Louisiana Department of Wildlife and Fisheries

Marine Fisheries Division

2007

OYSTER STOCK ASSESSMENT REPORT

OF THE

PUBLIC OYSTER AREAS IN LOUISIANA

SEED GROUNDS and SEED RESERVATIONS

Oyster Data Report Series
No. 13
July, 2007

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INTRODUCTION AND OVERVIEW

The oyster resource in Louisiana is one of the largest and most valuable in the nation. Its value is derived from both the economic benefits it provides to the state and the ecological benefits it provides to the estuarine environment. Due to Louisiana's vast coastal wetland area, ample habitat exists where oysters thrive under a variety of environmental conditions. The Department of Wildlife and Fisheries (LDWF) is charged with managing the oyster resource on the public grounds by closely monitoring the size and health of oysters on nearly 1.7 million acres of public water bottoms. Oyster management on these public grounds includes activities such as setting oyster seasons, monitoring harvest levels, and cultch planting (reef building) projects (Figure 1).

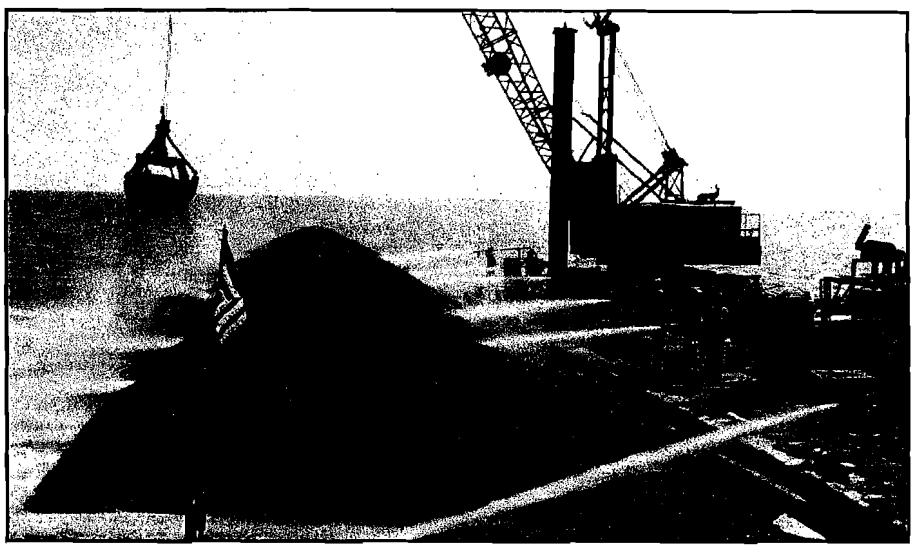


Figure 1. Cultch planting (reef building) activities being performed in Mississippi Sound near Turkey Bayou (St. Bernard Parish) in early June 2007.

Typically, the oyster industry utilizes the public oyster grounds as a source of seed oysters (< 3") for transplant to private leases. The public grounds, however, also yield a supply of sack-sized oysters (≥ 3") and these oysters may be taken directly to market. The manner in which both the public grounds and private leases are utilized in combination helps to keep Louisiana's industry viable. In fact, Louisiana regularly leads the nation in the production of oysters and accounted for an average of 34% of the nation's oyster landings from 1997-2005 (Figure 2).

Oysters have been a part of the Louisiana economy for many years; starting from meager beginnings and growing into a multi-million dollar industry. In 2006, the dockside value of oysters totaled nearly 30 million dollars and harvest yielded approximately 11.3 million pounds of meat (LDWF Trip Ticket Data). This represents an 11% drop in value and a 6% drop in landings versus 2005 levels and a 19% drop in landings versus 2004 levels. The decrease can be directly linked to the continued impacts from Hurricanes Katrina and Rita that not only resulted in heavy oyster mortalities in late 2005 (and, thus, caused a significant drop in oyster availability for 2006), but in extensive damage to the oyster industry's infrastructure (i.e. vessels, docks, processing facilities, etc.). Therefore, oyster resources were scarce in 2006, especially on the primary public oyster seed grounds east of the Mississippi River and the industry had difficulties harvesting the available resource due to reduced infrastructure capacities. In addition, 2006 oyster landings of 11.4 million pounds were approximately 1.5 million pounds below the long-term average of landings (1997-2005) for the state.

Oysters also play an important ecological role in the estuarine ecosystem. Oyster reefs provide the majority of hard substrate required by other sessile invertebrate species such as barnacles, bryozoans, tunicates, and anemones. Reefs are also utilized as shelter and forage habitat for many species of crabs, worms, fish, and meiofauna. Estuarine water quality can be affected by the filter-feeding activities of oysters, and reefs may also play a role in stabilizing shorelines.

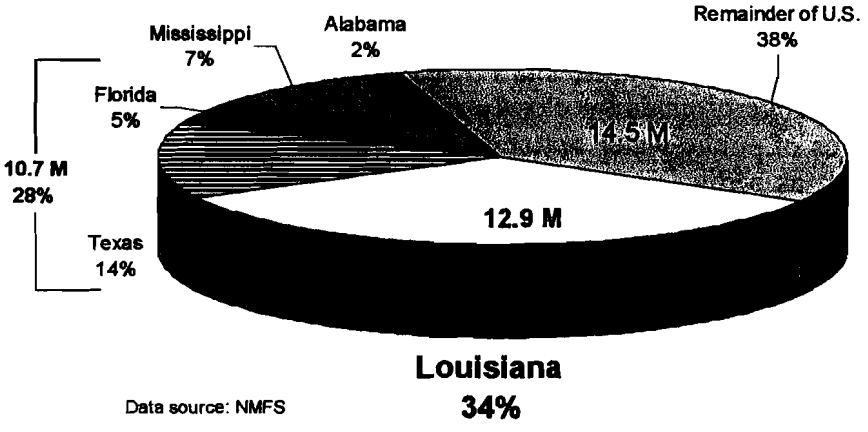


Figure 2. Average 1997 - 2005 oyster landings (all species combined, pounds of meat).

Each summer, LDWF biologists from the Marine Fisheries Division perform quantitative evaluation of the oyster resource on the public oyster areas. This biological evaluation includes using SCUBA to collect replicate oyster samples from within a square meter frame from multiple locations in each public oyster ground. The public ground oyster season generally opens in early September and runs through April of the following year, although the season may be closed or delayed if biological concerns or enforcement problems are encountered. Square-meter sampling is conducted each July and used in conjunction with estimated reef acreage to estimate the stock size of the resource and to make recommendations to the Wildlife and Fisheries Commission for the setting of the oyster season. Although known reefs are estimated at approximately 38,000 acres, it is likely that additional reef acreage exists on the public oyster grounds.

The Louisiana public ground oyster resource had remained at or above the three million barrel level for over a decade, but decreased in 2005 to its lowest point since 1991. That decrease continued in 2006, largely due to the heavy mortalities sustained from the hurricanes of 2005. However, 2007 oyster stocks have seen a small increase over 2006 levels. The total 2007 oyster stock availability of 2,253,203 barrels represents a slight increase of 87,250 barrels, or approximately 4%, over 2006 levels (Figure 5). Stocks of sack-sized oysters account for much of the increase in the statewide stock size as those numbers increased from 374,522 barrels in 2006 to 910,470 barrels in 2007 (+143%). Unfortunately, statewide seed oyster stocks decreased by approximately 25% from 1,790,431 barrels in 2006 to 1,341,733 barrels in 2007 (Figure 3).

The public oyster grounds are a valuable contributor to overall Louisiana oyster landings each year. The trend from 1970 – 1992 showed the majority of Louisiana oyster landings came from private reefs. From 1992 to 2001, however, the public ground stock size increased, in general, and landings from the public grounds increased as well. Although the general trend since 1992 shows an increased reliance of the oyster industry on the public grounds, recent

decreases in public ground oyster availability has lead to decreased harvest from the public grounds since 2002 (Figure 4).

The following report includes both biological and historical oyster landings data from each CSA in Louisiana (CSA map depicted on page vi). Biological data was generated from quantitative square-meter sampling (see above) and landings data was generated from boarding runs and trip ticket information. Questions and/or comments can be directed to the individual CSA Biologist Managers (page vii) or Patrick Banks at (225) 765-2370.

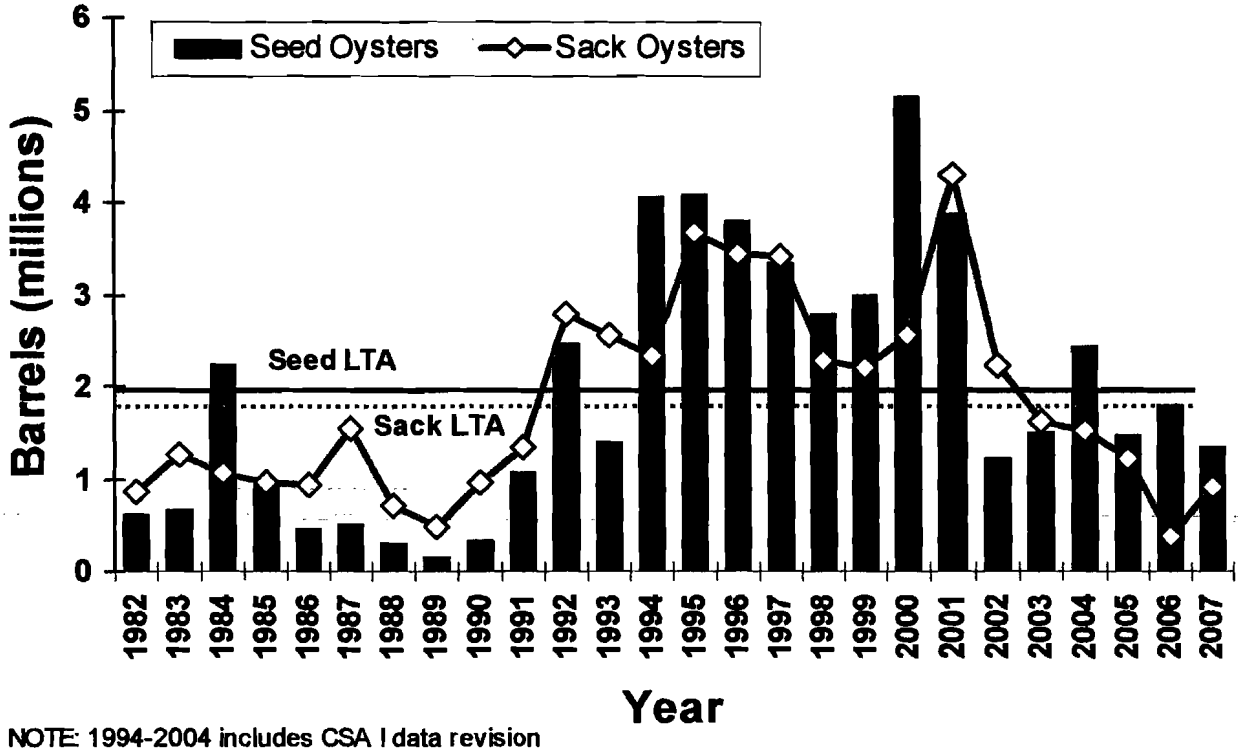


Figure 3. Historical Louisiana oyster stock size on the public oyster areas (estimated based on square meter sample analysis). LTA denotes the long-term average of 1982 – 2006.

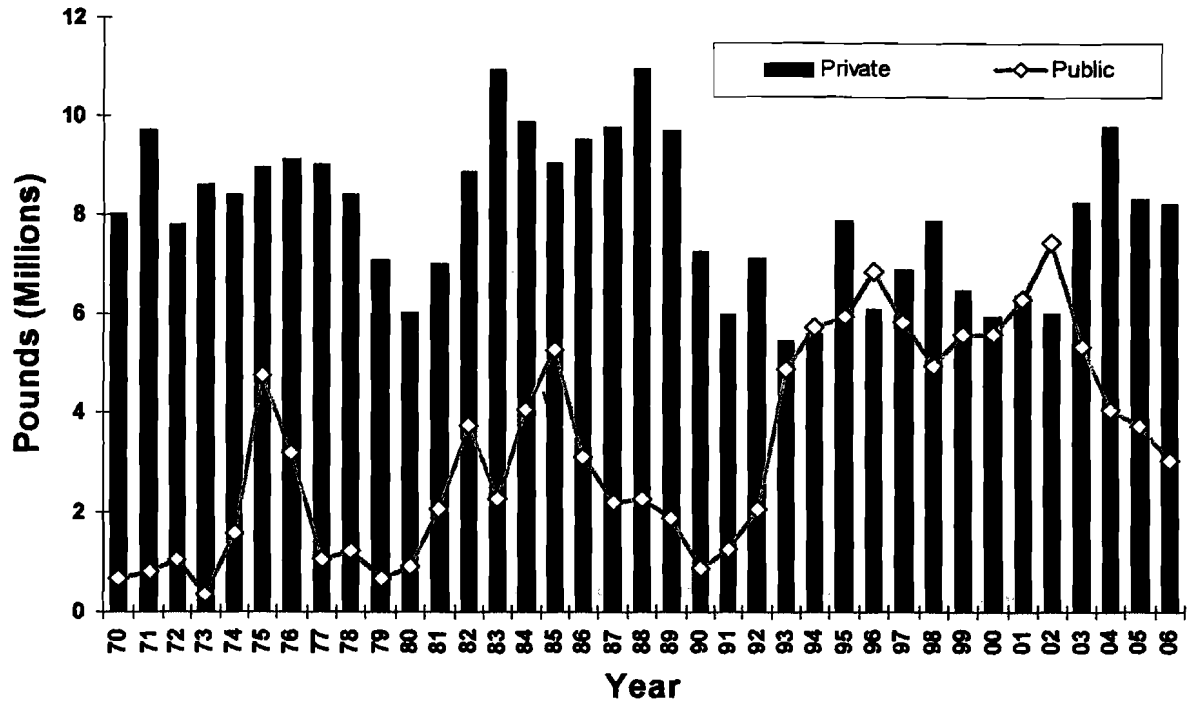


Figure 4. Historical Louisiana oyster landings (NMFS and LDWF data).

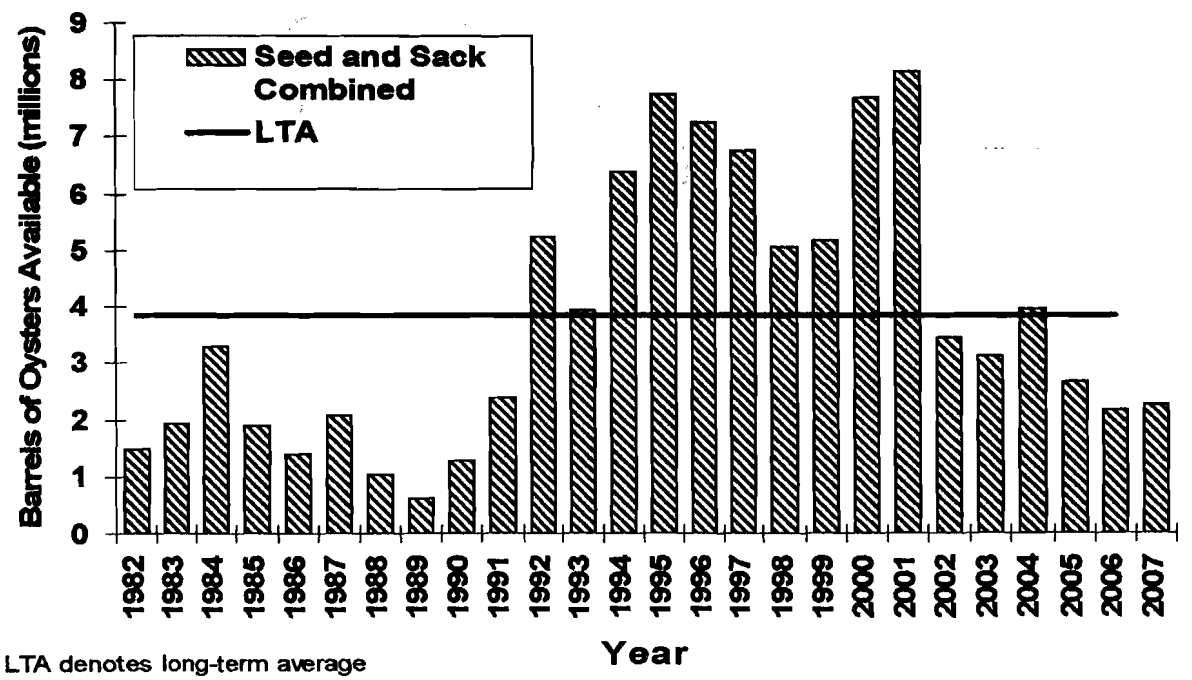
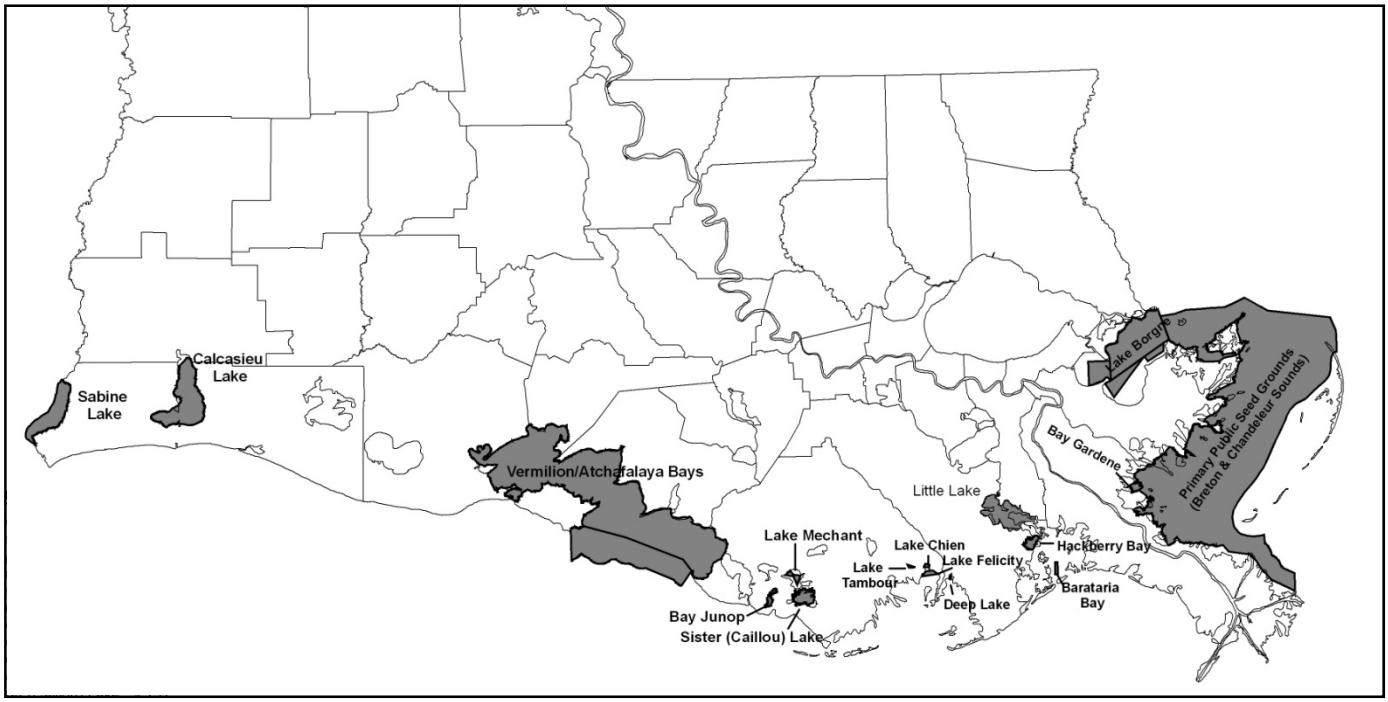


Figure 5. Historical estimated oyster stock size on the public oyster areas of Louisiana. 1994 – 2004 data includes CSA I data revision.

Public Oyster Areas



Public Seed Grounds

Lake Borgne
Chandeleur/Breton Sound
(Primary Seed Grounds)
Barataria Bay
Little Lake
Deep Lake
Lake Chien
Lake Felicity
Lake Tambour
Lake Mechant
Vermilion/Cote Blanche/Atchafalaya Bays

Public Seed Reservations

Bay Gardene
Hackberry Bay
Sister (Caillou) Lake
Bay Junop

Public Oyster Area

Calcasieu Lake

Public Tonging Area

Sabine Lake

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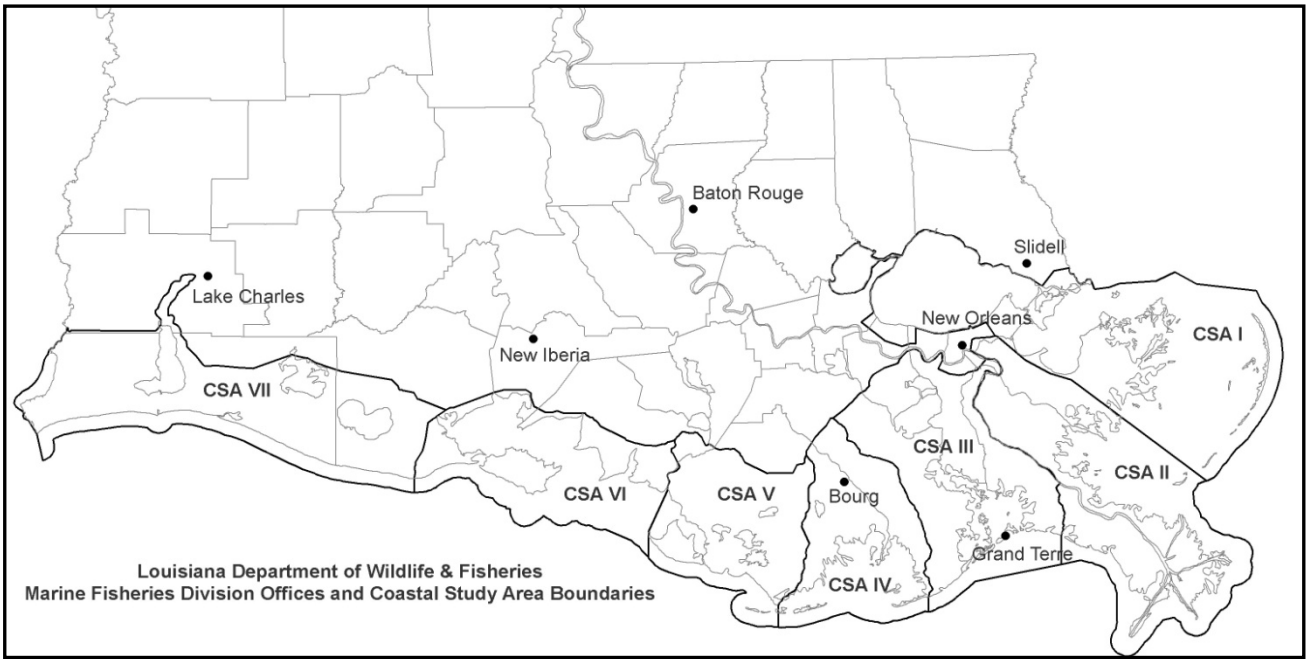
* Seed grounds are designated by the Wildlife and Fisheries Commission.
Seed reservations, Calcasieu Lake, and Sabine Lake are designated by the state legislature.

LDWF Marine Fisheries' Coastal Study Areas (CSAs)



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4	Vince Guillory	P.O. Box 189 Bourg, LA 70343	(985) 594-4139	(985) 594-7317
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6	Paul Cook	2415 Darnall Road New Iberia, LA 70560	(337) 373-0032	(337) 373-0032
7	Michael Harbison	1213 N. Lakeshore Drive Lake Charles, LA 70601	(337) 491-2573	(337) 491-2009

CSA I

July 23, 2007

MEMORANDUM

TO: Patrick Banks, Biologist Program Manager, Marine Fisheries Division

FROM: Brian Lezina, Biologist Manager, Marine Fisheries Division
Coastal Study Area 1.

SUBJECT: 2007 CSA1 Square Meter Samples and Stock Assessment Report

INTRODUCTION

The public oyster areas within Coastal Study Area 1 (CSA1) consist of approximately 690,000 water bottom acres and are located in the Louisiana portion of Mississippi Sound, Lake Borgne, Chandeluer Sound and adjacent waters. These areas have historically been used by both Louisiana and Mississippi fisherman, and have recently been areas of high oyster production within the state of Louisiana. Although managed as public oyster seed grounds by the state for many decades, the majority of this area was officially designated by Louisiana Wildlife and Fisheries Commission rule in 1988. Much of Lake Borgne was later added as a public oyster seed ground in 1995 and was expanded in 2004.

Currently, these areas are managed to balance the economic viability of the fishery with the biological sustainability of the resource. This management is contingent upon obtaining and utilizing the best fishery dependent and independent data available. This includes monitoring the harvest and resource availability throughout the fishing season and performing yearly stock assessments. The information these data provide allow resource managers to implement management changes to both protect the current resource as well as protect long term viability. This report will fulfill one of those data needs by providing estimates of the current stock size of the oyster resource within CSA1.

METHODS

Samples were taken between July 9 and July 11, 2007 using a one square-meter frame placed directly on the bottom. Divers removed all enclosed live and dead oysters, as well as shell, by hand. Live and dead oysters, spat, fouling organisms, and oyster predators were identified and enumerated.

A total of ten stations were visited with two square-meter replicates taken at each station. The average of the two replicates was then pooled within reef systems. This average density per reef system was multiplied by the total area of the reef systems. The resulting number was adjusted into a barrel unit of measure where one barrel equals 720 seed-sized oysters or 360 market-sized oysters. Seed oysters are those measuring between 25 and 74 mm with market oysters being greater than 74 mm. Spat oysters are those less than 24mm. The Lake Borgne Public Seed Ground was not sampled due to a lack of reef acreage information.

RESULTS AND DISCUSSION

Seed and Sack Stock

The current stock size is estimated at 293,219 barrels (bbls) of seed-size oysters and 139,136 bbls of market-sized oysters. These numbers differ dramatically from the 2006 estimate with a 30.3% decrease in seed oysters and a 204.9 % increase in market oysters. Oyster density and abundance was not evenly distributed among areas (Table 1.1) with no apparent geographical trends (Figure 1.1). It is important to note variability both within and among stations when comparing estimates. This variability is magnified when extrapolating low sample sizes to large areas.

The current estimate falls well below the previous ten years' average for both seed and market sizes (Figure 1.2). However, that long-term average is largely driven by availability in 2000 and 2001.The decrease in seed and increase in market from 2006 to present reflects the movement of individuals spawned immediately after Hurricane Katrina through the size classes. Although extensive mortality was seen after Katrina (Table 1.2), a large spawning event and resultant recruitment allowed for relatively high seed-sized abundances in 2006. This progression into larger size-classes was especially noted at the Three-mile, Turkey Bayou, and 2000 Shell Plant stations. In addition, effort was sparse during the abbreviated 2005/2006 season with harvest estimates of 6,001 market sacks and 1200 bbls of seed. This limited harvest may have also increased the recruitment of seed oyster into the market fishery. *See further description of the 2006/2007 public season below.*

Spat Production

Live spat were not present in all samples containing a suitable substrate. Overall numbers were low and ranged from 0 to 12.5 individuals/m^2; however, based on previous years' data, the square meter samples may have occurred between seasonal spawning events. While dredge and square meter data are used to compare spawning times and magnitude between reefs, it is important to note that spat numbers are biased by the amount of substrate collected in a given sample.

Fouling Organisms

The hooked mussel, *Ischadium recurvum*, was present at three of the ten sample stations. All three of the stations with the highest densities are located in the western portion of the Mississippi Sound and are in close proximity to the Pearl River systems (Table 1.3). High densities of mussels have been noted in dredge samples at these stations and the Lake Borgne Area in previous years. However, salinities have remained elevated throughout the study area (Figure 1.3) over the past year. These increased salinities may have limited the growth and survival of hooked mussels either through an increase in mussel predators or decrease of suitable environmental conditions.

Oyster Predators

The southern oyster drill, *Stramonita haemastoma*, was not collected at any stations. This was surprising given the elevated salinities and seed size resource within the area. Mud crabs (*Xanthidae, et al.*) were found in each sample containing shell. However, these organisms are

not identified to species and several "mud crabs" are not known oyster predators. There were no blue crabs (*Callinectes sapidus*), or gulf toadfish (*Opsanus beta*), collected. Only two small stone crabs (*Mennipe adinia*) were collected, both from a single sample on Cabbage Reef. A description of Dermo (*Perkinsus marinus*) prevalence and infection on selected CSA1 reefs is provided in a later section.

Mortality

There was no recent mortality noted for either spat or market-size oysters at any station (Table 1.4). Seed mortalities ranged from 0 to 60.0% with all recent mortality coming from Cabbage (4.7%) and Grand Pass (60.0%) reefs. Although recent mortality was noted in several of the dredge samples between the 2006 and 2007 assessments, none appeared to reflect large-scale or long-term mortality.

Tropical and Climatic Events

There were no major tropical events since the 2006 stock assessment. The Pearl River slightly exceeded flood stage for about 10 days in January 2007. This reduced salinities throughout the northern reefs by about 10ppt.

2006/2007 PUBLIC SEED GROUND SEASON SUMMARY

Methods

Several tools are used by research personnel to estimate harvest and assess the biological condition of the resource. Harvest estimates are obtained by monitoring the users and obtaining fishery dependent data. Fisherman are contacted while fishing and asked to provide estimates of current and past catch and effort as well as an estimate of future effort. These data are obtained weekly and are used to estimate harvest in a particular reef complex. Harvest data are also obtained via the trip ticket system in place for this fishery. However, these data are consolidated by geographic region, are considered preliminary until well after the season concludes, and provide a limited resolution.

