CHARACTERIZATION OF SECTION 404 PERMIT MITIGATION PLANS, COASTAL MARGIN AND ASSOCIATED WATERSHEDS, UPPER TEXAS COAST

A Dissertation

by

APRIL ANN TORRES CONKEY

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2009

Major Subject: Wildlife and Fisheries Sciences

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Approved by:

Chair of Committee,	R. Douglas Slack
Committee Members,	Frances Gelwick
	Nova J. Silvy
	X. Ben Wu
Head of Department,	Thomas E. Lacher, Jr.

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ABSTRACT

Characterization of Section 404 Permit Mitigation Plans, Coastal Margin and Associated Watersheds, Upper Texas Coast. (May 2009)

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Chair of Advisory Committee: Dr. R. Douglas Slack

A predicted loss of agricultural rice-wetlands and increasing urbanization and development threatens the remaining freshwater wetlands along the upper Texas coast. To avoid, minimize, and mitigate wetland loss, the U.S. Army Corps of Engineers (Corps) is directed to enforce Section 404 of the Clean Water Act (1975 amendment) by administering permits for development. Furthermore, a 1990 Memorandum of Agreement (MOA) between the Corps and the U.S. Environmental Protection Agency (EPA) proposed a national goal of no net wetland loss (NNL). My goals were to identify the frequency of occurrence of freshwater wetland loss due to dredge or fill, assess final plans to mitigate wetland loss, and verify the persistence of the created compensatory wetlands. I created a database of 96 individual, Section 404 permits issued from 1981 to 2001 in the counties of Chambers, Hardin, Jefferson, Liberty, Montgomery, Orange, and San Jacinto (Galveston District Office, U.S. Army Corps of Engineers). Descriptive statistics were calculated for permit characteristics in relation to issue date (pre- or post-NNL). Public comments received from national and state agencies were rank ordered

against mitigation plan type to determine Spearman's Rank Order Correlation Coefficient. Visual identification (via site visits and 1996 aerial photos) was used to validate compensatory wetland persistence. Shoreline protection of private property and oil and gas drilling (64% of permit applicants and 59% of impacts) had the greatest effect on wetland loss in the region, particularly Chambers, Jefferson, and Montgomery counties. Overall, 79.3 ha of freshwater wetlands were gained; however, gain was overestimated due to large projects for habitat enhancement. Permits issued post-NNL were more likely to have formal mitigation plans (58% vs. 13% pre-NNL) and allowed no net wetland loss. Although agency comments recommending more formal mitigation plans increased after NNL, only a weak positive correlation was detected (Spearman's $r \leq 0.4$). Six of seven created wetlands remained in existence through 2006 though they are freshwater ponds replacing more diverse aquatic systems. I recommend the development of a comprehensive method to track wetland loss, mitigation, and changes in watersheds over time.

DEDICATION

I dedicate this to my parents, Thelma J. Torres and Carlos Torres, who taught me, instilled in me the importance of education, and who always told me that I could be anything I wanted to be.

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INTRODUCTION

Wetland ecosystems are important features in a landscape. Wetlands exist on every continent, excluding Antarctica, and at all latitudes, from tundra to tropics, including swamps, bogs, fens, wet prairies, salt marshes, playas, potholes, sloughs, and bottomlands, and vary according to size, depth, duration of flooding, and adapted species (Mitsch and Gosselink, 2000). The presence of hydric soils, hydrophytes, and hydrology discern wetlands from other ecosystems (Kentula et al., 1992a; Mitsch and Gosselink, 2000). Ecosystem functions such as flood abatement, water quality, wildlife habitat, nursery for fish and shellfish, aquifer recharge, erosion control, and human recreation are wetland services (Kentula et al., 1992a; Mulamoottil et al., 1996; Mitsch and Gosselink, 2000). Wetlands also act as ecotones, zones of transition between terrestrial and deep water systems, edge habitat, and buffers between ecosystems (Kentula et al., 1992a; Mulamoottil et al., 1996; Mitsch and Gosselink, 2000). Coastal wetlands, in particular, develop under pressures from tropical storms and changes in sea level, and climate change models predict a sea level rise of 38 cm from 1990 to 2080 and more frequent, powerful storm systems (Nicholls et al., 1999). Without coastal wetlands, hurricane damage increases (Walker et al., 1987; Michener et al., 1997), as seen from the impact of Hurricanes Katrina and Rita on the Louisiana and Texas coast in 2005 and Hurricane Ike in 2008 (Sheikh, 2005; Stokstad, 2005; Day et al., 2007), and fish and shellfish

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This dissertation follows the style of *Wetlands.*

nurseries collapse (Deegan and Buchsbaum, 1997; Hampel et al., 2003; Worm et al., 2006). Freshwater wetland loss is also of concern due to recent Supreme Court rulings excluding isolated wetlands from permitting (Semlitsch and Bodie, 1998; van der Valk and Pederson, 2003; Government Accountability Office, 2004; 547th U.S. Supreme Court, 2006), conservation emphasis on estuarine systems (Chafee, 1999), and salt water intrusion (Patrick et al., 1990; Brady and Flather, 1994; Brinson and Malvarez, 2002).

Approximately 50% of Earth's wetlands have been lost during the course of human history (Dugan, 1993), and the cumulative impacts of wetland loss will have an adverse effect on the quality of life for humans and wildlife (Holland and Kentula, 1992; Johnston, 1994; Zedler, 2004). Estimates in Europe and New Zealand assess a loss of greater than 90% of their wetlands, and Australia, Canada, China, and the Philippines have seen over 50% of their wetlands disappear (National Wetlands Policy Forum, 1988; Kentula et al., 1992a; Dugan, 1993; Mitsch and Gosselink, 2000). Likewise, the continental United States lost 50% of its wetlands from the time of European settlement to the 1970s (Dahl, 1990; Dugan, 1993; Mitsch and Gosselink, 2000) and continued to have "net wetland loss" though the year 2005 (Dahl, 2006).

Wetland lost results from subsidence associated with petroleum drilling and mineral extraction (Holzer and Bluntzer, 1984), aquifer drawdown (Mitsch and Gosselink, 2000; Morton and Purcell, 2001), loss of agricultural wetlands (Alston et al., 2000), habitat fragmentation (Cuperus et al., 1999), alteration of watershed function (Cedfeldt et al., 2000), and fill for development, among other impacts (Mitsch and

Gosselink, 2000; Kentula et al., 2004). Loss of agricultural wetlands are of particular concern in East Texas, as Texas stands to lose 30% of existing agricultural wetlands, due to a decline in rice agriculture (Alston et al., 2000) and increasing urbanization (U.S. Census Bureau, 2000). High rainfall and humidity provide a temperate climate for wetlands to form on any flat, slow draining land on the Lissie – Beaumont geological formation of the upper Texas coast (Moulton and Jacob, 2000). Along the rice belt, 25-50% of the land and 50-100% of coastal areas from Houston east to the Louisiana border consisted of wetlands prior to 1993 (Dugan, 1993), but rice planting in Texas has dropped from 228,647 ha in 1974 (USDA, 1976) to 60,703 ha in 2006 (USDA, 2006). Although crop yield is up, only 59,711 ha of rice were planted in Texas in 2007, the lowest since 1934 (U.S. Census Bureau, 2000).

In the U.S., government policy has both encouraged wetland loss and fostered wetland protection. European settlers believed that wetlands were wastelands, thus policies, such as the Swampland Acts (1849, 1850, and 1860), sanctioned and promoted wetland drainage for the benefit of human health and economic development (Mitsch and Gosselink 2000). Similarly, from 1940 to 1977, the Agricultural Conservation Program (enacted by the U.S. Department of Agriculture) allowed 23 million hectares of wet farmland to be drained for agricultural use (Mitsch and Gosselink, 2000). The federal government, in the mid-1970s, finally recognized wetland values in the interpretation of the Clean Water Act (CWA).

The U.S. does not have a national wetland law; instead, water quality laws have been interpreted by the court system to include wetlands (Federal Water Pollution Control Act, 1972; Mitsch and Gosselink, 2000). The U.S. Army Corps of Engineers (Corps) has the responsibility to uphold the 1899 Rivers and Harbors Act regulating dredging and filling of navigable waters, which is a requirement of the Federal Water Pollution Control Act (1972), otherwise known as the Clean Water Act (CWA). Jurisdictional wetlands are those under the jurisdiction of Section 404 of the CWA provisions. Section 404 requires application for a permit from the Corps to dredge or fill in U.S. waters.

To mitigate the loss of wetlands, the U.S. Environmental Protection Agency (EPA) convened the National Wetlands Policy Forum in 1987. This group recommended that the U.S. needed "to achieve no overall net loss of the nation's remaining wetlands base and to create and restore wetlands, [and] where feasible, to increase the quantity and quality of the nation's wetland resource base" (National Wetlands Policy Forum, 1988). In response, the 1990 Memorandum of Agreement (MOA) between the Department of Army and the EPA, Section 404 (b) (1) CWA, established

> The Corps will strive to avoid adverse impacts and offset unavoidable adverse impacts to existing aquatic resources, and for wetlands, will strive to achieve a goal of no overall net loss of values and function.

However, confusion exists over identifying, quantifying, and evaluating net loss. The National Wetlands Policy Forum (1988) states concern for net loss of the "wetland resource base"; yet, the 1990 MOA refers to net loss of wetland "values and function". It is difficult to quantify and monitor values and functions and many agencies try, instead, to replace area by at least a 2:1 ratio and hope that function will develop (Mitsch and Gosselink, 2000).

To act in accordance with the CWA, the Corps requires an application and public permit review before granting permission to adversely impact wetlands (Mitsch and Gosselink, 2000). Upon the decision to modify (specifically dredge or fill) a wetland, the landowner or representative agency, such as an environmental consulting company, applies for a general Section 404 permit through the Corps. The permit undergoes Corps review, and the applicant may receive guidance on additional measures needed for wetland conservation. A public review and comment period of 30 days is required before the permit receives approval. At this time, the Corps also sends a copy of the permit to state and federal regulatory agencies, such as the National Marine Fisheries Service (NMFS), Texas Commission on Environmental Quality (TCEQ), U.S. Fish and Wildlife Service (FWS), Texas Parks and Wildlife Department (TPWD), and the Texas Historical Commission (THC). The Corps makes judgments on the economic and construction feasibility of recommendations submitted from agencies and the public. The Corps may request permit modifications from the applicant, and the applicant may choose to incorporate or dispute the recommendations. In cases of dispute, the Corps

makes the decision on final permit requirements. If a reviewer's recommendations are not incorporated, the 1989 MOA grants the reviewer the right to appeal to the EPA for further review; however, few cases are appealed (Page and Wilcher, 1990; Mitsch and Gosselink, 2000). If no appeals are made, the Corps grants the permit. Completion of permitted construction and mitigation must be within a 5-year period from the permit issue date, otherwise an extension application is required. The Corps may send a field agent to verify completion and require monitoring reports from the applicant.

Compensatory wetlands can be constructed on- or off-site, of the same (in-kind) or different vegetative types (out-of-kind) and can vary in compensation type and size (Mitsch and Gosselink, 2000). On-site wetlands are constructed on the same site as the impact and those of the same vegetative type as the lost wetland are considered in-kind (Mitsch and Gosselink, 2000). To minimize impacts of development, replacement wetlands can take the form of preservation of an adjacent wetland, enhancement of an existing wetland (by increasing wetland functions), restoration of a disturbed or degraded wetland (to a pre-existing condition), or creation of a new wetland (Mitsch and Gosselink, 2000). As an alternative, applicants can opt to pay "in-lieu fees" or purchase "mitigation bank credits" to a third party that has preserved, enhanced, restored, or created a wetland (Mitsch and Gosselink, 2000). For size, the EPA recommends a 2:1 area ratio of created wetlands to impacted wetlands as a minimum buffer against potential loss of functions and area (Mitsch and Gosselink, 2000). Overall preference

is for on-site, in-kind restoration or creation of compensatory wetlands at a 2:1 area ratio (Mitsch and Gosselink, 2000; Zedler and Shabman, 2001).

Wetland conservation is made more complicated by a lack of long-term studies on replacement wetlands (Mitsch et al., 1998; Mitsch and Gosselink, 2000; Zedler, 2000), lack of comprehensive mitigation databases (King et al., 2000; La Peyre et al., 2001), and lack of follow-up for mitigation compliance (Government Accountability Office, 2001; Zedler and Shabman, 2001). In the U.S., freshwater emergent and forested wetlands are most at risk for loss (Dahl, 2006), and riparian wetlands that do not meet jurisdictional guidelines are at high risk for development (Mitsch and Gosselink, 2000). To simulate a long-term study on freshwater mitigation, I will investigate Section 404 permits submitted between 1981 and 2001 to the Galveston District Office, U.S. Army Corps of Engineers (Corps) for freshwater dredge or fill. My overall objectives are 1) to identify occurrence of Section 404 permit applications granted for freshwater dredge or fill during the twenty-year period, 2) to assess mitigation plans to compensate for wetland loss, and 3) to validate the persistence of mitigation wetlands to date.

Characterization of Section 404 Permits

By compiling a database of Section 404 permits, queries can be used to discern impacts and compensation over time and area (Kentula et al., 1992b; Sifneos et al., 1992). I assembled a database to categorize permits by applicant, impact type, location, and to identify frequency of occurrence before (pre-NNL) and after (post-NNL)

implementation of the No Net Loss policy. I categorized public comments to compare the permit's initial proposal for mitigation to the final permit requirements. To date, no other study has reviewed the influence of public comments on final mitigation plans. I predict that permits granted after implementation of the No Net Loss rule, will be more likely to have 1) formal mitigation plans (following the mitigation directives of the 1990 MOA), 2) include goals and monitoring plans, thus 3) less wetland loss.

Compensatory Wetland Persistence

The long term persistence of compensatory wetlands is relatively unstudied (Johnston, 1994; Mitsch and Wilson, 1996; Mitsch et al., 1998). In particular, long-term studies of freshwater replacement wetlands are rare (Zedler and Callaway, 1999; Zedler, 2000). As development increases across the country, wetlands are increasingly impacted (Mitsch and Gooselink 2000). Without long-term monitoring of compensatory wetlands, cumulative impacts (as part of the Corps of Engineers' Environmental Assessment and statement of Findings), project locations, and impacts cannot be effectively tracked. Use of Geographic Information Systems (GIS) and remote sensing can provide a supplement to long-term monitoring studies. Thus, I propose to validate the persistence of mitigation wetlands by using GIS and a sequence of aerial photos.

