OYSTER STOCK ASSESSMENT REPORT

OF THE

PUBLIC OYSTER AREAS IN LOUISIANA

SEED GROUNDS, SEED RESERVATIONS, AND CONDITIONALLY MANAGED AREAS

2006 **2006**

Louisiana Department of Wildlife and Fisheries

Marine Fisheries Division

Oyster Data Report
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No. 12
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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 1.65 million acres of public water bottoms.

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 2005, the dockside value of oysters totaled nearly $33.3 million and harvest yielded nearly 12.1 million pounds of meat (LDWF Trip-Ticket Data). Typically, the oyster industry utilizes the public oyster grounds as a source of seed oysters for transplant to private leases (Figure 1). The public grounds, however, also yield a supply of sack-sized oysters 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 35% of the nation's oyster landings from 1997-2004 (Figure 2).

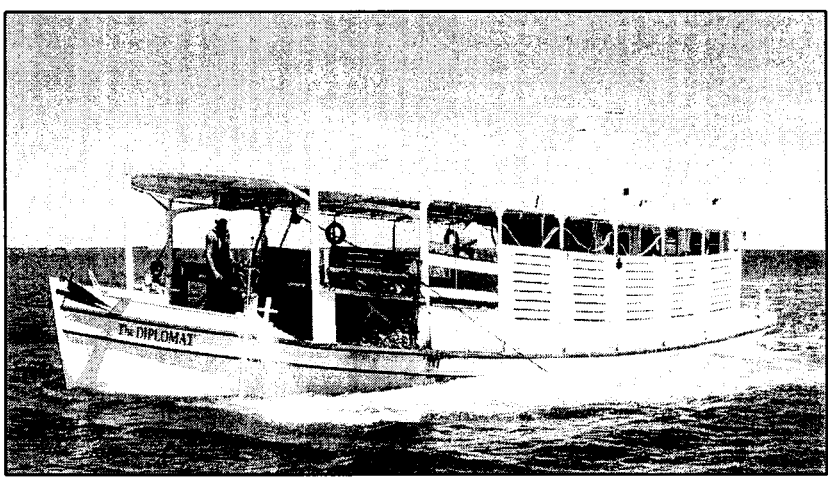


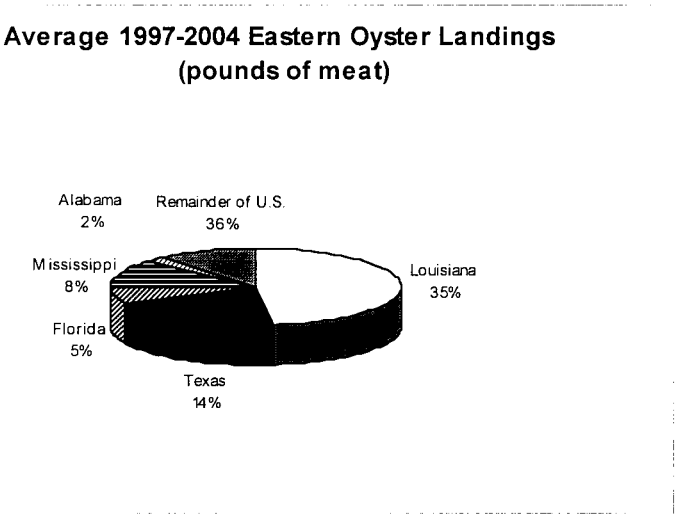
Figure 1. The oyster lugger, The Diplomat, harvests seed oysters from the Sister Lake Public Oyster Seed Reservation during the open season in 2003.

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.

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 square meter samples from each public oyster area. The public oyster season on the public grounds generally opens in early September or October and runs through March or April of the following year but may now be extended beyond May 15th of each year. Square-meter sampling is conducted each July in order to assess the stock size of the

resource and to develop and present recommendations to the Wildlife and Fisheries Commission for adoption of oyster season dates.

Figure 2.



The Louisiana public ground oyster resource has remained at or above the three million barrel level for over a decade, but has decreased in 2006 to its lowest point since 1990. In combination with declining trends in annual stock size together with the devastating impacts of Hurricanes Katrina and Rita on the public and private oyster resource, total 2006 public oyster stock availability of 2,164,923 barrels represents a decrease of nearly 18% from 2005 levels[1]. Sack oyster availability alone accounts for the decrease in the statewide stock size as availability dropped from roughly 1.2 million barrels in 2005 to 375 thousand barrels in 2006. Increases in statewide seed oyster stock availability were driven largely by high survival of spat recruited following Hurricane Katrina on the historic seed grounds east of the Mississippi River in Coastal Study Area (CSA) II.

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 production data from each CSA in Louisiana (CSA map depicted on page vi). Biological data was generated from quantitative square-meter sampling (see above) and production data was generated from boarding runs and trip ticket information. Questions and/or comments can be directed to the individual CSA Biologist Managers or Martin Bourgeois at (225) 765-2401.

[1] 2004 levels represent the 2004 stock availability following the CSA I data revision performed in March 2005

Figure 3. Annual Louisiana oyster stock size on the public oyster areas (estimated based on square meter sample data analysis).

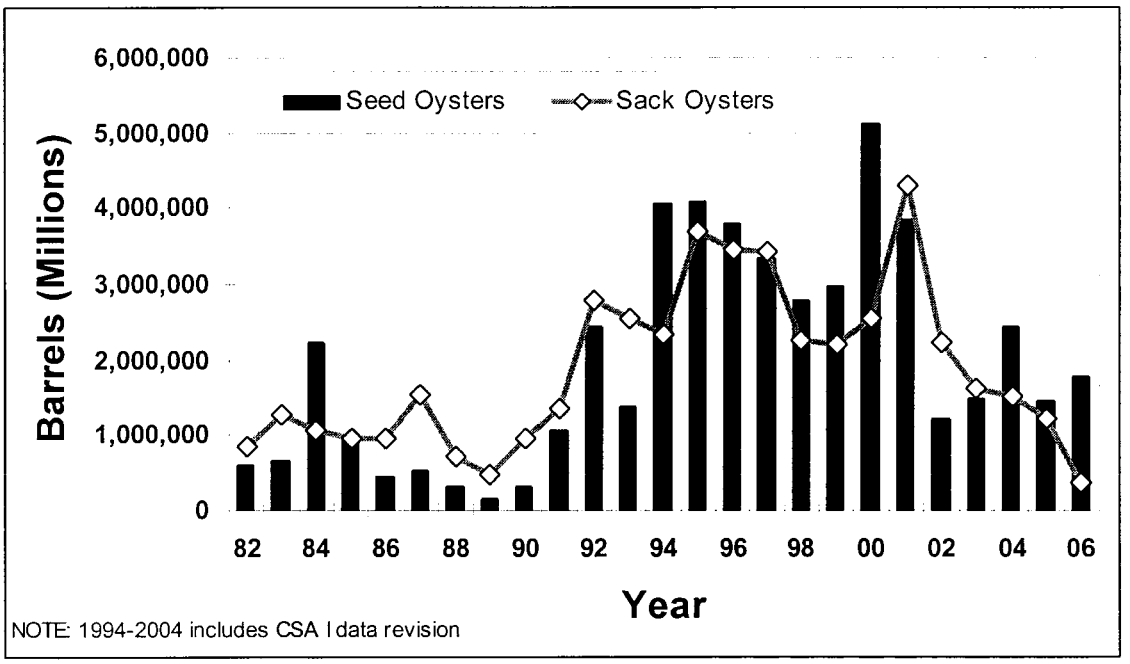
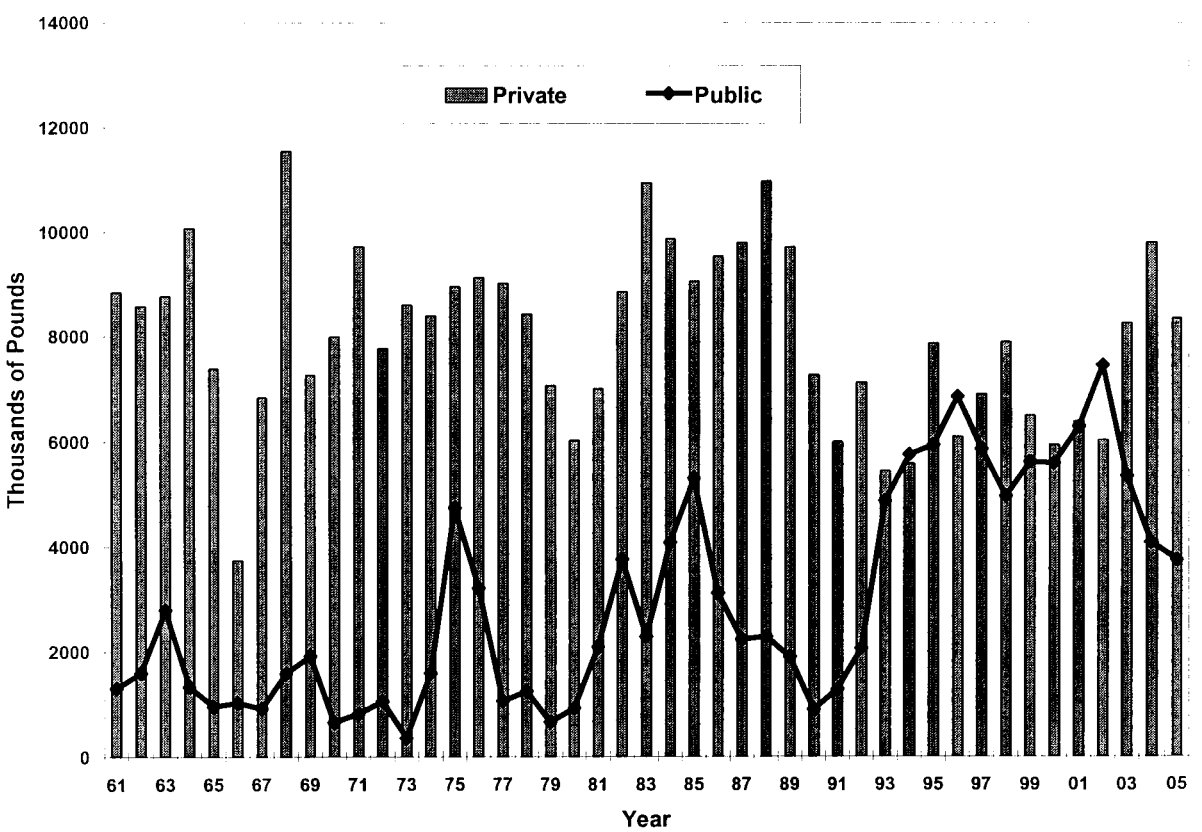
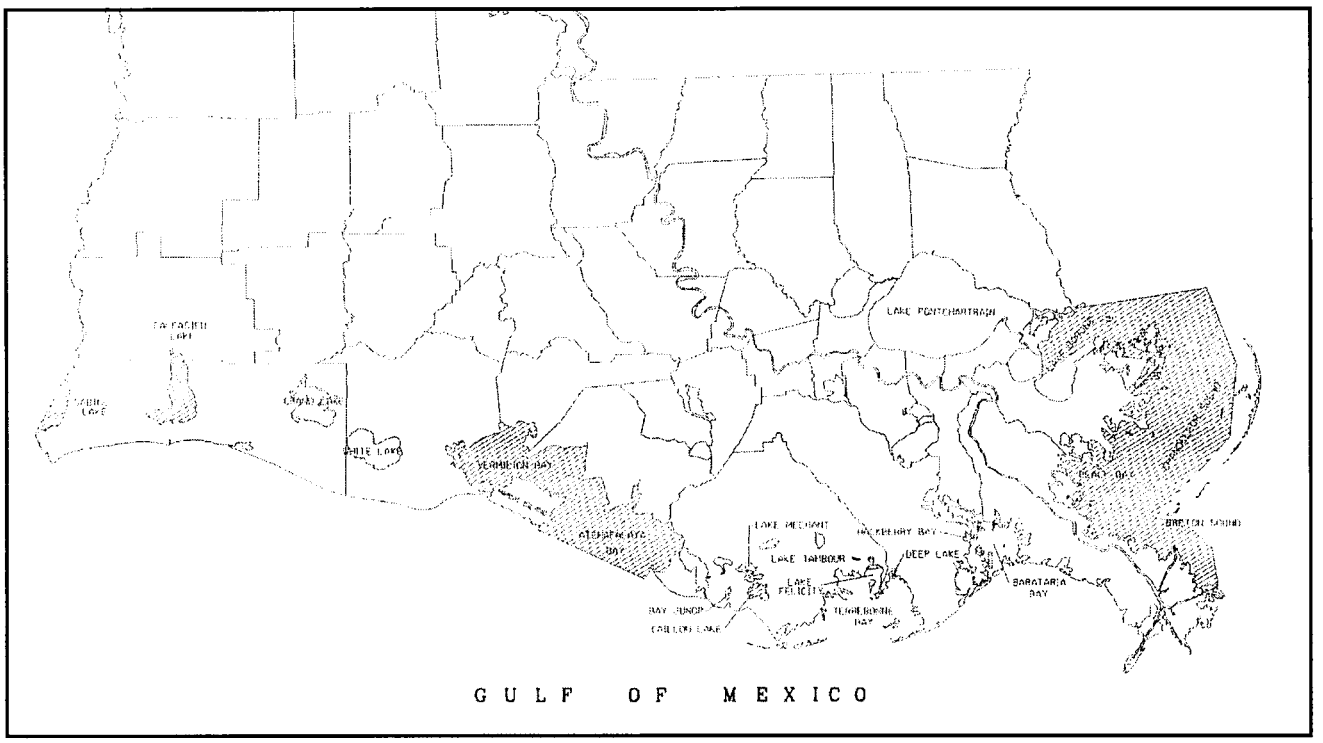


Figure 4. Annual Louisiana commercial oyster landings (NMFS and LDWF data).



Public Oyster Areas



Public Seed Grounds

Lake Borgne
Chandeleur/Breton Sound
(Primary Seed Grounds)
Barataria Bay
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

Conditional and Tonging Areas

Calcasieu Lake
Sabine Lake

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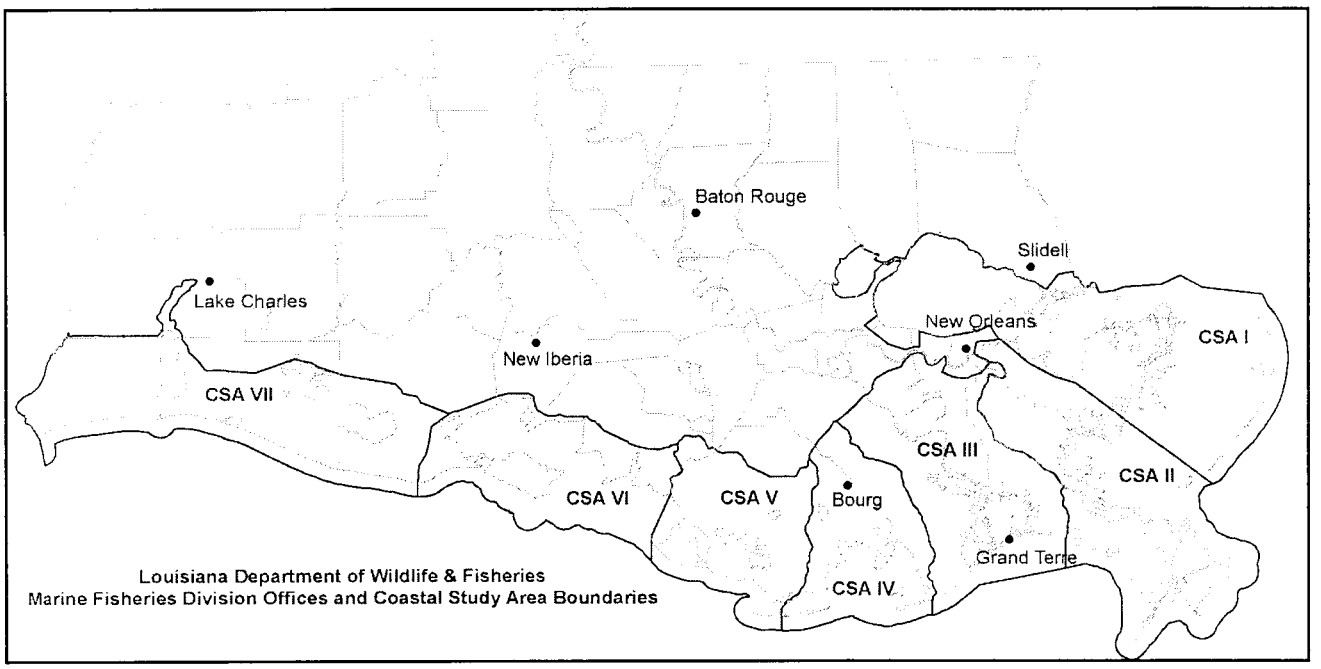
* Seed grounds are designated by the Wildlife and Fisheries Commission.

Seed reservations and tonging areas are designated by the state legislature.

LDWF Marine Fisheries Division 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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CSA I

State of Louisiana

KATHLEEN BABINEAUX BLANCO
GOVERNOR

DEPARTMENT OF WILDLIFE AND FISHERIES

DWIGHT LANDRENEAU
SECRETARY

July 17, 2006

MEMORANDUM

TO: Martin Bourgeois, Marine Fisheries Division Program Manager

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

SUBJECT: 2006 CSA1 Square Meter Samples

METHODOLOGY

Stock assessment samples were completed by Coastal Study Area 1 (CSA 1) personnel on June 22, 2006. 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 enclosed area by divers. 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 samples taken at each station (Figure 1.1). The average of the two replicates was used, in combination with reef acreage, to estimate the current oyster stock size. The Lake Borgne Public Seed Ground was not sampled due to a lack of reef acreage information.

SEED AND SACK STOCK

The current stock size is estimated at 459,625 barrels (bbls) of seed-size oysters and 66,459 bbls of sack sized oysters. These numbers differ dramatically from the 2005 estimate with a 13.6% increase in seed oysters and a 77.6% reduction in sack oysters. The current estimate falls well below the previous ten years' average (Figure 1.2). The majority of this variability can be explained by mortality events associated with Hurricane Katrina and environmental changes described in a later section.

Samples for the current estimate were not distributed evenly by station and the overall sack and seed estimates were driven by a small number of stations (Table 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.

SPAT PRODUCTION

Live spat were not present in all samples containing a suitable substrate. Overall numbers were low; however, based on previous years' data, the square meter samples may have occurred too early to capture the entire system. 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 in a given sample.

FOULING ORGANISMS

The hooked mussel, *Ischadium recurvum*, was present at three of the ten sample stations. Two 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 1.2). High densities of mussels have been noted in dredge samples at these stations and the Lake Borgne Area in previous years. However, hurricane related damages and a persistent drought have elevated salinities throughout the Study Area (Figure 1.3). These increased salinities have limited the regrowth of mussel populations likely due to an increase in mussel predators and suitable environmental conditions.

