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AND NATURAL RESOURCES

James D. Martin, Commissioner

MARINE RESOURCES DIVISION

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R. VERNON MINTON
Director

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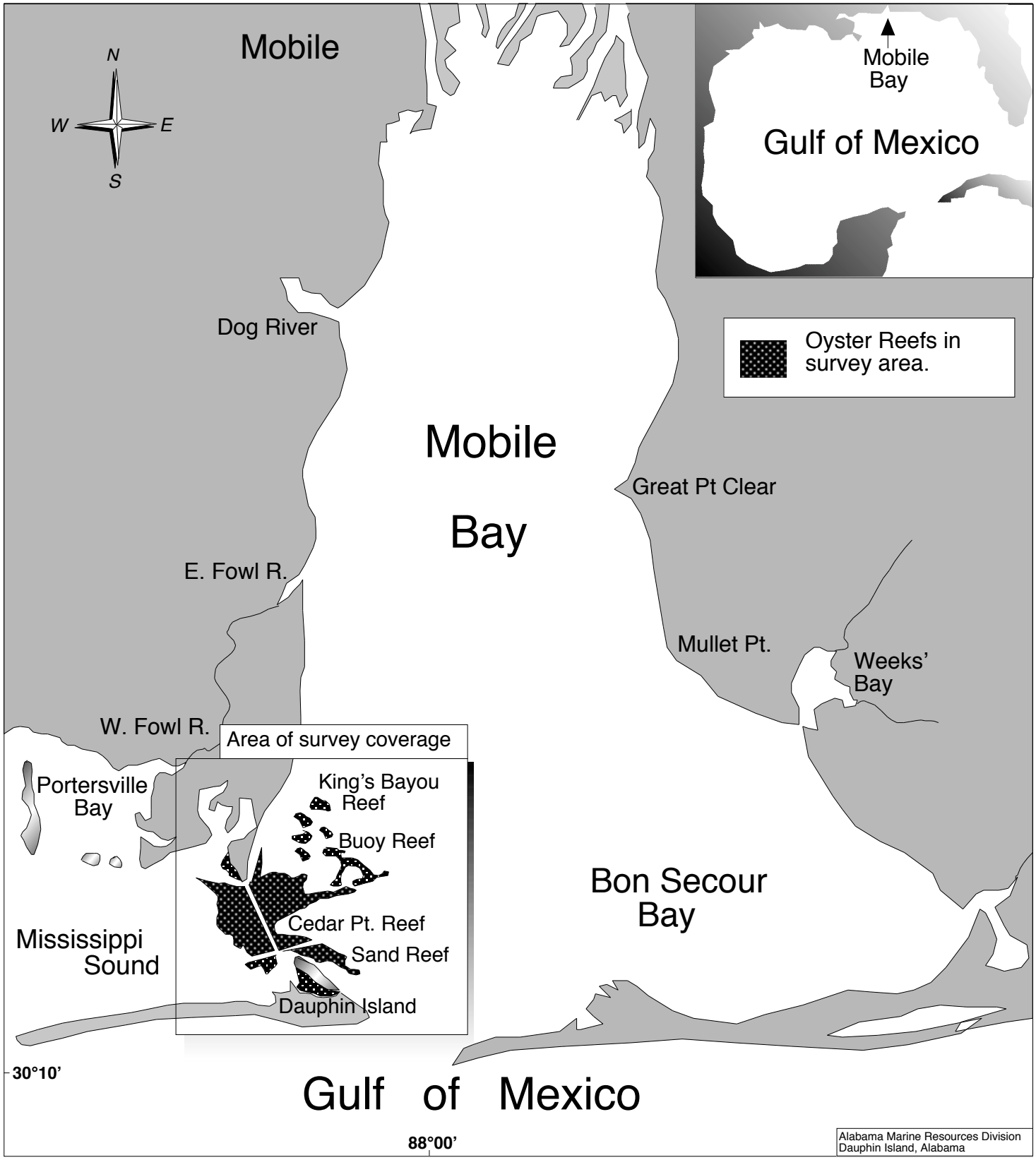
Mobile
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Bon Secour Bay
Cedar Pt. Reef
Mississippi Sound
Sand Reef
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30°10'
Gulf of Mexico
88°00'
Alabama Marine Resources Division
Dauphin Island, Alabama

The 1995 Atlas of Major Public Oyster Reefs of Alabama and a Review of Oyster Management Efforts 1975-1995

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ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES MARINE RESOURCE DIVISION
DAUPHIN ISLAND, ALABAMA

INTRODUCTION

Alabama's oyster reefs have been assessed on six occasions over the last century. Two researchers, Galtsoff (1930) and Engle (1945), confined their efforts to studying the population of oysters and the condition of the reefs. The other studies, Ritter (1896), Moore (1913), Bell (1952) and May (1971), not only studied the condition and population of the reefs but also measured their areas and mapped their configuration.

Since the 1968 survey, exploratory drilling for natural gas, production platforms and pipelines, have developed tremendously in the Alabama estuarine area. Such activities involve disruption of bay bottoms in the placement of drilling rigs, pipelines, as well as associated support activities. Concerns arose that the 1968 study was inadequate as a guide to assure placement of rig and pipeline structures in a manner which would have no impact on oyster resources. The 1968 survey, because of the deep draft barges used, gave only a cursory description of the oyster reefs south of the Gulf Intracoastal Waterway (GIWW), Sand Reef and Dauphin Island Bay in particular. Since this area is the subject of natural gas exploration, a new survey was needed of the reefs around Little Dauphin Island to ensure safe placement of rig structures and pipeline corridors.

