MANGROVES

MARINE HABITAT TREND ANALYSIS
SARASOTA COUNTY

FINAL REPORT

prepared for
SARASOTA COUNTY
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INTRODUCTION

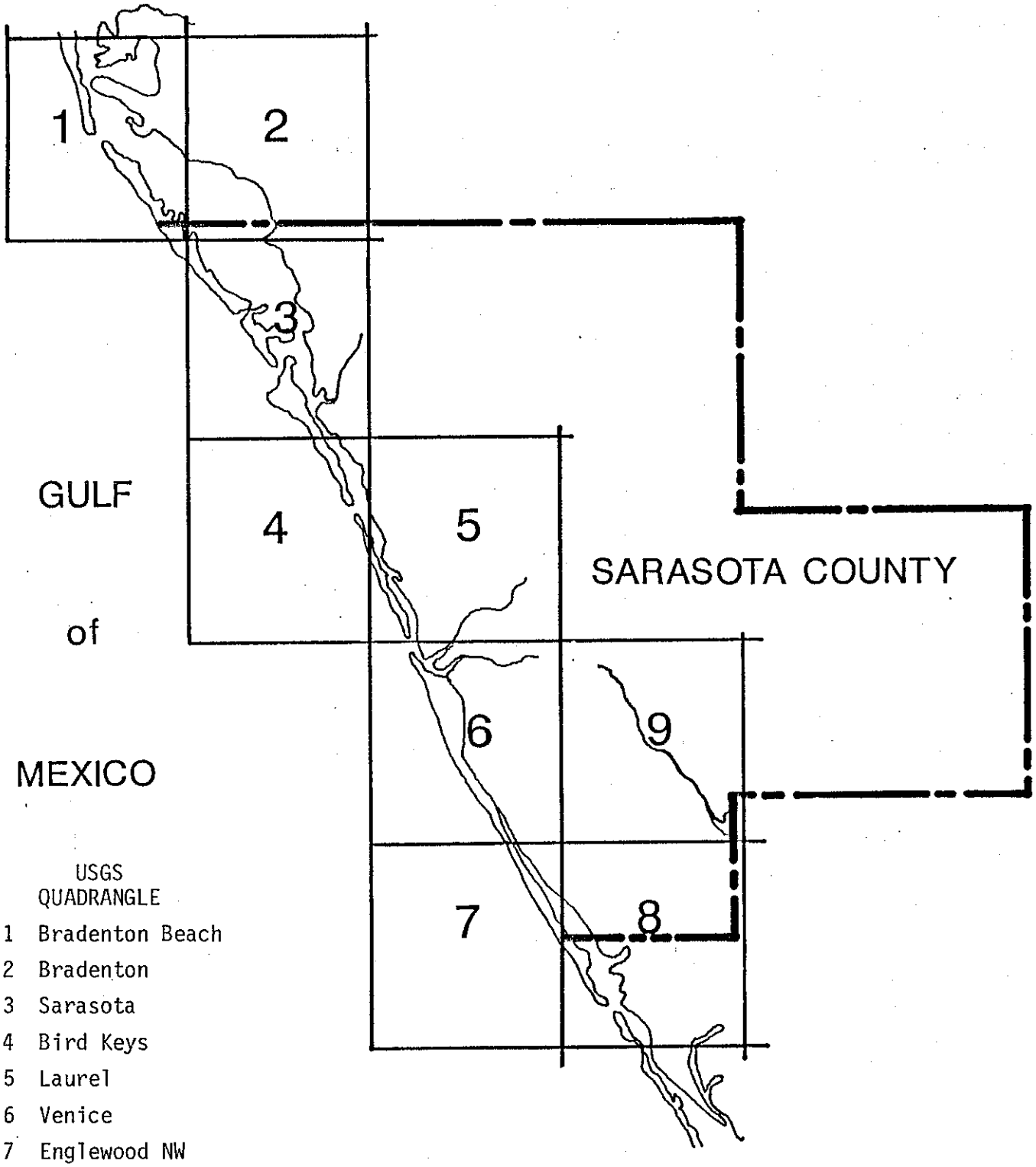
In order to document historical conditions and evaluate trends of marine and estuarine habitats in Sarasota County, a Marine Habitat Trend Analysis has been accomplished comparing the periods 1948, 1972 and 1987. The project represents the first attempt to analyze trends in areal extent of marine habitats using Sarasota County as the study area.

