SHORELINE CHANGES IN THE ISLES DERNIERES BARRIER ISLAND ARC: 1887-1996 TERREBONNE PARISH, LOUISIANA

Shea Penland1[1], Chris Zganjar2[2], Karen A. Westphal[2], Paul Connor[1]
Jeff List[3] and S. Jeffress Williams[3]

INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with the Coastal Research Laboratory in the Department of Geology and Geophysics at the University of New Orleans (UNO) and the Center for Coastal Energy and Environmental Resources at Louisiana State University (LSU), is investigating the processes of coastal erosion and wetland loss in Louisiana (Sallenger and others, 1987; Sallenger and Williams 1989; Penland and others, 1992). Building on the USGS Louisiana Barrier Island Study (Williams and others, 1992) and the USGS Hurricane Andrew impact assessment (Penland and others, 1998), this USGS Open-File Report depicts shoreline changes between 1887 and 1996, which provides an 8-year update of McBride and others (1992).

The Isles Dernieres are located about 120 km southwest of New Orleans (Figure 1). This barrier island shoreline is 32 km long and extends from Caillou Bayou east to Wine Island Pass. The Isles Dernieres represent a barrier island arc developed from the reworking and erosion of an abandoned distributary of the Lafourche delta complex within the Mississippi River delta plain (Penland and others, 1988). Previous work by McBride and others (1992) documented a long-term (1887-1988) gulfside erosion rate of -11.1 m/yr and a short-term (1978-1988) gulfside erosion rate of -19.2 m/yr. The long-term bayside (1906-1988) erosion rate was measured at -0.6 m/yr and the short-term (1978-1988) bayside erosion rate was measured at -5.2 m/yr. The Isles Dernieres decreased in area at a rate of -28.2 ha/yr between 1887 and 1988, suggesting the long-term date of disappearance would be 2015. The rate of area loss between 1978 and 1988 was measured at -42.7 ha/yr suggesting a short-term disappearance date of 2004. In the 1992 Hurricane Andrew impact assessment by Penland and others (1998), the Isles Dernieres experienced a brief and intense period of increased erosion. The average gulfside erosion rate accelerated to -59.37 m/yr and the average bayside erosion rate accelerated to -10.8 m/yr during the year of the 1992 Hurricane Andrew impact. The Isles Dernieres rate of area change accelerated to -155.7 ha/yr during the 1992 hurricane season. Hurricane Andrew accelerated the long-term area loss rate to -28.5 ha/yr and the short-term area loss rate to -49.54 ha/yr.

The Hurricane Andrew impact on the Isles Dernieres produced 3-5 years of erosion in a matter of days. After the Hurricane Andrew impact, the projected long-term disappearance date of the Isles Dernieres was reduced from 2015 to 2012 and the short-term disappearance date was reduced from 2004 to 2003.

[1] Department of Geology and Geophysics, University of New Orleans
[2] Center for Coastal, Energy and Environmental Resources, Louisiana State University
[3] U.S. Geological Survey, Coastal and Marine Geology Program

The objective of this USGS Open-File Report is to up-date the shoreline change analysis by McBride and others (1992) and Penland and others (1998) for the Isles Dernieres to 1996. In this shoreline change update, the authors used the methods and transects used by McBride and others (1992) to insure data compatibility of the new measurements and analysis. Table 1 presents the transect measurements of shoreline change for the Isles Dernieres. For gulfside change measurements, a negative (-) sign signifies landward movement or erosion and a positive (+) sign signifies a seaward movement or progradation. For bayside change measurements, a negative sign signifies a seaward movement or erosion and a positive sign signifies a landward movement or accretion.

To update the Louisiana Barrier Island Erosion Study Atlas, new vertical aerial mapping photography was acquired on December 9, 1996 in order to quantify shoreline changes since January 21, 1988. The focus of this USGS Open-File report is to update the results presented by McBride and others (1992). The Hurricane Andrew impact on the Isles Dernieres is recorded in the December 9, 1996 morphology of this barrier island arc.

GULFSIDE SHORELINE CHANGES

In terms of long-term shoreline change history between 1887 and 1996, the highest rates of change occurred along the gulfside of the Isles Dernieres where erosion is dominant (Table 1). The highest rates of shoreline erosion are found at Wine Island where total erosion amounts measured between -2412.1 m (transect #88) and -2429.2 m (transect #86) for this 109-year period. This amount of erosion translates to an average annual rate of -22.2 m/yr.

