

Summary of Beach Nourishment along the U.S. Gulf of Mexico Shoreline

Arthur C. Trembanis and Orrin H. Pilkey

Duke University
Program for the Study of Developed Shorelines
Campus Box 90228
Durham, NC 27708, U.S.A.

ABSTRACT

TREMBANIS, A.C. and PILKEY, O.H., 1998. Summary of beach nourishment along the U.S. Gulf of Mexico shoreline. *Journal of Coastal Research*, 14(2), 407-417. Royal Palm Beach (Florida), ISSN 0749-0208.

This paper expands and revises the original Gulf of Mexico beach nourishment database of DIXON and PILKEY (1989) by summarizing the beach nourishment experience up to 1996. Information is presented concerning 158 nourishment episodes along 60 beaches totaling over 78,000,000 cubic yards of emplaced sand from Corpus Christi, Texas to Marco Island, Florida. In recent years, the number, volume and average length of beach nourishments per year has increased.

ADDITIONAL INDEX WORDS: *Replenishment, erosion control, volume, funding.*



INTRODUCTION

The importance of beach nourishment as a coastal erosion management option for the Gulf of Mexico was discussed by DIXON and PILKEY (1989), "The Purple Report" USACE (1993) and the special NRC panel report on nourishment (NRC, 1995). Characterized as "soft stabilization", beach nourishment is often preferred to seawalls, groins and other "hard structures" which have been shown to have deleterious effects on beaches. The first attempts to document the full extent of beach nourishment were made by PILKEY and CLAYTON (1989), DIXON and PILKEY (1989) and CLAYTON (1989) and LEONARD, CLAYTON, DIXON and PILKEY (1989). Other attempts to document the extent of beach nourishment at a regional and national level have focused only on federally funded projects (SUDAR *et al.*, 1995 and IWR, 1993). This paper updates DIXON and PILKEY (1989) for projects from 1987 through 1996 with information (when available) on year, location, volume, length, cost and funding type for each project. Some gaps in the original database have been filled by the correction of inaccurate information on previously identified projects as well as through the addition of previously unknown project data. This research remains an open effort to refine and close gaps in the database.

For purposes of this study, the term *nourishment* has been taken to encompass all instances in which sand has been emplaced either by truck or dredge on beaches or within the nearshore. The term *project* is used to indicate the full series of individual nourishment events at a single location. *Episode* is used to refer to a single nourishment event on a given beach. Both projects with specifically designed life spans (*i.e.*, Federal Storm & Erosion) and nondesigned projects (*i.e.*, Federal Navigation) have been included in this database. Approximately 60 projects were identified as the site of at least

158 variously funded nourishment episodes (Table 1). Ninety-two of the 158 episodes are located on Florida's central to southern coast, especially within Pinellas County (Figure 1). Information on three projects (Panama City, Treasure Island, and Sand Key IV), planned for 1997 are included in the table but excluded from the graphs of cumulative volume (Figure 2) and decadal volume (Figure 3).

The variety of record keeping practices employed by funding and governing entities leads to variation in the extent, type and accuracy of data on any given project. Despite a clear shortage of information with regards to certain parameters (especially cost and length), this database represents the most complete collection of project information available. Some episodes may have been missed and possibly forever lost from all record keeping sources (especially small local and private projects). Additionally, factual discrepancies often exist between sources leaving the details of some projects forever in dispute. Taken in full, however, the data set presented herein gives a rather complete picture of the overall experience of beach nourishment along the Gulf of Mexico and will serve well as a starting point of discussion for all parties interested in examining its use as a coastal erosion management strategy.

METHODS

A variety of methods have been employed in obtaining the data presented in this paper. Information came from a wide array of sources as evidenced by the reference list. Useful information was obtained from U.S. Army Corps of Engineers officials, state and local coastal managers and permitting agents as well as both academic researchers and consulting engineers with projects in the region.

Whenever possible, primary sources (*i.e.* permit and project files, government reports, payment statements and personal communications) were utilized over secondary sources (brief

Table 1. List of beach nourishment projects along the Gulf of Mexico shoreline. "Type" refers to principle or sole funding category. For additional explanation of funding type, see text section Project Funding Categories.

Location	Year	Type	Volume (cubic yards)	Length (miles)	Cost (\$)	References
South Padre Island, TX	1989	Federal Navigation	1,300,000			138, 152, 153
	1997	Federal Navigation	500,000	1.3		138, 152, 153
GIWW Channel—Port Mansfield, TX	1986	Federal Navigation	73,000			138
	1988	Federal Navigation	132,000			138
Corpus Christi, TX	1978	Federal Storm & Erosion	871,000	1.4	3,087,000	10, 11, 12, 18, 147
	1985	Federal Storm & Erosion			4,415,000	11
	1986	Federal Storm & Erosion	38,000		399,000	147
Sargent Beach, TX	1988	Federal Navigation	150,000			138
Surfside, TX	1991	Federal Navigation	600,000			138
	1988	Federal Navigation	132,000			138
Galveston, TX	1985	Private	14,989	0.28	21,275	13
	1994–1995	State/Local	710,000	3.6	5,900,000	14, 15, 16, 17, 19
Rollover, TX	1956		6,000			151
	1997	Federal Navigation	100,000	0.1		153
Mermentau River, LA	1987	Federal Navigation	125,000			138
Isles Dernieres, LA	1985	State/Local	400,000		841,980	24, 27, 121
	1996	State/Local	100,000		450,000	121
Fourchon, LA	1986	State/Local	653,975			25
Grand Isle, LA	1954–1955	State/Local	1,150,000	1.4	188,000	20, 21, 22
	1957	Emergency	140,000	4.5	76,000	20
	1961–1962	State/Local	350,000	1.4	115,000	20
	1966	Emergency	550,000		447,000	20
	1972	State/Local	640,000		595,200	125
	1976	Emergency				23
	1983–1984	Federal Storm & Erosion	2,800,000	7.5	8,640,000	20, 23, 1
	1985	Federal Storm & Erosion	2,970,000	7	10,500,000	125, 147
	1987	Federal Storm & Erosion				26
	1988	Federal Storm & Erosion	473,000		1,745,000	125
	1990–1991	Emergency	1,422,000		10,934,000	26, 125, 147
	1994	Federal Storm & Erosion	310,000		2,491,000	125, 147
Waveland, MS	1994	State/Local	600,000	2	2,000,000	121
Harrison County, MS	1952–1953	Federal Storm & Erosion	7,004,000	26	3,001,800	1, 28, 29, 30, 31, 32, 147
	1962	Federal Storm & Erosion				147
	1964	Federal Storm & Erosion	200,000			31, 32
	1972–1973	Federal Storm & Erosion	1,923,443	26		1, 28, 30, 31, 147
	1988	Federal Storm & Erosion	1,500,000			147
City of Bay St. Louis, MS	1942	State/Local				33
City of Bay St. Louis, MS	1967	Emergency		6.1		33
West Ship Island, MS	1974	State/Local	500,000			34
	1980	State/Local	100,000			34
	1984	State/Local	210,000			34
	1991	State/Local	58,000	0.13		34
	1996	State/Local	55,000			35
Dauphin Island, AL	1996	Federal Navigation	20,000			35
Perdido Pass, AL	1986	Federal Navigation	660,000			138
Perdido Key, FL	1985	Federal Navigation	2,433,000	1		37, 39
	1989–1990	Federal Navigation	5,362,597	4.72		113
Pensacola Harbor, FL	1986	Federal Navigation	35,000			138
Santa Rosa Island, FL	1961	State/Local	75,300			40
Destin, FL	1986	State/Local	182,000			38, 138
	1987	State/Local	126,000			38, 138
	1988	State/Local	125,000			138
Port St. Joe Harbor	1986	State/Local	500,000			138
Appalachicola, FL	1986	Federal Navigation	138,000			138
Panama City Beach, FL	1976	Emergency	232,000	5.06		71
	1982	Federal Navigation	347,000	1		38
	1984	Federal Navigation	320,000	1		38
	1986	Federal Navigation	221,000	1		38, 138
	1988	Federal Navigation	225,000			138
	1996	Federal Navigation	98,990			72
Panama City, FL—planned	1997–1998	Emergency	7,000,000	17.9	33,000,000	71
Mexico Beach, FL	1965–1970	State/Local	101,250	0.7	41,000	41, 42
	1971–1975	State/Local	100,000	0.6		41, 42
St. Joseph Spit, FL	1980	Federal Navigation	332,000	0.6		38
	1985–1986	Federal Navigation	500,000	0.6	80,000	38

