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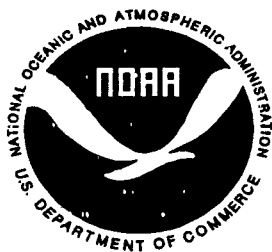
**National Marine Fisheries Service
Habitat Conservation Efforts
Related to
Federal Regulatory Programs
in the Southeastern United States**

by:

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May 1990



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Abstract

The U.S. Army Corps of Engineers (COE) in the southeastern region of the United States regulates development activities affecting thousands of acres of wetlands every year. Although significant, the amount, type, and geographical distribution of affected habitats and even the exact number of individual projects were largely unknown. In 1981, the National Marine Fisheries Service (NMFS) Habitat Conservation Division's Southeast Region initiated a computerized database to track projects that would alter wetlands. During 1989 the NMFS reviewed 3,683 projects and has detailed information on proposed habitat losses for 763 of these projects. Overall, alteration of more than 27,354 wetland acres was proposed. The NMFS recommended conservation of 15,745 acres and 7,451 acres of mitigation. The COE, in 1989, accepted NMFS habitat conservation recommendations on about 78 percent of the projects reviewed. Recommendations were partially accepted or rejected on 4 percent and 11 percent, respectively.

The database now contains information on 39,050 projects reviewed between 1981 and 1989. In a subsample of 9,148 of these projects, alteration of roughly 683,731 acres of wetlands was proposed. Of this amount, implementation of NMFS recommendations would have conserved at least 371,366 acres. Mitigation amounting to 176,536 acres also was recommended. However, a survey of 2,009 permits issued by the COE between 1981 and 1989 reveals that the COE accepted NMFS comments on 61 percent of these permits. Recommendations were partially accepted or rejected on 18 percent and 21 percent of the issued permits, respectively. The COE issued permits allowing 44 percent more habitat alteration than recommended by the NMFS.

Introduction

The U.S. Army Corps of Engineers (COE), under authority of the River and Harbor Act of 1899 and the Clean Water Act, regulates wetland alteration activities in waters of the United States. In this capacity, thousands of requests to alter wetlands are processed annually in the southeastern region of the United States alone. The National Marine Fisheries Service (NMFS) provides recommendations to the COE that are designed to minimize project effects on marine, estuarine, and anadromous fishery resources. Because the amount, type, and geographical distribution of the habitat to be altered were generally unknown, the NMFS, Southeast Region, developed a method in 1980 to compile such information. The effectiveness of the NMFS recommendations also was examined. The information is used to determine cumulative loss of habitat and measures needed to avoid or minimize harm to fisheries production. The effectiveness of the NMFS' habitat program also can be monitored and modifications can be made to the program as needed.

Because of the large amount of data collected and analyzed, a computerized system was developed. This allows efficient data collection, storage, and retrieval. Details are provided in Lindall and Thayer (1982), Mager and Thayer (1986), and Mager (in press). For each project reviewed, information is recorded on project identification; location by state, county, and major and secondary waterbody; and dates such as the public notice date and when NMFS responded. Data also can be retrieved according to activity type (e.g., permit application, unauthorized activity, federal project); project type (e.g., bulkhead, dock, maintenance dredging, navigation channel, marsh management, power plant, housing development, etc.); and NMFS action (e.g., objected, recommended modification, or approved the activity).

Tracking includes impact according to wetland acres potentially affected by a given activity. The acreage values are obtained from onsite reviews by NMFS contractors or NMFS biologists, from public notices, and from project plans when adequate to determine the acreage and habitat types proposed for alteration. The NMFS tracks individual actions by the amount of potential impact (i.e., dredge, fill, drain, impound); the amount of habitat modification the NMFS accepts or does not object to; the amount of habitat potentially conserved; and the amount of habitat mitigation.

The NMFS also surveys permits issued by the COE. Projects are examined for which NMFS (1) has been notified by the COE that a permit has been issued; (2) has accurate information on the size and type of wetlands requested for alteration; and (3) can determine the size of alteration that the COE actually permits. Also recorded are COE acceptance, partial acceptance, or rejection of NMFS recommendations.

The analysis of the 1989 database is presented and builds on earlier reports (Lindall and Thayer 1982, Mager and Thayer 1986, Mager 1987, Mager and Keppner 1987, Mager and Hardy 1988, Mager and Ruebsamen 1988, and Mager in press). Also presented are nine years of data for projects under federal purview that propose habitat alteration. The degree to which the COE included NMFS habitat conservation recommendations in their permit actions also is presented for 1989 and the eight preceding years.