Fishery independent methods are used to obtain the health and condition of the resource both prior to and during the final stages of the fishing season. Techniques used in these assessments are oyster dredging and visual census. It is important to note that both fishery dependent and independent sources are subject to several large biases and should be used in conjunction to provide a better estimate of the available resource.

Results and Discussion

Coastal Study Area 1 public grounds were opened to harvest on September 6, 2006 and closed on September 27, 2006. The public grounds were reopened on November 13, 2006 and closed on April 1, 2007. Total harvest estimates for the grounds were 51,071 sacks of market-sized oysters and 61,635 barrels of seed-sized oysters. In general, harvest was not spread evenly throughout the area (Table 1.5).The majority of the sack harvest (57%) was taken from Drum Bay and Morgan Harbor located in the southern portion of the survey area. In recent years these reef systems have seen light use by fishermen with heavy use only during

closures of other areas of the Primary Public Oyster Seed Grounds. The majority of the seed harvest (77%) was taken from three reefs (Grand Pass, West Karako, 2000 Shell Plant) in the northern survey area. Of particular note was the taking of 8,825 bbls of seed from the 2000 Shell Plant. This is a reef with an area of only 70 acres. In addition, 2,288 sacks were estimated harvested from this reef. This matched with an estimate of 151.5 seed oysters/m^2 in the 2006 stock assessment. While these northern areas were severely damaged by Hurricane Katrina, the unusually large spatfall post Hurricane and successive recruitment allowed for a harvestable supply of seed-sized oysters.

Harvest of both seed and market oysters was not constant over time (Figure 1.4). Market oyster harvest reached a peak of 5,033 sacks $week^{-1}$ in early February with seed oyster harvest reaching a peak of 11,700 bbls $week^{-1}$ immediately before the close of the season. Similarly, the amount of vessels observed fluctuated ranging from 0 to 32. The harvest types of these vessels changed throughout the season (Figure 1.5). These effort levels are lower than those observed in past seasons and are probably reflective of the condition of the resource, as well as the lingering problems associated with hurricane damaged infrastructure, vessels, and homes.

The Lake Borgne grounds continued to show the effects of Hurricane Katrina. As with the 2005/2006 season, no activity on public areas was seen, and therefore no harvest estimated. These grounds suffered heavy sedimentation and continue to be plagued by vegetative overburden.

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Attachments

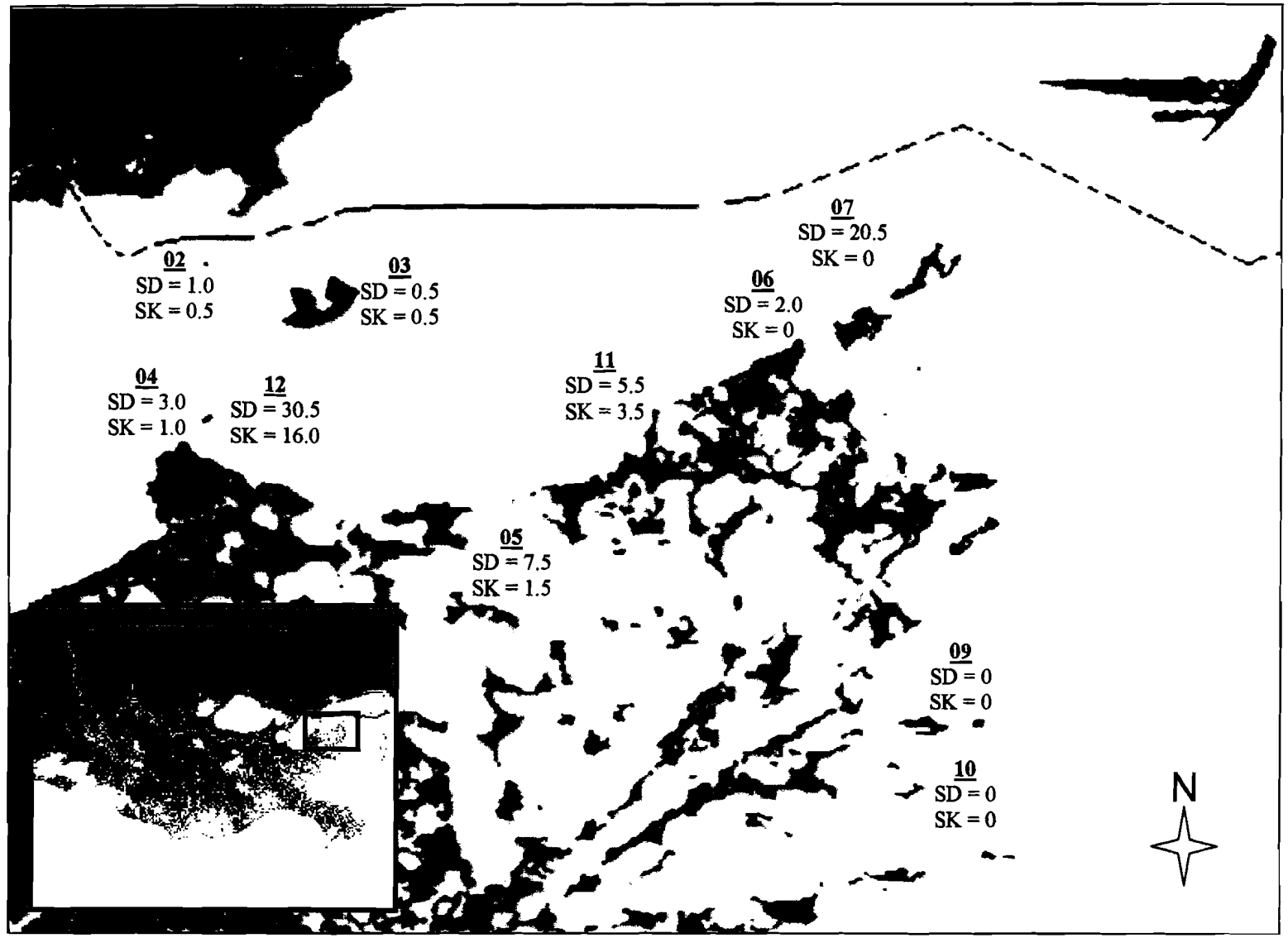

Figure 1.1. Map showing Coastal Study Area 1 oyster stock assessment stations within the Mississippi and Chandeleur Sounds. Numbers below stations are average numbers of seed (SD) and sack (SK) oysters per m^2.

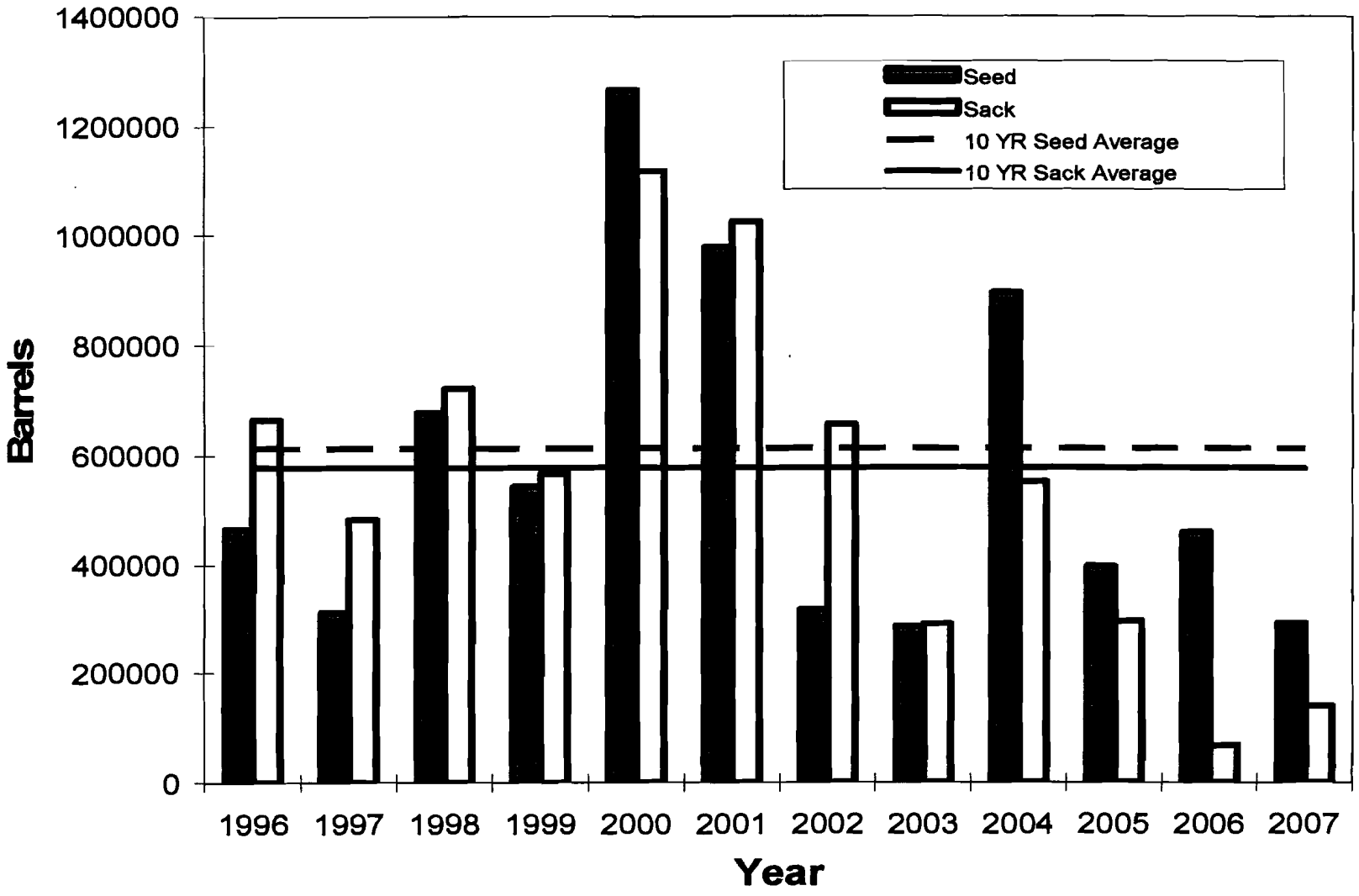

Figure 1.2. Current and historical Stock Assessment (seed and sack oysters) values. Horizontal lines represent the ten-year seed and sack average.

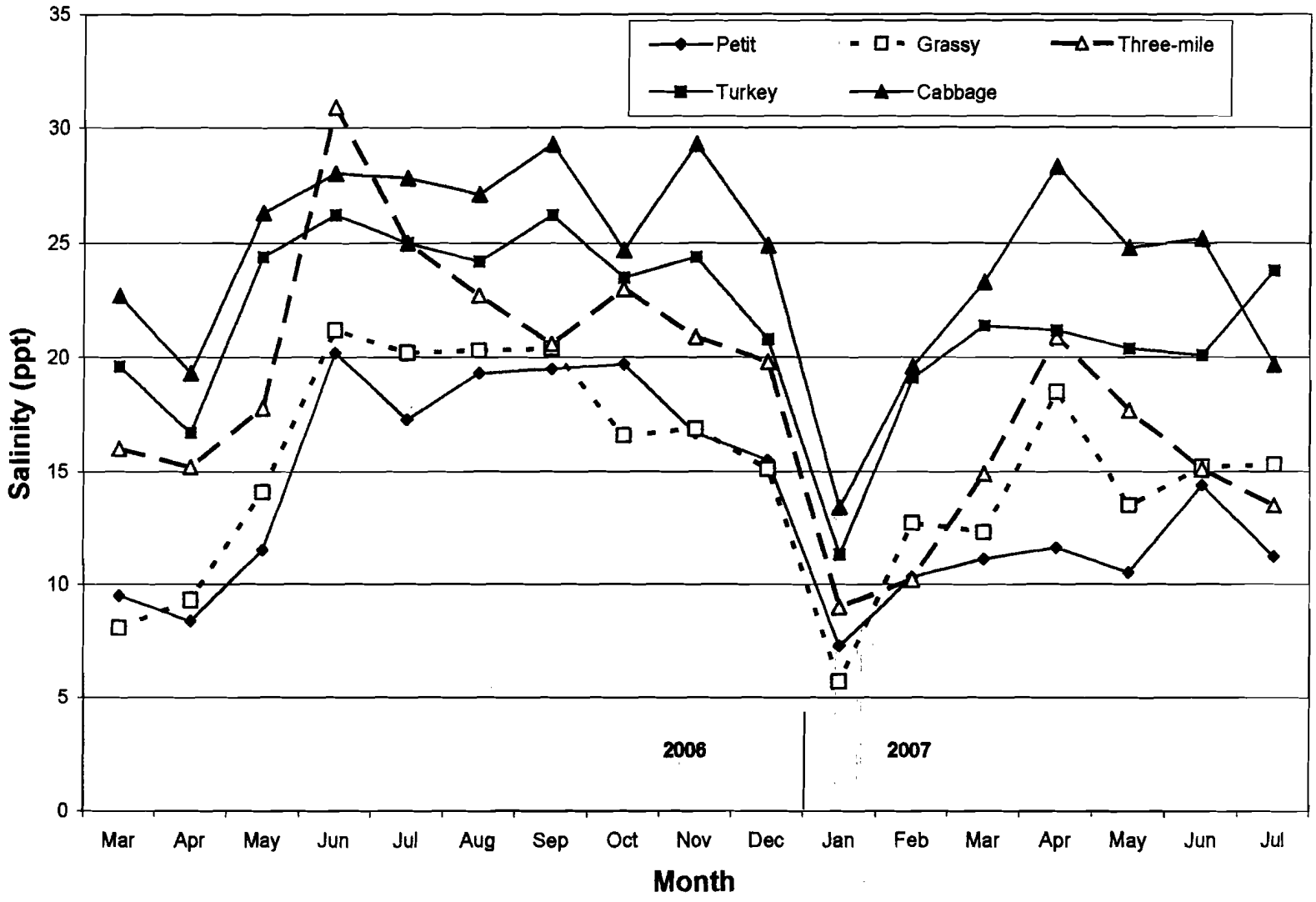

Figure 1.3. Mean monthly salinities for the northern Mississippi Sound public seed grounds.

Table 1.1. Mean densities of oysters collected at each station. * - note – station temporarily suspended

Station	Station Number	Reef Group Acreage	Seed Oysters per m2	Sack Oysters per m2	Number of seed oysters (bbls)	Number of sack oysters (bbls)
Grassy Is. Halfmoon Is. Petit Is.	2 3 4	6,850	1.0 0.5 3.0	0.5 0.5 1.0	57,756	51,338
Three-mile Bay	5	3,059	7.5	1.5	128,941	51,576
Grand Pass Cabbage Rf. Turkey Bayou	6 7 11	1,802	2.0 20.5 5.5	0 0 3.5	94,522	23,631
Martin Is. Holmes Is.	9 10	4,156	0 0	0 0	0 0	0 0
2000 Shell Plant	12	70	30.5	16	12,000	12,591
Hospital Wall*	1	376				
2007 Total Percent change from 2006					**293,219** -30.3%	**139,136** +204.9%

Table 1.2. Mortalities associated with Hurricane Katrina. Dredge sample conducted September 14, 2005.

Station	Spat Mortality (%)	Seed Mortality (%)	Sack Mortality (%)
Grassy Island	0.0	100	100.0
Petit Island	27.1	100.0	66.7
Three-Mile Bay	53.2	44.0	50.0
Turkey Bayou	70.6	37.5	100.0
Cabbage Reef	32.6	88.9	83.3

Table 1.3. Mean density of the hooked mussel, *Ischadium recurvum*, and the southern oyster drill, *Stramonita haemastoma*, at each station. Each mean represents two samples. * station temporarily suspended.

Station	Mussel Density (m^2)	*S. haemastoma* density (m^2)
Grassy Island	3.0	0
Petit Island	69.0	0
Half-moon Island	0	0
Three-mile Bay	0	0
Grand Pass	0	0
Turkey Bayou	0	0
Cabbage Reef	0	0
2000 Shell Plant	5	0
Martin Island	0	0
Holmes Island	0	0
Hospital Wall*		

Table 1.5. Harvest estimates from the 2006/2007 public season within CSA1.

Station	Seed-size (bbls)	Market-size (sacks)
Grassy Island	0	0
Half-moon Island	0	0
2000 Shell Plant	8,825	2,288
Petit Island	0	0
Grand Banks	1,500	0
Three-Mile Bay	3,625	3,883
Turkey Bayou	500	2,330
Grand Pass	26,600	4,720
Cabbage Reef	0	240
West Karako	11,825	8,481
Drum Bay	6,600	19,077
Morgan Harbor	2,160	10,052
Total	**61,635**	**51,071**

Table 1.4. Mean oyster mortality estimates from each square-meter sample station. N/A – no live or dead oysters were collected.

Station	Spat Mortality (%)	Seed Mortality (%)	Sack Mortality (%)
Grassy Island	0.0	0.0	0.0
2000 Shell Plant	0.0	0.0	0.0
Petit Island	N/A	0.0	0.0
Half Moon Island	N/A	0.0	0.0
Three-Mile Bay	0.0	0.0	0.0
Turkey Bayou	N/A	0.0	0.0
Cabbage Reef	0.0	4.7	N/A
Grand Pass	0.0	60.0	N/A
Martin Island	N/A	N/A	N/A
Holmes Island	N/A	N/A	N/A

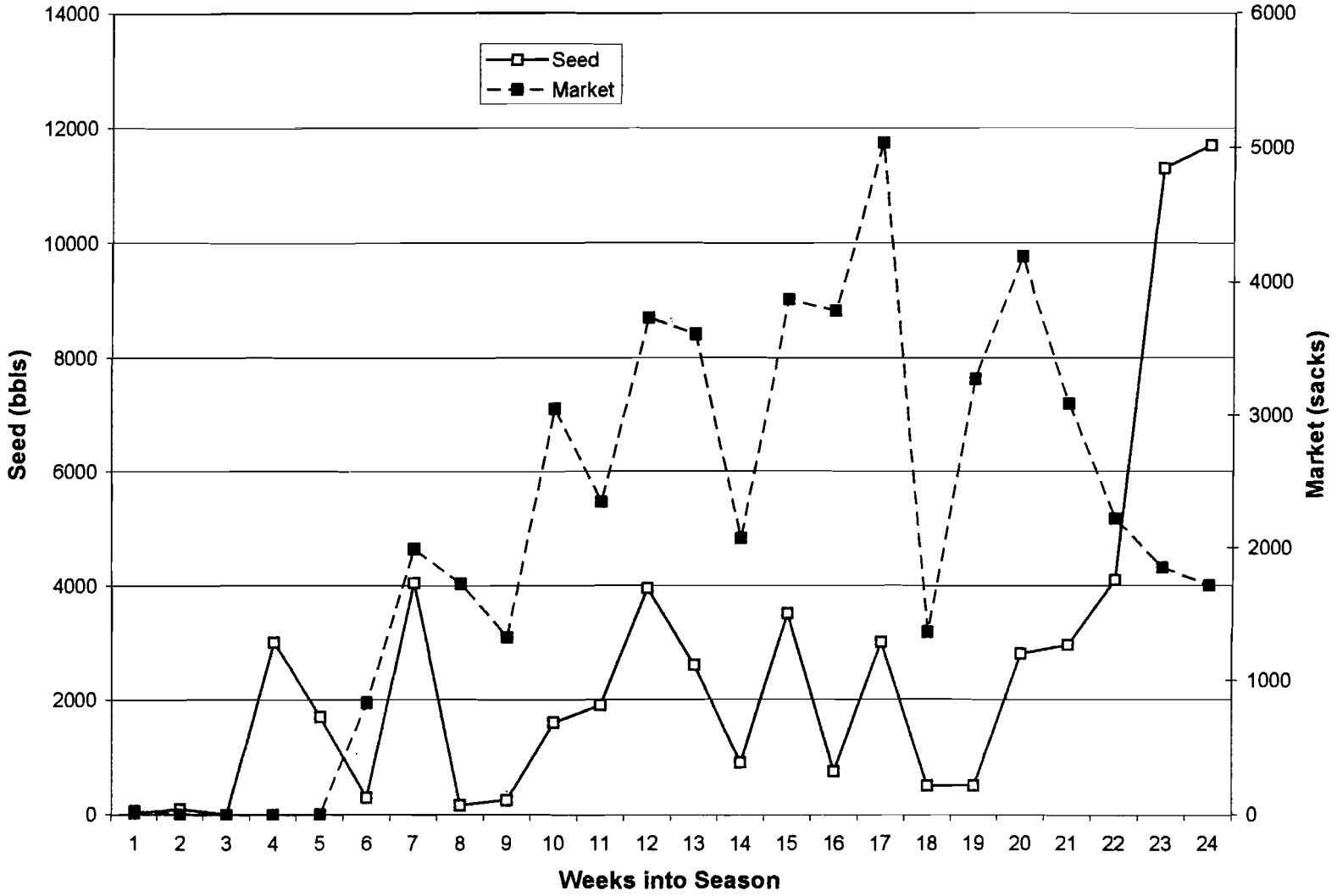

Figure 1.4. Estimated harvests for seed- and market-sized oysters by season week. Weeks 1-3 are September dates, remaining weeks correspond to November 13 to April 1.

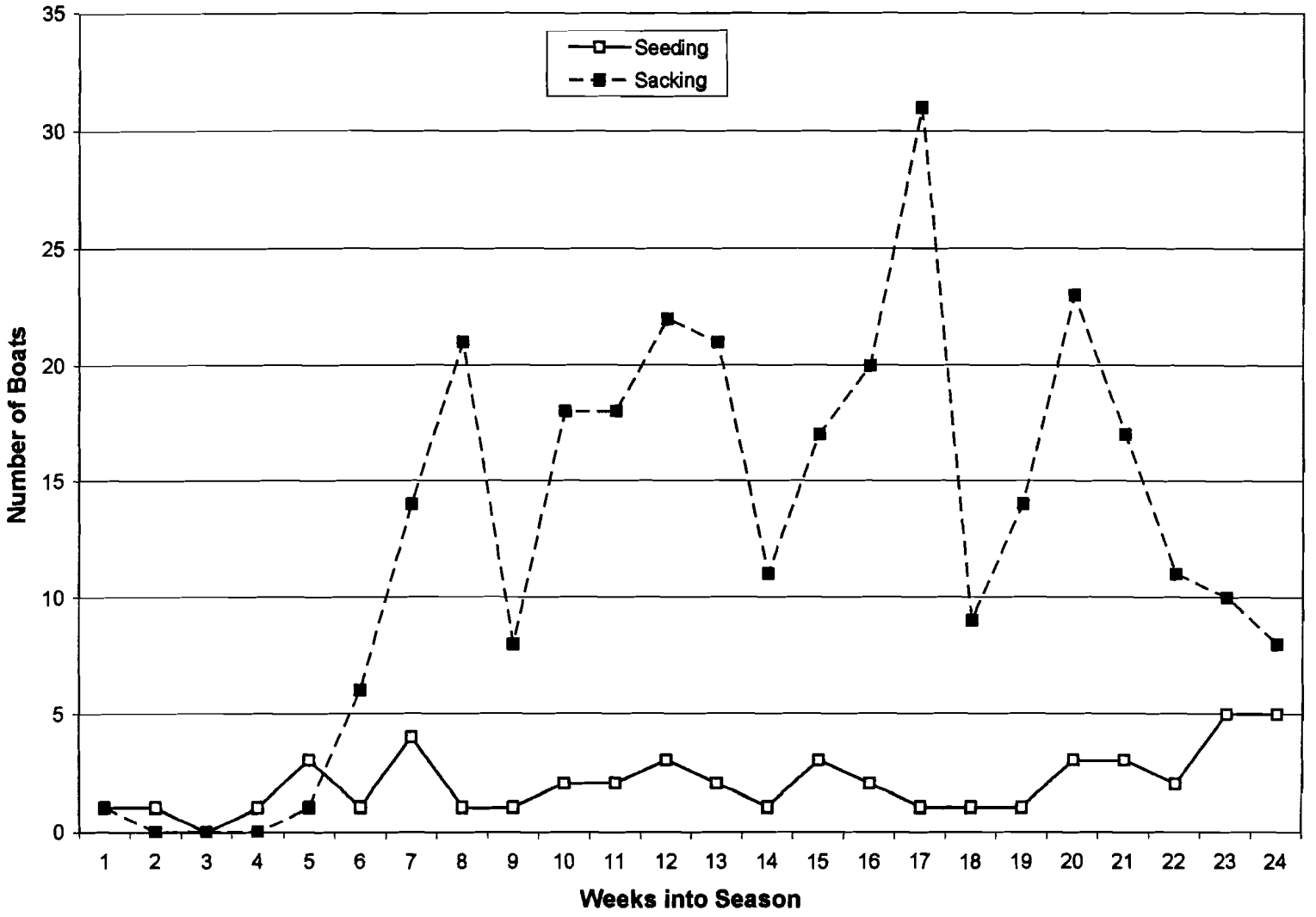

Figure 1.5. Number of vessels observed and contacted by harvest type and time of season. Weeks 1-3 are September dates, remaining weeks correspond to November 13 to April 1.

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CSA II

State of Louisiana

KATHLEEN BABINEAUX BLANCO
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BRYANT O. HAMMETT, JR.
SECRETARY

July 23, 2007

MEMORANDUM

TO: Patrick Banks, Marine Fisheries Division, Oyster Program Manager

FROM: Keith Ibos, Biologist Manager Coastal Study Area II

SUBJECT: 2007 CSA2 Meter Square Samples

INTRODUCTION

The Primary Public Oyster Grounds located in Coastal Study Area 2 include the area south of the MRGO to the Mississippi River, and from the "Red Line" (most eastern extent of privately leased areas) out to The Breton National Wildlife Refuge. This area encompasses approximately 300,000 of the 900,000 total acres of Primary Public Oyster Grounds east of the Mississippi River. This area includes a Sacking Only Area in Lakes Fortuna and Machias as well as the Bay Gardene Public Oyster Seed Reservation. Historically this area has provided seed stock and market oysters for oyster fishermen both east and west of the Mississippi River.

Hydrology in the area is affected at high Mississippi River stages by discharge through gaps in the levee south of Pt a la Hache and also from discharge from the Caernarvon and Bayou Lamoque freshwater diversion structures. After Hurricane Katrina, changes in the scope of operation of these two structures will likely affect salinities throughout the area.

METHODS

Personnel from Coastal Study Area II began meter square samples on June 27, 2007. All samples were completed by July 12, 2007. Samples were collected by randomly placing aluminum square meter frames on known reef substrate at 27 stations located from Lake Fortuna, Bay Gardene, Bay Crabe, Black Bay, and California Bay to Breton Sound. All live and dead oysters as well as shell in the upper portion (exposed) of the substrate were removed by SCUBA divers. Live and dead oysters, spat, fouling organisms, and oyster predators were identified and counted. Oysters were

measured in 5 millimeter (mm) size groups and divided into three categories: spat (<25mm), seed (25-74mm) and sack (75mm and larger). The average of two replicates at each station was used in conjunction with estimated reef acreage to estimate current oyster stock availability.

Two extra stations, one in Lake Fortuna and one in Black Bay were sampled and may be added to future assessments. These stations are not included in this year's stock assessment.
Dermo (*Perkinsus marinus*) samples were taken during meter square samples at seven locations throughout the study area. Twenty seed and twenty sack oysters are collected at each site for analysis by Dr. John Supan of LSU..

RESULTS AND DISCUSSION

SEED AND SACK STOCK

Based on data collected, stock for the area is estimated at 451,034 barrels of seed oysters and 309,562 barrels of market sized oysters for a total of 760,596 barrels of overall stock.

Overall availability is down 40% from last year, down 68% from the 10 year average of years 1997 thru 2006, and down 56% from the 25 year average since 1982. Seed oyster stock is down 59 % from last year, 69% below the past 10 year average, and 57% less than the 25 year average since 1982. Sack oyster stock is up 100% from 2006, but is still 66% below the average for the past ten years, and 55% less than the 25 year average since 1982. (Table 2.1)

Highest concentrations of sack oysters were found in Black Bay, Bay Crabe, and California Bay. Highest seed concentrations seed were found in Black Bay, Bay Gardene, California Bay, and Bay Crabe. Eighteen percent of seed oysters (not available for bedding) are located in the sacking only area. (Table 2.1)

Seed oysters averaged 1.8 inches overall with approximately 61% in the 1-2 inch size range. Most of these animals are not expected to reach market by the end of the season. Sack oysters averaged 3.6 inches overall with approximately 81% in the 3-4 inch size range.

With only an estimated 10% of the 2006 seed stock harvested, the expected increase in market oysters over last year was not as large as expected.

SPAT PRODUCTION

Live spat were observed at 22 stations. Overall occurrence was light with exception of good sets at stations 2, 11, 22, and 24. (Table 2.1) Eighty-three percent of spat measured were less than one half inch in length and will not reach seed size by the start of the season..

MORTALITY

Spat mortalities ranged from 0-100% with an average of 24%, while seed mortalities ranged from 0-25% with an average of 5.2%. No recent mortalities were observed for market sized oysters.

FOULING ORGANISMS

Although Hooked mussels (*Ischadium recurvum*) occurred in 20 stations, densities were low and should not be a major problem to harvesters.

OYSTER PREDATORS

Two southern oyster drills (*Stramonita haemastoma*) and egg casings were found in the sample at Station 26, Horseshoe Reef. Another was found outside of the sample frame at Station 28. Egg casings were also found at Stations 7, 4, and at the new site in Lake Fortuna.