Table 1. *Continued.*

Location	Year	Type	Volume (cubic yards)	Length (miles)	Cost (\$)	References	
Honeymoon Island, FL	1969	State/Local	1,440,000			75, 76	
	1989	State/Local	230,000	0.5		75, 76, 128, 129	
Clearwater Beach, FL	1949-1951	State/Local	200,000			74	
	1950	State/Local	150,000			43	
Clearwater Beach, FL	1981	Federal Navigation	180,000	0.6		43	
	1984	State/Local	80,000			77	
Sand Key, FL North End	1973	Federal Navigation	126,000			77	
	1977	Federal Navigation	186,000			77	
	1981-1983	State/Local	600,000			77	
	1984	State/Local	240,000			77	
Belleair Beach, FL	1992-1993	State/Local	82,300			78, 79, 80	
Sand Key Phase IV (planned)	1997	Federal Storm & Erosion	2,079,000		5,300,000	81	
Indian Shores, Sand Key Phase-III	1992	Federal Storm & Erosion	480,000	2.2	14,300,000	82, 131, 132	
Indian Rocks, Sand Key Phase-II	1990	Federal Storm & Erosion	1,300,000	2.6	14,150,000	83, 84, 113, 139, 140, 141, 142	
North Redington Beach, FL	1981-1983	Federal Storm & Erosion	19,144	0.3	369,000	41, 42	
	1986	Federal Storm & Erosion	30,000	0.07		85	
Sand Key, FL Phase-I	1988	Federal Storm & Erosion	529,150	1.6		85, 86, 87, 88, 89, 128, 143	
Madeira Beach, FL	1961	State/Local	30,000	2	300,000	43	
Treasure Island, FL	1964	Federal Storm & Erosion	10,000		6,500	43	
	1966	Federal Storm & Erosion				47	
	1968	Emergency			114,000	127, 147	
	1969	Federal Storm & Erosion	820,000	1.7	595,000	31, 32, 43, 44, 48, 147	
	1971	Federal Storm & Erosion	76,000	0.3	216,000	1, 31, 44, 48, 147	
	1972	Federal Storm & Erosion	150,000	0.4	185,700	1, 31, 43, 48, 51, 147	
	1976	Federal Storm & Erosion	405,000	1.5	1,149,000	43, 51, 147	
	1978	Federal Storm & Erosion	50,000	0.4	224,000	51, 147	
	1981	Federal Navigation	70,000			51	
	1983	Federal Storm & Erosion	220,000	0.8		51, 147	
	1986	Emergency	555,000	1.7	3,500,000	1, 147	
	(planned)	1997	Federal Storm & Erosion	142,500		2,000,000	91
	Upham Beach, FL	1968	State/Local	30,000			51, 52
		1975-1976	State/Local	80,000	0.5	230,000	31, 41, 43
		1979	State/Local	254,000	0.5		41, 42, 44
1980		Federal Storm & Erosion	243,000	0.5	779,000	51, 93	
1986		Federal Storm & Erosion	175,000			1	
1996		Federal Storm & Erosion	230,000	0.4	2,200,000	92, 124, 133	
1971-1975		State/Local	25,000	0.5	683,000	1, 41, 42	
St. Petersburg Beach, FL	1964	State/Local	140,000	0.8	236,000	31, 54	
	1972-1973	Federal Storm & Erosion	505,000	1.3	597,000	31, 44, 54	
Mullet Key, FL	1977	Federal Storm & Erosion				1, 47	
	1963	Federal Navigation				55	
	1977-1978	Federal Navigation	206,000			51	
	1985	Federal Navigation				1	
Longboat Key, FL	1993	State/Local	2,320,000	4.6	13,200,000	95	
	1977-1978	Federal Navigation	101,480			1, 98	
	1982	Federal Navigation	100,000			98	
Lido Key, FL	1993	Federal Storm & Erosion	3,130,000	9.28		96, 100, 101, 102, 132	
	1964	Federal Navigation	123,000		69,000	50, 56, 103	
	1970	Federal Storm & Erosion	350,000	1.2	333,000	1, 13, 56	
	1974	Federal Storm & Erosion	250,000	1.2	458,000	50, 57, 58	
	1977	Federal Storm & Erosion	350,000	1.2	610,000	41, 50, 56	
	1980	Federal Navigation	185,000			44	
	1982	Federal Navigation	92,000			44	
	1985	Federal Navigation	239,000		886,000	56, 98	
	1991	State/Local		0.75	1,500,000	96	
Venice Beach, FL	1963	Federal Navigation				56	
	1971-1975	State/Local				41, 42	
	1979-1980	Emergency				56	
	1994	Federal Storm & Erosion	902,254	3.2	19,000,000	96, 104, 123, 135, 136, 137	
	phase1						
1996	Federal Storm & Erosion		1.9		123, 135, 136, 137		
phase2							
Port Charlotte Beach, FL	1980	Federal Navigation	49,700	1.1		50, 59, 60	
Gasparilla Island, FL	1981	Federal Navigation	264,000	3.6	3,800,000	61, 106	
	1993	Federal Navigation		2	2,500,000	96	

Table 1. *Continued.*

Location	Year	Type	Volume (cubic yards)	Length (miles)	Cost (\$)	References
Captiva Island, FL	1961	Federal Storm & Erosion				62
	1962	Federal Storm & Erosion				63
	1962-1963	Federal Storm & Erosion				64
	1963	Federal Storm & Erosion				63
	1964-1967	Federal Storm & Erosion				63, 65
South Seas Plantation, FL	1965	Federal Storm & Erosion				63, 65
	1988-1989	Federal Storm & Erosion	1,595,000	4.7		87, 109, 112, 143, 147
	1981	Private	655,500	1.9	3,600,000	87, 109, 127, 143
	1985	Emergency	3,300	0.9		1, 60, 66, 67, 68, 69
Sanibel, FL	1995	Private		4.9		133
	1995	State/Local		0.7		133
Fort Myers Beach, FL	1961-1987	Federal Navigation	767,000			61
	1986	Federal Navigation	119,000			138
Bonita Beach, FL	1976	State/Local				61
	1995	State/Local	198,000	0.776	1,100,000	118, 119, 120, 121, 133
Naples-Gordon Pass, FL	FY 1986	Federal Navigation	119,000			138
Barefoot Beach, FL	1991	Federal Navigation				144
Wiggins State Park, FL	1993	Federal Navigation	35,000			145
	1995	Federal Navigation				146
	1983	Private	48,000			70
Vanderbilt Beach, FL	1995	Federal Navigation	42,000			116
Vanderbilt/Park Shore/Naples, FL	1996	Federal Storm & Erosion	1,132,000	5.71	10,000,000	114, 115, 116, 122
Keewaydin Island, FL	1963	Federal Navigation	524,000			70
	1964	Federal Navigation	10,000			70
	1968	Federal Navigation	8,800			70
	1970	Federal Navigation	140,000			70
	1980	Federal Navigation	235,000			70
	1985	Federal Navigation	120,000			70
Marco Island, FL	1989	State/Local	1,200,000	1.7	5,287,852	111, 116, 126
	1995	State/Local	2,400			110

references in literature or mass media articles). Additionally, whenever possible, the most recent data was always taken over pre-completion estimates especially in regards to volume and cost data. In a number of projects the only record came from either brief citations in professional literature or from the personal memories of professionals within the field.

