21 percent of total employees. Manufacturing employees changed little in the fifteen years, accounting for 13.7 percent of total employees.

Hired farm workers declined 64 percent to 296 workers in 1969. Cash paid to these workers was $990,000 in the terminal year, or $3344 per worker. Manufacturing payrolls were 11.4 million dollars in Terrebonne in 1969, $5211 per capita while total payrolls amounted to 95 million dollars in 1969.

In 1954, Terrebonne's agriculture marketings were two percent of that of the coastal zone and in 1969, they had maintained their two percent share. These same agricultural marketings were the equivalent of 3.4 percent of Terrebonne's retail sales; however, this was down from the 7.2 percent equivalency in 1954.

Vermilion Parish

According to the previous analysis of Vermilion parish, there is extensive farming in this parish. However, the parish has also experienced great strides in the non-agricultural sectors. Total covered payrolls in this parish increased 92 percent between 1954 and 1969. This increase was significantly higher than the 64 percent gain in the coastal zone. Retail employees comprised 36 percent of the total employees in 1959, but by 1969, this ratio has declined to 23 percent.

Manufacturing employees rose to 784 in 1969, 43 percent above the 1954 level. As experienced in the other coastal parishes, hired farm laborers fell 78 percent in Vermilion parish, from 2017 in 1954 to 434 in 1969. These 434 workers were 6 percent of the coastal zone's total.

Farm worker payrolls in Vermilion parish have not increased as fast as in the coastal zone. The coastal zone increase averaged 2.7 percent per year while Vermilion's averaged 2.3 percent per year. By 1969, the amount in Vermilion parish was 1.5 million dollars. On the other hand, total covered payrolls were 31.6 million dollars in 1969, 405 percent above the 1954 level. This increase was far greater than the state's or that of the coastal area as a unit.

Total retail sales in Vermilion parish increased from 20.2 million dollars in 1954 to 62.6 million dollars in 1969. This increase was one of 210 percent, while agricultural marketings rose 23 percent, from 19.5 million dollars in 1954 to 23.9 million in 1969. In 1954, these marketings were equivalent to 96 percent of the total retail sales and by 1969, they had declined to 38 percent of retail sales.

West Baton Rouge Parish

In 1954, West Baton Rouge had a fairly high number of hired farm workers, 1771; however, an 86 percent decline resulted in 240 in 1969. Total covered employees increased from 593 in 1954 to 1397 in 1969, a 136 percent increase. Much of this increase can be accounted for by the spillover of labor into East Baton Rouge. Over the fifteen years in question, manufacturing employees increased 76 percent to 321 in 1969.

Cash paid to farm laborers increased from $875,000 in 1954 to $1.1 million in 1964; however, in 1969, the payroll on farms fell to $977,000. Total covered payrolls increased almost six times over the 1954 amount while manufacturing payrolls rose to 2.4 million dollars, 414 percent above the 1954 level.

In 1954, the market value of agricultural products was $2.2 million in West Baton Rouge, equivalent to 47 percent of retail sales. By 1969, agricultural marketings had increased to 3.5 million dollars, or 31 percent of retail sales.

Summary

In summary, Louisiana's coastal zone has increased its acreage devoted to farmland by 300,000 acres. While this increase countered the decline in acres in all of Louisiana, continued marshland drainage and timber severance may lead to more acreage farmed. The question of more farmland and more intensive farming depends more on the question of technology, mechanization, prices received, and expertise than it does on land availability. It is evident that fertile lands are presently being cultivated in Louisiana's coastal zone; further cultivation of marginal lands is not apparent from past trends.

Data examined indicate that farmland has increased over the period 1934-1969. Most of this increase was realized early and may have levelled off since the early 1960's. The 1974 Census of Agriculture will supplement much of the present analysis and update it considerably.

Urban, suburban, and industrial growth will apparently continue within the coastal zone, exerting continual pressure on land use. To maintain the present ratio of farmland-to-total land within the coastal zone, it may be necessary to use marginal land for cultivation. That is, given that present lands are the most fertile agriculturally, present wetlands may need drainage to secure higher agricultural production levels. This occurrence depends significantly on the price of agricultural commodities; e.g. higher price enticing the use of the more marginal lands for cultivation.

As farming becomes more capital-intensive and the cost of production continues to rise, the number of farms in Louisiana's coastal zone will continue to decline. Coupled with increased industrialization and urbanization, no guarantee of larger farms exists in the long-run. Competing alternatives for land will provide enough incentive for marginal farmers to sell their land to developers rather than to other farmers.

The increased attempts to attract industry into the coastal zone and the continued use of labor-saving techniques in agriculture will surely cause further decreases in the use of hired labor on the farm. Some minimal number of hired laborers is probably soon to be achieved. It will be necessary to keep some workers simply to operate machinery and perform repairs. The coastal zone in Louisiana provided almost half of the farm payrolls in the state in 1969; however, these payrolls as a percent of total covered payrolls were only nine-tenths of one percent in the coastal zone. The parttime nature of farm labor, the relatively lower pay scale, and more alternatives for employment will entice workers away from agricultural employment in the 26-parish coastal zone.

FORESTRY PRODUCTION IN THE COASTAL ZONE

This section of the study examines the economic significance of forestry in Louisiana's coastal zone. It is an attempt to present a comparative analysis of forestry relative to the coastal area and to the individual parishes within the coastal zone. To accomplish this, forestry production is examined for both sawtimber and pulpwood cords, landowner income is compared to various payrolls as is employment in the forestry industry.

Louisiana sawtimber production increased 44.1 percent from 1959 to 1974. In 1959, 824.7 million boardfeet were severed compared to 1193.5 million boardfeet in 1974. The coastal zone's share of this production increased from 14.8 percent in 1959 to 15.4 percent in 1974. In 1959, 122.1 million boardfeet were severed in the coastal parishes while in 1974, 184.4 million were cut, a 51 percent increase.

Acadia parish claimed 2.3 million boardfeet of sawtimber severed in 1969, and this increased to 3.9 million in 1974. Much of this increased boardfeet was pine and some oak. In contrast to Acadia's severance, Ascension parish experienced an exceptional decline in boardfeet severed, from 5.9 million in 1959 to 200,000 in 1974, a 97 percent decrease. Its representative share of coastal sawtimber declined substantially from its 4.6 percent share in 1959.

Assumption parish, like Ascension, experienced a sharp decline in the number of boardfeet severed. In 1959, there were 1.9 million feet cut compared to 600,000 in 1974; this represents a 68 percent decrease. At the western end of the state, Calcasieu experienced a

161 percent increase in sawtimber severed from 6.2 million boardfeet in 1959 to 16.2 million in 1974. As much of the oak was diminished, there were increasing demands for pine and Calcasieu was easily able to increase its production in this timber. As a result, Calcasieu's share of coastal sawtimber increased from 5 percent in 1959 to 8.8 percent in 1974.

East Baton Rouge parish has had a respectable amount of sawtimber severed in relation to other coastal parishes. In 1959, 7.2 million boardfeet were severed which were 6 percent of total coastal severance. By 1974, this share had declined to 2.8 percent primarily due to fewer severed boardfeet in 1974, 5 million. Another parish to sever fewer boardfeet was Iberville parish. In 1959, 14.1 million boardfeet were severed; however, by 1974, this amount had declined to 6.8 million boardfeet. In the former year, 11.5 percent of sawtimber originated in Iberville but by 1974, its share had declined to 3.7 percent.

Jeff Davis parish has surprisingly increased its sawtimber production significantly in the fifteen years of 1959-1974. In 1959, 800,000 boardfeet were severed, .6 of one percent of coastal severance; in 1974, 2.5 percent of coastal sawtimber, 4.6 million boardfeet were cut in Jeff Davis parish.

A parish which experienced strong declines in sawtimber production was Lafourche. In 1959, eight percent of total coastal boardfeet were cut in Lafourche, or 8 million boardfeet. Apparently depletion of existing stocks caused the number of boardfeet to decline to 1.6 million in 1974.

More than 75 percent of Livingston parish is forested. The increased demand for wood and wood products resulted in a dramatic increase in sawtimber productions. In 1959, 24.5 million boardfeet were severed in Livingston, or 20 percent of coastal production and 3 percent of state sawtimber boardfeet. By 1974, this had grown to 81 million boardfeet or 44 percent of coastal parish sawtimber and 7 percent of the state's total. The Livingston parish increase is indeed phenomenal when considering that state increase was 44.7 percent in the 1959-1974 period.

St. Charles parish apparently depleted its stock of gum, for this tree provided 52 percent of its 1.4 million boardfeet in 1959. In 1974, only 100,000 boardfeet of sawtimber were severed, a 93 percent decline. Also in 1959, St. James parish had a considerable amount of gum and cypress sawtimber, so that total boardfeet were 3.9 million, 3.2 percent of total the coastal area's sawtimber. Only 100,000 boardfeet were severed in 1974, once again a 97 percent decrease. St. John the Baptist parish experienced a similar decline from 1.9 million to 200,000 boardfeet harvested for the initial and terminal years.

St. Martin parish's composition of sawtimber in 1959 was concentrated in gum and cypress, and 3.6 million boardfeet were severed or 2.9 percent of the coastal zone's total. The depletion of cypress and gums caused harvesting to be concentrated in cottonwoods and willow; however, St. Martin's total boardfeet fell only to 3.1 million boardfeet, yet its share of the total boardfeet declined significantly.

St. Tammany parish, like Livingston, is over 75 percent forested. In 1959, 11.9 million boardfeet were severed, accounting for 10 percent of coastal severance. By 1974, this parish's severance had increased to 27.8 million boardfeet, 15 percent of the coastal zone's total. In a similar situation was Tangipahoa parish which increased its production from 16.4 million boardfeet in 1959 to 28.6 million in 1974. Severance in this latter parish was more intense because less of Tangipahoa is forested.

Terrebonne parish had 1.6 million boardfeet of timber severed in 1959. Most of it was cypress, oak, and gum. By 1974, 1.2 million boardfeet were severed, 25 percent less, and this was concentrated in cypress trees. Vermilion parish cut 3.4 million boardfeet in 1959, 3 percent of the coastal total. More than 2.4 million of this was oak and gum; however, in 1974, less than 100,000 boardfeet were severed, resulting in the most dramatic drop in sawtimber production within Louisiana's coastal zone. Lastly, West Baton Rouge decreased its sawtimber production from 6.8 million boardfeet in 1959 to 1.6 million in 1974.

The need for wood in the use of paper products and fiberboard has undoubtedly increased dramatically in the last 15 to 20 years. The state's production of pulpwood cords has increased 149 percent from 1959 to 1974, from 1.5 million cords to 3.7 million. Within the coastal zone, production has increased from 143,500 cords to 300,000 or 109 percent. As a percent of statewide production, the 26-parish coastal area has declined from 9.5 percent to 8 percent.

Production in Acadia parish of cordwood increased 142 percent, from 4700 cords in 1959 to 11.4 thousand in 1974. In the latter year, Acadia's production accounted for 4 percent of the coastal zone's total. Meanwhile, production in Ascension parish increased ten times over to 3800 cords in contrast to the parish's decline in sawtimber production.

Calcasieu's extensive pine woods allowed for a healthy increase in sawtimber severed and pulpwood produced. The latter increased from 10,300 cords in 1959 to 39,100 in 1974. In 1974, Calcasieu's production was 13 percent of the coastal area production and one percent of that of the state.

East Baton Rouge did not increase its production of pulpwood cords, but rather they remained at about the same level of 4,500 cords per year of the 15-year period. Iberville parish increased its share slightly from 800 cords in 1959 to 1,400 in 1974. This is in contrast to its rather sharp decline in sawtimber production.