In general, the Isles Dernieres experiences high rates of coastal erosion in the center of the island arc which increases east and west away from Whiskey Island. The greatest amount of long-term erosion found on Whiskey Island is at Whiskey Pass (transect # 40) and Coupe Colin (transect #24) where -2453.6 m and - 2268.7 m of erosion were measured respectively. At these locations, very dynamic sandy recurved spits respond rapidly to changes in wave and tidal energy. On the central portion of Whiskey Pass (transect #33) where a resistant marsh platform is exposed, erosion was measured at-1493.7 m. The average long-term (1887-1996) erosion rate for Whiskey Island is -17.0 m/yr.

East and west of Whiskey Island the long-term erosion rates gradually decrease to the flanks of the Isles Dernieres barrier island arc. The exception is at the flank of Coupe Juan where this tidal inlet is rapidly eroding its channel margins. In general, erosion at Trinity Island measured -1430.6 m at the west end (transect #48) and decreased to -1072.2 m at the east end (transect #67). Adjacent to Coupe Juan on Trinity Island, the long-term erosion increased to a maximum of -1669.9 m (transect #66). The average long-term rate of erosion for Trinity Island is measured at -11.5 m/yr.

Further to the east lies East Island, which is the site of a barrier island restoration project by the Terrebonne Parish Consolidation Government. On the west end of East Island, at the margin of Coupe Juan (transect #67), the long-term erosion was measured at -1407.2

m and decreased and reversed to +386.9 m on the western margins of Wine Island Pass (transect #81) at the east end of East Island. The average long-term erosion rate documented for East Island is -5.1 m/yr.

West of Whiskey Island lies Raccoon Island which is experiencing a similar pattern of erosion that decreases from the central barrier island arc to its margins. The long-term erosion measurements ranged from^{-1} 286.4 m at the east end of Raccoon Island (transect #11) to -775.0 m at the west end (transect #2). The average long-term rate of erosion is measured at -8.4 m/yr .

Between 1887 and 1996, the overall average erosion rate for the Isles Dernieres was measured at -11.8 m/yr (Table 2). The previous analysis by McBride and others (1992) documented the long-term erosion rate between 1887 and 1988 as -11.1 m/yr. Our new analysis indicates the long-term rate of erosion has accelerated by -0.7 m/yr since 1988.

The short-term shoreline changes in the Isles Dernieres between 1988 and 1996 show greater variability than the long-term shoreline changes between 1887 and 1996 (Table 1). The highest erosion rates are found at tidal inlet margins and at breaches through individual islands. The average short-term erosion rate at Whiskey Island is -23.6 m/yr. The short-term erosion rate here is a third more than the long-term erosion rate of^{-1} 7.0 m/yr (Table 2). At Trinity Island, the average short-term erosion rate is -25.0 m/yr, which is more than double the long-term erosion rate of -11.5 m/yr. The short-term erosion at East Island is^{-1} 2.8 m/yr which is double the long-term erosion rate of -5.1 m/yr. The westernmost island in this barrier island arc is Raccoon Island where the short-term erosion rate is 25.7 m/yr, which is, triple the long-term erosion rate of -8.4 m/yr. At Wine Island the short-term erosion rate is -14.5 m/yr, which is less than its long-term erosion rate of -22.2 m/yr. The overall short-term gulfside erosion rate of the Isles Dernieres is -21.8 m/yr, which is a -2.6 m/yr increase over the 1978-1988 short-term rate of^{-1} 9.2 m/yr.

BAYSIDE SHORELINE CHANGES

For the bayside of the Isles Dernieres, the period of record for analysis is 1906-1996. In the original 1887 survey of the Isles Dernieres, only the gulfside shoreline was mapped. It was not until 1906 that a suitable bayside shoreline was mapped accurately to provide a long-term baseline for change analysis. Two distinct patterns of shoreline change are apparent. The first pattern of change is one of erosion associated with marsh platforms located at the wide parts of the individual barrier islands. The erosion of these features have been persistent since 1906 and will be discussed at that time scale. The second pattern is one of landward progradation associated with sandy tidal inlets and barrier shoreline features such as recurved spits and baymouth bars. Patterns of change associated with these sandy geomorphic features are episodic and some are less than a decade old. Therefore, the shoreline changes associated with these dynamic, ephemeral, and young sandy shoreline features will be discussed at the time scales suitable to accurately describe their development and rate of change.