One Shark Eye Snail (*Neverita duplicata*) was found at Station 6, while unidentified mud crabs (*Xanthidae, et al.*) were found at 21 stations. One small stone crab (*Mennipe adinia*) was collected at Snake Island (Station 1) and no blue crabs (*Callinectes sapidus*) or gulf toadfish (*Opsanus beta*) were seen in the samples. Results of Dermo (*Perkinsus marinus*) tests are included in a later section.

2006/2007 SEASON SUMMARY

METHODS

Harvest totals are estimated by obtaining fisheries dependent data from the monitoring of users. "Board Runs" are conducted weekly during the season. Biologists survey the entire area observing fishermen, recording locations and making harvest estimates for each vessel for that day. This estimate is projected over the amount of "fishable days" for the week and a total harvest of seed and market oysters for the week is made. Vessels collecting seed are often boarded to determine if excessive amounts of culch (non-living reef material) are being removed from area reefs.

RESULTS AND DISCUSSION

The Primary Public Oyster Grounds in CSA2, including the sacking only area and Bay Gardene Public Oyster Seed Reservation, opened September 6, 2006 and closed on September 27, 2006. The public grounds were reopened on November 13, 2006 and closed on April 1, 2007. Harvest on the Bay Gardene Public Oyster Seed Reservation was restricted to the taking of seed only.

Harvest for the grounds in 2006/2007 was an estimated 183,355 total sacks of market sized oysters. This represented 59% of the available market stock for that year. The majority of the sack harvest (46%) was from Black Bay, with 20% from Bay Crabe, and 20% from California Bay.

Seed harvest was an estimated 110,567 barrels of seed oysters which represented 10% of the available seed for that year. The majority of seed harvest was from California Bay (80%).

Eleven vessels were boarded by CSA2 biologists and checked for percent culch in seed stock harvested. Percentages ranged from 5-40% with a average culch percentage of 25%.

Table 2.1 2007 square meter sample results for Coastal Study Area II

Stations		Approx. Reef Acres	Square Meters	Average # of Live Seed Oysters/m²	Average # of Live Sack Oysters/m²	Barrels of Seed Oysters Available	Barrels of Sack Oysters Available	Hooked Mussels/m²	Oyster Spat/m²	Oyster Drill Presence	Spat Percent Mortality	Seed Percent Mortality	Sack Percent Mortality	Seed & Sack Percent Mortality	All Size Percent Mortality
1	Snake	508	2,047,782	1.5	1.0	4,266	5,686	6.0	10.0		5	0	0	0	4
2	Jessie	59	283,773	**62.0**	3	24,436	2,365	12.0	131.0		3.4	0.8	0	0.8	2.5
3	N. Lonesome	896	3,626,112	4.5	1.0	22,663	10,073	1.5	20.0		0	10	0	0.8	1.9
5	Bayou Lost	116	477,546	**46.5**	1.0	30,842	1,327	7.0	30.0		5	1	0	1	2.6
6	Lonesome	716	2,897,652	**4.5**	**2.5**	18,110	20,123	1.5	8.5	Shark eye snail	5.9	10	0	7.7	6.3
7	Black Bay	301	1,218,147	**3.0**	**2.5**	5,076	8,459	0.0	9.0	casings	33.3	14.3	0	8.3	23.3
8	W. Bay Crabe	501	2,027,547	5.5	3.5	15,488	19,712	5.5	23.5		14.9	15.4	0	10	13.4
9	Stone	461	1,865,667	14.5	**6.5**	37,572	33,686	6.5	5.5		27.3	3.3	0	2.3	7.4
10	S. Black Bay	145	586,815	1.5	1.5	1,223	2,445	0.0	6.5		0	0	0	0	0
11	Elephant	339	1,371,933	**15.5**	0.0	29,535	0	3.0	111.5		18.4	0	0	0	16.1
12	Curfew	425	1,719,975	7.0	**1.0**	16,722	4,778	6.5	1.0		50	12.5	0	11.1	15
13	N. California	109	441,123	7.0	**3.5**	4,289	4,289	21.0	8.5		11.8	6.7	0	4.5	7.7
14	California	7	28,329	10.5	1.5	413	118	25.0	6.5		15.4	16	0	14.3	14.6
18	Sunrise	174	704,178	4.0	**10.5**	3,912	20,539	124.0	2.0		100	0	0	0	12.1
17 SKIP		659	2,666,973			private leases discontinued									
19	Mangrove	937	3,792,039	1.0	1	5,267	10,533	27.7	8.3		0	0	0	0	0
20	W. Pelican	293	1,185,771	2.5	1.5	4,117	4,941	1.0	0.0		0	0	0	0	0
21	Bay Crabe	659	2,666,973	10.0	**9.0**	37,041	66,674	4.0	0.5		0	0	0	0	0
22	E. Bay Crabe	122	493,734	**47.5**	9	32,573	12,343	30.0	60.5		12.9	5	0	4.2	8.9
23	E. Gardene	28	113,316	**15.5**	2	2,439	630	0.0	0.5		100	6.1	0	5.4	7.9
24	Bay Gardene	69	279,243	**52.5**	13	20,361	10,084	30.0	118.5		0.6	0.9	0	0.6	0.8
4,26	N. Black Bay	315	1,274,805	1.8	**1.8**	3,098	8,197	0.3	1.5	2 drills, casings	50	0	0	0	15
15	Telegraph	127	513,969	5.0	**1.5**	3,569	2,142	32.0	6.0		8.3	9.1	0	7.1	7.7
18	E. Pelican	1,528	3,164,754	6.5	4	28,571	35,164	14.0	1.0		50	0	0	0	4.3
26 SKIP	see 4,26					combined data									
25	Battledore	1419	5,742,693	0.0	0.0	0	0	0.0	10.0		0	0	0	0	0
27	L Fortuna	4288	17,353,536	3.3	0.3	80,260	14,461	0.0	2.3		0	0	0	0	0
26	Wreck	2276	9,210,972	1.5	**0.5**	19,190	12,793	0.0	0.5	1 drill	100	25	0	20	33.3
Sub Total						**451,034**	**309,562**								
ALL TOTAL						**760,596**									

NOTE: Large bold numbers in seed and sack columns represent an increase in number over last season

	2006	2007	% Change
Seed	1,107,647	451,034	-59%
Sack	154,493	309,562	+100%
Total	1,262,140	760,596	-40%

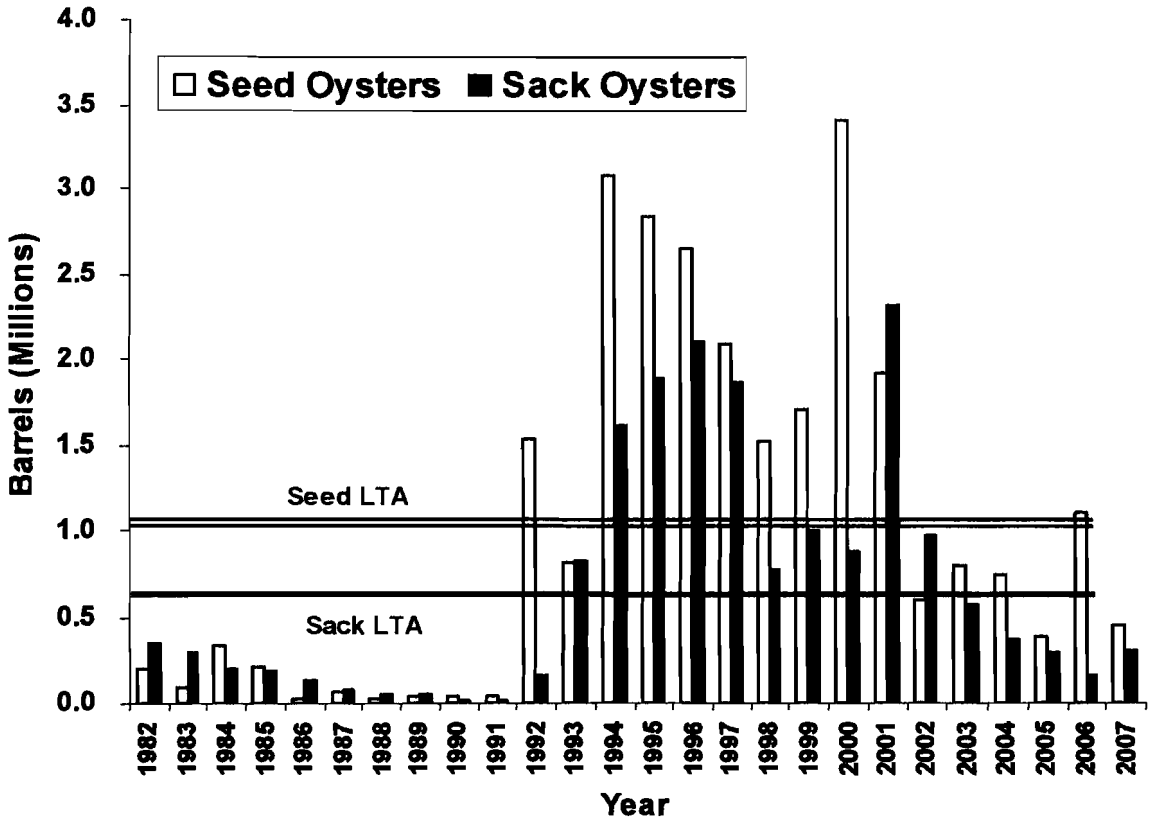


Figure 2.1. Historical Coastal Study Area 2 oyster stock size (estimates based on square meter sample analysis).

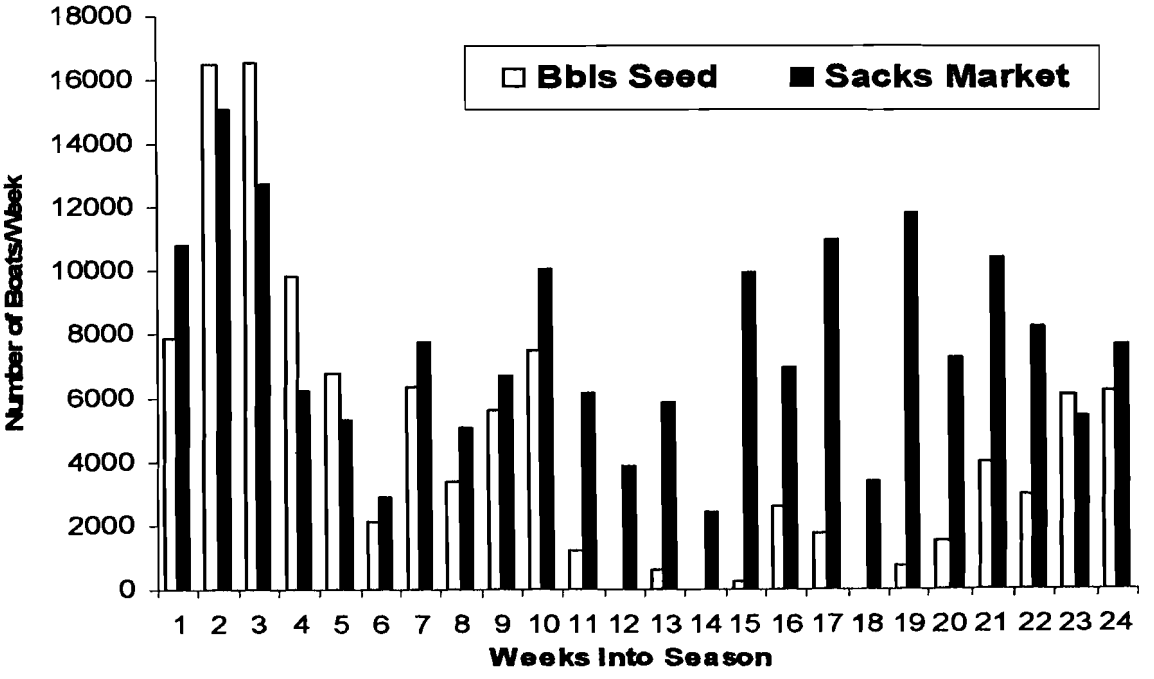


Figure 2.2. 2006/2007 estimated harvest by season week. September 6-27 equals weeks 1-4. November 13 to April 1 equals weeks 5-24.

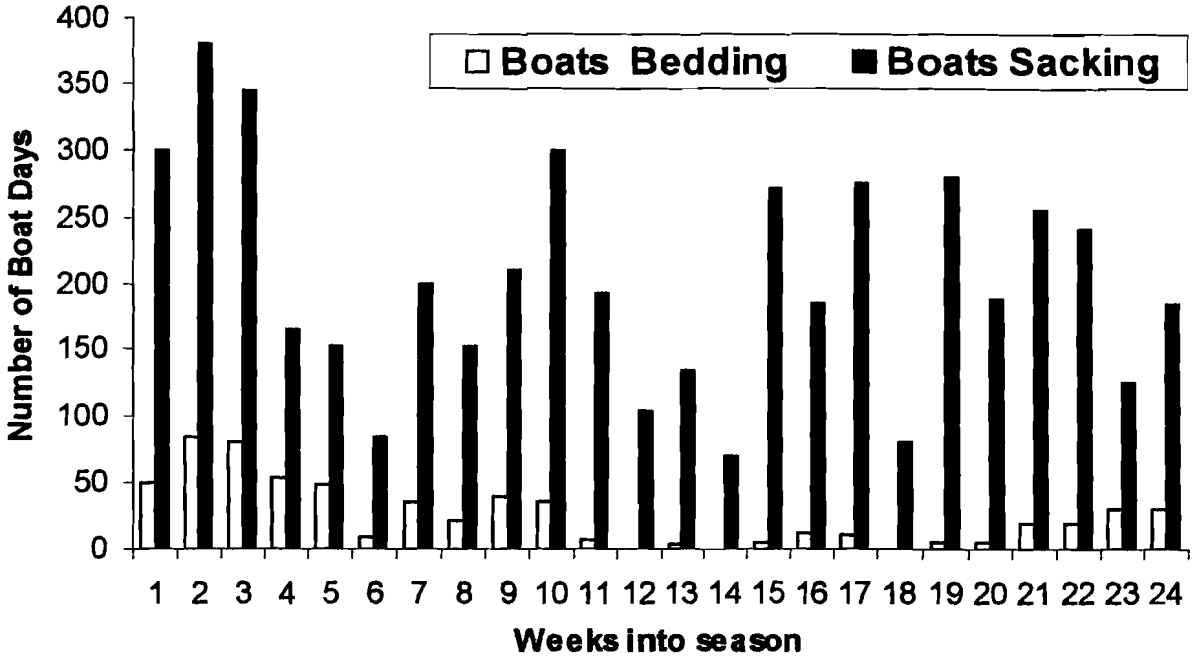


Figure 2.3. 2006/2007 estimated harvest effort by season week. September 6-27 equals weeks 1-4. November 13 to April 1 equals weeks 5-24.

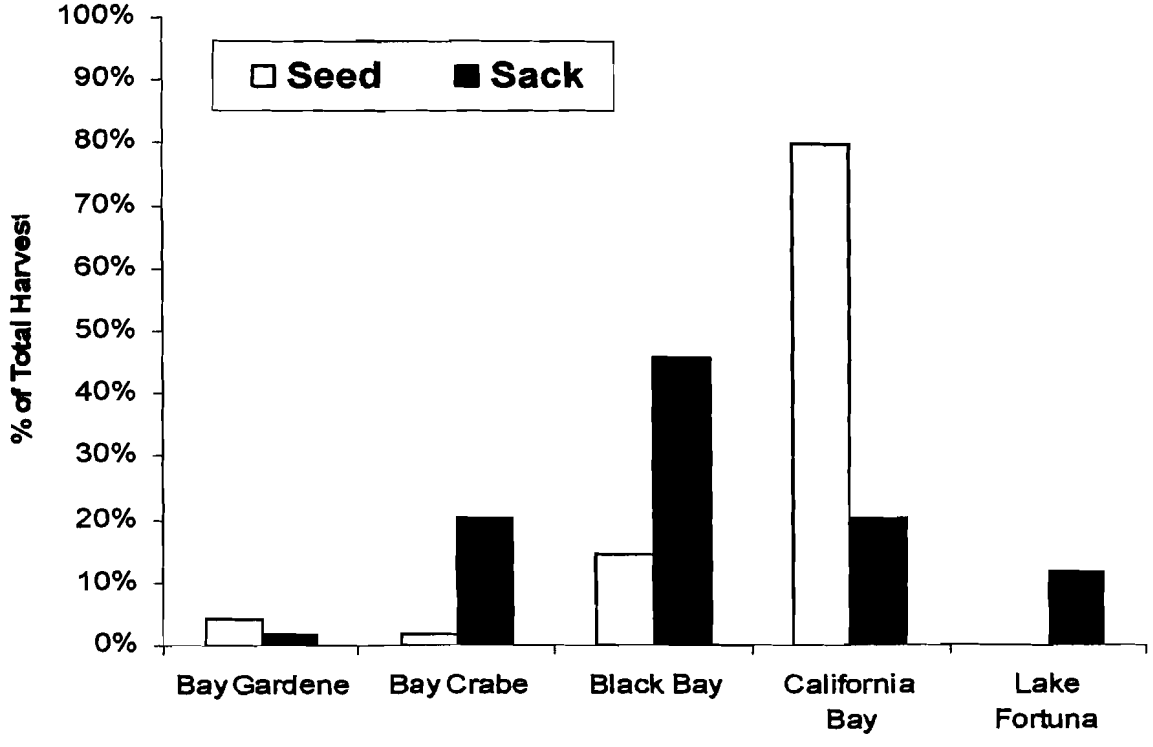


Figure 2.4. 2006/2007 percent of estimated harvest by bay system within Coastal Study Area 2.

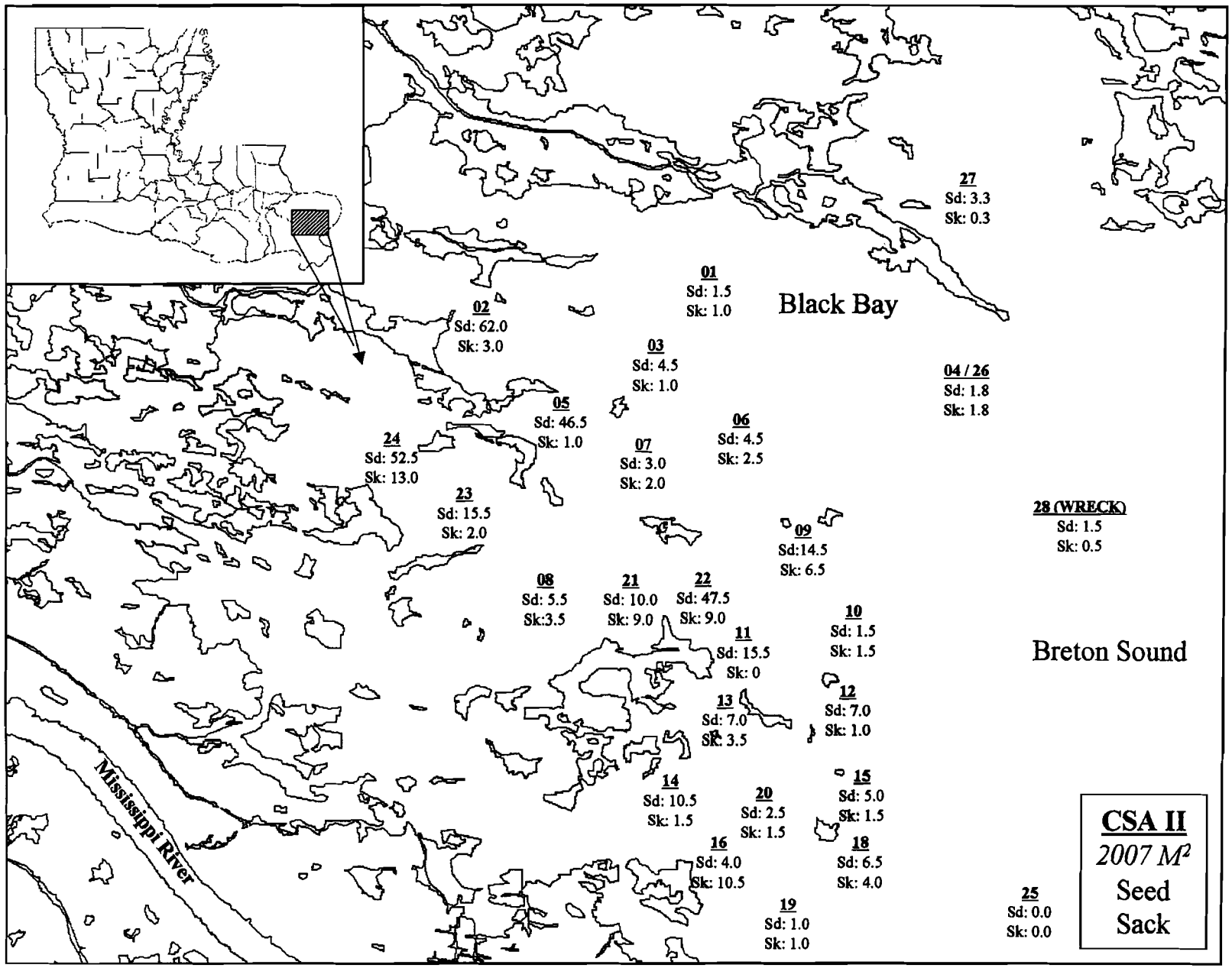


Figure 2.3. CSA II square meter stations and sample results. Numbers below stations are average numbers of seed (Sd) and sack (Sk) oysters per square meter.

CSA III

State of Louisiana

Bryant O. Hammett, Jr.
Secretary

Department of Wildlife & Fisheries
Post Office Box 37
Grand Isle, LA 70358
(985) 787-2163

Kathleen Babineaux Blanco
Governor

Date: **July 19, 2007**

To: **Patrick Banks, Oyster Program Manager**

From: **Jason Adriance, Biologist Manager, CSA – 3**

Re: **CSA III Public Oyster Seed Ground Meter Square Samples**

INTRODUCTION

Coastal Study Area 3 (CSA 3) has historically had three sampling sites for oyster assessment. These sites are all located in the Hackberry Bay Public Oyster Seed Ground (Jefferson Parish, La). Hackberry Bay is an approximately 8,000 acre euryhaline lake with a mostly silt and clay bottom. The three traditional sites within Hackberry Bay are the upper, middle, and lower Hackberry sampling sites. The middle Hackberry site is the only site located over historical existing reefs, the upper and lower sites are over former cultch plants placed on historical reefs. The upper Hackberry sampling site was the result of a 1994 cultch plant using federal disaster funds from Hurricane Andrew in 1992. The 1994 cultch site was comprised of six different sections of substrate. The substrates were crushed concrete, shucked shell, reef shell, mixed shell, Kentucky limestone, and Bahamian limestone. The lower Hackberry sampling site is on a reef that was part of a 1973 cultch plant.

In 2004 two more cultch plants were placed in Hackberry Bay and one in southern Barataria Bay using federal funds dedicated to the 2002 Hurricane Lilly impacts. The northern Hackberry Bay cultch plant, 10 acres, was planted near the old 1994 cultch plant on May 10, 2004 using approximately 2,322 cubic yards of #57 limestone. The southern Hackberry Bay cultch plant, 25 acres, was planted between May 10 and 12 2004 using approximately 4,005 cubic yards of #57 limestone. The 40 acre cultch plant that was planted in southern Barataria Bay is comprised of approximately 7,536 cubic yards of crushed concrete. The Barataria Bay cultch plant was placed onsite from May 6 to 8, 2004 and is the only known reef acreage in the Barataria Bay Public Oyster Seed Ground.

On February 1, 2007 the Wildlife and Fisheries Commission created the Little Lake Public Oyster Seed Ground. This area had been utilized in the past as a temporary seed ground, last in 2004. The Little Lake Public Oyster Seed Ground will allow oyster farmers and harvesters more access to seed and sack oysters in Barataria Bay, especially following the devastation of hurricanes Katrina and Rita. No square meter samples were collected from the Little Lake Seed Ground due to unknown reef sizes and locations.

METHODS

Square meter samples were collected by CSA 3 staff on July 2, 2007. All samples were taken using a one square-meter frame placed directly on the bottom. All live and dead oysters, as well as shell, were removed from the area enclosed in the frame by divers. Live and dead oysters, spat, fouling organisms, and oyster predators were identified and enumerated. All oysters were measured in 5 millimeter work groups and divided into size groups of spat (0-25mm), seed (25-75mm), and sack oyster (greater than 75mm). Combined Hackberry Bay Public Oyster Seed Ground estimates are adjusted for the percentage of reef acreage of the cultch plants and the historical reefs. A total of six stations were visited with three square meter samples taken at each station. The average of the three samples at each station was used, in combination with reef acreage, to estimate the current oyster availability for CSA 3. The Little Lake Public Oyster Seed Ground was not sampled due to lack of reef acreage information. Also on July 2nd, 2007 oysters from square meter samples, divided by sack and seed, were collected and transported to Dr. John Supan (L.S.U. Cooperative Extension Service) for an analysis for *Perkinsus marinus* (Dermo). Results of the Dermo analysis are presented later in this assessment.

RESULTS

The Hackberry Bay Public Oyster Seed Ground (Hackberry Bay POSG) sample sites, including the 2004 cultch plants, averaged 2.3 spat oysters per square meter, 37.9 seed oysters per square meter, and 4.3 sack oysters per square meter (Figure 3.1, Figure 3.2). Spat oyster estimates in the Hackberry Bay POSG were higher in 2007 than the previous three years, but still below the 2000 to 2006 average of 12.7 per square meter. Seed oyster estimates in the Hackberry POSG are higher than the previous seven years and well above the 2000 to 2006 average of 9.3 per square meter. Sack oyster estimates in the Hackberry POSG averaged 4.3 per square meter. Sack oyster estimates in the Hackberry POSG are higher than the previous five years and are above the 2000-2006 average of 3.4 per square meter. Using reef acreage, oyster availability estimates can be extrapolated from the average number of oysters sampled per square meter. For the Hackberry POSG there are an estimated 10,583.8 barrels (bbls) of seed oysters available for harvest (Figure 3.3, Table 3.1). This estimate is well above the five and ten year averages of 598.6 bbls and 1683.3 respectively. The Hackberry POSG also contains an estimated 2,424 bbls of sack oysters available for harvest (Figure 3.3, Table 3.1), which is above the five and ten year averages of 332 bbls and 780 bbls respectively.

The Barataria Bay Public Oyster Seed Ground (Barataria Bay POSG) sample sites averaged 0.0 spat, 0.0 seed, and 0.0 sack oysters per square meter. The Barataria POSG has only produced oysters in 2005 when an estimated 899.3 seed oysters were available.

The Little Lake Public Oyster Seed Ground was not sampled due to lack of information on reef acreage.

Salinities in the Hackberry Bay POSG, according to a USGS constant data recorder, averaged 12.5 ppt for the month of June in 2007 which is above the 2001 to 2006 average of 12.1 ppt. June temperatures averaged 29.3 degrees C in 2007 which is equal to the 2001 to 2006 average of 29.3 degrees C. June averages of constant recorder data is presented in Figure 3.4.

Hooked mussels per square meter averaged 2.3 on the Hackberry POSG and 0.0 per square meter on the Barataria POSG. The average number of hooked mussels per square meter on the Hackberry POSG is well below the 2002-2006 average of 15.1 per square meter. No oyster drills were noted in any samples.

DISSCUSSION

The Hackberry Bay POSG (Figure 3.5) has more oyster availability this year than in the previous eleven years. Part of the increased availability of oysters in the Hackberry Bay POSG can be directly attributed to the 2004 cultch plants, in particular the southern cultch plant in Hackberry Bay which contains the majority of seed oysters available in Hackberry Bay. The southern Hackberry Bay cultch plant had an estimated 28,103 bbls of seed available in 2005 then suffered a dramatic drop in available seed (2,051 bbls) for 2006 due to hurricanes Katrina and Rita. This year the southern cultch has had experienced no hurricanes or mortality events and has rebounded some with an estimated 10,356 bbls of seed available. The southern Hackberry Bay cultch plant also has an estimated 2,163 bbls of sack oysters available this year. While diving, divers noted that at the southern Hackberry cultch plant each seed oyster was attached to one piece of limestone and a significant majority of that cultch plant is still exposed and available for spat settlement. The southern Hackberry cultch plant drives the estimates for the Hackberry Bay POSG with the majority of the seed oysters sampled coming from this cultch plant. 2006 and early 2007 have been mild years as far as hurricanes and tropical events are concerned which also contributes to the increased availability of oysters. No major mortality events were noted in 2006 or 2007. The northern Hackberry Bay cultch plant has not been as productive as the southern cultch plant. This year the northern cultch plant only accounts for an estimated 129 bbls of seed oysters down from a high of 9,757 bbls in 2005. The northern Hackberry Bay cultch plant also contains an estimated 78 bbls of sack oysters.

The Barataria Bay POSG has not produce oysters since the first year after planting when an estimated 899.3 seed oysters were available. The location of the Barataria Bay POSG (Figure 3.6) hinders productivity until salinity regimes in the basin change due to natural forces or coastal restoration efforts. The Barataria POSG is close to the coast and has a higher salinity than the Hackberry POSG. This higher salinity regime makes it more vulnerable to predators such as oyster drills and stresses associated with higher salinities.

The above oyster availability estimates assume that 100% of each cultch site or the reservation is exposed at the water bottom. While diving on the sample sites biologists noticed that some portions of each of the cultch sites and grounds were silted over. Without being able to quantify the amount of cultch or reef that is silted over the above estimates may be high.