The efforts of this study were encumbered by the scattered and incomplete nature of attainable data on nourishment projects. Project data parameters (location, date, volume,

funding type, length and cost) were chosen as those which would be of most interest to researchers as well as the most commonly recorded facts about a project. "Gaps" in the database (Table 1) abound; at the present time for the 158 identified nourishment episodes, cost is known for 56 episodes (35%), volume data for 131 episodes (83%), and length data for 64 episodes (40%). "Complete" records, those in which data on all parameters were known, occurred with only 39 episodes (25%). The record of beach nourishment projects

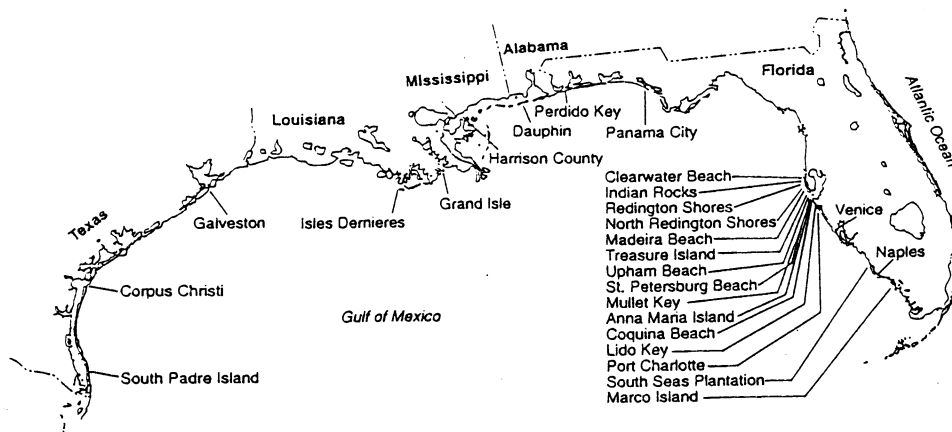


Figure 1. Index map of selected Gulf of Mexico nourishment projects. For a complete listing of projects see Table 1.

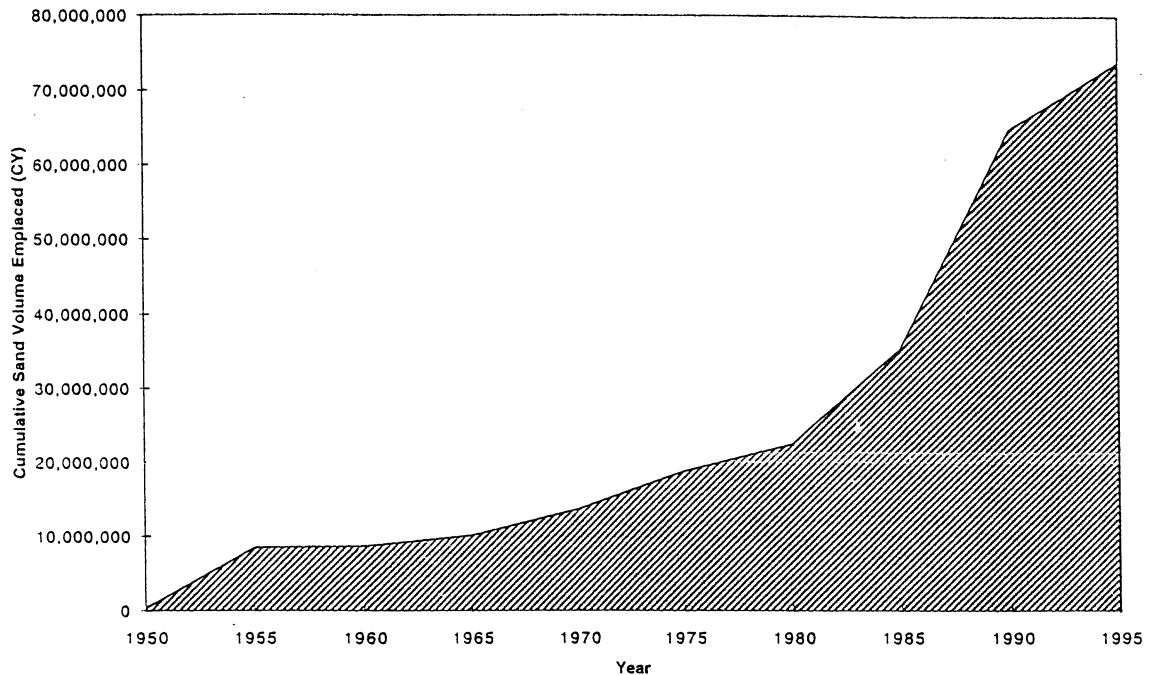


Figure 2. Cumulative volume of nourishment sand placed on US Gulf of Mexico shoreline.

(Table 1) is presented in geographical order progressing from West to East. For those unfamiliar with the Gulf Coast, the location of a selected number of projects is shown in Figure 1. The location of other projects may be estimated by locating projects with known locations.

The cost data presented in Figure 4 was arrived at by using a standard two step process. First all documented project costs were adjusted for inflation and converted to 1996 dollars using the cost update factors given by USACE (1996). As is noted above volume data is known more than twice as often as cost data. The second step in the cost analysis was to estimate the missing cost for projects in which volume was known. Average cost per cubic yard was determined for each funding type, from those projects with volume and associated cost data. Given the volume for a certain project and multiplying by the corresponding cost per cubic yard, we arrived at an estimated cost. After both documented and estimated costs were adjusted to 1996 dollars, they were graphed in decadal units (Figure 3).

In order to facilitate greater use of this database for managerial purposes, our records may be obtained by either contacting the authors directly or by downloading the files from our website at the following URL: <http://www.geo.duke.edu/psds.html>. Additionally, the authors gladly invite the submission of any corrections and additions to the database.

FUNDING CATEGORIES

Table 1 and Figure 5 illustrate the broad categories into which Gulf Coast nourishment projects fall. Occasionally through changes in project design or political conditions, projects will be funded under multiple sources throughout their

lifetime. For purposes of characterization, the dominating funding category has been chosen when multiple categories existed. Five basic funding types were established to characterize the Gulf nourishment experience. These were:

(1) *Federal Storm and Erosion*: These are planned congressionally approved projects designed to mitigate against future storm and/or erosion problems. Congress may authorize payment for up to 65 percent of the total cost with these projects. Federal Storm and Erosion projects dominate both the categories of cost and volume for nourishment projects along the Gulf Coast.

(2) *Federal Navigation*: These are projects designed to maintain federal navigation interests especially inlet channels in which adjacent beaches have been chosen as the disposal site. In theory, beach disposal of dredge material is only possible if it is the cheapest alternative. In practice, however, local interests often opt to foot the bill for the advantage of having spoil placed on adjacent beaches. Congressional review and approval, however, is required in order to receive federal cost-share assistance for the excess cost of adjacent beach disposal.

(3) *Federal Emergency*: These projects occur as the result of unexpected storm damage or immediate threat of erosion damage with the intent of protecting property from further or future damage.

(4) *State/Local*: These projects lack federal involvement and fall entirely under the funding of state and local governments.

(5) *Private*: In the four projects of this type, all funding came from private community groups seeking to protect property or restore a recreational beach.

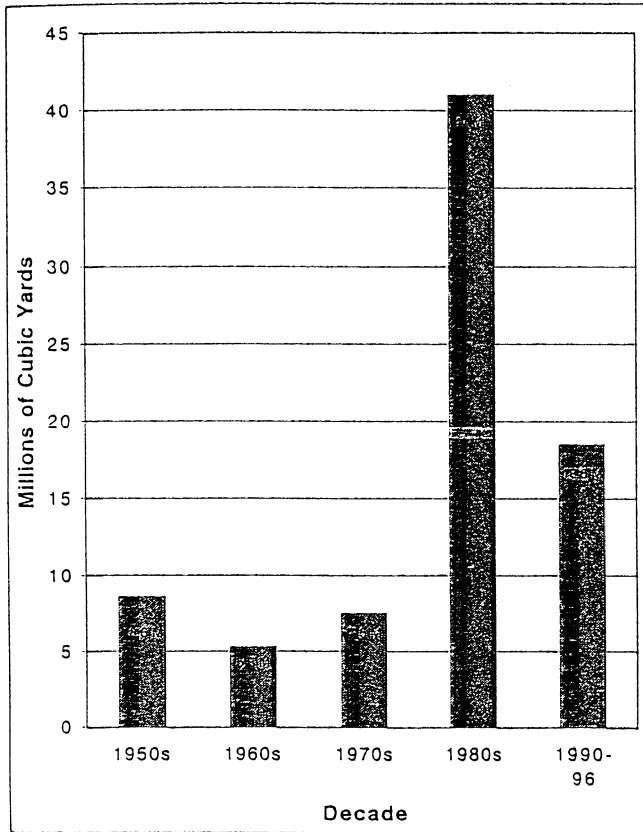


Figure 3. Total volume of nourishment sand placed per decade on US Gulf Coast.