Results

1989 Analysis

The NMFS reviewed 3,683 projects during 1989 for authorization to alter wetlands (Table 1). Detailed information was obtained from onsite inspections on 763 of these projects for which acreage determinations are possible. These comprise 21 percent of all the projects reviewed during 1989. The COE's regulatory programs under Section 10 of the River and Harbor Act and Section 404 of the Clean Water Act accounted for 3,135 projects or 85 percent of our workload. The NMFS also reviewed 461 unauthorized projects, 57 COE federal projects, and 28 bridge permits under Coast Guard Authority (Table 2). About 79 percent (21,588 acres) of the habitat alterations, including unauthorized projects, proposed during 1989 came under the COE's regulatory program. Federal projects amounted to 5,576 wetland acres or about 20 percent of the total.

Table 1 - Total Projects Reviewed During 1989

State	N1	N2	N3
North Carolina	320	202	63
South Carolina	279	110	39
Georgia	159	58	36
Florida	1,283	230	18
Alabama	127	14	11
Mississippi	93	10	11
Louisiana	724	90	12
Texas	457	44	10
Puerto Rico	228	4	2
U.S. Virgin Islands	13	1	8
Total	3,683	763	21

N1 - Total projects reviewed, N2 - Projects where acreage data is available, N3 - Percent of total projects with acreage data.

Table 2 - Acres of Habitat Proposed by Applicants and Reviewed by NMFS Under the Various Federal Regulatory Programs

Project Kind	Acres		Acres Proposed by Applicants	Acres Accepted by NMFS	Potential Acres Conserved	Mitigation
	N1	N2				
10	1,361	116	2,514.2	938.4	1,575.8	721.2
10/404	1,191	426	14,830.0	3,754.1	11,075.9	2,517.0
404	583	115	845.3	201.2	644.1	118.3
CFP	57	21	5,576.1	3,415.6	2,160.5	785.2
CG	28	4	1.2	1.1	0.1	1.1
I10	92	3	1.4	1.1	0.3	0.0
I10/404	129	38	3,338.7	3,296.1	42.6	3,303.4
I404	240	39	58.2	2.0	56.2	5.0
PRE	2	1	189.3	0.0	189.3	0.0
Total	3,683	763	27,354.4	11,609.6	15,744.8	7,451.2

N1 - Total projects reviewed in this category, N2 - Number of projects where acreage values could be determined.

10 = projects requested pursuant to Section 10 of the River and Harbor Act; 404 = projects requested pursuant to the Clean Water Act; 10/404 = projects advertised under Section 10 and 404 authorities; CFP = Corps Federal Project; CG = U.S. Coast Guard bridge/causeway permit application; I10, I404, and I10/404 = unauthorized projects; PRE = preapplication consultations.

About 27,355 wetland acres were proposed for alteration by the 763 projects where detailed acreage values exist. Dredging was sought in 4,269 of the total and 4,825 acres were proposed to be filled. Another 18,260 acres were proposed to be impounded (Table 3). The NMFS recommended conserving 15,745 acres and that 7,451 acres of mitigation be provided. About 86 percent of the area proposed for alteration in 1989 was in the Gulf of Mexico (23,502 acres). The bulk of this acreage (22,036 acres) was in Louisiana and involved only 90 projects. In the South Atlantic and Caribbean areas 3,853 acres of wetlands were proposed for alteration. About 61 percent of this amount was in North Carolina.