Previous studies varied greatly in selection of study area boundaries, or targeted only specific habitats, such as seagrass beds. Previous trend analyses in west central Florida have focused on the larger estuarine systems of Tampa Bay and Charlotte Harbor. Since production of these analyses, information concerning the Sarasota Bay complex has been considered a crucial missing link and will provide continuous coverage along the southwest coast of Florida.

This project documents historical conditions and evaluates trends in marine habitats to provide an accurate foundation for substantive management decisions affecting the coastal marine resources in Sarasota County.

METHODOLOGY

The habitat trend analysis involves the mapping of mangrove forests, saltmarshes, seagrass meadows, oyster bars, bay waters, and drift algal communities of the marine and estuarine areas of Sarasota County. The mapping was accomplished using USGS 7.5' quadrangle maps (Figure 1) as a basis of compilation of photointerpretive work products for three time periods: 1948, 1972 and 1987. These time periods were chosen based on availability and quality of vertical aerial photography.



USGS QUADRANGLE

1 Bradenton Beach
2 Bradenton
3 Sarasota
4 Bird Keys
5 Laurel
6 Venice
7 Englewood NW
8 Englewood
9 Myakka River

Figure 1.

The maps produced in this project depict eight numerically designated mapping units or habitat types defined in Table 1. In addition to these, three alphanumeric designations were added to the initial scope to define the presence of large drift algal communities (1A, sparse/medium; 2A, dense; 3A, patchy) present in Little Sarasota Bay and Lemon Bay.

Seagrasses were mapped in three categories of apparent density (1, sparse/medium; 2, dense; 3, patchy) based on signature intensity on the imagery and subsequent field verification of the current time period series. A category entitled "Other Habitats" (mapping unit 8) was included to facilitate digitization and to identify non-target areas (i.e., not habitats 1 through 7).

Black and white vertical aerial photography dated February 1948 of scale 1:20,000 (1"=1,666.67'; obtained from the U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service) provided the basis of the historical photointerpretive component of the trend analysis. Photo-interpretive delineations were prepared on transparent mylar overlays of each 9"x9" print comprising the image base. These overlays were subsequently compiled on mylar bases produced from USGS 7.5' quadrangles at a scale of 1:24,000 (1"=24,000').

The 1972 map series is based on 1972 black and white vertical aerial black diazo products of photography flown by Mark Hurd Aerial Surveys, Inc. (scale 1:24,000). Production of the 1987 map series was similarly accomplished using natural color vertical aerial photography dated December 1984, enlarged to

Table 1. Habitat designations, definitions and area, Sarasota County Coastal Marine Habitat Trend Analysis conducted by Mangrove Systems, Inc.

HABITAT NO.	DESCRIPTION	SARASOTA CO. APOXSEE		FDOT FLUCCS	USFWS	1987 AREA ac	ha
1	Seagrass, sparse to medium	IVA.	Brackish bays Seagrass beds	9111	E2AB2	835	337
2	Seagrass, dense	IVA.	Brackish bays Seagrass beds	9112	E2AB2	2,654	1,075
3	Seagrass, patchy	IVA.	Brackish bays Seagrass beds	9113	E2AB2	554	224
	Seagrass, total (not mapped; total of 1, 2 and 3)	IVA.	Brackish bays Seagrass beds	911	E2AB2	4,043	1,636
1A	Macroalgae, sparse to medium		-	-	E2AB1	-	-
2A	Macroalgae, dense		-	-	E2AB1	293	119
3A	Macroalgae, patchy		-	-	E2AB1	111	45
4	Mangrove swamp	IIIA.	Estuarine edges Mangrove swamps	612	E2SS3 E2FO3	843	341
5	Tidal marshes, saltwater	IIIB.	Estuarine edges Tidal marshes	642	E2EM5	45	17
6	Oyster beds (bars)	IVB.	Brackish bays Oyster beds	654	E2RF2	132	54
7	Bay waters	IVC.	Brackish bays Bay waters	541 (510)	E1OW	13,802	5,585
8	Other habitats (not mapped)		-	-	-	-	-

1:24,000 (1"=2,000'; obtained from AeroColor, Inc.). This photography provided the basis of field verification of present (1987-88) conditions.