Study Area

I will study the upper Texas coast, pothole, marsh and riverine forested freshwater wetlands, along Beaumont and Lissie formations and coastal flat woods within the Galveston District of the Corps of Engineers (Moulton and Jacob, 2000; Galveston District, 2001). Coastal freshwater potholes occurred along the Texas coast from Beaumont to the Rio Grande before the 1800s (Galveston District, 2001). Rice fields, built on potholes, covered 600,000 ha of the upper Texas coast and composed the majority of wetland types in the region (Alston et al., 2000; Moulton and Jacob, 2000). The coastal flatwoods extend from Louisiana to the Houston area and are important interfluvial zones along the floodplain (Moulton and Jacob, 2000). Riverine forested wetlands and coastal flatwood wetlands located on the floodplains of the lower Sabine, Neches, Trinity, and San Jacinto Rivers are included in this study. This area includes the following Texas counties: Chambers, Hardin, Jefferson, Liberty, Montgomery, Orange, and San Jacinto (Figure 1).

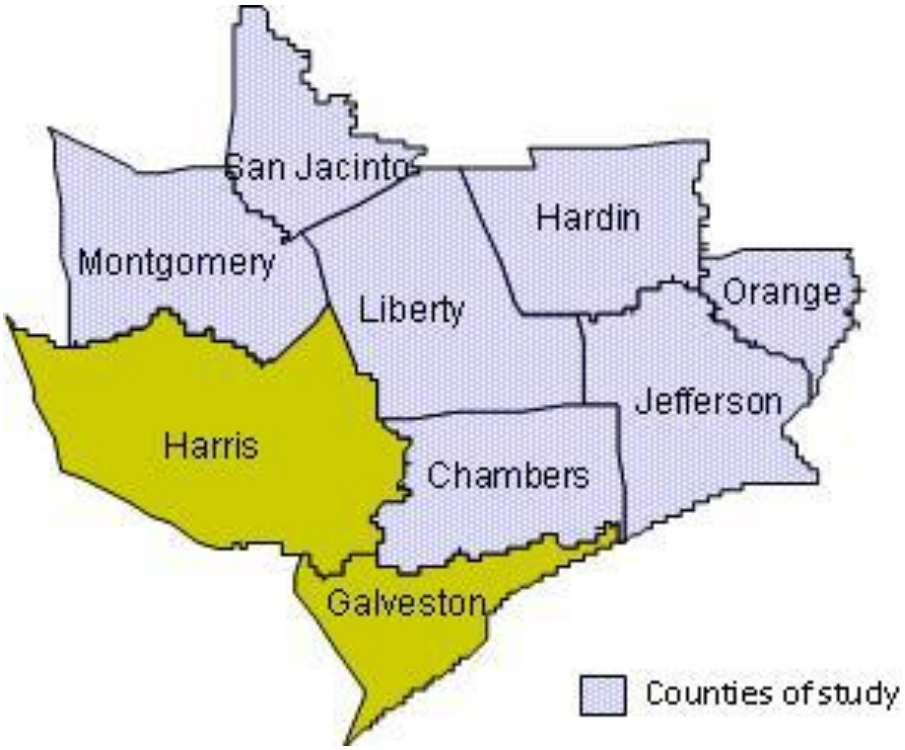

Figure 1. Counties of study: Montgomery, San Jacinto, Trinity, Hardin, Orange, Chambers, and Jefferson, Texas.

METHODS

Section 404 individual permits are required for substantial wetland impacts. I searched the U.S. Army Corps of Engineers, Galveston District database for the permit identification numbers of Section 404 individual permit applications submitted from 1981-1995 in the counties of Chambers, Hardin, Jefferson, Liberty, Montgomery, Orange, and San Jacinto, Texas. I randomly selected 116 (37%) of 311 non-bay permits for study. To increase the sample size of permits requiring mitigation and to include the time period after implementation of the No Net Loss policy, I randomly chose ten of 77 freshwater mitigation permits, submitted from 1994 – 2001, from a TPWD spreadsheet (TPWD, Dickinson office). Permits and corresponding documentation were only available on microfiche at the Galveston Office, from which I printed a paper copy. Documentation for each permit included an Application for a Department of the Army Permit (ENG form 4345; Appendix A), Permit Action Sheet (SWG form 377; Appendix A), Environmental Assessment and Statement of Findings, and approved Department of the Army Permit (ENG form 1721; Appendix A). Applications withdrawn, cancelled, that required no action, that had nothing on the microfiche or were not in the microfiche drawer were noted (n = 18) but not considered in the final sample. Two permits for impacts to open water in Sabine Lake and the Neches River were also omitted from the sample. The final sample consisted of 96 permits (n = 96), issued from 1981 – 2001. Presumably, these permits were old enough to have completed both construction and

wetland compensation, and for the Corps to have conducted compliance inspections and received monitoring reports (Government Accountability Office, 2005), as well as time for wetland self-organization (Mitsch et al., 1998).

When impact is unavoidable, the 1990 MOA calls for compensatory mitigation for the loss of wetlands (Page and Wilcher, 1990). Using this guide, I defined "required mitigation" as any instance when the wetland category of the Environmental Assessment and Statement of Findings Form indicated that wetland loss (area) would occur at the impact site. Permit information was entered into a Microsoft Access database (Microsoft 2003). I used queries within MS Access and exported data to Microsoft Excel (Microsoft 2003) for analysis.

Characterization of Section 404 Permits

Area of wetland impact was determined from the wetland section of the Environmental Assessment and Statement of Findings Form and converted from square feet (ft^2) or acres (ac) to hectares (ha). I calculated the frequency of permits issued before (pre-NNL) and after (post-NNL) implementation of the No Net Loss policy, as well as total frequencies for applicant type, impact type, size, and location (county).

The study area includes many lacustrine systems, such as Lake Conroe, that were primarily created for recreational use. Shallow water habitat along the lakeshore is lost when landowners install a bulkhead and dredge the shallows deep enough for boat parking and maneuverability. Because of the high number of shallow water impacts, I

kept these permits in the mitigation sample. When shallow water area was not stated in the Environmental Assessment and Statement of Findings report, I used the erosion control structure's water-ward distance (distance from the natural shoreline into the water to the proposed control structure placement in feet) and the length of the control structure (ft) to calculate area in square feet (ft^2) then converted to hectares (ha). I verified my area estimation technique using permits that stated both shallow water area and control structure dimensions. For control structures build on the shoreline, the water-ward distance was assumed to be 1 ft or less, thus, maximum area equaled the length of the control structure in square feet.

Public comments are included in each file in the Corps records and summarized in the Environmental Assessment Statement of Findings report. Application announcements for Section 404 permits go directly to the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, Texas Commission on Environmental Quality (TCEQ), and the Texas Historical Commission (THC), in addition to public newspapers in the county of application. Comments from the Texas Commission on Environmental Quality deal with issues associated with Section 401 (b) of the Clean Water Act as it relates to water quality and do not mention wetland impacts, and the Texas Historical Commission only evaluates impacts to archeological sites. Therefore, I omitted statements from the TCEQ and THC from my review of public comments. Remarks from the general public, non-governmental organizations, and agencies not mentioned above are included in "others". I categorized

public recommendations into four classes: approve the permit application, modify the permit application to include additional mitigation, deny the permit application, or no comment. Commentary received after the 30 day comment period was not considered by the Corps, and I included them under the "no comment" group. In addition, I separated the comments by date: pre-NNL (permit issued before 1990) and post-NNL (permit issued after 1990). Spearman's Rank Order Correlation Coefficient was calculated (in a MS Excel 2003 spreadsheet) to determine relationships between comments and type of mitigation plan.

Permits were sorted by year of issue and mitigation plan type (no mitigation plan, permit revision, simple mitigation plan, full mitigation plan, in-lieu fees, and mitigation bank). When a wetland or shallow water habitat was impacted without an agreement for mitigation, it was classified as having no mitigation plan. Most oil and gas drilling permits allowed impacts to wetlands, but rather than an agreement for mitigation, a clause in the permit states that the site would be restored to pre-impact conditions 90 days after the well is no longer productive. Revised permits include wetland mitigation after receiving recommendations from the public comment period. Permits having a mitigation plan that lacked assessment measures (goals, objectives, or monitoring plans) are herein categorized as simple mitigation plans, whereas full mitigation plans include goals or objectives and monitoring requirements. An in-lieu fee agreement is one in which the permit applicant consents to purchase credits or provide a service in-lieu of mitigation for wetland loss (Mitsch and Gosselink, 2000). In-lieu fees are distributed by

the Corps for restoration, establishment, enhancement, and/or preservation of aquatic resources. Permit applicants can also purchase mitigation bank credits from an established and approved mitigation bank rather than doing it themselves. Mitigation banks consist of enhanced or restored wetlands or the creation of a new wetland usually by a government agency or not-for-profit organization.

I calculated frequencies for mitigation plan type, compared plan types before and after implementation of the NNL policy, and compared public and agency comments for initial permit applications (pre- and post-NNL).

Compensatory Wetland Persistence

Twenty-seven Section 404 permits that required mitigation for wetland loss were identified from a random sample of 96 permits issued by the Corps from 1985 to 2002. These permits were old enough to have completed both the construction (impact) and mitigation requirements (within 5 years of the issue date). Compensatory wetland location (on-site or off-site) and types (in-kind or out-of-kind) were determined from the permit's mitigation plan, aerial photo, or site visit. Only seven permits had enough information to locate the mitigation site on a map or aerial photo to establish wetland persistence.

Field work was conducted in November 2004, March 2005, March 2006, and October 2006. To determine wetland area at each site, I visually identified the wetland boundary using primary and secondary wetland delineation characteristics and

hydrological connection to water source (Environmental Laboratory, 1987). I walked the wetland boundary using a hand-held Garmin 72 Global Positioning System (GPS) collecting data at one-second intervals. The GPS coordinates were downloaded to a text delimited file (.TXT) and imported into Microsoft Excel (Microsoft 2003). Digital ortho quarter quadrangles (DOQQ) flown in 1996 (Texas Orthographic Program, 1-m resolution) and 2004 (National Agriculture Imagery Program, 1-m resolution) were downloaded as .E00 files and imported to ArcCatalog (ArcGIS 9.1) for conversion to shape files (.SHP). National Wetland Inventory polygons from the 1990s (USFWS 2007) were downloaded from the U.S. Fish and Wildlife Service website (www.nwi.fws.gov). GPS points were downloaded into ArcInfo 9.1 Geographic Information System (GIS), and I used Visual Basic (within ArcView 9.1) to calculate wetland area at each site. In the event that I was not able to arrange a site visit, I digitized the wetland's perimeter using open water as the guide in the 1996 and 2004 photos (ArcView 9.1).

RESULTS

Characterization of Section 404 Permits

A net gain of 46.9 ha (n =96) of freshwater wetlands occurred along the upper Texas coast from 1981 – 2001 (Table 1). Fifty-eight permits were issued prior to the NNL policy, with a net loss of 24.5 ha, while 38 permits issued post-NNL had a net gain of 71.4 ha. Of 96 permits, 68 were issued without requiring mitigation (hereafter, referred to as non-impact). Fifty non-impact permits were issued pre-NNL (for a loss of 28.0 ha) and 18 issued post-NNL (for a loss of 4.3 ha).

Table 1. Impacted and compensated wetland area (ha) for all Section 404 permits (n = 96) issued 1981 – 1989 (pre-NNL) and 1990 – 2001 (post-NNL).

Wetland Habitat	Impacted (ha)	Compensated (ha)	Net Gain (ha)
Pre-NNL (n = 58)	162.7	138.2	- 24.5
Post-NNL (n = 38)	42.1	113.5	+ 71.4
Total (n = 96)	204.8	251.7	+ 46.9

Non-impact permits (n = 68) contributed to the loss of 28.0 ha (n = 50) before and 4.3 ha (n = 18) after NNL for a net loss of 32.3 ha (Table 2). Construction of erosion control and shore stabilization structures by individual landowners had the

greatest number of non-impact permits: 22 permits pre-NNL and 10 permits post-NNL. Permits for erosion structures, such as bulkheads with backfill, were primarily requested by private land owners with property surrounding Lake Conroe in Montgomery County (a man-made reservoir). Permits for exploratory oil and gas drilling (n = 22) that did not require mitigation for wetland losses, included a statement in the Project and Site Description section of the Environmental Assessment and Statement of Findings form that

> Following cessation of production and/or abandonment of the well, all debris will be removed and disposed of in a non-wetland area. The project area will be graded to pre-project elevations. (Permit #17780, issued 22 Aug. 1986)

Table 2. Wetland loss (impacted) and mitigation (compensated) area (ha) for non-impact Section 404 permits (n = 96) issued 1981 – 1989 (pre-NNL) and 1990 – 2001 (post-NNL).

Non-Impact Permits	Impacted (ha)	Compensated (ha)	Net Loss (ha)
Pre-NNL (n = 50)	28.0	0.0	-28.0
Post-NNL (n = 18)	4.3	0.0	-4.3
Total (n = 68)	32.3	0.0	-32.30

In addition, within the Wetland section of the Environmental Assessment form, a clause states that

> Within 90-days following abandonment of a non-productive well or cessation of production from a successful well, all drilling muds and debris, including drill cuttings, will be removed and disposed of in a non-wetlands area. Ring levees and disturbed areas will be graded into the areas from which they were taken, and the areas restored to as near pre-project condition as practicable within 30-days after the pit has been cleaned. These restorative procedures should promote the recovery of [the] wetland in the immediate project area. (Permit #17780, issued 22 Aug. 1986)

Of the 18 pre-NNL and 4 post-NNL permits issued for non-impact oil and gas drilling, I found no evidence of follow-up by the Corps or the permit applicant on the wetland restoration required after decommission of the well.

Nineteen permits stated, on the cover page, that mitigation for wetland loss was required. However, cover page information was not always correct, and after reviewing all 96 permits, I found that 28 required mitigation. One permit required enhancement of the wetland by establishing an upland buffer zone but did not include schematics or buffer area, thus is excluded from mitigation calculations.