2006/2007 HARVEST ESTIMATES

During the September 2006 to April 2007 season the Barataria Bay POSG remained closed for the entire season. The 2004 cultch plants in the Hackberry Bay POSG were opened from September 6, 2006 to September 8, 2008 and the remaining portion of the Hackberry Bay POSG was open from September 6, 2006 to September 26, 2006 and then again from November 13, 2006 to April 1, 2007. The newly created Little Lake POSG was open from February 21, 2007 to April 1, 2007 and again from May 4th to 18th, 2007.

The Hackberry Bay POSG, including the 2004 cultch plants, produced an estimated 271 sacks of marketable oysters and 900 barrels of seed oysters harvested. The Little Lake POSG produced an estimated 5,820 sacks of marketable oysters and 11,290 barrels of seed oysters harvested (Table 3.2).

During the previous oyster season, September 2005 to April 2006, the Hackberry Bay POSG was only open for twelve days from December 12th to December 23rd and production was estimated at zero sacks of marketable oysters and zero barrels of seed oysters. The 2004 cultch plants in the Hackberry Bay POSG and the Barataria Bay POSG were open from December 12th to December 14th, 2005 and production was estimated at zero sacks of marketable oysters and zero barrels of seed. These short openings were a result of the impacts of hurricanes Katrina and Rita as well as D.H.H. closures.

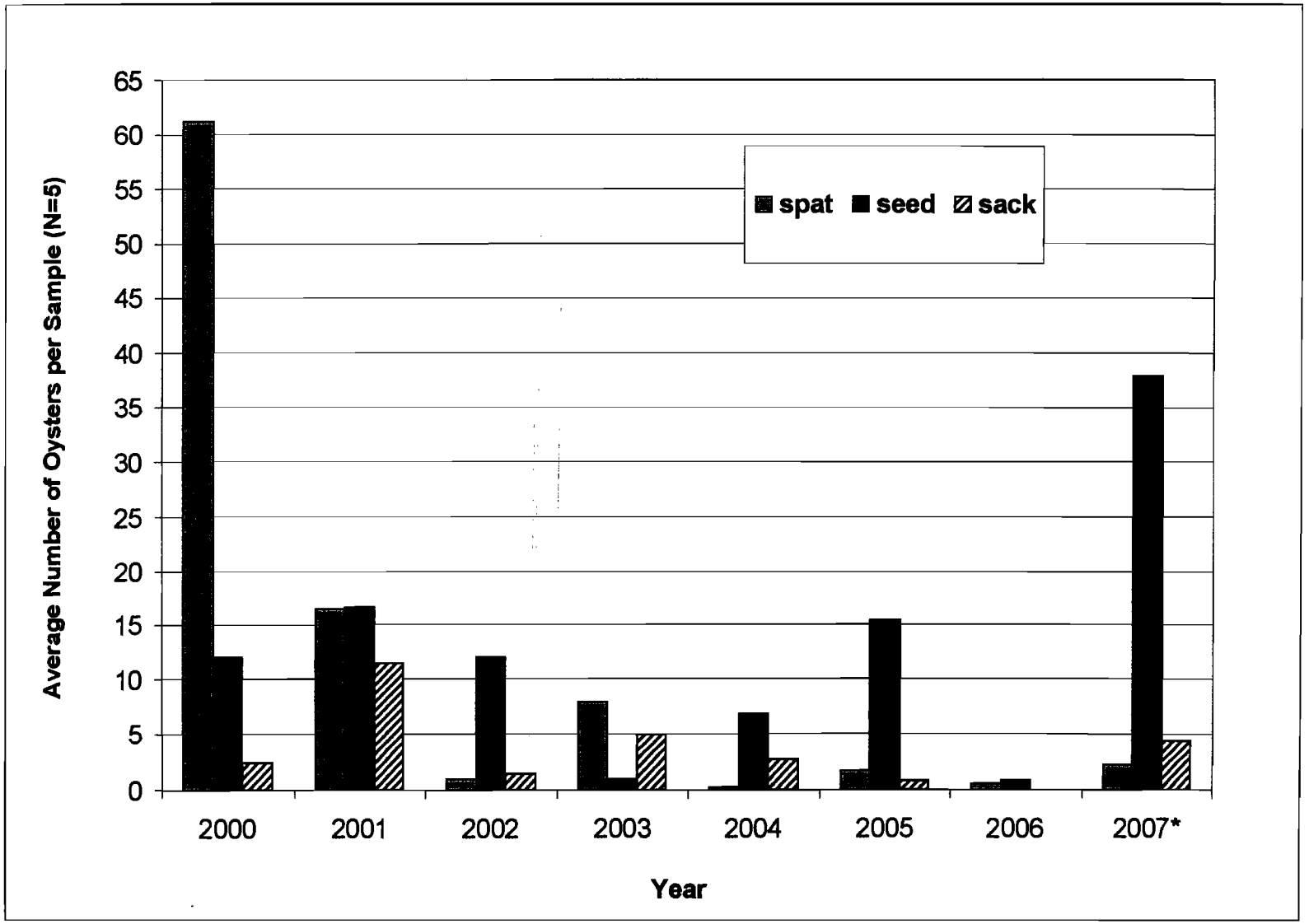


Figure 3.1 Average numbers of spat, seed, and sack oysters in the Hackberry Bay Public Oyster Seed Ground square meter samples from 2000-2007. * includes 2004 cultch plants.

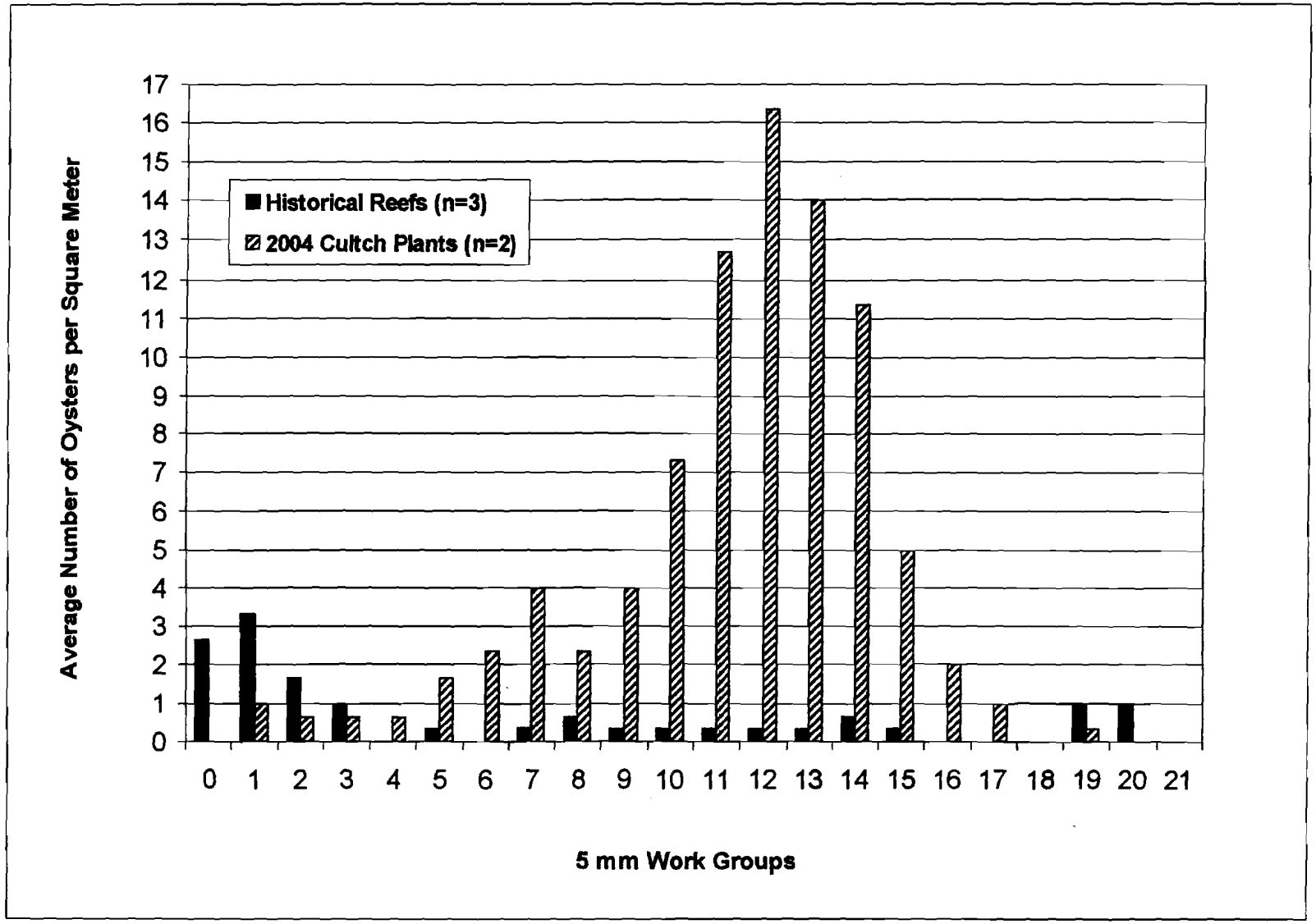


Figure 3.2 Oyster Size Distribution by 5 mm Work Groups in Square Meter Samples Collected from the Hackberry Bay Public Oyster Seed Ground during 2007.

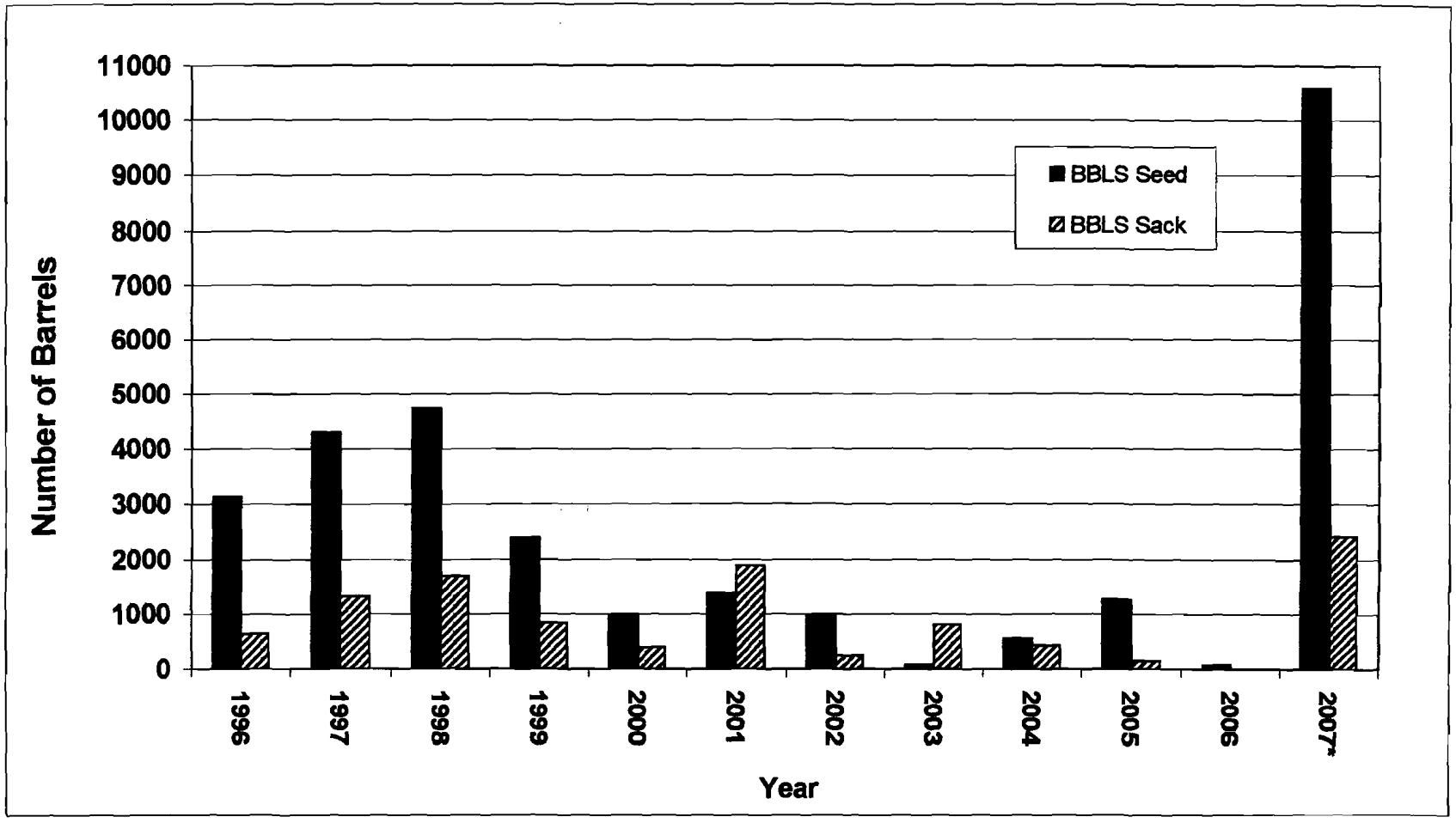


Figure 3.3 Oyster Availability in the Hackberry Bay Public Oyster Seed Ground from 1996 to 2007.
* includes the 2004 cultch plants.

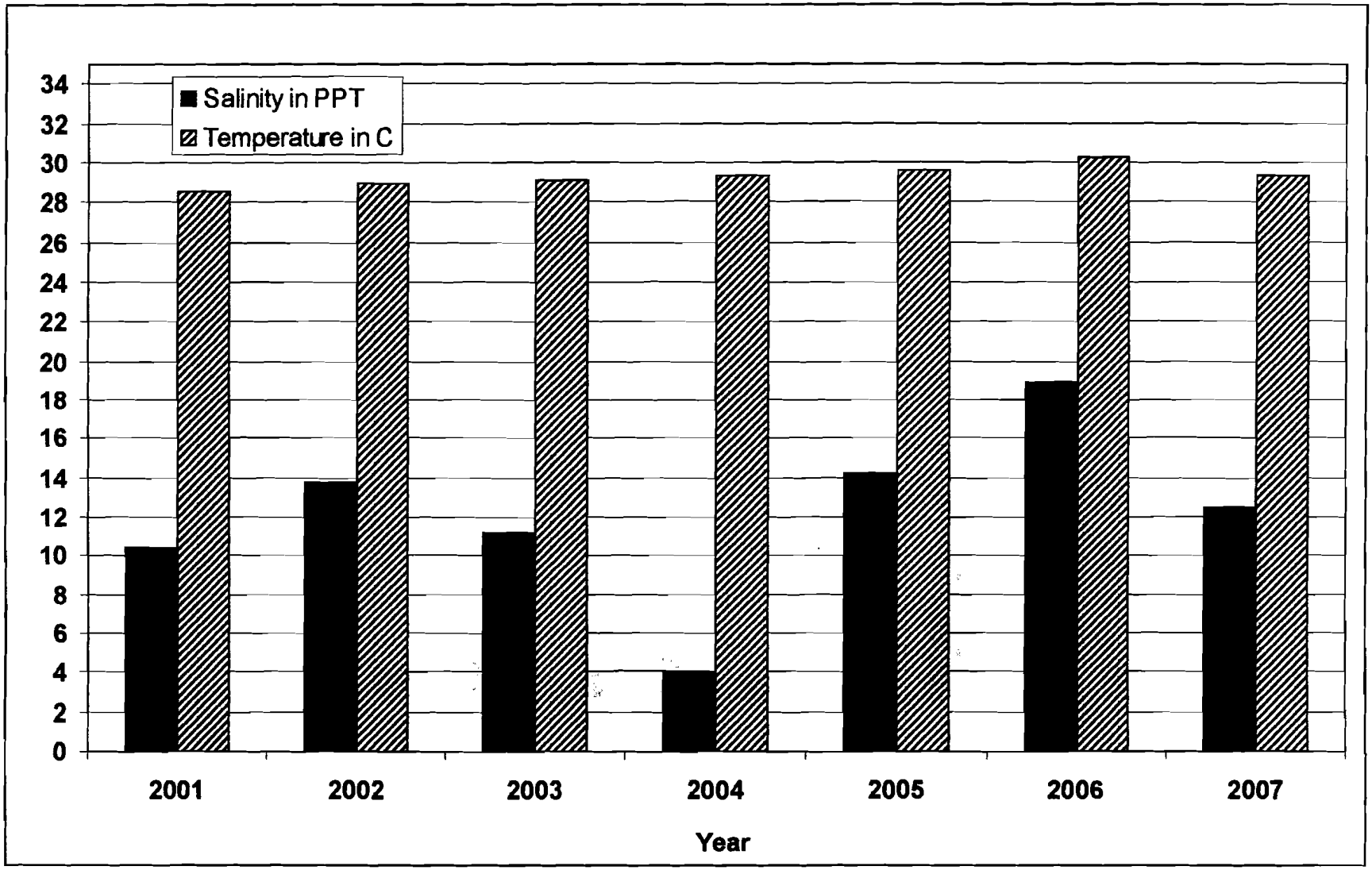


Figure 3.4 Average of Daily June Salinity (in ppt) and Temperature (in degrees C.) readings from a USGS Constant Data Recorder located in Hackberry Bay from 2001-2007.

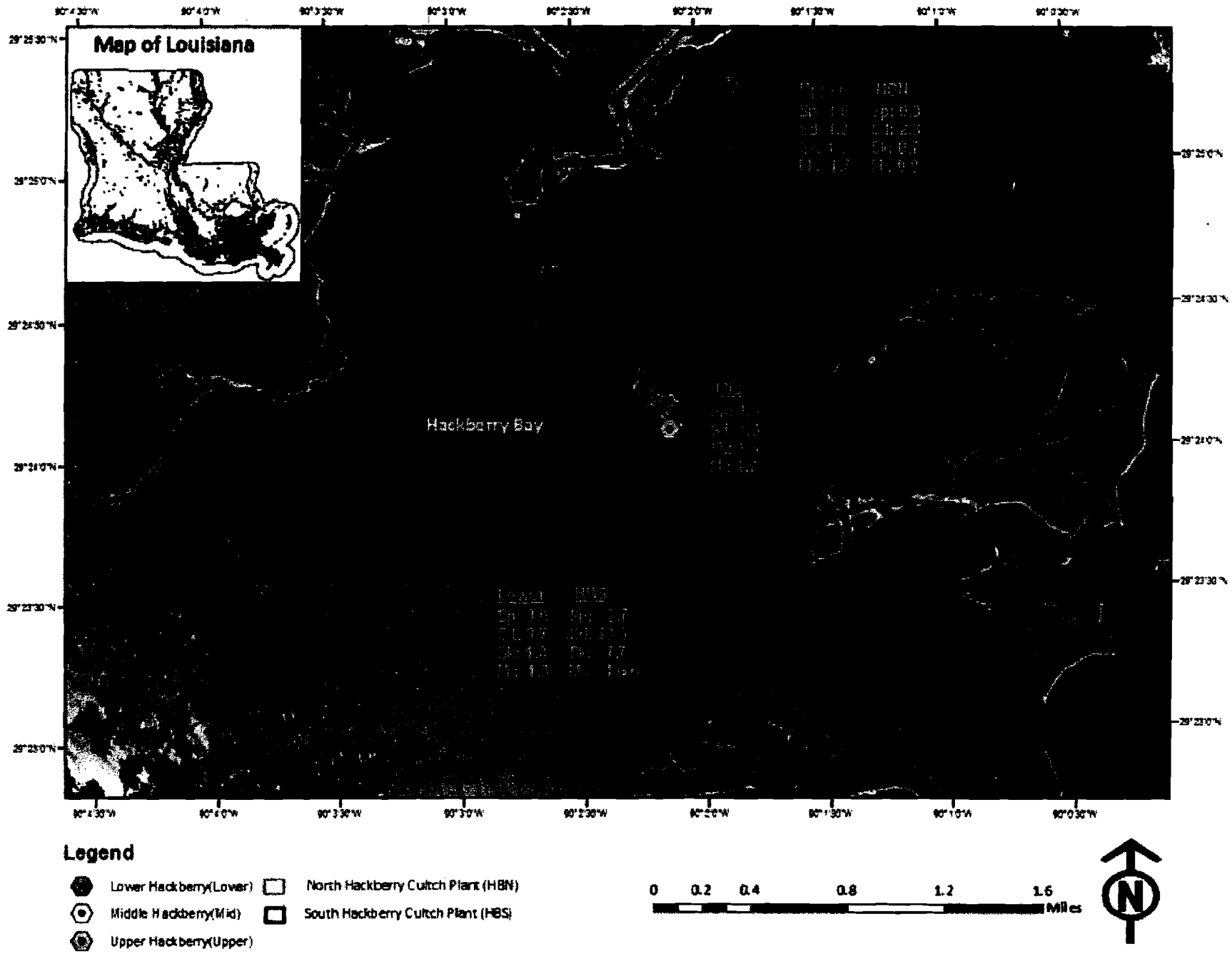


Figure 3.5. Map of Sample Sites and Cultch Plants in the Hackberry Bay POSG with Average Per Square Meter Results (Sp=Spat, Sd=Seed, Sk=sack, and M=Mussels).

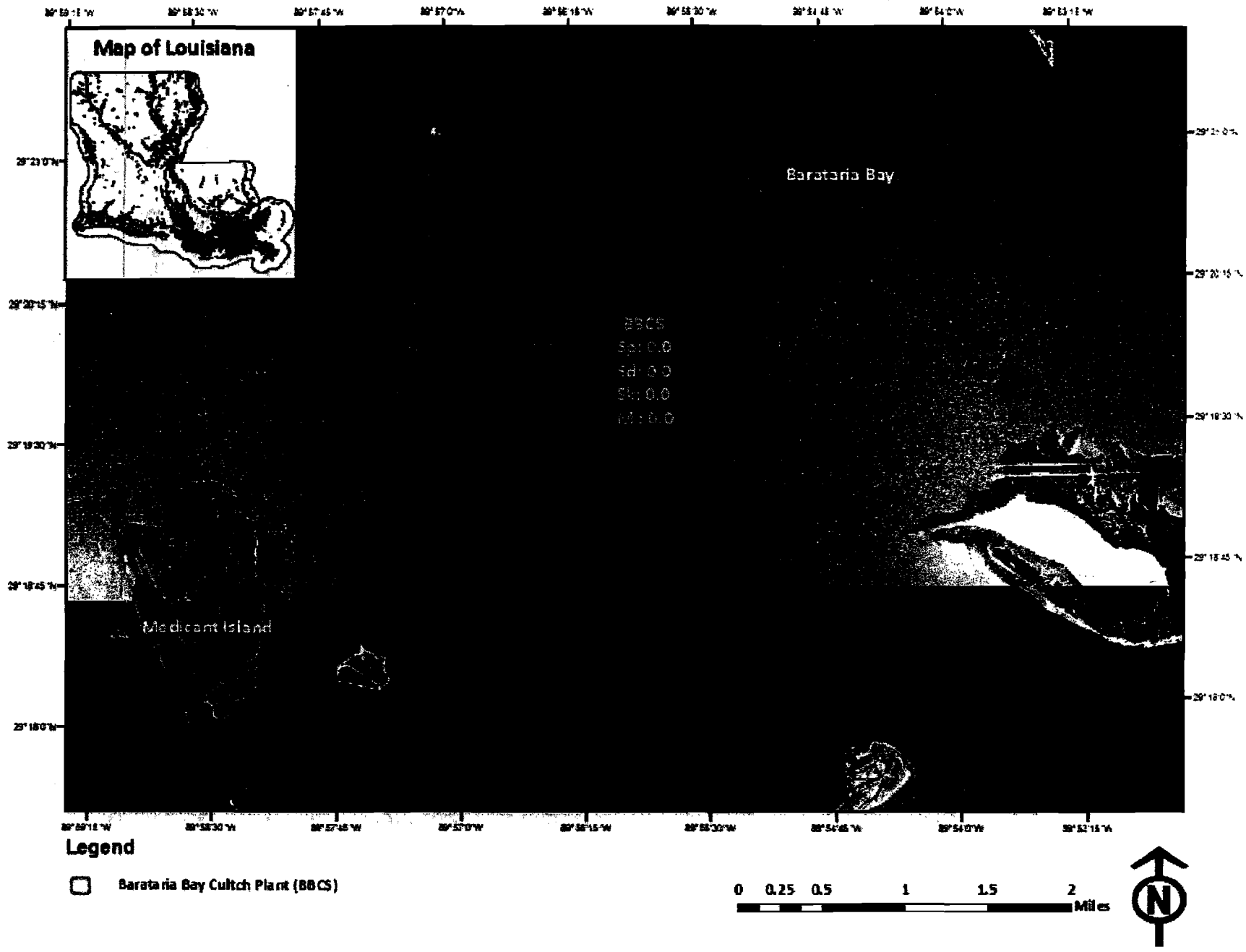


Figure 3.6. Map of Sample Sites and Cultch Plants in the Barataria Bay POSG with Average Per Square Meter Results (Sp=Spat, Sd=Seed, Sk=sack, and M=Mussels).

Table 3.1. 2007 oyster availability on the public oyster areas in Coastal Study Area (CSA) III.

Public Oyster Area	Reef Acreage	Square Meters	Seed Oysters Per M^2	Sack Oysters Per M^2	Seed Oysters (BBLS)	Sack Oysters (BBLS)
Barataria Bay (2004 Cultch Plant)	40.0	161,875	0.0	0.0	0.0	0.0
Hackberry Bay (2004 North Cultch Plant)	10.0	40,469	2.3	0.7	129.3	78.7
Hackberry Bay (2004 South Cultch Plant)	25.0	101,172	73.7	7.7	10,356.0	2,163.9
Hackberry Bay (Existing Reefs)	14.7	59,380	1.2	1.1	99.0	181.4
Little Lake	Unknown	Unknown	Unknown	Unknown	–	–
CSA 3 Totals	***89.7***	***362,896***			***10,584.3***	***2,424***

Table 3.2. Estimates of oyster production on the public seed grounds in Coastal Study Area III for the 2006 - 2007 season.

Public Oyster Area	Seed Oysters Harvested (BBLS)	Sack Oysters Harvested (Sacks)
Hackberry Bay POSG	900	271
Little Lake POSG	11,290	5,820
Barataria Bay POSG	0	0
CSA 3 Totals	***12,190***	***6,091***

CSA IV

July 18, 2007

MEMORANDUM

To: Patrick Banks, Biologist Program Manager

From: Vince Guillory, Biologist Manager, CSA IV

Subject: 2007 CSA IV Oyster Stock Assessment Report

The Timbalier-Terrebonne estuary in CSA IV is characterized as a high salinity system. The upper portion of Lake Felicity was used as a public seed ground reservation during the 1940s and early 1950s, but was discontinued because salinities were usually too high for oyster production. Most of Timbalier-Terrebonne estuary is in the high-salinity zone (where oyster populations are primarily intertidal because of extensive predation) or wet zone (where subtidal oysters may be found when salinities are suppressed) (Melancon et al., 1994. The productive wet-dry zone (where subtidal oysters may be consistently found) lies to the north of the current Lake Felicity and Lake Chien public seed grounds.

Four public oyster seed grounds (Lake Tambour, Lake Chien, and Lake Felicity in Terrebonne Parish and Deep Lake in Lafourche Parish) were established in CSA IV in 2001. Two cultch deposition projects using size number 57 limestone rock were performed in the Lake Felicity (Figure 4.1) and Lake Chien (Figure 4.2) seed grounds in summer of 2004. Approximately 6,000 cubic yards were deposited on 15.5 acres in Lake Chien and approximately 9,000 cubic yards on 40 acres in Lake Felicity.

METHODS

Square meter samples were taken from three locations each on the Lake Felicity and Lake Chien cultch plants on July 9, 2007. The aluminum square meter frame was tossed randomly over the cultch plant. All live and dead oysters within the top portion of the bottom were removed by SCUBA divers. Oysters collected in each sample were measured in 5-mm size classes and divided into three groups: spat (<25 mm), seed (25-74 mm), and sack (>74 mm).

The average numbers of seed and sack oysters per square meter for the Lake Felicity and Lake Chien cultch plants were expanded to provide estimates of the standing crops of barrels of seed and sack oysters using the following:

- an area of 62,726.5 square meters (15.5 acres) and 161,874.0 square meters (40.0 acres) for the Lake Chien and Lake Felicity cultch plants, respectively
- one barrel equals 720 seed oysters or 360 sack oysters

In conjunction with the square meter oyster samples, bottom water temperature and salinity data were also taken. Oysters were also collected from each reef for "Dermo" (*Perkinsus marinus*) analysis.

RESULTS

Hydrological Data

Salinities for 2007 were below the very high salinities experienced in 2006, but were above 2004 and 2005 salinities (Table 4.1).

Table 4.1. Hydrological data taken in conjunction with annual standing crop oyster samples (June or July) on CSA IV cultch plants.

CULTCH PLANT	PARAMETER	YEAR			
		2004	2005	2006	2007
Lake Felicity	Salinity (ppt)	16.5	17.0	26.6	20.5
	Temperature (°C)	30.3	29.8	30.7	29.8
Lake Chien	Salinity (ppt)	16.0	15.8	26.0	19.8
	Temperature (°C)	30.4	30.0	30.8	30.0

Although discrete measurements indicated salinities around 20 ppt, average annual salinities on the Lake Felicity and Lake Chien seed grounds appear to regularly remain below 20 ppt (Table 4.2). Monthly salinity measurements were suspended following calendar year 2005 and, therefore, LDWF data does not exist from which to determine average annual salinities for these seed grounds in 2006 and 2007.

Table 4.2. Annual salinities on the Lake Chien and Lake Felicity cultch plants from monthly measurements.