The areal extent of marine habitats were calculated by digital incorporation into the Marine Resource Geographical Information System [MRGIS] at the Florida Department of Natural Resources Bureau of Marine Research in St. Petersburg. The digital data bases produced were divided into six areas (SC 1 through SC 6) to facilitate identification of trends with more resolution than possible at the overall county level. Table 2 defines the physical boundaries of these subareas which are depicted on the accompanying map series.

Table 2. Boundaries of subareas SC 1 through SC 6 depicted on the accompanying map series.

SC 1	Manatee/Sarasota County line south to Ringling Causeway
SC 2	Ringling Causeway south to Stickney Point Bridge
SC 3	Stickney Point Bridge south to Blackburn Point Road
SC 4	Blackburn Point Road south to Albee Road at Nokomis Beach (south end of Blackburn Bay)
SC 5	Albee Road south to Manasota Bridge
SC 6	Manasota Bridge south to Sarasota/Charlotte County line; also includes Gottfried Creek north of county line.

RESULTS

The data reported in Tables 3 through 5 represents the analysis of 1948, 1972 and 1987 map series. Table 6 shows the change in percent composition and acreage of coastal habitats between 1948 and 1987; Table 7 summarizes the changes occurring among all three time periods.

Coastal marine habitats covered 20,331 acres in 1948, and were reduced by 2% (416 acres) in 1972. Between 1972 and 1987, total acreage was further reduced to 19,269 acres, for an overall reduction of 5.2% or 1,062 acres. The differences between 1948 and 1987 represent a 13% increase in open water area, a 21% decrease in oyster bar area, and decreases of vegetated habitats as follows:

Seagrass	-35%
Mangroves	-45%
Tidal Marsh	-83%

DISCUSSION

The changes observed are attributable to dredging and filling of shallow water habitats to support urbanization, as well as to water quality degradation resulting from agricultural and municipal sources. This loss of wetland habitat is consistent with reductions quantified for other areas of Florida. Harlen (1979) reported seagrass loss of -43% for northern Biscayne Bay; a -29% loss of seagrass in Charlotte Harbor has been reported by Harris et al. (1983). Lewis et al. (1985) reported -81% loss of seagrasses in Tampa Bay, and Mangrove Systems, Inc. (1984) reported -75% decline of seagrasses in Clearwater Harbor.

Table 3. Percent composition of coastal marine habitats in Sarasota County, 1948.

Seagrass:	MAPPING UNIT		SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	TOTAL
sparse/ medium	1	ac	172	202	267	140	6	143	930
		%	1.9	5.1	10.9	7.4	1.1	5.9	4.5
dense	2	ac	1513	890	1114	411	180	706	4814
		%	16.8	22.3	45.4	21.5	34.4	28.9	23.7
patchy	3	ac	141	15	7	31	3	244	441
		%	1.6	0.4	0.3	1.6	0.6	10.0	2.2
Total Seagrass		ac	1826	1107	1388	582	189	1093	6185
		%	20.3	27.8	56.6	30.5	36.1	44.8	30.4
Mangrove	4	ac	257	364	191	340	184	210	1546
		%	2.8	9.2	7.8	17.8	35.2	8.6	7.6
Tidal Marsh	5	ac	-	15	13	128	76	39	271
		%	0	0.4	0.5	6.7	14.5	1.6	1.3
Oyster Bar	6	ac	-	17	57	33	-	2	109
		%	0	0.4	2.3	1.7	0	0.1	0.6
Bay Waters	7	ac	6933	2486	803	826	74	1098	12,220
		%	76.9	62.2	32.8	43.3	14.2	44.9	60.1
TOTAL		ac	9016	3989	2452	1909	523	2442	20,331
		%	44.4	19.6	12.0	9.4	2.6	12.0	100

Table 4. Percent composition of coastal marine habitats in Sarasota County, 1972.

