Appendix A

Committee Lists

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Coastal Resources Commission :: Members

Members as of October 1, 2009				
Member	**Address**	**Telephone**	**Expertise**	**Term Ends**
Bob Emory (Chair)	112 Cameila Road New Bern, NC 28562	252-633-7417 (o) 252-638-8587 (h)	Coastal forestry	6/30/10
Joan L. Weld (Vice Chair)	352 Bear Branch Drive Currie, NC 28435	910-283-4521	State or national conservation organization	6/30/10
Charles B. Bissette Jr.	204 Coventry Rd. Morehead City, NC 28557	252-728-4191 (o)	Coastal Engineering	6/30/12
Renee Cahoon	P.O. Box 714 Nags Head, NC 27959	252-441-5358 (o) 252-441-4847 (h)	Local government	6/30/10
Veronica Carter	1102 Veranda Court Leland, NC 28451	910-371-1784 (H) 910-409-8457 (C)	At-large	6/30/12
Charles M. Elam	2880 Slater Rd. Suite 200 Morrisville, NC 27560	919-678-1071 (o)	Coastal land development financing	6/30/12
Dr. James R. Leutze	601 South College Rd. Wilmington, NC 28403	910-962-7662 (o) 910-256-6020 (h)	At-large	6/30/12
Ed Mitchell		252-634-3373 (o)	Coastal land development	6/30/12
Jerry L. Old	1669 Tulls Creek Road Moyock, NC 27958	252-435-6366 (o) 252-232-3925 (h)	Local government	6/30/12
William R. Peele III	6767 Hwy. 264 East Washington, NC 27889	252-975-6687 (o) 252-923-0053 (h)	Coastal agriculture	6/30/12
Vacant			Sports fishing	6/30/10
Melvin M. Shepard Jr.	194 Charles Creek Road Sneads Ferry, NC 28460	910-327-1231 (o) 910-327-7401 (h)	Marine-related business	6/30/12
David Webster	652 Chowning Place Wilmington, NC 28409	910-962-3756 (o)	Marine ecology	6/30/10
Robert O. "Bob" Wilson	The Rowboat Co. 858 Williamson Road Mooresville, NC 28117	704-663-3478 (o)	At-large	6/30/10
Lee Wynns	404 E. River St. P.O. Box 6 Colerain, NC 27924	252-356-4684 (h) 252-356-4387 (o)	Commercial fishing	6/30/10

Science Panel on Coastal Hazards	
Dr. Margery Overton, Chair	Department of Civil, Construction, and Environmental Engineering N.C. State University
Steven Benton	Division of Coastal Management (retired) Raleigh
Dr. William Cleary	Center for Marine Science University of North Carolina at Wilmington
Tom Jarrett, P.E.	U.S. Army Corps of Engineers (Retired)
Dr. Charles "Pete" Peterson	Institute of Marine Sciences University of North Carolina at Chapel Hill
Dr. David John Mallinson	East Carolina University
Dr. Stan Riggs	Department of Geology East Carolina University
Spencer Rogers	North Carolina Sea Grant Wilmington
Dr. Antonio B. Rodriguez	Institute of Marine Sciences University of North Carolina at Chapel Hill
Dr. Gregory Williams	U.S. Army Corps of Engineers Wilmington
William Birkemeier	Field Research Facility, ERDC/CHL US Army Corps of Engineers
Dr. Elizabeth Judge Sciaudone, PE	N.C. State University
Dr. Robert S. Young	Department of Geosciences Western Carolina University

Last Modified: September 15, 2009

Terminal Groin Study
CRC/CRAC Subcommittee Members:

- Bob Emory
- Jim Leutze
- Melvin Shepard
- Veronica Carter
- Charles “Boots” Elam
- Dara Royal
- Spencer Rogers
- Anne Deaton
- Tracy Skrabal
- Bill Morrison

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Appendix B

Session Law 2009-479

House Bill 709

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GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2009

SESSION LAW 2009-479
HOUSE BILL 709

AN ACT TO IMPOSE A MORATORIUM ON CERTAIN ACTIONS OF THE COASTAL RESOURCES COMMISSION RELATED TO TEMPORARY EROSION CONTROL STRUCTURES AND TO DIRECT THE COASTAL RESOURCES COMMISSION TO STUDY THE FEASIBILITY AND ADVISABILITY OF THE USE OF A TERMINAL GROIN AS AN EROSION CONTROL DEVICE.

The General Assembly of North Carolina enacts:

SECTION 1.(a) Definitions and Concepts. – The following definitions and concepts apply to Sections 1 of this act and its implementation:

(1) "Temporary erosion control structure" means a sandbag structure placed above mean high water and parallel to the shore.

(2) A community is considered to be actively pursuing a beach nourishment or inlet relocation project under any of the following circumstances:

a. The community has a current and valid Coastal Area Management Act permit for the project.

b. The community has been identified by a U.S. Army Corps of Engineers' Beach Nourishment Reconnaissance Study, General Reevaluation Report, Coastal Storm Damage Reduction Study, or an ongoing feasibility study by the U.S. Army Corps of Engineers.

c. The community has received a favorable economic evaluation report on a federal project or is in the planning stages of a project that (i) has been designed by the U.S. Army Corps of Engineers or persons meeting applicable State occupational licensing requirements and (ii) has been initiated by a local government or community working toward the identification and adoption of a mechanism to provide the necessary local or State funds to construct the project.

SECTION 1.(b) Moratorium Established. – Notwithstanding Article 7 of Chapter 113A of the General Statutes and rules adopted pursuant to Article 7, there is hereby established a moratorium on certain actions of the Coastal Resources Commission related to temporary erosion control structures. The Commission shall not order the removal of a temporary erosion control structure that has been permitted under Article 7 of Chapter 113A of the General Statutes in a community that is actively pursuing a beach nourishment project or an inlet relocation project on or before the effective date of this act.

SECTION 1.(c) Exceptions. – The moratorium on certain actions by the Coastal Resources Commission related to temporary erosion control structures shall not prohibit the Commission from undertaking any of the following actions:

(1) Granting permit modifications to allow the replacement, within the originally permitted dimensions, of temporary erosion control structures that have been damaged or destroyed.

(2) Requiring the removal of temporary erosion control structures installed in violation of Article 7 of Chapter 113A of the General Statutes and rules adopted pursuant to Article 7.

(3) Requiring that a temporary erosion control structure that has been modified in violation of Article 7 of Chapter 113A of the General Statutes and rules adopted pursuant to Article 7 be brought back into compliance with permit conditions.

(4) Requiring the removal of a temporary erosion control structure that no longer protects an imminently threatened road and associated right-of-way or an imminently threatened building and associated septic system.

SECTION 2.(a) Study. – The Coastal Resources Commission, in consultation with the Division of Coastal Management, the Division of Land Resources, and the Coastal Resources Advisory Commission, shall conduct a study of the feasibility and advisability of the use of a terminal groin as an erosion control device at the end of a littoral cell or the side of an inlet to limit or control sediment passage into the inlet channel. For the purpose of this study, a littoral cell is defined as any section of coastline that has its own sediment sources and is isolated from adjacent coastal reaches in terms of sediment movement.

SECTION 2.(b) Specific Considerations. – In conducting the study, the Commission shall specifically consider all of the following:

(1) Scientific data regarding the effectiveness of terminal groins constructed in North Carolina and other states in controlling erosion. Such data will include consideration of the effect of terminal groins on adjacent areas of the coastline.
(2) Scientific data regarding the impact of terminal groins on the environment and natural wildlife habitats.
(3) Information regarding the engineering techniques used to construct terminal groins, including technological advances and techniques that minimize the impact on adjacent shorelines.
(4) Information regarding the current and projected economic impact to the State, local governments, and the private sector from erosion caused by shifting inlets, including loss of property, public infrastructure, and tax base.
(5) Information regarding the public and private monetary costs of the construction and maintenance of terminal groins.
(6) Whether the potential use of terminal groins should be limited to navigable, dredged inlet channels.

SECTION 2.(c) Public Input. – In conducting the study, the Commission shall hold at least three public hearings where interested parties and members of the general public will have the opportunity to present views and written material regarding the feasibility and advisability of the use of a terminal groin as an erosion control device at the end of a littoral cell or the side of an inlet to limit or control sediment passage into the inlet channel.

SECTION 2.(d) Report. – No later than April 1, 2010, the Commission shall report its findings and recommendations to the Environmental Review Commission and the General Assembly.

SECTION 3. This act is effective when it becomes law. Section 1 of this act expires September 1, 2010.

In the General Assembly read three times and ratified this the 11th day of August, 2009.

s/ Walter H. Dalton
President of the Senate

s/ Joe Hackney
Speaker of the House of Representatives

s/ Beverly E. Perdue
Governor

Approved 1:21 p.m. this 26th day of August, 2009

Appendix C

Engineering Activity Logs

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ENGINEERING ACTIVITIES LOG FOR OREGON INLET

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
1	1950	Dredging	USACE begins dredging to maintain a 14' X 400' channel through Oregon Inlet				
2	1960	Dredging	Oregon Inlet - Hyde (dredge)	62,991			
3	1961	Dredging	Oregon Inlet - Hyde (dredge)	24,013			
4	1962	Dredging	Oregon Inlet - Hyde (dredge)	109,186			
5	1963	Dredging	Oregon Inlet - Hyde (dredge)	76,868			
6	1964	Dredging	Oregon Inlet - Hyde (dredge)	12,800			
7	1964	Dredging	Oregon Inlet - Merrit (dredge)	7,800			
8	1965	Dredging	Oregon Inlet - Hyde (dredge)	188,142			
9	1965	Dredging	Oregon Inlet - Merrit (dredge)	95,404			
10	1966	Dredging	Oregon Inlet - Hyde (dredge)	88,489			
11	1966	Dredging	Oregon Inlet - Merrit (dredge)	98,244			
12	1967	Dredging	Oregon Inlet - Hyde (dredge)	215,232			
13	1968	Dredging	Oregon Inlet - Hyde (dredge)	211,430			
14	1968	Dredging	Oregon Inlet - Merrit (dredge)	85,704			
15	1969	Dredging	Oregon Inlet - Hyde (dredge)	132,036			
16	1969	Dredging	Oregon Inlet - Merrit (dredge)	70,000			
17	1970	Dredging	Oregon Inlet - Hyde (dredge)	40,531			
18	1970	Dredging	Oregon Inlet - Merrit (dredge)	74,790			
19	1970	Dredging	Oregon Inlet - Schweizer (dredge)	55,424			
20	1971	Dredging	Oregon Inlet - Hyde (dredge)	132,149			
21	1972	Dredging	Oregon Inlet - Hyde (dredge)	302,206			
22	1972	Dredging	Oregon Inlet - Merrit (dredge)	22,944			
23	1973	Dredging	Oregon Inlet - Merrit (dredge)	19,995			
24	1973	Dredging	Oregon Inlet - Schweizer (dredge)	40,450			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
25	1974	Dredging	Oregon Inlet - Merrit (dredge)	55,100			
26	1974	Dredging	Oregon Inlet - Schweizer (dredge)	164,672			
27	1975	Dredging	Oregon Inlet - Schweizer (dredge)	182,068			
28	1976	Dredging	Oregon Inlet - Schweizer (dredge)	372,473			
29	1977	Dredging	Oregon Inlet - Schweizer (dredge)	312,485			
30	1978	Dredging	Oregon Inlet - Merrit (dredge)	9,045			
31	1978	Dredging	Oregon Inlet - Schweizer (dredge)	349,082			
32	1979	Dredging	Oregon Inlet - Schweizer (dredge)	415,000			
33	1980	Dredging	Oregon Inlet - Schweizer (dredge)	438,000			
34	April, 1963	Bridge Opening	The 2.4-mile Bonner Bridge opens				
35	1980	Dredging	Oregon Inlet - Schwiezer (dredge)	438,000			
36	1981	Dredging	Oregon Inlet - Currituck (dredge)	27,225			
37	1981	Dredging	Oregon Inlet - Schwiezer (dredge)	550,250			
38	1981	Dredging	Oregon Inlet - Merrit (dredge)	115,605			
39	1982	Dredging	Oregon Inlet - Schwiezer (dredge)	665,080			
40	1982	Dredging	Oregon Inlet - Merrit (dredge)	279,265			
41	1983	Dredging	Oregon Inlet - Mermentau (dredge)	146,251			
42	1983	Dredging	Oregon Inlet - Schwiezer (dredge)	514,160			
43	1983	Dredging	Oregon Inlet - Merrit (dredge)	221,019			
44	1983	Dredging	Oregon Inlet - Fry (dredge)	152,986			
45	1984	Dredging	Oregon Inlet - Mermentau (dredge)	270,467			
46	1984	Dredging	Oregon Inlet - Mermentau (dredge)	24,418			
47	1984	Dredging	Oregon Inlet - Schweizer (dredge)	356,327			
48	1984	Dredging	Oregon Inlet - Merrit (dredge)	85,498			
49	1984	Dredging	Oregon Inlet - Fry (dredge)	162,835			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
50	1984	Dredging	USACE initiates a large scale hopper dredge of Oregon Inlet				
51	1984	Dredging	Oregon Inlet - Mermentau (dredge)	480,739			
52	1985	Dredging	Oregon Inlet - Mermentau (dredge)	456,321			
53	1985	Dredging	Oregon Inlet - Northerly Island (dredge)	283,507			
54	1985	Dredging	Oregon Inlet - Schweizer (dredge)	377,790			
55	1985	Dredging	Oregon Inlet - Merrit (dredge)	305,446			
56	1985	Dredging	Oregon Inlet - Northerly Island (dredge)	521,442			
57	1986	Dredging	Oregon Inlet - Northerly Island (dredge)	744,522			
58	1987	Dredging	Oregon Inlet - Mermentau (dredge)	365,906			
59	1987	Dredging	Oregon Inlet - Mermentau (dredge)	533,183			
60	1987	Dredging	Oregon Inlet - Currituck (dredge)	41,400			
61	1988	Dredging	Oregon Inlet - Mermentau (dredge)	274,166			
62	1988	Dredging	Oregon Inlet - Northerly Island (dredge)	213,791			
63	1989	Dredging	Oregon Inlet - Atchafalaya (dredge)	290,000			
64	1989	Dredging	Oregon Inlet - Atchafalaya (dredge)	159,000			
65	1989	Dredging	Oregon Inlet - Currituck (dredge)	77,638			
66	1990	Dredging	Oregon Inlet Ocean Bar	292,020			
67	1990	Beach Nourishment	Dredging near Bonner Bridge; placed on tip of Pea Island	254,955	2,000	127	Vicinity of Bonner Bridge
68	1989 - March 1991	Groin Construction	The project consisted of a terminal groin and revetment (3,125 and 625 ft long) starting at the US Coast Guard Station; the groin ranges in width btw 110 to 170 ft at the base and 25 ft at the landward end to 39 ft at the seaward end; the groin was designed to withstand a still water level of 8 ft above MSL and wave btw 9 and 15 ft.				
69	April - November, 1991	Beach Nourishment	USACE places fill on to the PINWE beach	470,000			
70	1991	Dredging	Oregon Inlet Ocean Bar	230,779			Placed Offshore
71	1991	Dredging	Oregon Inlet - Northerly Island (dredge)	182,894			
72	1991	Dredging	Oregon Inlet - Currituck (dredge)	149,503			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
73	1991	Dredging	Oregon Inlet - S	480,926			
74	1991	Dredging	Oregon Inlet - Merrit (dredge)	61,243			
75	November, 1991	Beach Nourishment	Placed on Pea Island (sta 60 to 100)	184,300	4,000	46	Navigation Span
76	April, 1991	Beach Nourishment	Placed on Pea Island (sta 45 to 55 & sta 85 to 100)	282,600	2,500	113	Oregon Inlet Navigation Span
77	September, 1992	Beach Nourishment	Placed on Pea Island	157,600	1,000		Oregon Inlet Navigation Channel
78	1991 - 1997	Surveys	FRF's Oregon Inlet Monitoring Program surveys extended 6 km north and south of the inlet; survey lines spaced at 300 m intervals and extended offshore to the 9 m depth contour				
79	September, 1992	Beach Nourishment	Placed on Pea Island (sta 80 to 134)	1,078,000	5,400	200	Oregon Inlet Navigation Span
80	1992	Dredging	Oregon Inlet - ADCO (dredge)	94,331			
81	1992	Dredging	Oregon Inlet - Georgia (dredge)	900,592			
82	1992	Dredging	Oregon Inlet - Schweizer (dredge)	602,896			
83	1992	Dredging	Oregon Inlet - Merrit (dredge)	88,802			
84	October, 1993	Beach Nourishment	Placed on Pea Island (sta 80 to 105)	433,235	2,500	173	Oregon Inlet Navigation Span and Ocean Bar
85	1993	Dredging	Oregon Inlet - Currituck (dredge)	18,485			
86	1993	Dredging	Oregon Inlet - Schweizer (dredge)	585,690			
87	1994	Dredging	Oregon Inlet - Merrit (dredge)	55,596			
88	1995	Beach Nourishment	Placed on Pea Island	203,191	2,000	102	
89	November, 1995	Beach Nourishment	Placed on Pea Island (sta 79 to 80)	65,231			Orgeon Inlet Ocean Bar
90	December, 1995	Beach Nourishment	Placed on Pea Island (Nearshore)	168,400			Orgeon Inlet Ocean Bar
91	1995	Dredging	Oregon Inlet - Schweizer (dredge)	577,891			
92	1995	Dredging	Oregon Inlet - Atchafalaya (dredge)	250,000			
93	1995	Dredging	Oregon Inlet	233,631			
94	1996	Beach Nourishment	Placed on Pea Island	500,217			
95	August, 1996	Beach Nourishment	Placed on Pea Island (Nearshore)	271,004			Oregon Inlet Navigation Span and Ocean Bar
96	1996	Dredging	Oregon Inlet - Mermentau (dredge)	271,004			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
97	1996	Dredging	Oregon Inlet - Currituck (dredge)	13,110			
98	September, 1997	Beach Nourishment	Placed on Pea Island (Nearshore)	271,703			Oregon Inlet Navigation Span and Ocean Bar
99	1997	Dredging	Oregon Inlet	271,703			
100	October, 1998	Beach Nourishment	Placed on Pea Island (Nearshore)	260,183			Oregon Inlet Navigation Span and Ocean Bar
101	1998	Dredging	Oregon Inlet	260,183			
102	1999	Beach Nourishment	Placed on Pea Island (Nearshore)	328,919			Oregon Inlet Navigation Span and Ocean Bar
103	1999	Dredging	Oregon Inlet	328,919			
104	2000	Beach Nourishment	Placed on Pea Island	419,305			
105	October, 2000	Beach Nourishment	Placed on Pea Island (Nearshore)	244,445			Oregon Inlet Navigation Span and Ocean Bar
106	2000	Dredging	Oregon Inlet	419,305			
107	November, 2001	Beach Nourishment	Placed on Pea Island (sta 40 to 43 & sta 52 to 100)	513,706			Oregon Inlet Navigation Span
108	2001	Dredging	Oregon Inlet	513,706			
109	October, 2002	Beach Nourishment	Placed on Pea Island (Nearshore & sta 80 to 151)	732,852			Oregon Inlet Navigation Span and Ocean Bar
110	2002	Dredging	Oregon Inlet	732,829			
111	October, 2003	Beach Nourishment	Placed on Pea Island (sta 66 to 188)	1,029,543			Oregon Inlet Navigation Span
112	2003	Beach Nourishment	Placed on Pea Island (Nearshore)	107,631			Oregon Inlet Ocean Bar
113	2003	Dredging	Oregon Inlet	107,631			
114	2003	Dredging	Oregon Inlet - Merrit (dredge)	50,840			
115	July - November, 2004	Beach Nourishment	Placed on Pea Island (Nearshore & sta 45 to 115 - not 70 to 90)	616,448			Oregon Inlet Navigation Span and Ocean Bar
116	2004	Dredging	Oregon Inlet	147,871			
117	2004	Dredging	Oregon Inlet - Currituck (dredge)	54,895			
118	November, 2005	Beach Nourishment	Placed on Pea Island (Nearshore)	172,155			Oregon Inlet Ocean Bar
119	2005	Dredging	Oregon Inlet - Currituck (dredge)	15,710			
120	2005	Dredging	Oregon Inlet - Fry (dredge)	242,930			
121	2006	Dredging	Oregon Inlet - Currituck (dredge)	38,270			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
122	2006	Dredging	Oregon Inlet - Fry (dredge)	200,480			
123	2006	Dredging	Oregon Inlet - Merrit (dredge)	255,540			
124	2007	Dredging	Oregon Inlet - Currituck (dredge)	113,145			
125	2007	Dredging	Oregon Inlet - Fry (dredge)	241,870			
126	2007	Dredging	Oregon Inlet - Merrit (dredge)	702,466			
127	November, 2008	Beach Nourishment	Placed on Pea Island (sta 45 to 110)	791,829			Oregon Inlet Navigation Span and Ocean Bar
128	October, 2009	Beach Nourishment	Placed on Pea Island (sta 45 to 150)	1,183,144			Oregon Inlet Navigation Span and Ocean Bar