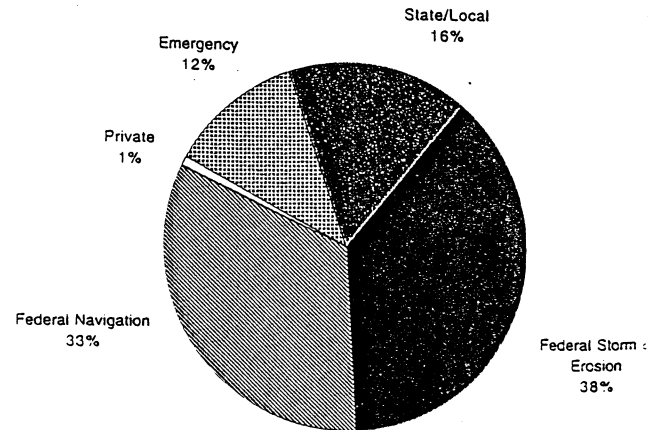


Figure 5. Funding sources of US Gulf Coast nourishment episodes based on percent of total sand volume.

FINDINGS

The growth of beach nourishment as an erosion control management tool is illustrated by Figures 2 and 3 which show the historical trends for cumulative nourishment volume and decadal nourishment volume respectively. A total of 158 beach nourishment episodes in 60 locations have been recorded. These episodes together account for over 78 million cubic yards of sand, making the Gulf of Mexico the third most highly nourished coastline in the country behind the East and Pacific coasts. Owing to the fact that sand volume figures were not known for all episodes, the exact cumulative volume can be expected to be much higher than that shown. However, Figure 2 serves as the most reliable proxy available for

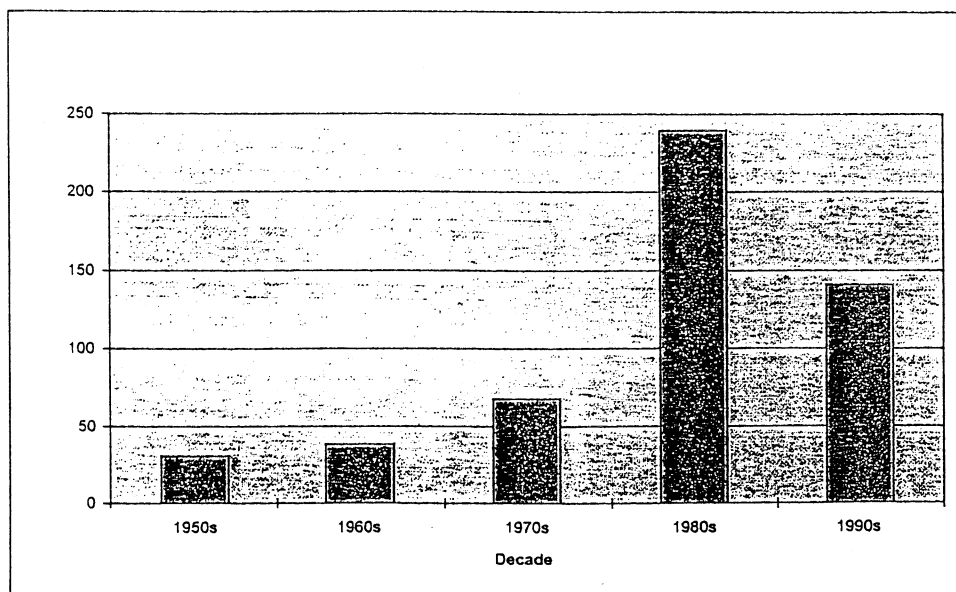


Figure 4. Total estimated cost of nourishing US Gulf Coast beaches per decade.

estimating the trend of beach nourishment activity through time. In particular Figure 2 shows a rapid increase in the total volume of sand emplaced along the Gulf Coast in the last twenty years. This curve is similar to the trend of beach nourishment along the East Coast over the same time period (see Figure 2 VALVERDE and PILKEY, this volume). Figure 3 indicates that since the 1950s, the sand placed on the Gulf Coast by various nourishment practices has increased with time. Note that approximately 25% of all the sand which has ever been placed on the Gulf Coast has occurred over just the last 6 years. Already the cost to maintain Gulf Coast beaches in the 90s is more than half of what was spent during the entire 1980s (Figure 4). The nineties clearly have been the most active time along the Gulf Coast for beach nourishment and we still have three more years to go! When projects of the 1980s are also considered, the shift towards greater beach nourishment is even more striking. Over 60% of all the sand known to have been placed along the Gulf Coast has occurred during the last 16 years. Within the span of one generation, a larger nourishment effort was undertaken than the previous two generations combined! This trend shows no sign of slowing down thus emphasizing the need for careful evaluation of the consequences and necessity of taking such action.

The importance of federal funding is illustrated in Figure 5. Federal Storm and Erosion Control projects alone account for the funding on over 38% of all known nourishment deposits along the Gulf Coast. When Federal Navigation and Emergency projects are added in as well, then federal involvement climbs to 83% of the total volume of emplaced material. Cooperative projects between state and local entities make up the bulk of the remaining funding (16%) and privately funded projects round off the list with a minor contribution (1%).

Although the overall increasing trend of reliance on beach nourishment can be expected to continue in the foreseeable future the mixture of funding types may be expected to change in response to the political climate and sediment availability. Actions of the current administration to cut the availability of federal funds has put a premium on state and local revenue sources. This situation was recently realized with the planned Panama City project in which the Mobile Corps District office was unable to obtain federal appropriations leaving the funding for what will be the largest and costliest project in Gulf Coast history entirely in the hands of state and local funding agencies. In an attempt to maintain federal involvement and save money, the State of Florida enacted some coastal legislation requiring all beach compatible navigation spoil to be placed on surrounding beaches. This law covers all navigation operations except at 13 specified inlets (WOODRUFF, 1997). The scarcity of beach compatible sand in many areas of the Gulf Coast (SPADONI, 1996) places an additional premium on the utilization of dredge spoil for nourishment purposes. Another option is the pursuit of Section 111 project status which requires Federal action to mitigate against the deleterious effects resulting from some previous shore protection project. Section 111 projects have been popular in the Great Lakes region (see O'BRIEN *et al.*, this issue) and may be explored as yet another way to maintain federal involvement in beach nourishment along the Gulf

Coast as well. In the absence of federal involvement, the cost of nourishment may drive some locations to further pursue hard stabilization alternatives.

Nourishment projects themselves may in the future be expected to fall into two major categories: gigantism and dwarfism. Gigantism is meant to describe the trend of fewer but bigger nourishment episodes. These projects combine several adjoining beaches into one nourishment package with a large initial fill and a long nourishment interval. The continuing Sand Key, Fl project, the recent Vanderbilt/Park Shores/Naples, Fl project and the planned Panama City, Fl project all illustrate this trend (see Table 1 for data and Figure 1 for location). Dwarfism describes the move towards smaller and more frequently renourished episodes. Most of these smaller episodes are related to federal navigation projects.

Other observations on the nature of beach nourishment along the Gulf Coast include the following. There has been an increase in the total number of episodes, volume of emplaced material, and the total length of nourished beach since the 1950's. There was a sharp increase in activity occurring in the mid 1980's. Seventeen percent (23 episodes) involved the placement of over 1 million cubic yards of sand. The Harrison County, Miss. project of 1952 alone accounted for over 7 million cubic yards of sand. Sixty percent (78 episodes) involved the placement of between 100,000 to 1,000,000 cubic yards of sand. Together, over 75% of all known nourishment episodes entailed the disposal of over 100,000 cubic yards. Thus the typical Gulf Coast nourishment episode is both larger and more expensive than those in either New England or the Great Lakes but smaller and less expensive than East Coast nourishment episodes (see HADDAD, *et al.*, and VALVERDE *et al.*, this issue). The relationship between the size of Gulf Coast projects and those along other U.S. coastline is likely to remain the same.