In 1995, funds became available to survey the oyster reefs of Alabama not only south of the GIWW but also those to the north of it. The objective of this survey was to establish the current size and configuration of Alabama's natural oyster reefs in the Dauphin Island-Cedar Point vicinity. Unlike previous works, this survey made no attempt to characterize the population or conditions of the reefs themselves. Since the late 1970's, both fishery dependent and independent data is available to yield a better depiction of Alabama oyster resources than a single overall reef survey.

The decade of the 1980's was the period of the most intense shell planting activities in Alabama history. Unfortunately the bulk of federal funding for these activities is tied to natural disasters such as hurricanes and floods and is not available for strictly management purposes. In an effort to establish a stable oyster reef enhancement program, the Alabama Marine Resources Division recommended several new laws designed to benefit Alabama oyster resources in the decade of the 1980's and beyond. These new actions, a sack tagging law, revival of an old law requiring local oyster shops replant shell plus the establishment of annual dive surveys on the reefs and periodic oyster checkpoints has provided the Marine Resources Division with the foundation for annual reef enhancement and management programs based upon yearly population estimates and firm harvest data. Lack of sufficient funding remains a major obstacle by restricting the necessary daily monitoring of oyster harvest and the establishment of annual large reef rehabilitation efforts.

PROCEDURE

The boundaries of each oyster reef were determined by sounding with a 6-meter pole from a shallow draft boat. Where the edge of the reef was a sand bar, a dredge was towed to determine the presence or absence of oyster spat and cultch material. The location of tows that revealed the presence of little or no reef material was determined to be a point on the edge of the reef. Reefs whose edges were bordered by mud bottoms were not dredged as sounding alone could adequately identify the reef edge. A Si-Tex HE32 recording fathometer was also used to pinpoint the edges of reefs that had high relief profiles. In order to provide a land perspective, the Cedar Point peninsula, Peavy Island, and Little Dauphin Island from its northwest terminus to Pass Drury were surveyed.

Once a point on the reef edge was determined, a LORAN C coordinate was recorded. When a sufficient number of points were established to give the size and

configuration of the reefs, survey crews from the Engineering Section, Administrative Division, Alabama Department of Conservation and Natural Resources were contacted. They established bench marks on the western shore of Mobile Bay and the high-rise section of the Dauphin Island bridge, Little Dauphin Island and at the Alabama Marine Resources Lab on Dauphin Island. A member of the survey crew, equipped with triple prisms mounted on a rod, was taken to the predetermined loran locations, where the edge of the reef was reconfirmed with a sounding pole, and the survey party chief shot the target using a Wilt T 1600 Total Station Survey Instrument. If the water was choppy or the current strong, a weighted cane pole was placed at the loran location to better hold the boat on station while the survey shot was accomplished. The survey shots were stored in the WILT T instrument memory and downloaded to a PC at Engineering Section headquarters in Montgomery, Alabama. A working map was produced from this information.

Shallow water reefs, intertidal reefs and shoreline edges were determined by visual inspection or sounding by cane pole or foot. Aside from the rod man being on foot and not in a boat, survey shots of shallow water and shoreline locations were taken as described previously.

RESULTS AND DISCUSSION

The present survey was begun in February 1995 and finished in June 1995. Coordinating with the state engineers, located in Montgomery, Alabama, to be on site with the proper weather conditions accounted for the extended time needed to accomplish the survey. Actual field time, including initial siting of the points on the reef edges encompassed all or in part of 20 days. The results of the 1995 work and areas surveyed in 1968 are given in Table 1. Results of historical oyster surveys are listed in the appendix.

The map of the reefs as delineated in 1995 is contained in the appendix along with the 'XY' survey coordinates used to determine reef edges and the LORAN C coordinates of those edges.

In 1968, in order to properly assess population density, May arbitrarily divided Cedar Point reef, a continuous area, into seven sections (Bland personal communication, 1995). He also designated its northwestern most reaches as Heron Bay reefs C and D. May's 1968 Cedar Point A-C, E-H along with Heron Bay D and C are all considered to be Cedar Point reef. in the 1995 survey. In 1995, Sand reef was considered to be the reef area south of the GIWW, east of Little Dauphin Island and north of Peavy Island. In 1968 this area was divided into Sand Reef and Cedar Point D. Peavy Island Reef in 1995 was considered to be the area south of Peavy Island and west of Little Dauphin Island not including the waters of Dauphin Island Bay. All of the oyster reef areas in Dauphin Island Bay proper and its tributaries were designated Dauphin Island Bay Reef in this 1995 survey.

The reef area determined in 1995 in the Cedar Point vicinity was nearly twice that found by May in 1968. No single explanation can account for the entire difference, however, three major factors are likely responsible. First, between 1968 and 1995, the Mobile Bay area withstood two category three hurricanes. These storms can cover or uncover buried shell. The reefs east of the Dauphin Island bridge that increased in area since 1968 are all located atop extensive buried shell deposits as determined by May (1971), and could have easily had a part of this formerly buried shell exposed by storm tidal scour.

A second likely explanation for reef expansion is shell planting. The large amounts of clamshell and oystershell planted from 1970 to 1995 were concentrated west of the Dauphin Island Bridge on Cedar Point reef, especially in the northwest section. Half Moon reef, not shown in the May survey, was the recipient of two shell plantings in the 1980's. These areas increased in size as measured by the 1995 survey.