ENGINEERING ACTIVITIES LOG FOR FORT MACON

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
1	1829 - 1834	Fort Construction	Fort Macon Construction				
2	1911	Dredging	Navigational Improvements to Beaufort Inlet begin; Channel dredged to 300-ft wide				
3	1927	Dredging	Outer Bar Channel	311,300			
4	1928	Dredging	Outer Bar Channel	156,900			
5	1929	Dredging	Outer Bar Channel	209,400			
6	1930	Dredging	Outer Bar Channel	166,300			
7	1932	Dredging	Outer Bar Channel	56,100			
8	1933	Dredging	Outer Bar Channel	156,300			
9	1935	Dredging	Outer Bar Channel	763,100			
10	1936	Dredging	Outer Bar Channel deepened to -30 ft and 400-ft wide; channel location becomes fixed				
11	1936	Dredging	Morehead City Harbor Channel Maintenance	2,367,900			
12	1936	Dredging	Outer Bar Channel	3,460,100			
13	1937	Dredging	Morehead City Harbor Channel Maintenance	215,900			
14	1937	Dredging	Outer Bar Channel	268,300			
15	1938	Dredging	Morehead City Harbor Channel Maintenance	55,700			
16	1938	Dredging	Outer Bar Channel	205,700			
17	1939	Dredging	Morehead City Harbor Channel Maintenance	35,000			
18	1939	Dredging	Outer Bar Channel	473,800			
19	1940	Dredging	Morehead City Harbor Channel Maintenance	262,700			
20	1940	Dredging	Outer Bar Channel	918,100			
21	1942	Dredging	Outer Bar Channel	299,200			
22	1943	Dredging	Morehead City Harbor Channel Maintenance	10,000			
23	1943	Dredging	Outer Bar Channel	91,900			
24	1944	Dredging	Morehead City Harbor Channel Maintenance	727,600			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
25	1944	Dredging	Outer Bar Channel	584,900			
26	1945	Dredging	Morehead City Harbor Channel Maintenance	141,800			
27	1945	Dredging	Outer Bar Channel	520,800			
28	1946	Dredging	Morehead City Harbor Channel Maintenance	193,900			
29	1946	Dredging	Outer Bar Channel	145,800			
30	1947	Dredging	Morehead City Harbor Channel Maintenance	119,400			
31	1947	Dredging	Outer Bar Channel	48,800			
32	1948	Dredging	Morehead City Harbor Channel Maintenance	174,800			
33	1948	Dredging	Outer Bar Channel	542,900			
34	1949	Dredging	Outer Bar Channel	1,103,000			
35	1950	Dredging	Morehead City Harbor Channel Maintenance	101,800			
36	1950	Dredging	Outer Bar Channel	637,900			
37	1951	Dredging	Outer Bar Channel	616,800			
38	1952	Dredging	Outer Bar Channel	504,600			
39	1953	Dredging	Morehead City Harbor Channel Maintenance	230,500			
40	1953	Dredging	Outer Bar Channel	312,200			
41	1954	Dredging	Outer Bar Channel	797,100			
42	1955	Dredging	Morehead City Harbor Channel Maintenance	166,000			
43	1955	Dredging	Outer Bar Channel	719,200			
44	1956	Dredging	Outer Bar Channel	564,200			
45	1957	Dredging	Morehead City Harbor Channel Maintenance	177,600			
46	1957	Dredging	Outer Bar Channel	1,039,500			
47	1958	Dredging	Outer Bar Channel	866,800			
48	1959	Dredging	Morehead City Harbor Channel Maintenance	196,600			
49	1959	Dredging	Outer Bar Channel	977,400			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
50	1960	Dredging	Morehead City Harbor Channel Maintenance	130,000			
51	1960	Dredging	Outer Bar Channel	589,400			
52	1961	Beach Nourishment			7656		
53	1961	Seawall, Revetment, Partial Groin Construction	Due to financial constraints, the groin was only built to a length of 720 ft at an elevation of 6 ft and excluded the structure's top armor layer. The revetment (250 ft) and seawall (530 ft) were constructed along the dune bank starting just north of the present-day Fort Macon parking lot in a southeastern direction				
54	1961	Dredging	Morehead City Harbor Channel Maintenance	1,336,000			
55	1961	Dredging	Outer Bar Channel	1,869,200			
56	1962	Dredging	Outer Bar Channel	898,600			
57	1963	Dredging	Outer Bar Channel	584,800			
58	1963	Dredging	Morehead City Harbor Channel Maintenance	509,200			
59	1964	Dredging	Outer Bar Channel	407,800			
60	1965	Groin Extention & Construction; Beach Nourishment	Groin extended an additional 410 ft oceanward; Additional groin was constructed west of the revetment due to extensive erosion on the back, or sound side, of the island and its impact to the US Coast Guard station. Beach fill was also placed on the beach between the present day bathhouse and boardwalk region and the terminal groin	93,000			
61	1965	Dredging	Outer Bar Channel	655,000			
62	1965	Dredging	Morehead City Harbor Channel Maintenance	253,300			
63	1966	Dredging	Outer Bar Channel	691,800			
64	1967	Dredging	Outer Bar Channel	966,000			
65	1967	Dredging	Morehead City Harbor Channel Maintenance	178,000			
66	1968	Dredging	Outer Bar Channel	708,600			
67	1968	Dredging	Morehead City Harbor Channel Maintenance	72,100			
68	1969	Dredging	Outer Bar Channel	401,800			
69	1970	Dredging	Morehead City Harbor Channel Maintenance	431,300			
70	1970	Dredging	Outer Bar Channel	853,900			Disposal: ODMDS

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
71	1970 (aug)	Groin Extention & Construction; Beach Nourishment	Groin extended an additional 400 ft to a total length of 1,530 ft; A stone groin (480 ft long) was built near the bathhouse in an effort to stabilize the beach fill placed in the area of the bathhouse and boardwalk	100,000			
72	1971	Dredging	Outer Bar Channel	913,800			
73	1972	Dredging	Outer Bar Channel	783,700			
74	1973	Beach Nourishment		504,266	5043	100	State Port (Morehead City Harbor)
75	1973	Dredging	Outer Bar Channel	952,900			
76	1974	Dredging	Morehead City Harbor Channel Maintenance	557,400			
77	1974	Dredging	Outer Bar Channel	401,600			Disposal: ODMDS
78	1975	Dredging	Outer Bar Channel - Gerig	238,289			Disposal: ODMDS
79	1975	Dredging	Outer Bar Channel - Goethals	190,397			Disposal: ODMDS
80	1976	Dredging	Outer Bar Channel - Davison	74,685			Disposal: ODMDS
81	1976	Dredging	Outer Bar Channel - Gerig	583,929			Disposal: ODMDS
82	1977	Dredging	Outer Bar Channel - Macfarland	96,133			Disposal: ODMDS
83	1978	Dredging	Outer Bar Channel - Landfitt	1,364,069			Disposal: ODMDS
84	1978	Dredging	Outer Bar Channel - Sensibar	1,608,131			Disposal: ODMDS
85	1978	Dredging	Morehead City Harbor Channel Maintenance	164,893			
86	1978	Dredging	Morehead City Harbor Channel Maintenance - Pullen	1,179,739			
87	1978	Dredging	Outer Bar Channel - Landfitt	530,008			Disposal: ODMDS
88	1979	Beach Nourishment	USACE Maintenance Dredge of Morehead City Inner Harbor	1,179,739	11797	100	Morehead City Inner Harbor
89	1980	Dredging	Outer Bar Channel	294,610			
90	1981	Dredging	Outer Bar Channel - Dodge Island	824,052			Disposal: ODMDS
91	1981	Dredging	Morehead City Harbor Channel Maintenance - Hampton Roads	589,566			
92	1982	Dredging	Morehead City Harbor Channel Maintenance - Hampton Roads	22,865			
93	1982	Dredging	Outer Bar Channel - Manhattan	977,040			Disposal: ODMDS
94	1983	Dredging	Morehead City Harbor Channel Maintenance - Hampton Roads	263,609			Disposal: ODMDS

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
95	1983	Dredging	Outer Bar Channel - Dodge Island	848,933			Disposal: ODMDS
96	1984	Dredging	Outer Bar Channel	1,098,259			
97	1985	Dredging	Outer Bar Channel - Sugar Island	583,181			Disposal: ODMDS
98	1985	Dredging	Morehead City Harbor Channel Maintenance - Clinton	153,625			
99	1986	Beach Nourishment	USACE Maintenance Dredge of Morehead City Inner Harbor and Brandt Island Pump out; placed on Atlantic Beach	4,168,600	39129	107	Morehead City Inner Harbor / Brandt Island
100	1986	Dredging	Morehead City Harbor Channel Maintenance - Jim Bean	3,912,894			
101	1986	Dredging	Outer Bar Channel	367,681			
102	1986	Dredging	Morehead City Harbor Channel Maintenance	255,743			
103	1987	Dredging	Morehead City Harbor Channel Maintenance - Enterprise	351,588			
104	1987	Dredging	Outer Bar Channel - Sugar Island	534,555			Disposal: ODMDS
105	1988	Dredging	Outer Bar Channel - Dodge Island	691,190			Disposal: ODMDS
106	1989	Dredging	Outer Bar Channel - Atchafalaya	539,192			Disposal: ODMDS
107	1989	Dredging	Morehead City Harbor Channel Maintenance	269,178			
108	1990	Dredging	Outer Bar Channel - Cherokee	592,232			Disposal: ODMDS
109	1991	Dredging	Outer Bar Channel	11,959			
110	1991	Dredging	Morehead City Harbor Channel Maintenance	143,747			
111	1991	Dredging	Outer Bar Channel Eagle	831,637			Disposal: ODMDS
112	1993	Dredging	Outer Bar Channel	837,573			Disposal: ODMDS
113	November 1993 - February 1994	Beach Nourishment	USACE Maintenance Dredge of Morehead City Inner Harbor	2,192,268	24,737 (total)		Morehead City Inner Harbor
114	November 1993 - February 1994	Beach Nourishment	USACE Brandt Island Pump Out	2,472,132	24,737 (total)		Brandt Island
115	1994	Dredging	Morehead City Harbor Channel Maintenance	4,664,416			
116	1994	Dredging	Outer Bar Channel	2,606,922			Disposal: ODMDS
117	1995	Dredging	Morehead City Harbor Channel Maintenance	815,579			Disposal: ODMDS
118	1996	Dredging	Outer Bar Channel	656,646			Disposal: ODMDS
119	1997	Dredging	Morehead City Harbor Channel Maintenance	739,584			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
120	1997	Dredging	Outer Bar Channel	191,872			Disposal: ODMDS
121	1998	Dredging	Outer Bar Channel	1,163,563			
122	1998	Dredging	Morehead City Harbor Channel Maintenance	18,233			
123	1999	Dredging	Outer Bar Channel	1,040,919			
124	1999	Dredging	Morehead City Harbor Channel Maintenance	350,042			
125	June & September, 1999	Survey	CSE surveys for Carteret County				
126	2000	Dredging	Outer Bar Channel	1,701,659			
127	June, 2000	Survey	CSE surveys for Carteret County				
128	February, 2002	Beach Nourishment	USACE Maintenance Dredge of Morehead City Inner Harbor	209,348			Morehead City Inner Harbor
129	December, 2003	Survey	CSE surveys for Carteret County				
130	2004	Dredging	Morehead City Harbor Channel Maintenance	2,940,507			Disposal: ODMDS
131	2004	Dredging	Morehead City Harbor Channel Maintenance	1,577,052			Disposal: ODMDS
132	June, 2004	Survey	CSE surveys for Carteret County				
133	November 2004 - February 2005	Beach Nourishment	USACE Brandt Island Pump Out; placed on Atlantic Beach	2,390,000	22,543 (total)		
134	2005	Dredging	Morehead City Harbor Channel Maintenance	906,716			Disposal: ODMDS
135	January - March, 2005	Beach Nourishment	USACE Maintenance Dredge of Morehead City Inner Harbor	530,729	12,500 (total)		Morehead City Inner Harbor
136	May, 2005	Survey	CSE surveys for Carteret County				
137	May, 2006	Survey	CSE surveys for Carteret County				
138	May, 2007	Survey	CSE surveys for Carteret County				
139	2007	Beach Nourishment	Morehead City Inner Harbor Maintenance Dredging (Range C, Bulkhead Channel)	211,000			Morehead City Inner Harbor (Range C Bulkhead Channel)

ENGINEERING ACTIVITIES LOG FOR AMELIA ISLAND

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
1	1964	Revetment Construction	In response to erosion damage from Hurricane Dora (1964), emergency Federal funds were appropriated for construction of granite stone revetments along approximately 1.1 miles of American Beach		5808		
2	1970's	Beach Scraping	Amelia Island Plantation (AIP) conducted beach scraping along its shoreline. The effort consisted of seasonal scraping of sand from the intertidal beach zone and subsequent placement at the dune toe				
3	1980	Beach Scraping	Permitted beach scraping was conducted between monuments R-64 and r-68. The project was undertaken by the AIP and constructed in a manner consistent with previous scraping efforts	32,000			
4	January - March, 1984	Beach Nourishment	Between January and March, the AIP placed material via truck haul from the Atlantic Intracostal Waterway (AIWW) dredge spoil disposal site within the Amelia Island State Recreation Area (AISRA) located at the southern end of Amelia Island	76,000	7,200	11	AIWW dredge spoil
5	1984	Beach Nourishment	As an emergency response to the Thanksgiving Day Storm of 1984, an additional 5,500 cy of sand were trucked in from the AIWW spoil site and placed at various locations where breaching of the AIP dune system was considered imminent	5,500			AIWW dredge spoil
6	1987	Beach Nourishment	As part of a larger island-wide 1.42 mcy beach fill project, 515,000 cy of material were placed by the USACE along a 1.3 mile each of shoreline between R-48 and R-55. The material was obtained from new work dredging of the St. Mary's Entrance required to provide navigational access for the US Navy's submarines. The disposal project was undertaken as a result of a 1986 Memorandum of Understanding between the US Navy and the State of Florida	515,000	6,864	75	St. Mary's Entrance
7	1987	Nearshore Disposal	USACE placed 2.13 mcy of material in a nearshore disposal site located between R-33 and R-55. The material placed was obtained from the new work dredging of St. Mary's Entrance. The material was placed seaward of the -18 ft (MLW) contour, and primarily in deeper water *-20 to -35 ft, MLW)	2,130,000			St. Mary's Entrance
8	1988	Beach Nourishment	USACE placed material along approximately 1 mile of shoreline between R-55 and R-60. The material was originally placed in the USACE nearshore disposal site by hopper dredge, then later moved onshore by means of a cutterhead dredge. The volume actually placed on the beach is a matter of dispute. The dredging contractor was paif for the placement of 1.083 mcy of fill, intended to extend over the 12,000-ft reach of shoreline between R-54 and R-65. Actual placement of material occurred along approximately 5,000 ft of shoreline between R-55 and R-60. This resulted in an approximate 60% shortfall in project length relative to the original design. Anecdotal visual inspection indicated that much of the material was fine sands and clay, which in all probability resulted from over-dredging of the specified nearshore rehandling site.	750,000	5,280	142	
9	1989	Beach Nourishment	AIP placed beach fill material along its shoreline. The material was trucked in from an AIWW dredge spol disposal site located west of the Amelia River	50,000			AIWW (west of Amelia River) dredge spoil
10	1991	Beach Nourishment	AIP placed beach fill, from an upland source, along its shoreline as part of a continuing dune protection project	12,000			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
11	Winter, 1992/1993	Erosion Control	For purposes of "holding the line" until a comprehensive shore-protection solution could be developed, some 10,000 ft of 60" diameter sand-filled geotextile tubes were installed along the existing dune line to protect development.				
12	1993	Beach Nourishment	USACE beach fill along South American Beach extending south to about R-62	300,000			
13	1994	Beach Nourishment	SAISS-MSBU constructed a comprehensive beach restoration project along the southernmost 17,000 feet of Amelia Island's shoreline. The project placed fill between monuments R-62 and R-78. The borrow area for the site was 800-ft wide by 7,500-ft long and located between 3,000 and 3,900 feet offshore of the southern end of the island on the margins of the Nassau Sound ebb shoal platform	2,600,000			Offshore of southern end of island on Nassau Sound ebb shoal platform
14	August - November, 1995	Temporary Terminal Groin	Consists of four groins placed perpendicular to the shoreline, spaced about 500 ft apart in a tapered configuration. The groins were constructed of 70" diameter, sand-filled geotextile tubes (LONGARD) and numerous smaller support tubes. The landward terminus of each groin was installed below grade withing the 1994 beach fill				
15	October, 1996	Terminal Groin Repair	The southernmost groin, G-4, was vandalized in October, resulting in deflation of a 50-ft section of the geotextile groin. The gap was closed through the placement of several small tube sections				
16	May - September, 1997	Beach Nourishment	Between May and September, USACE placed fill along 4,500 ft of shoreline between monuments R-77.5 and R-73.5. The sand was obtained from maintenance dredging of the AIWW through Nassau Sound. Fill was placed within the groin field as well as along the beach 1,000 ft north and 2,000 ft south of the structures	300,000	4,500	67	AIWW dredge spoil through Nassau Sound
17	2000	Terminal Groin Repair	All four groins have been routinely vandalized, resulting in substantial structural damage and sand loss. The seaward terminus of each groin required major reconstruction during which the decision was made to truncate each structure, thereby creating the current groin configuration. Additional stablizing bags were also added to groin, G-4, at this time. In October, groin, G-3, was rendered ineffective				
18	November - December, 2000	Flood Protection	Approximately 2,000 ft of shore-parallel sand-filled geotextile tubes were placed along segments of the AISRA to reduce flooding of the maritime forest in areas where the dune had been lost to chronic erosion.				
19	May - September, 2001	Beach Nourishment	USACE placed fill along 4,500 ft of shoreline between monuments R-77.5 and R-73.5. The sand was obtained from maintenance dredging of the AIWW through Nassau Sound. Fill was placed within the groin field as well as along the beach 1,000 ft north and 2,000 ft south of the structures	300,000	4,500	67	AIWW dredge spoil through Nassau Sound
20	June, 2002	Survey	Pre-construction (2002 Shore Stabilization Project)				
21	2002	Groin Removal / Beach Nourishment	Phase 1 of the South Amelia Island Shore Stabilization Project was constructed between monuments R-79 and R-60 along Amelia Island State Park and northward thereof. Prior to construction, all shore-parallel and shore-perpendicular geotextil structures are removed	1,800,000			
22	August, 2002	Survey	Post-Construction (2002 Shore Stabilization Project)				