Jeff Davis parish matched its viable increase in sawtimber with that of pulpwood. From 1959 to 1974, production of the latter rose eightfold, from 1,300 to 11,700 cords. The forests of Livingston parish were apparently cut the maximum possible extent during the fifteen years in question. Sawtimber production increased 231 percent while cord production rose 300 percent from 24,900 cords in 1959 to

From 1959 to 1969, there was a slight decrease in the number employed in forestry related activities (forestry, lumber and wood products, furniture and fixtures, and, paper and allied products). From 1959 to 1969, total coastal employment in the forestry industry declined from 5623 to 5003 or from 16.2 percent of the state total to 15.6 percent. Payrolls, however, rose from $16 million to $26.8 million in 1969. The coastal share of these payrolls increased from 12.4 percent in 1959 to 13.3 percent in 1969. Employment in coastal forestry-related establishments as a percent of coastal manufacturing declined from 6 percent in 1959 to 4.4 percent in 1969. This indicates that other manufacturing establishments have been increasing at a faster pace then forestry in the coastal zone. Give the relatively fixed supply of timber in the 26-parish area, this development is not surprising. In addition, continued attraction of industry in Louisiana will gradually lessen the relative importance of forest activities in the employment are of Louisiana.

A limited number of parishes have a high intensity of forestry activities in the 26-parish coastal zone. However, to illustrate the microeconomic importance of forestry, those parishes with over $1,000 in landowner income are examined.

Acadia parish did not employ any individuals in the forestry-related industries outlined above. However, its landowner income from forestry increased from $5,000 in 1959 to $33,000 in 1974. Most of this probably came as a result of the increased pulpwood production in the parish. The high intensity of agriculture in this parish caused the

$330,000 in forest income to wave, however. Severance taxation increased from $2,200 in 1959 to $9,200 in 1974, a minor contribution, at best, to total Acadia tax receipts.

Ascension parish, like Acadia, did not employ significant numbers in any of the forestry-related activities, Severance taxation increased to $3,000 in 1969; however, since then has declined to less than $1,000. This decline is due to the depletion of hardwood and gum production in the parish. Similarily, landowner income peaked in 1969 at $70,000 and in 1974 was $21,000.

Pulpwood production in Assumption parish increased slightly from 1959 to 1974, to 1,100 standard cords while sawtimber boardfeet declined from 1.9 million to 600,000 in 1974. Apparently, landowner income did not change significantly, $26,000 in 1964 and $23,000 in 1974, due to the tradeoff in production of the above two categories. Severance taxation has never yielded over $1,000 in this parish.

The greatly increased severance of timber and pulpwood in Calcasieu parish pushed landowner forest income from $10,000 in 1959 to $1,501,000 in 1974. Total Calcasieu income from forestry in 1974 was 9.3 percent of coastal forestry income 1.4 percent of the state's $110,622,000. In Calcasieu, landowner forest income was equivalent to 12 percent of farm income, a significant contribution of this parish's total income. Since the severance tax is so low, the increased timber severance in Calcasieu did not result in as great a contribution to parish taxes as it did to landowner income.

Covered employees in Calcasieu parish engaged in some aspect of the forestry industry numbered 187 in 1959 and received $460,000 in wages. Ten years later, the employees fell to 124 and payrolls had decreased slightly to $456,000. In both years, farm workers outnumbered those in forestry as did wages paid to farm laborers. However forestry payrolls were 46 percent of farm payrolls. Forestry employees were approximately one percent of manufacturing employees in 1969 in Calcasieu. This is not surprising in this parish due to the high degree of industry in the Lake Charles area.

East Baton Rouge parish, a highly industrialized area for many years, had a significant amount of forestry activity since the end of World War II. Much of this was probably due to the growth of Baton Rouge proper and the need for cleared land in order to develop. While the number of boardfeet and pulpwood cords did not change significantly, the increase in remuneration led to higher levels of landowner income over the years. In 1959, only $5,000 was gained from forest severance; however, in 1974, this category had increased to $331,000, approximately equivalent to 3.5 percent of agricultural income.

Employment in East Baton Rouge was high relative to other parishes' forestry employment. In 1959, 419 employees were employed in this sector, accounting for 2.3 percent of manufacturing employment. The high incidence of other types of manufacturing employment led to this low proportion. By 1969, the number of employed declined to 377 or 2.1 percent of total manufacturing. Forestry payrolls increased 17.3 percent for the years 1959-1969, half as fast as the increase in total manufacturing payrolls in this parish. The decline in forestry employment in East Baton Rouge was about equal to that of coastal employment in this sector, 10 percent.

Payrolls in East Baton Rouge in forestry increased 17 percent from 1.6 million dollars in 1959 to 1.9 million in 1969. In this category of income, the coastal payrolls' increase far outdistanced East Baton Rouge, by 50 percent. Compared to agricultural workers, forestry-related employees earned $4954 in 1969, while the farm laborers earned $3341 per capita. Interestingly, in the same year, per capita payrolls for all of manufacturing was $9046, considerably above that for forestry.

Iberville parish, long one of the most forested areas in Louisiana, largely due to the cypress forests of the Atchafalaya Basin, experienced a sharp decline in sawtimber production from 1959 to 1974. Landowner income, however, increased from $117,000 in 1964 to $275,000 in 1974. Most of this increase came after 1969, due to changes in the production of pulpwood. This forest income equalled 4 percent of agricultural income in Iberville parish. In 1959, employment in forestry-related activities was 201, or 3.6 percent of total coastal employees in this sector. By 1969, there were so few forestry employees in Iberville that the Department of Commerce could not report them to prevent the revelation of individual employers.

Jefferson parish which is primarily urban and industrially-oriented had little or no forestry income to landowners. By 1974, no sawtimber or pulpwood was severed; however, employment in forestry related activities was quite high. In 1959, there were 373 covered employees in the forestry sector, earning 1.3 million dollars. Through 1969, these employees increased 280 percent to 1403, and payrolls rose to 9.8 million dollars, a 631 percent gain in covered payrolls. Total manufacturing payrolls increased 271 percent, much less than forestry alone and total employees in manufacturing rose from 11,038 in 1959 to 16,043 in 1969, a 45 percent increase.

On a per capita payroll basis, forestry-related employees gained $7042 in 1969 while all other manufacturing employees gained $7376, a 4.6 percent payroll difference in per capita payrolls. In 1959, the forestry sector in Jefferson parish accounted for 3.3 percent of total manufacturing employment and 6.6 percent of coastal forestry employees. Over the next ten years, Jefferson parish gained many employees in the forestry-related sector, and increased its share of manufacturing employment to 8.8 percent.

Livingston parish, one of the most forested parishes of Louisiana's coastal zone, provided for 7.4 million dollars in landowner income from forestry. The growth of severance taxation was from $15,100 in 1959 to $177,400 in 1974, comparable to the increase in landowner income.

Orleans parish was similar to Jefferson parish in the context of the forestry industry. The parish provided no sawtimber of pulpwood yet it employed a considerable number of persons in forestry-related activites-furniture and fixtures, and lumber and wood products.

There was no landowner income since there was no production and similarly, no severance tax receipts. However, employment and payrolls are a different matter.

Orleans parish employed 2344 workers in forestry-related industries in 1959. These 2344 were 42 percent of the coastal employees in the same industries and 6.8 percent of the state total. In the next ten years, the number of similar employees declined to 1793 in Orleans, 36 percent of the coastal total.

As a percent of manufacturing employees, forestry-related employees were 8.6 percent. However, the increase in manufacturing and decline in forestry employment caused the ratio to decline to five percent. Payrolls associated with forestry-related employment in Orleans rose from $7.9 million to $9.28 million, a 33 percent increase. The coastal forestry payrolls increased 56 percent from 1959 to 1969. On a per capita basis, forestry employees in Orleans earned about $5100 per capita, compared to manufacturing employees who earned approximately $7250 per capita in 1969.

The final two parishes which significantly contributed to forestry activity in the coastal zone are St. Tammany and Tangipahoa. Their input comes first from their dominance of forest areas and the location of pulp and paper mills in the area North of Lake Ponchartrain.

St. Tammany parish provided more than 28 percent of the pulpwood in the 26 coastal parishes in 1959. In 1969, its share had declined to 12.7 percent. Hardwood sawtimbers in St. Tammany were 9.7 percent of the coastal sawtimber production in 1959 and this proportion increased in 1969 to 15.7 percent. As a result of the overall forest activity increase in this parish, landowner income increased from $40,000 in 1959 to $2.5 million in 1974. In 1969, forest income was equivalent to 22 percent of agricultural income; but most of the forestry increase was between 1969 and 1974. Therefore, 1974 Census of Agriculture figures will surely report forest income to landowners greater than income to farmers.

It is interesting to note that despite the predominance of forest activities in St. Tammany parish, employment has declined in this sector of manufacturing. In 1959, 215 employees were reported compared to 157 in 1969. Covered wages, however, increased 50 percent, to $688,000. Manufacturing employees increased from 1057 to 1446 from 1959 to 1969. Some of this decline in employment is probably due to mechanization and technology. Most of the decrease can be attributed to the higher earnings in other sectors. For instance, in total manufacturing, average per capita payroll was $3200 in 1959 and $6500 in 1969; with in the forestry sector, per capita wages were $2316 in 1959 and $4382 in 1969. Such a wide divergence is likely to have aided in the outflow of workers from forestry.

Tangipahoa parish, like St. Tammany, had over 75 percent of its area forested. The previous data indicated how much was harvested in pulpwood and sawtimber over the last fifteen years. Landowner income increased from $50,000 in 1959 to over $2.8 million in 1974. In 1974, this income was 17.6 percent of coastal income from forestry production. Severance tax receipts made similar gains from $18,900 in 1959 to $75,600 in 1974.

In 1959, there were 1256 covered workers in forestry-related activities in Tangipahoa parish, 22.3 percent of the coastal total. This employment declined 23 percent to 969 in 1974, 19.4 percent of the coastal total. Forestry-related payrolls, however, increased from $2.9 million to $4.1 million over the ten year period, 1959-1969.

Manufacturing payrolls rose 62 percent from 1959-1969, dwarfing the 39 percent rise in forestry, but employees had also increased in total manufacturing from 1264 to 2044. Contrary to the occurrence in St. Tammany parish, per capita forestry payrolls in Tangipahoa were slightly higher or equivalent to that in total manufacturing.

Summary

Coastal sawtimber and pulpwood production have increased substantially over the last 20 years. More limited supplies will, however, force a much quicker downturn in production than in the non-coastal parishes. The nature of the more limited forest areas in the coastal zone is evident when examining forest employment trends. Such employment had declined only slightly in the 1959-1969 period, mainly because of the secondary forestry-related activities in the urban parishes. Other than these urban parishes, there have been declines in employment in these sectors, indicative of mechanization and falling timber supplies.

Additionally, salaries in forestry-related employment have not been comparable to those in manufacturing in Louisiana's coastal zone. Rising prices for wood and wood-products are likely to contribute to more landowner income until existing supplies diminish more. Generally, one can expect fewer persons engaged in forestry related activities as additional manufacturing enters the coastal zone.

BIBLIOGRAPHY

Agricultural Statistics for Louisiana, 1910-1961
Lonnie L. Fielder and C. O. Parker. DAE #316 (Dec., 1962).

Agricultural Statistics for Louisiana, 1950-1963
Lonnie L. Fielder and C. O. Parker. DAE #338, (Nov., 1964).

Agricultural Statistics for Louisiana, 1909-68
Lonnie L. Fielder, C. O. Parker, and J. B. Penn. DAE Research Report #397, (June, 1969).

Agricultural Statistics for Louisiana, 1964-72
DAE Report #458, Oct., 1973. Lonnie L. Fielder and Sam L. Guy.

An Analysis of Trends in Yields of Major Field Crops in Louisiana
DAE Research Report #446, Oct., 1972. Lonnie L. Fielder, Jr.

Changes in Number of Farms, By Size, of Farm, by Color of Operator, by Tenue of Operator, and in Number of Commercial Farms, by Parishes, Louisiana, 1939-1959
Lonnie L. Fielder, Jr. DAE Circular #289, (July, 1961).

Estimates of the Annual Cash Income from Farm Marketings, by Parishes, Louisiana, 1929, 1939, and 1943-58
J. P. Montgomery, DAE #240, (April, 1959).

Louisiana Crop Statistics, by Parishes, 1950-1962
Lonnie L. Fielder and C. O. Parker. DAE Research Project #328, Nov., 1963.

Louisiana Crop Statistics, by Parishes, Through 1970 for Cotton, Rice, Corn, Soybeans, Wheat, Sorghums, Sugar Cane
Lonnie J. Fielder, Jr. and C. O. Parker, DAE Research Project #436 (April, 1972).

Louisiana Department of Agriculture, Annual Reports.

Louisiana Department of Agriculture, ASCS Annual Reports.