OYSTER PREDATORS

The southern oyster drill, *Stramonita haemostoma*, was present at only the Cabbage Reef station (Table 1.2). 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*), gulf toadfish (*Opsanus beta*), or stone crabs (*Mennipe adinia*) in the samples.

MORTALITY

Recent mortality estimates were variable within and among stations (Table 1.3). Spat mortalities ranged from 0 to 14.7%, seed mortalities ranged from 0 to 6.7%, and 0 to 14.7% for sack oysters. Overall mean spat mortality was 7.4%, mean seed mortality was 3.3%, and mean sack mortality was 6.7%.

TROPICAL AND CLIMATIC EVENTS

Hurricane Katrina moved through CSA1 on August 29, 2005. Post storm assessments showed acute physical damage to the reefs as well as prolonged damaging conditions due to sediment deposition and vegetative overburden. Although post-storm mortality estimates were variable among area and oyster sizes, the damage was extensive (Table 1.4). The average sack mortality for the Area (taken September 14, 2006) was 80% with seed mortality at 74% and spat mortality at 37%. In dredges conducted one week later only one station had live sack oysters remaining. Although these mortalities were extremely high, the loss was partially offset by an extremely strong reproductive event. Spat set was high after the storm, and a large majority have now progressed into the seed size category. The values contained in the current stock assessment show the "downstream" results of Hurricane Katrina.

In addition to the effects of Hurricane Katrina, the seed grounds are experiencing elevated salinities associated with a drought (Figure 1.3). The cumulative effects of this increased salinity with the physical alteration of the reefs and reduced biomass may impact the oyster population for some time.

BJL/bjl
Attachments

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

Station	Station Number	Seed Oysters per m2	Sack Oysters per m2	Number of seed oysters (bbls)	Number of sack oysters (bbls)
Grassy Island	2	1.5	0.5		
Petit Island	4	0.5	0	25,669	12,835
Half-moon Island	3	0	0		
Three-mile Bay	5	15	1	257,882	34,384
Grand Pass	6	0	0		
Turkey Bayou	11	14.0	2.5	116,465	16,879
Cabbage Reef	7	20.5	0		
2000 Shell Plant	12	151.5	3.0	59,609	2,361
Martin Island	9	0	0	0	0
Holmes Island	10	0	0		
Hospital Wall*	1				

Table 1.2. Mean density of the hooked mussel, *Ischadium recurvum*, and the southern oyster drill, *Stramonita haemostona*, at each station. Each mean represents two samples. * station temporarily suspended.

Station	Mussel Density (m^2)	*S. haemostoma* density (m^2)
Grassy Island	68.5	0
Petit Island	0	0
Half-moon Island	0	0
Three-mile Bay	0	0
Grand Pass	0	0
Turkey Bayou	0.5	0
Cabbage Reef	0	1.0
2000 Shell Plant	18.5	0
Martin Island	0	0
Holmes Island	0	0
Hospital Wall*		

Table 1.3. 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	14.7	3.5	14.3
Petit Island	N/A	0.0	N/A
Half Moon Island	N/A	N/A	N/A
Three-Mile Bay	0.0	3.2	0.0
Turkey Bayou	0.0	6.7	0.0
Cabbage Reef	2.6	0.0	N/A
Grand Pass	N/A	N/A	N/A
Martin Island	N/A	N/A	N/A
Holmes Island	N/A	N/A	N/A

Table 1.4. 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

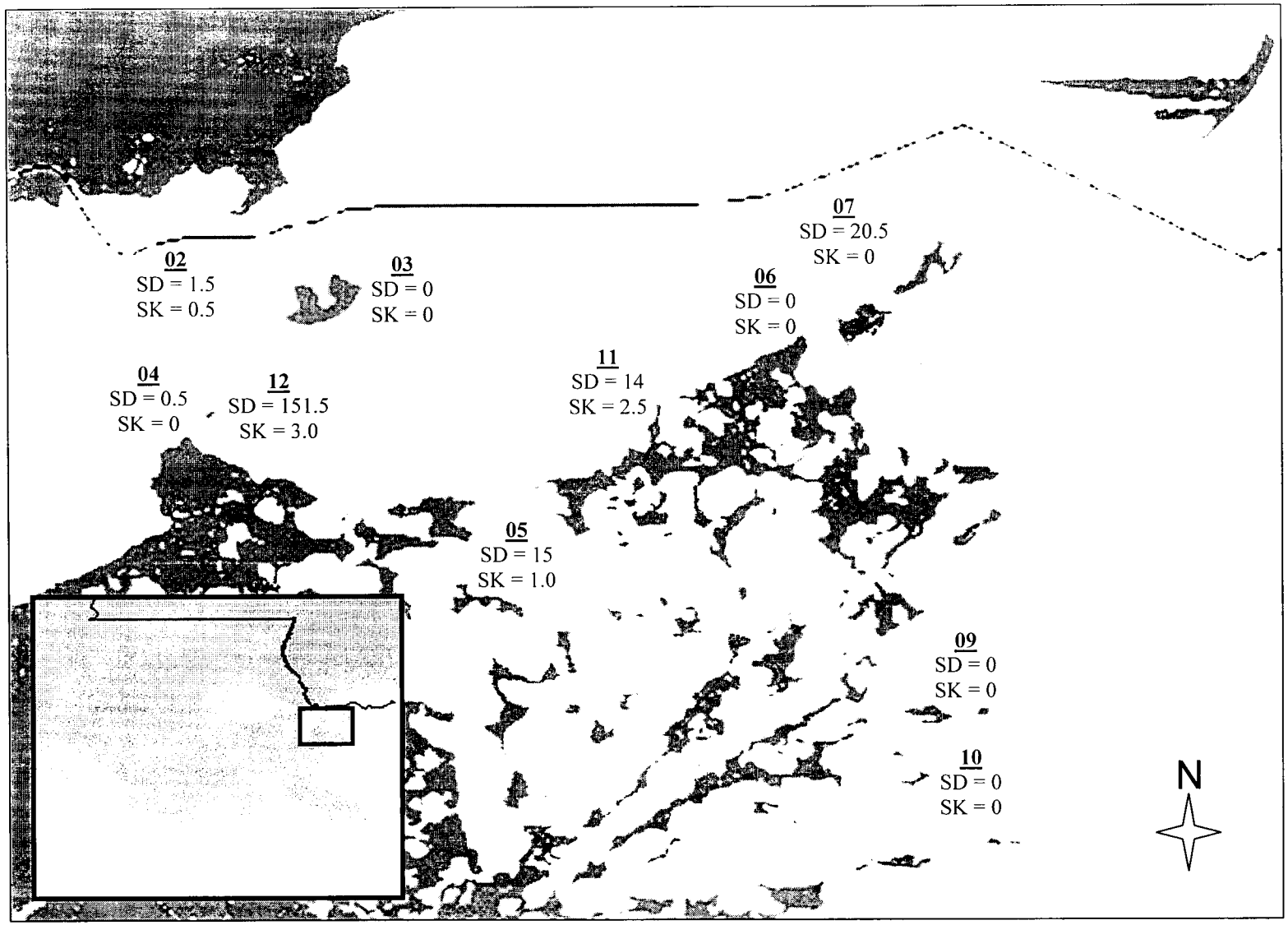


Figure 1.1. Map showing Coastal Study Area 1 oyster stock assessment stations within the Mississippi and Chandeleur Sounds. Numbers below stations are average numbers of seed (SD) and sack (SK) oysters per m^2.

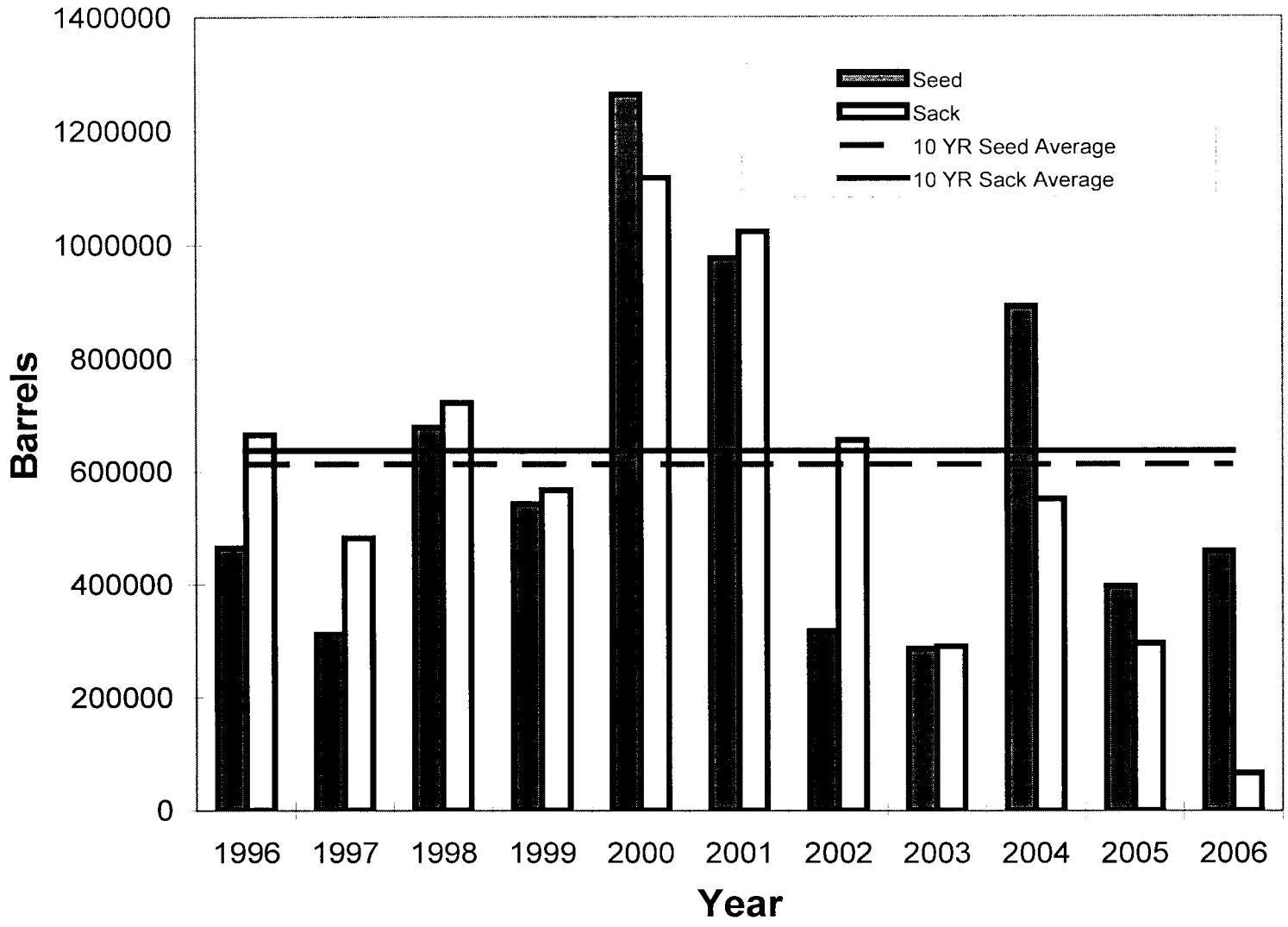


Figure 1.2. Stock Assessment (seed and sack oysters) values for the present year and the 10 previous years. Horizontal lines represent the ten-year seed and sack average.

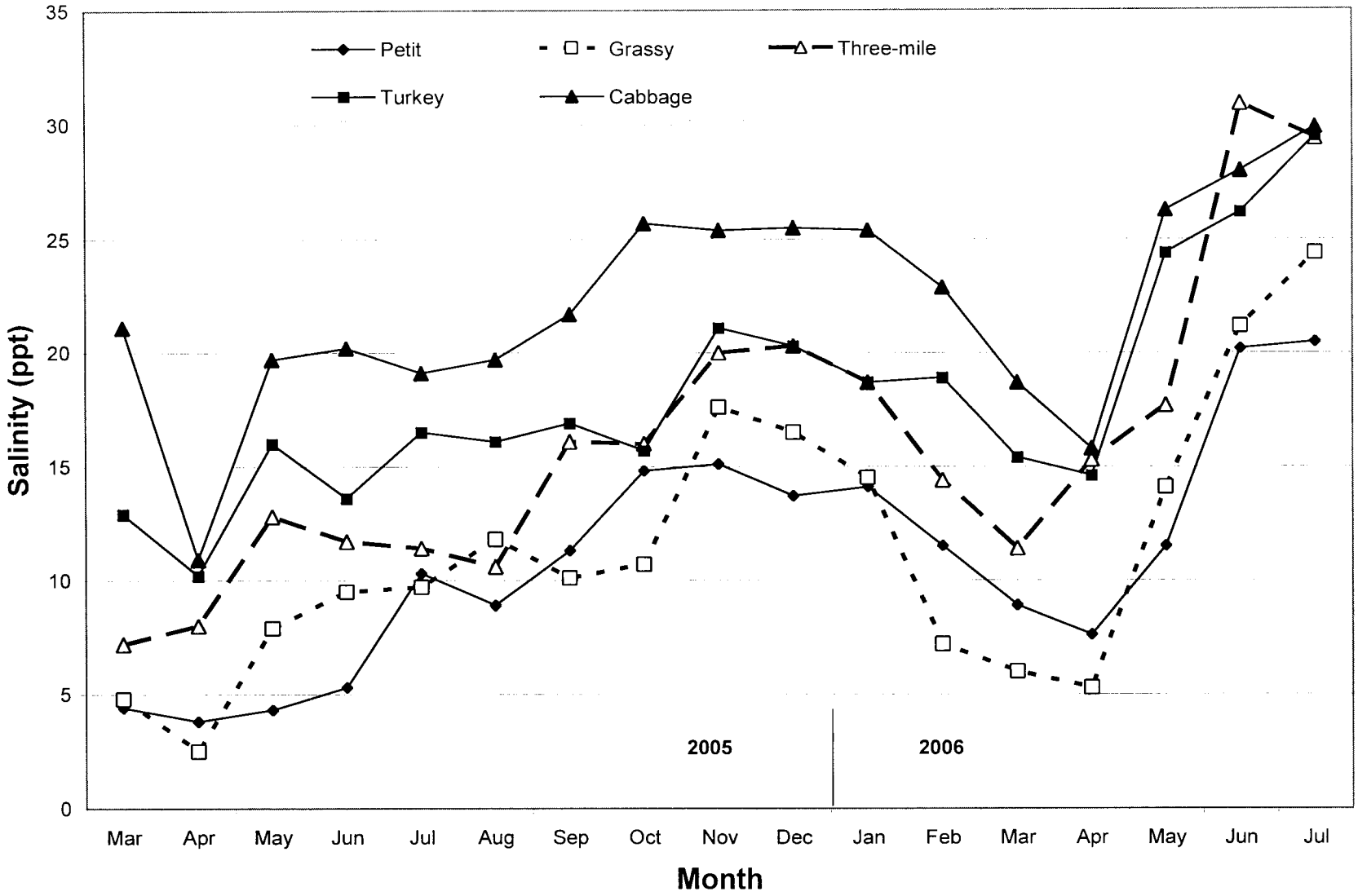


Figure 1.3. Mean monthly salinities for the northern Mississippi Sound public seed grounds.

CSA II

State of Louisiana

Dwight Landreneau
Secretary

Department of Wildlife & Fisheries
Post Office Box 98000
Baton Rouge, LA 70898-9000
(225) 765-2800

Kathleen Babineaux Blanco
Governor

July 14, 2006

MEMORANDUM

TO: Martin Bourgeois, Marine Fisheries Division

FROM: Keith Ibos, Biologist Manager, and Clarence Luquet, Biologist Supervisor, Coastal Study Area II

SUBJECT: 2006 CSA2 Meter Square Samples

Personnel from Coastal Study Area II completed the 2005 meter square sampling project on June 27, 2006. A total of 27 stations were sampled from Bay Gardene and Northern Black Bay to Breton Sound. Based on data collected, stock for the area is estimated at 1,107,647 barrels of seed oysters and 154,493 barrels of sack oysters for a total of 1,262,140 barrels of overall stock.

Overall availability is up 83% from last year, and down 53% from the 10 year average of years 1996 thru 2005. Seed oyster stock is up by 718,574 barrels (184 % increase) compared to last year. However, seed stock is 30% below the past 10 year average. Sack oyster stock is down 149,216 barrels (48%) from 2005, and 86% below the average for the past ten years.

Twenty percent of the total seed oyster stock is located in the Battledore reef area. Seed oysters are also available in Bay Crabe and California Bay reefs. Twelve percent of seed oysters (not available for bedding) are located in the sacking only area.

Sack oyster numbers are down throughout the area again but are available in Bay Crabe and California Bay reefs.

Hooked mussel (*Ischadium recurvum*) densities were low on most reefs and should not be a problem to harvesters except at isolated locations.

Recent seed oyster mortalities at each station ranged from 0 to 33% with an average mortality of 3% across the area. No recent sack mortalities were observed.

Drills (*Stramonita haemostoma*) were found on 5 CSA2 stations this year. Spat were present at all but one station with highest occurrences in Bay Gardene. Average numbers of spat and mussels are reported on table 2.1

The results of this year's Dermo (*Perkinsus marinus*) sampling are not yet available.