The six major applicant types are business development, oil and gas exploration companies, individual landowners, county agencies, state agencies, and natural resource agencies (Figure 2). Most permits were issued to oil and gas companies (34%, n = 33), individual landowners (29%, n = 28), and businesses (25%, n = 24). Federal, state, and local agencies make up the remaining 11% (n = 11) of permits.

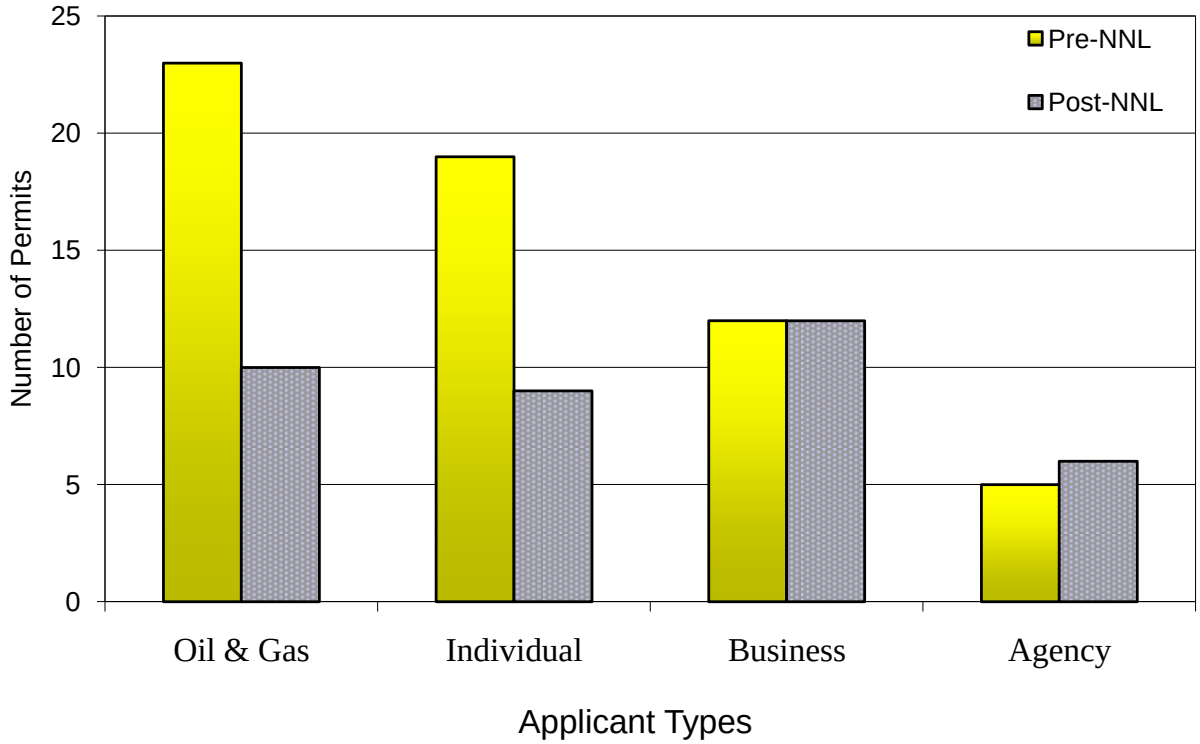

Figure 2. Applicant types for 96 issued Section 404 permits constructed pre-NNL (1981 – 1989) and post-NNL (1990 – 2001) along the upper Texas coast.

I categorized impact types into seven groups: flood control structures, fill for development, boat and pier facilities, oil and gas drilling, erosion control and shore stabilization, habitat restoration and dredging (Figure 3). Erosion protection, including breakwater and wave barrier structures, was the most common impact type at 40% (n = 38). Wetland fill for exploratory oil and gas drilling was the second most common impact type (27%, n = 26). Seventeen percent of permits (n = 16) were issued for filling wetlands for development of businesses, residential subdivisions, roads, and expansion of an airport's runways. All other categories made up the remaining 16% of permits:

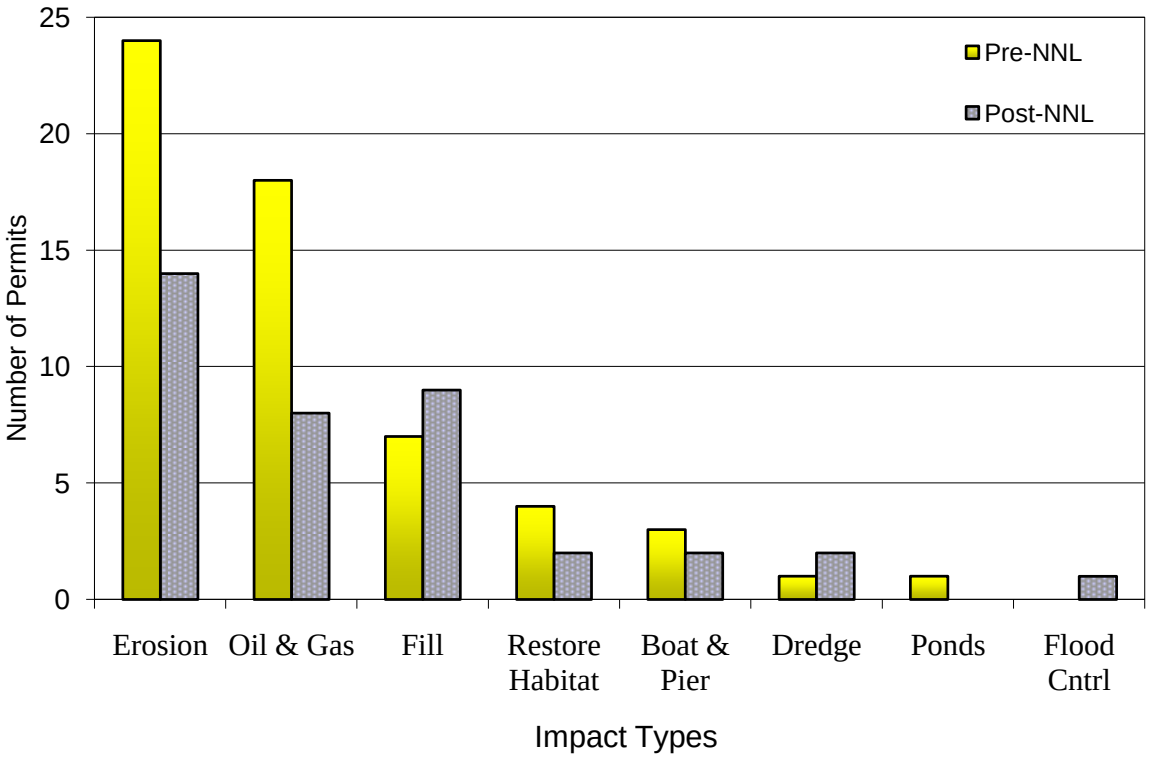

Figure 3. Types of projects (impact types) permitted for 96 Section 404 permits issued pre-NNL (1981 – 1989) and post-NNL (1990 – 2001) along the upper Texas coast.

habitat restoration (6%, n = 6), boat facilities (ramp, dock, slip, lift, or house) and piers (5%, n = 5), dredge (3%, n = 3), flood detention ponds and farm ponds (2%, n = 2).

Wetland impacts occurred mostly in Montgomery (n = 32) and Jefferson Counties (n = 38; Figure 4). Orange, Chambers, and Liberty Counties had 12, 11, and 7 permits issued, respectively. San Jacinto (n = 3) and Hardin (n = 1) Counties had the least number of permits. Chambers and Jefferson Counties had the most oil and gas drilling impacts with six pre-NNL permits each for a loss of 5.0 ha and 3.7 ha respectively. Liberty and Orange Counties had fewer pre-NNL permits (n = 3), but Liberty lost 3.7 ha and 2.9 ha were lost in Orange. Overall 14.8 ha were lost to oil and

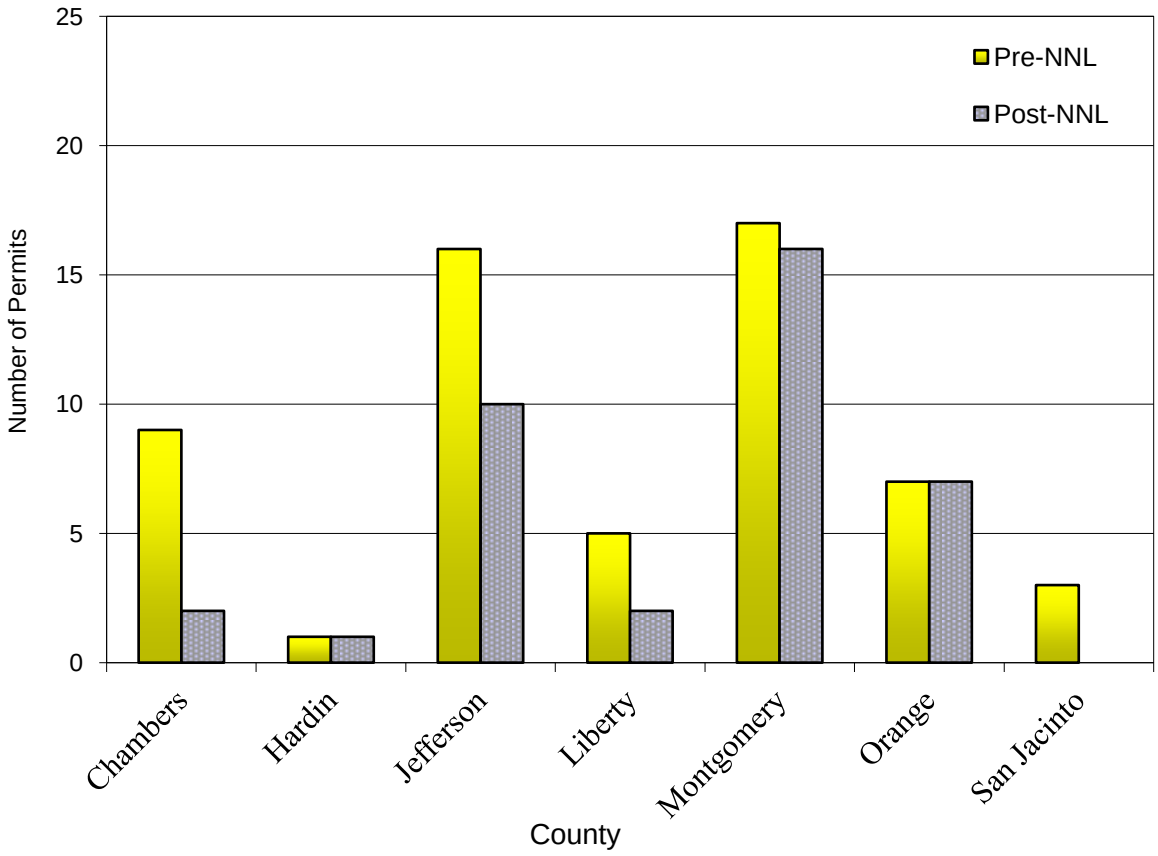

Figure 4. Percent of Section 404 permits (n = 96) issued per county by the Galveston Office, Army Corps of Engineers pre- (1981 - 1989) and post-NNL (1990 - 2001) in the study area.

gas development before implementation of the NNL policy. Jefferson and Orange each had 3 oil and gas drilling permits issued after 1990, for a loss of 5.8 ha. After 1990, eight oil and gas drilling permits were issued and half required at least 1:1 compensation, in addition to the restoration clause, for a gain of 0.7 ha.

Because shallow water habitat lacks emergent vegetation, its loss has been viewed as minimal, but necessary, when land owners demand they be able to restore

property lines and enhance property value. Thirty-three percent (n = 32) of 96 permits were issued for impacts to submerged vegetative, shallow water habitat (Table 3). Twenty-one permits were granted pre-NNL, with replacement of 2.1 ha for the loss of 2.0 ha of shallow water habitat. Post-NNL, 0.03 ha of shallow water habitat were impacted and replaced with 0.01 ha. Overall, a loss of 0.2 ha of shallow water occurred during the study period.

Table 3. Shallow water habitat (submerged vegetation) loss (impacted) and mitigation (compensated) area (ha) for Section 404 permits (n = 96) issued 1981 – 1989 (pre-NNL) and 1990 – 2001 (post-NNL).

Shallow Water Habitat	Impacted (ha)	Compensated (ha)	Net Loss (-) and Gain (+)
Pre-NNL (n = 21)	2.03	2.10	+ 0.07
Post-NNL (n = 11)	0.3	0.01	- 0.29
Total (n = 32)	2.33	2.11	- 0.22

Of 96 Section 404 permits sampled from 1981 – 2001, 75 permits (Figure 5) allowed the loss of 204.8 ha of wetlands. Sixty-eight permits allowed wetland impacts

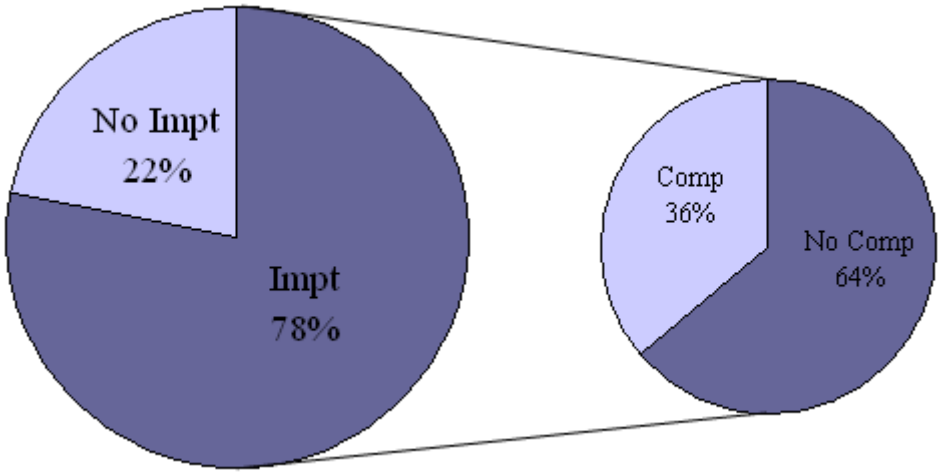

Figure 5. Frequencies of permits that allowed wetland impacts (Impt; n = 75), those that did not (No Impt; n = 21), and frequency of impact permits requiring wetland compensation (Comp).

without an agreement for mitigating the loss. Twenty-seven permits proposed the creation, enhancement, restoration, or preservation of 251.7 ha of wetlands to offset the destruction of 172.4 ha. Overall, the permit records indicate a gain of 79.3 ha of wetlands along the upper Texas coast. However, the gain is inflated due to three permits that were issued specifically for large tracts of habitat restoration on federal parklands that have a 5:1 or higher replacement ratio. When the No Net Loss policy is taken into consideration, the outcome is less optimistic. Fifty-eight permits were issued prior to implementation of NNL (1980 – 1989), but only 14% (n = 8) required mitigation of wetland loss (Figure 6). Therefore, 50 permits (86%) allowed wetland loss; four permits provided replacement at a ratio of 1:1, three permits at 2:1, and one permit at a 3:1 ratio. In contrast, 19 of 38 permits issued after NNL (1990 – 2001) required mitigation. Five

of those allowed less than 1:1 replacement, six permits agreed to a 1:1 replacement, five permits to a 2:1 ratio, two permits to a 5:1 replacement; one permit promised enhancement at a 36:1 ratio of federal parkland.