Louisiana Department of Employment Security, Employment Wages.

Louisiana Department of Employment Security, Manpower Information for Affirmative Action Programs, Feb., 1975.

Louisiana Department of Employment Security, Louisiana Labor Market, Louisiana Work Force Summaries.

Louisiana Department of Revenue, Annual Reports.

Louisiana Forestry Commission, Progress Report.

Louisiana Forestry Commission, Timber and Pulpwood Production in Louisiana.

Louisiana State Planning Office, The State of the State.

Louisiana State University, Center for Wetland Resources, An Economic Base Study of Coastal Louisiana, L. B. Jones and G. R. Rice.

Louisiana Tax Commission, Biennial Reports.

Trends in Farm Land Acreage, Use, and Value in Louisiana, 1909-1954. J. P. Montgomery, DAE #190, (March, 1956).

Trends in Farm Land Acreage, Use, and Value in Louisiana, 1909-1959. Lonnie L. Fielder, Jr. DAE Circular #279, (Feb., 1961).

Trends in Farms Producing, Acreage, and Production of Selected Agriculture Crops, Louisiana, 1910-1955 J. P. Montgomery, DAE #195, (Nov., 1956).

Trends in Farms, Producing, Acreage, and Production of Selected Agriculture Crops, Louisiana, 1909-1959 Lonnie L. Fielder, Jr. DAE Circular #280.

Trends in Louisiana Agriculture, A Technical Presentation. Lonnie L. Fielder, Jr. DAE Research Report #416, (Nov., 1970).

University of New Orleans, Division of Business and Economic Research, Statistical Abstract of Louisiana.

U. S. Department of Commerce, Bureau of the Census, Census of Agriculture, Louisiana.

U. S. Department of Commerce, Bureau of the Census, Census of Population, Detailed Characteristics, Louisiana.

U. S. Department of Commerce, Bureau of the Census, Census of Population, General Social and Economic Characteristics, Louisiana.

U. S. Department of Commerce, Bureau of the Census, County Business Patterns.

U. S. Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics.

A P P E N D I X

TABLE I

LAND AREA
(Hundreds of Acres)

Parish	1934	1939	1944	1949	1954	1959	1964	1969
Acadia	414.1	423.7	423.7	423.7	423.7	423.7	423.7	424.2
Ascension	182.4	192.0	192.0	192.0	192.0	192.0	192.0	192.6
Assumption	309.8	228.5	228.5	228.5	228.5	228.5	228.5	227.6
Calcasieu	695.0	706.6	706.6	706.6	706.6	706.6	706.7	707.2
Cameron	960.6	924.2	924.2	924.2	924.2	924.2	924.2	922.4
East Baton Rouge	291.2	295.7	295.7	295.7	295.7	295.7	295.7	293.8
Iberia	376.9	376.3	376.3	376.3	376.3	376.3	376.3	377.0
Iberville	373.7	391.0	391.0	401.9	401.9	401.9	401.9	401.5
Jefferson	272.6	261.8	261.8	261.8	261.8	261.8	261.7	236.4
Jeff Davis	466.6	421.1	421.1	421.1	421.1	421.1	421.1	420.9
Lafayette	178.6	181.1	181.1	181.1	181.1	181.1	181.1	181.1
Lafourche	634.2	740.5	740.5	740.5	740.5	740.5	740.5	730.0
Livingston	427.5	425.6	425.6	425.6	425.6	425.6	425.6	418.4
Orleans	125.4	127.4	127.4	127.4	127.4	127.4		
Plaquemines	644.5	629.8	629.8	629.8	629.8	629.8	629.8	658.9
St. Bernard	394.9	326.4	326.4	326.4	326.4	326.4	326.4	329.0

Parish	1934	1939	1944	1949	1954	1959	1964	1969
St. Charles	188.8	194.6	194.6	194.6	194.6	194.6	194.6	188.2
St. James	161.3	159.4	159.4	159.4	159.4	159.4	159.4	162.1
St. John	149.1	144.0	144.0	144.0	144.0	144.0	144.0	145.0
St. Martin	336.0	472.3	472.3	461.4	461.4	461.4	461.4	471.0
St. Mary	404.5	387.2	387.2	387.2	387.2	387.2	387.2	399.0
St. Tammany	579.8	581.1	581.1	581.1	581.1	581.1	581.1	567.4
Tangipahoa	505.6	513.9	513.9	513.9	513.9	513.9	513.9	517.2
Terrebonne	1123.8	890.2	890.2	890.2	890.2	890.2	890.2	875.2
Vermilion	776.3	783.4	783.4	783.4	783.4	783.4	783.4	771.3
West Baton Rouge	137.0	128.6	128.6	128.6	128.6	128.0	128.0	129.9
STATE TOTAL	29061.8	28913.3	28913.3	28903.7	28903.7	28867.8	28867.5	28771.2
Coastal Zone Total	11382.8	10436.4	10906.4	10906.4	10906.4	10905.8	10905.8	10874.8
Coastal Zone Per State	39.2	36.1	37.7	37.7	37.7	37.7	37.7	37.8

Source: Department of Agriculture, Census of Agriculture.

TABLE II

LAND IN FARMS
(Acres)

Parish	1934	1939	1944	1949	1954	1959	1964	1969
Acadia	304,961	298,881	288,947	318,555	343,697	338,824	349,255	335,630
Ascension	85,363	74,623	98,753	112,808	93,594	89,775	92,497	64,135
Assumption	101,383	94,021	90,414	101,845	88,315	94,831	87,775	84,743
Calcasieu	225,566	181,659	199,464	401,386	496,406	468,350	528,535	403,435
Cameron	129,355	71,746	113,788	166,735	253,704	216,476	284,585	287,385
E. Baton Rouge	165,862	151,880	172,798	174,927	185,322	179,002	152,325	133,511
Iberia	130,379	110,444	135,698	134,218	133,410	138,846	133,985	131,051
Iberville	103,662	93,621	98,947	111,989	134,561	120,271	123,265	122,340
Jefferson	7,981	11,594	10,475	31,540	21,785	16,786	10,148	8,951
Jeff Davis	309,010	270,617	292,818	351,684	334,338	355,999	356,325	365,769
Lafayette	155,054	136,791	151,177	131,783	139,916	141,672	128,385	136,453
Lafourche	219,751	255,000	222,035	252,094	230,790	236,254	225,015	204,629
Livingston	101,219	83,217	82,229	93,902	102,319	66,774	69,585	44,864
Orleans	8,080	12,031	4,038	8,178	2,422	7,487		
Plaquemines	26,241	45,829	41,779	60,277	55,239	39,284	57,289	31,691
St. Bernard	11,742	5,786	18,030	10,567	22,578	12,797	15,152	7,112

Parish	1934	1939	1944	1949	1954	1959	1964	1969
St. Charles	26,268	28,832	40,929	60,304	64,408	43,901	52,765	33,653
St. James	61,231	57,619	59,090	69,503	70,198	52,785	62,002	56,900
St. John	47,535	31,844	32,575	47,794	41,441	32,677	37,878	22,556
St. Martin	108,946	128,523	108,658	124,019	130,097	97,751	108,365	99,532
St. Mary	120,382	113,318	104,902	160,656	162,162	139,947	123,285	121,199
St. Tammany	62,195	78,763	109,637	126,169	140,716	79,219	90,273	80,206
Tangipahoa	175,194	192,747	189,621	209,460	215,458	184,455	196,995	159,592
Terrebonne	141,391	114,644	116,137	116,383	116,627	100,537	123,415	100,080
Vermilion	312,740	316,201	363,942	403,227	383,064	386,801	386,835	393,113
W. Baton Rouge	38,999	45,688	50,517	50,802	55,198	54,057	47,536	55,334
STATE TOTAL	10,444,288	9,996,108	10,039,657	11,202,278	11,441,343	10,347,328	10,411,500	9,788,662
Coastal Zone Total	3,180,490	3,005,919	3,197,398	3,830,805	4,017,765	3,693,558	3,843,470	3,483,864
Coastal Zone Per State	30.5	30.1	31.8	34.2	35.1	35.7	36.9	35.6

Source: Department of Agriculture, Census of Agriculture.

TABLE III

PERCENT OF TOTAL AREA IN FARMS

Parish	1934	1939	1944	1949	1954	1959	1964	1969	% Change
Acadia	73.6	70.5	68.2	75.2	81.2	79.9	82.4	79.1	7.5
Ascension	46.8	38.9	51.4	58.7	48.7	46.8	48.1	33.4	-28.6
Assumption	32.7	41.1	39.6	44.5	38.6	41.5	38.4	37.2	13.7
Calcasieu	32.5	25.7	28.2	56.8	70.2	66.3	74.7	57.0	75.4
Cameron	13.5	7.8	12.3	18.0	27.5	23.4	30.8	31.1	130.4
E. Baton Rouge	56.9	51.4	58.4	59.1	62.7	60.5	51.5	45.4	-20.2
Iberia	34.6	29.3	36.1	35.7	35.4	36.9	35.6	34.8	.6
Iberville	27.7	29.3	25.3	27.8	33.4	29.9	30.7	30.4	9.7
Jefferson	2.9	4.4	4.0	12.0	8.3	6.4	3.9	3.8	31.0
Jeff Davis	66.2	64.3	69.5	83.5	79.4	84.5	84.6	86.9	31.3
Lafayette	86.7	75.5	83.5	72.8	77.2	78.2	70.9	75.3	-13.1
Lafourche	34.6	34.4	30.0	34.0	31.1	31.9	30.4	28.0	-19.1
Livingston	23.7	19.5	19.3	22.1	24.0	15.7	16.4	10.7	-54.8
Orleans	6.4	9.4	3.1	6.4	1.9	5.9			- 7.8
Plaquemines	4.1	7.3	6.6	9.6	8.8	6.2	9.1	4.8	17.1

Parish	1934	1939	1944	1949	1954	1959	1964	1969	% Change
St. Bernard	3.0	1.8	5.5	3.2	6.9	3.9	4.7	2.2	-26.7
St. Charles	13.9	14.8	21.0	31.0	33.1	22.6	27.1	17.8	28.1
St. James	37.9	36.1	37.1	43.6	43.9	33.1	38.9	35.1	- 7.4
St. John	31.9	22.0	22.6	33.2	28.8	22.7	26.3	15.6	-51.1
St. Martin	32.4	27.2	22.9	26.9	28.2	21.2	23.5	21.1	-34.9
St. Mary	29.7	29.3	27.1	41.5	41.9	36.1	31.8	30.4	2.3
St. Tammany	10.7	13.6	18.9	21.7	24.2	13.6	15.5	14.1	31.8
Tangipahoa	34.7	37.5	36.9	40.8	41.9	35.9	38.3	30.9	-10.9
Terrebonne	12.6	12.9	13.0	13.1	13.1	11.3	13.9	11.4	- 9.5
Vermilion	40.3	40.4	46.4	51.4	48.9	49.4	49.4	51.0	26.6
W. Baton Rouge	28.4	35.5	39.3	39.5	43.0	42.2	37.1	42.6	50.0
STATE TOTAL	35.9	34.5	34.7	38.7	39.6	35.8	36.1	34.0	
Coastal Zone Total	27.9	28.8	29.3	35.1	36.8	33.9	35.2	32.0	

Source: Department of Agriculture, Census of Agriculture.