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
23	May, 2003	Survey	9-Months Post Construction (collected independently by FDEP)				
24	October, 2003	Survey	14-Months Post Construction				
25	March, 2004	Survey	19-Months Post Construction				
26	2004/2005	Breakwater / Groin Construction	Phase 2 of the South Amelia Island Shore Stabilization Project was constructed consisting of 3 engineered rubble mound erosion control structures, a detached breakwater and two groins, including a "leaky" terminal groin at the south end of the island in an east-west orientation				
27	March, 2005	Survey	31-Months Post Construction				
28	September, 2005	Survey	37-Months Post Construction				
29	2006	Beach Nourishment	USACE placed fill onto the south Amelia Island beaches between the detached breakwater and the terminal groin, or between monuments R-76 to R-79	400,000			
30	July, 2006	Survey	47-Months Post Construction				
31	June, 2007	Survey	58-Months Post Construction				
32	July, 2008	Survey	Condition surveys for each structure including adjacent beaches; beach profiles from R-55 to R-82; including half-stations between R-73 and R-82; Bathymetric surveys of Nassau Sound (including borrow areas)				

ENGINEERING ACTIVITIES LOG FOR CAPTIVA ISLAND

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
1	1960s - 1970s	Seawalls & Revetment Construction	Extensive Seawalls and Revetments are placed				
2	1961	Groin Construction & Beach Nourishment	134 Groins are constructed on Captiva Island; fill placed along Captiva Island	107,000			
3	1966	Groin Construction	2 timber groins are constructed at the middle of captiva Island				
4	November - December, 1973	Beach Nourishment	Fill placed on Captiva Island	5,000			
5	July, 1976	Jetty Construction	The recently constructed jetty is deemed to be a navigation hazard				
6	1977	Groin Construction	A 350-ft rock groin is constructed at the north end of Captiva Island at Redfish Pass; a 1,500 foot long rubble rock revetment is constructed at the Gulf beach at the north end of Captiva Island				
7	1981	Beach Nourishment	Fill placed on South Seas Resort	655,000			
8	1988	Groin Construction & Beach Nourishment	Fill placed on Captiva Island & Blind Pass Groin constructed	1,600,000			
9	1991	Beach Nourishment	Fill placed on SO. Seas Plantation				
10	1996	Beach Nourishment	Fill placed along Captiva Island	821,000			
11	2005 - 2006	Beach Nourishment	Fill placed on Captiva Island	1,017,000			
12	July, 2006	Groin Reconstruction & Extention	Redfish Pass Groin reconstructed and extended				
13	April, 2008	Beach Nourishment	Fill placed on Captiva Island	100,000			

ENGINEERING ACTIVITIES LOG FOR JOHN'S PASS

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
1	1926	Bridge Construction	Pinellas County constructed bridges across Blind Pass & Johns Pass and built a road on Treasure Island				
2	1934	Groin Construction	Two 150-ft groins are built on the Veteran's Administration Beach at Madeira Beach				
3	1957	Groin Construction	The City of Madeira Beach builds a groin field of 37 groins over its entire frontage. These groins were constructed of timber piles with adjustable timber and concrete panels				
4	1960	Groin Construction	The City of Treasure Island installs a groin field of 56 groins on the southern frontage of Treasure Island. 94,000 cy of material is dredged from Johns Pass and placed on the outer bar of Johns Pass (20,000 ft offshore)	94,000			
5	1961	Jetty Construction & Beach Nourishment	A 460-ft curved jetty is installed on the north side of Johns Pass, and fill is placed on the beach north of Johns Pass	30,000			
6	1964	Beach Nourishment	Fill placed on Sunset Beach (Treasure Island)	10,000			Dredge from Blind Pass
7	1966	Dredging	Channel Maintenance	77,650			
8	1966	Revetment Construction	A 920-ft long revetment is placed along the south bank of Johns Pass				
9	1969	Bridge Construction	New bridge over Johns Pass is completed				
10	1969	Beach Nourishment	Fill placed on Treasure Island	790,000	1,000	790	Dredge from Blind Pass
11	1971	Beach Nourishment	Fill placed on Treasure Island	75,000	1,600	47	Dredge from Johns Pass
12	1972	Beach Nourishment	Fill placed on Treasure Island	150,000	1,400	107	
13	1974	Survey	Beach Profile Surveys for Treasure Island				
14	1976	Groin Construction & Beach Nourishment	USACE begins construction of 2 impermeable sheet pile groins and the third periodic nourishment of Treasure Island beaches north of Blind Pass. The groin at the southern end of Treasure Island is 360-ft long and the 2nd groin (2,300 ft north of the first) is 285-ft long	404,849			
15	1976	Beach Nourishment & Groin Extention	Fill placed on southern portion of Treasure Island; Groin extended and stabilized at south end of island	380,000	7,920	48	offshore borrow area
16	December, 1978	Beach Nourishment	Fill placed on southern Treasure Island	32,000			Dredge from Blind Pass
17	1979	Dredging	Channel Maintenance	80,000			
18	1981	Dredging	Channel Maintenance	70,000			
19	1983	Dredging	Channel Maintenance	80,000			
20	1983	Beach Nourishment	Fill placed on Treasure Island	220,000			
21	1986	Emergency Beach Nourishment	Repairs to Treasure Island	549,000			

No	Date	Project Type	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
22	1988	Beach Nourishment	Initial Fill placed on North Redington Beach				
23	1987	Groin Rehabilitation	Rehabilitation of Groin at Johns Pass completed				
24	1991	Dredging	Channel Maintenance	56,000			
25	June, 1996	Beach Nourishment	Fill placed on Sunset Beach (Treasure Island) & northern 2,400 feet of Long Key	252,950			Egmont Shoal
26	2000	Dredging	Channel Maintenance	390,000			
27	2000	Groin Construction	Terminal groin constructed on the south side of John's Pass				
28	May, 2000	Beach Nourishment	Fill placed along the northern 2,400 feet of Long Key & Sunset Beach (Treasure Island)	358,900	2,400	150	Blind Pass & Johns Pass
29	August, 2000	Beach Nourishment	Fill placed along Sunset Beach (Treasure Island) between monuments DNR-136 and DNR-141	40,000			Blind Pass & Johns Pass
30	September, 2004	Beach Nourishment	Fill placed along southern third of Treasure Island between monuments DNR-136 and DNR-141. Following Hurricane Jeanne, additional fill was placed along Sunset Beach to complete segment and repair damages due to the storm	225,422	5,100	44	
31	February, 2006	Survey	Beach Profile Surveys done for Long Key & Treasure Island				
32	August, 2006	Beach Nourishment	Fill placed on Sunshine Beach & Sunset Beach (Treasure Island)	184,272			Egmont Shoal
33	December, 2006	Survey	Beach Profile Surveys done for Long Key & Treasure Island				
34	August, 2007	Survey	Beach Profile Surveys done for Long Key & Treasure Island				
35	October, 2008	Survey	Beach Profile Surveys done for Long Key & Treasure Island				
36	2009	Dredging	Channel Maintenance	375,000			

Appendix D

Physical Data

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Appendix D – Physical Data

1. Oregon Inlet

a) Waves and Tides

For the Oregon Inlet site, the closest NDBC buoys and WIS stations were selected to represent wave conditions within the immediate area surrounding the Oregon Inlet terminal groin. These locations are shown in Figure D-1 along with nearby NOAA tidal gages. The closest tide gage is located at the Oregon Inlet Marina, which is inside the sound, not on the oceanside. The closest ocean tidal measurements are approximately 30 miles north at Duck, NC. Table D-1 presents the tidal datums for both gages.

Table D-1. Tidal Gages near Oregon Inlet

Tidal Datum	Station	
	Oregon Inlet Marina (8652587)	Duck (8651370)
MHHW (ft)	1.17	3.69
MHW (ft)	1.02	3.37
DTL (ft)	0.59	1.84
MTL (ft)	0.57	1.75
MSL (ft)	0.58	1.77
MLW (ft)	0.13	0.14
MLLW (ft)	0.00	0.00
NAVD (ft)	0.66	2.19
Maximum (ft)	5.66	6.92
Max Date	1999/09/16	1999/08/30
Max Time	15:00	15:54
Minimum (ft)	-1.99	-2.66
Min Date	1996/03/10	1980/03/16
Min Time	21:48	12:54

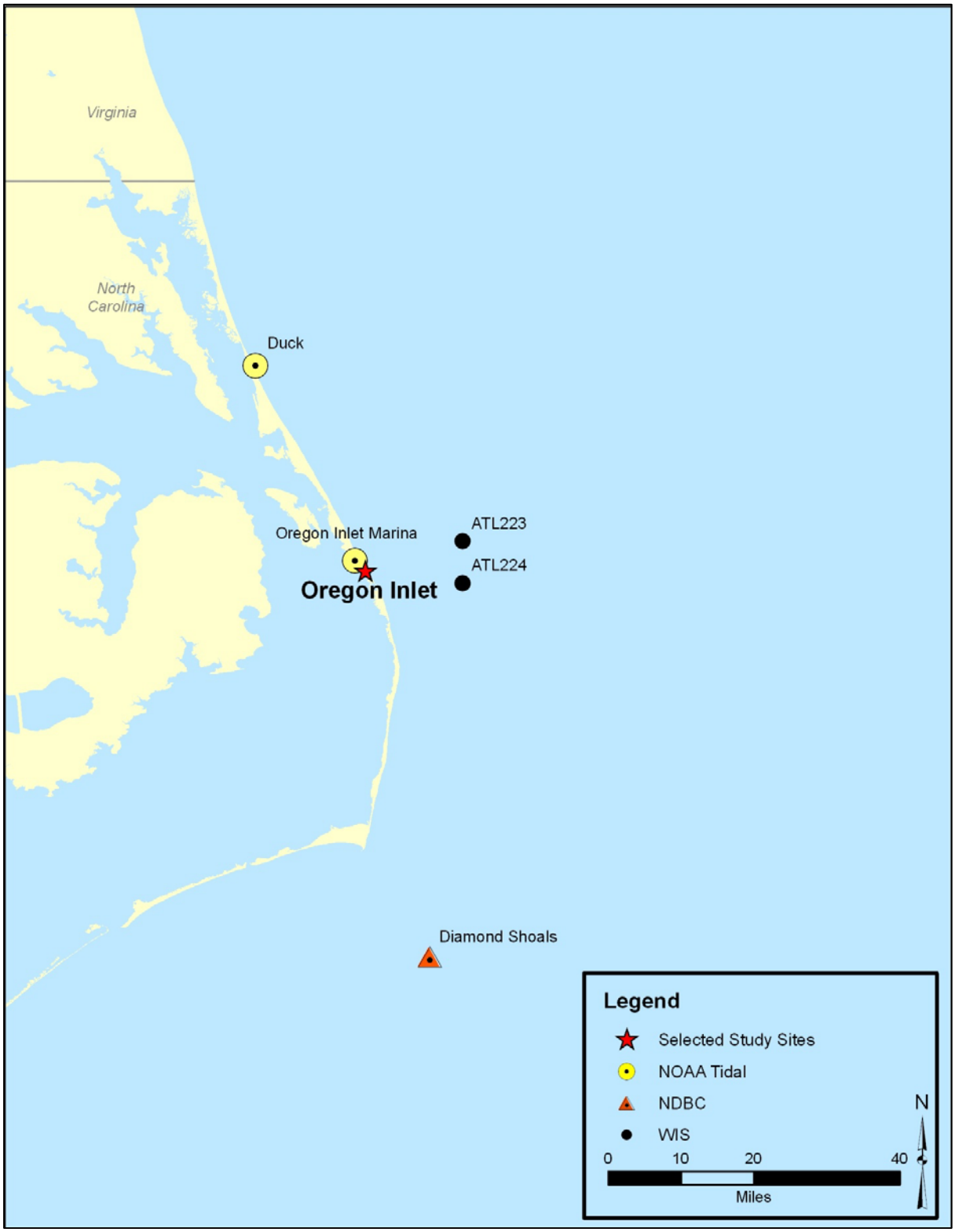

Figure D-1. Wave and Tidal Stations near Oregon Inlet

Table D-2 and Table D-3 summarize the percent occurrences by wave height and direction for WIS stations ATL 223 and 224. Figure D-2 illustrates the average annual wave roses for both stations. The wave rose provides a graphical representation of the wave heights and directions from which the waves are coming.

Table D-2. WIS Percent Occurrence of Wave Heights

Wave Height (meters)	Percent Occurrence of Wave Height	
	Station ATL 223	Station ATL 224
0.00 – 0.49	8.0	8.4
0.50 – 0.99	38.9	39.5
1.00 – 1.49	26.0	26.8
1.50 – 1.99	13.0	12.9
2.00 – 2.49	7.1	6.8
2.50 – 2.99	3.5	3.0
3.00 – 3.49	1.7	1.3
3.50 – 3.99	0.9	0.6
4.00 – 4.49	0.4	0.3
4.50 – 4.99	0.2	0.1
5.00 - GREATER	0.3	0.2

Table D-3. WIS Percent Occurrence by Mean Wave Direction (From)

Direction Band & Center (deg)	Percent Occurrence of Mean Direction	
	Station ATL 223	Station ATL 224
348.75 – 11.24 (0.0)	8.8	8.2
11.25 – 33.74 (22.5)	8.8	9.6
33.75 – 56.24 (45.0)	10.1	11.0
56.25 – 78.74 (67.5)	11.0	12.2
78.75 - 101.24 (90.0)	10.1	10.5
101.25 - 123.74 (112.5)	8.9	8.4
123.75 - 146.24 (135.0)	8.2	7.6
146.25 - 168.74 (157.5)	8.0	7.6
168.75 - 191.24 (180.0)	9.1	9.3
191.25 - 213.74 (202.5)	4.5	5.0
213.75 - 236.24 (225.0)	1.3	1.3
236.25 - 258.74 (247.5)	0.8	0.5
258.75 - 281.24 (270.0)	0.8	0.5
281.25 - 303.74 (292.5)	1.3	0.9
303.75 - 326.24 (315.0)	2.3	2.2
326.25 - 348.74 (337.5)	6.0	5.0

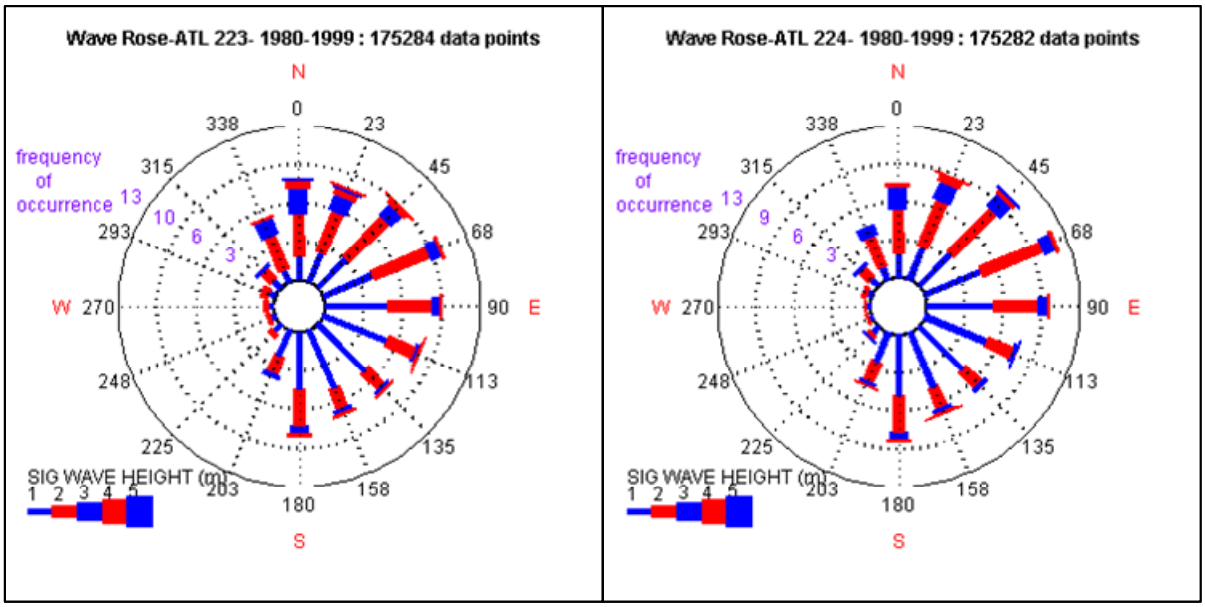

Figure D-2. Wave Roses (USACE WIS Hindcast)

A review of the WIS hindcast data yields the following observations:

- Almost 40% of the wave heights over the period 1980 – 1999 were between approximately 0.5 – 0.99 meters (1.6 – 3.2 feet).
- The typical direction of the waves was from northeast - southeast.
- The largest waves occur during the winter months (December – March) and are predominately from the north.

b) Storms

The NOAA database of historical storms records approximate storm track, wind speed, pressure, and category for storms since 1851. Figure D-3 illustrates the hurricane tracks in the vicinity of Oregon Inlet and Table D-4 lists the extratropical storms, tropical storms, and hurricanes that have passed within 65 nautical miles between 1851 and 2008. Of these 98 storms, three have made landfall within 10 miles.