A third explanation for increase in reef area from 1968 to 1995 specifically concerns the shallow water and intertidal reefs south of the GIWW. These reefs, Sand reef, Peavy Island reef, and Dauphin Island

Bay reef increased by 850.5 acres since 1968. This probably does not reflect actual reef area growth because in 1968 May (1971) did not have the proper shallow draft equipment to adequately survey these areas (Bland personal communication 1995). The 1995 survey in this area, however, is close to that of Moore (1913). May designated only 8.7 acres of Dauphin Island Bay as oyster reef, while the 1995 survey found 521.8 acres and Moore listed 756 acres. If the area now dredged to maintain the Dauphin Island Bay channel and Dauphin Island Marina is subtracted from Moore's figure, the result approximates the 1995 total. Similarly, Moore listed 208 acres of productive reef in what is now the Peavy Island reef area. This figures

similar to the 256.5 acres found in 1995 but very different from the 22.2 found by May (1971).

Regardless of the specific reasons for the difference in reef areas found by each survey, the configurations for most reefs are basically the same. One exception is Sand reef which has changed radically. The early surveys of Ritter (1896) and Moore (1913) found this area as productive as any in Alabama waters. May (1971) despite his logistic, depth limitations, found the area barren of oysters, but still containing numerous half-shells. The present survey found only hard bottom with little cultch material.

In summary, north of the GIWW, Alabama's oyster reefs in the Cedar Point vicinity have changed little in size and configuration in the past 25 years. Much more reef was found south of the GIWW in 1995, but this was largely because this area was inadequately surveyed in 1968.

MANAGEMENT OF ALABAMA'S OYSTER INDUSTRY

Historically Alabama's efforts to manage oyster production and harvest have consisted of planting shell on public reefs. Until the 1970's, oyster shell was used to rehabilitate depleted reefs. Clamshell, because of its availability and cheaper price, had become the preferred cultch from the 1970's through the mid 1980's. In the past decade, oyster shell has again become the predominant cultch material as expense and environmental concerns have eliminated clamshell sources. Table 2 lists recent shell planting efforts.

There have been a few efforts over the years to transfer oysters from closed to open areas. In general these small and sporadic attempts have faired poorly because the cost involved in moving the oysters exceeded the subsequent harvest benefits. Current concerns about public health, scarce funding and controversy over moving oysters from traditional, natural areas will severely restrict any future oyster transfer programs.

At present Alabama's productive reefs would benefit from extensive shell planting. Lack of suitable cultch is a limiting factor in oyster abundance over large areas of Cedar Point reef. Plantings on the Cedar Point - Heron Bay area in 1990 and 1992 have successfully increased spat set and subsequently oyster harvest.

The two major obstacles that large consistent shell planting programs face are 1) supply of shell and 2) financing. Because of the unique nature of Alabama's oyster industry an available supply of oyster shell for cultch is not a problem. Alabama landings have remained at a steady three to four per cent of the overall Gulf totals since the 1960's. However, over that period Alabama has processed nearly 20 % of the oysters landed Gulf wide. These imported oysters provide the shell surplus Alabama enjoys.

In the future, however, should other Gulf states process their own oysters, or require that shellstock shipped out of state for processing be returned, Alabama would lose its major source of shell. At that point it would be essential that all oysters harvested from Alabama reefs and subsequent shell received for replanting be documented. Data from periodic enforcement checkpoints in February and April 1995 indicate oystermen caught 1410.17 sacks/day in February and 712.67 sacks/day in April. Projecting these figures over the entire month, the landings figures should be 28,203 sacks in February and 14,253 sacks in April. The final landings figures for those months as collected by Alabama port agents were 12,804 sacks in February and 9,061 sacks in April, 45% and 64% respectively of the checkpoint landing projections.

Lack of funding has prevented the establishment of permanent checkpoint sites, but their need will become critical for the Alabama oyster industry if other Gulf states eventually retain all their respective shellstock.

The limiting factor in Alabama shell planting efforts is financing. The large plantings of 1980's were largely funded by federal disaster relief funds in the wake of two hurricanes and a severe flood year. No state or county funds have been available for shell planting with the exception of an occasional special legislative grant. The oyster industry does not allocate any funds for public reef rehabilitation, although the newly revitalized Alabama Seafood Association has plans to supplement Marine Resources Division shell plantings through the cooperation of its membership. A shell planting barge is currently under construction by the Association, with hopes that supplemental shell planting will take place annually beginning in 1995.

Efforts to address the funding shortfall for shell planting began in the mid 1980's. An oyster sack tagging law provided some funding for shell planting efforts and, helped identify the actual amounts of shell owed by individual shops. Once shell owed by

individual shops was determined, collection and planting this shell was initiated. All proceeds from oyster tag sales were used to partially fund these efforts. However, receipts from tag sales were insufficient to completely fund these plantings, thus additional Marine Resources funds were allocated for shell planting purposes. Budget constraints may not allow for Marine Resources Division supplemental funding for future shell plantings. Identification of a stable, consistent source of funds for shell planting is essential if this management practice is to continue.

The Marine Resources Division has recently undertaken oyster management projects other than shell planting. An effort to test archeological coral as an alternative cultch material was accomplished. The coral proved successful in capturing spat, however its current cost is far higher than available oyster shell.

At present, shell planting efforts by the Marine Resources Division are conducted under a consistent methodology. Under Alabama law each shop owner is required to plant one half of all Alabama shell processed back on the public reefs or pay the Marine Resources Division to do so. In the late winter, when final annual harvest figures are available, a list of each shop and the amounts of shell it owes is provided to the Marine Resources Division biological staff. From the amount of shell owed plus the amount of money available to plant, the quantity of shell to be hauled and planted is determined. The Alabama Department of Finance, Purchasing Division issues an invitation to bid, and contracts to haul, load, and plant shell are awarded.