TABLE IV

NUMBER OF FARMS

Parish	1934	1939	1944	1949	1954	1959	1964	1969
Acadia	3,850	3,937	3,517	3,346	3,310	2,471	1,989	1,453
Ascension	1,415	1,411	1,368	1,455	1,283	896	880	293
Assumption	423	551	359	409	313	307	270	194
Calcasieu	1,931	1,776	1,598	1,896	1,296	771	819	739
Cameron	892	842	823	592	649	479	462	423
E. Baton Rouge	2,557	1,853	1,956	1,981	1,704	1,103	1,085	675
Iberia	1,538	1,314	1,308	1,069	1,002	805	607	591
Iberville	923	741	645	681	572	425	359	286
Jefferson	413	284	320	254	218	119	78	54
Jeff Davis	1,754	1,665	1,237	1,553	1,207	1,049	811	897
Lafayette	3,677	3,441	3,152	2,977	2,928	2,272	1,826	1,452
Lafourche	1,222	1,120	1,159	1,058	736	758	623	519
Livingston	2,588	2,162	1,897	2,397	2,585	1,520	1,585	489
Orleans	312	199	150	110	40	69		
Plaquemines	704	602	635	596	594	419	277	111

Parish	1934	1939	1944	1949	1954	1959	1964	1969
St. Bernard	272	111	148	170	153	53	33	27
St. Charles	328	253	369	259	161	110	104	71
St. James	675	434	318	406	413	208	210	145
St. John	305	181	225	195	141	83	117	47
St. Martin	2,762	2,440	2,063	2,238	2,198	1,432	1,208	774
St. Mary	509	387	408	391	417	271	220	216
St. Tammany	1,179	1,245	1,321	1,455	1,405	705	737	526
Tangipahoa	4,792	4,521	4,238	4,551	3,998	2,985	2,568	1,513
Terrebonne	1,151	917	701	726	658	428	408	217
Vermilion	3,959	3,392	3,185	3,180	2,648	2,299	2,121	1,738
W. Baton Rouge	464	501	457	404	414	269	193	141
STATE TOTAL	170,216	150,007	129,295	124,181	111,127	74,438	62,466	42,269
Coastal Zone Total	40,595	36,280	33,557	34,349	31,043	22,306	19,390	13,397
Coastal Zone Per State	23.8	24.2	26.0	27.7	27.9	30.0	31.0	31.7

Source: Department of Agriculture, Census of Agriculture.

TABLE V

AVERAGE FARM SIZE IN ACRES

Parish	1935	1940	1945	1950	1954	1959	1964	1969
Acadia	79.2	75.9	82.2	95.2	103.8	137.1	175.6	230.9
Ascension	60.3	52.9	68.5	77.5	72.9	100.2	105.1	218.8
Assumption	239.7	170.6	251.8	282.2	249.0	308.9	325.1	436.8
Calcasieu	116.8	102.3	124.8	211.7	383.0	607.5	645.3	545.9
Cameron	145.0	85.2	138.3	281.6	390.9	451.9	616.0	679.3
E. Baton Rouge	64.9	82.0	88.3	88.3	80.0	136.6	140.4	197.7
Iberia	84.8	84.1	103.7	125.6	133.1	172.5	220.7	221.7
Iberville	112.3	126.3	153.4	164.4	235.2	283.0	343.4	427.7
Jefferson	19.3	40.8	32.7	124.2	99.9	141.1	130.1	165.7
Jeff Davis	176.2	162.5	236.7	226.5	277.0	339.4	439.4	407.7
Lafayette	42.2	39.8	48.0	44.3	47.8	62.4	70.3	93.9
Lafourche	179.8	227.7	191.6	238.3	313.6	311.7	361.2	394.3
Livingston	39.1	38.5	43.3	39.2	39.6	43.9	43.9	91.7
Orleans	25.9	60.5	26.9	74.3	60.6	108.5	29.3	
Plaquemines	37.3	76.1	65.8	101.1	93.0	93.8	206.8	285.5

Parish	1935	1940	1945	1950	1954	1959	1964	1969
St. Bernard	43.2	52.1	121.8	62.2	147.6	241.5	459.2	263.4
St. Charles	80.1	114.0	110.9	232.8	400.0	399.1	507.4	273.9
St. James	90.7	132.8	185.8	171.2	170.0	253.8	295.2	392.4
St. John	155.9	175.9	144.8	245.1	293.9	393.7	323.7	479.9
St. Martin	39.4	52.7	52.7	55.4	59.2	68.3	89.7	128.5
St. Mary	236.5	292.8	257.1	410.9	388.9	516.4	560.4	561.1
St. Tammany	38.6	63.3	83.0	26.7	100.2	112.4	122.5	152.4
Tangipahoa	36.6	42.6	44.7	46.0	53.9	61.8	76.7	105.4
Terrebonne	122.8	125.0	165.7	160.3	177.2	234.9	302.5	461.1
Vermilion	79.0	93.2	114.2	126.8	144.7	168.2	182.4	226.1
W. Baton Rouge	84.0	91.2	110.5	125.7	133.3	201.0	246.3	392.4
STATE TOTAL	61.4	66.6	77.6	90.2	103.0	139.0	166.7	231.5
Coastal Zone Total	93.4	102.3	117.2	149.9	178.8	228.8	269.9	301.3

Source: Department of Agriculture, Census of Agriculture.

TABLE VI

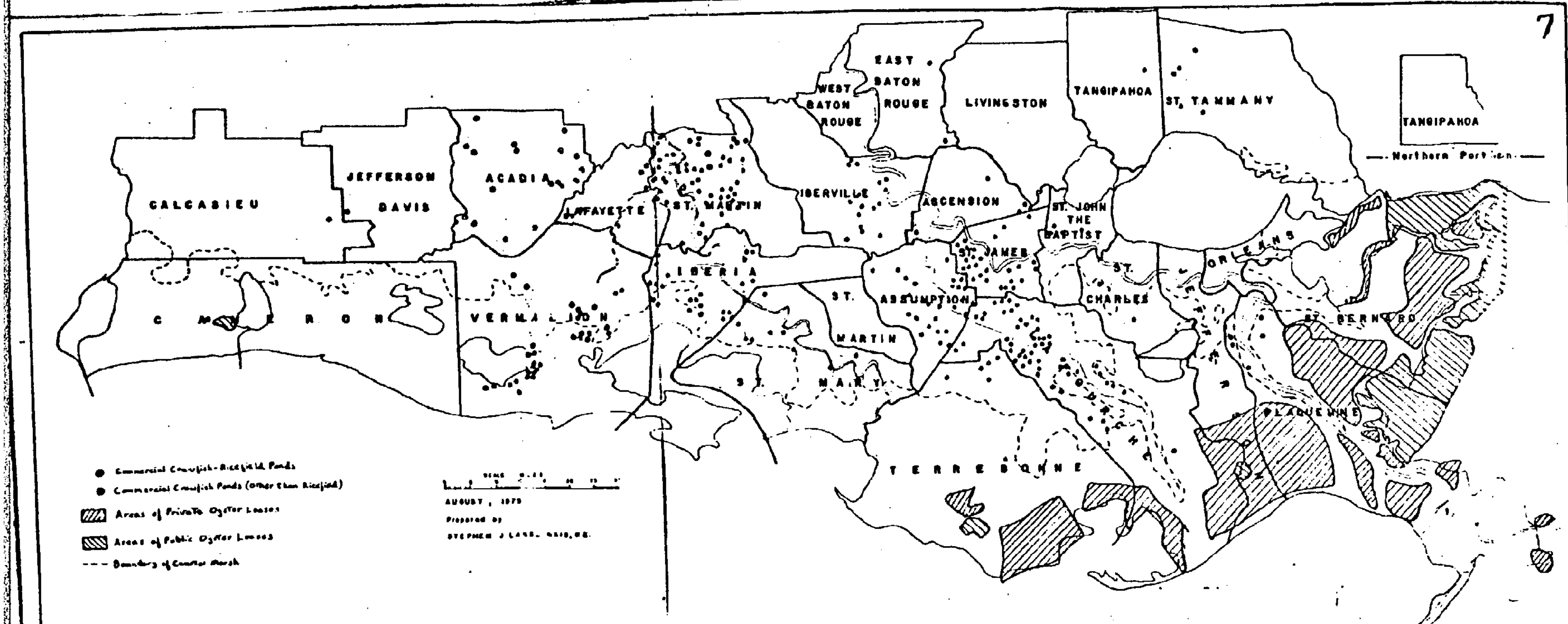
TOTAL COVERED EMPLOYEES

Parish	1954	1959	1964	1969
Acadia	4,921	5,293	5,645	6,301
Ascension	1,551	2,544	3,539	6,270
Assumption	1,522	1,634	1,975	2,791
Calcasieu	25,057	25,996	24,752	32,896
Cameron	672	606	1,254	2,509
E. Baton Rouge	47,101	55,574	57,057	81,253
Iberia	5,927	7,018	9,233	10,260
Iberville	2,181	2,648	3,366	5,312
Jefferson	16,557	30,859	42,864	63,247
Jeff Davis	3,135	3,101	3,161	4,031
Lafayette	10,141	14,426	18,487	25,871
Lafourche	5,607	7,497	10,269	10,610
Livingston	1,185	1,465	1,265	2,109
Orleans	185,908	182,397	201,047	224,172
Plaquemines	3,350	4,182	6,004	11,424
St. Bernard		5,685	6,265	7,524
St. Charles	3,541	3,473	3,877	7,555
St. James	1,433	2,694	2,092	3,331
St. John	1,602	1,509	3,033	2,864
St. Martin	1,325	1,379	1,884	3,275
St. Mary	5,851	7,750	12,139	16,477
St. Tammany	2,733	3,344	4,759	6,412

Parish	1954	1959	1964	1969
Tangipahoa	6,019	6,541	7,217	8,246
Terrebonne	6,506	8,032	12,528	16,442
Vermilion	3,252	3,390	5,645	6,241
W. Baton Rouge	593	1,115	1,188	1,397
STATE TOTAL	578,206	594,335	631,829	797,926
Coastal Zone Total	347,670	390,152	450,545	568,820
Coastal Zone Per State	60.1	65.6	71.3	71.3

Source: Department of Commerce, County Business Patterns.

7



TANGIPAHOA
Northern Portion
CALCASIEU
JEFFERSON DAVIS
ACADIA
LAFAYETTE
ST. MARTIN
IBERVILLE
WEST BATON ROUGE
EAST BATON ROUGE
LIVINGSTON
TANGIPAHOA
ST. TAMMANY
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ST. CHARLES
ORLEANS
ST. BERNARD
PLAQUEMINES
IBERIA
VERMILION
CAMERON
ST. MARTIN
ASSUMPTION
ST. MARY
TERREBONNE
Commercial Crawfish-Ricefield Ponds
Commercial Crawfish Ponds (Other than Ricefield)
Areas of Private Oyster Leases
Areas of Public Oyster Leases
Boundary of Coastal Marsh
AUGUST,
Prepared by

FIGURE 1

TABLE VII

RETAIL TRADE COVERED EMPLOYEES

Parish	1954	1959	1964	1969
Acadia	1,707	1,500	1,572	1,668
Ascension	656	748	834	1,318
Assumption	240	246	272	349
Calcasieu	4,655	5,173	5,013	6,712
Cameron	73	115	118	149
E. Baton Rouge	9,274	11,349	11,254	15,563
Iberia	1,445	1,902	1,929	2,349
Iberville	550	630	632	931
Jefferson	2,358	6,199	10,426	15,172
Jeff Davis	973	1,166	1,094	1,330
Lafayette	2,874	4,018	4,274	6,556
Lafourche	1,276	1,564	1,777	2,207
Livingston	315	410	421	722
Orleans	38,198	37,415	34,991	38,658
Plaquemines	190	355	529	852
St. Bernard	196	468	681	1,266
St. Charles	449	358	318	493
St. James	361	237	311	471
St. John	229	349	331	484
St. Martin	345	454	570	712
St. Mary	1,199	1,661	1,764	2,560
St. Tammany	856	1,043	1,446	1,895

Parish	1954	1959	1964	1969
Tangipahoa	1,652	2,030	2,383	2,744
Terrebonne	1,529	1,974	2,440	3,461
Vermilion	1,167	1,275	1,244	1,424
W. Baton Rouge	263	289	236	266
STATE TOTAL	110,229	122,561	127,640	160,952
Coastal Zone Total	73,030	82,928	86,851	110,312
Coastal Zone Per State	66.3	67.7	68.0	68.5

Source: Department of Commerce, County Business Patterns.