The erosion of the marsh platform on the bayside of the Isles Dernieres has been persistent since 1906 (Table 1). The highest measurements of bayside erosion are found

on Trinity Island where erosion measurements range between -80.0 m (transect #63) and -423.6 m (transect #62) with an average rate of - 2.9 m/yr. At East Island the bayside erosion amounts range between -60.3 m (transect #70) and -398.1 m (transect #79) with an average rate of -2.6 m/yr. The bayside erosion amounts at Whiskey Island are measured between^{-1} 50.2 m (transect #29) and -259.1 m (transect #40) with an average rate of -2.2 m/yr. Further to the west at transects #11 and #10 on Raccoon Island the bayside erosion amount range between -91.8 m and -245.5 m. The average bayside erosion rate here is -2.0 m/yr. The overall annual erosion rate along the bayside marsh platform shoreline of the Isles Dernieres is -2.5 m/yr for the period of 1906 - 1996. In comparison, the rate of bayside erosion between 1906 and 1988 is –1.6 m/yr. This bayside shoreline change rate indicates the erosion of the marsh platform has accelerated.

At Wine Island, the amount of landward bayside progradation for the period 1906 to 1996 ranges between +1856.8 m and +2638.3 m at transects #88 & 82. This amount of progradation is related to island migration by overwash and tidal inlet processes. The average rate of landward progradation is +23.9 m/yr. Similar patterns of progradation are found at Coupe Juan separating East Island and Trinity Island. The original single island composed of Whiskey, Trinity, and East Islands was breached by Hurricane Carmen in 1974 to form a tidal inlet. Subsequently in 1985 Hurricane Juan significantly modified and enlarged this tidal inlet, which was renamed Coupe Juan. The morphology of the Coupe Juan tidal inlet is wave dominated with a pair of landward flaring recurved spits and a flood tidal delta. These sandy recurved spits have prograded landward between +216.8 m and +766.7 m at an average long-term rate of +21.8 m/yr since Hurricane Carmen breached the tidal inlet in 1974. At Whiskey Island where the sandy barmouth bar connects the two island halves, the amount of landward progradation was measured between +69.7 m and +416.9 m since forming in 1978. The average rate of landward bay mouth bar progradation is +11.1 m/yr. On the western side of Whiskey Island there has been a landward prograding recurved spit in existence since 1934. The amount of long-term progradation was measured between +1706.5 m and +1941.9 m at an average rate of +29.8 m/yr. Further west, the recurved spit on the west end of Raccoon Island has shown significant progradation since 1988. Prior to this time the west end of Raccoon Island was more or less eroding in place from both the gulf and bay sides. Since 1988, the Raccoon Island recurved spit has prograded between +102.8 m and +600.1 m at an average rate of +42.6 m/yr.

SHORELINE AREA CHANGES

The area changes of the Isles Dernieres have been dramatic since 1887. Between 1887 and 1996, the Isles Dernieres have decreased from 3535.0 ha to 616.7 ha at a rate of -26.8 ha/yr (Table 3). This long-term rate of area loss forecasts a disappearance date of 2019. The previous long-term disappearance date was forecasted at 2015 using an area loss rate of -27.2 ha/yr (McBride and others, 1992). All of the individual islands show a remarkable improvement over the predictions made by McBride and others (1991; 1992). At Raccoon Island, the shift in the short-term disappearance date from 2001 to 2011 is due to the beach nourishment project that repaired much of the Hurricane Andrew damages to this important shore bird nesting colony. The shift of the disappearance date

of Whiskey Island from 2016 to 2079 demonstrates the importance of barrier island recovery processes following a major hurricane impact. Since the impact of Hurricane Andrew in 1992, two major flanking recurved spits have formed at Whiskey Island by the sediment bypassing Whiskey Pass and nourishing these recurved spits and the baymouth bar in the central part of the island. A similar pattern of post-storm recovery processes have nourished Trinity Island, shifting its disappearance date from 2011 to 2017. A combination of natural storm recovery processes combined with two barrier island restoration projects significantly improved East Island and shifted its disappearance date from 2003 to 2110.

SUMMARY

The highest and most persistent erosion continues to occur along the gulfside shoreline of the Isles Dernieres. The average gulfside shoreline erosion has increased from -11.1 m/yr for 1887 - 1988 to -11.8 m/yr for 1887-1996. The highest erosion rates are found along tidal inlet margins and the lowest rates are found where salt marsh platforms are exposed on the gulfside shoreline.