Of the 27 permits requiring mitigation, eight permits failed to show mitigation on their cover page (however, I could find no information about the Corps requirements for cover page information). Wetland impacts were often not stated in the Environmental Assessment and Statement of Findings section of permits issued in the early 1980s. I was able to determine wetland impacts from vegetative and surface water descriptions of the site in environmental habitat descriptions in the permit. Comments from state and federal agencies and the public were forwarded to the permit applicant (Table 4). Seventy-eight percent of the time, the National Marine Fisheries Service (NMFS), which is charged with managing (freshwater and marine) fish and their habitat, gave permit approval without comments. The U.S. Fish and Wildlife Service (FWS) and Texas Parks and Wildlife Department (TPWD) gave approval comments on 30% and 33% respectively. Permit modifications for minimizing and mitigating wetland loss were suggested by the NMFS on 7% of permits, by the FWS on 44% of permits, by TPWD on 48% of permits, and by the public and non-governmental organizations on 33% of permits. Denial of the permit was recommended for 15% of all permits by the FWS, 7% of permits by TPWD, and 7% of permits by other public comments. In all cases recommended for denial, the Corps ultimately issued the permit with at least some of the conditions recommended by NMFS, FWS, and TPWD for minimizing or mitigating wetland impacts. A weak positive Spearman rank order correlation exists between final

mitigation plan requirements and NMFS (r = 0.4), FWS (r = 0.3), and TPWD (r = 0.3) recommendations. Other organizations were excluded from correlation analysis because two-thirds of the permits did not receive comments from the public or non-governmental organizations. In two cases, FWS disagreed with the Corps approval of final permit plans but did not seek to elevate the cases to the EPA.

Table 4. Number of agency and public comments submitted to the Corps for 27 mitigation permits sorted by recommendation type and issued either prior to (n = 8) implementation of No Net Loss (NNL) in 1990 or after NNL (n = 19).

[+]Comment	National Marine Fisheries Service		U.S. Fish and Wildlife Service		Texas Parks and Wildlife Department	
	Pre-NNL	Post–NNL	Pre–NNL	Post–NNL	Pre-NNL	Post–NNL
Approve	7	14	1	7	5	4
Modify	1	1	3	9	1	12
Deny	0	0	3	1	2	0
No comment	0	4	1	2	0	3

[+]Comment:

Approve permit means that the original permit application and included mitigation plan was acceptable to the agency.

Modify permit means that the agency recommended a modification of the permit application to include additional mitigation.

Deny permit means the agency recommends the Corps deny the permit application.

No comment means that the agency did not submit an observation of the permit application to the Corps within the 30-day review period, or the Corps disregarded the comments because they were submitted after the review period.

Before the NNL policy, 24% of permits contained mitigation plans lacking goals and objectives, 63% of permits included revisions or amendments to the permit that included mitigation, and 13% included a full plan for mitigation of wetland loss. In contrast, 53% of permits issued post-NNL had full mitigation plans, 37% included permit revisions, 5% had plans that lacked objectives, and 5% purchased mitigation bank credits. No in-lieu fee contracts were made overall. Agreements relied on the applicant to restore the wetland after impact and lacked evidence of further Corps monitoring. When grouped by issue date (Table 5), the frequency of permits with full mitigation plans (41%) improved after NNL. According to permit records, 9 ha of wetland area were gained pre-NNL and 75 ha were gained post-NNL.

Table 5. Mitigation plans for wetland loss by plan type and issue date 1981 – 1989 (pre-NNL) and 1990 – 2001 (post-NNL).

	Mitigation Plan Types*			
	Permit Revision	**Simple Plan**	**Mitigation Bank**	**Full Plan**
Pre-NNL (n = 8)	5	2	0	1
Post-NNL (n = 19)	7	1	1	10
Total	12	3	1	11

*Types:

Revision means that the permit revision includes a statement of mitigation.

Simple Plan means that a simple mitigation plan without goals or monitoring plans is part of the approved permit.

Mitigation Bank refers to the purchase of mitigation bank credits in lieu of mitigation.

Full Plan means that a full mitigation plan with goals and monitoring plans is part of the approved permit.

Compensatory Wetland Persistence

Seven permits contained enough information to locate the compensatory wetland site either on the ground or on a DOQQ (Table 6). Two permits (18337 and 18871) were issued pre-NNL and five were issued post-NNL. A total of 24.9 ha were lost due to development, 13.5 ha were proposed for compensation, and 12.1 ha were verified as persisting through 2006 (Table 6). For the seven permits, there was a net loss of 12.8 ha of wetlands.

Compensatory wetlands (Table 7) were constructed on-site (within approximately 200 km from the impact site). Full in-kind replacement was present in one permit (18871), partial in-kind replacement was present at four sites (18337, 19247, 21168, 21600), and two sites were out-of-kind replacements (19759 and 20052; Table 7). Freshwater emergent wetlands were most frequently impacted and freshwater ponds were the most common replacements.

Comparisons of 1996 and 2004 aerial photographs showed a decrease in open water and an increase in vegetation (Appendix B). A connected trio of freshwater ponds was created for Permit #18337 in Jefferson County. Wetland dimensions (Table 6) were taken from aerial photos and showed an abundance of vegetation filling in the perimeter and the corridors connecting the ponds. In the case of Permit #18871, the compensatory freshwater pond was present in 1996 but was paved over by 2004 (items in the permit materials indicated neither monitoring reports nor additional mitigation). For Permit #19247, three small freshwater ponds (each < 0.3 ha) were created along the upland area

Table 6. Wetland impacts (ha) and compensation (Comp, ha) proposed for seven Section 404 permits issued along the upper Texas coast. National Wetland Inventory (NWI) area (ha) for each compensatory wetland (1990s). Current area calculated from GPS points of wetland perimeter or digitized wetland from 2006 aerial photo. Net gain (+) or loss (-) calculated by subtracting the Proposed Compensation (ha) from the Current Area (ha).

Permit #	Year of Issue	County	Impact (ha)	Proposed Comp (ha)	NWI (ha)	Current Area (ha)	Gain (+) or Loss (-)
18337	1988	Jefferson	2.6	2.6	5.8	4.6	+2.0
18871	1989	Jefferson	0.2	0.2	0.2	0.2	0.0
19247*	1991	Montgomery	17.1	0.9	---	0.4	-16.7
19759	1993	Orange	0.8	2.4	---	0.9	+0.1
20052	1994	Montgomery	1.7	1.6	---	1.7	0.0
21168	1999	Montgomery	1.1	1.8	---	0.2	-0.9
21600	1999	Montgomery	1.4	4.0	---	4.1	+2.7

* 26.6 ha preserved

--- Wetland not delineated in 1990s NWI polygons

of a creek flood zone bordering a residential neighborhood. During the site visit, the pond water levels were low; there was little emergent vegetation, and no indication of hydrologic connectivity with the flood plain. Two sites restored for Permit #19759 were former oil platforms within a freshwater marsh. I was able to view the sites only via aerial photos. The concrete, metal, and structures were removed, but the impact scar is still visible on the photos. Water and vegetation are filling the impact areas. Of the three freshwater ponds created for Permit #20052, one (0.2 ha) is silted in and all three have little emergent vegetation. Because these were constructed on the upstream flood plain of a man-made lake, these ponds will likely persist. Along another creek, a small lake and a freshwater emergent area were created for Permit #21168. The borders of the lake are mowed and planted with bald cypress saplings, but the emergent marsh is well protected from disturbance. Lastly, replacement wetlands for Permit #21600, along Interstate Highway 45, were created along a drainage creek, have been planted with emergent hydrophytes and bald cypress and are managed by the Texas Department of Public Transportation.

Table 7. Compensatory wetland types, National Wetland Inventory (NWI) classification, and location (in relation to the impacted wetland).

Permit #	Compensatory Wetland Type	NWI Wetland Type	Wetland Location (On-site, Off-site)
18337	Freshwater pond	Freshwater emergent Freshwater pond	On-site
18871	Freshwater pond	Freshwater pond	On-site
19247	Freshwater pond	Freshwater forested Freshwater pond	On-site
19759	Freshwater pond	Freshwater forested/shrub	On-site
20052	Freshwater pond	Freshwater emergent	On-site
21168	Lake Freshwater emergent	Freshwater emergent	On-site
21600	Freshwater emergent Freshwater pond	Freshwater forested Freshwater emergent	On-site

CONCLUSION

Characterization of Section 404 Permits

Wetlands in the study area were impacted by the construction of erosion control barriers, oil and gas drilling, boat and pier structures, flood detention ponds, stock ponds, dredging, filling, and habitat restoration. Oil and gas drilling in Chambers and Jefferson Counties and shoreline protection of private property along Lake Conroe (Montgomery County) were the most frequent impacts to wetlands in the sample area. Oil and gas industry and private landowners made up 64% of permit applicants (34% and 30% respectively), 59% of wetland impacts (27% and 32% respectively), and accounted for almost all wetland impacts in Chambers, Jefferson, and Montgomery counties.

Beneath the upper Texas coastal wetlands, lie the Port Neches, Clam Lake, and Caplen Oil Fields (Morton and Paine, 1990). Consequently, oil and gas companies were the most frequent applicants for Section 404 permits, and drilling for oil and gas was the second most frequent impact type. Even though drilling permits included a wetland restoration clause, permit files contained no evidence of post-production restoration or monitoring. Jefferson and Chambers Counties, where most oil and gas drilling occurred, have the most water by area, 53,797 ha and 70,624 ha, respectively (U.S. Census Bureau 2000), hence, the most wetlands to lose. Although Chambers County has a relatively low human population (26,031 people) and the population of Jefferson County (252,051 people) is concentrated in the cities of Port Arthur and Beaumont (U.S. Census Bureau

2000), the impact of development on the unique pothole wetlands will increase with projected human population increases (U.S. Census Bureau 2000).

Private land owners requested permits for erosion protection, the most frequent impact type, along lakeside property of Lake Conroe in Montgomery County. Due to its proximity to Houston and desirable suburban communities, Montgomery County has the highest population (293,768 people), greatest number of houses (112,770 housing units), and highest density among the seven counties (U.S. Census Bureau 2000). This population boom has a high impact on the county's water area (8,490 ha) and its ephemeral wetlands (U.S. Census Bureau 2000, Moulton and Jacob 2000).

Overall, permits issued post-NNL complied with the NNL goal (Table 1). Although non-impact permits declined after 1990, 4.3 ha were lost to non-impact construction (Table 2). Applicant types and impact types changed little over the 20 year period (Figure 2 and Figure 3). A decline of oil and gas impacts occurred in Chambers and Jefferson Counties (Figure 2, Figure 3, and Figure 4). Montgomery and Orange Counties did not change from pre- to post-NNL. This is likely an artifact of development in The Woodlands and Orange County (Figure 4). Shallow water habitat of reservoirs had less impact and less compensation (Table 3) than wetland habitat.

The outcome of implementation of the No Net Loss policy on Section 404 permits was an increase in the number of formal mitigation plans (Table 5). Overall, 79.3 ha of wetlands were gained in the sampling area from 1981 – 2001. Though wetland area increased, this is inflated due to large tracts of wetlands on national and state properties developed specifically for wildlife habitat enhancement. Upland buffers

and wetland enhancement and preservation are often omitted from net gain and loss calculations, because they do not represent direct wetland gains (Breaux and Serefiddin, 1999, Morgan and Roberts, 2003, Mitsch and Gosselink, 2000). When enhancement and preservation are omitted from this sample, wetland gain is only 10.4 ha.

Implementation of the No Net Loss policy may have had a positive effect on Section 404 permits that required mitigation for wetland losses. I found a slight decline in the number of post-NNL recommendations for permit approval, modification, denial, and no comment (Table 4). Declines in approval rate of the initial application might signify better enforcement of NNL, if there had been an increase in recommendations for permit modifications; however, this was not apparent. Instead, 37% of Section 404 permit applications received neither comments from agencies nor notice of a lack of personnel and time to review the application. Late submissions of agency comments are disregarded by the Corps. It can be assumed that at least one of the three biologically related agencies will submit an on-time comment on each permit, but as of yet, no wetland mitigation study has evaluated the influence of comments on permit revision and approval.

An increase in the number of permits requiring compensatory wetlands, mitigation revisions, and number including formal mitigation plans occurred after 1990 (Table 5). Similarly, an increase was observed in the frequency of agency comments (USFWS and TPWD) recommending that additional mitigation of wetland loss be incorporated in the permit (Table 4). Because the Corps did not suggest mitigation revisions, except in response to public comments, a weak positive relationship

(Spearman $r \leq 4$) can be inferred between the number of more aggressive agency recommendations and probability of incorporation of wetland replacement. In addition, comments submitted by a few specific agency personnel were more rigorous in their assessment. Thus, public comments are critical to the final mitigation plan.

Compensatory Wetland Persistence

Even though 27 of 96 permits were identified as requiring compensatory mitigation, permit information in 20 permits was too vague to determine the location of the replacement wetland. For seven permits, I was able to make site visits to four and able to find all on aerial photos. With the exception of Permit #18871 (Appendix B, Figures A – 3 and A – 4), all replacement wetlands have persisted through 2006. Wetlands with evident hydrologic connections to creeks and drainage areas may be better able to persist and develop into functional aquatic systems (Mitsch and Gosselink 2000). As seen in the latest national wetlands status and trends report (Dahl, 2006), compensatory wetlands increasingly comprise freshwater ponds. The cumulative effect of lost wetland diversity is unknown, but increases in monotypic aquatic systems as a result of mitigation are likely to have an overall negative effect on biodiversity and water quality (Allen and Feddema, 1996; Kettlewell et al., 2008).