Once these contracts are in place Marine Resources Division biological personnel meet with the representatives of the local oystermen associations and a consensus regarding planting areas is reached. Usually an oysterman will accompany Marine Resources Division personnel to mark the exact sites chosen. Just prior to the beginning of planting the individual shop owners are contacted and offered several options for meeting their shell planting obligations required by law. The choices are, 1) plant half the quantity of Alabama shell they processed at their own expense as required by strict interpretation of the law, 2) if they are situated where their shell can be loaded directly onto a barge, give the Marine Resources Division three-quarters of the amount of Alabama oyster shell they processed and Marine Resources Division will pay for planting it or, 3) give the Marine Resources Division all the Alabama shell they processed and Marine Resources Division will haul it to a staging site and plant it from that point. Virtually all shops choose option three. Not only do shops generally choose the third option, many allow and even request that the Marine Resources Division haul all their shell (including imported shell) to the staging area. Thus Marine Resources Division will haul shell until its funding for the activity is exhausted. In 1993 when there was the greatest amount of funding to haul shell ($10,000) Alabama collected 4833.5 cubic yards more shell than was actually processed by Alabama shops.

The dollar amount reported for shell hauling and planting does not include Marine Resources Division personnel time, which is significant. To haul shell, one person is required at the shop to issue a receipt for each load to the shop owner, one person at the unloading or staging site to give a receipt to the truck driver, and one person is needed to seek out and identify shops with shell ready to haul that day so the loader can move his equipment from shop to shop in a timely and efficient manner. The shell is loaded from the staging area onto a barge where the person already at the staging area assists an additional man in measuring each barge load. A receipt is given to the loader and the additional man accompanies the barge to the planting site to guide and observe the actual planting operation. The planter is then given a receipt for the amount planted. Finally, the biologist in charge of the entire operation, usually the person who is contacting the shops in advance of shell pickups, must determine the amount of shell hauled and planted at the end of each day, and set priorities as to which shops need to have additional shell collected to fulfill their obligations based upon the updated figures. Each operation, hauling and planting, is usually a 10-12 hour day. If the salaries and benefits for the biologist, two biologist aides, and laborer who participate in the activity are computed, a day of hauling and planting shell costs the Marine Resources Division $654.74 in personnel expenses. If no equipment breakdown occurs generally 800 yds 3/day can be planted and 1000 yds 3/day can be hauled.

Besides shell planting, Alabama Marine Resources Division management efforts concentrate on regulations which provide sack limits and length of the harvest days and season. These regulations are set in meetings with the representatives of local oystermen associations. The sack limit has varied from, no limit, prior to Hurricane Elena in 1985, to 20 sacks/day, in 1987, down to four when the population of oysters on the reef was very low in 1989, upwards to 8 in 1991,

to the present 12 set in September 1992.

The size limit of 75 mm (3 inches) was established in 1937 and the commissioner of conservation given the power to reduce the legal size to 65 mm (2 5/8 inches).

In Alabama, oysters can legally be taken only in daylight hours. At present, again with the concurrence of local oyster associations, the harvest hours run from 7 a.m. to 4 p.m. from October to April and 6 a.m. to 12 noon May through September. The change from 6 am. to 7 a.m. is to make allowance for later sunrise in the winter and the one from 4 p.m. to 12 noon to decrease the mortality of spat lying on a hot deck waiting to be culled in the summer. Unless there is a very low population of oysters, requiring reduced harvest pressure, Alabama reefs are closed only by order of the state health department because of high river flows and subsequent increased fecal coliform levels.

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X Y GRID COORDINATES - 1995 OYSTER REEF SURVEY

SAND REEF

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105626.33-303271.11
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114401.89-298824.96
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114836.90-298792.05
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116044.12-298906.53
116453.16-298968.20
117007.24-299073.58
117653.30-299218.09
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118854.75-299559.33
119390.67-299737.72
119982.75-299951.51
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121667.98-300613.04
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122925.39-301363.84
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108447.35-303388.15
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112701.19-302703.21
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112780.12-303638.56
112862.97-303922.03
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113714.38-305480.10
114115.64-306440.82
114295.94-307165.07
114437.48-307756.79
114786.14-308104.96
114652.53-308605.62
115298.18-309029.74
115279.17-309401.80
115181.96-309974.34
115536.35-310235.71
115806.68-311194.37

CEDAR PT. REEF cont.

115890.14-311263.75
116046.57-311721.57
116092.28-312011.64
116502.73-311696.69
116331.21-311265.78
116513.86-310690.64
116579.33-310176.58
116211.89-309908.55
116166.81-309333.93
115795.95-308841.84
115756.28-308357.28
115596.80-307853.46
115531.94-307330.63
115280.09-306829.94
115141.92-306418.84
114973.82-305780.01
114763.50-305353.06
114652.00-304925.01
114396.25-304330.24
114247.15-303925.85
114275.40-303426.09
114462.29-302952.10
114477.20-302565.81
115955.93-302453.02
116169.72-301895.93
116102.09-301813.80
116192.41-301276.68
117063.87-300712.45
117645.61-301536.95
118428.18-301888.63
119133.30-302171.71
119735.33-302440.66
117910.12-301308.40
117109.60-300745.71
116333.31-300575.76
115692.95-300402.86
115365.28-300243.25
115311.56-300025.41
115048.69-300010.07

BUOY REEF "A"