The bayside shoreline of the Isles Dernieres exhibits two very distinct patterns of shoreline change. Bayside shorelines which are composed of an eroded salt marsh platform have displayed a steady rate of erosion between -1.6 and -2.5 m/yr . The other distinct style of bayside shoreline change is associated with tidal inlet and recurved spit development during this century. At these locations significant volumes of sand accumulate to prograde tidal inlet systems landward. Coupe Juan has prograded +21.8 m/yr since 1974. The sandy baymouth bar in the central portion of Whiskey Island has prograded landward at a rate of -11.1 m/yr since 1978. The recurved spit in the Coupe Colin tidal inlet system has prograded landward at a rate of +29.8 m/yr over the last 62 years. The recurved spit on the west end of Raccoon Island has prograded landward at a rate of +43.7 m/yr since it became active in 1988. Wine Island has rapidly migrated landward by gulfside erosion and bayside progradation at a rate of +23.9 m/yr.

The most remarkable discovery made by this shoreline change analysis update is that the life expectancy of the Isles Dernieres has greatly improved due to the combination of post-storm barrier island recovery processes and several restoration projects. The projected long-term disappearance date has shifted from 2015 to 2019. The projected short-term disappearance date has shifted from 2004 to 2029.

The conclusion of this Isles Dernieres coastal erosion update is that the combination of post-storm recovery processes, combined with the natural sediment dispersal pattern and barrier island restoration projects is helping to stabilize these islands and sustain them for future generations.

ACKNOWLEDGEMENTS

This analysis of Louisiana’s barrier islands was funded by the U.S. Geological Survey Coastal and Marine Geology Program.

DISCLAIMER

This poster is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards (and stratigraphic nomenclature). Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

BIBLIOGRAPHY

McBride, R.A., Penland, S., Jaffe, Bruce, Williams, S.J., Sallenger, A.H., Jr., and Westphal, K.A., 1991. Shoreline changes of the Isles Dernieres Barrier Island Arc, Louisiana, from 1853 to 1989, Miscellaneous Investigation Series Map I-2186, U.S. Geological Survey.

McBride, R.A., Penland, S., Hiland, M., Williams, S.J., Westphal, K.A., Jaffe, B., and Sallenger, A.H., Jr., 1992. Louisiana barrier shoreline change analysis- 1853 to 1989: methodology, database, and results. *In:* Williams, S.J., Penland, S., and Sallenger, A.H., (editors), Atlas of Shoreline Changes in Louisiana from 1853 to 1989. US Geological Survey, Reston, Virginia.

Penland, S., Suter, J.R., and Boyd, R., 1988. The transgressive depositional system of the Mississippi River Delta Plain: A model for barrier shoreline and shelf sand development: Journal of Sedimentary Petrology, v.58, no. 6, p. 932-949.

Penland, S., Williams, S.J., Davis, D.W., Sallenger, A.H., Jr., and Groat, C.G., 1992. Barrier island erosion and wetland loss in Louisiana, in Williams, S.J., Penland, S., and Sallenger, A.H., Jr., eds., Louisiana Barrier island erosion study--atlas of barrier shoreline changes in Louisiana from 1853 to 1989: U.S. Geological Survey Miscellaneous Investigations Series I-2150_A, p. 2-7.

Sallenger, A.H., Jr., Jaffe, B.E., and Williams, S.J., 1989. Erosion of Louisiana's coastal barriers: Louisiana Geological Survey Yearbook 1988, p. 42-45.

Sallenger, A.H., Jr, Penland, S., Williams, S.J., and Suter, J.R., 1987. Louisiana barrier island erosion study: Coastal Sediments '87, American Society of Civil Engineers, p. 1503-1516.

Sallenger, A.H., Jr., and Williams, S.J., 1989. U.S. Geological Survey studies of Louisiana barrier island erosion and wetlands loss: An interim report on status and results: U.S. Geological Survey Open- File Report 89-372, 17 p.