SUMMARY

In 2006, Gayle Norton, then Secretary of the U.S. Department of the Interior, announced that for the first time since European settlement, a net gain of wetlands in the U.S. was achieved (Dahl, 2006). However, this study did not address wetland values and functions or wetland gains and losses due to legal permitting under Section 404 of the CWA. Whereas there may be sufficient wetland creation and restoration to show an overall net gain from 1998 – 2004, the net impact to wetlands due specifically to Section 404 permitting may differ from the generally perceived balance for this outcome. If so, enforcement of the no net loss policy is not likely to have occurred.

Wetland restoration and creation are young disciplines within ecology, and the level of equivalency of a compensatory mitigation wetland as compared to the undisturbed site or reference wetland is debated (Roberts, 1993; Malakoff, 1998). Long term monitoring of wetland mitigation sites and their comparison to reference wetlands is necessary to evaluate compensatory wetland functions (Kentula et al., 1992a; Mitsch and Gosselink, 2000; Stolt et al., 2000). However, reports having incomplete records and unfinished construction of mitigation projects hamper such an evaluation (Erwin, 1991; Kentula et al., 1992a; Sifneos et al., 1992; Government Accountability Office, 2005). The successful completion and persistence of compensatory wetlands is low (Mitsch and Gosselink, 2000; La Peyre et al., 2001). A study in Florida found 60% of replacement projects were not considered successful (Erwin, 1991). In a Louisiana study, site visits occurred for only 10% of mitigation cases (Sifneos et al., 1992). Factors contributing to the lack of replacement wetland success include setting

unrealistic replacement goals, site creation with little regard to wetland functions, too little time for adequate assessment (within two years of creation), and mitigation wetland construction by unqualified consultants providing low bids (Mitsch and Gosselink, 2000; Zedler, 2000). More "habitat-specific" restoration advice is needed because models developed for one type of wetland do not transfer to other types (Zedler, 2000).

Without a comprehensive method to track wetland loss, mitigation, and changes in watersheds over time, the Corps has assumed each permit "proposal does not significantly affect the quality of the human environment" (Environmental Assessment and Statement of Findings) and has little cumulative effect. The 2006 Status and Trends of Wetlands in the Conterminous United States report notes that large changes in freshwater wetland type compositions occurred from 1998 to 2004, and "freshwater wetland gains resulted from restorations and the creation of numerous freshwater ponds" (Dahl, 2006). The increased area for ponds during the study period is the greatest contributor to net gain of wetlands (Dahl, 2006). My results concur with that assessment.

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APPENDIX A

EXAMPLE PERMIT FORMS AND DOCUMENTS

Permit Action Sheet (SWG Form 377)

RAMS ACTION TRACKING SHEET (R A T S)

APPLICATION NUMBER	ACTION ID NUMBER	PROJECT MANAGER
22444( )/	200101096	COMPTON

APPLICATION RECEIVED 17 Jul 2001 APPLICATION COMPLETE 21 Aug 2001

APPLICANT INFORMATION:

HS Resources, A1	B&H Environmental Management, AG
Applicant/Violator	Contractor/Agent
1999 Broadway Ste. 3600	1010 Lamar Ste 1000
Address	Address
Denver, CO 80202-	Houston, TX 77002-
City, State, Zip	City, State, Zip
(303)296-9740 ( ) -	(713)659-6610 ( ) -
Work Phone Home Phone	Work Phone Home Phone

WORK INFORMATION:

Spindal Top Bayou	Chambers//TX
Waterway	County/City/State

Area Office Auth: 10 X 404 10/404 9 103

Work Description:
Construct and install well site and access road.

PUBLIC NOTICE/COORDINATION LETTER INFORMATION:

Send Notice To: Zone: 1 2 3 4 5

	Mayor/City Manager		Postmaster
	U.S. Park Service		County Judge
	Adjacent Property Owners		Navigation District

PUBLIC NOTICE/COORDINATION LETTER INFORMATION (CONT'D).

Issued 04 Sep 2001 ___ 30 days

Extended ___ X 15 days

Ended 03 Oct 2001

****

FINAL ACTION INFORMATION:

EA/SCF/404(B)(1) ___ Draft Permit Forwarded 13 Nov 2001

Appl. Denied ___ Permit Issued 23 Apr 2002

Permit Expiration Date 31 Dec 2006 Fee 100

Appl Withdrawn ___ Mitigation: ___ Yes X No

Type of Action: X IP ___ LP ___ GP ___ NW ___ Mod ___ Transfer

Desk Juris ___ Field Juris ___ No Permit Required

****

UNAUTHORIZED ACTIVITY RESOLUTIONS:

___ After-the-Fact Issued ___ Vol. Rest. ___ Litigation

___ After-the-Fact Penalty ___ Case Closed

****

NON-COMPLIANCE RESOLUTIONS:

___ Mod ___ Vol. Rest. ___ Litigation ___ Penalty ___ Minor

****

401 Cert. ___ CZM ___ Railroad Cert.

Related Action ID's:

Application for Department of the Army Permit (ENG Form 4345)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33CFR325)	OMB APPROVAL NO. 0710-003 Expires October1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404, Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1.APPLICATION NO.	2.FIELD OFFICE CODE	3.DATE RECEIVED	4.DATE APPLICATION COMPLETED
		JUL 17 2001	

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5.APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE *(an agent is not required)*
Patrick Flynn HS Resources	Edward Beene
6. APPLICANT'S ADDRESS	**9. AGENT'S ADDRESS**
1999 Broadway, Suite 3600 Denver, CO 80202	1010 Lamar, Suite 1000 Houston, TX 77002
7. APPLICANT'S PHONE NOS. W/AREA CODE	**10. AGENT'S PHONE NOS. W/AREA CODE**
a. Residence	a. Residence FAX 713-757-9992
b. Business (303)296-9740	b. Business (713)659-6610 ext. 124

11. STATEMENT OF AUTHORIZATION

I hereby authorize, Mr. Edward Beene to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE — DATE 7/12/01

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see Instructions)

Ogden well site

13. NAME OF WATERBODY, IF KNOWN *(if applicable)*	14 PROJECT STREET ADDRESS *(if applicable)*
15. LOCATION OF PROJECT Chambers (COUNTY) Texas (STATE)	

16 OTHER LOCATION DESCRIPTIONS, IF KNOWN, *(see instructions)*
Prospect #1- Latitude: N 29° 47' 33"; Longitude: W 94° 24' 29"

17 DIRECTIONS TO THE SITE
From Houston, take I-10 east to Winnie, TX. Go south on Hwy 124 to Stowell, TX. Head west on Hwy 65 approximately 1.5 miles. Well site is on the left side of the road within an improved pasture.

18. Nature of Activity *(Description of project, include all features)*
Construction and installation of a natural gas and/or crude oil production well and access road to site.

19. Project Purpose *(Describe the reason or purpose of the project, see instructions)*
To install and/or operate an oil/gas wells for the purpose of increasing production capabilities as part of HS Resources long-term Corporate strategy.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
Installation of well - Construction of a 125' x 100' reserve pit. The spoil will be used to construct a containment berm around each reserve pit. Excess spoil will be temporarily stored on-site until completion of the well. Additional incidental discharges will occur during the grading of each site during site preparation.

Operations – If the well makes, a permanent 250' x 350' facility will be constructed which will be converted from wetlands to non-wetlands.

Access Road - A 900' long road will be constructed and become permanent if the well makes. Two 100' wide entrance/exit pads will be located on either end of the road. The remainder of the road will be 30' wide, ditch to ditch.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards
Installation of well - Discharge material will be spoil associated with the installation of two reserve pits surrounded by a containment berm, one on each site. Approximately 3240 cu yd of spoil will be displaced (125'x100'x7'= 8,750 cu ft/27= 3240 cu yd) for the pit. The spoil will be used to refill the reserve pit upon completion of drilling activities. In addition a ring levee will be constructed from the grading of the project site. This will encompass the perimeter of the well pad and act as an erosion control device. Excluding the reserve pit, the approximate of spoil displacement will be 141 cu yd (1275' X 3' = 3825 cu ft / 27= 141 cu yd) totaling 282 cu yd. The total cubic yards of spoil for the reserve pit and ring levee is 6762 cu yd. Upon completion of drilling activities this spoil will be used to refill the project area.

Operations – There will be no additional material discharge during operations.

Access Road – The access will have no impact from discharge material.

22. Surface Area in Acres of Wetlands or Other Waters Filled *(See instructions)*
Installation of well - No wetlands or waters will be filled during installation of the well. An area 350' x 350' will be temporarily disturbed. No filling will occur during this phase.

Operations – If the well makes a 250' x 350' permanent facility will be constructed filling 87,500 sq ft, or 2.0 acres.

Access Road – A 900' long will be constructed during installation and will be made permanent if the well makes. The 100' wide pads on either end of the road will result in filling 5,000 sq ft for each pad for a total of 10,000 sq ft. The remainder of the road will be 30' wide, ditch to ditch, and will result in filling an area 30' x 700' (21,000 sq ft). This is a total impact from construction of the road of 0.71 acres.

Total area filled – 2.71 acres.

23. Is Any Portion of the Work Already Complete? Yes_____ No __X__ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
TNRCC	Sec. 401 Water Quality certification		Concurrent with CoE application process		

*Would include but is not restricted to zoning, building and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT — DATE — SIGNATURE OF AGENT — 8/14/2011 DATE

Environmental Assessment and Statement of Findings

PERMIT APPLICATION – 22444

COMPTON/3855
CESWG-PE-RE

ENVIRONMENTAL ASSESSMENT
AND
STATEMENT OF FINDINGS

1. Name and Address of Applicant.

HS Resources
Mr. Patrick Flynn
1999 Broadway, Suite 3600
Denver, Colorado 80202

2. Corps Authority. Section 404 of the Clean Water Act.

3. Project and Site Description. The applicant proposes to install, operate, and maintain structures and equipment necessary for oil and gas drilling, production, and transportation activities. Such activities include construction of an access road to the well site, installation of typical gravel pads, production structures with attendant facilities, and flowlines. The applicant proposes to initially grade a 30- by 900-foot access road and a 350- by 350-foot work pad with a 100- by 125-foot reserve pit. If the well is productive the completed project will, in part, consist of a 30- by 900-foot access road and a 225- by 350-foot well/production pad. The completed project will result in the filling of 2.71 acres of atypical wetland that has been improved for use as pasture for cattle. The applicant proposes to purchase 9 acre-credits from Wetlands Mitigation Replacement of Southeast Texas as mitigation. The project is located on the south side of State Highway 65, approximately 1.5 miles west of Stowell, in Chambers County, Texas. The USGS Quad reference map is Stowell, Texas.

4. Environmental Assessment.

a. Purpose and Need for the Work. The purpose and need for this project is for the provision of an additional source of oil and/or gas to serve the energy needs of the U.S. Gulf Coast.

b. Alternatives. It has been determined that the proposed project is of such limited nature and scope that there are no unresolved conflicts concerning alternatives. The project will have minimal impacts on the surrounding environment as well as on local and migratory wildlife.

c. Environmental Setting. The project site is located within prairie pothole and marshland wetlands on the plains of rural, eastern Chambers County, Texas. This part of the county is historically agrarian and is comprised of cropland for rice farming and rangeland for grazing cattle. The project site is located on improved rangeland that has been grazed for an extended period. If left fallow the area would most likely return naturally to a typical wetland found throughout this part of Chambers County. The geology in this area is favorable for oil and gas resources.

PERMIT APPLICATION – 22444

d. Environmental Impacts. The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. 320-330. All factors, which may be relevant to the proposal, must be considered. The following factors were determined to be particularly relevant to this application and were evaluated appropriately.

(1) Historic and Cultural Resources. The National Register of Historic Places has been consulted and no properties are listed in the permit area. In addition, the proposed permit work is of such a limited nature and scope that little likelihood exists for the proposed project to affect any historic properties, even if present within the affected project area. The proposed work and/or structures are of such limited nature and scope that little likelihood exists for the proposed project to impinge upon a historic property, even if present within the affected area.

(2) Water Quality. Precautions will be taken to minimize spillage during exploration. Precautions will also be taken during site construction to ensure containment of possible accidental spillage. Incidental spillage during operation and transportation will be contained within the project site by levees. No lasting water pollution will occur.

(3) Endangered Species. No known endangered species or their critical habitat will be affected by the proposed work.

(4) Fish and Wildlife Values. Local wildlife inhabitants may be displaced during exploration and construction phases of the project due to work related disturbance such as noise and human presence. However, wildlife should return to the area after completion of the project. Required levees will contain incidental spillage and prevent possible impacts from contaminated runoff. The proposed project will have minimal impacts on fish and wildlife values.

(5) Essential Fish Habitat. No known impacts will occur to essential fish habitat as listed under the Magnuson-Stevens Fishery Conservation and Management Act.

(6) Wetlands/Special Aquatic Sites. The project site is located in an improved pasture. Although the area is currently being used for grazing purposes, the presence of wetland vegetation in conjunction with the surrounding land suggest that if left fallow the property would naturally return to a wetland state as found throughout this part of Chambers County. This project will directly result in the temporary loss of approximately 2.7 acres of wetlands. This loss is being mitigated through the purchase of 9.0 wetland acre-credits at an approved mitigation bank.

PERMIT APPLICATION – 22444

(7) Aesthetics. The proposed project is similar to other projects throughout East Chambers County. The well site is also located in a fairly remote area that is not visible from any public thoroughfare and therefore does not, aesthetically speaking, pose a problem.

(8) Land Use. The use of land in this manner is necessary to conduct this type work, however, through planning and adherence to permit restrictions the applicant will use only the minimal amount of land necessary for the exploration, production and transportation of oil and/or gas.

(9) Federal Projects. The project is not located in, on or along a Federal navigation project.

(10) Safety. The utilization of standardized methods and approved materiels will increase the safety factor for this project. The required methods of performing this type work will also ensure that the safety factor for continued, long-term service is maintained at a high level.