	MAPPING UNIT		SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	TOTAL
Seagrass:									
sparse/ medium	1	ac	102	56	319	136	24	93	730
		%	1.1	1.5	13.3	7.5	4.3	4.1	3.7
dense	2	ac	1696	668	695	348	57	822	4286
		%	18.8	17.5	29.0	19.1	10.2	36.0	21.5
patchy	3	ac	23	-	1	2	7	38	71
		%	0.3	0	<0.1	0.1	1.3	1.7	0.4
Total Seagrass		ac	1821	724	1015	486	88	953	5087
		%	20.1	19.0	42.3	26.7	15.7	41.7	25.5
Macroalgae:									
sparse/ medium	1A	ac	-	-	255	-	-	-	255
		%	0	0	10.6	0	0	0	1.3
dense	2A	ac	-	-	120	-	-	-	120
		%	0	0	5.0	0	0	0	0.6
patchy	3A	ac	-	-	-	-	-	-	-
		%	0	0	0	0	0	0	0
Mangrove	4	ac	239	231	177	165	113	107	1032
		%	2.6	6.1	7.4	9.1	20.2	4.7	5.2
Tidal Marsh	5	ac	-	-	11	16	11	6	44
		%	0	0	0.5	0.9	2.0	0.3	0.2
Oyster Bar	6	ac	-	9	67	33	1	5	115
		%	0	0.2	2.8	1.8	0.2	0.2	0.6
Bay Waters	7	ac	6985	2843	753	1120	346	1215	13,262
		%	77.2	74.7	31.4	61.5	61.9	53.1	66.6
TOTAL		ac	9045	3807	2398	1820	559	2286	19,915
		%	45.4	19.1	12.0	9.1	2.8	11.5	100

Table 5. Percent composition of coastal marine habitats in Sarasota County, 1987.

	MAPPING UNIT		SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	TOTAL
Seagrass:									
sparse/ medium	1	ac	257	82	250	134	3	109	835
		%	2.9	2.5	10.3	7.8	0.5	4.7	4.3
dense	2	ac	873	470	422	375	85	429	2654
		%	9.7	14.5	17.4	21.7	15.0	18.5	13.8
patchy	3	ac	123	98	150	26	-	157	554
		%	1.4	3.0	6.1	1.5	0	6.8	2.9
Total Seagrass		ac	1253	650	822	535	88	695	4043
		%	14.0	20.0	33.8	31.0	15.5	30.0	21.0
Macroalgae:									
dense	2A	ac	-	-	293	-	-	-	293
		%	0	0	12.0	0	0	0	1.5
patchy	3A	ac	-	-	6	-	-	105	111
		%	0	0	0.3	0	0	4.5	0.6
Mangrove	4	ac	138	250	134	113	106	102	843
		%	1.5	7.7	5.5	6.6	18.7	4.4	4.4
Tidal Marsh	5	ac	-	-	5	11	21	8	45
		%	0	0	0.2	0.6	3.7	0.3	0.2
Oyster Bar	6	ac	1	14	71	33	1	12	132
		%	<0.1	0.4	3.0	1.9	0.2	0.5	0.7
Bay Waters	7	ac	7586	2330	1100	1033	352	1401	13,802
		%	84.5	71.9	45.2	59.9	61.9	60.3	71.6
TOTAL		ac	8978	3244	2431	1725	568	2323	19,269
		%	46.6	16.8	12.6	8.9	3.0	12.1	100

Table 6. Percent change in area of coastal marine habitats in Sarasota County between 1948 and 1987.

