

Wetland Mitigation under the Clean Water Act in the Houston-Galveston Region

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The wetland permit process required by the Clean Water Act (CWA) does not appear to be adequately protecting the water quality and wetland resources affected by development in the Houston area, based on a thorough review of a rigorously selected sample of permits maintained by the U.S. Army Corps of Engineers Galveston District office.

Since 1990, development has filled in or destroyed thousands of wetland acres in the eight-county Houston-Galveston area. According to the wetland regulatory program under the Clean Water Act, the loss of jurisdictional wetland acreage must be offset by the gain of an adequate number of wetland “mitigation” acres to replace lost functions and values.

However, recently completed research (Gonzalez et al 2014) found that many actions permitted by the U.S. Army Corps of Engineers (USACE) contain little or no evidence that the mitigation had been completed as required by the Clean Water Act. Our study found that less than half of the sampled permit records that required compensatory mitigation contained documentation that mitigation had been completed. Worse, 66 percent of these incompletely documented permits had no record of any mitigation activity.

Sampled permits with incomplete documentation of mitigation account for a shortfall of 1,070 acres of required wetland compensatory mitigation in the greater Houston region.



San Jacinto Monument marsh, Houston, TX. Source: Yinan Chen, public domain, via Wikimedia Commons

The study gauged the effectiveness of the wetland permit process through *documented* permit compliance—whether or not the conditions of the permit were *documented* as having been met. The study included no on-the-ground assessment as to whether the mitigation had been completed¹, nor did it assess the relative success or failure of the mitigation projects.

Given the lack of documentation for completed mitigation requirements in the USACE administrative records, neither the public nor resource managers should be overly confident

¹ A very basic analysis of aerial photography in Google Earth was performed to assess the existence of impacts, and to a lesser degree, mitigation.

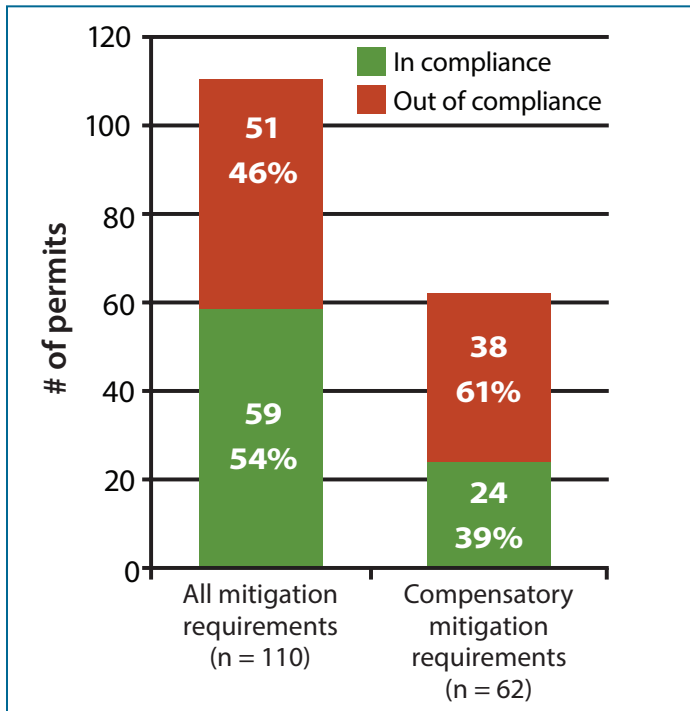


Figure 1. Overall mitigation compliance documented for a sample of 110 permits in Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties, TX.

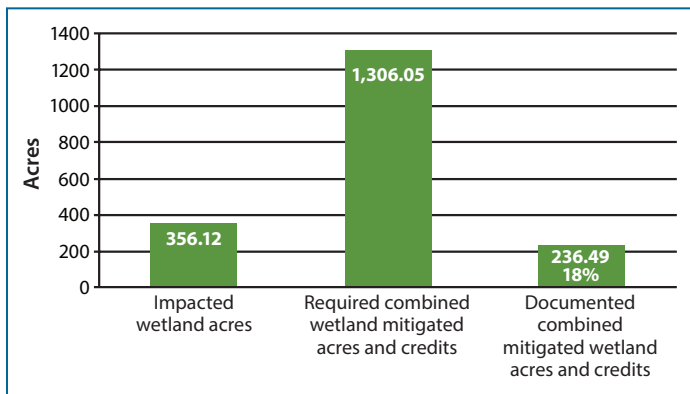


Figure 2. Sample permits requiring compensatory mitigation, by acreage of impacts, required mitigation acreage, and documented mitigation acreage.