(11) Energy Needs. The energy needs of the United States are continually increasing. Considering the Nation's present state of war, there will most likely be a need for an increase in the production of oil and/or gas.

(12) Economics. Although temporary, this project will create local jobs during construction. It will also create long-term jobs in regard to site management and the transportation of raw product. Both of these factors are beneficial to the local and national economy.

(13) Other Federal, State, or Local Requirements. All required Federal, State, and/or local authorization or certifications necessary to complete processing of this application have been obtained. Texas Coastal Zone consistency certification is required. The applicant has stated that the project is consistent with the Texas Coastal Management Program (CMP) goals and policies and will be conducted in a manner consistent with said Program. The Texas Coastal Coordination Council confirmed that the project is consistent with the CMP by letter, dated 10 September 2001. In accordance with 33 C.F.R. 325.2 (b)(1)(ii), Railroad Commission of Texas certification was confirmed on 31 October 2001. No required authorizations or certifications have been denied and none are known to exist which would preclude finalization of this permit action.

(14) Other Factors Considered. The following factors were considered during the evaluation process but were determined to not be particularly relevant to this application: shoreline erosion and accretion, recreation, navigation, general

environmental concerns, conservation, floodplain values, flood hazards, water supply and conservation, air pollution, food and fiber production, and mineral needs.

e. Cumulative Impacts. The assessment of cumulative impacts takes into consideration the effects upon an ecosystem of past, present, and reasonably foreseeable future projects. Every application must be considered on its own merits and its impacts on the environment must be assessed in light of historical permitting activity along with anticipated future activities in the area. Although a particular project may constitute a minor impact in itself, the cumulative effect of a large number of such projects could cause a significant impairment of water resources and interfere with the productivity and water quality of existing aquatic ecosystems.

The proposed activity is typical for the exploration and production of oil and/or gas. Similar type projects are found throughout East Chambers County and provide a fair base for comparison both in age and size of the project. Necessary measures will be taken to minimize immediate and long-term impacts. The project will impact a little less than three acres and will be contained within that area for the life of the project. Upon cessation of production activities, the permittee will return the project area to pre-construction elevations and contours, and allow the area to naturally re-vegetate. The limited size of the project area should allow for its return to an atypical wetland within a reasonable amount of time. Overall, the project will result in minimal environmental impacts and minimal impacts on fish and wildlife values.

When considering the overall impacts from similar past, present, and reasonably foreseeable future projects, their cumulative impacts are not considered to be significantly adverse. It is likely we will receive similar projects in the future, which will go through a comparable review process.

f. Findings of No Significant Impact. There have been no significant environmental effects identified resulting from the proposed work. The impact of this proposed activity on aspects affecting the quality of the human environment has been evaluated and it is determined that this action does not require an Environmental Impact Statement.

5. Statement of Findings.

a. Coordination. The formal evaluation process began with publication of a 30-day public notice on 4 September 2001. The comment period for the public notice closed on 3 October 2001. Copies of the public notice were forwarded to concerned Federal, State, and local agencies, organized groups, individuals and navigation districts. These entities included but are not limited to the following:

U.S. Fish and Wildlife Service

PERMIT APPLICATION – 22444

National Marine Fisheries Service
Environmental Protection Agency
U.S. Coast Guard
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Texas Historical Commission
Texas Coastal Coordination Council
General Land Office
National Ocean Survey, Atlantic Marine Center
Galveston Bay Foundation
Railroad Commission of Texas
American Waterways Operators
Adjacent Property Owners

b. Response to the Public Notice.

(1) Federal Agencies. The U.S. Fish and Wildlife Service (FWS) submitted a letter, dated 2 October 2001, stating that because of the current workload, their biologists are unable to adequately investigate this application, therefore, they can take no action on this permit at this time. The National Marine Fisheries Service (NMFS) submitted a letter, dated 20 September 2001, stating that the resources affected are not ones for which they are responsible and therefore they have no comment regarding issuance of the permit.

The U.S. Environmental Protection Agency (EPA) submitted a letter, dated 3 October 2001, stating that the well pad should be reduced to the minimum size necessary and upon abandonment, the road and well sites should be restored to pre-project elevations and contours.

(2) State and Local Agencies. The Texas Parks and Wildlife Department submitted a letter, dated 8 October 2001, stating that should the well be unproductive, or upon cessation of drilling activities, the impacted area will be re-graded to original contours and re-vegetated with appropriate native vegetation indicative of the pre-impact plant community. We did not receive written notice of the findings of the Texas State Historic Preservation Officer within the 30-day coordination period. Therefore, in accordance with provisions of 33 C.F.R. Part 325, Appendix C, "Department of Army Processing Permits: Procedures and Protection for Historic Properties", 1990, all cultural resources responsibilities are complete. The Texas Coastal Coordination Council (CCC) submitted a letter, dated 10 September 2001, stating that it has been determined that this project is below the Texas Railroad Commission's (RRC) thresholds for referral to the CCC and is not subject to CCC review.

(3) Individual and Organized Groups. No response was received from any individual or organized group.

c. Consideration of Comments. The comments received in response to the public notice were sent to the applicant on 12 October 2001. The applicant's agent responded to these comments by agreeing to the conditions requested by the EPA and TPWD. Therefore, all comments and concerns have been resolved.

d. Findings. We find that although this project will impact approximately 2.71 acres of wetlands, it will result in a minimal environmental threat to those immediately adjacent to the project area and the aquatic environment. The permittee will mitigate for these impacts by purchasing 3 wetland acre-credits. Further, if the well is non-productive, the site will be returned to pre-construction elevations and re-planted resulting in only negligible and temporary impacts. If the well is productive, the project area will be minimized to the extent to allow typical production work to proceed. It is expected that incidental spillage during exploration and production may occur. The following special conditions will be added to the authorization:

1. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Should the well be nonproductive, or upon cessation of operational activities, within 6 months the permittee will return the impacted area to pre-construction contours and re-plant with appropriate native vegetation indicative of the pre-impact plant community.

3. The permittee will purchase 9 acre-credits from the Wetlands Mitigation Replacement of Southeast Texas, Ltd. mitigation bank prior to the start of construction in the permit area.

4. The permittee will submit documentation to the Corps Galveston District, verifying that 9 acre-credits were purchased from the Wetlands Mitigation Replacement of Southeast Texas, Ltd. mitigation bank, prior to the start of construction in the permit area.

5. The permittee must promptly comply with any future regulations or instructions affecting the authorized work if and when issued in accordance with law by any department of the Federal Government for the aid or protection of aerial navigation.

6. When a well is plugged and abandoned, the casing shall be cut off a minimum of 15 feet below the mudline, the area cleared of all structures, and written notice given to the Galveston District Engineer within 30 calendar days of completion.

7. When structures or work authorized by this permit are determined by the District Engineer to have become abandoned, obstructive to navigation or cease to be used for the purpose for which they were permitted, such structures or other work must be removed, the area cleared of all obstructions, and written notice given to the District Engineer within 30 days of completion.

e. Conclusion. We have reviewed and evaluated, in light of the overall public interest, the documents and factors concerning this permit application, as well as the stated views of other interested Federal and non-Federal agencies and the concerned public, relative to the proposed work in waters of the United States. This evaluation is in accordance with the guidelines contained in 40 C.F.R. 230 pursuant to Section 404(b) of the Clean Water Act.

Based on our review, we find that the proposed project is not contrary to the public interest and that a Department of the Army permit should be issued.

FOR THE COMMANDER:

9 Nov 2001
(Date)

Bruce H. Bennett
Leader, North Evaluation Unit

Department of the Army Permit (ENG Form 1721)

DEPARTMENT OF THE ARMY PERMIT

Permittee HS Resources

Permit No. 22444

Issuing Office Galveston District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The applicant proposes to install, operate, and maintain structures and equipment necessary for oil and gas drilling, production, and transportation activities. Such activities include construction of an access road to the well site, installation of typical gravel pads, production structures with attendant facilities, and flowlines. The applicant proposes to initially grade a 30- by 900-foot access road and a 350- by 350-foot work pad with a 100- by 125-foot reserve pit. If the well is productive the completed project will, in part, consist of a 30- by 900-foot access road and a 225- by 350-foot well/production pad. The completed project will result in the filling of 2.71 acres of atypical wetland that has been [illegible]ved for use as pasture for cattle. The project will be conducted in accordance with the attached plans, in 6 sheets.

Project Location: The project is located on the south side of State Highway 65, approximately 1.5 miles west of Stowell, in Chambers County, Texas.

Rec'd Blcoco APR 23 2002 BR

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on 31 December 2006. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Should the well be nonproductive, or upon cessation of operational activities, within 6 months the permittee will return the impacted area to pre-construction contours and re-plant with appropriate native vegetation indicative of the pre-impact plant community.

3. The permittee will purchase 9 acre-credits from the Wetlands Mitigation Replacement of Southeast Texas, Ltd. mitigation bank prior to the start of construction in the permit area.

4. The permittee will submit documentation to the Corps Galveston District, verifying that 9 acre-credits were purchased from the Wetlands Mitigation Replacement of Southeast Texas, Ltd. mitigation bank, prior to the start of construction in the permit area.

5. The permittee must promptly comply with any future regulations or instructions affecting the authorized work if and when issued in accordance with law by any department of the Federal Government for the aid or protection of aerial navigation.

6. When a well is plugged and abandoned, the casing shall be cut off a minimum of 15 feet below the mudline, the area cleared of all structures, and written notice given to the Galveston District Engineer within 30 calendar days of completion.

7. When structures or work authorized by this permit are determined by the District Engineer to have become abandoned, obstructive to navigation or cease to be used for the purpose for which they were permitted, such structures or other work must be removed, the area cleared of all obstructions, and written notice given to the District Engineer within 30 days of completion.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

APPENDIX B

AERIAL PHOTOS OF COMPENSATION WETLAND SITES FROM 1996 AND 2004

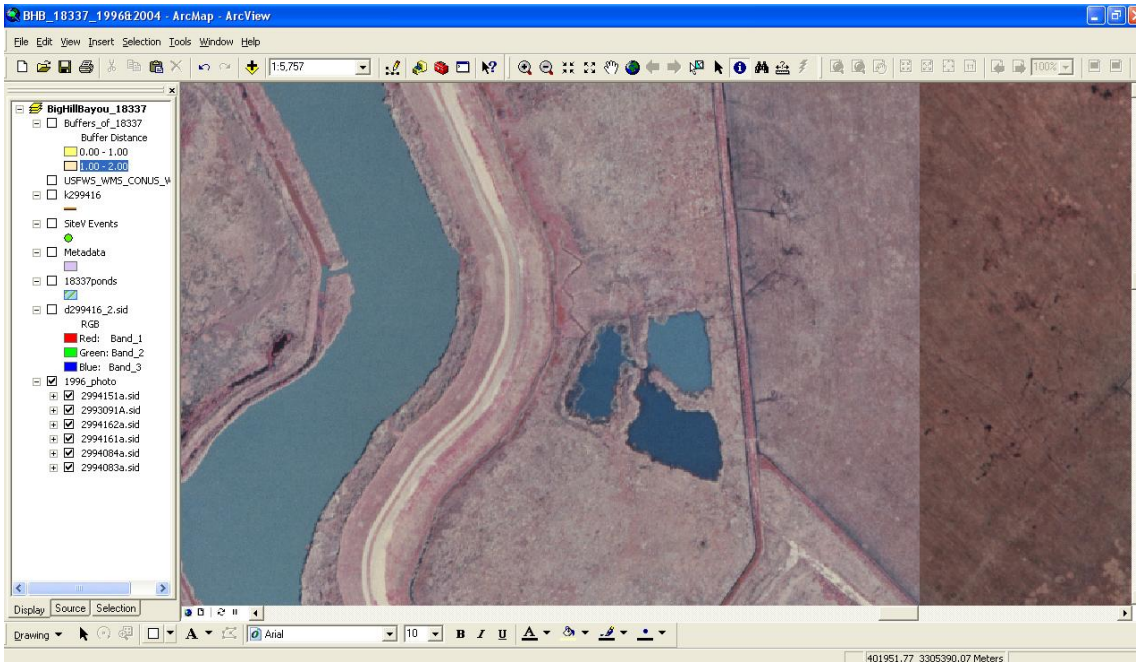

Figure A – 1. Aerial photo of compensatory wetland (3 connected ponds) for Permit 18337, year 1994, scale 1:5,757.

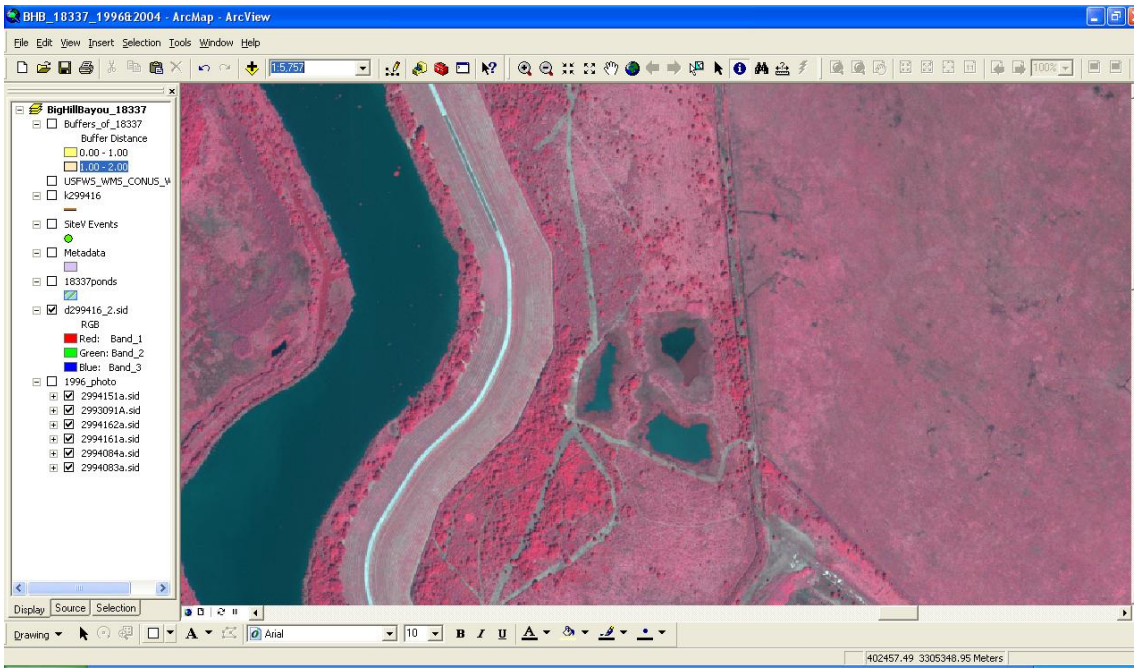

Figure A – 2. Aerial photo of compensatory wetland (3 connected ponds) for Permit 18337, year 2004, scale 1:5,757.