Table 3 - NMFS 1989 Habitat Conservation Efforts by State

State	N	Acreage Proposed by Applicant			Acreage Accepted by NMFS			Potential Acreage Conserved			Mitigation Acres
		Dredge	Fill	Other	Dredge	Fill	Other	Dredge	Fill	Other	
AL	14	10.9	3.3	0.1	7.1	2.9	0.1	3.8	0.4	0.0	0.0
FL	230	89.5	689.8	2.7	63.7	260.6	2.0	25.8	429.2	0.7	127.1
GA	58	165.8	167.3	11.1	116.7	85.3	0.1	49.1	82.0	11.0	79.9
LA	90	1,046.7	2,965.4	18,023.6	446.2	1,144.4	5,998.4	600.5	1,821.0	12,025.2	6,860.2
MS	10	614.5	179.6	0.1	614.5	179.5	0.1	0.0	0.1	0.0	178.0
NC	202	2,165.6	372.6	41.7	2,078.7	285.0	0.0	86.9	87.6	41.7	99.9
PR	4	0.0	161.4	0.0	0.0	4.5	0.0	0.0	156.9	0.0	4.5
SC	110	126.8	193.1	115.0	117.8	140.7	0.0	9.0	52.4	115.0	37.7
TX	44	35.9	86.1	66.1	29.9	10.8	20.6	6.0	75.3	45.5	63.9
VI	1	13.1	6.6	0.0	0.0	0.0	0.0	13.1	6.6	0.0	0.0
Total	763	4,268.8	4,825.2	18,260.4	3,474.6	2,113.7	6,021.3	794.2	2,711.5	12,239.1	7,451.2

N - Represents number of projects where acreage could be determined.

Marsh management projects, impoundments, and maintenance dredging amounted to 88 percent (24,019 acres) of the wetlands proposed for alteration (Table 4). Residential development, oil and gas exploration, beach nourishment, industrial development, navigation projects and marinas, bridges and causeways, bulkheads and other minor shoreline perturbations, and mining accounted for an additional 3,222 acres of proposed alterations. The NMFS did not object to construction in about 11,607 acres of wetlands. However, 89 percent of this area was involved in marsh management, impoundments, maintenance dredging, and beach nourishment. Accepted marsh management proposals generally provided for marine fish access and impoundments were mostly in freshwater areas where NMFS has limited authority. The maintenance dredging and the beach nourishment projects were determined to have only short-term adverse effects. Impacts to the remaining 1,243 acres of altered wetlands would be offset through mitigation involving 7,451 wetland acres. The success of mitigation actions such as marsh creation is highly variable and total viable mitigation is unknown.

The wetlands involved were classified using 23 vegetation or substrate types (Table 5) and according to the Cowardin et al. (1979) wetland classification system (Table 6). Most alterations were proposed in freshwater marshes (8,336 acres), unconsolidated water bottoms (8,007 acres) and salt marshes of various types (7,748 acres). Development in significant amounts of hardwood swamp (2,891 acres), mangroves (274 acres) and submerged vegetation (100 acres) also was proposed.

Table 4 - Acres of Habitat Alterations Requested by Type of Projects Reviewed During 1989

Project Type	N1	N2	Proposed By Applicants	Accepted By NMFS	Potentially Conserved	Mitigation
BA	154	20	6,852.0	3,278.3	3,573.7	3,274.2
BE	30	15	599.5	435.7	163.8	0.3
BR	216	74	193.3	121.8	71.5	126.2
DO	722	19	1.3	0.6	0.7	0.0
HO	520	161	638.5	112.9	525.6	69.6
IN	192	53	533.7	291.5	242.2	256.5
IR	52	14	41.4	37.2	4.2	80.2
MD	371	83	5,291.2	3,539.0	1,752.2	813.3
MI	67	3	116.6	4.6	112.0	1.0
MM	20	6	11,875.7	3,113.5	8,762.2	2,577.1
NA	172	81	382.7	311.7	71.0	42.2
CI	203	35	625.4	279.3	346.1	147.3
OT	146	13	27.5	3.3	24.2	7.3
PI	167	19	40.2	35.8	4.4	51.2
SH	632	166	131.1	44.4	86.7	4.8
TR	19	1	4.3	0.0	4.3	0.0
Total	3,683	763	27,354.4	11,609.6	15,744.8	7,451.2

BA = barriers and impoundments; BE = beach nourishment projects; BR = bridges, roads, and causeways; DO = docks and other minor structures; HO = housing developments; IN = commercial and industrial developments; etc.; IR = irrigation and drainage works; MD = maintenance dredging; MI = mining and mineral exploration; MM = marsh management areas; NA = navigation projects, marinas, etc.; OI = oil and gas construction; OT = unclassified; PI = oil, gas, and chemical pipelines; SH = bulkheads, small fills, groins, etc.; TR = transmission lines.

N1 - Total number of projects reviewed.

N2 - Number of projects where acreage could be determined.