TABLE VIII

FIRST QUARTER MANUFACTURING EMPLOYMENT

Parish	1954	1959	1964	1969
Acadia	830	787	974	1,281
Ascension	430	1,092	1,305	2,560
Assumption	937	1,127	708	1,760
Calcasieu	7,671	8,092	7,444	8,956
Cameron		97		141
E. Baton Rouge	18,942	18,155	15,107	18,128
Iberia	1,250	1,177	1,519	1,723
Iberville	708	921	1,125	1,764
Jefferson	8,755	11,038	12,130	16,043
Jeff Davis	347	243	210	362
Lafayette	1,287	1,546	2,036	1,697
Lafourche	1,503	1,098	1,883	1,748
Livingston	506	468	331	390
Orleans	41,631	29,217	34,864	35,510
Plaquemines	683	1,322	747	827
St. Bernard	4,291	4,021	3,585	3,842
St. Charles	1,527	2,083	1,526	2,749
St. James	809	1,296	1,475	2,028
St. John	1,191	859	1,504	1,274
St. Martin	451	374	296	491
St. Mary	1,732	1,557	2,064	2,593
St. Tammany	925	1,057	1,243	1,446

Parish	1954	1959	1964	1969
Tangipahoa	2,471	2,193	2,235	2,022
Terrebonne	2,223	1,607	1,749	2,255
Vermilion	549	328	766	784
W. Baton Rouge	182	140	109	321
STATE TOTAL	151,729	135,756	142,712	172,882
Coastal Zone Total	101,831	91,895	95,760	112,695
Coastal Zone Per State	67.1	67.9	67.1	65.2

Source: Department of Commerce, County Business Patterns.

TABLE IX

HIRED FARM WORKERS
(More Than 150 Days)

Parish	1939	1944	1949	1954	1959	1964	1969	% Change
Acadia	1,516	284	978	4,456	441	509	481	- 68.3
Ascension	979	329	914	1,088	594	368	215	- 78.0
Assumption	2,248	1,477	1,527	1,430	991	947	507	- 77.4
Calcasieu	943	187	456	618	314	349	235	- 75.1
Cameron	266	48	141	161	52	49	57	- 78.6
E. Baton Rouge	1,127	291	522	318	371	208	167	- 85.2
Iberia	1,806	888	1,395	1,922	765	908	535	- 70.4
Iberville	1,451	1,015	843	1,658	615	789	340	- 76.6
Jefferson	310	159	181	253	46	36	31	- 90.0
Jeff Davis	841	443	1,085	714	395	513	547	- 35.0
Lafayette	522	338	656	3,635	348	323	264	- 49.4
Lafourche	2,816	1,800	1,575	1,190	866	849	521	- 81.4
Livingston	248	182	930	282	65	55	112	- 54.8
Orleans	158	54	93	10	50	26		- 83.8
Plaquemines	422	118	387	292	47	53	30	- 92.8

Parish	1939	1944	1949	1954	1959	1964	1969	% Change
St. Bernard	221	103	286	67	12	15	16	- 92.8
St. Charles	320	173	189	224	126	139	57	- 82.2
St. James	1,228	722	990	1,073	357	825	281	- 77.1
St. John	661	637	622	574	198	354	207	- 68.7
St. Martin	599	607	812	2,690	264	396	263	- 56.1
St. Mary	3,121	1,444	2,005	1,587	681	1,108	680	- 78.2
St. Tammany	486	175	796	630	216	242	188	- 61.3
Tangipahoa	982	313	3,860	1,431	424	463	375	- 61.8
Terrebonne	1,705	816	1,256	826	508	474	296	- 82.6
Vermilion	1,209	345	1,058	2,017	309	462	434	- 64.1
W. Baton Rouge	1,455	684	727	1,771	511	673	240	- 83.5
STATE TOTAL	56,712	18,954	41,972	53,305	17,409	20,590	14,743	- 74.0
Coastal Zone Total	27,640	13,632	24,284	30,917	9,566	11,138	7,079	- 74.4
Coastal Zone Per State	48.7	71.9	57.9	28.7	54.9	54.1	48.0	

Source: Department of Agriculture, Census of Agriculture.

TABLE X

FIRST QUARTER TOTAL COVERED PAYROLLS
(Thousands of Dollars)

Parish	1954	1959	1964	1969
Acadia	2,657	3,487	5,020	6,671
Ascension	718	2,414	4,315	11,433
Assumption	812	1,503	2,439	4,447
Calcasieu	21,844	27,311	30,140	52,117
Cameron	564	572	1,584	4,481
E. Baton Rouge	40,403	62,917	71,731	130,703
Iberia	3,588	5,511	10,030	13,703
Iberville	1,143	2,171	4,080	8,575
Jefferson	12,992	30,243	50,365	95,496
Jeff Davis	1,805	2,242	2,942	4,744
Lafayette	6,344	11,774	20,382	35,366
Lafourche	3,577	5,897	10,850	13,800
Livingston	549	942	972	2,232
Orleans	131,609	165,454	228,421	329,056
Plaquemines	2,701	5,010	9,077	22,246
St. Bernard		7,349	9,442	13,146
St. Charles	3,309	4,771	5,801	14,650
St. James	1,007	3,372	2,914	6,637
St. John	1,262	1,202	4,037	4,586
St. Martin	756	850	1,737	3,548
St. Mary	4,076	6,873	15,491	26,280
St. Tammany	1,579	2,298	4,169	7,714

Parish	1954	1959	1964	1969
Tangipahoa	2,893	4,076	5,392	7,885
Terrebonne	3,643	6,860	14,938	23,851
Vermilion	1,574	2,394	3,700	7,954
W. Baton Rouge	305	756	1,038	1,934
STATE TOTAL	399,945	555,303	708,223	1,145,906
Coastal Zone Total	251,710	368,249	523,007	853,255
Coastal Zone Per State	62.9	66.3	73.8	74.5

Source: Department of Commerce, <u>County Business Patterns</u>.

TABLE XI

FIRST QUARTER RETAIL PAYROLLS
(Thousands of Dollars)

Parish	1954	1959	1964	1969
Acadia	794	872	1,047	1,413
Ascension	302	410	585	1,251
Assumption	94	128	169	300
Calcasieu	2,638	3,407	3,782	6,082
Cameron	22	63	65	98
E. Baton Rouge	5,146	8,034	9,051	15,857
Iberia	629	1,080	1,319	2,036
Iberville	251	312	419	784
Jefferson	1,213	4,032	8,270	15,371
Jeff Davis	422	710	809	1,343
Lafayette	1,298	2,397	3,175	6,027
Lafourche	636	960	1,390	2,081
Livingston	156	262	310	716
Orleans	20,864	25,166	27,495	38,873
Plaquemines	79	187	450	1,016
St. Bernard	96	228	451	944
St. Charles	261	208	235	440
St. James	149	153	247	433
St. John	94	159	190	363
St. Martin	144	220	337	546
St. Mary	579	1,026	1,358	2,319
St. Tammany	396	568	1,023	1,732

Parish	1954	1959	1964	1969
Tangipahoa	754	1,286	1,643	2,433
Terrebonne	761	1,330	1,906	3,717
Vermilion	481	699	800	1,179
W. Baton Rouge	91	115	120	190
STATE TOTAL	57,671	78,124	96,284	154,009
Coastal Zone Total	38,350	54,012	66,646	107,535
Coastal Zone Per State	66.4	69.1	69.2	69.8

Source: Department of Commerce, County Business Patterns.

TABLE XII

TOTAL FIRST QUARTER MANUFACTURING PAYROLLS
(Thousands of Dollars)

Parish	1954	1959	1964	1969
Acadia	486	584	912	1,265
Ascension	189	1,430	2,000	6,096
Assumption	461	1,213	903	3,074
Calcasieu	8,249	11,623	12,599	19,875
Cameron		81		191
E. Baton Rouge	20,246	29,652	28,186	41,000
Iberia	834	943	1,630	2,346
Iberville	374	1,023	1,921	3,641
Jefferson	7,983	13,007	17,477	29,586
Jeff Davis	225	155	173	436
Lafayette	769	1,406	2,080	2,428
Lafourche	991	854	2,028	2,565
Livingston	229	276	233	461
Orleans	31,949	29,081	48,605	64,376
Plaquemines	217	840	941	1,514
St. Bernard	3,086	6,126	6,697	8,549
St. Charles	1,698	3,519	3,248	6,619
St. James	706	1,783	2,417	4,886
St. John	1,073	858	2,119	2,473
St. Martin	224	253	244	458
St. Mary	1,242	1,515	2,526	4,426
St. Tammany	644	845	1,355	2,331

Parish	1954	1959	1964	1969
Tangipahoa	1,148	1,264	1,731	2,044
Terrebonne	883	976	1,692	2,853
Vermilion	326	278	653	754
W. Baton Rouge	115	113	115	591
STATE TOTAL	120,962	152,149	197,336	308,001
Coastal Zone Total	84,347	109,698	140,755	214,838
Coastal Zone Per State	69.7	72.1	71.3	69.7

Source: Department of Commerce, <u>County Business Patterns</u>.

TABLE XIII

CASH PAID FOR HIRED FARM WORKERS
(Thousands of Dollars)

Parish	1940	1945	1950	1955	1960	1965	1969	% Change
Acadia	545	1,223	926	1,254	1,199	1,196	1,739	219
Ascension	236	475	815	835	1,026	731	981	316
Assumption	912	1,722	1,619	1,716	1,735	2,294	1,908	109
Calcasieu	249	313	540	649	918	888	986	296
Cameron	58	124	195	262	198	180	293	405
E. Baton Rouge	251	270	291	264	705	449	558	122
Iberia	935	1,986	952	1,238	1,401	2,037	1,944	108
Iberville	670	904	1,546	855	823	1,227	1,340	100
Jefferson	125	175	253	132	99	52	120	- 4
Jeff Davis	430	1,164	1,163	972	975	1,157	1,943	352
Lafayette	84	535	1,162	863	768	809	950	1,031
Lafourche	804	1,693	1,755	1,434	1,551	2,181	1,970	145
Livingston	104	139	115	159	111	211	464	346
Orleans	44	87	90	7	298	82		86
Plaquemines	104	189	363	163	212	176	98	- 6
St. Bernard	32	110	133	41	38	82	96	200

Parish	1940	1945	1950	1955	1960	1965	1969	% Change
St. Charles	140	195	244	240	154	250	243	74
St. James	385	665	944	872	625	575	1,225	218
St. John	139	659	695	525	429	770	592	326
St. Martin	184	506	705	736	457	860	803	336
St. Mary	787	1,782	1,946	1,487	1,287	2,331	2,702	243
St. Tammany	89	265	595	458	549	649	748	740
Tangipahoa	355	572	587	1,055	799	1,271	1,491	320
Terrebonne	545	1,020	862	885	746	1,277	990	82
Vermilion	349	1,635	1,059	1,149	1,054	1,067	1,551	344
W. Baton Rouge	336	652	911	875	911	1,062	977	191
STATE TOTAL	14,546	30,102	38,912	39,378	40,030	46,237	56,651	289
Coastal Zone Total	8,892	19,060	20,266	19,126	19,068	23,864	26,712	200
Coastal Zone Per State	61.1	63.3	52.1	48.6	47.7	51.6	47.1	

Source: Department of Agriculture, Census of Agriculture.