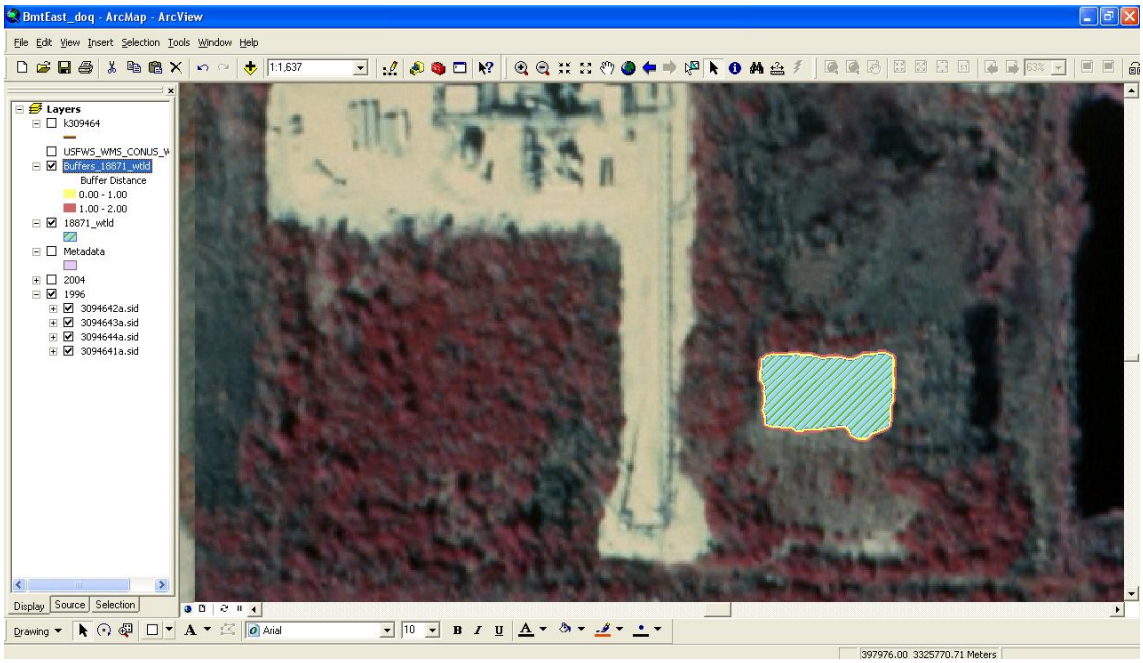

Figure A – 3. Aerial photo of compensatory wetland (shaded polygon) for Permit 18871, year 1996, scale 1:1,637.

Figure A – 4. Aerial photo of compensatory wetland (colored outline of polygon) for Permit 18871, year 2004, scale 1:1,637.

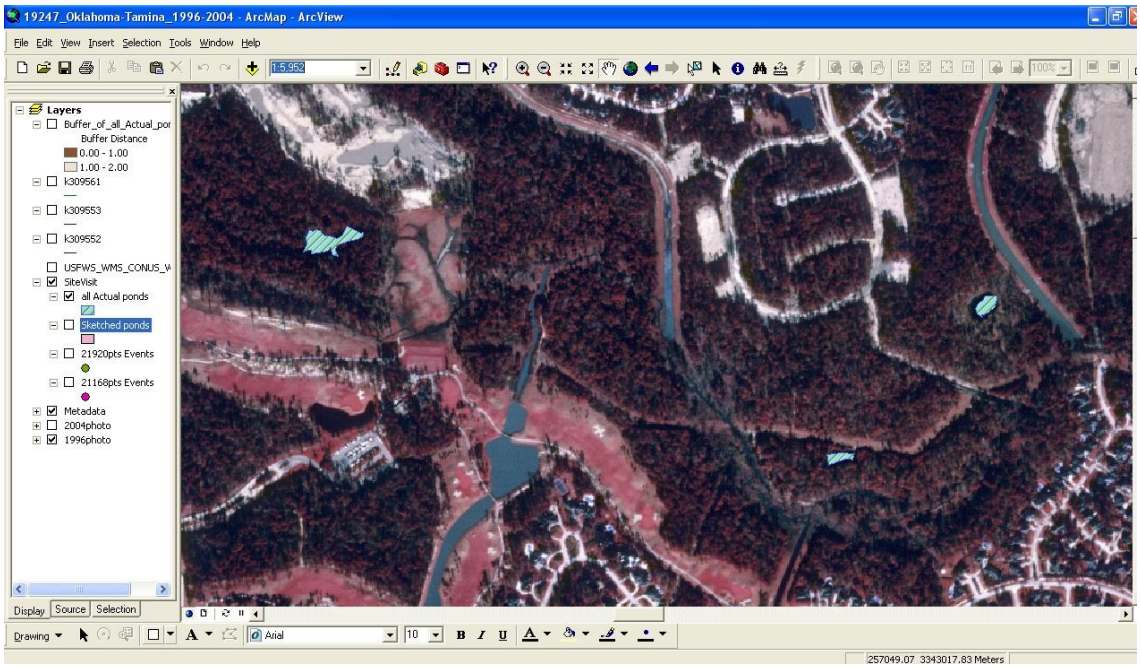

Figure A – 5. Aerial photo of compensatory wetlands (3 shaded ponds) for Permit 19247, year 1996, scale 1:5,952.

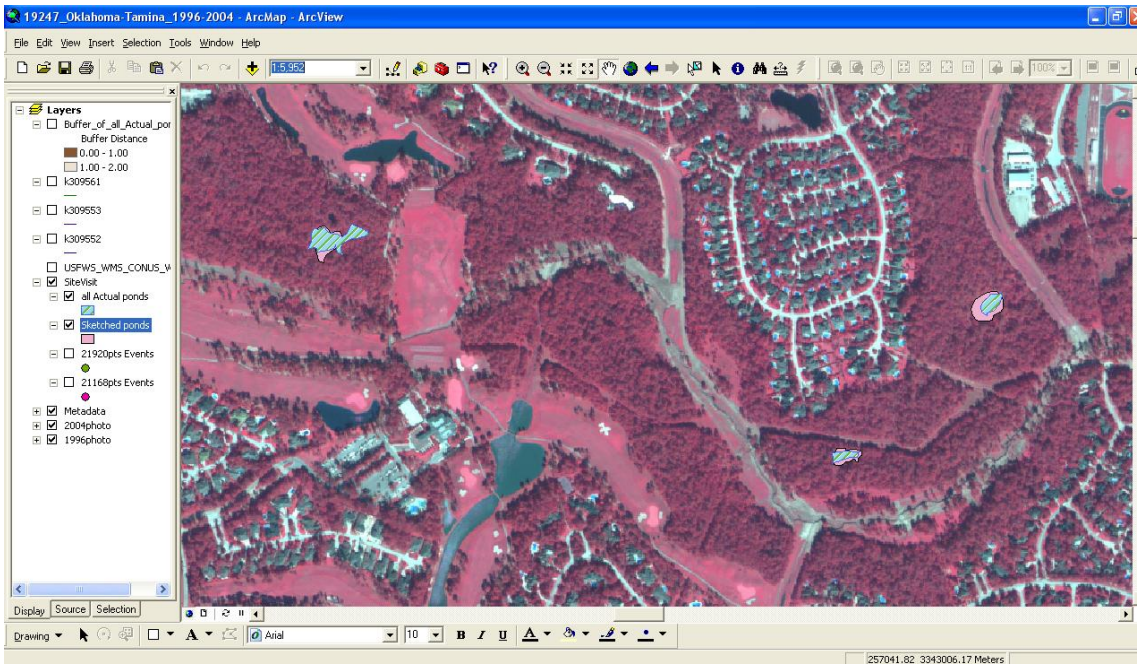

Figure A – 6. Aerial photo of compensatory wetlands (3 shaded polygons) for Permit 19247, year 2004, scale 1:5,952.

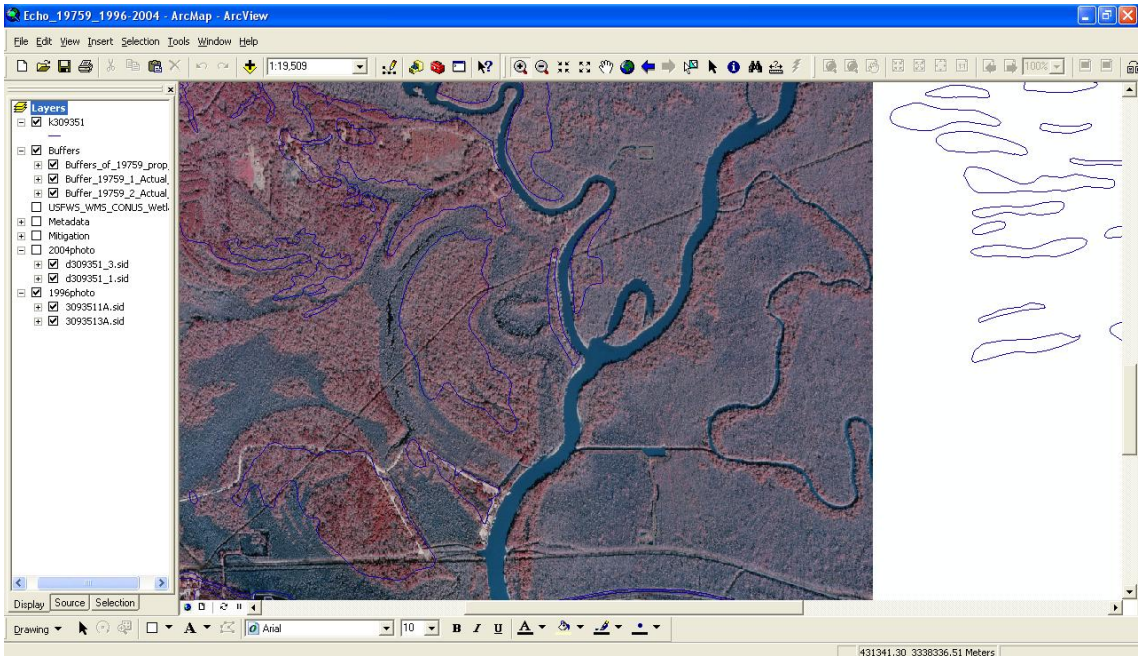

Figure A – 7. Aerial photo of compensatory wetlands (former drilling platforms) for Permit 19759, year 1996, scale 1:19,509.

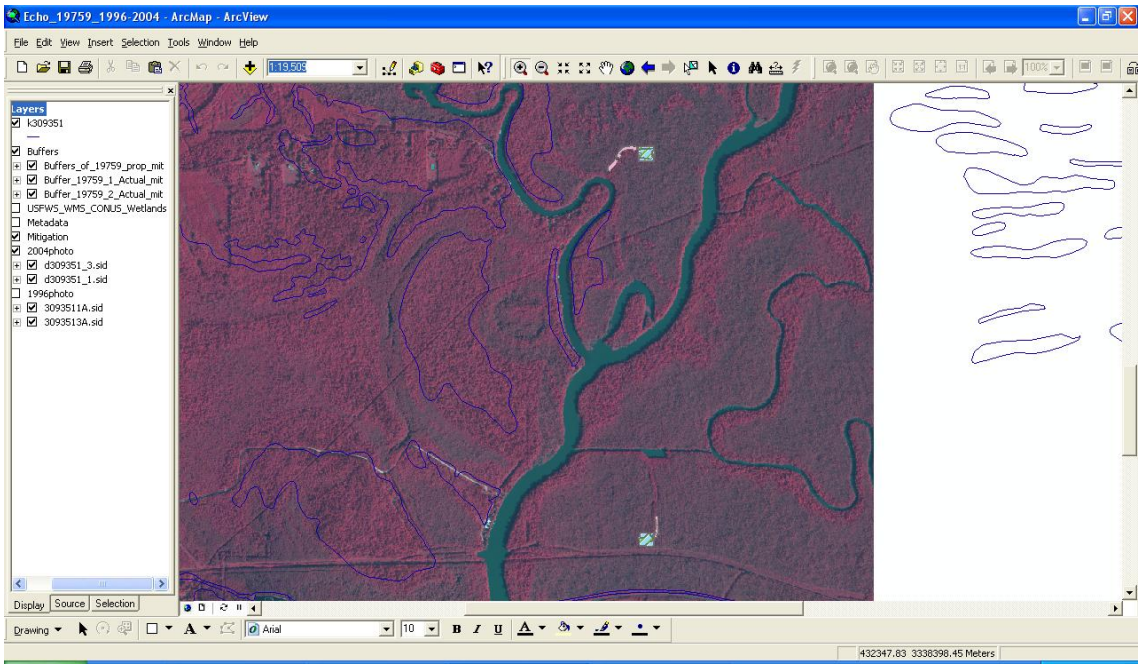

Figure A – 8. Aerial photo of compensatory wetlands (shaded polygons) for Permit 19759, year 2004, scale 1:19,509.