ACKNOWLEDGEMENTS

This study was funded by a grant from FEMA (Federal Emergency Management Agency) to the Program for the Study of Developed Shorelines.

The authors extend their gratitude to the following groups and individuals: Hugo Valverde, Tanya Haddad, Michael O'Brien; the Florida Bureau of Beaches and Coastal Systems especially Paden Woodruff, Phil Flood and Catherine Florlko; the Jacksonville, Mobile, New Orleans and Galveston Districts of the U.S. Army Corps of Engineers, the University of Florida Coastal Engineering Archives especially Mrs. Helen Twedell; the Special Collections Section of the Duke University Perkins Library and the many coastal managers and engineering firms along the Gulf Coast.

LITERATURE CITED

- CLAYTON, T.D., 1989. Artificial beach replenishment on the U.S. Pacific shore: a brief overview. In: MAGOON, O.T. *et al.*, (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 2033-2045.
- DIXON, K.L. and PILKEY, O.H., 1989. Beach replenishment on the U.S. coast of the Gulf of Mexico. In: MAGOON, O.T. *et al.*, (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 2007-2020.

- DIXON and PILKEY, 1991. Summary of beach replenishment on the U.S. Gulf of Mexico shoreline. *Journal of Coastal Research*, 7(1), 249-256.
- LEONARD, L.A.; CLAYTON, T.D.; DIXON, K.L., and PILKEY, O.H., 1989. U.S. beach replenishment experience: a comparison of the Atlantic, Pacific, and Gulf coasts. In: MAGOON, O.T. et al., (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 1994-2006.
- BEACH NOURISHMENT RESEARCH COUNCIL, 1995. *Beach Nourishment and Protection*. Washington, D.C.: National Academy Press.
- PILKEY, O.H. and CLAYTON, T.D., 1989. Summary of beach replenishment experience on U.S. east coast barrier islands. *Journal of Coastal Research*, 5(1), 147-159.
- SPADONI, R.H., 1996. The 1994/1995 Galveston Island beach nourishment project. In: *9th National Conference on Beach Preservation Technology*, 1996.
- SUDAR, A.; POPE, J.; HILLYER, T., and CRUMM, J., 1995. Shore protection projects of the U.S. Army Corps of Engineers. *Shore and Beach*, 63(2), 3-16.
- U.S. ARMY CORPS OF ENGINEERS, 1993. Institute of Water Resources shoreline protection and beach erosion control study of 1993.
- U.S. ARMY CORPS OF ENGINEERS, WATER RESOURCES SUPPORT CENTER INSTITUTE FOR WATER RESOURCES, 1996. IWR Report 96-PS-1, Shoreline protection and beach erosion control study, final report: an analysis of the U.S. Army Corps of Engineers shore protection program. pp. 362.
- WOODRUFF, P., 1997. Chief Engineer, Florida Bureau of Beaches and Coastal Systems, Tallahassee. *Personal Communication*.

REFERENCES

Numbers Refer to Table 1

1. DIXON, K.L. and PILKEY, O.H., 1991. Summary of beach replenishment on the U.S. Gulf of Mexico shoreline. *Journal of Coastal Research*, 7(1), 249-256.
2. DIXON, K.L. and PILKEY, O.H., 1989. Beach replenishment on the U.S. coast of the Gulf of Mexico. In: MAGOON, O.T., et al., (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 2007-2020.
3. PILKEY, O.H. and CLAYTON, T.D., 1989. Summary of beach replenishment experience on U.S. East Coast barrier islands. *Journal of Coastal Research*, 5(1), 147-159.
4. CLAYTON, T.D., 1989. Artificial beach replenishment on the U.S. Pacific shore: a brief overview. In: MAGOON, O.T. et al., (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 2033-2045.
5. LEONARD, L.A.; CLAYTON, T.D.; DIXON, K.L., and PILKEY, O.H., 1989. U.S. beach replenishment experience: a comparison of the Atlantic, Pacific, and Gulf Coasts. In: MAGOON, O.T. et al., (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 1994-2006.
6. PILKEY, O.H., 1988. A "Thumbnail Method" for beach communities: Estimation of long-term replenishment requirements. *Shore & Beach*, 56(3), 23-31.
7. LEONARD, L.A.; PILKEY, O.H., and CLAYTON, T.D., 1988. An assessment of parameters critical to beach replenishment. In: TAIT, L.S., (ed.), *Florida Shore and Beach Proceedings*. Tallahassee, Florida: Florida Shore and Beach Preservation Association, pp. 115-124.
8. LEONARD, L.A.; CLAYTON, T.D., and PILKEY, O.H., 1990. An analysis of replenished beach design parameters on U.S. East Coast barrier islands. *Journal of Coastal Research*, 6(1), 15-36.
9. LEONARD, L.A.; DIXON, K.L., and PILKEY, O.H., 1990. A comparison of beach replenishment on the U.S. Atlantic, Pacific and Gulf of Mexico Coasts. *Journal of Coastal Research*, Special Issue 6, 127-140.
10. MORTON, R.A. and PAINE, J.G., 1983. Historical shoreline changes in Corpus Christi, Oso and Nueces Bay, Texas Gulf Coast, Bureau of Economic Geology, University of Texas at Austin.
11. U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT, 1971. *Report on Corpus Christi beach, Texas, restoration project*. House Document No. 415, 91st Congress, 2nd session. Washington, D.C.: U.S. Government Printing Office, 84p.
12. STEPHEN, W. and BUTLER, K.S., 1983. Land use and economic impacts of a beach nourishment project. In: MAGOON, O.T. et al., (ed.), *Coastal Zone '83*, Sacramento, California: American Shore and Beach Preservation Association and California State Lands Commission, pp. 1-17.
13. GIARDINO, J.R.; BEDNARZ, R.S., and BRYANT, J.T., 1987. Nourishment of San Luis Beach, Galveston Island, Texas: and assessment of the impact. In: KRAUS, N.C., (ed.), *Coastal Sediments '87*, New York: American Society of Civil Engineers, pp. 1145-1157.
14. BEUMEL, N.H. and BEACHLER, K.E., 1993. Beach nourishment design within an existing groin field at Galveston, Texas. In: *7th National Conference on Beach Preservation Technology*, 1993. pp. 183-197.
15. SPADONI, R.H., 1996. Nourishment of the Beach in Galveston, Texas. In: *Houston Geological Society Bulletin*, Vol. 38, No. 1996. pp. 19-20.
16. MCKENNA, K.K. and BROWN, C.A., 1995. The first open-coast beach fill in Texas. In: *8th National Conference on Beach Preservation Technology*, 1995.
17. SPADONI, R.H., 1996. The 1994/1995 Galveston Island beach nourishment project. In: *9th National Conference on Beach Preservation Technology*, 1996.
18. KRESLICH, J.M. and BRUNT III, D.H., 1989. Assessment of two-layer beach fill at Corpus Christi beach, TX. In: MAGOON, O.T. et al., (eds.), *Coastal Zone '89*. New York: American Society of Civil Engineers, pp. 3975-3984.
19. TOMASO, B., 1995. Shifting sands, restoration of Galveston beach with undersea soil nears finish. In: *The Dallas Morning News*, February 19, 1995.
20. U.S. ARMY CORPS OF ENGINEERS, NEW ORLEANS DISTRICT, 1975. Report on Grand Isle and vicinity, Louisiana. House Document No. 639, 94th Congress, 2nd Sessions. Washington, D.C.: U.S. Government Printing Office.
21. MEYER-ARENDRT, K.J., 1987. Grand Isle: the evolution of a Louisiana seaside resort. In: PENLAND, S. and SUTER, J.R., (ed.) *Barrier Shoreline Geology, Erosion, and Protection in Louisiana*. New Orleans, LA: American Society of Civil Engineers, pp. 13 to 10-8.
22. MEYER-ARENDRT, K.J., 1987. Resort evolution along the Gulf of Mexico littoral: historic, morphological, and environmental aspects. Unpublished dissertation, Louisiana State University, 103p.
23. COMBE, A.J. and SOILEAU, C.W., 1987. Behavior of man-made beach and dune: Grand Isle, Louisiana. In: KRAUS, N.C., (ed.) *Coastal Sediments '87*, New York: American Society of Civil Engineers, pp. 1232-1242.
24. JONES, R.S. and EDMONSON, J.B., 1987. The Isles Dernier barrier shoreline restoration project. In: PENLAND, S. and SUTER, J.R., (ed.), *Barrier Shoreline Geology, Erosion, and Protection in Louisiana*. New Orleans, Louisiana: American Society of Civil Engineers, pp. 5-1 to 5-5.
25. MOSSA, J. and NAKASHIMA, L.D., 1989. Changes along a sea wall and natural beaches: Fourchon, LA. In: *Coastal Zone '89*, pp. 3723-3737.
26. POURTAHERI, H., 1996. U.S. Army Corps of Engineers, New Orleans. *Personal Communication*.
27. JONES, R.S., 1987. Barrier island reconstruction in Louisiana. In: *Coastal Zone '87*, pp 3248-3254.
28. SAND BEACH PLANNING TEAM, 1986. Sand Beach Master Plan. Harrison County, Mississippi. Harrison County, Mississippi Department of Wildlife Conservation, Bureau of Marine Resources. Variable paging.
29. U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT, 1947. *Report on Harrison County, Mississippi*. Harrison County, Mississippi: Mississippi Department of Wildlife Conservation, Bureau of Marine Resources. Variable paging.
30. U.S. ARMY CORPS OF ENGINEERS, 1983. *Shore Protection Manual*.