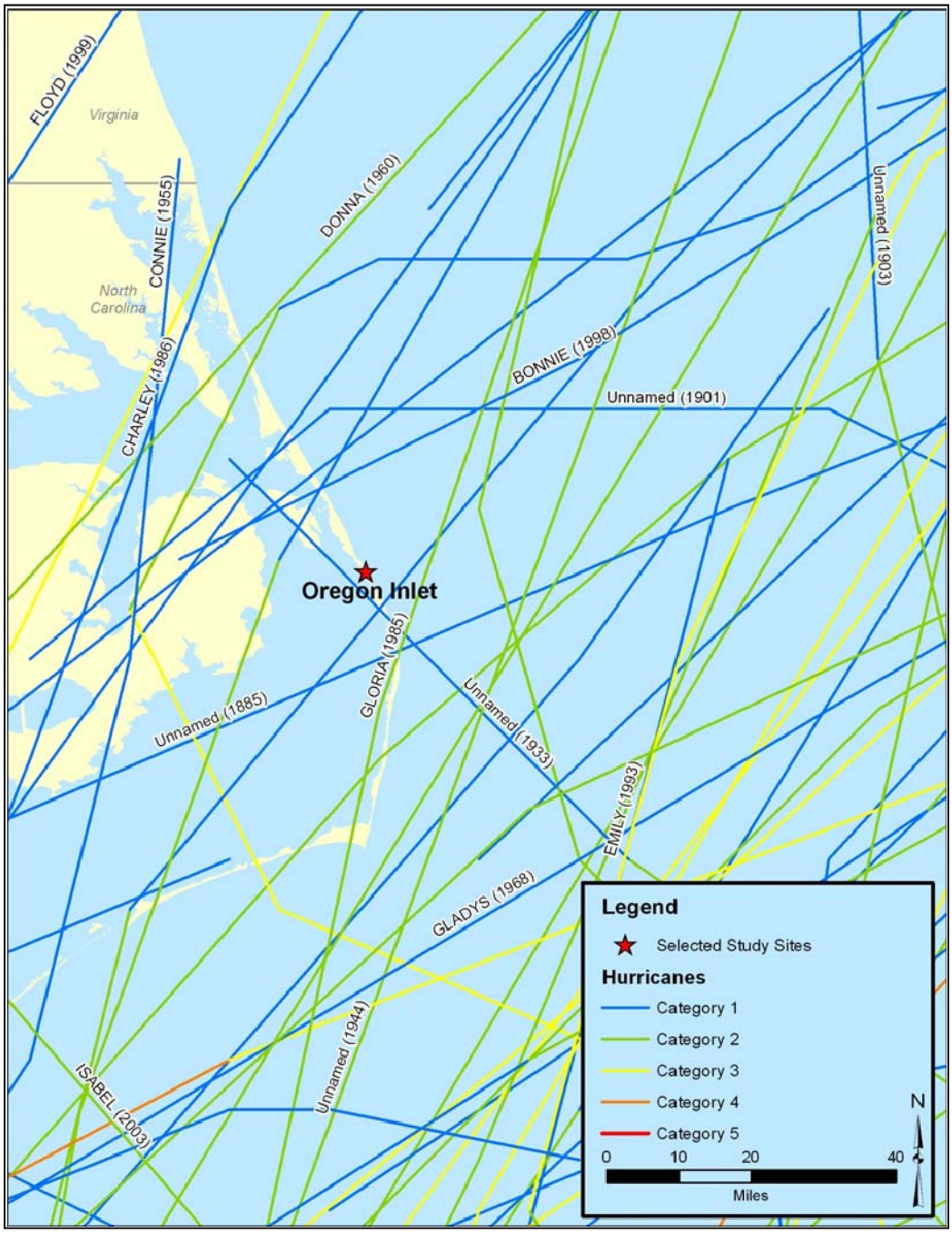

Figure D-3. Hurricanes in the Vicinity of Oregon Inlet

Table D-4. Oregon Inlet Storms (NOAA, 1951-2008)

YEAR	STORM NAME	MAXIMUM CATEGORY
1851	NOTNAMED	Tropical Storm
1852	NOTNAMED	Tropical Storm
1854	NOTNAMED	Tropical Storm
1856	NOTNAMED	Tropical Storm
1856	NOTNAMED	Tropical Storm
1857	NOTNAMED	Category 2
1858	NOTNAMED	Category 2
1861	NOTNAMED	Tropical Storm
1861	NOTNAMED	Tropical Storm
1861	NOTNAMED	Category 1
1863	NOTNAMED	Tropical Storm
1866	NOTNAMED	Category 1
1879	NOTNAMED	Category 3
1880	NOTNAMED	Category 1
1881	NOTNAMED	Tropical Storm
1882	NOTNAMED	Tropical Storm
1885	NOTNAMED	Category 1
1887	NOTNAMED	Extratropical
1888	NOTNAMED	Tropical Storm
1889	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1894	NOTNAMED	Category 1
1894	NOTNAMED	Tropical Storm
1897	NOTNAMED	Tropical Storm
1897	NOTNAMED	Tropical Storm
1897	NOTNAMED	Tropical Storm
1899	NOTNAMED	Category 3
1900	NOTNAMED	Extratropical
1901	NOTNAMED	Category 1
1901	NOTNAMED	Tropical Storm
1907	NOTNAMED	Extratropical
1908	NOTNAMED	Category 1
1908	NOTNAMED	Category 1
1908	NOTNAMED	Tropical Storm
1910	NOTNAMED	Tropical Storm
1910	NOTNAMED	Extratropical
1912	NOTNAMED	Extratropical
1918	NOTNAMED	Tropical Storm
1924	NOTNAMED	Category 2
1925	NOTNAMED	Extratropical
1932	NOTNAMED	Tropical Storm
1933	NOTNAMED	Category 2
1933	NOTNAMED	Category 2
1934	NOTNAMED	Extratropical
1936	NOTNAMED	Category 2
1937	NOTNAMED	Tropical Storm
1938	NOTNAMED	Extratropical
1942	NOTNAMED	Extratropical
1944	NOTNAMED	Category 2
1945	NOTNAMED	Tropical Storm
1946	NOTNAMED	Tropical Storm
1946	NOTNAMED	Extratropical
1947	NOTNAMED	Extratropical
1953	BARBARA	Category 2
1954	CAROL	Category 2
1954	EDNA	Category 3
1955	CONNIE	Category 1
1955	IONE	Category 1
1956	FLOSSY	Extratropical
1958	HELENE	Category 3
1960	DONNA	Category 2
1962	ALMA	Category 1
1964	CLEO	Tropical Storm
1964	DORA	Tropical Storm
1964	ISBELL	Extratropical
1965	NOTNAMED	Extratropical
1967	DORIA	Tropical Storm
1968	GLADYS	Category 1
1970	ALMA	Extratropical
1971	DORIA	Tropical Storm
1972	AGNES	Tropical Storm
1981	BRET	Tropical Storm
1981	DENNIS	Tropical Storm
1984	DIANA	Tropical Storm
1985	GLORIA	Category 2
1986	CHARLEY	Category 1
1991	BOB	Category 2
1992	DANIELLE	Tropical Storm
1993	EMILY	Category 3
1995	ALLISON	Extratropical
1996	ARTHUR	Tropical Storm
1996	JOSEPHINE	Extratropical
1997	DANNY	Tropical Storm
1998	BONNIE	Category 1
1998	EARL	Extratropical
1999	FLOYD	Category 1
2000	HELENE	Tropical Storm
2002	GUSTAV	Tropical Storm
2002	KYLE	Tropical Storm
2004	ALEX	Category 2
2004	CHARLEY	Tropical Storm
2004	CHARLEY	Extratropical
2006	ALBERTO	Extratropical
2007	GABRIELLE	Tropical Storm
2007	BARRY	Extratropical
2008	CRISTOBAL	Tropical Storm

2. Fort Macon

a) Waves and Tides

The closest NDBC buoys and USACE Wave Information Study hindcast points (WIS stations) near Fort Macon that represent wave conditions within the immediate area surrounding Beaufort Inlet and the terminal groin are shown in Figure D-4 along with nearby NOAA tidal gages. The closest operating tidal gage is located in Beaufort Inlet with another located on the ocean shore approximately 70 miles to the southwest at Wrightsville Beach. Table D-5 presents the tidal datums for both gages.

Table D-5. Tidal Gages near Fort Macon

Tidal Datum	Station	
	Beaufort (8656483)	Wrightsville Beach (8658163)
MHHW (ft)	3.54	4.31
MHW (ft)	3.26	3.96
DTL (ft)	1.77	2.15
MTL (ft)	1.70	2.06
MSL (ft)	1.71	2.05
MLW (ft)	0.15	0.15
MLLW (ft)	0.00	0.00
NAVD (ft)	-	2.51
Maximum (ft)	6.29	7.08
Max Date	1999/09/16	2008/09/25
Max Time	9:12	20:54
Minimum (ft)	-1.92	-2.81
Min Date	1978/01/11	2007/04/16
Min Time	3:18	4:24

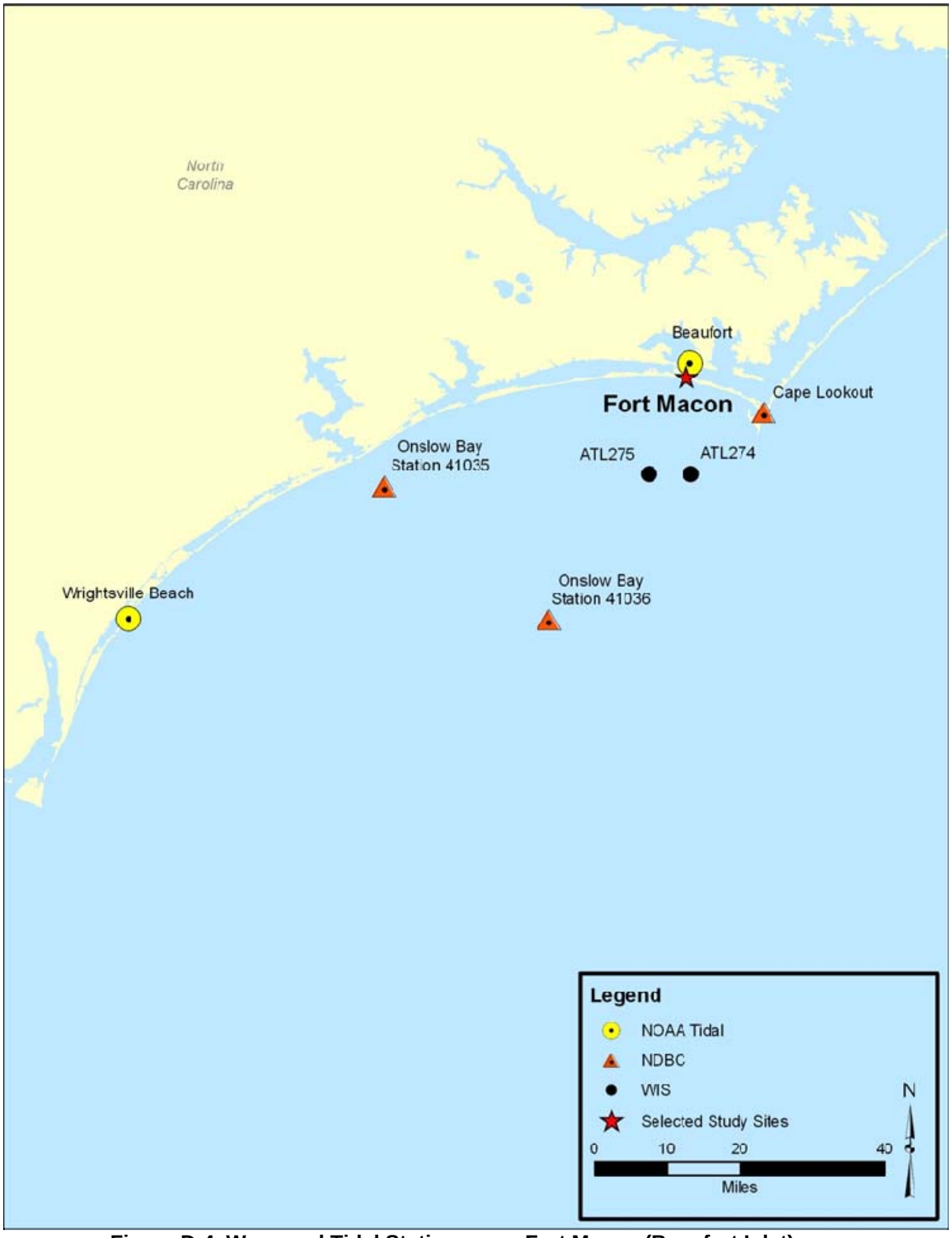

Figure D-4. Wave and Tidal Stations near Fort Macon (Beaufort Inlet)

Table D-6 and Table D-7 summarize the percent occurrences by wave height and direction for WIS stations ATL 274 and 275. Figure D-5 illustrates the average annual wave roses for both stations. These wave roses provide a graphical representation of the wave heights and directions from which the waves are coming.

Table D-6. WIS Percent Occurrence of Wave Heights

Wave Height (meters)	Percent Occurrence of Wave Height	
	Station ATL 274	Station ATL 275
0.00 – 0.49	15.6	15.5
0.50 – 0.99	47.9	48.4
1.00 – 1.49	22.2	22.1
1.5 – 1.99	7.8	7.4
2.00 – 2.49	3.7	3.7
2.50 – 2.99	1.6	1.5
3.00 – 3.49	0.7	0.7
3.50 – 3.99	0.3	0.3
4.00 – 4.49	0.1	0.1
4.50 – 4.99	0.1	0.0
5.00 – GREATER	0.1	0.1

Table D-7. WIS Percent Occurrence by Mean Wave Direction (From)

Direction Band & Center (deg)	Percent Occurrence of Mean Direction	
	Station ATL 274	Station ATL 275
348.75 – 11.24 (0.0)	2.4	2.5
11.25 – 33.74 (22.5)	2.9	2.8
33.75 – 56.24 (45.0)	5.0	4.5
56.25 – 78.74 (67.5)	6.7	6.1
78.75 - 101.24 (90.0)	6.5	6.0
101.25 - 123.74 (112.5)	7.2	7.7
123.75 - 146.24 (135.0)	9.8	11.1
146.25 - 168.74 (157.5)	9.4	10.3
168.75 - 191.24 (180.0)	12.0	12.4
191.25 - 213.74 (202.5)	13.3	12.8
213.75 - 236.24 (225.0)	8.0	7.4
236.25 - 258.74 (247.5)	5.0	4.8
258.75 - 281.24 (270.0)	4.0	3.6
281.25 - 303.74 (292.5)	2.9	2.7
303.75 - 326.24 (315.0)	2.8	2.8
326.25 - 348.74 (337.5)	2.2	2.3

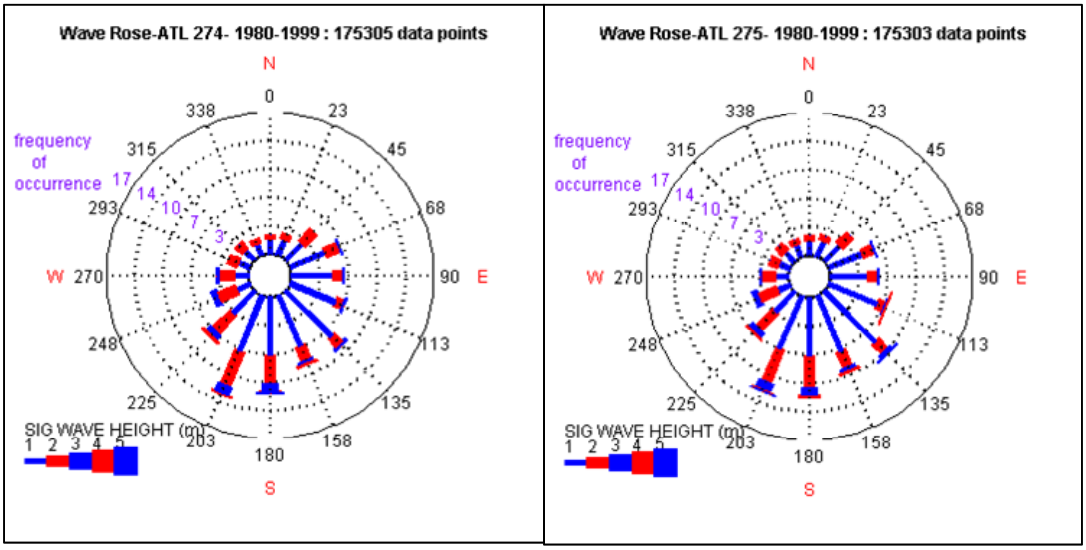

Figure D-5. Wave Roses (USACE WIS Hindcast)

A review of the WIS hindcast data yields the following observations:

- Almost 50% of the wave heights over the hindcast period (1980 – 1999) were between approximately 0.5 – 0.99 meters (1.6 – 3.2 feet).
- The typical direction of the waves was from south – southwest.
- However, from August to November the typical direction of the waves is from the east - southeast
- The largest waves occur during the winter months (December – March).

b) Storms

The NOAA database of historical storms records approximate storm track, wind speed, pressure, and category for storms since 1851. Figure D-6 illustrates the hurricane tracks in the vicinity of Fort Macon and Table D-8 lists the extratropical storms, tropical storms, and hurricanes that have passed within 65 nautical miles between 1851 and 2008. Of these 117 storms, 9 have made landfall within 10 miles.

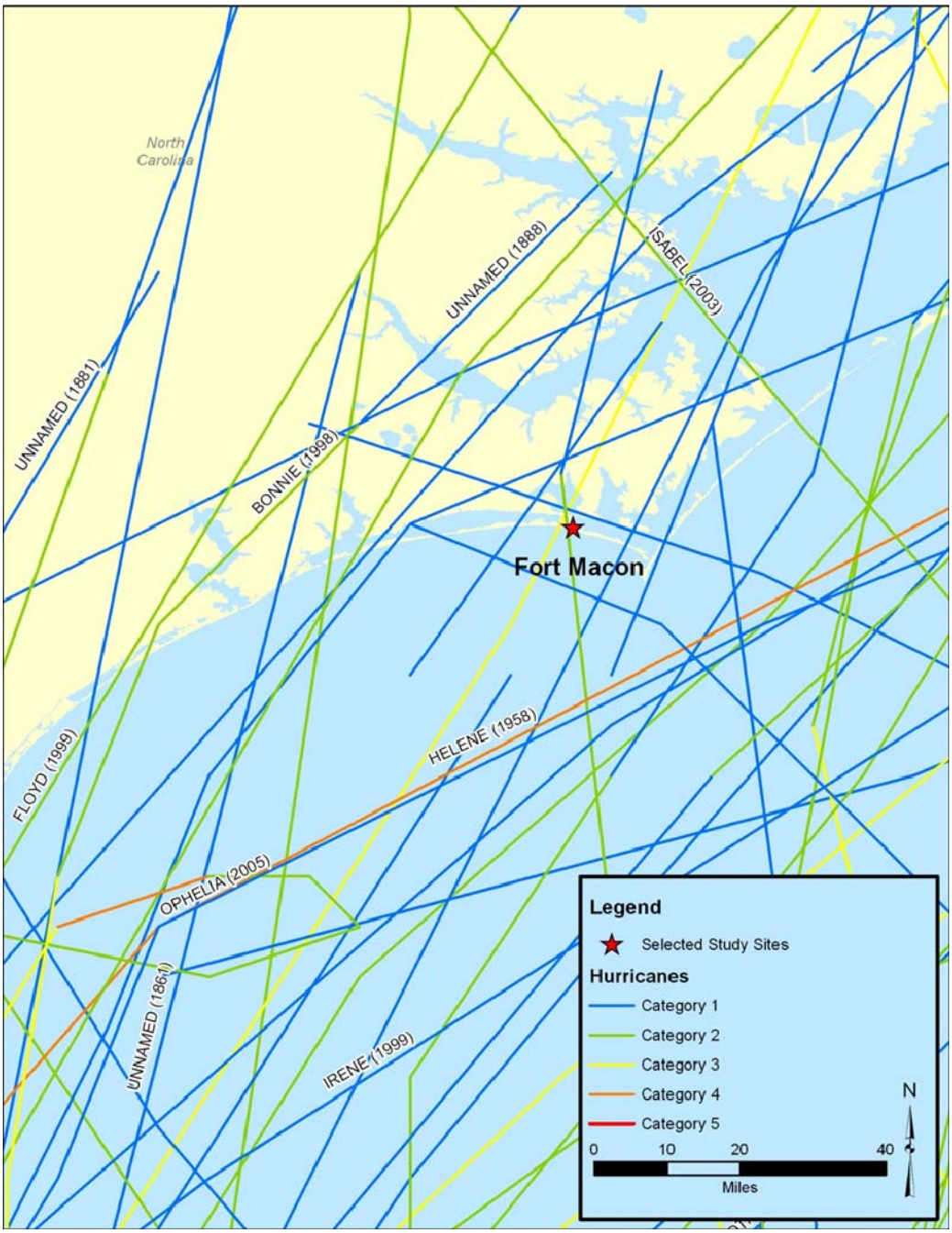

Figure D-6. Hurricanes in the Vicinity of Fort Macon

Table D-8. Fort Macon Storms (NOAA, 1951-2008)