YEAR	SALINITY (ppt)	
	LAKE CHIEN CULTCH PLANT	LAKE FELICITY CULTCH PLANT
2000	22.9	24.8
2001	17.1	18.4
2002	16.6	18.2
2003	16.5	18.2
2004	16.2	17.4
2005	14.6	18.8

Biological Sampling

The average numbers of seed and sack oysters per square meter in 2007 were 3.7 seed and 0.3 sack oysters, respectively, for the Lake Felicity cultch plant and 15 seed and 4 sack oysters, respectively, for the Lake Chien cultch plant (Table 4.3). Average percent mortalities for seed oysters were 29% and 9.7% and for sack oysters were 0% and 4% at the Lake Felicity and Lake Chien cultch plants, respectively. Silt overburden was much more pronounced in the Lake Felicity site than in Lake Chien.

Table 4.3. Oyster abundance per sample and percent mortalities of spat, seed, and sack oysters from square meter samples, July 2007.

CULTCH PLANT	SAMPLE	NUMBER/SAMPLE			PERCENT MORTALITY		
		SPAT	*SEED*	*SACK*	*SPAT*	*SEED*	*SACK*
Lake Felicity	1	1	6	1	0	20	0
	2	0	3	0	0	25	0
	3	0	2	0	100	50	0
	Mean	0.3	3.7	0.3	75	29	0
Lake Chien	1	8.2	9	0	0	0	0
	2	0	10	4	100	9.1	11
	3	0	26	8	0	10.3	0
	Mean	3.3	15	4	0	9.7	4

Recruitment, as measured by the number of spat, was highest in 2004 followed by a peak in seed oysters in 2005 and sack oysters in 2006 (Table 4.4). Numbers of spat, seed, and sack oysters all declined after their respective peaks.

Table 4.4. Average numbers of spat, seed, and sack oysters per square meter by year on the Lake Felicity and Lake Chien cultch plants. One-quarter meter square sampler was used from 2004-2006, a one square meter sampler in 2007.

CULTCH PLANT	YEAR	NUMBER/SQUARE METER		
		SPAT	*SEED*	*SACK*
Lake Felicity	2004	3,014.8	30.8	0
	2005	0	0	0
	2006	9.6	13.6	0
	2007	0.3	3.7	0.3
Lake Chien	2004	2536.8	20.0	0
	2005	270.0	474.0	0
	2006	1.6	28.0	17.6
	2007	3.3	15.0	4.0

Estimated Resource Availability

A total of 2,131 barrels of seed oysters and 847 barrels of sack oysters for both cultch plants are estimated (Table 4.5).

Table 4.5. Estimated 2007 standing crops of seed and sack oysters on the Lake Chien and Lake Felicity cultch plants based on square meter samples.

CULTCH PLANT	ESTIMATED RESOURCE	
	SEED OYSTERS (Barrels)	SACK OYSTERS (Barrels)
Lake Felicity	824	150
Lake Chien	1,307	697
Total	2,131	847

Estimated 2007 resource availability of combined seed and sack oysters has declined substantially from 41,296 barrels of seed in 2005 and 3,067 barrels of sack oysters in 2006 (Table 4.6).

Table 4.6. Estimated annual standing crops of seed and sack oysters on the Lake Chien and Lake Felicity cultch plants based on 0.25 (2004-2006) and 1.0 (2007) square meter samples.

CULTCH PLANT	YEAR	ESTIMATED RESOURCE	
		SEED OYSTERS (Barrels)	SACK OYSTERS (Barrels)
Lake Felicity	2004	6,925	0
	2005	0	0
	2006	3,058	0
	2007	824	150
Lake Chien	2004	1,742	0
	2005	41,296	0
	2006	2,718	3,067
	2007	1,307	697
Total	2004	8,667	0
	2005	41,296	0
	2006	5,776	3,067
	2007	2,131	847

Historic Oyster Harvests

The only oyster vessels observed on the four public seed grounds for both the 2005 and 2006 seasons were on the Lake Felicity and Lake Chien cultch plants (Table 4.7), with most (95%) directed to the latter. Only seed oysters were harvested the first two years, with 367.5 barrels in 2005 and 1,940 barrels in 2006.

Table 4.7. Commercial effort and harvest data for 2005 and 2006 from the Lake Chien and Lake Felicity cultch plants.

YEAR	PARAMETER	LAKE FELICITY CULTCH PLANT	LAKE CHIEN CULTCH PLANT	OVERALL
2005	Vessel-days	1	9	10
	Seed Oyster Harvest (barrels)	15	252.5	367.5
	Sack Oyster Harvest (barrels)	0	0	0
2006	Vessel-days	0	11	11
	Seed Oyster Harvest (barrels)	0	1,940	1,940
	Sack Oyster Harvest (barrels)	0	0	0

The current Lake Felicity and Lake Chien seed grounds were first opened to harvest in 2005, which was initially set for October 17-19, but public health closure after Hurricanes Katrina and Rita prevented the harvest of oysters. The Louisiana Wildlife and Fisheries Commission subsequently reopened the Deep Lake, Lake Felicity, Lake Chien, and Bay Tambour public oyster seed grounds on December 12 for three days. In 2006, the oyster season ran from November 13 through November 15.

DISCUSSION

High salinities found on the cultch plants and subsidence of the cultch materials, especially in Lake Felicity, may have a negative impact on future oyster populations. Initial oyster recruitment on the cultch plants were good, and was followed by peaks of seed oysters the following year and sack oysters two years later. Since these peaks, however, resource availability has declined. These factors, coupled with the small size of the cultch plants and the apparent absence of other commercially viable oyster reefs on the seed grounds, should be considered when formulating management recommendations for harvest.

VG/vg

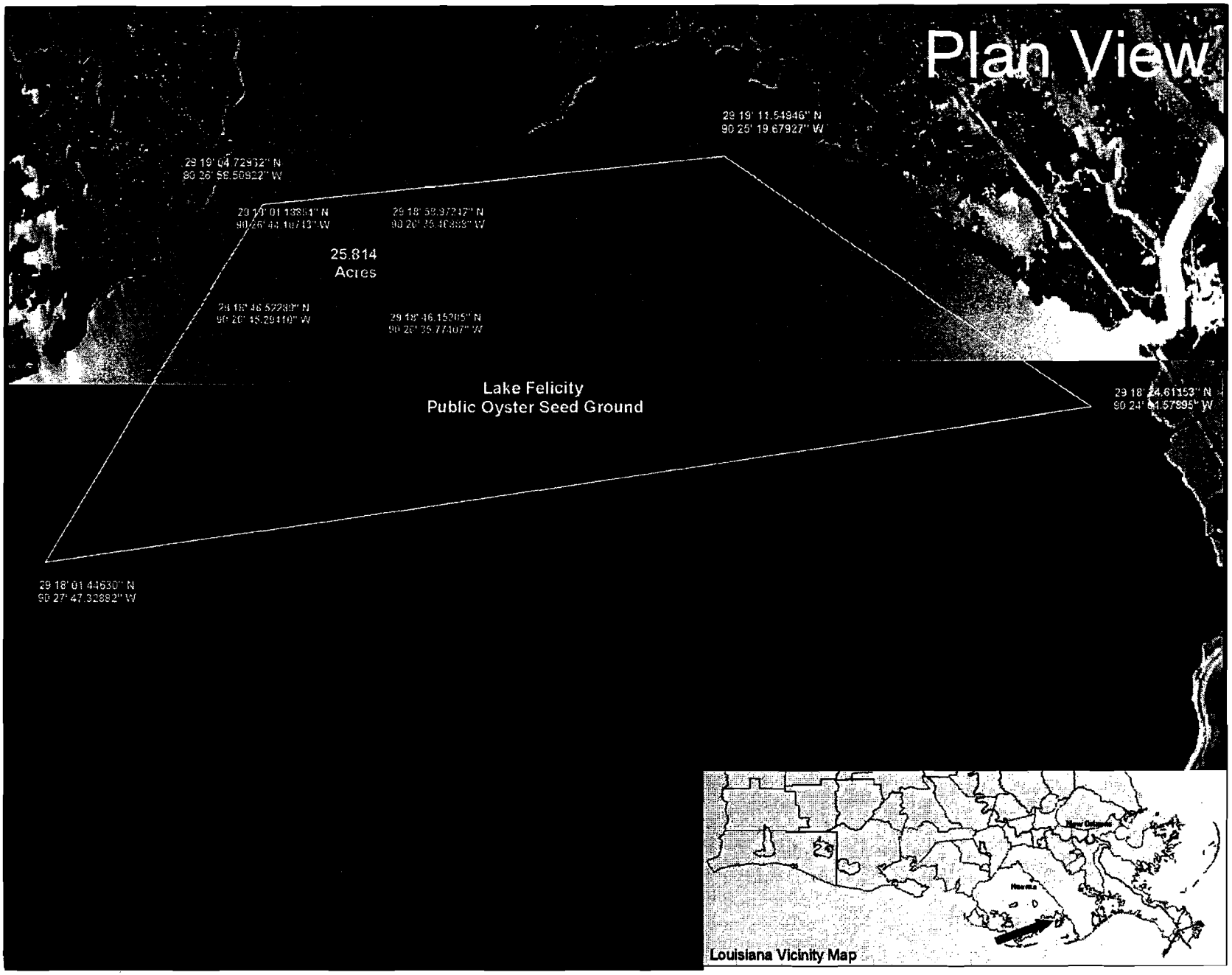


Figure 4.1. The Lake Felicity Public Oyster Seed Ground and the approximate location of the 2004 cultch plant.

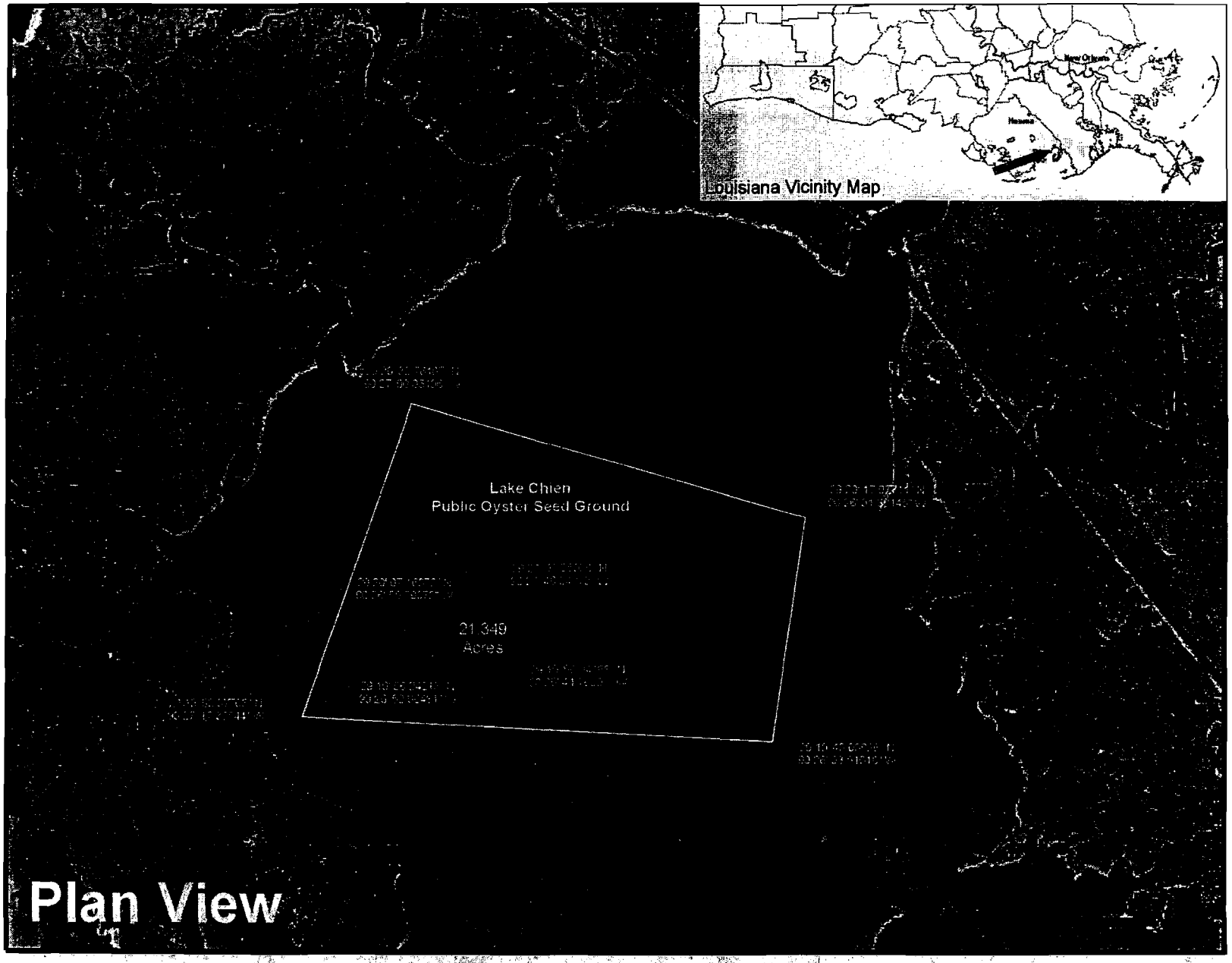


Figure 4.2. The Lake Chien Public Oyster Seed Ground and the approximate location of the 2004 cultch plant,

CSA V

KATHLEEN BABINEAUX BLANCO
GOVERNOR

State of Louisiana

BRYANT O. HAMMETT, JR.
SECRETARY

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF FISHERIES

July 18, 2007

MEMORANDUM

To: Patrick Banks, Biologist Program Manager

From: Stephen Hein, CSA V Biologist Manager

Subject: 2007-2008 CSA-V Oyster Stock Assessment

INTRODUCTION/BACKGROUND

One of seven coastal study areas (CSA) established in 1965, CSA-5 lies within the Terrebonne Basin and is located in southwest Terrebonne Parish. Within the nearly half million acres (Gaidry and White 1973) of euryhaline coastal marshland are three Public Oyster Seed Reservations/Grounds:

Sister Lake was designated as a Public Oyster Seed Reservation in 1940 and is comprised of 7,752 acres of water bottoms. The first cultch deposition projects were established in Terrebonne Parish between 1906-1909 by the U.S. Bureau of Fisheries. Subsequent plantings by the State of Louisiana began in 1917 (Mackin and Hopkins 1962) and continued during twenty intermittent years totaling 24 projects and 4,112 acres of cultch materials including the most recent 67-acre site in 2004. Early cultch consisted of oyster shell and later was replaced by clam (*Rangia sp.*) shell. The most recent site consists of size 57 limestone.

Bay Junop Public Oyster Seed Reservation was established in 1948 and consists of approximately 2,448 acres of water bottoms. Due to the shallow water depth of the bay and inability of barges and tugs to enter for cultch deposition, no projects have been attempted for this area.

The most recent (2001) designated area is the Lake Mechant Public Oyster Seed Grounds with approximately 2,131 acres of water bottoms. An approximate 30-acre cultch (size 57 limestone) deposition site was established on this public seed ground in 2004.

METHODS

Coastal Study Area 5 (CSA-5) meter square (m^2) field samples were completed on July 5, 2007. Samples were collected using an aluminum square meter frame tossed randomly over known reef substrate at sites located in the Sister Lake and Bay Junop Public Oyster Seed Reservations and the Lake Mechant Public Oyster Seed Grounds. Replicate samples were taken at each station and the average of the two was used to estimate oyster stock size at each station. All live and dead oysters and shell within the top portion of substrate was removed by SCUBA divers. Live and dead oysters, spat, oyster predators, and hooked mussels (*Ischadium recurvum*) were collected, identified and tallied. Oysters were measured in 5 millimeter (mm) size groups and then divided into three categories: spat (<25 mm), seed (25-74 mm) and sack (75 mm and larger).

A total of 31 m^2 samples were collected at 15 locations in Sister Lake (Caillou Lake), Bay Junop, and Lake Mechant (Figures 5.1, 5.2 and 5.3), including the 2004 Lake Mechant (MS300) and Sister Lake (MS218) cultch plants (Figures 5.1 and 5.3). Additionally, four dredge samples were collected from Sister Lake and Bay Junop for "Dermo" (*Perkinsus marinus*) analysis.

RESULTS AND DISCUSSION

Sister Lake

The total barrels (BBLS) of oysters available for 2007-2008 increased 13% from last year's assessment (Table 5.5), with 82,393 BBLS of seed and 124,837 BBLS of sack oysters available in Sister Lake (Table 5.1). Estimated seed oyster availability decreased 37% while estimated sack oyster availability increased 137%. Seed oyster availability decreased at 8 of 10 stations while sack availability increased at 9 of 10 stations (Table 5.1). The seed to sack ratio decreased accordingly from 2.5:1.0 last year to 0.7:1.0 (Figure 5.4, Table 5.5). However, compared to the 2005 m^2 results, which was the last time the season was open, seed decreased 57% and sack decreased 19%.

Known reef acreage in Sister Lake increased 45% from 1,566 to 2,279 acres based on a side scan sonar survey conducted in May 2005. This acreage increase was calculated into availability estimates beginning in 2006 thus 2007 resource estimates are comparable only to those of 2006. Overall mortality averaged 1.8% which indicates no significant mortality present in current m^2 samples. Spat counts were 45% below the five year average (20.5) with an average of 11.2 spat per station.

Seed and sack oyster availability from the 67-acre 2004 cultch plant are included in Sister Lake seed/sack availability totals. This site accounts for only 4% of total reef acreage but contributed 12% (9,863 BBLS) of seed and 17% (20,822 BBLS) of potential sack availability in the lake (Table 5.1).

Significantly larger numbers of seed and sack availability are located north of the traditional November-February Department of Health and Hospitals (DHH) reclassification line.

During this year's assessment, 1" to 6" of overburden was recorded at 6 of 10 sample sites suggesting a lingering negative impact from 2005 hurricanes (Katrina and Rita). All of these sites were located south of the DHH reclassification line within the lake (Stations 207, 213, 214, 215, 217 and 218) (Figure 5.1).

Bay Junop

The 2007-2008 Bay Junop estimated stock availability is 2,526 BBLS of seed oysters and 1,728 BBLS of sack oysters; these estimates ranked 25th for seed and 26th for sack, since 1980 (Tables 5.2 and 5.4). This is a 35% increase in seed availability and 4% increase in sack availability from 2006. Seed to sack ratio has increased from last year's assessment of 1.1:1.0 to 1.5:1.0 (Table 5.6). Bay Junop had an overall average mortality of 2.0% indicating no significant oyster mortality. Spat sets averaged 9 spat per station with two sites having 4 spat/site. This is lower than the five-year average of 17.0 spat/site. Sack oysters remained the same or increased at two of three sites with the most significant increase being at the northern end of the bay which was closed to harvest last year by the DHH pollution line.

Lake Mechant

The 2007 assessment of the approximate 30-acre site included estimates of 11,972 BBLS of seed oysters and 563 BBLS of sack oysters available (Table 5.3), which represented a 169% increase of seed and a 109% increase of sack availability from 2006 (Table 5.7). Although additional resources are available on these grounds, lack of known reef locations and amount of productive reef acreage presently prevents an accurate population assessment of this lake.

Water Temperature and Salinity

Water temperatures in Sister Lake and Bay Junop were below the long term average (LTA) for May and June, with the greatest deviance being 1.2 degrees Centigrade (°C). Salinities in Sister Lake were above the LTA [15.2 parts per thousand (ppt)] for May (20.5 ppt) and LTA (11.5 ppt) for June (18.2 ppt). Salinities in Bay Junop were above the LTA (19.2 ppt) for May (21.8 ppt) and the LTA (14.7 ppt) for June (18.2 ppt) (Tables 5.10 and 5.11). Water temperatures and salinities, taken in conjunction with square meter samples, are listed in Tables 5.8 and 5.9. Lake Mechant water temperature (29.3°C) was the same as the LTA for June while salinity (10.4 ppt) was above the LTA of 5.97 ppt.

Predators/Disease/Fouling

Biofouling of hooked mussels in Sister Lake has increased slightly from last year's assessment with two stations (North 1994 Shell Plant and 2004 Cultch Plant) accounting for 60% of the total hooked mussels observed. The number at the remaining eight stations ranged from 0-6 hooked mussels per station. Hooked mussels in Bay Junop have increased from a total of 7 in the 2006 assessment to 48 this year. Buckskin Bayou had the largest number (36) of mussels. Samples from Lake Mechant contained two mud crabs (*Xanthidae sp.*) and an average of 39 hooked mussels.

Perkinsus marinus ("Dermo") samples were collected during m^2 sampling and delivered to Nicholls State University for analysis. Results indicate "disease levels below the threshold of significant oyster mortalities" (Personal Communications, Dr. Tom Soniat).

No evidence of oyster drills (*Stramonita haemastoma*) was present in m^2 samples. Other potential predators included a total of 66 unidentified mud crabs recorded from 15 stations. One stone crab (*Menippe adina*) was collected; however blue crabs (*Callinectes sapidus*) and Gulf toadfish (*Opsanus beta*) were not present in samples.

HISTORICAL OYSTER HARVEST

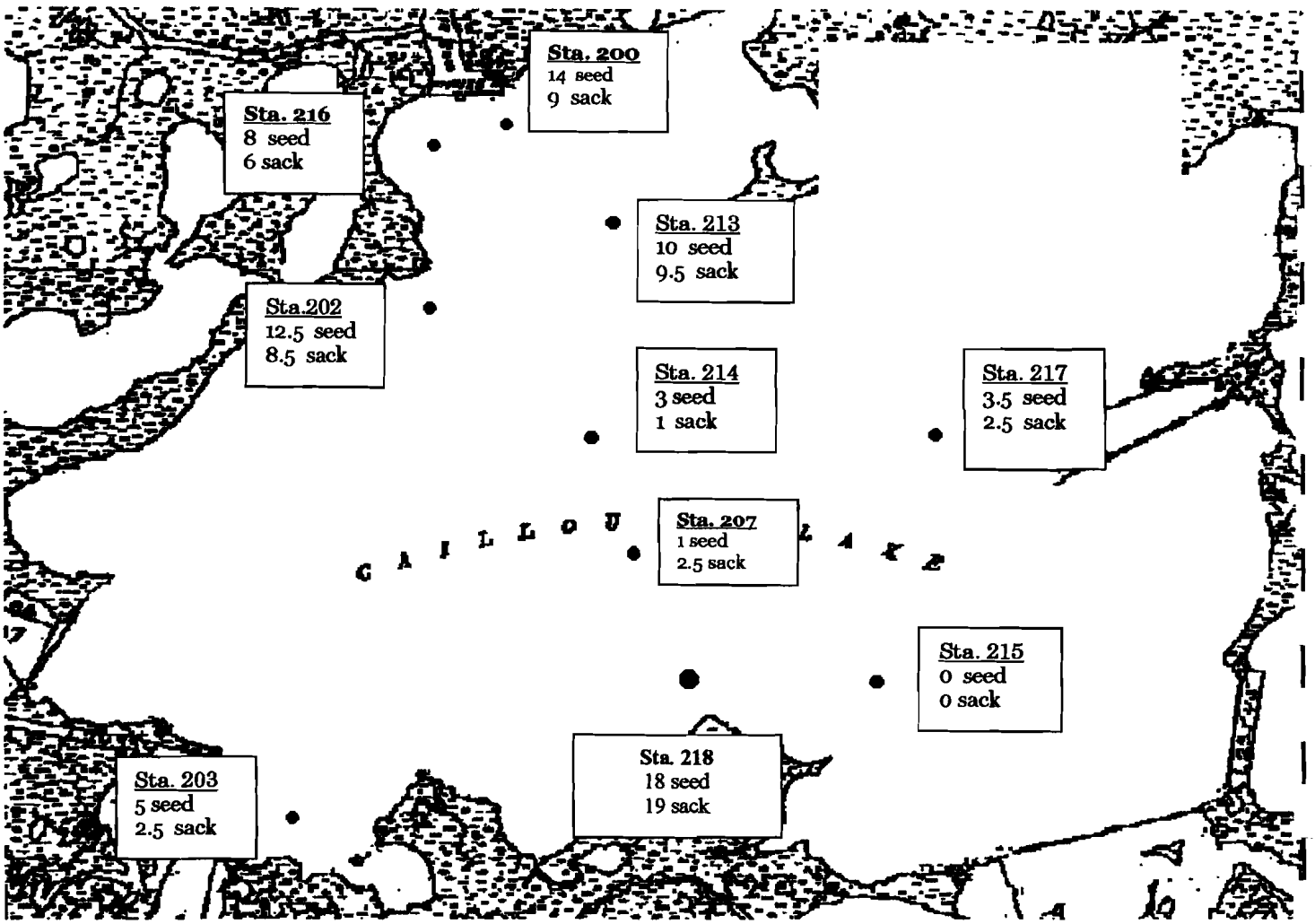
The Sister Lake Public Oyster Seed Reservation remained closed to harvest during 2006-2007.

Bay Junop Public Oyster Seed Reservation was last opened to seed and sack harvest for a 30-day period, from November 13 through December 12, 2006. Estimated seed and sack production was 10 BBLS and 3,890 BBLS, respectively, with 79 participating boats culminating in 228 boat days averaging 34 sacks/boat/day.

October 20, 2004 marked the historic opening of Lake Mechant to commercial oyster harvest. Lack of available resource and fishing effort effectively closed an abbreviated eight day season with a total of 2,211 sacks of market oysters harvested, with most harvest along the southeast portion of the seed ground. No seed production occurred during this period. The lake has remained closed to harvest since that time.

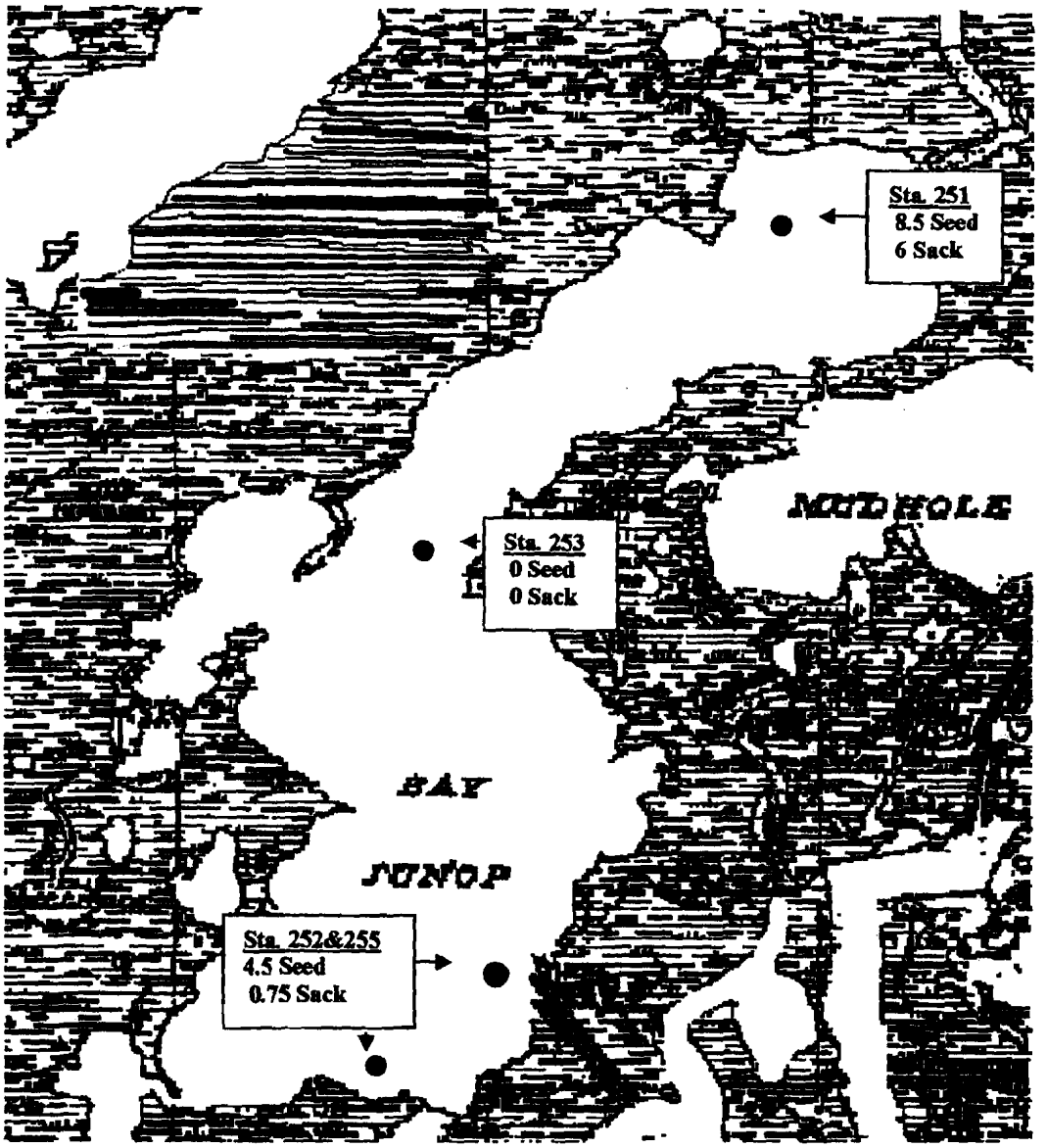
SH/jbv

cc: Jim Hanifen



Stn. #	Stn. Name	North Lat.	West Long.	Depth
200	Grand Pass	29°15'28.5"	90°55'45.5"	10'
202	Walkers Pt.	29°14'50.9"	90°56'16.9"	6'
203	Old Camp	29°12'58.2"	90°56'40.2"	4'
207	Mid Sister Lake	29°14'00.1"	90°55'14.7"	6'
213	N '94 Shell Plant	29°15'02.9"	90°55'30.9"	6'
214	Mid '94 Shell Plant	29°14'16.5"	90°55'33.8"	6'
215	S '94 Shell Plant	29°13'14.1"	90°53'53.6"	5'
216	N '95 Shell Plant	29°15'25.1"	90°56'10.1"	5'
217	Camp '95 Shell Plant	29°14'21.8"	90°54'18.3"	5'
218	2004 Cultch Plant	29°13'24.6"	90°54'54.3"	5'