KBI/kbi
Attachments

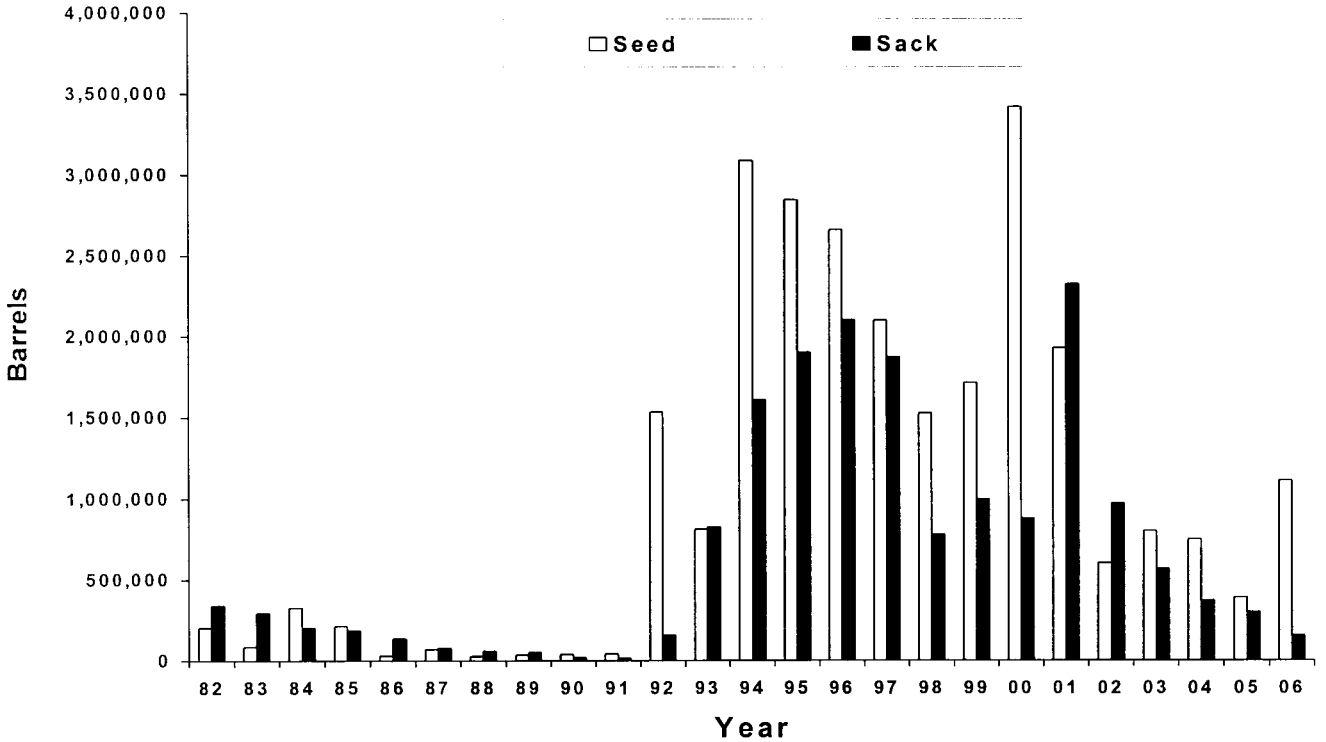


Figure 2.1. Coastal Study Area (CSA) II annual oyster stock availability.

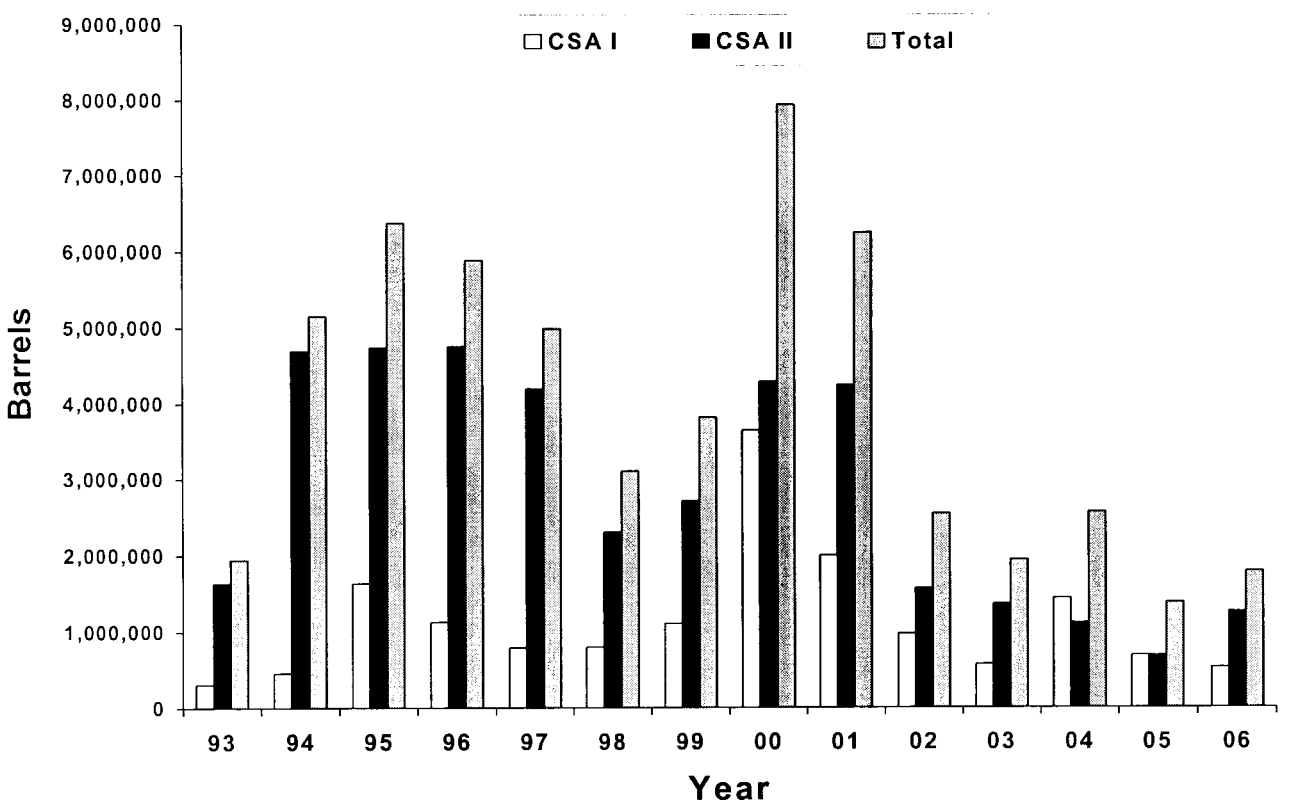


Figure 2.2. Annual oyster availability on the Primary Public Seed Grounds east of the Mississippi River (seed and sack oysters combined).

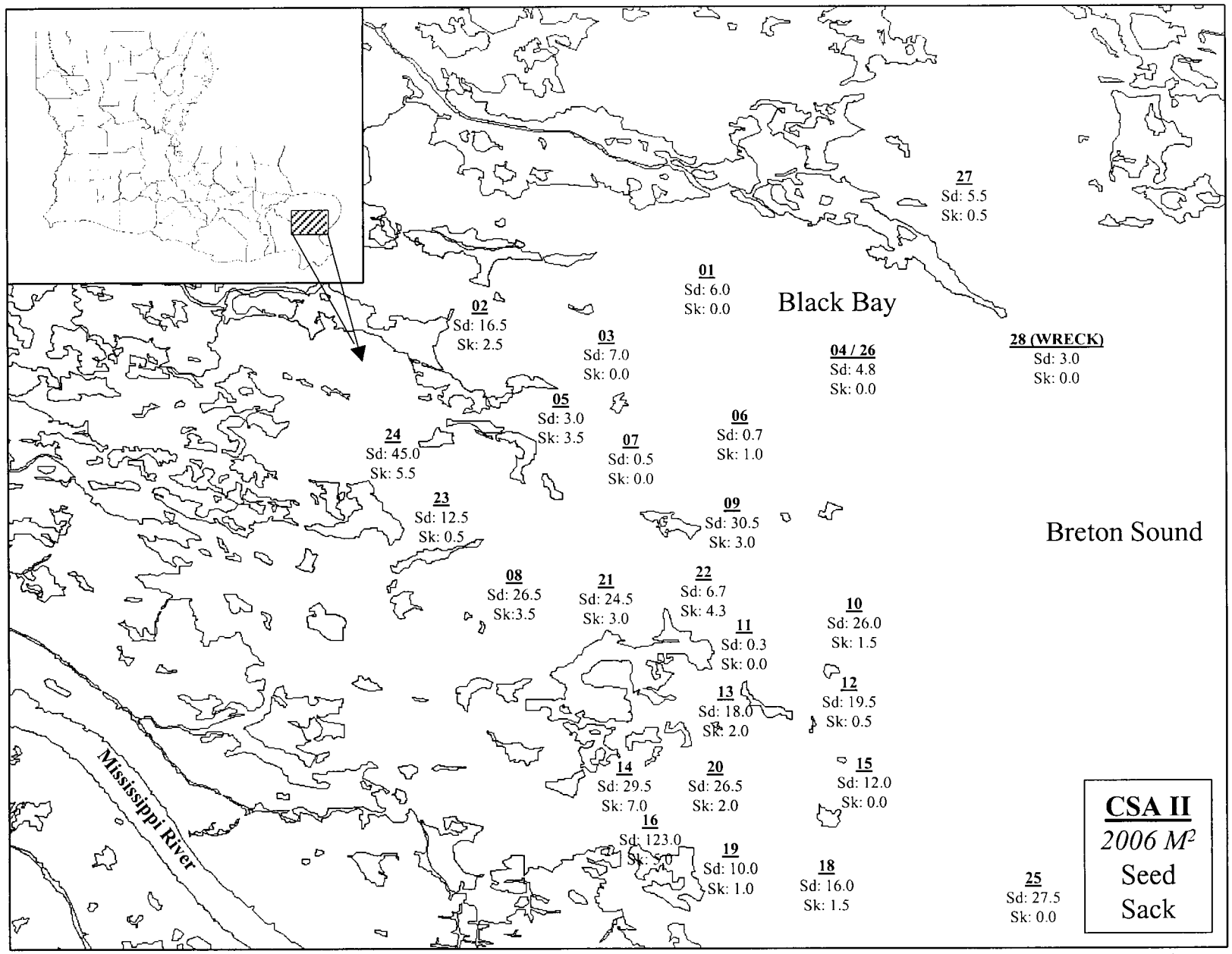


Figure 2.3. CSA II square meter stations and sample results. Numbers below stations are average numbers of seed (Sd) and sack (Sk) oysters per square meter.

Table 2.1 Coastal Study Area II 2006 square meter sample results.

Stations	Grids	Approx. Reef Acres	Square Meters	Average # of Seed Oysters/m^2	Average # of Sack Oysters/m^2	Barrels of Seed Oysters Available	Barrels of Sack Oysters Available	Hooked Mussels	Oyster Spat/m^2	Oyster Drill Presence	Spat Percent Mortality	Seed Percent Mortality	Sack Percent Mortality	Seed & Sack Percent Mortality	All Size Percent Mortality
1	Snake	506	2,047,782	6.0	0.0	17,065	0	30.0	0.5		0	14.3	na	na	13.3
2	Jessie	59	283,773	16.5	2.5	6,503	1,971	57.5	10.5		0	0	0	0	0
3	N. Lonesome	896	3,626,112	7.0	0.0	35,254	0	25.0	3.0		45.5	12.5	na	na	25.9
5	Bayou Lost	118	477,546	3.0	3.5	1,990	4,643	66.5	34.5		14.8	0	0	0	12.8
6	Lonesome	716	2,897,652	0.7	1.0	2,696	8,049	16.7	0.7		0	0	0	0	0
7	Black Bay	301	1,218,147	0.5	0.0	846	0	14.5	0.5		0	0	na	na	0
8	W. Bay Crabe	501	2,027,547	26.5	3.5	74,625	19,712	37.5	33.0		1.5	0	0	0	0.7
9	Stone	461	1,865,667	30.5	3.0	79,032	15,547	105.0	4.5	1	10	3.2	0	2.9	3.8
10	S. Black Bay	145	586,815	26.0	1.5	21,191	2,445	36.0	6.0		0	1.9	0	1.8	1.5
11	Elephant	339	1,371,933	0.3	0.0	629	0	42.7	1.0	1 + egg cases	0	0	na	na	0
12	Curfew	425	1,719,975	19.5	0.5	46,583	2,389	16.0	4.0		20	2.5	0	2.4	5.9
13	N. California	109	441,123	18.0	2.0	11,028	2,451	38.0	4.0	1	11	5.3	0	4.8	5.9
14	California	7	28,329	29.5	7.0	1,161	551	31.0	1.0		33	0	0	0	1.3
16	Sunrise	174	704,178	123.0	5.0	120,297	9,780	46.0	2.0		20	1.2	0	1.2	1.5
17 SKIP		659	2,666,973			private leases discontinued									
19	Mangrove	937	3,792,039	10.0	1.0	52,667	10,533	203.5	1.0		0	9.1	0	8.3	7.7
20	W. Pelican	293	1,185,771	26.5	2.0	43,643	6,588	156.0	0.0		na	3.6	0	na	3.4
21	Bay Crabe	659	2,666,973	24.5	3.0	90,751	22,225	0.0	3.0		0	0	0	0	0
22	E. Bay Crabe	122	493,734	6.7	4.3	4,594	5,897	10.0	1.0		25	4.8	0	2.9	5.3
23	E. Gardene	28	113,316	12.5	0.5	1,967	157	50.0	16.5		2.9	0	0	0	1.7
24	Bay Gardene	69	279,243	45.0	5.5	17,453	4,266	262.5	165.0		2.9	2.2	0	1.9	2.7
4,26	N. Black Bay	315	1,274,805	4.8	0.0	8,499	0	3.2	3.8		0	0	na	na	0
15	Telegraph	127	513,969	12.0	0.0	8,566	0	2.0	1.5	1+ egg cases	0	4.2	na	na	3.6
18	E. Pelican	1,528	3,164,754	16.0	1.5	70,328	13,186	30.5	1.5		25	8.6	0	7.9	9.5
26 SKIP	see 4,26					combined data	29 not used								
25	Battledore	1419	5,742,693	27.5	0.0	219,339	0	0.0	32.5	2	9.7	6.8	na	na	8.4
27	L Fortuna	4288	17,353,536	5.5	0.5	132,562	24,102	0.0	13.0		18.8	15.4	0	14.3	17.4
28	Wreck	2276	9,210,972	3.0	0.0	38,379	0	0.0	5.5		26.7	33.3	na	na	29.2
Sub Total						**1,107,647**	**154,493**								
ALL TOTAL						***1,262,140***									

CSA III

State of Louisiana

KATHLEEN BABINEAUX BLANCO
GOVERNOR

DEPARTMENT OF WILDLIFE AND FISHERIES

DWIGHT LANDRENEAU
SECRETARY

July 12, 2006

MEMORANDUM

To: Martin Bourgeois

From: Jason Adriance

Subject: 2006 CSA 3 Meter Square Samples

Meter square oyster samples were on collected July 5th and July 12th, 2005. The samples on July 5th were taken from the 2004 Barataria Bay Cultch Site (BBCS). The samples taken on July 12th were collected from the Hackberry Bay Seed Reservation (HBSR), the 2004 Hackberry Bay North (HBN) and 2004 Hackberry Bay South (HBS) cultch sites. The BBCS, HBN, and HBS samples consisted of five random ¼ meter square samples at each site. The HBSR was sampled at three historical stations (upper, middle, and lower) with three replicate meter square samples collected at each station.

Oysters collected in each sample were measured in 5 – mm work groups, averaged for each group, and divided into types by spat, seed, and sack oysters (Figures 3.1, 3.2, and 3.3). Spat oysters, which measured less than 25mm, averaged 0.6 per m^2 on the HBSR, 0.0 per 1/4 m^2 on the BBCS, 61.4 per 1/4 m^2 on the HBN, and 19.0 per 1/4 m^2 on the HBS (Figure 3.1). This number was lower than the previous five years for the HBSR (Figure 3.2). Seed oysters, which measured 25 mm to less than 75 mm, averaged 0.9 per m^2 on the HBSR, 0.0 per 1/4 m^2 on the BBCS, 15.2 per 1/4 m^2 on the HBN, and 14.6 per 1/4 m^2 on the HBS. The number of seed oysters on the HBSR is lower than the past five years (Figure 3.2). Sack oysters, which measured 75 mm or greater, averaged 0.0 per m^2 on the HBSR, 0.0 per 1/4 m^2 on the BBCS, 0.2 per 1/4 m^2 on the HBN, and 0.0 per 1/4 m^2 on the HBS. This number of sack oysters on the HBSR is below the average for the past five years (Figure 3.2). Oysters per m^2 were extrapolated for 5.938 hectares (14.7 acres) of reef for the HBSR and oysters per 1/4 m^2 were extrapolated out for 40.0 acres on the BBCS, 10.0 acres on the HBN, and 25.0 acres on the HBS sites. The results were 73.3 barrels of seed oysters and 0.0 barrels of marketable oysters for the HBSR. The BBCS contains 0.0 barrels of seed oysters and 0.0 barrels of marketable oysters. The HBN cultch site contains an estimated 854.3 barrels of seed oysters and 22.5 barrels of marketable oysters. The HBS contains an estimated 2,051.5 barrels of seed oysters and 0.0 barrels of marketable oysters (Table 3.1). 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 reservation were silted over. Without being able to quantify the amount of cultch or reef that is silted over the above estimates may be high. Hooked

mussels per square meter averaged 2.1 for the HBSR, 0.0 per quarter meter for the BBCS, 5.2 per quarter meter for the HBN, and 4.6 per quarter meter on the HBS.

During September 2005 to April 2006 the Hackberry Bay Seed Reservation was only open for 12 days from December 12th to December 23rd and the 2004 cultch plants were open for three days from December 12th through December 14th. During this time no boats were observed harvesting oysters on either the Hackberry Bay Seed Reservation or the 2004 cultch sites, therefore there are no oyster production estimates for the reservation or the cultch sites during the 2005 – 2006 season.

On July 10, 2006, oysters were collected for Dr. John Supan (L.S.U. Cooperative Extension Service) from the middle Hackberry station with a dredge. Sack and seed oysters were divided, and an analysis for *Perkinsus marinus* (Dermo) was preformed. Results of the analysis are pending.

Salinities in Hackberry Bay averaged 18.9 ppt for the month of June in 2006 which is above the 2001 to 2005 average of 10.7 ppt. June temperatures averaged 30.2 degrees C in 2005 which is above the 2001 to 2005 average of 29.1 degrees C. June averages of constant recorder data is presented in Figure 4.

JWA/jwa

Attachments

Figure 1.1. 2006 Oyster Size Distribution in Samples Collected from the 2004 Cultch Plants in CSA III.