- ual: *Volumes I and II*. Washington, D.C.: U.S. Government Printing Office. Variable paging.
31. WALTON, T., 1977. *Beach Nourishment in Florida and the Lower Atlantic and Gulf Coasts*. Technical Paper TP-2. Gainesville, Florida: Florida Sea Grant, 66p.
 32. WALTON, T. and PURPURA, J., 1977. Beach nourishment along the Southeast Atlantic and Gulf coasts. *Shore & Beach*, 45(3), 10-18.
 33. SAND BEACH PLANNING TEAM, 1986. *Master Plan for Shorefront Protection and Utilization Hancock County, Mississippi*. Hancock County, Mississippi: Mississippi Department of Wildlife Conservation, Bureau of Marine Resources. Variable paging.
 34. CHANEY, P.L. and STONE, G.W., 1995. Soundside erosion of a nourished beach and implications for Winter cold front forcing: West Ship island, Mississippi. *Shore & Beach*. pp. 27-33.
 35. REED, S., 1996. Mobile Area Office, U.S. Army Corps of Engineers Mobile District. *Personal Communication*.
 36. ITSCHNER, LT. GEN., E.C., 1959. Partners in Erosion Control. *Shore & Beach* Vol. 27, No. 2, pp. 4-8.
 37. BEACHES AND SHORES RESOURCES CENTER, FLORIDA STATE UNIVERSITY, 1986. *Coastal Construction Control Line Review and Reestablishment Study for Escambia County*. Tallahassee, Florida: Division of Beaches and Shores, Department of Natural Resources, 43p.
 38. OPERATIONS DEPARTMENT, U.S. ARMY CORPS OF ENGINEERS, 1988. Unpublished Florida coastal inlet dredging record, 2p.
 39. PSUTY, N.P.; ALLEN, J.R., and THACKERAY, R., 1987. Shoreline change at Perdido Key, Florida. In: MAGOON, O.T. et al., (ed.), *Coastal Zone '87*. New York: American Society of Civil Engineers, pp. 5689-5695.
 40. U.S. ARMY CORPS OF ENGINEERS, 1980. *Detailed Project Report on Beach Erosion Control at Santa Rosa Island, Florida*. Mobile, Alabama: Mobile District, U.S. Army Corps of Engineers.
 41. FLORIDA DEPARTMENT OF NATURAL RESOURCES, 1983. *Beach Restoration: An Historical Perspective*. Tallahassee, Florida: Office of Beach Erosion Control, Division of Beaches and Shores, Florida Department of Natural Resources, 19p.
 42. FLORIDA DEPARTMENT OF NATURAL RESOURCES, 1985. *Beach Restoration: A State Initiative*. Tallahassee, Florida: Office of Beach Erosion Control, Division of Beaches and Shores, Florida Department of Natural Resources, Variable paging.
 43. U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, 1966. *Report on Pinellas County, Fla.* House Document No. 519, 89th Congress, 2nd Session. Washington, D.C.: U.S. Government Printing Office, 77p.
 44. U.S. ARMY CORPS OF ENGINEERS, 1987. Sand placed on Florida beaches by the Jacksonville District 1970 to September 1985, unpublished notes. Jacksonville, FL.: Jacksonville District, U.S. Army Corps of Engineers, 6p.
 45. DOLAN, R.; ADAMS, K.; AUBREY, D.; DAVIS, R., and DEAN, R., 1987. *Independent review of the Corps of Engineers plan for beach restoration of Sand Key, Pinellas County, Florida*, Draft.
 46. TERRY, J. and HOWARD, E., 1986. Redington Shores beach access breakwater. *Shore & Beach*, 55(3).
 47. SAYRE, W., 1987. Coastal erosion on barrier Island of Pinellas County, West-Central Florida. In: KRAUS, N.C., (ed.), *Coastal Sediments '87*, New York: American Society of Civil Engineers, pp. 1037-1050.
 48. DEPARTMENT OF COASTAL AND OCEANOGRAPHIC ENGINEERING, 1971. *Study to determine behavior of project fill for beach erosion control at Treasure Island, Florida*. COEL 71-01 Gainesville, Florida: University of Florida, 47p.
 49. U.S. ARMY CORPS OF ENGINEERS, 1987. *Pinellas County, Florida, beach erosion control project Sand Key segment: Feature Design Memorandum reach 1, beach renourishment and Indian Shores breakwater*. Jacksonville, Florida: Jacksonville District, U.S. Army Corps of Engineers. Variable paging.
 50. HOBSON, R.D., 1981. *Beach nourishment techniques; report 3, typical U.S. beach nourishment projects using offshore sand deposits*. TR H-76-1: Vicksburg, Mississippi: Coastal Engineering Research Center, U.S. Army Corps of Engineers, 117p.
 51. U.S. ARMY CORPS OF ENGINEERS, 1983. *Pinellas County, Florida, beach erosion control project Sand Key segment, General Design Memorandum*. Jacksonville, Florida: Jacksonville District, U.S. Army Corps of Engineers. Variable paging.
 52. BEACH RESTORATION MANAGEMENT PLAN FOR FLORIDA DRAFT, 1987. Tallahassee, Florida: Florida Department of Natural Resources, Variable paging.
 53. MEHTA, A.J.; JONES, C.P., and ADAMS, W.D., 1976. *John's Pass and Blind Pass, Glossary of Inlets Report #4*. Gainesville, Florida: State University System of Florida, Sea Grant Program, 66p.
 54. U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, 1966. *Report on Mullet Key, Fla.* House Document No. 516, 89th Congress, 2nd Session. Washington, D.C.: U.S. Government Printing Office, 75p.
 55. U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT. *Report on Manatee County, Fla.* Senate Document No. 37, 93rd Congress, 1st Session. Washington, D.C.: U.S. Government Printing Office.
 56. U.S. ARMY CORPS OF ENGINEERS, 1983. *Beach erosion control and hurricane protection study for Sarasota County, Florida with environmental impact statement*. Jacksonville, Florida; Jacksonville District, U.S. Army Corps of Engineers. Variable paging.
 57. U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, 1970. *Report on Lido Key County, Sarasota County, Fla.* House Document No. 320, 91st Congress, 2nd Session. Washington, D.C.: U.S. Government Printing Office, 69p.
 58. GREN, G., 5 December 1977. Letter to C.E. Furbee, West Coast Inland Navigation District, Jacksonville, Fl. G. Gren, U.S. Army Corps of Engineers, Jacksonville District, 2p.
 59. OLSEN ASSOCIATES, INC., 1987. *Beach Management Plan for Charlotte County*. Jacksonville, Florida: Olsen Associates, Inc., 52p.
 60. STAUBLE, D.K. and HOEL, J., 1986. *Guideline for Beach Restoration Projects: Part III—Engineering*. Report #77, Gainesville: Florida Sea Grant, 10p.
 61. OLSEN ASSOCIATES, INC., 1987. *Beach management plan for Lee County*. Jacksonville, Florida: Olsen Associates, Inc., 87p.
 62. U.S. ARMY CORPS OF ENGINEERS, 1961. *Annual report of the Chief of Engineers on civil works activities: Fiscal Year 1961*. Extract Report of the Jacksonville District. Washington, D.C.: U.S. Government Printing Office. Variable paging.
 63. DUANE HALL AND ASSOCIATES, 1975. *Captiva Island beach erosion study and plan of improvements, Captiva Island, Florida*. Fort Myers, Florida: Duane Hall and Associates, Inc.
 64. APPLIED TECHNOLOGY AND MANAGEMENT, INC., 1987. *Captiva comprehensive beach and shore preservation plan*, Third Draft. Gainesville, FL.: Applied Technology and Management, Inc.
 65. U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, 1970. *Report on Lee County, Fla.* House Document No. 395, 91st Congress, 2nd Session. Washington, D.C.: U.S. Government Printing Office, 74p.
 66. STEVENS, R. and OLSEN, E., 1979. The privately funded beach project—what to do when there's no government funding. In: TAIT, S. and LEAHY, T., (eds.), *Papers Presented at Annual Conference on Beach Preservation*. Bal Harbour, Florida: Florida Shore and Beach Preservation Association, pp. 26-41.
 67. GEORGE F. YOUNG, INC., 1987. *Eighth post-project Captiva Island beach monitoring study report*. George F. Young, Inc.
 68. GIANNINO, S.P.; STEVENS, R.W., and WATTS, G.M., 1985. Local financing for beach nourishment at Captiva Island, Florida. In: *Coastal Zone '85*, pp. 2154-2170.
 69. OLSEN, E.J., 1982. South Seas Plantation beach improvement project. *Shore and Beach*, 50(1), 6-10.
 70. COASTAL ENGINEERING CONSULTANTS, INC., 1987. *Collier County beach management plan*. Naples, Florida: Coastal Engineering Consultants.