FIGURES

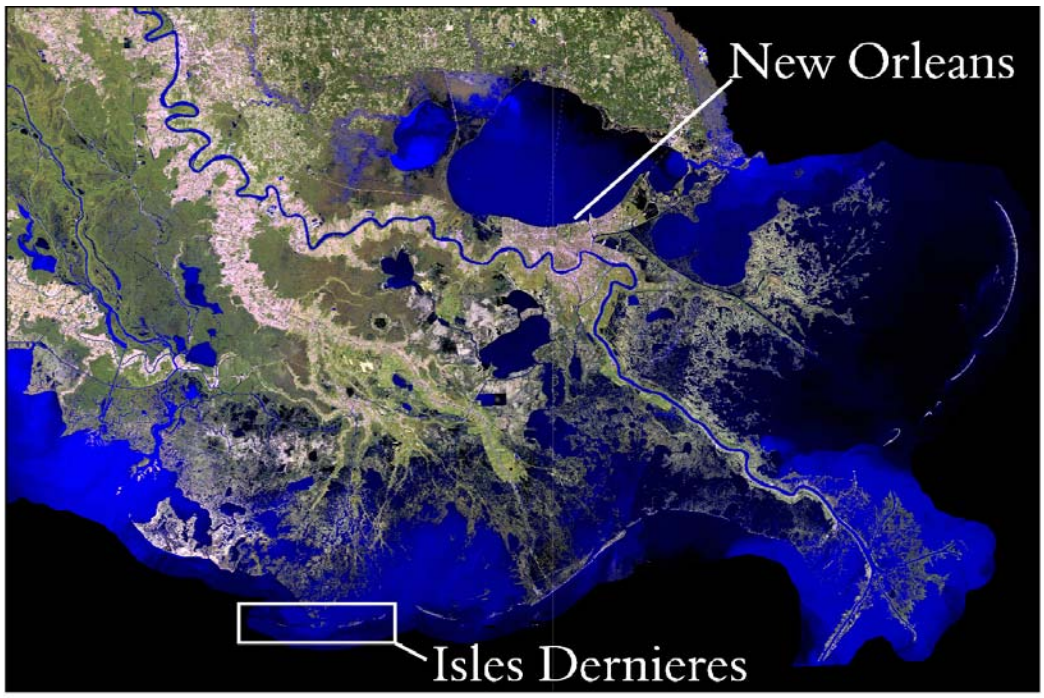
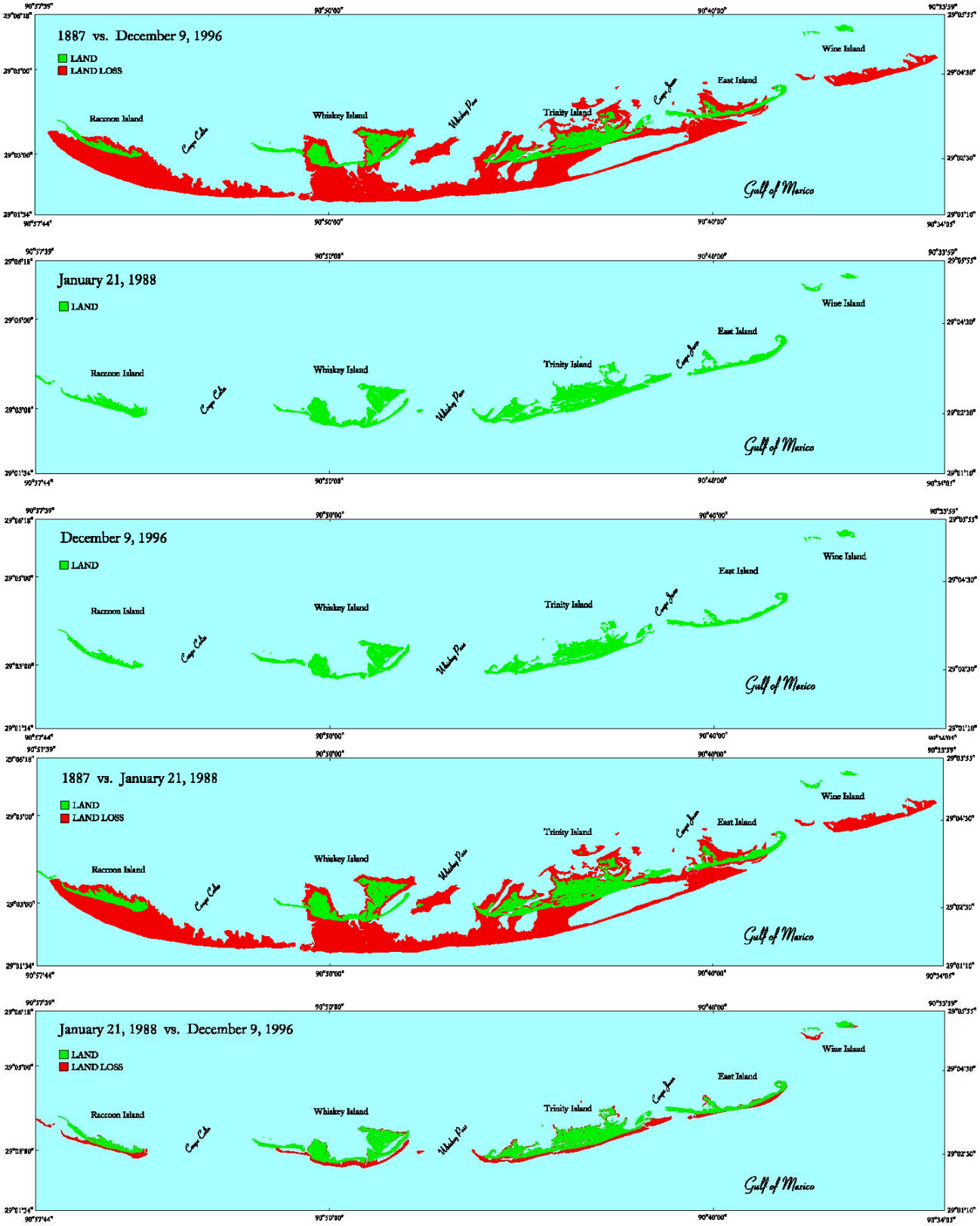
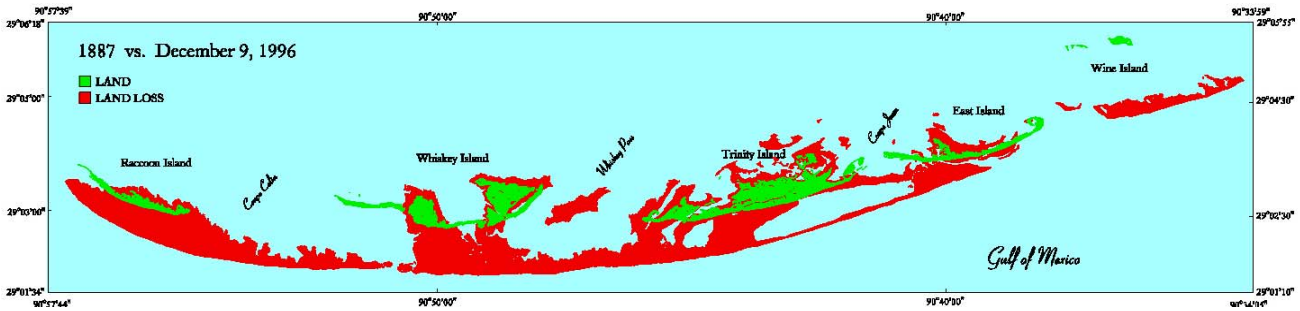