Table 1: Statistical values for Figure 2

Value	Impacted wetland Acres	Required mitigated acres	Documented mitigated acres
Sum (n=62)	356.12	1306.05	236.49
Mean value	5.74	21.07	3.81
Median value	1.03	1.60	NA
Maximum value	117.80	642.00	101.00
Minimum value	0.00	0.00	0.00
Mitigation to impact ratio	--	3.7 to 1	0.7 to 1

that wetland resources are being protected as envisioned in Section 404 of the Clean Water Act.

Federal requirements

For all but very minor damage, the fill or destruction of wetlands is regulated under the Clean Water Act Section 404 wetland program and requires a permit from the U.S. Army Corps of Engineers. In many cases, the destruction of those wetlands must be offset through a process known as *mitigation*.

Mitigation requires first *avoidance* of existing wetlands and then *minimization* of damage if avoidance is not possible. When developers cannot avoid or sufficiently minimize damage, the act requires *compensatory* mitigation.

Compensatory mitigation replaces the ecological functions and values that are lost when wetlands are filled. The final USACE permit for wetland fill specifies the types and details of any compensatory mitigation required. Mitigation is what makes possible the national wetland policy of “no net loss.”

Compliance in the Houston metro area

To assess whether the USACE Galveston District is achieving “no net loss,” the study reviewed a random sample of 110 complete² administrative permit records from the 7,052 permits issued from 1990 to 2012 in Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties³.

The review found that 51 of 110 permits (46 percent) were out of compliance, in terms of documentation, with regards to some form of mitigation, whether avoidance, minimization, and/or compensation. Of the 62 permits requiring compensatory mitigation, 38 (61 percent) were out of compliance with compensatory mitigation requirements. One permit was in compliance with compensatory requirements but out of compliance with avoidance requirements (Fig. 1).

Most of the compliance problems entailed missing monitoring reports or other required documentation. It is unclear whether the lack of documentation in the permit adminis-

²“Complete” in terms of what was delivered by the USACE in response to Freedom of Information Act requests for the selected permits. We sampled 123 permits but determined that no actual work or impacts were associated with 13 of these permits. Note: Permits issued post-ORM II record management system may have multiple actions that may have been considered separate permits pre-ORM II implementation. For post-ORM II permits, the construction status of the most recent action is recorded. For the two permits in this category (neither of which actions required compensatory mitigation), a no work status was recorded even though work did occur on a prior action. In these cases, wetland impacts totaling 0.003 acre and open-water impacts totaling about 0.017 acre are not included in the total wetland and open-water impacts.

³All permits except duplicated modifications and offshore permits.

trative records is synonymous with ineffective or non-existing mitigation, or merely reflective of deficient record keeping in documenting permit requirements⁴.

Based on what the USACE Galveston District office released in response to Freedom of Information Act requests, the study found that 62 of the 110 permit samples required compensatory mitigation, representing work that filled 356.12 acres of wetlands. Those 62 permits required a total of 1,306.05 acres of mitigation, including permittee-responsible mitigation as well as mitigation bank credits.

Mitigation banks are larger areas that can be professionally managed and that are presumably easier for managers to document accountability. Permits not requiring compensatory mitigation contributed minimally to total wetland impacts.

Documented mitigation for the 62 permits requiring compensatory mitigation totaled 236.49 acres (including mitigation bank credits), or 18 percent of the requirement. What should have been a nearly 4:1 mitigation to impact ratio appears to have been a 0.7:1 ratio, far short of a “no net loss” (Fig. 2 and Table 1).