Table 5 - Acres of Habitat Alterations Proposed in 1989 by Habitat Type

Dominant Habitat	Proposed For Alteration	Accepted By NMFS	Potentially Conserved	Mitigation
Algae	3.4	0.2	3.2	0.3
Eelgrass	0.9	0.0	0.9	0.0
Shoalgrass	78.5	19.6	58.9	38.5
Manateegrass	0.1	0.0	0.1	0.0
Turtlegrass	7.8	0.3	7.5	0.0
Widgeongrass	8.6	3.9	4.7	0.0
Black Mangrove	111.9	1.1	110.8	2.3
Red Mangrove	34.1	2.8	31.3	9.9
White Mangrove	127.6	7.0	120.6	2.4
Black Needlerush	50.4	40.6	9.8	38.4
Saltgrass	8.7	2.6	6.1	6.2
Smooth Cordgrass	2,176.2	40.6	2,135.6	81.2
Saltmeadow Cordgrass	3,530.6	770.0	2,760.6	1,613.3
Threesquare	0.1	0.0	0.1	0.0
Hardwood Swamp	2,891.1	2,337.5	553.6	1,799.0
Fresh Marsh	8,320.4	1,014.0	7,306.4	995.4
Miscellaneous	0.8	0.1	0.7	6.3
Other Marsh	1,981.0	1,898.1	82.9	1,898.0
Oysters	0.3	0.3	0.0	0.5
Unvegetated Wetlands	8,021.9	5,470.9	2,551.0	959.5
Total	27,354.4	11,609.6	15,744.8	7,451.2

Acreages are based on a sample of 763 projects.

**Table 6 - Acres of Habitat Proposed for Alteration
According to the Cowardin et al. (1979) Wetlands Classification System**

Classification	Proposed by Applicant	Accepted by NMFS	Potentially Conserved	Mitigation Area
E 1 AB	80.6	5.9	74.7	2.3
E 1 EM	0.3	0.0	0.3	0.0
E 1 UB	5,321.4	3,508.7	1,812.7	946.4
E 2 AB	0.6	0.0	0.6	0.0
E 2 US	742.2	88.4	653.8	3.1
E 2 EM	15,869.2	3,697.3	12,171.9	4,584.3
E 2 FO	288.2	18.2	270.0	20.2
E 2 RF	0.3	0.3	0.0	0.5
E 2 SB	0.6	0.4	0.2	0.0
E 2 SS	0.0	5.0	-5.0	5.0
E 2 UB	4.1	2.4	1.7	0.1
M 1 AB	18.2	18.2	0.0	36.5
M 1 UB	503.3	490.4	12.9	0.0
M 2 US	352.5	352.5	0.0	0.0
P FO	1.2	0.0	1.2	0.0
P AB	15.3	15.3	0.0	15.5
P EM	77.4	62.0	15.4	43.4
P US	0.7	0.0	0.7	0.0
P FO	2,864.4	2,330.3	534.1	1,773.2
P SS	12.2	1.2	11.0	20.2
P UB	0.9	0.9	0.0	0.0
L 2 UB	1.4	1.4	0.0	0.0
R 1 EM	120.5	1.5	119.0	0.0
R 1 UB	985.2	962.2	23.0	0.0
R 2 UB	19.3	7.7	11.6	0.0
R 3 UB	74.4	39.4	35.0	0.5
Total	27,354.4	11,609.6	15,744.8	7,451.2

E1 = estuarine subtidal; E2 = estuarine intertidal; L2 = lacustrine subtidal; M1 = marine subtidal; M2 = marine intertidal; P = palustrine; R1 = riverine tidal; R2 = riverine lower perennial; R3 = riverine upper perennial; AB = aquatic bed; EM = emergent; FO = forested; RF = reef; SB = stream bed; SS = scrub shrub; UB = unconsolidated bottom; US = unconsolidated shoreline.

The data indicate that if all NMFS recommendations had been implemented during 1989, conservation of 15,745 wetland acres and mitigation of 7,457 acres of wetlands would have occurred. Since the final disposition of a permit or federal project lies with the COE, The data indicate that if all NMFS recommendations had been implemented during 1989, conservation of 15,745 wetland acres and mitigation of 7,457 acres of wetlands would have occurred. Since the final disposition of a permit or federal project lies with the COE, recommendations of environmental agencies may not be followed. For this reason, and to test NMFS effectiveness, the database also records the extent that NMFS recommendations were implemented by the various COE districts (Table 7). This followup on 350 issued permits reveals that the COE implemented NMFS recommendations on about 83 percent of the permit applications examined. Recommendations were partially accepted or rejected on 5 percent and 12 percent, respectively.