121828.41-300610.11
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117237.14-306887.91
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116582.66-306284.10
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116304.33-306288.38
115964.09-306547.04
116160.54-307225.82
116459.66-307543.10
116696.97-308065.04
116941.13-307437.02
117245.62-307260.57
117818.11-307243.03
118051.31-307171.26
118348.21-307544.26
118330.73-308080.98
118321.78-308586.68
118333.40-308920.31
117994.72-309525.23
117401.92-309081.08
117162.41-308831.00
116873.19-308745.61
116672.27-308817.52
116717.68-309216.01
116794.32-309810.04
117072.76-310112.36
117121.69-310690.75
117438.16-311170.79
117434.68-311673.55
121828.40-300610.10
117786.76-306820.43
117251.28-306879.71
116430.69-306884.81
116583.45-306338.37
116383.47-306203.15
116226.45-306300.79
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116181.52-307186.48
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116735.91-308022.15
116824.68-307479.89
117167.17-307294.24
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117969.15-307125.02
118208.28-307519.83
118327.35-308073.99
118313.45-308616.04
118252.52-308938.83
117925.17-309521.77
117407.92-309078.74
117102.73-308826.16
116837.87-308728.31
116682.68-308783.13
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117397.15-311147.09
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117610.39-312279.60
117813.00-312455.69
118127.80-312190.84
118367.47-311652.41
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118666.46-310070.18
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119171.87-308915.28
118872.09-308571.34
118675.32-307522.31
119300.86-307300.28
119310.19-307012.48
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120017.45-306604.99
120253.26-306163.41
120408.33-306161.91
120872.94-305822.05
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120337.40-304998.04
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119474.93-305332.08
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119497.66-306218.21
119221.66-306457.69
118613.52-306594.36

BUOY REEF "B"

121362.32-305580.83
121218.73-305931.64
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121343.02-306543.49
121685.36-306575.01
122346.48-306126.28
122554.57-305810.40
122630.16-305323.05
122475.66-304920.06
122306.09-304866.05
122065.36-305134.46
121882.24-305240.74

BUOY REEF "C"

121107.17-303616.74
120837.13-304157.91
120895.71-304352.73
120760.94-304538.00
120660.98-304951.14
120768.89-304984.60
121174.09-304653.41
121177.77-304244.04
121536.15-303796.06
121693.54-303586.33

BUOY REEF "D"

119088.94-302695.26
119208.18-303022.02
118841.89-303433.03
119283.72-303646.18
119276.34-304125.57
119321.69-304421.66
119729.57-303892.72
119859.18-303134.18
120322.81-302854.49
119578.55-302605.12

BUOY REEF "E"

123377.75-306049.23
123154.45-306505.82
123078.09-306897.56
122810.54-307148.37
122740.35-307378.21
123511.80-307061.62
123678.12-307062.39
123977.50-306804.81
123852.62-306541.27
123954.05-306353.93
123915.62-306153.61

KING'S BAYOU REEF

125346.62-308133.73
125396.09-308494.94
125239.07-308665.95
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124826.20-309478.98
124667.06-309767.66
124438.02-309576.64
124404.38-309186.29
124378.09-308919.85
124417.96-308555.34
124524.04-308136.00
124467.95-307742.68
124396.97-307198.06
124434.55-306751.00
124545.59-306409.66
124929.48-306384.68
124915.32-306403.02
125383.86-306734.10
125665.92-306996.69
125796.78-307388.66
125724.04-307828.82
125524.72-308090.56

PEAVY ISLAND REEF

103660.50-301935.43
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103538.43-302010.00
103463.57-302062.81
103379.08-302120.99
103344.12-302179.31
103263.74-302290.06
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103343.56-302357.88
103439.15-302366.80
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103638.57-302374.03
103738.32-302354.82
103743.45-302300.41
103746.71-302231.40
103731.30-302197.01
103728.07-302107.68
103672.22-302040.88
103631.28-301987.52
103637.21-302119.55
100773.02-304039.22
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100926.99-304080.90
100963.08-304118.53
101014.01-304149.78
101116.40-304245.44
101158.86-304308.95
101233.64-304448.95
101270.43-304530.22
101297.36-304576.62
101336.13-304597.43
101402.25-304616.61
101499.73-304619.10
101565.18-304510.44
101686.86-304530.22
101757.34-304547.98
101849.50-304514.26
101973.08-304464.03
101966.94-304341.35
102087.84-304270.14
102189.93-304273.82
102296.45-304325.68
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102438.38-304129.29
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102670.01-303725.71
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102597.10-304015.85
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102518.32-304178.98
102445.23-304294.95
102241.97-304542.90
102241.75-304542.69
102142.16-304656.84
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102320.42-303427.54
102319.76-303405.31
102332.64-303381.91
102310.42-303381.53
102282.21-303379.30
102279.41-303404.72

DAUPHIN ISLAND REEF

98496.31-307511.97
98501.72-307585.02
98524.26-307636.83
98558.42-307675.36
98603.78-307702.35
98679.09-307703.34
98691.56-307589.35
98946.82-307889.97
98829.94-307966.29
98750.06-308007.20
98652.90-308087.85
98493.88-308127.46
98390.71-308106.23
98295.35-308056.07
98239.40-308046.21
98219.93-308070.17
98301.68-308150.80
98381.79-308196.36
98432.58-308191.43
98471.42-308141.92
98677.31-308135.69
98724.96-308246.24
98755.75-308338.09
98772.69-308446.07
98766.88-308508.47
98762.70-308688.68
98720.71-308711.23
98684.85-308821.29
98639.14-308904.45
98609.89-308973.40
98544.19-309080.96
98450.48-309174.81

DAUPHIN IS. REEF cont.