Of the 38 permits that were out of compliance with their compensatory mitigation requirements, three degrees of record completeness were delineated:

- *No evidence*: The permit record lacked any evidence that compensatory mitigation ever commenced (25 permits).
- *Weak evidence*: Records showed some evidence that the mitigation construction began, but little to no evidence that it was completed or monitored (seven permits).
- *Likely complete evidence*: The records indicated that mitigation was completed and monitoring had begun, but not all the required documents were on file in the administrative record (six permits).

Only the mitigation acres for *Likely complete evidence* were included in the documented mitigation totals. However, it should be noted that two permits had joint permittee responsible mitigation and utilization of a mitigation bank. For two

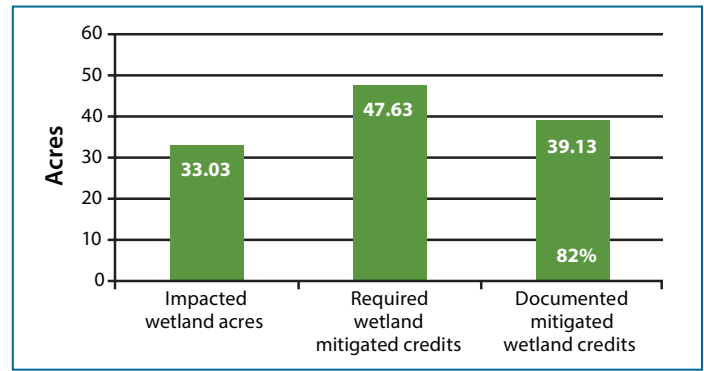


Figure 3. Permits exclusively using mitigation banks for compensatory mitigation.

of the weak-evidence permits, documented mitigation from the mitigation bank aspect of compensatory mitigation was included in documented mitigation totals.

Mitigation bank compliance

The USACE is trying to guide most new mitigation into mitigation banks. In the permit sample, 10 projects used mitigation banks for all of their compensatory mitigation. Permits using multiple types of compensatory mitigation that also included a mitigation bank as a component of mitigation were not included in the totals listed below.

Three of the 10 permits (30 percent) did not comply because they lacked evidence that the credits were ever purchased. These 10 permits accounted for 33.03 acres of wetland impacts and required the purchase of 47.63 credits from area mitigation banks, for a 1.44:1 mitigation-to-impact ratio (Figure 3).

⁴ We selected six of the delinquent permits and made inquiries directly with the permittees or their agents. Several of the permittees assured us that mitigation was indeed complete, but this could not be verified in most cases. For one project in a state park, we had personal knowledge that the mitigation had in fact been carried out, even though the USACE permit record was lacking documentation for the mitigation. It is thus possible that the overall required mitigation actually carried out on the ground may be somewhat better than what was documented in the study.

Table 2. Permits requiring compensatory mitigation by impact acreage amount

Impact (X) acreage category	Number of permits	Impacted wetland acreage	Required wetland mitigation acres and credits	Documented wetland mitigation acres and credits	Percent of required mitigation acreage documented per category
50ac>x	2	185.17	940.59	4.59	0.5%
50ac>x>10ac	3	66.73	145.20	132.70	91.4%
10ac>x>1ac	27	96.79	170.56	87.30	51.2%
1ac>x>0.1ac	16	7.12	38.48	2.79	7.2%
0.1>x	14	0.33	11.23	9.12	81.2%
Total	62	356.12	1,306.05	236.49	18.1%

This lower 1.44:1 required ratio versus the higher 4:1 required ratio for the total permit sample likely reflects the USACE’s much greater confidence in the success rate of mitigation banks. In addition, one mitigation bank credit theoretically encompasses some kind of functional equivalence beyond simple acreage. However, no long-term, independent studies in this area have verified that banks improve mitigation success (Kihslinger, 2008).