Figure 5.1 Sister Lake Meter Square Samples (average # of seed and sack oysters at each station)



Stn. #	Stn. Name	North Lat.	West Long.	Depth
251	Buckskin Bayou	29°15'56.1"	91°01'45.1"	6'
252	Rat Bayou	29°13'06.6"	91°02'52.6"	3'
253	Mid Bay Junop	29°14'43.7"	91°03'08.6"	5'
255	Bayou deWest	29°12'38.4"	91°03'18.2"	4'

Figure 5.2 Bay Junop Meter Square Sample Site (average # of seed and sack oysters at each station)

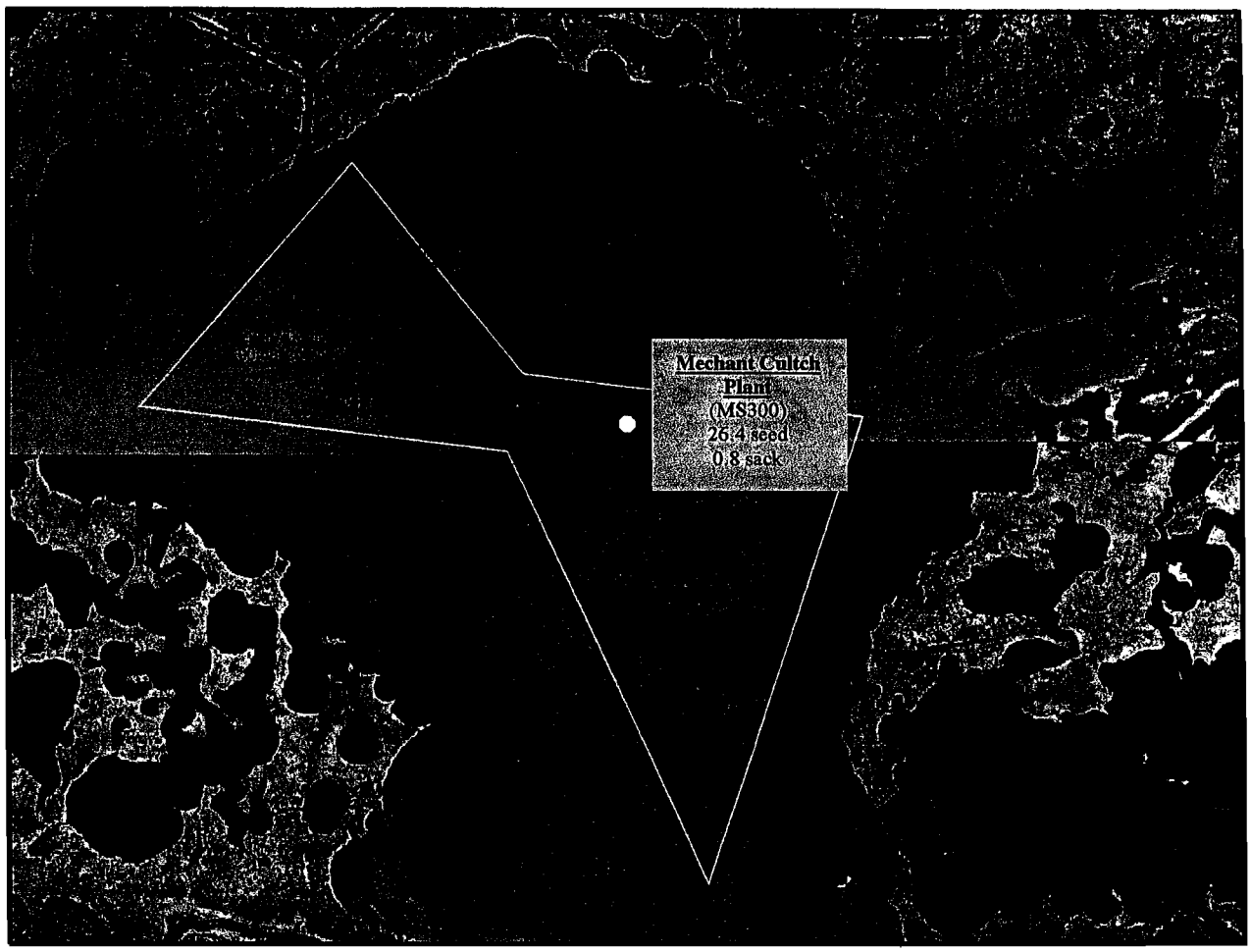


Figure 5.3 Lake Mechant Meter Square Samples (average # of seed and sack oysters at each station)

Table 5.1 2007 Sister Lake Oyster Availability

METER² STATION	HISTORICAL REEF ACREAGE	ADJUSTED REEF ACREAGE****	#METER²	#SEED OYSTERS	#SACK OYSTERS	BARRELS SEED OYSTERS	BARRELS SACK OYSTERS
200	221.58	322	1,304,748.35	14	9	25,370.11	32,618.71
202	81.93	119	482,435.38	12.5	8.5	8,375.61	11,390.84
203	151.31	220	890,971.53	5	2.5	6,187.30	6,187.30
207	185.72	270	1,093,590.86	1	2.5	1,518.88	7,594.38
213*	96	140	565,284.96	10	9.5	7,851.18	14,917.24
214*	129	188	759,601.67	3	1	3,165.01	2,110.00
215*	81	118	476,959.19	0	0	0.00	0.00
216**	115	167	677,164.28	8	6	7,524.05	11,286.07
217**	438	637	2,579,112.63	3.5	2.5	12,537.35	17,910.50
218***	67	97	394,521.80	18	19	9,863.04	20,821.98
TOTAL		2,279.32	9,224,390.64	75	60.5	82,392.53	124,837.03

* 1994 Shell Plants

** 1995 Shell Plants

***2004 Sister Lake Cultch Plant newly added dredge/meter square site for 2007

****2005 Side Scan Sonar Survey conducted in May 2005 measured Sister Lake reef acreage to be 2,279 acres. This is an increase of 45.5% over prior years' estimates. Beginning in 2007, individual site acreage has been adjusted accordingly to reflect this increase.

Table 5.2 2007 Bay Junop Oyster Availability

METER² STATION	REEF ACREAGE	#METER²	#SEED OYSTERS	#SACK OYSTERS	BARRELS SEED OYSTERS	BARRELS SACK OYSTERS
251	17.20	69,608.40	8.5	6	821.77	1,160.14
252*	67.36	272,605.92	4.5	0.75	1,703.79	567.93
253	73.26	296,483.22	0	0	0.00	0.00
TOTAL	**157.82**	**638,697.50**	**13.00**	**6.75**	**2,525.56**	**1,728.07**

* Stations 252 and 255 are combined

Table 5.3 2007 Lake Mechant Oyster Availability

METER² STATION	REEF ACREAGE	#METER²	#SEED OYSTERS	#SACK OYSTERS	BARRELS SEED OYSTERS	BARRELS SACK OYSTERS
300	30	121,410.00	71	1.67	11,972.38	562.08

Table 5.4 Bay Junop Ranking of Oyster Seed and Sack Availability

YEAR	BARRELS SEED
1994	78,896.0
1999	63,010.4
1996	62,841.0
1998	52,340.1
1993	51,492.0
1992	47,448.0
1995	38,950.0
2000	34,107.1
2001	29,453.4
1981	22,329.0
1997	17,262.0
2002	15,524.4
2003***	10,455.6
1985	10,004.0
2005	9,522.0
1991	8,843.0
1989	8,073.7
1982	7,082.2
1990	6,787.0
1983	6,464.0
1987	5,878.0
1986	4,632.0
1980	4,297.4
2004	4,142.2
1988	3,282.0
2007	2,525.6
2006	1,869.0
1984**	----

YEAR	BARRELS SACK
1996	117,669.0
1994	114,303.0
1998	90,786.6
1995	67,837.0
2000	61,193.8
2003***	33,518.0
1993	32,466.0
2001	32,004.9
1992	31,128.0
1997	29,243.0
1999	28,763.5
1982	21,809.0
2002	21,583.3
1981	15,213.0
1987	11,188.0
1991	11,166.0
1983	11,129.0
1989	8,935.0
2004	7,547.3
1980	5,632.3
1990	5,249.5
1986	4,317.0
2005	3,385.0
1985	3,344.5
2007	1,728.1
2006	1,656.0
1988	1,169.0
1984**	----

** No samples taken
*** Station 254 discontinued

Table 5.5 Sister Lake Historic Meter² Oyster Availability Estimates

YEAR	Barrels Seed	Barrels Sack	TOTAL BBLS AVAILABLE	RATIO SEED TO SACK AVAILABILITY
1980	142,620.10	35,170.30	177,790.40	4.1-1.0
1981	111,146.10	110,990.20	222,136.30	1.0-1.0
1982	76,950.00	94,050.00	171,000.00	0.8-1.0
1983	8,768.50	27,654.50	36,423.00	0.3-1.0
1984	69,136.00	50,587.00	119,723.00	1.4-1.0
1985	13,775.00	16,206.00	29,981.00	0.8-1.0
1986	32,633.00	21,516.00	54,150.00	1.5-1.0
1987	18,522.00	2,008.00	20,530.00	9.2-1.0
1988	47,695.00	69,570.00	117,265.00	0.7-1.0
1989	26,179.00	64,549.50	90,728.50	0.4-1.0
1990	72,862.90	24,282.00	97,144.90	3.0-1.0
1991	87,044.20	28,733.70	115,777.90	3.0-1.0
1992	172,132.00	209,854.00	381,986.00	0.8-1.0
1993	77,190.00	35,824.00	113,014.00	2.2-1.0
1994	358,455.00	50,429.00	408,884.00	7.1-1.0
1995	236,687.00	397,777.00	634,464.00	0.6-1.0
1996	384,500.00	256,164.00	640,664.00	1.5-1.0
1997	540,270.20	557,072.20	1,097,342.40	1.0-1.0
1998	298,975.00	327,125.00	626,100.00	0.9-1.0
1999	452,991.00	301,321.00	452,991.00	1.5-1.0
2000	243,589.90	76,515.50	320,105.40	3.2-1.0
2001	304,763.00	343,655.50	648,418.50	0.9-1.0
2002	115,034.00	186,233.40	301,257.40	0.6-1.0
2003	131,038.30	151,844.50	282,882.80	0.9-1.0
2004	104,598.10	43,193.10	147,791.20	2.4-1.0
2005*	193,785.00	153,732.90	347,517.90	1.3-1.0
2006**	130,448.22	52,660.89	125,848.22	2.5-1.0
2007	82,392.54	124,837.04	207,229.58	0.66-1.0
LTA(1980–2007)	161,935.04	136,198.44		

* 2004 Cultch Plant not included in totals
**2004 Cultch Plant included in totals

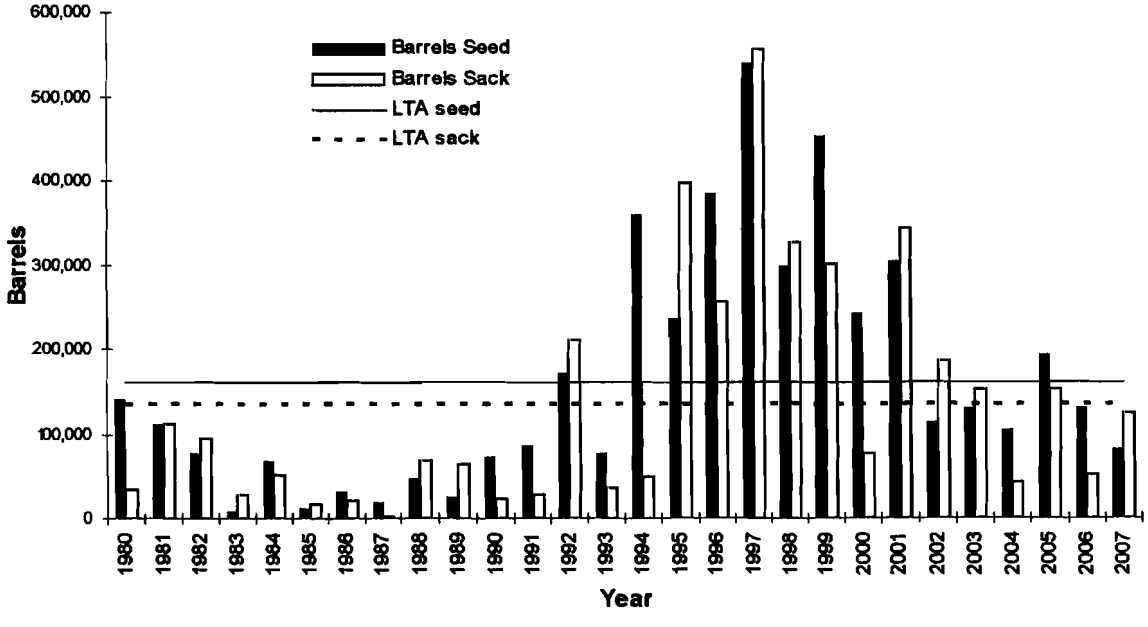


Figure 5.4 Sister Lake Historic Meter² Oyster Availability Estimates

Table 5.6 Bay Junop Historic Meter² Oyster Availability Estimates

YEAR	Barrels Seed	Barrels Sack	TOTAL BBLS AVAILABLE	RATIO SEED TO SACK AVAILABILITY
1980*	4,297.40	5,632.30	9,929.70	0.8-1.0
1981	22,329.00	15,213.00	37,542.00	1.5-1.0
1982	7,082.20	21,809.00	28,891.20	0.3-1.0
1983	6,464.00	11,129.00	17,593.00	0.6-1.0
1984**	—	—	—	—
1985	10,004.00	3,344.50	13,348.50	3.0-1.0
1986	4,632.00	4,317.00	8,949.00	1.1-1.0
1987	5,878.00	11,188.00	17,066.00	0.5-1.0
1988	3,282.00	1,169.00	4,451.00	2.8-1.0
1989	8,073.70	8,935.00	17,009.00	0.9-1.0
1990	6,787.00	5,249.50	12,036.50	1.3-1.0
1991	8,843.00	11,166.00	20,009.00	0.8-1.0
1992	47,448.00	31,128.00	78,572.00	1.5-1.0
1993	51,492.00	32,466.00	83,958.00	1.6-1.0
1994	78,896.00	114,303.00	193,199.00	0.7-1.0
1995	38,950.00	67,837.00	106,787.00	0.6-1.0
1996	62,841.00	117,669.00	180,510.00	0.5-1.0
1997	17,262.00	29,243.00	46,505.00	0.6-1.0
1998	52,340.10	90,786.60	143,126.70	0.6-1.0
1999	63,010.40	28,763.50	91,773.50	2.2-1.0
2000	34,107.10	61,193.80	95,300.90	0.6-1.0
2001	29,453.40	32,004.90	61,458.30	0.9-1.0
2002	15,524.40	21,583.30	37,107.70	0.7-1.0
2003***	10,455.60	33,518.00	43,973.60	0.3-1.0
2004	4,142.20	7,547.30	11,689.50	0.5-1.0
2005	9,521.60	3,385.30	12,906.90	2.8-1.0
2006	1,868.80	1,656.50	3,525.30	1.1-1.0
2007	2,525.56	1,728.10	4,253.66	1.46-1.0
LTA(1980–2007)	22,500.39	28,665.39		

* Based on 1999 Acreage **No sample taken ***Station 254 discontinued

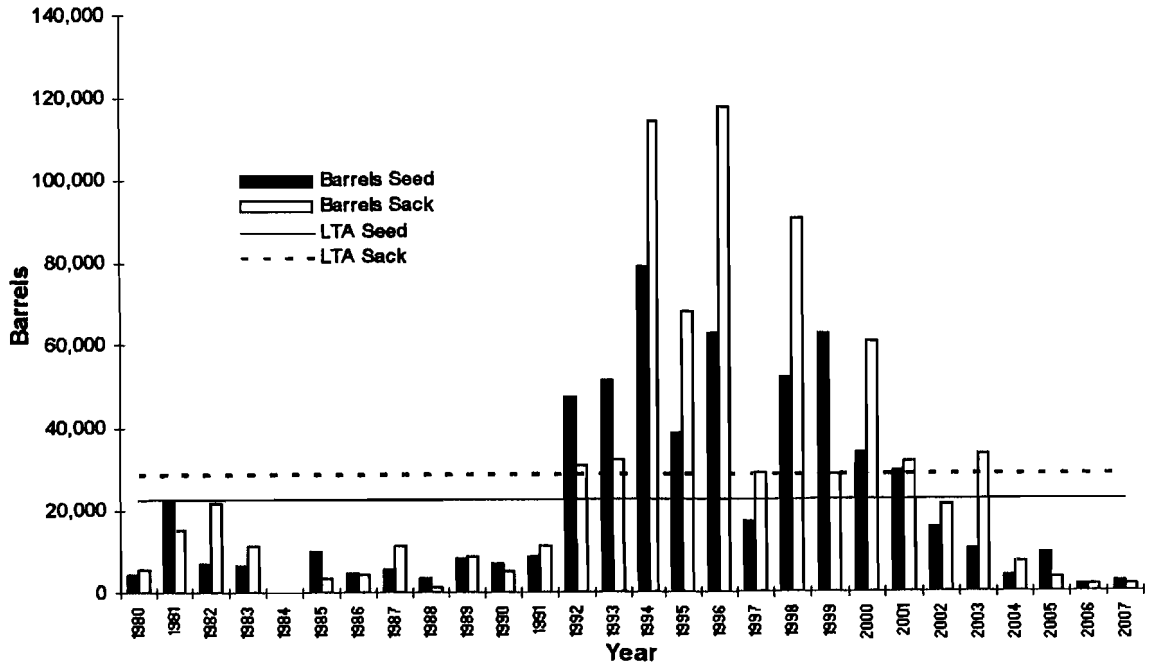


Figure 5.5 Bay Junop Historic Meter² Oyster Availability Estimates

Table 5.7 Lake Mechant Historic Meter² Oyster Availability Estimates

YEAR	BARRELS SEED	BARRELS SACK	TOTAL BBLS AVAILABLE	RATIO SEED TO SACK AVAILABILITY
2005	51,936.50	0.00	51,936.50	n/a
2006	4,451.70	269.80	4,721.50	16.5:1
2007	11,972.38	562.08	12,534.46	21.3:1

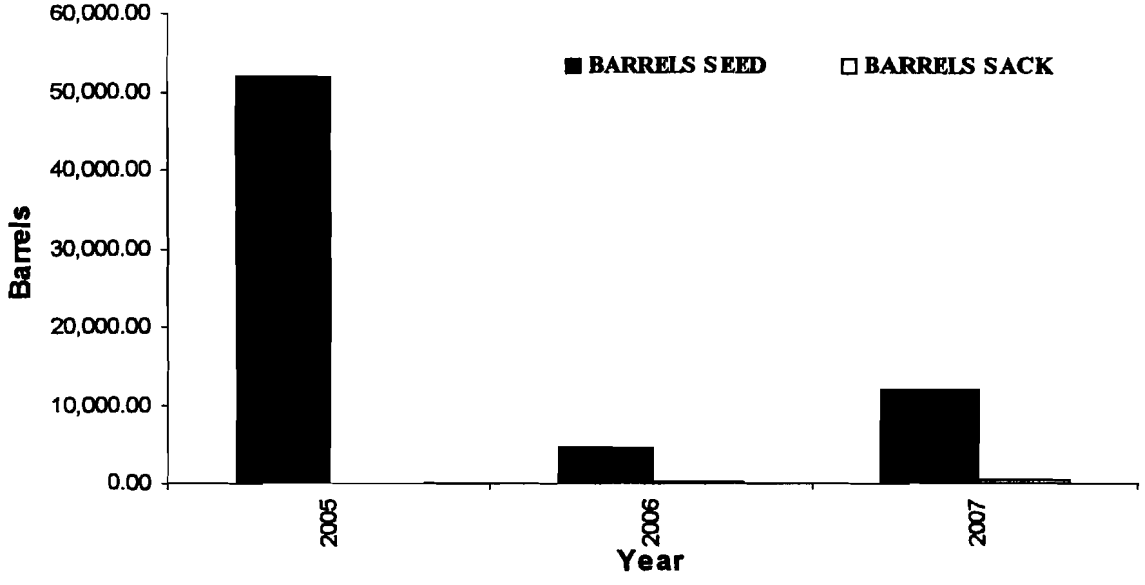


Figure 5.6 Lake Mechant Historic Meter² Oyster Availability Estimates

Table 5.8. July 2007 Sister Lake Meter² Temp and Salinity

STATION	STATION NAME	TEMP (°C)**	SAL (ppt)**
200	GRAND PASS	29.4	18.1
202	WALKER'S PT.	29.8	19.1
203	OLD CAMP	29.8	20.9
207	MID SISTER LAKE	30.2	16.6
213*	NORTH '94*	29.5	18.6
214*	MID '94*	30.1	20.1
215*	SOUTH '94*	30.4	22.9
216*	NORTH '95*	29.8	18.9
217*	CAMP '95*	30.2	20.7
218*	SOUTH '04*	30.2	22.6
	Mean	**29.9**	**19.9**

*SHELL PLANTS

Table 5.9 July 2007 Bay Junop Meter² Temp and Salinity

STATION	STATION NAME	TEMP (°C)**	SAL (ppt)**
251	BUCKSKIN BAYOU	28.7	13.0
252/255	RAT BAYOU/BAYOU deWEST	29.3	23.9
253	MID BAY JUNOP	29.0	21.6
	Mean	**29.0**	**19.5**

Table 5.10. Sister Lake and Bay Junop Historic May/June Mean Water Temp (°C)

	SISTER LAKE		BAY JUNOP		LAKE MECHANT	
YEAR	MAY	JUNE	MAY	JUNE	MAY	JUNE
1995	27.3	29.0	29.3	29.3		
1996	27.2	29.5	28.4	30.3		
1997	27.1	30.0	26.4	28.6		
1998	27.8	30.1	28.0	28.9		
1999	25.0	28.8	25.0	28.8		
2000	27.3	28.8	28.3	29.7		
*2001	24.9	29.3	26.0	30.1		
*2002	28.4	28.7	28.4	28.5	25.6	28.2
*2003	27.8	30.0	27.6	30.2	27.1	29.6
*2004	27.8	29.5	27.5	29.2	26.0	29.5
2005	26.5	30.1	26.2	30.2	25.8	29.2
2006	27.1	30.6	25.7	30.9	26.6	30.1
2007	25.9	29.3	25.9	29.0	26.35	29.3
mean	**26.9**	**29.5**	**27.1**	**29.5**	**26.24**	**29.32**

*OYSTER DREDGE SAMPLES

Table 5.11 Sister Lake and Bay Junop Historic May/June Mean Salinity (ppt)

	SISTER LAKE		BAY JUNOP		LAKE MECHANT	
YEAR	MAY	JUNE	MAY	JUNE	MAY	JUNE
1995	14.5	8.8	23.3	12.6		
1996	15.8	7.4	24.3	12.2		
1997	4.1	3.4	10.6	10.7		
1998	6.6	4.8	14.4	8.6		
1999	17.7	12.4	19.4	13.0		
2000	22.0	20.5	25.5	27.7		
*2001	17.6	8.2	18.4	9.8		
*2002	14.2	11.1	16.6	15.9	3.1	2.4
*2003	15.4	7.2	18.2	8.9	7.5	2.4
*2004	17.2	12.2	18.9	18.6	4.5	3.1
2005	15.3	17.0	16.9	20.0	2.1	7.2
2006	16.9	18.5	21.3	15.4	10.7	10.3
2007	20.5	18.2	21.8	18.2	12.5	10.4
mean	**15.2**	**11.5**	**19.2**	**14.7**	**6.73**	**5.97**

*OYSTER DREDGE SAMPLES

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CSA VI

July 18, 2007

MEMORANDUM

To: Patrick Banks, Biologist Program Manager

From: E. Paul Cook, CSA 6 Biologist Manager

Subject: 2007 CSA 6 Square Meter Oyster Samples

Introduction/Background

The public oyster seed grounds within Coastal Study Area (CSA) VI encompasses approximately 550,000 water bottom acres and is divided into an inside and outside portion of the Vermilion, East and West Cote Blanche, and Atchafalaya Bays. The inshore seed ground, promulgated by the Louisiana Wildlife and Fisheries Commission in 1990, generally consists of that portion of state water bottoms found in inside waters from the western shore of Vermilion Bay and Southwest Pass eastward to Point Au Fer. The outside area, designated in 1988, consists of Louisiana State Territorial Waters from the private oyster lease boundary near Mound Point/Marsh Island eastward to Point Au Fer. Prior to the official designation of these areas, LDWF managed the oyster resource found on local state water bottoms in a manner similar to present seed ground protocols. This allowed limited harvest/relays from these public grounds when hydrological conditions and oyster abundance and distribution permitted.

An overall Vermilion Bay area stock assessment is not possible at this time as information relative to oyster reef sizes are not available. However, data collected from this year's sampling program will be compared to previous years, with a look at associated hydrologic conditions and marine fouling on sampled reefs. In addition, information regarding the 2006/2007 oyster season harvest estimates on the Vermilion Bay area seed grounds will be presented.

Methods

Square meter field sampling at designated sites on the inshore and offshore areas of the Vermilion, East and West Cote Blanche and Atchafalaya Bays Public Oyster Seed Ground was completed on July 3, 2007. A total of 5 (five) stations (Figure 6.1) were sampled with one additional replicate made at each station. Upon reaching the designated site the square meter frame was randomly thrown onto the oyster reef. A SCUBA diver removed all oysters, associated macroscopic organisms, and loose surface shell within the frame. All live oysters and shells from recently dead oysters greater than 25 mm were counted, measured in 5 mm. intervals, then classified as spat (< 25 mm), seed (25 mm to < 75 mm), or sack oysters (> 75 mm). Shells from dead oysters were defined as "box" (both valves attached) or "valve" (one valve). Oyster size was determined by measuring the "straight-line" distance from the hinge to the mouth of the shell. Live predators and fouling organisms were counted. Cultch type and reef condition were noted.

Results

Sample results showed that, in general, the South Point area contains the most oysters with 20 seed oysters and 1.5 sack oysters per square meter (Table 6.1). Overall, spat oysters (< 25 mm) averaged 6.6 per square meter while the average number of seed oysters (25 mm to < 75 mm) was 11.6. Few oysters that meet the sack size criteria (> 75 mm) were taken in the 2007 CSA 6 stock assessment, with an average of 0.8

harvested in each sample replicate. This is a reduction in seed oyster abundance compared to 2006, but a slight increase in sack oyster abundance (Table 6.2).

Table 6.1 Vermilion Bay Area Square Meter 2007 - Live Oysters by Class

Station No.	Station Name	Avg. No. Live Spat	Avg. No. Live Seed	Avg. No. Live Sack
001	South Pt. / M. I.	12.0	20.0	1.5
002	Big Charles / SWP	3.0	8.5	0.5
003	Indian Pt. / SWP	6.0	11.5	1.0
004	Dry Reef	0.0	0.0	0.0
005	Bayou Blanc	12.0	18.0	1.0

Table 6.2 Vermilion Bay Area Oyster Availability (by year)

Year	Average No. Seed/Sample (M^2)	Average No. Sack/Samples (M^2)	Seed/Sack Ratio (M^2)
1998	2.70	0	No Sack Oysters
1999	5.50	0.20	27.5:1
2000	81.40	3.30	24.7:1
2001	28.80	4.80	6.0:1
2002	2.25	0.25	9.0:1
2003	1.20	0	No Sack Oysters
2004	4.30	0	No Sack Oysters
2005	14.80	0	No Sack Oysters
2006	16.1	0.5	32.2:1
2007	11.6	0.8	14.5:1

A chart comparing 2007 square meter data (by oyster class) to previous years can be seen in Figure 6.3.

Discrete hydrological data taken during square meter sampling show that < 5 parts per thousand (ppt) salinities were present throughout the public oyster seed grounds while water temperatures hovered near 30 degrees Celsius. The most southern sample station, South Point, had the highest salinity at 4.7 ppt (Table 6.3).

Table 6.3 Vermilion Bay Area M^2 Site Salinity and Water Temperature (7/03/07)

Station No.	Station Name	Salinity (ppt)	Temperature (°C)
001	South Point / M. I.	4.7	29.9
002	Big Charles / SWP	2.7	29.6
003	Indian Point / SWP	2.7	29.5
004	Dry Reef	1.6	28.9
005	Bayou Blanc	3.8	30.8

Hooked mussel (*Ischadium recurvum*) abundance and distribution has increased in 2007 samples relative to 2006. The Indian Point sample station yielded the highest mussel abundance at 33.5 mussels per square meter while no mussels were noted in samples from the Dry Reef station (Table 6.4).

Table 6.4 Vermilion Bay Area Hooked Mussel Abundance and Distribution (by year)*

Station No.	Station Name	2003	2004	2005	2006	2007
001	South Point/Marsh Island	19	34	28	16	26.0
002	Big Charles	172	45	12.5	17	16.0
003	Indian Point	90	92	43	9	33.5
004	Dry Reef	468	23	8.5	0	0
005	Bayou Blanc	64	33	9.5	7	18.5

*Average number hooked mussels per M^2 sample.

"Dermo" samples from the eastern and western part of the system were delivered to Dr. Tom Soniat on July 05, 2007. Results of his analysis were not available for this report.