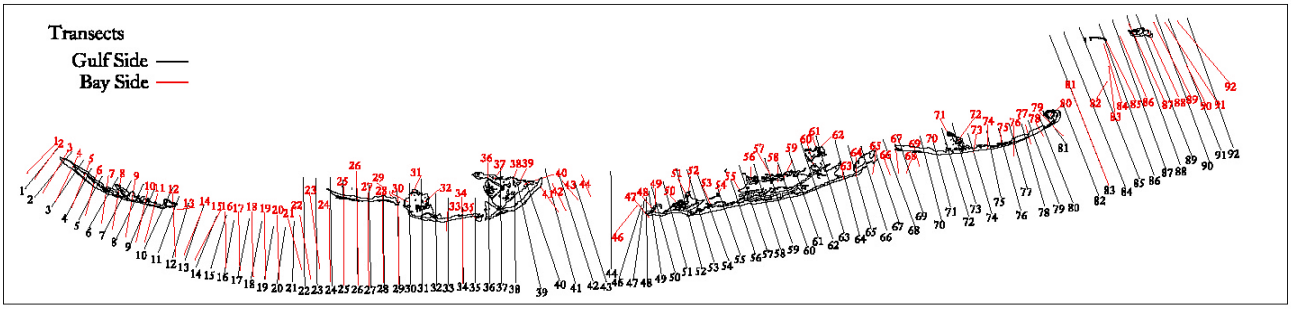
Figure 1.
The Isles Dernieres barrier island arc located 120 km southwest of New Orleans.