The documented mitigation acreage for the 10 permits exclusively using mitigation banks was 39.13 acres, or 82 percent of what was required—far above the 18 percent rate associated with the overall sample (Figs. 2 and 3). This is a 1.2 to 1 documented mitigation credit-to-wetland impact ratio. Note: *This number reflects the completeness of the documented mitigation requirements for the reviewed permits, not the quality of mitigation at the mitigation site itself.*

Size of project impacts

Almost half of all permits reviewed accounted for less than 1 acre of wetland impact per permit. Just over a fifth of all permits affected less than 1/10 of an acre of wetlands per permit.

The analysis of the total impact acreage (Table 2) revealed that a few large permits accounted for the vast majority of the impact acreage of our sample. The top five permits made up 71 percent of the total impacted acreage in our permit sample, and the mitigation requirement for these projects accounted for 83 percent of all required mitigation in the overall sample (Table 3).

Two of the five permits accounted for 88 percent, or 936 acres, of the 1,070 documented mitigation acreage shortfall. The permit with the largest impact accounted for 60 percent of the shortfall (Tables 2 and 3).

Internal USACE assessment performance measures

The USACE requires its districts to inspect 5 percent to 10 percent of all permits for compliance each year. Our sampling revealed that the USACE met or exceeded this inspection requirement. The USACE compliance inspections within our sample (12 of 110 permits) suggested a non-compliance rate of about 30 percent (3 of 10 USACE-inspected permits where work occurred), significantly less than what we documented in our full study sample (46 percent).

Table 3. Permits with more than 10 acres of wetland impact

DA number	Rank	Impacted wetland acreage	Required wetland mitigation acres and credits	Documented wetland mitigation acres and credits
SWG-2007-01963	1	117.7967	642	0
SWG-2007-00909	2	67.37	298.59	4.59
SWG-2004-00790	3	27.37	12.5	0
SWG-2009-00247	4	21.41	101	101
SWG-1993-01967	5	17.95	31.7	31.7
Total		251.8967	1,085.79	137.29

Summary

Based on a thorough review of documented wetland mitigation from a rigorously selected permit sample, it appears unlikely that wetland mitigation through the Clean Water Act process is achieving the intended outcome of “no net loss” of wetlands on the Upper Gulf Coast of Texas.

Although the study reviewed only the *documentation* of mitigation, it would not be unreasonable to assume that lack of documentation correlates to a lack of complete on-the-ground mitigation.

This study was based on information provided by the USACE Galveston District office through the Freedom of Information Act process.

The FOIA process with the USACE to obtain full permit records was time consuming and expensive. This process would be an obstacle for anyone attempting a larger scale review of USACE Galveston District’s regulatory success.

Over 60 percent of all permits in the sample that required compensatory mitigation were lacking in documentation supporting full compliance. Documentation was found for only 18 percent of the required mitigation acres and credits.

Somewhat more disturbing, of the out-of-compliance permits requiring mitigation, 61 percent had no documentation that any kind of mitigation was carried out.

Undermining the goal of “no net loss” on the Texas coast is the fact that the Galveston District USACE’s current interpretation of the Clean Water Act does not protect the vast majority of wetlands in the study area. In general, the District exerts jurisdiction over wetlands only if they are adjacent to traditional navigable waters (TNW), but non-navigable tributaries of TNW that are relatively permanent, or are determined to have a “significant nexus”⁵ to TNW (USACE, 2008). This analysis typically includes only wetlands in the 100-year floodplain or those with a distinct channel—that is, with an