Discussion

The Vermilion/Cote Blanche/Atchafalaya Bays Complex is a large, primarily open-water brackish system. Primary influences on its highly dynamic salinity regime are the Gulf of Mexico, Atchafalaya River and the adjacent Wax Lake Outlet, and the Vermilion River. The oyster resource found in the area is highly vulnerable to low salinity/high turbidity conditions often seen as a result of extended freshwater conditions associated with high river discharge. Oyster mortalities are most often the result of the combined effects of low salinity coupled with high water temperatures.

There has been very little oyster mortality noted from dredge samples taken at the 5 (five) designated sites since the July 2006 stock assessment. Samples taken during the Fall of 2006 found relatively high salinity conditions for the area due to prolonged low discharge levels from the Atchafalaya River. Spat set was light but successful with growth documented through October 2006. Late winter saw the Atchafalaya River at Butte La Rose rise to 16 feet during January then fall to around 10 feet by March 2007. Spring samples found extremely low salinity conditions but below average water temperatures associated with late cold fronts may have precluded a mortality event.

The only mortality noted in the 2007 square meter project was seen at South Pt., where 4.7% of the oysters sampled had recently died.

Seed oyster numbers found in the 2007 square meter samples are well below that seen during the drought years of 2000 and 2001 but only slightly below those seen last year. This slight decline may be a result of the extensive harvest documented for this area during the 2006/2007 season. Numbers of sack size oysters is low and has not changed significantly from last year. If oyster mortalities continue to remain low, it is anticipated that harvestable quantities of seed oysters will be available for the upcoming oyster season. Although samples showed a low abundance of sack-sized oysters, data indicates that at least a small amount of sack oysters are available for the upcoming season to be taken directly to market. The majority of the available resource appears to be located on reefs south of South Point of Marsh Island where most of the traditional oyster harvest has been located in recent years.

A slight increase in hooked mussel fouling was noted over last years samples, but fouling remains well below that seen in 2003. The 2007 samples showed no evidence of a silt or vegetative overburden.

2006/2007 Oyster Season

The regular oyster season on inshore and offshore areas of the Vermilion, East and West Cote Blanche and Atchafalaya Bay Public Oyster Seed Ground opened one-half hour before sunrise on September 6, 2006 and closed on April 1, 2007. A 15-day season extension beginning on May 4, 2007 allowed harvest on that portion located east of South Point/Marsh Island and south of the DHH May-August 2007 seasonal reclassification line that generally ran from South Point to Point Chevreuil. In total, 17,767 sacks of oysters were harvested for direct market and 60,390 barrels of seed oysters (does not include the Prien Point re-location project) were harvested for transplanting to leases. This harvest is further divided below.

Inshore portion/sacking

The Southwest Pass area, designated "OPEN" classification by DHH during the entire season, had an estimated 5209 sacks harvested. The reef area north of Southwest Pass in Vermilion Bay was under "OPEN" classification during March 2007. This allowed sacking in this area for the first time in many years. An estimated 4122 sacks were taken during March to bring the season sacking total for the inshore portion of the seed ground to an estimated 9331 sacks.

Inshore/bedding

An estimated 31,250 barrels were harvested from the reefs north of Southwest Pass during a DHH permitted relay in December 2006. In addition, approximately 9010 barrels were relayed from the area north of Southwest Pass (Boxcar Reef) to an artificial reef project at Prien Pt. in western Vermilion Bay (this re-located resource was not removed from the seed ground).

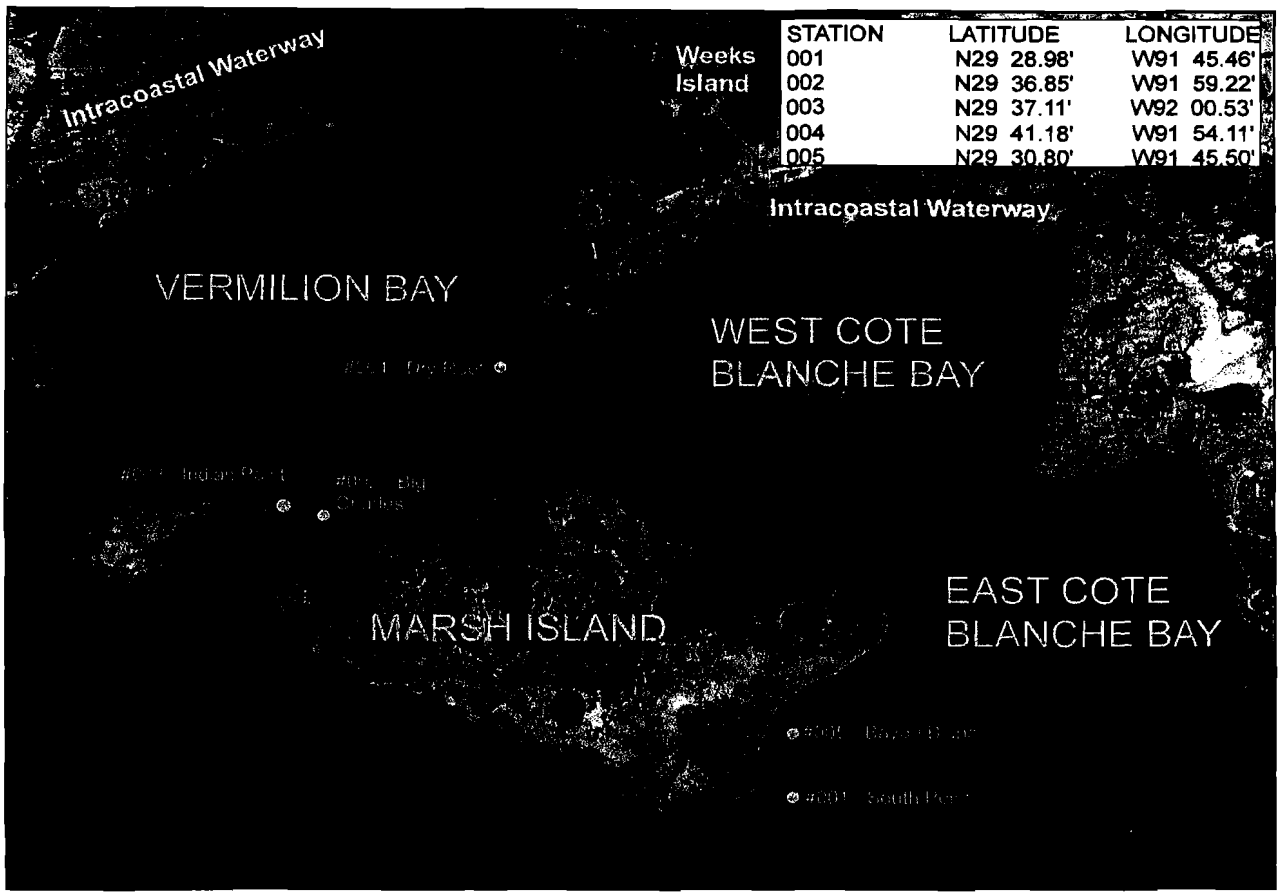
Offshore/sacking

A small portion of the offshore portion of the seed ground fell under "OPEN" classification during the regular season. This area between South Point and the private lease boundary near Mound Pt./Marsh Island saw an estimated harvest of 648 sacks during the first month of the season. No sacking effort was observed in this area after September 2006. An estimated 7788 sacks were harvested from the South Point/Marsh Island area during the 15-day season extension that began on May 4, 2007. This brought the total sacking estimate to 8436 sacks for the offshore portion of the seed ground.

Offshore/bedding

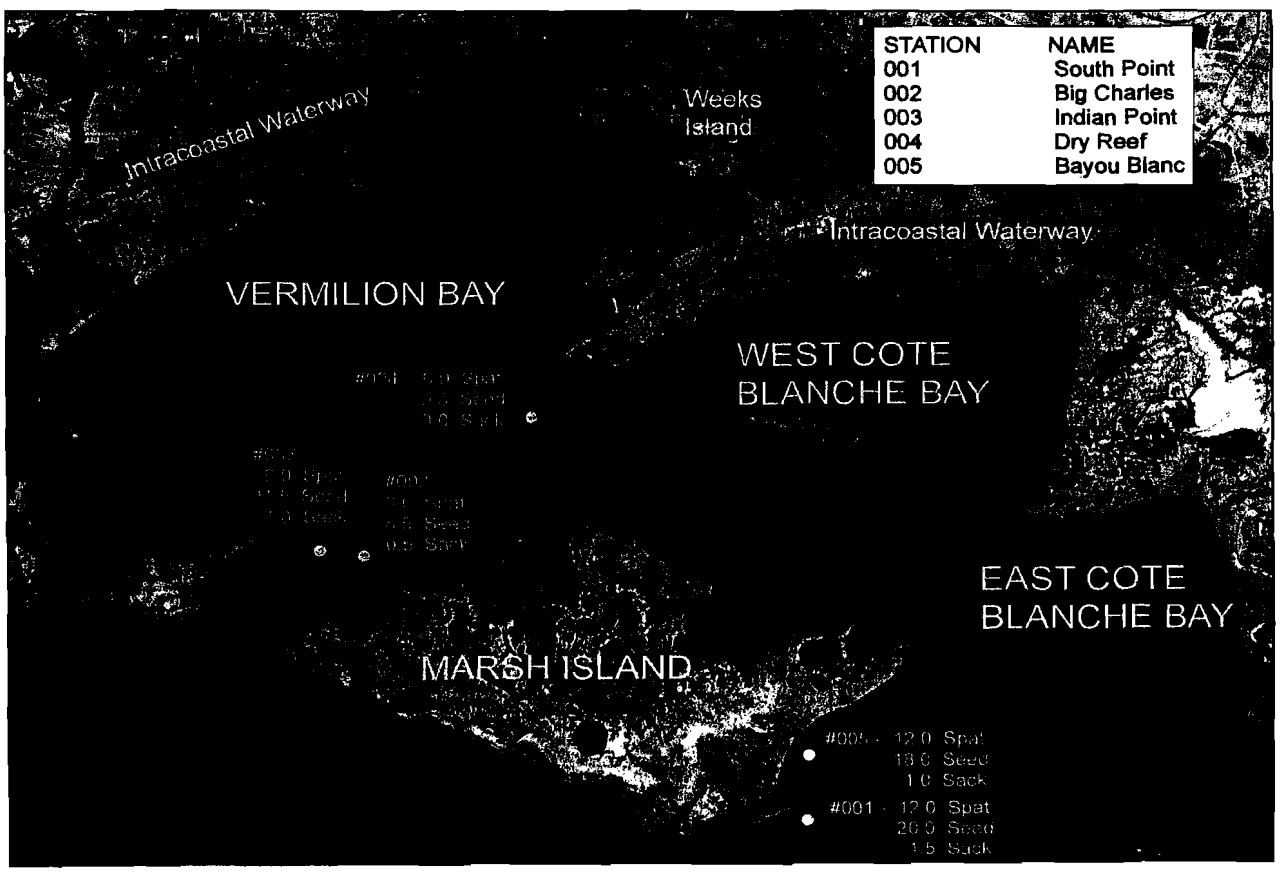
A combined estimate of 24,640 barrels were harvested during DHH permitted relays in October 2006 and March 2007. An additional 4500 barrels were relayed during the May 2007 15-day season extension off South Pt./Marsh Island. This brought the 2006/2007 season total bedding estimate for the offshore portion of the seed ground to 29,140 barrels.

EPC/dgg
Attachments



STATION	LATITUDE	LONGITUDE
001	N29 28.98'	W91 45.46'
002	N29 36.85'	W91 59.22'
003	N29 37.11'	W92 00.53'
004	N29 41.18'	W91 54.11'
005	N29 30.80'	W91 45.50'

Figure 6.1 Vermilion Bay Area square meter sample sites (2007).



STATION	NAME
001	South Point
002	Big Charles
003	Indian Point
004	Dry Reef
005	Bayou Blanc

Figure 6.2 Vermilion Bay Area square meter sample results (2007).

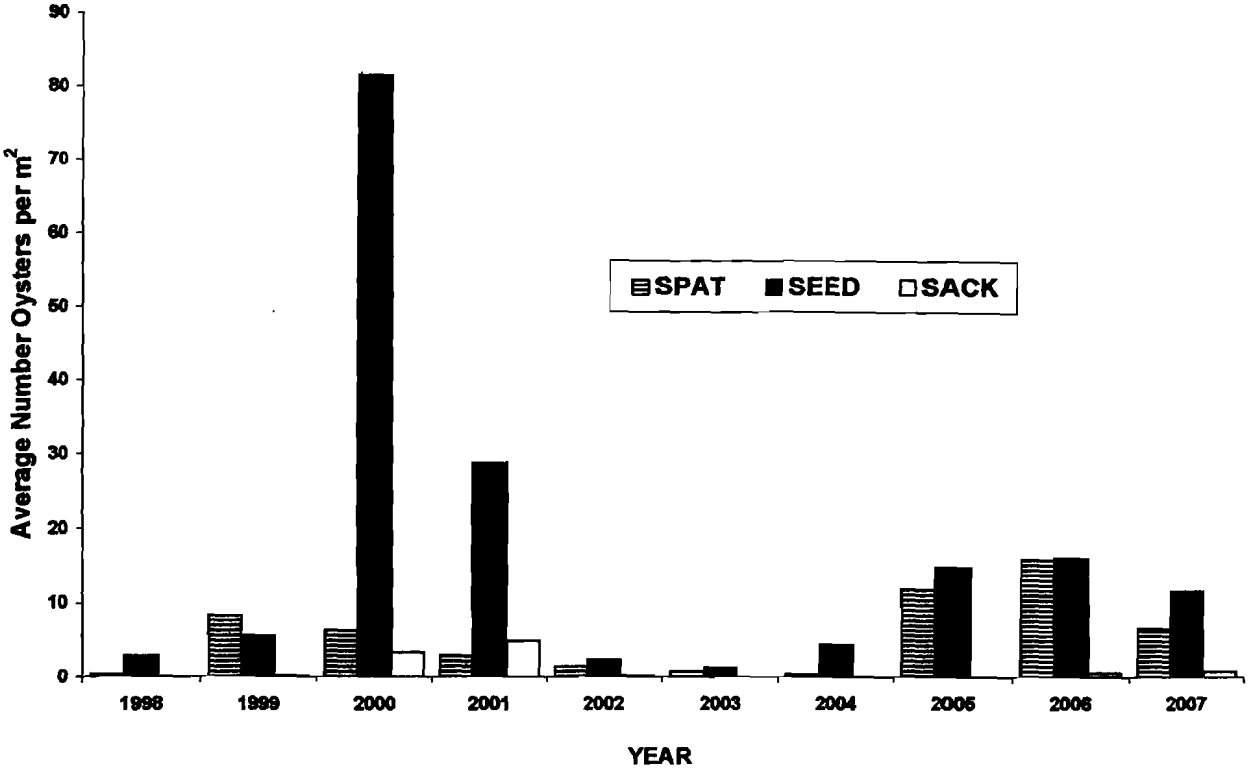


Figure 6.3. **CSA 6 historical square meter results.**

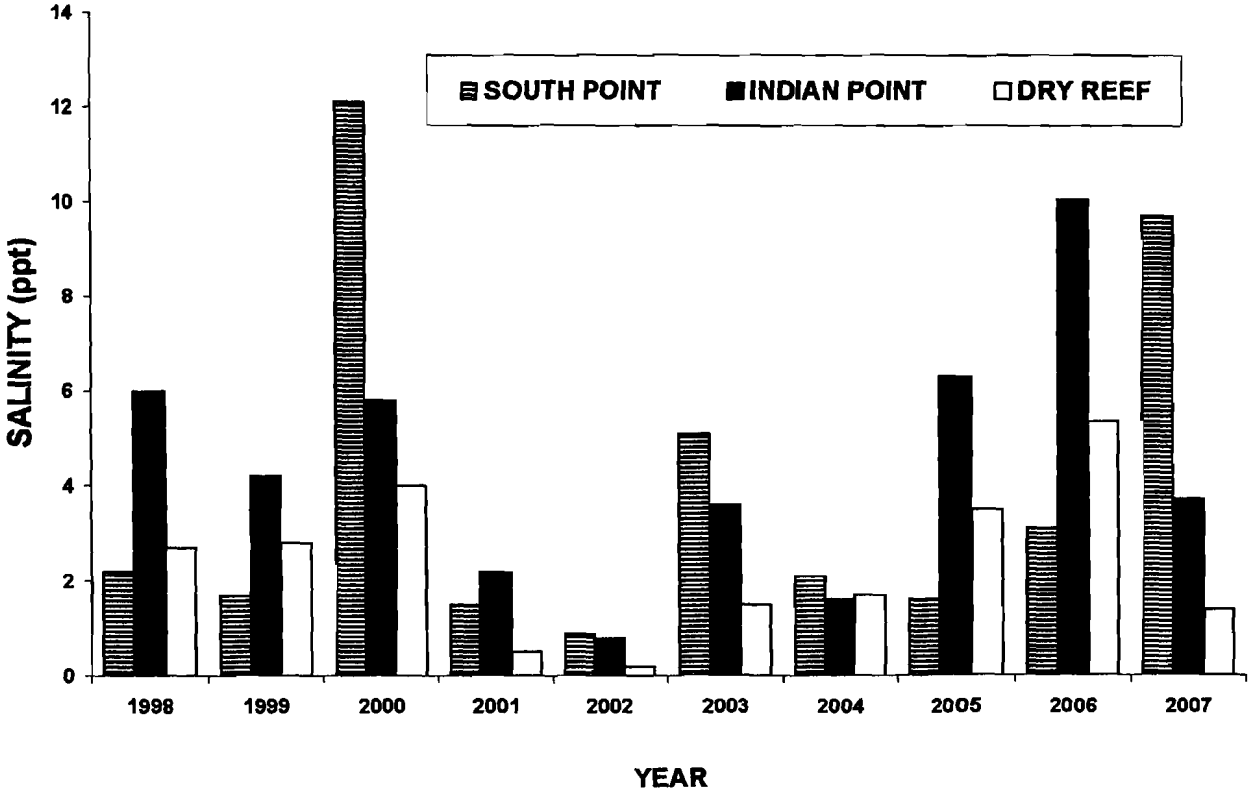


Figure 6.4. CSA 6 historical average May salinities by selected sample station.

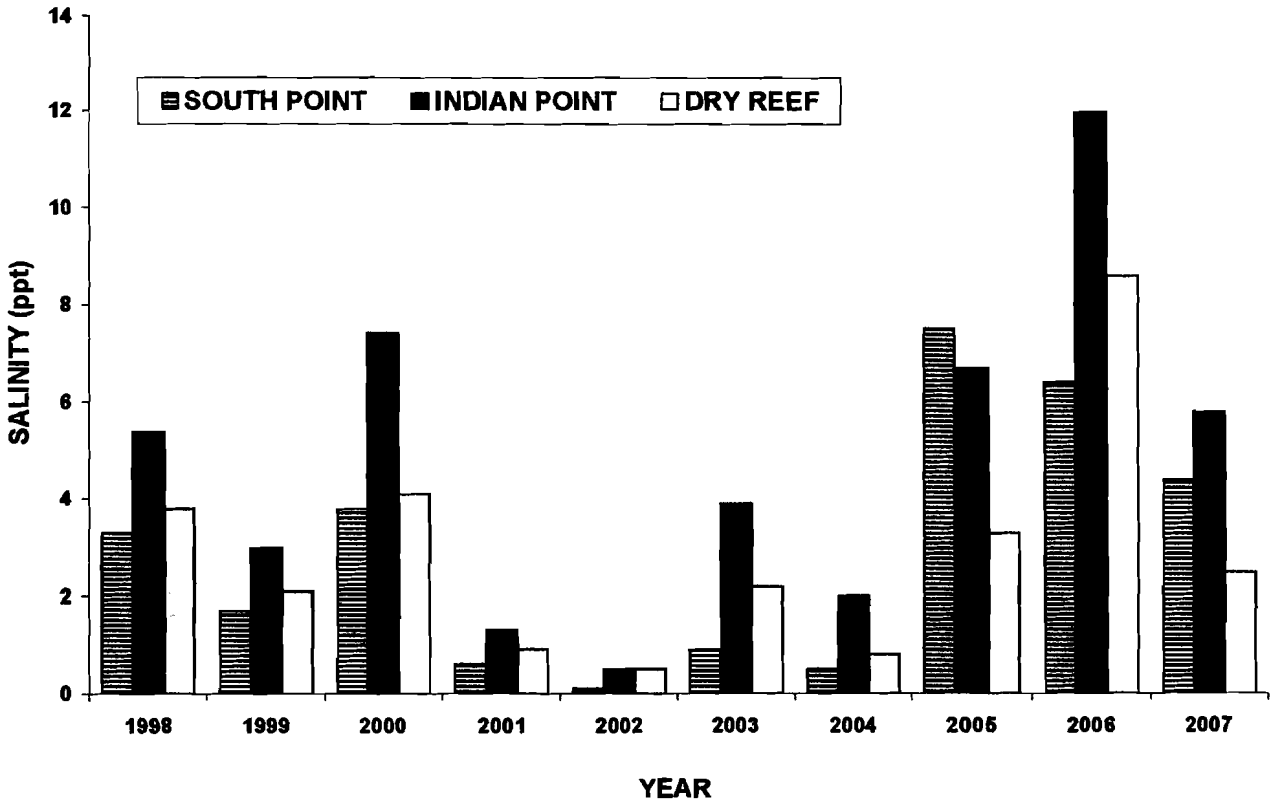


Figure 6.5. CSA 6 historical average June salinities by selected sample station.

CSA VII

July 23, 2007

MEMORANDUM

To: Patrick Banks, Biologist Program Manager

From: Michael Harbison, CSA VII Biologist Manager

RE: CALCASIEU LAKE OYSTER STOCK ASSESSMENT REPORT

INTRODUCTION/BACKGROUND

Louisiana Department of Wildlife and Fisheries' Coastal Study Area VII is located in Southwest Louisiana, from the Louisiana/Texas state line to Freshwater Bayou in Vermilion Parish. It is comprised of Calcasieu and Mermentau River basins and the eastern portion of the Sabine River Basin.

Calcasieu Lake is located at the Southern end of the basin in Calcasieu and Cameron parishes. It consists of approximately 58,260 water bottom acres with healthy oyster reefs located throughout the lake, especially in the southern end.

Oyster seasons occurred prior to 1967, but were closed from 1967-1975. Oyster harvesting resumed in 1975 with only taking by hand or tongs allowed. In 2004, legislation was passed allowing for the use of hand oyster dredges of three feet wide or less in Calcasieu Lake.

For assessment purposes, Calcasieu Lake has always been split into two areas – Eastside and Westcove (the Calcasieu Ship Channel being the dividing line). In 1992, Louisiana Department of Health and Hospitals (LDHH) also split the lake into two separately managed areas – Calcasieu Lake Conditional Managed Area (CLCMA) and West Cove Conditional Managed Area (WCCMA), (see boundaries in Figures 7.1 and 7.2). When this change occurred the two areas were also managed for closing based on the river stage of the Calcasieu River at Kinder. CLCMA would close when the river rose to 12 feet and the WCCMA would close when the level reached 7 feet. Once the river fell below these levels for 48 hours the seasons would resume. LDHH changed the CLCMA river lever in 1998 to 13.5 feet. In 2004 LDHH changed CLCMA to Growing Area (GA) 29 and WCCMA to GA 30.

LDHH also limited the amount of acreage available to oyster harvest on the Eastside. Oysters can only be harvested in the southern portion of the area. The total area has been changed several times over the years with the current acreage being approximately 14,743 water bottom acres. WCCMA has remained the same at approximately 9,248 acres.

Historical reef acreage for all of Calcasieu Lake is 1,690.95. West Cove consists of 726.98 acres and the Eastside consists of 963.97 acres. The reef acreage on the Eastside is made up of reefs that fall both within and outside of the conditional managed area.

METHODS

The oyster assessment for Calcasieu Lake was derived by taking "meter square" samples on July 10, 2007. These samples are collected utilizing an aluminum frame measuring one meter by one meter. The frame is randomly tossed in the very near vicinity of the sample station located on a known oyster reef. There are two replicate samples taken by a SCUBA diver at each station and there are three stations each in each portion of Calcasieu Lake (Figures 7.1 and 7.2). The diver removes all live and dead oysters and shell on the top portion of the reef substrate. Any live and recent dead oysters are measured in five millimeter (mm) groups and divided into three categories – spat (<25mm), seed oysters (25mm – 74mm) and sack oysters (75mm and larger). Oyster predators and Hooked mussels (*Ishchadium recurvum*) that were collected are identified and tallied. As no bedding (seeding) operations occur in Calcasieu Lake and all harvest is for direct market, the results of data collected are reported in sacks rather than barrels (two sacks equals one barrel).

RESULTS

Eastside

The oyster assessment for the Eastside indicates 548,333 sacks of sack oysters and 598,182 sacks of seed oysters available. This represents a considerable increase over the 2006 assessment of 140,876 sacks of sack oysters and 159,298 sacks of seed oysters (Table 7.1, 7.2 and 7.6). Though these are gains from the previous year, this remains below the short term average by 13.2% (Table 7.3).

West Cove

The oyster assessment for West Cove indicates 114,414 sacks of sack oysters and 377,567 sacks of seed oysters available. This is higher than the 2006 assessment of 98,069 sacks of sack oysters and 65,380 sacks of seed oysters (Table 7.1, 7.2 and 7.6). Though these are gains from the previous year, this remains below the short term average by 13.7% (Table 7.3).

Also see Figure 7.3 for graphic depiction of seed and sack data by year.

DISCUSSION

Sack Oysters

Though the overall assessment fell below the short term average, this overall decrease is driven mostly by a decrease in sack oyster stocks in the Eastside of 20.7% and in West Cove of 65.8% for an average overall decrease of 35.4% (see Table 7.3). Even with the below average assessment the population continues to be healthy. If the harvest levels continue as they have in the short term there should be no detriment the population.

Harvest levels continue to be low in comparison to the oysters that are available (Figure 7.4). This is in part because a portion of the reef acreage on the Eastside is not in the LDHH conditional managed area and that West Cove harvest pressure is low and is very susceptible to rainfall with the low closure level of 7.0 feet at Kinder.

Seed Oysters

The seed oysters faired much better with the Eastside down by only 4.8%, but with West Cove up by 78.1% for an average increase of 19.2% (Table 7.3). With successful growth of these seed oysters during the coming year, they should help boost next year's level of sack oysters.

Hydrology

Average water temperatures for May and June were 26.3°C and 28.7°C respectively and above the long term average (LTA), with the maximum deviation of 3.7°C (Table 7.4). The average water temperature during the oyster assessment was 29.6°C which is also above the LTA.

Average salinities (in parts per thousand - ppt) for May and June were 15.9ppt and 15.5ppt respectively and also above the LTA average with a maximum deviation of 5.5ppt. The average salinity during the oyster assessment was 16.0ppt which is also above the LTA.

Disease, Fouling Organisms, and Predators

Oysters from Station 1 and Station 5 were delivered to Dr. Tom Soniat at Nicholls State University to sample for *Perkinsus marinus* ("DERMO"). The results are available in a separate section of the statewide stock assessment report.

Hooked mussel's numbers were low again this year averaging 35.2 per station. There was an average in 2006 and 2005 of 10.3 and 149.7 respectively. The low numbers this year and last year could be attributed to dredging and/or Hurricane Rita.

There were no Oyster drills (*Stramonita haemastoma*) present in the meter square samples. There was a total of 31 unidentified mud crabs found in the samples. No other species of concern were found.

2006-07 OYSTER SEASON

This was the second attempt in as many years at opening West Cove earlier than the Eastside, but river levels caused the closing of West Cove after only three days of open season (Tables 7.5 and 7.7). This was attempted in order to get more oyster fishermen to utilize the resource in West Cove.

This was also the first year that mechanical retrieval systems were allowed to assist with dredging.

The entire month of April was closed as a precautionary measure by LDHH due to a broken sewage line in Bayou D'Inde. This along with some wet periods caused this year to be among the lowest in percentage of open days (Table 7.7). Despite the closures, preliminary trip-ticket data revealed that 28,341 sacks of oysters were harvested from Calcasieu Lake during the open season (Table 7.6).