YEAR	STORM NAME	MAXIMUM CATEGORY
1852	NOTNAMED	Tropical Storm
1852	NOTNAMED	Tropical Storm
1856	NOTNAMED	Tropical Storm
1856	NOTNAMED	Tropical Storm
1857	NOTNAMED	Category 2
1861	NOTNAMED	Category 1
1861	NOTNAMED	Category 1
1863	NOTNAMED	Tropical Storm
1868	NOTNAMED	Tropical Storm
1871	NOTNAMED	Tropical Storm
1871	NOTNAMED	Tropical Storm
1872	NOTNAMED	Tropical Storm
1873	NOTNAMED	Tropical Storm
1876	NOTNAMED	Category 1
1877	NOTNAMED	Tropical Storm
1878	NOTNAMED	Tropical Storm
1878	NOTNAMED	Category 2
1879	NOTNAMED	Category 3
1880	NOTNAMED	Category 1
1882	NOTNAMED	Tropical Storm
1882	NOTNAMED	Category 1
1885	NOTNAMED	Category 1
1885	NOTNAMED	Category 1
1887	NOTNAMED	Category 3
1887	NOTNAMED	Category 3
1887	NOTNAMED	Tropical Storm
1888	NOTNAMED	Tropical Storm
1889	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1894	NOTNAMED	Tropical Storm
1894	NOTNAMED	Tropical Storm
1897	NOTNAMED	Tropical Storm
1897	NOTNAMED	Tropical Storm
1899	NOTNAMED	Category 3
1899	NOTNAMED	Extratropical
1900	NOTNAMED	Extratropical
1901	NOTNAMED	Category 1
1901	NOTNAMED	Tropical Storm
1901	NOTNAMED	Tropical Storm
1904	NOTNAMED	Extratropical
1907	NOTNAMED	Tropical Storm
1907	NOTNAMED	Tropical Storm
1908	NOTNAMED	Category 1
1908	NOTNAMED	Category 1
1908	NOTNAMED	Tropical Storm
1908	NOTNAMED	Tropical Storm

YEAR	STORM NAME	MAXIMUM CATEGORY
1908	NOTNAMED	Tropical Storm
1908	NOTNAMED	Tropical Storm
1910	NOTNAMED	Tropical Storm
1910	NOTNAMED	Extratropical
1912	NOTNAMED	Extratropical
1913	NOTNAMED	Category 1
1918	NOTNAMED	Category 1
1924	NOTNAMED	Extratropical
1925	NOTNAMED	Extratropical
1928	NOTNAMED	Tropical Storm
1932	NOTNAMED	Tropical Storm
1933	NOTNAMED	Category 3
1934	NOTNAMED	Tropical Storm
1934	NOTNAMED	Category 1
1937	NOTNAMED	Tropical Storm
1938	NOTNAMED	Extratropical
1942	NOTNAMED	Tropical Storm
1944	NOTNAMED	Category 2
1945	NOTNAMED	Tropical Storm
1946	NOTNAMED	Tropical Storm
1949	NOTNAMED	Category 2
1953	BARBARA	Category 2
1953	FLORENCE	Extratropical
1954	CAROL	Category 2
1955	CONNIE	Category 2
1955	IONE	Category 3
1956	FLOSSY	Extratropical
1958	HELENE	Category 4
1960	BRENDA	Tropical Storm
1960	DONNA	Category 2
1962	ALMA	Tropical Storm
1964	DORA	Tropical Storm
1964	ISBELL	Category 1
1966	ALMA	Tropical Storm
1967	DORIA	Tropical Storm
1968	GLADYS	Category 1
1971	DORIA	Tropical Storm
1971	GINGER	Category 1
1972	AGNES	Tropical Storm
1975	AMY	Tropical Storm
1975	HALLIE	Tropical Storm
1981	DENNIS	Tropical Storm
1984	DIANA	Category 4
1985	GLORIA	Category 2
1985	KATE	Tropical Storm
1986	CHARLEY	Category 1
1995	ALLISON	Extratropical
1996	ARTHUR	Tropical Storm
1996	BERTHA	Category 2
1996	JOSEPHINE	Extratropical

YEAR	STORM NAME	MAXIMUM CATEGORY
1998	BONNIE	Category 2
1999	DENNIS	Tropical Storm
1999	FLOYD	Category 2
1999	IRENE	Category 1
2002	KYLE	Tropical Storm
2003	ISABEL	Category 2
2004	ALEX	Category 2
2004	CHARLEY	Tropical Storm
2005	OPHELIA	Category 1
2006	ALBERTO	Extratropical
2007	GABRIELLE	Tropical Storm
2007	BARRY	Extratropical
2008	CRISTOBAL	Tropical Storm

3. Amelia Island

a) Waves and Tides

The closest NDBC buoys and WIS stations near Amelia Island that represent wave conditions within the immediate area surrounding the terminal groin are shown in Figure D-7 along with nearby NOAA tidal gages. The closest operating tidal gage is located at the Nassau River entrance with a second nearby gage approximately 9 miles south at Mayport. Table D-9 lists the tidal datums for both gages.

Table D-9. Tidal Gages near Amelia Island

Tidal Datum	Station	
	Mayport - Bar Pilots Dock (8720218)	Nassau River Entrance (8720135)
MHHW (ft)	4.99	5.69
MHW (ft)	4.72	5.35
DTL (ft)	2.5	2.85
MTL (ft)	2.44	2.77
MSL (ft)	2.46	2.7
MLW (ft)	0.15	0.19
MLLW (ft)	0	0
NAVD (ft)	-	3.18
Maximum (ft)	7.14	-
Max Date	20010917	-
Max Time	0.041667	-
Minimum 9ft)	-2.28	-
Min Date	19960218	-
Min Time	0.270833	-

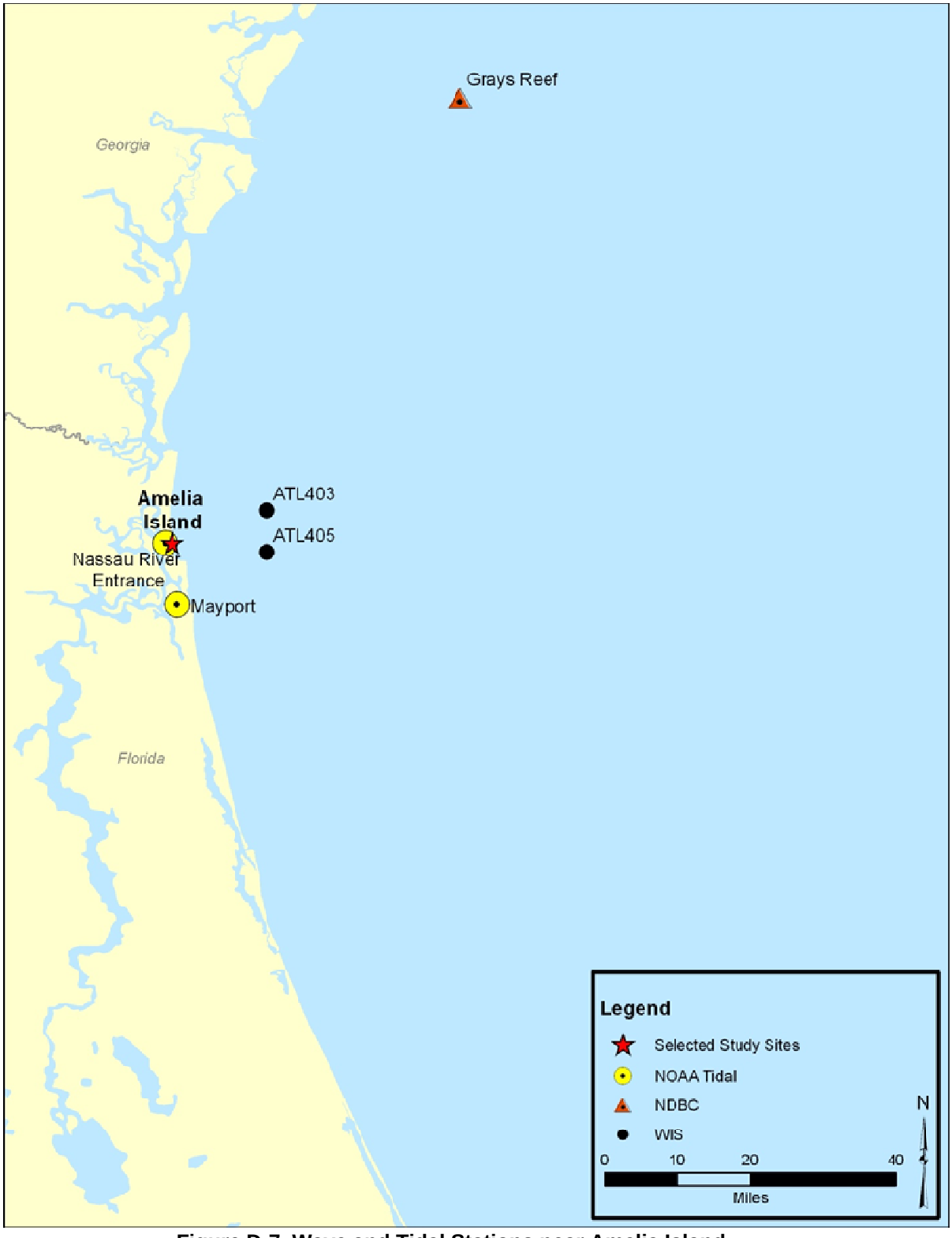

Figure D-7. Wave and Tidal Stations near Amelia Island

Table D-10 and Table D-11 summarize the percent occurrences by wave height and direction for WIS stations ATL 403 and 405. Figure D-8 illustrates the average annual wave roses for both stations. These wave roses provide a graphical representation of the wave heights and directions from which the waves are coming.

Table D-10. WIS Percent Occurrence of Wave Heights

Wave Height (meters)	Percent Occurrence of Wave Height	
	Station ATL 403	Station ATL 405
0.00 – 0.49	9.7	9.4
0.50 – 0.99	49.5	49.1
1.00 – 1.49	26.1	26.2
1.5 – 1.99	9.9	10.1
2.00 – 2.49	3.1	3.4
2.50 – 2.99	1.1	1.2
3.00 – 3.49	0.4	0.4
3.50 – 3.99	0.1	0.2
4.00 – 4.49	0.0	0.1
4.50 – 4.99	0.0	0.0
5.00 - GREATER	0.0	0.0

Table D-11. WIS Percent Occurrence by Mean Wave Direction (From)

Direction Band & Center (deg)	Percent Occurrence of Mean Direction	
	Station ATL 403	Station ATL 405
348.75 – 11.24 (0.0)	3.3	3.4
11.25 – 33.74 (22.5)	4.9	5.2
33.75 – 56.24 (45.0)	7.6	8.2
56.25 – 78.74 (67.5)	13.4	15.0
78.75 - 101.24 (90.0)	22.1	22.7
101.25 - 123.74 (112.5)	25.8	24.7
123.75 - 146.24 (135.0)	8.9	7.9
146.25 - 168.74 (157.5)	4.5	4.3
168.75 - 191.24 (180.0)	3.1	2.8
191.25 - 213.74 (202.5)	1.1	1.0
213.75 - 236.24 (225.0)	0.6	0.6
236.25 - 258.74 (247.5)	0.5	0.5
258.75 - 281.24 (270.0)	0.6	0.5
281.25 - 303.74 (292.5)	0.8	0.7
303.75 - 326.24 (315.0)	1.2	1.1
326.25 - 348.74 (337.5)	1.5	1.5

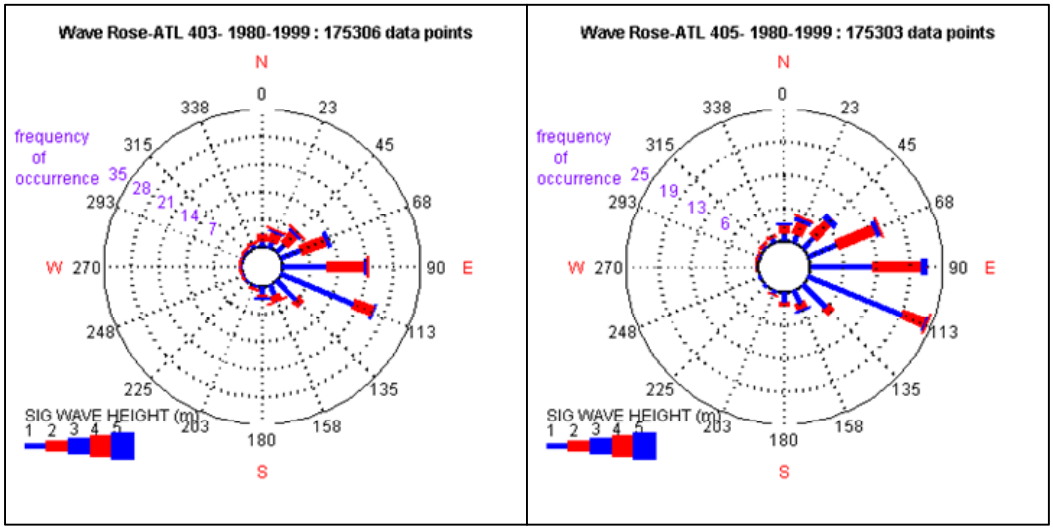

Figure D-8. Wave Roses (USACE WIS Hindcast)

A review of the WIS hindcast data yields the following observations:

- Almost 50% of the wave heights over the hindcast period (1980 – 1999) were between approximately 0.5 – 0.99 meters (1.6 – 3.2 feet).
- This region typically does not experience large wave heights over 2 meters (6.6 feet) – less than 5% of the total number of waves
- The typical direction of the waves was from east – east southeast.
- The largest waves occur during the winter months (December – March) and predominately from the northeast.

b) Storms

The NOAA database of historical storms records approximate storm track, wind speed, pressure, and category for storms since 1851. Figure D-9 illustrates the hurricane tracks in the vicinity of Amelia Island and Table D-12 lists the extratropical storms, tropical storms, and hurricanes that have passed within 65 nautical miles between 1851 and 2008. Of these 83 storms, 4 have made landfall within 10 miles.

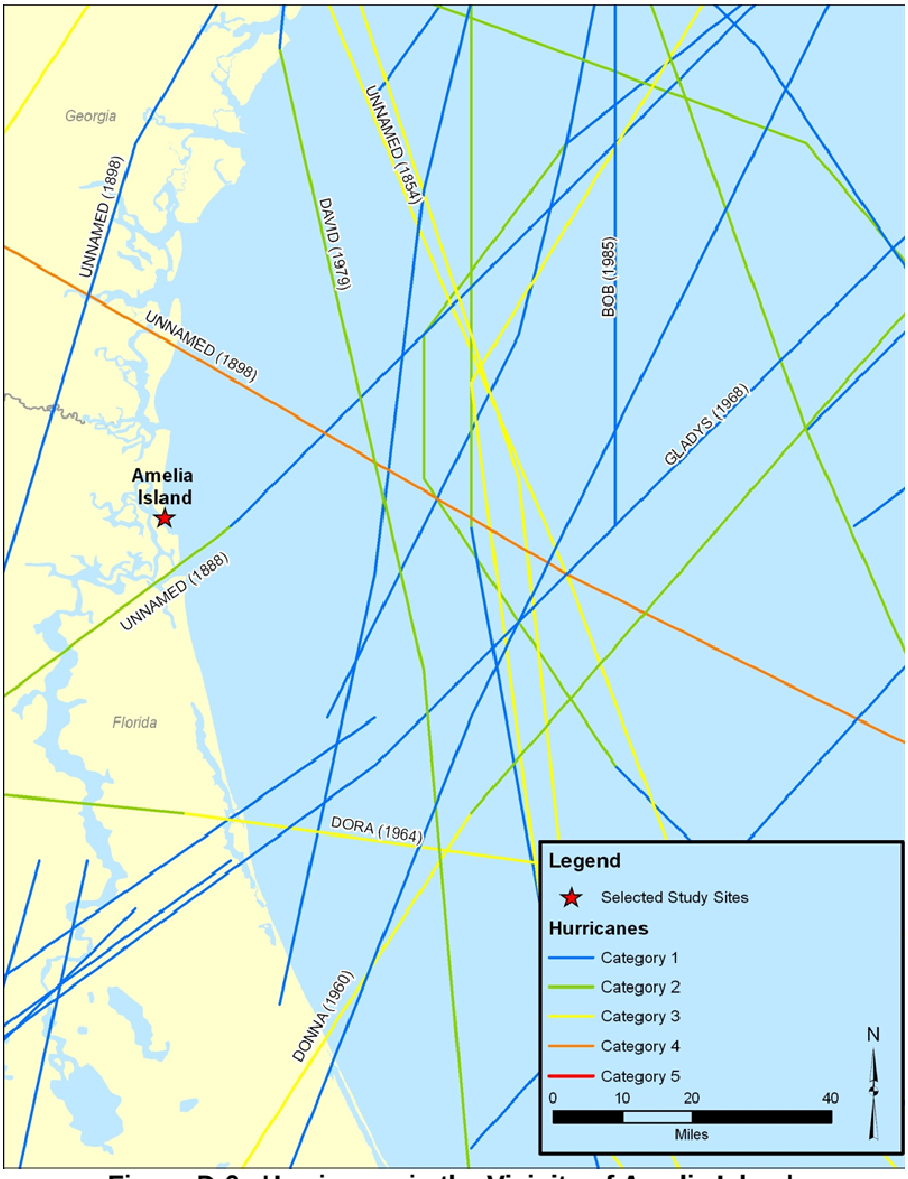

Figure D-9. Hurricanes in the Vicinity of Amelia Island

Table D-12. Amelia Island Vicinity Storms (NOAA, 1951-2008)

YEAR	STORM NAME	MAXIMUM CATEGORY
1853	NOTNAMED	Category 2
1854	NOTNAMED	Category 3
1867	NOTNAMED	Tropical Storm
1867	NOTNAMED	Tropical Storm
1867	NOTNAMED	Tropical Storm
1868	NOTNAMED	Tropical Storm
1871	NOTNAMED	Tropical Storm
1871	NOTNAMED	Tropical Storm
1871	NOTNAMED	Tropical Storm
1873	NOTNAMED	Tropical Storm
1874	NOTNAMED	Category 1
1877	NOTNAMED	Tropical Storm
1877	NOTNAMED	Tropical Storm
1878	NOTNAMED	Category 1
1878	NOTNAMED	Tropical Storm
1879	NOTNAMED	Tropical Storm
1880	NOTNAMED	Tropical Storm
1880	NOTNAMED	Category 1
1881	NOTNAMED	Category 2
1882	NOTNAMED	Tropical Storm
1884	NOTNAMED	Tropical Storm
1884	NOTNAMED	Tropical Storm
1885	NOTNAMED	Category 2
1885	NOTNAMED	Tropical Storm
1885	NOTNAMED	Tropical Storm
1885	NOTNAMED	Tropical Storm
1886	NOTNAMED	Tropical Storm
1888	NOTNAMED	Tropical Storm
1888	NOTNAMED	Category 2
1889	NOTNAMED	Tropical Storm
1893	NOTNAMED	Tropical Storm
1893	NOTNAMED	Category 3
1893	NOTNAMED	Category 3
1894	NOTNAMED	Category 1
1896	NOTNAMED	Category 3
1898	NOTNAMED	Category 4
1900	NOTNAMED	Tropical Storm
1906	NOTNAMED	Tropical Storm
1907	NOTNAMED	Tropical Storm
1910	NOTNAMED	Tropical Storm
1912	NOTNAMED	Tropical Storm
1912	NOTNAMED	Tropical Storm
1914	NOTNAMED	Tropical Storm
1915	NOTNAMED	Tropical Storm
1916	NOTNAMED	Tropical Storm
1916	NOTNAMED	Tropical Storm
1919	NOTNAMED	Tropical Storm
1919	NOTNAMED	Tropical Storm
1924	NOTNAMED	Tropical Storm
1926	NOTNAMED	Tropical Storm
1927	NOTNAMED	Tropical Storm
1928	NOTNAMED	Category 2
1932	NOTNAMED	Tropical Storm
1934	NOTNAMED	Tropical Storm
1936	NOTNAMED	Tropical Storm
1938	NOTNAMED	Tropical Storm
1944	NOTNAMED	Category 1
1945	NOTNAMED	Category 1
1945	NOTNAMED	Category 1
1945	NOTNAMED	Tropical Storm
1946	NOTNAMED	Tropical Storm
1946	NOTNAMED	Tropical Storm
1947	NOTNAMED	Tropical Storm
1947	NOTNAMED	Tropical Storm
1950	EASY	Tropical Storm
1953	NOTNAMED	Tropical Storm
1960	BRENDA	Tropical Storm
1960	DONNA	Category 3
1964	CLEO	Tropical Storm
1964	DORA	Category 3
1968	ABBY	Tropical Storm
1968	GLADYS	Category 1
1979	DAVID	Category 2
1981	DENNIS	Tropical Storm
1984	ISIDORE	Tropical Storm
1985	BOB	Category 1
1985	ISABEL	Tropical Storm
1988	CHRIS	Tropical Storm
1996	JOSEPHINE	Tropical Storm
2000	GORDON	Tropical Storm
2002	KYLE	Tropical Storm
2004	CHARLEY	Category 1
2005	TAMMY	Tropical Storm

4. Captiva Island

a) Waves and Tides

The closest NDBC buoys and WIS stations near Captiva Island / Redfish Pass that represent wave conditions within the immediate area surrounding the terminal groin are shown in Figure D-10 along with nearby NOAA tidal gages. The NOAA tidal gage located at Fort Myers is the closest tidal gage to Captiva Island. This gage is located along the Caloosahatchee River, before its confluence with San Carlos Bay. The closest ocean-side tide gage is located approximately 37 miles south at Naples, Florida. Table D-13 lists the tidal datums for both gages.