	MAPPING UNIT			SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	TOTAL
Seagrass:										
sparse/ medium	1	1948	ac	172	202	267	140	6	143	930
		1987		257	82	250	134	3	109	835
		change		+85	-120	-17	-6	-3	-34	-95
			%	+49	-58	-6	-4	-50	-24	-10
dense	2	1948	ac	1513	890	1114	411	180	706	4814
		1987		873	470	422	375	85	429	2654
		change		-640	-420	-692	-36	-95	-277	-2160
			%	-42	-47	-62	-9	-53	-39	-45
patchy	3	1948	ac	141	15	7	31	3	244	441
		1987		123	98	150	26	-	157	554
		change		-18	+83	+143	-5	-3	-87	+113
			%	-13	+553	+2042	-16	-100	-36	+26
Total Seagrass		1948	ac	1826	1107	1388	582	189	1093	6185
		1987		1253	650	822	535	88	695	4043
		change		-573	-457	-566	-47	-101	-398	-2142
			%	-31	-41	-40	-8	-53	-36	-35
Macroalgae:										
dense	2A	1948	ac	-	-	-	-	-	-	-
		1987		-	-	293	-	-	-	293
		change not calculated								
patchy	3A	1948	ac	-	-	-	-	-	-	-
		1987		-	-	6	-	-	105	111
		change not calculated								
Mangrove	4	1948	ac	257	364	191	340	184	210	1546
		1987		138	250	134	113	106	102	843
		change		-119	-114	-57	-227	-78	-108	-703
			%	-46	-31	-30	-67	-42	-51	-45
Tidal Marsh	5	1948	ac	-	15	13	128	76	39	271
		1987		-	-	5	11	21	8	45
		change		-	-15	-8	-117	-55	-31	-226
			%	-	-100	-61	-91	-72	-79	-83
Oyster Bar	6	1948	ac	-	17	57	33	-	2	109
		1987		1	14	71	33	1	12	132
		change		+1	-3	+14	0	+1	+10	+23
			%	-	-18	+24	0	-	+500	+21
Bay Waters	7	1948	ac	6933	2486	803	826	74	1098	12,220
		1987		7586	2330	1100	1033	352	1401	13,802
		change		+653	-156	+297	+207	+278	+303	+1582
			%	+9	+6	+37	+25	+376	+28	+13

Table 7. Summary of changes in acreage and percent composition of coastal marine habitats in Sarasota County between 1948 and 1972, and between 1972 and 1987.

	1948		1972		1987	
	ac	%	ac	%	ac	%
Open Water	12,220	60.1	13,262	66.6	13,802	71.6
Seagrass	6,185	30.4	5,087	25.5	4,043	21.0
Mangroves	1,546	7.6	1,032	5.2	843	4.4
Tidal Marsh	271	1.3	44	0.2	45	0.2
Oyster Bars	109	0.6	115	0.6	132	0.7
Reduction in area since 1948			-416		-1,062	

Areal cover and historical loss of seagrasses in various areas of the Sarasota Bay complex are reported in Table 8, as modified from Lewis and Sauers (in preparation). The major differences in the data are primarily the result of each study concentrating on seagrass cover in different parts of the bay. For example, Evans and Brungardt (1978) included only South Sarasota Bay and Robert's Bay, while the NUS Corporation study (1986) included only North Sarasota Bay. Sauers (1981) studied only a portion of South Sarasota Bay; McNulty et al. (1972) included both Sarasota Bay and Little Sarasota Bay, but did not include any historical data.

Tidal marsh and mangrove forest declines of -44% have been documented in Tampa Bay by Lewis (1977), by -82% in northern Biscayne Bay (Harlen 1979), and -46% in Clearwater Harbor (Mangrove Systems, Inc. 1984). Harris et al. (1983) reported a 51% decrease in areal cover of saltmarshes in Charlotte Harbor and a 10% increase in mangrove forest area. This increase was attributed to: enactment of Federal, State and local protective regulations prior to large scale development in the area; colonization of tidal flats (which exhibited a

reduction in acreage) by mangroves; and other factors such as marsh succession and colonization of artificial habitats such as spoil islands.

Table 8. Seagrass areal cover data reported for various areas of Sarasota Bay (modified from Lewis and Sauers, in preparation).