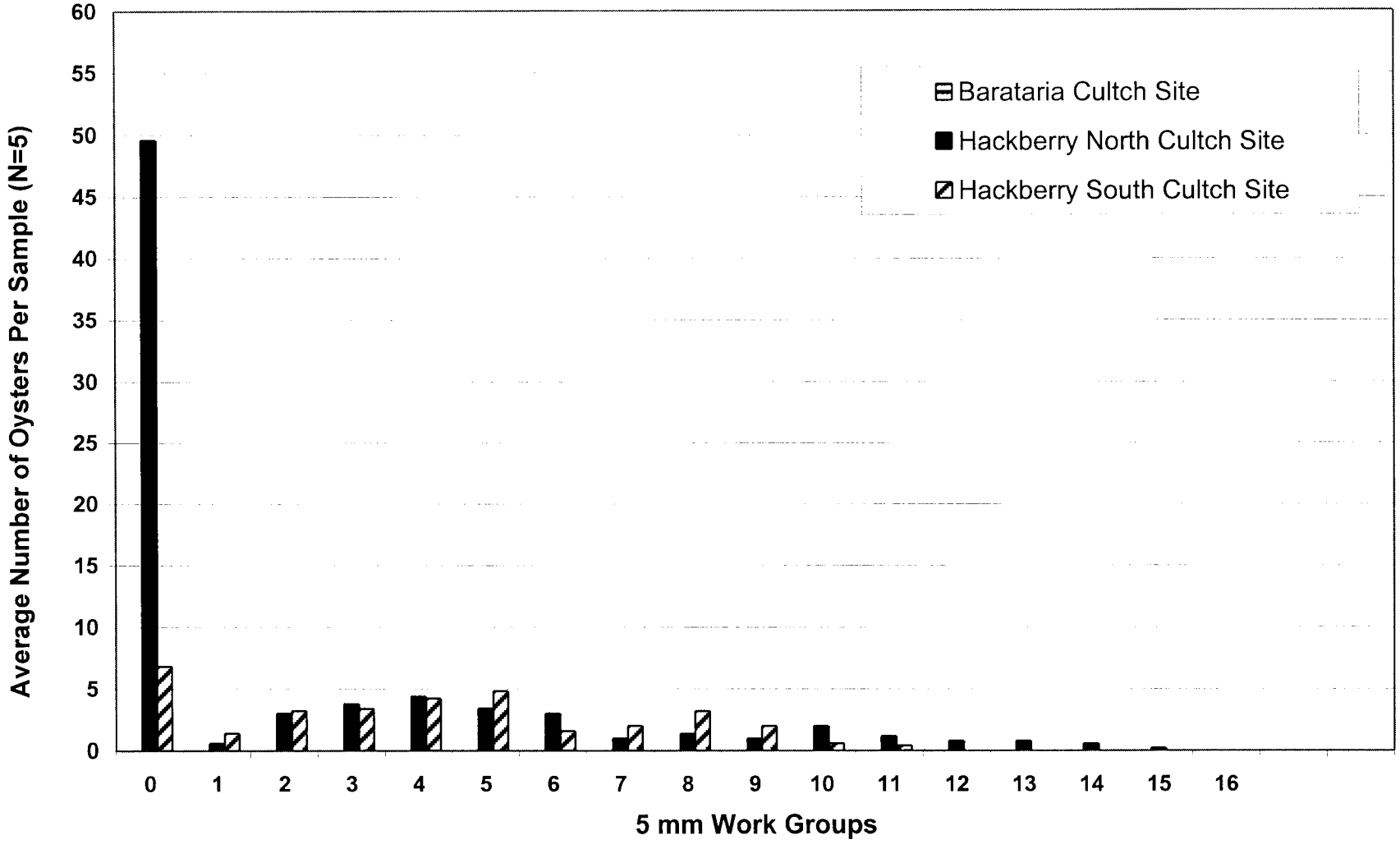


Figure 1.2 Historical Average Number of Oysters in the Hackberry Bay Public Oyster Seed Reservation (excluding 2004 cultch plants).

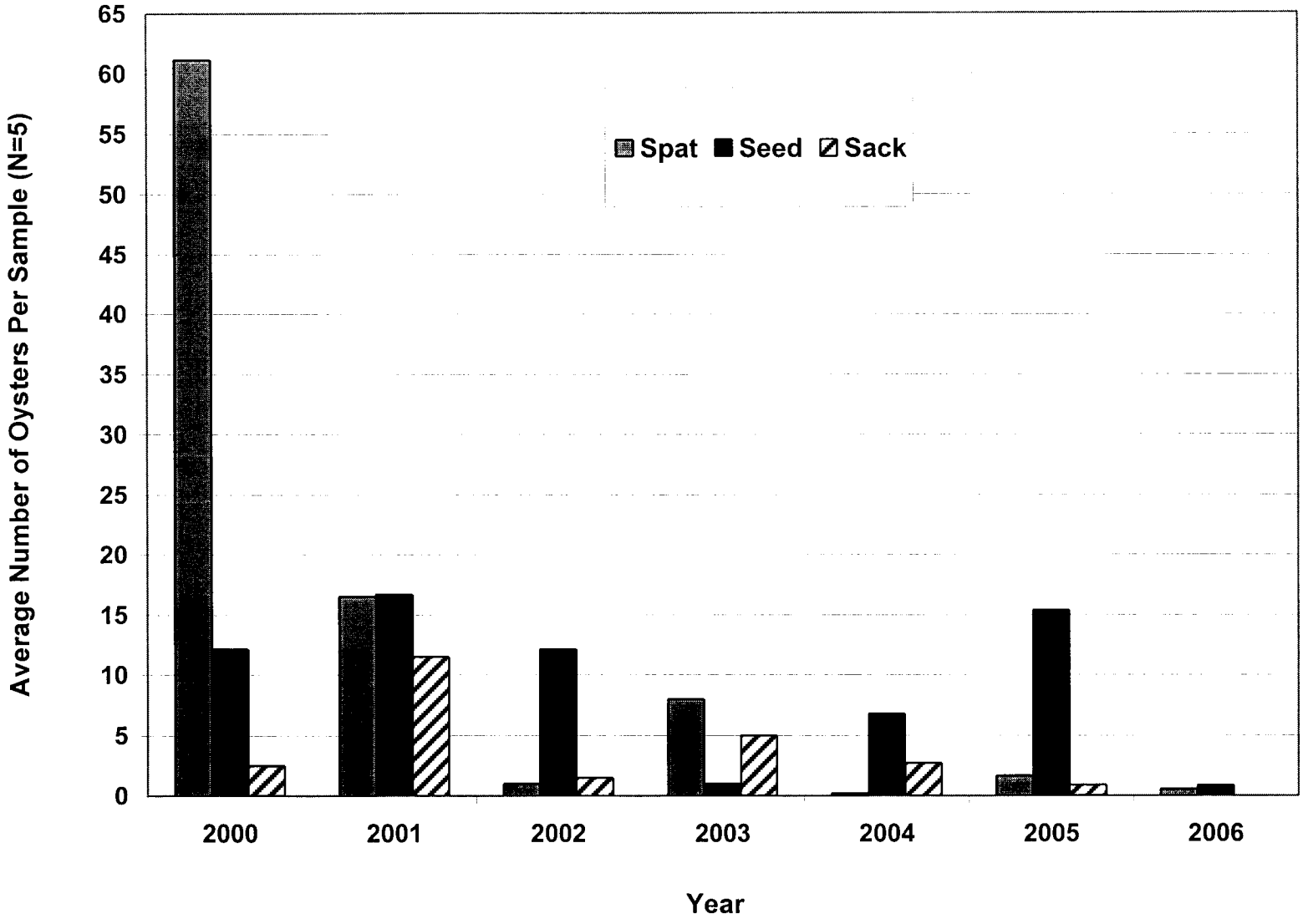


Figure 1.3. 2006 CSA III Cultch Site Quarter Meter Square Samples by Oyster Type

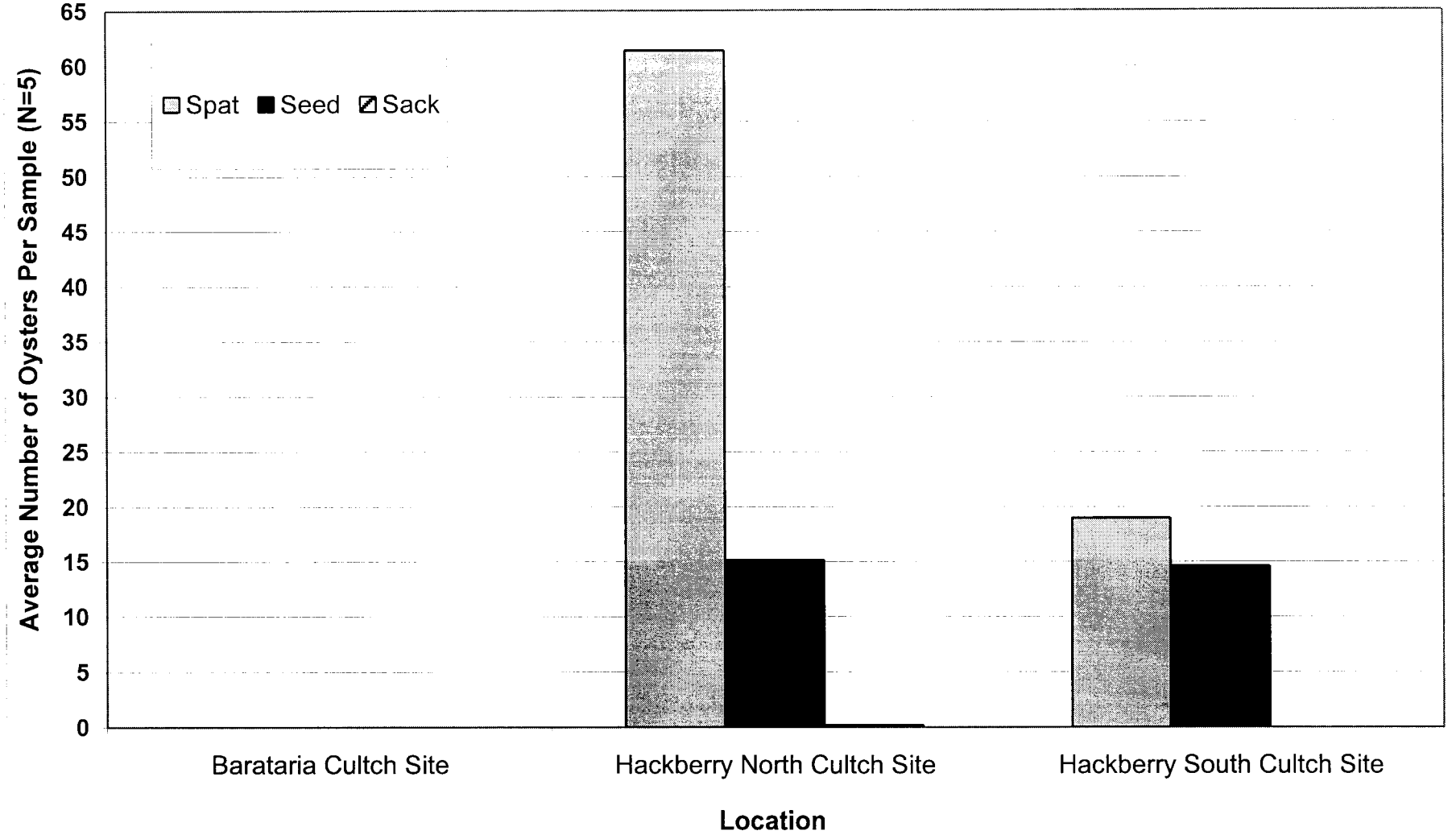


Figure 1.4. Hackberry Bay Average June Salinity and Water Temperature.

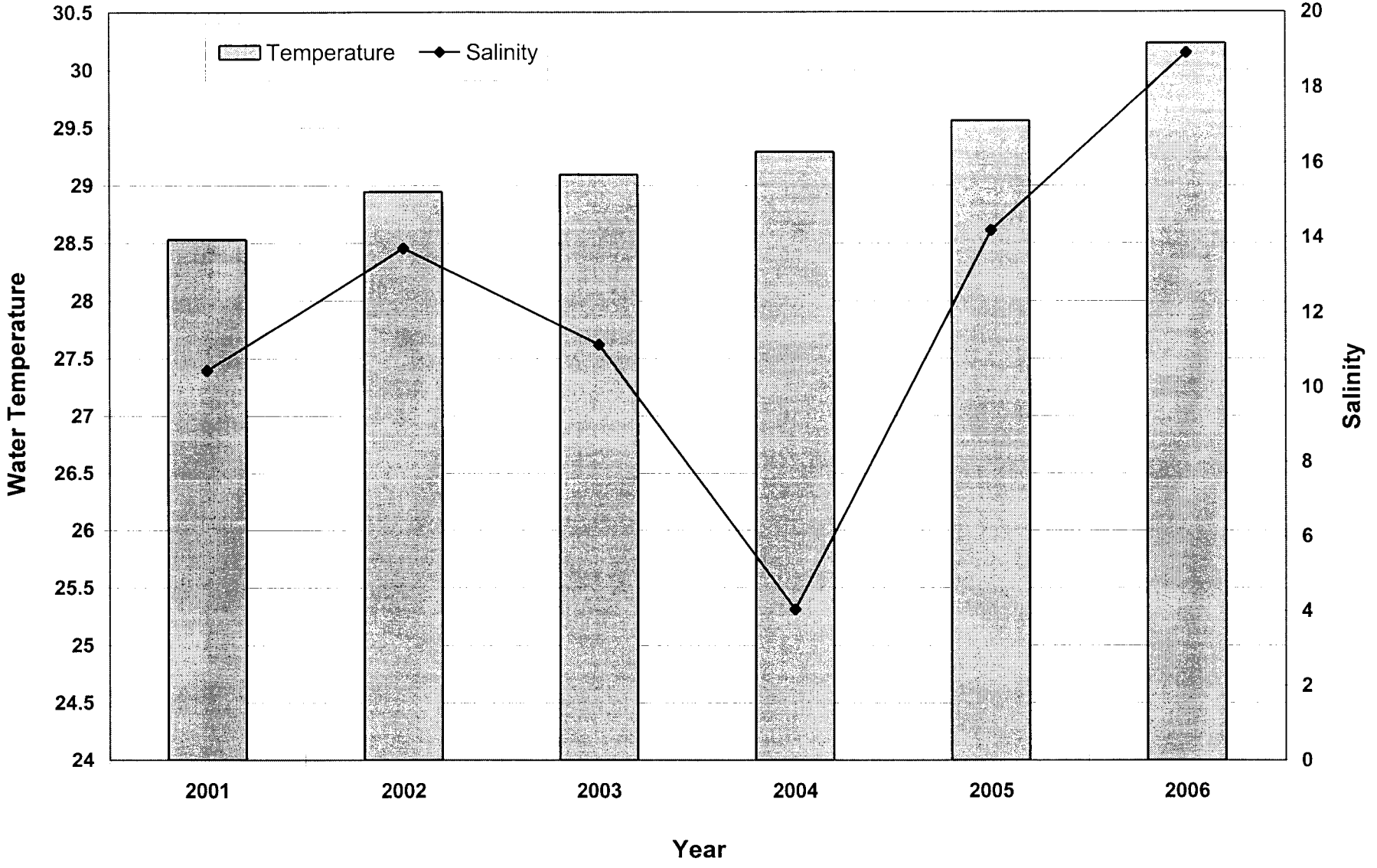


Table 1.1. 2006 oyster availability on the public oyster areas in Coastal Study Area (CSA) III.

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	15.2	0.2	854.3	22.5
Hackberry Bay (2004 South Cultch Plant)	25.0	101,172	14.6	0.0	2,051.5	0.0
Hackberry Bay (Existing Reefs)	14.7	59,380.0	0.9	0.0	73.3	0.0
CSA 3 Totals	***89.7***	***362,896***			***2,979.1***	***22.5***

CSA IV

State of Louisiana

KATHLEEN BABINEAUX BLANCO
GOVERNOR

DEPARTMENT OF WILDLIFE AND FISHERIES

DWIGHT LANDRENEAU
SECRETARY

July 17, 2006

MEMORANDUM

To: Martin Bourgeois

From: Vince Guillory, Biologist Manager

Subject: 2006 CSA IV Oyster Stock Assessment Report

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 plants using size number 57 limestone rock were made in the Lake Felicity (Figure 1) and Lake Chien (Figure 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.

2005 Oyster Harvest Season

The oyster season was initially set for October 17-19, 2005, but a 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.

The only vessels observed on the four public seed grounds were on the Lake Felicity and Lake Chien cultch plants. The overall fishing effort of 10 boat days was low, with only one boat at the Lake Felicity cultch plant (see table below). The resultant harvest was only 367.5 barrels, all of which were seed oysters.

	Lake Felicity Cultch Plant	Lake Chien Cultch Plant	Overall
Vessels-days	1	9	10
Harvest (barrels)	15	352.5	367.5

Hydrological Data

Salinity was recorded at two stations on each seed ground monthly in 2000 and 2001 twice a month from 2002 through 2005. Average salinities in ppt by year on the Lake Felicity and Lake Chien seed grounds were:

Year	Lake Chien	Lake Felicity
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

Temperature and salinity data taken in association with annual July 1.0 and 0.25 square meter samples are provided below:

Reef	Parameter	Year		
		2004	2005	2006
Felicity	Salinity (ppt)	16.5	17.0	26.6
	Temperature (°C)	30.3	29.8	30.7
Chien	Salinity (ppt)	16.0	15.8	26.0
	Temperature (°C)	30.4	30.0	30.8

Salinities on the seed grounds were much higher in 2006 than in 2005 or 2004.

Biological Data

Five 0.25 m^2 samples were taken from random locations on each cultch plant on July 6, 2004. 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). Sample results and expanded estimates of production are provided in the following table.

Reef	Sample	Number/Sample			Percent Mortality			Barrels Available	
		Spat	Seed	Sack	Spat	Seed	Sack	Seed	Sack
Felicity	1	0	0	0	--	--	--	--	--
	2	0	0	0	--	--	--	--	--
	3	12	17	0	--	--	--	--	--
	4	0	0	0	--	--	--	--	--
	5	0	0	0	--	--	--	--	--
	Mean	2.4	3.4	0	4.0	0	--	3,058	0
Chien	1	0	9	9	--	--	--	--	--

	2	0	0	0	--	--	--	--	--
	3	2	12	4	--	--	--	--	--
	4	0	12	6	--	--	--	--	--
	5	0	6	3	--	--	--	--	--
	Mean	0.4	7.8	4.4	42.8	3.7	0	1,673	3,069

Averages of 2.4 spat and 3.4 seed oysters per sample were collected in Lake Felicity and 0.4 spat, 7.8 seed oysters, and 4.4 sack oysters in Lake Chien. Estimates of 2006 resource availability on the cultch plants included 3,058 barrels of seed for Lake Felicity and 1,673 barrels of seed oysters and 3,069 barrels of sack oysters for Lake Chien, for a combined total of 7,800 barrels.

As documented below, overall 2006 resource availability declined significantly from 41,296 barrels in 2005 to 7,800 barrels in 2006, a decline of 81.1%.

		Number/Sample			Barrels Available	
Reef	Year	Spat	Seed	Sack	Seed	Sack
Felicity	2004	753.7	7.7	0	1,731	0
	2005	0	0	0	0	0
	2006	2.4	3.4	0	3,058	0
Chien	2004	634.2	5.0	0	436	0
	2005	67.5	118.5	0	41,296	0
	2006	0.4	7.8	4.4	1,673	3,069

The decreased abundance of oysters in 2006 was at least partially due to mortalities associated with Hurricanes Cindy (early Jul), Katrina (late Aug), and Rita (mid-Sept). Overall oyster mortalities for different time periods with reference to the hurricanes are summarized in the table below. High mortalities were observed on the Felicity site after Hurricane Cindy and on both sites after Hurricane Katrina. Mortalities again increased again after passage of Hurricane Rita and then declined by spring and summer of 2006.