71. MILLER, G., 1996. Mobile District, U.S. Army Corps of Engineers. *Personal communication*.
72. MORTON, D., 1996. Panama City Site Office, U.S. Army Corps of Engineers. *Personal communication*.
73. ULRICH, C.P., 1992. *Selecting the optimum dune height for Panama City beaches, Fl.* Mobile, Alabama: Mobile District, U.S. Army Corps of Engineers.
74. HOBBS, A., 1988. Historical overview of Federal beach nourishment projects in Florida. In: TAIT, L.S., (ed.), *Papers Presented at Beach Preservation Technology '88*, Gainesville, Florida. pp. 41-46.
75. INGLIN, D.C. and DAVIS, R.A., 1993. Performance of an upland source nourishment project, Honeymoon Island, Fl. *Coastlines of the Gulf of Mexico*.
76. INGLIN, D.C. and DAVIS, R.A., 1993. Honeymoon Island Study: Phase IV—Three year monitoring report. Tampa, Florida: Coastal Research Laboratory.
77. LEADON, M.E., 1988. *Clearwater Pass dredging and beach nourishment project: beach inlet monitoring report*. Tallahassee, Florida: Bureau of Coastal Engineering Regulation, Division of Beaches and Shores, Florida Department of Natural Resources.
78. TACKNEY & ASSOCIATES, INC., 1993. *Beach restoration and stabilization: south beach Clearwater, Florida three-month monitoring report*. Temple Terrace, Florida: Tackney and Associates Inc.
79. TACKNEY & ASSOCIATES, INC., 1993. *Beach restoration and stabilization: south beach Clearwater, Florida one-year monitoring report*. Temple Terrace, Florida: Tackney and Associates Inc.
80. TACKNEY & ASSOCIATES, INC., 1995. *Beach restoration and stabilization: south beach Clearwater, Florida two-year monitoring report*. Temple Terrace, Florida: Tackney and Associates Inc.
81. FLOOD, P.G., 1996. Department of Environmental Protection, Bureau of Beaches and Coastal Systems Tallahassee, Florida. *Personal communication*.
82. BEEMAN, K., 1993. Sand Key Phase III—Indian Shores project. *Tampa Tribune*, December 12, 1994.
83. COASTAL RESEARCH LABORATORY, 1992. *Indian Rocks beach nourishment monitoring two-year summary*. Tampa, Florida: University of South Florida.
84. CHATRY, S. and SMITH, R., 1993. T.L. James Marine Group Beach Nourishment Projects. *Coastal Zone '93*. pp. 1490-1504.
85. CHU, Y.H.; DENES, T.A.; MARTIN, T., and POPE, M.K., 1991. Redington Shores breakwater: beach response. *Coastal Sediments '91*. pp. 1170-1174.
86. CURTIN, P., 1989. Redington Beach nourishment project. *St. Petersburg Times City Edition*, April 20, 1989.
87. WALTHER, M. and DOUGLAS, B., 1993. Use of ebb shoal borrow areas. *Proceedings of 6th National Beach Preservation Technology Conference*.
88. DAVIS, R.A., 1991. Performance of a beach nourishment project based on detailed multi-year monitoring: Redington Beach, Fl. *Coastal Sediments '91*. pp. 2101-2115.
89. LIN, L.H. and DEAN, R.G., 1990. *Beach monitoring project Sand Key Phase II beach nourishment program (North Redington Beach & Redington Shores) Part II—Offshore profiles and wave data*. Gainesville, Florida: Coastal & Oceanographic Engineering Department.
90. U.S. ARMY CORPS OF ENGINEERS, 1968. *Pinellas County, Florida beach erosion control project Treasure Island, beach restoration General Design Memorandum*. Jacksonville, Florida: Jacksonville District, U.S. Army Corps of Engineers. Variable paging.
91. MINAI, L., 1996. Treasure Island nourishment project. *St. Petersburg Times*, March 20, 1996. St. Petersburg Florida.
92. PORTER, L., 1996. \$2.2 million facelift on tap for Upham Beach. *The Tampa Tribune*, May 4, 1996. Tampa, Florida.
93. U.S. ARMY CORPS OF ENGINEERS, 1978. *Pinellas County, Florida beach erosion control project General and Detail Design Memorandum Addendum (Long Key)*. Jacksonville, Florida: Jacksonville District, U.S. Army Corps of Engineers. Variable paging.
94. U.S. ARMY CORPS OF ENGINEERS, 1971. *Mullet Key, Florida beach erosion control project, Mullet Key beach restoration remainder*. Jacksonville, Florida: Jacksonville District, U.S. Army Corps of Engineers. Variable paging.
95. COASTAL PLANNING & ENGINEERING, INC., 1995. *Manatee County, Florida: Anna Maria Island beach restoration monitoring study (2 year report)*. Boca Raton, Florida.
96. ROLAND, J., 1993. Beaches. *Sarasota Herald-Tribune*, June 27 1993. Sarasota, Florida. pp. 1A, 14A-15A.
97. U.S. ARMY CORPS OF ENGINEERS, 1991. *Manatee County, Florida shore protection project General Design Memorandum*. Jacksonville, Florida. Jacksonville District: U.S. Army Corps of Engineers.
98. APPLIED TECHNOLOGY AND MANAGEMENT, INC., 1986. *Longboat Key beach restoration briefings notebook*.
99. ERICKSON, K.M. and PEENE, S., 1995. *Interim maintenance report design report town of Longboat Key*. Gainesville, Florida: Applied Technology and Management, Inc.
100. COASTAL PLANNING & ENGINEERING, 1995. *Town of Longboat Key beach restoration project two-year monitoring report*. Boca Raton, Florida. Coastal Planning and Engineering.
101. ERICKSON, K.M. and HEARN, J.K., 1995. *Longboat Key beach restoration project one-year monitoring report*. Gainesville, Florida. Applied Technology and Management, Inc.
102. IRISH, J.L. and TRUIT, C., 1995. Beach fill storm response at Longboat Key, Florida. In: *Proceedings of the 8th National Beach Preservation Technology Conference*. pp. 103-117.
103. FOSTER, E.R. and SAVAGE, R.J., 1989. Historic shoreline changes in Southwest Florida. In: *Proceedings of Coastal Zone '89*, pp. 4420-4433.
104. COASTAL TECHNOLOGY CORP., 1995. *City of Venice Beach nourishment project: phase I—permit compliance borrow area and beach fill quantity verification*. Vero Beach, Florida. Coastal Technology Corp.
105. U.S. ARMY CORPS OF ENGINEERS, 1991. *Sarasota County shore protection project general design memorandum pertinent data sheet*. Jacksonville, Florida. Jacksonville District: U.S. Army Corps of Engineers.
106. U.S. ARMY CORPS OF ENGINEERS, 1990. *Lee County, Florida Charlotte Harbor section 933 study with environmental assessment*. Jacksonville, Florida. Jacksonville District: U.S. Army Corps of Engineers.
107. COASTAL PLANNING & ENGINEERING, INC., 1985. *Captiva Island beach monitoring study*. Boca Raton, Florida. Coastal Planning and Engineering, Inc.
108. COASTAL PLANNING & ENGINEERING, INC., 1995. *Captiva Island beach monitoring study 72 month follow-up report*. Boca Raton, Florida. Coastal Planning and Engineering, Inc.
109. BARNETT, M.R. and STEVENS, R.W., 1988. Performance of beach restoration at South Seas Plantation, Florida. In: TAIT, L.S., (ed.), *Proceedings Beach Preservation Technology Conference*. Tallahassee, Florida, pp. 65-73.
110. COASTAL ENGINEERING CONSULTANTS, INC., 1996. *Marco Island beach restoration project annual monitoring report: 1995*. Naples, Florida. Coastal Engineering Consultants, Inc.
111. COASTAL ENGINEERING CONSULTANTS, INC., 1989. *Marco Island beach nourishment department of natural resources completeness summary*. Naples Florida. Coastal Engineering Consultants.
112. COASTAL PLANNING & ENGINEERING, INC., 1992. *Captiva Island: beach maintenance nourishment project sand search phase III*. Boca Raton, Florida. Coastal Planning and Engineering, Inc.
113. NATIONAL RESEARCH COUNCIL, Committee on "beach nourishment and protection," *Beach Nourishment and Protection*, Marine Board Commission on Engineering and Technical Systems 1995.
114. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, 1995. *Permit for construction or other activities pursuant to section 161.041, Florida statutes*. Letter from Virginia B. Westrell dated Oct. 9, 1995 Tallahassee Florida. 8 pages.
115. COLLIER COUNTY, 1996. *Collier County restoration project weekly status report May 9, 1996*. Collier County Florida.