MAPS


1887 vs. December 9, 1996
LAND
LAND LOSS
Raccoon Island
Whiskey Island
Trinity Island
East Island
Wine Island
Gulf of Mexico
January 21, 1988
LAND
December 9, 1996
1887 vs. January 21, 1988
January 21, 1988 vs. December 9, 1996


1887 vs. December 9, 1996
LAND
LAND LOSS
Raccoon Island
Whiskey Island
Trinity Island
East Island
Wine Island
Gulf of Mexico


Isles Dernieres Aerial Photographic Mosaic 1996
Raccoon Island
Whiskey Island
Trinity Island
Wine Island


Transects
Gulf Side
Bay Side

TABLES

Table 1

Isles Dernieres gulfside magnitude of change (meters)							Isles Dernieres bayside magnitude of change (meters)					
1887 - Jan 88		Jan 88 - Dec 96		1887 - Dec 96			1906 - Jan 88		Jan 88 - Dec 96		1906 - Dec 96	
1	na	1	na	1	na		1	na	1		1	
2	na	2	na	2	-775		2	na	2		2	
3	-348	3	-506	3	-854		3	na	3		3	521
4	-448	4	-351	4	-799		4	-100	4	567	4	447
5	-570	5	-227	5	-797		5	-207	5	600	5	383
6	-700	6	-99	6	-801		6	-349	6	403	6	48
7	-796	7	-80	7	-874		7	-295	7	103	7	-185
8	-884	8	-74	8	-958		8	-140	8	-6	8	-146
9	-919	9	-77	9	-993		9	-212	9	4	9	-208
10	-926	10	-124	10	-1068		10	-238	10	-6	10	-246
11	-978	11	-317	11	-1286.4		11	-98	11	6	11	-92
12	na	12	na	12	na		12	-163	12	29	12	-202
13	na	13	na	13	na		13	-175	13	na	13	na
14	na	14	na	14	na		14	na	14	na	14	na
15	na	15	na	15	na		15	na	15	na	15	na
16	na	16	na	16	na		16	na	16	na	16	na
17	na	17	na	17	na		17	na	17	na	17	na
18	na	18	na	18	na		18	na	18	na	18	na
19	na	19	na	19	na		19	na	19	na	19	na
20	na	20	na	20	na		20	na	20	na	20	na
21	na	21	na	21	na		21	na	21	na	21	na
22	na	22	na	22	na		22	na	22	na	22	na
23	na	23	na	23	na		23	na	23	na	23	na
24	na	24	na	24	-2269		24	na	24	na	24	na
25	na	25	na	25	-2023		25	na	25	na	25	1707
26	-2019	26	-61	26	-1998		26	1879	26	51	26	1942
27	-1823	27	-188	27	-1971		27	1606	27	217	27	1832
28	-1657	28	-247	28	-1943		28	1603	28	335	28	1922
29	-1814	29	-164	29	-1978		29	1619	29	188	29	-150
30	-1568	30	-137	30	-1695		30	-196	30	-7	30	-213
31	-1398	31	-125	31	-1524		31	-168	31	3	31	-170
32	-1376	32	-142	32	-1528		32	-160	32	-3	32	-164
33	-1306	33	-195	33	-1494		33	-116	33	138	33	70
34	-1420	34	-215	34	-1626		34	289	34	69	34	417
35	-1366	35	-196	35	-1594		35	-96	35	201	35	110
36	-1386	36	-249	36	-1628		36	-152	36	-12	36	-173
37	-1487	37	-289	37	-1761		37	-177	37	-14	37	-194
38	-1686	38	-192	38	-1855		38	-168	38	-26	38	-198
39	-1926	39	-174	39	-2070		39	-204	39	-34	39	-239
40	-2222	40	-259	40	-2454		40	-368	40	85	40	-259
41	-1876	41	na	41	na		41	-126	41	761	41	11