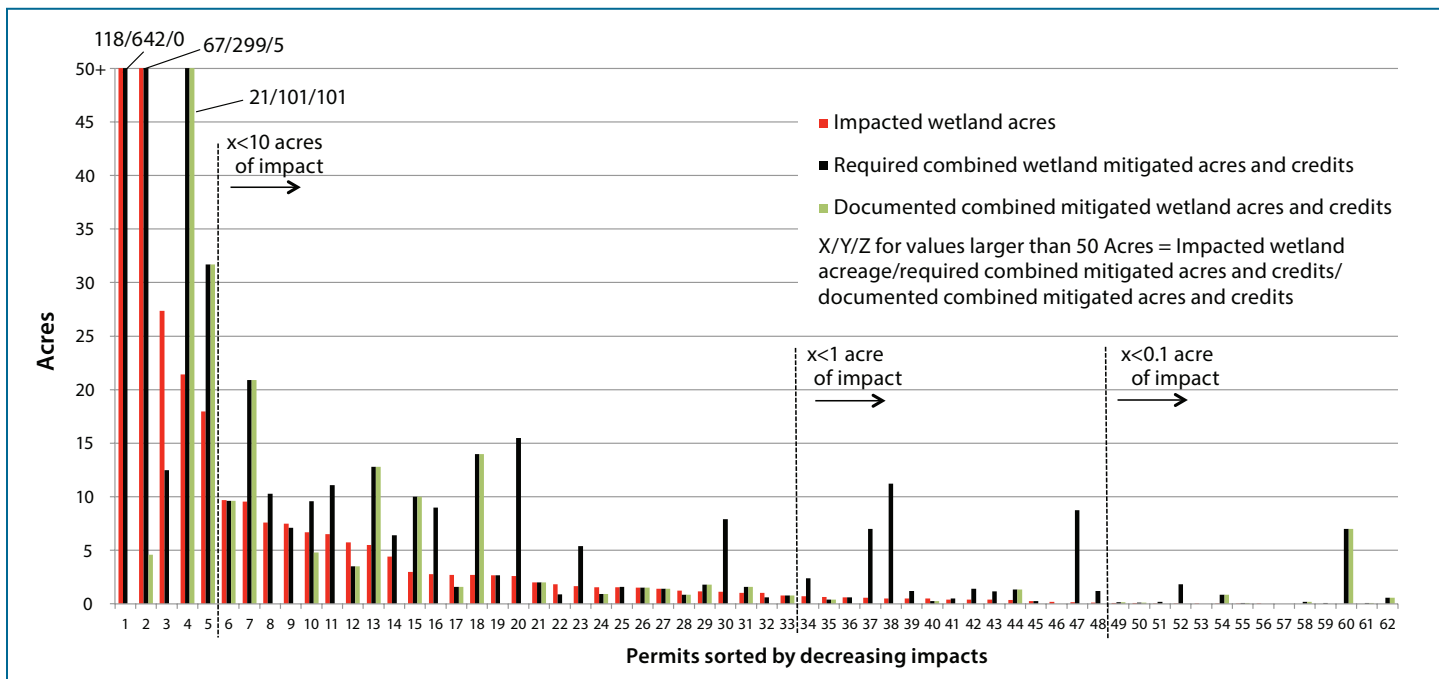


Figure 4: Range and associated mitigation of permitted wetland acreage.

ordinary high water mark and clear bed and banks—connecting the wetlands to TNW. However, it should be noted that the Galveston District USACE’s official policy is that jurisdiction is determined on a case-by-case basis.

Nearly 90 percent of the wetlands lost to development in the past 25 years were outside the 100-year floodplain; thus, no permits were required for their loss⁶ after 2001. Recent research has documented significant hydrologic connections between non-floodplain wetlands and TNW in this area (Wilcox et al., 2011; Forbes et al., 2012), but the USACE has yet to acknowledge these studies.

In light of the inconsistent and often incomplete record of



Black-necked stilts fly over a wetland in Chambers County, Texas. Source U.S. Natural Resources Conservation Service

mitigation documentation, area resource managers should carefully monitor the quality of wetland mitigation that the public is getting under the CWA 404 wetland program.

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⁵ A “significant nexus” evaluation assesses the flow characteristics and functions of a non-navigable tributary and its adjacent wetlands to determine whether they significantly impact the biological, chemical, and physical integrity of downstream TNW. This evaluation considers hydrologic and ecological factors.

⁶ Before the Supreme Court SWANCC ruling in 2001, mitigation would have been required for wetlands outside the floodplain, with or without an ordinary high water mark.