			Range in Percent Mortality	
Date(s)	Event	Gear	Lake Chien	Lake Felicity
Apr, Jun 2005	Pre-Cindy	Dredge	0-2.4	2.4-3.6
Jul 2005	Post-Cindy	0.25^2	6.9-71	88.4-100
Sep 7, 2005	Post-Katrina	Dredge	34.9	57.9
Sep, Oct 2005	Post-Katrina/ Rita	Dredge	16.1-54.8	36.2-94.9
Mar-Jun 2006	NA	Dredge	0.9-3.2	1.5-17.4
Jul 2006	NA	0.25^2	7.3	1.7

VG/vg

cc: Jim Hanifen

CSA V

State of Louisiana

Dwight Landreneau
Secretary

Department of Wildlife & Fisheries
Post Office Box 189
Bourg, LA 70343
(985) 594-4139

Kathleen Babineaux Blanco
Governor

July 14, 2006

MEMORANDUM

To: Martin Bourgeois

From: Stephen Hein

Subject: 2006-2007 CSA-V Meter Square Samples

With assistance from Marine Fisheries Division staff, meter square (m^2) field sampling by Coastal Study Area V personnel was completed on June 28, 2006. A total of 26 m^2 samples were collected at 13 locations in Sister Lake (Caillou Lake) and Bay Junop (Figures 1 and 2). An additional ten ¼ m^2 samples were taken from randomly selected grids on the Lake Mechant and Sister Lake cultch plants (Figures 1 and 3). Four dredge samples were collected from Sister Lake and Bay Junop for "Dermo" analysis.

SISTER LAKE

Sister Lake Oyster Seed Reservation remained closed for the 2004-2005 season but was opened to harvest during the 2005-2006 season. Fishing effort during that split season was estimated at 2,102 boat days resulting in an estimated harvest of 3,900 barrels (BBLS) seed and 122,815 sacks of market oysters for a total production of 65,308 BBLS (Table 15).

Overall, total BBLS available for the 2006-2007 assessment has decreased 64% from last year (Table 5). Oysters available in Sister Lake total 89,655 BBLS of seed and 36,193 BBLS of sack oysters, using an adjusted lake acreage of 1,567 acres (Table 1; Figure 4). These totals rank 16th and 19th, respectively, since 1980 (Table 3). Seed oyster availability decreased 54% from last year's assessment while sack oyster availability declined by 76% from last year's assessment (Table 3). The ratio of seed to sack oyster availability has increased from 1.3-1.0 in 2005 to 2.5-1.0 in 2006 (Table 5). While seed has decreased at seven of nine stations, sack oysters have decreased at all nine stations since last year's assessment. Overall mortality averaged 4.3% which indicates no significant mortality present in current m^2 samples. Spat sets were slightly above average in Sister Lake with 24 spat per station. The majority of estimated

seed and sack oysters available are located south of the traditional November Department of Health and Hospitals (DHH) reclassification line.

A 67-acre cultch plant was established on the Sister Lake Seed Reservation in May 2004. The plant was open to harvest for three days in January 2006 when 475 BBLS of oysters were removed. The 2005 assessment of the 67-acre plant contained 271,149 m^2 with an estimated 50,464 BBLS of seed and no sack oysters available. The 2006 assessment indicates 17,173 BBLS of seed and 10,846 BBLS of sack oyster availability. This represents a 67% (44% overall) decrease in seed availability. This is the first time seed and sack oyster availability from the cultch plant are included in Sister Lake seed/sack availability totals. The totals from this site make up 19% of seed and 30% of sack availability in Sister Lake (Table 1). Without including the Sister Lake cultch plant into data rankings, the lake would drop to 20th for seed and 23rd for sack, respectively. Removing cultch plant data would better reflect the heavy losses incurred by storms and harvest operations of the 2005-2006 season.

A Sidescan Sonar Survey (SSS) was conducted May 2005 by the Louisiana State University (LSU) Coastal Fisheries Institute (CFI) for the Louisiana Department of Wildlife and Fisheries (LDWF) and is the best estimated acreage information available. According to the survey there are 2,279 acres of reef.

Historic estimates of seed/sack oyster populations were based on earlier poling surveys of 1,500 acres in Sister Lake, or a difference of 779 acres. While ground-truthing by LSU was not completed on this estimated acreage (totals could be higher or lower) it is believed to be more representative of actual reef acreage than historic estimates. This increase in acreage and oysters (Table 1) can be attributed to an increase in lake area due to erosion, creation of new reef, additional cultch plants and utilization of a more accurate tool (SSS) in acreage assessment.

With the additional acres calculated into this year's assessment, resultant numbers represent a 46% increase in availability for Sister Lake. Seed oysters would then increase to 130,448 BBLS and sack oysters increase to 52,661 BBLS. Overall availability increases to 183,109 BBLS (Table 1).

BAY JUNOP

Bay Junop Oyster Seed Reservation was last opened to seed and sack harvest for a ten day period, from October 1 through October 10, 2004. This marked the third consecutive year in which the season was opened with season lengths numbering 24, 12 and 10 days for 2002, 2003 and 2004, respectively. The Bay remained closed during the 2005-2006 season.

The 2006-2007 Bay Junop stock assessment indicates 1,869 BBLS of seed oysters and 1,656 BBLS of sack oysters available for harvest, ranking them 26th and 25th, respectively, since 1980 (Tables 2 and 4; Figure 5). This represents an 80% decrease in seed availability from the 2005 assessment. The 2005 sack availability assessment decreased 55% from the previous year and the current assessment is 51% below that level. Seed to sack ratio has decreased from last year's assessment of 2.8-1.0 to 1.1-1.0 (Table 6). Bay Junop had an overall mortality average

of 5.1% indicating no significant oyster mortality. Spat sets were below average at 20 spat per station.

WATER TEMPERATURE AND SALINITY

Water temperatures in Sister Lake and Bay Junop were above the long term average (LTA) for May and June with the greatest deviance being 1.5 degrees Centigrade (°C). Salinities in Sister Lake were above the LTA [14.6 parts per thousand (ppt)] for May (16.9 ppt) and LTA (10.3 ppt) for June (18.5 ppt). Salinities in Bay Junop were above the LTA (18.8 ppt) for May (21.3 ppt) and the LTA (14.4 ppt) for June (15.4 ppt) (Tables 9 and 10). Water temperatures and salinities, taken in conjunction with square meter samples, are listed in Tables 7 and 8. Lake Mechant water temperature (28°C) was below the LTA of 31°C for June while salinity (14 ppt) was above the LTA of 12 ppt.

PREDATORS/DISEASE/FOULING

Replicate samples were combined to generate a total number of hooked mussels recorded for each station (Tables 11 & 12). Biofouling rates of hooked mussels in Sister Lake has decreased 69% from last year's assessment with four stations accounting for 93% of the total hooked mussels observed. The number at the remaining five stations ranged from 0-1 hooked mussels per station. Biofouling rates of hooked mussels in Bay Junop have decreased 77% from the 2005 assessment with an average of two hooked mussel observed per station and only 50% of stations with any mussels present. Cultch plant samples were not included for the purpose of comparison.

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 which were lower than expected considering the drought" (Personal Communication, Dr. Tom Soniat) (Tables 13 and 14).

No evidence of oyster drills (*Stramonita haemastoma*) was present in m^2 samples. Other potential predators included a total of 135 unidentified mud crabs recorded from the 13 stations. No blue crabs (*Callinectes sapidus*), stone crabs (*Menippe adina*), or toadfish (*Opsanus beta*) were collected.

LAKE MECHANT

On February 20, 2001, the Louisiana Wildlife and Fisheries Commission designated Lake Mechant as an Oyster Seed Reservation and 2004 marked the historic opening of this area to commercial oyster harvest. Lack of available resource and fishing effort effectively closed the 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 reservation. No seed production occurred during this period. The Lake remained closed for the 2005-2006 season. Lack of known reef locations and amount of productive reef acreage presently prevents a population assessment of this lake.

The first cultch plant was established on the Lake Mechant Seed Reservation in May, 2004. The 2005 assessment of the approximate 30-acre site contained 121,410 m^2 with preliminary estimates of 51,937 BBLS of seed and no sack oysters available. The 2006 assessment of this site indicates 4,452 BBLS of seed and 270 BBLS of sack oysters available. This represents a 91% decrease of seed availability from the 2005 assessment.

HURRICANE ASSESSMENT

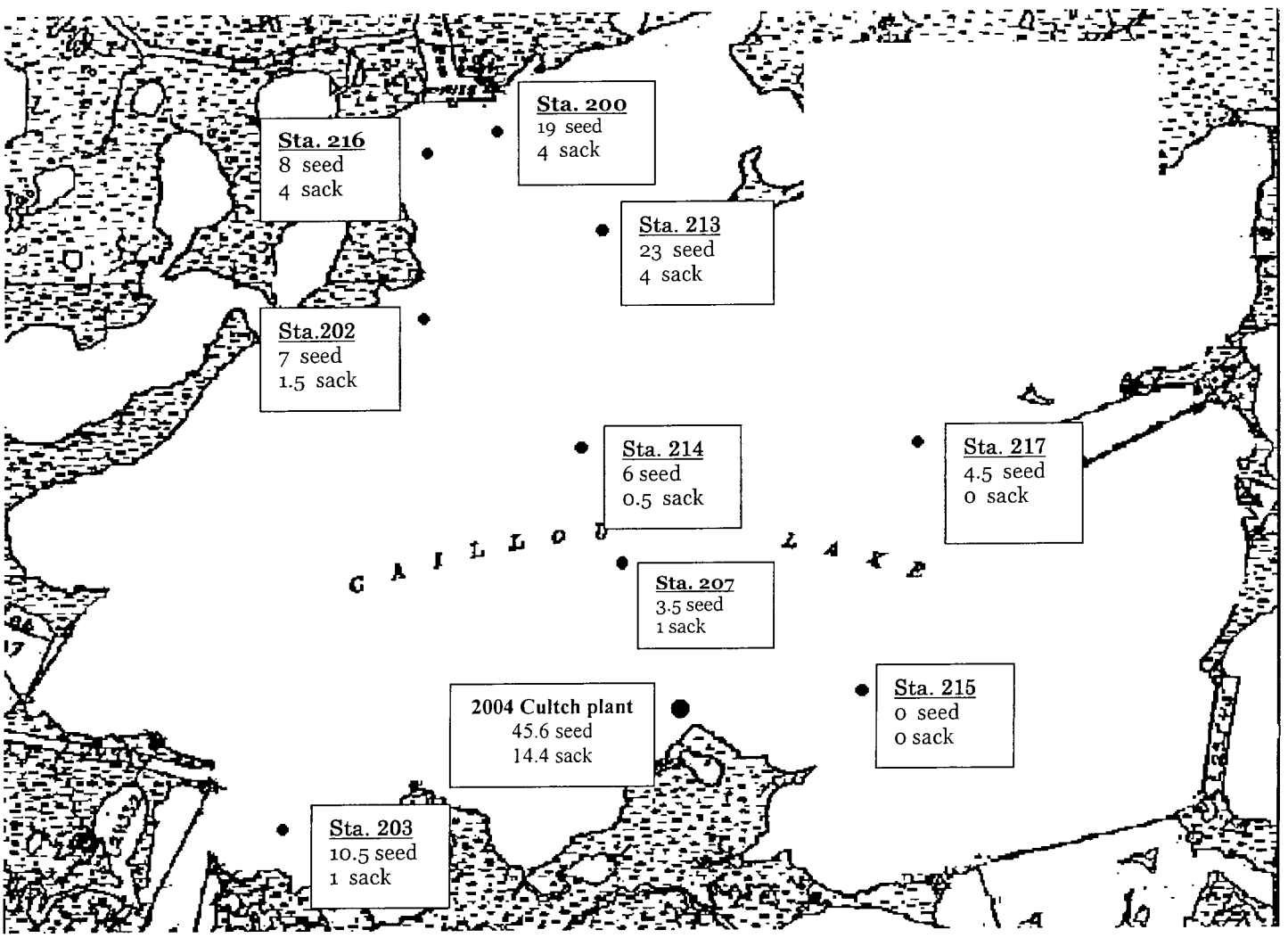
Following landfall of Hurricanes Katrina (8/29/05) and Rita (9/24/05) the Sister Lake, Bay Junop and Lake Mechant Seed Reservations were monitored and damages documented. In general, Lake Mechant and Bay Junop appeared to have less overburden and mortalities than Sister Lake, especially the mid to lower (southern) portion of the Lake. Stations 215 and 217 still have a minimum of one to four inches of overburden and two of five cultch plant samples indicated mortality due to overburden. Spat and seed oysters were more negatively impacted by the storms than were sack oysters. The Sister Lake cultch plant experienced an overall estimated seed and sack mortality of 55% (27,906 BBLS) while mortality on the Lake Mechant plant was 17% (8,985 BBLS). Total seed and sack losses due to hurricanes were estimated at 64,065 BBLS in Sister Lake (2005-2006 Oyster Season Report).

Samples were collected from the Sister Lake and Lake Mechant cultch plants in conjunction with the m^2 sampling program. The cultch plants have and will continue to be monitored for oyster spat set, growth, size, population density, predation, hydrology, adverse environmental effects and mortality.

SH/jbv

cc: Jim Hanifen

Figure 1 Sister Lake Meter Square Samples (average # of seed and sack oysters at each station)



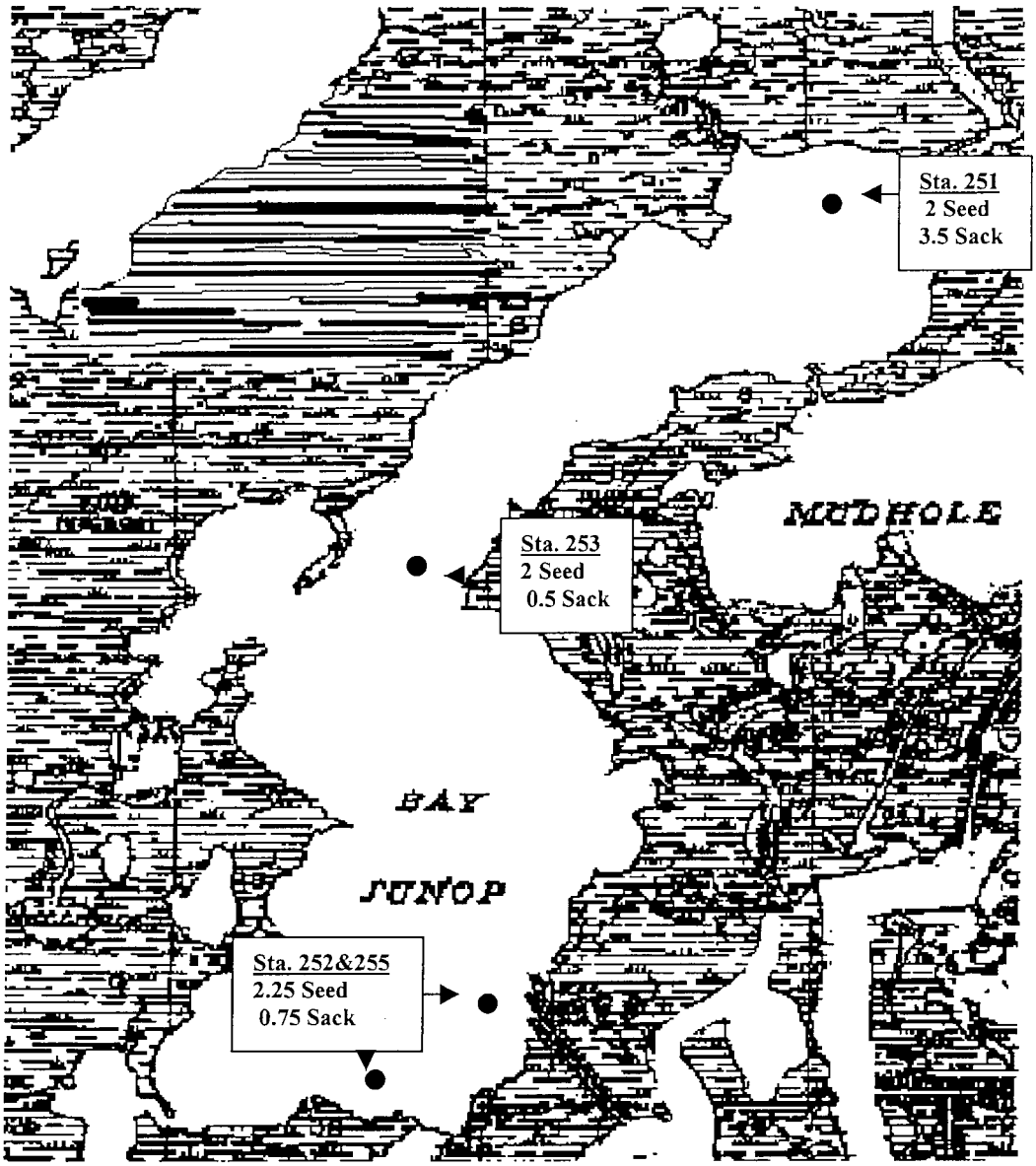
Stn. #	Stn. Name	North Lat.	West Long.	Depth
200	Grand Pass	29°15'28.5"	90°55'45.5"	10'
202	Walkers Pt.	29°14'50.9"	90°56'16.9"	6'
203	Old Camp	29°12'58.2"	90°56'40.2"	4'
207	Mid Sister Lake	29°14'00.1"	90°55'14.7"	6'
213**	N '94 Shell Plant	29°15'02.9"	90°55'30.9"	6'
214**	Mid '94 Shell Plant	29°14'16.5"	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'
	2004 Cultch Plant	29°13'24.6"	90°54'54.3"	5'

* Revised July 2001

** Not permanent stations; will sample 5 years then stop; 1995-1999. Continued samples '00-'04.

***Not permanent stations; will sample 5 years then stop; 1996-2000. Continued samples '01-'04.

Figure 2. Bay Junop Meter Square Sample Sites (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'

* Revised July 2006

Figure 3 Lake Mechant Meter Square Samples (average # of seed and sack oysters at each station)