Table 7 - Treatment of NMFS Recommendations on Permits Issued During 1989

COE District	N	NMFS Recommendations Accepted		NMFS Recommendations Partially Accepted		NMFS Recommendations Rejected	
			(%)		(%)		(%)
Charleston	55	49	(89.1)	2	(3.6)	4	(7.3)
Galveston	21	13	(61.9)	2	(9.5)	6	(28.6)
Jacksonville	32	15	(46.9)	5	(15.6)	12	(37.5)
Mobile	12	12	(100.0)	0	(0.0)	0	(0.0)
New Orleans	38	19	(50.0)	6	(15.8)	13	(34.2)
Savannah	30	23	(76.7)	1	(3.3)	6	(20.0)
Wilmington	162	161	(99.4)	0	(0.0)	1	(0.6)
Total	350	292	(83.1)	16	(4.6)	42	(12.3)

N refers to number of permits sampled.
Numbers in parentheses refer to percent of N.

The greatest acceptance of NMFS recommendations was by the Mobile, Wilmington, Charleston, and Savannah Districts. Rejection of recommendations was highest among the Galveston, New Orleans, and Jacksonville Districts. Of the 350 permits tracked, alteration of 323,920 wetland acres, or more than 99 percent of the 324,487 acres proposed for alteration by applicants were authorized (Table 8). Most of this acreage occurred in the New Orleans District and involved several applications from a single landowner for over 317,814 acres of marsh management.

Table 8 - Acres of Habitat Permitted for Alteration Over NMFS Objections During 1989

COE District	N	Proposed by Applicants		Accepted by NMFS		Permitted by COE	Percent Difference	NMFS Recommended Mitigation	COE Permitted Mitigation
			(%)		(%)				
Charleston	55	175.6	124.0	(70.6)	125.6	(71.5)	(0.8)	5.2	1.0
Galveston	21	136.0	70.9	(52.1)	89.1	(65.5)	(13.4)	15.9	18.9
Jacksonville	32	61.8	16.5	(26.7)	40.0	(64.7)	(38.0)	47.5	48.6
Mobile	12	11.6	11.4	(98.2)	11.4	(98.2)	(0.0)	1.6	1.7
New Orleans	38	323,791.2	169,497.2	(52.3)	323,370.8	(99.9)	(47.6)	1,076.7	1,058.2
Savannah	30	116.8	89.0	(76.2)	112.4	(96.2)	(20.0)	53.3	36.2
Wilmington	162	194.0	170.4	(87.8)	170.7	(88.0)	(0.2)	8.7	9.5
Total	350	324,487.0	169,979.4	(52.4)	323,920.0	(99.8)	(47.4)	1,208.9	1,174.1

N refers to number of permits sampled.
Numbers in parentheses refer to percent of the acreage proposed.
Percent difference column is percent habitat alterations accepted by NMFS subtracted from the percent permitted by the COE.

Long-Term Analysis

Since 1981 the NMFS has reviewed 39,050 projects (Fig. 1) and has detailed information on 9,148 projects (Table 9). These projects, for which we have detailed information, call for the alteration of 683,731 acres of wetlands. Mitigation of 176,536 acres involving creation of wetlands or enhancement of existing wetlands also was sought. If implemented, NMFS recommendations would have allowed 312,366 acres of alteration and potentially conserved 371,366 wetland acres. Most accepted alteration, including that for 1989, was for marsh management, maintenance dredging, and beach nourishment. Based on the nature of the work, the proposed mitigation, if successful, would exceed anticipated losses with regard to acreage considerations. Accordingly, the mitigation area would more than have compensated for the losses accepted by the NMFS, assuming it is successful.