Table D-13. Tidal Gages near Captiva Island

Tidal Datum	Station	
	Fort Myers (8725520)	Naples (8725110)
MHHW (ft)	1.32	2.87
MHW (ft)	1.10	2.61
DTL (ft)	0.66	1.44
MTL (ft)	0.63	1.61
MSL (ft)	0.63	1.65
MLW (ft)	0.15	0.60
MLLW (ft)	0.00	0.00
NAVD (ft)	1.04	2.28
Maximum (ft)	4.72	5.98
Max Date	1988/11/23	1972/12/21
Max Time	4:48	23:54
Minimum (ft)	-2.86	-2.48
Min Date	1965/09/08	1988/03/15
Min Time	0:00	4:12

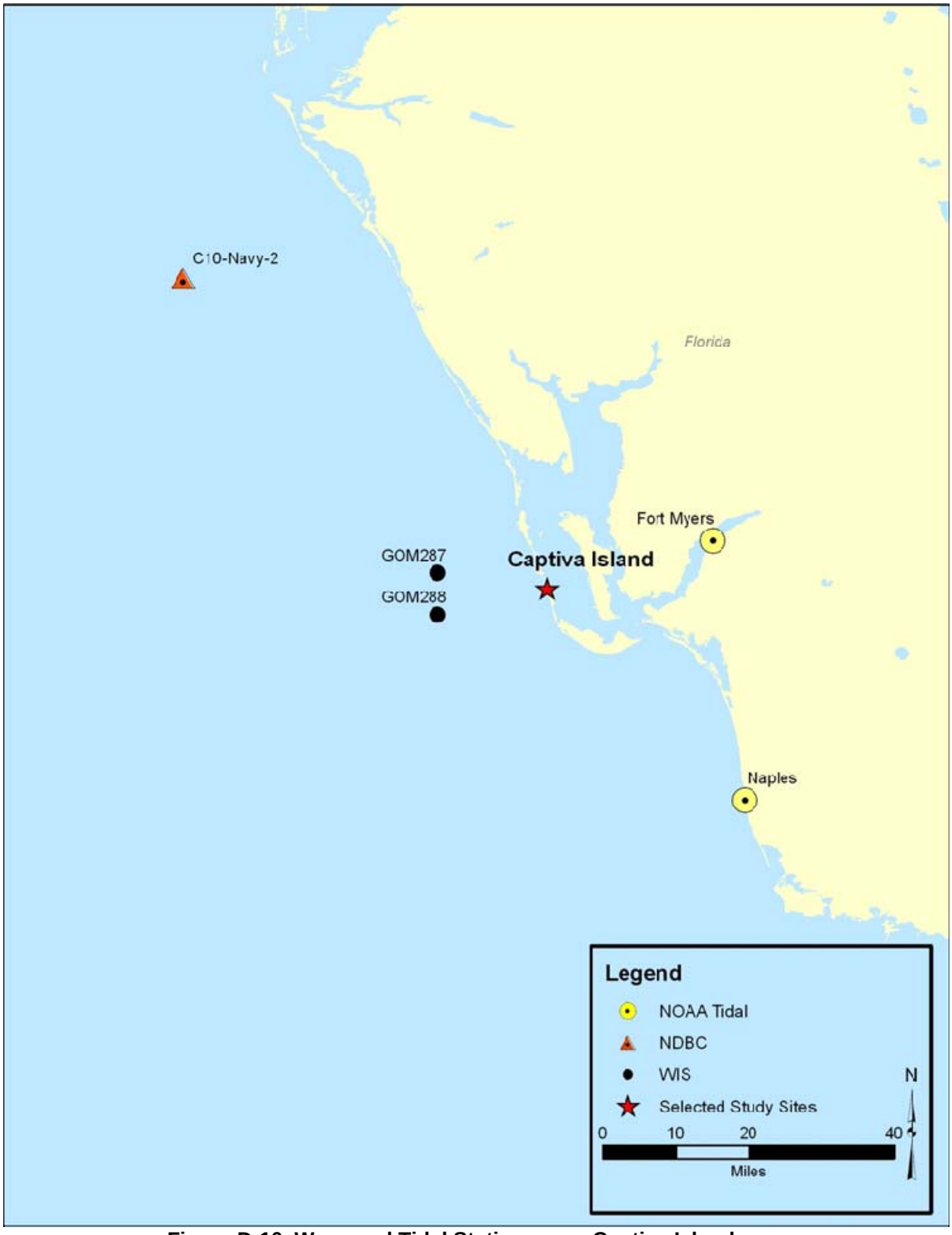

Figure D-10. Wave and Tidal Stations near Captiva Island

Table D-14 and Table D-15 summarize the percent occurrences by wave height and direction for WIS stations GOM 287 and 288. Figure D-11 illustrates the average annual wave roses for both stations. These wave roses provide a graphical representation of the wave heights and directions from which the waves are coming.

Table D-14. WIS Percent Occurrence of Wave Heights

Wave Height (meters)	Percent Occurrence of Wave Height	
	Station GOM 287	Station GOM 288
0.00 – 0.49	43.5	38.3
0.50 – 0.99	38.9	42.5
1.00 – 1.49	11.4	12.1
1.5 – 1.99	3.8	4.2
2.00 – 2.49	1.5	1.7
2.50 – 2.99	0.5	0.6
3.00 – 3.49	0.3	0.3
3.50 – 3.99	0.1	0.1
4.00 – 4.49	0.1	0.1
4.50 – 4.99	0.0	0.0
5.00 - GREATER	0.0	0.0

Table D-15. WIS Percent Occurrence by Mean Wave Direction (From)

Direction Band & Center (deg)	Percent Occurrence of Mean Direction	
	Station GOM 287	Station GOM 288
348.75 – 11.24 (0.0)	4.7	5.1
11.25 – 33.74 (22.5)	4.6	4.7
33.75 – 56.24 (45.0)	4.8	4.6
56.25 – 78.74 (67.5)	4.5	4.9
78.75 - 101.24 (90.0)	4.0	7.3
101.25 - 123.74 (112.5)	6.7	10.3
123.75 - 146.24 (135.0)	14.4	10.3
146.25 - 168.74 (157.5)	9.8	8.8
168.75 - 191.24 (180.0)	9.4	8.5
191.25 - 213.74 (202.5)	4.1	3.8
213.75 - 236.24 (225.0)	3.1	3.0
236.25 - 258.74 (247.5)	3.1	2.9
258.75 - 281.24 (270.0)	4.4	4.0
281.25 - 303.74 (292.5)	8.8	8.4
303.75 - 326.24 (315.0)	8.1	8.1
326.25 - 348.74 (337.5)	5.4	5.3

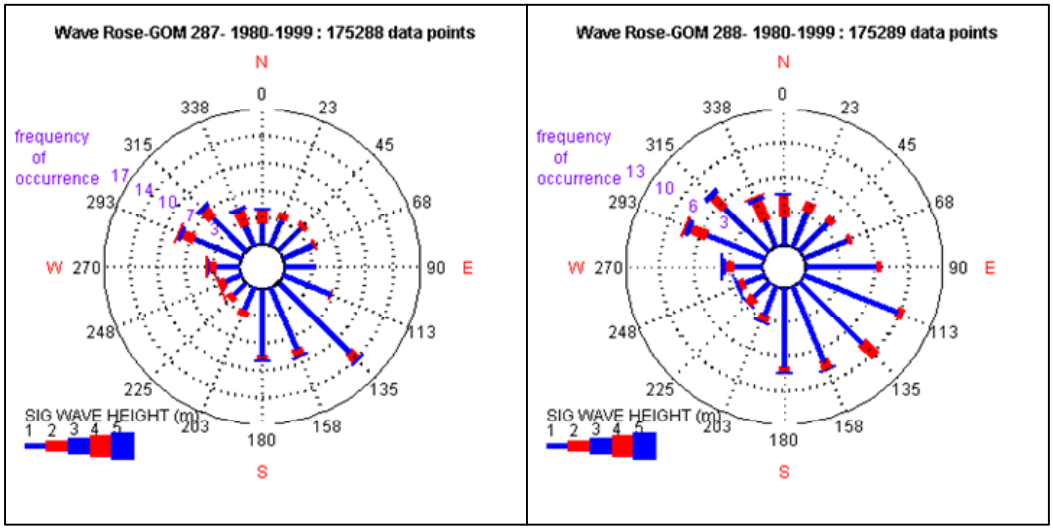

Figure D-11. Wave Roses (USACE WIS Hindcast)

A review of the WIS hindcast data yields the following observations:

- Over 40% of the wave heights over the hindcast period (1980 – 1999) were between approximately 0.5 – 0.99 meters (1.6 – 3.2 feet).
- This region typically does not experience large wave heights over 2 meters (6.6 feet) – less than 3% of the total number of waves
- The offshore wave direction is highly variable – the area experiences waves from all directions

b) Storms

The NOAA database of historical storms records approximate storm track, wind speed, pressure, and category for storms since 1851. Figure D-12 illustrates the hurricane tracks in the vicinity of Captiva Island and Table D-16 lists the extratropical storms, tropical storms, and hurricanes that have passed within 65 nautical miles between 1851 and 2008. Of these 65 storms, 5 have made landfall within 10 miles.

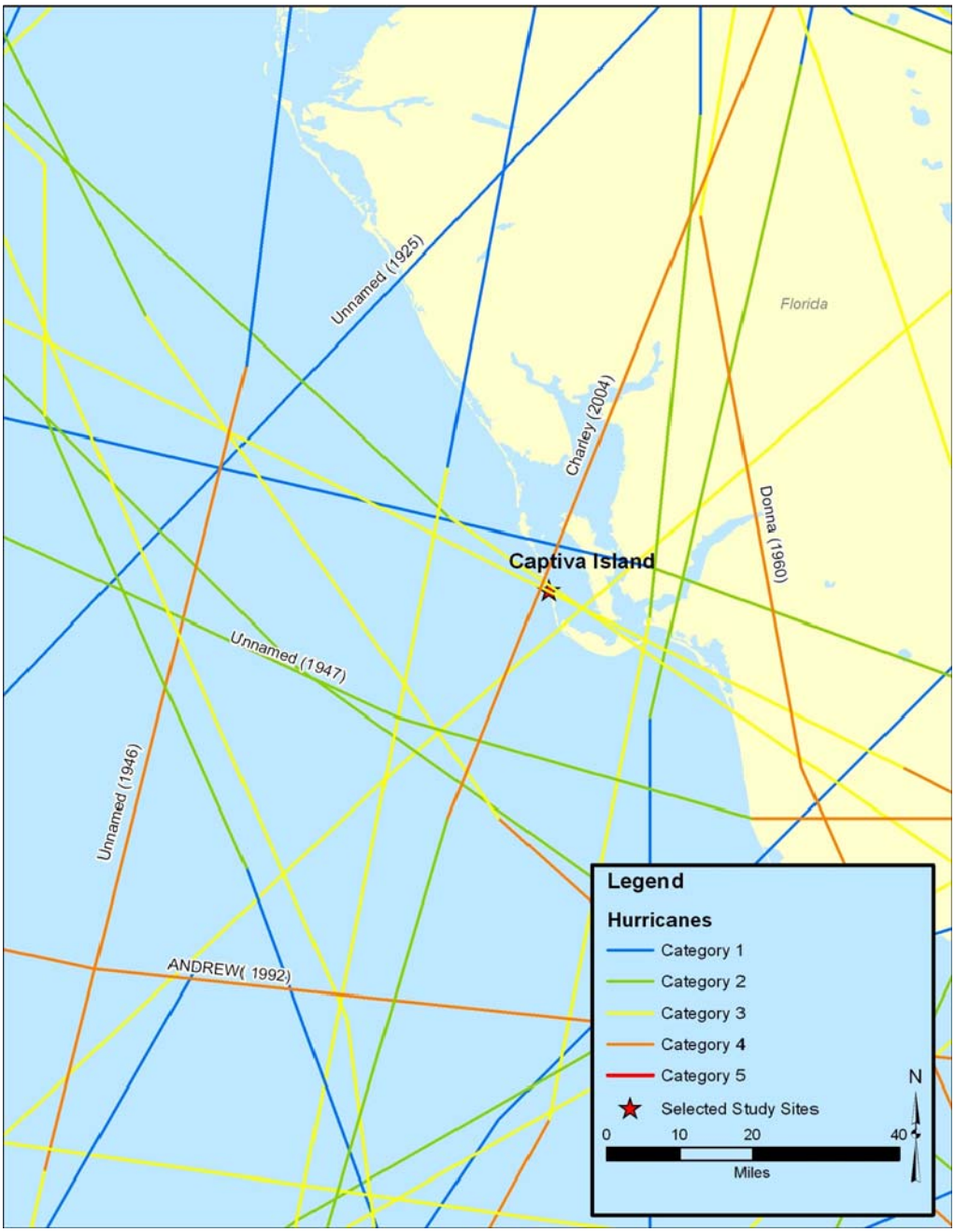

Figure D-12. Hurricanes in the Vicinity of Captiva Island

Table D-16. Captiva Island Vicinity Storms (NOAA, 1951-2008)

YEAR	STORM NAME	MAXIMUM CATEGORY
1858	NOTNAMED	Tropical Storm
1859	NOTNAMED	Tropical Storm
1861	NOTNAMED	Tropical Storm
1870	NOTNAMED	Category 1
1873	NOTNAMED	Category 3
1876	NOTNAMED	Category 2
1878	NOTNAMED	Tropical Storm
1878	NOTNAMED	Tropical Storm
1888	NOTNAMED	Category 3
1888	NOTNAMED	Tropical Storm
1891	NOTNAMED	Tropical Storm
1891	NOTNAMED	Tropical Storm
1894	NOTNAMED	Category 2
1895	NOTNAMED	Tropical Storm
1896	NOTNAMED	Tropical Storm
1897	NOTNAMED	Tropical Storm
1899	NOTNAMED	Tropical Storm
1901	NOTNAMED	Tropical Storm
1903	NOTNAMED	Category 1
1904	NOTNAMED	Tropical Storm
1904	NOTNAMED	Tropical Storm
1907	NOTNAMED	Tropical Storm
1909	NOTNAMED	Tropical Storm
1909	NOTNAMED	Tropical Storm
1910	NOTNAMED	Category 3
1916	NOTNAMED	Tropical Storm
1924	NOTNAMED	Category 2
1925	NOTNAMED	Category 1
1926	NOTNAMED	Category 4
1928	NOTNAMED	Tropical Storm
1929	NOTNAMED	Category 2
1932	NOTNAMED	Tropical Storm
1933	NOTNAMED	Tropical Storm
1934	NOTNAMED	Tropical Storm
1935	NOTNAMED	Category 4
1936	NOTNAMED	Tropical Storm
1936	NOTNAMED	Tropical Storm
1941	NOTNAMED	Category 3
1944	NOTNAMED	Category 3
1945	NOTNAMED	Tropical Storm
1945	NOTNAMED	Category 4
1946	NOTNAMED	Category 4
1946	NOTNAMED	Category 1
1947	NOTNAMED	Category 4
1951	HOW	Tropical Storm
1953	NOTNAMED	Tropical Storm
1953	HAZEL	Tropical Storm
1959	JUDITH	Tropical Storm
1960	DONNA	Category 4
1964	ISBELL	Category 3
1966	ALMA	Category 3
1968	ABBY	Tropical Storm
1969	JENNY	Tropical Storm
1981	DENNIS	Tropical Storm
1985	BOB	Tropical Storm
1988	KEITH	Tropical Storm
1990	MARCO	Tropical Storm
1992	ANDREW	Category 4
1994	GORDON	Tropical Storm
1998	MITCH	Tropical Storm
1999	HARVEY	Tropical Storm
2001	GABRIELLE	Tropical Storm
2004	CHARLEY	Category 4
2005	WILMA	Category 3
2006	ERNESTO	Tropical Storm
2008	FAY	Tropical Storm

5. John's Pass

a) Waves and Tides

The closest NDBC buoys and WIS stations near John's Pass that represent wave conditions within the immediate area surrounding the terminal groins are shown in Figure D-13 along with nearby NOAA tidal gages. The NOAA tidal gage located at St. Petersburg, inside Tampa Bay is the closest tide gage to John's Pass. There is a second gage located in Tampa Bay approximately 16 miles south at Port Manatee, Florida. The closest ocean-side tide gage is located approximately 14 miles north at Clearwater Beach, Florida. Table D-17 lists the tidal datums for all three gages.

Table D-17. Tidal Gages near John's Pass

Tidal Datum	Station		
	Clearwater Beach (8726724)	St. Petersburg (8726520)	Port Manatee (8726384)
MHHW (ft)	2.74	2.26	2.19
MHW (ft)	2.40	1.98	1.92
DTL (ft)	1.37	1.13	1.09
MTL (ft)	1.46	1.18	1.14
MSL (ft)	1.48	1.20	1.16
MLW (ft)	0.52	0.39	0.36
MLLW (ft)	0.00	0.00	0.00
NAVD (ft)	1.79	-	1.56
Maximum (ft)	6.79	6.26	4.48
Max Date	1993/03/13	1985/08/31	2004/09/06
Max Time	4:48	12:42	13:06
Minimum (ft)	-2.54	-2.47	-2.03
Min Date	1977/01/19	1972/01/16	2008/01/03
Min Time	8:06	0:00	11:36

Figure D-13. Wave and Tidal Stations near John's Pass

Table D-18 and Table D-19 summarize the percent occurrences by wave height and direction for WIS stations GOM 268 and 269. Figure D-14 illustrates the average annual wave roses for both stations. These wave roses provide a graphical representation of the wave heights and directions from which the waves are coming.