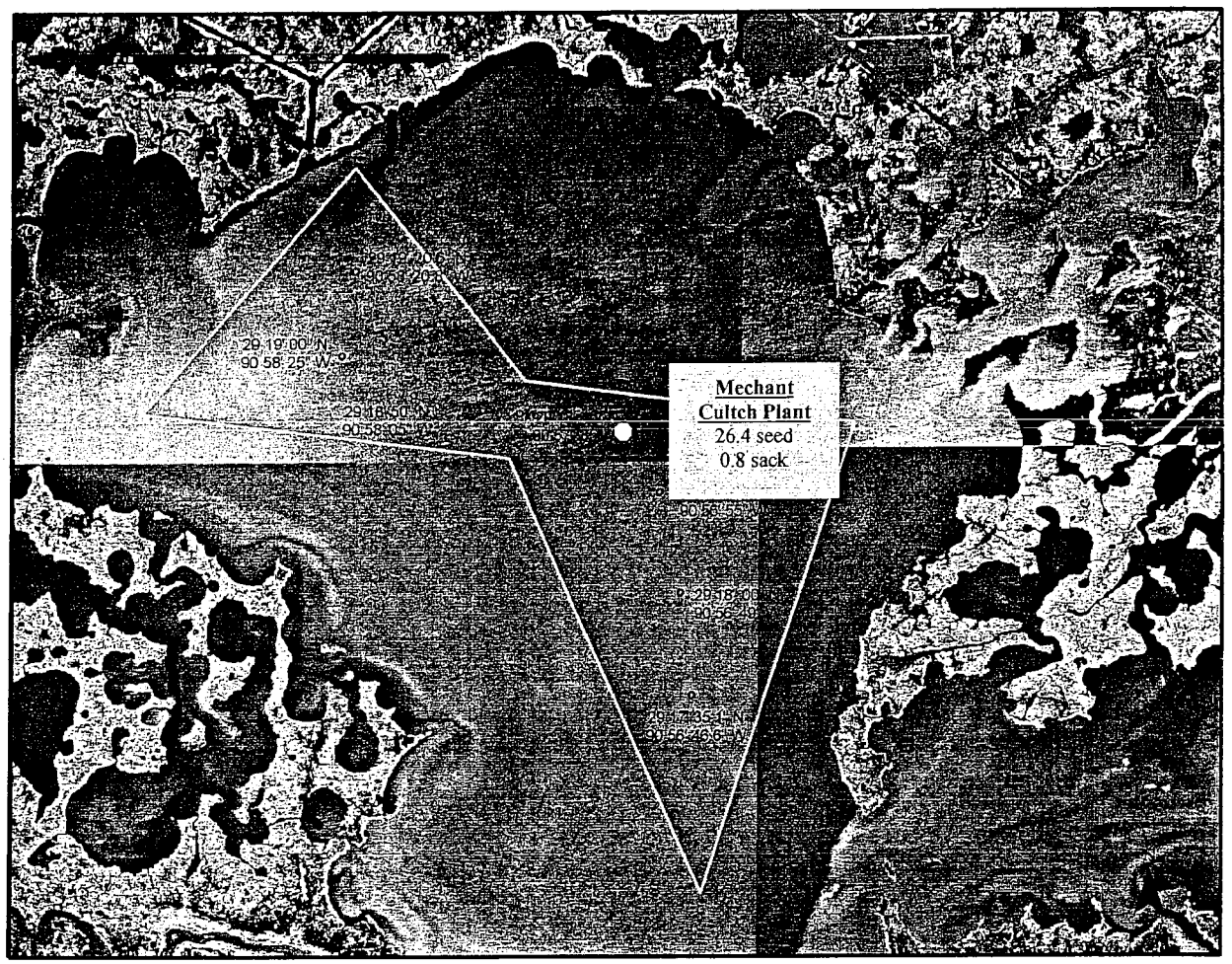


Table 1. 2006 Sister Lake Oyster Availability

METER² STATION	REEF ACREAGE	#METER²	#SEED OYSTERS	#SACK OYSTERS	BARRELS SEED OYSTERS	BARRELS SACK OYSTERS
200	221.58	896,734.26	19	4	23,663.82	9,963.71
202	81.93	331,570.71	7	1.5	3,223.60	1,381.54
203	151.31	612,352.00	10.5	1	8,930.13	1,700.98
207	185.72	751,608.84	3.5	1	3,653.65	2,087.80
213*	96	388,512	23	4	12,410.80	4,316.80
214*	129	522,063	6	0.5	4,350.53	725.09
215*	81	327,807	0	0	0.00	0.00
216**	115	465,405	8	4	5,171.17	5,171.17
217**	438	1,772,586	4.5	0	11,078.66	0.00
cultch plant***	67	271,149	45.6	14.4	17,172.77	10,845.96
TOTAL	1,566.54	6,339,787.81	127.1	30.4	89,655.14	36,193.05
Adj. Total**	**2,279**	**9,224,391.26**			**130,448.22**	**52,660.89**

* 1994 Shell Plants
** 1995 Shell Plants
*** 2004 Shell Plant

**** May 2005 Side Scan Sonar Survey listed Sister Lake reef acreage at 2279 acres. This is an increase of 45.5% over prior years' estimates. Adjusted totals for 2006 reflect this increase of availability.

Table 2. 2006 Bay Junop Oyster Availability

METER² STATION	REEF ACREAGE	#METER²	#SEED OYSTERS	#SACK OYSTERS	BARRELS SEED OYSTERS	BARRELS SACK OYSTERS
251	17.2	69,608.40	2	3.5	193.36	676.75
252/255*	67.36	272,605.92	2.25	0.75	851.89	567.93
253	73.26	296,483.22	2	0.5	823.56	411.78
TOTAL	**157.82**	**638,697.54**	**6.25**	**4.75**	**1,868.81**	**1,656.46**

* Stations 252 and 255 are combined.

Table 3. Annual Sister Lake Seed and Sack Oyster Availability Rankings

YEAR	BARRELS SEED
1997	540,270.2
1999	452,991.0
1996	384,500.0
1994	358,455.0
2001	304,763.0
1998	298,975.0
2000	243,589.9
1995	236,687.0
2005*	193,784. 99
1992	172,132.0
1980	142,620.1
2003	131,038.3
2002	115,034.0
1981	111,146.1
2004	104,598.1
2006**	89,655.17
1991	87,044.2
1993	77,190.0
1982	76,950.0
1990	72,862.9
1984	69,136.0
1988	47,695.0
1986	32,633.0
1989	26,179.0
1987	18,522.0
1985	13,775.0
1983	8,768.5

YEAR	BARRELS SACK
1997	557,072.2
1995	397,777.0
2001	343,655.5
1998	327,125.0
1999	301,321.0
1996	256,164.0
1992	209,854.0
2002	186,233.4
2005*	153,732. 9
2003	151,844.5
1981	110,990.2
1982	94,050.0
2000	76,515.5
1988	69,570.0
1989	64,549.5
1984	50,587.0
1994	50,429.0
2004	43,193.1
2006**	36,193.05
1993	35,824.0
1980	35,170.3
1991	28,733.7
1983	27,654.5
1990	24,282.0
1986	21,516.0
1985	16,206.0
1987	2,008.0

* 2004 CULTCH PLANT NOT INCLUDED IN TOTALS

** 2004 CULTCH PLANT INCLUDED IN TOTALS

Table 4 Bay Junop Ranking of Seed and Sack Available Oyster Production

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	9522
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
2006	1869.0
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	3385
1985	3,344.5
2006	1656.0
1988	1,169.0
1984**	----

** No samples taken
*** Station 254 discontinued

Table 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**	89,655.17	36,193.05	125,848.22	2.5-1.0

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

Figure 4

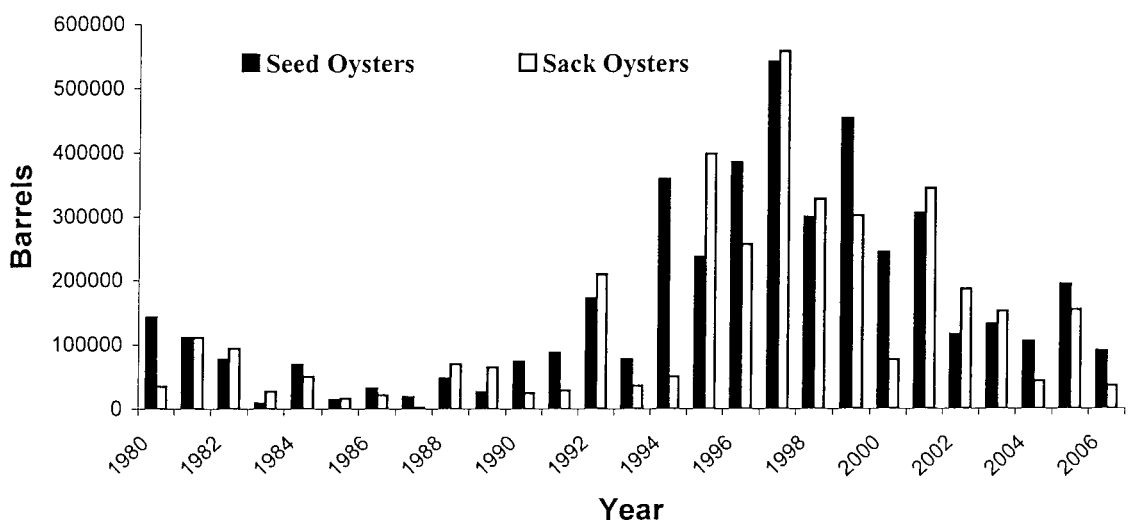


Table 6 Bay Junop Historic Meter² Available Oyster Production Estimates

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

* BASED ON 1999 ACREAGE
** NO SAMPLES TAKEN
*** STATION 254 DISCONTINUED

Figure 5

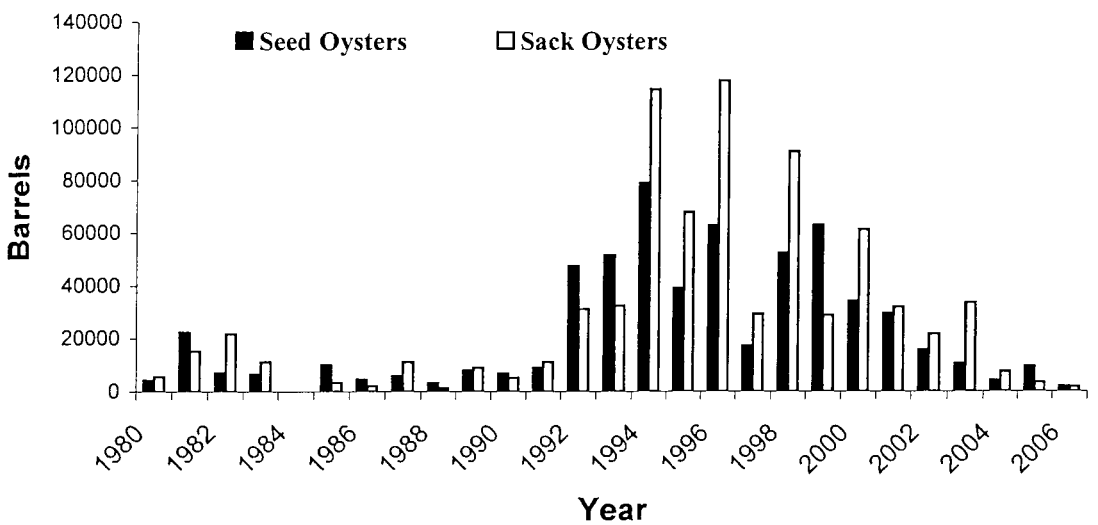


Table 7 Sister Lake Meter² Temp and Salinity

STATION	STATION NAME	TEMP (°C)**	SAL (ppt)**
200	GRAND PASS	30.5	21.9
202	WALKER'S PT.	30.7	23.1
203	OLD CAMP	29.4	24.9
207	MID SISTER LAKE	30.6	23.3
213*	NORTH '94*	30.7	23.1
214*	MID '94*	30.6	23.3
215*	SOUTH '94*	30.1	24.7
216*	NORTH '95*	30.5	21.9
217*	CAMP '95*	30.6	24.5
	Mean	30.4	23.4

*SHELL PLANTS

Table 8 Bay Junop Meter² Temp and Salinity

STATION	STATION NAME	TEMP (°C)**	SAL (ppt)**
251	BUCKSKIN BAYOU	27.5	12.4
252/255	RAT BAYOU/BAYOU deWEST	29.1	25.2
253	MID BAY JUNOP	28.3	22.5
	Mean	28.3	20.6

Table 9 Sister Lake and Bay Junop Mean Water Temp (°C)

	SISTER LAKE		BAY JUNOP	
YEAR	MAY	JUNE	MAY	JUNE
1995	27.3	29	29.3	29.3
1996	27.2	29.5	28.4	30.3
1997	27.1	30	26.4	28.6
1998	27.8	30.1	28	28.9
1999	25	28.8	25	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
*2003	27.8	30.0	27.6	30.2
*2004	27.8	29.5	27.5	29.2
2005	26.5	30.1	26.2	30.2
2006	27.1	30.6	25.7	30.9
mean	**27.0**	**29.5**	**27.2**	**29.6**

*OYSTER DREDGE SAMPLES

Table 10 Sister Lake and Bay Junop Mean Salinity (ppt)

	SISTER LAKE		BAY JUNOP	
YEAR	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
2000	22	20.5	25.5	27.7
*2001	17.6	8.2	18.4	9.8
*2002	14.2	11.1	16.6	15.9
*2003	15.4	7.2	18.2	8.9
*2004	17.2	12.2	18.9	18.6
2005	15.3	17.0	16.9	20.0
2006	16.9	18.5	21.3	15.4
mean	**14.8**	**11.0**	**19.0**	**14.5**

*OYSTER DREDGE SAMPLES

Table 11. Sister Lake Hooked Mussel Distribution By Station

	200	202	203	207	213	214	215	216	217
1998	2	48	0	112	123	64	31	35	534
1999	28	59	85	85	23	51	567	45	201
2000	2	2	0	11	27	19	6	22	9
2001	764	3	0	0	129	350	0	124	36
2002	322	9	0	36	247	145	4	5	0
2003	224	38	3	73	506	28	0	37	73
2004	146	9	0	110	51	28	23	131	283
2005	30	9	0	5	10	43	0	18	26
2006	4	0	1	16	1	6	0	1	15

*** Hooked Mussels in sample – sample and replicate combined to show total mussels for each station

Table 12. Bay Junop Hooked Mussel Distribution By Station

	251	252	253	254**	255
1998	0	19	88	750	78
1999	136	24	20	452	25
2000	308	0	9	14	17
2001	0	49	0	78	0
2002*	0	0	0	0	0
2003	396	55	10	-	2
2004	161	47	0	-	5
2005	4	27	0	-	0
2006	2	5	0	-	0

* No Data Collected – Noted that some stations may have had five or less
** Suspended due to conflict with private lease
*** Hooked Mussels in sample – sample and replicate combined to show total mussels for each station

Table 13 Percent Infection and Weight Incidence of *perkinsus marinus* in Sister Lake and Bay Junop

STATION NAME	SALINITY (ppt)	TEMP (°C)	SIZE AVERAGE (mm)	PERCENT INFECTION (PI)	WEIGHTED INCIDENCE (WI)	DAYS TO CRITICAL LEVEL
Grand Pass (200) (North Sister Lake)	24.1	28.5	95	10%	0.03	192
Old Camp (203) (South Sister Lake)	21.0	29.8	95	30%	0.13	172
Buckskin Bayou (251) (North Bay Junop)	14.6	27.7	99	20%	0.06	344
Bayou DeWest (255) (South Bay Junop)	23.5	28.6	105	50%	0.19	177

Table 14 Weighted Incidences Of Dermo In M² Samples 1997 -2006

	Station			
Year	200	203	251	255
1997	0.0	0.3	0.0	0.43
1998	0.0	0.17	0.0	0.23
1999	1.0	1.10	0.13	1.40
2000	1.43*	1.03	0.43	1.17
2001	0.03	0.40	0.13**	0.37***
2002	0.17	0.73	0.37**	0.77
2003	0.03	0.07	0.0	0.07
2004	.033	.066	0.0	0.03
2005	0.16	0.19	0.0	0.19***
2006	0.03	0.13	0.06	0.19

* NORTH 1994 SHELL PLANT (213)– ALTERNATE SITE

** MID BAY JUNOP (253) – NO OYSTERS AVAILABLE AT NORTH BAY JUNOP SITE (251)

*** RAT BAYOU (252) – ALTERNATE SITE

Table 15 Sister Lake Historical Oyster Production (1944-2005)

Season	Boat Days	Seed (BBLS)	Sack (BBLS)	Total Production	Season Length	Catch/Effort (BBLs)
1944 & 1945	--	--	--	108550 (two years)	--	0
1946 & 1947	--	--	--	217100 (two years)	--	0
1948	--	--	--	no data	--	0
1949	--	--	--	4884	--	0
1950	--	--	--	20677	--	0
1951	closed	--	--	--	--	0
1952	closed	--	--	--	--	0
1953	--	--	--	91588	190	0
1955 (tonging only)	no data	--	--	--	--	0
1956	--	--	--	20000	--	0
1957	--	--	--	11000	45	0
1958-1959	4500 (tonging only)	15000 (tong & dredge)		19500	131	0
1959-1960	closed	--	--	--	--	0
1960-1961	--	--	--	90000	--	0
1961-1962	closed	--	--	--	--	0
1962-1963	--	--	--	50000	292	0
1963-1964	closed	--	--	--	--	0
1964-1965	--	44623	4365	48988	292	0
1965-1966	closed	--	--	--	--	0
1966-1967	--	120614	9848	130462	292	0
1967-1971	no data	--	--	--	--	0
1971-1972	953	36082	16414	52496	260	1.8
1974-1975	204	35683	862	36545	258	0.6
1976-1977	1268	45101	20028	65129	254	1.9
1978-1979	1191	33649	21218	54867	116	2.2
1980-1981	1031	38067	11517	49584	210	2.1
10/12-10/31/81	365	21780	4404	26184	19	1.4
1982-1983	1838	45965	44092	90057	67	2.0
1984-1985	1552	53911	15292	69203	181	2.2
1986-1987	1644	58095	13079	71174	102	2.3
1988-1989	661	26371	7152	33523	197	2.0
1990	780	30427	6751	37178	9	2.1
1992-1993	1203	11215	14873	26088	204	4.6
1993-1934	448	6901	4203	11104	115	4.0
1995-1996	2173	51160	48824	99984	236	2.2
1996-1997	1854	20055	40019	60074	149	3.1
1997-1998	2341	31668	43727	75395	208	3.1
10/5/98-10/12/98	767	15228	16510	31738	12	2.4
1999-2000	3153	29934	47586	77520	255	4.1
2001-2002	1428	18183	34060	52243	196	2.7
2003-2004	1453	11840	51872	63712	30	2.3
2005-2006	2102	3900	61408	65308	42	3.2

CSA VI

State of Louisiana

KATHLEEN BABINEAUX BLANCO
GOVERNOR

DEPARTMENT OF WILDLIFE AND FISHERIES

DWIGHT LANDRENEAU
SECRETARY

July 17, 2006

MEMORANDUM

To: Martin Bourgeois

From: E. Paul Cook

Subject: 2006 CSA 6 Meter Square Samples

Square meter field sampling of 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 11, 2006. A total of 5 (five) stations were sampled with one additional replicate made at each station. Oysters were measured in 5 mm group sizes and divided into classes of spat, seed, and sack oysters. Numbers of oysters in each class is listed in Table 1 and Figure 2.