42	na	42	na	42	na	42	na	42	na	42	na
43	na	43	na	43	na	43	na	43	na	43	na
44	na	44	na	44	na	44	na	44	na	44	na
45	na	45	na	45	na	45	na	45	na	45	na
46	-1452	46	na	46	na	46	-48	46	na	46	na
47	-1341	47	na	47	na	47	-274	47	4	47	-224
48	-1211	48	-211	48	-1431	48	-273	48	1	48	-284
49	-1188	49	-196	49	-1397	49	-379	49	-27	49	-417
50	-1175	50	-201	50	-1368	50	-152	50	-72	50	-211
51	-1183	51	-213	51	-1398	51	-260	51	-70	51	-361
52	-1071	52	-141	52	-1208	52	-317	52	-63	52	-381
53	-1083	53	-133	53	-1218	53	-135	53	-188	53	-324
54	-1162	54	-626	54	-1273	54	-122	54	-13	54	-88
55	-1190	55	-100	55	-1287	55	-106	55	2	55	-101
56	-1091	56	-154	56	-1239	56	-115	56	-7	56	-153
57	-1113	57	-131	57	-1225	57	-233	57	-7	57	-475
58	-994	58	-165	58	-1158	58	-177	58	-8	58	-208
59	-992	59	-131	59	-1121	59	-278	59	-7	59	-302
60	-989	60	-117	60	-1104	60	-154	60	-28	60	-176
61	-985	61	-95	61	-1072	61	-215	61	7	61	-209
62	-1020	62	-104	62	-1125	62	-261	62	-151	62	-423
63	-1026	63	-124	63	-1154	63	-80	63	3	63	-80
64	-1025	64	-140	64	-1155	64	-130	64	349	64	217
65	-1001	65	-156	65	-1160	65	295	65	-39	65	240
66	-1022	66	-659	66	-1670	66	324	66	na	66	na
67	-1059	67	na	67	-1391	67	288	67	313	67	767
68	-1083	68	na	68	na	68	na	68	na	68	705
69	na	69	na	69	-1407	69	na	69	na	69	466
70	-858	70	-294	70	-1182	70	-91	70	57	70	-60
71	-773	71	-168	71	-956	71	-291	71	-52	71	-357
72	-706	72	-102	72	-799	72	-282	72	6	72	-266
73	-650	73	-50	73	-696	73	-374	73	24	73	-345
74	-622	74	-25	74	-666	74	-237	74	-2	74	-258
75	-542	75	45	75	-540	75	-188	75	-4	75	-155
76	-87	76	-27	76	-123	76	-59	76	-85	76	-164
77	-208	77	-69	77	-278	77	-95	77	-41	77	-96
78	-118	78	-129	78	-266	78	na	78	99	78	na
79	342	79	-164	79	-177	79	-399	79	-4	79	-398
80	na	80	-141	80	na	80	na	80	24	80	na
81	na	81	-66	81	387	81	na	81	na	81	na
82	na	82	na	82	na	82	na	82	na	82	2638
83	na	83	na	83	na	83	na	83	na	83	1931
84	na	84	na	84	na	84	1746	84	na	84	na
85	na	85	na	85	na	85	1838	85	152	85	2041
86	-2270	86	-196	86	-2429	86	na	86	na	86	na
87	na	87	na	87	na	87	na	87	na	87	2276
88	na	88	na	88	-2412	88	1931	88	-129	88	1857
89	-2348	89	-36	89	-2403	89	na	89	na	89	na

90	na	90	na	90	na		90	na	90	na	90	na
91	na	91	na	91	na		91	na	91	na	91	na
92	na	92	na	92	na		92	na	92	na	92	na

Table 2: Average Gulfside Erosion Rates for the Isles Dernieres: 1887 - 1996

Years	Average Erosion Rate (m/yr)
Previous Analysis[1]	
1887 - 1934	-11.7
1934 - 1956	-7.8
1956 - 1978	-7.9
1978 - 1988	-19.2
1887 - 1988	-11.1
New Analysis[2]	
1988 - 1996	-21.8
1887 - 1996	-11.8

[1] McBride and others (1992)
[2] This USGS Open-File Report

Table 3: Isles Dernieres Area Change: 1887 – 1996[1]

Isles Dernieres	1887	1988	1996	NLTACR[2]	NSTACR[3]	NLTDR[4]	NSTDR[5]	PSTDD[6]	PSTDD[7]
Raccoon Island	833.1	81.0	54.1	-7.2	-3.4	2004	2012	2001	NA[8]
Whiskey Island	2541.4	228.3	208.6	-18.3	-2.5	2007	2079	2016	NA[8]
Trinity Island		362.0	261.1	-18.3	-12.6	2010	2017	2011	NA[8]
East Island		85.8	79.9	-18.3	-0.7	2000	21110	2003	NA[8]
Wine Island	160.5	8.8	13.0	-1.4	+0.5	2005	NA[8]	NA[8]	NA[8]
Total	3535.0	765.9	606.7	-26.8	-18.7	2019	2029	2004	2015

[1] Area in hectares (ha)
[2] New long-term area change rate
[3] New short-term area change rate
[4] New long-term disappearance rate
[5] New short-term disappearance rate
[6] Previous short-term disappearance date (McBride and others, 1992)
[7] Previous short-term disappearance date (McBride and others, 1992)
[8] Not Applicable