98340.71-309269.28
98255.89-309338.69
98142.83-309427.75
98075.99-309449.69
97926.23-309528.48
97813.70-309590.35
97715.02-309648.81
97622.46-309721.45
97508.12-309792.78
97363.80-309857.86
97269.87-309911.85
97226.11-309988.49
97203.04-310107.34
97180.79-310225.36
97136.85-310282.63
97019.01-310366.75
96949.46-310440.98
96957.22-310496.59
96956.45-310586.48
96857.23-310580.50
96814.31-310544.96
96783.21-310639.59
96730.07-310716.82
96663.22-310813.07
96569.85-310891.75
96483.37-310944.22
96364.82-310971.83
96283.76-310986.97
96165.38-311021.72
96098.35-311044.92
98740.06-305088.98
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98297.49-305313.47
97986.93-305443.50
97881.59-305914.38
97780.43-306076.14
97222.33-306058.67
97080.25-306243.14
96819.16-306380.43
96703.91-306493.32
96432.10-306815.69
96131.16-307187.11
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95811.53-307408.61
95463.12-307614.25
95217.06-307619.23
94989.33-307665.09
94676.86-307974.35
94609.55-308467.33
94500.44-308757.07
94044.85-308997.35
93775.08-309169.27
93992.39-311609.11
94368.19-312109.59
96074.25-311088.20
96032.24-311212.10
95987.44-311307.98
95951.41-311407.43
95910.57-311488.35
95856.94-311573.60
95834.12-311639.63
95824.06-311684.21
95775.46-311732.70
95743.51-311704.80
95670.64-311722.68
95687.56-311778.13
95730.03-311845.41
95763.11-311904.09
95784.67-311948.46
95772.16-312017.66
95666.94-312124.88
95576.46-312125.69
95433.56-312125.25
95405.59-312205.76
95417.15-312287.54
95427.40-312354.48
95453.53-312442.11
95586.81-312676.82
95477.20-312826.32
95392.91-312859.89
95383.99-312946.84
95388.10-313054.61
95417.53-313207.14
95342.42-313382.99
94416.95-308478.91
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94826.46-312678.14
93353.13-310843.25
93430.38-310317.36
93775.03-309169.53
99104.13-302369.76
99308.09-302514.44
99974.05-302949.02
100484.95-303348.55
100869.58-303164.36
98556.05-302642.88
98352.61-303157.26
98018.35-302990.10
97757.19-303157.66
97920.44-303990.32
98314.67-304116.84
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98681.36-304724.04
98722.37-304581.73
98746.35-304503.63
98776.71-304436.03
98822.91-304362.96
98873.79-304320.36
98943.35-304273.37
99027.92-304228.71
99125.08-304182.03
99237.29-304122.84
99405.01-304051.53
99589.52-303972.62
99728.09-303929.07
99878.49-303891.61
100027.30-303868.90
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100293.58-303835.69
100439.79-303834.05
100565.85-303842.45
102685.34-303150.12
102833.72-302996.21
103287.15-302931.55
103035.24-303205.13
102829.39-303476.94
102676.01-303688.94
102617.87-303841.00
102527.93-304072.04
102346.80-304414.63
102221.42-304546.58
102016.92-304802.87
101776.25-305113.04
101576.47-305376.28
101359.84-305643.97
101147.51-305949.53
100920.09-306275.16
100739.87-306535.13
100556.86-306787.89
100352.66-307070.95
100139.19-307343.84
99912.25-307632.87
99676.20-307966.77
99441.07-308299.52
99228.65-308569.78
98902.66-309006.38
98725.11-309274.10
98513.79-309569.90
98119.19-310045.10
98028.50-310174.03
97919.11-310300.25
95403.30-313643.60
95511.22-313517.30
95644.94-313363.63
95711.82-313222.84
95779.80-313086.51
95873.54-312914.37
95978.73-312737.10
96080.13-312602.42
96183.02-312465.65
96272.48-312366.54
96377.64-312222.01
96486.68-312092.48
96925.60-311527.33
97010.94-311406.11
97152.05-311246.44
97276.05-311085.67
97391.98-310963.69
97481.85-310867.27
97566.34-310769.31
97643.33-310672.82

MAIN CONTROL POINT FOR 1995 ALABAMA OYSTER REEF SURVEY 21E-1B

△ BRONZE DISK - TOP OF MAIN SPAN DAUPHIN ISLAND BRIDGE.

105624.24 - 301581.33

LORAN C (GULF CHAIN 7980) PRE-SURVEY CONTROL POINTS

SAND REEF

12708.9	47104.4
12709.0	47107.3
12709.9	47096.9
12711.1	47097.0
12711.7	47097.1
12712.7	47097.7
12712.9	47097.0
12713.3	47097.2
12713.6	47097.1
12714.0	47096.9
12715.1	47097.1
12715.2	47097.2
12715.8	47097.0
12716.1	47096.9
12717.1	47096.9
12717.7	47096.8
12718.6	47096.7
12719.3	47096.7
12720.4	47096.5
12721.1	47096.5
12721.6	47096.1
12721.4	47096.0
12720.6	47096.0
12721.0	47096.2
12720.9	47096.4
12720.0	47096.5
12719.1	47096.4
12718.0	47096.5
12717.0	47096.6
12716.4	47096.4
12715.9	47096.5
12715.3	47096.7
12714.2	47096.8
12714.4	47096.7
12715.2	47096.4
12715.8	47096.2
12716.3	47095.8
12716.9	47095.7
12717.3	47095.4
12716.6	47095.3
12716.1	47095.4
12715.1	47095.4
12713.9	47095.4
12712.7	47095.4
12711.7	47095.5
12710.8	47095.6

W.CEDAR PT. REEF

12967.3	47095.5
12695.5	47096.3
12695.3	47096.5
12695.3	47097.1
12694.0	47097.4
12694.1	47097.7
12694.2	47097.8
12695.0	47098.1
12695.3	47098.4

W.CEDAR PT. cont.