HISTORICAL			CURRENT			PERCENT	
year	ac	ha	year	ac	ha	CHANGE	REFERENCE
1970	7,610	3,080	-	-	-	-	McNulty et al. 1972
1948	1,925	783	1974	1,460	591	-25	Evans and Brungardt 1978
1948	262	106	1979	121	49	-57	Sauers 1981
1957	5,902	2,389	1982	4,493	1,818	-24	NUS Corp. 1986
1957	10,000	4,047	1986	7,565	3,062	-25	Lewis and Sauers (in preparation)

MANAGEMENT RECOMMENDATIONS

Resource management recommendations should focus on preservation of the remaining coastal habitats, and maintenance and improvement of water quality which will promote proliferation of seagrasses and discourage algal blooms. The re-opening of Midnight Pass may realize some loss of seagrasses due to increased current velocities, but daily tidal introduction of marine waters would be expected to reduce problems associated with nutrient loading. Sauers and Serviss (1985) also reported a potential for increases exposure of Little Sarasota Bay to red tide events that could result from opening the pass.

Another potential area of introducing Gulf waters may exist in the Alexander Island area on Manasota Key where the seaward extent of Manasota Key Road

(S.R. 789) has experienced severe and chronic erosion. A bridge and non-navigable inlet at this location would probably improve water quality conditions.

Conversions of upland spoil areas to wetland or improved upland habitat (e.g., coastal hammocks) represent the single largest potential for re-creation of lost wetland acreage. Spoil areas along the Gulf Coast Intracoastal Waterway could be excavated to intertidal elevations and planted with marsh and mangrove species, as well as seagrasses. Critical areas for targeting these activities would be the spoil areas near Midnight Pass, Bird Keys, Red Lake, and South Venice west of Shamrock Drive, Longboat Key northeast of New Pass Bridge, and Alexander Island. Efforts at Midnight Pass could be coordinated with work to reopen the pass, and coordination of any public sector road project in the area of Alexander Island.

Development of a model dredged material disposal area management program should begin with identification of County-owned parcels and a feasibility study including conceptual design scenarios for each parcel. Several small scale projects could then be designed and implemented as demonstration projects to generate public support and funding.

Other recommendations would include analysis and mitigative retrofitting and improvement of infrastructural support facilities, particularly in municipalities' inadequate control of stormwater runoff and wastewater discharge to the Bay. These measures would benefit water quality, which has chronically suffered degradation from agricultural and urban runoff due to historic disturbance of palustrine and riverine floodway perturbations.

Channelization of major floodplains, particularly evident in Cow Pen Slough, results in:

-- the loss of floodwater attenuation ability of the floodway;
-- the loss of biological assimilative ability of the floodway to utilize nutrients and trap sediments; and
-- the loss or degradation of wildlife habitat by alteration of hydroperiod and species composition of the floodplain.

These losses are ultimately realized in degradation of water quality in the receiving body. Perturbed floodways within agricultural basins contribute to nutrient loading from unassimilated agrichemicals and animal waste. Urbanized floodways such as Phillippi Creek additionally contribute oils and greases, as well as heavy metals, from highway runoff.

Water quality improvements in the contributing areas as well as the receiving bodies could be realized by redirecting floodwaters from the existing channel into the adjacent historic floodplain and re-creating marshes along the margins of channelized floodways, especially in highly urbanized situations. Where structures such as seawalls are present, marshes could be created waterward of such structures. This scenario may be particularly useful when created at the outfall from stormwater pipes. Evaluation on a case-by-case situation is necessary in order to realize success. In some instances, these treatments are not physically feasible, while in others, the marsh may need to be perched above the existing channel bottom elevation within a range of elevation where the marsh plants can be expected to survive. Energy dissipators or baffles may be needed to reduce water velocity at the outfall pipe.

Small scale improvement of existing habitats could be realized by posting cautionary signs in seagrass shoal areas where chronic propeller damage is a problem. Instructive signs describing the importance of seagrass habitat could be posted at all boat launching facilities and marinas. Examples of this type of signage are now posted at all public launching sites.

A further recommendation would be the placement of small dissipation breakwaters on the flood tide delta at New Pass, to reduce current velocities and promote natural recolonization by seagrasses on the flat. The wavebreaks could incorporate mangrove planting as a portion of the structure. Obviously, techniques of this type require at least modular analysis prior to implementation, as do many of the recommendations presented here.

SUMMARY

The intent of this document is to provide a database from which a comprehensive County-wide preservation and restoration plan can be developed. Continued analysis of trends in coastal marine habitats should be an important element of County policy and will provide continuing data for critical management decisions.

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