Projects Reviewed Between 1981-1989

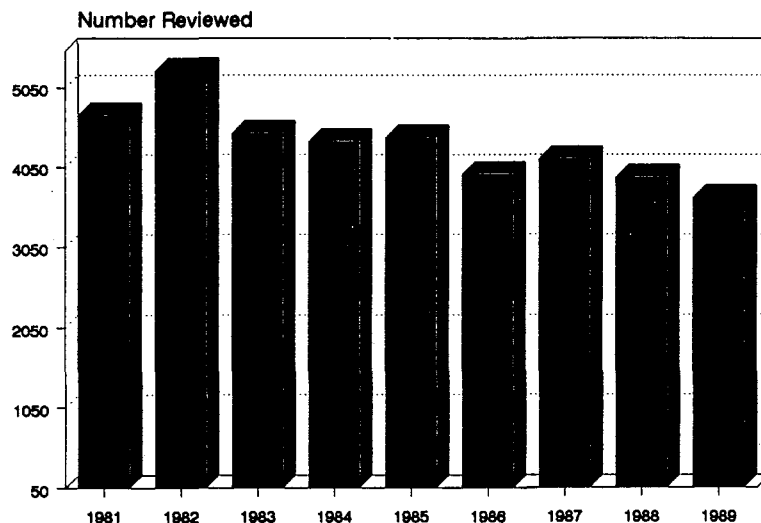


Figure 1

Table 9 - NMFS Habitat Conservation Efforts From 1981 to 1989

	N	Acres Proposed by Applicants	Acres Accepted by NMFS	Acres Potentially Conserved	Acres Mitigated
1981	811	7,949	2,868	5,081	2,471
1982	1,059	81,184	21,831	59,353	7,910
1983	825	20,778	8,658	12,120	26,775
1984	888	8,606	3,981	4,625	54,050
1985	1,802	65,670	11,161	54,509	19,200
1986	969	90,559	70,838	19,721	49,713
1987	1,054	21,755	8,135	13,620	7,139
1988	977	359,876	173,284	186,592	1,827
1989	763	27,354	11,610	15,745	7,451
Total	9,148	683,731	312,366	371,366	176,536

N refers to the number of projects sampled.

Since 1981 the total number of projects reviewed by the NMFS has decreased from a high of 5,269 in 1982 to a low of 3,683 in 1989. This decline is attributable to a greater number of projects being authorized under Nationwide and General Permits. Each year, the COE processes about 75,000 Nationwide and 21,000 General Permits Nationwide. While specific information was unavailable on the overall number of projects authorized and their cumulative effect, it is believed to be significant in the Southeast.

A survey of 2,009 permits issued between 1981 and 1989 reveals that NMFS recommendations were accepted on 61 percent, partially accepted on 18 percent, and rejected on 21 percent of the permits issued (Table 10). By comparison, the Wilmington District accepted NMFS recommendations on 94 percent of the projects reviewed versus only 23 percent by the Jacksonville District. The projects recorded sought the alteration of 362,638 acres of wetlands and the COE authorized the alteration of 346,705 acres (Table 11). The Wilmington District authorized only 2 percent more wetland alterations than recommended by NMFS. This is followed by the Savannah District (12 percent); Galveston District (17 percent); Charleston District (28 percent); Mobile District (38 percent); Jacksonville District (41 percent); and New Orleans District (45 percent).

Table 10 - Treatment of NMFS Recommendations on Permits Issued Between 1981 and 1989

COE District	N	NMFS Recommendations		NMFS Recommendations		NMFS Recommendations	
		Accepted	(%)	Partially Accepted	(%)	Rejected	(%)
Charleston	277	232	(84)	15	(5)	30	(11)
Galveston	302	190	(63)	77	(25)	35	(12)
Jacksonville	501	114	(23)	127	(25)	260	(52)
Mobile	113	61	(54)	26	(23)	26	(23)
New Orleans	259	108	(42)	112	(43)	38	(15)
Savannah	79	64	(81)	2	(2)	13	(17)
Wilmington	478	450	(94)	13	(3)	15	(3)
Total	2,009	1,219	(61)	372	(18)	417	(21)

N refers to number of permits sampled.
Numbers in parentheses refer to percent of N.

Table 11 - Acres of Habitat Permitted for Alteration Over NMFS Objections Between 1981 and 1989

COE District	N	Proposed By Applicants	Accepted By NMFS		Permitted By COE		Percent Difference
			(%)	(%)	(%)	(%)	
Wilmington	478	1,086	328	(30)	351	(32)	(2)
Savannah	79	584	139	(24)	208	(36)	(12)
Galveston	302	10,483	1,394	(13)	3,101	(30)	(17)
Charleston	277	3,956	236	(6)	1,341	(34)	(28)
Mobile	113	840	158	(19)	481	(57)	(38)
Jacksonville	501	2,402	827	(34)	1,797	(75)	(41)
New Orleans	259	343,287	184,457	(54)	339,426	(99)	(45)
Total	2,009	362,638	187,539	(52)	346,705	(96)	(44)

N refers to the number of projects sampled.
Percent Difference is the percent of alterations accepted subtracted from the percent permitted.
Numbers in parentheses refer to percent of the acreage proposed.