12695.3	47098.5
12695.4	47098.8
12695.3	47099.1
12694.8	47099.4
12694.6	47099.8
12694.6	47100.1
12693.7	47100.3
12691.5	47100.2
12690.4	47100.2
12690.1	47100.6
12689.9	47100.9
12689.8	47101.0
12684.5	47100.8
12685.3	47101.1
12686.2	47101.4
12687.4	47101.7
12688.8	47101.9
12690.0	47102.2
12690.9	47102.3
12691.7	47102.4
12691.1	47102.2
12690.5	47102.0
12689.5	47101.6
12690.5	47100.9
12691.7	47101.1
12694.1	47101.7
12696.0	47102.0
12697.0	47102.4
12696.3	47102.7
12697.0	47103.1
12696.4	47103.8
12696.0	47104.2
12696.3	47104.8
12697.0	47105.1
12698.0	47105.6

E. CEDAR PT. REEF

12713.5	47098.8
12710.6	47098.9
12707.7	47099.1
12706.5	47099.6
12705.8	47099.9
12705.7	47100.2
12705.7	47100.6
12706.0	47100.8
12707.8	47101.4
12709.4	47101.7
12710.4	47101.8
12711.3	47101.8
12711.9	47101.9
12713.0	47102.1
12715.0	47102.5
12717.0	47102.9
12718.5	47103.1
12719.6	47103.2
12720.3	47103.4
12721.5	47103.4

E. CEDAR PT. cont.

12722.3	47103.8
12723.0	47103.8
12724.0	47103.7
12724.7	47104.0
12725.5	47104.1
12726.5	47104.2
12726.8	47104.3
12727.7	47104.4
12728.3	47104.4
12727.8	47104.7
12726.9	47104.6
12725.9	47104.6
12724.7	47104.7
12724.0	47104.4
12723.0	47104.4
12721.9	47104.1
12721.0	47104.1
12720.0	47104.0
12719.1	47103.9
12717.9	47103.7
12717.1	47103.6
12716.0	47103.4
12715.0	47103.3
12714.0	47103.2
12713.0	47103.0
12712.1	47102.9
12711.1	47102.9
12710.1	47103.0
12709.4	47103.1
12709.4	47104.0
12708.2	47104.1
12708.8	47104.0
12707.0	47104.0
12706.0	47104.6
12707.6	47105.0
12708.4	47105.6
12709.0	47106.1
12709.6	47106.5
12707.2	47105.2
12706.1	47104.4
12705.6	47104.1
12705.1	47103.1
12705.0	47103.5
12704.5	47103.4
12704.3	47103.2

BUOY REEF "A"

12718.0	47105.4
12718.0	47105.0
12718.0	47104.5
12716.8	47104.5
12716.6	47104.4
12716.8	47104.3
12717.3	47104.1
12718.6	47104.3
12719.3	47104.5
12720.3	47104.7

LORAN C (GULF CHAIN 7980) PRE-SURVEY CONTROL POINTS cont.

BUOY "A" cont.

12719.1	47104.8
12718.8	47105.0
12718.8	47105.4
12718.6	47105.5
12719.4	47105.7
12720.5	47105.8
12721.5	47105.8
12722.2	47105.8
12723.3	47105.6
12722.4	47105.2
12721.9	47105.0
12721.7	47104.8
12721.8	47104.7
12722.6	47104.7
12723.5	47104.7
12724.5	47105.0
12725.6	47105.1
12726.5	47105.3
12727.5	47105.4
12728.7	47105.5
12729.1	47105.6
12728.6	47105.8
12727.6	47106.0
12726.5	47106.1
12725.7	47105.8
12724.5	47106.1
12723.6	47106.1
12722.3	47106.4
12721.6	47106.2
12720.5	47106.2
12719.5	47106.0
12719.0	47106.4
12718.5	47106.4
12718.6	47106.6
12717.7	47106.8
12717.0	47107.0
12718.6	47107.1
12716.3	47107.4
12715.2	47107.1
12714.6	47107.0
12714.5	47106.7
12715.2	47106.4
12716.4	47106.8
12717.0	47106.5
12717.4	47106.3
12717.6	47105.9

BUOY REEF "B"

12715.8	47107.6
12716.5	47107.6
12717.8	47107.7
12717.9	47108.0
12717.0	47108.4
12716.4	47108.5
12715.4	47108.5
12714.7	47108.4
12714.5	47108.3

BUOY "B" cont.

12714.9	47108.1
12715.2	47108.0

BUOY REEF "C"

12711.9	47107.4
12712.9	47107.3
12713.3	47107.3
12713.7	47107.2
12714.5	47107.2
12714.6	47107.3
12714.0	47107.5
12713.2	47107.5
12712.3	47107.7
12711.9	47107.8

BUOY REEF "D"

12709.9	47106.0
12710.5	47106.1
12711.3	47105.9
12711.8	47106.2
12712.7	47106.2
12713.3	47106.3
12712.3	47106.5
12710.8	47106.6
12710.4	47106.8
12709.8	47106.4

BUOY REEF "E"