TABLE XIV

MARKET VALUE OF AG. PRODUCTS SOLD

Parish	1939	1944	1949	1954	1959	1964	1969	% Change
Acadia	4,578,380	10,449,919	11,403,991	18,800,059	15,558,017	19,799,050	21,800,855	376.2
Ascension	837,026	1,277,795	2,663,039	2,573,280	2,461,547	3,030,150	3,965,196	373.7
Assumption	1,846,727	3,218,911	5,079,793	5,364,393	4,756,552	6,617,250	7,813,408	323.1
Calcasieu	1,777,791	2,085,880	6,136,857	8,800,157	10,850,255	13,104,500	13,332,257	649.9
Cameron	485,577	788,866	1,670,109	2,357,827	2,559,392	2,705,550	3,193,316	557.6
E. Baton Rouge	228,683	463,185	2,299,889	1,440,005	2,800,393	3,048,350	5,202,065	2174.8
Iberia	2,078,255	3,920,694	5,310,014	6,085,592	6,861,090	8,809,050	11,160,253	437.0
Iberville	1,141,250	2,074,807	3,242,748	3,701,813	3,443,313	4,481,850	7,857,520	588.5
Jefferson	80,010	209,834	1,291,456	1,263,314	589,499	613,305	450,627	463.2
Jeff Davis	2,925,001	6,593,649	10,113,482	15,156,061	14,215,230	19,280,500	22,903,980	683.0
Lafayette	1,754,769	4,609,302	6,341,000	8,879,248	6,981,248	7,763,250	9,903,144	464.4
Lafourche	1,761,954	4,018,510	4,499,048	5,329,181	5,885,395	7,156,150	8,713,454	394.0
Livingston	775,073	1,130,667	1,610,910	1,757,214	2,830,834	6,774,050	9,352,152	1106.6
Orleans	168,613	243,603	623,746	407,444	909,485			
Plaquemines	324,536	814,191	1,101,951	923,407	1,052,268	470,185	463,889	42.9

Parish	1939	1944	1949	1954	1959	1964	1969	% Change
St. Bernard	59,292	383,070	377,437	247,798	258,809	244,015	280,206	372.6
St. Charles	222,187	304,033	703,357	847,721	635,234	999,245	1,135,845	411.2
St. James	1,013,691	1,816,879	2,698,390	3,746,531	3,082,485	4,586,450	5,184,242	411.4
St. John	500,029	1,249,329	1,626,373	1,601,380	1,711,053	2,265,250	1,911,385	282.2
St. Martin	1,489,430	3,150,974	4,566,921	6,094,682	4,111,899	5,456,850	5,739,298	285.3
St. Mary	1,580,776	3,580,532	4,655,110	4,599,703	6,348,360	6,432,050	8,789,206	456.0
St. Tammany	122,394	793,176	2,082,919	2,379,049	2,473,386	2,749,650	3,817,407	3018.9
Tangipahoa	2,215,612	2,672,167	7,484,828	10,343,527	11,643,964	19,252,500	27,168,075	1126.2
Terrebonne	1,123,203	1,953,875	2,254,108	2,784,825	3,367,867	3,433,550	4,016,918	257.6
Vermilion	3,773,960	8,050,304	11,327,099	19,472,194	18,064,379	21,964,500	23,994,443	535.8
W. Baton Rouge	691,824	1,238,604	1,973,116	2,216,246	2,409,875	2,431,550	3,518,714	408.6
STATE TOTAL	75,702,310	146,143,335	245,730,002	309,790,562	334,907,581	406,795,000	496,406,133	555.7
Coastal Zone Total	33,544,000	67,078,000	103,125,000	137,162,000	135,850,000	173,460,000	211,657,900	530.9
Coastal Zone Per State	44.3	45.9	42.0	44.3	45.6	42.6	42.6	

Source: Department of Agriculture, Census of Agriculture.

TABLE XV

TIMBER SEVERANCE TAXATION
(Thousands of Dollars)

Parish	1959	1964	1969	1974
Acadia	2.2	1.6	5.7	9.2
Ascension	1.7	1.3	3.0	.7
Assumption	.7	.6	.2	.6
Calcasieu	6.2	3.6	13.5	40.9
Cameron	---	---	---	---
E. Baton Rouge	4.3	2.2	4.9	7.8
Iberia	---	---	---	---
Iberville	4.1	2.7	3.1	6.2
Jefferson	---	---	---	---
Jeff Davis	.7	.6	3.7	11.0
Lafayette	---	---	---	---
Lafourche	3.3	1.9	---	1.3
Livingston	15.1	21.8	85.1	177.4
Orleans	---	---	---	.1
Plaquemines	---	---	---	---
St. Bernard	---	---	---	---
St. Charles	.4	---	---	---
St. James	1.2	.4	.5	.3
St. John	.6	.2	.6	.2
St. Martin	1.3	2.8	2.4	3.2
St. Mary	---	---	.2	1.8
St. Tammany	15.9	11.8	20.1	63.4

Parish	1959	1964	1969	1974
Tangipahoa	18.9	22.7	37.3	75.6
Terrebonne	.6	.9	.3	.9
Vermilion	.9	.4	---	---
W. Baton Rouge	2.1	1.5	1.5	1.7
STATE TOTAL	657.7	758.4	1427.4	3019.7
Coastal Zone Total	80.2	77.0	182.1	402.3
Coastal Zone Per State	12.2	10.1	12.7	13.3

Source: Louisiana Forestry Commission.

TABLE XVI

LANDOWNER FOREST INCOME
(Millions of Dollars)

Parish	1959	1964	1969	1974
Acadia	.005	.050	.225	.330
Ascension	-----	.056	.070	.021
Assumption	-----	.026	.008	.023
Calcasieu	.010	.112	.391	1.501
Cameron	-----	-----	-----	-----
E. Baton Rouge	.005	.085	.180	.331
Iberia	-----	.002	-----	-----
Iberville	-----	.117	.135	.275
Jefferson	-----	-----	.001	.001
Jeff Davis	.001	.023	.119	.415
Lafayette	-----	-----	-----	-----
Lafourche	-----	.084	-----	.059
Livingston	.025	.755	3.462	7.335
Orleans	-----	-----	-----	.006
Plaquemines	-----	-----	-----	-----
St. Bernard	-----	-----	-----	-----
St. Charles	-----	.004	-----	.002
St. James	-----	.019	.021	.008
St. John	-----	.010	.025	.008
St. Martin	-----	.098	.100	.140
St. Mary	-----	-----	.010	.083
St. Tammany	.040	.331	.612	2.572

Parish	1959	1964	1969	1974
Tangipahoa	.050	.757	1.257	2.829
Terrebonne	-----	.038	.013	.040
Vermilion	-----	.018	.003	-----
W. Baton Rouge	.004	.068	.057	.069
STATE TOTAL	1.509	25.130	50.251	110.622
Coastal Zone Total	.140	2.653	6.689	16.048
Coastal Zone Per State	9.3	10.6	13.3	14.5

Source: Louisiana Forestry Commission.

TABLE XVII

FORESTRY PRODUCTION IN THE COASTAL ZONE

Parish	Pulpwood[1] 1959	Pulpwood[1] 1974	Sawtimber[2] 1959	Sawtimber[2] 1974
Acadia	4.7	11.4	2.3	3.9
Ascension	.3	3.8	5.7	.2
Assumption	.7	1.1	1.9	.6
Calcasieu	10.3	39.1	6.2	16.2
Cameron	----	----	----	----
E. Baton Rouge	4.8	4.2	7.2	5.0
Iberia	----	----	----	----
Iberville	.8	1.4	14.1	6.8
Jefferson	----	----	----	----
Jeff Davis	1.3	11.7	.8	4.6
Lafayette	----	----	----	----
Lafourche	----	----	----	----
Livingston	24.9	99.7	24.5	81.0
Orleans	----	----	----	----
Plaquemines	----	----	.1	----
St. Bernard	----	----	----	----
St. Charles	----	----	1.4	.1
St. James	.6	.8	3.9	.1
St. John	.6	----	1.9	.2
St. Martin	----	----	3.6	3.1
St. Mary	----	----	.2	1.7
St. Tammany	40.7	38.2	11.9	27.8

Parish	Pulpwood[1] 1959	Pulpwood[1] 1974	Sawtimber[2] 1959	Sawtimber[2] 1974
Tangipahoa	50.1	85.7	16.4	28.6
Terrebonne	----	----	1.6	1.2
Vermilion	----	----	3.4	----
W. Baton Rouge	3.7	2.9	6.8	1.6
STATE TOTAL	1509.0	3754.2	824.7	1193.5
Coastal Zone Total	143.5	300.0	122.1	184.4
Coastal Zone Per State	9.5	8.0	14.8	15.4

[1] Thousand Standard Cords.

[2] Million Boardfeet.

Source: Louisiana Forestry Commission.

TABLE XVIII

EMPLOYMENT AND EARNINGS IN COASTAL
FORESTRY - RELATED ACTIVITIES

Parish	Employment 1959	Employment 1969	Earnings[1] 1959	Earnings[1] 1969
Acadia	----	----	----	----
Ascension	----	----	----	----
Assumption	----	----	----	----
Calcasieu	187	124	460	456
Cameron	----	----	----	----
E. Baton Rouge	419	377	1592	1868
Iberia	----	----	----	----
Iberville	201	----	396	----
Jefferson	373	1403	1352	9880
Jeff Davis	----	----	----	----
Lafayette	----	----	----	----
Lafourche	----	----	----	----
Livingston	426	180	956	600
Orleans	2344	1793	7928	9280
Plaquemines	----	----	----	----
St. Bernard	----	----	----	----
St. Charles	----	----	----	----
St. James	----	----	----	----
St. John	----	----	----	----
St. Martin	----	----	----	----
St. Mary	----	----	----	----
St. Tammany	215	157	460	688

Parish	Employment 1959	Employment 1969	Earnings[1] 1959	Earnings[1] 1969
Tangipahoa	1256	969	2900	4032
Terrebonne	----	----	----	----
Vermilion	----	----	----	----
W. Baton Rouge	----	----	----	----
STATE TOTAL	34710	32164	129160	201952
Coastal Zone Total	5623	5003	16044	26804
Coastal Zone Per State	16.2	15.6	12.4	13.3

[1] Thousands of dollars

Source: Department of Commerce, County Business Patterns.

SECTION IV

A REPORT ON AQUACULTURE IN LOUISIANA'S COASTAL ZONE

By Prescott L. Williams

Department of Biology
University of Southwestern Louisiana
Lafayette, Louisiana 70501

Edited by Richard A. Pecora

Department of Biology
University of Southwestern Louisiana
Lafayette, Louisiana 70501

TABLE OF CONTENTS

Chapter	Title
1	Introduction
2	Area Description
3	Oyster Culture
4	Crawfish Culture
5	Catfush Culture
6	Summary and Conclusion

INTRODUCTION

The 26 parish area of Louisiana's Coastal Zone includes extensive marsh or tidally influenced areas. Approximately 30% of the Coastal Zone is classified as coastal marsh. The marsh has esthetic, recreational, agricultural, and economic values. The value of this marsh is more difficult to quantify than the remaining 70% of the Coastal Zone, where the value of tangible resources such as forests and agricultural lands is more easily assessed.

In addition to the recreational and esthetic value of the marsh-dependent mammals and water fowl, the estuarine areas of the Gulf Coast support a recreational fishery of approximately 100 million pounds annually.

The major portion of the total commercial fishery catch of the Gulf coast is made up of estuarine dependent species. In addition to the value of the marsh as a nursery ground for Gulf of Mexico fishes and shellfishes, the marsh-estuary complex provides commercial and sport fishery returns of $100.00 per acre per year (Gosselink et al., 1974). Undisturbed estuarine marsh areas perform both secondary and tertiary waste treatment in urban areas. The cost for the same degree of waste treatment would approach $50,000.00 per year for each acre of undisturbed marsh. The value of waste assimilation and total life support work provided by estuarine marshes is several times higher than the value of by-products such as fisheries (Gosselink, et al., 1974).

Within the 26 parish area of southern Louisiana known as the Coastal Zone there are three types of aquacultural endeavors which are practiced on a commercial scale. These three, catfish, crawfish, and oyster culture, must all experience some degree of a human management technique in order to be classified as an aquacultural activity. The production of catfish and oysters from the Coastal Zone of Louisiana is almost entirely dependent on some form of managed endeavor, whereas the production of crawfish from managed ponds can only be considered supplemental to the harvests of wild stocks of Louisiana crawfish. In 1973 approximately 50% of the commercial crop of crawfish from southern Louisiana came from managed ponds.

Obviously all of Louisiana's oyster production is in the Coastal Zone and this crop is almost exclusively dependent upon management techniques such as transplanting and controlled fresh water diversion programs. Unfortunately there are practically no naturally reproducing and proliferating oyster beds of commercial size in Louisiana. Through management techniques, the areas of the Louisiana coast which are capable of supporting the popular edible oyster (<u>Crassostra virginica</u>) are producing at levels above natural productivity.

By establishing areas which are condusive to the setting of new oyster larvae and subsequently transplanting the developing larvae to more suitable growing areas, the oyster industry is making efficient use of the remaining oyster grounds. Approximately 99% of the acceptable oyster grounds lie within the five parishes adjacent to and including the Mississippi River delta. During the last two decades, industrialization and associated activities within the northern delta have severely reduced the productivity of many oyster grounds.

The crawfish industry is unique to the Coastal Zone. Crawfish are cultured primarily within the non-estuarine marsh areas of the Coastal Zone. Crawfish ponds are classified as either swamp, open, or ricefield ponds depending on the extent of levee construction and pond bottom clearing. The majority of the crawfish pond acreage is located in the Bayou Teche and Bayou Lafourche areas of the Coastal Zone. The reasons for this are primarily socio-economic, whereas the exclusion of crawfish farming from the estuarine marshes is due to environmental and/or biological factors.