Table 1 **Vermilion/Atchafalaya Area Square Meter 2006 - 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.	3.0	13.0	1.0
002	Big Charles / SWP	8.5	17.5	1.5
003	Indian Pt. / SWP	9.5	27.5	0.0
004	Dry Reef	0.0	0.0	0.0
005	Bayou Blanc	58.0	22.5	0.0

Spat oysters (less than 25 mm) averaged 15.8 per square meter, representing the highest numbers seen over the last 9 years. Seed oysters (25 mm to less than 75 mm) averaged 16.1 per square meter, a slight increase over last year but not at the high levels seen in 2000 and 2001. Few oysters that meet the sack size criteria (greater than 75 mm) were taken in the 2006 CSA 6 stock assessment, with an average of 0.5 harvested in each sample replicate. (Table 2 and Figure 3)

An overall Vermilion Bay area stock assessment is not possible at this time as figures relative to oyster reef sizes are not available.

There has been very little oyster mortality noted from dredge samples taken on the seed ground since the July 2005 stock assessment. The passage of Hurricanes Katrina and Rita did not induce significant mortality events on either the inshore or offshore portions of the seed ground sampled by CSA 6. A slight overburden of marsh grasses was noted on reefs near Southwest Pass in Vermilion Bay post Hurricane Rita, but significant mortality was not documented.

Table 2 **Vermilion/Atchafalaya 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

Atchafalaya River levels recorded at Butte La Rose have remained below the 10 foot mark since August of 2005 with the exception of a 6 day period in February of 2006 and a 10 day period in March of 2006. As a result of the low river levels and below-average rainfall recorded since the Fall of 2005, low-salinity induced oyster mortality has not occurred.

With Atchafalaya River levels documented below 10 feet since April 1, 2006, salinities recorded at sample stations on the seed grounds averaged 8.0 ppt and 10.7 ppt for May and June 2006 respectively (Figures 4 and 5). Those levels have remained relatively high through July (Table 3).

Table 3 **Vermilion/Atchafalaya Area M^2 Site Salinity and Water Temperature (7/11/06)**

Station No..	Station Name	Salinity (ppt)	Temperature (°C)
001	South Point / M. I.	8.8	30.1
002	Big Charles / SWP	9.4	29.9
003	Indian Point / SWP	9.3	29.6
004	Dry Reef	6.9	28.9
005	Bayou Blanc	7.6	30.4

A chart tracking hooked mussel numbers in square meter samples over the past 5 (five) years indicates that a significant decrease in fouling has occurred since 2003.

Table 4 **Vermilion/Atchafalaya Area Hooked Mussel Distribution (by year)***

Station No.	Station Name	2002	2003	2004	2005	2006
001	South Point/Marsh Island	8	19	34	28	16
002	Big Charles	187	172	45	12.5	17
003	Indian Point	31	90	92	43	9
004	Dry Reef	NDA	468	23	8.5	0
005	Bayou Blanc	65	64	33	9.5	7

*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 12, 2006. Results of his analysis were not available for this report.

Maps and graphs depicting the 2006 CSA 6 assessment follow:

EPC/dgg

Attachments

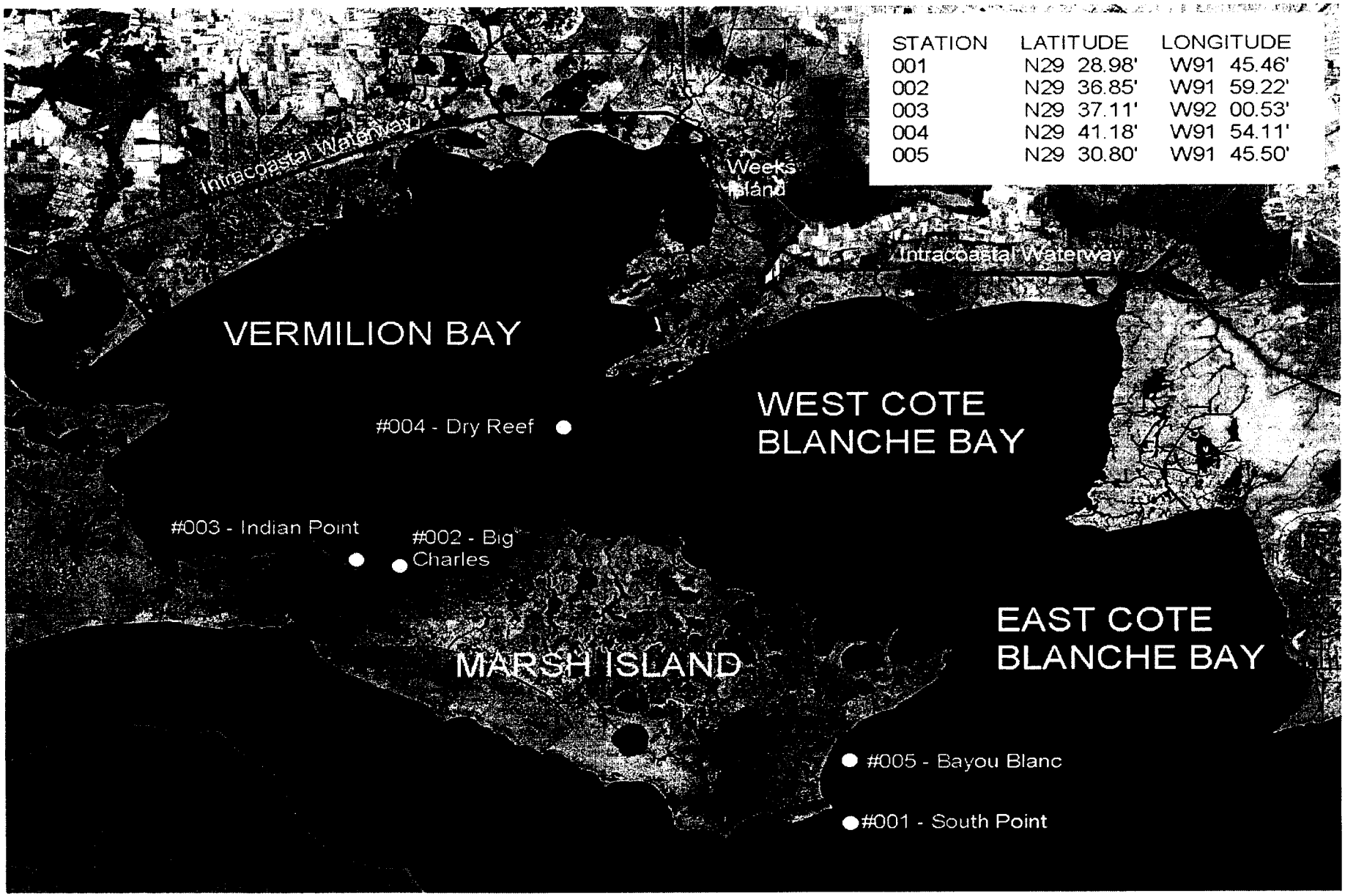


Figure 1. Vermilion / Atchafalaya area square meter sample sites.

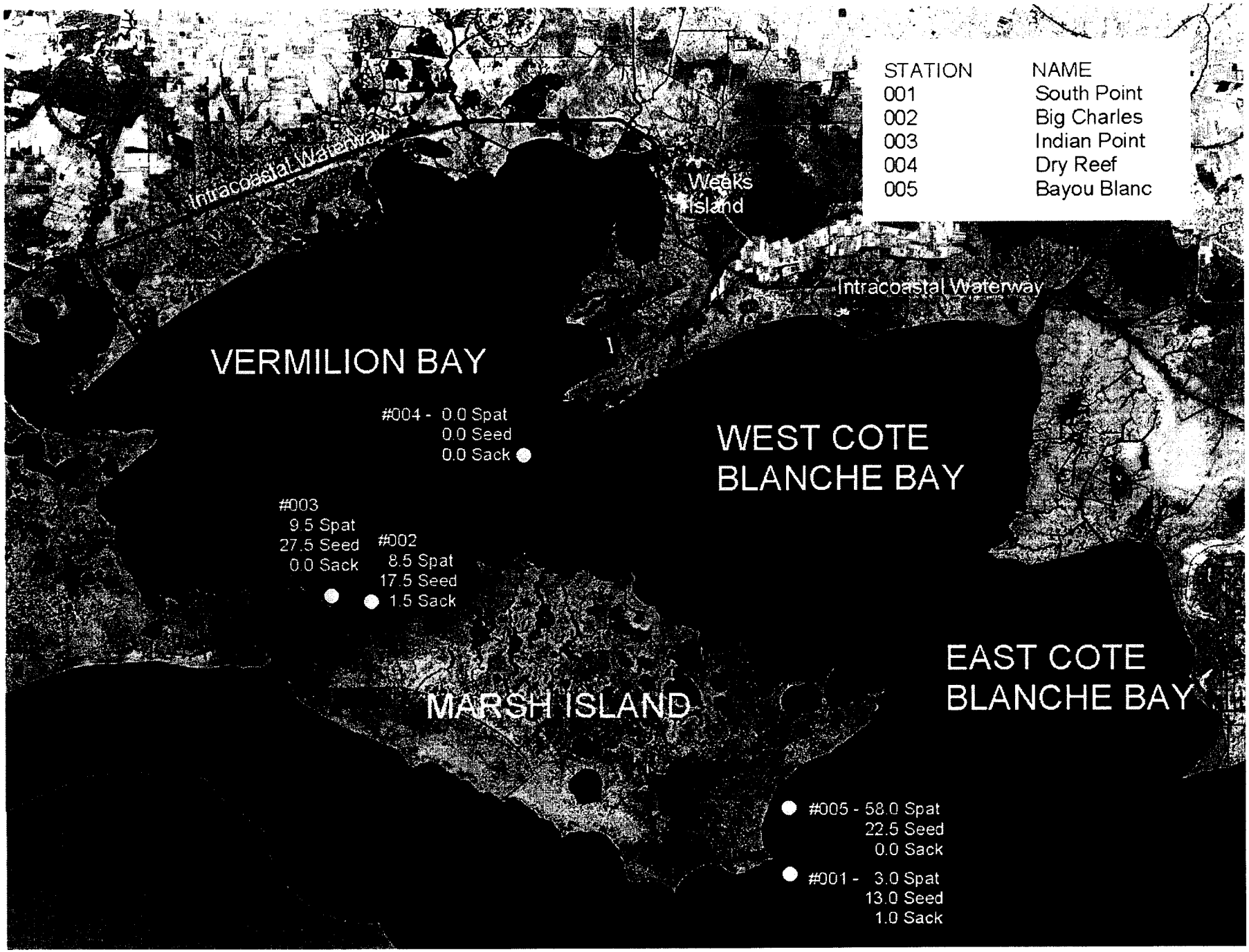


Figure 2. Vermilion / Atchafalaya Area square meter sample results 2006.

Figure 3. Vermilion/Atchafalaya Area Square Meter Results By Year

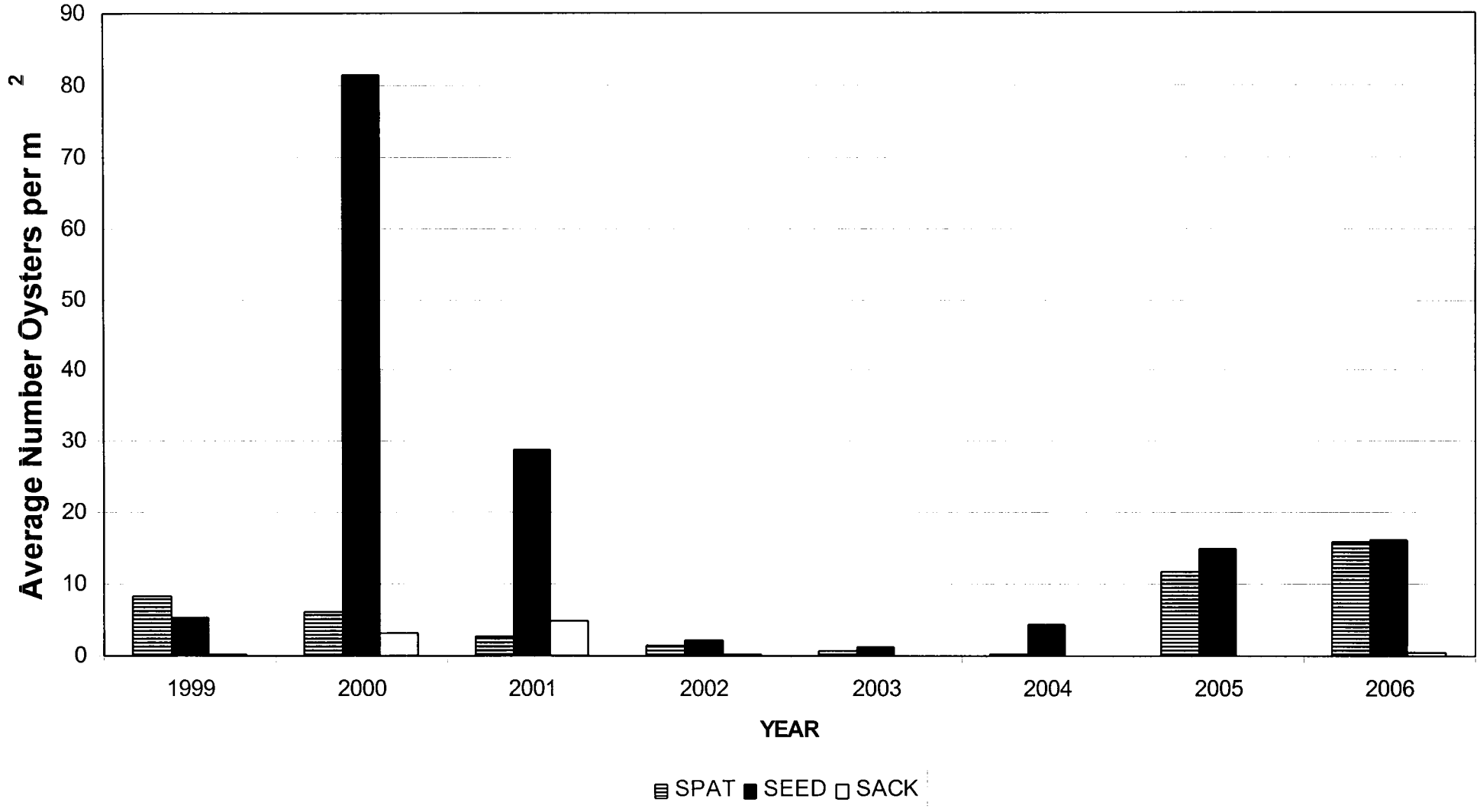


Figure 4. Vermilion/Atchafalaya Area Average May Salinity /1999 Through 2006

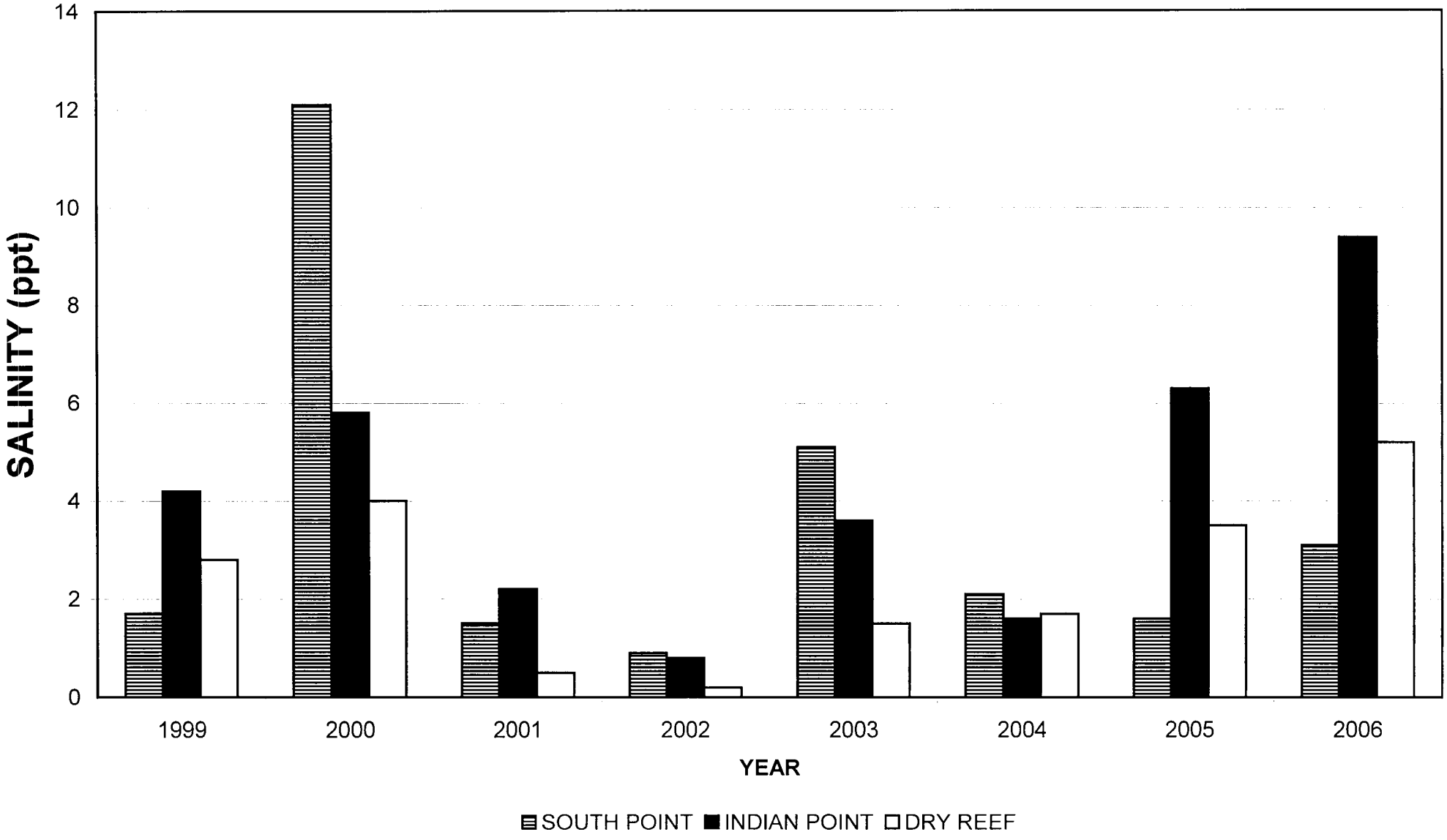
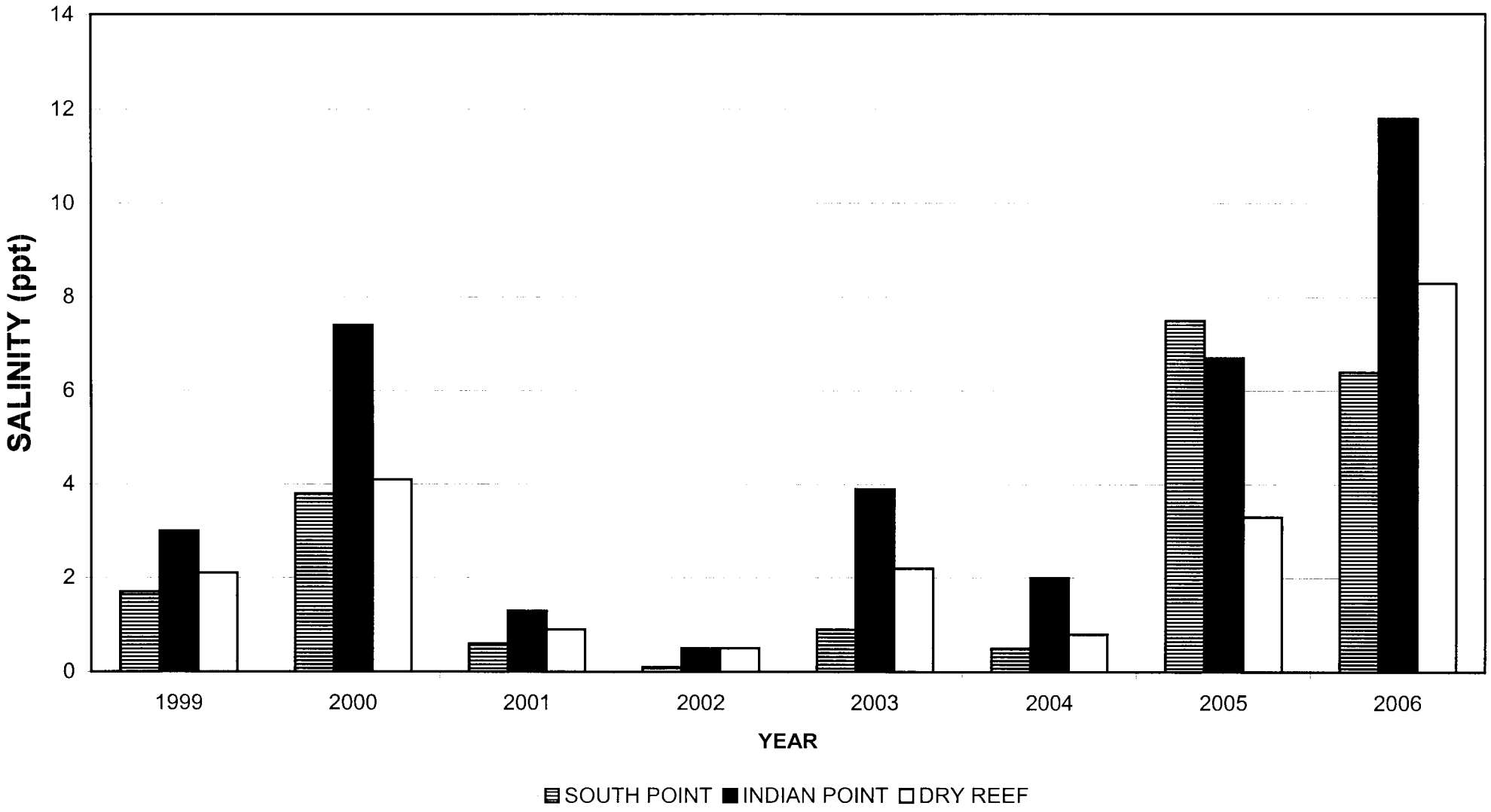