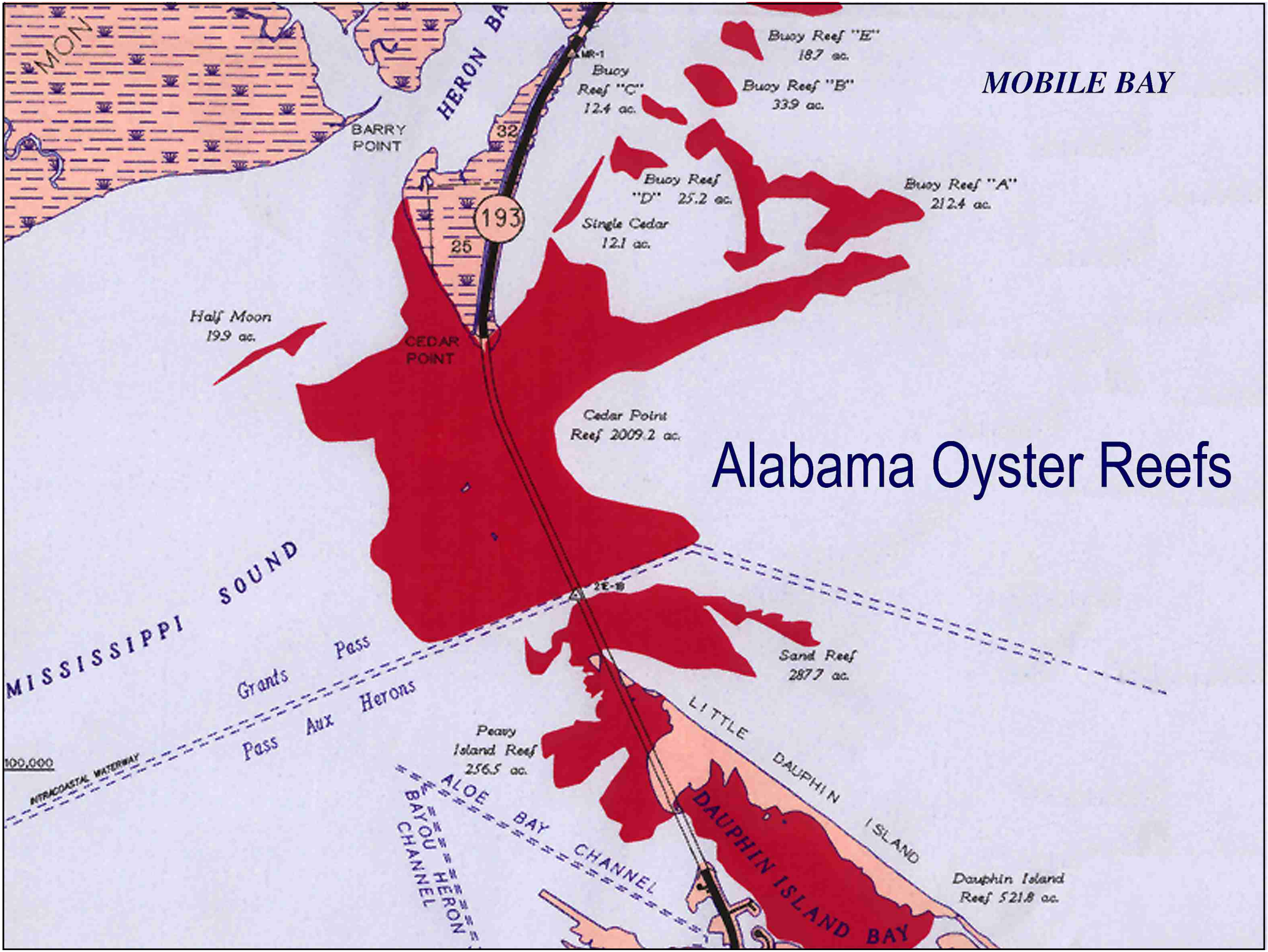
12717.0	47109.1
12717.9	47108.9
12718.6	47108.9
12719.1	47108.7
12719.5	47108.7
12719.0	47109.2
12719.0	47109.3
12718.5	47109.5
12718.0	47109.4
12717.7	47109.5
12717.3	47109.4

PEAVY IS. REEF

12709.3	47093.7
12709.7	47093.5
12708.9	47093.1
12708.1	47092.6
12707.5	47092.5
12708.2	47092.1
12709.2	47092.0
12708.9	47091.8
12709.1	47091.6
12710.9	47091.9
12711.1	47092.1
12711.8	47092.2
12706.0	46096.3
12708.5	47096.5
12705.4	47096.4
12705.2	47096.1

PEAVY IS. cont.

12705.0	47095.9
12705.0	47095.7
12704.5	47095.6
12703.9	47095.7
12703.7	47095.8
12703.7	47096.0
12703.3	47096.1
12703.0	47096.1
12702.1	47096.1
12701.1	47096.0
12700.5	47096.3
12707.2	47096.7
12707.0	47096.8
12703.4	47095.4
12702.7	47095.2
12702.0	47095.3
12709.8	47095.1
12709.7	47095.4
12706.3	47096.5


MOBILE BAY
Alabama Oyster Reefs
MON
HERON BA
MR-1
Buoy Reef "C"
12.4 ac.
Buoy Reef "E"
18.7 ac.
Buoy Reef "B"
33.9 ac.
BARRY POINT
32
193
25
Buoy Reef "D" 25.2 ac.
Buoy Reef "A"
212.4 ac.
Single Cedar
12.1 ac.
Half Moon
19.9 ac.
CEDAR POINT
Cedar Point
Reef 2009.2 ac.
MISSISSIPPI SOUND
Grants Pass
Pass Aux Herons
2E-18
Sand Reef
287.7 ac.
LITTLE DAUPHIN ISLAND
Peavy
Island Reef
256.5 ac.
100,000
INTRACOASTAL WATERWAY
ALOE BAY CHANNEL
BAYOU HERON CHANNEL
DAUPHIN ISLAND BAY
Dauphin Island
Reef 521.8 ac.

THE 1995 ATLAS OF MAJOR PUBLIC OYSTER REEFS OF ALABAMA AND A REVIEW OF OYSTER MANAGEMENT EFFORTS 1975 - 1995

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