Of primary importance to the crawfish culturist is his proximity to an appreciative and responsive market. Such a market undoubtedly exists today in much of the south central and southeastern portions of Louisiana. Future expansion of this market into nearby states is dependent on the expansion of processing facilities and effective promotional advertizing. Although crawfish survival is dependent on low habitat salinity (Loyacana, 1967), the primary factor controlling the distribution of the industry is market availability. In the western portion of the Coastal Zone the demand for crawfish is high. The practice of combined rice and crawfish farming is popular but in reality, does not support the commercial demand.

Catfish farming is totally absent from the coastal marshes and compared to the activity in northern and central Louisiana is sparse in the remainder of the Coastal Zone. Catfish farmers are currently facing unfavorable economic realities, due to feed costs which will undoubtedly hamper future growth of this activity.

Management techniques are very attractive to the catfish farmer, as they maintain yields far above natural yields. The control of growth and maturation processes through various management techniques is of major importance to the catfish farmer and processor. These techniques enable the individual farmer to predict and periodically schedule his harvests, thus ensuring a continuous supply of fresh marketable catfish.

Several factors are responsible for the distribution of catfish farming within the Coastal Zone. Foremost of these is the type of soil available in which to construct catfish ponds. The success of any catfish farming operation is dependent upon the degree of control which the farmer has over the levels and quality of water in his ponds. Although experimental ponds in the coastal marshes have produced good yields of catfish, the high cost of pond construction and the organic nature of the soil are obstacles to commercial success in the marshes. Catfish farmers are beset with tremendous feed prices, due to unavoidable South American fishing failures. The added cost of maintaining levees and low salinity in the coastal marshes would be prohibitive.

State, Federal, and private interests have attempted to determine the feasibility of applying aquacultural methods to other species. Although the majority of these studies have elucidated problems associated with the establishment of commercial aquacultural species, further research and technological development may facilitate expansion. Shrimp is a possible major addition to aquaculture in the Coastal Zone. Raceway culture of shrimp has been developed by the National Marine Fisheries Service in the Texas Gulf Coast. de la Bretonne and Avault (1970) recorded favorable growth of shrimp behind weirs but found harvesting to be a major problem. The culture of mullet (Joanen, 1970), croaker (Avault et al., 1969), and pompany (Joanen, 1970) has also been investigated.

The raising of alligators under controlled conditions has great potential and has proven practical in several locations. The wild alligator stocks within the Coastal Zone are justifiably classified as endangered. However, the economic potential of domesticated alligator crops should be realized. Pen raised alligators produce a high quality hide and grow to an optimal size faster than wild animals. Alligator culture can be a means of relieving pressure on wild stocks since cultured hides have a greater economic value than those from wild specimens.

The Coastal Zone also produces commercial harvests of frogs. The difficulties of growing domesticated animals and the ease of collecting wild specimens are most likely responsible for the commercial use of only wild specimens (Personal communication, J. Weil, 1975).

In the context of this study the importance and distribution by parish of each of the three major aquacultural activities are listed and discussed. Factors affecting the distributional patterns and their potential for expansion are also discussed.

II. AREA DESCRIPTION

Louisiana's Coastal Zone encompasses 13,846,400 acres (21,635 square miles) including the coastal marshes and their associated lakes, bays, and sounds within the various parish boundaries. The Coastal Zone can be divided into the more northern, non-marsh areas totaling 7,663,168 acres (11,974 square miles) and the marshes. The marshes include the adjacent water bodies out to the parish lines and total 6,183,232 acres (9,661 square miles). These bodies of water include 1,971,132 acres (3,080 square miles) of conspicuously large (greater than 7,000 acres) water bodies which are included because of their utilization as oyster bottoms.

Aquacultural activities are almost exclusively restricted to specific areas within the Coastal Zone (See Figure 1). Oyster bottoms are found exclusively in the submerged coastal areas and adjacent emergent marsh areas which together comprise approximately 45% of the total dry and submerged lands of the Coastal Zone. However, both catfish and crawfish farming activities are conspicuously absent from the coastal marshes and are distributed, although unevenly, in the remaining 55% of the Coastal Zone. The successful commercial crawfish farming area west of Vermilion Bay is a notable exception to this distributional pattern. The emergent marsh land totals 4,212,100 acres (6,581 square miles) (Chabreck, 1971) of land covered primarily with grasses. The salinity of the marshes, the vegetative types present, and the surface soil characteristics render a great deal of Louisiana's coastal marshes unsuitable for catfish and crawfish farming operations.

The majority of the land in the more northern, non-marsh area is suitable for either catfish or crawfish cultural operations. Conflicting land usage is the primary factor which usually limits expansion of aquacultural activities into the northern Coastal Zone.

III. OYSTER CULTURE

Oyster culture, along the Louisiana coast, began in the late 1850's when fishermen began moving oysters from areas which produced smaller, less tasty oysters to beds which were well known for their larger, tastier yields (Pausina, 1970). The growth of this industry lead to the establishment of the Louisiana Oyster Commission in 1902. Louisiana continues to receive economic and cultural benefits from the yearly harvesting of oysters in coastal waters. In the first nine months of 1974, Louisiana's oyster harvest was 6.79 million pounds of meat and was valued at 4.02 million dollars.

The practice of transplanting is the primary management technique utilized by the oyster industry to maintain a continued commercially profitable harvest. The primary reason for transplanting oysters is to avoid the setting of new spat (oyster larva) on already existing oysters and thus smothering them (Pausina, 1970). Generally, seed oysters (small oysters which have grown on suitable substrate, usually planted clam shell) are removed by dredging from the state-managed seed grounds east of the Mississippi River, then transported to private leases on both sides of the river where they are planted, cultivated, and allowed to fatten prior to marketing (Pollard, 1973). Certain areas are utilized specifically for oyster seed production and the public and private lease areas are used to fatten the oysters for the commercial trade. The locations of seed reservations were chosen because of their great natural prolificacy and are areas of relative stable salinity since juveniles do not have the euryhaline tolerance of mature oysters (Pollard, 1973). Within two years of setting or when the oyster is at least 6 cm in height and thus able to withstand the necessary salinity change, they are transplanted to areas which are usually closer to the Gulf of Mexico. Approximately 90% of the oyster seed producing grounds lie east of the Mississippi River (Pausina, 1970). The importance of these seed grounds is evident when we realize that all of the oyster production east of the Mississippi River and 80% of the oyster production from the Mississippi River west to the Atchafalaya River is dependent upon seed oysters obtained east of the Mississippi River (Perret, et al., 1971).

Distribution of Oyster Culture

The five primary oyster producing parishes in Louisiana are Plaquemines, St. Bernard, Terrebonne, Jefferson, and Lafourche. The combined oyster acreage in these parishes is 580,107 acres (Table 1) or more than 99% of Louisiana's total oyster acreage. In the several years prior to 1973, these five parishes produced a combined average of 270,000 barrels or 3,923,100 pounds of oyster meat per year (Pollard, 1973).

Plaquemines Parish and St. Bernard Parish are undoubtedly the most important oyster producing parishes since their combined acreage of oyster bottoms account for 90% of the total in the Coastal Zone. The oyster bottoms in these two parishes are indirectly responsible for the success of the entire Louisiana oyster industry, for their acreage includes more than 450,000 acres of seed grounds, most of which are being nurtured for future seeding purposes.

Over the last twenty years, steadily increasing salt water intrusion has reduced the effectiveness of these seed grounds by some 60-65%. Periods of drought, industrial development with its accompanying canalization and dredging, and the implementation of the Mississippi River-Gulf Outlet Channel are the acknowledged causes for this intrusion. With the rise in salinity, oyster predators, such as the Southern oyster drill (*Thais haemastoma*) and pathogens, particularly the fungus *Labyrinthomyxa marina*, have become widespread in this area. The diversion of fresh water from the Mississippi River through controlled outlets into this area east of the river may restore these seed grounds to their full potential (Pollard, 1973). Recently investigations into the feasibility of raising oysters suspended beneath oilfield production platforms were begun. The idea is attractive since it may provide uses for any non-producing platforms and also supplement the value of those still producing (Ogle, 1975). Although still subject to the same environmental constraints that affect any oyster community, the increased susceptibility of suspended oyster cultures to wave action, storm damage, and contamination from operational platforms is considerable.

Mackin and Hopkins (1961) correlated high temperature and salinity to widespread oyster mortalities. This study indicated only local detrimental effects of various oil production operations on oyster mortalities. Future research and development should determine if a tremendous potential increase in suitable oyster habitat is possible from the utilization of Louisiana's estuarine petroleum and natural gas production platforms in addition to utilization of new areas adjacent to existing petroleum operations.

IV. CRAWFISH CULTURE

The crawfish is so much a part of the Acadiana Region of southern Louisiana that it symbolizes the Acadian culture. In southern Louisiana crawfishing is both a commercial and recreational pursuit. In the first three quarters of 1974, the Louisiana crawfish harvest was 6.75 millions pounds and had a value of 4.02 million dollars. This industry in Louisiana is characterized by increased yearly growth in both production and profit.

Crawfish collecting and the subsequent organized crawfish farming are undoubtedly old practices in Louisiana. Although rice farmers attempted to grow crawfish in fields in the late 1940's, the first true crawfish farms were not developed until a decade later. Increased interest resulted in the Louisiana Wildlife and Fisheries Commission's 1966 Crawfish Project which attempted to improve cultural procedures. With increased publicity and the opening of new markets in other areas of the country, future growth of this unique fishery is likely.

Although 27 species of crawfish naturally occur in Louisiana, the 2 popular edible types are the white river crawfish (*Procambarus blandingi acutus*) and the red swamp crawfish (*P. clarki*). The red swamp crawfish is the better suited of these two species for any of the pond culture activities encountered in the Coastal Zone because it is more fecund and more tolerant of low dissolved oxygen conditions (LaCaze, 1963). The red swamp crawfish can almost be considered indigenous to the

Louisiana Coastal Zone since it occurs naturally in coastal ricefields, fresh water fields at or near sea level, and in most interior river valleys of the area (LaCaze, 1963). It does not naturally occur in brackish water but tolerates low salinities.

Crawfish produced from commercially managed impoundments in the Louisiana Coastal Zone can be divided into three categories, depending upon the type of habitat improvement practice utilized. The most popular type of impoundment for commercial use is the "swamp pond." These ponds are maintained by combinations of natural and man-made levees. The larger rooted vegetation is usually left standing which hampers and often prevents intensive harvesting efforts (LaCaze, 1963). However, these ponds require the least amount of maintenance and usually the least initial effort to construct. "Swamp ponds" account for 21,340 acres or 51% of the crawfish acreage in the Coastal Zone (Gary, 1973).

The second type of crawfish pond is the "open pond." Earthen levees are constructed so as to allow 12-30 inches of water to stand in the impoundment and all rooted vegetation is removed prior to flooding (LaCaze, 1963). Complete intensive harvesting is usually possible in "open ponds" and yields of 500-700 pounds of crawfish per acre are not uncommon. There are approximately 17,270 acres of "open crawfish ponds" in the coastal zone, or 41% of the total crawfish acreage.

The culture of rice and crawfish together or alternately in the same fields, is not as widely practiced as might be expected. Although such culture has been practiced commercially since 1947 (Gary, 1973), its expansion throughout the rice growing areas of the western Coastal Zone has been severely limited. The use of pesticides and the necessity of altering dike formations deter rice farmers from establishing a crawfish culture operation. The only advantage which a rice farmer has over any other land owner wishing to raise crawfish, is his water pumping facilities. Although rice fields are already leveed, the height of these levees is usually insufficient to maintain a water depth capable of providing protective cover in the fall for the newly hatched crawfish.

Other requirements for successful crawfish culture which are incompatible with rice farming techniques are: 1) no contamination of fields with insecticides, 2) rice stubble and straw should be left in the field after harvest to decay and provide food for the young crawfish and protective cover from birds, and 3) filtering of water supply to remove predatory fish and invertebrates during flooding (Hill, et al., 1972). There are only 3,648 acres of "rice field" crawfish ponds in the Coastal Zone. This is less than 9% of the total crawfish acreage in the Coastal Zone.