Table D-18. WIS Percent Occurrence of Wave Heights

Wave Height (meters)	Percent Occurrence of Wave Height	
	Station GOM 268	Station GOM 269
0.00 – 0.49	37.6	35.7
0.50 – 0.99	41.8	41.2
1.00 – 1.49	11.7	13.9
1.5 – 1.99	5.0	5.3
2.00 – 2.49	2.4	2.4
2.50 – 2.99	0.9	0.9
3.00 – 3.49	0.4	0.4
3.50 – 3.99	0.1	0.1
4.00 – 4.49	0.0	0.0
4.50 – 4.99	0.0	0.0
5.00 - GREATER	0.0	0.0

Table D-19. WIS Percent Occurrence by Mean Wave Direction (From)

Direction Band & Center (deg)	Percent Occurrence of Mean Direction	
	Station GOM 268	Station GOM 269
348.75 – 11.24 (0.0)	6.2	6.0
11.25 – 33.74 (22.5)	6.4	6.5
33.75 – 56.24 (45.0)	5.4	5.8
56.25 – 78.74 (67.5)	7.0	6.9
78.75 - 101.24 (90.0)	6.7	6.4
101.25 - 123.74 (112.5)	5.4	6.0
123.75 - 146.24 (135.0)	6.9	7.9
146.25 - 168.74 (157.5)	9.6	9.5
168.75 - 191.24 (180.0)	6.6	6.1
191.25 - 213.74 (202.5)	5.3	5.0
213.75 - 236.24 (225.0)	3.9	3.7
236.25 - 258.74 (247.5)	3.7	3.5
258.75 - 281.24 (270.0)	6.2	5.8
281.25 - 303.74 (292.5)	8.7	8.6
303.75 - 326.24 (315.0)	6.9	7.0
326.25 - 348.74 (337.5)	5.3	5.3

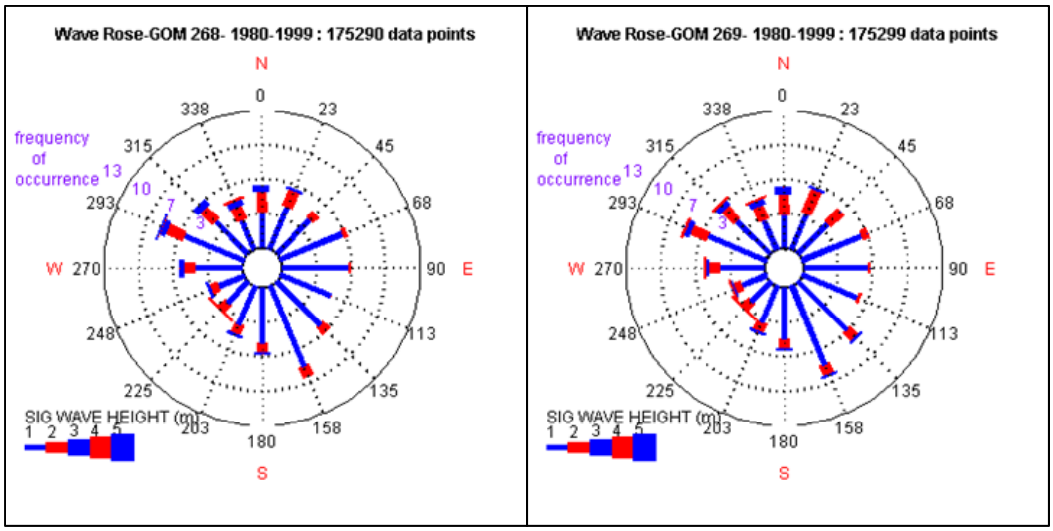

Figure D-14. Wave Roses (USACE WIS Hindcast)

A review of the WIS hindcast data yields the following observations:

- Over 40% of the wave heights over the hindcast period (1980 – 1999) were between approximately 0.5 – 0.99 meters (1.6 – 3.2 feet).
- This region typically does not experience large wave heights over 2 meters (6.6 feet) – less than 5% of the total number of waves
- The offshore wave direction is variable
- The largest waves occur during the winter months (December – March) and are predominately from the northwest.

b) Storms

The NOAA database of historical storm records approximate storm track, wind speed, pressure, and category for storms since 1851. Figure D-15 illustrates the hurricane tracks in the vicinity of John's Pass and Table D-20 lists the extratropical storms, tropical storms, and hurricanes that have passed within 65 nautical miles between 1851 and 2008. Of these 65 storms, only 2 have made landfall within 10 miles.

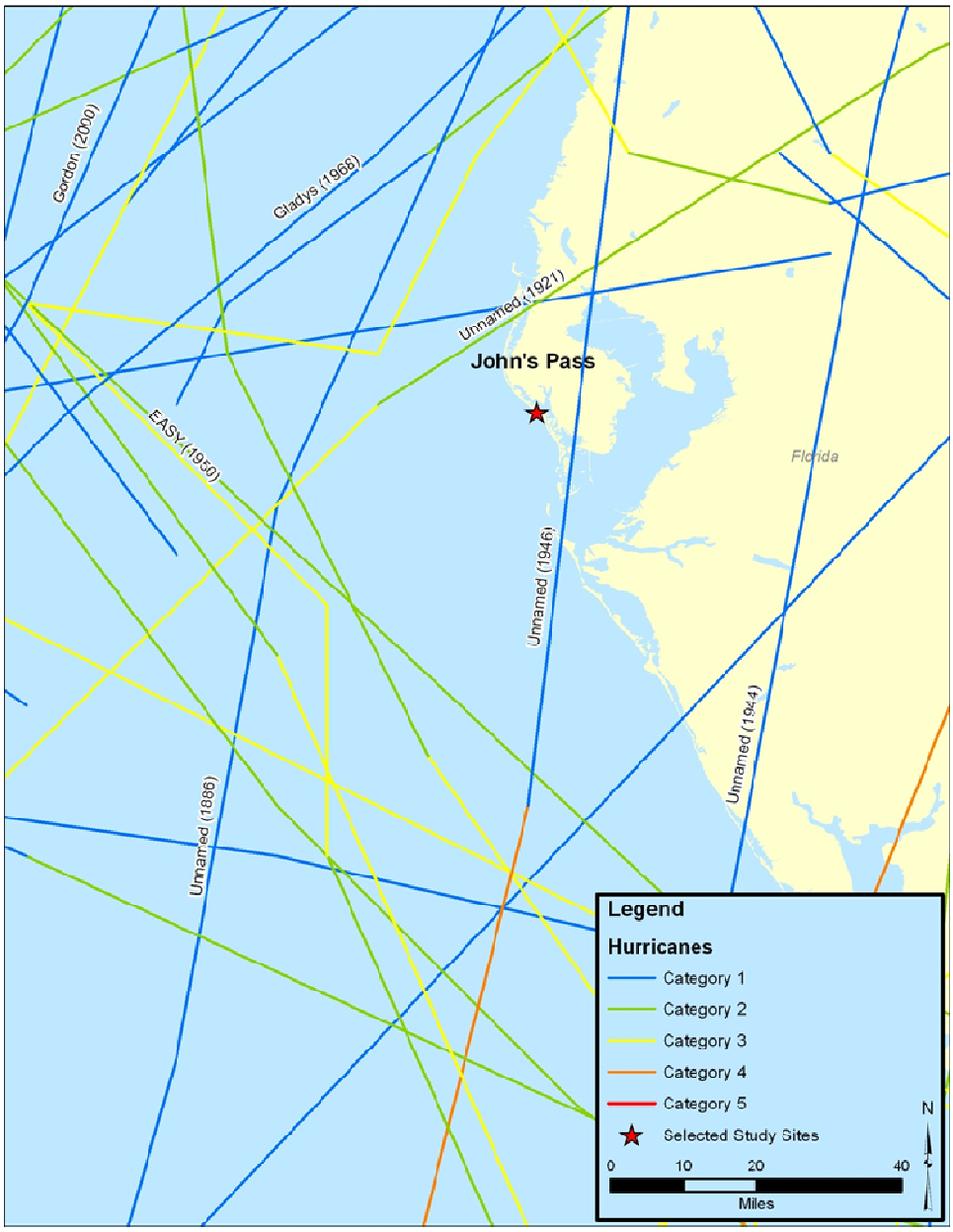

Figure D-15. Hurricanes in the Vicinity of John's Pass

Table D-20. John's Pass Vicinity Storms (NOAA, 1951-2008)

YEAR	STORM NAME	MAXIMUM CATEGORY
1852	NOTNAMED	Category 1
1858	NOTNAMED	Tropical Storm
1859	NOTNAMED	Tropical Storm
1872	NOTNAMED	Tropical Storm
1873	NOTNAMED	Tropical Storm
1874	NOTNAMED	Category 1
1878	NOTNAMED	Category 2
1880	NOTNAMED	Tropical Storm
1880	NOTNAMED	Category 1
1886	NOTNAMED	Category 1
1887	NOTNAMED	Tropical Storm
1888	NOTNAMED	Category 1
1888	NOTNAMED	Tropical Storm
1892	NOTNAMED	Tropical Storm
1894	NOTNAMED	Category 2
1896	NOTNAMED	Category 3
1897	NOTNAMED	Tropical Storm
1898	NOTNAMED	Tropical Storm
1899	NOTNAMED	Category 1
1899	NOTNAMED	Tropical Storm
1901	NOTNAMED	Tropical Storm
1903	NOTNAMED	Tropical Storm
1904	NOTNAMED	Tropical Storm
1909	NOTNAMED	Tropical Storm
1910	NOTNAMED	Category 2
1916	NOTNAMED	Tropical Storm
1921	NOTNAMED	Category 3
1925	NOTNAMED	Category 1
1926	NOTNAMED	Category 3
1928	NOTNAMED	Tropical Storm
1928	NOTNAMED	Category 3
1929	NOTNAMED	Category 2
1930	NOTNAMED	Tropical Storm
1932	NOTNAMED	Tropical Storm
1933	NOTNAMED	Tropical Storm
1933	NOTNAMED	Category 3
1935	NOTNAMED	Category 3
1936	NOTNAMED	Tropical Storm
1937	NOTNAMED	Tropical Storm
1939	NOTNAMED	Tropical Storm
1940	NOTNAMED	Tropical Storm
1941	NOTNAMED	Category 2
1944	NOTNAMED	Category 3
1945	NOTNAMED	Category 1
1945	NOTNAMED	Tropical Storm
1945	NOTNAMED	Category 3
1946	NOTNAMED	Category 4
1947	NOTNAMED	Tropical Storm
1949	NOTNAMED	Category 3
1950	EASY	Category 3
1951	HOW	Tropical Storm
1960	DONNA	Category 4
1966	ALMA	Category 3
1968	ABBY	Tropical Storm
1968	GLADYS	Category 1
1984	ISIDORE	Tropical Storm
1988	KEITH	Tropical Storm
1990	MARCO	Tropical Storm
1995	ERIN	Category 1
1995	JERRY	Tropical Storm
2001	GABRIELLE	Tropical Storm
2004	CHARLEY	Category 4
2004	FRANCES	Category 1
2004	JEANNE	Category 2
2007	BARRY	Tropical Storm

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Appendix E

Environmental Contacts

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Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Aaron Adams	Fisheries Specialist	Mote Marine Laboratory		aadams@mote.org	10/13/09	fisheries data for Pine Sound
Adam Fauth	IT Specialist	Pea Island National Wildlife Refuge	252-473-1131	Adam_Fauth@fws.gov	11/30/09	receive files for annual narrative reports on ftp site
Adam Gelber	Program Manager - Ecological Science	PBS&J	305-514-3387	agelber@pbsj.com	11/23/2009, 1/14/10	SAV data for FL projects
Alan Shirey		USACE Charleston	843-329-8166	alan.d.shirey@usace.army.mil	9/10 email	emailed response 9/10 No monitoring to his knowledge on Hunting Island
Albert E. Browder, Ph.D., P.E.	Senior Engineer/ Vice-President	Olsen Associates	904-387-6114 ext 15	abrowder@olsen-associates.com	12/4/09	Nassau Sound Inlet Management Plan
Amanda Bryant	Biologist	Sanibel-Captiva Conservation Foundation	239-472-3984	abryant@sccf.org	12/4/09	sea turtle data for Captiva and Sanibel
Amanda Hardy	Biologist	Amelia Island Plantation	904-321-5082	nelsonc@aipfl.com	1/14/10	pre- and post-construction monitoring data for Amelia Island
	Assistant Director	Pinellas County Envir. Mngt.	727-464-4633	asquires@pinellascounty.org	10/26/09	permits for Johns Pass
Andy Coburn	Associate Director	Program for the Study of Developed Shorelines, Western Carolina Univeristy		acoburn@wcu.edu	11/2/09	natural resource information relative to terminal groins
Angela Mangiameli	Conservation Biologist	Audubon North Carolina	910-686-7527	amangiameli@audubon.org	10/11/09	request bird data for NC inlets
Ann Hodgson	Gulf Coast Ecosystem Science Coordinator	Audubon, Florida Coastal Islands Sanctuaries Program	813--623-6826	Ahodgson@audubon.org	1/7/10	Requested shorebird data for Johns Pass
Ann Marie Lauritsen	Biologist	USFWS Jacksonville	904-525-0661	annmarie_lauritsen@fws.gov	10/28/09	biological information on Johns Pass and Amelia Island

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Anne Deaton	Habitat Specialist	NC Division of Marine Fisheries	252-726-7021	Anne.Deaton@ncdenr.gov	11/19/09	Coastal Habitat Protection Plan - updated version
Annette Nielsen	Environmental Specialist II	Charlotte Harbor Preserve State Park-FL DEP	941-575-5861	annette.nielsen@dep.state.fl.us	10/13/09	Redfish Pass and Stump Pass info
Audra Livergood	Habitat Restoration Specialist	NMFS - NOAA Habitat Conservation Division	954-356-7100	audra.livergood@noaa.gov	11/2/09	biological monitoring data for FL
Beth Brost	Biological Scientist II	Florida Fish and Wildlife Conservation Commission	727-896-8626 ext 1914	beth.brost@myfwc.com	12/4/09	historical sea turtle data for FL
Beth Irlandi	Assistant Professor of Oceanography	Department of Marine and Environmental Systems, Florida Institute of Technology	321-674-7454	irlandi@fit.edu	11/23/09	biological monitoring data for FL
Beverlee Lawrence	Project Manager/Biologist	USACE - Jacksonville District	904-232-1904	beverlee.a.lawrence@usace.army.mil	11/3/09	Amelia Shore Stabilization Project
Bill Birkemeier	Washington DC liaison	USACE - Coastal & Hydraulics Laboratory	252-261-6840 ext 229	William.Birkemeier@usace.army.mil	11/7/09	background on CHL's studies
Bill Dennis	Coastal Engineer	USACE - Wilmington District	910-251-4780	william.a.dennis@usace.army.mil	11/4/09	Final Supplemental EIS on Manteo (Shallowbag) Bay
Bill Kirby Smith		Duke Univ. Marine Lab		wwks@duke.edu	12/1/09	marine ecology
Blaire Witherington	Research Scientist	Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute	321-674-1801		1/14/10	Effects of ocean inlets on sea turtle nesting
Bob Brantley	Coastal Engineering Manager	FL DEP	850-413-7803	Robert.brantly@dep.state.fl.us		included in email chain from C.Hand 9/10-9/11
Bob Joseph	Park Manager	Talbot Island State Park	904-251-2320	robert.joseph@dep.state.fl.us	11/30/09	pre- and post-construction monitoring data for Amelia Island
Bob Wasno	Marine Agent	Florida Sea Grant College Program	461-7518	wasnorm@leegov.com	11/23/09	biological monitoring data for Redfish Pass and/or Blind Pass
Bonnie Bendell	Coastal Engineer	NC Division of Coastal Management	919-733-2293 ext 256	Bonnie.Bendell@ncdenr.gov	11/19/09	NC estuarine policy on groins
Bonnie Strawser	Visitor Services Manager	Alligator River/Pea Island National Wildlife Refuges	252-473-1131 ext 230	Bonnie_Strawser@fws.gov	11/24/09	Pea Island data - ftp site

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Brad Smith	Director	Sanibel / Captiva Conservation Wildlife Habitat Management Office	239-472-3984 ext. 200		11/25/2009, 1/14/10	biological monitoring data for Redfish Pass and/or Blind Pass
Brandon Howard	Biologist	USACE - Jacksonbille District	561-472-3527	brandon.howard@saj02.usace.army.mil	11/23/09	biological monitoring data for FL
Brent Stufflebeam	Student Aide	USACE - Fort Myers Regulatory Division	239-334-1975 ext 26	brent.a.stufflebeam@usace.army.mil	11/19/09	regulatory permits for Redfish Pass
Britta Muiznieks	biologist	Cape Hatteras National Seashore	252.995.3740	Britta_Muiznieks@nps.gov	10/15/09	breeding and non-breeding data for the N side of the inlet (Bodie Island Spit)
Carolyn Currin, PhD	Marine Scientist and Microbiologist	NMFS - NOAA Office of Habitat Protection	252-728-8749	carolyn.currin@noaa.gov	11/2/09	fisheries data for study sites
Chad Lach	Manager	Florida State Parks	941-964-0375	chad.lach@dep.state.fl.us	11/25/09	biological monitoring data for Captiva
Charlotte Hand	JCP Compliance Officer	FL DEP	850-414-7716	Charlotte.hand@dep.state.fl.us	9/11/09	received email 9/10 regarding turtles and permit compliance for projects
Chase Gatlin	GIS Specialist	Cape Hatteras National Seashore	252-995-6968		11/9/09	GIS data for Oregon Inlet - Bodie Island spit
Chris Canfield	ED & VP	NC Audubon	919-929-3899	CCANFIELD@audubon.org	10/6/09	
Chris Freeman	Senior Coastal Geologist	Geodynamics	252-247-5785	chris@geodynamicsgroup.com	11/5/09	shoreline change data for Fort Macon
Christina Nelson		Amelia Island Plantation	904-321-5082	nelsonc@aipfl.com	11/30/2009, 1/14/10	pre- and post-construction monitoring data for Amelia Island
Chuck Schnepel	Regulatory Chief	USACE Tampa Bay	813-769-7071	chales.a.schnepel@usace.army.mil	10/29/09	regulatory documents on Johns Pass
Clarence Coleman		Federal Highways Administration			11/10/09	Bonner Bridge EIS
Craig Ten Brink	Wildlife Biologist	Threatened & Endangered Species-Marine Corps Base Camp Lejeune	910-451-7228	craig.tenbrink@usmc.mil	10/9/09	phone call to determine if USMC has analyzed terminal groins in mgmt
Cynthia Scott	Administrative Support Supervisor	Pinellas Co. Dept. of Env. Management		csscott@co.pinellas.fl.us	10/17/09	Johns Pass permit
Dan Rittschoff, PhD	Associate Professor of Zoology	Duke Univ. Marine Lab		RITT@duke.edu	11/13/09	habitat change for Shackelford Banks and Bird Shoal
Dave Kandz		Audubon of Florida		conservation@stpeteaudubon.org	11/23/2009, 1/14/10	shorebird nesting data for Redfish Pass and Johns Pass