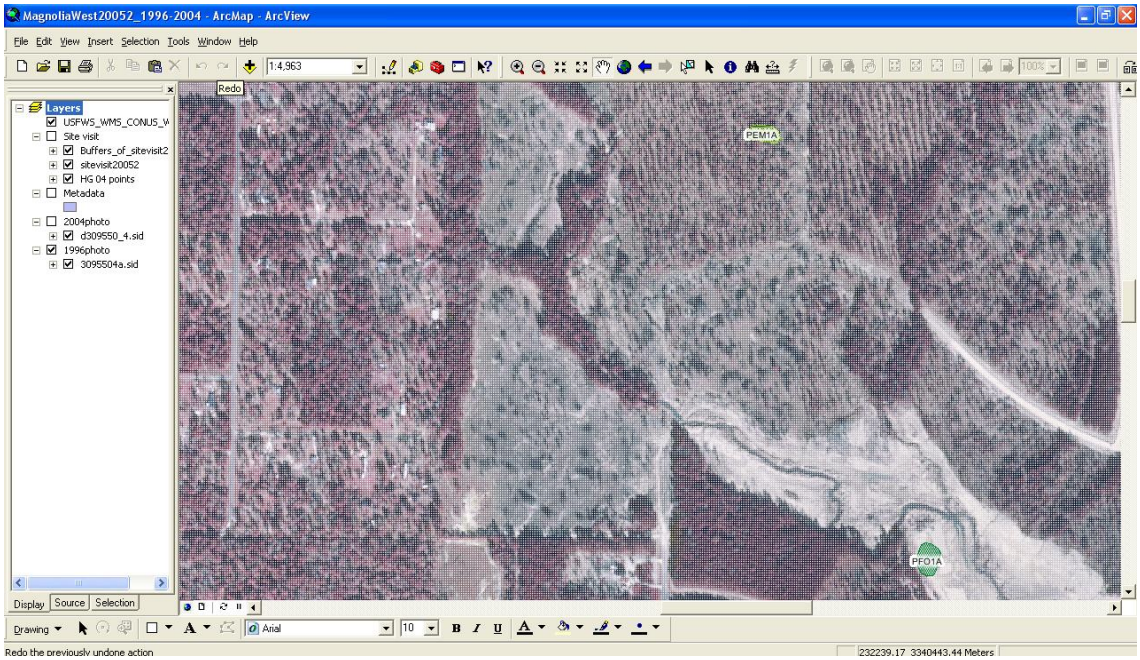

Figure A – 9. Aerial photo of compensatory wetland site for Permit 20052, year 1996, scale 1:4,963.

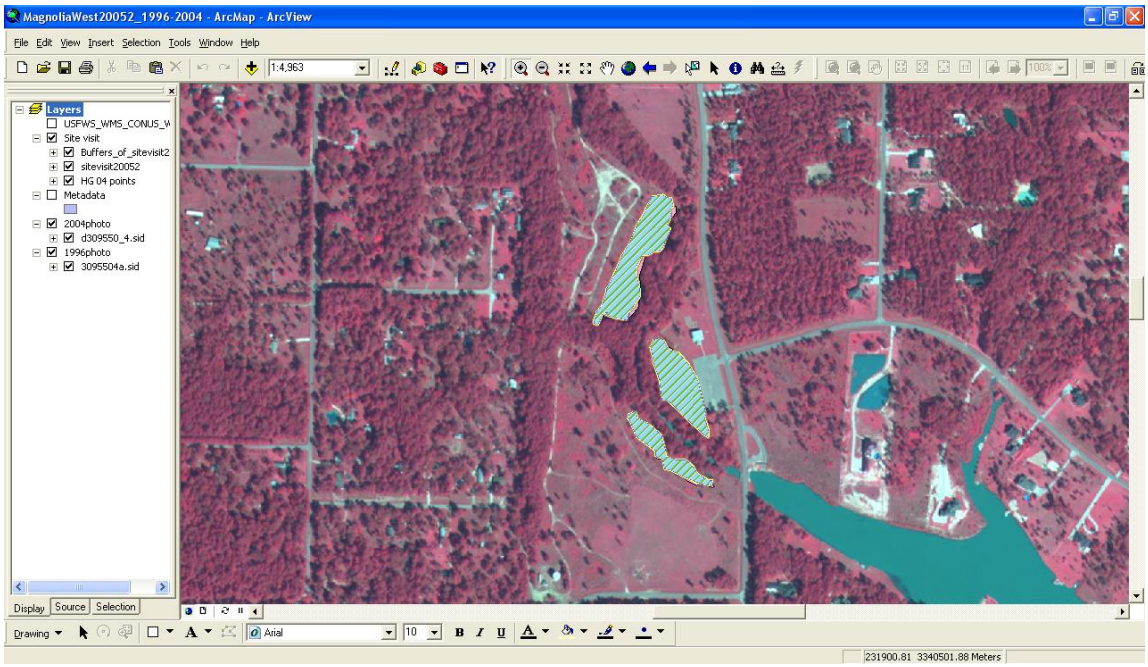

Figure A – 10. Aerial photo of compensatory wetlands (3 shaded polygons) for Permit 20052, year 2004, scale 1:4,963.

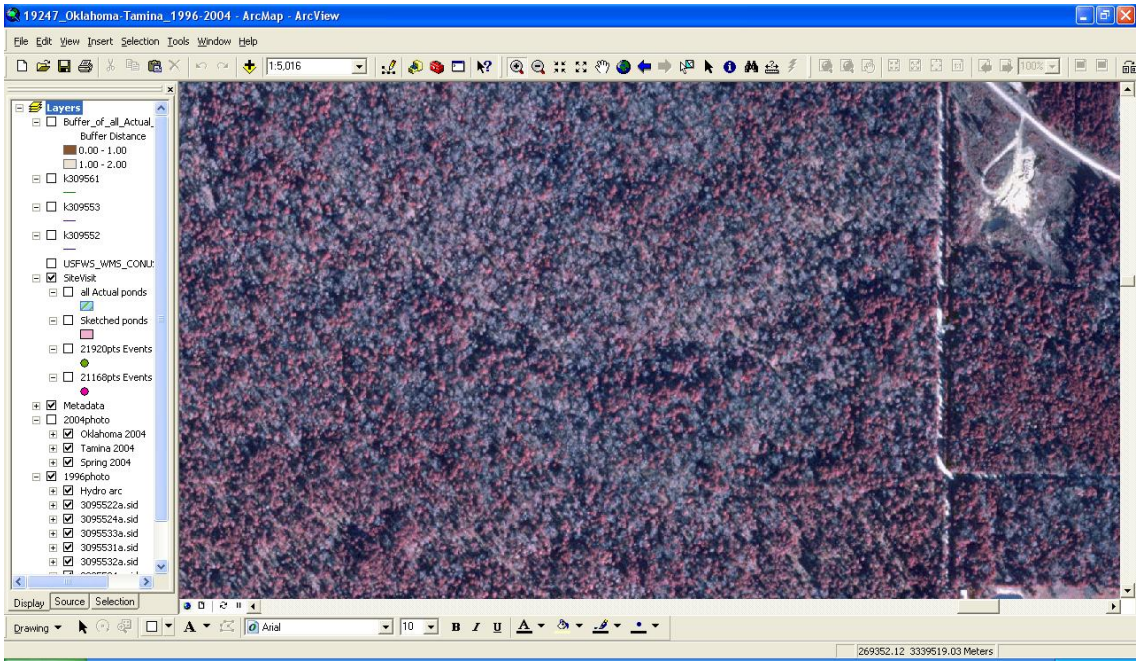

Figure A – 11. Aerial photo of compensatory wetland site for Permit 21168, year 1996, scale 1:5,016.

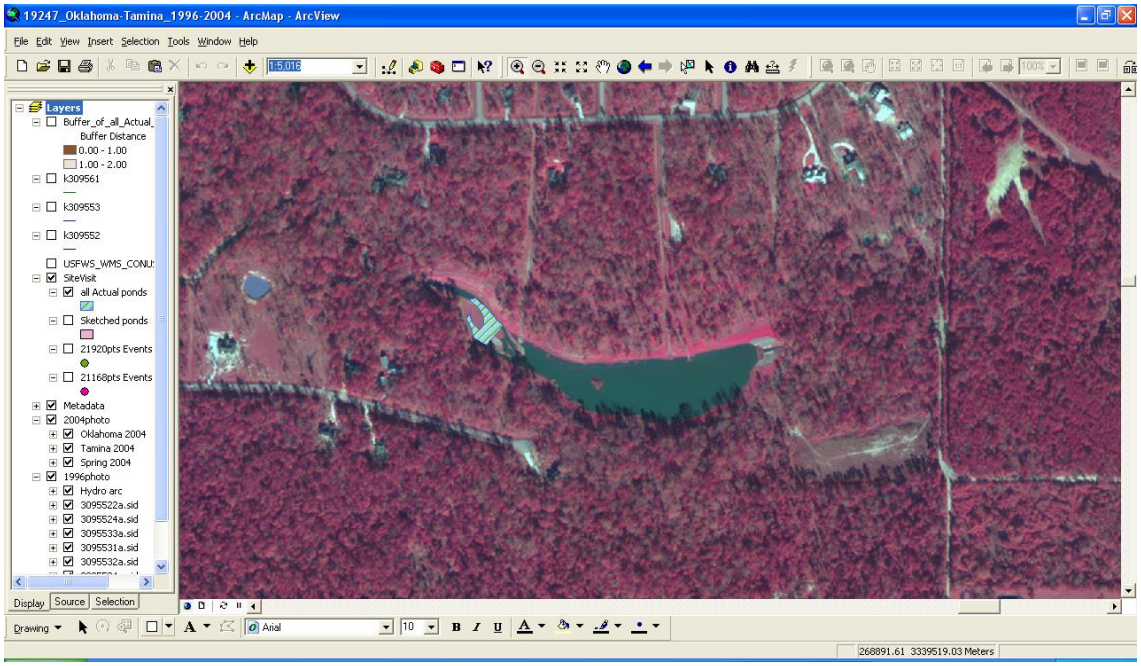

Figure A – 12. Aerial photo of compensatory wetland (shaded polygon) for Permit 21168, year 2004, scale 1:5,016.

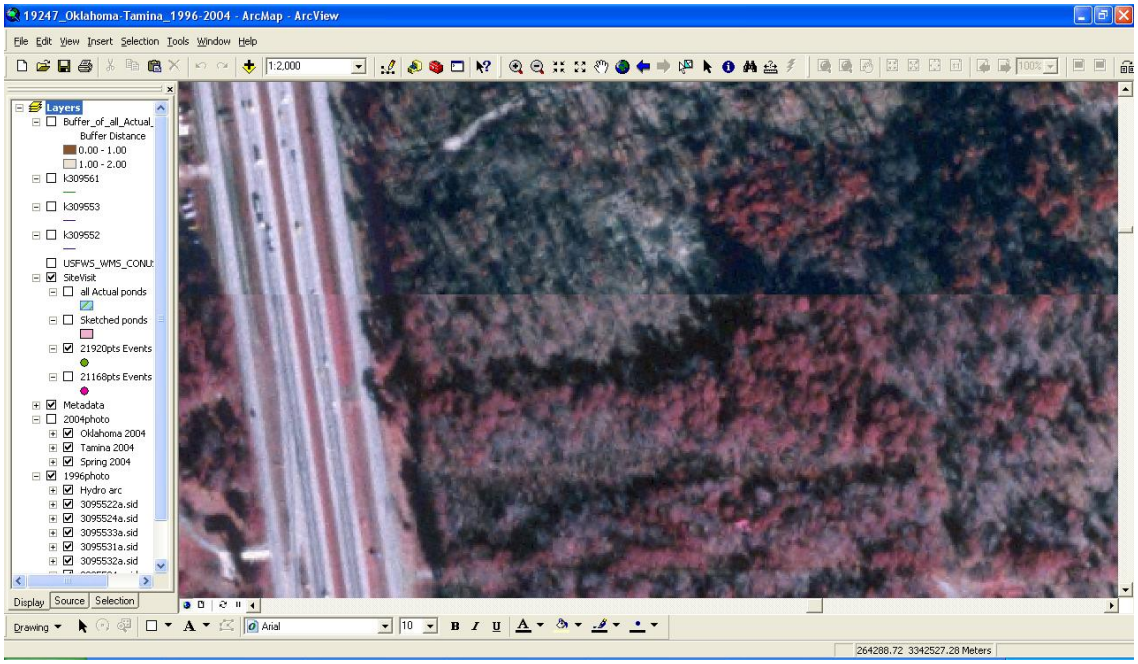

Figure A – 13. Aerial photo of compensatory wetland site for Permit 21600, year 1996, scale 1:2,000.

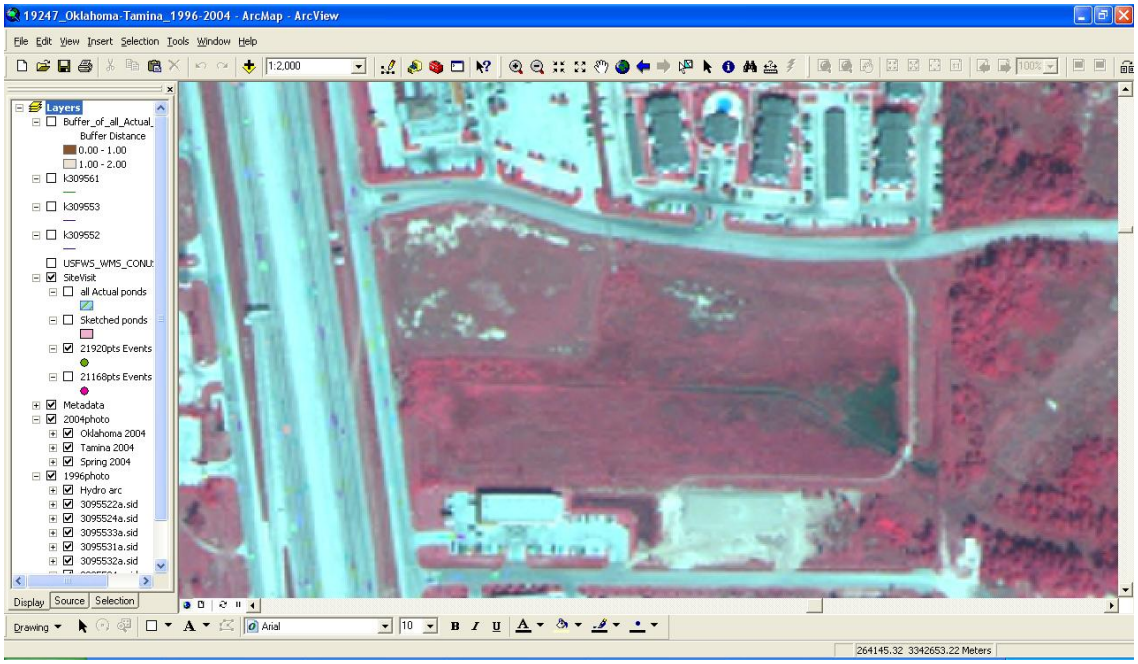

Figure A – 14. Aerial photo of compensatory wetland for Permit 21600, year 2004, scale 1:2,000.

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