Distribution of Crawfish Culture

Crawfish pond acreage is conspicuously concentrated in the Bayou Teche and Bayou Lafourche areas of the Coastal Zone. St. Martin, Iberia and St. Mary parishes, adjacent to Bayou Teche, contain 14,334 acres or 41% of the crawfish acreage in the zone. Ascension, Assumption, St. James, and Lafourche parishes contain 11,655 acres of ponds in the Bayou Lafourche area, which is 33% of the Coastal Zone's crawfish acreage.

St. Martin Parish contains the greatest acreage (10,169) devoted to commercial crawfish (Tables 1 and 2). St. James Parish ranks second in acreage with 8,285 acres which represents almost 5% of the parish area while St. Martin Parish has slightly less than 2% of its total area devoted to crawfish production.

Several other parishes such as Ascension, Assumption, Iberia, and Vermilion contain significant concentrations of crawfish ponds, all with more than 0.5% of their area in crawfish acreage. Vermilion Parish is of particular interest since the majority of its crawfish acreage lies within the coastal marshes south and east of White Lake. Crawfish ponds are virtually non-existent in the coastal marshes elsewhere in the Coastal Zone.

The coastal marsh west of Vermilion Bay (see Figure 1). is characterized by soils containing greater amounts of clay and less organic matter than those in the marshes to the east. This marsh area, known as the Chenier Plain (Chabreck, 1970), is geologically more stable than the eastern marshes and subsidence is not as great of a problem as it is east of Vermilion Bay. There are areas within the Chenier Plain with salinities and soil characteristics which render them completely unsuitable for crawfish culture. However, the prominent chenier complexes provide areas for potential expansion of crawfish farming westward from White Lake.

V. CATFISH CULTURE

Farm raised catfish are widely advertised in Louisiana's Coastal Zone but in reality they are not as abundant here as the advertising indicates (see Kilburn, 1972). Catfish farming is much more popular in the northern section of the Mid-South, such as southern and eastern Arkansas, Mississippi, and Alabama. Within Louisiana, the fourth ranked catfish producing state, the total acreage in catfish production amounts to 6,400 acres, of which only 550 acres are in the Coastal Zone. There were 678 acres in catfish production within the Coastal Zone in 1969 (Kilburn, 1972). The acreage has been therefore reduced in this area by almost 19% in the past six years or approximately 3.25% per year. The annual catfish harvest in the state is approximately six million pounds and has a value of 2.7 million dollars. The yield for the state in 1974 was 1.02 million pounds greater than the 1972 yield for this fishery.

Considering the disproportionate increases in the cost of catfish and trout feeds in the recent few years, this statewide trend may be a short-term phenomenon. The Peruvian Anchovetta fishery, upon which most commercial fish feeds are based, has proven extremely unstable in recent years and until a suitable substitute ingredient is found, feed prices will increase. A substantial increase in the utilization of native, noncultured catfish may result from this change in the economics of catfish farming.

Distribution of Catfish Culture

St. Tammany, Tangipahoa, and Livingston Parishes account for 47% or 260 acres of the catfish acreage in the Coastal Zone (Table 1). In the western part of the state the parishes of Calcasieu, Jefferson Davis, and Acadia contain 27% or 147 acres of the Coastal Zone's total of 550 acres. Thus these six Coastal Zone border parishes contain 407 acres or 74% of the state's total catfish acreage. The five remaining northern boundary parishes: Lafayette, St. Martin, Iberville, West Baton Rouge, and East Baton Rouge account for only 2 acres. A conspicuous gap occurs between the two most productive catfish farming areas of the Coastal Zone (Figure 1).

Ascension Parish is the only parish not lying on the northern Coastal Zone boundary, which contains concentrations of catfish acreage comparable with the six primary catfish producing parishes in the northeastern and northwestern corners of the Coastal Zone (Figure 1).

Commercial catfish farming activities are completely absent from the coastal marshes of the Louisiana Coastal Zone. Experimental catfish raising activities are being conducted or were recently concluded by a team of investigators from Louisiana State University (Perry and Avault, 1971) at the Rockefeller Wildlife Refuge in the western coastal marsh and in both ponds and pipeline canals in the eastern marshes by personnel from Nicholls State University (Harris et al., 1973). Various combinations of channel, white, and blue catfish were grown in these experimental ponds. Extension of catfish culture into the marsh areas of the Coastal Zone would most likely utilize the more saline tolerant channel catfish. This species is hardy in brackish water and would be the best investment in coastal areas for growth periods of one or two years (Perry, 1970). The establishment of catfish culture in the marsh areas would, in many instances, conflict with current recreational and industrial land use activities. Furthermore, a corresponding loss in marsh production and breeding nurseries of aquatic species would accompany the establishment of such ponds in this area of the Coastal Zone.

VI. SUMMARY AND CONCLUSIONS

1. Aquaculture activities are common throughout the Coastal Zone. Catfish, oysters, and crawfish are the three major organisms which experience some degree of management.
2. Catfish and oyster production are almost entirely dependent on managed operations. Approximately 50% of Louisiana's crawfish crop comes from swamp, open, or ricefield ponds.
3. Oyster production in Louisiana is dependent on transplanting and freshwater diversion programs. In the first three quarters of 1974 the Louisiana oyster harvest (6.79 million pounds of meat) had a value of 4.02 million dollars. The five primary oyster producing parishes in Louisiana are: Plaquemines, St. Bernard, Terrebonne, Jefferson, and Lafourche.
4. Salinity changes, increases in predators, and habitat destruction and contamination threaten this Louisiana industry.
5. Crawfish production is centered in the Bayou Teche and Bayou Lafourche areas of the state. Cultural operations are located primarily within the non-estuarine marsh areas of the Coastal Zone.
6. The crawfish industry in Louisiana is characterized by increased yearly production and profits. Expansion of the crawfish industry into other areas of the country is predicted.
7. Within Louisiana, the fourth ranked catfish producing state, only 550 acres of the 6,400 acres of catfish ponds

are in the Coastal Zone. The annual catfish harvest in the state is approximately 2.7 million dollars.

8. Increasing costs of feed and pond construction limit the expansion of catfish culture operations. Little expansion of such operations is predicted into the coastal marshes.

9. The culture of frogs, alligators, shrimp, and fish such as pompany may be commercially successful in the Coastal Zone in the next few years.

TABLE 1

ACREAGE UTILIZED IN EACH AQUACULTURAL ACTIVITY—BY PARISH

Parish	Oyster Acreage[1]	Crawfish Pond Acreage[2]	Catfish Pond Acreage[3]	Total Aquaculture Acreage
Acadia		1,325	22	1,347
Ascension		1,050	43	1,093
Assumption		1,322		1,322
Calcasieu	1,200	50	80	1,330
Cameron		60	20	80
E.B.R.		27		27
Iberia	701	2,915		3,616
Iberville		1,335		1,335
Jefferson	14,774			14,774
Jeff. Davis		3	45	48
Lafayette		440		440
Lafourche	7,955	998	6	8,959
Livingston			80	80
Orleans	333			333
Plaquemines	265,320	760	20	266,100
St. Bernard	261,939			261,939
St. Charles		270		270
St. James		8,285	6	8,291
St. John		105		105
St. Martin		10,169	2	10,171
St. Mary	713	1,250	5	1,968
St. Tammany	208	169	130	507

TABLE 1 (Continued)

Parish	Oyster Acreage[1]	Crawfish Pond Acreage[2]	Catfish Pond Acreage[3]	Total Aquaculture Acreage
Tangipahoa		10	50	60
Terrebonne	30,119	52	3	30,174
Vermilion	709	4,620	38	5,367
W.B.R.				0
	583,971	35,215*	550	619,736**

* 20% of actually existing crawfish ponds were assumed missed, so the adjusted figure is 42,258 acres (Gary, personal communication)

** Adjusted figure is 626,779 acres.

1 Louisiana Wildlife and Fisheries Commission, 1971.

2 Gary, Don L., 1973.

3 Fowler, J., 1975. Personal communication.

TABLE 2

PERCENT OF PARISH AREA (DRY AND SUBMERGED) UTILIZED

IN EACH AQUACULTURAL ACTIVITY

Parish	Area of Parish acres[1]	% Oyster	% Crawfish	% Catfish	Total Percentage
Acadia	419,840		0.32	0.01	0.33
Ascension	199,680		0.53	0.02	0.55
Assumption	236,160		0.56		0.56
Calcasieu	708,480	0.17	0.01	0.01	0.19
Cameron	1,073,920		0.01	0.002	0.012
E.B.R.	302,720		0.01		0.01
Iberia	524,800	0.13	0.56		0.69
Iberville	406,400		0.33		0.33
Jefferson	389,120	3.8			3.8
Jeff.Davis	417,920		0.001	0.01	0.011
Lafayette	178,560		0.25		0.25
Lafourche	895,360	0.89	0.21	0.001	1.101
Livingston	440,960			0.02	0.02
Orleans	126,080	0.26			0.26
Plaquemines	1.271,040	20.9	0.06	0.002	20.962
St.Bernard	901,120	29.1			29.1
St.Charles	249,600		0.11		0.11
St.James	166,400		4.98	0.004	4.984
St.John	224,640		0.05		0.05
St.Martin	531,840		1.91	0.0004	1.9104
St. Mary	663,040	0.11	0.19	0.001	0.301
St.Tammany	730,240	0.03	0.02	0.02	0.07
Tangipahoa	536,960		0.002	0.01	0.012

TABLE 2 (Continued)

Parish	Area of Parish acres[1]	% Oyster	% Crawfish	% Catfish	Total Percentage
Terrebonne	1,211,520	2.49	0.004	0.0002	2.4942
Vermilion	906,240	0.08	0.51	0.004	0.594
W.B.R.	133,760				0.0
Area of Coastal Zone	13,846,400	4.22%	0.25%*	0.004%	4.48%**

* Adjusted for crawfish ponds assumed missed, the figure is 0.31%.

** Adjusted figure is 4.53%.

[1]Louisiana Almanac, 1973.

TABLE 3

OYSTER BOTTOM ACREAGE AS A PERCENTAGE OF TOTAL

SUBMERGED ACREAGE--BY PARISH

Parish	Submerged Acreage[1]	Oyster Bottom Acreage[2]	%
Cameron	141,440	1,200	0.85
Iberia	150,400	701	0.47
Jefferson	104,320	14,774	14.2
Lafourche	409,600	7,955	1.94
Plaquemines	638,080	265,320	41.58
St.Bernard	567,040	261,939	46.19
St.Mary	269,440	713	0.26
St.Tammany	176,000	208	0.12
Terrebonne	356,480	30,119	8.45
Vermilion	135,040	709	0.53
Total	2,947,840	583,638	19.8

[1]Louisiana Almanac, 1973.

[2]Louisiana Wildlife and Fisheries, 1971.

VII. REFERENCES

Avault, J. W., C. L. Birdsong, and W. G. Perry. 1969. Growth, survival, food habits and sexual development of Croaket, *Micropogon undulatus*, in brackish water. Proc. 23rd Ann. Conf. Southeast Assoc. Game and Fish. Comm.

Chabreck, R. 1970. Marsh zones and vegetative types in the Louisiana coastal marshes. Ph.D. dissertation, Louisiana State University, Baton Rouge.

de la Bretonne, L. W. and J. W. Avault, Jr. 1970. Shrimp mariculture methods tested. Am. Fish Farmer and World Aquaculture News 1:8-12.

Gary, D. L. 1973. A geographical systems analysis of the commercial crawfish industry in south Louisiana. Ph.D. dissertation, Oregon State University, Corvalles.

Gosselink, J. G., E. P. Odum and R. M. Pope. 1974. The value of the tidal marsh. Center for Wetland Resources, LSU, Baton Rouge, Louisiana.

Harris, A. H., R. H. Kilgen and D. Kraemar. 1973. Mariculture in estuarine oil-pipeline canals in Louisiana. Proc. 4th Annual Workshop World Maricultural Soc.

Hill, L. and E. A. Cancienne. 1972. Grow crawfish in rice fields. Louisiana Wildlife and Fisheries Commission.

Joanen, T. 1971. 14th Biennial Report of the Louisiana Wildlife and Fisheries Commission.

Kilburn, J. W. 1972. Catfish farming in the mid-south; its distribution and growth potential. Ph.D. dissertation, University Southern Mississippi, Hattiesburg.