Figure 7.1 - LCLCMA Boundary and Meter Square Stations

Figure 7.2 - WCCMA Boundary and Meter Square Stations

Table 7.1 - Calcasieu Lake 2007 Oyster Stock Assessment

CALCASIEU LAKE OYSTER STOCK ASSESSMENT

JULY 2007

OYSTER NUMBERS

CALCASIEU LAKE EASTSIDE

SIZE	STATION			AVE.
	1	2	3	
≥3"	19	97	36	25.3
1-<3"	59	184	88	55.2

WEST COVE

SIZE	STATION			AVE.
	4	5	6	
≥3"	9	9	24	7.0
1-<3"	73	58	146	46.2

OYSTER PRODUCTION AREA

CALCASIEU LAKE EASTSIDE	WEST COVE
3,901,185.57 SQ. METERS	2,942,076.67 SQ. METERS

PRODUCTION OF ≥3" OYSTERS

CALCASIEU LAKE EASTSIDE		WEST COVE	
OYSTERS:	98,699,994.921	OYSTERS:	20,594,536.690
SACKS:	548,333.3	SACKS:	114,414.1
TOTAL SACKS OF ≥3" OYSTERS:			662,747.4

PRODUCTION OF 1 - < 3" OYSTERS

CALCASIEU LAKE EASTSIDE		WEST COVE	
OYSTERS:	215,345,443.464	OYSTERS:	135,923,942.154
SACKS:	598,181.8	SACKS:	377,566.5
TOTAL SACKS OF 1-<3" OYSTERS:			975,748.3

TOTAL PRODUCTION

TOTAL OVERALL POTENTAL OF OYSTERS (SACKS):	1,638,495.7

Table 7.2 - Calcasieu Lake 2006 Oyster Stock Assessment

CALCASIEU LAKE OYSTER STOCK ASSESSMENT

JULY 2006

OYSTER NUMBERS

CALCASIEU LAKE EASTSIDE

SIZE	STATION			AVE.
	1	2	3	
≥3"	8	0	31	6.5
1-<3"	13	38	37	14.7

WEST COVE

SIZE	STATION			AVE.
	4	5	6	
≥3"	17	4	15	6.0
1-<3"	13	14	21	8.0

OYSTER PRODUCTION AREA

CALCASIEU LAKE EASTSIDE	WEST COVE
3,901,185.57 SQ. METERS	2,942,076.67 SQ. METERS

PRODUCTION OF ≥3" OYSTERS

CALCASIEU LAKE EASTSIDE		WEST COVE	
OYSTERS:	25,357,706.205	OYSTERS:	17,652,460.020
SACKS:	140,876.1	SACKS:	98,069.2
TOTAL SACKS OF ≥3" OYSTERS:			238,945.3

PRODUCTION OF 1 - < 3" OYSTERS

CALCASIEU LAKE EASTSIDE		WEST COVE	
OYSTERS:	57,347,427.879	OYSTERS:	23,536,613.360
SACKS:	159,298.4	SACKS:	65,379.5
TOTAL SACKS OF 1-<3" OYSTERS:			224,677.9

TOTAL PRODUCTION

TOTAL OVERALL POTENTAL OF OYSTERS (SACKS):	463,623.2

Table 7.3 - Calcasieu Short Term Assessments and Percentage Change

ASSESSMENTS BY CONDITIONAL MANAGED AREA						
	SACK OYSTERS (≥ 3")			SEED OYSTERS (< 3")		
YEAR	EASTSIDE	WESTCOVE	TOTAL	EASTSIDE	WESTCOVE	TOTAL
2002	520,158.1	261,517.9	781,676.0	212,511.9	106,069.6	318,581.5
2003	786,739.1	383,257.5	1,169,996.6	393,369.5	137,296.9	530,666.4
2004	927,615.2	171,621.1	1,099,236.3	1,102,084.9	267,238.6	1,369,323.5
2005	632,859.0	282,766.3	915,625.3	446,469.0	179,793.6	626,267.6
2006	140,876.1	98,069.2	238,945.3	159,298.4	65,379.5	224,677.9
AVERAGE	**691,810.2**	**334,246.7**	**1,026,056.9**	**628,547.1**	**189,566.1**	**818,113.2**
2007	548,333.3	114,414.1	662,747.4	598,181.8	337,566.5	975,748.3
% CHANGE FROM AVE.	-20.7	-65.8	-35.4	-4.8	+78.1	+19.2

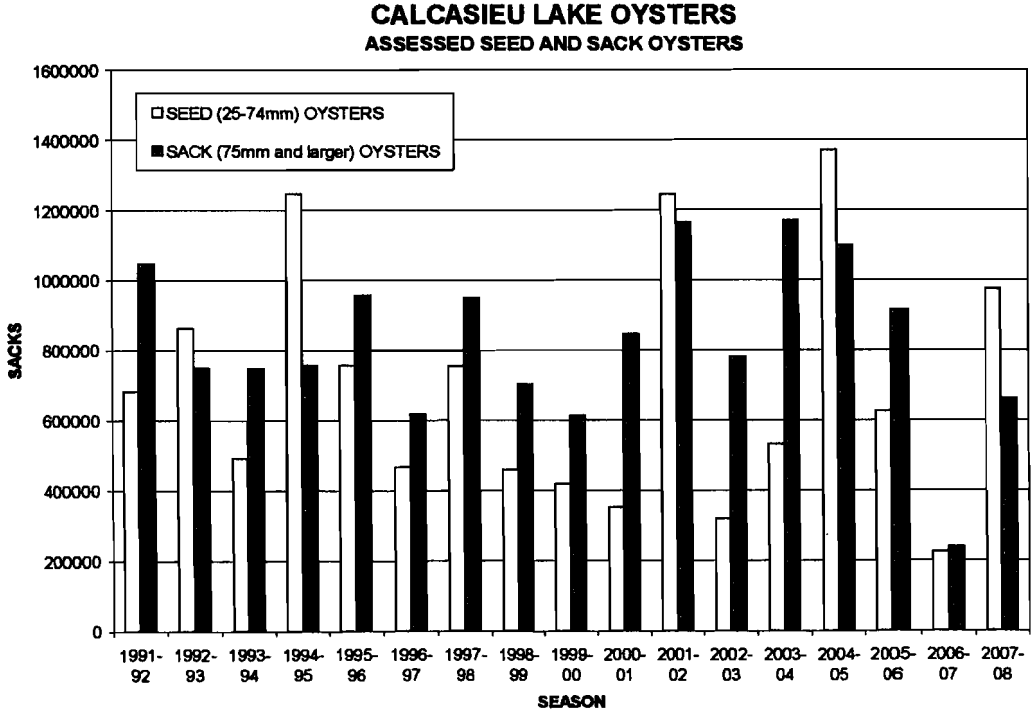


Figure 7.3 - Calcasieu Lake Available Seed and Sack Oysters

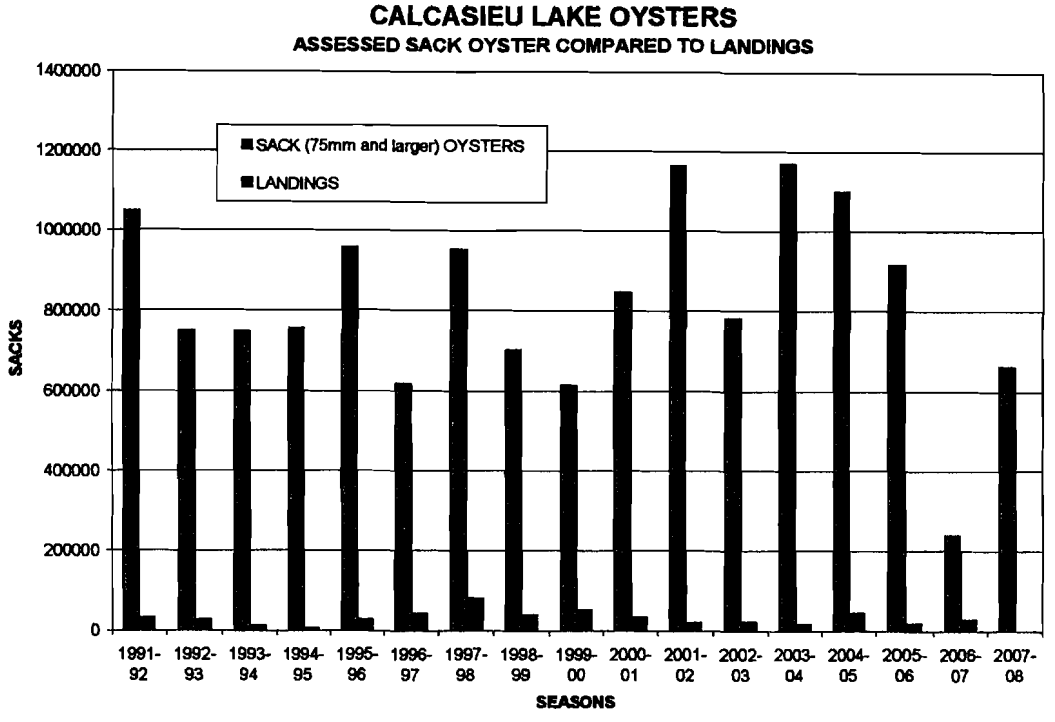


Figure 7.4 - Calcasieu Lake Available Oysters and Landings

Table 7.4 - Calcasieu Lake Salinity and Temperature

CALCASIEU LAKE HYDROLOGY						
	2007		LONG TERM		2007 OY. ASSESSMENT	
MONTH	AV. SAL.	AV. TEMP	AV. SAL.	AV. TEMP.	AV. SAL.	AV. TEMP.
MAY	15.9	26.3	12.2	25.2		
JUNE	15.5	28.7	13.7	28.5		
JULY					16.0	29.6

Table 7.5 - Calcasieu Lake Percent of Season Days Open

SEASON		TOTAL DAYS	LOWER CALCASIEU LAKE CMA		WEST COVE CMA OPEN	
			OPEN DAYS	PERCENTAGE	OPEN DAYS	PERCENTAGE
1991-92		199	114	57	114	57
1992-93*		165	137	83	76	46
1993-94		181	146	81	84	46
1994-95		181	90	50	9	5
1995-96		188	175	93	115	61
1996-97		197	149	76	114	58
1997-98		197	139	71	96	49
1998-99		197	135	69	120	61
1999-00		197	197	100	182	92
2000-01		198	180	95	106	53
2001-02		198	158	80	61	31
2002-03		198	146	74	66	33
2003-04		199	172	87	126	63
2004-05		198	168	85	68	34
2005-06	LCLCMA	198	187	11		
	WCCMA	205			165	40
2006-07	LCLCMA	197	118	65		
	WCCMA	181			70	35

* 92-93 SEASON STARTED USING CALCASIEU RIVER GAUGE AT KINDER FOR DHH CLOSURES.

Table 7.6 - Historical Stock Assessments and Landings (in sacks)

CALCASEIU LAKE STOCK ASSESSMENT AND HARVEST ESTIMATES			
SEASONS	STOCK ASSESSMENT		ESTIMATED SACKS HARVESTED
	MARKETABLE	TOTAL	
1963	-	-	210,160
1967-74	-	-	NO COMMERCIAL LANDINGS
1975-76	142,726	441,183	40,000
1976-77	694,420	869,475	100,000
1977-78	483,673	621,885	141,976
1978-79	-	-	75,000
1979-80	676-333	979,613	125,000
1980-81	355,664	705,117	150,000
1981-82	608,110	988,575	-
1982-83	-	-	50,000-75,000
1983-84	-	-	150,000
1984-85	125,407	644,788	-
1985-86	315,160	537,760	27,400
1986-87	589,940	1,217,959	200,000
1987-88	796,950	2,703,647	125,000
1988-89	463,331	1,036,580	50,000
1989-90	172,046	640,892	40,000
1990-91	408,961	1,268,962	50,000
1991-92	1,048,882	1,731,367	31,383[1]
1992-93	749,915	1,612,736	27,328
1993-94	748,281	1,238,783	12,818
1994-95	756,525	1,246,480	6,134
1995-56	956,926	1,298,379	29,082
1996-97	618,767	1,083,866	43,441
1997-98	950,979	1,706,510	80,735
1998-99	702,371	1,160,115	39,202[2]
1999-00	614,145	1,032,117	50,592[3]
2000-01	846,176	1,197,311	35,881
2001-02	1,163,750	2,409,482	21,297
2002-03	781,676	1,100,257	21,386
2003-04	1,169,997	1,700,663	18,196
2004-05	1,099,236	2,468,560	44,293
2005-06[4]	915,625	1,541,893	19,327
2006-07[5]	238,945	463,623	28,341
2007-08	662,747	1,638,496	

1 - STARED USING DEALER REPORTS FOR LANDINGS.
2 - THE 1999 PORTION OF THE LANDINGS WAS DERIVED FROM PRELIMINARY TRIP TICKET DATA.
3 - TRIP TICKET DATA WAS UNAVAILABLE, CALLED DEALERS FOR LANDINGS.
4 - HURRICAN RITE MADE LANDFALL ON 9/23/05 IN CAMERON PARISH, DELAYING SEASON OPENING, LIMITING THE NUMBER OF FISHERMEN AND BUYERS.
5 - A SEWAGE LINE BREAK IN BAYOU D'INDE CLOSED THE SEASON IN FOR THE ENTIRE MONTH OF APRIL, LIMITING THE LANDINGS.

Table 7.7 - Calcasieu Lake Oyster Season Dates

CALCASIEU LAKE OYSTER SEASONS

SEASON	REGULAR SEASON							EXTENDED SEASON							TOTAL DAYS IN SEASON
	DATES			DHH HEALTH CLOSURES				DATES			DHH HEALTH CLOSURES				
				CAL. L. CMA		WEST COVE CMA					CAL. L. CMA		WEST COVE CMA		
	OPEN DATE	CLOSED DATE	TOTAL DAYS	DAYS OPEN	DAYS CLOSED	DAYS OPEN	DAYS CLOSED	OPEN DATE	CLOSED DATE	TOTAL DAYS	DAYS OPEN	DAYS CLOSED	DAYS OPEN	DAYS CLOSED	
1989-90	11-15	3-15	121	79	42	79	42	3-16	4-30	46	40	6	40	6	165
1990-91	11-15	3-1	147	95	52	95	52	3-30	4-20	34	20	0	0	0	181
1991-92	10-15	3-1	139	69	70	69	70	3-2	4-30	60	45	15	15	15	199
1992-93[1]	10-15	3-1	138	123	15	76	62	3-8	4-3	27	14	13	13	27	165
1993-94	11-1	3-1	121	94	27	61	60	3-2	4-30	60	52	8	8	7	181
1994-95[2]	11-1	3-1	121	69	52	9	112	3-2	4-30	60	21	39	39	60	181
1995-96	10-16	3-1	138	125	13	80	58	3-2	3-31	30	30	0	0	0	-
								4-11	4-30	20	20	0	0	15	188
1996-97	10-16	5-1	197	149	48	83	114	-	-	-	-	-	-	-	197
1997-98	10-16	4-30	197	139	58	101	96	-	-	-	-	-	-	-	197
1998-99[3]	10-16	4-30	197	135	62	77	120	-	-	-	-	-	-	-	197
1999-00	10-16	4-30	197	197	0	182	15	-	-	-	-	-	-	-	197
2000-01	10-15	4-30	198	180	18	106	92	-	-	-	-	-	-	-	198
2001-02	10-15	4-30	198	158	40	61	137	-	-	-	-	-	-	-	198
2002-03	10-15	4-30	198	146	52	66	132	-	-	-	-	-	-	-	198
2003-04	10-15	4-30	199	172	27	126	73	-	-	-	-	-	-	-	199
2004-05	10-15	4-30	198	168	30	68	130	-	-	-	-	-	-	-	198
2005-06 LCLCMA	10-15	4-30	198	187	11			-	-	-	-	-	-	-	198
2005-06 WCCMA	10-8	4-30	205			165	40	-	-	-	-	-	-	-	205
2006-07 LCLCMA	11-1	4-30	181	118	63			-	-	-	-	-	-	-	181
2006-07 WCCMA	10-16	4-30	197			70	127	-	-	-	-	-	-	-	197
2007-08 LCLCMA															
2007-08 WCCMA															

1 - STARTING WITH THE 92-93 SEASON CALCASIEU LAKE WAS SPLIT INTO TWO UNITS: CAL. LAKE CMA (W/ RIVER STAGE CLOSURE @ 12 FT.) AND WEST COVE CMA (W/ RIVER STAGE CLOSURE @ 7 FT.).

2 - DHH CLOSED THE CAL. LAKE CMA (FROM 11/1-12/10/94) AND WEST COVE (FROM 11/1-1/28/95) WITH A PRECAUTIONARY (POSSIBLE LEAD CONTAMINATION) CLOSURE.

3 - DURING THIS SEASON THE RIVER LEVEL CRITERIA IN THE CAL. LAKE CMA CHANGED FROM 12 TO 13.5 FT.

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DERMO

2007 Dermo Summary
Public Oyster Areas of Louisiana

INTRODUCTION/BACKGROUND

Since 1997, the Louisiana Oyster Task Force (OTF) has funded yearly analysis of *Perkinsus marinus* (Dermo) infestation on the Louisiana public oyster grounds, reservations, and tonging areas by Dr. John Supan (Louisiana State University) and Dr. Tom Soniat (Nicholls State University). These results have been available to the OTF and other members of the Louisiana oyster industry to aid in decision-making efforts during harvest of seed and sack oysters from the public oyster areas. Utilization of these results can help predict and possibly prevent dermo-related mortalities on private leases that were planted with seed from public oyster areas.

Dermo was first identified in the late 1940s as the cause of significant oyster mortalities in the warm waters of Louisiana and other Gulf of Mexico states, although it also occurs along the east coast up to Long Island Sound. It is a microscopic parasite that infects the hemocytes (oyster cells that aid in digestion, nutrient transport, wound healing, internal defense, etc.) of oysters and was originally classified as a fungus under the scientific name *Dermocystidium marinum*. Although the scientific name has changed to *Perkinsus marinus*, the parasite is commonly referred to as Dermo.

METHODS

Dermo infestation levels in oyster populations are described in two ways: 1) percentage of the population infested with the parasite (sometimes referred to as *prevalence*), and 2) the average level of infestation in each oyster, termed the *weighted incidence*. A weighted incidence of 2.0 or greater on the Mackin Scale (scale ranges from 0 to 5) indicates an intense epidemic of the parasite in the oyster population. Historical Dermo data show that the primary public oyster seed grounds east of the Mississippi River have not experienced high levels of Dermo during the past 11 years; however, sampling usually occurs in late June or early July which may be well before Dermo levels begin to increase in the oyster population. Please refer to specific methods outlined by Drs. Supan and Soniat in the following sections.

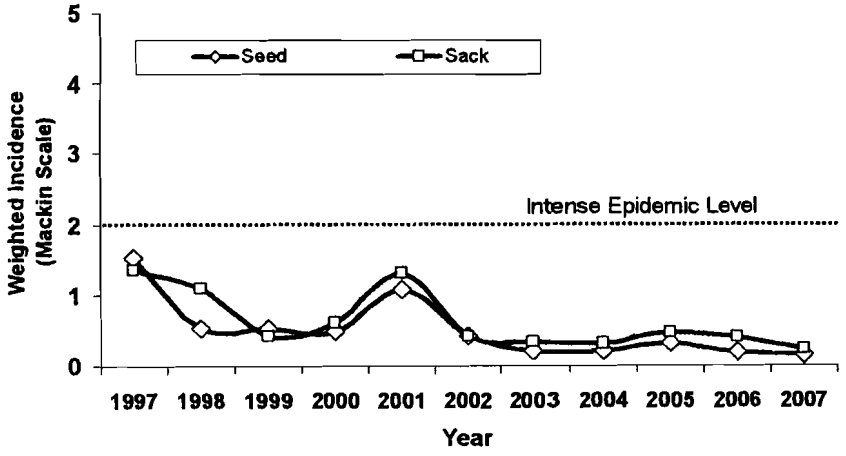

Figure D.1. Historical average weighted incidence levels of Dermo on the Primary Public Oyster Seed Grounds east of the Mississippi River.

RESULTS AND DISCUSSION

Data from 2007 sampling show weighted incidence levels for seed oysters on the primary public

grounds east of the Mississippi River in 2007 was 0.14 while average weighted incidence of sack oysters was 0.23. These results show that Dermo is well below the intense epidemic level of 2.0 and lower than the long-term average (LTA) of 0.55 and 0.67 for seed and sack, respectively (Figure D.1). For oysters sampled from the remaining public oyster areas throughout the state, similar results were obtained. Dermo lovels in oysters in Hackberry Bay remained low at 0.1 and 0.1 for seed and sack, respectively.

Dermo is a warm-water, high salinity parasite that becomes most abundant in waters above 25°C. Although water temperatures became conducive to Dermo proliferation in early spring 2002 (largely due to a warm winter), levels have remained low through the summer. This is likely due to the influx of fresh water into Louisiana estuaries from frequent rains experienced over the first half of 2002, which has kept salinities low throughout much of the public oyster areas. Dermo is almost completely suppressed at salinities < 8 ppt. If salinities remain low, available oyster resources on the public grounds should provide fishermen with a healthy supply of both seed oysters for transplating and sack oysters for market.

Project Title: *Perkinsus marinus* evaluation for managing Louisiana's public and private oyster grounds.

Principal Investigator: Dr. John Supan
Office of Sea Grant Development
Louisiana State University
Baton Rouge, LA 70803

Background and Motivation

Louisiana's public oyster grounds, particularly east of the Mississippi River, are the source of seed oysters for private leaseholders. Louisiana generally leads the nation in oyster production, with up to 80% produced on private leases historically. Therefore, the condition and productivity of the public seed grounds sets the pace for private production; when seed is lacking, so is private production (Berrigan et al. 1991).

During past seasonal openings of the public grounds during September, harvesters noticed increasing mortality in sizes greater than two inches. Collaborative efforts between the Department of Wildlife and Fisheries and the Louisiana Sea Grant College Program have identified Dermo. (*Perkinsus marinus*) as the potential cause of oyster mortality (LDWF, 1996) and initiated an annual Dermo Advisory Program for oyster leaseholders.

Results of successive samplings on nine stations east of the river and in Hackberry Bay showed high infection intensity and prevalence at most stations during drought years and lower infection during wet years. Although past population density surveys conducted by LDWF have revealed high concentrations of oysters at sampling stations east of the river, they are predominantly in the seed-size range of less than two inches. Many leaseholders have experienced high mortalities of bedded seed concurrent with high salinities and temperatures on their bedding grounds.

Therefore, the latest year-class of seed oysters available for bedding on leases set among existing oysters that are highly infected with *Perkinsus* will exhibit high mortalities with rising temperature and salinity during the following summer. It is safe to say that more losses will occur during future bedding operations.

Objectives

The objectives of this project are:

(1) to conduct *Perkinsus* analyses on sack and seed oysters collected from LDWF sampling stations during their annual population density evaluations; and,

(2) to develop a database for assisting in the management of the public grounds by LDWF and to develop and continue a Dermo Advisory Program for oyster leaseholders.

Approach

Seed and sack oysters were collected by LDWF personnel from ten stations during the annual sampling of the public grounds, including nine stations east of the river and Hackberry Bay. Samples were taken to the Sea Grant Oyster Hatchery for subsequent analyses.

Perkinsus assays were conducted using oyster rectal tissue in Ray's Fluid Thioglycollate Media (RFTM) with a 7-14 day incubation period (Ray, 1966), and ranked according to intensity of infection by a 0-5 evaluation scale (Mackin 1962).

Final laboratory results were forwarded to LDWF for incorporation into its database for oyster management decision making and for the continuation of the Dermo Advisory Program.

Results

The Dermo infection intensity (weighted incidence) and percent prevalence at the ten stations during July 2007 are listed in Table D.1. Table D.2 lists the 2006 data for comparison. Generally, Dermo infections remain reasonably low. A weighted incidences valued at 1 or greater, which is considered a dangerous or lethal value for any given oyster population, was not found in size classes from any of the ten stations, but high intensity (>2) was found in some individual oysters from Telegraph Point and Three-Mile Pass.

As always, oyster farmers are advised to harvest seed oysters for bedding from areas with the lowest Dermo infection levels. These levels can increase with bedding into higher salinity and oyster mortality could increase the following summer in such locations as water temperature increases.

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Table D.1. 2007 DERMO RESULTS EAST OF RIVER & HACKBERRY BAY

	Seed		Market	
	Prevalence	Weighted Incidence	Prevalence	Weighted Incidence
Bay Gardene	26%	0.1	53%	0.3
Lonesome I.	6%	0.03	20%	0.1
Mozambique Pt.	13%	0.1	20%	0.1
N. Black Bay	13%	0.1	20%	0.1
S. Black Bay	14%	0.2	26%	0.2
Bay Crabe	28%	0.2	33%	0.4
Telegraph Pt.	33%	0.5	40%	0.5
Cabbage Reef	7%	0.03	20%	0.1
Three-Mile Pass	0%	0.0	33%	0.3
Hackberry Bay	13%	0.1	13%	0.1

Table D.2. 2006 DERMO RESULTSEAST OF RIVER & HACKBERRY BAY

	Seed		Market	
	Prevalence	Weighted Incidence	Prevalence	Weighted Incidence
Bay Gardene	20%	0.1	50%	0.3
Lonesome I.	27%	0.1	47%	0.2
Mozambique Pt.	47%	0.2	67%	0.4
N. Black Bay	33%	0.2	40%	0.2
S. Black Bay	20%	0.1	50%	0.4
Bay Crabe	53%	0.3	60%	1.0
Telegraph Pt.	80%	0.4	53%	0.4
Cabbage Reef	40%	0.2	NO SAMPLE	
Three-Mile Pass	33%	0.2	47%	0.3
Hackberry Bay	47%	0.2	73%	0.7

Mackin Scale used to determine incidence

Levels of the oyster parasite *Perkinsus marinus* from Louisiana oysters west of the Mississippi River: Summer 2007

by

Thomas M. Soniat, Ph.D.

21 July 2007

Among the most significant causes of oyster mortality is the parasite *Perkinsus marinus* (formerly *Dermocystidium marinum*), which is responsible for annual mortality rates that exceed 50% in most populations of adult eastern oysters, *Crassostrea virginica*. *Perkinsus marinus* was described in 1950 by John Mackin, Malcom Owen and Albert Collier as *Dermocystidium marinum* – hence the common name "Dermo" which is still in use (Mackin et al. 1950).

The discovery of the parasite was the result of investigations (funded by a consortium of oil companies and directed by Texas A&M University) of the impact of oil and gas activities on the Louisiana oyster industry (Mackin and Hopkins, 1962). Extensive studies were conducted on the effects of crude oil, bleedwater, natural gas, drilling mud and seismographic surveys. It was ultimately realized that none of these pollutants or activities explained the widespread mortalities of oysters that were observed. It is now known that the parasite is a major cause of oyster mortality from Maine to Mexico (Soniat, 1996).

The critical environmental factors which favor the proliferation of the parasite are high water temperatures and high salinities. Thus infections are more intense in the late summer, on the seaward side of estuaries and during droughts. Drought conditions on the Gulf Coast are associated with the La Niña phase of El Niño Southern Oscillation, however increases in prevalence (PI) precede sharp increases in intensity (WI) and epizootics of Dermo in Louisiana can lag La Niña events by about 6 months (Soniat et al., 2005). Management techniques to minimize disease and increase oyster harvest include moving infected oysters to lower salinity, early harvest of infected populations, and even freshwater diversion into high-salinity estuaries. Because of the key role of Dermo as a cause of oyster mortality, the success of oyster farming depends on the ability to manage oyster populations in the presence of high levels of disease (Soniat and Kortright, 1998).

The standard assay for determining the level of parasitism is the fluid thioglycollate method (Ray, 1966). The length of ten oysters is measured and a small piece of tissue is removed and assayed for disease after incubation in fluid thioglycollate and antibiotics for one week. *P. marinus* intensity is scored using a 0-to-5 scale developed by Mackin (1962), where 0 is no

infection and 5 is an infection in which the oyster tissue is almost entirely obscured by the parasite. Calculations are made of percent infection (PI) and weighted incidence (WI), which is the sum of the disease code numbers divided by the total number of oysters in the sample. A WI of 1.5 could be considered a level at which disease-related mortalities are occurring. For example, Mackin (1962) claims: "a population of live oyster with a weighted incidence of 2.0 contains an intense epidemic, and more than half of the population may be in advanced stages of the disease, with all of the individuals infected."

Oysters for the summer 2007 study were collected from 10 sites west of the Mississippi River. Samples were taken from one site in Lake Felicity (LF), one site in Lake Chien (LC), two sites in Sister Lake, two sites in Bay Junop, two sites in Vermilion Bay, and two in Lake Calcasieu. The Sister Lake sites were Grand Pass (GP) and Old Camp (OC). The Bay Junop sites were Bayou DeWest (DW) and Buckskin Bayou (BS). The Vermilion Bay sites were Indian Point (IP) and South Point (SP), and the Lake Calcasieu sites were Big Washout (BW) and Northeast Rabbit Island (NR).

Mantle tissue was removed from each of 10 oysters, incubated at room temperature in fluid thioglycollate for about a week, and assayed according to the standard Ray (1966) technique. The level of infection (disease code) was scored from 0 to 5, where 0 is no infection and 5 is near total coverage of the oyster tissue by the parasite. Weighted incidence (WI) was calculated by summing the disease code values and dividing by 10, the number of oysters in the sample.

Weighed incidence and percent infection results are shown in Table D.3. WI values were 0.300 (DW), 0.233 (BB), 0.324 (GP), 0.267 (OC), 0.000 (IP), 0.000 (SP), 0.401 (LC), 0.335 (LF), 1.170 (BW), and 0.701 (NR). WI levels from the summer 2007 samples are significantly higher than in the summer of 2006. With the exception of IP, that in 2006 had a WI of 0.090, 2007 values at all other stations were of equal or higher magnitude. Disease levels have increased significantly in most areas west of the Mississippi River. Most of the WI values are below critical levels, but there is some cause for concern -- especially in Lake Calcasieu.

Prevalences in the lower Lake are approaching 100%, and oysters at Big Washout are likely already experiencing disease-related mortalities. Lake Calcasieu oyster populations appear to be on the verge of an epizootic.

Table D.3. Collection, environmental, oyster and disease data for oysters sampled from west of the Mississippi River: Summer 2007.

Station	Date collected	Salinity (ppt)	Temperature (°C)	Oyster size range(mm)	Percent infection	Weighted incidence
Bayou DeWest	7/5/07	23.1	29.0	91-120	60%	0.300
Buckskin Bayou	7/5/07	14.4	28.6	78-112	50%	0.233
Grand Pass	7/5/07	18.8	29.5	90-112	60%	0.324
Old Camp	7/5/07	21.5	29.8	85-117	50%	0.267
Indian Point	7/5/07	2.5	27.9	75-92	0%	0.000
South Point	7/5/07	3.8	28.2	77-107	0%	0.000
Lake Chien	7/9/07	19.8	30.0	76-94	60%	0.401
Lake Felicity	7/9/07	20.5	29.8	81-100	50%	0.335
Big Washout	7/11/07	21.3	29.4	83-123	100%	1.170
NE Rabbit Island	7/11/07	10.7	29.4	81-107	90%	0.701

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NOTES