Figure 5. Vermilion/Atchafalaya Area Average June Salinity / 1999 Through 2006



CSA VII

Dwight Landreneau
Secretary

Department of Wildlife & Fisheries
1213 North Lakeshore Drive
Lake Charles, LA 70601
(337)491-2579

Kathleen Babineaux Blanco
Governor

July 19, 2006

MEMORANDUM

To: Martin Bourgeois

From: Michael Harbison

Subject: 2006 CSA 7 Meter Square Samples

Calcasieu Lake is divided into two portions – Eastside and Westcove. These are separated by the Calcasieu ship channel. Each portion is set up as a conditional managed area by the Department of Heath and Hospitals. All of Westcove is setup as West Cove Conditional Management Area 30 (Area 30). Only a portion of the Eastside is available for harvesting oysters, this is setup as Lower Calcasieu Lake Conditional Management Area 29 (Area 29). Area 30 has approximately 726.98 acres or 2.942, 076.67 square meters of oyster reef. The Eastside of Calcasieu Lake has approximately 963.57 acres or 3,901,185.57 square meters of oyster reef. See MAP 1 and MAP 2 for the boundaries of the two conditionally managed areas.

Six stations were sampled on July 12, 2006. There were three sample stations in Area 29 and Area 30. See MAP 1 and MAP 2 indicates the locations of the sampling stations.

The oyster square meter samples for 2006 indicates a total of 238,945.3 sacks of marketable (≥ 3") and 159,298.4 sacks of seed (< 3") oysters. These numbers indicate a decrease of 74% of marketable and 64% of seed oysters, for an overall decrease of 70% of oysters from the Calcasieu Lake oyster reefs. Spat totaled 314 for all stations and this is an increase from the 2005 season of 85. See TABLE 1 for the 2006 assessment and TABLE 2 for a comparison of the last five years. TABLE 3 is a listing of stock assessments and landings since 1963.

Hurricane Rita had some impacts on the oyster reefs. Areas sampled after the storm indicated normal mortalities, except those reefs that were on North to Northwest side of landmasses. Station 5 in Westcove is on the North side of Rabbit Island and had silt and march grasses on the reef. There was also 50 – 60% mortality immediately following the storm. Mortalities have since returned to normal. Trawl samples along the southeastern bank on the Eastside also indicated silt and marsh grasses, so those reefs close to the banks should have the same effects as Station 5.

Other effects that may have contributed to the decrease in oysters are the heavy use on some of the same reefs that we have stations on (especially stations 1 and 2), while other reefs through out the lake may not get the same pressure.

MDH/mdh
Attachments

Figure 1.1. Lower Calcasieu Lake Conditional Management Area.

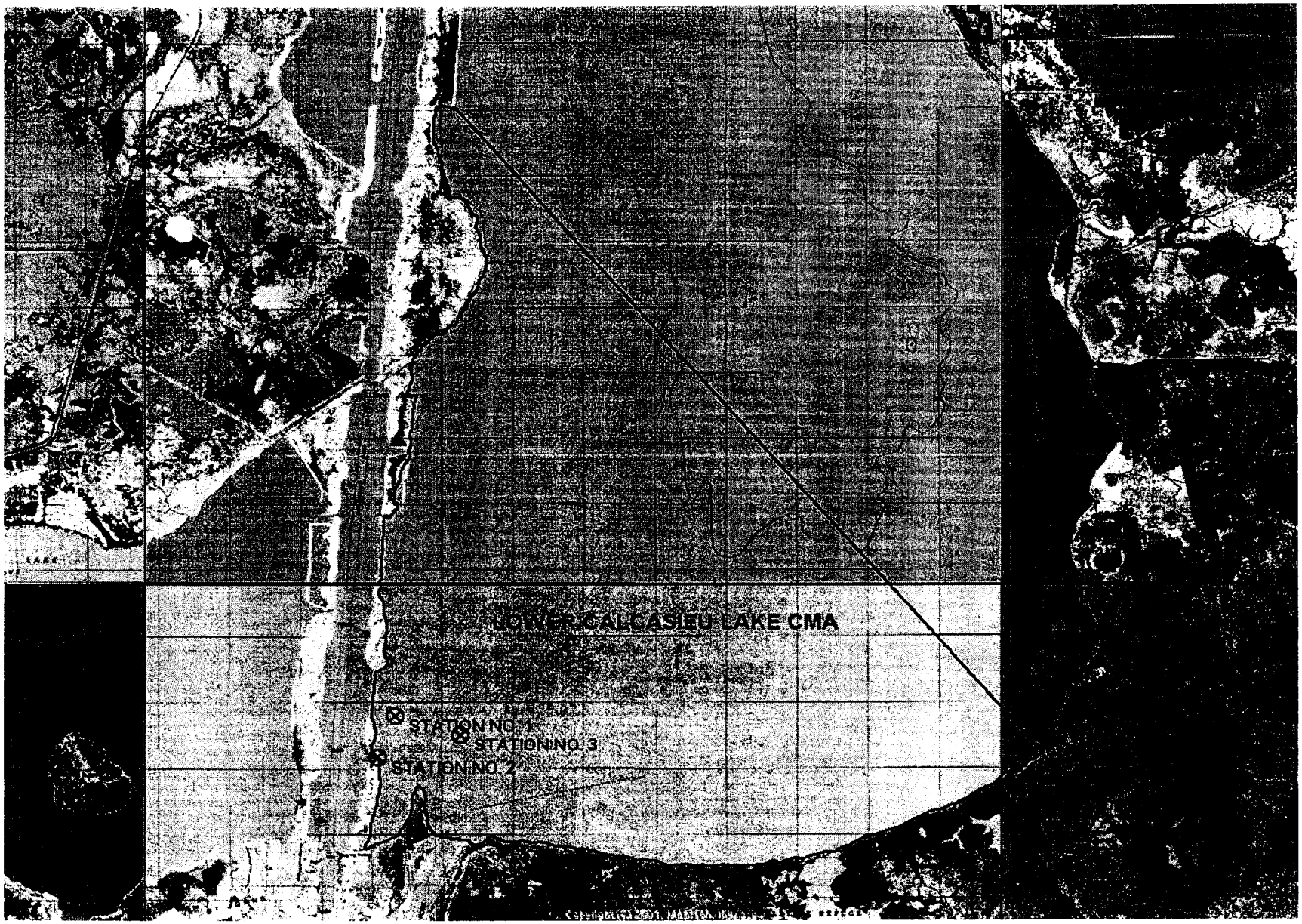


Figure 1.2. West Cove Conditional Management Area

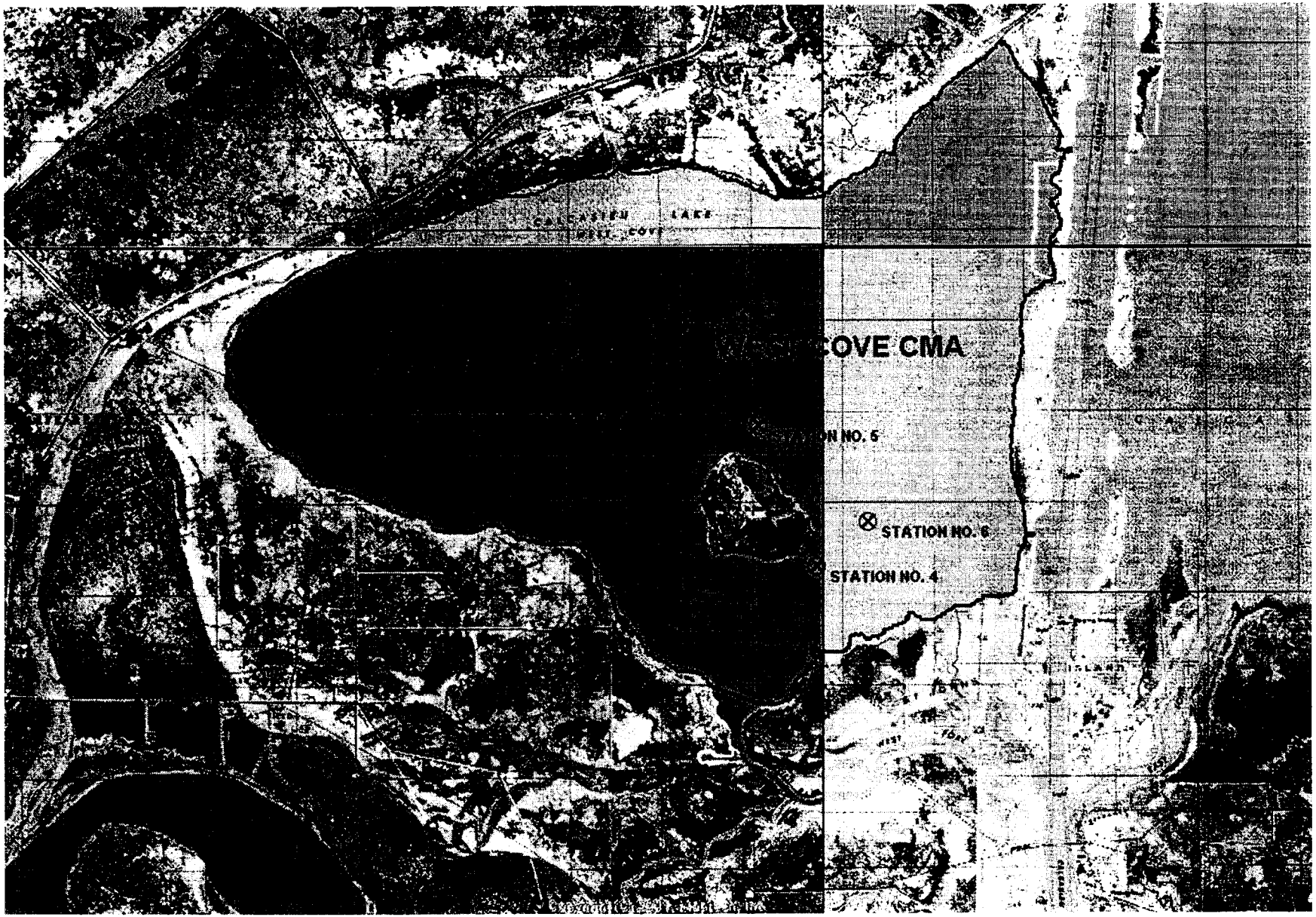


Table 1.1. Lower Calcaseiu Lake and West Cove Conditional Management Area oyster availabilities (2006).

CALCASIEU LAKE OYSTER STOCK ASSESMENT

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

AVAILABILITY 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

AVAILABILITY 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 OYSTER AVAILABILITY

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

Table 1.2. Annual Lower Calcaseiu Lake and West Cove Conditional Management Area oyster availabilities.

ASSESSMENTS BY CONDITIONAL MANAGED AREA

	SACK OYSTERS (≥ 3")			SEED OYSTERS (< 3")		
YEAR	EASTSIDE	WESTCOVE	TOTAL	EASTSIDE	WESTCOVE	TOTAL
2001	591,679.8	572,070.5	1,163,750.3	988,300.3	257,431.7	1,245,732.0
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
AVERAGE	691,810.2	334,246.7	1,026,056.9	628,547.1	189,566.1	818,113.2
2006	140,876.1	98,069.2	238,945.3	159,298.4	65,379.5	224,677.9
% CHANGE FROM AVE.	- 79.6	- 70.7	- 76.7	- 74.7	- 65.5	- 72.5

Table 1.3. Annual Lower Calcaseiu Lake and West Cove Conditional Management Area oyster availabilites and harvest estimates.

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	N/A
2006-07	238,945	463,623	N/A

N/A – NOT AVAILABLE
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.

Dermo (*Perkinsus marinus*) Analysis

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

Principal Investigator: Dr. John Supan
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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 has 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 experienced high mortalities of bedded seed during the same time periods, 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 LSU 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 2006 are listed in Table 1. Table 2 lists the 2005 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 only found in market-size oyster from Bay Crabe. Slight decreases occurred in oyster populations at Lonesome Island, Mozambique Point, Black Bay, Hackberry Bay, Three-Mile Pass, and Cabbage Reef.

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 1
2006 DERMO RESULTS
EAST 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

Table 2
2005 DERMO RESULTS
EAST OF RIVER & HACKBERRY BAY

	Seed		Market	
	Prevalence	Weighted Incidence	Prevalence	Weighted Incidence
Bay Gardene	40%	0.2	27%	0.1
Lonesome I.	73%	0.4	80%	0.4
Mozambique Pt.	47%	0.2	87%	0.5
E. Black Bay	100%	0.5	63%	0.5
S. Black Bay	53%	0.3	53%	0.6
Bay Crabe	50%	0.2	87%	0.5
Telegraph Pt.	40%	0.2	80%	0.4
Cabbage Reef	73%	0.4	87%	0.6
Three-Mile Pass	80%	0.4	93%	0.5
Hackberry Bay	40%	0.2	89%	0.8

Mackin Scale used to determine incidence

Levels of the oyster parasite, *Perkinsus marinus* in Louisiana oysters west of the Mississippi River, Summer 2006

by

Thomas M. Soniat, Ph.D.

24 July 2006

Among the most significant causes of oyster mortality is the parasite *Perkinsus marinus* (= *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 could not explain the widespread mortalities of oysters that were observed. It is now known that the parasite is a major cause of mortality from Maine to Mexico (Soniat, 1996).

The main 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 and on the seaward side of estuaries. 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. The success of oyster farming often depends on the ability to manage oyster population 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 this summer's study were collected from 9 sites west of the Mississippi River. Samples were taken from one site in Lake Felicity (LF), 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 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.

WI values were 0.00 (LF), 0.03 (GP), 0.13 (OC), 0.19 (DW), 0.06 (BS), 0.09 (IP), 0.00 (SP), 0.29 (BW) and 0.20 (NR) Disease levels from the summer 2006 samples are relatively low and well below critical levels. The low intensities (WI) of disease is somewhat surprising

considering that the area has been experiencing a severe drought. Drought conditions on the Gulf Coast are associated with the La Nina phase of El Nino Southern Oscillation, however increases in prevalence (PI) precede sharp increases in intensity (WI) and epizootics of Dermo in Louisiana can lag La Nina events by about 6 months (Soniat et al., 2005). The effects of the drought are clearly noticed along the more arid Texas coast, where numerous disease "hot spots" now exist. (See www.dermowatch.org.) If the drought continues Louisiana sites may become disease hot spots as well, even though present disease levels are low.

Station	Date sampled	Salinity (ppt)	Temperature (C)	Size range (mm)	Percent infection	Weighted incidence
Lake Felicity	07/06/06	26.8	30.1	75-86	0%	0.00
Grand Pass	06/28/06	14.6	28.5	83-111	10%	0.03
Old Camp	06/28/06	21.0	29.8	82-106	30%	0.13
Bayou DeWest	06/28/06	23.5	28.6	95-119	50%	0.19
Buckskin Bayou	06/28/06	14.6	27.7	81-122	20%	0.06
Indian Point	07/11/06	10.0	29.3	75- 89	30%	0.09
South Point	07/11/06	8.8	30.0	75-107	0%	0.00
Big Washout	07/17/06	17.9	31.3	81-117	70%	0.29
NE Rabbit Island	07/17/06	15.9	30.7	82-114	40%	0.20

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