116. POFF, M., 1996. Associate Engineer & Coastal Division Manager, *Coastal Engineering Consultants, Inc.* Naples, Florida. *Personal Communication.*
117. COASTAL ENGINEERING CONSULTANTS, INC., 1996. Architect-engineer and related services questionnaire standard forms 254 and 255. Coastal Engineering Consultants, Inc., Naples, FL.
118. OLSEN AND ASSOCIATES, INC., 1995. Architect-engineer and related services questionnaire standard forms 254 and 255. Olsen and Associates, Inc., Jacksonville, FL.
119. BROWDER, A.E., 1996. Bonita Beach restoration project: six-month post construction monitoring report. Prepared for Florida Department of Environmental Protection Bureau of Beaches and Coastal Systems Permit No. DBS 900263 LE. Olsen and Associates, Inc., Jacksonville, FL.
120. BODGE, K.R. and SAVAGE, R.J., 1989. Engineering analysis of beach restoration at Bonita Beach, Florida. Submitted to Lee County Board of County Commissioners. Olsen and Associates, Jacksonville, FL.
121. SMITH, R., 1996. Chief of Engineers T.L. James and Company, Inc. *Personal Communication.*
122. STAIGER, J., 1996. Natural Resource Manager City of Naples. *Personal Communication.*
123. HUNT, G., 1995. Letter to Lonnie L. Ryder Environmental Administrator, September 22, 1995.
124. TERRY, J., 1996. Coastal Manager Pinellas County. *Personal Communication.*
125. U.S. ARMY CORPS OF ENGINEERS, WATER RESOURCES SUPPORT CENTER INSTITUTE FOR WATER RESOURCES, 1996. IWR Report 96-PS-1, Shoreline protection and beach erosion control study, final report: an analysis of the U.S. Army Corps of Engineers shore protection program. pp. 362.
126. COASTAL ENGINEERING CONSULTANTS, INC., 1987. Revised estimate of project costs for Marco Island. CEC File No. 87.003. October 26, 1987.
127. PHLEGAR, W.S., 1989. Performance prediction of beach nourishment projects. Coastal and Oceanographic Engineering Department, University of Florida.
128. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Legislative Appropriation for FY 1987-1988.
129. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Legislative Appropriation for FY 1988-1989.
130. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Legislative Appropriation for FY 1989-1990.
131. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Legislative Appropriation for FY 1990-1991.
132. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Legislative Appropriation for FY 1991-1992.
133. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Restoration/Nourishment Projects Conducted during FY 1995-1996.
134. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Legislative Appropriation for FY 1996-1997.
135. HUNT, G.N., 1991. Letter to Lonnie L. Ryder Environmental Administrator dated December 2, 1991.
136. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished financial summary of Venice Beach restoration project.
137. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS. Unpublished Permit for construction or other activities pursuant to section 161.041 Florida Statutes Final Order. 1993.
138. VALLIANOS, L. 1990. Beach and nearshore placement of material dredged from Federally authorized navigation projects. 87 pages. U.S. ARMY CORPS OF ENGINEERS Institute for Water Resource Policy Study 90-PS-1.
139. TERRY, J.B., 1991. Letter to Lonnie Ryder, Environmental Administrator dated December 3, 1991.
140. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS EROSION CONTROL PROGRAM 1989. Project agreement amendment #1. September 6, 1989. DEP contract number C-5775.
141. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS EROSION CONTROL PROGRAM 1989. Project agreement March 24, 1989. DEP contract number C-5775.
142. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS 1987. Application for funds under provisions of chapter 161.091 signed April 10, 1987.
143. WALTHER, M.P. and DOUGLAS, B.D., 1993. Ebb shoal borrow area recovery. *Journal of Coastal Research*, Special Issue No. 18, 211-223. Fort Lauderdale, FL.
144. HUMISTON AND MOORE ENGINEERS, 1993. Wiggins Pass maintenance dredging 1st annual monitoring report for Wiggins Pass in Collier County.
145. COASTAL ENGINEERING CONSULTANTS, INC., 1993. Performance of the Wiggins Pass dredging project and adjacent shorelines 1993-1994.
146. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF BEACHES AND COASTAL SYSTEMS 1995. Unpublished request for authorization to perform subsequent maintenance dredging event and beach disposal.
147. U.S. ARMY CORPS OF ENGINEERS, 1993. Unpublished shoreline protection and beach erosion study yearly cost data for constructed projects (1950-1993).
148. SUDAR, A.; POPE, J.; HILLYER, T., and CRUMM, J., 1995. Shore protection projects of the U.S. Army Corps of Engineers. *Shore and Beach* Vol. 63, No.2 3-16.
149. U.S. ARMY CORPS OF ENGINEERS, 1993. Institute of Water Resources Shoreline Protection and Beach Erosion Control Study of 1993.
150. NATIONAL RESEARCH COUNCIL, 1995. Beach nourishment and protection. National Academy Press, Washington D.C.
151. MORTON, R.A., 1997. Gulf shoreline movement between Sabine Pass and the Brazos River, Texas. *Geological Circular 97-3 Bureau of Economic Geology University of Texas at Austin.*
152. HEILMAN, D., 1997. Shiner Moseley and Associates, Inc., Corpus Christi *Personal Communication.*
153. BARCAK, R., 1997. U.S. ARMY CORPS OF ENGINEERS GALVESTON DISTRICT PLANNING DIVISION. *Personal Communication.*