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Shoreline wetland plants on one of the inlet bays of Galveston Bay at Galveston Island State Park, Texas. Source: Yinan Chen, public domain, via Wikimedia Commons

Appendix

Table 1. Required and documented wetland impact and compensatory mitigation acreage for permits (n=123)		Number of permits	Wetland acres impacts authorized	Wetland acres impacts that likely occurred ⁴	Combined wetland mitigation acres and credits required ¹	Combined wetland mitigation acres and credits required for impacts that likely occurred ⁴	How much of this is mitigation bank credits?	Total wetland mitigation acres documented as complete ² or likely complete ³
All permits		123	359.58	358.90	1434.25	1306.05	58.96	236.64
Permits requiring compensatory mitigation		68	356.80	356.12	1434.25	1306.65	58.96	236.64
Permits in compliance with compensatory mitigation requirements ⁵		30	78.85	78.17	341.80	213.60	41.08	213.75
Permits in compliance with compensatory mitigation where no work ⁴ occurred		6	0.68	0.00	128.2	0.00	0.00	0.15 ⁶
Subset:		24	78.17	78.17	213.60	213.60	40.93	213.60
Permits out of compliance with compensatory mitigation where work occurred		38	277.9514	277.9514	1092.4471	1092.4471	17.88	22.89
Permits out of compliance with compensatory mitigation where mitigation is likely to have occurred		6	12.76	12.76	13.5121	13.5121	none	13.51
Subset:		32	265.1867	265.1867	1078.9350	1078.9350	17.88	9.38 ⁷
Permits out of compliance with compensatory mitigation where mitigation is unlikely to have occurred		7	202.44	202.44	986.93	986.93	9.38	9.38
Subset:		25	62.75	62.75	92.01	92.01	8.50	0.00
Permits out of compliance where there is no evidence of mitigation work		55	2.78	2.78	None	None	None	None
Permits not requiring compensatory mitigation		43	2.65	2.65	None	None	None	None
Permits in compliance with avoidance and minimization mitigation requirements		7	0.003 ⁸	0.00	None	None	None	None
Subset:		36	2.6466 ⁸	2.6466 ⁸	None	None	None	None
Permits out of compliance with avoidance and minimization mitigation requirements		12	0.13	0.13	None	None	None	None
Permits out of compliance with avoidance mitigation requirements		1	0.13 ⁸	0.13 ⁸	None	None	None	None
Subset:		11	0 ⁸	0 ⁸	None	None	None	None

¹ Mitigation bank credits are considered 1 credit = 1 acre of wetland mitigation for this study.

² "Documented as complete" is defined as: Evidence exists in the permit's administrative record of completion of all compensatory mitigation. requirements due within the study time frame (1990 through 2012).

³ "Likely complete" is defined as: Significant evidence exists in the permit administrative record to suggest that mitigation was completed. However, some other compensatory mitigation requirements, such as monitoring reports, is incomplete.

⁴ "No work" is defined as: Based on a review of permit administrative records, RIBITS database, and available aerial imagery, no impacts appear to have occurred. Therefore, no compensatory mitigation is required. These permits were removed from the sample of 123 permits analyzed to create a sample of 110 permits where impacts occurred.

⁵ One permit (SWG-1999-00473) is in compliance with compensatory mitigation requirements but out of compliance with avoidance mitigation. Compliance numbers will swing between 30 and 31, depending if the question is about mitigation as a whole or just compliance with compensatory mitigation.

⁶ Though no work appears at one of the permit sites (SWG-2009-00253), it appears that the 0.15 credit required was purchased, based on a review of RIBITS.

⁷ Permit SWG-2007-00909 and SWG-2005-02256 required both mitigation bank (MB) and permittee-responsible mitigation (PRM). The 4.59 and 4.79 MB credits (respectively) were purchased, based on evidence in the administrative record. However, there is little evidence that the 294 acres and 4.79 acres (respectively) of PRM occurred.

⁸ These permits authorize temporary impacts to wetlands and/or permanent or temporary impacts to non-wetland open waters of the US. This table reflects only permanent wetland impacts and required compensatory mitigation.

Note: This report is a brief summary of the research findings. For the complete report, *Galveston Bay Wetland Mitigation Assessment and Local Government Capacity Building*, see (Gonzalez et al., 2014) at <http://tcwp.tamu.edu/wetlands/wetland-mitigation/>.



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