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
David Allen	Wildlife Diversity Supervisor	NC Wildlife Resources Commission	252-448-1546	allend@coastalnet.com	10/5/09	forwarded C. Canfield's message (included Sam Cooper and Greg Massey)
David Bernhart		National Marine Fisheries Service, SE Regional Office	727-570-5312	david.bernhart@noaa.gov	11/23/09	SAV data for FL projects
David Eggleston, PhD		NC State University, Center for Marine Sciences and Technology		david_eggleston@ncsu.edu	12/1/09	marine biology
Dennis Stewart	biologist	Pea Island National Wildlife Refuge	252-473-1131 ext 231	dennis_stewart@fws.gov	10/16/09	PINWR data
Donald Deis	Senior Scientist	PBS&J	904-363-8442	ddeis@pbsj.com	11/23/09	seagrass data for FL
Don Fields	Principal Investigator	NOAA Center for Coastal Fisheries and Habitat Research	252-728-8770	don.field@noaa.gov	12/1/09	SAV data for NC study sites
Doug Piatowski	Biologist	USACE, Wilmington	910-251-4908	Douglas.Piatkowski@usace.army.mil	10/8/09	NC Inlet - USACE info
Elizabeth Gillen		FL DEP Fort Meyers	239-332-6975	elizabeth.gillen@dep.state.fl.us	10/14/09	Redfish Pass permit requirements
Ellen McCarron	Assistant Director	Office of Coastal and Aquatic Managed Areas	850-245-2110	Ellen.McCarron@dep.state.fl.us	10/7/09	Bird rookery monitoring and Charlotte Harbor Volunteer Water Quality Monitoring Network
Emily Rice	Assistant Waterbird Biologist	NCWRC	252-393-6585	emily.rice@ncwildlife.org	10/12/09	request bird data for NC inlets
Eric Gasch	Biologist - Environmental Planning	USACE - Jacksonville District	904-232-3140	eric.k.gasch@saj02.usace.army.mil	10/29/09	regulatory documents relative to terminal groins
Erik Olsen	President	Olsen Associates	904-387-6114	eolsen@olsen-associates.com	9/9/09	emailed 9/09. Received response 9/09
Erin Rasnake		FL DEP		Erin.Rasnake@dep.state.fl.us	10/7/09	requested biological data for Redfish Pass via email
Eve Haverfield		Turtle Time Inc.	239-851-1338		11/25/09	sea turtle nesting data for Pinellas County and Lee County
Frank Yelverton	Lead Biologist, Environmental Resources Section	USACE, Wilmington	910-251-4640	frank.yelverton@usace.army.mil	10/8/09	NC Inlet - USACE info
Fritz Rohde	Fishery Biologist	NMFS - NOAA	252-728-5090	fritz.rohde@noaa.gov	10/1/09	fisheries and benthic data for NC

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Harry LeGrand	Naturalist	NC Natural Heritage Program DENR Division of Natural Resources Planning and Conservation	919-715-8697		11/6/09	vegetation data for dune habitats at inlets
Heather Strafford	Manager	Charlotte Harbor Aquatic Preserves	850-245-2110	Heather.Stafford@dep.state.fl.us	10/7/09	Bird rookery monitoring and Charlotte Harbor Volunteer Water Quality Monitoring Network
Hope Sutton	Stewardship Coordinator	NC National Estuarine Research Reserve	910-962-2998	suttonh@uncw.edu	11/9/09	sea turtle data for Shackelford Banks
Howard Hall	Fish and Wildlife Biologist	USFWS - Ecological Services	919 856-4520 ext 27	howard_hall@fws.gov	10/8/09	fisheries and benthic data for NC; BO for Oregon Inlet
Hugh Heine	Biologist	USACE - Wilmington District	910-251-4070	hugh.heine@usace.army.mil	11/4/09	nearshore hardbottom data for Beaufort Inlet
Jackie Keiser	Project Manager	USACE Jacksonville	904-232-3915	Jacqueline.J.Keiser@saj02.usace.army.mil	10/5/09	
Jackie Ott	GIS Specialist	NC National Estuarine Research Reserve	910-962-2324	ottj@uncw.edu	10/13/09	GIS Data for Oregon Inlet and Beaufort Inlet
Jaime Collazo, PhD	Biology Professor	NC State University	919-515-8837	jaime_collazo@ncsu.edu	11/9/09	breeding and non-breeding data for the N side of the inlet (Bodie Island Spit)
WD Higginbotham	City Manager	Madeira Beach, Fl	727.391.9951	jmadden@ci.madeira-beach.fl.us	12/18/2009, 1/14/10	environmental documents for John's Pass
Jason Powell		Cape Hatteras National Seashore	252-473-4018		11/9/09	archival data for Cape Hatteras National Seashore
Jeff Howe	Fish and Wildlife Biologist	USFWS S. FL. Ecological Services Office	772-562-3909 ext 283	jeffrey_howe@fws.gov	10/25/09	Service Biological Opinion on marine structures
Jennifer Nelson	Environmental Administrator	Florida Department of Environmental Protection South District Office	239-332-6975	Jennifer.Nelson@dep.state.fl.us	10/7/09	water quality data for Redfish Pass
Jill Huntington	Coastal Management Specialist	GA DNR/Coastal Management	912-264-7218	jill_huntington@dnr.state.ga.us	9/9/09	Left message. No response 9/09 E. Olsen has monitoring data for Tybee Island project
Joanne Steenhuis	Senior Environmental Specialist	NCDENR - NC Division of Water Quality	910-796-7306	Joanne.Steenhuis@ncdenr.gov	10/13/09	401 Certification for Oregon Inlet
Jocelyn Karazsia	Fishery Biologist	NMFS - NOAA Protected Species Section	561-616-8880 ext 207		11/2/2009, 1/14/10	

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Johathan Cohen, PhD	Research Scientist	Virginia Tech	540-231-9069	jocohen1@vt.edu	10/14/09	non-breeding piping plovers at Oregon Inlet
John Fussell	ornithologist		252-240-1046	jfuss@clis.com	10/7/09	request bird data for NC inlets
Jon Altman	Biologist	Cape Lookout National Seashore	252-728-2250	jon_altman@nps.gov	11/9/09	sea turtle data for Shackelford Banks
Joy Hazell	Agent	Florida Sea Grant College Program	239-533-7518	jhazell@ufl.edu	11/30/09	fish data for Redfish Pass
Judy Ott	Program Scientist	Charlotte Harbor National Estuary Program	239-338-2556 ext 230	jott@swfrpc.org	10/8/2009, 1/14/10	biological information on aquatic preserve and background info on Redfish Pass, Blind Pass, and Stump Pass
Katherine McGlade		NC Coastal Federation	203 962 3046	katherinem@nccoast.org	12/1/09	Pea Island data - infauna graphs
Kathy Rooker	Administrator	Lee County	239-472-2472	mycepd@gmail.com	10/15/09	biological monitoring reports for Captiva
Kenneth Dugger	Section Chief, Supervisory Biologist	USACE - Jacksonville District	904-232-1686	Kenneth.R.Dugger@usace.army.mil	11/25/09	biological monitoring reports
Ken Taylor	Chief	N.C. Geological Survey	919-733-2423 ext 401	kenneth.b.taylor@ncdenr.gov	10/1/09	
Kevin Conner	Coastal Engineer	USACE-Wilmington District	910-251-4867		11/4/09	discussion of Beaufort Inlet ebb tidal delta deflation
Kristie Anders	Educational Director	SCCF	239-472-2329	kanders@sccf.org	10/14/09	Redfish Pass background
Larry Cahoon, PhD	oceanographer	UNCW	910-962-3000	cahoon@uncw.edu	10/7/09	general information for NC inlets
Lee Edmiston	Director	Office of Coastal and Aquatic Managed Areas FL DEP Tallahassee	850-245-2110	Lee.Edmiston@dep.state.fl.us	10/7/2009, 1/14/10	Bird rookery monitoring and Charlotte Harbor Volunteer Water Quality Monitoring Network
Loren D. Coen, PhD	Director	Sanibel-Captiva Conservation Foundation Marine Laboratory	239-395-3115	lcoen@sccf.org	10/6/2009, 1/14/10	biological information on Redfish Pass and Captiva Island
Lynn Leonard	Professor of Geology	UNCW		lynnl@uncw.edu	11/3/09	data on Redfish Pass based on journal article
Maia McGuire	Marine Agent	Florida Sea Grant College Program	824-4564	mpmcguire@ifas.ufl.edu	11/23/09	biological monitoring data for Amelia Island

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Margery Overton, PhD	Civil, Construction and Envrionmental Engineering Professor	NC State University	919-515-7682	overton@ncsu.edu	11/2/09	natural resource information relative to terminal groins
Mark Evans		USACE	904-232-2028	mark.r.evans@usace.army.mil	11/3/09	Amelia Shore Stabilization Project
Mark Fonesca, PhD	Supervisory Ecologist	NMFS - NOAA NOS/CCFHR	252-728-8729	mark.fonseca@noaa.gov	11/2/2009, 1/14/10	fisheries data for study sites
Mark Ladeon		Beaches & Shore Resource Center - Lee County	850-487-7723	mark.leadon@dep.state.fl.us	11/12/09	FL inlet management documents
Mark Sramek	Fishery Biologist	NMFS - NOAA Protected Species Section	727-824-5311	Mark.Sramek@noaa.gov.	10/30/2009, 1/14/10	Gulf Coast information
Mark Thompson		NMFS - NOAA Habitat Conservation Division	850-234-5061	mark.thompson@noaa.gov	11/23/09	biological monitoring data for FL
Martin Posey, PhD	Department Chair	UNCW - Biology Department	910-962-3470	poseym@uncw.edu	11/4/09	infaunal data for Oregon and Beaufort Inlet
Marty Seeling	Biological Administrator	Beaches and Coastal Systems permitting - FL DEP	850-487-4471, extension 104., 850-414-7728	martin.seeling@dep.state.fl.us	09/09/2009, 10/14/2009, 1/14/10	Sent email with permit info 9/09, email sent 9/10 regarding monitoring; NEPA documents on FL study sites
Mary Saunders	Project Manager	USACE - Jacksonville District		mary.l.saunders@usace.army.mil	12/24/09	Captiva biological monitoring reports
Matthew Godfrey, PhD	Sea Turtle Biologist	NC Wildlife Resources Commission	252-728-1528	matt.godfrey@ncwildlife.org	10/5/09	request sea turtle trend data (included Molly Ellwood, Rudi Rudolph, Jean Beasley, Doug Piatowsky) and other biological data
Michael Hensley	Manager	Lovers Key State Park	239-463-4588		11/25/09	biological monitoring data
Michael Piehler, PhD		UNC Chapel Hill		mpiehler@email.unc.edu	12/1/09	nearshore habitat/ water column processes
Michael Rikard	Resource Management Specialist	Cape Lookout National Seashore	252-728-2250 ext 3012	Michael_Rikard@nps.gov	11/11/09	Shoreline change data for Shackelford Banks
Mike Anderson	Manager of Sea Turtle Nesting	Clearwater Marine Aquarium	727-441-1790 ext 224	manderson@cmaquarium.org	11/11/09	sea turtle nesting data for Pinellas County
Mike Giles	Cape Fear COASTKEEPER	NC Coastal Federation	910-790-3275	capefearcoastkeeper@nccoast.org	10/23/09	terminal groin data for NC

Contact	Title	Agency/Company	Phone Number	Email	Date Contacted	Information
Mike Maxemow	Public Works Director					
Mike Mullens	Board of Director	Captiva Erosion and Protection Division	239-472-2472	mycepd@gmail.com	11/25/09	biological monitoring data for Captiva
Mike Nowicki	Project Manager and Engineer	USACE - Jacksonville District, Regulatory Division	904-232-2171	Michael.F.Nowicki@usace.army.mil	10/29/09	environmental planning documents relative to terminal groins
Mike Simmons	Environmental Specialist I	Talbot Island State Park	904 251-2815	Michael.T.Simmons@dep.state.fl.us	11/12/09	shorebird data for Amelia Island State Park
Mindy Brown		Charlotte Harbor Aquatic Preserves	341-575-5861			bird data for Captiva
Molly Ellwood	Southeast Permit Coordinator	NC Wildlife Resources Commission	910-796-7240	molly.ellwood@ncwildlife.org	10/5/09	recommendations for biological contacts
Nancy Douglas		FWC	863-647-4000 ext 1137		12/4/09	shorebird data for Pinellas and Lee Counties
Nancy White	Director	UNC Coastal Studies Institute, ECU	252-475-3663	nmwhite@csi.northcarolina.edu	12/1/09	biological data relevant to terminal groins
Nicole Elko, PhD	President	Elko Coastal Consulting	727-439-4774	nelko@pinellascounty.org	8/09 (call message), 9/8 (call message), 9/9 (email)	Nicole no longer works for Pinellas county. Andrew Squires responded via email 9/09.
Pace Wilbur	Atlantic Branch Supervisor, Fishery Biologist	NMFS - NOAA Habitat Conservation Division	843-953-7200	pace.wilber@noaa.gov	11/2/09	fisheries data for study sites
Paden Woodruff	Environmental Administrator	FL DEP Beach Erosion Control Program	850-922-7703	Paden.Woodruff@dep.state.fl.us	9/9/09	contactted by email and forwarded to M. Seeling 9/09
Paula Gillikin	Rachel Carson Site Manager	NC Coastal Reserve & National Estuarine Research Reserve	252.838.0886	paula.gillikin@ncdenr.gov	10/16/09	information on habitat alterations and/or other anectodal sightings for Bird Shoals.
Paula Johnson	Project Manager	USACE - Jacksonville District	904-232-2503	Paula.R.Johnson@usace.army.mil		
Penny Hall	biologist	Florida Fish and Wildlife Conservation Commission	727-896-8626	penny.hall@myfwc.com	11/23/09	SAV data for FL projects
Pete Peterson, PhD	Scientist	University of North Carolina at Chapel Hill	252) 726-6841	CPeters@email.unc.edu	10/6/09	request biological data for NC terminal groins - fisheries/benthic

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Phil Payonk	Chief, Environmental Resources Section	USACE, Wilmington	910 251-4589	philip.m.payonk@usace.army.mil	9/22/09	
Ping Wang, PhD		University of S. Florida	813-974-9170	pwang@chuma1.cas.usf.edu	9/10/09	email 9/10
Randy Newman	Park Ranger	Fort Macon State Park	(252) 726-3775	randy.newman@ncdenr.gov	11/3/09	background on Fort Macon terminal groin
Richard D. Bartleson, Ph.D.	Research Scientist	Sanibel-Captiva Conservation Foundation Marine Lab	239-395-4617	rbartleson@sccf.org	10/6/2009, 1/14/10	requested biological data for Redfish Pass via phone
Richard Fischer, PhD	Certified Wildlife Biologist	U.S. Army Engineer Research & Development Center	502-315-6707	Richard.A.Fischer@usace.army.mil	11/13/09	natural resource information relative to terminal groins for Oregon Inlet
Rob Young	Director	Program for the Study of Developed Shorelines, Western Carolina Univeristy		ryoung@wcu.edu	11/2/09	natural resource information relative to terminal groins
Robert Ginsburg, PhD	professor of marine geology	RSMAS, University of Miami, FL	305 421 4875	rginsburg@rsmas.miami.edu	10/7/09	request for hardbottom information in selected FL sites
Robert Neal		Lee County	239-533-8566		10/6/09	Gaspiralla Island information - USACE GRR/EIS
Robin Trindell, PhD	Biological Administrator	Florida Fish and Wildlife Conservation Commission	850-922-4330	Robbin.Trindell@fwc.state.fl.us	9/10/09	email 9/10; replied 9/10
Roland Ottolini	Supervisor	Lee County	239-533-5533	rottolini@leegov.com	10/14/2009, 1/14/10	Redfish Pass - inlel management details
Ron Sechler	Fishery Biologist	NMFS - NOAA	252-728-5090	ron.sechler@noaa.gov	10/1/09	fisheries and benthic data for NC
Sam Cooper	Environmental Scientist	CZR Incorporated	910-392-9253	scooper@czr-inc.com	10/5/09	bird survey information for Oregon Inlet and Beaufort Inlet
Sara Winslow		NC Division of Marine Fisheries	252-264-3911	sara.winslow@ncmail.net	10/8/09	fisheries and benthic data for NC
Scott Chappell	GIS Specialist	NC Division of Marine Fisheries	252-808-8071	scott.chappell@ncdenr.gov	12/1/09	SAV data for NC study sites
Sidney Maddock	Conservation Biologist	Audubon North Carolina	252-996-0234	smaddock@audubon.org	10/10/2009, 1/14/10	request bird data for NC inlets
Spencer Rogers		North Carolina Sea Grant	910-962-2491	rogerssp@uncw.edu	9/11/09	

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Stan Riggs	Coastal and Marine Geologist	East Carolina University	328-6015	riggss@ecu.edu	12/1/09	contacts for biological data
Steve Benton	Retired	Science Hazard Panel	919-231-2885	sbenton45@earthlink.net	11/6/09	environmental data for NC inlets
Steve Boutelle	Operations Manager, Marine Services	Lee County	239-533-8128	boutelsj@leegov.com	1/14/10	general operation of Redfish Pass terminal groin
Steve Everhart	District Manager	NC Division of Coastal Management	910-796-7215	Steve.Everhart@ncdenr.gov	11/9/09	sea turtle data
Steve Keehn	Coastal Engineer	Coastal Planning & Engineering, Inc.	561-391-8102	skeehn@coastalplanning.net	10/5/2009, 1/14/10	Redfish and Johns Pass data
Steve Ross	Research Associate Professor	University of NC at Wilmington	910-395-3905	rosss@uncw.edu	11/15/09	fisheries data for NC
Steve Underwood	Assistant Director of Policy & Planning	NC Division of Coastal Management	919-733-2293 ext 224	Steve.Underwood@ncdenr.gov	11/17/09	environmental data on rubble structures
Susan Blass		USACE - Jacksonville District		Susan.M.Blass@saj02.usace.army.mil	11/9/09	Redfish Pass NEPA documents
Susan Cohen	Program Manager	MCB Camp Lejeune, NC	910-451-7900	susan.cohen@usmc.mil	10/28/09	barrier island dynamics
Tampa Audubon Chapter				president@tampaaudubon.org	11/25/09	shorebird nesting data for Johns Pass
Tancred Miller	Coastal Policy Analyst	NC Division of Coastal Management	252-808-2808	Tancred.Miller@ncdenr.gov	11/17/09	Biological and Estuarine Working Group
Todd Miller	Executive Director	NC Coastal Federation	252 393-8185	toddm@nccoast.org	9/29/09	terminal groin data for NC
Tom Jarrett	professional engineer	Coastal Planning & Engineering of North Carolina	910-392-0453	tjarrett@coastalplanning.net	10/5/09	information on the construction timeframe of NC terminal groins
Tori Deal	JCP Compliance	FL DEP	850-414-7731	Tori.Deal@dep.state.fl.us	9/11/09, 9/14, 9/14, 9/17	Providing permits and engineering files on FL groin projects
Tracy Rice		Terwilliger Consulting, Inc.	610-693-1147	tracymrice@yahoo.com	11/2/09	threats to sandy beach ecosystems
Tracy Skrabal	Coastal Scientist & Southeast Regional Manager	NC Coastal Federation	910-790-3275	tracys@nccoast.org	9/29/09	terminal groin data for NC
Troy Alphin	lab manager	UNCW - Center for Marine Science	910-962-2395	alphint@uncw.edu	11/4/09	infaunal data for Oregon and Beaufort Inlet
Tunis McElwain				Tunis.W.McElwain@usace.army.mil	11/18/09	regulatory permits for Redfish Pass

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USACE Florida Shore Protection and Sea Turtle Management System	NA	NA	NA	http://el.erdc.usace.army.mil/flshore/refs.cfm	NA	literature on FL sea turtle nesting
USACE Turtle Warehouse Data	NA	NA	NA	http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm	NA	literature on FL sea turtle nesting
Vincent George	Project Manager and Planning Consultant	Bureau of Beaches and Coastal Systems	850-413-7783	vincent.george@dep.state.fl.us	11/6/2009, 1/14/10	Redfish Pass Inlet Management Plan - CPE study ('93)
Walker Golder	Bird Ecologist	Audubon		wgolder@audubon.org	10/5/09	forwarded C. Canfield's message (included Andy Wood and Angela Mangiamelli) - follow up
Wilson Laney		USFWS - South Atlantic Division	919-515-5019	Wilson_laney@fws.gov	10/8/09	fisheries and benthic data for NC

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