The NMFS has four field offices which cover several COE districts as follows: the Beaufort, North Carolina field office covers the Wilmington, Charleston, and Savannah districts; the Panama City, Florida office covers the Jacksonville and Mobile districts; and the Baton Rouge, Louisiana office covers the New Orleans district. Tabulation does not include the infrequent review of permit applications issued by the Vicksburg or Fort Worth Districts. Since the success of having NMFS' recommendations incorporated into issued permits ranged widely among COE districts, an analysis was made of 15,923 permit applications to determine if NMFS' recommendations also varied by field office. While the number of projects reviewed varied by COE district, NMFS treatment (e.g., the level or significance of advice provided to the COE) as percent of the total reviewed, was relatively consistent between the field offices (Figure 2).

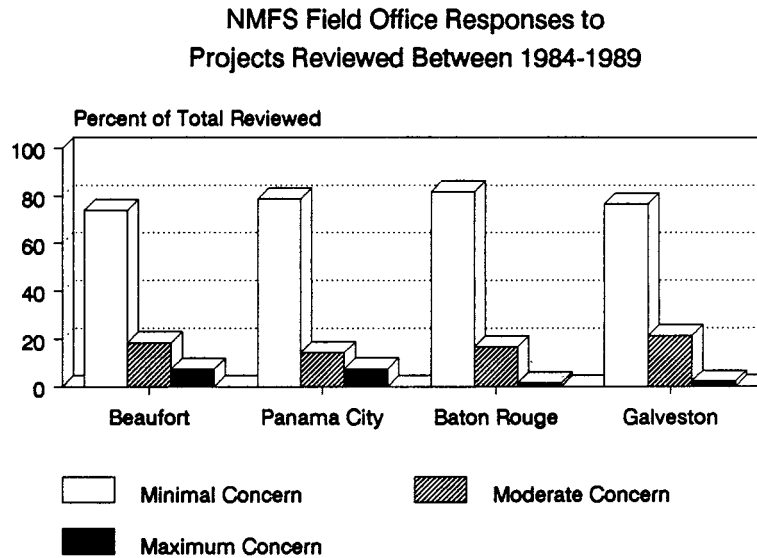


Figure 2

On average, the NMFS did not object to about 80 percent of all projects reviewed and recommended major project modifications or denial of a permit application less than 5 percent of the time. However, treatment of NMFS recommendations by the COE varies considerably among districts. Since the NMFS recommendations were generally considered favorably by most COE districts, lack of favorable consideration by the rest appears to result from inconsistencies in public interest reviews rather than significant variation in NMFS field office recommendations. This verifies similar trends report in Mager (1987). A key factor may be that some COE districts do not give fish and wildlife protection, as well as other wetland functions, adequate consideration in their public interest determinations.

Conclusions

From the data presented, it is evident that the Corps' Regulatory Program is a significant factor in the Nation's efforts to conserve wetlands. The effects of the program, however, are poorly documented and NMFS data provide only a small part of the picture. There is virtually no follow up once a permit is issued and the ultimate fate of thousands of acres of wetlands is unknown. This situation is particularly troublesome where mitigation is needed to offset significant wetlands losses. Many of the mitigation strategies have poor success rates due to a lack of adequate planning, monitoring, and enforcement (Race and Christie 1982, Race 1985, Thayer et al. 1985, Steinhart 1987). This weakness in the current permitting system requires reevaluation and correction. At the minimum, monitoring of permitted mitigation should be required as well as a plan for remedial action for unsuccessful mitigation. It must further be realized that post-authorization monitoring would be a long-term effort if attaining the functional equivalency of the lost wetland values is to be assured.

It is apparent that considerable variation exists among COE Districts in the way NMFS recommendations are treated. This highlights an area where varied interpretations of COE guidelines at the District level can directly and adversely affect important public trust resources. If the current Administration's goal of no-net-loss of wetlands is to be achieved, it is evident that the recommendations of the resource agencies must be implemented more fully.

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